Baywide Egg and Larval Surveys Sub-Program

Progress Report No. 3 (Nov. 2008–Jan. 2009)

No. 58

July 2009

Victoria
The Place To Be

Baywide Egg and Larval Surveys Sub-Program

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Introduction

The Egg and Larval Surveys Sub-Program of the Channel Deepening Baywide Monitoring Programs (CDBMP) monitors trends in fish egg and larval abundance of snapper and anchovy in Port Phillip Bay (PPB), with a focus on anchovy (*Engraulis australis*) and snapper (*Pagrus auratus*).

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:

- Comparison of total fish egg abundance from the reporting period November-January 2008-09 with those from November January 2007-08
- Comparison of total fish larval abundance from the reporting period November-January 2008-09 with data for the period November–January 2004-08 (Acevedo *et al.* 2009a, b; Hamer and Jenkins 2007)
- Comparison of anchovy egg and larval abundance from the reporting period November-January 2008-09 with data for the period November–January 2004-08 (Acevedo *et al.* 2009a, b, c; Hamer and Jenkins 2007)
- Comparison of snapper larval abundance from the reporting period November-January 2008–09 with data for the period November–January 2004-08 (Acevedo *et al.* 2009a, b; Hamer and Jenkins 2007).

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).

Samples for the most recent field event were collected during daylight from 26 November 2008 to 6 January 2009, from two regions. Region 1 consisted of six sampling areas within PPB, and Region 2 consisted of a transect immediately inside Port Phillip Heads (Figure 1).

Concentrations of total fish eggs, total fish larvae, anchovy eggs and larvae, and snapper larvae were graphically compared with historic data collected in November–January 2004-08 (where available)

Results are presented as both raw concentration data and log-transformed concentration data. Log-transformation was used to reduce the influence on the mean values of individual samples with exceptionally high concentrations.

Exceptions

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

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

This exception has since been addressed by formal amendment of the Detailed Design (PoMC 2009).

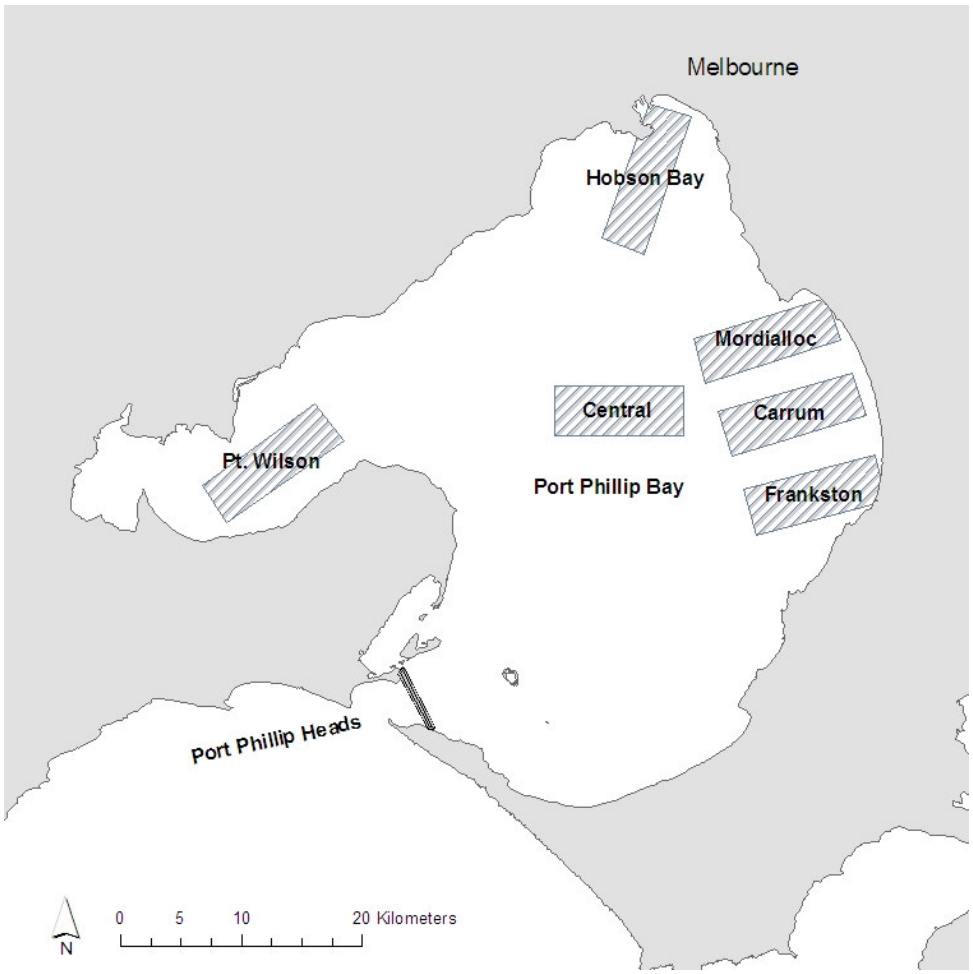

Figure 1. Map showing locations of plankton sampling areas (shaded boxes) within PPB (Region 1) and the sampling transect immediately inside Port Phillip Heads (Region 2).

Results and Discussion

Detailed results are provided in Appendix 1 and summarised here.

The concentration of total fish eggs was very similar between the first (2007-08) and second (2008-09) year of sampling for the CDBMP. Concentrations of total fish larvae recorded in 2008-09 were within the range of natural variability recorded over the previous four years.

An increasing trend from 2004-05 to 2007-08 was recorded for anchovy eggs. Concentrations in 2008-09 were lower than in 2007-08 but similar to those recorded in 2006-07. Differences in concentrations of anchovy eggs could be related to transport of positively buoyant anchovy eggs being influenced by variations in wind driven currents.

Anchovy larval concentrations varied between years. Total anchovy larval concentrations were lowest in 2006-07 and highest in 2004-05. This variability may be due to several factors, such as larval behaviour, food availability and natural interannual variability. The number of anchovy larvae recorded during the second year (2008-09) of the CDBMP program was within the range of concentrations observed since 2004-05 and within the expected natural variability.

Concentrations of snapper larvae were highest in 2004-05 and lowest in 2005-06. An increasing trend in concentrations of snapper larvae was recorded from 2005-06 to 2008-09. The number of snapper recorded during the second year (2008-09) of the CDBMP program was within the range of concentrations observed since 2004-05 and within expected natural variability.

Conclusions

Results from the 2008-09 survey show that PPB continues to be a key spawning area for important species such as snapper and anchovy.

Interannual variation in abundance of fish eggs and larvae in PPB is relatively high. This variability is likely to be linked to environmental fluctuations that affect plankton productivity and, in turn, influence spawning and larval survival. Other environmental factors affecting larval transport, such as wind and currents, may also have contributed to such variability.

The concentrations of total eggs and larvae, anchovy eggs and larvae, and snapper larvae in the November 2008-January 2009 survey were within the range of variability recorded in previous surveys.

References

Acevedo, S., Jenkins, G., and Harris, A. (2009a). Baywide Egg and Larval Surveys Sub-Program, Progress Report No. 1 (November 2007–January 2008) (Edition 2). Fisheries Victoria. Technical Report Series No. 10, January 2009. Department of Primary Industries, Queenscliff, Victoria, Australia. 7 pp.

Acevedo, S., Jenkins, G., and Harris, A. (2009b). Baywide Egg and Larval Surveys Sub-Program, Milestone Report No. 1 (November 2007–January 2008) (Edition 2). Fisheries Victoria. Technical Report Series No. 19, January 2009. Department of Primary Industries, Queenscliff, Victoria, Australia. 24 pp.

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Port of Melbourne Corporation (2009). Fish stock and recruitment. Sub-program 2a—Egg and Larval Surveys. Detailed Design CDP_ENV_MD_015 Rev 2. (www.channelproject.com).

Appendix 1 Results

A total of 221 307 fish eggs were collected in 2008-09 (Table 1). Mean concentration (log-transformed) of fish eggs were similar in 2007-08 and 2008-09 (Figure 2).

A total of 33 309 fish larvae were collected in 2008-09 (Table 1). Mean concentrations (log-transformed) of total fish larvae were lowest in 2006-07 and highest in 2004-05 (Figure 2).

A total of 9726 anchovy eggs were collected in 2008-09 (Table 1). Mean anchovy egg concentrations (log-transformed) were lowest in 2004-05 and highest in 2007-08 (Figure 3).

A total of 22 354 anchovy larvae were collected in 2008-09 (Table 1). Mean anchovy larval concentrations (log-transformed) were lowest in 2006-07 and highest in 2004-05 (Figure 3).

A total of 595 snapper larvae were collected in 2008-09 (Table 1). Mean snapper larval concentrations (log-transformed) were lowest in 2005-06 and highest in 2004-05 (Figure 4). An increasing trend from 2005-06 to 2008-09 was recorded for snapper larval concentration (Figure 4).

Table 1. Total number and mean concentration (± 1 standard error) of total fish eggs for all species and for anchovy only, and total fish larvae for all species and for snapper only and anchovy only, collected during November 2008–January 2009.

	Total fish eggs	**Eggs** %	**Concentration of eggs** (eggs per 1000 m^3)	**Total fish larvae**	**Total Larvae** %	**Concentration** Mean (± SE) (larvae per 1000 m^3)
All fish species	221 307	-	7907 ± 1535	33 309	-	1165 ± 375.1
Snapper	na	na	na	595	1.8	20.4 ± 5.7
Anchovy	9726	4.3	329 ± 122.6	22 354	67.1	787 ± 348.7

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

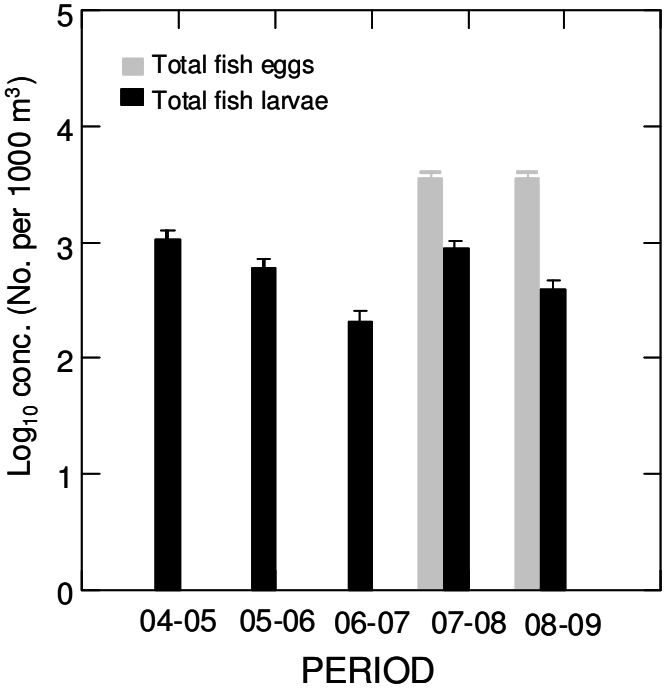

Figure 2. Mean of the log-transformed concentration (± 1 standard error) of total fish larvae (all species) collected during each period during 2004-05-2008-09 and total fish eggs (all species) collected during 2007-08 and 2008-09 N.B. Appearance of graph has changed from Acevedo *et al.* (2009a,b) although values of non transformed means and data trends remain same.

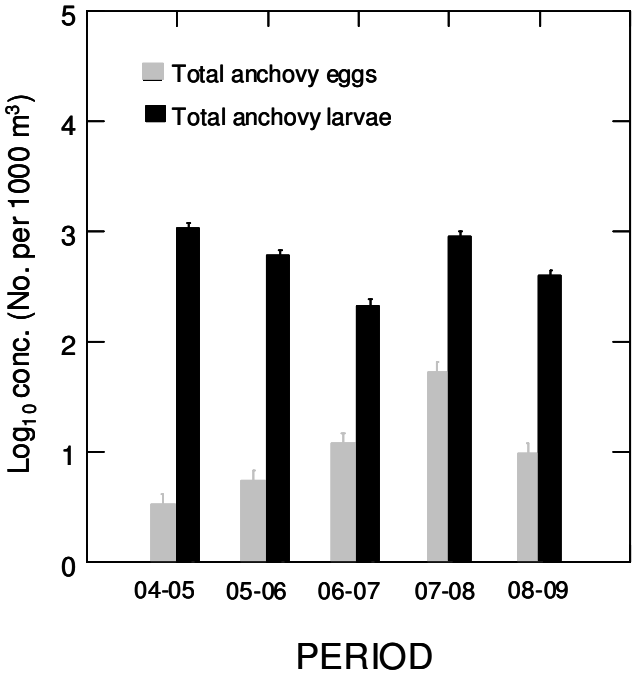

Figure 3. Mean of the log-transformed concentration (± 1 standard error) of total anchovy eggs and larvae collected during each period 2004-05-2008-09 N.B. Appearance of graph has changed from Acevedo *et al.* (2009a,b) although values of non transformed means and data trends remain same.

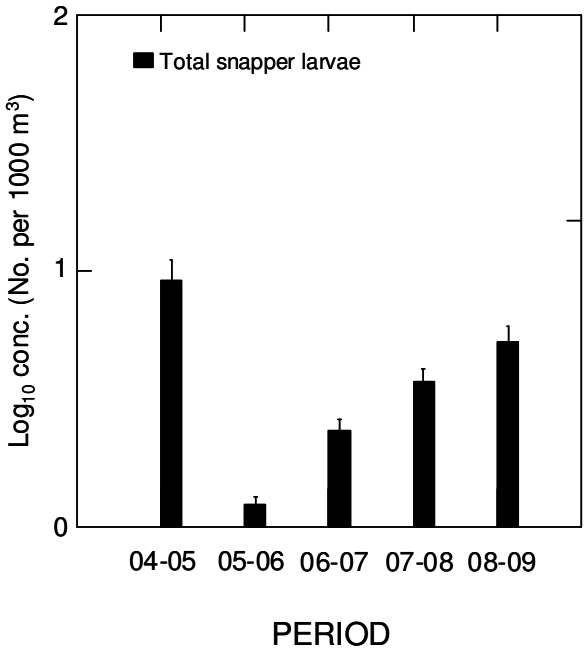

Figure 4. Mean of the log-transformed concentrations (± 1 standard error) of total snapper larvae sampled during each period 2004-05-2008-09 N.B. Appearance of graph has changed from Acevedo *et al.* (2009a,b) although values of non transformed means and data trends remain same.

Appendix 2 Raw Data

Raw data

- Missing data: None.

Raw data are provided with this report electronically as a Microsoft Excel file.

Data Files

Electronic data files area as follows:

- PPB_Anchvoy eggs larvae_snapper larvae_Period 5 and Metadata.xls