

SYNTHESIS OF ASTERIAS WORKSHOP

14 JULY 2000

Attendees

Mr Brian Cohen (Marine and Freshwater Resources Institute), Mr John Garnham (NRE), Mr Rod Gowans (NRE), Dr Leanne Gunthorpe (Marine and Freshwater Resources Institute), Mr Don Hough (NRE), Prof Craig Johnson (University of Tasmania) Dr Michael Keough (University of Melbourne), Prof Sam Lake (Monash University), Dr Dennis O'Dowd (Monash University), Dr Greg Parry (Marine and Freshwater Resources Institute), Dr David Smith (Marine and Freshwater Resources Institute), Dr Ron Thresher (CSIRO).

Background

The Northern Pacific seastar (*Asterias amurensis*) was first detected in Port Phillip Bay in 1995, when two individuals were found. Over the next two years, two further specimens were found in the Bay. Despite intensive surveys in each of the capture locations, and the operation of the scallop dredge fishery until 1996, no more seastars were found until early 1998 when numerous small seastars were reported from a mussel farm on the eastern side of the bay. These small seastars have been attributed to spawning/settlement in 1997.

The Department of Natural Resources and Environment had management responsibilities for marine pests and were presented with the following issues:

- Is there a way to manage the seastar population and the resulting impacts?
- What are the impacts, do we need to know these in detail?
- Was the natural spread of seastar to Western Port inevitable? Should we control human assisted vectors between these two environments in relation to this pest?
- What could be done if this seastar was found elsewhere across southern Australia and what can we learn from the experiences in Port Phillip Bay and the Derwent Estuary, where there are now established populations?
- What is the best way to spend finite resources (pest & impact mitigation vs pest prevention)?

In addition to these questions there was the issue of urgency. Before *A. amurensis* established in the Bay, it was restricted to the Derwent Estuary in Tasmania, where it had established in the 1980s, but was not correctly identified until 1992. Little was therefore known about the early stages of the invasion process and management options during the establishment of the seastar population.

In 1999 NRE therefore commissioned a study to address some of these issues. The questions that formed the basis of the project were:

- What are the ecological factors that control the distribution of the seastar in the Bay?
- What factors could be manipulated to mitigate impacts?

In July 2000, NRE convened a half-day workshop of scientists and senior managers with expertise relevant to managing the ecological impacts of the establishment of the seastar in the Bay.

The workshop was to:

- provide critical appraisal of NRE's current approach to understanding how to manage and limit the ecological impacts from the seastar in Port Phillip,
- provide critical appraisal of the research undertaken to date and
- assist in establishing the direction of future research and to establish priorities for future research.

Workshop Consensus based on evidence to date

Seastar population size and structure in the Bay

- There are three age classes present in the Bay due to spawnings in 1997 (the first), 1998 and 1999.
- The first spawning gave rise to 300,000 individuals, the second to 30 million and the third to 90 million.
- The original spawning population in Port Phillip Bay could have been as low as 2 females (+ 1 male), if mortality rates of starfish during the first 6 months of life in 1997/98 were similar to those measured in 1998/99 - but this is unlikely.

Seastar reproduction in the Bay

- Spawning occurs between mid -July and mid – September (same as occurs in the Derwent Estuary).
- Settlement occurs approximately two months after spawning (similar to but a little shorter than Tasmanian laboratory studies).

Seastar larval dispersal in the Bay

- Asteroid larvae (probably *Asterias*) were widely distributed in the water column, highest abundances occurring near Mornington and St Leonards. Larval densities were much lower than the highest recorded from the Derwent Estuary.
- There was no statistically significant variation in abundances of seastar larvae within the water column.
- Hydrodynamic modelling indicated that seastar larvae could be exported through the heads to Bass Strait and be transported east towards Western Port.

Settlement/Recruitment in the Bay.

- Hydrodynamic modelling predicted the main areas in which recruitment of the seastars occurred and predicted most of the areas in which no recruitment occurred.

- Seastars did not recruit along the shallow margins of the predicted settlement area or on southern half of the predicted settlement area.
- Biological and/or environmental factors which affect settlement or juvenile survival may be responsible for the low recruitment in the above areas.

Population Condition

- There appears to be major mortality during the seastars early life history during the larval and early settlement stages.
- Individuals of the 1998 age class do not appear to have grown over the last year nor was there significant mortality at most sites in Port Phillip Bay.
- The level of predation on seastars varies between sites with the highest incidence occurring at sites in the west of the Bay.

Priority Issues emerging from the work to date

- Determine if the seastar will spread naturally from Port Phillip to Western Port by deploying spat collectors in Bass Strait between the entrances of Port Phillip and Western Port. Include analysis of functionality of spat collectors deployed 1999/2000.
- Monitor the dynamics and condition of the seastar populations in Port Phillip including collecting basic physio-chemical parameters that may correlate with larval survival.
- Determine the factors that limit recruitment/settlement success in Port Phillip including the effects of food, predation and habitat.
- Determine the impacts of the seastar on Port Phillip including impacts on benthic species and implications for higher trophic levels (eg fish)
- Confirm identification of Asteroid larvae collected.
- Confirm that recruitment of *Asterias* in 1999 was indeed low in inshore regions and in southern Port Phillip Bay by further field sampling.
- Explore correlation between seastar establishment and environmental conditions (compare with dynamics of other asteroids eg *Coscinasterias*).
- Monitor levels of parasites to detect new (exotic) parasites or colonisation of the seastar by parasites of native asteroids.
- Determine predation by fish on both the adult phase and the larval phase of the starfish. Which species of fish could potentially feed on the larvae when they are in the water column? And if there is predation of adults as reported in the west of the bay, what are the species involved?