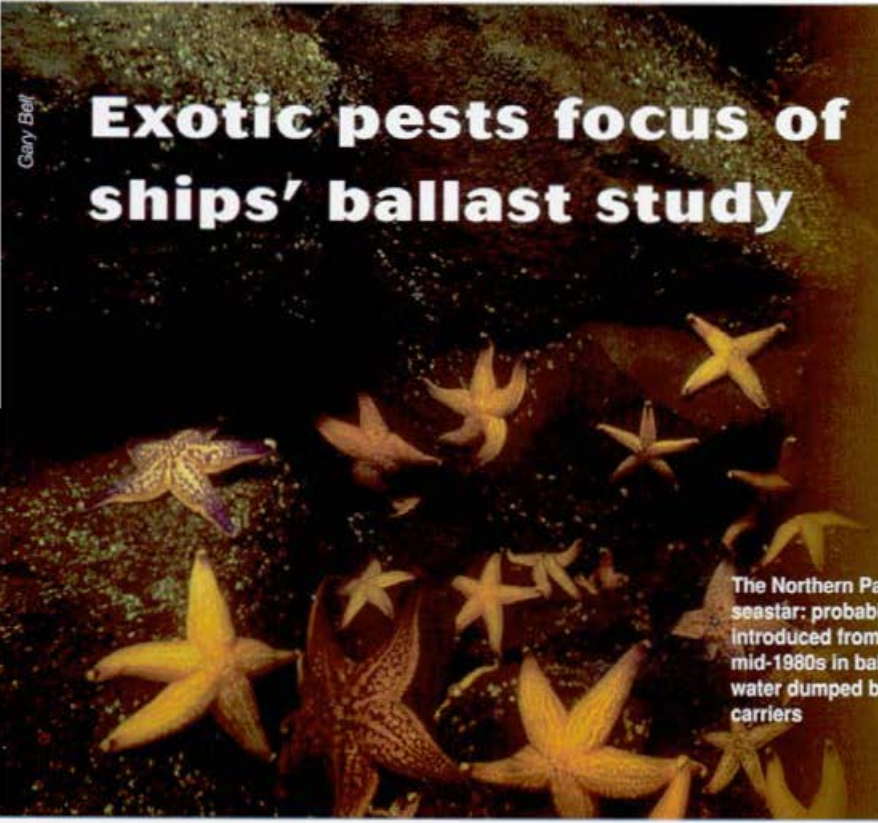
Exotic pests focus of ships' ballast study



Gary Bell

The Northern Pacific seastar: probably introduced from Japan in mid-1980s in ballast water dumped by bulk carriers

As long as ships have sailed the sea, tiny life forms have joined them on their voyages, many as 'stowaways' in ballast water. More than a century has passed since water was first used as ballast, yet the effects of this practice are only now being appreciated.

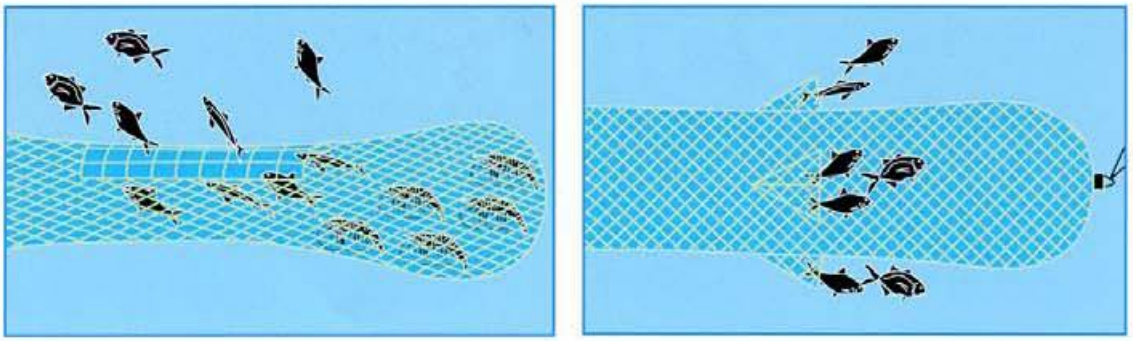
To assess the problem in Australia, CSIRO has begun a national investigation of the impact of organisms introduced by ships' ballast water. The study is an important step towards better ballast-water management strategies for international and coastal shipping. A planned survey of selected ports is expected to take about three years.

At least 40 Australian ports receive ships that discharge ballast water and some 120 million tonnes are imported each year. A further 34 million tonnes are transferred between Australian ports by domestic and coastal shipping.

The manager of CSIRO's new Centre for Research on Introduced Marine Pests at the Division of Fisheries at Hobart, Dr Ron Thresher, says Australia hosts more than 20 pest species believed to have been introduced in ships' ballast water.

'Escape nets' reduce fish bycatch

New prawn nets to be trialled in the Gulf of Carpentaria near Weipa early next year are expected to reduce the unwanted fish bycatch by up to 70%. This amounts to tens of thousands of tonnes of fish each season in the northern Australian prawning industry.



Two of the many bycatch reduction devices to be tested off Weipa in January. The 'square mesh window' net (left) and the 'fish eye' net both allow fish to escape by active swimming. The prawns fall into the back of the codend.

The trials are part of efforts by scientists and the fishing industry world-wide to make commercial fishing ecologically sustainable. If successful, they will also bring immediate economic benefits for commercial fishers.

A study of one prawn fishery season in northern Australian waters found that 47 000 tonnes of unwanted bycatch were taken for the harvesting of 4100 tonnes of prawns. Revised fishing gear used so far has cut the bycatch by between 17 and 30%. It is hoped that the continued research will at least double this result.

The bycatch reduction project, begun in July 1993, brings together biologists and gear technologists from the CSIRO Division of Fisheries, the Australian Maritime College in Tasmania and the Northern Territory Department of Primary Industries and Fisheries. New gear is tested in a special flume tank at the Maritime College.

More than 10 combinations of net designs will be tested in the tank before the January trials off Weipa. Past trials tested nets featuring square mesh 'codends'. These allowed some of the bycatch to escape, while retaining the prawns in the codend or sack part of the net.

The January trials will test different types of escape pathways to encourage the fish to swim out of the net. Each escape device has an intriguing name such as 'radical escape section', 'inclined grid' and 'fish eye'. The fish will be recaptured after their escape to gauge the fish survival rates of the nets tested.

The importance of the new nets is recognised by the fishing industry. In addition to reducing the unnecessary capture of turtles and other fish, the new nets will prevent the crushing of prawns by large fish such as stingrays. Keeping the bycatch in the sea also means that the larger prawn predators have an alternative menu.

Reducing the unwanted bycatch will also bring benefits for recreational fishers. In the northern rivers country of northern New South Wales, the new nets have reduced the bycatch of juvenile mulloway, or 'jewfish', which are enthusiastically targeted by anglers in their mature form. It is the project's aim that the new types of nets do not reduce the size of commercial prawn catches.

The research team has also been devising ways of keeping fin-fish trawl nets off the sea floor. Work so far has shown that improved nets minimise habitat damage while maintaining catches of the target fish species.

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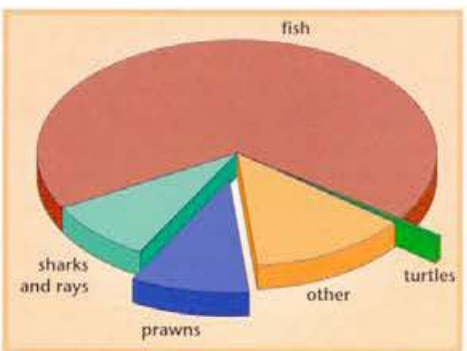

Breakdown by weight of catch from Gulf of Carpentaria prawn trawling.

Thresher says Australia's isolation, its dependence on shipping for international trade, the high volume of dry bulk exports, and marine quarantine procedures that world-wide are poorly developed, have contributed to this exotic invasion.

He says at least three pests, – toxic dinoflagellates, the alga *Undaria*, and the Northern Pacific seastar *Asterias amurensis* – are likely to cost the shipping, mariculture and fishing industries millions of dollars annually. In addition, both *Undaria* and *Asterias* have the potential to cause major changes to the structure of temperate coastal marine ecosystems.

'The Northern Pacific seastar is now established in south eastern Tasmanian waters, where it is a voracious predator of mussels, scallops and oysters,' Thresher says. 'This pest was probably introduced from Japan in the mid-1980s in ballast water dumped by bulk carriers.'

The east coast waters of Tasmania are also infected with *Undaria*, a brown algae (also from Japan) which can overgrow and smother other marine life, and toxic dinoflagellates, small planktonic algae which can poison commercially-grown shellfish and cause paralysis or even death when these shellfish are eaten.

Thresher says because Tasmania has a relatively small and undiverse marine flora and fauna, introduced marine pests have been readily detected, but elsewhere in Australia, the search for introduced species has not been thorough.

A safe, effective, practical and cost-effective method of killing marine pests in ballast water has not yet been developed, Thresher says. Flushing ballast water tanks at sea is one option for international shipping, but this can only be done when safety requirements can be met. Another option is to heat ballast water to kill any organisms, but it has proved difficult to make this effective on the scale required.

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