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*11th International Congress on Marine Corrosion & Fouling,
San Diego, CA, July 2002*



Hull Fouling as a Vector for Introduction of Exotic Marine Species to Australia

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Alien Marine Invaders

Seaweed menace threatens the bay

A Japanese seaweed that harms native marine life is flourishing in Port Phillip Bay.

By **CLAIRE MILLER**
ENVIRONMENT REPORTER

The south-east rim of Port Phillip Bay is infested with a seaweed that displaces native marine plants and is believed to have caused extensive damage to shellfish beds in the United States.

It is not known what effect the seaweed, which was first found in waters off Japan, will have in the

reserves. Mr. Blos codium could be He said little ecological impact southern hemisphere. "It may well insidious effect. I around it but if it we don't know," Gowans said.

Aggressive and codium favors water. Unlike it plants that need to reproduce, co reproduces by re broken pieces a suitable hard sur shells, boats or f

THE AGE SATURDAY 9 OCTOBER 1999

Sea creatures invade bay

Up to 400 exotic marine species may have been introduced into Port Phillip Bay.

By **CLAIRE MILLER**
ENVIRONMENT REPORTER

Port Phillip Bay is now home to an estimated 400 introduced marine species, and scientists warn the number is growing by two to three a year.

Marine experts who conducted has been the most proactive but it

Top invasive marine pests in Port Phillip Bay

- North Pacific Seastars
- Japanese undaria (a seaweed)
- Broccoli weed
- Toxic dinoflagellates (phytoplankton)
- Gymnodinium
- Alexandrium tamarense
- Alexandrium catenella
- Asian clam Corbicula gibba
- Asian mussel Mytilus senhousii
- European shore crab
- Mediterranean fanworm

mentary committee on killer had more exotic species

One optic high risk po Victorian co The CSIR exotic species estimated 1 300-400. It tures from globe eweg were conce

While in came from t brought in recent arrive Pacific. Som ive species.

Seaweed infestation spreading

An invasive Japanese plant has been found at two more bay piers.

By **CLAIRE MILLER**
ENVIRONMENT REPORTER

pulling out mature plants could kill the seaweed's microscopic spores, but authorities are concerned it may already have spread elsewhere.

The muddy green undaria grows rapidly up to two metres long in winter and crowds out other marine plants before dying back in summer.

spores which ices of ships, fish and the

ant is to ship t and create Mr Joy. "We

Bay under siege from starfish

A new survey shows the voracious seastar is taking hold.

By **CLAIRE MILLER**
ENVIRONMENT REPORTER

Hundreds of Northern Pacific seastars have been found across Port Phillip Bay, confirming the worst fears of Fisheries Victoria that the voracious starfish is well established and breeding fast. The director of Fisheries Victoria, Mr Richard



Fishing fears in the bay.

ago. Believed to have been introduced in ballast water from a ship, more than 30 million of the exotic starfish are now believed to be turning

head of fisheries in Tasmania when the seastar was discovered there.

However, he was less concerned about the potential for damage to shellfish farms, which he said had not been as badly affected as first feared in Tasmania.

The seastars have no known enemies or competing species in Australian waters, although Mr McLoughlin said there were some encouraging signs that native starfish were holding their own against the seastars.

"If they are competing with the native starfish, then (the native one) seems to be a



Marine Invaders in Southern Australia



- Mediterranean Fan Worm
- (*Sabella spallanzanii*)

- | | |
|-------------------|-------------|
| -Albany | 1965 |
| -Port Phillip Bay | early 1980s |
| -South Australia | 1986 |
| -Cockburn Sound | 1994 |



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Marine Invaders in Southern Australia



North Pacific Seastar

(Asterias amurensis)

- Hobart 1985
- Triabunna 1992
- Port Phillip Bay 1995



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Marine Invaders in Southern Australia



Japanese Kelp

(Undaria pinnatifida)

- France
1971
- New Zealand 1987
- Triabunna, Tas
1988
- Port Phillip Bay 1996



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Marine Invaders in Southern Australia

Broccoli Weed (*Codium fragile* ssp. *tomentosoides*)



- **Europe** **1900**
- **North America** **1962**
- **New Zealand** **1973**
- **Corner Inlet** **1995**
- **Port Phillip Bay** **1997**
- **Western Port** **1998**
- **Tasmania** **1999**



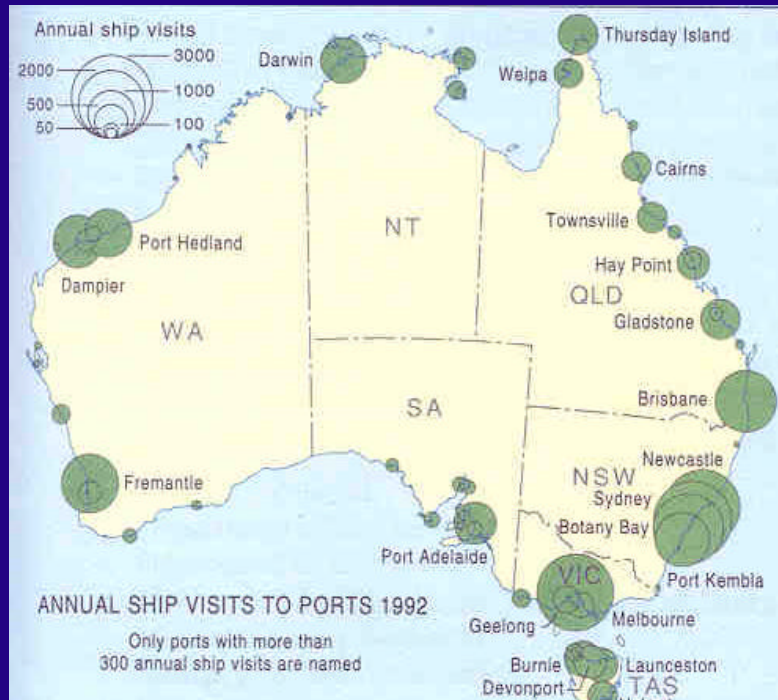
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Australian Quarantine & Inspection Service



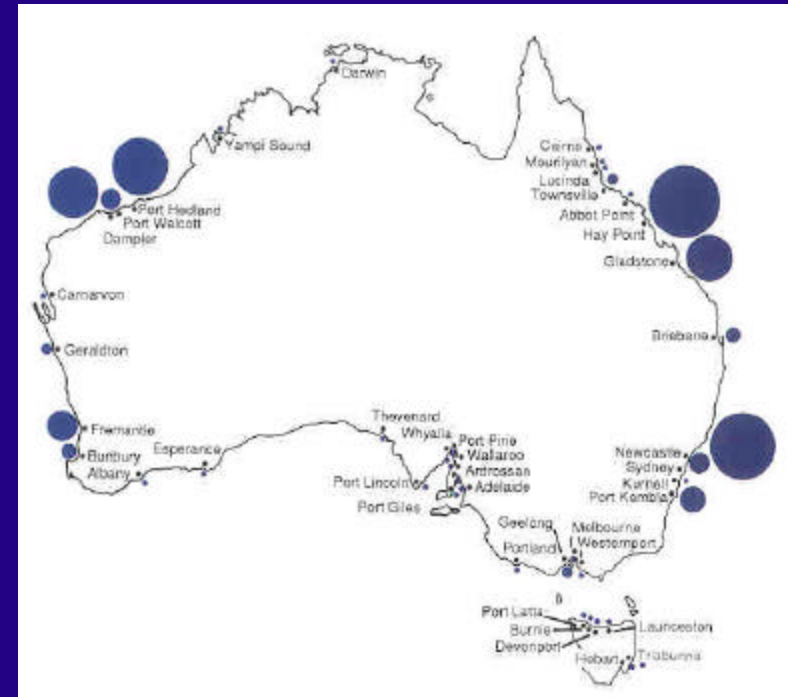
- From July 2001:
- Mandatory Reporting
- Ballast Water
- Management

Shipping Trade



Ballast Water Discharge

- **U Annual Ship Visits**

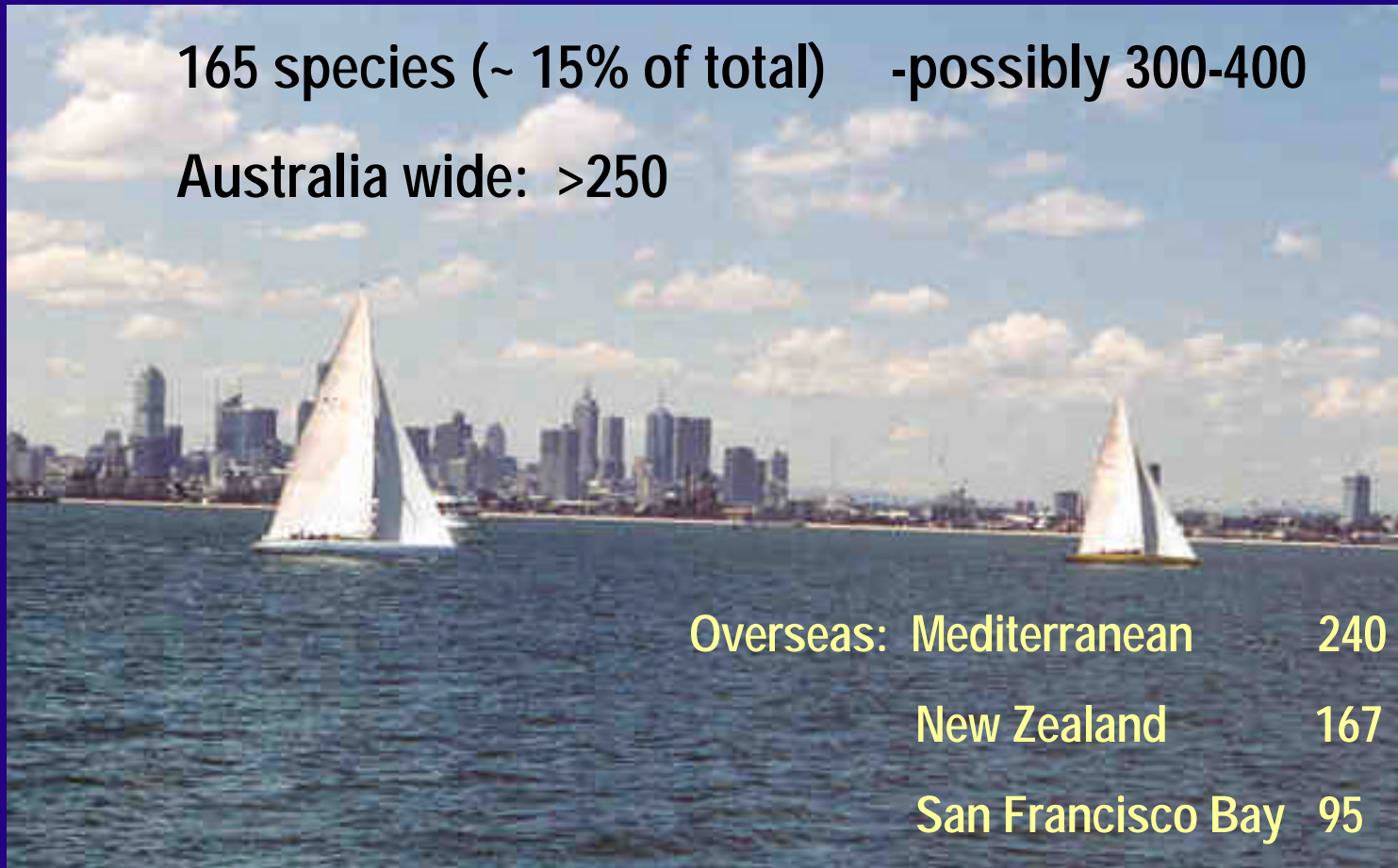




Exotic Species in Port Phillip Bay

165 species (~ 15% of total) -possibly 300-400

Australia wide: >250



Overseas: Mediterranean 240

New Zealand 167

San Francisco Bay 95



Exotic Species in Port Phillip Bay

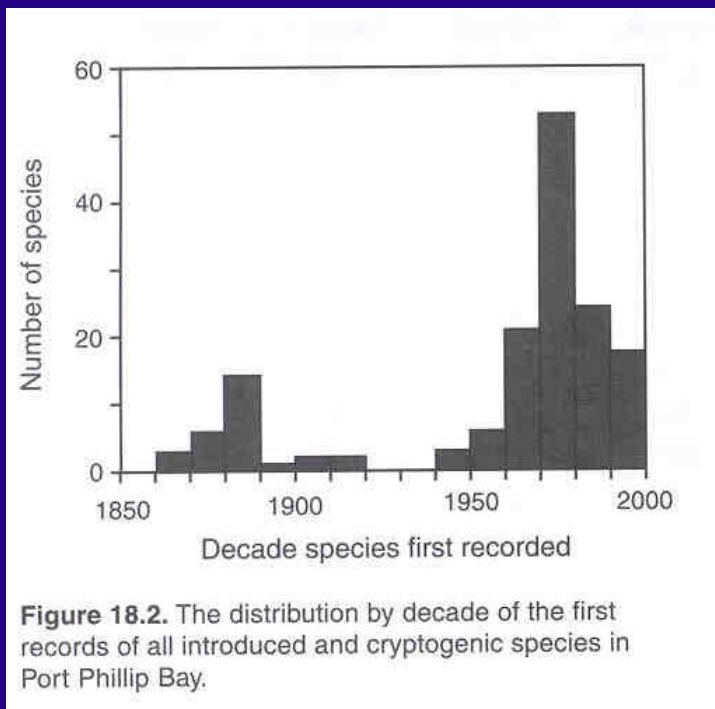


Figure 18.2. The distribution by decade of the first records of all introduced and cryptogenic species in Port Phillip Bay.

- Source: CRIMP Technical Report No. 20 (1999)

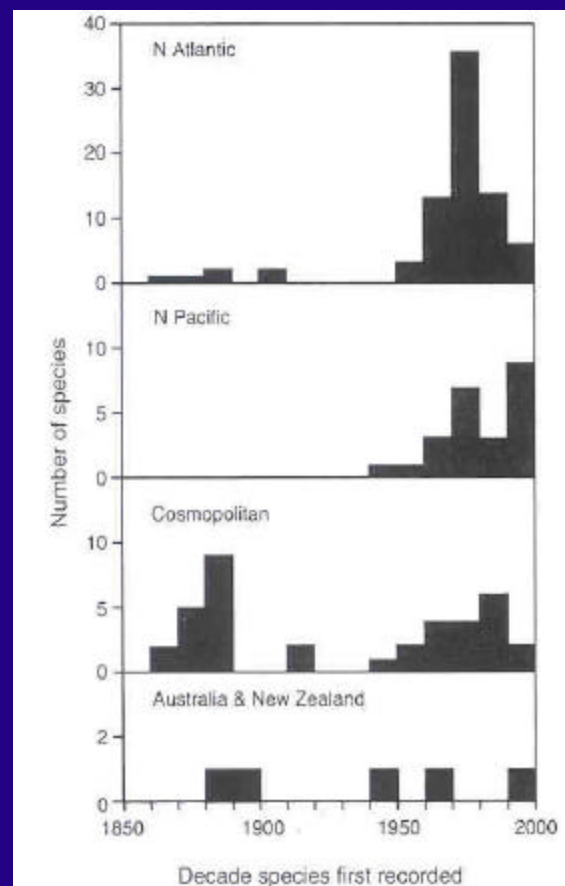


Figure 18.7. The distribution by decade of the first records from Port Phillip Bay of all introduced and cryptogenic species from four broad source regions.



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Caribbean tubeworm in Cairns





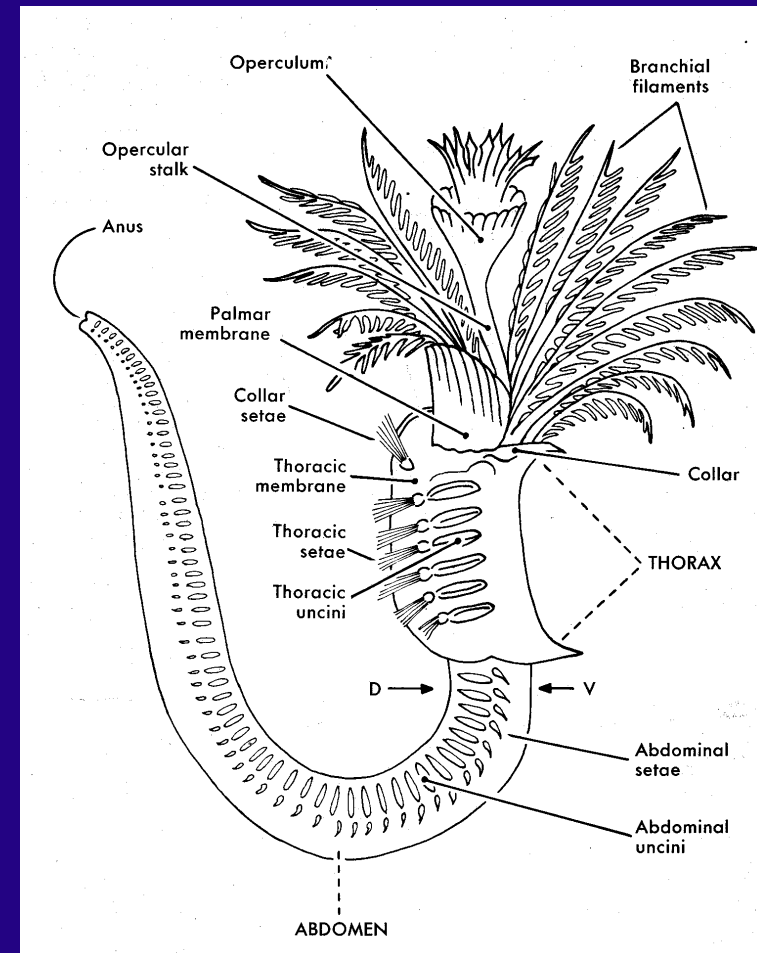
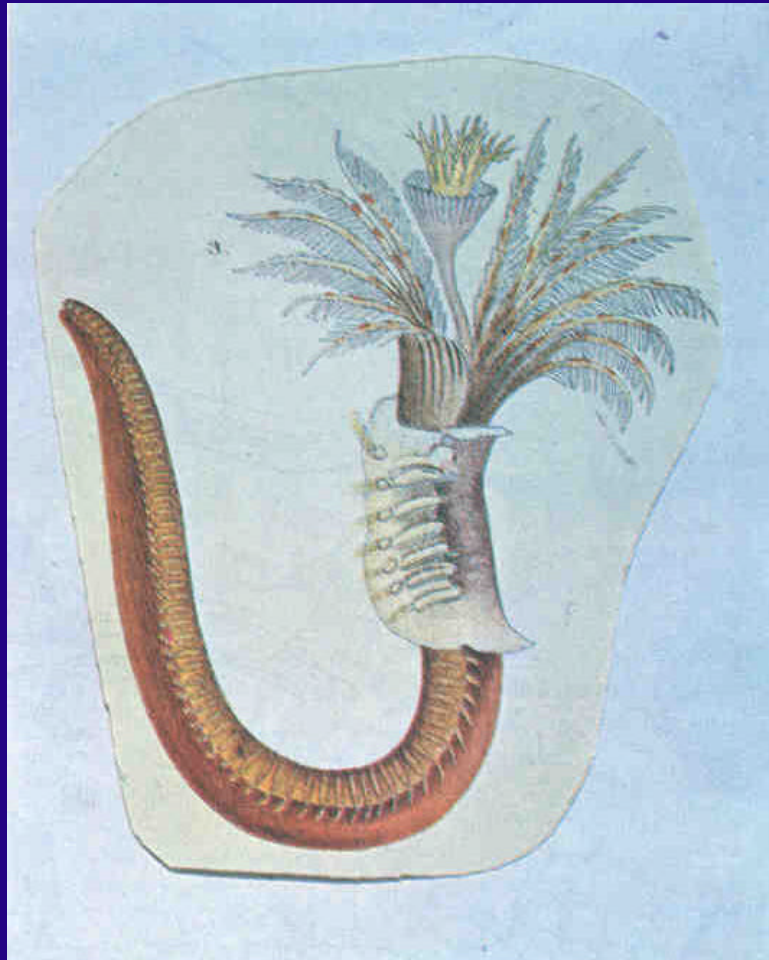
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Tubeworm fouling





Serpulid tubeworms

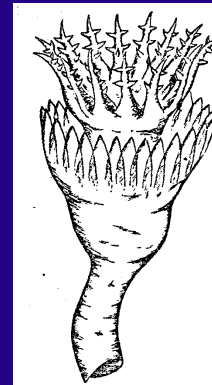
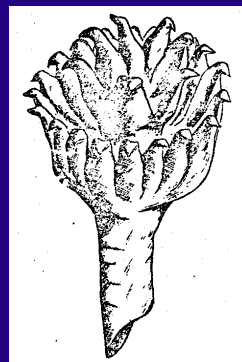
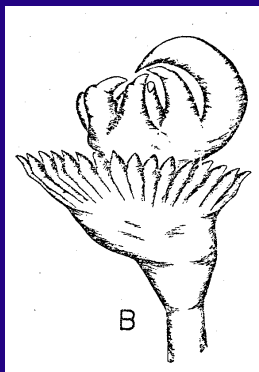




Hydroides spp.



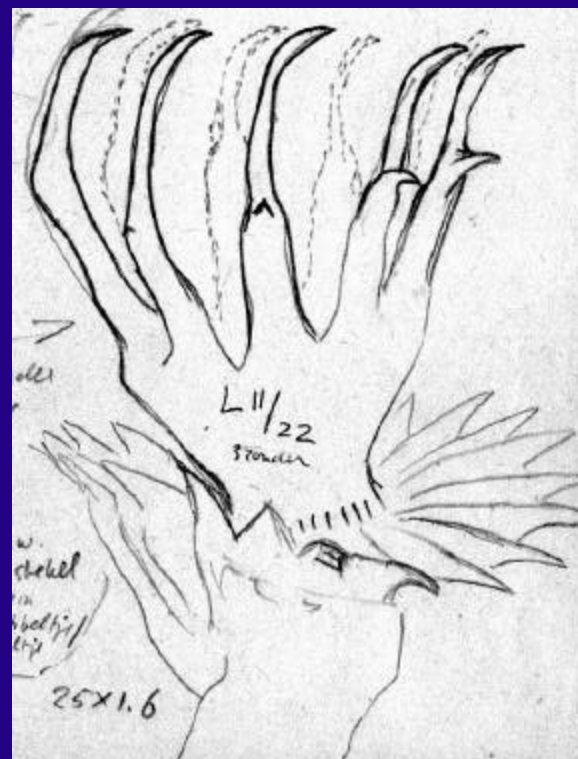
- ~ 90 species worldwide
- Indo-Pacific – 24 (1967)
- World expert-
- Harry ten Hove
- (The Netherlands)





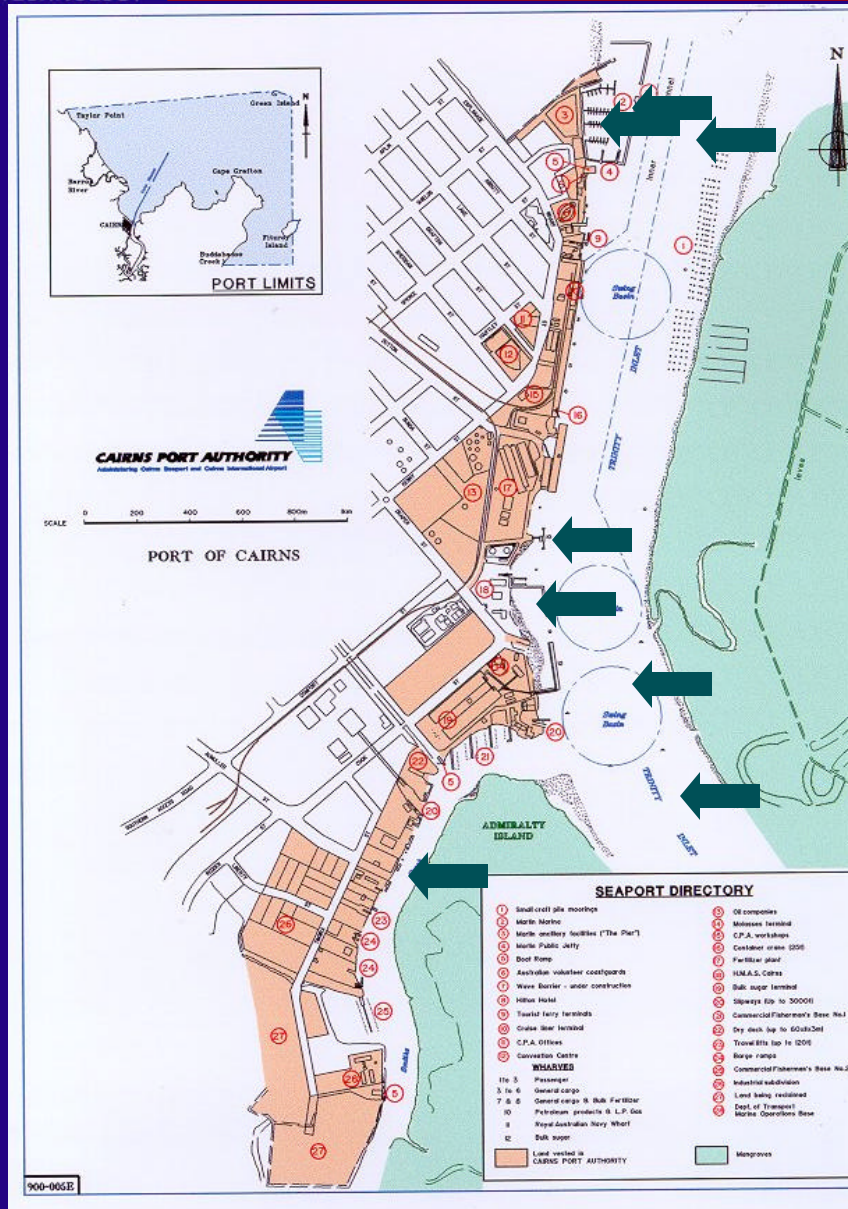
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Hydroides sanctaecrucis Rioja





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Marlin Marina
MV Reef Encounter

Refuelling Wharf
HMAS Cairns
Swing Basin
FV Wing Sang
Smith's Creek

*Cairns Tubeworm
Survey*



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Navy Dive Boat - Cairns





Further findings.....



Hawaii

1974

Indonesian tall ship

Dewa Ruci

Sydney 1998

Cairns

Jan 1999

Darwin Port Survey

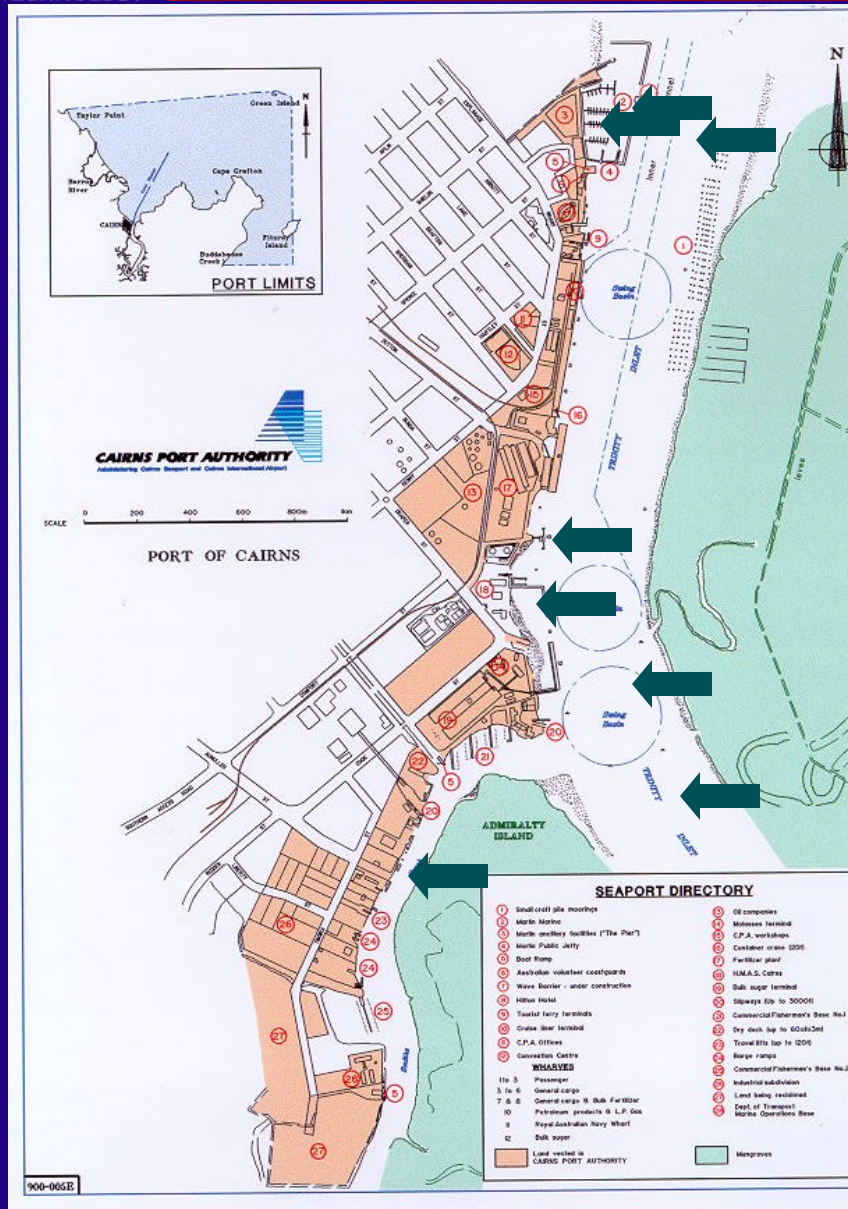
2000/01

JCU Fouling Studies

2000/01



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- Marlin Marina
- MV Reef Encounter

Refuelling Wharf
HMAS Cairns
Swing Basin
FV Wing Sang
Smith's Creek



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Asian Green-Lipped Mussel (*Perna viridis*)



Cairns, 2001-2002

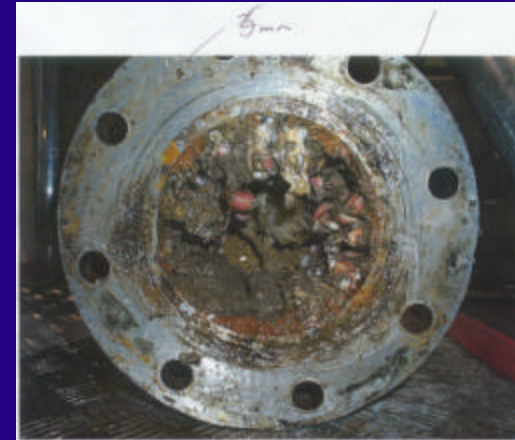


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Acorn barnacle: Megabalanus tintinnabulum



Temperate eastern Australia





The Black-Striped Mussel Incursion



Mytilopsis sallei

- Origin: Eastern Pacific
- Invaded:
 - India (1967)
 - Japan (1974)
 - Taiwan (1977)
 - Hong Kong (1980)
 - Darwin (1999)
- eradicated by large scale chemical treatment:
chlorine, copper



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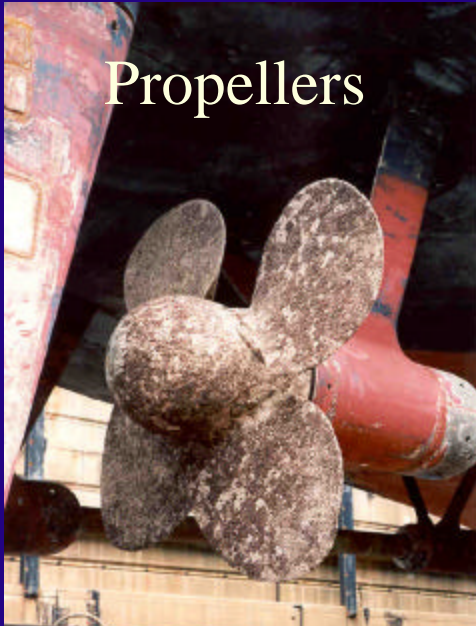
Hull fouling



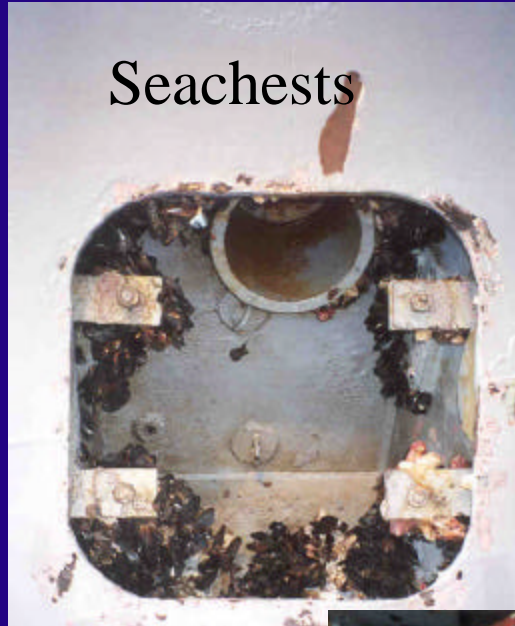


Fouling in Niche Areas

Propellers



Seachests



Free flood spaces



Docking block locations



Pipework





The risks

- Platforms, barges, pontoons, derelict & laid-up vessels
- Moored recreational & small craft
- International yachts, fishing vessels, illegal entry vessels
- Poorly maintained merchant vessels
- Vessels nearing the end of docking cycles
- Vessels with long docking cycles and no in-water maintenance of propellers, intake grates, seachests etc



The solutions

- Effective antifouling protection
- Promotion of modern technology coatings
- Paints appropriate to operational characteristics & docking intervals
- Good maintenance practice
 - regular docking cycles
 - improved maintenance of niche areas
- Regulation of movement of laid-up & derelict vessels
- Education of boat owners



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Australian Action

AFFA

AQIS

EA

State Governments

CRIMP

Industry

**National Taskforce on the Prevention and
Management of Marine Pest Incursions**

National Introduced Marine
Pests Coordination Group

Consultative Committee on
Introduced Marine Pest
Emergencies



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Questions?