



## FISHERIES FACT SHEET

# INTRODUCED MARINE SPECIES



Dead Man's Fingers/Oyster Thief  
*Codium fragile ssp. fragile*

Photo: Rob Hilliard

## Dangerous migrants

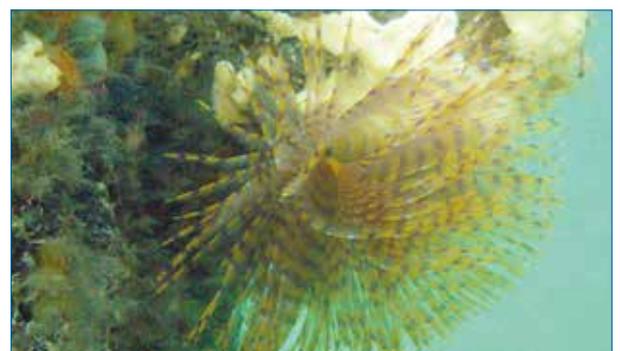
Marine species that are introduced into environments in which they do not occur naturally can become deadly pests and represent one of the greatest threats to the world's oceans and biodiversity. These interlopers threaten our enjoyment of many coastal recreational activities, including fishing, sailing, boating and scuba diving. They are also a danger to the viability of tourism, fishing and seafood industries, and reduce the operating efficiency of vessels. In short, they can seriously damage many of the things Western Australians value highly.

Unlike many other types of environmental impacts, invasions of introduced marine species can be irreversible, making their prevention or early detection the most important aspects of marine pest management.

### Local invaders

In Western Australian waters, there are 60 known non-native marine species that have become established. Most are temperate species, with only six that are exclusively tropical. The greatest number of introduced species is found in the south-west corner of the State – 46 in Perth and Fremantle waters, 25 in Albany and 24 in Bunbury.

Two of these species are included on the national 'trigger list' – the European fan worm (*Sabella spallanzanii*) and a subspecies of the green macroalgae (seaweed) *Codium* (*Codium fragile ssp. fragile*). This trigger list comprises species that are having, or are likely to have, a significant impact on local marine ecosystems in Australian waters if they become established.



The European fan worm (*Sabella spallanzanii*).  
Photo: Justin McDonald

## Upsetting the balance

Western Australian waters contain a diverse array of marine plants and animals. These organisms have evolved over time, established relationships with fellow inhabitants and adapted to the available habitat. The introduction of species that are non-native has the potential to disrupt the natural balance of marine ecosystems.

Not all marine species introduced into a new area become pests. In fact, not all of them will survive the move if conditions in their new home are not suitable – and those that do survive do not always manage to reproduce and establish a viable population. Many introduced marine species that establish self-sustaining populations cause no detectable harm. However, others have the potential to cause significant long-term economic, ecological and health consequences for the marine environment.

These marine species are often resilient, tolerant and aggressive. They achieve their pest status by preying upon or competing with endemic species for food and space, altering the marine habitat to suit their needs.

## Deliberate introduction

There have been very few deliberate introductions into the marine environment in Western Australia. Aquaculture activities in some countries and other Australian states have resulted in the introduction of non-native aquatic plants and animals so they can be cultured for food.

In 1947, the Pacific oyster (*Crassostrea gigas*) was introduced in Albany to establish a new aquaculture industry. The introduction was unsuccessful, which proved to be very fortunate because the oyster has established in other areas in Australia and can out-compete native oyster species.

## Hitching a ride

Ever since ships started to navigate the seas and oceans of the world carrying passengers, cargo and crew, they have also inadvertently transported marine species.

Attached to the lower hulls of vessels and other submerged surfaces are a variety of organisms, such as barnacles, mussels, marine worms or algae. The accumulation of the organisms in this manner is referred to as 'biofouling' and is a means by which marine species can be transported around the world.

As soon as a vessel is submerged in seawater, a range of micro-organisms attach to the hull, giving it a slimy surface film. More animals such as barnacles, bryozoans and worms then begin to attach themselves in a secondary layer. A further 'wave' of larger organisms subsequently takes up residence and can include sponges, sea squirts, mussels, oysters and algae. Once this level of growth is attained, the biofouling is a suitable habitat for crabs, seastars and even fish!



Hull fouling on the bottom of a dredge. Photo: Justin McDonald

## Stowaways

Vessels take up seawater into special ballast water tanks within the cargo hold to improve vessel stability. This ballast water can contain introduced marine species, usually as eggs, larvae or juveniles, but sometimes in adult form.

In the past, when vessels arrived at the destination port, the ballast water was released, allowing many introduced species to be released into new environments. This facilitated the cycle of 'port-hopping' of introduced marine species along shipping routes.

Each year around 150 million tonnes of ballast water is discharged into Australian ports by 10,000 ships visiting from 600 overseas ports.

Commercial shipments of seafood, aquarium supplies and aquaculture products also provide a travel opportunity for marine species, which can 'hitch a ride' by means of the seafood or animal itself, its packaging or the transport water.



The Asian green mussel is one of about 250 introduced marine species that has been detected in Australia. Photo: Justin McDonald

## Escapees

Strict controls are placed on which aquatic plants and animals can be imported or translocated into Western Australia.

The risk is that those permitted into the State may escape or be deliberately released from the aquarium or aquaculture facility to which they are delivered.

Fishers may also unintentionally introduce pests into waterways by using them as 'live' bait.



Carp and goldfish are unfortunately now found in south-western waterways. Photo: Cathy Anderson

## Species spotlight

Marine species introduced into Western Australia include a variety of different plants and animals such as fish, seastars, crabs, microscopic dinoflagellates, shellfish and algae. They may travel as adults, juveniles or larvae.

### Codium (*Codium fragile* spp. *fragile*)



Photo: Rob Hilliard

*Codium fragile* ssp. *fragile* is a large green branching macro-algae (seaweed) with a spongy texture. Thought to be native to Japan, it was first reported in Victoria in the mid-1990s and has since spread to New South Wales, Tasmania, and South Australia. In 2008 it was reported in Western Australia for the first time at Princess Royal Harbour, Albany. There is a native species that looks exactly like the pest species, so very detailed microscopic examination is required for identification.

### Northern Pacific seastar (*Asterias amurensis*)



Photo: Karen Gowlett-Holmes

The Northern Pacific seastar was introduced to Tasmania from Japan in the 1980s, but initially was confused with a native species. By the time it was recognised as a marine invader in 1992, there were millions of seastars lining the sea floor.

Being a large, highly mobile predator with a ferocious appetite and few native enemies, the Northern Pacific seastar is recognised as a significant pest. Currently there is no record of this species in Western Australia.

### Asian date mussel (*Arcuatula senhousia*)



Photos: Helen Cribb, Northern Territory Government

The Asian date mussel (or Asian bag mussel) was discovered in the Swan River estuary in 1983 and within a few years had reached densities of up to 2,600 individuals per square metre. The population seems to have been decimated by an extreme summer rainfall event in 2000. A survey in 2007 failed to find any individuals in the waters of the Swan River, Fremantle Harbour and Cockburn Sound. However, a recent study by the Department of Fisheries has detected new populations.



### Black striped mussel (*Mytilopsis salleii*)



Photos: Helen Cribb, Northern Territory Government

Black striped mussel can quickly colonise hard surfaces, and spread over ship hulls and port infrastructure. It competes with and smothers native shellfish and alters the ecosystem balance, with the potential to devastate Australia's pearling industry. This mussel has not been recorded in Western Australia, although it has been detected on Indonesian fishing boats apprehended in WA waters.



### European fan worm (*Sabella spallanzanii*)



Photo: Justin McDonald

The European fan worm was first discovered in Australia in 1965 at Albany Harbour in WA. It has since spread to other locations, including Cockburn Sound, Fremantle, Bunbury, Albany and Esperance, where it fouls jetty pylons, wrecks and breakwaters, and forms large meadows stretching across the sea floor.

### Fan scallops



Photo: Sandy Clarke

Thought to have been introduced from its native habitats of south-eastern Australia, *Scaechlamys livida* appears to have replaced the south-western Australian fan scallop *Mimachlamys asperimus*, which was once widespread in seagrass beds, on jetty pylons and other hard substrates in local waters.

### Green mussels



The Asian green mussel (*Perna viridis* – pictured) has been found among biofouling on vessels in WA ports but has not been found established in the natural environment so far.

### Gobies



Photo: Barry Hutchins, WA Museum

Native to Japan, China and Korea, the chameleon goby (*Tridentiger trigonocephalus*) and the striped sand goby (*Acentrogobius pflaumii*), or streaked goby as it is also commonly known, have become established in the Swan River estuary and adjacent waters, as well as in other Australian ports and harbours.

## Early detection is vital

Across the world and in Australia, introduced marine pests have caused millions of dollars worth of damage to local economies. Once established in an area, it can cost a large amount of money each year to control the spread of the pest species and attempt to eradicate it all together.



Vessel at Fremantle.  
Photo: Justin McDonald

Early detection and monitoring are vital tools in controlling and eliminating the further spread of marine pests.

The early detection of thaid snails (*Thais haemastoma floridana* and *Thais rustica*) in the port of Geraldton and black striped mussels (*Mytilopsis sallei*) on illegal fishing boats apprehended in northern Western Australian waters prevented the establishment of these potential pests.

The community has an important role in reporting any aquatic pest sightings or unusual species to the Department of Fisheries.

Fishers, boat users and divers should become familiar with the animals and plants at their favourite locations and watch out for any species that have not been there before. If you think you have spotted a marine pest, please contact the Department of Fisheries' FISHWATCH service on **1800-815-507** to report your sighting and, if possible, take a photo of the animal or plant.

If you are a boat user, there are other things you can do:

- Keep your vessel and associated equipment clean and well-maintained, paying particular attention to hard-to-get-at areas.
- Ensure your antifouling protection is up to date – re-apply at the shorter end of the period recommended by the manufacturer.

There are six simple steps that you can use to keep your boat and its gear clean:

- 1 **Dislodge** all plants and animals from your boat and gear on land.
- 2 **Drain** your boat and gear on land.
- 3 **Dispose** of unwanted bait on land.
- 4 **Douse** your boat and gear with fresh water.
- 5 **Dry** your boat and gear.
- 6 **Don't forget** to carry out antifouling on vessels (that are usually moored) on land.

### A costly disruption

In addition to changing the marine environment, introduced marine species have the potential to impact on recreational and commercial fisheries and the aquaculture the shipping industries. Many introduced species are encrusting organisms and will smother native species and attach themselves to any artificial structure in the water, such as aquaculture longlines, vessels, jetties, and intake and outflow pipes.

## References

### Websites

Department of Fisheries, Western Australia  
[www.fish.wa.gov.au](http://www.fish.wa.gov.au)

National System for the Prevention and Management of Marine Pest Incursions  
[www.marinepests.gov.au](http://www.marinepests.gov.au)

State of the Environment Report 2007  
[www.soe.wa.gov.au/report/marine.html](http://www.soe.wa.gov.au/report/marine.html)

Australian Quarantine and Inspection Service  
[www.aqis.gov.au](http://www.aqis.gov.au)

Global Ballast Water Management Programme (GloBallast)  
[www.globallast.imo.org](http://www.globallast.imo.org)

International Maritime Organisation  
[www.imo.org/Conventions/mainframe.asp?topic\\_id=867](http://www.imo.org/Conventions/mainframe.asp?topic_id=867)

### Publications

Wells, F.E., McDonald, J.I., Huisman, J.M. 2009. **Introduced Marine Species in Western Australia**. Fisheries Occasional Publications No. 57. Department of Fisheries, Western Australia. 97p. Available at [www.fish.wa.gov.au](http://www.fish.wa.gov.au)

## Glossary

### Anti-fouling

The process of removing the accumulation, or preventing the accumulation, of micro-organisms, plants, algae and animals on submerged structures, especially ships' hulls

### Biodiversity

The number and variety of life forms, including different species, the genes they contain and the ecosystems they form

### Distribution

Geographic area within which a species is generally found

### Endemic

A species that occurs only in a confined area; referred to as a native species

### Hull

The watertight body of a ship or boat

### Pest

An unwanted, destructive or damaging organism

### Quarantine

Enforced isolation or restriction of free movement that has been imposed to prevent the spread of diseases, pests and other unwanted materials

### Range

Geographic area or location in which a species is recorded, even if only rare or single sightings

### Substrate

The layer immediately underneath something or to which it is attached

### Translocation

The capture, transport and release or introduction of species or other ecological material from one location to another

This fact sheet is the eighteenth (No. 18, first revision) in a Department of Fisheries series. ISSN 1834-9382

## FURTHER INFORMATION

Visit the Department's website at [www.fish.wa.gov.au](http://www.fish.wa.gov.au) or contact:

### DEPARTMENT OF FISHERIES – HEAD OFFICE

3rd Floor, The Atrium,  
168 St George's Terrace, Perth 6000  
Ph (08) 9482 7333 Fax (08) 9482 7389  
e-mail: [headoffice@fish.wa.gov.au](mailto:headoffice@fish.wa.gov.au)  
ABN: 55 689 794 771