



FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE
FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

Introduction of exotic organisms into Victorian marine waters.
(Potentially Threatening Process)

Date of receipt of the nomination: 27 September 1991
Date of preliminary recommendation: 28 July 1992
Date of final recommendation: 17 November 1992

File No.: 91/5713

Validity:

The nomination is for a valid item and the prescribed information was provided. The nominated process was adequately defined and described.

The nominated process is the deliberate and accidental introduction of exotic organisms into Victorian marine waters. The transfer of marine organisms can occur through the discharge of water and sediments from ballast tanks, as part of the fouling community attached to vessel hulls, as well as via the aquaculture industry and for sporting purposes. At least 20 species of exotic organisms have been recorded in Victorian waters including live fish, crustaceans, molluscs, polychaete worms, sea squirts and algae. The potential introduction of disease organisms including viruses, protozoans and bacteria represent a threat to marine aquaculture and have associated health risks.

The process has the potential to lead to the large scale movement of plant and animal species to where they have previously not existed and to genetic mixing of populations which are usually isolated from each other. The introduction of exotic organisms, particularly species which are highly predatory, competitive or spread rapidly, has the potential to alter the structure of natural communities.

The process has occurred and is continuing to occur in Victorian marine waters. The absence of barriers in the ocean enables the spread of introduced species into new areas to be ongoing. In particular, the increasing size and speed of cargo vessels is escalating the risk of transfer of species.

The range of flora or fauna affected or potentially affected was adequately stated in the nomination.

Significance of the threat which the potentially threatening process poses or has the potential to pose was adequately stated in the nomination.

Eligibility for listing as a potentially threatening process under the Flora and Fauna Guarantee

The nominated item satisfies at least one criterion of the set of criteria prepared and maintained under Section 11 of the *Flora and Fauna Guarantee Act 1988*, and stated in Schedule 1 of the *Flora and Fauna Guarantee Regulations 1990*.

Evidence that criteria are satisfied:

Criterion 5.1 *The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a range of flora or fauna.*

Evidence:

Exotic marine species which have been recorded in Victorian waters include fish (*Tridentiger trigonocephalus* Striped Goby, *Acanthogobius flavimanus* Yellow-fin Goby), crustaceans (*Carcinus maenas*, *Cancer novaezealandiae*), molluscs (*Crassostrea gigas*, *Theora lubrica*, *Musculista senhousia*), polychaete worms (*Boccardia proboscidea*, *Pseudopolydora paucibranchiata*, *Sabella spallanzanii*, *Styela plicata*) and seaweeds (*Polysiphonia brodiaei*, *Stictyosiphon soriferus*) (Pollard and Hutchings 1990a & b, Watson pers. comm.).

Few studies have considered the impacts of introductions of exotic species on natural communities. However, evidence is mounting that introductions continue to occur and that they have the potential to pose a significant threat to the survival of native flora and fauna throughout the world, including parts of Australia.

Stewart (1991) provided a summary of introductions of diseases in fish and aquatic invertebrates. Some examples include eel parasites (*Anguillicola crassus* and *A. novaezealandiae*) introduced to Europe from the Far East and New Zealand; a disease caused by a fungus (*Aphanomyces astaci*) which kills the European crayfish (*Astacus astacus*); and bonamiasis, a disease of the flat oyster (*Ostrea edulis*), caused by a protozoan parasite (*Bonamia ostreae*).

In captivity, the Yellow-fin goby (*Acanthogobius flavimanus*) has been shown to prey on native species including the tupong (*Pseudaphritis urvillii*) and the Blue-spot goby (*Pseudogobius olorum*) (Koehn pers. comm.)

Rice-grass (*Spartina townsendii* (s.l.)) was deliberately introduced into Australia in the late 1920s as a grass for land reclamation and and coast protection. This halophytic grass colonises intertidal zones and has the ability to dramatically change the appearance and ecology of invaded areas. In Britain, wading birds have been displaced from their habitat following colonisation by *Spartina* (Millard and Evans 1984, Davis and Moss 1984: cited DCE 1992). In Victoria, *Spartina* occurs in Corner Inlet, Shallow Inlet, Anderson Inlet and Westernport Bay, which are internationally recognised habitats for migratory waders.

In Tasmania, the successful establishment of a New Zealand species of screw shell and a sea star appear to have caused declines in numbers of native species i.e. *Gazameda gunnii* has declined in numbers following the introduction of *Maoricolpus roseus*; *Patiriella exigua* and *Marginaster littoralis* after the introduction of *Patiriella regularis* (additional expert opinion).

The Asian mussel (*Musculista senhousia*), now established in Western Australia, and recently recorded in Port Phillip Bay, is potentially harmful as it has the capacity to significantly alter the biota and movement of soft sediments through its mat building activities (Jones 1991a).

Undaria pinnatifida, a large brown seaweed endemic to Japan, has become widespread in eastern Tasmania (Sanderson 1990). It can form thick canopies which could result in competition for light and space with native species of brown seaweeds, *Phyllospora*, *Sargassum* and *Ecklonia* species. Declines in these species could affect local commercial fisheries for sea urchin and abalone which sometimes feed on these species of algae.

The Pacific oyster (*Crassostrea gigas*) which was introduced into Australia for commercial fisheries in the 1940s, has spread particularly in NSW. Pacific oysters grow more rapidly than indigenous rock oysters (*Saccostrea culcullata*) and have the potential to cause overcrowding (Williams *et al.* 1988).

Toxic and non-toxic dinoflagellates (or their benthic resting spores) may be spread in ballast water (Hallegraeff and Sumner 1986, Hallegraeff *et al.* 1988). Toxic dinoflagellates such as *Gymnodinium catenatum*, which is endemic to Japan, can release toxins and have caused paralytic shellfish poisoning and the closure of shellfish farms in Tasmania. These toxins have been known to affect fish, bird and mammal populations which eat infected fish (Burkholder *et al.* 1992, Smayda 1992). The dinoflagellate *Alexandrium tamarense* has become established in Port Phillip Bay, although its toxicity has yet to be determined (Jones 1991).

Background Information:

- Around 66 million tons of ballast water are discharged in Australian ports each year. Approximately 70% of ballast water discharged originates from Asian ports including half from Japan (Jones 1991b).
- It is estimated that cargo vessels entering Australian ports each carry approximately 300 million dinoflagellate cysts (Hallegraeff and Bolch 1991).
- Voluntary guidelines to reduce the risk of harmful introductions (i.e. re-ballasting at sea, ballasting at sea, non-discharge of water in ports) were developed in 1990 for ships entering Australian ports.

Advertisement for public comment

In accordance with the requirements of Section 14 of the *Flora and Fauna Guarantee Act 1988*, the preliminary recommendation was advertised for public comment for a period of at least 30 days.

The preliminary recommendation was advertised in:

- "The Age" - on 30 September 1992
- "The Weekly Times" - on 30 September 1992
- Government Gazette* - on 30 September 1992

Submissions closed on 6 November 1992.

Further evidence provided:

No public comments were received by the Scientific Advisory Committee.

No evidence was provided to warrant a review of the Scientific Advisory Committee's preliminary recommendation that the potentially threatening process is eligible for listing.

Documentation

The published information and research data provided to the SAC have been assessed. To the best of their knowledge, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Final Recommendation of the Scientific Advisory Committee

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11 of the Act because primary criteria 5.1 is satisfied.

The Scientific Advisory Committee recommends that the nominated item be supported for listing on Schedule 3 of the *Flora and Fauna Guarantee Act 1988*.

Selected references:

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- Paxton, J.R. & Hoese, D.F. (1985) The Japanese Sea Bass, *Lateolabrax japonicus* (Pisces, Percochthyidae), an apparent marine introduction into eastern Australia. *Japan. J. Ichthyol.* 31(4):369-372.
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- Sanderson, J.C. (1990) A preliminary survey of the distribution of the introduced macroalga, *Undaria pinnatifida* (Harvey) Suringer on the east coast of Tasmania, Australia. *Botanica Marina* 33:153-157.
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