

**The Impact of Importing Live
Spotted Notothen (*Trematomus nicolai*)
into Melbourne Aquarium, Australia.**

**Report Prepared for Oceanis Australia
by Thorburn Consultants Ltd.**

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1 Introduction

1.1 The Oceanis Australia Group.

The Oceanis Australia Group is a privately owned Australian company. It is the largest owner/operator of aquariums in the Asia Pacific region and the second largest globally. Oceanis owns and successfully operates five aquariums: Under Water World, on Queensland's Sunshine Coast; The Melbourne Aquarium; Shanghai Chang Feng Ocean World; Busan Aquarium in South Korea and the recently completed Siam Ocean World, Bangkok.

A major objective of the Company is to operate aquariums with a total educational focus and a strong conservation ethic. The journeys are designed to be a conservation education experience for every visitor. All five aquariums have a vibrant school education program and interactive public education component.

1.2 Melbourne Aquarium.

The Melbourne Aquarium, Oceanis's premier aquarium in Australia, has commenced construction of a stage 2 development based on Australia's rich and diverse history of activity in the Antarctic and Sub Antarctic Territories.

The design team at the Melbourne Aquarium seeks to engage the Australian public and international visitors in a dynamic and interactive experience highlighting the unique characteristics of this formidable region. It is intended to showcase its geographical features, its marine and terrestrial wildlife and the relationship with Australian Scientists and environmental managers.

Education is the primary focus for the existence of our aquaria. It is widely accepted that people are more receptive to education and conservation messages if the experience is surrounded by excitement and enjoyment.

The Melbourne team wishes to identify and join with synergistic partners who share an interest in promoting conservation messages from the Antarctic and sub-Antarctic regions.

Australia's Antarctic territories and the sub-Antarctic Islands of Macquarie, Heard and Macdonald fall within Australia's environmental management programs. Programs are created and driven largely by the scientists and staff from a number of government agencies including the Australian Antarctic Division, Tasmanian National Parks and Wildlife Service and Department of Environment and Water Resources.

The critical components of these dynamic experiences include live animals, faithful and naturalistic environments, real human interactions with wildlife that are enhanced with strong relationships with field researchers, and various forms of on-site interpretation.

Criteria for specimen selection are based on many years of staff collaboration and experience in both the Zoo and Aquarium industry. While we can identify many key species in any ecosystem may be identified, not all are suited to living in a simulated environment.

Although penguins adapt and flourish in the environments we create, we must find other means of tell the story of the Albatross and other sea birds. The role of marine fish and invertebrates can be successfully described in aquaria, however, other technologies must be looked into to describe the role of tuna and whales in the Southern Ocean.

Popular facilities such as the Melbourne Aquarium offer unique opportunities to reach large numbers of public at times when they are at their most receptive. Children and students attending specifically designed education programs and parents spending time with families in an enjoyable and informative environment are highly receptive to conservation education messages. Over 700,000 people visit the Melbourne Aquarium each year, including in excess of 66,000 school students of all ages.

Oceanis Australia employs 16 graduate biologists and over 20 Education Officers (in the two Australian Aquariums) who provide continuing support and development of husbandry and education programs. Facilities and programs in turn provide unique opportunities for other organisations to undertake research that at times can be extremely difficult and costly to undertake in the wild.

The aquarium provides a unique and powerful tool for the dissemination of scientific information to the general public.

1.3 The Oceanis Foundation.

Oceanis Australia has recently established The Oceanis Foundation. This Foundation is a not-for-profit foundation established to promote Conservation, Research and Education for the aquatic environment.

Its aim is to provide funding towards programs and projects that directly benefit the enhancement and protection of the aquatic environment. This is achieved through innovative and educationally sound programs, scientifically based research projects and in-situ and ex-situ conservation projects.

The Oceanis Foundation is a registered Trust administered by a Board of Directors. Funds are acquired for the Oceanis Foundation by philanthropic donations, grants, gifts and general donations. The Melbourne Aquarium donates funds to the Foundation from all free-of-charge (gold coin donation) entries to the aquarium. The Board of Directors administers the funds according to articles of the Foundation.

2 Terms of Reference

2.01 Summary of the proposed activity.

For the purposes of the development of a public display focusing on Australia's Sub-Antarctic Territories, Oceanis Australia is proposing to import live Spotted Notothen (*Trematomus nicolai*) into a purpose built climate-controlled facility at the Melbourne Aquarium.

These fish will be collected in Antarctica and or the Sub Antarctic Islands and transferred by government and commercial air carrier in chilled fish transporters. The intended transport route is likely to be via New Zealand's Scott Base in Antarctica via New Zealand to Australia.

Up to 50 specimens of this species are likely to be displayed at any one time in Oceanis Australia's Melbourne Aquarium as part of educational display and limited observational scientific research.

The Spotted Notothen will be contained within temperature controlled aquariums between 800 litres and 25,000 litres. The water system will be self contained comprising a Life Support System (LSS), backwash water recovery system and a quarantine treatment system. Other Antarctic marine fish will be held in similar tanks all of which are treated in the same manner. The LSS system will be housed in a quarantined area in Melbourne Aquarium designed to meet AQIS requirement. All wastes from these displays is treated according to AQIS protocol before being discharged to the municipal sewer system.

Australian Antarctic Division (AAD) have successfully held other species of Antarctic fish in isolation from the source population as have other Antarctic programmes worldwide such as the British Antarctic Survey headquarters in Cambridge UK (Ward, 1997).

Kelly Tarlton's Underwater World and Antarctic Experience in Auckland has in the past successfully transferred and displayed live Nototheniidae and other Antarctic species in specialist displays.

2.02 Taxonomy of the species

Kingdom	Animalia	
Phylum	Chordata	
Class	Actinopterygii	
Order	Perciformes	Perch like fishes
Family	Notothniidae	Cod icefishes
Genus	<i>Trematomus</i>	
Species	<i>nicolai</i> (Boulenger, 1902)	

2.03 Current status of the species in its natural range.

The Spotted Notothen is demersal; marine; depth range 1 – 420 m polar; 65°S - 78°S.

It is found in the Southern Ocean: East Antarctica (some localities), but not from the Peninsula region and westward to the Ross Sea. Coasts of Adelie Land, Davis, Weddell, South Shetland and South Orkney Islands.

Feeds primarily on amphipods, other fishes, and molluscan larvae, with lesser amount of polychaetes and mysids. Captures some prey in the water column, but not cryopelagic.

None of the Cod Icefishes are listed with CITES or IUCN.

2.04 Current status of the species in Australia

There are no Notothens in Australia's mainland or Tasmanian waters.

2.05 Likelihood that the species could establish in Australia

The Spotted Notothen has a temperature tolerance that would only allow it to survive in Antarctic or Arctic regions in temperatures of maximum 5°C (pers. com. Dr Clive Evans). If released into the ocean in or around Australia the Spotted Notothen will die within minutes to hours depending upon whether the region is northern Australia or Tasmania respectively.

The likelihood of establishment in Australia is nil as temperatures are too warm for survival let alone reproduction.

2.06 Consequences of the species becoming established

There are no consequences of the species becoming established because the likelihood of establishment is nil. The Spotted Notothen is up to 20 cm in length and is harmless to people.

2.07 Results of similar import assessments

To date there have been a number of Antarctic or Sub-Antarctic fish species that have been approved as suitable for import into Australia by the Department. Examples are the Spiny Horsefish (*Zanclorhynchus spinifer*) and both species of Toothfish *Dissostichus mawsonii* and *D. elignoides*.

More importantly however is the addition of three other species in the Family Nototheniidae, *Nothenia coriiceps*, *N. Rossii* and *N. magellanica* which are all listed by the department as suitable for live import. These three listed species are found in latitudes closer to Australia (Williams, 1983) making survival (if released) more probable (but still unlikely) than Spotted Notothen.

2.08 Commonwealth, State and Territory legislative controls

There are at present no legislative controls (other than the Department of Environment and Water Resources process) that might prohibit the importation of Nototheniidae from Antarctica or the Sub-Antarctic Islands.

The import of fish is also subject to the provisions of the Quarantine Act 1908, although Biosecurity Australia and AQIS indicate that an import permit for Antarctic fish would be granted, subject to certain conditions related to quarantine control.

2.09 Conditions or restrictions

For display purposes only in high security areas.

Due to the highly controlled temperatures required to maintain Antarctic fish, the fish are not directly in contact with any public space within the aquarium. Access to back of house is by restricted personnel only and

AQIS will provide direction on appropriate conditions and restrictions for the proposed importation of Antarctic fish. Melbourne Aquarium has a good record with marine quarantine and is a registered Marine Quarantine area on site.

2.10 Overall analysis on the potential impacts of importing the species

Overall the potential impact of importing Spotted Notothen into Australia from Antarctica are essentially nil. The Nototheniidae family of fish are found in extremely cold and stable water temperatures between 0-2°C. These conditions are far colder than any found around Australia's coast so if released these fish would die in a very short space of time.

To be released, the fish would have to be removed by criminal means from Melbourne Aquarium's high security area. Transport of fish from the Aquarium to the ocean would in itself be an extremely difficult task without adequate temperature controlled transportation unit.

There is very limited potential for importation of disease agent from Antarctica via these specimens. Parasites have been recorded on Nototheniidae such as the isopod *Gnathia calva* (Wägele, 1988) however routine treatment of the fish while held in Antarctica will remove these ectoparasites before transfer. Follow up treatments will ensure no intermediate stages persist to re-infect the host. It must be noted that the parasites are kept at temperatures from -1°C to 0°C to survive (J.W.Wägele, 1988).

There is significantly less risk of disease transfer and release into the Australian environment from Antarctic fish due to temperature differences than the disease risk associated with the importation of aquarium species living in temperate and tropical areas around the world that could survive in the Australian environment. The previous listing of other Antarctic or Sub-Antarctic Nototheniidae species by the Department suggests that the very limited risks associated with import of these fish are acceptable.

3 References

Fish Base <http://www.fishbase.org/summary/speciessummary.php?id=7059>

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