**Asterias amurensis**

**Common name**
North Pacific seastar (English), Nordpazifischer Seestern (German), Japanese seastar (English), northern Pacific seastar (English), purple-orange seastar (English), flatbottom seastar (English), Japanese starfish (English)

**Synonym**
- *Parasterias albertensis*, Verrill, 1914
- *Asterias rubens*, Murdoch, 1885
- *Asterias pectinata*, Brandt, 1835
- *Asterias nortonensis*, Clark, 1920
- *Asterias anomala*, Clark, 1913
- *Asterias amurensis*, f. *robusta* Djakonov, 1950
- *Asterias amurensis*, f. *latissima* Djakonov, 1950
- *Allasterias rathbuni nortonensis*, Verrill, 1909
- *Allasterias rathbuni*, var. *anom* Verrill, 1909
- *Allasterias rathbuni*, var. *nort* Verrill, 1914
- *Asterias amurensis*, f. *acervispinis* Djakonov, 1950
- *Asterias amurensis*, f. *flabellifera* Djakonov, 1950
- *Asterias amurensis*, f. *gracilispinis* Djakonov, 1950

**Similar species**
- *Pisaster brevispinus*, *Pisaster giganteus*, *Pisaster ochraceus*

**Summary**
Originally found in far north Pacific waters and areas surrounding Japan, Russia, North China, and Korea, the northern Pacific seastar (*Asterias amurensis*) has successfully invaded the southern coasts of Australia and has the potential to move as far north as Sydney. The seastar will eat a wide range of prey and has the potential for ecological and economic harm in its introduced range. Because the seastar is well established and abundantly widespread, eradication is almost impossible. However, prevention and control measures are being implemented to stop the species from establishing in new waters.

**Species Description**
*Asterias amurensis* (northern Pacific seastar) can grow up to 50cm in diameter. It is yellow with red and purple pigmentation on its five arms, and a small central disk. Its distinctive characteristic is its upturned tips which are its identification key when compared to similar starfish. The undersides are completely yellow and arms are unevenly covered with small, jagged-edged spines (CSIRO, 2004). These spines line the groove in which the tube feet lie, and join up at the mouth in a fan-like shape (NIMPIS, 2002).

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Notes
In its native Japan, *Solaster paxillatus* (a sunstar) has been noted as a predator of *Asterias amurensis* (northern Pacific seastar). The predation of *A. amurensis* by king crabs in Alaskan aquaria has also been observed (NIMPIS, 2002). The size of prey eaten by *A. amurensis* usually equals the length of the seastar’s arm. Organisms that compete with *A. amurensis* include: *Uniohora granifera*, *Coscinasterias muricata* and *Odobenus rosmarus divergens* (Pacific walruses) (NIMPIS, 2002).

Lifecycle Stages
Juvenile *Asterias amurensis* (northern Pacific seastars) grow up to 6mm per month in the first year and continue to grow 1 - 2mm per month until maturity. The female is able to reproduce at about 12 months of age, when they are around 10cm in diameter.

Uses
No valuable human use has been documented. Hunting incentives have been suggested, such as catching and drying as souvenirs of the Australian coast (Goggin, 1999).

Habitat Description
While *Asterias amurensis* (northern Pacific seastar) prefers waters temperatures of 7-10°C, it has adapted to warmer Australian waters of 22°C. It is typically found in shallow waters of protected coasts and is not found on reefs or in areas with high wave action. The starfish is capable of tolerating many temperatures and wide ranges of salinities. It is often found in estuaries and on mud, sand or rocky sheltered areas of intertidal zones (CSIRO, 2004). The maximum temperature for *Asterias amurensis* is 25°C and the minimum is 0°C (NIMPIS, 2002). The salinity range for this species is between 18.7 and 41ppt, while the maximum depth at which individuals have been found is 220m (NIMPIS, 2002).

Reproduction
*Asterias amurensis* (northern Pacific seastar) reproduces sexually and asexually. Spawning occurs between July and October in Australian waters. The female seastar is capable of carrying up to 20 million eggs. Fertilisation is external and larvae remains in a planktonic stage for up to 120 days before settling and metamorphosing into juvenile starfish (NSW Department of Primary Industries, 2004). Sperm half life at 10°C > 2 hours, at 17°C < 30 minutes (NIMPIS, 2002).

Nutrition
*Asterias amurensis* (northern Pacific seastar) eats bivalves, gastropod molluscs, barnacles, crabs, crustaceans, worms, echinoderms, ascidians, sea urchins, sea squirts and other seastars, including conspecifics if food source becomes exhausted (CSIRO, 2004).

General Impacts
*Asterias amurensis* (northern Pacific seastar) has the potential to establish large populations in new areas. Estimates made in Port Phillip Bay (where they were first detected), indicate that numbers reached as much as 12 million individuals in two years. In their native range they are known to go through 'bust and boom' cycles reaching high abundance and then rapid decline (NSW, 2007). The northern Pacific seastar is a voracious feeder, preferring mussels, scallops and clams. It will eat almost anything it can find, including dead fish and fish waste (CSIRO, 2004). The seastar is considered a serious pest of native marine organisms. It is implicated in the decline of the critically endangered spotted handfish (see *Brachionichthys hirsutus* in IUCN Red List of Threatened Species) in Tasmania It preys on handfish egg masses, and/or on the sea squirts (ascidians) that handfish use to spawn on (NSW, 2007). The seastar is also considered a mariculture pest, settling on scallop longlines, spat bags, mussel and oyster lines and salmon cages (CSIRO, 2004). Oyster production on some marine farms in southeastern Tasmania have been affected by the seastar (NSW, 2007). In Japan seastar outbreaks cost the mariculture industry millions of dollars (NSW, 2007; NIMPIS, 2002).
Management Info
A two-year study was undertaken for the Department of Environment and Heritage (Australia) by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to identify and rank introduced marine species found within Australian waters and those not found within Australian waters. All of the non-native potential target species identified in this report are ranked as high, medium and low priority, based on their invasion potential and impact potential. *Asterias amurensis* is identified as one of the ten most damaging potential domestic target species, based on overall impact potential (economic and environmental). A hazard ranking of potential domestic target species based on invasion potential from infected to uninfected bioregions identifies *Asterias amurensis* as a 'medium priority species' - these species have a reasonably high impact/or invasion potential.
For more details, please see Hayes et al. 2005.
The rankings determined in Hayes et al. 2005 will be used by the National Introduced Marine Pest Coordinating Group in Australia to assist in the development of national control plans which could include options for control, eradication and/or long term management.
For details on preventative measures, chemical, physical and biological control options, please see management information compiled by the ISSG.

Pathway
*Asterias amurensis* (northern Pacific seastar) can be distributed on ship hulls*Asterias amurensis* (northern Pacific seastar) settles on scallop longlines, spat bags, mussel and oyster lines, and salmon cages.*Asterias amurensis* (northern Pacific seastar) can be transmitted via seawater in live fish trade*Asterias amurensis* (northern Pacific seastar) can be unintentionally transferred via recreational boats*Asterias amurensis* (northern Pacific seastar) larvae can be distributed through ballast water*Asterias amurensis* (northern Pacific seastar) can be transmitted via seawater in live fish trade


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BIBLIOGRAPHY
22 references found for Asterias amurensis

Management information

Summary: Over view of Introduction and reproduction methods of the *Asterias amurensis*. 

Summary: The decision support tools made available on the Cefas page for free download are Crown Copyright (2007-2008). As such, these are freeware and may be freely distributed provided this notice is retained. No warranty, expressed or implied, is made and users should satisfy themselves as to the applicability of the results in any given circumstance. Toolkits available include 1) FISK- Freshwater Fish Invasiveness Scoring Kit (English and Spanish language version); 2) MFISK- Marine Fish Invasiveness Scoring Kit; 3) MI-ISK- Marine invertebrate Invasiveness Scoring Kit; 4) FI-ISK- Freshwater Invertebrate Invasiveness Scoring Kit and AmphISK- Amphibian Invasiveness Scoring Kit. These tool kits were developed by Cefas, with new VisualBasic and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).


The guidance document is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].

Department of Fisheries. 2000. Introduced Marine Invaders, Northern Pacific Seastar.

Summary: Detailed description of habitat, reproduction, description, invasion, and eradication attempts.


Summary: Plans for Australia to implement a National Control Plan to prevent further invasion.


Summary: Analysis of transmission vectors of Asterias amurensis to provide information for the formulation of a management plan.


Summary: This report is the final report of a two year study designed to identify and rank introduced marine species found within Australian waters (potential domestic target species) and those that are not found within Australian waters (potential international target species).


Hill, N.A; Blount, C; Poore, A.G.B; Worthington, D; Steinberg, P.D., 2003. Grazing effects of the sea urchi in Australian waters (potential domestic target species) and those that are not found within Australian waters (potential international target species).


Summary: This report is the final report of a two year study designed to identify and rank introduced marine species found within Australian waters (potential domestic target species) and those that are not found within Australian waters (potential international target species).

Available from: http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].


Summary: Provides a detailed description of habitat, reproduction, description, invasion, and eradication attempts.


Summary: Has useful information on management options for A. amurensis.


Summary: Eradication attempts and description/education about Northern Pacific Seastar.


Summary: Comparison of field study conducted between Asterias amurensis and Carcinus maenas on the Tasmanian coast.

Ross, J. D., Craig R. Johnson & Chad L. Hewitt., 2003. Assessing the ecological impacts of an introduced seastar: the importance of multiple methods. Biological Invasions 5: 3-21

Summary: This paper synthesizes work on the current and predicted impacts of an introduced predatory seastar (Asterias amurensis) on soft sediment assemblages, including native species subject to commercial fishing, in the Derwent Estuary and other areas of southeast Tasmania.


Summary: A biological control agent has been found for this species.

General information


Summary: A popular science article outlining the problems posed by *Asterias amurensis* and research that is being conducted to address this issue.


Summary: Report on the invasions that have occurred at Port Phillip Bay.


ITIS (Integrated Taxonomic Information System). 2004. Online Database *Asterias amurensis*

Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.


Summary: Report into the rate of spread by the invasive sea star.
