

## *Pseudodiaptomus inopinus*

**System:** Freshwater

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Maxillopoda	Calanoida	Pseudodiaptomidae

**Common name** Asian calanoid copepod (English)

**Synonym**

**Similar species**

**Summary** *Pseudodiaptomus inopinus* is endemic to the Indo-Pacific region including southeast Asia. It was introduced to Pacific Northwest estuaries via ballast water between 1980 and 1990 and has rapidly expanded in range since then. It has persisted in many estuaries between southern Washington and southern Oregon. It appears to be a stable and dominant component of zooplankton there. The dominance of *P. inopinus* in several estuaries will likely alter the food web and ecosystem dynamics, but to what extent is unknown.



[view this species on IUCN Red List](#)

## Species Description

*Pseudodiaptomus inopinus* is typically 1-2mm long, with a teardrop shaped body and large antennae. It has an armoured exoskeleton which is almost totally transparent (Wikipidea 2006).

## Uses

*Pseudodiaptomus inopinus* is an important, perhaps even dominant component of the diet of benthic-pelagic invertebrate predators in its introduced range (e.g. mysids and Crangon shrimp), and shares a vertical distribution and migration pattern with these predators (dwells in the bottom during the day, and up in the water column at night) (Bollens *et al.*, 2002).

## Habitat Description

In its native Asia *P. inopinus* occurs in a variety of fresh\water and estuarine habitats (Shen and Song 1979). It is most abundant in autumn (Shen and Song 1979), and appears to be part of an assemblage that occurs mainly in the fluvial-oligohaline reaches of the estuary at salinities of 0-5 psu (Cordell & Morrison 1996). \n\nIn its introduced habitat *P. inopinus* has only invaded coastal estuaries with relatively high temperatures, low elevation gradients and large salinity transition zones. It is confined predominantly to the lower salinity (<10 psu) reaches of estuaries, with peak abundances occurring in the 2-5 psu range (Bollens *et al.* 2002).

## General Impacts

*P. inopinus* may dominate plankton assemblages in the low salinity zones of estuaries it has invaded. Where does *P. inopinus* fit into estuarine ecosystems? Where does it fit into the food chain? Can it significantly impact ecosystems and food chains? Such questions are being addressed by researchers Cordell Rasmussen and Bollens (2007), whose work suggests that *P. inopinus* may dominate plankton assemblages in low salinity zones of estuaries where it has been introduced. The authors found that other abundant planktonic copepods were separated from *P. inopinus* at the estuarine study site either temporally (*Eurytemora affinis*) or spatially (*Acartia* spp., *E. americana*) (Cordell Rasmussen and Bollens 1998, in Cordell Rasmussen and Bollens 2007). This separation implies that *P. inopinus* experienced little competition when it was introduced or, alternatively, it may have altered the distribution of other copepods in the estuary following introduction.

Due to competition for limiting resources (eg: phytoplankton food), predation, or some other coincidental factors, the invasion of this Asian copepod may have caused dramatic food web and ecosystem changes in estuaries. *P. inopinus* may have the potential to alter the energy and nutrient flow of an ecosystem and may replace or reduce pre-existing native estuarine zooplankton populations. Such changes in energy flow could have higher level effects on juvenile salmon and other commercially important species (Bollens *et al* 2002). Such fears are precipitated because of other examples, such as, the invasion of the northwestern Atlantic ctenophore *Mnemiopsis leidyi* in the Black and Azov Seas, which possibly triggered significant ecosystem changes to cause declines in numbers of commercially important species (Shiganova and Bulganova 2000, Kideys 2002, Bilio and Niermann 2004, in Cordell Rasmussen and Bollens 2007).

Research by Cordell Rasmussen and Bollens (1998) found that although *P. inopinus* was rare in the diets of estuarine fishes, it comprised an important and sometimes dominant prey for mysid shrimp *Neomysis mercedis* which were in turn preyed upon by fish. *P. inopinus* was also an important component of the diet of juvenile caridean shrimp (*Crangon franciscorum*). In conclusion *P. inopinus* indirectly supplied an important food source to fish via the mysid shrimp pathway. For a discussion on the relation between abundance of this copepod and flooding events / temperature please see [Cordell Rasmussen and Bollens 2007](#).

## Management Info

**Preventative measures:** *P. inopinus* spread can be prevented by draining water from boats or other equipment when leaving a body of water, and by emptying bait buckets on land or into the trash (WSGP, 2000). Furthermore, legislation applicable to coastal shipping may also be useful for prevention (Falkner, 2003).

## Pathway

### Principal source:

**Compiler:** National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

**Review:** Jeffery R. Cordell. Principal Research Scientist School of Aquatic and Fishery Sciences University of Washington, Seattle USA

**Publication date:** 2007-05-11

## ALIEN RANGE

[1] COLUMBIA RIVER

[12] UNITED STATES

## BIBLIOGRAPHY

10 references found for *Pseudodiaptomus inopinus*

Management information

[Centre for Environment, Fisheries & Aquaculture Science \(CEFAS\), 2008. Decision support tools-Identifying potentially invasive non-native marine and freshwater species: fish, invertebrates, amphibians.](#)

**Summary:** The electronic tool kits 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 decision support tools are available from:

<http://cefas.defra.gov.uk/our-science/ecosystems-and-biodiversity/non-native-species/decision-support-tools.aspx> [Accessed 13 October 2011]

[The guidance document](http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf) is available from [http://www.cefas.co.uk/media/118009/fisk\\_guide\\_v2.pdf](http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf) [Accessed 13 January 2009].

[Cordell, J.R., Rasmussen, M. and Bollens, S.M. 2007. Biology of the Introduced Copepod \*Pseudodiaptomus inopinus\* in a Northeast Pacific Estuary, \*Marine Ecology Progress Series\* 333: 213–227.](#)

[Falkner, M.B. 2003, Report on the California Ballast water management program, California State Lands Commission Marine Facilities Division, February, unpublished.](#)

**Summary:** This is report produced for the California State Legislature. AB 703 established the California Ballast Water Management for Control of Nonindigenous Species Act during the 1999 legislative session to address the introduction of nonindigenous aquatic species. This report summarizes the ballast water management activities in California during the first 2.5 years of the Program and makes recommendations for amendments to the Act based on the effectiveness of the State's program.

[Washington Sea Grant Program \(WSGP\) 2001. A guide to least-wanted aquatic organisms of the Pacific Northwest-aquatic invasive species, University of Washington.](#)

**Summary:** This paper lists a number of wanted aquatic organisms of Pacific Northwest, and provides information general description, impacts and management for each one of them.

Available from: <http://www.wsg.washington.edu/outreach/mas/nis/leastwanted.pdf> [Accessed 27 November 2006].

## General information

[Bollens, S.M., Cordell, J.R., Arent, S. and Hooff, R. 2002 Zooplankton invasions: a brief review, plus two case studies from the northeast Pacific Ocean, in \*Hydrobiologia\* 480: 87-110](#)

**Summary:** This paper reviewed the current state of research on nonindigenous zooplankton, and included preliminary results from two ongoing studies of invasive zooplankton in the northeast Pacific Ocean- the Asian copepods *Pseudodiaptomus inopinus* in Washington and Oregon coastal estuaries, and *Tortanus dextrilobatus* in San Francisco Bay Estuary.

[Cordell, J.R. and Morrison, S.M. 1996. The invasive Asian Copepod \*Pseudodiaptomus inopinus\* in Oregon, Washington, and British Columbia Estuaries, in \*Estuaries\* 19: 629-638](#)

**Summary:** This study is to survey river estuaries in Oregon and Washington and in southern British Columbia, Canada, for the presence of *P. inopinus*. It aims to gather preliminary data on how widespread exotic copepods are in this region's estuaries and the distribution in rivers in relation to the salinity and gradient.

[Cordell, J.R. and Rasmussen, M. 2001. An exotic copepod in Pacific Northwest Estuaries. In Abstracts: Second International Conference on Marine Bioinvasions, March 9-11, 2001. New Orleans, LA.](#)

**Summary:** Study into the effects of an exotic copepod invasion in Pacific Northwest Estuaries.

[ITIS \(Integrated Taxonomic Information System\), 2005. Online Database \*Pseudodiaptomus inopinus\*.](#)

**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.

Available from: [http://www.itis.gov/servlet/SingleRpt/SingleRpt?search\\_topic=TSN&search\\_value=331702](http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=331702) [Accessed 23 August 2006]

[The Ocean Biogeographic Information System \(OBIS\) \*Pseudodiaptomus inopinus\*](#)

**Summary:** The Ocean Biogeographic Information System (OBIS) is the information component of the Census of Marine Life (CoML), a growing network of more than 1000 researchers in 73 nations engaged in a 10-year initiative to assess and explain the diversity, distribution, and abundance of life in the oceans - past, present, and future. OBIS is a web-based provider of global geo-referenced information on marine species. OBIS contains expert species level and habitat level databases and provide a variety of spatial query tools for visualizing relationships among species and their environment.

This page available from:

<http://www.iobis.org/OBISWEB/ObisControllerServlet?searchName=Pseudodiaptomus+inopinus+&category=all&names=data&x=25&y=12> [Accessed 23 August 2006]

Ocean Biogeographic Information System (OBIS) available from: [www.iobis.org](http://www.iobis.org)

[United States Geological Survey, 2006 \*Pseudodiaptomus inopinus\*, USGS Nonindigenous Aquatic Species Database, Gainesville, FL.](#)

**Summary:** This website provides information about the common name of *Pseudodiaptomus inopinus*.

Available from: <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=176> [Accessed 27 November 2006].