GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Chthamalus proteus***

Chthamalus proteus 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Maxillopoda	Sessilia	Chthamalidae

Common name Caribbean barnacle (English), Atlantic barnacle (English)

Synonym

Similar species

Summary *Chthamalus proteus* is a barnacle native to the Caribbean and western Atlantic. It was introduced to the Pacific in 1970s and first reported in Hawaii in 1995. It is now one of the most abundant organism in the upper intertidal harbors and bays throughout the Hawaiian Islands. *C. proteus* are likely to be spread by ship hull fouling and larvae by ballast water.

view this species on IUCN Red List

Species Description
Chthamalus proteus is a small light brown or gray white barnacle that grows to about 1cm diameter. Its conical shell is variable in external appearance depending on age, crowding, and degree of weathering. Shell plates may be smooth or ribbed.

Lifecycle Stages
There are seven stages for *C. proteus*, six naupliar stages followed by a cypid. The developmental period is short and varies with temperature and diet. At low food concentration, the higher the temperature, the quicker the larvae develop into cyprids. At 28 C° the earliest cyprids could develop within 10 days. At high food concentration, there temperature does not play a role in development time (Zabin 2005).

Habitat Description
Chthamalus ptroteus uses similar habitat types in introduced ranges as in native ranges. It is found in protected bays, lagoons, harbors and embayments, particularly where there are few other intertidal organisms (DeFelice *et al*. 2001; Zabin 2002). The barnacle inhabits the upper intertidal zone, where it occurs on both natural and man-made surfaces (DeFelice *et al*. 2001). Rare in open-coast settings, these barnacles appear to tolerate a fairly wide range of water temperatures (from 16°C to 38°C). They are also able to survive in both clear and turbid waters (Zabin 2005). Habitat modifications that increase hard substrata and decrease wave action are likely to facilitate their spread (Zabin 2003). In its native range (Gulf of Mexico and the Caribbean) it does not tolerant low salinity and is found in highest densities in moderate to low energy locations in muddy or murky water. The introduced Hawaiian mangrove *Rhizophora mangle* is able to facilitate establishment of *C. proteus*, as its roots provide an ideal habitat for this introduced barnacle (Amanda and Craig 2003).

Reproduction
These barnacles are hermaphrodites. Cross-fertilisation occurs in dense populations. In such cases, sperm are deposited directly into the mantle cavity of adjacent individuals via a long tube. Fertilised eggs are brooded in the mantle cavity, and it may be several months before the free-swimming planktonic larvae are released (DeFelice *et al*. 2001).

Nutrition
This barnacle has a specialised pair of appendages, called cirri, which are used as a scoop net, reaching out into the water to extract food particles. When the cirri are drawn back, food is scraped off into the mouth (DeFelice *et al*. 2001).

General Impacts
C. proteus is a serious fouling organism. This species potentially threatens to alter natural substrates through dense colonisation, which could lead to habitat conversion, alter settlement patterns of native species and exclude algal grazers such as opihi (limpets). Competition for space with native invertebrates in the high intertidal zone is also likely to occur (DeFelice *et al*. 2001). At high densities the barnacle appears to negatively impact the limpet *Siphonaria normalis* in Hawaii (Zabin 2005).

Management Info
There is no specific management for controlling *C. proteus* at this moment. It is recommended to step up monitoring programs for *C. proteus* for preventative purposes (Southward *et al*. 1998). Physical factors may limit the spread of this barnacle and provide some natural protection from invasion, for example open coastal habitats (Zabin 2003).

Pathway
Chthamalus proteus was introduced in the 1970s *via* ships (Southward *et al*. 1998). Larvae of this barnacle have survived the journey from the Caribbean to Hawaii in a ballast tank (Godwin 2003).

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from La Fondation d'entreprise Total

Review:

Pubblication date: 2007-01-10

ALIEN RANGE

[2] FRENCH POLYNESIA
[1] NORTHERN MARIANA ISLANDS
[1] UNITED STATES MINOR OUTLYING ISLANDS
[1] GUAM
[46] UNITED STATES

BIBLIOGRAPHY
14 references found for **Chthamalus proteus**

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

Southward, A.J., Burton, R.S., Coles, R.S., Dando, P.R., DeFelice, R., Hoover, J., Parnell, P.E., Yamaguchi, T. and Newman, W.A. 1998. Invasion of Hawaiian shores by an Atlantic barnacle, *Marine Ecology 165*: 119-126.
Summary: Occurrence of *Chthamalus proteus* on ships and long distance dispersal of the genus.
Zabin, C.Z. 2003. Biotic and abiotic factors in the invasion success of a Caribbean barnacle in Hawaii. In *Marine Bioinvasions- Third International Conference on Marine Bioinvasions Abstracts book*, California Sea Grant College System and the MIT Sea Grant College Program.
Summary: This abstract book contains all summaries of the presentations in the conference.
Available from: http://massbay.mit.edu/publications/marinebioinvasions/mbi3_abstract_book.pdf [Accessed 14 December 2006].

General information

Amanda, D. and Craig, S. 2003. Ecological impacts of introduced mangroves on Hawaiian coastal communities, *7th International Conference on the Ecology and Management of Alien Plant Invasions, ecological impacts of invasive plants session*
Summary: A summary of the ecological impacts of invasive plants.
Coles, S.L. and Eldredge, L.G. 2002. Nonindigenous species introductions on Coral Reefs: A need for information, *Pacific Science 56*(2): 191-209.
Summary: This paper summarises the information for nonindigenous species from harbors, embayments, and coral reefs in the Pacific region.
Available from: http://hbs.bishopmuseum.org/pdf/56(2)p191-209.PDF [Accessed 13 December 2006].
Coles, S.L., DeFelice, R.C., Eldredge, L.G. and Carlton, J.T., 1997. *Biodiversity of marine communities in Pearl Harbor, Oahu, Hawaii with observations on introduction exotic species: Finial report for the U.S. Navy* . Bishop Museum Press: Honolulu.
Summary: This report looks at biodiversity in Pearl Harbour; 22% of collected species were introduced.
Available from: http://www.anstaskforce.gov/Documents/PearlHarbor.pdf [Acceseed 4 November 2006].
Dando, R.C. and Southward, A.J. 1980. In *A Guidebook of Introduced Marine Species of Hawai i.* 2002. Hawaii Biological Survey, Bishop Museum.
Summary: This site contains information about *C. proteus* including desciption, distribution, habitat and impact.
Available from: http://www2.bishopmuseum.org/HBS/invertguide/species/chthamalus_proteus.htm [Accessed 4 November 2006].
DeFelice, R.C., Coles, S.L., Muir, D. and Eldredge, L.G., 1998. *Investigation of the marine communities of Midway Habor and Adjacent Lagoon, Midway Atoll, Northwest Hawaiian Islands- report to U.S. Fish and Wildlife Service Pacific Islands Area Office Honolulu, Hawaii* . Bishop Museum Press: Honolulu.
Summary: This report represents a survey of the marine communities of Midway Atoll harbor and surrounding lagoon.
Avaliable from: http://hbs.bishopmuseum.org/pdf/defelice-etal98.pdf [Accessed 13 December 2006].
Godwin, L.S. 2003. Hull fouling of maritime vessels as a pathway for marine species invasions to the Hawaiian Islands. In *Biofouling* 19: 123-131.
Summary: A case study reviews that maritime vessel hull fouling has effects on altered isolated marine environments. It indicates that hull fouling of commercial maritime vessels is documented as a transport vector, and an inter-island dispersal mechanism for marine non-indigenous species to the main Hawaiian Island.
ITIS (Integrated Taxonomic Information System). 2006. Online Database *Chthamalus proteus*.
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=89598 [Accessed 27 November 2006]
United States Geological Survey. 2006. *Chthamalus proteus*. USGS Nonindigenous Aquatic Species Database.
Summary: This website provides information about the distribution of *C. proteus* in the United States of America.
Available from: http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=83 [Accessed 27 November 2006].
Zabin, C.J. 2002. Do locals rule? Interactions between native intertidal animals and a Caribbean Barnacle in Hawai I, *Pacific Science 56*(2): 235-236.
Summary: This article discussed the relationship between *C. proteus* and another two native species in Hawaii.
Available from: http://muse.jhu.edu/journals/pacific_science/v056/56.2zabin.pdf [Accessed 4 November 2006]
Zabin, C.J. 2005. *Community ecology of the invasive intertidal barnacle Chthamalus proteus in Hawai i* . University of Hawai i at Manoa.
Summary: This paper provides general information about *C. proteus* including habitat, distribution, larval development, reproduction, growth, and mortality. It also investigated competitive interations between this species and other barnacles, and the interation between *C. proteus* and a limpet *Siphonaria normalis*.
Zardus, J. D. and Hadfield, M.G. 2005. Multiple origins and incursions of the Atlantic barnacle *Chthamalus proteus* in the Pacific, *Molecular Ecology 14*: 3719-3733.
Summary: This study looks at the genetic variation of *C. proteus* populations to determine whether there were multiple geographical sources and intoduction points for this barnacle.