Carijoa riisei **System:** Marine

Kingdom	Phylum	Class	Order	Family
Animalia	Cnidaria	Anthozoa	Alcyonacea	Clavulariidae

Common name orange soft coral (English), snowflake coral (English), Branched pipe coral (English)

Synonym

Similar species

Summary Carijoa riisei commonly known as \"snowflake coral\" or \"branched pipe coral\", is a soft coral species. Originally from the tropical Western Atlantic it was first reported in the Pacific Ocean around the Hawaiian Islands in the 1970's. Its introduction was thought to be benign until recent surveys began showing it proliferating at depths as far down as 120m off the island of Maui, where it is rapidly changing habitat and out-competing native black coral colonies.

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Species Description
Carijoa riisei is an octocoral that forms erect, branching colonies with flexible stems. Each tall axial polyp has many short lateral polyps. Polyps, when extended, have eight white pinnate tentacles, like the rays of a snowflake, unlike stony corals which have six tentacles. The long stems or branches of the octocoral are a dirty white colour, but they are almost always covered with a very thinly encrusting orange-red sponge, which was identified as *Desmapsamma anchorata* on *Carijoa* identified as *C. riisei* from Indonesia (Cacinai *et al.* 2004). Two types of sclerites occur in the body wall (HBS, 2002). *C. riisei* colonies grow about 10-25cm high (Samuel Kahng., pers. comm., 2005).

Notes
While shallow-water octocorals (soft corals) are well described in the Caribbean, their taxonomy in the Indo-Pacific is less well defined. Many genera of soft corals in the Indo-Pacific are not defined to the species level. In Hawai‘i, the *Carijoa* species was identified as *C. riisei* by a leading octocoral taxonomist. However, recent molecular sequencing work in progress is now casting doubt on the Caribbean/Atlantic origin for the Hawai‘ian population (Samuel Kahng., pers. comm., 2005).

Uses
Gasparini *et al.* (2004) reports that *Carijoa riisei* is used in the aquarium trade and can also be found in the souvenier trade.

Habitat Description
Carijoa riisei is reported to grow well in turbid waters rich in organic matter and zooplankton on which it feeds. It requires a firm surface on which it attaches using stolons (root-like structures). It also grows well on artificial hard surfaces such as metal, plastic, concrete, etc. It is commonly reported on artificial reefs visited by recreational scuba divers. It is a passive filter feeder and needs moderate amounts of water flow, which is provided by wave surges and tidal or long-shore currents. It does not proliferate in direct sunlight and is usually most abundant on rocky surfaces or other hard substrates at depths below significant light penetration (Kahng, Undated(b)). Grigg (2003) states that not only can this species be found on pier pilings in shallow water, but that it is also abundant in much deeper water (down to 120m), particularly in shaded environments.

Reproduction
Carijoa riisei is capable of single parent reproduction and has male, female and hermaphrodite colonies. It also spreads by vegetative growth through runners and stolons which spread and colonise adjacent areas in all directions. *C. riisei* also exhibits high fecundity, producing almost continously, and hundreds of eggs per axial polyp (Kahng, Undated(a)). HBS (2002) reports that, \"Polyps may reproduce asexually by simply splitting in two, or sexually by release and fertilisation of gametes (a cell connected with sexual reproduction, which is either a male sperm or a female egg) into the water column. The resulting planula larvae (flat ciliated free-swimming larva) settle to the bottom and develop directly into young polyps.\"

Nutrition
Carijoa riisei lacks symbiotic algae (unlike many stony corals), and is an obligate predator of zooplankton. Octocorals in general have weak nematocysts (stinging cells). From feeding trials in Hawai‘i, *C. riisei* does not appear to have effective nematocysts (Samuel Kahng., pers. comm.., 2005).

General Impacts
Carijoa riisei had been described as a shallow water species, but deep-water surveys conducted near Maui in Hawai‘i discovered *C. riisei* overgrowing >70% of the black coral colonies (*Antipathes dichotoma* and *A. grandis*) in certain areas at depths of 65-115m (Grigg 2003). *C. riisei* can settle and grow on other stationary organisms like shellfish and coral. When conditions are favourable it is capable of explosive growth, hence able to smother competitors and occupy any available space.
C. riisei is a voracious feeder and can consume large quantities of zooplankton (ecological impacts of this feeding habit are yet to be studied) (Kahng, Undated(b)). *C. riisei* exhibits high fecundity compared to other corals (clonal benthic marine invertebrates like corals in general exhibit much lower fecundity than aclonal benthic marine invertebrates like mussels). No significant predators have of *C. riisei* have been found in Hawai‘i with the possible exception of a recently discovered introduced nudibranch, *Phyllodesmium poindimiei*. Predators of *Carijoa* in other parts of the globe have been reported (Samuel Kahng., pers. comm., 2005).

Management Info
Preventative measures: *Carijoa riisei* has been described as the most invasive of the 287 non-indigenous marine invertebrates in Hawai’i (Toonen, 2004). Toonen (2004) points out that *C. riisei* has unique characteristics which aid its dispersal *via* maritime vectors. Research into its reproductive system and larval development are a primary requirement in the development of an effective management strategy aimed at preventing spread and containing existing populations.
\r\nA research programme supported by Sea Grant and the Hawai‘i Undersea Research laboratory (HURL) is underway to study the ecological impacts of *C. riisei* on Hawai‘i's deep water and shallow coral reef communities.
\r\nBiological: Kahng (Undated(a)) has found that, \"A potential agent of *C. riisei* bio-control (introduced aeolid nudibranch soft coral predator) has recently been identified but must undergo further research before it can be considered as an actual management technique.\"

Pathway
Gasparini *et al.* (2004) reports that *Carijoa riisei* is used in the aquarium trade and can also be found in the souvenir trade.HBS (2002) reports that *Carijoa riisei* is most likely to be introduced as fouling on ships' hulls.

Principal source: Kahng, Undated(b) *Carijoa riisei*: Fact Sheet Department of Oceanography, University of Hawai'i.
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Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

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ALIEN RANGE

[1] INDIAN - OCEAN EASTERN

[9] UNITED STATES

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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).
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