

Sea Cucumbers

There are directed commercial fisheries in the PNCIMA area for three species of echinoderms: one sea cucumber and two sea urchins.¹ The sea cucumber fishery targets giant red sea cucumbers (*Parastichopus californicus*), an echinoderm found at depths ranging from intertidal to 250 m. They are found on most substrate types, but show preferences for hard substrates.² Sea cucumbers are commonly associated with bedrock in areas with low to moderate current and areas rich in micro-organisms and/or organic matter. In general, echinoderm species aggregate, resulting in significantly high population densities in areas with favourable conditions, such as available food and specific reproduction temperatures.³

Sea Cucumber Fishery

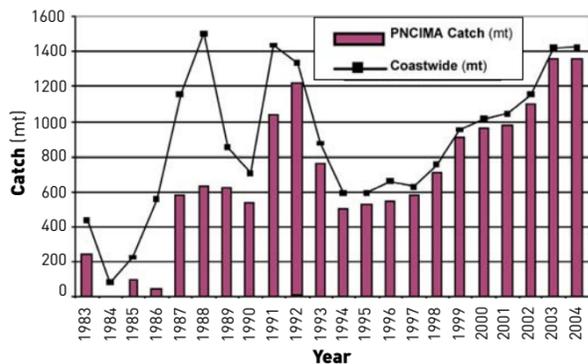
The sea cucumber hand-picking dive fishery is small and limited.¹ The PNCIMA sea cucumber catch is presented alongside the coastwide catch in the graph.^{1,4}

Today, the commercial fishery is managed through limited entry licensing, area licensing, a precautionary fixed exploitation rate of 4.2 percent,⁵ area quotas and an Individual Quota (IQ) program. In 1997, an adaptive management plan was implemented that divided the coast into three categories: non-contiguous areas for the commercial fishery, areas allocated for experimental fisheries, and areas closed to harvesting until they were determined to be sustainable.¹ There are also large, self-imposed closures for this fishery.⁶



Giant red sea cucumber. Photo: Mueller

Sea Cucumber Catch



Fishery Effort

The fishery effort map, using four by four km gridded data, represents 78.40 percent of the data available for PNCIMA after screening for confidentiality (minimum three vessels reporting per grid cell).¹ The five data classes presented on the map are based on natural groupings inherent in the data such that similar values are grouped and differences between classes are maximized (Natural Break or Jenks statistical method). The cumulative sea cucumber fishery effort was measured in dive hours.

Invertebrate fisheries are predominantly located along the inner coast where access, transport and shipping of product are more readily available. In PNCIMA, the majority of the sea cucumber fishery effort is located in the inside waters of the central and northern coasts, primarily off Dean Channel, directly around Bella Bella, and in Douglas Channel leading to Kitimat. With the exception of the north and west coasts of Haida Gwaii (Pacific Fishery Management Areas [PFMAs] 1 and 2W), the central and north coast (PFMAs 3 to 10) support approximately 80 percent of the fishery effort coast-wide.¹

The proximity of fishing to the coast makes the gridded data appear to overlap land, an artifact of applying the data to a standard grid. The fishing data were layered above the land only to make the data more visible.

Map data are viewable online through DFO Mapster at www-heb.pac.dfo-mpo.gc.ca/maps/maps-data_e.htm
 Material presented is drawn from the following literature reviews, which include primary references:
 1 MacConnachie, S., Hillier, J. and Butterfield, S. 2007. Marine use analysis of the Pacific North Coast Integrated Management Area. Can. Tech. Rep. Fish. Aquat. Sci. 2677: viii + 188p.
 2 Lucas, B.G., Verrin, S. and Brown, R. (Editors). 2007. Ecosystem overview: Pacific North Coast Integrated Management Area (PNCIMA). Can. Tech. Rep. Fish. Aquat. Sci. 2667: xiii + 104p.
 3 DFO. 2008/2009. Sea cucumber integrated fisheries management plan, 82 pp.
 4 The date ranges in the graph and map differ because the graph is taken from MacConnachie et al. (see footnote 1), but updated information was available when creating the map.
 5 The 2010/2011 Integrated Fishery Management Plan for sea cucumber states that the 4.2 percent harvest rate will continue to be used throughout most of coastal BC. The exception to this is that in newly surveyed locations where logistically impassable or unsafe areas have been removed and where the habitat is suitable for sea cucumber productivity, a harvest rate of 6.7 percent will be used.
 6 British Columbia Marine Conservation Analysis Project Team. 2011. Marine atlas of Pacific Canada: a product of the British Columbia Marine Conservation Analysis. Available from www.bcmca.ca (Accessed March 2011).

The sea cucumber fishery targets giant red sea cucumbers

