Management options of the commercial dive fisheries for sea cucumbers in Baja California, Mexico

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Isostichopus fuscus and *Parastichopus parvimensis* have been commercially fished in Baja California (BC) for ten and six years respectively. Processors sell these whole, gutted and dried, boiled, semifrozen and as raw fresh muscle. These products are all exported to the United States and later re-exported to Asia. For both coasts, landings averaged 1000 t from 1988 to 1994 (fresh total weight); the highest catch, in 1991, was almost 2000 t.

Until now, sea cucumber fishing has been virtually unrestricted; divers could take animals 365 days a year from any area as long as they held a permit.

In 1992 and 1993 there was a noted drop in diver's catch per unit of effort (CPUE) and total catch, related to the 'explosion' of fishing effort (more permits and bigger fleet size). In the light of decreasing catches and CPUE and increasing harvest depths, it appeared that the resource had been overfished and this has prompted intensive management. Closed season, size limits, underwater population surveys and catch monitoring all play a role in maintaining the resource.

In February 1994, regulations were adopted to restrict the harvest season to the period from 1October to 30 April. This seasonal closure for five months was designed to permit reproduction. Different size limits were proposed for each species. They consisted of length limits (26 – 23 cm and 24 – 21 cm) and weight limits (550 – 400 g and 350 – 200g) for whole and gutted-and-drained sea cucumbers respectively.

Recommendations for catch and CPUE levels are : total catch under 1000 t per year (harvest season) with a fleet size of 50 boats and 14 permits.

These regulations have still not been enforced, but in May 1994 the National Institute of Ecology declared *I fuscus* to have the status 'in danger of extinction' along the Mexican Pacific coast, which means a ban on the fishing of this species in the entire area.

Future changes will be made to the regulations in the light of additional information from our studies.

Developments in California sea cucumber landings

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Kristine Barsky and Dave Ono from Associate Marine Biologists (74763.1265@compuserve.com, California Dept. of Fish and Game, 530 East Montecito Street, Room 104, Santa Barbara, California 93103) write about the situation of the sea cucumber fishery in California.

The sea cucumber fishery began in California near Los Angeles around 1978. The catch is composed of the warty sea cucumber (*Parastichopus parvimensis)* and the California or giant red sea cucumber (*P. californicus*).

Warty sea cucumbers inhabit the ocean bottom from the intertidal zone out to 27 m, and range from Monterey Bay to Baja California. This species is uncommon north of Point Conception.

Giant red sea cucumbers inhabit the subtidal zone out to 90 m, and range from the eastern Gulf of Alaska to Baja California.

Warty sea cucumbers migrate annually between their shallow- and deep-water depth limits. Fishermen claim that giant red sea cucumbers make similar large-scale movements over varying depth ranges, but this has not been verified by research.

The warty cucumber is harvested by hand by commercial divers, primarily in southern California (south of Point Conception). The California sea cucumber is taken primarily with trawl net gear, also in southern California.

The catch averaged under 45 t annually until 1982, when a trawl fishery developed near Santa Barbara. During the next 10 years, annual landings increased gradually. In 1991, an influx of trawlers, predominantly out of the port of Los Angeles, greatly expanded the fishery.

Catches from 1984 to 1992 were as follows:

Year	Catch (t)
1984	21.0
1985	26.6
1986	35.1
1987	48.5
1988	71.6
1989	72.0
1990	66.3
1991	261.9
1992	263.0

Since the 1992–93 fishing season (1 April to 31 March), the fishery has had restricted limited entry. To qualify for a sea cucumber permit a fisherman must have landed 50 lb of sea cucumber between 1 January 1988 and 30 June 1991. There were 86 permit-holders in 1993.

In 1993, 293 t of sea cucumber were landed in California. The catch was mainly composed of 12 t of warty sea cucumber and 279 t of California or giant red sea cucumber.

Most sea cucumbers were landed at the ports of Los Angeles and Santa Barbara. The main fishing grounds for *P. californicus* were the Santa Catalina Channel and the Santa Barbara Channel, at depths of 30 to 90 fathoms. *P. parvimensis* was harvested as far south as San Diego, but most of the catch was taken from waters off the northern Channel Islands.

Cucumber landings for the first nine months of 1994 were 259 t. The average price for warty sea cucumbers was $0.66/lb; it ranged from $0.30 to $0.90/lb; the average price for California sea cucumbers was $0.62/lb; it ranged from $0.20 to $0.70/lb.

However, divers are frequently paid a higher price per pound for the cucumbers they harvest. The warty variety is supposed to have a thicker, meatier body wall, which could result in a higher price for the diver.

Most of the sea cucumbers landed are dried and exported to Hong Kong and Taiwan. A small portion of the harvest is sold in the United States.

Problems of the Galapagos sea cucumber fishery

Communicated by C. Conand

Background information

Based on information and correspondence from G. Coppois, Charles Darwin Foundation

Ninety-five per cent of the Galapagos Islands Territory is a national park, with the remaining five per cent occupied by 'Ecuadorean settlers'. Unemployment on the mainland has caused many Ecuadoreans to move to this region over the last decade. The Marine Resources Reserve was created in 1986.

Traditional subsistence fishing in the Galapagos Islands is relatively undeveloped and there has never been any traditional fishing of sea cucumbers. Sea cucumber fishing appeared after the decline of the rock lobster fishery which was prohibited at the end of the 1980s. This venture was brought in from abroad and is controlled by entrepreneurs on the mainland. Local fishermen quickly turned to this type of fishing and currently account for 100 out of the 250 people involved. Processing camps have been set up on land in national park areas, leading to clearing of the land, fires, etc.

In 1992, a decree from the President of the Republic of Ecuador prohibited the harvesting of sea cucumbers, but social tensions have been very high (summer, 1994) and it has been very hard for the authorities to enforce this decree. In September 1994, an attempt was made to regulate the conflict through trial authorisation of 'artisanal' fishing in park waters, but this experiment does not take into consideration long-term conservation efforts. Negotiations are currently in progress. The Darwin Foundation, the Darwin Research Station and the National Park are continuing their efforts so that the Galapagos Islands, which have been declared a 'World Heritage' site by the United Nations, will safeguard their ecological resources for future generations.