

Date: 9/4/93  
 Time: 19h00  
 Species: *Stichopus chloronotus*  
 Moon Phase: full + 2  
 Remarks: 5 individuals, sea grass bed  
 Observer: S. Uthicke

**General Remarks:** only populations of *S. chloronotus* were generally observed for spawning (this means that they actually did not spawn in the months where no spawning was recorded) all observations on other species were made by coincidence.

### Spawning of lollyfish (*Holothuria atra*) — communicated by Johann Bell

**Species:** *Holothuria atra*

**Number:** Three individuals (1 female & 2 males) out of a group of 15 animals held in a 75l fibreglass tank spawned at 12.00h on 14 October 1993. The tank was supplied with a system of flow-through seawater at 30°C.

**Behaviour:** Anterior half of the body elevated during spawning, with uniform swaying from side to side. Gametes were released from the genital papillae in strands of varying lengths. Gametes were negatively buoyant, sinking to the bottom of the tank or onto the animal itself. Eggs were pink and sperm were white. The release of gametes was moderately slow. Upon disturbance, gametes spilt from the strand into the water. The spawning period for each individual varied between 20 and 30 min.

**Fertilisation:** The average size of an unfertilised egg was 137µm. The two-cell division stage was reached after two hours. The four-cell stage began after four hours.

**Moon Phase:** 1 day before New Moon.

### The sea cucumber should stay under

by Catherine Malaval  
 (Excerpt from an article published  
 in Liberation, 25/01/94)

The holothurian, highly valued for its culinary virtues, especially in South-East Asia, is being over-fished.

The problem is that, like the earthworm on land, it plays an important ecological role on the sea floor.

Dried, rehydrated, tossed into a soup or cut into thin slices, it is a delicacy for the Chinese, who call it beche-de-mer or trepang. Served raw with soy sauce, it is also a favourite of the Japanese. This has been true for thousands of years, ever since the culinary qualities of the holothurian, or sea cucumber, were first discovered. Unfortunately this creature, whose soft body makes it at first glance quite repulsive, is today the target of a booming trade.

In tropical regions, 80,000 t are thought to be harvested each year, while another 12,000 t are estimated to be taken annually in temperate zones. Their destination: the big Singapore and Hong Kong markets. 'Over-exploitation is occurring almost everywhere. While it is true that we do not have as much information on the sea cucumber as we do on tunas or whales, the signs are unmistakable. Once an area is depleted, fishermen change

location, and this process is being seen more and more frequently. The size at capture is also decreasing. Nowadays it rarely even reaches one metre', explained Chantal Conand, a biological oceanographer and senior lecturer at the University of La Réunion.

In short, the sea cucumber is highly sought after not only in Japan or China but also in all the other 'Chinatowns' around the world, such as those in Sydney or San Francisco. So much so that this animal, which once passed its days peacefully reclining on the ocean floor, is soon to become the subject of a study programme off the Galapagos Islands by the World Conservation Union (an international conservation organisation). It is already under surveillance in the Maldives. Researchers are hoping to develop a system of aquaculture without delay. This will not be possible without a full file on holothurians, a major task.

'Just knowing its growth rate poses a problem. Frankly, measuring a holothurian is like trying to measure an accordion!' claims Conand, who, from 1981 to 1984, conducted a study aimed at assessing the number of exploitable species, for ORSTOM in

New Caledonia. 'What's more, of the 1,200 species of holothurians, the 12 which are edible do not all have the same biology.' In general, it is known that a toxin, concentrated mainly in its skin, protects it from many predators and that it sometimes allows small fish such as Carapidae (messmate fish or pearlfish) to take shelter in its anus. Its method of reproduction is quite astonishing – both males and females, which are ordinarily content to lie flat, rear up like cobras and swing backwards and forwards while releasing their sexual cells.

Finally, the sea cucumber plays a very important role ecologically. As it moves forward, it ingests

and turns over kilos of sediment from the ocean floor. 'If they were not around to stir up the sediment, it would become more stratified and there would be less oxygen. Less oxygen means that the sediment would be less healthy and thus there would be less food for other animals', explains Conand. In other words, the sea cucumber plays the same role on the seabed that the earthworm plays on land.

A useful but unlucky animal: large quantities must be harvested to supply enough to eat since, in fact, only 10 per cent of the animal, i.e., its thick skin, is eaten.

### Sea cucumber dive fishery in Washington State: an update

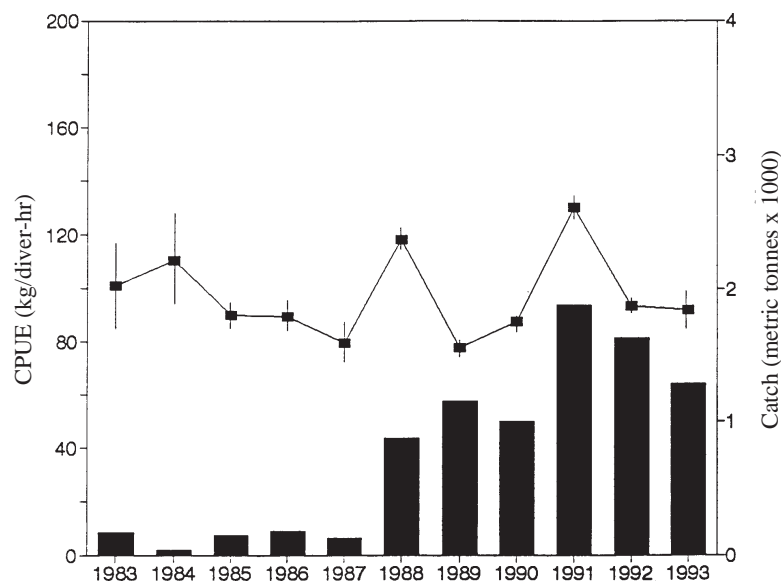
by Alex Bradbury  
Department of Fisheries  
Washington State, USA

The commercial dive fishery for *Parastichopus californicus* in Washington State began in 1971, and was the subject of an article by C. Conand and A. Bradbury in *Beche-de-Mer Bulletin* #3 (1991). This article updates the fishery information for the last three seasons (1991–1993) and summarises catch-and-effort data since 1983, the first year that harvest logbooks were required.

From 1971 to 1986, the fishery was open in all areas. Following signs of overfishing, Washington State Department of Fisheries implemented a rotational harvest from 1987 to 1992. State waters were divided into four areas, each fished for roughly six months followed by a closure of roughly three and a half years.

In 1993, it became apparent that two of the four harvest areas were not as productive as the other two, resulting in catch inequities and economic imbalance. The future of the rotational system was also questioned following legal decisions regarding harvest rights for native American Indian tribes. The rotational system was abandoned midway through the 1993 season, with the fishery returning to an all-State fishery. The pros and cons of rotational management are presently being analysed from biological, legal, and socioeconomic standpoints.

A summary of production and catch per unit of effort (CPUE) since 1983 is given in Figure 1. Catch figures prior to 1988 should be viewed with cau-



**Figure 1.** *Parastichopus* catch per unit of effort (line) and catch (bars) since 1983 in Washington State. Vertical bars through CPUE estimates are 95% confidence intervals derived from lognormalised data. Catch refers to tonnes of split, drained, and eviscerated sea cucumbers.