

RED SEA URCHIN

Background

The red sea urchin (*Strongylocentrotus franciscanus*) is found from Baja California to Alaska, and from the Aleutian Islands to Hokkaido Island, Japan. The largest of five species of sea urchins occurring in British Columbia, the red urchin is usually found on rocky substrates in shallow water areas of moderate to strong currents, typically from the intertidal zones to depths of 50 metres, although some individuals occur as deep as 125 metres.

Red sea urchins have separate sexes, mature at about 50 mm test diameter (TD), and recruit into the fishery at 90 mm TD. Reproduction occurs annually with timing of the spawning season varying from March to September depending on local environmental conditions such as food availability and temperature. Gonads increase in size usually from September to January. Mature males and females release eggs and sperm into the water and fertilization success will depend on the local density of adults and dilution of gametes. The larvae are planktonic for 6 to 9 weeks prior to settlement on suitable habitat. Juvenile (4-50 mm TD) abundance is usually highest when associated with the spine canopy of adults as a refuge from predators. This juvenile-adult association may be important to the recruitment success of juveniles to legal size.

Red sea urchins are harvested by divers and delivered fresh to processing plants where the roe is extracted, treated and sold in Japan and North American markets as uni. Yields of roe from whole sea urchins range from 5 to 15%. Food availability in the wild is an important factor in determining the quality of red sea urchin roe for the market.

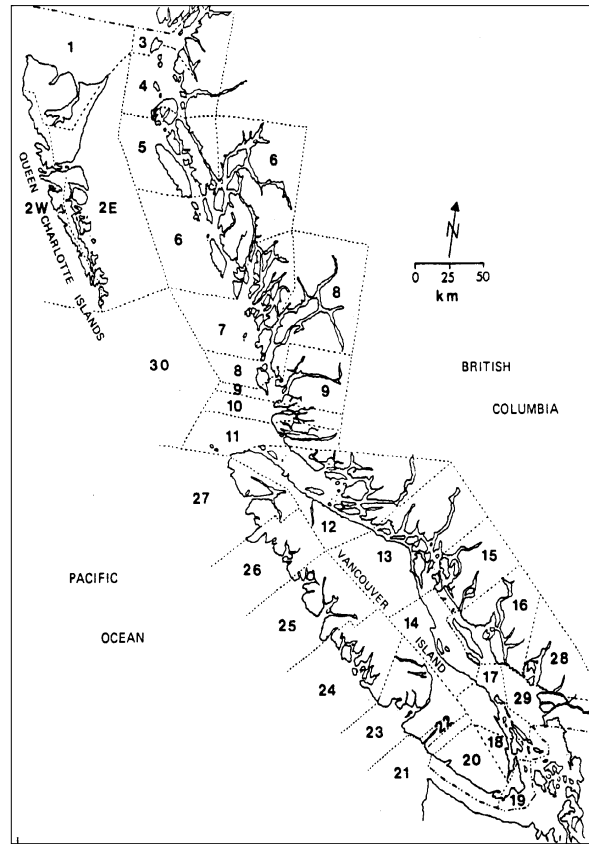


Figure 1: Fisheries Statistical Areas for coastal B.C.

The Fishery

The red sea urchin has been the subject of a commercial diving fishery in B.C. since the 1970s. Annual landings began to increase rapidly in the early 1980s for the south coast of B.C. and the late 1980s for the north coast, but after 1992, landings were reduced and stabilized by quotas. The total annual landed value has generally increased throughout the red sea urchin fishery (Figure 2), peaking at \$14.4 million in 1997/98 (18 month fishery). In 2001 there were 110 licences issued with a coastwide quota of 4,885.9 tonnes, 17.3% allocated to the south coast and 82.7% allocated to the north coast of B.C.

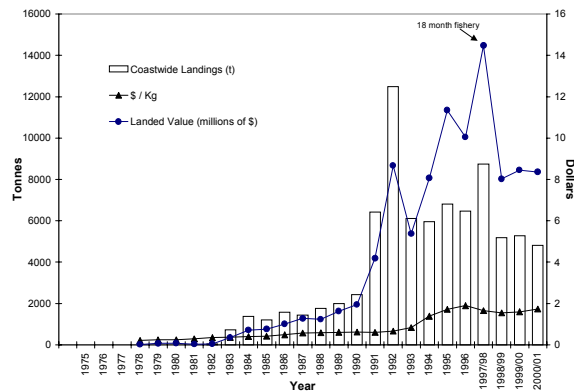


Figure 2: Annual total landings (t, columns), ex-vessel value (millions of dollars, dots), and value per kilogram (triangles) for red sea urchin fishery in British Columbia.

Currently, the main management tools of the red sea urchin fishery include: a minimum test diameter of 90mm (reduced from 100mm in 2000) to allow about 3 to 5 spawning years for red sea urchin prior to harvest; a quota system to provide a conservative fixed exploitation rate of about 2% of estimated biomass; limited licence entry; and an Individual Quota (IQ) program in which total quota is divided equally among licences. Industry funds management and research through fees to association members, and contracts independent port validators for the IQ program, an on-grounds monitor to record fishing vessel activity and beds fished, processing plant samplers to examine the size range of urchins harvested, and vessels and divers for surveys for biomass estimation as well as other research activities.

Resource Status

In recent years, annual fishery updates and assessments have been prepared. Quotas are estimated from a modified surplus production model which provides for an approximate 2% annual rate of exploitation of estimated biomass of recruited red sea urchins. Biomass is calculated for each statistical subarea as the product of the estimated average weight and

density of urchins per square metre (from surveys) and bed areas.

Historically, commercial bed areas of red sea urchins were indicated on charts or diagrams provided by fishermen with their harvest logbooks, then transferred to hydrographic charts, digitised, and bed areas estimated. Since 1997, harvest log data have been more reliable, with the combination of the dockside validation and harvest logbook programs. Currently, harvest location information is digitised directly from harvest logbooks on a “fishing event” basis. Density and weight estimates are based on surveys conducted between 1994 and 2001.

The commercial fleet has discovered most of the productive red sea urchin beds in B.C., although there are a few beds that are closed due to overfishing or depletion by sea otters, as well as five areas set aside as research study sites. There are also a number of beds that are not fished due to high densities and poor gonad quality.

Although quotas have decreased in recent years this is attributed mainly to refined assessment techniques (for urchin density and bed estimation), than to significant declines in stock biomass.

Outlook

Improved understanding of red sea urchin natural mortality stock and recruitment relationships, and biomass estimates are anticipated through surveys and on-grounds observer reports. A long-term strategy is presently being developed that includes: continuation of the processing plant sampling program initiated along with the reduction in minimum size limit to provide information about temporal and spatial changes in size frequency; continued improvement of the process used to estimate bed areas; and incorporates adaptive management methods

for sustainable harvests while maintaining a precautionary approach to management. Sea otter populations are expanding in B.C. and may become a major influence on red sea urchin populations in the future. Currently there is no management to restrict sea otter populations as the sea otter is considered a threatened species in B.C.

For more Information

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