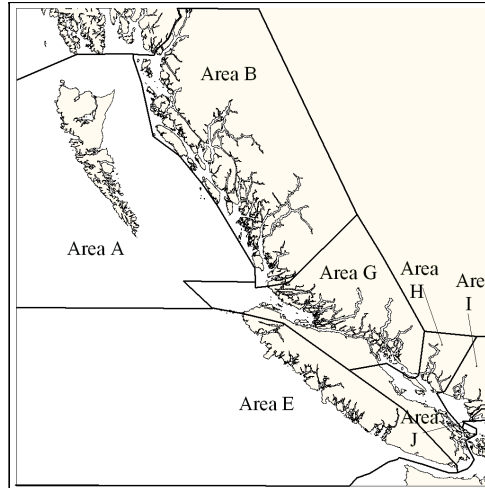


Dungeness Crab Coastal Fisheries License Areas B, E, G, H, I & J



Background

The Dungeness crab, *Cancer magister*, is found from California to Alaska, generally on sandy bottoms less than 50 meters deep with moderate to strong current. Dungeness crabs are the most important crab species harvested in British Columbia and are exploited by commercial, aboriginal and recreational fishers coast-wide. Major crab fishing areas in British Columbia include the Fraser River delta, the Gulf Islands and inside waters of the Strait of Georgia, the west coast of Vancouver Island off Tofino, the Skeena River estuary, and Hecate Strait/McIntyre Bay. The coastal fisheries above, exclusive of Hecate Strait/McIntyre Bay (crab license Area A, a separate report) are discussed in this document.

Maximum size in British Columbia is about 220 mm shell width, or approximately 2.0 kg weight however most crabs caught are less than 200mm or 1kg. Female crabs are generally smaller.

In 1998, landings totalled \$21.4 million. The Dungeness crab fishery ranked 2nd in value of all invertebrate fisheries and 7th overall amongst all fish species harvested on the west coast of Canada. British Columbia, with 15% of coast-wide landings, ranked fourth, behind Washington, (34%) California, (27%) and Oregon, (17%) but ahead of Alaska (7%). Coastal crab fisheries, considered here, accounted for 62% of the total B.C landings in 1998.

Summary

- Dungeness crabs are the second most valuable invertebrate fishery on the west coast of Canada. Reported landings exceeded \$21 million in 1998.
- All major Dungeness crab fisheries are considered to be fully exploited.
- There may be substantial underreporting of harvest due to illegal fishing. Effort and landings in the recreational and aboriginal fisheries are unknown.
- Dungeness crab fisheries are managed in a precautionary manner by size and sex restrictions. Removal of undersize and female crabs through illegal harvest and incidental commercial fishing mortality violate these precautionary principles and could threaten the viability of some fisheries.
- Escalating effort levels in all Dungeness crab fisheries have necessitated more stringent management of this resource.

Species Biology

Crabs grow by producing a new shell underneath the old one, a process called moulting. Once the old shell is cast off, the new shell quickly swells with water to a size approximately 15-25% larger. For the first several weeks, the new shell is soft and easily damaged. In this softshell condition, the crab is highly vulnerable to natural predation and to injury or death as a result of trapping and handling. Hardening requires 2 months or more. Smaller crabs moult several times per year while large crabs may moult annually or biannually after reaching sexual maturity. Moulting, generally takes place in late spring and is usually locally coordinated although timing is variable between years and over relatively short distances. A crab becomes sexually mature after the second year and usually enters the fishery at 3 years. Maximum age is probably 6-7 years.

Mating takes place in summer. The female crab can only be bred in the newly moulted (softshell) condition but can produce two or more batches of eggs from a single mating using stored sperm. In the fall she extrudes a bright orange clutch of eggs which adheres to her abdomen. Throughout the winter she remains inactive, buried in bottom sediments protecting and aerating her eggs. The eggs hatch in the spring and planktonic larvae are released into the water. The larvae develop for 3 to 4 months and become dispersed by ocean currents before eventually settling on suitable bottom. Recruitment of juveniles is probably from this general offshore larval population, at least regionally, and appears to be independent of local adult stock abundance. Once crabs have settled, they are confined throughout their juvenile and adult lives by appropriate habitat.

The Fishery

The commercial crab fishery in British Columbia began near Vancouver in the late 1800's. Product was locally consumed or canned. Fisheries began in Tofino and on the North Coast in the 1930's where nearly all product was canned. Other areas developed during the 1950's and 1960's as

transportation improved and live markets developed. Today, every area with commercial abundance of crabs is exploited.

With the exception of the exposed West Coast of Vancouver Island off Tofino, most fisheries take place in estuaries such as the Skeena and the Fraser, or in coastal inlets which are relatively sheltered. Consequently, vessels are somewhat smaller and gear lighter than that fished in Area A (Hecate Strait). Vessel length is generally between 8m and 14m. Many vessels near urban centres operate daily out of port and may deliver daily as well, although most tend to accumulate live catch in holding cages for up to a week.

No cyclic patterns have been noted in any of the coastal fisheries, and interannual variations in landings appear less pronounced than Hecate Strait (Area A) or the outside coast of the U.S.

Fishermen are required to select one of seven crab licence areas in which to fish. This pilot, begun in 1997, has been extended for another three years beginning January 1, 2000. Each licence area is unique and has different management strategies developed in consultation with the local stakeholders.

Basic Dungeness crab fishery management is by size and sex, and in some areas by season and gear restrictions. No quotas are set. A minimum size limit of 165mm shell width (outside spines) applies to male crabs harvested in B.C. in both commercial and recreational fisheries. Retention of females is prohibited in the commercial fishery.

All commercial fishing is done with baited traps. These have circular steel frames 70-90 cm diameter, 20-30 cm high covered with stainless or synthetic mesh. Crabs are attracted to fresh bait, usually squid, herring, clams or fish frames, and enter via entrance tunnels, triggered to retain large crabs. Traps must be equipped with an escape port to allow escape of undersize crabs, and must also have a biodegradable mechanism to prevent the trap from fishing for an extended period if lost. Traps must be hauled a minimum of once in 14 days.

Commercial crab fishing licenses are vessel based. Depending on license area, traps may be singly buoyed, or fished on sunken long-lines buoyed at either end with from 10 to 50 traps. Buoys must carry the fishing vessel license number. Trap limits have been established in all areas as of 2000.

Crabs are cooked, processed for meat, or shipped live to world markets. The major market is the US. Ex-vessel price in 1998 averaged \$7.20 (Can.) per kg. with an average weight of 0.74 kg. per crab.

Recreational and aboriginal harvest is by trap, dip net, mesh covered open ring or by SCUBA. A recreational fishing licence or Native Band licence is required.

Catch and Effort

Commercial effort in all areas has increased significantly over the past decade, which has, in most areas, resulted in the annual removal of nearly all of the legal size male crab. These are replaced by small crabs moulting up (recruiting) to legal size. Fluctuations in crab landings over the past ten years tend to reflect local variation in annual recruitment rather than changes in effort. Landings in all areas (excluding Area A) have remained relatively stable or have increased slightly in the last ten years.

Recently, high landed value of crabs has intensified competition for a seasonally limited resource. This has resulted in shortened fishing seasons, retention of soft, undersize and female crab, over-capitalisation, gear theft, trap robbery, and vandalism. Markets are frequently flooded with product shortly after openings, reducing the value returned from this resource.

There is increasing demand by First Nations groups for food social and ceremonial harvest by traditional means. This has resulted in removal of some areas from commercial fishing, thereby increasing competition in other areas.

Recreational fishing effort directed toward crabs

has also increased owing to a growing population and to a shift in target species from salmon to other fish and invertebrates.

Aboriginal and sports effort and landings remain unquantified and may be substantial in certain areas.

Management Considerations

Recent management actions including trap limits, seasonal softshell closures and gear restrictions are in response to increasingly high effort levels in all areas by all sectors. At the same time, the level of directed enforcement in crab fisheries has declined.

Management in all Pacific coast crab fisheries focuses on reducing mortality of undersized, female, soft shelled and juvenile crabs as a means of ensuring reproductive potential. At low to moderate effort levels, the highly selective trap fishery does not seriously impact upcoming generations of small crabs. However, there is mounting concern, especially near urban areas, that undersized and female crabs are being removed either by directed illegal harvest or through incidental mortality due to the intensive fishing. These practices could jeopardize otherwise sustainable fisheries.

Resource Status

Exploitation of this resource is near maximum. The consequence of current high levels of effort to the long term stock dynamics and overall economics of this fishery are unknown. Most crab stocks appear viable and continue to support valuable commercial fisheries despite high exploitation rates over the past decade.

Outlook

All major fisheries appear to have achieved maximum harvest rates of legal size crabs. It is expected that landings will fluctuate to some extent due to natural environmental variation, however the resource will ultimately remain limited by available crab habitat. Increased revenue from this resource will depend upon

harvest strategies that optimize the landed product value.

Table 1 Catch and Landed Value for Crab License Areas B, E, G, H, I & J

Year	Vessels	Catch (tonnes)	Value (K\$ Can.)	Price (ave./kg.)
1988	~	1129.3	4449.4	\$3.94
1989	~	1167	4632.9	\$3.97
1990	468	1351.7	5663.6	\$4.19
1991	205	1409.9	6330.5	\$4.49
1992	205	1733.3	5719.5	\$3.30
1993	200	1491.2	4413.9	\$2.96
1994	189	1722.8	7356.4	\$4.27
1995	182	1810.4	9251.1	\$5.11
1996	171	1609.9	7582.6	\$4.71
1997	167	1803.1	13342.9	\$7.40
1998	168	1847.5	13339.1	\$7.22

Table 2 Fishery CPUE and Effort for 1990-1998

Year	CPUE Kg./day	Trap Days (millions)
1990	1.31	1.26
1991	1.36	1.34
1992	1.42	1.14
1993	1.36	1.58
1994	1.38	1.80
1995	1.40	1.99
1996	1.04	2.02
1997	0.87	2.14
1998	0.78	2.41

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