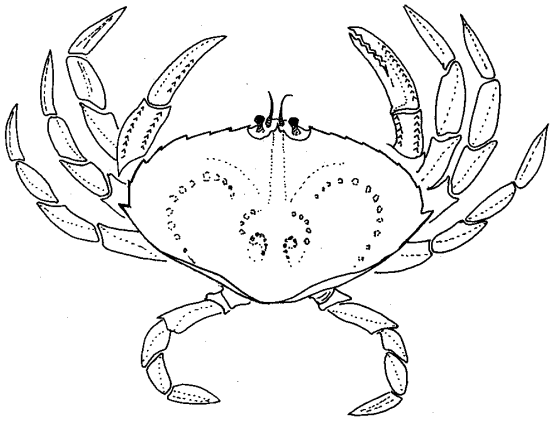

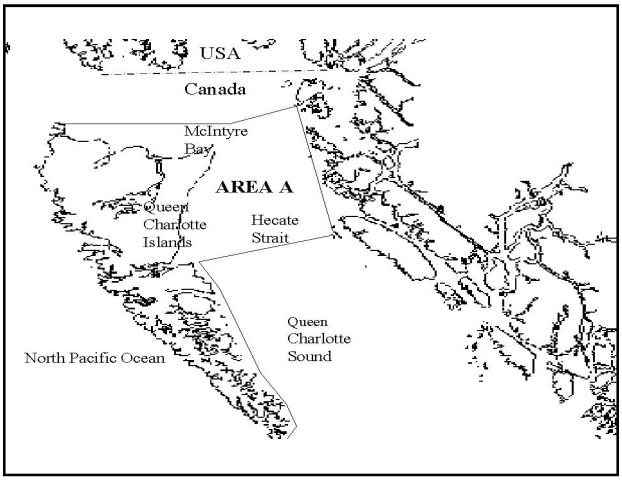

Dungeness Crab North Coast License Area A

Background

*The Dungeness crab (*Cancer magister*) is found from California to Alaska, generally on sandy bottoms less than 50 metres deep and subject to moderate to strong currents. Dungeness crabs are the most important species of crab harvested in British Columbia and are exploited by commercial, aboriginal and recreational fishermen coast-wide. Major crab fishing areas include Hecate Strait, McIntyre Bay, the Fraser River delta, the Skeena River estuary and waters off Tofino on the west coast of Vancouver Island. This report deals with crab stocks in Hecate Strait and Dixon Entrance, (Licence Area A).*

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 by 20 to 30 %. For the first few weeks, the new shell is soft and easily damaged, and the crab is highly vulnerable to natural predation, or to injury or death as a result of trapping and handling. It requires 2 months or more for the new shell to completely harden and fill with meat. Smaller crabs may moult several times a year while large crabs may only moult once in two years. Moulting generally takes place in late spring.

The Fishery

North coast crab stocks are probably composed of two or more component populations that interact to some extent. These include populations in Dixon Entrance, (Naden Harbour, Virago Sound, and McIntyre Bay) and in Hecate Strait. This area has supported the major crab fishery in British Columbia since 1993, but historically has shown periods of low stock abundance interspersed with relatively shorter periods of extremely high abundance. Fluctuations are unpredictable, although they appear less pronounced in Dixon Entrance.

The crab fishery on the north coast began in Naden Harbour, at the north end of Graham Island, in 1920 and would have been impracticable if not for the establishment there of the first crab cannery in Canada. With development of the circular trap in the late 1930s, the fishery was extended, first to adjacent Virago Sound and McIntyre Bay (Dixon Entrance) and then, in 1946, to Hecate Strait. Until the 1950s, nearly all the catch was canned, but after the Second World War, markets developed for fresh-cooked and live crabs. Currently, crabs are shipped live to world markets, or processed and sold fresh-cooked or as shelled meat. The major market is the U.S. Ex-vessel price in 1998 was $7.22 per kg, with an average live weight of 0.79 kg per crab.

Only male crabs above the regulated minimum shell width of 165 mm are retained by the fishery. Commercial harvest in Area A is primarily by circular traps constructed of a heavy steel frame between 80 and 110 cm in diameter and 20 to 35 cm deep, covered with stainless steel mesh. The traps are baited and usually have two or more entrance tunnels, triggered to prevent escape of large crabs. By regulation, they must have an escape port for undersize crabs, and be equipped with a biodegradable device to prevent traps from continuing to fish if lost. As of 1998, traps must be individually buoyed. In this area, traps are hauled every 3 to 14 days, although the incidence of soak times exceeding the 14day maximum has increased. Open, mesh-covered rings are the only gear allowed in the Naden Harbour fishery. These are pulled every one to several hours. Crab vessels range from 5 to 25 metres may deploy 100 to 1,500 traps, depending on vessel size and fishing conditions.

In 1997, crab fishermen were required to select one of 5 licence areas in the province to fish for a trial period of three years. Reselection for one of 7 licence areas will be for another 3-year period commencing in 2000. The number of commercial licences was limited to 223 in 1991, of which 52 currently fish Area A. Recreational and aboriginal harvest is by trap, ring, dip-net or scuba dive gear. A personal fishing license or band licence is required and the minimum catch size limit of 165-mm shell width also applies.

Catch and Effort

Commercial effort has increased significantly over the last decade in this and other invertebrate fisheries, owing to development of new markets, increased value for product, improved harvest technology, and reduced opportunities in finfish fisheries. The high biomass of crabs on the north coast from 1993 to 1996 attracted many fishermen from other licence areas and has encouraged over-capitalization.

High variability in Area A crab stocks has been documented over the past 50 years with low abundance levels predominating. The causes of these fluctuations are unknown, although natural forces are suspected. Currently the north coast crab population is shrinking, whereas prices for crabs landed have risen. As a result, fishermen have tried to maintain catches by increasing trap inventories, fishing in unsafe conditions, and landing soft crabs. The unprecedented effort levels are thought to be threatening an already declining resource.

Recent management actions are largely a response to these high effort levels. A spring soft-shell closure for Hecate Strait implemented in 1996 and extended in 1997 and 1998 was added to the closure in place for McIntyre Bay since 1958. Trap limitation as a means of reducing effort has been discussed, but it has been rejected by fishermen in the area owing to disagreement over equitable trap allocations, and the high levels of enforcement required to ensure compliance over such a vast area. An additional winter closure was imposed in 1998 as an alternative to trap limitation.

Recreational fishing effort directed toward north coast crabs has also increased due to improved access, an increase in the number of fishing lodges and a general increase in tourism in the area.

Effort, Catch and Landed Value for Crabs in Area A

Year	Vessels	Catch (tonnes)	Value (K$Can.)	Price (av./kg.)
1985	-	166.3	674.7	$4.05
1986	-	219.0	939.5	$4.29
1987	-	257.6	1,020.1	$3.96
1988	-	378.6	1,491.6	$3.94
1989	-	351.5	1,395.5	$3.97
1990	13	777.7	3,258.5	$4.19
1991	11	447.9	2,011.1	$4.49
1992	11	1600.3	5,281.0	$3.30
1993	21	4798.0	14,202.1	$2.96
1994	33	4272.5	18,243.6	$4.27
1995	38	2728.8	13,944.2	$5.11
1996	51	3320.8	15,641.0	$4.71
1997	53	1568.1	11,666.7	$7.40
1998	52	1107.3	7,994.7	$7.22

Management Considerations

With increasing competition for a declining resource, gear theft, trap raiding, and other illegal fishing activities have become problems. A major concern with large individual trap inventories is that, due to weather or other problems, it may not be possible to tend all traps within the regulation 2-week interval, which results in crab mortality through confinement and cannibalism and a subsequent loss to the fishery. There is also growing concern over the impact on other crab fisheries if a large number of Area A license holders elects to change areas in the year 2000.

Resource Status

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. To date, no relationship has been described between stock size and recruitment. At low to moderate effort levels, the highly selective trap fishery does not seriously effect upcoming generations of small crabs. Whether the current high levels of effort will affect long-term stock dynamics on the north coast is unknown. Healthy crab stocks remain on the south coast, despite intensive fisheries over the past several decades.

McIntyre Bay experiences less inter-annual variation in landings than adjacent Hecate Strait. The two areas appear to have separate stock dynamics, although migration of crabs from McIntyre Bay to Hecate Strait has been documented. This may be in response to lower stock densities in Hecate Strait. Some parts of the strait show a stock structure similar to that of intensively exploited stocks on the south coast, where nearly all legal-sized crabs are removed in a given fishing season. Under these conditions, the fishery is sustained mostly by one year-class of crabs and is therefore highly sensitive to natural variation in crab recruitment. Landings from the Hecate Strait component of Area A appear to be naturally unstable. High effort levels may further destabilize this fishery by removing other, larger, year-classes of crabs normally present in this fishery. The economics of pursuing this fishery may prevent effort levels from increasing further.

Outlook

The commercial fishery in Area A is probably oversubscribed for the current crab biomass. Except for 1996, catches have been declining steadily since 1993 and are expected to continue to decline in the near future. With changing technology and economics, and long-term changes in climate, it is uncertain at what level the fishery can be sustained. Historic records suggest that a return to higher abundance levels is likely, but the timing and magnitude are unpredictable based on our present knowledge of recruitment mechanisms for this area.

For more information:

Contact:
Antan C. Phillips
Shellfish Section
Stock Assessment Division
Pacific Biological Station
Nanaimo, B.C. V9R 5K6
Tel: (250)756-7000
Fax: (250)756-7138
E-Mail: phillipsa@dfo-mpo.gc.ca

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This report is available:

PSARC Secretariat
Pacific Biological Station
Nanaimo, BC V9R 5K6
Phone: (250) 756-7208
Fax: (250) 756-7209
E-Mail: psarc@pac.dfo-mpo.gc.ca
Internet Address: (www.dfo-mpo.gc.ca/csas)

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