Fisheries and Oceans / Pêches et Océans
Pacific Region

DFO Science
Stock Status Report C6-17(2001)

Photo: R. Harbo

Manila Clams (Area 7)

Background

Manila clams, Venerupis philippinarum, are exotic to British Columbia. The species was inadvertently introduced to British Columbia in the 1930s with imported Japanese oyster seed. Manilas quickly spread throughout Georgia Strait and, after introduction into Barkley Sound, spread up the west coast of Vancouver Island.

Intentional introductions in the North Coast and Queen Charlotte Islands failed to produce sustainable populations. Natural recruitment into the Central Coast is believed to have come from Quatsino Sound. Manilas currently range from Laredo Inlet, British Columbia (52°59'N) to Elkhorn Slough, California, and are found intertidally on protected beaches, above the half-tide level in mixed substrates of gravel, sand and/or mud.

Manila clams were gradually accepted in the market, and have recently become the dominant clam in the commercial fishery. Coastwide landings increased dramatically until 1988, subsequently decreased, and currently vary around 1,100 t/yr. Decreased landings are a result of depletion of accumulated biomass, decreased opportunity due to toxic algal blooms, loss of beaches to fecal contamination and loss of beaches to aquaculture tenure.

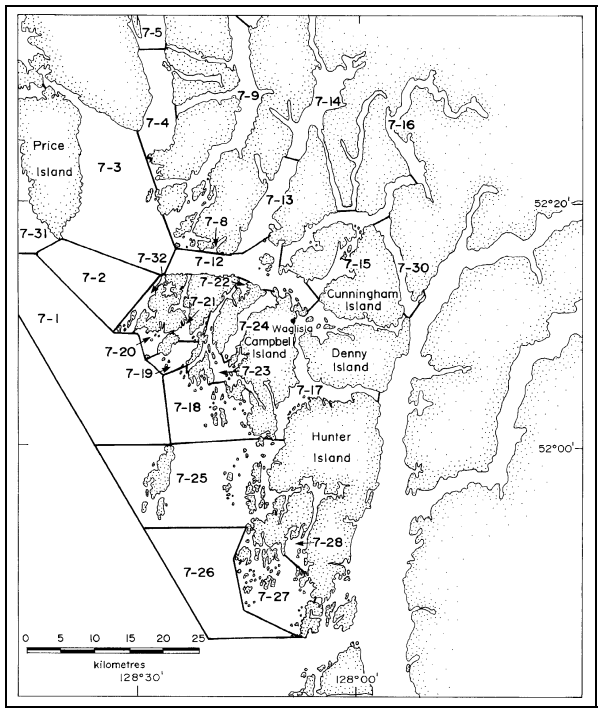

Fig. 1. Subareas that support the Area 7 Manila clam fishery on the Central Coast of British Columbia.

Summary

- The Manila clam fishery in Area 7 (Fig. 1) is small relative to clam fisheries in southern British Columbia, but is of considerable economic value in Waglisla (Bella Bella)
- The Area 7 fishery produced 656.5 t of Manila clams between 1992 and 2001, averaging 72.9 t per season.
- Total Allowable Catch (TAC) for Area 7 was reduced from 113.6 t to 68.2 t after review of stock status and fishery performance in 1999.
- From 1999 to 2000, index beaches showed decreases in biomass of legal sized clams in four of five Subareas surveyed. Over all index beaches in Area 7, biomass of legal sized clams decreased 40%.
- Subareas close to Waglisla are showing indication of overharvest.

Species Biology

Manila clams have separate sexes and are broadcast spawners, synchronously releasing gametes into the water column, where fertilization occurs. Maturation between 20-25 mm in length, or approximately 1-3 years of age and spawning occurs from June to September in the Strait of Georgia. Temperatures of 12-13°C are required for gonadal development, and temperatures of 15°C are required for spawning. Fecundity increases with size, with estimates ranging from 188,000 eggs/female at first maturity to 2,350,000 eggs/female at 40 mm total length (TL).

Larvae are planktonic for 3 or 4 weeks before settling in suitable habitat. Adult populations are closed: once settled on one beach, clams cannot move to another. Although there may be some movement of clams on a beach, distinct growth rates on upper and lower portions of a beach indicate that these movements are relatively limited. Recruitment, the introduction of adults into a population, is highly variable due primarily to environmental conditions. Recruitment is sporadic in the Central Coast.

Interpretation and counts of annual rings on the shell surface are used to estimate age. Maximum size of 75 mm TL is achieved after 8-10 years, and maximum age in B.C. is 16 years. Age at recruitment to legal size (38 mm TL) varies from beach to beach and between areas on a single beach. Growth is greatly affected by tidal elevation and substrate characteristics, and growth can vary as much between different areas of the same beach as between different beaches. Under optimal conditions, Manila clams can reach legal size (38 mm total length) in approximately 3-4 years in Georgia Strait, 4 years on the west coast of Vancouver Island, and 3-4.5 years in the Central Coast.

Manila clams are filter feeders, and thus can accumulate fecal contaminants (bacteria and viruses that can cause disease) which originate in fecal materials from human, wildlife or agricultural sources. Water quality in shellfish growing areas is monitored by Environment Canada, and beaches suffering elevated levels of fecal contamination are restricted from both commercial and recreational harvests.

Manila clams can also accumulate algal toxins, including those causing paralytic shellfish poisoning (PSP). The Canadian Food Inspection Agency uses mussel stations to monitor PSP levels, and areas showing increased levels of toxic algae are closed to harvest until algal blooms decline and toxin levels in shellstock samples are safe for human consumption.

Moonsnails (*Euspira lewisi*) and sea stars (*Pisaster* sp.) are occasional predators of Manila clams, although the distribution of Manilas at higher tidal elevations generally provides a refuge from these predators, which have lower tolerance for desiccation at low tide. Manila clams are also preyed upon by diving ducks (*Aythya affinis*, *Melanitta fusca*, *Melanitta perspicillata*), which excavate them from the substrate at high tide. Gulls (*Larus glaucescens*) and crows (*Corvus caurinus*) collect clams from the beach surface and drop them from flight to break them open.

Because Manila clams live high in the intertidal zone and do not burrow deeply into the substrate, they are susceptible to environmentally-induced mortality when frost is driven into the beach by a combination of low air temperatures, night-time low tides and prevailing winds. These “winter kills” can remove significant proportions of the population. Large-scale winter kills were recorded from specific locations in Georgia Strait in 1976-77, 1984-85, and 1995-96. Minor kills occur annually.

The Manila Clam Fishery

Commercial clam landings since the 1950’s were dominated by butter clams until a shift in market preference in the 1980’s increased demand for steamer clams (Manila and native littleneck clams)(Fig. 2). The market shift was primarily driven by demand for Manila clams, which are an attractive clam that separates easily from the shell after cooking.

Landings of Manila clams and mixed steamers (which are presumed to be primarily Manila clams) increased dramatically in the early 1980s, averaging 1,654 t between 1980 and 2000, as opposed to 189 t from 1951 to 1979. Manila clam landings decreased after 1988, primarily as a result of more restrictive management measures. In recent years, openings have been reduced in most areas to only a few days per year. Regardless of reduced opportunity, landings increased to 1,327 t in 1994, and have fluctuated between approximately 1,100 and 1,500 t since then. However, these statistics include depuration landings since 1994, representing the revival of operations on some beaches that had been lost to contamination, and landings from the Central Coast since 1992.

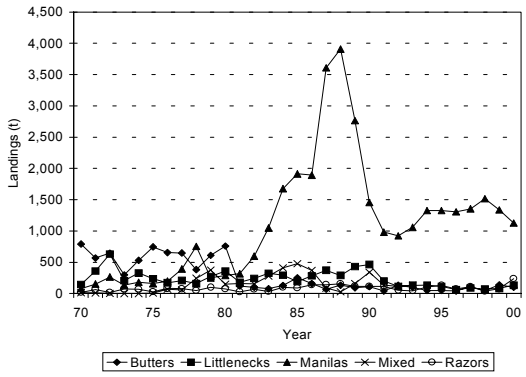

Fig. 2. Annual landings (t) of clams in British Columbia, 1970-2000.

Landings of Manila clams are primarily from the South Coast of British Columbia (Fig. 3), primarily because there are few Manila populations in the North Coast. There have been relatively few clam fisheries in the North Coast region (Statistical Areas 1-10) since the early 1960's, primarily due to potential human health concerns related to water quality, toxic algal blooms and limited monitoring programs. Notable exceptions are the ongoing razor clam fishery on Gwaii Haanas and a butter clam canning operation in Port Edward in the mid-1980's. Exploratory surveys in the early 1980's first found Manila clams in the area around Bella Bella, and a pilot communal commercial fishery was established in Area 7 in 1992, with special water and product quality monitoring programs.

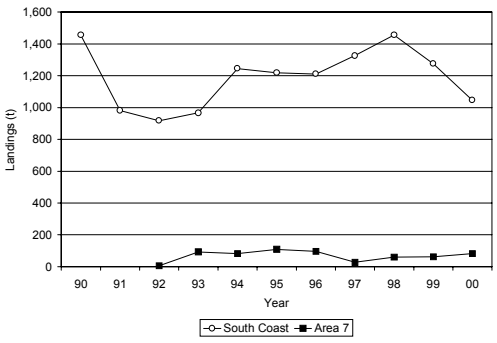

Fig. 3. Annual landings (t) of Manila clams in the South Coast and Area 7, British Columbia, 1990-2000.

The Area 7 Fishery

The Heiltsuk Tribal Council administers 50 Aboriginal Commercial Licences for the Area 7 fishery. The fishery is co-managed by DFO and the Heiltsuk Fisheries Program. The Heiltsuk conduct annual assessment surveys on index beaches in each of the Subareas fished, and Subarea catch ceilings are developed pre-season to insure that fishing effort is not concentrated in a few Subareas close to Waglisla. Logbooks and a dockside validation program track landings in-season.

The Area 7 fishery is conducted in the winter, usually between November and April. Clams are harvested during low tides, using rakes or scrapers to turn Manila clams out of the substrate and collect them by hand. Clams are wet stored on beaches in designated areas, and delivered to Waglisla on pre-determined dates. The clams are purchased and transported to processing facilities in the South Coast.

The fishery was managed under a TAC of 113.6 t until 1999, when the TAC was reduced to 68.2 t after a review of the fishery. Littleneck and butter clams, which had also been under 114.1 t TACs, were removed from the commercial fishery due to low interest from the diggers (mainly concerns regarding price) and to set these species aside for food, social and ceremonial use.

Area 7 Landings

The Area 7 fishery landed 656.5 t of Manila clams between 1992 and spring 2001, an average of 72.9 t per year. Landings fluctuated between 25.3 t in 1997/1998 season and 114.1 t in the 1994/1995 season (Fig 4). Peak landings coincided with opening of seven new Subareas, and low landings occurred in a season where the final management plan was not ratified until late in the year, and the season was not opened until January.

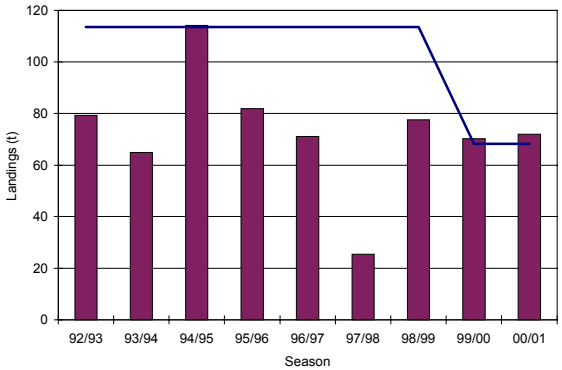

Fig. 4. Landings (bars, in t) and TAC (line) of Manila clams from the Area 7 fishery by season.

Subareas 7-12, 7-15, 7-17 and 7-21 have traditionally accounted for most of the landings. Subareas open to Queen Charlotte Sound (7-18, 7-19, 7-20, 7-25, 7-27, 7-28 and 7-32) have not attracted harvesting effort, in part because of the distances required to access them, and because exploratory surveys conducted by DFO in the 1990s and the Heiltsuk in 2001 demonstrated that there were no Manila populations of sufficient size to sustain fisheries in these areas.

Resource Status

Six Subareas (7-9, 7-12, 7-13, 7-15, 7-22 and 7-23) showed peak production in their first or second year fished, and declining production thereafter. This is indicative of removal of accumulated legal biomass made up of several year classes, and insufficient recruitment to replace clams removed by fisheries.

Three Subareas (7-17, 7-21 and 7-24) have demonstrated relatively consistent production. The remaining areas have either not attracted effort or have production too low to discuss meaningful trends.

Legal biomass of Manila clams from index beach surveys decreased in four of five Subareas surveyed between 1999 and 2000. All of these areas were showing indications of overharvest.

Outlook

Surveys in the summer of 2001 indicated that legal biomass had increased on seven of 10 index beaches, indicating that the TAC can likely be taken in the 2001/2002 fishery with few required management actions other than to monitor Subareas close to Waglisla and close them if catch ceilings are reached.

Sublegal biomass and abundance decreased for eight of 10 index beaches surveyed in 2001, relative to estimates from 2000 surveys. Of 18 beaches surveyed in 2001, 11 had sublegal stocks that were less than the legal stocks on the same beach. This is indicative of poor recruitment of Manilas to most Subareas over the last two years.

Management Considerations

Review of 1999/2000 landings and 2000 survey results raised concern that Subareas close to Waglisla were being overharvested. The fishery might be opened in more remote areas that have received little attention in the past, to test the production potential of these Subareas and allow core Subareas to recover. However, outlying Subareas likely will not support sustained production. These areas are known to support fewer, smaller Manila populations and suffer more erratic recruitment than beaches close to Waglisla. These Subareas might be fished in pulses to allow core Subareas to recover, but would likely require several years to recover from intensive harvest themselves.

Manila clam populations in Area 7 are the northernmost populations known in North America, and likely in the world. Fluctuations in recruitment will result in fluctuations in the overall population size, and these will likely be more pronounced if the populations are harvested. If the management objective for this fishery is to have sustained harvests, rather than pulse fishing with periods of total closure for stocks to recover, then stock status and landings will have to be closely monitored to determine if a lower overall TAC is required.

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