



SHRIMP TRAWL FISHERY OFF THE WEST COAST OF CANADA

Background

The shrimp trawl fishery in British Columbia catches 7 species of shrimp belonging to the family Pandalidae: northern (or spiny) pink shrimp (*Pandalus borealis* eous), smooth pink shrimp (*P. jordani*), sidestripe shrimp (*Pandalopsis dispar*), coonstripe (or dock) shrimp (*Pandalus danae*), humpback shrimp (*P. hypsinotus*), flexed pink shrimp (*P. goniurus*), and prawn (*P. platyceros*).

Pandalid shrimp undergo a change of sex in mid-life, starting out as males and then becoming females in the final year or two of their lives. This is called protandric hermaphroditism. The time spent in each stage varies by species and location. Although this is the general pattern, individuals of some species can bypass the male phase completely and function only as females. These individuals are known as primary females.

Spawning occurs in late autumn or early winter. The females carry developing eggs on appendages known as swimmerets or pleopods until the eggs hatch in spring. The timing of these events varies by species and by area, and is critical information used in establishing the opening of a fishery, in order to protect the breeding females long enough to release the eggs.

Shrimp must shed their exoskeleton to grow. As a result, no permanent body structures are retained, and ageing the animals using conventional ring-counting techniques is impossible. Instead, an analysis of length data that

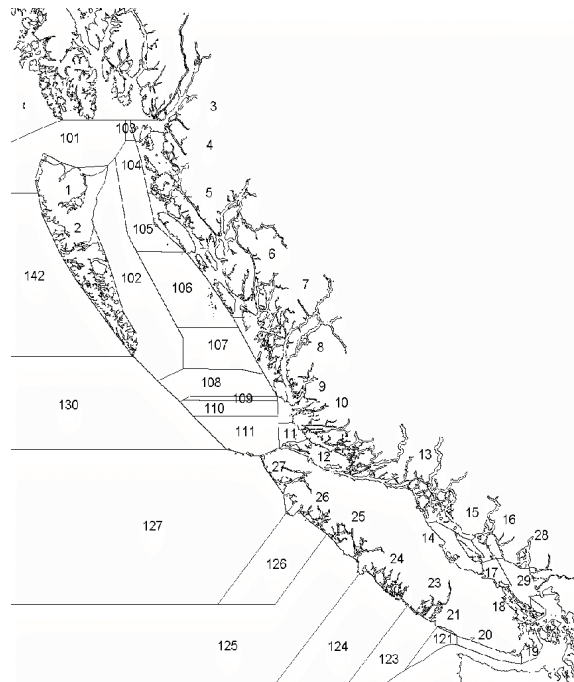


Figure 1: Pacific Fishery Management Areas (PFMA) of B.C.

incorporates the animal's sex and maturity condition is used. Sex and maturity are important factors in the analysis because males and females have different growth patterns. Males continue to grow and moult throughout the year, while females cease moulting while carrying eggs. The abundance of females cannot be extrapolated from age/size composition alone, because some animals can skip the male phase completely. Four is the maximum age for most species of commercial shrimp in B.C., although most probably live only to age 3.

The habitat, behavior and migration of shrimp are important criteria used in stock assessments. Different species generally prefer different habitats, from rocky bottom to mud and sand. Some species prefer to remain on the bottom, while others will move upward into the water column. Coonstripes, humpbacks, and prawns are basically bottom dwellers. Northern pinks and smooth pinks may rise off the bottom at night and will not be as available to bottom-fishing trawl gear. Prawns, meanwhile, may migrate into shallower water. An analysis of catch rate data must incorporate correction factors that will vary by location, gear, species, time of day, and season.

Unlike prawns, which do not tend to move great distances, pink shrimp off the west coast of Vancouver Island have been known to show substantial changes in distribution throughout the year. Stocks of sidestripes in Howe Sound and adjacent areas indicate very limited movement for this species.

Summary

- Fishery is managed by area quotas.
- Stock status is, as yet, unknown.
- Indices of stock abundance are being developed with the goal towards a biologically based management strategy.

The Fishery

The shrimp fishery off the Pacific Coast developed in earnest in the 1960s with the introduction of trawl bottom gear. Historically, fishing occurred in three major areas of the B.C. coast: the inshore waters of the Strait of Georgia by a fleet composed of small beam trawl vessels; the coastal areas off the North Coast inlets, mainly by small local beam trawl vessels; and the west coast of Vancouver Island, where the majority of vessels fished with otter trawls. In 1996, fishing expanded into areas not previously exploited, including the offshore areas of the central coast, by both large and small vessels.

The British Columbia shrimp trawl fishery has traditionally targeted smooth pink, northern pink, and sidestripe shrimp. Humpback, coonstripe, flexed pink, and prawns have historically been caught incidentally or in small quantities.

A category S licence is required for participation in this fishery. There are currently 248 eligible S licences, a reduction of one since licence limitations were introduced in 1978.

The history of B.C. shrimp landings recorded since 1982 is shown in Figure 2. The total catch in the 1995 shrimp trawl fishery was almost double the 1994 landings.

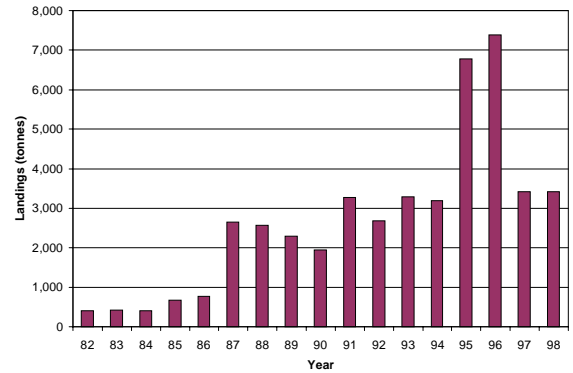


Figure 2: Landings (tonnes) of shrimp, 1982 - 1998 (NB: 1998 landings are preliminary). Area quotas were introduced in 1997.

Until 1996, the commercial shrimp trawl fishery was open year-round, with no limitations on catch. That year, the commercial shrimp fleet expanded its efforts into areas that were not historically fished, resulting in unprecedented catches in many areas. As a precautionary measure to protect the stock, a seasonal closure was implemented for the first time on the west coast of Vancouver Island. The main factors responsible for the dramatic increases in landings in 1995 and 1996 were the changes in the groundfish and salmon fisheries that resulted in increased effort on fishing shrimp, the high price offered for shrimp in those two years coinciding with a decline in the Washington and Oregon shrimp fisheries, as well as abundant stocks available to the B.C. fishery. In response, significant changes in the management of the shrimp trawl fishery were implemented in 1997 with the establishment of catch ceilings for most areas, the development of industry-funded programs to monitor catches and a stock assessment program.

The number of vessels in the B.C. shrimp trawl fishery with reported landings increased to 222 in 1996 from 165 vessels in 1994. Historically, the number of active vessels from 1987 to 1994 ranged from 158 to 190. An increase in the number of single licensed vessels, occurring as a result of buy-backs from the salmon industry in 1995, also increased the reliance on the fishery. In 1995, of 249 vessels eligible to fish under the S licence, only 6 were single licensed vessels.

Two years later, 67 of 248 eligible vessels held single licences.

The landed value of the B.C. shrimp trawl fishery ranged from \$2.6 million to \$4.8 million between 1987 and 1994, reaching a peak of \$13.7 million in 1995 (see Figure 3). The landed value of the 1997 fishery was \$5.3 million.

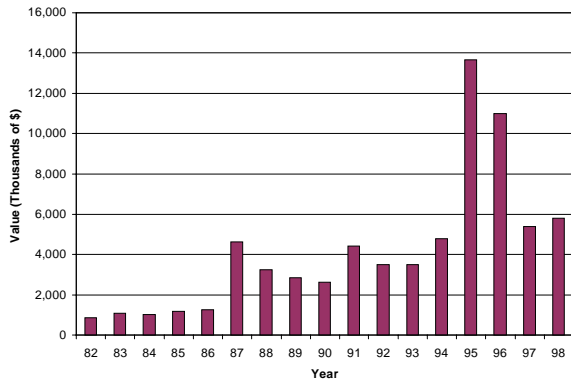


Figure 3: Landed value (in thousands of dollars) of the B.C. shrimp fishery, 1982 - 1998 (NB: 1998 landed values are preliminary).

Resource Status

A stock assessment program for the shrimp trawl fishery was developed concurrently with the change in management strategy implemented in 1997. Surveys were conducted in selected shrimp areas in 1997 and 1998 to obtain reliable biomass indices of abundance for key stocks. As this is the first year of assessment for most shrimp stocks in B.C., the status of the stocks is, as yet, unknown.

Until a relationship between biomass indices and shrimp abundance is established, surveys are used in-season to indicate whether an area can sustain fishing pressure greater than, or less than, an initial precautionary area catch ceiling set at the beginning of the year.

The west coast of Vancouver Island has historically been the predominant shrimp fishing grounds, with 80 to 90 % of B.C.’s landings taken from the offshore areas. Landings have fluctuated widely, varying between 225 and 5,000 tonnes. Recent survey data from these traditional areas have shown continuous declines (see Figure 4).

The estimated stock sizes in 1998 for Pacific Fisheries Management Areas 123 and 125 are the lowest on record, while stocks in PFMA 124 are the second lowest on record.

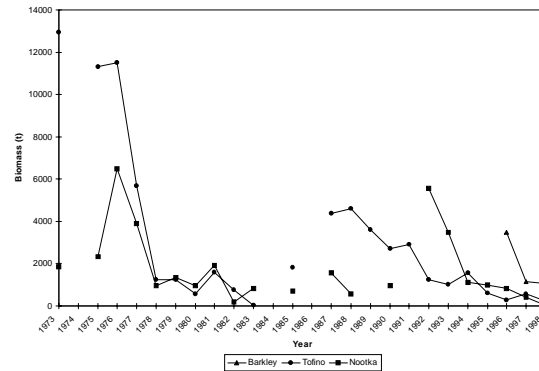


Figure 4: Biomass of shrimp off the West Coast of Vancouver Island, as estimated by surveys. The principle fishing grounds are located in Pacific Fisheries Management Area 123 (Barkley), 124 (Tofino) and 125 (Nootka) – see Figure 1.

Outlook

Management and assessment in the shrimp trawl fishery are complicated by the diversity of shrimp stocks, multiple-species fisheries and varying types of gear. The shrimp species involved occupy varying habitats and ecological niches, and differ in size and value. Although the stock status of B.C. shrimp is unknown, assessment programs have been initiated with the goal of developing a biologically based management strategy. There is interest in the development of species-selective and size-selective fishing practices, and in maximizing markets and higher-valued product.

There is some concern in this fishery that shrimp stocks cannot support the current size of the commercial fleet. More vessels are now directing more time and effort at shrimp trawling, and sufficient stocks may not exist to support this effort.

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