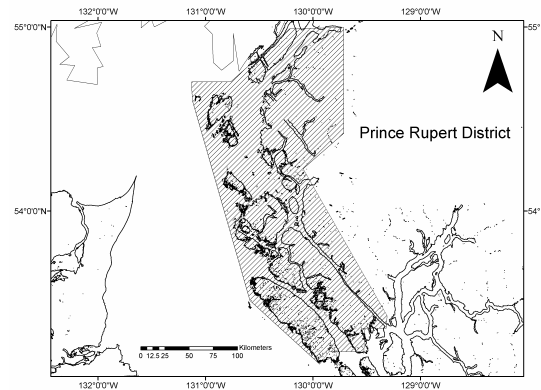




STOCK ASSESSMENT REPORT ON PRINCE RUPERT DISTRICT PACIFIC HERRING



Source: Fisheries & Oceans Canada



Context

Pacific herring is a pelagic species that occurs in inshore and offshore waters of the North Pacific. In the eastern Pacific it ranges from California to the Beaufort Sea. Herring mature and recruit to the spawning stock predominantly between ages 2 and 5. Within this range, age-at-recruitment tends to increase with latitude. The Prince Rupert District (PRD) herring stock is one of five major migratory B.C. herring stocks. The fishery began here at the turn of the century but did not become extensive until the expansion of the dry-salted market in the mid-1930s and reduction fishery in the 1940s. This stock declined as part of the coastwide collapse from overfishing in the early 1960s, and the commercial reduction fishery was closed in 1967. Following a combination of favourable environmental conditions and a low harvest rate, the stock recovered by the mid-1970s. The current roe fishery began in 1972. The target harvest rate of roe herring is fixed at 20% of the forecast mature stock biomass, when the stock size is sufficiently above the minimum spawning stock biomass (Cutoff). The stock has been fairly stable since the early 1980s. Recent assessments indicate that the mature herring biomass remains well above the fishing threshold (12,100 t), and could support both commercial and aboriginal fisheries in 2008.

SUMMARY

- All herring spawning within Statistical Areas 3 to 5 are assumed to belong to the Prince Rupert District stock that migrates inshore from Hecate Strait in the late fall and leaves, after spawning, in late March and early April.
- The roe herring gillnet total allowable catch (TAC) in 2007 was 924 tonnes or 7% of the coastal total and the validated catch was 968 tonnes. No seine fishery occurred in this area in 2007.
- The 2008 mature stock biomass forecast is 20,071 tonnes with an allowable harvest of 4,014 tonnes.

BACKGROUND

From the mid-1940s until the late 1960s, herring were harvested and processed (reduced) into relatively low value products such as fishmeal and oil. The largest catch was taken in the PRD in 1952 and the fishery was closed in 1953 and 1958 due to industrial disputes. Catches increased dramatically in the early 1960s but were unsustainable. By 1965, most of the older fish had been removed from the spawning population by a combination of overfishing, and a sequence of weak year-classes, attributed to unfavourable environmental conditions and a low spawning biomass. As a result, the commercial fishery collapsed (Fig. 1), and was closed by the federal government in 1967 to rebuild the stock.

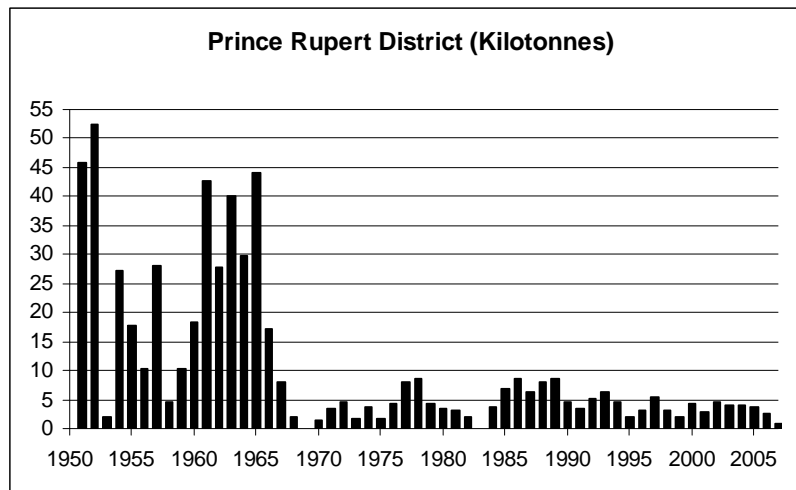


Figure 1. Total herring catch in the Prince Rupert District from 1951-2007.

Following the closure, a series of above average year-classes occurred in the early 1970s rapidly rebuilding the stock and providing opportunities for a new fishery.

During the closure from 1967-1973, the small traditional fisheries continued locally for food and bait (Hourston 1980). At this time there was a growing interest to harvest roe herring for export to Japan as their stocks became decimated. A small experimental roe harvest began in 1971, and expanded rapidly until 1983, when fixed quotas were introduced to regulate the catch. A significant quantity of PRD herring is also utilized for spawn-on-kelp, and aboriginal food fish.

The objective of the current herring fishery is to obtain a low volume, high-quality product that is economically profitable and ecologically sustainable. The fishery is managed by setting a fixed quota based on a harvest rate of 20% of the forecast mature stock biomass. To meet management objectives, the harvest strategy also includes a minimum spawning stock biomass. If the forecast biomass falls below the fishing Cutoff threshold (12,100 t) managers have chosen to close the commercial fishery to allow for stock recovery. The harvest strategy is designed to minimize the number of years of commercial fishery closures. In response to reduced stock levels the PRD fishery was closed in 1983. Subsequently, the stock has rebuilt and sustained an average roe catch of 3,257 t over the past decade¹.

¹ Excluding years where commercial fisheries were closed. Only anecdotal reports of food, social, and ceremonial harvests are available and so are not included here. Spawn-on-kelp (SOK) allocation (short tons) refers to live fish impounded to develop product.

Recent removals from this stock have been:

Prince Rupert District catch (ktonnes)						
2001	2002	2003	2004	2005	2006	2007
2.9	4.5	4.0	4.1	3.8	2.6	1.0
1.1	1.2	1.0	1.0	1.0	1.0	1.0

SOK Allocation

ASSESSMENT

Assessment of current abundance for 2007 is obtained using the new Herring Catch-Age Model (HCAM). The analysis is based on the 57-year time series of total catch, spawn abundance, weight-at-age, and age structure data and the model is tuned using information on the total egg deposition from spawn surveys. Forecasts of abundance for the upcoming season are based on projections of current biomass assuming average levels of growth and natural mortality.

Herring stock assessments utilize information from biological samples for determining the population age composition and average weight-at-age, historical catch data, and an assessment of the distribution and intensity of egg deposition in the stock assessment area. Prior to the 2002 assessment, the forecast of the pre-fishery biomass of mature herring was estimated by two assessment models: an age-structured and an escapement model. For the current assessment only the age-structured model was adopted as the best estimator of stock abundance (Schweigert and Haist 2007).

The assessment indicates that the Prince Rupert District assessment region herring population decreased in abundance from 1992 through 1995, and increased from 1996 to 1998 (Fig. 2). Abundance has subsequently declined through to 2007, except for a peak in 2003. The pre-fishery biomass for the area is estimated at 18,100 t in 2007, a decrease of 600 t, or 3% below the 2006 level. During the past decade, recruitment for most year-classes has been average or better. The 1998 and 2000 year-classes were good while those in 2001, 2003 and 2004 were poor. The spawning run in 2007 consisted of about 48% age 2+ recruits from the 2004 year-class, 22% of age 3+ from the 2003 year-class and 11% age 4+ fish from the 2002 year-class.

As with other areas, forecasting recruitment to the stock remains a significant challenge. For the 2008 assessment an average recruitment is expected and assumed for the stock forecast.

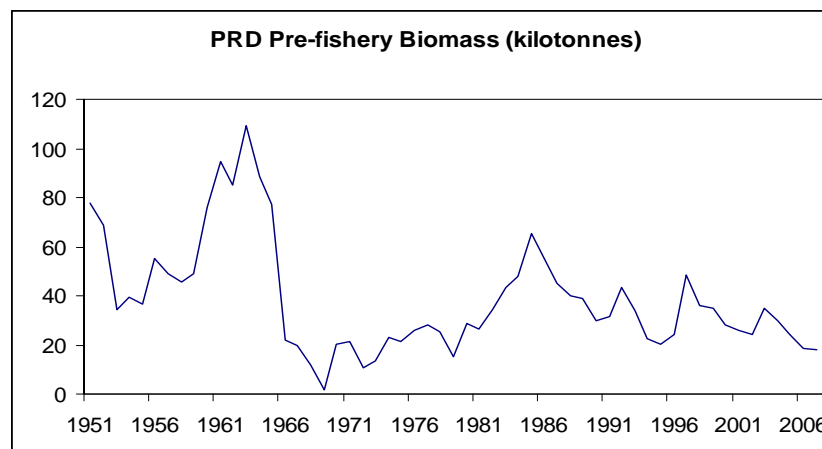


Figure 2. Estimated mature pre-fishery herring biomass from 1951 to 2007.

CONCLUSIONS AND ADVICE

Herring stocks are managed with a fixed 20% harvest rate, in conjunction with a commercial fishing threshold or Cutoff level. A decision rule has been adopted by management to close all commercial herring fisheries when the stock is forecast to be below the Cutoff level. The Cutoff levels are established at 25% of the estimated unfished average mature biomass.

In the Prince Rupert District, an average recruitment option was adopted for 2008 resulting in a pre-fishery biomass forecast of 20,071 t and a potential harvest of 4,014 t. The stock is well above the Cutoff level of 12,100 tonnes and roe and spawn-on-kelp fisheries are anticipated.

OTHER CONSIDERATIONS

Since very little is known about the factors that affect recruitment in this stock, it is difficult to forecast future stock trends. However, the recent history of recruitment to the stock has indicated a good year-class occurring about every fourth year, a pattern similar to that in southeastern Alaska. If this pattern continues it will result in increased stock stability and resource levels that should sustain current levels of harvest. During the past decade, most recruitment for year-classes have been average or better, except for the poor 2001 and 2003 year-classes, which should maintain the stock at healthy levels in the short term.

SOURCES OF INFORMATION

Hourston, A.S. 1980. The decline and recovery of Canada's Pacific herring stocks. Rapp. P.-v. Reun. Cons. Int. Explor. Mer, 177: 143-153.

Schweigert, J.F. and V. Haist. 2008. Stock assessments for British Columbia herring in 2007 and forecasts of the potential catch in 2008. Can. Sci. Advis. Sec. Res. Doc. 2008/011: 59p.

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