



STRAIT OF GEORGIA LINGCOD (*Ophiodon elongatus*) ASSESSMENT AND ADVICE FOR FISHERY MANAGEMENT

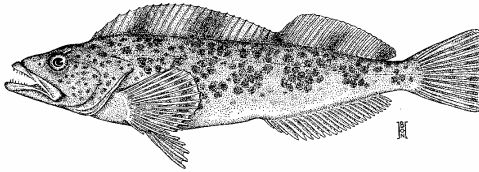


Image from Hart, J.L. 1973. *Pacific Fishes of Canada*. Fish. Res. Bd. Can. Bull. 180. 740 p.

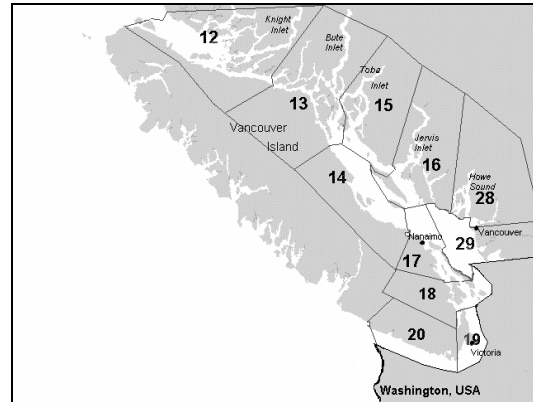


Figure 1: Minor Statistical Areas within the Major Area 4B, Strait of Georgia. This report focuses only on Statistical Areas 13-19, 28 and 29..

Context

Lingcod populations in the Strait of Georgia have been severely depressed for several decades and a commercial fishery closure was implemented in 1990 followed by a recreational fishery closure implemented in 2002. A Stock Assessment Framework for lingcod suggested that a management framework be developed in consultation with stakeholders that would identify benchmark abundance levels as reference points to measure recovery in abundance and identify management action associated with those benchmarks. In response to that recommendation, the Lingcod Management Framework Committee was formed in 2004 and included federal and provincial fisheries agencies' staff along with representatives of the recreational fishery sector, the commercial fishery sector and conservation groups. The committee identified criteria to be used as reference points in classifying the status of Strait of Georgia lingcod and to be used as decision rules for fishery management. Estimates of historic high levels of biomass are used in lieu of biomass estimates for the unfished Strait of Georgia lingcod population.

SUMMARY

- Proportions of historic high biomass of 40% ($B_{40\%}$), 25% ($B_{25\%}$) and 10% ($B_{10\%}$) were selected as reference points for defining the status of lingcod populations and as decision rules for management actions:
 - $B_{40\%}$ level was identified as a desirable, long-term (10 years) recovery target for Strait of Georgia lingcod abundance.
 - below $B_{25\%}$, the population would be considered to be overfished; therefore the $B_{25\%}$ level was identified as a desirable, short-term recovery target for Strait of Georgia lingcod.
 - no catch would be permitted for populations with biomass estimates below 10% of the unexploited level ($B_{10\%}$)

Pacific Region

- a population simulation model estimates that the lowest level of depletion for the Strait of Georgia lingcod population occurred in 1990 (2% of historic biomass)
- based on criteria identified by the Lingcod Management Framework Committee, all portions of Strait of Georgia are considered to be overfished (< 25% of historic biomass) and some portions (Southeast and Northwest portions) are below 10% of historic biomass, a level which the committee identified as one in which no harvest should be permitted
- given uncertainty with early records of catch data for the Southeast portion, the Strait of Georgia lingcod population was modelled as a whole with this portion excluded. Population model estimates for Statistical Areas 13-19 (excluding 28 and 29) are 16% of historic biomass estimates. Harvest permitted for this population (16% of historic biomass) should be associated with a 86% probability that the stock will be higher than the current level in 10 years time.
- the mean annual estimate of recreational landings prior to the closure in 2002 (1991-2001) was 4,880 pieces, ranging from 2,912 pieces in 1999 to 8,219 pieces in 2001. Stock projections for 5,000 and 7,000 pieces annually for the next 10 years suggests that there is a 50% probability that the stock will be at 44% and 43% respectively of historic biomass in the year 2013.

DESCRIPTION OF THE ISSUE

Lingcod populations in the Strait of Georgia have been severely depressed for several decades. As such, the commercial fishery has been closed since 1990 and the recreational fishery has been subject to regulations. Prior to 2002, recreational fishery regulations to protect lingcod included an eight month winter non-retention period to protect nest guarding males, the non-retention of fish less than 65 cm, and reduced daily (1 per day) and annual catch limits (10 per year). In 2002, the recreational fishery was closed for the retention of lingcod as an additional measure to protect this stock. In 2002, Fisheries and Oceans Canada implemented a Rockfish and Lingcod Sustainability Strategy since inshore rockfish (genus *Sebastes*), are also at historically low levels in British Columbia, including in the Strait of Georgia. In 2003, a Stock Assessment Framework for Strait of Georgia lingcod recommended monitoring and assessment programs that would provide measures of the relative abundance and biological parameters for Strait of Georgia lingcod. The survey and research recommended by that framework has been implemented. The Stock Assessment Framework suggested that the next step in assessing and managing Strait of Georgia lingcod should be the development of a conservation-based management strategy conducted in consultation of stakeholders and with consideration of relevant legislation and regional policies. It was recommended that a management framework should identify benchmark abundance levels as reference points, either as targets for the recovery for the lingcod population, or as levels that triggered management responses. Developing a management framework with pre-agreed conservation and management actions that are triggered through decision rules are essential steps in the precautionary approach.

In response to that recommendation, the Lingcod Management Framework Committee was formed in 2004 and included federal and provincial fisheries agencies' staff along with representatives of the recreational fishery sector, the commercial fishery sector and conservation groups. The committee met eight times between April 2004 and April 2005 with the task to identify criteria to be used as reference points in classifying the status of Strait of Georgia lingcod and to be used as decision rules for fishery management. The committee also reviewed sources of commercial and recreational catch and catch per unit effort data to be used in estimating historic and current biomass levels of Strait of Georgia lingcod. An age-structured stock assessment model was used to estimate lingcod biomass, and the development of the

model was directed by the committee. The committee provided input on the spatial-scale of the population model, the stock-recruitment relationship, biological parameters, and assumptions regarding recruitment variability. Decisions and recommendations made by the committee were based on consensus, and are contained in this report.

ASSESSMENT

The suggested criteria and recovery targets for Strait of Georgia lingcod are derived from standards for rebuilding plans adopted by the US Pacific Fishery Management Council for the US Pacific coast groundfish fisheries. We used estimates of historic high levels of biomass in lieu of biomass estimates for the unfished Strait of Georgia lingcod population. Proportions of historic high biomass of 40% ($B_{40\%}$), 25% ($B_{25\%}$) and 10% ($B_{10\%}$) were selected as reference points for defining the status of lingcod populations and as decision rules for management actions. The $B_{40\%}$ level was identified as a desirable, long-term (10 years) recovery target for Strait of Georgia lingcod abundance. Below $B_{25\%}$, the population would be considered to be overfished; therefore the $B_{25\%}$ level was identified as a desirable, short-term recovery target for Strait of Georgia lingcod.

The management framework and decision rules are specified in terms of an acceptable probability of being below the current stock size in ten years time (Figure 2). Thus, if the stock is estimated to be depleted to below 10% of the unexploited level ($B_{10\%}$), the probability of further decline has to be negligible; in effect, no catch would be permitted. For a stock at 25% ($B_{25\%}$) the allowable removals number is limited to be that which has a 10% probability of a lower stock size in ten years time. However, this is augmented by two constraints:

1. the allowable removals shall have a negligible probability of depleting the stock to below $B_{10\%}$ in any of the next ten years;
2. if the stock is above $B_{25\%}$, the removals shall have no more than a 10% probability of depleting the stock to below $B_{25\%}$ in any of the next 10 years.

A Ricker stock-recruitment age structured model was selected by the committee to estimate historic and current biomass levels. The Strait of Georgia was modelled as a single unit (Statistical Areas 13-19; 28 and 29); as four geographic areas (Southeast: Statistical Areas 28 and 29, excluding 29-5; Northeast: Statistical Areas 15 and 16); Northwest: Statistical Areas 13 and 14; Southwest: Statistical Areas 17, 18, 19 and 29-5); and as a modified geographic area that excluded the Southeast area since catch and effort data for this area were unreliable and its current biomass estimates were less than 1% of historic biomass estimates. Current biomass estimates for the Northeast, Northwest and Southwest geographic areas were 12%, 7% and 20% respectively of historic biomass estimates.

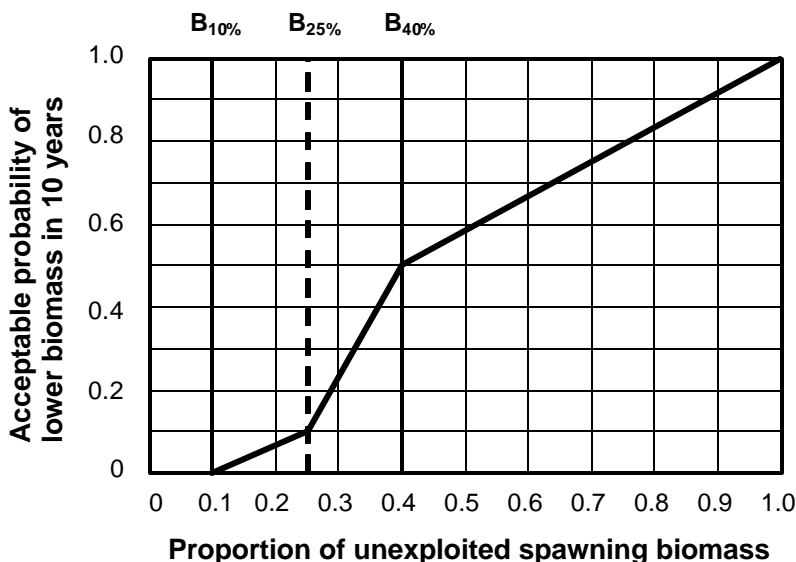


Figure 2. An illustration of the decision rule relating current state of the stock to the acceptable probability of obtaining a lower spawning stock size after ten years of constant removals.

The population model selected by the committee combined these three geographic areas and estimated the lowest level of depletion to have occurred in 1990 (2% of historic biomass) and the current biomass of lingcod is estimated to be 15% of historic biomass levels. Using the outlined management framework, this population is classified as overfished and any harvest level selected should be associated with a 95% probability of maintaining an increase in biomass for 10 years. The mean annual estimate of recreational landings prior to the closure in 2002 (1991-2001) was 4,880 pieces, ranging from 2,912 pieces in 1999 to 8,219 pieces in 2001. Based on these historic recreational fishery harvest levels, the committee recommended an annual harvest between 5,000 – 7,000 pieces. Stock projections for 5,000 and 7,000 pieces annually for the next 10 years suggests that there is a 50% probability that the stock will be at 44% and 43% respectively of historic biomass in the year 2013.

ADDITIONAL STAKEHOLDER PERSPECTIVES

Perspectives from stakeholders vary. Recreational fishermen indicate that encounters with lingcod have increased dramatically in the last 5 years or so. As such they believe that the Strait of Georgia lingcod population can withstand a harvest level similar to that deployed throughout the 1990s when lingcod populations were considered to be at historic lows. Commercial fishermen agree that lingcod abundance has improved in recent years, but are wary of any allowable harvest given that the current abundance is not close to that during the 1960s and 1970s. Non-governmental organizations share the concern that current biomass estimates for lingcod are below the 25% of the historic biomass reference point. They are also concerned that targeted fisheries for lingcod will negatively impact already depleted rockfish populations with increased bycatch of those species.

CONCLUSIONS AND ADVICE

The model selected by the committee estimates that the current biomass of lingcod in the combined Statistical Areas 13-19 (including sub-area 29-5 which encompasses the eastern portion of the Gulf Islands) is approximately 16% of the historic biomass. The Lingcod Management Framework Committee recommends that fishery managers can consider a harvest of between 5,000 to 7,000 lingcod (pieces) for the 2005/2006 fishing year. Any harvest would be restricted to Statistical Areas 13 through 19, including sub-area 29-5 (of Statistical Area 29) only. Non-retention of lingcod should remain in effect for Statistical Area 28, and the remaining portions of Statistical Area 29.

OTHER CONSIDERATIONS

There are several initiatives underway for the conservation of inshore rockfish populations in the Strait of Georgia. One of which is the designation of approximately 30% of rockfish habitat as Rockfish Conservation Areas. No fishing will be permitted in these areas, and this measure will also protect lingcod inhabiting these areas.

SOURCES OF INFORMATION

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