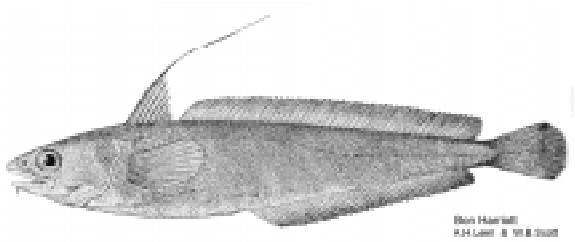


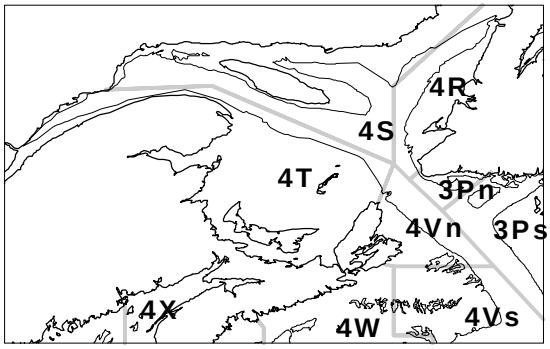
White Hake In The Southern Gulf Of St. Lawrence

Background

White hake (Urophycis tenuis) are found from southern Labrador, and the Grand Bank southward to North Carolina. This species is exploited throughout its geographical range by directed, seasonal fisheries. The most important catches are taken in the southern Gulf of St. Lawrence (Northwest Atlantic Fisheries Organization (NAFO) Division 4T). Temperatures of 5 - 11°C seem to be favored as well as soft bottoms (i.e., silt, mud or sand). White hake are among the most fertile of the commercial groundfish species, with a single female producing several million eggs per spawn. In the southern Gulf of St. Lawrence, spawning commences in early June and peaks in the second half of the same month. The diet of white hake is dominated by other fish species (such as cod, herring and flatfish).

The fishery for white hake in NAFO Division 4T has historically been the third or fourth most important groundfish fishery, with annual landings averaging 5,375 t since 1960. Landings in this fishery traditionally peak between July and September and decline through October and November. The hake fishery is carried out mainly by small inshore vessels and is strongly affected by weather and local market conditions. Both fixed (gillnets and longlines) and mobile gears (small otter trawlers and larger seiners) are used in the hake fishery. The fishery is concentrated in the Northumberland Strait, on the western end of P.E.I., and between P.E.I. and Cape Breton Island.

Stock structure has been a long-standing issue with this resource. The combined evidence from several studies indicates that there are at least two different stock components in NAFO Division 4T, one occupying shallow inshore areas in summer, principally the Northumberland Strait area (the 'Strait' component) and another occupying deep water along the Laurentian Channel in summer (the 'Channel' component). The extent of mixing between these two stock components is presently unknown and recent analyses indicate that the distribution of southern Gulf white hake extends outside of NAFO Division 4T in winter.



The Fishery

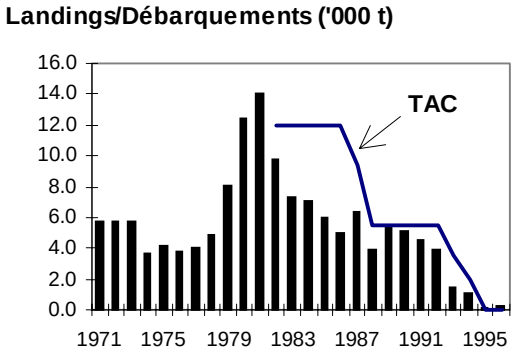
A precautionary quota of 12,000 tonnes was established for white hake in NAFO Division 4T in 1982, and the total allowable catch (TAC) has been reduced on five occasions since then. Directed fishing for white hake was closed in the southern Gulf in 1995 and 1996, and a daily by-catch limit of 10%, by weight, was imposed on fisheries targeting other species.

Landings were fairly stable at the 4,000-6,000 t level from 1971-1978, rose sharply to 12,423 and 14,039 t in 1980 and 1981, and then declined rapidly to the 4,000-6,000t level in 1985-1992. A substantial drop in landings occurred in 1993. Directed fishing for white hake was closed in 1995 and 1996. In 1996, 154 t were landed, mostly (105 t) by the sentinel fishery.

Landings (thousands of tonnes)

Year	70-79 Avg	80-89* Avg	1992	1993	1994	1995	1996
TAC		9.1	5.5	3.6	2.0	0	0
Total	5.1	7.7	3.9	1.5	1.0	0.1	0.2

* - First TAC was established in 1982



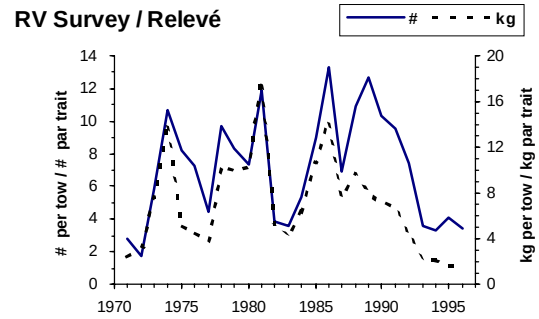
Landings in 1996 were dominated by ages 4-6 (the 1990-1992 year-classes). This differs from the older **age composition of landings** in 1995, and resembles the age composition of landings in 1993 and 1994. The percentage of old fish (8 years and older) in the landings declined from an average of 21% in 1982-1986 to 4% in 1990-1994, and increased to 11% in 1995 and 1996. Recent changes in the age composition in the fishery may reflect changes in the mix of gears used.

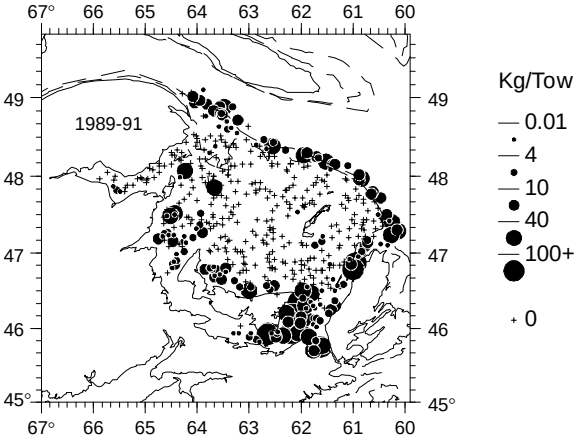
Resource Status

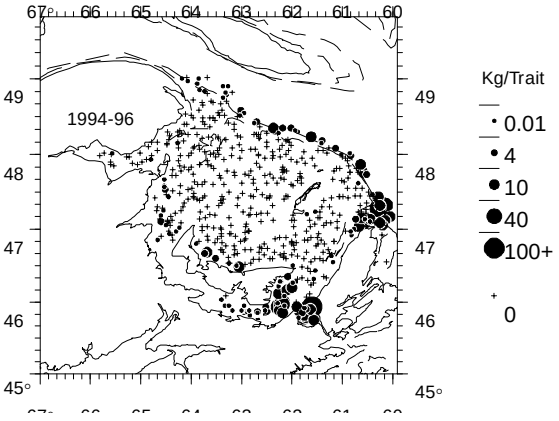
The evaluation of stock status was based on landings statistics, sampling for size and age composition of the fishery catch and trends in abundance from the annual (September) research survey. In 1996, most samples of landings were from the sentinel fishery.

Catch rates in the **sentinel fishery** suggest that white hake are most abundant in St. George's Bay and the area between eastern PEI and Cape Breton, and are relatively rare in other areas of the southern Gulf. Participants indicated that longline catches in St. George's Bay were unexpectedly high. Because 1996 is the first year with sentinel fishery catches from St. George's Bay using longline gear, interannual variation in hake abundance cannot yet be inferred from these data.

The catch rate of hake (mean number per tow, all ages) during the September **research survey** declined sharply to a very low level in 1993, and remained at that low level in the 1994, 1995 and 1996 surveys. The mean weight of white hake caught per tow (all ages) in 1996 was the lowest observed in the history of this survey.



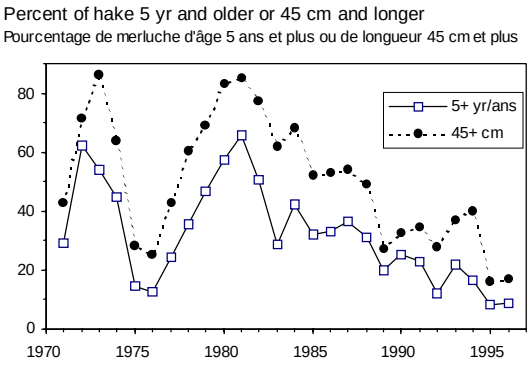




Few white hake have been caught in the western part of the southern Gulf in years since 1993, suggesting that there has been a

contraction of the geographic range in recent years. There has also been a decline in the abundance of white hake in the area between P.E.I. and Cape Breton and in St. George's Bay (N.S.).

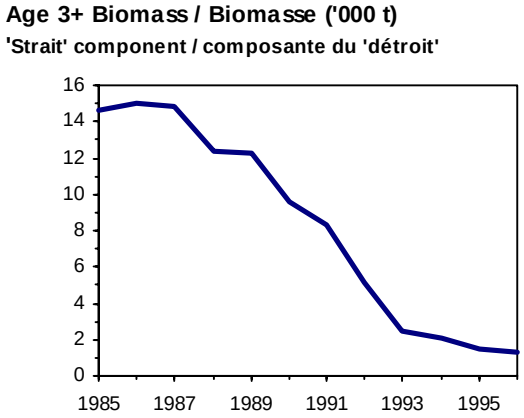
The abundance of large old hake in the population has declined to the lowest level observed. The proportion of hake 45 cm or longer in the survey catch averaged 61% in the 1971-1985 period but declined to less than 17% in 1995 and 1996. Similarly, hake 5 years and older averaged 40% of the survey catch in 1971-1985 but less than 9% in 1995 and 1996. From 1984 -1994, the most abundant age groups in the survey were age 3 or 4, but in 1995 and 1996 the most abundant age group was age 2.



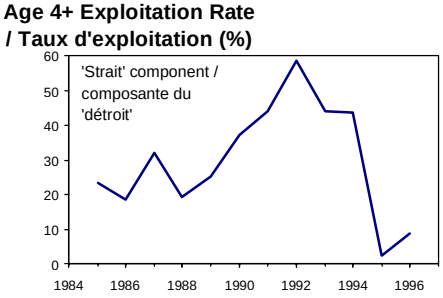
The presence of small fish (less than 40 cm) and in particular of "**young of the year**" hake (less than 10 cm) in the 1995 and 1996 surveys is encouraging, but it is too early to determine whether this will result in an increase in the population. On the other hand, abundance at age 3 has been very low since 1993 (1990-1993 year-classes), particularly for the inshore 'Strait' component of the stock.

The survey results indicate that the abundance of white hake in both stock components (the 'Strait' and 'Channel' components) has declined to minimum values recently.

Although the results of a sequential population analysis (SPA) were generally consistent with the survey results, they suggested a more gradual decline in **population abundance** than that indicated by the abrupt decline in survey catch rates between 1992 and 1993. SPA suggested that 3+ biomass of the inshore 'Strait' component was relatively stable from 1985 to 1989 (12,000 - 15,000 t), but declined rapidly to 2421 t in 1993 and reached a minimum of 1317 t in 1996.

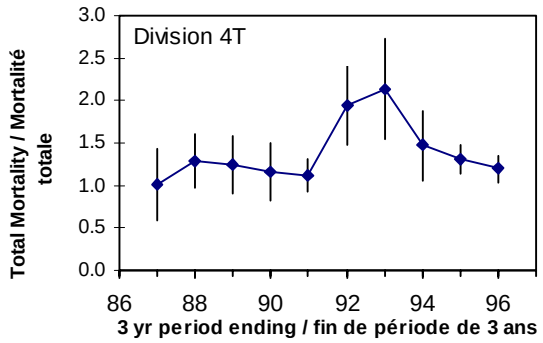


Exploitation rates estimated by SPA increased to high levels in the early 1990s and then declined abruptly to very low levels in 1995 and 1996 when reported landings were very low. The increase in estimated exploitation rate from the late 1980s to the early 1990s is consistent with the large increase in hake-directed mobile gear effort estimated for the early 1990s (Sinclair 1996). However, it may also reflect the abrupt decline in the survey catch rate in 1993.



Estimates of **total mortality** based on analyses of the survey data for the entire 4T

area also suggest peak levels in the early 1990s. In this case, the high mortality rate estimated for the 1990-1992 period is not influenced by the 1993 decline in the survey abundance index. Total mortality appears to have declined somewhat in recent years but remains very high despite low reported landings of hake.



There was considerable **uncertainty** concerning the results of the SPA but other approaches (i.e., estimates of trends in total mortality) yielded results that were in general agreement, indicating high mortalities in the early 1990s. The high total mortality rates estimated for recent years are unexpected given the very low landings reported in 1995 and 1996.

There is also uncertainty concerning the stock structure of white hake in the southern Gulf and the adequacy of the management unit (NAFO Division 4T). Migration into or out of the survey area could influence mortality estimates.

The sharp decline in the survey abundance index between 1992 and 1993 is not well understood. It appears to be too large to be accounted for by the reported landings, which also declined sharply between 1992 and 1993.

Outlook

The white hake resource in NAFO Division 4T appears to be at its lowest level since the first quota was put in place in 1982. The recent abrupt decline in hake abundance and continuing high mortality despite limited fishing raise grave concern for the state of this resource.

The research survey results indicate that population biomass has declined to its lowest level in the history of this survey. Furthermore, recent research surveys suggest that there has been a contraction of the geographic range, as well as a reduction in the abundance of larger hake. Fishing mortalities appear to have been high in the early 1990s and population abundance has declined to its lowest observed level. Total mortality appears to remain high despite low landings.

Management Considerations

A monitoring program in the Miramichi estuary in the fall of 1994 and 1995 found the by-catch of small white hake in the 'openwater' fishery for smelt to be very high. Smelt fishers were required to sort and release all groundfish (including white hake) from their fishing gear. This requirement should be maintained.

A 500-t allocation has been established for this stock in 1997 to accomodate by-catch in other fisheries. In view of the very low biomass and high total mortality rates estimated for this stock, this allocation is considered to be too high and should be reduced to as low a level as possible.

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