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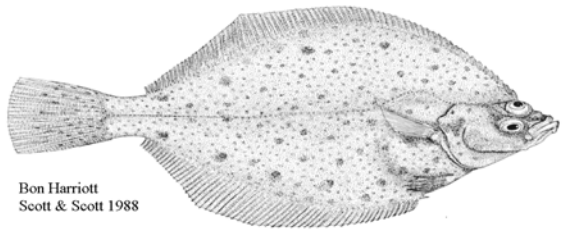
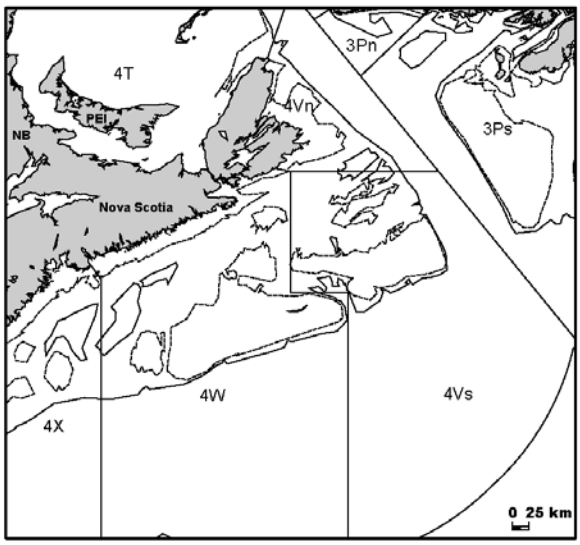
Maritimes Region **Stock Status Report A3-34(2002)**



American Plaice and Yellowtail Flounder on the Eastern Scotian Shelf (Div. 4VW)



Background

Flatfish are bottom dwelling fishes primarily associated with soft substrate (mud and sand bottom). They are unique among other fish in being asymmetrical, both eyes lying on one side of the highly flattened body. Early in life they start swimming on one side, and the eye on the underside migrates to the upper side. Flatfishes lie on the bottom on the blind side. Principal food items include crustaceans, molluscs, polychaete worms and small fishes.

Prior to 1994, yellowtail flounder (Limanda ferruginea), witch flounder (Glyptocephalus cynoglossus) and American plaice (Hippoglossoides platessoides) were managed as one stock complex (4VWX); winter flounder (Pseudopleuronectes americanus) was excluded from management considerations. In 1994, the management area was divided into an eastern (4VW) and western (4X) component, winter flounder was included, and the overall Total Allowable Catch (TAC) partitioned between the two areas based on catch history. The flounder fishery in 4X was placed under the Individual Transferable Quotas (ITQ) program in August 1994.

Management of the four species together under one TAC reflected the fact that it has been impossible to obtain reliable statistics on landings separated by species. The reported witch flounder landings are generally considered to be reliable, due to the higher price paid for this species. But the unreliability of the catch data for the other three species, coupled with the reports from the fishing industry of serious mis-reporting of other species as flatfish prior to 1991 eliminates the value of that information in determining resource exploitation. Initiation of ITQ logs and dockside monitoring of landings has had limited success in separating catch to individual species because landings were not separated at weighout or were misidentified by the weighmaster. It was decided to assess witch flounder separately from the other three species in 1997, but it is still managed as part of the general flounder TAC.

Summary

- The abundance and production of large American plaice and yellowtail flounder are very low.
- There should be low fishing mortality on American plaice and yellowtail flounder until increases in production and biomass of commercial-sized fish are observed.
- Large yellowtail flounder are no longer available in either of the two areas of concentration (4Vs and 4W).
- Indicators of recruitment for both species have been improving, but with no evidence of a contribution to the fishable biomass. Until this happens, there are no prospects of improved yields.

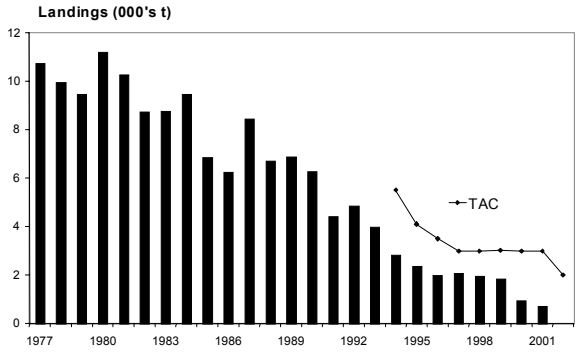
Canada

The Fishery

Landings (000s t)

Year	1977-1979 Avg	1980-1989 Avg	1990-1997 Avg	1998	1999[2]	2000[3]	2001	2002
TAC[1]				3.0	3.0	3.0	3.0	2.0
Total	10.0	8.4	3.6	2.0	2.1	0.9	0.7	

1. The TAC and landings include all flatfish species except Atlantic halibut.
2. Fishing year, landings and TAC refer to the 15-month period from January 1, 1999, to March 31, 2000.
3. Commencing in 2000, fishing year, landings and TAC refer to the period April 1st of the current year to March 31st of the following year.



Total **landings** of 4VW flatfish had remained around 2000t from 1995 through 1999, then dropped to 939t in 2000. **Total flatfish landings** in 2001/2002 were 705t. The 2002 fishing year landings of flatfish in 4VW to October 24, 2002, are 538t. Most of the TAC is allocated to the ITQ (mobile <65') and offshore fleets, with the majority of the catch taken by the ITQ fleet (in addition to its own quota, the ITQ fleet catches most of the quota of the offshore fleet under the Temporary Vessel Replacement Program - TVRP). Since 1994, total landings have never exceeded 67% of the TAC, with most of the shortfall attributed to the offshore allocation.

American plaice are fished primarily in 4Vs (Banquereau) and 4Vn (Sydney Bight), with most of the 4Vn catches since 1995 made in the spring and fall. The yellowtail flounder fishery was most active on Banquereau and Sable Island Bank (4W) through the mid-1980s. From about 1987 the yellowtail fishery was concentrated on the southeast corner of Banquereau until the fishery virtually disappeared in 1996. There has not been a significant yellowtail fishery since that time.

The biggest problem for managing flatfish fisheries has been the inability to segregate landings by species, and consequently overall quotas have been applied to combined fisheries. Unspecified flounder (unidentified flatfish species) in the commercial flatfish landings statistics for 4VW has increased from 19% in 1998 to almost 30% in 2002. Reconciliation of unspecified flounder for 1992-1999 (Fowler and Stobo, 1999; Fowler and Stobo, 2000) and by proration of 1999 adjustments for 2000-2001, resulted in reducing the percent unspecified but it remains substantial and variable. This limits the utility of catch data for determination of stock status. Recognizing this caveat, the reconciled plaice and yellowtail landings were used to evaluate exploitation rate.

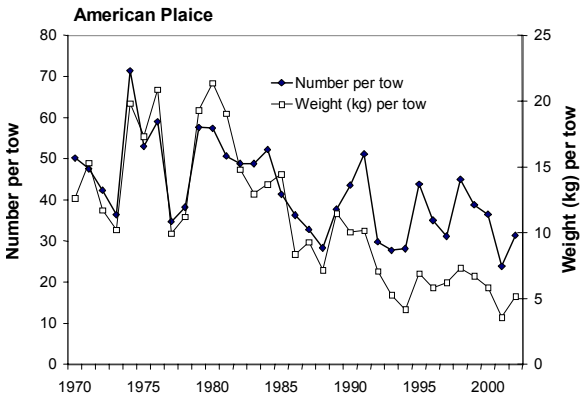
Reconciliation of Commercial and Fishing Log Data (Scotia Fundy only)

Revised Landings in Tonnes			
Year	**Plaice**	**Yellowtail**	**Percent Remaining Unspecified**
1992	479	1390	33.8%
1993	778	1864	18.4%
1994	836	1219	15.5%
1995	843	921	9.5%
1996	953	396	9.3%
1997	1206	87	17.9%
1998	1258	33	6.1%
1999	1269	47	11.8%
2000	538	6	13.0%
2001	364	8	14.0%

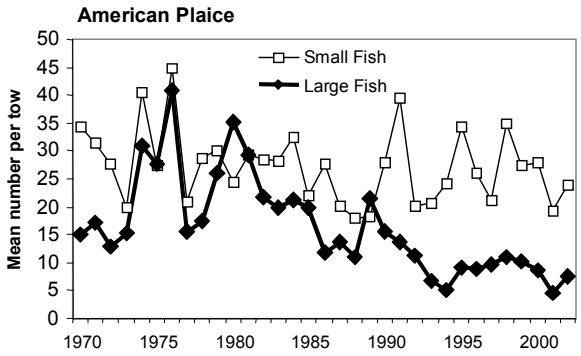
Resource Status

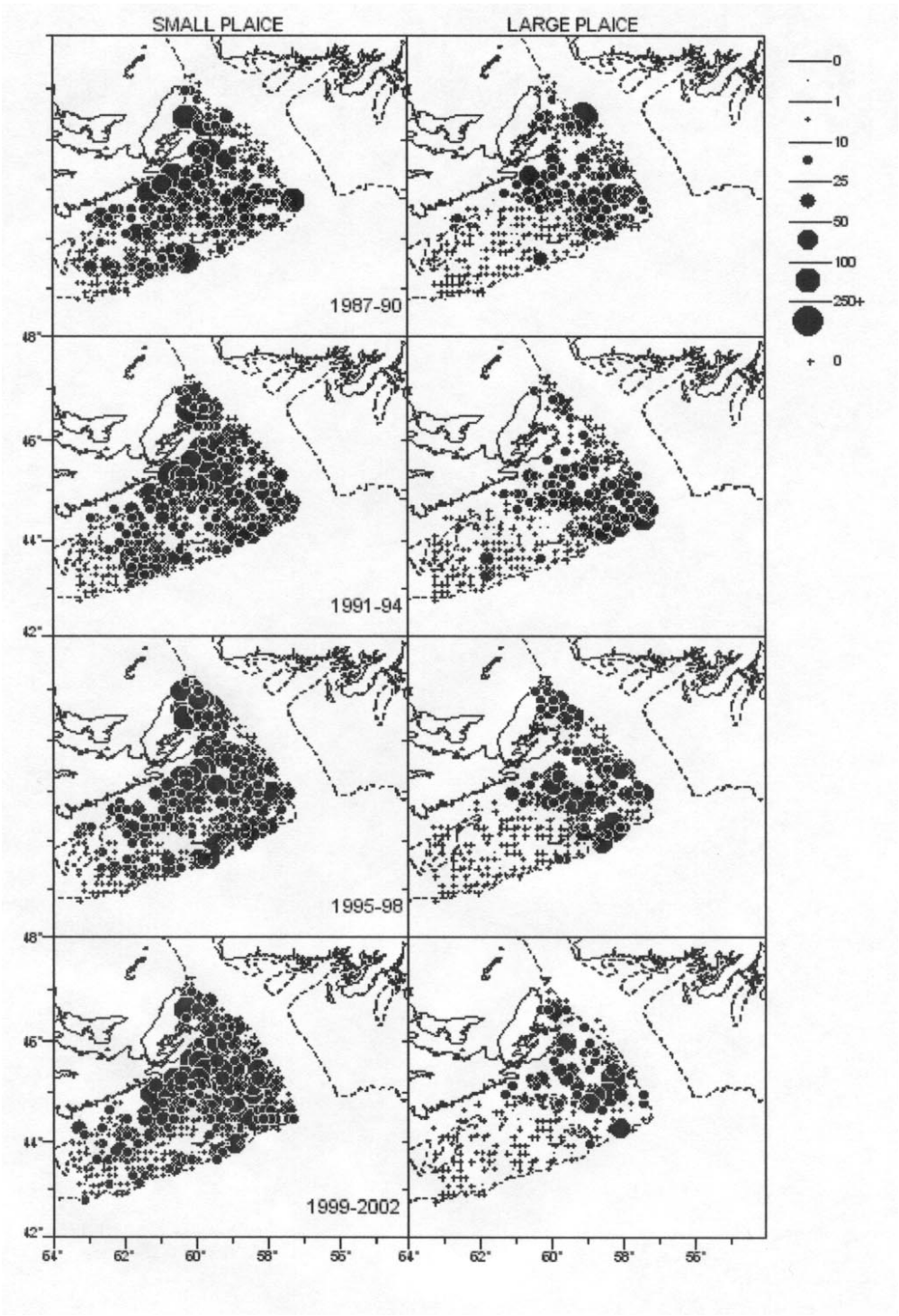
American Plaice

Summer **research vessel (RV) survey** information indicates a declining trend in abundance of American plaice from 1980 to 1994. This was followed by a period of stability at very low abundance, with a record low in 2001.

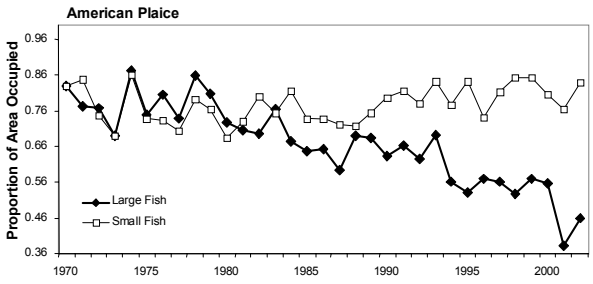


Most of the decline in abundance of American plaice has been associated with fishery-sized (denoted large; ≥31cm) components of the population. Abundance of pre-recruit sizes (denoted small; ≤30cm) of plaice show no trends over time. There is currently no evidence of a relationship between small plaice abundance and subsequent abundance of large plaice.

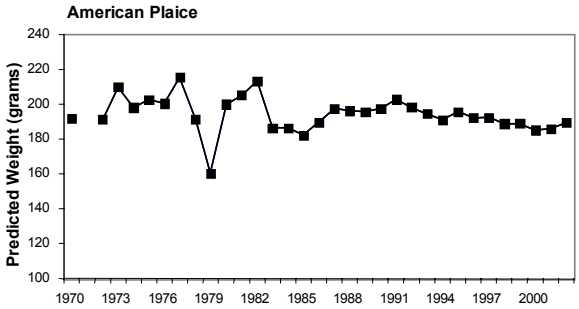



SMALL PLAICE
LARGE PLAICE
0
1
10
25
50
100
250+
0
1987-90
1991-94
1995-98
1999-2002
48°
46°
44°
42°
64°
62°
60°
58°
56°

The area occupied for large plaice declined steadily throughout the time series, then dropped sharply to a record low in 2001, and has increased only slightly in 2002. The area occupied for small plaice has been above average in most years since 1990.

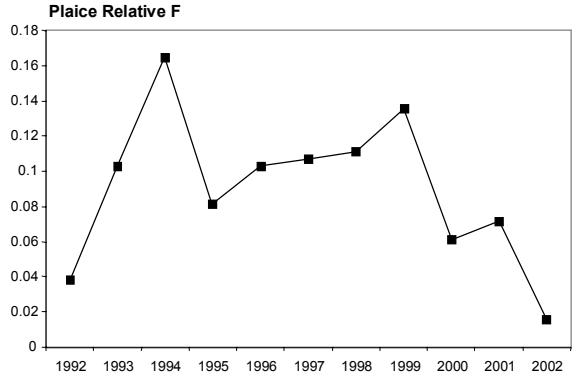


Condition, the weight of a fish at a given length, from the summer RV survey was used as an indicator of fish health. The predicted weight of 29cm plaice, representing the mean length of the population over the time series, has declined slightly since 1991.



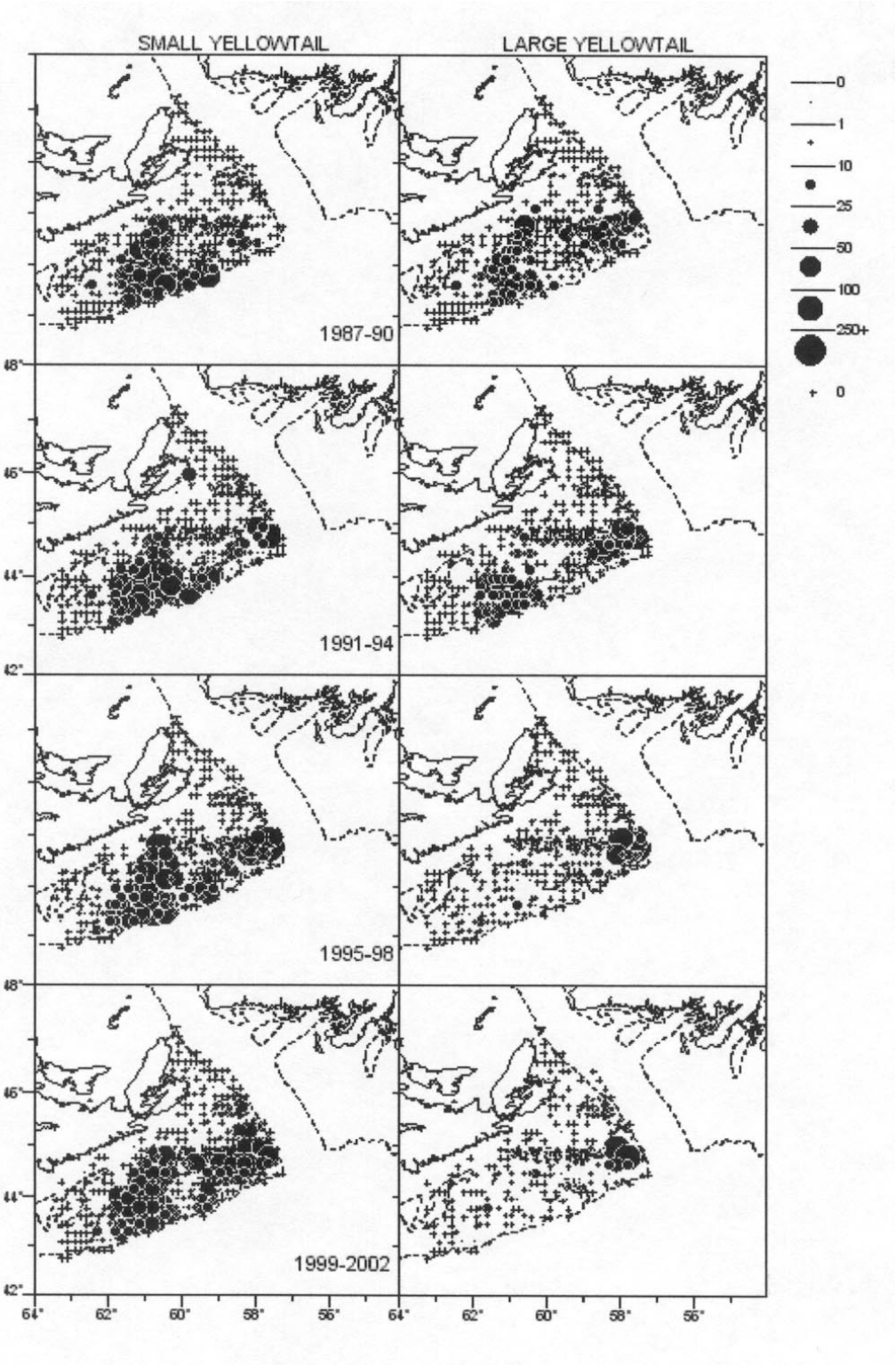
Age and length composition of American plaice in 1999 indicate that most of the fish taken in the survey are 5-6 years old. Applying the survey age/length key to commercial sampling data for 1993-1999 indicates full recruitment to the fishery at age 9.

Relative fishing mortality (relative F) was derived by dividing the catch by the RV survey biomass of large fish. The high proportion of unspecified flounder at the beginning of the series and in recent years implies that Relative F's for those years should be higher. Therefore, it is very difficult to interpret any trend in Relative F's throughout the period. Due to this complication, this indicator will not be used further in this assessment.

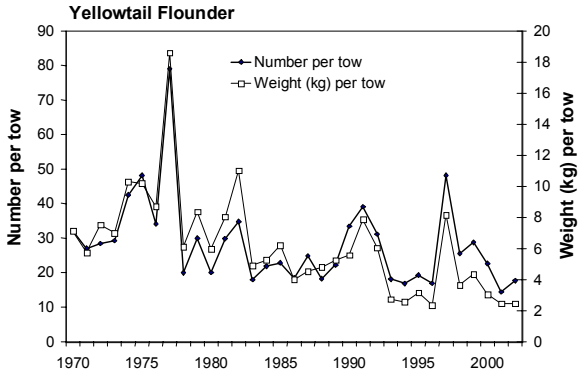


Yellowtail Flounder

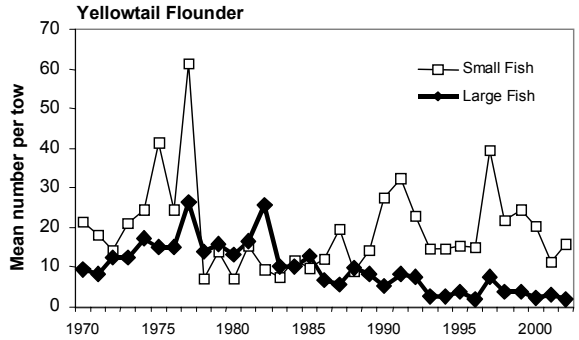
Based on **summer RV surveys**, yellowtail flounder appear to consist of two separate concentrations, only one of which has been fished since about 1987. The concentration on Banquereau (4Vs) supported the fishery until 1996, while the concentration on Sable Island Bank (4W) has not been fished since the 1980s.


SMALL YELLOWTAIL
LARGE YELLOWTAIL
1987-90
1991-94
1995-98
1999-2002
0
1
10
25
50
100
250+
0
48°
46°
44°
42°
64°
62°
60°
58°
56°

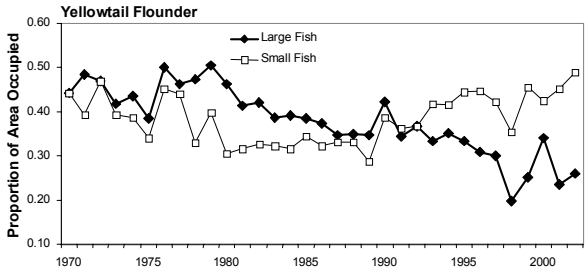
Since the 1970s, yellowtail flounder abundance and biomass have been declining.



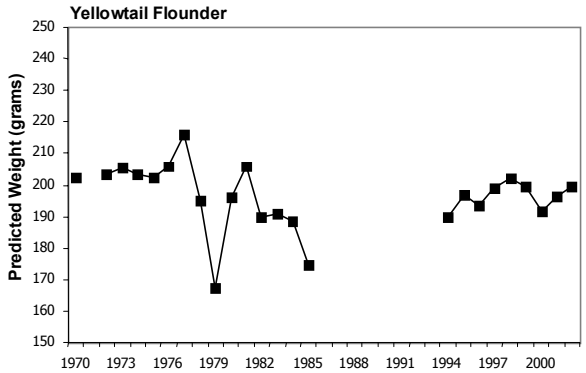
Most of the decline in abundance of yellowtail flounder has been associated with fishery-sized (denoted large; ≥31cm) components of the population, which have decreased to a record low in 2002. Abundance of pre-recruit sizes (denoted small; ≤30 cm) are highly variable over time, and have declined over the last few years. There is no evidence of a relationship between small yellowtail flounder abundance and subsequent abundance of large yellowtail flounder. Small yellowtail increased in abundance from 1978 to 1997, without making any apparent contribution to the abundance of large yellowtail, even in the absence of a significant fishery.



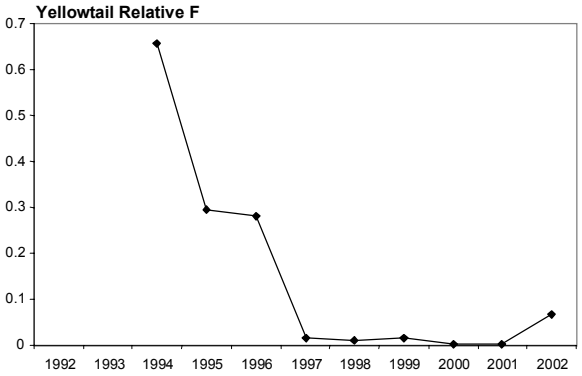
The area occupied for large yellowtail has declined steadily since 1980. The area occupied for small yellowtail has increased almost steadily since 1990.



Condition, the weight of a fish at a given length, from the summer RV survey was used as an indicator of fish health. The predicted weight of yellowtail flounder at the mean length of 29 cm has been about average in recent years, but remains below values observed in the early to mid-1970s.

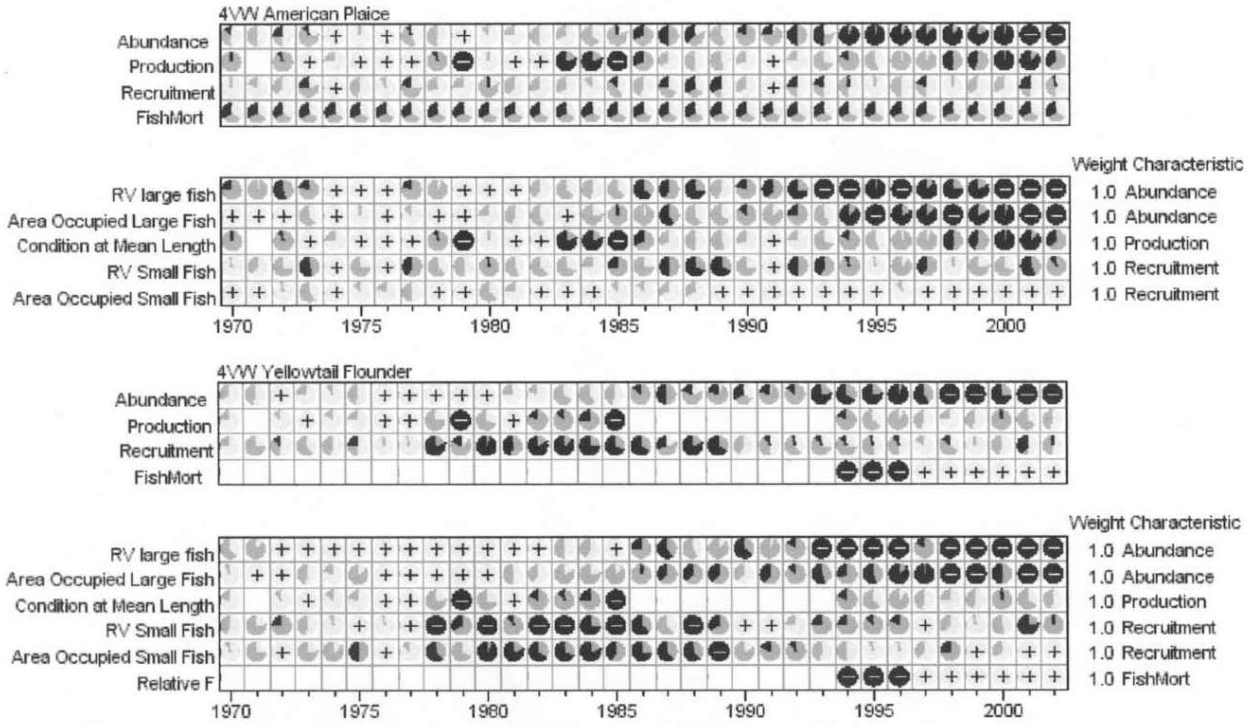


Relative fishing mortality (relative F) declined as the landings fell, settling at approximately zero since 1997. There has been essentially no fishery since 1996. Relative F's in 1994 to 1996 suggest that the real exploitation rate in those years may have been high and that catches in excess of 1000t are not sustainable.



The **Traffic Light** table summarises the indicators of stock status shown above. This table shows the annual values of each indicator as a combination of three lights depending on whether they are among the best values for that indicator, among the worst or in between. For indicators such as stock biomass and recruitment, high values are good and have a green light and low values are bad and have a red light. However, for indicators such as mortality, high values are bad and are assigned a red light ⊖ whereas low values are good and receive a green light ⊕. Intermediate values (midpoint between red and green) are yellow ●. A value between red and yellow is expressed as a pie with increasing amounts of red in the pie as the value approaches the red threshold or cut point. Similarly, a value between the midpoint and the green cut point becomes increasingly green in the pie as the green cut point is approached. Empty cells in the table indicate no observation for that year. Uncertainties about the appropriate cut point resulted in a broad yellow zone.

In the traffic light analysis, indicators are summarised into groups, which emphasize specific aspects of the resource. These groupings are called characteristics. The following outlook is cast in terms of these characteristics and each is shown in bold.



* See Appendix 1 for description of traffic light boundary points, weights and rationale for 4VW flounders.

Outlook

American Plaice

Indicators of **Abundance** (RV Large Fish, Area Occupied Large Fish) of large American plaice have declined throughout the time series.

The **Production** characteristic (Condition Mean Length) has deteriorated since the late 1980s.

Recruitment (RV Small Fish, Area Occupied Small Fish) has been stable or increasing, but without making a discernible contribution to the fishable component of the stock since 1990.

Yellowtail Flounder

Indicators of **Abundance** (RV Large Fish, Area Occupied Large Fish) of large yellowtail flounder have declined throughout the time series.

The **Production** characteristic (Condition Mean Length) has been about average in recent years, but remains below levels observed in the 1970s.

Recruitment (RV Small Fish, Area Occupied Small Fish) has been improving, especially through the 1990s, but without making a discernible contribution to the fishable component of the stock.

Fishing mortality (Relative F) suggests that catches in excess of 1000t may not be sustainable.

In summary, both American plaice and yellowtail flounder are producing substantial amounts of small fish that do not translate into biomass of commercial sizes. This could be due to slow growth or high mortality. Fishery removals should be kept as low as possible until substantial increases in commercial size biomass have been observed for several years. If the lack of increase in commercial size biomass is related to slow growth or high natural mortality, restricting the fishery may not result in increased biomass.

For more Information

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Fowler, G.M., and W.T. Stobo. 1999. Reconciliation of processed catch statistics with log data for 1992-97 flatfish in 4VWX/5Y. DFO Can. Stock Assess. Sec. Res. Doc. 99/149.

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Appendix 1. Description of traffic light indicators, boundary points, weights and rationale for 4VW flounders.

The traffic light approach provides a framework that allows us to incorporate multiple indices of stock status and other relevant indicators. Colour boundaries corresponding to good and bad periods can be established qualitatively for some indicators, but remain problematic for others. For most indicators, the history of the index is short relative to the ecological and evolutionary history of the fish populations or of the ecosystems within which they occur. In the absence of quantitative information to specify colour boundaries they have been established by a process of deliberation, where the weight of expert opinion is used to determine the most reasonable estimates. These represent the best available estimates; however all are subject to improvement through ongoing research.

American Plaice

Indicator	Green Boundary (+)	Red Boundary (-)	Characteristics	Weights
RV Large Fish	25 – reflects good period of fishery	9 – reflects bad period of fishery	Abundance	1
Area Occupied Large Fish	.75 – reflects good period of fishery	.55 – reflects bad period of fishery	Abundance	1
Condition at Mean Length	200 – top third of values plus margin of doubt	185 – bottom third of values plus margin of doubt	Production	1
RV Small Fish	35 – good period of fishery plus margin of doubt	15 – bad period of fishery plus margin of doubt	Recruitment	1
Area Occupied Small Fish	.75 – as for Area Occupied Large Fish	.55 – as for Area Occupied Large Fish	Recruitment	1

Yellowtail Flounder

Indicator	Green Boundary (+)	Red Boundary (-)	Characteristics	Weights
RV Large Fish	12 – reflects good period of fishery	4 – reflects bad period of fishery	Abundance	1
Area Occupied Large Fish	.45 – reflects good period of fishery	.3 – reflects bad period of fishery	Abundance	1
Condition at Mean Length	205 – top third of values plus margin of doubt	180 – bottom third of values plus margin of doubt	Production	1
RV Small Fish	25 – good period of fishery plus margin of doubt	10 – bad period of fishery plus margin of doubt	Recruitment	1
Area Occupied Small Fish	.45 – as for Area Occupied Large Fish	.3 – as for Area Occupied Large Fish	Recruitment	1
Relative F	.1 – no rationale	.2 – higher values associated with loss of marketable sizes	Fishing Mortality	1