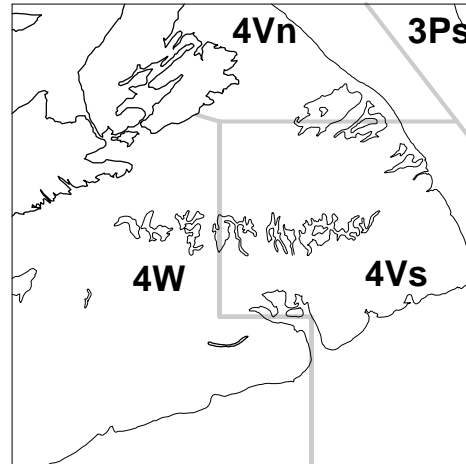


Bon Harriott  
Scott & Scott 1988

## 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 condition of fishery-sized American plaice is very low.
- There should be a reduction in fishing mortality on American plaice until an increase in production is observed.
- Fishery-sized yellowtail flounder are no longer available in either of the two areas of concentration (4Vs and 4W).
- Yellowtail flounder pre-recruit abundance has been improving, but with no evidence of a contribution to the fishable biomass. Until this happens, there are no prospects of improved yields.

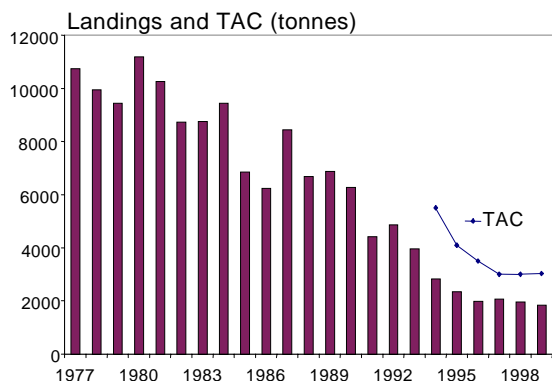
### The Fishery

Landings (000's tonnes)

Year	1994	1995	1996	1997	1998	1999 <sup>2</sup>	2000 <sup>3</sup>
TAC <sup>1</sup>	5.5	4.1	3.5	3.0	3.0	3.0	3.0
Flatfish	2.8	2.3	2.0	2.1	2.0	2.1	

1. The TAC and landings include witch flounder and unidentified flatfish.
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 1 of the current year to March 31 of the following year.

## Maritimes Region



Total **landings** of 4VW flatfish have remained around 2000t since 1995. 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 their own TAC, much of the offshore TAC is caught by the ITQ fleet under the Temporary Vessel Replacement Program). Since 1994, total landings have never exceeded 67% of the TAC, most of the shortfall attributed to the offshore allocation. The 2000 fishing year landings of flatfish in 4VW to August 30, 2000, are 541t (including witch flounder).

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 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.

Unspecified flounder (unknown flatfish species) currently makes up about 20% of the commercial flatfish landings statistics. This is an improvement over the 30-40% unspecified flounder reported throughout 1991-1997, but is still inadequate to interpret species-specific landings with regard to stock status. An investigation of fishing log data indicated that much of the unspecified flounder in the commercial landings statistics had been identified by the fishermen, suggesting a problem with the collection or processing of

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

Dockside Monitoring Program data. Substituting unspecified flounder with identified species from fishing log data reduced unknown flatfish to 6-12% of recent (1998-99) landings, and revealed that our previous perception of a dramatic increase in plaice landings (20-fold rise in landings from 1992 to 1999) was simply an artifact of improving data quality. Most of the unspecified flounder are American plaice, so as data quality improved the apparent landings of this species rose sharply. Actual plaice landings increased 40% between 1992-99.

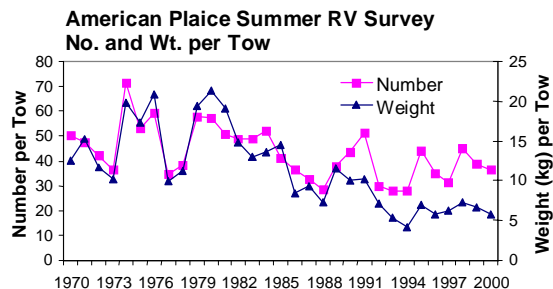
Reconciliation of Commercial and Fishing Log Data (Scotia/Fundy only)  
Revised Landings in Tonnes

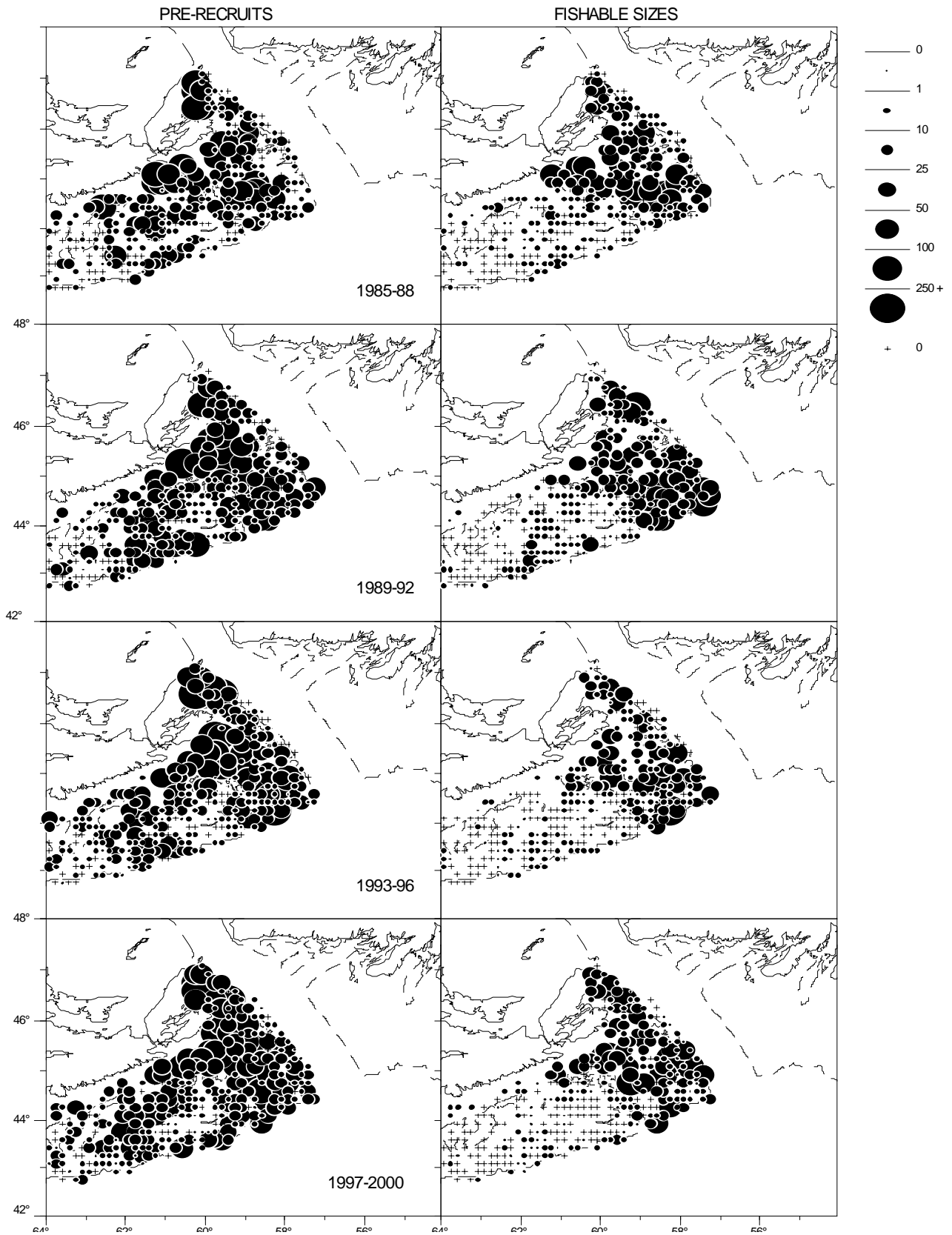
Year	Plaice	Yellowtail	Winter	Witch	Unspecified		Percent Unspecified
					Flatfish	Total	
1992	479	1390	7	922	1425	4223	33.8%
1993	778	1864	3	527	714	3886	18.4%
1994	836	1219	3	284	430	2771	15.5%
1995	843	921	0	303	216	2284	9.5%
1996	953	396	4	332	173	1858	9.3%
1997	1206	87	2	306	349	1950	17.9%
1998	1258	33	2	412	110	1814	6.1%
1999	1269	47	0	167	198	1681	11.8%

## Resource Status

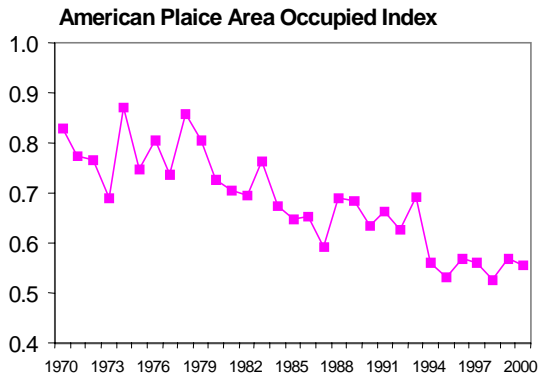
### American Plaice

Declining **research vessel (RV) survey abundance** of American plaice from 1980 to a record low in 1994 was followed by a period of stability, but at very low abundance. Most of this decline was associated with fishery-sized (>30cm) plaice (resulting in a decline in mean fish weight), and occurred in both areas of fishery concentration (4Vs and 4Vn).

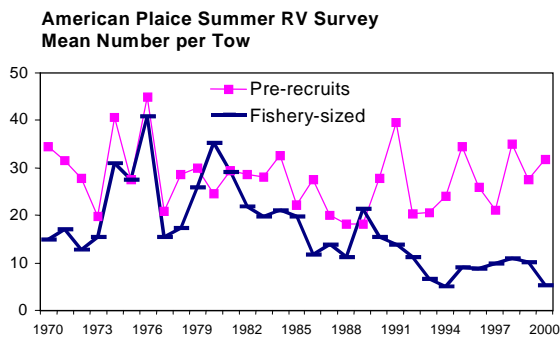




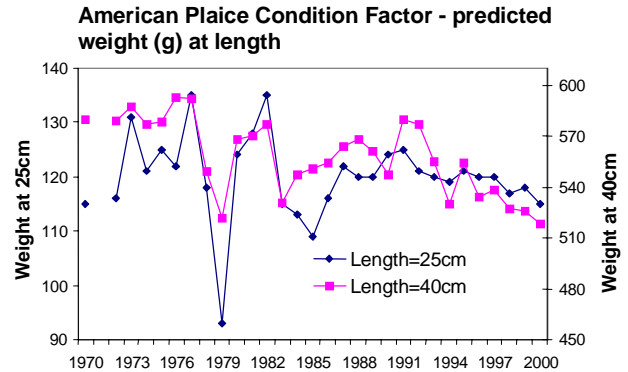
Associated with this decline, a reduction in the **area occupied index** (proportion of RV sets in which plaice are caught) by fishery-sized American plaice has occurred.



There is no evidence of a relationship between pre-recruit ( $\leq 30\text{cm}$ ) abundance and subsequent abundance of plaice of fishery sizes. Pre-recruit numbers have increased in **abundance** since 1989, while those of fishery-sized plaice have declined.



**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 25cm plaice, representing pre-recruits, has shown no clear trend over the years. However, the predicted weight of 40cm plaice, representing fishery-sized plaice, has declined.

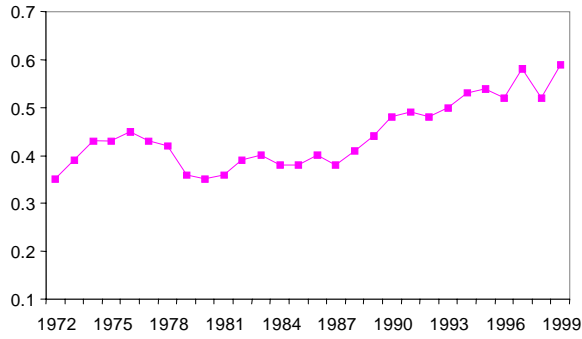


**Age and length composition** of American plaice in 1999 indicate that most of the fish taken in the survey are 5-6 years old. Applying the survey age/length key to commercial sampling data indicates full recruitment to the fishery at age 9.

Historical (1970-85) **maturity** data for American plaice gives lengths at 50% maturity in the 26-29cm range, largely comprised of 7-8 year-olds today. This provides for some reproductive activity prior to fish becoming available to the fishery. It is also possible that plaice today mature at even smaller sizes, as a decline in length at maturity was observed during the 1970s.

**Total mortality** ( $Z$ ) of 4VW American plaice, estimated by applying a 1999 age-length key to summer RV survey data for all years, has increased from about 0.4 in the mid-1980s to between 0.5 and 0.6 by the mid-1990s. Estimates for years prior to the mid-1990s will be too high if plaice have undergone a decline in growth rate as observed for several of the commercial fish species in 4VW.

American Plaice Total Mortality

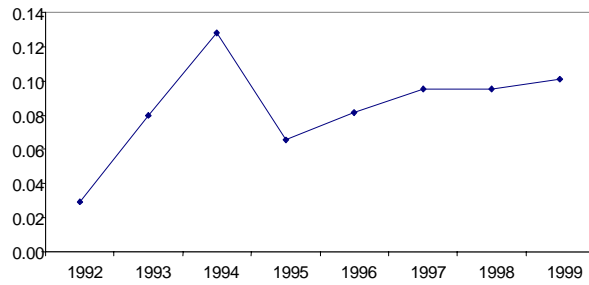


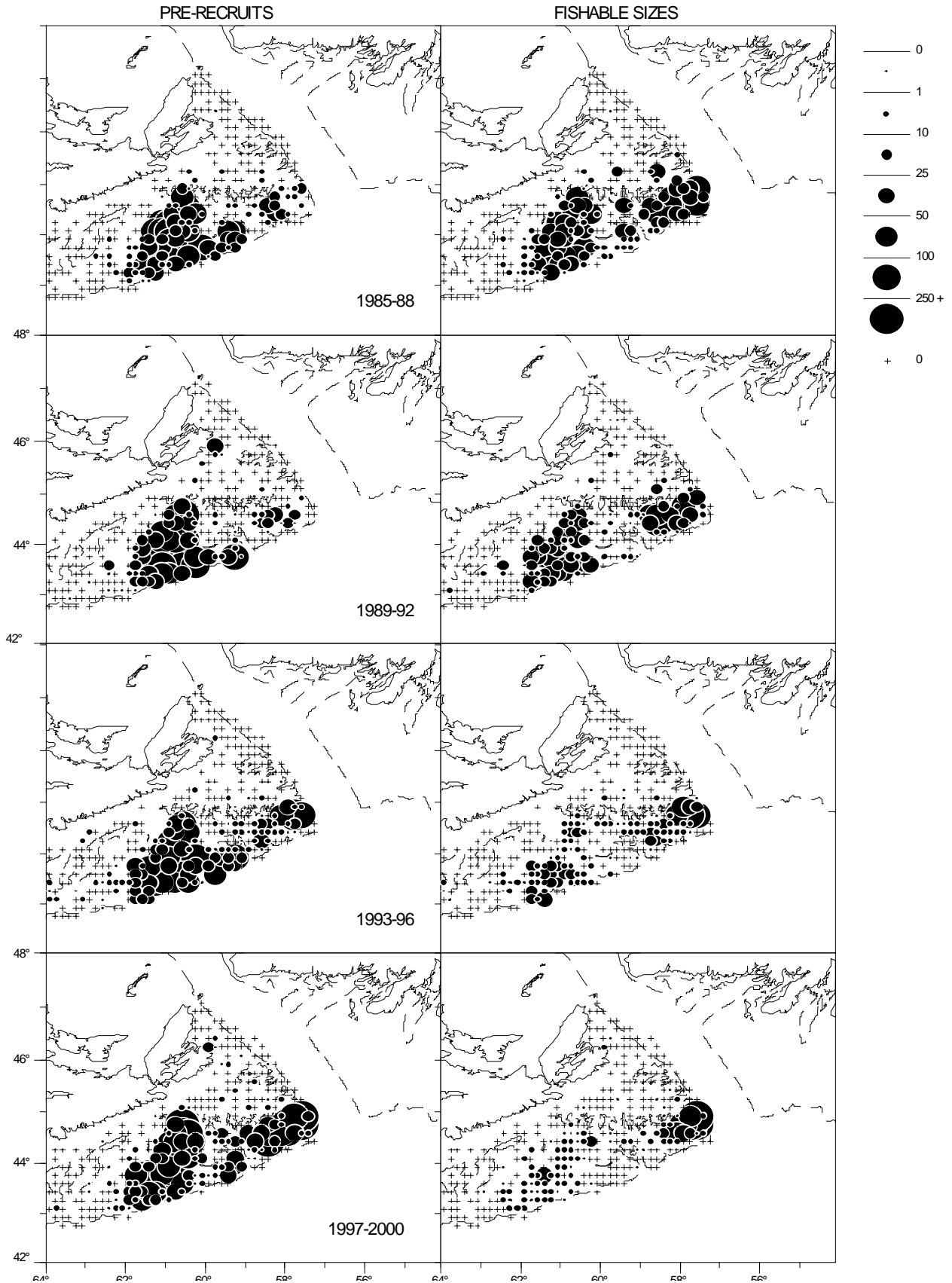
Yellowtail Flounder

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 group on Banquereau (4Vs) supported the fishery until 1996, while the group on Sable Island Bank (4W) has not been fished since the 1980s.

**Relative fishing mortality** (relative F) was derived by dividing the catch by the RV survey biomass. It has generally increased since 1995.

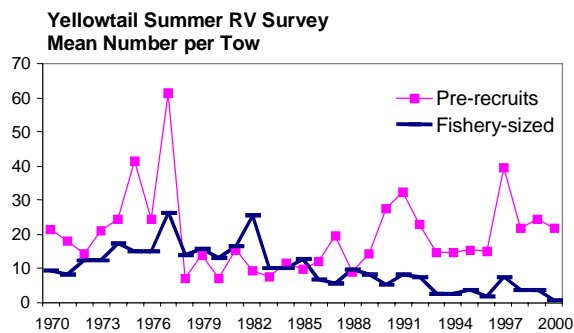
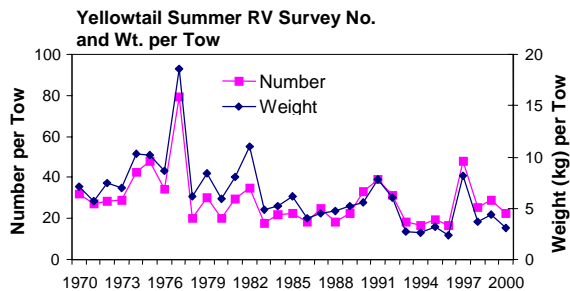
American Plaice Relative Fishing Mortality



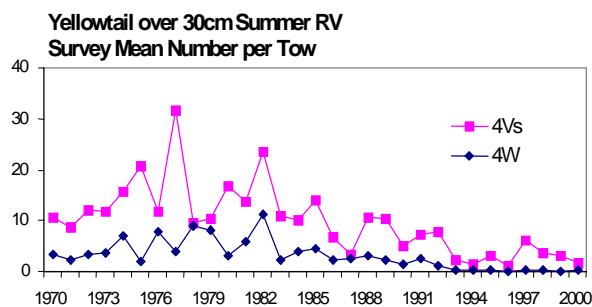


## Maritimes Region

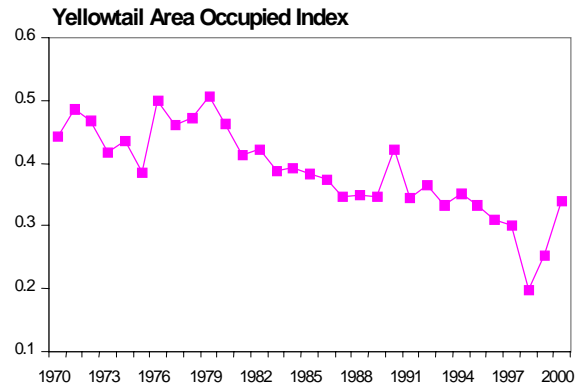
A general trend of declining **abundance** since 1970 to a record low in 1993 was followed by a period of relatively low abundance. This decline was entirely associated with fishery-sized (>30cm) yellowtail, resulting in a decline in mean fish weight.



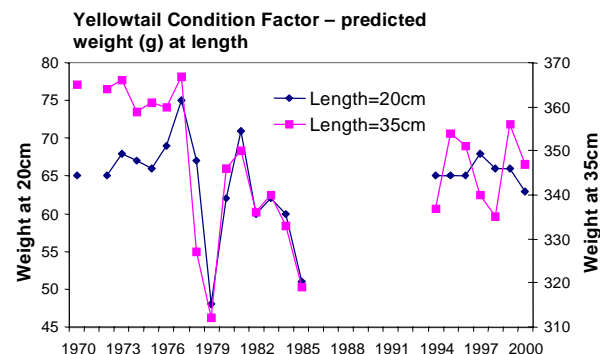
The decline in abundance of fishery-sized yellowtail flounder occurred in both areas of concentration (4Vs and 4W). This was reflected in a contraction of the distribution, and a reduction in the area occupied by fishery-sized yellowtail.



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



**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 weights of 20cm and 35cm yellowtail, representing pre-recruits ( $\leq 30$ cm) and fishery sizes respectively, have shown no clear trend over the years.



There is no evidence of a relationship between pre-recruit abundance and subsequent abundance of fishery-sized yellowtail flounder. Pre-recruits have been increasing in abundance since 1978, without making any apparent contribution to the abundance of fishery-sized yellowtail.

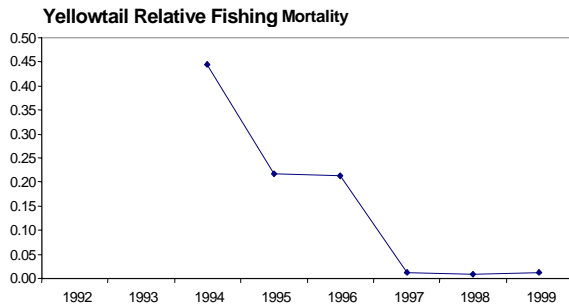
Historical **maturity** data (1970-85) showed a decline in length at maturity throughout the 1970s, possibly continuing into the 1980s, and length at 100% maturity was in the 29-30cm range in most years since 1979. If length at 100% maturity has remained under 31cm to the present day, yellowtail flounder



## Maritimes Region

are reproductively active well before recruiting into the fishery.

**Relative fishing mortality** (relative F) declined as the landings fell, settling at approximately zero since 1997 (there has been essentially no fishery since 1996).



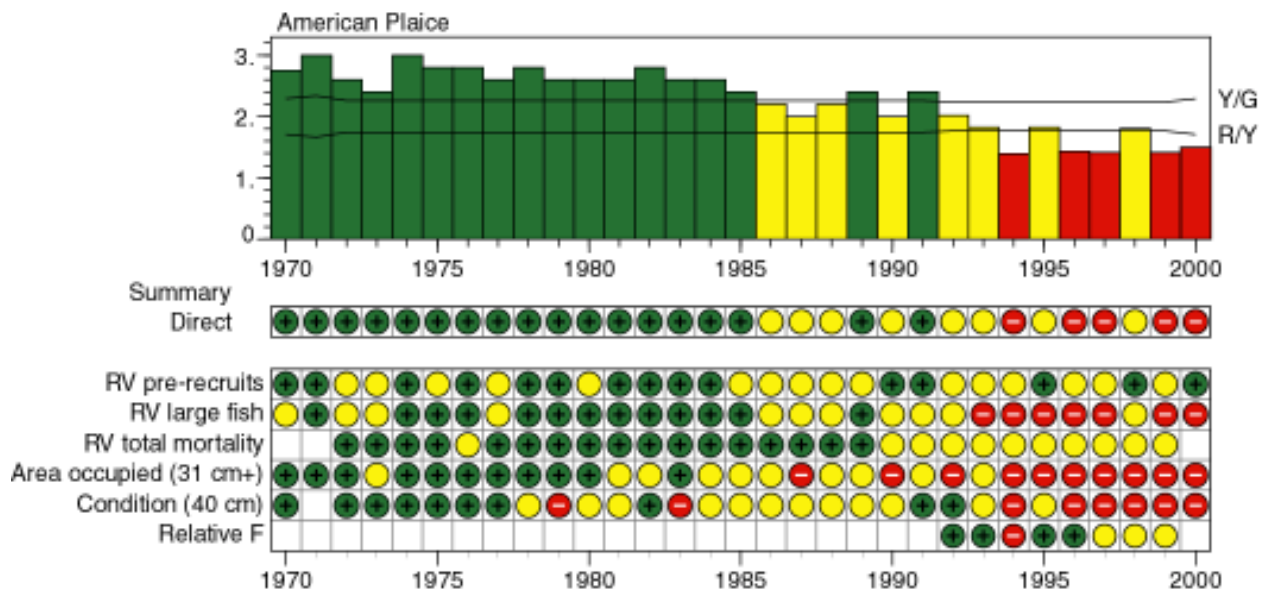
The **Traffic Light** table that follows summarizes the indicators of stock status shown above.

This table shows the annual values of each indicator as one of three lights depending on whether they are among the highest values observed for that indicator, among the

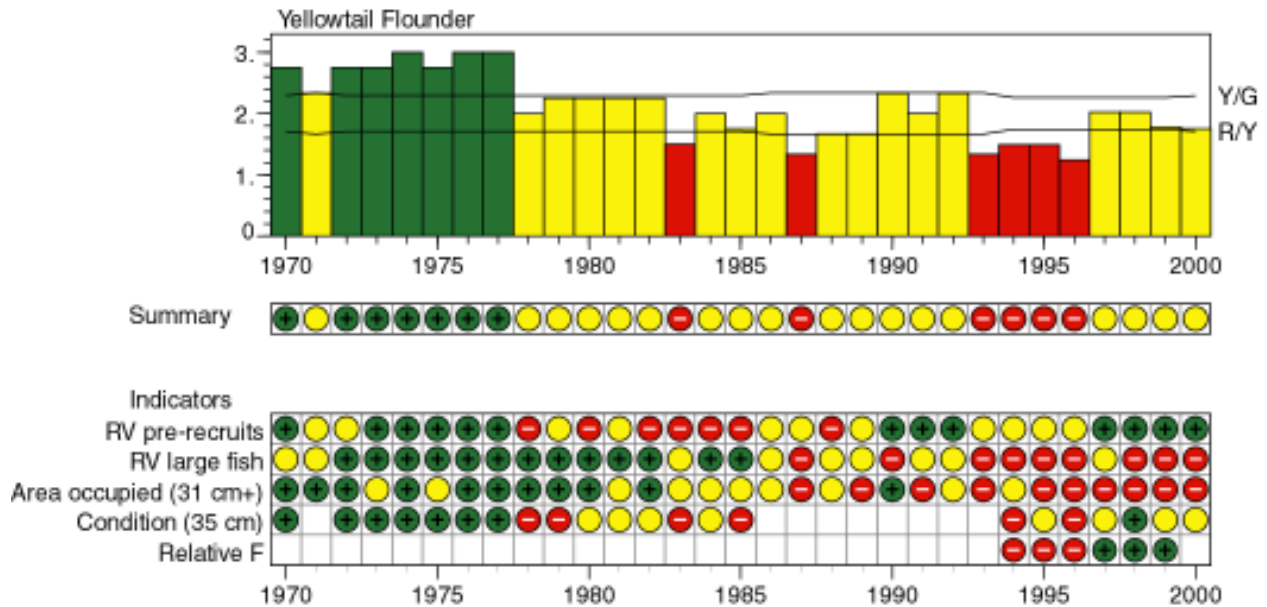
## American Plaice and Yellowtail Flounder on the Eastern Scotian Shelf (Div. 4VW)

lowest 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 are yellow ●.

The results for the indicators combined are shown in the summary line above the array of individual indicators. If most indicators in a particular year are red then the summary light for that year will be red, if most are green the summary light will be green, and so on. The actual summary scores from the range of indicators in the table are shown in the bar chart above the table. The height of the bar determines the colour for the corresponding year and the horizontal lines on the bar chart indicate the boundaries between the colours (red-yellow and yellow-green).







**Outlook**

American plaice

Indicators of **abundance** of fishery-sized American plaice (RV large fish, Area occupied 31 cm+) declined in the early 1990s and have remained low since.

The three indicators of **productivity** give mixed signals. Small fish abundance (RV pre-recruits) has varied in recent years between yellow and green. Total mortality (RV total mortality) has been in the yellow zone since 1989. Fish condition (Condition (40 cm)) declined in the 1990s and has been in the red for the last 5 years.

**Fishing mortality** (Relative F) is in the yellow range.

The **summary** indicator is, and has been, red in most years since 1992. This is due to low abundance (lowest observed in 30 years) and poor condition of fishery-sized plaice. The current poor status of this resource requires that measures be taken to reduce fishing mortality. Until productivity increases, there is little prospect for

improved stock status. The reasons for low productivity are not understood, but the recent increases in removals (since 1996) can only exacerbate this problem.

Yellowtail flounder

Indicators of **abundance** of fishery-sized yellowtail flounder (RV large fish, Area occupied 31 cm+) are very low, and have been in the red since 1991.

The indicators of **productivity** are positive. Pre-recruit abundance (RV pre-recruits) has improved since the mid-1990s, and has remained in the green since 1997. No trend in fish condition (Condition (35 cm)) is apparent.

**Fishing mortality** (Relative F) has been low (green) since 1996 due to the absence of a directed fishery.

The **summary** indicator was red during the period leading up to the end of the fishery. Since that time, the signal has remained yellow, a result of the low abundance of fishery-sized yellowtail (red) and good production of pre-recruits (green). However,

the recent production of pre-recruits has not translated into increases in fishable biomass. Until this happens, there are no prospects of improved yields.

***For more Information***

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