# MARITIMES SUMMER RESEARCH VESSEL SURVEY TRENDS

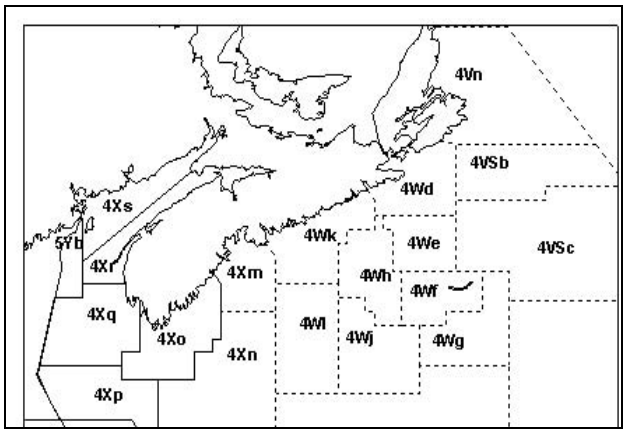


*Figure 1. Northwest Atlantic Fisheries Organizations (NAFO) Unit Areas.*

**Context :**

*DFO has conducted summer research vessel (RV) surveys in the Maritimes Region, Northwest Atlantic Fisheries Organization (NAFO) Divisions 4VWX and a small portion of 5Y, using a standardized protocol since 1970. Results of these surveys provide information on trends in abundance for most groundfish species on the Scotian Shelf. While these data reflect trends in biomass and abundance and are a critical part of science-based stock assessments, a full assessment, including other sources of data, would be required to evaluate the impacts of management measures on population status. Fisheries and Aquaculture Management (FAM) requested a review the DFO RV survey information on the following list of fish stocks: 4X5Y cod, 4VWX pollock, Unit 3 redfish, 4VW white hake, 4X5Y white hake, 4VW haddock, 4X5Y flatfish, and 4VW flatfish.*

*Full assessments were not conducted for these stocks in 2009. The survey information will be used by DFO Resource Management as background for discussions with various industry stakeholders on recommendations for management measures, and to determine which stocks should be reviewed in more detail in 2010.*

## SUMMARY


- Catches in the 2009 summer research vessel (RV) survey were quite high for a variety of groundfish species on the Scotian Shelf and Gulf of Maine, but catches remained low for most species in the Bay of Fundy.

- In recent years, there is no clear trend in RV survey biomass indices for 4VW haddock, 4VW white hake, 4X5Y white hake, 4X5Y cod, 4VW American plaice, 4X witch flounder, or pollock (Eastern or Western management areas).

- Biomass indices for Unit 3 redfish, 4X winter flounder, and 4VW witch flounder are displaying an increasing trend.

# INTRODUCTION

The DFO summer research vessel (RV) survey of the Scotian Shelf and Bay of Fundy has been conducted annually since 1970. The survey follows a stratified random sampling design, and includes sampling of fish and invertebrates using a bottom otter trawl. These survey data are the primary data source for monitoring trends in species distribution, abundance, and biological condition within the region, and also provide data to the Atlantic Zonal Monitoring Program (AZMP) for monitoring hydrographic variability.

The bottom trawl survey was designed to provide abundance trends for groundfish between depths from about 50m to 400m. Survey indices are expected to be proportional to abundance for most species. The distribution of some species, such as cusk and turbot, may not be fully covered by the survey. Abundance trends for theses species may only provide indication of direction of change over time. Similarly, for pelagic species, such as herring, which are distributed broadly through the water column, bottom trawl catches may not reflect abundance trends. For all these species, other biological information collected during the RV survey, such as length and weight, will still be useful for analysis.

For the purpose of this report, the survey area has been divided into three zones, based on oceanography and biogeography (Figure 2). Trends are shown for the entire survey area, and also for three separate regions: Eastern Scotian Shelf (4VW; strata 440-466), Western Scotian Shelf (4X East; strata 470-481), and Gulf of Maine/Bay of Fundy (4X West; strata 482-495). Differences in patterns of fish abundance and species composition are apparent for these regions during the survey.

Comparisons of stratified length frequencies for 2008 and 2009 to the long-term mean are also included for major commercial fish species.

# ANALYSIS

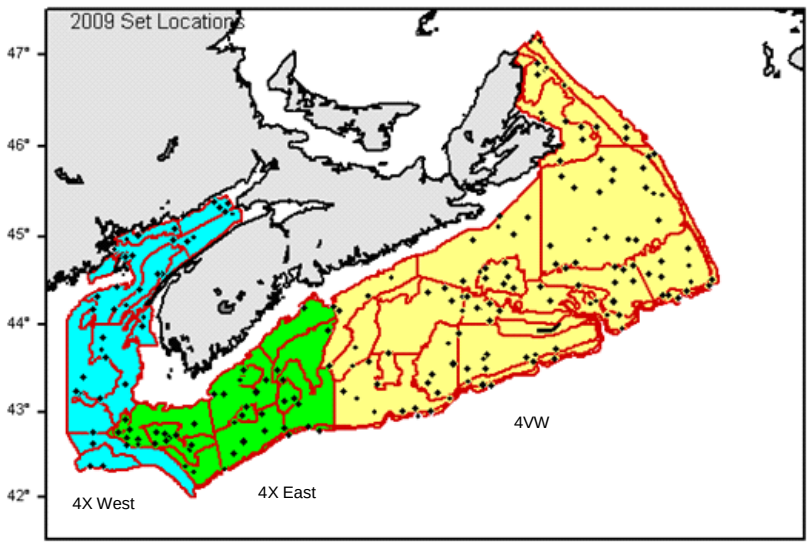


*Figure 2. 2009 summer RV survey station distribution.*

4X **Atlantic cod** were widespread in the survey area in 2009 and there were several sets where the catch exceeded 50kg. Biomass indices in 2008 were the lowest in the series. Biomass indices for 2009 increased in 4X East and 4X West and were the highest since 1996 in 4X East (Figure 3a). In 4X West, biomass remained well below average (average = 13,412). Abundance indices were above average in 4X East for most lengths below 64cm, but less than average above that (Figure 3b). Abundance remains low for most lengths in 4X West (Figure 3c).

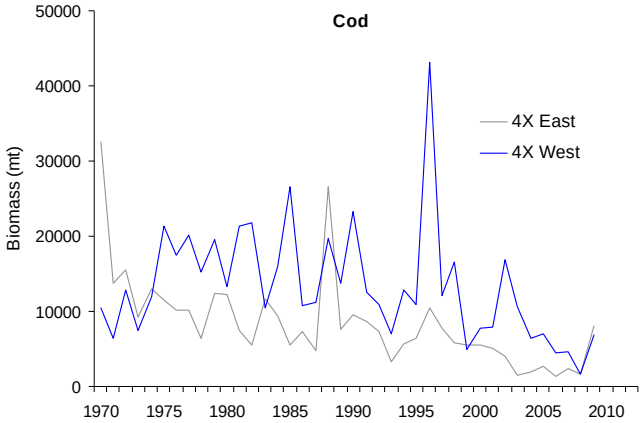


*Figure 3a. Biomass estimate for 4X cod from the summer RV survey.*

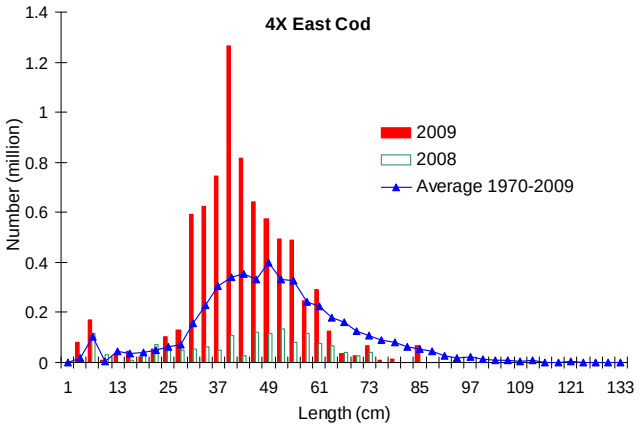


*Figure 3b. Length composition for cod in 4X East from the summer RV survey.*

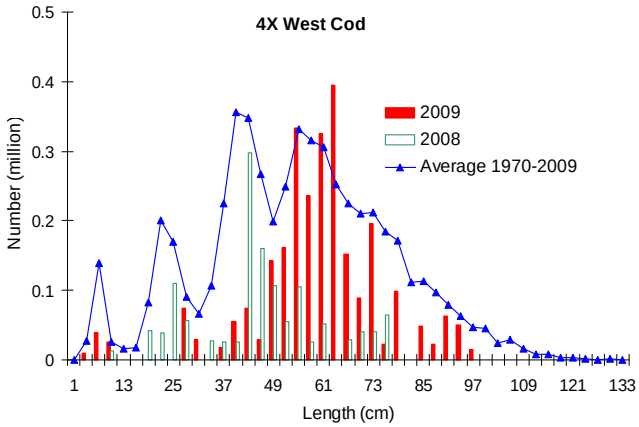


*Figure 3c. Length composition for cod in 4X West from the summer RV survey.*

Most **pollock** were caught in the Gulf of Maine (4Xpq) and near the 4X-4W line. Biomass indices remain high in all areas compared to the last decade, despite a decline in 4VW in 2009 (Figure 4a). Abundance of pollock in the east (4VW and 4Xmn) in 2009 was the highest in the series for lengths 25cm to 31cm, a mode which is likely comprised of Age 2 fish, but below average for almost all other lengths (Figure 4b). Pollock abundance in the west (4Xopqrs) was above average for lengths 58 cm – 82 cm in both 2008 and 2009, but below average for most lengths less than 49cm (Figure 4c).

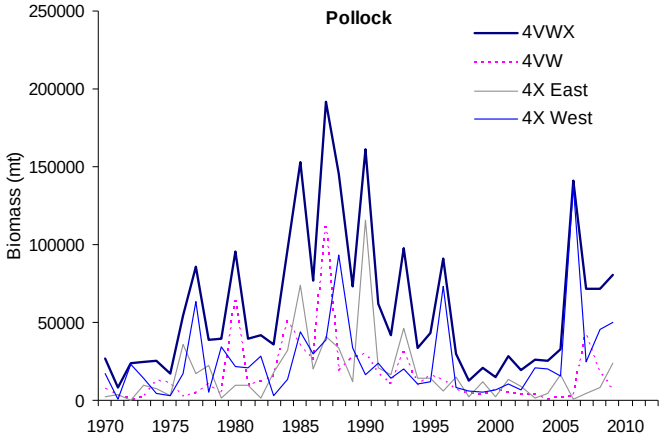


*Figure 4a. Biomass estimate for pollock in 4VWX from the summer RV survey.*

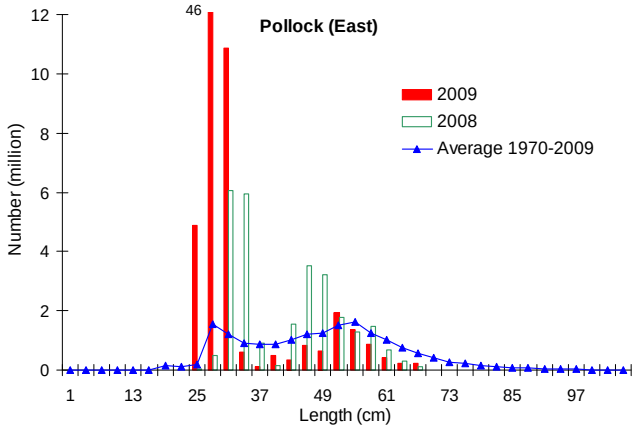


*Figure 4b. Length composition for pollock Eastern component from the summer RV survey.*

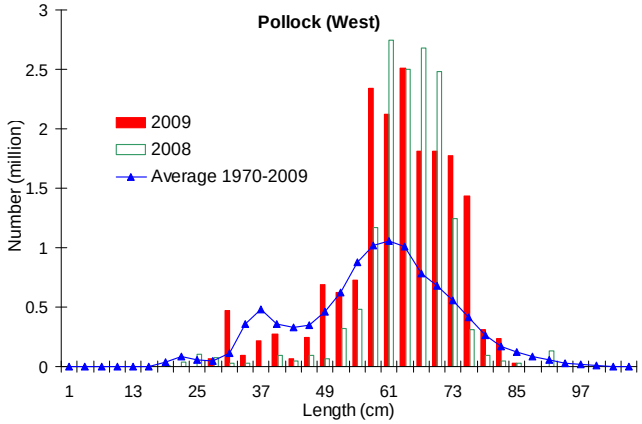


*Figure 4c. Length composition for pollock Western component from the summer RV survey.*

**White hake** in 4VWX were distributed throughout the survey area, with the largest catches in the Gulf of Maine (4Xpq), the Bay of Fundy, and in 4Vn. Biomass indices display high inter-annual variability. They have declined in general since the mid 1980s, but have risen for the last two years in all regions (Figure 5a). Abundance remained below average for all lengths for 4VW in 2008 and 2009 (Figure 5b). In 4X East, abundance indices were above average for most lengths below 58cm in 2009, but below average for larger fish (Figure 5c). This is similar to what was seen in 2008. White hake abundance indices in 4X West were near average for most lengths in both 2008 and 2009 (Figure 5d).

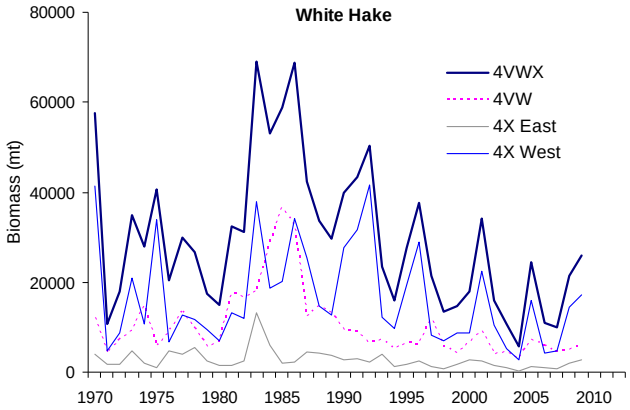


*Figure 5a. Biomass estimate for white hake in 4VWX from the summer RV survey.*

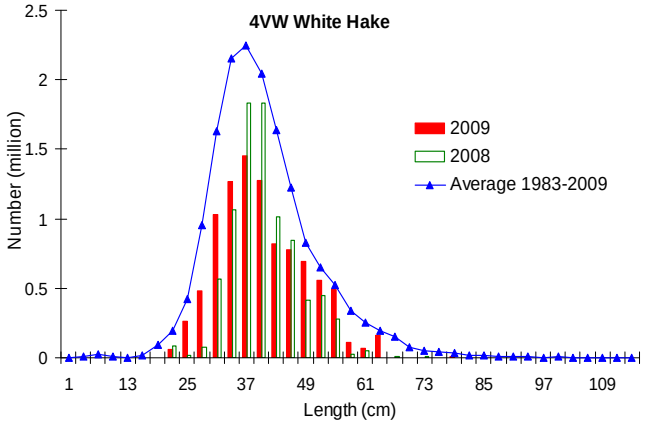


*Figure 5b. Length composition for white hake in 4VW from the summer RV survey.*

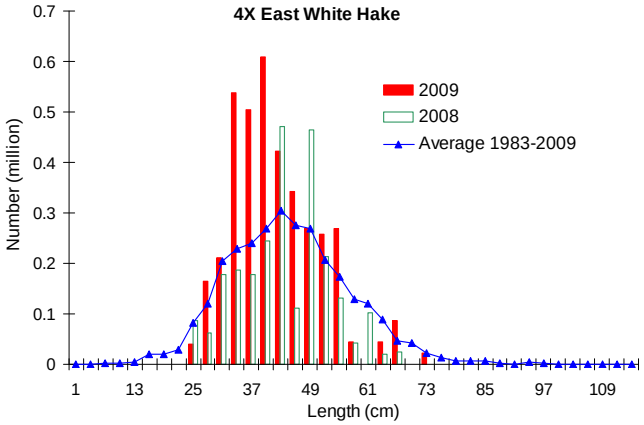


*Figure 5c. Length composition for white hake in 4X East from the summer RV survey.*

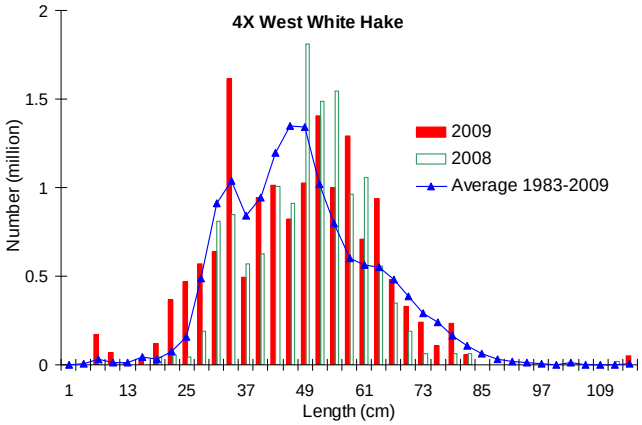


*Figure 5d. Length composition for white hake in 4X West from the summer RV survey.*

Large catches of **redfish** were wide-spread throughout the survey area in 2009. The biomass index has followed an increasing trend since 2004, and in 2009 was the highest in the series (Figure 6a). Abundance indices for Unit 3 redfish were above average for most lengths in 2009, with a strong mode apparent in the length frequency (21cm) (Figure 6b).

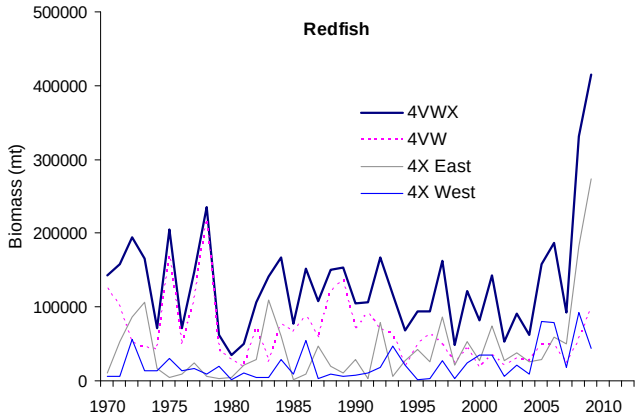


*Figure 6a. Biomass estimate for redfish in 4VWX from the summer RV survey.*

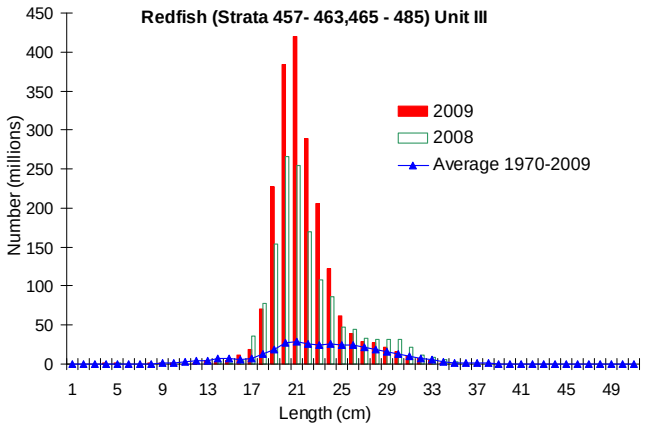


*Figure 6b. Length composition of redfish in Unit III from the summer RV survey.*

Large catches of **haddock** in 4VW were taken on offshore banks in 4Wefhj and the eastern tip of the Scotian Shelf in 4VSc in 2009. The 4VW haddock biomass index decreased in the early 1990s, but has fluctuated without trend since then. In 2009, the biomass index was the highest in the series in 4VW (Figure 7a). Abundance indices were much higher than average for lengths above 30cm, but lengths between 11 and 30cm were almost absent in 2008 and 2009 (Figure 7b).

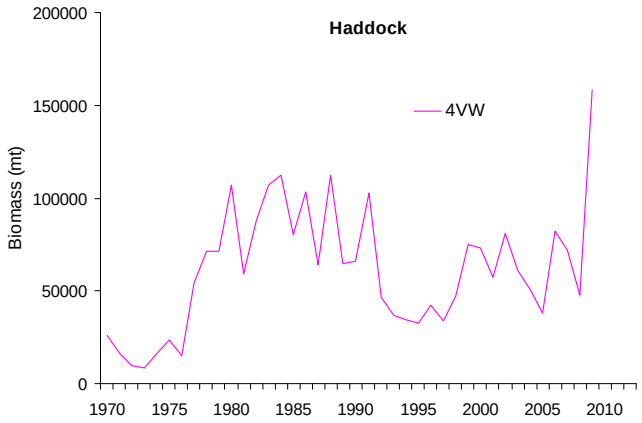


*Figure 7a. Biomass estimate for haddock in 4VW from the summer RV survey.*

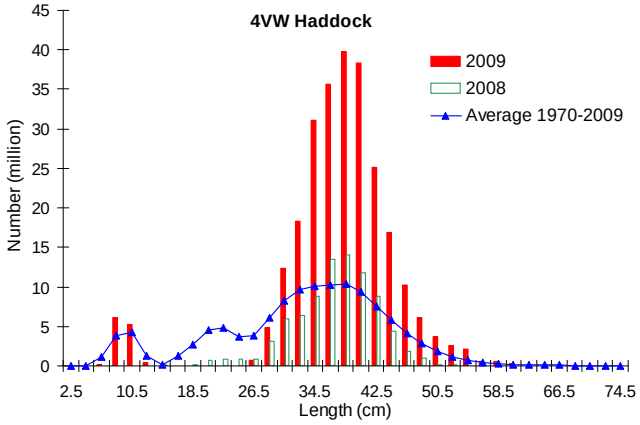


*Figure 7b. Length composition for haddock in 4VW from the summer RV survey.*

The two main species which constitute **4X5Y flatfish** in recent years are winter flounder and witch flounder. **Winter flounder** accounts for over 60% of the 4X survey flatfish catch. Winter flounder were caught mainly in the Bay of Fundy with smaller catches also occurring on Browns Bank (4Xp). The biomass index for winter flounder in 4X has been increasing since the late 1990s. Biomass indices increased slightly in 4X East for 2009, and increased again in 4X West to the highest in the series (Figure 8a). Abundance of winter flounder was generally above average at lengths below 40cm in 4X East, but very few were caught above this length (Figure 8b). In 4X West, numbers were well above average at all lengths less than 36cm, and near average above that (Figure 8c).

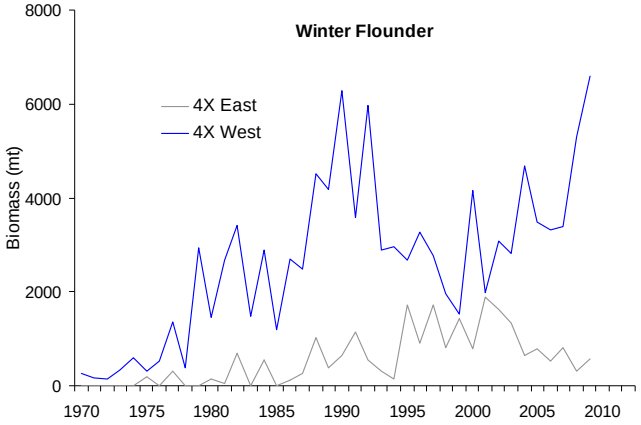


*Figure 8a. Biomass estimate for winter flounder in 4X5Y from the summer RV survey.*

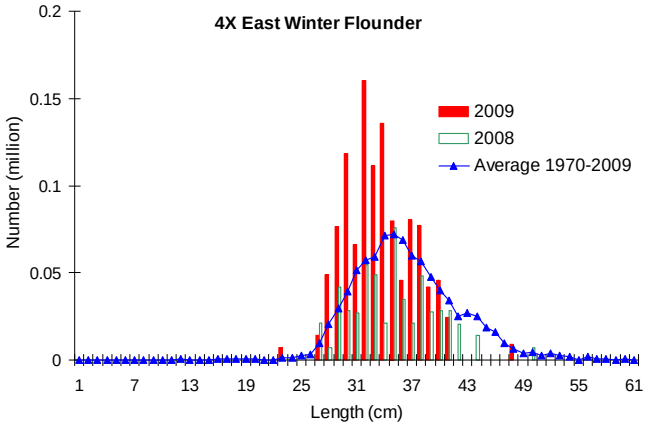


*Figure 8b. Length composition for winter flounder in 4X East from the summer RV survey.*

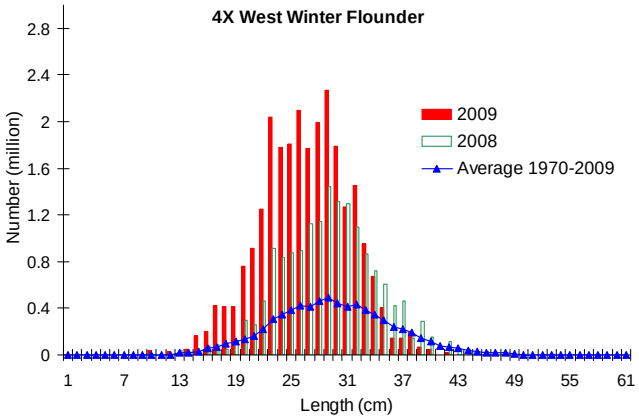


*Figure 8c. Length composition for winter flounder in 4X West from the summer RV survey.*

**Witch flounder** biomass in 4X5Y declined in the 1990s and has remained low since then, varying without trend. The biomass index in 2009 for 4X East remains below average (average = 674), while in 4X West it was above average (average = 1210) for the time-series, and the second highest since 1986 (Figure 9a). Abundance indices were below average for most lengths in 4X East in both 2008 and 2009, except at lengths less than 13cm in 2009 (Figure 9b). Abundance indices in 4X West were above average for most lengths less than 46cm in both 2008 and 2009 (Figure 9c). Larger witch flounder (larger than 46cm), which had constituted a large part of the survey catch in the past, continue to be absent from the survey catches.

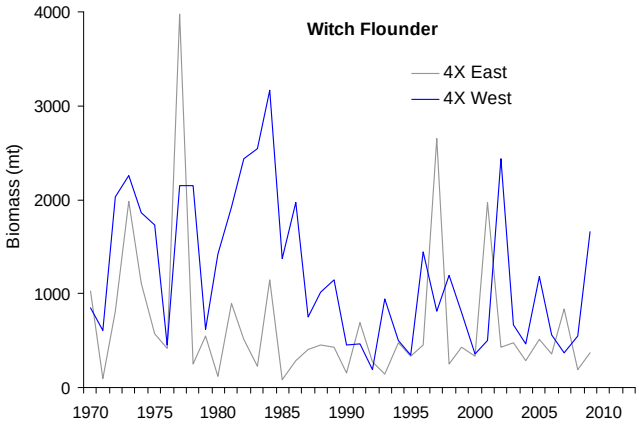


*Figure 9a. Biomass estimate for witch flounder in 4X5Y from the summer RV survey.*

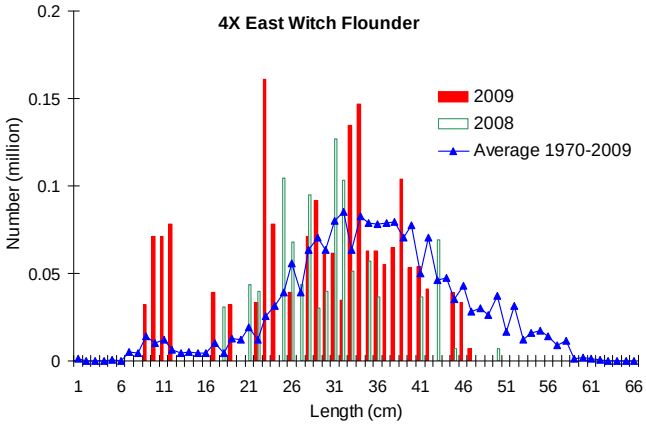

*Figure 9b. Length composition for witch flounder in 4X East from the summer RV survey.*

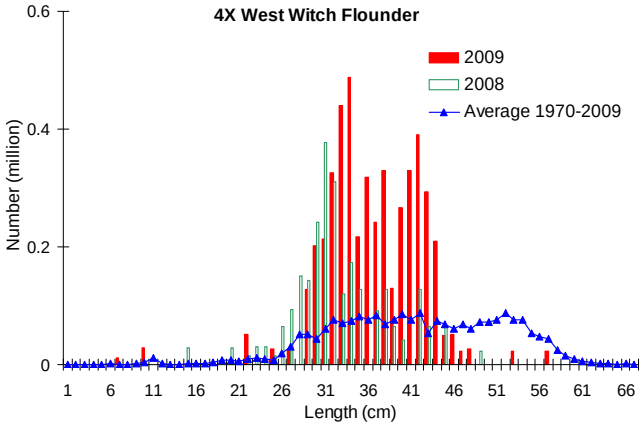


*Figure 9c. Length composition for witch flounder in 4X West from the summer RV survey.*

The three species that constitute **4VW flatfish** are American plaice, witch flounder, and yellowtail flounder. **American plaice** biomass has fluctuated without trend at a low level in 4VW since 1995, and was near the lowest in the series in 2009 (Figure 10a). Abundance at length in 4VW was below average for all lengths greater than 22cm in 2009 (Figure 10b).

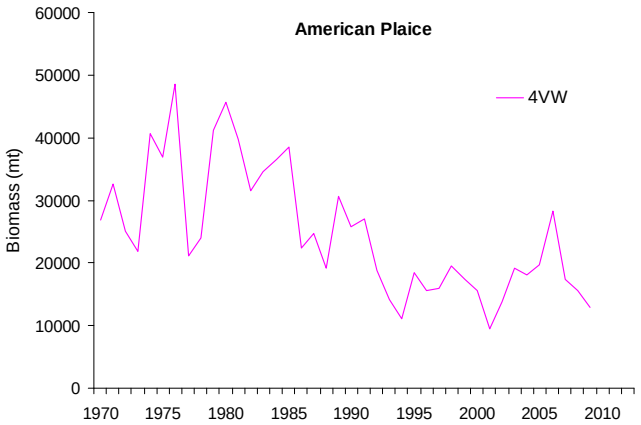


*Figure 10a. Biomass estimate for American plaice in 4VW from the summer RV survey.*

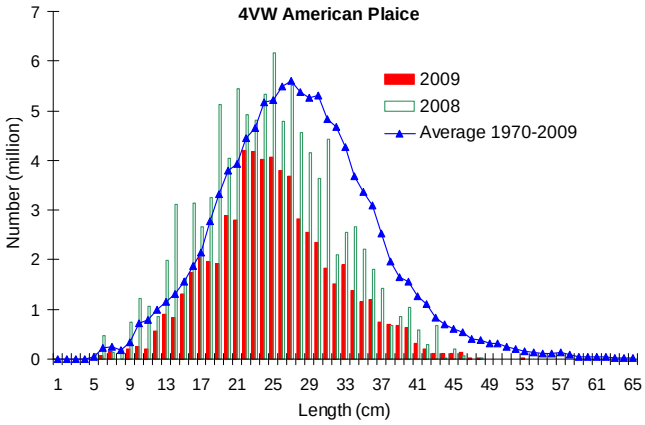


*Figure 10b. Length composition for American plaice in 4VW from the summer RV survey.*

**Witch flounder** biomass in 4VW has followed an increasing trend since the early 1990s and was the second highest in the series in 2009, although the 2009 value is very dependent on one large catch (Figure 11a). Witch flounder abundance in 4VW is well above average for most lengths below 40cm in 2009, and about average in 2008 (Figure 11b).

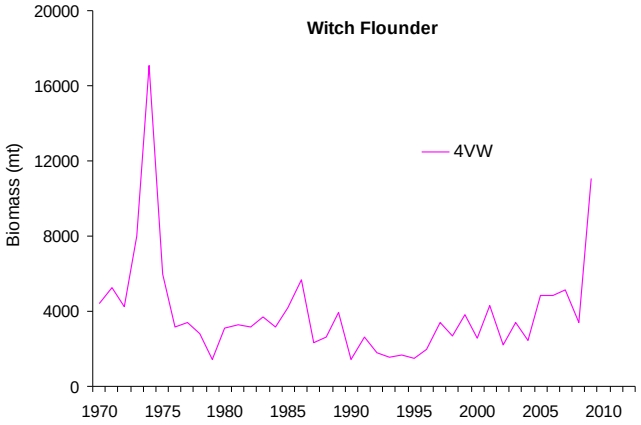


*Figure 11a. Biomass estimate for witch flounder in 4VW from the summer RV survey.*

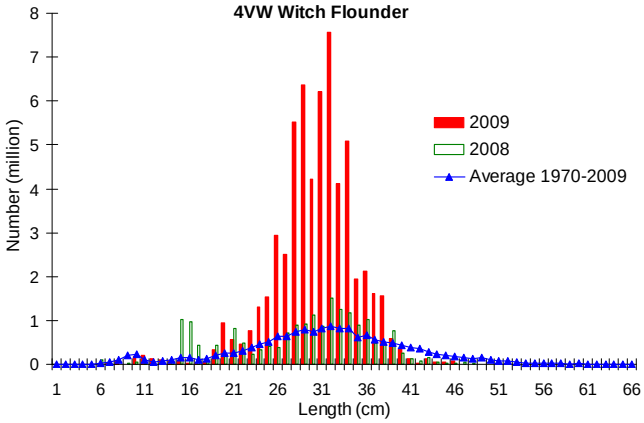


*Figure 11b. Length composition for witch flounder in 4VW from the summer RV* survey.

There is very little directed fishery for **yellowtail flounder** in recent years. The biomass index declined from the 1970s to 2003, and has been increasing since then. The biomass index in 2009 is the highest since 1997.

## CONCLUSIONS

Catches in the 2009 summer RV survey were quite high for a variety of groundfish species on the Scotian Shelf and Gulf of Maine, but catches remained low for most species in the Bay of Fundy. In recent years, there is no clear trend in RV survey biomass indices for 4VW haddock, 4VW white hake, 4X5Y white hake, 4X5Y cod, 4VW American plaice, 4X witch flounder, or pollock (Eastern or Western management areas). Biomass indices for Unit 3 redfish, 4X winter flounder, and 4VW witch flounder are displaying an increasing trend.

## SOURCES OF INFORMATION

Clark, D. S., J. Emberley, C. Clark, and B. Peppard. 2010. Update of the 2009 Summer Scotian Shelf and Bay of Fundy Research Vessel Survey. DFO Can. Sci. Advis. Sec. Res. Doc. 2010/008.

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