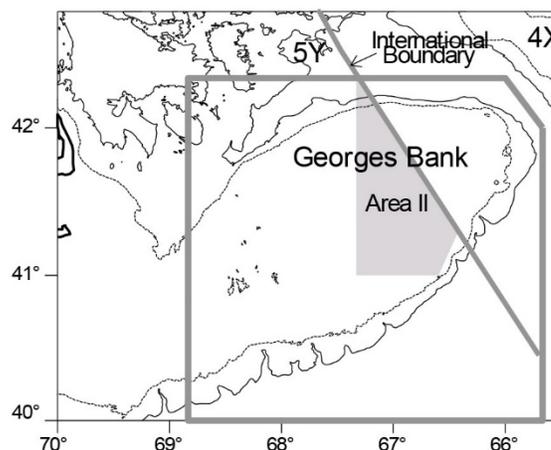




# GEORGES BANK YELLOWTAIL FLOUNDER

[5Zhjmn; 522,525,551,552,561,562]



## Summary

- Combined Canada and United States (US) catches in 2017 were 95 mt.
- The declining trend in survey biomass to low levels, despite reductions in catch to historical low amounts, indicates a poor state of the resource.
- Recent catch is low relative to the biomass estimated from the surveys but catch curve analyses indicate declining but high total mortality rates ( $Z$  above 1 for most years).
- Stock biomass is low and productivity is poor with all three surveys showing low recent recruitment.
- An empirical approach based on survey catches developed during the 2014 Georges Bank Yellowtail Flounder Diagnostic and Empirical Approach Benchmark and updated during the 2017 intersessional conference call was applied to generate catch advice.
- For catch advice, the Transboundary Resource Assessment Committee (TRAC) recommended an upper bound of 6% for the exploitation rate, which results in 68 mt for 2019

In 2017, TRAC introduced a new process of review for eastern Georges Bank cod and haddock and Georges Bank yellowtail flounder. Following its first implementation in 2017, this process was reviewed by TRAC and the Transboundary Management Guidance Committee (TMGC) and some modifications were made to further clarify the process. An overview of the process applied in 2018 is available at <https://www.nefsc.noaa.gov/saw/trac/>. Following the updated process, the TRAC review involved three steps for each stock: (1) presentation of the assessment by the assessment leads, followed by scientific and technical review by science assessment staff, designated reviewers and two identified resource managers (one from the US and one from Canada); (2) contributions by all meeting participants, including stakeholders from the fishing industry, representatives from non-government organizations, and representatives from other levels of government (State, Federal, and Provincial) as well as the general public; (3) science assessment staff, reviewers, and resource managers then considered these additional contributions to inform the development of final conclusions and catch advice, adjusting their initial conclusions if appropriate and necessary.

Table 1. Catches in metric tonnes (mt)

		2012	2013	2014	2015	2016	2017	2018	Avg <sup>1</sup>	Min <sup>1</sup>	Max <sup>1</sup>
Canada <sup>2</sup>	Quota	586	285	72	106	85	93	87			
	Landed	46	1	1	3	1	<1		430	<1	2,913
	Discard	48	39	14	11	10	2		428	10	815
USA <sup>2</sup>	Quota <sup>3</sup>	564	215	328	248	269	207	213			
	Catch <sup>3</sup>	379	93	122	68	26	84 <sup>4</sup>				
	Landed	443	130	70	63	26	35		3,792	26	15,899
	Discard	188	49	74	41	7	57		519	7	3,021
Total <sup>2</sup>	Quota <sup>5</sup>	1,150	500	400	354	354	300	300			
	Catch <sup>5</sup>	473	132	136	82	36	87 <sup>4</sup>				
	Catch <sup>6</sup>	725	218	159	118	44	95		5,192	44	17,211

<sup>1</sup>1973 – 2017

<sup>2</sup>unless otherwise noted, all values reported are for calendar year

<sup>3</sup>for fishing year May 1 – April 30

<sup>4</sup>preliminary estimate

<sup>5</sup>for Canadian calendar year and USA fishing year May 1 – April 30

<sup>6</sup>sum of Canadian landed, Canadian discarded, and USA catch (includes discards)

## Fishery

**Total catches** of Georges Bank yellowtail flounder peaked at about 21,000 mt in both 1969 and 1970 (Figure 1). The combined Canada/US catch increased from 1995 through 2001, averaged 6,300 mt during 2002-2004, but declined to 95 mt in 2017 (Table 1) due in part to restrictive management measures.

The 2017 **Canadian catch** of 3 mt was well below the Canadian quota of 93 mt, with landings of <1 mt and estimated discards of 2 mt from the scallop dredge fishery.

**US catches** in calendar year 2017 were 92 mt, with landings of 35 mt and discards of 57 mt. The US landings in calendar year 2017 were predominantly from the trawl fishery, while discards were predominantly from the scallop dredge fishery. Preliminary estimates of the US catch (landings plus discards) for fishing year 2017 were 44% of the 207 mt quota.

## *Harvest Strategy and Reference Points*

The Transboundary Management Guidance Committee (TMGC) has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference,  $F_{ref} = 0.25$  (established in 2002 by the TMGC). When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding. Due to the lack of an assessment model, an estimate of the fishing mortality rate can no longer be calculated. Status determination relative to reference points is not possible because reference points have not been defined.

## *State of Resource*

The declining trend in survey biomass to low levels, despite reductions in catch to historical low amounts, indicates a poor state of the resource. Recent catch is low relative to the biomass estimated from the surveys (relative  $F$ ; Figure 2) but catch curve analyses (Sinclair 2001) indicate declining but high total mortality rates ( $Z$  above 1 for most years; Figure 3). Fishing does not appear to be a major driver of stock status currently, although large amounts of missing catch could change this interpretation.

## *Productivity*

Recruitment, spatial distribution, and fish growth typically reflect changes in the productive potential. Recent **recruitment** has generally been below average (Figure 4) and age structure is truncated (i.e., both fewer young fish and fewer old fish). Recent **spatial distribution patterns** from the three bottom trawl surveys generally follow the ten year average, although low survey catches makes these comparisons difficult. **Growth**, as measured by length at age in the surveys, has been variable without trend, and condition (weight at length) has been poor recently, although low survey catches makes interpreting these trends difficult. Stock biomass is low and productivity is poor.

## *Outlook*

This outlook is provided in terms of an empirical approach from the 2014 Georges Bank Yellowtail Flounder Diagnostic and Empirical Approach Benchmark, subsequent TRAC meeting in 2014, and intersessional TRAC conference call in June 2017. The empirical approach averages estimates of biomass from the Fisheries and Oceans Canada (DFO), National Marine Fisheries Service (NMFS) spring, and NMFS fall surveys (Figure 5), and applies an exploitation rate to this average to generate catch advice.

For catch advice, the TRAC recommended an upper bound of 6% for the exploitation rate, which results in 68 mt for 2019. Survey biomass decreased 95% from 2010 to 2017 and decreased again in 2018 (Table 2). Historical exploitation rates can be computed from either the quota or the catch. The TRAC used the exploitation rate associated with the quota to set the catch advice because quotas have limited the catch directly and indirectly. The average exploitation rate associated with the quota for years 2010 to 2017 is 6% and ranged from 3% to 11% (Table 3). Including 2018 increases the average to 8%, but the 2018 quota was set higher than the 6% exploitation rate recommended by TRAC last year so is not considered to be appropriate as part of the average. The average exploitation rate associated with the catch for years 2010 to 2017 is 2% and ranged from 1% to 5%. The TRAC notes increasing the exploitation rate above the

average from 2010 to 2017, a period when the stock declined substantially, is risky and reduces the chances of rebuilding. During 2010 to 2017, the quota has averaged 3.1 times the catch, ranging from 1.6 to 8.1 times the catch. The TRAC recognizes that catch has been well below the quota recently and expect this to continue in the future. If quota utilization increases, the exploitation rate used to provide catch advice may need to be reconsidered. The TRAC recommends low exploitation to allow for the possibility of rebuilding.

The quota and catch have been relatively constant and low since 2012 and the average survey biomass has continued to decline during this period. The TRAC considers the recent quota too high to continue as a constant quota approach given the continued decline in survey biomass. If a constant quota approach is considered by TMGC, the TRAC recommends using a lower value than recent quotas. The TRAC recognizes that catch has been well below the quota recently and expects this to continue in the future.

There are a number of reasons to reduce the catch advice from the recent quota of 300 mt. The exploitation rate associated with continuing the 2018 quota of 300 mt is 27%. The most recent survey biomass is at a record low for two surveys and the second lowest in the time series for the third survey. All three surveys show low recruitment recently. Total mortality declined recently in two surveys but continues to be high based on the age structure in all three surveys. Although covering only a small portion of Georges Bank, a multispecies survey conducted using a scallop dredge in Closed Area II during 2016 to 2018 also indicated low and declining abundance of yellowtail flounder.

There are two observations that would support maintaining the current quota. Relative F continues to be low compared to pre-1995 values and catch has been below the quota in both countries every year.

The 2017 TSR noted the reason for changing the exploitation rate range last year from 2%-16% to 2%-6% was the change from using trawl door spread to wing spread when calculating biomass estimates and from survey catchability of 0.37 to 0.31. There were no changes to the empirical approach this year compared to last year other than adding the three new survey values. Thus, there was no change in the empirical approach requiring a change in the exploitation rate this year.

The 2018 quota of 300 mt was set above the range recommended by TRAC. Despite the possibility of other factors influencing the population trends, such as environmental factors or missing catch, the TRAC recommends setting the exploitation rate as low as possible below the upper bound of 6%.

*Table 2. Survey biomass from the three bottom trawl surveys, an arithmetic average of these biomasses, and catch advice for an exploitation rates of 6%. Catch advice is implemented in the following year (e.g., the row of 2018 catch advice would be implemented in 2019).*

Year	Biomass (mt)			Average	Catch Advice (mt)
	DFO	Spring	Fall (year-1)		
2010	29,452	68,752	83,490	60,565	3,634
2011	12,344	29,621	27,821	23,262	1,396
2012	18,113	46,209	30,354	31,559	1,894
2013	2,249	12,766	31,199	15,404	924
2014	1,654	8,564	10,828	7,015	421
2015	2,650	5,861	12,682	7,064	424
2016	5,569	3,610	5,811	4,997	300
2017	1,104	2,819	5,432	3,118	187
2018	812	143	2,424	1,126	68

*Table 3. Recent actual quotas and catches by year and associated exploitation rates (computed by dividing by the average survey biomass in Table 2). (VPA = Virtual Population Analysis.)*

Year	Quota (mt)	Catch (mt)	Quota/Avg	Catch/Avg	Model Type
2010	1,956	1,170	3%	2%	VPA
2011	2,650	1,171	11%	5%	VPA
2012	1,150	725	4%	2%	VPA
2013	500	218	3%	1%	VPA
2014	400	159	6%	2%	VPA
2015	354	118	5%	2%	Empirical
2016	354	44	7%	1%	Empirical
2017	300	95	10%	3%	Empirical
2018	300		27%		Empirical
mean	885	462	8% <sup>1</sup>	2%	

<sup>1</sup> The average Quota/Avg for years 2010-2017 is 6%.

### **Special Considerations**

- Catch in 2017 increased from 2016 primarily due to rotational management of the US scallop fishery allowing fishing in Closed Area II. When quotas and abundance are low, discards can exceed landings, as they did in 2014 and 2017. Rotational management of the US scallop fishery is expected to cause large changes in the amount of US discards depending on years when the fishery is allowed in Closed Area II.

### **Source Documents**

Clark, K. and E.N. Brooks, editors. 2017. Proceedings of the Transboundary Resources Assessment Committee (TRAC): Eastern Georges Bank Cod and Haddock, and Georges Bank Yellowtail Flounder: Report of Meeting held 11-14 July 2017. TRAC Proceedings 2017/XX.

Legault, C.M., and Q. McCurdy. 2018. Stock Assessment of Georges Bank Yellowtail Flounder for 2018. TRAC Reference Document 2018/XX.

O'Brien, L., and K. Clark, editors. 2014. Proceedings of the Transboundary Resources Assessment Committee for Georges Bank Yellowtail Flounder Diagnostic and Empirical

Approach Benchmark: Report of Meeting held 14-18 April 2014. TRAC Proceedings 2014/01.

Sinclair, A.F. 2001. Natural mortality of cod (*Gadus morhua*) in the Southern Gulf of St. Lawrence. ICES J. Mar. Sci. 58: 1-10.

***Correct Citation***

TRAC. 2018. Georges Bank Yellowtail Flounder. TRAC Status Report 2018/XX.

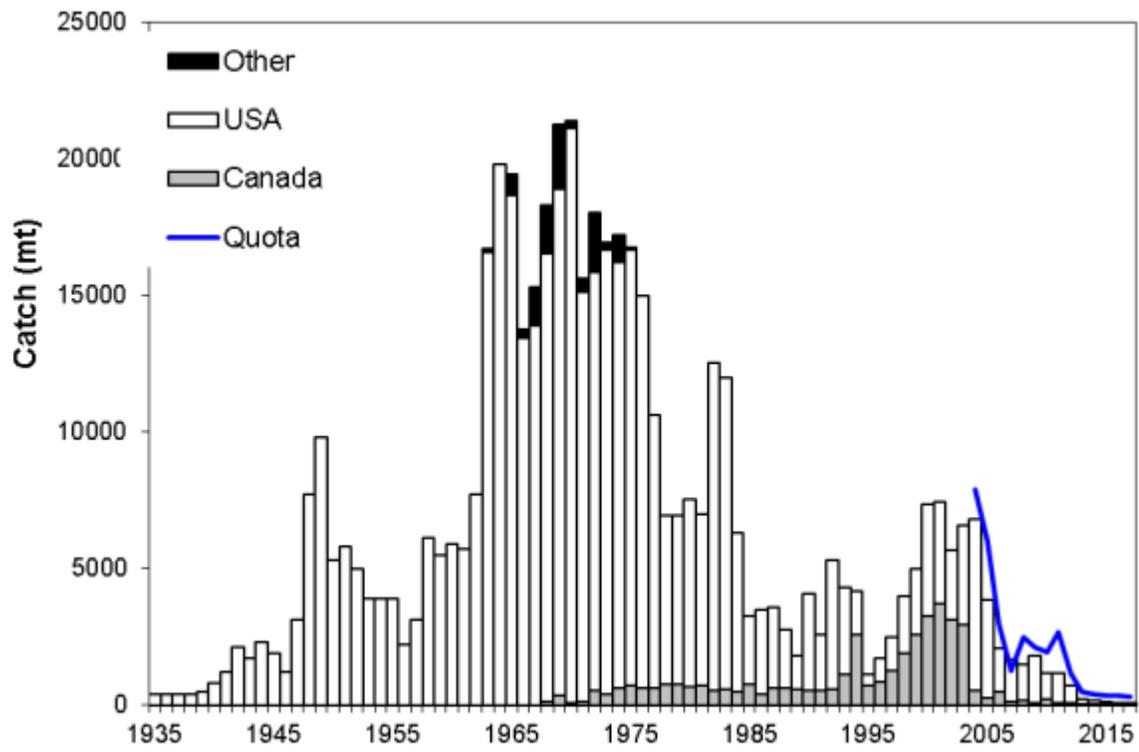


Figure 1. Catches and quota for Georges Bank yellowtail flounder.

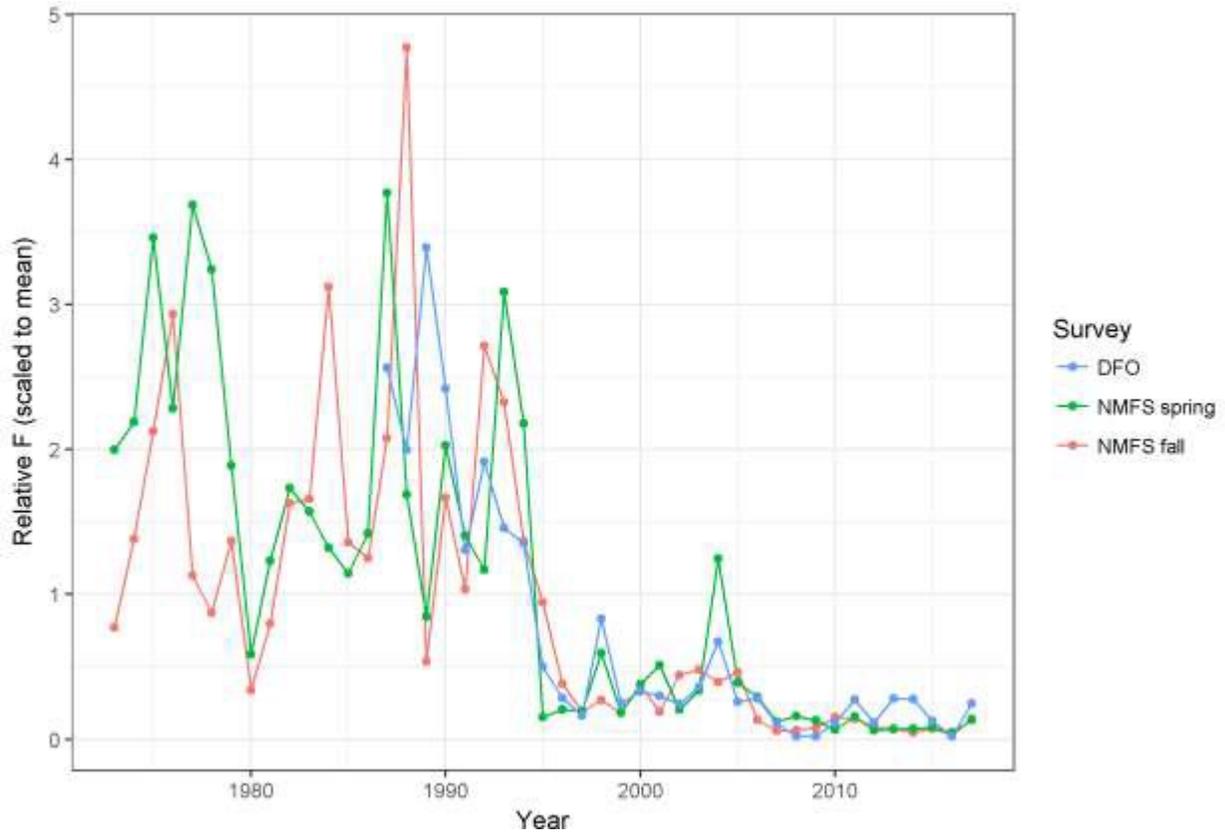


Figure 2. Relative F (catch in mt divided by survey catch in kg per tow) scaled to the mean value during 1987-2007 for the three surveys.

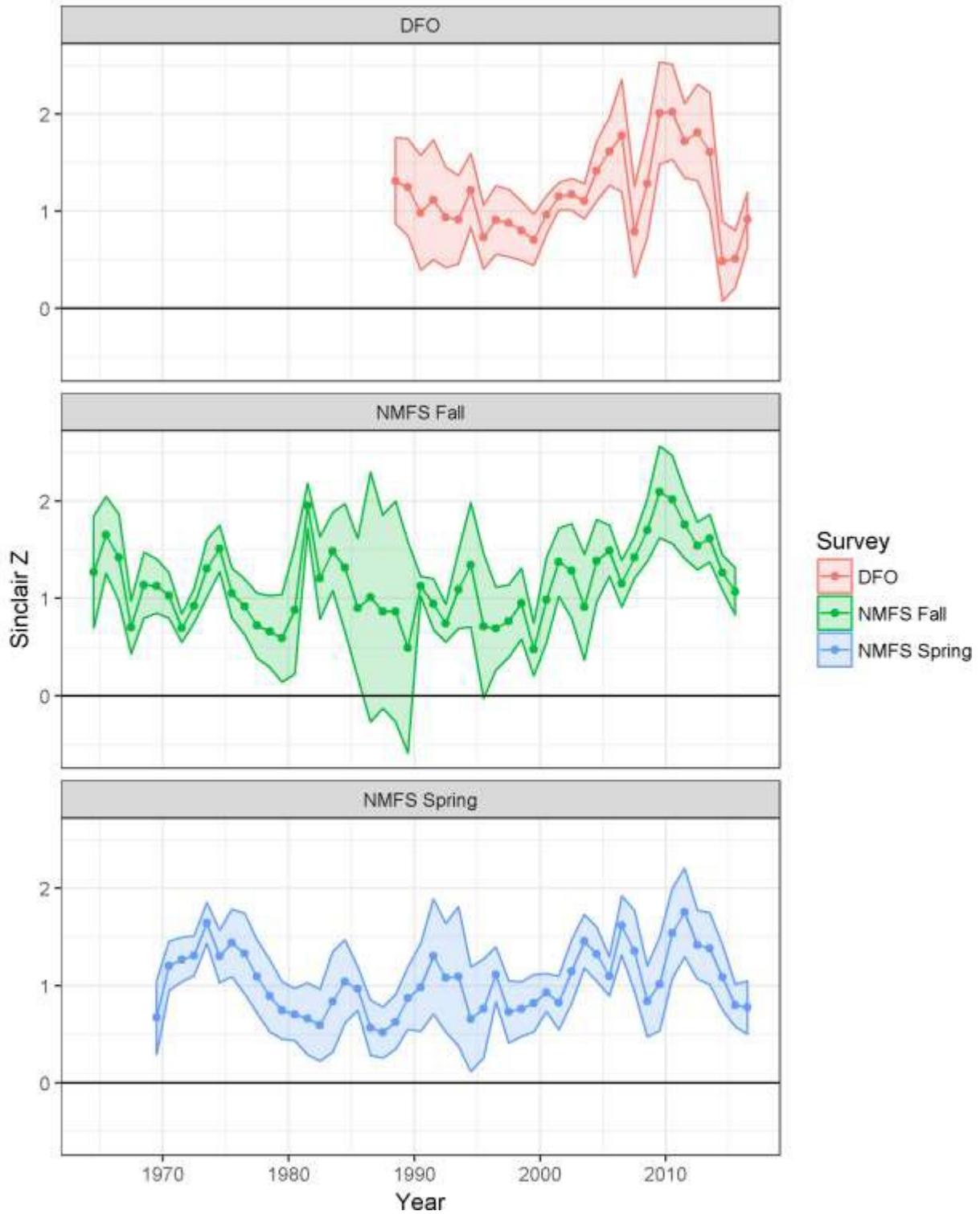


Figure 3. Total mortality (Z) from the three surveys using the Sinclair (2001) method with a four year moving window for ages 3 to 8.

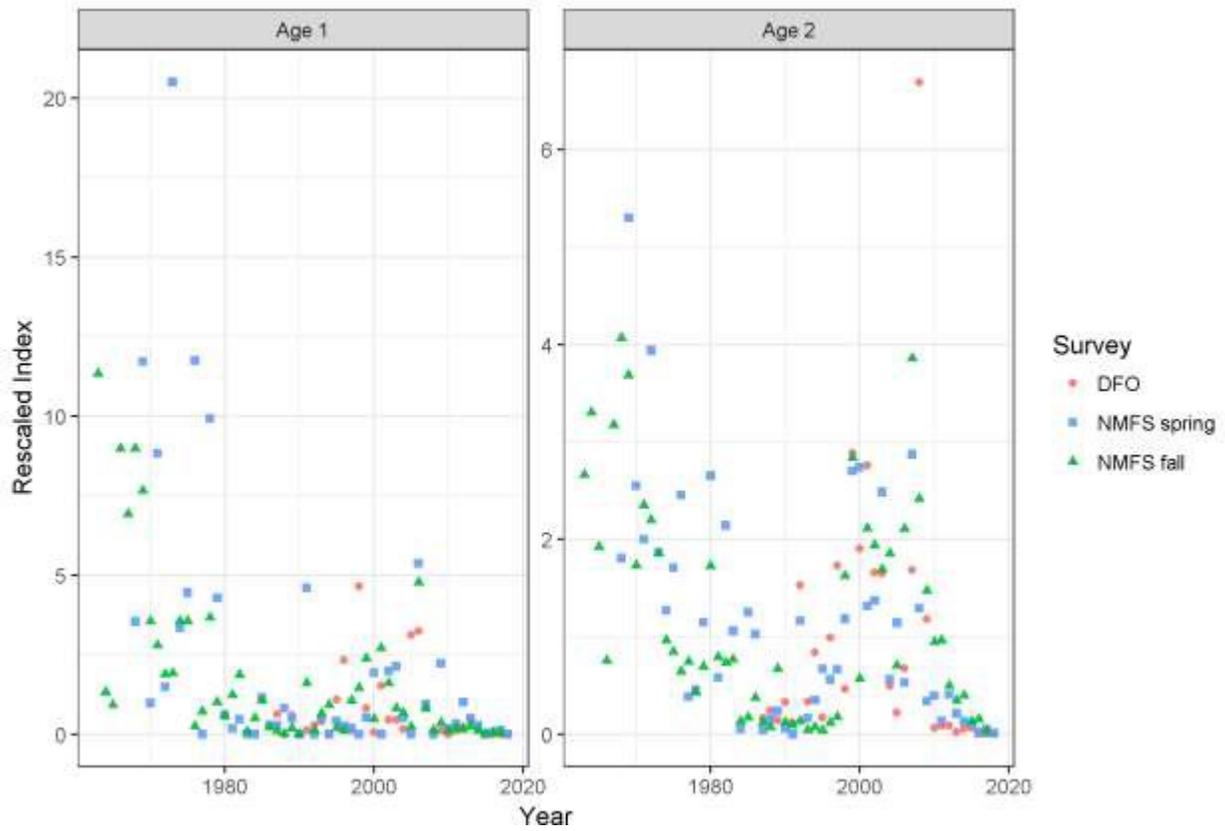


Figure 4. Estimates of recruitment (age 1 has many zeros, so age 2 also shown) from the three bottom trawl surveys standardized to their respective means during 1987 through 2007.

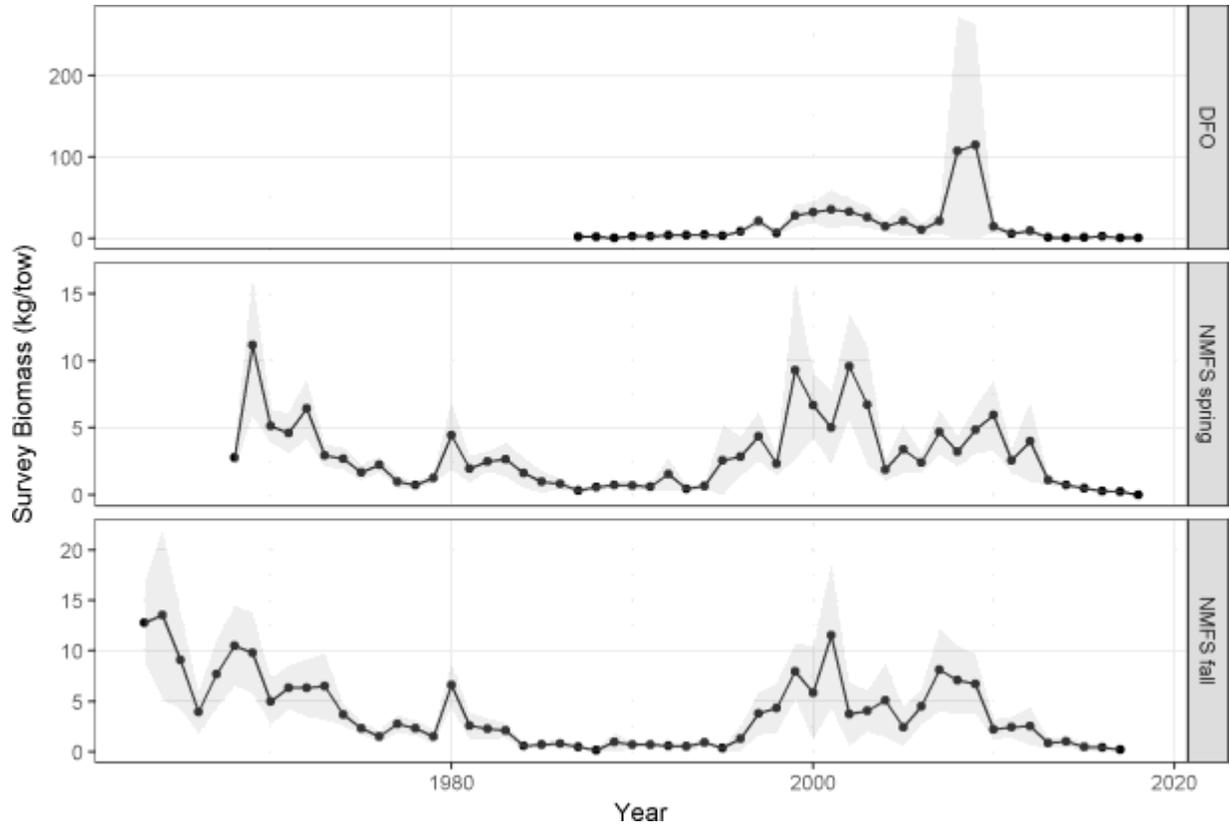


Figure 5. Bottom trawl survey catch rates (in biomass) for Georges Bank yellowtail flounder (filled circles) with 90% confidence intervals (gray area). Note that the amount of Georges Bank area covered in the DFO and NMFS surveys differs and that the NMFS surveys have been standardized to Albatross units.