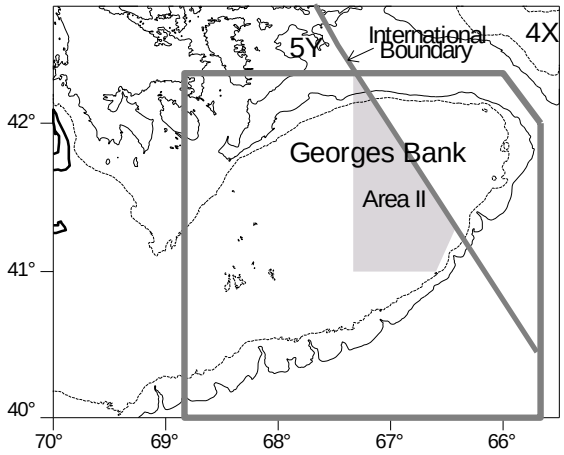
GEORGES BANK

YELLOWTAIL

FLOUNDER

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



Summary

- Combined Canada and USA catches in 2018 were 45 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 intersession conference call was applied to generate catch advice.
- The TRAC recommends an upper bound for the exploitation rate of 6% for catch advice, which results in 199 mt for 2020.
- The TRAC recommends setting the exploitation rate as low as possible below the upper bound of 6%.

In 2017 TRAC introduced a new process of review for Eastern Georges Bank Cod and Haddock and Georges Bank Yellowtail Flounder. This process was reviewed by TRAC and TMGC following its first implementation in 2017, and some modifications were made to further improve clarity in the process. An overview of the entire process applied in 2018 is available at https://www.nefsc.noaa.gov/saw/trac/trac-process-overview-2017.pdf.

Table 1. Catches (mt)

		2013	2014	2015	2016	2017	2018	2019	Avg[1]	Min[1]	Max[1]
Canada[2]	**Quota**	285	72	106	85	93	87	34			
	Landed	1	1	3	1	<1	<1		414	<1	2,913
	Discard	39	14	11	10	2	3		410	2	815
USA[2]	**Quota[3]**	215	328	248	269	207	213	106			
	Catch[3]	93	122	68	26	84	40[4]				
	Landed	130	70	63	26	35	32		3,711	26	15,899
	Discard	49	74	41	7	57	11		508	7	3,021
Total[2]	**Quota[5]**	500	400	354	354	300	300	140			
	Catch[5]	132	136	82	36	87	42[4]				
	Catch[6]	218	159	118	44	95	45		5,080	44	17,211

[1] 1973 – 2018
[2] unless otherwise noted, all values reported are for calendar year
[3] for fishing year May 1 – April 30
[4] preliminary estimate
[5] for Canadian calendar year and USA fishing year May 1 – April 30
[6] sum of Canadian landed, Canadian discard, 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/USA catch increased from 1995 through 2001, averaged 6,300 mt during 2002-2004, but declined to 45 mt in 2018 (Table 1) due in part to restrictive management measures.

The 2018 **Canadian catch** of 3 mt was well below the Canadian quota of 87 mt, with landings of <1 mt and estimated discards of 3 mt from the sea scallop dredge fishery.

USA catches in calendar year 2018 were 42 mt, with landings of 32 mt and discards of 11 mt. The USA landings in calendar year 2018 were predominantly from the trawl fishery, while discards were predominantly from the scallop dredge fishery. Preliminary estimates of the USA catches (landings plus discards) for fishing year 2018 were 20% of the 213 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 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 Z) indicate declining but high total mortality rates (Z above 1 for most years; Figure 3). However, the low catches in the survey in recent years make interpretation of the current relative F and survey Z difficult. Fishing does not appear to be a major driver of stock status currently, although large amounts of missing catch could change this interpretation and the many negative signals for this stock require continued low catches to protect what remains of the stock.

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 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 and TRAC Advice

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

During the 2014 Benchmark, considerations were provided as reasons to decrease or to maintain or increase the quota. The assessment findings this year support reasons to both decrease the quota and to maintain or increase the quota for 2020. Last year's catch was 15% of the quota, the relative F continues to be low, two surveys increased, and survey total mortality decreased to low values in two of the surveys, which support maintaining or increasing the quota. One survey declined last year to the lowest value in the time series, all three survey biomass estimates remain low compared to their means, and recent recruitment continues to be below average, which support decreasing the quota.

The 2017 TSR noted the reason for changing the exploitation rate range from 2%-16% to 2%-6% was the change from door spread to wing spread and from survey catchability of 0.37 to 0.31 and the decline in the surveys during the time series available. There were no changes to the empirical approach this year compared to last year other than adding the three new survey values. Thus, the absence of any changes in the empirical approach means no change in the exploitation rate this year.

The TRAC recommends an upper bound for the exploitation rate of 6% for catch advice, which results in 199 mt for 2020. Survey biomass decreased 95% from 2010 to 2019 (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 it has 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). The TRAC notes that increasing the exploitation rate above the average from 2010 to 2017 when the stock declined substantially is risky and reduces the chances of rebuilding. Including 2018 and 2019 quotas increases the average exploitation rate to 8%, but both quotas were set higher than the 6% exploitation rate recommended by TRAC. The average exploitation rate associated with the catch for years 2010 to 2018 is 3% and ranged from 1% to 5%. During 2010 to 2018, the catch has averaged 38% of the quota, ranging from 12% to 63%. 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 2019 quota of 140 mt was set above the value recommended by TRAC (68 mt). 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 rate of 6%. Catch advice is implemented in the following year (e.g., the row of 2019 catch advice would be implemented in 2020).

	Biomass (mt)				
Year	DFO	Spring	Fall (year-1)	Average	Catch Advice (mt)
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
2019	182	3735	6,047	3,322	199

Table 3. Recent 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	45	27%	4%	Empirical
2019	140		4%		Empirical
Mean	810	416	8%[1]	3%	

[1] *The average Quota/Avg for years 2010-2017 is 6%.*

Special Considerations

- Results from the most recent surveys are considered valid for use in the empirical approach.
- Preliminary estimates of new survey catchability based on additional information were examined during the meetings. The new estimates are similar to the currently used value. Continued work on survey catchability could change the results of the empirical approach, but so far there are no indications that these changes would result in large changes to the catch advice.

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.

Clark. K. and T. Trinko-Lake, editors. 2019. Proceedings of the Transboundary Resources Assessment Committee: Eastern Georges Bank Cod and Haddock, and Georges Bank Yellowtail Flounder: Report of Meeting held 9-11 July 2019. TRAC Proceedings 2019/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.

Legault, C.M., and M. Finley. 2019. Stock Assessment of Georges Bank Yellowtail Flounder for 2019. TRAC Reference Document 2019/XX.

Correct Citation

TRAC. 2019. Georges Bank Yellowtail Flounder. TRAC Status Report 2019/XX.

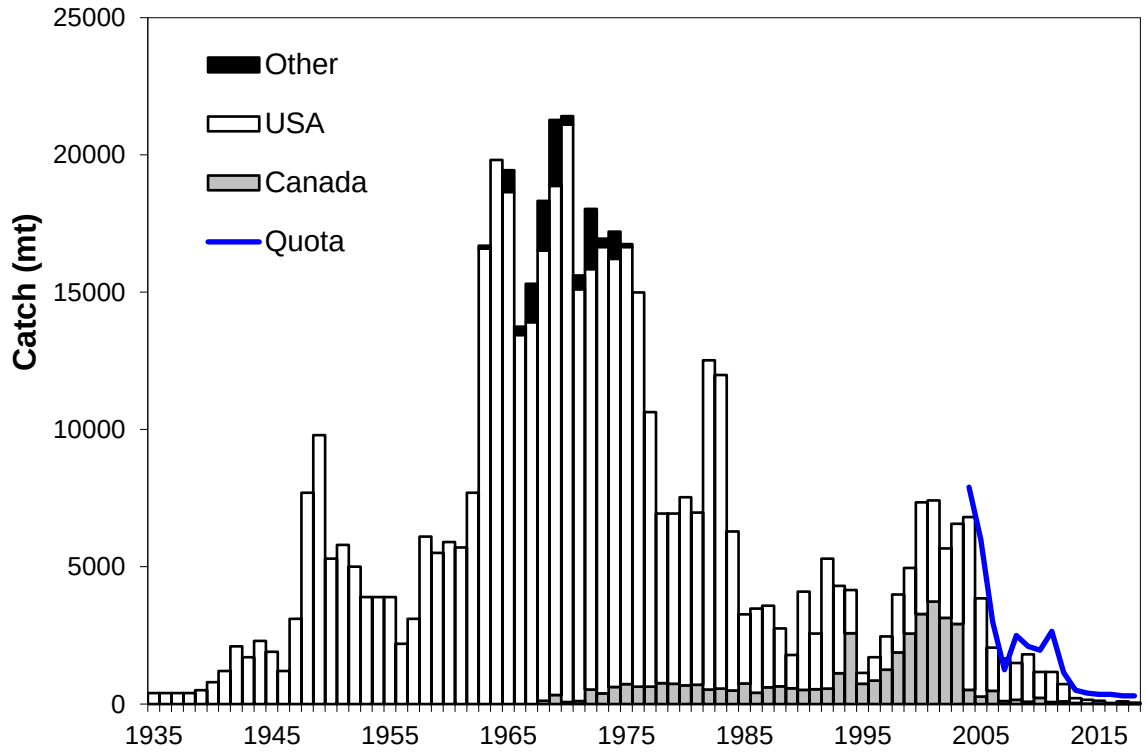


Figure 1. Catches and quota for Georges Bank yellowtail flounder.

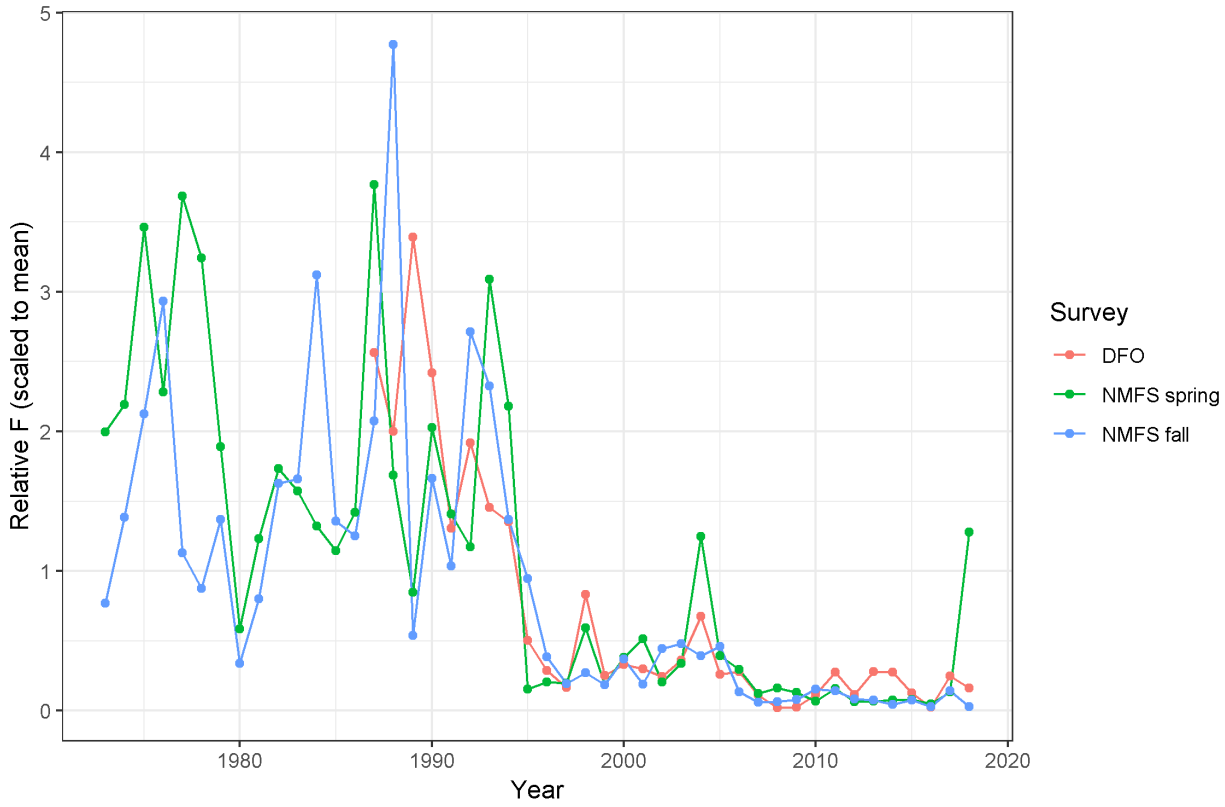


Figure 2. Relative F (catch in mt divided by survey catch in kg per tow) scaled to the mean value during 1987-2007 for the three surveys. Please see note in State of the Resource about recent low survey catches.

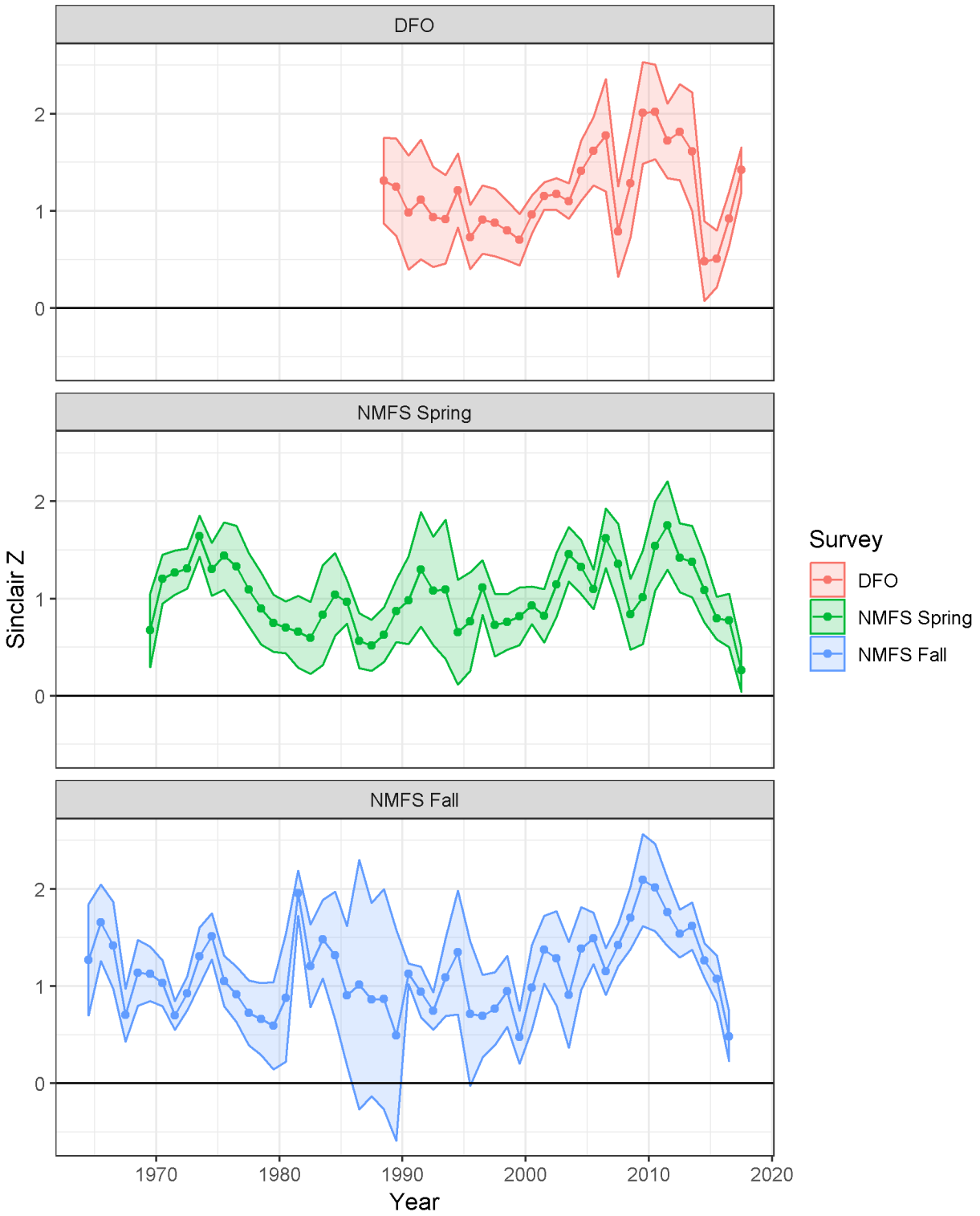


Figure 3. Total mortality (Z) from the three surveys using the Sinclair method with a four year moving window for ages 3 to 8. Please see note in State of the Resource about recent survey catches.

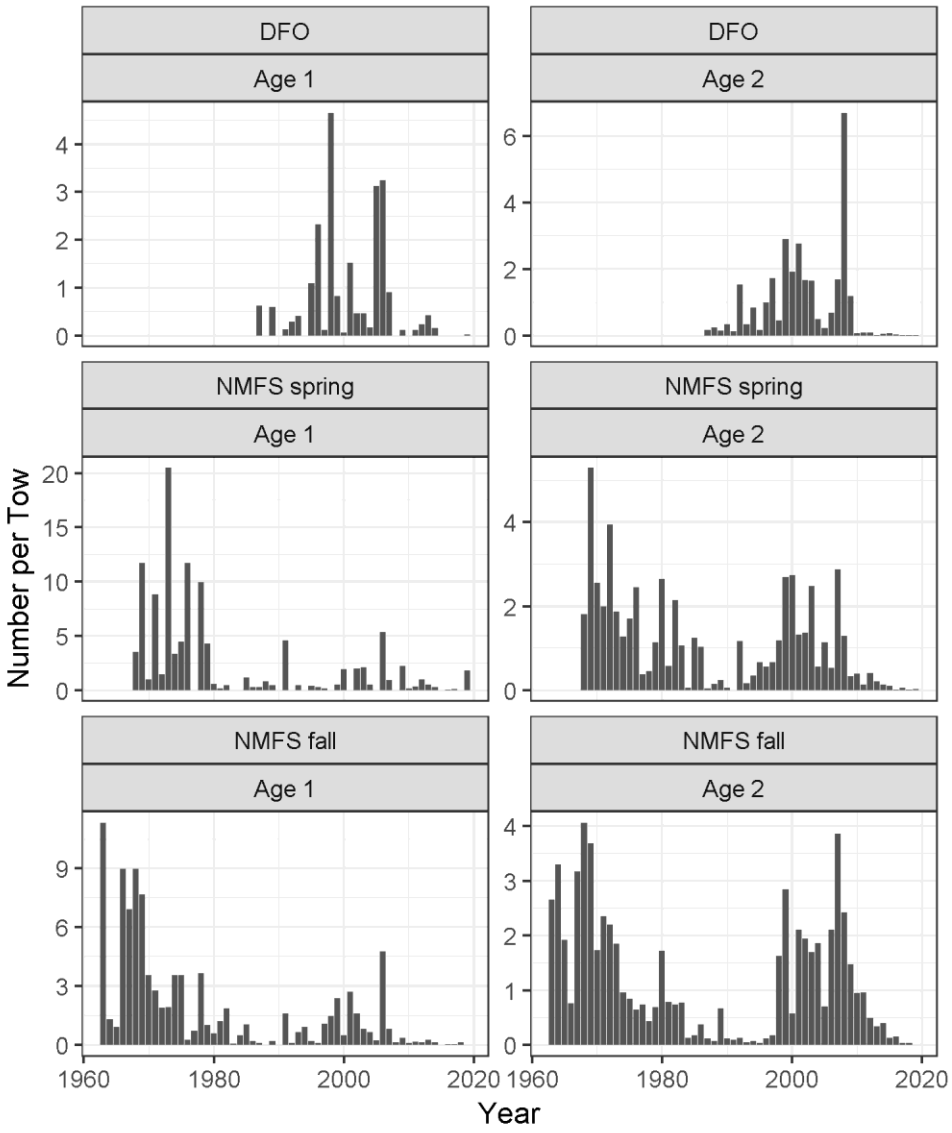


Figure 4. Estimates of recruitment (age 1 has many zeros, so age 2 also shown) from the three bottom trawl surveys.

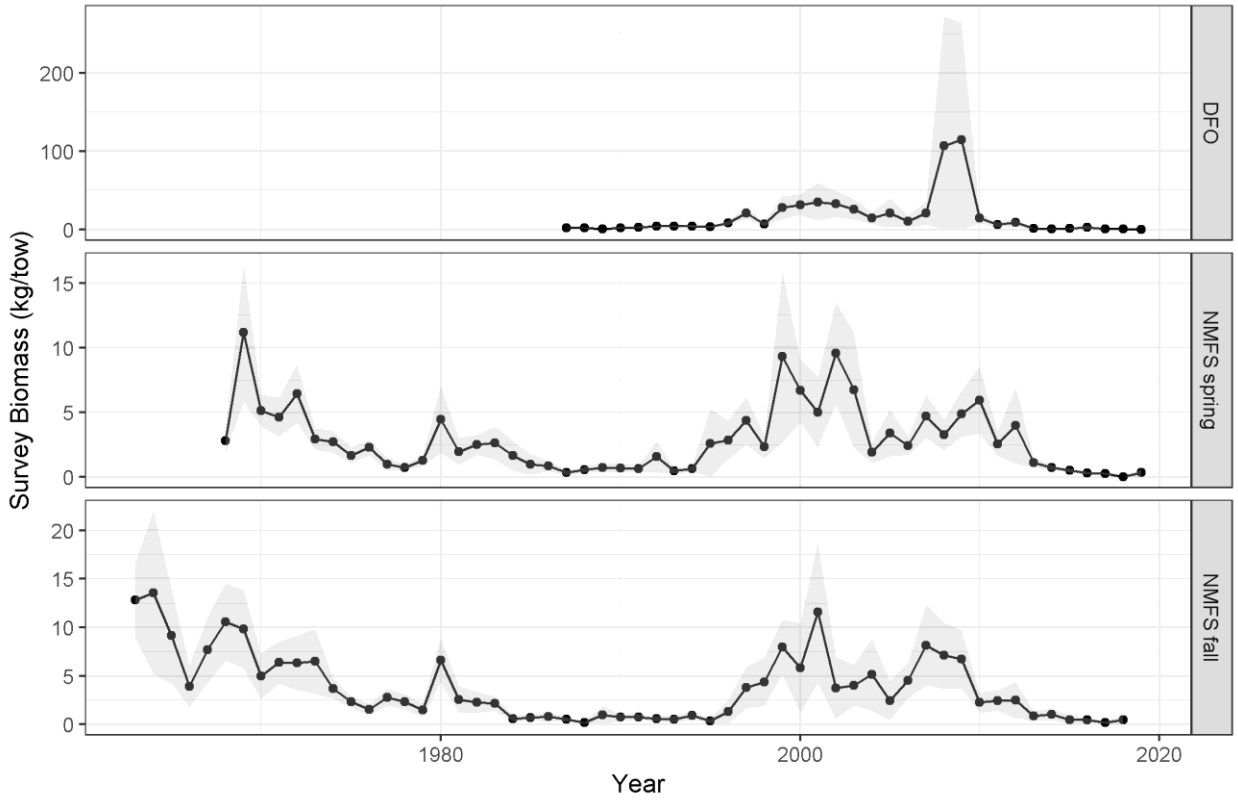


Figure 5. Bottom trawl survey catch rates (in biomass) for Georges Bank yellowtail flounder (filled circles) with 90% confidence intervals (gray area). Note that the amount of Georges Bank area covered in the DFO and NMFS surveys differs and that the NMFS surveys have been standardized to Albatross units.