2013 TRAC Status Reports

Eastern GB cod, EGB haddock, and GB yellowtail flounder

NEFMC
Hyannis, Massachusetts
September 24, 2013

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NEFSC

U.S.A. / CANADA
Allocation Shares

Allocation Shares

Resource Utilization	Cod	Haddock	Ytl
USA	40%	45%	98%
CANADA	60%	55%	2%

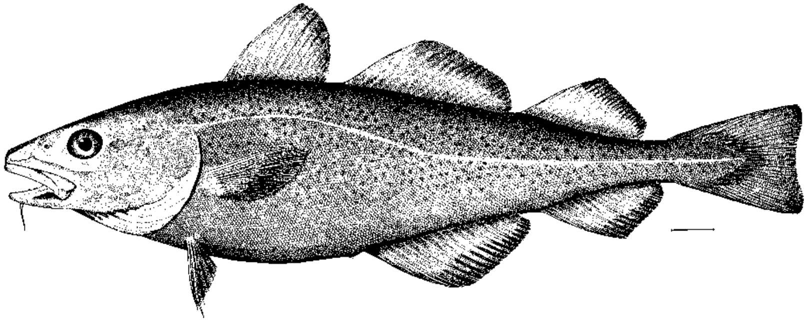
Resource Distribution					Resource Utilization and DistributionWeighting			Allocation Shares		
	Survey Year	Cod	Haddock	YtFld	Fishing Year	Utilization	Distribution	Cod	Haddock	YtFld
USA	2000	18%	20%	54%	2002	40%	60%	27%	30%	72%
CANADA		82%	80%	46%				73%	70%	28%
USA	2001	14%	16%	64%	2003	40%	60%	24%	28%	78%
CANADA		86%	84%	36%				76%	72%	22%
USA	2002	12%	26%	62%	2004	40%	60%	23%	34%	76%
CANADA		88%	74%	38%				77%	66%	24%
USA	2003	18%	27%	56%	2005	35%	65%	26%	33%	71%
CANADA		82%	73%	44%				74%	67%	29%
USA	2004	14%	29%	56%	2006	30%	70%	22%	34%	69%
CANADA		86%	71%	44%				78%	66%	31%
USA	2005	21%	29%	63%	2007	25%	75%	26%	33%	72%
CANADA		79%	71%	37%				74%	67%	28%
USA	2006	26%	32%	73%	2008	20%	80%	29%	35%	78%
CANADA		74%	68%	27%				71%	65%	22%
USA	2007	29%	36%	73%	2009	15%	85%	31%	37%	77%
CANADA		71%	64%	27%				69%	63%	23%
USA	2008	23%	40%	60%	2010	10%	90%	25%	40.50%	64%
CANADA		77%	60%	40%				75%	59.50%	36%
USA	2009	17%	43%	50%	2011	10%	90%	19%	43%	55%
CANADA		83%	57%	50%				81%	57%	45%
USA	2010	22%	43%	44%	2012	10%	90%	24%	43%	49%
CANADA		78%	57%	56%				76%	57%	51%
USA	2011	13%	37%	37%	2013	10%	90%	16%	38%	43%
CANADA		87%	63%	63%				84%	62%	57%
USA	2012	20%	38%	80%	2014	10%	90%	**22%**	**39%**	**82%**
CANADA		80%	62%	20%				78%	61%	18%

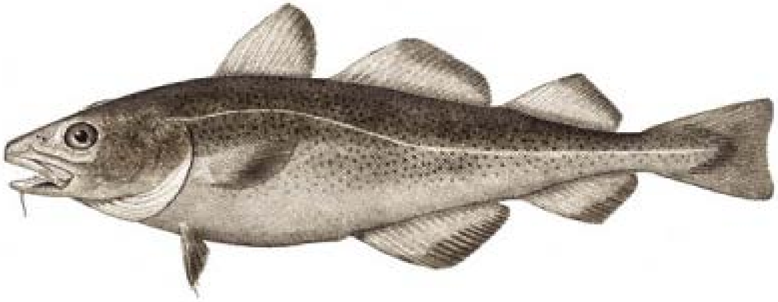
Allocation Shares

Resource Utilization	Cod	Haddock	Ytl
USA	40%	45%	98%
CANADA	60%	55%	2%

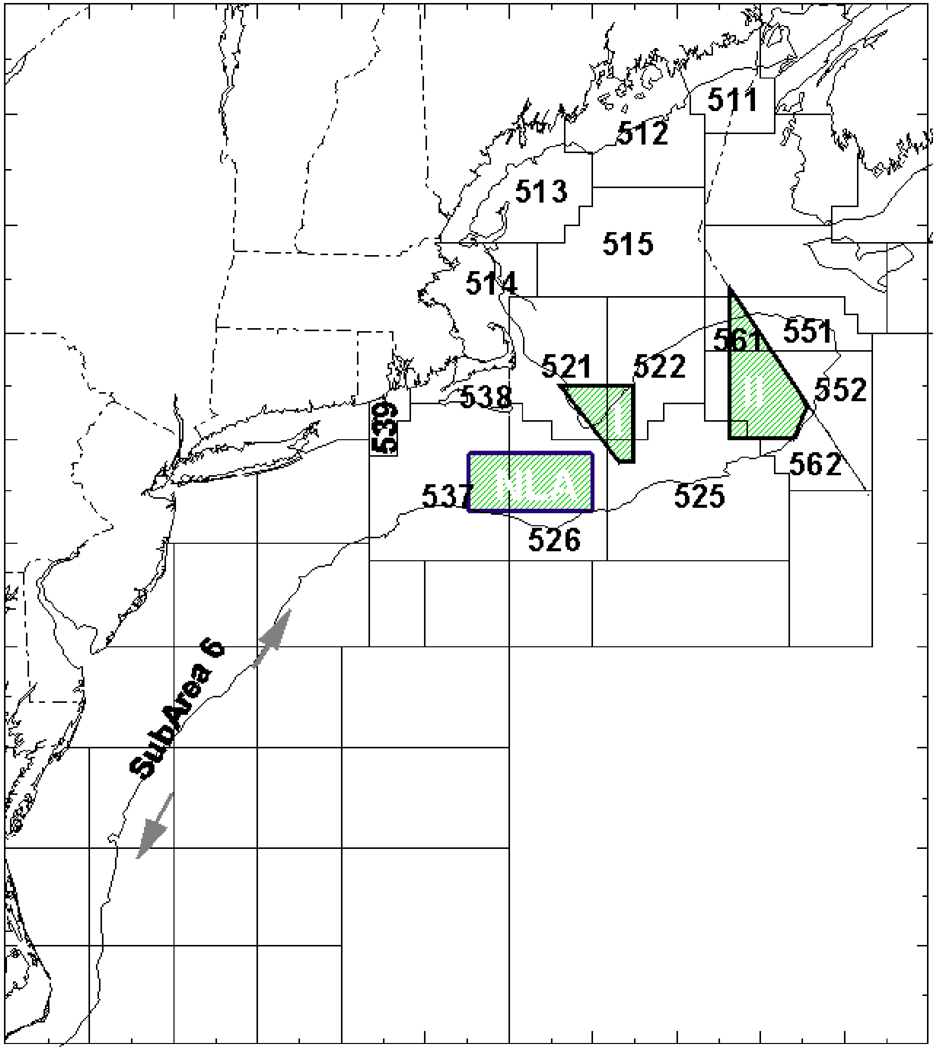
	Resource Distribution				**Resource Utilization and Distribution Weighting**			**Allocation Shares**		
	Survey Year	Cod	Haddock	YtFld	Fishing Year	Utilization	Distribution	Cod	Haddock	YtFld
USA	2008	23%	40%	60%	2010	10%	90%	25%	40.50%	64%
CANADA		77%	60%	40%				75%	59.50%	36%
USA	2009	17%	43%	50%	2011	10%	90%	19%	43%	55%
CANADA		83%	57%	50%				81%	57%	45%
USA	2010	22%	43%	44%	2012	10%	90%	24%	43%	49%
CANADA		78%	57%	56%				76%	57%	51%
USA	2011	13%	37%	37%	2013	10%	90%	16%	38%	43%
CANADA		87%	63%	63%				84%	62%	57%
USA	2012	20%	38%	80%	2014	10%	90%	**22%**	**39%**	**82%**
CANADA		80%	62%	20%				78%	61%	18%

Eastern GB Atlantic Cod
Management Unit





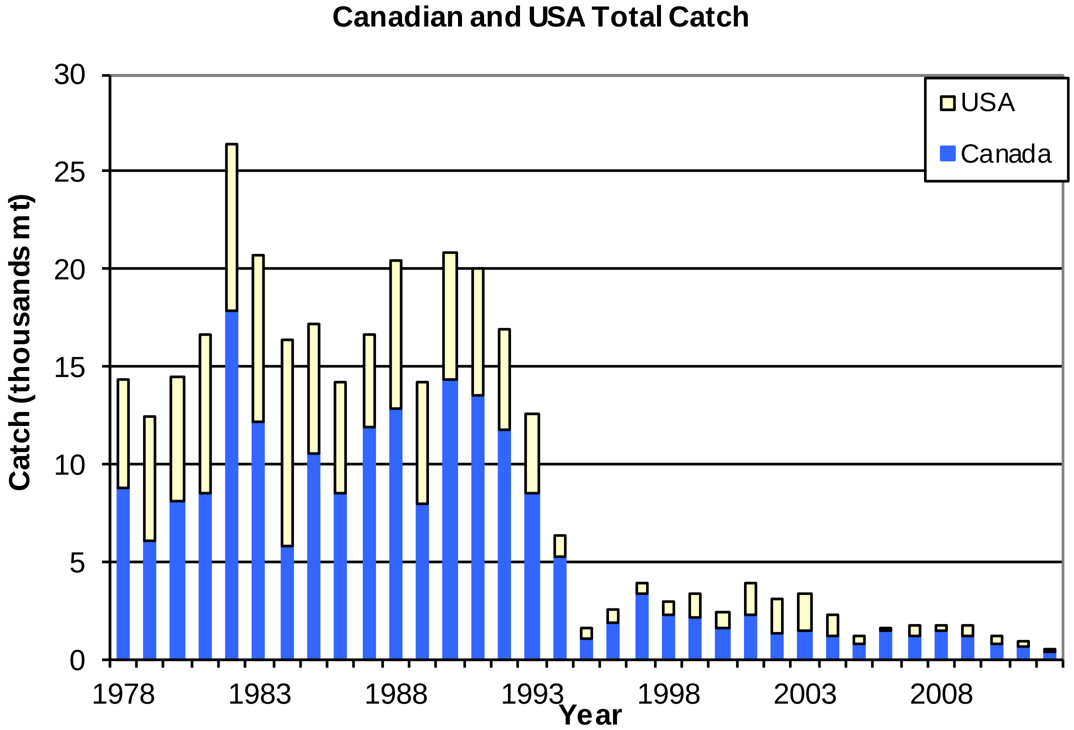
Management Unit Statistical Areas



USA: SA 561,562

CA: SA 551,552

Catch



2012 Catch (mt)	US	Canada	Total
Landings	91	437	488
Discards	55	31	234
Total	146	468	614
Quota taken	42%	91%	

Assessment

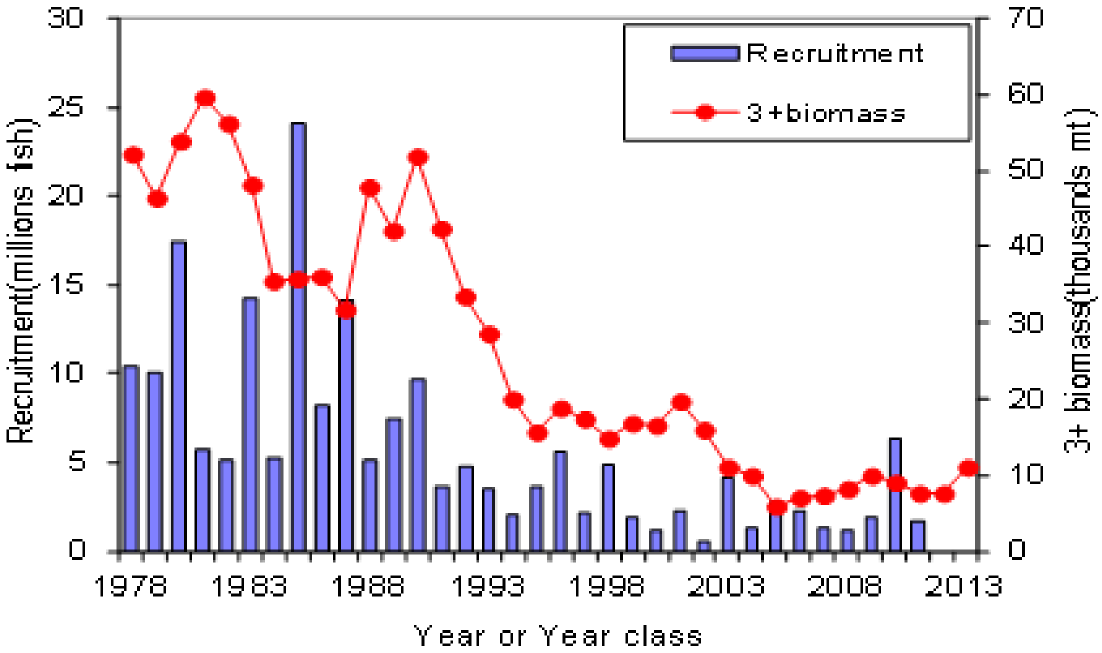
- **2013 April Benchmark model meeting**
  - **no consensus on final benchmark model**
  - **agreed to use one model for catch advice**

- **“VPA M 0.8 model”; M=0.8 for ages 6+ from 1994 onward , otherwise M = 0.2 for all ages and years**

Assessment

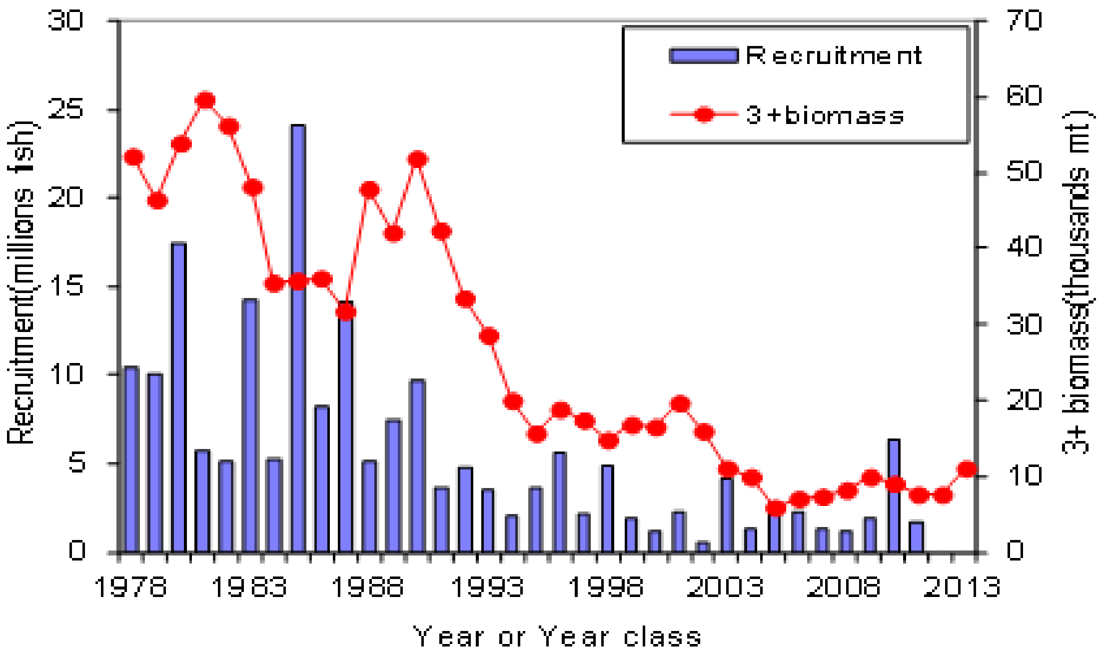
- June 2013: Strong retrospective bias in SSB and F from the “M 0.8” model
- Caused by the substantial reduction in the estimated size of the 2003 yc;
- Sensitivity analyses that adjusted for the 2003 year class indicated similar catch advice as the VPA “M 0.8”;
- VPA “M 0.8” model results used for catch advise; however, not adjusted for retrospective bias; only reliable for relative pop’n trends between 1994-2011,not magnitude

3+ Biomass (*lines*)



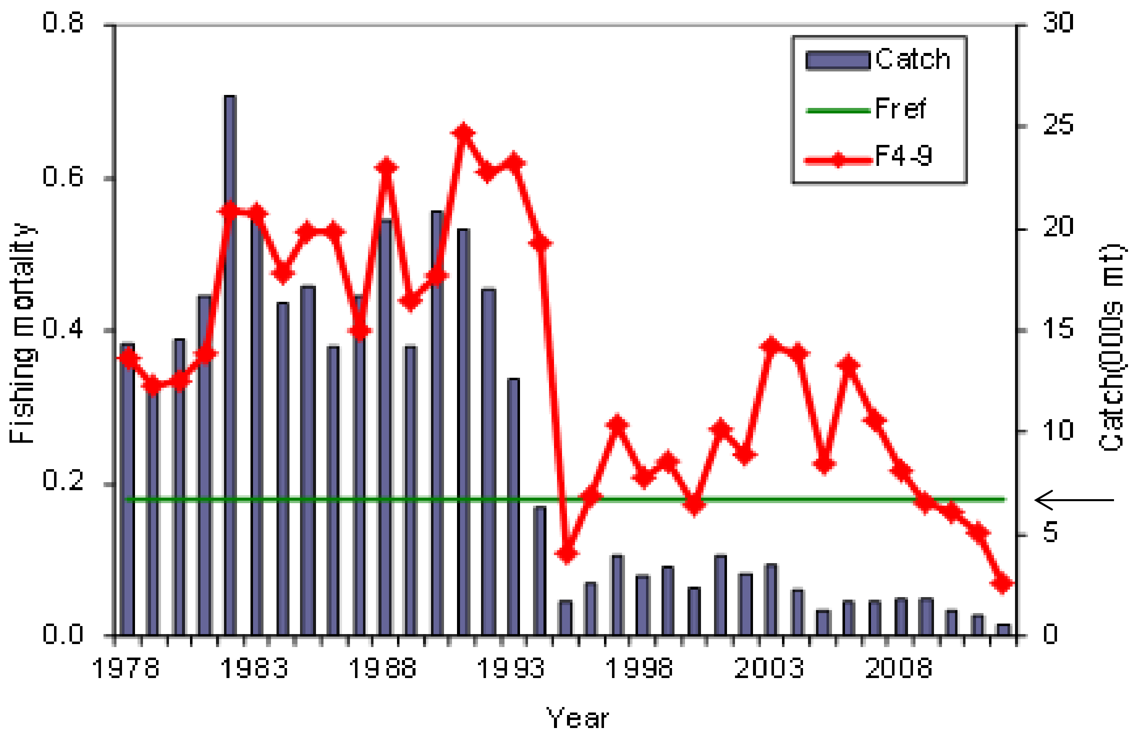
- **2013 Jan 1 3+ biomass increasing (growth 2010 yc)**

Recruitment (bars)



- **Poor rct since 1990 yc; 2010 yc strongest since**
- **2010 yc >2003 but estimate still uncertain**
- **Mean weight at age remains low**

Fishing Mortality



$F_{ref} = 0.18$

- **2012 F= 0.07**
- **Change in perception – 1st time below Fref**
- **Fref not consistent with M=0.8 model**

Harvest Strategy : TMGC adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $\mathbf{F_{ref} = 0.18}$ **(**established in 2002 by the TMGC).

When stock conditions are poor, fishing mortality rates should be further ***reduced*** to promote rebuilding.

Catch Projections

- At the 2013 cod benchmark meeting, it was agreed that the current F_{ref}=0.18 was inconsistent with the VPA “M 0.8” model given that it was derived based on models with an M=0.2
- TRAC recommended using a lower value of F for projections and catch advice; an arbitrary value of F = 0.11 was used

2013 Catch Projection

Probability of exceeding target F in 2014	**0.25**	**0.5**	**0.75**
“M 0.8”(F =0.11)	1,075 mt	1,225 mt	1,425mt

- A 50% probability of not exceeding F= 0.11 implies a catch less than 1,225 mt

Neutral risk (50%) that biomass will not increase by:	**0%**	**10%**
“M 0.8”	2,075 mt	600 mt

- Achieving a 10% increase in SSB between 2014 and 2015 implies catches less than 600 mt

Catch Projection Summary

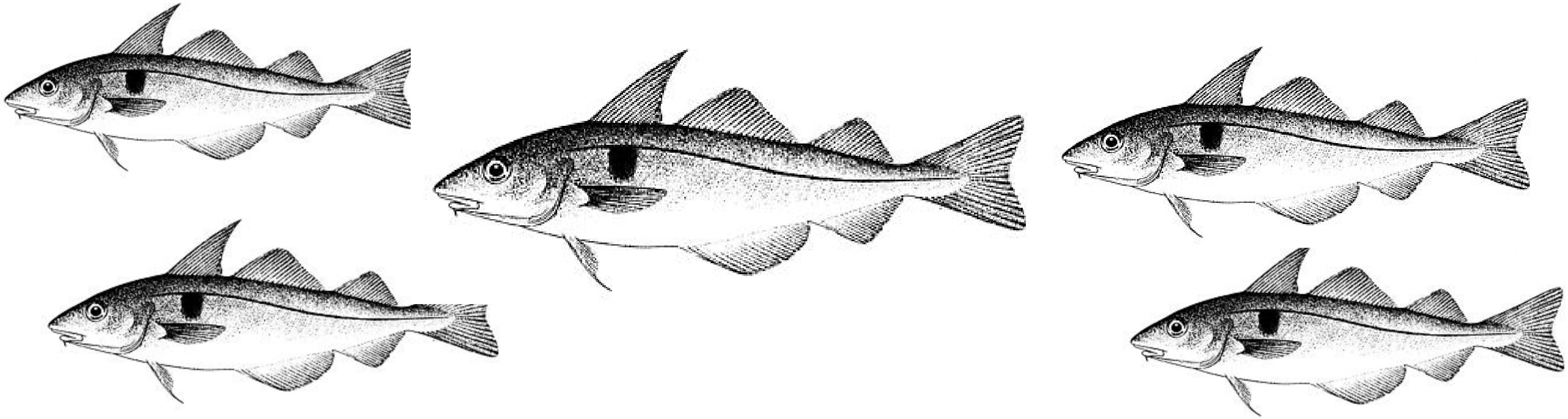
Given the extremely low SSB, TRAC advises that management should try to realize the growth potential from the 2010 year class to rebuild the SSB. In order to not exceed F=0.11, & to achieve a 10% increase in biomass, catches must not exceed 600 mt

Consequence Analysis : reflect uncertainties

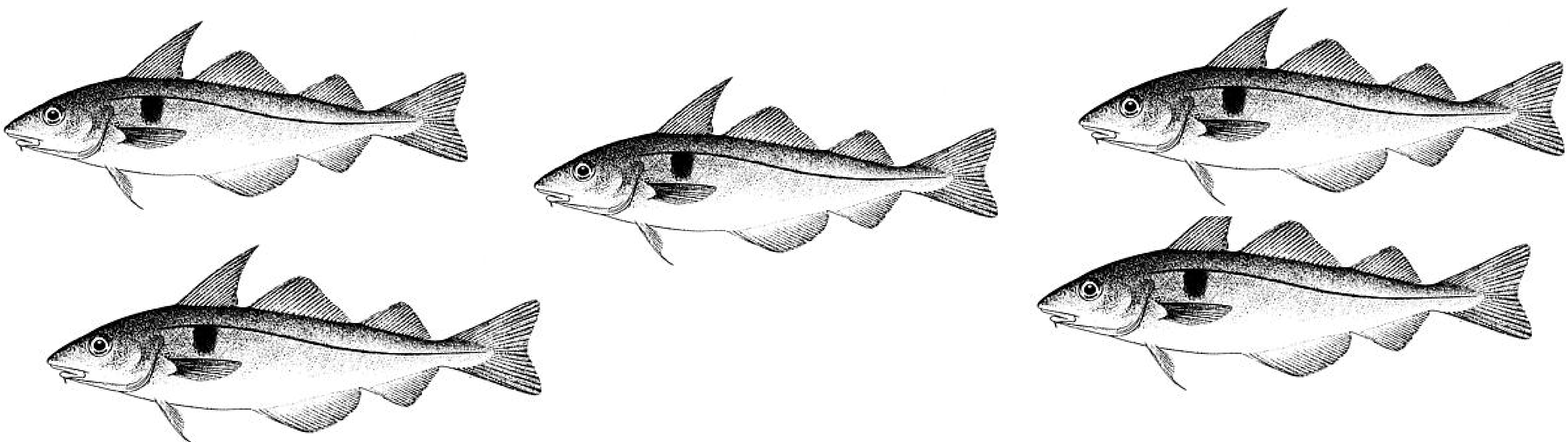
		VPA 0.8	ASAP
Catch 2012		613 mt	613 mt
quota 2013		600 mt	600 mt
2012 biomass (3+)		7700 mt	2091 mt
2013 biomass (3+)		11160 mt	
Projected Catch			
2028 mt	2014 F	0.18	0.75
(VPA F=0.18)	2015 Biomass	13314	3328
	% inc B from 2014	0.4%	-20.2%
1225 mt	2014 F	0.11	0.40
(VPA F=0.11)	2015 Biomass	14018	4153
	% inc B from 2014	6%	-0.42%
601 mt	2014 F	0.05	0.18
(ASAP F=0.18)	2015 Biomass	14646	4794
	% inc B from 2014	10.0%	15.0%
378 mt	2014 F	0.03	0.11
(ASAP F=0.11)	2015 Biomass	14858	5029
	% inc B from 2014	12%	20.6%
(green)	F<=Fref and a 10% biomass increase in 2015		
(light blue)	F< =Fref and biomass increase less than 10% in 2015		
(red)	F>Fref and biomass increase less than 10% in 2015		
(grey)	not feasible projection		

Summary - EGB Cod

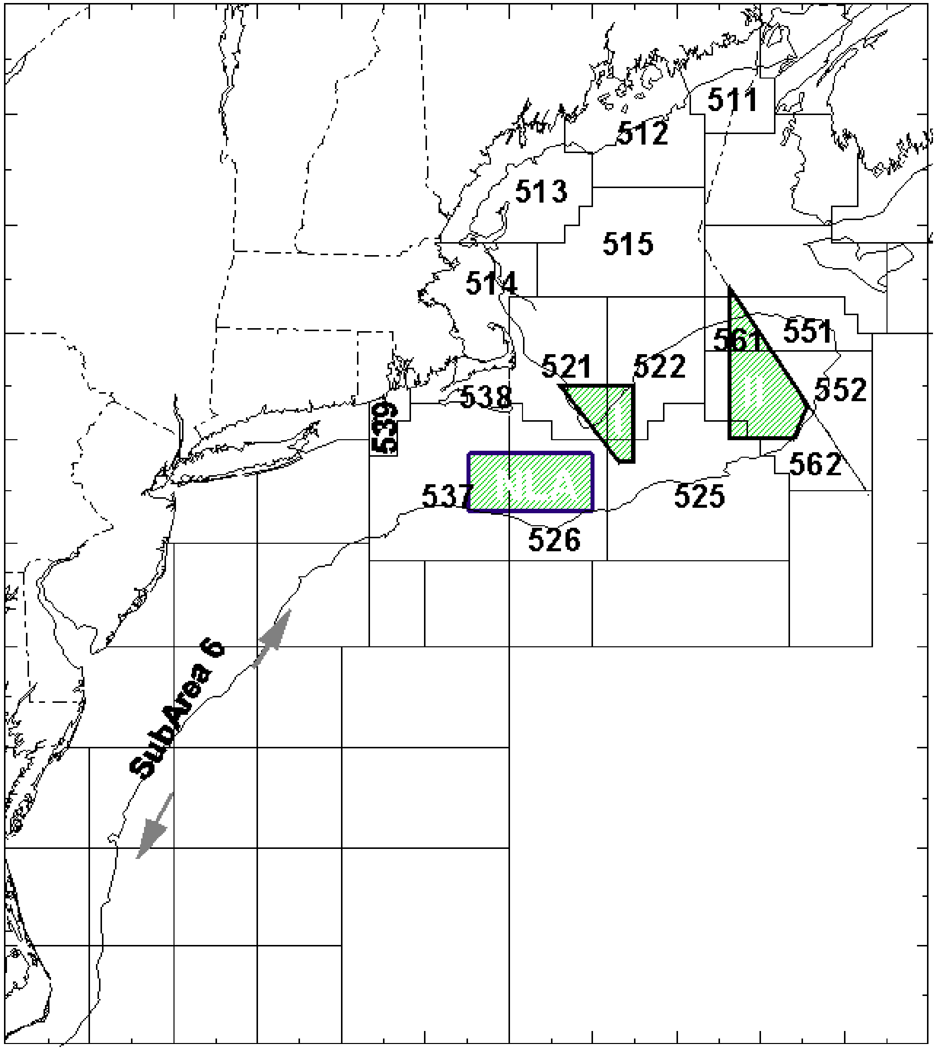
- Biomass increasing, F reduced
- Recent rct generally poor, except for 2003 and 2010 yc
- 2010 year class highest since 1990; estimate still uncertain
- Reduced weights at age
- Lower biomass hampers improved recruitment
- Low numbers of 7+ fish
- Rebuilding will not occur without improved recruitment
- Model results uncertain; not adjusted for retrospective; used sensitivity analyses to interpret base model results
- Not exceeding F = 0.11 and achieving a 10% increase in biomass implies catches of less than 600 mt.



Eastern GB Haddock Management Unit



Management Unit Statistical Areas



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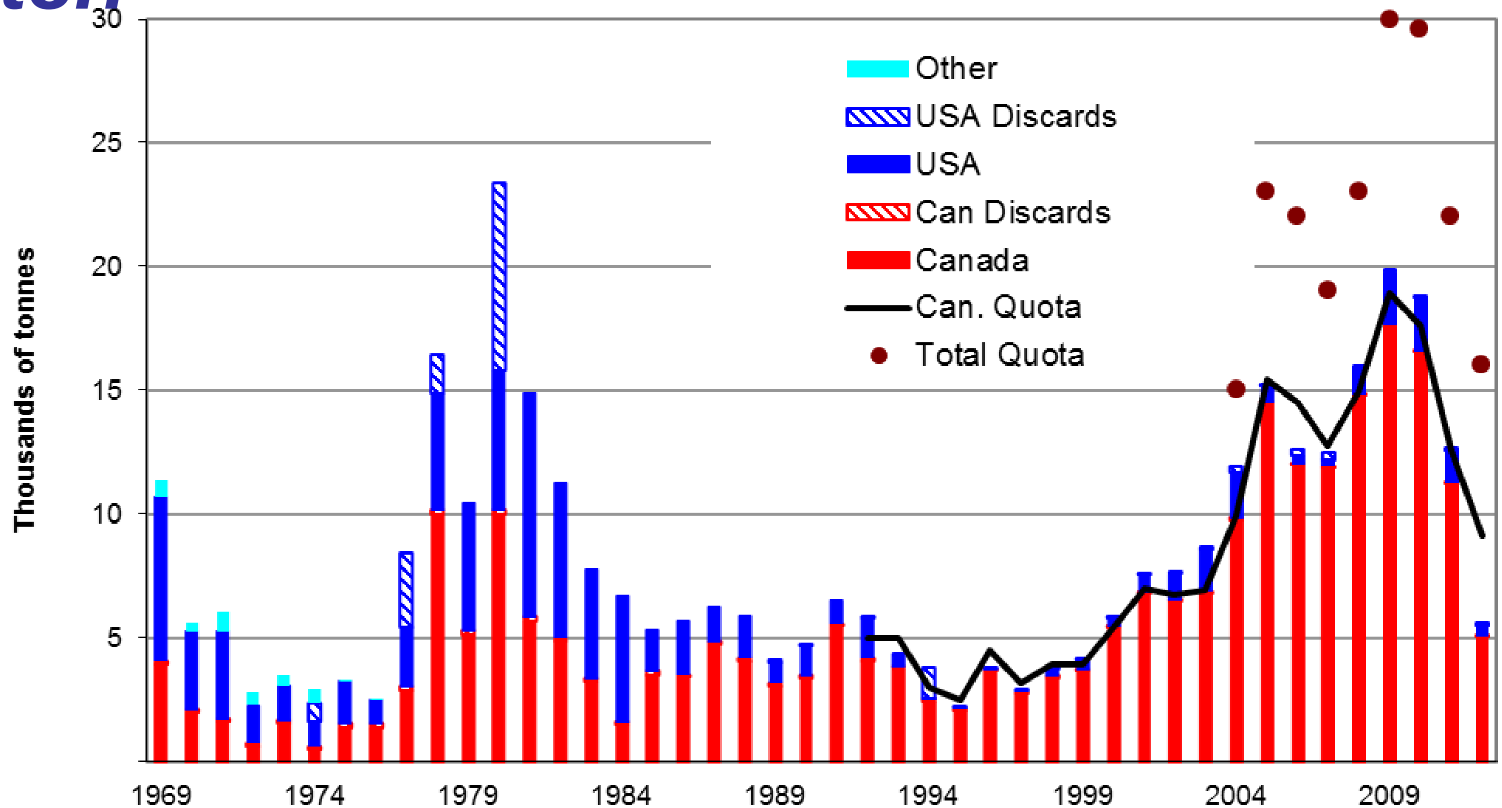
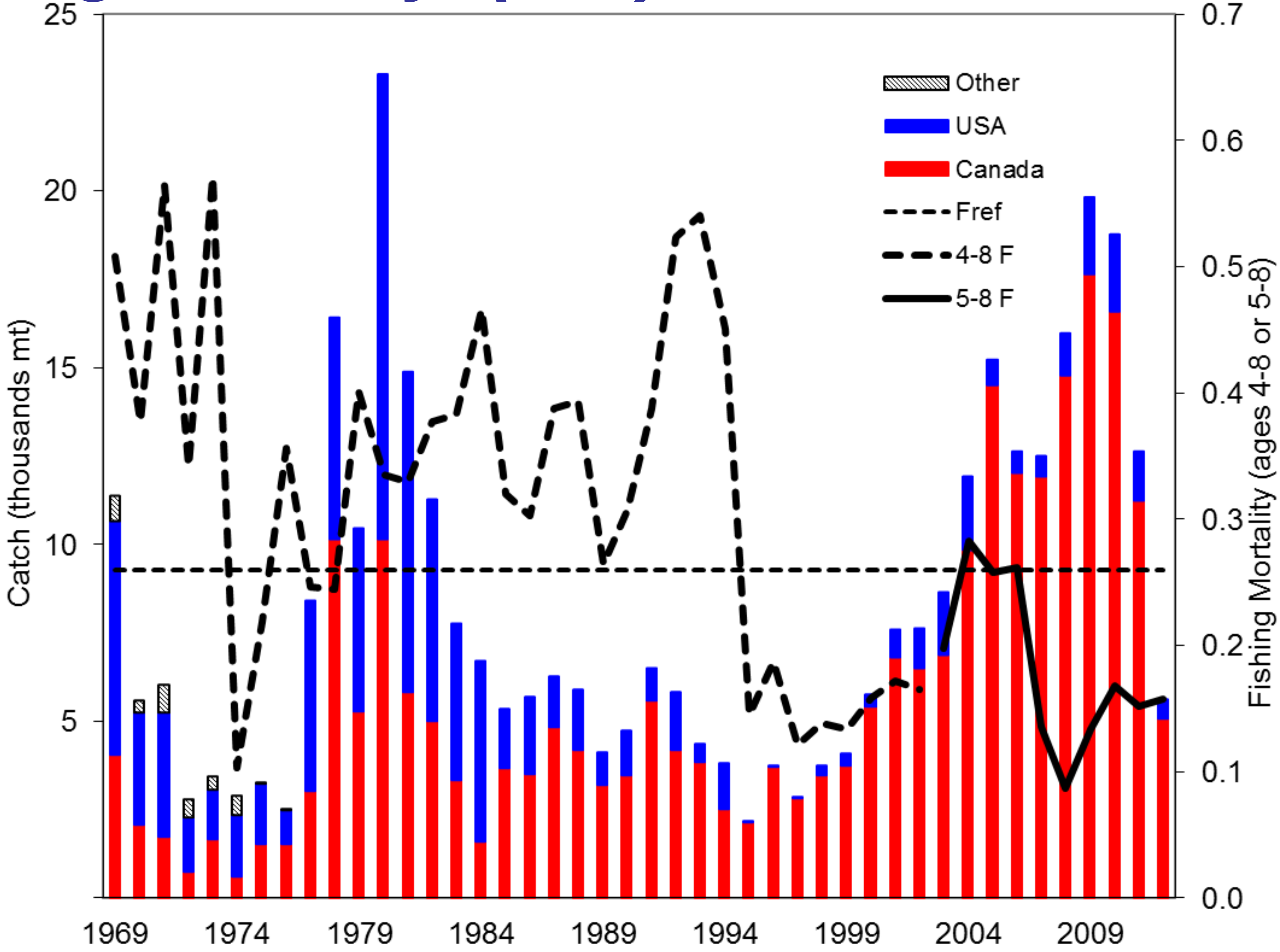
Catch



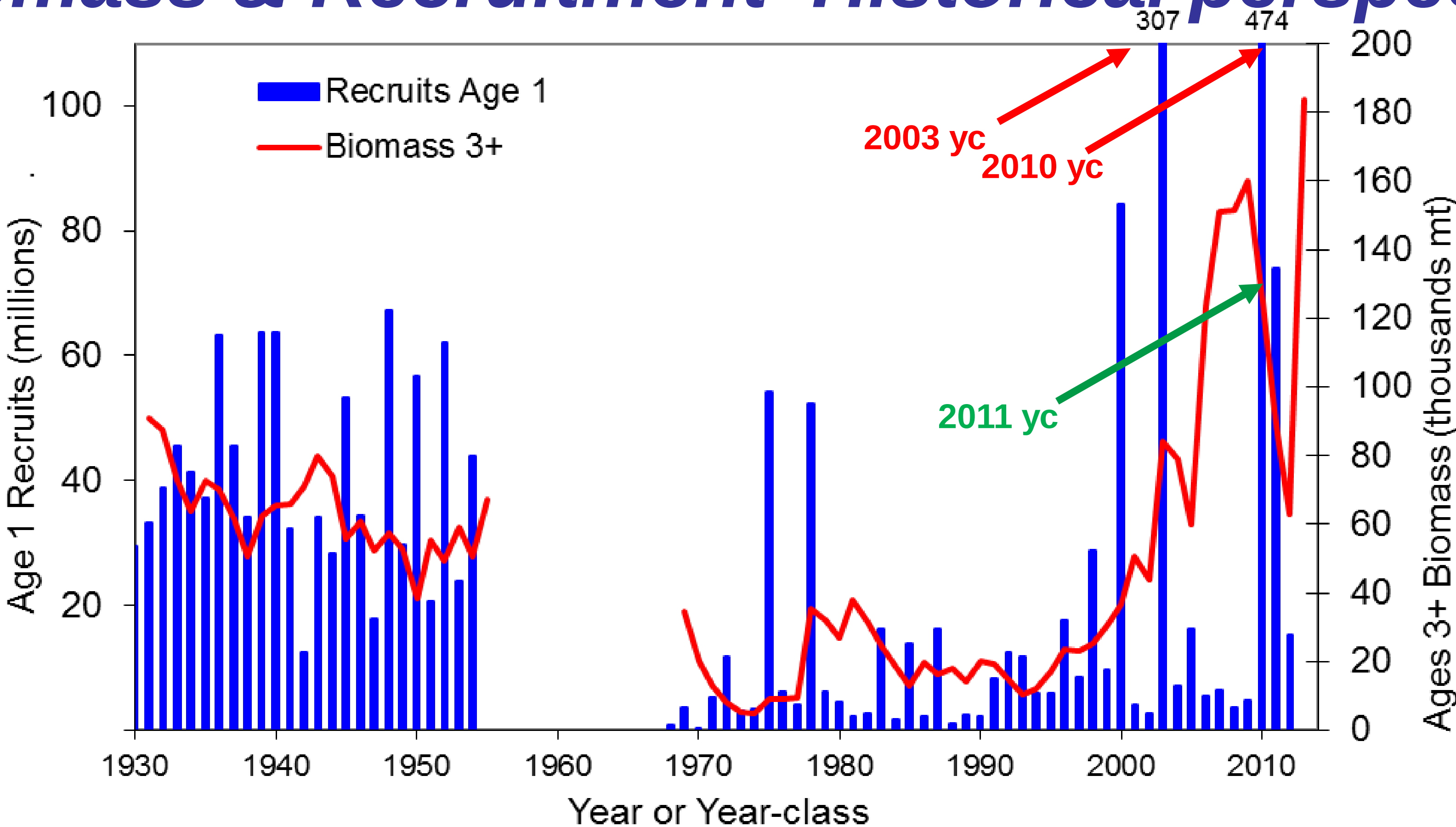
2012 Catch (mt)	US	Canada	Total
Landings	443	5034	5477
Discards	126	28	154
Total	569	5062	5631
Quota taken	5%	55%	

Fishing Mortality (line)



2012 F = 0.16, below or near Fref since 1995

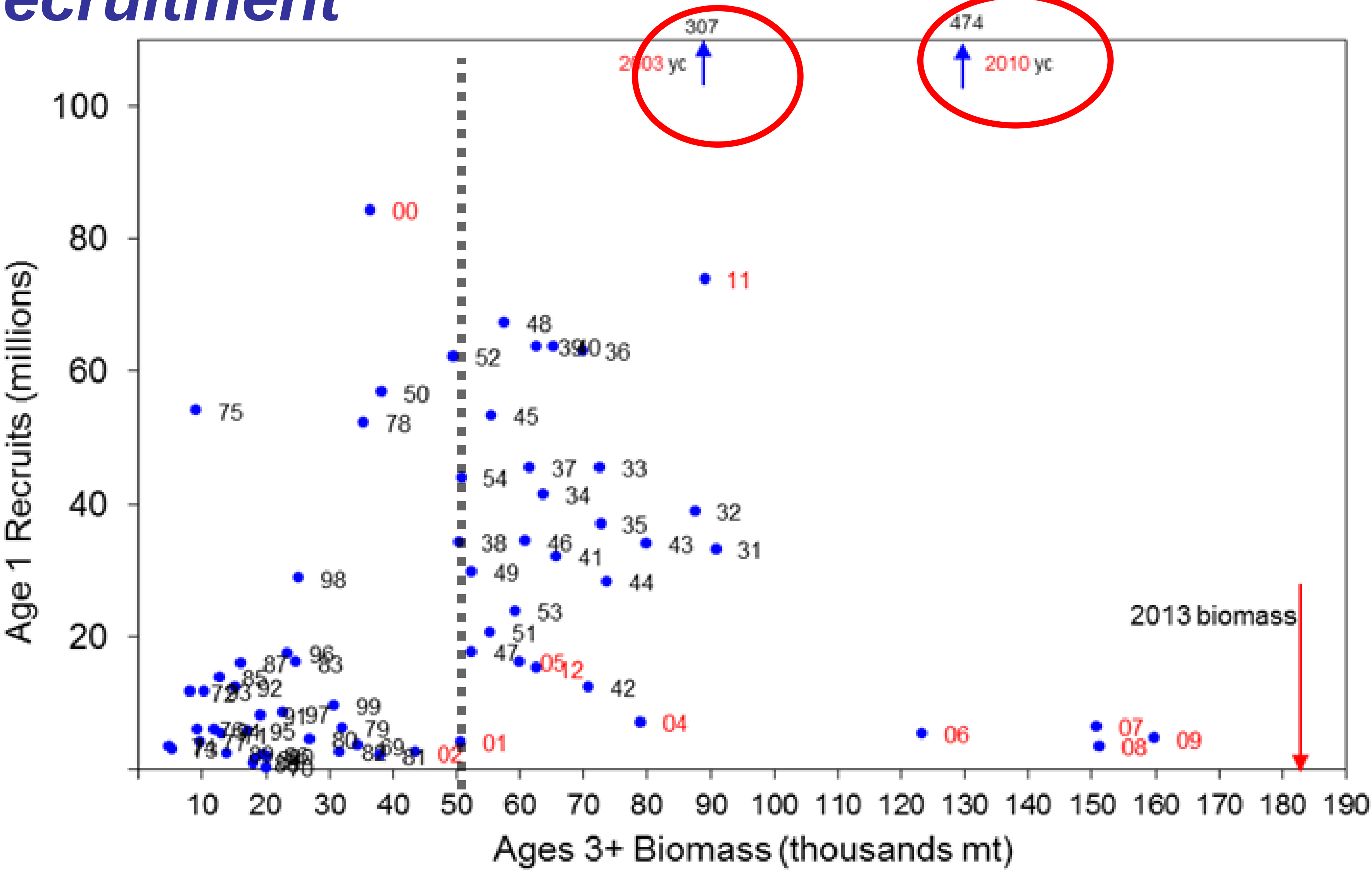
Biomass & Recruitment–Historical perspective



- Adult (3+) biomass increased dramatically in 2000s due to the large 2003 year class.
- At the beginning of 2013, adult biomass was 183,600 mt.
- 2003 and 2010 year classes are exceptionally large; 2011 year class is very strong (~74 million)

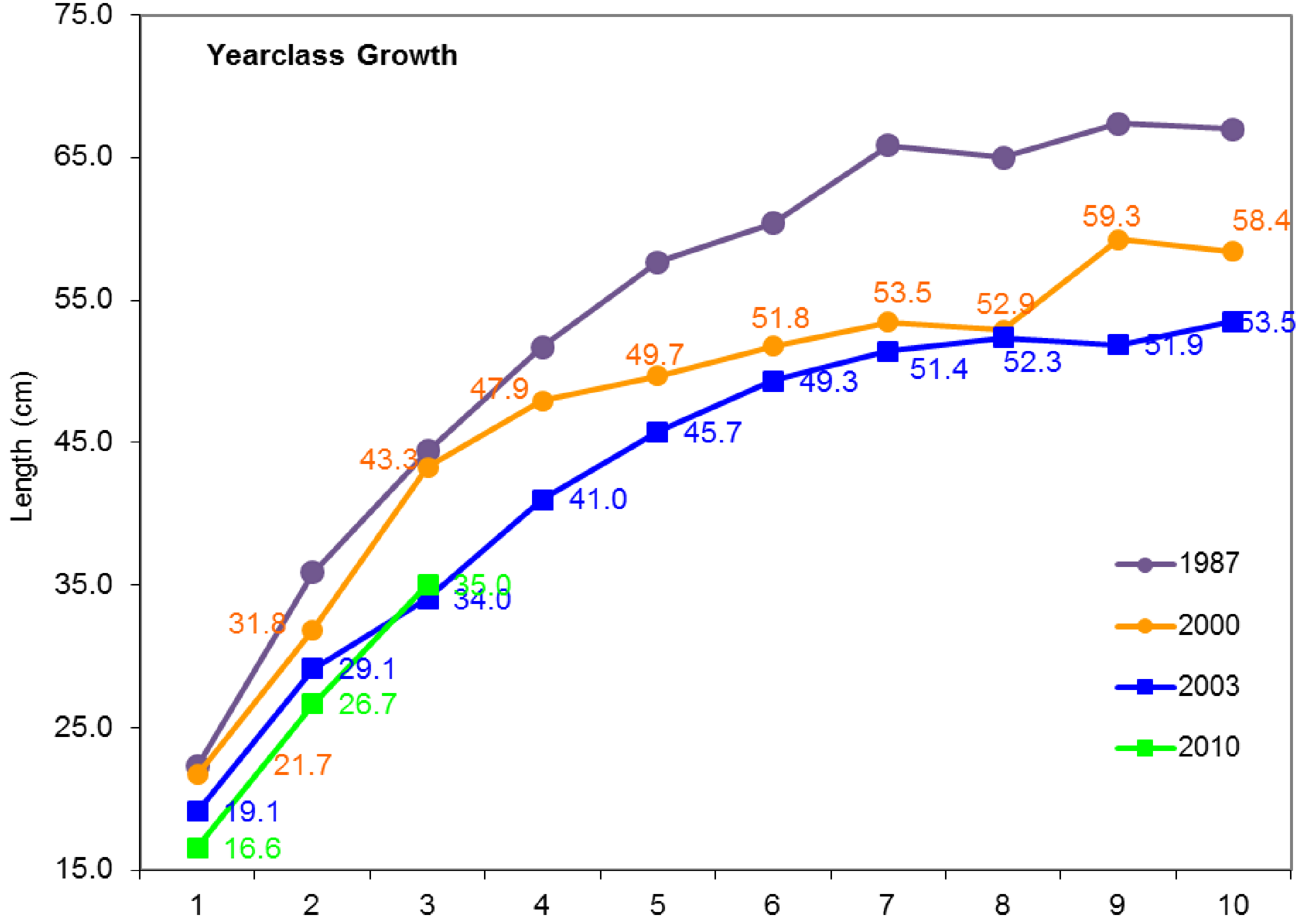
Recruitment

EGB Haddock



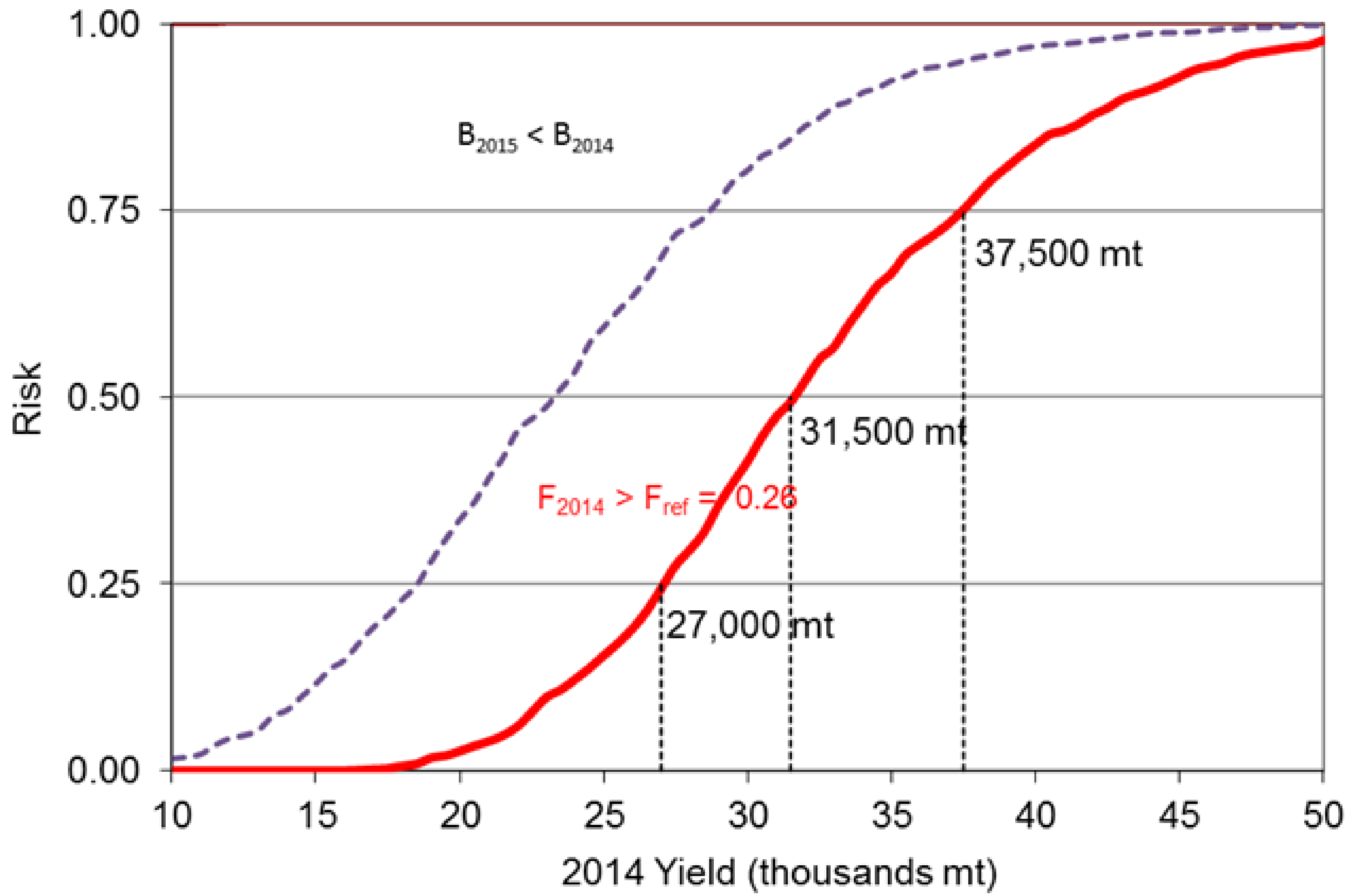
- Recruitment is highly variable but has generally been higher when adult biomass has been above 40,000 mt, which has been the case since 2001.
- 2013 3+ biomass estimated at 183,600 mt.
- 2003 yc estimated to be 307 M and 2010 yc preliminary estimate of 474 M at age 1

Year class growth



- Size at age has decreased and maximum average size smaller
- 2003 year class values used for 2010 year class projection inputs

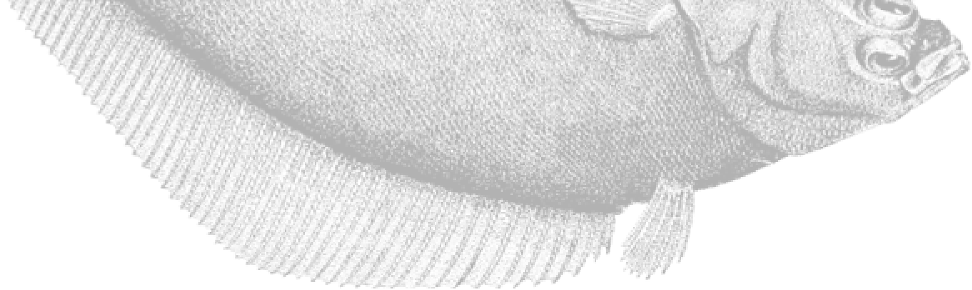
Projection



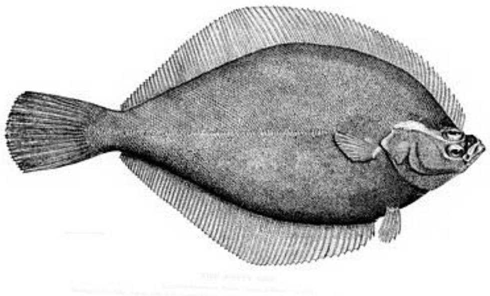
- Assuming a 2013 catch equal to the 10,400 mt total quota, a combined Canada/USA catch of 31,500 mt in 2014 results in a neutral risk (50%) that the 2014 fishing mortality rate would exceed Fref = 0.26
- Biomass in 2014 expected to be largest in times series; biomass expected to decline in 2015
- Used 2003 year class values for 2010 year class projection inputs.
- Assumed no growth for 2003 year class (9+) and reduced availability of ages 9+ to fishery

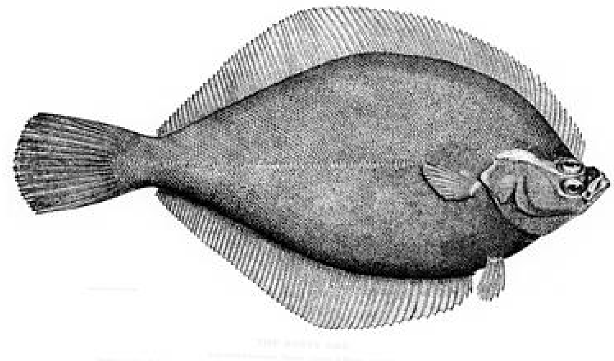
Summary - EGB Haddock

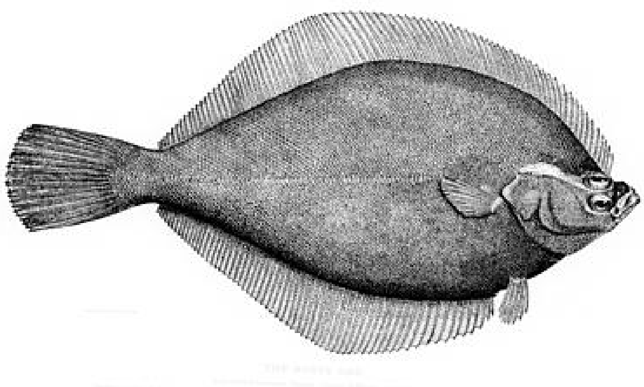
- 2012 quota not caught (bycatch and difficulty finding large haddock)
- Highest biomass in assessment time series
- Extremely variable recruitment
- 2010 and 2011 year classes will supply fishery for several years with large catches
- F has been below F_{ref} since 2007
- Risk neutral 2014 F_{ref} catch = 31,500 mt
- 2015 biomass projected to be 240,000 mt

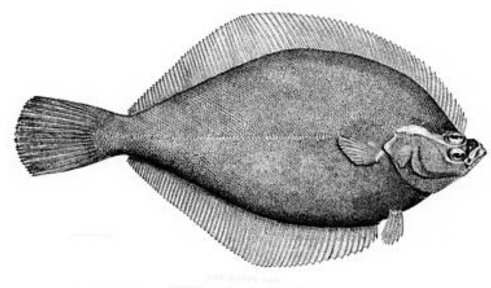


Georges Bank Yellowtail Flounder

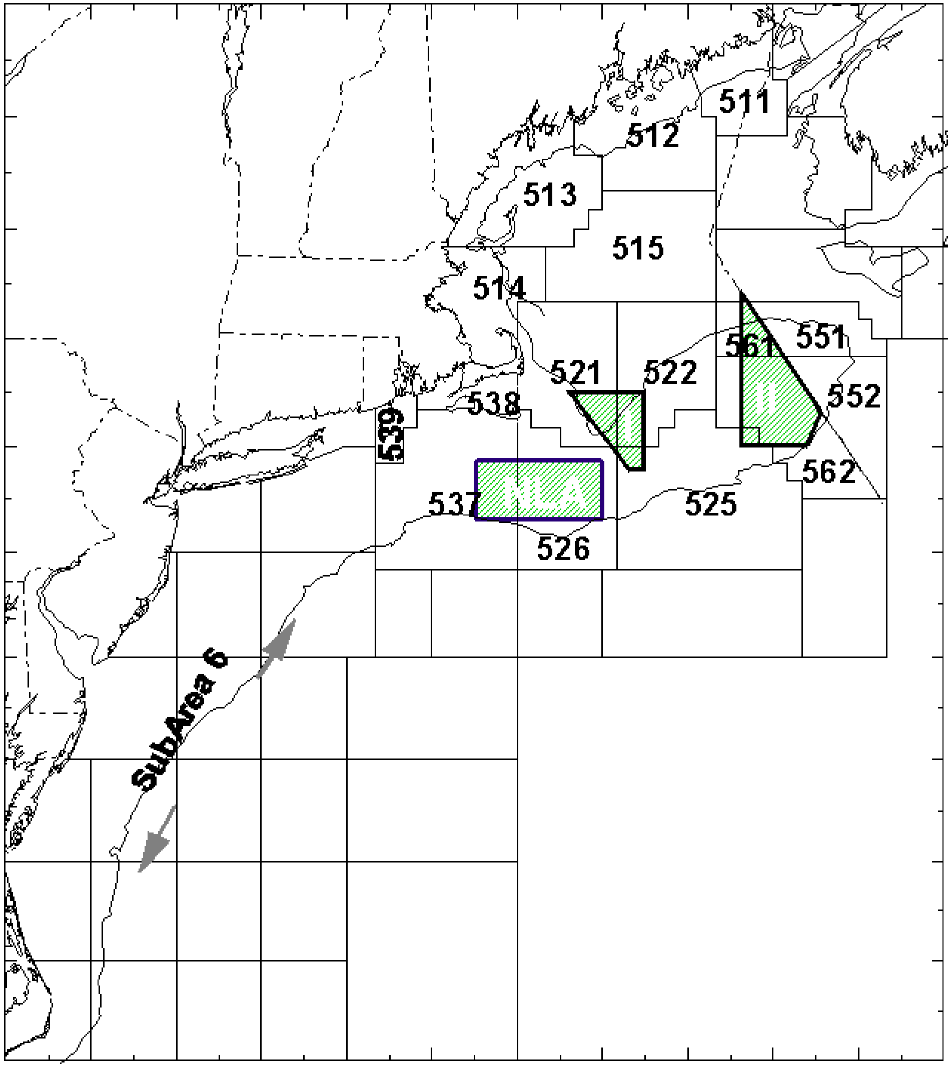








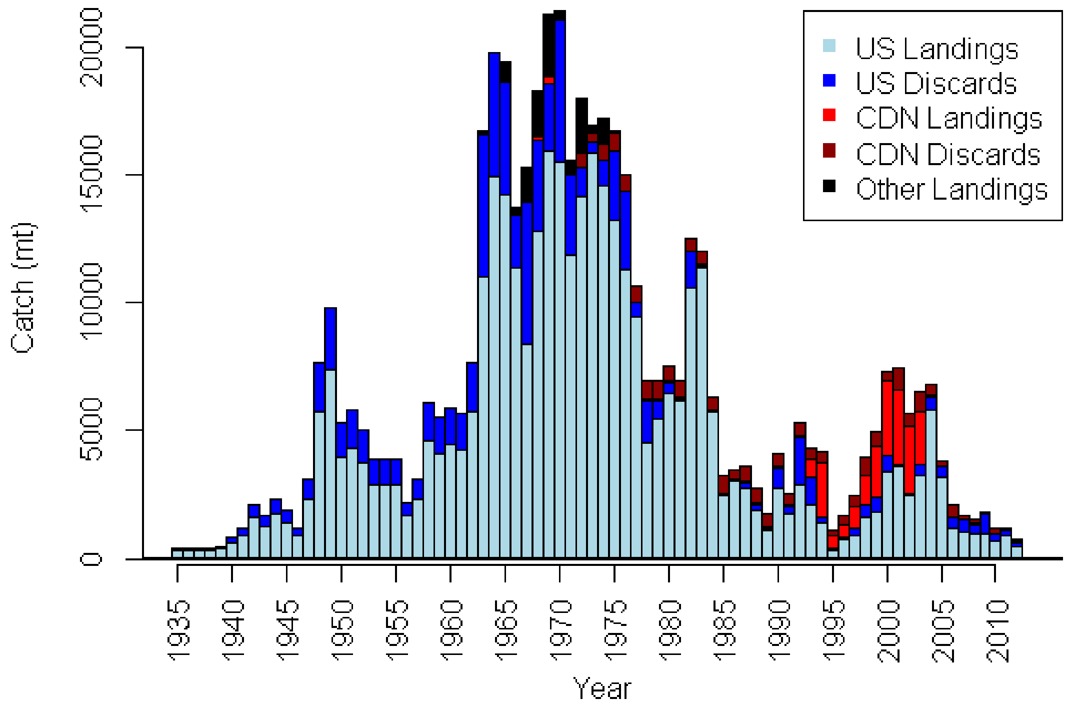
Georges Bank Yellowtail Flounder



USA catches:
SA 522,525,561,562

CA catches:
SA 551,552

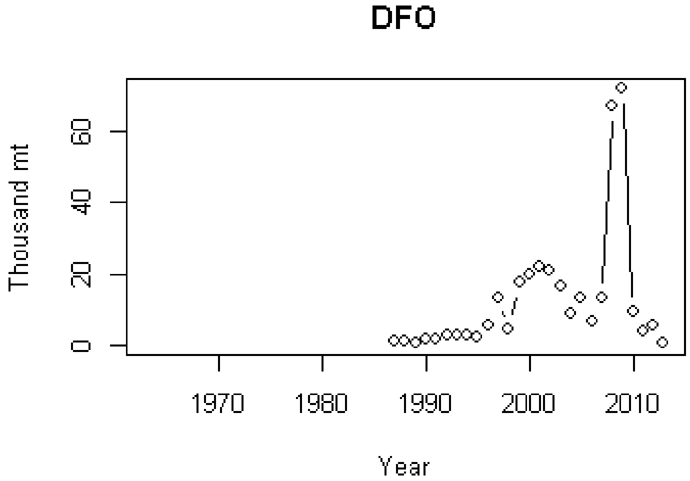
Catch



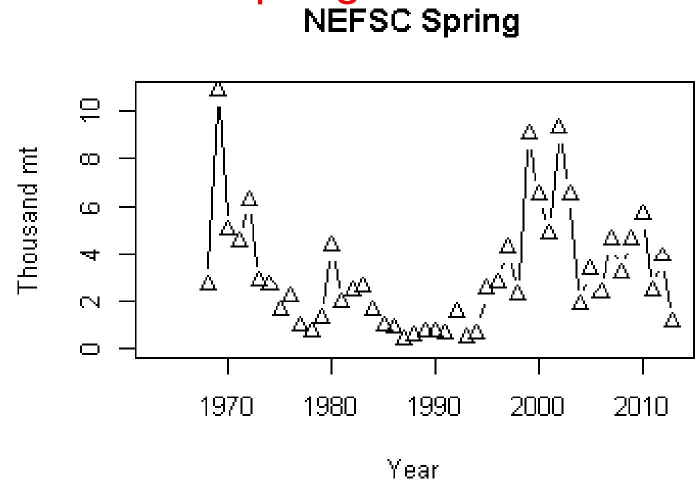
2012 Catch (mt)	US	Canada	Total
Landings	443	46	488
Discards	188	45	234
Total	631	91	722
Quota taken	94%	16%	

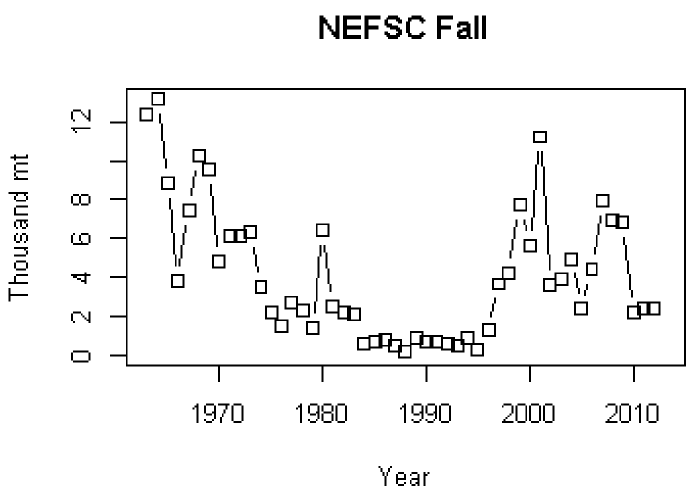
Surveys

DFO 2nd lowest in time series

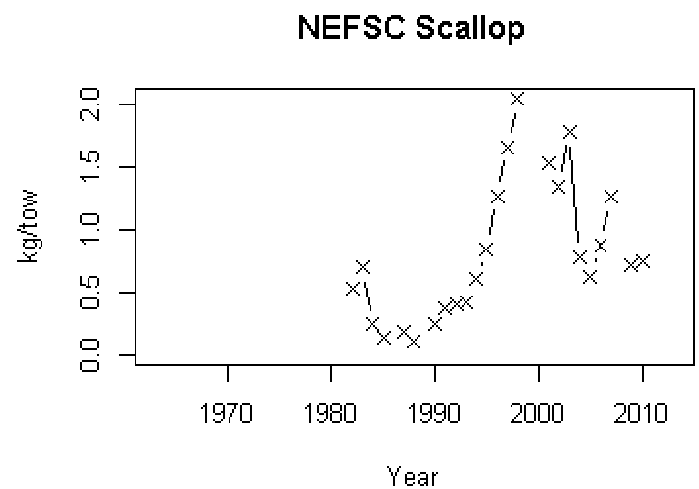


NEFSC Spring lowest since 1994





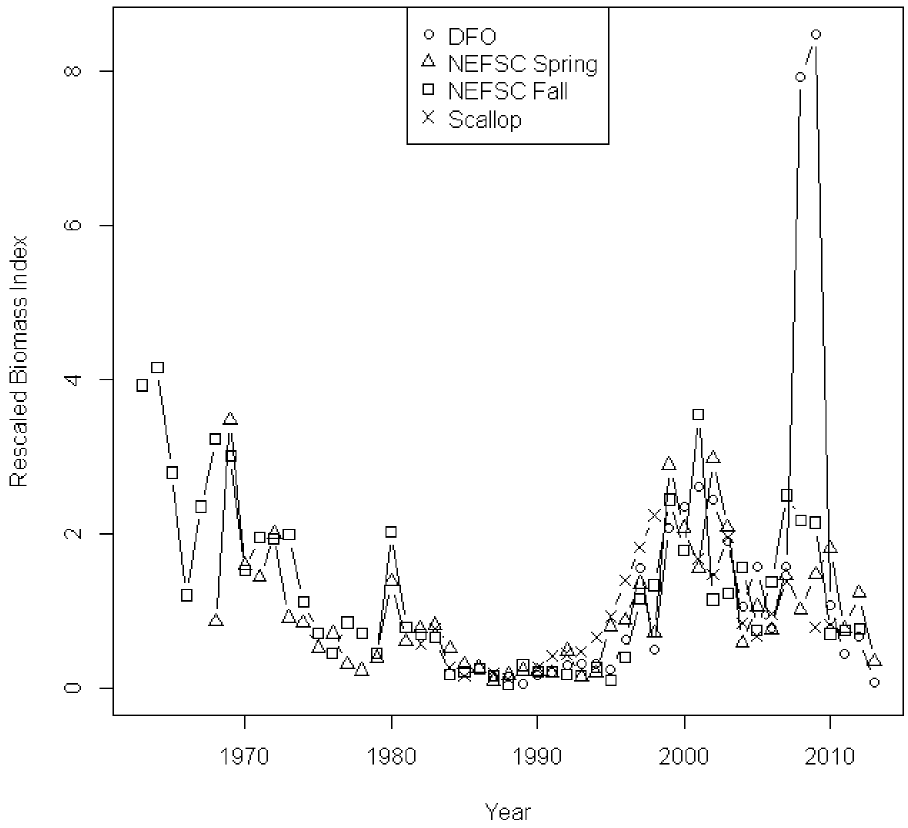
NEFSC Fall same past 3 years
Low relative to recent 15 years
Higher relative to mid-80s-90s



NEFSC Scallop did not sample Canadian waters in 2011 or 2012

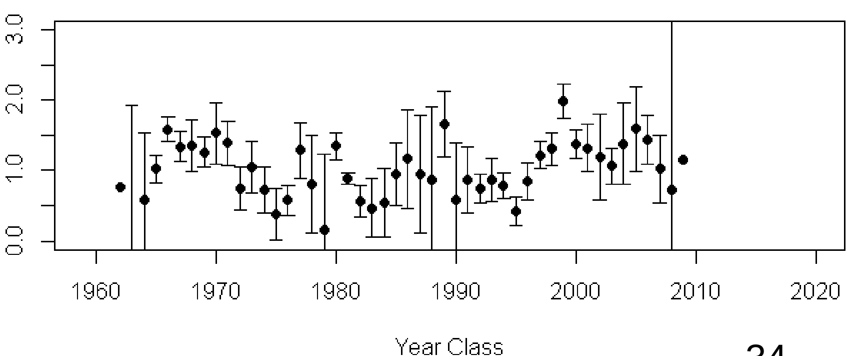
Surveys

- Continued agreement among surveys



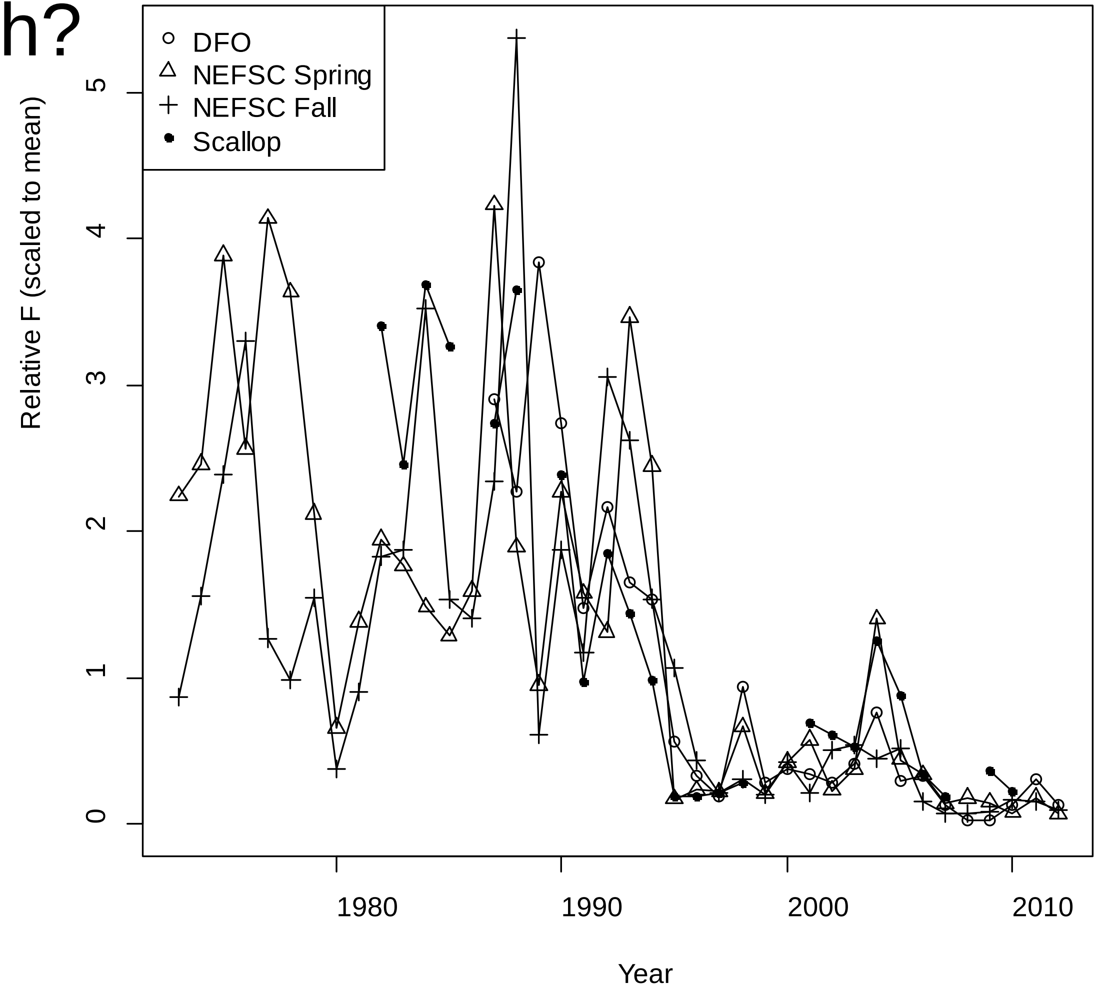
Total mortality (Z) estimates high

Survey Z estimates



Relative F

- Continued disagreement with survey Z
- If F has been low since 1995, where are the old fish?



Missing catch?
Missing M?
Missing F?

Model

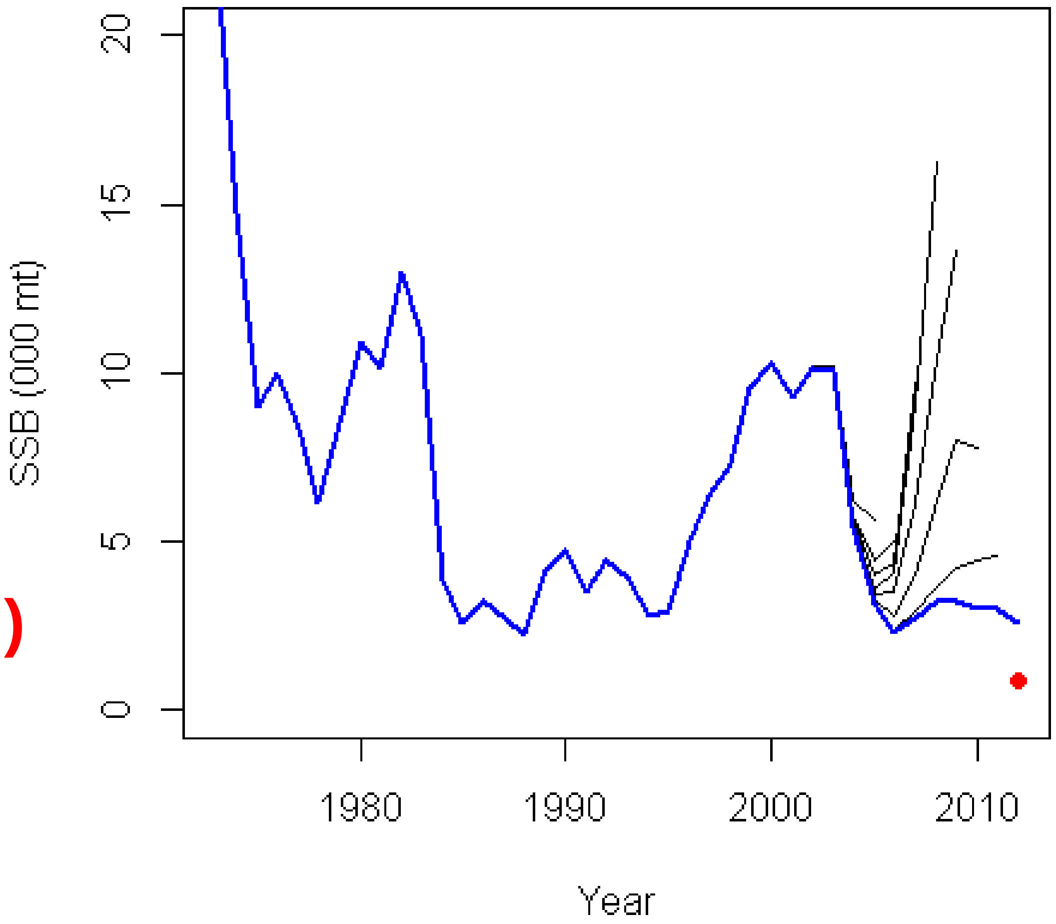
The Split Series formulation was approved at the last benchmark assessment and is used to estimate current stock size and fishing mortality.

The TRAC acknowledges that the assumptions made about population dynamics in the model do not fully capture the trends in the data. However, the model's conclusion that stock conditions are poor is valid.

TRAC recommends basing 2012 status and 2014 catches on the *adjusted* model projection results.

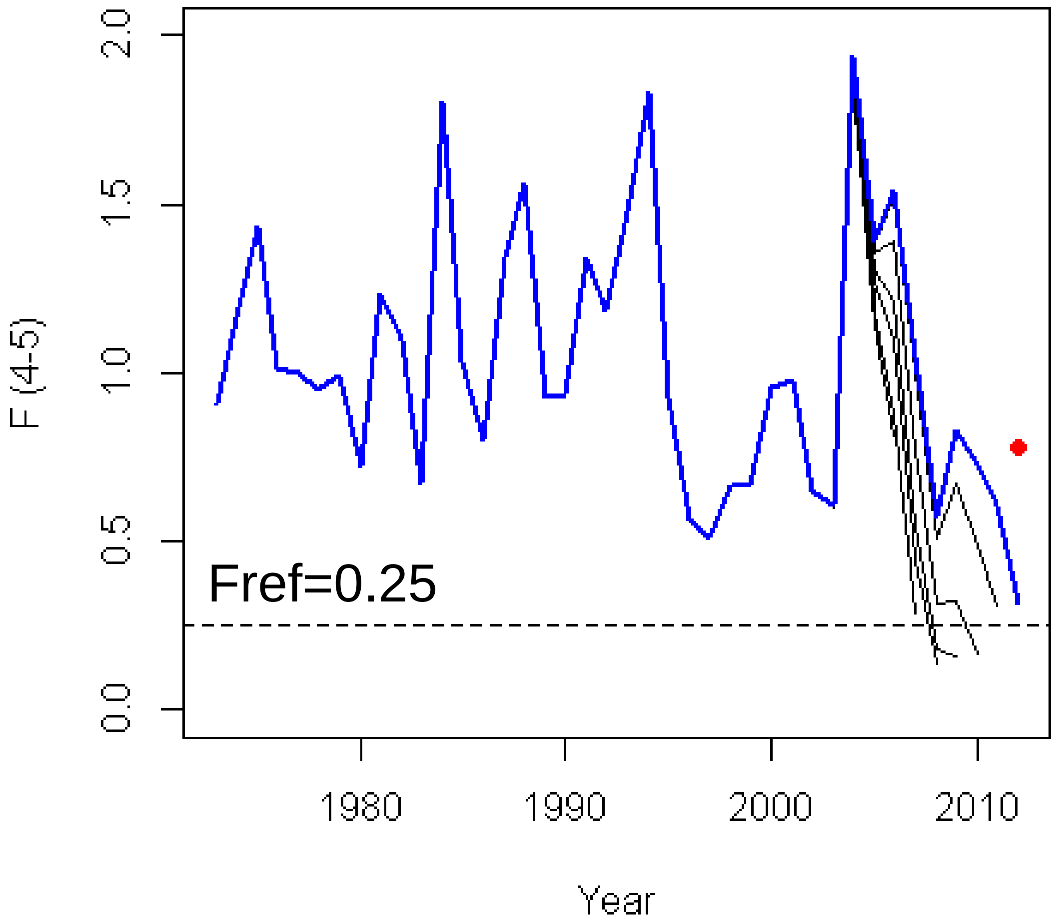
SSB

1994: 2,800 mt
2003: 10,900 mt
2006: 2,400 mt
2011: 3,100 mt
2012: 2,600 mt
2012: 869 mt (rho adj)



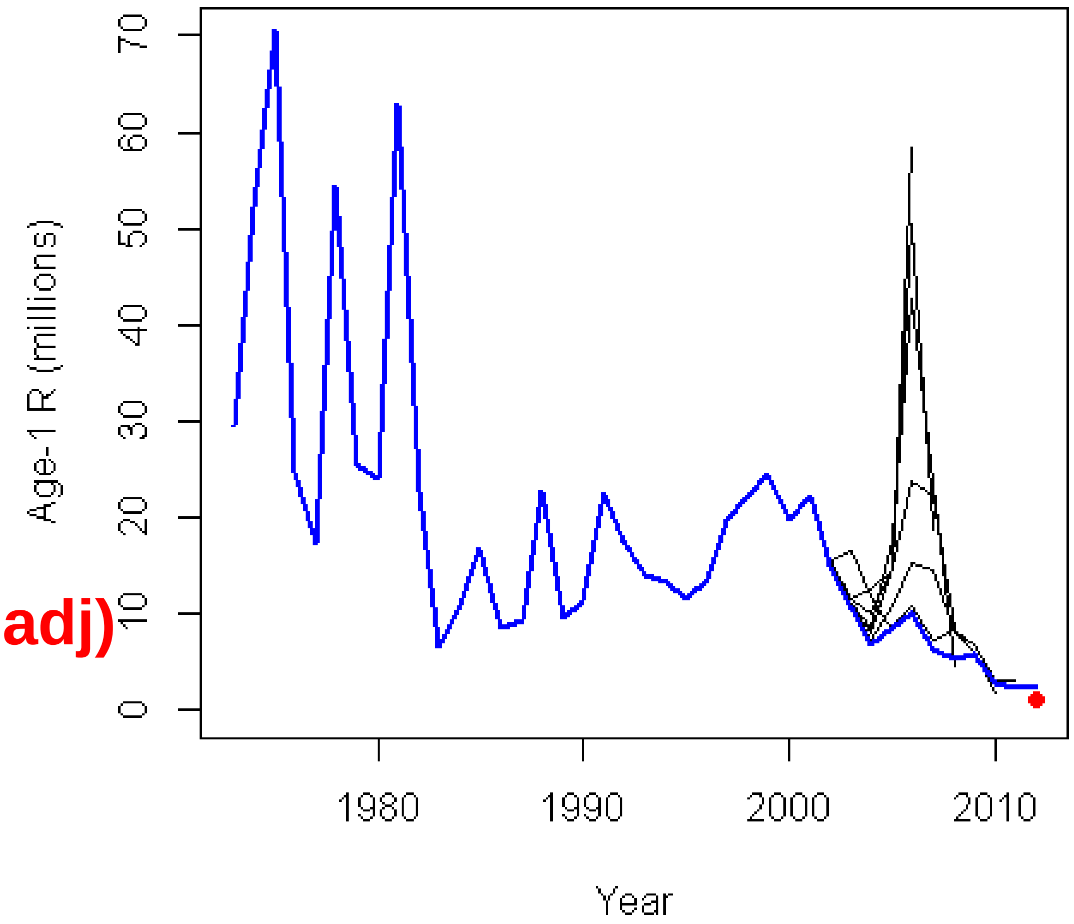
Fishing Mortality

1994: 1.83
2003: 0.61
2006: 1.54
2011: 0.60
2012: 0.32
2012: 0.78 (rho adj)



Recruitment

1994: 13.2 million
2003: 10.6 million
2006: 10.1 million
2011: 2.3 million
2012: 2.3 million
2012: 1.2 million (rho adj)



Harvest Strategy

TMGC 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.

2014 Catch Advice

	2014 Quota (mt)				
	100	200	300	400	500
Split Series rho adjusted					
P(F>Fref)	0.26	0.97	1.00	1.00	1.00
F2014	0.20	0.43	0.71	1.05	1.48
delta B	60%	44%	27%	11%	-4%
P(B inc)	1.00	1.00	1.00	1.00	0.21
P(B inc 10%)	1.00	1.00	1.00	0.66	0.02

<200

<500
optimistic?

- *Quota of < 200 mt would be required to achieve high Prob. 2014 F<Fref*
- *"Catches well below 500 mt are likely needed to achieve the harvest strategy"*
- *Projection results may be optimistic given the assumption of 2012 rct.*

Summary – GB Yellowtail Flounder

- Catch in 2012 low and below quota
- Surveys down or same from last year
- F_{2012} > Fref
- Biomass lowest in time series
- Recruitment poor recently
- Major retrospective issue
- 2014 catch advice well below 500 mt