JUNE 2011 TRAC

Eastern GB cod, EGB haddock, and GB yellowtail flounder

NEFMC
Danvers , MA
September 28, 2011

Allocation Shares

Resource Utilization

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

Resource Distribution

	Survey Year	Cod	Haddock	Ytl
USA	**2000**	18%	20%	54%
CANADA		82%	80%	46%
USA	**2001**	14%	16%	64%
CANADA		86%	84%	36%
USA	**2002**	12%	26%	62%
CANADA		88%	74%	38%
USA	**2003**	18%	27%	56%
CANADA		82%	73%	44%
USA	**2004**	14%	29%	56%
CANADA		86%	71%	44%
USA	**2005**	21%	29%	63%
CANADA		79%	71%	37%
USA	**2006**	26%	32%	73%
CANADA		74%	68%	27%
USA	**2007**	29%	36%	73%
CANADA		71%	64%	27%
USA	**2008**	23%	40%	60%
CANADA		77%	60%	40%
USA	**2009**	17%	43%	50%
CANADA		83%	57%	50%
USA	**2010**	22%	43%	44%
CANADA		78%	57%	56%

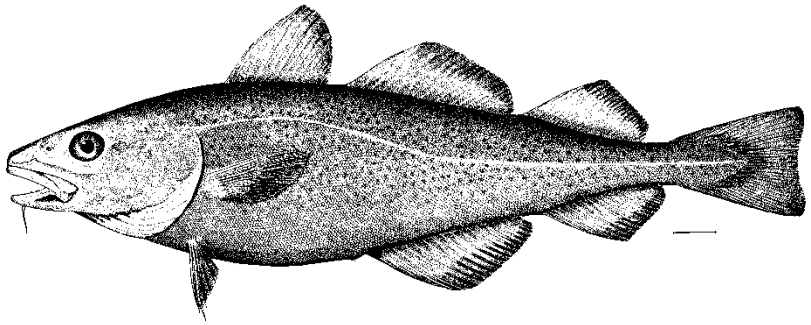
Resource Utilization and Distribution Weighting

	Fishing Year	Utilization	Distribution
USA	**2002**	40%	60%
CANADA			
USA	**2003**	40%	60%
CANADA			
USA	**2004**	40%	60%
CANADA			
USA	**2005**	35%	65%
CANADA			
USA	**2006**	30%	70%
CANADA			
USA	**2007**	25%	75%
CANADA			
USA	**2008**	20%	80%
CANADA			
USA	**2009**	15%	85%
CANADA			
USA	**2010**	10%	90%
CANADA			
USA	**2011**	10%	90%
CANADA			
USA	**2012**	10%	90%
CANADA			

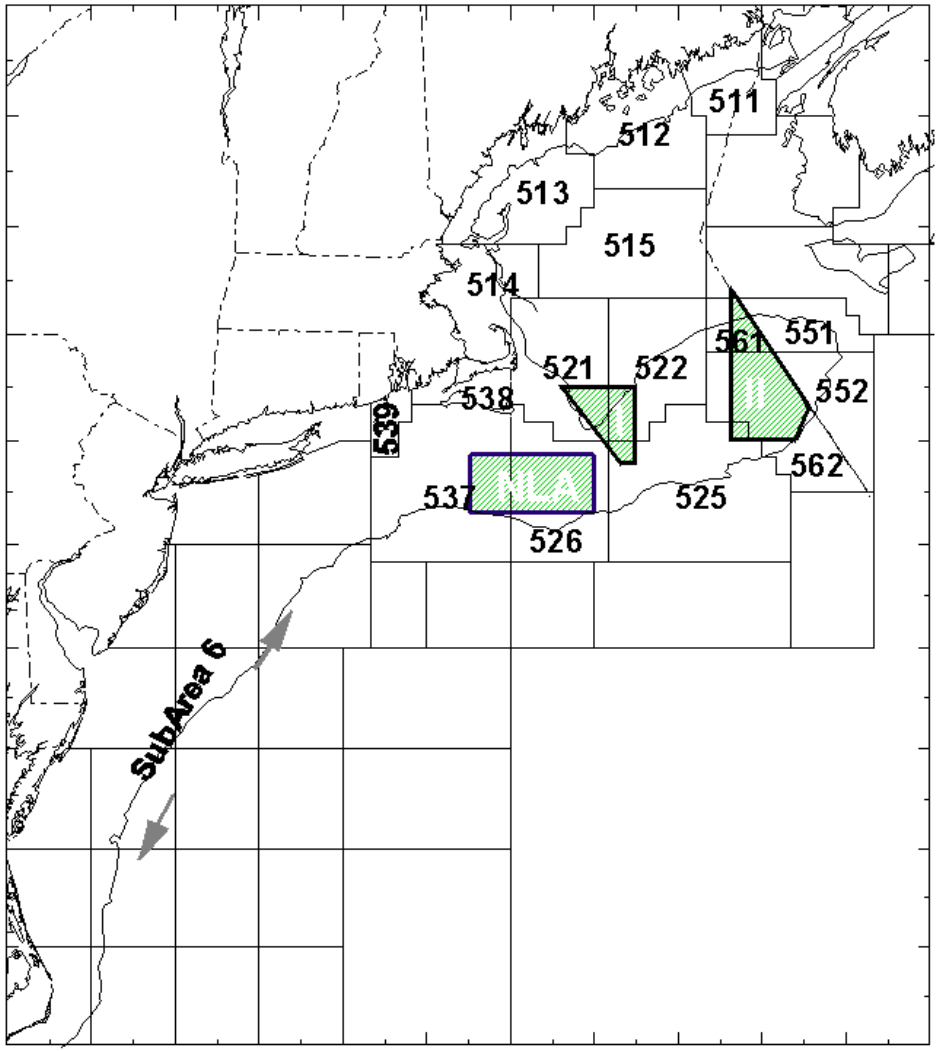
Allocation Shares

	Cod	Haddock	Ytl
USA	27%	30%	72%
CANADA	73%	70%	28%
USA	24%	28%	78%
CANADA	76%	72%	22%
USA	23%	34%	76%
CANADA	77%	66%	24%
USA	26%	33%	71%
CANADA	74%	67%	29%
USA	22%	34%	69%
CANADA	78%	66%	31%
USA	26%	33%	72%
CANADA	74%	67%	28%
USA	29%	35%	78%
CANADA	71%	65%	22%
USA	31%	37%	77%
CANADA	69%	63%	23%
USA	25%	40.5%	64%
CANADA	75%	59.5%	36%
USA	19%	43%	55%
CANADA	81%	57%	45%
USA	24%	43%	49%
CANADA	76%	57%	51%

Eastern GB Atlantic Cod
Management Unit



Management Unit

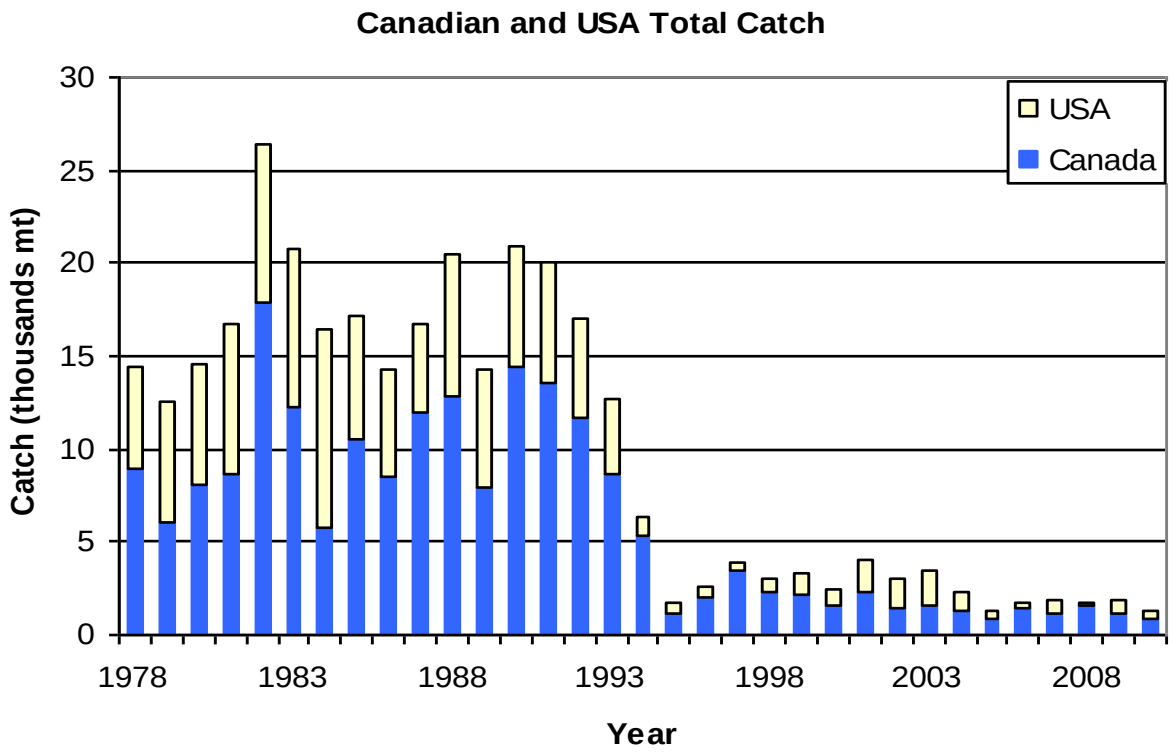


USA: SA 561,562

CA: SA 551,552

Catch

EGB Cod



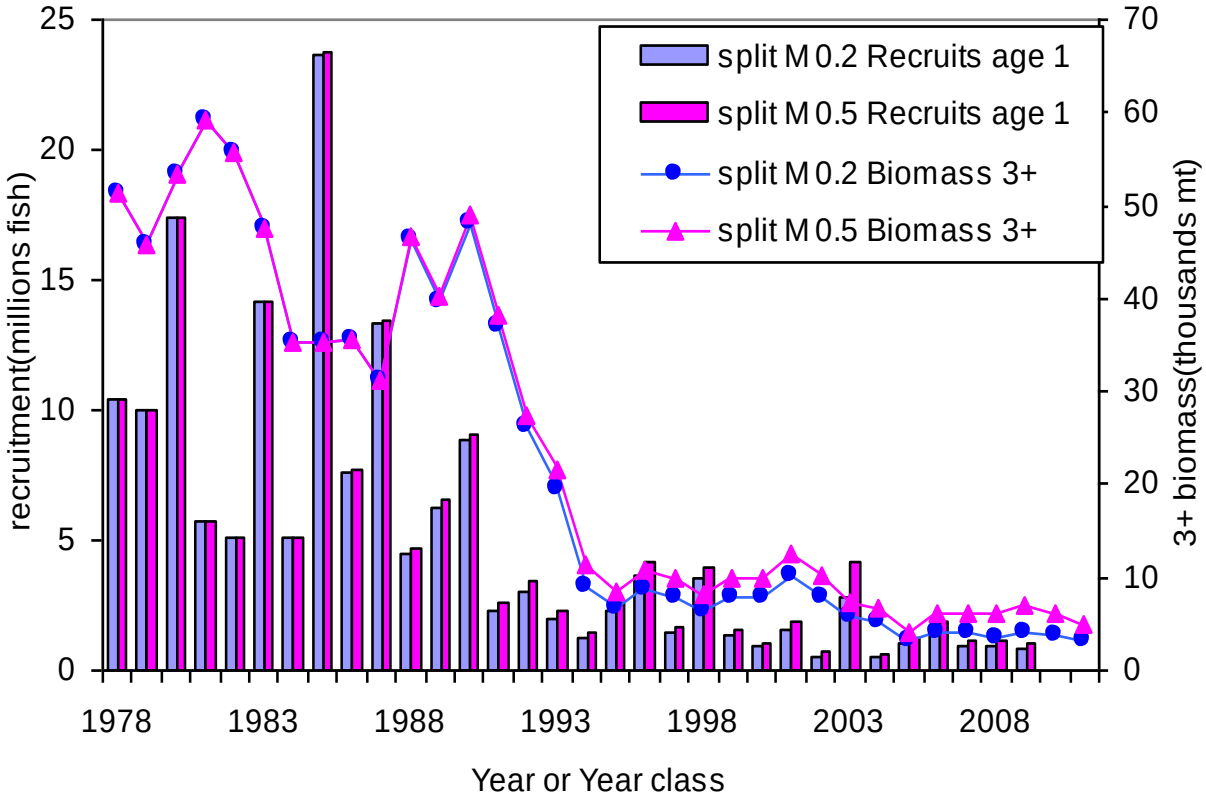
- **USA+CA 2010 total catch: 1,326 mt (CY) ; 221 mt discards**
- **USA 2010 catch 486 mt : 357 mt landings; 129 mt discards**
- **Canadian 2010 catch 840 mt: 748 mt landings; 92 mt discards**
- **US: 100% quota , CA: 83% quota**

Assessment

- **Two VPA formulations: split “M 0.2” & “M 0.5”**
- **Natural mortality (M) = 0.2 for all ages in “M 0.2” model, increased M for ages 6+ in “M 0.5” model after 1994**
- **Survey indices split in 1993-1994 for both models (change in sv catchability an alias for unknown mechanism that produces better fitting model)**
- **Benchmark: consider both model formulations until the fate of the 2003 year class has been documented , thus providing information on M.**
- **Retrospective: overestimate B, underestimate F.**

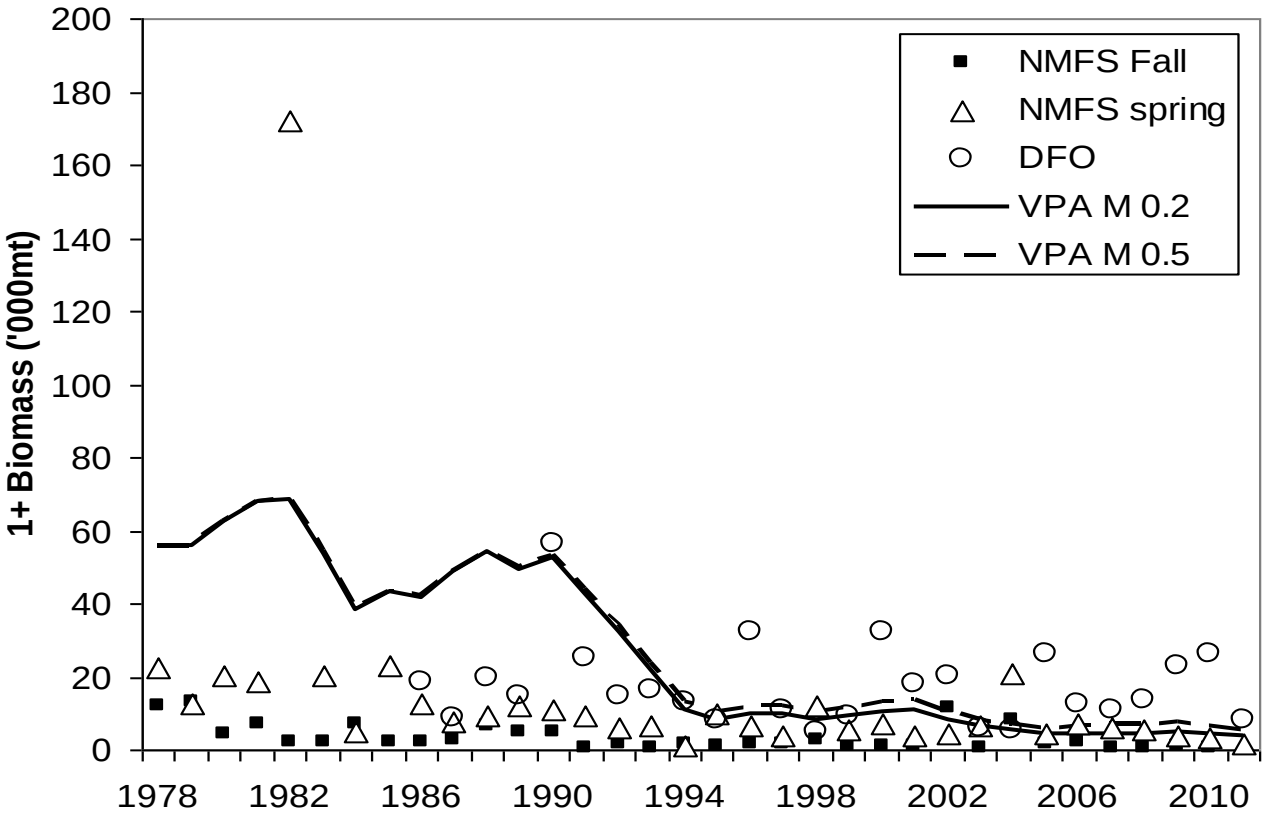
3+ Biomass (dotted lines)

EGB Cod



- **3,288 mt (split M 0.2) / 5,088 mt (split M 0.5) - 2011**
- **Increase since 2004/05 due to 2003 year class**
- **Biomass is 2nd lowest in both models**

Survey & VPA 1+ Biomass



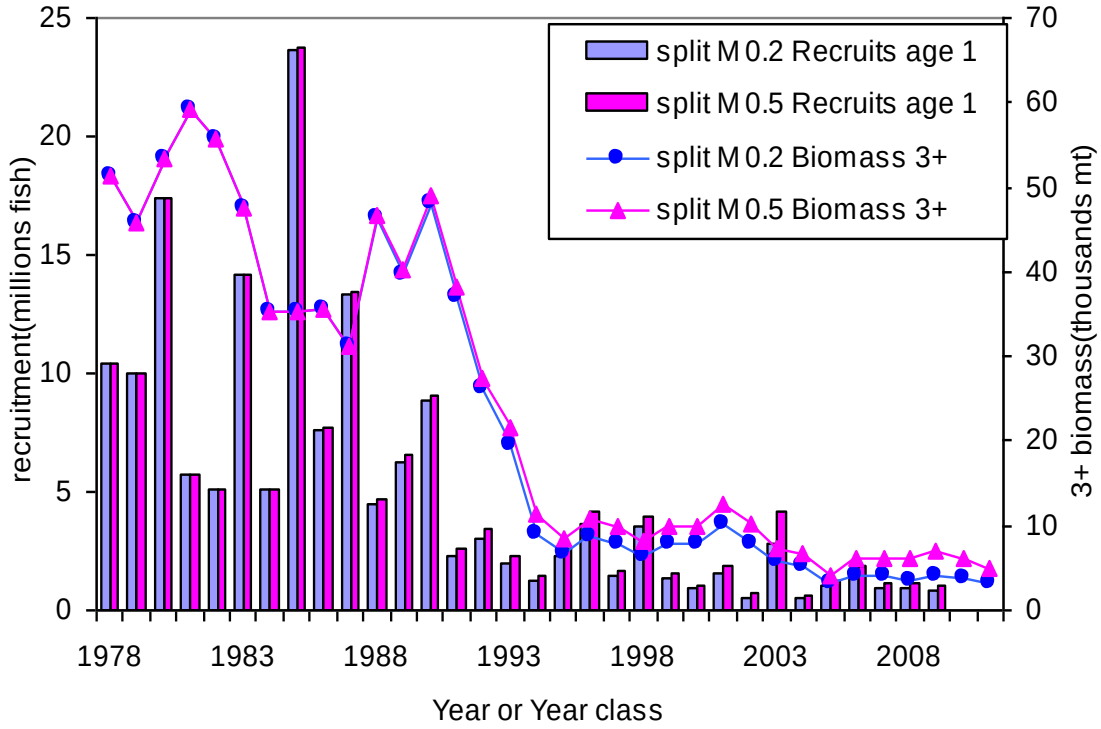
1+ popn. biomass & SV biomass indices:

- **fluctuating at low values since 1994**

EGB Cod

Recruitment

EGB Cod



M 0.2 - 2003 yc (2.8 mil.) ~ 1992 ;strongest since 1998

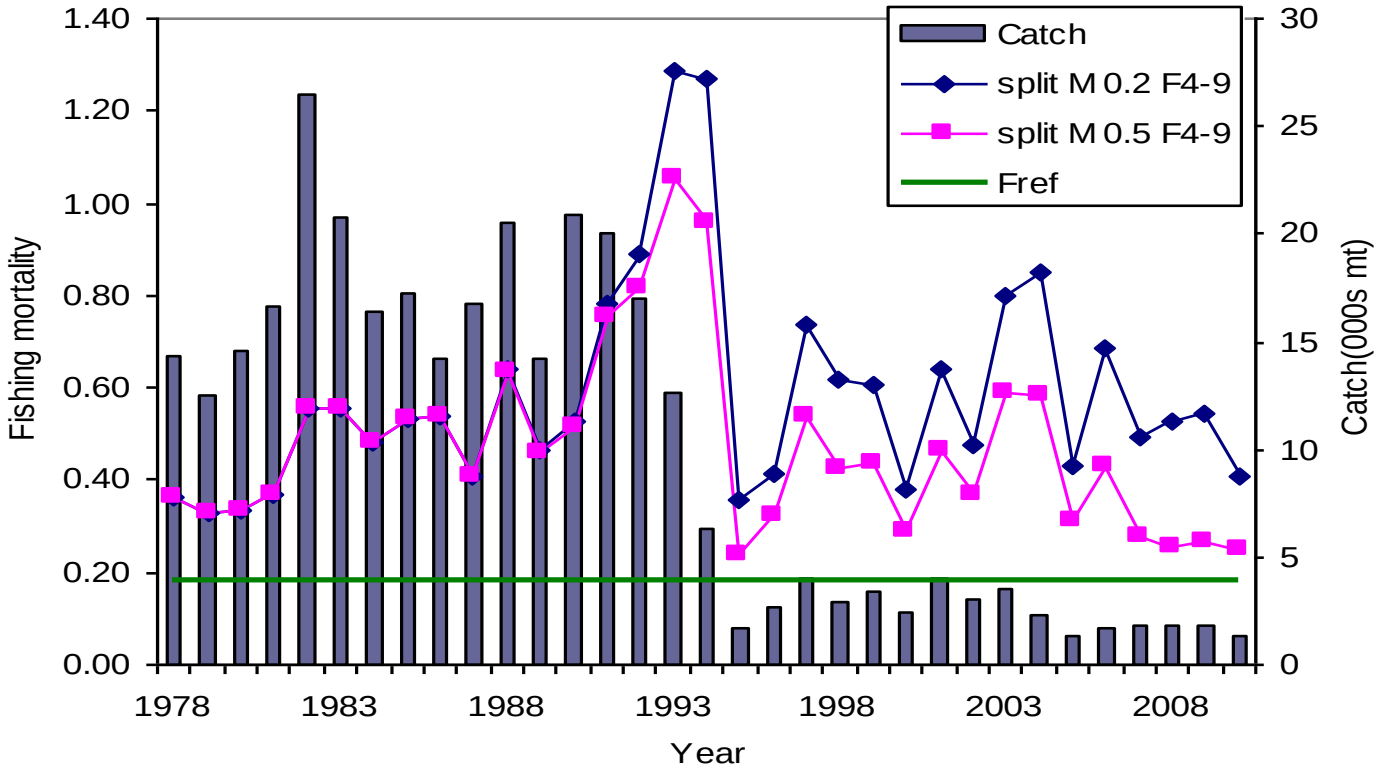
M 0.5 - 2003 yc (4.1 mil.) ~ 1996 ;strongest since 1996

2007-2008-2009 YCs (0.8 mil. – 1.2 mil. age 1 fish)

~among weakest in time series

Fishing Mortality

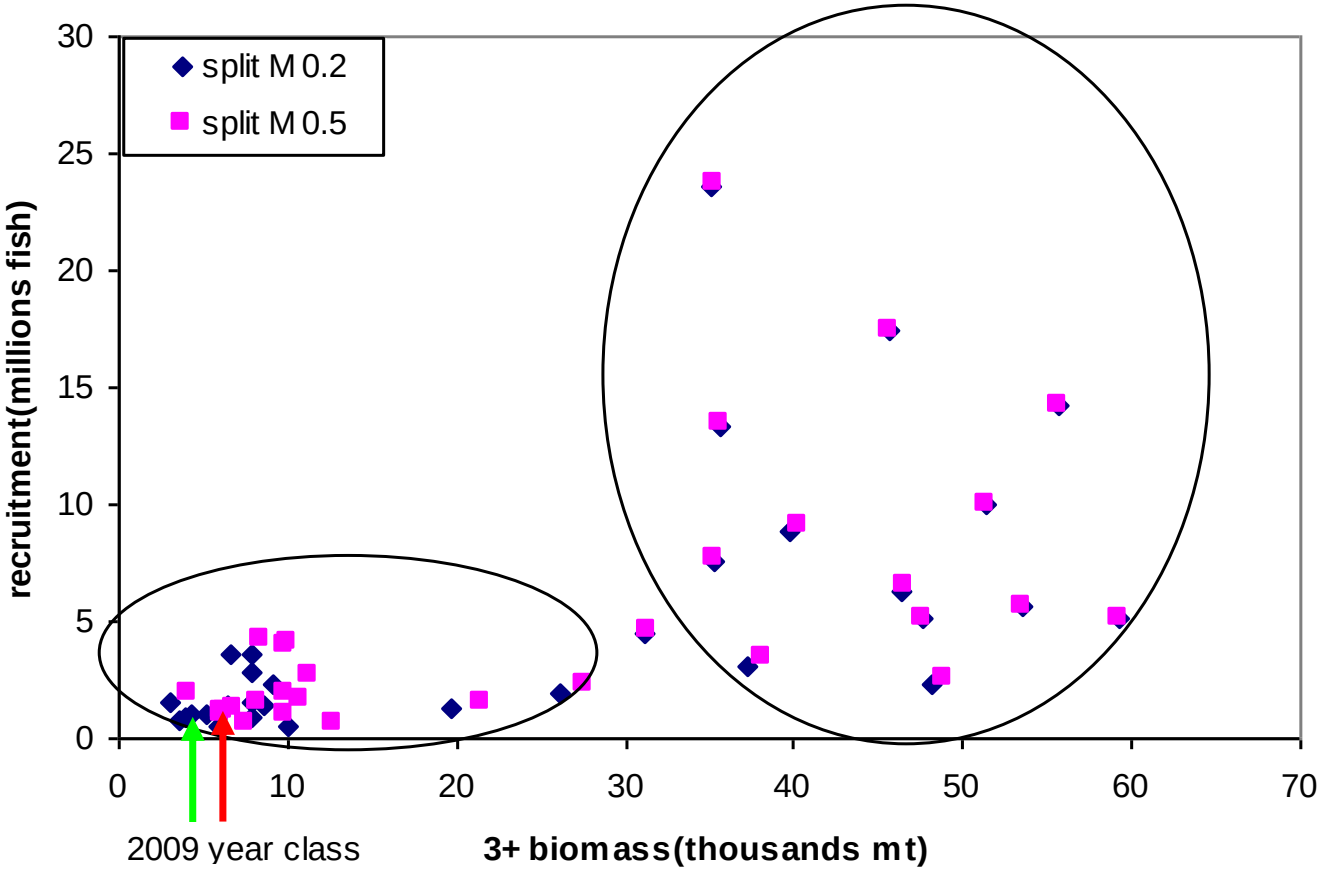
EGB Cod



- **2010 F= 0.41 (M 0.2) / 0.25 (M 0.5).**
- **Among lowest F on record ; still above F_{ref}**
- **F > F_{ref} (0.18) for entire time series**

Stock Recruitment

EGB Cod

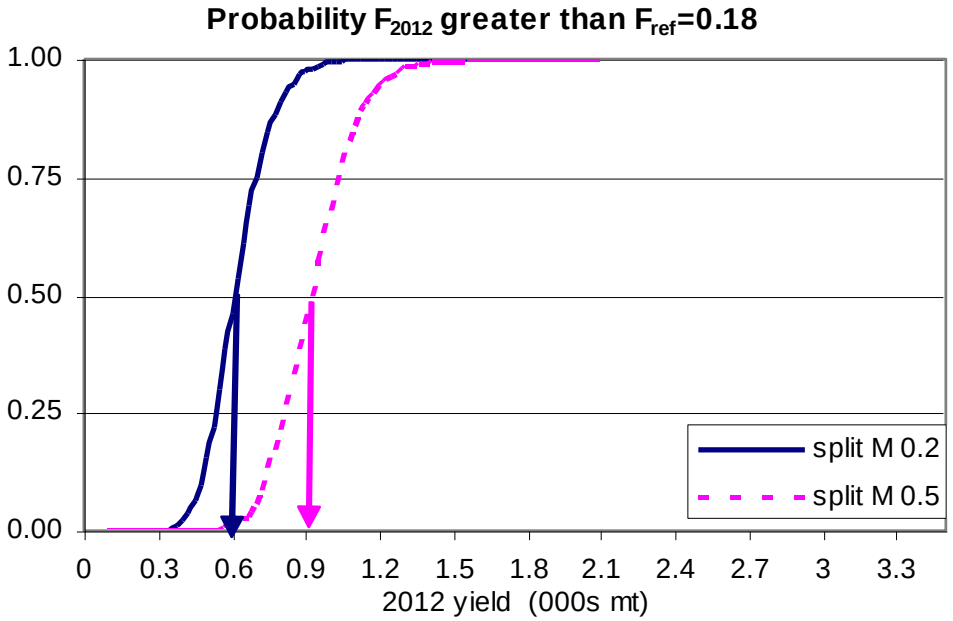


Remain at low productivity; low weights at age

Rct event more likely > 30,000 mt SSB

2012 Projection : Fref

EGB Cod



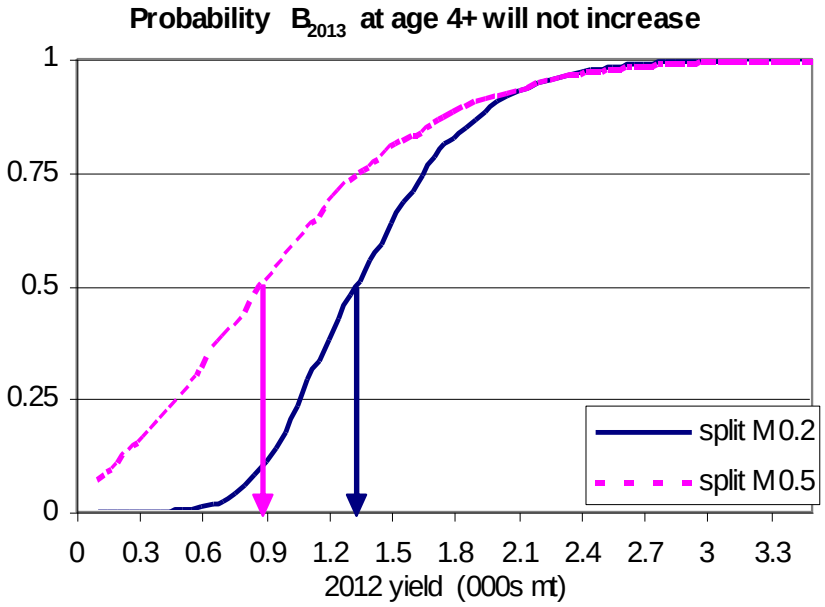
Probability of exceeding Fref in 2012	25%	50%	75%
Split M 0.2	525 mt	600 mt	700 mt
Split M 0.5	825 mt	925 mt	1,025 mt

M 0.2 model: A catch of about 600 mt in 2012 will result in a neutral risk (50%) that the fishing mortality rate in 2012 will exceed F_{ref}

Split M 0.5 model: A catch of about 925 mt in 2012 will result in a neutral risk (50%) that the fishing mortality rate in 2012 will exceed Fref

2012 Projection : Biomass

EGB Cod



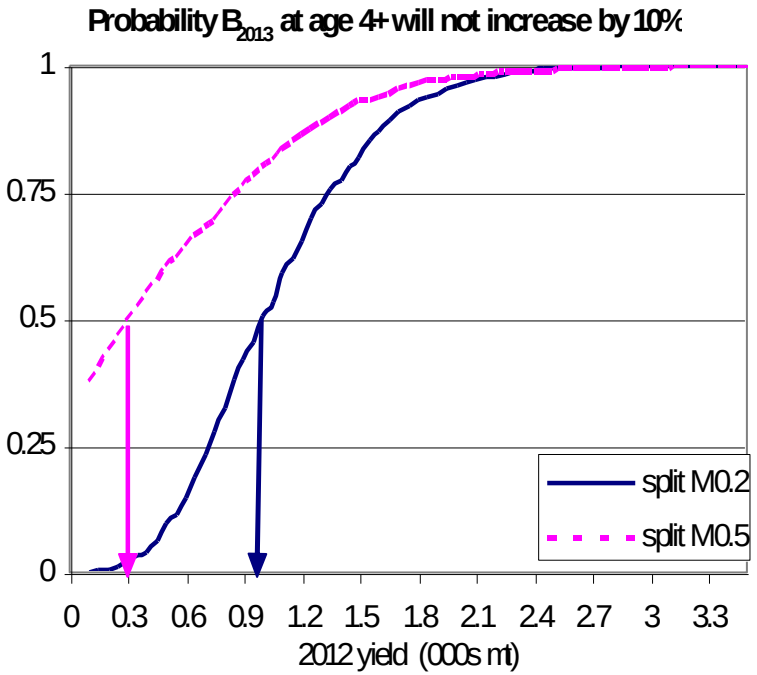
Risk that the 4+ adult biomass in 2013 will be lower than the 2012 biomass	25%	50%	75%
Split M 0.2	1,050 mt	1,350 mt	1,650 mt
Split M 0.5	500 mt	900 mt	1,350 mt

Split M 0.2: 1,350 mt catch → results in 50% risk that 4+ biomass in 2013 < 2012

Split M 0.5: 900 mt catch → results 50% risk that 4+ biomass in 2013 < 2012

2012 Projection : Biomass

EGB Cod



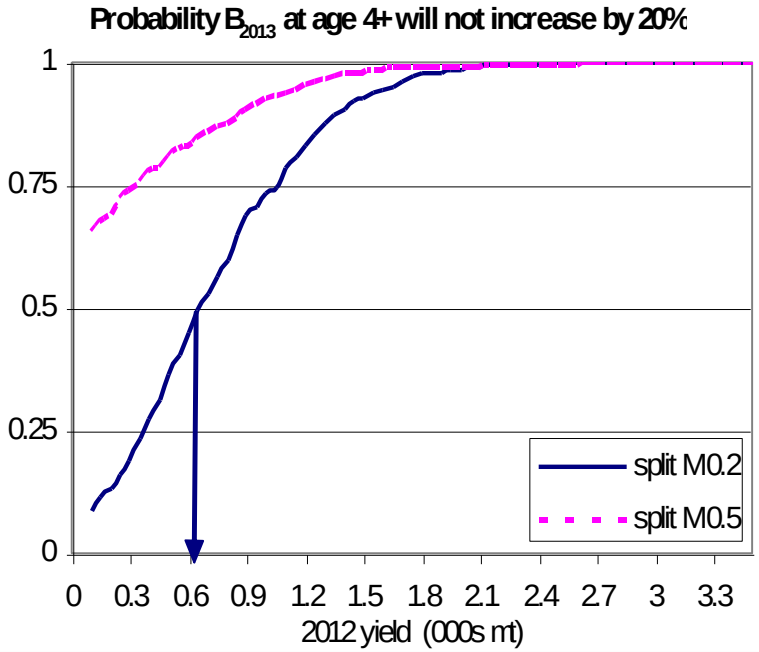
Risk that the 4+ adult biomass in 2013 will not increase by 10%	25%	50%	75%
Split M 0.2	700 mt	1,000 mt	1,350 mt
Split M 0.5	--	300 mt	850 mt

Split M 0.2: 1,000 mt catch results in 50% risk that 4+ biomass in 2013 will not increase by 10%

Split M 0.5: 300 mt catch results in 50% risk that 4+ biomass in 2013 will not increase by 10%

2012 Projection : Biomass

EGB Cod



Risk that the 4+ adult biomass in 2013 will not increase by 20%	25%	50%	75%
Split M 0.2	350 mt	650 mt	1,050 mt
Split M 0.5	--	--	350 mt

Split M 0.2: 650 mt catch results in 50% risk that 4+ biomass in 2013 will not increase by 20%

Split M 0.5: No amount of catch results in 50% risk that 4+ biomass in 2013 will not increase by 20%

2011 Projection

EGB Cod

	Split M 0.2			Split M 0.5		
	25%	50%	75%	25%	50%	75%
Probability of exceeding Fref in 2012	525 mt	600 mt	700 mt	825 mt	925 mt	1,025 mt
Risk that the 4+ adult biomass in 2013 will be lower than the 2012 biomass	1,050 mt	1,350 mt	1,650 mt	500 mt	900 mt	1,350 mt
Risk that the 4+ adult biomass in 2013 will not increase by 10%	700 mt	1,000 mt	1,350 mt	--	300 mt	850 mt
Risk that the 4+ adult biomass in 2013 will not increase by 20%	350 mt	650 mt	1,050 mt	--	--	350 mt

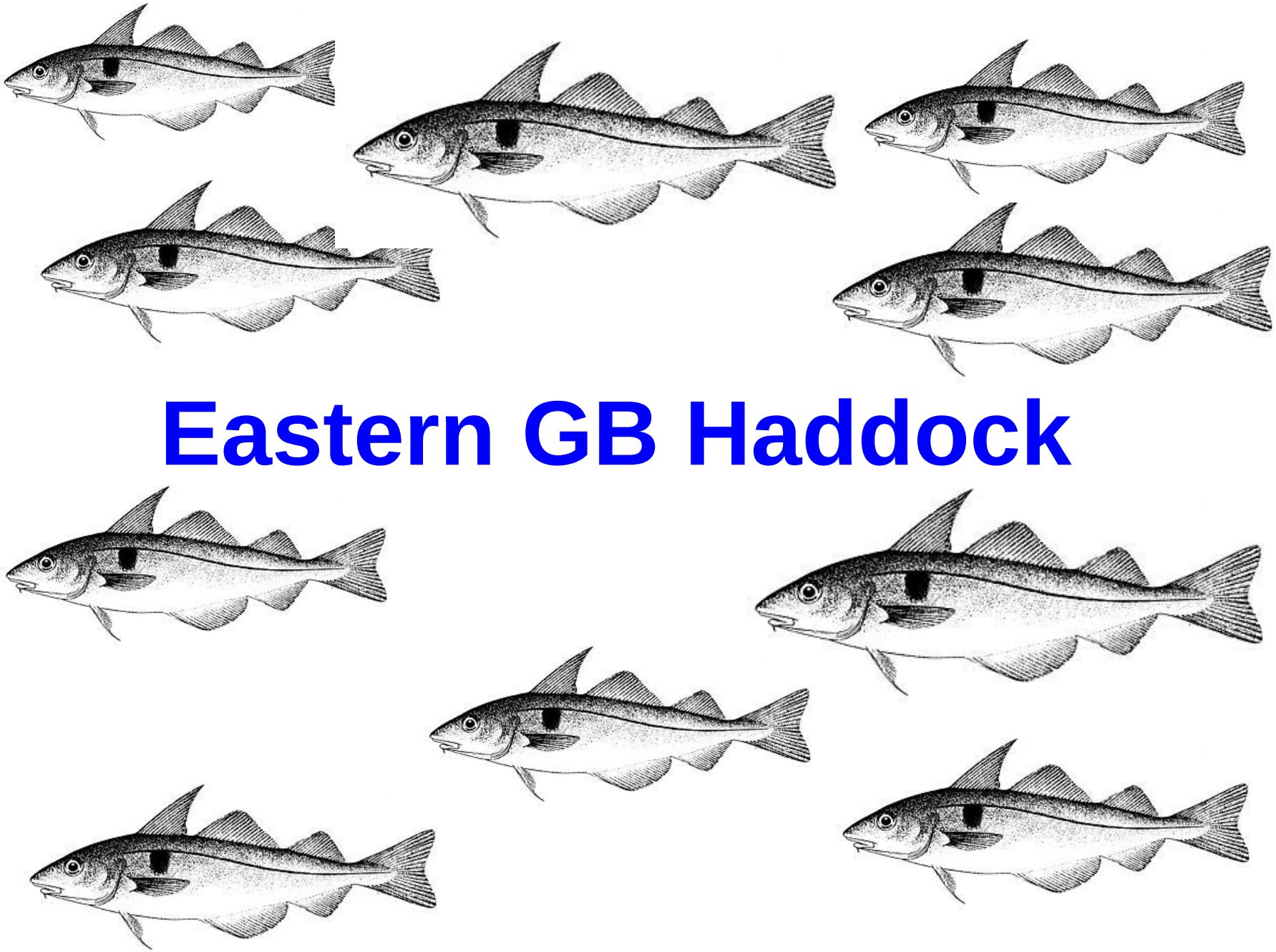
Catch advice should be lower than shown:

- The retrospective bias is not taken into account in these projections

- The split series introduces a change in survey catchability, which is an alias for a mechanism that is not understood - adds uncertainty to the model results.

Summary

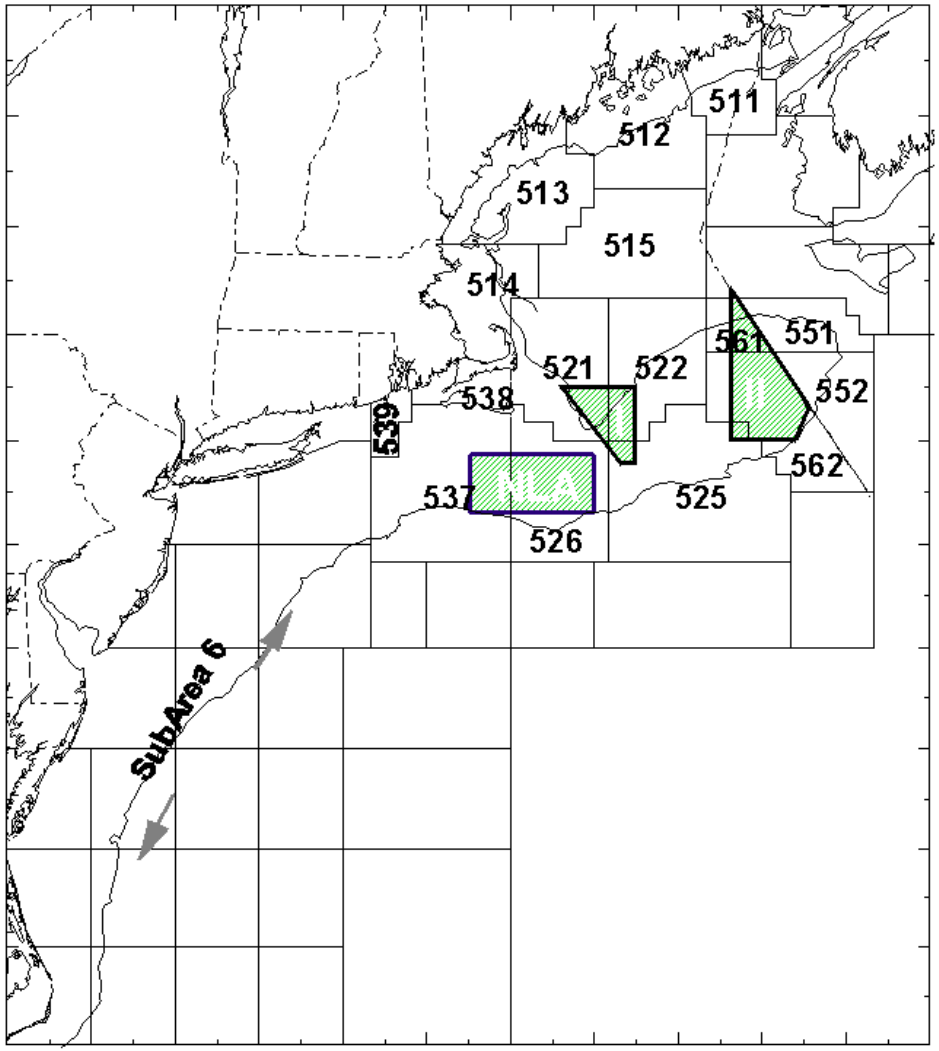
- F reduced but still above F_{ref} ; retrospective bias
- Recent recruitment among poorest
- Low numbers: 7+ fish; Reduced weights at age
- 2nd lowest biomass ; Fishing below Fref will maintain a higher biomass
- Unable to benefit from 2003 YC : F > Fref
- Rebuilding: not w/o improved recruitment and F<Fref
- 2 models equally viable & both should be considered
- Catch advice should be lower than shown:retrospective bias not taken into account in projections



Eastern GB Haddock

Management Unit

EGB Haddock

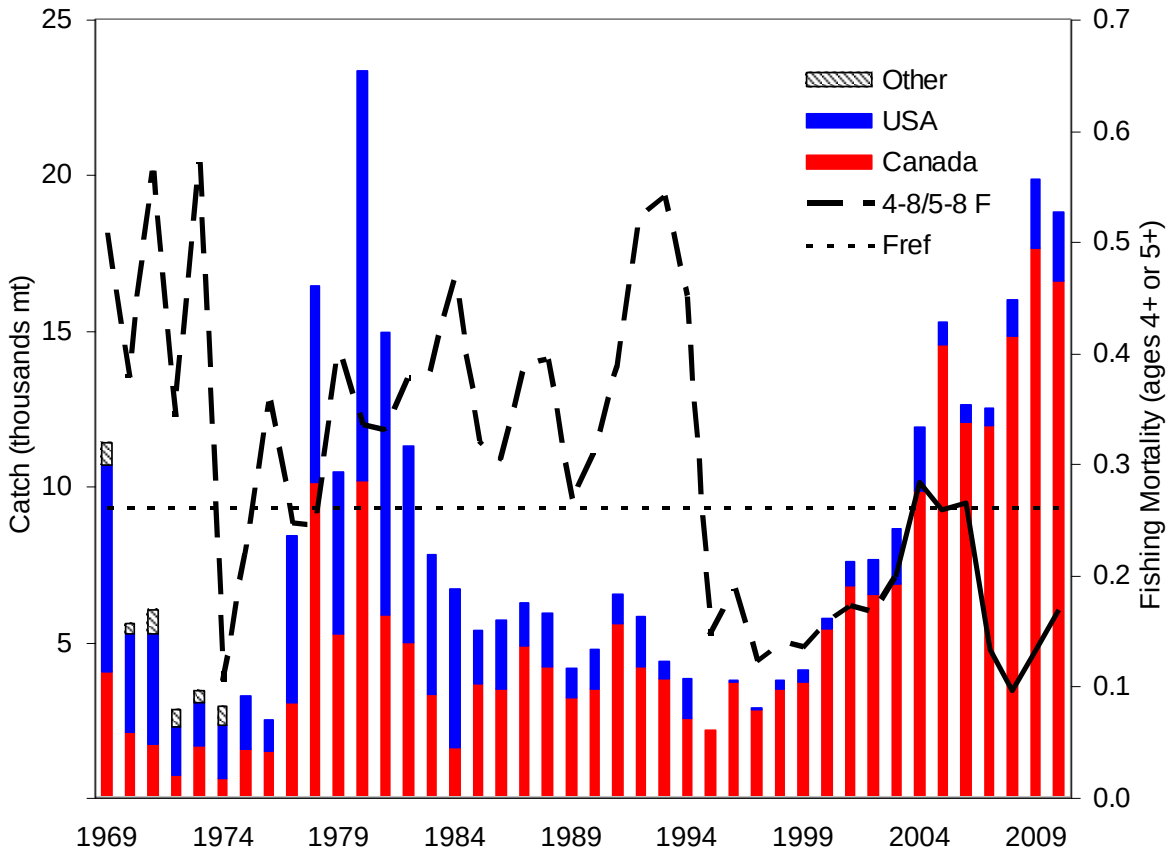


USA: SA 561,562

CA: SA 551,552

Catch

EGB Haddock



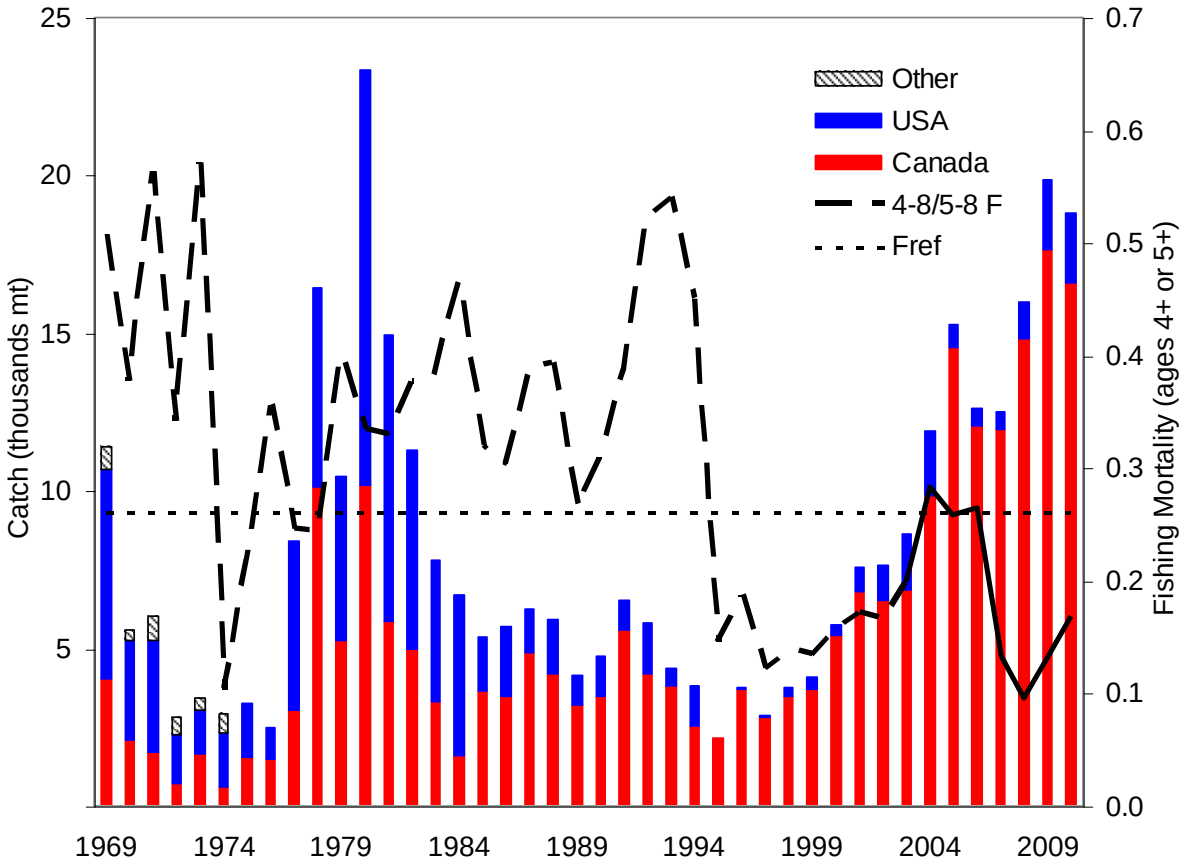
CY: Total 2010 catch: 18,794 mt

US: 2,201 mt ; Canada: 16,592 mt

FY: Quota taken: US ~ 15%, CA ~ 94%

Fishing Mortality

EGB Haddock

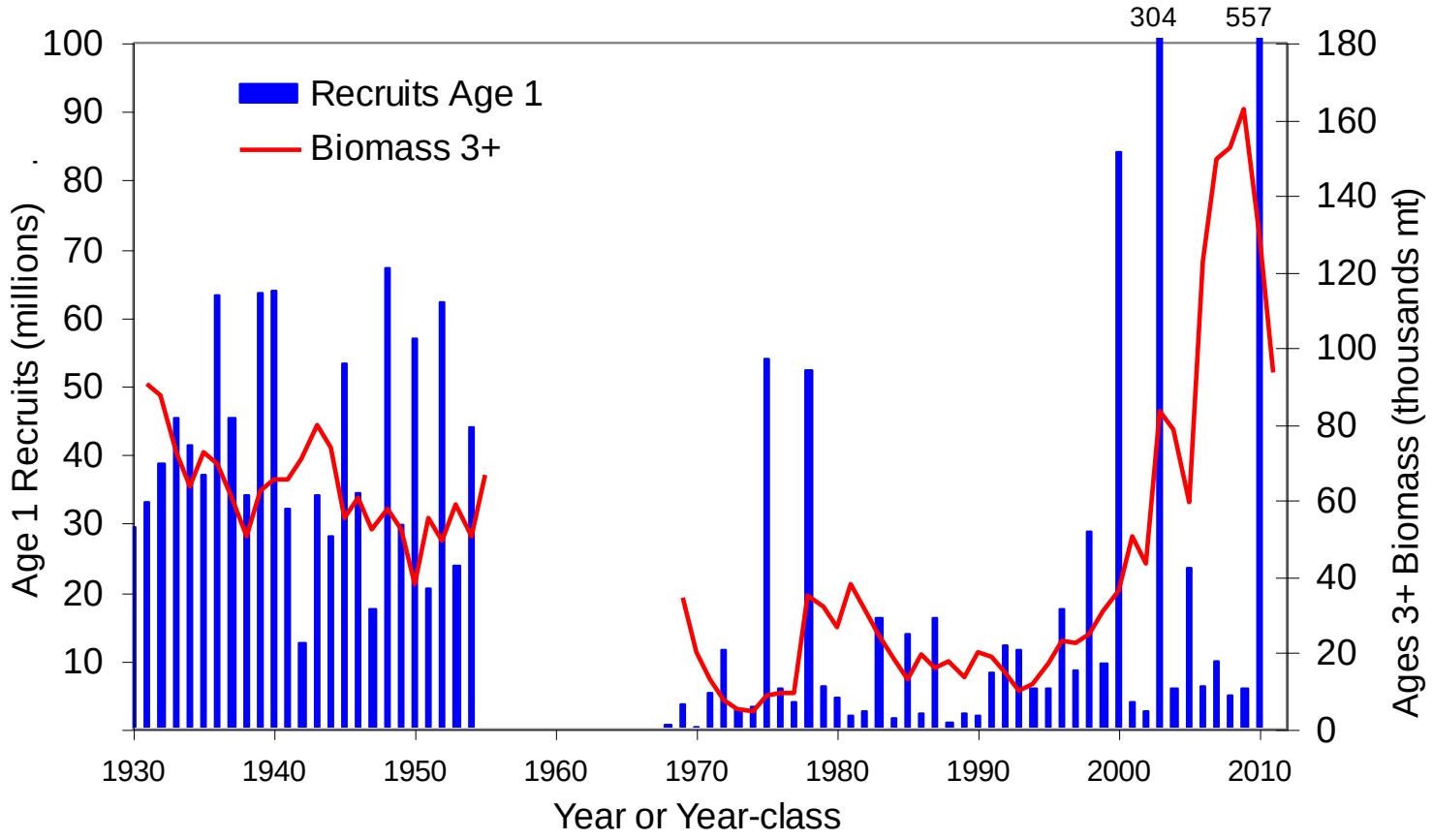


2010 F = 0.15 , below or near Fref since 1995

F now estimated as average of ages 5-8

Biomass

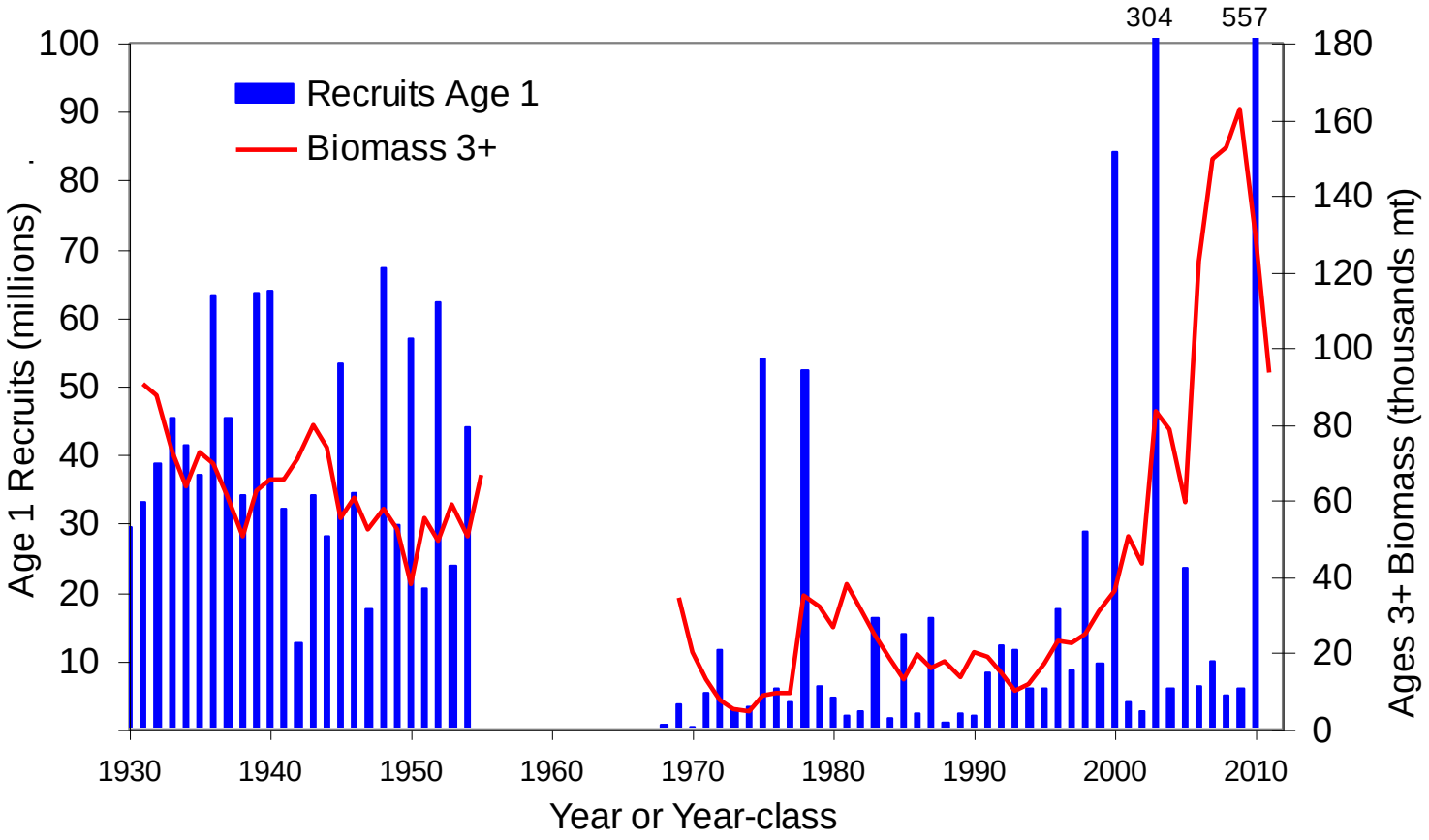
EGB Haddock



- 2010 biomass: 93,400 mt
- 2009 record high 162,800 mt

Recruitment

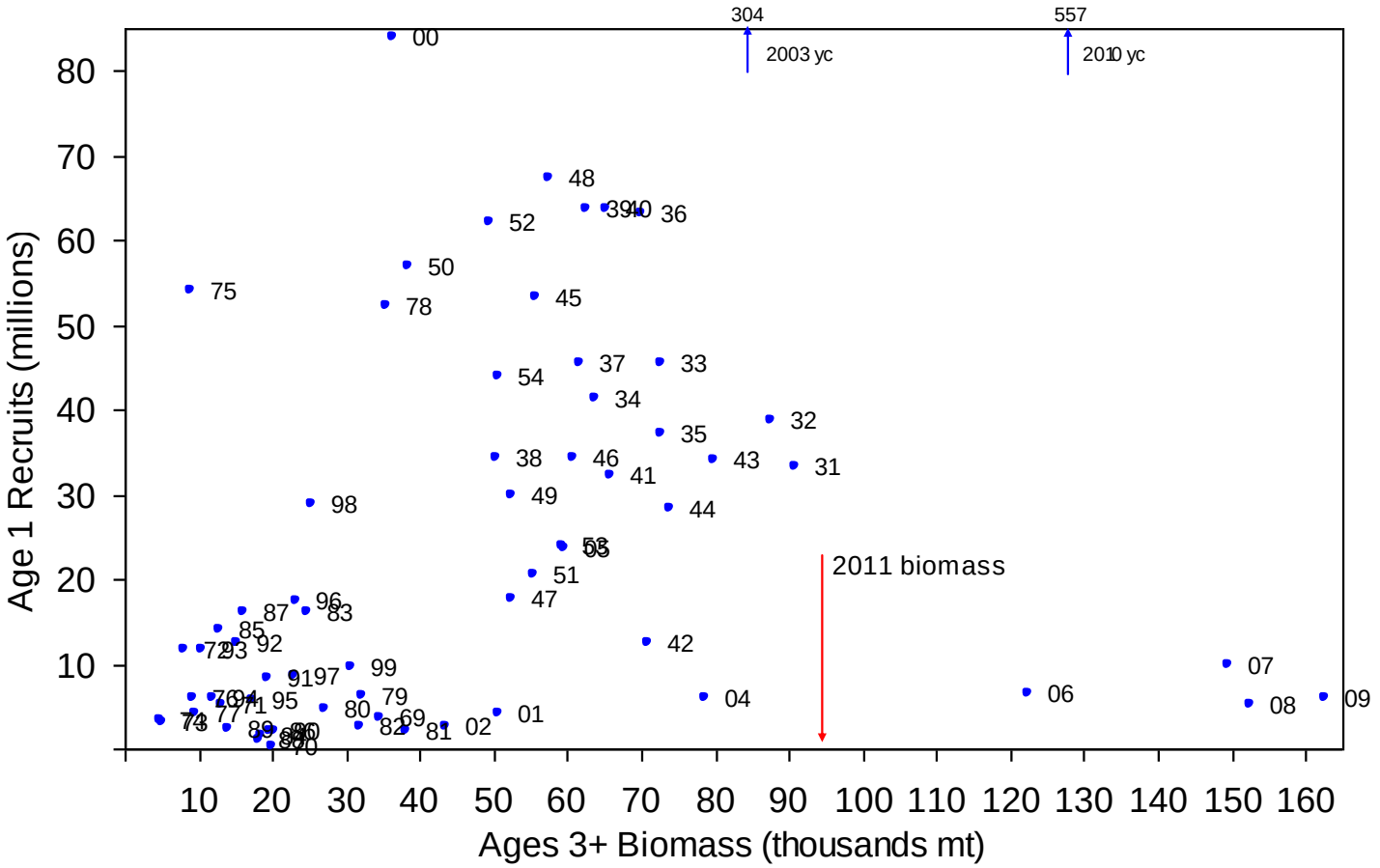
EGB Haddock



- Preliminary est. 2010 YC ~ 557 mil.
- Rct.~ 9.0 mil. since 1990,w/o ‘00,’03,’10

Stock/Recruitment

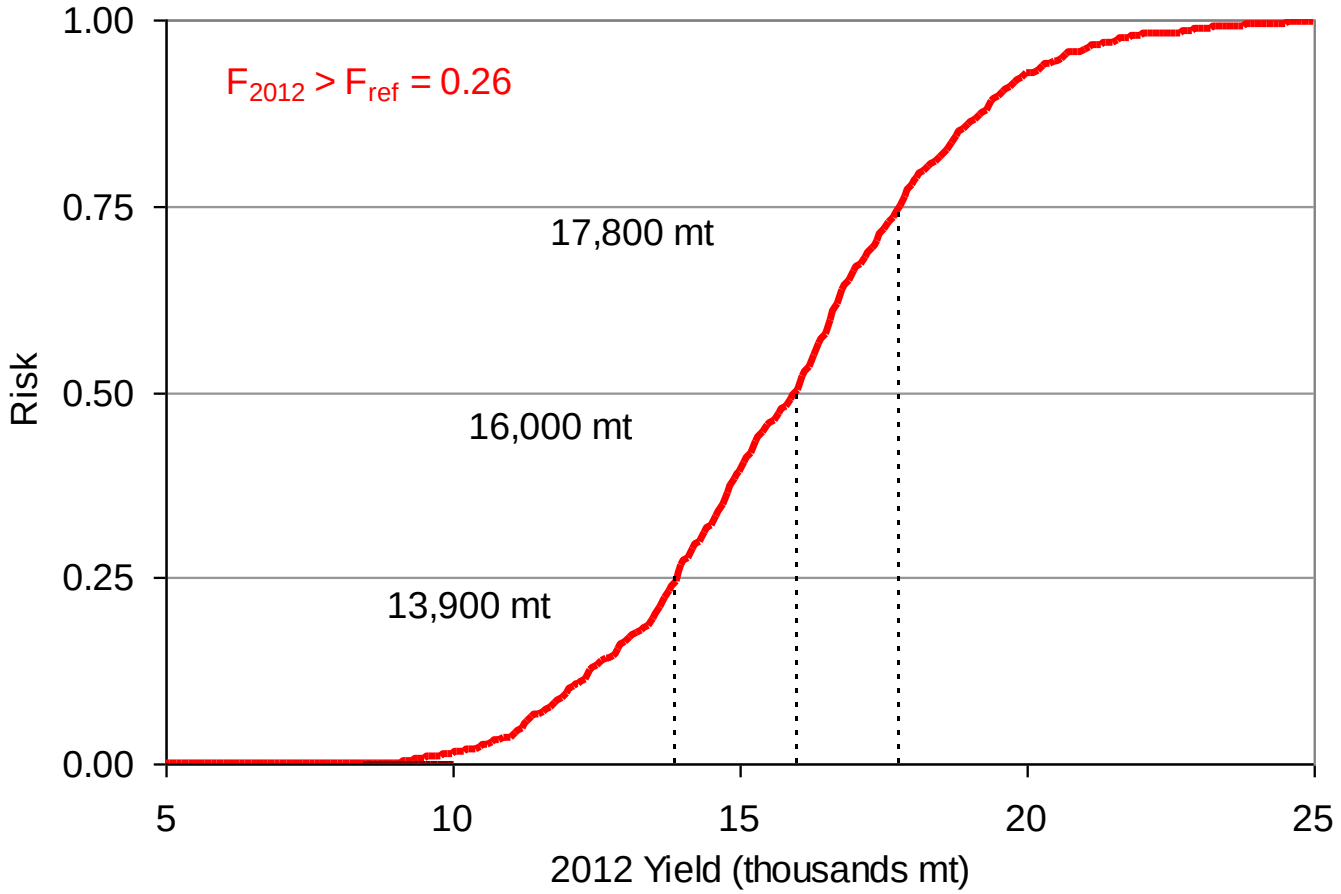
EGB Haddock



- Higher recruitment SSB > 40,000 mt

Projection

EGB Haddock

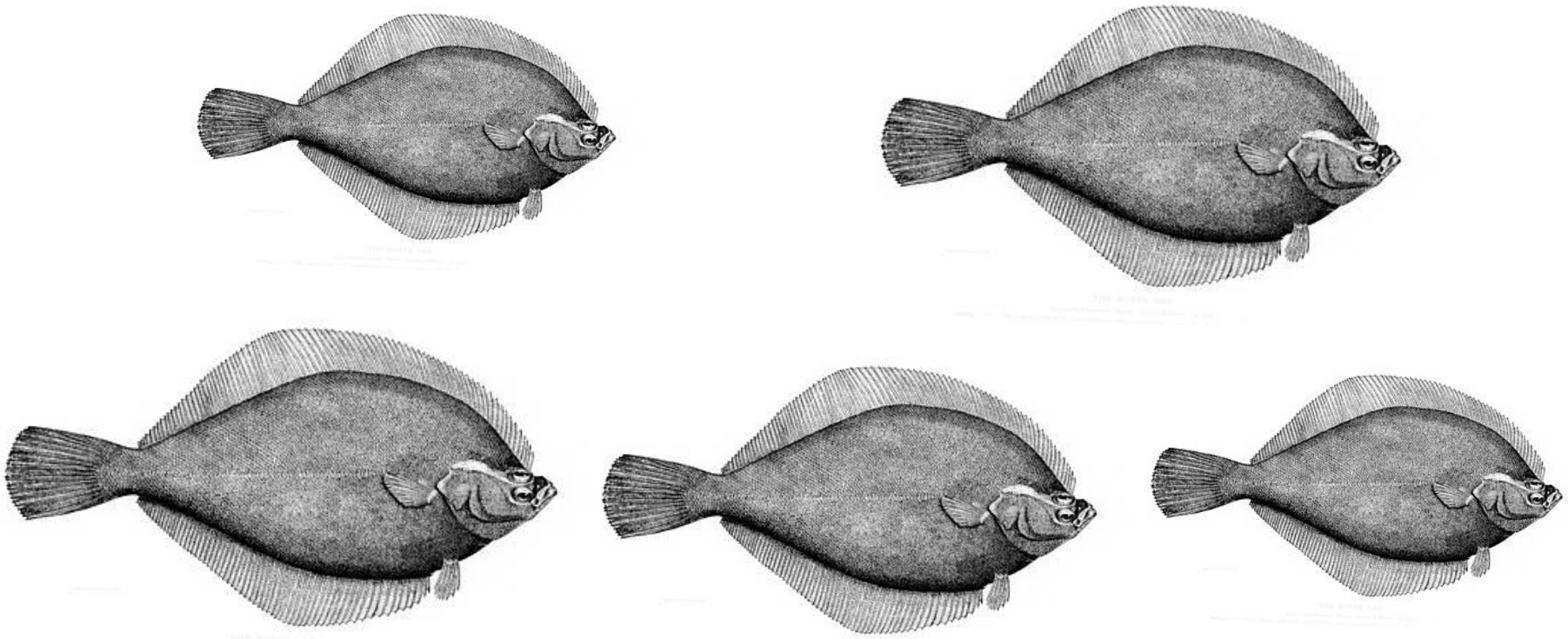


- 2012 catch of 16,000 mt → 50% risk F > F_{ref}
- No biomass decline from 2012 to 2013 (2010 YC)

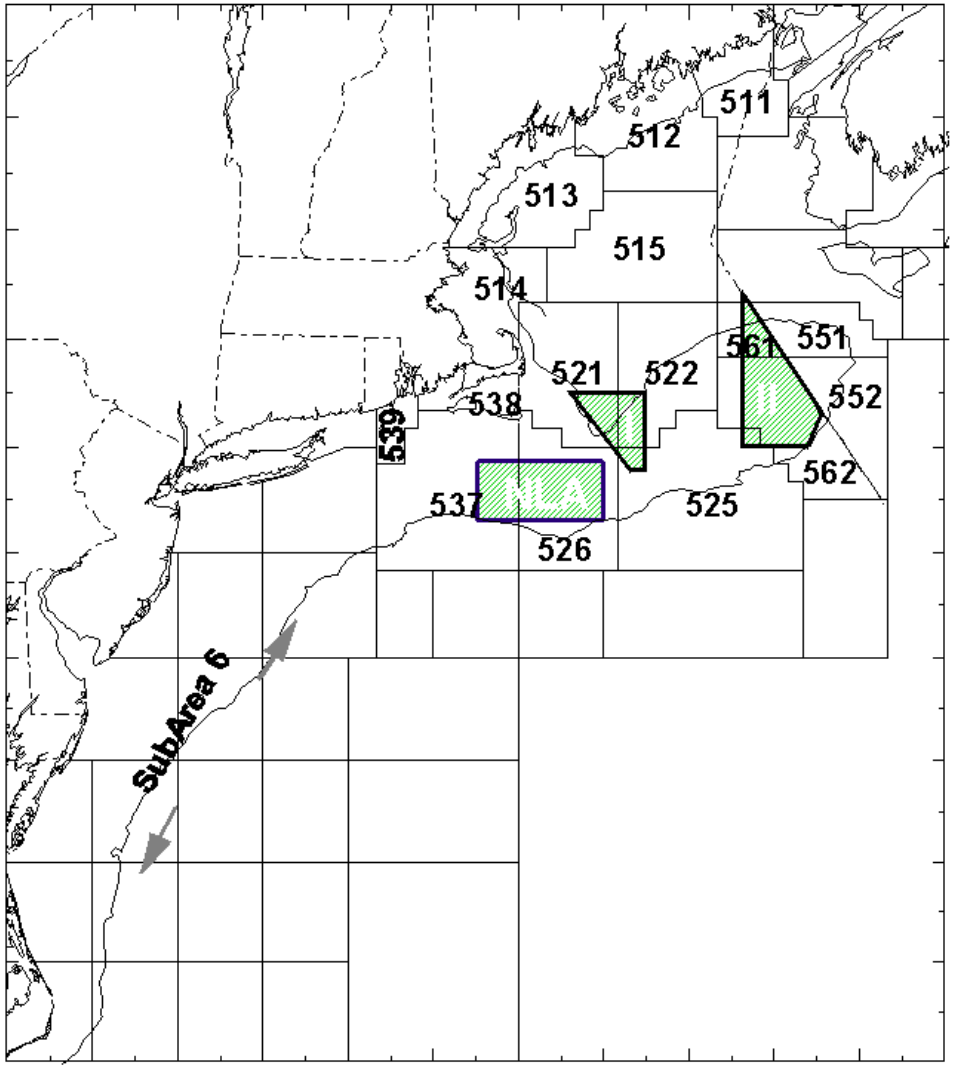
Summary

- **F =0.15 in 2010 ; F below F_{ref} (0.26) since 2007**
- **2010 YC exceptional: preliminary est. ~ 557 M**
- **Except for the 2000,2003,2010 YCs, recruitment has averaged 9 million fish at age 1 since 1990**
- **Biomass will decline in 2012 but expected to increase in 2013 as 2010 YC enters fishery**
- **Fishing up to F_{ref} does not pose conservation concerns for haddock in near future**

GB Yellowtail Flounder



Georges Bank Yellowtail flounder

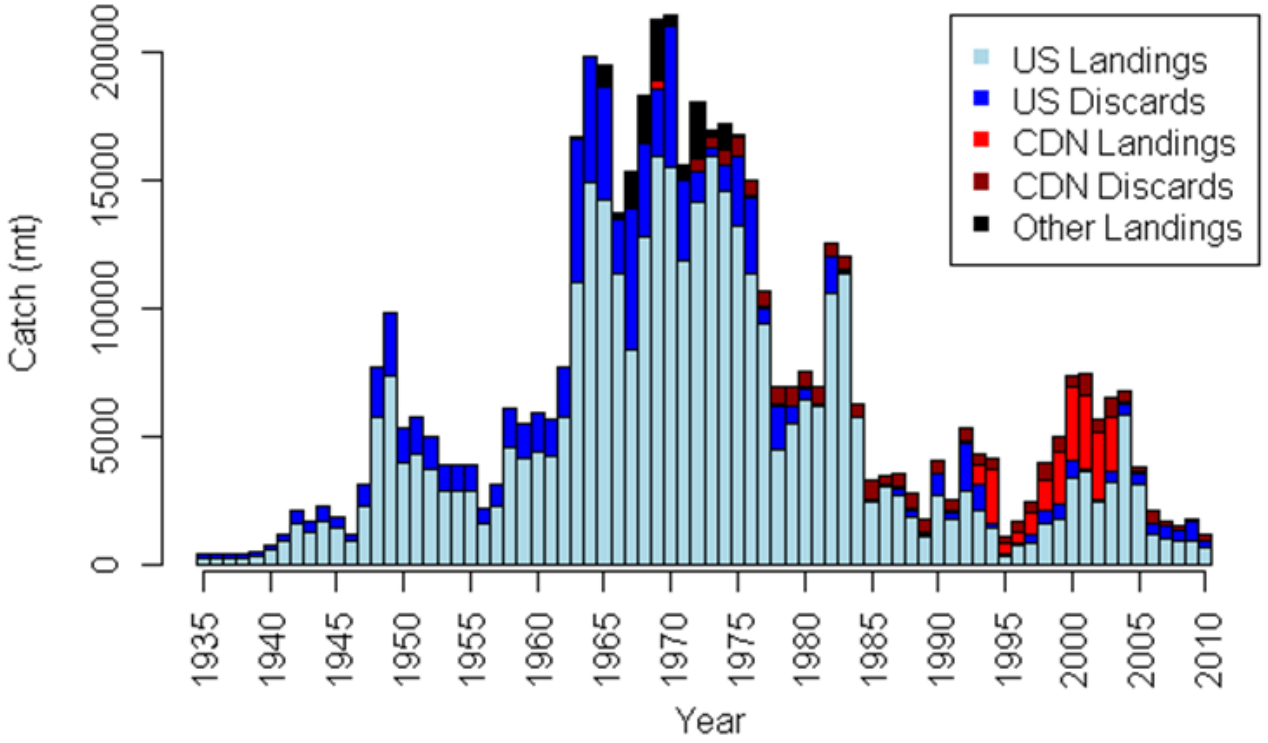


US catches:
SA 522,525,
561,562

CA catches:
551,552

Catch

GB YTF

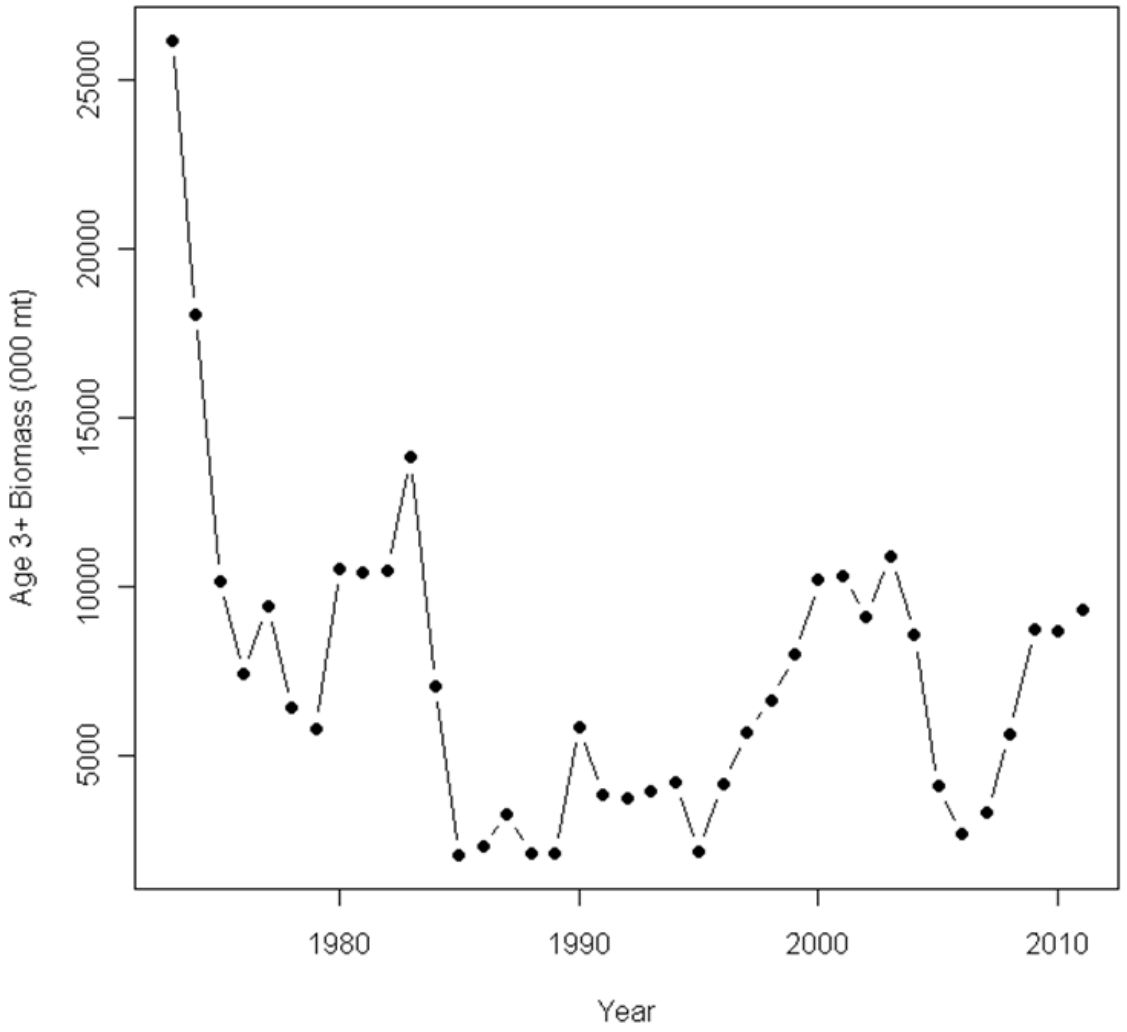


- **2010 USA + CA catch :1,160 mt ; discards 42% of catch**
- **Decline 36% from 1,806 mt in 2009**

- **US catch: 943 mt (654 mt landings, 289 mt discards)**
- **CA catch: 217 mt (17 mt landings; 200 mt discards)**

3+ Biomass

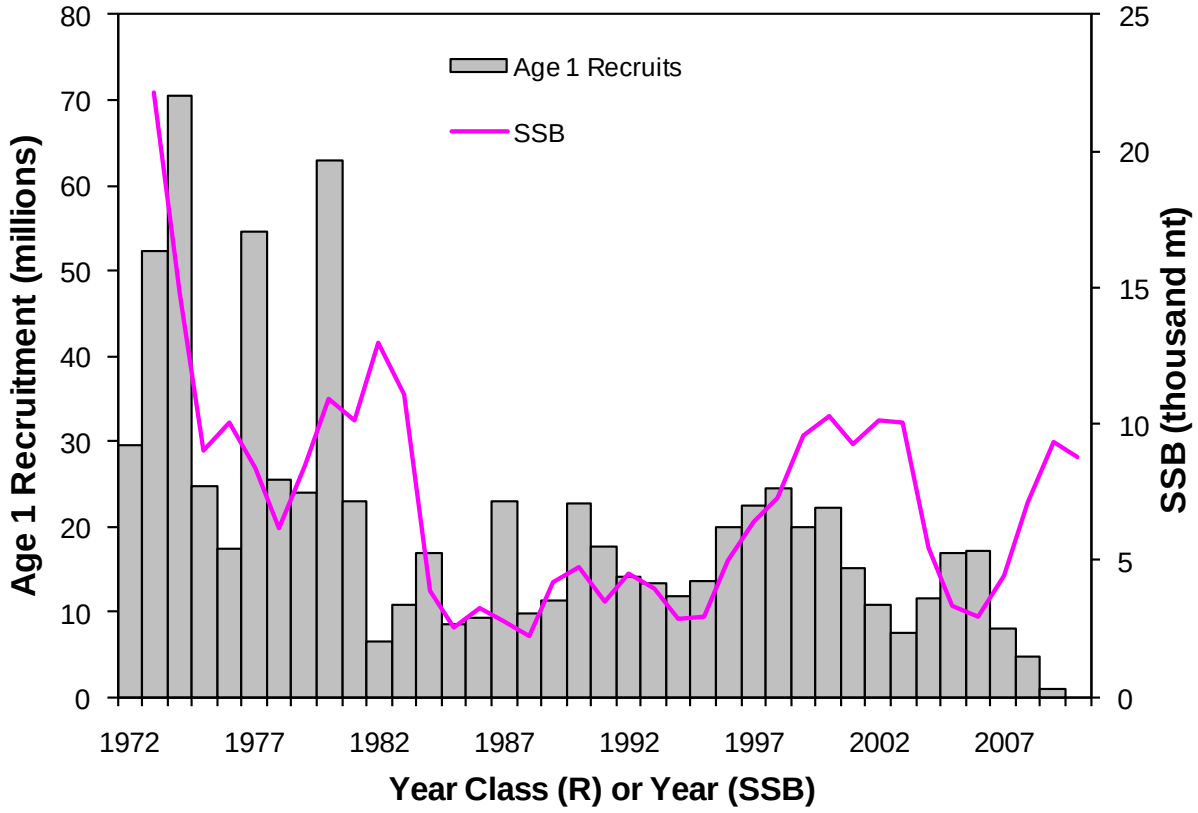
GB YTF



- **1995: 2,100 mt**
- **2003: 10,900 mt**
- **2006: 2,700 mt**
- **2011: 9,300 mt**

SSB and Recruitment

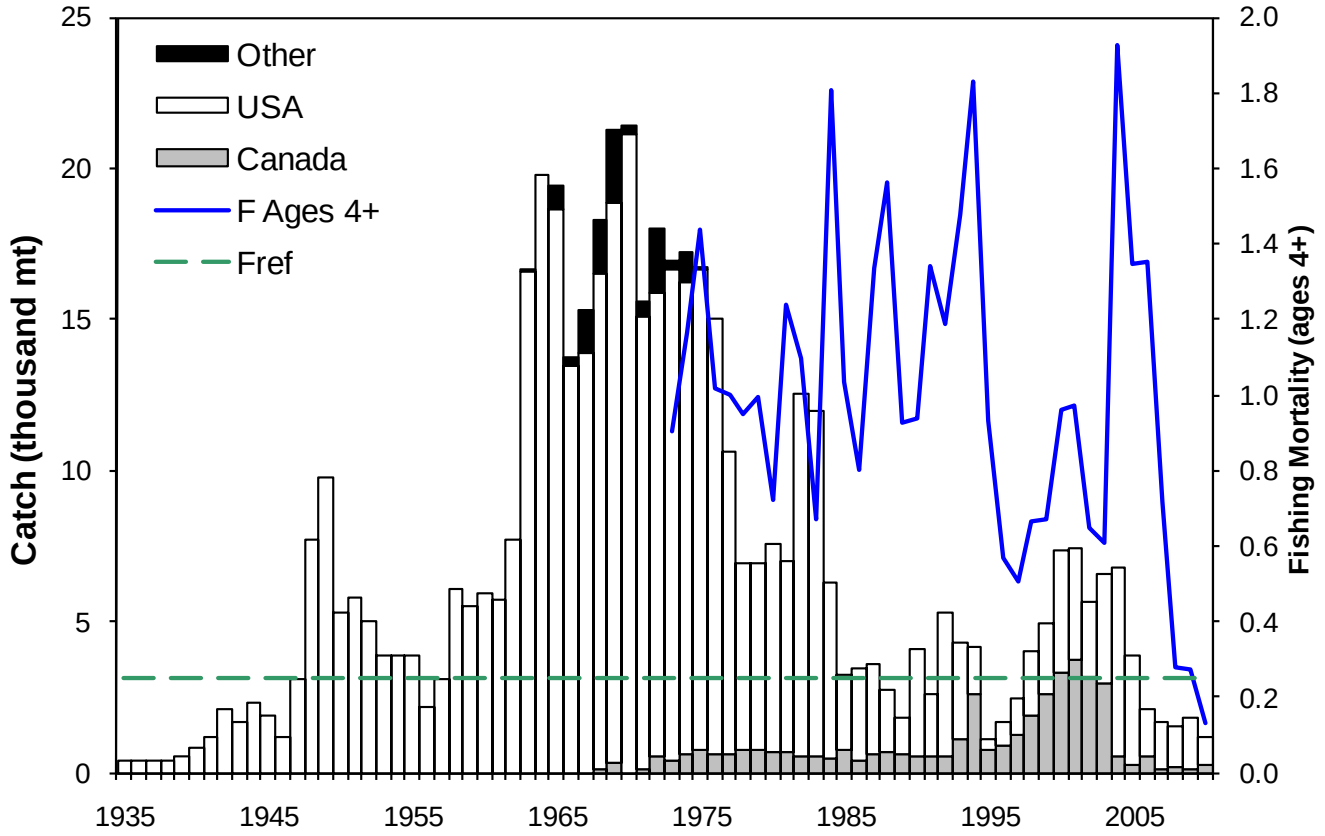
2010 SSB ~ 8,800 mt



- 1998-2001 avg. recruit. ~ 22.2 million age 1
- 2005 YC ~16.8 mil. & 2006 YC ~17.2 mil.
- 2007-2008 YCs : 8.0-5.0 mil.
- 2009 poorest ~0.9 mil.

Fishing mortality

GB YTF



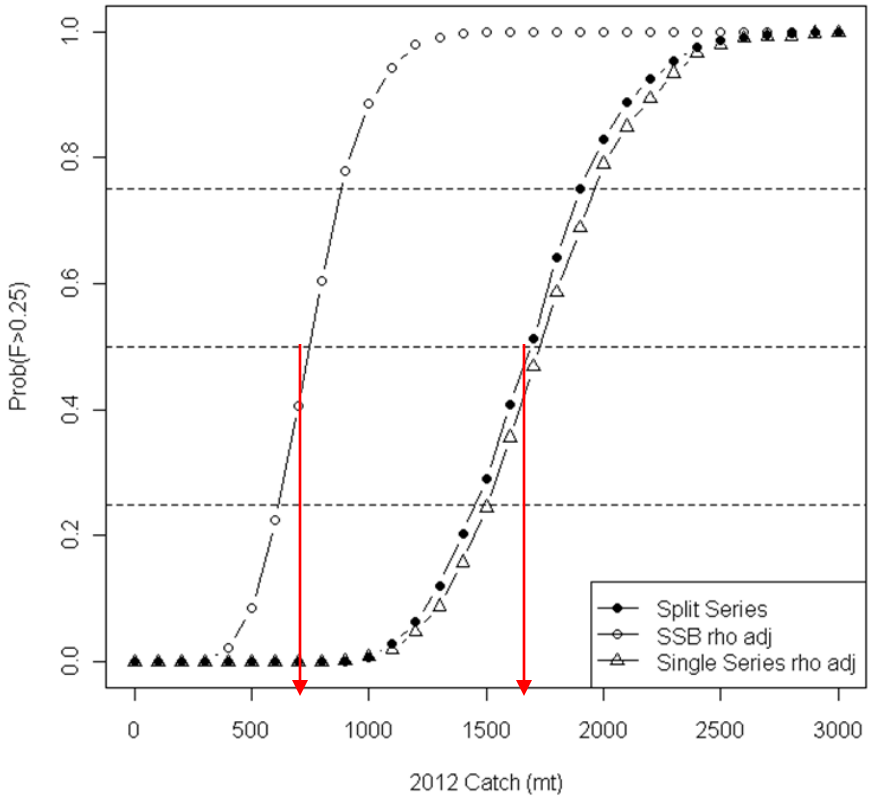
F > Fref (0.25) during 1973-2009

2010 F= 0.13 < Fref

Projection Risks & 2012 TAC

GB YTF

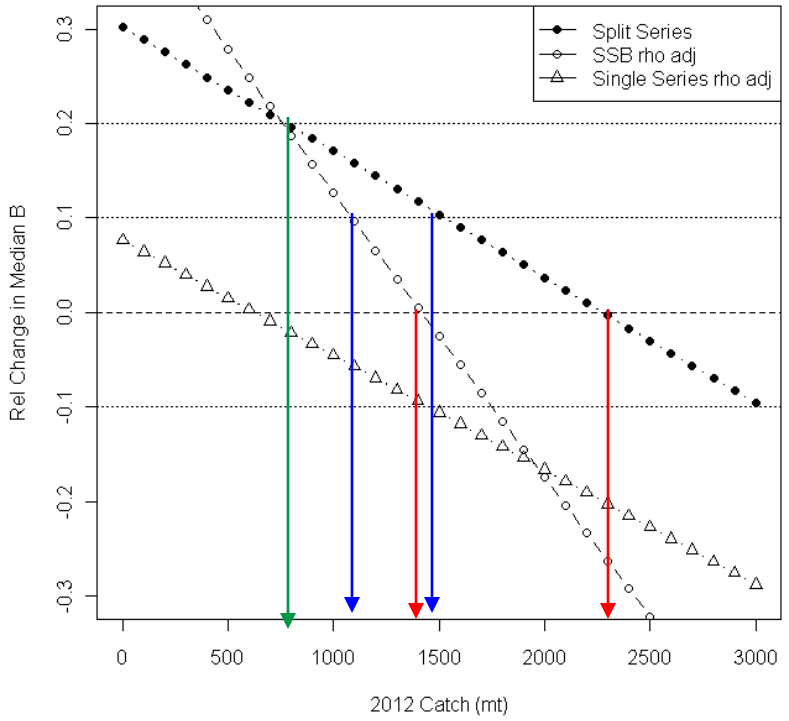
Probability of exceeding F_{ref}	25%	50%	75%
Split Series	1,400	1,700	1,900
Split Series rho adjusted	600	750	900
Single Series rho adjusted	1,400	1,700	1,900



Retrospective bias: overestimate biomass

Relative change in median biomass 2012 to 2013

2012 Catch (mt)	Split Series	Split Series rho adjusted	Single Series rho adjusted
600	+22%	+25%	0%
750	+20%	+20%	-2%
900	+18%	+16%	-3%
1,400	+12%	+1%	-9%
1,700	+8%	-8%	-13%
1,900	+5%	-14%	-15%



Split : 2012 catch of 2300 mt
= no change in B in 2013

Rho adj: 2012 catch: 1400 mt
= 1% inc. in B in 2013

GB YTF

USA rebuilding scenario for yellowtail fld.

- Calculate fishing mortality which results in a 50% probability of reaching 43,200 mt (Table 24 – assessment doc)
- Rebuilding target cannot be achieved by 2016 even with no fishing
- At F=0.08, 50% P rebuilding achieved by 2017 with 2012 catch of 600 mt

Summary

- 2005 YC not strong in surveys or catch
- Adult biomass (3+) in 2011 slightly higher than 2010
- 2010 SSB lower than 2009
- 2007-2009 recruitment among lowest
- Expect SSB decline in near future if low rct. persists
- F 2010 = 0.13
- F 2008 and 2009 were = 0.15 now 0.27-0.28
- Increased uncertainty: retrospective pattern re-emerged
- USA requirement for a rebuilding strategy – not attainable in short term with current productivity
- TRAC: TAC 900-1,400 mt BUT highly dependent on recruitment assumption