NOAA FISHERIES

NEFSC

Operational Assessment of Atlantic Wolffish

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Team Member: Paul Nitschke

Last Assessed: 2012 Operational Assessment

September 16, 2015

Background

- Life History
  - Long-lived
  - Growth curve based on Nelson and Ross (1992)
  - M = 0.15
  - No possession limit since May 2010
- Previous Assessments
  - 2008 DPSWG
  - 2012 Update

Background

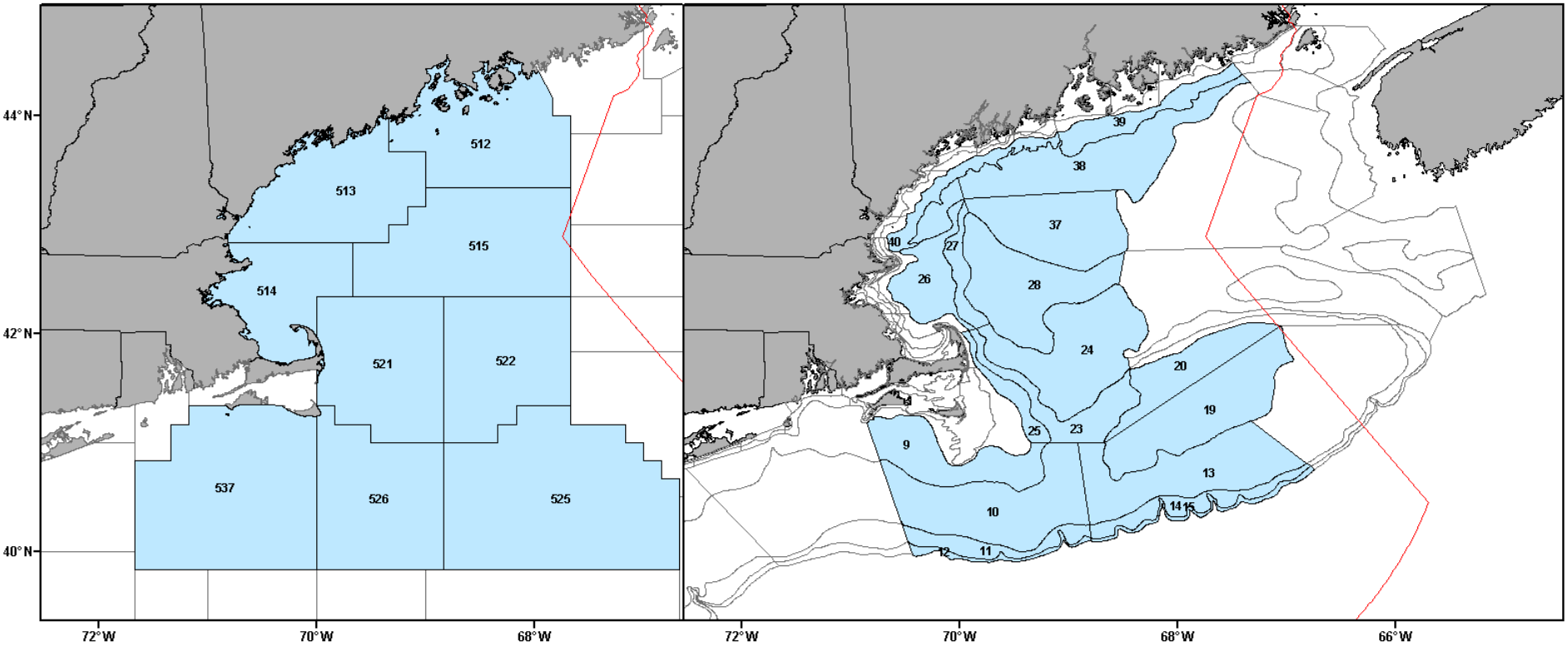
- Statistical Catch at Length (SCALE) model
  - Forward projecting age-structured model tuned with
    - Total catch (mt)
    - Catch at length (port samples/NEFOP)
    - Recruitment at age 1 (1-7 cm spring NEFSC survey)
    - Survey indices of abundance of the larger/older fish (40+ cm)
    - Survey length frequency distributions
  - 2012 final model used ocean pout calibration coefficient

Background

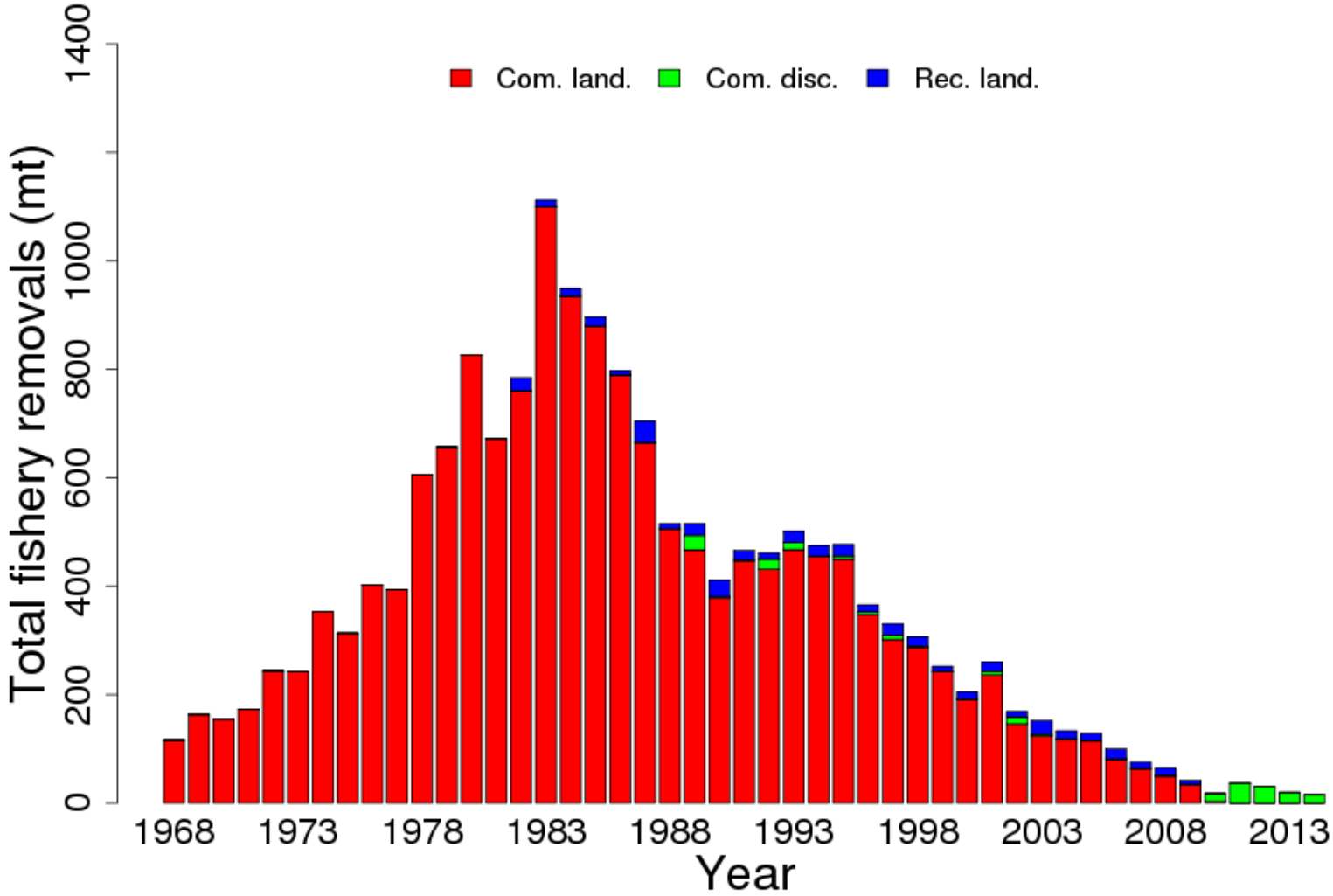
- Review of 2012 status
  - Overfished
  - Overfishing not occurring
  - Projections not done

	2012 final model	
Length of maturity	40 cm	65 cm
F_{MSY} proxy	$F_{40\%}$	$F_{40\%}$
F_{MSY}	0.334	0.243
YPR	0.864	0.824
SSB per Recruit	5.818	5.155
Initial Recruits (000s)	302	302
MSY (mt)	261	249
SSB_{MSY} (mt)	1,756	1,556
SSB_{2010} (mt)	505	371
F_{2010}	0.069	0.069
SSB_{2010}/SSB_{MSY}	29%	24%
F_{2010}/F_{MSY}	21%	28%

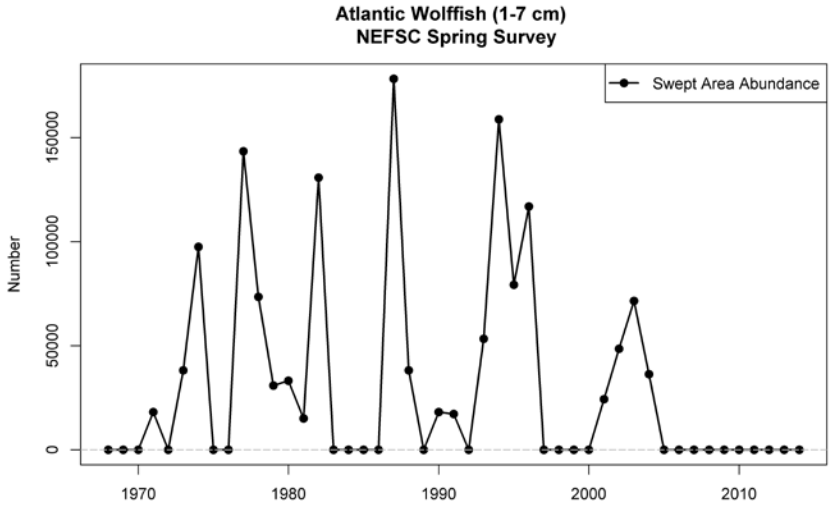
Statistical Areas & NEFSC Survey Strata

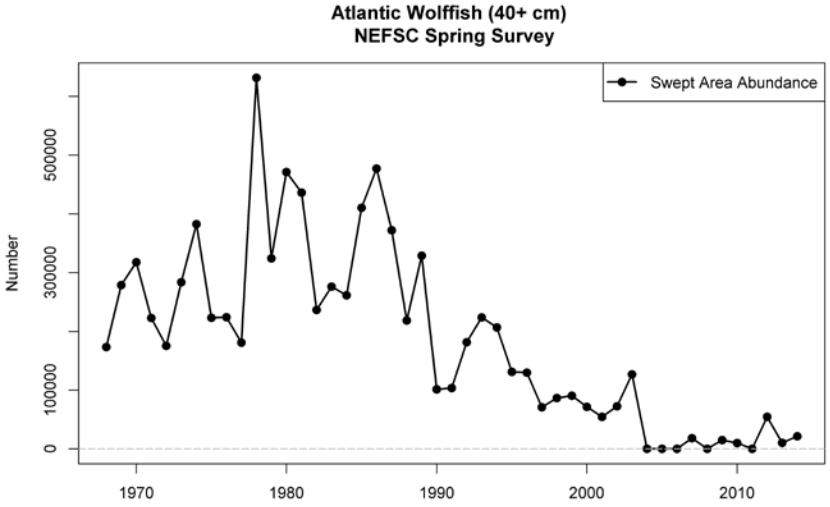


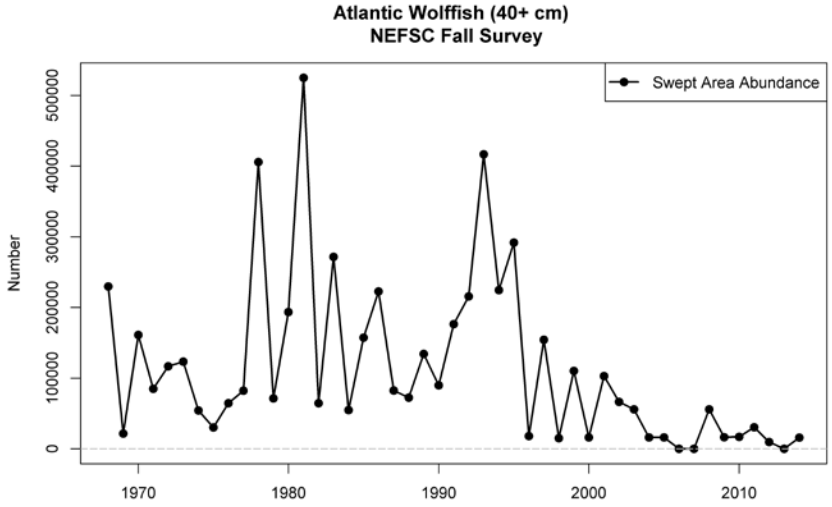
Catch

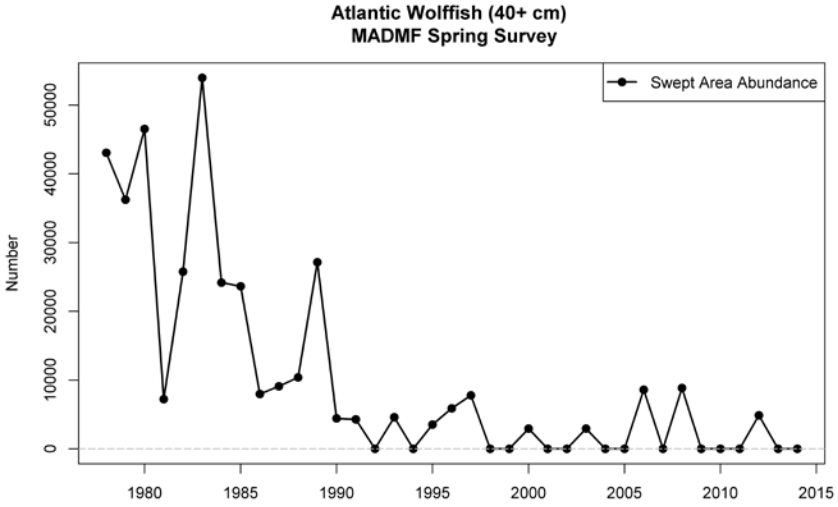

Com. land.
Com. disc.
Rec. land.
Total fishery removals (mt)
0
200
400
600
800
1000
1400
1968
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year

Surveys


Atlantic Wolffish (1-7 cm)
NEFSC Spring Survey
Swept Area Abundance
Number
0
50000
100000
150000
1970
1980
1990
2000
2010

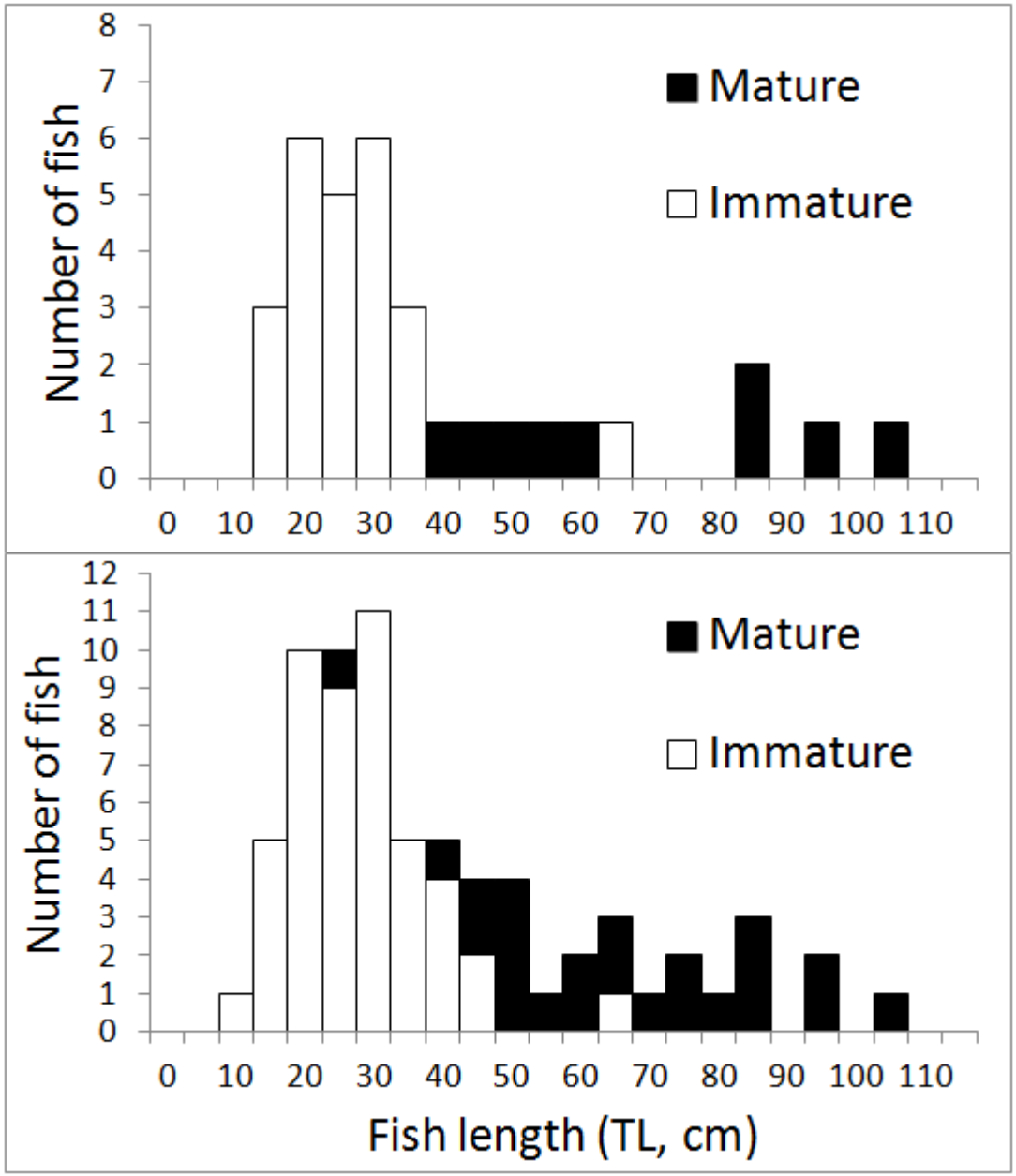

Atlantic Wolffish (40+ cm)
NEFSC Spring Survey
Swept Area Abundance
Number
0
100000
300000
500000
1970
1980
1990
2000
2010


Atlantic Wolffish (40+ cm)
NEFSC Fall Survey
Swept Area Abundance
Number
0
100000
200000
300000
400000
500000
1970
1980
1990
2000
2010


Atlantic Wolffish (40+ cm)
MADMF Spring Survey
Swept Area Abundance
Number
0
10000
20000
30000
40000
50000
1980
1985
1990
1995
2000
2005
2010
2015

Histology

- 2012 n = 33
- 2015 n = 72
- $L_{50} \approx 50$ cm
- BRPs
  - $L_{50} = 40$ cm
  - $L_{50} = 50$ cm
  - $L_{50} = 65$ cm



Discard Mortality

- 2012 assessment did 10% discard mortality run
  - No difference in model output
- Grant and Hiscock, 2014
  - 100% survival for wolffish returned to bottom
  - 92% survival when exposed to air < 2 hours
    - Only 83% if others included
  - Sensitivity run with 8% discard mortality

Miscellaneous

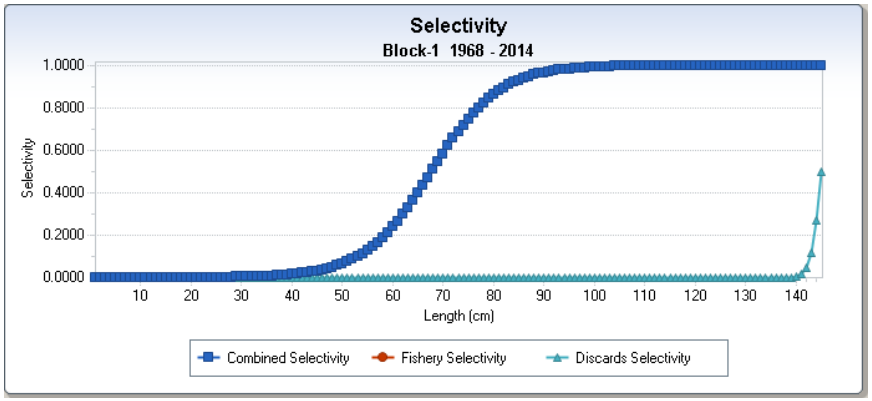
- MRFSS/MRIP calibration
  - Sensitivity run = negligible, no change in status
- Retrospective
  - Not apparent in 2008 or 2012
  - Re-calculated using 2012 final model
  - Provided for current update, including Mohn's rho
- No projections (DPSWG 2008)

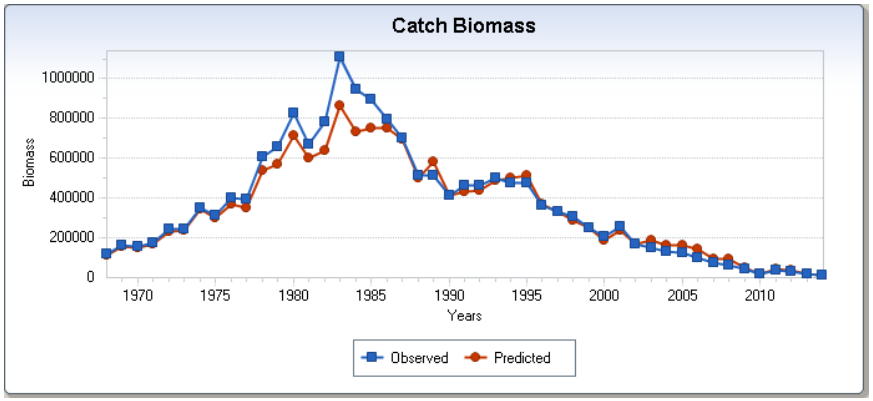
SCALE Model Tab	Parameters	Input Data
General Data	Years: 1968-2014 Ages: 30 Maximum Length: 145 1 Selectivity Block 1 Recruitment Index 3 Adult Indices 1 Survey with LF (Spring NEFSC)	
Biological	Mean Lengths at Age	Same as 2008 assessment
	Natural Mortality	Same as 2008 assessment
	Length-Weight Parameters	Same as 2008 assessment
Catch Length Frequency	Observed Catch LF Distributions	**New data for 2011-2014**
Fishery Data	Total Catch in Weight (mt)	**New data for 2011-2014; MRFSS/MRIP calibration**
Recruitment		Same as 2008 assessment
Recruitment Indices	NEFSC Spring Age 1	**New data for 2011-2014**
Adult Indices	NEFSC Spring 40+	**New data for 2011-2014**
	MADMF Spring 40+	**New data for 2011-2014**
	NEFSC Fall 40+	**New data for 2011-2014**
Survey Length Frequency	Observed LF Distribution	**New data for 2011-2014**
Selectivity	Selectivity Bounds	Same as 2008 assessment
Parameter Estimation		Same as 2008 assessment

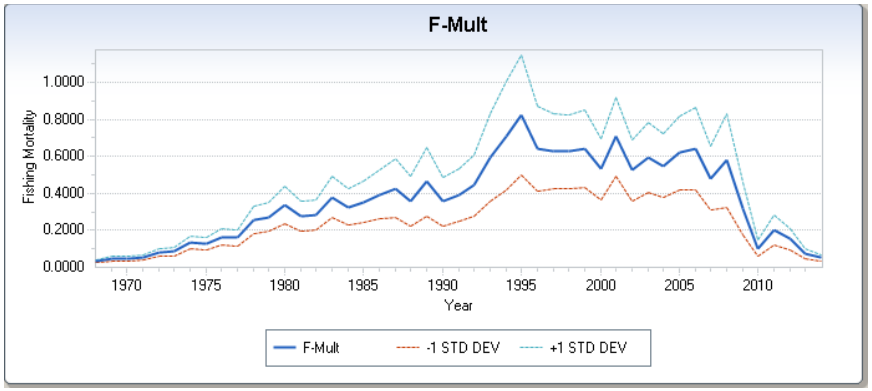
SCALE Model Diagnostics

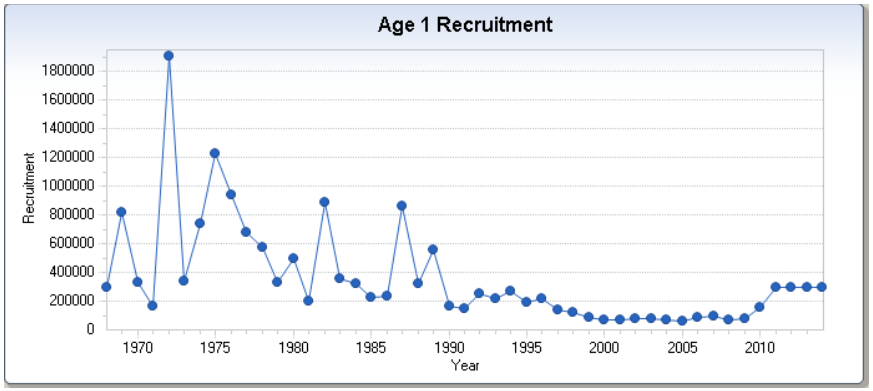
	Base			Sensitivity		
Item	**Weight**	**Q**	**Resid/ Param**	**Weight**	**Q**	**Resid/ Param**
Total objective function			380.00			385.24
Catch weight	10		0.87	10		0.83
Catch length frequency	500		28.12	500		28.72
Variation in recruitment penalty	2		37.09	2		37.58
Recruit index: NEFSC spring 1-7 cm	2	0.20	12.15	2	0.20	12.16
Adult index: NEFSC spring 40+ cm	12	0.19	8.66	12	0.19	8.99
Adult index: MADMF spring 40+ cm	3	0.01	13.37	3	0.01	13.21
Adult index: NEFSC fall 40+ cm	3	0.11	28.35	3	0.11	28.53
Survey LF index: NEFSC spring 40+	5		15.58	5		15.58
Alpha (L50) selectivity			67.73			66.91
Beta (slope) selectivity			0.15			0.15
Fstart			0.001			0.001
Recruitment Year 1 (1968, 000s)			296			298

SCALE Model Selectivity & Fits

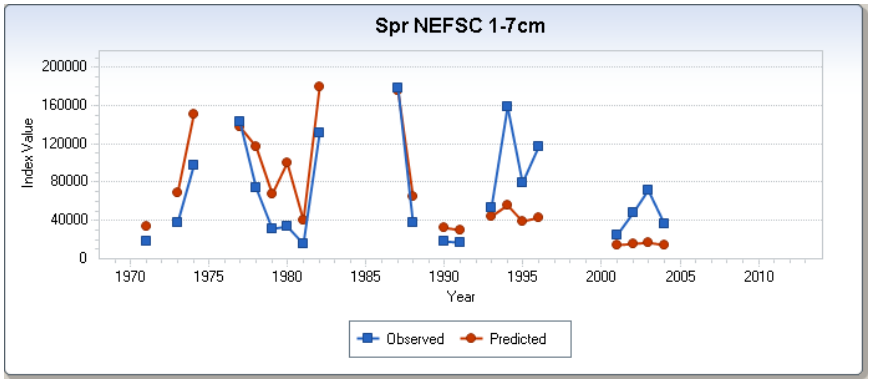


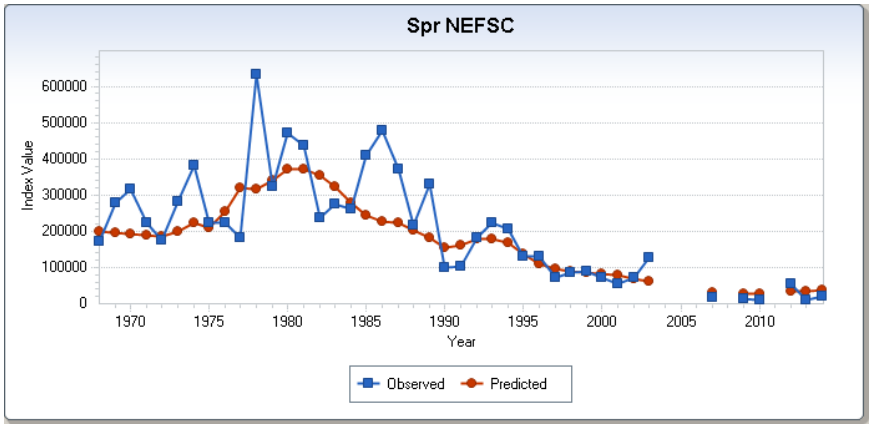


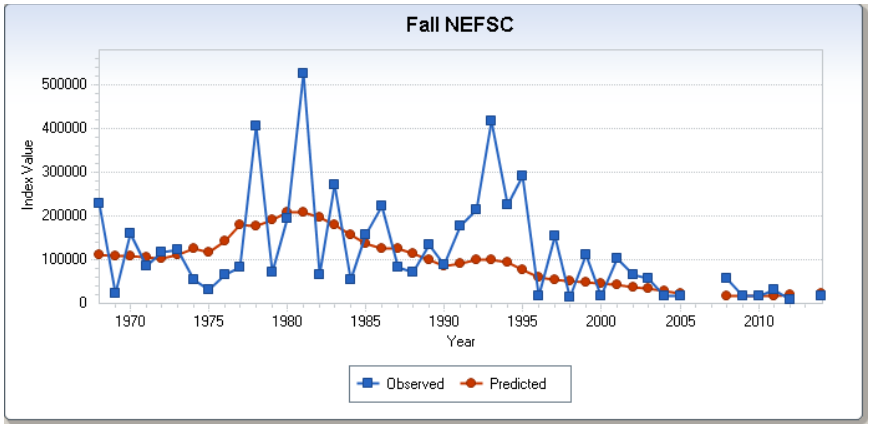


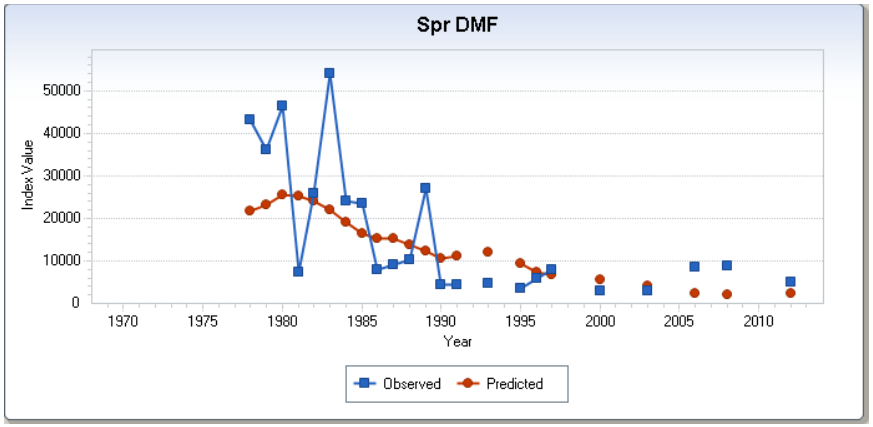


SCALE Model Fits

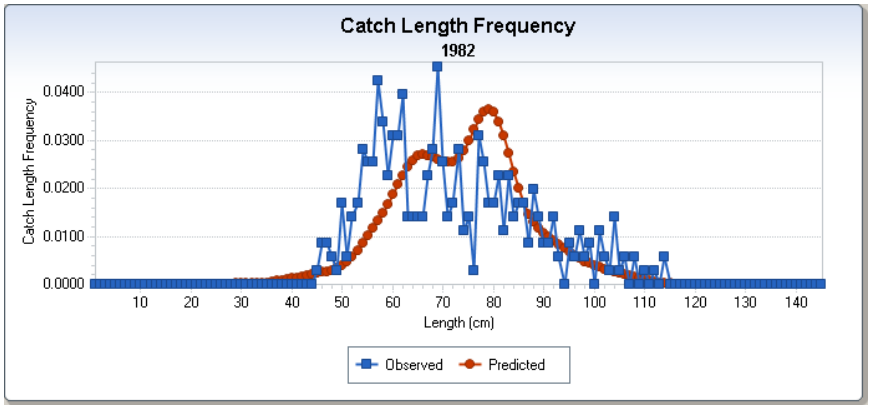


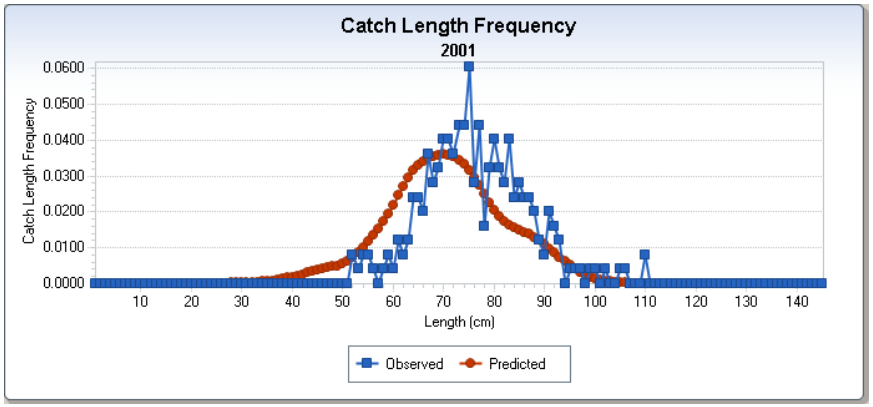


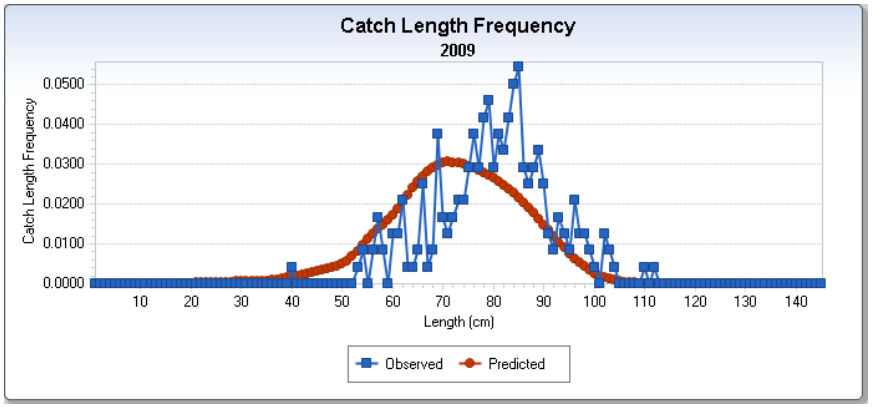


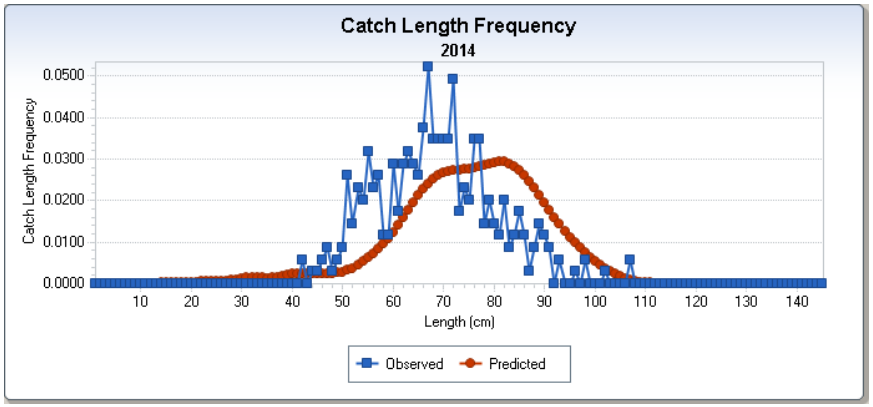


SCALE Model Fits

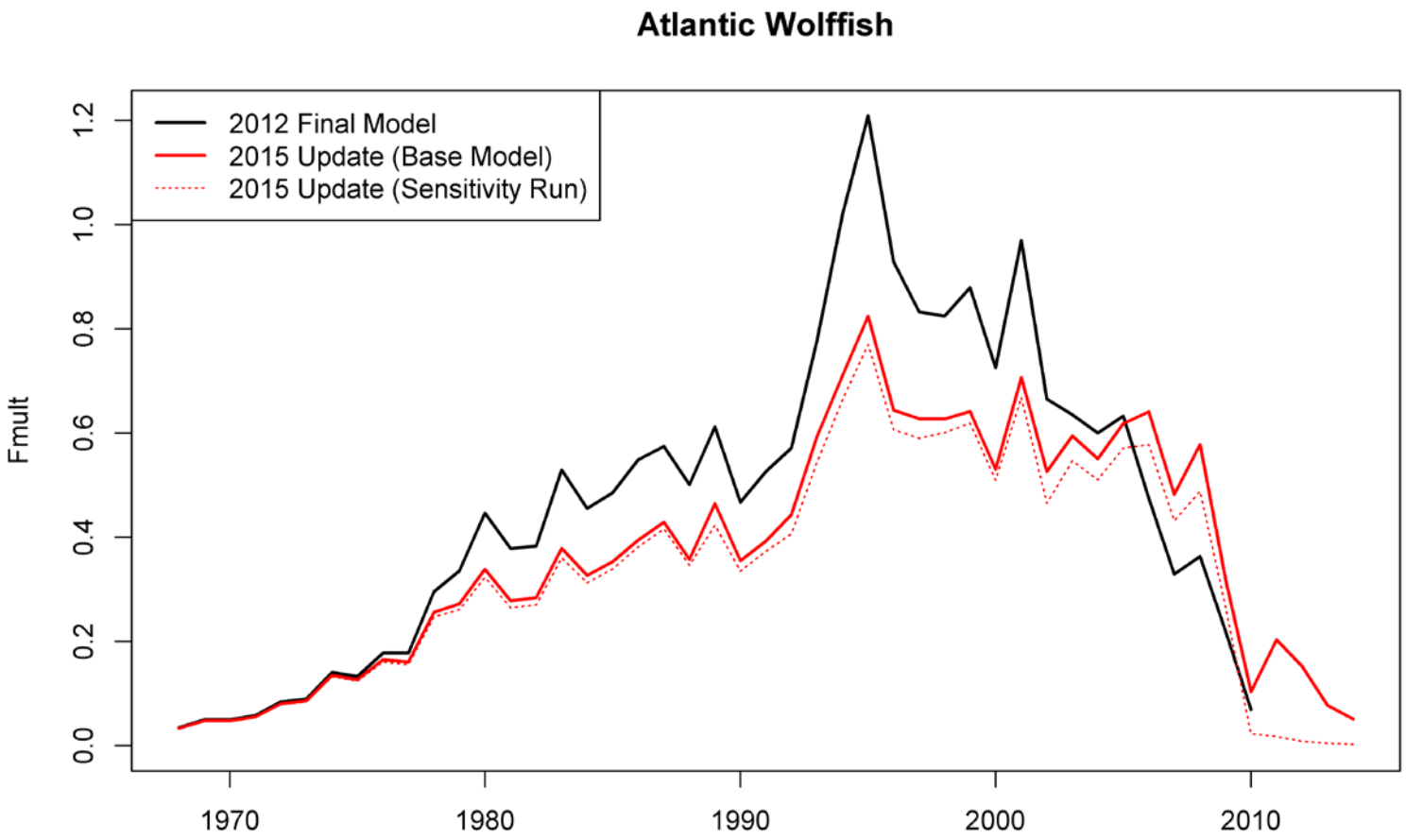




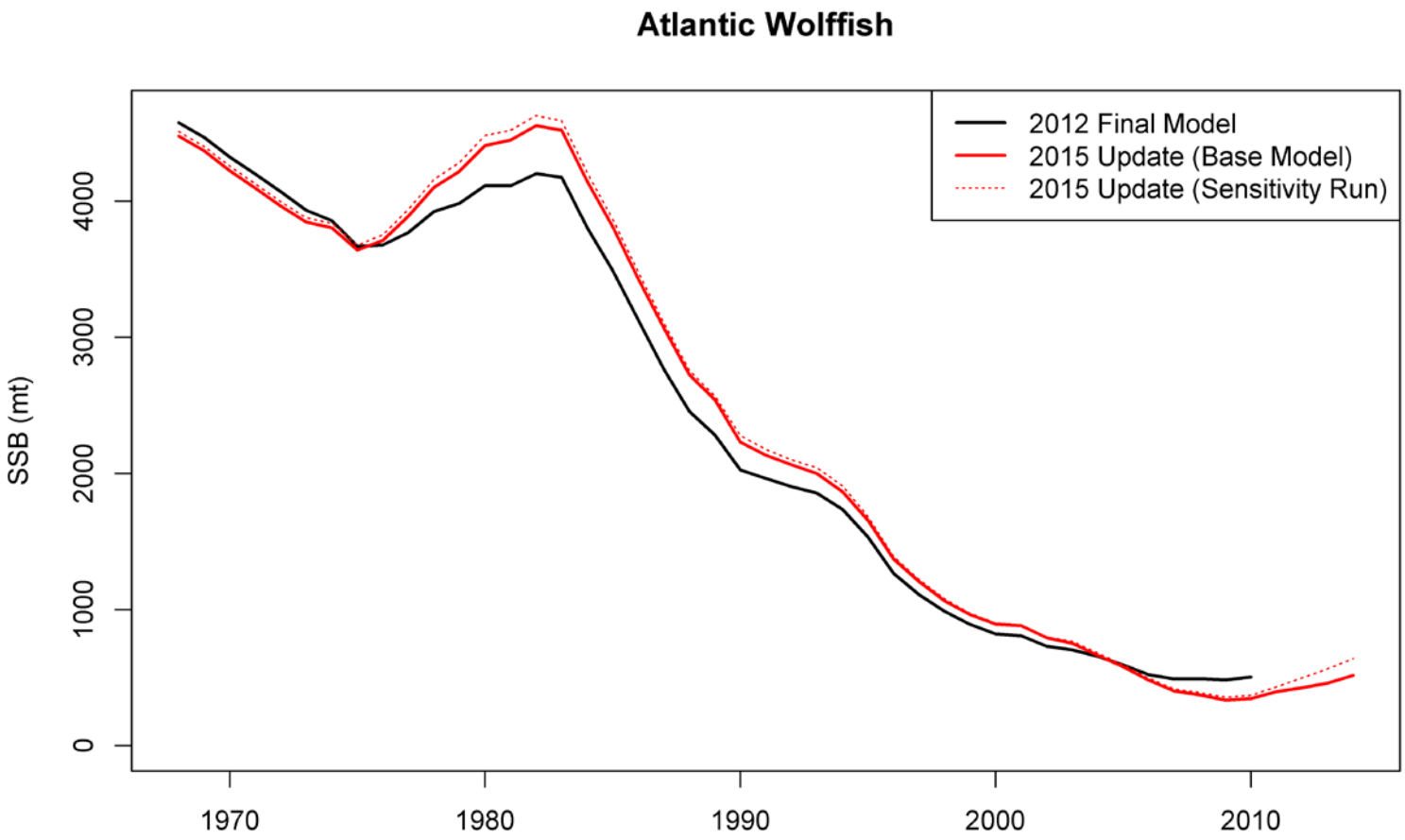




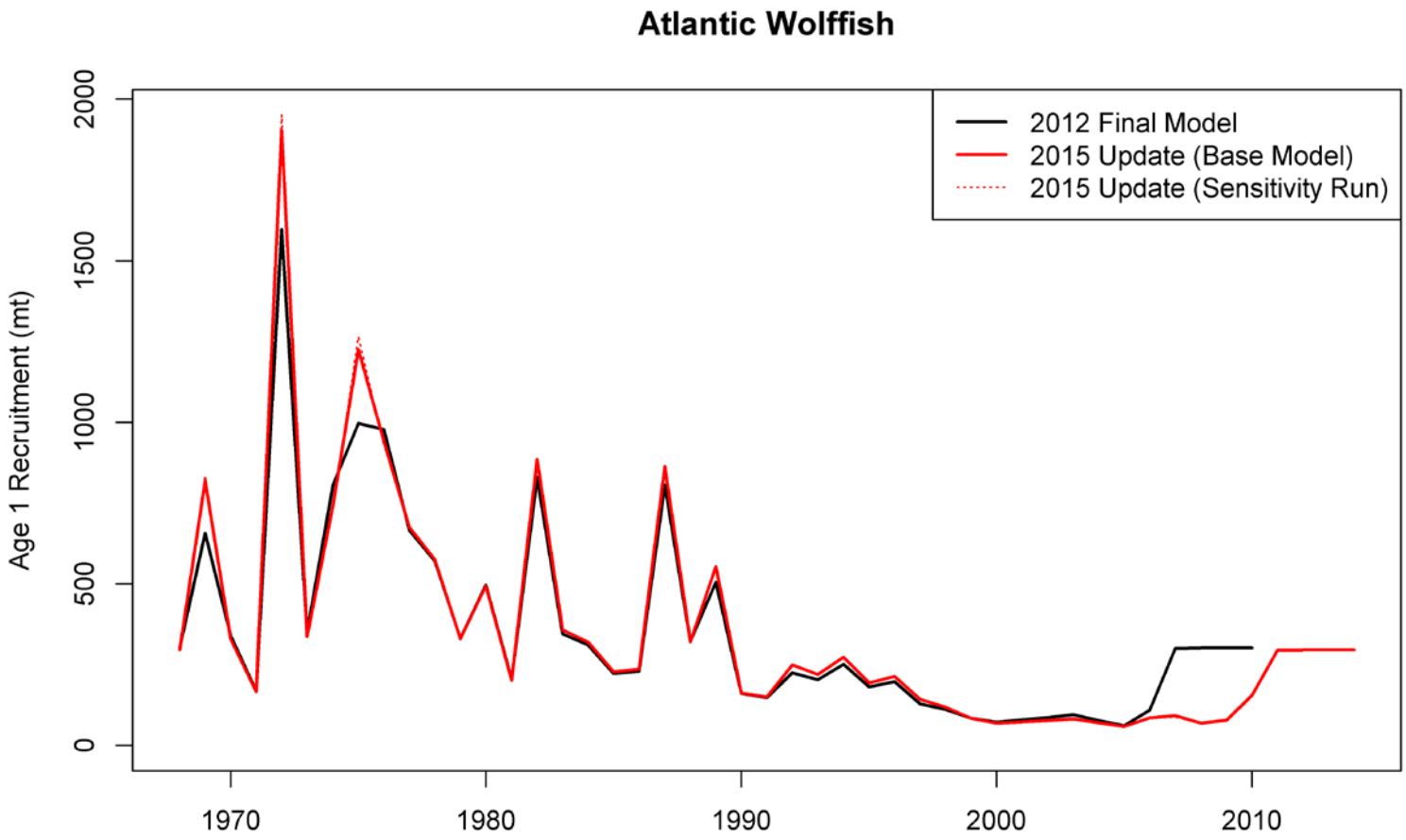
SCALE Model F



SCALE Model SSB

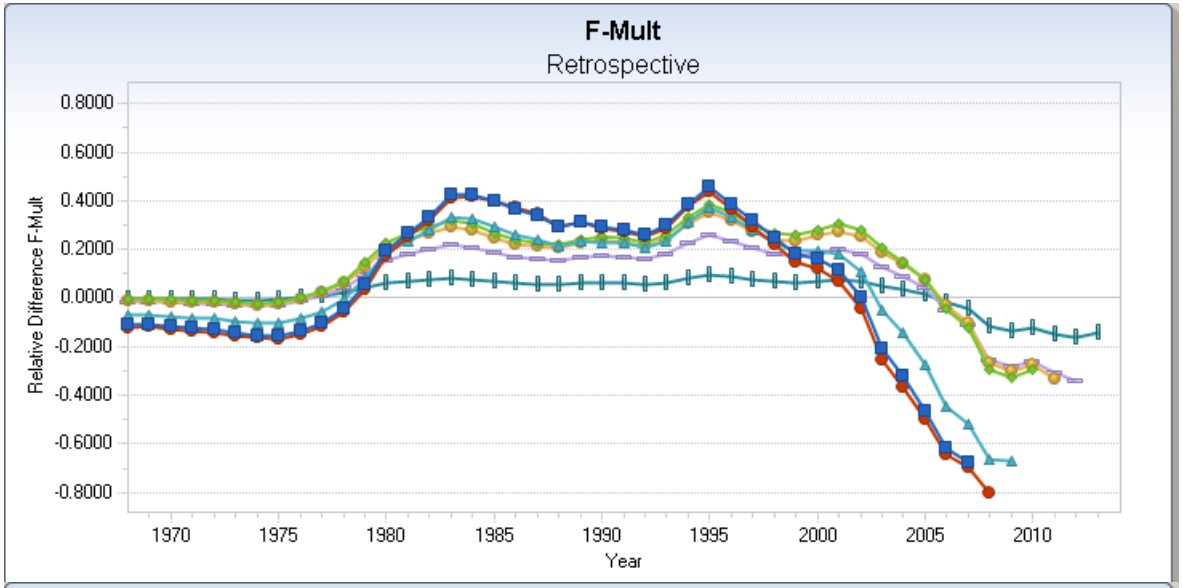


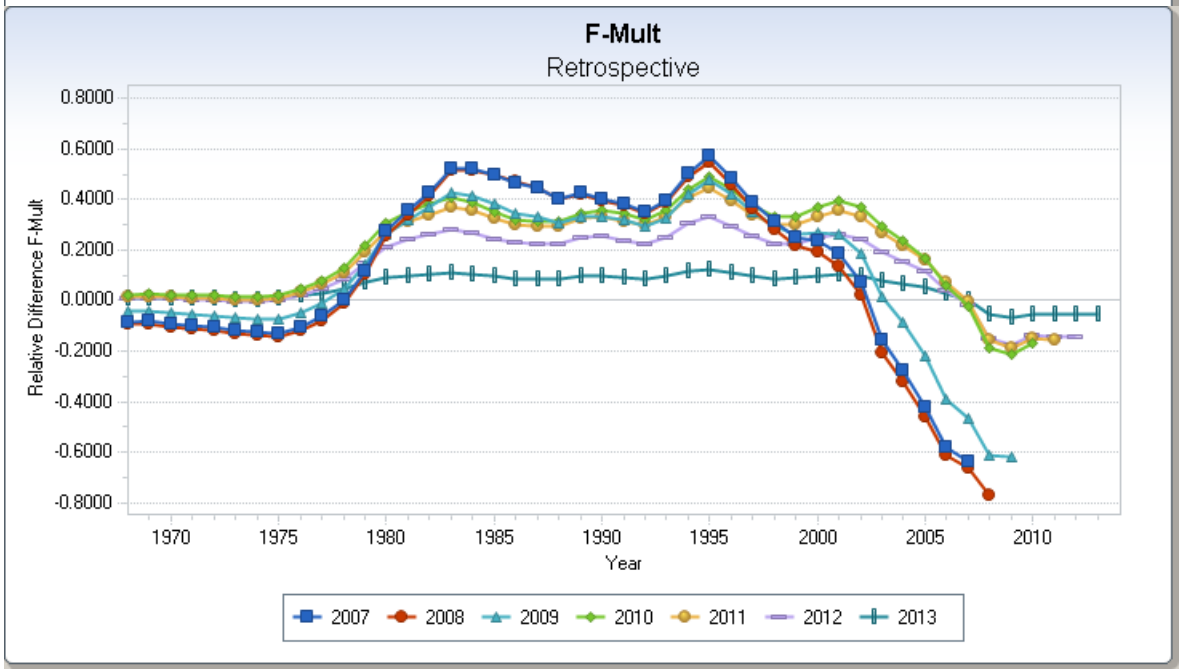
SCALE Model Recruitment



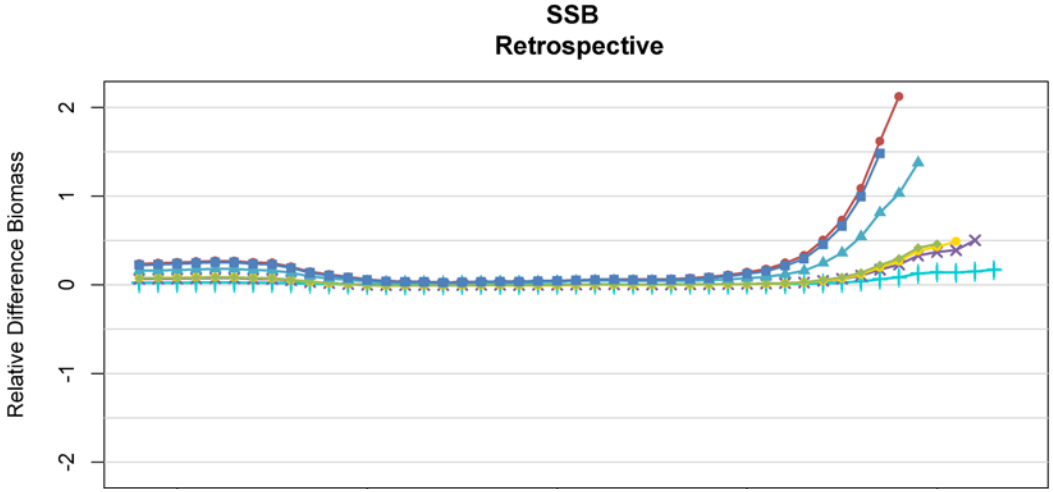
Retro: F

	Mohn's rho
2012 Final Model	-0.55
2015 Base Model	-0.47
2015 Sensitivity	-0.36

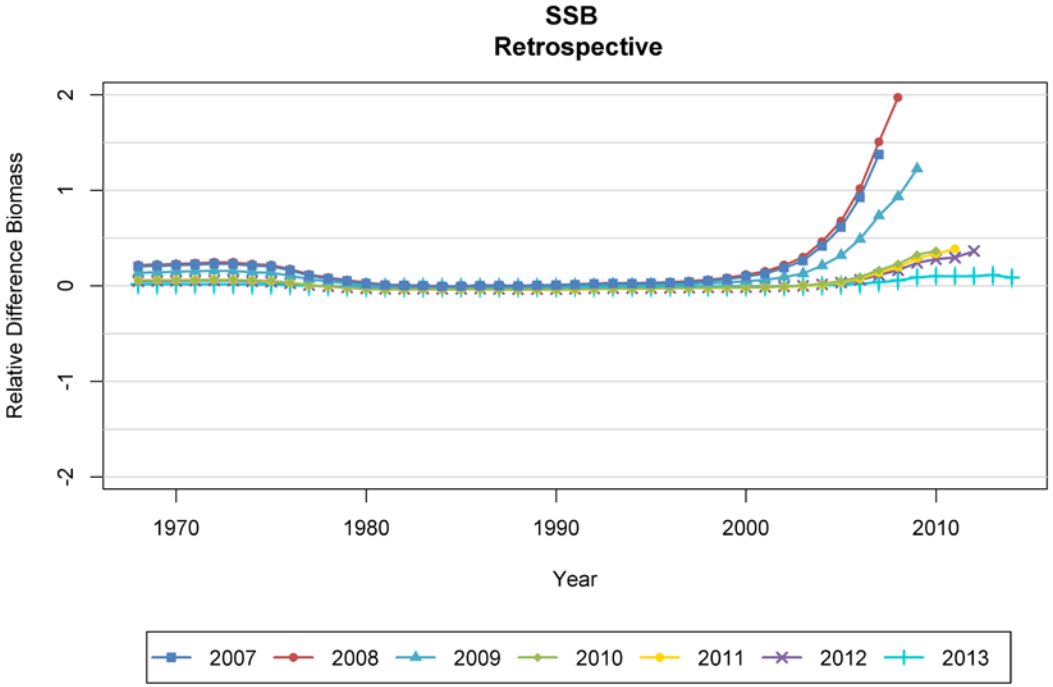




Retro: SSB

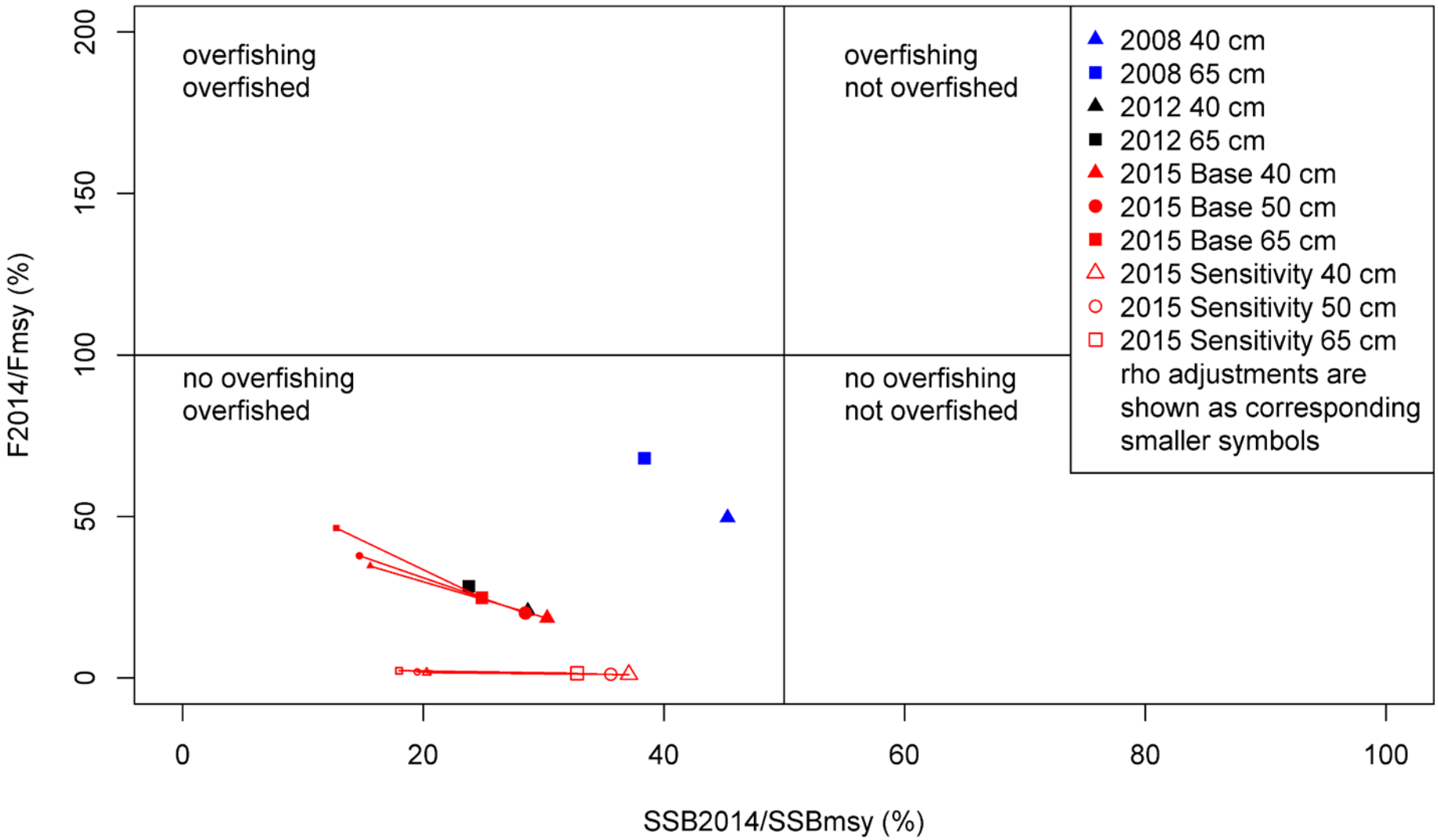


	Mohn's rho
2012 Final Model	0.96
2015 Base Model	0.94
2015 Sensitivity	0.83



	2015 base			2015 sensitivity		
Length of maturity	40 cm	50 cm	65 cm	40 cm	50 cm	65 cm
F_{MSY} proxy	$F_{40\%}$	$F_{40\%}$	$F_{40\%}$	$F_{40\%}$	$F_{40\%}$	$F_{40\%}$
F_{MSY}	0.274	0.251	0.205	0.265	0.243	0.200
YPR	0.834	0.825	0.796	0.828	0.819	0.791
SSB per Recruit	5.783	5.588	5.126	5.779	5.586	5.110
Initial Recruits (000s)	296	296	296	298	298	298
MSY (mt)	246	244	235	247	244	235
SSB_{MSY} (mt)	1,709	1,651	1,515	1,720	1,663	1,521
SSB_{2014} (mt)	518	471	378	638	592	499
F_{2014}	0.051	0.051	0.051	0.003	0.003	0.003
SSB_{2014}/SSB_{MSY}	30%	29%	25%	37%	36%	33%
F_{2014}/F_{MSY}	19%	20%	25%	1%	1%	1%
	Retrospective adjustment			Retrospective adjustment		
SSB_{2014} (mt)	266	242	194	349	324	273
F_{2014}	0.095	0.095	0.095	0.005	0.005	0.005
SSB_{2014}/SSB_{MSY}	16%	15%	13%	20%	19%	18%
F_{2014}/F_{MSY}	35%	38%	46%	2%	2%	2%

Atlantic Wolffish
Stock Status



Key Decisions

- L40 vs. L50
- Base vs. sensitivity
- ~~Retro adjustment?~~
- No combination of any of these changes stock status

Uncertainties

- Use of ocean pout calibration coefficient
- No possession limit since May 2010
- No recruitment index since 2004
- Surveys have reached limits of detectability?
- Lack of commercial lengths = model estimation difficulties for fishery selectivity

Research Needs

- Regional maturity ogive should be developed
  - Histology ongoing
- NEFSC trawl catchability
- Fixed gear survey to determine abundance in non-trawlable habitat
- Tagging study to inform wolffish movements & post-capture survival