

**Review of SARC-59,
2014 Scallop Surveys, and
OFL/ABC Estimates for FW26**

**Scallop AP and Committee Meeting
September 23/24, 2014**

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Part 1: SARC59

- Document #1 – SARC59 Summary Report
- Final meeting in July 2014 – Final report any day
- 5 major highlights:
 1. several changes to dredge index
 2. use of separate habcam index
 3. splitting out GB open and GB closed
 4. updated several model parameters
 5. new reference points

1. Changes to Dredge Index

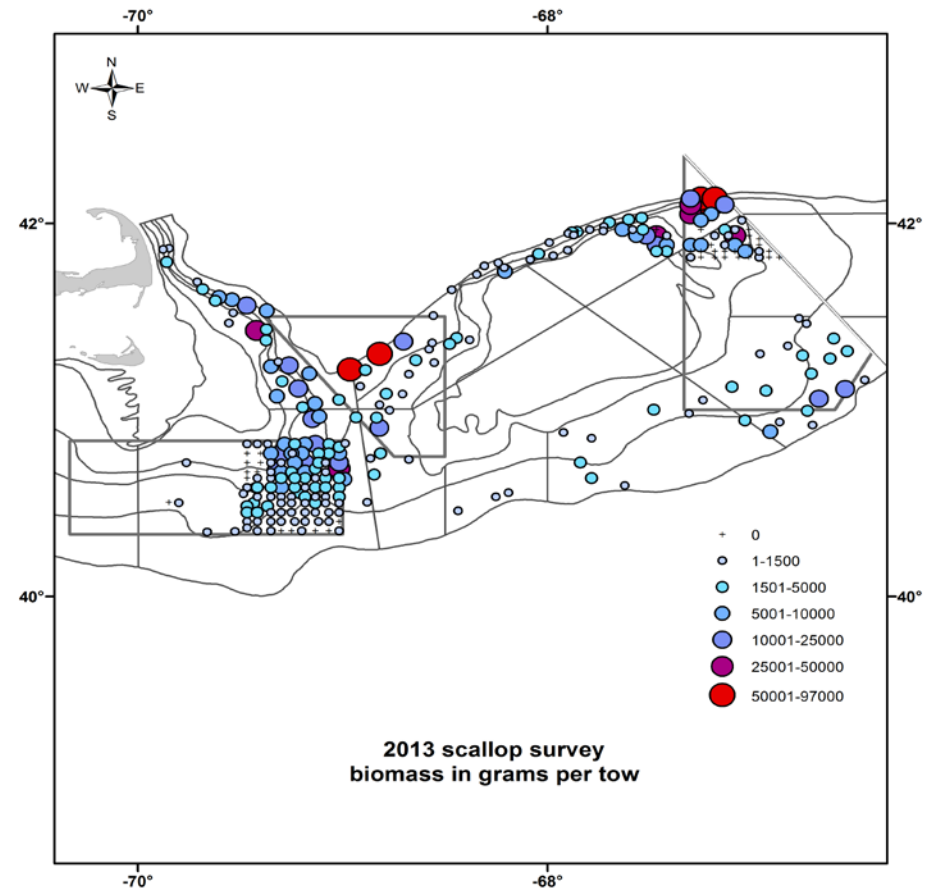
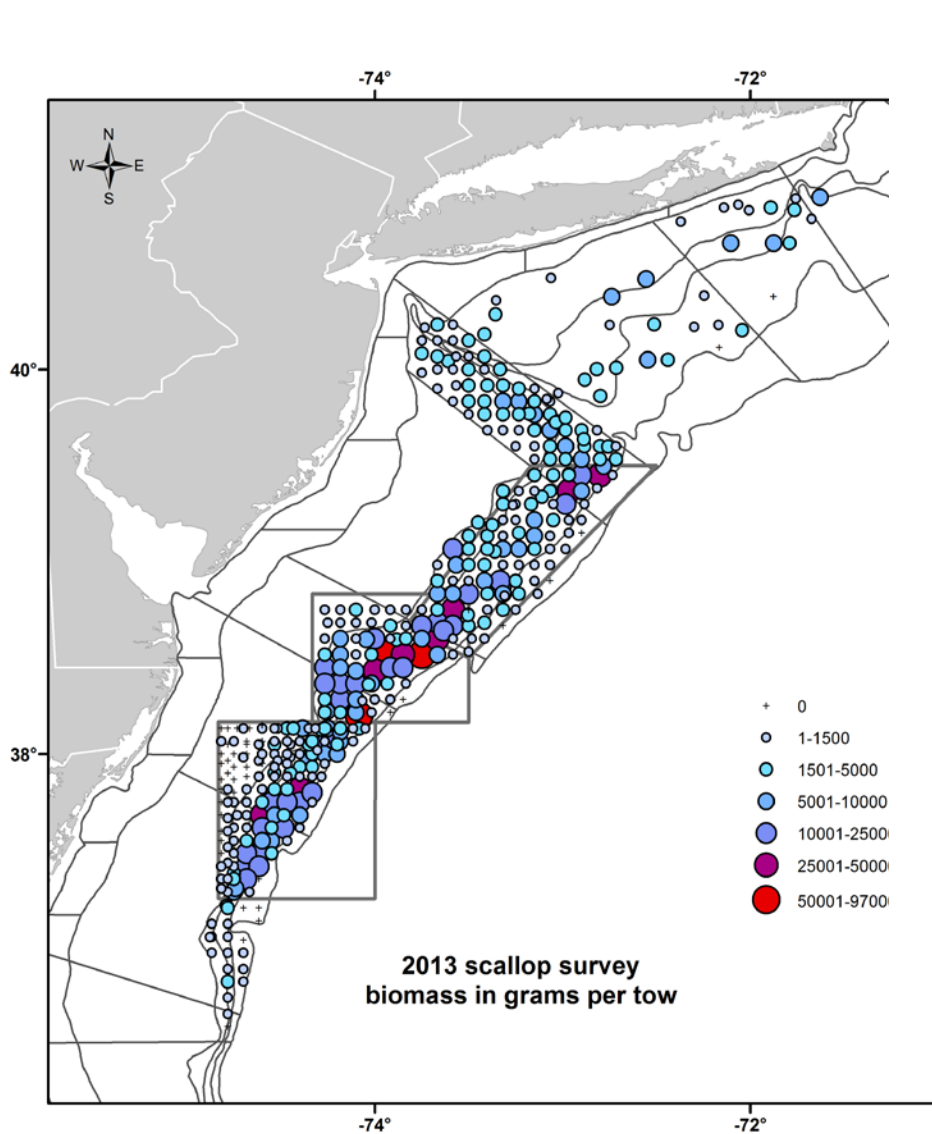
For the first time, VIMS survey data (survey dredge only) was integrated into the dredge survey index for 2005-2013. VIMS data had modest effects on index, but improved CVs

Tows were standardized to 1nm tow path (instead of using a vessel correction factor)

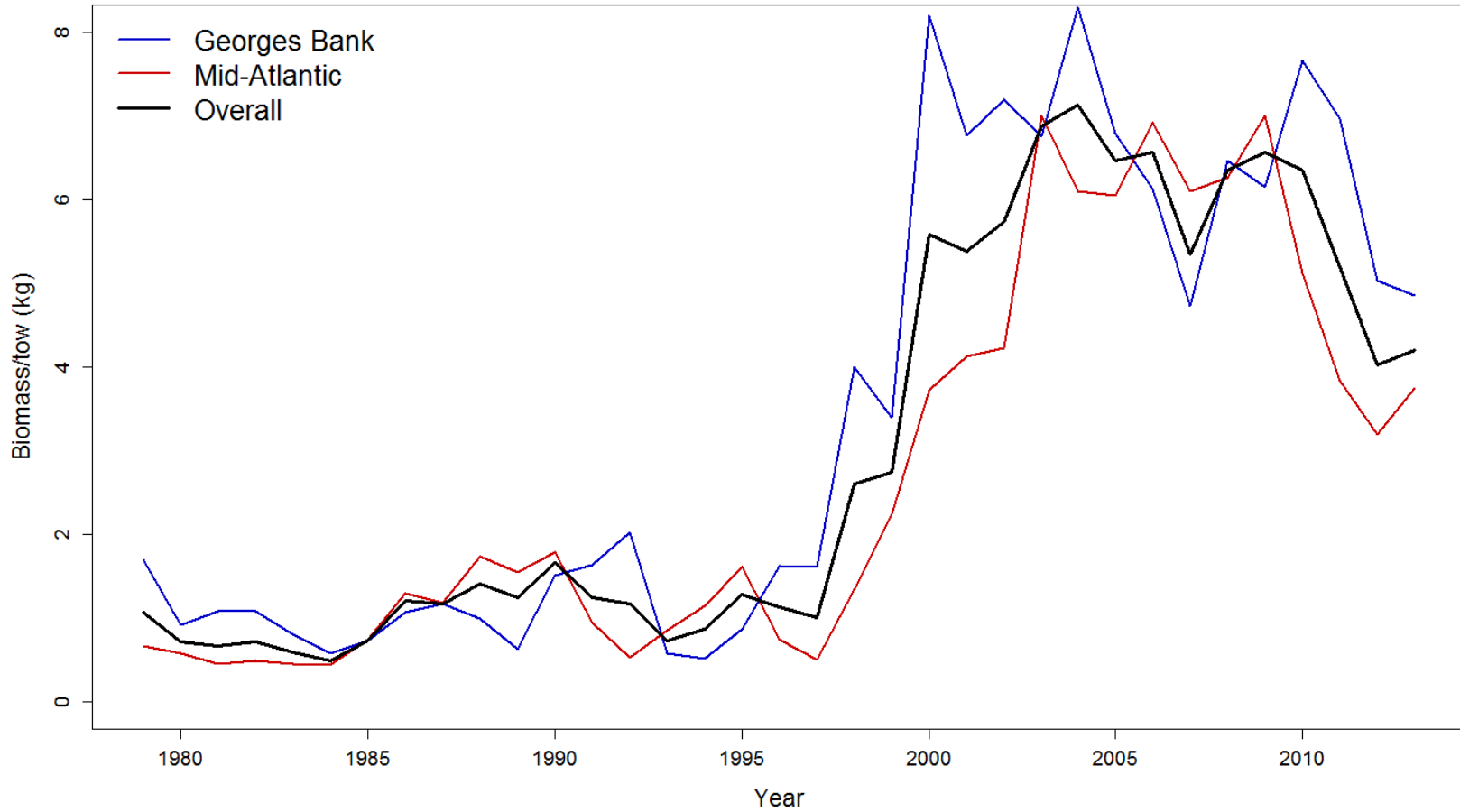
Marginal areas on Georges Bank were dropped from the survey index



Combined NEFSC/VIMS Dredge Survey for 2013



Dredge Survey Time Series



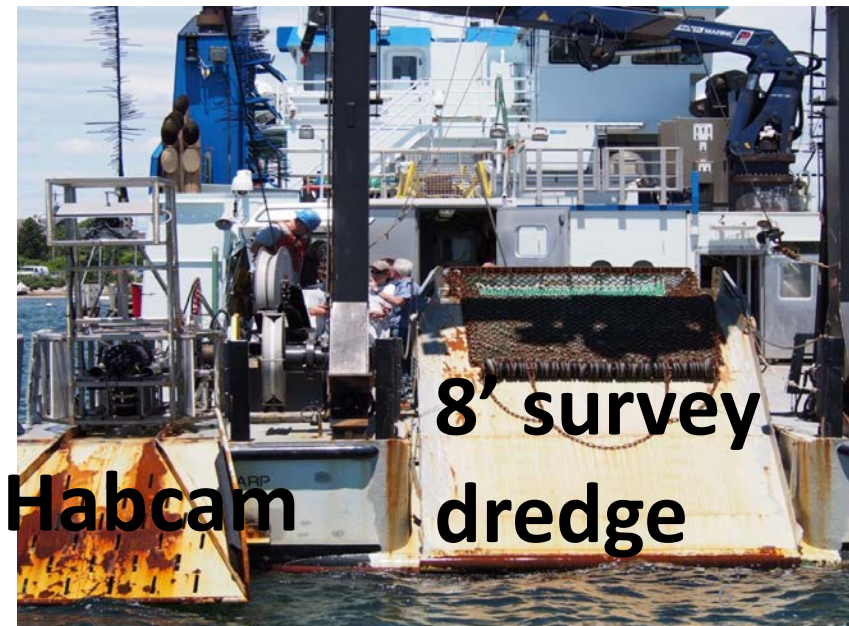


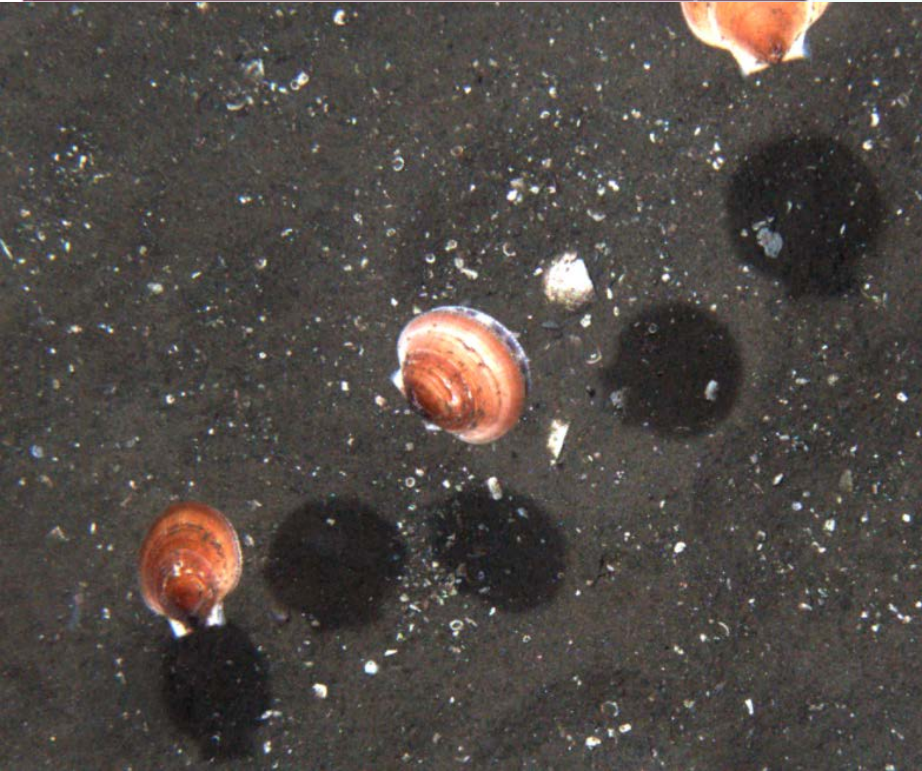
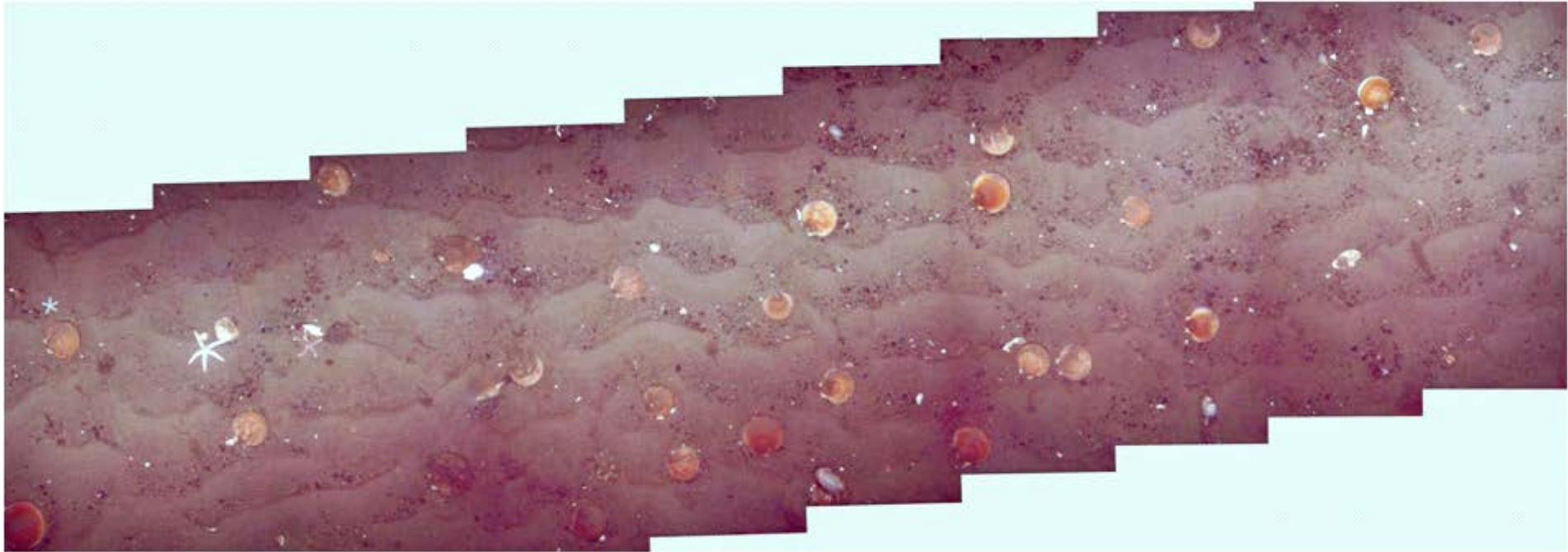
2. Separate Habcam Index

Used as a survey index for the first time (Georges Bank 2011-2013, Mid-Atlantic 2012-2013)

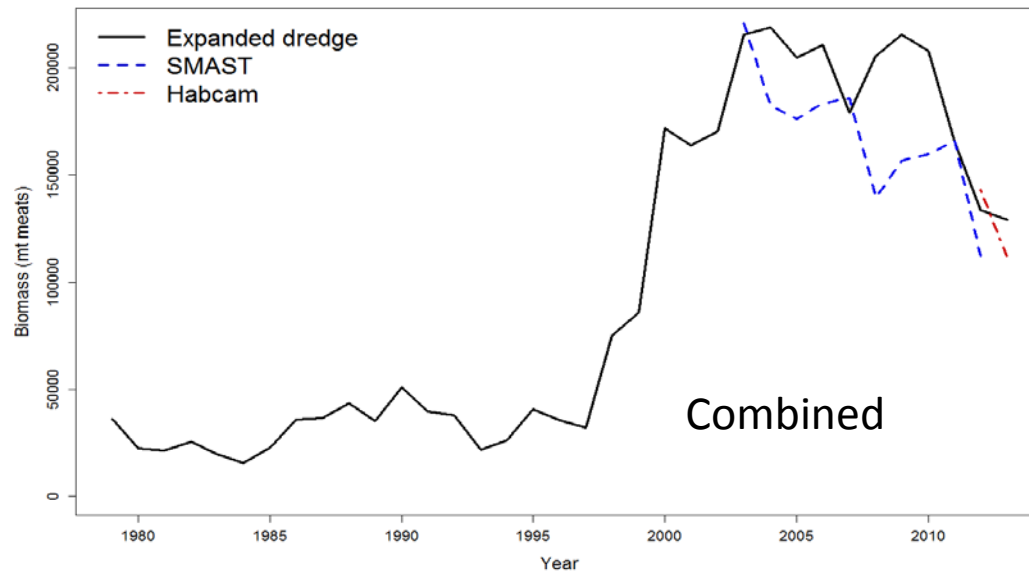
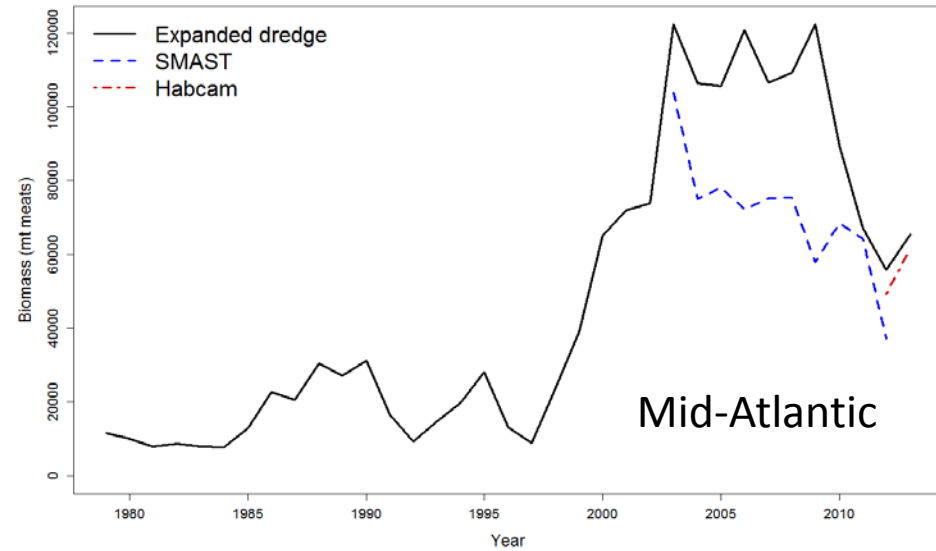
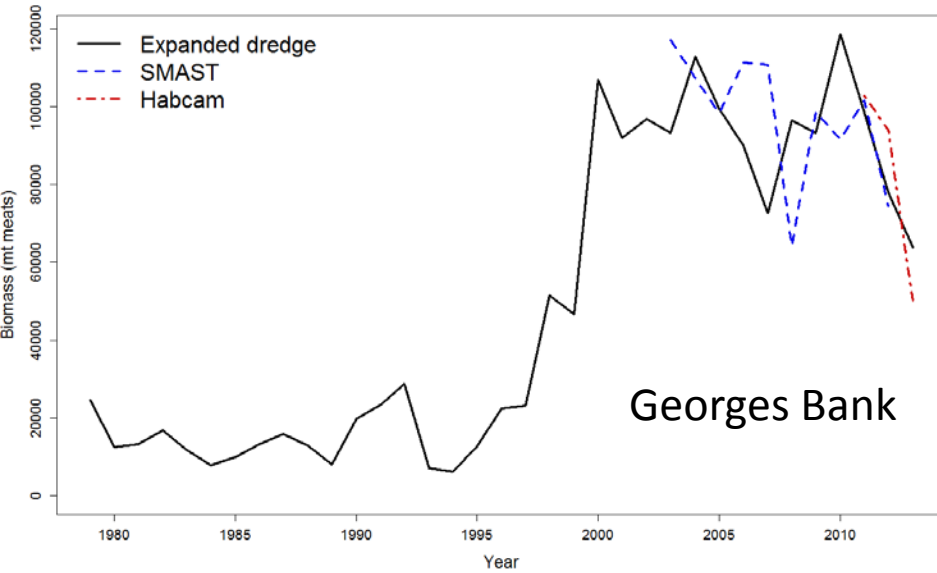
GAM + Ordinary Kriging model used to obtain biomass and abundance estimates. Stratified mean used as backup and “sanity check”

Paired Habcam/Dredge tows used to obtain survey dredge efficiency estimates





Comparison of Survey Time Series



Updates to CASA Model

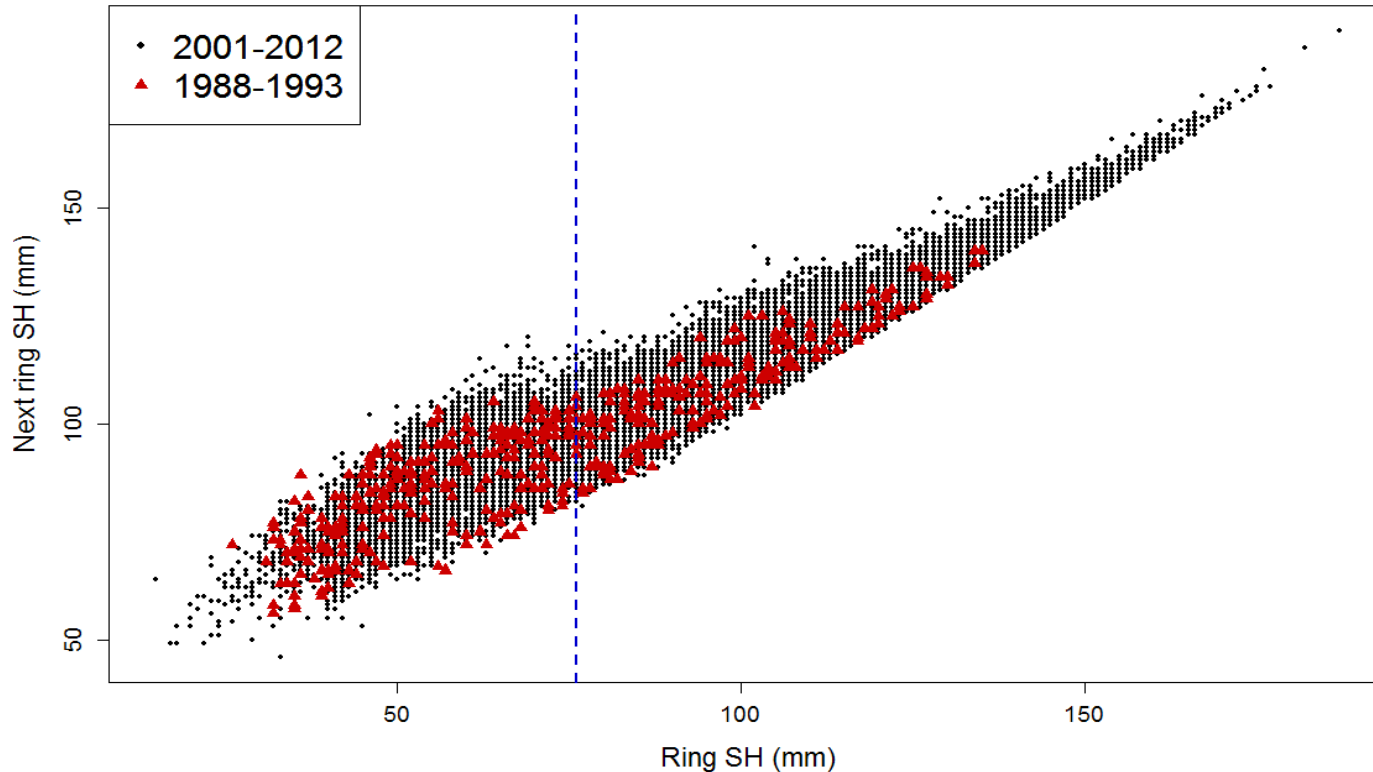
3. Split out GB and 4. updated parameters

Three models used for this assessment – GB open, GB closed, Mid-Atlantic. Previous assessments used only two.

Updated model parameters:

- 1) estimates for natural mortality (M) increased in all areas;
- 2) natural mortality for plus group assumed to be 1.5 times that of other sizes; and
- 3) Growth varied by period – heavy fishing corresponded to slow growth

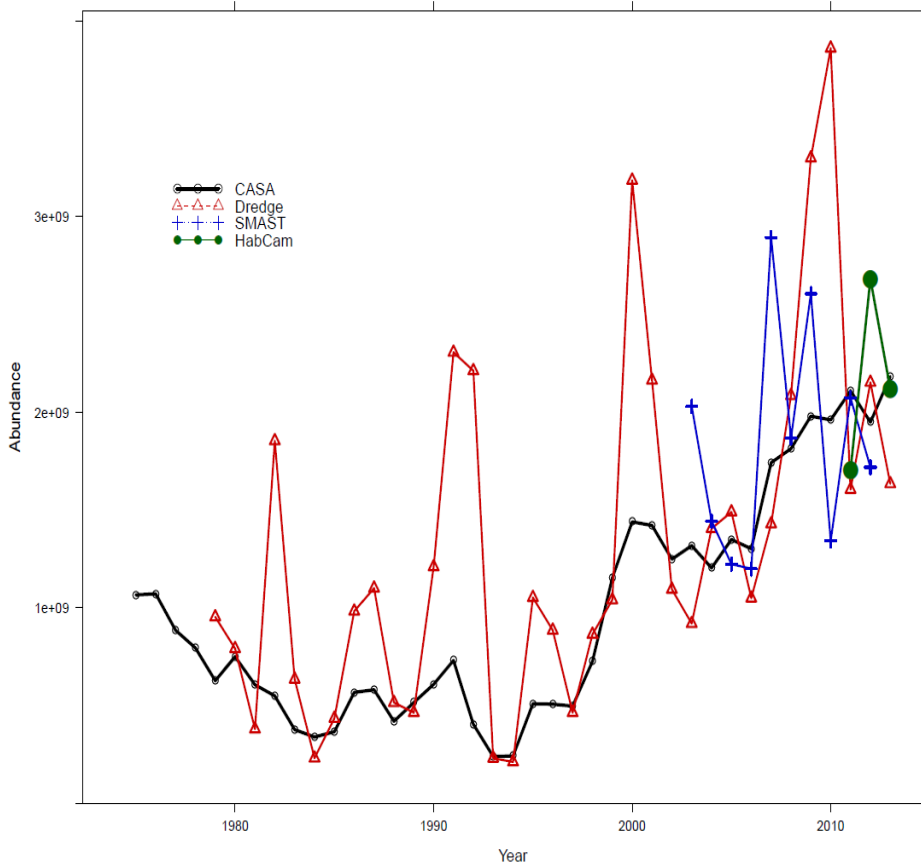
Comparison of recent growth to that from 1988-1993



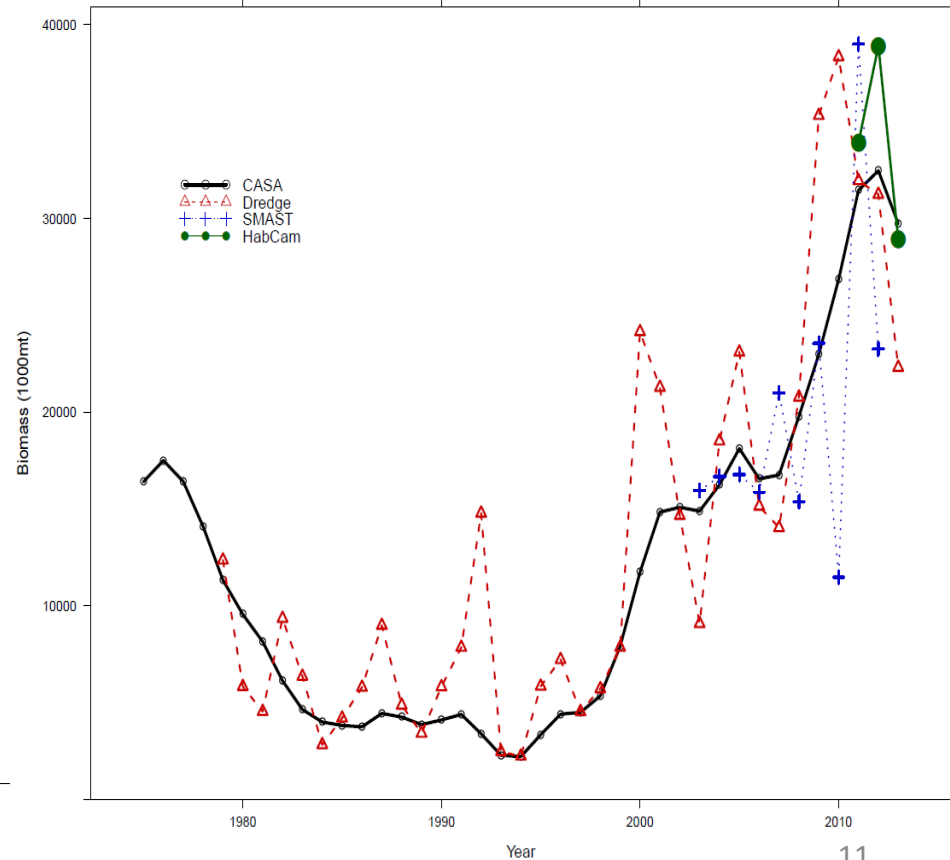
Growth from two periods appears similar at small shell heights, but fast growing scallops appear to be preferentially removed at commercial sizes

Georges Bank Open model. Model estimates reasonably agree with surveys; model has almost no retrospective pattern

GB-open
Abundance (survey vs. model)

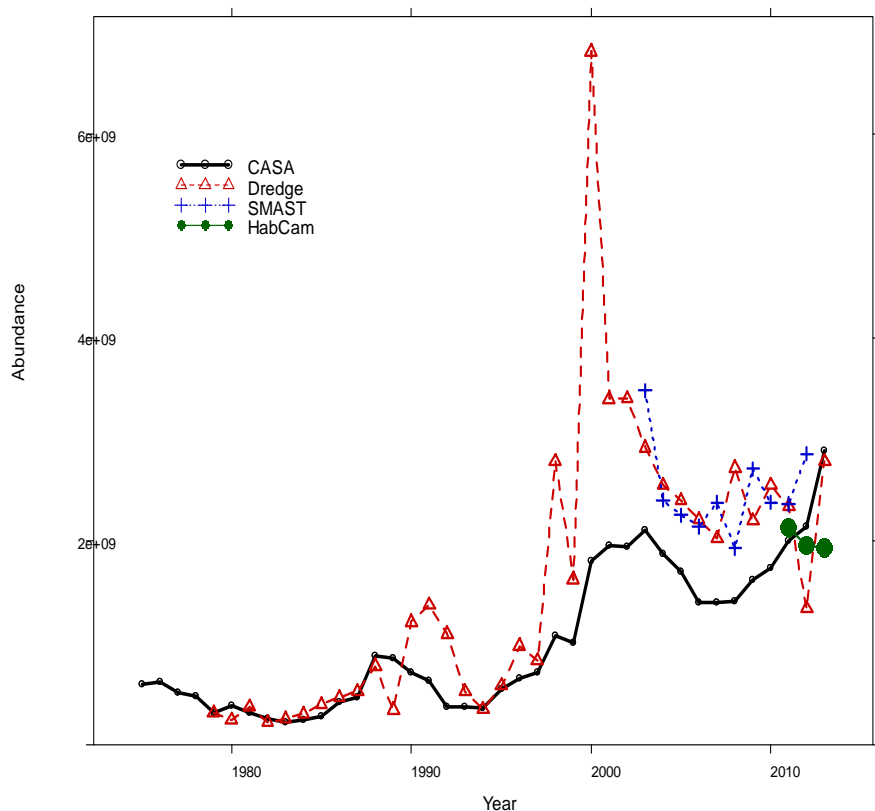


GB-open
Biomass (survey vs. model)

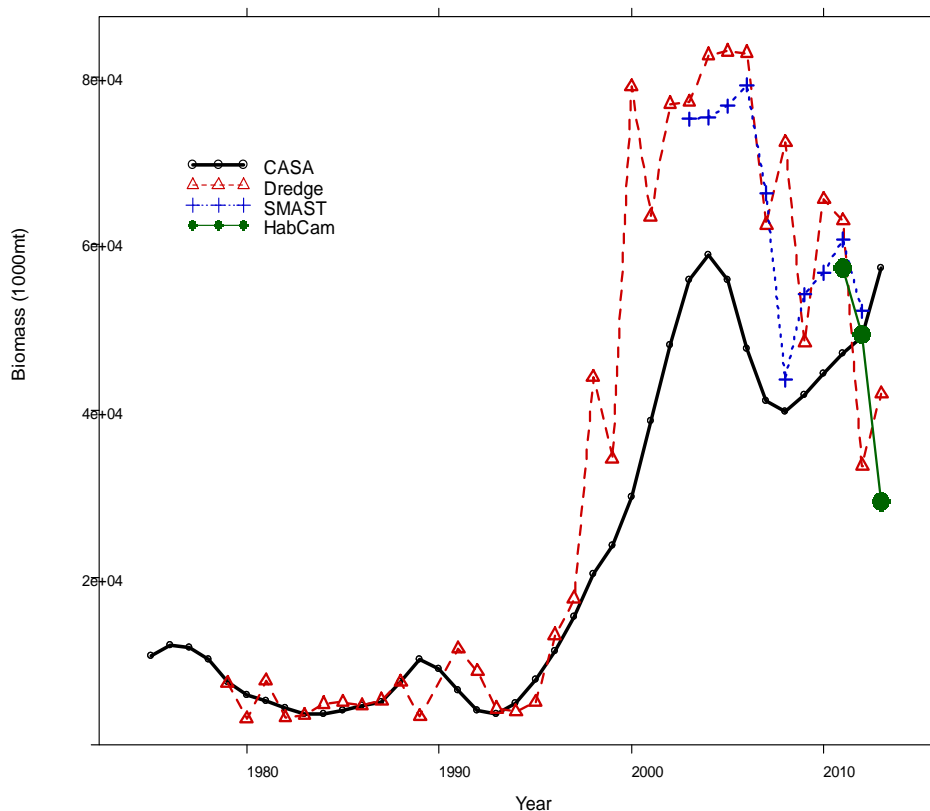


Georges Bank Closed – CASA biomass below surveys during 1998-2010, but above during most recent period. Moderate retrospective pattern

GBK-closed
Abundance (survey vs. model)



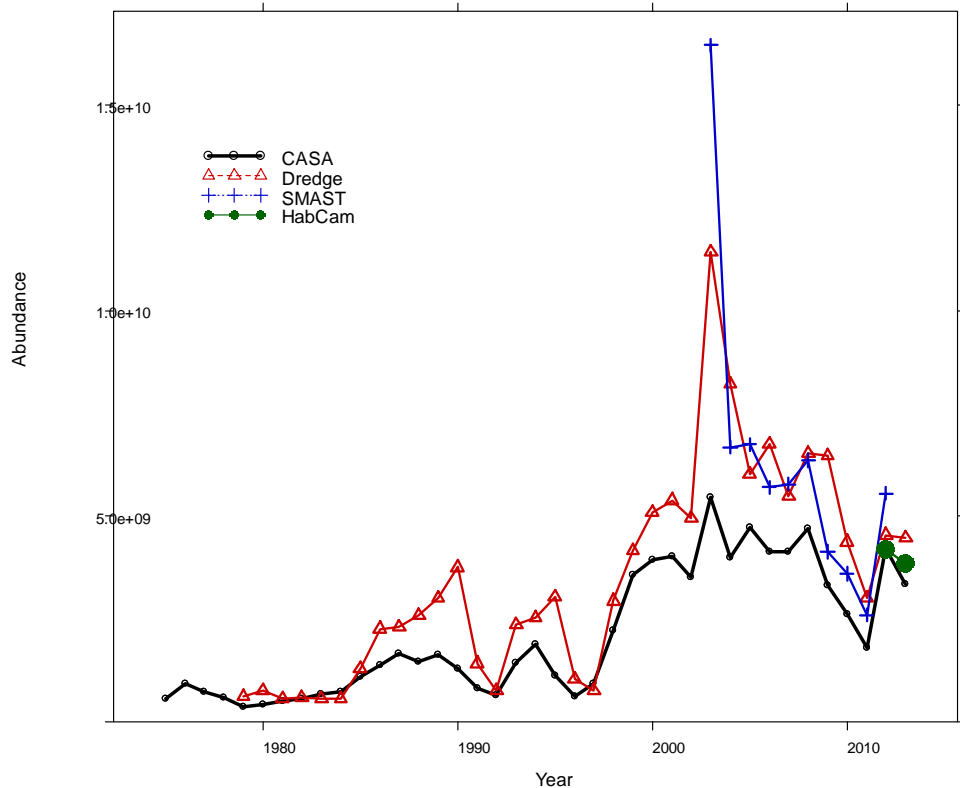
GBK-closed
Biomass (survey vs. model)



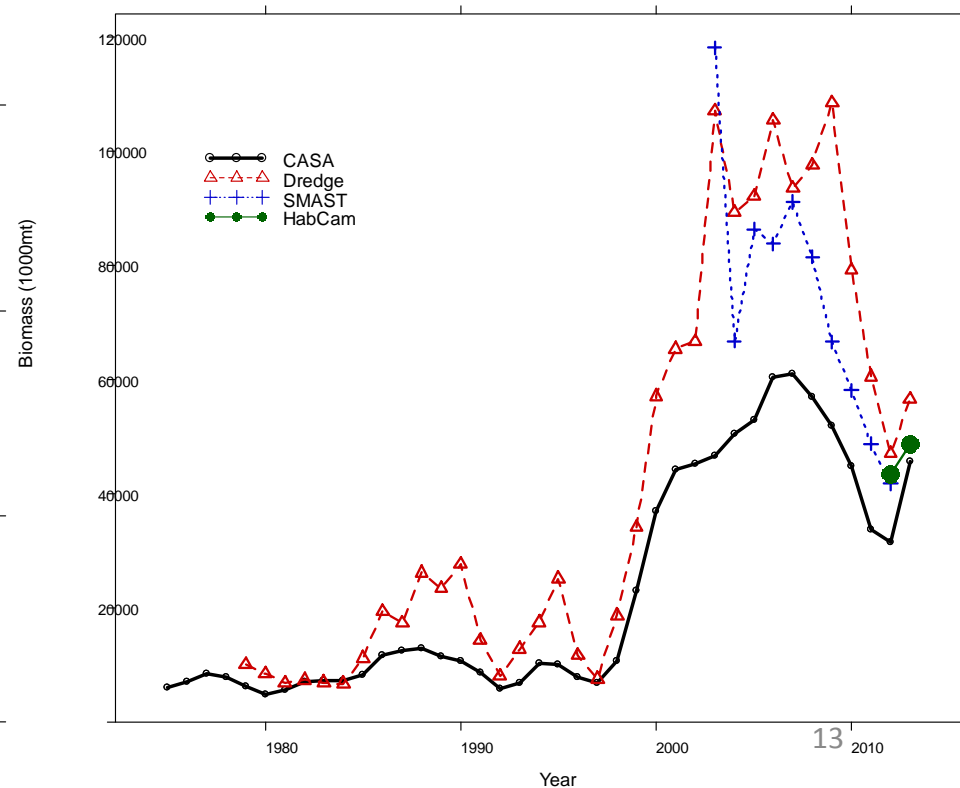
Mid-Atlantic – Model estimates tend to be below surveys, especially after strong recruitment. Retrospective pattern

Models may be suggesting density-dependent mortality among juveniles

Mid-Atlantic
Abundance (survey vs. model)

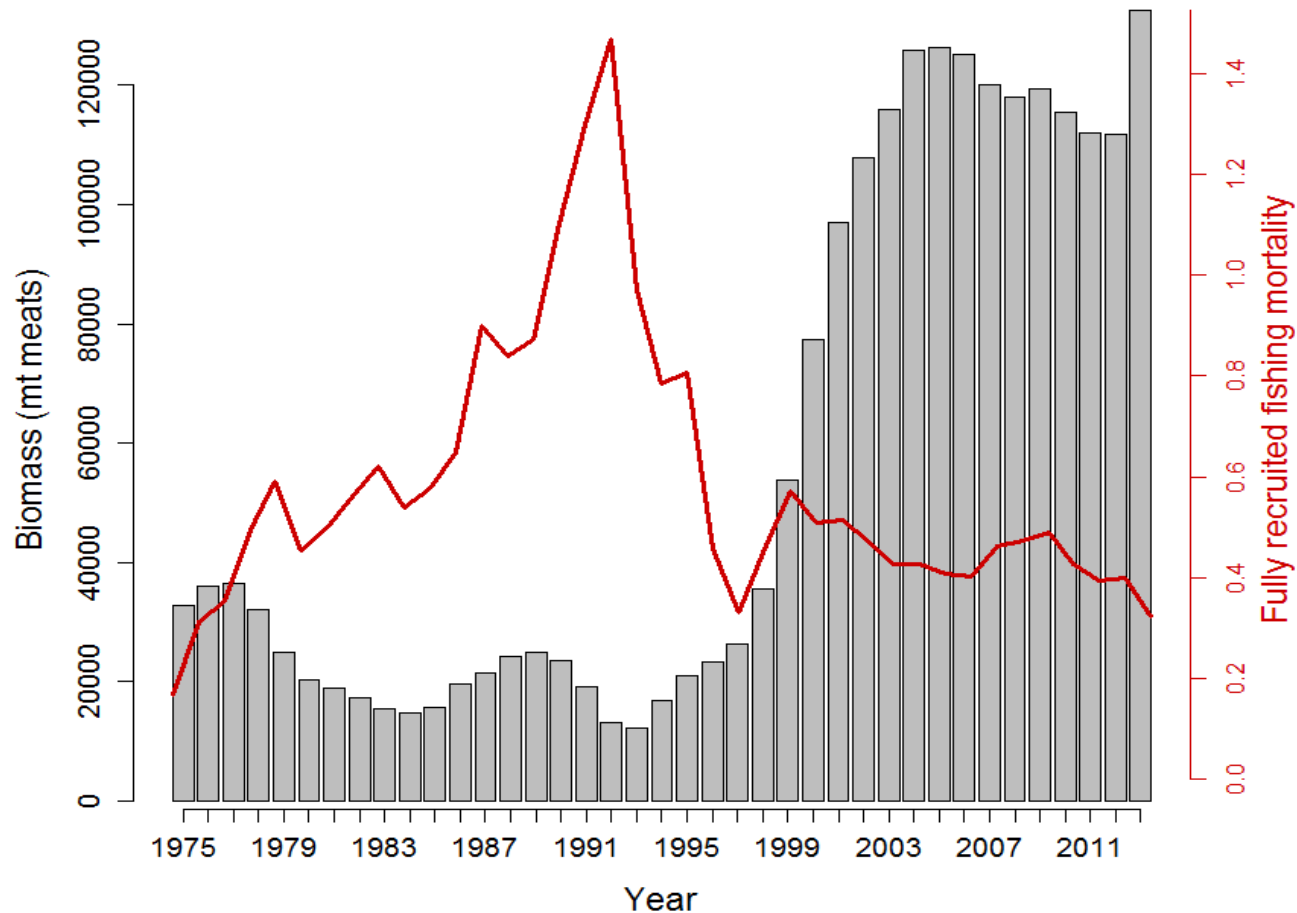


Mid-Atlantic
Biomass (survey vs. model)



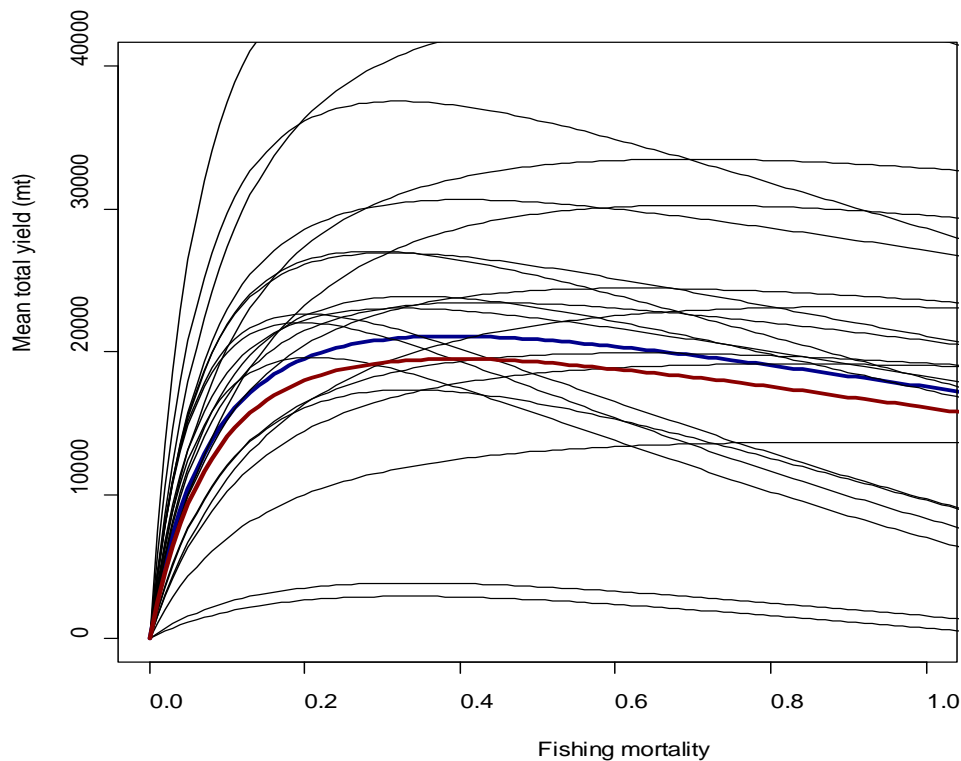
Whole stock (GB + MA) biomass and fishing mortality estimates.

2013 estimates: $F = 0.32$, $B = 132.6$ thousand mt

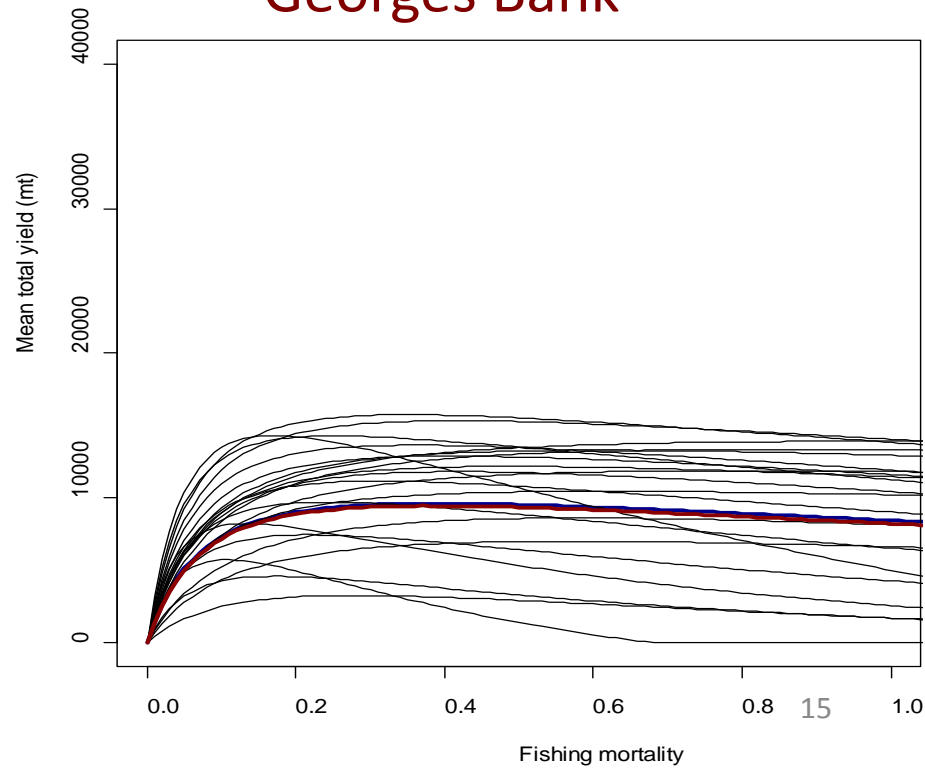


Reference points computed using the Stochastic Yield Model, that takes into account uncertainty in model parameters such as natural mortality and stock-recruit relationships

Mid-Atlantic

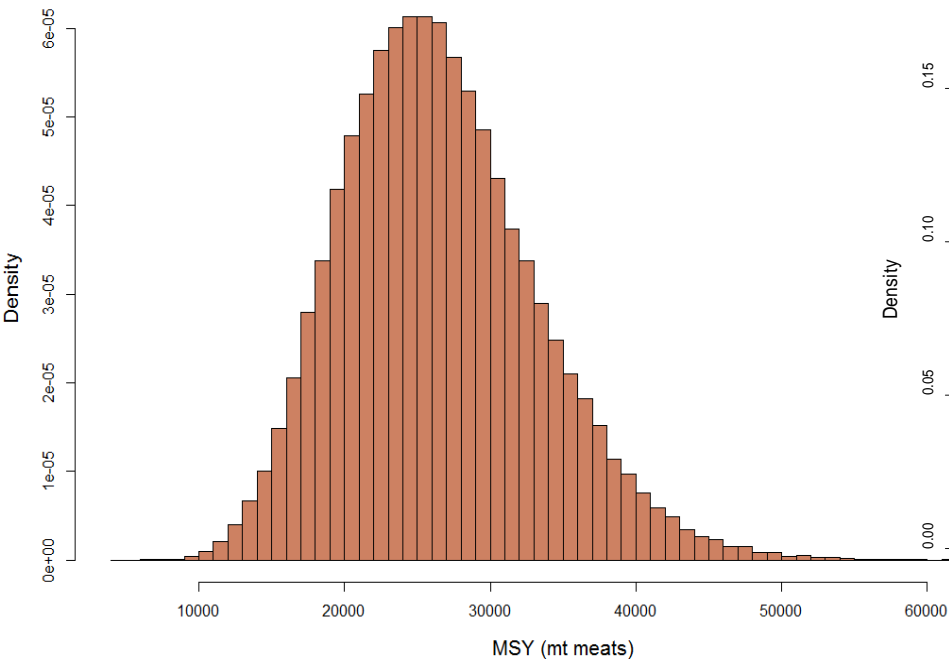


Georges Bank

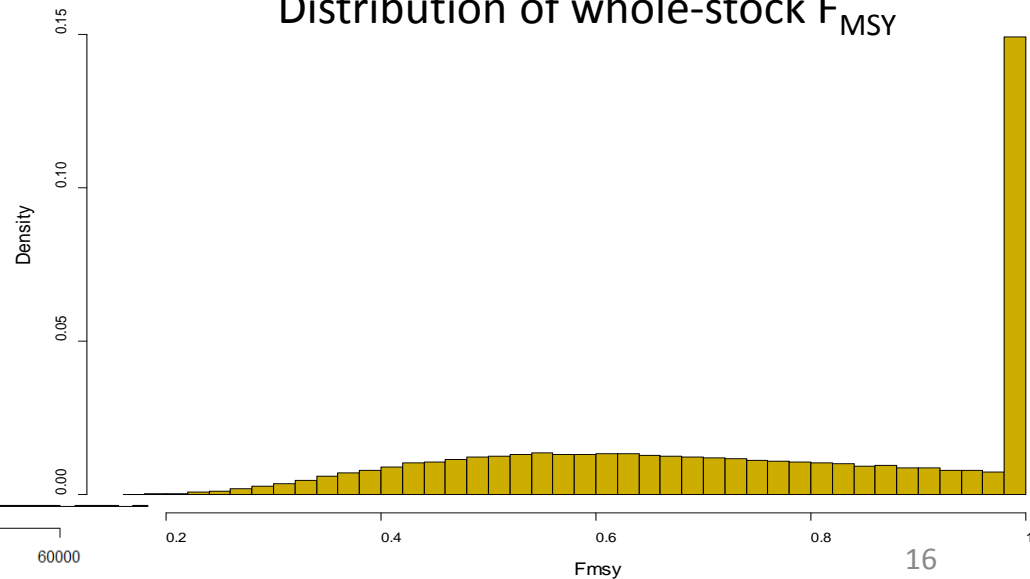


The model outputs distributions of reference points such as MSY and F_{MSY}

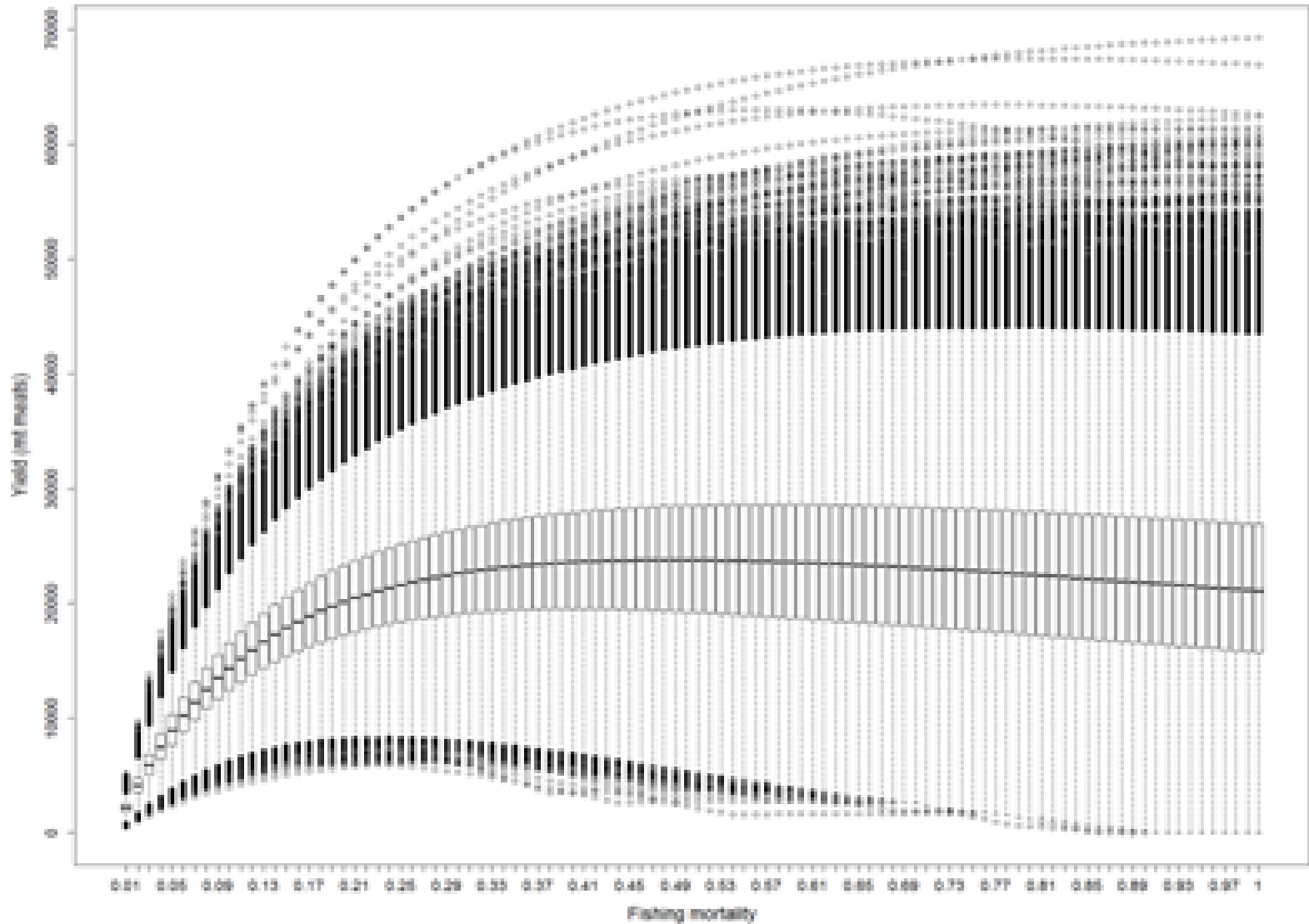
Distribution of whole-stock MSY



Distribution of whole-stock F_{MSY}



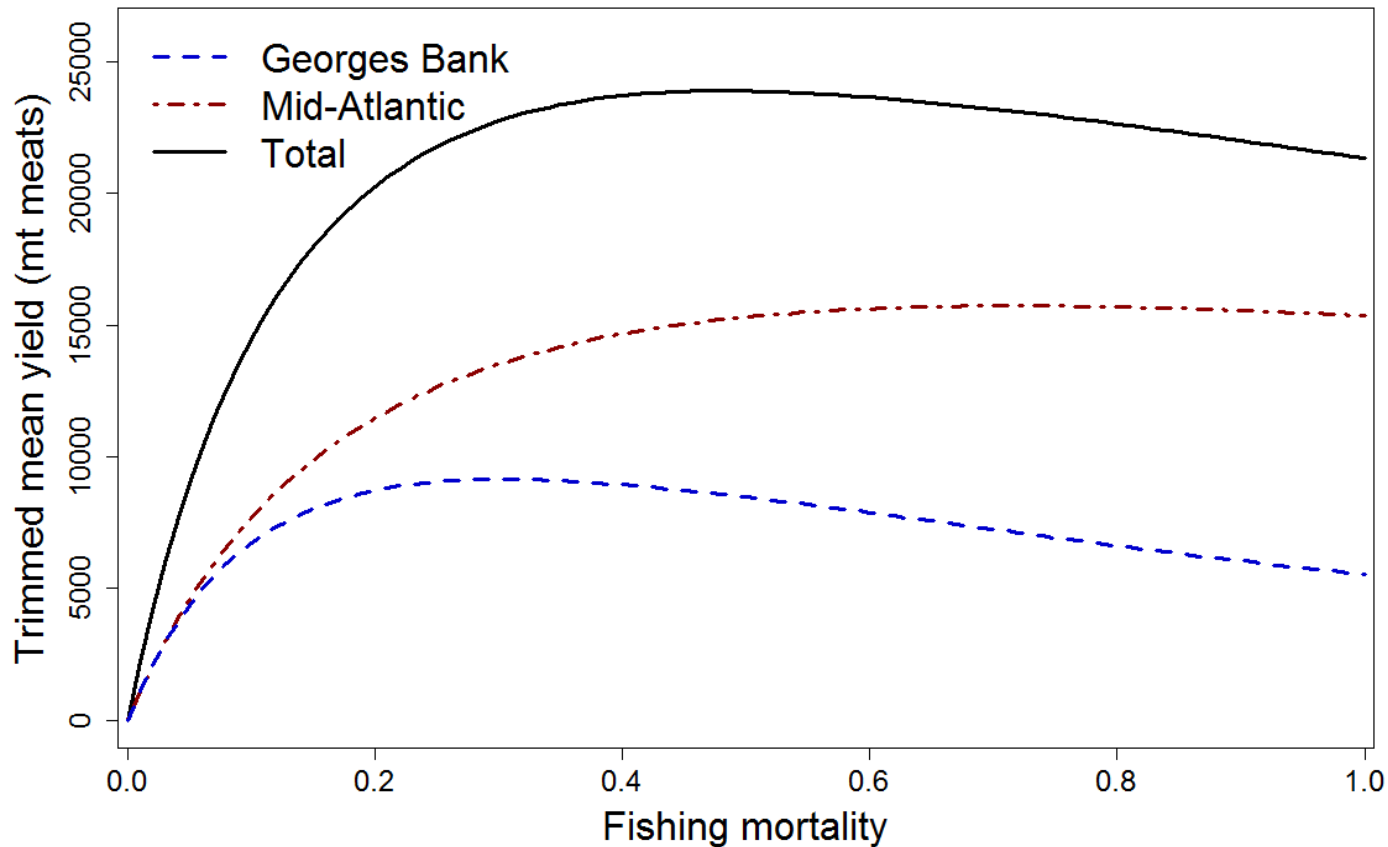
Whole stock yield boxplot



5. New Reference Points

FMSY = 0.48, MSY = 23,798 mt, BMSY = 96,480 mt

Increase in F_{MSY} due to increases in M and weakening of Mid-Atlantic stock-recruit relationships



Comparison of ACL values from old and new assessment

	SARC 50 (2010)	SARC 59 (2014)
OFL	F = 0.38	F = 0.48
ABC/ACL (25% chance of exceeding OFL)	F = 0.32	F = 0.38
ACT for LA fishery (25% chance of exceeding ABC)	F = 0.28	F = 0.34

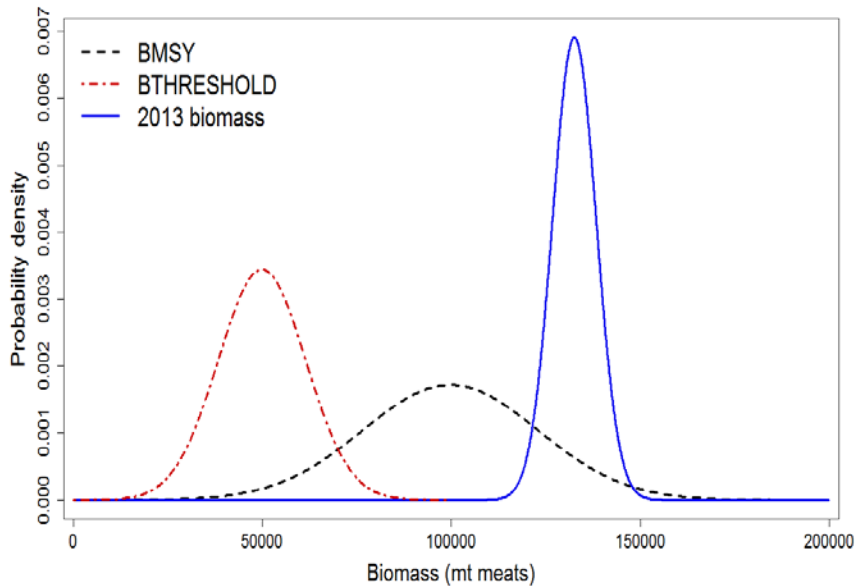
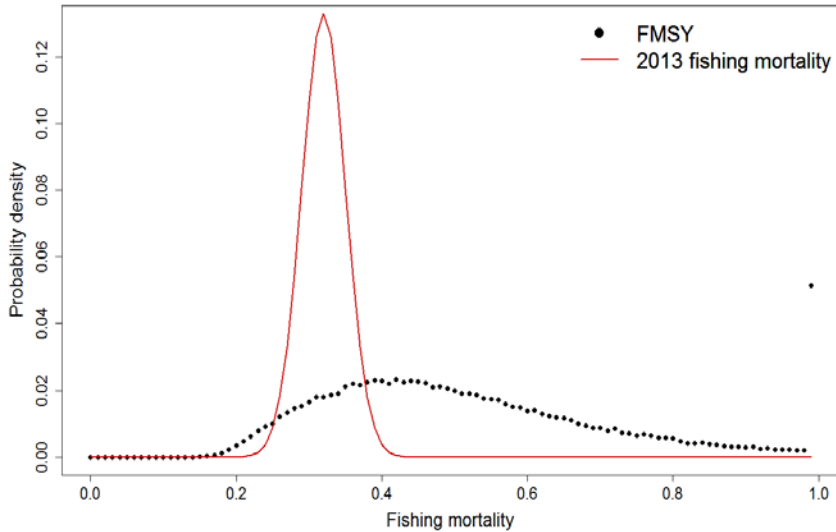
Overfished (biomass) status determination:

Estimated biomass in 2013 from CASA:	132,561 mt
Estimated B_{MSY} from SYM:	96,480 mt
Biomass (overfished) threshold: $\frac{1}{2} B_{MSY} =$	48,240 mt

Fishing mortality (overfishing) status determination:

Estimated fishing mortality in 2013 from CASA:	0.32
Estimated F_{MSY} from SYM:	0.48

Biomass is above B_{MSY} and F was below F_{MSY} so sea scallops were not overfished and overfishing did not occur in 2013



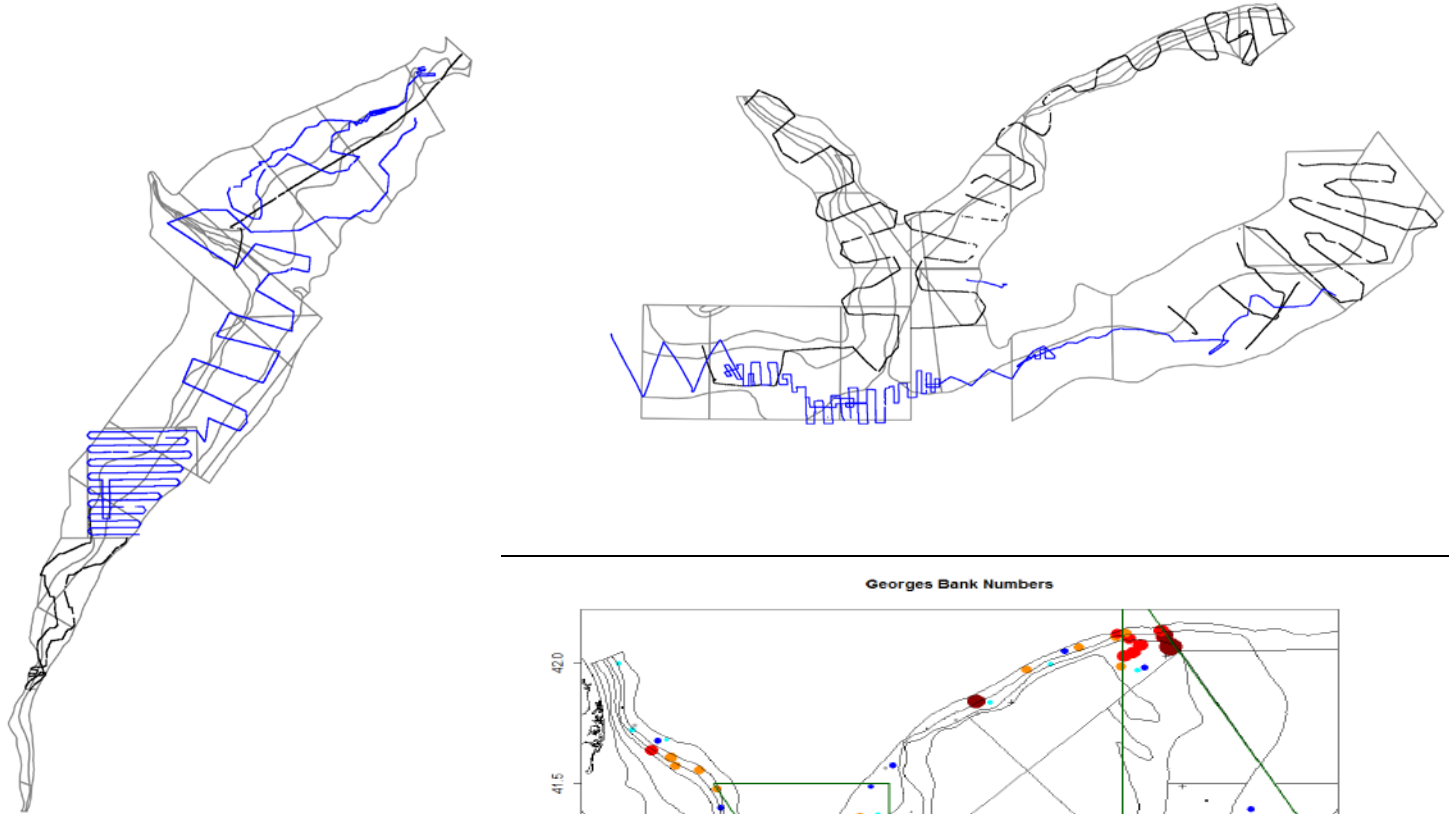
Modest chance that overfishing is occurring and almost no chance that the stock is overfished

The CASA model errors are likely underestimated, and CASA has a tendency to overestimate biomass and underestimate F , so that these figures underestimate the true errors of the CASA estimates

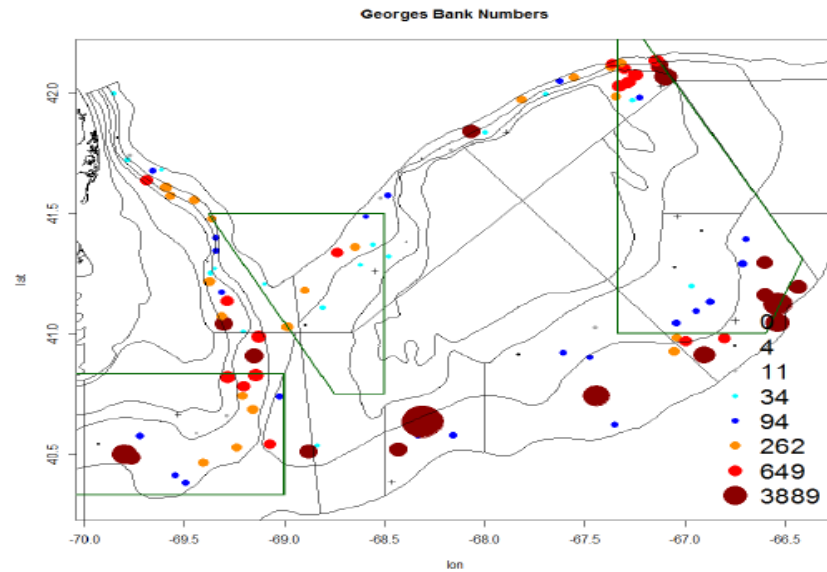
Part 2: 2014 survey results

- Document #2 – Summary of results and OFL/ABC estimates
- PDT Meeting on August 26/27 to review results (Document #7 – meeting summary for details)
- Extensive coverage by multiple surveys
- Preliminary biomass estimates per area

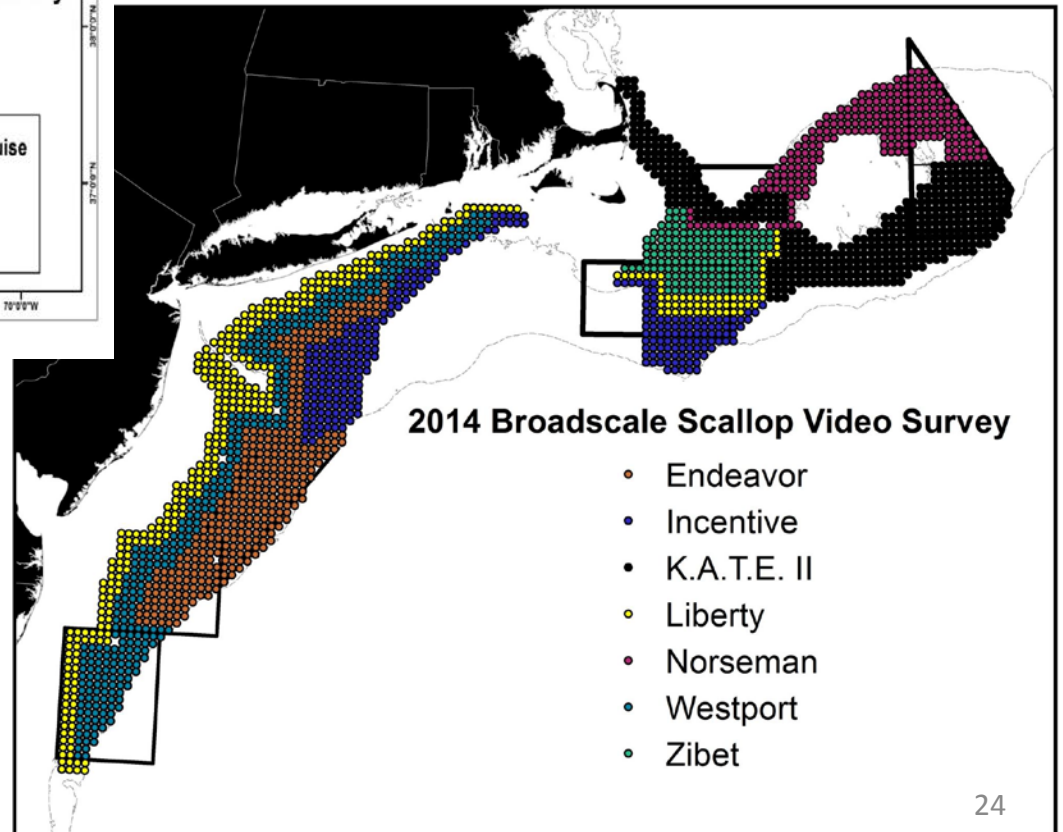
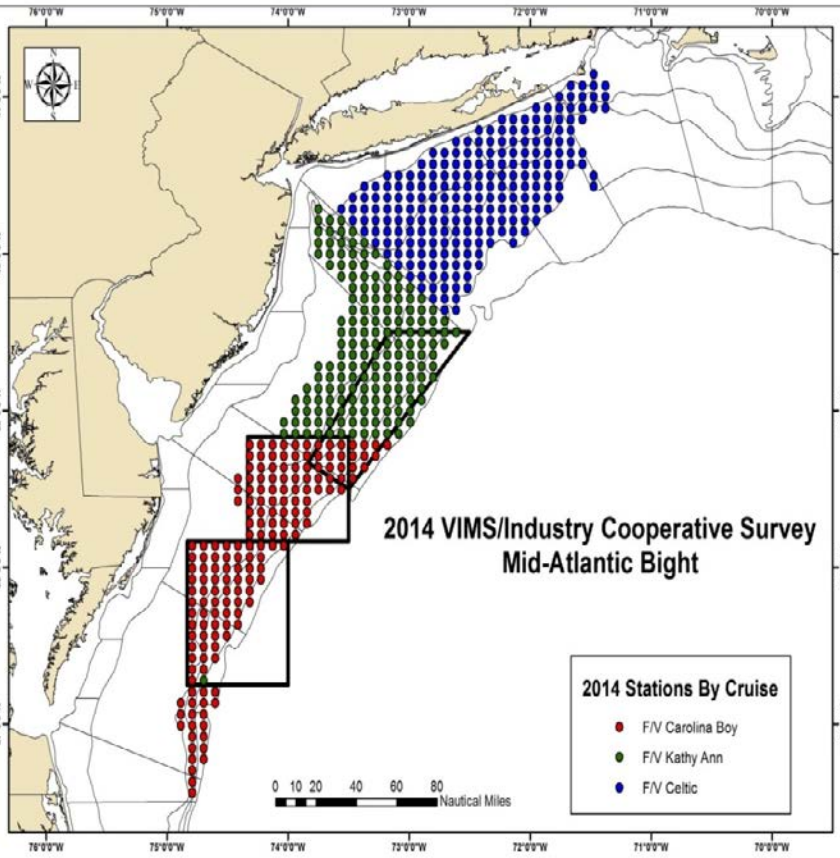
2014 Scallop Surveys



Federal Habcam V4 (black tracklines)
Arnie's Habcam V2 (blue tracklines)
Federal dredge stations on GB (bottom right)



2014 Scallop Surveys (cont.)



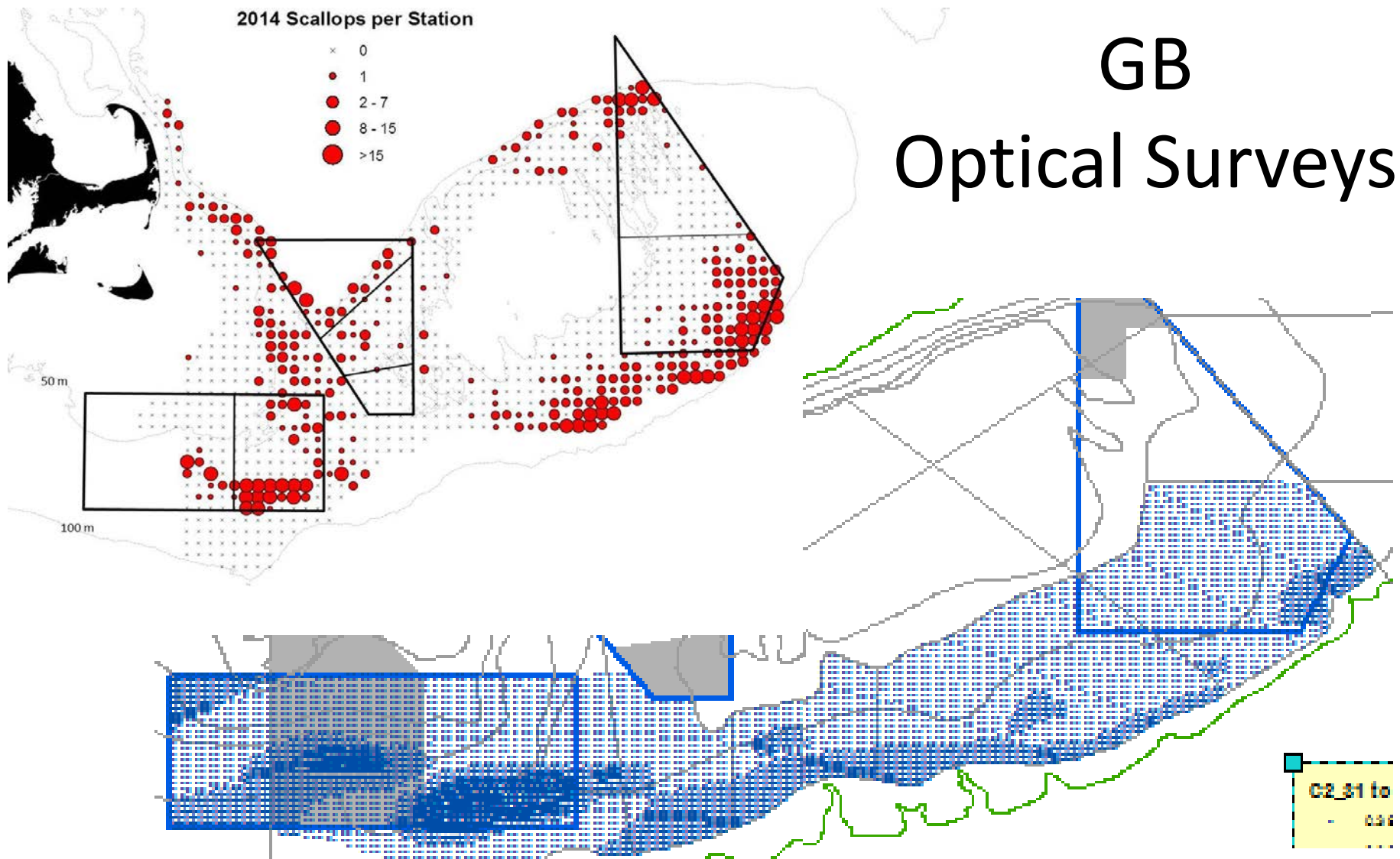
2014 Highlights

- Small scallops found in patches throughout GB
- Seed observed last year in and around NL and southern GB has survived
- One year old scallops observed off Long Island
- Patches of two year old scallops observed in inshore portions of MA access areas
- Abundance has increased, but most scallops are small

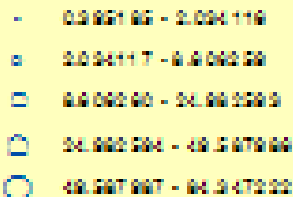
GB

Optical Surveys

2014 Scallops per Station



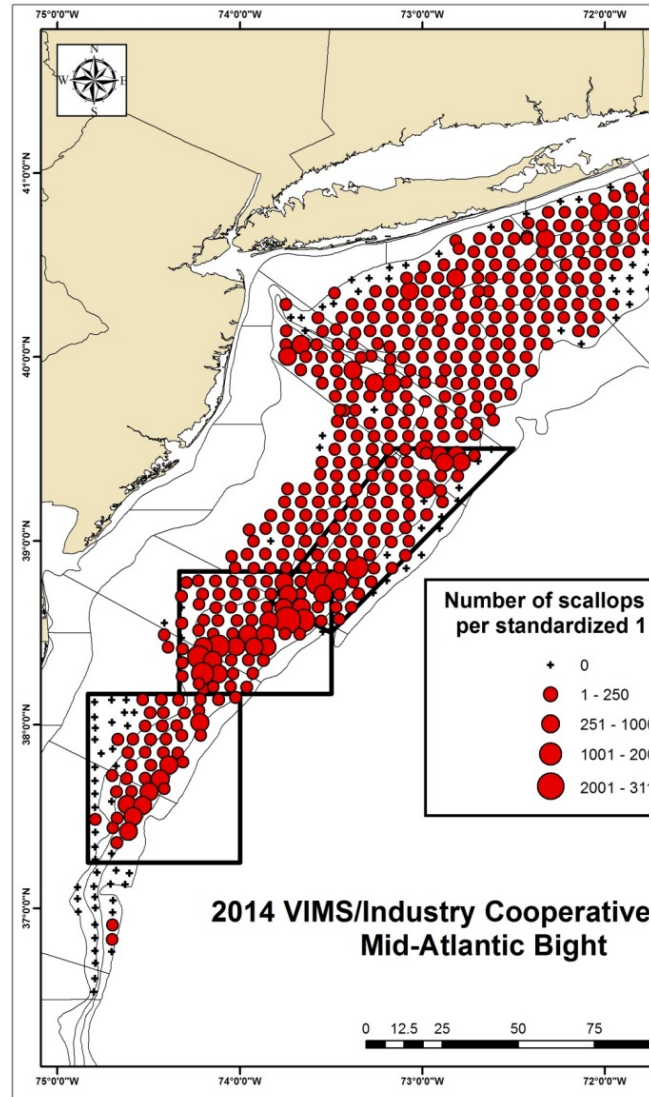
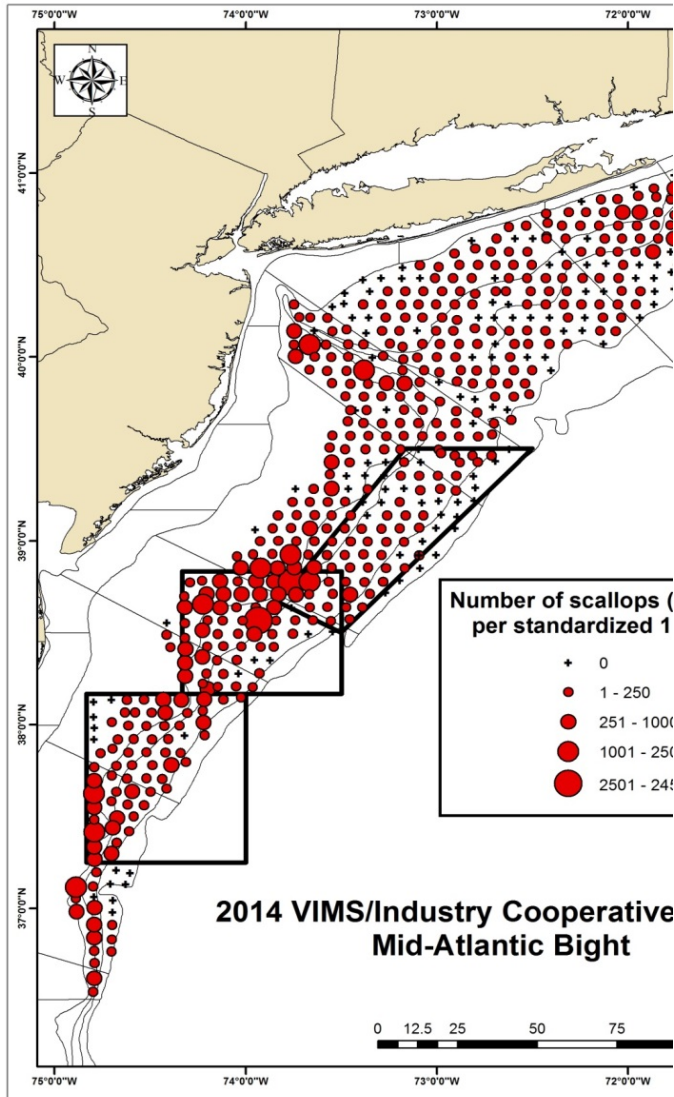
C2_31 to 75



Age 2 Scallops

MA Dredge

Small (31-
75mm)
and Large
(+75mm)
Scallops



Preliminary Biomass Estimates

Area	DREDGE			SMAST			Habcam		Totals		
	Bms	SE	Ebms	Bms	SE	Ebms	Bms	SE	Bms	SE	Ebms
Delmarva	4707	778	2080	9626	1093	3935	10598	2526	8310	1651	3008
Elephant Trunk	16392	3426	8067	24799	2909	12938	36154	14729	25782	8891	10503
HCS	5805	1206	3044	7381	1021	3143	18041	6752	10409	4004	3094
Virginia	279	79	3	NS	NS	NS			279	79	3
NYB	6822	1656	4140	6900	867	2119	12756	6082	9415	3674	3130
Long Island	11966	816	8438	10269	950	6402	14305	11131	12950	6467	7420
NYB Ext	1766	332	757	*	*	4013	*		*		2385
Block Island	939	206	535	1372	671	521	*		*		528
Mid-Atlantic Total	48676	4167	27064	60347	3612	33071	91854	20577	67145	12374	30069
CL-I NA	2163	649	1854	5115	3004	3091	21378	4510	9984	3151	2473
CL-1 Acc	333	59	246	962	375	190	*		*	219	218
CL-2 NA	8989	3190	7061	5550	2054	4191	7087	1486	7209	2353	5626
CL-2 Acc	7848	2462	3642	8197	2570	929	9835	3681	8627	2956	2286
NLS-NA	2240	1142	675	5211	4650	677			3726	2765	676
NLS-Acc	1637	327	854	30052	6534	3091	3231	626	11640	3794	1973
GSch	17689	1875	9485	11134	7849	4949	15994	3825	14939	5156	7217
SEP	15434	9833	2862	7026	1359	2476	16038	4019	12833	6183	2669
NEP	7752	9302	3837	5863	1483	2259	4330	861	5982	5461	3048
Georges Bank Total	64085	14311	30516	79110	12246	21853	77893	19008	74938	11446	26185
TOTALS	112761	14906	57580	143066	12767	54924	159149	28013	142083	16856	56253
* Included in other areas											

Part 3: OFL and ABC for FW26

- PDT Conference call on Sept 10
- SSC reviewed and approved PDT recommendations on Sept 15
- Will present results to full Council on Sept 30
- Same methods as the past for ABC control rule
- Over 25% Increase from 2014 OFL and ABC – but many scallops small so 2015 catches will NOT increase by the same amount

F_{ABC} is the 25th percentile of whole-stock F_{MSY} from SYM model

5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
0.27	0.3	0.33	0.36	0.38	0.4	0.43	0.45	0.47	0.49	0.52	0.54	0.57	0.61	0.64	0.69	0.75	0.83	1



$$F_{ABC} = 0.38$$

$$F_{TARGET} = 0.38 - 0.04 = 0.34$$

SAMS ABC Run

Initialized to 2014 surveys

Recruitment event in southern NLS access area not included in this run (outside normal SAMS area)

Fishing in 2014 determined by access area quotas and fleet dynamics model, overall landings 16500 mt

All areas fished in 2015 and 2016 @ $F_{ABC} = 0.38$

SAMS ABC Run

Year	Landings	Discards	Total ABC
2015	25879	6240	32119
2016	33872	5964	39836

SAMS OFL Runs

2014 as in ABC run

All areas fished @ 0.48 in 2015 and 2016

For 2016 OFL calculation, F was assumed to be 0.38 in all areas in 2015, i.e., the ABC was taken in 2015

SAMS OFL Runs

Year	Landings	Discards	Total OFL
2015	31309	7818	39127
2016	41064	7425	48489

Performance of OFL/ABC/ACL/ACT to date

	OFL	ABC (including discards)	Discards	ABC available to fishery = ACL (after discards removed)	Actual Landings	% of ACL (landings/ACL)	Total Catch (landings plus assumed discards)	% of ABC (including discards)
	A	B	C	A-C = D	E	E/D	E+C=F	F/B
2011	32,387	31,279	4,009	27,269	26,795	98.30%	30,804	98.50%
2012	34,382	33,234	4,266	28,961	26,160	90.30%	30,426	91.60%
2013	31,555	27,370	6,366	21,004	18,303	87.14%	24,669	90.13%
2014	30,419	26,240	5,458	20,782	16,500 (17,447)	79.4% (84.0%)	21,958 (22,905)	83.7% (87.3%)
2015 (default)	34,247	29,683	5,701	23,982				
2015 proposed	39127	32119	6240	25879				
2016 proposed	48489	39836	5964	33872				

- 2014 Actual landings is a projection only – the fishing year is only half over.
- PDT estimated catch using trends from NMFS Monitoring website (and estimate in parentheses is the projected catch from FW25).