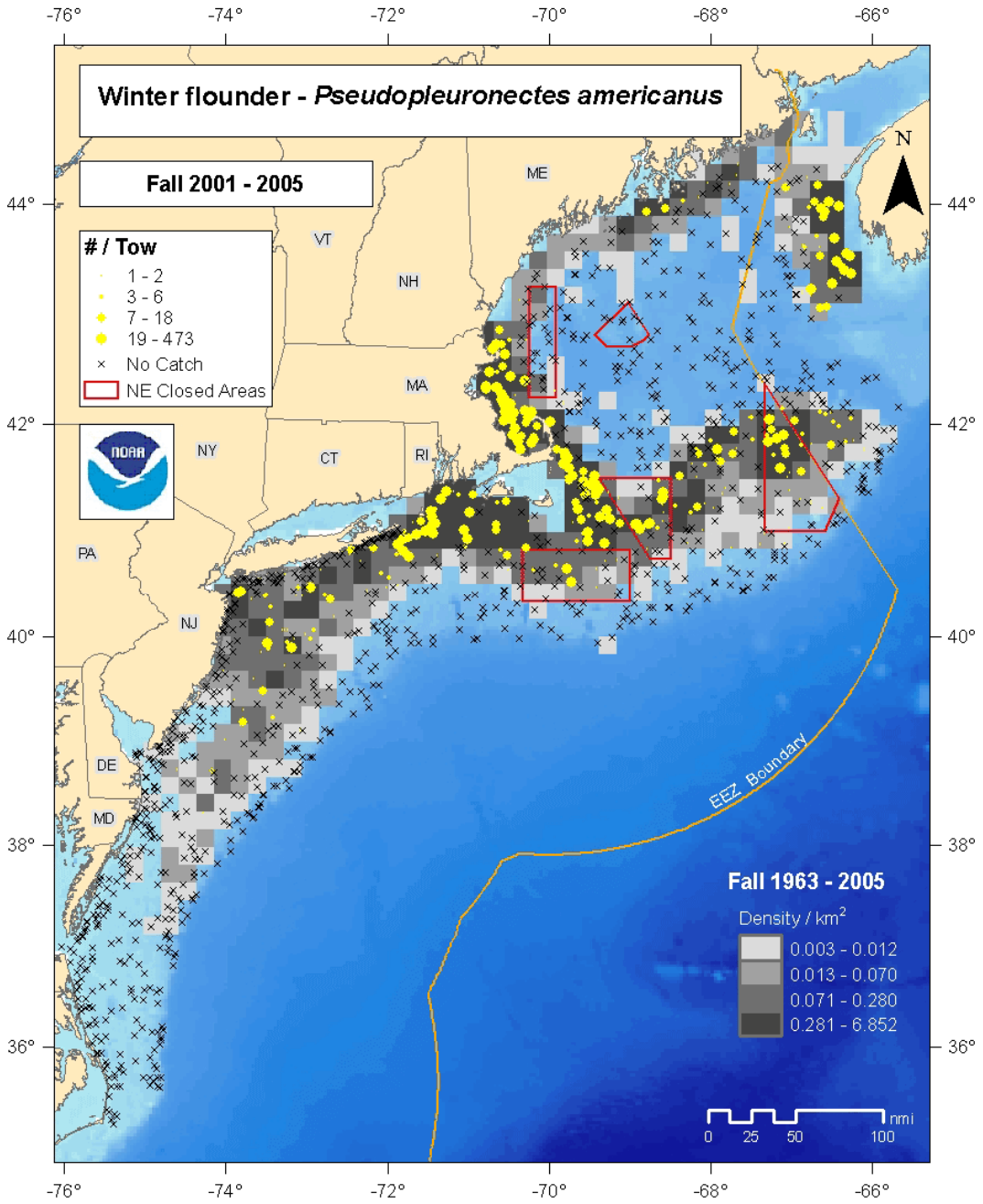
Gulf of Maine winter flounder
Operational Update 2014


Winter flounder - Pseudopleuronectes americanus
Fall 2001 - 2005
/ Tow
1 - 2
3 - 6
7 - 18
19 - 473
No Catch
NE Closed Areas
NOAA
N
ME
VT
NH
MA
NY
CT
RI
PA
NJ
DE
MD
-76°
-74°
-72°
-70°
-68°
-66°
44°
42°
40°
38°
36°
EEZ Boundary
Fall 1963 - 2005
Density / km²
0.003 - 0.012
0.013 - 0.070
0.071 - 0.280
0.281 - 6.852
nmi
0
25
50
100

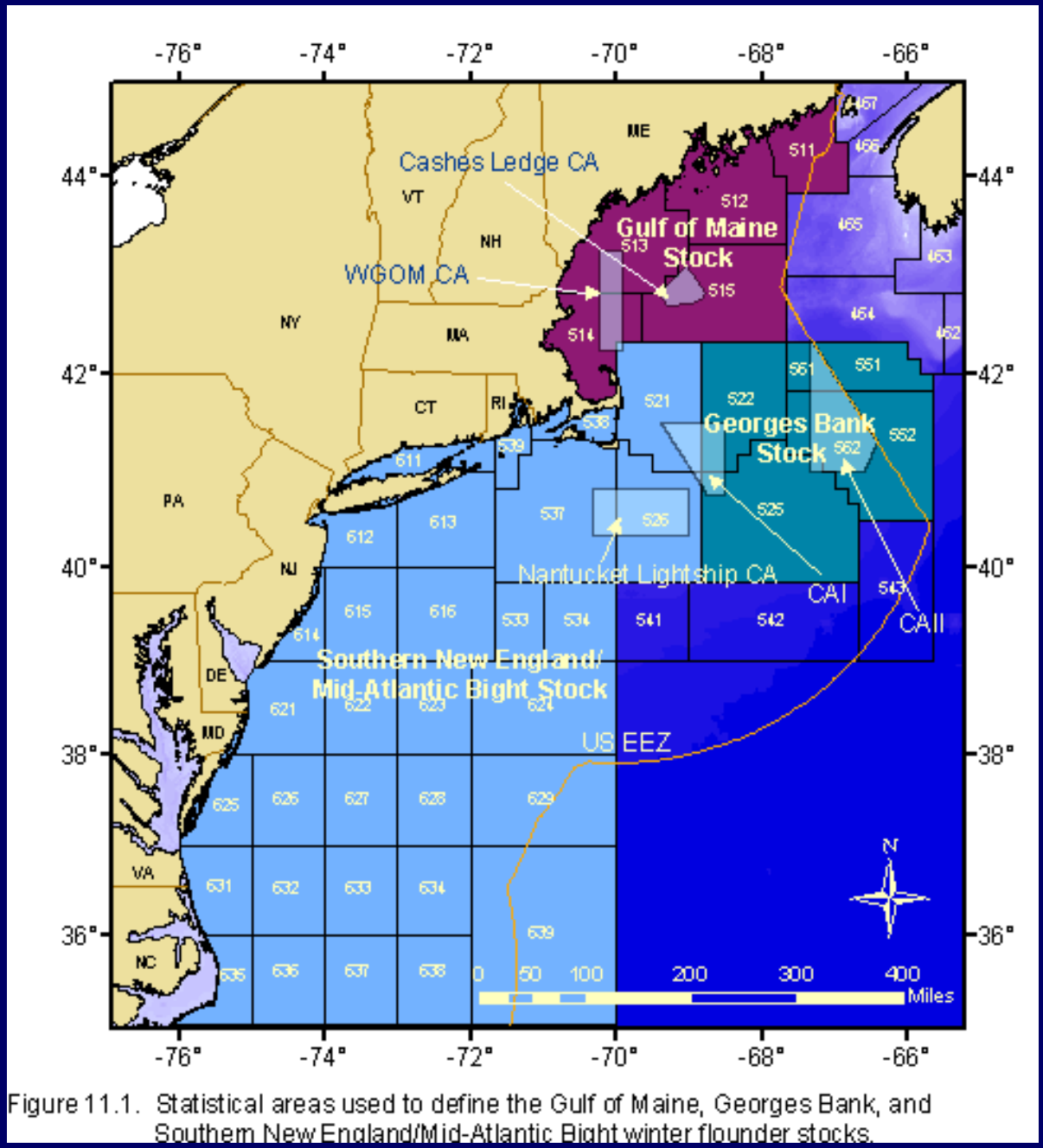


Figure 11.1. Statistical areas used to define the Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic Bight winter flounder stocks.

GARM III & SARC 52 Gulf of Maine Winter Flounder Conclusion

Wicked retrospective pattern and

a very large change in Qs for the split VPA models

Or a horrible fit to commercial age comps in ASAP.

Models have difficulty with the apparent lack of a relationship between a large decrease in the catch with little change in the indices and age and/or size structure over time.

GARM III

Models were rejected

SARC 52

Gulf of Maine Winter Flounder SARC 52 (Terminal year 2010)

- *Modeling (VPA, SCALE, ASAP). Conflicting signals in the data sources exist (large decrease in catch over the time series with little change in the indices or age structure in both the catch and surveys).*

- *Plan B (Appendix C1 in SARC 52)*

  "A new sophisticated model"

Direct survey 30+ cm area swept biomass estimates.

Gulf of Maine Winter Flounder SARC 52 Status

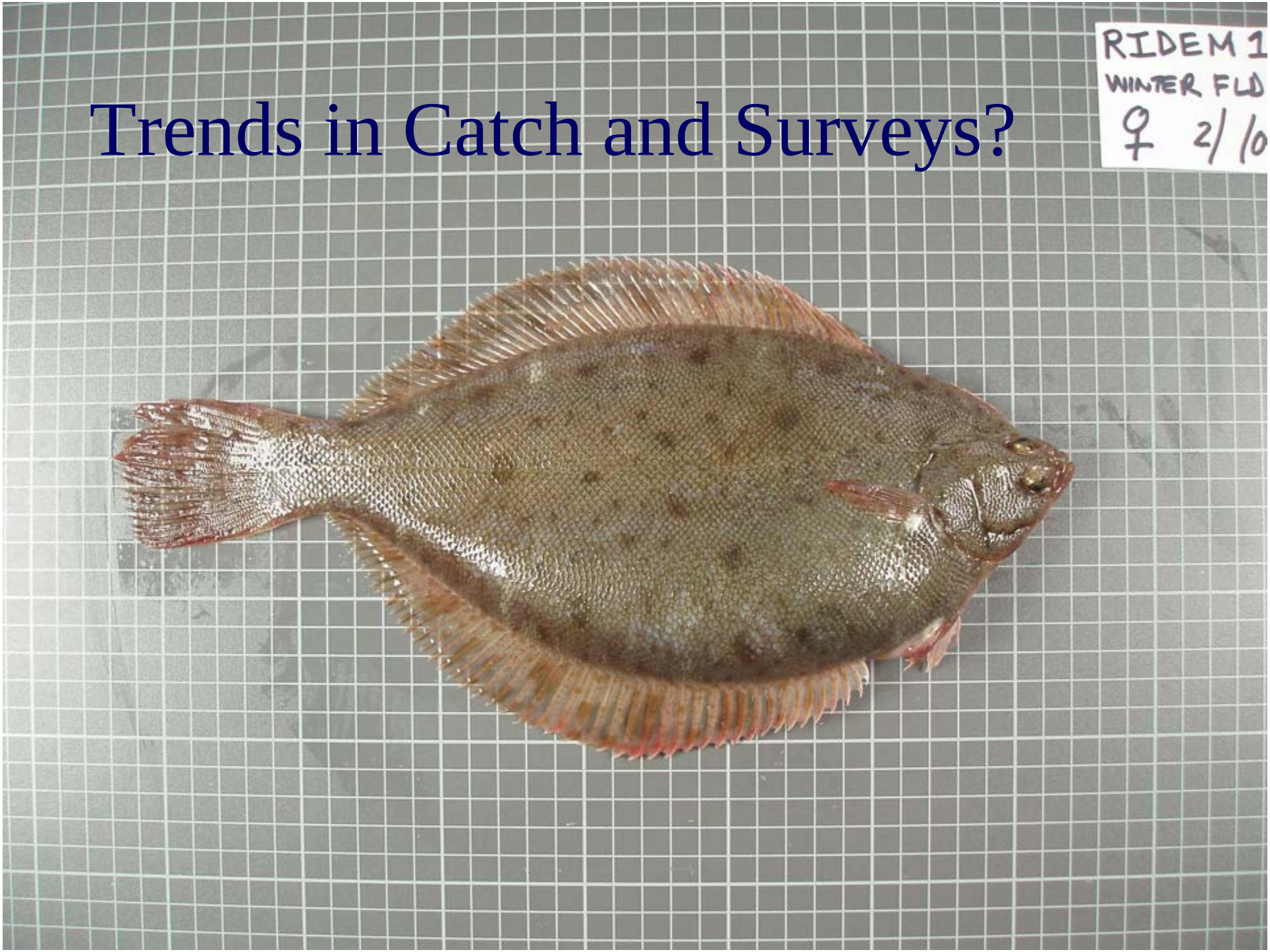
Plan B Appendix C1 in SARC 52

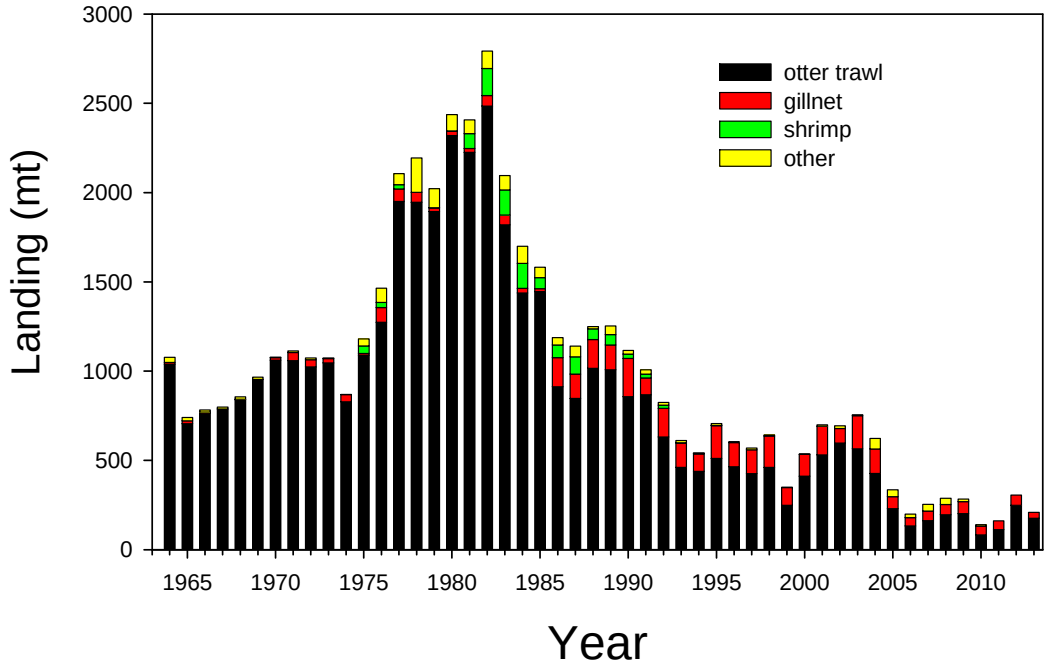
Exploitation rates based of catch/30+ cm area swept biomass were low.

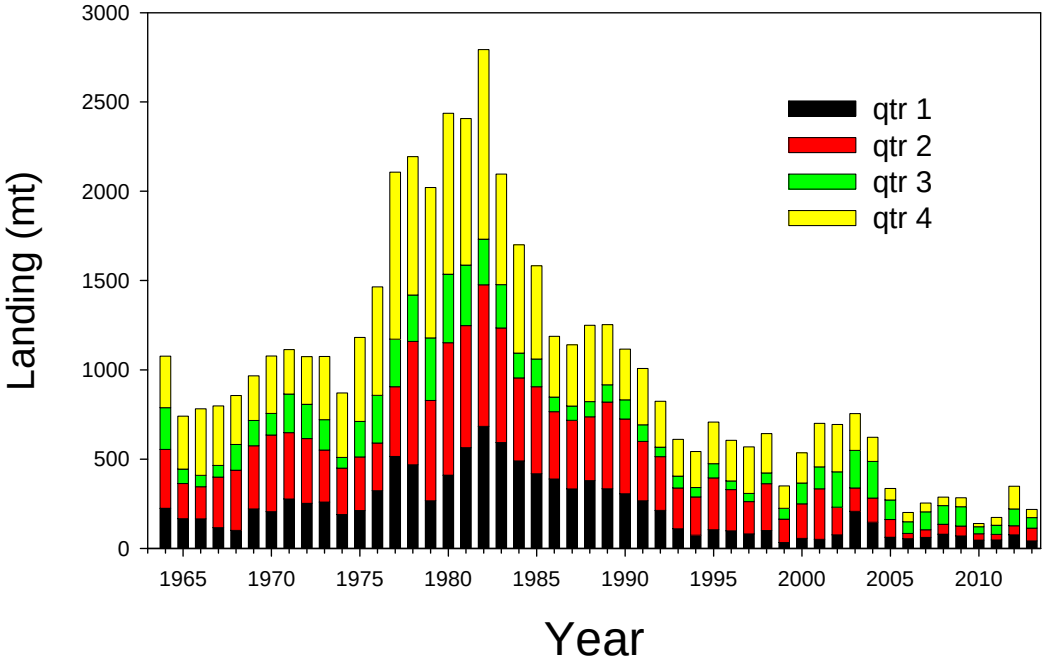
Overfishing was not occurring (F2010/F40% = 0.13).

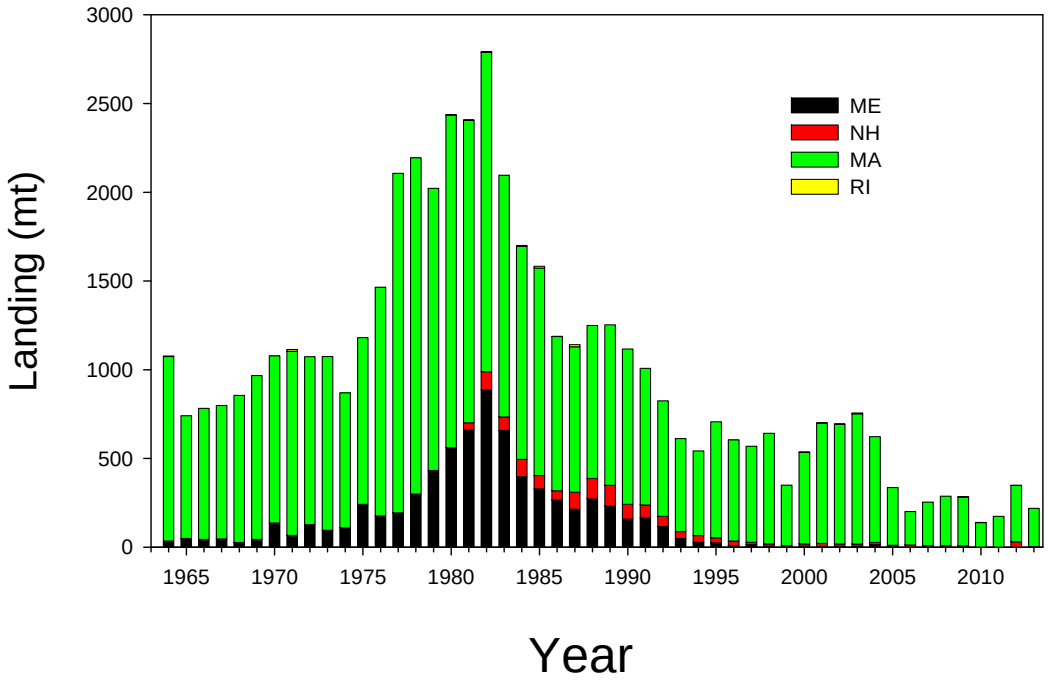
The Overfished status is unknown.

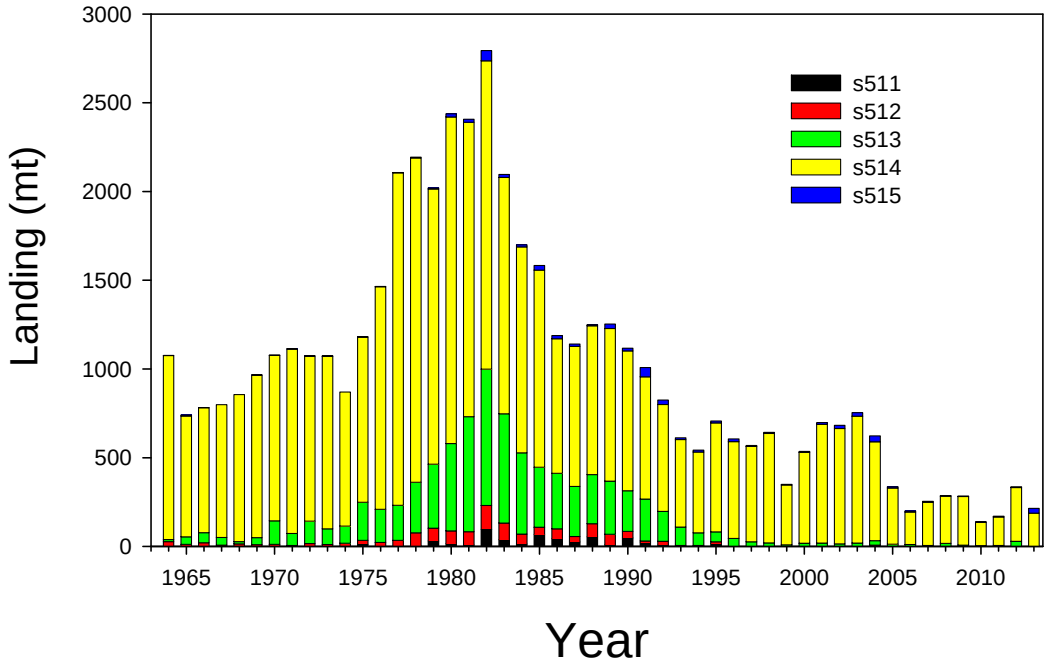
Trends in Catch and Surveys?




Landing (mt)
3000
2500
2000
1500
1000
500
0
otter trawl
gillnet
shrimp
other
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
Year

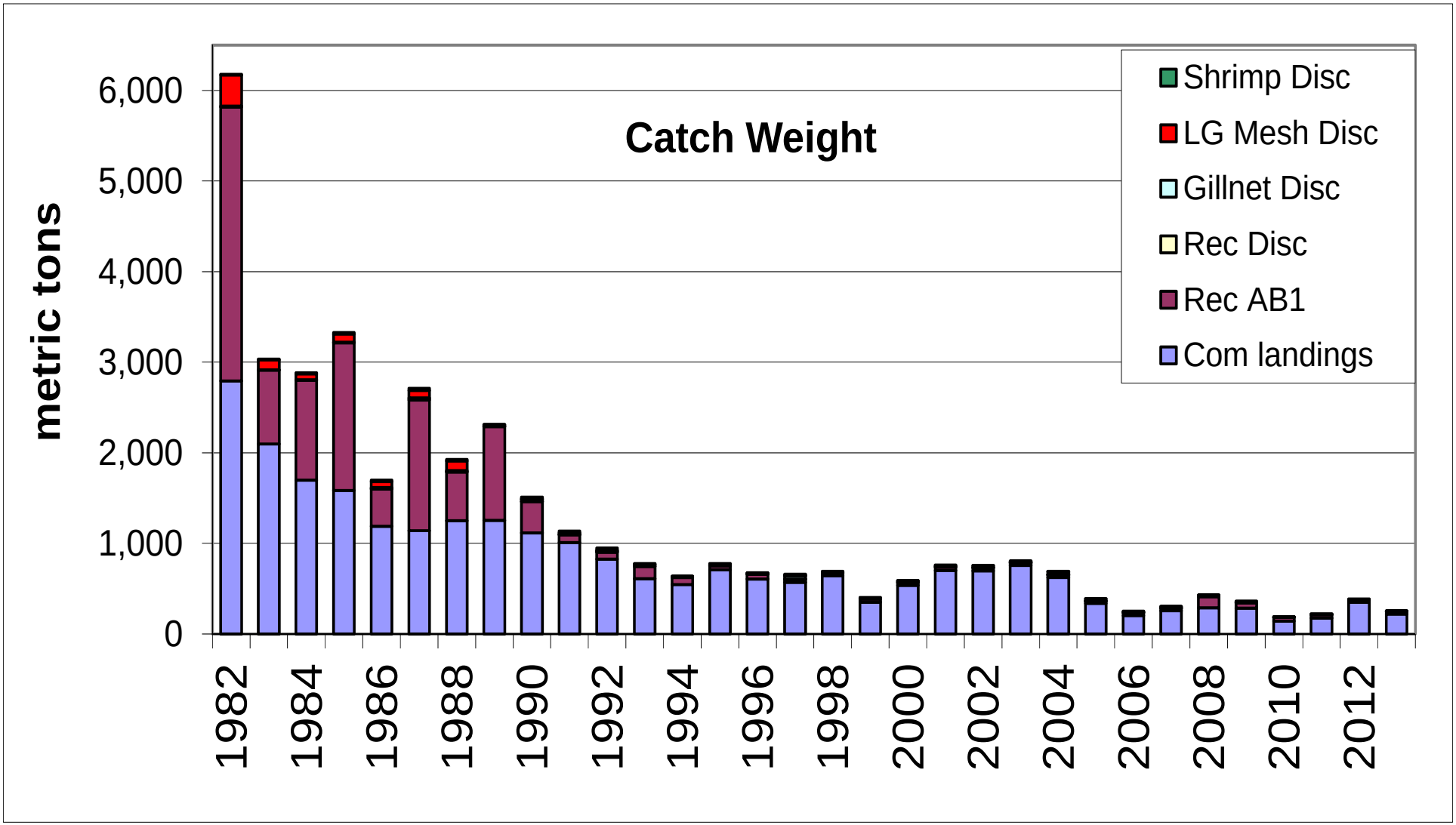

Landing (mt)
3000
2500
2000
1500
1000
500
0
qtr 1
qtr 2
qtr 3
qtr 4
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
Year


Landing (mt)
3000
2500
2000
1500
1000
500
0
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
ME
NH
MA
RI
Year


Landing (mt)
3000
2500
2000
1500
1000
500
0
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
s511
s512
s513
s514
s515
Year

Updated discards 2004-2013 (Discard/Keptall ratio x Keptall)

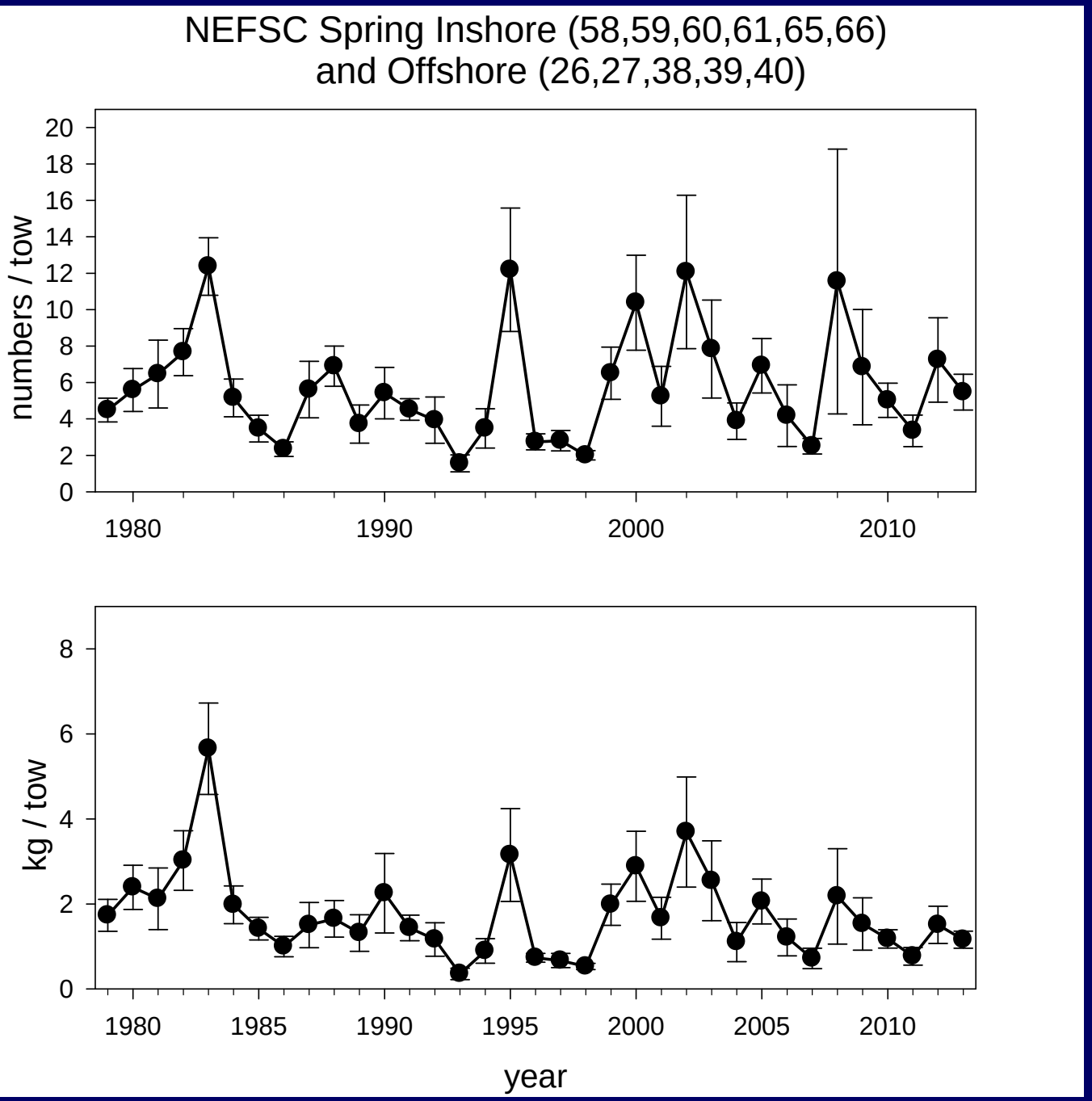
	Discard Ratio			CV			Metric Tons		
	trawl			trawl			trawl		
year	lg mesh	shrimp	gillnet	lg mesh	shrimp	gillnet	lg mesh	shrimp	gillnet
2004	0.0022	0.0035	0.0011	0.28	0.27	0.27	60.61	3.83	7.65
2005	0.0025	0.0063	0.0003	0.27	0.41	0.22	46.95	5.52	2.21
2006	0.0019	0.0012	0.0001	0.32	0.33	0.42	20.89	1.49	0.85
2007	0.0032	0.0010	0.0002	0.33	0.33	0.39	29.73	2.08	1.33
2008	0.0015	0.0018	0.0002	0.24	0.26	0.43	17.12	3.40	1.76
2009	0.0015	0.0046	0.0003	0.19	0.33	0.29	16.19	5.62	2.31
2010	0.0004	0.0016	0.0001	0.26	0.42	0.16	4.80	5.61	0.82
2011	0.0005	0.0001	0.0001	0.11	0.00	0.09	5.95	0.36	0.90
2012	0.0013	0.0008	0.0002	0.11	0.29	0.08	17.08	1.41	1.16
2013	0.0009	0.0070	0.0001	0.17	0.32	0.18	9.74	1.36	0.45

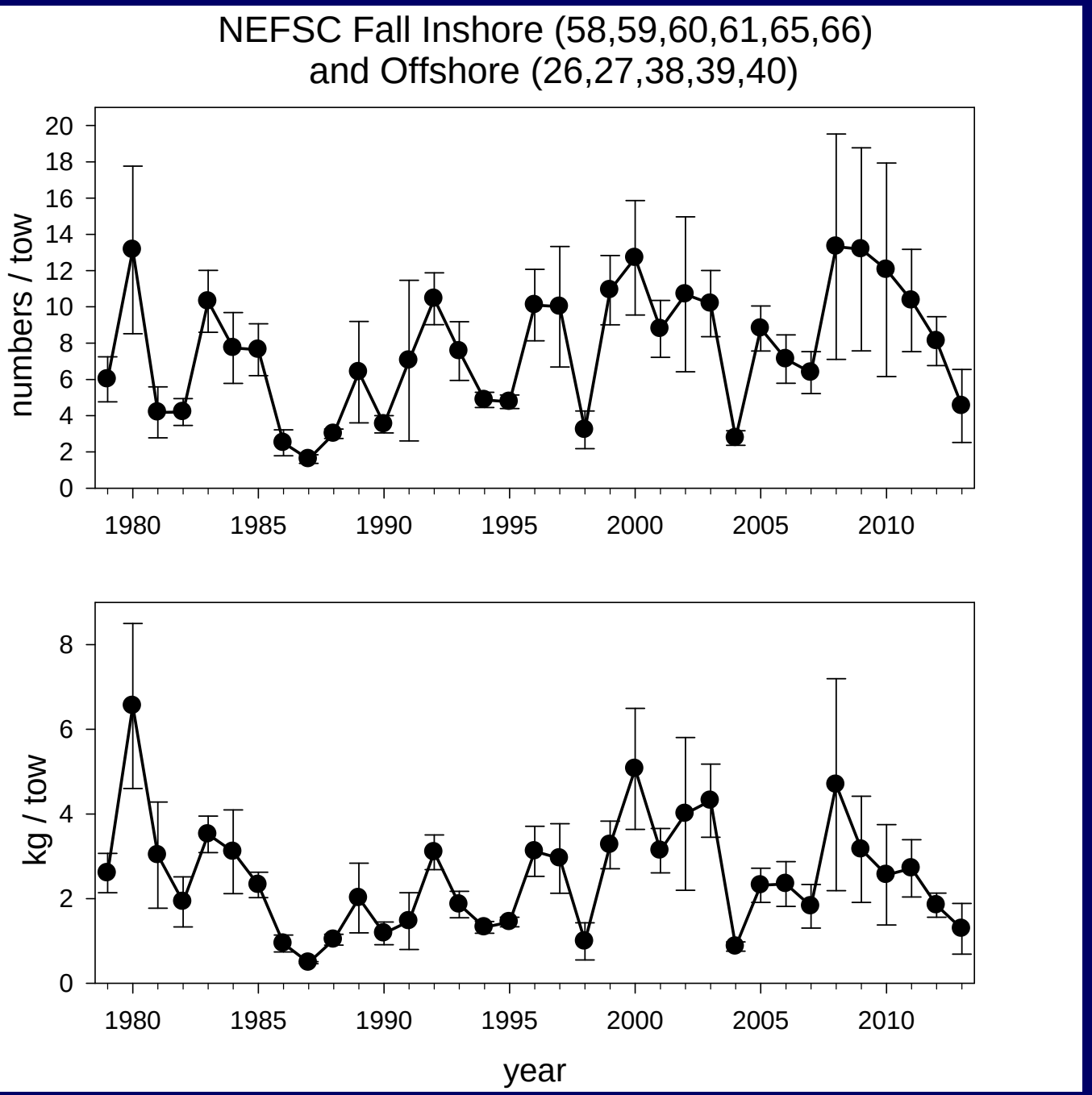


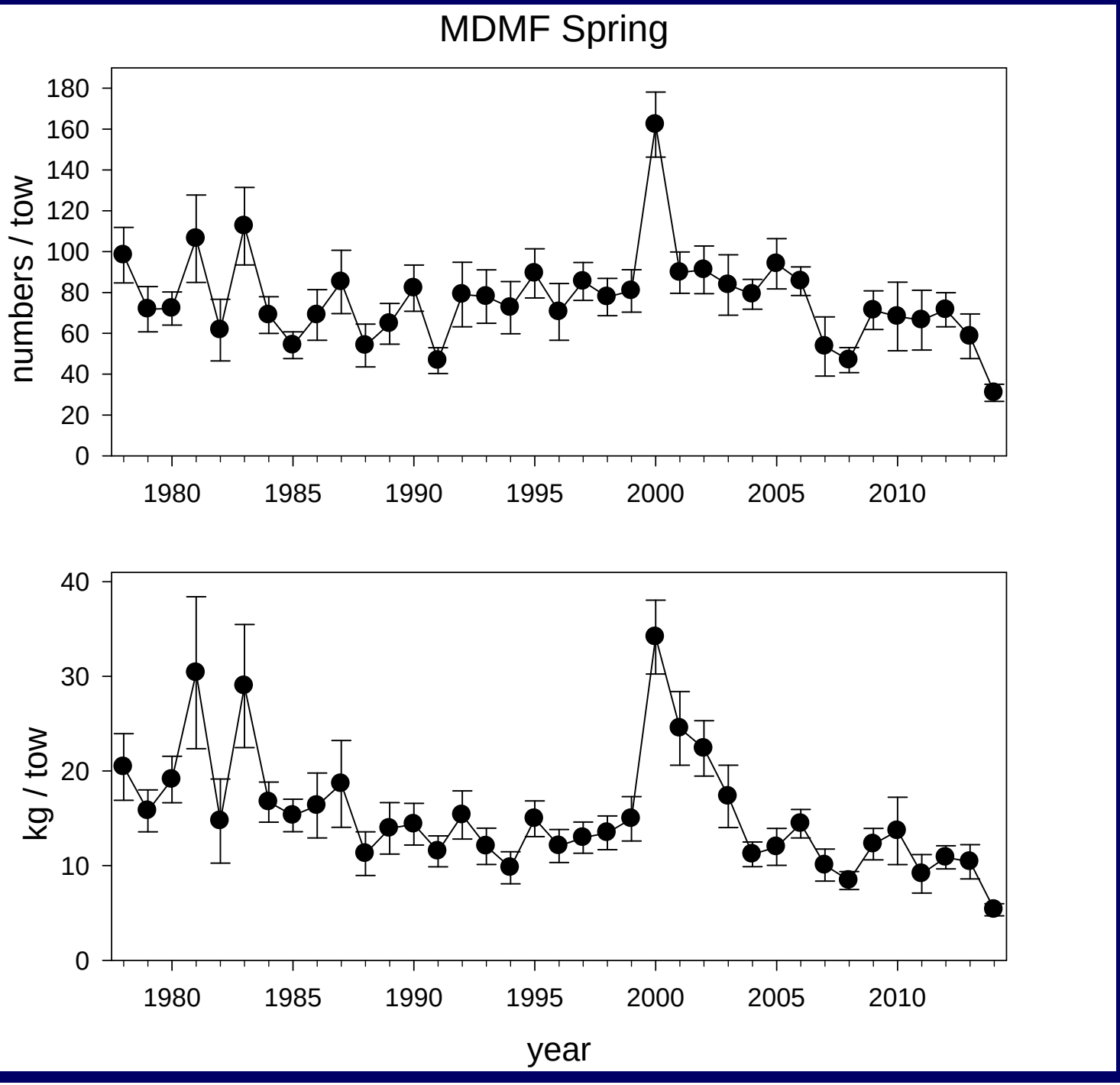
Commercial Discards assume a 50% mortality
Recreational Discards assume 15% mortality

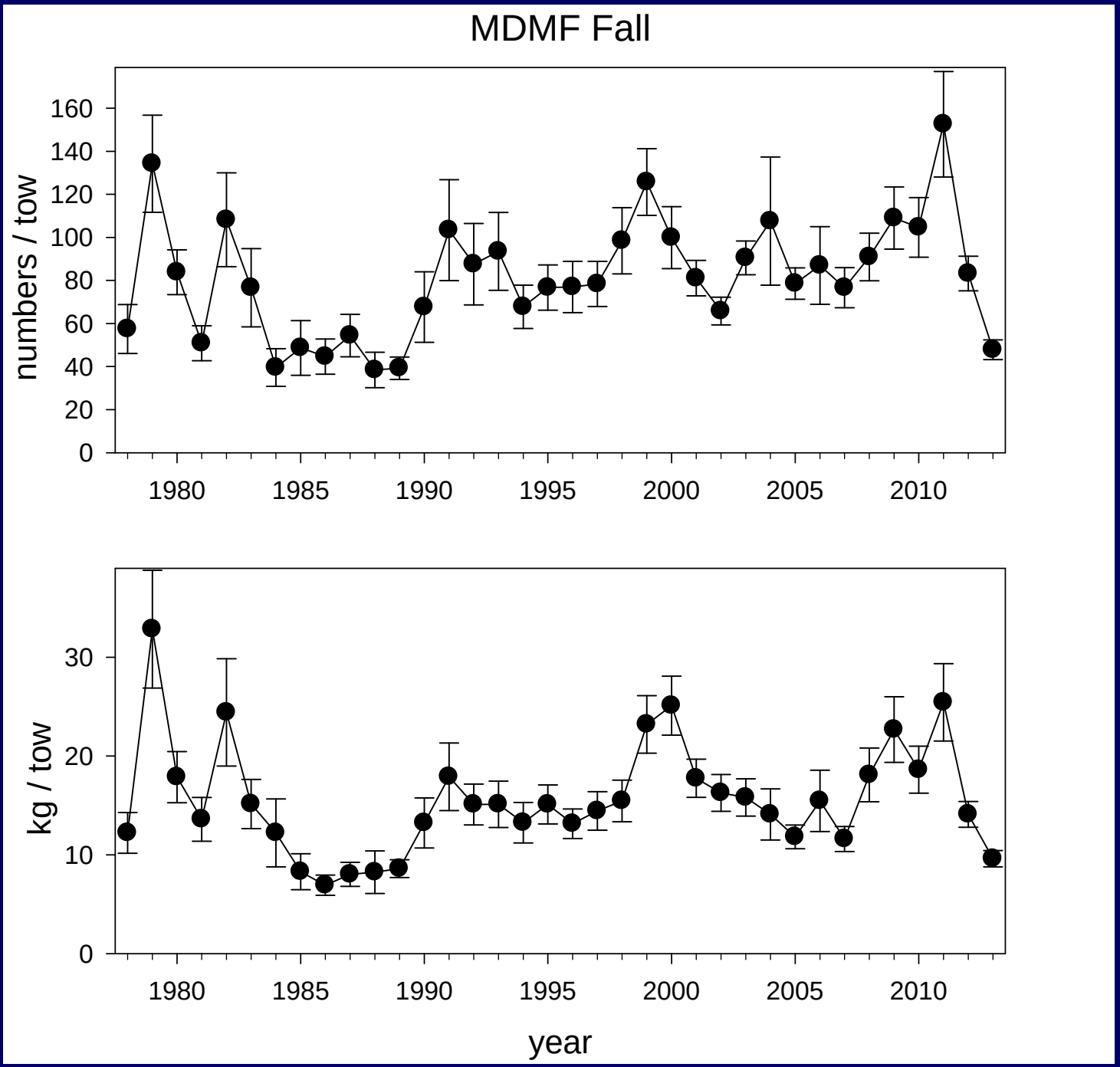
Table B5

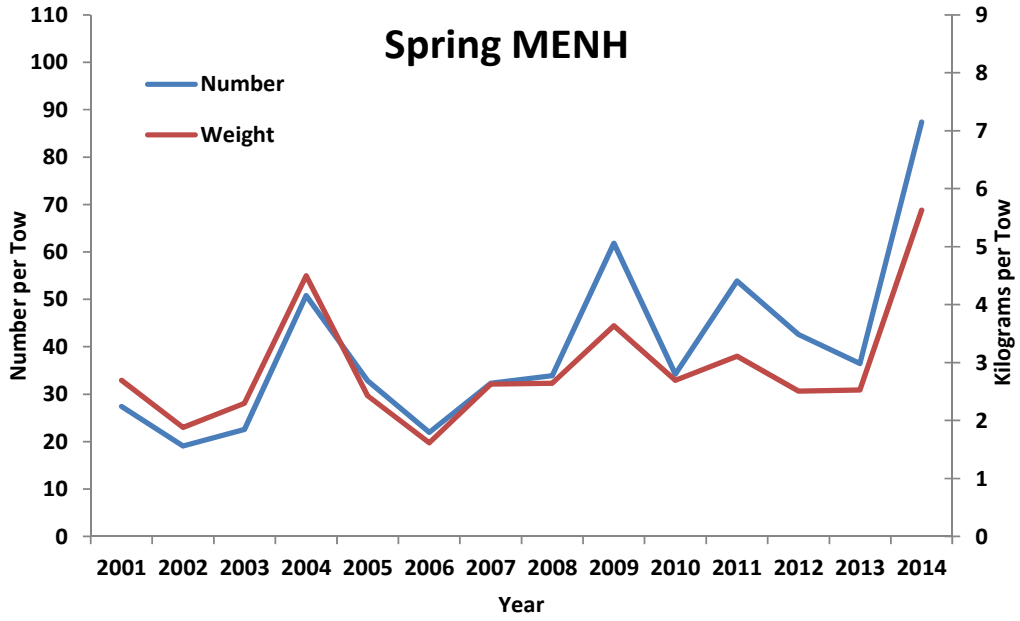
	Landings		Dead Discards				
year	recreational	commercial	recreational	gillnet	lg mesh	shrimp	Total
1981	2,270						
1982	3,024	2,793	11		343	7	6,178
1983	817	2,096	2		112	8	3,035
1984	1,103	1,699	3		67	12	2,883
1985	1,629	1,582	8		93	14	3,327
1986	411	1,188	5	12	63	16	1,696
1987	1,443	1,140	12	12	81	25	2,713
1988	537	1,250	2	12	106	19	1,927
1989	1,035	1,253	6	4	11	5	2,315
1990	344	1,116	3	22	5	21	1,511
1991	86	1,008	1	3	17	21	1,136
1992	77	825	1	12	7	24	947
1993	134	611	3	19	4	7	777
1994	77	543	2	6	6	6	640
1995	40	707	1	12	8	8	777
1996	52	606	2	6	2	7	675
1997	32	569	3	38	5	14	660
1998	27	643	1	7	7	4	690
1999	34	350	1	4	9	1	399
2000	31	535	2	12	3	3	587
2001	37	700	3	3	14	2	759
2002	35	694	1	5	17	0	752
2003	29	755	1	3	13	2	803
2004	29	623	1	4	30	2	689
2005	23	336	2	1	23	3	388
2006	34	201	1	0	10	1	248
2007	28	254	1	1	15	1	300
2008	124	288	3	1	9	2	426
2009	60	283	4	1	8	3	359
2010	40	140	3	0	2	3	188
2011	37	173	2	0	3	0	217
2012	22	348	1	1	9	1	380
2013	28	218	1	0	5	1	253

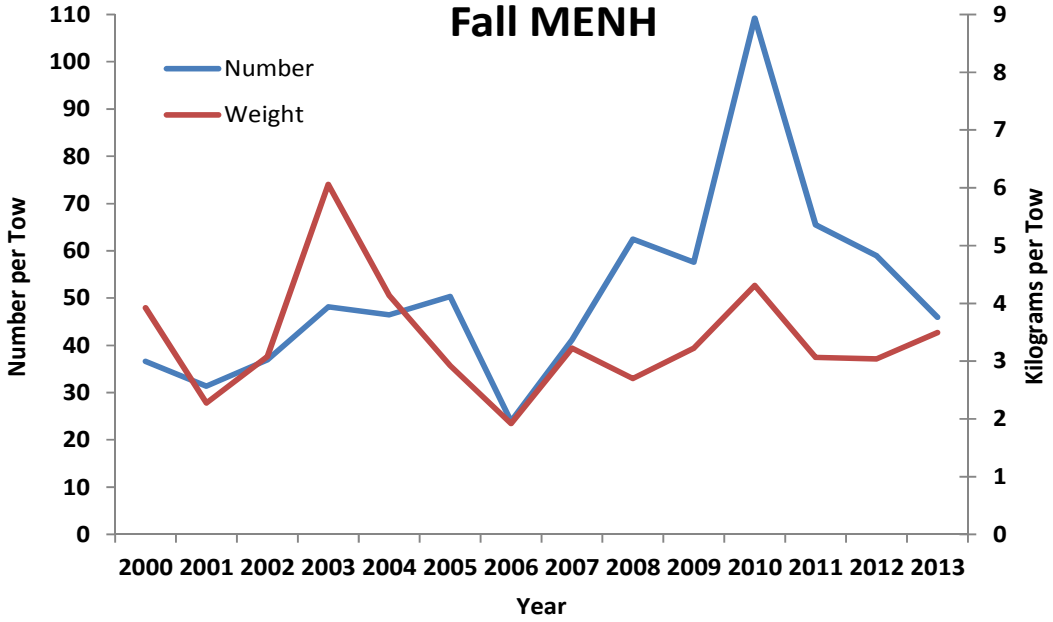

NEFSC Spring Inshore (58,59,60,61,65,66)
and Offshore (26,27,38,39,40)
numbers / tow
0
2
4
6
8
10
12
14
16
18
20
1980
1990
2000
2010
kg / tow
0
2
4
6
8
1980
1985
1990
1995
2000
2005
2010
year

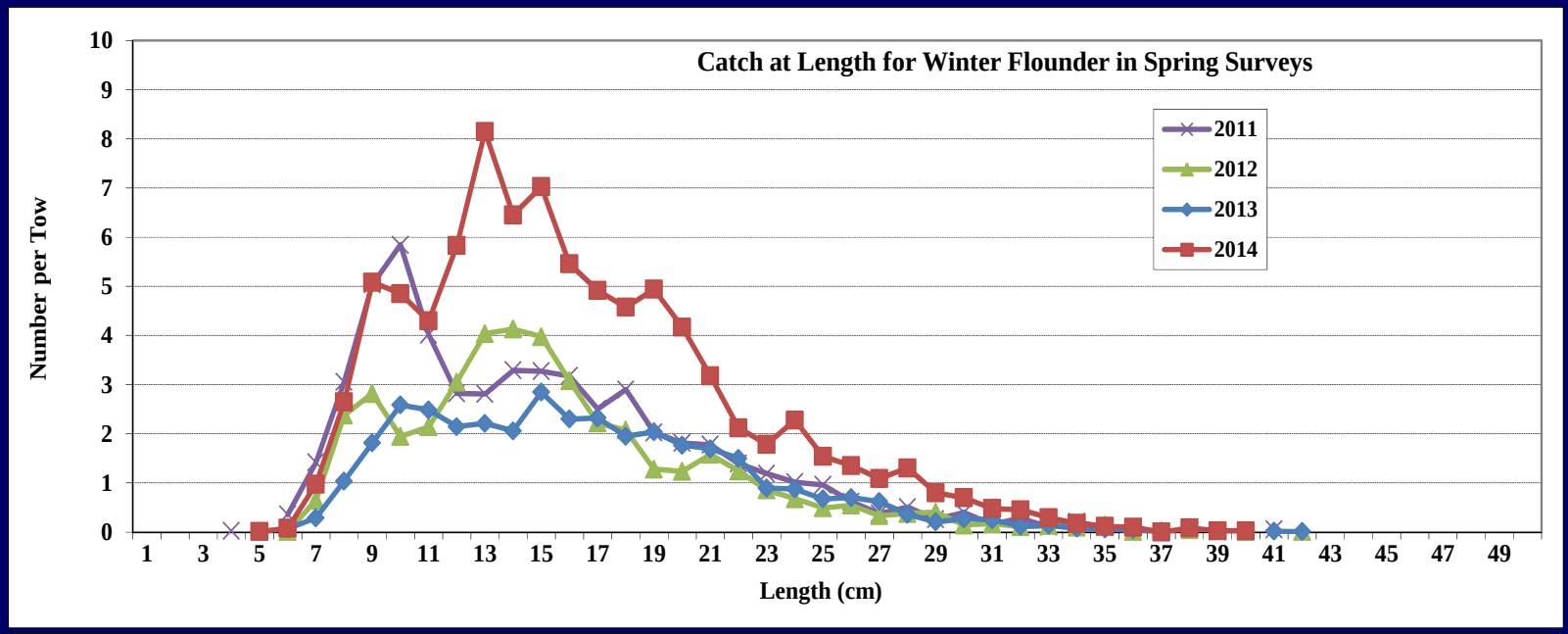

NEFSC Fall Inshore (58,59,60,61,65,66)
and Offshore (26,27,38,39,40)
numbers / tow
0
2
4
6
8
10
12
14
16
18
20
1980
1985
1990
1995
2000
2005
2010
kg / tow
0
2
4
6
8
1980
1985
1990
1995
2000
2005
2010
year

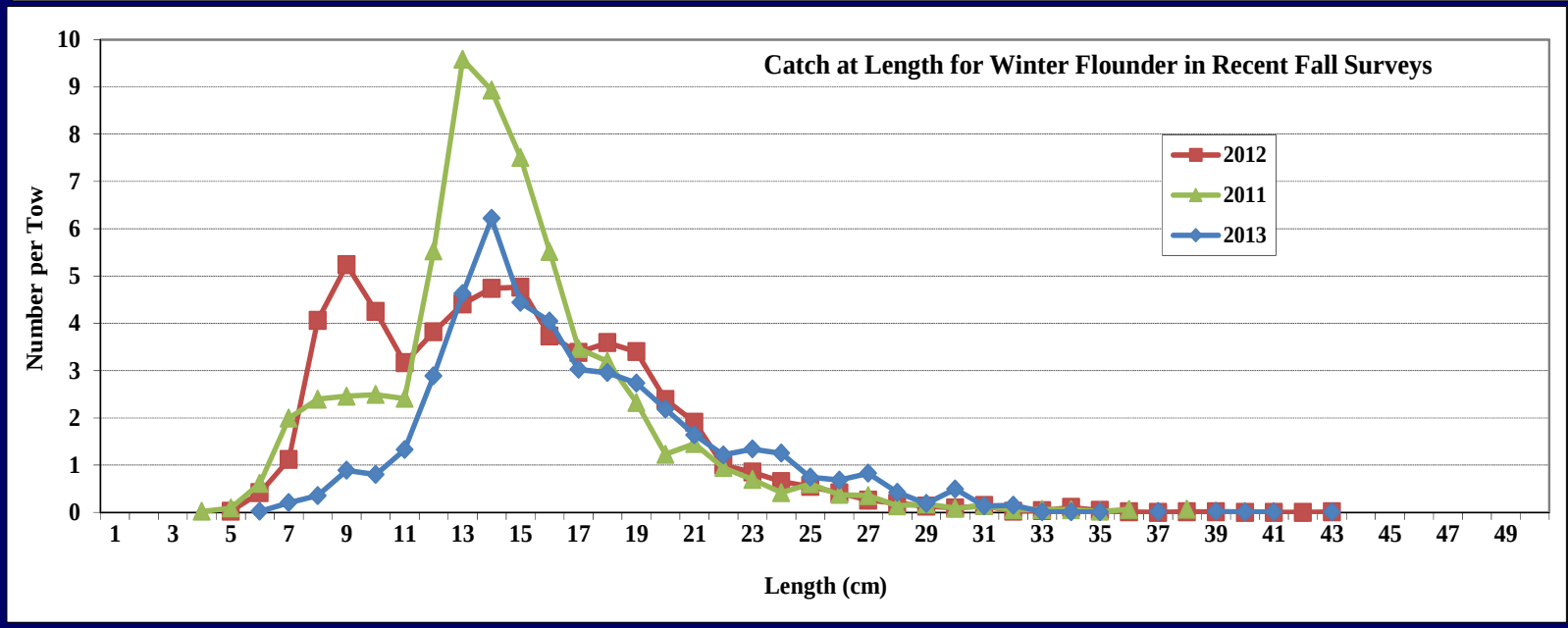

MDMF Spring
numbers / tow
0
20
40
60
80
100
120
140
160
180
1980
1985
1990
1995
2000
2005
2010
kg / tow
0
10
20
30
40
1980
1985
1990
1995
2000
2005
2010
year


MDMF Fall
numbers / tow
0
20
40
60
80
100
120
140
160
1980
1985
1990
1995
2000
2005
2010
kg / tow
0
10
20
30
1980
1985
1990
1995
2000
2005
2010
year

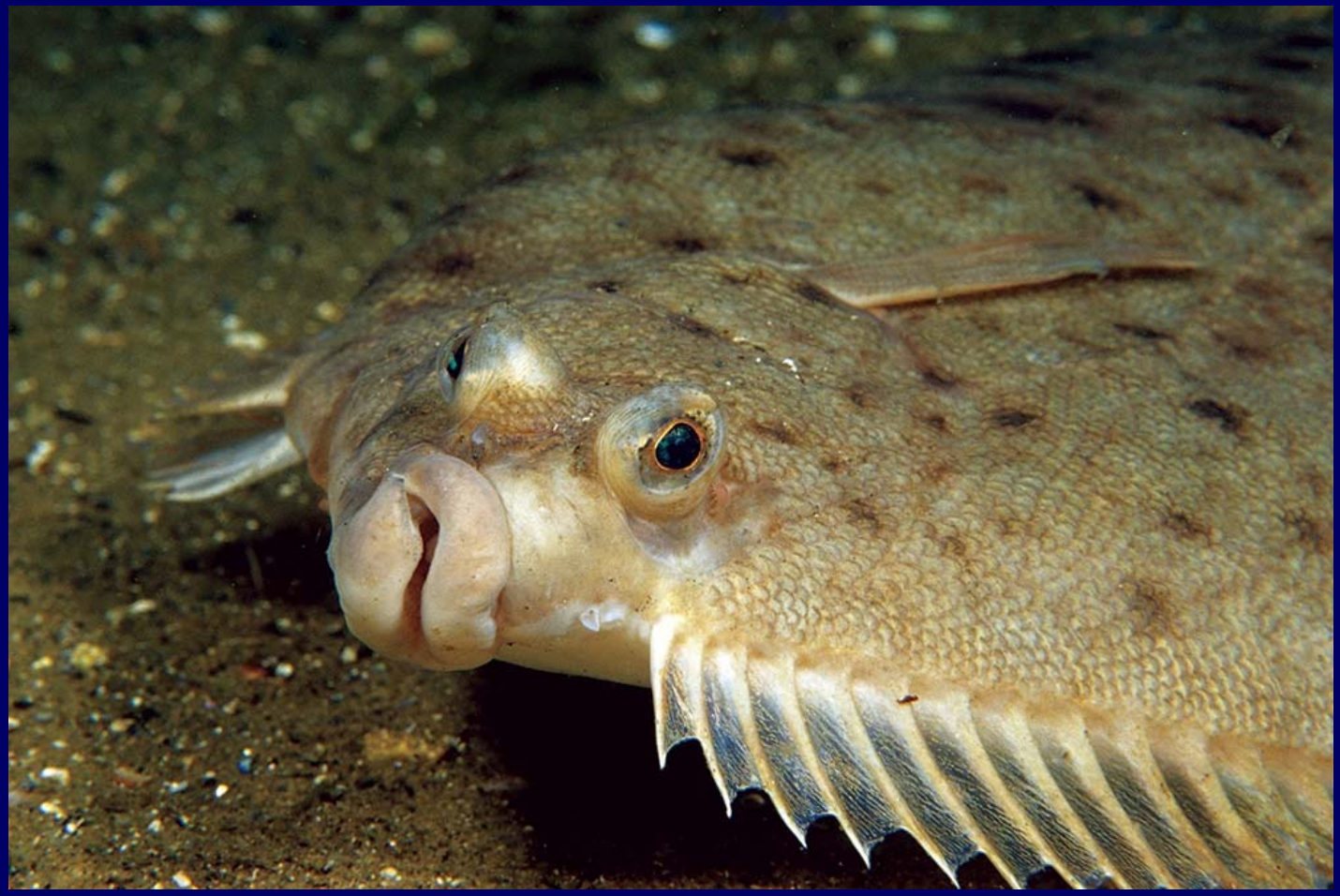

Spring MENH
Number
Weight
Number per Tow
Kilograms per Tow
Year
0
10
20
30
40
50
60
70
80
90
100
110
0
1
2
3
4
5
6
7
8
9
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014


Fall MENH
Number
Weight
Number per Tow
Kilograms per Tow
Year
0
10
20
30
40
50
60
70
80
90
100
110
0
1
2
3
4
5
6
7
8
9
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013


Catch at Length for Winter Flounder in Spring Surveys
Number per Tow
Length (cm)
2011
2012
2013
2014


Catch at Length for Winter Flounder in Recent Fall Surveys
Number per Tow
Length (cm)
2012
2011
2013

30+ cm Area Swept Biomass Estimates



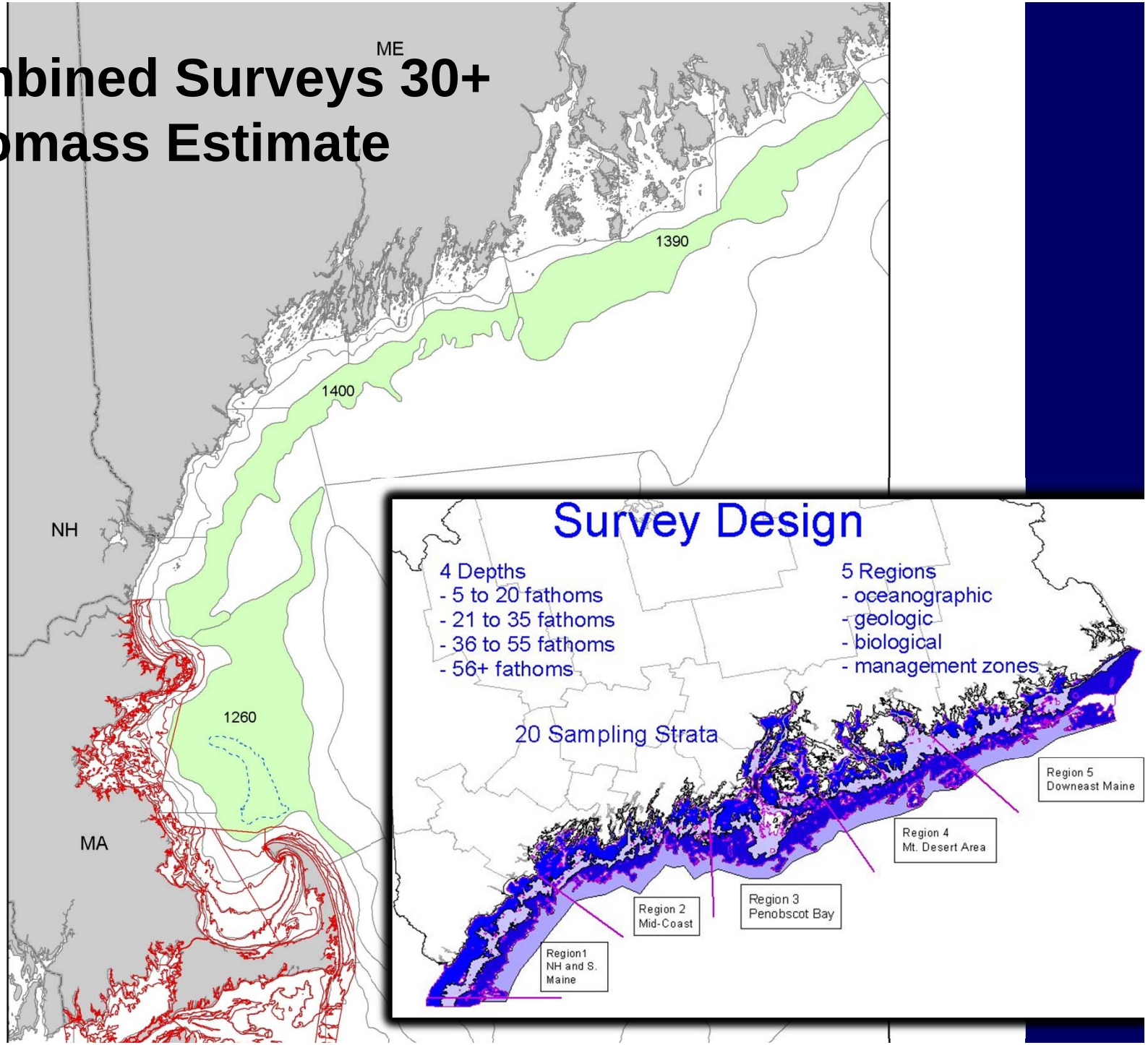
- MDMF and NEFSC (RV Bigelow) and MENH surveys catch significant numbers of GOM winter flounder per tow.
- Bigelow sampling intensity increased for inshore strata.
- MENH surveys now covers a large area of the stock since 2000.
- Overfishing status was robust to a range of survey efficiency assumptions (Q).

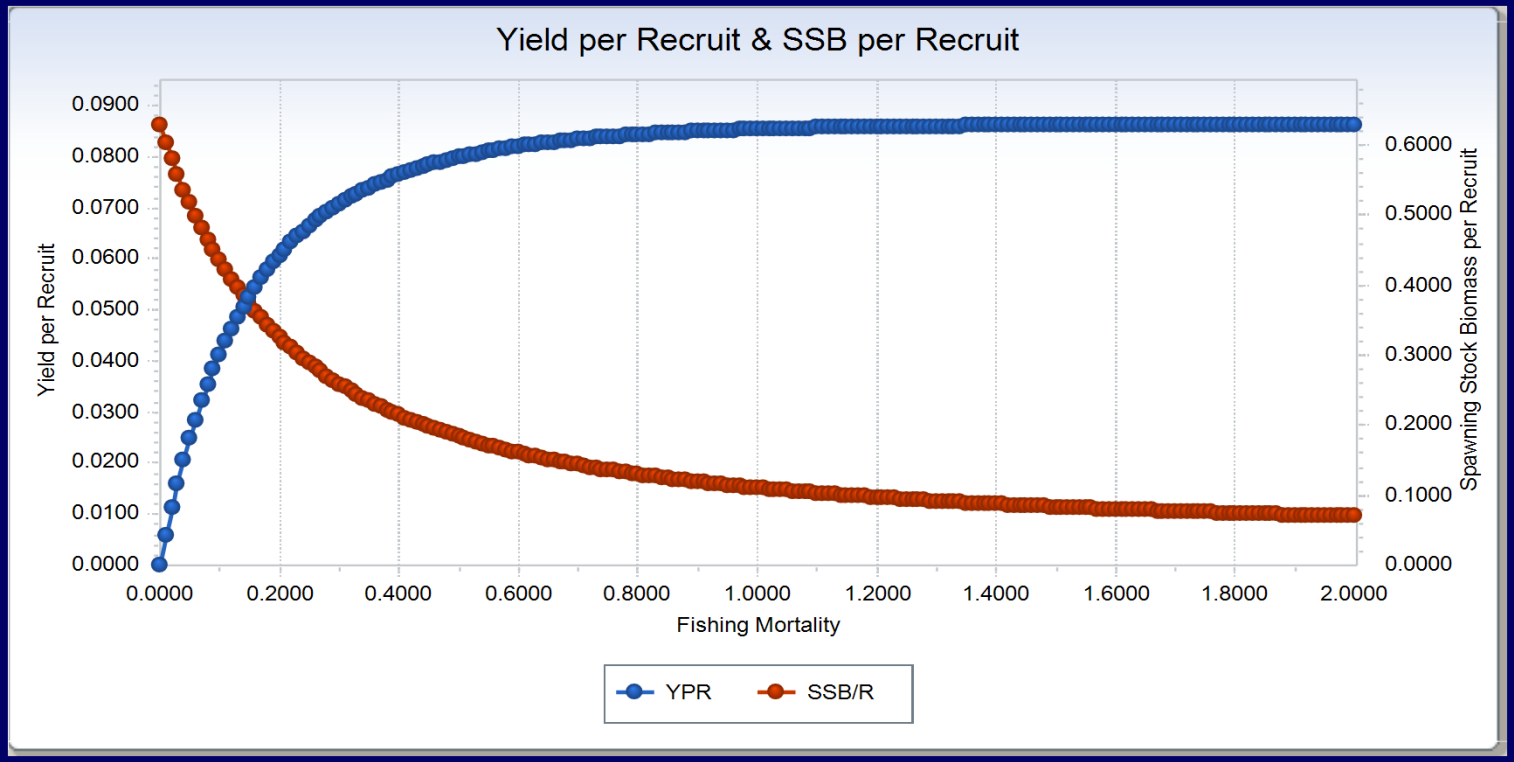
Exploitable Biomass =
30cm+ biomass index per tow /1000 x
total survey Area/tow footprint x 1/q

Q = 0.6
Informed by GB winter flounder

Exploitation rate = catch / 30cm+ biomass.

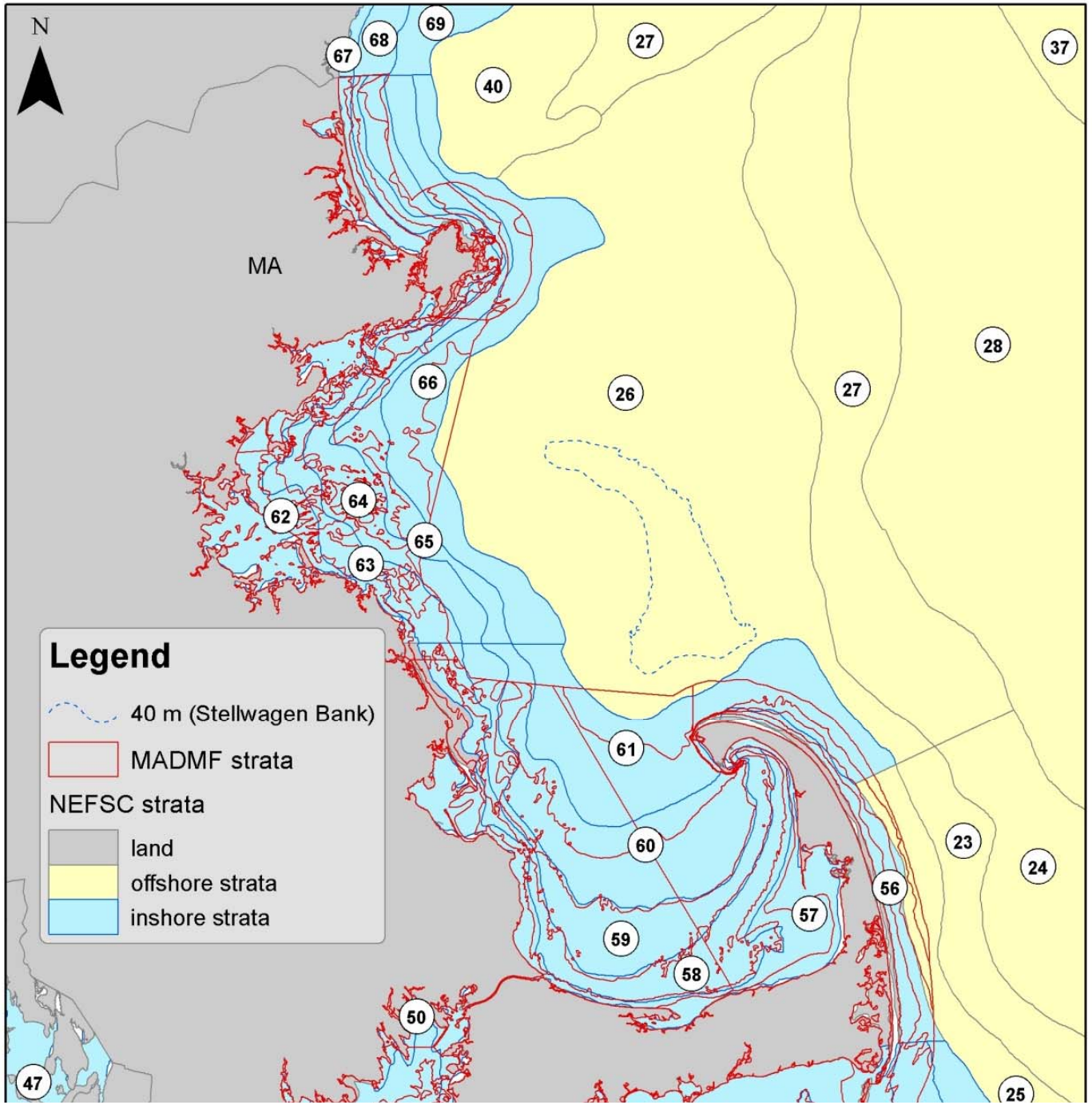
Combined Surveys 30+ Biomass Estimate

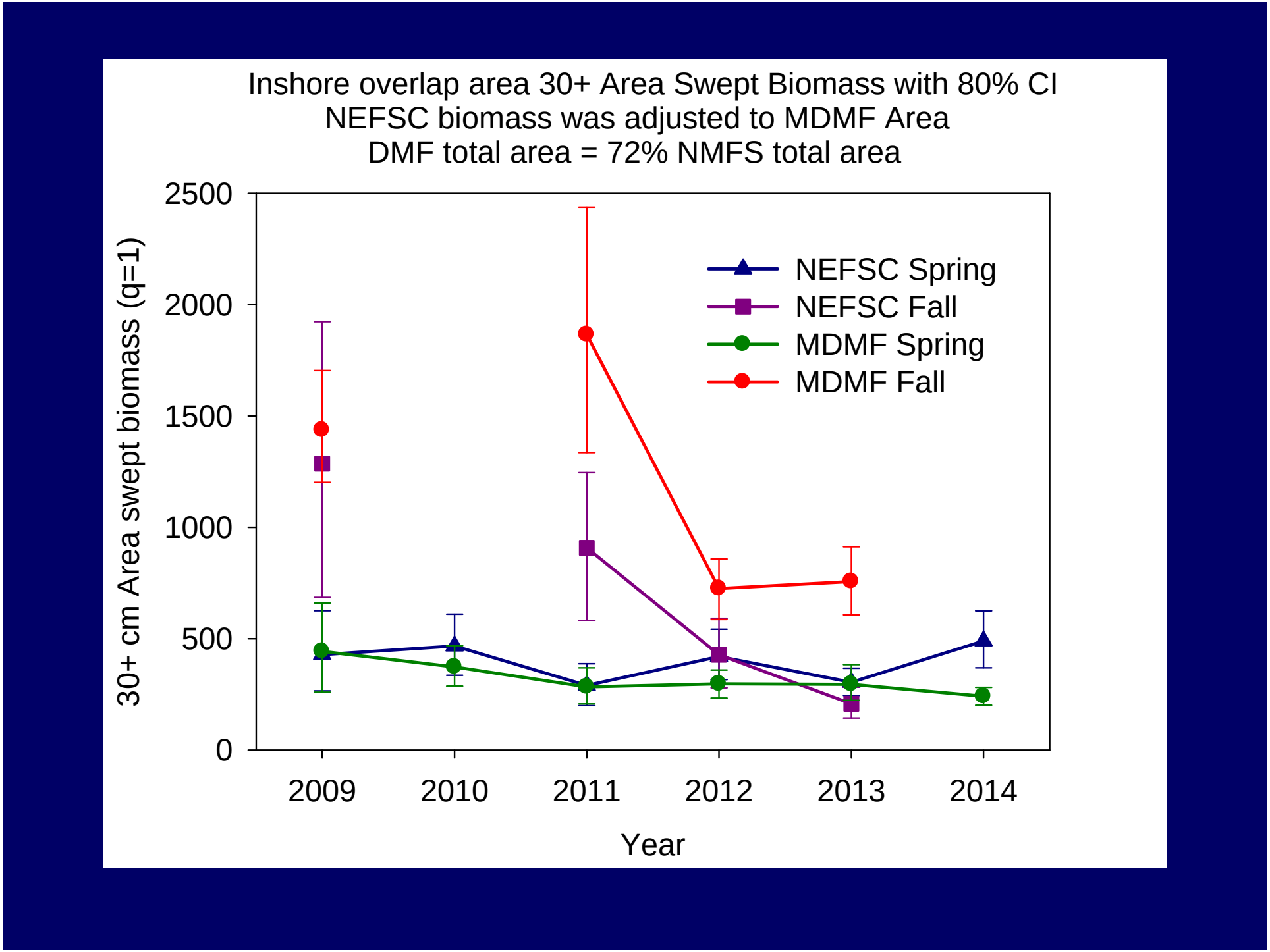




Length based YPR from SARC 52
m=0.3
FMSY = F40% = 0.31
Exploitation rate = 0.23
75%FMSY = 0.24
Exploitation rate = 0.17

Knife edge selectivity at 30 cm


N
MA
Legend
40 m (Stellwagen Bank)
MADMF strata
NEFSC strata
land
offshore strata
inshore strata
69
68
67
27
37
40
66
26
27
28
64
62
65
63
61
60
23
24
56
57
59
58
50
47
25


Inshore overlap area 30+ Area Swept Biomass with 80% CI
NEFSC biomass was adjusted to MDMF Area
DMF total area = 72% NMFS total area
30+ cm Area swept biomass (q=1)
2500
2000
1500
1000
500
0
2009
2010
2011
2012
2013
2014
Year
NEFSC Spring
NEFSC Fall
MDMF Spring
MDMF Fall

	Combined Survey Estimate		
	NEFSC	MDMF	MENH
survey area (nm2)	2,990	309	3,475
Avg tow (wing area swept)	0.00700	0.00385	0.00462
Total area/tow footprint	427,143	80,343	752,154
Tow duration	20 min	20 min	20 min
Numbers per tow	34-65	80	35

Table B8

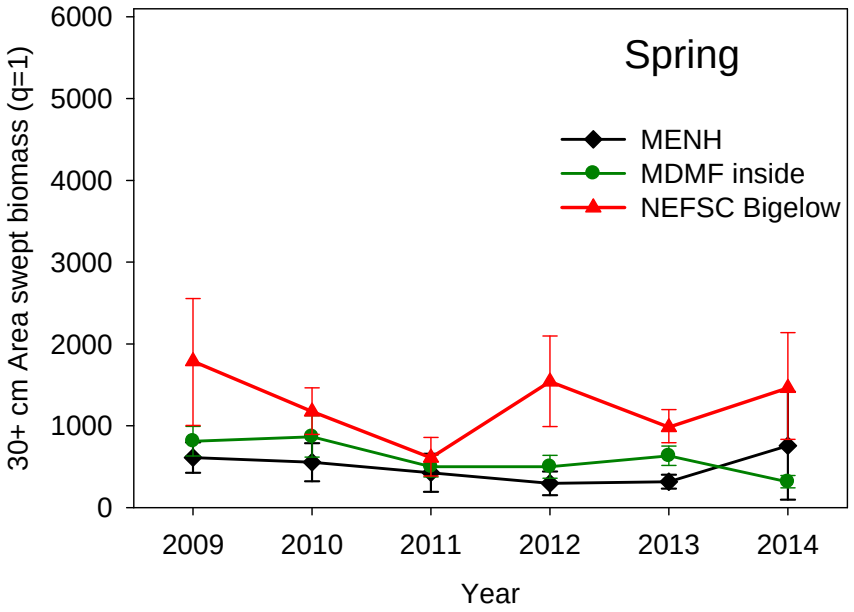
Wing Spread

	NEFSC (Bigelow)			Gloria Michele (MDMF)			MENH
	inshore overlap	Fall 2010	combined	overlap	Fall 2010	near shore	state waters
survey area (nm2)	668	2,638	2,990	484	633	309	3,475
Avg tow (area swept)	0.0070	0.0070	0.0070	0.0038	0.0038	0.0038	0.0046
Total area/tow footprint	95,429	376,857	427,143	125,845	164,587	80,343	752,165
Tow duration	20 min	20 min	20 min	20 min	20 min	20 min	20 min

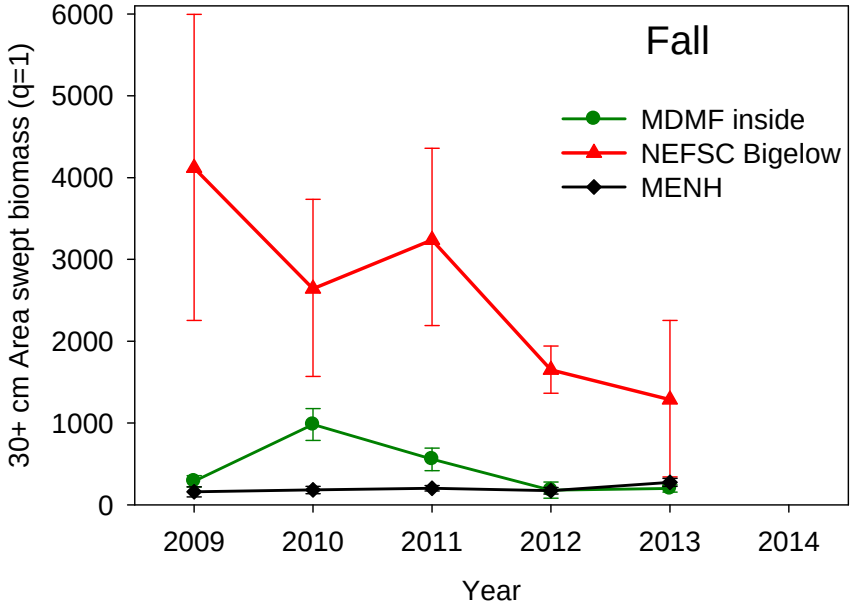
Door Spread

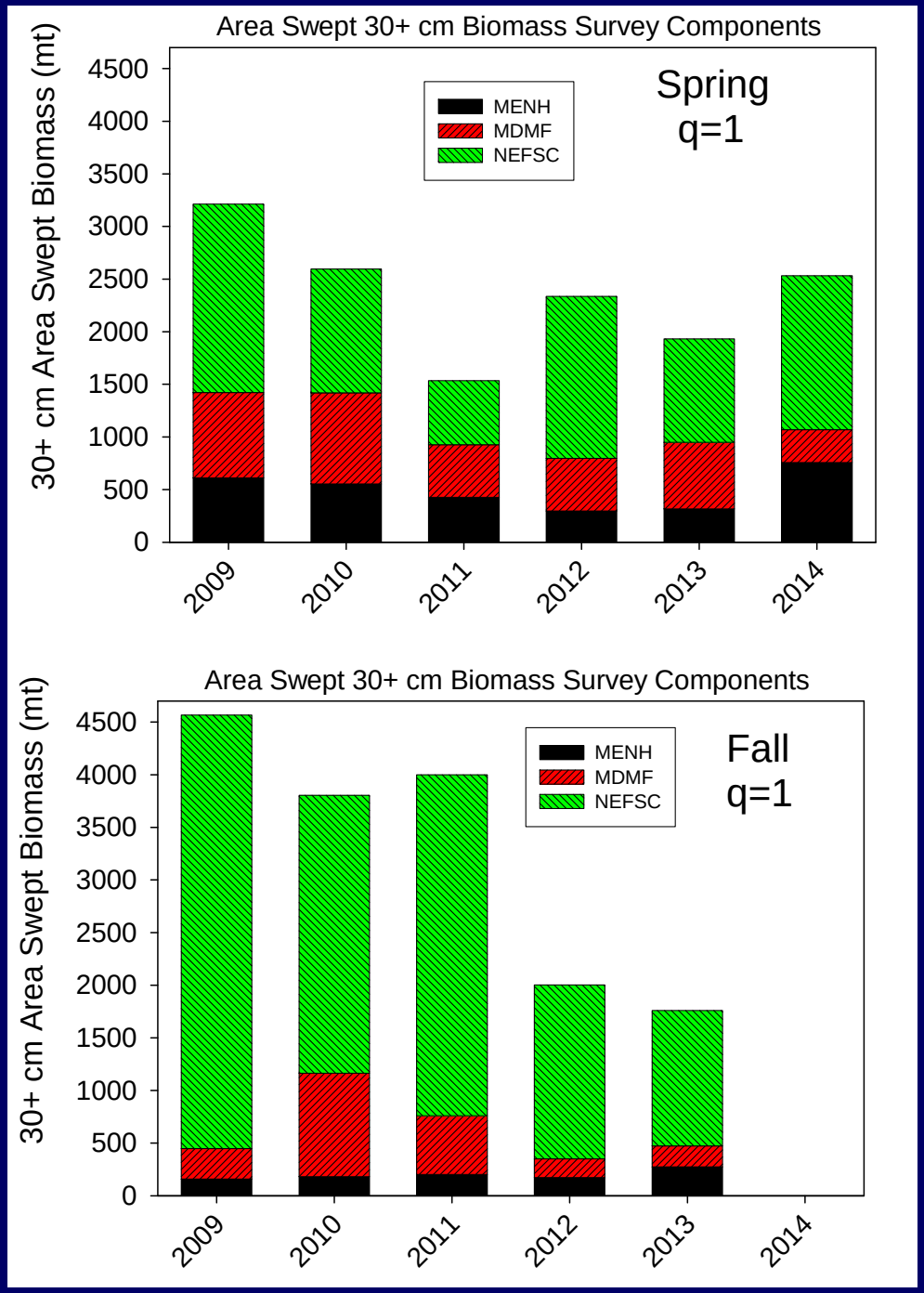
	NEFSC (Bigelow)			Gloria Michele (MDMF)			MENH
	inshore overlap	Fall 2010	combined	overlap	Fall 2010	near shore	state waters
survey area (nm2)	668	2,638	2,990	484	633	309	3,475
Avg tow (area swept)	0.0173	0.0173	0.0173	0.0125	0.0125	0.0125	0.0123
Total area/tow footprint	38,657	152,662	173,032	38,758	50,690	24,744	282,469
Tow duration	20 min	20 min	20 min	20 min	20 min	20 min	20 min

30+ Area Swept Biomass with 80% CI
Fall Components of the Combined Survey Estimate



30+ Area Swept Biomass with 80% CI
Fall Components of the Combined Survey Estimate





Fall 2010 based on different strata

Table B9 wing spread

Q = 1.0				Total	2013	2012	abc	OFL
	NEFSC	MDMF	MENH	30+ biomass	253	380	1078	1458
Spring 2009	0.56	0.25	0.19	3,212	0.08	0.12	0.34	0.45
Spring 2010	0.45	0.33	0.21	2,594	0.10	0.15	0.42	0.56
Spring 2011	0.40	0.33	0.28	1,536	0.16	0.25	0.70	0.95
Spring 2012	0.66	0.21	0.13	2,336	0.11	0.16	0.46	0.62
Spring 2013	0.51	0.33	0.16	1,931	0.13	0.20	0.56	0.75
Spring 2014	0.58	0.12	0.30	2,533	0.10	0.15	0.43	0.58
2012-2014 avg	0.58	0.22	0.20	2,267	0.11	0.17	0.48	0.65
Fall 2009	0.90	0.06	0.03	4,567	0.06	0.08	0.24	0.32
Fall 2010*	0.69	0.26	0.05	3,804	0.07	0.10	0.28	0.38
Fall 2011	0.81	0.14	0.05	3,999	0.06	0.10	0.27	0.36
Fall 2012	0.82	0.09	0.09	2,002	0.13	0.19	0.54	0.73
Fall 2013	0.73	0.11	0.16	1,759	0.14	0.22	0.61	0.83
2011-2013 avg	0.79	0.11	0.10	1,881	0.13	0.20	0.57	0.78

Q = 0.8				Total	2013	2012	abc	OFL
	NEFSC	MDMF	MENH	30+ biomass	253	380	1078	1458
Spring 2009	0.56	0.25	0.19	4,015	0.06	0.09	0.27	0.36
Spring 2010	0.45	0.33	0.21	3,243	0.08	0.12	0.33	0.45
Spring 2011	0.40	0.33	0.28	1,920	0.13	0.20	0.56	0.76
Spring 2012	0.66	0.21	0.13	2,920	0.09	0.13	0.37	0.50
Spring 2013	0.51	0.33	0.16	2,414	0.10	0.16	0.45	0.60
Spring 2014	0.58	0.12	0.30	3,166	0.08	0.12	0.34	0.46
2012-2014 avg	0.58	0.22	0.20	2,833	0.09	0.14	0.39	0.52
Fall 2009	0.90	0.06	0.03	5,709	0.04	0.07	0.19	0.26
Fall 2010*	0.69	0.26	0.05	4,756	0.05	0.08	0.23	0.31
Fall 2011	0.81	0.14	0.05	4,999	0.05	0.08	0.22	0.29
Fall 2012	0.82	0.09	0.09	2,503	0.10	0.15	0.43	0.58
Fall 2013	0.73	0.11	0.16	2,199	0.12	0.17	0.49	0.66
2011-2013 avg	0.79	0.11	0.10	2,351	0.11	0.16	0.46	0.62

Q = 0.6				Total	2013	2012	abc	OFL
	NEFSC	MDMF	MENH	30+ biomass	253	380	1078	1458
Spring 2009	0.56	0.25	0.19	5,354	0.05	0.07	0.20	0.27
Spring 2010	0.45	0.33	0.21	4,324	0.06	0.09	0.25	0.34
Spring 2011	0.40	0.33	0.28	2,559	0.10	0.15	0.42	0.57
Spring 2012	0.66	0.21	0.13	3,894	0.06	0.10	0.28	0.37
Spring 2013	0.51	0.33	0.16	3,219	0.08	0.12	0.33	0.45
Spring 2014	0.58	0.12	0.30	4,221	0.06	0.09	0.26	0.35
2012-2014 avg	0.58	0.22	0.20	3,778	0.07	0.10	0.29	0.39
Fall 2009	0.90	0.06	0.03	7,612	0.03	0.05	0.14	0.19
Fall 2010*	0.69	0.26	0.05	6,341	0.04	0.06	0.17	0.23
Fall 2011	0.81	0.14	0.05	6,666	0.04	0.06	0.16	0.22
Fall 2012	0.82	0.09	0.09	3,337	0.08	0.11	0.32	0.44
Fall 2013	0.73	0.11	0.16	2,932	0.09	0.13	0.37	0.50
2011-2013 avg	0.79	0.11	0.10	3,135	0.08	0.12	0.34	0.47

Table B10 door spread and q = 0.37

	NEFSC	MDMF	ME/NH	Total 30+ biomass	2013 253	2012 380	abc 1078	OFL 1458
Spring 2009	0.60	0.21	0.19	3,255	0.08	0.12	0.33	0.45
Spring 2010	0.50	0.28	0.22	2,569	0.10	0.15	0.42	0.57
Spring 2011	0.44	0.28	0.29	1,516	0.17	0.25	0.71	0.96
Spring 2012	0.70	0.17	0.13	2,403	0.11	0.16	0.45	0.61
Spring 2013	0.56	0.27	0.17	1,923	0.13	0.20	0.56	0.76
Spring 2014	0.61	0.10	0.29	2,630	0.10	0.14	0.41	0.55
2012-2014 avg	0.62	0.18	0.19	2,319	0.11	0.16	0.46	0.63
Fall 2009	0.92	0.05	0.03	4,912	0.05	0.08	0.22	0.30
Fall 2010*	0.74	0.21	0.05	3,893	0.06	0.10	0.28	0.37
Fall 2011	0.84	0.11	0.05	4,216	0.06	0.09	0.26	0.35
Fall 2012	0.85	0.07	0.08	2,132	0.12	0.18	0.51	0.68
Fall 2013	0.76	0.09	0.15	1,852	0.14	0.21	0.58	0.79
2011-2013 avg	0.82	0.09	0.09	1,992	0.13	0.19	0.54	0.73

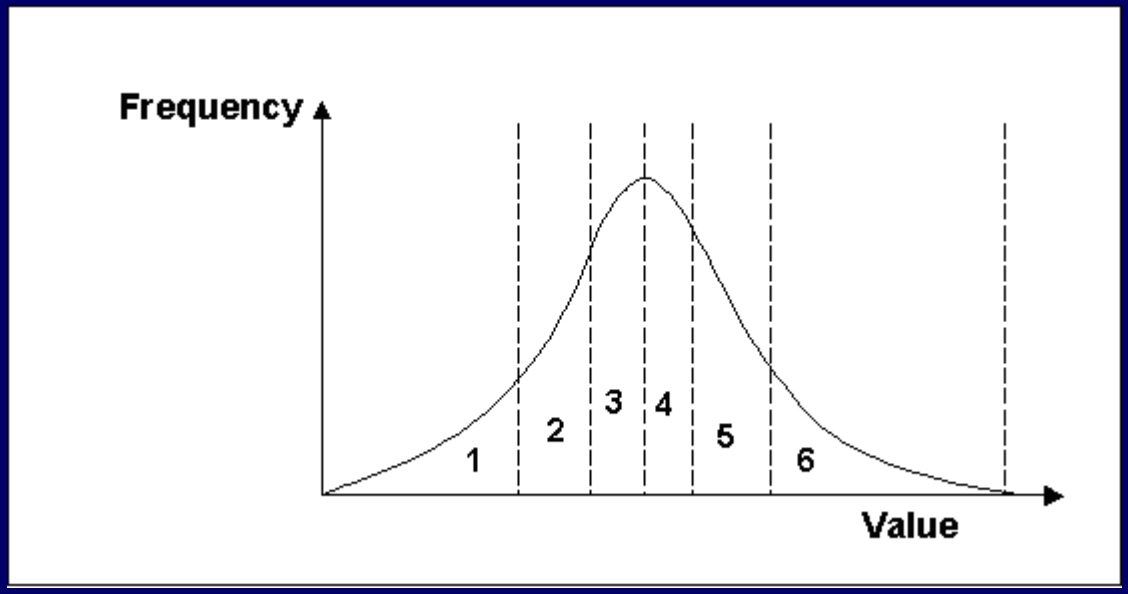
Fall 2013

Q = 1.0 using wing spread Biomass = 1,759 mt

Q = 0.37 using door spread Biomass = 1,852 mt

Uncertainty was estimated using the Latin Hypercube approach

$$B_{Tot} = A_{NEFSC}\frac{I_{NEFSC}}{e\ a_{NEFSC}} + A_{MADMF}\frac{I_{MADMF}}{e\ a_{MADMF}} + A_{MENH}\frac{I_{MENH}}{e\ a_{MENH}}$$



40 equal probability intervals

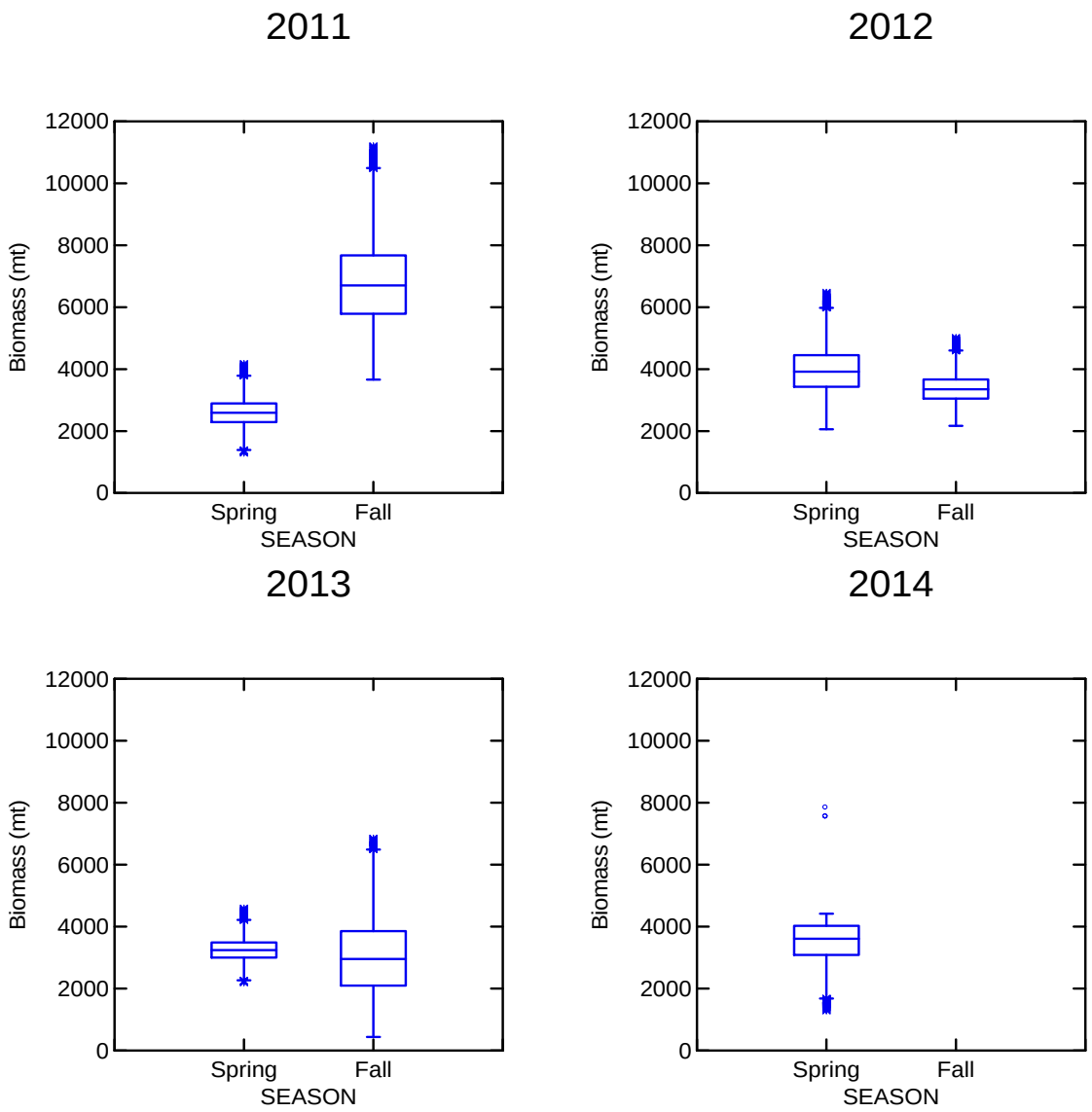
$$E[B_{Tot}] = \sum_{i=1}^{40}\sum_{j=1}^{40}\sum_{k=1}^{40}\sum_{l=1}^{40}\sum_{m=1}^{40}\sum_{n=1}^{40}\left[A_{NEFSC}\frac{I'_i}{e\ a'_j} + A_{MADMF}\frac{I'_k}{e\ a'_l} + A_{MENH}\frac{I'_m}{e\ a'_n}\right]\delta^6$$

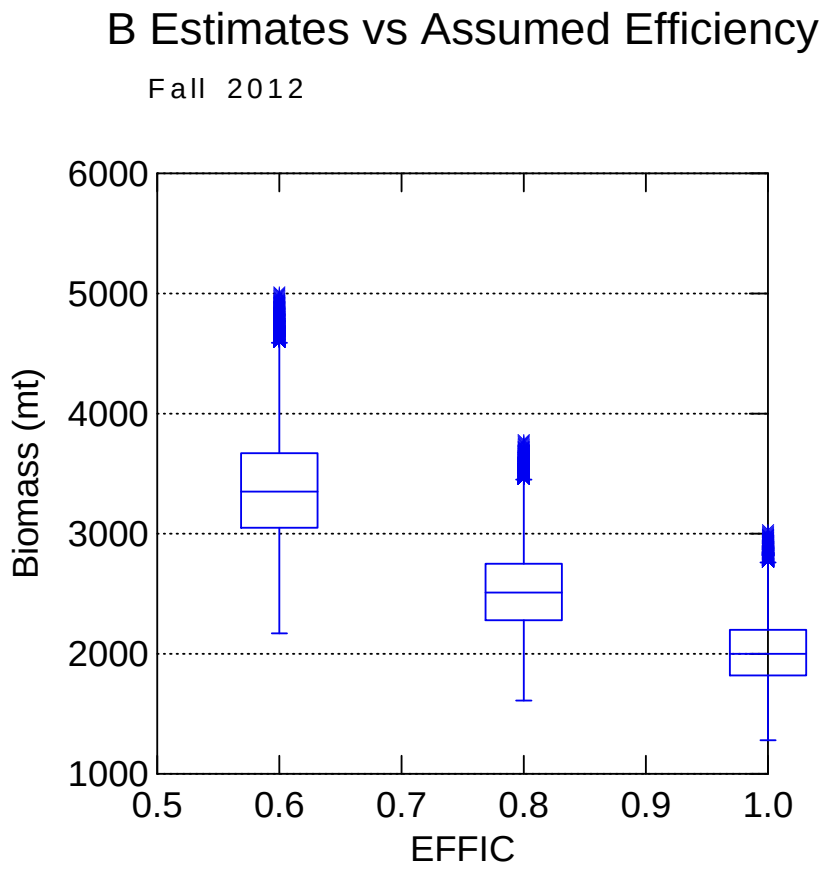
40^6 = 4,096,000,000 evaluations

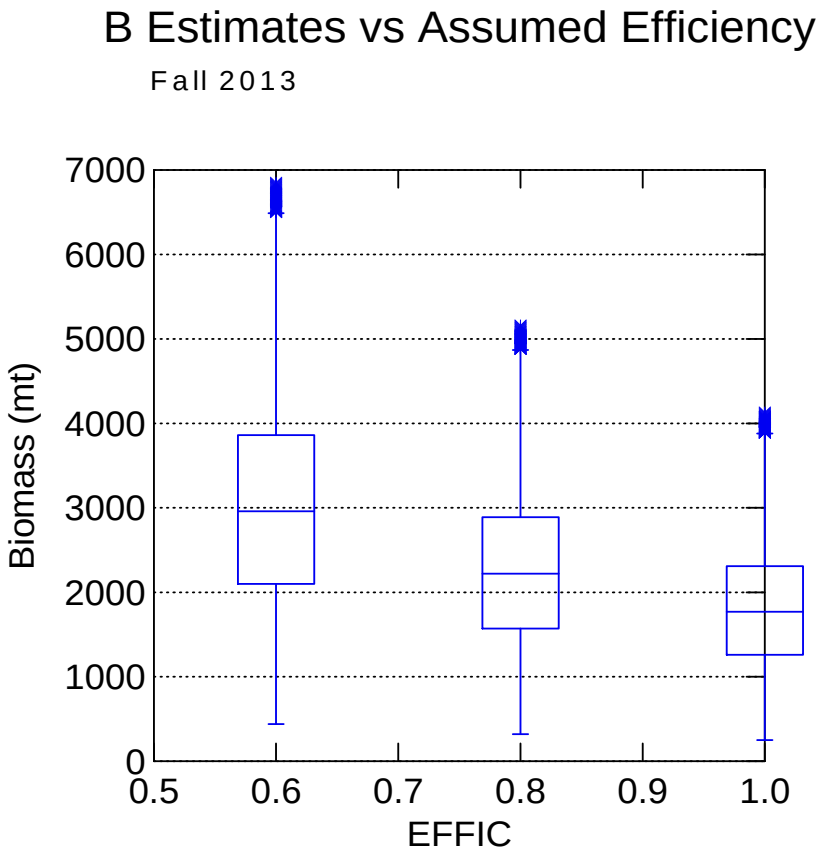
Table B11

Survey	Season	Year	Total Survey Area in	Area per tow in nm^2 (SE)	Survey in kg/tow (SE)
NEFSC	Fall	2011	2990	0.006974755	7.58160
				0.000835526	1.89494
MADMF			309	0.003846	6.95300
				0.0004607	1.36203
ME-NH			3475	0.00462	0.26902
				0.000553443	0.03428
NEFSC	Fall	2012	2990	0.006974755	3.86460
				0.000835526	0.51401
MADMF			309	0.003846	2.22835
				0.0004607	0.86196
ME-NH			3475	0.00462	0.22957
				0.000553443	0.04138
NEFSC	Fall	2013	2990	0.006974755	3.00956
				0.000835526	1.91193
MADMF			309	0.003846	2.47407
				0.0004607	0.42430
ME-NH			3475	0.00462	0.36564
				0.000553443	0.05090
NEFSC	spring	2011	2990	0.006974755	1.42612
				0.000835526	0.43308
MADMF			309	0.003846	6.23390
				0.0004607	1.29496
ME-NH			3475	0.00462	0.56596
				0.000553443	0.24210
NEFSC	spring	2012	2990	0.006974755	3.60241
				0.000835526	1.00922
MADMF			309	0.003846	6.23518
				0.0004607	1.34671
ME-NH			3475	0.00462	0.39419
				0.000553443	0.14960
NEFSC	spring	2013	2990	0.006974755	2.29905
				0.000835526	0.37989
MADMF			309	0.003846	7.87736
				0.0004607	1.12588
ME-NH			3475	0.00462	0.42051
				0.000553443	0.08807
NEFSC	spring	2014	2990	0.006974755	3.42422
				0.000835526	1.20931
MADMF			309	0.003846	3.90166
				0.0004607	0.70399
ME-NH			3475	0.00462	1.00579
				0.000553443	0.68373

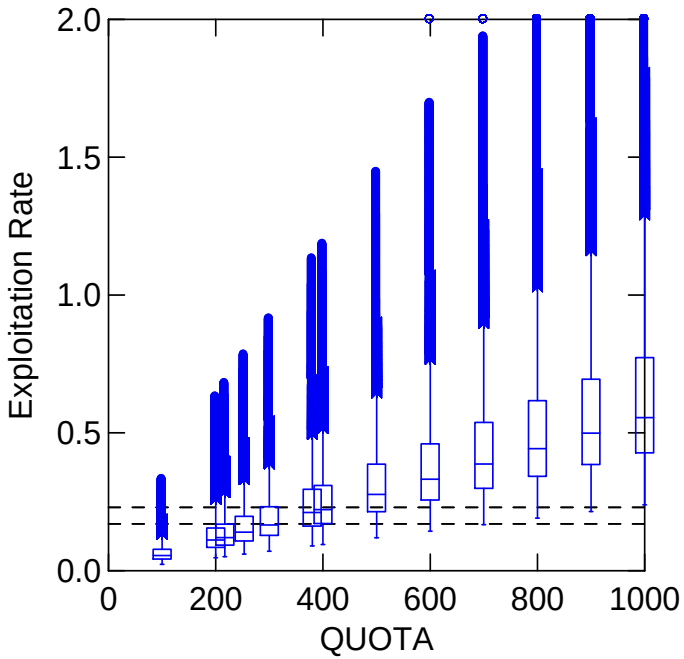
Comparison of Biomass Estimates by Season: Effic=0.6



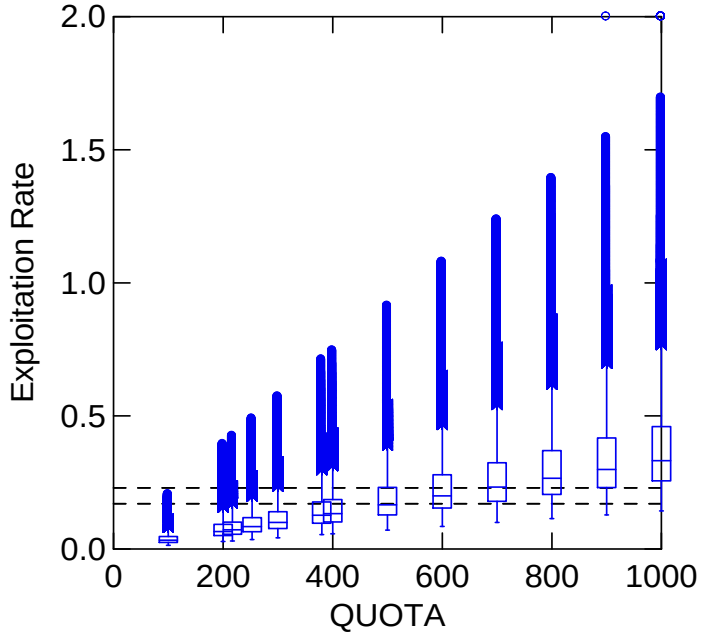

B Estimates vs Assumed Efficiency
Fall 2012
Biomass (mt)
6000
5000
4000
3000
2000
1000
0.5
0.6
0.7
0.8
0.9
1.0
EFFIC


B Estimates vs Assumed Efficiency
Fall 2013
Biomass (mt)
7000
6000
5000
4000
3000
2000
1000
0
0.5
0.6
0.7
0.8
0.9
1.0
EFFIC

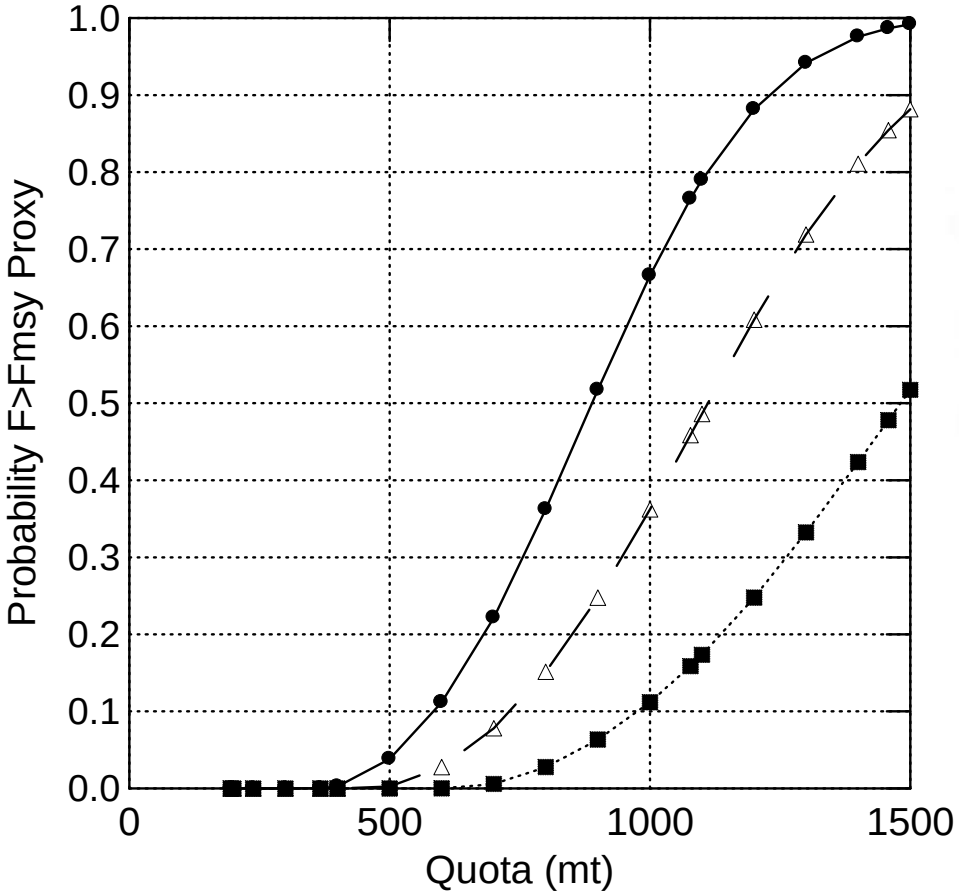
Exploitation Estimates: Fall 2013, Efficiency=1.0



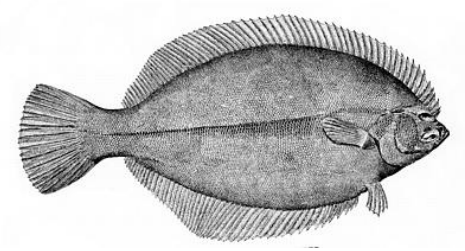
Exploitation Estimates: Fall 2013, Efficiency=0.6



Probability of Exceeding Fmsy Proxy=0.23



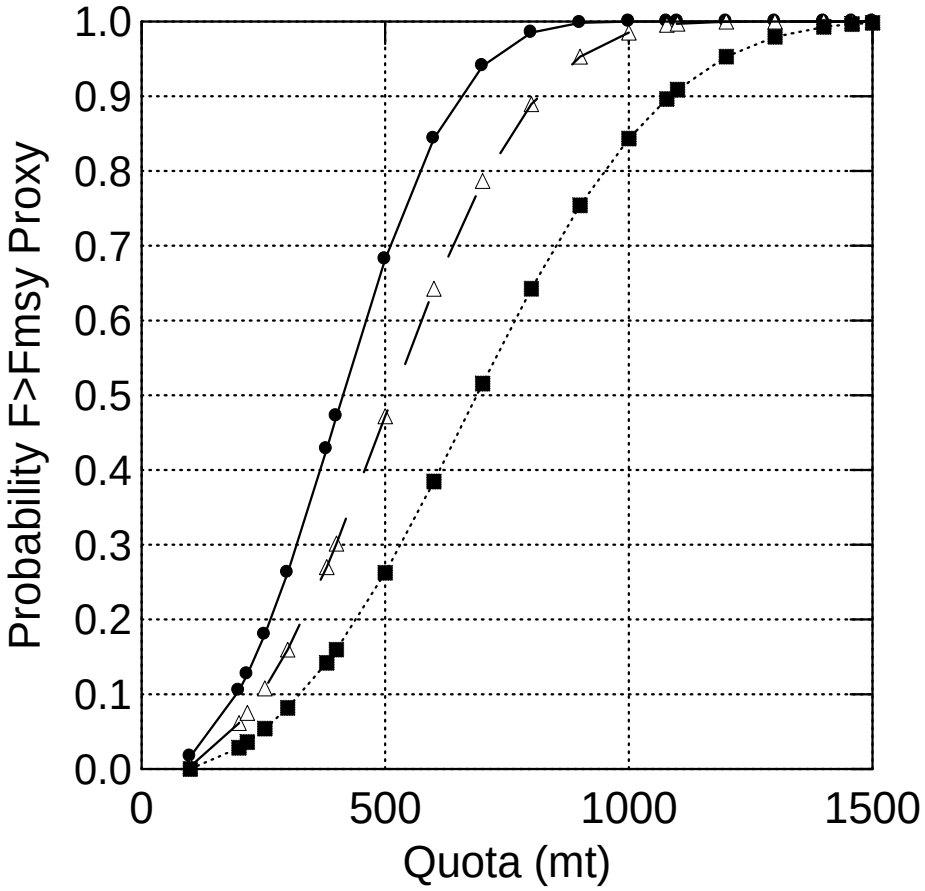
OFL = 1458
SARC 52
Fall 2010



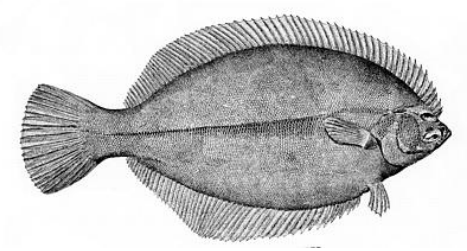
Efficiency

- 100%
- 80%
- 60%

Probability of Exceeding Fmsy Proxy=0.23



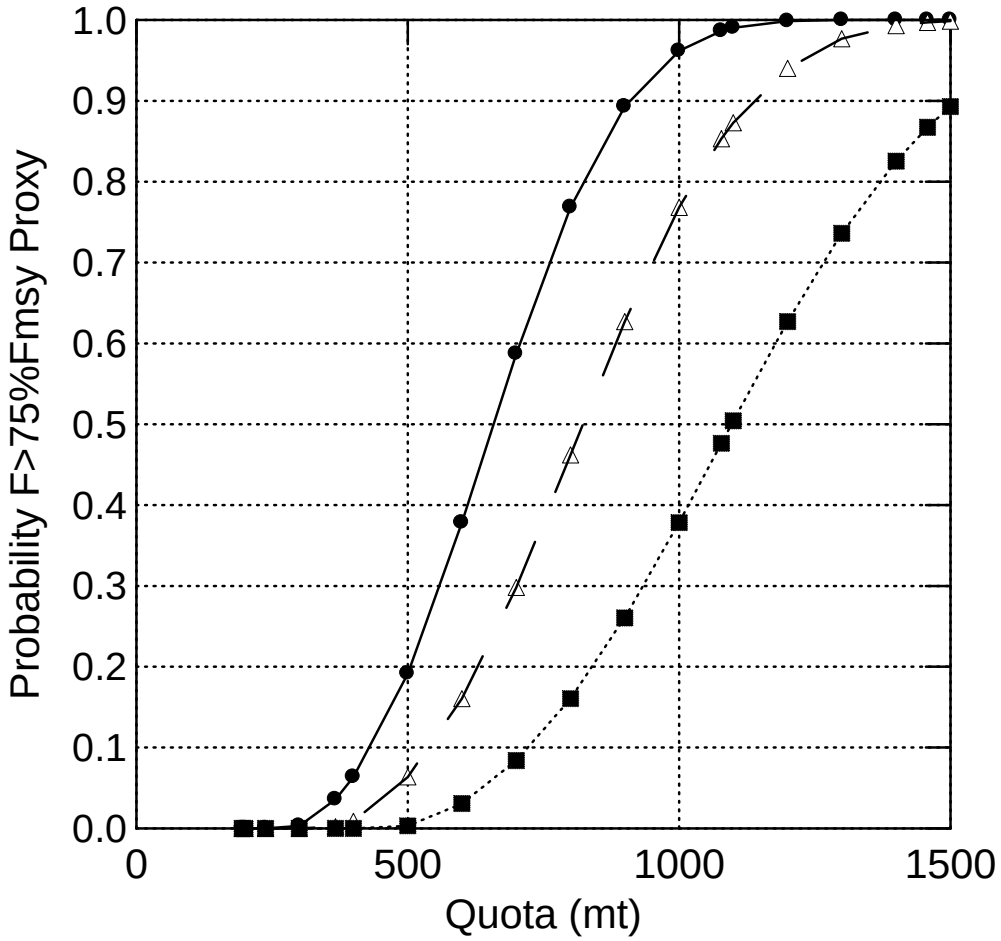
OFL
OP-UP
Fall 2013



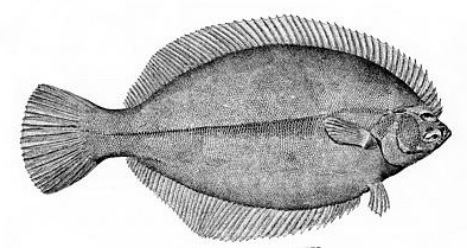
Efficiency

- 100%
- 80%
- 60%

Probability of Exceeding 75% Fmsy Proxy=0.17



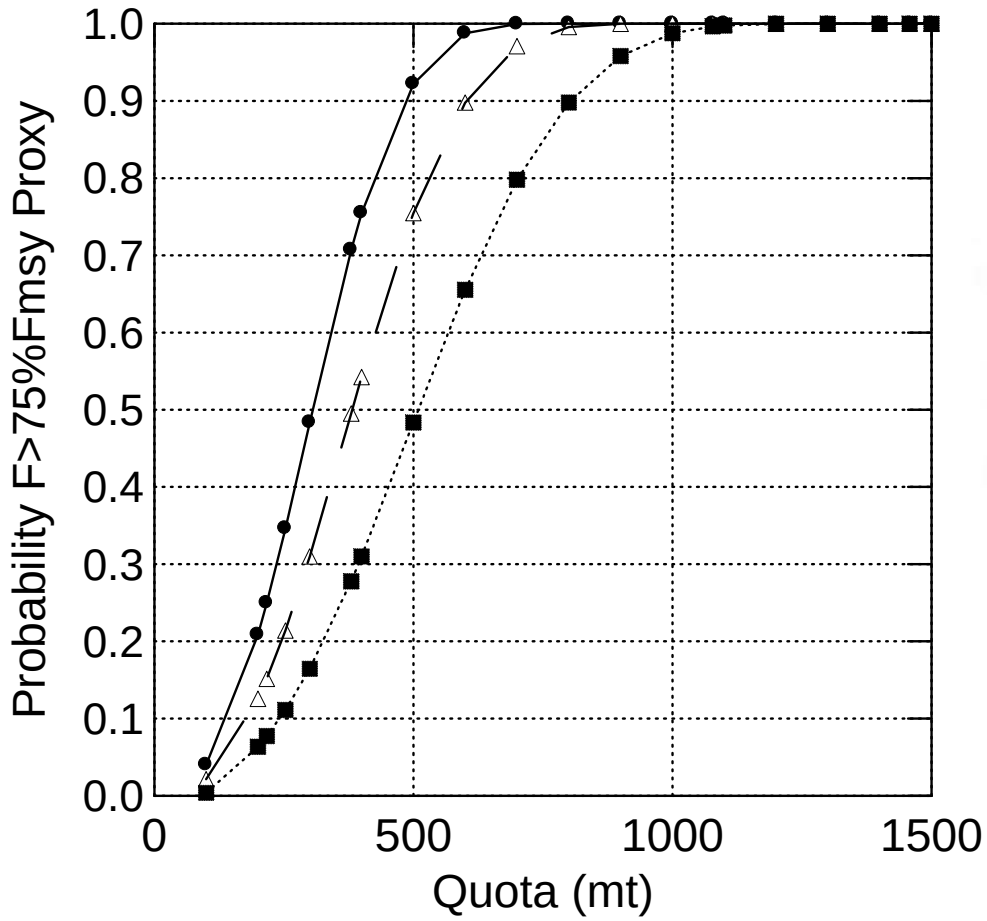
ABC = 1078
SARC 52
Fall 2010



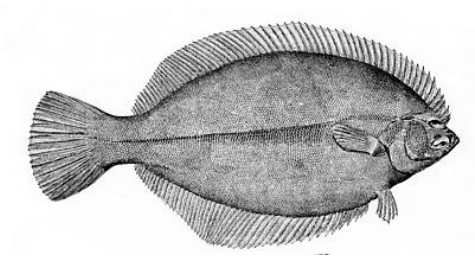
Efficiency

- 100%
- 80%
- 60%

Probability of Exceeding 75% Fmsy Proxy=0.17

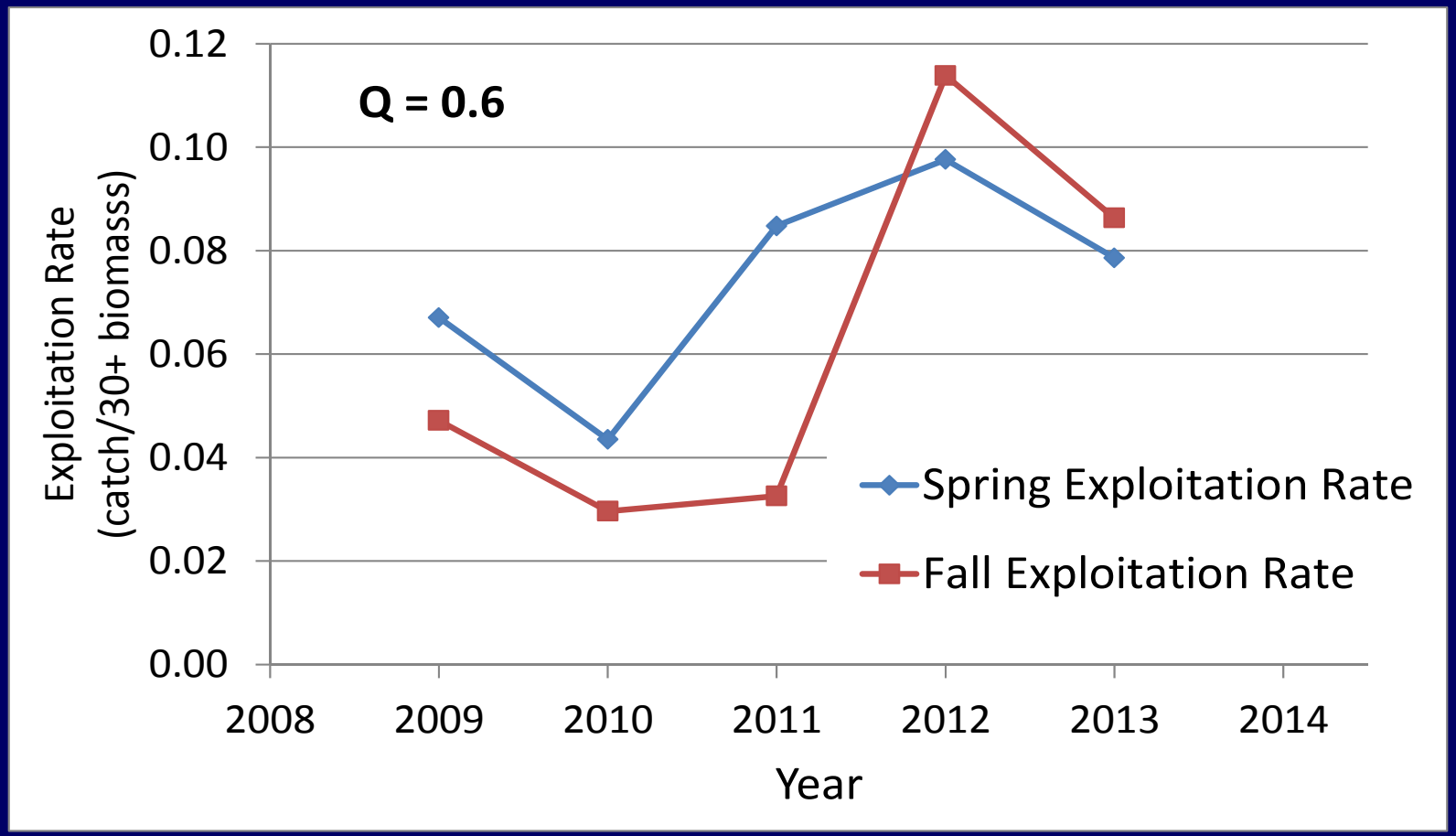


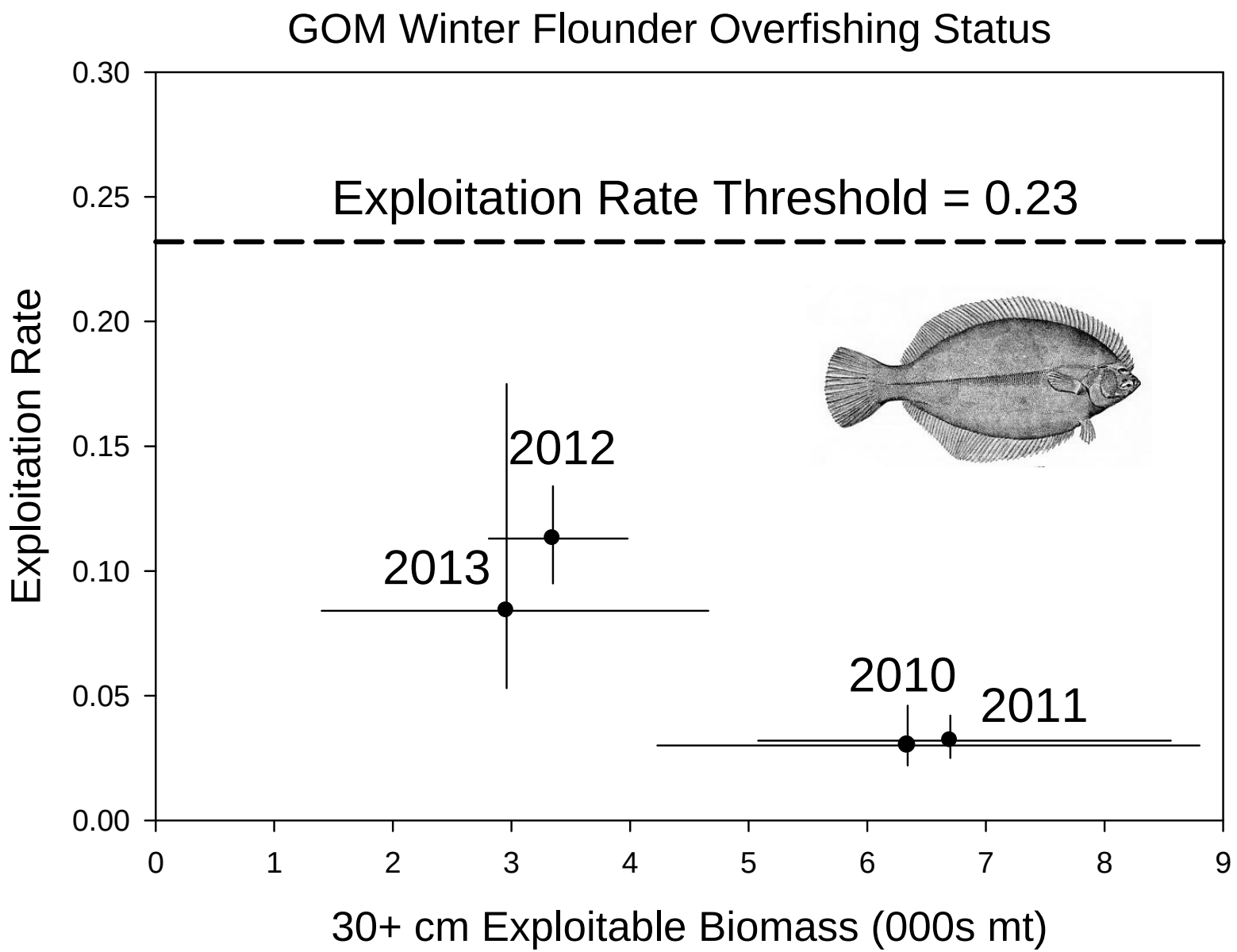
ABC
OP-UP
Fall 2013

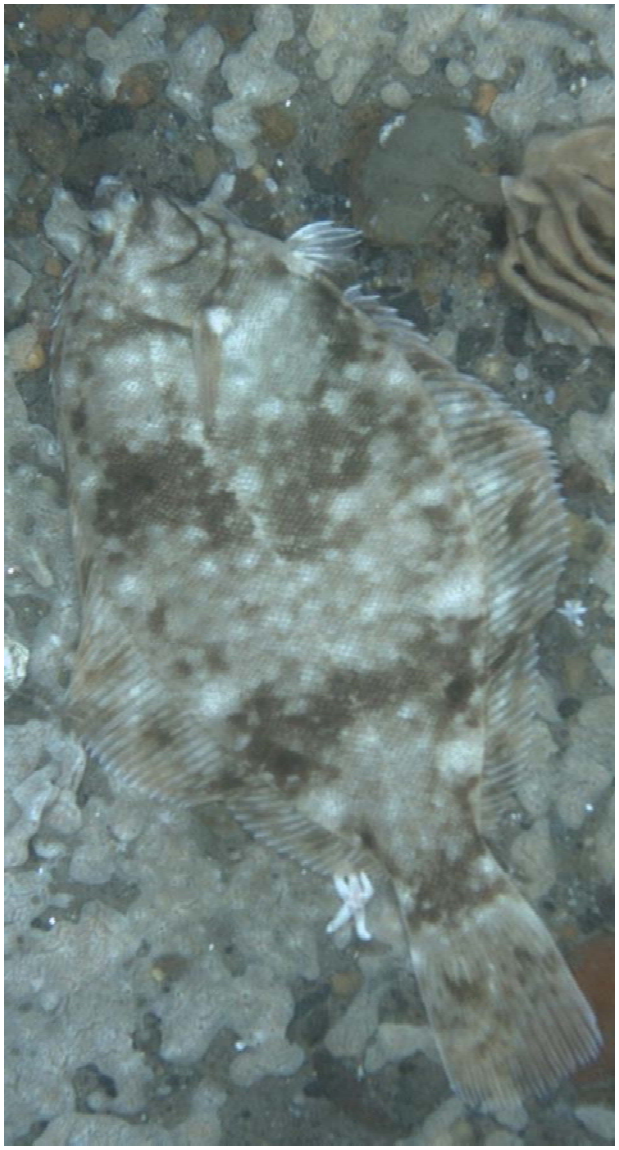


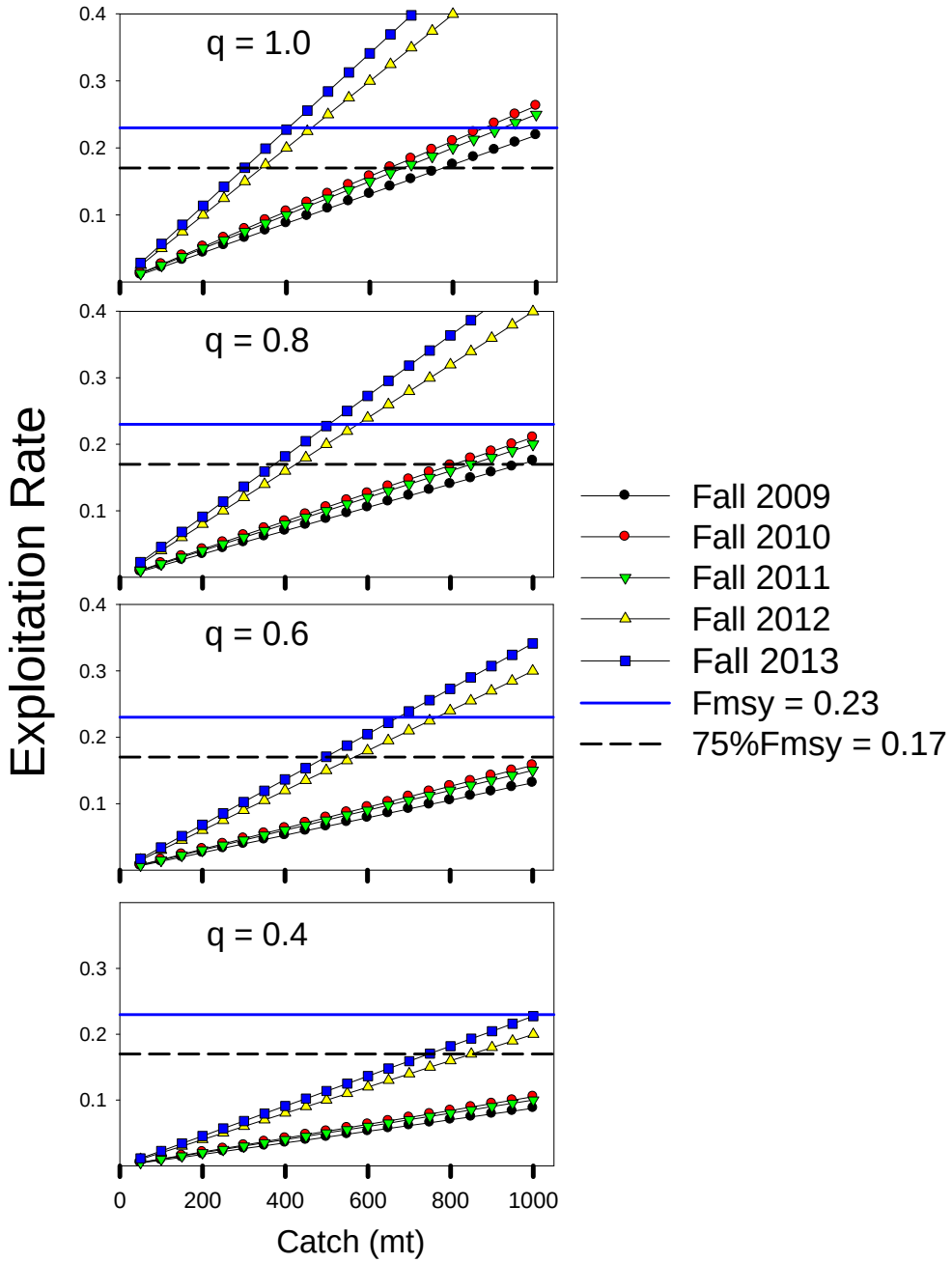
Efficiency

- 100%
- 80%
- 60%


Q = 0.6
Exploitation Rate
(catch/30+ biomasss)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
2008
2009
2010
2011
2012
2013
2014
Year
Spring Exploitation Rate
Fall Exploitation Rate


GOM Winter Flounder Overfishing Status
Exploitation Rate Threshold = 0.23
Exploitation Rate
0.30
0.25
0.20
0.15
0.10
0.05
0.00
2012
2013
2010
2011
0
1
2
3
4
5
6
7
8
9
30+ cm Exploitable Biomass (000s mt)




q = 1.0
q = 0.8
q = 0.6
q = 0.4
0.4
0.3
0.2
0.1
0
200
400
600
800
1000
Exploitation Rate
Catch (mt)
Fall 2009
Fall 2010
Fall 2011
Fall 2012
Fall 2013
Fmsy = 0.23
75%Fmsy = 0.17

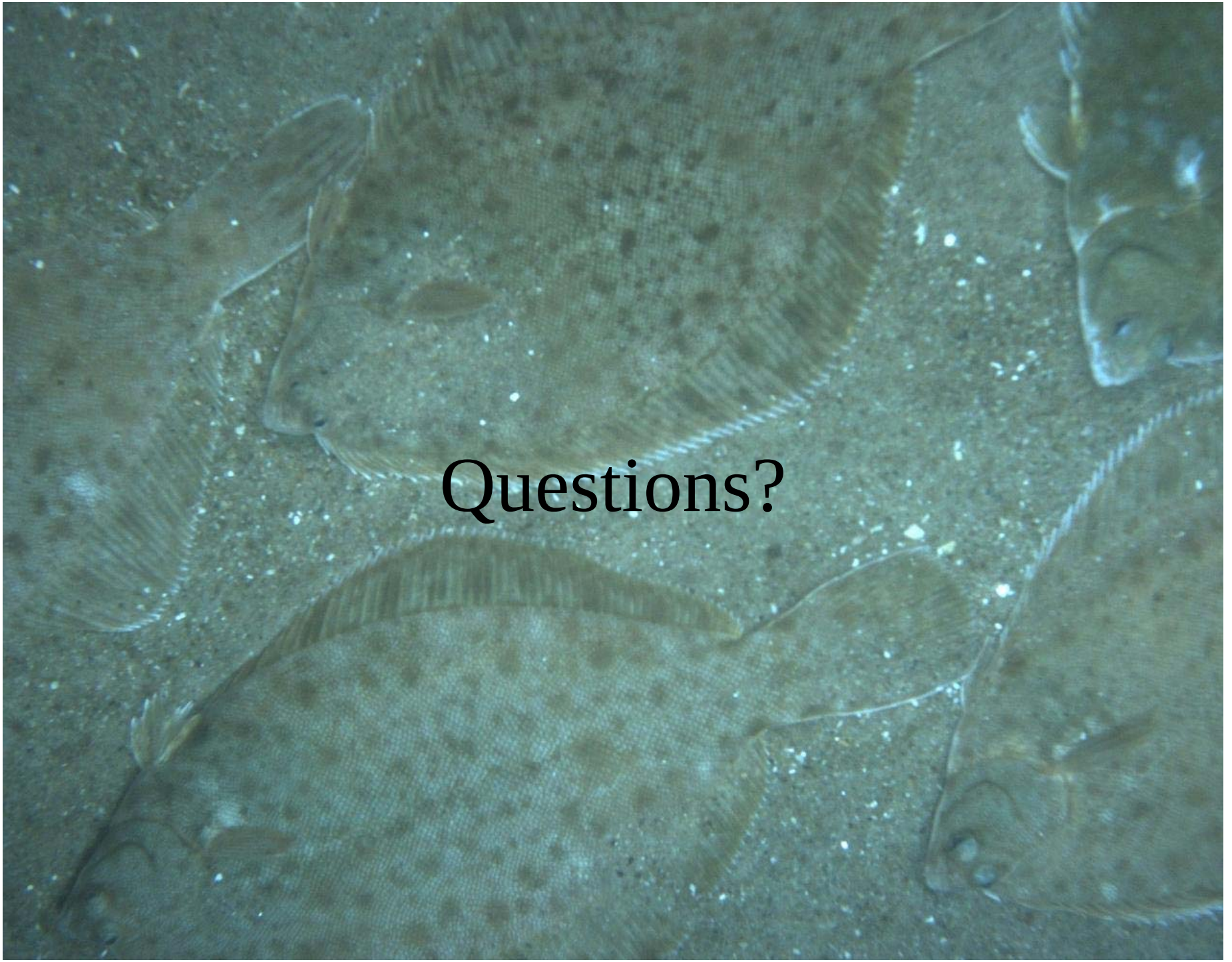
2014 Empirical Benchmark of Georges Bank yellowtail

Little information exists to inform the Q assumption. There are questions with herding from the ground cable and footrope escapement in the surveys. The GB yellowtail benchmark used a Q estimated from the flatfish literature (0.37 on the doors). However catch advice from door spread estimates would still have resulted in higher catch limits than the removals that have occurred.

Concerns

Catch and exploitation rates have been very low (in the 300 mt range over the last few years, ABCs set at 1,078 mt).

There has been no signs of increases in the survey 30+ biomass. There are some signs of recent declining biomass in the surveys.


Questions?

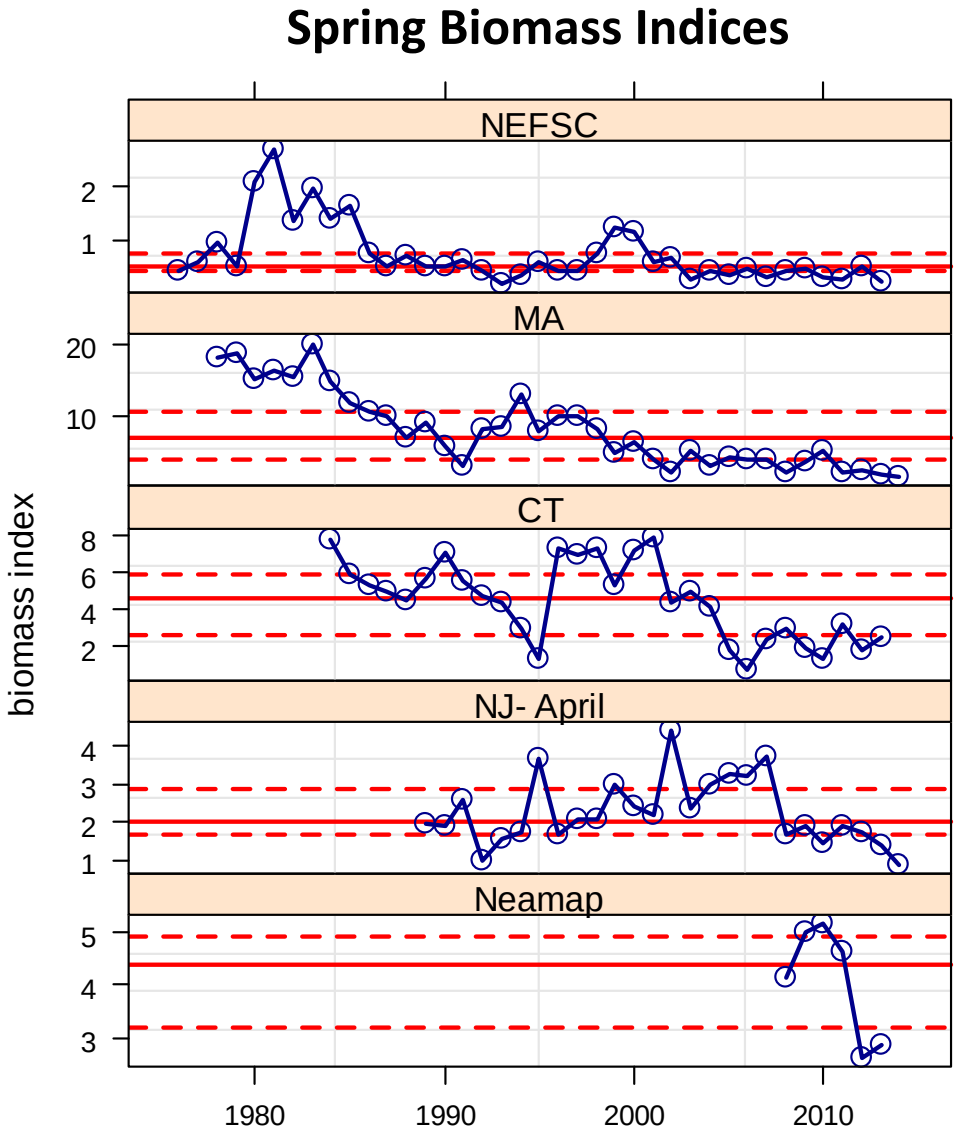
Winter Flounder Technical Committee Report

October 27, 2014

Topics

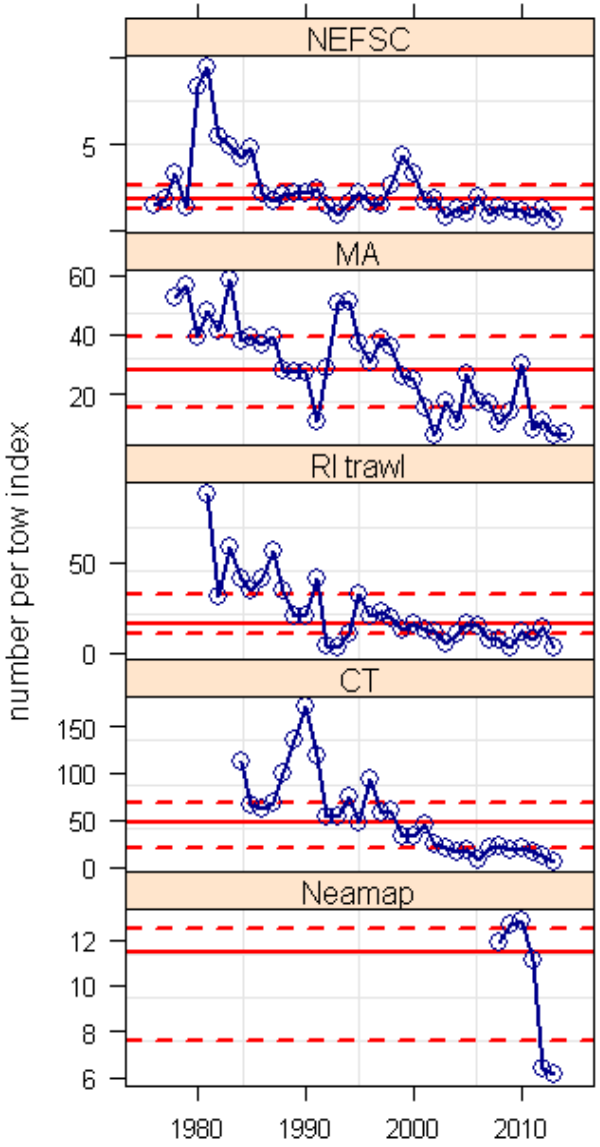
- SNE-MA winter flounder indices
- TC recommendations for SNE-MA region

SNE-MA Indices



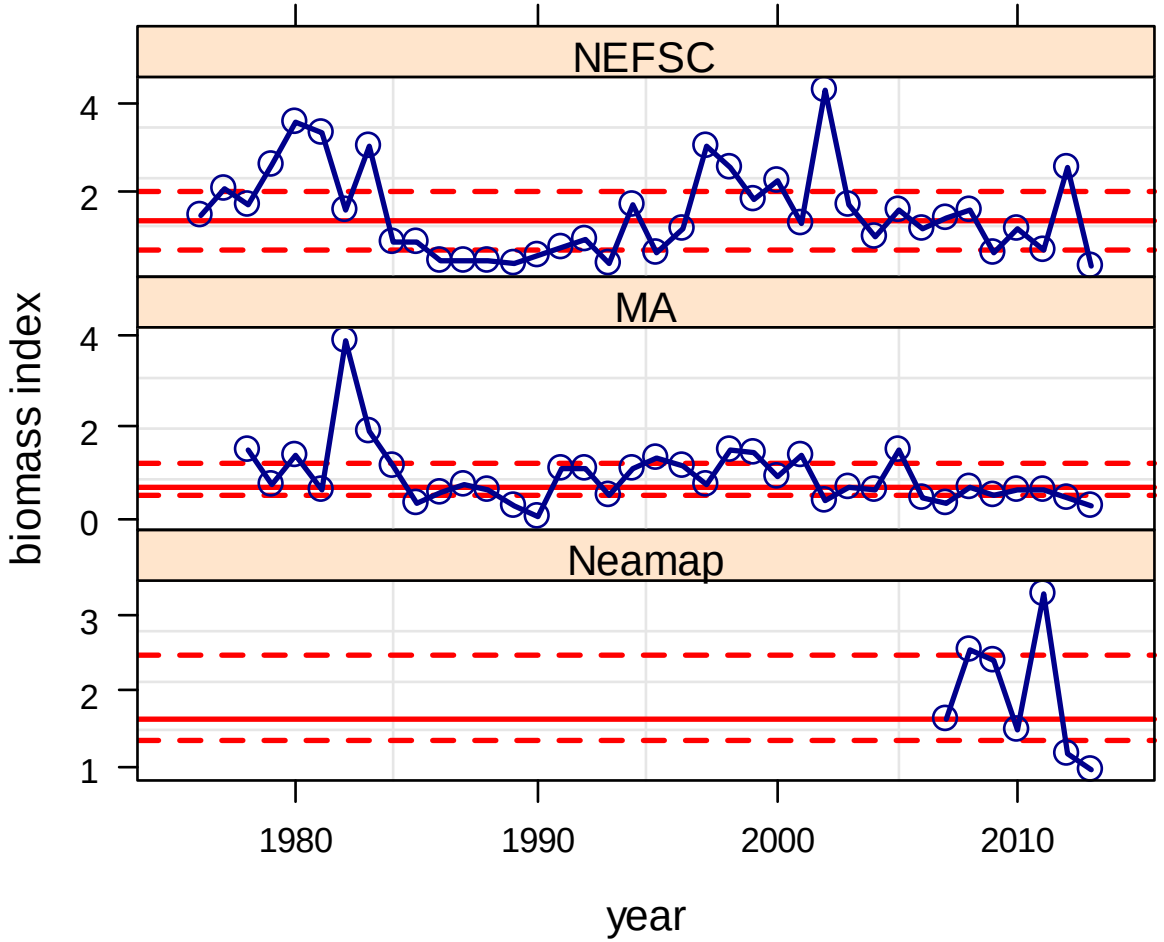
SNE-MA Indices

Spring Abundance Indices



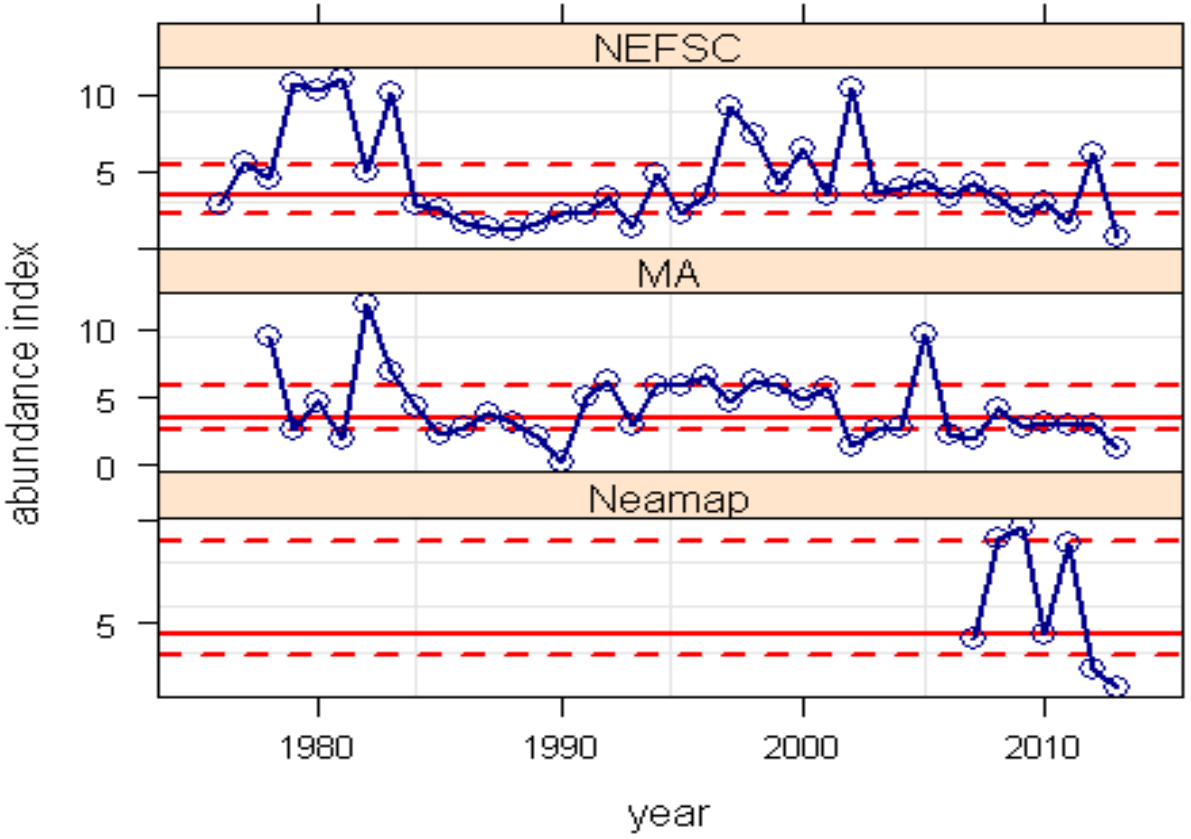
SNE-MA Indices

Fall Biomass Indices



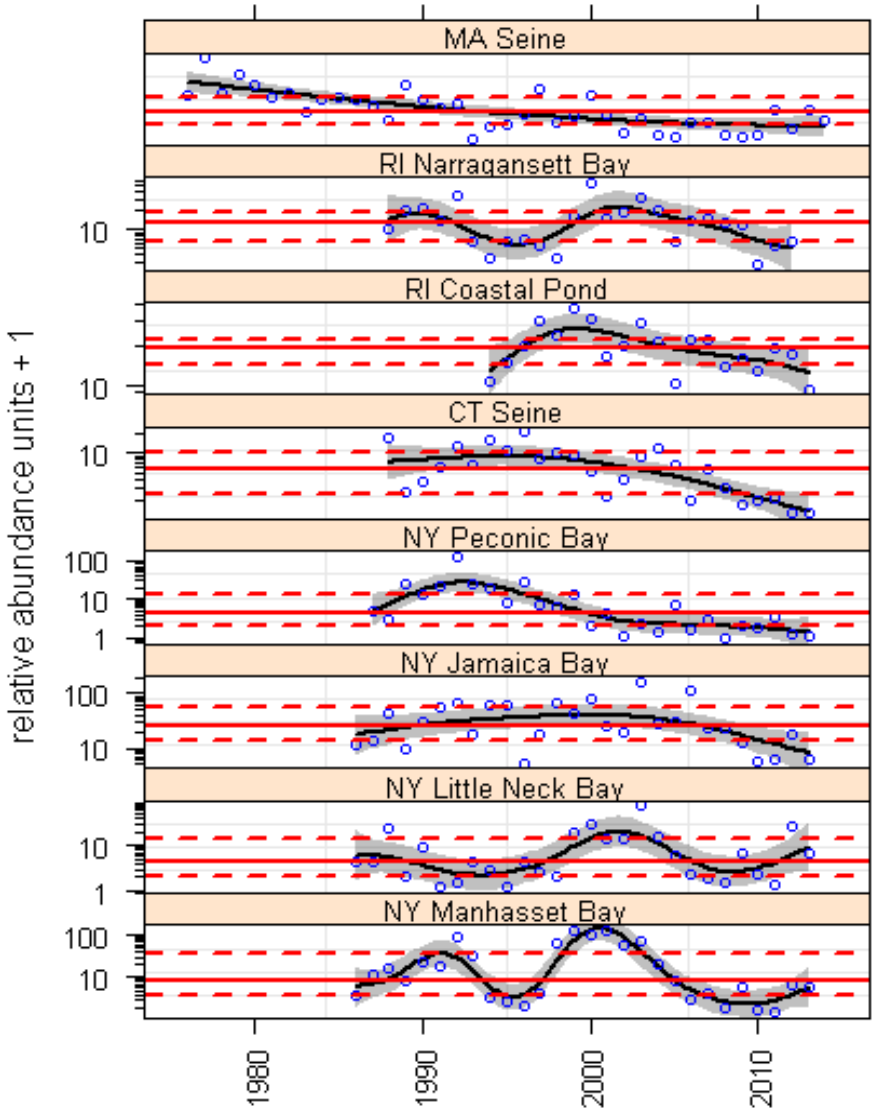
SNE-MA Indices

Fall Abundance Indices



SNE-MA Indices

Young of Year Indices



TC Conclusions

- Almost all survey indices are near time-series lows
- YOY indices also remain low, although a few indices have improved in recent years
- Rebuilding likely to be slow, if it occurs at all, especially if recruitment remains low

TC Recommendations

- TC has not reviewed the NEFMC SSC's recommendations for the GOM stock
- Specs for SNE-MA stock remain the same
- The TC recommends maintaining status quo management for the SNE-MA stock, given that indices indicate no rebuilding of the stock in recent years

Winter Flounder Specifications for the 2015 Fishing Year

Presented to

the ASMFC Winter Flounder Board

October 27, 2014

2014 Specifications

- **Commercial measures that could be adjusted through Board action:**
  - Trip limits
  - Size limits
  - Season

2014 Specifications

- **Recreational measures that could be adjusted through Board action:**
  - Size limits
  - Bag limits
  - Season

Current Management Measures: Commercial

- **Gulf of Maine**
  - ❑ 500-lb trip limit for non-federal permits
  - ❑ 12” size limit
  - ❑ Minimum 6.5” square or diamond mesh in cod-end
  - ❑ Maintain seasonal closures

Current Management Measures: Commercial

- **Southern New England/ Mid-Atlantic**
  - ❑ 50-lb or 38 fish possession limit for non-federal permits
  - ❑ 12” size limit
  - ❑ Minimum 6.5” square or diamond mesh in cod-end
    - ❑ 100-lb “mesh trigger”

Current Management Measures: Recreational

- **Gulf of Maine**
  - ❑ 12” minimum size limit
  - ❑ 8 fish creel limit
- **Southern New England/ Mid-Atlantic**
  - ❑ 2 fish bag limit
  - ❑ 60-day open season
  - ❑ March 1 –December 31

2014 Fishing Season

Commercial Sector and Common Pool

(May 1 through October 21, 2014)

Stock	Kept (mt)	Discarded (mt)	Total Catch	Sub-ACL	% Caught
GOM	66.4	4.2	70.6	714	9.9%
SNE/MA	366.9	3.9	370.8	1,210	30.6%
GB	937.7	2.0	939.7	3,385	27.8%

Consider 2015 Specifications