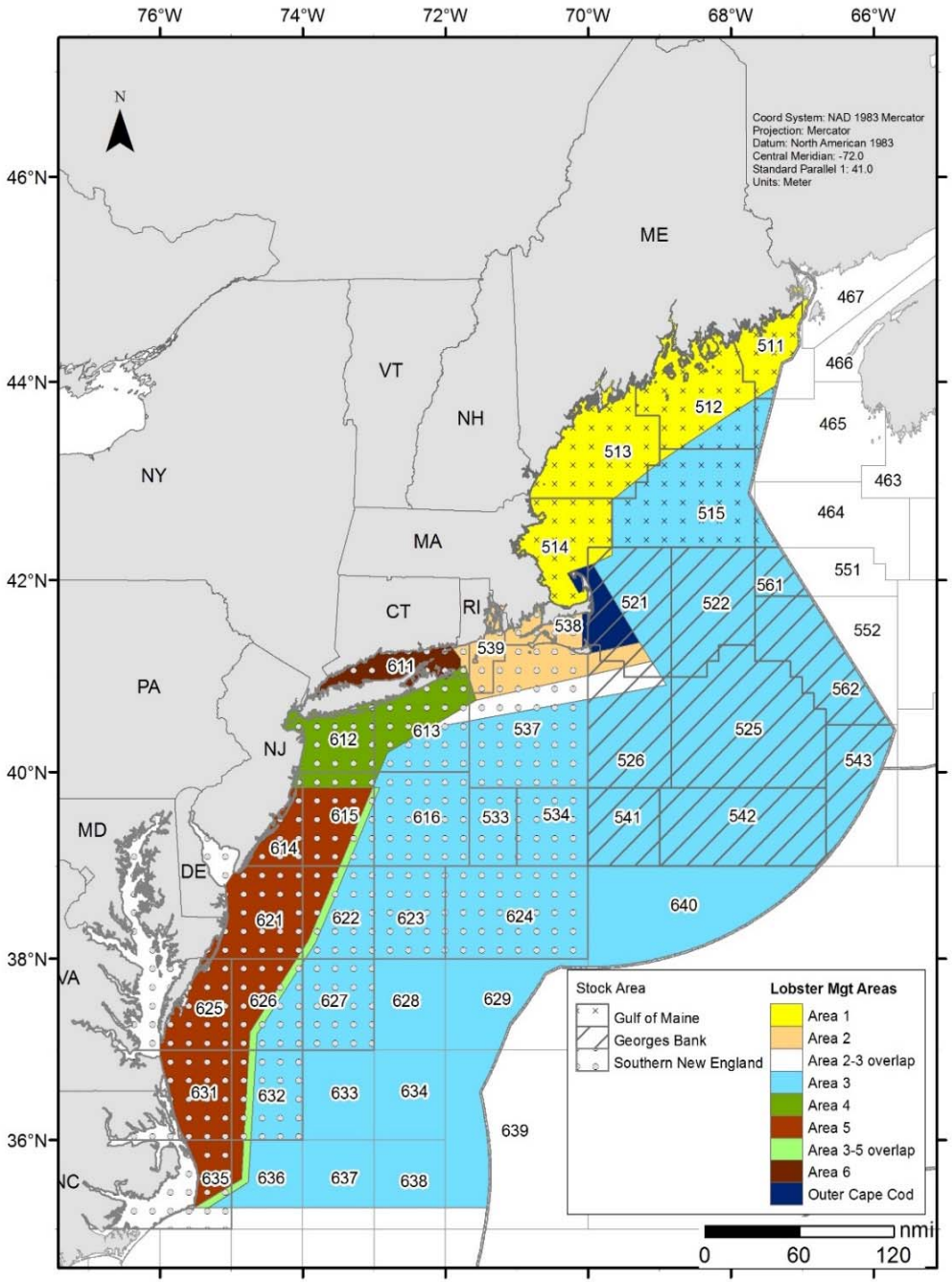
ASMFC *American Lobster Stock Assessment for Peer Review* - August 2015

Management Unit

- 3 Stock Units

- Management Areas



Management History

- Since 1997 a total of 24 Addendum to Amendment III have been passed

Management Measure	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	OCC
Min Gauge Size	3-1/4"	3-3/8"	3-17/32"	3-3/8"	3-3/8"	3-3/8"	3-3/8"
Vent Rect.	1-15/16x 5-3/4"	2 x 5-3/4"	2-1/16 x 5-3/4"	2 x 5-3/4"	2 x 5-3/4"	2 x 5-3/4"	2 x 5-3/4"
Vent Cir.	2-7/16"	2-5/8"	2-11/16"	2-5/8"	2-5/8"	2-5/8"	2-5/8"
V-notch requirement	Mandatory for all eggers	Mandatory for all legal size eggers	Mandatory for all eggers above 42°30'	Mandatory for all eggers	None	None	None
V-Notch Definition (possession)	Zero Tolerance	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	1/8" with or w/out setal hairs[1]	State Permitted fisherman in state waters 1/4" without setal hairs Federal Permit holders 1/8" with or w/out setal hairs[1]
Max. Gauge (male & female)	5"	5 ¼"	6 3/4"	5 ¼"	5 ¼"	5 ¼"	State Waters none Federal Waters 6 3/4"
Season Closure				Feb 1- Mar 31	April 30-May 31	Sept 8-Nov 28	Feb 1-April 30

[1] A v-notched lobster is defined as any female lobster that bears a notch or indentation in the base of the flipper that is at least as deep as 1/8 inch, with or without setal hairs. It also means any female which is mutilated in a manner that could hide, obscure, or obliterate such a mark.

Reference Points

Diagram of the abundance reference point threshold, target, and management responses for the Gulf of Maine and Georges Bank stocks.

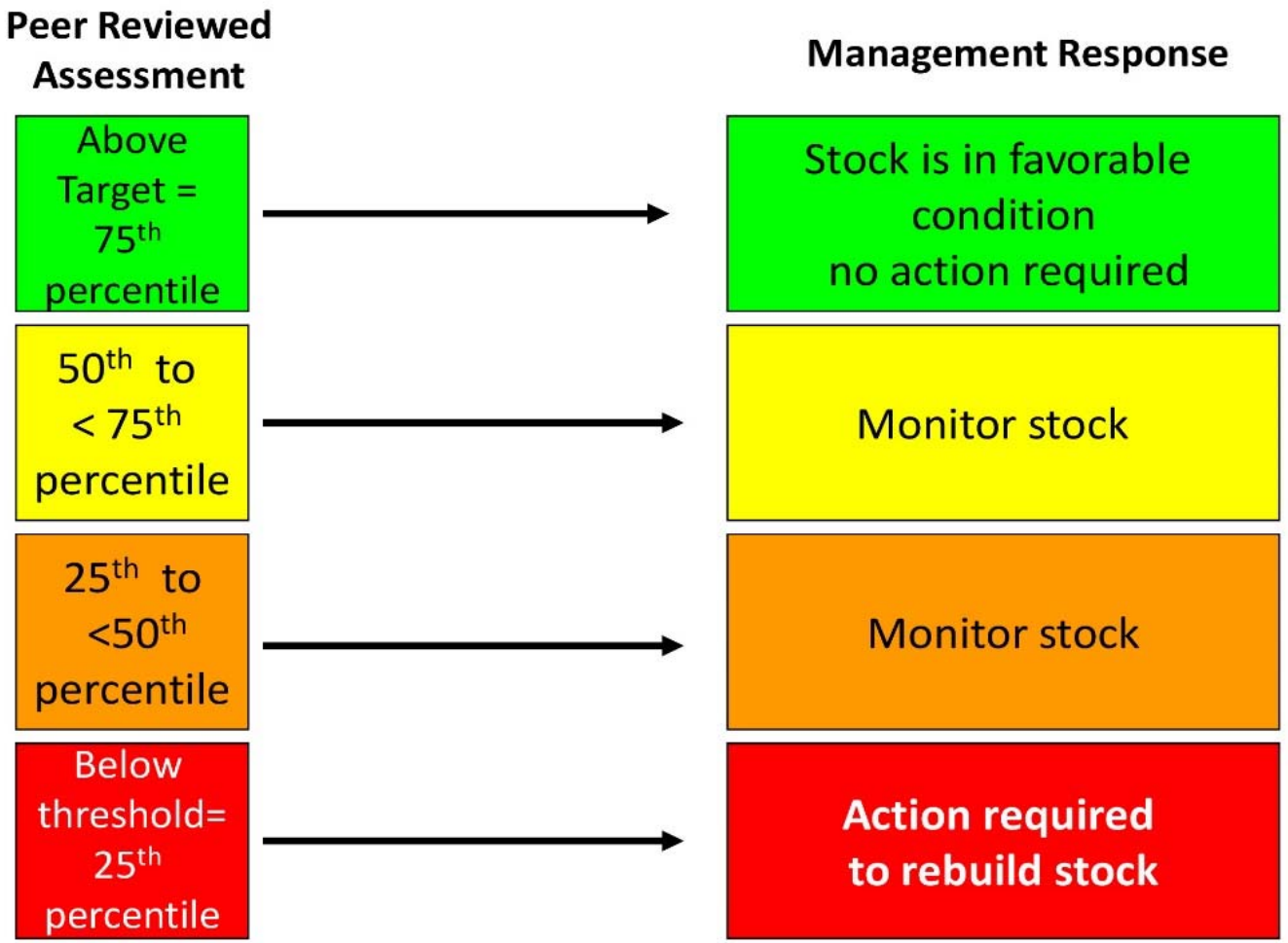


Diagram of the abundance reference point threshold, target, and management responses for the Southern New England stocks.

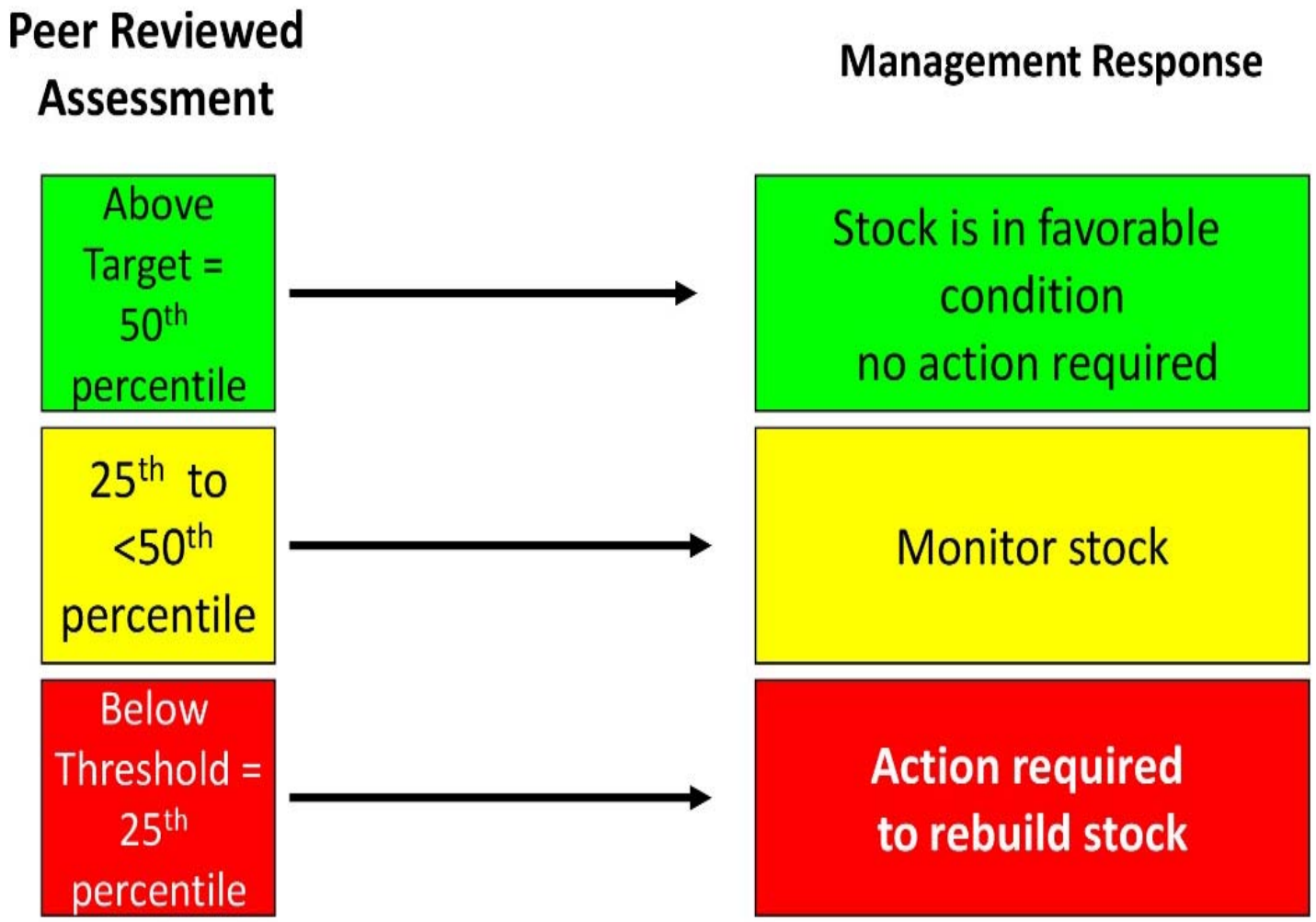
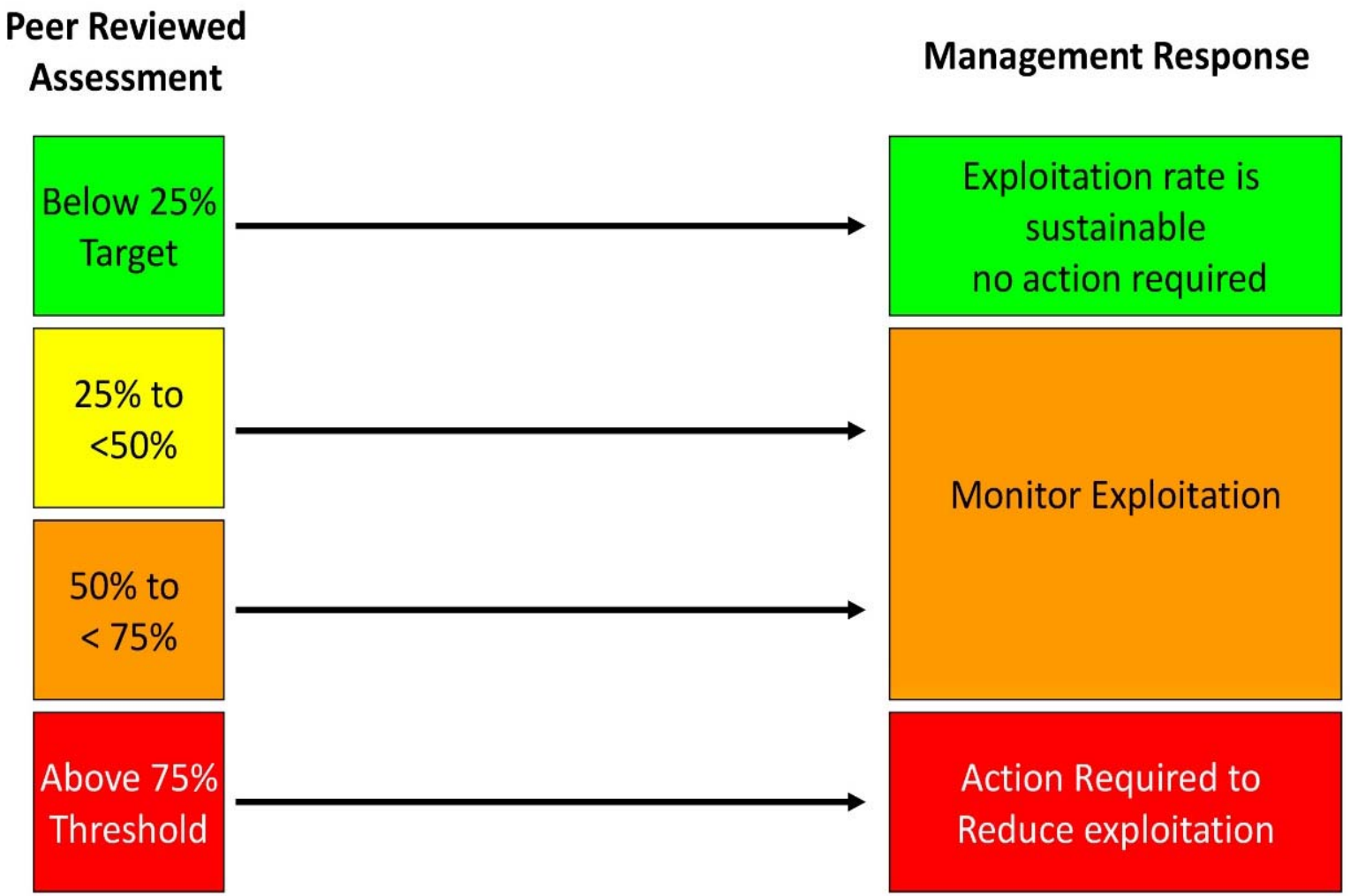


Diagram of the mortality based reference point threshold, target, and management responses for the GOM, GBK, and SNE stocks.



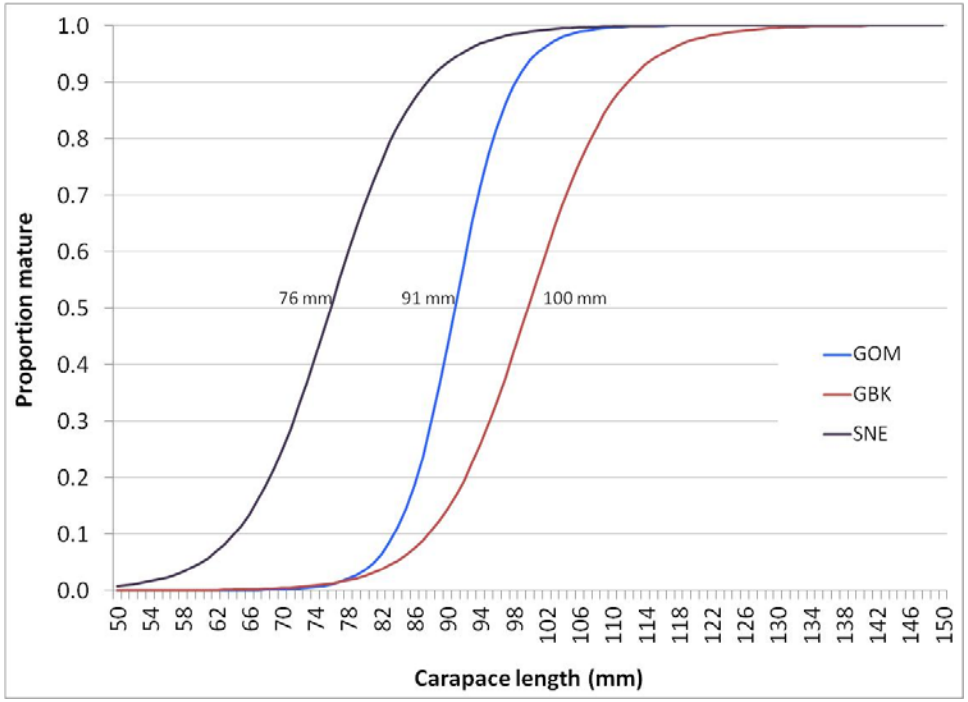
Natural History

Life History

- Age
  - longed-lived species, cannot reliably be aged
  - Recruit to the fishery between 5 and 8 years old (based on rearing studies)
  - length based methods are still standard for lobsters
- Growth
  - lobsters grow incrementally in distinct molting events
  - growth parameters updated for this assessment but new data are still largely lacking especially for large lobsters
  - abundance and exploitation estimates and biological reference points are sensitive to growth
  - Growth rates vary with changing environment
  - Time varying estimates of growth not possible
  - THE ENVIRONMENT HAS CHANGED!

Natural History

- Maturity
  - Sexual maturation is directly influenced by the thermal history experienced
    - Generally occurs at smaller sizes in warmer waters
  - Current size at maturity estimates are based on data collected in the late 1980's and early - 1990's
  - The thermal environment has changed since this time



Natural Mortality

- Lobsters are long-lived, slow to reach maturity and generally considered to be a k-selected species
- Low and stable rates of M make sense in stable environments
- GOM and GB: M is held constant @ M = 0.15 for all size classes

Natural Mortality - SNE

- Empirical evidence of increasing M in SNE
  - Prolonged exposure to water temperatures above the stress threshold
  - Increase physiological stress
  - Increase in disease rates
  - Die-off in Long Island Sound (Hypoxia)
  - Dramatic declines in YOY settlement
  - Dramatic declines in adult indices

- **2015 Assessment** - The negative relationship between annual recruitment, as measured in the four SNE surveys and the number of days the average temperature above 20° C is strongly correlated within an increase in M
  - SNE used M=0.29 during 1998-2014 due to direct evidence of increased natural mortality after 1997 and as a crude attempt to capture effects of recent warm water conditions in the inshore portions of SNE.
  - Current sensitivity analyses show that reference abundance estimates were -9% to -1% smaller and effective exploitation estimates were 4%-12% larger using different M assumptions.

Habitat

- Four Critical Components
  - Temperature, Salinity, DO, pH
  - Largely determine the extent of suitable habitat and as result the geographic distribution of lobster
  - Changes in these critical habitat components can lead to habitat contraction and expansion

Category	Life-Stage	Threshold Value	Reference(s)
Temperature	Eggs	<5°C winter, 10-12°C hatching	1, 2
	Larvae	10-12°C	2
	Juveniles/Adults	5-18°C, preference ~ 16°C, 20.5°C stressed	3, 4, 5, 6
Salinity	Eggs/Larvae	< 17 ppt	7
	Juveniles/Adults	< 12 ppt	8
Dissolved Oxygen	Larvae	< 1 mgO_2/L	9
	Juveniles/Adults	< 2 ppm	10
pH	Larvae	< 7.7 (stages I – IV)	11
	Juveniles/Adults	n/a	

Temperature

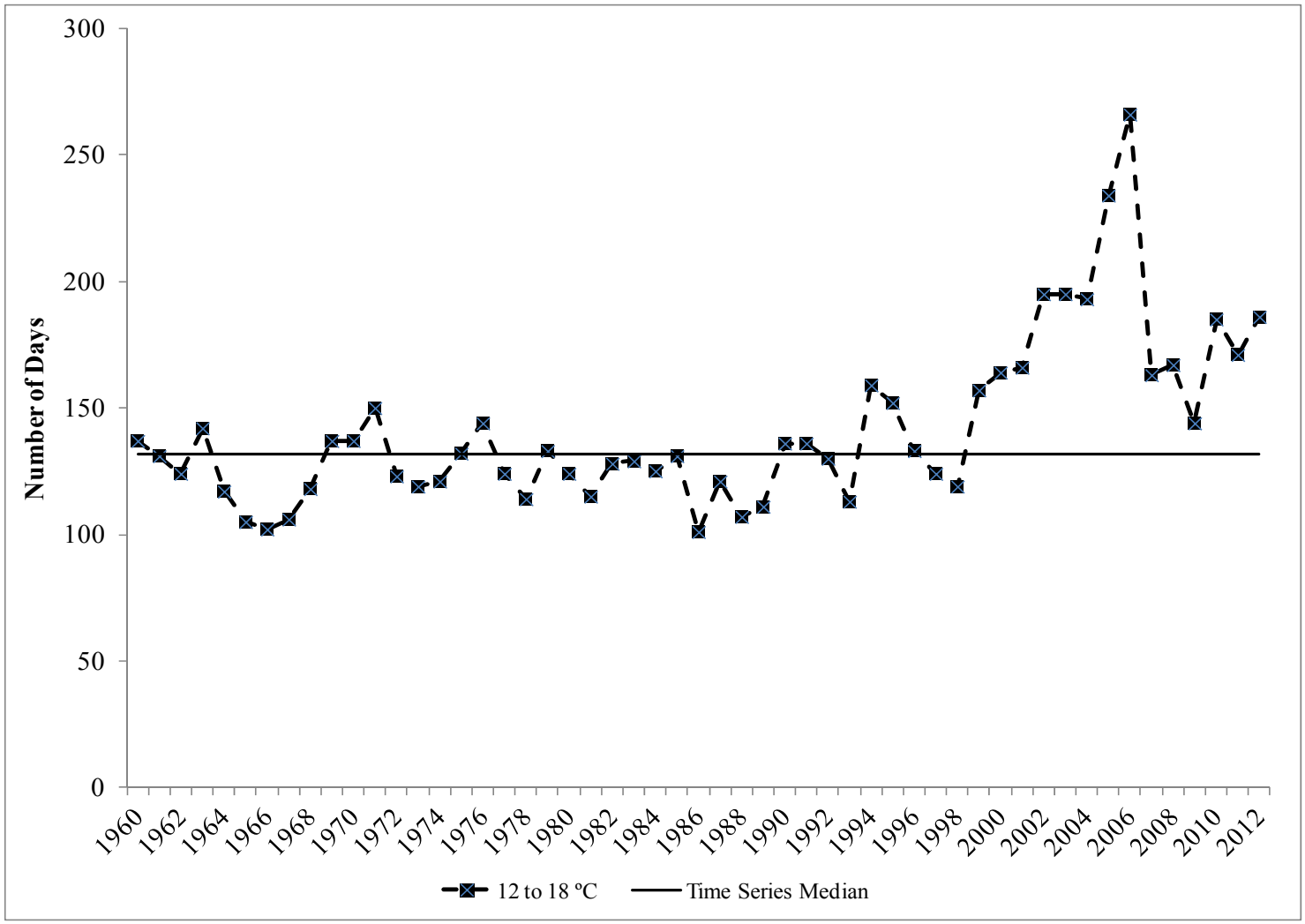
- The best indicator of thermal habitat for cold-blooded marine animals is not the magnitude of temperature extremes but rather the amount of time the temperature remains within the species preferred temperature range
- 12 to 18 ° C – “Optimal Temperature”
  - Faster rates of sexual maturation and egg development
  - Hatching occurs
  - Faster larval development and higher larval survivorship
  - Thermal preference of 15.9° C
- Lobsters avoid water temperatures below 5° C and above 18° C
- 20 ° C – “Stress Threshold”
  - Increased physiological stress
  - Depression of immunocompetence
  - Increased rates of disease
  - Increased larval mortality
  - Changes in the distribution of spawning females

Temperature Effects and Climate Change

- North Atlantic Ocean has undergone significant and widespread warming over the last century (Trenberth et al. 2007, Belkin 2009, Friedland and Hare 2007)
  - GOM - 1 ° C increase in the annual mean SST since 1890 (Sherman and Lentz, 2010)
  - Woods Hole, MA SST is 1 ° C warmer in recent history as compared to the average observed between 1880 and 1970 (Nixon et al. 2004)
  - Northeast Shelf - rate of warming has increased over last 35 years (Belkin 2009, Nye 2010, Sherman et al. 2013).
- Warming trend has been very pronounced in coastal waters of New England since 1990's.
- Climate projections for the NE shelf predict that water temperatures will continue to warm over the next 50 years at a rate similar to what has been observed for the last 50 years

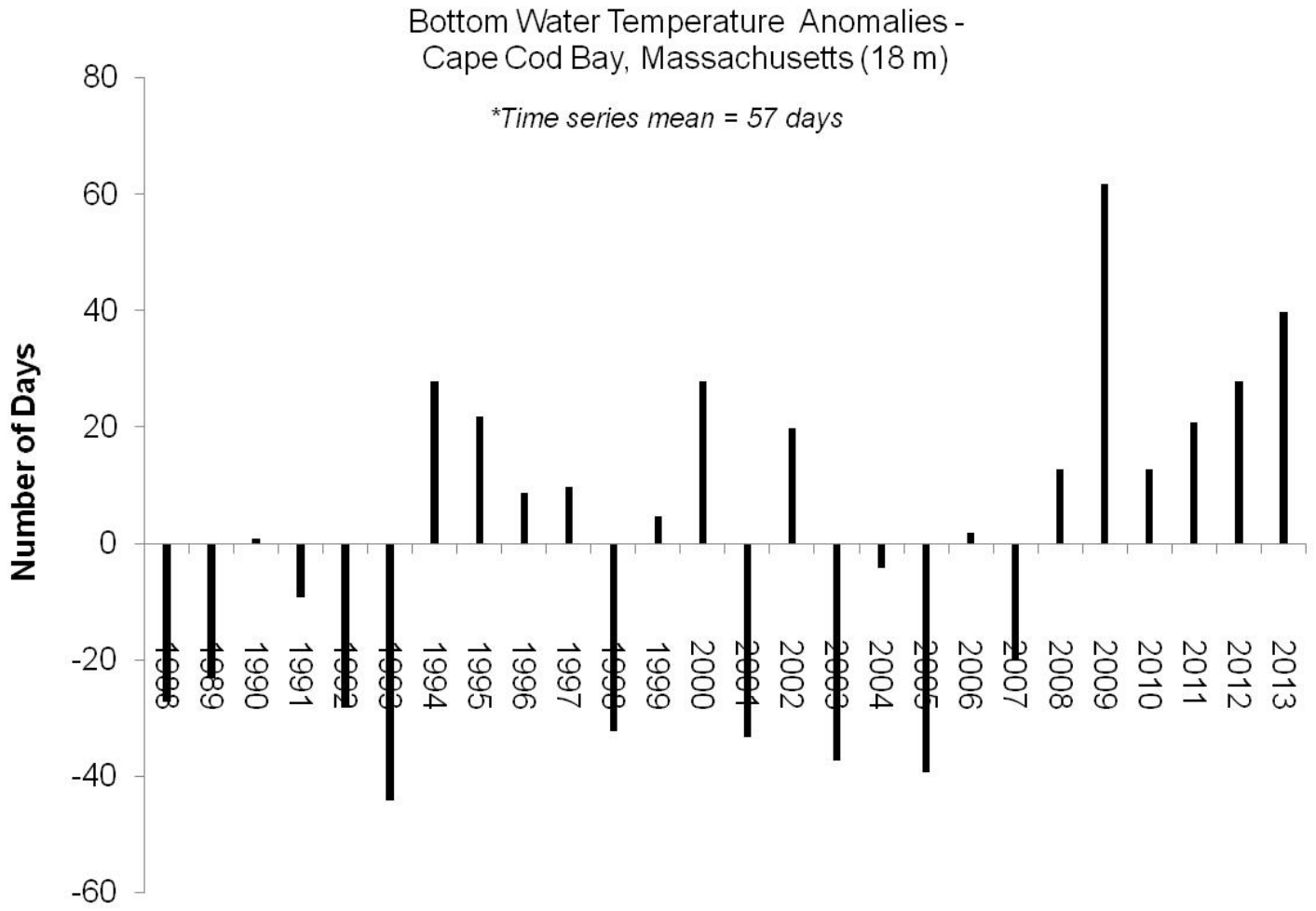
Temperature Trends – Gulf of Maine

- Number of days SST was within the optimal temperature range of 12° to 18º C at Boothbay Harbor, ME – 1960 to 2012 (dashed line).
- Time series median solid line.



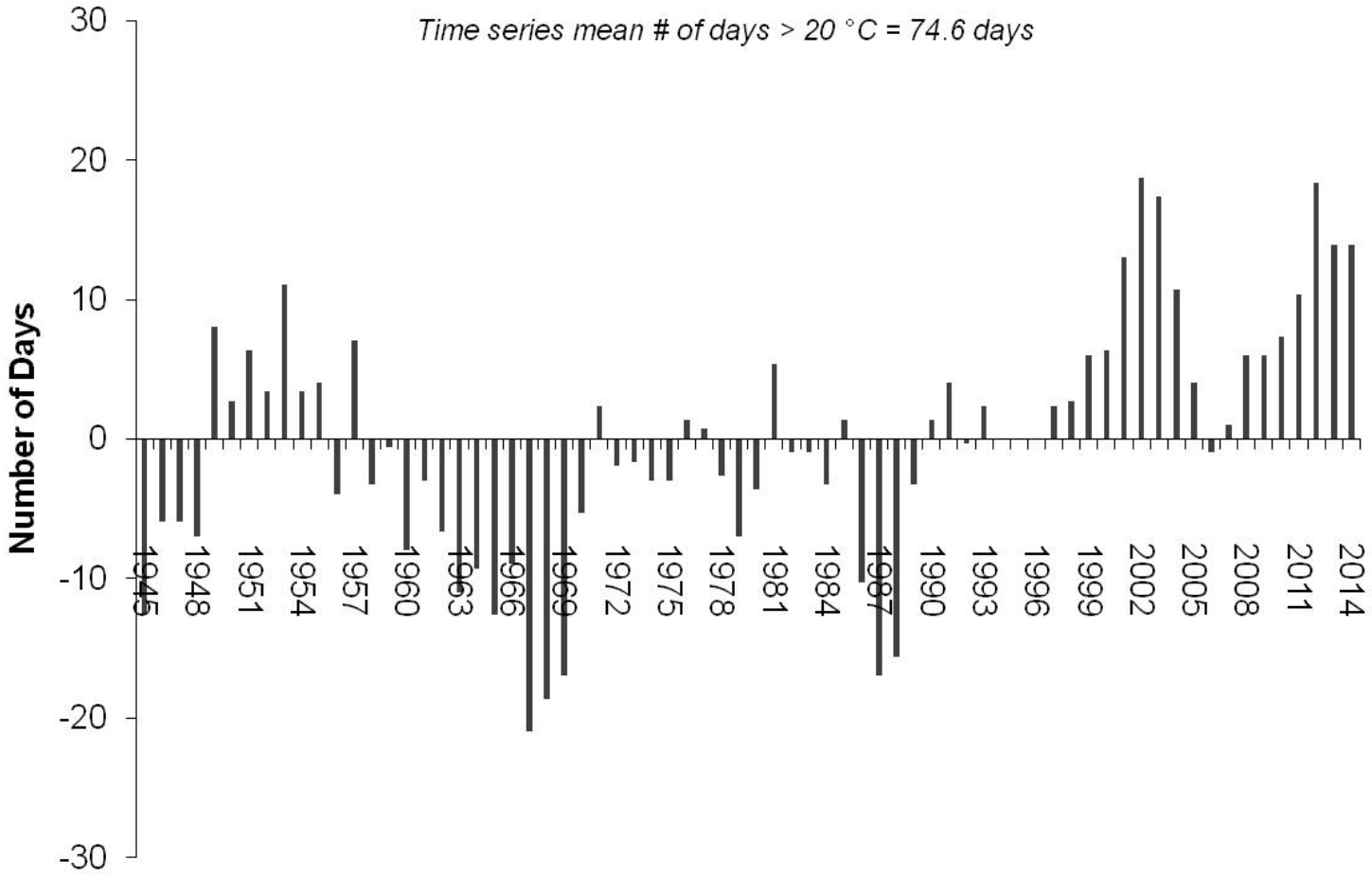
Temperature Trends – Gulf of Maine

- Anomalies from the time series mean number of days between 12° to 18 ºC at Manomet Point (depth = 18m) Cape Cod Bay, Massachusetts.
- Number of days in the “optimal range” above average in 14 out of the last 20 years



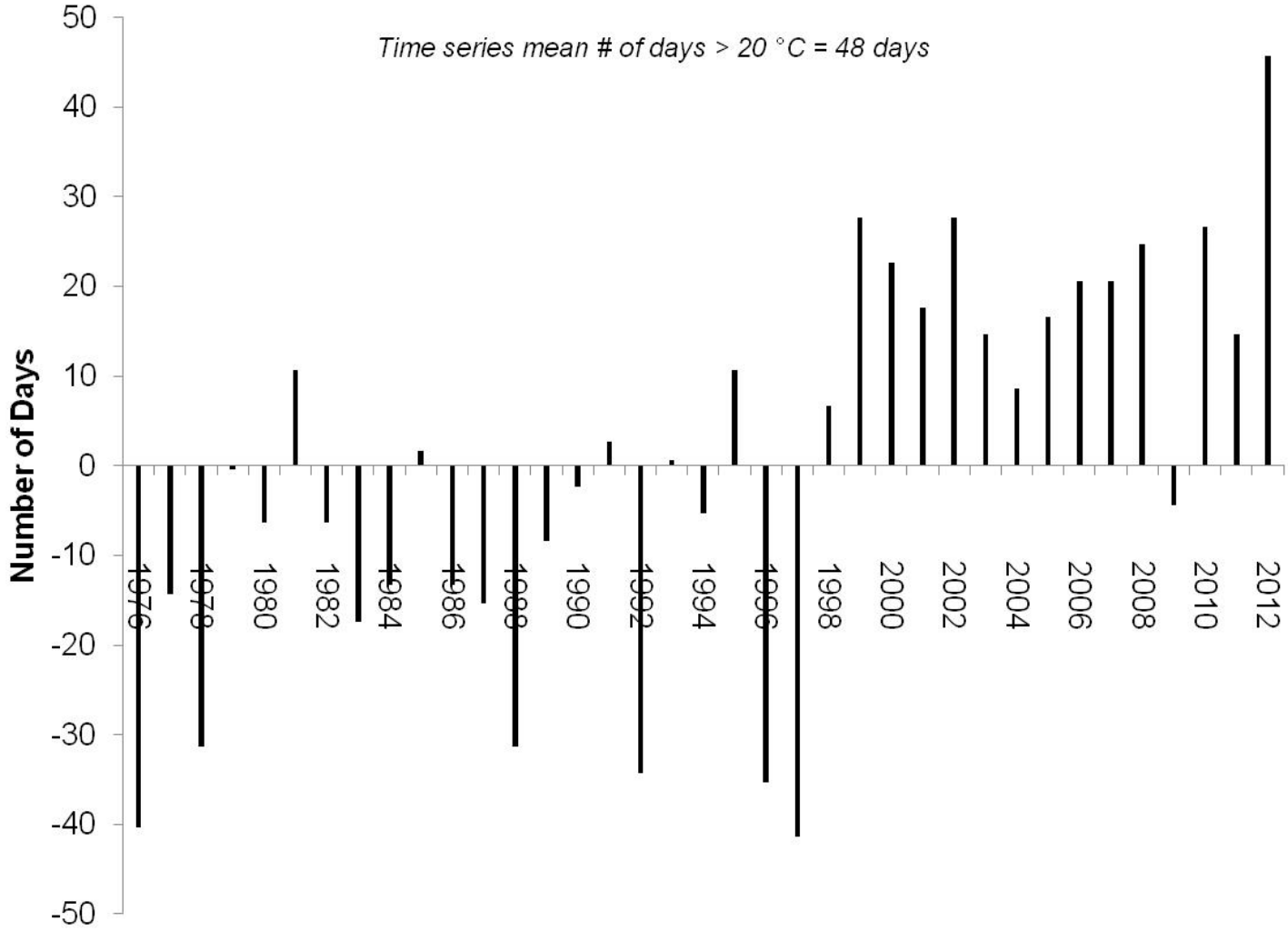
Temperature Trends – Southern New England

- Sea Surface Temperature Anomalies from the # of Days > 20° C from 1945 to 2014 at Woods Hole, MA.
- Water temps in SNE above the “stress threshold” in 17 out of the last 18 years



Temperature Trends – Southern New England

- Bottom water (11 m) temperature anomalies from the mean number of days >20° C at Dominion Nuclear Power Station, eastern Long Island Sound, CT - 1976-2012.



Take home points about Temperature

- The waters of the NW Atlantic have warmed dramatically
- In SNE this has had a negative effect on lobster
  - Higher rates of natural mortality
  - Lower stock productivity
  - Habitat contraction – many inshore areas that once held high densities of lobsters are no longer viable lobster habitat
  - **A stock that is under environmental stress is less resilient to fishing pressure**
- In GOM this has had a positive effect on lobster
  - Higher rates of larval survival
  - Faster rate of sexual maturity
  - Higher stock productivity
  - Habitat expansion – areas in the eastern GOM that were once too cold for successful settlement are now viable nursery grounds
  - **Stocks under favorable environmental conditions are more resilient to fishing pressure**

Stock Definitions

- No clear genetic differentiation of American lobster stocks.

- Geographical differences in biological characteristics provide justifiable basis for defining lobster stocks.

TLPugh5

  - *Patterns of Abundance
  - *Patterns of Migration
  - *Location of spawners
  - *Dispersal and transport of larvae
  - *Size Composition
  - *Size at sexual maturity

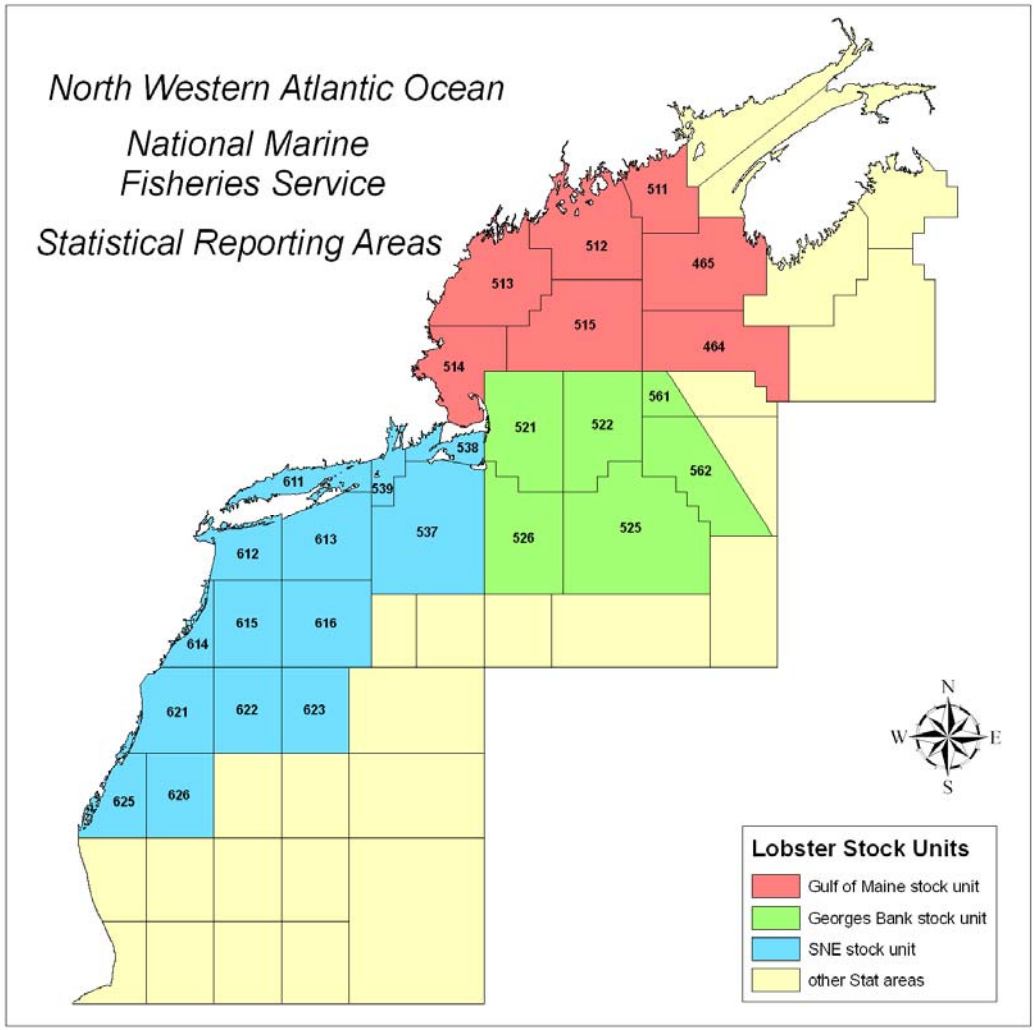
Slide 21

TLPugh5 2 different colors in your text here...intentional??
tlp, 7/31/2015

Stock Units

- Three Stock Units:
  - Gulf of Maine (GOM)
  - Georges Bank (GB)
  - Southern New England (SNE)

- Stock boundary lines fall along NMFS statistical reporting area lines, because this is the highest level of spatial resolution in which commercial catch data can be aggregated

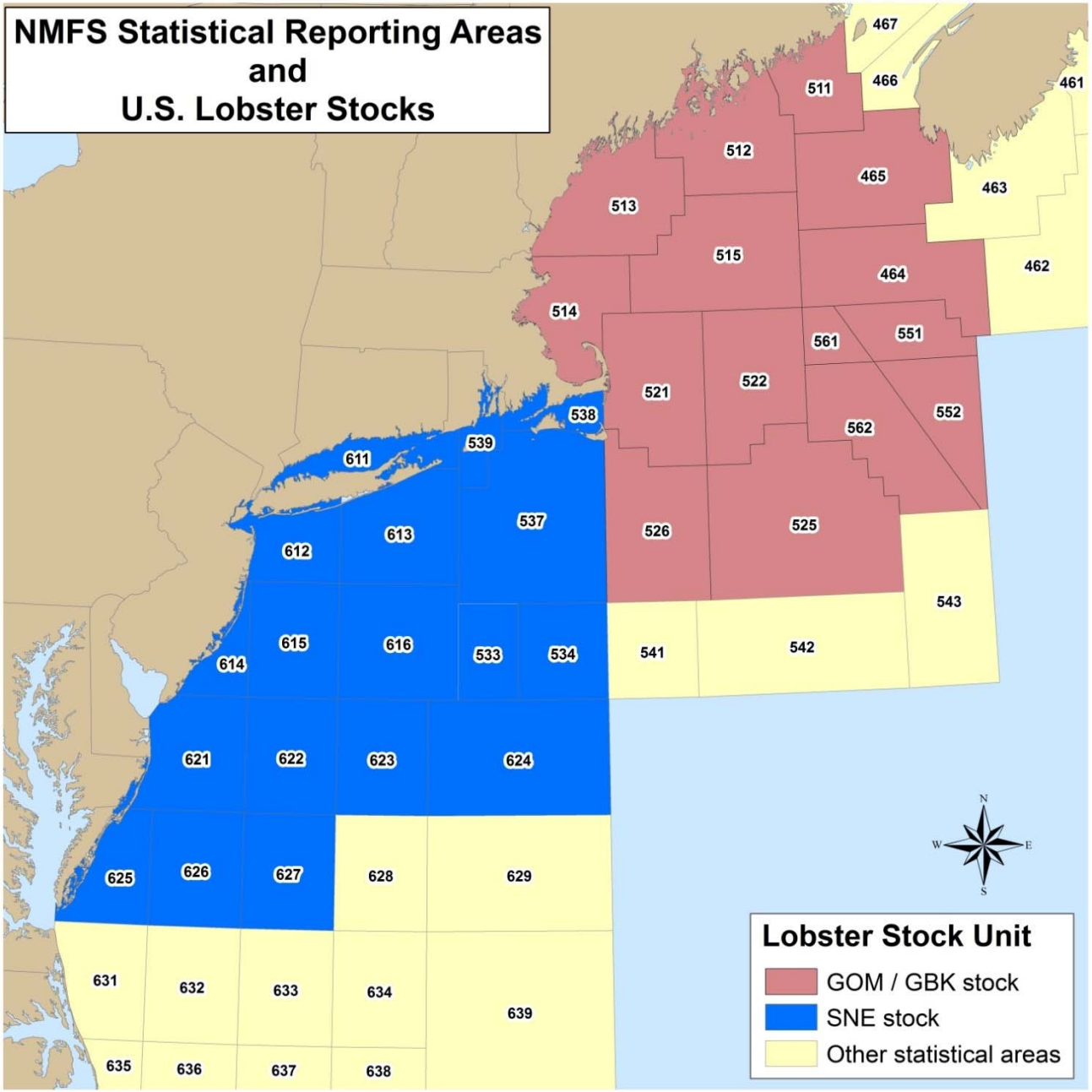


Stock Definitions for Current Assessment

- TC recommends combining the GOM and GB stocks.

- Consideration of combining the GOM and GB stock units.
  - Trawl survey data
    - GB - large female lobster present in the fall but not the spring
    - GOM – large female lobster present in spring but not the fall
  - Tagging data from boundary of GOM and GB suggest;
    - Easterly movement of lobsters in fall from GOM to GB (Fair 1977, MADMF unpublished)
    - Westerly movement of lobsters in the spring from GB to GOM (Estrella & Morrisey 1997, MADMF unpublished)
    - Large females migrate farther than any other population demographic
  - Anecdotal evidence
    - Fishermen on GB report seeing a moderate number of v-notches, yet few practice it. An accidental tagging study of sorts.
  - Management
    - Measures taken in LMA 1 to protect “brood stock” lobster (5” max, v-notching, 100/500 rule) have increased this segment of the population
    - This is apparent in survey indices of both GOM and GB

Proposed Stock Units



Information used to assess each Stock

- Empirical Data
  - Fishery Dependent
  - Fishery Independent
  - Biological
- Model Free Indicators
  - Mortality Indicators
  - Abundance Indicators
  - Fishery Performance Indicators
- Model Results
  - Reference abundance estimates
  - Reference exploitation estimates
  - Threshold Reference Points

Data Sources

- Fishery Dependent Data – ME, NH, MA, RI, CT, NY, NJ, NMFS
  - Catch Reports - landings and effort
  - Sea-sampling - size distribution, sex ratio, discard rates
  - Port-sampling - size distribution and sex ratio
  - Industry sampling - AOLA, CFRF

- Fishery Independent Data
  - Trawl surveys – ME, MA, RI, CT, NJ, NMFS, NEAMAP
  - Ventless Trap Survey – ME, NH, MA, RI
  - YOY/Larval Surveys – ME, NH, MA, RI, CT

Stock Indicators: The Traffic Light Approach

- “Common sense” stock indicators
- Used to corroborate model results and provide additional information and context about the overall health of the each stock
- Not used in the legal determination of stock status

Stock Indicators: The Traffic Light Approach

- Categories:
  - Mortality Indicators
  - Abundance Indicators
  - Fishery Performance Indicators

- Characterized positive, negative, or neutral based on interquartile ranking of the annual value

- Strengths:
  - use of percentiles is objective
  - focus on trends is robust to many biological and modeling assumptions.

Mortality Indicators

	$\leq 25^{th}$ percentile	Between 25^{th} and 75^{th} percentile	$\geq 75^{th}$ percentile
Exploitation rate (u)	Positive	neutral	negative

Abundance Indicators

	$\leq 25^{th}$ percentile	Between 25^{th} and 75^{th} percentile	$\geq 75^{th}$ percentile
Recruit Abundance	negative	neutral	positive
Post Recruit Abundance	negative	neutral	positive
Spawning Stock Abundance Index	negative	neutral	positive
Settlement Index	negative	neutral	positive
Proportion of Positive Tows	negative	neutral	postive

Fishery Performance Indicators

	≤ 25th percentile	Between 25th and 75th percentile	≥ 75th percentile
Landings	**negative**	**neutral**	**Positive**
Effort	**Positive**	**neutral**	**negative**
Gross CPUE	**Negative**	**neutral**	**positive**

University of Maine Assessment Model

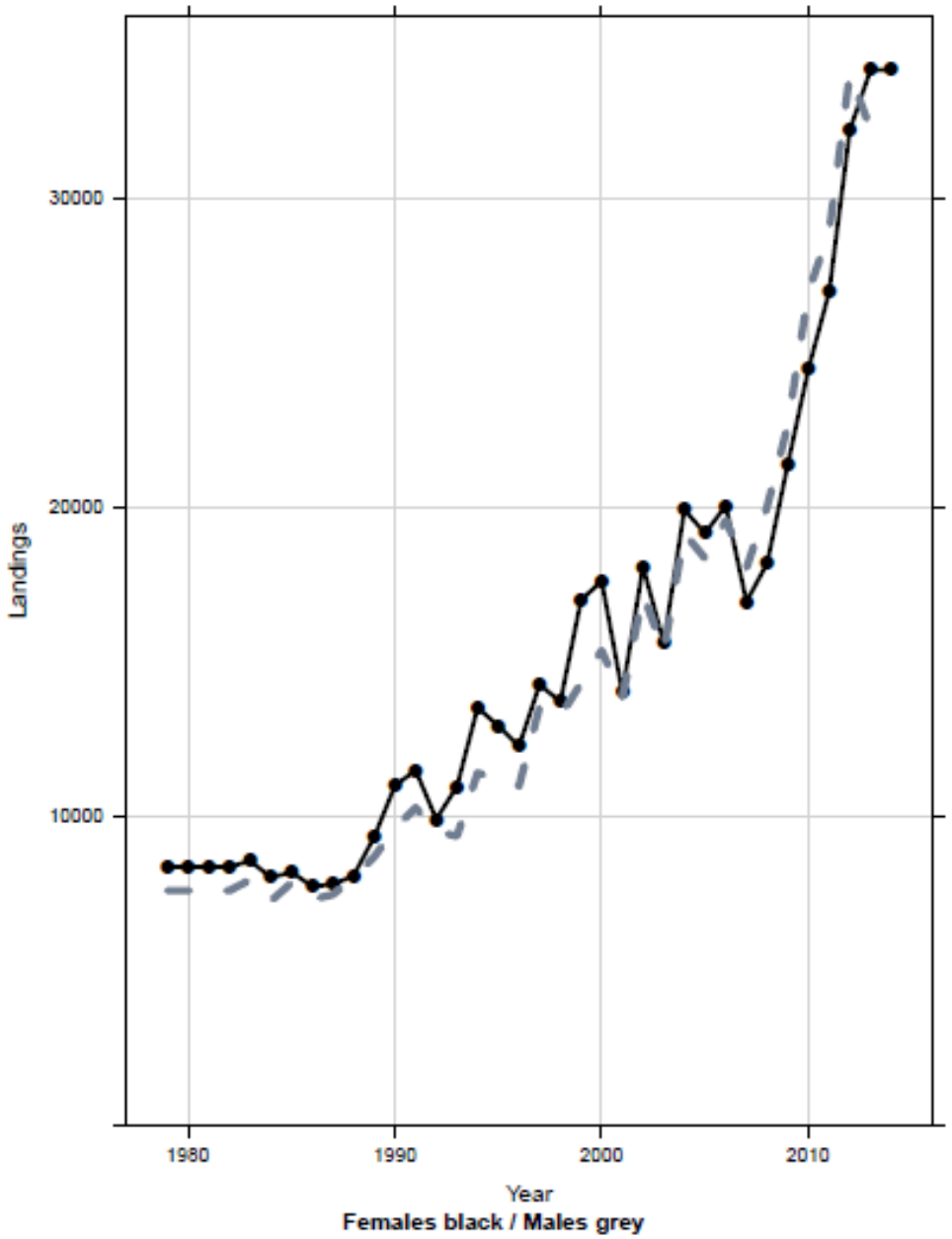
- Primary model last assessment, only model this assessment
  - Some improvements/corrections this time
- Book keeping by year (1979-2014), quarter, sex and size (53-223+ mm stock in 5 mm size groups)
- Standard “maximum likelihood” statistics for comparing observed and predicted data
- Natural mortality, growth, seasonal progression of biological processes, discard rates assumed to be known
- **Strengths**: built for lobster, uses all/most available data, results make sense, estimated trends reliable
- **Weaknesses:** more uncertainty than meets the eye, hard to deal realistically with spatial complexity in stock and fishery, assumes growth is known and biological sampling is representative

GOM/GB - Results

Description of the Fishery

- GOM/GB
  - Largest fishery
    - Accounted for roughly 98% of U.S. landings in 2013
    - Largest portion from inshore/nearshore waters, with smaller portion offshore
  - Effort high and stable – roughly 3.5 million traps
  - Majority of boats are 22’ to 45’ and make day trips

GOM/GB Landings



GOM/GB Fishery Performance Indicators

	EFFORT	TOTAL GOM/GBK LANDINGS	PARTIAL LANDINGS	GROSS CPUE	SET OVER DAYS			PRICE PER POUND		REVENUE		REVENUE PER TRAP	
Description	Traps	Pounds (all sources)	Pounds from jurisdictions with effort data	Landings / Traps	Average Soak Time of Traps			Un-adjusted	Adjusted to Unprocessed Fish CPI	Un-adjusted	Adjusted to Unprocessed Fish CPI	Un-adjusted	Adjusted to Unprocessed Fish CPI
Jurisdiction	*ME & MA*	*All*	*ME & MA*	*ME & MA*	*ME GOM*	*MA GOM*	*MA GBK*			*All*	*All*	*ME & MA*	*ME & MA*
1981		35,146,476	33,099,940		3.0			$2.19	$3.01	$77,003,037	$105,672,027		
1982	2,417,975	35,208,814	32,833,514	13.6	3.3			$2.31	$2.69	$81,267,478	$94,638,353	$31	$36
1983	2,628,564	36,412,200	33,212,963	12.6	3.4			$2.42	$2.55	$88,131,219	$92,858,589	$31	$32
1984	2,480,816	33,715,824	30,496,815	12.3	3.5			$2.69	$2.39	$90,708,129	$80,412,883	$33	$29
1985	2,114,708	35,376,280	32,551,112	15.4	3.7			$2.49	$2.35	$88,073,394	$82,974,247	$38	$36
1986	1,963,663	33,199,366	30,893,812	15.7	4.0			$2.62	$2.15	$86,937,043	$71,446,857	$41	$34
1987	2,304,843	33,660,903	31,329,384	13.6	3.6			$3.09	$1.92	$104,173,328	$64,626,927	$42	$26
1988	2,449,421	35,522,311	33,333,229	13.6	3.8			$2.99	$1.81	$106,050,066	$64,210,494	$41	$25
1989	2,391,747	39,758,078	37,529,917	15.7	4.1			$2.80	$1.88	$111,345,338	$74,784,040	$44	$30
1990	2,544,594	45,580,927	43,030,889	16.9	4.0	2.9	6.8	$2.48	$1.83	$113,075,013	$83,232,151	$42	$31
1991	2,450,794	48,051,041	44,801,565	18.3	3.8	2.8	6.7	$2.59	$1.80	$124,460,362	$86,392,767	$47	$33
1992	2,439,160	42,860,881	40,070,688	16.4	4.3	2.8	6.8	$2.90	$1.72	$124,510,437	$73,802,991	$48	$28
1993	2,219,682	44,857,936	42,444,913	19.1	4.5	3.0	6.8	$2.77	$1.72	$124,035,370	$77,044,337	$53	$33
1994	3,204,908	55,117,563	53,070,047	16.6	3.8	3.2	6.9	$2.96	$1.67	$163,278,980	$91,791,455	$49	$28
1995	2,827,658	53,299,862	51,097,667	18.1	3.4	3.2	7.0	$3.06	$1.57	$163,335,545	$83,879,145	$55	$28
1996	3,034,534	51,287,667	49,290,877	16.2	4.5	3.5	6.8	$3.39	$1.62	$173,649,857	$83,096,424	$55	$26
1997	2,954,814	61,372,655	59,559,913	20.2	4.6	3.6	8.3	$3.29	$1.51	$201,842,453	$92,624,690	$66	$30
1998	3,175,971	59,446,330	57,864,129	18.2	4.5	3.7	6.8	$3.19	$1.47	$189,339,987	$87,288,053	$58	$27
1999	3,351,254	69,106,003	67,224,810	20.1	4.8	3.5	7.1	$3.70	$1.41	$255,393,216	$97,334,616	$74	$28
2000	3,073,957	72,711,978	70,555,059	23.0	4.8	3.6	7.1	$3.61	$1.36	$262,828,430	$98,659,124	$83	$31
2001	3,254,778	61,518,028	59,209,636	18.2	5.1	3.8	7.1	$3.50	$1.41	$215,602,316	$86,664,215	$64	$26
2002	3,399,620	77,961,334	75,692,191	22.3	5.0	3.7	6.7	$3.54	$1.41	$275,762,764	$109,599,140	$79	$31
2003	3,488,781	68,157,594	65,376,605	18.7	5.2	3.9	7.1	$3.96	$1.38	$269,572,509	$93,805,388	$74	$26
2004	3,500,918	85,981,298	82,296,703	23.5	4.8	3.9	7.6	$4.16	$1.30	$357,298,937	$112,025,521	$98	$31
2005	3,539,075	82,566,804	79,066,371	22.3	5.4	4.1	7.9	$4.73	$1.21	$390,618,186	$99,700,757	$106	$27
2006	3,534,125	87,164,859	83,563,109	23.6	5.1	4.1	7.7	$4.21	$1.15	$366,722,922	$100,089,782	$99	$27
2007	3,526,988	76,642,931	73,214,743	20.8	5.2	4.1	7.4	$4.55	$1.16	$348,534,363	$88,763,250	$94	$24
2008	3,454,643	84,246,549	80,977,742	23.4	5.2	4.5	6.9	$3.71	$1.10	$312,144,746	$92,759,267	$87	$26
2009	3,366,769	97,122,170	93,376,406	27.7	4.9	4.6	6.5	$3.09	$1.27	$299,906,010	$123,255,444	$86	$35
2010	3,304,684	113,487,733	108,912,224	33.0	5.2	4.6	6.3	$3.44	$1.15	$390,006,875	$130,724,631	$113	$38
2011	3,336,811	123,222,174	118,333,016	35.5	4.9	4.4	5.8	$3.35	$1.17	$412,738,609	$144,751,699	$119	$42
2012	3,314,103	146,093,780	140,895,025	42.5	NA	4.2	6.2	$2.87	$1.16	$419,370,212	$169,518,854	$122	$49
2013	3,263,241	146,427,940	141,923,718	43.5	NA	4.4	6.4	$2.89	$1.00	$423,176,747	$146,427,940	$126	$43
2008 - 2013 ave	**3,340,042**	**118,433,391**	**114,069,688**	**34.3**	**5.1**	**4.5**	**6.3**	**$3.22**	**$1.14**	**$376,223,866**	**$134,572,972**	**$109**	**$39**
25th	2,423,271	35,744,783	33,243,030	15.5	3.7	3.1	6.8	$2.64	$1.48	$104,642,513	$77,886,474	$41	$27
median	2,586,579	46,815,984	43,916,227	16.7	4.1	3.5	6.8	$2.97	$1.72	$124,485,400	$85,135,956	$48	$29
75th	3,150,468	60,891,074	58,873,259	18.6	4.6	3.7	7.1	$3.36	$1.91	$198,716,837	$92,800,115	$62	$32

GOM/GB Mortality Indicators

EXPLOITATION RATE (landings / survey ref. pop'n)						
Landings (lbs) by area / Reference pop'n (survey weights (lbs) > 77						
Survey	*NESFC*		*ME/NH*		*MA 514*	
	fall	*spring*	*fall*	*spring*	*fall*	*spring*
1981						
1982	1.42	1.29				
1983	1.18	1.56				
1984	1.07	1.90				
1985	0.94	0.97				
1986	0.62	0.73				
1987	0.73	0.92				
1988	0.95	0.62				
1989	0.81	0.82				
1990	0.85	1.67			0.40	0.80
1991	0.97	1.41			0.62	1.41
1992	0.90	1.19			0.71	0.78
1993	1.07	1.22			1.71	0.74
1994	1.02	1.76			0.47	0.77
1995	0.86	1.43			0.59	1.18
1996	0.64	0.97			0.54	1.30
1997	0.70	0.91			0.76	0.95
1998	0.89	0.84			1.10	0.90
1999	0.85	1.07			0.76	0.96
2000	0.80	0.64	0.89		0.69	0.83
2001	0.85	0.49	1.15	1.44	1.81	0.78
2002	0.96	0.86	1.20	0.80	1.06	1.01
2003	0.92	0.65	0.87	1.18	2.83	1.48
2004	1.37	0.81	1.51	2.11	2.69	0.81
2005	1.35	1.00	0.86	0.85	1.81	0.46
2006	1.79	0.94	1.18	0.87	0.91	0.51
2007	1.59	0.73	1.04	0.85	1.65	1.90
2008	1.35	0.82	0.73	0.93	0.63	0.81
2009	1.05	0.83	0.71	0.72	0.58	0.89
2010	1.01	0.90	0.81	0.97	0.41	1.41
2011	0.79	0.76	0.74	0.58	0.35	0.79
2012	0.88	0.66	1.19	0.71	0.47	1.70
2013	0.81	0.63	1.12	0.78	0.43	0.83
2008 - 2013 ave	**0.982**	**0.766**	**0.88**	**0.78**	**0.48**	**1.07**

25th	0.82	0.83	0.89	0.99	0.60	0.78
median	0.90	0.97	1.02	1.18	0.73	0.92
75th	0.97	1.38	1.16	1.31	1.09	1.14

GOM/GB Abundance Indicators

SPAWNING STOCK ABUNDANCE Mean weight (g) per tow of mature females						
Survey	NESFC		ME/NH		MA 514	
	fall	spring	fall	spring	fall	spring
1981	304.27	173.96			342.80	251.36
1982	223.09	74.35			404.26	90.43
1983	264.22	125.99			537.29	32.40
1984	189.82	188.73			336.33	78.90
1985	328.01	1138.49			563.45	32.32
1986	206.27	286.30			135.10	50.24
1987	179.30	219.81			146.15	82.80
1988	271.72	184.18			94.55	42.74
1989	407.16	130.78			123.19	114.57
1990	289.98	220.91			538.08	100.27
1991	326.86	204.07			142.51	101.77
1992	293.28	202.01			262.54	110.74
1993	277.73	200.30			53.48	117.58
1994	360.16	280.51			376.55	132.17
1995	452.00	141.92			222.57	91.04
1996	555.40	465.08			262.89	72.61
1997	398.24	410.45			87.30	49.64
1998	438.12	449.94			113.80	81.44
1999	929.85	411.02			178.35	194.17
2000	457.89	484.73	3425.58		287.35	133.73
2001	718.46	625.39	1858.63	462.60	105.26	151.41
2002	1350.72	849.37	3707.47	967.67	163.87	105.74
2003	701.10	1139.33	3988.26	847.68	101.81	45.15
2004	716.95	1141.16	3497.55	682.69	86.24	189.23
2005	593.44	762.80	4062.27	1505.13	167.88	358.32
2006	968.92	811.80	2909.52	885.80	118.39	290.44
2007	752.12	805.69	3010.80	735.09	138.01	91.86
2008	1270.51	1316.45	3423.42	712.51	354.40	222.36
2009	1811.80	1140.39	5525.54	1138.18	396.60	135.71
2010	1662.97	1249.92	3879.74	1322.90	1176.34	157.93
2011	2206.17	1053.94	4446.97	868.71	782.58	151.85
2012	1910.13	1703.54	2964.59	1190.50	524.55	68.82
2013	1853.09	1322.28	4144.70	671.93	761.16	187.97
2008 - 2013 ave	**1785.78**	**1297.75**	**4064.16**	**984.12**	**665.94**	**154.11**
25th	273.23	191.62	3033.84	655.14	116.15	55.84
median	344.08	250.71	3566.52	847.68	171.11	90.73
75th	456.42	461.30	3777.66	907.67	324.09	113.62

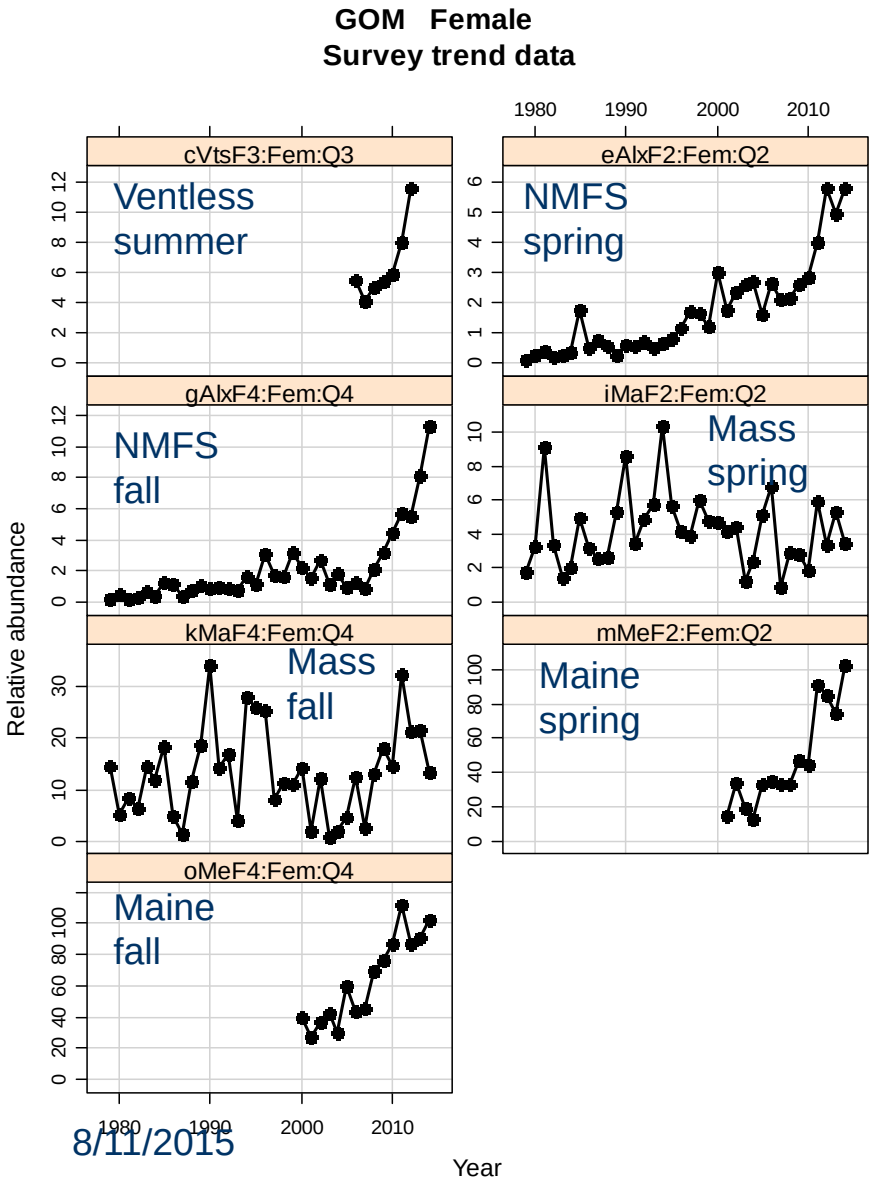
FULL RECRUIT ABUNDANCE (SURVEY) Abundance of lobsters > 82 mm CL (sexes combined)						
Survey	NEFSC		ME/NH		MA 514	
	fall	spring	fall	spring	fall	spring
1981	0.42	0.23			1.91	1.83
1982	0.32	0.21			2.80	0.57
1983	0.38	0.18			3.08	0.51
1984	0.39	0.20			4.09	0.49
1985	0.52	0.99			3.94	0.50
1986	0.52	0.42			1.71	0.54
1987	0.26	0.28			0.53	0.56
1988	0.40	0.33			1.51	0.56
1989	0.61	0.25			2.27	0.79
1990	0.41	0.27			4.92	0.97
1991	0.54	0.32			3.18	0.69
1992	0.39	0.32			2.35	0.87
1993	0.46	0.35			0.63	1.00
1994	0.57	0.39			3.15	0.76
1995	0.78	0.28			2.50	0.58
1996	0.80	0.71			2.50	0.33
1997	0.74	0.56			1.69	0.62
1998	0.53	0.53			0.88	0.49
1999	1.27	0.48			1.93	0.72
2000	0.68	0.79	14.22		2.20	0.97
2001	0.90	0.94	9.83	2.25	0.72	0.53
2002	1.73	1.14	12.57	3.40	1.02	0.43
2003	0.92	1.55	16.65	3.08	0.42	0.22
2004	1.17	1.46	16.18	3.14	0.33	0.78
2005	0.77	1.04	21.09	6.53	0.56	0.95
2006	0.99	1.06	14.85	5.33	1.03	0.68
2007	0.84	1.04	14.13	4.19	0.48	0.32
2008	1.38	1.55	20.72	3.06	1.55	0.67
2009	1.89	1.27	30.48	6.32	1.70	0.54
2010	2.15	1.81	21.42	6.29	2.30	0.40
2011	2.93	1.50	23.83	5.14	3.80	0.55
2012	2.51	2.32	16.51	5.94	3.18	0.31
2013	2.53	1.62	21.45	4.50	3.74	0.87
2008 - 2013 ave	**2.23**	**1.68**	**22.40**	**5.21**	**2.71**	**0.55**
25th	0.40	0.28	11.88	2.67	1.14	0.50
median	0.53	0.37	13.39	3.08	2.24	0.56
75th	0.77	0.67	14.83	3.24	3.01	0.75

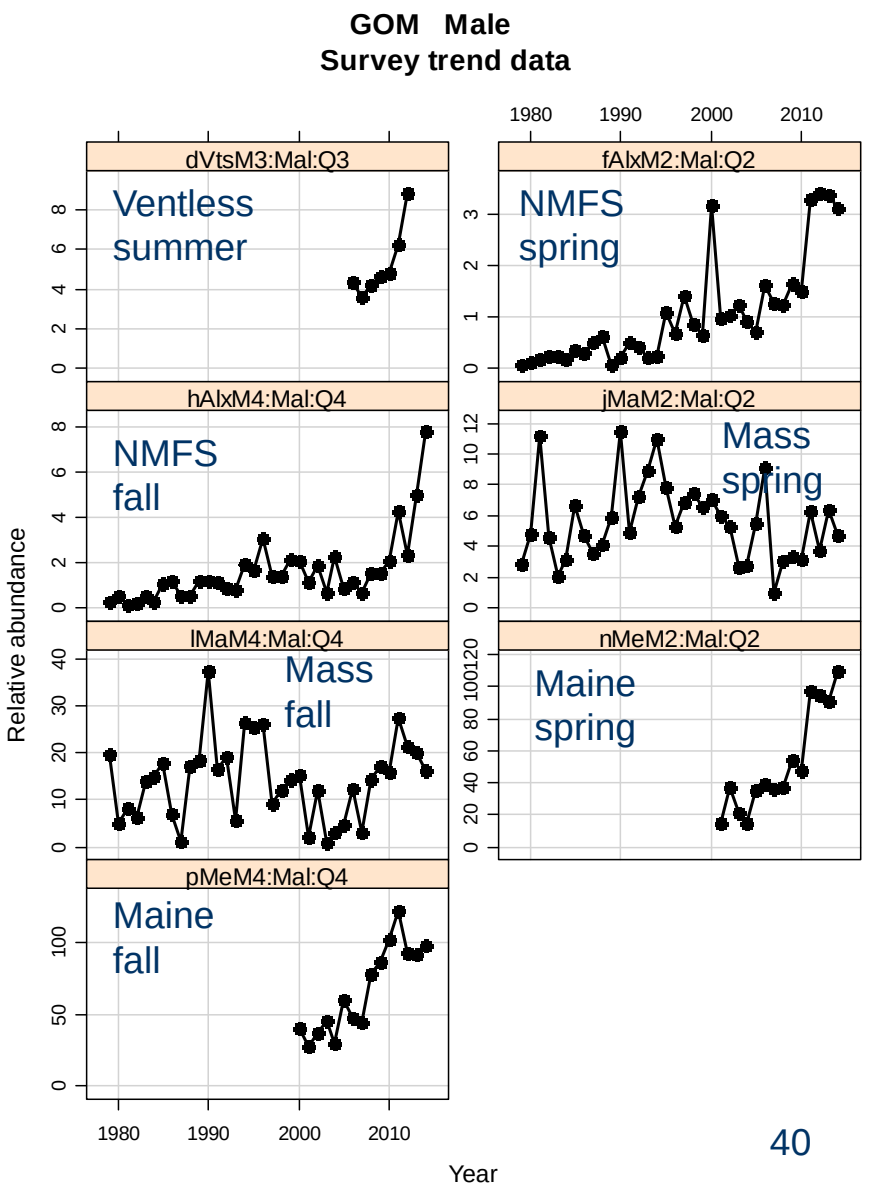
GOM/GB Abundance Indicators

RECRUIT ABUNDANCE (SURVEY)						
Abundance of lobsters 71 - 80 mm CL (sexes combined)						
Survey	NEFSC		ME/NH		MA 514	
	fall	spring	fall	spring	fall	spring
1981	0.11	0.05			4.84	6.38
1982	0.20	0.13			3.85	2.74
1983	0.31	0.10			9.76	1.76
1984	0.19	0.09			6.13	2.15
1985	0.40	0.10			9.60	4.48
1986	0.42	0.14			3.80	3.01
1987	0.26	0.17			1.16	2.47
1988	0.36	0.38			4.12	2.52
1989	0.37	0.07			7.51	4.48
1990	0.55	0.18			15.40	6.11
1991	0.46	0.19			7.55	2.73
1992	0.45	0.16			8.95	4.31
1993	0.35	0.22			3.19	5.12
1994	0.64	0.07			13.80	7.59
1995	0.46	0.41			12.10	4.54
1996	1.16	0.19			12.10	3.09
1997	0.58	0.50			6.41	4.57
1998	0.61	0.40			7.47	4.50
1999	0.76	0.37			8.73	4.26
2000	0.78	0.99	23.82		8.86	4.24
2001	0.50	0.45	17.53	9.16	1.58	4.30
2002	0.51	0.41	22.12	22.63	5.00	3.43
2003	0.25	0.37	23.78	13.71	0.66	1.96
2004	0.61	0.24	15.96	9.69	1.30	2.46
2005	0.25	0.17	30.88	23.85	2.11	4.35
2006	0.33	0.64	23.27	23.15	5.30	6.09
2007	0.29	0.39	21.62	20.24	1.61	0.75
2008	0.58	0.29	40.45	22.90	6.12	2.54
2009	0.70	0.55	41.84	31.77	8.88	3.18
2010	0.82	0.41	46.24	22.40	9.39	2.22
2011	1.50	1.05	58.53	47.39	15.00	5.24
2012	0.89	1.24	47.28	44.81	11.30	3.03
2013	1.74	1.06	48.24	39.71	12.20	4.83
2008 - 2013 ave	**1.04**	**0.77**	**47.10**	**34.83**	**10.48**	**3.51**
25th	0.35	0.13	20.97	11.43	3.92	2.73
median	0.45	0.19	22.95	13.71	7.49	4.25
75th	0.57	0.40	23.79	18.17	9.44	4.50

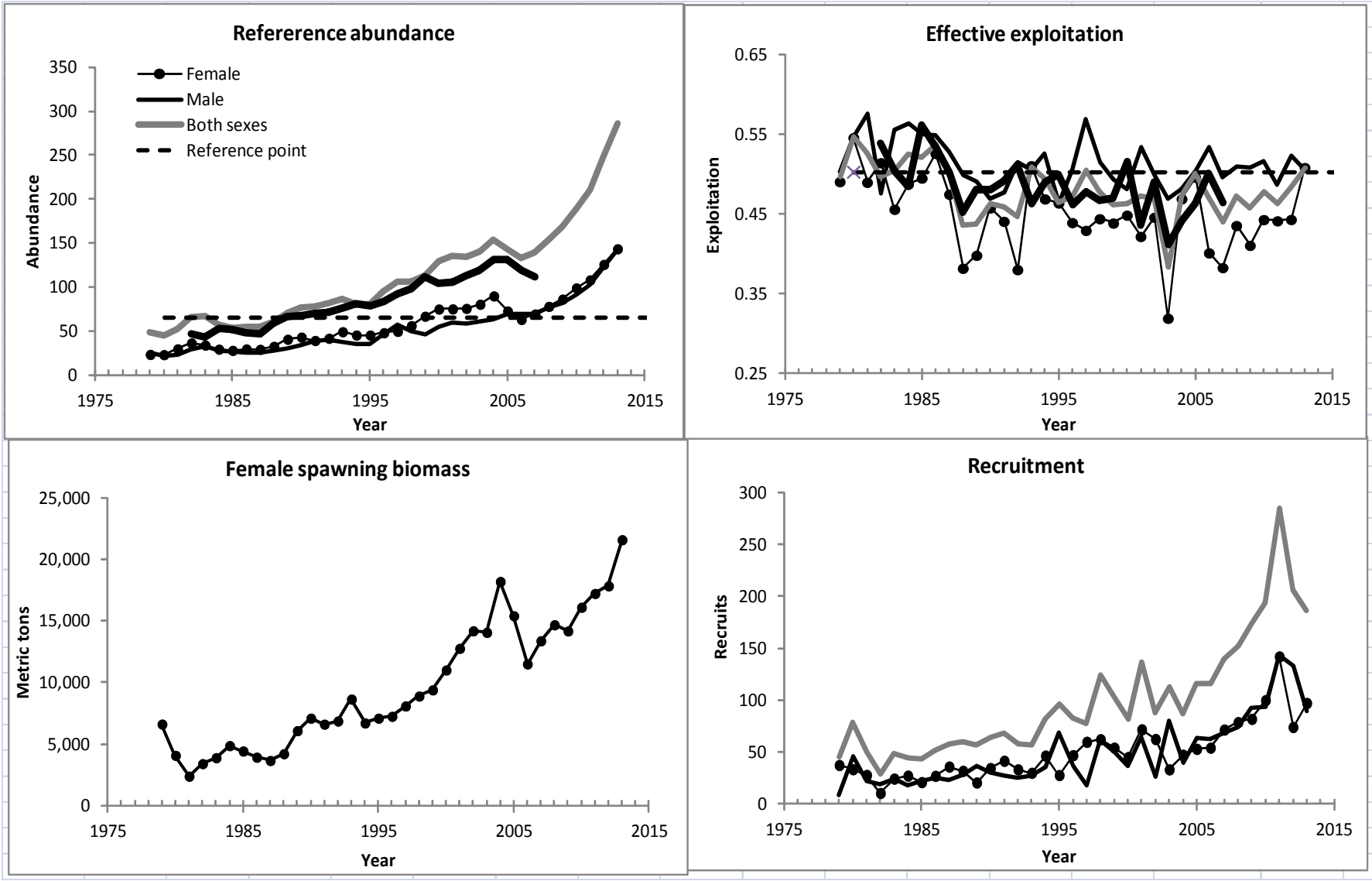
YOUNG-OF-YEAR INDICES					
	YOY	YOY	YOY	YOY	YOY
Survey	ME 511	ME 512	ME 513 East	ME 513 West	MA 514
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988					
1989			1.64		
1990			0.77		
1991			1.54		
1992			1.30		
1993			0.45		
1994			1.61		
1995		0.02	0.66		0.56
1996		0.05	0.47		0.00
1997		0.05	0.46		0.17
1998		0.00	0.14		0.02
1999		0.04	0.65		0.36
2000		0.10	0.13	0.17	0.19
2001		0.43	2.08	1.17	0.38
2002	0.13	0.29	1.38	0.85	0.89
2003	0.22	0.27	1.75	1.22	0.68
2004	0.18	0.36	1.75	0.67	1.20
2005	1.59	1.36	1.77	0.82	0.82
2006	0.58	1.13	0.84	0.82	0.32
2007	0.84	1.34	2.01	1.27	1.22
2008	0.42	0.83	1.08	0.97	0.24
2009	0.69	0.48	1.25	0.45	0.13
2010	0.28	0.72	0.80	0.47	0.45
2011	0.41	1.10	2.33	0.67	0.63
2012	0.53	0.73	1.06	0.22	0.21
2013	0.10	0.20	0.48	0.12	0.09
2008 - 2013 ave	**0.40**	**0.68**	**1.17**	**0.48**	**0.29**
25th	0.15	0.04	0.47	0.68	0.17
median	0.17	0.05	0.77	1.01	0.36
75th	0.19	0.27	1.57	1.18	0.56

GOM/GB – Survey Indices

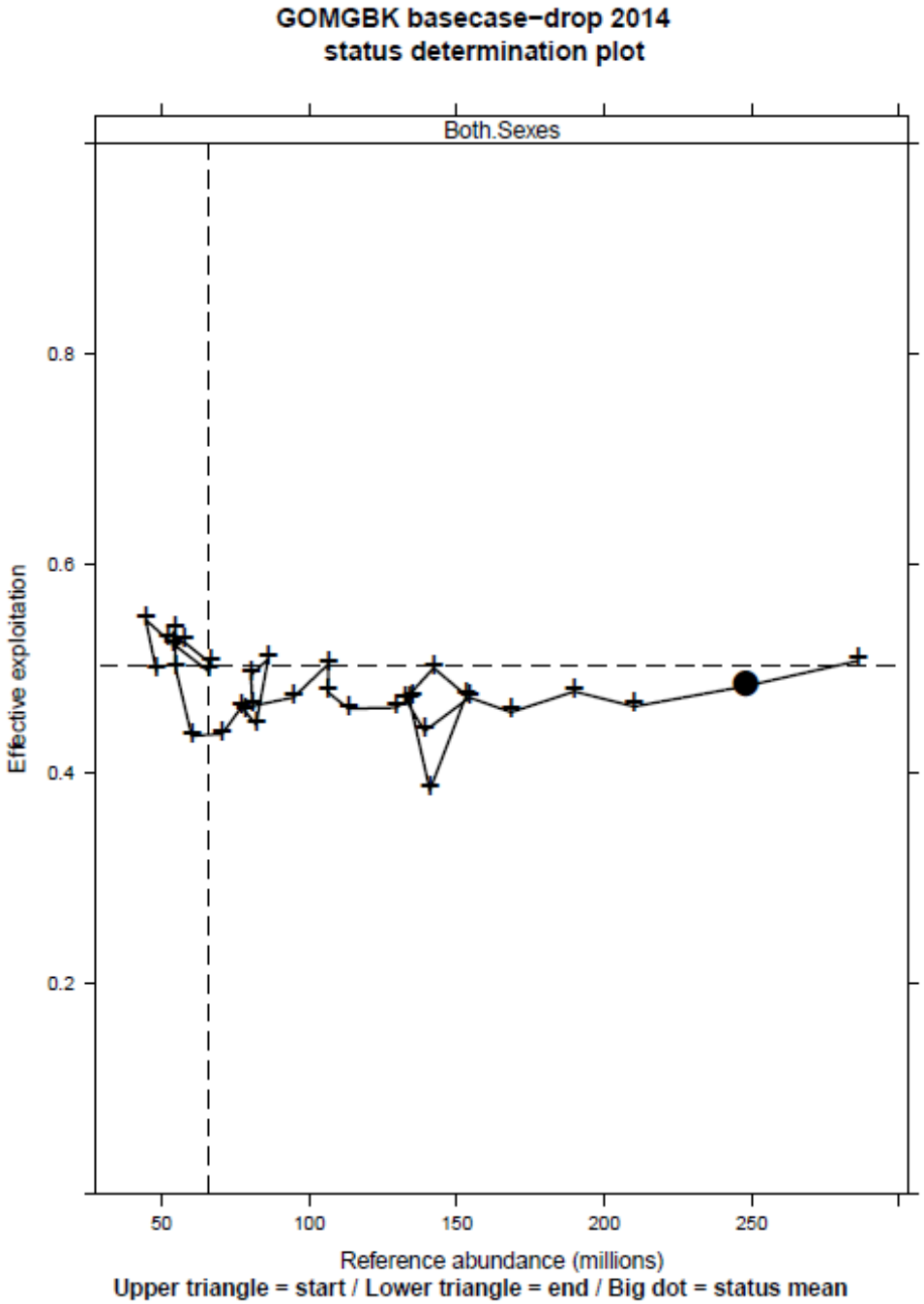




GOM/GB Reference abundance, Exploitation, Spawning biomass and Recruitment



GOM/GB –
Status Determination



Synopsis

Model Results:

- GOM/GB biomass is high and the stock is not depleted
- GOM/GB stock is not overfished

Empirical Indicators:

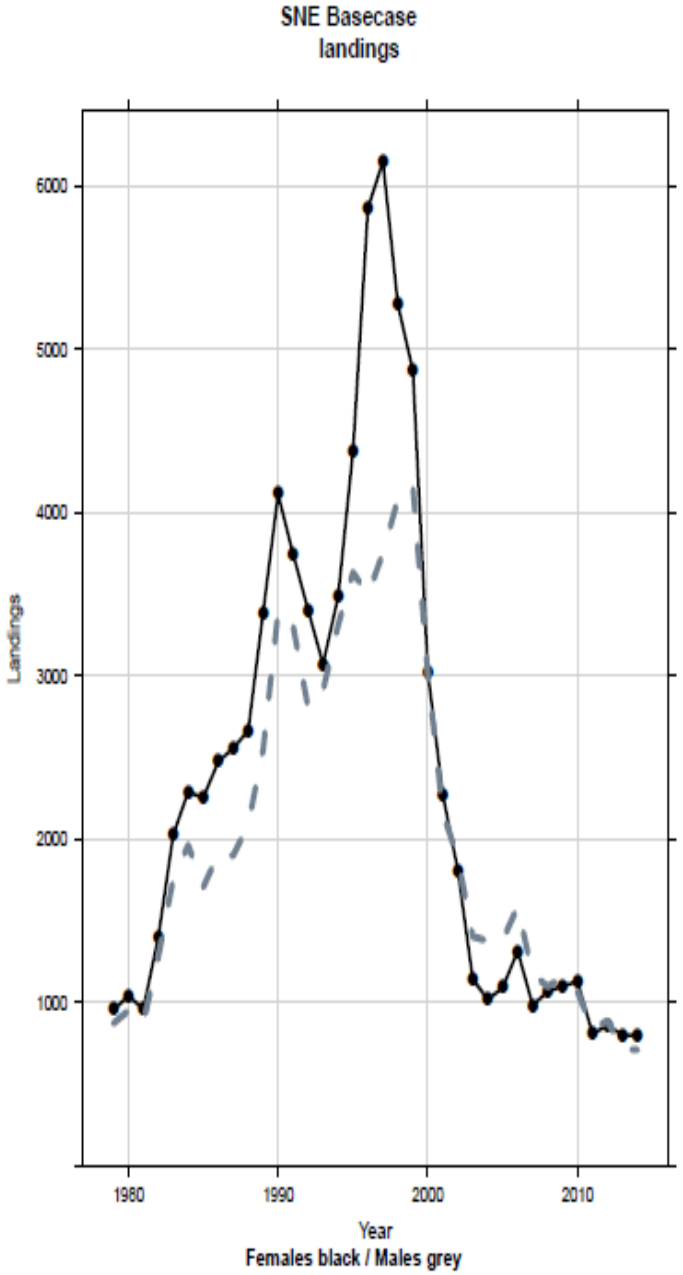
- Exploitation rate is mixed (fall negative, spring positive)
- Spawning stock abundance is above the 75% (favorable)
- Recruit abundance is above the 75% (favorable)
- Full recruit abundance is above the 75% (favorable)
- Encounter rate is above the 75% (favorable)

SNE - Results

Description of the Fishery

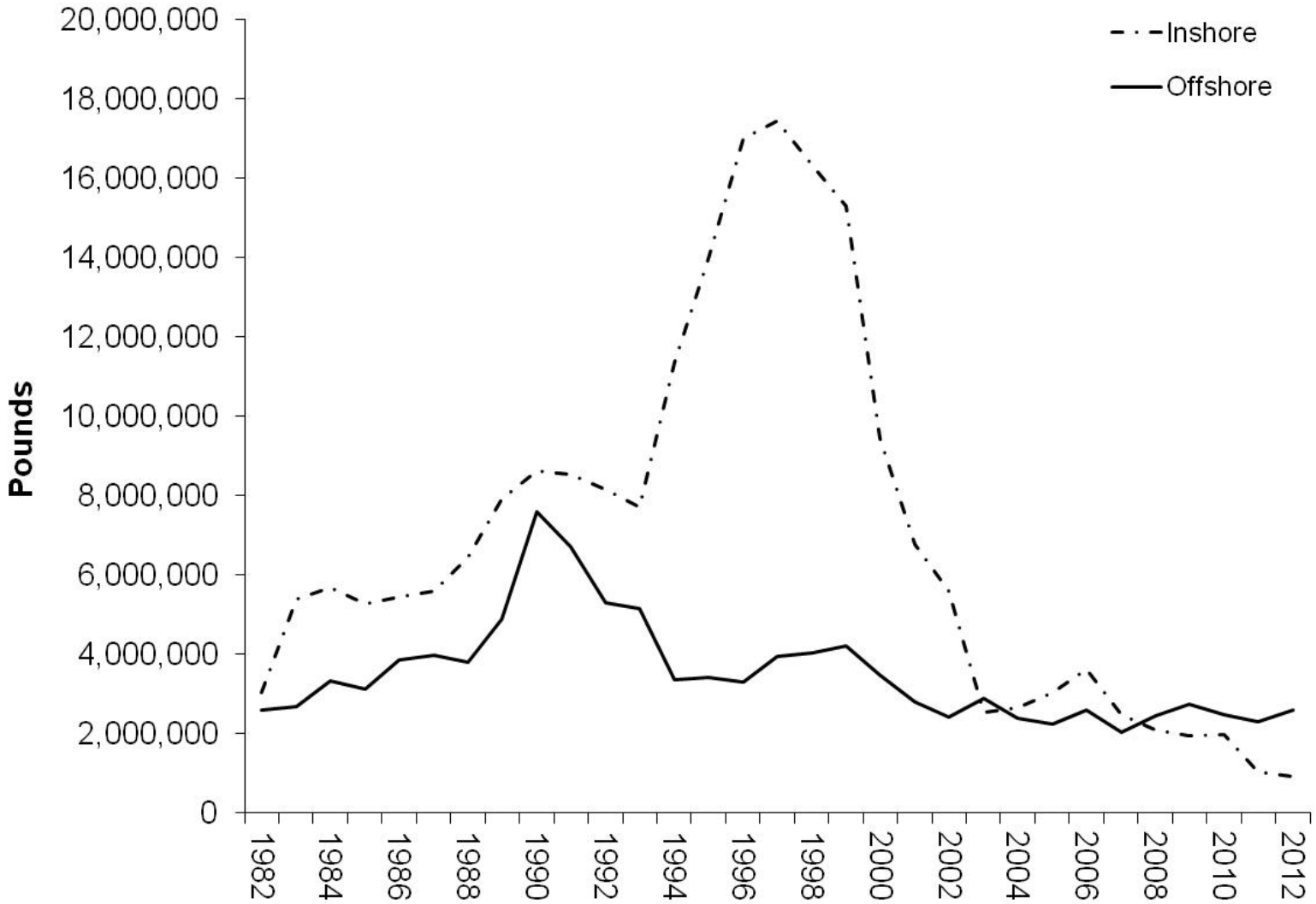
- SNE
  - Conducted by states of MA, RI, CT, NY, NJ and small mid-Atlantic component
  - Historically the 2nd largest fishery; but now the smallest
    - 21% of U.S. landings 1981 – 2000
    - 12% of landings 2001 – 2003
    - Time series low of 2% in 2013
  - Inshore landings dominate historically, but offshore component increasingly important
  - Vessels – 22’ to 44’ inshore, and 55’ to 75’ offshore
  - Historically day trips conducted from 0 to 12 miles, but now more trips in the nearshore/offshore area
  - Effort has declined steadily since the early 2000’s… near or at lowest levels

SNE Landings



Appendix SNE. Figure 39

Commercial lobster landings in SNE 1982 to 2012 from inshore (SA 538, 539, 611; dashed) and offshore/nearshore (SA 537, 612, 613, 615, 616; solid) regions.



SNE Fishery Performance Indicators

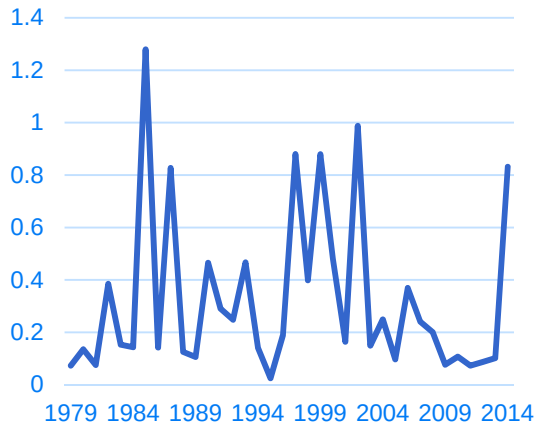
	EFFORT	TOTAL SNE LANDINGS	PARTIAL LANDINGS	GROSS CPUE	SET OVER DAYS		PRICE PER POUND		REVENUE		REVENUE PER TRAP	
Description	Traps	Pounds (all sources)	Pounds from jurisdictions with effort data	Landings / Traps	Average Soak Time of Traps		Un-adjusted	Adjusted to Unprocessed Fish CPI	Un-adjusted	Adjusted to Unprocessed Fish CPI	Un-adjusted	Adjusted to Unprocessed Fish CPI
Jurisdiction	*MA, CT, NY*	*all*	*MA, CT, NY*	*MA, CT, NY*	*MA*	*CT*			*All*	*All*	*MA, CT, NY*	*MA, CT, NY*
1981		4,060,297	2,595,413			3.4	$2.19	$3.01	$8,895,777	$12,207,763		
1982		5,907,454	3,162,734			3.3	$2.31	$2.69	$13,635,332	$15,878,742		
1983		8,350,636	4,201,326			3.1	$2.42	$2.55	$20,211,680	$21,295,837		
1984	193,380	9,379,497	4,600,248	23.8		4.0	$2.69	$2.39	$25,234,342	$22,370,279	$64	$57
1985	209,548	8,731,427	3,899,105	18.6		4.2	$2.49	$2.35	$21,737,911	$20,479,360	$46	$44
1986	202,411	9,663,892	3,971,304	19.6		4.3	$2.62	$2.15	$25,306,211	$20,797,225	$51	$42
1987	210,893	9,826,820	3,993,476	18.9		4.5	$3.09	$1.92	$30,411,914	$18,866,907	$59	$36
1988	244,554	10,475,714	4,878,141	19.9		4.6	$2.99	$1.81	$31,274,716	$18,936,009	$60	$36
1989	289,935	13,095,006	5,906,893	20.4		4.7	$2.80	$1.88	$36,673,499	$24,631,408	$57	$38
1990	291,632	16,798,605	8,065,523	27.7	4.9	4.9	$2.48	$1.83	$41,673,186	$30,674,760	$69	$51
1991	316,488	15,621,005	7,861,069	24.8	4.4	5.1	$2.59	$1.80	$40,461,058	$28,085,590	$64	$45
1992	353,735	13,742,002	6,977,429	19.7	5.0	5.4	$2.90	$1.72	$39,920,379	$23,662,622	$57	$34
1993	414,956	13,246,216	6,757,241	16.3	4.8	5.5	$2.77	$1.72	$36,626,725	$22,750,621	$45	$28
1994	451,696	14,934,767	8,258,793	18.3	3.8	5.5	$2.96	$1.67	$44,242,404	$24,871,999	$54	$30
1995	443,833	17,646,733	11,355,614	25.6	5.2	5.9	$3.06	$1.57	$54,077,790	$27,771,045	$78	$40
1996	516,487	20,697,168	14,448,223	28.0	4.8	6.3	$3.39	$1.62	$70,076,501	$33,533,610	$95	$45
1997	546,347	21,902,392	14,920,913	27.3	5.1	6.2	$3.29	$1.51	$72,032,611	$33,055,476	$90	$41
1998	588,422	20,671,210	14,030,667	23.8	5.2	6.2	$3.19	$1.47	$65,838,994	$30,352,583	$76	$35
1999	577,865	19,870,895	11,228,721	19.4	5.2	6.7	$3.70	$1.41	$73,436,339	$27,987,814	$72	$27
2000	403,314	13,387,841	5,897,836	14.6	5.6	7.1	$3.61	$1.36	$48,392,373	$18,165,269	$53	$20
2001	551,712	9,844,660	5,024,534	9.1	6.1	7.0	$3.50	$1.41	$34,502,592	$13,868,775	$32	$13
2002	506,464	8,050,419	4,157,018	8.2	5.8	7.3	$3.54	$1.41	$28,475,730	$11,317,393	$29	$12
2003	383,386	5,630,900	2,637,818	6.9	6.4	7.7	$3.96	$1.38	$22,270,973	$7,749,816	$27	$9
2004	369,694	5,477,212	2,800,898	7.6	6.4	7.6	$4.16	$1.30	$22,760,787	$7,136,291	$31	$10
2005	335,152	5,733,586	3,053,909	9.1	6.9	7.4	$4.73	$1.21	$27,125,225	$6,923,399	$43	$11
2006	352,954	6,588,980	3,290,888	9.3	7.1	7.5	$4.21	$1.15	$27,721,379	$7,566,003	$39	$11
2007	354,438	5,367,227	2,283,872	6.4	7.2	8.7	$4.55	$1.16	$24,407,511	$6,216,001	$29	$7
2008	294,638	6,069,202	1,875,050	6.4	5.6	NA	$3.71	$1.10	$22,487,205	$6,682,466	$24	$7
2009	260,648	6,203,080	2,028,765	7.8	6.4	9.7	$3.09	$1.27	$19,154,648	$7,872,182	$24	$10
2010	283,933	6,031,530	2,005,660	7.1	4.5	9.7	$3.44	$1.15	$20,727,687	$6,947,619	$24	$8
2011	226,929	4,663,070	1,087,632	4.8	4.0	10.2	$3.35	$1.17	$15,619,178	$5,477,807	$16	$6
2012	189,959	4,535,915	1,152,468	6.1	3.8	10.5	$2.87	$1.16	$13,020,594	$5,263,216	$17	$7
2013	151,970	3,327,197	1,070,293	7.0	4.1	10.2	$2.89	$1.00	$9,615,600	$3,327,197	$20	$7
2008 - 2013 ave	**234,679**	**5,138,332**	**1,536,645**	**6.5**	**4.8**	**10.1**	**$3.22**	**$1.14**	**$16,770,819**	**$5,928,415**	**$21**	**$7**
25th	278,590	9,786,088	4,489,440	17.8	4.8	4.7	$2.75	$1.45	$29,927,868	$18,918,734	$50	$28
median	393,350	13,317,028	6,332,067	19.7	5.1	5.5	$3.02	$1.69	$38,296,939	$23,206,622	$58	$36
75th	508,970	17,010,637	9,001,275	24.1	5.5	6.4	$3.42	$1.84	$49,813,727	$28,012,258	$69	$43

TLPugh18

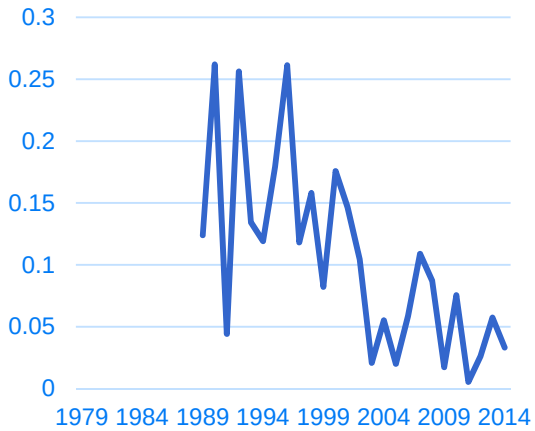
SNE – Trawl Survey Trends

TLPugh19

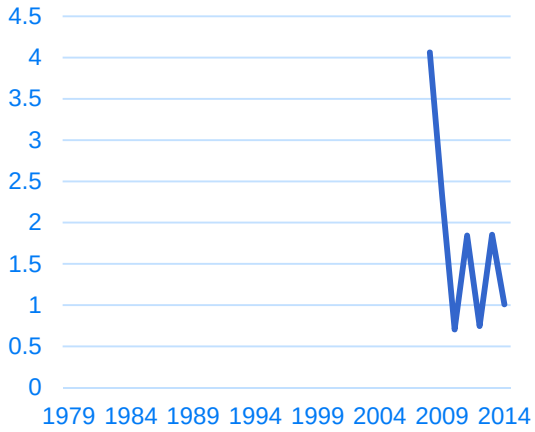
NEFSC Spring F



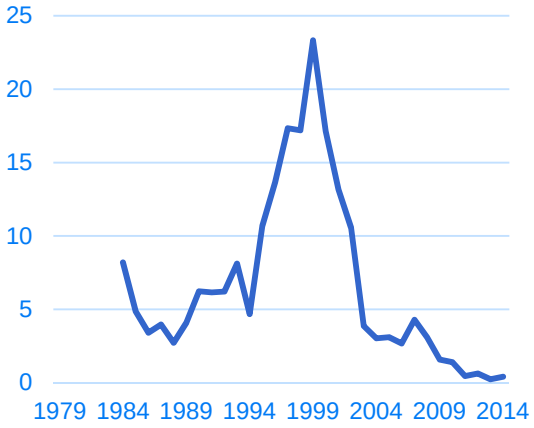
NJ Spring F



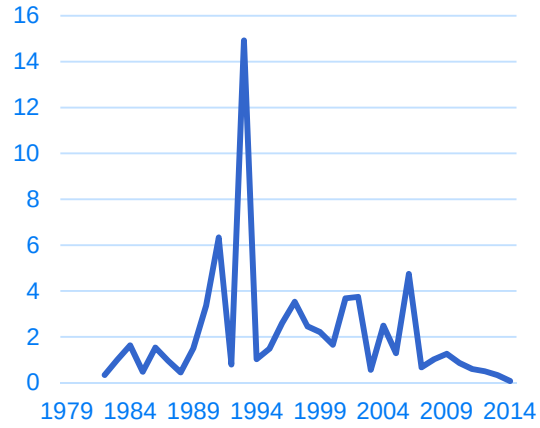
NEAMAP Spring F



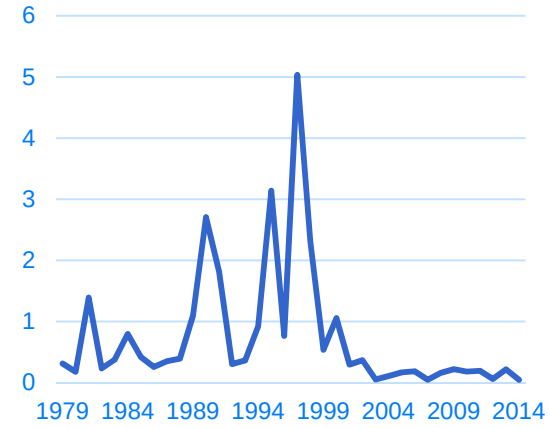
CT Spring F

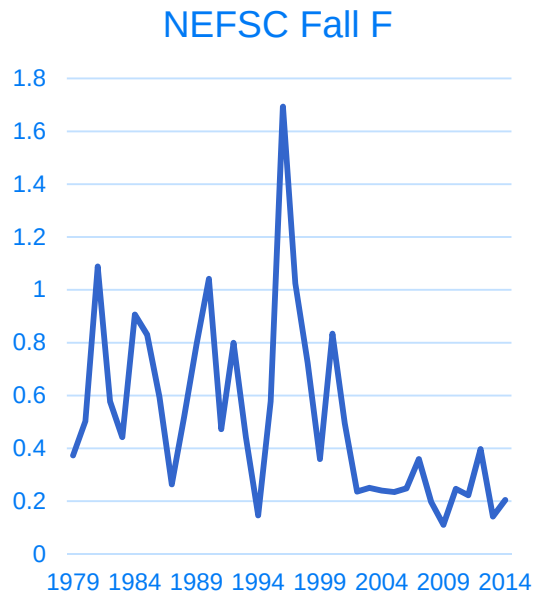


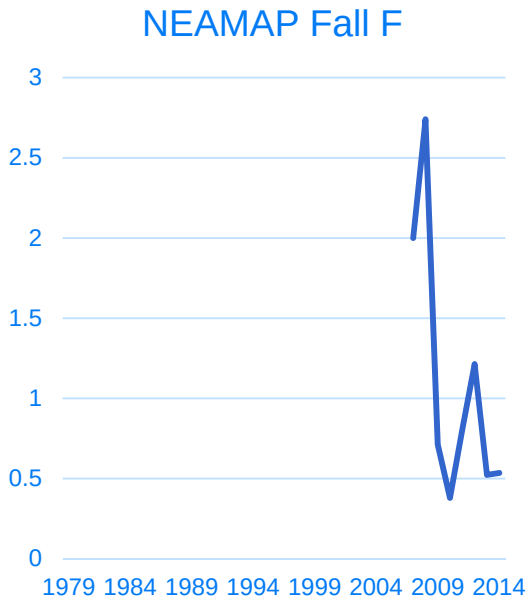
RI Spring F

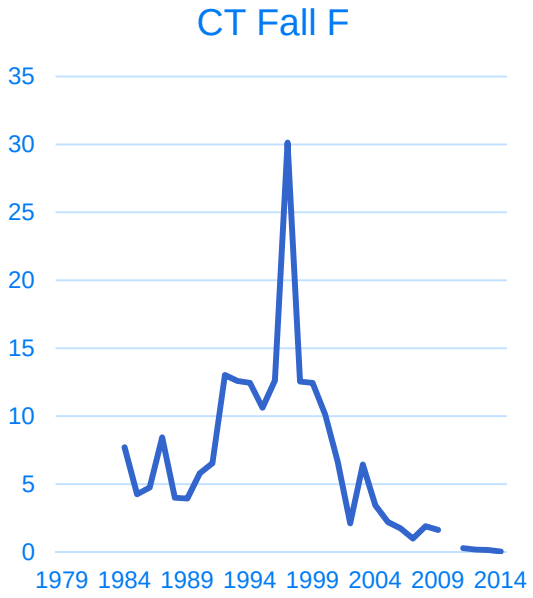


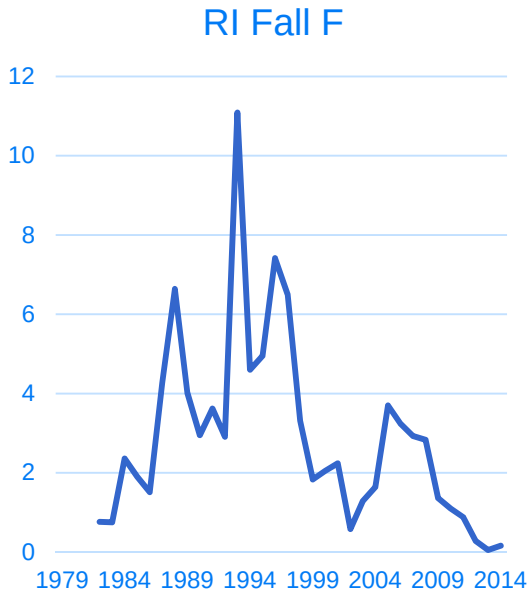
MA Spring F



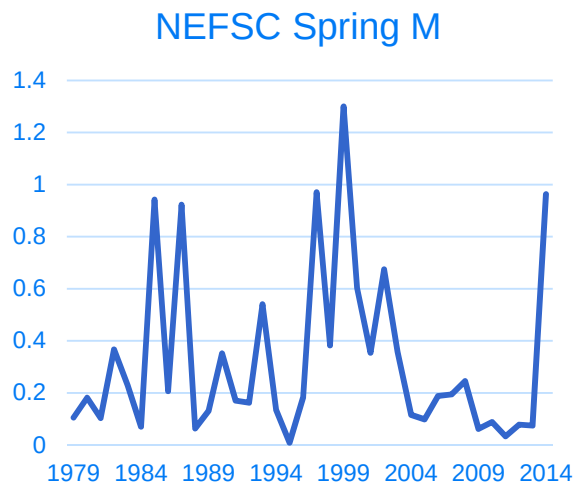

NEFSC Fall F
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1979 1984 1989 1994 1999 2004 2009 2014

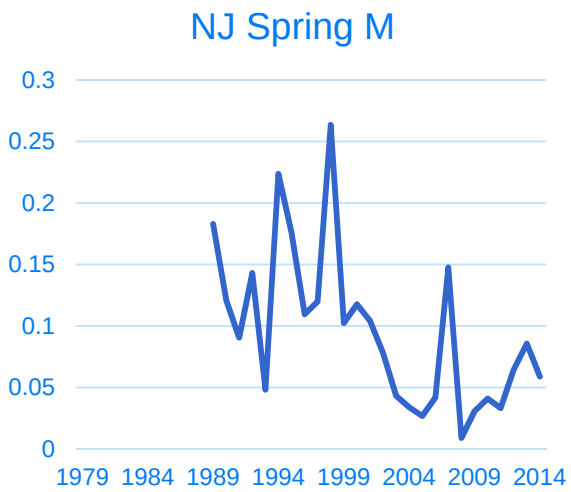

NEAMAP Fall F
3
2.5
2
1.5
1
0.5
0
1979 1984 1989 1994 1999 2004 2009 2014

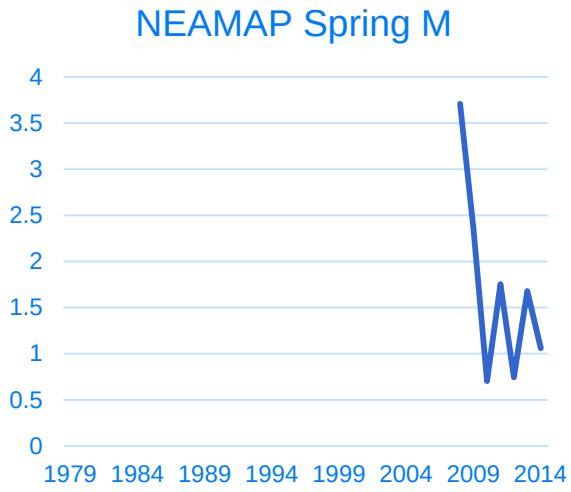

CT Fall F
35
30
25
20
15
10
5
0
1979 1984 1989 1994 1999 2004 2009 2014

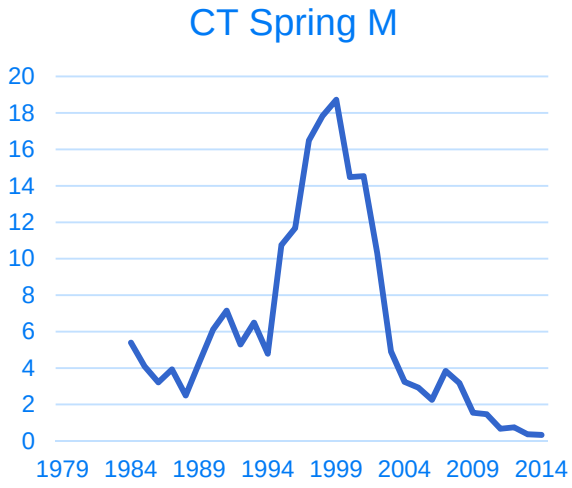

RI Fall F
12
10
8
6
4
2
0
1979 1984 1989 1994 1999 2004 2009 2014

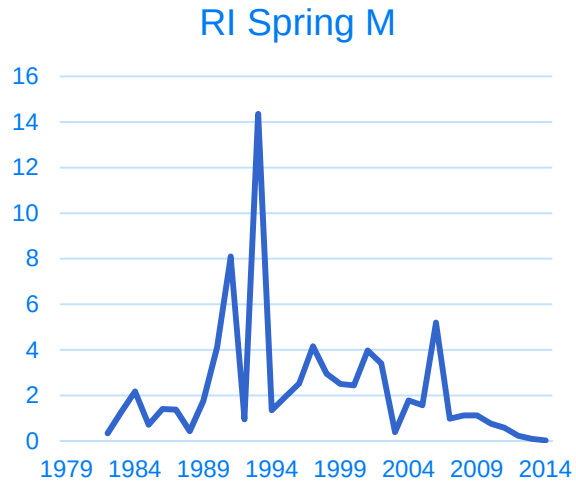

VTS summer F
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1979 1984 1989 1994 1999 2004 2009 2014

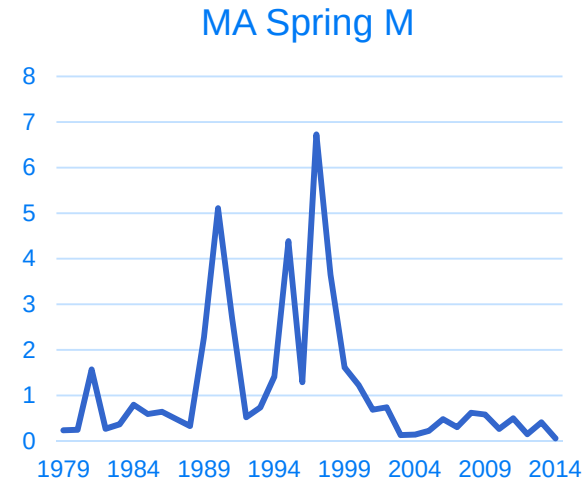

NEFSC Spring M
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1979 1984 1989 1994 1999 2004 2009 2014

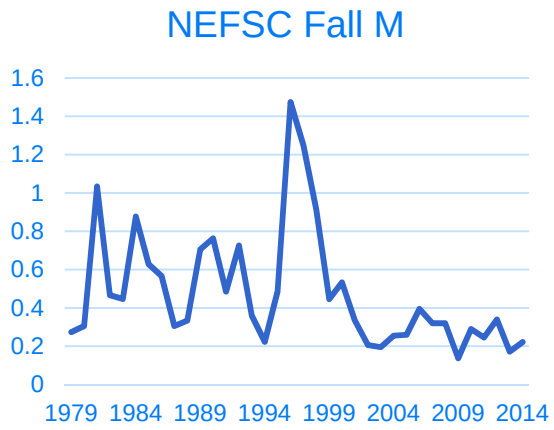

NJ Spring M
0.3
0.25
0.2
0.15
0.1
0.05
0
1979 1984 1989 1994 1999 2004 2009 2014

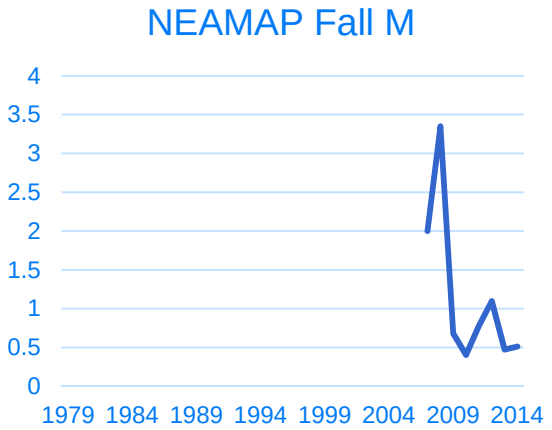

NEAMAP Spring M
4
3.5
3
2.5
2
1.5
1
0.5
0
1979 1984 1989 1994 1999 2004 2009 2014

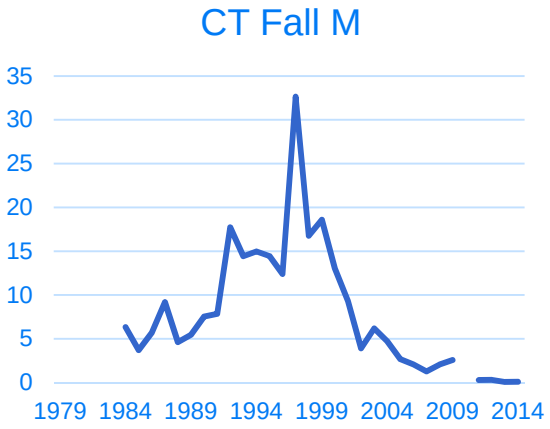

CT Spring M
20
18
16
14
12
10
8
6
4
2
0
1979 1984 1989 1994 1999 2004 2009 2014

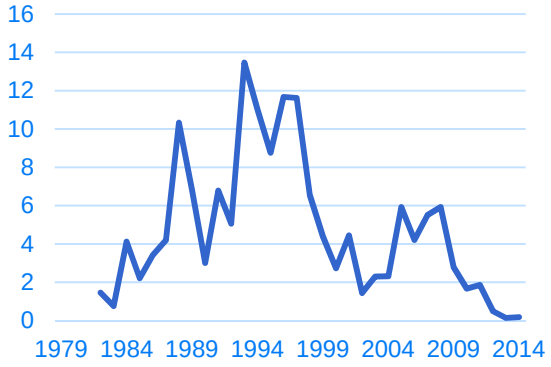

RI Spring M
16
14
12
10
8
6
4
2
0
1979 1984 1989 1994 1999 2004 2009 2014


MA Spring M
8
7
6
5
4
3
2
1
0
1979 1984 1989 1994 1999 2004 2009 2014


NEFSC Fall M
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1979 1984 1989 1994 1999 2004 2009 2014


NEAMAP Fall M
4
3.5
3
2.5
2
1.5
1
0.5
0
1979 1984 1989 1994 1999 2004 2009 2014


CT Fall M
35
30
25
20
15
10
5
0
1979 1984 1989 1994 1999 2004 2009 2014


RI Fall M
16
14
12
10
8
6
4
2
0
1979 1984 1989 1994 1999 2004 2009 2014


VTS summer M
3.5
3
2.5
2
1.5
1
0.5
0
1979 1984 1989 1994 1999 2004 2009 2014

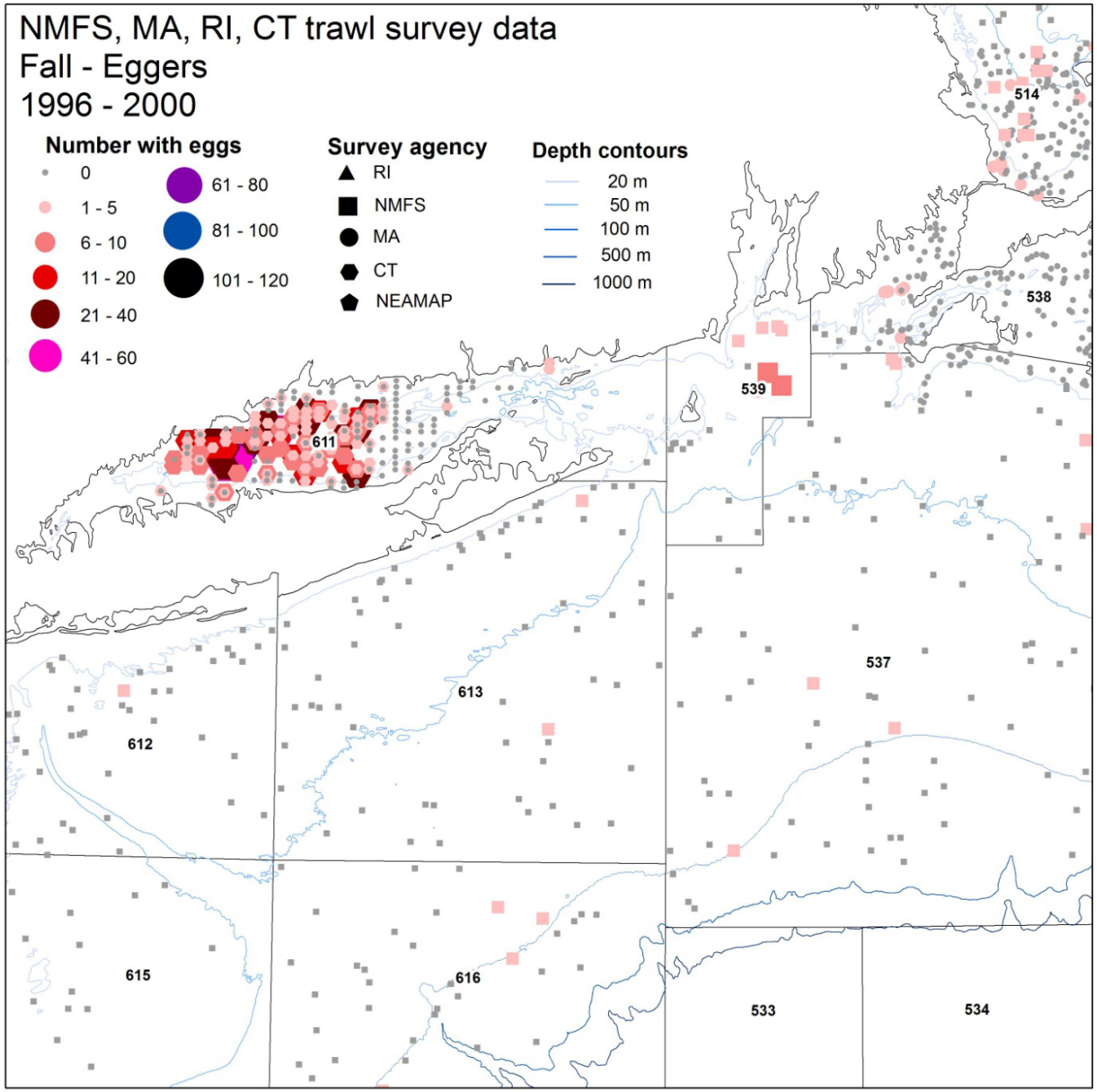
SNE Mortality Indicators

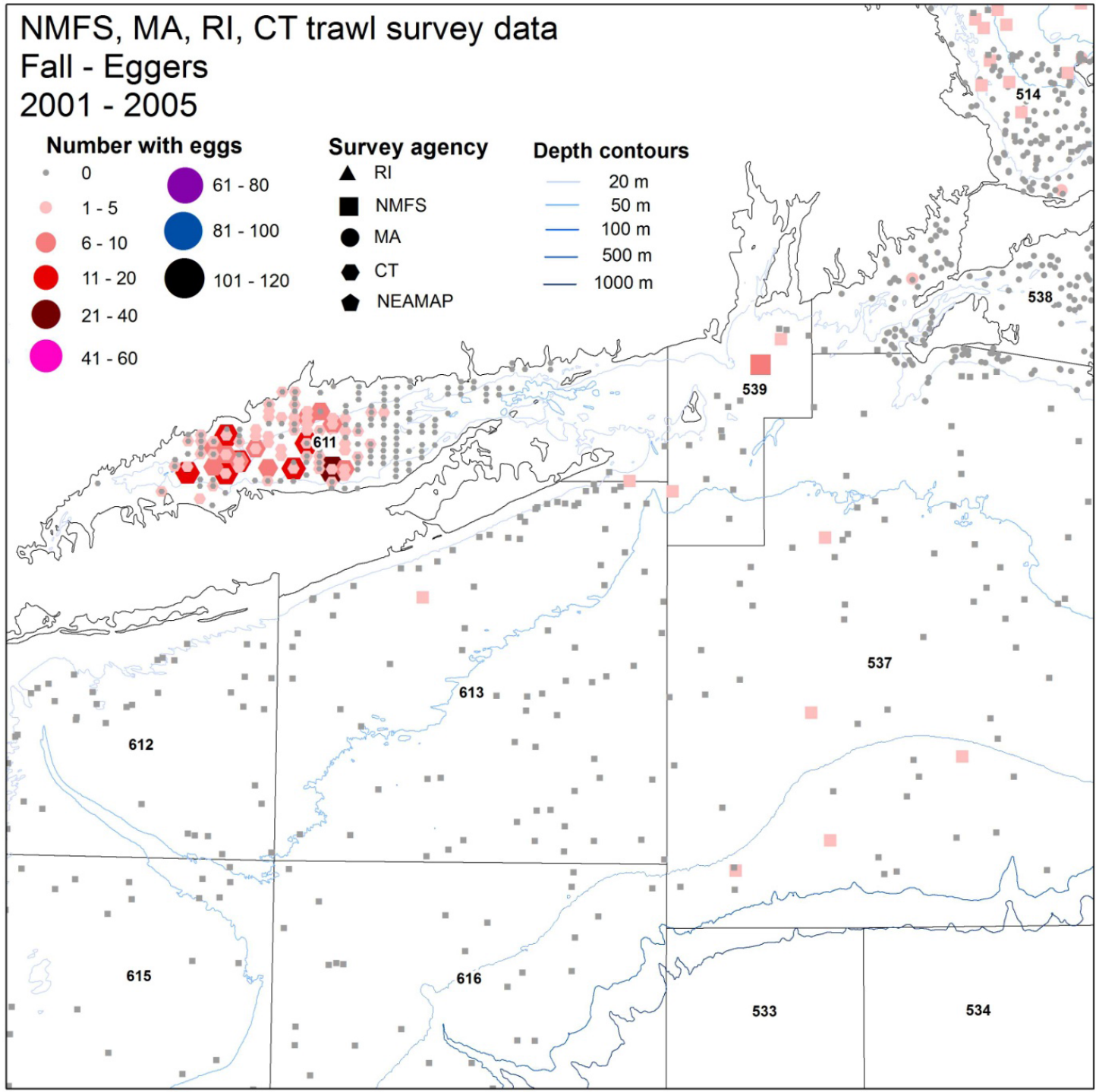
EXPLOITATION RATE (landings / survey ref. pop'n)								
Landings (numbers) by area / Reference pop'n (survey lengths > 77 mm, sexes								
Survey	NESFC		MA		RI		CT/NY LIS	
	fall	spring	fall	spring	fall	spring	fall	spring
1981								
1982	0.41	0.21			0.85	1.56		
1983	0.88	0.78			2.39	1.04		
1984	0.57	1.17			0.84	0.68	0.32	
1985	0.65	0.16			1.09	1.94	0.64	1.00
1986	1.02	0.67			1.05	1.07	0.29	1.33
1987	1.22	0.28			0.57	1.27	0.35	0.92
1988	1.11	0.76			0.27	2.39	0.74	1.99
1989	0.81	1.23			0.58	1.22	0.85	1.02
1990	0.90	0.69	0.43	0.31	1.51	0.66	0.54	0.83
1991	1.15	1.16	0.11	0.20	0.69	0.32	0.50	0.50
1992	0.82	0.91	0.11	0.59	0.88	2.28	0.42	0.58
1993	1.40	0.54	0.23	2.50	0.28	0.14	0.35	0.90
1994	3.31	1.77	0.21	0.53	0.63	2.43	0.43	2.27
1995	1.45	10.78	7.00	0.66	0.72	1.73	0.76	1.13
1996	0.61	2.05	0.46	1.28	0.49	1.09	1.22	1.51
1997	1.00	0.38	1.30	0.46	0.56	0.87	0.49	0.77
1998	1.18	1.14	1.08	0.53	1.03	1.18	1.05	0.58
1999	2.43	0.37	2.22	0.65	2.07	1.59	0.74	0.49
2000	0.93	0.47	0.51	0.47	2.10	1.52	0.52	0.40
2001	0.82	0.59	0.56	1.91	1.03	0.54	0.50	0.32
2002	1.40	0.17	3.32	1.07	2.98	0.50	1.36	0.40
2003	1.00	0.34		1.00	0.43	0.96	0.39	0.90
2004	0.65	0.51	0.55		0.39	0.21	0.75	1.17
2005	0.69	0.69	0.22	1.59	0.23	0.41	1.05	1.72
2006	0.89	0.38		0.35	0.38	0.17	3.03	1.70
2007	0.50	0.40	0.53	4.18	0.22	0.56	1.62	0.97
2008	0.70	0.30	1.29	1.11	0.20	0.50	0.86	0.47
2009	1.13	0.93		0.68	0.40	0.43	0.71	0.81
2010	0.66	0.59	0.10	0.54	0.57	0.59	NA	1.16
2011	0.62	0.78	0.14	1.34	0.40	0.51	2.78	1.09
2012	0.42	0.46	0.33	0.62	1.70	0.77	4.08	1.36
2013	0.66	0.36	0.32	0.44	4.51	0.87	1.65	0.70
2008 - 2013 ave	**0.70**	**0.57**	**0.43**	**0.79**	**1.30**	**0.61**	**2.02**	**0.93**
25th	0.82	0.38	0.23	0.49	0.56	0.67	0.41	0.54
median	1.01	0.68	0.51	0.62	0.78	1.13	0.51	0.90
75th	1.27	1.16	1.30	1.05	1.06	1.63	0.75	1.07

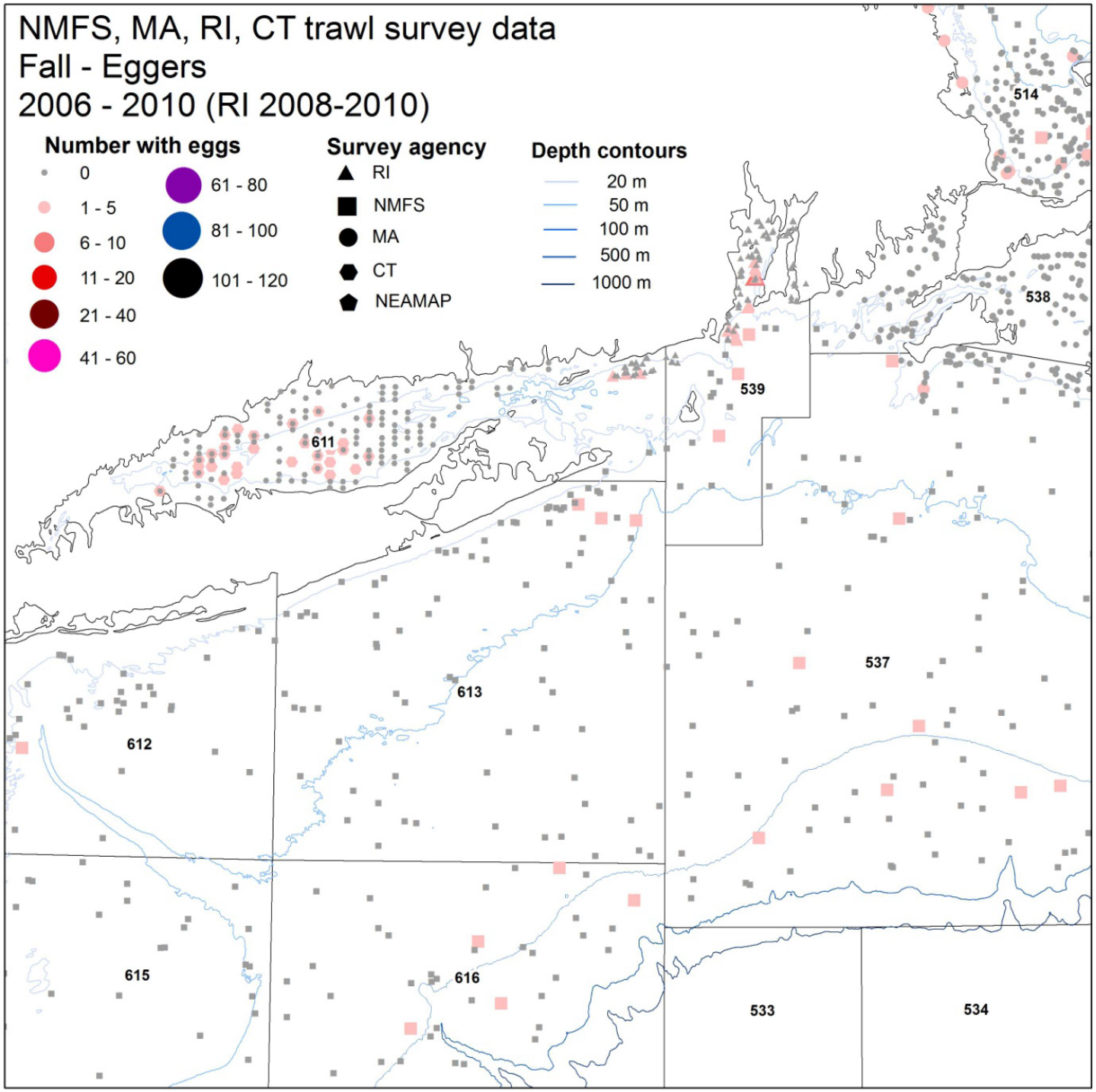
SNE Abundance Indicators

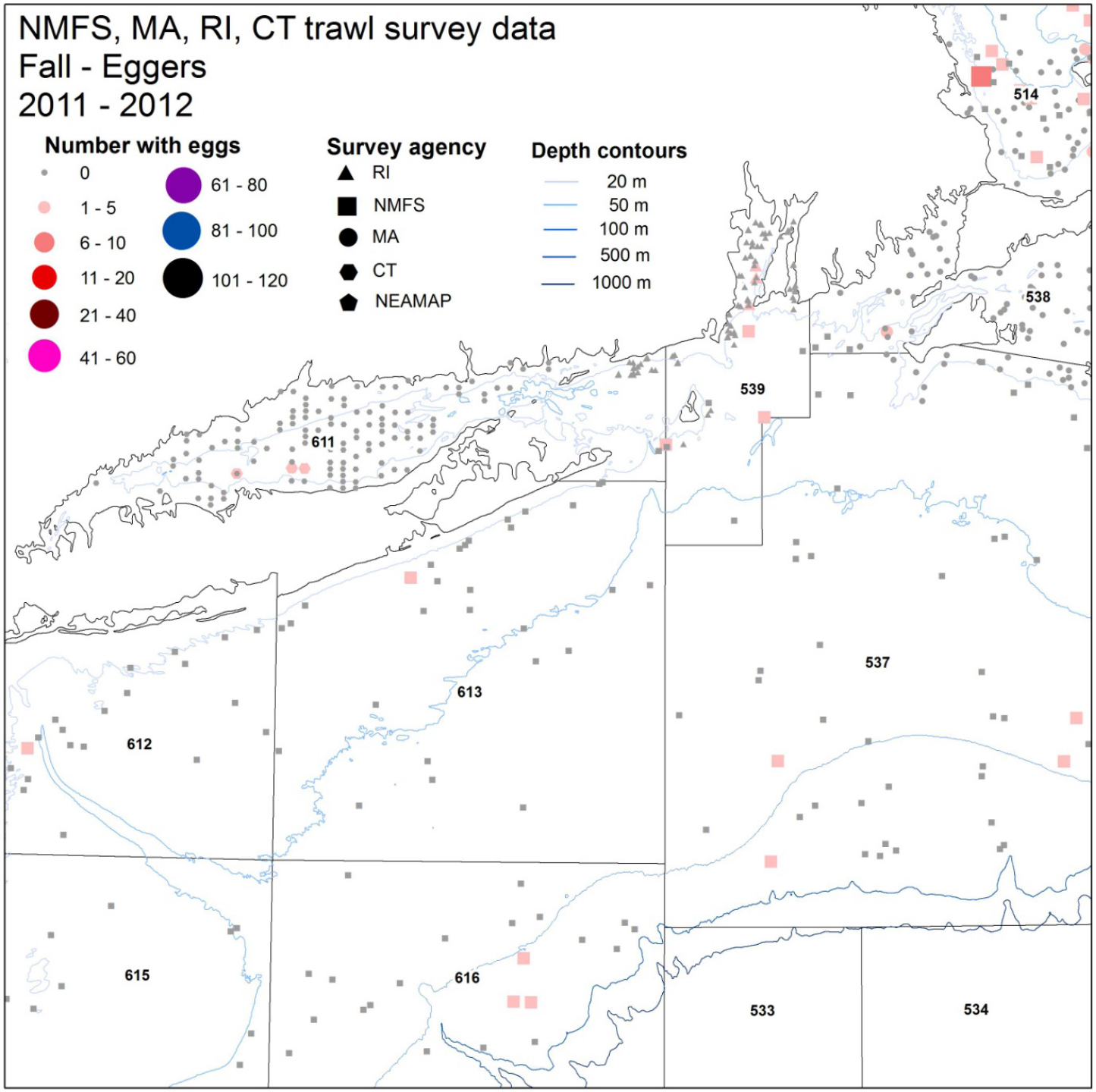
SPAWNING STOCK ABUNDANCE Mean weight (g) per tow of mature females								
Survey	NESFC		MA		RI		CT	
	Fall	spring	fall	spring	Fall	spring	Fall	spring
1981	198.93	15.71	9.21	99.78	161.55	111.57		
1982	156.07	118.29	50.04	26.42	53.52	43.52		
1983	120.20	35.51	0.72	59.62	87.86	141.69		
1984	192.38	44.50	4.04	51.67	203.58	259.91	2331.33	
1985	132.96	138.13	1.88	36.90	125.09	60.22	1040.42	1155.01
1986	59.83	61.35	87.60	19.06	128.49	136.78	1548.94	751.75
1987	143.76	67.33	44.51	35.12	475.51	86.13	1869.91	932.49
1988	122.36	121.34	13.16	46.33	662.07	100.75	1081.60	639.82
1989	124.57	44.65	233.88	70.68	363.92	151.06	853.74	1193.87
1990	175.83	75.87	59.02	150.21	230.17	258.72	1818.59	2369.93
1991	160.99	53.14	125.79	236.11	367.25	698.35	2185.29	2692.42
1992	178.88	61.38	179.80	47.84	321.95	117.18	1905.99	3598.02
1993	139.25	71.48	99.33	25.59	1286.74	1595.77	3335.55	2320.25
1994	54.70	36.40	126.00	82.42	359.96	164.37	3402.43	1170.49
1995	145.39	10.18	10.89	92.76	410.53	153.14	2253.58	3302.56
1996	227.08	32.01	59.61	54.16	861.32	353.55	3018.00	3882.27
1997	121.74	137.20	29.11	225.15	654.91	439.93	7173.56	5994.27
1998	161.20	44.97	52.73	138.81	251.53	286.59	2573.44	7738.30
1999	69.56	122.59	24.53	81.12	171.54	324.62	2546.24	8261.90
2000	95.66	60.02	20.08	142.78	268.99	303.32	1744.69	4430.68
2001	95.78	36.43	21.28	16.61	267.62	535.45	1513.56	3363.78
2002	85.56	146.86	0.00	44.75	35.68	572.35	365.12	2044.42
2003	52.83	31.71	0.00	5.97	205.85	110.43	1187.14	698.04
2004	47.10	47.01	37.18	3.58	288.49	591.60	626.96	522.99
2005	110.36	42.31	101.87	23.02	353.53	243.36	473.26	479.71
2006	65.03	90.62	0.00	60.77	465.26	788.63	219.99	465.37
2007	44.60	34.20	41.79	10.32	350.43	206.96	188.98	595.89
2008	25.90	58.14	0.00	19.67	401.73	194.57	248.63	760.88
2009	36.92	24.49	3.95	31.29	184.35	250.00	305.31	371.95
2010	101.74	46.39	130.73	32.09	166.07	177.64	na	361.72
2011	89.95	22.79	36.96	8.55	148.47	152.43	30.24	64.00
2012	205.12	39.64	14.13	9.93	31.16	118.13	6.28	88.85
2013	52.95	42.05	23.96	35.49	2.02	67.76	24.56	39.81
2008 - 2013 ave	**85.43**	**38.92**	**34.96**	**22.84**	**155.63**	**160.09**	**123.00**	**281.20**

25th	93.14	42.48	12.59	36.45	205.28	131.88	1431.95	1162.75
median	128.76	60.69	36.81	52.92	295.47	259.32	1887.95	2369.93
75th	161.04	87.24	90.53	104.27	426.78	375.15	2553.04	3740.14


NMFS, MA, RI, CT trawl survey data
Fall - Eggers
1996 - 2000
Number with eggs
0
1 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
81 - 100
101 - 120
Survey agency
RI
NMFS
MA
CT
NEAMAP
Depth contours
20 m
50 m
100 m
500 m
1000 m
514
538
539
611
537
613
612
615
616
533
534


NMFS, MA, RI, CT trawl survey data
Fall - Eggers
2001 - 2005
Number with eggs
0
1 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
81 - 100
101 - 120
Survey agency
RI
NMFS
MA
CT
NEAMAP
Depth contours
20 m
50 m
100 m
500 m
1000 m
514
538
539
611
537
613
612
615
616
533
534


NMFS, MA, RI, CT trawl survey data
Fall - Eggers
2006 - 2010 (RI 2008-2010)
Number with eggs
0
1 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
81 - 100
101 - 120
Survey agency
RI
NMFS
MA
CT
NEAMAP
Depth contours
20 m
50 m
100 m
500 m
1000 m
514
538
539
611
537
613
612
615
616
533
534


NMFS, MA, RI, CT trawl survey data
Fall - Eggers
2011 - 2012
Number with eggs
0
1 - 5
6 - 10
11 - 20
21 - 40
41 - 60
61 - 80
81 - 100
101 - 120
Survey agency
RI
NMFS
MA
CT
NEAMAP
Depth contours
20 m
50 m
100 m
500 m
1000 m
514
538
539
611
537
613
612
615
616
533
534

SNE Abundance Indicators

FULL RECRUIT ABUNDANCE (SURVEY)								
Abundance of lobsters > 85 mm CL (sexes combined)								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Fall	*spring*	*fall*	*spring*	*Fall*	*spring*	*Fall*	*spring*
1981	0.24	0.03	0.00	0.02	0.01	0.03		
1982	0.17	0.13	0.07	0.02	0.04	0.03		
1983	0.13	0.03	0.00	0.07	0.13	0.08		
1984	0.24	0.04	0.07	0.03	0.16	0.31	2.67	
1985	0.12	0.07	0.00	0.00	0.10	0.07	0.81	1.06
1986	0.06	0.12	0.05	0.00	0.08	0.11	2.73	0.63
1987	0.19	0.05	0.05	0.05	0.31	0.04	1.62	0.99
1988	0.15	0.04	0.00	0.03	0.83	0.09	1.26	0.82
1989	0.20	0.07	0.20	0.07	0.24	0.05	1.00	1.41
1990	0.19	0.05	0.05	0.05	0.38	0.10	2.39	1.35
1991	0.20	0.04	0.23	0.19	0.44	0.37	1.34	3.26
1992	0.20	0.07	0.22	0.05	0.34	0.10	2.37	1.44
1993	0.14	0.10	0.12	0.02	1.12	1.42	1.55	0.68
1994	0.08	0.03	0.00	0.00	0.55	0.10	3.75	0.50
1995	0.15	0.01	0.01	0.05	0.33	0.07	2.20	1.85
1996	0.22	0.02	0.06	0.08	0.82	0.19	1.97	1.96
1997	0.11	0.19	0.02	0.10	0.98	0.08	4.00	4.44
1998	0.25	0.00	0.04	0.00	0.17	0.17	1.48	4.10
1999	0.08	0.07	0.00	0.16	0.27	0.26	1.70	3.27
2000	0.08	0.08	0.08	0.08	0.30	0.32	0.95	2.44
2001	0.10	0.07	0.02	0.03	0.10	0.32	0.35	2.47
2002	0.08	0.08	0.00	0.08	0.00	0.20	0.03	1.35
2003	0.08	0.05	0.00	0.06	0.29	0.07	0.62	0.35
2004	0.07	0.04	0.04	0.00	0.26	0.41	0.27	0.30
2005	0.12	0.07	0.06	0.00	0.30	0.33	0.21	0.25
2006	0.11	0.06	0.00	0.14	0.24	0.65	0.03	0.20
2007	0.07	0.03	0.05	0.01	0.32	0.15	0.03	0.24
2008	0.07	0.06	0.00	0.02	0.74	0.12	0.19	0.66
2009	0.07	0.03	0.00	0.01	0.17	0.19	0.24	0.32
2010	0.11	0.05	0.15	0.07	0.07	0.12	na	0.26
2011	0.10	0.04	0.07	0.00	0.14	0.16	0.01	0.07
2012	0.19	0.05	0.03	0.02	0.02	0.09	0.03	0.06
2013	0.08	0.09	0.03	0.07	0.00	0.02	0.03	0.07
2008 - 2013 ave	**0.10**	**0.05**	**0.05**	**0.03**	**0.19**	**0.12**	**0.10**	**0.24**

25th	0.08	0.04	0.00	0.03	0.17	0.07	0.99	0.91
median	0.14	0.06	0.04	0.05	0.31	0.10	1.59	1.41
75th	0.20	0.08	0.07	0.08	0.46	0.28	2.38	2.46

SNE Abundance Indicators

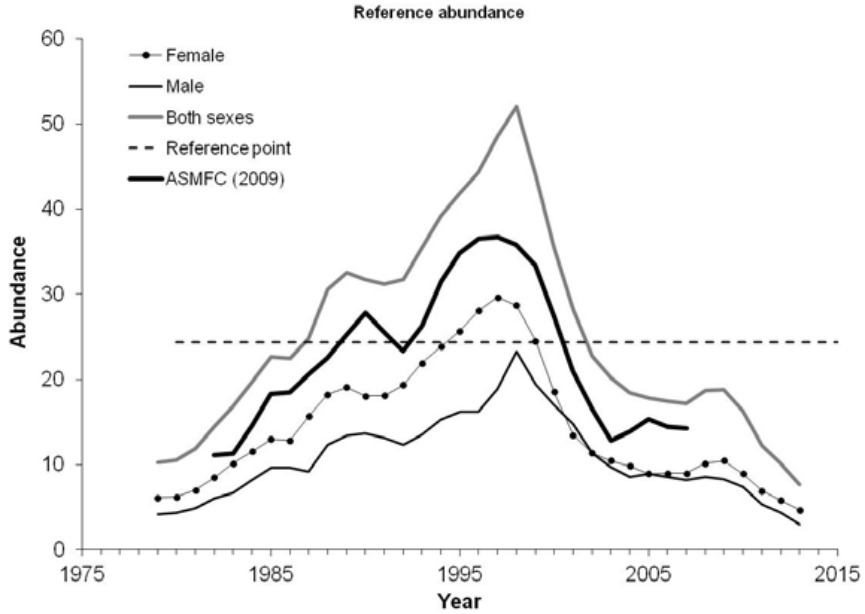
RECRUIT ABUNDANCE (SURVEY)								
Abundance of lobsters 71 - 80 mm CL (sexes combined)								
Survey	NEFSC		MA		RI		CT	
	Fall	spring	fall	spring	Fall	spring	Fall	spring
1981	0.40	0.05	0.07	0.65	1.31	0.89		
1982	0.24	0.23	0.04	0.10	0.62	0.26		
1983	0.28	0.13	0.04	0.09	0.43	0.94		
1984	0.17	0.04	0.01	0.42	1.21	1.03	8.62	
1985	0.32	0.77	0.09	0.34	0.97	0.26	5.03	4.73
1986	0.12	0.09	0.20	0.17	1.30	0.75	8.22	3.45
1987	0.18	0.33	0.17	0.27	2.53	0.79	9.46	3.90
1988	0.22	0.07	0.16	0.24	4.14	0.42	4.82	2.16
1989	0.52	0.04	0.43	0.14	3.26	0.93	6.32	5.51
1990	0.35	0.29	0.31	2.29	1.38	2.17	10.31	9.53
1991	0.22	0.18	0.87	1.18	3.05	4.77	14.23	15.39
1992	0.36	0.06	0.57	0.10	1.97	0.67	12.25	16.55
1993	0.17	0.27	0.52	0.25	8.29	7.81	21.46	10.69
1994	0.10	0.10	0.42	0.95	3.64	1.00	18.87	5.90
1995	0.27	0.00	0.03	1.14	4.48	1.36	15.30	16.31
1996	0.75	0.12	0.32	0.40	6.42	1.60	14.91	16.30
1997	0.53	0.59	0.12	1.45	6.10	2.58	40.43	25.49
1998	0.43	0.36	0.11	1.09	3.38	1.63	18.61	37.56
1999	0.20	0.89	0.19	0.75	2.10	1.64	20.22	40.84
2000	0.40	0.30	0.13	0.54	1.83	1.54	12.71	20.72
2001	0.16	0.13	0.03	0.18	2.21	3.03	11.94	19.12
2002	0.16	0.62	0.00	0.34	0.75	2.73	3.52	11.44
2003	0.12	0.21	0.00	0.07	1.00	0.29	5.56	4.58
2004	0.12	0.11	0.00	0.05	1.48	1.86	4.52	2.92
2005	0.07	0.04	0.00	0.08	2.48	1.02	2.14	2.67
2006	0.10	0.12	0.03	0.08	2.26	3.63	1.38	2.12
2007	0.10	0.10	0.00	0.08	2.76	0.73	1.35	2.86
2008	0.12	0.09	0.01	0.16	2.98	0.64	1.43	3.10
2009	0.04	0.05	0.05	0.16	1.36	1.14	1.72	1.55
2010	0.13	0.05	0.18	0.06	1.21	0.44	na	1.41
2011	0.11	0.03	0.00	0.18	1.02	0.42	0.19	0.42
2012	0.14	0.04	0.21	0.07	0.27	0.61	0.14	0.50
2013	0.08	0.02	0.04	0.11	0.02	0.18	0.06	0.23
2008 - 2013 ave	**0.10**	**0.05**	**0.08**	**0.12**	**1.14**	**0.57**	**0.70**	**1.20**
25th	0.17	0.09	0.08	0.23	1.36	0.78	7.74	5.12
median	0.22	0.19	0.17	0.37	2.37	1.45	12.09	11.44
75th	0.37	0.34	0.35	0.99	3.77	2.27	16.13	17.84

YOUNG-OF-YEAR INDICES				
	YOY	YOY	Larvae	Postlarvae
Survey	MA	RI	CT / ELIS Summer	CT_NY / WLIS Summer
1981				
1982				
1983				14.48
1984			0.43	6.89
1985			0.53	66.75
1986			0.90	4.58
1987			0.78	18.98
1988			0.74	49.27
1989			0.74	5.88
1990		1.31	0.81	19.66
1991		1.49	0.55	9.97
1992		0.63	1.44	14.12
1993		0.51	1.19	26.23
1994		1.23	0.98	96.52
1995	0.17	0.33	1.46	18.20
1996	0.00	0.15	0.31	12.07
1997	0.09	0.99	0.21	13.69
1998	0.20	0.57	0.55	4.85
1999	0.03	0.92	2.83	39.70
2000	0.33	0.34	0.78	14.28
2001	0.10	0.75	0.32	9.46
2002	0.10	0.25	0.64	1.99
2003	0.03	0.79	0.25	2.60
2004	0.03	0.42	0.45	6.10
2005	0.13	0.53	0.49	6.90
2006	0.17	0.44	0.71	1.70
2007	0.10	0.36	0.37	18.10
2008	0.00	0.14	0.37	8.10
2009	0.03	0.08	0.19	7.62
2010	0.00	0.11	0.35	9.91
2011	0.03	0.00	0.26	5.90
2012	0.00	0.09	0.12	2.77
2013	0.20	0.22	0.16	NA
2008 - 2013 ave	**0.04**	**0.11**	**0.24**	**6.86**
25th	0.03	0.39	0.50	6.64
median	0.10	0.69	0.74	13.91
75th	0.17	0.97	0.92	21.30

SNE Abundance Indicators

SURVEY LOBSTER ENCOUNTER RATE Proportion of postive tows								
Survey	NEFSC		MA		RI		CT	
	Fall	spring	fall	spring	Fall	spring	Fall	spring
1981			0.15	0.38	0.54	0.49		
1982	0.34	0.24	0.21	0.28	0.59	0.30		
1983	0.22	0.14	0.16	0.21	0.36	0.45		
1984	0.27	0.09	0.18	0.40	0.45	0.59	0.76	0.72
1985	0.30	0.20	0.22	0.51	0.50	0.31	0.69	0.57
1986	0.25	0.19	0.38	0.39	0.43	0.64	0.61	0.67
1987	0.23	0.13	0.18	0.28	0.47	0.33	0.76	0.63
1988	0.27	0.08	0.21	0.39	0.59	0.49	0.66	0.65
1989	0.37	0.11	0.33	0.50	0.55	0.52	0.63	0.75
1990	0.43	0.14	0.44	0.66	0.54	0.66	0.76	0.73
1991	0.29	0.13	0.39	0.41	0.69	0.77	0.78	0.81
1992	0.31	0.23	0.23	0.51	0.57	0.41	0.69	0.78
1993	0.26	0.09	0.26	0.54	0.73	0.50	0.77	0.74
1994	0.23	0.09	0.20	0.51	0.57	0.56	0.74	0.73
1995	0.33	0.06	0.13	0.44	0.67	0.55	0.68	0.77
1996	0.41	0.08	0.16	0.30	0.76	0.79	0.78	0.68
1997	0.28	0.24	0.21	0.45	0.71	0.75	0.81	0.71
1998	0.30	0.11	0.13	0.54	0.55	0.59	0.71	0.83
1999	0.29	0.18	0.21	0.41	0.59	0.76	0.79	0.78
2000	0.30	0.13	0.15	0.45	0.63	0.68	0.73	0.82
2001	0.24	0.18	0.18	0.28	0.61	0.64	0.58	0.77
2002	0.21	0.19	0.03	0.28	0.45	0.63	0.59	0.73
2003	0.25	0.11	0.03	0.14	0.40	0.53	0.63	0.71
2004	0.20	0.10	0.03	0.28	0.50	0.54	0.66	0.61
2005	0.20	0.08	0.15	0.34	0.45	0.50	0.55	0.63
2006	0.23	0.13	0.03	0.43	0.61	0.81	0.53	0.61
2007	0.19	0.15	0.10	0.34	0.54	0.43	0.53	0.70
2008	0.24	0.11	0.10	0.33	0.52	0.55	0.65	0.63
2009	0.28	0.16	0.05	0.50	0.40	0.57	0.55	0.49
2010	0.30	0.09	0.24	0.23	0.45	0.47	NA	0.54
2011	0.32	0.11	0.05	0.18	0.23	0.29	0.28	0.46
2012	0.32	0.12	0.15	0.18	0.16	0.29	0.20	0.44
2013	0.24	0.09	0.08	0.18	0.09	0.20	0.15	0.28
2008 - 2013 ave	0.28	0.11	0.11	0.26	0.31	0.39	0.37	0.47
25th	0.25	0.09	0.16	0.37	0.49	0.52	0.65	0.70
median	0.29	0.13	0.20	0.42	0.57	0.59	0.72	0.73
75th	0.31	0.18	0.24	0.51	0.64	0.66	0.76	0.77

SNE Reference Abundance, Exploitation, Spawning Biomass and Recruitment



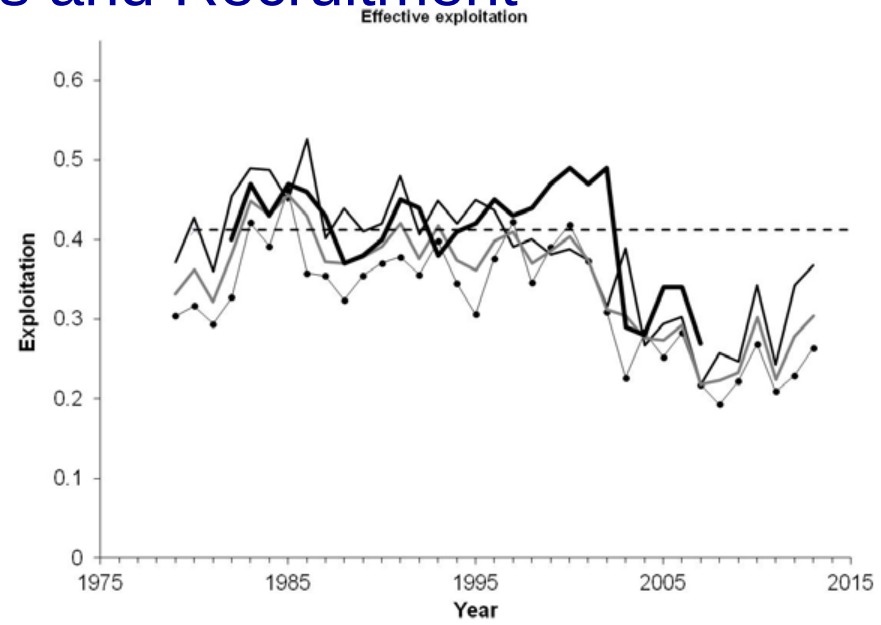
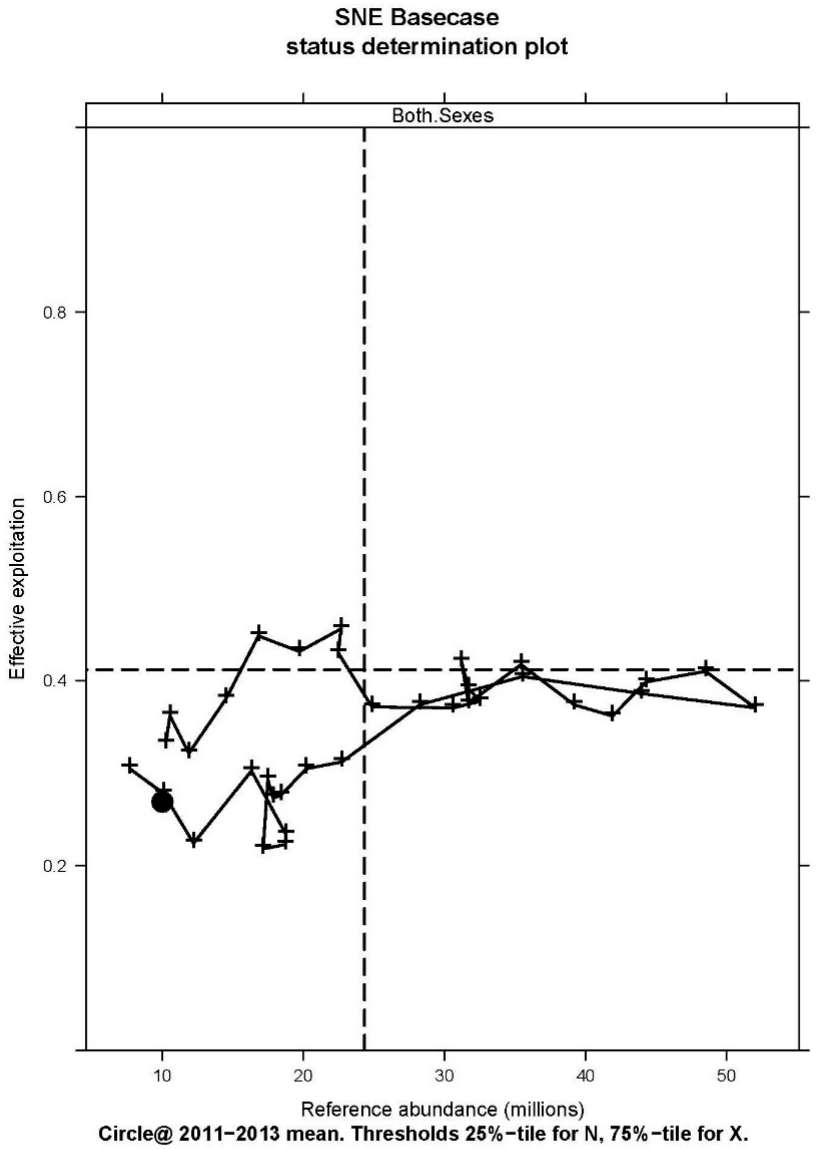


Figure 7.3.4. Reference abundance and effective exploitation estimates for 1979-2013 from the basecase University of Maine assessment model for SNE lobsters.



SNE - Status Synopsis

- Basecase model
  - Stock depleted
  - Overfishing not occurring
  - Recruitment and SSB at all time lows

- Indicators
  - Abundance – negative -near or below 25th percentile
  - Exploitation – moderate to negative
  - Recruitment – extremely poor - at or below 25th percentile

SNE - Status Synopsis

- The SNE Stock is in extremely poor condition and is substantially worse than what was reported in the previous assessment
- The low levels of catch observed over the last 3 years were derived from moderate year classes that settled between 2003 and 2007.
- The record low settlement observed between 2009 and 2013 has not yet recruited to the fishery. The TC expects that landings, full recruit abundance, SSB, and the overall condition of the SNE stock will continue to decline in the coming years
- Environmental conditions in the inshore portions of SNE are stressful to lobsters and the overall productivity of the stock is severely diminished
- The SNE stock is experiencing recruitment failure

Review

- GOM/GBK should be combined into one stock
- GOM/GBK stock is in good condition
  - Not depleted
  - Overfishing not occurring
  - Status of GOM and GB viewed independently is the same

- SNE stock is in poor condition
  - Stock is depleted
  - Overfishing not occurring
  - SSB and Recruitment at historic lows
  - Environmental conditions not favorable for stock productivity

Reference TLPugh24013) threshold and target abundance and effective exploitation for the GOM, GBK, GOM/GBK, and SNE stocks.
Red shading indicates that the reference period estimate exceeds the threshold reference point. Green shading indicates that the reference estimate exceeds the target reference point.

Abundance (millions)	GOM *Model*	GBK *Empirical*	GOM/GBK *Model*	SNE *Model*
2011 - 2013 reference	247	1.57	248	***10***
Threshold (25th percentile)	52	0.8	66	24
Target (75th percentile GOM & GBK, 50th percentile SNE)	103	1.1	107	32

Effective exploitation	GOM *Model*	GBK *Empirical*	GOM/GBK *Model*	SNE *Model*
2011 - 2013 reference	0.48	1.54	0.48	0.27
Threshold (75th percentile)	0.54	1.83	0.50	0.41
Target (25th percentile)	0.49	1.24	0.46	0.37

Questions

American lobster
Assessment Peer Review Report

Presented to ASMFC Lobster Management Board

August 4, 2015

Lobster Assessment Peer Review

1. Lobster Assessment Subcommittee and Technical Committee developed assessment

2. Independent Peer Review Panel: 3 Independent Experts

    - Emphasis on reviewing only the science/assessment

3. Panel Product: Review Report

    - in briefing book materials and via www.asmfc.org

ASMFC Lobster Stock Assessment Review Panel
June 8-12, 2015
Woods Hole, Massachusetts

Dr. John Hoenig (Chair), Virginia Institute of Marine Science
Dr. John Tremblay, Canada Dept. Fisheries & Oceans
Dr. Robert Muller, Florida Fish & Wildlife Research Institute

Review Panel Overall Findings

- Stock assessment was accepted – both model results & indicators
- Gulf of Maine (GOM) and Georges Bank (GB) combined for assessment purposes (but conclusions don't change if they are assessed separately)
- GOM/GB stock is not overfished & overfishing not occurring
- Southern New England (SNE) stock overfished with lowest biomass on record + (in the inshore at least) recruitment failure. Overfishing is technically not occurring in 2014, but a misleading result that may obscure the need for management action
- Forecasting GOM/GB not possible (recruitment unpredictable)
- Panel finds stock assessment acceptable for management use

Assessment Terms of Reference

ToR 1: Evaluate thoroughness of data collection and presentation and treatment of fishery-dependent and fishery-independent data in the assessment.

- incorporated almost all data sources directly into U of Maine model or into stock indicator tables.
- data limitations were substantial, but SASC took a thorough, resource intensive approach to fill gaps; trends in data overcome data limitations
- to understand effects of reducing effort on stock status, better information on fishing effort is vital

Assessment Terms of Reference

ToR 2: Evaluate the methods and models used to estimate population parameters and reference points for each stock unit

- SASC was thorough in its review and use of life history information and environmental data
- commended for its use of temperature data to explore changes in natural mortality in SNE
- used wide variety of data types to examine movements between GOM and GBK areas
- need for updated information on growth and maturity
- most appropriate model & parameterization was used

Assessment Terms of Reference

ToR 3: Evaluate the estimates of stock abundance and exploitation from the assessment for use in management. If necessary, specify alternative estimation methods.

- assessment model effectively captures trends (but not absolute values) in abundance & exploitation rate.
  - model outputs consistent with the stock indicators
  - model consistent with previous assessment & stable over sensitivity model runs; sensitivity runs affect scaling rather than trends
  - potential problem of filling holes in input length frequencies in early years not important (cf runs with early data discarded)
  - no retrospective inconsistencies & model diagnostics good
- model underestimates big animals in GOM/GB. Natural mortality adjusted for SNE. Both affect estimated abundance

Assessment Terms of Reference

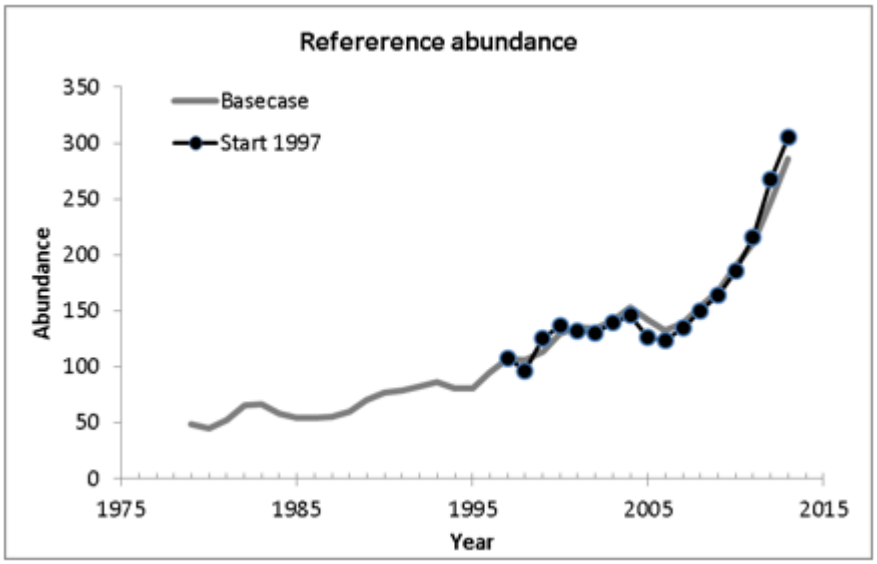
ToR 4: Evaluate the methods used to characterize uncertainty in estimated parameters. Were the implications of uncertainty in technical conclusions clearly stated?

- UMaine model confidence intervals "grossly understated the true uncertainty in the base case"
- Panel concurs that sensitivity runs give best indication of uncertainty (no retrospective patterns → not a consideration)

Assessment Terms of Reference

ToR 5: Evaluate the diagnostic analyses performed, including but not limited to:

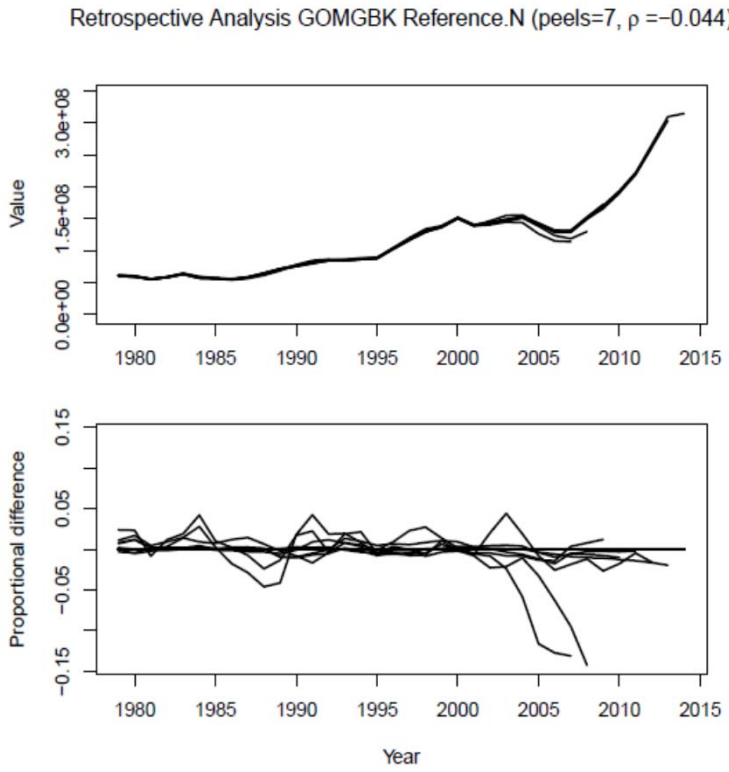
a. Sensitivity analyses to determine model stability and potential consequences of major model assumptions

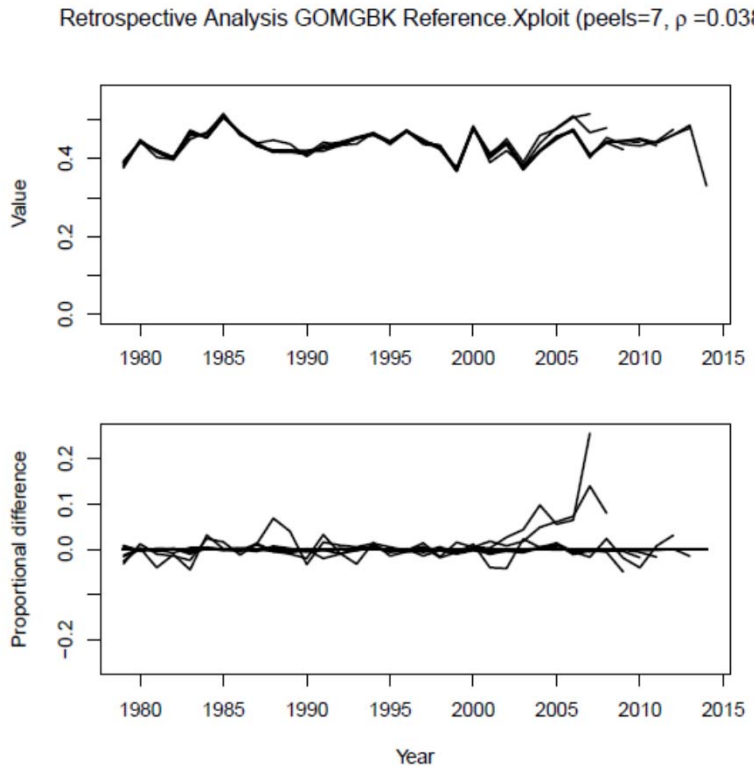


Assessment Terms of Reference

ToR 5: Evaluate the diagnostic analyses performed, including but not limited to:

b. Retrospective analysis (GOM/GBK)





Assessment Terms of Reference

ToR 6: Evaluate the preparation and interpretation of indicator-based analyses for stocks and sub-stock areas.

- Panel supports use of indicators ('model-free indicators')
- Panel recommends an environmental indicator table be developed to illustrate changes in temperature over time.

GOM/GBK abundance indicator

SPAWNING STOCK ABUNDANCE		
Mean weight (g) per tow of mature females		
Survey	NESFC	
	fall	*spring*
1981	304.27	173.96
1982	223.09	74.35
1983	264.22	125.99
1984	189.82	188.73
1985	328.01	1138.49
1986	206.27	286.30
1987	179.30	219.81
1988	271.72	184.18
1989	407.16	130.78
1990	289.98	220.91
1991	326.86	204.07
1992	293.28	202.01
1993	277.73	200.30
1994	360.16	280.51
1995	452.00	141.92
1996	555.40	465.08
1997	398.24	410.45
1998	438.12	449.94
1999	929.85	411.02
2000	457.89	484.73
2001	718.46	625.39
2002	1350.72	849.37
2003	701.10	1139.33
2004	716.95	1141.16
2005	593.44	762.80
2006	968.92	811.80
2007	752.12	805.69
2008	1270.51	1316.45
2009	1811.80	1140.39
2010	1662.97	1249.92
2011	2206.17	1053.94
2012	1910.13	1703.54
2013	1853.09	1322.28
2008 - 2013 ave	**1785.78**	**1297.75**
25th	293.28	202.01
median	452.00	449.94
75th	929.85	1053.94

Assessment Terms of Reference

ToR 7: Evaluate the current and recommended reference points and the methods used to calculate/estimate them. Evaluate stock status determination from the assessment or specify alternative methods.

- Panel agrees traditional reference points, based on yield and spawning biomass per recruit and based on MSY considerations, are not appropriate given life history and recruitment trends

	GOM	GBK	GOM/GBK	SNE
2011 -2013 Reference F	0.48	1.54	0.48	0.27
$F_{5\%}$	0.45	N/A	0.44	> 0.4
$F_{10\%}$	0.36		0.34	> 0.4
$F_{15\%}$	0.3		0.29	> 0.4
$F_{20\%}$	0.26		0.25	> 0.4
F_{MAX}	0.36		0.26	> 0.4
$F_{0.1}$	0.17		0.15	0.24

Assessment Terms of Reference

ToR 7: continued…

- Panel agrees with using trend-based abundance and exploitation reference points determined from the model
- Panel agrees GOM/GBK combined stock not overfished and overfishing not occurring according to both model results and stock indicators. (Separate determinations for GOM and GBK not deemed appropriate by SASC and Panel.)

Assessment Terms of Reference

ToR 7: Continued

- SNE stock clearly overfished according to both model & stock indicators
  - Abundance lowest on record, with inshore extremely low
  - Apparently not due to fishing
  - Recruitment failure inshore; believed offshore SNE depends on nearshore settlement for recruits
- "The SASC and Panel believe the SNE stock has little chance of recovering unless fishing effort is curtailed."

Assessment Terms of Reference

"To be specific, according to the reference point defined by the time series of model outputs, the exploitation rate for the entire SNE stock does not lie in the overfishing zone; however, the definition was created without considering the possibility that the stock could be at the lowest abundance level ever and the production of recruits in the inshore area (on which the offshore area depends) could be brought to an extremely low level. Hence, by any reasonable standard, it is necessary to protect the offshore component of the stock until increased recruitment can be observed."

Assessment Terms of Reference

ToR 8: Review the research, data collection, and assessment methodology recommendations provided by the Technical Committee and make any additional recommendations warranted. Clearly prioritize the activities needed to inform and maintain the current assessment, and provide recommendations to improve the reliability of future assessments.

- updating growth information is imperative
- 2nd priority task is to investigate stock connectivity to support combined GOM/GBK analysis. Tagging program suggested
- 3rd priority is increase sea sampling for biological data in the offshore
- U of Maine model computer program is inflexible and should be rewritten

Assessment Terms of Reference

ToR 9: Review the recommended timing of the next benchmark assessment relative to the life history and current management of the species.

- For SNE, Panel recommends close monitoring to try to save the stock. Stock indicators should be updated annually and reported to the Management Board for appropriate action.
- For GOM/GBK, given good condition of the stock, a five-year interval may be appropriate for a benchmark assessment. However, stock indicators should be updated frequently.

Jonah Crab
Draft Fishery Management Plan

American Lobster Management Board

Alexandria, Virginia

August 4, 2015

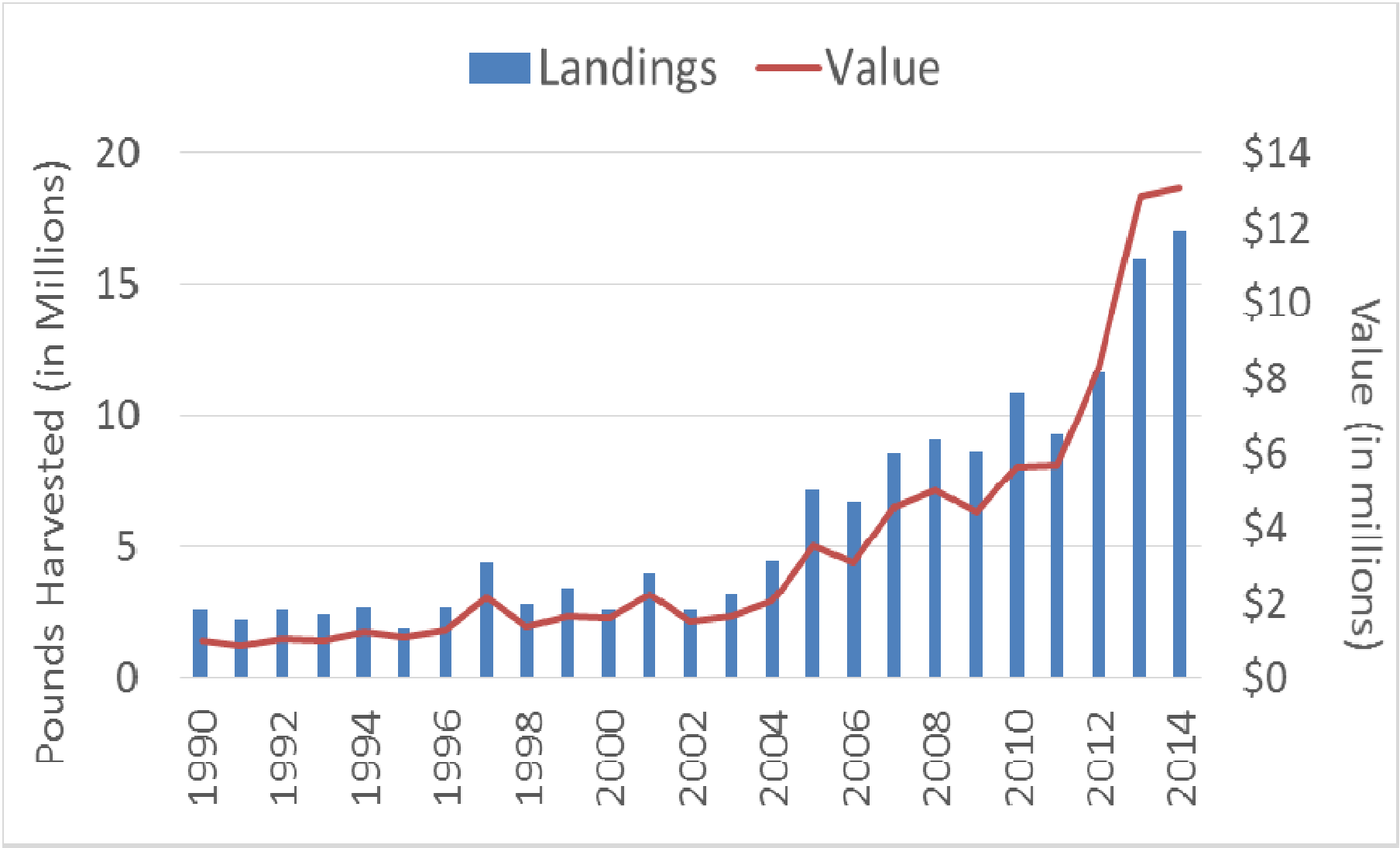
Overview

- Timeline
- Fishery Background
- Management Options
- Public Comments

Jonah Crab FMP Timeline

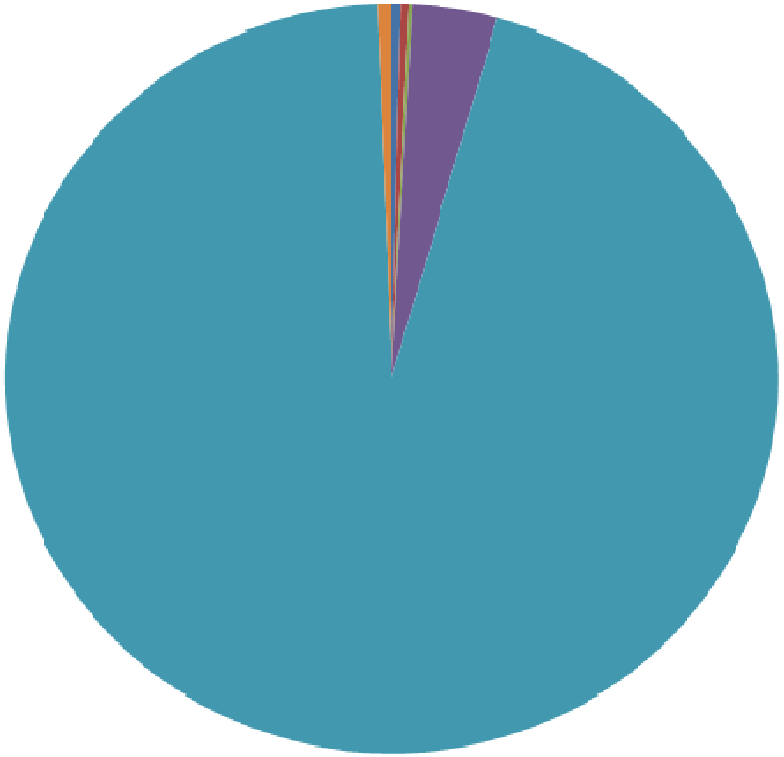
May 2014	Board Initiated Jonah Crab FMP
August 2014	Board Approved Draft PID for Public Comment
October 2014	Board Tasked PDT with Drafting a FMP
May 2015	Board Approved Document for Public Comment
May 22 – July 24, 2015	Public Comment Period
July 21, 2015	Law Enforcement Committee Meeting
July 22, 2015	Advisory Panel Meeting
August 2015	Board Consider Final Action

Rapid Increase in Landings & Value



Mixed Crustacean Fishery

Crab (Jonah and Rock) Percent Landings by Year and Gear



Dredge (0.39%)
Other (3.55%)
Pots & Traps (94.89%)
Trawls (0.60%)

Stock Status

- No range-wide stock assessment
- Size at maturity between 4-5”
- Current data collection is variable

Current Management is Variable

.	Trap Limit	Trap Restrictions	License Required	Minimum Size	Sex Restrictions	Closed Seasons	Comm Harvest Limit	Recreational License	Rec Harvest Limit	Rec Trap Limit	Landing License	Reporting Requirements
Maine	Lobster Limit	Lobster Traps	Yes	None	None	Dec 30 - Apr 1 in rivers	200 lbs/day or 500 lbs/trip	No - hand harvest; Yes - traps	No	5 traps	Yes; endorsement to the comm. fishing license	Yes; 100% dealer and 10% harvester, tied to lobster reporting
New Hampshire	Lobster Limit (1,200)	Lobster Traps	Yes	None	None	No	No	Yes (if more than 12 taken)	No	5 traps	Yes	Yes, 100% harvester reporting (>1000 lbs/year)
Massachusetts	Lobster Limit	Lobster Traps	Yes	None	None	Jan 1 - Apr 30 in state waters	No	No - hand harvest; Yes - traps/SCUBA	50 crabs	10 traps	Yes	Yes, 100% dealer and harvester
Rhode Island	No	No	Yes	None	None	No	No	No	No	No		
Connecticut		Lobster Traps	Yes; general comm license	No	No	No	No	No	No	No		Yes
New York	No	Escape panel required	Yes; limited entry	No	No egg bearers	No	No	50/day	50/day	No	No	Yes, 100% dealer and harvester
New Jersey	No	Biodegradable panel required	Yes	3.5" to 5" (varies by hardnes)	No egg bearers	Yes	No	Yes	One bushel/day	Yes		
Maryland	No	No	Yes	No	No	No	No	No	No	No		
Virginia	No	No	No	None	No	No	No	No	No	No		
Federal Lobster Permit Holder	Lobster Limit	Lobster Traps	No	None	No	No*	No	No	No	No	N/A	Yes; either VTR or state reporting depending on permits held.
Federal Non-lobster Permit Holder	None	None	No	None	No	No*	No	No	No	No	N/A	No, unless holds more restrictive permit that requires VTR

Table 5

- Most boxes are “No”
- Indirect regulation through lobster fishery
- Federal fishery regulated incidentally

Issues Identified in the Fishery

Stock status is unknown

Current management is variable

Rapid increase in landings and value

Jonah crab and lobster fisheries inseparable

FMP seeks to cap effort and protect spawning biomass in the absence of a stock assessment

Fishery Dependent Data Collection

Option 1: Monthly Reporting

- This options applies to **harvester** reporting of catch, landings and effort data.
- Data recorded daily by fishermen harvesting Jonah crab and reported to the states on at least a monthly basis (eg: traps hauled, pounds, days fished, soak time)

Fishery Dependent Data Collection

Option 2: Coastwide Mandatory Reporting

- Apply to **dealer and harvester** reporting of catch, landings and effort data.
- 100% mandatory dealer and X % harvester reporting.
    - Sub-Option 1: 100%
    - Sub-Option 2: 75%
    - Sub-Option 3: 50%
    - Sub-Option 4:10%
- Two-ticket system linked by trip ID

Fishery Dependent Data Collection

Option 3: Coastwide Mandatory Reporting and Fishery Dependent Sampling

- Applies to **dealer and harvester** reporting of catch, landings and effort data and **staff** to conduct sampling.
- Option 2 + port/sea sampling by state and federal agencies (eg: shell condition, traps per trawl, bait type, soak time)

Commercial Management Measures

A. Permits

- **Option 1: Status Quo**.
  - States/agencies maintain their current permit requirements
  - Federal waters: required to possess a lobster license & lobster tags or, in the absences of a lobster license and lobster tags, an individual would be allowed to fish for crabs without a permit but have no lobster bycatch
- **Option 2: Discretionary state permitting with recommendations for new federal permitting**.
  - States decide permitting
  - Federal waters: recommend that NOAA Fisheries require a new federal Jonah crab permit

Commercial Management Measures

A. Permits

- **Option 3: New crab license to participate in either a State or Federal Jonah crab fishery.**
  - Lobster permit holders continue to fish crab with traps but if permit doesn't have crab endorsement need to obtain new crab permit
  - Federal waters: need new federal crab permit
- **Option 4: New crab license to participate in either a State or Federal Jonah crab fishery with approved trap design.**
  - Option 3 + trap design
  - Trap design to ensure that additional traps have a minimal impact on the declining SNE lobster stock

Commercial Management Measures

A. Permits

- **Option 5: Directed fishery and incidental permit requirements.**
  - If participate in directed Jonah crab trap fishery, need lobster permit with allocation
  - Otherwise, need incidental permit from state or federal agency

Commercial Management Measures

B. Minimum Size

- **Option 1**: No coastwide min size
- **Option 2**: 4” min size
- **Option 3**: 4.25” min size
- **Option 4**: 4.5” min size
- **Option 5**: 4.75” min size
- **Option 6**: 5” min size
- **Option 7**: 5.25” min size
- **Option 8**: 5.5” min size

	4”	4.25”	4.5”	4.75”	5”
Female % Under	27%	41%	65%	84%	96%
Male % Under	3%	6%	11%	18%	29%

From: Maine Jonah Crab sea sampling, 2013.

	4"	4.25"	4.5"	4.75"	5"
Females % under	39%	50%	70%	93%	98%
Male % under	2%	4%	7%	15%	31%

From: CFRF sea sampling

Commercial Management Measures

C. Minimum Size Tolerance

- **Option 1:** No tolerance for undersize crabs
- **Option 2:** 5% tolerance for undersize crabs
- **Option 3:** 10% tolerance for undersize crabs

Commercial Management Measures

D. Crab Part Retention

- **Option 1:** Crabs parts, such as claws, may be retained and sold in any form
- **Option 2:** Only whole crabs may be retained and sold

Commercial Management Measures

E. Prohibition on Retention of Egg-Bearing Females

- **Option 1:** No prohibition on retention of egg-bearing females.
- **Option 2:** Egg-bearing females may not be retained.
- **Option 3:** No females may be retained; 1% tolerance for females

Commercial Management Measures

F. Incidental Bycatch Limit for Non-Trap Gear

- **Option 1:** No coastwide possession limit
- **Option 2:** 200 pounds per day up to a max of 500 pounds per trip

Recreational Management Measures

A. <u>Possession Limits</u>

- **Option 1:** No coastwide possession limit
- **Option 2:** 50 (whole crabs); or 100 claw possession limit per person

Recreational Management Measures

B. Prohibition on Retention of Egg-Bearing Females

- **Option 1:** No prohibition on retention of egg-bearing females.
- **Option 2:** Egg-bearing females may not be retained.
- **Option 3:** No females may be retained; 1% tolerance for females

De Minimis Criteria

Option 1:

Commercial **or** recreational landings are less than X% of 3 year coastwide average

- *Sub-option 1a*: X = 1%
- *Sub-option 1b*: X = 2%
- *Sub-option 1c*: X = 3%

Option 2:

Combined commercial **and** recreational landings are less than X% of 3 year coastwide average

- *Sub-option 2a*: X = 1%
- *Sub-option 2b*: X = 2%
- *Sub-option 2c*: X = 3%

Public Comments on the Draft Jonah Crab FMP

Overview of Comments Received

- **May 22 – July 24, 2015**
- **12 Letters**
  - **4 Groups (NEFMC, NMFS, MLA, AOLA)**
  - **8 Individuals**
- **5 Public Hearings**
  - **ME, NH, MA, RI, MD**

Public Comments on Data Collection

Option	Hearings	Comments	Total
1. Harvester Reporting	2	1	3
2. Harvester & Dealer Reporting	9	1	10
3. Harvester & Dealer Reporting, Sea/Port Sampling	2	5	7

- **Option 2 aligns with current practices**
- **Need for increased biological sampling**
- **Non-dealer related outlets for Jonah crab**
- **100% vs. 10% harvester reporting**

Public Comments on Permits

Option	Hearings	Comments	Total
1. Status Quo	6	1	7
2. States Decide w/ Recommendation To NOAA	0	1	1
3. New Jonah Crab Permit	1	0	1
4. New Jonah Crab Permit with Trap Design	0	0	0
5. Lobster Permit or Incidental Permit	17	7	24

Option 5 prevents the proliferation of traps and helps cap effort

- **Status quo until further studies are conducted**
- **Jonah crab specific traps an issue**
- **Preserve existing levels of participation in the fishery**

Public Comments on Min Size

Option	Hearings	Comments	Total
1. No Min Size	4	1	5
2. 4”	6	1	7
3. 4.25”	0	1	1
4. 4.5”	0	1	1
5. 4.75”	0	0	0
5. 5”	12	2	14
6. 5.25”	0	1	1
8. 5.5”	1	0	1

- **5” min size will protect females**
- **4” min size supported by Area 2 fishermen**
- **Min size not needed because no market for crabs <5”**
- **Claw fishery?**

Public Comments on Size Tolerance

Option	Hearings	Comments	Total
1. No Tolerance	1	2	3
2. 5% Tolerance	13	1	14
3. 10% Tolerance	2	0	2

- **5% tolerance needed because high volume fishery**
- **10% tolerance in infancy of FMP**
- **Tolerances are not enforceable**
- **Count, volumetric standard?**

Public Comments on Crab Parts

Option	Hearings	Comments	Total
1. Crab Parts	8	1	9
2. Whole Crab Fishery	14	5	19

- **Majority favor whole crab fishery**
- **Claw harvest is sustainable**
- **Potential conservation equivalency for claw fishermen**
- **Demonstrate significant history**

Public Comments on Egg Bearing Females

Option	Hearings	Comments	Total
1. No Prohibition	1	2	3
2. No Retention of Egg-Bearing Females	18	4	22
3. No Females	1	1	2

- **Majority in favor of prohibition on egg-bearing females**
- **Concern over zero tolerance**
- **Several comment that, with correct min size, this is not needed**

Public Comments on Incidental Bycatch

Option	Hearings	Comments	Total
1. No Possession Limit	0	0	0
2. 200 lbs/day; 500 lbs/trip	13	6	19

- **Consensus that there should be a bycatch limit**
- **Count or volumetric limit**
- **1,000 pound trip limit**
- **Clarification on 'trip'**

Public Comments on Recreational Limit

Option	Hearings	Comments	Total
1. No Possession Limit	0	1	1
2. 50 Whole Crab; 100 Claw Limit	13	4	17

- **Majority support a recreational possession limit**
- **Whole crab only**
- **Too small for management**

Public Comment on Rec Egg-Bearing Females

Option	Hearings	Comment	Total
1. No Prohibition	0	1	1
2. Prohibition on Egg-Bearers	21	2	23
3. No Females	0	1	1

- **Support for prohibition on egg-bearing females**
- **Mimic regulations in commercial sector**
- **Min size needed for recreational fishery**

De Minimis Criteria

Option	Hearings	Comments	Total
1. Separate Com & Rec	6	0	6
2. Combined Com & Rec	2	2	4

- **No clear consensus**
- **1% from groups, 3% from fishermen**
- **How does claw fishery fit in?**

Other Comments

- There should be limits on the number of traps or total catch
- FMP needs to include MPAs, TAC, and rights based management
- The fishery is under-utilized and we should not be limiting effort
- Need to have area management
- The Jonah crab fishery is primarily in federal waters and should be jointly managed with NEFMC.
- The Board should recognize the baited drop trap in the Jonah Crab FMP
- Escape vent specifications

Questions?

Advisory Panel Recommendations

August 4, 2015

Data Collection and Permits

- **Harvest and dealer reporting along with port and sea sampling (Option 3)**
- **Require lobster permit or incidental permit to participate in Jonah crab fishery (Option 5)**

- **Consensus not reached**
  - **–4.75” min size with a tolerance**
  - **–4.75” min size with no tolerance**
  - **–4.5” min size with no tolerance**
  - **–4.5” min size with 5% tolerance**

Crab Part Retention

- **Proposed a third option to maintain status quo**
  - **–Those in claw fishery can continue to fish**
  - **–Create a maximum claw count**

- **Prohibition on the retention of egg-bearing females (Option 2)**
- **Institute a bycatch limit (Option 2)**
  - **–200 crabs/day**
  - **–500 crabs/trip**

Recreational Measures

- **Support recreational possession limit (Option 2)**
  - **50 whole crabs only**
- **Prohibition on the retention of egg-bearing females (Option 2)**

Questions?

Law Enforcement Committee Comments

Draft Jonah Crab FMP

August 4, 2015

LEC Review Process

- Subcommittee conducted field visit to crab facility
- LEC held conference call and reviewed management options
- Memorandum submitted for this meeting

Commercial Management

- Permits issued only for lobster permit holders
- 4.75-inch minimum size
- No size tolerance for undersized crabs
- Only whole crabs for retention and sale
- No retention of egg-bearing females
- Bycatch limit of 200lb/day up to 500lb/trip

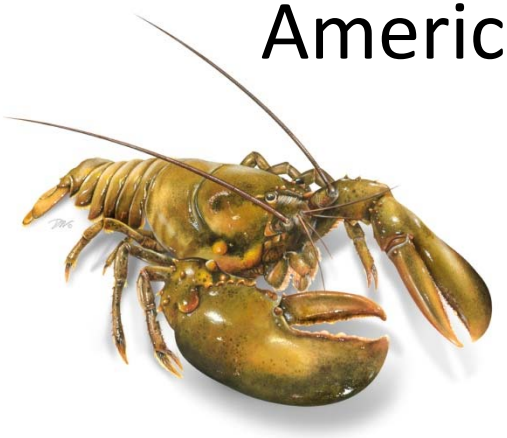
Recreational Management

- Supports 50-whole-crab limit
  - Additionally recommend a minimum size limit matching the commercial minimum size
  - No possession of parts or claws consistent with commercial restriction
- No retention of egg-bearing females

Lobster Trap Transfer Database Update

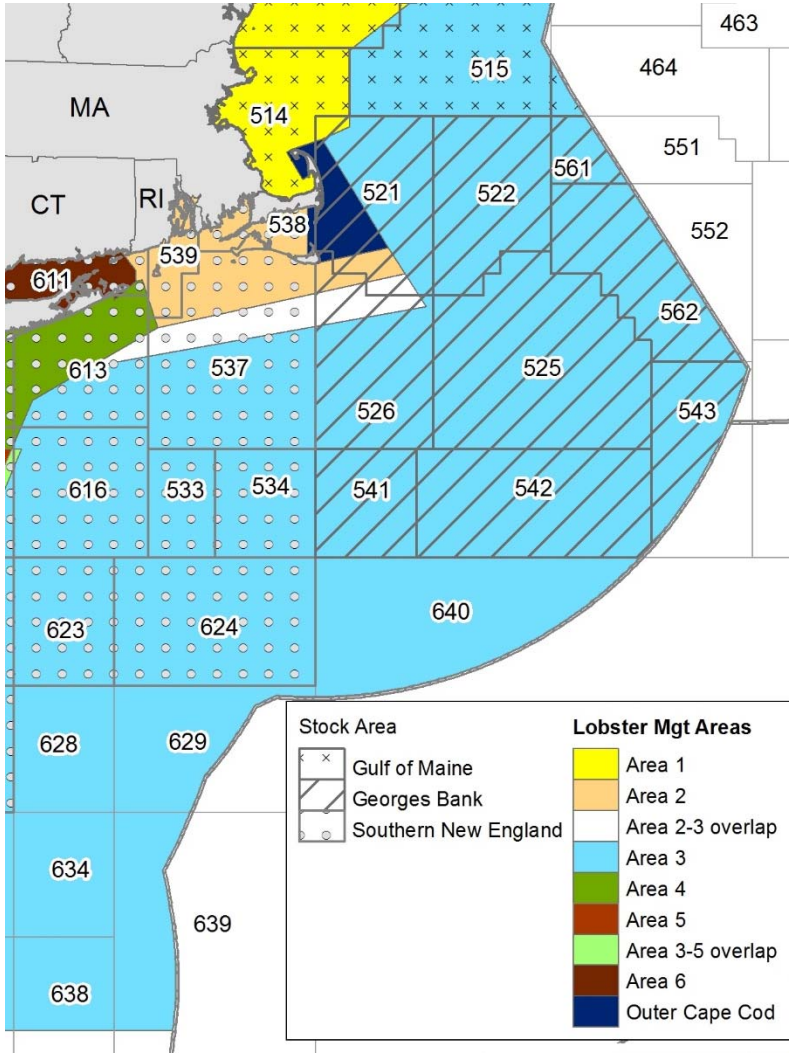
American Lobster Management Board

August 4, 2015



Program Overview

- **Issue: No centralized database to track changes in allocations**
- **Goals:**
  - **Track allocations across jurisdictions**
  - **Help agencies make informed decisions**
- **LCMA 2, 3, and Outer Cape Cod**

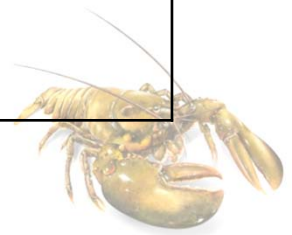


Program Status

- **Trap Transfer Program will be ready for transfers affecting the 2016 fishing season**
- **Features**
  - **Bank Statement**
  - **Transaction Receipt**
  - **Limited ability to undo transactions**
- **Phase I**

Timeline

July 2015	Program in test mode
August 1 – September 30, 2015	Applications to transfer traps
October – December 2015	NMFS and states finalize transfer transactions
May 1, 2016	Revised allocations effective



Notification

- Federal Register Notice June 4, 2015
- NOAA sent letter to federal permit holders
- Asked states to send a letter to state permit holders

Questions?