American Lobster Data Update

American Lobster Management Board
October 18, 2021

Background

- 2020 Lobster Assessment recommended an annual data update process to monitor changes in stock abundance
- Update survey indicators since assessment
- Data sets chosen indicate trends in exploitable lobster abundance expected in near term
  - YOY settlement
  - Trawl Survey (71-80mm and encounter rate)
  - Ventless Trap Survey (53+ mm)

Indicator Status

- Each indicator compared relative to percentiles of assessment time series to determine status
  - Negative, neutral, or positive
- Five year means compared
  - 2020 Assessment terminal indicator status (2014-2018)
  - Updated indicator status (2016-2020)

Indicator	< 25th percentile	Between 25th and 75th percentile	> 75th percentile
YOY settlement (larval or YOY)	Negative	Neutral	Positive
Trawl survey recruit abundance	Negative	Neutral	Positive
Trawl survey encounter rate	Negative	Neutral	Positive
Ventless trap survey abundance	Negative	Neutral	Positive

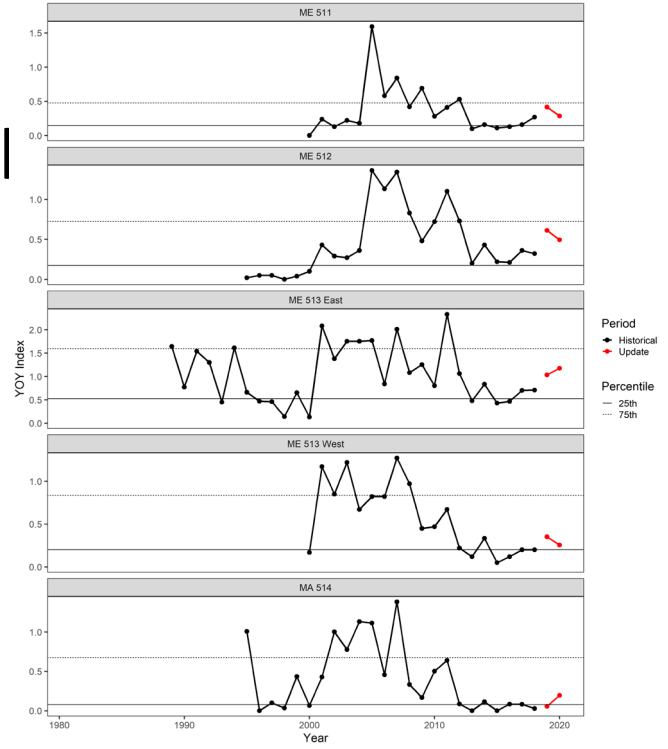
Covid-19 Impact

- Covid-19 pandemic prevented multiple trawl surveys from sampling
- Missing data impacts 5 year means used for updated indicator status

GOM YOY

YOUNG-OF-YEAR INDICES					
Survey	*ME*				*MA*
	511	*512*	*513 East*	*513 West*	*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		1.01
1996		0.05	0.47		0.00
1997		0.05	0.46		0.10
1998		0.00	0.14		0.03
1999		0.04	0.65		0.43
2000	0.00	0.10	0.13	0.17	0.07
2001	0.24	0.43	2.08	1.17	0.43
2002	0.13	0.29	1.38	0.85	1.00
2003	0.22	0.27	1.75	1.22	0.78
2004	0.18	0.36	1.75	0.67	1.13
2005	1.59	1.36	1.77	0.82	1.11
2006	0.58	1.13	0.84	0.82	0.46
2007	0.84	1.34	2.01	1.27	1.38
2008	0.42	0.83	1.08	0.97	0.33
2009	0.69	0.48	1.25	0.45	0.17
2010	0.28	0.72	0.80	0.47	0.50
2011	0.41	1.10	2.33	0.67	0.64
2012	0.53	0.73	1.06	0.22	0.09
2013	0.10	0.20	0.48	0.12	0.00
2014	0.16	0.43	0.83	0.33	0.11
2015	0.11	0.22	0.43	0.05	0.00
2016	0.13	0.21	0.47	0.12	0.08
2017	0.16	0.36	0.70	0.20	0.08
2018	0.27	0.32	0.71	0.20	0.03
2014-2018 mean	0.17	0.31	0.63	0.18	0.06
2019	0.42	0.61	1.03	0.35	0.06
2020	0.29	0.49	1.17	0.25	0.19
2016-2020 mean	0.25	0.40	0.82	0.23	0.09
25th	0.15	0.18	0.52	0.20	0.08
median	0.24	0.34	0.84	0.47	0.25
75th	0.48	0.72	1.59	0.84	0.67

- YOY indices showed improvements, but not positive
  - Assessment status
    - 2 negative, 3 neutral
  - Updated status
    - 5 indices neutral



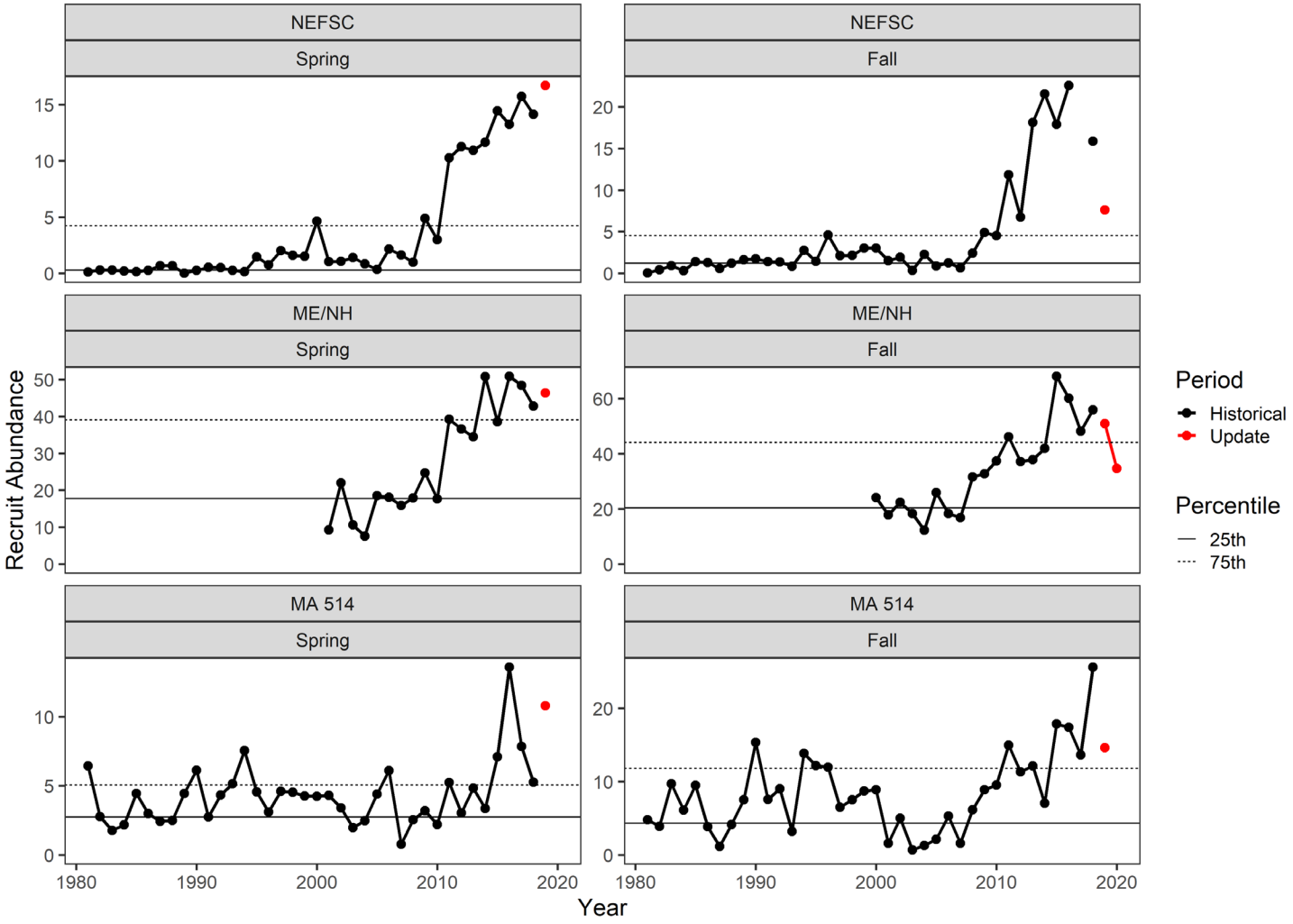
GOM Trawl Survey: Recruits

RECRUIT ABUNDANCE (SURVEY)						
Abundance of lobsters 71 - 80 mm CL (sexes combined)						
Survey	*NEFSC*		*ME/NH*		*MA 514*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.13	0.06			6.43	4.80
1982	0.29	0.42			2.77	3.89
1983	0.28	0.90			1.77	9.71
1984	0.20	0.31			2.17	6.13
1985	0.14	1.41			4.44	9.50
1986	0.27	1.29			2.99	3.83
1987	0.67	0.57			2.42	1.17
1988	0.67	1.21			2.50	4.14
1989	0.00	1.61			4.45	7.53
1990	0.27	1.76			6.12	15.36
1991	0.55	1.41			2.74	7.55
1992	0.50	1.37			4.32	9.01
1993	0.25	0.86			5.14	3.20
1994	0.15	2.75			7.54	13.87
1995	1.45	1.44			4.55	12.18
1996	0.76	4.59			3.11	11.96
1997	2.02	2.12			4.59	6.48
1998	1.59	2.16			4.52	7.54
1999	1.51	3.01			4.25	8.73
2000	4.64	3.01		24.09	4.25	8.89
2001	1.05	1.51	9.28	17.81	4.31	1.59
2002	1.08	1.91	22.00	22.41	3.41	5.00
2003	1.41	0.36	10.65	18.32	1.96	0.67
2004	0.84	2.26	7.55	12.29	2.47	1.30
2005	0.34	0.87	18.51	25.90	4.40	2.12
2006	2.17	1.27	18.07	18.30	6.09	5.29
2007	1.62	0.64	15.91	16.82	0.77	1.58
2008	0.99	2.41	17.88	31.61	2.54	6.14
2009	4.88	4.90	24.72	32.67	3.20	8.91
2010	2.98	4.53	17.66	37.35	2.20	9.53
2011	10.27	11.83	39.25	46.09	5.24	14.98
2012	11.25	6.74	36.55	37.12	3.03	11.35
2013	10.93	18.12	34.50	37.86	4.82	12.16
2014	11.66	21.54	50.79	41.95	3.35	7.05
2015	14.44	17.89	38.51	67.99	7.09	17.86
2016	13.25	22.54	50.83	60.07	13.58	17.41
2017	15.74		48.42	48.13	7.85	13.63
2018	14.15	15.87	42.77	55.84	5.25	25.62
2014-2018 mean	13.84	19.46	46.27	54.80	7.43	16.31
2019	16.69	7.62	46.37	50.85	10.78	14.61
2020				34.65		
2016-2020 mean	14.95	15.34	47.10	49.91	9.37	17.82
25th	0.30	1.21	17.72	20.36	2.75	4.30
median	1.07	1.76	23.36	32.67	4.28	7.55
75th	4.23	4.53	39.07	44.02	5.06	11.81

- Trawl Survey indices showed positive conditions with no status change from assessment
- 5 of 6 surveys not completed in 2020, but first neutral value since 2015 was observed in Fall 2020 ME/NH Survey
- Fall indicators show a declining trend

GOM Trawl Survey: Recruits

- Fall indicators show a declining trend
- No data in Spring 2020



GOM Trawl Survey: Encounter

SURVEY LOBSTER ENCOUNTER RATE Proportion of postive tows						
Survey	NEFSC		ME/NH		MA 514	
	Spring	Fall	Spring	Fall	Spring	Fall
1981	0.44	0.25			0.86	0.73
1982	0.34	0.18			0.50	0.70
1983	0.26	0.33			0.76	0.76
1984	0.28	0.36			0.76	0.76
1985	0.38	0.49			0.71	0.67
1986	0.33	0.47			0.68	0.83
1987	0.43	0.24			0.85	0.54
1988	0.31	0.30			0.76	0.58
1989	0.19	0.35			0.78	0.95
1990	0.41	0.32			0.86	0.95
1991	0.42	0.32			0.87	0.94
1992	0.40	0.24			0.93	0.77
1993	0.41	0.39			0.97	0.82
1994	0.45	0.40			1.00	0.93
1995	0.41	0.37			0.93	0.93
1996	0.54	0.54			0.91	0.96
1997	0.64	0.35			0.93	0.86
1998	0.52	0.40			0.76	0.69
1999	0.51	0.42			0.73	0.91
2000	0.63	0.42		0.94	0.93	0.98
2001	0.57	0.40	0.88	0.86	0.93	0.72
2002	0.75	0.53	0.94	0.95	0.91	0.73
2003	0.69	0.44	0.92	0.85	0.82	0.55
2004	0.87	0.31	0.89	0.86	0.84	0.56
2005	0.77	0.36	0.95	0.91	0.95	0.67
2006	0.72	0.60	0.93	0.93	0.91	0.88
2007	0.72	0.43	0.97	0.85	0.51	0.54
2008	0.84	0.49	0.92	0.86	0.83	0.75
2009	0.82	0.63	0.98	0.92	0.89	0.87
2010	0.85	0.75	0.98	0.96	0.87	0.98
2011	0.83	0.74	0.99	0.96	0.89	0.85
2012	0.86	0.78	0.98	0.98	0.91	0.95
2013	0.87	0.73	1.00	0.93	0.96	0.96
2014	0.90	0.71	1.00	0.99	0.79	0.96
2015	0.93	0.69	1.00	0.96	0.98	0.95
2016	0.94	0.75	1.00	0.96	0.96	0.97
2017	0.86		0.99	0.94	0.84	0.98
2018	0.86	0.71	0.98	0.96	0.84	0.90
2014-2018 mean	0.90	0.72	0.99	0.96	0.88	0.95
2019	0.83	0.71	0.99	0.95	0.85	0.93
2020				0.96		
2016-2020 mean	0.87	0.72	0.99	0.95	0.87	0.94
25th	0.41	0.35	0.93	0.89	0.78	0.72
median	0.60	0.42	0.98	0.94	0.86	0.86
75th	0.84	0.60	0.99	0.96	0.93	0.95

- Encounter rates remain high and similar to assessment, but some deterioration
  - Assessment status
    - 5 positive, 1 neutral
  - Updated status
    - 3 positive, 3 neutral

Ventless Trap Survey

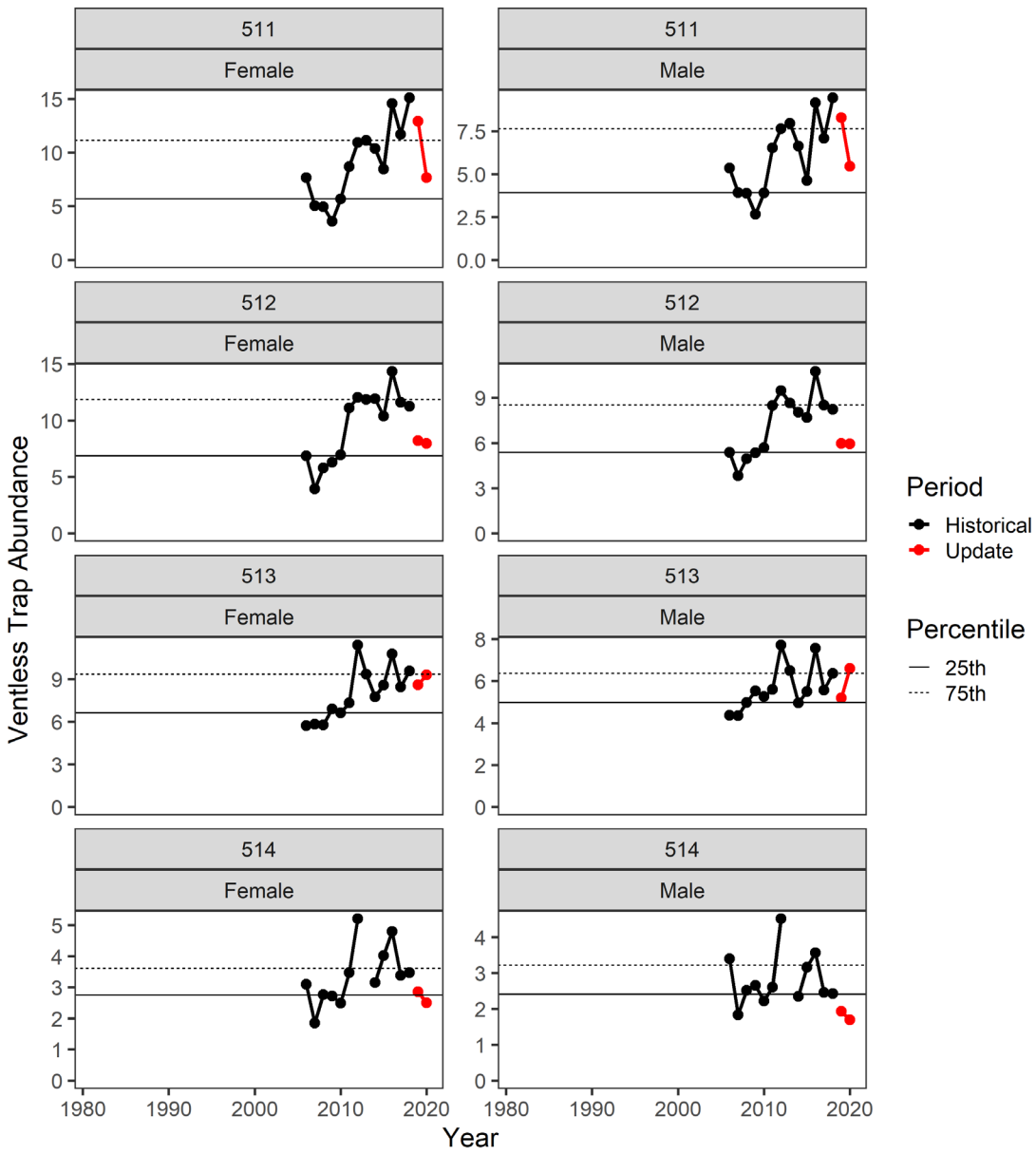
- VTS was not a stock indicator in previous assessments b/c surveys started more recently
  - Appropriate here to show changes since the assessment
- Model based VTS index is stockwide
  - Used in the assessment
  - Not evaluated for estimating indices by statistical area
- Design based VTS indices presented here by statistical areas to provide greater spatial resolution to examine abundance trends within the stock boundary

GOM Ventless Trap Survey

VENTLESS TRAP ABUNDANCE Abundance of lobsters ≥ 53 mm CL								
Survey	*511*		*512*		*513*		*514*	
	Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*
1981								
1982								
1983								
1984								
1985								
1986								
1987								
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								
2001								
2002								
2003								
2004								
2005								
2006	7.65	5.34	6.87	5.38	5.73	4.37	3.10	3.40
2007	5.06	3.91	3.95	3.83	5.82	4.35	1.85	1.84
2008	4.94	3.87	5.78	4.95	5.78	4.97	2.77	2.51
2009	3.60	2.65	6.31	5.35	6.89	5.53	2.72	2.66
2010	5.66	3.90	6.95	5.69	6.61	5.27	2.49	2.22
2011	8.70	6.52	11.10	8.48	7.32	5.60	3.47	2.60
2012	10.95	7.64	12.06	9.47	11.40	7.72	5.21	4.52
2013	11.14	7.95	11.87	8.64	9.36	6.49		
2014	10.38	6.63	11.92	8.04	7.74	4.96	3.15	2.35
2015	8.47	4.63	10.39	7.70	8.57	5.50	4.01	3.16
2016	14.59	9.15	14.34	10.75	10.78	7.56	4.79	3.56
2017	11.69	7.07	11.61	8.52	8.46	5.56	3.38	2.45
2018	15.10	9.43	11.26	8.23	9.57	6.37	3.47	2.43
2014-2018 mean	12.05	7.38	11.90	8.65	9.02	5.99	3.76	2.79
2019	12.93	8.27	8.23	5.96	8.59	5.20	2.85	1.93
2020	7.65	5.44	7.95	5.95	9.29	6.61	2.50	1.69
2016-2020 mean	12.39	7.87	10.68	7.88	9.34	6.26	3.40	2.41
25th	5.66	3.91	6.87	5.38	6.61	4.97	2.76	2.41
median	8.70	6.52	11.10	8.04	7.74	5.53	3.27	2.56
75th	11.14	7.64	11.87	8.52	9.36	6.37	3.61	3.22

- VTS indices showed declines since assessment
  - Assessment status
    - 4 positive, 4 neutral
  - Updated status
    - 2 positive, 6 neutral

GOM Ventless Trap Survey



- VTS indices showed declines since assessment
- 514 observed first negative values since 2014
- 511 and 512 also show a declining trend

GBK Trawl Survey

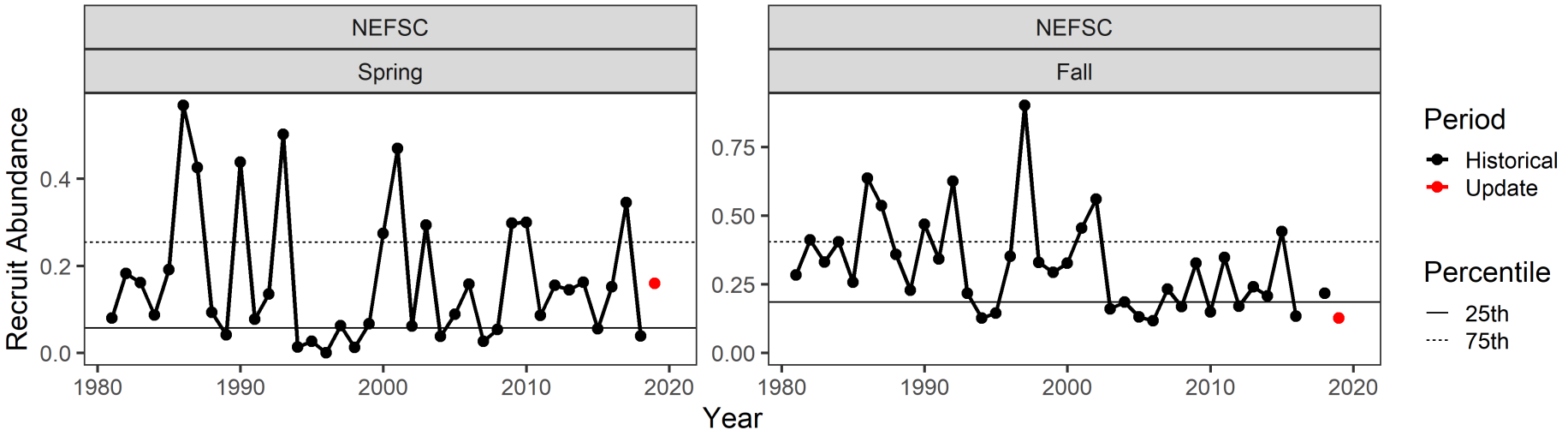
RECRUIT ABUNDANCE (SURVEY)		
Abundance of lobsters 71 - 80 mm CL (sexes combined)		
Survey	*NEFSC*	
	Spring	*Fall*
1981	0.08	0.28
1982	0.18	0.41
1983	0.16	0.33
1984	0.09	0.40
1985	0.19	0.26
1986	0.57	0.64
1987	0.43	0.54
1988	0.09	0.36
1989	0.04	0.23
1990	0.44	0.47
1991	0.08	0.34
1992	0.13	0.62
1993	0.50	0.22
1994	0.01	0.13
1995	0.03	0.14
1996	0.00	0.35
1997	0.06	0.90
1998	0.01	0.33
1999	0.07	0.29
2000	0.27	0.33
2001	0.47	0.45
2002	0.06	0.56
2003	0.29	0.16
2004	0.04	0.18
2005	0.09	0.13
2006	0.16	0.12
2007	0.03	0.23
2008	0.05	0.17
2009	0.30	0.33
2010	0.30	0.15
2011	0.09	0.35
2012	0.15	0.17
2013	0.14	0.24
2014	0.16	0.21
2015	0.06	0.44
2016	0.15	0.13
2017	0.35	
2018	0.04	0.22
2014-2018 mean	0.15	0.25
2019	0.16	0.13
2020		
2016-2020 mean	0.17	0.16
25th	0.06	0.18
median	0.11	0.29
75th	0.25	0.40

SURVEY LOBSTER ENCOUNTER RATE		
Proportion of postive tows		
Survey	*NEFSC*	
	Spring	*Fall*
1981	0.23	0.52
1982	0.23	0.43
1983	0.18	0.38
1984	0.12	0.34
1985	0.19	0.35
1986	0.27	0.36
1987	0.18	0.35
1988	0.34	0.40
1989	0.14	0.38
1990	0.18	0.44
1991	0.19	0.45
1992	0.26	0.49
1993	0.22	0.36
1994	0.11	0.38
1995	0.14	0.42
1996	0.16	0.40
1997	0.10	0.48
1998	0.10	0.40
1999	0.16	0.58
2000	0.23	0.41
2001	0.23	0.49
2002	0.29	0.55
2003	0.27	0.44
2004	0.18	0.53
2005	0.16	0.58
2006	0.24	0.54
2007	0.26	0.46
2008	0.29	0.55
2009	0.34	0.54
2010	0.38	0.62
2011	0.30	0.69
2012	0.35	0.57
2013	0.33	0.65
2014	0.37	0.61
2015	0.27	0.59
2016	0.45	0.55
2017	0.40	
2018	0.29	0.59
2014-2018 mean	0.36	0.58
2019	0.36	0.57
2020		
2016-2020 mean	0.37	0.57
25th	0.18	0.40
median	0.23	0.48
75th	0.29	0.55

- No indicators available for 2020
- Recruit Abundance
  - Assessment status
    - both neutral
  - Updated status
    - 1 neutral, 1 negative
- Encounter rates similar to assessment
  - both positive

GBK Trawl Survey

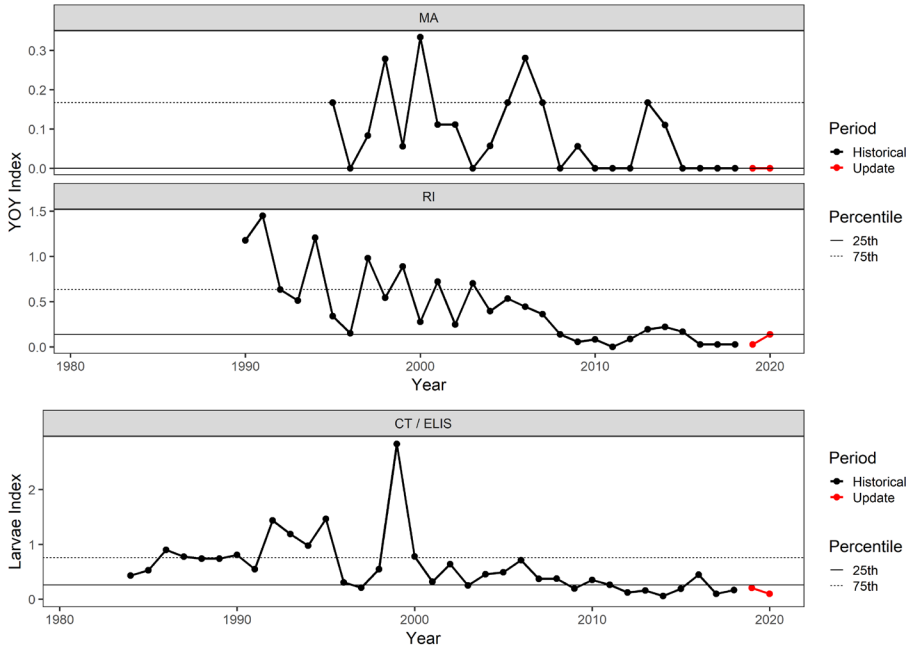
- Recruit indicators show high interannual variability
- GBK recruits shows potential for deterioration in the Fall 2019



SNE YOY

YOUNG-OF-YEAR INDICES			
Survey	*MA*	*RI*	*CT / ELIS Larvae*
1981			
1982			
1983			
1984			0.43
1985			0.53
1986			0.90
1987			0.78
1988			0.74
1989			0.74
1990		1.18	0.81
1991		1.45	0.55
1992		0.63	1.44
1993		0.51	1.19
1994		1.21	0.98
1995	0.17	0.34	1.46
1996	0.00	0.15	0.31
1997	0.08	0.98	0.21
1998	0.28	0.54	0.55
1999	0.06	0.89	2.83
2000	0.33	0.28	0.78
2001	0.11	0.72	0.32
2002	0.11	0.25	0.64
2003	0.00	0.70	0.25
2004	0.06	0.40	0.45
2005	0.17	0.54	0.49
2006	0.28	0.44	0.71
2007	0.17	0.36	0.37
2008	0.00	0.14	0.37
2009	0.06	0.06	0.19
2010	0.00	0.08	0.35
2011	0.00	0.00	0.26
2012	0.00	0.09	0.12
2013	0.17	0.19	0.16
2014	0.11	0.22	0.06
2015	0.00	0.17	0.19
2016	0.00	0.03	0.45
2017	0.00	0.03	0.10
2018	0.00	0.03	0.17
2014-2018 mean	0.02	0.09	0.19
2019	0.00	0.03	0.21
2020	0.00	0.14	0.10
2016-2020 mean	0.00	0.05	0.20
25th	0.00	0.14	0.26
median	0.06	0.34	0.45
75th	0.17	0.63	0.76

- YOY indices negative across the stock
  - Assessment status
    - 2 negative, 1 neutral
  - Updated status
    - all indices negative



SNE Trawl Survey: Recruits

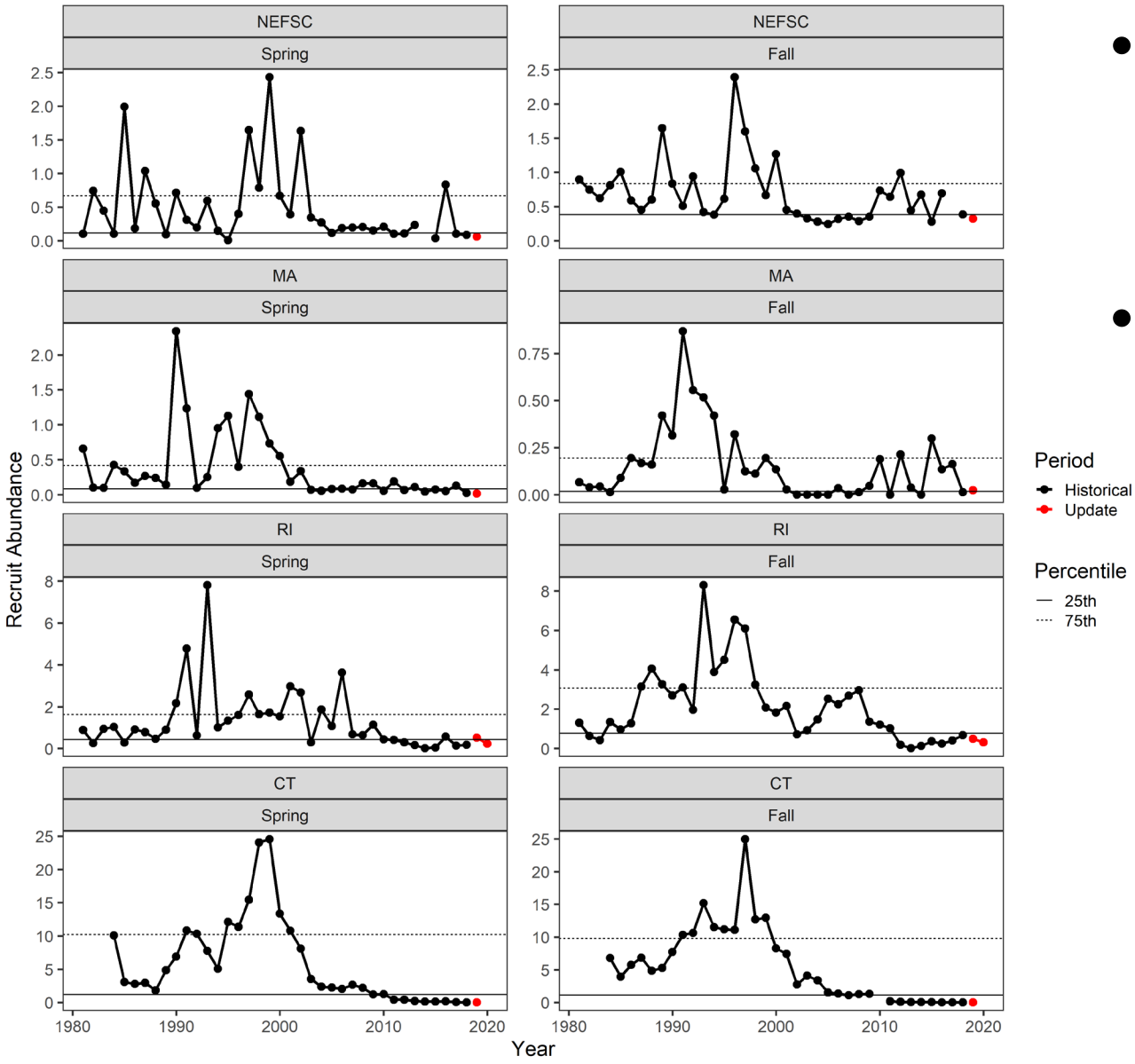
RECRUIT ABUNDANCE (SURVEY)								
Abundance of lobsters 71 - 80 mm CL (sexes combined)								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.10	0.89	0.66	0.07	0.89	1.31		
1982	0.74	0.74	0.10	0.04	0.26	0.64		
1983	0.45	0.62	0.10	0.04	0.94	0.43		
1984	0.10	0.81	0.42	0.01	1.03	1.35	10.09	6.80
1985	1.99	1.01	0.33	0.09	0.28	0.97	3.08	3.93
1986	0.18	0.59	0.17	0.19	0.91	1.28	2.77	5.76
1987	1.04	0.45	0.27	0.17	0.79	3.14	2.93	6.86
1988	0.55	0.60	0.24	0.16	0.47	4.05	1.85	4.88
1989	0.09	1.65	0.14	0.42	0.90	3.26	4.86	5.28
1990	0.71	0.83	2.34	0.32	2.17	2.69	6.89	7.74
1991	0.31	0.51	1.23	0.87	4.77	3.10	10.83	10.32
1992	0.19	0.94	0.10	0.55	0.62	1.97	10.31	10.65
1993	0.59	0.42	0.25	0.52	7.81	8.29	7.78	15.18
1994	0.15	0.38	0.95	0.42	1.00	3.88	5.07	11.51
1995	0.01	0.61	1.13	0.03	1.33	4.50	12.13	11.20
1996	0.40	2.39	0.40	0.32	1.60	6.55	11.37	11.08
1997	1.64	1.60	1.44	0.12	2.58	6.10	15.42	24.99
1998	0.78	1.06	1.11	0.11	1.63	3.24	24.06	12.72
1999	2.43	0.66	0.73	0.19	1.71	2.07	24.57	12.96
2000	0.67	1.27	0.55	0.13	1.54	1.83	13.37	8.27
2001	0.39	0.45	0.18	0.03	2.97	2.17	10.77	7.41
2002	1.63	0.39	0.34	0.00	2.68	0.73	8.07	2.75
2003	0.34	0.33	0.07	0.00	0.29	0.93	3.52	4.08
2004	0.27	0.28	0.05	0.00	1.86	1.48	2.38	3.37
2005	0.11	0.24	0.08	0.00	1.07	2.53	2.26	1.54
2006	0.19	0.32	0.09	0.03	3.63	2.24	2.02	1.38
2007	0.19	0.35	0.07	0.00	0.68	2.68	2.65	1.12
2008	0.21	0.29	0.16	0.01	0.64	2.95	2.20	1.27
2009	0.15	0.35	0.16	0.05	1.14	1.36	1.20	1.33
2010	0.21	0.73	0.05	0.19	0.44	1.21	1.26	
2011	0.10	0.64	0.19	0.00	0.42	1.02	0.43	0.18
2012	0.11	0.99	0.06	0.21	0.30	0.18	0.44	0.08
2013	0.23	0.44	0.11	0.04	0.16	0.02	0.23	0.06
2014		0.67	0.04	0.00	0.02	0.14	0.15	0.05
2015	0.03	0.28	0.07	0.30	0.05	0.37	0.15	0.06
2016	0.83	0.69	0.05	0.13	0.57	0.25	0.16	0.00
2017	0.10		0.13	0.16	0.14	0.41	0.03	0.00
2018	0.08	0.38	0.02	0.01	0.18	0.68	0.00	0.01
2014-2018 mean	0.26	0.51	0.06	0.12	0.19	0.37	0.10	0.03
2019	0.06	0.32	0.01	0.02	0.52	0.50	0.03	0.00
2020					0.23	0.32		
2016-2020 mean	0.27	0.47	0.05	0.08	0.33	0.43	0.06	0.00
25th	0.11	0.38	0.08	0.02	0.42	0.78	1.23	1.16
median	0.23	0.61	0.16	0.10	0.91	1.65	2.93	4.48
75th	0.67	0.83	0.42	0.19	1.62	3.07	10.20	9.81

- 6 of 8 surveys not completed in 2020
- Recruit indicators showed neutral conditions offshore and negative inshore, similar to assessment

➢ Status similar to assessment

  – 3 neutral and 5 negative

SNE Trawl Survey: Recruits



- Both offshore indicators were negative in 2019
- All inshore areas remain low

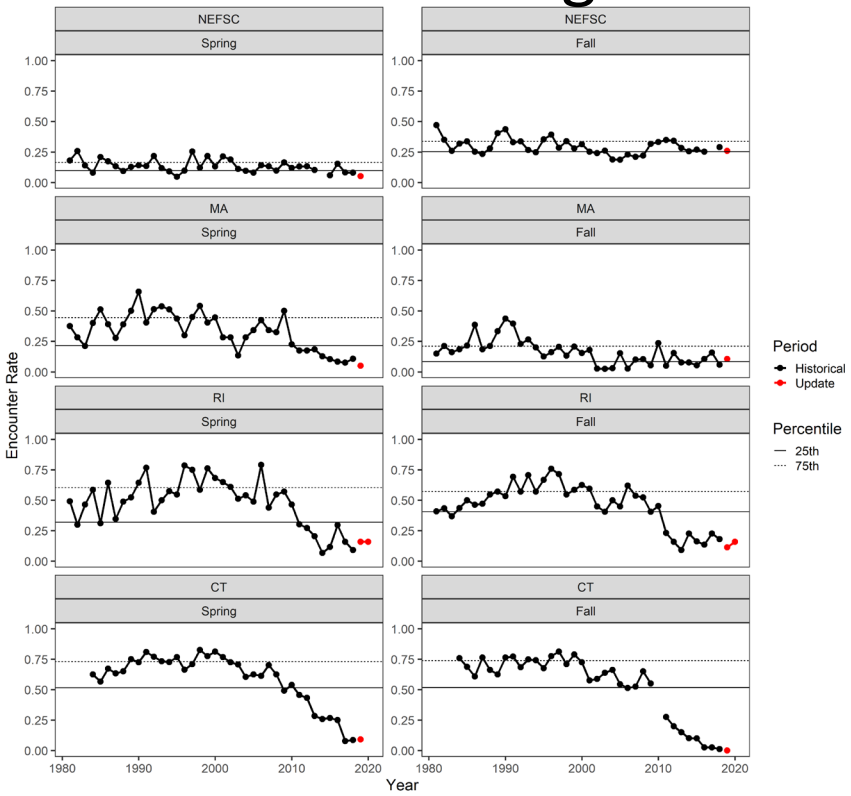
SNE Trawl Survey: Encounter

SURVEY LOBSTER ENCOUNTER RATE Proportion of postive tows								
Survey	*NEFSC*		*MA*		*RI*		*CT*	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
1981	0.18	0.47	0.38	0.15	0.49	0.41		
1982	0.26	0.35	0.28	0.21	0.30	0.43		
1983	0.14	0.26	0.21	0.16	0.46	0.37		
1984	0.08	0.32	0.40	0.18	0.59	0.44	0.63	0.76
1985	0.21	0.34	0.51	0.22	0.31	0.50	0.57	0.69
1986	0.17	0.25	0.39	0.39	0.64	0.46	0.67	0.61
1987	0.13	0.23	0.28	0.18	0.35	0.47	0.63	0.76
1988	0.09	0.28	0.39	0.21	0.49	0.55	0.65	0.66
1989	0.13	0.40	0.50	0.33	0.52	0.57	0.75	0.63
1990	0.14	0.44	0.66	0.44	0.64	0.53	0.73	0.76
1991	0.14	0.33	0.41	0.40	0.77	0.69	0.81	0.77
1992	0.22	0.34	0.51	0.23	0.40	0.57	0.77	0.68
1993	0.12	0.27	0.54	0.27	0.50	0.71	0.73	0.75
1994	0.09	0.25	0.51	0.20	0.58	0.57	0.73	0.74
1995	0.05	0.35	0.44	0.13	0.55	0.67	0.77	0.68
1996	0.10	0.39	0.30	0.16	0.79	0.76	0.66	0.78
1997	0.25	0.28	0.45	0.21	0.75	0.71	0.71	0.81
1998	0.12	0.34	0.54	0.13	0.59	0.55	0.83	0.71
1999	0.22	0.28	0.41	0.21	0.76	0.59	0.78	0.79
2000	0.13	0.31	0.45	0.15	0.68	0.63	0.81	0.73
2001	0.21	0.25	0.28	0.18	0.65	0.60	0.77	0.58
2002	0.19	0.24	0.28	0.03	0.61	0.45	0.73	0.59
2003	0.11	0.26	0.14	0.03	0.51	0.40	0.71	0.64
2004	0.10	0.19	0.28	0.03	0.54	0.50	0.61	0.66
2005	0.08	0.19	0.34	0.15	0.49	0.45	0.63	0.54
2006	0.14	0.23	0.43	0.03	0.79	0.62	0.61	0.51
2007	0.13	0.21	0.34	0.10	0.44	0.54	0.70	0.53
2008	0.10	0.22	0.33	0.10	0.55	0.52	0.63	0.65
2009	0.17	0.32	0.50	0.05	0.57	0.40	0.49	0.55
2010	0.12	0.33	0.23	0.24	0.47	0.45	0.54	
2011	0.13	0.35	0.18	0.05	0.30	0.23	0.46	0.28
2012	0.13	0.34	0.18	0.15	0.27	0.16	0.43	0.20
2013	0.10	0.28	0.18	0.08	0.20	0.09	0.28	0.15
2014		0.26	0.13	0.08	0.07	0.23	0.26	0.10
2015	0.06	0.27	0.10	0.05	0.12	0.16	0.27	0.10
2016	0.15	0.25	0.08	0.11	0.30	0.14	0.25	0.03
2017	0.08		0.08	0.16	0.16	0.23	0.08	0.03
2018	0.08	0.29	0.11	0.06	0.09	0.18	0.09	0.01
2014-2018 mean	0.09	0.27	0.10	0.09	0.15	0.19	0.19	0.05
2019	0.05	0.26	0.05	0.11	0.16	0.11	0.09	0.00
2020					0.16	0.16		
2016-2020 mean	0.09	0.27	0.08	0.11	0.17	0.16	0.13	0.02
25th	0.10	0.25	0.21	0.08	0.32	0.40	0.52	0.52
median	0.13	0.28	0.34	0.16	0.51	0.49	0.65	0.64
75th	0.17	0.34	0.44	0.21	0.60	0.57	0.73	0.74

- 6 of 8 surveys not completed in 2020

➢ Status similar to assessment

  – 2 neutral and 6 negative



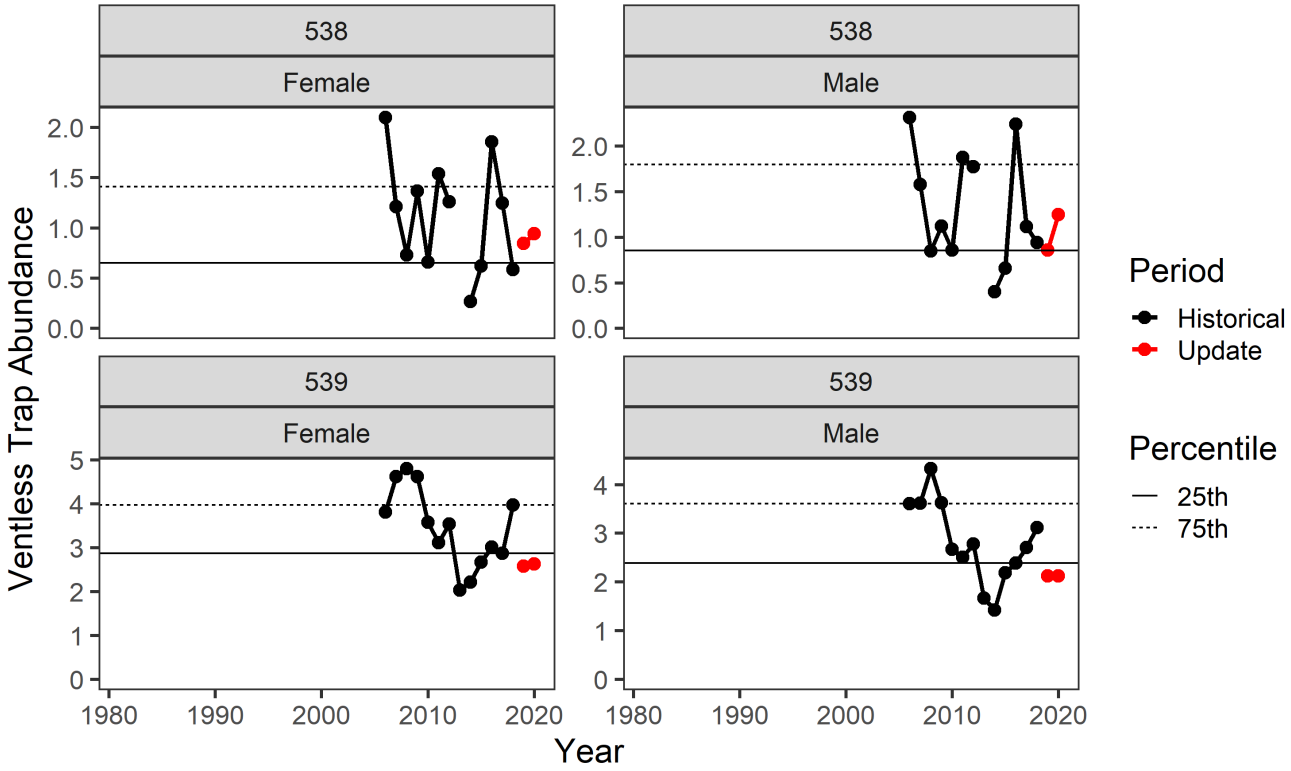
SNE Ventless Survey

VENTLESS TRAP ABUNDANCE Abundance of lobsters ≥ 53 mm CL				
Survey	*538*		*539*	
	Female	*Male*	*Female*	*Male*
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004				
2005				
2006	2.10	2.31	3.81	3.60
2007	1.21	1.58	4.61	3.61
2008	0.73	0.85	4.80	4.32
2009	1.37	1.12	4.61	3.62
2010	0.66	0.86	3.57	2.67
2011	1.54	1.88	3.11	2.50
2012	1.26	1.77	3.53	2.77
2013			2.03	1.67
2014	0.27	0.40	2.22	1.42
2015	0.62	0.66	2.66	2.18
2016	1.85	2.24	3.01	2.38
2017	1.25	1.11	2.86	2.71
2018	0.58	0.94	3.97	3.12
2014-2018 mean	0.91	1.07	2.94	2.36
2019	0.84	0.86	2.57	2.12
2020	0.94	1.25	2.63	2.12
2016-2020 mean	1.09	1.28	3.01	2.49
25th	0.65	0.85	2.86	2.38
median	1.23	1.12	3.53	2.71
75th	1.41	1.80	3.97	3.60

- VTS indices showed similar status to assessment
  - ➢ Assessment status
    - 1 negative, 3 neutral
  - ➢ Updated status
    - All 4 neutral
- Note: SNE VTS has only taken place during depleted stock conditions in an adverse environmental regime, so interannual variability can be misleading without the context of a longer time series with varying stock conditions

SNE Ventless Survey

- While updated 5 year mean was neutral, both 2019 and 2020 values in 539 were negative



Conclusions

- Lack of 2020 trawl survey data is problematic
- With limited data, uncertain conclusions, but some evidence for declines
  - GOM – declining trends in recruitment in both fall trawl surveys and VTS
  - GBK – highly variable
  - SNE – continued negative conditions inshore and neutral conditions offshore

Questions?

Update on Development of Draft Addendum XXVII: GOM/GBK Resiliency

American Lobster Management Board
October 18, 2021

Outline

1. Background
2. Update on action timeline
3. Technical Committee recommendations
4. PDT recommendations for management options
5. PDT request for Board guidance

Background

- August 2017: Board initiated Draft Addendum XXVII to increase the resiliency of the GOM/GBK stock
  - Focus on standardizing measures across LCMAs
- Work on Atlantic Right Whale issues prioritized over Draft Addendum XXVII
- Following 2020 benchmark assessment, Board reinitiated work on Addendum XXVII
- February 2021 Board motion:

  "Move to re-initiate PDT and TC work on the Gulf of Maine resiliency addendum. The addendum should focus on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the GOM/GBK stock."

Background

- Board provided guidance:
  - Prioritize increasing biological resiliency over standardizing measures across LCMAs
  - Consider a tiered approach to trigger levels
  - Include relatively conservative trigger levels to maintain the current abundance regime
- May-September 2021: TC provided analyses and PDT continued developing draft options

Background

- PDT has struggled to develop appropriate management options
  - Inconsistencies between Board motion, Board guidance, TC advice
  - Different perspectives among PDT members
- PDT is requesting additional guidance to move forward with finalizing the addendum for public comment

Updated Action Timeline

May-Sept 2021	TC Analysis and PDT development of Draft Addendum options
→October 2021	**Board meeting to review PDT recommendations**
Nov-Dec 2021	PDT finalizes Draft Addendum XXVII for public comment
January 2022	Board considers Draft Addendum XXVII for public comment
February 2022	Public Hearings and Comment Period
May 2022	Consider final approval of Draft Addendum XXVII

Technical Committee Analysis and Recommendations

Technical Analysis/Recommendations

- TC defined resiliency as the ability of the stock to recover from a disturbance
- Recommendations based on increasing stock resiliency by adding an additional biological buffer through the protection of spawning stock biomass (SSB) across LCMAs.
- TC provided analysis and recommendations to the PDT on the following issues:
  - **Index for Establishing Triggers**
  - **Trigger Levels**
  - **Impacts of Management Measures**

TC Recommendation: Trigger Index

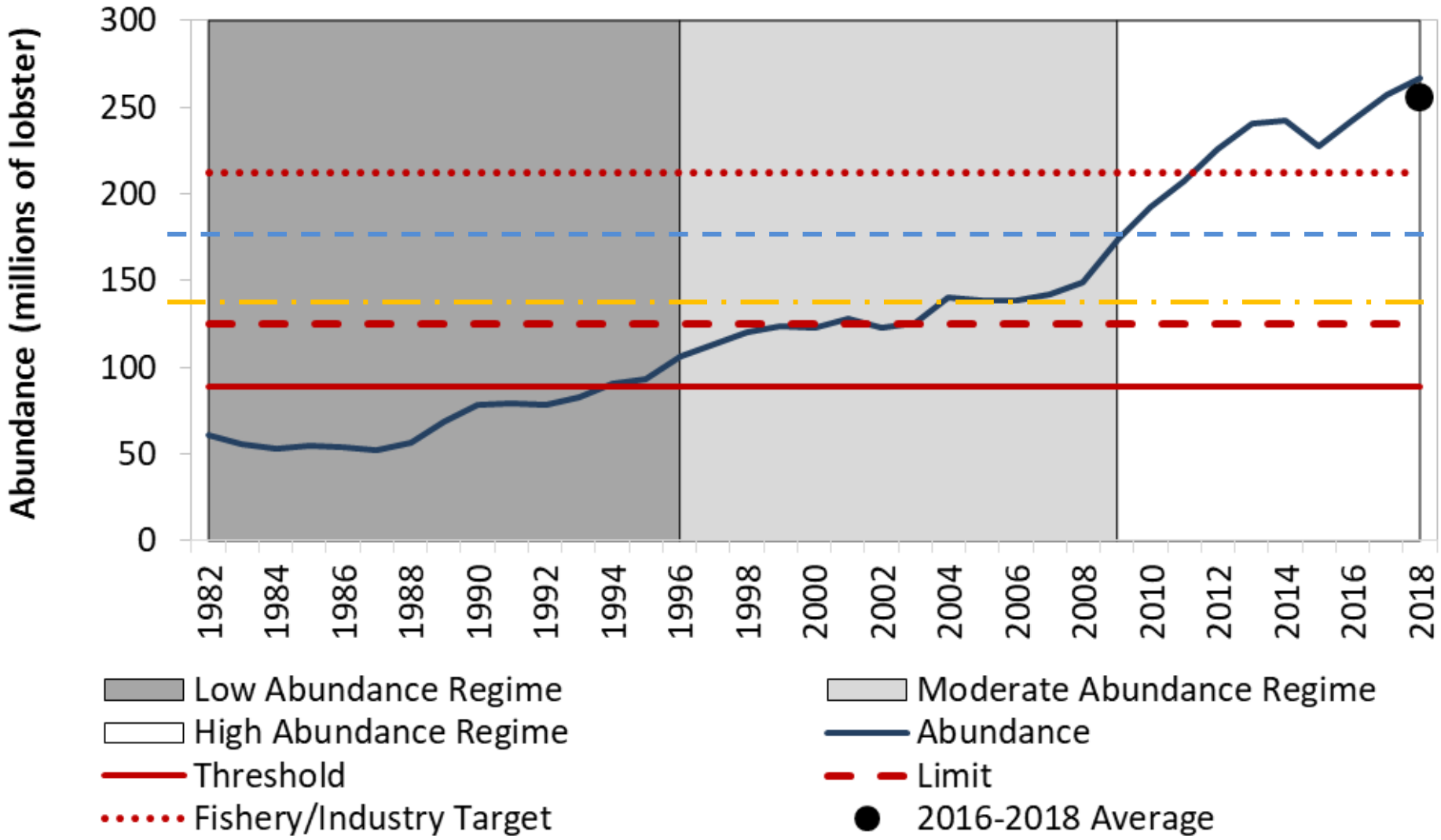
- TC recommended a trigger based on observed change in annual survey recruit indices scaled to 2015-2017 values
  1. Spring combined ME/NH and MA trawl survey index
  2. Fall combined ME/NH and MA trawl survey index
  3. Ventless Trap Survey index
- Single indices by season, survey provided stratum areas, sexes aggregated, constrained to sizes 71-80 mm
- Correlation analysis shows relationship between modeled abundance and the trawl indices, one year lag
- Management would be triggered if 3 year moving average of these 3 indices falls below established trigger level

TC Recommendations: Trigger Levels

- Trigger levels should be related to model outputs and abundance reference points, and regime shifts
  1. Fishery/Industry Target: more proactive/conservative
  2. Shift from moderate to high abundance regime
  3. 75th percentile of moderate abundance regime
  4. Abundance Limit: **Not recommended for use as a trigger in this addendum**
     - Not proactive management

GOM/GBK Reference Abundance

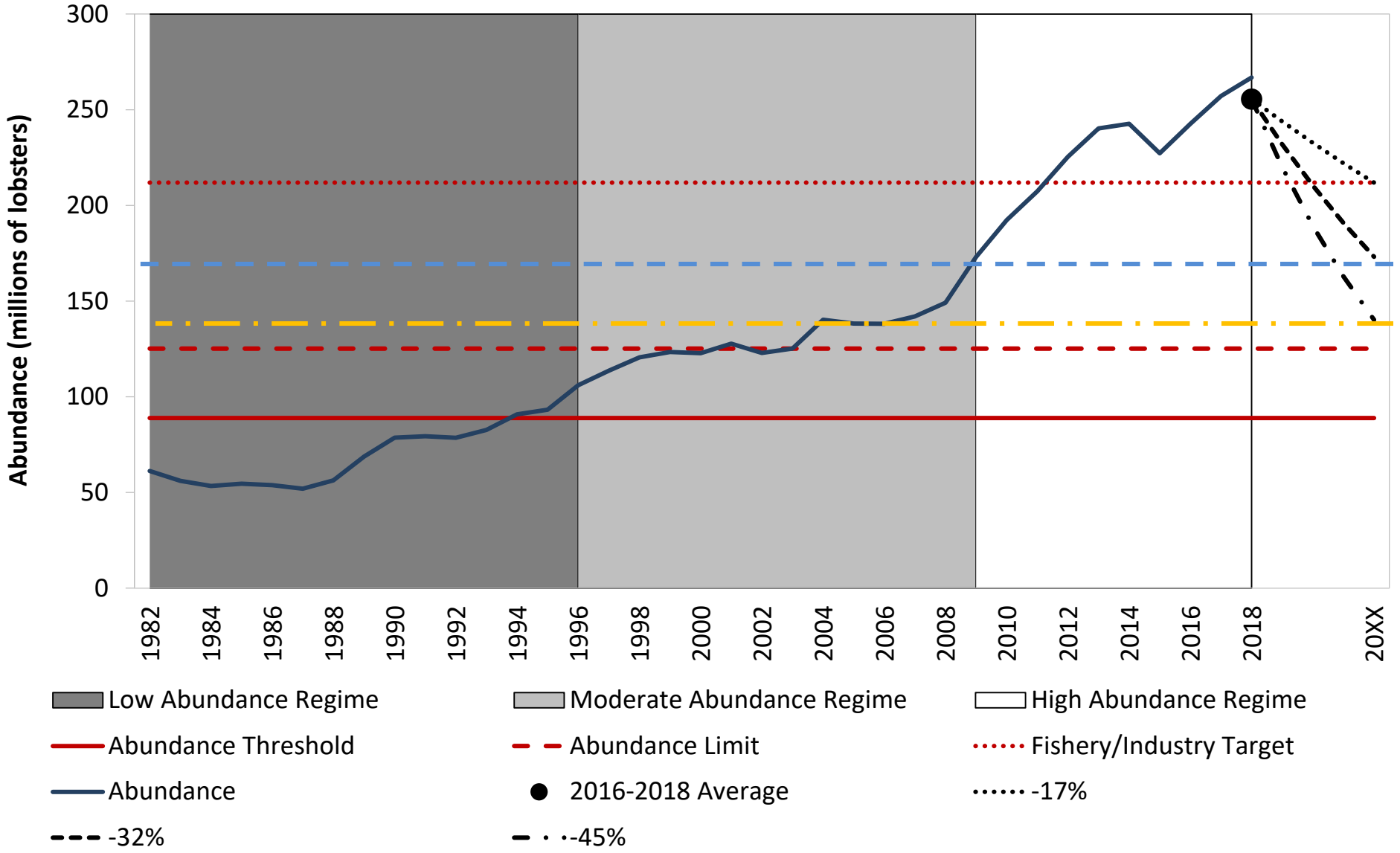
Figure 1. Abundance for GOM/GBK Relative to Reference Points



Potential Trigger Levels

Relation to Reference Point	Decline from 2016-2018 average abundance
Fishery/Industry Target	-17%
Moderate/ High Abundance Regime Shift Level	-32%
75th Percentile of Moderate Abundance Regime	-45%

Potential Trigger Levels



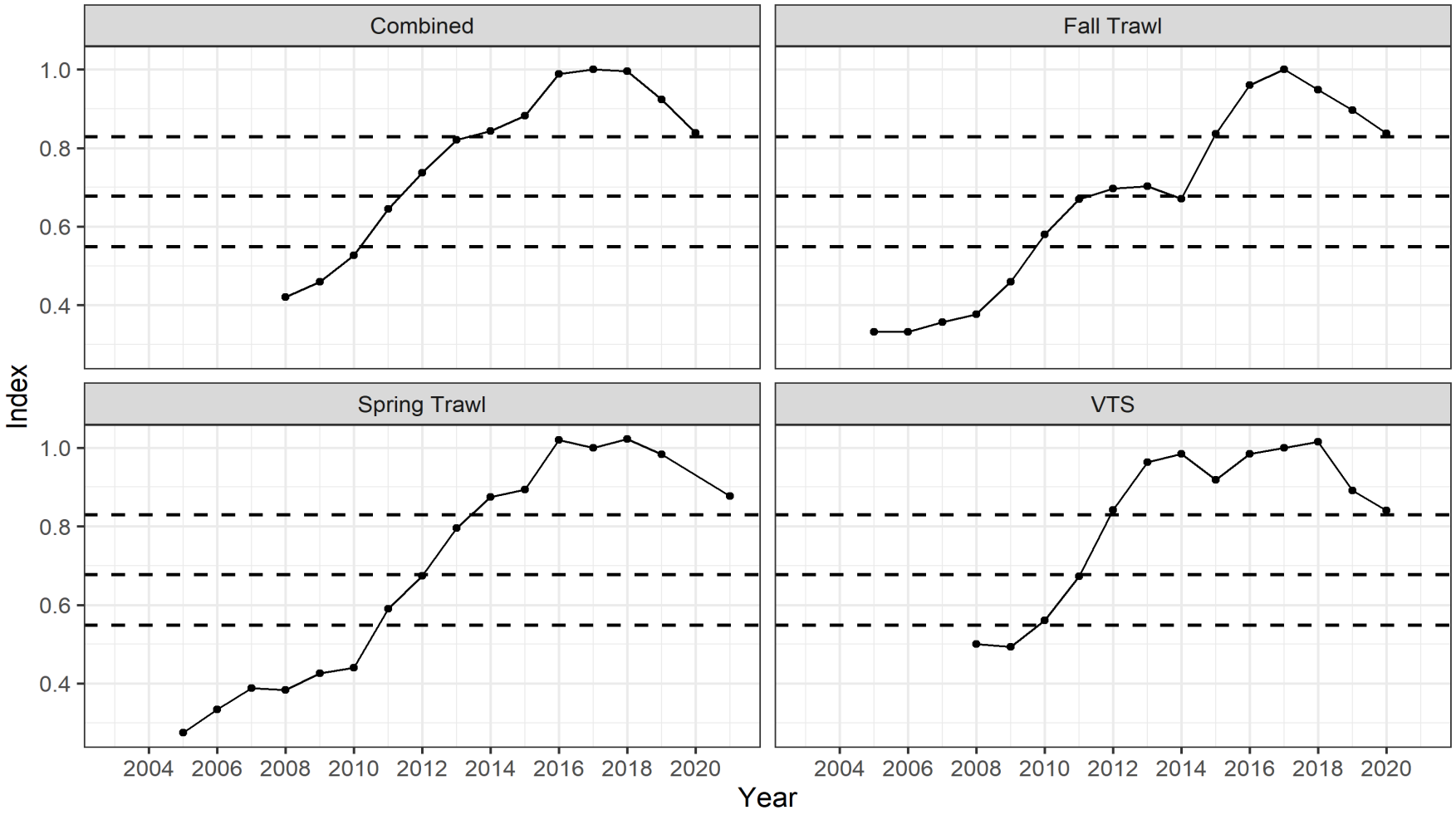
TC Recommendations: Trigger Levels

Additional Discussion

- In general, more immediate action to increase the minimum gauge size more immediately while abundance is at its highest levels has the potential to enhance the resiliency of the stock
- Changing measures (e.g. gauge size) before abundance declines further will have less of an impact to industry, versus waiting until declining abundance is negatively affecting catch

Current Trigger Index Calculation

- TC calculated the trigger index as recommended with available data (through 2020) = 0.84



Technical Analysis: Gauge Sizes

- TC analysis focused on gauge sizes changes
  - Estimated impacts of minimum and maximum gauge size combinations landings weight and numbers, SSB, and exploitation
- In general, increasing minimum gauge size expected to have the largest impact, even with small changes
  - Increasing min. gauge size would have a short term impact of decrease in numbers landed, but ultimate increase in total weight of landings
  - Vent size should be changed accordingly with minimum gauge size
- Maximum gauge size effects are less certain
  - Minor changes less likely to be effective due to population size structure
  - Places forever protections on larger lobster

Current Measures (GOM/GBK)

Mgmt. Measure	Area 1	Area 3	OCC
Min Gauge Size	3 1/4"	3 17/32"	3 3/8"
Vent Rect.	1 15/16 x 5 3/4"	2 1/16 x 5 3/4"	2 x 5 3/4"
Vent Cir.	2 7/16"	2 11/16"	2 5/8"
V-notch requirement	Mandatory for all eggers	Mandatory for all eggers above 42°30'	None
V-Notch Definition[1] (possession)	Zero Tolerance	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"	6 3/4"	State Waters none; Federal Waters 6 3/4"
Season Closure			February 1-April 30

Measures

Min size	inches	mm	
3 1/4	3.25	82.5	Area 1 minimum
3 5/16	3.31	84.1	
3 3/8	3.38	85.7	OCC minimum
3 15/32	3.47	88.1	
3 17/32	3.53	89.7	Area 3 minimum
3 19/32	3.59	91.3	
Max size	in	mm	
5	5	127	Area 1 Max
5 1/2	5.5	139.7	
6	6	152.4	
6 1/4	6.25	158.7	
6 1/2	6.5	165.1	
6 3/4	6.75	171.4	Area 3/OCC Max
9	9	228.6	

Possible Measures Analyzed

Maximum Gauge Size

Minimum Gauge Size	5 in / 127mm	5 ½ in / 140mm	6 in / 152mm	6 ¼ in / 159mm	6 ½ in / 165mm	6 ¾ in / 171mm	None
3 ¼ in / 83mm	LCMA 1						
3 5/16 in / 84mm							
3 3/8 in / 86mm						OCC (federal)	OCC (state)
3 15/32 in / 88mm							
3 17/32 in / 90mm						LCMA 3	
3 19/32 in / 91mm							

TC Recommendations: Gauge Sizes

LCMA 1 Recommendations

- Increase the minimum gauge size in LCMA 1
  - LCMA 1 min size (3 ¼”, 82.5 mm) is significantly below stock-wide estimated size at 50% maturity (87 mm)
  - Growth overfishing occurring in LCMA 1; most of the catch consists of individuals within one molt of minimum legal size, resulting in less yield per recruit
- Change to max gauge size in LCMA 1 (5”) not recommended
  - Not expected to increase SSB

TC Recommendations: Gauge Sizes

LCMA 3 Recommendations

- Do not recommend decreasing minimum gauge size
- Increasing minimum gauge size not a high priority
  - LCMA 3 current gauge size is already close to the size at which 50% of females are mature (91 mm for Georges Bank)
- Uncertain impacts of decreasing maximum gauge in LCMA 3
  - Complex population and reproductive dynamics for larger lobsters
  - Generally, decreasing max gauge size has larger effects for LCMA3 relative to decreasing min size in LCMA3 or for changing max sizes for the other LCMAs.

TC Recommendations: Gauge Sizes

Outer Cape Cod Recommendations

- Do not recommend decreasing minimum gauge size
- In general, increasing minimum gauge benefits stock
  - OCC is a transitional area with lobsters moving in from other locations.
  - Size at maturity is not estimated for this area
- Uncertain impacts of decreasing maximum gauge size
  - Small portion of the stock-wide fishery
- TC recommends measures within OCC be standardized for state and federal permit holders.
  - Benefits for enforcement and commerce, consistent conservation strategy

Additional TC Recommendations

- Standardizing measures across areas would simplify the stock assessment
- Other types of measures like trap reductions, quotas, have potential to reduce fishing mortality but pose challenges for gauging impacts
  - Could be further analyzed and considered in future
- Not realistic to expect abundance to remain at record high levels
  - Recommendations are expected to address growth overfishing, mitigate effects of productivity declines, and improve stock's ability to rebound from future declines by increasing the proportion that reproduce before harvest

PDT Recommendations

PDT Recommendations

- PDT concerned that management response to a trigger based on abundance decline is inconsistent with stated goals of increasing resiliency and proactive management
- Already seeing declines in abundance indices
- Therefore, the PDT recommends Board consider changing objective of the Addendum
  - ***Given persistent low settlement indices and recent decreases in recruit indices, the addendum should consider a trigger mechanism such that, upon reaching the trigger, measures would be automatically implemented to increase the overall protection of spawning stock biomass of the GOM/GBK stock.***

PDT Recommendations

- The PDT proposes Addendum XXVIII options grouped into 3 issues:
  1. Standardizing some measures upon final approval of addendum
  2. Establishing management triggers to automatically implement measures to increase spawning stock biomass
  3. Spatial implementation of management measures in LCMA 3

Issue 1 Options

Option	Description
1	**Status Quo: no changes to measures upon final approval of addendum**
2	**Standardized measures to be implemented upon final approval of addendum (not dependent on a trigger)**
2A	Implement standardized measures within each LCMA to the most conservative measure where there are inconsistencies between state and federal regulations within GOM/GBK stock LCMAs. This would result in Outer Cape Cod (OCC) maximum gauge being standardized to 6-3/4" for state and federal permit holders, and the V-notch definition being standardized to 1/8" with or w/out setal hairs.
2B	Implement a standard V-notch requirement across all GOM/GBK stock LCMAs. This would result in mandatory V-notching for all eggers in LCMAs 1, 3, and OCC.
2C	Standardize regulations across LCMAs in GOM/GBK for issuing trap tags for trap losses, such that there would be no issuance of trap tags before trap losses occur.

Issue 2 Options

	LCMA 1	LCMA 3	OCC
Option 1			
Trigger 1 (17% decline)	Min: 3-5/16 (84 mm) Max: status quo, 5”	Min: status quo, 3-17/32” (90 mm) Max: status quo, 6 ¾” (171mm)	Min: status quo, 3 3/8” (86 mm) Max: status quo, 6 ¾” (171mm)
Trigger 2 (32% decline)	Min: 3-3/8 (86 mm) Max: status quo	Min: status quo **Max: 6 or 6.5”**	Min: status quo **Max: 6 or 6.5”**
Option 2			
Trigger 1 (17% decline; gradual change in increments of 1/16”)	Min: **3-3/8” or 3-15/32” (88 mm)** Max: status quo	Min: status quo **Max: 6 or 6.5”**	Min: status quo or 3-15/32” (88 mm) **Max: 6 or 6.5”**
Option 3 (no trigger and LCMA 1 only)			
Immediate action: 2023 measures	Min: 3-5/16 (84 mm) Max: status quo	Min: status quo Max: status quo	Min: status quo Max: status quo
2025 measures	Min: 3-3/8 (86 mm) Max: status quo	Min: status quo Max: status quo	Min: status quo Max: status quo

Issue 3 Options

Option	Description
1	**Maintain LCMA 3 as a Single Area (Status Quo)**
2	**Split LCMA 3 along the 70°W Longitude Line with an Overlap Area** • LCMA 3 would be split along the 70°W longitude line to create an eastern section and a western section in LCMA 3 with an overlap area of 30' on either side of the 70°W longitude line. The eastern boundary of the LCMA 3 overlap would be comprised of the area west of the 69° 30' W longitude line. The western boundary of the overlap would be comprised of the area east of 70° 30' W longitude line. • LCMA 3 harvesters could elect to fish exclusively in the western or eastern portions of LCMA 3, while being allowed to fish annually in the overlap zone without the need to change their area declaration. In the overlap zone, the fishermen would be held to the management measures of the sub-area declared.

Request for Board Guidance

1. Is the Board interested in including sub-option 2B in the Draft Addendum for public comment? PDT has some concerns about estimating impacts on SSB given available data and the issue of enforceability of V-notching.

2. Is Board interested in considering an option to standardize the V-notch definition to 1/8” across all areas in the stock? Or standardizing minimum depth of the V-notch and shape when it is cut?

3. Does the Board prefer to address the options under Issue 1 separately (no trigger) or as part of the measures that would be implemented upon reaching defined triggers?

Request for Board Guidance

4. Is Board willing to consider options that increase the min size in LCMA 1 to 3-3/8” (86 mm) or 3-15/32” (88 mm)?

   – The current min size in LCMA 1 is 3 ¼” (83mm).

5. The TC agreed that decreasing the max gauge size in LCMA 3 and OCC to 6” or above has great uncertainty surrounding the impact, but is likely to have a relatively small positive impact on SSB with minimal, but permanent impacts to the Area 3 industry. Is the Board willing to consider decreases to the max gauge size in these areas?

   – If so, what sizes: 6 ½”? 6-1/4”? 6”?

Questions?

Update on Development of Draft Addendum XXIX

Electronic vessel tracking in the federal lobster and Jonah crab fisheries

American Lobster Management Board
October 2021

Background

- In August the Board initiated Addendum XXIX to consider vessel tracking requirements for federally permitted lobster and Jonah crab vessels based on recommendations of a work group established in May
- The Addendum will address need for high resolution spatial/temporal data to address challenges associated with stock assessment, protected species interactions, marine spatial planning, and offshore enforcement.

Objective

- Addendum objective:
  - **Collect high-resolution spatial and temporal data to characterize effort in the federal American lobster and Jonah crab fisheries for management and enforcement needs**
  - **These data will improve stock assessment, inform discussions and management decisions related to protected species and marine spatial planning, and enhance offshore enforcement**

PDT Discussions

- Based on WG recommendations the PDT has been discussing proposed requirements for:
  - Tracking devices
    - Specifications devices/vendors would need to meet to be approved
  - Harvesters
    - Rules that federal permit holders would need to comply with
  - States
    - Processes/rules states would need to implement to ensure program requirements are met

Considerations for Tracking Devices

- Cellular devices preferred due to low cost and accessibility of technology
- Must be capable of reporting location data at 1 ping per minute
  - Rate may differ when vessel is moored
- Must meet the VMS precision and accuracy requirements and must report horizontal accuracy of the location and vessel ID
- Devices must be able to provide data in accordance with the ACCSP trip locations API specifications
- Addendum should address a process to approve devices for use in the fishery
  - Possibly Commission-level work group process

Considerations for Harvesters

- PDT recommends basic language under harvester requirements, e.g.,
  - Federal permit holders will be required to report spatial data via approved tracking device.
  - Federal permit holders will be required to have the tracking device on board and powered at all times when the vessel is in the water, unless under repairs.

Considerations for States

States will have to Administer the Program

- States would be responsible for verifying that harvesters have installed a device to their vessel that meets the standards
  - E.g., states would have to certify the device at initial installation before vessel goes on a fishing trip
- If vessel ownership changes, states need a process to associate tracker with a new vessel or permit holder

Data Processes

- Data validation
  - GARFO responsible for trip reporting compliance and validation
  - States responsible for tracking data compliance and validation
    - Need to establish how to determine what state is responsible if vessel lands in multiple states
  - ACCSP responsible for linking location data that has not previously been associated with a trip to the appropriate trip report
- Further discussion needed to define these processes

Proposed Action Timeline

Date	Action
August 2021	Board initiated Draft Addendum XXIX
Aug-Oct 2021	PDT meetings to discuss addendum development
October 2021	**Update to Board on Addendum XXIX development**
Oct-Dec 2021	PDT drafts document for public comment
December 2021	Special Board meeting to consider Draft Addendum XXIX for Public Comment
January 2022	Public hearings and comment period
Winter/Spring 2022	Special Board meeting to consider final approval of Draft Addendum XXIX

Questions?

Management Strategy Evaluation for American Lobster

American Lobster Management Board
October 18, 2021

May 2021 Board Meeting

- TC presented lobster MSE recommendations
  - Prioritize two-phase GOM/GBK MSE
  - Form a steering committee to further guide development of a MSE
  - Convene management objectives and goals workshop

- Board postponed further consideration of MSE development until August 2021 meeting
  - Prioritize work on Draft Addendum XXVII

August 2021 Board Meeting

- Reviewed and considered TC recommendations on next steps for lobster MSE

- Postponed discussion of next steps to next Board meeting in order to prioritize workloads for ongoing actions (Addenda XXVII and XXIX)

Steering Committee

- Complete additional scoping including format of stakeholder outreach and identifying funding and personnel
- Steering Committee charge would be to develop comprehensive work plan to ensure successful process, not direct content within MSE process
- MSE start date depends on completion of management workshop and outcome of steering committee findings

Steering Committee Roles

- Reps from Board, TC, ASMFC Staff, industry stakeholders, Committee on Economics and Social Sciences, Assessment and Science Committee

- Need to have some members with MSE experience

- Ideally ≤ 12 members

Management Workshop

- Need Board and stakeholder input
- Big picture goals, both short and long term to guide the focus of the two phases
- E.g. Menhaden Management Objectives Workshop
- Should be conducting parallel to steering committee work so final recommendations are relevant to objectives and goals for the future of the lobster fishery

Recent Developments

- ASMFC MSE Training Workshop

- Chen Lab Simulation Project Funded
  - Provides tools necessary to support MSE
  - Includes scenario testing as a precursor to traditional MSE

Next Steps

- TC recommended next steps not intended to represent commitment to full MSE
- Move forward with development of steering committee?
  - Staff to work with Board and TC members to populate steering committee
  - Board review and consensus of steering committee membership following completion of Addendum XXVII
- Competing Board priorities
  - Addendum XXVII
  - Addendum XXIX
  - 2023 Jonah Crab Stock Assessment
- If there is not interest/sufficient resources at this time Board can postpone considering action to initiate MSE indefinitely