Tautog Harvest Reduction and Spawning Stock Biomass Projection Analysis

Massachusetts-Rhode Island Region

Background

In October of 2016 the Tautog Management Board (Board) approved the creation of an Amendment to the fishery management plan for tautog. The Amendment will set forth management measures for the recreational and commercial fisheries for tautog that are meant to reduce the regional harvest in an effort to get the stock in to better stock status. The Amendment will achieve this reduction through the creation of regional management plans which match the structure of the current stock assessment regions.

Four regions will be established by the Amendment. Each region will implement tautog management programs that utilize minimum size limits, maximum possession limits, quotas, and seasonal closures that are designed to achieve a specific regional harvest reduction. The MARI region will contain the states of Massachusetts and Rhode Island. All states will agree to the regulations implemented within the region. States will work to develop regulations that are a similar as possible for their recreational management programs within the region, though if quotas are used for the commercial fisheries, those quotas can be state specific and need not be equal.

Methods and Results

The following are tools that can be used by RI and MA to calculate harvest reductions. The methods described below all use MRIP recreational data for the years of 2013 – 2015, only waves 2 – 6 are available for analysis in these states during these years. Additionally, both RI and MA have a commercial quota in state waters. Any needed reductions on the commercial side will be achieved through reductions in quota.

Four methods of estimating future recreational tautog harvest were employed. These included; 1.) seasonal reductions calculated from daily harvest rates based on MA and RI harvest from 2013 - 2015 waves 2 – 6 according to MRIP data; 2.) bag limit reduction calculations based on MA and RI harvest from 2013 - 2015 waves 2 – 6 according to MRIP data; 3.) reductions achieved from increasing the minimum size based on MRIP size distribution data from 2013 - 2015 waves 2 – 6, and 4.) a methodology for combining size, bag, and season harvest reduction calculations based on MA and RI harvest from 2013 - 2015 waves 2 – 6 according to MRIP data. In all cases, illegal harvest was accounted for in an effort to not give credit for illegal harvest and to also make the assumption that illegal harvest will occur in a similar fashion in the future as it has in the past.

As a final task, the previous projections from the benchmark assessment were rerun to determine when the biomass levels would reach the spawning stock biomass (SSB) threshold. For the MARI region, six separate projections were run. Three of the projections were run relative to the SPR targets (status quo harvest, 50% probability of reach F target, 70%

probability of achieving F target), and the other three were run relative to the MSY targets (same scenarios as for the SPR calculations).

Bag Limit Adjustments

Changes in harvest due to possession limit adjustments were analyzed using MRIP intercept data. In general, the analysis takes the intercept data as described above, weights and expands it, and simulates the effects of different bag limits were they to be implemented in the future. There is an added complication of differing seasonal regulations between MA and RI, these were accounted for in the analysis. The results of the analysis are indicated below (Table 1a and b).

Table 1a. The projected effects of various bag limits on future tautog recreational landings in MA and RI in waves 2 – 4 and a portion of wave 5, calculated as percent decrease from current management configuration.

Bag	1	2	3
RI	32%	7%	0%
MA	30%	7%	0%
2 States Combined	28%	5%	0%

Table 1b. The projected effects of various bag limits on future tautog recreational landings in MA and RI for a portion of wave 5 and all of wave 6, calculated as percent decrease from current management configuration.

Bag	1	2	3	4	5	6
RI	59%	32%	15%	6%	1%	0%
MA	30%	7%	0%	NA	NA	NA
2 States Combined	57%	30%	12%	4%	1%	0%

Seasonal Adjustments

Seasonal adjustments were also calculated by using the MRIP intercept data. In general, the analysis takes the intercept data for 2013-2015, weights and expands it, and calculates an average daily harvest rate for the data by wave. This harvest is then accumulated through the year, showing the different rates per wave as differing slopes in the lines (Figure 2). As noted above, calculations were run removing illegal harvest. Harvest reductions needed could be calculated based on these daily harvest rates by removing periods of time (closing a season) to accumulate enough of a harvest reduction to meet management goals.

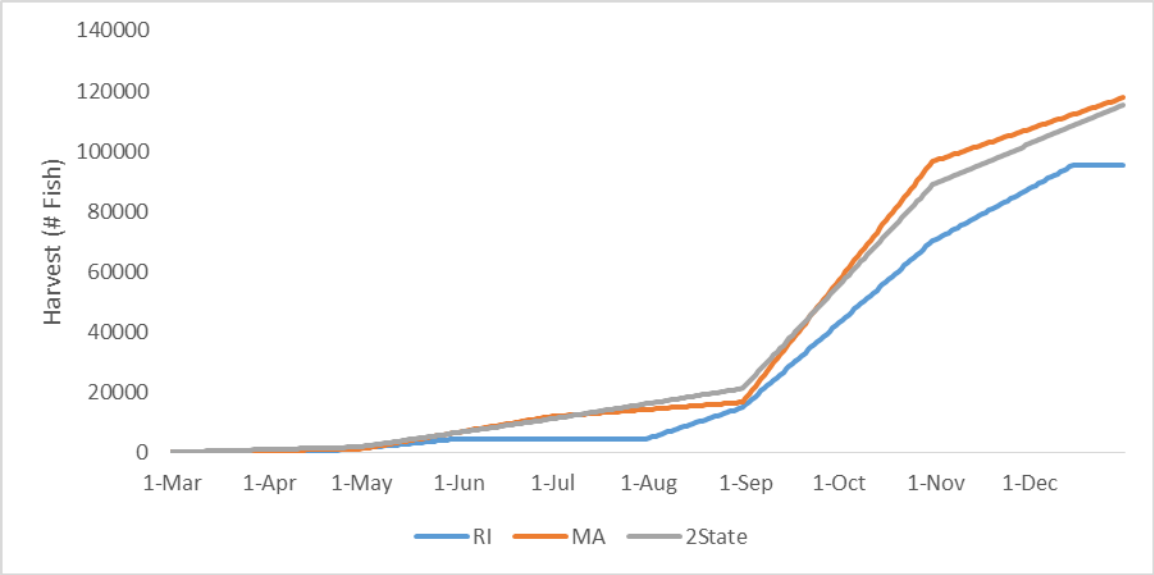


Figure 2. Results of the season 1 catch rate analysis for MARI. The three lines represent state specific or combined state scenarios.

Minimum Size Adjustments

Minimum size adjustments were calculated by using the MRIP size data. In general, the analysis takes the size data from the MRIP survey, weights and expands it, and calculates a harvest at size in ½ inch bins. This harvest is then adjusted by simulating a new minimum size, protecting the harvest underneath the new minimum size, and calculating the reduction in harvest achieved (Figure 3, Table 2). An important note on the analysis is that illegal harvest (harvest on fish smaller than the legal 16 inch minimum size) was added back in to the analysis, so the assumption is that illegal harvest will remain in the future in the same proportions as it occurred in 2016.

One final calculation was made when adjusting size limits. For this portion of the analysis, the newly protected fish that had been harvested in previous years but would now be too small to harvest were considered discards. For these discarded fish, a 2.5% mortality rate was applied, and these dead discards were used to down weight the total reduction calculation for minimum size adjustments.

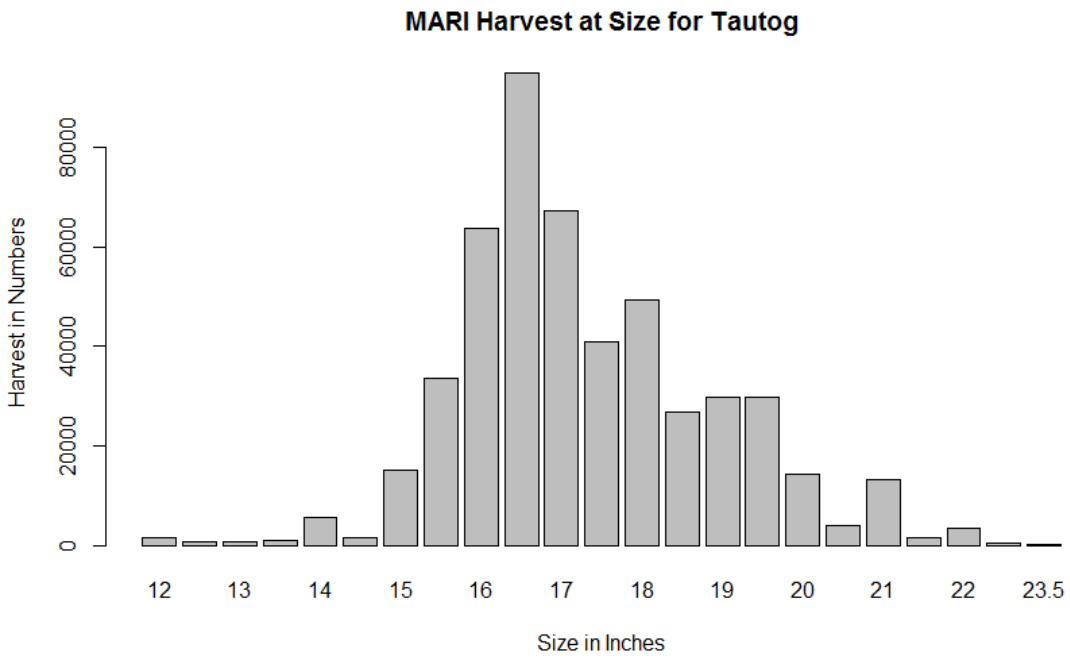


Figure 3. Harvest at length 2013-2015 for the MARI region.

Table 2. The projected effects of a size limit increase on recreational harvest in the MARI region, calculated as percent decrease from current management configuration. The right two columns account for dead discards.

Size	16.5”	17”	16.5” w/ discards	17” w/ discards
RI	14%	34%	13.6%	33%
MA	16%	39%	15.6%	38%
2 States Combined	14%	36%	13.6%	35%

Combination Seasonal, Bag, and Size Limit Adjustments

Combination seasonal and bag limit adjustments were also calculated by using the MRIP intercept data. In general, the analysis takes the intercept data, weights and expands it, and calculates a daily harvest level under simulated bag limits. This harvest is then accumulated through time and compared against the reduction scenarios currently suggested by the board, namely a suite of reductions from the 3 year average harvest amount to meet 50% and 70% probabilities of reaching the F target in 3 years. For this exercise, only the 70% scenarios are shown due to the 50 and 70 scenarios being very close in magnitude. The results are presented below (Table 3). This table shown both state specific and states combined scenarios, but an effort was made to match the state specific management as close as possible while still meeting the management goals. When combining proportions for minimum size with the other reduction strategies, the following equation is used to account for the interaction:

Total Increase = (X+Y) - (X*Y);
X = The percentage decrease associated with possession limit/seasonal closure(s).
Y= The percentage decrease associated with size limit.

Table 3. Results of the combination season, bag, and size limit analysis for RI under 2 reduction strategies for Season 1

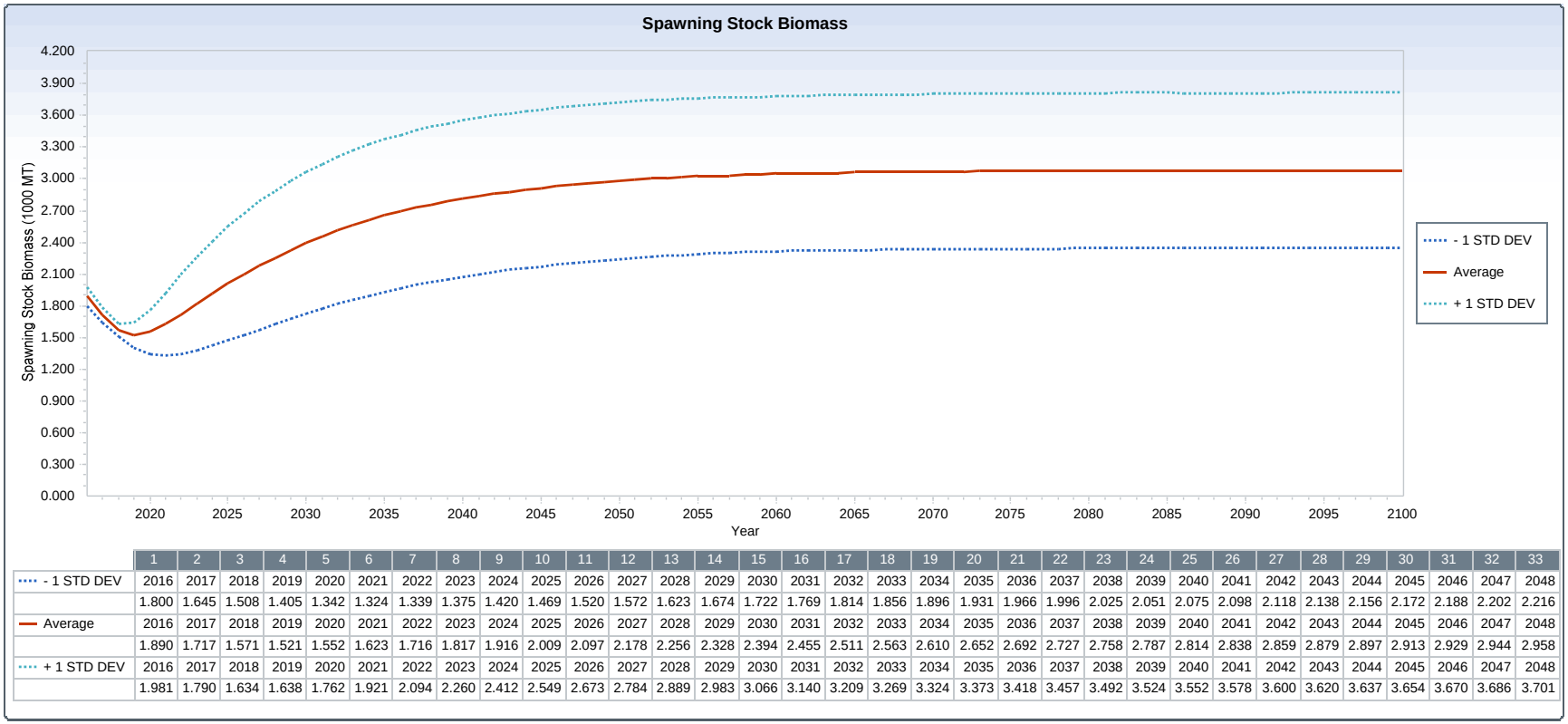
Options	Size (inches)	Bag Limit	Open Season
RI Option 1	17	3	April 15 - May 31; August - October 14
RI Option 2	17	2	August 1 - October 14
		3	October 15 - October 24
MA Option 1	17	3	April 15 - May 31; August 1 - October 19
MA Option 2	17	2	April 15 - May 31; August 1 - October 14
		3	October 15 - October 23
Combined States Option 1	17	3	March 1 - May 31; August 1 - October 20
Combined States Option 2	17	2	March 1 - May 31; August 1 - October 14
		3	October 15 - October 22

Projections to Determine When SSB Threshold Is Reached

Using the approved methodology from the benchmark assessment, projections were run under 6 separate scenarios, with the goal being to determine how long it will take for the population size to rebuild to the SSB threshold level. The scenarios include three from the SPR reference point calculations; 1. Projecting at status quo harvest, 2. Projecting at the harvest level that will achieve a 50% probability of achieving the F target in three years, in this case 257 mt, and, 3. Projecting at the harvest level that will achieve a 70% probability of achieving the F target in three years, in this case 253 mt. The remaining three scenarios are set relative to the MSY reference points and follow the same three sub scenarios as noted for the SPR reference point projections. The results are presented below (Table 4, Figures 4 – 9).

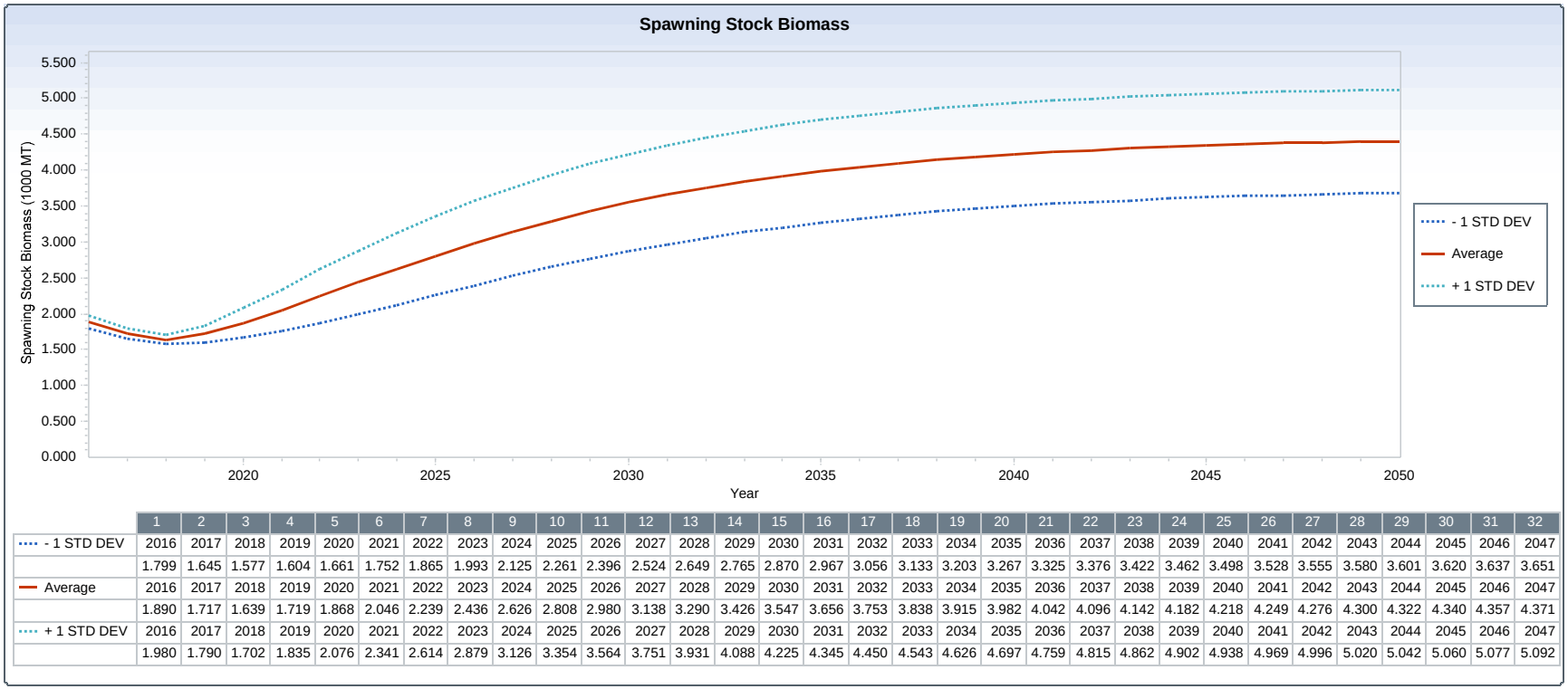
Table 4 – Projection information for the six reduction strategies for the MARI region.

	MARI MSY Reference Points			
MSY	**2018-2020 Landings Scenario**	**Probability of being at or below F target in 3 years**	**Probability of being at or above SSB threshold in 3 years**	**Calendar year when stock size is at or above SSB threshold**
	Status quo (390 mt)	0%	0.00%	N/A
	151 mt	50%	2.20%	2025
	148 mt	70%	2.30%	2025
	MARI SPR Reference Points			
SPR	**2018-2020 Landings Scenario**	**Probability of being at or below F target in 3 years**	**Probability of being at or above SSB threshold in 3 years**	**Calendar year when stock size is at or above SSB**
	Status quo (390 mt)	0%	4.10%	2025
	257 mt	50%	23.2%	2021
	253 mt	70%	24.3%	2021



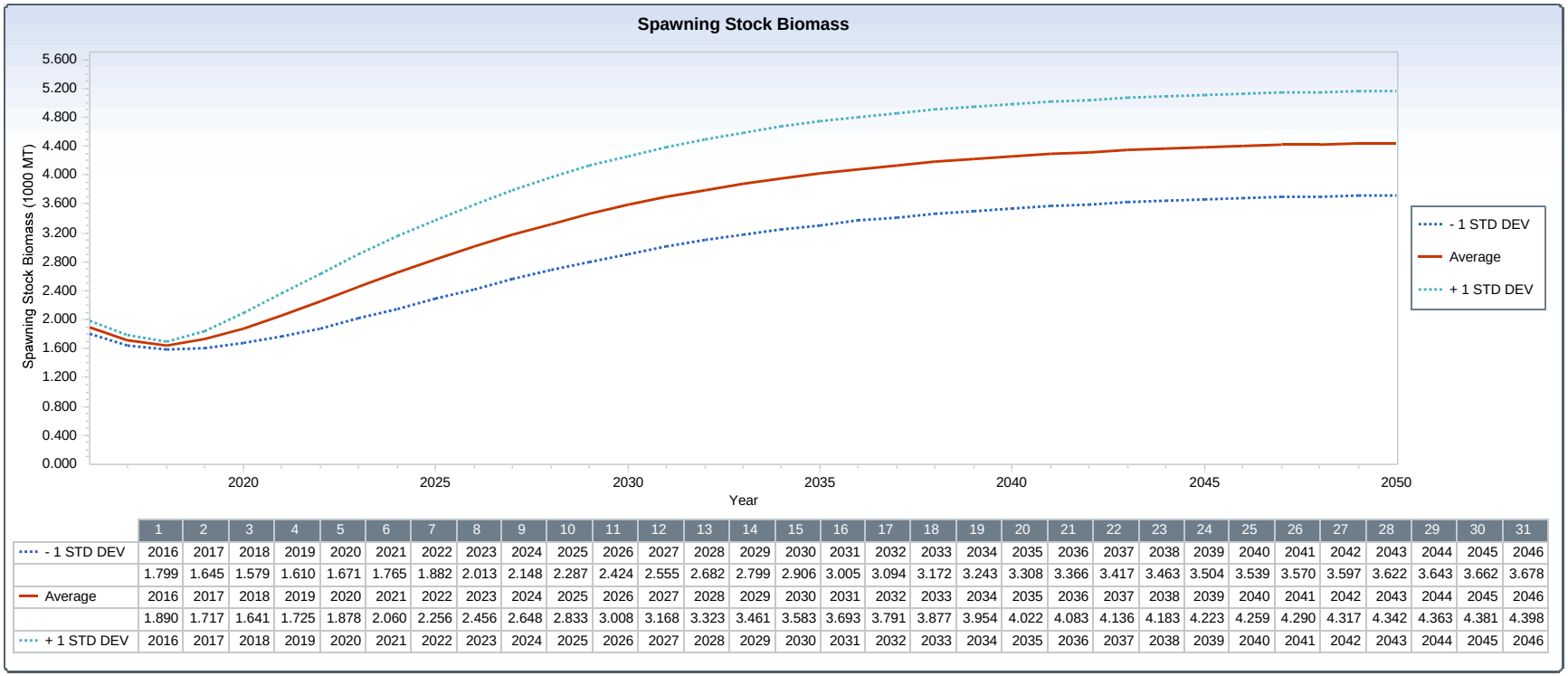
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
- 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
	1.800	1.645	1.508	1.405	1.342	1.324	1.339	1.375	1.420	1.469	1.520	1.572	1.623	1.674	1.722	1.769	1.814	1.856	1.896	1.931	1.966	1.996	2.025	2.051	2.075	2.098	2.118	2.138	2.156	2.172	2.188	2.202	2.216
Average	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
	1.890	1.717	1.571	1.521	1.552	1.623	1.716	1.817	1.916	2.009	2.097	2.178	2.256	2.328	2.394	2.455	2.511	2.563	2.610	2.652	2.692	2.727	2.758	2.787	2.814	2.838	2.859	2.879	2.897	2.913	2.929	2.944	2.958
+ 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
	1.981	1.790	1.634	1.638	1.762	1.921	2.094	2.260	2.412	2.549	2.673	2.784	2.889	2.983	3.066	3.140	3.209	3.269	3.324	3.373	3.418	3.457	3.492	3.524	3.552	3.578	3.600	3.620	3.637	3.654	3.670	3.686	3.701

Figure 5. Status Quo SPR: Average hits SSB threshold in 2025, Lower STDEV hits threshold in 2038



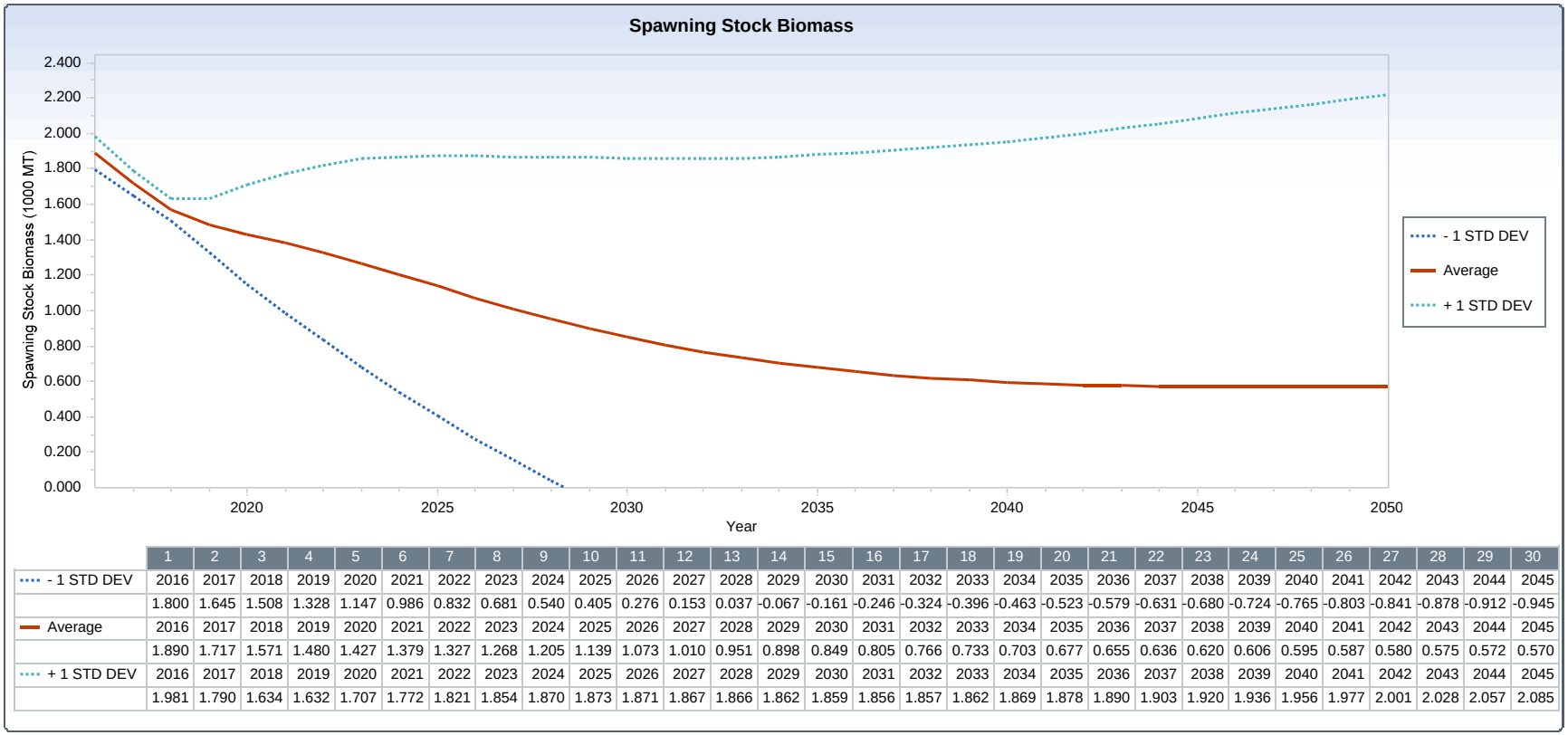
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
- 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
	1.799	1.645	1.577	1.604	1.661	1.752	1.865	1.993	2.125	2.261	2.396	2.524	2.649	2.765	2.870	2.967	3.056	3.133	3.203	3.267	3.325	3.376	3.422	3.462	3.498	3.528	3.555	3.580	3.601	3.620	3.637	3.651
Average	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
	1.890	1.717	1.639	1.719	1.868	2.046	2.239	2.436	2.626	2.808	2.980	3.138	3.290	3.426	3.547	3.656	3.753	3.838	3.915	3.982	4.042	4.096	4.142	4.182	4.218	4.249	4.276	4.300	4.322	4.340	4.357	4.371
+ 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
	1.980	1.790	1.702	1.835	2.076	2.341	2.614	2.879	3.126	3.354	3.564	3.751	3.931	4.088	4.225	4.345	4.450	4.543	4.626	4.697	4.759	4.815	4.862	4.902	4.938	4.969	4.996	5.020	5.042	5.060	5.077	5.092

Figure 6. SPR 50% Ftarget. Average meets SSB threshold 2021, Lower STDEV meets SSB threshold 2024



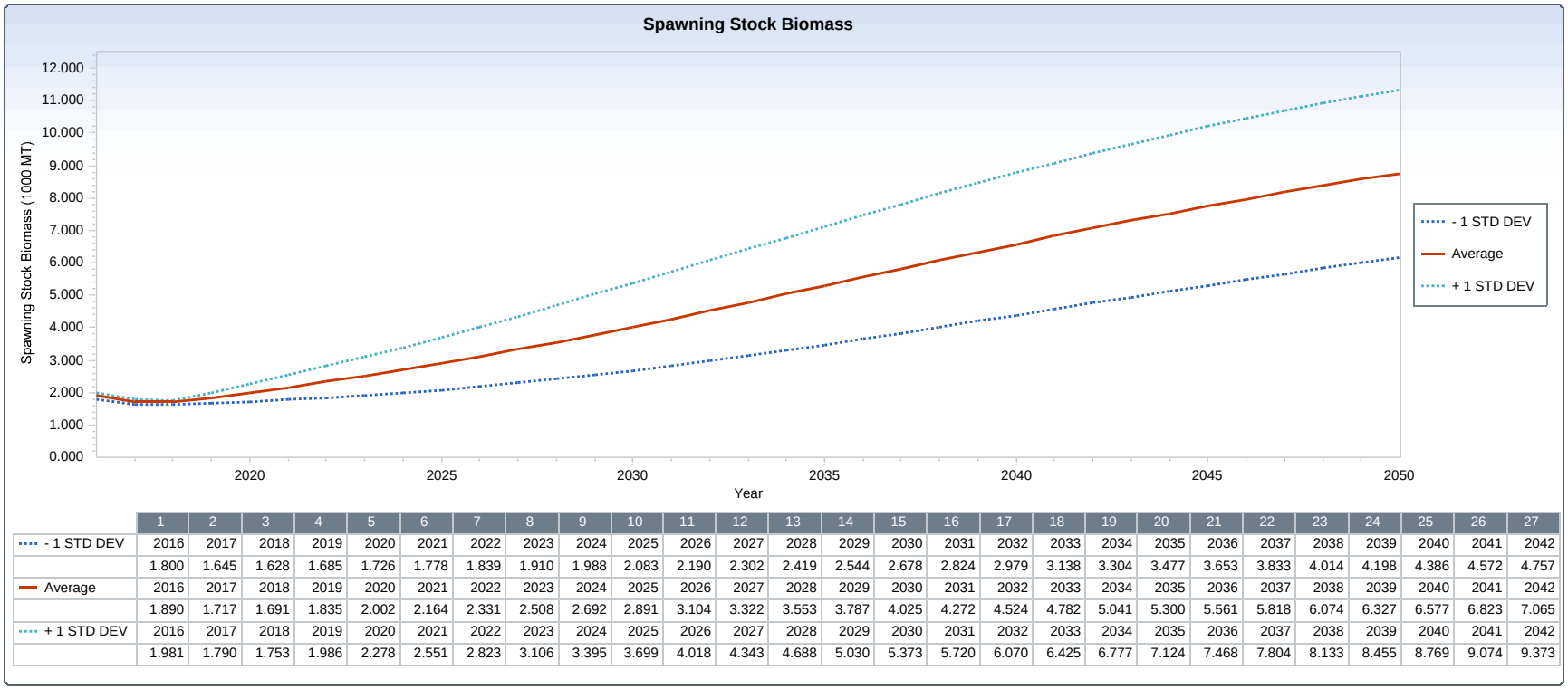
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
- 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
	1.799	1.645	1.579	1.610	1.671	1.765	1.882	2.013	2.148	2.287	2.424	2.555	2.682	2.799	2.906	3.005	3.094	3.172	3.243	3.308	3.366	3.417	3.463	3.504	3.539	3.570	3.597	3.622	3.643	3.662	3.678
Average	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
	1.890	1.717	1.641	1.725	1.878	2.060	2.256	2.456	2.648	2.833	3.008	3.168	3.323	3.461	3.583	3.693	3.791	3.877	3.954	4.022	4.083	4.136	4.183	4.223	4.259	4.290	4.317	4.342	4.363	4.381	4.398
+ 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046

Figure 7. SPR 70% F Target. Hit threshold in 2021, Lower STDEV hits threshold in 2023



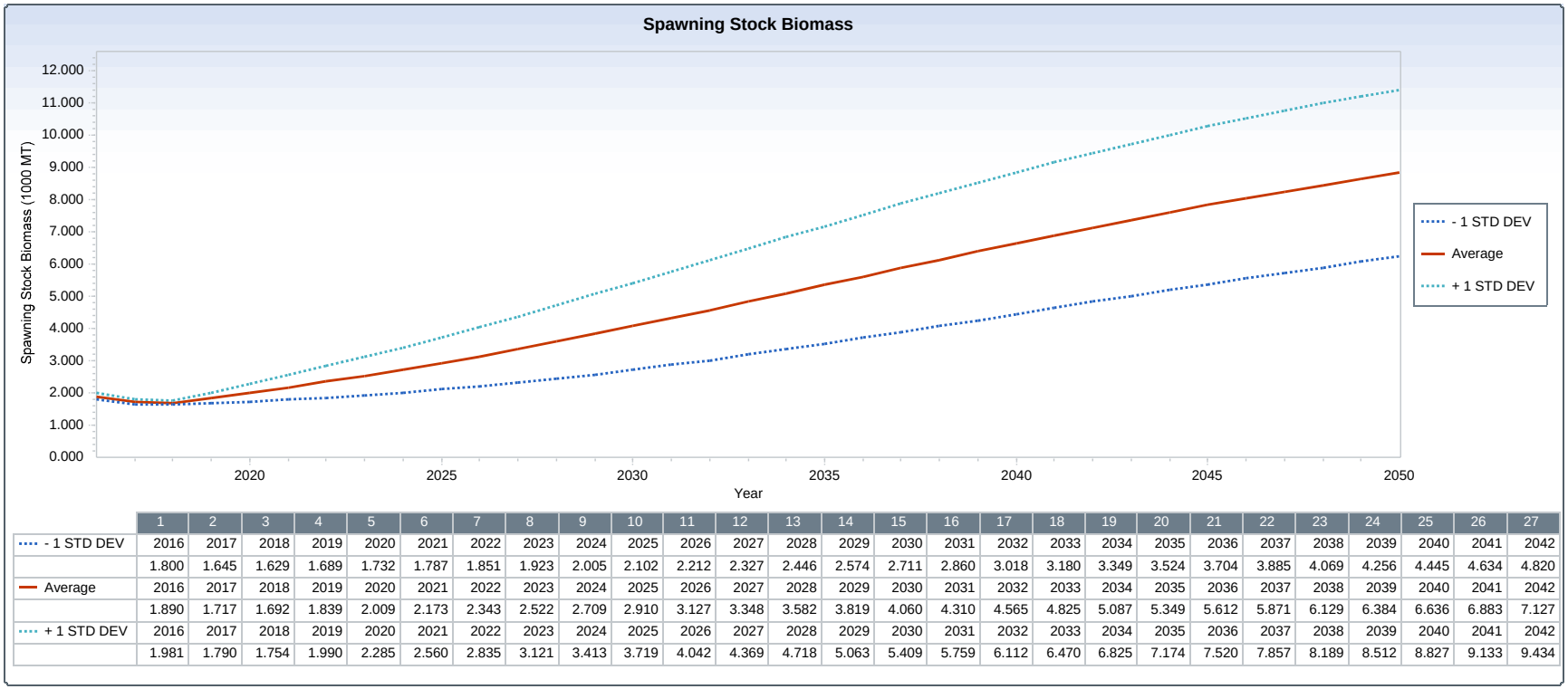
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
- 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
	1.800	1.645	1.508	1.328	1.147	0.986	0.832	0.681	0.540	0.405	0.276	0.153	0.037	-0.067	-0.161	-0.246	-0.324	-0.396	-0.463	-0.523	-0.579	-0.631	-0.680	-0.724	-0.765	-0.803	-0.841	-0.878	-0.912	-0.945
Average	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
	1.890	1.717	1.571	1.480	1.427	1.379	1.327	1.268	1.205	1.139	1.073	1.010	0.951	0.898	0.849	0.805	0.766	0.733	0.703	0.677	0.655	0.636	0.620	0.606	0.595	0.587	0.580	0.575	0.572	0.570
+ 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
	1.981	1.790	1.634	1.632	1.707	1.772	1.821	1.854	1.870	1.873	1.871	1.867	1.866	1.862	1.859	1.856	1.857	1.862	1.869	1.878	1.890	1.903	1.920	1.936	1.956	1.977	2.001	2.028	2.057	2.085

Figure 8. MSY status quo SSB threshold never reached



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
- 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	1.800	1.645	1.628	1.685	1.726	1.778	1.839	1.910	1.988	2.083	2.190	2.302	2.419	2.544	2.678	2.824	2.979	3.138	3.304	3.477	3.653	3.833	4.014	4.198	4.386	4.572	4.757
Average	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	1.890	1.717	1.691	1.835	2.002	2.164	2.331	2.508	2.692	2.891	3.104	3.322	3.553	3.787	4.025	4.272	4.524	4.782	5.041	5.300	5.561	5.818	6.074	6.327	6.577	6.823	7.065
+ 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	1.981	1.790	1.753	1.986	2.278	2.551	2.823	3.106	3.395	3.699	4.018	4.343	4.688	5.030	5.373	5.720	6.070	6.425	6.777	7.124	7.468	7.804	8.133	8.455	8.769	9.074	9.373

Figure 9. MSY 50% SSB threshold hit 2025, Lower STDEV hits 2031



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
- 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	1.800	1.645	1.629	1.689	1.732	1.787	1.851	1.923	2.005	2.102	2.212	2.327	2.446	2.574	2.711	2.860	3.018	3.180	3.349	3.524	3.704	3.885	4.069	4.256	4.445	4.634	4.820
Average	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	1.890	1.717	1.692	1.839	2.009	2.173	2.343	2.522	2.709	2.910	3.127	3.348	3.582	3.819	4.060	4.310	4.565	4.825	5.087	5.349	5.612	5.871	6.129	6.384	6.636	6.883	7.127
+ 1 STD DEV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
	1.981	1.790	1.754	1.990	2.285	2.560	2.835	3.121	3.413	3.719	4.042	4.369	4.718	5.063	5.409	5.759	6.112	6.470	6.825	7.174	7.520	7.857	8.189	8.512	8.827	9.133	9.434

Figure 10. MSY 70%, SSB threshold will be hit in 2025, Lower STDEV will hit threshold in 2031

Tautog Harvest Reduction and Spawning Stock Biomass Projection Analysis

Long Island Sound Region

Executive Summary

This proposal provides specific management measures that meet the proposed Tautog harvest reductions in the Long Island Sound (LIS) region (Connecticut and New York north shore of Long Island). Examples are given for both commercial and recreational fisheries in in each state. Under the recent proposal, LIS harvest should be reduced by between 47.2 and 54.2% to achieve various biological reference points in 2021. Management measures to achieve the required reduction would be based on the methods presented for recreational and commercial fisheries.

Reference Points

Four biological reference points for LIS are currently under discussion. Two reductions in landings provide a 50% and 70% probability of reaching the target value of F under MSY in three years, and two provide a 50% and 70% probability of reaching the target value of F under MSY in three years (Table 1).

Table 1. Projections associated with the LIS (MSY and SPR) reference points

		Short-Term Projections		Long-Term Projection
MSY	2018-2020 Landings Scenario	Probability of being at or below F Target in 3 years	Probability of being at or above SSB threshold in 3 years	Year at which stock is estimated to be at or above SSB threshold
	Status quo (500	1.70%	0.60%	2149
	264 mt	50%	34%	2021
	237 mt	70%	40%	2021

		Short-Term Projections		Long-Term Projection
SPR	2018-2020 Landings Scenario	Probability of being at or below F Target in 3 years	Probability of being at or above SSB threshold in 3 years	Year at which stock is estimated to be at or above SSB threshold
	Status quo (500	0%	0.60%	2238
	255 mt	50%	28%	2021
	229 mt	70%	33%	2021

Recreational

Recreational options were developed by adjusting season, size and possession limit regulations using MRIP data from 2013 to 2015. MRIP measured and imputed lengths were used for this analysis. CT Volunteer Angler Survey (> 16”) and NY Headboat Survey (> 16”) lengths were included in the pool of MRIP lengths to assign lengths to the unmeasured MRIP fish. Illegal

harvests (out of season and over bag limit) were ignored. Alterations in size and possession limits were investigated using R in a script built by Jeffery Brust at NJ DEP. Alterations in season length were evaluated by converting percent of annual harvest by wave to percent of annual harvest by day in each wave. Data are scant for the CT spring fishery (Waves 2 and 4) because harvest for this period is minimal, and we therefore did not project harvest reductions that would be realized from changes in season length for Wave 2, and projected harvest reductions realized for changes in bag limit and minimum size at current season length for Wave 4 but not Wave 2. Below are some possible alternative management measures based on the analytical method.

1. Reduction in harvest with changes in bag limit and minimum size with no change in season length

State	Wave(s)	Days Closed by Wave	Bag Limit by Wave	Harvest Reductions for Minimum Size Limits				
				16	16.5	17	17.5	18
NY	5,6	0,0	1	48.8	52.1	58.6	65.7	70.8
NY	5,6	0,0	2	22.0	28.1	37.6	49.8	56.9
NY	5,6	0,0	3	8.5	15.9	27.8	41.6	50.4
NY	5,6	0,0	4	0.0	7.8	24.4	38.3	47.7
CT	4	0	1	6.5	19.5	39.0	71.5	78.0
CT	4	0	2	0.0	19.5	39.0	71.5	78.0
CT	5,6	0,0	1	53.9	62.6	64.2	72.1	73.7
CT	5,6	0,0	2	26.9	40.4	47.6	58.7	64.2
CT	5,6	0,0	3	8.7	27.7	41.2	53.9	61.0
CT	5,6	0,0	4	0.0	23.0	40.4	53.9	61.0

2. Approximately 50% of the current seasons closed (x indicates impact of bag limit not analyzed)

State	Wave(s)	Days Closed by Wave	Bag Limit by Wave	Harvest Reductions for Minimum Size Limits				
				16	16.5	17	17.5	18
NY	5,6	13,22	1	60.8	63.4	68.2	73.6	77.4
NY	5,6	13,22	2	40.7	45.3	52.4	61.6	67.0
NY	5,6	13,22	3	30.5	36.2	45.1	55.5	62.1
NY	5,6	13,22	4	24.2	30.0	42.5	53.0	60.1
CT	2,4,5,6	0,31,11,18	X,1,1,1	67.2	73.1	74.5	80.3	81.4
CT	2,4,5,6	0,31,11,18	X,2,2,2	49.2	58.4	63.5	71.4	75.1
CT	2,4,5,6	0,31,11,18	X,1,3,3	37.2	50.1	59.3	68.2	73.0
CT	2,4,5,6	0,31,11,18	X,2,3,3	37.1	50.1	59.3	68.2	73.0
CT	2,4,5,6	0,31,11,18	X,1,4,4	31.5	46.9	58.8	68.2	73.0
CT	2,4,5,6	0,31,11,18	X,2,4,4	31.4	46.9	58.8	68.2	73.0

3. 10 days of seasonal closure (x indicates impact of bag limit not analyzed)

State	Wave(s)	Days Closed by Wave	Bag Limit by Wave	Harvest Reductions for Minimum Size Limits				
				16	16.5	17	17.5	18
NY	**5,6**	**10,10**	**1**	56.6	59.5	64.9	70.8	75.1
NY	**5,6**	**10,10**	**2**	34.2	39.3	47.3	57.5	63.5
NY	**5,6**	**10,10**	**3**	22.9	29.1	39.1	50.7	58.1
NY	**5,6**	**10,10**	**4**	15.8	22.3	36.2	47.9	55.8
CT	**2,4,5,6**	**0,10,10,10**	**X,1,1,1**	65.5	71.9	73.3	79.4	80.6
CT	**2,4,5,6**	**0,10,10,10**	**X,2,2,2**	46.6	56.3	61.7	69.9	73.9
CT	**2,4,5,6**	**0,10,10,10**	**X,1,3,3**	34.0	47.5	57.2	66.6	71.7
CT	**2,4,5,6**	**0,10,10,10**	**X,2,3,3**	33.9	47.5	57.2	66.6	71.7
CT	**2,4,5,6**	**0,10,10,10**	**X,1,4,4**	27.9	44.2	56.7	66.6	71.7
CT	**2,4,5,6**	**0,10,10,10**	**X,2,4,4**	27.8	44.2	56.7	66.6	71.7

Commercial

Commercial options were restricted to changes in season length and minimum length. Connecticut's current commercial fishery has three open seasons and New York's commercial fishery has two open seasons. Length distributions were imputed as described above for the recreational analysis, except that the size range used from the NY Headboat Survey was extended to >15" because the NY commercial fishery has a 15" minimum size. Illegal harvests (out of season) were ignored. Total reported harvest from trip level reporting in 2013-2015 was calculated for each open wave/season and converted to percent of total annual harvest. This was divided by the number of days in the season to provide an average daily percent of total annual harvest, permitting projection of cumulative harvest at different restrictions in season length. Some possible alternatives based on this method are shown below, based on a target harvest reduction of 47.2%. These projections can be revised to fit the appropriate reference point selected the technical committee.

CT- Commercial

Current seasons					
Period	Wave	Dates	Days open		
1	2	4/1 - 4/30	30		
2	4	7/1 - 8/31	62		
3	5	10/8 - 10/31	24		
4	6	11/1 - 12/24	54		
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
16	0	1	0	0.0	30
16	0	2	31	18.0	31
16	0	3	12	20.8	12
16	0	4	27	9.2	27
			70	48.0	100
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
16	0	1	30	1.6	0
16	0	2	62	35.9	0
16	0	3	5	8.7	19
16	0	4	4	1.4	50
			101	47.5	69
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
17	23.6%	1	30	1.6	0
17	23.6%	2	51	29.6	11
17	23.6%	3	0	0.0	24
17	23.6%	4	0	0.0	54
			81	31.1	89
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
17	23.6%	1	30	1.6	0
17	23.6%	2	0	0.0	62
17	23.6%	3	15	26.0	9
17	23.6%	4	14	4.8	40
			59	32.3	111
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
18	45.9%	1	0	0.0	30
18	45.9%	2	0	0.0	62
18	45.9%	3	2	3.5	22
18	45.9%	4	0	0.0	54
			2	3.5	168

NY LIS- Commercial

Current seasons					
Period	Wave	Dates	Days open		
1	1	1/1 -2/28	59		
2	2	4/8 - 4/30	23		
3	3	5/1 - 6/30	61		
4	4	7/1 - 8/31	62		
5	5	9/1 - 10/31	61		
6	6	11/1 - 12/31	61		
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
15	0	1	0	0.0	59
15	0	2	21	1.1	2
15	0	3	30	21.4	31
15	0	4	30	7.9	32
15	0	5	29	9.2	32
15	0	6	29	7.6	32
				47.2	
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
15.5	6.6%	1	0	0.0	59
15.5	6.6%	2	20	1.1	3
15.5	6.6%	3	27	19.3	34
15.5	6.6%	4	27	7.1	35
15.5	6.6%	5	28	8.9	33
15.5	6.6%	6	28	7.4	33
				43.7	
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
16	19.1%	1	0	0.0	59
16	19.1%	2	9	0.5	14
16	19.1%	3	22	15.7	39
16	19.1%	4	22	5.8	40
16	19.1%	5	22	7.0	39
16	19.1%	6	22	5.8	39
				34.7	
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
16.5	30.0%	1	0	0.0	59
16.5	30.0%	2	0	0.0	14
16.5	30.0%	3	16	11.4	45
16.5	30.0%	4	16	4.2	46
16.5	30.0%	5	16	5.1	45
16.5	30.0%	6	15	3.9	46
				24.6	
Min Size	**Len. Cred.**	**Period**	**Days closed**	**Savings**	**Days open**
17	38.3%	1	0	0.0	59
17	38.3%	2	0	0.0	23
17	38.3%	3	9	6.4	52
17	38.3%	4	9	2.4	53
17	38.3%	5	10	3.2	51
17	38.3%	6	10	2.6	51
				14.6	

Appendix.

Connecticut and New York Recreational Fishery, Open Seasons by Wave

Wave	Month	Connecticut	New York
1	January/February	Closed	Closed
2	March/April	Closed in March Open in April	Closed
3	May/June	Closed	Closed
4	July/August	Open	Closed
5	September/October	Closed in September Opens October 10	Closed in September Opens on October 5
6	November/December	Open in November Closes on December 6	Closes on December 14

Recreational Management Measures

STATE	SIZE LIMIT (inches)	POSSESSION LIMITS (number of fish/person/day)	OPEN SEASON	Days Open
Connecticut	16”	2 2 4	Apr 1-Apr 30 July 1 – Aug 31 Oct 10 – Dec 6	149
New York	16”	4	Oct 5 – Dec 14	70

Commercial Management Measures

STATE	SIZE LIMIT	POSSESSION LIMITS (number of fish)	OPEN SEASONS	2015 QUOTA (LBS)	Days Open
Connecticut	16”	10	Apr 1 - Apr 30 July 1 – Aug 31 Oct 8 – Dec 24	-	169
New York	15”	25 (except, 10 per vessel when fishing lobster pot gear and more than six lobsters are in possession)	Jan 1 – Feb 28 Apr 8 – Dec 31	-	327

Tautog Harvest Reduction and Spawning Stock Biomass Projection Analysis

New Jersey-New York Bight Region

I. Commercial Size and Season Reduction Analyses

Size Reduction Analysis

Length frequencies from the recreational sector were used for both the commercial and recreational sectors due to the lack of commercial length frequencies and to reflect the predominance of the recreational harvest (~90%) in the tautog fisheries for both New Jersey (NJ) and the south shore of New York (NYB). For NJ the data were pulled from the MRIP NJ harvest expanded length frequencies, the state's Volunteer Angler Survey's kept length frequencies, and the Type 9 MRIP records (Table 1). For NYB, the raw MRIP length frequency data were used due to the necessity of pulling out the records obtained from Long Island Sound. These data were supplemented by the New York State DEC Headboat Survey length frequencies and MRIP Type 9 data from the non-Long Island Sound records (Table 2). Only the length frequencies for legal harvests were used which for NJ in both the recreational and commercial sectors is 15 inches. The legal size for New York's commercial harvest is 15 inches while the recreational minimum size limit is 16 inches. The centimeter (cm) lengths were converted to inches (") with the following cm lengths serving as proxies as for inch lengths: 38 cm = 15"; 39 cm = 15.5"; 40 cm = 16"; 41 cm = 16.5"; 42 and 43 cm = 17"; 44 cm = 17.5"; 45 cm = 18".

For NJ, the percent savings in annual harvest of raising the size limit to 15.5", comprised of the portion of harvest attributed to 15" inch fish was 16.2%, with the percent savings rising to 31.7% for fish harvested up to 15.5" if the size limit were raised to 16". For NYB, the percent savings of raising the commercial limit to 15.5" was 8.2%, with 19.3% savings estimated for raising the minimum size to 16". For NYB's recreational sector, raising the current minimum size to 16.5" would result in an estimated 29.4% savings in annual harvest, with 49.1% estimated savings with a 17" minimum size. For NYB's commercial reductions, alternative analyses were run using NJ's percent savings to account for any biases from using NYB's recreational data due to the larger minimum size limit in effect for the recreational sector, and the equivalence of the size limit for NJ's fisheries, both recreational and commercial, with NYB's commercial fishery.

New Jersey

Data for the NJ commercial season analysis were obtained from ACCSP's NJ eTRIPS confidential fishermen harvest records for 2013 through 2015. Daily harvests were summed cumulatively by day for the year, with each cumulative sum converted to percentage of total annual harvest. A

mean average percent for daily harvest was then calculated across the 3 years. The mean daily harvest percentage at the end of each season (minus the percentages for previous seasons) was then divided by the number of open days within each season to calculate the daily percent contribution to the annual harvest by season. Table 3 illustrates example reduction scenarios based harvest reductions of 11% for a 70% probability of achieving NJ-NYB F_{Target}, and harvest reductions of 2% for a 50% probability of achieving F_{Target}. The current seasons for NJ are January 1 – 15, June 11 – 30, and November 9 – December 31 for a total of 88 days for the year. Retention of the current size limit of 15" would require reductions in season days, while increasing the minimum size to at least 15.5" would allow retention of current seasons with percent savings above the levels needed.

New York Bight

Data for the NYB commercial season analysis were obtained from summarized monthly landings from the New York DEC confidential commercial landings for 2013 through 2015. The monthly harvests were divided by the number of open days within each month to estimate daily harvests. The season day savings were then calculated similarly as the NJ estimates. Table 4 illustrates example reduction scenarios based on harvest reductions of 11% and 2% using the NYB size percent savings of annual harvest. The current season was divided into two periods, January 1 through February 28 and April 8 through December 31 for a total of 327 season days. Retention of the current 15" size limit would result in season reductions for both the 11% and 2% reduction scenarios. Increasing the size limit to 15.5" would allow for retention of current season days in the 2% reduction scenario, while an increase to 16" would be necessary to retain current season days in the 11% reduction scenario. Additional analyses were run using NJ's size percent savings (Table 5) with results similar to NJ's in size and season reduction examples. A third analysis was done splitting the larger NYB harvest season into two seasons to better reflect the relative increased harvest per season day from September through December (days 244 through 365) (Figure 1). These seasons were defined as January 1 through February 28, April 8 through August 31, and September 1 through December 31, and Table 6 illustrates possible size and season reduction scenarios using the NYB size savings percentages. Table 7 illustrates the possibilities with the three seasons using NJ's size savings percentages.

II. Recreational Size, Season and Bag Reduction Analyses

New Jersey

New Jersey's current recreational seasons occur during Waves 1,2,4,5 and 6 comprised of open dates from January 1 through February 28 with a 4 fish bag limit, April 1 through 30 with a 4 fish

bag , July 17 through November 15 with a 1 fish bag limit, and November 16 through December 31 with a 6 fish bag limit. The current minimum size limit is 15". Data for this analysis were obtained from MRIP raw length and catch frequency data by wave from 2013 through 2015 using only records showing legal size, bag and season harvests. Percent savings estimates by wave for size and bag limit options were calculated through an R code program created by Jeffrey Brust (NJDEP). Wave (season) savings were estimated by calculating the percent harvest by wave of the total annual harvest for the sum of the years 2013 through 2015. For New Jersey's recreational sector, similarly as for the commercial fishery, retaining the current 15" minimum size limit would require season reductions while raising the minimum size limit to 15.5" or larger would allow for the retention of current season days (Table 8).

New York Bight

New York's current recreational season occurs in Waves 5 and 6 only, comprised of open dates from October 5 through December 14 with a 4 fish bag limit. The current minimum size limit is 16". Data for this analysis was obtained from the MRIP raw length and catch data to exclude Long Island Sound harvests. Similarly to New Jersey, only the records of harvest within the legal size, season and bag limits were used. The analysis was conducted as described above for New Jersey. For the New York Bight recreational sector, retaining the current size of 16" would require season reductions while raising the minimum size to 16.5" or larger would allow for retention of current number of season days (Table 9).

III. NJ-NYB Harvest Reduction Estimate Concerns

Concerns were raised about the discrepancy to the degree of reductions necessary for MARI and LIS versus those for NJ-NYB when all three regions seemed to be similarly below their respective $SSB_{Threshold}$. Since the 2012 year class was shown to be unusually high in the stock assessment analysis for NJ-NYB, analyses were done using index data only through 2011 while retaining the actual harvest values through 2015. Projections from this analysis indicated that 47% and 38% reductions would be necessary for 70% and 50% likelihoods respectively of achieving F_{Target} in 5 years. These values were much closer to the percent reductions necessary for the two more northerly regions. Harvest reduction analyses were run using these percent reduction values and can be provided if needed.

Table 1. New Jersey Percent Harvest Reductions Based On Size Limits

New Jersey

Length (in)	NJ Type 9	%
15	2	0.250
15.5	2	0.250
16	4	0.500
Grand Total	8	

Length (in)	NJ VAS Lengths - Kept	%
15	93	0.280
15.5	8	0.024
16	90	0.271
16.5	5	0.015
17	53	0.160
17.5	3	0.009
18	32	0.096
18.5	5	0.015
19	20	0.060
19.5	1	0.003
20	7	0.021
21	4	0.012
22	4	0.012
23	2	0.006
24	2	0.006
25	2	0.006
27	1	0.003
Grand Total	332	

Length (in)	Total All NJ	%	Cumulative %
15	60,267.55	0.162	0.162
15.5	57,759.13	0.155	0.317
16	63,186.59	0.170	0.487
16.5	29,127.91	0.078	0.565
17	28,930.01	0.078	0.643
17.5	56,910.25	0.153	0.796
18+	76,092.89	0.204	1.000
Grand Total	372,282.33		

Length (cm)	NJ MRIP Expanded Landings	%
38	60,172.55	0.162
39	57,757.13	0.155
40	63,092.59	0.170
41	29,122.91	0.078
42	28,877.01	0.078
43	38,789.51	0.104
44	18,117.74	0.049
45	2,954.99	0.008
46	19,690.69	0.053
47	10,063.97	0.027
48	4,873.55	0.013
49	10,233.31	0.028
50	1,210.26	0.003
51	4,713.10	0.013
52	3,037.86	0.008
53	1,569.79	0.004
54	3,323.65	0.009
56	3,167.71	0.009
57	2,081.97	0.006
58	5,922.98	0.016
59	27.88	0.000
61	175.88	0.000
62	1,254.31	0.003
63	1,501.04	0.004
67	209.95	0.001
Grand Total	371,942.33	

Table 2. New York South Percent Harvest Reductions Based On Size Limits

NY Bight

Length (in)	NY Bight Raw MRIP	%
15	10	0.047
15.5	15	0.070
16	20	0.094
16.5	45	0.211
17	24	0.113
17.5	20	0.094
18	79	0.371
Grand Total	213	

Length (in)	NY Bight Type 9	%
15	7	0.636
15.5	2	0.182
16	2	0.182
Grand Total	11	

Length (in)	Total NY Bight	%	Cumulative %
15	26	0.1	0.082
15.5	35	0.1	0.193
16	32	0.1	0.294
16.5	62	0.2	0.491
17	32	0.1	0.592
17.5	33	0.1	0.696
18+	96	0.3	1.000
Grand Total	316		

NYS DEC Headboat Survey - NY Bight		
Length (cm)	NYS DEC	%
38	9	0.098
39	18	0.196
40	10	0.109
41	17	0.185
42	8	0.087
43	5	0.054
44	8	0.087
45	3	0.033
46	4	0.043
47	5	0.054
48		0.000
49		0.000
50		0.000
51		0.000
52	1	0.011
53		0.000
54	2	0.022
55		0.000
56		0.000
57		0.000
58		0.000
59	1	0.011
60		0.000
61	1	0.011
Grand Total	92	

Table 3. New Jersey Commercial Catch Reduction Analysis

Current New Jersey Commercial Regulations

Minimum Size: 15”

Possession Limit: N/A; commercial quota

Period	Open Season	Days Open
1	January 1 – 15	15
2	June 11 – 30	20
3	November 9 – December 31	53
	Total Open Days	88

11% Reduction for 70% Probability to Achieve F_{target}

Option 1: Maintain 15” minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – 15	13	2	11.22
2	June 11 – 30	18	2	
3	November 9 – December 31	46	7	
	Total Open Days	77		

Option 2: Raise minimum size limit to 15.5” or larger and retain current season length

2% Reduction for 50% Probability to Achieve F_{target}

Option 1: Maintain 15” minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – 15	11	4	2.08
2	June 11 – 30	20	0	
3	November 9 – December 31	53	0	
	Total Open Days	84		

Option 2: Raise minimum size limit to 15.5” or larger and retain current season length

Table 4. New York Bight Commercial Catch Reduction Analysis Using NYB Size Percent Savings

Current New York Commercial Regulations

Minimum Size: 15”

Possession Limit: 25 per person (10 per vessel when fishing lobster pot gear and more than 6 lobsters are in possession)

Period	Open Season	Days Open
1	January 1 – February 28	59
2	April 8 – December 31	268
	Total Open Days	327

11% Reduction for 70% Probability to Achieve F_{target}

Option 1: Maintain 15” minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	57	2	11.03
2	April 8 – December 31	237	31	
	Total Open Days	294		

Option 2: Increase to 15.5” minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	57	2	11.03
2	April 8 – December 31	259	9	
	Total Open Days	316		

Option 3: Raise minimum size limit to 16” or larger and retain current season length.

2% Reduction for 50% Probability to Achieve F_{target}

Option 1: Maintain 15” minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	54	5	2.02
2	April 8 – December 31	263	5	
	Total Open Days	317		

Option 2: Raise minimum size limit to 15.5” or larger and retain current season length

Table 5. Alternative New York Bight Commercial Catch Reduction Analysis Using New Jersey's Size Percent Savings

11% Reduction for 70% Probability to Achieve F_{target}

Option 1: Maintain 15" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	*57*	2	11.03
2	April 8 – December 31	237	31	
	Total Open Days	294		

Option 2: Raise minimum size limit to 15.5" or larger and retain current season length.

2% Reduction for 50% Probability to Achieve F_{target}

Option 1: Maintain 15" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	54	5	2.02
2	April 8 – December 31	263	5	
	Total Open Days	317		

Option 2: Raise minimum size limit to 15.5" or larger and retain current season length

Table 6. Alternative New York Bight Commercial Catch Reduction Analysis Using 3 Seasons and New York's Size Percent Savings

11% Reduction for 70% Probability to Achieve F_{target}

Option 1: Maintain 15" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	52	7	11.04
2	April 8 – August 31	130	16	
3	September 1 – December 31	108	14	
	Total Open Days	290		

Option 2: Increase to 15.5" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	57	2	11
2	April 8 – August 31	141	5	
3	September 1 – December 31	118	4	
	Total Open Days	316		

Option 3: Raise minimum size limit to 16" or larger and retain current season length.

2% Reduction for 50% Probability to Achieve F_{target}

Option 1: Maintain 15" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	58	1	2.03
2	April 8 – August 31	144	2	
3	September 1 – December 31	119	3	
	Total Open Days	321		

Option 2: Raise minimum size limit to 15.5" or larger and retain current season length.

Table 7. Alternative New York Bight Commercial Catch Reduction Analysis Using 3 Seasons and New Jersey's Size Percent Savings

11% Reduction for 70% Probability to Achieve F_{target}

Option 1: Maintain 15" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	52	7	11.04
2	April 8 – August 31	130	16	
3	September 1 – December 31	108	14	
	Total Open Days	290		

Option 2: Raise minimum size limit to 15.5" or larger and retain current season length.

2% Reduction for 50% Probability to Achieve F_{target}

Option 1: Maintain 15" minimum size; reduce open days

Period	Open Season	Days Open	# of lost fishing days	Total % Reduction
1	January 1 – February 28	58	1	2.03
2	April 8 – August 31	144	2	
3	September 1 – December 31	119	3	
	Total Open Days	321		

Option 2: Raise minimum size limit to 15.5" or larger and retain current season length.

Table 8. New Jersey Recreational Catch Reduction Analysis

New Jersey
Recreational

Current size limit = 15"

Current Seasons:

Wave	Dates	Days open	Bag Limit	
1	Jan 1 - Feb 28	59	4	
2	Apr 1 - 30	30	4	
3	Closed	0	0	
4	Jul 17 - Aug 31	46	1	
5	Sep 1 - Oct 31	61	1	
6	Nov 1 - Dec 31	61	6*	* Nov 16 - Dec 31
Total Open Days		257		

11 % Reduction for 70% Probability to Achieve F_{target}

Wave	Size	Bag	Days open	Total Savings
1	15	4	59	0.110046003
2	15	4	30	
3	15	0	Closed	
4	15	1	46	
5	15	1	54	
6	15	6	54	

Retain 15" minimum size & current bag limits but close 7 days each in Waves 5 & 6.

Raise minimum size to 15.5" or larger & retain current bag limits and seasons. Savings => 20.7%

2 % Reduction for 50% Probability to Achieve F_{target}

Wave	Size	Bag	Days open	Total Savings
1	15	4	59	0.020865772
2	15	4	30	
3	15	0	Closed	
4	15	1	46	
5	15	1	52	
6	15	6	61	

Retain 15" minimum size & current bag limits but close 9 days in Wave 5.

Raise minimum size to 15.5" or larger & retain current bag limits and seasons. Savings => 20.7%

Table 8. New York Bight Recreational Catch Reduction Analysis

New York Bight
Recreational

Current size limit = 16"

Current Seasons:

Wave	Dates	Days open	Bag Limit
1	Closed	0	0
2	Closed	0	0
3	Closed	0	0
4	Closed	0	0
5	Oct 5 - 31	27	4
6	Nov 1 - Dec 14	44	4
Total Open Days		71	

11 % Reduction for 70% Probability to Achieve F_{target}

Wave	Size	Bag	Days open	Total Savings
1	16	0	Closed	0.110050654
2	16	0	Closed	
3	16	0	Closed	
4	16	0	Closed	
5	16	4	16	
6	16	4	44	

Retain 16" minimum size & current bag limits but close 11 days in Wave 5.

Raise minimum size to 16.5" or larger & retain current bag limits and seasons. Savings => 14.2%

2 % Reduction for 50% Probability to Achieve F_{target}

Wave	Size	Bag	Days open	Total Savings
1	16	0	Closed	0.02000921
2	16	0	Closed	
3	16	0	Closed	
4	16	0	Closed	
5	16	4	25	
6	16	4	44	

Retain 16" minimum size & current bag limits but close 2 days in Wave 5.

Raise minimum size to 16.5" or larger & retain current bag limits and seasons. Savings => 14.2%

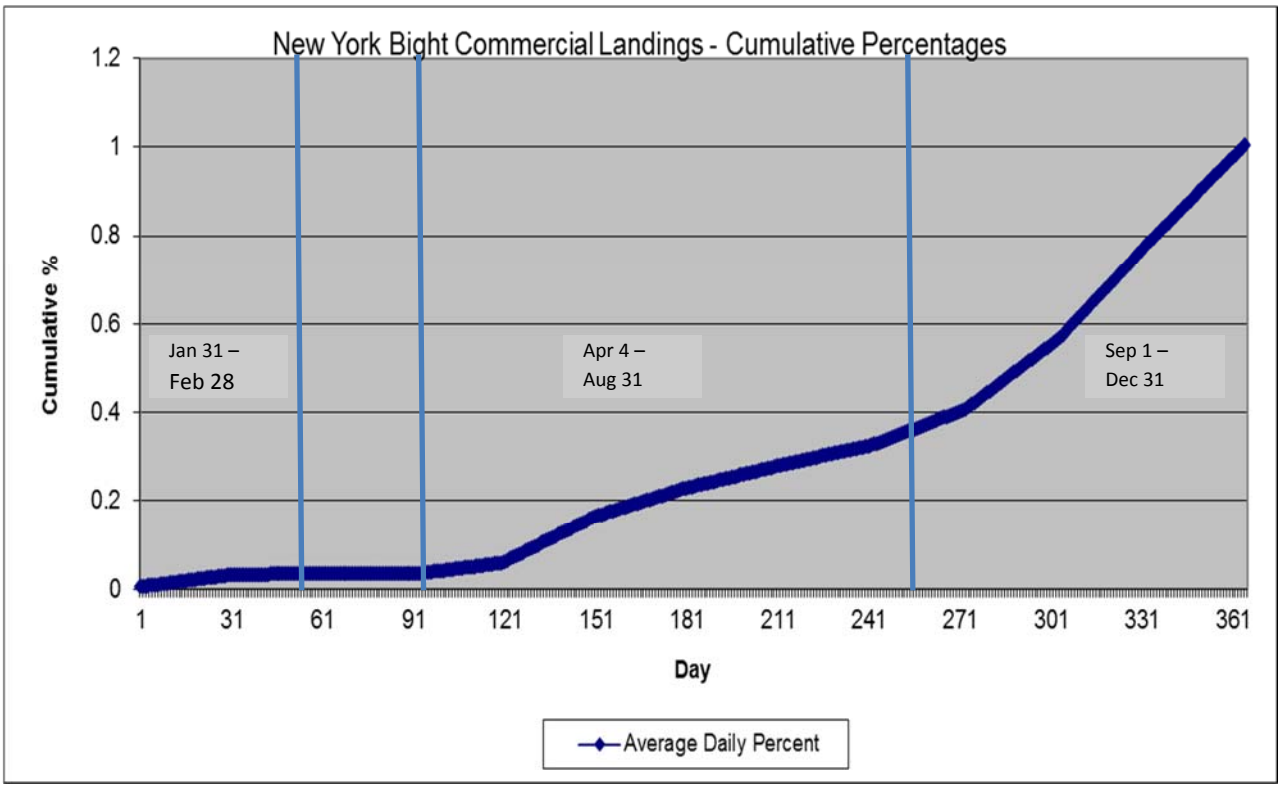


Figure 1. Cumulative Daily Percent New York Bight Commercial Landings

Table 9. Projections associated with the NJ-NYB (SPR) reference points

		Short-Term Projections		Long-Term Projection
SPR	2018-2020 Landings Scenario	Probability of being at or below F Target in 3 years	Probability of being at or above SSB threshold in 3 years	Year at which stock is estimated to be at or above SSB threshold
	Status quo (461	45%	85%	2046
	450 mt	50%	86%	2042
	410 mt	70%	88%	2030

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MEMORANDUM

January 20, 2017

TO: **Tautog Management Board**

FROM: **Plan Development Team and Regional Working Groups**

RE: **Guidance on Draft Amendment 1 and Review of Technical Committee Harvest Reduction Analysis**

Executive Summary

In October 2016, the Tautog Management Board (Board) created regional working groups comprised of Board and Plan Development Team (PDT) members (Table 1) to provide additional guidance on the alternatives and potential options for Draft Amendment 1. Three regional working groups (WG) were initiated: 1) Massachusetts-Rhode Island (MARI), 2) Long Island Sound (LIS) and New Jersey-New York Bight (NJ-NYB), 3) Delaware-Maryland-Virginia (DelMarVa). All WGs, except MARI, met via conference call twice to discuss the following:

- Commercial Quota
- Commercial harvest tagging program
- Differential sector reduction
- Management within a region

The DelMarVa, LIS and NJ-NYB working groups previewed the TC harvest reduction analyses on the second WG call. After review of the proposed harvest reductions and upon consideration of the opportunity to explore entirely new ways of managing the fishery in Draft Amendment 1, the WGs proposed additional TC tasks for the Board to consider.

<u>Potential TC Tasks, if Approved by the Board</u>

- LIS and NJ-NYB
    - Research peak spawning time periods
    - Evaluate the impact on potential harvest if:
        - A slot limit is implemented and similar seasonal closures (including spawning closures)
        - The regions have a consistent minimum size limit (15” or 16”), seasonal closures (including spawning closures) and bag limits
- DelMarVa
    - Evaluate the impact of a uniform 16” size limit and possession limit; is it then possible for the region to only have spawning closures?
    - Research peak spawning time periods.

- All WGs preferred a 50/50 sector reduction; therefore the TC did not evaluate options where one sector would take a greater reduction than the other.
- The MARI region was not able to hold a second WG call and may present additional TC tasks at the Winter Meeting.

The WGs discussed the four management issues identified above and provided guidance to the PDT on management options or program parameters that should be included in Draft Amendment 1. This guidance can be modified or removed at the Winter Meeting.

<u>Guidance to PDT</u>

- MARI
    - Calculate average landings by state over a 3, 5 and 10 year timeframe
    - Require unused commercial harvest tags to be turned in.
    - Consider rumble strip or traffic light approach to evaluate the degree of stock changes.
    - Consider management responses if a state or region exceeds their quota.

- LIS and NJ-NYB
    - There was a general agreement to explore a consistent minimum size limit and seasonal spawning closures across the two regions.
    - Spawning closures should be included in recreational and commercial management measures to protect brooding females and large males.
    - Biological and compliance justification for the minimum size to not exceed 16 inches.
    - Implementation of the harvest reductions should happen concurrently with the commercial harvest tagging program.
    - Consider a date the commercial harvest tags should be returned by, recommend February 15 of the following year.
    - There should be unique codes for New York's LIS and South Shore.

- DelMarVa
    - Include an option for a limited entry program.
    - Include an option that requires the sale of tautog to a federally permitted dealer.
    - Ensure gear restrictions align with black sea bass gear restrictions.
    - Require state quotas to be reviewed by the TC prior to implementation.
    - De minimis states should be required to participate in the commercial harvest tagging program.

Summary of the Regional Working Group Discussions

The following provides a more in-depth summary of the discussions within each WG. It also includes more context related to the tasks and guidance provided in the executive summary.

1. **Massachusetts-Rhode Island**

Commercial Quota

- RI and MA have commercial quotas; however states will need to think about quota allocation moving forward.
- *Guidance to PDT:* Will there be a management trigger if a state or region exceeds their quota? Will there be different consequences if a state or region exceeds one year versus three consecutive years?

Limited Entry

- RI currently has a quasi-limited entry system, where only fishermen with restricted endorsements can renew and there is a residency requirement for quota managed species, which includes tautog.
- MA is considering limited-entry program and how to account for tautog as bycatch.

Commercial Harvest Tagging Program

- *Guidance to PDT:* To obtain commercial harvest tags for the current fishing year, fishermen are required to turn in unused tags from the prior fishing year.

Regional Management

- Considering two pathways:
    - Calculate the maximum regional harvest and allocate the state harvest (e.g., state share) based on the proportion of historical landings. *Guidance to PDT:* Calculate average landings by state over a 3, 5 and 10 year timeframe.
    - Implemented consistent recreational regulations for the region and manage the commercial fishery with a quota, TBD if it will be a regional or state quota
        - The only difference in the recreational regulations are seasons: MA does not have any closures; whereas RI is closed January through mid-April, June-July and only private vessels can fish mid-October to mid-December
- *Guidance to PDT:* Recommend the development of response protocols to evaluate the degree of stock changes (i.e. rumble strip or traffic light approach that were developed for spot and croaker).

2. **Long Island Sound and New Jersey-New York Bight**

Restricting Commercial Harvest (quota, limited-entry, commercial harvest tags)

- CT is considering a lottery or lease scenario to distribute commercial harvest tags. Does not want to allocate tags based on history.

- NY is considering a limited-entry program. May consider a commercial quota in the future although it would be more difficult for NY because it is spread across two regions. A NY quota would require a more timely reporting system to be developed by the state.
- NJ has a commercial quota and limited entry program in place.
- *PDT guidance:* Commercial harvest tags should be returned by February 15 of the following year. NY tags should have a unique #/letter to differentiate whether it was issued to the LIS region vs south shore.

Regional Management

- General agreement to have some consistency across the region, starting with minimum size and spawning closures.
    - Given the species complicated spawning pattern it may be necessary to institute spawning closures for the region.
- CT wants LIS recreational measure as closely aligned as possible with NY. Also an interest in similar commercial measures.
- General belief that the tagging program and the finite amount of tags will limit the commercial harvest and the black market.
- TC member cautioned against raising the minimum size limit because larger females produce significantly more (and potentially higher quality) eggs than smaller females.
    - Non-compliance becomes more of an issue as the minimum size limit is increased. Given the pervasive black market issues in this fishery, managers want to avoid any measures that would increase non-compliance.
- The harvest restrictions and the commercial harvest tagging program should be implemented at the same time. Law abiding fishermen do not want to be penalized before the fishermen participating in the black market.
- *PDT Guidance:*
    - Spawning closures should be included in recreational and commercial management measures to protect brooding females and large males.
    - Biological and compliance justification for the minimum size to not exceed 16 inches.
    - Implementation of the harvest reductions should happen concurrently with the commercial harvest tagging program.
- *Potential TC Tasks*
    - Research peak spawning time periods
    - Evaluate the impact on potential harvest if a slot limit is implemented and similar seasonal closures (including spawning closures)
    - Evaluate the impact on potential harvest if the regions have a consistent minimum size limit (15” or 16”), seasonal closures (including spawning closures) and bag limits

3. **Delaware-Maryland-Virginia**

Commercial Quota

- VA is considering a commercial quota or ITQ, as well as a developing a tautog permit.
- DE and MD have a very small commercial fishery and are not considering a commercial quota. *PDT Guidance*: Develop options for a limited entry program, the initial criteria would likely be a black sea bass permit. It could be a tool in the toolbox for future implementation.
- Member states would meet annually to discuss a soft quota and review VA's proposals for a hard quota. *PDT Guidance:* The TC should review state quotas prior to implementation.
- *PDT Guidance:* Develop an option that would require harvesters to sell to a federally permitted dealer to improve transparency in the commercial fishery.
- *PDT Guidance:* Review gear restrictions to ensure they are consistent with the black sea bass gear regulations.

Commercial Harvest Tagging Program

- *PDT Guidance*: De minimis states have to adhere to the program
- VA will use average weight from their commercial harvest sampling program as their biological metric.

Regional Management

- Agreement to propose measures that will not greatly expand the fishery.
- The region would like the TC to explore regulation scenarios that achieve consistent regulations (size limit, bag size and season) across the region.
- *Potential TC Task:* Evaluate the impact of a uniform 16" size limit and possession limit; is it then possible for the region to only have spawning closures? If needed, the region would consider a slight harvest increase (up to 125 mt) to achieve this goal.
    - TC would evaluate the spawning season for the region.

Table 1. Regional Working Group Membership

MARI	LIS and NJ-NYB	DelMarVa
Dan McKiernan (Board: MA)	Dave Simpson (Board: CT)	John Clark (Board: DE)
Mark Gibson (Board: RI)	Steve Heins (Board: NY)	Mike Luisi (Board: MD)
Jason McNamee (PDT)	Russ Allen (Board: NJ)	Joe Cimino (Board: VA)
	Lindy Barry (PDT)	Craig Weedon (PDT)
	Sandra Dumais (PDT)	
Staff: Ashton Harp and Toni Kerns		