



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026
July 27, 2015

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MEMORANDUM FOR: John K. Bullard
Regional Administrator, GARFO

FROM: William A. Karp, Ph.D. *William Karp*
Science and Research Director

SUBJECT: Update of Skate Stock Status Based on NEFSC Bottom Trawl Survey
Data through Autumn 2014/Spring 2015

The purpose of this memo and report is to update the stock status of seven species of skates based on data from the NEFSC bottom trawl survey through autumn 2014/spring 2015. The previous annual report, dated August 22, 2014, was based on survey data through autumn 2013/spring 2014. The 2014 report highlighted the incomplete coverage of the spring 2014 survey and its impact on the estimated little skate survey index. The 2014 report also stated that one skate species was overfished (thorny) and overfishing was occurring in two of the seven skate species (thorny and winter).

Based on recent survey data collected through autumn 2014/spring 2015, one skate species remains overfished (thorny) and overfishing is no longer occurring for any of the seven skate species. For thorny skate, the 3-year average (2012-2014) survey catch/tow (0.13 kg/tow) was less than the $B_{\text{threshold}}$ (2.06 kg/tow).

Details about the survey indices, vessel calibration coefficients, and biological reference points for each skate species are provided in the attachment. Additional details are in the 2012-2013 Northeast Skate Complex Specifications, available online at (<http://www.nefmc.org/skates/index.html>).

Attachment



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ATTACHMENT

2015 NE Skate Stock Status Update (NEFSC, Lead Analyst: K. Sosebee, 7/24/2015)

Seven species of skates occur along the North Atlantic coast of the United States: winter skate (*Leucoraja ocellata*), little skate (*L. erinacea*), barndoor skate (*Dipturus laevis*), thorny skate (*Amblyraja radiata*), smooth skate (*Malacoraja senta*), clearnose skate (*Raja eglanteria*), and rosette skate (*L. garmani*). Skates are currently managed under the New England Fishery Management Council's Skate Fishery Management Plan implemented in 2003. This plan includes mandatory reporting by species, possession prohibitions on barndoor, thorny, and smooth skates, trip limits for winter skate, and Annual Catch Limits (ACL) for the wing and bait fisheries.

Indices of relative abundance (stratified mean weight/tow) have been developed from Northeast Fisheries Science Center's (NEFSC) bottom trawl surveys for the seven species in the skate complex. These indices and their rates of change form the basis for all of the conclusions about the status of the complex. All statistically significant NEFSC gear, door, and vessel (RV *Delaware II* to RV *Albatross IV*) conversion factors were applied to little, winter, and smooth skate indices when applicable. The calibration coefficients (FSV *Henry B. Bigelow* to RV *Albatross IV*) below represent changes in overall catch rates expressed in terms of average weight per tow and these were accepted by the New England Fishery Management Council's (NEFMC) Science and Statistical Committee (SSC). All values for survey catch/tow in **Table 1** and **Figure 1** are expressed in "Albatross" units. The survey, range of years, and survey strata sets used as the basis of biological reference points for each species are given in **Table 1**. These strata sets were revised and accepted by the NEFMC SSC in 2011. The changes to the strata sets resulted in changes to biomass reference point values for all species except rosette skate, as well as a change to the overfishing reference point value for clearnose skate.

Calibration coefficients for seven skate species captured during NEFSC bottom trawl surveys:

Species	Calibration Coefficient (Std Err)*	Comment
Little <i>Leucoraja erinacea</i>	2.785519 (0.32)	Spring Survey
Winter <i>Leucoraja ocellata</i>	2.174334 (0.31)	Fall Survey
Barndoor <i>Dipturus laevis</i>	3.661128 (0.51)	Fall Survey
Thorny <i>Amblyraja radiata</i>	3.626359 (0.58)	Fall Survey
Smooth <i>Malacoraja senta</i>	4.449518 (0.67)	Fall Survey
Clearnose <i>Raja eglanteria</i>	6.189401 (0.81)	Fall Survey
Rosette <i>Leucoraja garmani</i>	8.813973 (0.98)	Based on the calibration coefficient for little skate in the fall survey comparisons

*Calibration coefficients represent the ratio of *Bigelow* to *Albatross* catch weight per tow.

Biomass reference points are based entirely on NEFSC survey data, as reliable landings and discard information are not available by species. For all species except barndoor, the B_{MSY} proxy is defined as the 75th percentile of the appropriate survey biomass index time series for that species (**Table 1**). For barndoor skate, the B_{MSY} proxy is defined as the average of 1963-1966 autumn survey biomass indices since the survey did not catch barndoor for a protracted period.

Bottom trawl surveys in autumn 2014 and spring 2015 were complete. However, ship problems delayed the start of the 2014 spring survey until late March and a decision was made, for that survey only, to drop any strata south of Delaware (Offshore 61-68; Inshore 32, 35, 38, 41, and 44). The consequences of the delay were relatively minor for assessment of the skate complex overall because only the little skate assessment relies on the spring survey. Because the status determination criteria for little skate are based on 3-year survey averages, the 2014 spring survey value will enter into the little skate stock status calculation in 2015 and in 2016. The time series trends without the southern strata are very similar to the full assessment strata set and are generally within the 95% confidence limits of each series (**Figure 2**). Based on survey data from multiple years, the ratio between the survey index from the smaller (truncated) strata set and the full strata set is 1.091 kg/tow. Therefore, the estimated little skate index for spring 2014 was adjusted downward (i.e., divided) by this factor to account for the difference in spatial coverage that year. Some caution should be exercised when interpreting this value.

The fishing mortality reference points are based on changes in survey biomass indices. If the three-year moving average of the survey biomass index for a skate species declines by more than the average CV of the survey time series, then fishing mortality is assumed to be greater than F_{MSY} and overfishing is occurring for that skate species. The average CVs of the indices are given by species in **Table 1**.

For winter skate, the 2012-2014 NEFSC autumn average biomass index of 5.06 kg/tow is above the biomass threshold reference point (2.83 kg/tow) but below the B_{MSY} proxy (5.66 kg/tow). Thus the species is not overfished but is below B_{MSY} . The 2012-2014 average index is above the 2011-2013 index by 2%, therefore overfishing is not occurring.

For little skate, the 2013-2015 NEFSC spring adjusted average biomass index of 6.75 kg/tow is above both the biomass threshold reference point (3.07 kg/tow) and the B_{MSY} proxy (6.15 kg/tow), and thus the species is not overfished and is above B_{MSY} . The 2013-2015 average index is below the 2012-2014 average by 3.4%, therefore overfishing is not occurring as this decline is less than 20%.

For barndoor skate, the 2012-2014 NEFSC autumn average survey biomass index of 1.41 kg/tow is above the biomass threshold reference point (0.78 kg/tow), and thus the species is not overfished, but is not yet rebuilt to B_{MSY} (1.57 kg/tow). The 2012-2014 average index is above the 2011-2013 index by 16.5%, therefore overfishing is not occurring.

For thorny skate, the 2012-2014 NEFSC autumn average biomass index of 0.13 kg/tow is well below the biomass threshold reference point (2.06 kg/tow), indicating that the species is in an overfished condition. The 2012-2014 index is higher than the 2011-2013 index by 8.7%, therefore overfishing is not occurring.

For smooth skate, the 2012-2014 NEFSC autumn average biomass index of 0.19 kg/tow is above the biomass threshold reference point (0.134 kg/tow) and thus the species is not overfished but is not yet rebuilt to B_{MSY} . The 2012-2014 index is below the 2011-2013 index by 12.5%, therefore overfishing is not occurring as this decline is less than 30%.

For clearnose skate, the 2012-2014 NEFSC autumn average biomass index of 0.77 kg/tow is above both the biomass threshold reference point (0.33 kg/tow) and the B_{MSY} proxy (0.66 kg/tow), and hence the species is not overfished. The 2012-2014 index is below the 2011-2013 index by 23.3%, therefore overfishing is not occurring as this decline is less than 40%.

For rosette skate, the 2012-2014 NEFSC autumn average biomass index of 0.048 kg/tow is above the biomass threshold reference point (0.024 kg/tow), and thus the species is not overfished and is at B_{MSY} . The 2012-2014 index is above the 2011-2013 index by 14.6%, therefore overfishing is not occurring.

REFERENCES

Miller TJ, Das C, Politis PJ, Miller AS, Lucey SM, Legault CM, Brown RW, Rago PJ. 2010. Estimation of Albatross IV to Henry B. Bigelow calibration factors. Northeast Fish Sci Cent Ref Doc. 10-05; 233 p.

Survey (kg/tow)	BARNDOOR Autumn	CLEARNOSE Autumn	LITTLE Spring	ROSETTE Autumn	SMOOTH Autumn	THORNY Autumn	WINTER Autumn
Time Series Basis	1963-1966	1975-2007	1982-2008	1967-2007	1963-2007	1963-2007	1967-2007
Strata Set	Offshore 1-30, 34-40	Offshore 61-76, Inshore 17,20,23,26,29,32,35,38,41,44	Offshore 1-30, 34-40, 61-76, Inshore 2,5,8,11,14,17,20,23,26,29,32,35,38,41,44,46,56,59-61,64-66	Offshore 61-76	Offshore 1-30, 34-40	Offshore 1-30, 34-40	Offshore 1-30, 34-40, 61-76
2007	0.76	0.90	4.01	0.068	0.09	0.32	3.74
2008	1.11	1.23	6.29	0.029	0.10	0.20	9.62
2009	1.13	0.89	6.62	0.064	0.21	0.25	11.33
2010	1.10	0.68	10.63	0.028	0.18	0.28	8.09
2011	1.02	1.32	6.88	0.034	0.30	0.18	6.65
2012	1.54	0.93	7.54	0.040	0.21	0.08	5.29
2013	1.07	0.77	6.90	0.056	0.14	0.11	2.95
2014	1.62	0.61	6.54 ^a	0.053	0.22	0.21	6.95
2015			6.82				
2009-2011 3-year average	1.08	0.96	8.04	0.042	0.23	0.24	8.69
2010-2012 3-year average	1.22	0.97	8.35	0.033	0.23	0.18	6.68
2011-2013 3-year average	1.21	1.01	7.11	0.042	0.22	0.12	4.96
2012-2014 3-year average	1.41	0.77	6.99 ^a	0.048	0.19	0.13	5.06
2013-2015 3-year average			6.75 ^a				
Percent change 2010-2012 compared to 2009-2011	+12.6	+1.3	+3.8	-21.7	+0.8	-24.1	-23.2
Percent change 2011-2013 compared to 2010-2012	-1.0	+3.1	-14.9	+28.8	-5.0	-31.9	-25.7
Percent change 2012-2014 compared to 2011-2013	+16.5	-23.3	-1.6	+14.6	-12.5	+8.7	+2.0
Percent change 2013-2015 compared to 2012-2014			-3.4				
Percent change for overfishing status determination in FMP	-30	-40	-20	-60	-30	-20	-20
Biomass Target	1.57	0.66	6.15	0.048	0.27	4.13	5.66
Biomass Threshold	0.78	0.33	3.07	0.024	0.13	2.06	2.83
CURRENT STATUS	Not Overfished	Not Overfished	Not Overfished	Not Overfished	Not Overfished	Overfished	Not Overfished
	Overfishing is Not Occurring	Overfishing is Not Occurring	Overfishing is Not Occurring	Overfishing is Not Occurring	Overfishing is Not Occurring	Overfishing is Not Occurring	Overfishing is Not Occurring

Table 1. Footnote a. No survey tows completed south of Delaware in spring 2014. Values for 2014 were adjusted for missing strata (i.e., Offshore 61-68, Inshore 32, 35, 38, 41, 44) but may not be fully comparable to other surveys which sampled all strata.

Skate Complex Biomass Indices

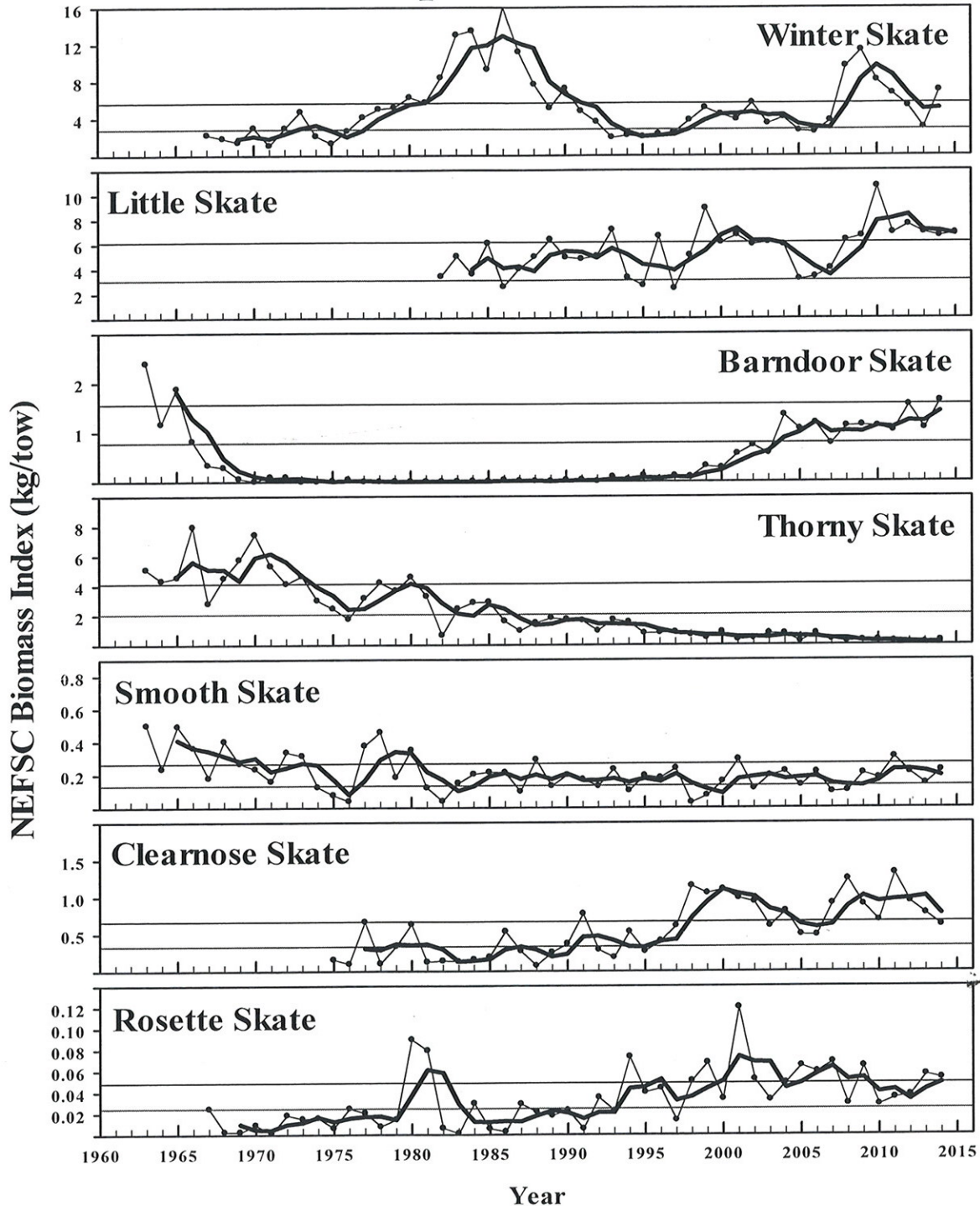


Figure 1.: NEFSC survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the biomass thresholds and targets developed through 2007/2008 with consistent strata sets.

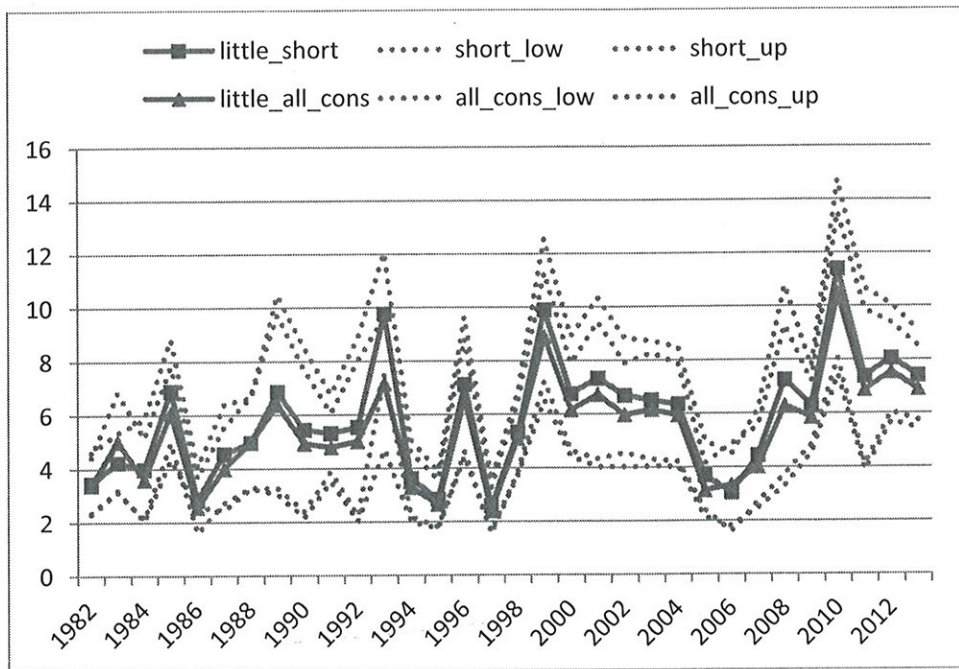


Figure 2. Little skate spring indices (kg per tow) based on all strata (i.e., full strata set; red triangles) and based on truncated strata set (i.e., strata south of Delaware Bay were removed; blue squares) from 1982-2013. The 95% confidence limits for each series are shown as dotted lines in the same color. The survey catch ratio of the truncated strata set to the full strata set is 1.091 (based on a ratio estimator = sum across years of survey estimates based on truncated series divided by sum of estimates based on full strata set).