



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 2, 2013

MEMORANDUM FOR: John K. Bullard
Regional Administrator, NER

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 2012 and Spring 2013

The purpose of this memo is to update the status of seven species of skates based on NEFSC bottom trawl survey data through autumn 2012/spring 2013. The previous update, completed on June 28, 2012, and revised on August 21, 2012, was based on NEFSC bottom trawl survey data through autumn 2011/spring 2012. The 2012 report stated that one skate species was overfished (thorny) and overfishing was not occurring in any of the seven skate species.

Based on new survey data collected through autumn 2012/spring 2013, one skate species remains overfished (thorny) and overfishing is occurring on two of the seven skate species (winter and thorny). For thorny skate, the 3-year average (2010-2012) survey catch/tow (0.18 kg/tow) was less than the $B_{\text{threshold}}$ (2.06 kg/tow). For winter skate, the 3-year average (2010-2012) decreased by 23% from the previous 3-year average (2009-2011). For thorny skate, the 3-year average (2010-2012) decreased by 24% from the previous 3-year average (2009-2011). These reductions in the thorny skate and winter skate 3-year average survey catch/tow exceed the overfishing threshold of 20% given in the Skate Fishery Management Plan for these two stocks.

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

Attachment

cc: R. Brown
F. Serchuk
J. Weinberg
P. Rago
G. Shepherd
M. Terceiro
K. Sosebee



ATTACHMENT

There are seven species of skates occurring 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 per 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 most of the conclusions about the status of the complex. All statistically significant NEFSC gear, door, and vessel (RV *Delaware* to RV *Albatross*) conversion factors were applied to little, winter, and smooth skate indices when applicable. The calibration coefficients (FSV *Henry B. Bigelow* to RV *Albatross*) 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, 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 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.

Biomass reference points are based entirely on NEFSC survey data, as reliable landings and discard data are not available by species. For all species but barndoor, the Bmsy proxy is defined as the 75th percentile of the appropriate survey biomass index time series for that species (Table 1). For barndoor skate, the Bmsy proxy is the average of 1963-1966 autumn survey biomass indices, rather than the full time series, because there was a protracted period when the survey did not catch barndoor skate.

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 it is concluded that overfishing is occurring for that skate species. The average CVs of the indices, which serve as overfishing threshold proxies, are given by species in **Table 1**.

For winter skate, the 2010-2012 NEFSC autumn average biomass index of 6.68 kg/tow is above both the biomass threshold reference point (2.83 kg/tow) and the B_{msy} proxy (5.66 kg/tow). Thus the species is not overfished and is 18% above B_{msy} . The 2010-2012 average index is below the 2009-2011 index by 23%; therefore overfishing is occurring as this decline is greater than 20%.

For little skate, the 2010-2012 and 2011-2013 NEFSC spring average biomass indices of 8.35 kg/tow and 7.11 kg/tow are 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 2010-2012 average index was above the 2009-2011 index by 4%. The 2011-2013 average index is below the 2010-2012 average by 15%; therefore overfishing is not occurring as the decline is less than 20%.

For barndoor skate, the 2010-2012 NEFSC autumn average survey biomass index of 1.22 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 2010-2012 average index is above the 2009-2011 index by 13%; therefore overfishing is not occurring.

For thorny skate, the 2010-2012 NEFSC autumn average biomass index of 0.18 kg/tow is well below the biomass threshold reference point (2.06 kg/tow), indicating that the species is in an overfished condition. The 2010-2012 index is lower than the 2009-2011 index by 24%; therefore overfishing is occurring as this decline is more than 20%.

For smooth skate, the 2010-2012 NEFSC autumn average biomass index of 0.23 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 2010-2012 index is above the 2009-2011 index by 1%; therefore overfishing is not occurring.

For clearnose skate, the 2010-2012 NEFSC autumn average biomass index of 0.97 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 2010-2012 index is above the 2009-2011 index by 1.3%; therefore overfishing is not occurring.

For rosette skate, the 2010-2012 NEFSC autumn average biomass index of 0.033 kg/tow is above the biomass threshold reference point (0.024 kg/tow), and thus the species is not overfished. The 2010-2012 index is below the 2009-2011 index by 22%; but overfishing is not occurring as this decline is not more than 60%.

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.

	BARNDOOR	CLEARNOSE	LITTLE	ROSETTE	SMOOTH	THORNY	WINTER
Survey (kg/tow)	Autumn	Autumn	Spring	Autumn	Autumn	Autumn	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
2004	1.33	0.80	5.95	0.048	0.22	0.72	4.08
2005	1.05	0.49	3.13	0.064	0.13	0.20	2.65
2006	1.17	0.48	3.33	0.059	0.21	0.74	2.52
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			6.90				
2006-2008 3-year average	1.01	0.87	4.54	0.052	0.14	0.42	5.29
2007-2009 3-year average	1.00	1.01	5.64	0.053	0.13	0.26	8.23
2008-2010 3-year average	1.11	0.93	7.85	0.040	0.16	0.24	9.68
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			7.11				
Percent change 2009-2011 compared to 2008-2010	-2.8	+3.0	+2.5	+4.6	+42.4	-2.4	-10.2
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			-14.9				
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 Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Overfished Overfishing is Occurring	Not Overfished Overfishing is Occurring

Table 1.

Skate Complex Biomass Indices

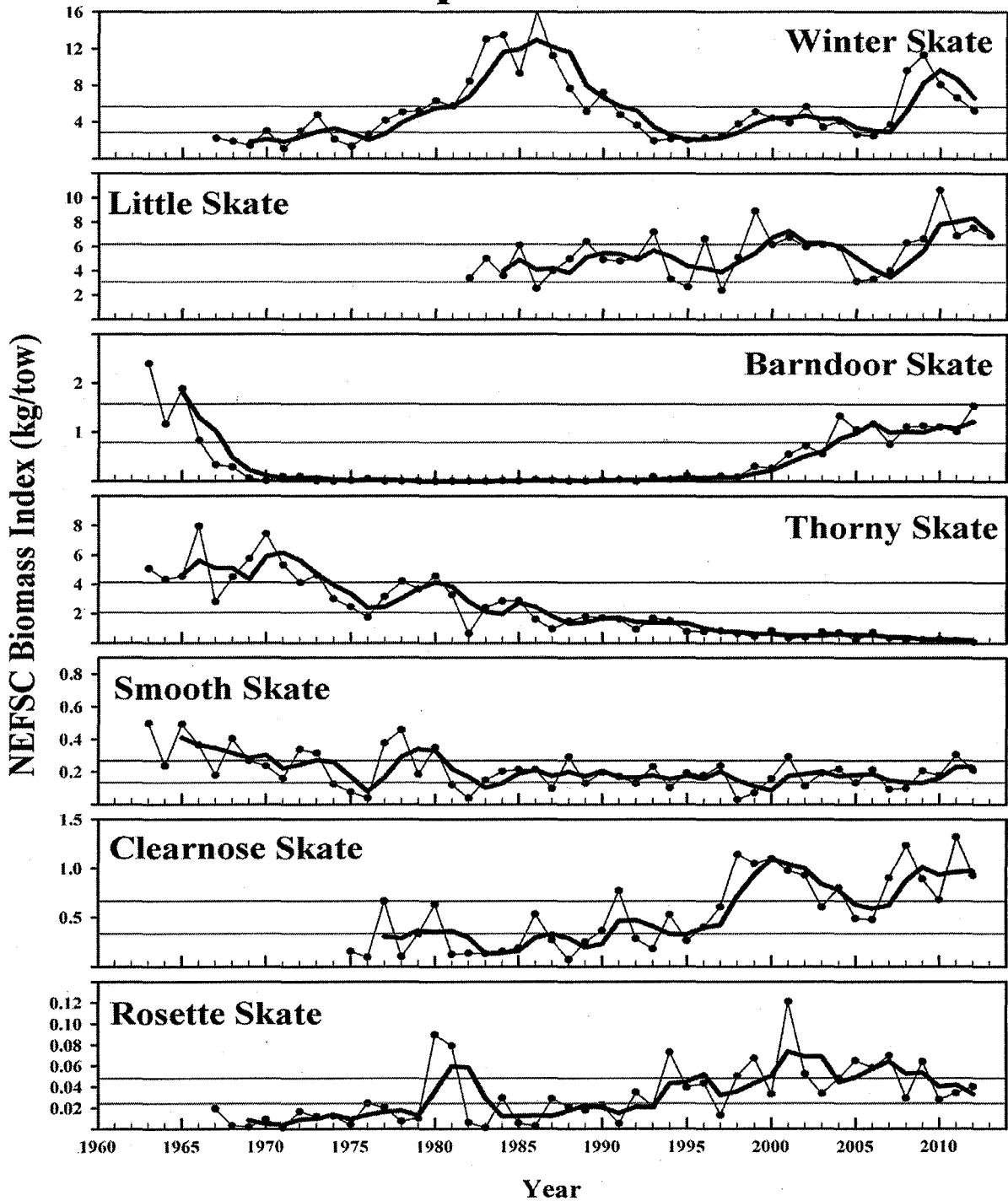


Figure 1. NEFSC survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the biomass thresholds and targets developed through 2007/2008 with consistent strata sets.