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

August 22, 2014

MEMORANDUM FOR: John K. Bullard
Regional Administrator, GARFO

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

SUBJECT: Update of Skate Stock Status Based on NEFSC Bottom Trawl Survey Data through Autumn 2013/Spring 2014

The purpose of this memo is to update the status of seven species of skates based on NEFSC bottom trawl survey data through autumn 2013 and spring 2014. There is an important change in the assessment of little skate. The little skate assessment is based on the NEFSC spring survey. Due to mechanical problems with the FSV *Henry B. Bigelow*, the spring 2014 survey was delayed by nearly a month. To ensure that we did not introduce an unknown seasonal effect into the survey results, the NEFSC elected to eliminate southern strata in the Mid-Atlantic. This decision allowed the remaining strata, located to the north, to be sampled at the time of year when they are typically sampled. Thus, the data that were collected in the spring 2014 survey are comparable in time and space to the data collected during previous surveys. The alternative was to attempt to complete the entire survey area but with delayed timing for all strata. That was not done because it would have introduced unknown bias in the catch in kg per survey tow data for all stocks.

The spring 2014 survey for little skate may not be comparable to earlier surveys, which sampled more strata from a broader area. To evaluate this, an analysis of the entire time series was done to estimate the difference in the little skate catch estimate caused by excluding the southern strata not sampled in spring 2014. In general, little skate are more abundant in the northern strata. Thus, survey catch estimates (in kg per tow) based only on the northern strata will be higher than those based on the entire strata set. Over the entire time series (1968-2013), the ratio of the time series without the southern strata to the full strata set is 1.091. To adjust the observed 2014 value for this average ratio, the 2014 value of 7.14 kg/tow for little skate was divided by 1.091, yielding an adjusted estimate of 6.54 kg/tow. Even though the adjustment is relatively small, some caution should be noted when interpreting little skate stock status using the spring 2014 value. This adjustment will also have consequences for updates in 2015 and 2016 because the adjusted value for 2014 will be included in the three-year averages in 2015 and 2016.

The previous update, completed July 2, 2013, was based on NEFSC bottom trawl survey data through autumn 2012/spring 2013. The 2013 report stated that one skate species was overfished (thorny) and overfishing was occurring in two of the seven skate species (thorny and winter).

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Based on new survey data collected through autumn 2013/spring 2014, the status of all skates remains the same as reported in the previous status update. Thorny skate remains overfished, and overfishing is still occurring on winter and thorny skate. For thorny skate, the 3-year average (2011-2013) survey catch/tow (0.12 kg/tow) is less than the $B_{threshold}$ (2.06 kg/tow). For winter skate, the 3-year average (2011-2013) declined by 26% from the previous 3-year average (2010-2012). For thorny skate, the 3-year average (2011-2013) declined by 32% from the previous 3-year average (2010-2012). As defined in the Skate Fishery Management Plan, overfishing for both thorny skate and winter skate occurs when the rate of population decline exceeds 20%.

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 2014-2015 Northeast Skate Complex Specifications, available online at (http://www.nefmc.org/skates/index.html).

Attachment
cc: R. Brown
M. Simpkins
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/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 revisions 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 *Leucoraja erinacea*	2.785519 (0.32)	Spring Survey
Winter *Leucoraja ocellata*	2.174334 (0.31)	Fall Survey
Barndoor *Dipturus laevis*	3.661128 (0.51)	Fall Survey
Thorny *Amblyraja radiata*	3.626359 (0.58)	Fall Survey
Smooth *Malacoraja senta*	4.449518 (0.67)	Fall Survey
Clearnose *Raja eglanteria*	6.189401 (0.81)	Fall Survey
Rosette *Leucoraja garmani*	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 in kg per tow.

Biomass reference points are based entirely on NEFSC survey data, as reliable fishery landings and discard information 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, given that the survey did not catch barndoor skates for a protracted period.

As noted in the cover memo, ship problems delayed the start of the 2014 spring survey until late March and a decision was made to drop any strata south of Delaware (Offshore 61-68; Inshore 32, 35, 38, 41, 44). The consequences of the delay are relatively minor for the skate complex because only the little skate stock assessment relies on the spring survey. The time series trends computed without those southern strata that were missed in 2014 are very similar to the trends based on the full assessment strata set (**Figure 2**). The ratio between the smaller strata set and the full assessment strata set is 1.091. Therefore, the little skate spring index in 2014 was adjusted downward by this factor to account for the missing strata. Some caution should be noted when interpreting stock status with the spring 2014 value now and in future years. Even if the full assessment strata set is sampled in future years, this data point will enter into status determination of little skate through 2016.

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 Fmsy 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 2011-2013 NEFSC autumn average biomass index of 4.96 kg/tow is above the biomass threshold reference point (2.83 kg/tow), but below the Bmsy proxy (5.66 kg/tow). Thus the species is not overfished but is below Bmsy proxy. The 2011-2013 average index is below the 2010-2012 index by 26%; therefore, overfishing is occurring as this decline is more than 20%.

For little skate, the 2012-2014 NEFSC spring adjusted average biomass index of 6.99 kg/tow is above both the biomass threshold reference point (3.07 kg/tow) and the Bmsy proxy (6.15 kg/tow), and thus the species is not overfished and is above Bmsy. The 2012-2014 average index is below the 2011-2013 average by 1.6%; therefore, overfishing is not occurring as this decline is less than 20%.

For barndoor skate, the 2011-2013 NEFSC autumn average survey biomass index of 1.21 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 Bmsy (1.57 kg/tow). The 2011-2013 average index is below the 2010-2012 index by only 1%; therefore, overfishing is not occurring.

For thorny skate, the 2011-2013 NEFSC autumn average biomass index of 0.12 kg/tow is well below the biomass threshold reference point (2.06 kg/tow), indicating that the species is in an overfished condition. The 2011-2013 index is lower than the 2010-2012 index by 32%; therefore, overfishing is occurring as this decline is more than 20%.

For smooth skate, the 2011-2013 NEFSC autumn average biomass index of 0.22 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 Bmsy. The 2011-2013 index is below the 2010-2010 index by 5%; therefore, overfishing is not occurring as this decline is less than 30%.

For clearnose skate, the 2011-2013 NEFSC autumn average biomass index of 1.01 kg/tow is above both the biomass threshold reference point (0.33 kg/tow) and the Bmsy proxy (0.66 kg/tow), and hence the species is not overfished. The 2011-2013 index is above the 2010-2012 index by 3.1%; therefore, overfishing is not occurring.

For rosette skate, the 2010-2012 NEFSC autumn average biomass index of 0.042 kg/tow is above the biomass threshold reference point (0.024 kg/tow), and thus the species is not overfished. The 2011-2013 index is above the 2010-2012 index by 29%; therefore, overfishing is not occurring.

References

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

Table 1. Resource survey and stock status information for seven skate species. Footnote "a": No survey tows were taken south of Delaware in spring 2014. The spring 2014 survey catch value (in kg per tow) for little skate was adjusted to account for the strata that were not sampled (Offshore 61-68, inshore 32,35,38,41,44), and may not be fully comparable to the other values.

(NOTE: Refer to Page 7 for Table 1 data.)

	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**
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	1.07	0.77	6.90	0.056	0.14	0.11	2.95
2014			6.54[a]				
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	1.21	1.01	7.11	0.042	0.22	0.12	4.96
2012-2014 3-year average			6.99[a]				
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	-1.0	+3.1	-14.9	+28.8	-5.0	-31.9	-25.7
Percent change 2012-2014 compared to 2011-2013			-1.6				
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**

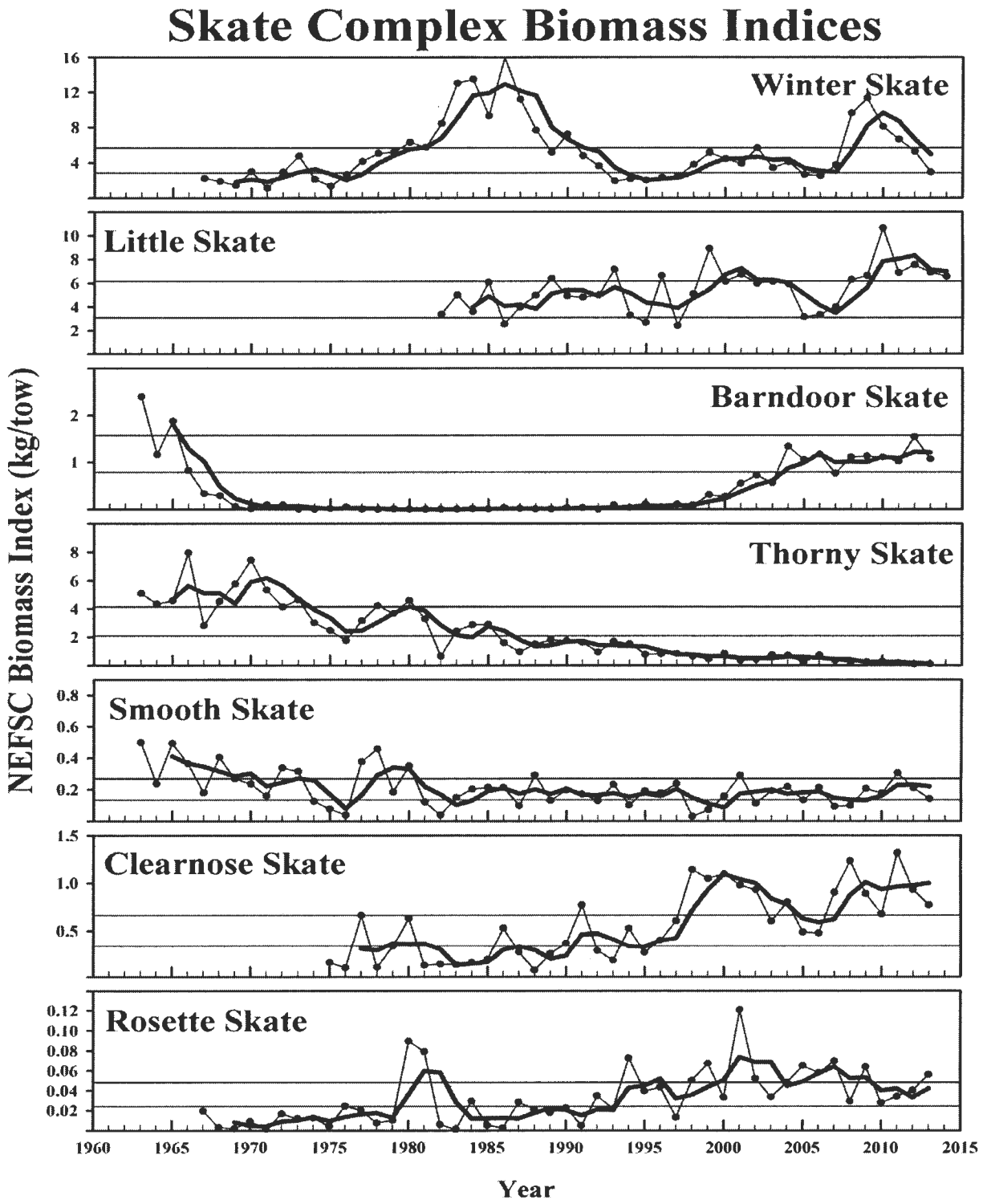

Figure 1. NEFSC survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the biomass thresholds and targets developed through 2007/2008 with consistent strata sets.

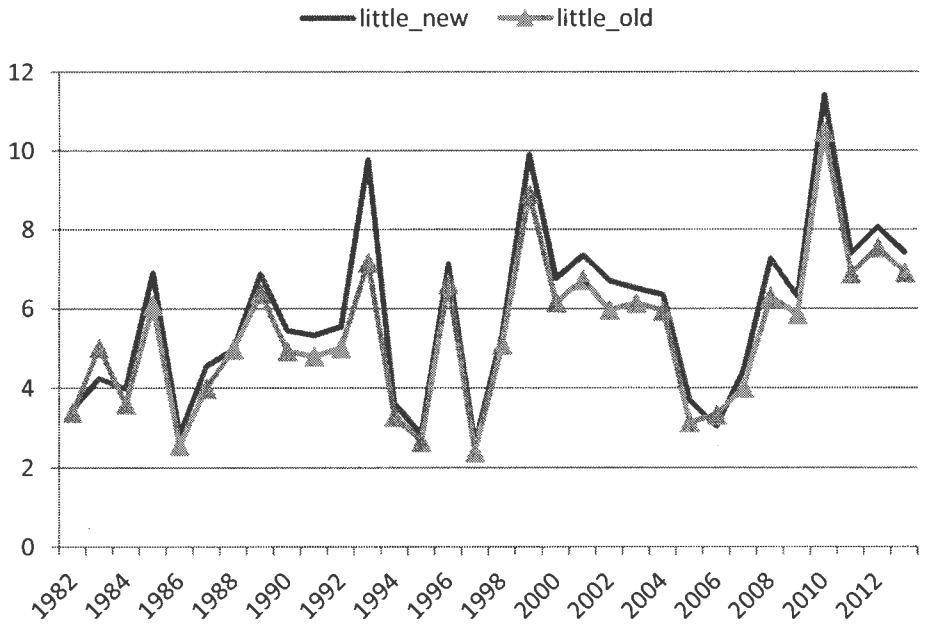

Figure 2. Little skate spring indices (kg per tow) with all consistent strata (triangles) and with strata south of Delaware Bay removed (solid line) from 1982-2013. The ratio of the truncated data series to the estimates from the full strata set is 1.091 (based on a ratio estimator =sum of estimates for truncated series divided by sum of estimates for full strata set).