

MEMORANDUM

DATE: July 30, 2008
TO: Skate Oversight Committee
FROM: Skate PDT
SUBJECT: Smooth skate rebuilding potential and rebuilding plan

This month the Council received notice that based on 2007 trawl survey data, smooth skate has become overfished (i.e. below the minimum biomass target of 0.16 kg/tow) and thorny skate was experiencing overfishing (i.e. the decline in the three year moving average for biomass was greater than 20%). In response, the PDT evaluated the rebuilding potential for smooth skate using available life history and survey information. It also evaluated the likelihood that Amendment 3 alternatives would address thorny skate overfishing and initiate smooth skate rebuilding.

Based on this analysis, the PDT found that to rebuild smooth skate within 6-10 years would require a minimum intrinsic rate of population growth of 0.1 to 0.2. Although critical information on survival and fecundity are missing, the PDT's best estimate of the maximum intrinsic rate (i.e. an average population growth rate with no fishing) of population growth for smooth skate is 0.20 (range 0.00 to 0.35). The PDT notes that when skate catch was below the median, smooth skate biomass increased 8 of the 11 years in the time series, with an average 37% annual increase in biomass. Based on this information rebuilding to the biomass target (0.31 kg/tow) within 10 years is possible.

Although the three year moving average for biomass declined below the threshold, smooth skate abundance has exhibited increases in abundance (0.12/yr) since the late 1990s, but abundance trends have been flat in the fall survey (0.00/yr). The Skate FMP prohibits landings of smooth and thorny skates and there is very little skate fishing that presently occurs in the Gulf of Maine. Furthermore, with catch limits set at or below the median for the time series, Amendment 3 is likely to provide sufficient conservation of smooth skate to initiate or continue smooth skate rebuilding. There is also potential conservation that could be realized through existing or planned regulations for the groundfish and monkfish FMPs. Skate discard estimates for 2007 are however unavailable, which could show the effects of Framework 42 on skate catches. But it is presently unclear what alternatives will emerge from Amendment 16 or how they may affect skate catches.

Nevertheless, the Skate PDT recommends consideration of measures to reduce skate bycatch in other fisheries. Implementing measures to reduce bycatch in the Gulf of Maine would provide conservation benefits for smooth and thorny skate (which are distributed primarily in the Gulf of Maine). An expansion of the required use of the haddock rope ("eliminator") trawl in the Gulf of Maine would provide this conservation benefit to skates (see Beutel et al. and Council analysis URL=).

Although gear restricted areas (GRAs) were not included as a measure in Amendment 3 alternatives, additional analysis may identify well-defined areas where a reduction of fishing

with gears capable of catching skates could have significant conservation benefits for overfished skates. It may be worthy of re-consideration of GRAs in future skate actions, particularly after the data poor assessment workshop has concluded and when the Council will hopefully have a better understanding of skate population dynamics.

Results

Leslie matrix demographic analysis for smooth skate

- Limited information is available on the life history of the smooth skate, with no information on fecundity, first year survival, or egg survival.
- Natural mortality was estimated indirectly from maximum age, age-at-maturity, and the von Bertalanffy growth parameter (Table 1).

Table 1.

	Smooth Skate Natural Mortality Estimates			
Method:	Hoenig	Pauly	Jensen	Jensen
Parameters used:	Max. age	K, Linf, Water temp	(tmat)	(K)
Estimates:	0.167	0.199	0.183	0.180

- There is not enough information from the survey indices to provide clear population trends and annual rates of increase that could be used to gain insights and narrow estimates for the unknown life history parameters. Thus, a sensitivity analysis was conducted over a reasonable range of input values.
- The base case scenario (first line in table) predicts a population growth rate of 0.2 yr^{-1} but given the uncertainty in the inputs estimates could range from 0 (clearly infeasible but without additional information it is impossible to determine which input parameters are in error), to a maximum of 0.35 yr^{-1} .
- If the observed growth of 0.12 yr^{-1} in the spring survey is valid (see Survey Trends below) and not simply a result of noisy data then the maximum population growth rate is bound from 0.12 to 0.35. Thus the base case model result of 0.2 seems very reasonable but difficult to support given the limited information.

Population trends of smooth skate from the NEFSC annual surveys

- Survey data is extremely noisy and shows no evidence of a declining population since the mid 1990's (Figures 1).
- The fall survey shows some evidence that population may have declined in the late 1960's but the values are highly variable and there is no evidence for either a declining or increasing abundance. A linear fit to log transformed values suggests the population has been stable (-0.007 yr^{-1}) since 1994.
- The spring survey appears to have a slightly greater catchability for smooth skate than the fall survey (mean of 0.57 versus 0.41 per tow for the entire time series, respectively) but values are also highly variable.
- A log transformation of the spring indices indicates that the population was in decline until the early 1990's with an apparent recovery occurring since around 1994. This would correspond to the timing of the Georges Bank closed areas.
- Since 1994, the spring survey data indicates that the population has been growing at a rate of around 0.12 yr^{-1} .

Figure 1. NMFS trawl survey indices of smooth skate abundance for the autumn survey (top) and spring survey (bottom).



