New England Fishery Management Council

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MEMORANDUM

DATE: **January 26, 2009**

TO: Scientific and Statistical Committee

FROM: Skate PDT

SUBJECT: **Skate ABC recommendations**

The Skate PDT recently incorporated the two new catch time series, both approved by the DPWS, into the updated ABC analyses that was applied in April 2008 to estimate ABCs for Amendment 3. Serving as background material, the results of the new analysis is described in Document 1; while the derivation of the landings and discards time series are described in Documents 2 and 3. In addition, Documents 4, 5, and 6 summarize and describe the skate assessment results from the Data Poor Assessment Workshop. Document 5 includes a discussion of why the DPWS recommended updating the survey-based biological reference points that define when skate stocks would be overfished.

Table 1. List of technical skate documents describing recent catch time series derivation and assessment modeling efforts.

#	Document title	Date	Contents	Important information
1.	Skate rebuilding catch limit re-analysis	Jan. 21, 2009	Application of previous biomass change model to new catch time series	Estimation of rebuilding potential based on observed changes in biomass at various historic catch levels.
2.	Discard estimation	Dec. 11, 2008	Comparison of discard estimates	Describes three new methods for estimating discards and compares them with previous estimates.
3.	Estimated species composition of skate landings and discards suing the selectivity ogive method	Jan. 14, 2009	Revised PDT method for allocating landings and discards to skate species.	Derivation of catch time series using selectivity ogive method.

#	Document title	Date	Contents	Important information
4.	Summary of Data Poor Assessment Workshop (DPWS) results	Undated Power Point presentation	Summary of assessment results	Methodology, discard estimates, attempted analytic models, proposed biological reference points.
5.	DPWS Skate Assessment Consensus Summary	Late Jan. 2009	Assessment results	Catch and biomass time series; assessment results.
6.	DPWS technical documents	Late Jan. 2009	Derivation of catch time series using length composition method.	Derivation of catch time series using length composition method.

New biological reference points

The DPWS recommended that the 'selected time series' for the overfishing definitions of all skates except barndoor skate should be updated to include data through the 2007 survey (2008 for little skate) to replace a 'selected time series' that includes data through the 1998 survey (1999 for little skate). The PDT recommends that the Council approve the updated biomass targets and thresholds through Amendment 3. Comparison of the existing and proposed reference points are given in the table below and contrasted with the current survey biomass.

Table 2. Comparison between current biomass status with existing and proposed new biomass (overfished) reference points.

	Stratified mean biomass (kg/tow)				
Skate species	Current biomass	Threshold	Proposed threshold	Target	Proposed target
Winter[1]	2.935	3.43	2.80	6.46	5.60
Little	5.040	3.27	3.51	6.54	7.03
Barndoor	1.002	0.81	0.81	1.62	1.62
Thorny[2]	0.425	2.2	2.06	4.41	4.12
Smooth[3]	0.144	0.16	0.14	0.31	0.29
Clearnose	0.635	0.28	0.38	0.56	0.77
Rosette	0.065	0.015	0.024	0.029	0.048

Changing the reference points is not automatic under the Skate FMP, but it is anticipated that the Council will include the DPWS recommendation in Amendment 3. Thus, the basis for setting an ABC to rebuild overfished skate stocks will have changed pending a Council decision to update the biological reference points, except for thorny skate whose landings are currently prohibited. Instead of rebuilding overfished skate stocks, the emphasis for setting the ABC should be on preventing overfishing. A mortality rate or level of catch that causes overfishing has not been determined, however, and reliable estimates of Fmsy are unlikely to be forthcoming in the near future due to poor model performance during the DPWS.

Using the updated reference points, only thorny skate would be classified as overfished and overfishing would be occurring. Smooth and winter skates are not overfished, but are,

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[1] Winter skate would no longer be considered overfished under proposed reference point.
[2] Status is overfished and overfishing is occurring under either reference point.
[3] Smooth skate would no longer be considered overfished under proposed reference point.

however, near the biomass threshold, and steps should be taken to prevent further declines in biomass. Biomass for these species has not dipped below the proposed threshold since 1997. These proposed biological reference point changes also modify the PDT's estimate of MSY, the yield if the C/B median is applied to skate biomass when all stocks are at the target. The effects of the revised biological reference points on MSY have been incorporated into the analysis in Document 1.

Figure 1. Trends in stratified weight per tow compared to updated biomass reference points. The blue, upper line represents the biomass target, considered to be a B_{msy} proxy. The red line represents the minimum biomass threshold and the stock is deemed to be overfished when the three year moving average for biomass is below this threshold.
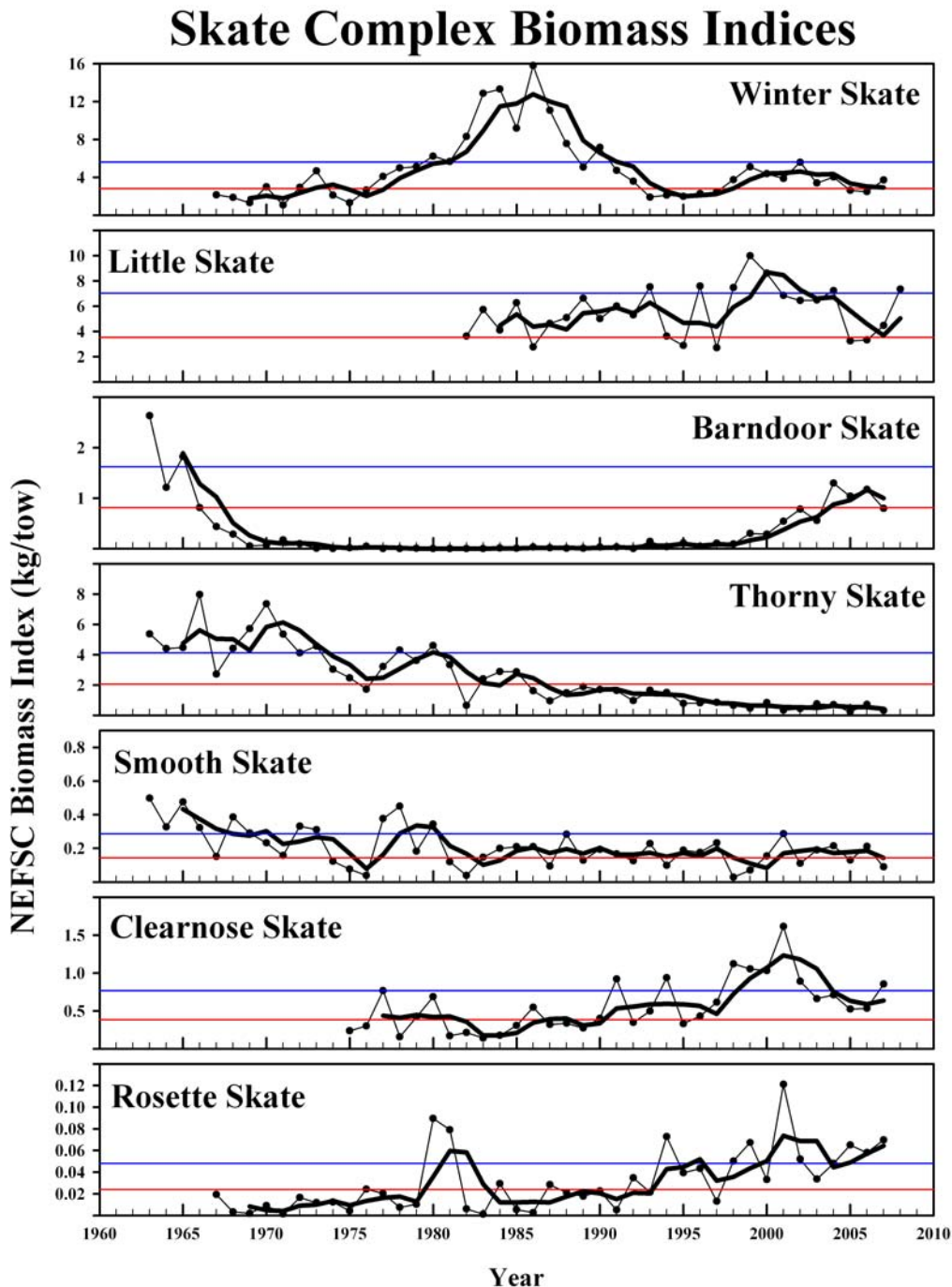
ABC choices

In the absence of a specific need for a rebuilding plan for winter and smooth skates, an appropriate ABC/ACL is still required by the Act. The probability of rebuilding biomass (or preventing biomass declines at specific catch level), however, cannot be demonstrated with the available new catch data and models (see Document 1 below).

Although the Skate PDT does not have a recommendation for which option to choose, a catch limit based on a C/B ratio may be sufficient to prevent overfishing and prevent stocks that are approaching an overfished condition from being overfished, but the choice of what level to apply is not obvious. Using the C/B ratio is more precautionary than using the median or average catch which the Pacific Fishery Management Council uses for data poor stocks classified in Tier 6 (see Table 4). The figure below shows how these choices compare with historic landings and catch. In the absence of an objective choice, the PDT proffers the choices listed in the table below with some pros and cons for each choice.

Table 3. Potential choices for setting skate ABCs with pros and cons for each choice. Catch and landings in 2006 were 33,121 and 15,057 mt, respectively. In 2007, they were 41,664 and 17,936 mt.

#	ABC options	Pros	Cons
1.	75th percentile of C/B ratio 2009 TAC = 41,281 mt 2009 TAL = 12,702 mt	a) ABC would be about 2007 level but TAL would need a 32% reduction. b) Since only thorny skate needs to rebuild, a drastic aggregate skate catch reduction is not needed. c) Automatically responds to changes in survey biomass	d) Less risk adverse than using the median value. e) New survey calibration introduces uncertainty in biomass index time series.
2.	Median C/B ratio 2009 TAC = 23,826 mt 2009 TAL = 7,328 mt	f) Catch limit is responsive to changes in biomass g) Automatically responds to changes in survey biomass	h) Median value is not an obvious choice based on past performance measures i) Relationship between C/B and ΔB is confounded by B_2 on both sides of equation j) Requires dramatic reduction in landings from current levels k) New survey calibration introduces uncertainty in biomass index time series.
3.	Median catch in time series 2009 TAC = 41,664 2009 TAL =12,819	l) Tends to be more conservative than the average catch. m) More stable limit.	n) Total catch is highly uncertain in early time series and omits foreign discards.
4.	75% of average catch in time series (PFMC tier 6) 2009 TAC = 31,724 2009 TAL =9,761	o) Easy to determine; precedent in other regions for data poor stocks p) More stable limit.	q) Total catch is highly uncertain in early time series and omits foreign discards.
5.	Cap TAL at 2007 level; ABC is 2007 + realized discards 2009 TAC = realized value 2009 TAL = 17,936	r) Prevents landings from increasing to unobserved levels.	s) Discards are not limited by the control rule t) Would not address thorny skate rebuilding

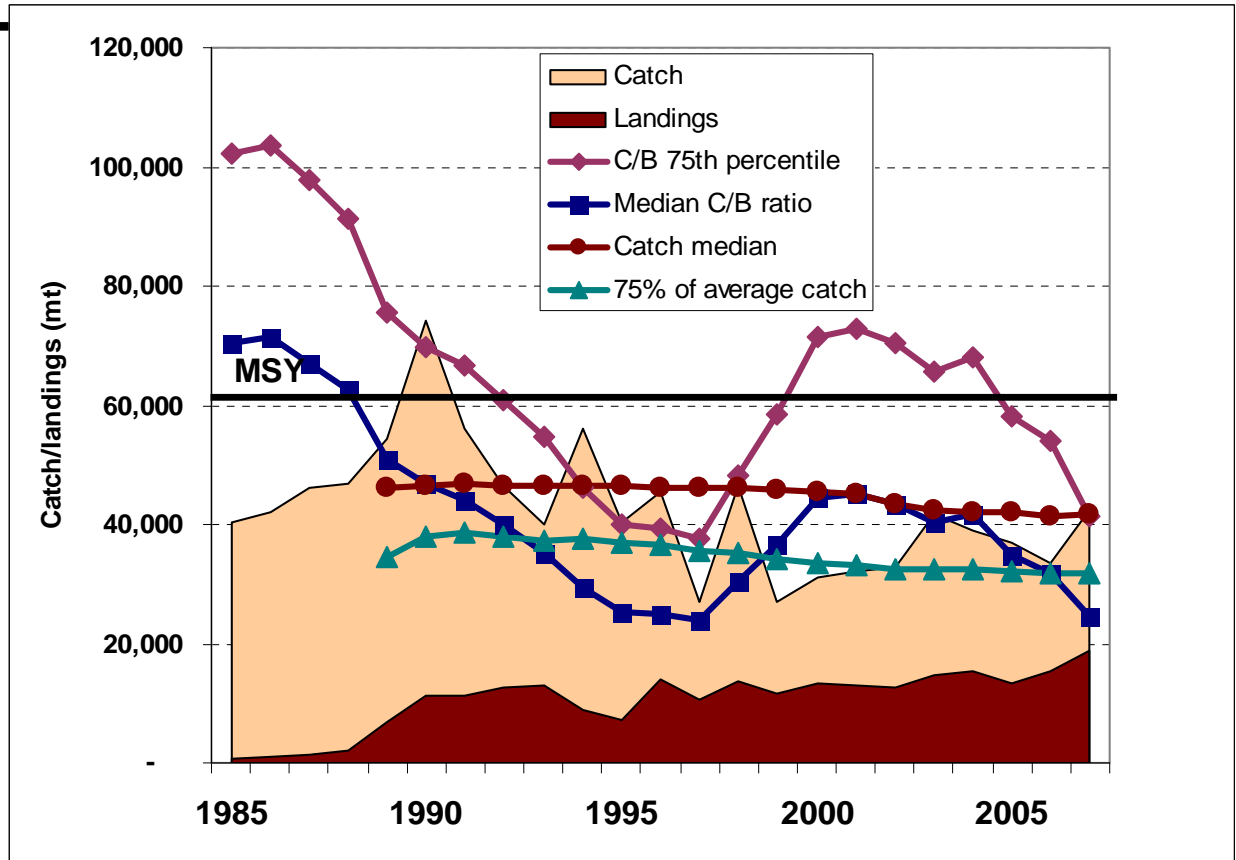**Figure 2.** Comparison of historic skate landings and catch with proposed catch limits.

Table 4. Pacific Fishery Management Council classification and basis of biological reference points.

Tier
1) Information available: *Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.*
   1a) Stock status: $B/B_{MSY} > 1$
   $F_{OFL} = \mu_A$, *the arithmetic mean of the pdf*
   $F_{ABC} \leq \mu_H$, *the harmonic mean of the pdf*
   1b) Stock status: $\alpha < B/B_{MSY} \leq 1$
   $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
   $F_{ABC} \leq \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
   1c) Stock status: $B/B_{MSY} \leq \alpha$
   $F_{OFL} = 0$
   $F_{ABC} = 0$
2) Information available: *Reliable point estimates of B, B_{MSY}, F_{MSY}, $F_{35\%}$, and $F_{40\%}$.*
   2a) Stock status: $B/B_{MSY} > 1$
   $F_{OFL} = F_{MSY}$
   $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$
   2b) Stock status: $\alpha < B/B_{MSY} \leq 1$
   $F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
   $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$
   2c) Stock status: $B/B_{MSY} \leq \alpha$
   $F_{OFL} = 0$
   $F_{ABC} = 0$
3) Information available: *Reliable point estimates of B, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.*
   3a) Stock status: $B/B_{40\%} > 1$
   $F_{OFL} = F_{35\%}$
   $F_{ABC} \leq F_{40\%}$
   3b) Stock status: $\alpha < B/B_{40\%} \leq 1$
   $F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
   $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$
   3c) Stock status: $B/B_{40\%} \leq \alpha$
   $F_{OFL} = 0$
   $F_{ABC} = 0$
4) Information available: *Reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.*
   $F_{OFL} = F_{35\%}$
   $F_{ABC} \leq F_{40\%}$
5) Information available: *Reliable point estimates of B and natural mortality rate M.*
   $F_{OFL} = M$
   $F_{ABC} \leq 0.75 \times M$
6) Information available: *Reliable catch history from 1978 through 1995.*
   $OFL =$ *the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information*
   $ABC \leq 0.75 \times OFL$

Changes in TAL and the effect of new discard estimates

During the development of Amendment 3, the perception was that discards had declined by 65% since 2002 and were being successfully managed through regulations in fisheries that have a significant skate bycatch. New discard estimates, however, indicate that 2007 discards are the highest since 2003 and may be increasing. As a result, the proportion of catch attributable to discards has increased from 38% (corrected) using Draft Amendment 3 data to 58-

59% using the DPWS data, the average 2005-2007 discard rate, and an assumption that 50% of discards perish. As in the April 2008 SSC review, the recent discard rate would be deducted from the target catch level to determine a TAL, which would be further allocated to the skate bait and wing fisheries. Using the new discard estimates, the updated TALs are much lower (7,328-7,786 mt) than previously estimated (10,484 mt corrected) assuming that the discard rate remains constant.