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To: Paul J. Howard, Executive Director
From: Dr**.** Steve Cadrin, Chairman, Scientific and Statistical Committee
Date: January 27, 2010

Subject: Review of EFH Omnibus 2, Phase II, Analytical Tool (SASI)

The Scientific and Statistical Committee (SSC) was asked to "*Evaluate the ways in which the Swept Area Seabed Impact (SASI) model can be used as a basis for crafting and analyzing alternatives to minimize to the extent practicable the adverse effects from fishing on Essential Fish Habitat*."

In March 2009, the SSC reviewed each portion of the SASI model and provided recommendations for each component:

1. *Vulnerability Analysis:*
    a. *While the literature review may not be comprehensive, it is an adequate basis for the development of analytical tools for evaluating adverse effects of fishing and associated uncertainty.*
    b. *The general matrix-based structure is appropriate for evaluating vulnerability, includes information on uncertainty and is consistent with the literature review. However, the approach presented to the SSC only included one major aspect of habitat, namely the geophysical component. The biological components of habitat, which have yet to be addressed, are essential elements for the evaluation of vulnerability, and they are necessary for implementation in the Omnibus Amendment.*
2. *The analytical approach of swept area of fishing effort is appropriate for evaluating seabed impact, but some modifications to the characterization of fishing effort should be considered to refine the method.*
3. *The general approach to the spatial analysis is appropriate to overlay habitat and fishing effort, but several methodological refinements are needed to more accurately characterize habitat, including analysis of heterogeneous data and the inference of energy levels from shear stress.*
4. *The proposed method for evaluation of impact of fishing on habitat has the potential to provide sensitivity-adjusted fishing areas for specific management alternatives. However, a more formal and transparent method is needed for the derivation of the sensitivity criterion used by the model and its uncertainty as a function of susceptibility and recovery. Higher spatial resolution of fishing effort is also needed.*
5. *In general, the SSC concludes that the PDT's general approach provides the best available approach to assessing the impacts of fishing on habitat. However, critical elements of the analysis need to be revised and the method needs to incorporate biological components before the methodology can be used to evaluate fishery management decisions. A revised methodology should be reviewed by the SSC or an external peer review before being applied as the analytical tool for the EFH Omnibus 2, Phase II.*

The Habitat Plan Development Team (PDT) responded to the SSC's recommendations and technical feedback, and the SSC reviewed a revised Swept Area Seabed Impact Model document and associated presentations on December 9, 2009. The SSC compliments the PDT on their efforts to provide a tool that uses the best information available to evaluate the effects of fishing on habitat. The SSC concludes that the SASI model is useful for evaluating alternative management options that have substantially different habitat impacts. However, several model limitations were identified that should be considered in applying the method.

Given the low resolution of some input data (e.g., location of fishing effort from logbooks, few substrate samples in some areas), the current SASI model results may not be well-suited to evaluate subtle differences in relative impacts among gear types. Some measure of uncertainty in impact (*Z*) is needed to evaluate the power of SASI for evaluating differences in habitat impact. Until a measure of uncertainty can be provided, the SASI is considered only capable of detecting large differences in relative habitat impact.

The assumption of additive impact of fishing effort (e.g., accumulating impact of multiple passes of gear or gear deployments) may be more reasonable for some gear types (e.g., fixed gear) than others (e.g., mobile gear). The location of mobile gear effort may overlap within fishing trips, while the location of seabed swept by fixed gears do not overlap within trips. As result of this difference, it is reasonable to assume that mobile gear area swept is not as additive as fixed gear area swept. Therefore, it may be appropriate to compare among mobile gears or among fixed gears, but not between fixed and mobile gears.

The next stage of development for the SASI model is to ground truth some of the model assumptions. For example, susceptibility of different habitats to different fishing gears should be field tested. Similarly, recovery rates of different energy environments should also be ground truthed. The model is flexible enough to allow for revised susceptibility and recovery information.

Technical feedback was that the document and presentations need to apply more precise terminology with respect to 'swept area' (*A*) and 'habitat impact' (*Z*). Given the SSC's involvement in providing the Council with recommendations on ecosystem-approaches to fishery management, it would be appropriate for the SSC to review applications of the SASI model for management decisions.

The SSC recommends that:

The Swept Area Seabed Impact model is a technically sound basis for evaluating relative effects of alternative management decisions on habitat impact. However, the data used by the model does not currently have adequate resolution for the model to detect subtle differences in habitat impact among different types of fishing gear.