

**Swept Area Seabed Impact (SASI) Model Peer Review  
On Behalf of the New England Fisheries Management Council  
Providence, RI – February 15-17, 2011**

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**Terms of Reference:**

- 1. Is the SASI approach a reasonable way to estimate the magnitude and location of adverse effects of fishing on EFH, as required by the MSA? In particular,**
  - a. Considering the availability of other tools used by Fishery Management Councils, is SASI -- without additional modification -- a valid approach to evaluate the adverse effects of fishing on EFH?**

*It is my professional opinion that the SASI model is a reasonable and effective framework for estimating the potential for geological habitat and inferred biological habitat modification to occur due to fishing activities. It provides these potential impacts in a spatial framework that allows additional data layers to be added for subsequent analysis. In question 1.a. it states "without additional modification" which would imply that this is a "turn-key" model. That is clearly not the case. SASI can be used, without significant modification, as a tool for focusing subsequent detailed analyses. The results from the SASI model should not be viewed as "the answer", but rather as a way to rank relevant alternatives and eliminate irrelevant ones.*

- 2 Is the SASI approach, including the geostatistical and practicability analyses, a reasonable way to develop and analyze spatially-based management alternatives to minimize the adverse effects of fishing on EFH? In particular:**
  - a. Have uncertainties in SASI inputs and resulting limitations of SASI been appropriately characterized for the Committee, Council, and members of the public?**

*The uncertainties in SASI inputs are well described within the document. However, model results are presented as deterministic and do not capture well the uncertainty in inputs. The panel review document covers this topic well. I want to emphasize that the assumption about cumulative impacts and additivity are of particular concern. It is more likely that the response function follows one of the more extreme situations, either a threshold effect or a diminishing effect. The model essentially averages these into a linear effect, which is probably the least likely outcome. As a minimum, sensitivity to the response function needs to be provided as a routine model output.*

*Another area that requires greater scrutiny is the susceptibility and recovery scoring done by the expert panel. Some sensitivity analysis was done on these scores, however, I am particularly concerned about the asymmetry in scoring categories, where the high score category (3) covers a >50% range and a 5-10*

*year period for recovery. These large ranges may have discouraged panelists from assigning these scores as opposed to the situation where the score ranges where symmetrical from 0-100%. This is in addition to the resolution one loses when assigning a single score to such a broad range. Therefore, I would like to see stronger justification for these ranges, as well as more exploration of what the literature might have to say about the pros and cons (e.g., literature on Likert and Likert-like rankings.*

- b. Is the spatial scale of the model outputs (i.e. 100 km<sup>2</sup> grid) appropriate for fishery management applications? What ecological processes are missed by estimating adverse effects at a 100 km<sup>2</sup> grid resolution? What implications does this have for development of alternatives?**

*The model's spatial scale is appropriate. It matches fishing data pretty well. The issue of missing larger scale ecological impacts shouldn't be a problem if the model is used appropriately. Again, the ability to overlay other data and information at different resolutions, allows one to deal with the impacts that don't occur at the SASI scale. Issues related to finer resolution can be dealt with when implementing the model for management. For example, more detailed finer scale mapping can be done for an area that is slated for some management action based on the SASI model output.*

- c. Are the practicability analyses appropriate to use for eliminating options at the alternatives development stage, or should they be reserved for a later stage when the impacts of various alternatives are being compared?**

*Although they were useful for illustration, the practicability analyses need a great deal more development before they can be applied. A great more can be done with existing trip data to model trip dynamics and potential responses to spatial management actions. The economics literature in trip decision making has grown significantly, and there are a variety of models that could be applied that are more realistic than the approach presented. These approaches incorporate uncertainty, and thus can provide the decision makers with the range and probability of different outcomes.*

- 2. Existing gaps in data and theoretical understanding of habitat-related processes have been identified during model development.**

- a. Review and evaluate research priorities that have been identified during the model development process.**

*As pointed out above and in the panel review, the nature of the damage function from fishing over time in an area needs to be better understood. There is not much more to add other than to emphasize how important this is.*

- b. Review and evaluate updates to the structure of the model that could be made in the future, given additional data or understanding of habitat-related processes.**

*The biggest challenge remains the linkage of habitat quantity and health to fish stock abundance. Even in the SASI model were able to characterize habitat impacts of fishing perfectly, we would still lack the ability to quantify the impact on fish stocks. We need to be able to differentiate between local impacts on fish availability and overall abundance.*