



## New England Fishery Management Council

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 John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

### MEMORANDUM

**DATE:** March 6, 2009  
**TO:** Scientific and Statistical Committee (SSC)  
**FROM:** Council  
**SUBJECT:** **Review of EFH Omnibus 2, Phase II, Analytical Tool (FiGSI)**

The Council is currently developing, in two phases, its Essential Fish Habitat (EFH) Omnibus Amendment 2. Phase I of this Amendment described and identified EFH for each managed species, reviewed the prey species consumed by each managed species, and reviewed non-fishing impacts to EFH. Phase II (currently in development) will include alternatives to minimize, to the extent practicable, the adverse impacts of fishing on EFH. To meet this goal, The Council's Habitat Plan Development Team is creating an analytic tool, the Fishing Gear Seabed Impact (FiGSI) model, which integrates fishing threats and fish habitats so that the Council can better understand the severity of threats and vulnerability of habitats. Methods and preliminary results are provided in Document 1; major components are highlighted in the following paragraph, and correspond with the terms of reference for the SSC review shown below.

Fish habitats are divided into three major components: geological, biological, and prey, which are in turn further disaggregated into habitat features. The **Vulnerability Assessment** uses a **Matrix-based Evaluation** to estimate quantitative susceptibility and recovery values for each feature by fishing gear type, based in part on a comprehensive **Literature Review**. Using the **Swept Area Seabed Impact model**, fishing effort data is subdivided by major gear type, represented universally as area swept, and scaled based on a particular gear's contact with the seabed to obtain contact-adjusted area swept. The **Spatial Model** uses three types of substrate data to generate dominant-seafloor-substrate base grid on which to combine fishing effort data with habitat vulnerability. Grid cells are classified as high or low energy using a **Critical Shear Stress Model**. The **FiGSI Model** combines contact-adjusted area swept and habitat vulnerability. Susceptibility and recovery scores from the vulnerability assessment are combined to generate a single sensitivity scalar for each feature. Features within each dominant substrate class are weighted according to their expected distributions to obtain a sensitivity score for each dominant-substrate/gear combination. Contact-adjusted area swept is then scaled by the appropriate sensitivity coefficient to obtain a sensitivity-adjusted area swept.

The Council has requested that the SSC review and provide input on this analytic tool, the Fishing Gear Seabed Impact Model, according to the terms of reference that were approved during a 14 November 2009 meeting of the Habitat Oversight Committee. Please note that the 14 November 2009 terms of reference are restructured slightly in order to better correspond with the organization of Document 1. Ideally, the SSC will provide feedback to the Council on these issues at the April 2009 Council meeting.

The Habitat PDT intends to have more fully developed results of some modeling exercises available to the SSC at the meeting.



**Terms of Reference for SSC review of the Omnibus Phase II analysis**

Evaluate the sufficiency of the Fishing Gear Seabed Impact (FiGSI) model as a basis for crafting and analyzing alternatives to minimize to the extent practicable the adverse effects from fishing on essential fish habitat. Specifically, provide the Council with commentary on the adequacy of the following components:

- 1. Vulnerability Assessment**
  - a. Literature review**
    - i. Is the literature review comprehensive and well developed?
    - ii. Does it provide an adequate basis for the Vulnerability Assessment?
    - iii. Does it adequately capture sources of uncertainty?
  - b. Matrix-based evaluation**
    - i. Is the assessment's matrix-based structure appropriate to its intended use?
    - ii. Are the assessment results consistent with the published literature?  
In cases where results are extrapolated are these cases treated appropriately?
    - iii. Are sources of uncertainty adequately carried forward from the literature review?
- 2. Swept Area Seabed Impact (SASI) Model**
  - a. Is the model structure appropriate for its intended use?
  - b. Are the data inputs (fishing effort) characterized appropriately?
- 3. Spatial Model**
  - a. Is the Critical Shear Stress Model appropriate for its intended use?
  - b. Are the substrate data inputs characterized appropriately?
- 4. Fishing Gear Seabed Impact (FiGSI) Model**
  - a. Do the model results make sense in the context of fishery management decision making?
  - b. Are the uncertainties previously noted adequately addressed?



In addition to the draft FiGSI document (document 1) , summaries of recent Oversight Committee and Plan Development Team meetings (documents 2-6) are provided to draw attention to committee and stakeholder concerns. These concerns are generally within the scope of the terms of reference, and include:

- Integration of geological habitat components with biological and prey habitat components in the FiGSI model
- The paucity of substrate data underlying the spatial model in some areas, in particular the Gulf of Maine, and the use of trawl survey hangs to represent boulder habitats
- The lack of gear impacts literature for fixed gears, including traps, gill nets, and longlines
- The estimation of contact indices in the SASI model
- The evaluation of hypothetical gear-feature interactions in the Vulnerability Assessment, and the need to summarize unlikely combinations of gears and substrates in the text
- The adequacy of the fishing gear descriptions used as the foundation for the Vulnerability Assessment

Council staff will present the FiGSI methods and results at the 18 March 2009 SSC meeting.

Relevant Meeting Materials:

1. Draft Summary of 03 March 2009 Habitat Oversight Committee meeting
2. Summary of 13 February 2009 Habitat PDT conference call
3. Summary of 11 February 2009 Habitat PDT meeting
4. Summary of 15 January 2009 Habitat Oversight Committee meeting
5. Summary of 05-06 January 2009 Habitat PDT meeting



# Essential Fish Habitat Omnibus Amendment 2

## Phase II – Analysis methods

New England Fishery  
Management Council

Scientific and Statistical  
Committee Meeting

18 March 2009



# *What are we trying to do?*

Minimize adverse effects of fishing on Essential Fish Habitat to the extent practicable

## *On what authority?*

EFH Final Rule

# *How are we doing it?*

## EFH Omnibus Amendment 2

### Phase I:

- Review EFH for all species managed by NEFMC
- Review prey species list for each managed species
- Review non-fishing impacts to EFH
- Designate HAPCs

### Phase II:

- Develop alternatives to minimize fishing impacts on EFH to the extent practicable

# *Phase II – In two parts*

In order to:

Develop management alternatives that reduce adverse impacts to fish habitats,

We have to:

Identify sensitive fish habitats, and determine how these habitats overlap with fishing effort

**Focus of review**





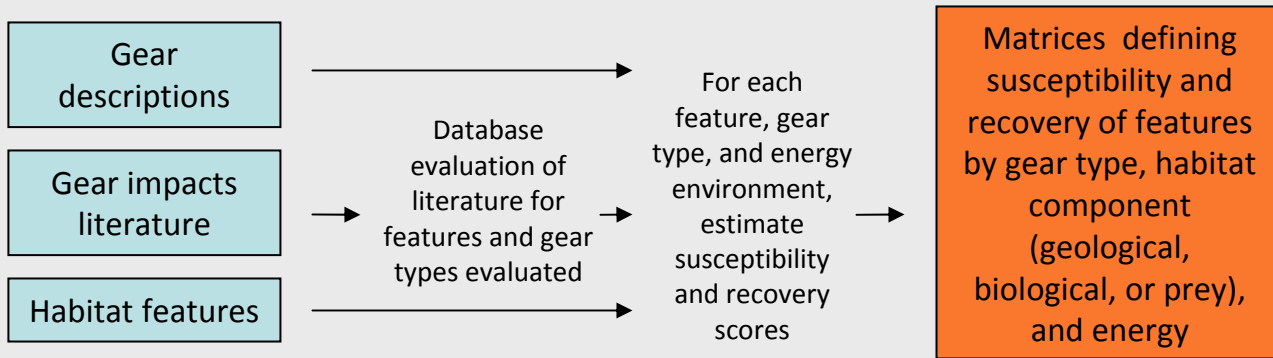
# *The Fishing Gear Seabed Impact (FiGSI) model*

1. Vulnerability assessment
  - a. Break down fish habitats into components that can be assessed individually
  - b. Review fishing impacts literature
  - c. Estimate the sensitivity of those habitat components to fishing
2. Convert fishing effort to swept area
3. Generate a surface on which habitat components and swept areas can be combined
4. Apply habitat sensitivity values to swept area estimates

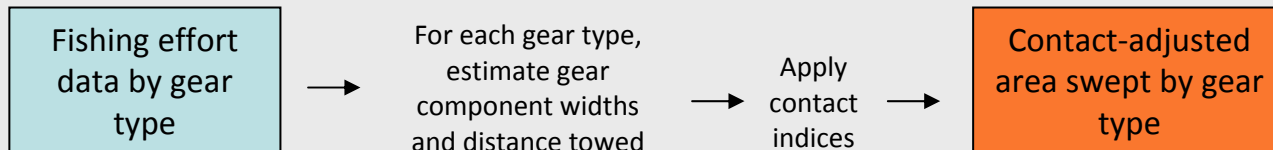
# the Fishing Gear Seabed Impacts (FiGSI) model



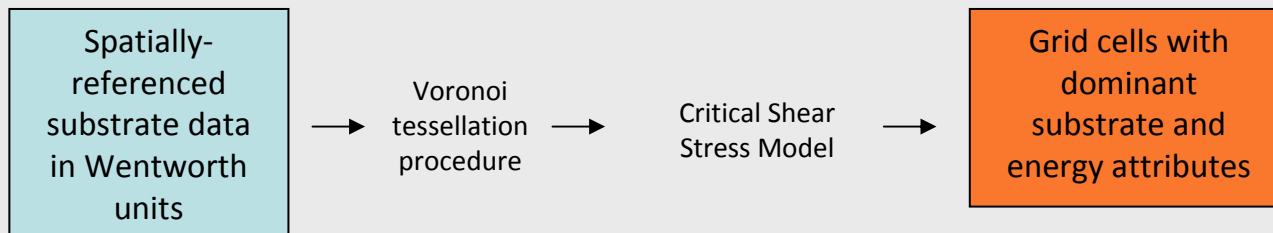
## Evaluate the effects of fishing gears on habitats (Vulnerability Assessment):



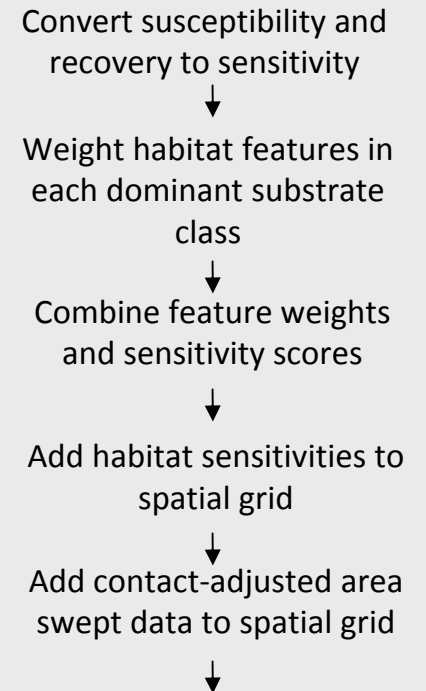
## Estimate effective fishing effort (SASI Model):



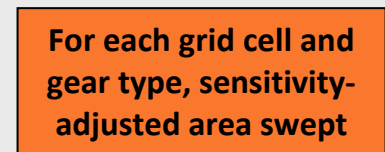
## Estimate Habitat and Energy components (Spatial Model):



## Combine habitat vulnerability and fishing effort spatially (FiGSI):



## Final output:



# *What has been done:*

- Literature review
- Sensitivity estimation for one of three habitat components (geological)
- Fishing effort estimation for trawl gears and scallop dredge gears (1996-2008)
- Construction of spatial grid
- Preliminary results generated for the above combinations

# *Terms of reference for review*

## **1. Vulnerability Assessment**

### a. Literature Review

- i. Is the literature review comprehensive and well developed?
- ii. Does it provide an adequate basis for the Vulnerability Assessment?
- iii. Does it adequately capture sources of uncertainty?

### b. Matrix-based evaluation

- i. Is the assessment's matrix-based structure appropriate to its intended use?
- ii. Are the assessment results consistent with the published literature? In cases where results are extrapolated are these cases treated appropriately?
- iii. Are sources of uncertainty adequately carried forward from the literature review?

# *Terms of reference for review, cont.*

## **2. Swept Area Seabed Impact (SASI) Model**

- a. Is the model structure appropriate for its intended use?
- b. Are the data inputs (fishing effort) characterized appropriately?

## **3. Spatial model**

- a. Is the Critical Shear Stress model appropriate for its intended use?
- b. Are the substrate data inputs characterized appropriately?

## **4. Fishing Gear Seabed Impact (FiGSI) Model**

- a. Do the model results make sense in the context of fishery management decision making?
- b. Are the uncertainties previously noted adequately addressed?

# *Next steps:*

- Complete vulnerability assessment for biological and prey habitat components
- Summarize fishing effort for hydraulic dredges and fixed gears (traps, gill nets, longlines)
- Weight biological and prey features by substrate to allow for spatial analysis
- Generate results and complete sensitivity analyses
- Use results to inform alternatives designed to minimize the adverse effects of fishing on EFH to the extent practicable