

JOINT SESSION BREAKOUT 1B: USING HABITAT INFORMATION IN SURVEY DESIGN AND ANALYSIS, DIADROMOUS/ESTUARINE DEPENDENT/REEF & UNTRAWLABLE GROUPS

Facilitators: John F. Walter (SEFSC), Stephen Ralston (SWFSC)

Rapporteur: Terill Hollweg (OHC, Restoration Center)

Top Recommendations

- The capacity of existing resource surveys should be expanded to collect habitat information concurrently.
- Create a comprehensive central repository for existing and future habitat data, specifically new multibeam data, and use to identify current information gaps. The Essential Fish Habitat Mapper or Multipurpose Marine Cadastre may provide useful templates or serve as potential data repositories.
- NMFS should facilitate greater use of vessel monitoring system (VMS) data beyond enforcement. Such data provides spatially-explicit information for assessing fishing gear impacts on habitat.

Overall Summary

The unanimous opinion of the group was that comprehensive mapping and classification are critical for incorporating habitat information into survey design, analysis, and improving fisheries assessments. In systems with such mapping, of which at least two were identified (i.e. west coast salmonid streams and the Florida Keys reef track), a broad suite of improvements in sample design, survey analysis, and stock assessment can be obtained by considering habitat. Habitat information can improve surveys a priori in the design phase through facilitating stratification to more efficiently allocate sampling resources. Post-survey improvements can be obtained from using habitat maps to either post-stratify survey results or in model-based standardization to account for factors that the sampling design cannot control.

The group felt that multibeam habitat mapping represents the state of the art for habitat classification, but that the optimal technology (e.g. sidescan sonar, LIDAR [light detection and ranging], aerial photography, and satellite remote sensing) will likely be habitat specific. In the short-term, substantial habitat information already exists and there is a need for a comprehensive repository for existing information, which will serve to identify gaps. Existing fishery surveys should be staffed and equipped to obtain habitat information to fill in gaps.

General Recommendations

- 1) Expand the capacity of existing fishery survey operations to collect and store habitat data at the same time as the collection of fishery data (benthic grabs, multibeam, and sidescan mapping capability).
- 2) Create a central repository of habitat data, specifi-

cally new multibeam data, similar to the Pacific Coast Ocean Observing System (PaCOOS; <http://ocean-watch.pfeg.noaa.gov/PaCOOS/>). The NOAA Essential Fish Habitat Mapper (<http://sharpfin.nmfs.noaa.gov>) and Multipurpose Marine Cadastre (www.csc.noaa.gov) may provide useful templates or may be potential repositories of information.

- 3) Explore the potential to obtain existing data from other governmental agencies (e.g. Bureau of Ocean Energy Management, Regulation and Enforcement [the former Minerals Management Service], U.S. Geological Survey) and nongovernmental entities (e.g. oil companies). Some partnerships already exist (i.e. <http://www.gulfofmexicoalliance.org>).
- 4) Create a NOAA-wide statistical support team using existing expertise. Sampling design, analysis, and considerations of design changes or modeling in response to habitat information may require a high level of professional statistical support.
- 5) Include a 'habitat' time series and/or narrative as background material in stock assessments (i.e. what is known about the habitat, how has it changed, and how might the time series of landings and catch per unit of effort (CPUE) be interpreted in terms of changes in habitat).
- 6) Caution should be exercised in model-based standardization of survey abundances in light of changing habitat characteristics. There is a difference between developing habitat models and standardizing survey data to account for habitat effects. Model-based standardization of survey CPUE for use as indices should only account for factors which affect survey catchability (i.e. if a trawl fishes differently on mud or sand). However, if the proportion of mud is increas-

ing over time, a standardization model could detrend a true abundance signal.

Habitat Subgroup Discussions

The larger breakout group split into smaller subgroups based on habitat types for further discussions. The three subgroups were: Diadromous, Estuarine Dependent, and Reef/Untrawlable.

Diadromous Fishes: Because of the life history bottleneck of returning to natal or nursery streams and rivers, the linkage between diadromous fishes and habitat is extremely direct. The major issue discussed by the group was NMFS' role in anadromous fish assessment and management, given the multiple jurisdictions and entities involved. The group felt that the state of the art was a comprehensive mapping and classification of all known spawning areas, such as exists for Pacific salmonids. However, while individual states have taken various initiatives to map and classify habitats, such a comprehensive mapping has not been conducted for all east coast diadromous fishes. Nevertheless, substantial work has been accomplished by individual states, government agencies (the U.S. Geological Survey, U.S. Fish and Wildlife Service), and other entities for which NOAA might serve as a strong partner. Further, given the critical role that diadromous fishes play in the marine ecosystem, explicit consideration of the spawning and nursery habitats of diadromous fishes will fall under the NOAA mandate for ecosystem considerations.

Estuarine Dependent: Estuarine dependent species share similar logistical difficulties with diadromous fishes, in that multiple agencies collect habitat information using different methods. Most estuarine dependent species are managed under state or intrastate management authority. A recommendation from the group is that NOAA may facilitate coordination of habitat monitoring, assessment, and classification programs through state-Federal partnerships such as the Southeast Area Monitoring and Assessment Program (SEAMAP). A particular logistical problem for incorporating habitat information into survey design and analysis is the extreme temporal variability of estuaries created by tidal and seasonal dynamics. These dynamics complicate presurvey stratification based upon habitat and may elevate the importance of post-survey stratification or model-based survey standardization. For example, if a survey cannot sample a habitat on all tidal cycles, it may be possible to incorporate a tidal cycle model into survey abundance estimates. It was the view of the group that comprehensive habitat surveys

and maps are needed before habitat per se can be used to improve resource survey design and analysis.

Reef/Untrawlable: Reef/untrawlable habitats represent unique environments for which the state of the art is high resolution maps of specific habitats (e.g. Flower Garden Banks, Heceta Bank, coral reefs) obtained with multi-beam sonar mapping or satellite imagery. The main limitation is that, like estuaries, relatively few habitats have been mapped, leaving substantial gaps in the information base. Some of these gaps can be filled by collecting data during ongoing surveys. Further, much of this high resolution information may have already been collected by the Bureau of Ocean Energy Management, Regulation and Enforcement (the former Minerals Management Service) and/or oil companies and it may be possible to obtain non-proprietary versions of the information. As these habitats can be heavily fished, high resolution vessel monitoring system (VMS) data also represents state of the art information for assessing fishing effects on habitat. Gaps in multibeam habitat mapping represent major impediments to incorporating habitat information into surveys and assessments.

Trigger Questions

Three trigger questions were posed to the group to stimulate and focus discussions. The questions were:

- 1) What is the state of the art and future potential for incorporating habitat information into survey design and analysis?
- 2) How can habitat data improve analysis of fishery data?
- 3) What new projects are feasible to implement in the next five years if funding was available? What are longer term research needs?

Q1 ~ State of the Art:

- State of the art technology is multibeam habitat mapping, though the best technology (sidescan sonar, aerial photography and satellite remote sensing) will likely be habitat-specific.
- Remotely operated vehicle, autonomous underwater vehicle, and glider technology can be platforms for deployment.
- VMS provides spatially-explicit fishing effort data.
- Habitat information can be incorporated a priori in stratified sampling or a posteriori through post-stratification or modeling.

Q2 ~ Improvement of Analysis:

- Pre-and post-survey gains in sampling efficiency (e.g. Bohnsack's Visual Census of Florida Reefs). Habitat mapping can facilitate survey stratification. Survey data can also be post-stratified after collection or habitat information can be incorporated into model-based abundance estimates.
- Improved standardization of fishery-dependent CPUE (coupled with either high spatial resolution catch rate or VMS data).
- Improved potential to recreate historical patterns of abundance, determine initial conditions or carrying capacity and to predict responses to changes in habitat. The group identified the following as important research questions:
 - How has loss of spawning streams reduced carrying capacity of diadromous stocks? (Diadromous Fishes)
 - How has the increase in hard substrate and oil rigs affected carrying capacity of red snapper? (Reef/Un-trawlable)

- How has the loss of oyster reef or seagrass habitat affected carrying capacity and function of estuaries? (Estuarine Dependent)

- Habitat can serve as a proxy/index for potential abundance in the assessment model.
- Improved understanding of ecosystem changes that have occurred during the time series of an assessment model.

Q3 ~ Needs in the Next Five Years:

- Create/expand central repository of habitat data, specifically new multibeam data, similar to PaCOOS in the Pacific.
- Comprehensive mapping of habitat quality of current and historic spawning tributaries for the 11 diadromous fish species on the east coast of North America.
- Conduct surveys in estuaries to map habitat availability and extent.
- Facilitate the greater use of VMS data beyond enforcement.

PROCEEDINGS

11TH NATIONAL STOCK ASSESSMENT WORKSHOP

Characterization of Scientific Uncertainty in Assessments to Improve Determination of Acceptable Biological Catches (ABCs)

JOINT SESSION OF THE NATIONAL STOCK AND HABITAT ASSESSMENT WORKSHOPS

Incorporating Habitat Information in Stock Assessments

1ST NATIONAL HABITAT ASSESSMENT WORKSHOP

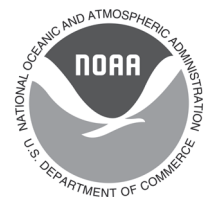
Moving Towards a National Habitat Science Program

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**U.S. Department
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Jane Lubchenco, Ph.D.
Administrator of NOAA

**National Marine
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Eric C. Schwaab
Assistant Administrator for Fisheries

Copies of this document may be obtained by contacting:

Office of Science and Technology, F/ST
National Marine Fisheries Service, NOAA
1315 East West Highway
Silver Spring, MD 20910

An online version is available at <http://www.st.nmfs.noaa.gov/>

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