



GULF OF MEXICO FISHERY MANAGEMENT COUNCIL

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November 3, 2008

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Dear Drs. *Bonnie Roy* Ponwith, Crabtree, and Michaels,

Please find the enclosed Gulf of Mexico Fishery Management Council (Council) List of Fishery Research and Socio-Economic Priorities for 2010-2015. This list of fishery research and socio-economic priorities was reviewed by the Scientific and Statistical Committee (SSC), the Socio-Economic Panel (SEP), and suggestions from staff at the Southeast Fisheries Science Center were included. The Research and Socio-Economic Priorities for 2010-2015 were approved by the Council at their October 27-30, 2008 meeting in Mobile, Alabama. If you have any questions, please do not hesitate to call.

Sincerely,

Tom
Tom McIlwain, Ph.D.
Council Chairman

TM:CMS:tk

Enclosures: Gulf of Mexico Fishery Management Council List of Fishery Research and Socio-Economic Priorities for 2010-2015.

C. John Boreman
Gulf Council
Technical Staff

Gulf of Mexico Fishery Management Council
List of Fishery Research and Socio-Economic Priorities for 2010-2015

The following list of research priorities is organized in three main sections:

I. Priorities associated with broad, multi-purpose research and monitoring programs aimed at collecting a variety of data for a number of species prioritized and listed below.

- a. Fishery Independent Sampling: Develop a Gulf-wide fisheries-independent monitoring program to enhance our capacity to correlate fisheries data with environmental data, habitat quality and abundance, and physical oceanographic parameters. In addition, more resources are needed to improve existing NMFS fishery-independent sampling programs such as SEAMAP ground fish and larval surveys, bottom long-lining, and video/trap surveys (consecutive years of better spatial/temporal coverage, larger number of stations sampled, more biological samples, etc.). Enhance physical and biological sampling to develop a long-term time series of chlorophyll/phytoplankton and zooplankton biomass from areas of concern such as the Mississippi River plume.
- b. Fishery Dependent Surveys: Enhance existing recreational (for-hire and private/rental sectors) and commercial fishery dependent sampling programs. Specifically, improve temporal/spatial coverage (ideally Gulf-wide and potentially including international fisheries such as Mexico), increase collection of hard parts and tissues to support life history studies and catch-at-age analyses. All fisheries logbooks should be required to provide precise geo-referencing on all harvesting.
- c. Estimation of Discards: Develop methods and research/monitoring programs to evaluate the magnitude and impacts of dead discards (both commercial and recreational), and develop practical methods for minimizing catch-and-release/discard mortality. The estimation of the total number of discards requires a broad systematic expansion of fishery observer programs, in some cases by adding observer personnel and in others (e.g., small or unsafe vessels) by use of innovative technologies (e.g., cameras). This needs to be done for all components of the commercial and for-hire industry as well as the recreational sector.
- d. Large-scale Tagging Program: Develop a large-scale tagging program (conventional dart tags, PIT tags, telemetry, and genetic tagging methods) to better quantify fishing mortality rates, movements, and improve estimates of natural mortality.

II. Priorities associated with individual species or specific research topics.

Each species listed in this section has identified research needs provided by SEDAR workshop panels. Each species and the respective SEDAR project is assigned a priority code as indicated below. In some cases research needs for each species are to be addressed by the broad-based research and monitoring programs described in section I above. Additional research needs are listed individually under each species when applicable.

Priority Codes

A: Highest Priority – Stocks designated as overfished AND overfishing

B: 2nd Priority – Stocks designated as overfished OR overfishing

C: 3rd Priority – Stocks with SEDAR assessments scheduled but not classified A or B

D: Everything else (Not yet prioritized) (Criteria is needed to prioritize non-SEDAR recommendations)

1. **SEDAR 7, Gulf of Mexico Red Snapper** – Priority Code: A
 - Research to clarify the magnitude and timing of density-dependent compensation in juveniles by estimating survival (age-0 and age-1) at different densities of juvenile abundance.
 - Research is recommended to estimate (independently of any stock assessment) changes in catchability by gear over time.

2. **SEDAR 9, Gulf of Mexico Greater Amberjack** - Priority Code: A

3. **SEDAR 9, Gulf of Mexico Gray Triggerfish** - Priority Code: B
 - More aging studies in addition to Wilson et al. (1995) and W. Ingram (2001) including radiocarbon dating or mark-recapture with staining to verify annulus formation in spines.

4. **SEDAR 10, Gulf of Mexico Gag** – Priority Code: B
 - Additional research on the number, location and persistence of spawning aggregations should be obtained and presented in future assessments to identify essential habitat.
 - Research and develop a suitable method to correct species misidentification between black and gag grouper on a trip by trip basis.
 - Research should be conducted to quantify changes in catchability over time and to determine a more appropriate level and degree of increasing catchability.
 - Continue genetics research to determine connectivity among different regions.
 - Improved spatial depth related mortality including ages of fish throughout the Gulf of Mexico should be collected.
 - Environmental factors (when possible) should be considered in future index standardization procedures, particularly for spawner-recruit relations.
 - The mature sex ratio needs to be observed, from which it may also be possible to calculate information about male fertility and the number of sperm required for successful fertilization.

5. **Upcoming Assessment. Yellowedge Grouper** – Priority Code: C
 - Early life history information for juveniles, such as abundance.
 - Adult habitat and distribution.
 - Spawning behavior, aggregations, and locations are needed.

6. **Upcoming Assessment. Tilefishes** – Priority Code: C
 - Catchability of the dominant males during spawning.
 - All basic biological and fishery data to improve ability to assess both Golden Tilefish and Gray (Blueline) Tilefish

7. **SEDAR 6, Goliath Grouper** – Priority Code: C
 - Research and monitoring the demographics and stock structure of the population (historical Gulf wide range vs current south Florida), particularly age composition, could provide valuable information (as it has for red drum in the Gulf of Mexico).
 - Obtaining and quantifying information on historical abundance, perhaps via old logbooks.
 - Additional research on stock structure and quantification of sources of mortality (accidental or illegal harvest etc.).
 - Research on abundance and distribution in mangroves over several years, documenting changes in available nursery habitat and annual variation (goliath grouper spend their first 6-7 years in mangrove areas, sometimes attaining as much as 50 lbs).

8. **SEDAR 12, Gulf of Mexico Red Grouper** – Priority Code: C
 - Develop methods to evaluate the impact of natural events such as red tide in modeling instantaneous natural mortality (M) and the overall assessment.
 - Continue studies on fecundity and spawning frequency and incorporate a spatial-temporal design to improve estimates of reproductive potential by age. Other studies should include collection of spawning pattern to better understand and discriminate between annual asynchrony in spawning (skipped spawning) and seasonal asynchrony in spawning (fishery models could incorporate this information).
 - Research a two-gender growth model that explicitly addresses maturation (protogynous hermaphrodite gender change differences in growth).
 - Study and quantify temporal and spatial changes in catchability rate, including when natural events such as red tide occur.

9. **SEDAR 3, South Atlantic/Gulf of Mexico Yellowtail Snapper** – Priority Code: C
 - Continued research and development on the reef visual census before use as a fishery-independent abundance index.

10. SEDAR 9, Vermilion Snapper – Priority Code: C

11. SEDAR 19, Black Grouper – Priority Code: C

The priority of black grouper could change after the 2009 assessment.

12. SEDAR 6, Hogfish – Priority Code: D

Note: The 2004 SEDAR 6 assessment was not accepted, but has not been redone.

13. Atlantic and Gulf of Mexico King Mackerel – Priority Code: D

- Western Gulf king mackerel catches need to be aged for use in age length key analyses.
- Field studies are needed to develop or improve batch fecundity, spawning frequency, and age specific fecundity estimates, including size and age at maturity.
- More studies on stock mixing such as analyzes of otolith shape and microchemistry.
- Data from Mexican catches need to be obtained and quantified for better identification of eastern and western stock components (international cooperation).

14. Red Drum – Priority Code: D

- Evaluate feasibility of experimental commercial fishery for adult red drum in offshore areas to obtain information on status of stock and ability to sustain a fishing mortality on adults.

III. Ecosystem Based Management Recommendations

Short-term goal is to develop predictive ecosystem models to project fisheries productivity, assess uncertainty in stock assessments, and improve single species and evaluate impacts of proposed management actions from an ecosystem perspective. Long-term goal is to develop data and methods to conduct integrated ecosystem assessments (IEAs) for the Gulf of Mexico as described in NOAA Technical Memorandum NMFS-NWFSC-92 (Integrated Ecosystem Assessments, June 2008), and to provide the necessary information to effectively adapt management to mitigate the ecological, social and economic impacts of major shifts in the productivity of living marine resources.

1. Data Collection Priorities:

A. Data Mining, Compilation, Processing and QC/QA

- Physical Components (GIS database development/mapping of habitat, climatologically, geographic and oceanographic variables).
- Human Components (social and economic inputs).
- Biotic Components (coastal habitat, coral, algal/zooplankton, fishery, etc.).

B. Establishing Ecological Relationship, Linkages and Network

- Habitat Mapping, Quality Assessment, Species Utilization and Alterations.
- Community Structure/Fish Assemblage Analysis and Resilience.
- Analysis of Ecosystem Network and Interactions.
- Development of Leading Ecological Indicators (akin to the FATE [Fisheries and the Environment] initiative), i.e.,
 - Biological indicators as leading and performance indicators derived from the analysis of (1) fish recruitment, distribution and migration, (2) ecosystem community structure, (3) annual fish growth patterns from length-at-age data (e.g. otoliths), (4) fishery production and other mortalities, and (5) primary and secondary production.
 - Physical indicators derived from a combination of data sources, including (1) satellite / remote sensing, *in situ* oceanographic measurements, and (2) large-scale atmospheric and oceanic fields (both time series and derived products).

2. Ecosystems Model Development:

A. Goal is to develop predictive models for ecosystem assessment and to project/forecast fish productivity based on:

- anthropogenic factors (e.g. current and planned fishing activities, coastal developments).
- physical habitat and natural forcing events (e.g., hurricanes, ocean features, short-term climatic changes/ENSO events, dry/wet years, etc.).
- trophic dynamics / networks, ocean productivity, interaction with protected species and introduction of invasive species.
- habitat availability and quality, etc.

B. The suggested approach is to develop models to conduct IEAs as discussed in NOAA Technical Memorandum NMFS-NWFSC-92. The methodology for using such models should follow five steps:

1. Scoping. Identify management objectives, articulate the ecosystem to be assessment, identify ecosystem attributes of concerns, and identify stressors relevant to the ecosystem being examined.
 2. Indicator development. Researchers develop and test indicators that reflect the ecosystem attributes and stressors specified in the scoping process. Specific indicators are dictated by the problem at hand and must be linked objectively to decision criteria.
 3. Risk analysis. This analysis is hierarchical in approach and moves from a comprehensive, but initially qualitative analysis, through a more focused and semiquantitative approach, and finally to a highly focused and fully quantitative approach. The goal of these risk analyses is to fully explore the susceptibility of an indicator to natural or human threats, as well as the ability of the indicator to return to its previous state after being perturbed.
 4. Overall ecosystem assessment. Results from the risk analysis for each ecosystem indicator are then integrated in the assessment phase of the IEA. The assessment quantifies the overall status of the ecosystem relative to historical status and prescribed targets.
 5. Evaluation. The final phase of the IEA evaluates the potential of different management strategies to influence the status of the ecosystem.
- Descriptive Models - to provide snapshot pictures of the ecosystem (e.g., Ecopath)

- “Nowcasting”/“Forecasting” Models (e.g., Multispecies Virtual Population Analysis (MSVPA), Very Large Individual Based Models (IBMs), and Agent-Based Models) – to provide useful interface with stock assessment/fishery management and provide a space of possibilities for policy/decision-making.
 - Components of Ecosystem Forecasting
 - Review and evaluation of current tools
 - Tool development and model tuning
 - Tool application and evaluation
 - Components of Ecosystem Monitoring
 - Data and communication portal development
 - Continuing need assessment for EBM
 - Climate change

3. Continue Monitoring and Research on Marine Protected Areas:

- A. As “microcosm” for ecosystem modeling, ground truthing, and analysis.
- B. As natural “experimental control” to assess effects of fishery management (biological, ecological, and human/social effects).
- C. To help sustain the fishery.

5-Year Research Time Schedule:

Ecosystem Research Components	Duration (Years)				
	1	2	3	4	5
Data Mining, Compilation, Processing and QC/QA	xxxx	xxxx			
Establishing Ecological Relationships		xxxx	xxxx		
Tool Assessment and Development	xxxx	xxxx	xxxx		
Model Development and Tuning			xxxx	xxxx	
Tool and Model Application/Evaluation				xx	xxxx
Monitoring of Marine Protected Areas	xxxx	xxxx	xxxx	xxxx	xxxx

Economic and Socio-cultural Recommendations

Below are recommendations from the Socioeconomic Panel for the Gulf Council's 5 year research plan with regard to social and economic priorities. The recommendations are offered in order of prioritization:

(1) Estimate the effect of proposed management alternatives on the benefits of recreational fishing. Estimate suitable recreational benefit functions and participation rates, by fishery and mode of fishing (private boats, charter boats, head boats) to evaluate the economic effects of regulations for recreational fisheries, such as (but not necessarily limited to) minimum size limits, bag limits, quotas, seasonal closures and marine reserves. Economic effects include changes in economic surpluses (consumer surplus for fishermen, producer surplus for charter and head boats), levels of fishing effort and catch, and switching behavior among target species and other forms of recreational activities in response to regulation.

(2) Development of regional input-output models and the data needed to make them operational. Economic impact models characterize the linkages between industries in regional economies, and can be used to estimate the effects of fishery regulations or environmental events such as major hurricanes or red tides as they ripple through state and regional economies. The NMFS has contracted to develop input-output models for commercial fisheries. A research priority is to make them operational by conducting an economic survey of fishing-related businesses to quantify the linkages between them. Fishing-related businesses include suppliers of inputs to fishermen and marketing channels for commercially landed fish. The data collection should focus on revenues, expenditures, employment data and firm characteristics. These data become the inputs to regional impact models that calculate the direct and indirect effects of changes in allowable harvests or environmental events on employment and income.

(3) Development of methodologies to accurately assess the cumulative economic and social impacts of individual fishing quotas on Gulf fisheries.

(4) Estimate fishing behavioral models, including effort supply and production functions for the commercial and for-hire sectors. Specific attention should be given to species targeting behavior, seasonal and spatial decisions. The intent of this research is to determine how fishermen change their fishing patterns and strategies regarding how, when and where to fish, and what species to target in response to changes in common management tools such as seasonal closures, area closures, industry quotas, trip limits, minimum size limits, etc. This includes switching behavior among fishing activities as well as the rates at which boats enter or exit the fishery.

(5) Survey of engagement and dependence in marine fisheries. Collect data about basic socio-demographic characteristics of commercial and recreational fishermen, and other indicators of their levels of engagement and dependence on marine fisheries. For commercial fishermen, these indicators include information about the proportions of their household incomes derived from marine fisheries. For recreational fishermen, these indicators include information about how often they participate in marine fishing compared to other recreational activities. Develop a comprehensive survey of individuals throughout the Gulf of Mexico, and then repeat the survey periodically to provide a series of snapshots over time so that the evolution of engagement and dependence in marine fisheries can be studied and understood. This should be accompanied by an update to census, landings, and permit data included in fishing community profiles with questions on the survey pertaining to the community and fisher's connection to the community and fishing sector.

(6) Develop quantitative models for evaluating social and economic impacts of allocation or reallocation schemes.