



FOCAL

Fisheries Oceanography of Coastal Alabama



Established in 2006, FOCAL is a long-term baseline survey designed to provide critical biological and oceanographic data needed to assess impacts on Alabama's marine fisheries resources.

Impacts include:

- Oil Spills and related accidents
- Liquid Natural Gas (LNG) operations
- Tropical storms and hurricanes
- Climate change

For further information, please contact:

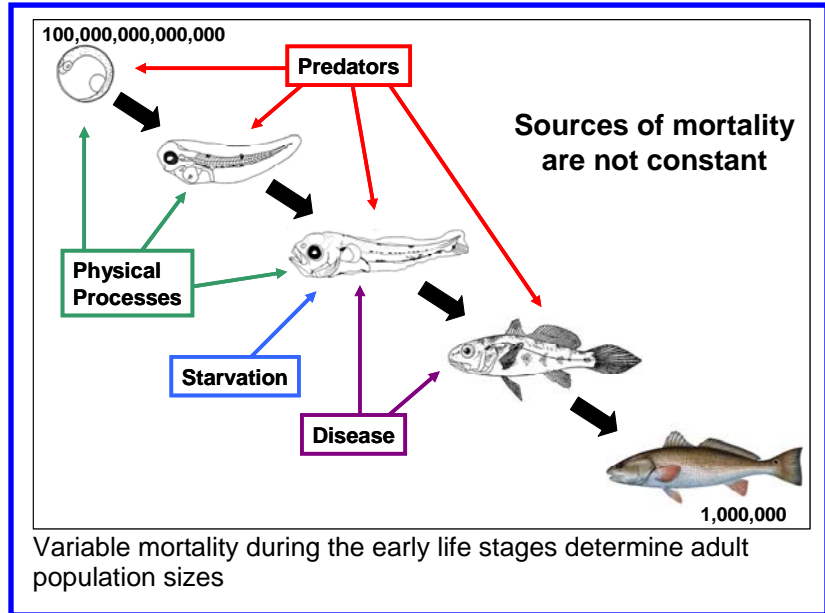
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Fish populations in the ocean fluctuate from year-to-year as the supply of new recruits varies. The number of new recruits is determined by variable mortality rates encountered by the early life stages of fishes (eggs, larvae and juveniles). A multitude of interacting biological and physical processes drive recruitment variability, demanding a comprehensive, ecosystem-based approach to fisheries research and management.

In November 2006, with the support of the Marine Resources Division (MRD) of the Alabama Department of Conservation and Natural Resources (ADCNR), the Dauphin Island Sea Lab (DISL) established the Fisheries Oceanography of Coastal Alabama program, or **FOCAL**. The primary goals of the FOCAL program are to:

1. *maintain and expand a fisheries-independent survey initiated in 2004 as part of a comprehensive biological baseline survey for a proposed liquid natural gas (LNG) development; and*

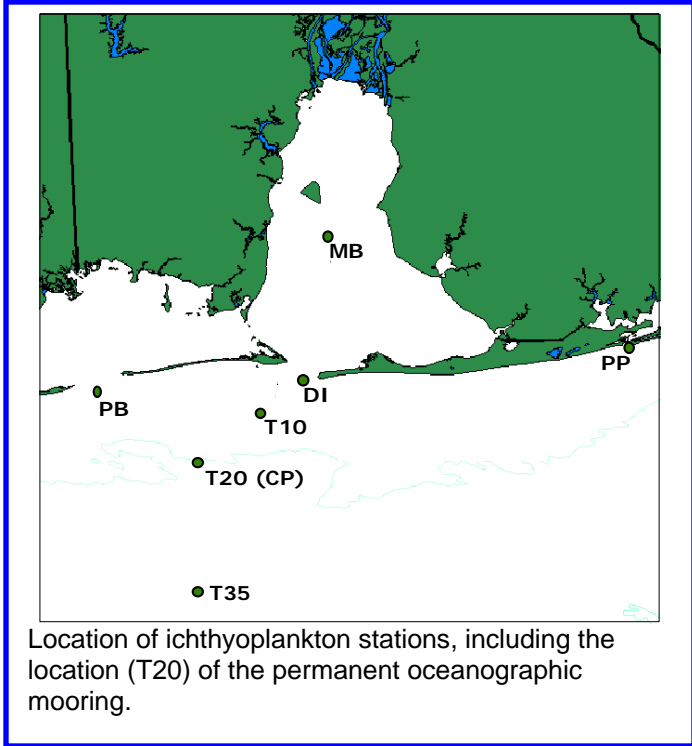


2. *collect fisheries-independent data in support of ongoing DISL fisheries research and ADCNR-MRD management goals.*

The primary components of the FOCAL program include monthly ichthyoplankton & zooplankton surveys and continuous physical oceanography observations (e.g., temperature, salinity, current velocity) from a permanent offshore mooring. From 2006-2009 depth-discrete ichthyoplankton samples were collected near-monthly along a cross-shelf transect from inside Mobile Bay to a station located approximately 55 km offshore (2006-2009). Ichthyoplankton samples were also collected at two coastal inlets. Since 2009, the ichthyoplankton survey has been refined to include monthly sampling at two offshore stations and targeted "process studies" to examine mechanisms of recruitment for economically-important species (e.g., red drum and Gulf menhaden).

The FOCAL program provides numerous benefits to fisheries research and management efforts including the collection of data needed to:

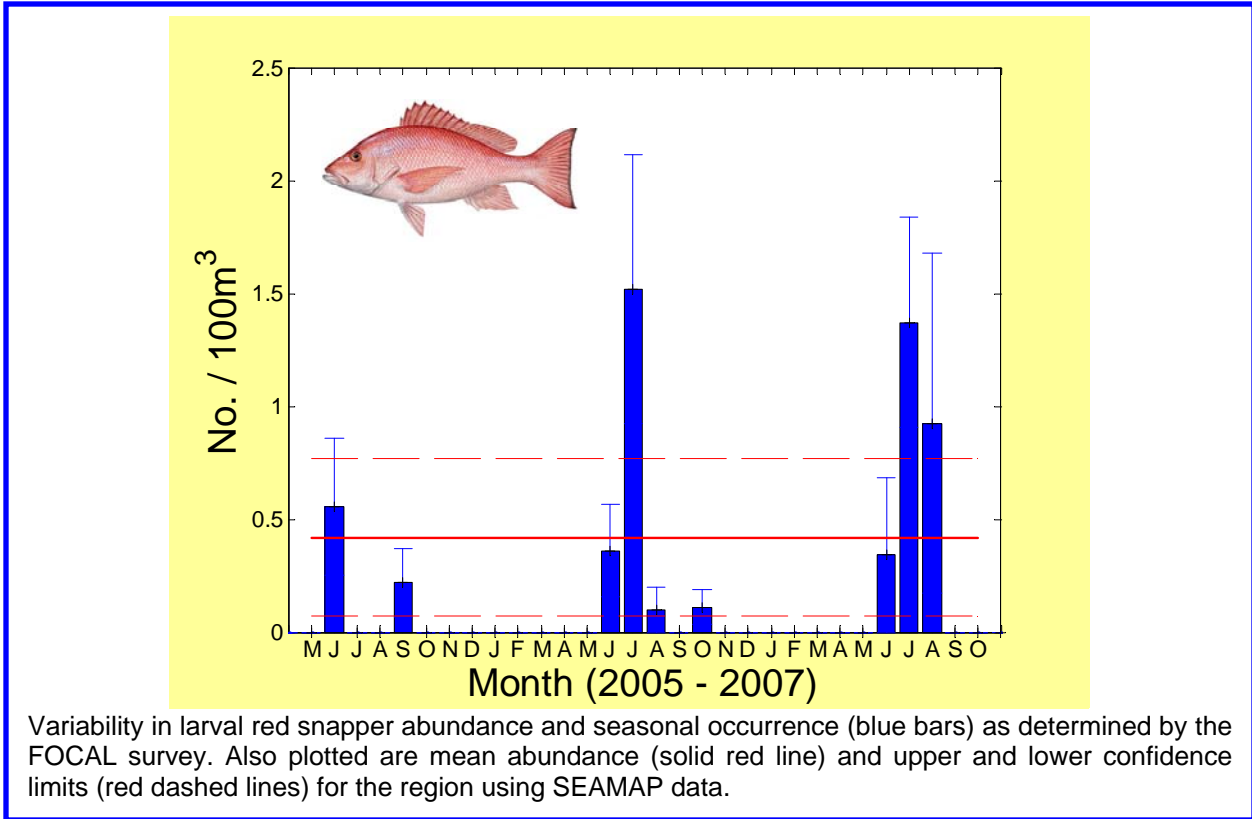
1. *provide data to third parties for the assessment of impacts due to LNG-related operations and other petroleum industry impacts such as oil spills;*
2. *develop larval and juvenile recruitment indices; and*
3. *assess relationships between fisheries recruitment and environmental variability.*



Data collection to assess LNG and oil spill impacts

The primary fisheries-related impacts from the operation of "open loop" LNG facilities are the potential dangers to fish eggs and larvae. Previous environmental impact assessments of proposed LNG facilities have been based on data collected from the National Marine Fisheries Service's Southeast Area Assessment and Monitoring Program (NMFS SEAMAP) ichthyoplankton survey. Although the SEAMAP surveys cover a long time period (1982-present), the data are lacking in fine-scale spatial and temporal resolution needed to determine environmental impacts. These same data can be used to assess the impacts of petroleum industry operations, such as oil spills. Since 2007, FOCAL sampling efforts have included the use of a neuston plankton

net, which is specifically designed to skim the surface of the water to sample organisms in the upper 10-50 cm. Because many fish eggs are buoyant and fish larvae sometimes aggregate in surface waters, these life stages may be susceptible to the impacts of floating crude oil.



In order to provide data for impact assessments, the FOCAL ichthyoplankton survey collects site-specific information on larval fish:

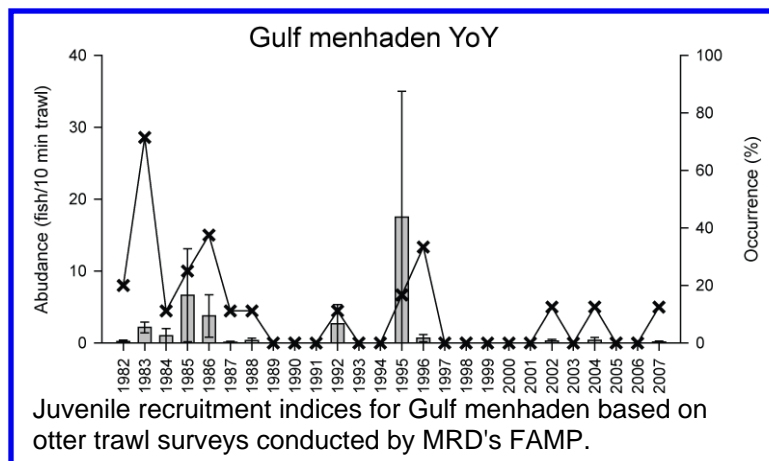
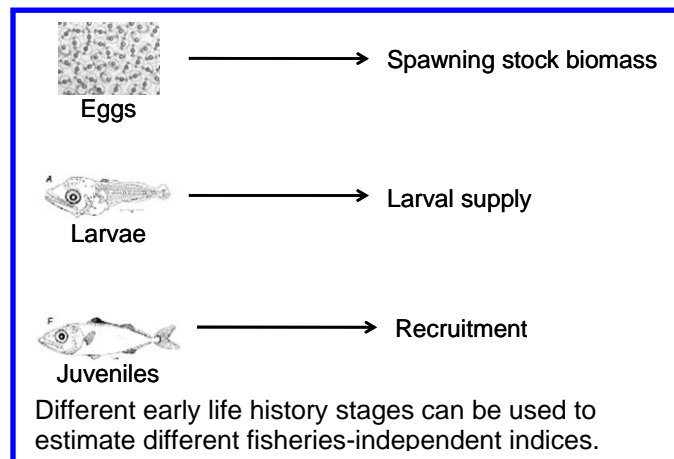
1. *seasonality*;
2. *abundance*;
3. *across-shelf distribution*; and
4. *vertical distribution*.

In addition, the long-term nature of the FOCAL survey provides important information on the seasonal and year-to-year variability of these ichthyoplankton assemblages. All of these attributes are critical to estimate the impacts of "open loop" LNG facilities and oil spills that may threaten marine resources in Alabama waters.

Development of recruitment indices

The collection of fish early life stages provides fisheries-independent data needed for stock assessments. Fish egg and larval data collected during FOCAL surveys, combined with juvenile fish data collected within MRD's Fisheries Assessment and Management Program (FAMP), can be used to calculate recruitment indices.

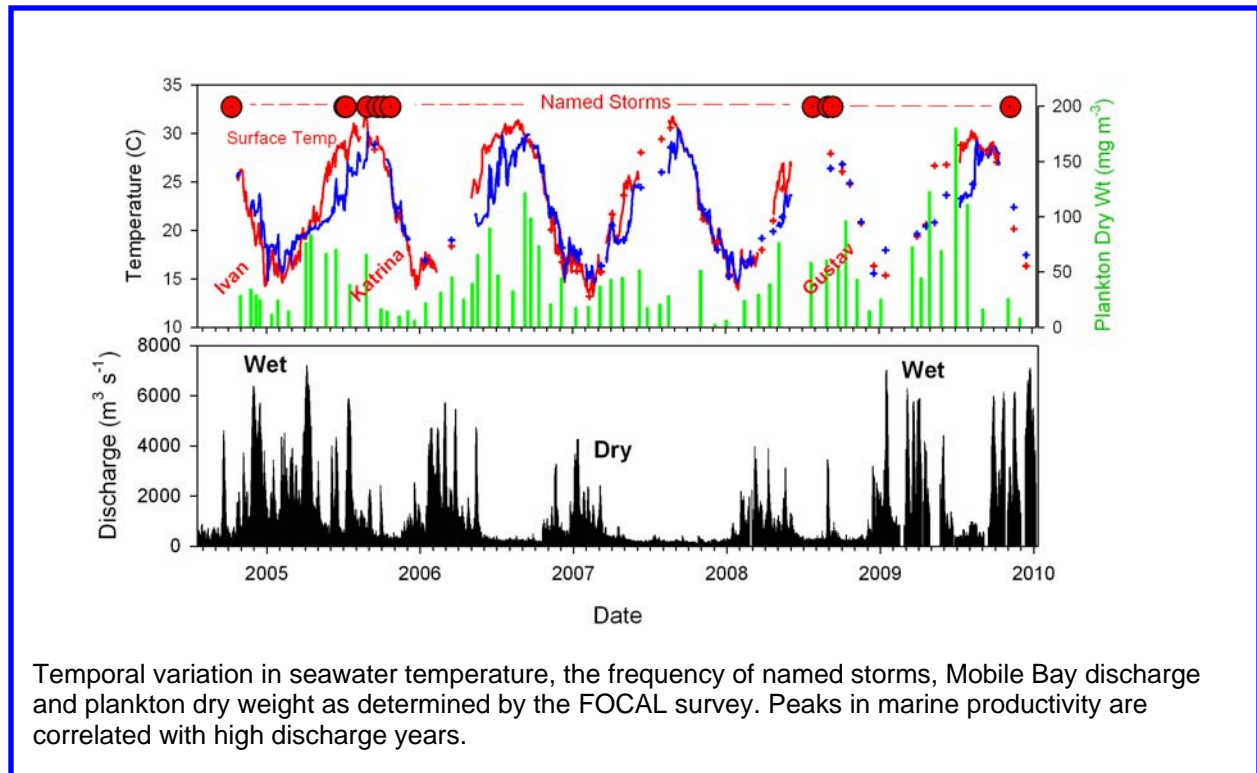
Early life history based indices have been proven efficient in predicting variations in commercial landings in a variety of locations in United States (e.g., Chesapeake Bay), but these indices require long time series (10+ years). Recent stock assessments have recommended the increased use of fisheries-independent data sources, including early life history indices. FOCAL's long term ichthyoplankton survey provides the data required to generate additional estimates of spawning stock biomass and fisheries recruitment.



Environmental variability and fisheries

Marine fisheries are highly dependent on the physical environment, which also affects fish prey and predator abundances and recruitment processes. The ecosystem-based approach of the FOCAL program provides the comprehensive data collection and analyses needed to assess fish population dynamics with respect to environmental

factors. For example, preliminary analyses show relationships between Mobile Bay freshwater discharge and peaks in primary and secondary productivity, as well as the juvenile recruitment of several fish species (e.g., spot, Atlantic croaker, Gulf menhaden).



Management perspectives often require analyses of data at different time scales. For example, longer term data series are needed to determine the direct and indirect effects of hurricanes on fisheries resources. Similarly, the long-term benefits of habitat enhancement efforts (e.g., oyster reef restorations and artificial reef programs) require long-term fisheries data to assess the fisheries production (i.e., larval fish supply) generated by these habitats. An understanding of relationships between physical parameters and fisheries recruitment can help resource managers make informed decisions in the face regional climate change, coastal habitat alterations, hurricane impacts and other perturbations.

FOCAL benefits and attributes

The FOCAL program provides a much needed, fisheries-independent and ecosystem-wide approach to research and management. Long-term data series are critical for monitoring fish population responses to climate change, LNG development, oil spills and coastal habitat degradation, as well as habitat enhancement programs.

By funding the FOCAL program, MRD has provided financial and/or data support for at least 13 senior research scientists, 29 lab and field technicians, 19 graduate students, and 18 student interns. Many former interns, students and technicians have used FOCAL as a springboard for future employment and graduate school opportunities in marine and fisheries science.

The FOCAL program has also stimulated additional funding and research initiatives, totaling over \$984,000 (2005-present). In doing so, researchers within FOCAL have formed

collaborations with international, national and regional colleagues to address ecosystem-based fisheries initiatives critical for resource management.



An integral part of the FOCAL program is the training and development of interns, graduate students and technicians into future fisheries and marine scientists.

One of the primary goals of FOCAL is to serve as a resource for ADCNR-MRD. To achieve this objective, the FOCAL program has changed over time to anticipate MRD research and management needs, while maintaining the ever important long-term time series of fisheries-independent data collection. The establishment of a long-term ichthyoplankton survey is a perfect complement to the juvenile and adult surveys conducted by MRD. Further, the continuation of the ichthyoplankton monitoring program is critical in monitoring the marine fisheries resources of Alabama in light of climate change, hurricane impacts, future LNG developments, and other perturbations. The ecosystem-based fisheries research framework of FOCAL is

easily adaptable to support and complement MRD Management needs as they change in the future.