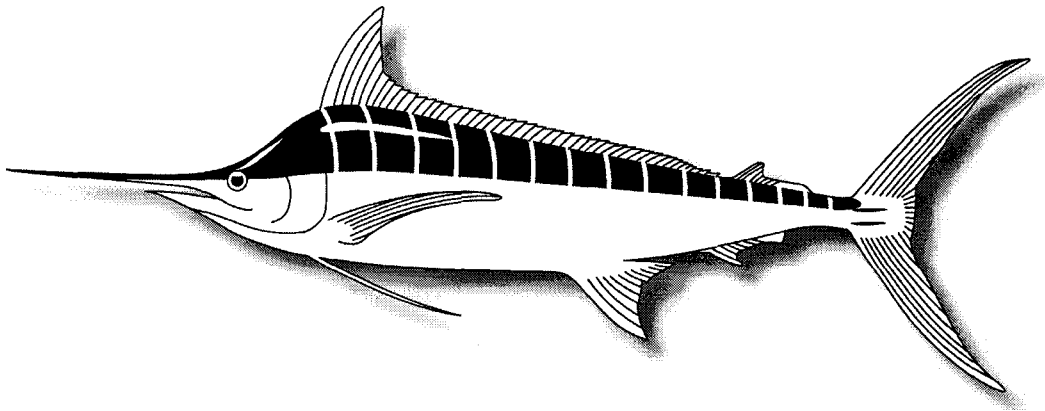




SCTB13 Working Paper

BBRG-18

**Biological Research on Swordfish
at the
NMFS Honolulu Laboratory.**



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Biological Research on Swordfish at the NMFS Honolulu Laboratory

The NMFS Honolulu Laboratory has a multidisciplinary research program on swordfish. The research is guided by a comprehensive research plan developed a Laboratory Swordfish Research Team and by the Swordfish Working Group of the Interim Scientific Committee for Tuna and Tuna-like Species. Present research is grouped into four categories: biological research in support of stock assessment, stock assessment, fishery oceanography to define swordfish habitat and the affects of oceanography on CPUE, and ECOPATH/ECOSIM modeling.

Biological Research

The emphasis of the biological research is to obtain information required for swordfish stock assessment. Specific research topics include: 1) size-age relationships, 2) growth rates, 3) size and age at sexual maturity, 4) sex, size, and age composition of catch, and 5) stock structure. Information is given in the figures on 1) relationship between eye-to-fork length (EFL) and age, 2) relationship between EFL and otolith micro-increments for young-of-the-year and yearling swordfish, and 3) ray diameter vs. age estimated from otoliths.

Stock Assessment

Work was recently completed on the development of a basin-scale stochastic computer simulation model of swordfish population dynamics and exploitation that will be used to generate sets of observations to test stock assessment procedures. The model mimics key aspects of the swordfish population dynamics and fisheries with detailed representations of biological processes, including growth, maturation, reproduction, recruitment, and mortality. Catch statistics are generated with size and/or age structure. In addition, two types of production models have been used for assessments with combined Hawaiian and Japanese longline catch and effort data.

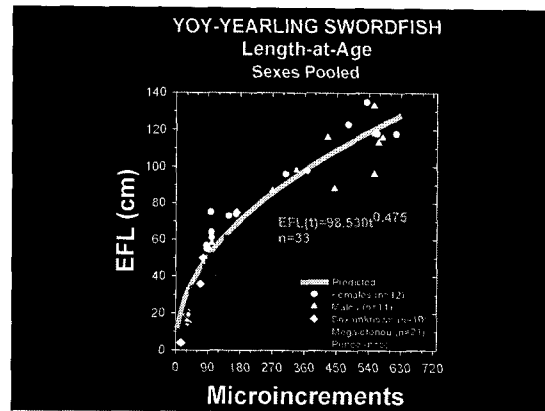
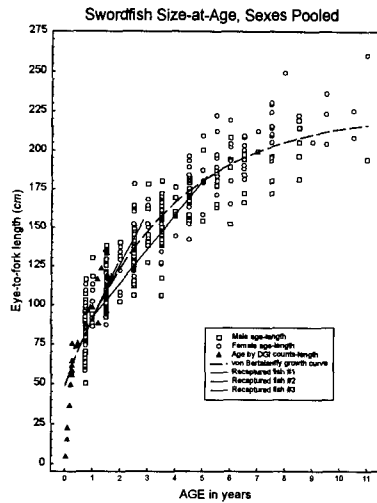
Fishery Oceanography

The goals of the Laboratory's fishery oceanography research related to swordfish are to define the habitat of the swordfish in the North Pacific and to develop methods to improve CPUE estimates by taking into account ocean conditions. The assumption of the latter goal of the fishery oceanography research is that CPUE is a function of ocean conditions that affect swordfish aggregation and vulnerability, as well as gear performance. Research is conducted using fisheries research vessels, satellite remote sensing, ocean circulation models, and swordfish fishery statistics. An example of the

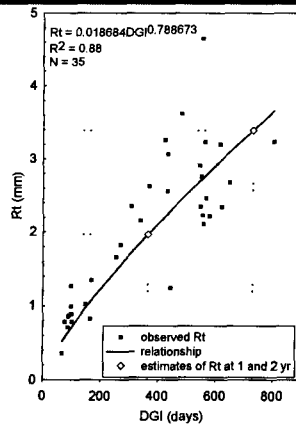
relationship between the oceanography of the North Pacific Subtropical Frontal Zone and fishery performance and CPUE is shown in the figures.

Central North Pacific Pelagic Ecosystem Research

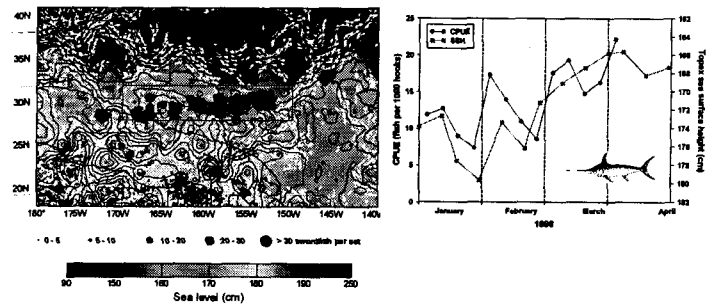
Research on the central North Pacific pelagic ecosystem is currently underway at the Laboratory. ECOPATH and ECOSIM are major tools being used in part of this research. One of the goals of this research is to understand the linkages and relationships among swordfish and other large pelagic predators and the pelagic ecosystem of the central North Pacific.



Swordfish Age and Growth: Ray Diameter vs Otolith Age



Relationship to Fishery Performance



Swordfish CPUE and Subtropical Front Index

