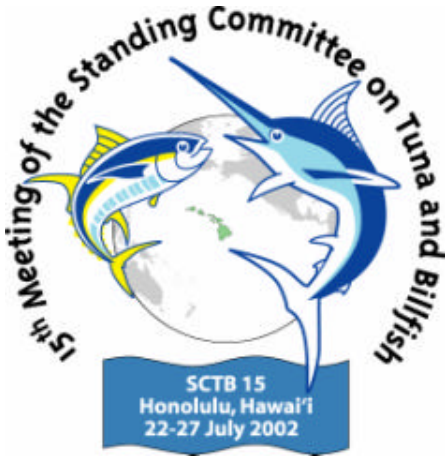
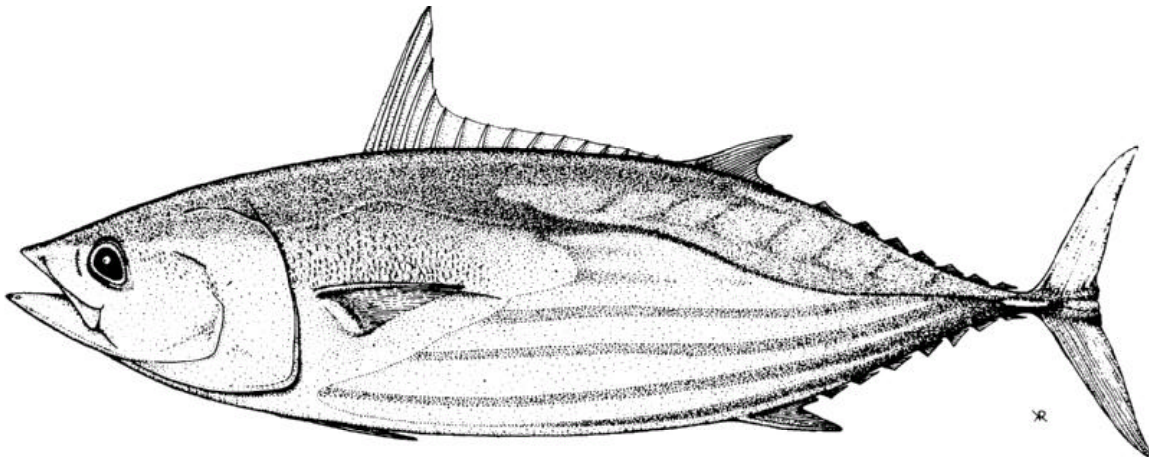


SCTB15 Working Paper

MWG- 4



**Standardizing Longline Fishing Effort in Stock Assessment Models:
Effect of Oceanic Conditions**



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Standardizing Longline Fishing Effort in Stock Assessment Models: Effect of Oceanic Conditions¹

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A workshop was held May 8—10, 2002 at the NMFS, Honolulu Laboratory to consider use of oceanographic data as part of a strategy for standardizing longline effort in stock assessment analyses. The workshop was part of a project of the Pelagic Fisheries Research Program, Joint Institute of Marine and Atmospheric Research, University of Hawaii (JIMAR) under the direction of co-principal investigators Pierre Kleiber (NMFS Honolulu Laboratory) and Hideki Nakano (National Research Institute of Far Seas Fisheries, Shimizu, Japan).

An important issue with longline effort is the degree of congruence between the depth distribution of longline hooks and the depth distribution of particular fish species. Various fish species are known to prefer particular depth ranges. It is also well-known that longline hooks do not always fish at intended depths often as a result of certain oceanographic conditions, notably current shear, leading to lack of congruence between locations of fish and hooks and diminished effective effort. To account for the degree of congruence requires knowledge of the depth behavior not only of fish but also of longline hooks, and it is the latter issue, the behavior of longline gear, that was the focus of the workshop.

Previous attempts have been made to standardize longline effort for use in stock assessment models by considering the degree to which the depth distribution of hooks intersects the depth distribution of the species in question. These were reviewed by the workshop. Experimental and theoretical information about the effects of oceanographic conditions and gear configuration on behavior of longlines was also reviewed. It was evident that to advance effort standardization beyond what has already been done would require input of detailed historical data on current shear, particularly vertical shear, in place of sea surface current as a proxy for shear.

Oceanographic information relevant for the task of calculating an index of fish-longline congruence was discussed with focus on availability of current data from which to calculate current shear. It was evident that general circulation models (GCMs) would be the only source of such data with sufficient historical depth (1950 to present), geographic scope (Pacific Ocean), and fine resolution in time and space (10s of km by 1—2 weeks). Though high-resolution output from a GCM was viewed as necessary, a demand for historical pinpoint accuracy was not. Such accuracy was felt to be unattainable from GCMs in any case. However, the pertinent demand would actually be for accuracy in the statistical properties of current structure within large-scale

¹ A working document submitted to the 15th Meeting of the Standing Committee on Tuna and Billfish, Honolulu, Hawaii, 22-27 July 2002.

areas -- a more realizable goal. Though there was some discussion of how to derive an appropriate mathematical form of an index of fish-longline congruence, a precise formulation was not achieved during the workshop.

As an alternative strategy for determining the effective depths sampled by longlines it was suggested that plots of abundance of the different species in the catch against their rank order of abundance in the catch could be related to the effective longline depth. Experience in French Polynesia indicates that the shape of such a plot is characteristic of the maximum depth achieved by a longline set. After much discussion, data sets from US observers and Japanese research vessels were identified that might be used to determine if this suggested strategy would be applicable in other areas of the Pacific.