

A. Yellowtail Flounder Stock Structure

The SARC reviewed a summary of available information on stock structure of yellowtail flounder in the Northwest Atlantic, with a focus on resources off the northeastern United States. Following an extensive review of the literature on stock identification, the SARC was presented with a summary of a series of studies covering spatial distribution patterns, geographic variation in growth and maturity, morphometric variation, and larval transport. At present, yellowtail flounder off the northeast coast of the United States are managed as four units: Georges Bank, Cape Cod, Southern New England, and Mid-Atlantic. In addition, the resource is distributed in the western Gulf of Maine, primarily in statistical area 513 adjacent to the Cape Cod management unit. Assessment of the Georges Bank, Southern New England, and Cape Cod stocks are carried out analytically through Virtual Population Analysis (VPA) and/or Biomass Dynamics Models (ASPIC), while the status of the Mid-Atlantic stock is evaluated using research survey index proxies. There has been no analytical assessment of the Gulf of Maine resource.

Most scientific evidence, including tagging studies, growth and maturity rates, and larval transport suggests that yellowtail flounder on Georges Bank are distinct from those in adjacent areas. However, there appears to be a considerable degree of mixing and similarities in biological characteristics between the southern New England and Mid-Atlantic stock units. In the past, the two units were considered to be a single stock, and were apparently split for ICNAF jurisdictional, rather than biological reasons. Although data on stock structure in the Gulf of Maine are sparse, the available information suggests that there is no basis to maintain a distinction between the Cape Cod stock unit and the remaining distribution of the resource in the Gulf of Maine.

The SARC then considered a proposal by the Southern Demersal Working Group to define three stock units: Georges Bank, Southern New England/Mid-Atlantic, and Cape Cod/Gulf of Maine.

Although the literature review and recent studies are comprehensive, there remain several areas of concern. Many conclusions were based on differences in biological characteristics that may simply reflect different environmental regimes in the various locations or changes in exploitation over time. Regardless of the mechanism, differences in growth and maturity are maintained because there is a significant degree of geographic isolation, particularly between the Georges Bank stock and those to the west. However, there are no such physical barriers between the southern New England and Mid-Atlantic areas and there appears to be substantial movement across the existing boundary between the management units for these two stocks.

The relevance of the historical tagging experiments is also an area of concern. The tag returns from these earlier studies were not adjusted for fishing effort, and the tag release sites (often on the boundary of the existing management units) and time at large was not considered in the original analyses by Royce et al. (1959) and Lux (1963) and in the recent review of stock structure. The available information on tagging is also somewhat dated and may not represent

current environmental and stock conditions. In the case of the Mid-Atlantic tagging experiment, the number of tag returns was relatively low ($n = 64$ recaptures off Southern New England), and release sites may not represent the distribution of yellowtail flounder in the Mid Atlantic region, particularly off New Jersey and Delaware.

In all cases, there must be evidence that the proposed stock units are self-sustaining. This may be problematic for the Cape Cod stock unit, whether or not it is combined with the remaining Gulf of Maine area, because there appears to be little evidence of egg and larval production in this area.

The SARC endorsed the conclusions of the Southern Demersal Working Group to conduct assessments of yellowtail flounder based on the following stock units (Figure A1):

- Georges Bank
- Southern New England/Mid-Atlantic
- Cape Cod/Gulf of Maine.

Research Recommendations to be carried forward.

Further investigation should be carried out to evaluate the degree of mixing between the Georges Bank and Cape Cod stocks of yellowtail flounder.

Several suggestions were made to refine the analysis of stock boundaries, including: 1) evaluating the spatial scale at which data are presented for distribution of life history stages, 2) incorporating information on larval size composition to better delineate possible spawning areas, and 3) performing statistical tests for differences in biological characteristics.

Figure A.1. Revised stock boundaries of yellowtail flounder off the northeastern U.S.

