3.19 Atlantic Halibut

Catch and Survey Indices

The Atlantic halibut (*Hippoglossus hippoglossus*) is distributed from Labrador to southern New England in the northwest Atlantic (Bigelow and Schroeder 1953; Wise and Jensen 1959). The Atlantic halibut stock within Gulf of Maine and Georges Bank waters (NAFO Subarea 5) has been exploited since the 1830s. This resource is currently depleted and is not expected to rebuild in the near future (NEFMC 1998).

Records of Atlantic halibut landings from the Gulf of Maine and Georges Bank begin in 1893 (Figure 3.19.1). Substantial landings occurred prior to this, however, as the halibut fishery declined in the late 1800s (Hennemuth and Rockwell 1987). Landings have decreased since the 1890s as components of the resource have been sequentially depleted. Annual landings averaged 662 mt during 1893-1940 and declined to an average of 144 mt during 1941-1976. Since 1977, landings have averaged 95 $mt \cdot yr^{-1}$. Reported landings in 1999 were 20 mt. Of these, 12 mt were landed by domestic fishermen (60%) with the remainder landed by Canadian fishermen (Division 5Zc).

The Northeast Fisheries Science Center spring and autumn bottom trawl surveys provide measures of the relative abundance of Atlantic halibut within the Gulf of Maine and Georges Bank (Offshore survey strata 13-30 and 36-40). Both indices have high inter-annual variability since relatively few halibut are captured during these surveys; in some years, no halibut are caught. The survey indices suggest that relative abundance increased during the 1970s to early 1980s and subsequently declined in the 1990s. It is unknown whether abundance trends in the Gulf of Maine and Georges Bank have been influenced by changes in the seasonal distribution and availability of Atlantic halibut, however.

Stock Assessment

Based on updated spring and autumn survey data, Atlantic halibut biomass within the Gulf of Maine and Georges Bank remains very low. Swept-area biomass indices in spring 2000 and autumn 1999 were both less than 100 mt (Figure 3.19.2). Thus, even if survey catchability was as low as 25%, current stock biomass, as indexed by the 5-year moving average of swept-area biomass, would be below the biomass threshold of 2,700 mt. Although no estimates of fishing mortality are available, exploitation rate indices (annual landings/5-year moving average of survey index) suggest that exploitation rates have probably been stable since the 1970s, and may have declined during the 1990s. Thus, the Atlantic halibut stock in the Gulf of Maine and Georges Bank remains depleted and exploitation rates do not appear to have increased since the 1970s.

In the 1998 report on overfishing definitions and its Supplement (NEFMC 1998), the overfishing review panel recommended proxies for the stock biomass (B_{MSY}) and fishing mortality rate (F_{MSY}) that would produce the largest long-term potential yield. Based on yield-per-recruit and biomass-per-recruit calculations, the panel concluded that B_{MSY} was roughly 5,400 mt and that F_{MSY} was about 0.06 per year with an associated long-term potential yield of 300 mt per year. Accordingly, the panel recommended that the biomass threshold ($B_{THRESHOLD}$) be set to ½ of B_{MSY}

so that $B_{THRESHOLD}$=2,700 mt and that the target fishing mortality rate (F_{TARGET}) be set to 60% of F_{MSY} so that F_{TARGET}=0.04 per year. The panel also recommended that an appropriate harvest control rule would be to keep fishing mortality as close to zero as practicable until the Gulf of Maine and Georges Bank stock was rebuilt. To evaluate the harvest control rule, the review panel compared swept-area biomass estimates from the NEFSC spring and autumn surveys with the threshold. The panel concluded that the stock was depleted because, on average, the swept-area biomass index was far below $B_{THRESHOLD,}$ given an implicit assumption that survey catchability was probably on the order of 25-50%.

Yield and SSB per Recruit Analysis

A preliminary yield and SSB per recruit analysis was conducted using revised estimates of growth parameters from Sigourny (MS 2002). Catch mean weights were set equivalent to stock mean weights. Stock mean weights at age were derived from a Gompertz growth curve (L_{inf}=182 cm, K=0.2229, t_0=4.4317) and a log-log length-weight relationship (ln length = -11.7535 + 3.0658* ln length) for females only . Plus mean weights for ages 25+ were derived from an expanded age structure to age 38 (oldest age observed in survey) at F =0.1 and M = 0.1. The partial recruitment vector was considered to be knife-edge at age 6 based on the minimum size limit of 36". The maturity ogive was derived from pooled 1977-2000 female data presented graphically in Sigourny (MS 2002).

If $F_{40\%}$ is considered as a proxy for F_{MSY}, the newly estimated $F_{40\%}$=0.08 is similar to the previously estimated F_{MSY} =0.06. This analysis will not be accepted, however, until further analyses are conducted regarding the partial recruitment and maturity at age schedule.

Reference Points.
The reference points will remain as F_{MSY} = 0.06, B_{MSY} =5,400 mt and MSY = 300 mt.

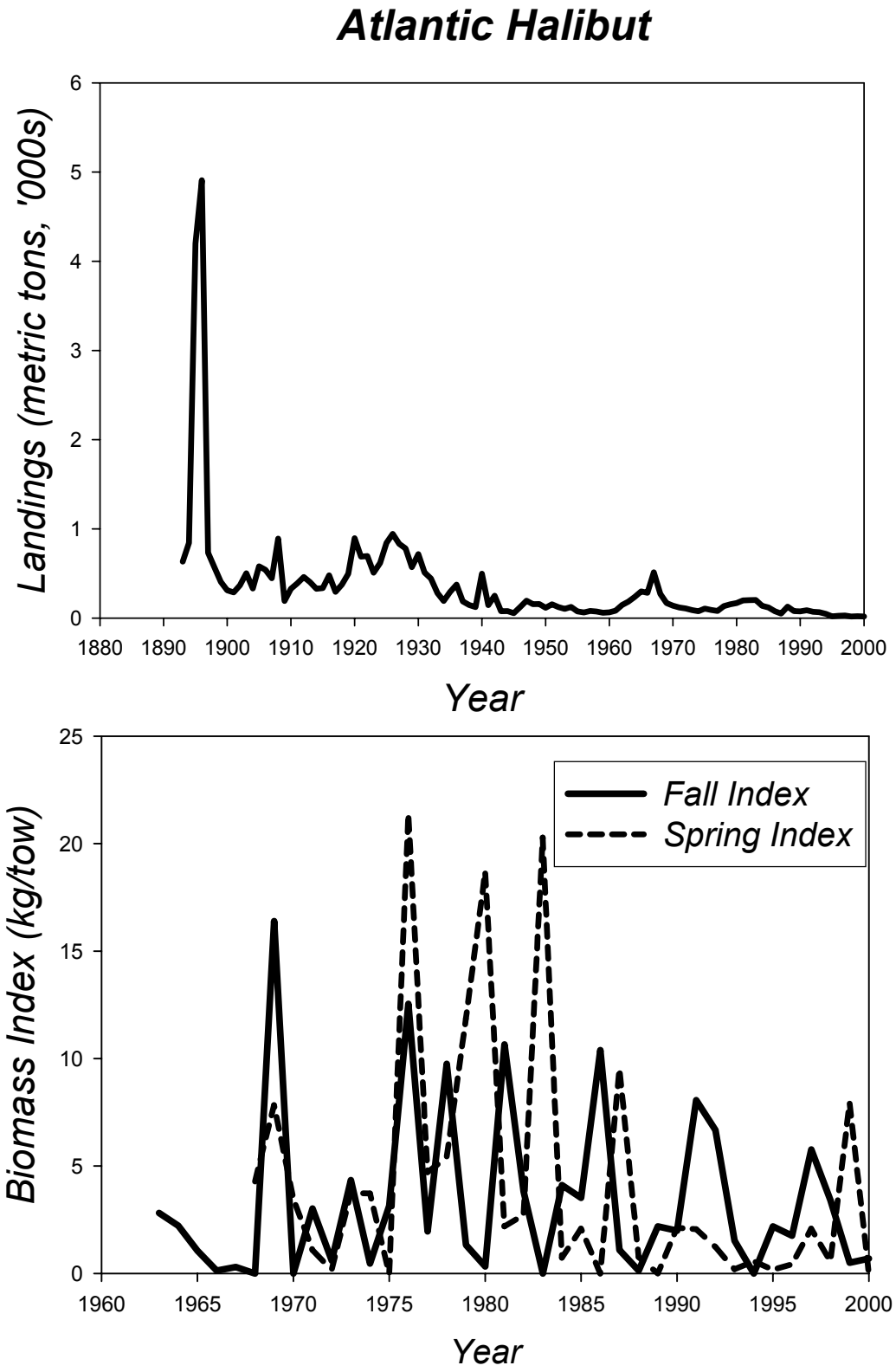

Figure 3.19.1. Landings and research vessel survey abundance indices for Atlantic halibut.

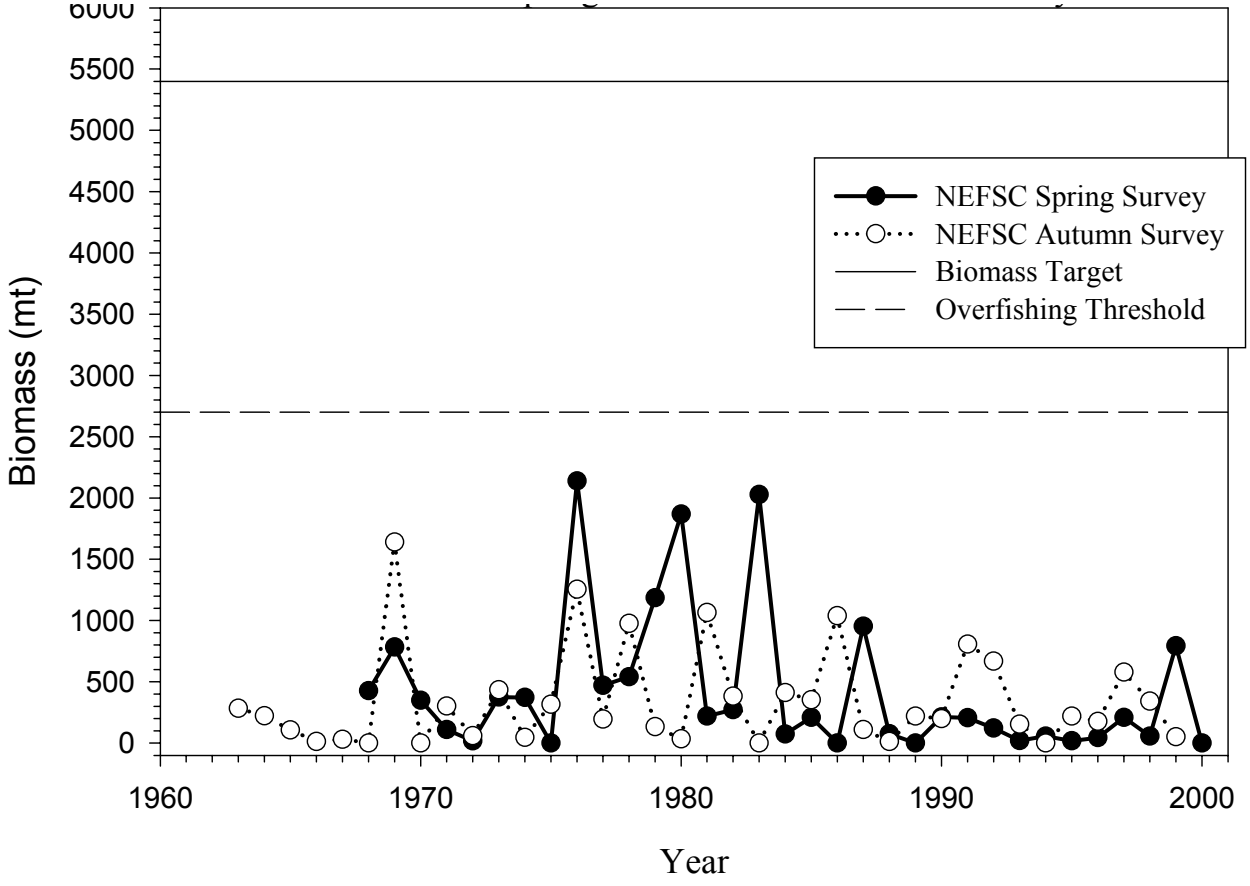

Figure 3.19.2. Trends in swept-area biomass indices (mt) of Atlantic halibut from NEFSC spring and autumn bottom trawl surveys. Current biomass targets and thresholds Are indicated.

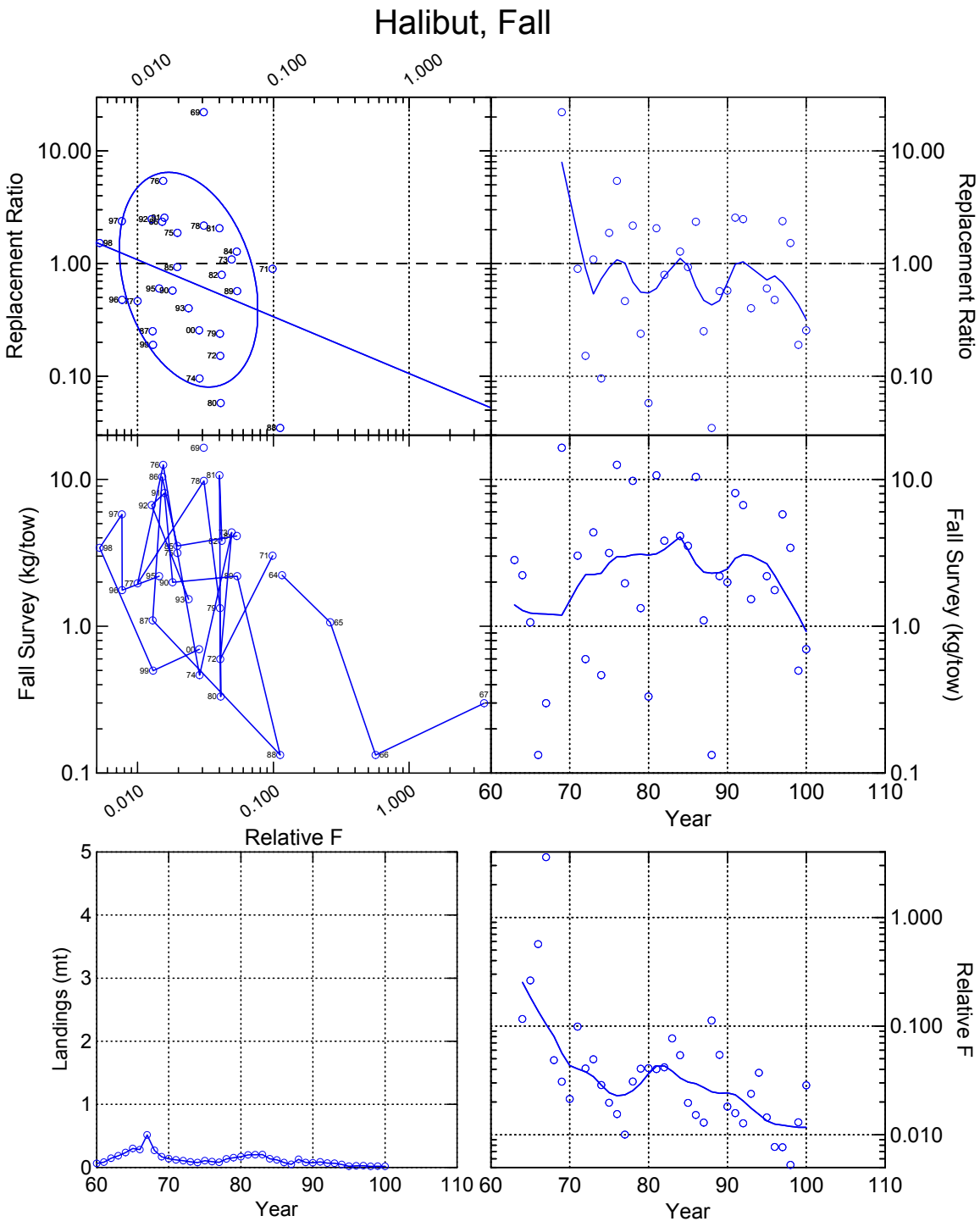

Figure 3.19.3. Trends in relative biomass, landings, fishing rate mortality rate indices (landings/ survey index) and replacement ratios for Atlantic halibut.

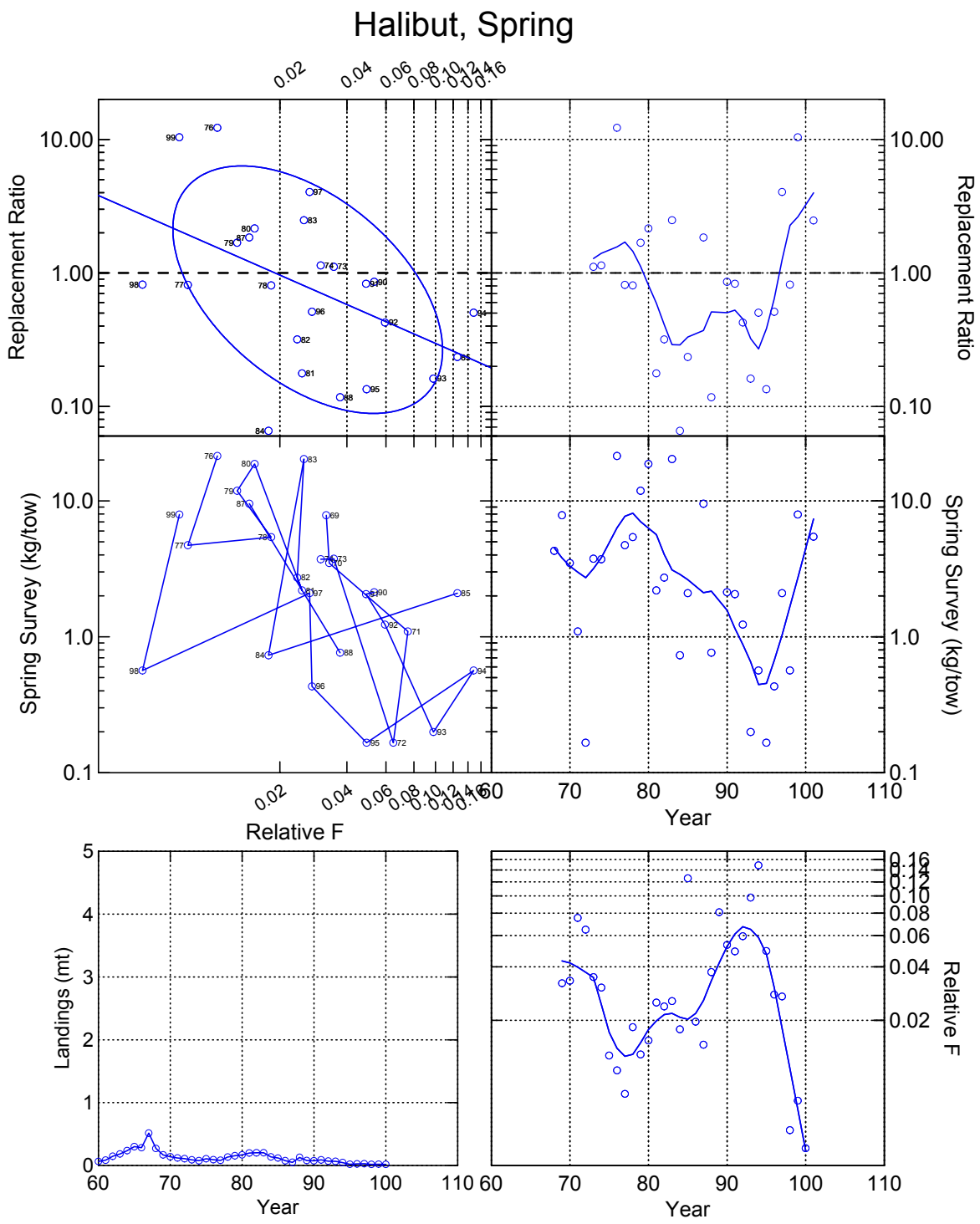

Figure 3.19.4. Trends in relative biomass, landings, fishing rate mortality rate indices (landings/ survey index) and replacement ratios for Atlantic halibut.