

3.12 Georges Bank Winter Flounder

Catch and Survey Indices

Commercial landings of Georges Bank winter flounder generally increased during the 1960s and early 1970s, ranged between 1,800 and 4,500 mt per year during the 1970s and 1980s, and decreased to less than 2000mt . Since 1989, total landings (U.S. and Canada) have been less than 2000 mt since 1986 (Figure 3.12.1).

Survey biomass indices are relatively variable, but generally suggest intermediate levels of abundance from the early 1960s to early 1980s, a decrease in stock biomass during the 1980s, and an increase in biomass in the 1990s (Figure 3.12.1).

Stock Assessment

The most recent assessment of Georges Bank winter flounder was based on a biomass dynamics model (ASPIC) of catch and survey indices, and the results were reviewed by the 34th Northeast Regional Stock Assessment Workshop (34th SAW) in November 2001 (NEFSC 2002). Results from the biomass dynamics model indicate that yield has been below the estimated surplus production since 1994 (Figure 3.12.2). Relative estimates of mean biomass (B_t/B_{MSY}) declined sharply during 1977-1994, but then increased to B_{MSY} in 2001.

Reference Points

Results from the biomass dynamics analysis indicate a reasonable fit to the input data. A maximum sustainable yield (MSY) of 3,020 mt was estimated to be produced by a biomass (B_{MSY}) of 9,360 mt at a F_{MSY} of 0.32. Bootstrap analysis indicates that MSY was estimated with relatively high precision (relative interquartile range, IQR = 6%), and B_{MSY} (IQR=29%) and F_{MSY} (IQR=28%) were estimated with moderate precision.

Although current reference points for Georges Bank winter flounder are expressed in survey units (2.49 kg/tow) and an exploitation index proxy for F_{msy} (1.21 C/I), estimates of biomass were similar from ASPIC and VPA (NEFSC 2002). Therefore, the working group considers the absolute estimates of B_{MSY} , and F_{MSY} to be more reliable than survey equivalents, because absolute reference points will facilitate determination of stock status through analytical modeling rather than averaging of recent survey observations.

The replacement ratio analysis for Georges Bank winter flounder suggests that the stock can replace itself at an exploitation index of 1.18 (Figure 3.12.6; Table 4.11), which corresponds to an F of 0.31 using the ASPIC estimate of survey catchability (0.2653). Therefore the empirical results generally confirm the F_{MSY} estimate from ASPIC (0.32).

The use of “total biomass” indices in ASPIC, and the resulting currency of MSY reference points (i.e., B_{MSY} in total biomass, and F_{MSY} on total biomass), has presented problems with interpretation, especially during times of strong recruitment, when a large portion of total biomass may not be recruited to the fishery (NEFSC 2001c). Therefore age distributions in the

catch and surveys were compared to investigate the proportion of unrecruited fish comprised in the aggregate biomass indices. During the large-mesh regulatory period (1994-2000) age compositions were similar: fishery catch was 3% age-1, 26% age-2 and 71% age-3+, the fall survey was 1% age-1, 22% age-2 and 77% age-3+, and the spring survey was 3% age-1, 24% age-2, and 72% age-3+ (in numbers, differences would be even less in weight). The Working Group concluded that the survey appears to measure the biomass of the exploitable stock. Therefore, survey indices are not expected to be sensitive to biomass of unexploited fish (i.e., prerecruits).

Projections

Stochastic projection was performed using bootstrap distributions of stock biomass in 2001, and biomass dynamics parameters (Prager 1995). Observed catch from January to November 2001 was 1,920mt, which corresponds to a total annual U.S. catch of 2,070mt based on proportion of 2000 landings taken in December, by gear. Canadian catch in 2001 was 590mt, and the total estimate of 2001 catch was 2,670mt. The resulting fishing mortality in 2001 (0.28), was assumed to continue in 2002. For the 2003-2008 fishing years, F_{MSY} (0.32) was projected.

Projected biomass is maintained at B_{MSY} throughout the projected time series with high probability (Figures 3.12.3 and 3.12.4). Projected catch increases to 3,000mt, and is maintained at that level for the projected time series (Figure 3.12.5).

Georges Bank Winter Flounder

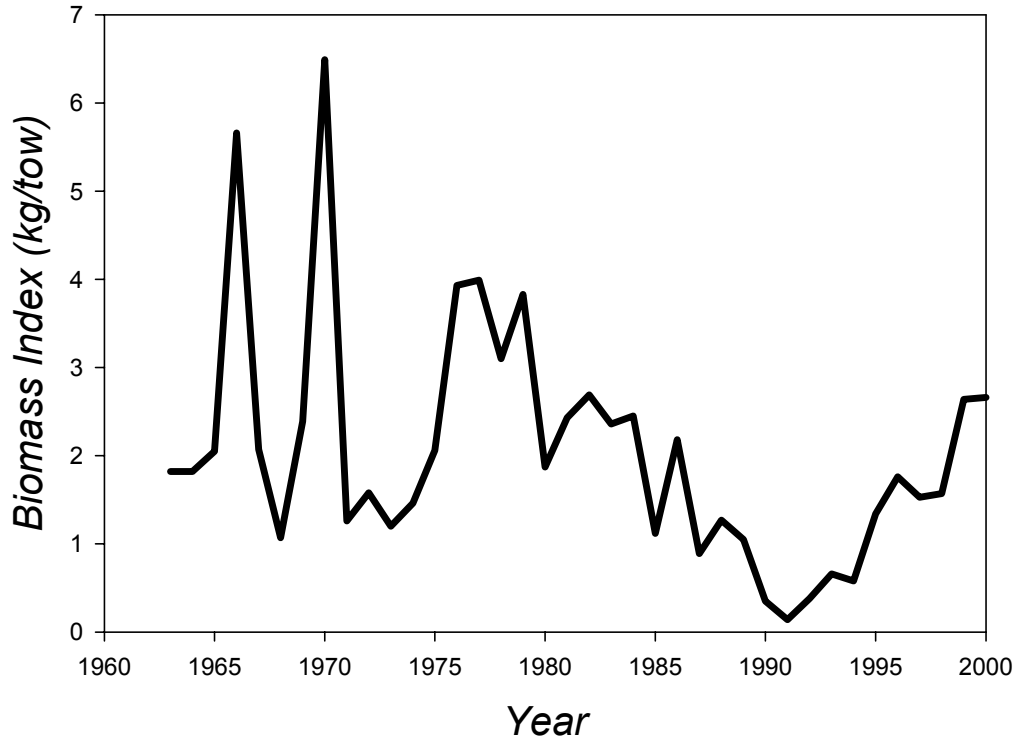
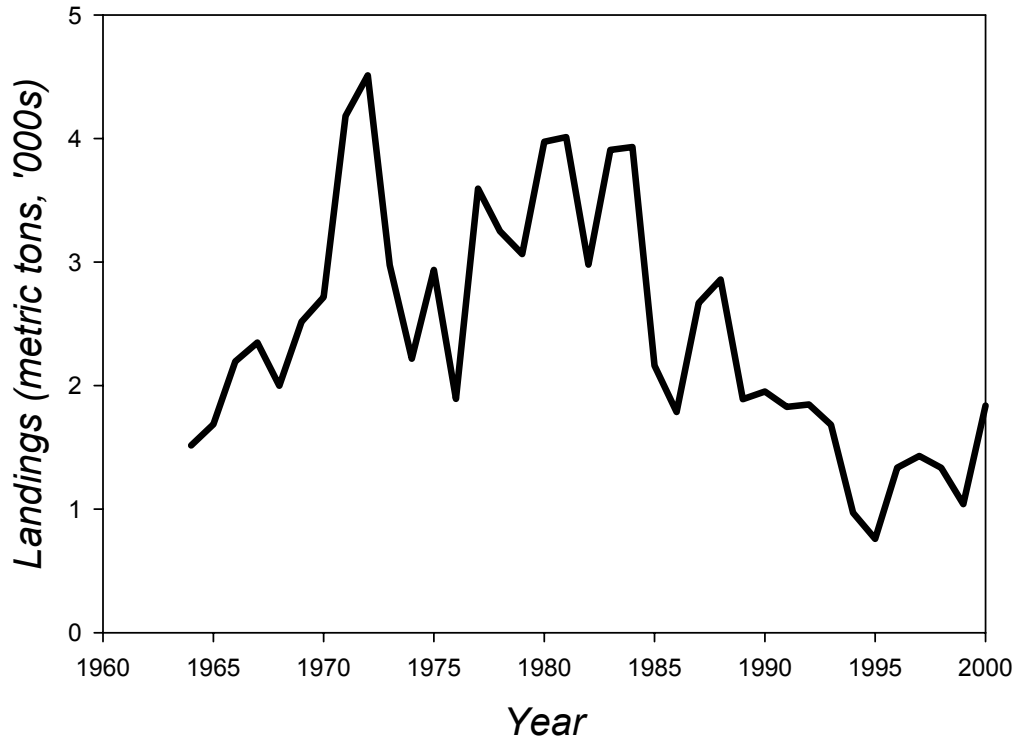


Figure 3.12.1. Landings and research vessel survey abundance indices for Georges Bank winter flounder.

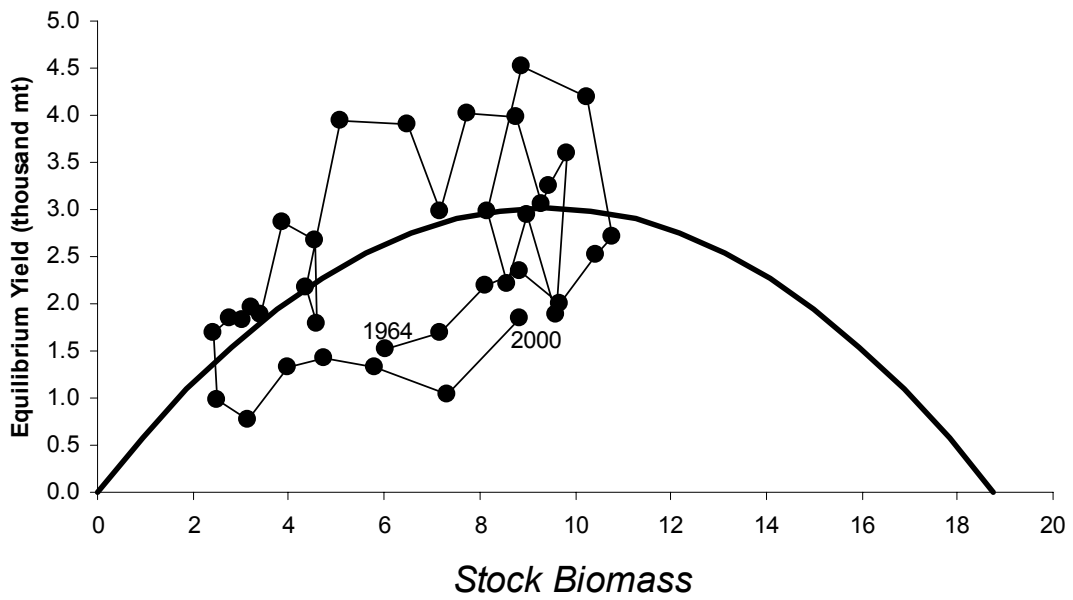
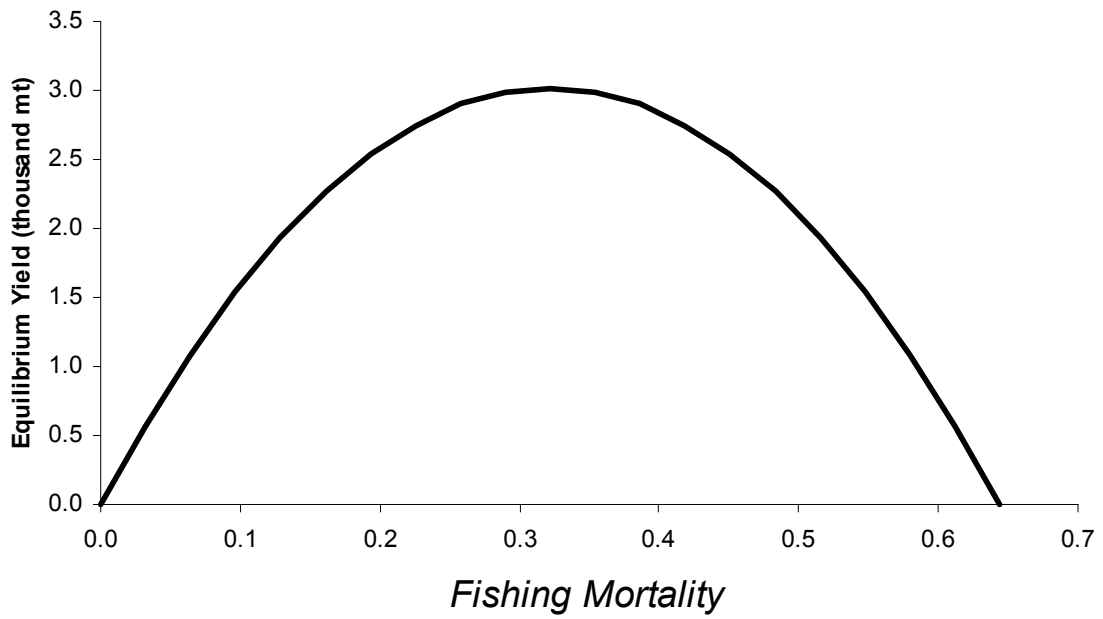


Figure 3.12.2. Results of surplus production analyses (ASPIC) for Georges Bank winter flounder

Georges Bank Winter Flounder

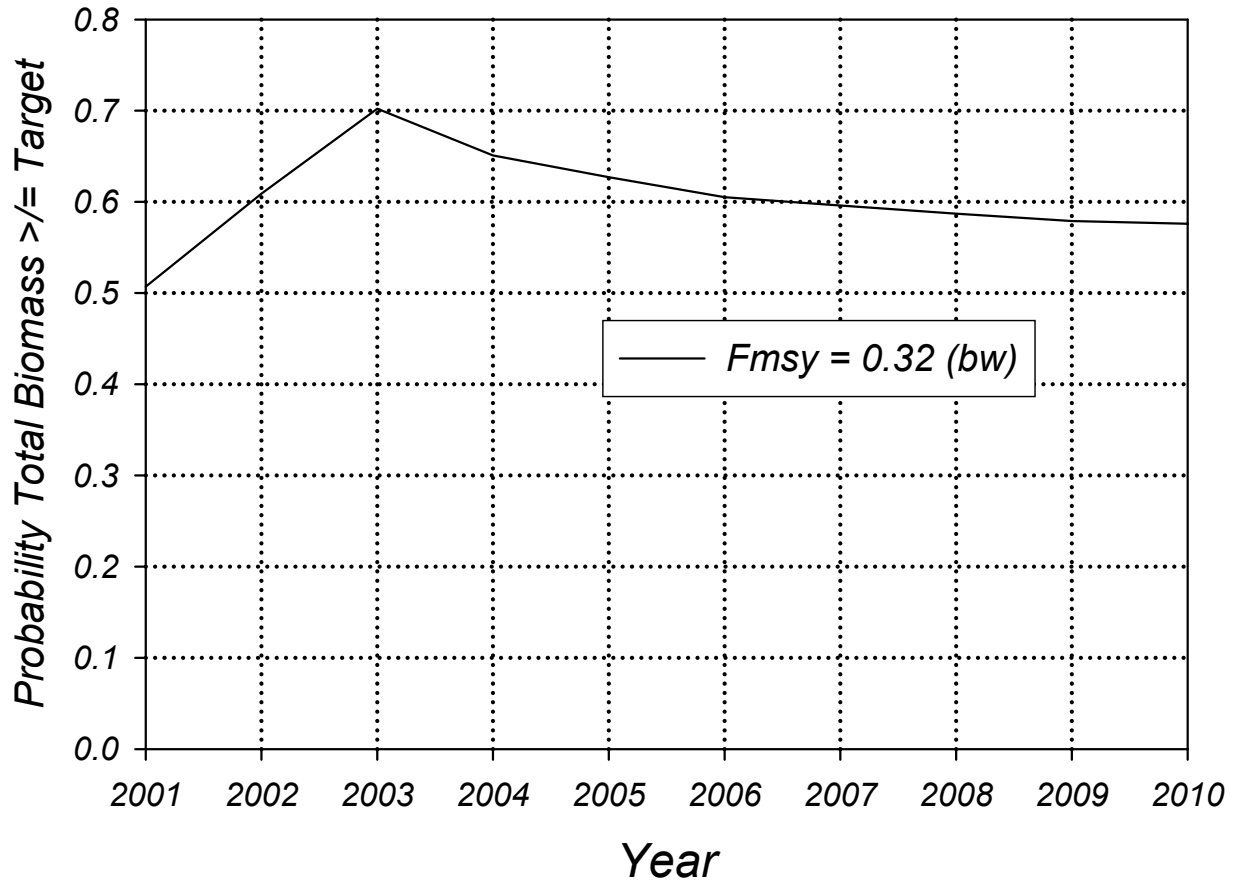


Figure 3.12.3. Probability that Georges Bank flounder total biomass will exceed Bmsy annually under Fmsy. Projections are based on an ASPIC surplus production analysis.

Georges Bank Winter Flounder

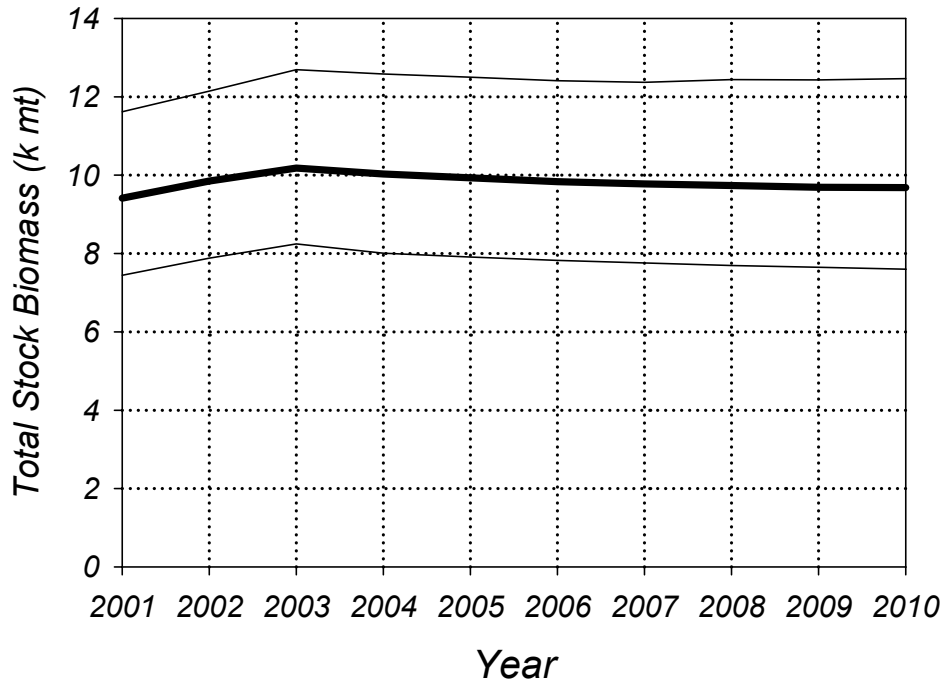


Figure 3.12.4. Median and 80% confidence interval of predicted spawning biomass for Georges Bank winter flounder under F-msy fishing mortality rates.

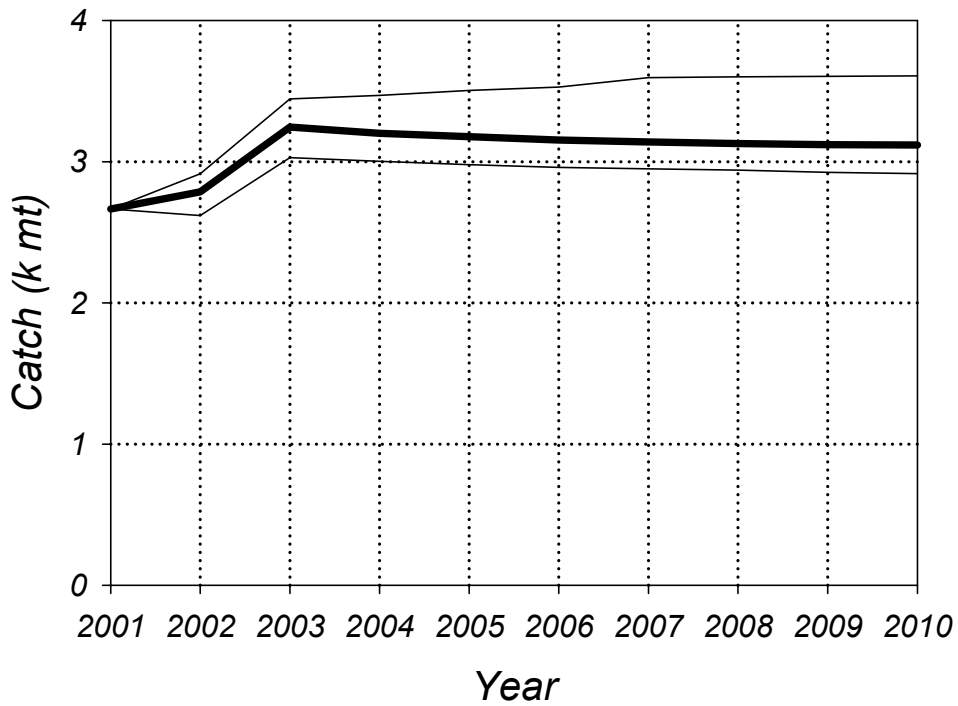


Figure 3.12.5. Median and 80% confidence interval of predicted catch for Georges Bank winter flounder under F-msy fishing mortality rates.

GB Winter Flounder, Fall

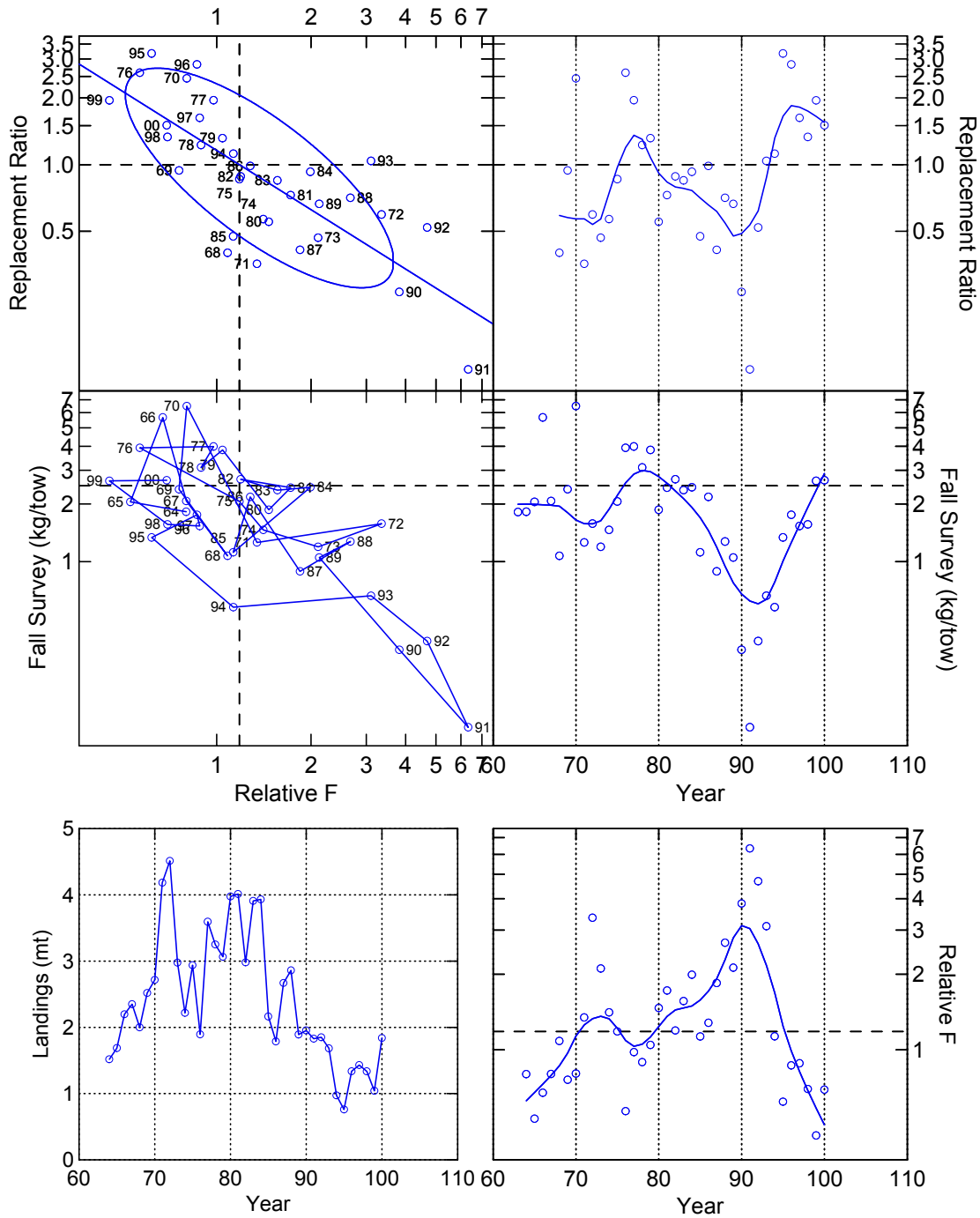


Figure 3.12.6. Trends in relative biomass, landings, fishing rate mortality rate indices (landings/survey index) and replacement ratios for Georges Bank winter flounder. Dashed lines indicate equivalent biomass and fishing mortality rate proxies of Bmsy and Fmsy.