assumed for fishery catch at age and the survey indices at age were entered as separate series. The calibration indices at age for NEFSC spring and DFO surveys were compared to population numbers of the same age at the beginning of the same year. The NEFSC autumn calibration indices at age were compared to population numbers one year older at the beginning of the next year.

The model was formulated with four fishery selectivity blocks for the commercial fleet based on changes in codend mesh size regulations (text table below): 1978-1982, 1983-1993, 1994-1999, and 2000-2011.

years	codend mesh inches
1973-1976	4.50
1977-1982	5.13
1983-1993	5.50
1994-1999	6.00
2000-2011	6.50

Survey selectivity was modeled by age with selectivity fixed at one for ages 8-10.

The final objective function and contribution of individual components are presented in Table B20. A comparison with the VPA results indicates a similar trend in SSB, whereas, the trend in F is similar but more variable (Figure 31). The retrospective pattern (Figure B32) did not improve in this formulation of ASAP compared to the split-survey VPA (Figure B30).

The WG agreed that further exploration of the ASAP model with a multinomial assumption for the survey age composition would be more beneficial than pursuing this VPA-like ASAP model with lognormal error for the age-specific survey time series.

BASE ASAP

Input to the Base ASAP model is essentially the same as described for the VPA. The catch at age is for the combined landings and discards of USA and Canadian fishing fleets (Table B12, Figure B9) for ages 1-10+ during 1978-2011. Swept-area estimates derived from indices of abundance included additional ages: NEFSC 1978-2011 standardized estimates for ages 1- 10+ (Table B15a), NEFSC 1978-2011 standardized autumn estimates for ages 1-6 (Table B15b) and Canadian DFO 1986-1992, and 1995-2011 estimates for ages 1- 10+ (Table B15c). The DFO survey data for 1993 and 1994 were not included in the model because the survey did not sample the entire GB area in those years. The NEFSC spring survey was dis-aggregated into two series based on the use of the Yankee #36 or Yankee #41 otter trawl as described in the VPA section. A five-year moving average of age-specific and time varying maturity at age was used in the model as described in the VPA section. Natural mortality was age and time invariant and was assumed to be 0.2 as in previous assessments (O'Brien et al. 2012).

About 50 ASAP model formulations were explored to inform this final base model formulation, however, none of those model results will be presented, although they may be referenced.