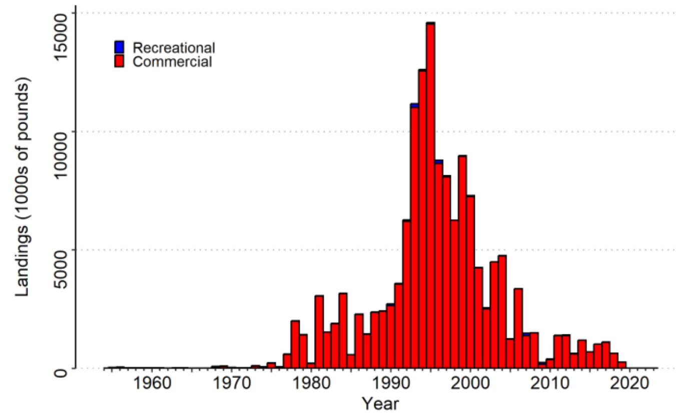
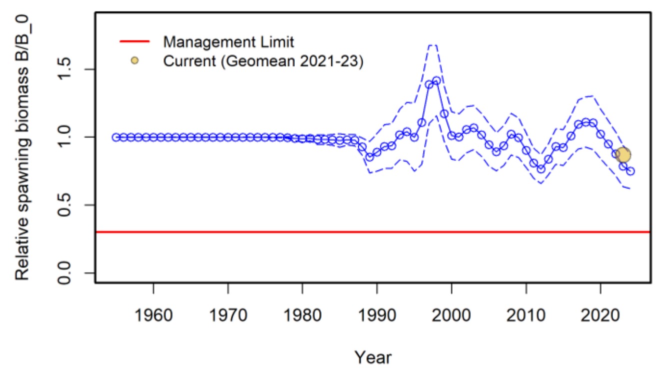
Assessment of Striped Mullet *Mugil cephalus* in Louisiana Waters
2025 Report

<u>Executive Summary</u>

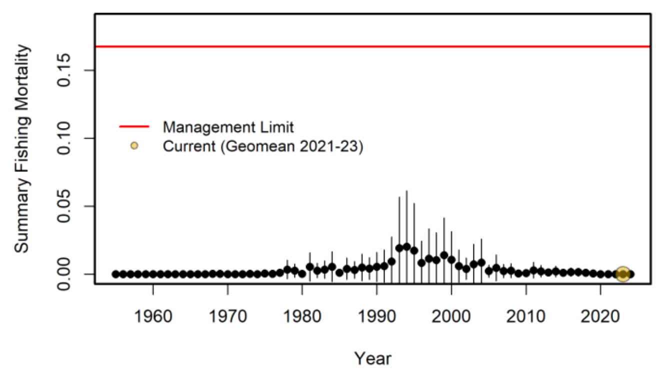
The conservation threshold established by the Louisiana Legislature for Striped Mullet is a 30% spawning potential ratio. Based on results of this assessment, the Louisiana Striped Mullet stock is not overfished or experiencing overfishing. The current spawning potential ratio estimate is 87%.



Landings of Striped Mullet in Louisiana have decreased substantially in the last twenty-five years with recent lows below 10 thousand pounds per year. The decline in landings since 2000 are due to a number of factors including: increases in operating costs, increases in foreign wild-caught and aquaculture mullet production, decreases in the demand and price of mullet roe, and reductions in fishery effort from the impacts of several major hurricanes and the COVID-19 pandemic. The highest harvests on record (over 10 million pounds) occurred during the mid-1990's. After commercial restrictions were enacted in 1995, Striped Mullet landings began to decline. Recreational landings comprised approximately 1% of the Striped Mullet harvest in the most recent decade.



An integrated statistical catch-at-length and -age model is used in this stock assessment to describe the dynamics of the Louisiana Striped Mullet stock from 1955-2023. The assessment model projects forward from initial condition estimates using age and length structured population dynamic calculations. The primary model inputs are time-series' of recreational and commercial landings, an index of relative abundance developed from the LDWF marine gillnet survey, length compositions of fishery and survey catches, and age-at-length compositions (age-length-keys) of the commercial fishery and survey catches.



<u>Summary of Changes from 2020 Assessment</u>

The previous LDWF stock assessment of Striped Mullet (West et al. 2022) utilized the Age Structured Assessment Program (ASAP) stock assessment model to estimate current and historical stock abundance and the rate of fishery removals. In this assessment, Stock Synthesis 3 (SS3) is used as the primary assessment model with the ASAP assessment model presented as a continuity case.

Stock Synthesis 3 is an integrated fish population analysis model that combines all available data sources, with minimal preprocessing, into a single analysis through joint likelihood functions. The SS3 model is extremely flexible and can be configured from low to high complexity depending on data availability and life history of the stock. The SS3 population dynamics model can be parametrized using an age and/or length-based structure. A variety of fisheries and survey data can be used to configure SS3 allowing multiple fleets, surveys, sexes, areas, and stocks to be modeled simultaneously. The SS3 analysis also allows missing data to be included in the modeled time-series precluding the use of pooled data sets in years without observations that were necessary when developing ASAP model inputs. Another advantage of the integrated SS3 model is the ability to input data in the rawest form possible, eliminating the need to preprocess model inputs such as externally converting catch-at-length data into catch-at-age with age-length-keys, thus allowing more appropriate estimates of uncertainty around the estimated stock status metrics by carrying variances of the observations though the model fitting process into the parameter estimates and the calculated management metrics.

In this assessment, the SS3 base model is configured as a two sex model with both age and length structuring where fishery and survey catch-at-age are estimated within SS3 from age-length-keys (ALKs) calculated from the species growth curves in concert with the available fleet- and survey-specific empirical ALKs, and the estimated fishery and survey catch-at-length. Model inputs for the SS3 base model are summarized below. Model inputs for the ASAP continuity run have been updated through 2023 with no changes made to the configuration of the ASAP model itself.

Life History:

- Growth was modeled for each sex with von Bertalanffy growth equations with parameters estimated within and outside the SS3 model.
- A combined sex weight-length relationship was fixed in SS3 with parameters estimated outside of the SS3 model.
- Sex-specific natural mortality (M) point estimates (0.540 yr^{-1} for each sex) were used to scale declining M-at-age (Lorenzen 1996) for each sex outside of the SS3 model.
- Sex ratio was fixed at 1:1 at birth within the SS3 model.
- Spawning output at age (fecundity*maturity) was fixed in SS3 with parameters estimated outside of the SS3 model.

Landings and Discards:

- Commercial landings (1955-2023).
- Recreational landings (1955-2023).

Indices of Abundance:

- LDWF marine gillnet survey index of relative abundance (1988-2023).

Length Composition:

- Commercial length composition (combined sex 1986-1987, sex-specific 1994-2019).
- Recreational length composition (combined sex 1982-2013).
- Marine gillnet survey length composition (combined sex 1988-1994, sex-specific 1995-2023).

Age-at-length Composition (ALKs):

- Commercial sex-specific ALKs (2002-2019).
- Marine gillnet survey sex-specific ALKs (2019-2023).

Assessment of Striped Mullet *Mugil cephalus* in Louisiana Waters

2025 Report

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Table of Contents

1. Introduction

A statistical catch-at-length and -age model is used in this assessment to describe the dynamics of Striped Mullet *Mugil cephalus* occurring in Louisiana (LA) waters from 1955-2023. The assessment model projects forward from estimates of initial conditions using length and age structured population dynamic calculations. The primary model inputs are the removals from the commercial and recreational fisheries, an index of relative abundance developed from the LDWF marine gillnet survey, the corresponding length compositions of the fisheries and survey, and the age-at-length compositions of the commercial fishery and gillnet survey.

1.1 Fishery Status

A comprehensive history of the Striped Mullet (SM) resource and associated fishery within LA is described in Mapes et al. (2001) and for the Gulf of Mexico (GOM) in GSMFC (1995). A current summary of the Louisiana SM fishery is presented below.

Commercial

Mapes et al. (2001) detail the progression of the Louisiana commercial SM fishery from an underutilized fishery into a viable fishery after the development of a mullet roe market in 1976. However, regulatory changes enacted in 1995 along with the impacts from several major hurricanes, increasing operating costs and a decreasing demand for wild caught roe have led to a decline in the commercial effort directed at SM harvest in Louisiana. More recent effects from the COVID-19 pandemic have furthered this decline.

Louisiana commercial SM landings declined significantly after regulations were implemented in August 1995 which eliminated the harvest of mullet with entanglement nets outside of the period between the 3rd Monday in October through the 3rd Monday of the following January, with no harvest allowed on weekends or at night. The passages of major hurricanes in the last few decades caused substantial damage to LA marine fishery infrastructure causing a reduction in the directed effort of the LA commercial SM fleet. The lingering effects of the COVID-19 pandemic have also contributed to the low fishing effort of the commercial SM fleet primarily due to the closure of mullet processing facilities along the Gulf Coast. Higher fuel prices coupled with a decline of the price of roe have also contributed to a more variable fishery. Furthermore, Australian wild-caught and Asian farm-raised SM have gained a share of the worldwide market, especially following the impacts of major hurricanes. The commercial SM fishery in Louisiana is currently operating well below the peak in landings observed during the 1990s.

More recent regulatory changes enacted in 2012 established a year-round commercial cast-net season for the harvest of live SM for bait purposes only. This fishery follows the same weekday and daytime harvest restrictions as the commercial SM entanglement net fishery.

Recreational

Only limited recreational effort is directed toward SM harvest in Louisiana with less than 0.05% of LA anglers reporting SM as their primary or secondary target (LA Creel unpublished data). The recreational harvest that does occur is typically utilized as bait only (Mapes et al. 2001; GSMFC 1995).

1.2 Fishery Regulations

The LA SM fishery is governed by the Louisiana State Legislature, the Wildlife and Fisheries Commission, and the LDWF. A review of LA commercial and recreational SM fishery regulations are presented below; full descriptions of historical regulations can be found in Mapes et al. (2001) and GSMFC (1995).

Commercial

1980 – Special permits granted allowing the use of experimental gear. This usually involved seines and spotter planes for the SM fishery.

1984 – Permit restrictions limited use of purse seines in state waters.

1986 – Elimination of special permits for experimental gears.

1990 – Use of spotter planes banned except for use in the commercial menhaden fishery.

1995 - Limited access program established to commercially fish for SM with strike nets, harvest times limited to after sunrise and before sunset with no commercial fishing for SM allowed on Saturday or Sunday in state waters. Season established to run from the third Monday in October until the third Monday in January.

2012 – Year round commercial cast net fishery established for the capture of live mullet for bait purposes only.

Recreational

1992 – A daily recreational take and possession limit of 100 pounds established.

1.3 Trends in Harvest

Time series of LA recreational (1982-2023) and commercial (1950-2023) SM landings are presented (Figure 1) along with recreational fishing effort estimates (angler trips; 1982-2023) and commercial fishing effort (trips with landed SM; 1999-2023).

Commercial

Annual commercial landings of SM in Louisiana remained below 225 thousand pounds prior to 1977 (Figure 1). When the mullet roe market began to develop after 1977, LA commercial SM landings began to increase with over 3 million pounds harvested in 1981. From 1982-1991, LA commercial SM landings averaged over 2 million pounds per year. In the 1990s, with an increased demand for mullet roe, the LA commercial SM fishery expanded further. From 1992-2000, SM landings averaged just over 9 million pounds per year with a peak over 14 million pounds observed in 1995. After the 1995 legislation was enacted, which limited the use of entangling nets and established the current structure of the mullet season, commercial landings and fishing effort began a general decline with less than 200 thousand pounds harvested in 2009. Commercial fishing effort tracks the decline in landings (Figure 1) with over 3000 commercial fishing trips observed in 1999 to less than 100 trips in 2009 and 2010. In the most recent decade, commercial landings averaged less than 500 thousand pounds per year. After 2020, annual landings and fishing effort declined to the lowest levels observed and remain so to date.

Recreational

Annual recreational landings of SM in LA have rarely exceeded 100 thousand fish (Figure 1). From 1982-2023, recreational SM landings averaged just under 40 thousand fish per year. Landings over 100 thousand fish were observed in 1990, 1993, 1996, and 2007. In the most recent decade, recreational SM landings have averaged under 10 thousand fish per year.

2. Life History Information

2.1 Unit Stock Definition

Striped mullet are a catadromous schooling fish common in warm, temperate coastal waters throughout the world. They are ubiquitous in the GOM and can be found along extreme salinity gradients, from fresh to hyper-saline. Little or no genetic sub-structuring has been documented for GOM striped mullet. Thompson *et al.* (1991) found no differences in enzyme polymorphisms in striped mullet collected from various locations across Louisiana, or between those areas and mullet collected from the Pascagoula River (Mississippi), Mobile Bay (Alabama), and Charleston Harbor (South Carolina). Campton and Mahmoudi (1991) also found little evidence for genetic sub-structuring of striped mullet populations between the Atlantic and GOM coasts of Florida. More recently, Rocha-Olivares et al. (2005) also found very little genetic sub-structuring between GOM and Atlantic striped mullet suggesting a single stock with high levels of gene flow. For the purpose of this assessment, the unit stock is defined as those SM occurring in LA waters.

2.2 Morphometrics

Fish with only fork length (FL) measurements available were converted to total length (TL) from a linear regression of length data available from LDWF records (n=647; Table 1).

A combined sex length-weight regression was fit with a power function using SM length-at-weight data available from LDWF records (n=5,459; Table 2 and Figure 3).

2.3 Growth

Striped mullet exhibit sexually dimorphic growth where females tend to grow more rapidly than male fish (Thompson et al. 1991, LDWF unpublished data). For purposes of this assessment, sex-specific von Bertalanffy growth models are fit to LDWF SM length-at-age data (female n=8,727 and male n =1,253; Table 1 and Figures 4-5) to calculate expected length-at-age for computation of age-specific natural mortality rates (see section *2.6 Natural Mortality*). The theoretical age when length=0 parameter of each growth model were set to zero (t_0=0) and not estimated to allow reasonable values of hatch size. In the SS3 base model, the maximum theoretical length (L_{inf}) and von Bertalanffy growth coefficient (K) estimates were used as fixed parameters of sex-specific von Bertalanffy growth functions (see section *4.1 Model Configuration*).

2.4 Reproduction

Striped mullet are synchronous spawners that emigrate from estuarine waters to spawn in offshore waters of the GOM with peak spawning occurring in November and December (Thompson et al. 1991, GSMFC 1995). Thompson et al. (1991) reported that females were generally mature by age-2 with all females reaching maturity by age-3. For purposes of this assessment, female maturity is assumed to be 0 at age-0 and age-1, 50% at age-2, and 100% for ages-3 and greater. Fecundity estimates (eggs per fish) as a function of length are available (Table 1) from Thompson et al. (1991). For purposes of this assessment, fecundity-at-age estimates are calculated from the Thompson et al. (1991) function and female mean age-at-length calculated from the female growth curve (Table 1). The mean lengths-at-age were converted from total to fork length in order to match the Thompson et al. (1991) function. Spawning output at age (eggs per mature fish) that is used as a fixed input in the SS3 base model (Figure 6) was then calculated as the product of maturity and fecundity at age.

2.5 Sex Ratio

Sex ratios observed in LDWF samples are skewed towards females due to the species sexually dimorphic growth along with the differential profit in the commercial fishery between male and female gonads. For purposes of this assessment, the sex ratio at birth is assumed to be 1:1.

2.6 Natural Mortality

Striped Mullet can live to at least 10 years (Figures 4 and 5). For purposes of this assessment, sex-specific point estimates of natural mortality (M) were calculated (0.540; Table 1) based on an assumed maximum age of 10 years for each sex (Hamel and Cope 2022). The M point estimates were used to scale estimates of M-at-age for each sex (Table 3 and Figure 7). Following SEDAR 12 (SEDAR 2006), the point estimates of M are rescaled where the average mortality rate over ages is equivalent to the constant rate over ages. The allometric exponent estimated for natural ecosystems (-0.288; Lorenzen 1996) is used to calculate the Lorenzen curve as a function of age.

3. Data Sources

3.1 Fishery Dependent

Landings and Discards

Commercial

Commercial SM landings (Figure 8) are taken from the LDWF Trip Ticket Program (1999-2023) and NMFS commercial statistical records (pre-1999; NMFS 2023). All commercially caught mullet are assumed to be landed for purposes of this assessment.

Recreational

Time series of recreational landings as used in this assessment are presented (Figure 9). The recreational SM landings are taken from the LDWF recreational creel survey (LA Creel; 2014-2023) and estimates hindcast to the historic MRIP time-series (1982-2013; details in *Appendix 1*). Consequently, the pre-2014 recreational estimates used in this assessment differ from the LA estimates currently published by MRIP (https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index). All recreationally caught mullet are assumed to be landed for purposes of this assessment.

Historical recreational landings (1955-1981) are estimated following the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Survey (FHWAR) method (Brennan and Fitzpatrick 2012) outlined in the SEDAR 31 Data Workshop. The FHWAR survey has been conducted every five years since 1955. The FHWAR method uses estimates of U.S. saltwater anglers and the number of U.S saltwater days from the FHWAR survey as the main components. The ratio of U.S. saltwater anglers to total U.S. anglers was used to estimate the number of saltwater anglers in the West South Central (WSC) geographic region (LA, TX, AR, and OK) from the total number of WSC region anglers reported in each FHWAR survey. The ratio of WSC region saltwater anglers to U.S saltwater anglers was then used to calculate the WSC region saltwater days from estimates of the total U.S saltwater days reported in each

FHWAR survey. Recreational effort from Texas was removed from the WSC region using the proportion of LA saltwater anglers reported in the WSC region in the 1991 FHWAR survey, which was the first year state-specific effort was reported in FHWAR surveys. To account for levels of bias associated with the 12-month recall period used in the 1955-1985 FHWAR surveys, a bias adjustment factor was calculated to adjust the pre-1991 FHWAR effort estimates using the ratio of the 1985 estimate of saltwater days in the WSC region and the sum of the mean LA Creel and TX saltwater effort from 1984-1986. The historic LA SH recreational landings estimates (1955-1981) were then computed from the mean hindcast LA Creel landings per unit of effort estimates from 1984-1986 and the adjusted saltwater days for LA estimated from the 1955-1985 FHWAR surveys. Linear interpolation was used to estimate landings between each 5 year survey period.

Length/Sex Composition

Commercial

Annual length compositions of commercial harvest (Figure 10) are available from earlier LSU sampling (1986-1987), the Trip Interview Program (TIPS; 1994-2001), the Fishery Information Network (FIN; 2002-2013), and the LDWF Biological Sampling Program (2014-2019). The 1986-1987 length compositions represent combined sexes and length compositions starting in 1994 are sex-specific. The sex-specific length compositions are developed to sum to 1 across sexes to retain the sex ratio information. Sample size of the commercial length measurements are presented (Table 4) along with the sex ratios of the sex-specific length compositions (Figure 11). Sex-specific length compositions were not developed for the years with less than 10 males represented in the samples.

Commercial length compositions are weighted by the corresponding landings at the finest scale possible to correct for unrepresentative sampling. The pre-2014 commercial length compositions are unweighted. Beginning in 2014, commercial length compositions are weighted by the landings in each LA drainage basin.

Recreational

Annual length compositions of recreational SM landings are available for a limited number of years from the MRIP survey (Figure 10). Annual sample size of the recreational length measurements are summarized (Table 4). Length compositions were not developed for years with less than 10 fish represented in the annual samples. The MRIP length compositions are derived using the SAS template program available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads that estimates length frequencies for custom domains from the public-use MRIP datasets.

Age-at-length Composition

Age Assignments

Striped mullet spawn offshore with peak spawning occurring in November and December (GSMFC 2005). Ages of SM in this assessment are assigned based on a biological January 1st birthday, where SM become age-1 the first January after birth and remain age-1 until the beginning of the following year.

Commercial

Age-at-length data used to develop annual sex-specific age-length-keys (ALKs) of commercial SM landings (Figure 12) have been collected from LDWF sampling effort since 2002. Annual sample size of the commercial SM length-at-age measurements are summarized (Table 5).

Commercial age-at-length compositions are weighted by the corresponding landings at the finest scale possible to correct for any unrepresentative sampling. The pre-2014 commercial age-at-length compositions are unweighted. Beginning in 2014, commercial age-at-length compositions are weighted by the landings in each LA drainage basin.

3.2 Fishery Independent

Survey Description

The LDWF fishery-independent (FI) marine gillnet survey is used to develop an index of relative abundance as an input of the assessment model. Below is a brief description of the surveys methodology. Complete details can be found in LDWF (2018).

For sampling purposes, coastal Louisiana is currently divided into five LDWF coastal study areas (CSAs). Current CSA definitions are as follows: CSA 1 – Mississippi State line to South Pass of the Mississippi River (Pontchartrain Basin); CSA 3 – South Pass of the Mississippi River to Bayou Lafourche (Barataria Basin); CSA 5 – Bayou Lafourche to eastern shore of Atchafalaya Bay (Terrebonne Basin); CSA 6 – Eastern shore of Atchafalaya Bay to western shore of Freshwater Bayou Canal (Vermillion/Teche/Atchafalaya Basins); CSA 7 – western shore of Freshwater Bayou Canal to Texas State line (Mermentau/Calcasieu/Sabine Basins).

The LDWF Marine Fisheries Section conducts routine standardized sampling within each CSA as part of a long-term comprehensive monitoring program to collect life-history information and measure relative abundance/size distributions of recreationally and commercially important species.

The marine gillnet survey is conducted with a standardized design and is one of the primary gears used to sample inshore finfish. The survey is conducted year-round. Sampling gear is a 750-foot long gillnet made up of equal sized panels of 2.0, 2.5, 3.0, 3.5, and 4.0-inch stretch meshes.

This survey was conducted from 1986 to April 2013 at fixed sampling stations within each CSA. The 2.5 and 3.5-inch mesh sizes were not included in this survey until 1988. In October of 2010, additional fixed stations were added to the survey allowing more spatial coverage within each CSA. Beginning in April 2013, the survey design was modified where sampling locations are now selected randomly from the established stations within each CSA (Figure 13).

Samples are taken by 'striking' the net. All captured SM are enumerated and a maximum of 30 randomly selected SM per mesh panel are collected for length measurements, gender determination, and maturity information.

For index development, only the samples from the months of November through February were included. Samples prior to the 1988, when the 2.5 and 3.5-inch mesh sizes were not included in the survey, were also excluded along with samples from the 4.0-inch mesh panel due to very low catches. Samples collected during the months of January and February are grouped with the previous year's November and December samples for index development. Catch per unit effort (CPUE) is defined as the number of SM caught per net set. Indices are developed separately for each time period of consist sampling methodology (1988-2012 and 2013-2023).

IOA Development

To reduce unexplained variability in catch rates unrelated to changes in abundance, each IOA was standardized using methods described below.

A delta lognormal approach (Lo *et al.* 1992; Ingram *et al.* 2010) is used to standardize SM catch-rates in each year as $I_y = c_y p_y$, where c_y are estimated annual mean CPUEs of non-zero SM catches assumed as lognormal distributions and p_y are estimated annual mean probabilities of SM capture assumed as binomial distributions. The lognormal and binomial means and their standard errors are estimated with generalized linear models as least squares means and back transformed. The lognormal model considers only samples in which SM are captured; the binomial model considers all samples.

Because of the designed nature of the LDWF marine gillnet survey, model development was rather straightforward. Variables considered in model inclusion were year, CSA, and sampling location. To determine the most appropriate models, we began the model selection process with a fully-reduced model that included only year as a fixed effect. More complex models were then developed including interactions and random effects and compared using AIC and log-likelihood values. All sub-models were estimated with the SAS generalized linear mixed modeling procedure (PROC GLIMMIX; SAS 2008). In the final sub-models, year was considered a fixed effect, CSA was considered a random block effect, and sampling locations within CSAs were considered random subsampling block effects.

The relative abundance index and 95% confidence intervals of the marine gillnet survey are presented (Figure 14).

Length/Sex Composition

Annual length compositions of SM catches from the LDWF marine gillnet survey are presented (Figure 10) along with the corresponding annual sample size of the length measurements (Table 4). The pre-1994 length compositions represent combined sexes and the compositions starting in 1995 are sex-specific. The sex-specific length compositions are developed to sum to 1 across sexes to retain the sex ratio information. Sex ratios of the sex-specific length compositions are presented (Figure 15).

Age-at-size Composition

Age-at-size data used to develop annual sex-specific age-length-keys (ALKs) of SM catches of the LDWF marine gillnet survey (Figure 16) have been collected since 2019. Annual sample size of the SM age-at-length measurements are summarized (Table 5).

4. Assessment Model

Stock Synthesis 3 (SS Version 3.30.20; Methot and Wetzel 2013) is used in this assessment to describe the dynamics of Striped Mullet occurring in LA waters. Stock Synthesis 3 is an integrated fish population analysis model that combines available data sources, with minimal preprocessing, into a single analysis though joint likelihood functions. The SS3 model is extremely flexible and can be configured from low to high complexity depending on data availability and life history of the stock. The SS3 population dynamics model can be parametrized using an age and/or length-based structure. A variety of fisheries and survey data can be used to configure SS3 allowing multiple fleets, surveys, sexes, areas, and stocks to be modeled simultaneously. An overview of the model configuration, as applied in this assessment, is provided below. Specific details and full capabilities of SS3 can be found in the technical documentation (Methot et al. 2020).

4.1 Model Configuration

The base model was configured as a two sex single area model with annual time-steps from 1955-2023 with a simple one year forecast using the estimated fishing mortality rate from the terminal year of the assessment. Fish were modeled from age-0 through an age-7 plus group. Two fishing fleets (recreational and commercial) and a relative abundance index developed from LDWF marine gillnet survey were modeled. Fish spawn at the start of each annual time step and the age-0 fish recruit to the population at the time of settlement on January 1st. Lognormal error structure is assumed for fishery catches and abundance indices. A Dirichlet-multinomial error structure is assumed for length and age-at-length composition data. Coefficients of variation of data sources with lognormal structure are converted to standard errors in natural log space using the $\sqrt{(log_e(1+(CV)^2))}$ approximation (Methot et al. 2020). Length units are inches total length and biomass units are pounds. Inputs of the SS3 base model are summarized in Figure 17. The SS3 base model files (starter, forecast, data, and control files) are provided in *Appendix 2*.

Life History

Parameters for a combined sex power weight-length function (Table 2) are estimated outside of SS3 and fixed within the base model.

Spawning output at age estimates (Figure 6) are calculated outside of the model using the fecundity at length parameter estimates (Table 1) along with the assumed maturity at age (0 for ages < age-2, 50% at age-2, and 100% for ages-3 and greater) and fixed within the base model.

The sex-specific point estimates of M based on the assumed longevity of the species (Table 1) are assumed to decline as functions of age and are estimated outside of SS3 and fixed within the base model (Table 3).

Sex-specific growth and variability in length-at-age parameters are estimated outside and within the SS3 base model using the von Bertalanffy growth function with an assumed normal error structure and variability modeled as a function of age. The SS3 formulation of the von Bertalanffy growth function requires 5 parameters for each sex: 3 parameters to describe mean length-at-age (lengths at minimum and maximum reference age, and the functions slope) and 2 parameters to describe variability in length-at-age (coefficients of variation at the minimum and maximum reference age). The minimum and maximum reference ages for the length-at-age parameters were specified as 0.5 years and the age at the maximum theoretical length (L_{inf}). Fish less than the first reference age grow linearly from the settlement time of the age-0 recruits.

Estimating all growth function parameters simultaneously in the SS3 model became problematic leading to model stability issues. Thus, the sex-specific parameter estimates of L_{inf} and von Bertalanffy slopes (K) from the external model fits (Table 1) were used as fixed parameters in the SS3 base model while sex-specific variability in length-at-age and length at minimum reference age parameters were estimated within the SS3 base model. The length at minimum reference age and coefficient of variation at the maximum reference age parameters were shared by each sex.

Stock-Recruitment

The Beverton-Holt stock recruitment function was used to describe the relationship between spawning biomass and age-0 recruitment. Three parameters are required for this function: the unfished recruitment level (R_0), the standard deviation of natural log recruitment (σ_R), and steepness (h; the proportion of R_0 produced by 20% of unfished spawning biomass). In the base model, steepness was fixed at 0.99 and the R_0 and σ_R parameters estimated (see section *4.3 Model Diagnostics*).

Annual lognormal recruitment deviations in the SS3 base model are estimated for the period considered data-rich (1986-2021), when length and age composition data were available to inform the model on the year to year recruitment levels, as a deviation vector with an explicit sum-to-zero constraint. Age-0 recruitment for the period prior to 1986, when no length or age composition data were available, are estimated directly from the stock recruitment relationship using the annual spawning output estimates. Likewise, recruitment is estimated directly from the stock recruitment relationship for the last two years of the time series due to limited information about young fish in the size and age composition data.

Initial Conditions

The modeled time series in this assessment begins in 1955. The recreational and commercial fleets operated in LA prior to this time. In the SS3 base model, initial commercial landings are specified as the geometric mean of landings from 1950-1954 available from NOAA Fisheries commercial statistical records (26 thousand pounds). The initial apical fishing mortality parameter of the commercial fleet was estimated from the initial fleet-specific landings. Uncertainty around the initial commercial landings was specified with a CV of 0.1. The initial landings of the recreational fleet were considered minimal and not specified in the SS3 base model with the initial recreational apical fishing mortality parameter fixed at 0.

Landings

Landings are assumed to have a lognormal error structure in the SS3 base model and are calculated from each fleet's annual apical F's and selectivity-at-age derived from the length-based selectivity estimates and the species growth curve. Apical F's are calculated in the SS3 base model using the hybrid approach, where fractional annual harvest rates are first calculated using Pope's method before these values are converted into approximate apical F's and tuned over multiple iterations to achieve a better fit to each fleets landings. Uncertainty around commercial landings were specified with CV's of 0.05 for all years of the modeled time series. Coefficients of variation of the recreational landings were specified as the relative standard error of the annual landings estimates themselves (1982-2023, range 0.4 to 0.8) and 0.1

for the years prior to 1982. Larger uncertainty around the pre-1982 recreational landings time series was tested in the SS3 base model (CV=0.3), which led to model stability issues, and was ultimately not used.

Abundance indices

A relative abundance index time series is modeled for the LDWF marine gillnet survey (1988-2023). The abundance index is assumed proportional to stock abundance and to have a lognormal error structure in the SS3 base model. Catchability of the gillnet survey were estimated in two time blocks that correspond to periods of consistent sampling methodology: fixed station sampling (1985-2012) and random station selection (2013-2023). Index uncertainty was specified with CV's estimated from the index standardization procedure.

Length/Sex Compositions

Length composition data were modeled for both fleets and the marine gillnet survey. Length compositions for the recreational fleet that represent combined sexes were available from 1986, 1992-1996, and 1998-2002. Length compositions for the commercial fleet were available from 1986-1987, 1994-2004, and 2006-2009 (combined sex from 1986-1987 and sex-specific beginning in 1994). Length compositions of the marine gillnet survey are available from 1988-2023 (combined sex from 1988-1994 and sex-specific beginning in 1995). The sex-specific size compositions were developed to sum to 1 across sexes to retain the sex ratio information. The annual number of length observations (Table 4) from each fleet and survey are used as the input sample sizes. Combined sex observations with less than 10 fish are excluded from model fitting along with the sex-specific observations with less than 10 male fish represented.

Age-at-length Compositions

Sex-specific age-at-length compositions were modeled for the commercial fleet (2002-2019) and the marine gillnet survey (2019-2013). In the SS3 base model, age data was considered conditional on the length information. This configuration avoids double use of both length and age composition information by making the age data conditional on the length information while also providing better information to estimate growth parameters and the variability in size-at-age (Methot et al. 2020). The annual number of sex-specific age observations in each length bin from each fleet and survey are used as the input sample sizes.

Length and conditional age-at-length composition data were assumed to have a Dirichlet-multinomial error structure. The Dirichlet-multinomial (DM) differs from the standard multinomial by estimation of a self-weighting parameter that directly scales the input sample sizes. Three DM parameters were estimated in the SS3 base model for the length and conditional age-at-length compositions from each fleet and survey.

Selectivity and Retention

Length-based selectivity functions were used for both fleets and the marine gillnet survey. Selectivity represents the proportion of the stock vulnerable to capture. Selectivity of the fisheries and survey were assumed to be dome-shaped and were estimated in SS3 using six parameter double normal selectivity functions (pattern 24).). All selectivity parameters were estimated with symmetric beta priors (SE=0.05) to improve estimability. Selectivity of the recreational fleet and marine gillnet net survey were modeled as time invariant. Selectivity of the commercial fleet was estimated in two time blocks that correspond with periods of consistent regulation: year-round fishing (pre-1996) and current fishing season established (1996-2023). All fishery catches are assumed to be landed in this assessment precluding the use of retention functions to model discarded fish.

Estimated Parameters

In the SS3 base model, 87 total parameters were used with 72 parameters estimated. Estimated parameters were:

- Length at the minimum reference age and variability in length-at-age (4)
- Unfished recruitment and recruitment variability (2)
- Annual recruitment deviations from 1986-2021 (36)
- Initial apical commercial fishing mortality rate (1)
- Survey catchability coefficients (2)
- Fishery selectivity (18)
- Survey selectivity (6)
- Dirichlet-multinomial weighting factors (3)

Asymptotic standard error estimates derived from the inversion of the Hessian matrix are used to describe the uncertainty of the estimated parameters and calculated stock metrics.

Phases of estimation were specified in the SS3 base model as follows: the initial fishing mortality and unfished recruitment parameters were estimated in the first phase, catchability coefficients in the second phase, selectivity/ DM weighting parameters in the third phase, life history parameters in the fourth phase, recruitment deviations in the fifth phase, and recruitment variability in the last phase of estimation.

4.2 Model Results

Objective function components and log-likelihood values of the SS3 base model are summarized (Table 6). All components of the objective function were equally weighted (lambdas=1).

Parameter estimates and fixed parameter values of the base model are presented (Table 7) along with the asymptotic SEs and CVs (SE/estimate) of the estimates. Most parameters were reasonably estimated with CVs <1. Model parameters with CVs>1 include: annual recruitment deviations (1987, 1989, 1992, 1998, 2001-2002, 2004, 2006, 2013, 2015, and 2017-2018), initial commercial apical F, the descending slope and start logit parameters of the recreational selectivity function, and the top logit parameter of the marine gillnet survey selectivity function.

Model Fit

Landings

Model fits to the commercial and recreational landings match the observations very well (Table 8 and Figures 18 and 19) where the estimated landings virtually overlay the observations. Each time series used relatively low SEs to control model fits with the exception of the recreational landings beginning in the 1980's. Model estimated landings in units of numbers of fish and in units of biomass are also presented (Figure 20).

Abundance Indices

Model estimated catch rates of the marine gillnet survey (Table 9 and Figure 21) provide reasonable fits to the observations. With the exception of the 1996 value, estimated catch rates are within the 95% confidence intervals of the observations and adequately track the surveys trend across the time series.

Length/Sex Compositions

Model fits to the fishery and survey length composition data are presented in Figures 22-25. Fits to the corresponding sex ratios of the commercial fishery and survey length composition data are also presented (Figures 26 and 27). Length composition fits were controlled by the annual input sample sizes and the estimated DM parameters. The input and DM adjusted effective sample sizes are presented in the panel of the fleet and survey-specific length composition fits. The estimated DM multipliers used to adjust the input sample sizes were: 0.905 for the recreational fleet, 0.071 for the commercial fleet, and 0.113 for the gillnet survey.

The model provided adequate fits to the length composition data and corresponding sex ratio observations. Pearson residuals of the length composition fits show little patterning and only few instances with large residuals. Fits to the sex ratios of the commercial length compositions tend to underestimate the proportion of females observed in the landings.

Conditional Age-at-length Compositions

Model fits to the sex-specific commercial fishery and survey conditional age-at-length compositions are presented in Figures 28 and 29. Fits were controlled by the annual input sample sizes in each TL inch bin and the estimated DM parameters. The estimated DM multipliers used to adjust the input sample sizes were: 0.071 for the commercial fleet and 0.113 for the gillnet survey.

The model provided reasonable fits to the age-at-length composition data. Pearson residuals of the age-at-length composition fits are generally non-patterned and small in magnitude.

<u>Growth</u>

Sex-specific mean length-at-age and variability in length-at-age of the SS3 base model are presented (Figure 30) along with mean lengths-at-age estimated from the external growth function fit. Parameters of the von Bertalanffy growth function estimated in the SS3 base model are also presented (Table 7). In the SS3 base model, the L_{inf} and K parameters were fixed using the external sex-specific estimates (Table 1) while the length at the minimum reference age (0.5 yrs) and variability in length-at-age parameters were estimated.

The SS3 model estimated growth patterns differs somewhat from the external estimates. The SS3 growth patterns predict slightly smaller fish than the external models out to about age-3. This isn't surprising given the selectivity of the fishery and survey the samples were collected from weren't accounted for in the externally fitted models where only the fastest growing fish of the non-fully selected age classes were represented in the samples. The SS3 estimated von Bertalanffy growth curve that accounts for the selectivity of the fisheries and survey catches is thought to be a better representation of the species growth pattern.

<u>*Selectivity*</u>

Fishery and survey length-based selectivity estimates are presented in Figures 31-33 along with the corresponding sex-specific age-based selectivities derived from the length-based functions and the species growth curves.

Recreational

The dome-shaped recreational length-based selectivity curve (Figure 31) indicates full vulnerability to the fishery between 8 and 16 inches TL which corresponds with peak age-based selectivity at age-1 for female fish and at age-2 for male fish. Ascending limbs of the age-based selectivity curves are much steeper than the descending limbs. The age-based selectivity curves decline from the peaks to approximately 70% at the age-7 plus group for each sex.

Commercial

The dome-shaped commercial length-based selectivity curves (Figure 32) were estimated for each period of consistent regulation: year-round fishing (pre-1996) and with the current fishing season established (1996-2023). Selectivity curves from each time block are similar with full vulnerability to the fishery between 16 and 17 inches TL which corresponds with peak age-based selectivity at age-3 for female fish and around age-4 and age-5 for male fish for each time block. Ascending limbs of the age-based selectivity curves are much steeper than the descending limbs. The age-based selectivity curves decline from the peaks to approximately 50% at the age-7 plus group for each sex.

Gillnet

The dome-shaped marine gillnet net survey length-based selectivity curve (Figure 33) indicates full vulnerability to the survey gear between 8 and 11 inches TL which corresponds with peak age-based selectivity at age-2 for female fish and at age-1 for male fish. Ascending limbs of the age-based selectivity curves are much steeper than the descending limbs. The age-based selectivity curves decline from the peaks to approximately 30% at the age-7 plus group for each sex.

<u>Fishing Mortality</u>

Estimated annual fishing mortality rates (fleet-specific apical and total exploitation) are presented in Table 10 and Figure 34. Exploitation rates are calculated as the total number of fishery removals >age-0 / total stock size > age-0 as numbers of fish.

Annual apical F rates of the recreational fleet have remained low (<0.001) through time. Annual apical F rates of the commercial fleet have varied over the time series from estimates close to zero in the early years to a peak just under 0.14 estimated in 1995. After 1995, commercial annual apical F rates decreased considerably. The commercial annual apical F estimate in the terminal year of the assessment approached zero.

Exploitation rates climbed gradually from near zero in 1955 to around 2% in 1993 and 1994 after the fishery fully developed. After 1994, exploitation rates began a general decline. In the most recent decade, exploitation rates have remained below with 0.3% with the most recent estimates below 0.01%.

<u>Recruitment</u>

In the SS3 base model, the steepness parameter of the Beverton-Holt stock recruitment function was fixed at 0.99 (see section *4.3 Model Diagnostics*) with the other two parameters (unfished recruitment and sigmaR) estimated. Unfished recruitment in log space was estimated as 13.3 which corresponds to 604 million age-0 recruits. The sigmaR parameter was estimated as 0.402. The resulting stock recruitment function and the relationship between SSB and age-0 recruits are presented in Figure 35.

Age-0 recruitment estimates are presented (Table 11 and Figure 36) along with the annual recruitment deviations estimated in log space (Figure 36). Age-0 recruitment has varied over the modeled time series with no specific trend. Recruitment estimates during the data rich period (1986-2021) averaged 611 million age-0 fish with peaks greater than 1 billion fish estimated in 1994 and 1995. Age-0 recruitment estimates less than 400 million fish were estimated in 1986, 1996-1997, 2008, and 2021. Asymptotic confidence intervals around the annual recruitment estimates are rather large. This is mainly due to the relatively large asymptotic standard error estimate of the unfished recruitment parameter (0.999) that is carried through into the annual uncertainty estimates of the derived values.

Stock Abundance and Biomass

Time series of exploitable biomass and abundance (>age-0), SSB, and relative SSB (SSB/SSB_0) estimates are presented in Table 11. Exploitable biomass, SSB, and relative SSB are also presented graphically (Figure 37). Time series of sex-specific stock abundance-at-length and -age are also presented (Figures 38 and 39) along with the sex-specific annual mean length/age of the stock.

Exploitable biomass estimates averaged 279 million pounds from 1955-2023 and ranged from a peak of 384 million pounds estimated in 1997 to a low of 220 million pounds estimated in 2023. Estimates of exploitable abundance averaged 116 million fish from 1955-2023 and ranged from a peak of 156 million fish estimated in 1997 to 93 million fish estimated in 2023.

Estimates of SSB averaged 77.8 trillion eggs from 1955-2023 and ranged from a peak of 111 trillion eggs estimated in 1998 to a low of 59.8 trillion eggs estimated in 2012. The 2023 estimate of SSB was 61.6 trillion eggs. Asymptotic confidence intervals around the annual SSB estimates are also quite large. This is mainly due to the relatively large asymptotic standard error estimate of the unfished recruitment parameter (0.999) that is carried through into the annual uncertainty estimates of the derived values.

Unfished SSB was estimated as 78.2 trillion eggs. Relative SSB estimates ranged from 100% in 1955 to a low of 76.5% estimated in 2012. The 2023 estimate of relative SSB was 78.7%.

4.3 Model Diagnostics

Correlation Analysis

A correlation analysis was conducted on the SS3 base model to identify parameter pairs with correlations greater than 0.8. (Table 12). High correlations were identified between a numbers of parameter pairs including: the unfished recruitment and catchability parameters of each survey time block, the unfished recruitment and initial fishing mortality rate parameters, the initial fishing morality rate and catchability parameters of each survey time block, the catchability parameters of each survey time block, the ascending slope and peak parameters of the fisheries and survey, the descending slope and top logit parameters of the survey and recreational fishery, and the descending slope and peak parameters of the first commercial time block.

Jitter Analysis

A jitter analysis was conducted on the SS3 base model to evaluate model stability and determine if a global solution was found. Initial parameter values of the base model were jittered using a value of 0.1 for 100 model runs. Log likelihood values of each model run are presented (Table 13). The most frequent and lowest log likelihood, which was the log likelihood of the base model solution, was achieved in 71% of the jitter runs suggesting a stable global solution of the base model was found.

Likelihood Profiles

Likelihood profiles were conducted on each of the stock-recruitment parameters of the base model to determine the stability of the parameter estimates and the optimal value of any fixed parameters. Profiles of R0, sigmaR, and steepness are presented (Figure 40). The R0 profile shows a very diffuse trough around the base model log-space estimate of 13.3, where values from approximately 12 to 16 are essentially equally likely, indicating the parameter was not well estimated. The sigmaR profile shows a more defined trough around the base model estimate of 0.402 indicating a stable parameter estimate, although optimal values from each the individual likelihood components differed from the overall estimate. The steepness likelihood profile shows a decline towards 0.2 driven by the length likelihood component with the other likelihood components suggesting a value closer to 1. In the SS3 base model, the steepness parameter was deemed inestimable and fixed at 0.99.

Sensitivity Analysis

A series of sensitivity runs were conducted to explore uncertainty in the configuration of the base model. Given the large uncertainty, high correlations, and instability associated with the unfished recruitment parameter, the R0 parameter was fixed at the maximum likelihood estimate of the SS3 base model for all sensitivity model runs. Sensitivity runs include: increasing (and decreasing) the FHWAR historical recreational landings time series (1955-1981) by 25%, up-weighting the relative abundance index (lambda *5), estimating annual recruitment deviations through the terminal year of the assessment, starting the model in 1982 rather than 1955, and time-varying the selectivity estimates of the marine gillnet survey to match the time-varying catchability time blocks. Time series of relative SSB, age-0 recruitment, and exploitation rates for the base and sensitivity model runs are presented in Figure 41. Results of each run are similar to the base model run.

Retrospective Analysis

A retrospective analysis was conducted by sequentially truncating the base model by a year (terminal years 2018-2023). Given the large uncertainty, high correlations, and instability associated with the unfished recruitment parameter, the R0 parameter was fixed at the maximum likelihood estimate of the SS3 base model for each retrospective run. Retrospective estimates of relative SSB, age-0 recruits, and exploitation rates are presented (Figure 42). Retrospective estimates of relative SSB show a positive bias where terminal year estimates tend to increase with each model peel with the exception of the one year peel that virtually overlays the base model estimates. Retrospective estimates of age-0 recruitment and exploitation rates show a smaller bias where the estimates tend to either slightly increase or decrease with each model peel.

Continuity Model

The ASAP assessment model used in the previous LDWF SM stock assessment (West et al. 2022), which modeled female fish only, was updated with data through 2023 with no changes made to the configuration of the ASAP model itself. Time series of recruitment, relative SSB, and commercial apical fishing mortality estimates from ASAP are presented (Figure 43) along with the corresponding estimates from the SS3 base model. The recreational fleet was not modeled in the previous stock assessment using ASAP so comparisons between models are not presented. Trends of the ASAP estimated time series are generally consistent with trends of the SS3 estimates with the exception of the relative SSB time series.

The ASAP model estimated a more heavily exploited stock than the SS3 model with the exception of the terminal years of each time series where estimates between models generally converge. The SS3 estimated age-0 recruitment time series tracks the age-1 ASAP recruitment estimates with a one year lag in most years of the time series. Relative SSB estimates from the ASAP model suggest a more depleted stock than the SS3 model with the exception of the estimates from the first and terminal years of the ASAP time series that are consistent with the corresponding SS3 estimates. Commercial apical F estimates from the ASAP model share the downward trend but are much higher than the corresponding SS3 estimates until the terminal years of each time series where estimates generally converge.

The differences between the estimates of each model are not entirely surprising given the ASAP modeled time series was essentially a ‘one way trip’ (Hilborn and Walters 1992). Because the ASAP time series began the year following the peak of the fishery (1996), the data lacked contrast where the only information included in the modeled time series to scale population size estimates was the period of declining fishery catches and effort rather than the period before and after the fishery developed.

5. Management Benchmarks

Overfishing and overfished limits should be defined for exploitable stocks. The implication is that when biomass falls below a specified limit, there is an unacceptable risk that recruitment will be reduced to undesirable levels. Management actions are needed to avoid approaching this limit and to recover the stock if biomass falls below the limit.

The conservation standard established by the LA Legislature for striped mullet (RS 56:333(G)(2)) is a 30% spawning potential ratio (SPR). For purposes of this assessment, SPR is calculated as the relative depletion of the stock (SSB/SSB0). As reference points to guide management, the equilibrium spawning stock biomass and exploitation rate that lead to 30% SPR (SPR_{limit}, SSB_{limit}, F_{limit}) were estimated in the SS3 base model.

The established limits of fishing relative to each respective time-series are presented in Figure 43. Current estimates are taken as the geometric mean of the 2021-2023 estimates. Limit reference points are also presented in Table 14.

6. Stock Status

The history of the LA Striped Mullet stock relative to F/F_{limit} and SSB/SSB_{limit} is presented in Table 15. Fishing mortality rates exceeding F_{limit} (F/F_{limit} >1.0) are defined as overfishing; spawning stock sizes below SSB_{limit} (SSB/SSB_{limit}< 1.0) are defined as the overfished condition.

Overfishing Status

The current estimate of F/F_{limit} is <1.0 (0.0001), indicating the stock is currently not undergoing overfishing. The current assessment model indicates overfishing has not occurred during the modeled time-series.

Overfished Status

The current estimate of SSB/SSB_{limit} is >1.0 (2.9), indicating the stock is currently not overfished. The current assessment model indicates the stock has not been overfished during the modeled time-series. The current SPR estimate is 87%.

7. Research and Data Needs

As with any analysis, the accuracy of this assessment is dependent on the accuracy of the information of which it is based. Below we list additional recommendations to improve future LA stock assessments of Striped Mullet.

This assessment includes historic recreational harvest estimates (1955-1981) that are estimated using the most currently accepted method. If the historic estimates are not appropriately scaled to current harvest, it could influence estimates of unfished stock conditions. Continued examination of methods to improve such information could be useful for a number of stock assessments.

A new FI survey that is more efficient in capturing juvenile striped mullet and provides better precision in relative abundance estimates would allow better representation of juvenile abundance in future stock assessments.

Factors that influence year-class strength of Striped Mullet are poorly understood. Investigation of these factors, including inter-annual variation in seasonal factors (winter temperatures, seasonal salinities, food availability etc.) and the influence of environmental perturbations such as the Deepwater Horizon oil spill, could elucidate causes of inter-annual variation in abundance, as well as the species stock-recruitment relationship.

With the recent trend toward ecosystem-based assessment models (Mace 2000; NMFS 2001), more data is needed linking SM population dynamics to environmental conditions. The addition of meteorological and physical oceanographic data coupled with food web data may lead to a better understanding of the SM stock and its habitat.

Fishery-dependent data alone is not a reliable source of information to assess status of a fish stock. Consistent fishery-dependent and fishery-independent data sources, in a comprehensive monitoring plan, are essential to understanding the status of fishery. Present monitoring programs should be assessed for adequacy with respect to their ability to evaluate stock status, and modified if deemed necessary.

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9. Tables

Table 1: Life history parameters used to develop SS3 model inputs. Units are inches total length and fork length.

Type	Function	Equation	Parameters
FL to TL	Linear	$TL = m \times FL + b$	m=1.109, b=0.0290
M point estimate (female)	Hamel and Cope	$M = 5.40/\ Age_{max}$	Age_{max}=10 yrs, M=0.540
M point estimate (male)	Hamel and Cope	$M = 5.40/\ Age_{max}$	Age_{max}=10 yrs, M=0.540
Growth (female)	Von Bertalanffy	$TL = L_\infty(1 - e^{-K(t-t_0)})$	L_∞=17.9, K=0.629, t_0=0
Growth (male)	Von Bertalanffy	$TL = L_\infty(1 - e^{-K(t-t_0)})$	L_∞=18.4, K=0.455, t_0=0
Fecundity-length	Power	$Fec = aFL^b$	a=5.60-03, b=3.18

Table 2: Life history parameters used as fixed SS3 model inputs. Units are inches total length and pounds whole weight.

Type	Function	Equation	Parameters
Length-weight	Power	$W = aTL^b$	a=4.23-04, b=2.927
Growth (female)	Von Bertalanffy	$TL = L_\infty(1 - e^{-K(t-t_0)})$	L_∞=17.9, K=0.629
Growth (male)	Von Bertalanffy	$TL = L_\infty(1 - e^{-K(t-t_0)})$	L_∞=18.4, K=0.455

Table 3: Sex-specific natural mortality-at-age used as a fixed SS3 model inputs. The 7-plus values are the mean M-at-age for ages ≥7 weighted by expected survivorship.

	M	
Age	Female	Male
0	1.197	1.354
1	0.639	0.683
2	0.523	0.535
3	0.478	0.474
4	0.458	0.442
5	0.448	0.424
6	0.443	0.414
7+	0.439	0.405

Table 4: Annual sample size of length measurements (sex-specific and combined) from the fishery fleets and the LDWF marine gillnet survey.

	Length Samples								
	Commercial			Recreational			Gillnet		
Year	M+F	M	F	M+F	M	F	M+F	M	F
1982	--	--	--	1	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--
1984	--	--	--	4	--	--	--	--	--
1985	--	--	--	1	--	--	--	--	--
1986	125	--	--	14	--	--	--	--	--
1987	117	--	--	--	--	--	--	--	--
1988	--	--	--	4	--	--	636	--	--
1989	--	--	--	5	--	--	810	--	--
1990	--	--	--	8	--	--	882	--	--
1991	--	--	--	5	--	--	1109	--	--
1992	--	--	--	12	--	--	737	--	--
1993	--	--	--	16	--	--	569	--	--
1994	--	412	813	23	--	--	869	--	--
1995	--	1300	1450	21	--	--	--	228	228
1996	--	480	1270	10	--	--	--	86	102
1997	--	595	1580	9	--	--	--	302	440
1998	--	164	256	10	--	--	--	209	242
1999	--	400	744	10	--	--	--	73	167
2000	--	86	135	20	--	--	--	189	246
2001	--	25	214	10	--	--	--	158	135
2002	--	46	102	12	--	--	--	114	116
2003	--	265	464	3	--	--	--	153	153
2004	--	183	494	3	--	--	--	196	206
2005	--	--	646	5	--	--	--	315	270
2006	--	72	572	5	--	--	--	117	222
2007	--	97	816	4	--	--	--	116	181
2008	--	67	703	2	--	--	--	171	138
2009	--	178	318	3	--	--	--	111	106
2010	--	--	215	4	--	--	--	330	368
2011	--	27	857	4	--	--	--	262	284
2012	--	20	879	5	--	--	--	238	257
2013	--	228	584	3	--	--	--	208	150
2014	--	1	667	--	--	--	--	87	114
2015	--	10	785	--	--	--	--	55	62
2016	--	2	434	--	--	--	--	122	127
2017	--	1	524	--	--	--	--	102	156
2018	--	--	109	--	--	--	--	194	106
2019	--	--	50	--	--	--	--	99	86
2020	--	--	--	--	--	--	--	71	59
2021	--	--	--	--	--	--	--	105	87
2022	--	--	--	--	--	--	--	101	91
2023	--	--	--	--	--	--	--	62	58

Table 5: Annual sex-specific sample size of age-at-length measurements from the commercial fishery and the LDWF marine gillnet survey.

	Age-at-length Samples			
	Commercial		Gillnet	
Year	M	F	M	F
2002	46	102	--	--
2003	265	464	--	--
2004	183	494	--	--
2005	--	646	--	--
2006	72	572	--	--
2007	97	816	--	--
2008	67	703	--	--
2009	178	318	--	--
2010	--	215	--	--
2011	27	857	--	--
2012	20	879	--	--
2013	228	584	--	--
2014	1	667	--	--
2015	9	785	--	--
2016	2	434	--	--
2017	1	524	--	--
2018	--	109	--	--
2019	--	50	99	86
2020	--	--	71	59
2021	--	--	105	87
2022	--	--	101	91
2023	--	--	62	58

Table 6: Summary of objective function components and likelihood values of the SS3 base model.

LogL Componenet	logL*Lambda
TOTAL_LogL	6555.05
Catch	1.45255E-14
Equil_catch	2.17526E-10
Survey	-25.1676
Length_comp	3904.94
Age_comp	2684.38
Recruitment	-9.28714
InitEQ_regime	0
Sum_recdevs	5.55112E-16
Forecast_Recruitment	0
Parm_priors	0.170542
Parm_softbounds	0.00361353
Parm_devs	0
F_Ballpark	0
Crash_Pen	0

Table 7: Parameter estimates and fixed parameter values of the SS3 base model along with the asymptotic standard errors and coefficients of variation of the estimated parameters.

Parameter	Value	StdDev	Active/Fixed	CV
L_at_Amin_Fem_GP_1	2.32759	0.175628	Act	0.075
L_at_Amax_Fem_GP_1	17.94	0	Fix	
VonBert_K_Fem_GP_1	0.629	0	Fix	
CV_young_Fem_GP_1	0.109763	0.0096322	Act	0.088
CV_old_Fem_GP_1	0.243112	0.010674	Act	0.044
Wtlen_1_Fem_GP_1	0.000833	0	Fix	
Wtlen_2_Fem_GP_1	2.673	0	Fix	
L_at_Amin_Mal_GP_1	0	0	Fix	
L_at_Amax_Mal_GP_1	18.44	0	Fix	
VonBert_K_Mal_GP_1	0.455	0	Fix	
CV_young_Mal_GP_1	0.195338	0.0193775	Act	0.099
CV_old_Mal_GP_1	0	0	Fix	
Wtlen_1_Mal_GP_1	0.000833	0	Fix	
Wtlen_2_Mal_GP_1	2.673	0	Fix	
FracFemale_GP_1	0.5	0	Fix	
SR_LN(R0)	13.312	0.999494	Act	0.075
SR_BH_steep	0.99	0	Fix	
SR_sigmaR	0.402431	0.0632775	Act	0.157
Main_RecrDev_1986	-0.492211	0.321794	Act	0.654
Main_RecrDev_1987	-0.140366	0.210808	Act	1.502
Main_RecrDev_1988	0.325147	0.188756	Act	0.581
Main_RecrDev_1989	-0.192237	0.226732	Act	1.179
Main_RecrDev_1990	0.236841	0.190459	Act	0.804
Main_RecrDev_1991	0.433884	0.200425	Act	0.462
Main_RecrDev_1992	-0.0327837	0.223944	Act	6.831
Main_RecrDev_1993	0.210479	0.186787	Act	0.887
Main_RecrDev_1994	0.814399	0.206604	Act	0.254
Main_RecrDev_1995	0.887417	0.245158	Act	0.276
Main_RecrDev_1996	-0.651913	0.284296	Act	0.436
Main_RecrDev_1997	-0.467845	0.215158	Act	0.460
Main_RecrDev_1998	0.0688571	0.16894	Act	2.453
Main_RecrDev_1999	0.303629	0.133403	Act	0.439
Main_RecrDev_2000	0.291781	0.122391	Act	0.419
Main_RecrDev_2001	0.0215933	0.130108	Act	6.025
Main_RecrDev_2002	-0.0768349	0.128562	Act	1.673
Main_RecrDev_2003	-0.220895	0.131551	Act	0.596
Main_RecrDev_2004	-0.0955433	0.127398	Act	1.333
Main_RecrDev_2005	0.439314	0.113099	Act	0.257
Main_RecrDev_2006	0.078257	0.134463	Act	1.718
Main_RecrDev_2007	-0.195537	0.139962	Act	0.716
Main_RecrDev_2008	-0.587205	0.152769	Act	0.260
Main_RecrDev_2009	-0.315384	0.13047	Act	0.414
Main_RecrDev_2010	-0.23	0.134268	Act	0.584
Main_RecrDev_2011	0.458398	0.115701	Act	0.252
Main_RecrDev_2012	-0.166172	0.144181	Act	0.868
Main_RecrDev_2013	0.0317136	0.152053	Act	4.795
Main_RecrDev_2014	0.523065	0.159261	Act	0.304
Main_RecrDev_2015	0.0243281	0.189187	Act	7.776
Main_RecrDev_2016	0.347377	0.195681	Act	0.563
Main_RecrDev_2017	-0.172865	0.195983	Act	1.134
Main_RecrDev_2018	-0.134961	0.180699	Act	1.339

Table 7 (continued):

Parameter	Value	StdDev	Active/Fixed	CV
Main_RecrDev_2019	-0.245208	0.193036	Act	0.787
Main_RecrDev_2020	-0.297138	0.204903	Act	0.690
Main_RecrDev_2021	-0.781381	0.234157	Act	0.300
Late_RecrDev_2022	0	0	Fix	
Late_RecrDev_2023	0	0	Fix	
ForeRecr_2024	0	0	Fix	
InitF_seas_1_flt_2FISHERY2	0.00023929	0.000240524	Act	1.005
LnQ_base_SURVEY1(3)_BLK1repl_1955	-11.8915	1.00859	Act	0.085
LnQ_base_SURVEY1(3)_BLK1repl_2013	-11.794	1.01359	Act	0.086
Size_DblN_peak_FISHERY1(1)	8.05422	1.49049	Act	0.185
Size_DblN_top_logit_FISHERY1(1)	-0.504032	0.394298	Act	0.782
Size_DblN_ascend_se_FISHERY1(1)	1.84299	0.78435	Act	0.426
Size_DblN_descend_se_FISHERY1(1)	-1.2445	6.87002	Act	5.520
Size_DblN_start_logit_FISHERY1(1)	-6.61436	7.59814	Act	1.149
Size_DblN_end_logit_FISHERY1(1)	-0.97707	0.771654	Act	0.790
Size_DblN_peak_SURVEY1(3)	7.6352	0.050157	Act	0.007
Size_DblN_top_logit_SURVEY1(3)	-1.75361	0.10634	Act	0.061
Size_DblN_ascend_se_SURVEY1(3)	-5.99875	12.5641	Act	2.094
Size_DblN_descend_se_SURVEY1(3)	2.42608	0.159887	Act	0.066
Size_DblN_start_logit_SURVEY1(3)	-5.88482	0.479759	Act	0.082
Size_DblN_end_logit_SURVEY1(3)	-3.05232	0.236658	Act	0.078
ln(DM_theta)_Len_P1	2.25969	1.52672	Act	0.676
ln(DM_theta)_Len_P2	-2.57182	0.0489422	Act	0.019
ln(DM_theta)_Len_P3	-2.06447	0.0599474	Act	0.029
Size_DblN_peak_FISHERY2(2)_BLK2repl_1955	16.724	0.297299	Act	0.018
Size_DblN_peak_FISHERY2(2)_BLK2repl_1996	16.9893	0.193089	Act	0.011
Size_DblN_top_logit_FISHERY2(2)_BLK2repl_1955	-7.1158	7.05052	Act	0.991
Size_DblN_top_logit_FISHERY2(2)_BLK2repl_1996	-7.82662	5.7111	Act	0.730
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1955	2.00065	0.161182	Act	0.081
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1996	1.87041	0.111304	Act	0.060
Size_DblN_descend_se_FISHERY2(2)_BLK2repl_1955	0.683023	0.54743	Act	0.801
Size_DblN_descend_se_FISHERY2(2)_BLK2repl_1996	0.998248	0.320664	Act	0.321
Size_DblN_start_logit_FISHERY2(2)_BLK2repl_1955	-7.18099	0.619543	Act	0.086
Size_DblN_start_logit_FISHERY2(2)_BLK2repl_1996	-7.22338	0.626939	Act	0.087
Size_DblN_end_logit_FISHERY2(2)_BLK2repl_1955	-3.26237	0.741062	Act	0.227
Size_DblN_end_logit_FISHERY2(2)_BLK2repl_1996	-2.29214	0.287923	Act	0.126

Table 8: Observed and estimated commercial and recreational landings along with corresponding lognormal standard errors.

	Commercial (1000s of lbs)			Recreational (1000s of fish)		
Year	Observed	Predicted	StdErr	Observed	Predicted	StdErr
1955	28.700	28.700	0.050	5.316	5.316	0.100
1956	47.900	47.900	0.050	5.995	5.995	0.100
1957	15.200	15.200	0.050	6.674	6.674	0.100
1958	15.600	15.600	0.050	7.353	7.353	0.100
1959	13.700	13.700	0.050	8.032	8.032	0.100
1960	21.800	21.800	0.050	8.711	8.711	0.100
1961	11.900	11.900	0.050	8.905	8.905	0.100
1962	8.300	8.300	0.050	9.099	9.099	0.100
1963	18.900	18.900	0.050	9.293	9.293	0.100
1964	22.200	22.200	0.050	9.487	9.487	0.100
1965	7.000	7.000	0.050	9.680	9.680	0.100
1966	9.800	9.800	0.050	10.144	10.144	0.100
1967	6.100	6.100	0.050	10.608	10.608	0.100
1968	73.900	73.900	0.050	11.071	11.071	0.100
1969	87.800	87.800	0.050	11.535	11.535	0.100
1970	38.100	38.100	0.050	11.999	11.999	0.100
1971	8.100	8.100	0.050	13.331	13.331	0.100
1972	15.700	15.700	0.050	14.663	14.663	0.100
1973	102.500	102.500	0.050	15.995	15.995	0.100
1974	50.100	50.100	0.050	17.328	17.328	0.100
1975	213.400	213.400	0.050	18.660	18.660	0.100
1976	57.000	57.000	0.050	18.443	18.443	0.100
1977	595.200	595.200	0.050	18.226	18.226	0.100
1978	1991.650	1991.650	0.050	18.010	18.010	0.100
1979	1416.050	1416.040	0.050	17.793	17.793	0.100
1980	204.310	204.310	0.050	17.576	17.576	0.100
1981	3051.460	3051.460	0.050	17.820	17.820	0.100
1982	1533.450	1533.450	0.050	5.657	5.657	0.747
1983	1886.650	1886.650	0.050	14.048	14.048	0.841
1984	3157.220	3157.210	0.050	22.439	22.439	0.751
1985	579.297	579.297	0.050	1.970	1.970	0.843
1986	2277.710	2277.710	0.050	20.547	20.547	0.533
1987	1439.420	1439.420	0.050	19.376	19.376	0.548
1988	2367.110	2367.110	0.050	18.204	18.204	0.565
1989	2413.770	2413.770	0.050	18.120	18.120	0.639
1990	2645.930	2645.930	0.050	101.591	101.591	0.515
1991	3563.140	3563.140	0.050	23.528	23.528	0.430
1992	6214.530	6214.530	0.050	72.201	72.201	0.521
1993	11026.500	11026.500	0.050	232.454	232.454	0.622
1994	12560.300	12560.300	0.050	73.417	73.417	0.436
1995	14545.600	14545.600	0.050	96.326	96.326	0.369
1996	8658.880	8658.880	0.050	192.879	192.879	0.486
1997	8083.200	8083.200	0.050	49.328	49.328	0.395
1998	6252.320	6252.320	0.050	10.298	10.298	0.444
1999	8951.400	8951.390	0.050	32.538	32.538	0.530
2000	7252.950	7252.950	0.050	68.887	68.887	0.345
2001	4238.850	4238.850	0.050	34.041	34.041	0.415

Table 8 (continued):

	Commercial (1000s of lbs)			Recreational (1000s of fish)		
Year	Observed	Predicted	StdErr	Observed	Predicted	StdErr
2002	2520.7	2520.7	0.05	45.568	45.568	0.463
2003	4497.03	4497.03	0.05	3.595	3.595	0.628
2004	4753.76	4753.75	0.05	9.837	9.837	0.736
2005	1238.13	1238.13	0.05	9.376	9.376	0.521
2006	3360.65	3360.65	0.05	4.077	4.077	0.505
2007	1375.03	1375.03	0.05	134.734	134.734	0.7
2008	1503.28	1503.28	0.05	4.083	4.083	0.601
2009	178.441	178.441	0.05	81.582	81.582	0.706
2010	361.671	361.671	0.05	47.104	47.104	0.636
2011	1385.31	1385.3	0.05	8.734	8.734	0.63
2012	1385.02	1385.02	0.05	40.648	40.648	0.517
2013	608.554	608.554	0.05	44.466	44.466	0.164
2014	1185.57	1185.57	0.05	6.674	6.674	0.471
2015	692.083	692.083	0.05	14.292	14.292	0.419
2016	1020.52	1020.52	0.05	1.509	1.509	0.415
2017	1092.99	1092.99	0.05	20.783	20.783	0.458
2018	630.242	630.242	0.05	11.818	11.818	0.705
2019	256.774	256.774	0.05	5.689	5.689	0.525
2020	12.485	12.485	0.05	1.046	1.046	0.489
2021	2.634	2.634	0.05	5.039	5.039	0.432
2022	1.000	1.000	0.05	7.003	7.003	0.466
2023	1.000	1.000	0.05	5.553	5.553	0.504

Table 9: Observed and estimated index of relative abundance of the LDWF FI marine gillnet net survey along with corresponding lognormal standard errors and catchability coefficient estimates for each time block.

	Gillnet Survey			
Year	Observed	Predicted	StdErr	Q
1988	0.887	0.781	0.289	6.85E-06
1989	0.990	1.045	0.287	6.85E-06
1990	1.040	0.876	0.285	6.85E-06
1991	1.071	1.025	0.289	6.85E-06
1992	1.353	1.212	0.288	6.85E-06
1993	0.990	0.999	0.296	6.85E-06
1994	1.291	1.051	0.290	6.85E-06
1995	1.695	1.569	0.285	6.85E-06
1996	0.615	1.855	0.310	6.85E-06
1997	1.371	1.049	0.308	6.85E-06
1998	1.138	0.788	0.298	6.85E-06
1999	0.583	0.902	0.323	6.85E-06
2000	1.085	1.078	0.313	6.85E-06
2001	0.782	1.136	0.315	6.85E-06
2002	0.774	1.007	0.310	6.85E-06
2003	0.768	0.906	0.314	6.85E-06
2004	0.966	0.805	0.305	6.85E-06
2005	1.500	0.825	0.298	6.85E-06
2006	0.996	1.136	0.310	6.85E-06
2007	1.071	1.032	0.305	6.85E-06
2008	0.880	0.863	0.314	6.85E-06
2009	0.586	0.670	0.321	6.85E-06
2010	0.845	0.676	0.288	6.85E-06
2011	0.908	0.712	0.281	6.85E-06
2012	0.816	1.100	0.284	6.85E-06
2013	1.485	0.994	0.281	7.55E-06
2014	0.960	1.012	0.297	7.55E-06
2015	0.833	1.370	0.295	7.55E-06
2016	1.106	1.165	0.283	7.55E-06
2017	1.300	1.287	0.291	7.55E-06
2018	0.986	1.034	0.295	7.55E-06
2019	1.213	0.948	0.289	7.55E-06
2020	0.800	0.866	0.296	7.55E-06
2021	0.929	0.806	0.294	7.55E-06
2022	0.836	0.631	0.293	7.55E-06
2023	0.553	0.881	0.316	7.55E-06

Table 10: Annual fleet-specific apical fishing mortality and total exploitation rate estimates from the SS3 base model.

Year	Apical F		Exploitation rate (numbers killed/stock size>age-0)
	Commercial	Recreational	
1955	0.00027	0.00002	0.006%
1956	0.00045	0.00002	0.010%
1957	0.00014	0.00002	0.004%
1958	0.00015	0.00003	0.005%
1959	0.00013	0.00003	0.004%
1960	0.00020	0.00003	0.006%
1961	0.00011	0.00003	0.004%
1962	0.00008	0.00003	0.004%
1963	0.00018	0.00003	0.006%
1964	0.00021	0.00004	0.006%
1965	0.00007	0.00004	0.004%
1966	0.00009	0.00004	0.004%
1967	0.00006	0.00004	0.004%
1968	0.00069	0.00004	0.016%
1969	0.00082	0.00004	0.018%
1970	0.00036	0.00004	0.010%
1971	0.00008	0.00005	0.005%
1972	0.00015	0.00005	0.006%
1973	0.00096	0.00006	0.022%
1974	0.00047	0.00006	0.013%
1975	0.00200	0.00007	0.042%
1976	0.00053	0.00007	0.015%
1977	0.00557	0.00007	0.108%
1978	0.01873	0.00007	0.350%
1979	0.01337	0.00007	0.251%
1980	0.00193	0.00007	0.040%
1981	0.02887	0.00007	0.536%
1982	0.01457	0.00002	0.269%
1983	0.01793	0.00005	0.333%
1984	0.03010	0.00008	0.558%
1985	0.00552	0.00001	0.102%
1986	0.02167	0.00008	0.403%
1987	0.01372	0.00009	0.311%
1988	0.02490	0.00008	0.492%
1989	0.02731	0.00007	0.408%
1990	0.02684	0.00041	0.542%
1991	0.03558	0.00008	0.605%
1992	0.06044	0.00022	0.927%
1993	0.09656	0.00081	1.908%
1994	0.11251	0.00025	2.031%
1995	0.13490	0.00024	1.726%
1996	0.06601	0.00039	0.837%
1997	0.04886	0.00015	1.133%
1998	0.03990	0.00004	1.036%
1999	0.07292	0.00013	1.406%
2000	0.06788	0.00024	1.055%
2001	0.03837	0.00011	0.602%

Table 10 (continued):

Year	Apical F		Exploitation rate (numbers killed/stock size>age-0)
	Commercial	Recreational	
2002	0.02114	0.00016	0.396%
2003	0.03777	0.00001	0.735%
2004	0.04268	0.00004	0.857%
2005	0.01208	0.00004	0.227%
2006	0.03465	0.00001	0.478%
2007	0.01284	0.00047	0.245%
2008	0.01301	0.00002	0.261%
2009	0.00162	0.00040	0.064%
2010	0.00375	0.00024	0.092%
2011	0.01612	0.00004	0.294%
2012	0.01675	0.00014	0.218%
2013	0.00627	0.00017	0.121%
2014	0.01126	0.00003	0.204%
2015	0.00666	0.00004	0.095%
2016	0.00874	0.00001	0.154%
2017	0.00887	0.00006	0.152%
2018	0.00502	0.00004	0.103%
2019	0.00212	0.00002	0.045%
2020	0.00011	0.00000	0.003%
2021	0.00003	0.00002	0.002%
2022	0.00001	0.00004	0.003%
2023	0.00001	0.00003	0.002%
2024	--	--	0.002%

Table 11: Annual biomass and abundance of fish greater than age-0, SSB, age-0 recruits, and relative SSB estimates from the SS3 base model.

Year	Biomass>age-0 1000s of lbs	SSB 1000s of eggs	Abundance>age-0 1000s of fish	Age-0 Recruits 1000s of fish	Depletion SSB/SSB0
Virgin	279,810	7.826E+10	116,263	604,419	1.000
Initial	279,740	7.824E+10	116,235	604,418	1.000
1955	279,740	7.824E+10	116,235	604,418	1.000
1956	279,733	7.824E+10	116,232	604,418	1.000
1957	279,711	7.823E+10	116,223	604,418	1.000
1958	279,722	7.823E+10	116,227	604,418	1.000
1959	279,729	7.824E+10	116,230	604,418	1.000
1960	279,735	7.824E+10	116,232	604,418	1.000
1961	279,732	7.824E+10	116,231	604,418	1.000
1962	279,738	7.824E+10	116,233	604,418	1.000
1963	279,745	7.824E+10	116,236	604,418	1.000
1964	279,741	7.824E+10	116,234	604,418	1.000
1965	279,735	7.824E+10	116,232	604,418	1.000
1966	279,743	7.824E+10	116,235	604,418	1.000
1967	279,746	7.824E+10	116,236	604,418	1.000
1968	279,751	7.824E+10	116,238	604,418	1.000
1969	279,697	7.822E+10	116,217	604,418	1.000
1970	279,646	7.821E+10	116,197	604,418	0.999
1971	279,651	7.821E+10	116,198	604,418	0.999
1972	279,680	7.822E+10	116,209	604,418	0.999
1973	279,694	7.822E+10	116,214	604,418	1.000
1974	279,631	7.820E+10	116,190	604,418	0.999
1975	279,626	7.820E+10	116,188	604,418	0.999
1976	279,486	7.815E+10	116,134	604,417	0.999
1977	279,515	7.816E+10	116,144	604,417	0.999
1978	279,092	7.802E+10	115,980	604,414	0.997
1979	277,619	7.751E+10	115,409	604,404	0.990
1980	277,031	7.731E+10	115,170	604,400	0.988
1981	277,649	7.754E+10	115,397	604,404	0.991
1982	275,762	7.688E+10	114,666	604,391	0.982
1983	275,650	7.685E+10	114,609	604,391	0.982
1984	275,312	7.674E+10	114,468	604,389	0.981
1985	274,020	7.630E+10	113,961	604,379	0.975
1986	275,246	7.674E+10	114,421	353,053	0.981
1987	266,830	7.657E+10	111,266	500,606	0.978
1988	251,204	7.268E+10	105,500	795,170	0.929
1989	249,354	6.671E+10	104,359	472,619	0.852
1990	256,987	6.954E+10	106,591	724,041	0.889
1991	261,284	7.289E+10	108,346	879,526	0.931
1992	277,239	7.324E+10	114,319	550,094	0.936
1993	290,562	7.967E+10	119,465	699,896	1.018
1994	288,433	8.139E+10	119,480	1,277,670	1.040
1995	304,653	7.820E+10	125,846	1,374,320	0.999
1996	353,214	8.676E+10	143,883	294,898	1.109
1997	384,070	1.086E+11	156,481	354,659	1.388
1998	354,691	1.109E+11	147,892	606,617	1.417
1999	315,240	9.167E+10	133,755	766,853	1.171

Table 11 (continued):

Year	Biomass>age-0 1000s of lbs	SSB 1000s of lbs	Abundance>age-0 1000s of fish	Age-0 Recruits 1000s of fish	Depletion SSB/SSB0
2000	294,271	7.922E+10	124,773	757,564	1.012
2001	294,632	7.829E+10	123,578	578,183	1.000
2002	298,338	8.257E+10	124,284	524,053	1.055
2003	292,444	8.371E+10	121,984	453,759	1.070
2004	277,133	7.958E+10	116,243	514,294	1.017
2005	260,214	7.380E+10	109,656	877,834	0.943
2006	262,392	6.988E+10	109,924	611,705	0.893
2007	276,140	7.338E+10	114,328	465,258	0.938
2008	278,973	7.998E+10	115,547	314,551	1.022
2009	263,868	7.790E+10	110,286	412,774	0.995
2010	241,787	7.066E+10	102,089	449,450	0.903
2011	225,731	6.325E+10	95,514	894,349	0.808
2012	230,226	5.988E+10	96,409	478,832	0.765
2013	248,211	6.558E+10	102,308	583,779	0.838
2014	255,305	7.289E+10	105,320	954,488	0.931
2015	270,606	7.225E+10	111,431	579,644	0.923
2016	292,266	7.902E+10	119,719	800,869	1.010
2017	303,989	8.559E+10	124,997	476,109	1.094
2018	307,718	8.696E+10	126,990	494,520	1.111
2019	295,343	8.645E+10	122,981	444,775	1.105
2020	277,652	8.003E+10	116,475	424,184	1.023
2021	258,651	7.426E+10	109,045	262,551	0.949
2022	236,012	6.862E+10	99,929	604,204	0.877
2023	219,811	6.159E+10	93,199	604,006	0.787
2024	223,025	5.862E+10	93,340	603,908	0.749

Table 12: Correlated parameters of the SS3 base model with correlation coefficients greater than 0.8.

Parameter1	Parameter2	Correlation
LnQ_base_SURVEY1(3)_BLK1repl_1955	SR_LN(R0)	-0.997543
LnQ_base_SURVEY1(3)_BLK1repl_2013	SR_LN(R0)	-0.993568
InitF_seas_1_flt_2FISHERY2	SR_LN(R0)	-0.993014
LnQ_base_SURVEY1(3)_BLK1repl_1955	InitF_seas_1_flt_2FISHERY2	0.990417
LnQ_base_SURVEY1(3)_BLK1repl_2013	LnQ_base_SURVEY1(3)_BLK1repl_1955	0.989912
LnQ_base_SURVEY1(3)_BLK1repl_2013	InitF_seas_1_flt_2FISHERY2	0.986609
Size_DblN_ascend_se_FISHERY1(1)	Size_DblN_peak_FISHERY1(1)	0.895115
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1996	Size_DblN_peak_FISHERY2(2)_BLK2repl_1996	0.861304
Size_DblN_descend_se_FISHERY1(1)	Size_DblN_top_logit_FISHERY1(1)	-0.854785
Size_DblN_descend_se_SURVEY1(3)	Size_DblN_top_logit_SURVEY1(3)	-0.848209
Size_DblN_ascend_se_SURVEY1(3)	Size_DblN_peak_SURVEY1(3)	0.845509
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1955	Size_DblN_peak_FISHERY2(2)_BLK2repl_1955	0.838938
Size_DblN_descend_se_FISHERY2(2)_BLK2repl_1955	Size_DblN_peak_FISHERY2(2)_BLK2repl_1955	-0.804753

Table 13: Jitter analysis log likelihood distribution of the 100 model runs with parameter starting values jittered by 0.1.

Likelihood	Frequency
6555.05	71
6555.37	1
6555.43	1
6557.75	1
6581.9	5
6581.93	18
6582.21	2
6582.13	1

Table 14: Limit reference points for the Louisiana striped mullet stock. Spawning stock biomass units are thousands of eggs. Fishing mortality rate units are per year.

Management Benchmarks		
Parameter	Definition	Value
SPR_{limit}	Established SPR Limit RS 56:333(G)(2)	30.0%
SSB_{limit}	Equilibrium SSB that corresponds with $F_{SPR30\%}$	2.348E+10
F_{limit}	Equilibrium F that corresponds with $SPR_{30\%}$	16.8%

Table 15: Stock status summary: annual SSB and exploitation rate (F) estimates, ratios of SSB and F to $SSB_{SPR30\%}$ and $F_{SPR30\%}$, and spawning potential ratio (SSB/SSB_0) estimates. Current estimates are the geometric mean of the 2021-2023 estimates.

Year	SSB	$SSB/SSB_{SPR30\%}$	F	$F/F_{SPR30\%}$	SPR
1955	7.824E+10	3.332	0.006%	0.000	100.0%
1956	7.824E+10	3.332	0.010%	0.001	100.0%
1957	7.823E+10	3.332	0.004%	0.000	100.0%
1958	7.823E+10	3.332	0.005%	0.000	100.0%
1959	7.824E+10	3.332	0.006%	0.000	100.0%
1960	7.824E+10	3.332	0.006%	0.000	100.0%
1961	7.824E+10	3.332	0.004%	0.000	100.0%
1962	7.824E+10	3.332	0.004%	0.000	100.0%
1963	7.824E+10	3.332	0.006%	0.000	100.0%
1964	7.824E+10	3.332	0.006%	0.000	100.0%
1965	7.824E+10	3.332	0.004%	0.000	100.0%
1966	7.824E+10	3.332	0.004%	0.000	100.0%
1967	7.824E+10	3.332	0.004%	0.000	100.0%
1968	7.824E+10	3.333	0.016%	0.001	100.0%
1969	7.822E+10	3.332	0.018%	0.001	100.0%
1970	7.821E+10	3.331	0.010%	0.001	99.9%
1971	7.821E+10	3.331	0.005%	0.000	99.9%
1972	7.822E+10	3.332	0.006%	0.000	99.9%
1973	7.822E+10	3.332	0.022%	0.001	100.0%
1974	7.820E+10	3.331	0.013%	0.001	99.9%
1975	7.820E+10	3.331	0.042%	0.002	99.9%
1976	7.815E+10	3.329	0.015%	0.001	99.9%
1977	7.816E+10	3.329	0.108%	0.006	99.9%
1978	7.802E+10	3.323	0.350%	0.021	99.7%
1979	7.751E+10	3.301	0.251%	0.015	99.0%
1980	7.731E+10	3.293	0.040%	0.002	98.8%
1981	7.754E+10	3.303	0.536%	0.032	99.1%
1982	7.688E+10	3.275	0.269%	0.016	98.2%
1983	7.685E+10	3.273	0.333%	0.020	98.2%
1984	7.674E+10	3.269	0.558%	0.033	98.1%
1985	7.630E+10	3.250	0.102%	0.006	97.5%
1986	7.674E+10	3.269	0.403%	0.024	98.1%
1987	7.657E+10	3.261	0.311%	0.019	97.8%
1988	7.268E+10	3.096	0.492%	0.029	92.9%
1989	6.671E+10	2.842	0.408%	0.024	85.2%
1990	6.954E+10	2.962	0.542%	0.032	88.9%
1991	7.289E+10	3.105	0.605%	0.036	93.1%
1992	7.324E+10	3.120	0.927%	0.055	93.6%
1993	7.967E+10	3.393	1.908%	0.114	101.8%
1994	8.139E+10	3.467	2.031%	0.121	104.0%
1995	7.820E+10	3.331	1.726%	0.103	99.9%
1996	8.676E+10	3.695	0.837%	0.050	110.9%
1997	1.086E+11	4.626	1.133%	0.068	138.8%
1998	1.109E+11	4.724	1.036%	0.062	141.7%
1999	9.167E+10	3.905	1.406%	0.084	117.1%
2000	7.922E+10	3.374	1.055%	0.063	101.2%
2001	7.829E+10	3.335	0.602%	0.036	100.0%

Table 15 (continued):

Year	SSB	SSB/SSB$_{SPR30\%}$	F	F/F$_{SPR30\%}$	SPR
2002	8.257E+10	3.517	0.396%	0.024	105.5%
2003	8.371E+10	3.565	0.735%	0.044	107.0%
2004	7.958E+10	3.389	0.857%	0.051	101.7%
2005	7.380E+10	3.143	0.227%	0.014	94.3%
2006	6.988E+10	2.976	0.478%	0.029	89.3%
2007	7.338E+10	3.125	0.245%	0.015	93.8%
2008	7.998E+10	3.407	0.261%	0.016	102.2%
2009	7.790E+10	3.318	0.064%	0.004	99.5%
2010	7.066E+10	3.010	0.092%	0.005	90.3%
2011	6.325E+10	2.694	0.294%	0.018	80.8%
2012	5.988E+10	2.550	0.218%	0.013	76.5%
2013	6.558E+10	2.793	0.121%	0.007	83.8%
2014	7.289E+10	3.104	0.204%	0.012	93.1%
2015	7.225E+10	3.077	0.095%	0.006	92.3%
2016	7.902E+10	3.366	0.154%	0.009	101.0%
2017	8.559E+10	3.646	0.152%	0.009	109.4%
2018	8.696E+10	3.704	0.103%	0.006	111.1%
2019	8.645E+10	3.682	0.045%	0.003	110.5%
2020	8.003E+10	3.409	0.003%	0.000	102.3%
2021	7.426E+10	3.163	0.002%	0.000	94.9%
2022	6.862E+10	2.922	0.003%	0.000	87.7%
2023	6.159E+10	2.623	0.002%	0.000	78.7%
2024	5.862E+10	2.497	0.002%	0.000	74.9%
Current	6.796E+10	2.894	0.002%	0.000	86.8%

10. Figures

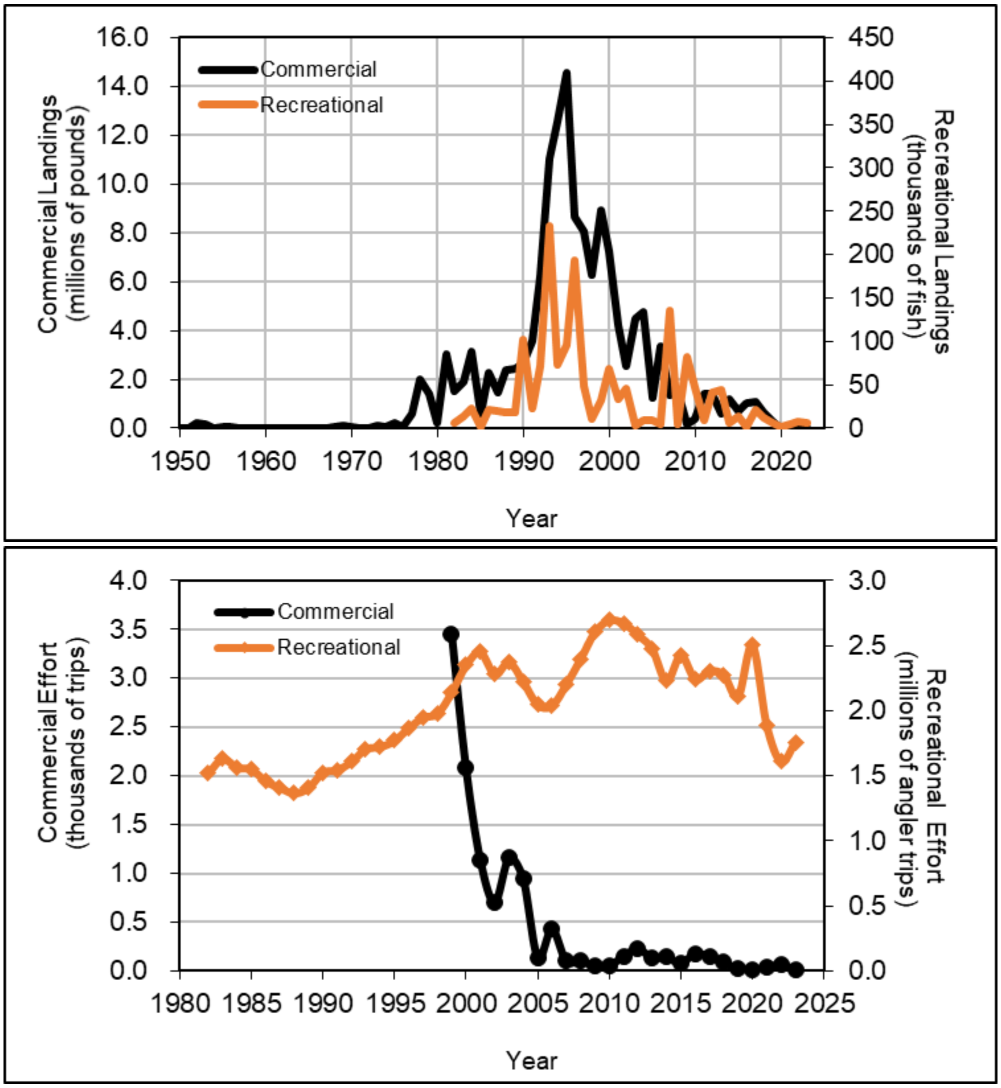


Figure 1: Reported Louisiana commercial and estimated recreational striped mullet landings derived from NMFS statistical records, the LDWF Trip Ticket Program, and the LDWF LA Creel Survey along with the number of commercial fishing trips with striped mullet landings and the estimated Louisiana recreational fishing effort (angler trips).

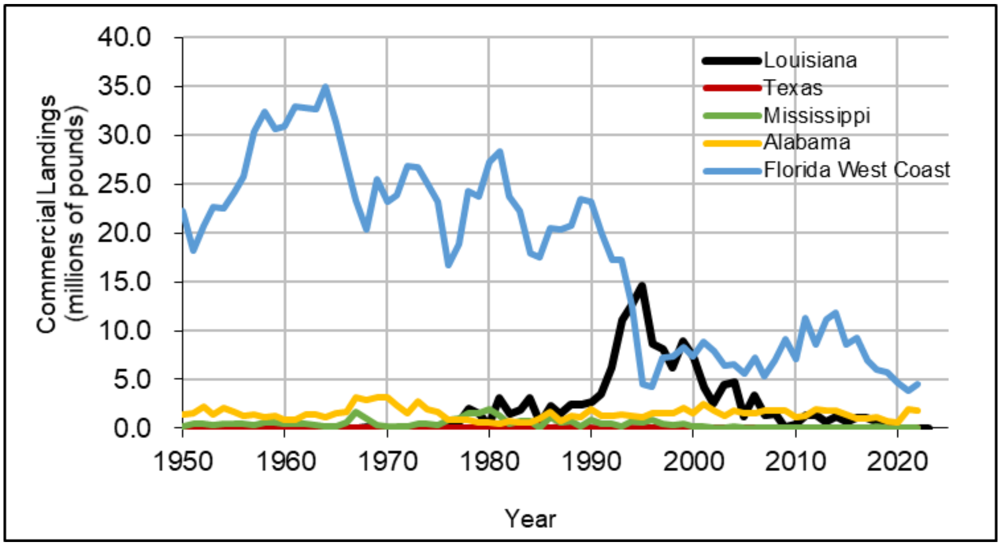


Figure 2: Reported commercial striped mullet landings of the Gulf of Mexico derived from NMFS statistical records and the LDWF Trip Ticket Program.

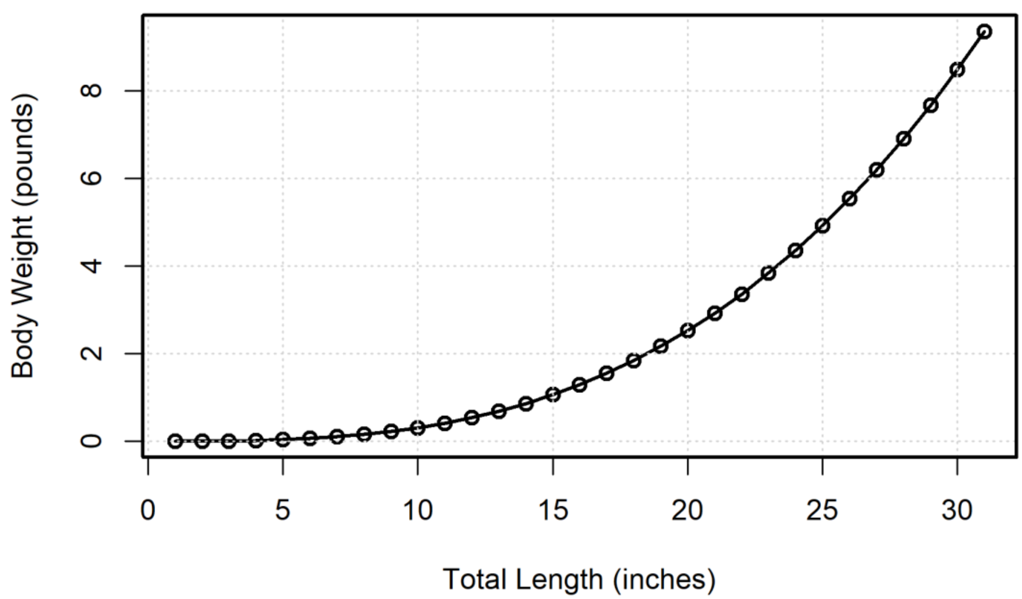


Figure 3: Mean weight-at-length relationship used as a fixed input of the SS3 base model.

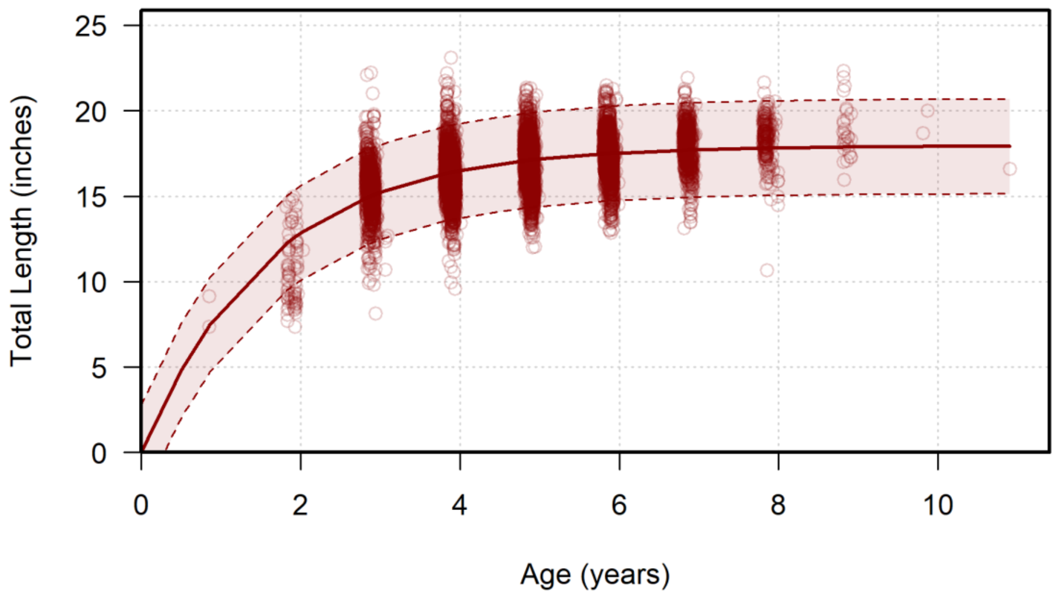


Figure 4: Female length-at-age observations and estimated von Bertalanffy growth curve with 95% confidence intervals.

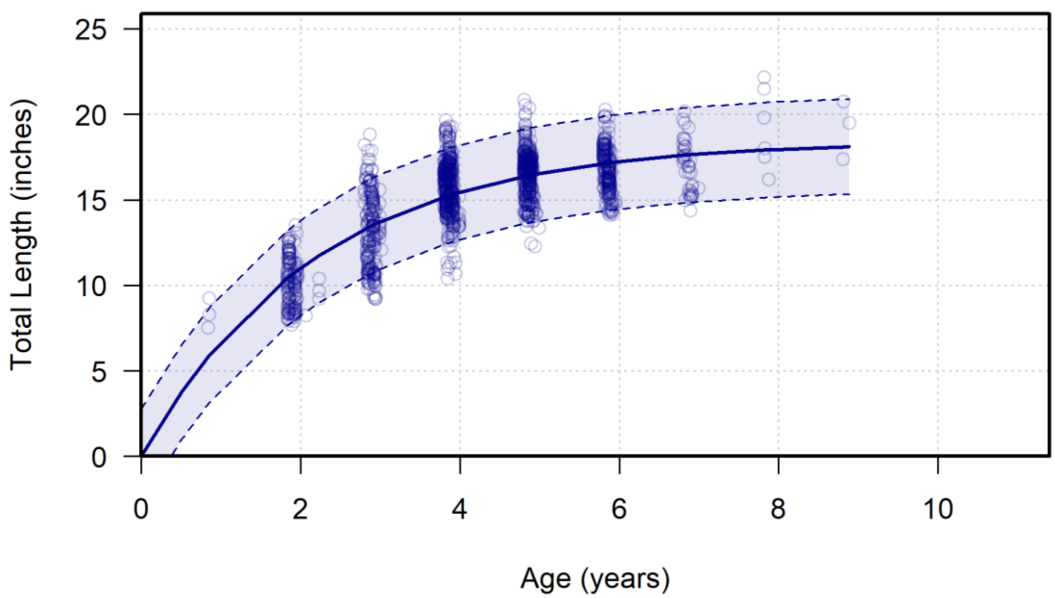


Figure 5: Male length-at-age observations and estimated von Bertalanffy growth curve with 95% confidence intervals.

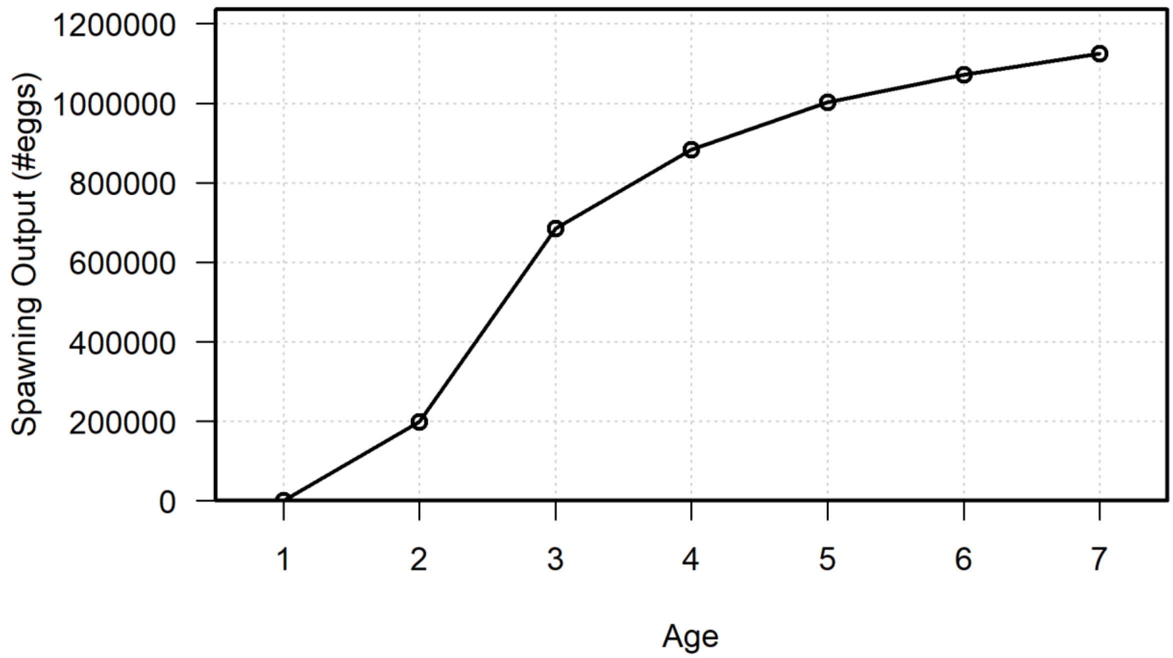


Figure 6: Spawning output at age relationship (fecundity* maturity) used as a fixed input of the SS3 base model.

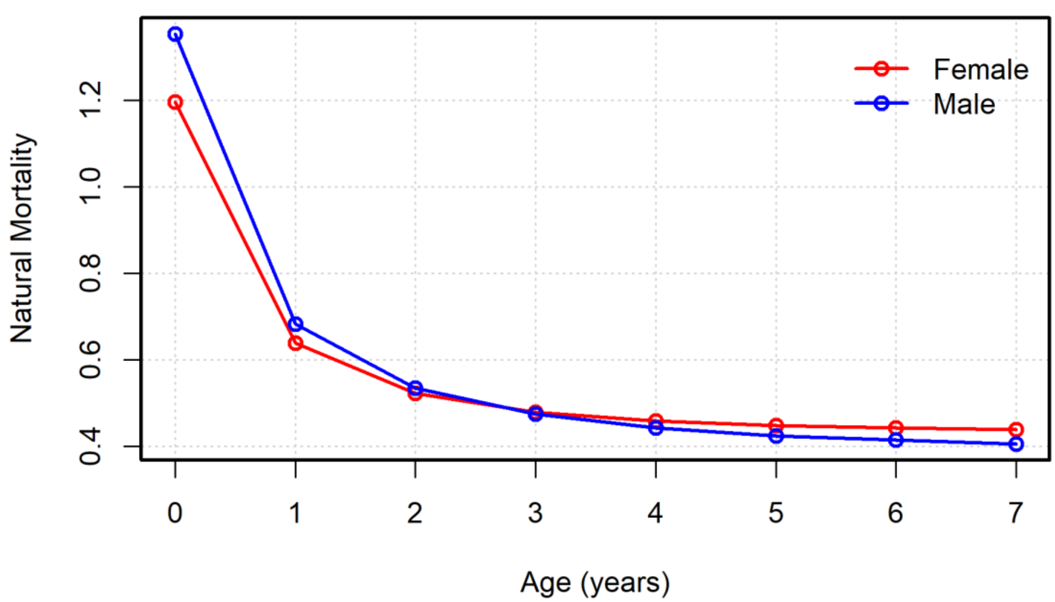


Figure 7: Sex-specific natural mortality rates at age calculated from the Lorenzen curve and the M point estimates of 0.540. The 7-plus value is the mean M-at-age for ages ≥7 weighted by expected survivorship.

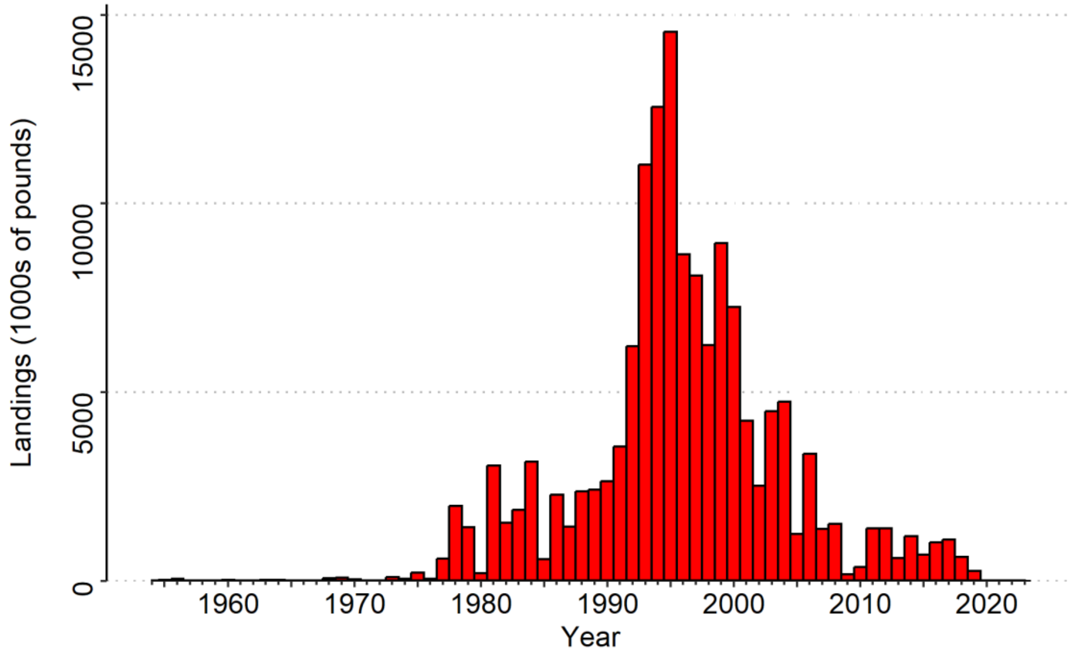


Figure 8: Observed commercial landings in pounds.

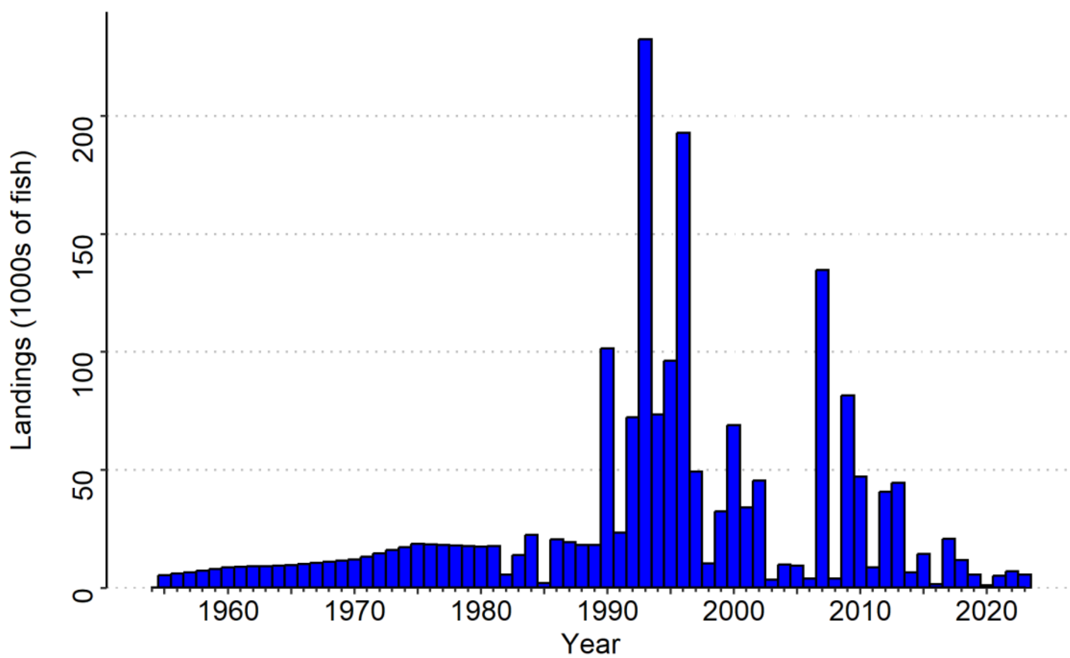


Figure 9: Observed recreational landings as numbers of fish.

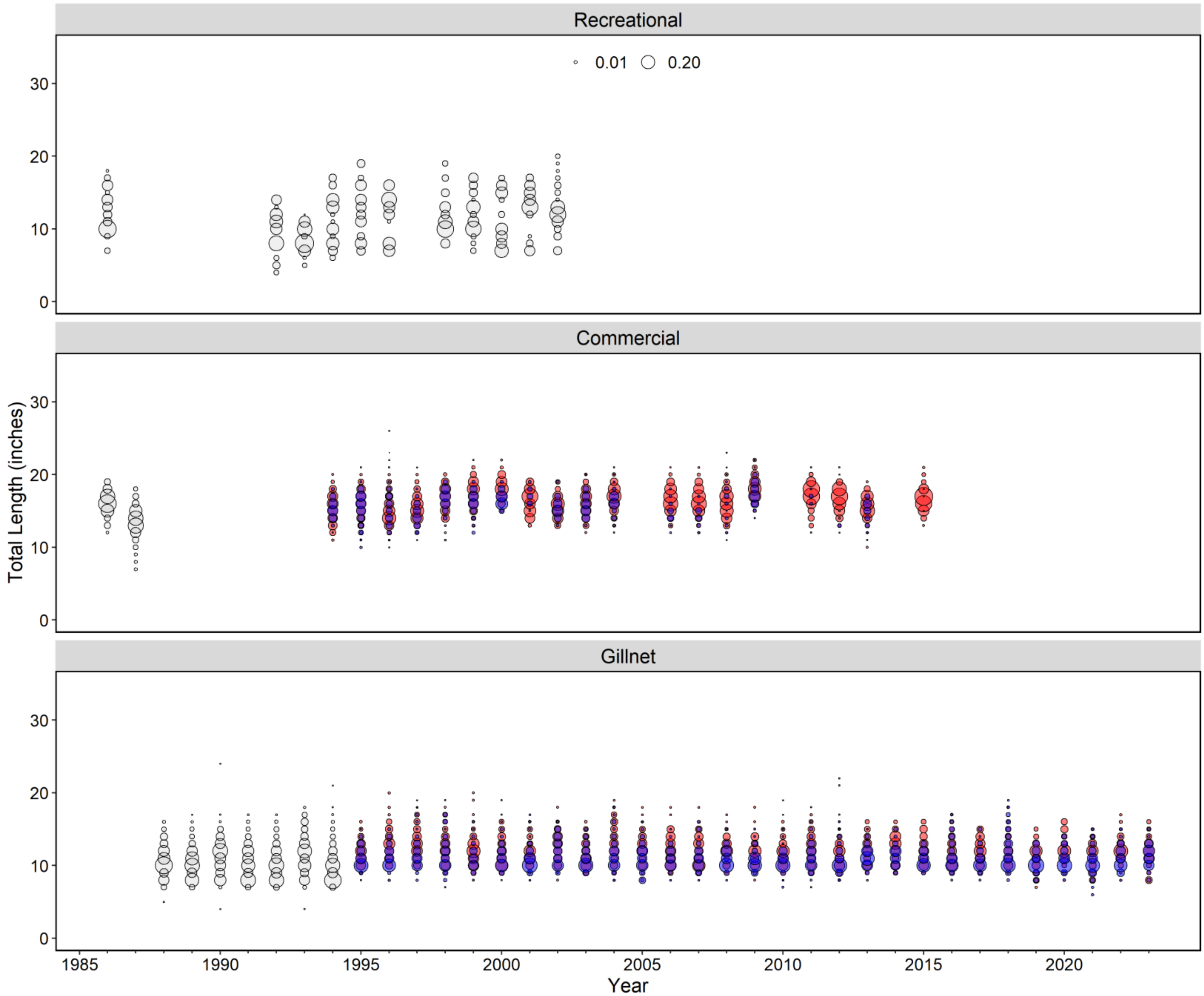


Figure 10: Observed length compositions of the fisheries and the LDWF marine gillnet survey. Uncolored bubbles represent combined sexes, red bubbles are females, and blue bubbles are males.

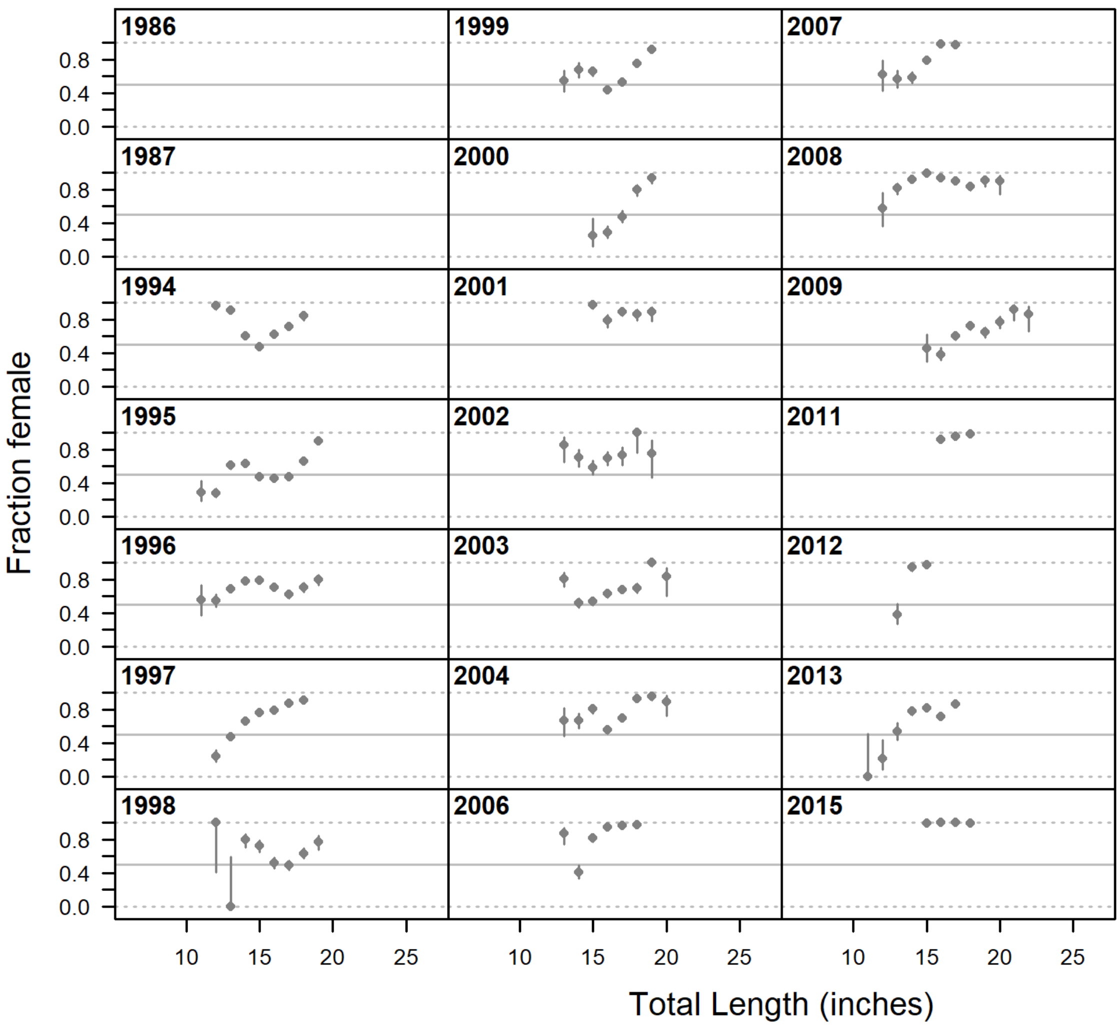


Figure 11: Observed sex ratios of the commercial length compositions with 75% confidence intervals

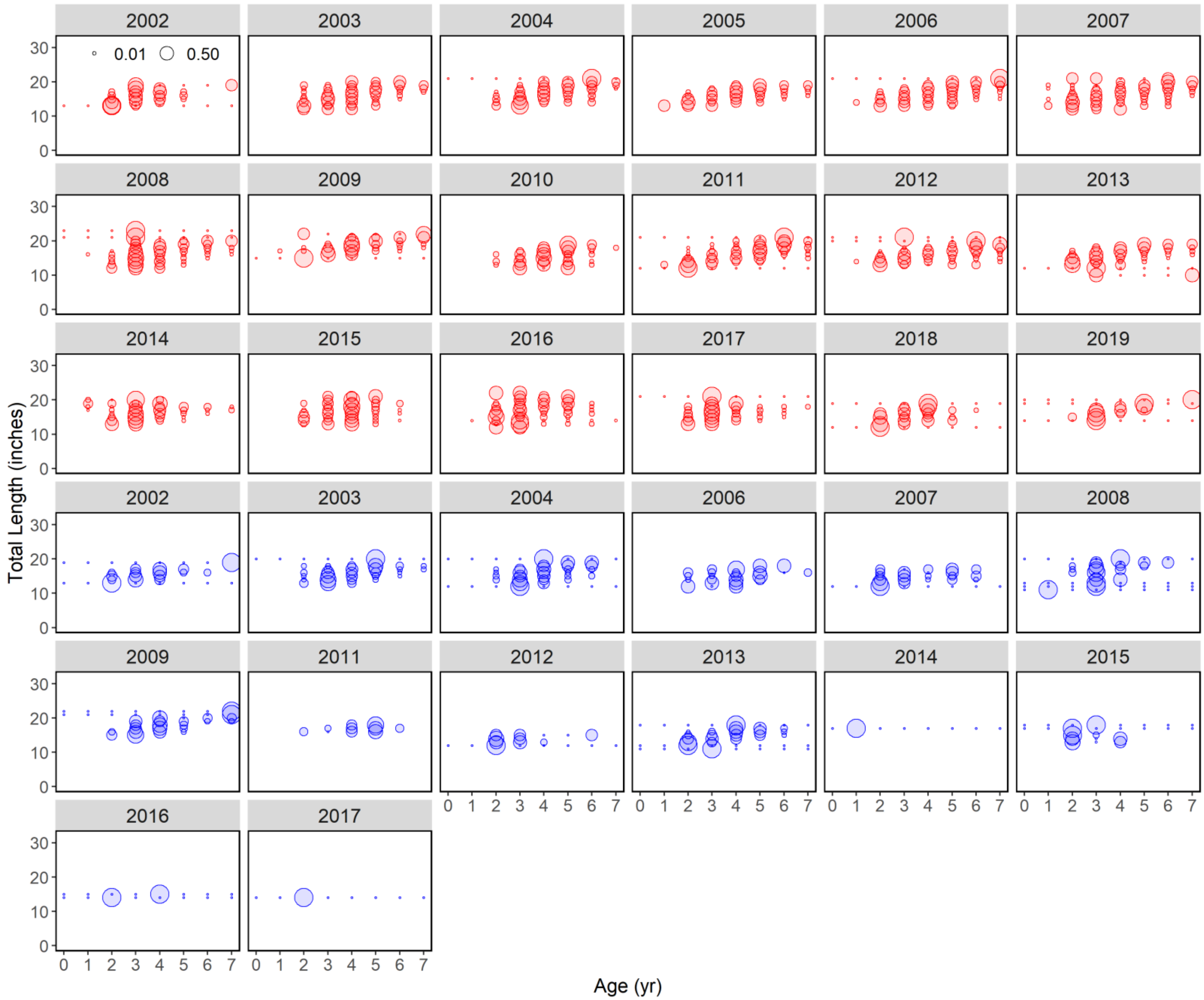


Figure 12: Observed sex-specific age-at-length compositions of the commercial fishery. Red bubbles are females and blue bubbles are males.

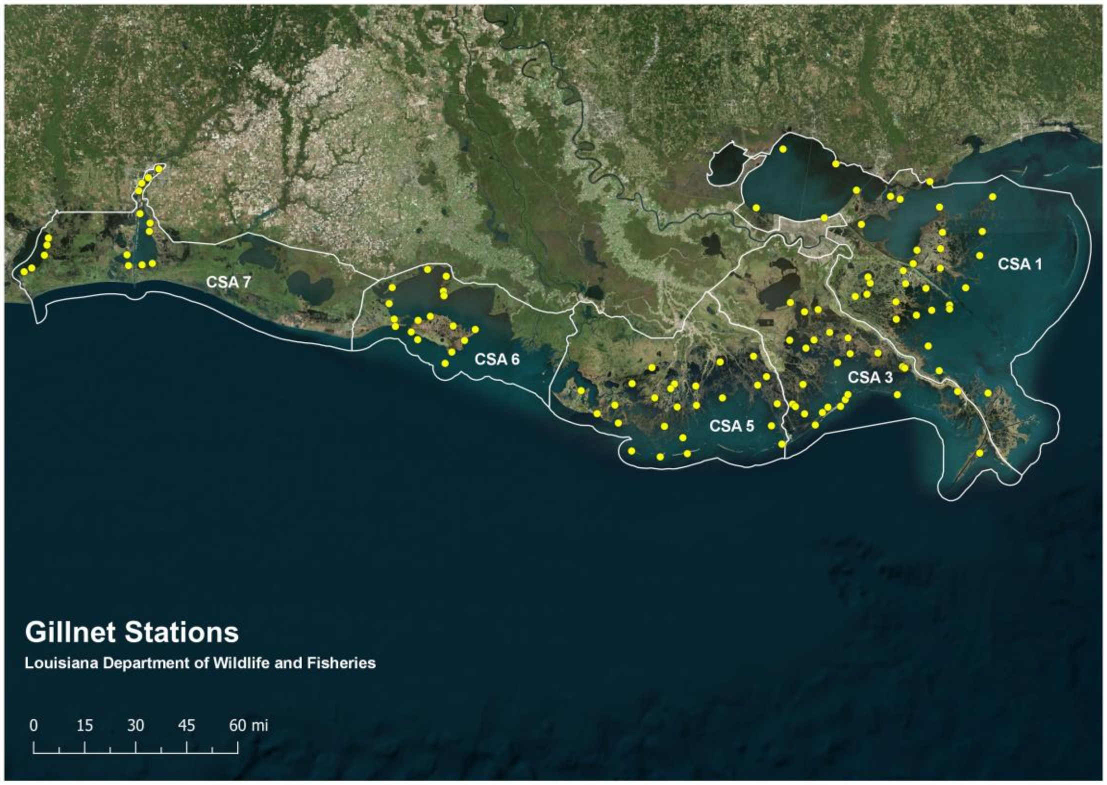


Figure 13: Station locations of the LDWF marine gillnet survey. Lines delineate LDWF Coastal Study Areas and state/federal waters.

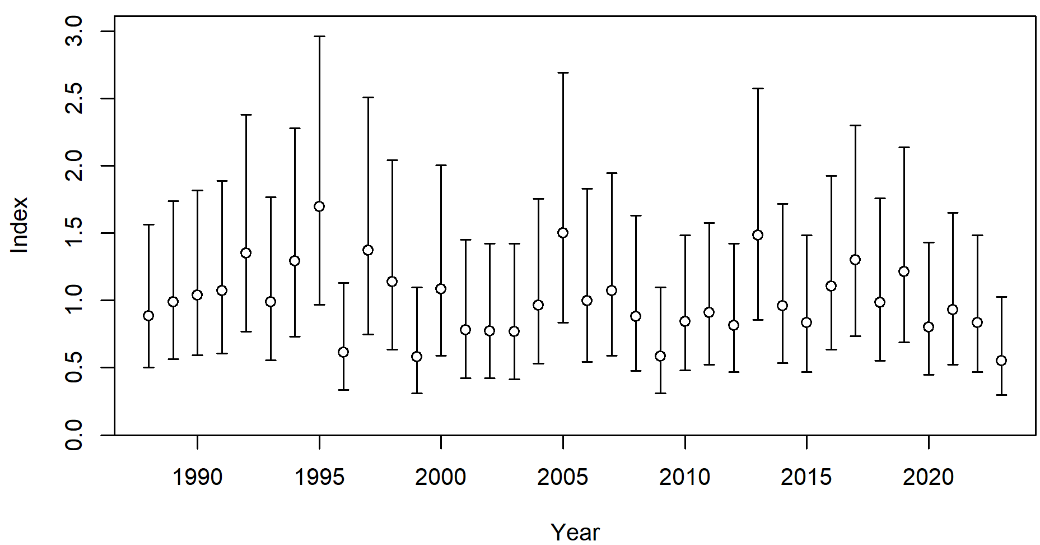


Figure 14: Observed index of relative abundance of the LDWF marine gillnet survey and corresponding lognormal 95% confidence intervals.

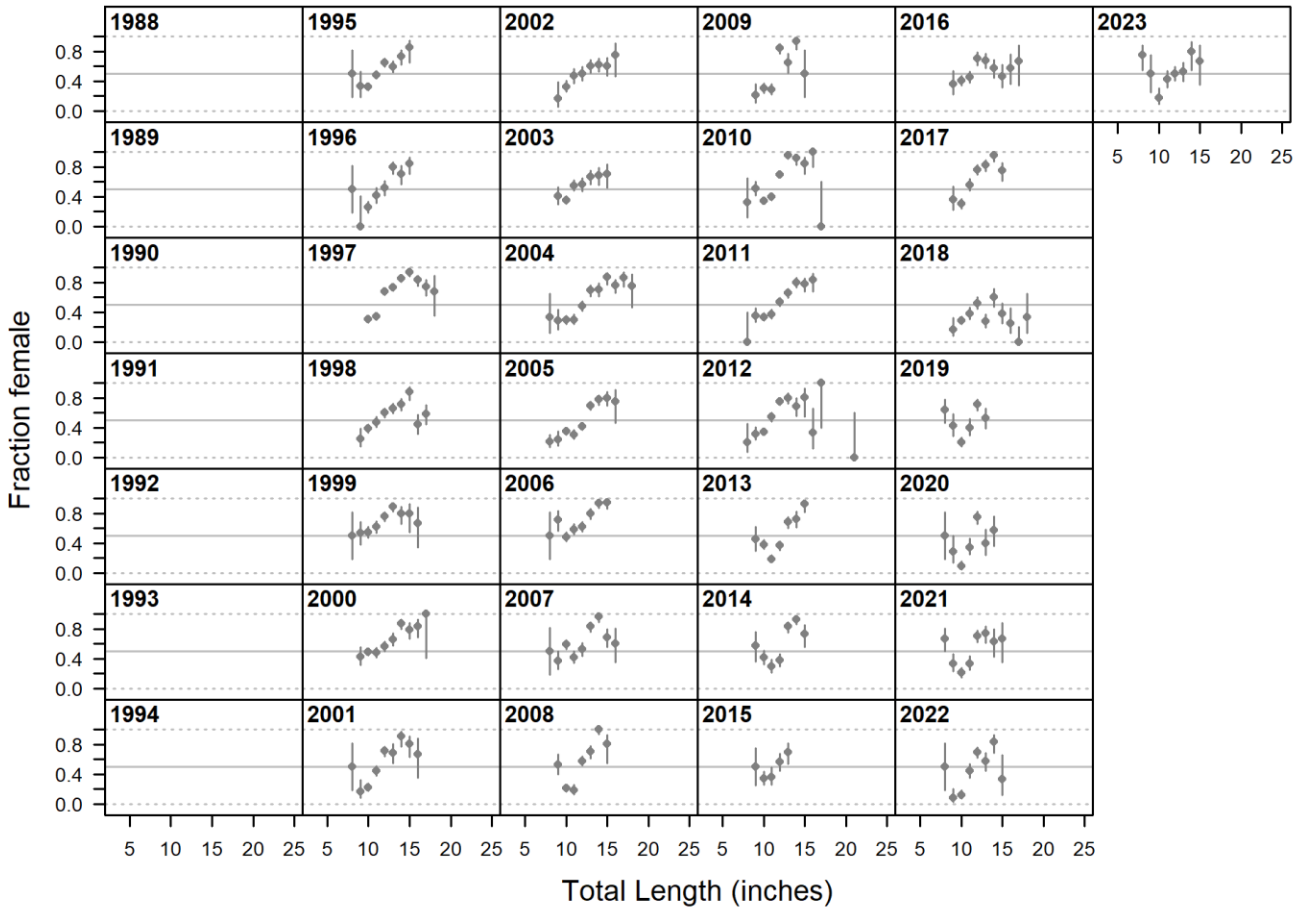


Figure 15: Observed sex ratios of the marine gillnet survey length compositions with 75% confidence intervals.

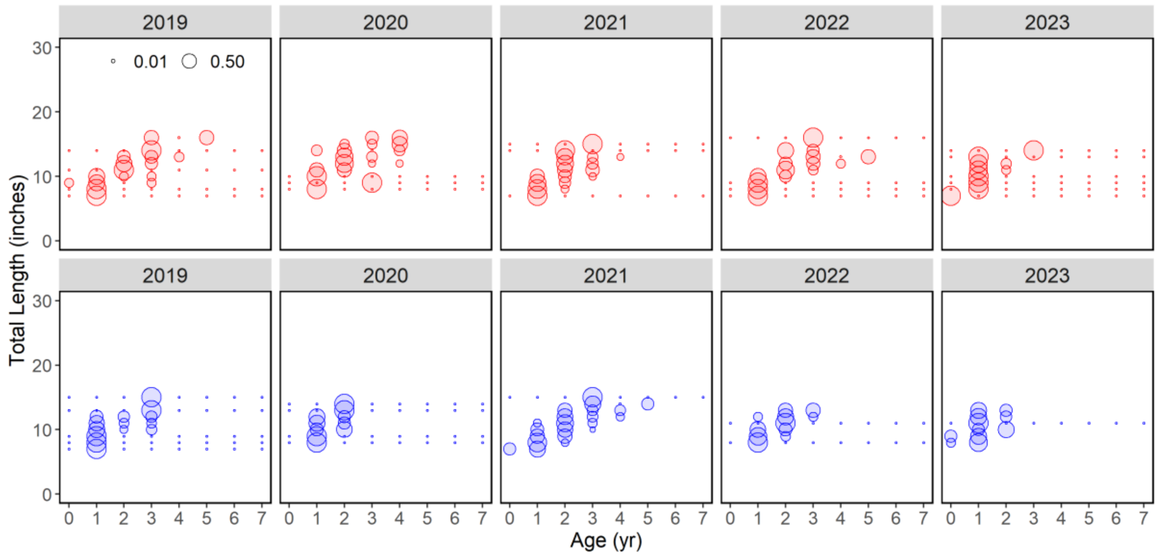


Figure 16: Observed sex-specific age-at-length compositions of the LDWF marine gillnet survey. Red bubbles are females and blue bubbles are males.

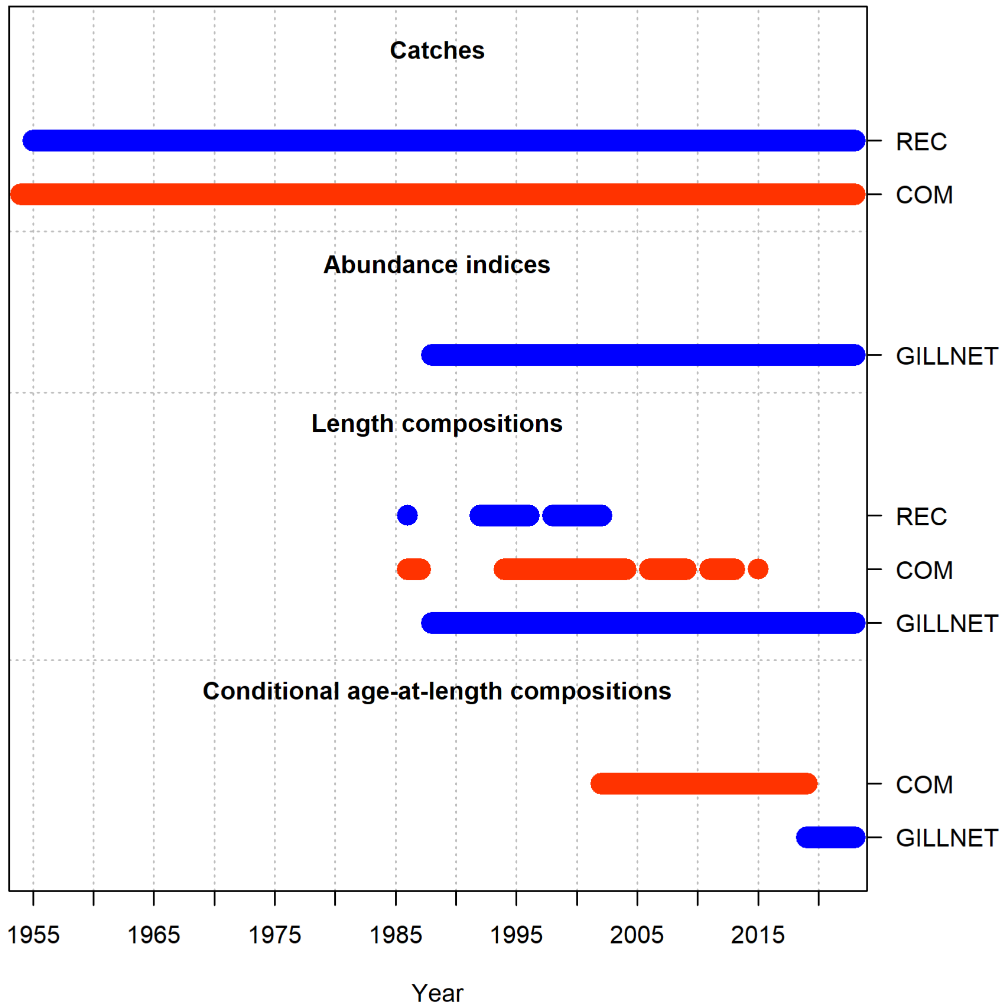


Figure 17: Data inputs of the SS3 base model.

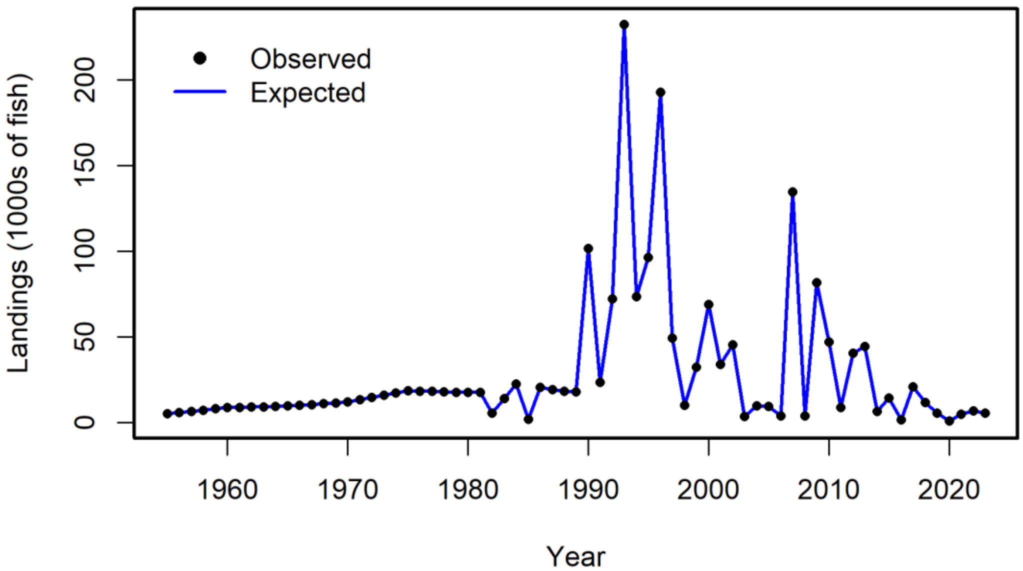


Figure 18: Observed and SS3 base model estimated recreational landings as numbers of fish.

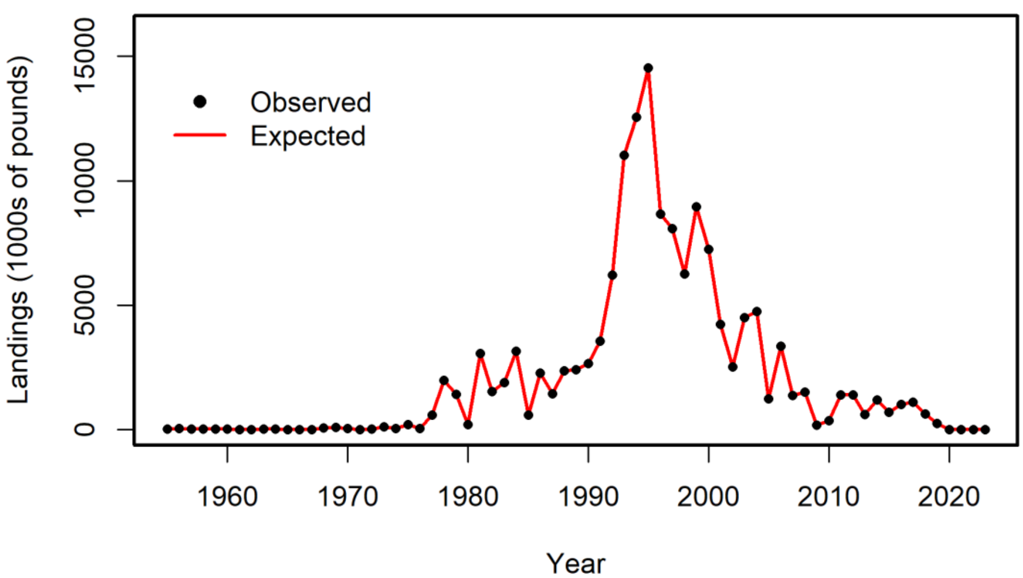
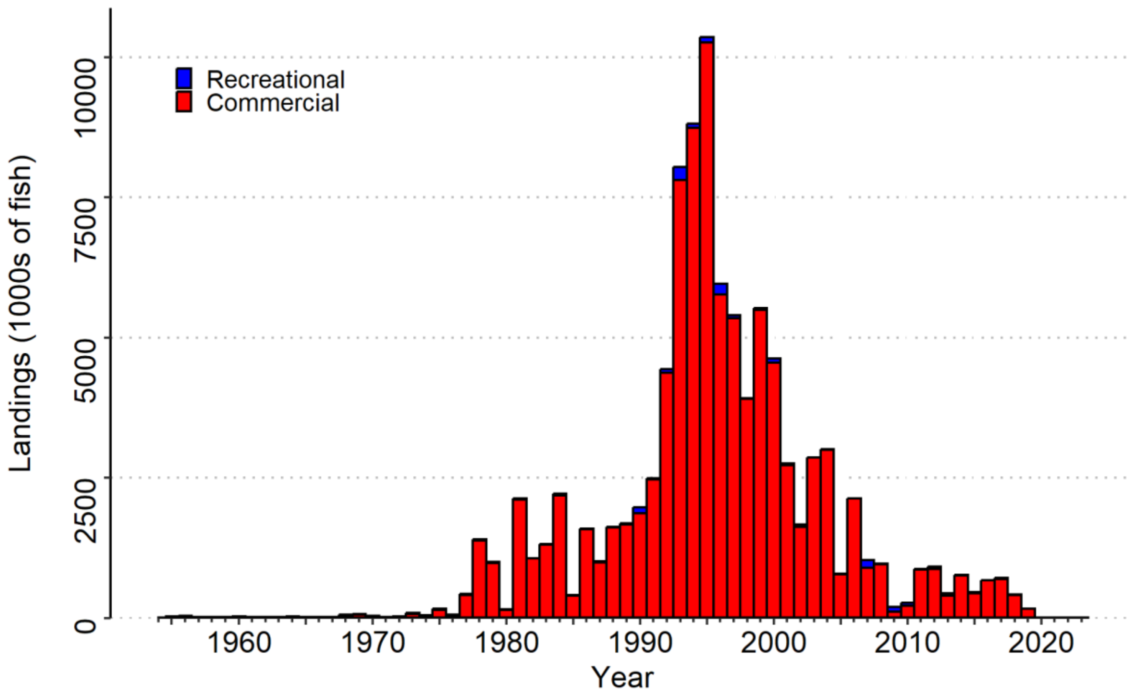


Figure 19: Observed and SS3 base model estimated commercial landings in pounds.



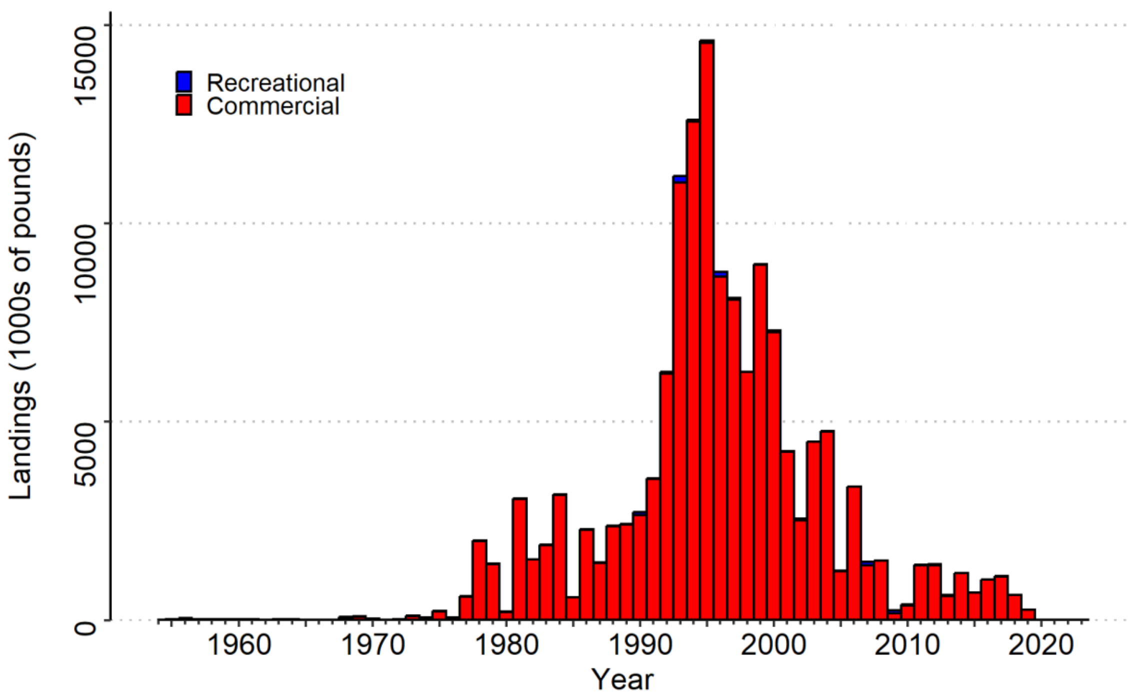


Figure 20: SS3 base model estimated landings in pounds (top) and as numbers of fish (bottom).

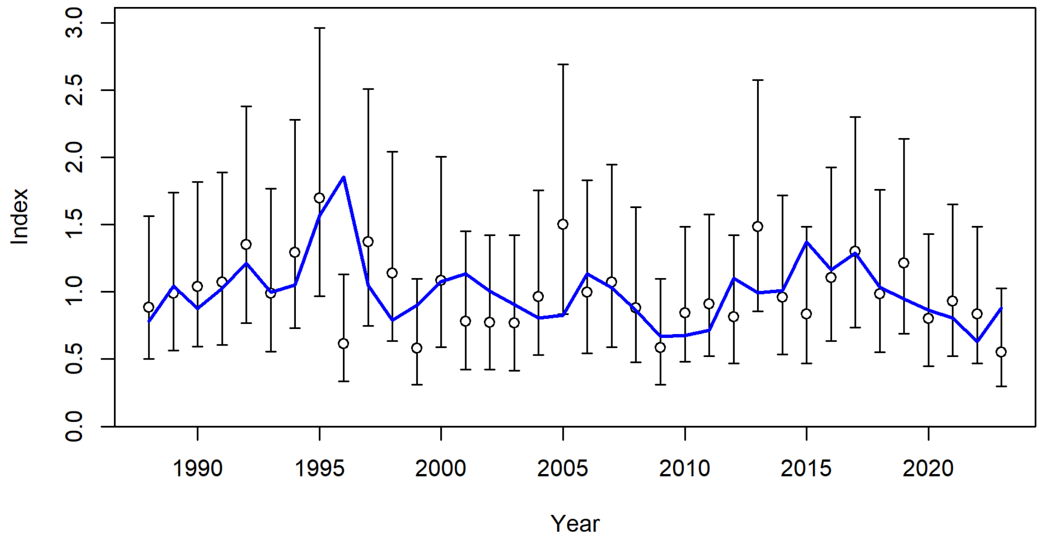


Figure 21: Observed and SS3 base model estimated index of relative abundance of the LDWF marine gillnet survey with corresponding lognormal 95% confidence intervals.

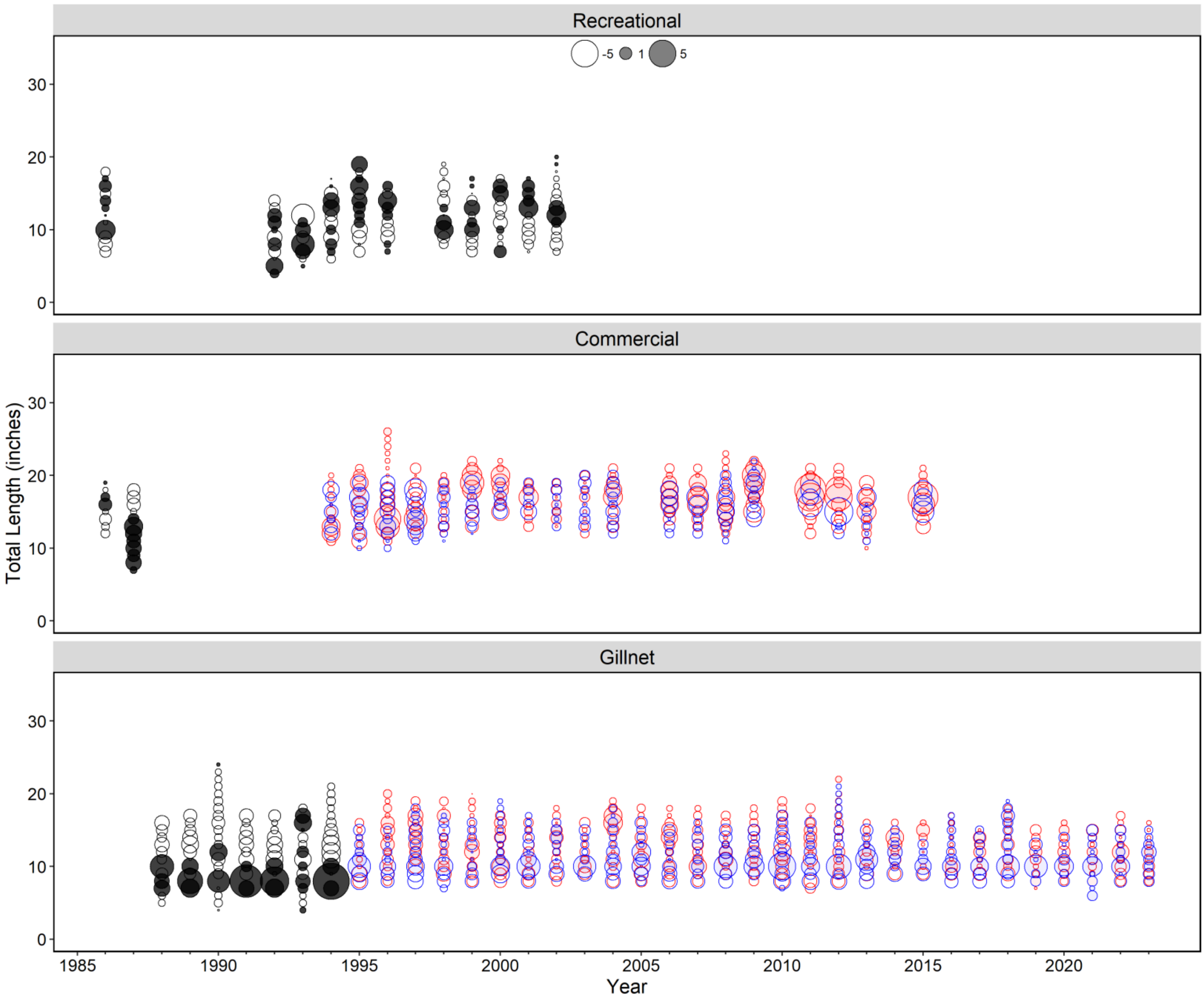


Figure 22: Pearson residuals of length composition fits of the fisheries and the LDWF marine gillnet survey. Shaded bubbles represent instances where observed values are greater than the predicted values and clear bubbles represent instances where observed values are less than the predicted values. Uncolored bubbles represent combined sexes, red bubbles are females, and blue bubbles are males.

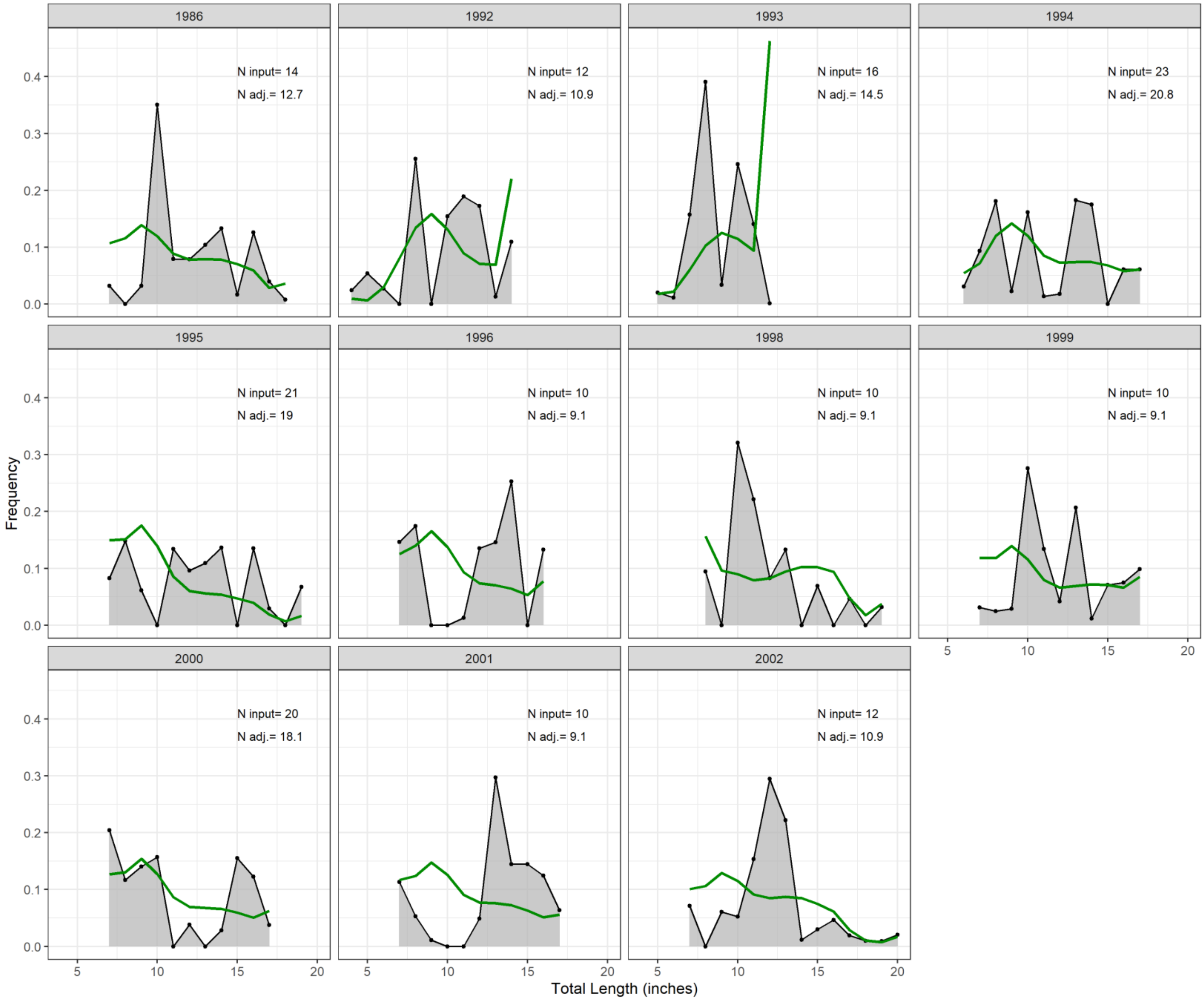


Figure 23: Observed and SS3 base model estimated size compositions of the recreational fishery. Input samples sizes (N input) and effective sample sizes adjusted by the estimated Dirichlet-multinomial multiplier (N adj.) are reported in each figure.

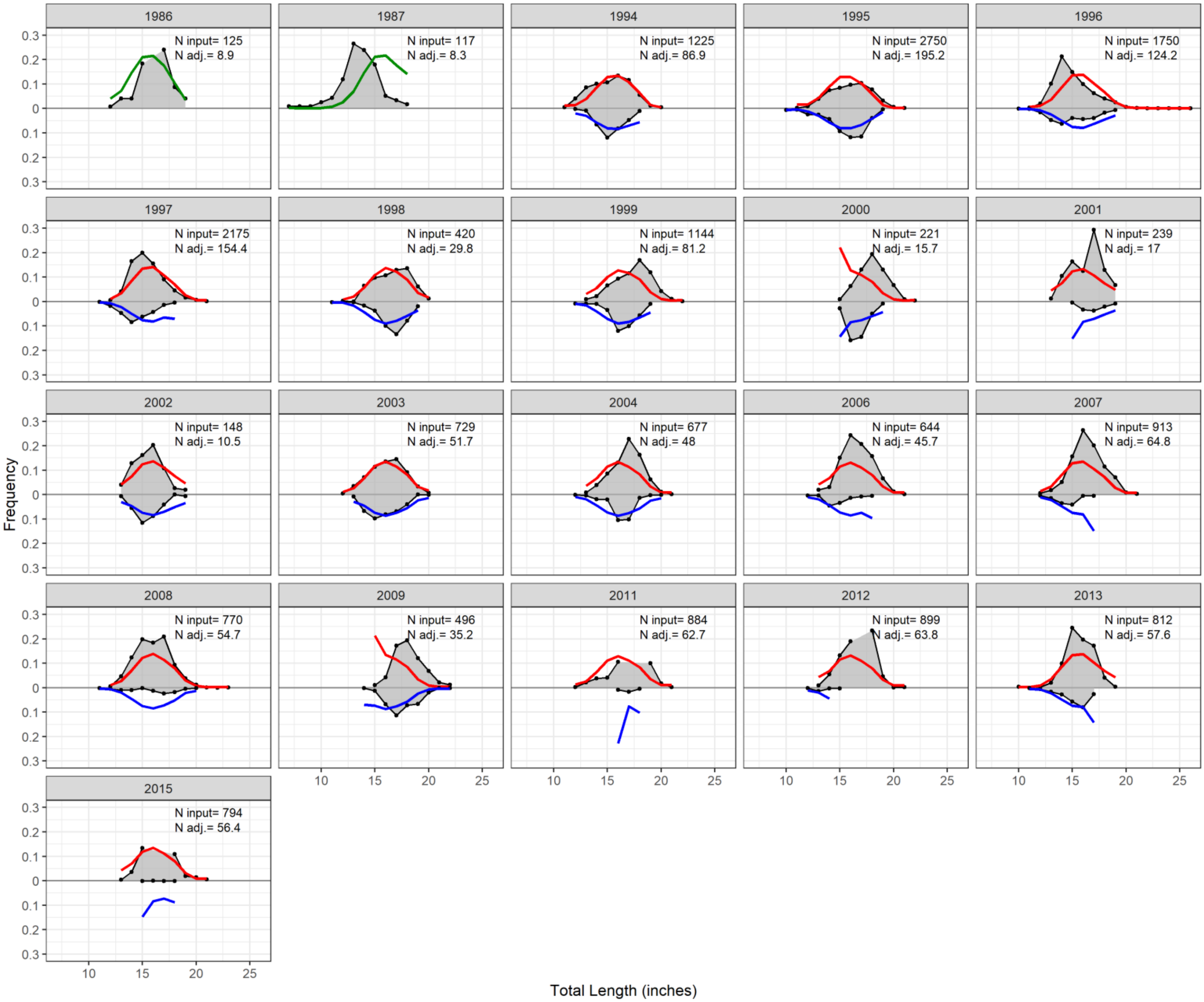


Figure 24: Observed and SS3 base model estimated size compositions of the commercial fishery (combined sex 1986-1987, and sex-specific beginning in 1994). Input samples sizes (N input) and effective sample sizes adjusted by the estimated Dirichlet-multinomial multiplier (N adj.) are reported in each figure.

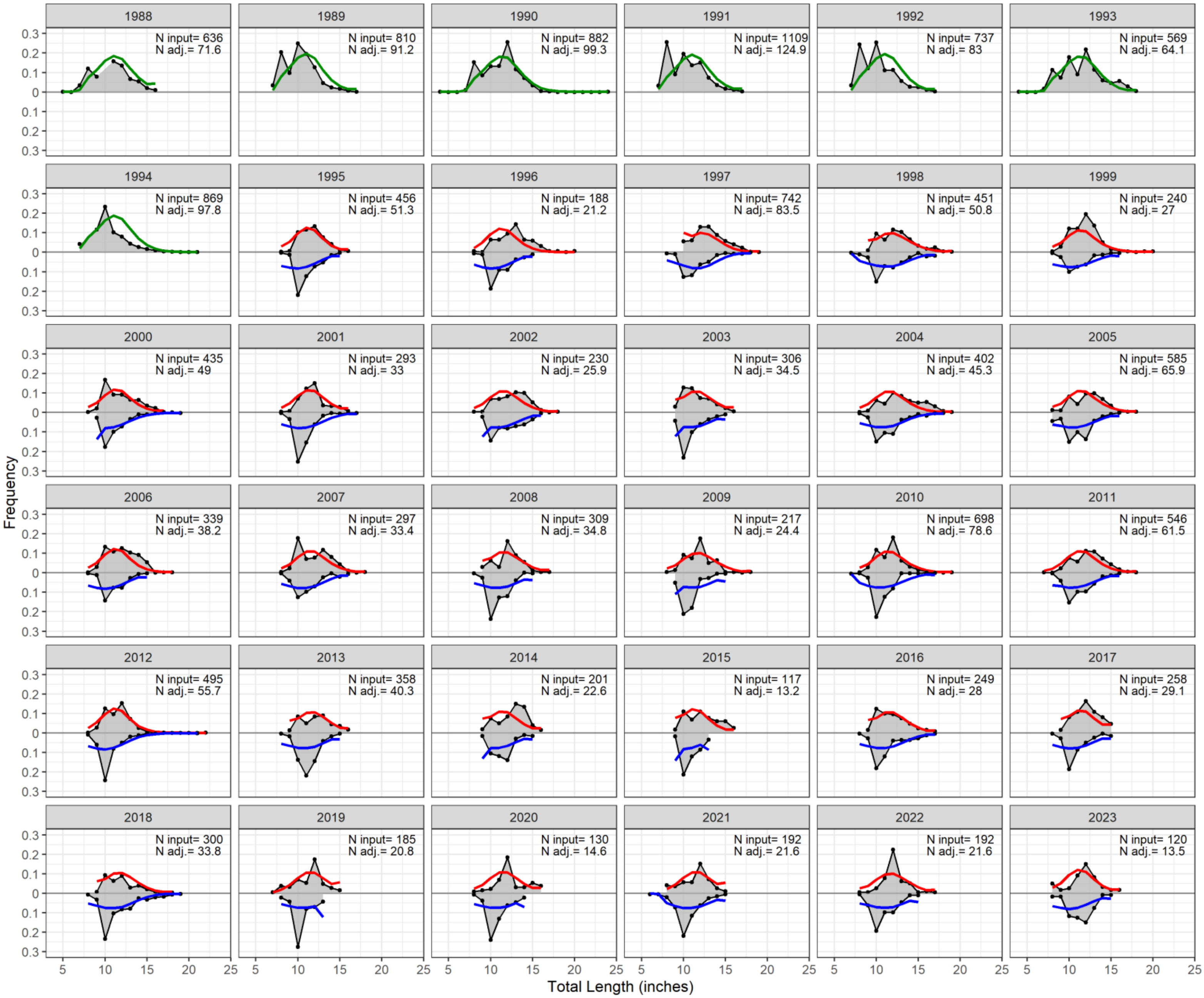


Figure 25: Observed and SS3 base model estimated size compositions of the LDWF marine gillnet survey (combined sex 1988-1994, and sex-specific beginning in 1995). Input samples sizes (N input) and effective sample sizes adjusted by the estimated Dirichlet-multinomial multiplier (N adj.) are reported in each figure.

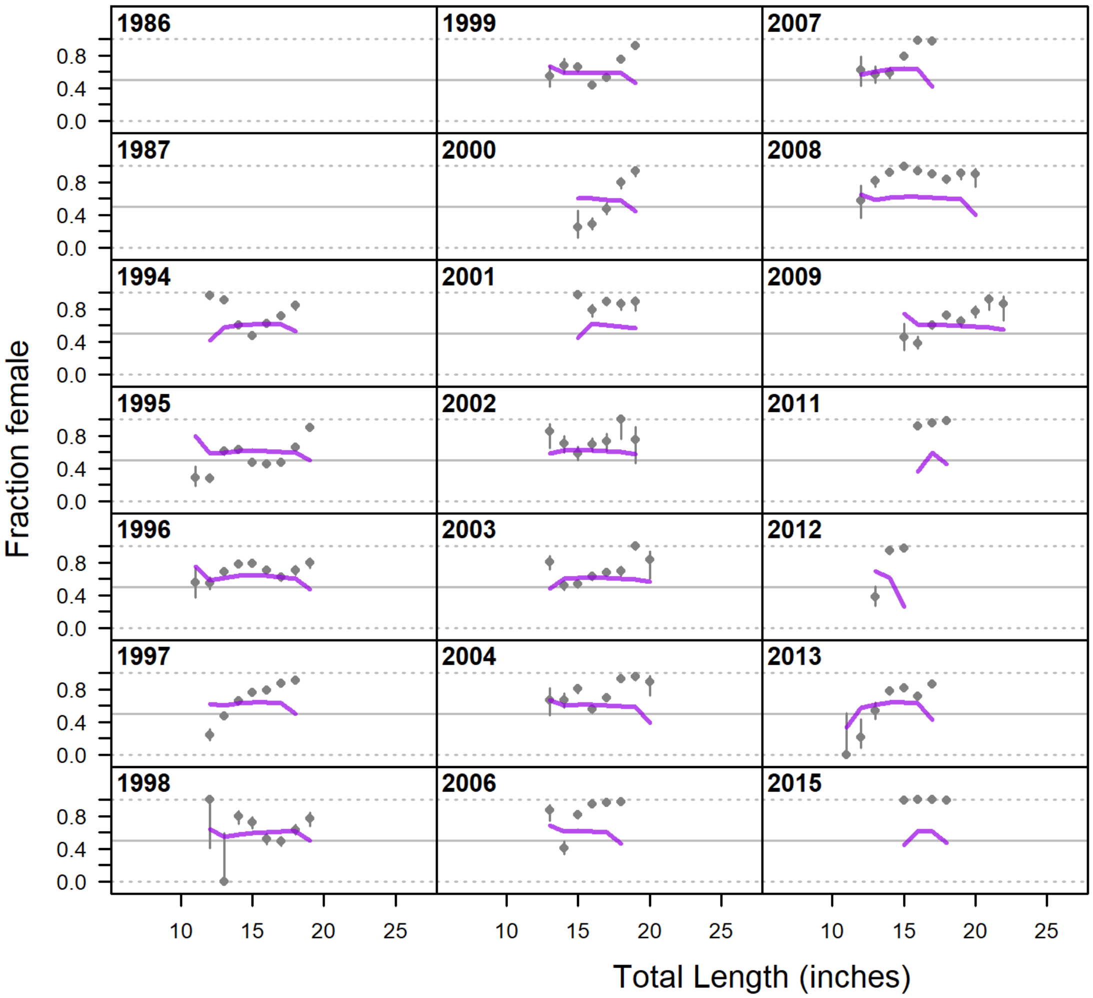


Figure 26: Observed and SS3 base model estimated sex ratios of the commercial length compositions with 75% confidence intervals.

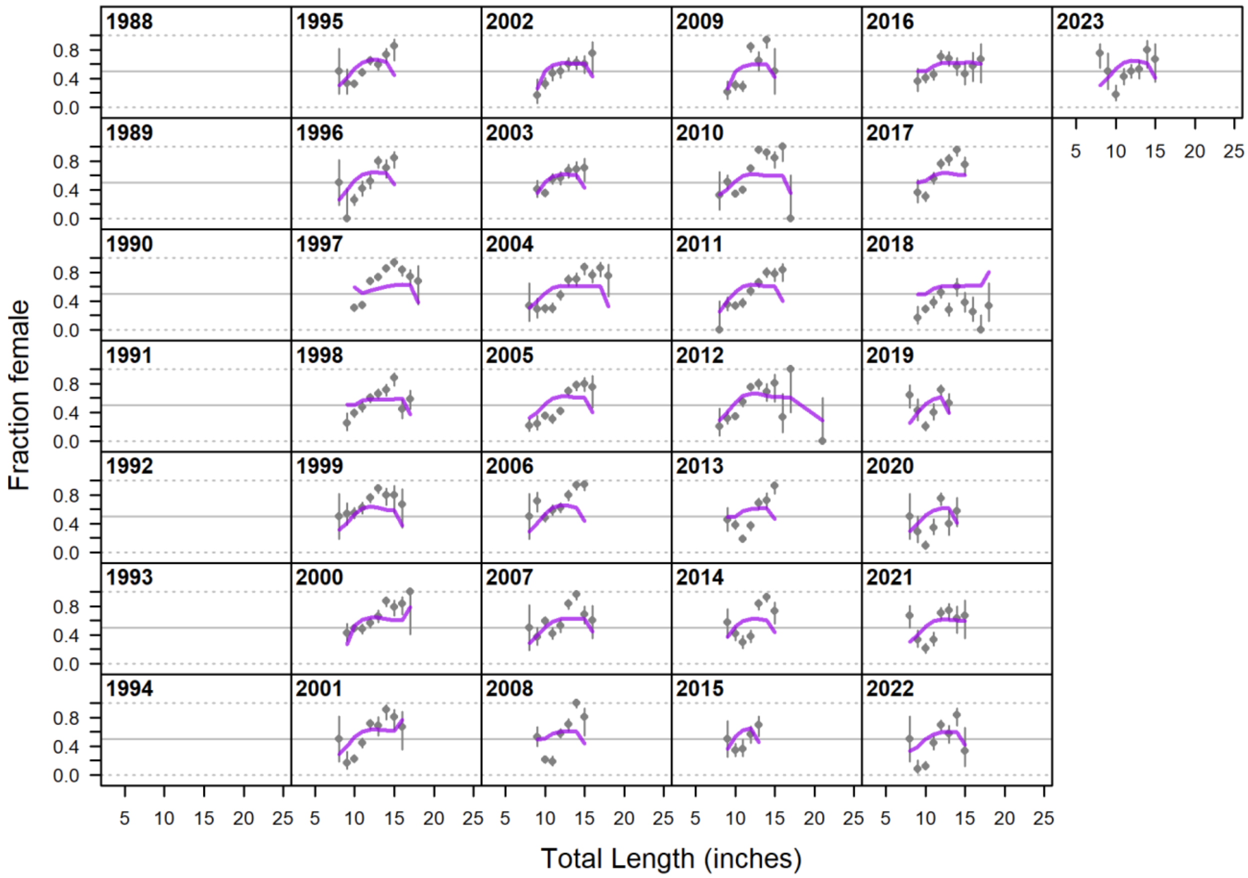


Figure 27: Observed and SS3 base model estimated sex ratios of the marine gillnet survey length compositions with 75% confidence intervals.

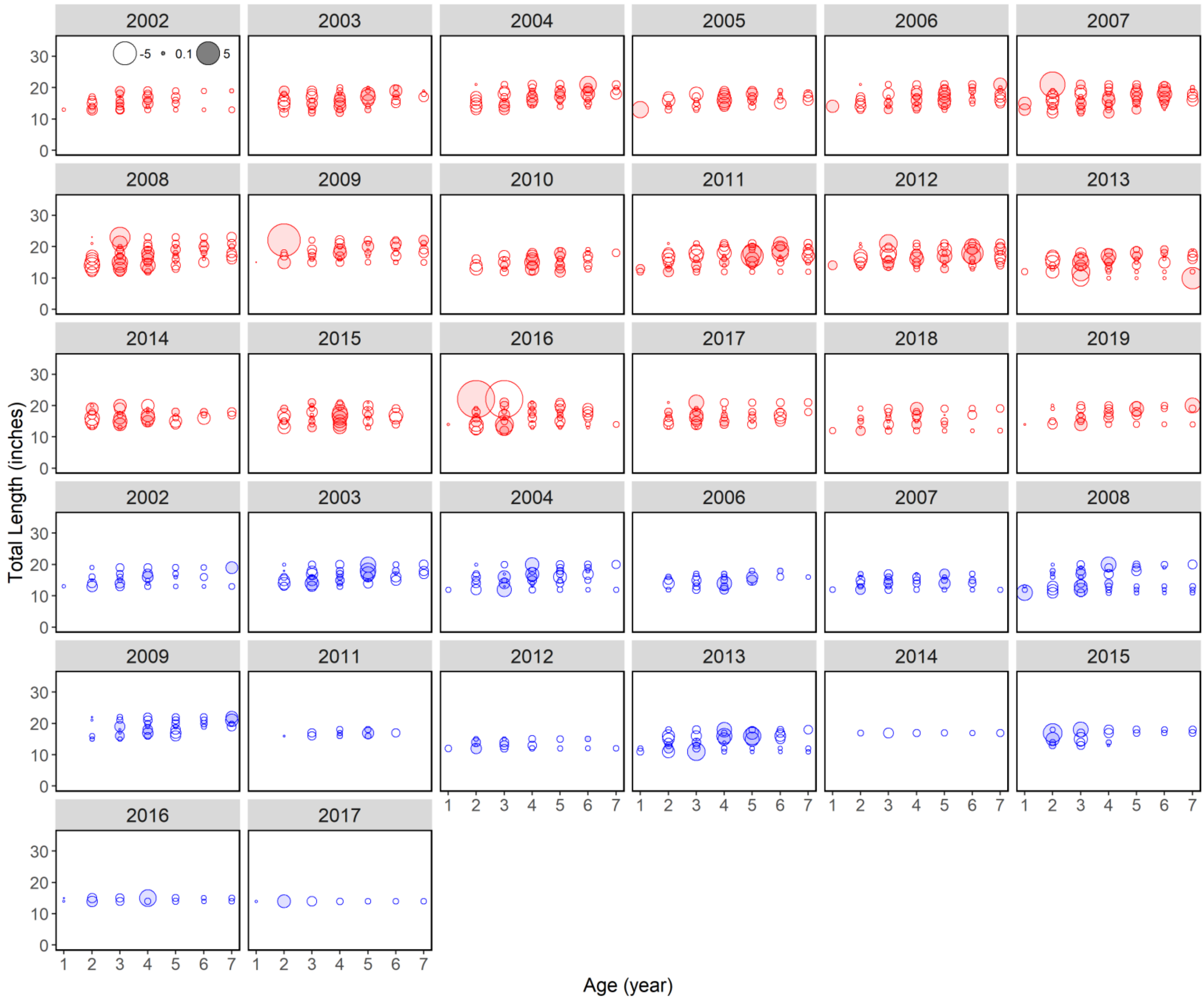


Figure 28: Pearson residuals of the sex-specific conditional age-at-length composition fits of the commercial fishery. Shaded bubbles represent instances where observed values are greater than the predicted values and clear bubbles represent instances where observed values are less than the predicted values. Red bubbles are females and blue bubble are males.

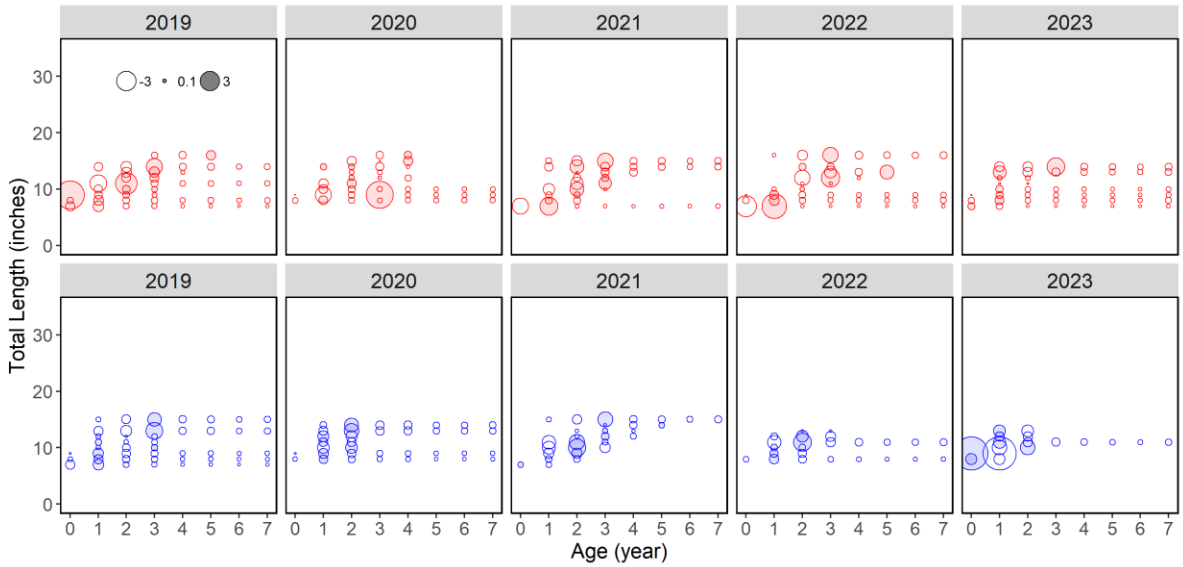
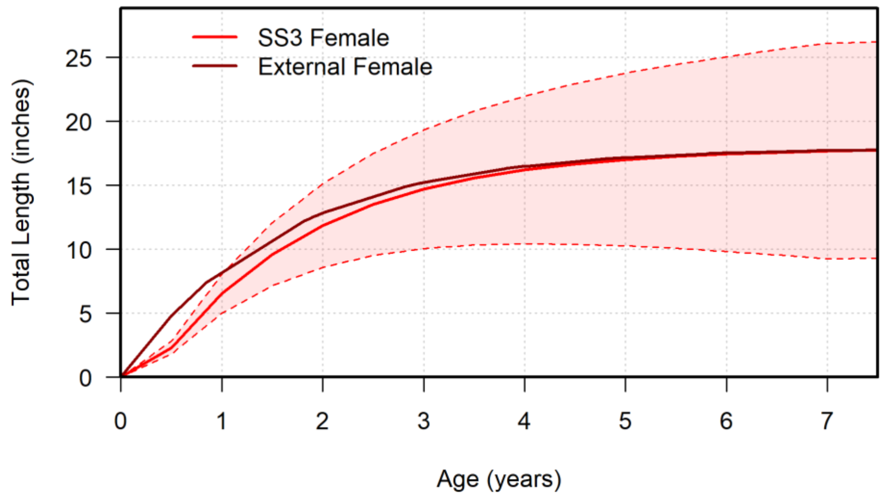


Figure 29: Pearson residuals of the sex-specific conditional age-at-length composition fits of the LDWF marine gillnet survey. Shaded bubbles represent instances where observed values are greater than the predicted values and clear bubbles represent instances where observed values are less than the predicted values. Red bubbles are females and blue bubble are males.



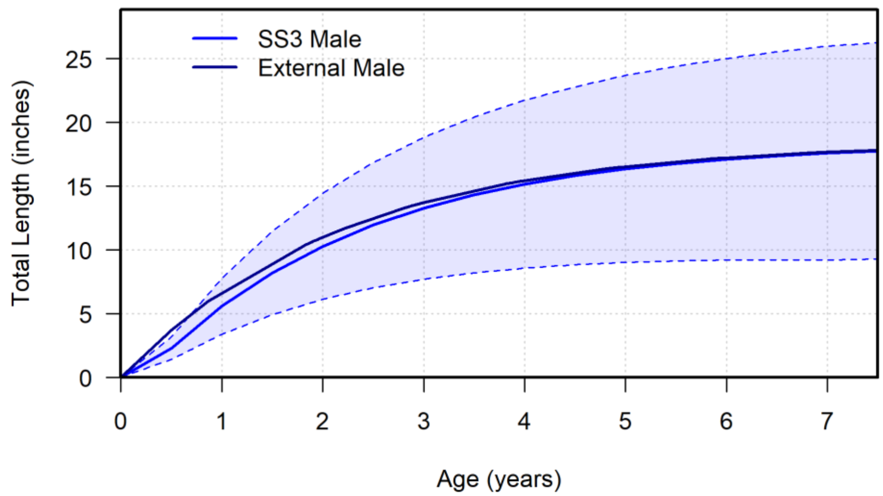
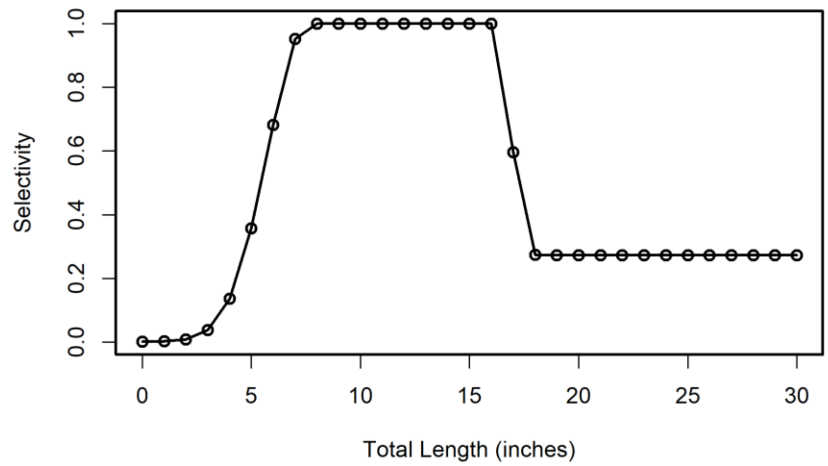


Figure 30: SS3 base model sex-specific mean length-at-age and 95% confidence distribution (shaded area) along with the external estimates of mean length-at-age. The estimated and fixed parameters of the SS3 base model growth function are presented in Table 7. Top graphic represents females and the bottom graphic represents males.



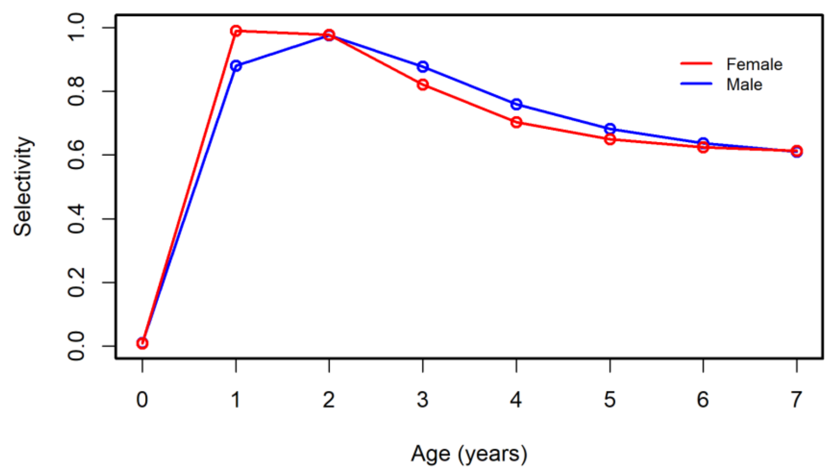


Figure 31: Estimated selectivity-at-size (top) and sex-specific selectivity-at-age (bottom) functions of the recreational fishery.

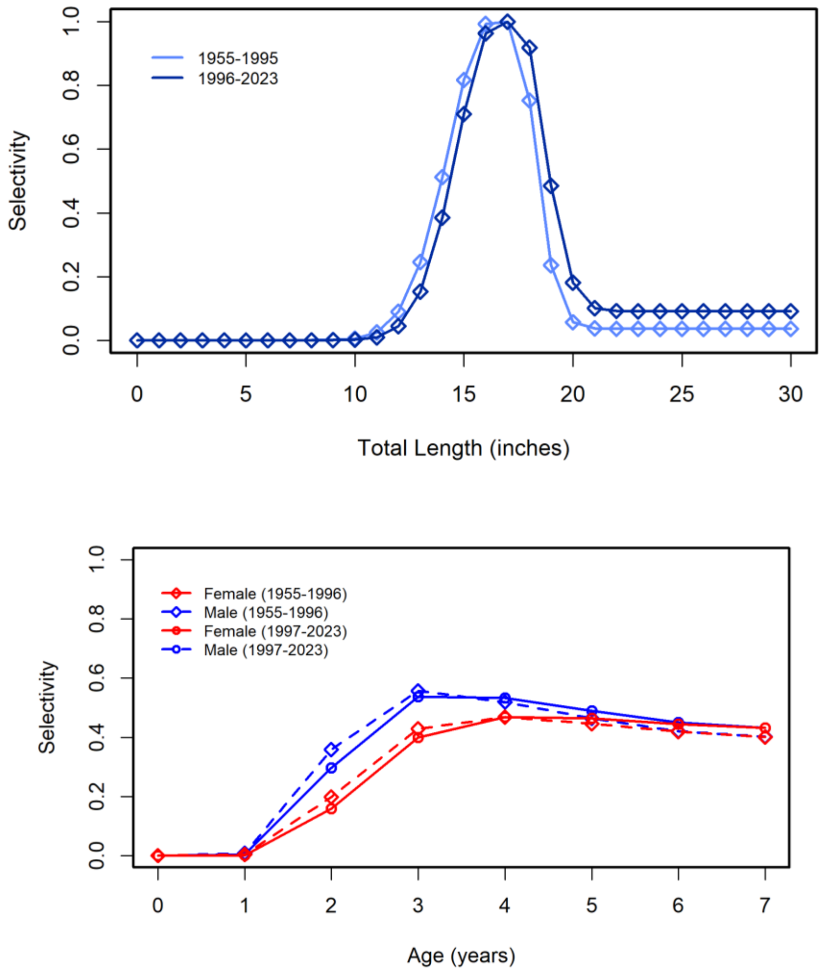


Figure 32: Estimated selectivity-at-size (top) and sex-specific selectivity-at-age (bottom) functions of the commercial fishery.

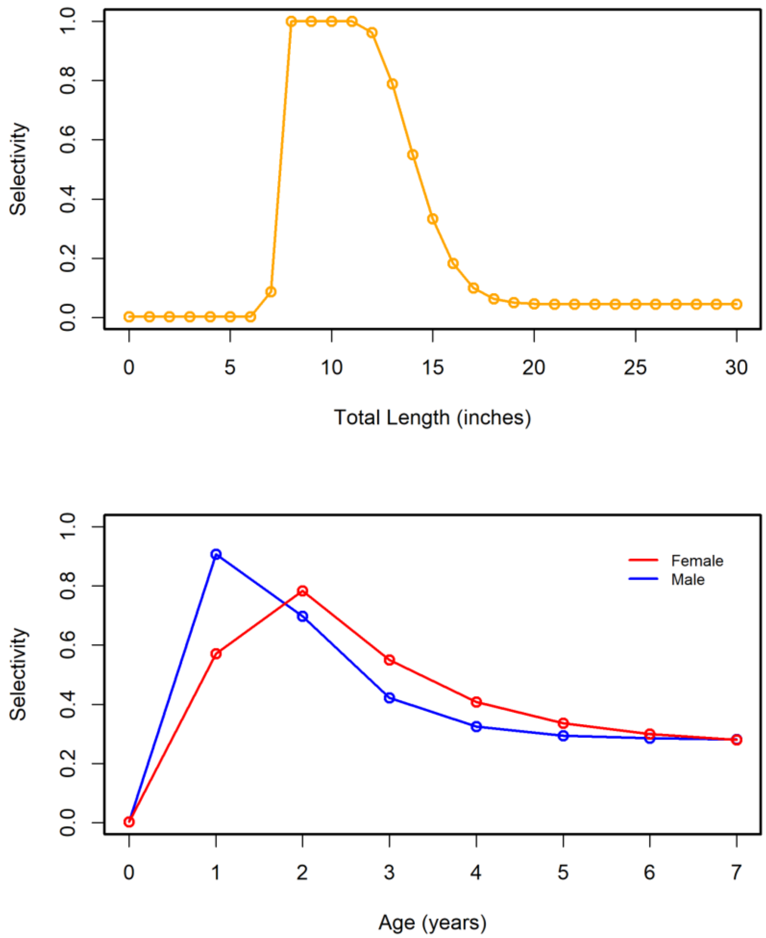
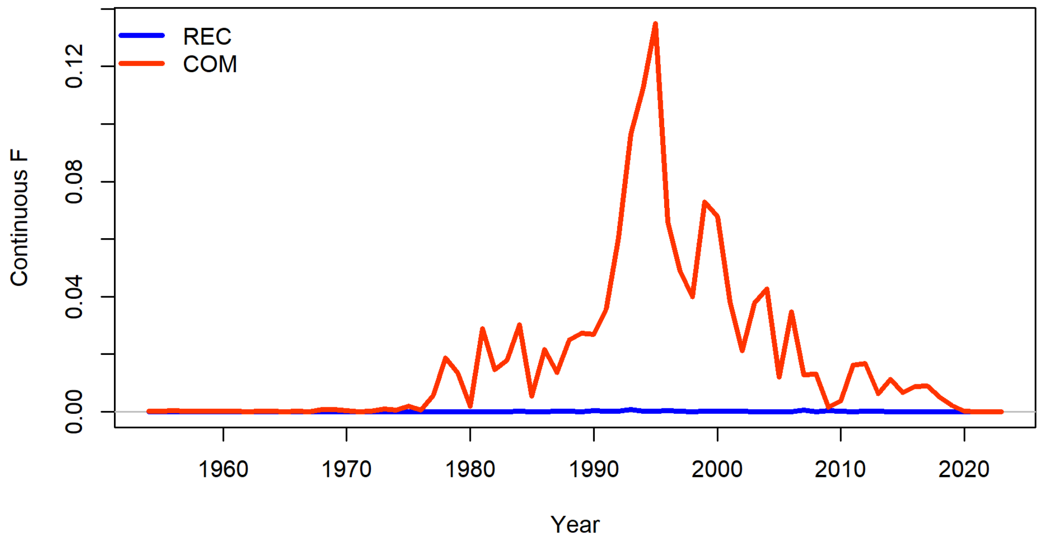


Figure 33: Estimated selectivity-at-size (top) and sex-specific selectivity-at-age (bottom) functions of the LDWF marine gillnet survey.



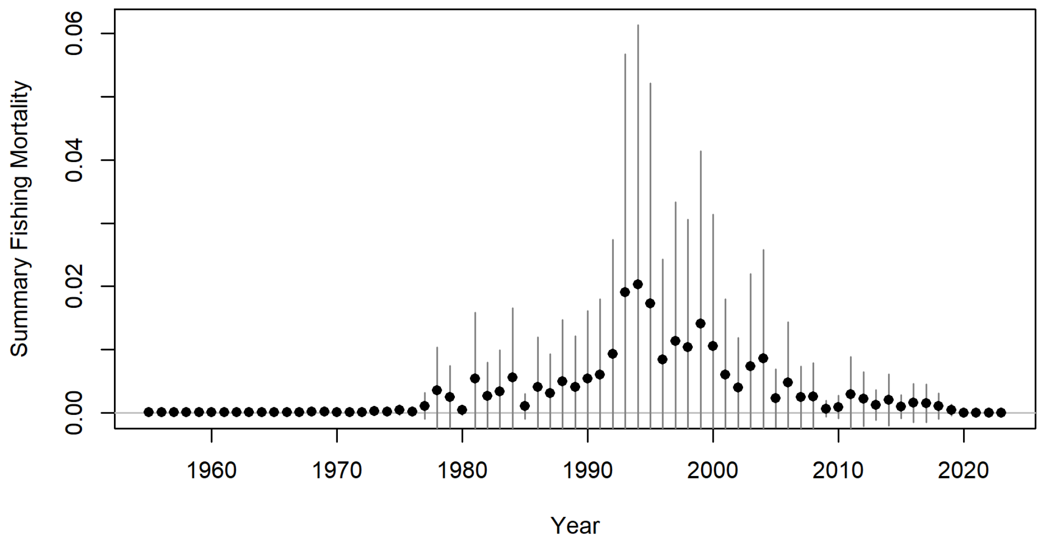


Figure 34: Fleet-specific apical fishing mortalities (top) and exploitation rate (summary F; bottom) estimates of the SS3 base model.

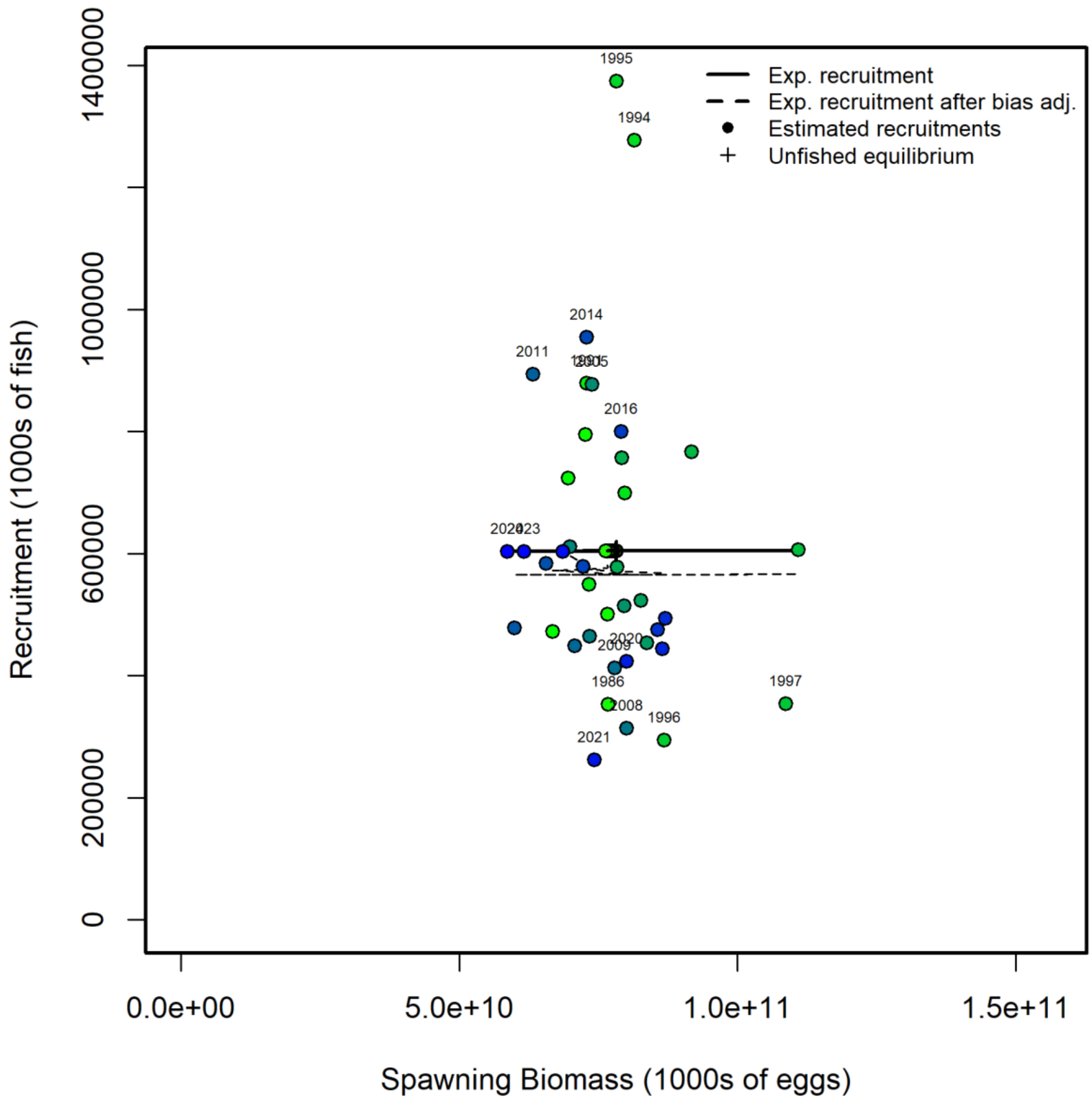
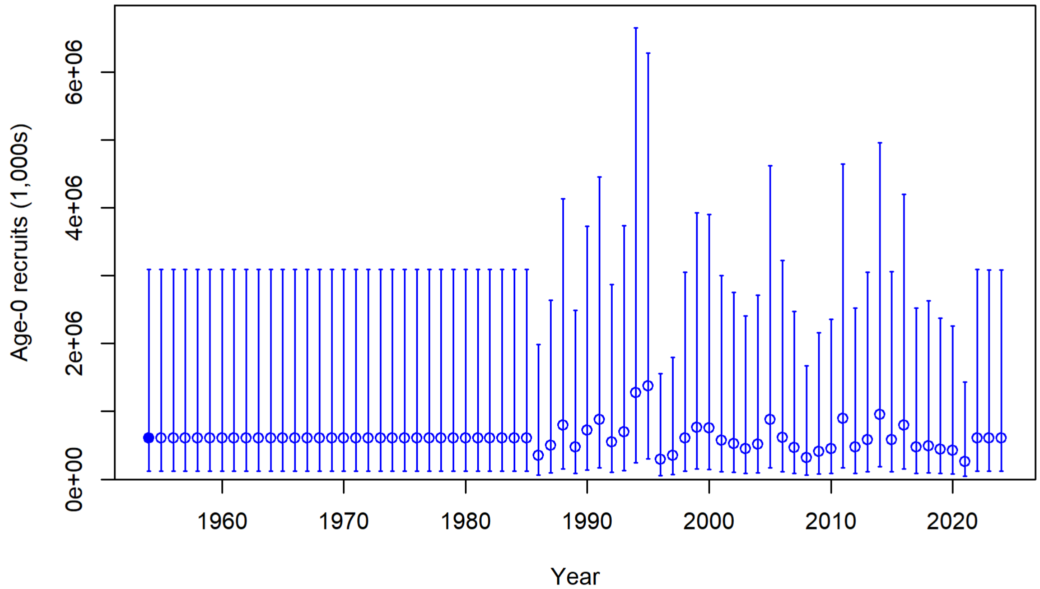


Figure 35: Estimated Beverton-Holt stock-recruitment relationship of the SS3 base model with steepness fixed at 0.99. Estimated age-0 recruitment/SSB pairs are plotted along with the expected Beverton-Holt recruitment (solid line) and the expected recruitment after lognormal bias adjustment (dashed line). Point colors indicate year (warmer colors indicate earlier years and cooler colors indicate later years).



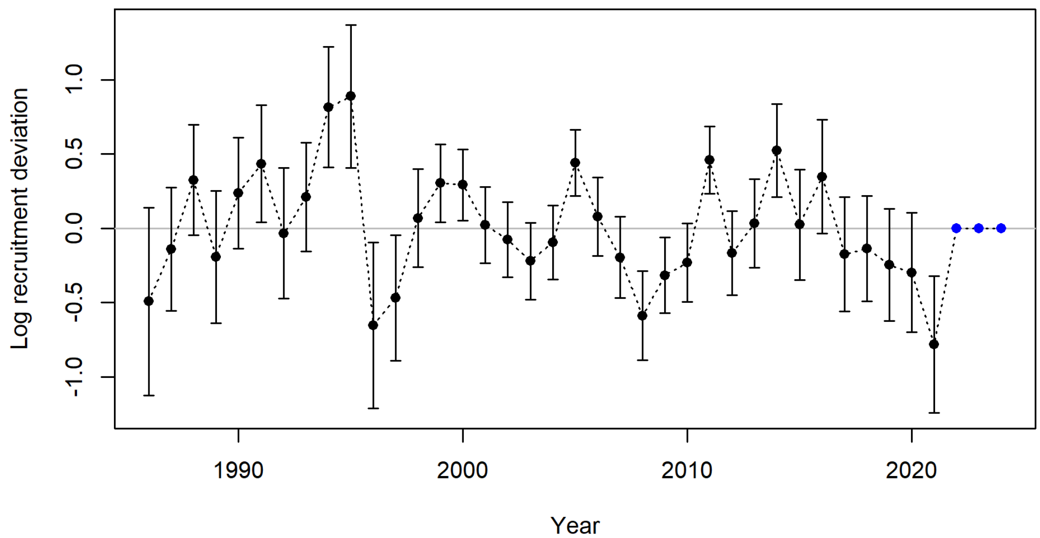


Figure 36: Annual age-0 recruitment (top) and lognormal recruitment deviations (bottom) estimates of the SS3 base model along with the 95% asymptotic confidence intervals of the estimates.

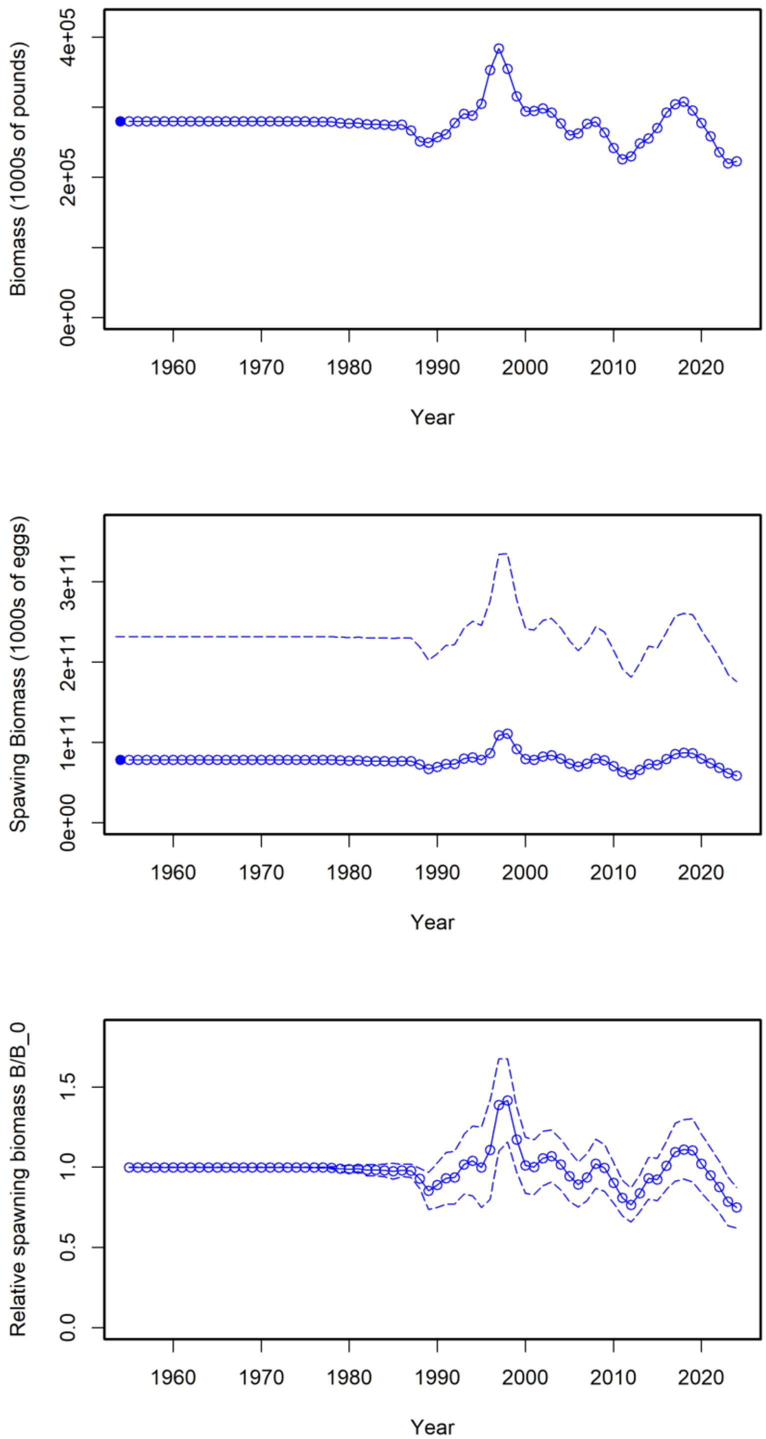
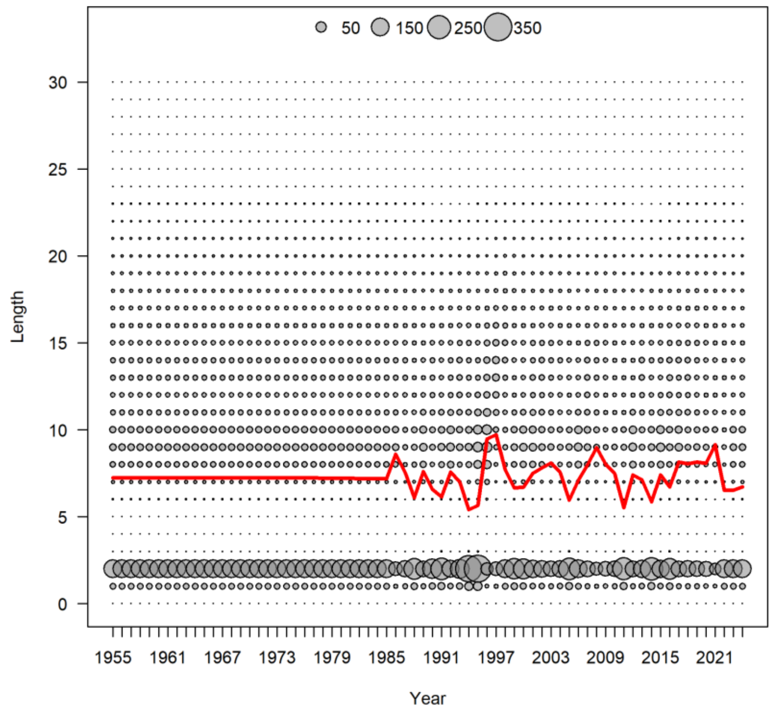


Figure 37: Annual biomass > age-0 (top), spawning biomass (middle), and relative spawning biomass (bottom) estimates of the SS3 base model along with the 95% asymptotic confidence intervals of spawning and relative spawning biomass time series.



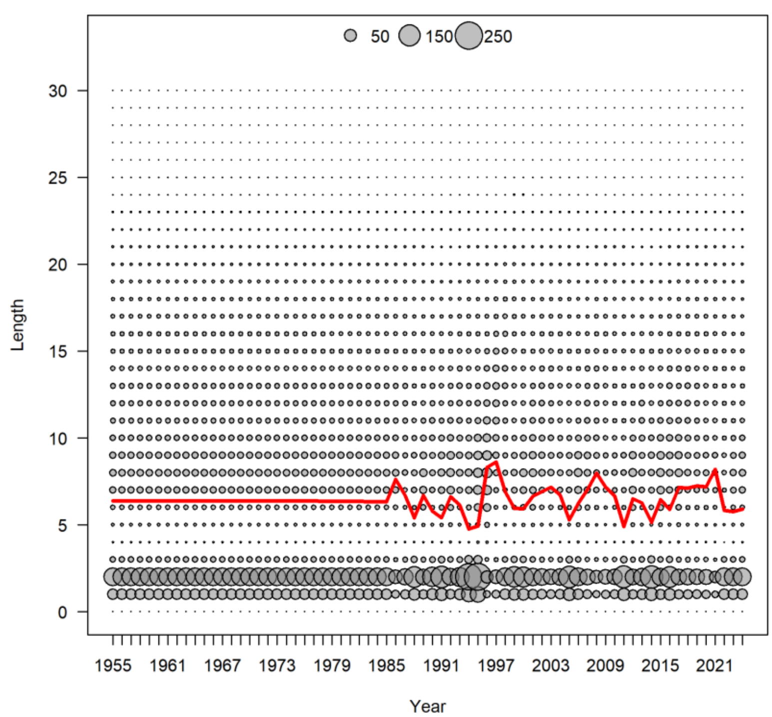


Figure 38: Annual beginning of the year female (top graphic) and male (bottom graphic) abundance at length (inches total length) estimates (bubbles) from the SS3 base model along with the annual sex-specific mean length of the stock (red lines).

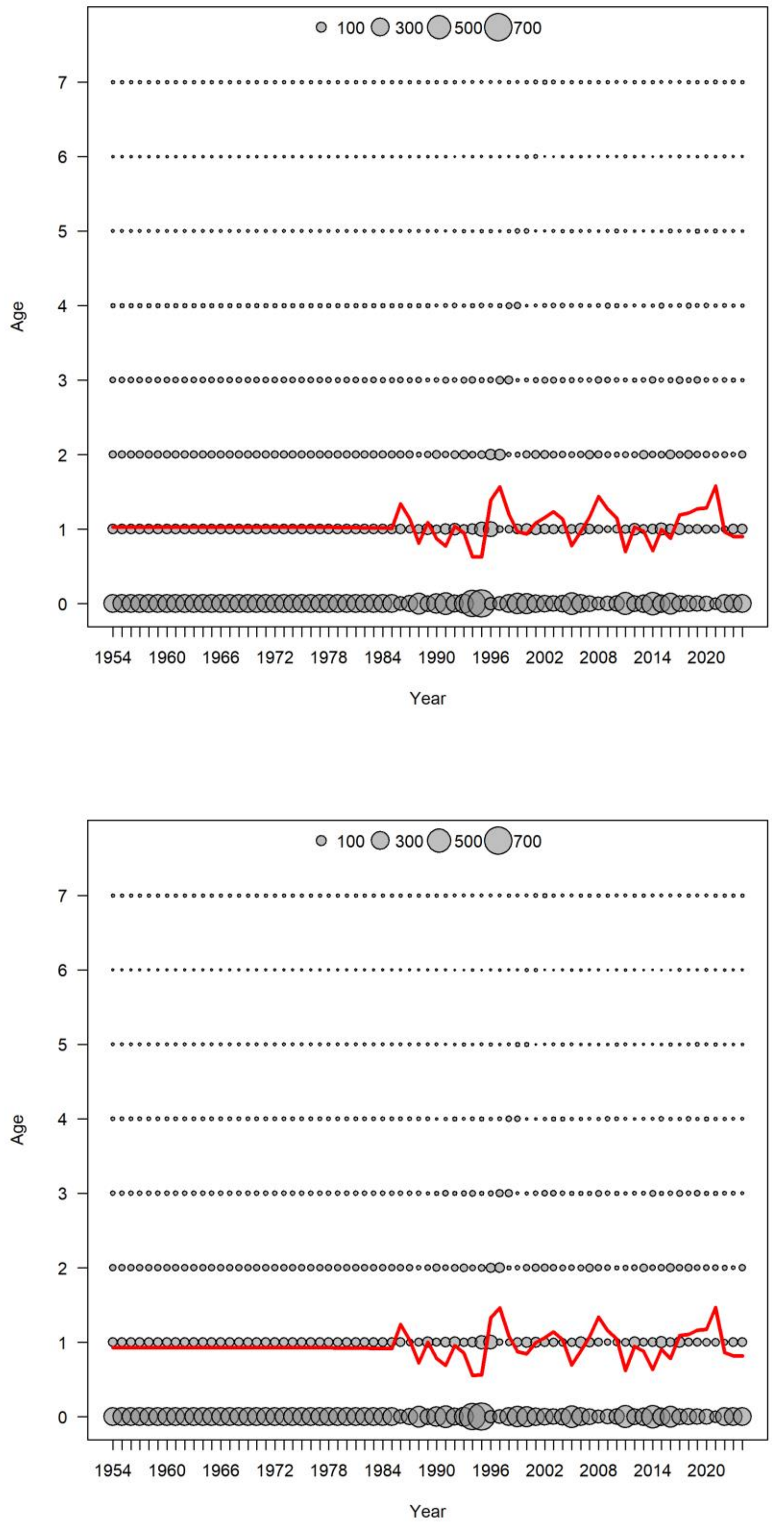


Figure 39: Annual beginning of the year female (top graphic) and male (bottom graphic) abundance at age estimates (bubbles) from the SS3 base model along with annual sex-specific mean age of the stock (red lines).

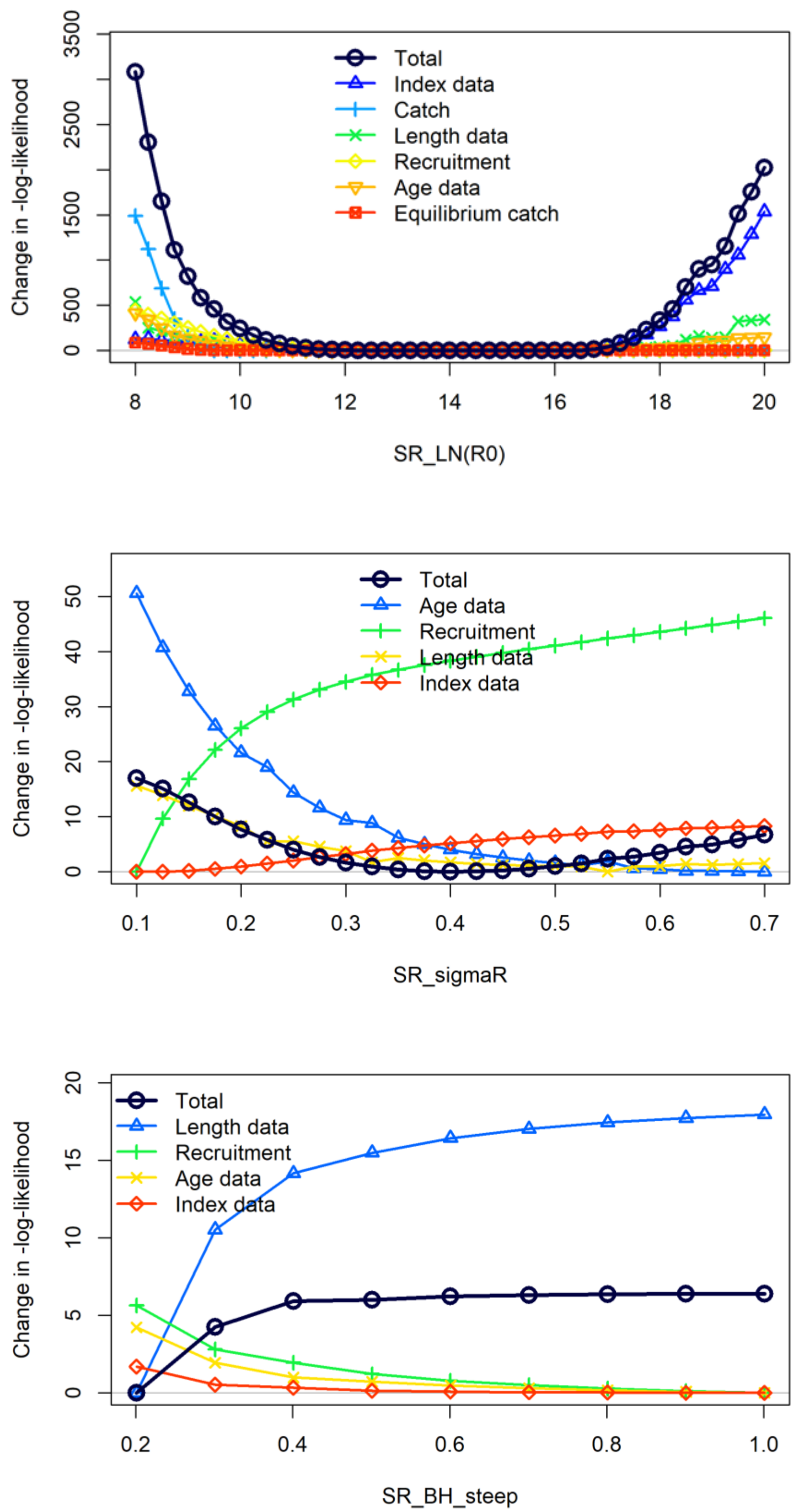


Figure 40: Likelihood profile plots of log-space unfished recruitment (LN_R0), recruitment variance (sigma R), and steepness parameters of the Beverton-Holt stock recruitment function.

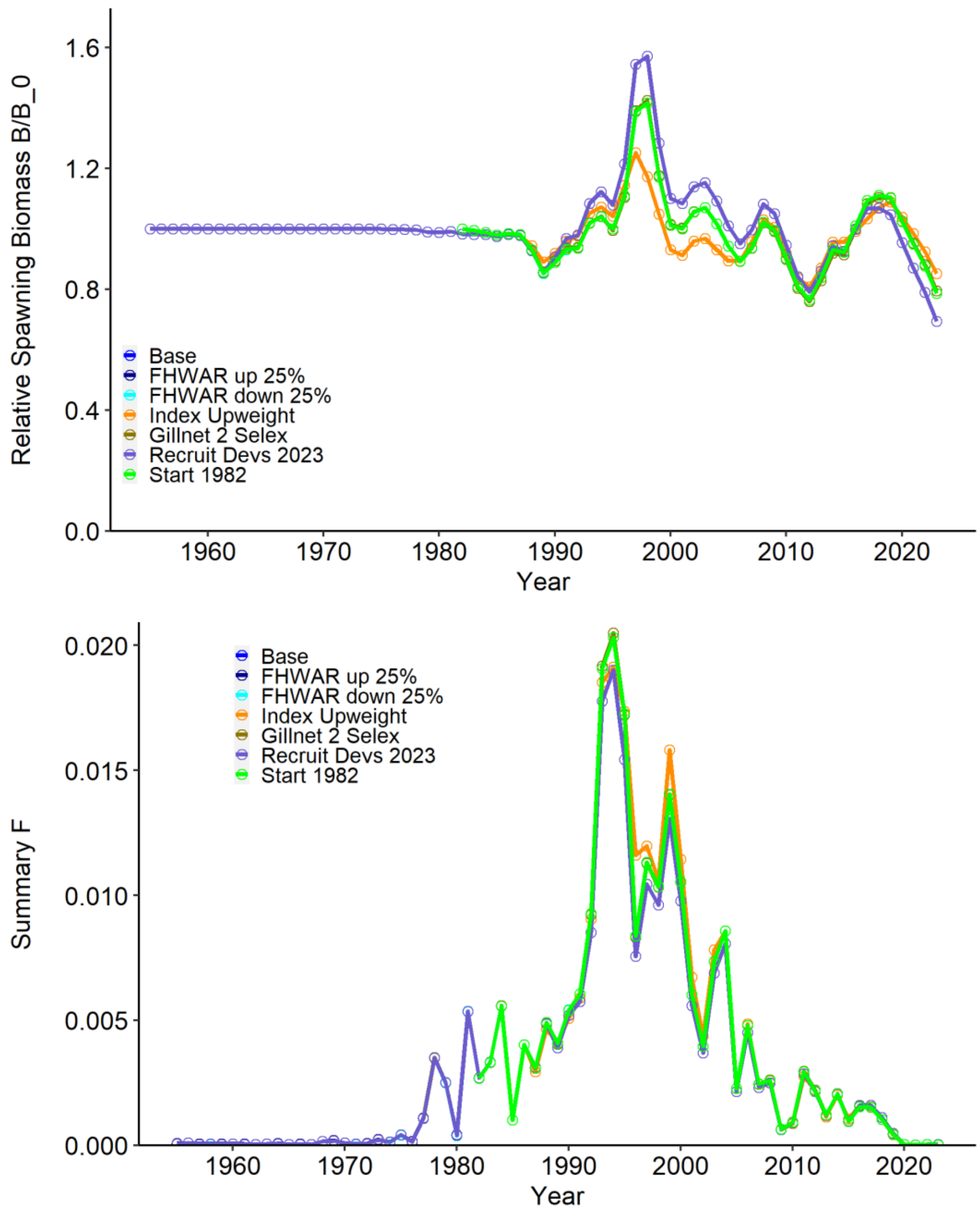


Figure 41: Model runs comparing time series of relative spawning stock biomass, exploitation rates (summary F), and age-0 recruitment estimates of the SS3 base model and sensitivity model runs (FHWAR estimates plus/minus 25%, relative abundance index upweighted, time-vary gillnet survey selectivity, recruitment deviations estimated though the terminal year, and model start year of 1982).

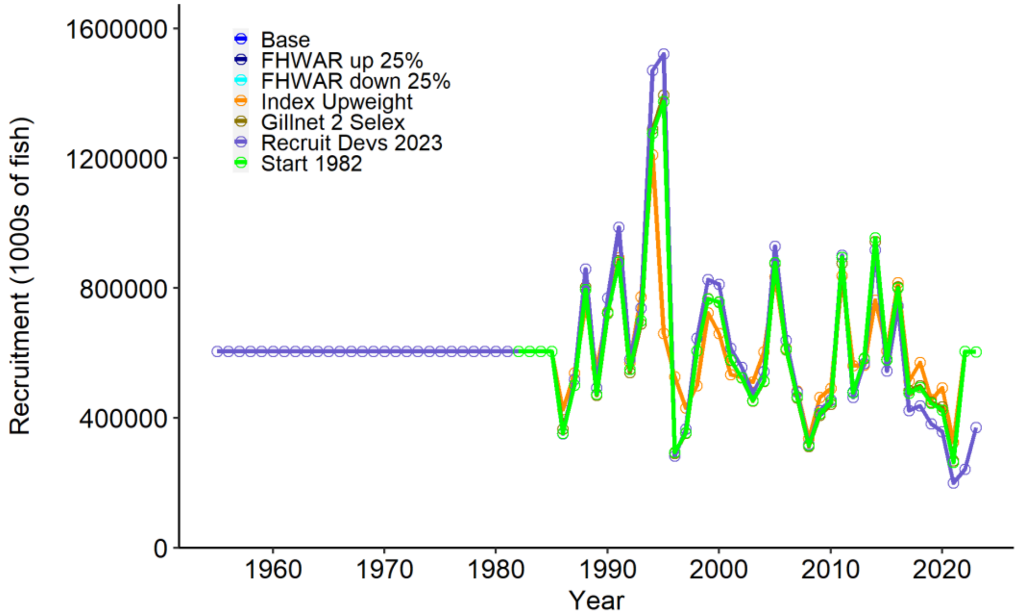


Figure 41 (continued):

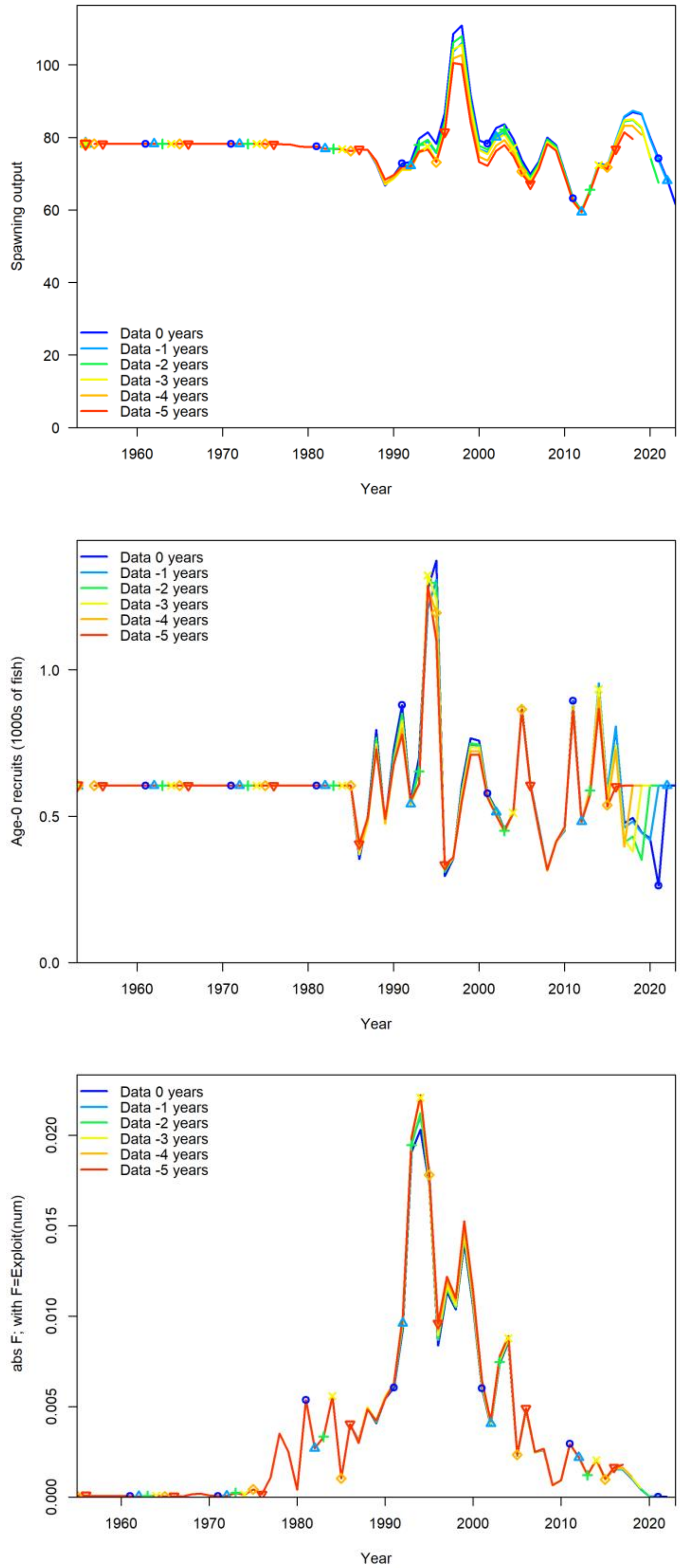


Figure 42: Retrospective analysis of relative spawning biomass, age-0 recruitment, and exploitation rate estimates of the SS3 base model.

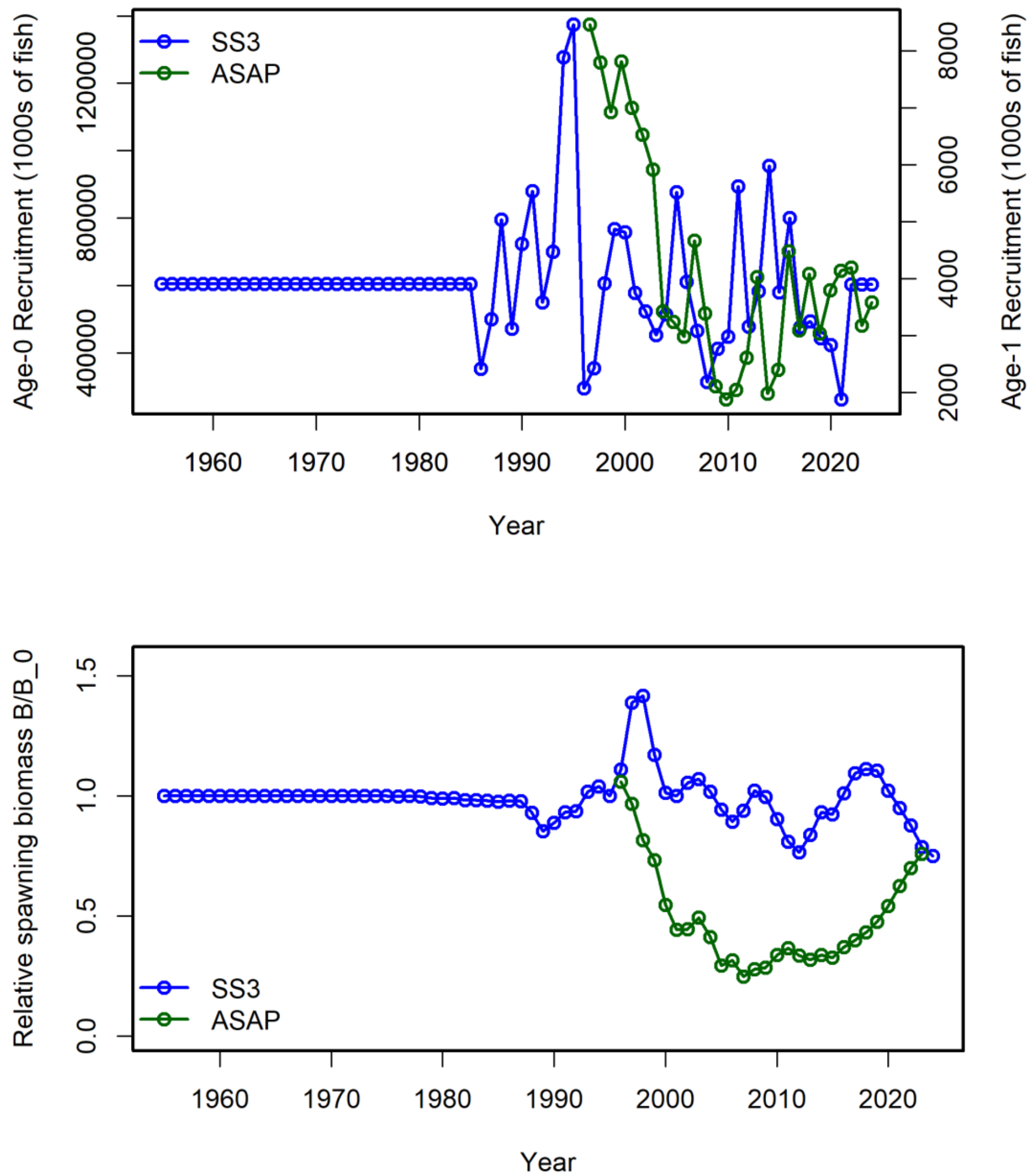


Figure 43: Comparison of the SS3 base model and the ASAP continuity model estimates of recruitment (age-0 in SS3 and age-1 in ASAP), relative spawning stock biomass, and apical fishing mortality rates of the commercial fleet.

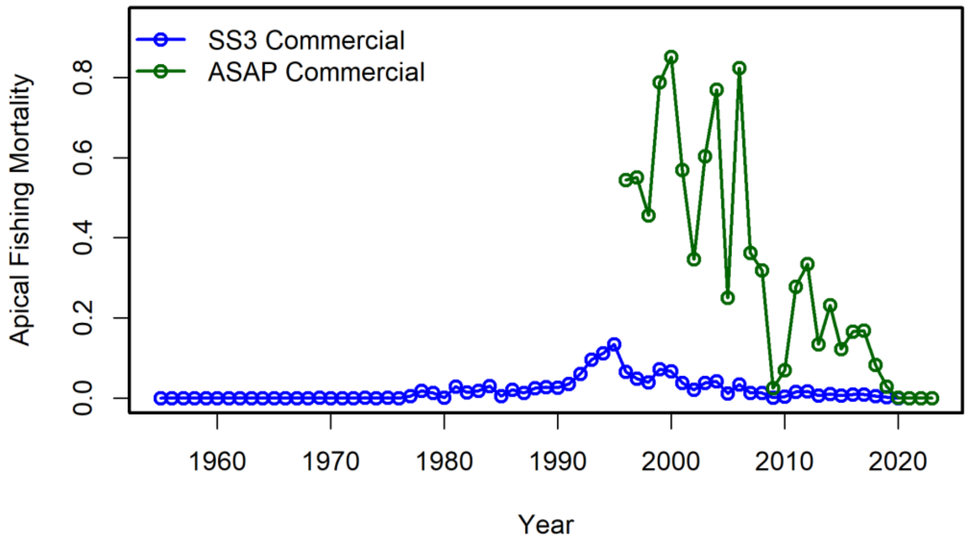


Figure 43 (continued):

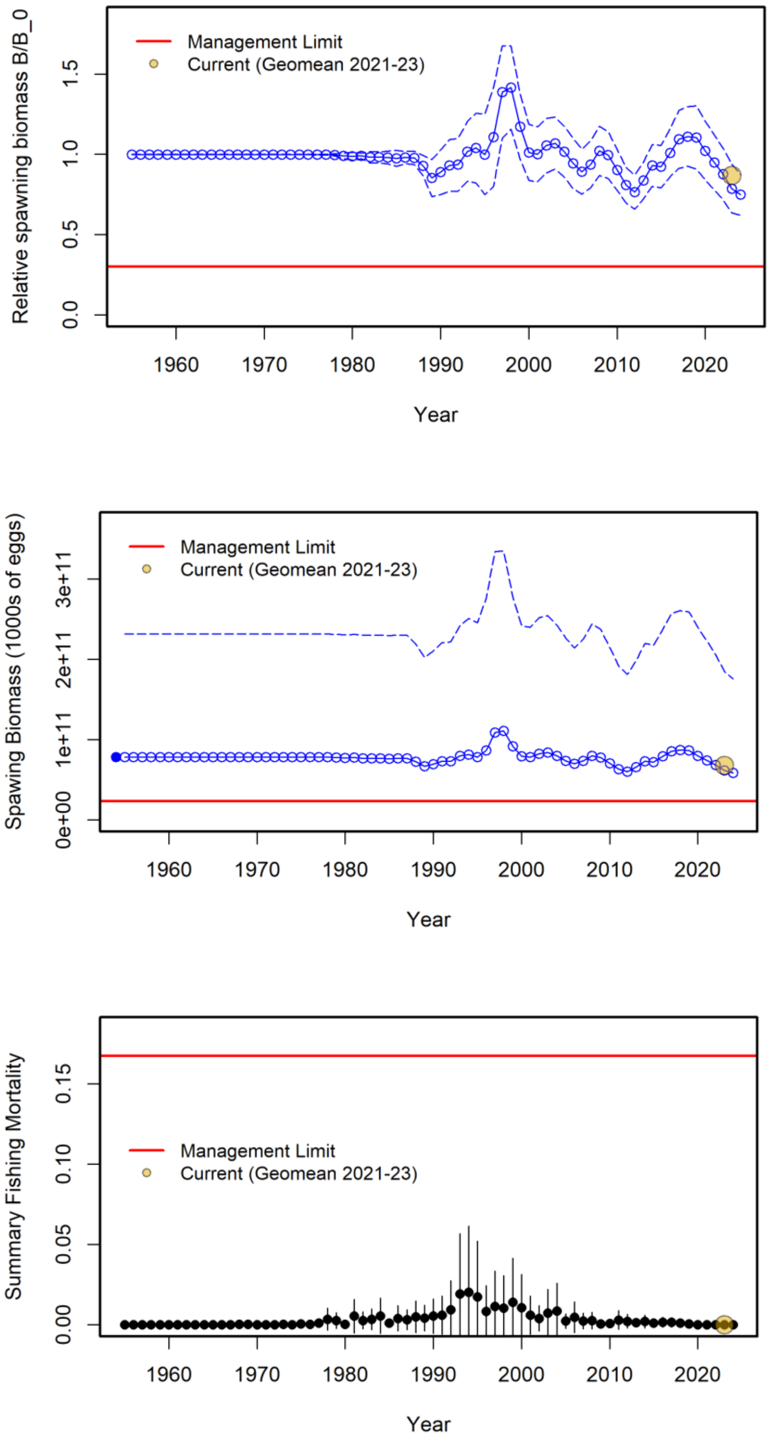


Figure 44: Time series of SS3 base model estimated spawning biomass, spawning potential ratio (relative SSB), and exploitation rates (summary F) relative to the established limit reference point. Current estimates represent the geometric mean of the 2021-2023 estimates.

Appendix 1:

LA Creel/MRIP Calibration Procedure

Joe West and Xinan Zhang
Office of Fisheries
Louisiana Department of Wildlife and Fisheries
Updated 10/29/2020

Overview

The Louisiana Department of Wildlife and Fisheries (LDWF) conducts stock assessments on important recreationally and commercially landed species. Time-series of fishery removals are critical components of these stock assessments as they provide the level of depletion of the resource through time. Beginning in 2014, LDWF started its own creel survey (LA Creel) to provide recreational landings estimates for Louisiana-specific fishery management and stock assessment purposes. Prior to 2014 recreational landings estimates were taken from the National Marine Fisheries Service's Marine Recreational Intercept Program and the earlier Marine Recreational Fisheries Statistical Survey (MRIP/MRFSS). The MRIP and LA Creel surveys were conducted simultaneously in 2015 for benchmarking purposes. Methods are now needed to calibrate MRIP landings estimates to LA Creel landings estimates for species with upcoming LDWF stock assessments.

Abbreviations used in this document:

E - Fishing effort
FM - Fishing mode
- C - charter
- CI - charter inshore
- CO - charter offshore
- P - private
- PI - private inshore (LA Creel)
- PO - private offshore
- PR - private boat (MRIP)
- SH - shore (MRIP)

H - Harvest
HR - Harvest rate
D - Discards
DR – Discard rate
PSE - Percent standard error
R - Ratio
V - Variance
y – Year
w – Bimonthly period
wk – Week of year

Calibration Methodology

A ratio estimator approach is described below allowing hind-casting of LA Creel recreational harvest estimates to 1982. The calibration procedure to hind-cast LA Creel discard estimates is presented in the Appendix of this document. Concurrent harvest rate estimates of LA Creel and MRIP are only available for the single year (2015) both surveys were conducted simultaneously. Effort estimates, however, are available from both surveys for multiple years (2015-2017). The reliability of this calibration procedure could be greatly improved with more comparison years of the surveys.

Note: MRIP private fishing effort is distributed across the various fishing modes (shore, inshore, and offshore) by applying the observed distribution of those modes from the dockside survey. In 2016 and 2017, the MRIP effort estimation process required additional estimations, as the dockside portion of that survey was not conducted in Louisiana. NOAA Fisheries applied the proportions of trips by fishing mode observed in 2015 to the effort data collected in 2016 and 2017 to obtain estimates of angler trips by fishing mode. While this method is clearly not optimal, it does allow comparison of effort over additional years.

The LA Creel survey provides estimates for four fishing modes (FM): private inshore (PI), private offshore (PO), charter inshore (CI), and charter offshore (CO). The MRIP survey provides estimates for five fishing modes: private boat (PR), shore (SH), PO, CI, and CO. For calibration purposes, LA Creel estimates are transformed into a fifth fishing mode equivalent to the MRIP surveys SH mode by separating the PI mode into PR and SH modes. Additionally, the inshore/offshore fishing modes of each survey are collapsed into overall private (P) and charter (C) fishing modes for the species included in this report that support predominantly inshore fisheries.

Fishing effort (E) estimates of the two surveys are calibrated separately by collapsed fishing mode (P and SH only) and bimonthly period (w). Because the charter fishing effort frame used by the LA Creel and MRIP surveys are functionally equivalent, charter fishing effort and corresponding variance estimates of the two surveys are assumed equivalent and not adjusted. Harvest rates and corresponding variance estimates of the MRIP and LA Creel surveys for the species included in this report are also assumed equivalent and not adjusted. Calibrated effort estimates of the shore and private fishing modes are then combined with unadjusted MRIP harvest rate estimates to provide time-series of recreational harvest estimates for species with upcoming LDWF stock assessments as described below.

Fishing Effort

To allow hind-casting of LA Creel effort estimates to the historic MRIP effort time-series, fishing effort calibration factors are calculated as the ratio of mean fishing effort (2015-2017) from each survey by fishing mode (P and SH only) and bimonthly period as:

$$\hat{R}_{E,FM,w} = \frac{\bar{E}_{LAcreel,FM,w}}{\bar{E}_{MRIP,FM,w}} \qquad [1]$$

Note: MRIP effort estimates in Equation [1] are based on the FES and APAIS methodologies.

Survey-specific mean fishing effort (angler trips) and calibration factors for the P and SH fishing modes by bimonthly period are presented below.

FM	w	$\bar{E}_{LAcreel}$	$\bar{E}_{MRIP}$	$\hat{R}_E$
P	1	141,988	760,757	0.187
P	2	229,436	608,036	0.377
P	3	425,433	908,285	0.468
P	4	349,345	1,075,253	0.325
P	5	284,077	935,917	0.304
P	6	277,228	806,998	0.344
SH	1	50,377	753,943	0.067
SH	2	80,580	642,766	0.125
SH	3	151,142	897,938	0.168
SH	4	73,203	1,095,251	0.067
SH	5	105,286	1,228,032	0.086
SH	6	64,342	950,532	0.068

The hind-cast LA Creel fishing effort estimates (1982-2013) are then calculated by fishing mode and bimonthly period as:

$$\hat{E}_{y,w,FM,\hat{R}} = \hat{R}_{E,FM,w}\hat{E}_{y,w,FM,MRIP} \quad [2]$$

Note: MRIP effort estimates in Equation [2] have been calibrated to the FES and APAIS design changes (FCAL).

Variances of the hind-cast LA Creel fishing effort estimates from Equation [2] are approximated by fishing mode and bimonthly period as:

$$\hat{V}\left(\hat{E}_{y,w,FM,\hat{R}}\right) = \hat{E}^2_{y,w,FM,MRIP}\hat{V}\left(\hat{R}_{E,FM,w}\right) + \hat{R}^2_{E,FM,w}\hat{V}\left(\hat{E}_{y,w,FM,MRIP}\right) - \hat{V}\left(\hat{R}_{E,FM,w}\right)\hat{V}\left(\hat{E}_{y,w,FM,MRIP}\right) \quad [3]$$

where

$$\hat{V}\left(\hat{R}_{E,FM,w}\right) = \hat{R}_{E,FM,w}{}^2\left[\frac{\hat{V}(\bar{E}_{LAcreel,FM,w})}{\bar{E}_{LAcreel,FM,w}{}^2} + \frac{\hat{V}(\bar{E}_{MRIP,FM,w})}{\bar{E}_{MRIP,FM,w}{}^2}\right]$$

Harvest

The hind-cast LA Creel harvest estimates (1982-2013) by fishing mode (P and SH only) for the species included in this report are then calculated as:

$$\hat{H}_{y,FM,\hat{R}} = \sum_w \hat{E}_{y,w,FM,\hat{R}}\ \widehat{HR}_{y,w,FM,MRIP} \quad [4]$$

Note: MRIP harvest rate estimates in Equation [4] are FCAL estimates and represent A+ B1 landings only.

Variances of the calibrated harvest estimates are then calculated as:

$$\hat{V}\left(\hat{H}_{y,FM,\hat{R}}\right) = \sum_w \left[\hat{E}_{y,FM,w,\hat{R}}{}^2\hat{V}(\widehat{HR}_{y,FM,w,MRIP}) + \widehat{HR}_{y,FM,w,MRIP}{}^2\hat{V}\left(\hat{E}_{y,FM,w,\hat{R}}\right) - \hat{V}\left(\hat{E}_{y,FM,w,\hat{R}}\right)\hat{V}(\widehat{HR}_{y,FM,w,MRIP})\right] \quad [5]$$

Percent standard errors of the calibrated harvest estimates are then calculated as:

$$PSE\left(\hat{H}_{y,FM,\hat{R}}\right) = 100 \times \frac{\sqrt{\hat{V}\left(\hat{H}_{y,FM,\hat{R}}\right)}}{\hat{H}_{y,FM,\hat{R}}} \quad [6]$$

The MRIP (FCAL) and hind-cast LA Creel harvest estimate time-series and corresponding PSEs by fishing mode for species with upcoming LDWF stock assessments are presented belo

FM = Private

Year	Black Drum				Red Drum				Sheepshead				Southern Flounder				Spotted Seatrout			
	MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel	
	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE
1982	1,106,821	27.1	426,166	31.2	3,046,664	12.0	925,323	21.4	511,387	34.3	184,011	40.4	497,263	19.5	190,801	23.4	9,160,786	16.2	3,111,188	23.8
1983	1,659,509	34.3	595,673	38.8	4,758,470	32.7	1,542,955	41.7	1,064,824	38.1	334,974	43.8	1,929,817	51.4	610,002	58.6	7,402,179	20.0	2,660,990	25.0
1984	362,104	26.0	138,699	29.8	2,976,458	38.9	960,611	40.8	548,364	47.5	176,510	39.5	213,064	23.0	73,394	28.5	2,503,426	29.8	790,913	33.0
1985	356,406	30.0	115,179	34.5	2,563,074	14.5	865,588	21.9	340,142	32.1	114,127	35.8	431,284	24.5	150,115	27.3	5,947,072	15.2	2,109,649	22.2
1986	918,541	24.1	317,533	28.9	2,635,843	10.0	843,830	21.1	252,644	15.5	84,282	23.6	1,464,132	48.5	483,555	47.8	14,077,720	7.8	4,947,892	16.4
1987	683,049	25.6	237,415	30.7	2,602,974	23.0	876,900	30.6	270,702	33.7	87,926	33.0	147,601	25.2	52,016	27.6	11,023,715	10.1	4,035,139	15.6
1988	344,681	15.4	115,234	22.3	1,160,955	20.2	349,965	26.3	277,793	21.3	90,608	28.5	358,099	13.2	123,628	18.1	6,890,452	14.3	2,511,864	21.3
1989	227,336	20.4	76,002	25.3	2,015,801	12.6	676,453	24.5	789,892	49.3	254,087	50.2	341,489	25.9	111,900	29.0	8,082,318	11.9	2,753,203	18.0
1990	231,168	22.9	79,940	26.9	1,469,547	16.8	481,003	25.0	270,726	27.1	104,809	31.1	805,964	23.6	264,106	26.8	4,881,711	13.7	1,640,863	21.0
1991	183,005	19.4	62,265	26.3	1,824,768	20.0	582,125	33.1	402,935	32.6	138,862	35.4	694,466	16.1	248,442	20.6	13,468,560	9.9	4,744,596	18.2
1992	333,217	23.9	119,606	28.4	2,807,145	8.7	936,586	15.5	563,816	25.3	182,360	27.9	615,928	14.6	217,218	17.6	10,680,755	9.3	3,584,240	20.0
1993	246,588	17.6	88,970	24.2	2,581,130	9.9	880,530	16.3	885,380	26.7	320,661	35.5	500,023	14.8	175,907	18.0	7,757,436	12.1	2,655,102	18.2
1994	234,272	16.9	79,717	24.5	2,311,786	9.5	778,462	16.4	508,883	17.8	170,439	24.2	578,264	21.0	216,551	26.3	10,418,883	10.5	3,481,640	17.6
1995	335,507	18.4	109,385	22.1	3,842,177	8.7	1,269,660	19.6	920,809	20.4	274,232	26.3	398,528	14.0	146,807	19.4	12,135,672	13.2	3,937,329	27.0
1996	414,798	12.9	137,386	20.9	3,197,497	9.0	1,120,688	16.0	760,607	21.7	243,914	29.8	416,737	11.4	148,322	15.5	10,306,475	11.3	3,488,899	20.1
1997	477,705	16.1	161,196	20.3	2,861,918	9.6	987,223	16.3	1,005,406	18.2	318,972	22.9	445,579	11.7	155,574	18.2	10,415,118	11.9	3,599,696	17.9
1998	920,933	14.6	311,906	20.5	2,762,600	8.0	955,164	15.1	1,138,280	15.6	358,340	25.5	393,018	13.8	148,318	18.2	10,005,379	8.7	3,578,852	18.8
1999	681,905	11.9	236,111	18.6	3,459,681	6.9	1,208,361	14.4	793,093	16.2	246,697	26.4	758,946	10.4	272,110	16.0	14,037,235	8.5	4,731,081	18.3
2000	1,017,717	12.8	352,152	18.8	4,249,272	6.9	1,474,223	16.0	769,653	28.0	246,219	34.0	670,295	13.3	246,882	18.4	15,977,551	7.7	5,264,946	19.6
2001	765,815	13.7	259,288	20.5	4,322,843	7.7	1,456,752	14.4	567,945	15.8	193,751	22.4	427,914	12.2	155,260	16.0	12,618,114	8.0	4,269,752	15.9
2002	908,616	12.6	315,701	19.5	3,445,574	8.2	1,168,322	15.9	1,249,437	18.7	408,449	30.9	443,758	18.8	173,052	23.0	9,816,916	10.3	3,441,381	16.8
2003	659,209	14.7	229,521	22.3	2,977,090	7.4	1,014,320	17.2	1,257,175	23.2	396,409	28.7	647,034	15.7	250,097	18.7	10,528,223	9.6	3,662,095	20.0
2004	546,776	12.0	183,643	18.3	2,605,118	8.1	898,352	15.2	1,722,589	24.9	586,483	33.7	408,006	12.6	148,846	17.3	9,728,915	10.5	3,334,545	18.8
2005	461,775	13.0	156,509	21.3	2,236,920	9.4	772,472	15.8	962,130	23.6	302,340	30.7	286,521	12.9	108,654	15.8	10,699,116	8.5	3,616,229	17.8
2006	354,910	14.3	117,386	19.2	2,385,907	10.7	812,152	16.3	430,504	25.3	125,365	32.5	285,429	11.9	98,401	15.3	13,779,620	8.7	5,016,008	16.0
2007	415,104	15.7	142,698	18.7	3,049,990	8.3	1,045,909	15.6	320,952	21.9	95,855	25.9	355,606	19.0	123,052	23.8	11,790,003	8.3	3,967,935	18.2
2008	668,820	12.8	224,335	20.6	3,336,041	7.9	1,155,421	14.9	623,988	17.6	205,809	26.8	239,893	10.9	88,186	16.8	15,551,638	9.5	5,347,885	19.1
2009	908,297	13.6	308,638	19.6	3,414,547	8.2	1,187,696	16.4	1,055,358	22.6	315,386	32.0	398,573	14.6	140,011	19.7	15,667,348	8.8	5,452,613	16.8
2010	697,188	14.5	231,949	19.1	5,128,842	8.0	1,797,454	14.5	753,414	22.4	261,214	29.3	571,870	14.4	214,026	18.3	14,465,717	10.7	4,974,270	23.5
2011	679,614	15.1	232,721	20.6	4,548,266	8.3	1,584,573	14.9	1,425,042	35.5	525,042	44.9	544,173	14.7	198,755	17.6	17,697,003	9.6	5,977,076	18.1
2012	694,257	12.8	241,481	18.1	3,458,029	8.8	1,210,182	15.5	577,843	16.7	175,722	24.4	524,259	14.8	184,915	17.5	17,938,248	8.9	6,201,433	19.0
2013	528,084	14.3	172,534	20.4	4,523,043	8.7	1,512,033	15.4	311,155	16.9	95,381	24.0	930,394	13.1	317,618	25.0	12,928,606	9.4	4,374,563	17.4

FM = Shore

	Black Drum				Red Drum				Sheepshead				Southern Flounder				Spotted Seatrout			
	MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel	
Year	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE	Harvest	PSE
1982	880,444	22.8	113,540	38.2	2,388,907	23.1	293,698	36.1	676,628	29.0	66,012	30.5	834,940	21.4	103,180	36.3	2,787,818	23.5	296,866	35.0
1983	500,922	29.9	62,566	38.0	1,351,640	25.0	123,385	34.4	2,326,172	25.9	276,981	40.7	327,205	34.7	31,100	37.4	2,927,094	47.2	258,452	45.3
1984	536,866	34.1	51,163	46.2	660,866	35.0	57,459	34.8	987,229	41.9	85,083	40.5	112,657	45.9	9,755	45.9	331,308	40.5	32,117	42.3
1985	181,986	27.0	16,397	32.7	618,693	30.8	46,417	33.4	656,976	30.2	51,856	35.9	284,046	29.1	23,081	33.1	500,629	27.9	43,400	33.5
1986	469,638	52.0	39,289	48.9	243,647	45.9	18,934	47.8	782,112	81.2	57,566	79.5	189,325	42.5	18,019	48.7	1,815,727	55.4	142,905	52.4
1987	260,971	52.0	26,358	51.9	665,407	54.3	49,467	55.0	65,880	46.2	4,878	52.4	185,090	37.3	14,954	38.7	965,130	44.3	112,992	58.7
1988	429,974	36.6	48,607	46.1	237,418	45.6	18,170	48.4	662,260	57.5	57,664	53.5	90,283	40.5	8,305	40.6	398,803	39.6	41,221	48.1
1989	484,955	58.2	47,183	67.1	472,062	35.4	45,444	43.7	179,471	40.2	16,156	43.5	127,388	33.6	12,077	38.8	402,794	68.4	30,056	67.0
1990	122,352	47.4	15,821	63.4	627,617	29.6	54,607	36.3	80,673	46.7	7,631	52.3	238,834	24.9	22,144	31.2	1,178,966	28.6	120,340	42.6
1991	80,287	38.8	7,830	45.0	497,827	35.7	39,572	39.7	109,726	43.1	8,166	45.0	617,776	26.6	69,562	37.3	1,611,329	29.8	190,451	48.5
1992	266,722	39.0	24,559	43.7	535,731	21.7	57,486	31.8	1,470,811	61.9	111,109	64.6	197,948	31.2	17,703	32.4	1,622,752	18.8	160,534	25.9
1993	332,409	38.4	32,083	46.0	1,058,829	26.2	102,231	30.1	438,233	37.3	34,539	38.3	152,286	34.8	14,994	35.2	1,262,891	19.3	139,848	32.3
1994	111,090	26.4	12,000	35.3	973,065	30.5	86,198	33.8	339,821	55.8	27,751	51.7	245,182	26.2	26,246	30.4	2,585,733	32.7	225,016	34.0
1995	122,762	40.4	10,791	37.0	747,219	23.9	61,587	28.3	338,135	43.2	33,177	41.4	56,558	30.7	5,970	40.2	1,432,447	21.4	141,769	30.2
1996	529,054	58.3	42,278	55.7	864,227	22.6	85,059	27.2	682,583	41.1	54,497	42.0	134,402	31.1	14,417	42.1	2,327,551	27.4	272,968	42.0
1997	123,564	39.8	14,500	55.8	347,632	21.5	33,897	27.2	283,171	25.4	28,012	31.1	307,330	23.1	31,614	33.0	1,905,584	21.5	196,046	32.0
1998	86,575	34.3	11,850	53.2	397,083	31.2	39,546	33.4	450,254	36.2	34,658	37.6	128,645	26.4	15,533	39.9	2,415,887	30.1	316,704	52.1
1999	385,329	39.6	34,484	42.0	492,350	25.7	58,215	38.6	202,445	35.8	17,647	34.4	641,276	32.9	57,671	36.5	3,530,688	27.9	302,816	33.9
2000	625,217	26.3	55,444	30.4	822,698	21.3	74,515	25.1	202,744	52.7	18,710	49.9	136,953	43.0	13,647	44.9	2,697,901	36.0	235,416	36.6
2001	675,474	30.1	74,021	37.8	621,324	23.2	56,647	29.7	399,908	49.4	46,027	53.6	305,296	67.4	40,328	72.5	2,657,545	28.5	284,780	35.3
2002	399,178	23.6	39,488	28.7	945,520	31.8	86,759	37.0	872,663	35.4	77,666	40.1	323,826	31.2	35,596	40.3	923,988	31.5	104,622	40.0
2003	288,546	23.4	29,030	28.5	280,366	33.2	26,439	34.2	983,844	36.8	108,655	37.5	199,400	38.3	17,629	37.0	945,730	42.3	70,559	43.3
2004	137,240	36.0	13,664	36.9	559,991	19.0	53,877	26.8	603,693	36.9	49,237	39.0	395,552	36.1	39,848	47.2	1,303,971	45.1	186,126	62.8
2005	138,758	28.0	13,443	36.2	704,981	30.9	57,698	36.6	563,322	29.6	52,206	36.7	450,207	38.7	35,117	45.5	632,798	30.7	54,561	34.2
2006	261,544	30.8	25,308	39.5	389,280	25.4	35,566	35.1	593,305	31.2	44,987	35.3	335,766	29.1	34,011	31.9	788,193	22.7	75,533	29.7
2007	286,213	35.5	28,210	37.6	187,726	25.1	17,832	35.4	257,091	36.2	27,901	42.7	348,752	28.0	38,995	36.9	771,812	27.5	84,196	35.4
2008	247,234	25.5	22,539	32.8	374,463	27.9	30,507	30.4	1,396,084	30.3	113,710	33.3	260,865	36.4	23,363	33.9	1,140,758	33.3	131,023	47.6
2009	100,842	26.9	10,221	33.5	123,122	28.0	12,120	33.8	523,105	46.9	62,220	56.4	470,681	44.6	39,588	45.3	611,298	25.2	62,519	33.2
2010	184,668	41.2	16,865	42.9	531,708	32.4	50,704	34.5	561,648	40.1	46,001	39.1	94,348	29.4	8,854	31.9	584,064	43.3	45,383	43.2
2011	380,669	21.7	36,537	27.0	983,461	22.1	96,717	27.3	1,318,064	44.8	124,632	55.1	430,717	40.0	39,973	40.9	651,281	27.8	67,792	37.1
2012	283,508	22.6	26,638	30.9	279,299	36.1	23,109	38.3	695,553	42.6	54,144	43.8	155,170	30.6	15,176	33.3	727,577	29.5	80,824	39.4
2013	471,823	13.0	36,871	21.6	849,762	9.3	80,731	27.2	659,450	12.4	48,095	25.1	573,922	18.3	51,029	30.3	2,682,372	11.4	241,359	21.8

Appendix (Discard Hindcast):

A ratio estimator approach is described below allowing hind-casting of LA Creel recreational discard estimates to 1982. Concurrent discard estimates of the LA Creel and MRIP surveys are not available.

Analogous to the procedure to hind-cast LA Creel harvest estimates, the hind-cast LA Creel effort estimates of the shore and private fishing modes are combined with unadjusted MRIP discard rate estimates to provide time-series of recreational discard estimates for species with upcoming LDWF stock assessments as described below. Discard estimates of the charter fishing mode for the LA Creel and MRIP surveys are assumed equivalent and not adjusted.

Discards (1982-2013)

The hind-cast LA Creel discard estimates (1982-2013) are calculated by collapsed fishing mode (P and SH only) and bimonthly period as:

$$\widehat{D}_{y,FM,\hat{R}} = \sum_{w} \hat{E}_{y,w,FM,\hat{R}} \, \widehat{DR}_{y,w,FM,MRIP} \quad [1a]$$

Note: MRIP discard rate estimates in Equation [1a] are FCAL estimates and represent B2 landings only. The calibrated effort estimates are taken from Equation [2].

Variances of the calibrated discard estimates from Equation [1a] are then calculated as:

$$\hat{V}\left(\widehat{D}_{y,FM,\hat{R}}\right) = \sum_{w} \left[\hat{E}_{y,FM,w,\hat{R}}{}^{2} \hat{V}(\widehat{DR}_{y,FM,w,MRIP}) + \widehat{DR}_{y,FM,w,MRIP}{}^{2} \hat{V}\left(\hat{E}_{y,FM,w,\hat{R}}\right) - \hat{V}\left(\hat{E}_{y,FM,w,\hat{R}}\right) \hat{V}(\widehat{DR}_{y,FM,w,MRIP}) \right] \quad [2a]$$

Percent standard errors of the calibrated discard estimates are then calculated as:

$$PSE\left(\widehat{D}_{y,FM,\hat{R}}\right) = 100 \times \frac{\sqrt{\hat{V}\left(\widehat{D}_{y,FM,\hat{R}}\right)}}{\widehat{D}_{y,FM,\hat{R}}} \quad [3a]$$

Discards (2014-2016)

Discard estimates of the LA Creel survey are only available from week 19 of 2016 to present. Discard estimates prior to week 19 of 2016 are imputed by fishing mode (P, SH, and C) and week of year (wk) by calculating discard to harvest ratios from the LA Creel estimates from week 19 of 2016 to week 18 of 2017 as:

$$\hat{R}_{D/H,FM,wk} = \frac{\widehat{D}_{LAcreel,FM,wk}}{\widehat{H}_{LAcreel,FM,wk}} \quad [4a]$$

The imputed LA Creel discard estimates are then calculated by fishing mode from week 1 of 2014 to week 18 of 2016 as:

$$\widehat{D}_{y,wk,FM,\hat{R}_{D/H}} = \hat{R}_{D/H,FM,wk} \widehat{H}_{y,wk,FM,LAcreel} \quad [5a]$$

Variances of the imputed LA Creel discard estimates from Equation [5a] are approximated by fishing mode and week of year as:

$$\hat{V}\left(\hat{D}_{y,wk,FM,\hat{R}_{D/H}}\right) = \hat{H}^2_{y,wk,FM,LAcreel}\hat{V}\left(\hat{R}_{D/H,FM,wk}\right) + \hat{R}^2_{D/H,FM,wk}\hat{V}\left(\hat{H}_{y,wk,FM,LAcreel}\right) - \hat{V}\left(\hat{R}_{D/H,FM,wk}\right)\hat{V}\left(\hat{H}_{y,wk,FM,LAcreel}\right) \qquad [6a]$$

where

$$\hat{V}\left(\hat{R}_{D/H,FM,wk}\right) = \hat{R}_{D/H,FM,wk}{}^2\left[\frac{\hat{V}(\hat{D}_{LAcreel,FM,wk})}{\hat{D}_{LAcreel,FM,wk}{}^2} + \frac{\hat{V}(\hat{H}_{LAcreel,FM,wk})}{\hat{H}_{LAcreel,FM,wk}{}^2}\right]$$

The MRIP (FCAL) and hind-cast/imputed LA Creel discard estimate annual time-series and corresponding PSEs by fishing mode for species with upcoming LDWF stock assessments are presented below.

FM = Private

	Black Drum				Red Drum				Sheepshead				Southern Flounder				Spotted Seatrout			
	MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel	
Year	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE
1982	818,734	54.5	345,860	60.5	274,870	40.0	94,664	41.5	515,459	44.8	200,681	47.1	1,083,668	45.5	415,439	50.2	1,654,868	35.7	609,681	39.2
1983	671,251	47.1	224,549	50.1	793,805	34.3	265,412	40.0	833,079	71.7	268,324	76.4	145,644	54.4	50,553	55.2	2,092,864	42.4	754,795	47.4
1984	284,254	68.2	93,240	65.6	346,317	56.3	111,489	56.2	309,986	35.6	93,467	45.2	65,411	64.9	21,520	65.9	197,040	21.8	64,439	30.9
1985	291,106	38.5	95,314	41.4	243,413	40.1	91,863	46.5	317,951	28.8	109,302	37.0	61,785	68.0	19,987	66.6	1,709,137	23.1	579,765	29.5
1986	448,236	20.4	152,135	27.7	451,777	15.3	162,385	19.5	393,569	19.8	127,427	29.5	367,830	40.1	162,331	43.1	4,745,760	10.2	1,630,190	19.8
1987	300,153	41.9	93,694	44.6	2,360,122	24.5	759,753	32.9	210,127	21.2	74,868	25.8	10,809	42.4	4,341	46.5	6,980,249	12.7	2,367,280	21.1
1988	350,541	21.1	118,251	29.1	3,062,822	16.2	1,010,542	22.4	398,058	25.6	135,054	32.6	375,399	58.9	119,109	60.9	5,610,284	10.4	2,077,053	16.1
1989	228,012	35.0	75,276	40.5	2,998,273	20.9	986,135	30.8	483,464	37.6	174,497	44.9	260,401	93.8	84,574	91.5	5,656,036	14.2	1,879,166	20.3
1990	653,511	28.7	214,860	36.2	1,880,922	19.7	575,989	24.4	408,363	25.1	146,133	30.3	334,821	40.3	107,726	42.4	4,750,794	18.0	1,566,570	24.0
1991	389,398	26.0	130,884	32.2	7,412,013	11.2	2,413,187	27.7	272,267	26.1	100,654	28.7	114,636	37.5	35,343	33.6	12,341,402	9.3	4,316,171	17.6
1992	559,417	33.2	179,758	38.0	5,753,237	9.1	1,845,345	17.5	440,289	16.8	142,247	23.5	42,988	21.4	14,876	24.2	8,795,484	8.4	2,994,762	16.4
1993	710,873	18.2	235,327	23.6	4,143,002	11.2	1,394,760	19.0	758,778	20.8	261,093	28.4	45,686	33.2	16,234	35.7	6,905,906	11.3	2,294,599	17.5
1994	440,825	29.8	144,491	33.2	4,086,816	12.5	1,292,596	19.6	608,190	19.3	200,928	25.0	34,050	29.6	11,832	31.0	7,780,829	9.7	2,545,253	17.4
1995	816,070	17.5	288,067	20.8	4,248,542	15.4	1,356,682	22.3	558,424	25.6	180,589	31.0	59,357	34.4	21,731	33.3	7,603,172	11.0	2,469,940	22.8
1996	525,560	20.4	180,919	27.4	3,312,106	11.9	1,066,067	18.3	878,282	23.1	280,982	30.9	80,897	23.0	28,339	27.1	8,055,743	10.2	2,790,011	17.6
1997	1,057,203	18.5	357,381	27.0	5,150,476	11.3	1,623,792	20.9	1,138,193	23.4	388,364	33.4	98,494	29.1	33,249	32.9	10,917,063	19.7	3,714,497	25.0
1998	1,439,547	24.7	488,061	28.2	5,753,271	10.8	1,852,465	18.5	1,056,926	17.9	341,063	28.4	99,007	29.1	32,096	32.3	9,977,400	9.3	3,525,435	17.2
1999	820,371	13.6	272,222	19.4	5,477,613	9.4	1,855,481	17.3	699,825	18.9	218,048	29.4	84,447	20.8	29,392	26.0	11,688,515	8.8	3,900,534	18.2
2000	1,833,450	16.2	636,903	21.0	6,018,948	8.2	2,015,680	18.4	586,993	21.9	204,594	28.9	121,790	28.3	37,513	29.7	11,091,619	7.9	3,696,143	17.1
2001	1,781,293	17.4	641,432	22.0	6,184,966	9.5	1,893,106	18.7	816,650	16.4	289,672	22.4	88,936	21.8	33,827	26.2	7,365,829	11.2	2,385,033	19.6
2002	1,670,431	17.1	549,754	23.8	6,266,166	10.8	2,051,328	21.1	854,311	17.0	278,770	22.5	90,982	26.1	32,596	28.9	6,778,238	11.5	2,325,982	18.2
2003	1,172,837	17.8	408,312	22.5	5,286,909	10.2	1,707,282	22.5	930,576	20.8	286,148	31.2	172,327	23.4	67,664	27.1	10,682,302	9.5	3,656,768	20.8
2004	1,155,649	17.0	384,622	24.5	3,841,642	10.1	1,251,295	17.5	701,938	19.9	253,961	27.9	149,844	27.6	53,175	29.8	9,847,326	11.5	3,329,014	17.7
2005	954,552	24.2	324,774	29.3	3,505,968	11.8	1,125,035	19.3	770,173	15.0	252,100	25.9	87,557	25.3	31,613	26.7	10,903,988	9.7	3,699,324	17.6
2006	699,933	16.3	227,542	20.8	4,124,647	11.7	1,352,670	19.7	616,668	30.1	179,470	34.3	41,784	27.7	14,147	30.4	11,930,250	9.1	4,253,200	16.1
2007	818,643	15.4	279,976	19.3	4,630,404	11.5	1,534,744	20.7	308,039	21.2	101,638	25.6	78,231	25.8	28,165	30.1	9,924,934	8.4	3,345,776	18.0
2008	1,320,182	14.8	447,658	22.4	5,074,358	8.1	1,704,655	15.5	609,401	23.6	193,005	30.6	50,063	26.0	17,325	28.4	13,158,192	9.4	4,628,268	17.0
2009	1,788,575	14.5	598,396	22.8	6,242,208	9.6	2,046,201	20.1	744,464	19.5	224,182	27.5	89,961	28.4	32,910	34.0	13,919,234	10.0	4,655,798	17.8
2010	1,813,254	14.9	636,963	18.6	7,335,948	10.2	2,585,291	15.8	711,836	21.9	248,894	26.2	111,912	23.5	40,129	23.3	9,190,616	12.6	3,180,901	22.2
2011	1,390,360	14.9	475,469	19.2	4,744,947	9.7	1,532,673	16.4	259,735	17.7	86,064	22.2	85,027	24.1	31,745	26.9	10,091,732	9.5	3,443,856	16.2
2012	1,136,427	13.3	373,501	18.6	5,374,152	8.9	1,776,461	17.9	422,968	13.4	136,234	19.8	152,363	24.3	53,417	25.2	13,175,745	8.7	4,524,702	18.2
2013	1,709,164	12.2	586,398	18.1	6,088,863	9.9	2,013,792	17.0	398,767	14.8	130,785	21.7	197,844	21.3	72,578	23.8	13,404,945	10.3	4,608,071	16.5
2014			330,955	24.0			1,609,006	11.8			148,454	38.3			44,345	56.6			2,316,191	11.3
2015			295,893	21.4			1,486,227	10.3			98,800	30.3			30,296	41.4			3,440,509	12.3
2016			161,733	21.0			1,096,370	6.4			47,135	25.6			29,612	24.3			3,643,636	8.6

FM = Shore																				
	Black Drum				**Red Drum**				**Sheepshead**				**Southern Flounder**				**Spotted Seatrout**			
	MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel	
Year	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE
1982	149,995	64.4	19,897	80.7	364,343	26.2	52,316	41.6	89,674	57.7	11,246	70.6	128,975	30.5	15,915	45.2	386,524	48.1	49,802	62.2
1983	69,276	40.0	6,493	59.5	15,283	79.9	1,470	73.4	25,959	61.6	2,914	58.8					7,794	83.8	1,361	89.1
1984	285,887	32.0	20,494	39.5	83,103	84.6	5,758	89.8	12,248	103.2	2,139	105.1	3,384	99.3	319	100.5	59,529	52.1	4,864	50.1
1985	138,851	42.9	12,304	55.2	32,336	53.0	2,919	51.6	155,985	38.0	11,628	41.9	12,292	79.8	881	80.3	603,943	44.5	47,922	44.9
1986	107,212	49.6	7,822	51.3	19,379	65.3	1,723	60.3	473,615	72.5	34,777	72.6	11,853	75.8	1,010	78.1	267,044	41.3	22,713	38.7
1987	102,949	71.9	8,596	74.4	352,180	47.9	26,897	48.2	36,133	89.7	3,410	94.8	13,517	87.5	1,198	89.8	642,898	37.9	64,120	42.0
1988	185,774	51.5	16,072	60.9	329,574	30.8	28,447	35.6	116,937	36.7	10,973	40.9	7,726	52.0	616	56.8	205,385	41.4	24,387	50.9
1989	61,484	38.9	5,723	46.1	1,080,247	72.5	128,194	83.5	115,300	39.3	11,720	45.4	49,549	66.9	3,586	66.6	311,869	36.9	27,571	40.1
1990	96,587	44.0	13,477	59.9	327,612	37.7	28,235	45.2	18,485	89.3	1,318	92.6	783,955	82.6	72,564	86.6	736,838	34.5	65,803	38.9
1991	237,878	30.6	24,906	36.8	1,544,560	43.0	124,239	43.5	207,958	30.7	14,829	39.1	91,471	44.6	10,241	47.2	1,902,261	22.7	219,559	37.7
1992	860,902	31.0	76,139	32.3	1,833,394	25.8	167,249	28.7	514,453	32.0	41,930	37.4	49,674	57.6	4,587	56.0	1,468,815	20.7	142,809	28.3
1993	1,345,395	39.9	110,604	41.5	1,630,396	23.1	171,511	31.8	1,109,224	51.0	86,564	51.4	51,220	62.5	3,860	64.5	2,544,151	26.7	323,743	45.9
1994	947,564	31.5	99,539	33.8	2,220,435	25.8	190,194	29.9	690,548	35.8	54,745	36.3	27,765	64.3	2,143	65.9	2,280,973	19.3	214,069	27.3
1995	602,888	40.5	48,383	40.0	942,643	25.9	86,408	28.5	72,571	30.1	8,839	38.7	18,216	63.3	1,309	62.8	1,617,673	19.6	162,345	29.9
1996	493,436	28.1	52,883	32.7	1,516,179	39.1	120,897	39.3	295,818	49.5	24,464	47.5	123,621	57.8	16,558	74.1	2,271,614	31.3	308,086	52.8
1997	1,032,761	51.8	90,230	49.3	1,179,933	27.3	100,418	31.4	199,864	33.2	17,257	35.4	71,388	41.3	8,442	48.4	2,076,029	22.6	207,557	32.1
1998	1,033,214	43.8	84,752	44.3	2,262,074	26.0	204,593	31.1	207,500	34.3	20,284	40.9	39,280	40.3	3,276	42.0	1,721,873	25.1	220,941	47.8
1999	532,125	37.2	45,165	42.1	1,281,413	23.5	130,179	31.6	51,091	32.2	4,474	39.5	68,459	49.6	7,292	57.3	4,103,241	23.1	371,893	29.8
2000	955,854	28.8	73,538	36.4	1,948,980	22.8	182,824	29.6	265,642	61.1	21,463	56.0	24,518	50.4	2,069	53.3	2,552,559	34.6	207,540	35.3
2001	1,404,055	37.8	143,215	44.1	1,702,671	23.4	159,705	28.0	627,865	66.9	49,516	64.4	267,359	75.6	37,792	76.1	2,252,160	31.5	187,174	32.3
2002	559,039	30.6	45,914	33.0	1,187,635	24.6	99,572	27.3	192,094	28.9	16,154	33.4	132,712	47.7	11,419	48.6	1,035,758	30.9	94,081	34.7
2003	1,024,308	33.3	104,601	38.7	744,196	31.1	73,392	36.7	114,932	46.8	11,660	47.4	299,436	63.4	31,155	65.2	1,546,106	34.1	119,188	35.8
2004	477,328	44.0	37,608	44.0	944,587	31.1	83,721	31.6	83,683	37.1	9,645	45.2	24,033	55.8	1,683	59.3	1,547,223	44.2	179,206	58.2
2005	793,236	24.4	78,009	30.6	1,986,884	22.7	197,746	37.7	322,768	29.1	27,129	33.4	127,575	57.7	10,772	59.1	895,780	34.2	88,581	36.9
2006	1,085,517	44.4	94,206	40.6	2,355,407	21.3	246,212	35.5	670,528	47.6	51,507	48.7	109,904	38.3	14,722	53.3	1,144,271	28.0	114,481	33.4
2007	464,018	30.3	53,814	41.9	1,109,367	20.9	108,758	29.6	256,654	49.1	23,186	43.8	96,680	53.7	16,221	68.5	929,550	25.0	101,536	36.6
2008	901,587	24.4	79,859	28.4	1,912,635	19.8	158,866	23.6	248,799	29.8	18,285	34.4	12,748	60.9	1,302	65.4	1,377,270	27.7	120,320	31.0
2009	417,567	31.0	39,805	30.9	1,414,008	28.6	126,475	32.2	384,706	30.4	37,443	32.7	87,082	93.5	6,332	93.7	927,737	30.0	109,736	43.9
2010	572,004	29.7	56,545	30.2	1,506,818	23.6	154,439	35.8	583,189	30.2	46,495	32.6	74,678	40.5	7,726	48.6	828,375	54.9	63,464	53.8
2011	1,434,105	21.3	134,468	28.0	1,860,121	22.2	162,394	25.3	249,435	48.1	22,119	43.9	103,717	65.2	7,384	66.2	719,286	25.7	64,218	31.8
2012	1,263,476	24.4	132,282	31.2	977,186	35.2	90,057	34.4	175,964	43.2	13,443	45.1	52,159	45.4	6,074	56.4	674,174	31.1	75,140	37.8
2013	2,271,755	9.7	195,413	19.6	3,675,890	9.3	327,093	18.3	939,354	18.9	77,379	32.1	41,427	37.2	3,162	40.7	5,525,367	8.1	504,444	24.1
2014			79,920	38.8			375,249	12.4			51,901	55.7			9,346	53.3			594,294	15.1
2015			76,780	21.4			378,245	11.5			23,835	34.1			9,300	45.9			727,719	12.3
2016			50,106	21.9			275,986	8.7			24,951	66.9			9,495	37.5			892,875	11.4

FM = Charter

	Black Drum				**Red Drum**				**Sheepshead**				**Southern Flounder**				**Spotted Seatrout**			
	MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel		MRIP		LA Creel	
Year	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE
1982																	7,252	32.4		
1983													352	57.8			121,816	54.1		
1984	182	112.8							1,166	78.8							116	101.5		
1985									587	107.7							42,739	26.9		
1986					25	55.4			266	97.1							16,514	42.5		
1987	2,752	45.9			2,597	42.5			2,484	64.6							64,522	30.1		
1988	5	106.1			1,561	59.4											59,254	37.7		
1989	298	63.1			26,854	45.6			1,199	62.5			1,401	106.9			190,285	38.2		
1990	6,449	56.2			30,305	40.5			16,177	94.7			445	57.1			39,578	32.1		
1991	3,258	52.2			46,366	44.7			1,641	52.5			280	82.8			144,689	30.9		
1992	7,421	46.7			63,966	35.7			3,664	55.2			225	61.5			91,373	31.5		
1993	410	71.7			58,230	19.2											155,919	30.0		
1994	329	100.1			70,705	32.6			1,123	61.4							243,186	36.3		
1995	2,606	72.8			198,687	34.0			1,654	110.7							300,673	31.6		
1996	4,776	74.9			113,101	28.6			406	56.1			843	103.1			223,999	36.0		
1997	20,581	37.1			157,816	23.0			19,422	46.2			490	68.4			260,983	23.5		
1998	18,161	43.4			138,650	25.5			8,030	44.8			647	48.0			199,955	31.8		
1999	12,980	33.2			105,462	22.3			5,944	40.9			520	57.8			277,771	21.3		
2000	10,335	28.4			108,340	13.2			1,739	48.3			259	59.4			175,694	15.8		
2001	13,566	28.8			203,577	19.3			12,615	31.6			1,224	72.4			211,516	15.0		
2002	9,657	30.9			138,601	17.2			4,954	29.6			1,248	50.0			104,977	25.3		
2003	25,831	34.0			129,125	18.5			16,306	53.2			982	53.9			170,658	26.6		
2004	13,050	32.7			105,936	14.2			10,370	38.8			503	55.6			221,275	16.5		
2005	5,692	45.0			53,333	25.0			3,190	61.4							263,044	26.2		
2006	30,916	38.8			144,300	48.0			10,206	71.3							464,015	26.8		
2007	13,350	37.3			178,892	21.5			23,101	34.4			486	60.6			238,335	19.0		
2008	31,830	33.1			198,411	16.5			30,031	55.1			1,197	59.3			323,315	17.3		
2009	62,094	27.2			332,961	19.7			16,588	52.9			98	71.3			356,216	17.4		
2010	38,261	33.5			151,250	23.0			10,938	36.4			69	107.9			167,473	21.6		
2011	29,517	38.0			203,917	17.0			5,021	34.4			640	62.2			149,933	27.4		
2012	21,344	30.0			153,584	17.6			5,844	46.6			2,353	48.7			205,441	22.7		
2013	83,501	7.5			281,131	7.2			48,342	11.3			12,017	15.1			222,879	7.6		
2014			14,093	31.5			353,243	19.2			2,706	40.6			442	53.7			316,892	29.4
2015			14,464	32.7			403,525	14.1			16,575	50.0			553	46.7			413,119	18.4
2016			16,975	33.3			338,910	7.4			10,778	23.1			497	31.4			439,247	9.6

Appendix 2:

Starter

```
#V3.30.20;_Stock_Synthesis_by_Richard_Methot_(NOAA)
#_File written by GUI version 3.30.20.0
#Stock Synthesis (SS) is a work of the U.S. Government and is not subject to copyright protection in the United States.
#Foreign copyrights may apply. See copyright.txt for more information.
#_user_support_available_at:NMFS.Stock.Synthesis@noaa.gov
#_user_info_available_at:https://vlab.noaa.gov/group/stock-synthesis
#C starter comment here
Mullet_dat.ss	# data file name
Mullet_ctl.ss	# control file name
0 # 0=use init values in control file; 1=use ss.par
0 # run display detail (0,1,2)
1 # detailed output (0=minimal for data-limited, 1=high (w/ wtatage.ss_new), 2=brief, 3=custom)
# custom report options: -100 to start with minimal; -101 to start with all; -number to remove, +number to add, -999 to end
0 # write 1st iteration details to echoinput.sso file (0,1)
0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms; 4=every,active)
0 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
0 # Include prior_like for non-estimated parameters (0,1)
1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
#
2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and higher are bootstrap
10 # Turn off estimation for parameters entering after this phase
#
0 # MCeval burn interval
1 # MCeval thin interval
0 # jitter initial parm value by this fraction
-1 # min yr for sdreport outputs (-1 for styr)
-1 # max yr for sdreport outputs (-1 for endyr+1; -2 for endyr+Nforecastyrs)
0 # N individual STD years
#vector of year values

0.0001 # final convergence criteria (e.g. 1.0e-04)
0 # retrospective year relative to end year (e.g. -4)
1 # min age for calc of summary biomass
1 # Depletion basis:  denom is: 0=skip; 1=rel X*SPB0; 2=rel SPBmsy; 3=rel X*SPB_styr; 4=rel X*SPB_endyr; values; >=11 invoke N multiyr (up to 9!) with 10's digit; >100 invokes log(ratio)
1 # Fraction (X) for Depletion denominator (e.g. 0.4)
4 # SPR_report_basis:  0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY); 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
2 # Annual_F_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum(Apical_F's); 4=true F for range of ages; 5=unweighted avg. F for range of ages
#COND 13 17 #_min and max age over which average F will be calculated with F_reporting=4 or 5 with F_reporting>3
0 # F_std_basis: 0=raw_annual_F; 1=F/Fspr; 2=F/Fmsy; 3=F/Fbtgt; where F means annual_F; values >=11 invoke N multiyr (up to 9!) with 10's digit; >100 invokes log(ratio)
1 # MCMC output detail: integer part (0=default; 1=adds obj func components); and decimal part (added to SR_LN(R0) on first call to mcmc)
0 # ALK tolerance (example 0.0001)
3.30 # check value for end of file and for version control
```

Forecast

```
#V3.30.20;_Stock_Synthesis_by_Richard_Methot_(NOAA)
#_File written by GUI version 3.30.20.0
#Stock Synthesis (SS) is a work of the U.S. Government and is not subject to copyright protection in the United States.
#Foreign copyrights may apply. See copyright.txt for more information.
#_user_support_available_at:NMFS.Stock.Synthesis@noaa.gov
#_user_info_available_at:https://vlab.noaa.gov/group/stock-synthesis
#C generic forecast file
# for all year entries except rebuilder; enter either: actual year, -999 for styr, 0 for endyr, neg number for rel. endyr
1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy; 2=calc F_spr,F_0.1,F_msy; 3=add F_BLimit
3 # Do_MSY: 1=set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt) or F0.1; 4=set to F(endyr); 5=calc F(MEY)
0.3 # SPR target (e.g. 0.40)
0.3 # Biomass target (e.g. 0.40)
#_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF, beg_recr_dist, end_recr_dist, beg_SRparm, end_SRparm (enter actual year, or values of 0 or -integer to be rel. endyr)
 2002 2023 2002 2023 2002 2023 1982 2023 1955 2023
# value <0 convert to endyr-value; except -999 converts to start_yr; must be >=start_yr and <=endyr
1 # Bmark_relF_Basis: 1 = use year range; 2 = set relF same as forecast below
#
0 # Forecast: -1=none; 0=simple_1yr; 1=F(SPR); 2=F(MSY) 3=F(Btgt) or F0.1; 4=Ave F (uses first-last relF yrs); 5=input annual F scalar
# where none and simple require no input after this line; simple sets forecast F same as end year F
1 # N forecast years
1 # Fmult (only used for Do_Forecast==5) such that apical_F(f)=Fmult*relF(f)
#_Fcast_years:  beg_selex, end_selex, beg_relF, end_relF, beg_mean recruits, end_recruits  (enter actual year, or values of 0 or -integer to be rel. endyr)
 2023 2023 2023 2023 1982 2023
0 # Forecast selectivity (0=fcast selex is mean from year range; 1=fcast selectivity from annual time-vary parms)
1 # Control rule method (0: none; 1: ramp does catch=f(SSB), buffer on F; 2: ramp does F=f(SSB), buffer on F; 3: ramp does catch=f(SSB), buffer on catch; 4: ramp does F=f(SSB), buffer on catch)
# values for top, bottom and buffer exist, but not used when Policy=0
0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40); (Must be > the no F level below)
0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
0.75 # Buffer:  enter Control rule target as fraction of Flimit (e.g. 0.75), negative value invokes list of [year, scalar] with filling from year to YrMax
3 # N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch with allocations applied)
```

```
3 # First forecast loop with stochastic recruitment
0 # Forecast recruitment: 0=spawn_recr; 1=value*spawn_recr; 2=value*VirginRecr; 3=recent mean from yr range above (need to set phase to -1 in control to get constant recruitment in MCMC)
0 # value is multiplier of SRR
0 # Forecast loop control #5 (reserved for future bells&whistles)
2015 # FirstYear for caps and allocations (should be after years with fixed inputs)
0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 to cause active impl_error)
0 # Do West Coast gfish rebuilder output (0/1)
2004 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to set to 1999)
-1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endyear+1)
1 # fleet relative F: 1=use first-last alloc year; 2=read seas, fleet, alloc list below
# Note that fleet allocation is used directly as average F if Do_Forecast=4
2 # basis for fcast catch tuning and for fcast catch caps and allocation  (2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
# Conditional input if relative F choice = 2
# enter list of:  season,  fleet, relF; if used, terminate with season=-9999
#  -9999 1 0.0
# enter list of: fleet number, max annual catch for fleets with a max; terminate with fleet=-9999
-9999 -1
# enter list of area ID and max annual catch; terminate with area=-9999
-9999 -1
# enter list of fleet number and allocation group assignment, if any; terminate with fleet=-9999
-9999 -1
#_if N allocation groups >0, list year, allocation fraction for each group
# list sequentially because read values fill to end of N forecast
# terminate with -9999 in year field
# no allocation groups
2 # basis for input Fcast catch: -1=read basis with each obs; 2=dead catch; 3=retained catch; 99=input apical_F; NOTE: bio vs num based on fleet's catchunits
#enter list of Fcast catches or Fa; terminate with line having year=-9999
#_Yr Seas Fleet Catch(or_F)
-9999 1   1   0
#
999   # verify end of input
```

Data

```
#V3.30.20;_Stock_Synthesis_by_Richard_Methot_(NOAA)
#_File written by GUI version 3.30.20.0
#Stock Synthesis (SS) is a work of the U.S. Government and is not subject to copyright protection in the United States.
#Foreign copyrights may apply. See copyright.txt for more information.
#_user_support_available_at:NMFS.Stock.Synthesis@noaa.gov
#_user_info_available_at:https://vlab.noaa.gov/group/stock-synthesis
#C data file for simple example
#_observed data:
#
1955 # StartYr
2023 # EndYr
1 # Nseas
12 #_months/season
12 # Nsubseasons (even number, minimum is 2)
1 # spawn_month
2 # Ngenders: 1, 2, -1  (use -1 for 1 sex setup with SSB multiplied by female_frac parameter)
7 # Nages=accumulator age, first age is always age 0
1 # Nareas
3 # Nfleets (including surveys)
#_fleet_type: 1=catch fleet; 2=bycatch only fleet; 3=survey; 4=ignore
#_sample_timing: -1 for fishing fleet to use season-long catch-at-age for observations, or 1 to use observation month;  (always 1 for surveys)
#_fleet_area:  area the fleet/survey operates in
#_units of catch:  1=bio; 2=num (ignored for surveys; their units read later)
#_catch_mult: 0=no; 1=yes
#_rows are fleets
#_fleet_type fishery_timing area catch_units need_catch_mult fleetname
 1 -1  1  2  0 FISHERY1 # 1
 1 -1  1  1  0 FISHERY2 # 2
 3  1  1  2  0 SURVEY1 # 3
#Bycatch_fleet_input_goes_next
#a:  fleet index
#b:  1=include dead bycatch in total dead catch for F0.1 and MSY optimizations and forecast ABC; 2=omit from total catch for these purposes (but still include the mortality)
#c:  1=Fmult scales with other fleets; 2=bycatch F constant at input value; 3=bycatch F from range of years
#d:  F or first year of range
#e:  last year of range
#f:  not used
# a   b   c   d   e   f
#_Catch data: yr, seas, fleet, catch, catch_se
#_catch_se:  standard error of log(catch)
#_NOTE:  catch data is ignored for survey fleets
-999      1      1      0        0.149
1955      1      1      5.316    0.100
1956      1      1      5.995    0.100
1957      1      1      6.674    0.100
1958      1      1      7.353    0.100
1959      1      1      8.032    0.100
1960      1      1      8.711    0.100
1961      1      1      8.905    0.100
1962      1      1      9.099    0.100
```

1963	1	1	9.293	0.100
1964	1	1	9.487	0.100
1965	1	1	9.680	0.100
1966	1	1	10.144	0.100
1967	1	1	10.608	0.100
1968	1	1	11.071	0.100
1969	1	1	11.535	0.100
1970	1	1	11.999	0.100
1971	1	1	13.331	0.100
1972	1	1	14.663	0.100
1973	1	1	15.995	0.100
1974	1	1	17.328	0.100
1975	1	1	18.660	0.100
1976	1	1	18.443	0.100
1977	1	1	18.226	0.100
1978	1	1	18.010	0.100
1979	1	1	17.793	0.100
1980	1	1	17.576	0.100
1981	1	1	17.820	0.100
1982	1	1	5.657	0.747
1983	1	1	14.048	0.841
1984	1	1	22.439	0.751
1985	1	1	1.970	0.843
1986	1	1	20.547	0.533
1987	1	1	19.376	0.548
1988	1	1	18.204	0.565
1989	1	1	18.120	0.639
1990	1	1	101.591	0.515
1991	1	1	23.528	0.430
1992	1	1	72.201	0.521
1993	1	1	232.454	0.622
1994	1	1	73.417	0.436
1995	1	1	96.326	0.369
1996	1	1	192.879	0.486
1997	1	1	49.328	0.395
1998	1	1	10.298	0.444
1999	1	1	32.538	0.530
2000	1	1	68.887	0.345
2001	1	1	34.041	0.415
2002	1	1	45.568	0.463
2003	1	1	3.595	0.628
2004	1	1	9.837	0.736
2005	1	1	9.376	0.521
2006	1	1	4.077	0.505
2007	1	1	134.734	0.700
2008	1	1	4.083	0.601
2009	1	1	81.582	0.706
2010	1	1	47.104	0.636
2011	1	1	8.734	0.630
2012	1	1	40.648	0.517
2013	1	1	44.466	0.164
2014	1	1	6.674	0.471
2015	1	1	14.292	0.419
2016	1	1	1.509	0.415
2017	1	1	20.783	0.458
2018	1	1	11.818	0.705
2019	1	1	5.689	0.525
2020	1	1	1.046	0.489
2021	1	1	5.039	0.432
2022	1	1	7.003	0.466
2023	1	1	5.553	0.504
-999	1	2	25.596	0.100
1955	1	2	28.700	0.050
1956	1	2	47.900	0.050
1957	1	2	15.200	0.050
1958	1	2	15.600	0.050
1959	1	2	13.700	0.050
1960	1	2	21.800	0.050
1961	1	2	11.900	0.050
1962	1	2	8.300	0.050
1963	1	2	18.900	0.050
1964	1	2	22.200	0.050
1965	1	2	7.000	0.050
1966	1	2	9.800	0.050
1967	1	2	6.100	0.050
1968	1	2	73.900	0.050
1969	1	2	87.800	0.050
1970	1	2	38.100	0.050
1971	1	2	8.100	0.050
1972	1	2	15.700	0.050
1973	1	2	102.500	0.050
1974	1	2	50.100	0.050
1975	1	2	213.400	0.050

1976	1	2	57.000	0.050
1977	1	2	595.200	0.050
1978	1	2	1991.648	0.050
1979	1	2	1416.045	0.050
1980	1	2	204.310	0.050
1981	1	2	3051.461	0.050
1982	1	2	1533.452	0.050
1983	1	2	1886.654	0.050
1984	1	2	3157.215	0.050
1985	1	2	579.297	0.050
1986	1	2	2277.713	0.050
1987	1	2	1439.425	0.050
1988	1	2	2367.106	0.050
1989	1	2	2413.768	0.050
1990	1	2	2645.927	0.050
1991	1	2	3563.137	0.050
1992	1	2	6214.532	0.050
1993	1	2	11026.497	0.050
1994	1	2	12560.261	0.050
1995	1	2	14545.610	0.050
1996	1	2	8658.881	0.050
1997	1	2	8083.201	0.050
1998	1	2	6252.317	0.050
1999	1	2	8951.395	0.050
2000	1	2	7252.951	0.050
2001	1	2	4238.849	0.050
2002	1	2	2520.699	0.050
2003	1	2	4497.034	0.050
2004	1	2	4753.755	0.050
2005	1	2	1238.129	0.050
2006	1	2	3360.649	0.050
2007	1	2	1375.027	0.050
2008	1	2	1503.283	0.050
2009	1	2	178.441	0.050
2010	1	2	361.671	0.050
2011	1	2	1385.305	0.050
2012	1	2	1385.019	0.050
2013	1	2	608.554	0.050
2014	1	2	1185.572	0.050
2015	1	2	692.083	0.050
2016	1	2	1020.516	0.050
2017	1	2	1092.989	0.050
2018	1	2	630.242	0.050
2019	1	2	256.774	0.050
2020	1	2	12.485	0.050
2021	1	2	2.634	0.050
2022	1	2	1.000	0.050
2023	1	2	1.000	0.050

-9999 0 0 0 0
#
#_CPUE_and_surveyabundance_observations
#_Units: 0=numbers; 1=biomass; 2=F; 30=spawnbio; 31=recdev; 32=spawnbio*recdev; 33=recruitment; 34=depletion(&see Qsetup); 35=parm_dev(&see Qsetup)
#_Errtype: -1=normal; 0=lognormal; >0=T
#_SD_Report: 0=no sdreport; 1=enable sdreport
#_Fleet Units Errtype SD_Report
1 0 -1 0 # FISHERY1
2 1 -1 0 # FISHERY2
3 0 0 0 # SURVEY1
#_yr month fleet obs stderr

1988	12.99	3	0.887	0.289
1989	12.99	3	0.990	0.287
1990	12.99	3	1.040	0.285
1991	12.99	3	1.071	0.289
1992	12.99	3	1.353	0.288
1993	12.99	3	0.990	0.296
1994	12.99	3	1.291	0.290
1995	12.99	3	1.695	0.285
1996	12.99	3	0.615	0.310
1997	12.99	3	1.371	0.308
1998	12.99	3	1.138	0.298
1999	12.99	3	0.583	0.323
2000	12.99	3	1.085	0.313
2001	12.99	3	0.782	0.315
2002	12.99	3	0.774	0.310
2003	12.99	3	0.768	0.314
2004	12.99	3	0.966	0.305
2005	12.99	3	1.500	0.298
2006	12.99	3	0.996	0.310
2007	12.99	3	1.071	0.305
2008	12.99	3	0.880	0.314
2009	12.99	3	0.586	0.321
2010	12.99	3	0.845	0.288
2011	12.99	3	0.908	0.281

```
2012    12.99   3   0.816   0.284
2013    12.99   3   1.485   0.281
2014    12.99   3   0.960   0.297
2015    12.99   3   0.833   0.295
2016    12.99   3   1.106   0.283
2017    12.99   3   1.300   0.291
2018    12.99   3   0.986   0.295
2019    12.99   3   1.213   0.289
2020    12.99   3   0.800   0.296
2021    12.99   3   0.929   0.294
2022    12.99   3   0.836   0.293
2023    12.99   3   0.553   0.316

-9999 1 1 1 1 # terminator for survey observations
#
0 #_N_fleets_with_discard
#_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
#_discard_errtype:  >0 for DF of T-dist(read CV below); 0 for normal with CV; -1 for normal with se; -2 for lognormal; -3 for trunc normal with CV
# note: only enter units and errtype for fleets with discard
# note: discard data is the total for an entire season, so input of month here must be to a month in that season
#_Fleet units errtype
#_yr month fleet obs stderr

#-9999 0 0 0.0 0.0 # terminator for discard data
#
0 # use meanbodysize_data (0/1)
#_COND_0 #_DF_for_meanbodysize_T-distribution_like
# note:  type=1 for mean length; type=2 for mean body weight
#_yr month fleet part type obs stderr
# -9999 0 0 0 0 0 0 # terminator for mean body size data
#
# set up population length bin structure (note - irrelevant if not using size data and using empirical wtatage
2 # length bin method: 1=use databins; 2=generate from binwidth,min,max below; 3=read vector
1 # binwidth for population size comp
0 # minimum size in the population (lower edge of first bin and size at age 0.00)
30 # maximum size in the population (lower edge of last bin)
1 # use length composition data (0/1)
#_mintailcomp: upper and lower distribution for females and males separately are accumulated until exceeding this level.
#_addtocomp:  after accumulation of tails; this value added to all bins
#_combM+F: males and females treated as combined gender below this bin number
#_compressbins: accumulate upper tail by this number of bins; acts simultaneous with mintailcomp; set=0 for no forced accumulation
#_Comp_Error:  0=multinomial, 1=dirichlet
#_ParmSelect:  parm number for dirichlet
#_minsamplesize: minimum sample size; set to 1 to match 3.24, minimum value is 0.001
#
#_mintailcomp addtocomp combM+F CompressBins CompError ParmSelect minsamplesize
 0.001   1e-07   0   0   1   1   1 #_fleet:1_FISHERY1
 0.001   1e-07   0   0   1   2   1 #_fleet:2_FISHERY2
 0.001   1e-07   0   0   1   3   1 #_fleet:3_SURVEY1
# sex codes:  0=combined; 1=use female only; 2=use male only; 3=use both as joint sexxlength distribution
# partition codes:  (0=combined; 1=discard; 2=retained
31 # N_LengthBins; then enter lower edge of each length bin
 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
#_yr month fleet sex part Nsamp datavector(female-male)
-1982   7       1       0       0       1       0       0       0       0.1000  0       0       0
        0       0       0       0       0       0.3000  0       0.1000  0       0       0.1000  0.4000
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0
-1984   7       1       0       0       4       0       0       0       0       0       0       0
        0.2800  0.2800  0.3933  0       0       0       0       0.0467  0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0
-1985   7       1       0       0       1       0       0       0       0       0       0       0
        0       0       0.3333  0.5000  0       0       0       0.1667  0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0
1986    7       1       0       0       14      0       0       0       0       0       0       0
        0.0319  0       0.0319  0.3504  0.0792  0.0788  0.1043  0.1332  0.0167  0.1262  0.0398  0.0075
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0
-1988   7       1       0       0       4       0       0       0       0       0       0       0
        0       0       0       0.4597  0.2610  0.2793  0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0
```

-1989	7	1	0	0	5	0	0	0	0	0	0	0
	0	0	0	0.1418	0.2881	0.0595	0.2643	0	0.1232	0	0.1232	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-1990	7	1	0	0	8	0	0	0	0	0	0	0
	0	0.0594	0	0.4014	0.3082	0.1766	0.0545	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-1991	7	1	0	0	5	0	0	0	0	0.0699	0	0.0699
	0	0.0237	0	0	0.3252	0.1745	0.3367	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1992	7	1	0	0	12	0	0	0	0	0.0243	0.0536	0.0270
	0	0.2556	0	0.1545	0.1895	0.1726	0.0133	0.1097	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1993	7	1	0	0	16	0	0	0	0	0	0.0202	0.0111
	0.1572	0.3904	0.0337	0.2456	0.1406	0.0010	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1994	7	1	0	0	23	0	0	0	0	0	0	0.0309
	0.0934	0.1810	0.0225	0.1613	0.0137	0.0179	0.1825	0.1752	0	0.0608	0.0608	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1995	7	1	0	0	21	0	0	0	0	0	0	0
	0.0825	0.1485	0.0612	0	0.1342	0.0965	0.1090	0.1362	0	0.1350	0.0297	0
	0.0672	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1996	7	1	0	0	10	0	0	0	0	0	0	0
	0.1465	0.1743	0	0	0.0128	0.1350	0.1457	0.2530	0	0.1329	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-1997	7	1	0	0	9	0	0	0	0	0	0	0
	0	0.1708	0	0.0856	0.2068	0.1451	0.0257	0.0043	0.1987	0	0.0950	0
	0.0680	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1998	7	1	0	0	10	0	0	0	0	0	0	0
	0	0.0946	0	0.3210	0.2214	0.0829	0.1330	0	0.0688	0	0.0463	0
	0.0318	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1999	7	1	0	0	10	0	0	0	0	0	0	0
	0.0313	0.0250	0.0290	0.2758	0.1341	0.0419	0.2067	0.0118	0.0709	0.0751	0.0984	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2000	7	1	0	0	20	0	0	0	0	0	0	0
	0.2045	0.1166	0.1405	0.1567	0	0.0383	0	0.0282	0.1549	0.1227	0.0375	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2001	7	1	0	0	10	0	0	0	0	0	0	0
	0.1134	0.0528	0.0112	0	0	0.0485	0.2969	0.1446	0.1445	0.1246	0.0635	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2002	7	1	0	0	12	0	0	0	0	0	0	0
	0.0713	0	0.0605	0.0523	0.1535	0.2945	0.2219	0.0115	0.0299	0.0463	0.0190	0.0095
	0.0094	0.0205	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					

-2003	7	1	0	0	3	0	0	0	0	0	0	0
	0	0	0	0.3127	0.1956	0.2459	0	0	0	0.2459	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2004	7	1	0	0	3	0	0	0	0	0	0	0
	0.2770	0.2770	0.2770	0	0.1117	0.0573	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2005	7	1	0	0	5	0	0	0	0	0	0	0
	0.0597	0	0	0.1393	0.4216	0.0900	0	0.1447	0	0	0.1447	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2006	7	1	0	0	5	0	0	0	0	0	0	0
	0	0.0791	0	0.2873	0.0788	0.1442	0	0	0.4105	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2007	7	1	0	0	4	0	0	0	0	0	0	0
	0	0.3110	0	0.6205	0.0549	0.0136	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2008	7	1	0	0	2	0	0	0	0	0	0	0
	0	0	0	0.5000	0.4484	0.0516	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2009	7	1	0	0	3	0	0	0	0	0	0	0
	0	0.2345	0.5255	0.1200	0.0480	0.0720	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2010	7	1	0	0	4	0	0	0	0	0	0	0
	0	0.0787	0.0198	0.3147	0.2361	0.0787	0.0668	0.0471	0.0198	0.0198	0.0593	0.0198
	0.0395	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2011	7	1	0	0	4	0	0	0	0	0	0	0
	0	0	0.0550	0.3142	0.3008	0.1650	0.0550	0.0550	0.0550	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2012	7	1	0	0	5	0	0	0	0	0	0	0.0252
	0	0	0	0.0053	0.0107	0.0757	0.0252	0.3092	0.1709	0.2121	0	0
	0	0.1656	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2013	7	1	0	0	3	0	0	0	0	0	0	0
	0	0.1938	0	0	0.2022	0	0	0.0140	0.1938	0.2022	0	0
	0	0.1938	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1986	7	2	0	0	125	0	0	0	0	0	0	0
	0	0	0	0	0	0.0080	0.0400	0.0400	0.1840	0.3600	0.2400	0.0880
	0.0400	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1987	7	2	0	0	117	0	0	0	0	0	0	0
	0.0085	0.0085	0.0085	0.0256	0.0427	0.1197	0.2650	0.2393	0.1795	0.0513	0.0342	0.0171
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1994	7	2	3	0	1225	0	0	0	0	0	0	0
	0	0	0	0	0.0049	0.0408	0.0865	0.1012	0.1069	0.1347	0.1167	0.0563
	0.0114	0.0033	0.0008	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

	0.0016	0.0090	0.0661	0.1192	0.0824	0.0473	0.0106	0	0	0	0	0
	0	0	0	0	0	0	0					
1995	7	2	3	0	2750	0	0	0	0	0	0	0
	0	0	0	0	0.0018	0.0091	0.0393	0.0756	0.0840	0.0967	0.1033	0.0778
	0.0324	0.0058	0.0015	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.0004	0	0.0004	0.0051	0.0044
	0.0236	0.0251	0.0436	0.0931	0.1182	0.1153	0.0400	0.0036	0	0	0	0
	0	0	0	0	0	0	0					
1996	7	2	3	0	1750	0	0	0	0	0	0	0
	0	0	0	0.0006	0.0023	0.0200	0.1011	0.2126	0.1491	0.1000	0.0623	0.0411
	0.0251	0.0063	0.0023	0.0011	0.0006	0	0	0.0006	0.0006	0	0	0
	0	0	0	0	0	0	0	0	0	0	0.0011	0.0023
	0.0166	0.0474	0.0623	0.0394	0.0429	0.0389	0.0171	0.0057	0.0006	0	0	0
	0	0	0	0	0	0	0					
1997	7	2	3	0	2175	0	0	0	0	0	0	0
	0	0	0	0	0	0.0055	0.0418	0.1646	0.1995	0.1559	0.0901	0.0446
	0.0166	0.0064	0.0014	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0.0014
	0.0175	0.0464	0.0846	0.0621	0.0432	0.0138	0.0046	0	0	0	0	0
	0	0	0	0	0	0	0					
1998	7	2	3	0	420	0	0	0	0	0	0	0
	0	0	0	0	0	0.0024	0	0.0643	0.0976	0.1071	0.1286	0.1357
	0.0619	0.0119	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0.0024
	0	0.0024	0.0167	0.0381	0.1000	0.1333	0.0786	0.0190	0	0	0	0
	0	0	0	0	0	0	0					
1999	7	2	3	0	1144	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0096	0.0219	0.0656	0.0935	0.1154	0.1696
	0.1198	0.0420	0.0114	0.0017	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0.0087	0.0079	0.0105	0.0341	0.1198	0.1014	0.0568	0.0096	0.0009	0	0	0
	0	0	0	0	0	0	0					
2000	7	2	3	0	221	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0090	0.0633	0.1312	0.1946
	0.1312	0.0679	0.0090	0.0045	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.0271	0.1584	0.1448	0.0498	0.0090	0	0	0	0
	0	0	0	0	0	0	0					
2001	7	2	3	0	239	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0126	0.1046	0.1632	0.1255	0.2929	0.1297
	0.0669	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.0042	0.0335	0.0377	0.0209	0.0084	0	0	0	0
	0	0	0	0	0	0	0					
2002	7	2	3	0	148	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0405	0.1284	0.1622	0.2027	0.1081	0.0270
	0.0203	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.0068	0.0541	0.1149	0.0878	0.0405	0	0.0068	0	0	0	0
	0	0	0	0	0	0	0					
2003	7	2	3	0	729	0	0	0	0	0	0	0
	0	0	0	0	0	0.0041	0.0343	0.0713	0.1139	0.1358	0.1454	0.0919
	0.0329	0.0069	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.0082	0.0672	0.0974	0.0809	0.0686	0.0398	0	0.0014	0	0	0
	0	0	0	0	0	0	0					
2004	7	2	3	0	677	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0089	0.0384	0.0857	0.1315	0.2275	0.1625
	0.0620	0.0118	0.0015	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0.0015	0.0044	0.0192	0.0207	0.1049	0.1019	0.0133	0.0030	0.0015	0	0	0
	0	0	0	0	0	0	0					
-2005	7	2	3	0	646	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0046	0.0650	0.2337	0.2864	0.2322	0.1579
	0.0201	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2006	7	2	3	0	644	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0202	0.0311	0.1506	0.2422	0.2065	0.1568
	0.0668	0.0124	0.0016	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0.0031	0.0031	0.0450	0.0342	0.0140	0.0078	0.0047	0	0	0	0	0
	0	0	0	0	0	0	0					
2007	7	2	3	0	913	0	0	0	0	0	0	0
	0	0	0	0	0	0.0055	0.0186	0.0515	0.1566	0.2629	0.2015	0.1150
	0.0701	0.0088	0.0033	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0.0033	0.0142	0.0361	0.0416	0.0055	0.0055	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2008	7	2	3	0	770	0	0	0	0	0	0	0
	0	0	0	0	0	0.0052	0.0468	0.1234	0.1987	0.1844	0.2091	0.0935
	0.0377	0.0117	0.0013	0	0.0013	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0.0013

	0.0039	0.0104	0.0104	0.0013	0.0130	0.0234	0.0182	0.0039	0.0013	0	0	0
	0	0	0	0	0	0	0					
2009	7	2	3	0	496	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0101	0.0423	0.1714	0.1935
	0.1210	0.0685	0.0222	0.0121	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0.0020	0.0121	0.0685	0.1129	0.0726	0.0665	0.0202	0.0020	0.0020	0
	0	0	0	0	0	0	0					
-2010	7	2	3	0	215	0	0	0	0	0	0	0
	0	0	0	0	0	0.0093	0.1349	0.2326	0.0930	0.2000	0.1814	0.1256
	0.0233	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2011	7	2	3	0	884	0	0	0	0	0	0	0
	0	0	0	0	0	0.0023	0.0215	0.0385	0.0407	0.1063	0.3224	0.3190
	0.0995	0.0170	0.0023	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.0090	0.0170	0.0045	0	0	0	0	0
	0	0	0	0	0	0	0					
2012	7	2	3	0	899	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0089	0.0545	0.1313	0.1891	0.3103	0.2336
	0.0467	0.0011	0.0022	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0.0011	0.0145	0.0033	0.0033	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2013	7	2	3	0	812	0	0	0	0	0	0	0
	0	0	0	0.0035	0	0.0017	0.0199	0.0985	0.2454	0.1968	0.1722	0.0414
	0.0037	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0.0017
	0.0064	0.0170	0.0275	0.0568	0.0808	0.0258	0.0009	0	0	0	0	0
	0	0	0	0	0	0	0					
-2014	7	2	3	0	668	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0279	0.1625	0.2826	0.3625	0.1331	0.0240
	0.0046	0.0027	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0.0001	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2015	7	2	3	0	794	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0039	0.0361	0.1335	0.3016	0.3735	0.1089
	0.0194	0.0138	0.0055	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.0002	0.0002	0.0007	0	0.0014	0.0014	0	0	0	0	0
	0	0	0	0	0	0	0					
-2016	7	2	3	0	436	0	0	0	0	0	0	0
	0	0	0	0	0	0.0002	0.0030	0.0222	0.1434	0.2217	0.2559	0.1504
	0.1055	0.0580	0.0343	0.0053	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0.0000	0.0001	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2017	7	2	3	0	525	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0041	0.1036	0.1897	0.3333	0.2781	0.0750
	0.0142	0	0.0020	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0.0001	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2018	7	2	3	0	109	0	0	0	0	0	0	0
	0	0	0	0	0	0.0092	0.0275	0.0459	0.1743	0.2202	0.3486	0.1376
	0.0367	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-2019	7	2	3	0	50	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.0200	0.1400	0.3800	0.2800	0.1400
	0.0200	0.0200	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					

1988	12.99	3	0	0	636	0	0	0	0	0	0.0016	0
	0.0330	0.1195	0.0786	0.3239	0.1572	0.1352	0.0660	0.0550	0.0204	0.0094	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1989	12.99	3	0	0	810	0	0	0	0	0	0	0
	0.0333	0.2049	0.0975	0.2481	0.1963	0.1272	0.0457	0.0235	0.0160	0.0062	0.0012	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1990	12.99	3	0	0	882	0	0	0	0	0.0011	0	0
	0.0091	0.1519	0.0862	0.1327	0.1338	0.2551	0.1168	0.0714	0.0340	0.0045	0.0023	0

	0	0	0	0	0	0.0011	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1991	12.99	3	0	0	1109	0	0	0	0	0	0	0
	0.0316	0.2561	0.0902	0.1948	0.1362	0.1506	0.0739	0.0352	0.0171	0.0117	0.0027	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1992	12.99	3	0	0	737	0	0	0	0	0	0	0
	0.0339	0.2442	0.1208	0.2537	0.1113	0.1126	0.0556	0.0271	0.0258	0.0122	0.0027	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1993	12.99	3	0	0	569	0	0	0	0	0.0018	0	0
	0.0158	0.1125	0.0738	0.1775	0.0914	0.2179	0.1142	0.0598	0.0457	0.0562	0.0281	0.0053
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1994	12.99	3	0	0	869	0	0	0	0	0	0	0
	0.0414	0.3234	0.1162	0.2325	0.1024	0.0806	0.0437	0.0265	0.0161	0.0092	0.0046	0.0023
	0	0	0.0012	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1995	12.99	3	3	0	456	0	0	0	0	0	0	0
	0	0.0022	0.0066	0.1031	0.1162	0.1338	0.0768	0.0417	0.0132	0.0066	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0022	0.0132	0.2193	0.1228
	0.0724	0.0526	0.0154	0.0022	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1996	12.99	3	3	0	188	0	0	0	0	0	0	0
	0	0.0053	0	0.0638	0.0638	0.0957	0.1436	0.0638	0.0585	0.0319	0.0053	0.0053
	0	0.0053	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0053	0.0106	0.1862	0.0904
	0.0904	0.0372	0.0266	0.0106	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1997	12.99	3	3	0	742	0	0	0	0	0	0	0
	0	0	0	0.0553	0.0606	0.1307	0.1321	0.0889	0.0580	0.0404	0.0229	0.0027
	0.0013	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0054	0.0094	0.1267	0.1173
	0.0633	0.0485	0.0148	0.0040	0.0081	0.0081	0.0013	0	0	0	0	0
	0	0	0	0	0	0	0					
1998	12.99	3	3	0	451	0	0	0	0	0	0	0
	0	0	0.0089	0.0953	0.0643	0.1153	0.1042	0.0665	0.0333	0.0177	0.0244	0.0044
	0.0022	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.0022	0.0111	0.0266	0.1508	0.0710
	0.0776	0.0532	0.0266	0.0044	0.0222	0.0177	0	0	0	0	0	0
	0	0	0	0	0	0	0					
1999	12.99	3	3	0	240	0	0	0	0	0	0	0
	0	0.0042	0.0292	0.1208	0.1208	0.1958	0.1375	0.0500	0.0167	0.0083	0.0042	0
	0.0042	0.0042	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0042	0.0250	0.1000	0.0750
	0.0625	0.0167	0.0125	0.0042	0.0042	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2000	12.99	3	3	0	435	0	0	0	0	0	0	0
	0	0.0023	0.0207	0.1678	0.0920	0.0920	0.0667	0.0644	0.0345	0.0230	0.0023	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.0276	0.1770	0.0989
	0.0713	0.0345	0.0092	0.0092	0.0046	0	0	0.0023	0	0	0	0
	0	0	0	0	0	0	0					
2001	12.99	3	3	0	293	0	0	0	0	0	0	0
	0	0.0034	0.0068	0.0717	0.1229	0.1502	0.0375	0.0341	0.0273	0.0068	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0034	0.0341	0.2526	0.1536
	0.0614	0.0171	0.0034	0.0068	0.0034	0.0034	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2002	12.99	3	3	0	230	0	0	0	0	0	0	0
	0	0.0043	0.0043	0.0696	0.0696	0.0826	0.1043	0.1000	0.0522	0.0130	0	0.0043
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.0217	0.1435	0.0783
	0.0826	0.0696	0.0609	0.0348	0.0043	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2003	12.99	3	3	0	306	0	0	0	0	0	0	0
	0	0	0.0294	0.1275	0.1242	0.0752	0.0719	0.0425	0.0229	0.0065	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.0425	0.2320	0.1013
	0.0588	0.0359	0.0196	0.0098	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2004	12.99	3	3	0	402	0	0	0	0	0	0	0
	0	0.0025	0.0100	0.0622	0.0448	0.1020	0.0846	0.0597	0.0498	0.0547	0.0323	0.0075

	0.0025	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0050	0.0249	0.1493	0.1045
	0.1095	0.0373	0.0249	0.0075	0.0174	0.0050	0.0025	0	0	0	0	0
	0	0	0	0	0	0	0					
2005	12.99	3	3	0	585	0	0	0	0	0	0	0
	0	0.0120	0.0103	0.0821	0.0444	0.0974	0.0991	0.0701	0.0342	0.0051	0.0034	0.0034
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0444	0.0325	0.1504	0.1009
	0.1368	0.0427	0.0205	0.0085	0.0017	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2006	12.99	3	3	0	339	0	0	0	0	0	0	0
	0	0.0029	0.0295	0.1327	0.1091	0.1268	0.1032	0.0914	0.0531	0	0.0029	0.0029
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0029	0.0118	0.1416	0.0767
	0.0767	0.0265	0.0059	0.0029	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2007	12.99	3	3	0	297	0	0	0	0	0	0	0
	0	0.0034	0.0236	0.1785	0.0707	0.0774	0.1178	0.0808	0.0438	0.0101	0	0.0034
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0034	0.0404	0.1246	0.0976
	0.0707	0.0236	0.0034	0.0202	0.0067	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2008	12.99	3	3	0	309	0	0	0	0	0	0	0
	0	0	0.0291	0.0615	0.0291	0.1618	0.0906	0.0550	0.0129	0.0032	0.0032	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0032	0.0259	0.2362	0.1262
	0.1197	0.0388	0	0.0032	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2009	12.99	3	3	0	217	0	0	0	0	0	0	0
	0	0.0046	0.0138	0.0922	0.0737	0.1751	0.0507	0.0645	0.0046	0.0046	0	0.0046
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.0507	0.2120	0.1797
	0.0323	0.0276	0.0046	0.0046	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2010	12.99	3	3	0	698	0	0	0	0	0	0	0
	0	0.0014	0.0272	0.1175	0.0802	0.1819	0.0630	0.0315	0.0158	0.0072	0	0
	0.0014	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.0043	0.0029	0.0258	0.2264	0.1232
	0.0802	0.0029	0.0029	0.0029	0	0.0014	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2011	12.99	3	3	0	546	0	0	0	0	0	0	0
	0.0018	0	0.0220	0.0769	0.0568	0.1117	0.1081	0.0733	0.0440	0.0183	0.0055	0.0018
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0037	0.0403	0.1520	0.0971
	0.0952	0.0568	0.0183	0.0128	0.0037	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2012	12.99	3	3	0	495	0	0	0	0	0	0	0
	0	0.0020	0.0283	0.1253	0.0970	0.1535	0.0727	0.0263	0.0081	0.0020	0.0020	0
	0	0	0	0.0020	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0081	0.0606	0.2424	0.0808
	0.0505	0.0182	0.0121	0.0020	0.0040	0	0	0	0	0.0020	0	0
	0	0	0	0	0	0	0					
2013	12.99	3	3	0	358	0	0	0	0	0	0	0
	0	0	0.0140	0.0838	0.0503	0.0838	0.0894	0.0447	0.0363	0.0168	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0028	0.0168	0.1369	0.2179
	0.1453	0.0419	0.0168	0.0028	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2014	12.99	3	3	0	201	0	0	0	0	0	0	0
	0	0	0.0199	0.0746	0.0498	0.0846	0.1493	0.1343	0.0398	0.0149	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.0149	0.1045	0.1194
	0.1393	0.0299	0.0100	0.0149	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2015	12.99	3	3	0	117	0	0	0	0	0	0	0
	0	0	0.0171	0.1111	0.0684	0.1111	0.0769	0.0598	0.0598	0.0256	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.0171	0.2137	0.1197
	0.0855	0.0342	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2016	12.99	3	3	0	249	0	0	0	0	0	0	0
	0	0	0.0161	0.1245	0.1004	0.0964	0.0763	0.0482	0.0241	0.0161	0.0080	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0040	0.0281	0.1807	0.1205
	0.0402	0.0361	0.0361	0.0281	0.0120	0.0040	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2017	12.99	3	3	0	258	0	0	0	0	0	0	0
	0	0	0.0155	0.0814	0.1085	0.1628	0.1085	0.0814	0.0465	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0039	0.0271	0.1860	0.0853
	0.0504	0.0233	0.0039	0.0155	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2018	12.99	3	3	0	300	0	0	0	0	0	0	0
	0	0	0.0067	0.0933	0.0633	0.0900	0.0300	0.0400	0.0200	0.0067	0	0.0033

	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0067	0.0333	0.2333	0.1033
	0.0833	0.0800	0.0267	0.0333	0.0200	0.0167	0.0067	0.0033	0	0	0	0
	0	0	0	0	0	0	0					
2019	12.99	3	3	0	185	0	0	0	0	0	0	0
	0.0054	0.0378	0.0324	0.0703	0.0541	0.1730	0.0486	0.0270	0.0162	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0216	0.0432	0.2757	0.0811
	0.0703	0.0432	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2020	12.99	3	3	0	130	0	0	0	0	0	0	0
	0	0.0077	0.0154	0.0231	0.0692	0.1846	0.0308	0.0308	0.0538	0.0385	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0077	0.0385	0.2385	0.1308
	0.0615	0.0462	0.0231	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2021	12.99	3	3	0	192	0	0	0	0	0	0	0
	0	0.0417	0.0365	0.0573	0.0573	0.1510	0.0729	0.0260	0.0104	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.0052	0.0052	0.0208	0.0729	0.2188	0.1146
	0.0625	0.0260	0.0156	0.0052	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2022	12.99	3	3	0	192	0	0	0	0	0	0	0
	0	0.0052	0.0052	0.0260	0.0781	0.2240	0.0625	0.0521	0.0052	0.0104	0.0052	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0052	0.0625	0.1927	0.0990
	0.0990	0.0469	0.0104	0.0104	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
2023	12.99	3	3	0	120	0	0	0	0	0	0	0
	0	0.0500	0.0167	0.0250	0.0917	0.1500	0.0833	0.0333	0.0167	0.0167	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.0167	0.0167	0.1167	0.1250
	0.1500	0.0750	0.0083	0.0083	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
-9999	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					

#
8 # N_age_bins
 0 1 2 3 4 5 6 7
1 # N_ageerror_definitions
 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5
 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001
#_mintailcomp: upper and lower distribution for females and males separately are accumulated until exceeding this level.
#_addtocomp: after accumulation of tails; this value added to all bins
#_combM+F: males and females treated as combined gender below this bin number
#_compressbins: accumulate upper tail by this number of bins; acts simultaneous with mintailcomp; set=0 for no forced accumulation
#_Comp_Error: 0=multinomial, 1=dirichlet
#_ParmSelect: parm number for dirichlet
#_minsamplesize: minimum sample size; set to 1 to match 3.24, minimum value is 0.001
#
#_mintailcomp addtocomp combM+F CompressBins CompError ParmSelect minsamplesize

0.001	1e-03	0	0	1	0	1 #_fleet:1_FISHERY1
0.001	1e-03	0	0	1	2	1 #_fleet:2_FISHERY2
0.001	1e-03	0	0	1	3	1 #_fleet:3_SURVEY1

3 # Lbin_method_for_Age_Data: 1=poplenbins; 2=datalenbins; 3=lengths
sex codes: 0=combined; 1=use female only; 2=use male only; 3=use both as joint sexxlength distribution
partition codes: (0=combined; 1=discard; 2=retained
#_yr month fleet sex part ageerr Lbin_lo Lbin_hi Nsamp datavector(female-male)

2002	7	2	1	0	1	13	13	6	0	0	0.8333	0.1667
	0	0	0	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	14	14	17	0	0	0.4118	0.4118
	0.1765	0	0	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	15	15	21	0	0	0.1429	0.4762
	0.3333	0.0476	0	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	16	16	26	0	0	0.1154	0.5000
	0.2692	0.1154	0	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	17	17	15	0	0	0.0667	0.4000
	0.4667	0.0667	0	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	18	18	3	0	0	0	0.6667
	0.3333	0	0	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	19	19	3	0	0	0	0.6667
	0	0	0	0.3333	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	12	12	3	0	0	0.3333	0.3333
	0.3333	0	0	0	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	13	13	24	0	0	0.5417	0.1250
	0.1667	0.1667	0	0	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	14	14	51	0	0	0.1765	0.3922
	0.3333	0.0980	0	0	0	0	0	0	0	0	0	0

2003	7	2	1	0	1	15	15	80	0	0	0.0875	0.5125
	0.3250	0.0625	0.0125	0	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	16	16	91	0	0	0.0220	0.3297
	0.3846	0.2198	0.0440	0	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	17	17	103	0	0	0.0388	0.1650
	0.3883	0.3301	0.0485	0.0291	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	18	18	67	0	0	0.0299	0.1493
	0.2537	0.3731	0.0746	0.1194	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	19	19	20	0	0	0.1000	0.0500
	0.2000	0.2000	0.2500	0.2000	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	20	20	5	0	0	0	0
	0.4000	0.2000	0.4000	0	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	13	13	6	0	0	0.1667	0.8333
	0	0	0	0	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	14	14	25	0	0	0.0800	0.5200
	0.1600	0.1200	0.1200	0	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	15	15	57	0	0	0.1053	0.4561
	0.3158	0.0877	0.0351	0	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	16	16	89	0	0	0.0562	0.2809
	0.3933	0.1685	0.1011	0	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	17	17	148	0	0	0.0135	0.2500
	0.3986	0.2568	0.0811	0	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	18	18	105	0	0	0	0.1048
	0.3714	0.2762	0.2381	0.0095	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	19	19	39	0	0	0	0.0513
	0.2308	0.4103	0.2308	0.0769	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	20	20	7	0	0	0	0
	0.2857	0.2857	0.2857	0.1429	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	21	21	1	0	0	0	0
	0	0	1.0000	0	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	13	13	3	0	0.3333	0.3333	0.3333
	0	0	0	0	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	14	14	42	0	0	0.5238	0.1190
	0.2619	0.0952	0	0	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	15	15	151	0	0	0.3510	0.2450
	0.2980	0.0927	0.0132	0	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	16	16	180	0	0	0.0556	0.2833
	0.3944	0.1944	0.0556	0.0167	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	17	17	148	0	0	0.0270	0.2230
	0.4054	0.2297	0.0743	0.0405	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	18	18	101	0	0	0	0.0495
	0.4059	0.3564	0.1188	0.0693	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	19	19	11	0	0	0	0
	0.1818	0.4545	0.1818	0.1818	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	13	13	12	0	0	0.4167	0.3333
	0.1667	0.0833	0	0	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	14	14	19	0	0.0526	0.1579	0.2632
	0.2632	0.2632	0	0	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	15	15	97	0	0	0.2371	0.3402
	0.1546	0.2165	0.0412	0.0103	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	16	16	155	0	0	0.1484	0.2581
	0.2968	0.2387	0.0516	0.0065	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	17	17	131	0	0	0.0687	0.2672
	0.2672	0.2595	0.1069	0.0305	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	18	18	101	0	0	0	0.1287
	0.3960	0.3267	0.1089	0.0396	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	19	19	42	0	0	0	0
	0.2143	0.4048	0.2143	0.1667	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	20	20	7	0	0	0	0
	0	0.4286	0.2857	0.2857	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	21	21	1	0	0	0	0
	0	0	0	1.0000	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	12	12	5	0	0	0.4000	0.2000
	0.4000	0	0	0	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	13	13	17	0	0.1176	0.4118	0.2941
	0	0.1176	0.0588	0	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	14	14	46	0	0	0.5217	0.2609
	0.1304	0.0435	0.0435	0	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	15	15	142	0	0.0141	0.3521	0.3521
	0.1338	0.0915	0.0563	0	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	16	16	234	0	0	0.1923	0.3162
	0.2564	0.1197	0.0983	0.0171	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	17	17	176	0	0	0.0511	0.2727
	0.2955	0.1875	0.1477	0.0455	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	18	18	96	0	0.0104	0.0208	0.0833
	0.2292	0.3125	0.2917	0.0521	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	19	19	55	0	0.0182	0.0182	0
	0.1273	0.3273	0.3091	0.2000	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	20	20	6	0	0	0	0
	0.1667	0	0.5000	0.3333	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	21	21	3	0	0	0.3333	0.3333
	0	0	0.3333	0	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	12	12	4	0	0	0.2500	0.5000
	0.2500	0	0	0	0	0	0	0	0	0	0	0

2008	7	2	1	0	1	13	13	35	0	0	0.1143	0.6571
	0.2000	0.0286	0	0	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	14	14	87	0	0	0.0575	0.6322
	0.2874	0.0230	0	0	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	15	15	137	0	0	0.0657	0.7153
	0.1606	0.0438	0.0146	0	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	16	16	134	0	0.0075	0.0522	0.6045
	0.2612	0.0299	0.0373	0.0075	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	17	17	159	0	0	0.0063	0.5031
	0.3082	0.1069	0.0566	0.0189	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	18	18	70	0	0	0	0.3143
	0.4286	0.1286	0.1000	0.0286	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	19	19	28	0	0	0	0.2500
	0.3214	0.2857	0.1429	0	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	20	20	9	0	0	0	0.2222
	0	0.1111	0.3333	0.3333	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	21	21	1	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	23	23	1	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	15	15	1	0	0	1.0000	0
	0	0	0	0	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	16	16	10	0	0	0	0.6000
	0.4000	0	0	0	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	17	17	60	0	0.0167	0.0333	0.4167
	0.4333	0.0833	0.0167	0	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	18	18	64	0	0	0.0156	0.1875
	0.6719	0.0781	0.0313	0.0156	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	19	19	30	0	0	0	0.0667
	0.7000	0.1333	0.0667	0.0333	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	20	20	15	0	0	0	0
	0.4667	0.4667	0.0667	0	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	21	21	8	0	0	0	0
	0.1250	0.1250	0.3750	0.3750	0	0	0	0	0	0	0	0
2009	7	2	1	0	1	22	22	3	0	0	0.3333	0
	0	0	0	0.6667	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	12	12	2	0	0	0	0.5000
	0	0.5000	0	0	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	13	13	29	0	0	0.0345	0.2759
	0.4483	0.2069	0.0345	0	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	14	14	50	0	0	0.0800	0.3600
	0.3000	0.2400	0.0200	0	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	15	15	20	0	0	0	0.1500
	0.7000	0.1500	0	0	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	16	16	43	0	0	0.0465	0.2791
	0.5116	0.1163	0.0465	0	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	17	17	39	0	0	0	0.1026
	0.5128	0.3590	0.0256	0	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	18	18	27	0	0	0	0
	0.3333	0.5185	0.1111	0.0370	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	19	19	5	0	0	0	0
	0	0.8000	0.2000	0	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	12	12	1	0	0	1.0000	0
	0	0	0	0	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	13	13	12	0	0.0833	0.6667	0.2500
	0	0	0	0	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	14	14	21	0	0	0.3810	0.3810
	0.1429	0.0952	0	0	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	15	15	24	0	0	0.0833	0.2083
	0.3333	0.3333	0	0.0417	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	16	16	71	0	0	0.0141	0.2817
	0.2254	0.3803	0.0704	0.0282	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	17	17	243	0	0	0.0041	0.0576
	0.2263	0.5597	0.1358	0.0165	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	18	18	245	0	0	0.0041	0.0041
	0.0531	0.4776	0.3755	0.0857	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	19	19	71	0	0	0	0.0141
	0.0423	0.2676	0.6197	0.0563	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	20	20	14	0	0	0	0
	0.0714	0.3571	0.4286	0.1429	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	21	21	1	0	0	0	0
	0	0	1.0000	0	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	13	13	7	0	0	0.5714	0.1429
	0	0.1429	0.1429	0	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	14	14	46	0	0.0217	0.3696	0.4130
	0.1304	0.0435	0	0.0217	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	15	15	115	0	0	0.2348	0.4435
	0.1565	0.0870	0.0435	0.0348	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	16	16	151	0	0	0.0530	0.3576
	0.2980	0.1656	0.0993	0.0265	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	17	17	233	0	0	0.0043	0.0858
	0.2704	0.2876	0.2833	0.0687	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	18	18	163	0	0	0	0.0123
	0.1043	0.1779	0.5092	0.1963	0	0	0	0	0	0	0	0

2012	7	2	1	0	1	19	19	30	0	0	0	0
	0	0.1000	0.3333	0.5667	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	20	20	1	0	0	0	0
	0	0	1.0000	0	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	21	21	1	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	10	10	2	0	0	0	0.5000
	0	0	0	0.5000	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	12	12	1	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	13	13	10	0	0	0.6833	0.0792
	0.2375	0	0	0	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	14	14	59	0	0	0.6070	0.3358
	0.0337	0.0234	0	0	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	15	15	154	0	0	0.3149	0.4933
	0.1434	0.0443	0.0042	0	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	16	16	123	0	0	0.0939	0.5097
	0.2668	0.0654	0.0395	0.0246	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	17	17	101	0	0	0.0470	0.2620
	0.4430	0.1371	0.0701	0.0408	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	18	18	29	0	0	0	0.1105
	0.3547	0.3343	0.1541	0.0465	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	19	19	4	0	0	0	0
	0	0.5000	0.2500	0.2500	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	13	13	13	0	0	0.4615	0.5385
	0	0	0	0	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	14	14	78	0	0	0.2299	0.6494
	0.1073	0.0134	0	0	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	15	15	163	0	0	0.0910	0.6895
	0.2108	0.0088	0	0	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	16	16	256	0	0	0.0263	0.6379
	0.2747	0.0492	0.0119	0	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	17	17	94	0	0.0014	0.0338	0.4423
	0.3814	0.0763	0.0162	0.0486	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	18	18	25	0	0.0160	0.0040	0.4600
	0.2088	0.1960	0.1024	0.0128	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	19	19	26	0	0.1901	0.1268	0.0845
	0.5986	0	0	0	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	20	20	7	0	0.0353	0	0.8588
	0.1059	0	0	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	13	13	9	0	0	0.0640	0.3572
	0.5361	0.0427	0	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	14	14	34	0	0	0.2914	0.1554
	0.5028	0.0481	0.0023	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	15	15	113	0	0	0.3267	0.1931
	0.4342	0.0461	0	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	16	16	232	0	0	0.1536	0.2868
	0.4816	0.0688	0.0092	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	17	17	279	0	0	0.0221	0.2665
	0.5827	0.1212	0.0075	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	18	18	82	0	0	0	0.1393
	0.7458	0.1144	0.0004	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	19	19	15	0	0	0.0713	0.2851
	0.4276	0.1425	0.0736	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	20	20	10	0	0	0	0.2000
	0.7000	0.1000	0	0	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	21	21	4	0	0	0	0.2500
	0.2500	0.5000	0	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	12	12	2	0	0	0.5000	0.5000
	0	0	0	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	13	13	6	0	0	0.0133	0.9009
	0.0286	0.0286	0.0286	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	14	14	32	0	0.0018	0.1420	0.8392
	0.0036	0.0057	0.0039	0.0039	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	15	15	72	0	0.0004	0.7195	0.1680
	0.0937	0.0184	0	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	16	16	85	0	0	0.4636	0.2927
	0.0487	0.1584	0.0366	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	17	17	98	0	0	0.2291	0.4896
	0.1252	0.1353	0.0208	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	18	18	59	0	0	0.1753	0.3335
	0.2984	0.1753	0.0175	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	19	19	40	0	0	0.0500	0.2500
	0.2500	0.4250	0.0250	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	20	20	22	0	0	0	0.3636
	0.3636	0.2727	0	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	21	21	13	0	0	0	0.3077
	0.2308	0.4615	0	0	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	22	22	2	0	0	0.5000	0.5000
	0	0	0	0	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	13	13	2	0	0	0.5000	0.5000
	0	0	0	0	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	14	14	54	0	0.0007	0.2355	0.5681
	0.1761	0.0196	0	0	0	0	0	0	0	0	0	0

2017	7	2	1	0	1	15	15	108	0	0	0.1948	0.5487
	0.2031	0.0428	0.0107	0	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	16	16	174	0	0	0.1652	0.6706
	0.1156	0.0304	0.0183	0	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	17	17	139	0	0	0.0891	0.6964
	0.1480	0.0518	0.0148	0	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	18	18	35	0	0	0.1143	0.5714
	0.2286	0.0286	0.0286	0.0286	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	19	19	7	0	0	0	0.4286
	0.5714	0	0	0	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	21	21	1	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	12	12	1	0	0	1.0000	0
	0	0	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	13	13	3	0	0	0.6667	0.3333
	0	0	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	14	14	5	0	0	0	0.4000
	0.4000	0.2000	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	15	15	19	0	0	0.5263	0.2105
	0.2105	0.0526	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	16	16	24	0	0	0.3750	0.3333
	0.2917	0	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	17	17	38	0	0	0	0.3947
	0.4737	0.1053	0.0263	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	18	18	15	0	0	0	0.2000
	0.8000	0	0	0	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	19	19	4	0	0	0	0
	1.0000	0	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	14	14	1	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	15	15	7	0	0	0.1429	0.8571
	0	0	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	16	16	19	0	0	0	0.8421
	0.1579	0	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	17	17	14	0	0	0	0.5714
	0.3571	0.0714	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	18	18	7	0	0	0	0
	0.2857	0.7143	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	19	19	1	0	0	0	0
	0	1.0000	0	0	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	20	20	1	0	0	0	0
	0	0	0	1.0000	0	0	0	0	0	0	0	0
2002	7	2	2	0	1	13	13	1	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2002	7	2	2	0	1	14	14	8	0	0	0	0
	0	0	0	0	0	0	0.1250	0.6250	0.2500	0	0	0
2002	7	2	2	0	1	15	15	15	0	0	0	0
	0	0	0	0	0	0	0.2667	0.4000	0.3333	0	0	0
2002	7	2	2	0	1	16	16	12	0	0	0	0
	0	0	0	0	0	0	0.0833	0.2500	0.5000	0.0833	0.0833	0
2002	7	2	2	0	1	17	17	4	0	0	0	0
	0	0	0	0	0	0	0	0.2500	0.5000	0.2500	0	0
2002	7	2	2	0	1	19	19	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1.0000
2003	7	2	2	0	1	13	13	6	0	0	0	0
	0	0	0	0	0	0	0.1667	0.6667	0.1667	0	0	0
2003	7	2	2	0	1	14	14	46	0	0	0	0
	0	0	0	0	0	0	0.0217	0.7174	0.2174	0.0435	0	0
2003	7	2	2	0	1	15	15	66	0	0	0	0
	0	0	0	0	0	0	0.0303	0.5455	0.3182	0.0909	0.0152	0
2003	7	2	2	0	1	16	16	55	0	0	0	0
	0	0	0	0	0	0	0.0727	0.3818	0.2909	0.2364	0.0182	0
2003	7	2	2	0	1	17	17	48	0	0	0	0
	0	0	0	0	0	0	0	0.1250	0.3542	0.4375	0.0417	0.0417
2003	7	2	2	0	1	18	18	27	0	0	0	0
	0	0	0	0	0	0	0.0370	0.0370	0.1481	0.6296	0.1111	0.0370
2003	7	2	2	0	1	20	20	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	1.0000	0	0
2004	7	2	2	0	1	12	12	1	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2004	7	2	2	0	1	13	13	3	0	0	0	0
	0	0	0	0	0	0	0	0.6667	0.3333	0	0	0
2004	7	2	2	0	1	14	14	13	0	0	0	0
	0	0	0	0	0	0	0.0769	0.6154	0.2308	0.0769	0	0
2004	7	2	2	0	1	15	15	14	0	0	0	0
	0	0	0	0	0	0	0.0714	0.3571	0.4286	0.0714	0.0714	0
2004	7	2	2	0	1	16	16	68	0	0	0	0
	0	0	0	0	0	0	0.0294	0.5294	0.3971	0.0441	0	0
2004	7	2	2	0	1	17	17	66	0	0	0	0
	0	0	0	0	0	0	0.0303	0.2424	0.5606	0.1061	0.0606	0
2004	7	2	2	0	1	18	18	9	0	0	0	0
	0	0	0	0	0	0	0	0	0.3333	0.3333	0.3333	0
2004	7	2	2	0	1	19	19	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.5000	0.5000	0

2004	7	2	2	0	1	20	20	1	0	0	0	0
	0	0	0	0	0	0	0	0	1.0000	0	0	0
2006	7	2	2	0	1	12	12	2	0	0	0	0
	0	0	0	0	0	0	0.5000	0	0.5000	0	0	0
2006	7	2	2	0	1	13	13	2	0	0	0	0
	0	0	0	0	0	0	0	0.5000	0.5000	0	0	0
2006	7	2	2	0	1	14	14	29	0	0	0	0
	0	0	0	0	0	0	0.0345	0.1724	0.5517	0.2414	0	0
2006	7	2	2	0	1	15	15	22	0	0	0	0
	0	0	0	0	0	0	0.0909	0.0455	0.2727	0.5909	0	0
2006	7	2	2	0	1	16	16	9	0	0	0	0
	0	0	0	0	0	0	0.2222	0.1111	0.1111	0.4444	0	0.1111
2006	7	2	2	0	1	17	17	5	0	0	0	0
	0	0	0	0	0	0	0	0.2000	0.8000	0	0	0
2006	7	2	2	0	1	18	18	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0.5000	0.5000	0
2007	7	2	2	0	1	12	12	3	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2007	7	2	2	0	1	13	13	13	0	0	0	0
	0	0	0	0	0	0	0.6923	0.3077	0	0	0	0
2007	7	2	2	0	1	14	14	33	0	0	0	0
	0	0	0	0	0	0	0.3333	0.3939	0.0303	0.2121	0.0303	0
2007	7	2	2	0	1	15	15	38	0	0	0	0
	0	0	0	0	0	0	0.1842	0.3947	0.0526	0.1316	0.2368	0
2007	7	2	2	0	1	16	16	5	0	0	0	0
	0	0	0	0	0	0	0.2000	0.4000	0	0.4000	0	0
2007	7	2	2	0	1	17	17	5	0	0	0	0
	0	0	0	0	0	0	0.2000	0	0.2000	0.4000	0.2000	0
2008	7	2	2	0	1	11	11	1	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2008	7	2	2	0	1	12	12	2	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2008	7	2	2	0	1	13	13	5	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2008	7	2	2	0	1	14	14	4	0	0	0	0
	0	0	0	0	0	0	0	0.5000	0.5000	0	0	0
2008	7	2	2	0	1	16	16	10	0	0	0	0
	0	0	0	0	0	0	0.1000	0.9000	0	0	0	0
2008	7	2	2	0	1	17	17	18	0	0	0	0
	0	0	0	0	0	0	0.0556	0.6667	0.2778	0	0	0
2008	7	2	2	0	1	18	18	14	0	0	0	0
	0	0	0	0	0	0	0.0714	0.5714	0.2143	0.1429	0	0
2008	7	2	2	0	1	19	19	3	0	0	0	0
	0	0	0	0	0	0	0	0.3333	0	0.3333	0.3333	0
2008	7	2	2	0	1	20	20	1	0	0	0	0
	0	0	0	0	0	0	0	0	1.0000	0	0	0
2009	7	2	2	0	1	15	15	4	0	0	0	0
	0	0	0	0	0	0	0.2500	0.7500	0	0	0	0
2009	7	2	2	0	1	16	16	27	0	0	0	0
	0	0	0	0	0	0	0.0741	0.4815	0.4074	0.0370	0	0
2009	7	2	2	0	1	17	17	41	0	0	0	0
	0	0	0	0	0	0	0	0.3415	0.5610	0.0976	0	0
2009	7	2	2	0	1	18	18	15	0	0	0	0
	0	0	0	0	0	0	0	0.2667	0.6000	0.1333	0	0
2009	7	2	2	0	1	19	19	21	0	0	0	0
	0	0	0	0	0	0	0	0.4286	0.2857	0.1905	0.0476	0.0476
2009	7	2	2	0	1	20	20	5	0	0	0	0
	0	0	0	0	0	0	0	0	0.6000	0	0.2000	0.2000
2009	7	2	2	0	1	21	21	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1.0000
2009	7	2	2	0	1	22	22	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1.0000
2011	7	2	2	0	1	16	16	7	0	0	0	0
	0	0	0	0	0	0	0.1429	0	0.2857	0.5714	0	0
2011	7	2	2	0	1	17	17	14	0	0	0	0
	0	0	0	0	0	0	0	0.0714	0.2857	0.5000	0.1429	0
2011	7	2	2	0	1	18	18	4	0	0	0	0
	0	0	0	0	0	0	0	0	0.2500	0.7500	0	0
2012	7	2	2	0	1	12	12	1	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2012	7	2	2	0	1	13	13	13	0	0	0	0
	0	0	0	0	0	0	0.4615	0.4615	0.0769	0	0	0
2012	7	2	2	0	1	14	14	3	0	0	0	0
	0	0	0	0	0	0	0.6667	0.3333	0	0	0	0
2012	7	2	2	0	1	15	15	3	0	0	0	0
	0	0	0	0	0	0	0.3333	0.3333	0	0	0.3333	0
2013	7	2	2	0	1	11	11	1	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2013	7	2	2	0	1	12	12	4	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2013	7	2	2	0	1	13	13	4	0	0	0	0
	0	0	0	0	0	0	0.7949	0.2051	0	0	0	0
2013	7	2	2	0	1	14	14	7	0	0	0	0
	0	0	0	0	0	0	0.2857	0.4286	0.2857	0	0	0

2013	7	2	2	0	1	15	15	40	0	0	0	0
	0	0	0	0	0	0	0.0979	0.2416	0.3670	0.2691	0.0245	0
2013	7	2	2	0	1	16	16	70	0	0	0	0
	0	0	0	0	0	0	0.0143	0.0857	0.4857	0.3714	0.0429	0
2013	7	2	2	0	1	17	17	12	0	0	0	0
	0	0	0	0	0	0	0	0	0.5000	0.4167	0.0833	0
2013	7	2	2	0	1	18	18	1	0	0	0	0
	0	0	0	0	0	0	0	0	1.0000	0	0	0
2014	7	2	2	0	1	17	17	1	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2015	7	2	2	0	1	13	13	3	0	0	0	0
	0	0	0	0	0	0	0.6667	0	0.3333	0	0	0
2015	7	2	2	0	1	14	14	2	0	0	0	0
	0	0	0	0	0	0	0.5000	0	0.5000	0	0	0
2015	7	2	2	0	1	15	15	2	0	0	0	0
	0	0	0	0	0	0	0.9317	0.0683	0	0	0	0
2015	7	2	2	0	1	17	17	1	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2015	7	2	2	0	1	18	18	1	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2016	7	2	2	0	1	14	14	1	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2016	7	2	2	0	1	15	15	1	0	0	0	0
	0	0	0	0	0	0	0	0	1.0000	0	0	0
2017	7	2	2	0	1	14	14	1	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0

2019	12.99	3	1	0	1	8	8	7	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	9	9	6	0.1667	0.6667	0	0.1667
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	10	10	13	0	0.6667	0.1667	0.1667
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	11	11	10	0	0	1.0000	0
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	12	12	32	0	0	0.6667	0.3333
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	13	13	9	0	0	0.4000	0.4000
	0.2000	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	14	14	5	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	1	0	1	16	16	2	0	0	0	0.5000
	0	0.5000	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	8	8	1	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	9	9	2	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	10	10	3	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	11	11	9	0	0.5000	0.5000	0
	0	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	12	12	24	0	0	0.8333	0.0833
	0.0833	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	13	13	4	0	0	0.7500	0.2500
	0	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	14	14	4	0	0.2500	0.5000	0
	0.2500	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	15	15	7	0	0	0.2000	0.2000
	0.6000	0	0	0	0	0	0	0	0	0	0	0
2020	12.99	3	1	0	1	16	16	5	0	0	0	0.4000
	0.6000	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	7	7	1	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	8	8	8	0	0.8889	0.1111	0
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	9	9	7	0	0.7143	0.2857	0
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	10	10	11	0	0.5000	0.4000	0.1000
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	11	11	11	0	0	0.5714	0.4286
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	12	12	29	0	0	0.7143	0.2857
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	13	13	14	0	0	0.6923	0.2308
	0.0769	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	14	14	5	0	0	1.0000	0
	0	0	0	0	0	0	0	0	0	0	0	0
2021	12.99	3	1	0	1	15	15	2	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	7	7	1	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	8	8	1	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

2022	12.99	3	1	0	1	9	9	1	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	10	10	5	0	0.6667	0.3333	0
	0	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	11	11	15	0	0	0.8000	0.2000
	0	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	12	12	43	0	0	0.4167	0.4167
	0.1667	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	13	13	12	0	0	0	0.5000
	0	0.5000	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	14	14	10	0	0	0.6667	0.3333
	0	0	0	0	0	0	0	0	0	0	0	0
2022	12.99	3	1	0	1	16	16	2	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	7	7	1	1.0000	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	8	8	6	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	9	9	2	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	10	10	3	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	11	11	11	0	0.8333	0.1667	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	12	12	18	0	0.7778	0.2222	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	13	13	10	0	1.0000	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
2023	12.99	3	1	0	1	14	14	4	0	0	0	1.0000
	0	0	0	0	0	0	0	0	0	0	0	0
2019	12.99	3	2	0	1	7	7	1	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2019	12.99	3	2	0	1	8	8	4	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2019	12.99	3	2	0	1	9	9	8	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2019	12.99	3	2	0	1	10	10	51	0	0	0	0
	0	0	0	0	0	0.6667	0.1111	0.2222	0	0	0	0
2019	12.99	3	2	0	1	11	11	15	0	0	0	0
	0	0	0	0	0	0.6000	0.2000	0.2000	0	0	0	0
2019	12.99	3	2	0	1	12	12	13	0	0	0	0
	0	0	0	0	0	0.4000	0.3000	0.3000	0	0	0	0
2019	12.99	3	2	0	1	13	13	8	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2019	12.99	3	2	0	1	15	15	1	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2020	12.99	3	2	0	1	8	8	1	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2020	12.99	3	2	0	1	9	9	5	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2020	12.99	3	2	0	1	10	10	31	0	0	0	0
	0	0	0	0	0	0.3846	0.6154	0	0	0	0	0
2020	12.99	3	2	0	1	11	11	17	0	0	0	0
	0	0	0	0	0	0.6667	0.3333	0	0	0	0	0
2020	12.99	3	2	0	1	12	12	8	0	0	0	0
	0	0	0	0	0	0.6667	0.3333	0	0	0	0	0
2020	12.99	3	2	0	1	13	13	6	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2020	12.99	3	2	0	1	14	14	3	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2021	12.99	3	2	0	1	7	7	1	0	0	0	0
	0	0	0	0	0.3333	0.6667	0	0	0	0	0	0
2021	12.99	3	2	0	1	8	8	4	0	0	0	0
	0	0	0	0	0	0.9000	0.1000	0	0	0	0	0
2021	12.99	3	2	0	1	9	9	14	0	0	0	0
	0	0	0	0	0	0.5000	0.5000	0	0	0	0	0
2021	12.99	3	2	0	1	10	10	42	0	0	0	0
	0	0	0	0	0	0.3793	0.5862	0.0345	0	0	0	0
2021	12.99	3	2	0	1	11	11	22	0	0	0	0
	0	0	0	0	0	0.1176	0.7059	0.1765	0	0	0	0
2021	12.99	3	2	0	1	12	12	12	0	0	0	0
	0	0	0	0	0	0	0.6250	0.2500	0.1250	0	0	0
2021	12.99	3	2	0	1	13	13	5	0	0	0	0
	0	0	0	0	0	0	0.5000	0.2500	0.2500	0	0	0
2021	12.99	3	2	0	1	14	14	3	0	0	0	0
	0	0	0	0	0	0	0	0.6667	0	0.3333	0	0
2021	12.99	3	2	0	1	15	15	1	0	0	0	0
	0	0	0	0	0	0	0	1.0000	0	0	0	0
2022	12.99	3	2	0	1	8	8	1	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2022	12.99	3	2	0	1	9	9	12	0	0	0	0
	0	0	0	0	0	0.8000	0.2000	0	0	0	0	0
2022	12.99	3	2	0	1	10	10	37	0	0	0	0
	0	0	0	0	0	0.6111	0.3889	0	0	0	0	0

2022	12.99	3	2	0	1	11	11	19	0	0	0	0
	0	0	0	0	0	0	1.0000	0	0	0	0	0
2022	12.99	3	2	0	1	12	12	19	0	0	0	0
	0	0	0	0	0	0.1667	0.6667	0.1667	0	0	0	0
2022	12.99	3	2	0	1	13	13	9	0	0	0	0
	0	0	0	0	0	0	0.5000	0.5000	0	0	0	0
2023	12.99	3	2	0	1	8	8	2	0	0	0	0
	0	0	0	0	0.1667	0.8333	0	0	0	0	0	0
2023	12.99	3	2	0	1	9	9	2	0	0	0	0
	0	0	0	0	0.3333	0.6667	0	0	0	0	0	0
2023	12.99	3	2	0	1	10	10	14	0	0	0	0
	0	0	0	0	0	0.3333	0.6667	0	0	0	0	0
2023	12.99	3	2	0	1	11	11	15	0	0	0	0
	0	0	0	0	0	1.0000	0	0	0	0	0	0
2023	12.99	3	2	0	1	12	12	18	0	0	0	0
	0	0	0	0	0	0.7000	0.3000	0	0	0	0	0
2023	12.99	3	2	0	1	13	13	9	0	0	0	0
	0	0	0	0	0	0.6667	0.3333	0	0	0	0	0
-9999	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

#
0 # Use_MeanSize-at-Age_obs (0/1)
#
0 # N_environ_variables
-2 in yr will subtract mean for that env_var; -1 will subtract mean and divide by stddev (e.g. Z-score)
#Yr Variable Value
#
0 # N sizefreq methods to read
#
0 # do tags (0/1)
#
0 # morphcomp data(0/1)
Nobs, Nmorphs, mincomp
yr, seas, type, partition, Nsamp, datavector_by_Nmorphs
#
0 # Do dataread for selectivity priors(0/1)
Yr, Seas, Fleet, Age/Size, Bin, selex_prior, prior_sd
feature not yet implemented
#
999

ENDDATA

Control

#V3.30.20.00;_safe;_compile_date:_Sep 30 2022;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_13.0
#_Stock_Synthesis_is_a_work_of_the_U.S._Government_and_is_not_subject_to_copyright_protection_in_the_United_States.
#_Foreign_copyrights_may_apply._See_copyright.txt_for_more_information.
#_User_support_available_at:NMFS.Stock.Synthesis@noaa.gov
#_User_info_available_at:https://vlab.noaa.gov/group/stock-synthesis
#_Source_code_at:_https://github.com/nmfs-stock-synthesis/stock-synthesis

#C growth parameters are estimated
#C spawner-recruitment bias adjustment Not tuned For optimality
#_data_and_control_files: Seatrout_dat.ss // Seatrout_ctl.ss
0 # 0 means do not read wtatage.ss; 1 means read and use wtatage.ss and also read and use growth parameters
1 #_N_Growth_Patterns (Growth Patterns, Morphs, Bio Patterns, GP are terms used interchangeably in SS3)
1 #_N_platoons_Within_GrowthPattern
#_Cond 1 #_Platoon_within/between_stdev_ratio (no read if N_platoons=1)
#_Cond 1 #vector_platoon_dist_(-1_in_first_val_gives_normal_approx)
#
4 # recr_dist_method for parameters: 2=main effects for GP, Area, Settle timing; 3=each Settle entity; 4=none (only when N_GP*Nsettle*pop==1)
1 # not yet implemented; Future usage: Spawner-Recruitment: 1=global; 2=by area
1 # number of recruitment settlement assignments
0 # unused option
#GPattern month area age (for each settlement assignment)
 1 1 1 0
#
#_Cond 0 # N_movement_definitions goes here if Nareas > 1
#_Cond 1.0 # first age that moves (real age at begin of season, not integer) also cond on do_migration>0
#_Cond 1 1 1 2 4 10 # example move definition for seas=1, morph=1, source=1 dest=2, age1=4, age2=10
#
2 #_Nblock_Patterns
 2 2 #_blocks_per_pattern
begin and end years of blocks
1955 2012 2013 2023
1955 1995 1996 2023
#
controls for all timevary parameters
1 #_time-vary parm bound check (1=warn relative to base parm bounds; 3=no bound check); Also see env (3) and dev (5) options to constrain with base bounds
#
AUTOGEN

```
 1 1 1 1 1 # autogen: 1st element for biology, 2nd for SR, 3rd for Q, 4th reserved, 5th for selex
# where: 0 = autogen time-varying parms of this category; 1 = read each time-varying parm line; 2 = read then autogen if parm min==-12345
#
#_Available timevary codes
#_Block types: 0: P_block=P_base*exp(TVP); 1: P_block=P_base+TVP; 2: P_block=TVP; 3: P_block=P_block(-1) + TVP
#_Block_trends: -1: trend bounded by base parm min-max and parms in transformed units (beware); -2: endtrend and infl_year direct values; -3: end and infl as fraction of base range
#_EnvLinks:  1: P(y)=P_base*exp(TVP*env(y));  2: P(y)=P_base+TVP*env(y);  3: P(y)=f(TVP,env_Zscore) w/ logit to stay in min-max;  4: P(y)=2.0/(1.0+exp(-TVP1*env(y) - TVP2))
#_DevLinks:  1: P(y)*=exp(dev(y)*dev_se;  2: P(y)+=dev(y)*dev_se;  3: random walk;  4: zero-reverting random walk with rho;  5: like 4 with logit transform to stay in base min-max
#_DevLinks(more):  21-25 keep last dev for rest of years
#
#_Prior_codes:  0=none; 6=normal; 1=symmetric beta; 2=CASAL's beta; 3=lognormal; 4=lognormal with biascorr; 5=gamma
#
# setup for M, growth, wt-len, maturity, fecundity, (hermaphro), recr_distr, cohort_grow, (movement), (age error), (catch_mult), sex ratio
#_NATMORT
3 #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4=agespec_withseasinterpolate;_5=BETA:_Maunder_link_to_maturity;_6=Lorenzen_range
#0 20  #Lorenzen Age Range
1.197   0.639   0.523   0.478   0.458   0.448   0.443   0.439
1.354   0.683   0.535   0.474   0.442   0.424   0.414   0.405

#
1 # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_specific_K_incr; 4=age_specific_K_decr; 5=age_specific_K_each; 6=NA; 7=NA; 8=growth cessation
0.5 #_Age(post-settlement)_for_L1;linear growth below this
999 #_Growth_Age_for_L2 (999 to use as Linf)
-998 #_exponential decay for growth above maxage (value should approx initial Z; -999 replicates 3.24; -998 to not allow growth above maxage)*************
0  #_placeholder for future growth feature
# number of K multipliers to read
# ages for K multiplier
#
0 #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
1 #_CV_Growth_Pattern:  0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A); 4 logSD=F(A)
#
4 #_maturity_option:  1=length logistic; 2=age logistic; 3=read age-maturity matrix by growth_pattern; 4=read age-fecundity; 5=disabled; 6=read length-maturity
0       0       199638  684787  882830  1002909 1071264 1124549

2 #_First_Mature_Age
3 #_fecundity_at_length option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b; (4)eggs=a+b*L; (5)eggs=a+b*W
0 #_hermaphroditism option:  0=none; 1=female-to-male age-specific fxn; -1=male-to-female age-specific fxn
1 #_parameter_offset_approach for M, G, CV_G:  1- direct, no offset**; 2- male=fem_parm*exp(male_parm); 3: male=female*exp(parm) then old=young*exp(parm)
#_** in option 1, any male parameter with value = 0.0 and phase <0 is set equal to female parameter
#
#_growth_parms
#_ LO HI INIT PRIOR PR_SD PR_type PHASE env_var&link dev_link dev_minyr dev_maxyr dev_PH Block Block_Fxn
# Sex: 1  BioPattern: 1  NatMort
#0.1    2       0.1530  0       0       0       -1      0       0       0       0       0       0
        0       #       N_Mort
# Sex: 1  BioPattern: 1  Growth
1       4       2       0.1     0.05    0       4       0       0       0       0       0       0
        0       #       L_at_Amin_Fem_1
15      25      17.94   17.94   0.05    0       -4      0       0       0       0       0       0
        0       #       L_at_Amax_Fem_1
0.3     0.7     0.629   0.629   0.05    0       -4      0       0       0       0       0       0
        0       #       VonBert_K_Fem_1
0.05    0.15    0.1     0.1     0.05    0       4       0       0       0       0       0       0
        0       #       CV_young_Fem_1
0.2     0.3     0.25    0.1     0.05    0       4       0       0       0       0       0       0
        0       #       CV_old_Fem_1

# Sex: 1  BioPattern: 1  WtLen
 0      1       0.000833        0.000833        0.05    0       -1      0       0       0       0       0       0
        0 # Wtlen_1_Fem_GP_1
 2      4       2.673   2.673   0.05    0       -1      0       0       0       0       0       0
        0 # Wtlen_2_Fem_GP_1
# Sex: 1  BioPattern: 1  Maturity&Fecundity
 10     20      14.11   14.11   0.05    0       -1      0       0       0       0       0       0
        0 # Mat50%_Fem_GP_1
 -2     1       -0.5418 -0.5418 0.05    0       -1      0       0       0       0       0       0
        0 # Mat_slope_Fem_GP_1
 1      1       1       1       0.8     0       -1      0       0       0       0       0       0
        0 # Eggs_scalar_Fem_GP_1
 1      1       1       1       0.8     0       -1      0       0       0       0       0       0
        0 # Eggs_exp_wt_Fem_GP_1
# Sex: 2  BioPattern: 1  NatMort
#0.2    2       0       0       0       0       -1      0       0       0       0       0       0
        0       #       N_Mort
# Sex: 2  BioPattern: 1  Growth
0       5       0       0       0       0       -4      0       0       0       0       0       0
        0       #       L_at_Amin_Fem_1
12      50      18.44   18.44   0       0       -4      0       0       0       0       0       0
        0       #       L_at_Amax_Fem_1
0.3     0.6     0.455   0.455   0       0       -4      0       0       0       0       0       0
        0       #       VonBert_K_Fem_1
0       0.3     0.2     0       0       0       4       0       0       0       0       0       0
        0       #       CV_young_Fem_1
```

0 0.6 0 0 0 0 -4 0 0 0 0 0 0
0 # CV_old_Fem_1
Sex: 2 BioPattern: 1 WtLen
0 1 0.000833 0.000833 0.05 0 -1 0 0 0 0 0 0
0 # Wtlen_1_Male_GP_1
2 4 2.673 2.673 0.05 0 -1 0 0 0 0 0 0
0 # Wtlen_2_Male_GP_1
Hermaphroditism
Recruitment Distribution
Cohort growth dev base
0.1 10 1 1 1 0 -1 0 0 0 0 0 0
0 # CohortGrowDev
Movement
Age Error from parameters
catch multiplier
fraction female, by GP
0.1 1 0.5 0.5 0 0 -4 0 0 0 0 0 0
0 # FracFemale_GP_1
M2 parameter for each predator fleet
#
#_no timevary MG parameters
#
#_seasonal_effects_on_biology_parms
0 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,malewtlen2,L1,K
#_ LO HI INIT PRIOR PR_SD PR_type PHASE
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
#
3 #_Spawner-Recruitment; Options: 1=NA; 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop; 7=survival_3Parm; 8=Shepherd_3Parm; 9=RickerPower_3parm
1 # 0/1 to use steepness in initial equ recruitment calculation
0 # future feature: 0/1 to make realized sigmaR a function of SR curvature
#LO HI INIT PRIOR PR_SD PR_type PHASE env-var use_dev dev_mnyr
dev_mxyr dev_PH Block Blk_Fxn # parm_name
10 16 12 11 0.05 0 1 0 0
0 0 0 0 0 # SR_LN(R0)
0.5 1 0.99 0.99 0.05 0 -7 0 0
0 0 0 0 0 # SR_BH_steep
0.1 0.7 0.5 0.5 0.05 0 7 0 0 0 0
0 0 0 # SR_sigmaR
-5 5 0 0 0.05 0 -1 0 0 0 0
0 0 0 # SR_regime
0 0 0 0 0 0 -1 0 0 0 0
0 0 0 # SR_autocorr
#_no timevary SR parameters
1 #do_recdev: 0=none; 1=devvector (R=F(SSB)+dev); 2=deviations (R=F(SSB)+dev); 3=deviations (R=R0*dev; dev2=R-f(SSB)); 4=like 3 with sum(dev2) adding penalty
1986 # first year of main recr_devs; early devs can preceed this era
2021 # last year of main recr_devs; forecast devs start in following year
5 #_recdev phase
1 # (0/1) to read 13 advanced options
0 #_Cond 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
6 #_Cond -4 #_recdev_early_phase
-1 #_Cond 0 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxphase+1)
1 #_Cond 1 #_lambda for Fcast_recr_like occurring before endyr+1
1968.8 #_Cond 982 #_last_yr_nobias_adj_in_MPD; begin of ramp
1993.8 #_Cond 1976 #_first_yr_fullbias_adj_in_MPD; begin of plateau
2018.1 #_Cond 2019 #_last_yr_fullbias_adj_in_MPD
2032.1 #_Cond 2022 #_First_recent_yr_nobias_adj_in_MPD (can be in forecast to shape ramp, but SS3 sets bias_adj to 0.0 for fcast yrs)
0.8147 #_Cond 1 #_max_bias_adj_in_MPD (typical ~0.8; -3 sets all years to 0.0; -2 sets all non-forecast yrs w/ estimated recdevs to 1.0; -1 sets biasadj=1.0 for all yrs w/ recdevs)
0 #_Cond 0 #_period of cycles in recruitment (N parms read below)
-5 #_Cond -5 #min rec_dev
5 #_Cond 5 #max rec_dev
0 #_Cond 0 #_read_recdevs
#_end of advanced SR options
#
#_placeholder for full parameter lines for recruitment cycles
read specified recr devs
#_Yr Input_value
#
all recruitment deviations

#Fishing Mortality info
0.3 # F ballpark value in units of annual_F
-2001 # F ballpark year (neg value to disable)
4 # F_Method: 1=Pope midseason rate; 2=F as parameter; 3=F as hybrid; 4=fleet-specific parm/hybrid (#4 is superset of #2 and #3 and is recommended)
3.9 # max F (methods 2-4) or harvest fraction (method 1)
#Fleet Parameter Phase
1 0.2 99
2 0.2 99
-9999 0 0
4 # N iterations for tuning in hybrid mode; recommend 3 (faster) to 5 (more precise if many fleets)
#
#_initial_F_parms; for each fleet x season that has init_catch; nest season in fleet; count = 2
overall start F value; overall phase; N detailed inputs to read
#_for unconstrained init_F, use an arbitrary initial catch and set lambda=0 for its logL
#LO HI INIT PRIOR PR_SD PR_type PHASE

```
#0	0.05	0.002	0.1	0.05	0	1 # InitF_seas_1_flt_1FISHERY1
0	0.005	0.001	0.1	0.05	0	1 # InitF_seas_1_flt_2FISHERY2
#
# F rates by fleet x season
# Yr:  1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021
# seas:  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
# FISHERY1 9.82304e-05 3.72409e-05 7.38148e-06 2.72446e-05 7.16417e-05 7.40515e-05 7.96852e-05 0.000104733 8.3897e-05 0.000288107 0.000274882 0.000279637 0.000475506 0.000675889 0.000743153 0.000964839 0.00123204 0.00188252 0.0023705 0.00254327 0.00219753 0.00284675 0.00303124 0.0037502 0.00578817 0.00511713 0.00773471 0.00949694 0.00868472 0.0122432 0.0152069 0.0135373 0.010036 0.0160772 0.0243028 0.0288925 0.0178388 0.0297319 0.0395718 0.037092
# FISHERY2 9.55191e-05 0.000110698 5.87194e-05 4.25583e-05 5.82148e-05 5.847e-05 5.1623e-05 6.79603e-05 3.75276e-05 8.95674e-05 9.01642e-05 0.000133202 0.00015005 0.000118968 0.000170963 0.000147799 3.59702e-05 2.94626e-05 1.87282e-05 6.05319e-05 4.55848e-05 1.40925e-05 1.64449e-05 1.56414e-05 2.07295e-06 1.25118e-05 1.31774e-05 1.51364e-06 3.94684e-07 4.69933e-07 2.5259e-07 3.89049e-06 4.21031e-06 8.85591e-06 1.03866e-05 2.48013e-05 3.35468e-05 2.23036e-06 2.76545e-06 3.0888e-06
#
#_Q_setup for fleets with cpue or survey data
#_1:  fleet number
#_2:  link type: (1=simple q, 1 parm; 2=mirror simple q, 1 mirrored parm; 3=q and power, 2 parm; 4=mirror with offset, 2 parm)
#_3:  extra input for link, i.e. mirror fleet# or dev index number
#_4:  0/1 to select extra sd parameter
#_5:  0/1 for biasadj or not
#_6:  0/1 to float
#fleet	link link_info  extra_se  biasadj  float  #  fleetname
3	1	0	0	0	0  #  SURVEY1
-9999 0 0 0 0 0
#
#_Q_parms(if_any);Qunits_are_ln(q)
#LO	HI	INIT	PRIOR	PR_SD	PR_type	PHASE	env-var	use_dev	dev_mnyr	dev_mxyr	dev_PH	Block	Blk_Fxn  #  parm_name
-20	-1	-11	0	1	0	-2	0	0	0	0	0	1	2  #  LnQ_base_SURVEY1(3)

# timevary Q parameters
#LO	HI INIT	PRIOR	PR_SD	PR_type	PHASE	#  parm_name
-15		-7	-11	-8	0.05		0	2	# LnQ_base_SURVEY1(3)_BLK1repl_1986
-15		-7	-11	-8	0.05		0	2	# LnQ_base_SURVEY1(3)_BLK1repl_2013

# info on dev vectors created for Q parms are reported with other devs after tag parameter section
#
#_size_selex_patterns
#Pattern:_0;  parm=0; selex=1.0 for all sizes
#Pattern:_1;  parm=2; logistic; with 95% width specification
#Pattern:_5;  parm=2; mirror another size selex; PARMS pick the min-max bin to mirror
#Pattern:_11; parm=2; selex=1.0  for specified min-max population length bin range
#Pattern:_15; parm=0; mirror another age or length selex
#Pattern:_6;  parm=2+special; non-parm len selex
#Pattern:_43; parm=2+special+2;  like 6, with 2 additional param for scaling (average over bin range)
#Pattern:_8;  parm=8; double_logistic with smooth transitions and constant above Linf option
#Pattern:_9;  parm=6; simple 4-parm double logistic with starting length; parm 5 is first length; parm 6=1 does desc as offset
#Pattern:_21; parm=2+special; non-parm len selex, read as pairs of size, then selex
#Pattern:_22; parm=4; double_normal as in CASAL
#Pattern:_23; parm=6; double_normal where final value is directly equal to sp(6) so can be >1.0
#Pattern:_24; parm=6; double_normal with sel(minL) and sel(maxL), using joiners
#Pattern:_2;  parm=6; double_normal with sel(minL) and sel(maxL), using joiners, back compatibile version of 24 with 3.30.18 and older
#Pattern:_25; parm=3; exponential-logistic in length
#Pattern:_27; parm=special+3; cubic spline in length; parm1==1 resets knots; parm1==2 resets all
#Pattern:_42; parm=special+3+2; cubic spline; like 27, with 2 additional param for scaling (average over bin range)
#_discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_discarded_dead;_4=define_dome-shaped_retention
#_Pattern Discard Male Special
24	0	0	0	#	1	FISHERY1
24	0	0	0	#	2	FISHERY2
24	0	0	0	#	3	SURVEY1



#
#_age_selex_patterns
#Pattern:_0; parm=0; selex=1.0 for ages 0 to maxage
#Pattern:_10; parm=0; selex=1.0 for ages 1 to maxage
#Pattern:_11; parm=2; selex=1.0  for specified min-max age
#Pattern:_12; parm=2; age logistic
#Pattern:_13; parm=8; age double logistic. Recommend using pattern 18 instead.
#Pattern:_14; parm=nages+1; age empirical
#Pattern:_15; parm=0; mirror another age or length selex
#Pattern:_16; parm=2; Coleraine - Gaussian
#Pattern:_17; parm=nages+1; empirical as random walk  N parameters to read can be overridden by setting special to non-zero
#Pattern:_41; parm=2+nages+1; // like 17, with 2 additional param for scaling (average over bin range)
#Pattern:_18; parm=8; double logistic - smooth transition
#Pattern:_19; parm=6; simple 4-parm double logistic with starting age
#Pattern:_20; parm=6; double_normal,using joiners
#Pattern:_26; parm=3; exponential-logistic in age
#Pattern:_27; parm=3+special; cubic spline in age; parm1==1 resets knots; parm1==2 resets all
#Pattern:_42; parm=2+special+3; // cubic spline; with 2 additional param for scaling (average over bin range)
#Age patterns entered with value >100 create Min_selage from first digit and pattern from remainder
#_Pattern Discard Male Special
0	0	0	0	#	1	FISHERY1
0	0	0	0	#	2	FISHERY2
```

```
0	0	0	0	#	3	SURVEY1


#
#LO	HI	INIT	PRIOR	PR_SD	PR_type	PHASE	env-var	use_dev	dev_mnyr	dev_mxyr	dev_PH	Block	Blk_Fxn	#	parm_name
# 1   FISHERY1 LenSelex
3	9	8	8	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_Base_P1_FISHERY1	1
-2	2	0	0	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_Base_P2_FISHERY1	2
-2	4	1	1	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_Base_P3_FISHERY1	3
-5	5	0	0	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_Base_P4_FISHERY1	4
-10	5	-8	-8	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_Base_P5_FISHERY1	5
-5	2	-1	-1	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_Base_P6_FISHERY1	6

# 2   FISHERY2 LenSelex
16	18	17	17	0.05	1	-3	0	0	0	0	0	2
	2	#	SizeSel_P1_FISHERY2
-20	10	-8	-8	0.05	1	-3	0	0	0	0	0	2
	2	#	SizeSel_P2_FISHERY2
-20	10	2	2	0.05	1	-3	0	0	0	0	0	2
	2	#	SizeSel_P3_FISHERY2
-20	10	1	1	0.05	1	-3	0	0	0	0	0	2
	2	#	SizeSel_P4_FISHERY2	10
-20	10	-8	-8	0.05	1	-3	0	0	0	0	0	2
	2	#	SizeSel_P5_FISHERY2
-20	10	-3	-3	0.05	1	-3	0	0	0	0	0	2
	2	#	SizeSel_P6_FISHERY2

# 3   SURVEY1(Gillnet) LenSelex
7	8	7.5	7.5	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_P1_SURVEY1
-3	0	-2	-2	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_P2_SURVEY1
-10	-2	-4	-4	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_P3_SURVEY1	15
2	3	2.5	2.5	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_P4_SURVEY1
-8	-3	-5	-5	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_P5_SURVEY1
-4	-2	-3	-3	0.05	1	3	0	0	0	0	0	0
	0	#	SizeSel_P6_SURVEY1


#_Dirichlet parameters
#LO	HI	INIT	PRIOR	PR_SD	PR_type	PHASE env-var	use_dev	dev_mnyr	dev_mxyr	dev_PH	Block	Blk_Fxn #	parm_name
-4	5	2	0	0	0	3	0	0	0	0
	0	0	0	#	Fleet1_LengthComps
-3	-2	-2.5	0	0	0	3	0	0	0	0
	0	0	0	#	Fleet2_Length&AgeComps	20
-2.5	-1.5	-2	0	0	0	3	0	0	0	0
	0	0	0	#	Survey1_Length&AgeComps


# timevary selex parameters
#LO	HI	INIT	PRIOR	PR_SD	PR_type	PHASE	#	parm_name
16	18	17	17	0.05	1	3
16	18	17	17	0.05	1	3
-10	5	-8	-8	0.05	1	3
-10	5	-8	-8	0.05	1	3
1	2.5	2	2	0.05	1	3
1	2.5	2	2	0.05	1	3
0	2	1	1	0.05	1	3
0	2	1	1	0.05	1	3
-9	-6	-8	-8	0.05	1	3
-10	-6	-8	-8	0.05	1	3
-4	-1	-3	-3	0.05	1	3
-4	-1	-3	-3	0.05	1	3

# info on dev vectors created for selex parms are reported with other devs after tag parameter section
#
0   #  use 2D_AR1 selectivity(0/1)
#_no 2D_AR1 selex offset used
#
# Tag loss and Tag reporting parameters go next
0  # TG_custom:  0=no read and autogen if tag data exist; 1=read
#_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0  #_placeholder if no parameters
#
# deviation vectors for timevary parameters
```

```
#  base   base first block   block  env  env   dev   dev   dev   dev   dev
#  type  index  parm trend pattern link  var  vectr link _mnyr  mxyr phase  dev_vector
#     3    1    1    1    2    0    0    0    0    0    0    0
#     3    2    3    1    2    0    0    0    0    0    0    0
#     3    3    5    1    2    0    0    0    0    0    0    0
#     5    1    7    2    2    0    0    0    0    0    0    0
#     5    2    9    2    2    0    0    0    0    0    0    0
#     5    3   11    2    2    0    0    0    0    0    0    0
#     5    4   13    2    2    0    0    0    0    0    0    0
#     5   15   15    2    2    0    0    0    0    0    0    0
#     5   16   17    2    2    0    0    0    0    0    0    0
#     5   17   19    2    2    0    0    0    0    0    0    0
#     5   18   21    2    2    0    0    0    0    0    0    0
#     5   19   23    2    2    0    0    0    0    0    0    0
#     5   20   25    2    2    0    0    0    0    0    0    0
    #
# Input variance adjustments factors:
 #_1=add_to_survey_CV
 #_2=add_to_discard_stddev
 #_3=add_to_bodywt_CV
 #_4=mult_by_lencomp_N
 #_5=mult_by_agecomp_N
 #_6=mult_by_size-at-age_N
 #_7=mult_by_generalized_sizecomp
#_Factor  Fleet  Value

 -9999   1    0  # terminator
#
2 #_maxlambdaphase
1 #_sd_offset; must be 1 if any growthCV, sigmaR, or survey extraSD is an estimated parameter
# read 0 changes to default Lambdas (default value is 1.0)
# Like_comp codes:  1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=sizeage; 8=catch; 9=init_equ_catch;
# 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14=Morphcomp; 15=Tag-comp; 16=Tag-negbin; 17=F_ballpark; 18=initEQregime
#like_comp fleet  phase  value  sizefreq_method
1          3          1          1          1
-9999  1  1  1  1  #  terminator
#
# lambdas (for info only; columns are phases)
# 0 #_CPUE/survey:_1
#  0 #_CPUE/survey:_2
#  1 #_CPUE/survey:_3
#  1 #_CPUE/survey:_4
#  1 #_CPUE/survey:_5
#  1 #_discard:_1
#  0 #_discard:_2
#  0 #_discard:_3
#  0 #_discard:_4
#  0 #_discard:_5
#  1 #_lencomp:_1
#  0 #_lencomp:_2
#  1 #_lencomp:_3
#  1 #_lencomp:_4
#  1 #_lencomp:_5
#  1 #_agecomp:_1
#  0 #_agecomp:_2
#  0 #_agecomp:_3
#  0 #_agecomp:_4
#  0 #_agecomp:_5
#  0 #_init_equ_catch1
#  0 #_init_equ_catch2
#  0 #_init_equ_catch3
#  0 #_init_equ_catch4
#  0 #_init_equ_catch5
#  1 #_recruitments
#  1 #_parameter-priors
#  1 #_parameter-dev-vectors
#  1 #_crashPenLambda
#  0 # F_ballpark_lambda
0 # (0/1/2) read specs for more stddev reporting: 0 = skip, 1 = read specs for reporting stdev for selectivity, size, and numbers, 2 = add options for M,Dyn. Bzero, SmryBio
 # 0 2 0 0 # Selectivity: (1) fleet, (2) 1=len/2=age/3=both, (3) year, (4) N selex bins
 # 0 0 # Growth: (1) growth pattern, (2) growth ages
 # 0 0 0 # Numbers-at-age: (1) area(-1 for all), (2) year, (3) N ages
 # -1 # list of bin #'s for selex std (-1 in first bin to self-generate)
 # -1 # list of ages for growth std (-1 in first bin to self-generate)
 # -1 # list of ages for NatAge std (-1 in first bin to self-generate)
999
```