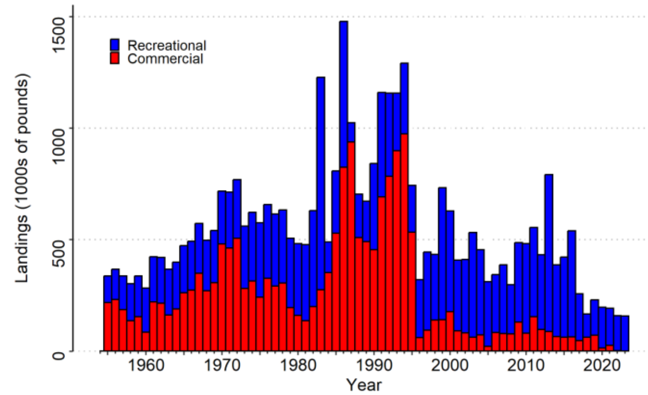
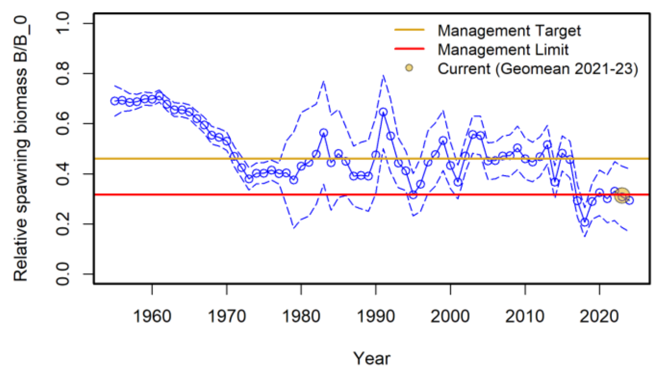
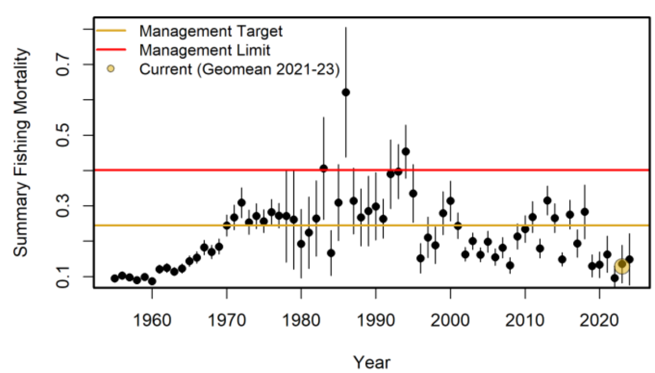
Assessment of Southern Flounder *Paralichthys lethostigma* in Louisiana Waters
2025 Report

Executive Summary

Precautionary limits to fishing are proposed in this stock assessment by requiring spawning biomass not fall below the lowest level observed from 1982-2013. This is equivalent to maintaining the stock above a limit spawning potential ratio. The spawning potential ratio that corresponds with the minimum spawning biomass observation is 32%. Based on results of this assessment, the Louisiana Southern Flounder stock is currently not experiencing overfishing but is overfished. The current spawning potential ratio estimate is 31%.







Landings of Southern Flounder in Louisiana have declined in the most recent decade from over 300 thousand pounds landed per year prior to 2017 to recent lows near 100 thousand pounds per year. The recent low landings observed are due to a number of factors including: reductions in fishery effort caused by the lingering impacts of the COVID-19 pandemic combined with major hurricanes in 2020 and 2021, fishery closures beginning in 2022 during the species annual spawning migration, and a series of below average recruitment to the stock in the most recent decade. The highest harvests on record (over 1 million pounds) occurred during the late 1980's and early 1990's. After commercial gear restrictions were enacted in 1995, Southern Flounder landings substantially declined. Recreational landings comprised approximately eighty percent of the total Southern Flounder 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 Southern Flounder 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, indices of relative abundance developed from LDWF fishery-independent surveys, length compositions of fishery and survey catches, and age-at-length compositions (age-length-keys) of the fishery catches.

Summary of Changes from 2020 Assessment

The previous LDWF stock assessment of Southern Flounder (West et al. 2020) 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 size-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 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-size data into catch-at-age with age-length-keys. This allows more appropriate estimates of uncertainty around the estimated stock status metrics by carrying variances of the observations through 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 of the SS3 model.
- Weight-length relationships for each sex were fixed in SS3 with parameters estimated outside of the SS3 model.
- Sex-specific natural mortality (M) point estimates (females=0.675 yr^{-1}, males=1.35 yr^{-1}) were used to scale declining M-at-age (Lorenzen 1996) for each sex outside of the SS3 model.
- Sex ratio at birth was fixed at 1:1 within the SS3 model.
- A length-based logistic female maturity ogive was fixed in SS3 with parameters estimated outside of the SS3 model.
- Fecundity was assumed to be directly proportional to mature female body weight in the SS3 model.

Landings and Discards:

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

- Recreational discards (1982-2023) with 10% release mortality.

Indices of Abundance:

- LDWF trammel net survey index of relative abundance (1986-2023).
- LDWF 16-foot inshore otter trawl survey index of age-0 relative abundance (1977-2023).

Length Composition:

- Commercial sex-specific length composition (1988-2023).
- Recreational length composition (combined sexes 1982-2001, sex-specific 2002-2023).
- Trammel net survey sex-specific length composition (1986-2023).

Age-at-length Composition (ALKs):

- Commercial sex-specific ALKs (2002-2023).
- Recreational sex-specific ALKs (2002-2023).

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1. Introduction

A statistical catch-at-length and -age model is used in this assessment to describe the dynamics of Southern Flounder *Paralichthys lethostigma* occurring in Louisiana (LA) waters from 1955-2023. The assessment model projects forward from estimates of initial conditions using age and length structured population dynamic calculations. The primary model inputs are the removals from the commercial and recreational fisheries, indices of relative abundance developed from the LDWF marine trammel net and 16-foot otter trawl surveys, length compositions of fishery and survey catches, and age-at-length compositions of the fishery catches.

1.1 Fishery Status

A comprehensive history of the Southern Flounder (SF) resource and associated fishery within LA is described in Parks et al. (2023) and for the Gulf of Mexico (GOM) in GSMFC (2000 and 2015). A current summary of the Louisiana SF fishery is presented below.

Commercial

The LA commercial SF fishery operates primarily within state inside waters (from the coastline upward to the saltwater line) and outside territorial waters (from the coastline seaward to the state water boundary), with some harvest from federal waters of the Exclusive Economic Zone (EEZ). Entanglement net bans in the late 1990's combined with other regulation changes caused a significant decline in commercial SF landings. Commercially harvested SF are landed primarily as incidental catch from shrimp fishers, with a smaller portion of the SF harvest from targeted activity.

Recreational

Similar to the commercial sector, the recreational SF fishery operates primarily within state inside waters and outside territorial waters. Southern Flounder are infrequently targeted recreationally with less than 2% of LA anglers reporting Southern Flounder as their primary target in 2023 (LA Creel unpublished data).

1.2 Fishery Regulations

The LA SF fishery is governed by the Louisiana State Legislature, the Wildlife and Fisheries Commission, and the LDWF. Commercial and recreational SF regulations in LA are summarized below.

Commercial

Commercial SF harvest regulations changed substantially from 1995 through 1999. Commercial harvest methods were restricted on August 15, 1995, when the Marine Resources Conservation Act of 1995 (Act

1316 of 1995 Regular Legislative Session) became effective. This act prohibited the use of "set" gill nets or trammel nets in saltwater areas of Louisiana, and restricted flounder harvest by "strike" nets to the period between the third Monday in October and March 1 of the following year. A "Restricted Species Permit" issued by LDWF was also required in order to harvest SF with that gear. The Act also required annual stock assessments of Southern Flounder. In 1996, as a result of the first assessment of Southern Flounder finding the stock below a 30% SPR, and within the provisions of that Act, additional regulations became effective that outlawed the use of strike nets for SF harvest and limited possession to 10 fish per person aboard a commercial vessel. In 1997, regulations were changed by Acts 1163 and 1352 of the 1997 Regular Legislative Session in which commercial shrimping vessels were limited to 100 pounds of Southern Flounder per trip. In March of 1997, all flounder harvest by gill or trammel nets was banned. These regulations substantially reduced the commercial harvest of flounder. Regulations were changed in 1999 by Act 220 of the 1999 Regular Legislative Session which eliminated the 100-pound harvest limit on commercial shrimping vessels when Southern Flounder were harvested as incidental catch. In 2022, regulations were modified again prohibiting SF harvest during the species' annual spawning migration from October 15 through November 30.

Current commercial regulations allow 10 fish for each licensed fisherman for each day on the water, with the exception of commercial shrimping vessels that may retain all SF caught incidentally. Commercial harvest of SF, including those incidentally caught on shrimping vessels, is currently prohibited during the species' spawning migration from October 15 through November 30. There is no size limit on commercially harvested SF.

Recreational

Recreational regulations were first enacted in 1996 that established a creel limit of ten SF per day per licensed angler, with only a single day's limit allowed in possession. Regulations were changed in August of 2004 by Act 460 of the 2003 Regular Legislative session, which allowed recreational harvest of SF with barbed gigs (prior to 2004 only barbless gigs were allowed). In 2022, regulations were modified again prohibiting SF harvest during the species' annual spawning migration from October 15th through November 30th.

1.3 Trends in Harvest

Time series of LA commercial (1950-2023) and recreational (1982-2023) SF landings are presented in (Figure 1) along with recreational fishing effort (angler trips; 1982-2023) and commercial fishing effort (trips landings SF; 2005-2023). Time series of commercial SF landings are also presented for each GOM state (Figure 2).

Commercial

Commercial landings of Southern Flounder in LA remained below 400 thousand pounds until the 1970's. Commercial landings peaked from the mid-1980s through the early-1990s with nearly 1 million pounds landed in 1987 and 1994. From 1986 through 1995, commercial SF harvest averaged over 700 thousand pounds. Commercial landings substantially declined in 1996 due to regulatory changes and have not exceeded 200 thousand pounds thereafter. Commercial landings have trended downward in the most recent decade. Before the October 15th through November 30th fishery closure was established in 2022, the lowest landings on record were observed in 2020 and 2021 (15 and 27 thousand pounds respectively). After the seasonal fishery closure became effective, commercial landings declined substantially. In 2023, the commercial sector landed less than 2 thousand pounds of SF.

The primary gears currently used in the commercial SF fishery are bottom trawls, butterfly nets, skimmer nets, trot lines, hand lines, and traps. Before the October 15th through November 30th fishery closure was established in 2022, the majority of commercial Southern Flounder landings occurred during the annual offshore migration (October through December). Commercial SF landings before 2006 were relatively evenly distributed among the southeastern portion of the state, offshore, and the southwestern portion of the state. After 2005, commercial landings of SF became more concentrated in the southwestern portion of the state and remain so to date.

Recreational

Recreational LA SF landings have varied from the highest recorded in 1983 and 1986 (637 and 519 thousand fish respectively) to a low of 66 thousand fish harvested in 1987. Recreational landings increased after 1987 and averaged close to 500 thousand fish per year through 1999. Landings generally declined after 2000 to another low observed in 2008 (124 thousand fish) before increasing to another peak just under 400 thousand fish in 2013. Since 2013, recreational SF landings have generally declined to a low of 75 thousand fish harvested in 2023.

Before the October 15th through November 30th fishery closure was established in 2022, the majority of recreational harvest occurred during the annual offshore migration. The most commonly used recreational gears to harvest Southern Flounder are rod-and-reel and a barbed gig.

2. Life History Information

2.1 Unit Stock Definition

Southern Flounder range along the Atlantic and Gulf Coasts from Albemarle Sound in North Carolina southward through the GOM to Laguna de Tamiahua in northern Mexico (GSMFC 2015). Genetic studies of SF utilizing allozymes (Blandon et al. 2001) and sequences of mitochondrial DNA (Anderson et al. 2012) suggest SF occurring in the GOM are a distinct stock. However, for purposes of this assessment, the unit stock is defined as those SF occurring in LA waters.

2.2 Morphometrics

Sex-specific length-weight regressions were fit with power functions using SF length-at-weight data available from LDWF records (female n=763 and male n=214; Table 2 and Figure 3).

2.3 Growth

Southern Flounder exhibit dimorphic growth where females grow to much larger sizes than males (Fischer and Thompson 2004). Sex-specific von Bertalanffy parameter estimates from Fischer and Thompson (2004; Table 2) were used to calculate expected length at age (Figure 4) for computation of age-specific natural mortality rates (see section *2.6 Natural Mortality*). In the SS3 base model, parameter estimates from Fischer and Thompson (2004) were used as fixed parameters of sex-specific von Bertalanffy growth functions (see section *4.1 Model Configuration*).

2.4 Reproduction

Adult Southern Flounder emigrate from bays and estuaries during the fall months following a decline in water temperatures to spawn in offshore waters of the GOM during late fall and early winter (GSMFC 2015). Unlike female Southern Flounder that return to estuarine and nearshore habitats following spawning, male Southern Flounder are thought to remain in offshore waters after spawning for the duration of their lives (GSMFC 2015).

Total egg production is currently not estimable for LA Southern Flounder (see section *7.0 Research and Data Needs*). For purposes of this assessment, mature female biomass is used as a proxy for total egg production.

A length-based logistic function was fit to female SF maturity data collected from recent LDWF FI sampling during the species spawning migration in November and December of 2022 and 2023 (n=321; Table 2 and Figure 5). Histological samples were obtained from survey catches and evaluated for presence of vitellogenesis. If vitellogenesis was present, the female SF was considered mature.

2.5 Sex Ratio

Sex ratios of SF observed in LDWF samples are heavily skewed towards females (~9:1) due to the species sexual dimorphic growth and movement dynamics.

A length-based logistic function was fit to SF sex ratio information collected from LDWF sampling (n=19,077) to estimate the probability of being female at a specific size (Table 2 and Figure 6). This function was used only to assign sex to SF catches with missing sex records of the LDWF FI trammel survey (see section *3.2 Fishery Independent*).

2.6 Natural Mortality

Female Southern Flounder can live to at least 8 years of age while male SF can live to at least 4 years of age (Fischer and Thompson 2004; LDWF unpublished data). For purposes of this assessment, sex-specific point estimates of natural mortality (M) were calculated (females=0.675 and males=1.35; Hamel and Cope 2022) based on the assumed longevity of female and male SF (8 and 4 years respectively; Table 1). The M point estimates were used to scale sex-specific estimates of M-at-age (Table 3 and Figure 6). Following SEDAR 12 (SEDAR 2006), the point estimates of M were rescaled where the average mortality rates over ages are 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.

2.7 Discard Mortality

Little information exists on SF discard mortality rates in the GOM. Southern Flounder are typical caught in shallow estuarine waters and are not subject to the levels of barotrauma associated with fish species caught in deeper depths. Discard mortality estimates of Southern Flounder caught with hook and line in North Carolina varied with season with an overall mean rate near 9% (Flowers et al. 2019). For purposes of this assessment, a constant rate of discard mortality (10%) across time and fish size/age is assumed.

3. Data Sources

3.1 Fishery Dependent

Landings and Discards

Commercial

Commercial SF landings (Figure 7) are taken from the LDWF Trip Ticket Program (1999-2023) and NMFS commercial statistical records (1955-1998; NMFS 2023). A time series of commercial live release estimates is currently not available (see section *7.0 Research and Data Needs*). Note: NMFS commercial records prior to 2000 did not differentiate landings of flatfish species in Louisiana. Several flatfish species can be found in LA waters, such as the Gulf Flounder *Paralichthys albigutta* and Broad Flounder *Paralichthys sauamilentus*, but the most common species is the Southern Flounder (GSMFC 2000). In the MRIP recreational landings estimates (1985-1999), Gulf Flounder comprised <3% (on average as weight) of the annual recreational harvest relative to SF harvest, and none have been reported in that survey since then. Neither Gulf nor Broad flounder have been identified in LA Creel landings to date (2014-2023). Given these small landings, it is unlikely the inclusion of Gulf or Broad flounder in the commercial LA flatfish landings would have a major impact on SF stock status estimation. Thus, for purposes of this assessment, commercial landings labeled as flatfish in LA are assumed as Southern Flounder.

Recreational

Time series of recreational SF landings and live discards as used in this assessment are presented (Figures 8 and 9). Recreational SF landings and live release estimates 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).

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 SF 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 sex-specific length compositions of commercial SF harvest (Figure 10) are developed from samples collected from the Trip Interview Program (TIPS; 1988-2002), the Fishery Information Network (FIN; 2002-2013), and the LDWF Biological Sampling Program (2014-2023). Length compositions are developed to sum to 1 across sexes to retain the sex ratio information. Sample size of the commercial SF length measurements are presented (Table 4) along with the sex ratios of the length compositions (Figure 11). The commercial length compositions are unweighted.

Recreational

Annual length compositions of recreational SF harvest are developed from the LDWF Biological Sampling Program (2014-2023) and MRIP (1982-2013; Figure 10). The pre-2002 length compositions represent combined sexes and the 2002-2023 length compositions 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 recreational SF length measurements are presented (Table 4) along with the sex ratios of the sex-specific length compositions (Figure 12).

Recreational length compositions are weighted by the corresponding landings at the finest scale possible to correct for unrepresentative sampling. Length compositions from the LDWF Biological Sampling Program are weighted by landings estimates from each mode of fishing (Private and Charter) in each LA drainage basin. 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

Southern Flounder typically spawn December-January (GSMFC 2000). Ages of SF in this assessment are assigned based on a biological January 1 birthday, where SF 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 SF landings (Figure 14) have been collected from LDWF sampling effort since 2002. Annual sample size of the commercial SF length-at-age measurements are summarized (Table 5). The commercial age-at-length compositions are unweighted.

Recreational

Age-at-length data used to develop annual sex-specific ALKs of recreational SF landings (Figure 13) have been collected from LDWF sampling effort since 2002. Annual sample size of the recreational SF length-at-age measurements are summarized (Table 5).

Recreational age-at-length compositions are weighted by the corresponding landings at the finest scale possible to correct for any unrepresentative sampling. The recreational age-at-length compositions from 2014-2023 are weighted by landings estimates from each mode of fishing (Private and Charter) in each LA drainage basin. The pre-2014 age-at-length compositions are weighted by statewide landings of each mode of fishing.

<u>*3.2 Fishery Independent*</u>

<u>*Survey Descriptions*</u>

The LDWF fishery-independent (FI) marine trammel net and 16-foot inshore otter trawl surveys are used to develop indices of abundance as inputs of the assessment model. Below are brief descriptions of each 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.

Trammel Net Survey

This survey is conducted with standardized design from October-March. Survey gear is a 750-foot long and 6-foot depth net, consisting of three walls constructed of nylon. The inner wall has 1 5/8-inch bar mesh wall, and the two outer walls have 6-inch bar mesh wall.

This survey was conducted from January 1986 to October 2013 at fixed sampling stations within each CSA. In October 2010, additional fixed stations were added to allowing more spatial coverage within each CSA (Figure 15). Beginning in 2013, the survey design was modified where sampling locations are now selected randomly from the established stations within each CSA.

Samples are taken by 'striking' the net. All SF catches are enumerated and a maximum of 50 randomly selected SF are collected for length measurements, gender determination, and maturity information.

Indices are developed separately for each time period of consist sampling methodology (1986-2012 and 2013-2023). Only samples collected during the months of October through December are retained for index development. Catch per unit effort (CPUE) is defined as the number of SF caught per trammel net sample.

16-foot Otter Trawl Survey

This survey is conducted with standardized design in each month of the year. Survey gear is a 16-foot flat otter trawl with a body and cod-end consisting of ¾ inch bar mesh and ¼ inch bar meshes, respectively.

The survey has been conducted from 1967 to present at fixed sampling locations. In October of 2010, additional fixed sampling locations were added to this survey allowing more spatial coverage within each CSA (Figure 16).

Samples are 10 minute tows. All SF catches are enumerated and a maximum of 50 randomly selected SF per sample are measured (in 5mm TL bins).

An index of abundance (IOA) is developed from this survey to represent relative abundance of age-0 SF from 1977-2023. Samples from the earlier years of this survey, which had limited coverage across the coast, are excluded. Only samples collected during the months of April through September are included in IOA development. Since catches are not directly aged from this survey, catches less than 10 inches TL are used as a proxy of age-0 catches. Catch per unit effort is defined as the number of age-0 SF caught per ten minute trawl tow.

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 SF catch-rates in each year as $I_y = c_y p_y$, where c_y are estimated annual mean CPUEs of non-zero SF catches assumed as lognormal distributions and p_y are estimated annual mean probabilities of SF 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 Southern Flounder are captured; the binomial model considers all samples.

Because of the designed nature of the LDWF marine trammel net and trawl survey, model development was rather straightforward. Variables considered in model inclusion for each IOA 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.

Relative abundance indices and 95% confidence intervals of each survey are presented (Figures 17 and 18).

Length/Sex Composition

Annual sex-specific length compositions of SF catches from the LDWF trammel net survey are presented (Figure 10) along with the corresponding annual sample size of the length measurements (Table 4). Survey catches with missing sex records were assigned sex using the length-based logistic function fit to LDWF sex ratio data (Table 1). The sex-specific length compositions are developed to sum to 1 across sexes to retain the sex ratio information. Sex ratios of the length compositions are presented (Figure 19).

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 SF 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. Female fish were modeled from age-0 through an age-4 plus group while males were modeled from age-0 though age-4. Two fishing fleets (recreational and commercial) and two relative abundance indices developed from LDWF FI surveys (trammel net and inshore 16-foot otter trawl) 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 20. The SS3 base model files (starter, forecast, data, and control files) are provided in Appendix 2.

Life History

Parameters for sex-specific power weight-length functions and a logistic length-based female maturity function (Table 2) are estimated outside of SS3 and fixed within the base model. In the SS3 base model, maturity of fish less than age-1 was set to zero, with the maturity of fish age-1 and greater determined from the length-based function.

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 function's 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 estimates from Fisher and Thompson (2004) were used as fixed parameters in the SS3 base model while the sex-specific variability in length-at-age parameters were estimated within the SS3 base model.

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 or sigmaR), 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 *5.3 Model Diagnostics*).

Annual lognormal recruitment deviations in the SS3 base model are estimated for the period considered data-rich (1977-2023), when size and age composition data were available to inform the model on the year to year recruitment levels along with the age-0 index of relative abundance, as a deviation vector with an explicit sum-to-zero constraint. Age-0 recruitment for the period prior to 1977, when no age-0 relative abundance index or size/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 1-year forecast.

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 (212 thousand pounds). Initial recreational landings are specified as the geometric mean of the 1955-1957 historical recreational landings estimates (69 thousand fish). Initial apical fishing mortality parameters were estimated from the initial fleet-specific landings. Uncertainty around the initial landings were specified with a relatively small CV of 0.1 for the commercial fleet and a slightly larger CV of 0.15 for the recreational fleet. Larger uncertainty around the initial recreational landings was tested in the SS3 base model (CV=0.35), which led to model stability issues, and was ultimately not used.

Landings

Landings are assumed to have a lognormal error structure in the SS3 base model and are calculated from each fleets annual apical F's and sex-specific selectivity-at-age derived from the length-based selectivity estimates and the species growth curves. 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 (Pope 1972) 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 0.08 to 0.56) 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.

Discards

Recreational discards are estimated in the SS3 base model from the selectivity and retention functions. Discard estimates are not available for the commercial fleet. The discard mortality rate used to calculate the number of dead recreational discards was assumed time invariant and fixed at 10% in the SS3 base model. Coefficients of variation of the input recreational discards were specified as the relative standard error of the annual discard estimates themselves (1982-2023, range 0.12 to 0.86)

Abundance indices

Abundance indices are assumed proportional to stock abundance and to have a lognormal error structure in the SS3 base model. Relative abundance time series are modeled for the LDWF trammel net (1986-2023) and 16-foot inshore otter trawl surveys (1977-2023). Catchability of the trammel net survey were estimated in two time blocks that correspond to periods of consistent sampling methodology: fixed station sampling (1986-2012) and random station selection (2013-2023). Catchability of the 16-foot otter trawl survey was modeled as time invariant. Index uncertainty was specified with CV's estimated from the index standardization procedure.

Length/Sex Compositions

Sex-specific length compositions were modeled for both fleets and the trammel net survey. The sex-specific size compositions were developed to sum to 1 across sexes to retain the sex ratio information. Length compositions were available from 1982-2023 for the recreational fleet (sex-specific from 2002-2023 only), from 1988-2023 for the commercial fleet, and from 1986-2023 for the trammel net survey. The annual number of length observations (Table 4) from each fleet and survey are used as the input sample sizes. Observations with 10 or less length measurements were excluded from model fitting.

Age-at-length Compositions

Sex-specific age-at-length compositions were modeled for the recreational and commercial fleets from 2002-2023. 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 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 (Tables 4 and 5). Five DM parameters were estimated in the SS3 base model: three for the length compositions from each fleet and survey, and two for conditional age-at-length compositions from each fleet.

Selectivity and Retention

Sex-specific length-based selectivity functions were used for both fleets and the trammel net survey. Selectivity represents the proportion of the stock vulnerable to capture. Sex-specific selectivity functions were required given the movement dynamics of the species where males are thought to remain in offshore waters for the duration of their lives after migrating from their natal estuary after reaching sexual maturity and are therefore underrepresented in the fishery and survey catches (see section *7. 0 Research and Data Needs* section).

Fishery selectivity was assumed to be flat-topped for female fish and dome-shaped for male fish. Survey selectivity was assumed to be dome-shaped for female and male fish. Selectivity curves were estimated in SS3 using the six parameter double normal selectivity functions (pattern 24). To create flat-topped functions for the fleets, the descending logit, slope, and top logit parameters of the double normal selectivity functions were fixed. Male selectivity was modeled relative to female selectivity (option 1) with four additional function parameters: the length bin where the dogleg occurs, and the natural log of relative selectivity at the minimum length, dogleg, and maximum length. The male selectivity parameters controlling the relative selectivity at the dogleg and the relative selectivity at the maximum length were estimated within the SS3 base model. The male selectivity parameters controlling the size where the dogleg occurs were fixed in the SS3 base model at the minimum size of female selection while the relative selectivity at the minimum length was fixed at 0. All estimated selectivity parameters used symmetric beta priors (SE=0.05) to improve estimability.

Selectivity was not estimated for the 16-foot otter trawl survey index which solely represents age-0 relative abundance in this assessment. Selectivity of the recreational fleet and trammel 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: entanglement nets allowed (pre-1997) and entanglement nets banned (1997-2023).

Size-based retention functions are used for the recreational fleet only in this assessment. Discard estimates are not available for the commercial fleet precluding the use of retention functions. Retention functions account for fish discarded based on the size of the fish. A time invariant recreational retention function is modeled that corresponds with the consistent regulation (no length limit) over the modeled time period. An asymptotic retention function was used which requires three parameters: the ascending inflection point and slope, and a parameter controlling the height of the functions asymptote (maximum retention). Size composition information of the recreational discard estimates is currently unavailable (see section *7.0 Research and Data Needs*) requiring most retention function parameters to be fixed in this assessment. The ascending inflection point of the retention function was fixed at 4-inches TL with a fixed knife-edged slope. The parameter controlling the height of the retention function asymptote was estimated in SS3.

Estimated Parameters

In the SS3 base model, 122 total parameters were used with 88 parameters estimated. Estimated parameters were:

- Sex-specific variability in length-at-age (4)
- Unfished recruitment and recruitment variability (2)
- Annual recruitment deviations from 1977-2023 (47)
- Initial apical fishing mortality rates (2)
- Survey catchability coefficients (3)
- Sex-specific fishery selectivity (18)
- Fishery retention (1)
- Sex-specific survey selectivity (6)
- Dirichlet-multinomial weighting factors (5)

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: initial fishing mortalities and the unfished recruitment parameters were estimated in the first phase, catchability coefficients in the second phase, selectivity/retention/ 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. Parameters with CVs>1 were: annual recruitment deviations (1977-81, 1984, 1988, 1991, 1996-97, 1999-00, 2006-10, and 2023), the ascending/descending slopes and top logit parameters of the trammel net survey selectivity, and the male maximum age relative selectivity parameter of the trammel net survey.

Model Fit

Landings and Discards

Model fits to the commercial and recreational landings match the observations very well (Table 8 and Figures 21 and 22) 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 in the early 1980's. Model estimated landings in units of numbers of fish and in units of biomass are also presented (Figure 23).

Model estimated discards provide reasonable fits to the data (Table 9 and Figure 24). Most estimates lay within the 95% confidence intervals of the model inputs. The larger discard observations from the earlier years of the modeled time series were noticeably under fit.

Abundance Indices

Model estimated catch rates of the trammel net and 16-foot otter trawl survey (Table 10-11 and Figures 25-26) provide reasonable fits to the observations given the relatively large SEs of the indices. Estimated catch rates of the trammel net survey and most of the of the estimates of the 16-foot otter trawl survey lay within the 95% confidence intervals of the observations and adequately tracks each surveys trend across the time series.

Length/Sex Compositions

Model fits to the sex-specific fishery and survey length composition data are presented in Figures 27-30. Fits to the corresponding sex ratios of the fishery and survey length composition data are also presented (Figures 31-33). 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: 0.0845 for the recreational fleet, 0.111 for the commercial fleet, and 0.274 for the trammel net survey.

The model provided reasonable fits to the length compositions and corresponding sex ratio observations. Pearson residuals of the length composition fits show little patterning and only few instances with large residuals.

Conditional Age-at-length Compositions

Model fits to the sex-specific fishery conditional age-at-length compositions are presented in Figures 34 and 35. 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: 0.243 for the recreational fleet and 0.526 for the commercial fleet.

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.

Growth

Sex-specific mean length-at-age and variability in length-at-age from the SS3 base model are presented (Figure 36) along with the estimated mean lengths-at-age from Fisher and Thompson (2004). The fixed and estimated parameters of the sex-specific von Bertalanffy growth functions from the SS3 base model are also presented (Table 7). In the SS3 base model, the length at the minimum reference age (0.5), L_{inf}, and K parameters were fixed using the sex-specific estimates from Fisher and Thompson (2004) while the variability in length-at-age parameters were estimated.

Selectivity and Retention

Fishery and survey length-based selectivity estimates are presented in Figures 37-39 along with the corresponding age-based selectivities derived from the length based functions and the species growth curves. Length based retention estimates of the recreational fleet are also presented.

Recreational

The recreational sex-specific length-based selectivity curves (Figure 37) indicate full vulnerability to the fishery for lengths greater than 12 inches TL for female fish and at 12 inches TL for male fish which corresponds with peak age-based vulnerability around age-2 for female and age-1 for male fish. The ascending limb of the male length-based recreational selectivity curve is steeper than the descending limb. The age-based selectivity curves reach approximately 30% for male fish and 95% for female fish. The recreational retention function is presented in Figure 37. The asymptote of the retention function, which is used to match the level of observed discards, was the only parameter estimated.

Commercial

The commercial sex-specific length-based selectivity curves (Figure 38) were estimated for each period of consistent regulation: entanglement nets allowed (pre-1997) and entanglement nets banned (1997-2023).

Selectivity curves for the pre-1997 time block indicate full vulnerability to the fishery for lengths greater than 14 inches for female fish and at 14 inches TL for male fish which corresponds with peak age-based vulnerability around age-4 for female fish and at age-2 for male fish.

Selectivity curves for the 1997-2023 time block indicate full vulnerability to the fishery for lengths greater than 13 inches TL for female fish and between 13 and 14 inches TL for male fish which corresponds with peak age-based vulnerability around age-4 for female fish and at age-2 for male fish.

Ascending limbs of the male length-based selectivity curves for each commercial time block are steeper than the descending limbs. The male age-based selectivity curves reach approximately 15% for the pre-1997 time block and nearly 35% for the 1997-2023 time block. The female selectivity curves reach approximately 90% for each time block.

Trammel net

The sex-specific length-based selectivity curves of the trammel net survey (Figure 39) indicate full vulnerability to the survey at 8 inches TL for female and male fish which corresponds with peak age-based vulnerability at age-0 for female fish and at age-1 for male fish. The male age-based selectivity curve gradually declines from its age-1 peak (33%) to just under 30% at age-4. The female age-based selectivity declines from its age-0 peak (70%) to close to 35% at age-4.

<u>Fishing Mortality</u>

Estimated annual fishing mortality rates (fleet-specific apical and total exploitation) are presented in Table 12 and Figure 40. Exploitation rates are calculated as the total number of fishery removals >age-1 / total stock size > age-1 as numbers of fish.

Annual apical F rates of the recreational fleet have remained above 0.10 through the modeled time series with peaks greater than 0.90 estimated in 1983 and 1986 that correspond with the high landings reported those years. Recreational apical F estimates averaged close to 0.40 from 2000 to 2021. After the fishery closure during the species spawning migration was established in 2022, recreational apical F estimates decreased. The recreational apical F estimate in the terminal year of the assessment was 0.27.

Annual apical F rates of the commercial fleet have varied over the time series from an earlier low of 0.06 estimated in 1960 to peaks of 0.65, 1.3, and 1.5 estimated in 1972, 1986, and 1994 respectively. After

1995, commercial apical F rates decreased considerably and have remained below 0.2. Commercial apical F estimates decreased again after the fishery closure during the species spawning migration was established in 2022. The commercial apical F estimate in the terminal year of the assessment was 0.002.

Exploitation rates climbed gradually from 9% estimated in 1955 to around 30% in 1972. After 1972, exploitation rates declined for a series of years before beginning to climb again as the commercial fishery expanded in the 1980's and 90's. Exploitation rates averaged just over 30% during this time period with peaks over 40% estimated in 1983, 1986, and 1994. Exploitation rates decreased in the late 1990's when the commercial entanglement net ban was enacted. Since 2000, exploitation rates have varied with values varying between 10 and 30%. The exploitation rate estimate in the terminal year of the assessment was 14%.

Recruitment

In the SS3 base model, the steepness parameter of the Beverton-Holt stock recruitment function was fixed (0.99) with the other two parameters (unfished recruitment and sigmaR) estimated. Unfished recruitment in log space was estimated as 8.43 which corresponds to 4.6 million age-0 recruits. The sigmaR parameter was estimated as 0.538. The resulting stock recruitment function and the relationship between SSB and age-0 recruits are presented in Figure 41.

Age-0 recruitment estimates are presented (Table 13 and Figure 42) along with the recruitment deviations estimated in log space (Figure 42). Age-0 recruitment has varied over the modeled time series with an overall decline observed in the last few decades. Recruitment estimates during the main recruitment deviation period (1977-2023) averaged 4.5 million age-0 fish. Recruitment generally increased from less than four million recruits estimated in 1978 to the peaks of 8.6 and 9.9 million age-0 fish estimated in 1986 and 1990, respectively. After 1990, recruitment generally declined to a low of 1.6 million fish in 2004 before increasing to another peak of 6.9 million fish estimated in 2014. Following 2014, recruitment dropped below the long-term average and has remained so to date with the exception of the 2018 recruitment estimate. Recruitment in the most recent decade averaged 1.9 million age-0 fish with less than 1 million recruits estimated in 2022 and over 2.5 million recruits estimated in 2023.

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 13. Exploitable biomass, SSB, and relative SSB are also presented graphically (Figure 43). Time series of sex-specific stock abundance-at-length and -age are also presented (Figures 44 and 45) along with the annual sex-specific mean length and age of the stock.

Exploitable biomass estimates averaged 1.48 million pounds from 1955-2023 and ranged from a peak of 2.18 million pounds estimated in 1991 to a low of 582 thousand pounds in 2018. The 2023 estimate of exploitable biomass was 867 thousand pounds. Estimates of exploitable abundance averaged 231 thousand fish from 1955-2023 and ranged from 412 thousand fish estimated in 1991 to a low of 69 thousand fish in 2018. The 2023 estimate of exploitable abundance was 101 thousand fish.

Estimates of SSB averaged 1.14 million pounds from 1955-2023 and ranged from a peak of 1.69 million pounds in 1961 to a low of 492 thousand pounds estimated in 2018. The 2023 estimate of SSB was 732 thousand pounds. Unfished SSB was estimated as 2.37 million pounds. Relative SSB estimates ranged from 71% estimated in 1961 to a low of 21% in 2018. The 2023 estimate of relative SSB was 30.8%.

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 14). High correlations were identified for a number of selectivity parameters: the ascending slope and peak parameters of the double normal selectivity functions of the trammel net survey and fishery fleets, the male selectivity parameters of the first time block of the commercial fleet, and the top logit/peak and top logit/ascending slope parameters of the double normal selectivity functions of the trammel net survey. The ascending slope, peak, and top logit parameters of the trammel net survey were essentially perfectly correlated.

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 15). The most frequent and lowest log likelihood, which was the log likelihood of the base model solution, was achieved in 35% of the jitter runs. Of the 100 jitter runs, 70% were within one tenth of a likelihood unit of the base model solution suggesting a stable global solution of the base model was found.

Sensitivity Analysis

A series of sensitivity runs were conducted to explore uncertainty in the configuration of the base model. Sensitivity runs include: increasing (and decreasing) the FHWAR historical recreational landings time series (1955-1981) by 25%, up-weighting relative abundance indices (lambdas *5), increasing the discard mortality rate from 10 to 20%, estimating the annual fleet-specific apical fishing mortalities as model parameters, time-varying the selectivity estimates of the trammel net survey to match the time-varying catchability time blocks, starting the model in 1982 rather than 1955, and excluding the age-0 relative abundance index . Time series of relative SSB, age-0 recruitment, and exploitation rates for the base and sensitivity model runs are presented in Figure 46. Results of each sensitivity run are similar to the base model with terminal year estimates that generally converge.

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 fixed parameters. Profiles of R0, sigmaR, and steepness are presented (Figure 47). The R0 profile shows a well-defined trough around the base model log-space estimate of 8.43 with optimal values from each data source near the base model estimate indicating the parameter was well estimated. The sigmaR profile also shows a trough around the base model estimate of 0.538 indicating a stable parameter estimate. However, optimal values from each the individual likelihood components differ from the total model estimate. The steepness likelihood profile is jagged indicating an unstable parameter. When allowed to solve for steepness, the base model failed to find a solution indicating a non-estimable parameter. In the SS3 base model, the steepness parameter was fixed at 0.99.

Retrospective Analysis

A retrospective analysis was conducted by sequentially truncating the base model by a year (terminal years 2018-2023). Retrospective estimates of relative SSB, age-0 recruits, and exploitation rates are presented (Figure 48). Retrospective estimates in the terminal years of each time series are non-patterned showing both positive and negative bias where values either increase or decrease with each model peel. A pattern is evident in the earlier years of each time series, where estimates of SSB and age-0 recruits tend to decrease, while exploitation rates tend to increase, with each model peel. Retrospective patterns can be quantified through Mohns's ρ metric (Mohn 1999). Using the recommendations from Hurtado-Ferro et al. (2015), Mohns's ρ for short-lived species should fall between -0.22 and 0.30. Mohns's ρ metric for relative SSB and exploitation rates fall within this range (-0.15 and -0.03 respectively), but falls outside of this range for age-0 recruits (1.6).

Continuity Model

The ASAP assessment model used in the previous LDWF Southern Flounder stock assessment (West et al. 2020), 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 fleet-specific apical fishing mortalities estimates from ASAP are presented (Figure 49) along with the corresponding estimates from the SS3 base model. Trends of the ASAP estimated time series generally match the trends of the SS3 estimates.

The SS3 estimated age-0 recruitment time series tracks the age-1 ASAP female only recruitment estimates in most years with a one year lag. Trends in relative SSB estimates from each model are similar. However, the ASAP model estimates a less depleted stock in the initial year of the ASAP time series when compared to the corresponding SS3 estimate. In the most recent years of the time series, estimates of relative SSB from the ASAP and SS3 models are more similar. Recreational apical F estimates from the ASAP model generally track the SS3 estimates but are much lower in scale. Trends in the commercial apical F estimates are very similar between models but the ASAP estimates are slightly lower in scale during the late-1980's and early-1990's.

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.

Precautionary limits to fishing are proposed in this stock assessment to ensure sustainability of the stock by requiring spawning biomass not fall below the lowest level observed from 1982-2013 (SSB_{limit}) where the stock demonstrated sustainability (i.e., no observed declines in recruitment over a wide-range of spawning biomass). This is equivalent to maintaining the stock above a limit spawning potential ratio (SPR_{limit}; Goodyear 1993) and brings the proposed fishing limits into the same framework as the management targets established by LAC 76: VII.385. For purposes of this assessment, SPR is calculated as the relative depletion of the stock (SSB/SSB0). As reference points to guide management, the spawning potential ratio and equilibrium exploitation rate that lead to the SSB_{limit} (SPR_{limit}, F_{limit}) were estimated in the SS3 base model.

Management targets for Southern Flounder were established by LAC 76: VII.385. The spawning stock biomass target (SSB_{target}) is calculated as the average SSB (geometric mean) from 1982 through 2013. The total exploitation rate target (F_{target}) and SPR target (SPR_{target}), that correspond to the SSB_{target} when the stock is in equilibrium, were estimated in the SS3 base model.

The proposed limits and established targets of fishing relative to each respective time-series are presented in Figure 50. Current estimates are taken as the geometric mean of the 2021-2023 estimates. Limit and target reference points are also presented in Table 16.

6. Stock Status

The history of the LA Southern Flounder stock relative to F/F_{limit} and SSB/SSB_{limit} is presented in Table 17 and Figure 51. 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 (0.32), indicating the stock is currently not undergoing overfishing. The current assessment model does indicate that overfishing occurred in earlier years of the time-series.

Overfished Status

The current estimate of SSB/SSB_{limit} is <1.0 (0.99), indicating the stock is currently overfished. The current SPR estimate is 31%.

Management Target Status

Management targets for Southern Flounder established by LAC 76: VII.385 indicate the stock is currently below its biomass target even though the fishery is operating below its fishing mortality rate target. Much of this is due to the series of below average recruitment to the stock observed in the most recent decade.

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 Southern Flounder.

Only limited catches of Southern Flounder occur in LDWF FI surveys. Expanding the LDWF FI surveys to gear more effective in capturing juvenile and adult Southern Flounder would allow additional indices of abundance in future modeling efforts that could help better characterize year class strength, spawning stock size, and also provide auxiliary life-history information.

Because existing and historic creel surveys have not sampled night fishing activities, recreational Southern Flounder harvest from gigging or bow fishing is not well-characterized. A specific survey to capture information on the scale of recreational flounder harvest that occurs at night could help improve the understanding of and the significance of those fisheries (note: commercial harvest of Southern Flounder from gigging is collected through the LDWF Trip Ticket Program).

The Southeast Area Monitoring and Assessment Program (SEAMAP) conducts fishery-independent monitoring surveys in the GOM. These surveys may provide useful information on adult Southern Flounder abundance/sex ratios in nearshore waters. Future efforts should explore these datasets and assess their potential for use in future stock assessments.

Female spawning stock biomass is used as a proxy of total egg production in this assessment. Spawning potential ratio estimates may be biased if egg production does not scale linearly with female body weight. Estimates of batch fecundity and spawning frequency as a function of age/size are needed.

The relationship between wetlands losses and the continuation of fishery production within Louisiana has been discussed by numerous authors. Understanding this relationship as it applies to the LA Southern Flounder stock should be an ongoing priority.

Factors that influence year-class strength of Southern Flounder 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 Southern Flounder 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 Southern Flounder 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 years.

Type	Function	Equation	Parameters
M point estimate (female)	Hamel and Cope	$M = 5.40/\, Age_{max}$	Age_{max}=8 yrs, M=0.675
M point estimate (male)	Hamel and Cope	$M = 5.40/\, Age_{max}$	Age_{max}=4 yrs, M=1.35
Growth (female)	Von Bertalanffy	$TL = L_{\infty}(1 - e^{-K(t-t_0)})$	L_{∞}=21.9, K=0.51, t_0=-0.62
Growth (male)	Von Bertalanffy	$TL = L_{\infty}(1 - e^{-K(t-t_0)})$	L_{∞}=13.1, K=1.03, t_0=-0.25
Female-length	Logistic	$Pfem = 1/(1 + e^{(-(\alpha * TL + \beta))})$	α=0.7674, β=-7.906

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 (female)	Power	$W = aTL^b$	a=1.28E-04, b=3.44
Length-weight (male)	Power	$W = aTL^b$	a=2.31E-04, b=3.22
Maturity	Logistic	$Mat = 1/(1 + e^{\alpha(TL - TL_{50\%})})$	α=-1.396, $TL_{50\%}$=11.16
Growth (female)	Von Bertalanffy	$TL = L_{\infty}(1 - e^{-K(t-t_0)})$	L_{∞}=21.9, K=0.51, L1(age-0.5)=9.53
Growth (male)	Von Bertalanffy	$TL = L_{\infty}(1 - e^{-K(t-t_0)})$	L_{∞}=13.1, K=1.03, L1(age-0.5)=7.04

Table 3: Sex-specific natural mortality at age used as fixed SS3 model inputs. The female 4-plus value is the mean M-at-age for ages ≥4 weighted by expected survivorship.

	M	
Age	Female	Male
0	1.220	1.984
1	0.807	1.320
2	0.670	1.182
3	0.609	1.139
4+	0.564	1.125

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

	Length Samples						
	Recreational			Commercial		Trammel net	
Year	F	M	Combined	F	M	F	M
1982	--	--	101	--	--	--	--
1983	--	--	68	--	--	--	--
1984	--	--	62	--	--	--	--
1985	--	--	113	--	--	--	--
1986	--	--	350	--	--	84	54
1987	--	--	91	--	--	16	7
1988	--	--	194	12	--	44	20
1989	--	--	106	29	1	26	12
1990	--	--	115	5	--	47	29
1991	--	--	186	18	--	183	70
1992	--	--	349	93	7	29	16
1993	--	--	208	--	--	111	80
1994	--	--	261	617	25	85	41
1995	--	--	178	875	48	90	49
1996	--	--	237	87	6	74	23
1997	--	--	271	16	1	30	7
1998	--	--	260	--	--	46	12
1999	--	--	460	47	4	44	10
2000	--	--	388	--	--	25	5
2001	--	--	274	--	--	45	--
2002	1126	143	--	421	106	105	26
2003	1307	124	--	324	73	83	44
2004	1331	118	--	288	129	56	8
2005	1016	58	--	202	16	101	15
2006	1416	67	--	347	64	42	16
2007	703	71	--	260	45	32	14
2008	826	62	--	179	7	53	7
2009	626	64	--	85	1	17	6
2010	428	26	--	32	195	193	69
2011	415	48	--	26	43	233	147
2012	319	36	--	25	9	70	49
2013	315	39	--	104	2	17	3
2014	274	71	--	133	5	22	13
2015	469	55	--	438	14	96	2
2016	459	52	--	244	7	10	4
2017	290	31	--	63	9	3	5
2018	328	70	--	4	1	23	9
2019	413	61	--	399	30	10	--
2020	269	33	--	119	--	6	1
2021	434	38	--	40	1	22	2
2022	479	74	--	4	--	8	2
2023	464	31	--	2	--	33	9

Table 5: Annual sex-specific sample size of length-at-age measurements from the recreational and commercial fishery fleets.

	Age-at-length Samples			
	Recreational		Commercial	
Year	F	M	F	M
2002	796	111	213	41
2003	1095	109	229	68
2004	1103	96	192	111
2005	871	52	161	16
2006	1161	58	339	61
2007	537	56	206	44
2008	628	56	176	7
2009	479	46	44	1
2010	292	20	32	83
2011	378	45	26	32
2012	283	27	18	5
2013	298	33	103	2
2014	269	64	129	4
2015	450	53	434	14
2016	449	50	242	7
2017	284	31	63	8
2018	326	70	4	1
2019	407	60	382	24
2020	261	33	115	--
2021	427	36	39	--
2022	465	71	4	--
2023	440	32	--	--

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

LogL Componenet	logL*Lambda
TOTAL_LogL	8700.24
Catch	1.68412E-05
Equil_catch	5.69528E-14
Survey	-28.6154
Discard	37.4653
Length_comp	5380.4
Age_comp	3316.04
Recruitment	-5.30512
InitEQ_regime	0
Sum_recdevs	-8.10463E-15
Forecast_Recruitment	0
Parm_priors	0.251613
Parm_softbounds	0.00626072
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	9.53	0	Fix	
L_at_Amax_Fem_GP_1	20.94	0	Fix	
VonBert_K_Fem_GP_1	0.51	0	Fix	
CV_young_Fem_GP_1	0.122463	0.0029271	Act	0.024
CV_old_Fem_GP_1	0.275301	0.0087923	Act	0.032
Wtlen_1_Fem_GP_1	0.000128	0	Fix	
Wtlen_2_Fem_GP_1	3.4427	0	Fix	
Mat50%_Fem_GP_1	11.4097	0	Fix	
Mat_slope_Fem_GP_1	-2.06554	0	Fix	
L_at_Amin_Mal_GP_1	7.04	0	Fix	
L_at_Amax_Mal_GP_1	13.09	0	Fix	
VonBert_K_Mal_GP_1	1.03	0	Fix	
CV_young_Mal_GP_1	0.246018	0.0065181	Act	0.026
CV_old_Mal_GP_1	0.43944	0.0301055	Act	0.069
Wtlen_1_Mal_GP_1	0.000231	0	Fix	
Wtlen_2_Mal_GP_1	3.22	0	Fix	
FracFemale_GP_1	0.5	0	Fix	
SR_LN(R0)	8.4286	0.0425123	Act	0.005
SR_BH_steep	0.99	0	Fix	
SR_sigmaR	0.537918	0.0689471	Act	0.128
Main_RecrDev_1977	0.114142	0.320414	Act	2.807
Main_RecrDev_1978	-0.0619691	0.334075	Act	5.391
Main_RecrDev_1979	0.289175	0.301137	Act	1.041
Main_RecrDev_1980	-0.122084	0.314693	Act	2.578
Main_RecrDev_1981	0.239855	0.240661	Act	1.003
Main_RecrDev_1982	0.576218	0.206088	Act	0.358
Main_RecrDev_1983	0.337901	0.223328	Act	0.661
Main_RecrDev_1984	0.0057567	0.261893	Act	45.494
Main_RecrDev_1985	0.34688	0.201013	Act	0.579
Main_RecrDev_1986	0.751245	0.151574	Act	0.202
Main_RecrDev_1987	0.208324	0.200808	Act	0.964
Main_RecrDev_1988	0.0964804	0.201462	Act	2.088
Main_RecrDev_1989	0.550224	0.187622	Act	0.341
Main_RecrDev_1990	0.90342	0.149176	Act	0.165
Main_RecrDev_1991	0.0615902	0.19474	Act	3.162
Main_RecrDev_1992	0.475284	0.147952	Act	0.311
Main_RecrDev_1993	0.507575	0.118867	Act	0.234
Main_RecrDev_1994	0.277942	0.132903	Act	0.478
Main_RecrDev_1995	0.307248	0.153459	Act	0.499
Main_RecrDev_1996	-0.0480817	0.170615	Act	3.548
Main_RecrDev_1997	0.154092	0.167985	Act	1.090
Main_RecrDev_1998	0.258803	0.152226	Act	0.588
Main_RecrDev_1999	-0.0977078	0.141188	Act	1.445
Main_RecrDev_2000	-0.0217308	0.10117	Act	4.656
Main_RecrDev_2001	0.440967	0.0694684	Act	0.158
Main_RecrDev_2002	0.216879	0.069504	Act	0.320
Main_RecrDev_2003	0.145796	0.0698593	Act	0.479
Main_RecrDev_2004	-0.918933	0.0967448	Act	0.105
Main_RecrDev_2005	0.15834	0.0769424	Act	0.486

Table 7 (continued):

Parameter	Value	StdDev	Active/Fixed	CV
Main_RecrDev_2006	-0.07019	0.085597	Act	1.219
Main_RecrDev_2007	0.038269	0.090958	Act	2.377
Main_RecrDev_2008	-0.06466	0.098806	Act	1.528
Main_RecrDev_2009	-0.03818	0.097306	Act	2.549
Main_RecrDev_2010	0.086346	0.091567	Act	1.060
Main_RecrDev_2011	0.31035	0.08639	Act	0.278
Main_RecrDev_2012	0.137193	0.086092	Act	0.628
Main_RecrDev_2013	-0.32453	0.095843	Act	0.295
Main_RecrDev_2014	0.548297	0.063593	Act	0.116
Main_RecrDev_2015	-0.79358	0.09602	Act	0.121
Main_RecrDev_2016	-0.89581	0.109548	Act	0.122
Main_RecrDev_2017	-1.66193	0.148062	Act	0.089
Main_RecrDev_2018	0.191295	0.099829	Act	0.522
Main_RecrDev_2019	-0.7273	0.131625	Act	0.181
Main_RecrDev_2020	-0.84577	0.15286	Act	0.181
Main_RecrDev_2021	-0.23595	0.157318	Act	0.667
Main_RecrDev_2022	-1.21992	0.204323	Act	0.167
Main_RecrDev_2023	-0.58757	0.220109	Act	0.375
ForeRecr_2024	0	0	Fix	
InitF_seas_1_flt_1FISHERY1	0.096324	0.018297	Act	0.190
InitF_seas_1_flt_2FISHERY2	0.144817	0.02311	Act	0.160
LnQ_base_SURVEY2(4)	-8.40112	0.062043	Act	0.007
LnQ_base_SURVEY1(3)_BLK1repl_1986	-6.34971	0.135911	Act	0.021
LnQ_base_SURVEY1(3)_BLK1repl_2013	-7.2971	0.259274	Act	0.036
Size_DblN_peak_FISHERY1(1)	13.0769	0.140816	Act	0.011
Size_DblN_top_logit_FISHERY1(1)	10	0	Fix	
Size_DblN_ascend_se_FISHERY1(1)	1.04803	0.120889	Act	0.115
Size_DblN_descend_se_FISHERY1(1)	0	0	Fix	
Size_DblN_start_logit_FISHERY1(1)	-4.58292	0.156259	Act	0.034
Size_DblN_end_logit_FISHERY1(1)	5	0	Fix	
Retain_L_infl_FISHERY1(1)	4	0	Fix	
Retain_L_width_FISHERY1(1)	0.01	0	Fix	
Retain_L_asymptote_logit_FISHERY1(1)	1.51555	0.037948	Act	0.025
DiscMort_L_level_old_FISHERY1(1)	0.1	0	Fix	
SzSel_MaleDogleg_FISHERY1(1)	11	0	Fix	
SzSel_MaleatZero_FISHERY1(1)	0	0	Fix	
SzSel_MaleatDogleg_FISHERY1(1)	0.45617	0.133981	Act	0.294
SzSel_MaleatMaxage_FISHERY1(1)	-6.88355	0.8144	Act	0.118
Size_DblN_peak_SURVEY1(3)	7.95311	3.79641	Act	0.477
Size_DblN_top_logit_SURVEY1(3)	-4.27113	13.1093	Act	3.069
Size_DblN_ascend_se_SURVEY1(3)	-2.19679	16.9578	Act	7.719
Size_DblN_descend_se_SURVEY1(3)	-0.19446	0.557113	Act	2.865
Size_DblN_start_logit_SURVEY1(3)	-2.33831	0.531803	Act	0.227
Size_DblN_end_logit_SURVEY1(3)	-0.75948	0.167889	Act	0.221
SzSel_MaleDogleg_SURVEY1(3)	9	0	Fix	
SzSel_MaleatZero_SURVEY1(3)	0	0	Fix	
SzSel_MaleatDogleg_SURVEY1(3)	-0.30761	0.089695	Act	0.292
SzSel_MaleatMaxage_SURVEY1(3)	-0.03834	0.164075	Act	4.279
ln(DM_theta)_Len_P1	-2.38296	0.068307	Act	0.029

Table 7 (continued):

Parameter	Value	StdDev	Active/Fixed	CV
ln(DM_theta)_Len_P2	-2.08374	0.0781173	Act	0.037
ln(DM_theta)_Len_P3	-0.974558	0.088744	Act	0.091
ln(DM_theta)_Age_P4	-1.136	0.0589914	Act	0.052
ln(DM_theta)_Age_P5	0.104251	0.127639	Act	1.224
Size_DblN_peak_FISHERY2(2)_BLK2repl_1955	15.7117	0.41839	Act	0.027
Size_DblN_peak_FISHERY2(2)_BLK2repl_1996	14.5617	0.26298	Act	0.018
Size_DblN_top_logit_FISHERY2(2)_BLK2repl_1955	10	0	Fix	
Size_DblN_top_logit_FISHERY2(2)_BLK2repl_1996	10	0	Fix	
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1955	1.80229	0.200959	Act	0.112
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1996	1.64411	0.163608	Act	0.100
Size_DblN_descend_se_FISHERY2(2)_BLK2repl_1955	0	0	Fix	
Size_DblN_descend_se_FISHERY2(2)_BLK2repl_1996	0	0	Fix	
Size_DblN_start_logit_FISHERY2(2)_BLK2repl_1955	-6.84985	0.750314	Act	0.110
Size_DblN_start_logit_FISHERY2(2)_BLK2repl_1996	-4.96566	0.314643	Act	0.063
Size_DblN_end_logit_FISHERY2(2)_BLK2repl_1955	5	0	Fix	
Size_DblN_end_logit_FISHERY2(2)_BLK2repl_1996	5	0	Fix	
SzSel_MaleDogleg_FISHERY2(2)_BLK2repl_1955	10	0	Fix	
SzSel_MaleDogleg_FISHERY2(2)_BLK2repl_1996	10	0	Fix	
SzSel_MaleatZero_FISHERY2(2)_BLK2repl_1955	0	0	Fix	
SzSel_MaleatZero_FISHERY2(2)_BLK2repl_1996	0	0	Fix	
SzSel_MaleatDogleg_FISHERY2(2)_BLK2repl_1955	1.15213	0.426294	Act	0.370
SzSel_MaleatDogleg_FISHERY2(2)_BLK2repl_1996	0.878649	0.217811	Act	0.248
SzSel_MaleatMaxage_FISHERY2(2)_BLK2repl_1955	-7.33215	1.52827	Act	0.208
SzSel_MaleatMaxage_FISHERY2(2)_BLK2repl_1996	-4.02192	0.734692	Act	0.183

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	218.000	218.000	0.050	61.664	61.664	0.100
1956	232.600	232.600	0.050	69.540	69.540	0.100
1957	186.700	186.700	0.050	77.416	77.416	0.100
1958	137.000	137.000	0.050	85.292	85.292	0.100
1959	154.800	154.800	0.050	93.168	93.168	0.100
1960	84.900	84.900	0.050	101.045	101.045	0.100
1961	221.000	221.000	0.050	103.294	103.294	0.100
1962	216.100	216.100	0.050	105.543	105.543	0.100
1963	162.200	162.200	0.050	107.792	107.792	0.100
1964	190.100	190.100	0.050	110.041	110.041	0.100
1965	261.700	261.700	0.050	112.290	112.290	0.100
1966	274.500	274.500	0.050	117.668	117.668	0.100
1967	350.000	350.000	0.050	123.047	123.047	0.100
1968	271.000	271.000	0.050	128.425	128.425	0.100
1969	306.800	306.800	0.050	133.803	133.803	0.100
1970	480.300	480.300	0.050	139.182	139.182	0.100
1971	463.400	463.399	0.050	154.635	154.635	0.100
1972	507.300	507.298	0.050	170.089	170.089	0.100
1973	281.400	281.400	0.050	185.543	185.543	0.100
1974	315.400	315.400	0.050	200.996	200.996	0.100
1975	242.500	242.500	0.050	216.450	216.450	0.100
1976	327.300	327.301	0.050	213.935	213.935	0.100
1977	292.500	292.501	0.050	211.420	211.420	0.100
1978	305.936	305.937	0.050	208.905	208.905	0.100
1979	195.375	195.375	0.050	206.390	206.390	0.100
1980	160.959	160.959	0.050	203.874	203.874	0.100
1981	136.962	136.962	0.050	206.705	206.705	0.100
1982	199.742	199.742	0.050	287.679	287.679	0.215
1983	276.151	276.170	0.050	637.907	637.939	0.521
1984	353.263	353.263	0.050	88.048	88.048	0.252
1985	529.979	529.978	0.050	176.743	176.743	0.251
1986	825.034	825.080	0.050	519.241	519.257	0.450
1987	938.076	938.204	0.050	66.804	66.811	0.231
1988	510.285	510.284	0.050	132.455	132.455	0.173
1989	492.047	492.047	0.050	128.814	128.814	0.245
1990	455.718	455.718	0.050	294.740	294.740	0.250
1991	692.338	692.337	0.050	310.261	310.261	0.177
1992	784.560	784.547	0.050	238.627	238.624	0.171
1993	898.874	898.924	0.050	191.299	191.306	0.173
1994	974.689	974.945	0.050	238.897	238.939	0.223
1995	533.172	533.174	0.050	161.568	161.568	0.193
1996	61.755	61.755	0.050	175.546	175.546	0.150
1997	94.898	94.898	0.050	210.652	210.652	0.145
1998	139.938	139.938	0.050	178.754	178.754	0.169
1999	141.273	141.274	0.050	343.534	343.535	0.138
2000	177.503	177.504	0.050	264.168	264.169	0.169
2001	91.769	91.769	0.050	211.432	211.432	0.185

Table 8 (continued):

	Commercial (1000s of lbs)			Recreational (1000s of fish)		
Year	Observed	Predicted	StdErr	Observed	Predicted	StdErr
2002	81.831	81.831	0.05	213.434	213.434	0.221
2003	63.649	63.649	0.05	274.086	274.086	0.206
2004	73.696	73.696	0.05	196.130	196.130	0.165
2005	21.576	21.576	0.05	146.086	146.086	0.186
2006	83.824	83.824	0.05	149.760	149.760	0.139
2007	78.828	78.828	0.05	174.284	174.284	0.183
2008	77.954	77.954	0.05	124.407	124.407	0.138
2009	131.593	131.593	0.05	193.977	193.977	0.163
2010	81.072	81.072	0.05	231.211	231.211	0.19
2011	154.268	154.268	0.05	249.424	249.424	0.166
2012	97.21	97.210	0.05	209.442	209.442	0.174
2013	89.114	89.116	0.05	397.245	397.251	0.175
2014	66.279	66.279	0.05	208.878	208.878	0.096
2015	62.843	62.843	0.05	217.370	217.370	0.084
2016	65.134	65.135	0.05	222.071	222.072	0.114
2017	47.412	47.412	0.05	93.667	93.667	0.119
2018	62.756	62.756	0.05	64.528	64.528	0.100
2019	71.419	71.419	0.05	102.900	102.900	0.122
2020	15.091	15.091	0.05	94.077	94.077	0.089
2021	27.383	27.383	0.05	88.541	88.541	0.098
2022	3.120	3.120	0.05	81.983	81.983	0.085
2023	1.711	1.711	0.05	74.642	74.642	0.091

Table 9: Observed and estimated recreational discards along with corresponding lognormal standard errors.

	Recreational (1000s of fish)		
Year	Observed	Predicted	StdErr
1982	435.80	63.54	0.468
1983	50.37	140.74	0.513
1984	21.16	19.41	0.594
1985	21.88	39.02	0.588
1986	164.30	114.89	0.449
1987	5.12	14.74	0.392
1988	118.62	29.22	0.549
1989	86.41	28.46	0.744
1990	177.14	65.13	0.397
1991	43.33	68.34	0.264
1992	19.16	52.70	0.223
1993	20.09	42.25	0.313
1994	13.76	52.75	0.283
1995	22.77	35.68	0.315
1996	44.06	38.70	0.309
1997	42.48	46.47	0.267
1998	36.40	39.44	0.285
1999	35.95	75.72	0.226
2000	38.12	58.28	0.260
2001	70.18	46.71	0.386
2002	45.12	47.06	0.245
2003	96.08	60.43	0.277
2004	54.37	43.16	0.282
2005	40.86	32.26	0.251
2006	27.97	33.02	0.300
2007	44.07	38.44	0.302
2008	19.96	27.42	0.253
2009	37.61	42.77	0.299
2010	47.78	51.01	0.224
2011	38.92	55.06	0.249
2012	61.90	46.18	0.241
2013	87.99	87.53	0.207
2014	54.13	46.19	0.449
2015	40.15	47.84	0.321
2016	39.60	48.91	0.201
2017	12.62	20.62	0.184
2018	8.04	14.30	0.204
2019	30.55	22.66	0.221
2020	26.61	20.72	0.173
2021	28.78	19.55	0.197
2022	30.66	18.05	0.121
2023	23.60	16.46	0.104

Table 10: Observed and estimated index of relative abundance of the LDWF FI trammel net survey along with corresponding lognormal standard errors and catchability coefficient estimates for each time block.

	Trammel net Survey			
Year	Observed	Predicted	StdErr	Q
1986	3.386	1.825	0.371	1.75E-03
1987	1.060	1.309	0.463	1.75E-03
1988	1.258	1.159	0.488	1.75E-03
1989	0.779	1.644	0.513	1.75E-03
1990	1.159	2.317	0.503	1.75E-03
1991	1.728	1.312	0.458	1.75E-03
1992	1.065	1.518	0.474	1.75E-03
1993	2.074	1.561	0.419	1.75E-03
1994	2.165	1.252	0.403	1.75E-03
1995	2.279	1.303	0.402	1.75E-03
1996	1.502	1.082	0.445	1.75E-03
1997	1.114	1.204	0.452	1.75E-03
1998	1.472	1.340	0.434	1.75E-03
1999	1.373	1.005	0.440	1.75E-03
2000	0.806	0.985	0.514	1.75E-03
2001	0.693	1.470	0.516	1.75E-03
2002	0.745	1.360	0.527	1.75E-03
2003	1.243	1.264	0.459	1.75E-03
2004	1.200	0.643	0.473	1.75E-03
2005	1.196	1.129	0.458	1.75E-03
2006	1.002	1.037	0.493	1.75E-03
2007	0.934	1.103	0.481	1.75E-03
2008	0.958	1.055	0.481	1.75E-03
2009	0.691	1.034	0.489	1.75E-03
2010	1.351	1.117	0.408	1.75E-03
2011	0.832	1.337	0.422	1.75E-03
2012	0.761	1.246	0.436	1.75E-03
2013	0.324	0.318	0.699	6.78E-04
2014	0.646	0.613	0.659	6.78E-04
2015	0.435	0.289	0.690	6.78E-04
2016	0.272	0.195	0.702	6.78E-04
2017	0.125	0.109	0.756	6.78E-04
2018	0.170	0.405	0.757	6.78E-04
2019	0.171	0.250	0.731	6.78E-04
2020	0.080	0.206	0.806	6.78E-04
2021	0.292	0.306	0.717	6.78E-04
2022	0.237	0.177	0.707	6.78E-04
2023	0.419	0.231	0.691	6.78E-04

Table 11: Observed and estimated index of age-0 relative abundance of the LDWF FI 16-foot otter trawl survey along with corresponding lognormal standard errors and the estimated catchability coefficient.

	16-foot Otter Trawl Survey			
Year	Observed	Predicted	StdErr	Q
1977	1.099	1.037	0.408	2.25E-04
1978	0.822	0.868	0.441	2.25E-04
1979	1.382	1.229	0.394	2.25E-04
1980	0.722	0.813	0.431	2.25E-04
1981	1.946	1.166	0.334	2.25E-04
1982	1.973	1.628	0.323	2.25E-04
1983	1.221	1.281	0.338	2.25E-04
1984	0.588	0.916	0.405	2.25E-04
1985	0.659	1.285	0.365	2.25E-04
1986	1.528	1.920	0.331	2.25E-04
1987	0.911	1.112	0.344	2.25E-04
1988	0.962	0.992	0.356	2.25E-04
1989	1.609	1.558	0.331	2.25E-04
1990	1.486	2.215	0.325	2.25E-04
1991	0.459	0.953	0.388	2.25E-04
1992	0.783	1.437	0.357	2.25E-04
1993	1.250	1.481	0.328	2.25E-04
1994	0.853	1.177	0.360	2.25E-04
1995	1.309	1.210	0.321	2.25E-04
1996	1.513	0.849	0.308	2.25E-04
1997	1.453	1.040	0.321	2.25E-04
1998	0.812	1.156	0.348	2.25E-04
1999	0.682	0.810	0.352	2.25E-04
2000	0.355	0.872	0.415	2.25E-04
2001	1.029	1.384	0.344	2.25E-04
2002	1.254	1.108	0.328	2.25E-04
2003	1.746	1.033	0.309	2.25E-04
2004	0.902	0.356	0.340	2.25E-04
2005	1.283	1.045	0.327	2.25E-04
2006	0.962	0.831	0.332	2.25E-04
2007	1.185	0.927	0.322	2.25E-04
2008	1.031	0.836	0.334	2.25E-04
2009	0.954	0.859	0.336	2.25E-04
2010	1.104	0.972	0.326	2.25E-04
2011	1.926	1.216	0.277	2.25E-04
2012	0.910	1.023	0.303	2.25E-04
2013	0.275	0.645	0.363	2.25E-04
2014	1.594	1.541	0.303	2.25E-04
2015	0.990	0.403	0.324	2.25E-04
2016	0.282	0.364	0.395	2.25E-04
2017	0.126	0.169	0.466	2.25E-04
2018	0.668	1.073	0.335	2.25E-04
2019	0.469	0.430	0.363	2.25E-04
2020	0.239	0.382	0.419	2.25E-04
2021	0.691	0.706	0.342	2.25E-04
2022	0.188	0.266	0.443	2.25E-04
2023	0.815	0.502	0.335	2.25E-04

Table 12: Annual fleet-specific apical fishing mortality and total exploitation rate estimates from the SS3 base model.

	Apical F		Exploitation rate (numbers
Year	Commercial	Recreational	killed/stock size>age-0)
1955	0.1490	0.0876	9.44%
1956	0.1597	0.0991	10.30%
1957	0.1287	0.1105	9.75%
1958	0.0933	0.1208	9.01%
1959	0.1047	0.1318	9.90%
1960	0.0569	0.1422	8.73%
1961	0.1505	0.1476	12.12%
1962	0.1538	0.1543	12.45%
1963	0.1176	0.1583	11.41%
1964	0.1389	0.1622	12.27%
1965	0.1973	0.1688	14.37%
1966	0.2169	0.1812	15.41%
1967	0.2947	0.1961	18.21%
1968	0.2391	0.2081	16.96%
1969	0.2776	0.2194	18.49%
1970	0.4751	0.2412	24.45%
1971	0.5203	0.2847	26.74%
1972	0.6455	0.3330	30.91%
1973	0.3669	0.3596	25.35%
1974	0.3976	0.3849	27.09%
1975	0.2998	0.4103	25.68%
1976	0.4067	0.4100	28.23%
1977	0.3697	0.4060	27.23%
1978	0.3870	0.4145	27.15%
1979	0.2581	0.4060	26.12%
1980	0.1751	0.3527	19.29%
1981	0.1511	0.3828	22.42%
1982	0.2067	0.4387	26.44%
1983	0.2770	0.9395	40.61%
1984	0.3670	0.1430	16.64%
1985	0.5975	0.3163	30.91%
1986	1.2809	0.9231	62.15%
1987	1.2026	0.1028	31.38%
1988	0.6476	0.2411	26.76%
1989	0.6380	0.2247	28.50%
1990	0.4674	0.3697	29.87%
1991	0.5310	0.3564	26.36%
1992	0.8452	0.4031	38.95%
1993	1.1722	0.3174	39.74%
1994	1.4508	0.4411	45.35%
1995	0.8616	0.3162	33.47%
1996	0.0629	0.3056	15.12%
1997	0.0896	0.3849	21.09%
1998	0.1220	0.2979	18.84%
1999	0.1220	0.5986	27.90%
2000	0.1939	0.5762	31.40%
2001	0.1033	0.4059	24.38%

Table 12 (continued):

Year	Apical F		Exploitation rate (numbers killed/stock size>age-0)
	Commercial	Recreational	
2002	0.0674	0.3139	16.30%
2003	0.0486	0.4191	20.01%
2004	0.0581	0.3578	16.18%
2005	0.0221	0.3493	19.81%
2006	0.0775	0.2798	15.51%
2007	0.0722	0.3299	18.12%
2008	0.0681	0.2260	13.16%
2009	0.1176	0.3717	21.33%
2010	0.0786	0.4538	23.43%
2011	0.1519	0.4543	26.81%
2012	0.0839	0.3366	17.95%
2013	0.0831	0.7735	31.53%
2014	0.0772	0.4251	26.54%
2015	0.0512	0.3449	14.83%
2016	0.0719	0.6282	27.51%
2017	0.0779	0.4149	19.38%
2018	0.1395	0.2611	28.29%
2019	0.0920	0.2372	13.01%
2020	0.0199	0.2843	13.34%
2021	0.0398	0.2813	16.31%
2022	0.0039	0.2309	9.60%
2023	0.0025	0.2684	13.53%
2024	--	--	14.88%

Table 13: 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 lbs	Abundance>age-0 1000s of fish	Age-0 Recruits 1000s of fish	Depletion SSB/SSB0
Virgin	2,754	2,372	256	4,576	1.000
Initial	2,006	1,639	247	4,571	0.691
1955	2,006	1,639	247	4,571	0.691
1956	2,011	1,643	247	4,571	0.693
1957	1,992	1,625	247	4,571	0.685
1958	1,998	1,632	247	4,571	0.688
1959	2,026	1,659	247	4,571	0.700
1960	2,020	1,654	247	4,571	0.697
1961	2,051	1,685	247	4,571	0.710
1962	1,974	1,609	245	4,571	0.679
1963	1,919	1,556	245	4,570	0.656
1964	1,917	1,554	245	4,570	0.655
1965	1,897	1,534	244	4,570	0.647
1966	1,831	1,470	243	4,569	0.620
1967	1,769	1,410	242	4,568	0.594
1968	1,669	1,314	240	4,567	0.554
1969	1,651	1,295	240	4,567	0.546
1970	1,610	1,256	239	4,566	0.530
1971	1,461	1,112	235	4,563	0.469
1972	1,352	1,009	232	4,561	0.425
1973	1,237	900	227	4,557	0.379
1974	1,293	953	229	4,559	0.402
1975	1,294	954	228	4,559	0.402
1976	1,323	983	229	4,560	0.415
1977	1,289	951	228	4,618	0.401
1978	1,299	958	229	3,863	0.404
1979	1,193	890	209	5,472	0.375
1980	1,398	1,022	245	3,621	0.431
1981	1,366	1,057	216	5,189	0.446
1982	1,500	1,133	240	7,249	0.478
1983	1,823	1,338	311	5,702	0.564
1984	1,471	1,054	284	4,076	0.445
1985	1,494	1,141	248	5,721	0.481
1986	1,468	1,066	265	8,549	0.450
1987	1,442	927	329	4,951	0.391
1988	1,342	932	287	4,416	0.393
1989	1,284	928	248	6,935	0.391
1990	1,594	1,127	302	9,860	0.475
1991	2,180	1,535	412	4,244	0.647
1992	1,724	1,307	306	6,399	0.551
1993	1,499	1,051	298	6,596	0.443
1994	1,439	977	307	5,240	0.412
1995	1,137	751	264	5,386	0.317
1996	1,240	850	262	3,779	0.358
1997	1,385	1,059	228	4,632	0.447
1998	1,474	1,131	229	5,145	0.477
1999	1,639	1,263	248	3,604	0.533

Table 13 (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	1,323	1,027	206	3,884	0.433
2001	1,156	871	192	6,163	0.367
2002	1,521	1,117	258	4,933	0.471
2003	1,707	1,320	262	4,599	0.557
2004	1,673	1,311	246	1,586	0.553
2005	1,273	1,069	156	4,652	0.451
2006	1,382	1,075	195	3,702	0.453
2007	1,411	1,119	197	4,126	0.472
2008	1,429	1,121	205	3,723	0.473
2009	1,493	1,195	201	3,824	0.504
2010	1,384	1,092	196	4,329	0.461
2011	1,374	1,060	207	5,415	0.447
2012	1,483	1,111	242	4,555	0.469
2013	1,580	1,225	241	2,872	0.516
2014	1,120	870	178	6,862	0.367
2015	1,573	1,143	268	1,796	0.482
2016	1,319	1,083	181	1,621	0.457
2017	850	693	115	751	0.292
2018	582	492	69	4,776	0.207
2019	961	688	161	1,913	0.290
2020	959	770	136	1,701	0.325
2021	867	713	109	3,143	0.301
2022	998	784	137	1,182	0.331
2023	867	732	101	2,237	0.308
2024	860	698	107	4,549	0.294

Table 14: Correlated parameters of the SS3 base model with correlation coefficients greater than 0.8.

Parameter1	Parameter2	Correlation
Size_DblN_ascend_se_SURVEY1(3)	Size_DblN_peak_SURVEY1(3)	0.999752
Size_DblN_top_logit_SURVEY1(3)	Size_DblN_peak_SURVEY1(3)	-0.996074
Size_DblN_ascend_se_SURVEY1(3)	Size_DblN_top_logit_SURVEY1(3)	-0.995456
Size_DblN_ascend_se_FISHERY1(1)	Size_DblN_peak_FISHERY1(1)	0.939606
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1996	Size_DblN_peak_FISHERY2(2)_BLK2repl_1996	0.922938
Size_DblN_ascend_se_FISHERY2(2)_BLK2repl_1955	Size_DblN_peak_FISHERY2(2)_BLK2repl_1955	0.918102
SzSel_MaleatMaxage_FISHERY2(2)_BLK2repl_1955	SzSel_MaleatDogleg_FISHERY2(2)_BLK2repl_1955	-0.802364

Table 15: Jitter analysis log likelihood distribution of the 100 model runs with parameter starting values jittered by 0.1.

Likelihood	Frequency
8700.24	35
8700.35	35
8704.42	2
8704.45	1
8727.71	2
8746.71	1
8766.08	1
8766.13	1
8766.15	1
8766.67	6
8766.72	1
8766.73	2
8766.84	1
8779.42	1
11302.60	1
11323.50	1
11325.50	1
11339.40	1
11341.00	1
11370.60	1
11370.90	1
11389.40	1
11420.00	1
11476.40	1

Table 16: Limit and target reference points for the Louisiana Southern Flounder stock. Spawning stock biomass units are thousands of pounds. Fishing mortality rate units are per year.

Management Benchmarks		
Parameter	Definition	Value
SSB_{limit}	Proposed SSB Limit (minimum SSB 1982-2013)	751
SPR_{limit}	SPR that corresponds with SSB_{limit}	31.7%
F_{limit}	Equilibrium F that corresponds with SPR_{limit}	40.1%
SSB_{target}	LAC 76: VII.385 (Geometric mean SSB 1982-2013)	1091
SPR_{target}	SPR that corresponds with SSB_{target}	46.0%
F_{target}	Equilibrium F that corresponds with SPR_{target}	24.4%

Table 17: Stock status summary: annual SSB and exploitation rate (F) estimates, ratios of SSB and F to $SSB_{SPRlimit}$ and $F_{SPRlimit}$, and spawning potential ratio (SSB/SSB_0) estimates. Current estimates are the geometric mean of the 2021-2023 estimates.

Year	SSB	$SSB/SSB_{SPRlimit}$	F	$F/F_{SPRlimit}$	SPR
1955	1,639	2.183	9.44%	0.236	69.1%
1956	1,643	2.189	10.30%	0.257	69.3%
1957	1,625	2.165	9.75%	0.243	68.5%
1958	1,632	2.173	9.01%	0.225	68.8%
1959	1,659	2.209	9.90%	0.247	70.0%
1960	1,654	2.203	8.73%	0.218	69.7%
1961	1,685	2.243	12.12%	0.302	71.0%
1962	1,609	2.143	12.45%	0.311	67.9%
1963	1,556	2.072	11.41%	0.285	65.6%
1964	1,554	2.069	12.27%	0.306	65.5%
1965	1,534	2.043	14.37%	0.359	64.7%
1966	1,470	1.958	15.41%	0.385	62.0%
1967	1,410	1.878	18.21%	0.455	59.4%
1968	1,314	1.750	16.96%	0.423	55.4%
1969	1,295	1.725	18.49%	0.462	54.6%
1970	1,256	1.673	24.45%	0.610	53.0%
1971	1,112	1.482	26.74%	0.668	46.9%
1972	1,009	1.343	30.91%	0.771	42.5%
1973	900	1.198	25.35%	0.633	37.9%
1974	953	1.269	27.09%	0.676	40.2%
1975	954	1.271	25.68%	0.641	40.2%
1976	983	1.309	28.23%	0.705	41.5%
1977	951	1.266	27.23%	0.680	40.1%
1978	958	1.276	27.15%	0.678	40.4%
1979	890	1.185	26.12%	0.652	37.5%
1980	1,022	1.361	19.29%	0.481	43.1%
1981	1,057	1.408	22.42%	0.560	44.6%
1982	1,133	1.509	26.44%	0.660	47.8%
1983	1,338	1.782	40.61%	1.014	56.4%
1984	1,054	1.404	16.64%	0.415	44.5%
1985	1,141	1.519	30.91%	0.772	48.1%
1986	1,066	1.420	62.15%	1.551	45.0%
1987	927	1.234	31.38%	0.783	39.1%
1988	932	1.242	26.76%	0.668	39.3%
1989	928	1.235	28.50%	0.712	39.1%
1990	1,127	1.501	29.87%	0.746	47.5%
1991	1,535	2.045	26.36%	0.658	64.7%
1992	1,307	1.740	38.95%	0.972	55.1%
1993	1,051	1.400	39.74%	0.992	44.3%
1994	977	1.302	45.35%	1.132	41.2%
1995	751	1.000	33.47%	0.836	31.7%
1996	850	1.132	15.12%	0.377	35.8%
1997	1,059	1.411	21.09%	0.527	44.7%
1998	1,131	1.506	18.84%	0.470	47.7%
1999	1,263	1.682	27.90%	0.696	53.3%
2000	1,027	1.367	31.40%	0.784	43.3%
2001	871	1.161	24.38%	0.609	36.7%

Table 17 (continued):

Year	SSB	$SSB/SSB_{SPRlimit}$	F	$F/F_{SPRlimit}$	SPR
2002	1,117	1.487	16.30%	0.407	47.1%
2003	1,320	1.758	20.01%	0.499	55.7%
2004	1,311	1.747	16.18%	0.404	55.3%
2005	1,069	1.424	19.81%	0.494	45.1%
2006	1,075	1.431	15.51%	0.387	45.3%
2007	1,119	1.490	18.12%	0.452	47.2%
2008	1,121	1.493	13.16%	0.329	47.3%
2009	1,195	1.592	21.33%	0.532	50.4%
2010	1,092	1.455	23.43%	0.585	46.1%
2011	1,060	1.412	26.81%	0.669	44.7%
2012	1,111	1.480	17.95%	0.448	46.9%
2013	1,225	1.631	31.53%	0.787	51.6%
2014	870	1.159	26.54%	0.662	36.7%
2015	1,143	1.523	14.83%	0.370	48.2%
2016	1,083	1.443	27.51%	0.687	45.7%
2017	693	0.923	19.38%	0.484	29.2%
2018	492	0.655	28.29%	0.706	20.7%
2019	688	0.917	13.01%	0.325	29.0%
2020	770	1.025	13.34%	0.333	32.5%
2021	713	0.949	16.31%	0.407	30.1%
2022	784	1.045	9.60%	0.240	33.1%
2023	732	0.974	13.53%	0.338	30.8%
2024	698	0.929	14.88%	0.371	29.4%
Current	742	0.989	12.84%	0.321	31.3%

10. Figures

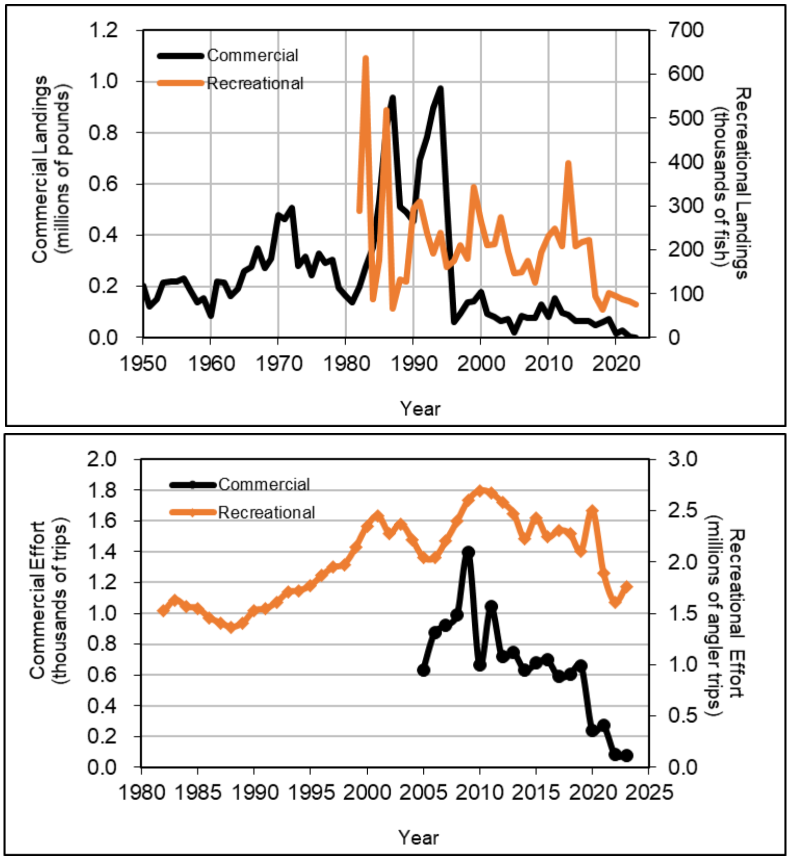


Figure 1: Reported Louisiana commercial and estimated recreational Southern Flounder landings derived from NMFS statistical records, the LDWF Trip Ticket Program, and the LDWF LA Creel Survey along with the number of commercial fishing trips with Southern Flounder landings and the estimated Louisiana recreational fishing effort (angler trips). (Note: NOAA did not distinguish between Southern Flounder and other flatfish species prior to 2000 in Louisiana).

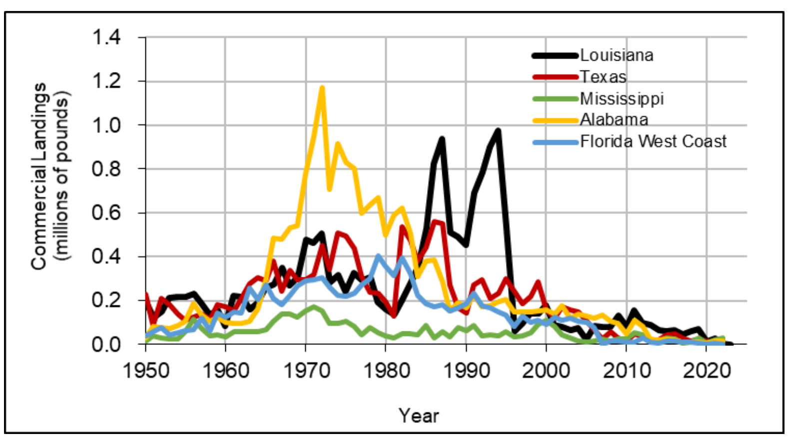


Figure 2: Reported commercial Southern Flounder landings of the Gulf of Mexico derived from NMFS statistical records and the LDWF Trip Ticket Program. (Note: NOAA did not distinguish between Southern Flounder and other flatfish species prior to 2000 in Louisiana).

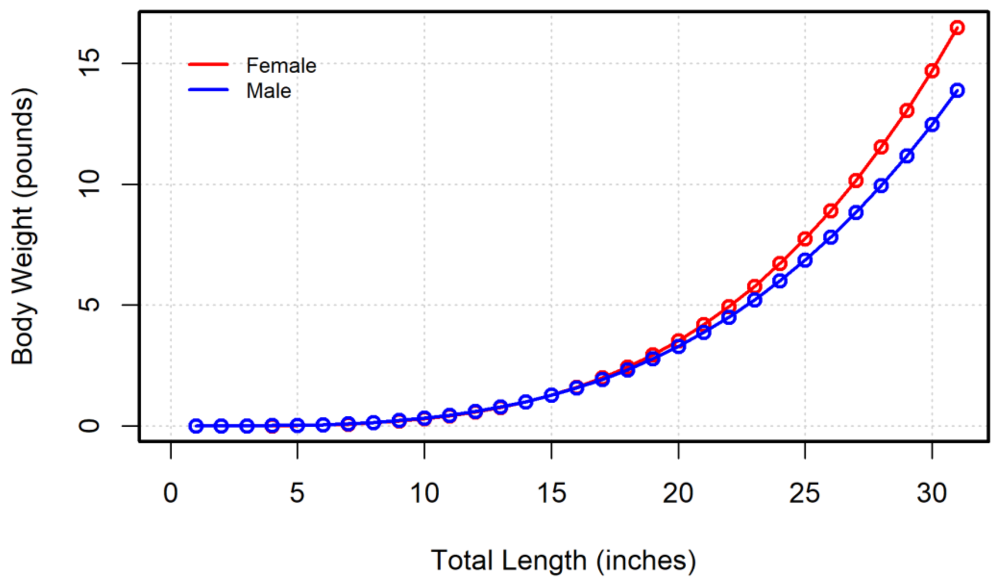


Figure 3: Mean sex-specific weight at length relationships used as fixed inputs of the SS3 base model.

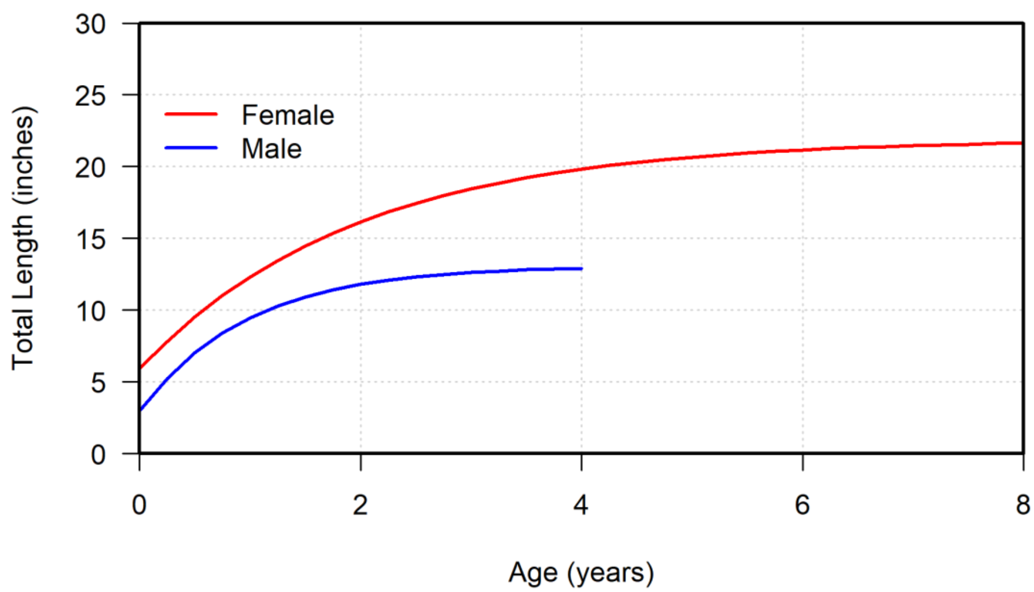


Figure 4: Sex-specific von Bertalanffy growth curves from Fischer and Thompson (2004).

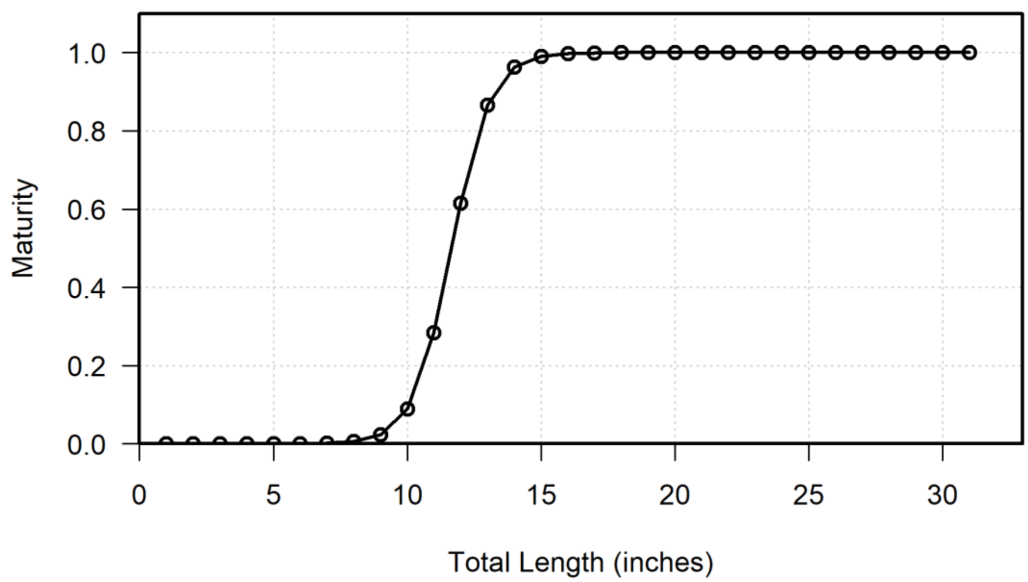


Figure 5: Mean female maturity at length relationship used as a fixed input of the SS3 base model.

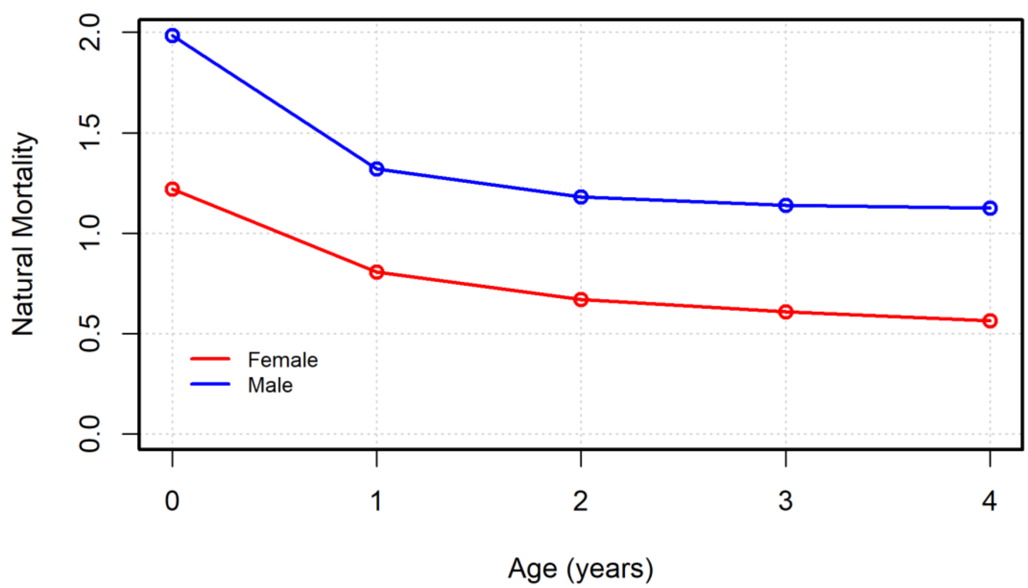


Figure 6: Sex-specific natural mortality rates at age calculated from the Lorenzen curve and the M point estimates of 0.675 (female) and 1.35 (male). The female 4-plus value is the mean M-at-age for ages ≥4 weighted by expected survivorship.

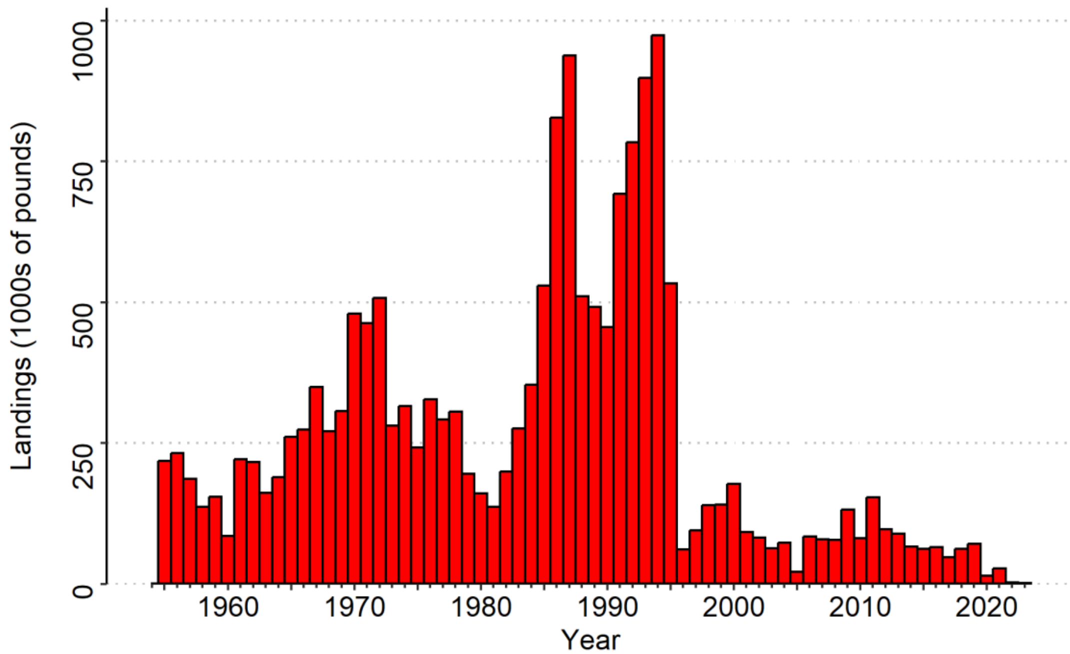


Figure 7: Observed commercial landings in pounds.

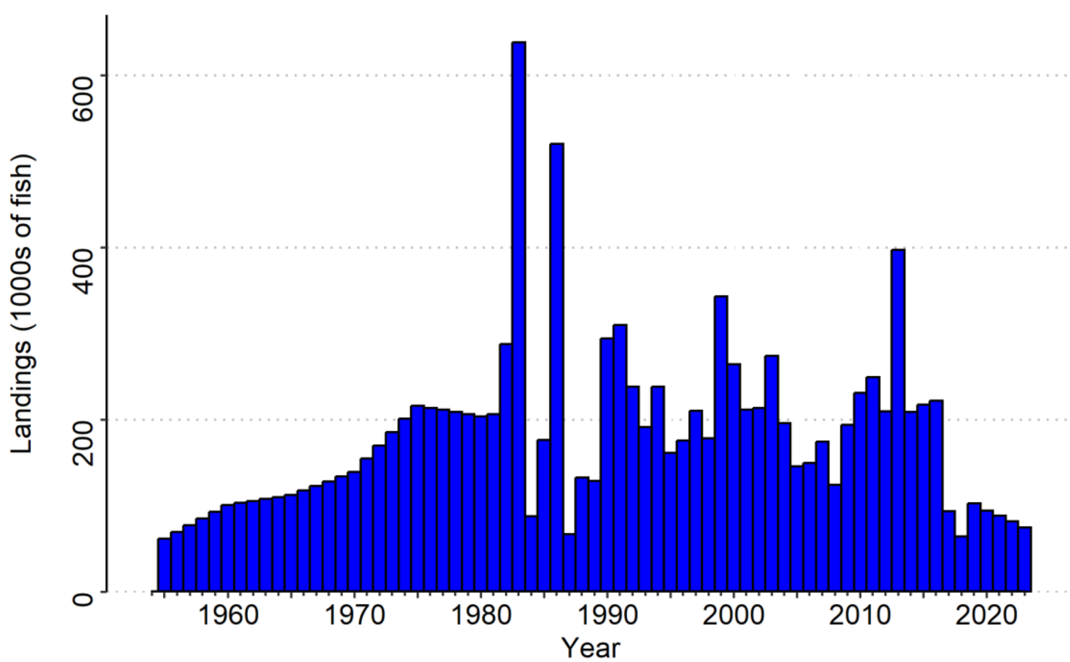


Figure 8: Observed recreational landings as numbers of fish.

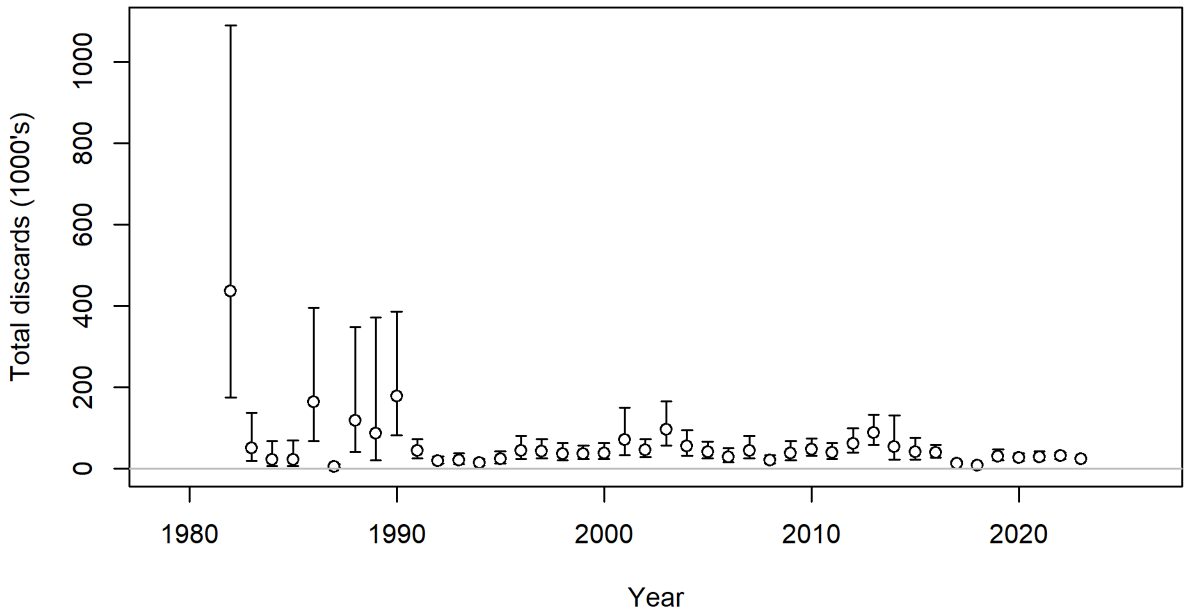


Figure 9: Observed recreational discards as numbers of fish and corresponding lognormal 95% confidence intervals.

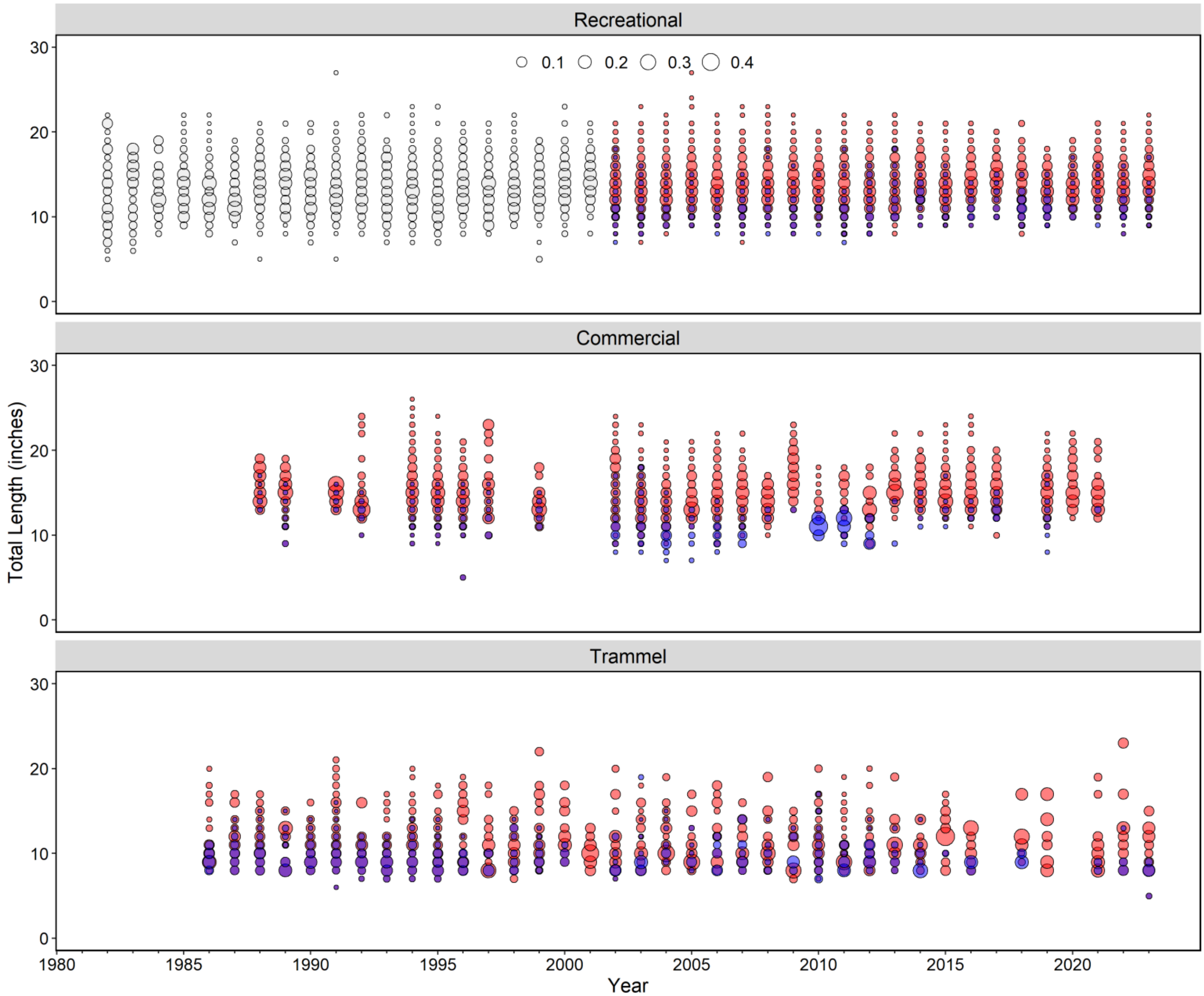


Figure 10: Observed length compositions of the fisheries and the LDWF trammel net survey. Uncolored bubbles represent combined sexes, red bubbles are females, and blue bubbles are males.

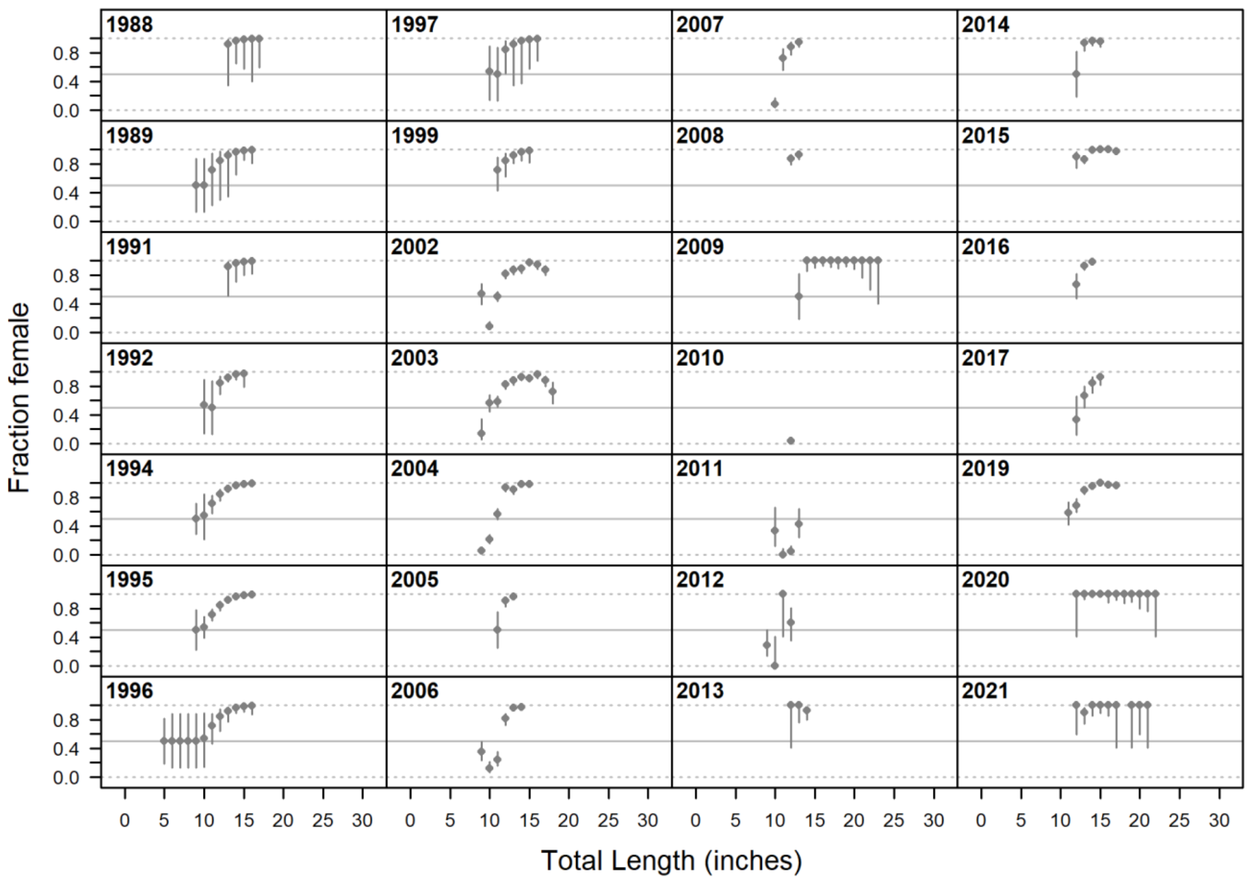


Figure 11: Observed sex ratios of the commercial length compositions along with 75% confidence intervals.

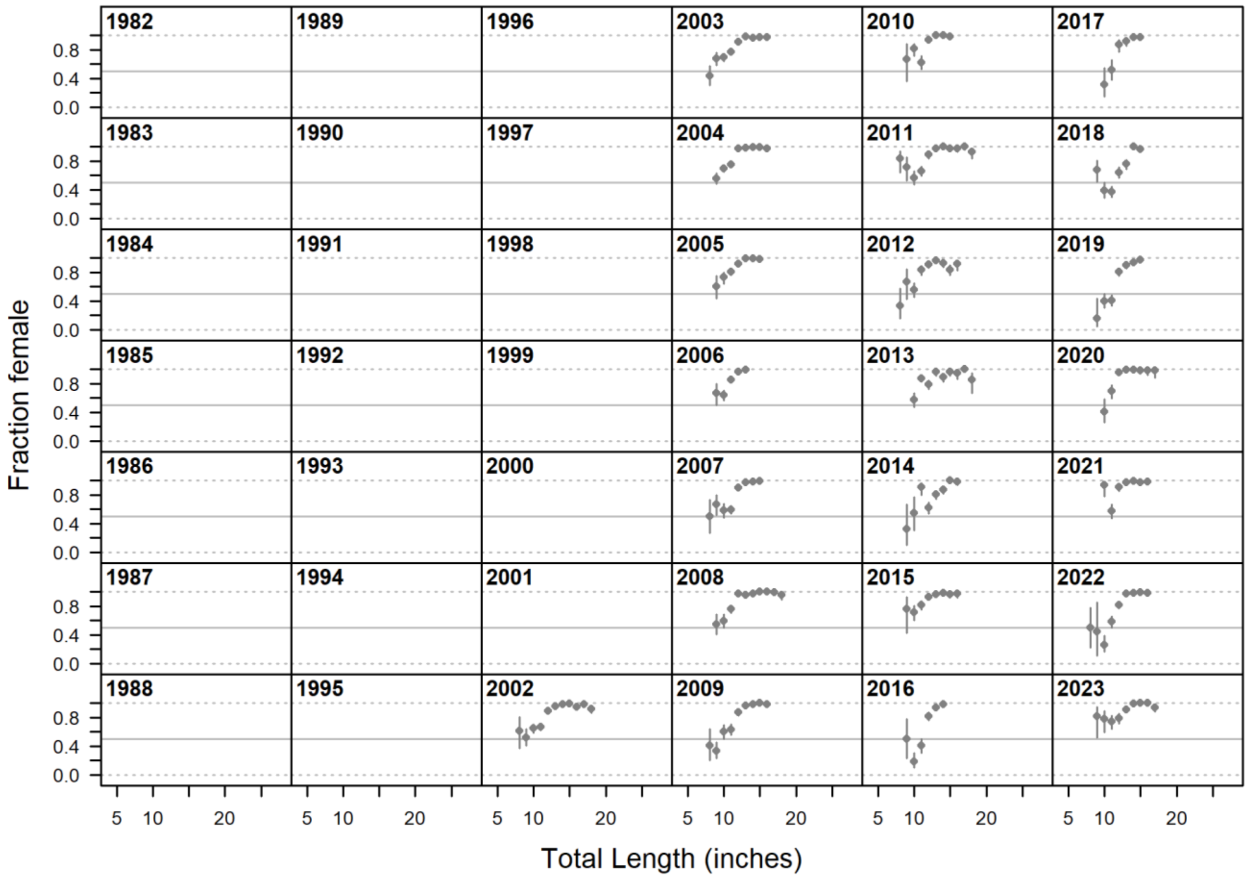


Figure 12: Observed sex ratios of the recreational length compositions along with 75% confidence intervals

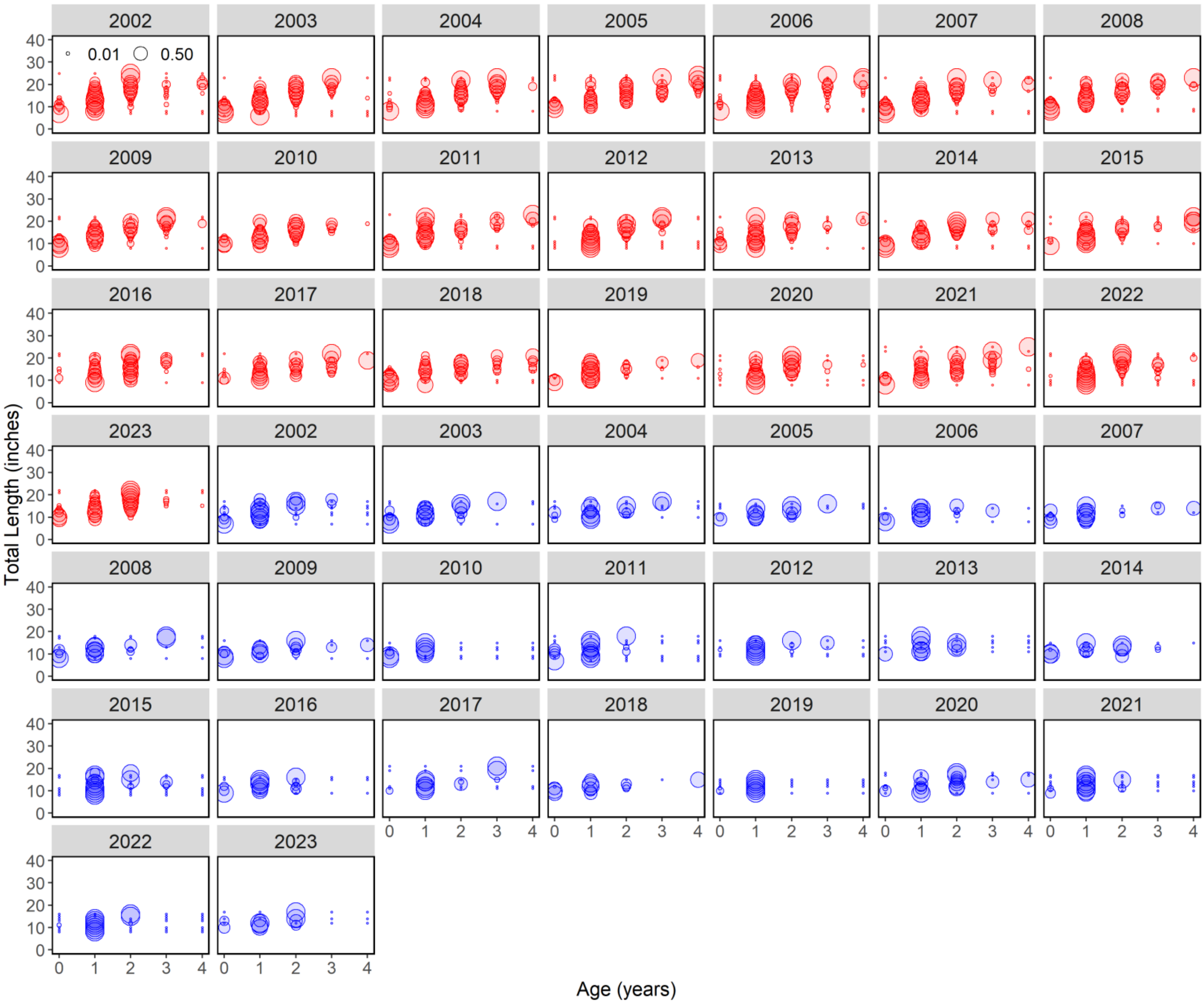


Figure 13: Observed sex specific age-at-length compositions of the recreational fishery. Red bubbles are females and blue bubbles are males.

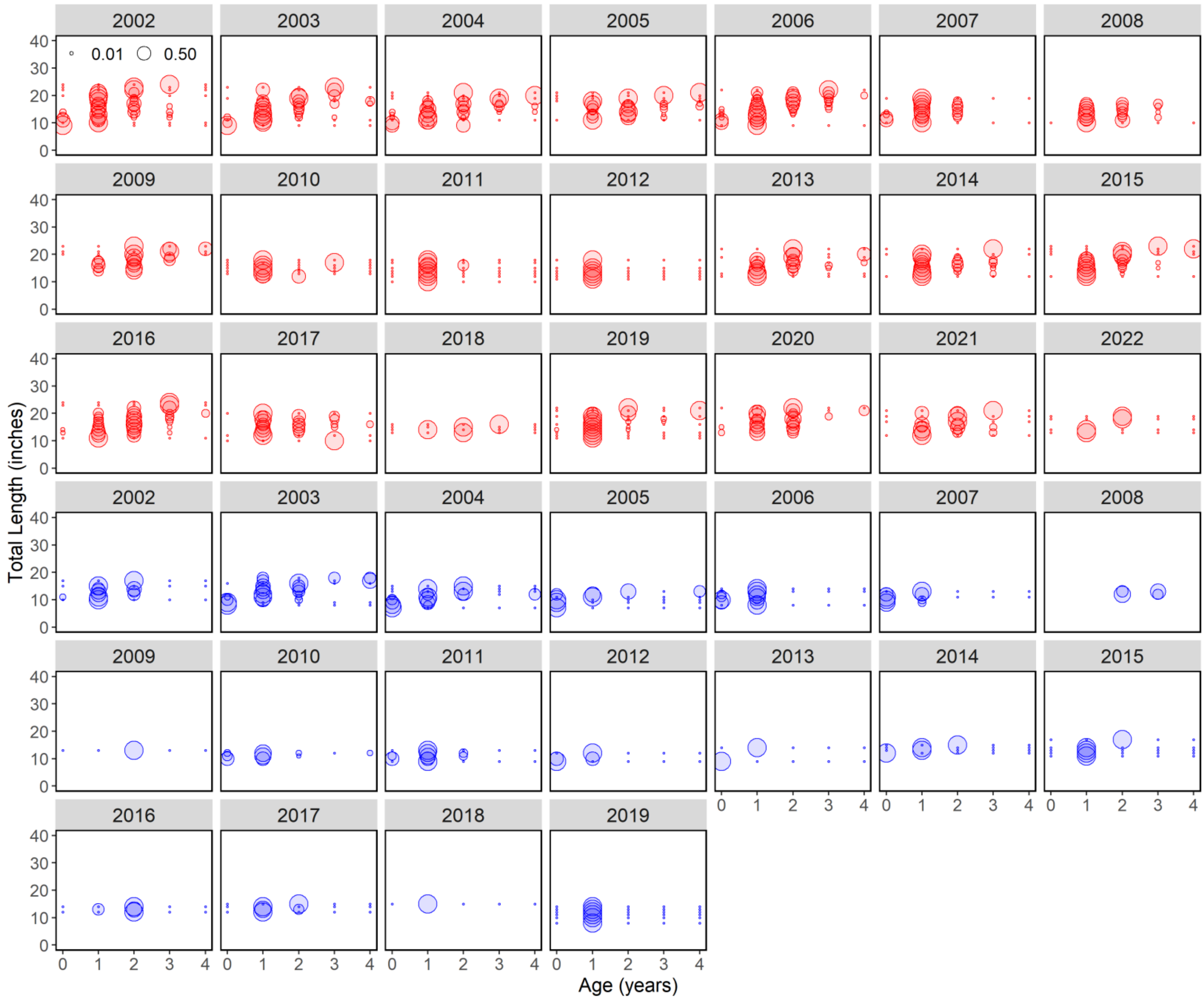


Figure 14: Observed sex-specific age-at-length compositions of the commercial fishery. Red bubbles are females and blue bubbles are males.

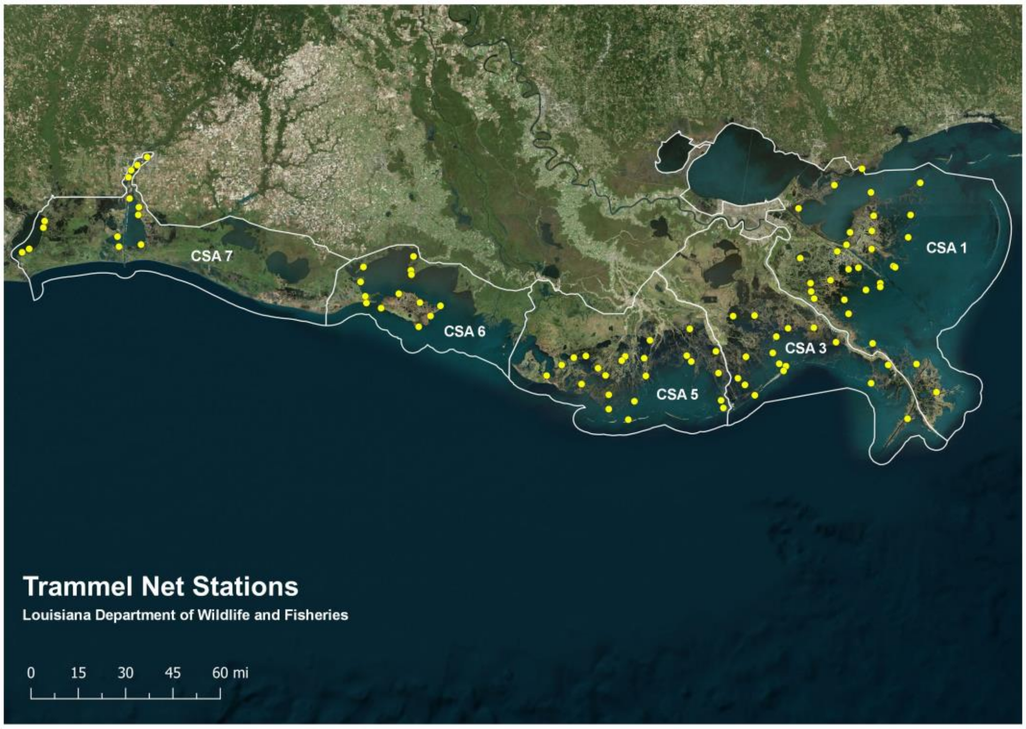


Figure 15: Station locations of the LDWF trammel net survey. Lines delineate LDWF Coastal Study Areas and state/federal waters.

Figure 16: Station locations of the LDWF 16-foot inshore trawl survey. Lines delineate LDWF Coastal Study Areas and state/federal waters.

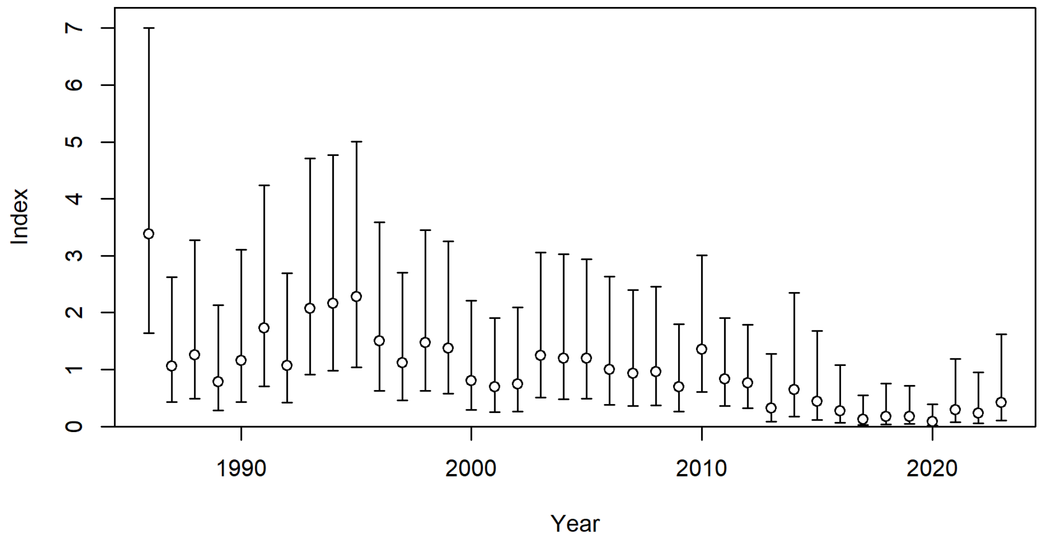


Figure 17: Observed index of relative abundance of the LDWF trammel net survey and corresponding lognormal 95% confidence intervals.

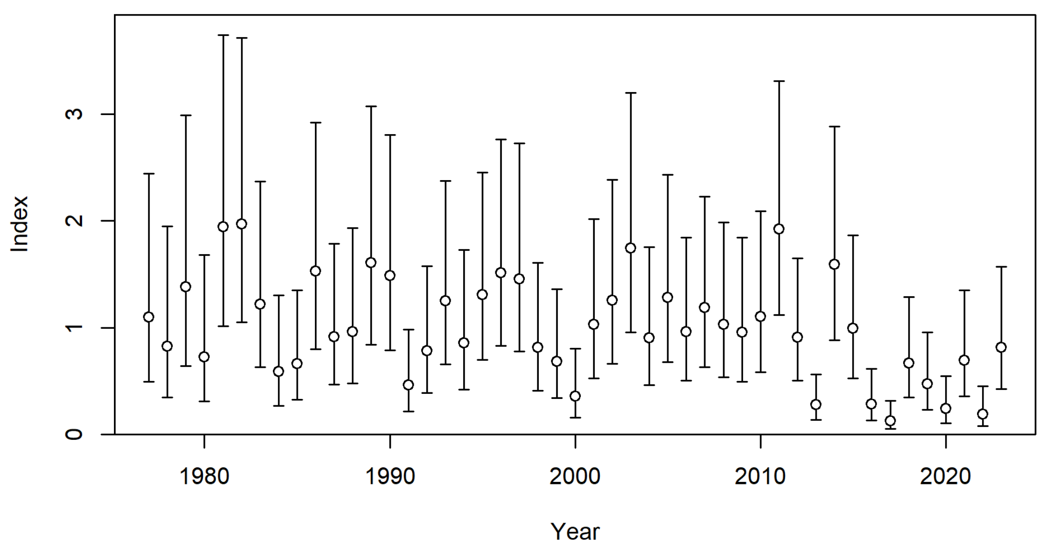


Figure 18: Observed index of age-0 relative abundance of the LDWF 16-foot inshore trawl survey and corresponding lognormal 95% confidence intervals.

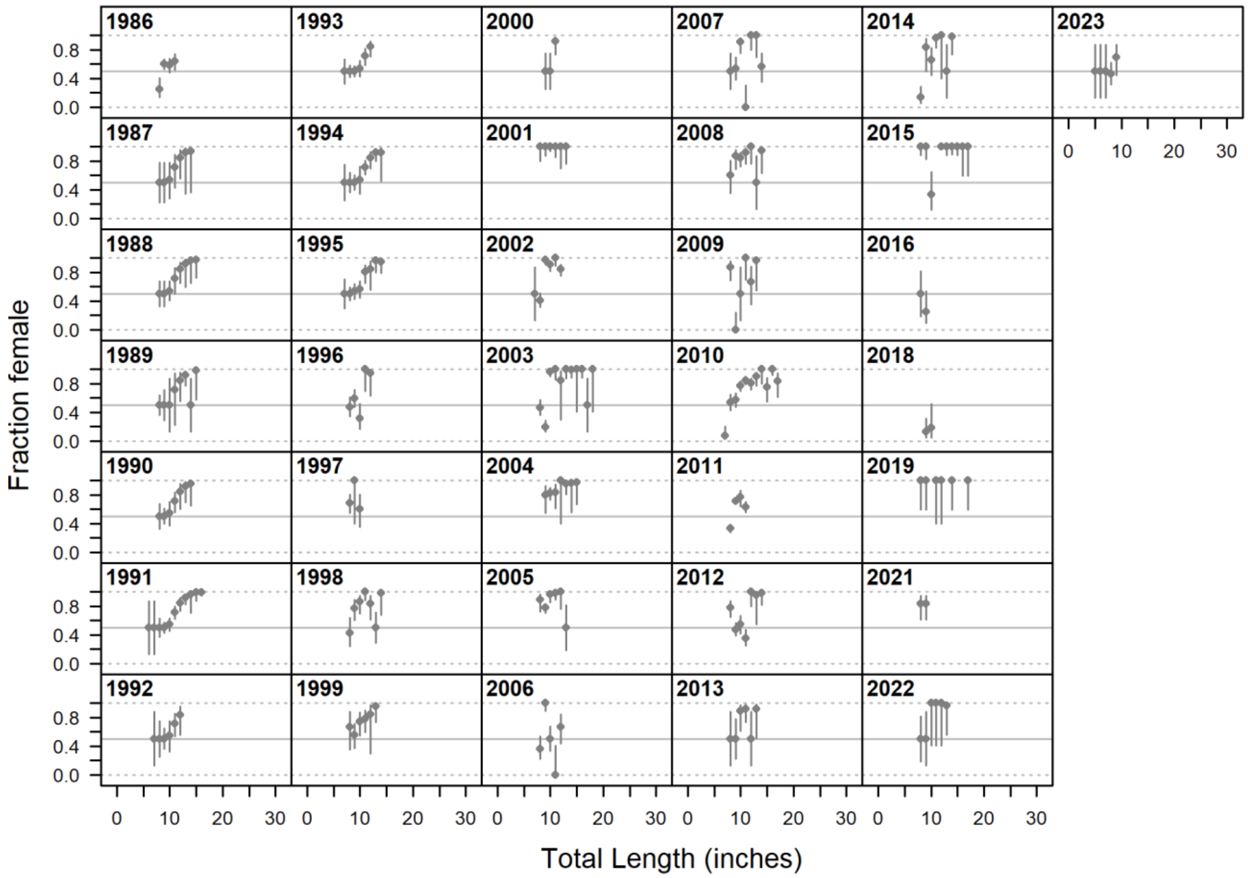


Figure 19: Observed sex ratios of the trammel net survey length compositions along with 75% confidence intervals.

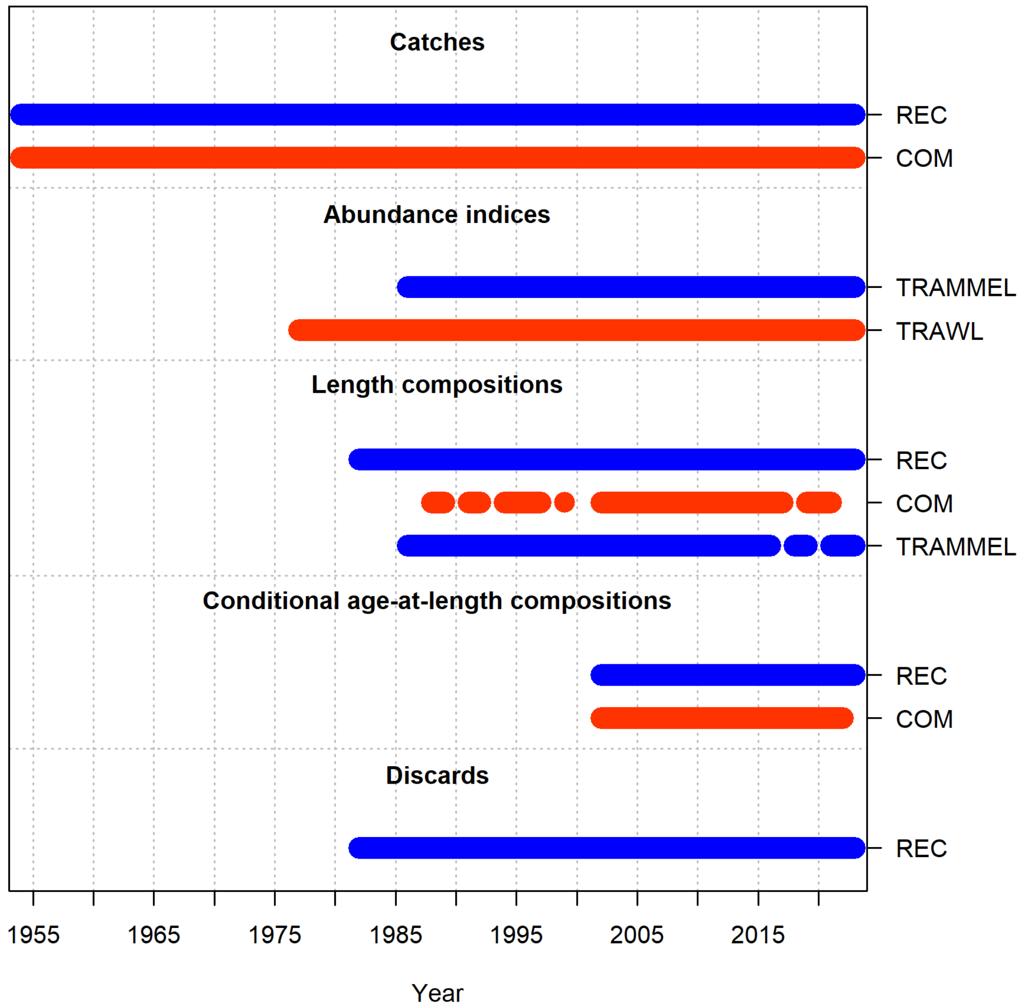


Figure 20: Data inputs of the SS3 base model.

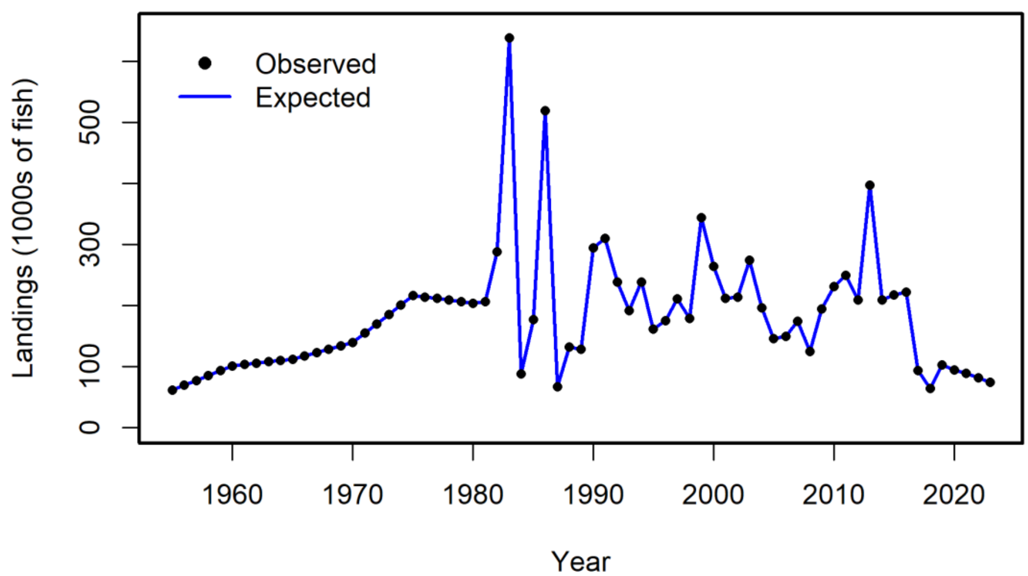


Figure 21: Observed and SS3 base model estimated recreational landings as numbers of fish.

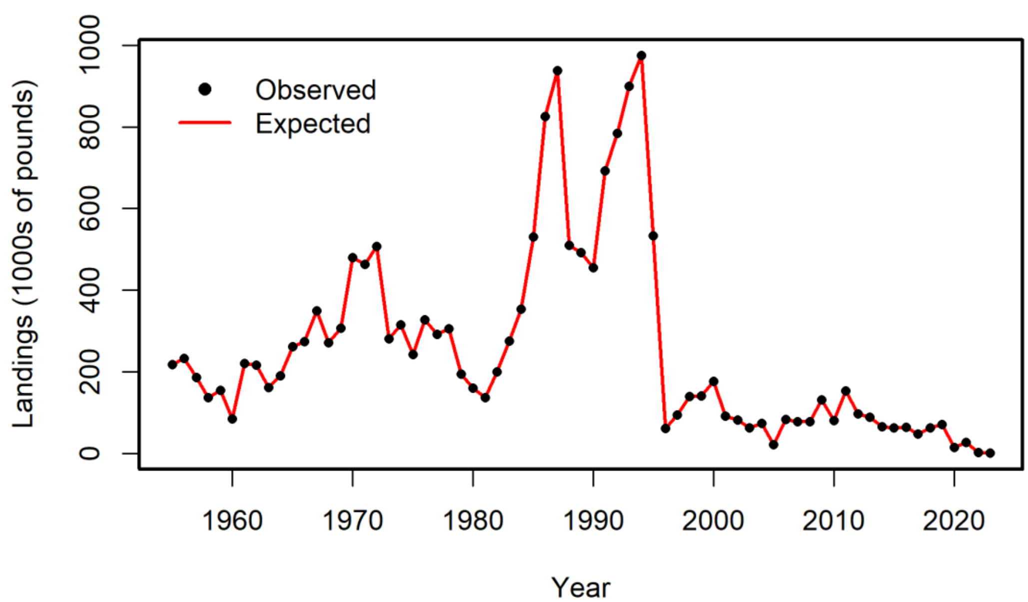


Figure 22: Observed and SS3 base model estimated commercial landings in pounds.

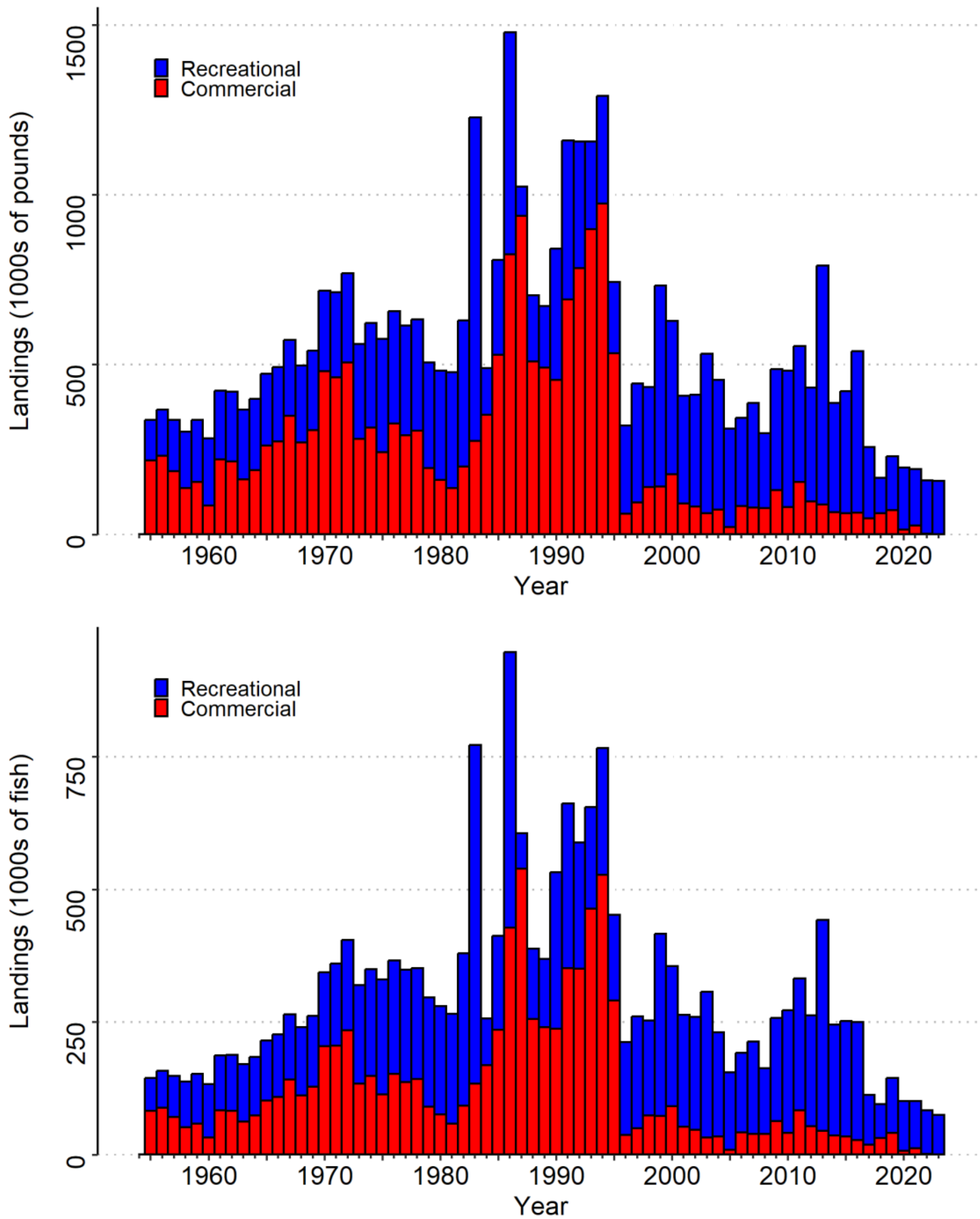


Figure 23: SS3 base model estimated landings in pounds (top) and as numbers of fish (bottom).

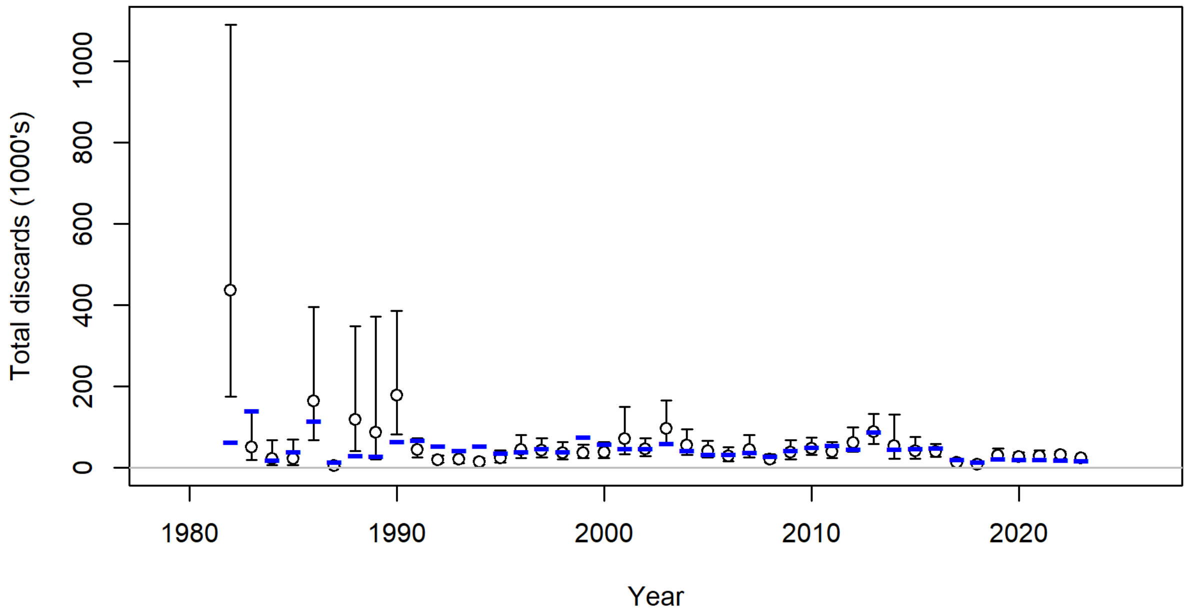


Figure 24: Observed and SS3 base model estimated discards of the recreational fishery with corresponding lognormal 95% confidence intervals.

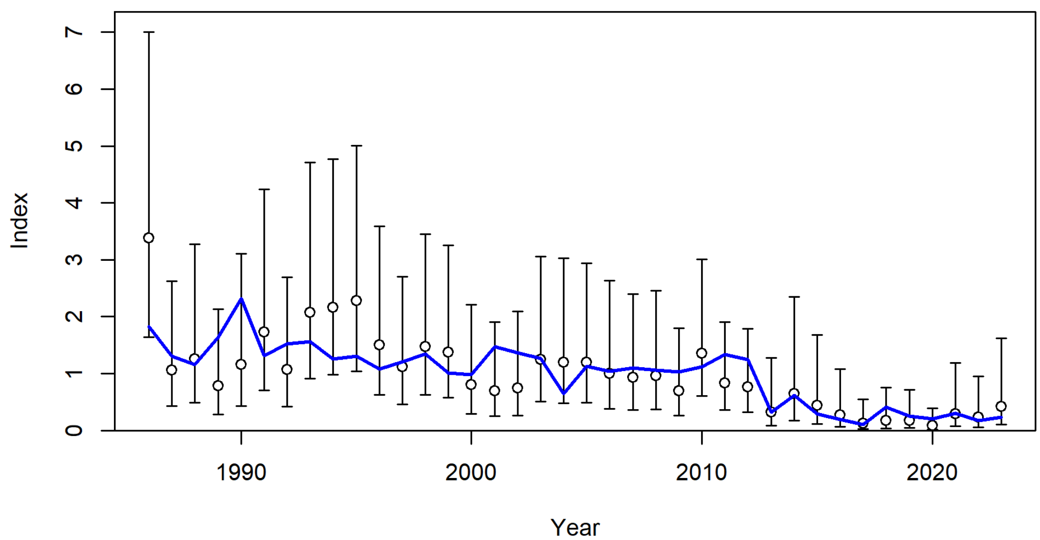


Figure 25: Observed and SS3 base model estimated index of relative abundance of the LDWF trammel net survey with corresponding lognormal 95% confidence intervals.

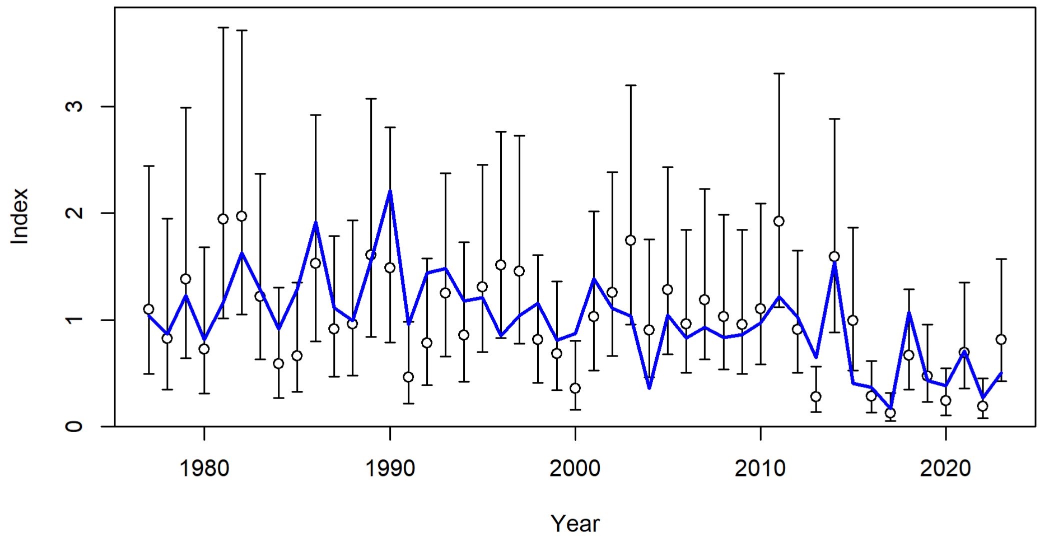


Figure 26: Observed and SS3 base model estimated index of age-0 relative abundance of the LDWF 16-foot inshore otter trawl survey with corresponding lognormal 95% confidence intervals.

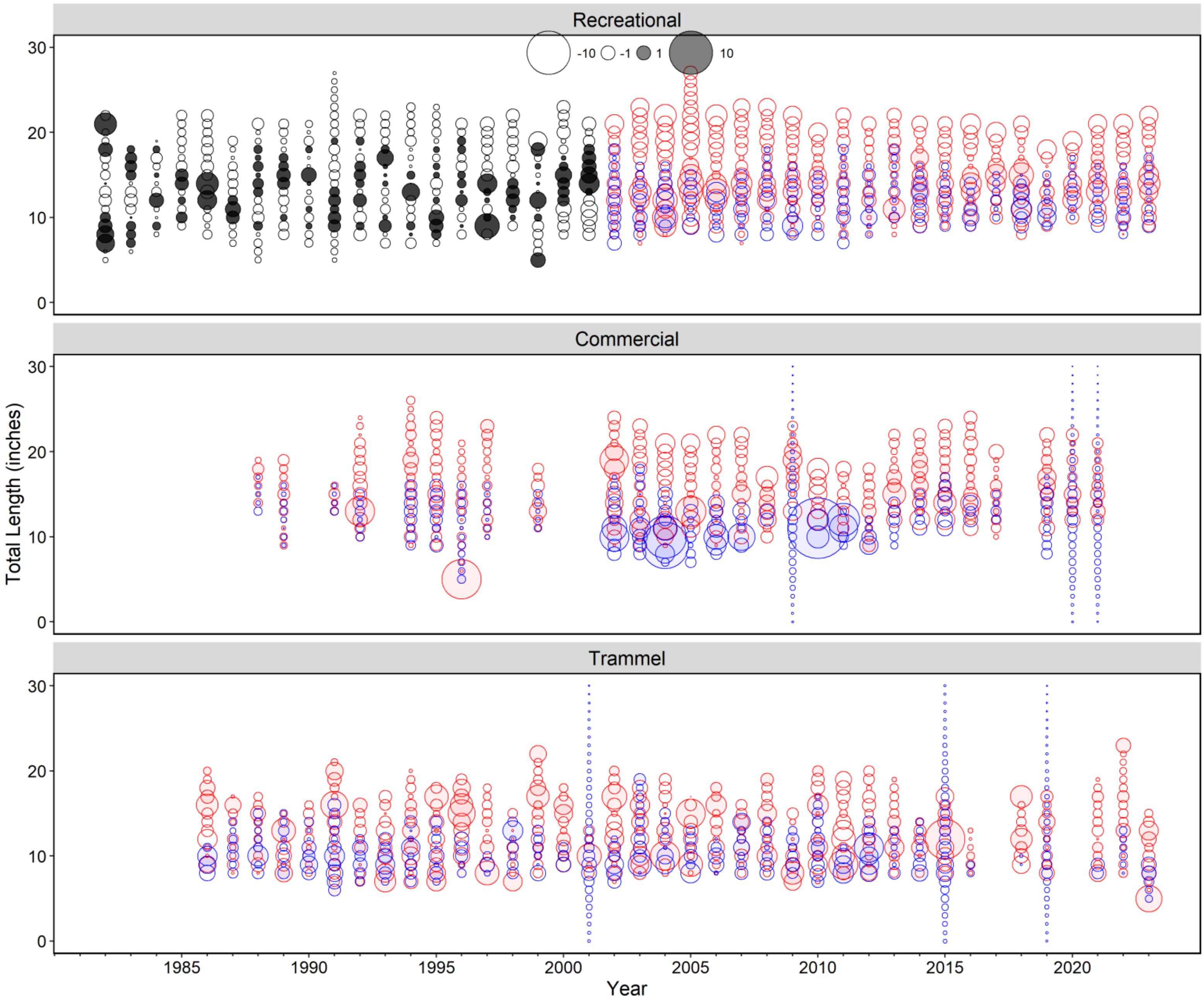


Figure 27: Pearson residuals of length composition fits of the fisheries and the LDWF trammel net survey. Shaded bubbles represent instances where observed values are greater than the predicted values and clear bubbles represent instances where observed values are less than the predicted values. Uncolored bubbles represent combined sexes, red bubbles are females, and blue bubbles are males.

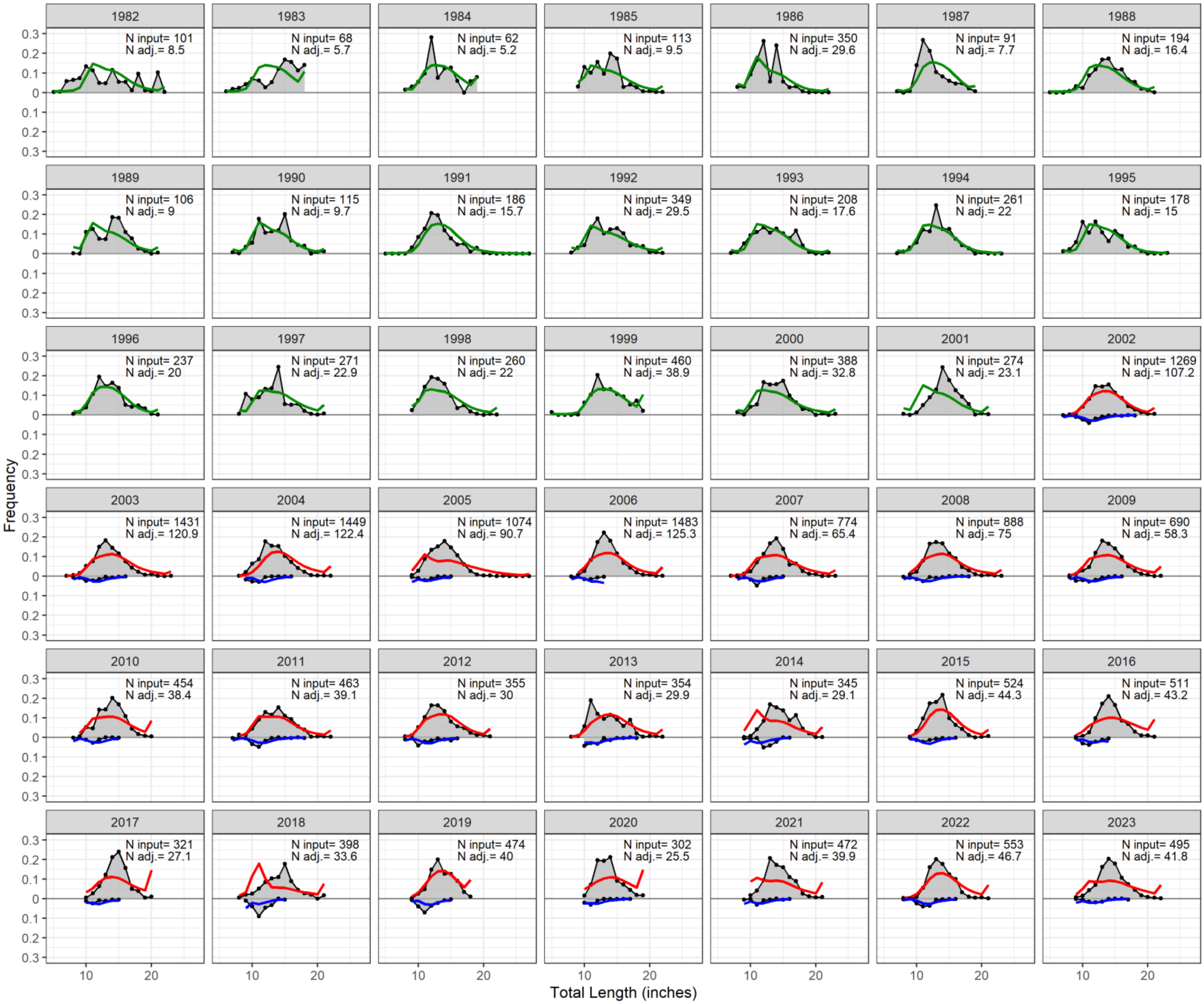


Figure 28: Observed and SS3 base model estimated length compositions of the recreational fishery (sexes combined 1982-2001 and sex-specific 2002-2023). Input samples sizes (N input) and effective sample sizes adjusted by the estimated Dirichlet-multinomial multiplier (N adj.) are reported in each figure.

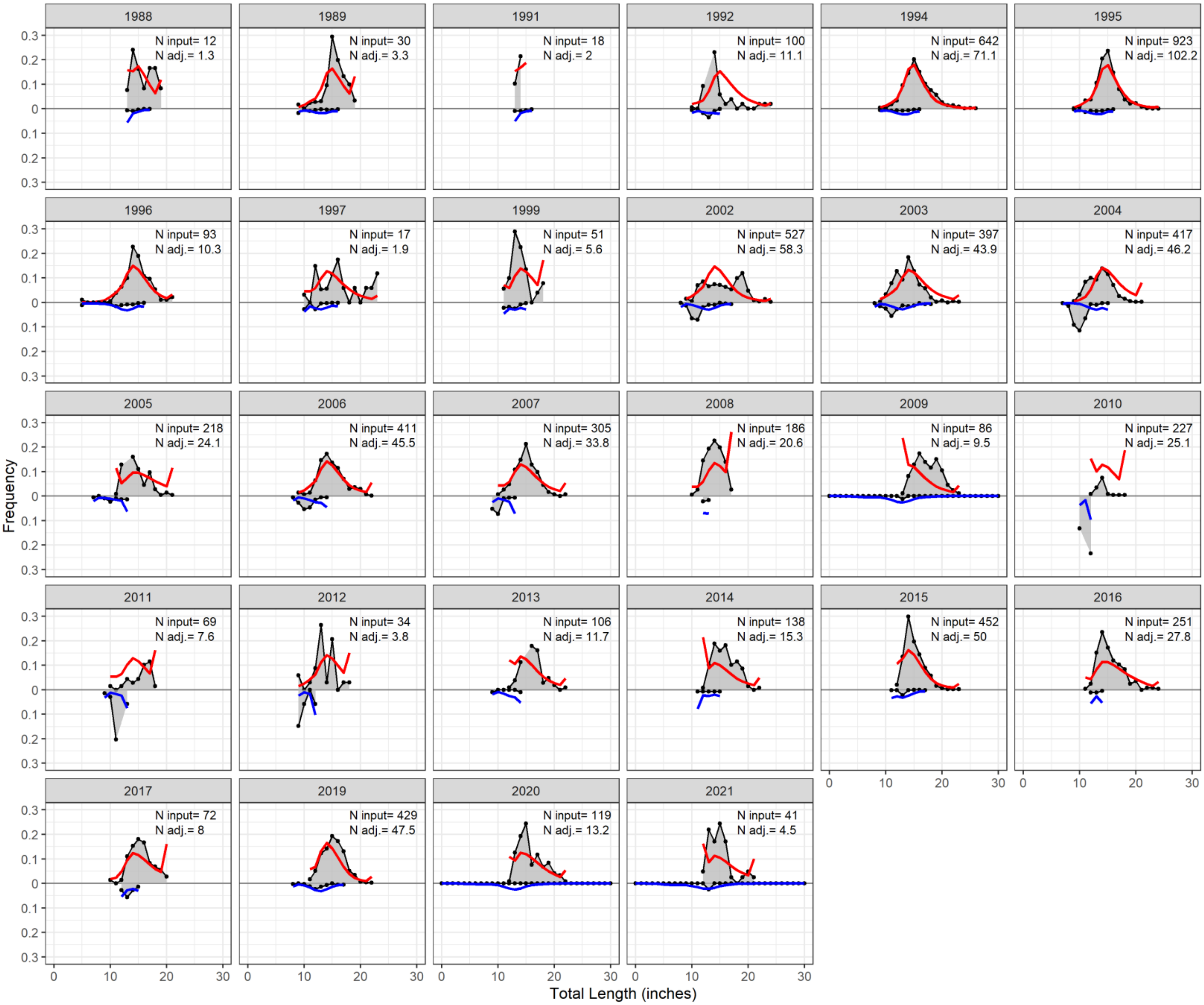


Figure 29: Observed and SS3 base model estimated sex-specific length compositions of the commercial fishery. Input samples sizes (N input) and effective sample sizes adjusted by the estimated Dirichlet-multinomial multiplier (N adj.) are reported in each figure.

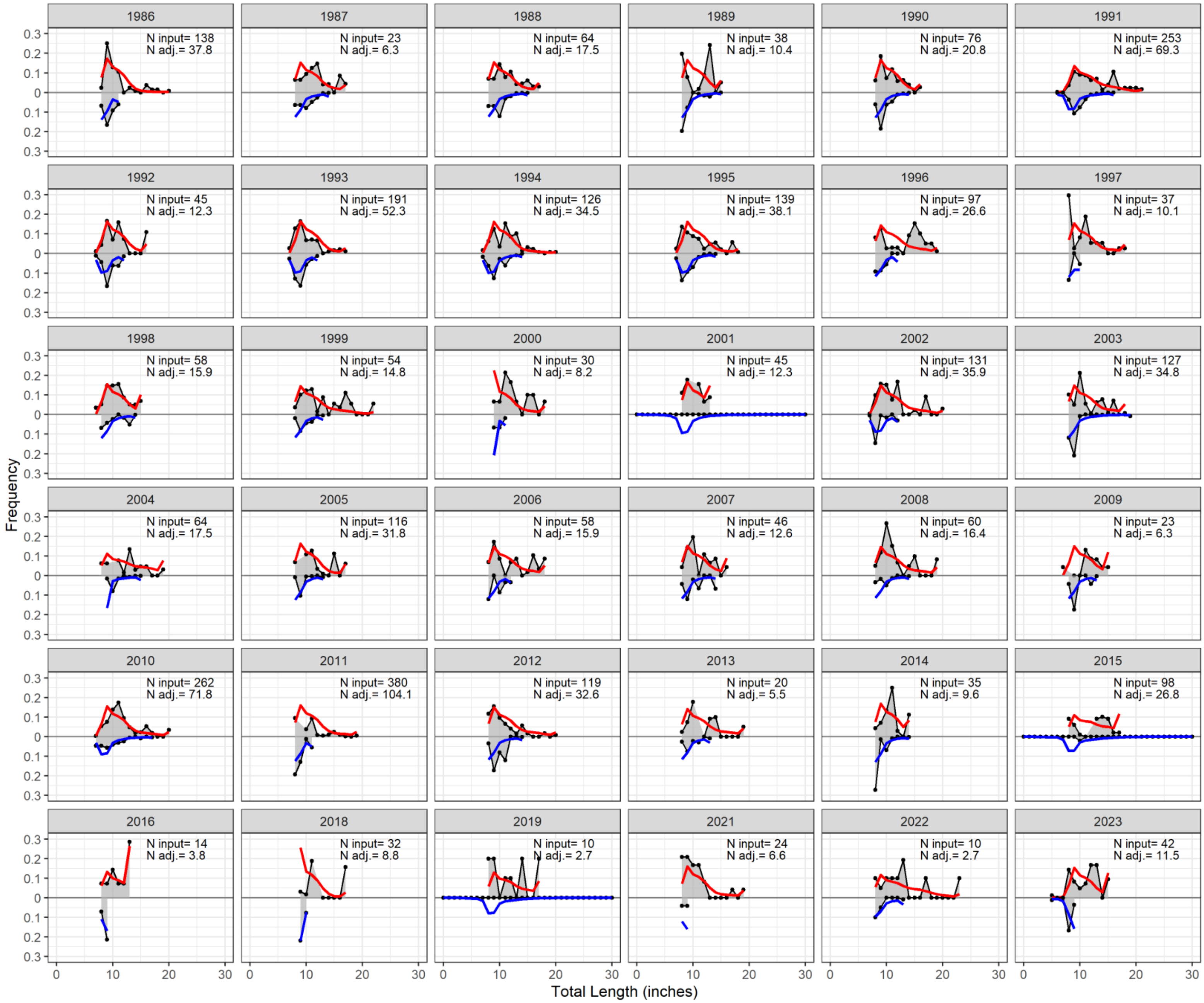


Figure 30: Observed and SS3 base model estimated sex-specific length compositions of the LDWF trammel net survey. Input samples sizes (N input) and effective sample sizes adjusted by the estimated Dirichlet-multinomial multiplier (N adj.) are reported in each figure.

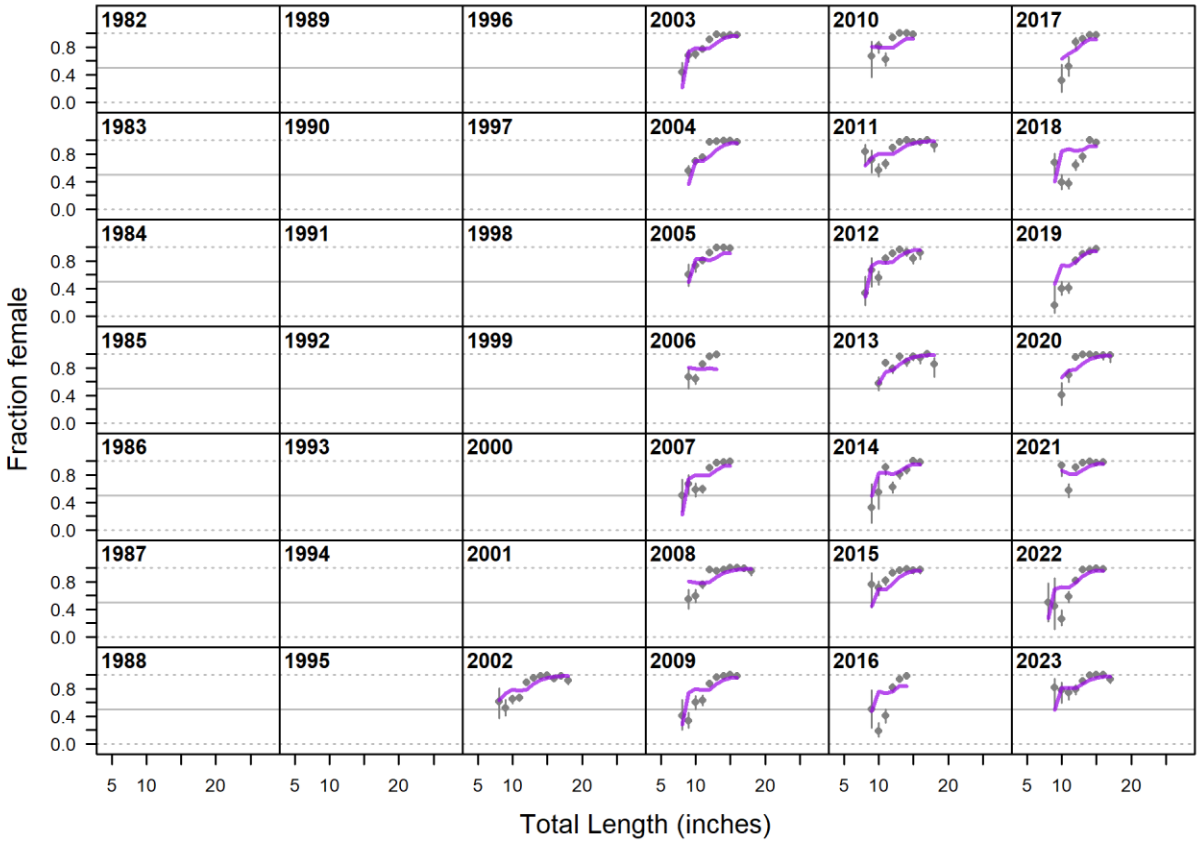


Figure 31: Observed and SS3 base model estimated sex ratios of the recreational length compositions along with 75% confidence intervals.

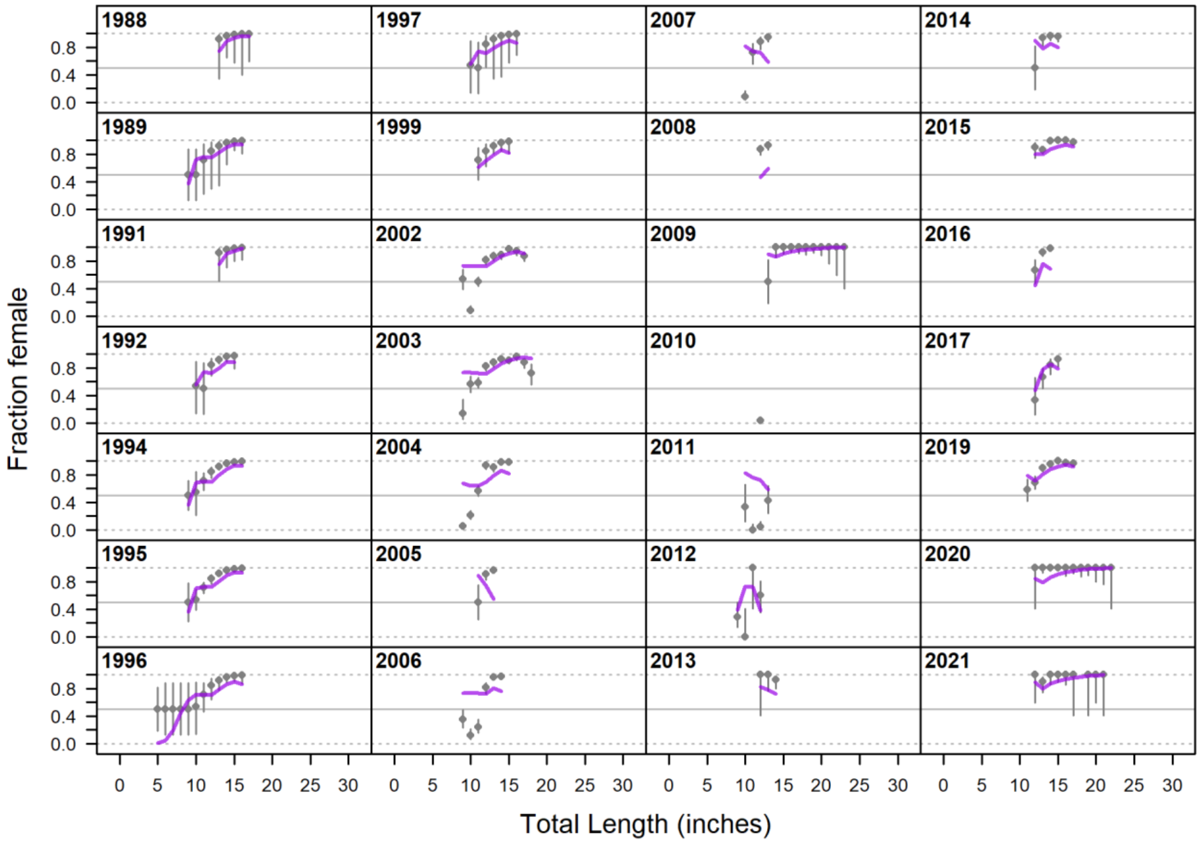


Figure 32: Observed and SS3 base model estimated sex ratios of the commercial length compositions along with 75% confidence intervals.

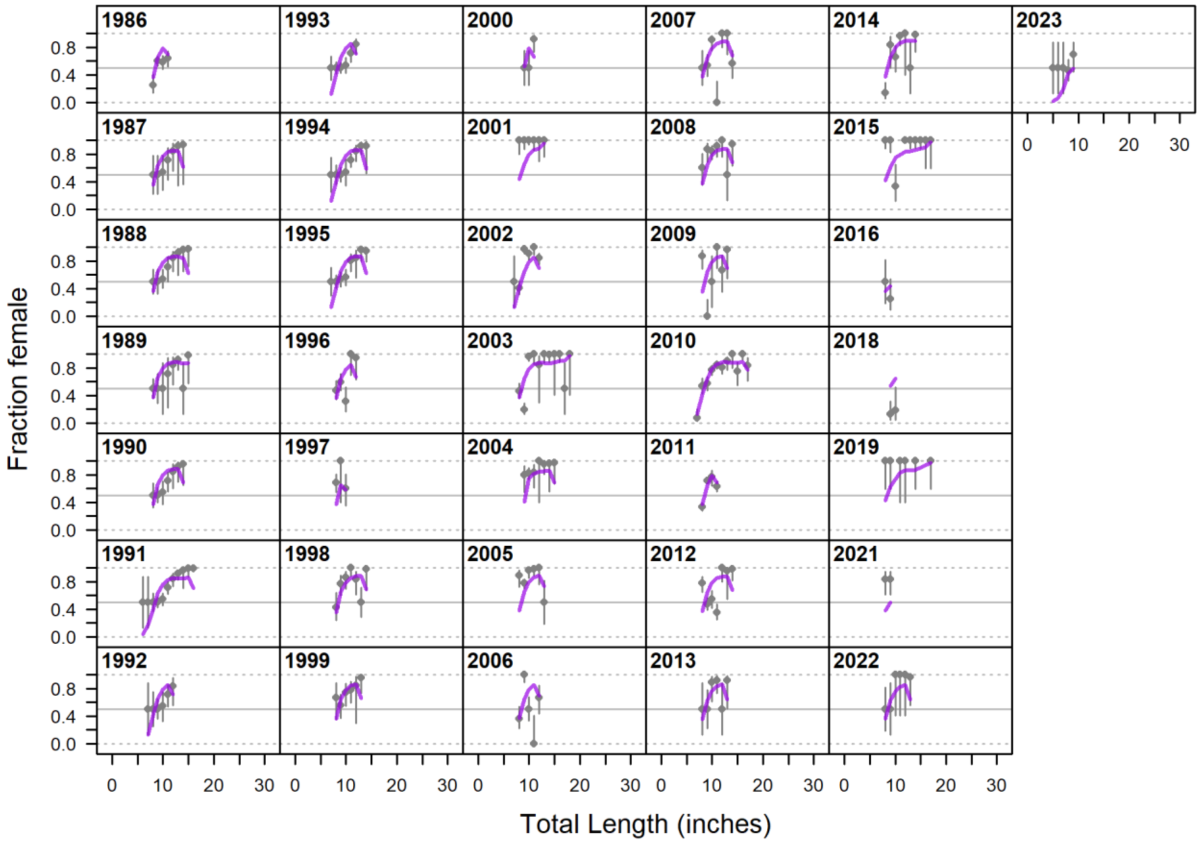


Figure 33: Observed and SS3 base model estimated sex ratios of the trammel net survey length compositions along with 75% confidence intervals.

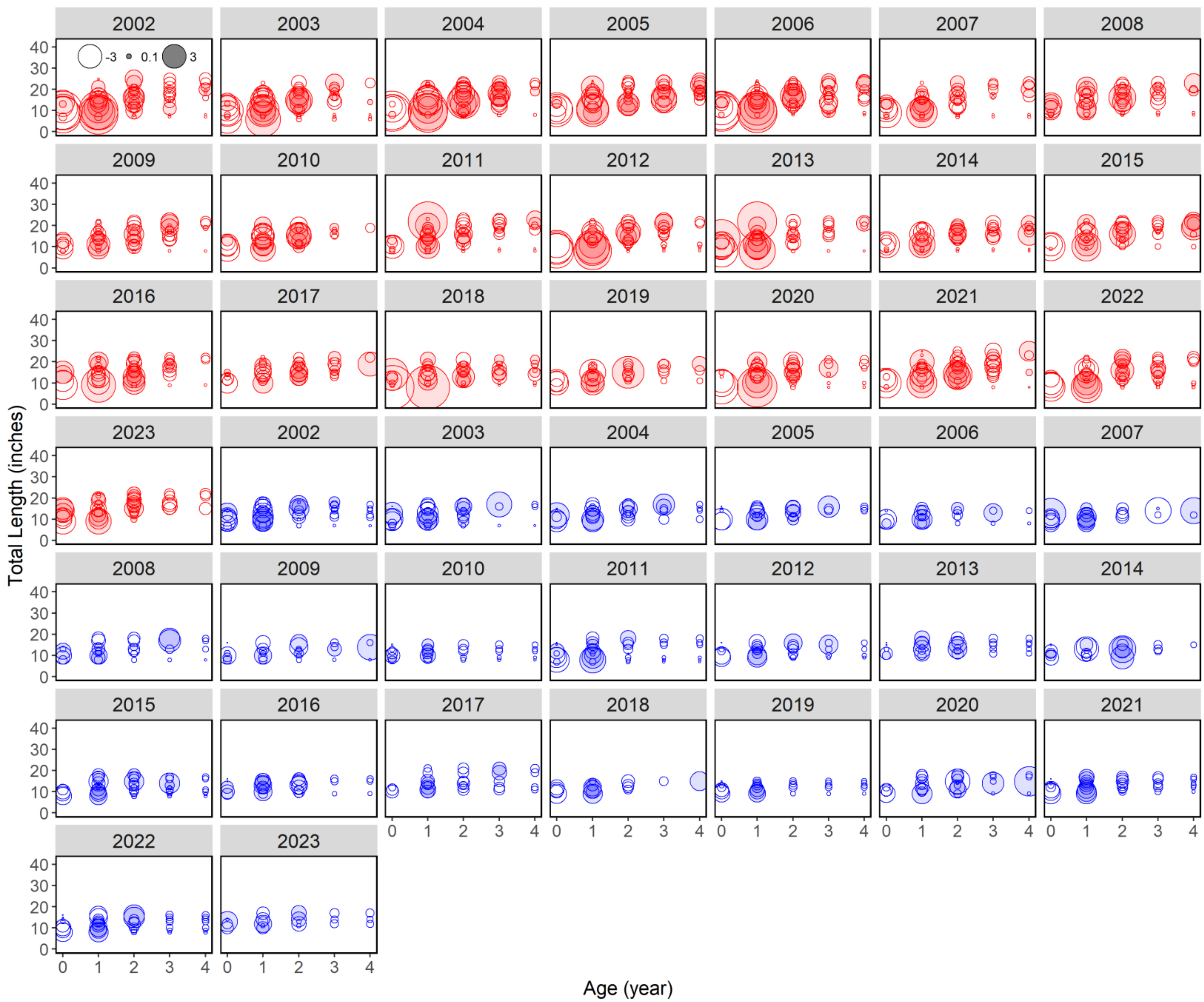


Figure 34: Pearson residuals of the sex-specific conditional age-at-length composition fits of the recreational fishery. Shaded bubbles represent instances where observed values are greater than the predicted values and clear bubbles represent instances where observed values are less than the predicted values. Red bubbles are females and blue bubbles are males.

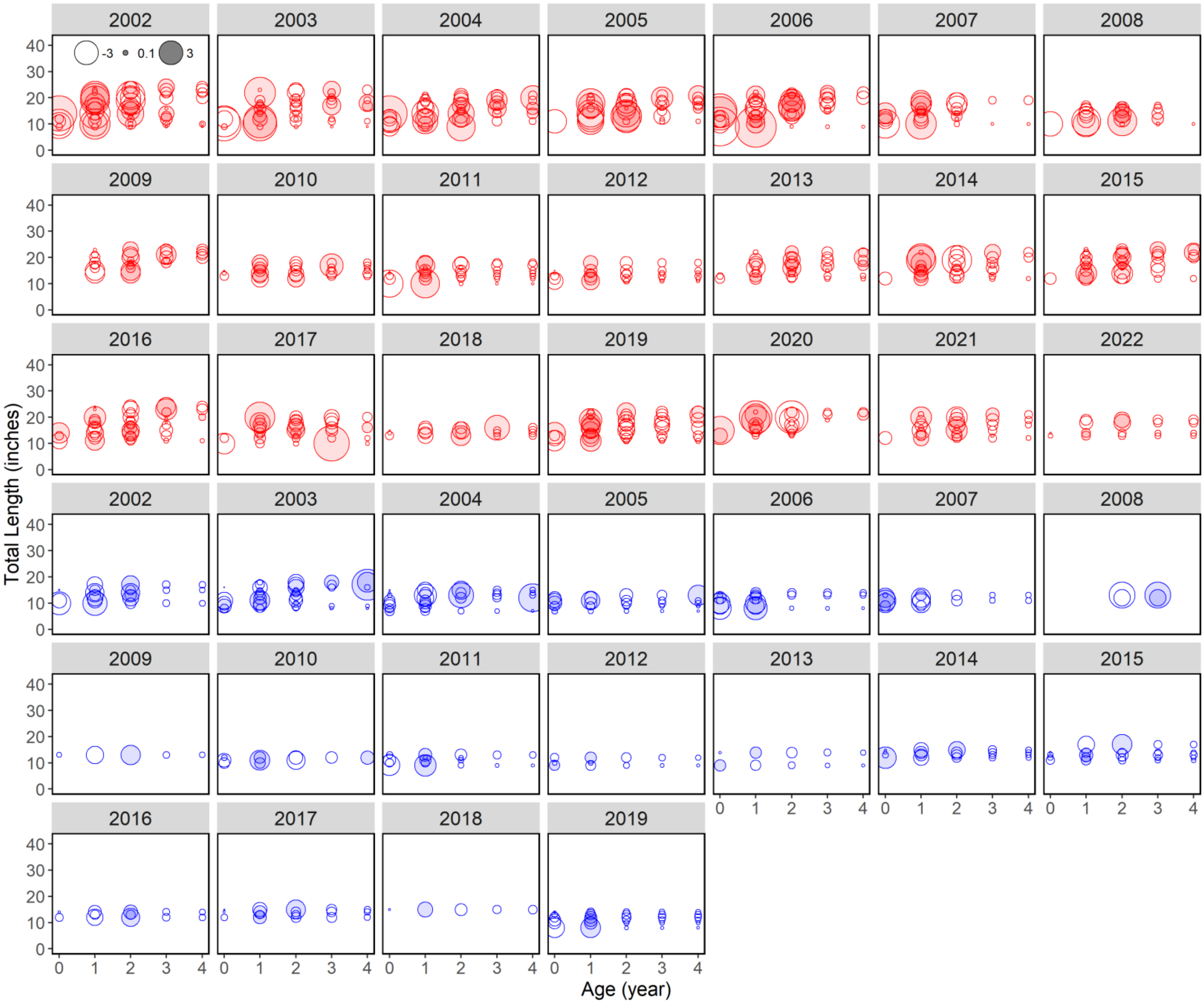


Figure 35: Pearson residuals of the sex-specific conditional age-at-length composition fits of the commercial fishery. Shaded bubbles represent instances where observed values are greater than the predicted values and clear bubbles represent instances where observed values are less than the predicted values. Red bubbles are females and blue bubbles are males

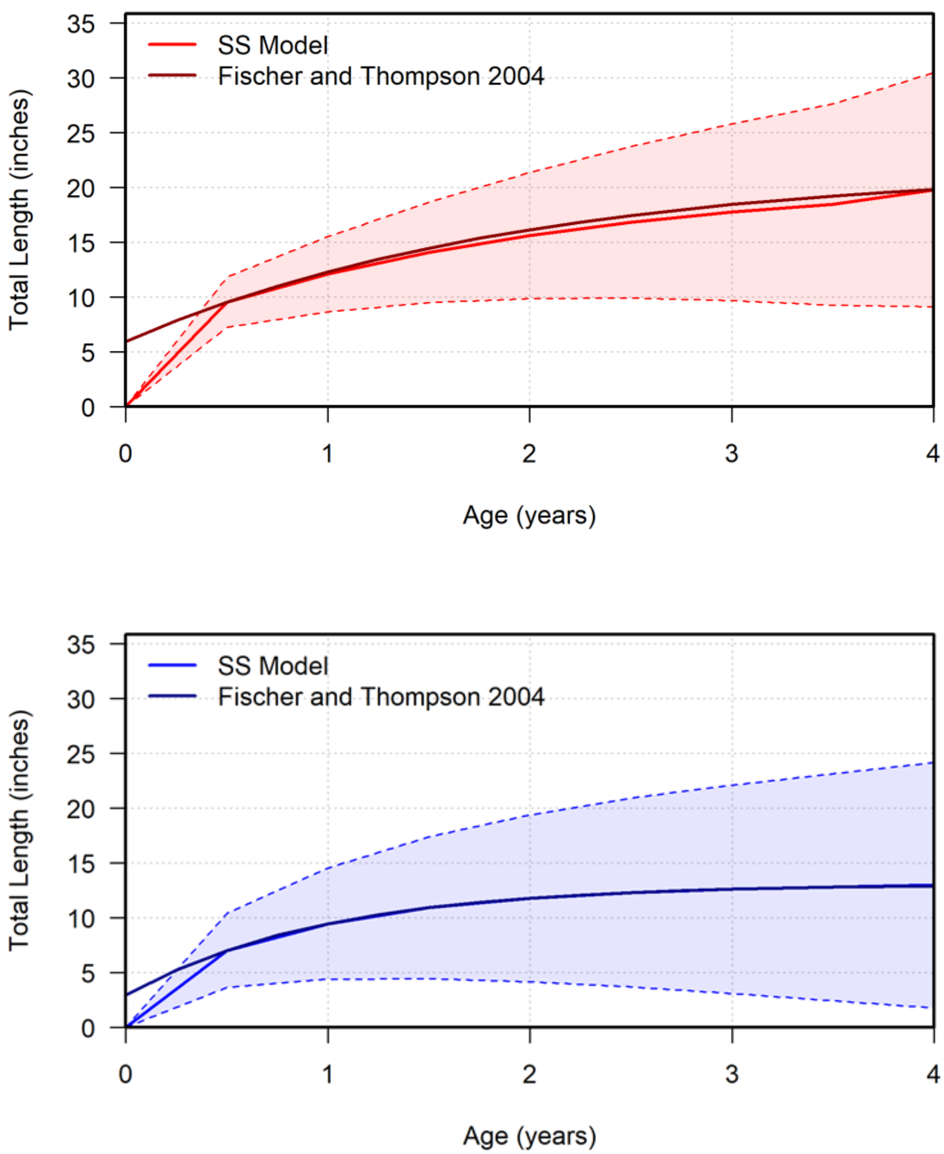


Figure 36: SS3 base model sex-specific mean length-at-age and 95% confidence distribution (shaded area) along with the external estimates of mean length-at-age from Fisher and Thompson (2004). The estimated and fixed parameters of the SS3 base model growth functions are presented in Table 7. Top graphic represents females and the bottom graphic represents males.

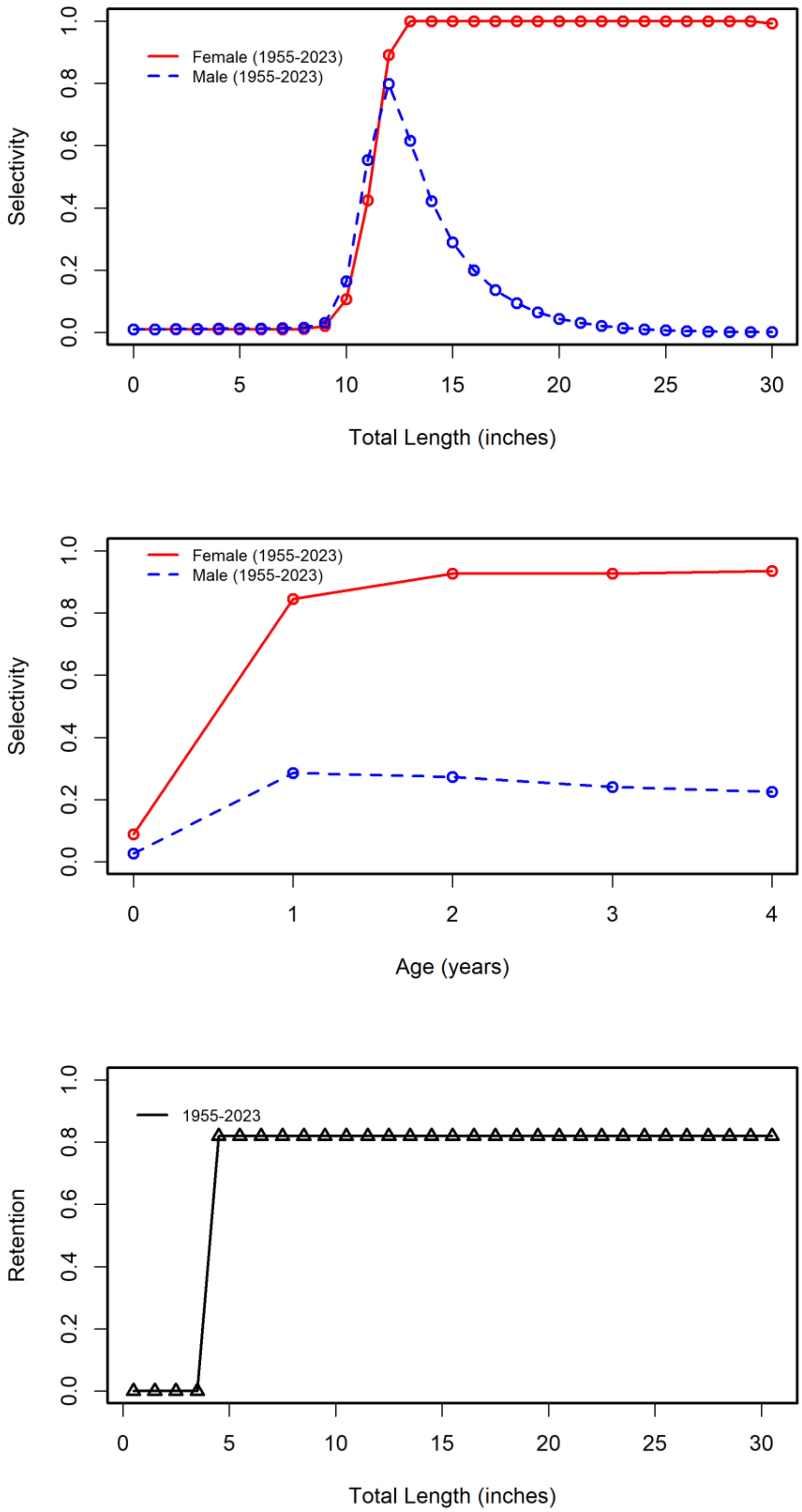


Figure 37: Estimated sex-specific selectivity at length (top), sex-specific selectivity at age (middle), and retention at size (bottom) functions of the recreational fishery.

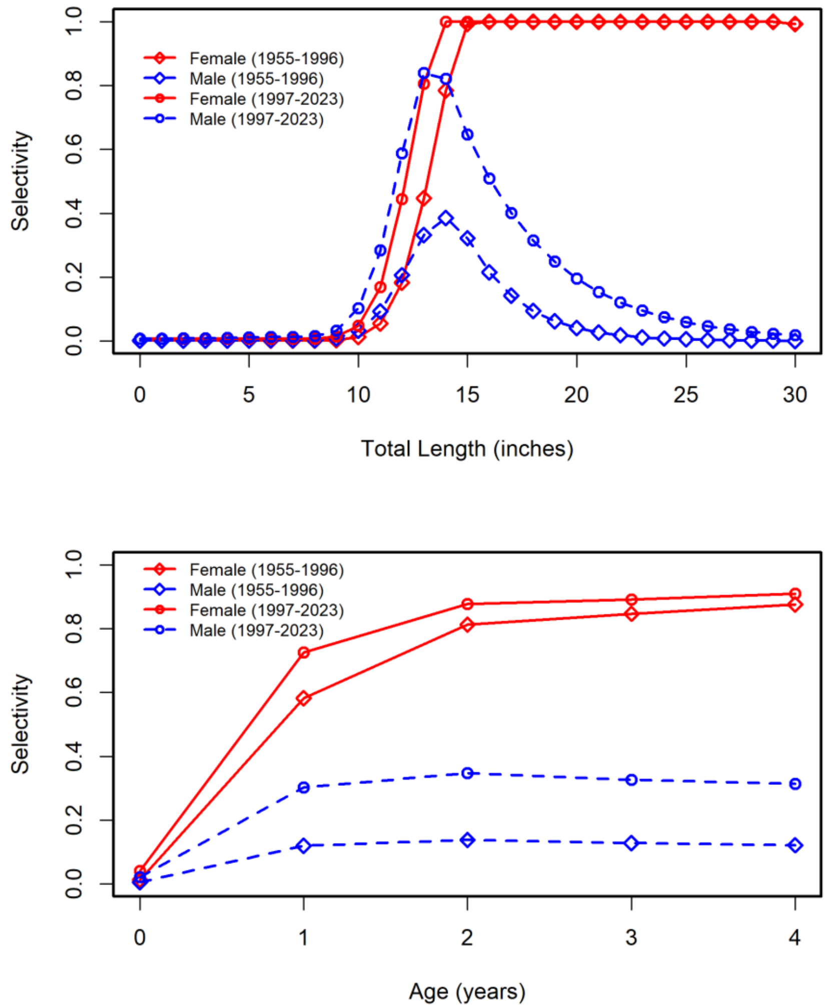


Figure 38: Estimated sex-specific selectivity at length (top) and selectivity at age (bottom) functions of the commercial fishery for each time block of consistent regulation.

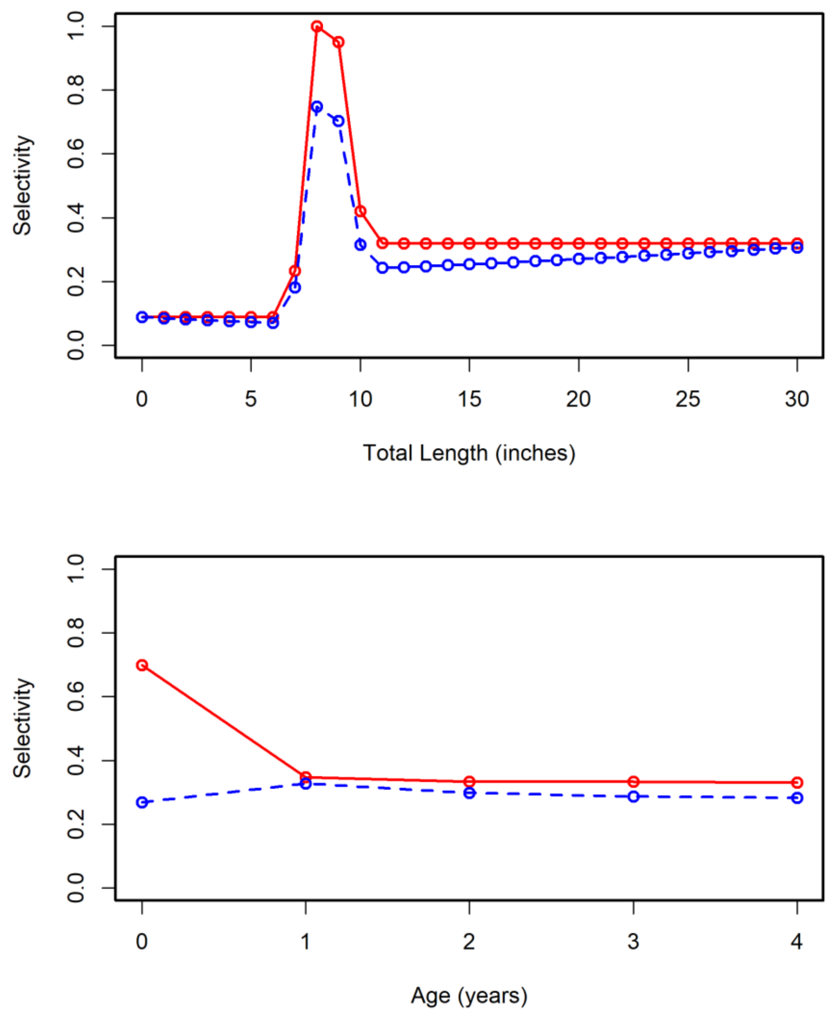


Figure 39: Estimated sex-specific selectivity at length (top) and selectivity at age (bottom) functions of the LDWF trammel net survey.

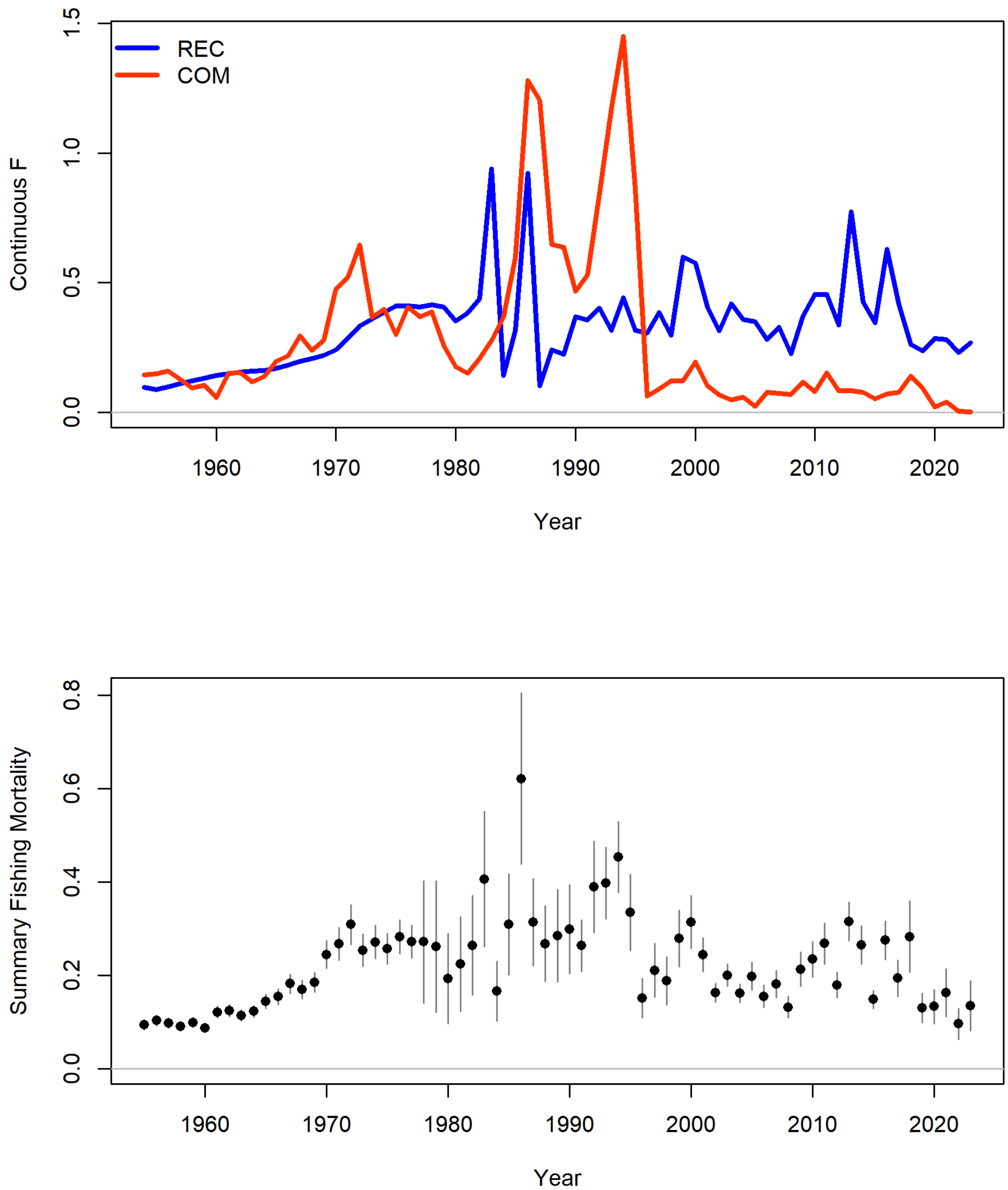


Figure 40: Fleet-specific apical fishing mortality (top) and exploitation rate (summary F; bottom) estimates of the SS3 base model.

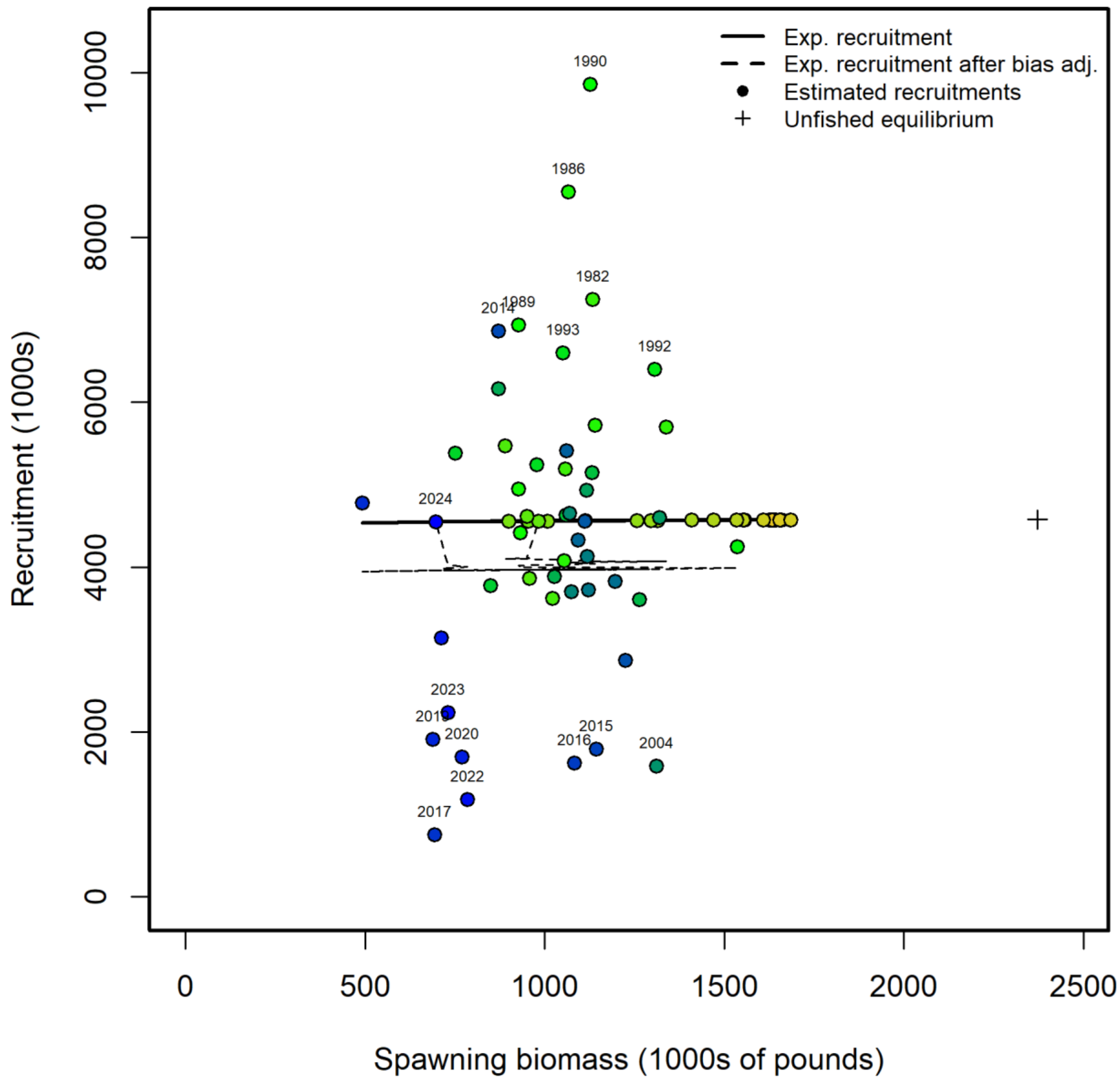


Figure 41: Estimated Beverton-Holt stock-recruitment relationship of the SS3 base model with steepness fixed at 0.99. Estimated age-0 recruitment/SSB pairs are plotted along with the expected Beverton-Holt recruitment (solid line) and the expected recruitment after lognormal bias adjustment (dashed line).

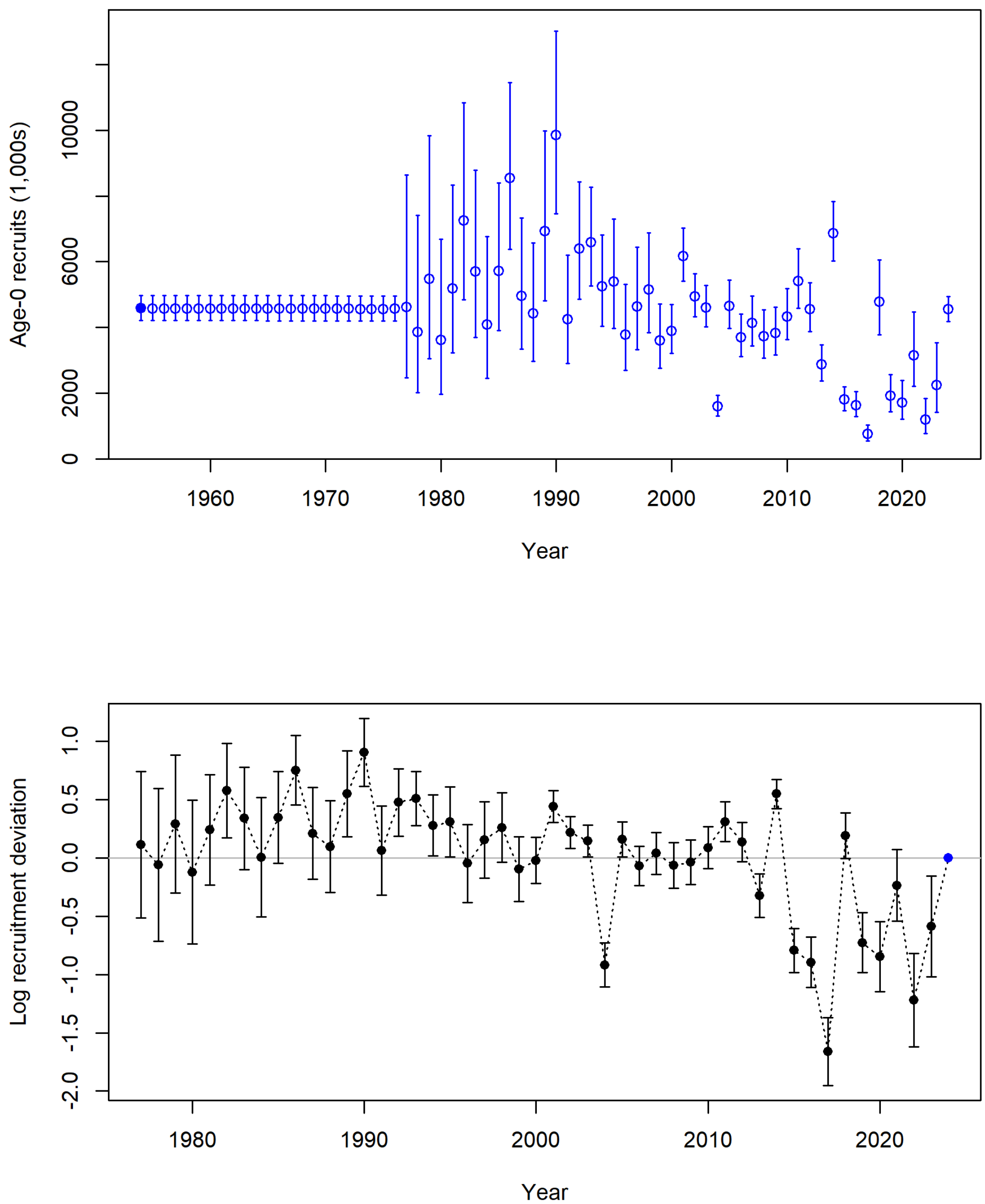


Figure 42: Annual age-0 recruitment (top) and lognormal recruitment deviation (bottom) estimates of the SS3 base model along with the 95% asymptotic confidence intervals of the estimates.

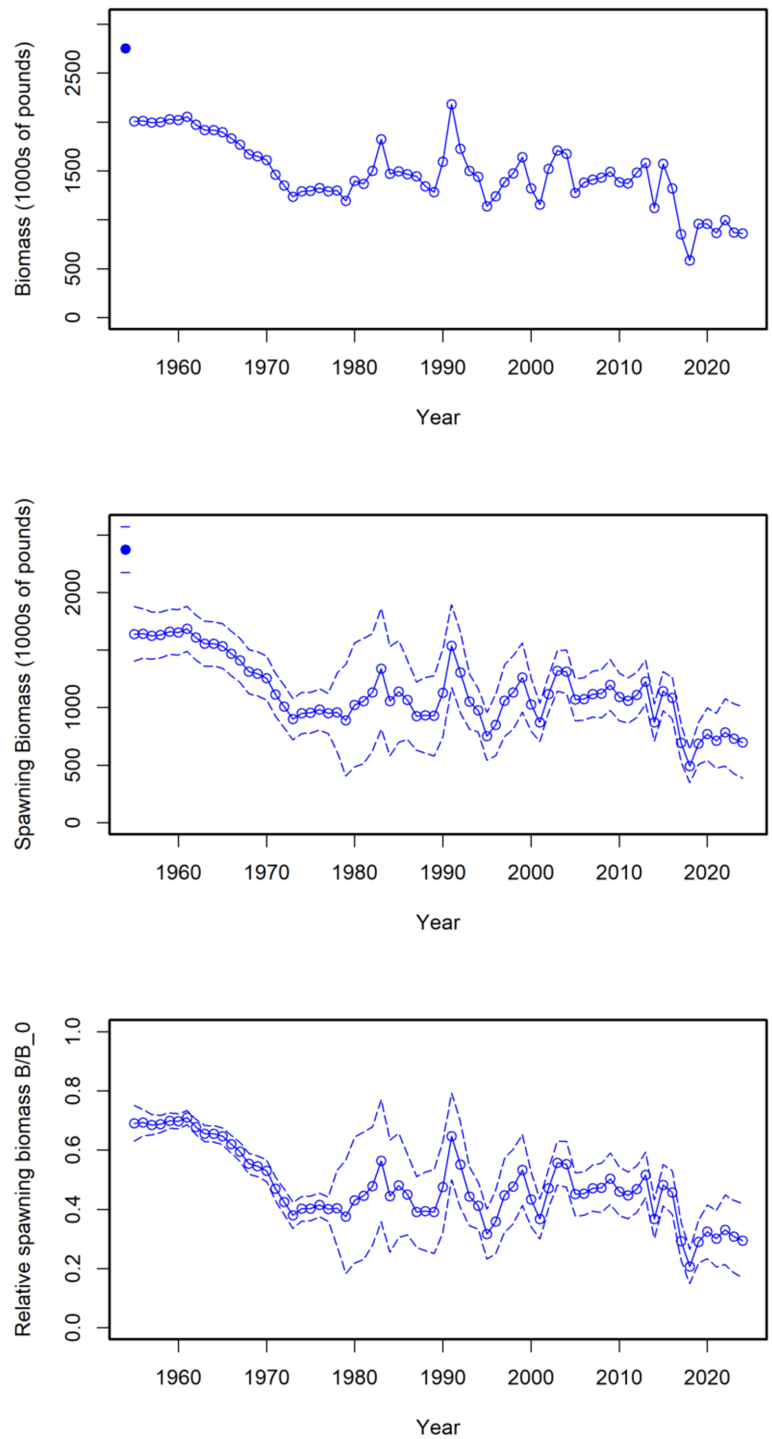
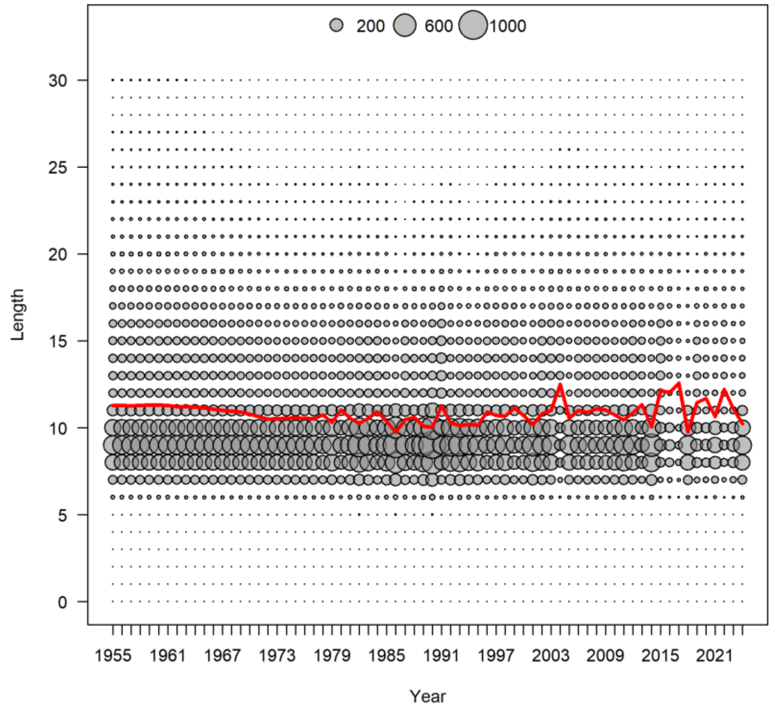


Figure 43: Annual biomass > age-0 (top), spawning biomass (middle), and relative spawning biomass (bottom) estimates of the SS3 base model along with the 95% asymptotic confidence intervals of spawning and relative spawning biomass time series.



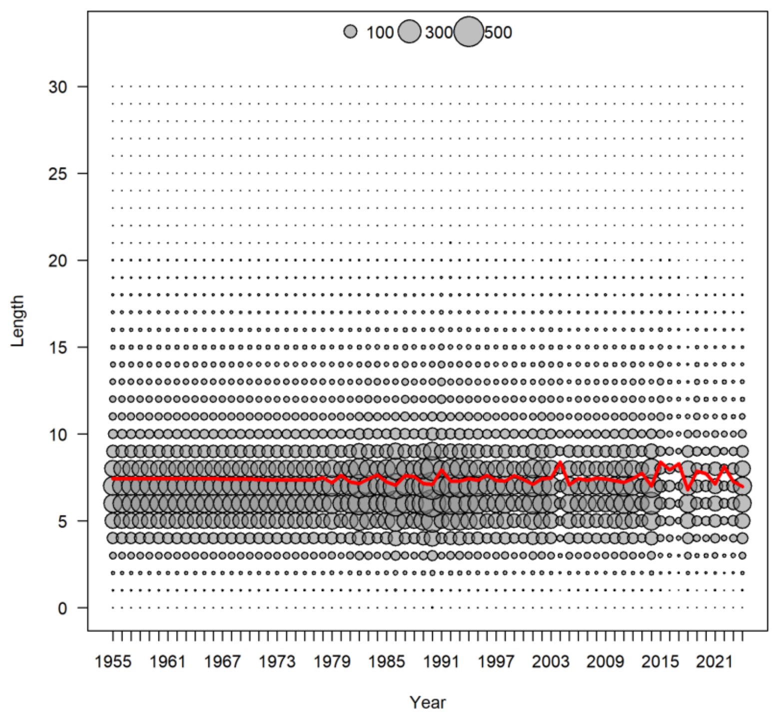


Figure 44: Annual beginning of the year female (top graphic) and male (bottom graphic) abundance at length (inches total length) estimates (bubbles) from the SS3 base model along with the annual sex-specific mean length of the stock (red lines).

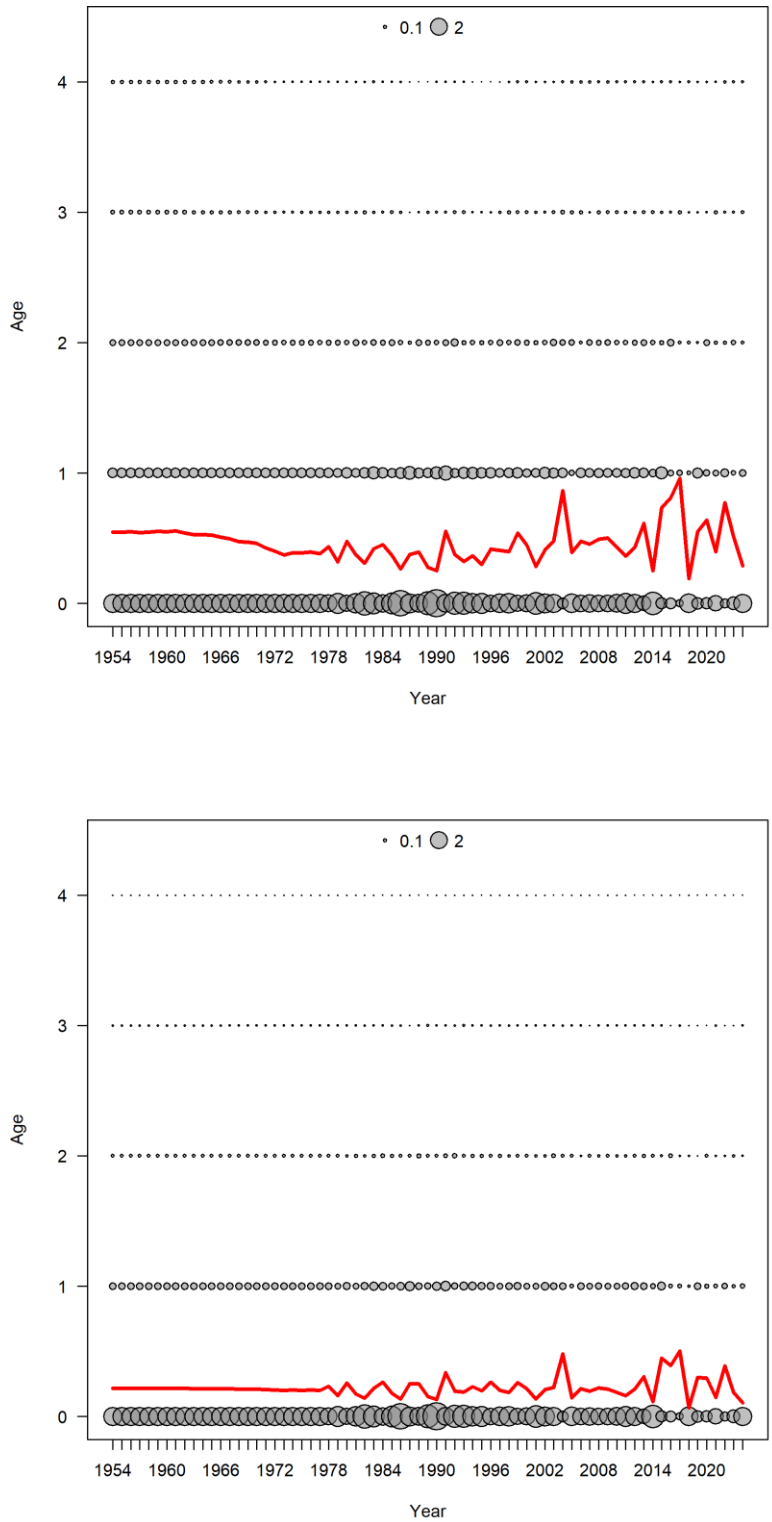


Figure 45: Annual beginning of the year female (top graphic) and male (bottom graphic) abundance at age estimates (bubbles) from the SS3 base model along with annual sex-specific mean age of the stock (red lines).

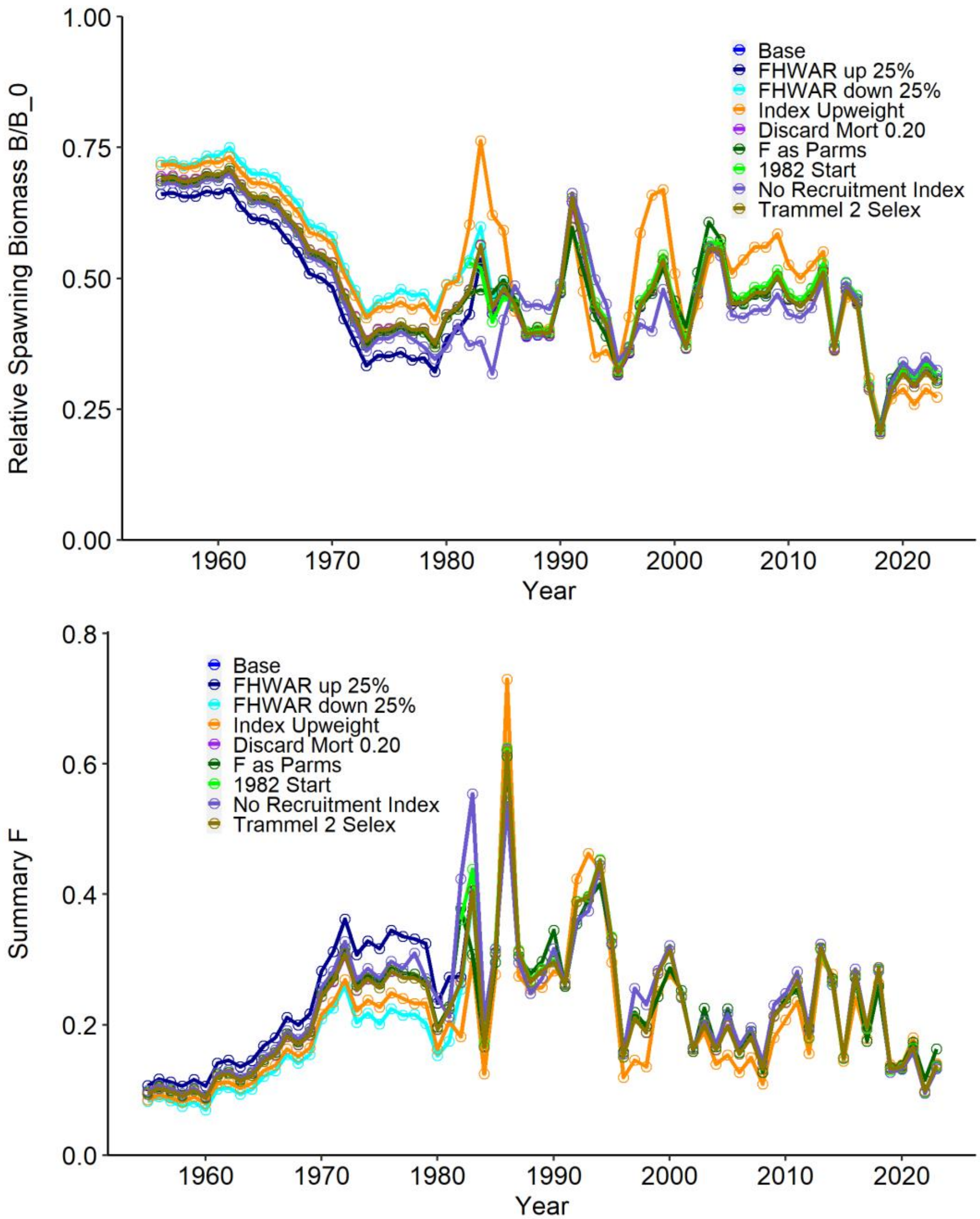


Figure 46: Model runs comparing time series of relative spawning stock biomass, exploitation rates (summary F), and age-0 recruitment estimates of the SS3 base model and the sensitivity model runs (FHWAR estimates plus/minus 25%, relative abundance indices upweighted, discard morality rate increased from 10 to 20%, apical F's estimated as parameters, 1982 model start year, recruitment index excluded, and two selectivity blocks estimated for the trammel net relative abundance time-series).

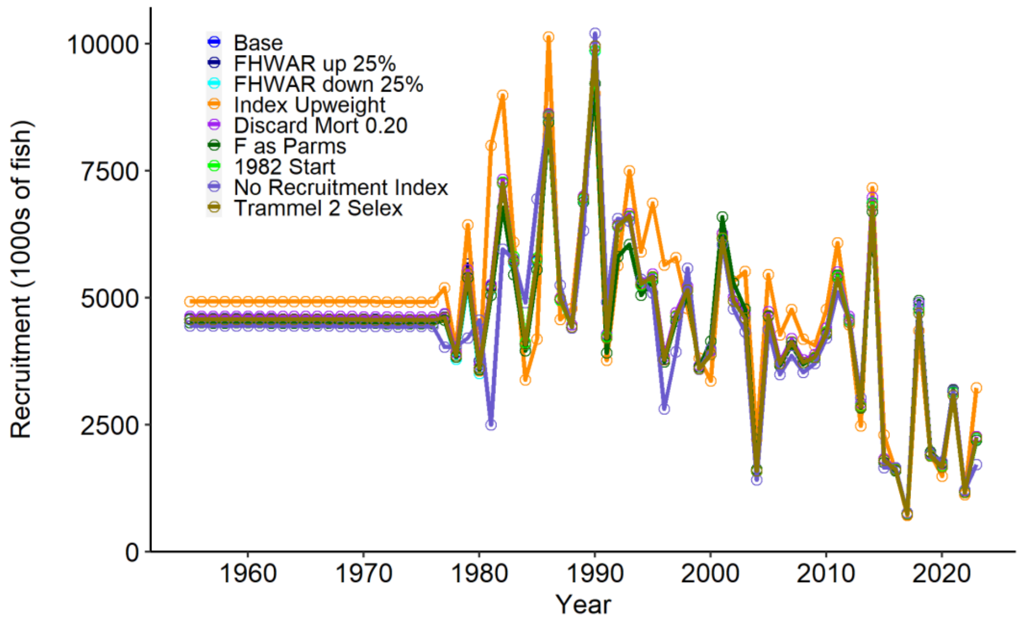


Figure 46 (continued):

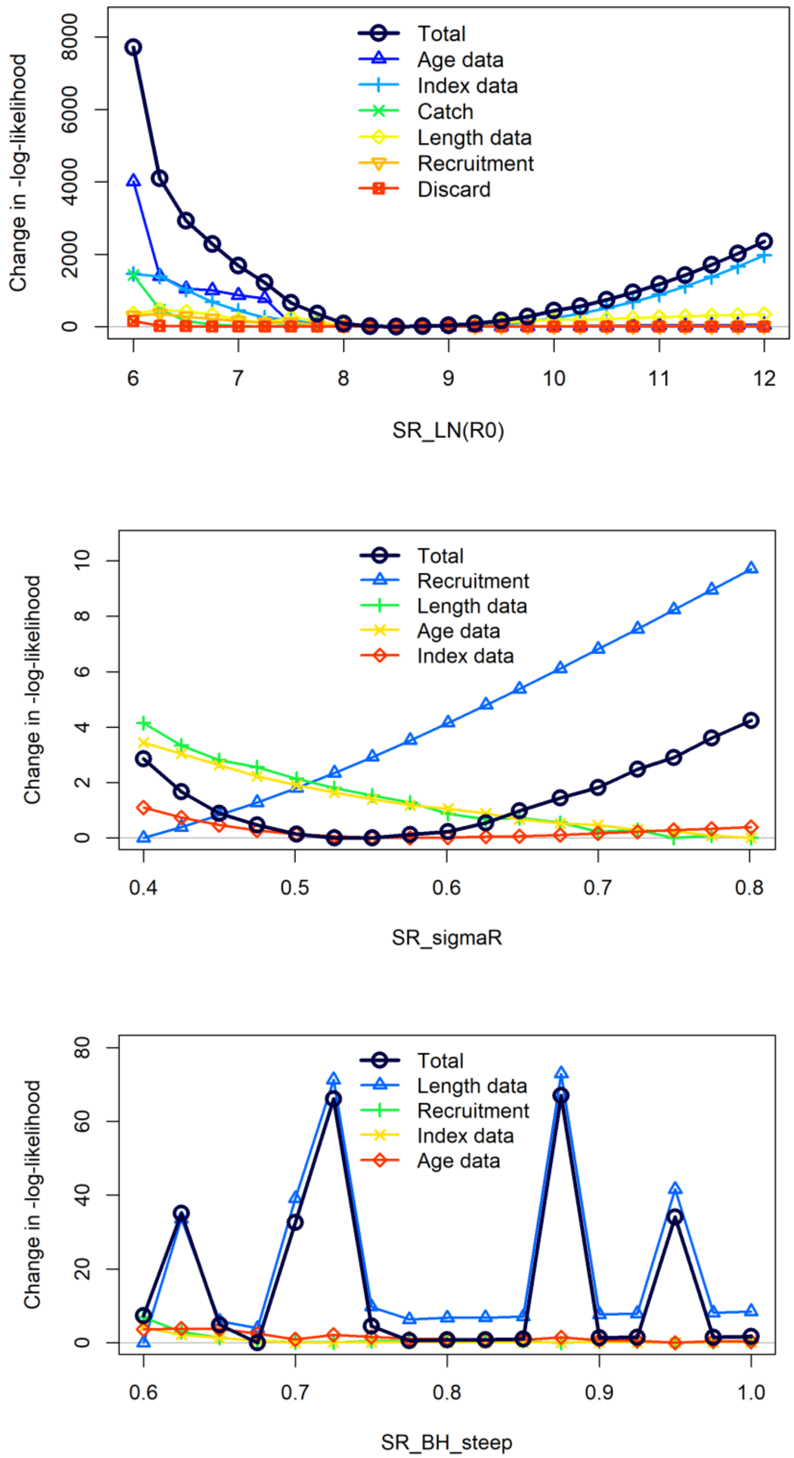


Figure 47: Likelihood profile plots of log-space unfished recruitment (LN_R0), recruitment variance (sigma R), and steepness parameters of the Beverton-Holt stock recruitment function.

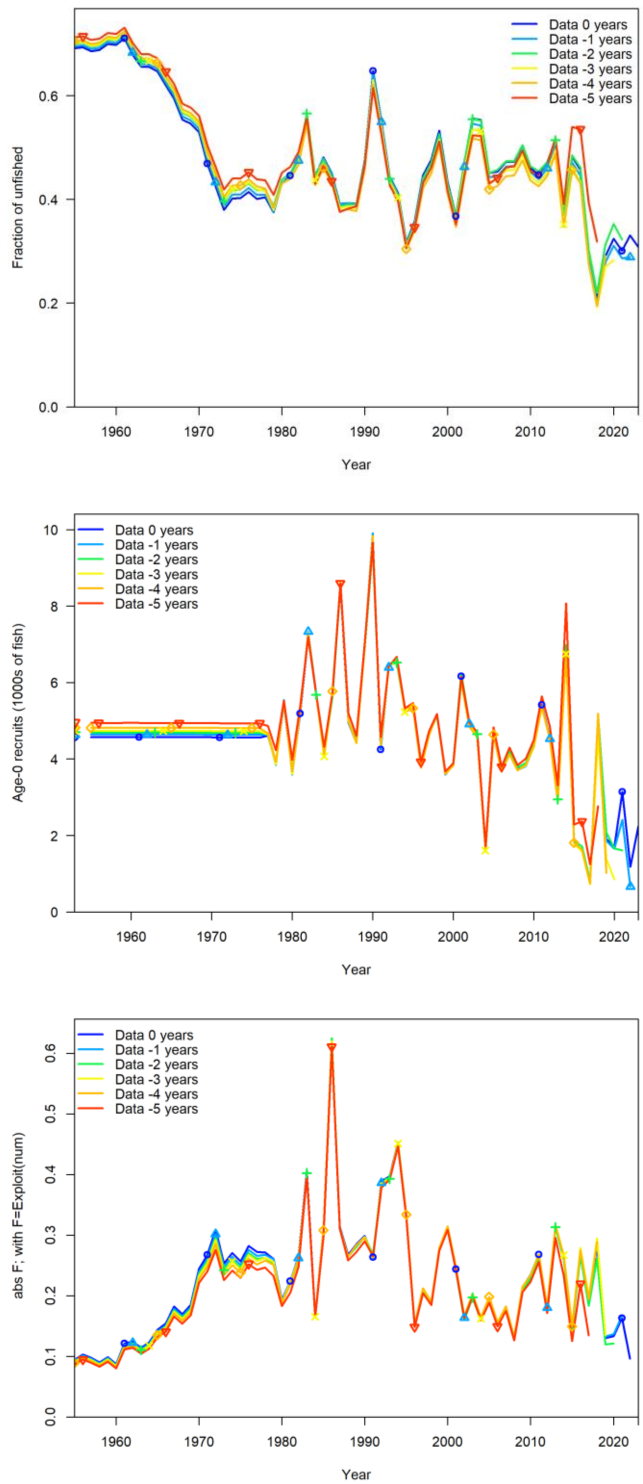


Figure 48: Retrospective analysis of relative spawning stock biomass, age-0 recruitment, and exploitation rate estimates of the SS3 base model.

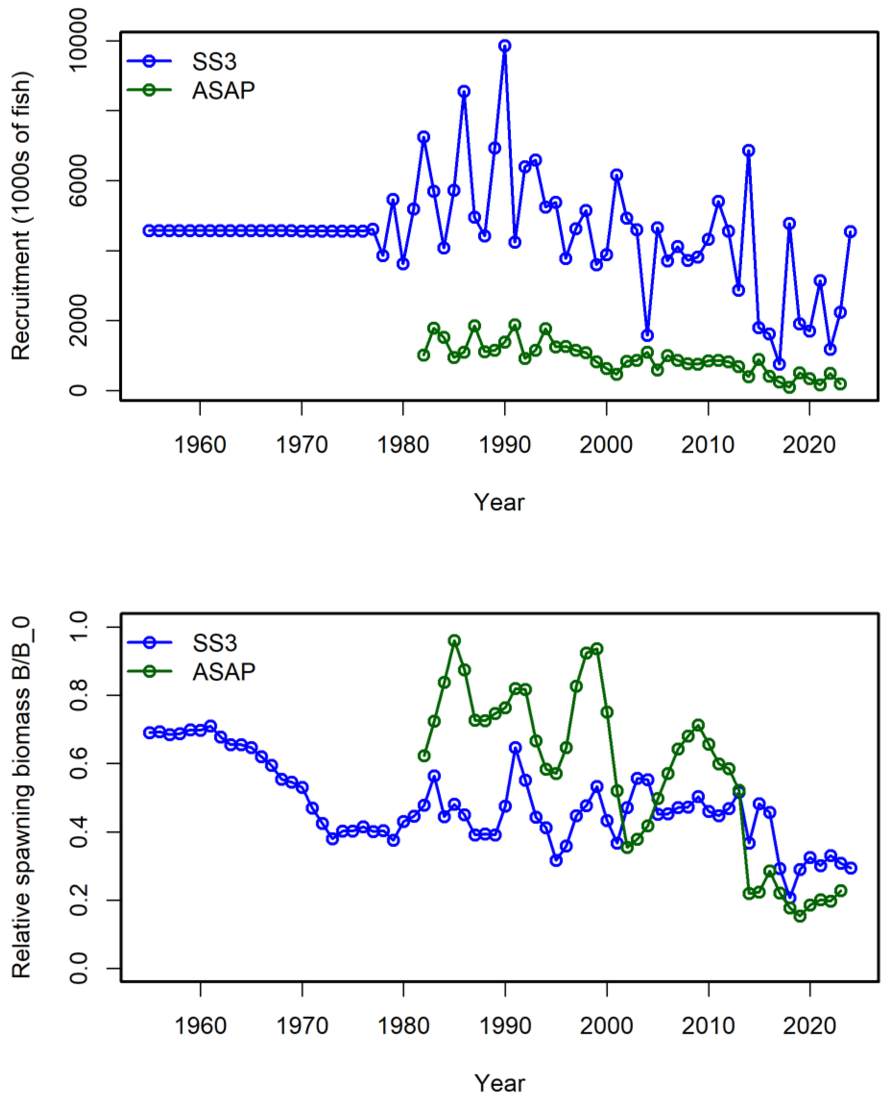
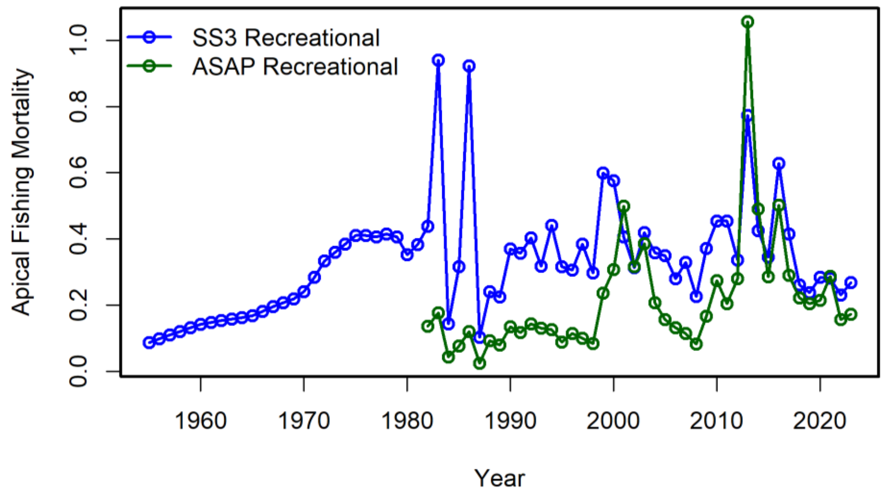


Figure 49: Comparison of the SS3 base model and the ASAP continuity model estimates of recruitment (age-0 males and females in SS3, and age-1 females in ASAP), relative spawning stock biomass, and fleet-specific apical fishing mortality rates.



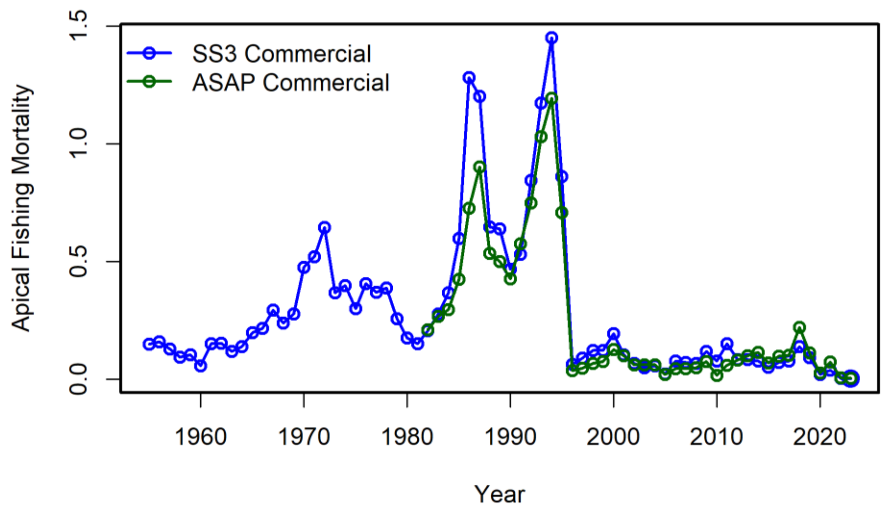


Figure 49 (continued):

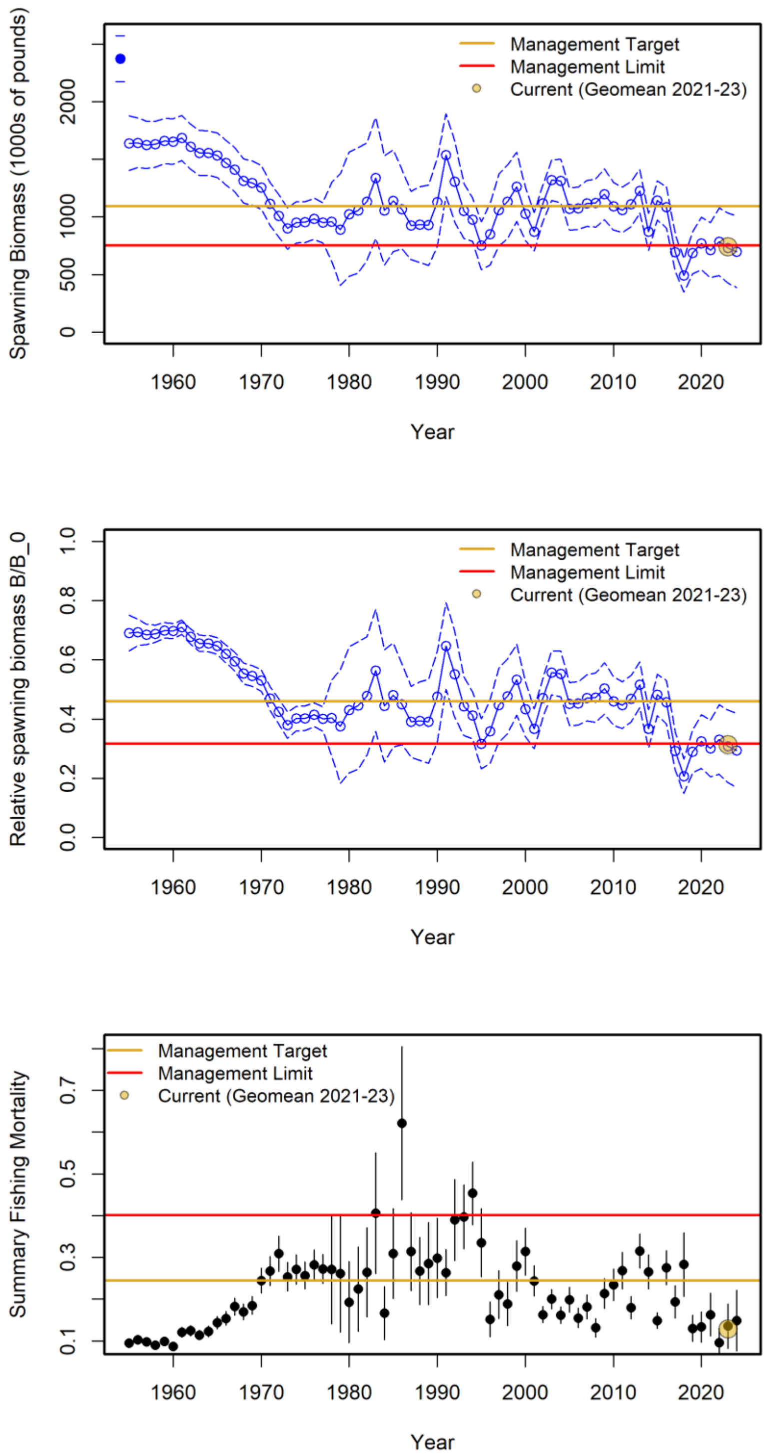


Figure 50: Time series of SS3 base model estimated spawning biomass, spawning potential ratio (relative SSB), and exploitation rates (summary F) relative to proposed limit and established target reference points. Current estimates represent the geometric mean of the 2021-2023 estimates.

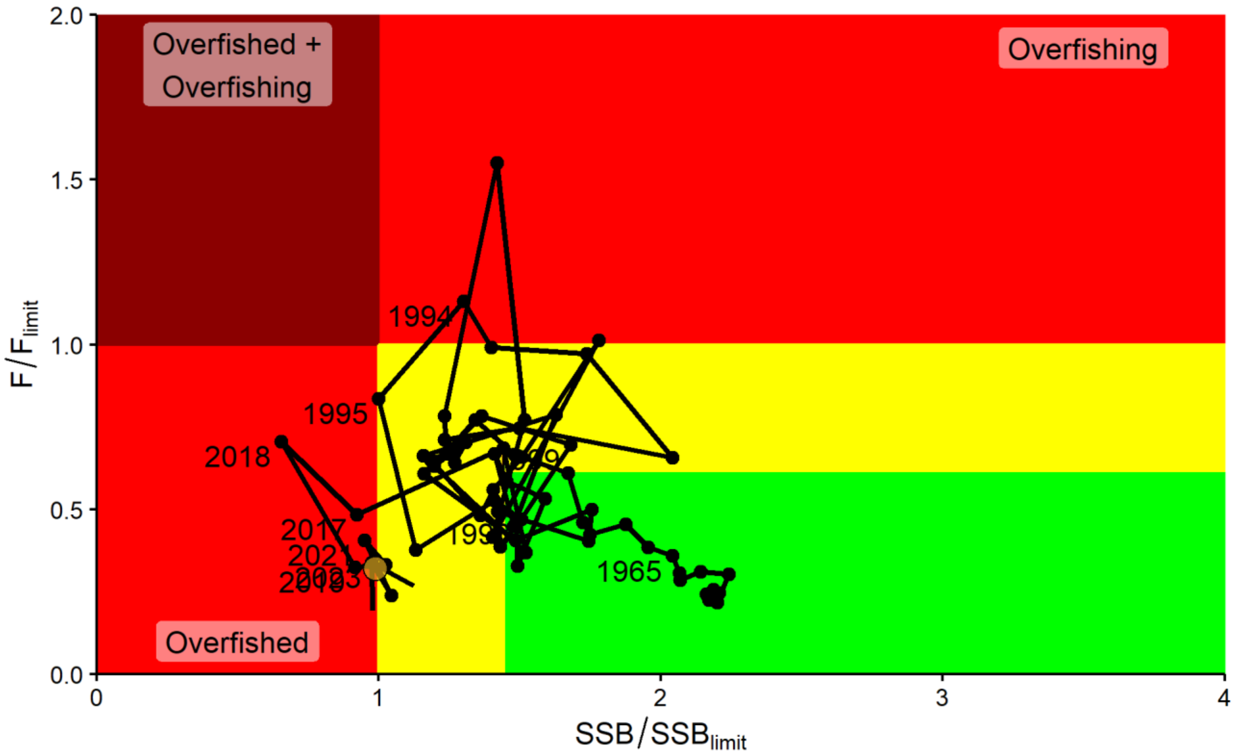


Figure 51: Kobe plot illustrating the trajectory of the stock relative to limit and target reference points. The yellow circle represents current status (geometric mean 2021-2023).

Appendix 1:

LA Creel/MRIP Calibration Procedure

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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.

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.

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

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

	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	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

<u>Appendix (Discard Hindcast):</u>

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
Flounder_dat.ss         # data file name
Flounder_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)
0.2 # SPR target (e.g. 0.40)
0.317 # 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
#  2002 2023 2002 2023 2002 2023 1982 2023 1955 2023 #_after processing
# 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 1977 2023
#  2023 2023 2023 2023 1977 2023 #_after processing
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)
4 # Nages=accumulator age, first age is always age 0
1 # Nareas
4 # 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
 3  1  1  2  0 SURVEY2 # 4
#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 69.241 0.149
1955  1  1 61.664 0.1
1956  1  1 69.540 0.1
1957  1  1 77.416 0.1
1958  1  1 85.292 0.1
1959  1  1 93.168 0.1
```

```
1960  1  1 101.045 0.1
1961  1  1 103.294 0.1
1962  1  1 105.543 0.1
1963  1  1 107.792 0.1
1964  1  1 110.041 0.1
1965  1  1 112.290 0.1
1966  1  1 117.668 0.1
1967  1  1 123.047 0.1
1968  1  1 128.425 0.1
1969  1  1 133.803 0.1
1970  1  1 139.182 0.1
1971  1  1 154.635 0.1
1972  1  1 170.089 0.1
1973  1  1 185.543 0.1
1974  1  1 200.996 0.1
1975  1  1 216.450 0.1
1976  1  1 213.935 0.1
1977  1  1 211.420 0.1
1978  1  1 208.905 0.1
1979  1  1 206.390 0.1
1980  1  1 203.874 0.1
1981  1  1 206.705 0.1
1982  1  1 287.679 0.215
1983  1  1 637.907 0.521
1984  1  1 88.048 0.252
1985  1  1 176.743 0.251
1986  1  1 519.241 0.450
1987  1  1 66.804 0.231
1988  1  1 132.455 0.173
1989  1  1 128.814 0.245
1990  1  1 294.740 0.250
1991  1  1 310.261 0.177
1992  1  1 238.627 0.171
1993  1  1 191.299 0.173
1994  1  1 238.897 0.223
1995  1  1 161.568 0.193
1996  1  1 175.546 0.150
1997  1  1 210.652 0.145
1998  1  1 178.754 0.169
1999  1  1 343.534 0.138
2000  1  1 264.168 0.169
2001  1  1 211.432 0.185
2002  1  1 213.434 0.221
2003  1  1 274.086 0.206
2004  1  1 196.130 0.165
2005  1  1 146.086 0.186
2006  1  1 149.760 0.139
2007  1  1 174.284 0.183
2008  1  1 124.407 0.138
2009  1  1 193.977 0.163
2010  1  1 231.211 0.190
2011  1  1 249.424 0.166
2012  1  1 209.442 0.174
2013  1  1 397.245 0.175
2014  1  1 208.878 0.096
2015  1  1 217.370 0.084
2016  1  1 222.071 0.114
2017  1  1 93.667 0.119
2018  1  1 64.528 0.100
2019  1  1 102.900 0.122
2020  1  1 94.077 0.089
2021  1  1 88.541 0.098
2022  1  1 81.983 0.085
2023  1  1 74.642 0.091
-999  1  2 211.545 0.100
1955  1  2 218.000 0.050
1956  1  2 232.600 0.050
1957  1  2 186.700 0.050
1958  1  2 137.000 0.050
1959  1  2 154.800 0.050
1960  1  2 84.900 0.050
1961  1  2 221.000 0.050
1962  1  2 216.100 0.050
1963  1  2 162.200 0.050
1964  1  2 190.100 0.050
1965  1  2 261.700 0.050
1966  1  2 274.500 0.050
1967  1  2 350.000 0.050
1968  1  2 271.000 0.050
1969  1  2 306.800 0.050
1970  1  2 480.300 0.050
1971  1  2 463.400 0.050
1972  1  2 507.300 0.050
1973  1  2 281.400 0.050
1974  1  2 315.400 0.050
1975  1  2 242.500 0.050
1976  1  2 327.300 0.050
1977  1  2 292.500 0.050
```

```
1978  1  2 305.936 0.050
1979  1  2 195.375 0.050
1980  1  2 160.959 0.050
1981  1  2 136.962 0.050
1982  1  2 199.742 0.050
1983  1  2 276.151 0.050
1984  1  2 353.263 0.050
1985  1  2 529.979 0.050
1986  1  2 825.034 0.050
1987  1  2 938.076 0.050
1988  1  2 510.285 0.050
1989  1  2 492.047 0.050
1990  1  2 455.718 0.050
1991  1  2 692.338 0.050
1992  1  2 784.560 0.050
1993  1  2 898.874 0.050
1994  1  2 974.689 0.050
1995  1  2 533.172 0.050
1996  1  2 61.755 0.050
1997  1  2 94.898 0.050
1998  1  2 139.938 0.050
1999  1  2 141.273 0.050
2000  1  2 177.503 0.050
2001  1  2 91.769 0.050
2002  1  2 81.831 0.050
2003  1  2 63.649 0.050
2004  1  2 73.696 0.050
2005  1  2 21.576 0.050
2006  1  2 83.824 0.050
2007  1  2 78.828 0.050
2008  1  2 77.954 0.050
2009  1  2 131.593 0.050
2010  1  2 81.072 0.050
2011  1  2 154.268 0.050
2012  1  2 97.210 0.050
2013  1  2 89.114 0.050
2014  1  2 66.279 0.050
2015  1  2 62.843 0.050
2016  1  2 65.134 0.050
2017  1  2 47.412 0.050
2018  1  2 62.756 0.050
2019  1  2 71.419 0.050
2020  1  2 15.091 0.050
2021  1  2 27.383 0.050
2022  1  2 3.120 0.050
2023  1  2 1.711 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
4 33 0 0 # SURVEY2
#_yr month fleet obs stderr
1986   11    3 3.386 0.371 # SURVEY1
1987   11    3 1.060 0.463 # SURVEY1
1988   11    3 1.258 0.488 # SURVEY1
1989   11    3 0.779 0.513 # SURVEY1
1990   11    3 1.159 0.503 # SURVEY1
1991   11    3 1.728 0.458 # SURVEY1
1992   11    3 1.065 0.474 # SURVEY1
1993   11    3 2.074 0.419 # SURVEY1
1994   11    3 2.165 0.403 # SURVEY1
1995   11    3 2.279 0.402 # SURVEY1
1996   11    3 1.502 0.445 # SURVEY1
1997   11    3 1.114 0.452 # SURVEY1
1998   11    3 1.472 0.434 # SURVEY1
1999   11    3 1.373 0.440 # SURVEY1
2000   11    3 0.806 0.514 # SURVEY1
2001   11    3 0.693 0.516 # SURVEY1
2002   11    3 0.745 0.527 # SURVEY1
2003   11    3 1.243 0.459 # SURVEY1
2004   11    3 1.200 0.473 # SURVEY1
2005   11    3 1.196 0.458 # SURVEY1
2006   11    3 1.002 0.493 # SURVEY1
2007   11    3 0.934 0.481 # SURVEY1
2008   11    3 0.958 0.481 # SURVEY1
2009   11    3 0.691 0.489 # SURVEY1
2010   11    3 1.351 0.408 # SURVEY1
2011   11    3 0.832 0.422 # SURVEY1
2012   11    3 0.761 0.436 # SURVEY1
2013   11    3 0.324 0.699 # SURVEY1
2014   11    3 0.646 0.659 # SURVEY1
```

```
2015   11    3 0.435 0.690 # SURVEY1
2016   11    3 0.272 0.702 # SURVEY1
2017   11    3 0.125 0.756 # SURVEY1
2018   11    3 0.170 0.757 # SURVEY1
2019   11    3 0.171 0.731 # SURVEY1
2020   11    3 0.080 0.806 # SURVEY1
2021   11    3 0.292 0.717 # SURVEY1
2022   11    3 0.237 0.707 # SURVEY1
2023   11    3 0.419 0.691 # SURVEY1
1977    7    4 1.099 0.408 # SURVEY2
1978    7    4 0.822 0.441 # SURVEY2
1979    7    4 1.382 0.394 # SURVEY2
1980    7    4 0.722 0.431 # SURVEY2
1981    7    4 1.946 0.334 # SURVEY2
1982    7    4 1.973 0.323 # SURVEY2
1983    7    4 1.221 0.338 # SURVEY2
1984    7    4 0.588 0.405 # SURVEY2
1985    7    4 0.659 0.365 # SURVEY2
1986    7    4 1.528 0.331 # SURVEY2
1987    7    4 0.911 0.344 # SURVEY2
1988    7    4 0.962 0.356 # SURVEY2
1989    7    4 1.609 0.331 # SURVEY2
1990    7    4 1.486 0.325 # SURVEY2
1991    7    4 0.459 0.388 # SURVEY2
1992    7    4 0.783 0.357 # SURVEY2
1993    7    4 1.250 0.328 # SURVEY2
1994    7    4 0.853 0.360 # SURVEY2
1995    7    4 1.309 0.321 # SURVEY2
1996    7    4 1.513 0.308 # SURVEY2
1997    7    4 1.453 0.321 # SURVEY2
1998    7    4 0.812 0.348 # SURVEY2
1999    7    4 0.682 0.352 # SURVEY2
2000    7    4 0.355 0.415 # SURVEY2
2001    7    4 1.029 0.344 # SURVEY2
2002    7    4 1.254 0.328 # SURVEY2
2003    7    4 1.746 0.309 # SURVEY2
2004    7    4 0.902 0.340 # SURVEY2
2005    7    4 1.283 0.327 # SURVEY2
2006    7    4 0.962 0.332 # SURVEY2
2007    7    4 1.185 0.322 # SURVEY2
2008    7    4 1.031 0.334 # SURVEY2
2009    7    4 0.954 0.336 # SURVEY2
2010    7    4 1.104 0.326 # SURVEY2
2011    7    4 1.926 0.277 # SURVEY2
2012    7    4 0.910 0.303 # SURVEY2
2013    7    4 0.275 0.363 # SURVEY2
2014    7    4 1.594 0.303 # SURVEY2
2015    7    4 0.990 0.324 # SURVEY2
2016    7    4 0.282 0.395 # SURVEY2
2017    7    4 0.126 0.466 # SURVEY2
2018    7    4 0.668 0.335 # SURVEY2
2019    7    4 0.469 0.363 # SURVEY2
2020    7    4 0.239 0.419 # SURVEY2
2021    7    4 0.691 0.342 # SURVEY2
2022    7    4 0.188 0.443 # SURVEY2
2023    7    4 0.815 0.335 # SURVEY2
-9999 1 1 1 1 # terminator for survey observations
#
1 #_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
1 1 -2 # FISHERY1
#_yr month fleet obs stderr
 1982     1     1 435.798 0.468 # FISHERY1
 1983     1     1 50.368 0.513 # FISHERY1
 1984     1     1 21.156 0.594 # FISHERY1
 1985     1     1 21.883 0.588 # FISHERY1
 1986     1     1 164.304 0.449 # FISHERY1
 1987     1     1 5.121 0.392 # FISHERY1
 1988     1     1 118.618 0.549 # FISHERY1
 1989     1     1 86.412 0.744 # FISHERY1
 1990     1     1 177.141 0.397 # FISHERY1
 1991     1     1 43.332 0.264 # FISHERY1
 1992     1     1 19.158 0.223 # FISHERY1
 1993     1     1 20.093 0.313 # FISHERY1
 1994     1     1 13.757 0.283 # FISHERY1
 1995     1     1 22.768 0.315 # FISHERY1
 1996     1     1 44.057 0.309 # FISHERY1
 1997     1     1 42.480 0.267 # FISHERY1
 1998     1     1 36.396 0.285 # FISHERY1
 1999     1     1 35.947 0.226 # FISHERY1
 2000     1     1 38.117 0.260 # FISHERY1
 2001     1     1 70.177 0.386 # FISHERY1
 2002     1     1 45.117 0.245 # FISHERY1
```

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 2003     1     1 96.076 0.277 # FISHERY1
 2004     1     1 54.370 0.282 # FISHERY1
 2005     1     1 40.855 0.251 # FISHERY1
 2006     1     1 27.974 0.300 # FISHERY1
 2007     1     1 44.074 0.302 # FISHERY1
 2008     1     1 19.958 0.253 # FISHERY1
 2009     1     1 37.605 0.299 # FISHERY1
 2010     1     1 47.781 0.224 # FISHERY1
 2011     1     1 38.916 0.249 # FISHERY1
 2012     1     1 61.895 0.241 # FISHERY1
 2013     1     1 87.989 0.207 # FISHERY1
 2014     1     1 54.133 0.449 # FISHERY1
 2015     1     1 40.149 0.321 # FISHERY1
 2016     1     1 39.604 0.201 # FISHERY1
 2017     1     1 12.622 0.184 # FISHERY1
 2018     1     1 8.037 0.204 # FISHERY1
 2019     1     1 30.550 0.221 # FISHERY1
 2020     1     1 26.611 0.173 # FISHERY1
 2021     1     1 28.776 0.197 # FISHERY1
 2022     1     1 30.661 0.121 # FISHERY1
 2023     1     1 23.602 0.104 # FISHERY1
-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
0.001 1e-07 0 0 0 0 1 #_fleet:4_SURVEY2
# 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    2  101    0    0    0    0    0 0.0028 0.0049 0.0582 0.0646 0.0725 0.1329 0.1131 0.0496 0.0478 0.1144
0.0545 0.0550 0.0117 0.0952 0.0117 0.0061 0.1025 0.0025    0    0    0    0    0    0    0    0    0    0    0    0    0    0
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
1983    7    1    0    2   68    0    0    0    0    0    0 0.0068 0.0187 0.0239 0.0417 0.0693 0.0615 0.0269 0.0525 0.1219 0.1676
0.1563 0.1125 0.1405    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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    2   62    0    0    0    0    0    0    0    0 0.0144 0.0302 0.0547 0.0978 0.2809 0.0742 0.1239 0.1263
0.0603    0 0.0580 0.0792    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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    2  113    0    0    0    0    0    0    0    0    0 0.0303 0.1294 0.1012 0.1568 0.0958 0.1982 0.1731
0.0292 0.0404 0.0264 0.0065 0.0071 0.0022 0.0034    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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    2  350    0    0    0    0 0.0007    0    0 0.0002 0.0273 0.0295 0.0924 0.1655 0.2621 0.0565 0.2399 0.0553
0.0270 0.0312 0.0054 0.0016 0.0034 0.0007 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
1987    7    1    0    2   91    0    0    0    0    0    0    0 0.0064    0 0.0081 0.1390 0.2678 0.2125 0.1039 0.0815 0.0591
0.0462 0.0482 0.0209 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    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
1988    7    1    0    2  194    0    0    0    0    0 0.0017    0    0 0.0074 0.0313 0.0227 0.0866 0.1181 0.1683 0.1738 0.1171
0.1179 0.0666 0.0538 0.0194 0.0139 0.0015    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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    2  106    0    0    0    0    0    0    0    0 0.0028 0.0013 0.1112 0.1268 0.0759 0.0756 0.1865 0.1825
0.1111 0.0782 0.0268 0.0152    0 0.0055    0 0.0005    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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    2  115    0    0    0    0    0    0    0 0.0079 0.0024 0.0360 0.0558 0.1778 0.1070 0.1139 0.1204 0.2016
0.0681 0.0459 0.0405    0 0.0099 0.0128    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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    2  186    0    0    0    0    0 0.0016    0    0 0.0014 0.0320 0.0859 0.1288 0.2080 0.1964 0.1194 0.0780
0.0480 0.0523 0.0103 0.0299 0.0040 0.0022    0    0    0    0    0 0.0016    0    0    0    0    0    0    0    0    0    0    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    2  349    0    0    0    0    0    0    0    0 0.0062 0.0323 0.0432 0.1342 0.1807 0.1035 0.1240 0.1296
0.1037 0.0423 0.0415 0.0395 0.0079 0.0072 0.0044    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    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 2 208 0 0 0 0 0 0 0 0.0043 0.0098 0.0524 0.0932 0.1112 0.1346 0.1071 0.1283 0.1035
0.0800 0.1181 0.0427 0.0091 0 0 0.0058 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 2 261 0 0 0 0 0 0 0 0.0023 0.0113 0.0326 0.0576 0.1223 0.1146 0.2477 0.1266 0.1256
0.0762 0.0442 0.0291 0.0010 0.0056 0.0009 0.0010 0.0014 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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 2 178 0 0 0 0 0 0 0 0.0121 0.0234 0.0601 0.1619 0.1078 0.1646 0.1095 0.0645 0.1155
0.0899 0.0347 0.0368 0.0142 0 0.0010 0 0.0041 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 2 237 0 0 0 0 0 0 0 0 0.0066 0.0167 0.0390 0.1074 0.1953 0.1476 0.1641 0.1380
0.0517 0.0417 0.0495 0.0335 0.0063 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
1997 7 1 0 2 271 0 0 0 0 0 0 0 0 0.0058 0.1071 0.0803 0.0905 0.1338 0.1359 0.2449 0.0561
0.0522 0.0576 0.0206 0.0059 0.0019 0.0068 0 0 0.0005 0 0 0 0 0 0 0 0 0 0 0 0 0 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 2 260 0 0 0 0 0 0 0 0 0 0.0253 0.0747 0.1432 0.1936 0.1849 0.1587 0.0986
0.0356 0.0506 0.0179 0.0065 0.0012 0.0066 0.0025 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 2 460 0 0 0 0 0 0.0138 0 0.0009 0 0.0023 0.0621 0.1038 0.2045 0.1319 0.1309 0.1077
0.0943 0.0535 0.0731 0.0203 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
2000 7 1 0 2 388 0 0 0 0 0 0 0 0 0.0136 0.0026 0.0411 0.0542 0.1677 0.1560 0.1564 0.1739
0.0991 0.0643 0.0300 0.0278 0 0.0082 0 0.0051 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 2 274 0 0 0 0 0 0 0 0 0.0054 0 0.0133 0.0498 0.0901 0.1300 0.2426 0.1772
0.1263 0.0930 0.0555 0.0023 0.0097 0.0048 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 3 2 1269 0 0 0 0 0 0 0 0 0.0025 0.0099 0.0420 0.0808 0.1477 0.1451 0.1553 0.1148
0.0874 0.0454 0.0289 0.0140 0.0066 0.0041 0 0.0009 0 0.0000 0 0 0 0 0 0 0 0 0 0 0 0
0.0016 0.0016 0.0091 0.0231 0.0404 0.0182 0.0074 0.0033 0.0016 0.0049 0.0008 0.0025 0 0 0 0 0 0 0 0 0
0 0 0
2003 7 1 3 2 1431 0 0 0 0 0 0 0.0007 0.0007 0.0051 0.0167 0.0525 0.0765 0.1494 0.1824 0.1445 0.1153
0.0765 0.0438 0.0227 0.0081 0.0110 0.0029 0 0.0015 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0007 0.0058 0.0080 0.0233 0.0226 0.0146 0.0036 0.0058 0.0029 0.0015 0.0007 0 0 0 0 0 0 0 0 0 0
0 0 0
2004 7 1 3 2 1449 0 0 0 0 0 0 0 0 0.0028 0.0206 0.0640 0.0869 0.1775 0.1555 0.1543 0.1040
0.0719 0.0413 0.0222 0.0050 0.0043 0.0043 0.0007 0.0007 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0007 0.0157 0.0278 0.0285 0.0050 0.0021 0.0014 0.0007 0.0014 0.0007 0 0 0 0 0 0 0 0 0 0 0
0 0
2005 7 1 3 2 1074 0 0 0 0 0 0 0 0 0 0.0062 0.0280 0.0873 0.1338 0.1520 0.1788 0.1466
0.1072 0.0614 0.0270 0.0084 0.0042 0.0041 0.0000 0.0021 0.0010 0 0 0.0010 0 0 0 0 0 0 0 0 0 0
0 0 0.0041 0.0104 0.0207 0.0115 0.0011 0.0010 0.0021 0.0000 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2006 7 1 3 2 1483 0 0 0 0 0 0 0 0 0.0007 0.0050 0.0266 0.0828 0.1742 0.2231 0.1804 0.1152
0.0676 0.0442 0.0188 0.0075 0.0073 0.0017 0.0007 0.0007 0.0001 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0022 0.0029 0.0152 0.0145 0.0060 0.0016 0.0008 0.0002 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2007 7 1 3 2 774 0 0 0 0 0 0 0 0.0016 0.0031 0.0125 0.0241 0.0704 0.1132 0.1678 0.1936 0.1398
0.0584 0.0649 0.0257 0.0130 0.0112 0 0.0019 0.0016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0031 0.0062 0.0171 0.0485 0.0128 0.0048 0.0032 0.0017 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2008 7 1 3 2 888 0 0 0 0 0 0 0 0 0.0004 0.0092 0.0231 0.0801 0.1660 0.1736 0.1673 0.1152
0.0919 0.0467 0.0290 0.0107 0.0036 0.0079 0.0039 0.0013 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0026 0.0079 0.0159 0.0251 0.0049 0.0081 0.0041 0 0 0.0002 0.0013 0 0 0 0 0 0 0 0 0 0 0
0
2009 7 1 3 2 690 0 0 0 0 0 0 0 0 0.0033 0.0114 0.0294 0.0476 0.1185 0.1806 0.1657 0.1414
0.0988 0.0499 0.0272 0.0132 0.0067 0.0002 0.0016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0049 0.0229 0.0196 0.0278 0.0180 0.0065 0.0033 0 0.0016 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2010 7 1 3 2 454 0 0 0 0 0 0 0 0 0 0.0047 0.0516 0.0471 0.1415 0.1435 0.2022 0.1693
0.1082 0.0447 0.0165 0.0095 0.0047 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0023 0.0023 0.0118 0.0282 0.0094 0.0001 0 0.0023 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2011 7 1 3 2 463 0 0 0 0 0 0 0 0 0.0139 0.0139 0.0445 0.0918 0.1288 0.1159 0.1528 0.1106
0.0936 0.0572 0.0395 0.0031 0.0060 0.0055 0.0029 0.0002 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0028 0.0028 0.0055 0.0336 0.0473 0.0166 0.0029 0 0.0028 0.0028 0 0.0028 0 0 0 0 0 0 0 0 0 0
0.0002 0
2012 7 1 3 2 355 0 0 0 0 0 0 0 0 0.0051 0.0102 0.0513 0.1031 0.1633 0.1636 0.1336 0.0811
0.0568 0.0491 0.0237 0.0116 0.0116 0.0051 0.0002 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0102 0.0051 0.0411 0.0209 0.0160 0.0053 0.0107 0.0156 0.0051 0 0 0 0 0 0 0 0 0 0.0002 0 0 0
0
2013 7 1 3 2 354 0 0 0 0 0 0 0 0 0.0035 0.0070 0.0565 0.1902 0.1208 0.0942 0.1155 0.0909
0.0593 0.0899 0.0201 0.0035 0.0073 0.0070 0.0035 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0.0422 0.0284 0.0319 0.0035 0.0141 0.0035 0.0035 0 0.0035 0 0 0 0 0 0 0 0 0 0 0 0
2014 7 1 3 2 345 0 0 0 0 0 0 0 0 0.0004 0.0019 0.0078 0.0410 0.0840 0.1695 0.1540 0.1372
0.0882 0.1132 0.0454 0.0208 0.0012 0.0026 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0049 0.0064 0.0040 0.0518 0.0420 0.0223 0.0004 0.0012 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2015 7 1 3 2 524 0 0 0 0 0 0 0 0 0 0.0042 0.0329 0.0966 0.1733 0.1812 0.2174 0.0983
0.0631 0.0428 0.0119 0.0007 0.0037 0.0074 0.0002 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0006 0.0007 0.0131 0.0217 0.0137 0.0067 0.0038 0.0042 0.0008 0.0004 0.0006 0 0 0 0 0 0 0 0 0 0
0 0
2016 7 1 3 2 511 0 0 0 0 0 0 0 0 0 0.0031 0.0066 0.0254 0.0981 0.1717 0.2104 0.1656
0.0869 0.0698 0.0302 0.0110 0.0097 0.0031 0.0004 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0031 0.0300 0.0378 0.0218 0.0111 0.0042 0.0001 0.0001 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2017 7 1 3 2 321 0 0 0 0 0 0 0 0 0 0 0.0059 0.0269 0.0630 0.1225 0.2112 0.2385 0.1566
0.0495 0.0400 0.0058 0.0107 0 0.0003 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0128 0.0246 0.0092 0.0114 0.0053 0.0053 0 0 0 0.0002 0 0.0002 0 0 0 0 0 0 0 0 0
```

```
2018 7 1 3 2 398 0 0 0 0 0 0 0 0 0.0057 0.0200 0.0251 0.0518 0.0848 0.1026 0.1105 0.1776
0.0896 0.0449 0.0275 0.0198 0 0.0163 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0097 0.0392 0.0890 0.0473 0.0325 0 0.0060 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2019 7 1 3 2 474 0 0 0 0 0 0 0 0 0 0.0014 0.0259 0.0487 0.1479 0.1991 0.1275 0.1252
0.0917 0.0338 0.0101 0.0006 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0075 0.0392 0.0706 0.0358 0.0232 0.0081 0.0038 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2020 7 1 3 2 302 0 0 0 0 0 0 0 0 0.0005 0 0.0145 0.0705 0.1960 0.1928 0.2122 0.0917
0.0725 0.0453 0.0182 0.0160 0.0002 0.0001 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0008 0.0207 0.0311 0.0096 0.0017 0.0020 0.0013 0.0013 0.0005 0.0005 0 0 0 0 0 0 0 0 0 0 0
0
2021 7 1 3 2 472 0 0 0 0 0 0 0 0 0.0005 0 0.0162 0.0412 0.0941 0.2060 0.1723 0.1594
0.1094 0.0895 0.0254 0.0123 0.0060 0.0078 0 0.0004 0 0.0000 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0.0049 0.0011 0.0308 0.0093 0.0051 0.0009 0.0050 0.0013 0.0009 0 0 0 0 0 0 0 0 0 0 0 0
0
2022 7 1 3 2 553 0 0 0 0 0 0 0 0 0.0028 0.0004 0.0088 0.0557 0.1598 0.2012 0.1778 0.1232
0.0992 0.0331 0.0109 0.0049 0.0060 0.0001 0.0010 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0028 0.0005 0.0249 0.0405 0.0355 0.0050 0.0030 0.0010 0.0020 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2023 7 1 3 2 495 0 0 0 0 0 0 0 0 0 0.0062 0.0151 0.0427 0.0709 0.1618 0.2031 0.1790
0.1058 0.0743 0.0454 0.0175 0.0093 0.0047 0.0016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0014 0.0044 0.0152 0.0193 0.0157 0.0016 0 0 0.0049 0 0 0 0 0 0 0 0 0 0 0 0 0
1988 7 2 3 0 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0767 0.2404 0.1636 0.0826 0.1660
0.1664 0.0833 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0066 0.0096 0.0030 0.0007 0.0007 0.0003 0.0001 0 0 0 0 0 0 0 0 0 0 0
1989 7 2 3 0 30 0 0 0 0 0 0 0 0 0 0.0167 0 0.0238 0.0281 0.0307 0.0962 0.2945 0.1983
0.1328 0.0998 0.0333 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0167
0 0.0095 0.0052 0.0026 0.0038 0.0055 0.0017 0.0005 0.0002 0.0000 0 0 0 0 0 0 0 0 0 0 0
-1990 7 2 3 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.3846 0.5891 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0154 0.0109 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1991 7 2 3 0 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1023 0.2137 0.3273 0.3305 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0088 0.0085 0.0061 0.0028 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1992 7 2 3 0 100 0 0 0 0 0 0 0 0 0 0 0.0054 0 0.0928 0.4052 0.2308 0.0589 0.0198
0.0398 0 0.0200 0 0 0.0200 0.0200 0.0200 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0046 0 0.0172 0.0348 0.0092 0.0011 0.0002 0.0002 0 0.0000 0 0 0.0000 0.0000 0.0000 0 0 0 0 0 0
1994 7 2 3 0 642 0 0 0 0 0 0 0 0 0 0.0047 0.0017 0.0189 0.0342 0.0961 0.1453 0.2019
0.1513 0.1024 0.0762 0.0576 0.0265 0.0140 0.0140 0.0093 0.0016 0.0031 0.0016 0 0 0 0 0 0 0 0 0 0
0 0 0 0.0047 0.0014 0.0076 0.0063 0.0083 0.0058 0.0037 0.0013 0.0004 0.0001 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000 0 0 0 0
1995 7 2 3 0 923 0 0 0 0 0 0 0 0 0 0.0016 0.0076 0.0333 0.0384 0.1058 0.2042 0.2361
0.1482 0.0799 0.0378 0.0206 0.0227 0.0087 0.0022 0 0.0011 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0.0016 0.0065 0.0133 0.0071 0.0091 0.0082 0.0044 0.0013 0.0003 0.0001 0.0000 0.0000 0.0000 0.0000 0 0.0000 0 0
0 0 0 0
1996 7 2 3 0 93 0 0 0 0 0 0.0108 0 0 0 0 0.0058 0.0384 0.0635 0.0990 0.2275 0.1900
0.1066 0.0964 0.0537 0.0107 0.0107 0.0215 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0108 0 0
0 0 0.0050 0.0153 0.0118 0.0085 0.0091 0.0035 0.0009 0.0004 0.0001 0.0000 0.0000 0.0000 0 0 0 0 0 0 0
0 0
1997 7 2 3 0 17 0 0 0 0 0 0 0 0 0 0 0.0316 0 0.1489 0.0542 0.0566 0.1155 0.1750
0.0586 0 0.0588 0 0.0588 0.0588 0.1176 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0272 0 0.0276 0.0047 0.0023 0.0021 0.0015 0.0002 0 0.0001 0 0.0000 0.0000 0.0000 0 0 0 0 0 0 0
1999 7 2 3 0 51 0 0 0 0 0 0 0 0 0 0 0 0.0561 0.0993 0.2889 0.2263 0.1348 0
0.0391 0.0783 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0224 0.0184 0.0248 0.0090 0.0025 0 0.0002 0.0001 0 0 0 0 0 0 0 0 0 0 0 0
2002 7 2 3 0 527 0 0 0 0 0 0 0 0 0 0.0152 0.0057 0.0702 0.0854 0.0664 0.0740 0.0721
0.0626 0.0531 0.0987 0.1195 0.0474 0.0095 0.0038 0.0133 0.0019 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0019 0.0133 0.0645 0.0702 0.0190 0.0095 0.0095 0.0019 0.0038 0.0076 0 0 0 0 0 0 0 0 0 0 0
0 0
2003 7 2 3 0 397 0 0 0 0 0 0 0 0 0 0.0025 0.0327 0.0781 0.1285 0.0932 0.1839 0.1285
0.0730 0.0579 0.0202 0.0025 0.0076 0 0.0050 0.0025 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0025 0.0151 0.0252 0.0554 0.0277 0.0126 0.0151 0.0126 0.0025 0.0076 0.0076 0 0 0 0 0 0 0 0 0 0
0 0
2004 7 2 3 0 417 0 0 0 0 0 0 0 0 0 0.0048 0.0312 0.0839 0.1007 0.0935 0.1391 0.1151
0.0719 0.0264 0.0144 0.0048 0.0024 0.0024 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0024
0.0144 0.0911 0.1151 0.0647 0.0072 0.0096 0.0024 0.0024 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2005 7 2 3 0 218 0 0 0 0 0 0 0 0 0 0 0 0.0092 0.1284 0.3257 0.1606 0.1101 0.0459
0.0963 0.0275 0.0046 0.0138 0.0046 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0046 0
0.0092 0.0229 0.0092 0.0138 0.0138 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2006 7 2 3 0 411 0 0 0 0 0 0 0 0 0 0.0146 0.0073 0.0146 0.0633 0.1460 0.1727 0.1363
0.1144 0.0706 0.0292 0.0365 0.0292 0.0073 0.0024 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0049 0.0268 0.0535 0.0462 0.0146 0.0049 0.0049 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2007 7 2 3 0 305 0 0 0 0 0 0 0 0 0 0 0.0066 0.0262 0.0492 0.1082 0.1475 0.2131 0.1279
0.0984 0.0459 0.0164 0.0066 0 0.0066 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0525 0.0721 0.0098 0.0066 0.0066 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2008 7 2 3 0 186 0 0 0 0 0 0 0 0 0 0 0.0054 0.0269 0.1452 0.1935 0.2258 0.1989 0.1398
0.0269 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0215 0.0161 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2009 7 2 3 0 86 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0116 0.0814 0.1279 0.1744 0.1395
0.1163 0.1512 0.1047 0.0465 0.0233 0.0116 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.0116 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2010 7 2 3 0 227 0 0 0 0 0 0 0 0 0 0 0 0 0.0088 0.0352 0.0749 0.0088 0.0044
0.0044 0.0044 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.1322 0.4934 0.2335 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2011 7 2 3 0 69 0 0 0 0 0 0 0 0 0 0 0.0145 0 0.0145 0.0435 0.0290 0.0435 0.1014
0.1159 0.0145 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0145
0.0290 0.2029 0.3188 0.0580 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
2012 7 2 3 0 34 0 0 0 0 0 0 0 0 0 0.0588 0 0.0294 0.0882 0.2647 0.0294 0.2059 0
0.0294 0.0294 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1471
0.0588 0 0.0588 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2013 7 2 3 0 106 0 0 0 0 0 0 0 0 0 0 0 0 0.0094 0.0377 0.1132 0.3774 0.1792
0.1604 0.0283 0.0472 0.0189 0 0.0094 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0094 0 0 0 0 0 0.0094 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2014 7 2 3 0 138 0 0 0 0 0 0 0 0 0 0 0 0 0.0072 0.1014 0.1884 0.1594 0.1812
0.1014 0.1159 0.0870 0.0145 0 0.0072 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0072 0.0072 0.0072 0.0072 0.0072 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2015 7 2 3 0 452 0 0 0 0 0 0 0 0 0 0 0 0 0.0199 0.1350 0.2987 0.1969 0.1438
0.0885 0.0575 0.0155 0.0066 0.0022 0.0022 0.0022 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0.0022 0.0022 0.0221 0.0022 0 0 0.0022 0 0 0 0 0 0 0 0 0 0 0 0 0
2016 7 2 3 0 251 0 0 0 0 0 0 0 0 0 0 0 0.0040 0.0239 0.1514 0.2351 0.1713 0.1195
0.1036 0.0837 0.0239 0.0359 0 0.0080 0.0080 0.0040 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.0120 0.0120 0.0040 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2017 7 2 3 0 72 0 0 0 0 0 0 0 0 0 0 0.0139 0 0.0139 0.1111 0.1528 0.1806 0.1667
0.0833 0.0694 0.0556 0.0278 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0.0278 0.0556 0.0278 0.0139 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-2018 7 2 3 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0.2000 0.2000 0.2000 0.2000 0
0 0 0 0 0 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 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2019 7 2 3 0 429 0 0 0 0 0 0 0 0 0 0 0 0.0163 0.0513 0.1235 0.1422 0.1935 0.1725
0.1305 0.0513 0.0350 0.0070 0.0047 0.0023 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0023
0 0.0023 0.0117 0.0233 0.0140 0.0070 0 0.0047 0.0047 0 0 0 0 0 0 0 0 0 0 0 0 0
2020 7 2 3 0 119 0 0 0 0 0 0 0 0 0 0 0 0 0.0084 0.1261 0.1933 0.2437 0.0756
0.1176 0.0672 0.0840 0.0420 0.0336 0.0084 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2021 7 2 3 0 41 0 0 0 0 0 0 0 0 0 0 0 0 0.0488 0.2195 0.1707 0.2439 0.1707
0.0244 0 0.0244 0.0488 0.0244 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.0244 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-2022 7 2 3 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0.2500 0.2500 0 0 0
0.2500 0.2500 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-2023 7 2 3 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.5000 0.5000 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 11 3 3 0 138 0 0 0 0 0 0 0 0 0.0227 0.2500 0.1278 0.1062 0 0.0227 0.0073 0 0.0377
0.0152 0.0151 0 0.0076 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0682 0.1667
0.0919 0.0604 0 0 0.0003 0 0.0001 0 0.0000 0 0.0000 0 0 0 0 0 0 0 0 0 0 0
1987 11 3 3 0 23 0 0 0 0 0 0 0 0 0.0652 0.0652 0.0941 0.1245 0.1467 0.0400 0.0418 0
0.0862 0.0433 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0652
0.0652 0.0798 0.0494 0.0272 0.0035 0.0017 0 0.0008 0.0002 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1988 11 3 3 0 64 0 0 0 0 0 0 0 0 0.0703 0.0703 0.1438 0.0783 0.1054 0.0431 0.0450 0.0613
0.0310 0.0311 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0703
0.0703 0.1218 0.0311 0.0196 0.0038 0.0018 0.0012 0.0003 0.0001 0 0 0 0 0 0 0 0 0 0 0 0 0
1989 11 3 3 0 38 0 0 0 0 0 0 0 0 0.1974 0.0789 0 0.0188 0.0888 0.2421 0 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 0.1974 0.0789 0
0.0075 0.0165 0.0211 0 0.0010 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1990 11 3 3 0 76 0 0 0 0 0 0 0 0 0.0616 0.1849 0.0741 0.1177 0.0578 0.0630 0.0395 0
0.0272 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0616
0.1849 0.0628 0.0467 0.0107 0.0055 0.0016 0 0.0002 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1991 11 3 3 0 253 0 0 0 0 0 0 0.0020 0 0.0375 0.1067 0.0899 0.0877 0.0633 0.0691 0.0152 0.0390
0.1058 0.0197 0.0237 0.0237 0.0237 0.0158 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0020 0
0.0375 0.1067 0.0762 0.0348 0.0118 0.0060 0.0006 0.0005 0.0009 0.0001 0.0000 0.0000 0.0000 0.0000 0 0 0 0 0 0
0 0 0
1992 11 3 3 0 45 0 0 0 0 0 0 0 0.0111 0.0444 0.1667 0.0722 0.1591 0.0750 0 0 0 0.1101
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0111 0.0444 0.1667 0.0612
0.0631 0.0139 0 0 0 0.0010 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1993 11 3 3 0 191 0 0 0 0 0 0 0 0.0262 0.1283 0.1649 0.0680 0.0712 0.0662 0 0.0105 0.0156
0.0208 0.0104 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0262 0.1283
0.1649 0.0576 0.0283 0.0123 0 0 0.0001 0.0001 0.0000 0 0 0 0 0 0 0 0 0 0 0 0 0
1994 11 3 3 0 126 0 0 0 0 0 0 0 0.0159 0.0635 0.1270 0.0344 0.1534 0.0870 0.1022 0.0153 0.0312
0.0237 0.0079 0 0.0079 0.0079 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0159
0.0635 0.1270 0.0291 0.0609 0.0162 0.0089 0.0006 0.0006 0.0001 0.0000 0 0.0000 0.0000 0 0 0 0 0 0 0 0
0 0
1995 11 3 3 0 139 0 0 0 0 0 0 0 0.0252 0.1367 0.1079 0.0890 0.0751 0.0243 0.0486 0.0553 0.0212
0 0.0573 0.0072 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0252 0.1367
0.0935 0.0693 0.0184 0.0045 0.0017 0.0023 0.0004 0 0.0002 0.0000 0 0 0 0 0 0 0 0 0 0 0 0 0
1996 11 3 3 0 97 0 0 0 0 0 0 0 0 0.0825 0.1289 0.0262 0.0309 0.0293 0 0.0928 0.1546
0.1031 0.0515 0.0515 0.0103 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0928
0.0876 0.0563 0 0.0016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1997 11 3 3 0 37 0 0 0 0 0 0 0 0 0.2973 0.0270 0.0811 0.1892 0.0541 0.0541 0.0541 0 0
0.0269 0.0270 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1351 0
0.0541 0 0 0 0 0 0 0.0001 0.0001 0 0 0 0 0 0 0 0 0 0 0 0 0
1998 11 3 3 0 58 0 0 0 0 0 0 0 0.0345 0.0517 0.1466 0.1487 0.1552 0.0862 0.0517 0.0510 0.0686
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0690 0.0431
0.0237 0 0.0172 0.0517 0.0007 0.0003 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1999 11 3 3 0 54 0 0 0 0 0 0 0 0 0.0370 0.1019 0.1227 0.1296 0.0156 0.0881 0 0.0556
0.0370 0.1111 0.0555 0 0 0 0.0556 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0185
0.0833 0.0440 0.0370 0.0029 0.0044 0 0 0 0 0.0000 0 0 0 0 0 0 0 0 0 0 0 0
2000 11 3 3 0 30 0 0 0 0 0 0 0 0 0 0.0667 0.0667 0.2144 0.1667 0.0667 0 0.1000 0.1000
0 0.0667 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0667 0.0667
0.0189 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2001 11 3 3 0 45 0 0 0 0 0 0 0 0 0.1111 0.1778 0.4000 0.1556 0.0667 0.0889 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 11 3 3 0 131 0 0 0 0 0 0 0 0.0038 0.0992 0.1565 0.1527 0.0763 0.1679 0 0 0.0228 0
0.0916 0 0 0.0305 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0038 0.1450 0.0038
0.0153 0 0.0305 0 0 0.0001 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2003 11 3 3 0 127 0 0 0 0 0 0 0 0 0.1024 0.0512 0.2126 0.0551 0.0066 0.0630 0.0781 0.0079
0.0709 0 0.0079 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1181
0.2087 0.0079 0 0.0012 0 0.0006 0 0 0 0 0.0079 0 0 0 0 0 0 0 0 0 0 0
2004 11 3 3 0 64 0 0 0 0 0 0 0 0 0.0625 0.0625 0.3750 0.0781 0.0156 0.1344 0.0300 0.0460
0.0465 0 0 0.0313 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0156 0.0781 0.0156 0 0.0063 0.0012 0.0009 0.0004 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2005 11 3 3 0 116 0 0 0 0 0 0 0 0 0.0690 0.3534 0.1081 0.1269 0.0345 0.0086 0 0.1121 0
0.0603 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0086 0.1034
0.0040 0.0024 0 0.0086 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2006 11 3 3 0 58 0 0 0 0 0 0 0 0 0.0690 0.1724 0.0862 0 0.0690 0.0862 0 0.0172 0.1034
0.0345 0.0862 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1207 0
0.0862 0.0345 0.0345 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2007 11 3 3 0 46 0 0 0 0 0 0 0 0 0.0435 0.1413 0.1974 0 0.1087 0.0652 0.0861 0 0.0435
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0435 0.1196 0.0199
0.0652 0 0 0.0661 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2008 11 3 3 0 60 0 0 0 0 0 0 0 0 0.0500 0.1167 0.2667 0.1525 0.0667 0 0.0480 0.0991 0
0 0 0.0833 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0333 0.0167 0.0500
0.0142 0 0 0.0020 0.0009 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2009 11 3 3 0 23 0 0 0 0 0 0 0 0.0435 0.3043 0 0 0.1304 0.0870 0.0835 0.0435 0.0435 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0435 0.1739 0
0 0.0435 0.0035 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2010 11 3 3 0 262 0 0 0 0 0 0 0 0.0038 0.0534 0.0763 0.1385 0.1746 0.0949 0.0478 0.0191 0.0229
0.0534 0.0191 0 0 0.0344 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0458 0.0458
0.0573 0.0409 0.0315 0.0234 0.0056 0 0.0076 0.0000 0.0038 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2011 11 3 3 0 380 0 0 0 0 0 0 0 0 0.0947 0.3211 0.0383 0.0932 0.0079 0.0051 0.0105 0.0236
0.0105 0.0026 0 0.0053 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1921
0.1289 0.0117 0.0541 0 0.0002 0 0.0001 0 0.0000 0 0 0 0 0 0 0 0 0 0 0 0 0
2012 11 3 3 0 119 0 0 0 0 0 0 0 0 0.1176 0.1555 0.0959 0.0649 0.0420 0.0161 0.0575 0.0168
0 0 0.0168 0 0.0084 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0336 0.1723
0.0806 0.1199 0 0.0007 0.0013 0 0 0 0.0000 0 0 0 0 0 0 0 0 0 0 0 0
2013 11 3 3 0 20 0 0 0 0 0 0 0 0 0.0250 0.0750 0.1771 0.3216 0 0.0920 0.1000 0 0
0 0 0.0500 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0250 0.0750 0.0229
0.0284 0 0.0080 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2014 11 3 3 0 35 0 0 0 0 0 0 0 0 0.0429 0.0714 0.1321 0.2490 0.0286 0 0.1120 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.2714 0.0143 0.0679
0.0081 0 0 0.0022 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2015 11 3 3 0 98 0 0 0 0 0 0 0 0 0.0918 0.0612 0.0102 0 0.4898 0.0918 0.1020 0.0918
0.0204 0.0204 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.0204 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2016 11 3 3 0 14 0 0 0 0 0 0 0 0 0.0714 0.0714 0.1429 0.0714 0.0714 0.2857 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0714 0.2143 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-2017 11 3 3 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0.1250 0 0 0.2500 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.2500 0.1250 0.2500 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2018 11 3 3 0 32 0 0 0 0 0 0 0 0 0 0.0313 0.0169 0.1875 0.3125 0 0 0 0 0.1563
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.2188 0.0768 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2019 11 3 3 0 10 0 0 0 0 0 0 0 0 0.2000 0.2000 0 0.1000 0.1000 0 0.2000 0 0
0.2000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-2020 11 3 3 0 6 0 0 0 0 0 0 0 0 0 0.0833 0 0 0.6667 0 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 0.0833 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2021 11 3 3 0 24 0 0 0 0 0 0 0 0 0.2083 0.2083 0.1667 0.1667 0.0833 0 0 0 0
0.0417 0 0.0417 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0417 0.0417
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2022 11 3 3 0 10 0 0 0 0 0 0 0 0 0.1000 0.0500 0.1000 0.1000 0.1000 0.1920 0 0 0
0.1000 0 0 0 0 0 0.1000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.1000 0.0500
0 0 0 0.0080 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2023 11 3 3 0 42 0 0 0 0 0 0.0119 0 0 0.1429 0.0833 0.0476 0.0714 0.1667 0.1667 0 0.0952
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0119 0 0 0.1667 0.0357
0 0 0 0 0 0 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
#
5 # N_age_bins
 0 1 2 3 4
1 # N_ageerror_definitions
 0.5 1.5 2.5 3.5 4.5
 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 0.001 0 0 1 4 1 #_fleet:1_FISHERY1
0.001 0.001 0 0 1 5 1 #_fleet:2_FISHERY2
0.001 0.001 0 0 0 0 1 #_fleet:3_SURVEY1
0.001 0.001 0 0 0 0 1 #_fleet:4_SURVEY2
```

```
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 1 1 2 1 8 8 2 0 1.0000 0 0 0 0 0 0 0 0
2002 7 1 1 2 1 9 9 7 0.2857 0.7143 0 0 0 0 0 0 0 0
2002 7 1 1 2 1 10 10 35 0.1429 0.8000 0.0571 0 0 0 0 0 0 0
2002 7 1 1 2 1 11 11 78 0.2211 0.7399 0.0130 0.0260 0 0 0 0 0 0
2002 7 1 1 2 1 12 12 132 0.0632 0.8975 0.0393 0 0 0 0 0 0 0
2002 7 1 1 2 1 13 13 120 0.0258 0.9653 0.0089 0 0 0 0 0 0 0
2002 7 1 1 2 1 14 14 136 0.0234 0.8438 0.1250 0.0078 0 0 0 0 0 0
2002 7 1 1 2 1 15 15 97 0 0.7145 0.2526 0.0329 0 0 0 0 0 0
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2015	7	1	1	2	1	21	21	2	0	0.5000	0	0	0.5000	0	0	0	0	0
2015	7	1	1	2	1	22	22	1	0	0	0	0	1.0000	0	0	0	0	0
2016	7	1	1	2	1	9	9	1	0	1.0000	0	0	0	0	0	0	0	0
2016	7	1	1	2	1	10	10	3	0	0.5275	0.4725	0	0	0	0	0	0	0
2016	7	1	1	2	1	11	11	17	0.1221	0.3846	0.4932	0	0	0	0	0	0	0
2016	7	1	1	2	1	12	12	52	0	0.5648	0.4352	0	0	0	0	0	0	0
2016	7	1	1	2	1	13	13	96	0	0.3490	0.6503	0.0007	0	0	0	0	0	0
2016	7	1	1	2	1	14	14	95	0.0150	0.4395	0.5305	0.0150	0	0	0	0	0	0
2016	7	1	1	2	1	15	15	80	0.0191	0.3754	0.6056	0	0	0	0	0	0	0
2016	7	1	1	2	1	16	16	44	0	0.3176	0.6769	0.0055	0	0	0	0	0	0
2016	7	1	1	2	1	17	17	31	0	0.2826	0.5742	0.1432	0	0	0	0	0	0
2016	7	1	1	2	1	18	18	15	0	0.1145	0.5771	0.3084	0	0	0	0	0	0
2016	7	1	1	2	1	19	19	9	0	0.2865	0.4061	0.3074	0	0	0	0	0	0
2016	7	1	1	2	1	20	20	4	0	0.3209	0.3582	0.3209	0	0	0	0	0	0
2016	7	1	1	2	1	21	21	1	0	0	1.0000	0	0	0	0	0	0	0
2016	7	1	1	2	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2017	7	1	1	2	1	10	10	2	0.1391	0.8609	0	0	0	0	0	0	0	0
2017	7	1	1	2	1	11	11	8	0.3925	0.6075	0	0	0	0	0	0	0	0
2017	7	1	1	2	1	12	12	21	0.0157	0.6461	0.3382	0	0	0	0	0	0	0
2017	7	1	1	2	1	13	13	35	0.0030	0.6328	0.2767	0.0875	0	0	0	0	0	0
2017	7	1	1	2	1	14	14	55	0.0013	0.5865	0.2366	0.1756	0	0	0	0	0	0
2017	7	1	1	2	1	15	15	63	0.0014	0.4841	0.3133	0.2012	0	0	0	0	0	0
2017	7	1	1	2	1	16	16	47	0	0.3393	0.3584	0.3023	0	0	0	0	0	0
2017	7	1	1	2	1	17	17	26	0	0.4563	0.5437	0	0	0	0	0	0	0
2017	7	1	1	2	1	18	18	19	0	0.5328	0.1797	0.2875	0	0	0	0	0	0
2017	7	1	1	2	1	19	19	3	0	0.0612	0	0.0566	0.8822	0	0	0	0	0
2017	7	1	1	2	1	20	20	4	0	0.0205	0.4795	0.5000	0	0	0	0	0	0
2017	7	1	1	2	1	22	22	1	0	0	0	1.0000	0	0	0	0	0	0
2018	7	1	1	2	1	8	8	2	0.3159	0.6841	0	0	0	0	0	0	0	0
2018	7	1	1	2	1	9	9	6	1.0000	0	0	0	0	0	0	0	0	0
2018	7	1	1	2	1	10	10	10	1.0000	0	0	0	0	0	0	0	0	0
2018	7	1	1	2	1	11	11	18	0.6974	0.2270	0.0757	0	0	0	0	0	0	0
2018	7	1	1	2	1	12	12	34	0.5148	0.2391	0.2460	0	0	0	0	0	0	0
2018	7	1	1	2	1	13	13	44	0.1648	0.3482	0.4858	0.0012	0	0	0	0	0	0
2018	7	1	1	2	1	14	14	48	0.1252	0.5017	0.2608	0.1075	0.0048	0	0	0	0	0
2018	7	1	1	2	1	15	15	67	0	0.3889	0.3403	0.1384	0.1324	0	0	0	0	0
2018	7	1	1	2	1	16	16	40	0.0048	0.3408	0.4793	0.0438	0.1313	0	0	0	0	0
2018	7	1	1	2	1	17	17	29	0	0.2950	0.5940	0.1110	0	0	0	0	0	0
2018	7	1	1	2	1	18	18	14	0	0.0959	0.5754	0.1427	0.1859	0	0	0	0	0
2018	7	1	1	2	1	19	19	9	0	0.1888	0.4158	0.1977	0.1977	0	0	0	0	0
2018	7	1	1	2	1	21	21	5	0	0.1247	0	0.3355	0.5398	0	0	0	0	0
2019	7	1	1	2	1	9	9	2	0.7526	0.2474	0	0	0	0	0	0	0	0
2019	7	1	1	2	1	10	10	12	0.2893	0.7107	0	0	0	0	0	0	0	0
2019	7	1	1	2	1	11	11	22	0	1.0000	0	0	0	0	0	0	0	0
2019	7	1	1	2	1	12	12	71	0.0225	0.9501	0.0274	0	0	0	0	0	0	0
2019	7	1	1	2	1	13	13	91	0	0.9811	0.0189	0	0	0	0	0	0	0
2019	7	1	1	2	1	14	14	69	0	0.9062	0.0938	0	0	0	0	0	0	0
2019	7	1	1	2	1	15	15	64	0	0.6904	0.3013	0.0082	0	0	0	0	0	0

2019	7	1	1	2	1	16	16	50	0	0.9143	0.0824	0	0.0033	0	0	0	0	0
2019	7	1	1	2	1	17	17	17	0	0.8888	0.1112	0	0	0	0	0	0	0
2019	7	1	1	2	1	18	18	7	0	0.5990	0.0295	0.3715	0	0	0	0	0	0
2019	7	1	1	2	1	19	19	2	0	0.5000	0	0	0.5000	0	0	0	0	0
2020	7	1	1	2	1	8	8	2	0	1.0000	0	0	0	0	0	0	0	0
2020	7	1	1	2	1	10	10	4	0	1.0000	0	0	0	0	0	0	0	0
2020	7	1	1	2	1	11	11	16	0.0019	0.9981	0	0	0	0	0	0	0	0
2020	7	1	1	2	1	12	12	49	0	0.7312	0.2688	0	0	0	0	0	0	0
2020	7	1	1	2	1	13	13	50	0.0149	0.5579	0.4271	0	0	0	0	0	0	0
2020	7	1	1	2	1	14	14	51	0	0.5346	0.4332	0.0322	0	0	0	0	0	0
2020	7	1	1	2	1	15	15	24	0.0016	0.2492	0.7492	0	0	0	0	0	0	0
2020	7	1	1	2	1	16	16	23	0	0.2172	0.7828	0	0	0	0	0	0	0
2020	7	1	1	2	1	17	17	17	0	0.3702	0.4371	0.1713	0.0214	0	0	0	0	0
2020	7	1	1	2	1	18	18	13	0	0.4083	0.5917	0	0	0	0	0	0	0
2020	7	1	1	2	1	19	19	9	0	0	1.0000	0	0	0	0	0	0	0
2020	7	1	1	2	1	20	20	2	0	0.4609	0.5391	0	0	0	0	0	0	0
2020	7	1	1	2	1	21	21	1	0	0	1.0000	0	0	0	0	0	0	0
2021	7	1	1	2	1	8	8	1	1.0000	0	0	0	0	0	0	0	0	0
2021	7	1	1	2	1	10	10	7	0.2870	0.7130	0	0	0	0	0	0	0	0
2021	7	1	1	2	1	11	11	20	0.3752	0.6016	0.0232	0	0	0	0	0	0	0
2021	7	1	1	2	1	12	12	37	0.0528	0.5887	0.3585	0	0	0	0	0	0	0
2021	7	1	1	2	1	13	13	74	0.0271	0.4992	0.4194	0.0543	0	0	0	0	0	0
2021	7	1	1	2	1	14	14	80	0.0005	0.4013	0.5317	0.0664	0	0	0	0	0	0
2021	7	1	1	2	1	15	15	76	0	0.4535	0.4447	0.0784	0.0234	0	0	0	0	0
2021	7	1	1	2	1	16	16	60	0	0.4391	0.4457	0.1152	0	0	0	0	0	0
2021	7	1	1	2	1	17	17	45	0	0.4953	0.4182	0.0865	0	0	0	0	0	0
2021	7	1	1	2	1	18	18	13	0	0.3610	0.4923	0.1467	0	0	0	0	0	0
2021	7	1	1	2	1	19	19	6	0	0.0301	0	0.9699	0	0	0	0	0	0
2021	7	1	1	2	1	20	20	4	0	0.6251	0.2185	0.1564	0	0	0	0	0	0
2021	7	1	1	2	1	21	21	2	0	0	0.9096	0.0904	0	0	0	0	0	0
2021	7	1	1	2	1	23	23	1	0	0	0	1.0000	0	0	0	0	0	0
2021	7	1	1	2	1	25	25	1	0	0	0	0	1.0000	0	0	0	0	0
2022	7	1	1	2	1	8	8	1	0	1.0000	0	0	0	0	0	0	0	0
2022	7	1	1	2	1	9	9	1	0	1.0000	0	0	0	0	0	0	0	0
2022	7	1	1	2	1	10	10	4	0	1.0000	0	0	0	0	0	0	0	0
2022	7	1	1	2	1	11	11	26	0	0.9498	0	0.0502	0	0	0	0	0	0
2022	7	1	1	2	1	12	12	81	0.0043	0.9577	0.0379	0	0	0	0	0	0	0
2022	7	1	1	2	1	13	13	105	0.0006	0.8937	0.0914	0.0142	0	0	0	0	0	0
2022	7	1	1	2	1	14	14	98	0.0007	0.7835	0.1437	0.0721	0	0	0	0	0	0
2022	7	1	1	2	1	15	15	69	0	0.7700	0.2074	0.0226	0	0	0	0	0	0
2022	7	1	1	2	1	16	16	48	0	0.3262	0.4705	0.2033	0	0	0	0	0	0
2022	7	1	1	2	1	17	17	16	0	0.3050	0.3293	0.3657	0	0	0	0	0	0
2022	7	1	1	2	1	18	18	7	0	0.4525	0.2927	0.2548	0	0	0	0	0	0
2022	7	1	1	2	1	19	19	4	0	0.1399	0.8601	0	0	0	0	0	0	0
2022	7	1	1	2	1	20	20	3	0	0	0.9191	0	0.0809	0	0	0	0	0
2022	7	1	1	2	1	21	21	1	0	0	1.0000	0	0	0	0	0	0	0
2022	7	1	1	2	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2023	7	1	1	2	1	9	9	4	0.5761	0.4239	0	0	0	0	0	0	0	0
2023	7	1	1	2	1	10	10	7	0.6847	0.2763	0.0390	0	0	0	0	0	0	0
2023	7	1	1	2	1	11	11	20	0.4670	0.5330	0	0	0	0	0	0	0	0
2023	7	1	1	2	1	12	12	31	0.1766	0.6291	0.1943	0	0	0	0	0	0	0
2023	7	1	1	2	1	13	13	70	0.1129	0.5690	0.3181	0	0	0	0	0	0	0
2023	7	1	1	2	1	14	14	90	0.0302	0.4910	0.4788	0	0	0	0	0	0	0
2023	7	1	1	2	1	15	15	79	0.0179	0.3556	0.5992	0.0179	0.0094	0	0	0	0	0
2023	7	1	1	2	1	16	16	54	0	0.3930	0.5862	0.0208	0	0	0	0	0	0
2023	7	1	1	2	1	17	17	40	0	0.2380	0.7122	0.0498	0	0	0	0	0	0
2023	7	1	1	2	1	18	18	27	0	0.1861	0.7634	0.0504	0	0	0	0	0	0
2023	7	1	1	2	1	19	19	12	0	0.2495	0.7505	0	0	0	0	0	0	0
2023	7	1	1	2	1	20	20	4	0	0.1721	0.8279	0	0	0	0	0	0	0
2023	7	1	1	2	1	21	21	1	0	0	1.0000	0	0	0	0	0	0	0
2023	7	1	1	2	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2002	7	1	2	2	1	7	7	2	0	0	0	0	0	1.0000	0	0	0	0
2002	7	1	2	2	1	8	8	2	0	0	0	0	0	0.5000	0.5000	0	0	0
2002	7	1	2	2	1	9	9	9	0	0	0	0	0	0.2222	0.7778	0	0	0
2002	7	1	2	2	1	10	10	20	0	0	0	0	0	0.1051	0.8424	0.0525	0	0
2002	7	1	2	2	1	11	11	40	0	0	0	0	0	0	1.0000	0	0	0
2002	7	1	2	2	1	12	12	18	0	0	0	0	0	0	1.0000	0	0	0
2002	7	1	2	2	1	13	13	6	0	0	0	0	0	0.1667	0.8333	0	0	0
2002	7	1	2	2	1	14	14	3	0	0	0	0	0	0	1.0000	0	0	0
2002	7	1	2	2	1	15	15	1	0	0	0	0	0	0	0	1.0000	0	0
2002	7	1	2	2	1	16	16	6	0	0	0	0	0	0	0.3333	0.5000	0.1667	0
2002	7	1	2	2	1	17	17	1	0	0	0	0	0	0	0	1.0000	0	0
2002	7	1	2	2	1	18	18	3	0	0	0	0	0	0	0.3333	0.3333	0.3333	0
2003	7	1	2	2	1	7	7	1	0	0	0	0	0	1.0000	0	0	0	0
2003	7	1	2	2	1	8	8	5	0	0	0	0	0	0.8000	0.2000	0	0	0
2003	7	1	2	2	1	9	9	10	0	0	0	0	0	0.3320	0.5533	0.1147	0	0
2003	7	1	2	2	1	10	10	26	0	0	0	0	0	0.0769	0.9231	0	0	0
2003	7	1	2	2	1	11	11	28	0	0	0	0	0	0.0357	0.8929	0.0714	0	0
2003	7	1	2	2	1	12	12	19	0	0	0	0	0	0	0.6316	0.3684	0	0
2003	7	1	2	2	1	13	13	5	0	0	0	0	0	0.2000	0.8000	0	0	0
2003	7	1	2	2	1	14	14	8	0	0	0	0	0	0	0.6250	0.3750	0	0
2003	7	1	2	2	1	15	15	4	0	0	0	0	0	0	0.2500	0.7500	0	0
2003	7	1	2	2	1	16	16	2	0	0	0	0	0	0	0	1.0000	0	0
2003	7	1	2	2	1	17	17	1	0	0	0	0	0	0	0	0	1.0000	0
2004	7	1	2	2	1	9	9	18	0	0	0	0	0	0.0556	0.9444	0	0	0
2004	7	1	2	2	1	10	10	32	0	0	0	0	0	0	1.0000	0	0	0
2004	7	1	2	2	1	11	11	33	0	0	0	0	0	0.0606	0.8485	0.0909	0	0
2004	7	1	2	2	1	12	12	5	0	0	0	0	0	0.4000	0.4000	0.2000	0	0

2004	7	1	2	2	1	13	13	3	0	0	0	0	0	0	0.3333	0.6667	0	0
2004	7	1	2	2	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2004	7	1	2	2	1	15	15	1	0	0	0	0	0	0	0	1.0000	0	0
2004	7	1	2	2	1	16	16	2	0	0	0	0	0	0	0.5000	0	0.5000	0
2004	7	1	2	2	1	17	17	1	0	0	0	0	0	0	0	0	1.0000	0
2005	7	1	2	2	1	9	9	4	0	0	0	0	0	0.5000	0.5000	0	0	0
2005	7	1	2	2	1	10	10	10	0	0	0	0	0	0.1107	0.6680	0.2214	0	0
2005	7	1	2	2	1	11	11	19	0	0	0	0	0	0	0.8337	0.1663	0	0
2005	7	1	2	2	1	12	12	11	0	0	0	0	0	0	0.6298	0.3702	0	0
2005	7	1	2	2	1	13	13	4	0	0	0	0	0	0	0.0316	0.9684	0	0
2005	7	1	2	2	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2005	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0	1.0000	0	0
2005	7	1	2	2	1	16	16	1	0	0	0	0	0	0	0	0	1.0000	0
2006	7	1	2	2	1	8	8	3	0	0	0	0	0	1.0000	0	0	0	0
2006	7	1	2	2	1	9	9	3	0	0	0	0	0	0.3333	0.6667	0	0	0
2006	7	1	2	2	1	10	10	18	0	0	0	0	0	0.0681	0.9319	0	0	0
2006	7	1	2	2	1	11	11	18	0	0	0	0	0	0	0.9418	0.0582	0	0
2006	7	1	2	2	1	12	12	10	0	0	0	0	0	0	0.9797	0.0203	0	0
2006	7	1	2	2	1	13	13	3	0	0	0	0	0	0	0.4610	0.0780	0.4610	0
2006	7	1	2	2	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2006	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0.5000	0.5000	0	0
2007	7	1	2	2	1	8	8	2	0	0	0	0	0	0.5000	0.5000	0	0	0
2007	7	1	2	2	1	9	9	3	0	0	0	0	0	0.3333	0.6667	0	0	0
2007	7	1	2	2	1	10	10	9	0	0	0	0	0	0.1111	0.8889	0	0	0
2007	7	1	2	2	1	11	11	27	0	0	0	0	0	0.0398	0.9205	0.0398	0	0
2007	7	1	2	2	1	12	12	7	0	0	0	0	0	0	1.0000	0	0	0
2007	7	1	2	2	1	13	13	3	0	0	0	0	0	0.4819	0.4819	0.0361	0	0
2007	7	1	2	2	1	14	14	3	0	0	0	0	0	0	0	0	0.4819	0.5181
2007	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0.9303	0	0.0697	0
2008	7	1	2	2	1	8	8	1	0	0	0	0	0	1.0000	0	0	0	0
2008	7	1	2	2	1	9	9	6	0	0	0	0	0	0.5000	0.5000	0	0	0
2008	7	1	2	2	1	10	10	10	0	0	0	0	0	0.1000	0.9000	0	0	0
2008	7	1	2	2	1	11	11	19	0	0	0	0	0	0	0.8898	0.1102	0	0
2008	7	1	2	2	1	12	12	7	0	0	0	0	0	0.2764	0.6809	0.0427	0	0
2008	7	1	2	2	1	13	13	7	0	0	0	0	0	0	1.0000	0	0	0
2008	7	1	2	2	1	14	14	4	0	0	0	0	0	0	0.6340	0.3660	0	0
2008	7	1	2	2	1	17	17	1	0	0	0	0	0	0	0	0	1.0000	0
2008	7	1	2	2	1	18	18	1	0	0	0	0	0	0	0	0	1.0000	0
2009	7	1	2	2	1	8	8	1	0	0	0	0	0	1.0000	0	0	0	0
2009	7	1	2	2	1	9	9	9	0	0	0	0	0	0.8889	0.1111	0	0	0
2009	7	1	2	2	1	10	10	9	0	0	0	0	0	0.1111	0.7778	0.1111	0	0
2009	7	1	2	2	1	11	11	13	0	0	0	0	0	0.3077	0.6154	0.0769	0	0
2009	7	1	2	2	1	12	12	7	0	0	0	0	0	0	0.7143	0.2857	0	0
2009	7	1	2	2	1	13	13	4	0	0	0	0	0	0	0.5000	0.2500	0.2500	0
2009	7	1	2	2	1	14	14	2	0	0	0	0	0	0	0	0.5000	0	0.5000
2009	7	1	2	2	1	16	16	1	0	0	0	0	0	0	0	1.0000	0	0
2010	7	1	2	2	1	8	8	1	0	0	0	0	0	1.0000	0	0	0	0
2010	7	1	2	2	1	9	9	1	0	0	0	0	0	1.0000	0	0	0	0
2010	7	1	2	2	1	10	10	6	0	0	0	0	0	0.1986	0.8014	0	0	0
2010	7	1	2	2	1	11	11	8	0	0	0	0	0	0.1250	0.8750	0	0	0
2010	7	1	2	2	1	12	12	2	0	0	0	0	0	0	1.0000	0	0	0
2010	7	1	2	2	1	13	13	1	0	0	0	0	0	0	1.0000	0	0	0
2010	7	1	2	2	1	15	15	1	0	0	0	0	0	0	1.0000	0	0	0
2011	7	1	2	2	1	7	7	1	0	0	0	0	0	1.0000	0	0	0	0
2011	7	1	2	2	1	8	8	1	0	0	0	0	0	0	1.0000	0	0	0
2011	7	1	2	2	1	9	9	1	0	0	0	0	0	0	1.0000	0	0	0
2011	7	1	2	2	1	10	10	13	0	0	0	0	0	0.2749	0.7251	0	0	0
2011	7	1	2	2	1	11	11	18	0	0	0	0	0	0.2932	0.5864	0.1204	0	0
2011	7	1	2	2	1	12	12	6	0	0	0	0	0	0.3333	0.6667	0	0	0
2011	7	1	2	2	1	13	13	2	0	0	0	0	0	0	0.9486	0.0514	0	0
2011	7	1	2	2	1	15	15	1	0	0	0	0	0	0	1.0000	0	0	0
2011	7	1	2	2	1	16	16	1	0	0	0	0	0	0	1.0000	0	0	0
2011	7	1	2	2	1	18	18	1	0	0	0	0	0	0	0	1.0000	0	0
2012	7	1	2	2	1	9	9	1	0	0	0	0	0	0	1.0000	0	0	0
2012	7	1	2	2	1	10	10	6	0	0	0	0	0	0	1.0000	0	0	0
2012	7	1	2	2	1	11	11	6	0	0	0	0	0	0	0.9887	0.0113	0	0
2012	7	1	2	2	1	12	12	5	0	0	0	0	0	0.0150	0.9850	0	0	0
2012	7	1	2	2	1	13	13	2	0	0	0	0	0	0	1.0000	0	0	0
2012	7	1	2	2	1	14	14	4	0	0	0	0	0	0	0.9779	0.0221	0	0
2012	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0.5000	0	0.5000	0
2012	7	1	2	2	1	16	16	1	0	0	0	0	0	0	0	1.0000	0	0
2013	7	1	2	2	1	10	10	9	0	0	0	0	0	0.5556	0.4444	0	0	0
2013	7	1	2	2	1	11	11	8	0	0	0	0	0	0	1.0000	0	0	0
2013	7	1	2	2	1	12	12	8	0	0	0	0	0	0	0.7171	0.2829	0	0
2013	7	1	2	2	1	13	13	1	0	0	0	0	0	0	0	1.0000	0	0
2013	7	1	2	2	1	14	14	4	0	0	0	0	0	0	0.7500	0.2500	0	0
2013	7	1	2	2	1	15	15	1	0	0	0	0	0	0	0	1.0000	0	0
2013	7	1	2	2	1	16	16	1	0	0	0	0	0	0	1.0000	0	0	0
2013	7	1	2	2	1	18	18	1	0	0	0	0	0	0	1.0000	0	0	0
2014	7	1	2	2	1	9	9	2	0	0	0	0	0	0.5539	0	0.4461	0	0
2014	7	1	2	2	1	10	10	4	0	0	0	0	0	0.9373	0.0627	0	0	0
2014	7	1	2	2	1	11	11	4	0	0	0	0	0	0.6457	0.3543	0	0	0
2014	7	1	2	2	1	12	12	17	0	0	0	0	0	0.0074	0.5804	0.3754	0.0368	0
2014	7	1	2	2	1	13	13	24	0	0	0	0	0	0	0.0903	0.8646	0.0450	0
2014	7	1	2	2	1	14	14	12	0	0	0	0	0	0	0.0706	0.9294	0	0
2014	7	1	2	2	1	15	15	1	0	0	0	0	0	0	1.0000	0	0	0
2015	7	1	2	2	1	8	8	1	0	0	0	0	0	0	1.0000	0	0	0
2015	7	1	2	2	1	9	9	2	0	0	0	0	0	0	1.0000	0	0	0

2015	7	1	2	2	1	10	10	10	0	0	0	0	0	0	1.0000	0	0	0
2015	7	1	2	2	1	11	11	11	0	0	0	0	0	0	1.0000	0	0	0
2015	7	1	2	2	1	12	12	8	0	0	0	0	0	0	0.9044	0.0520	0.0437	0
2015	7	1	2	2	1	13	13	7	0	0	0	0	0	0	0.9011	0	0.0989	0
2015	7	1	2	2	1	14	14	7	0	0	0	0	0	0	0.6288	0	0.3712	0
2015	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0.1058	0.8942	0	0
2015	7	1	2	2	1	16	16	2	0	0	0	0	0	0	1.0000	0	0	0
2015	7	1	2	2	1	17	17	1	0	0	0	0	0	0	1.0000	0	0	0
2015	7	1	2	2	1	18	18	2	0	0	0	0	0	0	0.2246	0.7754	0	0
2016	7	1	2	2	1	9	9	1	0	0	0	0	0	1.0000	0	0	0	0
2016	7	1	2	2	1	10	10	14	0	0	0	0	0	0.2071	0.6893	0.1036	0	0
2016	7	1	2	2	1	11	11	12	0	0	0	0	0	0	0.7291	0.2709	0	0
2016	7	1	2	2	1	12	12	9	0	0	0	0	0	0.1423	0.7154	0.1423	0	0
2016	7	1	2	2	1	13	13	8	0	0	0	0	0	0	0.9838	0.0162	0	0
2016	7	1	2	2	1	14	14	4	0	0	0	0	0	0	0.9153	0.0847	0	0
2016	7	1	2	2	1	15	15	1	0	0	0	0	0	0	1.0000	0	0	0
2016	7	1	2	2	1	16	16	1	0	0	0	0	0	0	0	1.0000	0	0
2017	7	1	2	2	1	10	10	6	0	0	0	0	0	0.0832	0.9168	0	0	0
2017	7	1	2	2	1	11	11	9	0	0	0	0	0	0	1.0000	0	0	0
2017	7	1	2	2	1	12	12	6	0	0	0	0	0	0	1.0000	0	0	0
2017	7	1	2	2	1	13	13	4	0	0	0	0	0	0	0.5507	0.4493	0	0
2017	7	1	2	2	1	14	14	2	0	0	0	0	0	0	0.9591	0.0409	0	0
2017	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0.9591	0	0.0409	0
2017	7	1	2	2	1	19	19	1	0	0	0	0	0	0	0	0	1.0000	0
2017	7	1	2	2	1	21	21	1	0	0	0	0	0	0	0	0	1.0000	0
2018	7	1	2	2	1	9	9	3	0	0	0	0	0	0.5938	0.4062	0	0	0
2018	7	1	2	2	1	10	10	10	0	0	0	0	0	0.7000	0.3000	0	0	0
2018	7	1	2	2	1	11	11	29	0	0	0	0	0	0.4417	0.4702	0.0881	0	0
2018	7	1	2	2	1	12	12	14	0	0	0	0	0	0.0051	0.8291	0.1658	0	0
2018	7	1	2	2	1	13	13	11	0	0	0	0	0	0	0.7554	0.2446	0	0
2018	7	1	2	2	1	15	15	3	0	0	0	0	0	0	0.3481	0	0	0.6519
2019	7	1	2	2	1	9	9	2	0	0	0	0	0	0	1.0000	0	0	0
2019	7	1	2	2	1	10	10	12	0	0	0	0	0	0.0958	0.9042	0	0	0
2019	7	1	2	2	1	11	11	24	0	0	0	0	0	0.0090	0.9910	0	0	0
2019	7	1	2	2	1	12	12	11	0	0	0	0	0	0	1.0000	0	0	0
2019	7	1	2	2	1	13	13	7	0	0	0	0	0	0	1.0000	0	0	0
2019	7	1	2	2	1	14	14	3	0	0	0	0	0	0	1.0000	0	0	0
2019	7	1	2	2	1	15	15	1	0	0	0	0	0	0	1.0000	0	0	0
2020	7	1	2	2	1	9	9	1	0	0	0	0	0	0	1.0000	0	0	0
2020	7	1	2	2	1	10	10	4	0	0	0	0	0	0.3200	0.6800	0	0	0
2020	7	1	2	2	1	11	11	11	0	0	0	0	0	0.0302	0.3314	0.6384	0	0
2020	7	1	2	2	1	12	12	6	0	0	0	0	0	0.0117	0.2588	0.7294	0	0
2020	7	1	2	2	1	13	13	2	0	0	0	0	0	0	0.5000	0.5000	0	0
2020	7	1	2	2	1	14	14	3	0	0	0	0	0	0	0.1863	0.4069	0.4069	0
2020	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0	0.3715	0	0.6285
2020	7	1	2	2	1	16	16	2	0	0	0	0	0	0	0.6285	0.3715	0	0
2020	7	1	2	2	1	17	17	1	0	0	0	0	0	0	0	1.0000	0	0
2020	7	1	2	2	1	18	18	1	0	0	0	0	0	0	0	1.0000	0	0
2021	7	1	2	2	1	9	9	3	0	0	0	0	0	0.2327	0.7673	0	0	0
2021	7	1	2	2	1	10	10	2	0	0	0	0	0	0	1.0000	0	0	0
2021	7	1	2	2	1	11	11	18	0	0	0	0	0	0.0603	0.8184	0.1213	0	0
2021	7	1	2	2	1	12	12	4	0	0	0	0	0	0	1.0000	0	0	0
2021	7	1	2	2	1	13	13	3	0	0	0	0	0	0	1.0000	0	0	0
2021	7	1	2	2	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2021	7	1	2	2	1	15	15	2	0	0	0	0	0	0	0.1978	0.8022	0	0
2021	7	1	2	2	1	16	16	2	0	0	0	0	0	0	1.0000	0	0	0
2021	7	1	2	2	1	17	17	1	0	0	0	0	0	0	1.0000	0	0	0
2022	7	1	2	2	1	8	8	1	0	0	0	0	0	0	1.0000	0	0	0
2022	7	1	2	2	1	9	9	1	0	0	0	0	0	0	1.0000	0	0	0
2022	7	1	2	2	1	10	10	12	0	0	0	0	0	0	1.0000	0	0	0
2022	7	1	2	2	1	11	11	27	0	0	0	0	0	0.0187	0.9813	0	0	0
2022	7	1	2	2	1	12	12	18	0	0	0	0	0	0	0.9862	0.0138	0	0
2022	7	1	2	2	1	13	13	5	0	0	0	0	0	0	1.0000	0	0	0
2022	7	1	2	2	1	14	14	4	0	0	0	0	0	0	1.0000	0	0	0
2022	7	1	2	2	1	15	15	1	0	0	0	0	0	0	0	1.0000	0	0
2022	7	1	2	2	1	16	16	2	0	0	0	0	0	0	0	1.0000	0	0
2023	7	1	2	2	1	10	10	2	0	0	0	0	0	0.3142	0.6858	0	0	0
2023	7	1	2	2	1	11	11	9	0	0	0	0	0	0	0.7642	0.2358	0	0
2023	7	1	2	2	1	12	12	8	0	0	0	0	0	0	1.0000	0	0	0
2023	7	1	2	2	1	13	13	8	0	0	0	0	0	0.1932	0.3867	0.4200	0	0
2023	7	1	2	2	1	14	14	1	0	0	0	0	0	0	0	1.0000	0	0
2023	7	1	2	2	1	17	17	4	0	0	0	0	0	0	0	1.0000	0	0
2002	7	2	1	0	1	9	9	2	1.0000	0	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	10	10	3	0	1.0000	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	11	11	13	0.5385	0.4615	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	12	12	23	0.2609	0.6522	0.0435	0.0435	0	0	0	0	0	0
2002	7	2	1	0	1	13	13	24	0	0.8750	0.0833	0.0417	0	0	0	0	0	0
2002	7	2	1	0	1	14	14	25	0.0800	0.4400	0.4000	0.0800	0	0	0	0	0	0
2002	7	2	1	0	1	15	15	24	0	0.6667	0.3333	0	0	0	0	0	0	0
2002	7	2	1	0	1	16	16	21	0	0.6667	0.2857	0.0476	0	0	0	0	0	0
2002	7	2	1	0	1	17	17	16	0	0.4375	0.5625	0	0	0	0	0	0	0
2002	7	2	1	0	1	18	18	19	0	0.8421	0.1579	0	0	0	0	0	0	0
2002	7	2	1	0	1	19	19	27	0	0.8889	0.1111	0	0	0	0	0	0	0
2002	7	2	1	0	1	20	20	7	0	1.0000	0	0	0	0	0	0	0	0
2002	7	2	1	0	1	21	21	4	0	0.7500	0.2500	0	0	0	0	0	0	0
2002	7	2	1	0	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2002	7	2	1	0	1	23	23	3	0	0	1.0000	0	0	0	0	0	0	0
2002	7	2	1	0	1	24	24	1	0	0	0	1.0000	0	0	0	0	0	0

2003	7	2	1	0	1	9	9	1	1.0000	0	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	10	10	10	0.2000	0.8000	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	11	11	20	0	1.0000	0	0	0	0	0	0	0	0
2003	7	2	1	0	1	12	12	34	0.0882	0.7647	0.1176	0.0294	0	0	0	0	0	0
2003	7	2	1	0	1	13	13	21	0	0.9048	0.0952	0	0	0	0	0	0	0
2003	7	2	1	0	1	14	14	53	0	0.7925	0.2075	0	0	0	0	0	0	0
2003	7	2	1	0	1	15	15	39	0	0.7179	0.2821	0	0	0	0	0	0	0
2003	7	2	1	0	1	16	16	19	0	0.7368	0.2632	0	0	0	0	0	0	0
2003	7	2	1	0	1	17	17	20	0	0.4500	0.3000	0.2000	0.0500	0	0	0	0	0
2003	7	2	1	0	1	18	18	5	0	0.4000	0.4000	0	0.2000	0	0	0	0	0
2003	7	2	1	0	1	19	19	1	0	0	1.0000	0	0	0	0	0	0	0
2003	7	2	1	0	1	20	20	3	0	0	0.6667	0.3333	0	0	0	0	0	0
2003	7	2	1	0	1	22	22	2	0	0.5000	0	0.5000	0	0	0	0	0	0
2003	7	2	1	0	1	23	23	1	0	0	0	1.0000	0	0	0	0	0	0
2004	7	2	1	0	1	9	9	2	0.5000	0	0.5000	0	0	0	0	0	0	0
2004	7	2	1	0	1	10	10	7	0.5714	0.4286	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	11	11	16	0	1.0000	0	0	0	0	0	0	0	0
2004	7	2	1	0	1	12	12	36	0.0278	0.9444	0.0278	0	0	0	0	0	0	0
2004	7	2	1	0	1	13	13	32	0.0313	0.6875	0.2813	0	0	0	0	0	0	0
2004	7	2	1	0	1	14	14	35	0.0571	0.4286	0.4571	0.0286	0.0286	0	0	0	0	0
2004	7	2	1	0	1	15	15	31	0	0.7097	0.2258	0.0645	0	0	0	0	0	0
2004	7	2	1	0	1	16	16	16	0	0.3750	0.3125	0.2500	0.0625	0	0	0	0	0
2004	7	2	1	0	1	17	17	9	0	0.2222	0.6667	0.1111	0	0	0	0	0	0
2004	7	2	1	0	1	18	18	4	0	0.2500	0.2500	0.5000	0	0	0	0	0	0
2004	7	2	1	0	1	19	19	2	0	0	0	1.0000	0	0	0	0	0	0
2004	7	2	1	0	1	20	20	1	0	0	0	0	1.0000	0	0	0	0	0
2004	7	2	1	0	1	21	21	1	0	0	1.0000	0	0	0	0	0	0	0
2005	7	2	1	0	1	11	11	2	0	1.0000	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	12	12	18	0	0.3333	0.6111	0.0556	0	0	0	0	0	0
2005	7	2	1	0	1	13	13	51	0	0.2941	0.6863	0.0196	0	0	0	0	0	0
2005	7	2	1	0	1	14	14	29	0	0.0690	0.9310	0	0	0	0	0	0	0
2005	7	2	1	0	1	15	15	21	0	0.2857	0.6190	0.0952	0	0	0	0	0	0
2005	7	2	1	0	1	16	16	9	0	0.3333	0.4444	0.1111	0.1111	0	0	0	0	0
2005	7	2	1	0	1	17	17	20	0	0.7000	0.1500	0.1000	0.0500	0	0	0	0	0
2005	7	2	1	0	1	18	18	6	0	1.0000	0	0	0	0	0	0	0	0
2005	7	2	1	0	1	19	19	1	0	0	1.0000	0	0	0	0	0	0	0
2005	7	2	1	0	1	20	20	3	0	0	0	1.0000	0	0	0	0	0	0
2005	7	2	1	0	1	21	21	1	0	0	0	0	1.0000	0	0	0	0	0
2006	7	2	1	0	1	9	9	4	0	1.0000	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	10	10	2	0.5000	0.5000	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	11	11	6	0.5000	0.5000	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	12	12	26	0.0385	0.9615	0	0	0	0	0	0	0	0
2006	7	2	1	0	1	13	13	58	0.0345	0.9310	0.0345	0	0	0	0	0	0	0
2006	7	2	1	0	1	14	14	71	0.0423	0.8592	0.0986	0	0	0	0	0	0	0
2006	7	2	1	0	1	15	15	55	0.0364	0.7091	0.1818	0.0727	0	0	0	0	0	0
2006	7	2	1	0	1	16	16	46	0	0.5652	0.3261	0.1087	0	0	0	0	0	0
2006	7	2	1	0	1	17	17	28	0	0.4286	0.5000	0.0714	0	0	0	0	0	0
2006	7	2	1	0	1	18	18	12	0	0.3333	0.5000	0.1667	0	0	0	0	0	0
2006	7	2	1	0	1	19	19	15	0	0.1333	0.6667	0.2000	0	0	0	0	0	0
2006	7	2	1	0	1	20	20	12	0	0.1667	0.5000	0.2500	0.0833	0	0	0	0	0
2006	7	2	1	0	1	21	21	3	0	0.3333	0.3333	0.3333	0	0	0	0	0	0
2006	7	2	1	0	1	22	22	1	0	0	0	1.0000	0	0	0	0	0	0
2007	7	2	1	0	1	10	10	2	0	1.0000	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	11	11	8	0.5000	0.5000	0	0	0	0	0	0	0	0
2007	7	2	1	0	1	12	12	14	0.4286	0.4286	0.1429	0	0	0	0	0	0	0
2007	7	2	1	0	1	13	13	32	0.0625	0.6875	0.2500	0	0	0	0	0	0	0
2007	7	2	1	0	1	14	14	42	0.0238	0.7381	0.2381	0	0	0	0	0	0	0
2007	7	2	1	0	1	15	15	51	0	0.7451	0.2549	0	0	0	0	0	0	0
2007	7	2	1	0	1	16	16	27	0	0.7037	0.2963	0	0	0	0	0	0	0
2007	7	2	1	0	1	17	17	22	0	0.7727	0.2273	0	0	0	0	0	0	0
2007	7	2	1	0	1	18	18	7	0	0.8571	0.1429	0	0	0	0	0	0	0
2007	7	2	1	0	1	19	19	1	0	1.0000	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	10	10	1	0	1.0000	0	0	0	0	0	0	0	0
2008	7	2	1	0	1	11	11	5	0	0.4000	0.6000	0	0	0	0	0	0	0
2008	7	2	1	0	1	12	12	27	0	0.7407	0.1852	0.0741	0	0	0	0	0	0
2008	7	2	1	0	1	13	13	33	0	0.7576	0.2424	0	0	0	0	0	0	0
2008	7	2	1	0	1	14	14	42	0	0.7143	0.2619	0.0238	0	0	0	0	0	0
2008	7	2	1	0	1	15	15	37	0	0.6486	0.3514	0	0	0	0	0	0	0
2008	7	2	1	0	1	16	16	26	0	0.5769	0.3462	0.0769	0	0	0	0	0	0
2008	7	2	1	0	1	17	17	5	0	0.4000	0.4000	0.2000	0	0	0	0	0	0
2009	7	2	1	0	1	14	14	4	0	0.2500	0.7500	0	0	0	0	0	0	0
2009	7	2	1	0	1	15	15	5	0	0.2000	0.8000	0	0	0	0	0	0	0
2009	7	2	1	0	1	16	16	6	0	0.5000	0.5000	0	0	0	0	0	0	0
2009	7	2	1	0	1	17	17	5	0	0.4000	0.6000	0	0	0	0	0	0	0
2009	7	2	1	0	1	18	18	6	0	0.1667	0.5000	0.3333	0	0	0	0	0	0
2009	7	2	1	0	1	19	19	8	0	0	0.7500	0.2500	0	0	0	0	0	0
2009	7	2	1	0	1	20	20	5	0	0	1.0000	0	0	0	0	0	0	0
2009	7	2	1	0	1	21	21	2	0	0	0	1.0000	0	0	0	0	0	0
2009	7	2	1	0	1	22	22	2	0	0	0	0.5000	0.5000	0	0	0	0	0
2009	7	2	1	0	1	23	23	1	0	0	1.0000	0	0	0	0	0	0	0
2010	7	2	1	0	1	12	12	2	0	0.5000	0.5000	0	0	0	0	0	0	0
2010	7	2	1	0	1	13	13	8	0	1.0000	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	14	14	17	0	1.0000	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	15	15	2	0	1.0000	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	16	16	1	0	1.0000	0	0	0	0	0	0	0	0
2010	7	2	1	0	1	17	17	1	0	0	0	1.0000	0	0	0	0	0	0
2010	7	2	1	0	1	18	18	1	0	1.0000	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	10	10	1	0	1.0000	0	0	0	0	0	0	0	0

2011	7	2	1	0	1	12	12	1	0	1.0000	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	13	13	3	0	1.0000	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	14	14	2	0	1.0000	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	15	15	3	0	1.0000	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	16	16	7	0	0.7143	0.2857	0	0	0	0	0	0	0
2011	7	2	1	0	1	17	17	8	0	1.0000	0	0	0	0	0	0	0	0
2011	7	2	1	0	1	18	18	1	0	1.0000	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	11	11	1	0	1.0000	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	12	12	2	0	1.0000	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	13	13	8	0	1.0000	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	14	14	1	0	1.0000	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	15	15	5	0	1.0000	0	0	0	0	0	0	0	0
2012	7	2	1	0	1	18	18	1	0	1.0000	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	12	12	1	0	1.0000	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	13	13	4	0	1.0000	0	0	0	0	0	0	0	0
2013	7	2	1	0	1	14	14	12	0	0.7500	0.2500	0	0	0	0	0	0	0
2013	7	2	1	0	1	15	15	40	0	0.7000	0.2500	0.0500	0	0	0	0	0	0
2013	7	2	1	0	1	16	16	19	0	0.3684	0.5263	0.1053	0	0	0	0	0	0
2013	7	2	1	0	1	17	17	16	0	0.4375	0.5000	0	0.0625	0	0	0	0	0
2013	7	2	1	0	1	18	18	3	0	0.6667	0.3333	0	0	0	0	0	0	0
2013	7	2	1	0	1	19	19	5	0	0	1.0000	0	0	0	0	0	0	0
2013	7	2	1	0	1	20	20	2	0	0	0.5000	0	0.5000	0	0	0	0	0
2013	7	2	1	0	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2014	7	2	1	0	1	12	12	1	0	1.0000	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	13	13	14	0	0.9286	0	0.0714	0	0	0	0	0	0
2014	7	2	1	0	1	14	14	25	0	0.8800	0.1200	0	0	0	0	0	0	0
2014	7	2	1	0	1	15	15	21	0	0.8095	0.1429	0.0476	0	0	0	0	0	0
2014	7	2	1	0	1	16	16	25	0	0.6400	0.3200	0.0400	0	0	0	0	0	0
2014	7	2	1	0	1	17	17	14	0	0.5714	0.2857	0.1429	0	0	0	0	0	0
2014	7	2	1	0	1	18	18	15	0	0.6667	0.2000	0.1333	0	0	0	0	0	0
2014	7	2	1	0	1	19	19	11	0	0.9091	0.0909	0	0	0	0	0	0	0
2014	7	2	1	0	1	20	20	2	0	1.0000	0	0	0	0	0	0	0	0
2014	7	2	1	0	1	22	22	1	0	0	0	1.0000	0	0	0	0	0	0
2015	7	2	1	0	1	12	12	9	0	1.0000	0	0	0	0	0	0	0	0
2015	7	2	1	0	1	13	13	61	0	0.9836	0.0164	0	0	0	0	0	0	0
2015	7	2	1	0	1	14	14	134	0	0.9851	0.0149	0	0	0	0	0	0	0
2015	7	2	1	0	1	15	15	88	0	0.8409	0.1477	0.0114	0	0	0	0	0	0
2015	7	2	1	0	1	16	16	65	0	0.8154	0.1846	0	0	0	0	0	0	0
2015	7	2	1	0	1	17	17	39	0	0.7692	0.2051	0.0256	0	0	0	0	0	0
2015	7	2	1	0	1	18	18	25	0	0.6800	0.3200	0	0	0	0	0	0	0
2015	7	2	1	0	1	19	19	7	0	0.2857	0.7143	0	0	0	0	0	0	0
2015	7	2	1	0	1	20	20	3	0	0	1.0000	0	0	0	0	0	0	0
2015	7	2	1	0	1	21	21	1	0	0	1.0000	0	0	0	0	0	0	0
2015	7	2	1	0	1	22	22	1	0	0	0	0	1.0000	0	0	0	0	0
2015	7	2	1	0	1	23	23	1	0	0	0	1.0000	0	0	0	0	0	0
2016	7	2	1	0	1	11	11	1	0	1.0000	0	0	0	0	0	0	0	0
2016	7	2	1	0	1	12	12	6	0	0.5000	0.5000	0	0	0	0	0	0	0
2016	7	2	1	0	1	13	13	38	0.0263	0.5526	0.3947	0.0263	0	0	0	0	0	0
2016	7	2	1	0	1	14	14	59	0.0169	0.4068	0.5763	0	0	0	0	0	0	0
2016	7	2	1	0	1	15	15	43	0	0.3488	0.6279	0.0233	0	0	0	0	0	0
2016	7	2	1	0	1	16	16	30	0	0.2667	0.7333	0	0	0	0	0	0	0
2016	7	2	1	0	1	17	17	25	0	0.2400	0.6800	0.0800	0	0	0	0	0	0
2016	7	2	1	0	1	18	18	21	0	0.2381	0.6190	0.1429	0	0	0	0	0	0
2016	7	2	1	0	1	19	19	6	0	0.1667	0.6667	0.1667	0	0	0	0	0	0
2016	7	2	1	0	1	20	20	8	0	0.2500	0.5000	0.1250	0.1250	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
2016	7	2	1	0	1	23	23	2	0	0	0	1.0000	0	0	0	0	0	0
2016	7	2	1	0	1	24	24	1	0	0	0	1.0000	0	0	0	0	0	0
2017	7	2	1	0	1	10	10	1	0	0	0	1.0000	0	0	0	0	0	0
2017	7	2	1	0	1	12	12	1	0	1.0000	0	0	0	0	0	0	0	0
2017	7	2	1	0	1	13	13	8	0	0.7500	0.2500	0	0	0	0	0	0	0
2017	7	2	1	0	1	14	14	11	0	0.6364	0.3636	0	0	0	0	0	0	0
2017	7	2	1	0	1	15	15	13	0	0.5385	0.3846	0.0769	0	0	0	0	0	0
2017	7	2	1	0	1	16	16	12	0	0.4167	0.4167	0.0833	0.0833	0	0	0	0	0
2017	7	2	1	0	1	17	17	6	0	0.6667	0.3333	0	0	0	0	0	0	0
2017	7	2	1	0	1	18	18	5	0	0.8000	0	0.2000	0	0	0	0	0	0
2017	7	2	1	0	1	19	19	4	0	0.2500	0.5000	0.2500	0	0	0	0	0	0
2017	7	2	1	0	1	20	20	2	0	1.0000	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	13	13	1	0	0	1.0000	0	0	0	0	0	0	0
2018	7	2	1	0	1	14	14	1	0	1.0000	0	0	0	0	0	0	0	0
2018	7	2	1	0	1	15	15	1	0	0	1.0000	0	0	0	0	0	0	0
2018	7	2	1	0	1	16	16	1	0	0	0	1.0000	0	0	0	0	0	0
2019	7	2	1	0	1	11	11	7	0	1.0000	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	12	12	22	0	1.0000	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	13	13	52	0	1.0000	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	14	14	60	0.0167	0.9667	0.0167	0	0	0	0	0	0	0
2019	7	2	1	0	1	15	15	83	0	0.9880	0.0120	0	0	0	0	0	0	0
2019	7	2	1	0	1	16	16	66	0	1.0000	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	17	17	52	0	0.9423	0.0385	0.0192	0	0	0	0	0	0
2019	7	2	1	0	1	18	18	21	0	0.9524	0	0.0476	0	0	0	0	0	0
2019	7	2	1	0	1	19	19	14	0	1.0000	0	0	0	0	0	0	0	0
2019	7	2	1	0	1	20	20	3	0	0.3333	0.6667	0	0	0	0	0	0	0
2019	7	2	1	0	1	21	21	1	0	0	0	0	1.0000	0	0	0	0	0
2019	7	2	1	0	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2020	7	2	1	0	1	13	13	14	0.0714	0.6429	0.2857	0	0	0	0	0	0	0
2020	7	2	1	0	1	14	14	23	0	0.6087	0.3913	0	0	0	0	0	0	0
2020	7	2	1	0	1	15	15	29	0.0345	0.4828	0.4828	0	0	0	0	0	0	0
2020	7	2	1	0	1	16	16	8	0	0.6250	0.3750	0	0	0	0	0	0	0

2020	7	2	1	0	1	17	17	13	0	0.5385	0.4615	0	0	0	0	0	0	0
2020	7	2	1	0	1	18	18	8	0	0.2500	0.7500	0	0	0	0	0	0	0
2020	7	2	1	0	1	19	19	10	0	0.7000	0.2000	0.1000	0	0	0	0	0	0
2020	7	2	1	0	1	20	20	5	0	0.8000	0.2000	0	0	0	0	0	0	0
2020	7	2	1	0	1	21	21	4	0	0.2500	0.5000	0	0.2500	0	0	0	0	0
2020	7	2	1	0	1	22	22	1	0	0	1.0000	0	0	0	0	0	0	0
2021	7	2	1	0	1	12	12	2	0	1.0000	0	0	0	0	0	0	0	0
2021	7	2	1	0	1	13	13	9	0	0.6667	0.2222	0.1111	0	0	0	0	0	0
2021	7	2	1	0	1	14	14	6	0	0.8333	0.1667	0	0	0	0	0	0	0
2021	7	2	1	0	1	15	15	10	0	0.3000	0.6000	0.1000	0	0	0	0	0	0
2021	7	2	1	0	1	16	16	7	0	0.5714	0.4286	0	0	0	0	0	0	0
2021	7	2	1	0	1	17	17	1	0	0	1.0000	0	0	0	0	0	0	0
2021	7	2	1	0	1	19	19	1	0	0	1.0000	0	0	0	0	0	0	0
2021	7	2	1	0	1	20	20	2	0	0.5000	0.5000	0	0	0	0	0	0	0
2021	7	2	1	0	1	21	21	1	0	0	0	1.0000	0	0	0	0	0	0
2022	7	2	1	0	1	13	13	1	0	1.0000	0	0	0	0	0	0	0	0
2022	7	2	1	0	1	14	14	1	0	1.0000	0	0	0	0	0	0	0	0
2022	7	2	1	0	1	18	18	1	0	0	1.0000	0	0	0	0	0	0	0
2022	7	2	1	0	1	19	19	1	0	0	1.0000	0	0	0	0	0	0	0
2002	7	2	2	0	1	10	10	12	0	0	0	0	0	0	1.0000	0	0	0
2002	7	2	2	0	1	11	11	14	0	0	0	0	0	0.0714	0.9286	0	0	0
2002	7	2	2	0	1	12	12	5	0	0	0	0	0	0	0.6000	0.4000	0	0
2002	7	2	2	0	1	13	13	3	0	0	0	0	0	0	0.6667	0.3333	0	0
2002	7	2	2	0	1	14	14	5	0	0	0	0	0	0	0.4000	0.6000	0	0
2002	7	2	2	0	1	15	15	1	0	0	0	0	0	0	1.0000	0	0	0
2002	7	2	2	0	1	17	17	1	0	0	0	0	0	0	0	1.0000	0	0
2003	7	2	2	0	1	8	8	1	0	0	0	0	0	1.0000	0	0	0	0
2003	7	2	2	0	1	9	9	6	0	0	0	0	0	1.0000	0	0	0	0
2003	7	2	2	0	1	10	10	9	0	0	0	0	0	0.3333	0.5556	0.1111	0	0
2003	7	2	2	0	1	11	11	19	0	0	0	0	0	0.0526	0.8947	0.0526	0	0
2003	7	2	2	0	1	12	12	11	0	0	0	0	0	0	0.9091	0.0909	0	0
2003	7	2	2	0	1	13	13	5	0	0	0	0	0	0	0.6000	0.4000	0	0
2003	7	2	2	0	1	14	14	5	0	0	0	0	0	0	0.6000	0.4000	0	0
2003	7	2	2	0	1	15	15	5	0	0	0	0	0	0	0.6000	0.4000	0	0
2003	7	2	2	0	1	16	16	1	0	0	0	0	0	0	0	1.0000	0	0
2003	7	2	2	0	1	17	17	3	0	0	0	0	0	0	0.3333	0	0	0.6667
2003	7	2	2	0	1	18	18	3	0	0	0	0	0	0	0.3333	0	0.3333	0.3333
2004	7	2	2	0	1	7	7	1	0	0	0	0	0	1.0000	0	0	0	0
2004	7	2	2	0	1	8	8	6	0	0	0	0	0	0.8333	0.1667	0	0	0
2004	7	2	2	0	1	9	9	38	0	0	0	0	0	0.4737	0.5263	0	0	0
2004	7	2	2	0	1	10	10	37	0	0	0	0	0	0.2432	0.7568	0	0	0
2004	7	2	2	0	1	11	11	20	0	0	0	0	0	0.0500	0.9500	0	0	0
2004	7	2	2	0	1	12	12	3	0	0	0	0	0	0	0.3333	0.3333	0	0.3333
2004	7	2	2	0	1	13	13	4	0	0	0	0	0	0	0	1.0000	0	0
2004	7	2	2	0	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2004	7	2	2	0	1	15	15	1	0	0	0	0	0	0	0	1.0000	0	0
2005	7	2	2	0	1	7	7	1	0	0	0	0	0	1.0000	0	0	0	0
2005	7	2	2	0	1	9	9	2	0	0	0	0	0	1.0000	0	0	0	0
2005	7	2	2	0	1	10	10	5	0	0	0	0	0	1.0000	0	0	0	0
2005	7	2	2	0	1	11	11	2	0	0	0	0	0	0	1.0000	0	0	0
2005	7	2	2	0	1	12	12	3	0	0	0	0	0	0.3333	0.6667	0	0	0
2005	7	2	2	0	1	13	13	3	0	0	0	0	0	0	0	0.6667	0	0.3333
2006	7	2	2	0	1	8	8	1	0	0	0	0	0	0	1.0000	0	0	0
2006	7	2	2	0	1	9	9	10	0	0	0	0	0	0.5000	0.5000	0	0	0
2006	7	2	2	0	1	10	10	21	0	0	0	0	0	0.8571	0.1429	0	0	0
2006	7	2	2	0	1	11	11	19	0	0	0	0	0	0.2105	0.7895	0	0	0
2006	7	2	2	0	1	12	12	6	0	0	0	0	0	0.1667	0.8333	0	0	0
2006	7	2	2	0	1	13	13	2	0	0	0	0	0	0	1.0000	0	0	0
2006	7	2	2	0	1	14	14	2	0	0	0	0	0	0	1.0000	0	0	0
2007	7	2	2	0	1	9	9	16	0	0	0	0	0	0.8750	0.1250	0	0	0
2007	7	2	2	0	1	10	10	22	0	0	0	0	0	0.8636	0.1364	0	0	0
2007	7	2	2	0	1	11	11	3	0	0	0	0	0	1.0000	0	0	0	0
2007	7	2	2	0	1	12	12	2	0	0	0	0	0	0.5000	0.5000	0	0	0
2007	7	2	2	0	1	13	13	1	0	0	0	0	0	0	1.0000	0	0	0
2008	7	2	2	0	1	12	12	4	0	0	0	0	0	0	0	0.7500	0.2500	0
2008	7	2	2	0	1	13	13	3	0	0	0	0	0	0	0	0.3333	0.6667	0
2009	7	2	2	0	1	13	13	1	0	0	0	0	0	0	0	1.0000	0	0
2010	7	2	2	0	1	10	10	14	0	0	0	0	0	0.5000	0.5000	0	0	0
2010	7	2	2	0	1	11	11	48	0	0	0	0	0	0.2083	0.7708	0.0208	0	0
2010	7	2	2	0	1	12	12	21	0	0	0	0	0	0.0952	0.8095	0.0476	0	0.0476
2011	7	2	2	0	1	9	9	1	0	0	0	0	0	0	1.0000	0	0	0
2011	7	2	2	0	1	10	10	2	0	0	0	0	0	0.5000	0.5000	0	0	0
2011	7	2	2	0	1	11	11	7	0	0	0	0	0	0.1429	0.7143	0.1429	0	0
2011	7	2	2	0	1	12	12	18	0	0	0	0	0	0	0.8333	0.1667	0	0
2011	7	2	2	0	1	13	13	4	0	0	0	0	0	0	1.0000	0	0	0
2012	7	2	2	0	1	9	9	1	0	0	0	0	0	1.0000	0	0	0	0
2012	7	2	2	0	1	10	10	2	0	0	0	0	0	0.5000	0.5000	0	0	0
2012	7	2	2	0	1	12	12	2	0	0	0	0	0	0	1.0000	0	0	0
2013	7	2	2	0	1	9	9	1	0	0	0	0	0	1.0000	0	0	0	0
2013	7	2	2	0	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2014	7	2	2	0	1	12	12	1	0	0	0	0	0	1.0000	0	0	0	0
2014	7	2	2	0	1	13	13	1	0	0	0	0	0	0	1.0000	0	0	0
2014	7	2	2	0	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0
2014	7	2	2	0	1	15	15	1	0	0	0	0	0	0	0	1.0000	0	0
2015	7	2	2	0	1	11	11	1	0	0	0	0	0	0	1.0000	0	0	0
2015	7	2	2	0	1	12	12	1	0	0	0	0	0	0	1.0000	0	0	0
2015	7	2	2	0	1	13	13	10	0	0	0	0	0	0	1.0000	0	0	0
2015	7	2	2	0	1	14	14	1	0	0	0	0	0	0	1.0000	0	0	0

```
2015    7    2    2    0    1   17   17    1    0    0    0    0    0    0    0 1.0000    0    0
2016    7    2    2    0    1   12   12    3    0    0    0    0    0    0    0 1.0000    0    0
2016    7    2    2    0    1   13   13    3    0    0    0    0    0    0 0.3333 0.6667    0    0
2016    7    2    2    0    1   14   14    1    0    0    0    0    0    0    0 1.0000    0    0
2017    7    2    2    0    1   12   12    2    0    0    0    0    0    0 1.0000    0    0    0
2017    7    2    2    0    1   13   13    4    0    0    0    0    0    0 0.7500 0.2500    0    0
2017    7    2    2    0    1   14   14    1    0    0    0    0    0    0 1.0000    0    0    0
2017    7    2    2    0    1   15   15    1    0    0    0    0    0    0    0 1.0000    0    0
2018    7    2    2    0    1   15   15    1    0    0    0    0    0    0 1.0000    0    0    0
2019    7    2    2    0    1    8    8    1    0    0    0    0    0    0 1.0000    0    0    0
2019    7    2    2    0    1   10   10    1    0    0    0    0    0    0 1.0000    0    0    0
2019    7    2    2    0    1   11   11    5    0    0    0    0    0    0 1.0000    0    0    0
2019    7    2    2    0    1   12   12   10    0    0    0    0    0    0 1.0000    0    0    0
2019    7    2    2    0    1   13   13    6    0    0    0    0    0    0 1.0000    0    0    0
2019    7    2    2    0    1   14   14    1    0    0    0    0    0    0 1.0000    0    0    0
-9999  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
 1986 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 4  #Lorenzen Age Range
 #_Age_natmort_by sex x growthpattern (nest GP in sex)
1.2205    0.8066    0.6704    0.6087    0.5636
1.9843    1.3201    1.1816    1.1392    1.1248

#
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)
-999 #_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
#
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)
#
1 #_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
1 #_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
#
# Sex: 1  BioPattern: 1  Growth
6         15        9.53      4.7       0         0         -4        0         0         0         0         0         0
          0         #         L_at_Amin_Fem_1
15        25        20.94     20.94     2.1       0         -4        0         0         0         0         0         0
          0         #         L_at_Amax_Fem_1
0.3       2         0.51      0.51      0.1       0         -4        0         0         0         0         0         0
          0         #         VonBert_K_Fem_1
0.1       0.5       0.36      0.05      0.8       0         4         0         0         0         0         0         0
          0         #         CV_young_Fem_1
0.05      0.4       0.16      0.05      0.8       0         4         0         0         0         0         0         0
          0         #         CV_old_Fem_1

# Sex: 1  BioPattern: 1  WtLen
 0 1 0.000128 0.000128 0.05 0 -1 0 0 0 0 0 0 0 # Wtlen_1_Fem_GP_1
 2 4 3.4427 3.4427 0.05 0 -1 0 0 0 0 0 0 0 # Wtlen_2_Fem_GP_1
# Sex: 1  BioPattern: 1  Maturity&Fecundity
 -10 15 11.409732 11 0.05 0 -1 0 0 0 0 0 0 0 # Mat50%_Fem_GP_1
 -5 1 -2.065542 -2 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
#
# Sex: 2  BioPattern: 1  Growth
0         15        7.04      4.7       0         0         -4        0         0         0         0         0         0
          0         #         L_at_Amin_Mal_1
12        30        13.09     15.24     1.5       0         -4        0         0         0         0         0         0
          0         #         L_at_Amax_Mal_1
0.3       2         1.03      1.03      0.21      0         -4        0         0         0         0         0         0
          0         #         VonBert_K_Mal_1
0.1       0.6       0.21      0.3       0.03      0         4         0         0         0         0         0         0
          0         #         SD_young_Mal_1
0         1         0.25      0.3       0.03      0         4         0         0         0         0         0         0
          0         #         SD_old_Mal_1
# Sex: 2  BioPattern: 1  WtLen
 0 1 0.000231 0.000231 0.05 0 -1 0 0 0 0 0 0 0 # Wtlen_1_Mal_GP_1
 2 4 3.2200 3.2200 0.5 0 -1 0 0 0 0 0 0 0 # Wtlen_2_Mal_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        8        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
8              8.6           8.34       10           10    0                    1          0          0          0          0
0          0          0 # SR_LN(R0)
0.4          1              0.99      0.675         0.5   0                    -7         0          0          0          0
0          0          0 # SR_BH_steep
0.2          1              0.58                0.63          0.5   0                    7          0          0          0
0          0          0          0 # SR_sigmaR
-5           5           0               0             1    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
1977 # first year of main recr_devs; early devs can preceed this era
2023 # 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
1935.5 #_Cond 982 #_last_yr_nobias_adj_in_MPD; begin of ramp
1992.4 #_Cond 1976 #_first_yr_fullbias_adj_in_MPD; begin of plateau
2020.1 #_Cond 2019 #_last_yr_fullbias_adj_in_MPD
2045.0 #_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)
0.9599 #_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)
5 # 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         0.5       0.21      0.1       0.05      0         1 # InitF_seas_1_flt_1FISHERY1
0         0.7       0.40      0.1       0.05      0         1 # InitF_seas_1_flt_2FISHERY2
#
#_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
4         1         0         0         0        0  #  SURVEY2
-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            -2           -11           0             1             0         -1          0          0          0          0
0          1          2  #  LnQ_base_SURVEY1(3)
-8.6           -8           -8.23          0             1             0         2          0          0          0          0
0          0          0  #  LnQ_base_SURVEY2(4)

# timevary Q parameters
#LO            HI          INIT         PRIOR         PR_SD       PR_type     PHASE  #  parm_name
-7                  -2        -5.64          0             1             0      2  # LnQ_base_SURVEY1(3)_BLK1repl_1986
-8                  -4        -7.5           0             1             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        2         1         0         #         1         FISHERY1
24        0         1         0         #         2         FISHERY2
24        0         1         0         #         3         SURVEY1
0         0         0         0         #         4         SURVEY2


#
#_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
0         0         0         0         #         4         SURVEY2


#
#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
11        14        13        13.03     0.05      1         3         0         0         0         0         0         0
          0         #         SizeSel_Base_P1_FISHERY1      1
-20       10        10        10        0.05      1         -3        0         0         0         0         0         0
          0         #         SizeSel_Base_P2_FISHERY1      2
-2        2         1.1       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
-7        -3        -6.4      -6.4      0.05      1         3         0         0         0         0         0         0
          0         #         SizeSel_Base_P5_FISHERY1      5
-5        5         5         5         0.05      1         -3        0         0         0         0         0         0
          0         #         SizeSel_Base_P6_FISHERY1      6

0         30        4         4         0         0         -1        0         0         0         0         0         0
          0         #         P1_Ascending Inflection
```

```
-100    100     0.01    0.01    0       0       -1      0       0       0       0       0       0
        0       #       P2_ascending slope
-5      5       1.4     1.4     0       0       3       0       0       0       0       0       0
        0       #       P3_height of asymtote (value of 999 assumes retention=1)
-20     1       0       0       0       0       -1      0       0       0       0       0       0
        0       #       P4_male offset to ascending inflection
-20     20      -10     0       0       0       -1      0       0       0       0       0       0
        0       #       P1_DiscardMort_Descending Inflection
1       1       1       0       0       0       -1      0       0       0       0       0       0
        0       #       P2_descending slope
0.1     0.1     0.1     0       0       0       -1      0       0       0       0       0       0
        0       #       P3_Max Discard Mort
0       0       0       0       0       0       -1      0       0       0       0       0       0
        0       #       P4_male offset

8       16      11      11      0.05    1       -3      0       0       0       0       0       0
        0       #       SizeSel_Male_P1_FISHERY1      15
-5      5       0       0       0.05    1       -3      0       0       0       0       0       0
        0       #       SizeSel_Male_P2_FISHERY1
-1      1       -0.38   -0.38   0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_Male_P3_FISHERY1
-10     -2      -6.3    -6.3    0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_Male_P4_FISHERY1

# 2   FISHERY2 LenSelex
8       28      16      16      0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_P1_FISHERY2 19
-20     20      -4      -4      0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_P2_FISHERY2
-20     20      4       4       0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_P3_FISHERY2
-20     20      4       4       0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_P4_FISHERY2
-20     20      -4      -4      0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_P5_FISHERY2
-20     20      -4      -4      0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_P6_FISHERY2

8       16      12      12      0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_Male_P1_FISHERY2      25
-20     20      0       0       0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_Male_P2_FISHERY2
-20     20      0       0       0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_Male_P3_FISHERY2
-30     20      0       0       0.05    1       -3      0       0       0       0       0       2
        2       #       SizeSel_Male_P4_FISHERY2

# 3   SURVEY1(Trammel) LenSelex
5       15      8.8     8.8     0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_P1_SURVEY1  29
-10     5       0.65    0.65    0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_P2_SURVEY1  30
-20     15      -2      -2      0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_P3_SURVEY1
-5      5       4.9     4.9     0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_P4_SURVEY1
-4      0       -3.1    -3.1    0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_P5_SURVEY1
-5      3       2.9     2.9     0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_P6_SURVEY1

0       16      9       9       0.05    1       -3      0       0       0       0       0       0
        0       #       SizeSel_Male_P1_SURVEY1       35
-5      5       0       0       0.05    1       -3      0       0       0       0       0       0
        0       #       SizeSel_Male_P2_SURVEY1
-2      1       0.19    0.19    0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_Male_P3_SURVEY1
-3      0       -1      -1      0.05    1       3       0       0       0       0       0       0
        0       #       SizeSel_Male_P4_SURVEY1


#_No_Dirichlet parameters
-5      -1      -1.1    0       0       0       3       0       0               0       0
        0       0       0       #       Fleet1_LengthComps
-5      -1.5    -2.5    0       0       0       3       0       0               0       0
        0       0       0       #       Fleet2_LengthComps
-1.4    -0.5    -1      0       0       0       3       0       0               0       0
        0       0       0       #       Survey1_LengthComps
-5      0.2     0.16    0       0       0       3       0       0               0       0
        0       0       0       #       Fleet1_AgeComps
-2      5       -1.9    0       0       0       3       0       0               0       0
        0       0       0       #       Fleet2_ageComps
# timevary selex parameters
#LO     HI      INIT    PRIOR   PR_SD   PR_type PHASE  #  parm_name
14      18      16.8            16.8    0.05    1       3       #       SizeSel_P1_FISHERY2
12      17      16.5            16.5    0.05    1       3       #       SizeSel_P1_FISHERY2 45
-5      10      10              10      0.05    1       -3      #       SizeSel_P2_FISHERY2
-30     10      10              10      0.05    1       -3      #       SizeSel_P2_FISHERY2
```

```
1        3        2                 2        0.05     1        3        #        SizeSel_P3_FISHERY2
0        3        2.6               2.6      0.05     1        3        #        SizeSel_P3_FISHERY2
-10      0        0                 0        0.05     1        -3       #        SizeSel_P4_FISHERY2 50
0        3        0                 0        0.05     1        -3       #        SizeSel_P4_FISHERY2
-15      -5       -6.8              -6.8     0.05     1        3        #        SizeSel_P5_FISHERY2
-8       -3       -6.3              -6.3     0.05     1        3        #        SizeSel_P5_FISHERY2
-5       5        5                 5        0.05     1        -3       #        SizeSel_P6_FISHERY2
-5       5        5                 5        0.05     1        -3       #        SizeSel_P6_FISHERY2 55

8        24       10       12       0.05     1        -3       #        SizeSel_Male_P1_FISHERY2
8        16       10       12       0.05     1        -3       #        SizeSel_Male_P1_FISHERY2
-5       5        0        0        0.05     1        -3       #        SizeSel_Male_P2_FISHERY2
-5       5        0        0        0.05     1        -3       #        SizeSel_Male_P2_FISHERY2
-1       2.5      1        1        0.05     1        3        #        SizeSel_Male_P3_FISHERY2      60
0        1.5      0.9      0.9      0.05     1        3        #        SizeSel_Male_P3_FISHERY2
-15      0        -9.7     -9.7     0.05     1        3        #        SizeSel_Male_P4_FISHERY2
-15      0        -7.4     -7.4     0.05     1        3        #        SizeSel_Male_P4_FISHERY2

# 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
#
# 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
-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
```