STOCK ASSESSMENT OF HOGFISH IN THE WEST FLORIDA SHELF STOCK 1986-2016

-- SEDAR 37 Update Assessment –

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1. INTRODUCTION

This document summarizes the update of the SEDAR 37 benchmark assessment of the Western Florida (WFL) Hogfish stock using updated data inputs through 2016. Except as otherwise noted, the specifications of the model and data streams are identical to those of the base model identified in the SEDAR 37 final report.

1.1 Terms of Reference

The terms of reference approved by the Gulf of Mexico Fishery Management Council are listed below.

1. Update the approved SEDAR 37 Gulf of Mexico hogfish base model with data through 2016.
2. Document any changes or corrections made to model and input datasets and provide updated input data tables. Provide commercial and recreational landings and discards in pounds and numbers.
3. Update model parameter estimates and their variances, model uncertainties, estimates of stock status and management benchmarks, and provide the probability of overfishing occurring at specified future harvest and exploitation levels.
4. Develop a stock assessment update report to address these TORS and fully document the input data and results of the stock assessment update.

NOTE: The intent of update assessments is to expedite appraisals of stock status by using only the methods and data sets used in the base model and approved during the preceding SEDAR assessment of that stock. Accordingly, it is not the intent of this update to resolve any outstanding issues identified in the SEDAR 37 benchmark assessment.

2. DATA REVIEW AND UPDATE

2.1 Stock Structure and Management Unit

Consistent with the findings of Seyoum et al. (2014) and SEDAR 37, this update assessment assumes the Western Florida (WFL) Hogfish stock extends from the panhandle of Florida south to Cape Sable, FL. Currently, the Gulf of Mexico Fishery Management Council manages the WFL stock as well as a portion of the Florida Keys/East Florida stock. The stock boundaries are illustrated in Figure 2.1.1.

2.2 Life History Parameters

The life history parameters used in the assessment were identical to those adopted during SEDAR 37. They are summarized in the subsections below (for more details see the SEDAR 37 Final report).

2.2.1 Mortality

2.2.1.1 Natural Mortality

Consistent with SEDAR 37, the natural mortality rate (M) was assumed time invariant but decreasing with age based on Lorenzen (2005) with a cumulative target of $M=0.179^{-1}$ across ages was used to scale the age-specific estimates (Table 2.2.1.1). The M vector was computed assuming a maximum age of 25 years (McBride and Murphy 2003), supported by maximum age collected in the life history studies (23 years), and using the von Bertalanffy growth parameters from the life history studies outlined in the benchmark assessment report (SEDAR 37, Ch. 5.5.4).

2.2.1.2 Release Mortality

Consistent with SEDAR 37 and for the purposes of this update assessment, a discard mortality rate of 10% was assumed for hook and line and 100% for spear.

2.2.2 Age and Growth

In SEDAR 37, a von Bertalanffy growth model was fit to a subset of the available age and length data using fork-length observations and the expected ages (n=1,063) from the life-history studies of the WFL stock (Figure 2.2.2.1). The growth parameters estimated from SEDAR 37 were:

L_{inf} (max FL cm) = 84.89885132
K = 0.1057678
t_0 = -1.3290378

2.2.3 Reproduction

Consistent with SEDAR 37, female maturity was modeled using the Stock Synthesis parameterization:

$$Maturity = \frac{1}{1 + e^{-0.09815*(FL(mm)-154.69570)}}$$

For the male transition, the 3-parameter hermaphroditic transition approach was used in Stock Synthesis, which resulted in the parameter estimates μ=7.497628 and σ=2.153877.

Batch fecundity and potential annual fecundity (PAF) were parameterized to match Stock Synthesis input options. For the batch fecundity relationship, the following model was estimated:

$$Batch\ Fecundity = 839.001 * Weight(g)^{0.478}$$

For the potential annual fecundity (PAF) approach, Stock Synthesis provides the option to input fecundity as an age-specific vector. Therefore, both batch fecundity and spawning frequency were modeled as a function of age. The batch fecundity relationship as a function of age was estimated as:

$$Batch\ Fecundity = 7773.0278 * Age(g)^{0.7843}$$

2.2.4 Conversion factors

The update model used conversion factors approved for SEDAR 37 (Figures 2.2.4.1 and 2.2.4.2) and are summarized below:

FL(cm) = 9.721758 + 1.180927*SL(cm)
FL(cm) = 12.4636084 + 0.8618861*TL(cm)
WW(g) = $0.000095*FL^{2.74522}$

2.3 Commercial Fishery

The primary commercial gears types used for Hogfish include spear, vertical long line/hook and line, and traps. The data collected from these fisheries include landings, discards, catch per unit effort (CPUE), and size and age compositions. These data were updated for the WFL stock through 2016.

2.3.1 Commercial Landings

Commercial landings were updated using the ALS-SEFSC dataset through 2016 (Table 2.3.1.1). Consistent with SEDAR 37, three main gear types emerged in the data: spear/diving fishery, vertical long line/hook and line, and traps. All other gear types were aggregated into an “other” category, which was primarily composed of unknown gear types (Table 2.3.1.2). However, this “other” category was not included in the assessment model. Total landings from 1977 to 2016 were apportioned according to the yearly proportions of the three major gear types (spear, hook and line, and traps) when yearly landings by gear were available. A five-year average gear proportion from 1977-1981 was used to estimate landings by gear for years 1950 to 1976 when information on gear type was lacking. The total landings are presented in Table 2.3.1.3 and in Figures 2.3.1.1 and 2.3.1.2.

2.3.2 Commercial Discards and Release Mortality

Fisher reported data to the discard logbook program were provided by K. McCarthy at the NMFS-SEFSC. These discard data were aggregated by year and gear type. Fisher reported proportions of "alive" and "dead" were applied to these discards to determine the ratio of alive to dead discards for each year/gear stratum. Reports of Hogfish discards were infrequent and because of those low sample sizes the proportions of dead and alive were the mean rate over the years 2002-2016 for each gear. Discard rate data were available for the years 2002-2016.

Divers reported 26% of discarded WFL Hogfish as all the fish were dead or the majority of the fish were dead. An additional 74% were reported as kept by divers. Table 2.3.2.1 presents the total discards estimated for each year for diver reported WFL Hogfish.

Discards in numbers were converted to discards in weight by applying the average weight from the fishery-dependent commercial sampling (primarily trip interview program, TIP; Table 2.3.2.2). A discard mortality rate was applied to the alive discards to determine the amount of alive discards that subsequently suffered mortality. These were added to the pre-determined dead discards to calculate an overall dead discard amount. The proportion of total dead discards to total landings were then calculated and this proportion was applied to the historical years before logbooks (1950-1992) in order to estimate total dead discards for the entire time period (Table 2.3.2.3).

2.3.3 Commercial Effort

Commercial effort was calculated using multiple methods including (1) logbook records in diver hours from the index standardization procedure (see Ch. 2.5.1.1); (2) the Florida trip ticket database in number of days fishing, as number of days per trip was generally found to be a significant factor in the CPUE standardization (see Ch. 2.5.1.2); and (3) the Florida trip ticket database in total number of saltwater product licenses (SPL) to gauge fisherman participation.

Effort from the commercial logbooks for the spear fishery has seen a steady increase since 1993 (Table 2.3.3.1 and Figure 2.3.3.1). Total number of days fished in the Florida trip ticket database for the spear fishery was relatively high in 1996-1997 and again in 2009-2010 as well as in 2014 (Table 2.3.3.2 and Figure 2.3.3.2). Reported effort for the hook and line fishery was high in 2001 but has since steadily declined aside from abnormally high effort in 2009. These generally declining trends of the effort time series are also supported by the total number of commercial licenses (SPLs) in Florida where both diving and hook and line fisheries peaked in the mid-1990s and declined through 2007. Since 2008, however, commercial diving SPLs have increased steadily (Table 2.3.3.3 and Figure 2.3.3.3).

2.3.4 Commercial Biological Sampling

Biological sampling of Hogfish from commercial trips is generally poor for age samples and poor to moderate for length samples (Tables 2.3.4.1-2.3.4.4). On average, a total of 63 fish lengths were sampled each year. Aging of commercially-sampled Hogfish has been mostly missing until recent years, with a combined total of 30 fish aged across all years.

2.4 Recreational Fishery

2.4.1 Recreational Landings

Updated recreational landings for the WFL stock were produced using the methods of SEDAR 37. Both the Marine Recreational Fishery Statistics Survey (MRFSS) and the MRFSS Marine Recreational Information Program (MRIP) data along with estimates of total recreational landings from headboats obtained from the NMFS Southeast Region Headboat Survey (SRHS), were used to derive a time series of recreational landings of Hogfish (Table 2.4.1.4 and Figure 2.4.1.1). Early MRFSS (1981-2011) data were calibrated to the MRIP (2004-2016) data following the procedures of Salt et al. (2012). Due to the unique stock structure of Hogfish, the MRFSS post-stratification routine was used to estimate landings by post-stratifying the MRFSS dataset using the Collier-Monroe county border as the WFL boundary, respectively. For-hire adjustments were applied to the MRFSS data using the coast specific (Gulf and Atlantic) calibration factors from SEDAR 28 (Matter 2012). Data were analyzed by year and gear type for both kept (Types A+B1) and released (Type B2) fish.

Recreational landings in numbers were converted to weight by applying the length-weight conversion to the average lengths from the MRFSS/MRIP intercepts. Due to relatively low numbers of intercepts on a yearly basis (Table 2.4.1.1-2.4.1.2), particularly when parsing by stock and gear type, year-specific average lengths were used across gear types.

Tables 2.4.1.8- 2.4.1.9 present the estimated recreational harvest for the different gears. Reported total recreational harvest of Hogfish has increased since the initiation of the MRFSS surveys in 1981, both for hook and line and spear fishing. Notably, the total number harvested by spear fishing is estimated to be nearly five times greater than the hook and line fishery.

2.4.2 Recreational Discards and Release Mortality

Recreational discards (released fish, type B2 records) were updated and estimated using the same procedures outlined above for the harvested fish (type A and B1). Table 2.4.2.1 presents the recreational discards for the hook-and-line gear, including the separate estimates from MRFSS and MRIP and the calibrated time series with the two combined. Generally, the discards were highly variable and many years did not have any estimated discarded fish. To note, there were no discards reported for the spear fishery over the entire model timespan.

2.4.3 SRHS Effort

Total recreational effort from the SRHS was determined by summing angler days. Estimates of directed effort were not available from the SRHS data. Despite the steep increase in headboat landings total headboat effort has not increased (Figure 2.4.3.1 and Table 2.4.3.1). Notably, since the effort trend is in total effort days this index does not provide insight to the amount of directed effort targeted at Hogfish.

2.4.4 Recreational Biological Sampling

Sampling of recreationally landed Hogfish is limited with moderate to high percent standard errors for most years (PSEs >30%), particularly the early time series (1980s) with PSEs from the calibrated time series often approaching or greater than 100% (Tables 7.2.3.4-7). Note that the PSE estimates can vary between the MRFSS estimates and MRIP estimates, with the MRFSS estimates from the post-stratification routine typically being lower than the MRIP estimates in the same years. While the MRFSS PSE estimates were in the moderate range for the early years, the variance adjustments applied during the calibration routine (Salt et al. 2012) substantially increased the PSE estimates of the calibrated time series. High error estimates as suggested by the calibrated time series indicate low precision and warrant caution for any PSE's greater than 50%, as advised by the MRFSS/MRIP program. Therefore, adequacy of these data for assessment analyses may be limited within early years of the recreational surveys when errors were greatest, although the original MRFSS PSE estimates prior to the calibration procedure suggest the estimates are suitable. Given that the landings data represent the best available science, they are considered adequate for assessment analyses so long as uncertainty surrounding recreational landings is parameterized correctly within the assessment. In particular, usage of an appropriate error estimate is recommended (e.g., year specific values or median of PSE values for a representative period) as opposed to assuming the recreational landings are known with little to no error (e.g., fixing the standard error for the recreational landings to 1-5% as done in many assessments).

Similar to commercial sampling, biological sampling of Hogfish from recreational trips is generally poor for age samples and poor to moderate for length samples (Tables 2.3.4.1-2.3.4.4). On average, a total of 45 fish lengths were sampled each year, for those years with data (Table 2.3.4.1). There are only 61 age observations from the recreational fleets across all years. However, an additional 81 age and 90 length observations obtained opportunistically in 2016 from the recreational spear fishery for a multi-year age and growth study were included in this analysis (Meaghan Faletti, M.S. student, University of South Florida, College of Marine Science; Table 2.3.4.2).

2.5 Measures of Population Abundance

2.5.1 Fishery Dependent Indices

2.5.1.1 Commercial logbook CPUE

Commercial fishermen provide landings and effort data to NMFS through the Coastal Fisheries Log Book (CFLB) program. The CFLB began collecting data from vessels federally permitted to fish in a number of fisheries in Gulf of Mexico (GOM) waters (Texas to southwest Florida and most of the Tortugas) in 1990 and from the South Atlantic (North Carolina to Key West and southeast of the Tortugas) in 1992. This program intended to collect fishing effort and landings in a complete census of federally permitted vessels; however, the program included only a subsample of 20% of Florida vessels until 1993 when all of the federally permitted vessels were required to report.

In SEDAR 37, the commercial logbook CPUE index of abundance (IOA) was constructed by K. McCarthy at the NMFS-SEFSC. For this assessment update, the commercial logbook index was constructed in-house using the same methods. The method utilizes a Stephens and MacCall (2004) approach to select zero-catch trips, and a delta-lognormal generalized linear model (GLM) to standardize indices of abundance for each stock and gear type. Like SEDAR 37, only a spear index was produced using the CFLB data due to data limitations (Table 2.5.1.1 and Figure 2.5.1.1).

2.5.1.2 Florida Trip Ticket CPUE

The commercial CPUE index of abundance for the hook and line fishery was produced using Florida trip ticket data (Table 2.5.1.2 and Figure 2.5.1.2) and was constructed with a methodological approach. First, an affinity propagation clustering (APC) analysis was performed on presence-absence data of the landings (commercial landings by weight) to identify those species caught in association with Hogfish to include as zero-catch trips; and second, a delta-lognormal (hurdle) GLM was fit to the data using a forward-selection procedure to produce an index of abundance time-series. Data were analyzed only from 1994-2016, due to gear becoming a required entry on the trip tickets in 1994. The APC procedure was used because it automatically selects an optimal number of clusters in the data and a Bray-Curtis measure of dissimilarity was used as it is the most appropriate distance metric for presence-absence data. For these analyses, multiple explanatory variables were used to model the change in landings over time, and those variables selected in a forward selection procedure were included in the final models. The influence of effort was modeled as number of trips, with total days fished per trip included as a potential explanatory variable.

2.5.1.3 MRFSS/MRIP CPUE

The recreational CPUE indices of abundance were based on MRFSS/MRIP data and used a similar methodological approach as was used in the commercial CPUE analyses. First, an APC analysis was performed on count data of the landings (recreational landings in numbers) to identify those species caught in association with Hogfish to include as zero-catch trips. Second, a delta-lognormal (hurdle) GLM was fit to the data using a forward-selection procedure to produce an index of abundance time-series. Although data existed from 1981-2016, data were only analyzed from 1991-2016 due to 1991 being the first year that the party code was recorded. Prior to 1991, interviews done on multiple individuals from the same trip could not be distinguished. The APC procedure for the recreational analysis was conducted on the MRFSS/MRIP count data, and therefore a Morisita index of dispersion was used as this is a preferred method for count data insensitive to sample sizes. Multiple explanatory variables were used to model the change in landings over time, and those variables selected in a forward selection procedure were included in the final models. The influence of effort was modeled as number of trips, with hours fished and number of anglers per trip included as potential explanatory variables.

Tables 2.5.1.3.1-2.5.1.3.2 and Figure 2.5.1.3.1-2.5.1.3.2 present the IOAs for the Florida MRFSS/MRIP CPUE analyses. The WFL spear index varied without trend through 2005, then increased to a peak in 2012, and then decreased starting in 2013. The WFL hook and line index showed a variable but stable trend over time, with a peak in abundance in 2010 and 2011 similar to the commercial hook and line index from the Florida trip ticket database.

2.5.2 Fishery Independent Indices

Four main fishery-independent IOAs were included in this assessment update. The first is from a combined video survey conducted by NOAA National Marine Fisheries Service (NMFS) and Florida Fish and Wildlife Research Institute (FWC-FWRI) within the eastern GOM. The second and third surveys were conducted by FWC-FWRI and included a polyhaline seagrass trawl survey within estuarine systems along the West Florida shelf and an annual spring baitfish trawl survey of the West Florida shelf. The fourth was a summer trawl survey from the Southeast Area Monitoring and Assessment Program (SEAMAP). Apart from the NMFS/FWC-FWRI video survey (which is explained below), the methodologies used to standardize and incorporate these data into the assessment update are identical to those employed during SEDAR 37 and are therefore only briefly reviewed.

2.5.2.1 NMFS/FWC-FWRI Video Survey

In SEDAR 37, the NMFS/FWC-FWRI video survey was a combination of the NMFS-Panama City (PC) video survey in and westward of the Big Bend and the FWC-FWRI video survey southward of Anclote Key to the Tampa Bay region. The NMFS-PC surveys began collecting data in 2005 using a stationary camera array within a systematic survey design but shifted toward a two-stage random survey by 2010. The FWC- FWRI survey began in 2008 with a stratified-random design and a stationary camera array but changes in the sampling universe have occurred as more habitat information has become available since the initiation of the project. These two surveys were combined for the analyses, and the relative abundance of Hogfish (MaxN-maximum number of Hogfish in the field of view at any time during the 20 minutes analyzed) was modeled using a GLM with a negative binomial distribution to standardize an index of abundance.

The combined NMFS/FWC-FWRI video survey is presented in Table 2.5.2.1 and Figure 2.5.2.1. The IOA showed low abundance in 2007 and rebounded in 2008, where it remained relatively stable through 2016. Yearly CVs were higher in early years (2005-2008) and subsequently decreased in later years, averaging at 20%.

2.5.2.2 FWC-FWRI Juvenile Seagrass Survey

FWC-FWRI began a polyhaline seagrass survey in 2008 using a stratified-random design within five estuarine systems along the WFL shelf with the intent of targeting reef fishes in preparation for SEDAR 10 GOM Gag grouper assessment. Sampling occurred in water depths of 1 and 7.6 meters using a 6.1 meter otter trawl. Young-of-the-year Hogfish were primarily found in the Big Bend region within three locations: St. Marks, Ecofina, and Steinhatchee. The number of Hogfish per set was modeled using a GLM with a negative binomial distribution to standardize an index of abundance (Table 2.5.2.2 and Figure 2.5.2.2).

The estimated abundance had initial declines in 2008, showed a high in 2012, then subsequently dropped to lower abundances from 2013-2016. Yearly CVs were moderate, averaging at 20% across years, with an exception of a higher CV (0.67) in 2014.

2.5.2.3 FWC-FWRI Baitfish Survey

FWC-FWRI began an annual spring baitfish trawl survey of the WFL in 1994 using a stratified-random design sampling, covering water depths of 6 to 28 meters with a 19.8 meter balloon trawl. Due to inconsistencies in the early data, only data collected in 2002 to present were used for the analyses. The number of Hogfish per set was modeled using a GLM with a negative binomial distribution to standardize an index of abundance (Table 2.5.2.3 and Figure 2.5.2.3).

No underlying trend was evident from the beginning to end of the survey period. Yearly CVs were high, averaging at 83% across all years with large confidence intervals for yearly estimates.

2.5.2.4 SEAMAP Survey

FWC-FWRI began a summer SEAMAP trawl survey of the WFL shelf in 2008 using a stratified-random design covering water depths from 10-110 meters within NMFS statistical zones 2-10 using a 12.8-m shrimp trawl. The number of Hogfish per set was modeled using a GLM with a negative binomial distribution to standardize an index of abundance (Table 2.5.2.4 and Figure 2.5.2.4).

The estimated abundance declined from the initial year in 2008 to 2011, increased in 2012, then remained low from 2013-2016. Yearly CVs were moderate to high, averaging at 49% across all years, and 41% if excluding the initially high CV in 2008.

3. STOCK ASSESSMENT MODELS

3.1 Overview

Version 3.24F of Stock Synthesis (SS) was selected for this update assessment to be consistent with SEDAR 37. Descriptions of SS algorithms and options are available in the SS user's manual (Methot et al. 2013) and Methot and Wetzel (2013). The r4ss software (https://github.com/r4ss/r4ss) was utilized extensively to summarize SS output files, conduct parametric bootstrap analyses, and produce summary figures.

Detailed descriptions of the data inputs, control files, parameter settings etc. can be found on the SEDAR website (http://sedarweb.org/sedar-37) and can also be obtained by contacting the corresponding author at Dustin.Addis@myfwc.com.

3.2 Continuity Model

The continuity model contained updated data through 2016 and was parameterized using the same data inputs as SEDAR 37. Best attempts were made to retain the original SEDAR 37 model configuration however some changes were made to this update model to correct for model warnings, parameter bounding issues, etc. Changes to the configuration are as follows:

- The initial equilibrium catches for 1986 were set to approximately half of those in SEDAR 37 to allow for estimation of initial F parameters comparable to those in SEDAR 37.
- The prior type of the steepness parameter was changed from a standard beta to a symmetrical beta prior with a standard deviation (SD) of 2.
- A symmetrical beta prior was placed on the first parameter of the double normal size selectivity pattern for the baitfish survey to alleviate bounding issues.

- A symmetrical beta prior was placed on the initial F for the recreational spear fleet to alleviate bounding issues.

3.2.1 Continuity Model Results

3.2.1.1 Measures of overall model fit

3.2.1.1.1 Landings

Like SEDAR 37, error in the commercial landings data was assumed constant at a standard error of 0.1 (log-space), leading to precise fits to the commercial catch data. In contrast to SEDAR 37, the recreational landings error was assumed constant at a standard error equal to the MRIP PSE values from 2004-2012, which ranged from 0.41-0.46. Due to these moderate to high error values, the fit to recreational landings were not as precise as in the commercial fisheries (Figure 3.2.1.1.1), particularly for the initial starting year of the recreational spear fishery which was also apparent in the SEDAR 37 base model.

3.2.1.1.2 Indices

The model was fit to four fisheries-dependent indices (commercial spear from logbooks, commercial hook and line from Florida trip tickets, recreational spear, and recreational hook and line) and four fisheries-independent indices (FWRI baitfish trawl, SEAMAP trawl, NMFS/FWC-FWRI video survey, and FWRI juvenile seagrass trawl). The observed and predicted indices are presented in Figures 3.2.1.1.2.1-3.2.1.1.2.8. The fits to the fisheries-dependent indices were consistent with the fits in SEDAR 37, since the four fisheries tended to have similar trends in the observed CPUEs over time. The commercial spear logbook index has been relatively stable since 2012, with predicted fits reflecting this trend (Figure 3.2.1.1.2.1). The commercial hook and line index remained low from 2012-2014, then increased markedly in 2015-2016. The discord between these two time periods resulted in predicted abundance values that reflected the average abundance between 2010 and 2016 largely ignoring the deviations during that time period (Figure 3.2.1.1.2.2).

Following 2012, the recreational spear index declined but remained stable through 2016, with predicted fits reflecting this trend (Figure 3.2.1.1.2.3). The predicted model also followed the trends of the recreational hook and line index, which has remained relatively stable since 2012 (Figure 3.2.1.1.2.4). All of the fisheries independent surveys, except for the FWRI juvenile trawl (‘RecTrawlIOA’), indicated increased abundance during 2012-2013 followed by a slight decline through 2016 (Figure 3.2.1.1.2.5-3.2.1.1.2.8). The predicted model did not fit the trend in the FWC-FWRI juvenile seagrass trawl well; the model largely under and overestimated abundance in years with exceptionally high (2012) and low (2014) abundance, respectively (Figure 3.2.1.1.2.8).

3.2.1.1.3 Length Composition

The model was fit to length observations from all four fisheries-dependent indices (commercial spear, commercial hook and line, recreational spear, and recreational hook and line) and all four fisheries-independent indices (FWRI baitfish trawl, SEAMAP trawl, NMFS/FWC-FWRI video survey, and FWRI juvenile seagrass trawl). The observed and predicted length composition data for each data source and year are presented in Figures 3.2.1.1.3.1-3.2.1.1.3.20, while Figures 3.2.1.1.3.19-3.2.1.1.3.20 present the observed and predicted data for all data sources averaged across all years. Given the sparseness and paucity of observations on a yearly basis, the year-specific predictions relative to the observed data were often variable and poor. However, the model predicted the average length compositions well when averaged across all years for each of the data sources (Figure 3.2.1.1.3.19) and no residual patterns were evident except for in the smallest size bins of the FWRI juvenile trawl (‘RecTrawlIOA’ in the assessment model) and SEAMAP trawl (Figure 3.2.1.1.3.20).

3.2.1.1.4 Conditional Age at Length

Age observations were included in the model as conditional age-at-length in order to avoid double-counting the length observations, since all age observations had corresponding length measurements used in the length composition data. Model fits to the age-at-length data are presented in Figures 3.2.1.1.4.1-3.2.1.1.4.6. Given the sparseness and paucity in the age observations the model fits were highly variable. While conditional age-at-length is often used to improve estimates of the growth function, the growth function was fixed in both SEDAR 37’s base model configuration as well as this model because of the large number of age samples from the life history analysis relative to the fisheries and surveys.

3.2.1.2 Parameter estimates

A list of all model parameters is provided in Table 3.2.1.2. The table includes estimated parameter values and their associated asymptotic standard errors, initial parameter values, prior values. The table also notes whether the parameter was fixed or estimated.

Similar to the SEDAR 37 base model, the standard errors are low to moderate for the majority of parameters with a few exceptions. The initial age structure and early recruitment deviations approached a standard error of 0.6. These analyses suggest that the data are not as informative as other components for determining the stock recruitment relationship.

3.2.1.3 Fishery Selectivity

The estimated selectivity patterns for the various fisheries and surveys including the length-based selectivity functions, the age-based-selectivity function for the FWC-FWRI juvenile trawl survey, and the derived age-based selectivity functions (i.e. derived from the length-based selectivity functions used in the model) are presented in Table 3.2.1.2 and Figure 3.2.1.3.1-3.2.1.3.3. All length-based selectivity functions were modeled with the double-normal approach, where the asymptotic selectivity functions had a number of parameters fixed in order to simulate a logistic function.

All selectivity functions in this continuity model were parametrized consistent with SEDAR 37. All recreational fisheries and surveys were modeled using a dome-shaped function, while the commercial hook and line was modeled as asymptotic, and the commercial spear was given the option to choose asymptotic or dome-shaped. For the commercial spear, hogfish under 40 centimeters in length were fully selected (100%). Percent selectivity decreased for all larger sizes and remained at approximately 20% for the largest sizes.

This model estimated selectivity functions consistent with those estimated by the SEDAR 37 base model with two exceptions. The model estimated larger first parameters (peak parameter) for the FWRI baitfish survey and the FWC-FWRI video survey than were estimated in SEDAR 37. SEDAR 37 reports the first parameter for the FWRI baitfish survey and the FWC-FWRI video survey at 7.00 and 24.00, respectively whereas this continuity model estimated the first parameter equal to 10.2 and 26.8, respectively.

3.2.1.4 Recruitment

Like the SEDAR 37 base model, the recruitment deviations in this continuity model (Figures 3.2.1.4.1-3.2.1.4.2) had moderate asymptotic error estimates (Figure 3.2.1.4.3) likely resulting from the relatively stable SSB levels predicted throughout the model period. Additionally, this continuity model also estimated exceptional recruitment in 2006 (Figure 3.2.1.4.2), leading to a strong year class in the population from 2006-2010. The various data sources tend to support this strong recruitment year (indices and length compositions), leading to consistency in the model fits. This strong recruitment class was one of the major factors causing the retrospective patterns as the model end year was decreased. This resulted in a subsequent decline in the strong year class and produced alternative model fits (see Ch. 3.2.1.8.2). The number of recruits are presented in Table 3.2.1.5.1.

3.2.1.5 Stock Biomass

Both the SEDAR 37 model and this continuity model estimated total biomass in 1986 to be around 1000 MT. However, estimated total biomass from this continuity model was generally larger over the entire time span than that estimated by SEDAR 37. Total biomass in the final year of the SEDAR 37 model was 1500 MT compared to 1950 MT in this continuity model (Table 3.2.1.5.1, Figure 3.2.1.5.1) However, the asymptotic errors for the time series of biomasses were relatively high, as can be seen in the 95% asymptotic intervals for SSB (Figure 3.2.1.5.2). Similar to the SEDAR 37 base model, the continuity model predicted relatively constant stock biomass from 1986 to 2005 followed by a pronounced rise in biomass starting in 2006. This increased biomass strongly corresponds to trends in the IOAs of the commercial and recreational fisheries. Likely, the predicted biomass increase is a result of the large recruitment cohort of 2006 as evident by the large number of males and females at age (Figure 3.2.1.5.3-3.2.1.5.4). Numbers at length for females and males are presented in Figures 3.2.1.5.5-3.2.1.5.6.

3.2.1.6 Fishing Mortality

Fishing mortality rates were summarized using annual exploitation rates of biomass, represented as the total annual catch divided by the summary biomass (ages 1 – 20, 20 as plus group) at the start of the year. Exploitation rates were chosen as an F proxy due to difficulties in interpreting the sum of instantaneous fleet-specific F’s, especially given variability in the fleet-specific selectivity functions.

The average exploitation rate across all years for the continuity model (0.046) was slightly lower than that estimated in the SEDAR 37 base model (0.052). Over the course of the time span, maximum estimates occurred in 1991 (0.10) and 2016 (0.09) which correspond to years with the largest observed landings (Table 3.2.1.5.1, Figure 3.2.1.6.1). The recreational fleets are the main drivers of exploitation with the recreational spear fishery accounting for most of the fishing pressure in all years and with recreational hook and line fishing rates steadily increasing since 2010 (Figure 3.2.1.6.2).

3.2.1.7. Model Convergence

Model convergence was assessed using a jitter analysis which randomly perturbs the initial values so the model is forced to traverse a broader region of the likelihood surface. Starting values of all estimated parameters were randomly perturbed by 10% and 50 trials were run. A total of 37 out of the 50 trials converged to a solution within two total log-likelihood units. All trials converged, and those greater than 2 log-likelihood units from majority of trials ranged between 15 and 226 total likelihood units. Table and Figure 3.2.1.7.1 depict the changes in selected quantities (parameters, biological reference points, total log-likelihood), all of which were relatively similar across runs that successfully converged.

3.2.1.8 Evaluation of Uncertainty

3.2.1.8.1 Parameter Uncertainty

Table 3.2.1.8.1.1 provides summary statistics (mean, standard deviation, median, 95% confidence intervals, interquartile ranges) for key quantities (derived parameters, stock status, and biological reference points) from both the bootstrap runs and the continuity model run. The continuity model results are also provided in each table for comparison to the bootstrap results. Figures 3.2.1.8.1.1-3.2.1.8.1.5 present the probability distributions of key parameters, BRPs, and stock status (both single estimates and time-varying estimates). For the tables and figures, F/MFMT was calculated with $F_{current}$ [geometric mean F of the terminal three years (2014-2016)], while SSB/MMST was calculated with the terminal year SSB (2016) and the mortality-adjusted estimate of SSB (MSST = (1-M)*SSB_{TARGET}). In general, key parameter estimates and standard errors from the continuity model were similar to those produced by the bootstrap analysis (Table 3.2.1.2; Table 3.2.1.8.1.1). However, given the highly skewed distributions for some quantities with restricted distributional ranges (e.g., SPR, steepness), the percentile distributions from the bootstrap analysis provide a more informative metric of the error distribution.

The likelihood profile for steepness depicts a defined minima in the total likelihood where steepness = 0.87 (Figure 3.2.1.4.4). Age and length data were informative enough so that the model found a global minima in steepness and there were no discontinuities in the response surface for any data input.

3.2.1.8.2 Retrospective Analysis

Retrospective analysis was conducted to assess the consistency of the model results by sequentially eliminating one year of data from the model starting at the terminal year after every model run. The results of this analysis were useful in assessing potential biases, data inconsistencies, and uncertainty in terminal year estimates. Like the SEDAR 37 base model, strong retrospective patterns were evident for the continuity model (Figure 3.2.1.8.2.1). Removing the terminal years of data from the continuity model leads to a systematic decrease in the strength of the 2006 recruiting class, and subsequently impacts the estimates of SSB and fishing mortality substantially. Failed attempts were made in SEDAR 37 to fit temporal changes in catchability to all fisheries, which is often a key process leading to potential retrospective patterns. This lead to an assertion that the consistency in the CPUE trends from both spear and hook and line fisheries suggest that base model estimates using all available years of data may represent the best available fit to the data and that the apparent retrospective patterns are not necessarily a result of model misspecification.

3.2.1.9 Benchmarks/Reference Points

This assessment update presents both 30% SPR and MSY-based reference points for consideration. For all analyses, stock status was evaluated with maximum fishing mortality thresholds (MFMT, which included F_{MSY} and $F_{30\%}$) and their corresponding minimum stock size thresholds (MSST), calculated as MSST=(1-M)*$SSB_{@MFMT}$. Here, M=0.179 y^{-1} for the continuity model configuration. All MFMTs are presented in terms of exploitation (harvest rate) of biomass. Estimated reference points, stock status, and their uncertainty are provided in Table 3.2.1.8.1.1, which includes estimates from both the continuity model and the bootstrap runs. Graphical representations are included with the bootstrap output in Figures 3.2.1.8.1.1-3.2.1.8.1.5.

The model estimated the 30% SPR reference point ($F_{30\%}$) at 0.096 and an F_{MSY} of 0.165 (Table 3.2.1.8.1.1). For all MFMTs, the continuity model predicted the population as being neither overfished nor experiencing overfishing. Substantial uncertainty existed in the overfishing and overfished categories, as can be seen from the individual bootstrap plots in Figure 3.2.1.8.1.4, but these nearly always estimated a non-depleted stock (SSB/MSST>1.0) in the terminal years. There was some disparity between the estimated base model values and the median values from the bootstrap runs which is depicted in Figure 3.2.1.8.1.4. For example, the base model predicted a lower F/FMFT and higher SSB/MSST than the median value determined by bootstrap analysis. Such disparity may have been caused by inconsistencies in the original input datasets which lead the base model to predict estimated values towards the tail ends of the uncertainty range determined from the bootstrap analysis.

3.2.1.10 Projections

Time-series of projected F, SSB, and OFL from 2017-2036 are provided in Tables and Figures 3.2.1.10 for the base model configurations. In SS the projection is done for a specific MFMT so the SPR associated with the MFMT is held constant, not the F (e.g., SPR at MSY is constant, not F_{MSY}), because SPR is a better gauge of fishing intensity in SS models (Methot 2013). As such, the projections show that F was time-varying even though the projections were done for a specific F scenario (F_{MSY}, $F_{30\%}$, F_0, and $F_{Current}$). This can be counterintuitive if one is expecting a constant F. Equilibrium is eventually reached when both the F and associated SPR are constant, but this can take a substantial amount of time and may not be achieved within the projection timespan. Given that the population had low F/MFMT and high SSB/MSST ratios in the final model year, the Fs steadily increased while the SSBs steadily decreased as the population moved closer to the target projection levels. The exploitation rates and OFLs decreased for the first few projection years (Figure 3.2.1.10). This is due to a lower recruitment being forecasted from current years (Figure 3.2.1.4.2, Table 3.2.1.5.1), which results in decreased F’s.

3.2.1.11 Discussion

This update assessment was conducted using version 3.24F of Stock Synthesis. There have been several version updates of Stock Synthesis since the 2012 Hogfish benchmark assessment. We compared the outputs among models evaluated with 3.24F and the new versions (3.24S and 3.3.08) and found significant differences in estimated biomass and selectivity curves. Such differences have been noted by others as well (J. Neer, *pers.comm.*). Although there may be some advantages to using the newer versions of Stock Synthesis, we chose to use version 3.24F to eliminate any effects the new model version may have on estimated stock status and management parameters. Therefore, any difference in biological reference parameters and stock status are due solely to additional data.

Overall, the results of this update model corroborate those of the SEDAR 37 assessment. This update assessment suggests the WFL Hogfish stock is neither overfished nor experiencing overfishing. The uncertainty in the data input remains high and other sources of uncertainty remain in the model specification and diagnostics as assessed through retrospective analysis. However, the bootstrap results support the conclusion made in regards to stock status. Total abundance remained relatively constant from the model start in 1986 through the model timespan but increased starting in 2006 and remained high until 2013 when there is an apparent decline. Likely, this decline in overall abundance in recent years is a result of increased landings made by the recreational spear and hook and line fisheries. To support these increased landings, the model estimated a large recruit class in 2006 which supported the increased abundances during 2006 to 2012. This increase was also detected by the surveys and fisheries dependent CPUE indices.

The bootstrap analysis highlighted the uncertainty in estimated reference points and derived quantities from the continuity model. Generally, the continuity model time series estimates (black bold lines in Figure 3.2.1.8.1.4) are either above or below the median estimates from the bootstrap analysis. Likely, the uncertainty surrounding the estimated and derived parameters would decrease if additional age and length observations were available to include in this update. However, the median values of the estimated and derived biological reference points and stock status parameters from the bootstrap analysis are generally consistent with SEDAR 37 assessment, with a few minor exceptions. Median values and 95% confidence intervals for MSY, F_{MSY}, and $F_{30\%}$ were consistent with the last benchmark. However, median SPR and $MSST_{30\%}$ and their corresponding confidence interval ranges were significantly lower in this update (Table 3.2.1.8.1.1). Additionally, this update model estimated a median $MSST_{MSY}$ slightly larger than the last benchmark although the distributional range of this parameter was significantly narrower than reported in the last benchmark. Here, median (LCI; UCI) $MSST_{MSY}$ is 396.3 (327.6; 475.34) whereas, the last benchmark assessment estimated median $MSST_{MSY}$ at 387.2 (382.7; 710.4). There was high precision in the median value of F/F_{MSY} between this update and the last benchmark; the median value differed by only two hundredths of a point. In contrast, this update produced a median $F/F_{30\%}$ slightly lower than SEDAR 37 but the distributional range of this estimated parameter is consistent with that reported in the last benchmark. The two largest differences in median values of stock status parameters between this update and SEDAR 37 are for $SSB/MSST_{30\%}$ and $SSB/MSST_{MSY}$. Median values of both parameters in this update model are slightly larger than in SEDAR 37. The increase in these estimates is a result of the estimated increase in SSB which was necessary to support increased catches in the most recent years of this update assessment mode. Finally, estimated time series of F, $F/F_{30\%}$, and F/F_{MSY} agree with those estimated in the SEDAR 37 assessment (Table 3.2.1.8.1.4).

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6. TABLES

Table 2.2.1.1. Age-specific natural mortality estimated from the following suite of parameters dependent on the method: K=0.106 (growth coefficient), t_0=-1.33 (growth coefficient), L_inf=849.0 (growth coefficient), t_max=25 (maximum age), P=0.01 (proportion of individuals surviving to maximum age), *alpha*=0.000095 (weight-length conversion), and *beta*=2.75 (weight-length conversion).

	Lorenzen (1996)		**Lorenzen (2005)**	**Gislason et al. (2010)**
Age	***M*** yr^{-1} ***(unscaled)***	***M*** yr^{-1} ***(scaled)***	***M*** yr^{-1}	***M*** yr^{-1}
0	1.041	0.640	0.597	2.27
1	0.696	0.428	0.400	1.00
2	0.546	0.336	0.309	0.61
3	0.461	0.284	0.257	0.43
4	0.406	0.250	0.223	0.33
5	0.368	0.227	0.200	0.27
6	0.340	0.209	0.182	0.23
7	0.319	0.196	0.169	0.20
8	0.302	0.186	0.159	0.18
9	0.289	0.177	0.150	0.17
10	0.277	0.171	0.144	0.15
11	0.268	0.165	0.138	0.14
12	0.261	0.160	0.134	0.14
13	0.254	0.156	0.130	0.13
14	0.249	0.153	0.126	0.12
15	0.244	0.150	0.123	0.12
16	0.240	0.147	0.121	0.11
17	0.236	0.145	0.119	0.11
18	0.233	0.143	0.117	0.11
19	0.230	0.142	0.115	0.11
20	0.228	0.140	0.114	0.10
21	0.226	0.139	0.113	0.10
22	0.224	0.138	0.112	0.10
23	0.222	0.137	0.111	0.10
24	0.221	0.136	0.110	0.10
25	0.220	0.135	0.109	0.10

Table 2.3.1.1. Landings in pounds from the three primary data sources: ALS online, ALS-SEFSC, and historical Florida landings reports.

	ALS-Online	**ALS-SEFSC**	**Florida Reports**
Year	**FL Total**	**WFL**	**WFL**
1950	17400		314
1951	34300		7445
1952	42600		319
1953	34600		5000
1954	32000		315
1955	31600		4671
1956	33100		2760
1957	39700		9068
1958	24400		5804
1959	19200		3873
1960	21400		1395
1961	36900		1119
1962	16800		1155
1963	20900		1000
1964	24000		1122
1965	17200		775
1966	22600		5281
1967	18200		3605
1968	29700		6756
1969	19500		4859
1970	25700		3050
1971	22800		3525
1972	22700		3471
1973	17900		1331
1974	16400		1742
1975	21700		3822
1976	15700		2632
1977	44300	32900	14088
1978	39732	37472	
1979	50118	48094	
1980	66308	46650	
1981	62509	44459	
1982	32188	29921	
1983	37027	32403	
1984	39160	36843	
1985	46990	42553	
1986	54315	37853	
1987	72977	55857	
1988	75840	55218	

Table 2.3.1.1 (continued). Landings in pounds from the three primary data sources

	ALS-Online	ALS-SEFSC	Florida Reports
Year	**FL Total**	**WFL**	**WFL**
1989	109408	85378	
1990	115395	91844	
1991	107580	77878	
1992	110012	92350	
1993	136707	116939	
1994	93632	77023	
1995	65013	51304	
1996	60786	47126	
1997	65956	50780	
1998	47153	36045	
1999	47267	38254	
2000	49117	42874	
2001	45545	39771	
2002	49900	44077	
2003	48682	42746	
2004	48604	42206	
2005	32487	28723	
2006	26967	22501	
2007	32427	26232	
2008	42032	32480	
2009	44330	39958	
2010	45480	41404	
2011	56379	54213	
2012	55134	51179	
2013	38824	34992	
2014	56470	50944	
2015	50512	45182	
2016	47187	43317	

Table 2.3.1.2. Observed landings in pounds by gear type from the ALS-SEFSC dataset. Note, the "Other" category is mainly comprised of unknown gear types.

	WFL			
Year	**Spear**	**Hook & Line**	**Pots & Traps**	**Other**
1977		7900		
1978		3000		
1979		5100		
1980		3576		
1981		1472		
1982		1381		
1983		2448		
1984	28	2302		37
1985	2855	2191		95
1986	3533	1676		86
1987	696	4201		116
1988	476	6156		502
1989	1056	27079		0
1990	7166	30902		0
1991	18575	10890	20	6385
1992	16384	4248	3800	1927
1993	15447	8903	16769	263
1994	13186	11396	5281	164
1995	5272	6538	3039	1629
1996	8157	4333	4526	218
1997	7490	3973	6780	68
1998	6271	3279	3312	187
1999	4411	4179	4294	103
2000	7589	8889	1810	120
2001	12146	5815	4070	8
2002	16599	4907	4025	675
2003	16094	5711	1331	80
2004	17696	2185	783	52
2005	12827	2553	24	532
2006	11537	1208	1	300
2007	13344	1694		387
2008	14988	2031		5412
2009	23347	2178		4715
2010	27324	5356	143	670
2011	36321	5346	62	2054
2012	36951	3884		0
2013	18489	2476	88	560
2014	31128	2000	154	16
2015	22906	3762	14	128
2016	24815	3530	64	408

Table 2.3.1.3. Estimated landings in pounds by gear type for the three primary gears (spear, hook and line, and pots and traps) with all other gear types, mostly unknown, reassigned based on proportions of the three primary types.

	WFL		
Year	**Spear**	**Hook & Line**	**Pots & Traps**
1950	0.0	380.4	0.0
1951	0.0	13332.7†	0.0
1952	0.0	665.3	0.0
1953	0.0	5013.9	0.0
1954	0.0	347.4	0.0
1955	0.0	4678.3	0.0
1956	0.0	3501.2	0.0
1957	0.0	9350.4	0.0
1958	0.0	5771.1	0.0
1959	0.0	3863.3	0.0
1960	0.0	1407.7	0.0
1961	0.0	1120.6	0.0
1962	0.0	1165.1	0.0
1963	0.0	1000.0	0.0
1964	0.0	1122.5	0.0
1965	0.0	778.4	0.0
1966	0.0	5286.1	0.0
1967	0.0	3600.6	0.0
1968	0.0	6769.9	0.0
1969	0.0	4816.8	0.0
1970	0.0	3056.2	0.0
1971	0.0	3528.4	0.0
1972	0.0	3451.4	0.0
1973	0.0	1317.0	0.0
1974	0.0	1738.4	0.0
1975	0.0	3806.6	0.0
1976	0.0	2604.0	0.0
1977	0.0	7900.0	0.0
1978	0.0	3000.0	0.0
1979	0.0	5100.0	0.0
1980	0.0	3576.0	0.0
1981	0.0	1472.0	0.0
1982	0.0	1381.0	0.0
1983	0.0	2448.0	0.0
1984	28.4	2338.6	0.0
1985	2908.8	2232.2	0.0

†The estimated total for the WFL stock in 1951 includes an additional 4,629.7 lbs recorded from Louisiana during that year.

Table 2.3.1.3. (continued). Estimated landings in pounds by gear type for the three primary gears (spear, hook and line, and pots and traps) with all other gear types, mostly unknown, reassigned based on proportions of the three primary types.

	WFL		
Year	**Spear**	**Hook & Line**	**Pots & Traps**
1986	3591.3	1703.7	0.0
1987	712.5	4300.5	0.0
1988	512.0	6622.0	0.0
1989	1056.0	27079.0	0.0
1990	7166.0	30902.0	0.0
1991	22597.4	13248.2	24.3
1992	17676.2	4583.0	4099.7
1993	15545.8	8959.9	16876.3
1994	13258.4	11458.6	5310.0
1995	5850.4	7255.2	3372.4
1996	8261.5	4388.5	4584.0
1997	7517.9	3987.8	6805.3
1998	6362.2	3326.7	3360.2
1999	4446.3	4212.4	4328.3
2000	7638.8	8947.3	1821.9
2001	12150.4	5817.1	4071.5
2002	17037.9	5036.7	4131.4
2003	16149.7	5730.7	1335.6
2004	17740.5	2190.5	785.0
2005	13270.0	2641.2	24.8
2006	11808.5	1236.4	1.0
2007	13687.4	1737.6	0.0
2008	19754.1	2676.9	0.0
2009	27659.7	2580.3	0.0
2010	27881.8	5465.3	145.9
2011	38108.8	5609.1	65.1
2012	36951.0	3884.0	0.0
2013	18980.8	2541.9	90.3
2014	31143.0	2001.0	154.1
2015	23015.9	3780.0	14.1
2016	25171.4	3580.7	65.0

Table 2.3.2.1. Calculated discards in number for Hogfish as discard rate * total effort. Diving gear includes spear fishing and powerhead gear. Vertical line includes handline and electric/hydraulic (bandit rig) gear.

WFL		
Year	**Diving**	**Vertical Line**
1993	37	0
1994	57	0
1995	35	0
1996	55	0
1997	61	0
1998	42	0
1999	41	0
2000	57	0
2001	53	0
2002	60	0
2003	78	0
2004	71	0
2005	78	0
2006	78	0
2007	74	0
2008	90	0
2009	92	0
2010	126	0
2011	114	0
2012	108	0
2013	83	0
2014	148	0
2015	136	0
2016	123	0

Table 2.3.2.2. Mean weight of WFL Hogfish in pounds by gear type from the commercial biostatistical sampling, used to convert discards in numbers (Table 2.4) to discards in weight. Note: mean weights were calculated across all years due to missing years for each gear combinations.

Stock	Gear	Weight (lbs)	N
WFL	Hook & Line	2.83	23
WFL	Long Line	9.37	4
WFL	Spear	3.20	382
WFL	Trap	1.41	53

Table 2.3.2.3. Calculated weight of dead discards in pounds from the commercial logbook program. The total number of dead discards were determined from the proportion dead and alive, and assuming a 10% discard mortality rate for those released alive from vertical lines and a 100% mortality for diving gear. Means weights from Table 2.5 were used to convert total numbers from Table 2.4.

Year	WFL	
	Diving	**Vertical Line**
1993	116.61	0
1994	179.65	0
1995	110.31	0
1996	173.35	0
1997	192.26	0
1998	132.37	0
1999	129.22	0
2000	179.65	0
2001	167.04	0
2002	189.10	0
2003	245.84	0
2004	223.77	0
2005	245.84	0
2006	245.84	0
2007	233.23	0
2008	283.66	0
2009	289.96	0
2010	397.12	0
2011	359.30	0
2012	340.39	0
2013	261.60	0
2014	466.46	0
2015	428.64	0
2016	387.67	0

Table 2.3.3.1. Total effort from the logbook analyses provided by the NMSF-SEFSC for the WFL stock in diver hours for spearfishing. Note the WFL hook and line records were too sparse to create a CPUE and therefore not provided.

Year	WFL
	Spear
1993	838.7
1994	506
1995	426.5
1996	880.5
1997	804.5
1998	667
1999	1043.5
2000	1255
2001	1150.5
2002	2067
2003	2219
2004	2692
2005	3098
2006	3281
2007	3261
2008	4162
2009	4040
2010	5944
2011	4362
2012	4112
2013	3283
2014	5371
2015	5459
2016	6446

Table 2.3.3.2. Total days fished from the Florida trip ticket database for the WFL stock by gear type. The total days fished includes all trips catching Hogfish and associated species identified from a cluster analysis for the CPUE standardization procedure.

Year	WFL	
	Spear	Hook & Line
1994	93	6259
1995	157	6961
1996	319	7385
1997	290	7964
1998	236	8519
1999	229	8623
2000	242	9851
2001	253	10248
2002	263	9724
2003	219	9766
2004	191	9344
2005	181	8063
2006	162	7584
2007	164	7349
2008	259	6972
2009	325	10270
2010	316	5510
2011	256	4985
2012	241	5089
2013	227	5710
2014	388	6690
2015	273	5744
2016	243	5415

Table 2.3.3.3. Number of SPL licenses landing Hogfish from the Florida Trip Ticket database for the WFL stock.

Year	WFL
1987	129
1988	154
1989	185
1990	144
1991	157
1992	214
1993	231
1994	232
1995	126
1996	105
1997	111
1998	90
1999	103
2000	106
2001	115
2002	101
2003	90
2004	63
2005	61
2006	34
2007	33
2008	53
2009	59
2010	62
2011	66
2012	60
2013	61
2014	74
2015	63
2016	78

Table 2.3.4.1. WFL stock length observations per year and data type (Comm=commercial; Rec=recreational intercepts; FIM=fisheries independent monitoring; MARFIN/CRP= FWCCFWRI biological sampling from multiple-year grant-funded life history studies on Hogfish).

	WFL			
Year	**Comm**	**Rec**	**FIM**	**MARFIN/CRP**
1981				
1982		2		
1983		3		
1984				
1985				
1986		36		
1987		33		
1988		17		
1989		16		
1990		6		
1991	7	27		
1992		22		
1993	31	20		
1994	14	31		
1995	1	43		10
1996	23	10		203
1997	38	28		372
1998	53	49		196
1999	140	43		187
2000	80	23		
2001	67	28		27
2002	127	23		
2003	32	60		
2004		44		
2005	1	30		79
2006	1	21		388
2007	14	27	30	179
2008	18	65	25	
2009	2	51	168	
2010	34	73	102	
2011	112	72	68	
2012	246	224	431	
2013	159	68	75	
2014	148	93	120	
2015	107	102	135	
2016	58	98	76	
Total	**1513**	**1488**	**1230**	**1641**

Table 2.3.4.2. WFL stock age observations per year and data type (Comm=commercial; Rec=recreational intercepts; FIM=fisheries independent monitoring; MARFIN/CRP= FWCCFWRI biological sampling from multiple-year grant-funded life history studies on Hogfish); USF= USF M.S. study.

	WFL				
Year	**Comm**	**Rec**	**FIM**	**MARFIN/CRP**	**USF**
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996				108	
1997				210	
1998				67	
1999				39	
2000					
2001				22	
2002					
2003		4			
2004					
2005				72	
2006				374	
2007			26	171	
2008		1	23		
2009		3	141		
2010	1	1	91		
2011			67		
2012	6	14	157		
2013	21		74		
2014	2		72		
2015		25	82		
2016		13	13		81
Total	**30**	**61**	**746**	**1063**	**81**

Table 2.3.4.3. Length observations per year and gear type

	WFL			
Year	**Hook & Line**	**Spear**	**Trap**	**Other/Unknown**
1981				
1982		2		
1983				3
1984				
1985				
1986				36
1987				33
1988				17
1989		16		
1990				6
1991		7		27
1992				22
1993	18	13	18	2
1994	28	17		
1995	12	40		2
1996	12	210	20	
1997	6	321		110
1998	44	134	89	31
1999	19	169	133	49
2000	11	26	65	1
2001	26	33	36	27
2002	10	33	107	
2003	28	43	21	
2004	4	40		
2005	6	99		5
2006	4	358		49
2007	11	174	1	66
2008	10	73		25
2009	13	39	1	169
2010	7	99	2	103
2011	33	151	1	68
2012	29	441		431
2013	19	208		75
2014	65	176		120
2015	69	140		135
2016	79	77		76
Total	**563**	**3139**	**494**	**1688**

Table 2.3.4.4. Age observations per year and gear type

	WFL			
Year	**Hook & Line**	**Spear**	**Trap**	**Other/Unknown**
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996		108		
1997		146		64
1998	1	59		7
1999		19		20
2000				
2001				22
2002				
2003	1	3		
2004				
2005		69		3
2006	1	326		48
2007		136	1	62
2008	1			23
2009	3		1	141
2010	1	2	2	90
2011			1	67
2012		20		157
2013		21		74
2014		2		72
2015	25			82
2016	13	80		13
Total	**46**	**991**	**5**	**945**

Table 2.4.1.1. Estimated number of Hogfish caught recreationally per state, both harvested and released combined (types A+B1+B2), from the Southeastern US. Data obtained from the Marine Resources Information Program (MRIP) web interface (http://www.st.nmfs.noaa.gov/st1/recreational).

Year	ALABAMA	FLORIDA	GEORGIA	LOUISIANA	MISSISSIPPI
1981		1,020,253			
1982		69,416			
1983		251,567			
1984		3,073,490			
1985		151,046		12,440	
1986		141,765		351	
1987		252,260			
1988		185,950			
1989		105,211			
1990	407	129,223			
1991		174,719			
1992		202,335			479
1993		217,252			
1994		180,857			
1995		145,760			
1996		101,688			2,909
1997		95,088			1,257
1998		73,328	228		
1999		101,034	26		
2000		45,616			
2001		77,423			
2002		65,479			
2003		151,514	21		3,990
2004		152,673			
2005		148,547			
2006		88,749	34		
2007		170,434			
2008		265,029			
2009		159,559			
2010		172,916			
2011		69,395			
2012		213,555			
2013		192,873			
2014		233,666			
2015		312,890			
2016		255,850			

Table 2.4.1.2. Total number of recreational intercepts of Hogfish from MRFSS/MRIP for each state.

Year	ALABAMA	FLORIDA	GEORGIA	LOUISIANA	MISSISSIPPI
1981		37			
1982		27			
1983		15			
1984		25			
1985		10		3	
1986		17		1	
1987		57			
1988		39			
1989		31			
1990	1	28			
1991		23			
1992		103			1
1993		82			
1994		113			
1995		71			
1996		53			1
1997		54			1
1998		71	1		
1999		100	1		
2000		33			
2001		70			
2002		71			
2003		100	1		1
2004		100			
2005		77			
2006		63	1		
2007		119			
2008		137			
2009		99			
2010		103			
2011		124			
2012		118			
2013		130			
2014		219			
2015		207			
2016		161			

Table 2.4.1.3 Total recreational harvest (types A+B1) of Hogfish by mode and gear type from MRIP for the WFL stock.

Year	Charter Boat		Private Boat		Shore	
	Hook and Line	Spear	Hook and Line	Spear	Hook and Line	Spear
2004	190.524	0	1039.082	41649.109	0	0
2005	53.568	319.199	4416.703	14019.670	0	0
2006	97.979	0	7303.096	15122.073	0	0
2007	1211.626	0	6701.558	23051.596	0	0
2008	409.146	0	5353.980	71909.278	3018.392	0
2009	650.168	0	5554.325	37083.813	1270.041	0
2010	0	28010.459	13031.253	48880.374	0	0
2011	764.076	1874.024	8007.015	19571.825	0	0
2012	1087.945	5397.463	9434.213	38838.112	0	0
2013	556.759	0	20317.026	82518.872	0	0
2014	2237.962	2003.966	13508.595	20521.280	4482.253	0
2015	4080.840	0	16609.351	27996.059	0	0
2016	11410.711	0	18907.605	92572.063	0	0
Proportion:	**0.031037**	**0.051300**	**0.177593**	**0.728106**	**0.011965**	**0.000000**

Table 2.4.1.4. Estimated number of Hogfish caught from the Southeast Region Headboat Survey (SRHS). Note: the Western Gulf states other than FL (WGOM) are shown separately to highlight the focal distribution for Hogfish, but were included in the WFL stock.

Year	WGOM	WFL
1981	0	0
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	117
1987	1	34
1988	14	187
1989	0	41
1990	1	147
1991	5	94
1992	0	213
1993	0	167
1994	0	654
1995	0	465
1996	0	13
1997	0	7
1998	0	25
1999	2	40
2000	0	66
2001	0	57
2002	0	61
2003	0	80
2004	0	53
2005	1	123
2006	0	41
2007	3	77
2008	0	61
2009	1	125
2010	0	431
2011	1	2,945
2012	0	4,139
2013	5	1,975
2014	2	2,030
2015	1	1,272
2016	0	2,553

Table 2.4.1.5. Total number of intercepted trips from the dockside surveys catching Hogfish by year, stock, and gear type.

	WFL		
Year	**Spear**	**Hook and Line**	**Other**
1981	4	1	0
1982	4	0	0
1983	2	0	0
1984	0	0	0
1985	0	0	0
1986	3	3	0
1987	17	2	0
1988	12	4	0
1989	11	3	0
1990	2	1	0
1991	10	1	1
1992	9	9	7
1993	14	9	0
1994	15	8	0
1995	10	16	1
1996	11	7	0
1997	16	9	0
1998	20	12	0
1999	32	11	0
2000	3	9	0
2001	17	8	0
2002	10	10	0
2003	18	19	0
2004	19	4	0
2005	8	14	0
2006	18	4	0
2007	11	10	0
2008	34	16	0
2009	19	22	0
2010	33	12	0
2011	55	20	0
2012	32	11	0
2013	33	12	0
2014	37	42	0
2015	22	41	0
2016	31	35	0

Table 2.4.1.6. Total number of intercepted trips from the dockside surveys targeting Hogfish by year and gear type.

	WFL		
Year	**Spear**	**Hook and Line**	**Other**
1981	0	1	0
1982	2	0	0
1983	0	0	0
1984	0	0	0
1985	0	0	0
1986	2	0	0
1987	7	0	0
1988	5	0	0
1989	3	1	0
1990	1	0	0
1991	7	0	0
1992	6	1	6
1993	7	3	0
1994	9	0	0
1995	6	7	1
1996	3	1	0
1997	10	0	0
1998	14	0	0
1999	15	0	0
2000	1	0	0
2001	10	0	0
2002	7	0	0
2003	5	4	0
2004	9	0	0
2005	2	5	0
2006	12	0	0
2007	6	0	0
2008	27	4	0
2009	10	6	0
2010	23	4	0
2011	55	10	0
2012	28	10	0
2013	27	6	0
2014	26	24	0
2015	15	32	0
2016	14	20	0

Table 2.4.1.7. Average weight of recreationally caught fish across years, with the total number of fish measured for each year.

Year	WFL	
	Wt (g)	Sample
1981	-	0
1982	2540.785	2
1983	424.2159	3
1984	-	0
1985	-	0
1986	1007.518	36
1987	1416.323	33
1988	1386.77	17
1989	1263.89	16
1990	1202.87	6
1991	1019.537	27
1992	1251.302	22
1993	1259.124	20
1994	1029.712	31
1995	880.9514	43
1996	899.3598	10
1997	1082.187	28
1998	964.477	49
1999	1001.762	43
2000	1434.654	23
2001	939.3886	28
2002	1237.984	23
2003	1027.774	56
2004	1074.484	44
2005	1310.492	30
2006	923.2821	21
2007	810.4352	27
2008	1030.52	64
2009	1153.917	48
2010	1075.435	72
2011	1209.82	72
2012	1318.593	133
2013	1132.10	70
2014	981.87	107
2015	979.60	113
2016	1005.86	116

Table 2.4.1.8. Recreational harvest (types A+B1) of Hogfish from hook and line in the WFL stock. Both the MRFSS and MRIP estimates are presented, along with the calibrated time series.

Year	MRFSS		MRIP		Calibrated Harvest		
	Number	Variance	Number	Variance	Number	Metric Tons	PSE
1981	6290.06	39564861.89			5293.46	6.65	1.28
1982							
1983							
1984							
1985							
1986	3123.09	2895669.45			2628.26	2.65	0.71
1987	1401.37	1963826.98			1179.33	1.67	1.28
1988	7037.59	7514108.67			5922.54	8.21	0.52
1989	4687.51	21972768.59			3944.82	4.99	1.28
1990	6040.46	36487119.03			5083.40	6.11	1.28
1991							
1992	5502.81	3394506.81			4630.94	5.79	0.45
1993	13687.44	19151770.17			11518.79	14.50	0.43
1994	12864.80	16552913.50			10826.48	11.15	0.43
1995	17982.88	30042702.89			15133.65	13.33	0.42
1996	7872.57	11576315.10			6625.23	5.96	0.57
1997	15523.23	93967185.75			13063.71	14.14	0.81
1998	5252.31	4302519.12			4420.13	4.26	0.52
1999	2934.31	1268860.68			2469.40	2.47	0.51
2000	12813.53	17072063.42			10783.34	15.47	0.44
2001	9825.28	12196325.74			8268.55	7.77	0.48
2002	7583.39	7209512.14			6381.87	7.90	0.47
2003	27280.90	34852441.64			22958.49	23.60	0.31
2004	1507.82	666136.73	1229.61	1092474.07	1229.61	1.32	0.85
2005	8196.52	4954126.63	4470.27	6388048.67	4470.27	5.86	0.57
2006	2715.27	3515449.13	7401.07	53335217.14	7401.07	6.83	0.99
2007	10624.22	7188493.87	7913.18	13892073.83	7913.18	6.41	0.47
2008	10118.62	27667289.65	8781.52	11751817.82	8781.52	9.05	0.39
2009	8002.43	7413842.07	7474.53	10434060.53	7474.53	8.62	0.43
2010	13889.95	20886574.12	13031.25	39841529.26	13031.25	14.01	0.48
2011	15139.34	21434204.07	8771.09	18254147.96	8771.09	10.61	0.49
2012			10522.16	50962453.91	10522.16	13.74	0.68
2013			20873.78	0.00	20873.75	25.73	0.00
2014			20228.81	64801082.82	20228.81	21.57	0.40
2015			20690.19	96182740.93	20690.61	22.61	0.47
2016			30318.32	36489580.32	30318.32	34.76	0.20

Table 2.4.1.9. Recreational harvest (types A+B1) of Hogfish from spear fishing in the WFL stock. Both the MRFSS and MRIP estimates are presented, along with the calibrated time series.

Year	MRFSS		MRIP		Calibrated Harvest		
	Number	Variance	Number	Variance	Number	Metric Tons	PSE
1981							
1982	4756.30	6567585.21			5329.09	6.69	1.18
1983	18375.80	121295569.95			20588.76	25.85	1.31
1984							
1985							
1986	40628.02	427140054.53			45520.76	45.86	1.11
1987	41474.31	99451627.15			46468.96	65.82	0.54
1988	33805.76	90186034.08			37876.91	52.53	0.63
1989	33975.40	193801797.22			38066.98	48.11	0.90
1990	5458.80	8270118.62			6116.19	7.36	1.15
1991	101146.47	2045119771.65			113327.31	115.54	0.98
1992	46796.98	738418704.61			52432.64	65.61	1.27
1993	68366.08	827387649.92			76599.26	96.45	0.92
1994	33568.12	221481428.50			37610.65	38.73	0.97
1995	29193.59	109870020.31			32709.31	28.82	0.79
1996	13874.32	18897270.32			15545.18	13.98	0.70
1997	21671.07	38150489.02			24280.86	26.28	0.64
1998	26905.26	39994810.92			30145.40	29.07	0.53
1999	35765.08	69144351.61			40072.18	40.14	0.53
2000	10330.25	16086985.73			11574.30	16.61	0.85
2001	27120.01	46146663.39			30386.01	28.54	0.56
2002	12658.97	24871824.65			14183.46	17.56	0.87
2003	40019.39	70045685.63			44838.83	46.08	0.48
2004	37061.26	78057353.47	41649.11	464965294.88	41648.92	44.75	0.52
2005	12973.43	18584105.98	14338.87	66231248.29	14338.87	18.79	0.57
2006	17226.61	19386189.25	15122.07	41286585.66	15122.07	13.96	0.42
2007	27822.31	47411044.08	23051.60	112099658.04	23052.02	18.68	0.46
2008	64624.27	165484809.52	71909.28	561546411.74	71908.94	74.10	0.33
2009	42522.33	108790850.59	37083.81	172448872.18	37083.68	42.79	0.35
2010	42021.06	64910940.73	76890.83	1125329072.85	76890.05	82.69	0.44
2011	24833.84	37706285.56	21445.85	53579794.44	21445.85	25.95	0.34
2012			44235.57	221862665.88	44235.04	57.76	0.34
2013			82518.87	1846664417.27	82518.49	101.73	0.52
2014			22525.25	31945817.68	22525.25	24.02	0.25
2015			27996.06	196421907.24	27996.08	30.60	0.50
2016			92572.06	1635082750.22	92572.83	106.12	0.44

Table 2.4.1.10. Estimated number of saltwater participants (license holders) for the historical reconstruction of the recreational harvest.

Year	FL		Year	FL
1950	265,900		**1984**	649,083
1951	274,187		**1985**	684,301
1952	282,475		**1986**	687,402
1953	290,762		**1987**	645,483
1954	299,049		**1988**	644,860
1955	307,337		**1989**	632,557
1956	315,624		**1990**	693,183
1957	323,911		**1991**	731,261
1958	332,199		**1992**	775,458
1959	365,676		**1993**	745,297
1960	374,577		**1994**	777,864
1961	414,720		**1995**	791,477
1962	391,199		**1996**	770,610
1963	399,699		**1997**	782,742
1964	418,956		**1998**	806,434
1965	442,416		**1999**	935,546
1966	453,819		**2000**	925,380
1967	493,510		**2001**	871,024
1968	496,090		**2002**	846,377
1969	521,289		**2003**	796,720
1970	562,752		**2004**	815,838
1971	705,592		**2005**	767,444
1972	731,204		**2006**	933,356
1973	772,865		**2007**	1,008,471
1974	834,392		**2008**	1,057,003
1975	870,670		**2009**	1,085,113
1976	821,995		**2010**	1,079,780
1977	739,438		**2011**	1,059,224
1978	667,847		**2012**	1,140,376
1979	716,261		**2013**	1,066,988
1980	588,882		**2014**	1,082,737
1981	581,532		**2015**	1,071,372
1982	563,339		**2016**	1,119,390
1983	607,404			

Table 2.4.1.11. Historical reconstruction of recreational harvest (MRFSS/MRIP and headboat) of Hogfish from hook and line in the WFL stock.

Year	Number	Metric Tons	PSE		Year	Number	Metric Tons	PSE
1950	1018.31	1.28	1.06		**1984**			
1951	1050.05	1.32	1.06		**1985**			
1952	1081.79	1.36	1.06		**1986**	2745.26	2.77	0.71
1953	1113.53	1.40	1.06		**1987**	1213.33	1.72	1.28
1954	1145.26	1.44	1.06		**1988**	6109.54	8.47	0.52
1955	1177.00	1.48	1.06		**1989**	3985.82	5.04	1.28
1956	1208.74	1.52	1.06		**1990**	5230.40	6.29	1.28
1957	1240.48	1.56	1.06		**1991**	94.00	0.10	
1958	1272.22	1.60	1.06		**1992**	4843.94	6.06	0.45
1959	1400.42	1.76	1.06		**1993**	11685.79	14.71	0.43
1960	1434.51	1.80	1.06		**1994**	11480.48	11.82	0.43
1961	1588.25	1.99	1.06		**1995**	15598.65	13.74	0.42
1962	1498.17	1.88	1.06		**1996**	6638.23	5.97	0.57
1963	1530.72	1.92	1.06		**1997**	13070.71	14.14	0.81
1964	1604.47	2.01	1.06		**1998**	4445.13	4.29	0.52
1965	1694.31	2.13	1.06		**1999**	2509.40	2.51	0.51
1966	1737.98	2.18	1.06		**2000**	10849.34	15.57	0.44
1967	1889.99	2.37	1.06		**2001**	8325.55	7.82	0.48
1968	1899.87	2.39	1.06		**2002**	6442.87	7.98	0.47
1969	1996.37	2.51	1.06		**2003**	23038.49	23.68	0.31
1970	2155.16	2.71	1.06		**2004**	1282.61	1.38	0.85
1971	2702.19	3.39	1.06		**2005**	4593.27	6.02	0.57
1972	2800.28	3.52	1.06		**2006**	7442.07	6.87	0.99
1973	2959.83	3.72	1.06		**2007**	7990.18	6.47	0.47
1974	3195.46	4.01	1.06		**2008**	8842.52	9.11	0.39
1975	3334.39	4.19	1.06		**2009**	7599.53	8.77	0.43
1976	3147.98	3.95	1.06		**2010**	13462.25	14.48	0.48
1977	2831.81	3.56	1.06		**2011**	11716.09	14.17	0.49
1978	2557.64	3.21	1.06		**2012**	14661.16	19.33	0.68
1979	2743.05	3.44	1.06		**2013**	22848.75	27.02	
1980	2255.23	2.83	1.06		**2014**	22258.81	19.81	0.40
1981	5293.46	6.65	1.28		**2015**	21962.61	18.94	0.47
1982					**2016**	32871.32	28.25	0.20
1983								

Table 2.4.1.12. Historical reconstruction of recreational harvest (MRFSS/MRIP and headboat) of Hogfish from spear fishing in the WFL stock.

Year	Number	Metric Tons	PSE		Year	Number	Metric Tons	PSE
1950	8224.50	10.33	0.97		**1984**			
1951	8480.83	10.65	0.97		**1985**			
1952	8737.18	10.97	0.97		**1986**	45520.76	45.86	1.11
1953	8993.50	11.29	0.97		**1987**	46468.96	65.82	0.54
1954	9249.83	11.61	0.97		**1988**	37876.91	52.53	0.63
1955	9506.18	11.93	0.97		**1989**	38066.98	48.11	0.90
1956	9762.51	12.26	0.97		**1990**	6116.19	7.36	1.15
1957	10018.83	12.58	0.97		**1991**	113327.31	115.54	0.98
1958	10275.18	12.90	0.97		**1992**	52432.64	65.61	1.27
1959	11310.65	14.20	0.97		**1993**	76599.26	96.45	0.92
1960	11585.97	14.55	0.97		**1994**	37610.65	38.73	0.97
1961	12827.63	16.10	0.97		**1995**	32709.31	28.82	0.79
1962	12100.10	15.19	0.97		**1996**	15545.18	13.98	0.70
1963	12363.01	15.52	0.97		**1997**	24280.86	26.28	0.64
1964	12958.65	16.27	0.97		**1998**	30145.40	29.07	0.53
1965	13684.29	17.18	0.97		**1999**	40072.18	40.14	0.53
1966	14036.99	17.62	0.97		**2000**	11574.30	16.61	0.85
1967	15264.66	19.16	0.97		**2001**	30386.01	28.54	0.56
1968	15344.47	19.26	0.97		**2002**	14183.46	17.56	0.87
1969	16123.89	20.24	0.97		**2003**	44838.83	46.08	0.48
1970	17406.38	21.85	0.97		**2004**	41648.92	44.75	0.52
1971	21824.53	27.40	0.97		**2005**	14338.87	18.79	0.57
1972	22616.73	28.39	0.97		**2006**	15122.07	13.96	0.42
1973	23905.34	30.01	0.97		**2007**	23052.02	18.68	0.46
1974	25808.42	32.40	0.97		**2008**	71908.94	74.10	0.33
1975	26930.53	33.81	0.97		**2009**	37083.68	42.79	0.35
1976	25424.97	31.92	0.97		**2010**	76890.05	82.69	0.44
1977	22871.42	28.71	0.97		**2011**	21445.85	25.95	0.34
1978	20657.05	25.93	0.97		**2012**	44235.04	58.33	0.34
1979	22154.53	27.81	0.97		**2013**	82518.50	91.00	0.52
1980	18214.60	22.87	0.97		**2014**	22525.25	20.34	0.25
1981					**2015**	27996.08	35.01	0.50
1982	5329.09	6.69	1.18		**2016**	92572.83	103.55	0.44
1983	20588.76	25.85	1.31					

Table 2.4.2.1. Recreational discards (type B2) of Hogfish from hook and line in the WFL stock. Both the MRFSS and MRIP estimates are presented, along with the calibrated time series.

Year	MRFSS		MRIP		Calibrated Harvest		
	Number	Variance	Number	Variance	Number	Metric Tons	PSE
1981							
1982							
1983							
1984							
1985							
1986							
1987	1786.32	3190945.56			1464.90	2.07	0.78
1988							
1989	1171.88	1373298.04			961.01	1.21	0.78
1990							
1991							
1992	2312.61	5348147.79			1896.48	2.37	0.78
1993							
1994							
1995	1915.39	1863467.10			1570.74	1.38	0.57
1996	3645.40	7764089.34			2989.46	2.69	0.60
1997	571.96	327142.61			469.05	0.51	0.78
1998	1395.77	433156.61			1144.62	1.10	0.39
1999	2380.61	3211930.11			1952.25	1.96	0.60
2000	787.48	620128.68			645.79	0.93	0.78
2001							
2002	579.90	336280.68			475.55	0.59	0.78
2003	743.84	553297.89			610.00	0.63	0.78
2004	705.07	497119.01	393.04	154477.17	393.04	0.42	1.00
2005	3781.43	4028538.20	2662.44	3740821.42	2662.44	3.49	0.73
2006	1728.87	1621414.16	2539.60	150074.99	2539.60	2.34	0.15
2007	1349.42	1820928.79	463.57	214895.92	463.57	0.38	1.00
2008	5351.58	5225477.64	5099.15	2596988.57	5099.15	5.25	0.32
2009	3156.68	3386787.53	2102.19	1248669.54	2102.19	2.43	0.53
2010	3635.22	3996660.34	3023.83	4208908.91	3023.83	3.25	0.68
2011	532.07	283099.33	314.54	98935.09	314.54	0.38	1.00
2012							
2013			1411.29	1279840.80	1411.29	1.74	0.80
2014			6063.08	13543454.97	6063.08	6.46	0.61
2015			1519.10	931103.36	1519.10	1.66	0.64
2016			11053.21	44417530.40	11053.21	12.67	0.60

Table 2.4.3.1. Total angler days from the Southeast Region Headboat Survey (SRHB) with the Western Gulf states other than FL (WGOM) separate.

Year	**WGOM**	**WFL**
1981		
1982		
1983		
1984		
1985		
1986	62,459	240,077
1987	69,725	217,049
1988	78,087	195,948
1989	66,256	208,325
1990	65,042	213,906
1991	66,342	174,312
1992	86,129	184,802
1993	92,160	207,898
1994	113,429	204,562
1995	100,962	182,410
1996	102,840	154,913
1997	91,215	149,442
1998	85,504	185,331
1999	66,261	176,117
2000	63,347	159,331
2001	61,583	157,243
2002	73,173	141,831
2003	81,068	144,211
2004	64,990	158,430
2005	59,857	130,233
2006	75,794	124,049
2007	66,286	136,880
2008	44,133	130,176
2009	54,005	142,438
2010	47,869	111,018
2011	50,941	157,025
2012	55,456	161,975
2013	59,155	174,731
2014	54,488	191,365
2015	58,722	194,383
2016	57,038	199,978

Table 2.5.1.1. Commercial logbook index of abundance for spear fisheries in the WFL stock.

Year	Std. CPUE	CV	Lower CI	Upper CI	Nom. CPUE	Prop. Positive	N Obs.
1993	1.028713	0.28	0.5825	1.8167	0.9367	0.8438	32
1994	0.699031	0.26	0.4130	1.1830	0.7016	0.8286	35
1995	0.870798	0.28	0.4944	1.5338	0.8394	0.6905	42
1996	0.497454	0.25	0.3025	0.8182	0.5161	0.7407	54
1997	0.790019	0.22	0.5120	1.2191	0.7156	0.8154	65
1998	0.696056	0.24	0.4289	1.1296	0.7022	0.7692	52
1999	0.627789	0.23	0.3956	0.9963	0.6028	0.7581	62
2000	1.132947	0.20	0.7625	1.6833	1.0902	0.8556	90
2001	1.791853	0.20	1.1901	2.6979	1.5530	0.8333	84
2002	1.416117	0.21	0.9346	2.1457	1.4218	0.7624	101
2003	1.374565	0.20	0.9262	2.0400	1.1980	0.8812	101
2004	0.764749	0.22	0.4961	1.1788	0.7907	0.7245	98
2005	0.833995	0.23	0.5247	1.3256	0.7847	0.7059	85
2006	0.448640	0.22	0.2887	0.6971	0.4399	0.6832	101
2007	0.661150	0.22	0.4239	1.0312	0.6608	0.7174	92
2008	0.933686	0.19	0.6386	1.3651	0.9497	0.8413	126
2009	1.830989	0.20	1.2363	2.7117	2.3513	0.8016	126
2010	0.984947	0.19	0.6764	1.4343	0.9466	0.8394	137
2011	1.211298	0.19	0.8261	1.7762	1.5498	0.8390	118
2012	1.307880	0.19	0.9001	1.9005	1.5297	0.8438	128
2013	0.938495	0.22	0.6067	1.4518	0.7244	0.7294	85
2014	1.050691	0.18	0.7338	1.5044	0.9496	0.8654	156
2015	0.991873	0.17	0.7004	1.4047	0.9661	0.8871	186
2016	1.116264	0.18	0.7841	1.5890	1.0791	0.8342	193

Table 2.5.1.2. Standardized index of abundance from commercial Florida trip tickets for the WFL hook and line model.

Year	Total trips	Positive Trips	Mean	Std. Dev.	CV
1994	2561	149	0.696297	0.099363	0.142702
1995	2666	86	0.669113	0.119826	0.179081
1996	2851	111	0.602572	0.099656	0.165384
1997	3005	92	0.468100	0.083429	0.178228
1998	3503	70	0.258970	0.052002	0.200802
1999	3548	78	0.312560	0.059794	0.191305
2000	4148	136	0.590178	0.087864	0.148878
2001	3706	141	0.580665	0.084599	0.145694
2002	3353	118	0.743108	0.119231	0.160449
2003	3235	64	0.451585	0.093480	0.207004
2004	3201	53	0.211224	0.048290	0.228619
2005	2627	47	0.374248	0.089889	0.240185
2006	2139	28	0.360019	0.113398	0.314977
2007	2086	21	0.215516	0.077651	0.360303
2008	2110	24	0.410541	0.139676	0.340225
2009	2732	36	0.435307	0.121455	0.279009
2010	1596	30	0.868820	0.261030	0.300442
2011	1510	58	1.391043	0.306627	0.220429
2012	1550	21	0.563205	0.202612	0.359749
2013	1723	25	0.226908	0.074874	0.329978
2014	1869	29	0.192367	0.058464	0.303920
2015	1741	48	1.327699	0.319139	0.240370
2016	1579	43	0.763396	0.194474	0.254749

Table 2.5.1.3.1 Standardized index of abundance from recreational MRFSS/MRIP intercept data for the WFL spear model. Note: year 1991 was removed due to convergence issues.

Year	Total trips	Positive Trips	Mean	Std. Dev.	CV
1992	13	5	1.383487	0.754019	0.545014
1993	21	12	2.719110	0.837682	0.308072
1994	25	10	1.615877	0.581362	0.359781
1995	20	8	1.897912	0.763705	0.402392
1996	35	11	0.782927	0.284928	0.363927
1997	24	11	1.511902	0.506718	0.335153
1998	32	21	2.149517	0.486069	0.226129
1999	38	26	1.734082	0.349967	0.201817
2000	12	5	1.404649	0.724651	0.515895
2001	24	16	1.655462	0.429909	0.259691
2002	24	7	1.068202	0.487376	0.456259
2003	43	21	1.247459	0.297825	0.238745
2004	18	10	2.122242	0.723460	0.340894
2005	17	8	1.114477	0.443580	0.398016
2006	14	11	1.630107	0.485723	0.297970
2007	10	8	2.492068	0.891106	0.357577
2008	24	17	2.722669	0.662488	0.243323
2009	22	16	2.807615	0.700901	0.249643
2010	20	16	3.558751	0.887020	0.249250
2011	17	15	3.176028	0.782271	0.246305
2012	22	20	5.186810	1.083193	0.208836
2013	34	22	2.358117	0.514601	0.218225
2014	38	25	1.698486	0.353047	0.207860
2015	23	16	1.909557	0.490847	0.257048
2016	35	25	2.449316	0.504417	0.205942

Table 2.5.1.3.2 Standardized index of abundance from recreational MRFSS/MRIP intercept data for the WFL hook-and-line model.

Year	Total trips	Positive Trips	Mean	Std. Dev.	CV
1992	220	8	0.052815	0.024511	0.464087
1993	163	7	0.097851	0.047799	0.488489
1994	138	10	0.150353	0.059373	0.394893
1995	175	11	0.130429	0.049941	0.382895
1996	141	7	0.133556	0.064177	0.480526
1997	110	8	0.150739	0.068148	0.452091
1998	184	15	0.149539	0.048088	0.321572
1999	220	10	0.073983	0.029649	0.400750
2000	181	9	0.109627	0.047096	0.429599
2001	189	7	0.070355	0.034464	0.489865
2002	223	10	0.071389	0.028604	0.400675
2003	230	16	0.223619	0.069445	0.310549
2004	160	4	0.039845	0.026230	0.658302
2005	163	7	0.119890	0.057982	0.483624
2006	66	4	0.120244	0.077739	0.646514
2007	80	10	0.234056	0.088384	0.377618
2008	121	12	0.172621	0.062545	0.362329
2009	144	15	0.175157	0.055972	0.319554
2010	49	9	0.696045	0.266207	0.382457
2011	72	9	0.393801	0.160276	0.406996
2012	142	5	0.169774	0.098660	0.581127
2013	148	7	0.112183	0.054711	0.487694
2014	268	28	0.260108	0.059846	0.230082
2015	257	21	0.214550	0.058179	0.271165
2016	287	24	0.270072	0.067154	0.248651

Table 2.5.2.1. Annual indices of relative abundance (MaxN) as well as coefficient of variation (CV) and lower (LCL) and upper (UCL) 95% confidence limits for Hogfish as determined via a generalized linear modeling analysis of data from the NMFS – Panama City and FWRI video surveys. Analyses were calculated using censored data sets (see Analytical Methods section).

Year	Standardized Index	CV	LCL	UCL
2005	1.439733	0.326105	0.635845	2.258072
2006	0.803490	0.420262	0.219832	1.384636
2007	0.067336	0.769558	0.000000	0.290011
2008	1.495601	0.315007	0.995588	3.222470
2009	1.288987	0.220055	0.830988	1.973405
2010	0.904796	0.210191	0.560307	1.197621
2011	0.761954	0.167617	0.523727	0.953745
2012	1.062321	0.161443	0.679975	1.267668
2013	1.366812	0.245186	0.855294	1.874990
2014	0.991934	0.208872	0.607889	1.321205
2015	0.965556	0.288917	0.505056	1.461308
2016	0.851481	0.161207	0.595102	1.047325

Table 2.5.2.2. Annual indices of relative abundance (Individuals Per Set) as well as coefficient of variation (CV) and lower (LCL) and upper (UCL) 95% confidence limits for Hogfish as determined via a generalized linear modeling analysis of data from the FWRI polyhaline seagrass trawl survey. Analyses were calculated using censored data sets (see Analytical Methods section).

Year	Standardized Index	CV	LCL	UCL
2008	0.6306	0.1613	0.4608	0.8629
2009	0.1278	0.2521	0.0789	0.2071
2010	0.2112	0.2266	0.1367	0.3264
2011	0.2860	0.1987	0.1939	0.4218
2012	1.0575	0.1580	0.7793	1.4350
2013	0.1115	0.2960	0.0636	0.1955
2014	0.0152	0.6674	0.0047	0.0492
2015	0.1207	0.2578	0.0736	0.1978
2016	0.1749	0.2224	0.1137	0.2690

Table 2.5.2.3. Annual indices of relative abundance (Individuals Per Set) as well as coefficient of variation (CV) and lower (LCL) and upper (UCL) 95% confidence limits for Hogfish as determined via a generalized linear modeling analysis of data from the FWRI baitfish trawl survey.

Year	Standardized Index	CV	LCL	UCL
2002	0.1605	0.8679	0.0423	0.6092
2003	2.3590	0.8185	0.6585	8.4502
2004	0.6214	0.8020	0.1715	2.2517
2005	2.6049	1.4951	0.5012	13.5371
2006	0.2489	0.6735	0.0812	0.7628
2007	0.7742	0.6460	0.2561	2.3404
2008	0.2295	1.1332	0.0448	1.1742
2009	0.8288	0.6826	0.2564	2.6789
2010	1.5853	0.6140	0.5473	4.5922
2011	1.6868	0.6587	0.5476	5.1958
2012	1.3169	0.6505	0.4386	3.9540
2013	0.3024	0.6144	0.1039	0.8797
2014	1.0154	0.7365	0.2887	3.5719
2015	2.1765	0.6822	0.6796	6.9713
2016	0.1315	1.3014	0.0216	0.8013

Table 2.5.2.4.Annual indices of relative abundance (Individuals Per Set) as well as coefficient of variation (CV) and lower (LCL) and upper (UCL) 95% confidence limits for Hogfish as determined via a generalized linear modeling analysis of data from the summer FWRI SEAMAP trawl survey.

Year	Standardized Index	CV	LCL	UCL
2008	1.0315	1.1541	0.2447	4.3477
2009	0.4088	0.4006	0.1941	0.8609
2010	0.4133	0.3684	0.2086	0.8189
2011	0.2540	0.4190	0.1163	0.5547
2012	0.6299	0.3107	0.3510	1.1307
2013	0.1909	0.4409	0.0859	0.4243
2014	0.2274	0.4027	0.1075	0.4808
2015	0.2827	0.4038	0.1334	0.5988
2016	0.2100	0.5505	0.0767	0.5749

Table 2.5.2.4. Annual indices of relative abundance (Individuals Per Set) as well as coefficient of variation (CV) and lower (LCL) and upper (UCL) 95% confidence limits for Hogfish as determined via a generalized linear modeling analysis of data from the FWRI baitfish trawl survey.

Year	Standardized Index	CV	LCL	UCL
2002	0.1605	0.8679	0.0423	0.6092
2003	2.3590	0.8185	0.6585	8.4502
2004	0.6214	0.8020	0.1715	2.2517
2005	2.6049	1.4951	0.5012	13.5371
2006	0.2489	0.6735	0.0812	0.7628
2007	0.7742	0.6460	0.2561	2.3404
2008	0.2295	1.1332	0.0448	1.1742
2009	0.8288	0.6826	0.2564	2.6789
2010	1.5853	0.6140	0.5473	4.5922
2011	1.6868	0.6587	0.5476	5.1958
2012	1.3169	0.6505	0.4386	3.9540
2013	0.3024	0.6144	0.1039	0.8797
2014	1.0154	0.7365	0.2887	3.5719
2015	2.1765	0.6822	0.6796	6.9713
2016	0.1315	1.3014	0.0216	0.8013

Table 3.2.1.2. List of SS parameters for the WFL Hogfish stock. The list includes fixed and estimated parameter values and their associated standard errors from the continuity model run, and any prior estimates that were used.

	Predicted		Prior				
Label	Value	Parm_StDev	PR_type	Prior	Pr_SD	Status	Description
L_at_Amin_Fem_GP_1	18.54	--	No_prior	--	--	Fixed	Female length at age 1
L_at_Amax_Fem_GP_1	84.89	--	No_prior	--	--	Fixed	Female length at age 21
VonBert_K_Fem_GP_1	0.1058	--	No_prior	--	--	Fixed	Female K
CV_young_Fem_GP_1	0.2	--	No_prior	--	--	Fixed	Young female growth CV
CV_old_Fem_GP_1	0.2	--	No_prior	--	--	Fixed	Old female growth CV
L_at_Amin_Mal_GP_1	18.54	--	No_prior	--	--	Fixed	Male length at age 1
L_at_Amax_Mal_GP_1	84.89	--	No_prior	--	--	Fixed	Male length at age 21
VonBert_K_Mal_GP_1	0.1058	--	No_prior	--	--	Fixed	Male K
CV_young_Mal_GP_1	0.2	--	No_prior	--	--	Fixed	Young male growth CV
CV_old_Mal_GP_1	0.2	--	No_prior	--	--	Fixed	Old male growth CV
Wtlen_1_Fem	5.28E-05	--	No_prior	--	--	Fixed	Female weight-length scalar
Wtlen_2_Fem	2.745	--	No_prior	--	--	Fixed	Female weight-length exponent
Mat50%_Fem	15.4696	--	No_prior	--	--	Fixed	Maturity inflection point
Mat_slope_Fem	-0.09815	--	No_prior	--	--	Fixed	Maturity slope
Eggs_scalar_Fem	1	--	No_prior	--	--	Fixed	Fecundity scalar
Eggs_exp_wt_Fem	1	--	No_prior	--	--	Fixed	Fecundity exponent
Wtlen_1_Mal	5.28E-05	--	No_prior	--	--	Fixed	Male weight-length scalar
Wtlen_2_Mal	2.745	--	No_prior	--	--	Fixed	Male weight-length exponent
Herm_Infl_age	7.5	--	No_prior	--	--	Fixed	Sex transition inflection point
Herm_stdev	2.15	--	No_prior	--	--	Fixed	Sex transition standard deviation
Herm_asymptote	0.999	--	No_prior	--	--	Fixed	Sex transition asymptote
SR_LN(R0)	6.13778	0.0824308	No_prior	--	--	Estimated	Virgin recruit
SR_BH_steep	0.866732	0.0786731	Sym_Beta	0.748	2	Estimated	Steepness
SR_sigmaR	0.6	--	No_prior	--	--	Fixed	Stock-recruit standard deviation
SR_R1_offset	-0.224914	0.0798033	No_prior	--	--	Estimated	Stock-recruit offset
SR_autocorr	0	--	No_prior	--	--	Fixed	Stock-recruit autocorrelation
Early_InitAge_20	0.0689511	0.621599	dev	--	--	Estimated	Age 20 Initial age structure
Early_InitAge_19	0.00903284	0.602725	dev	--	--	Estimated	Age 19 Initial age structure
Early_InitAge_18	0.0103523	0.603125	dev	--	--	Estimated	Age 18 Initial age structure
Early_InitAge_17	0.0118943	0.603594	dev	--	--	Estimated	Age 17 Initial age structure
Early_InitAge_16	0.0136894	0.604141	dev	--	--	Estimated	Age 16 Initial age structure
Early_InitAge_15	0.0158176	0.604791	dev	--	--	Estimated	Age 15 Initial age structure
Early_InitAge_14	0.0187988	0.605705	dev	--	--	Estimated	Age 14 Initial age structure
Early_InitAge_13	0.0220523	0.606706	dev	--	--	Estimated	Age 13 Initial age structure
Early_InitAge_12	0.0262717	0.608014	dev	--	--	Estimated	Age 12 Initial age structure
Early_InitAge_11	0.0292497	0.608942	dev	--	--	Estimated	Age 11 Initial age structure
Early_InitAge_10	0.0324334	0.609937	dev	--	--	Estimated	Age 10 Initial age structure
Early_InitAge_9	0.0370118	0.611378	dev	--	--	Estimated	Age 9 Initial age structure
Early_InitAge_8	0.0461752	0.614307	dev	--	--	Estimated	Age 8 Initial age structure
Early_InitAge_7	0.0615627	0.619329	dev	--	--	Estimated	Age 7 Initial age structure
Early_InitAge_6	0.0901873	0.629061	dev	--	--	Estimated	Age 6 Initial age structure
Early_InitAge_5	0.131581	0.644219	dev	--	--	Estimated	Age 5 Initial age structure
Early_InitAge_4	0.201152	0.673416	dev	--	--	Estimated	Age 4 Initial age structure
Early_InitAge_3	0.298934	0.726452	dev	--	--	Estimated	Age 3 Initial age structure
Early_InitAge_2	2.19158	0.313909	dev	--	--	Estimated	Age 2 Initial age structure
Early_InitAge_1	0.239286	0.699235	dev	--	--	Estimated	Age 1 Initial age structure

Table 3.2.1.2 (continued). List of SS parameters for the WFL Hogfish stock. The list includes fixed and estimated parameter values and their associated standard errors from the continuity model run, and any prior estimates that were used.

	Predicted		Prior				
Label	Value	Parm_StDev	PR_type	Prior	Pr_SD	Status	Description
Early_RecrDev_1986	0.0554524	0.607349	dev	--	--	Estimated	1986 recruit deviation
Early_RecrDev_1987	-0.117076	0.536748	dev	--	--	Estimated	1987 recruit deviation
Early_RecrDev_1988	-0.255413	0.512972	dev	--	--	Estimated	1988 recruit deviation
Early_RecrDev_1989	-0.398353	0.484533	dev	--	--	Estimated	1989 recruit deviation
Early_RecrDev_1990	-0.262115	0.458369	dev	--	--	Estimated	1990 recruit deviation
Early_RecrDev_1991	-0.235594	0.428397	dev	--	--	Estimated	1991 recruit deviation
Early_RecrDev_1992	0.149061	0.309243	dev	--	--	Estimated	1992 recruit deviation
Main_RecrDev_1993	0.338145	0.301516	dev	--	--	Estimated	1993 recruit deviation
Main_RecrDev_1994	-0.43897	0.481362	dev	--	--	Estimated	1994 recruit deviation
Main_RecrDev_1995	-0.394477	0.439025	dev	--	--	Estimated	1995 recruit deviation
Main_RecrDev_1996	0.391966	0.305381	dev	--	--	Estimated	1996 recruit deviation
Main_RecrDev_1997	0.131914	0.30023	dev	--	--	Estimated	1997 recruit deviation
Main_RecrDev_1998	-0.214208	0.352922	dev	--	--	Estimated	1998 recruit deviation
Main_RecrDev_1999	0.453798	0.18735	dev	--	--	Estimated	1999 recruit deviation
Main_RecrDev_2000	-0.618792	0.276019	dev	--	--	Estimated	2000 recruit deviation
Main_RecrDev_2001	-1.66402	0.359842	dev	--	--	Estimated	2001 recruit deviation
Main_RecrDev_2002	0.386481	0.180575	dev	--	--	Estimated	2002 recruit deviation
Main_RecrDev_2003	-0.867043	0.398971	dev	--	--	Estimated	2003 recruit deviation
Main_RecrDev_2004	-0.49712	0.357984	dev	--	--	Estimated	2004 recruit deviation
Main_RecrDev_2005	0.696476	0.1584	dev	--	--	Estimated	2005 recruit deviation
Main_RecrDev_2006	1.79999	0.0835978	dev	--	--	Estimated	2006 recruit deviation
Main_RecrDev_2007	0.91077	0.106833	dev	--	--	Estimated	2007 recruit deviation
Main_RecrDev_2008	0.992549	0.0809659	dev	--	--	Estimated	2008 recruit deviation
Main_RecrDev_2009	-0.443554	0.129499	dev	--	--	Estimated	2009 recruit deviation
Main_RecrDev_2010	-0.495506	0.121225	dev	--	--	Estimated	2010 recruit deviation
Main_RecrDev_2011	0.645611	0.0828317	dev	--	--	Estimated	2011 recruit deviation
Main_RecrDev_2012	0.712179	0.0830814	dev	--	--	Estimated	2012 recruit deviation
Main_RecrDev_2013	-0.0787146	0.121233	dev	--	--	Estimated	2013 recruit deviation
Main_RecrDev_2014	-0.668766	0.180501	dev	--	--	Estimated	2014 recruit deviation
Main_RecrDev_2015	-0.680769	0.202067	dev	--	--	Estimated	2015 recruit deviation
Main_RecrDev_2016	-0.397934	0.212143	dev	--	--	Estimated	2016 recruit deviation
InitF_1Comm_Spear	0.00433126	0.000611502	No_prior	--	--	Estimated	Comm. Spear initial F
InitF_2Comm_HL	0.001	--	No_prior	--	--	Fixed	Comm. HL initial F
InitF_3Comm_Trap	0	--	No_prior	--	--	Fixed	Comm. Trap initial F
InitF_4Rec_Spear	0.483312	0.0161981	Sym_Beta	0.25	1	Estimated	Rec. Spear initial F
InitF_5Rec_HL	0.0114334	0.00630387	No_prior	--	--	Estimated	Rec. HL initial F
SizeSel_1P_1_Comm_Spear	32.9673	0.392768	No_prior	--	--	Estimated	Comm spear size select peak
SizeSel_1P_2_Comm_Spear	-2.34635	0.297387	No_prior	--	--	Estimated	Comm spear size select top
SizeSel_1P_3_Comm_Spear	1.80804	0.249241	No_prior	--	--	Estimated	Comm spear size select ascending width
SizeSel_1P_4_Comm_Spear	4.00265	0.348815	No_prior	--	--	Estimated	Comm spear size select descending width
SizeSel_1P_5_Comm_Spear	-15	--	No_prior	--	--	Fixed	Comm spear size select initial
SizeSel_1P_6_Comm_Spear	-1.45256	0.159926	No_prior	--	--	Estimated	Comm spear size select final
SizeSel_2P_1_Comm_HL	23.6048	2.69179	No_prior	--	--	Estimated	Comm HL size select peak
SizeSel_2P_2_Comm_HL	-5	--	No_prior	--	--	Fixed	Comm HL size select top
SizeSel_2P_3_Comm_HL	2.742	1.21044	No_prior	--	--	Estimated	Comm HL size select ascending width

Table 3.2.1.2 (continued). List of SS parameters for the WFL Hogfish stock. The list includes fixed and estimated parameter values and their associated standard errors from the continuity model run, and any prior estimates that were used.

	Predicted		Prior				
Label	Value	Parm_StDev	PR_type	Prior	Pr_SD	Status	Description
SizeSel_2P_4_Comm_HL	6	--	No_prior	--	--	Fixed	Comm HL size select descending width
SizeSel_2P_5_Comm_HL	-15	--	No_prior	--	--	Fixed	Comm HL size select initial
SizeSel_2P_6_Comm_HL	15	--	No_prior	--	--	Fixed	Comm HL size select final
SizeSel_3P_1_Comm_Trap	30.9431	0.709047	No_prior	--	--	Estimated	Comm Trap size select peak
SizeSel_3P_2_Comm_Trap	-12.461	44.1138	No_prior	--	--	Estimated	Comm Trap size select top
SizeSel_3P_3_Comm_Trap	3.97671	0.195792	No_prior	--	--	Estimated	Comm Trap size select ascending width
SizeSel_3P_4_Comm_Trap	4.09288	0.19047	No_prior	--	--	Estimated	Comm Trap size select descending width
SizeSel_3P_5_Comm_Trap	-15	--	No_prior	--	--	Fixed	Comm Trap size select initial
SizeSel_3P_6_Comm_Trap	-15	--	No_prior	--	--	Fixed	Comm Trap size select final
SizeSel_4P_1_Rec_Spear	33.0097	0.451057	No_prior	--	--	Estimated	Rec spear size select peak
SizeSel_4P_2_Rec_Spear	-2.75143	0.343337	No_prior	--	--	Estimated	Rec spear size select top
SizeSel_4P_3_Rec_Spear	2.74256	0.178898	No_prior	--	--	Estimated	Rec spear size select ascending width
SizeSel_4P_4_Rec_Spear	4.62801	0.185343	No_prior	--	--	Estimated	Rec spear size select descending width
SizeSel_4P_5_Rec_Spear	-15	--	No_prior	--	--	Fixed	Rec spear size select initial
SizeSel_4P_6_Rec_Spear	-15	--	No_prior	--	--	Fixed	Rec spear size select final
SizeSel_5P_1_Rec_HL	33.1313	0.627039	No_prior	--	--	Estimated	Rec HL size select peak
SizeSel_5P_2_Rec_HL	-4.50481	3.33849	No_prior	--	--	Estimated	Rec HL size select top
SizeSel_5P_3_Rec_HL	3.07606	0.209765	No_prior	--	--	Estimated	Rec HL size select ascending width
SizeSel_5P_4_Rec_HL	4.51993	0.274431	No_prior	--	--	Estimated	Rec HL size select descending width
SizeSel_5P_5_Rec_HL	-15	--	No_prior	--	--	Fixed	Rec HL size select initial
SizeSel_5P_6_Rec_HL	-15	--	No_prior	--	--	Fixed	Rec HL size select final
SizeSel_6P_1_Baitfish	10.1999	0.139453	Sym_Beta	16	2	Estimated	Baitfish size select peak
SizeSel_6P_2_Baitfish	-9	--	No_prior	--	--	Fixed	Baitfish size select top
SizeSel_6P_3_Baitfish	11.7059	52.7233	No_prior	--	--	Estimated	Baitfish size select ascending width
SizeSel_6P_4_Baitfish	5.10304	0.0485564	No_prior	--	--	Estimated	Baitfish size select descending width
SizeSel_6P_5_Baitfish	-15	--	No_prior	--	--	Fixed	Baitfish size select initial
SizeSel_6P_6_Baitfish	-15	--	No_prior	--	--	Fixed	Baitfish size select final
SizeSel_7P_1_SEAMAP	0	--	No_prior	--	--	Fixed	SEAMAP size select mirror
SizeSel_7P_2_SEAMAP	0	--	No_prior	--	--	Fixed	SEAMAP size select mirror
SizeSel_8P_1_VideoIOA	26.7923	1.88284	No_prior	--	--	Estimated	Video size select peak
SizeSel_8P_2_VideoIOA	-11.2603	57.513	No_prior	--	--	Estimated	Video size select top
SizeSel_8P_3_VideoIOA	3.95193	0.613445	No_prior	--	--	Estimated	Video size select ascending width
SizeSel_8P_4_VideoIOA	5.806	0.289604	No_prior	--	--	Estimated	Video size select descending width
SizeSel_8P_5_VideoIOA	-15	--	No_prior	--	--	Fixed	Video size select initial
SizeSel_8P_6_VideoIOA	-15	--	No_prior	--	--	Fixed	Video size select final
AgeSel_9P_1_RecTrawlIOA	0.1	--	No_prior	--	--	Fixed	Rec Trawl age select initial
AgeSel_9P_2_RecTrawlIOA	0.9	--	No_prior	--	--	Fixed	Rec Trawl age select final

Table 3.2.1.5.1. Derived quantity estimates from the WFL stock continuity model configuration.

	SSB		Recruits		F		SPR	
Year	**Value**	**StdDev**	**Value**	**StdDev**	**Value**	**StdDev**	**Value**	**StdDev**
1986	840.029	112.817	439.708	267.298	0.046	0.007	0.719	0.048
1987	1050.280	144.575	375.848	202.144	0.044	0.006	0.755	0.042
1988	1225.920	172.676	329.207	169.318	0.041	0.005	0.740	0.038
1989	1358.020	193.179	285.420	138.969	0.045	0.006	0.648	0.041
1990	1436.700	206.103	325.867	150.125	0.021	0.003	0.776	0.025
1991	1526.140	214.455	333.407	143.697	0.104	0.013	0.238	0.041
1992	1401.400	209.707	483.111	152.331	0.058	0.008	0.360	0.049
1993	1365.660	207.471	578.023	178.958	0.088	0.012	0.183	0.037
1994	1274.990	202.385	262.278	128.822	0.051	0.008	0.363	0.052
1995	1252.150	200.592	271.683	122.363	0.045	0.007	0.432	0.051
1996	1234.680	198.712	591.182	182.733	0.025	0.004	0.628	0.041
1997	1256.630	198.589	452.906	141.853	0.038	0.006	0.478	0.047
1998	1258.950	198.248	317.950	115.462	0.033	0.005	0.540	0.043
1999	1265.920	197.727	615.556	120.788	0.040	0.006	0.497	0.044
2000	1275.820	198.123	209.085	60.379	0.024	0.004	0.661	0.035
2001	1295.720	197.793	73.033	27.444	0.039	0.006	0.526	0.040
2002	1274.300	195.653	562.442	108.851	0.027	0.004	0.632	0.035
2003	1279.910	195.044	159.381	65.808	0.069	0.010	0.256	0.040
2004	1203.630	194.936	227.786	84.300	0.048	0.008	0.374	0.049
2005	1147.560	190.554	743.146	131.212	0.025	0.004	0.604	0.044
2006	1155.170	189.221	2241.680	247.311	0.026	0.004	0.578	0.042
2007	1276.540	197.230	928.946	119.438	0.026	0.004	0.620	0.036
2008	1428.170	207.740	1016.660	107.554	0.055	0.008	0.526	0.038
2009	1576.470	220.769	243.450	36.030	0.035	0.005	0.709	0.027
2010	1712.850	232.352	232.330	32.587	0.063	0.008	0.544	0.035
2011	1751.440	240.769	728.221	77.765	0.032	0.004	0.698	0.027
2012	1828.810	248.714	780.295	85.321	0.048	0.006	0.517	0.036
2013	1854.430	255.408	354.094	50.157	0.069	0.009	0.332	0.037
2014	1794.290	258.453	195.907	38.534	0.034	0.005	0.573	0.035
2015	1795.880	259.935	193.579	42.390	0.037	0.005	0.532	0.037
2016	1762.710	258.943	261.505	60.116	0.093	0.014	0.172	0.031

Table 3.2.1.7.1. Model quantities from the jitter analysis for the WFL stock continuity model.

Rank	TOTAL	Steepness	SPB_Virgin	F_MSY	MSY	F/F_MSY	SSB/SSB_MSST	SPR	R0
1	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
2	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
3	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
4	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
5	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
6	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
7	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
8	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
9	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
10	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
11	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
12	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
13	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
14	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
15	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
16	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
17	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
18	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
19	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
20	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
21	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
22	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
23	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
24	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
25	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
26	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
27	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
28	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
29	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
30	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931275	4.8646705	0.17466	465.64801
31	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931277	4.8646705	0.17466	465.64801
32	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931277	4.8646705	0.17466	465.64801
33	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931277	4.8646705	0.17466	465.64801
34	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
35	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
36	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
37	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
38	2775.99	0.86648	2766.5	0.095818	81.7926	0.2927395	4.8648841	0.17426	466.20712
39	2782.56	0.866528	2779.0	0.0957786	82.1369	0.2900076	4.892525	0.17441	468.31446
40	2789.08	0.864527	2856.6	0.095518	83.8807	0.2763818	5.033819	0.18460	481.40552
41	2789.48	0.864204	2868.6	0.0954529	84.1262	0.2735934	5.0709323	0.18660	483.42201
42	2789.82	0.86499	2860.6	0.0955509	84.097	0.2759064	5.0333578	0.18486	482.07996
43	2791.72	0.863914	2885.4	0.0954077	84.5375	0.2701571	5.1124951	0.18840	486.24859
44	2807.12	0.868739	2636.1	0.0961275	78.4795	0.3227763	4.5891784	0.15487	444.24668
45	2822.56	0.866457	2742.1	0.0959362	81.1717	0.2980606	4.8091508	0.17252	462.10401
46	2822.56	0.866458	2742.1	0.0959364	81.1703	0.2980712	4.8090234	0.17251	462.09477
47	2851.04	0.862517	2659.5	0.0963694	78.6232	0.3322891	4.4182386	0.16204	448.18227
48	2890.23	0.86046	2915.8	0.0956344	85.1699	0.2689213	5.1099863	0.19538	491.36636
49	2943.25	0.887197	1951.7	0.123942	74.1881	1.4361787	1.260627	0.06636	328.89548
50	2999.95	0.882519	1959.7	0.123208	73.4874	1.3731093	1.3362083	0.06721	330.24341

Table 3.2.1.8.1.1. Estimates of parameters, derived quantities, BRPs, and stock status from both the continuity run and bootstrap analyses for the WFL stock continuity model configuration.

Parameter/Quantity	**Continuity Run**	**Bootstrap Runs**						
		2.5%	**25%**	**50%**	**75%**	**97.5%**	**Mean**	**SD**
SSB_Virgin	2747.58	2189.35	2407.5	2534.52	2701.12	3058.46	2556.79	218.54
SSB_2016	1762.71	924.03	1135.12	1269.49	1419.32	1722.87	1282.00	205.67
MSY	81.31	58.23	65.17	70.22	75.37	86.36	70.76	7.28
SPR	0.17	0.053	0.09	0.13	0.18	0.29	0.14	0.07
R0	463.025	368.95	405.71	427.12	455.20	515.41	430.87	36.83
Steepness	0.87	0.77	0.80	0.82	0.84	0.86	0.82	0.025
FMSY	0.17	0.11	0.12	0.13	0.14	0.16	0.13	0.014
F/FMSY	0.30	0.32	0.42	0.49	0.57	0.76	0.50	0.12
MSSTMSY	366.04	327.67	375.88	396.30	420.22	475.34	398.55	36.21
SSB/MSSTMSY	4.82	2.36	2.95	3.23	3.53	3.98	3.22	0.42
F30%	0.096	0.095	0.096	0.097	0.098	0.099	0.097	0.0009
F/F30%	0.51	0.46	0.59	0.68	0.78	0.96	0.68	0.13
MSST30%	613.60	447.25	505.97	541.21	578.73	659.47	544.29	53.22
SSB/MSST30%	2.87	1.88	2.20	2.35	2.49	2.80	2.35	0.23

Table 3.2.1.10. Projections of F, SSB, and OFL From the WFL stock for alternative MFMTs (F_{MSY}, $F_{30\%}$), F_0, and F_{Curr}, where F_{Curr} is the geometric mean of the terminal three years (2014-2016).

Year	F				SSB				OFL			
	F0	FCurr	F30	FMSY	F0	FCurr	F30	FMSY	F0	FCurr	F30	FMSY
2014	0.034322	0.034322	0.034322	0.034322	1794.29	1794.29	1794.29	1794.29	64.2333	64.2333	64.2333	64.2333
2015	0.037416	0.037416	0.037416	0.037416	1795.88	1795.88	1795.88	1795.88	69.5272	69.5272	69.5272	69.5272
2016	0.092952	0.092952	0.092952	0.092952	1762.71	1762.71	1762.71	1762.71	168.37	168.37	168.37	168.37
2017	0	0.041286	0.048728	0.069392	1564.62	1564.62	1564.62	1564.62	0	66.1137	78.0307	111.121
2018	0	0.037594	0.043978	0.061106	1583.53	1489.6	1472.54	1424.94	0	57.5614	66.5633	89.4872
2019	0	0.040054	0.046797	0.064869	1610.23	1433.03	1402.77	1321.32	0	59.2932	67.8211	88.5897
2020	0	0.045041	0.052637	0.073031	1643.43	1386.73	1345.23	1236.74	0	64.7847	73.4682	93.8038
2021	0	0.049322	0.057654	0.080034	1683.95	1345.55	1293.56	1161.25	0	69.0456	77.6325	96.8921
2022	0	0.052328	0.061271	0.085424	1732.75	1308.9	1246.95	1093.3	0	71.4205	79.7299	97.6799
2023	0	0.054582	0.064127	0.090186	1784.02	1272.43	1201.18	1028.79	0	72.5544	80.5551	97.33
2024	0	0.056335	0.066489	0.094594	1839.03	1238.79	1158.88	969.982	0	73.01	80.7267	96.5223
2025	0	0.057717	0.068476	0.098699	1897.98	1209.49	1121.54	917.941	0	73.1141	80.5806	95.5557
2026	0	0.058713	0.070034	0.102311	1962.43	1186.76	1091.22	874.202	0	73.0372	80.2827	94.5508
2027	0	0.059932	0.071898	0.106546	2017.26	1159.08	1056.87	828.706	0	72.8881	79.9386	93.5875
2028	0	0.061057	0.073669	0.110747	2070.82	1133.73	1025.4	787.376	0	72.7021	79.5773	92.6689
2029	0	0.062219	0.075496	0.115119	2119.36	1108.4	994.641	748.267	0	72.5027	79.2171	91.792
2030	0	0.063251	0.077165	0.119287	2166.96	1086.19	967.445	713.577	0	72.2938	78.8576	90.9417
2031	0	0.064104	0.078606	0.123113	2215.03	1067.77	944.344	683.473	0	72.0811	78.5026	90.1155
2032	0	0.064877	0.079938	0.126754	2260.69	1051.28	923.586	656.481	0	71.8736	78.1609	89.3217
2033	0	0.065633	0.081229	0.130283	2301.54	1035.64	904.23	631.899	0	71.6783	77.84	88.5693
2034	0	0.066318	0.082414	0.133591	2339.55	1021.71	886.956	610.028	0	71.4964	77.5407	87.8591
2035	0	0.066915	0.083471	0.136636	2375.7	1009.63	871.825	590.727	0	71.3269	77.2617	87.1885
2036	0	0.06743	0.084404	0.139417	2410.07	999.251	858.633	573.721	0	71.1697	77.0021	86.5569

7. FIGURES

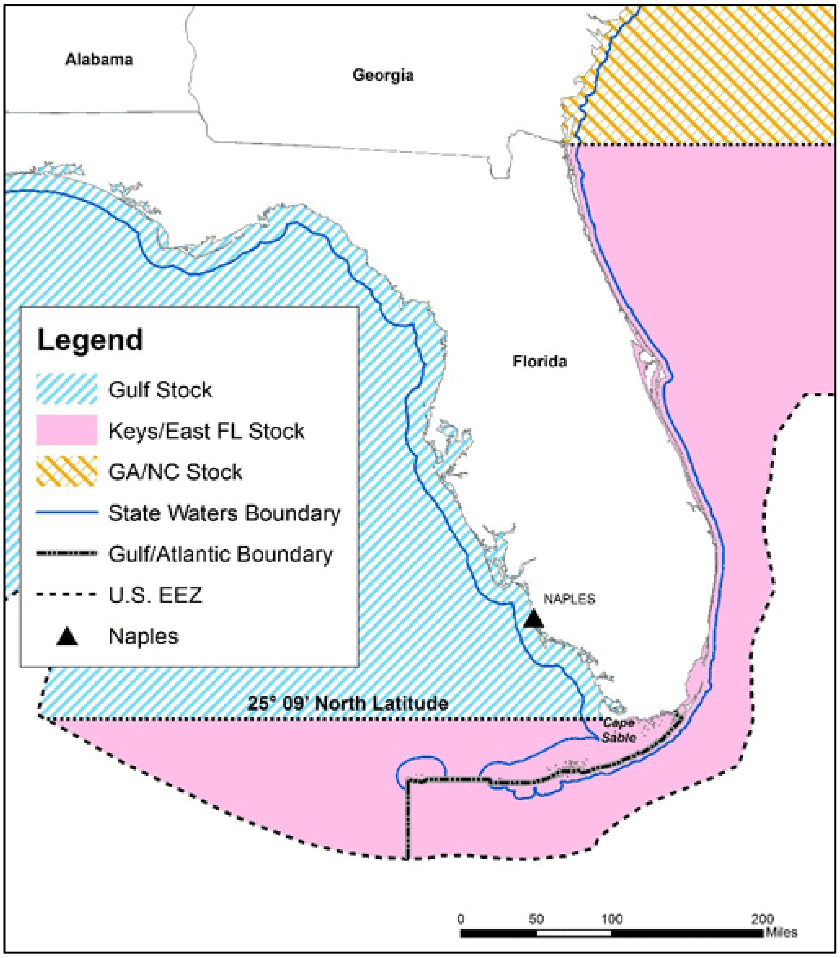


Figure 2.1.1. Hogfish stock boundaries in the eastern U.S. based on genetic analyses by Seyoum et al. (2014).

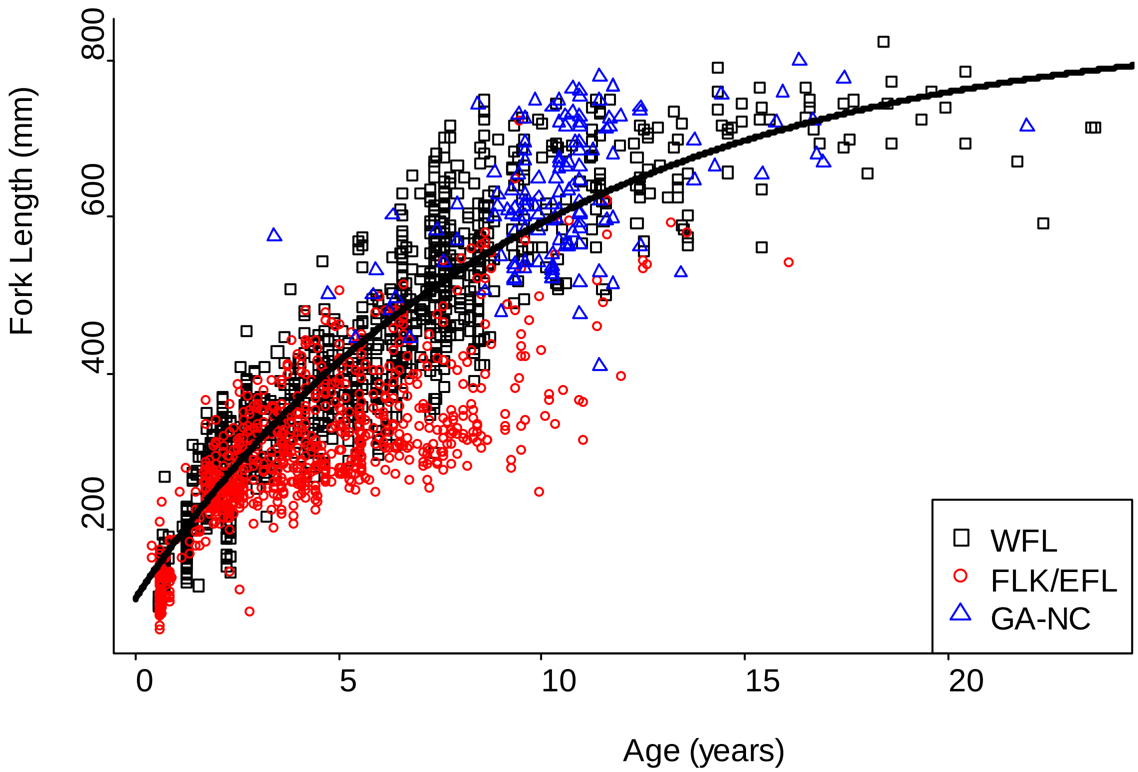


Figure 2.2.2.1. From SEDAR 37, Size at age for each of the three stocks, where age class is adjusted to reflect the month of sampling (age+(month-1)/12). The solid black line is the von Bertalanffy growth function fit to just those data from the dedicated biological studies on Hogfish in the WFL.

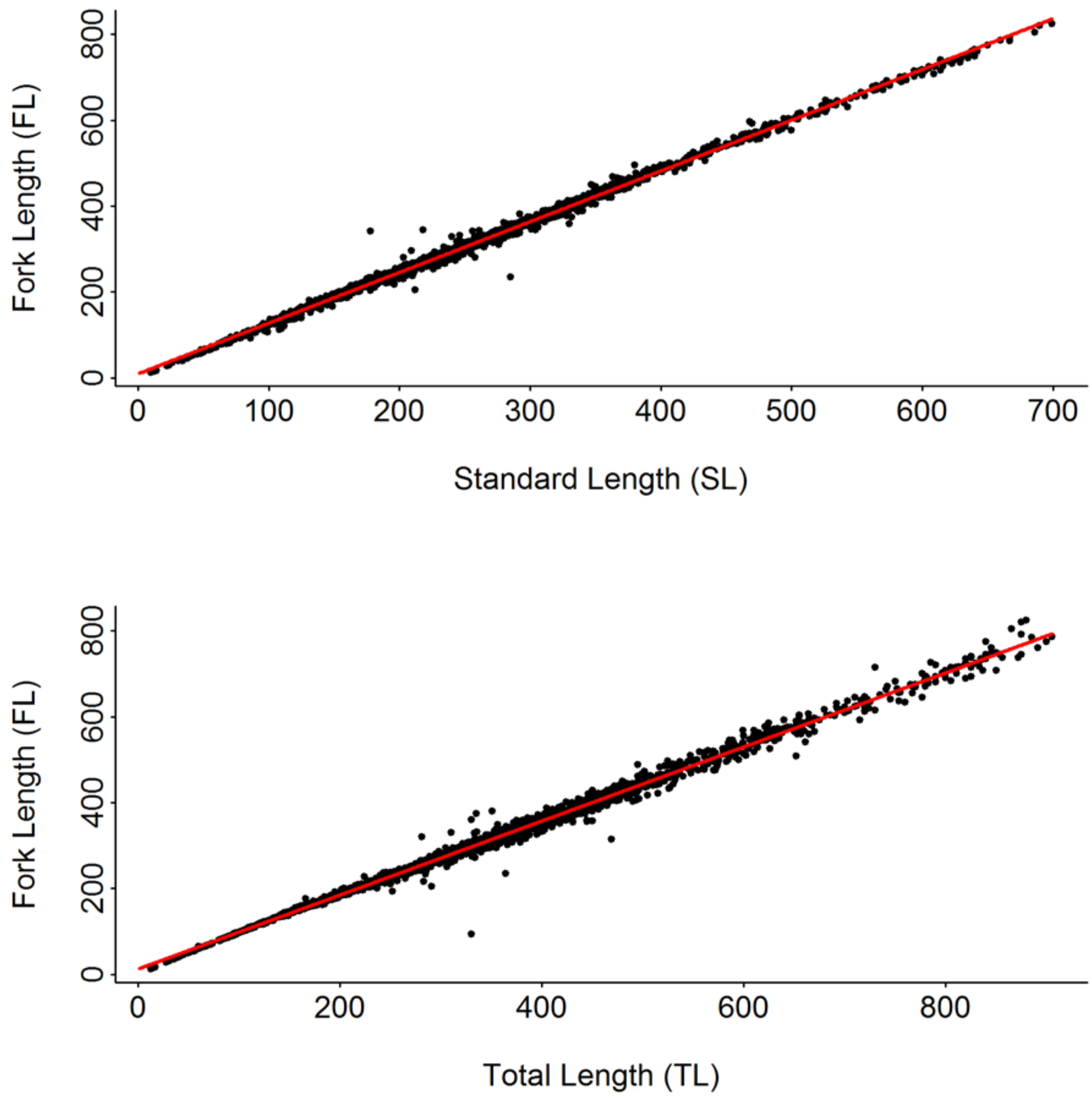


Figure 2.2.4.1 Length-length regressions from all available fisheries-dependent and fisheries-independent data sources from SEDAR 37.

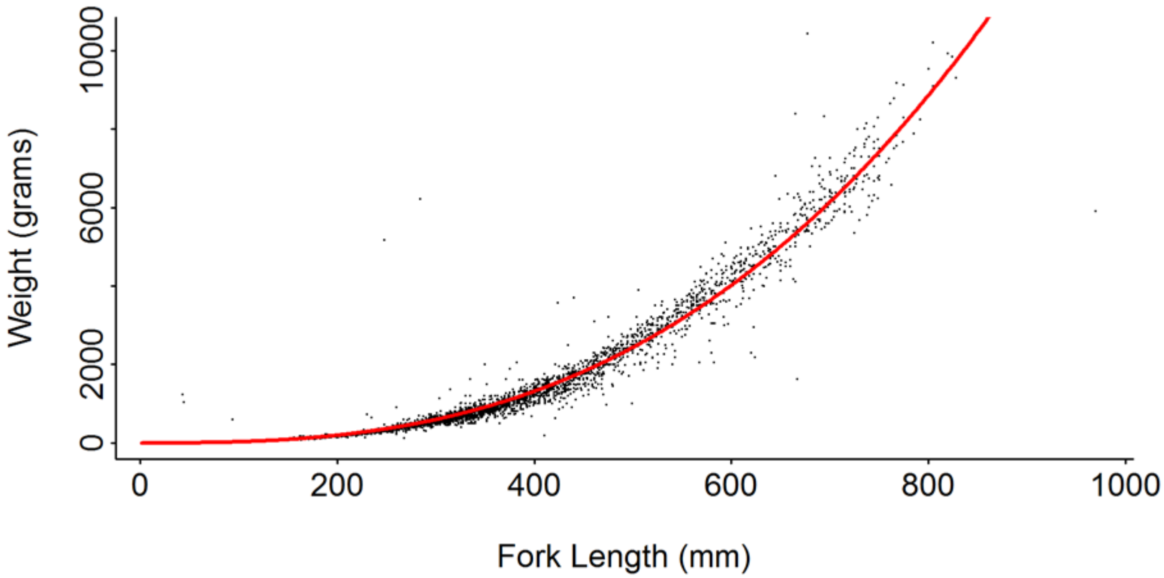


Figure 2.2.4.2. Weight-length regression from all available fisheries-dependent and fisheries-independent data sources from SEDAR 37.

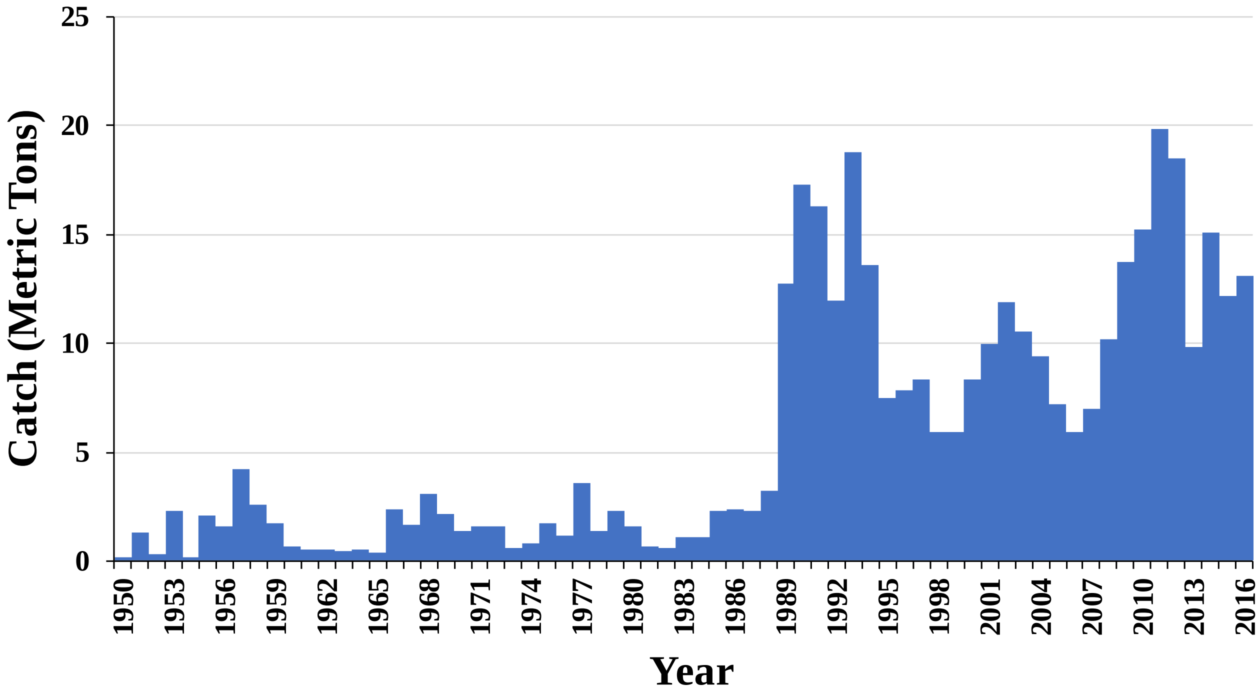


Figure 2.3.1.1. Total commercial landings of WFL Hogfish from 1950-2016.

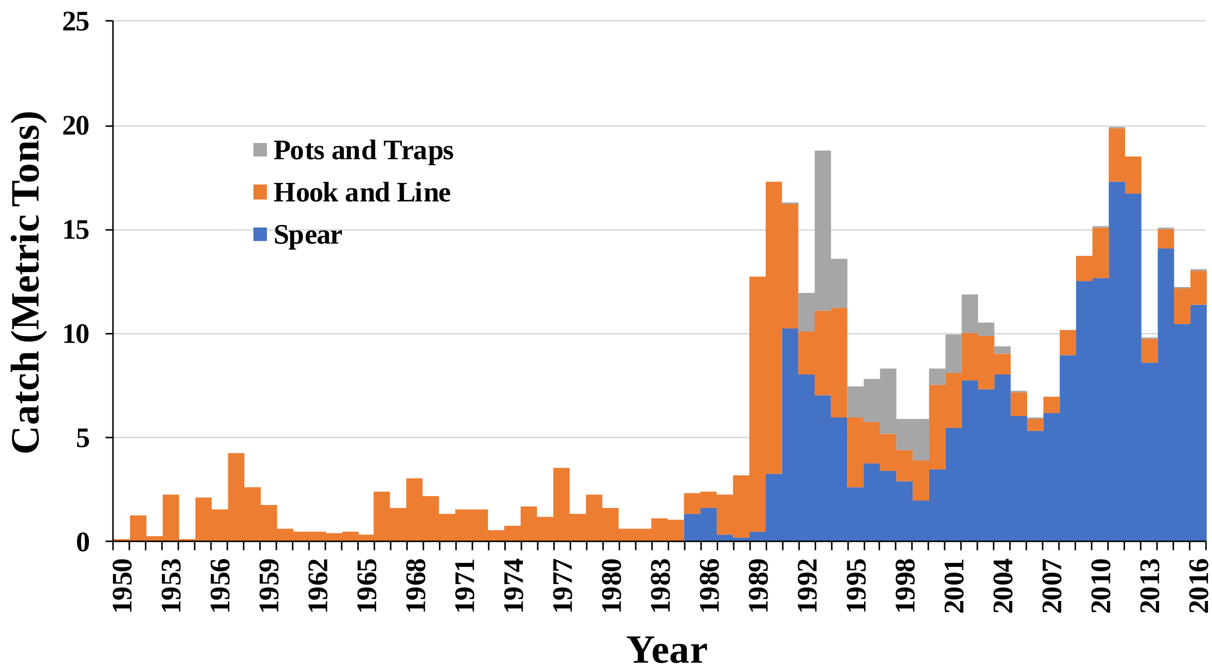


Figure 2.3.1.2. Total commercial landings of WFL Hogfish by gear type from 1950-2016.

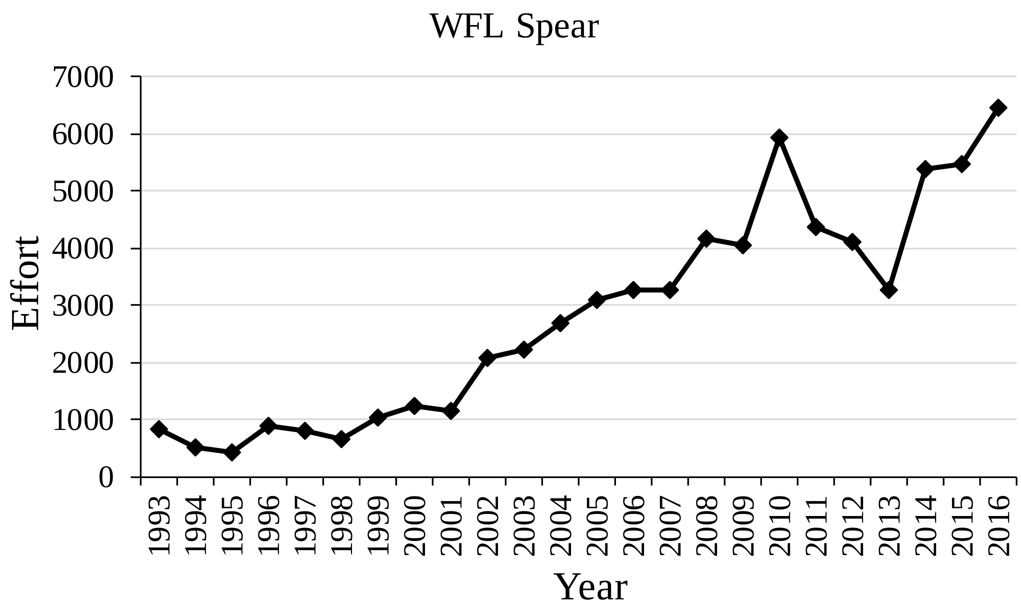
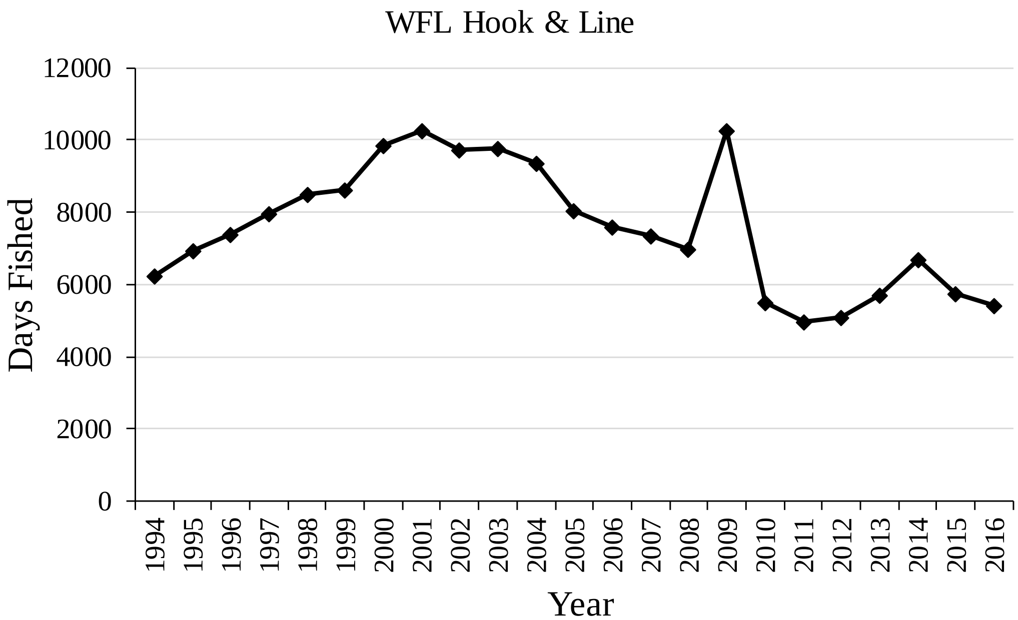


Figure 2.3.3.1. Total effort from the logbook analyses for WFL diver hours (for spear). Note: the WFL hook and line records were too sparse to create a CPUE index and not provided.



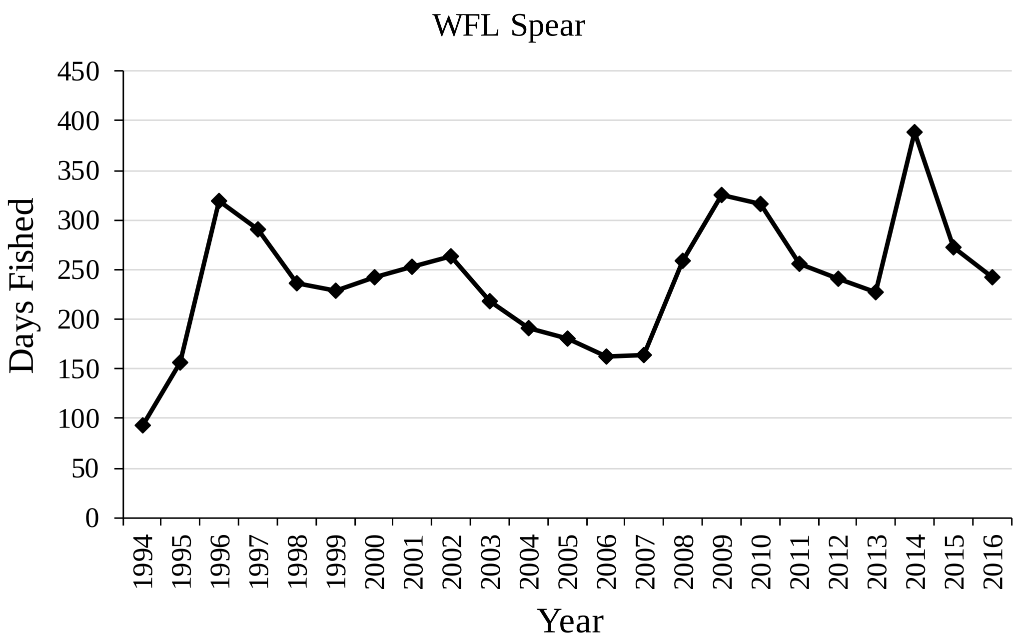


Figure 2.3.3.2. Total effort in total days fished from the Florida trip ticket database for the WFL stock among two main gear types. The total days fished includes all trips catching Hogfish or the associated species from a cluster analysis in the CPUE standardization procedure.

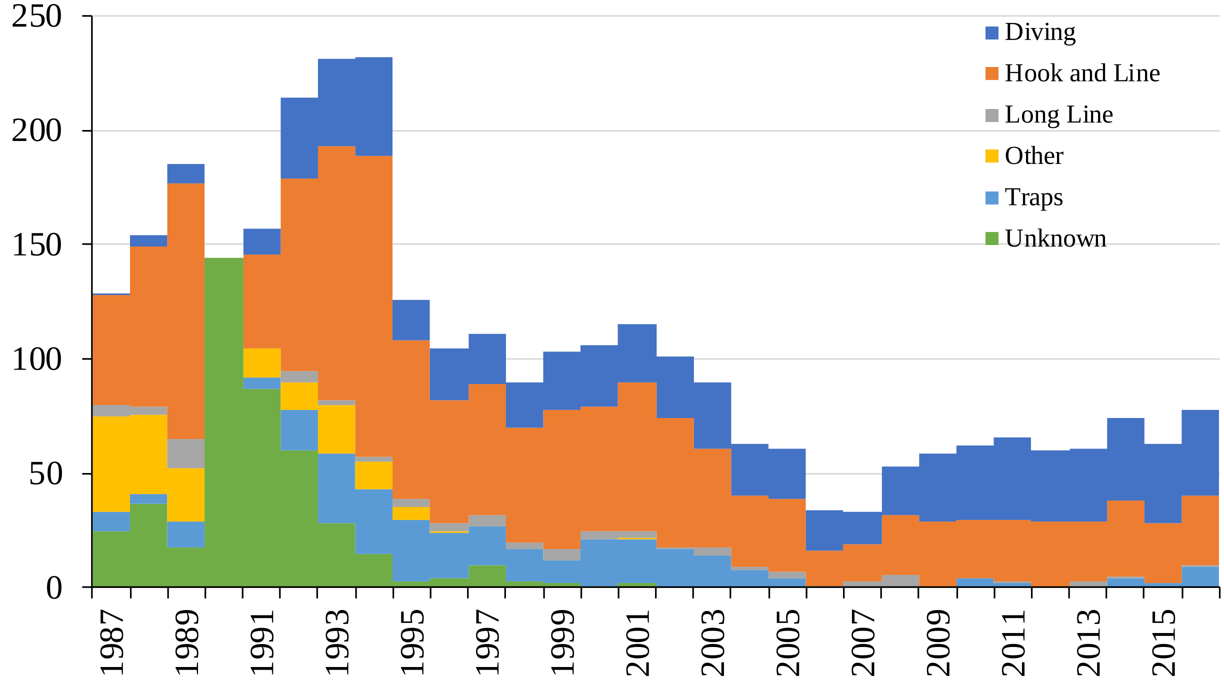


Figure 2.3.3.3. Number of SPL licenses landing Hogfish from the Florida Trip Ticket database by gear.

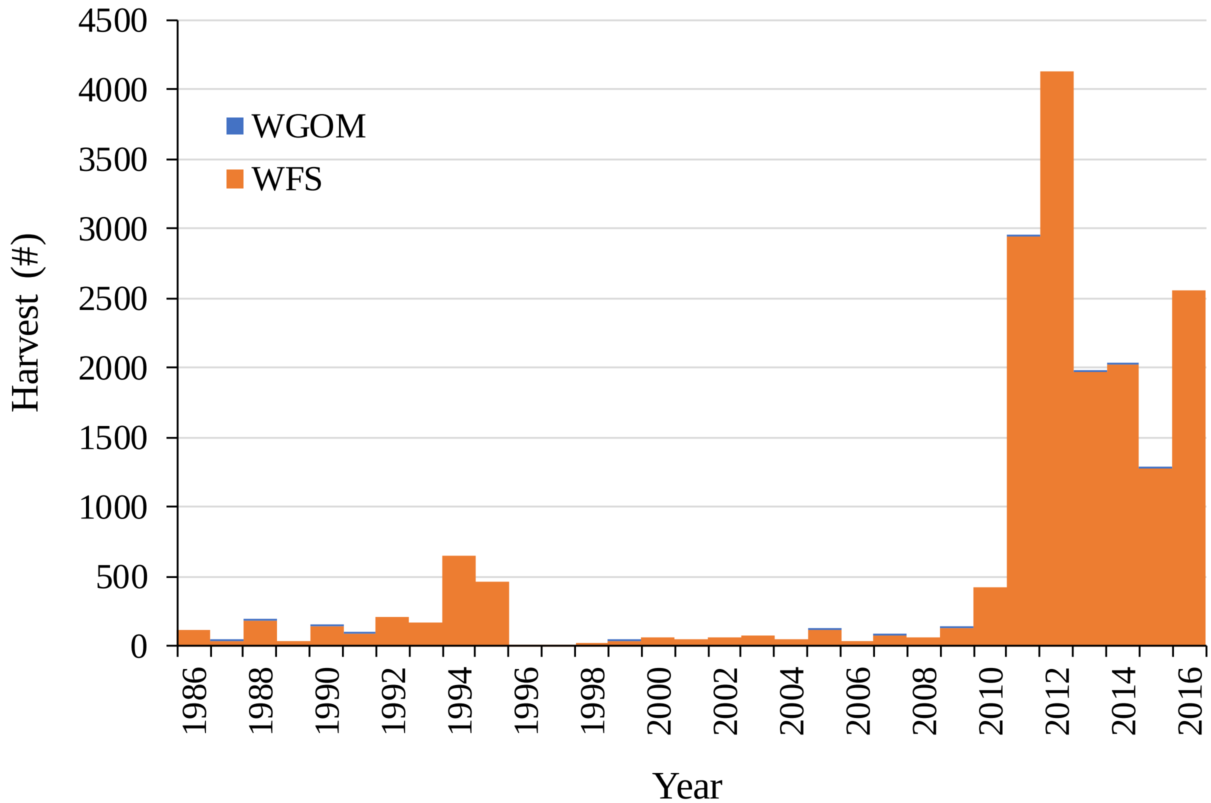


Figure 2.4.1.1. Estimated number of Hogfish caught from the Southeast Region Headboat Survey (SRHS). Note: the Western Gulf states other than FL (WGOM) are shown separately to highlight the focal distribution for Hogfish, but were included in the WFL stock.

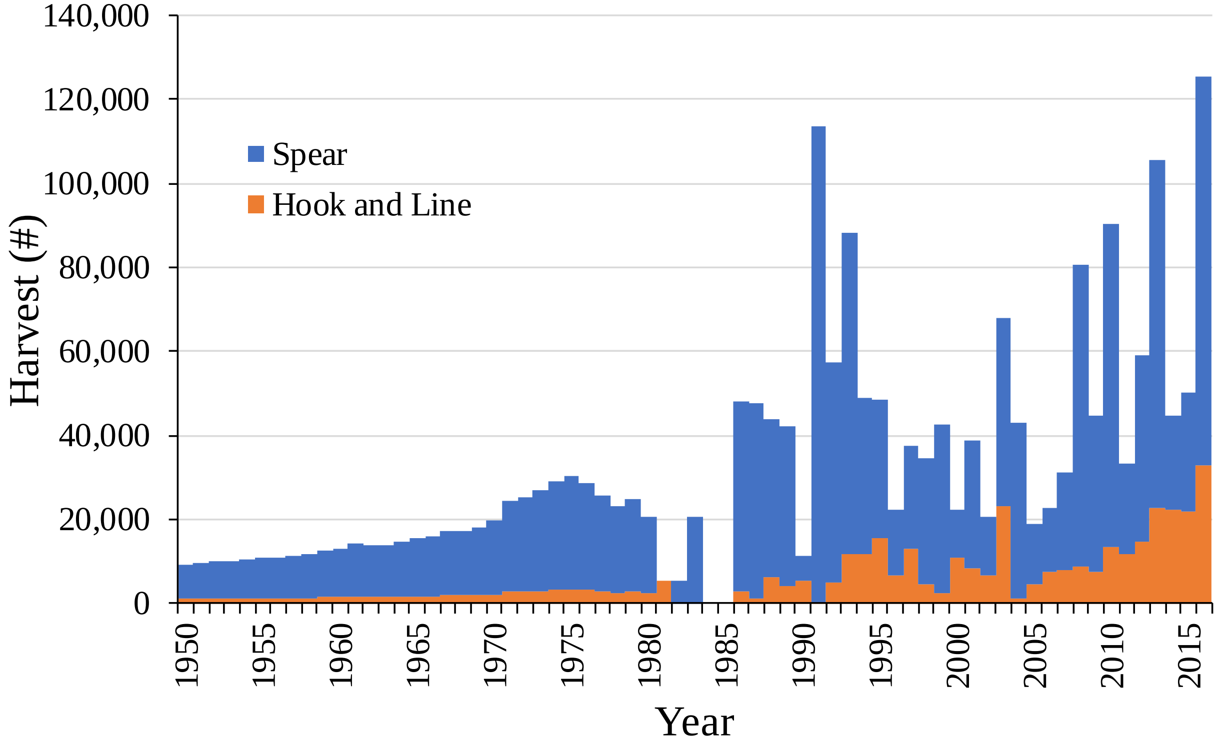


Figure 2.4.1.2. Historical reconstruction of recreational harvest (MRFSS/MRIP and headboat) of Hogfish from the two main gear types in the WFL stock.

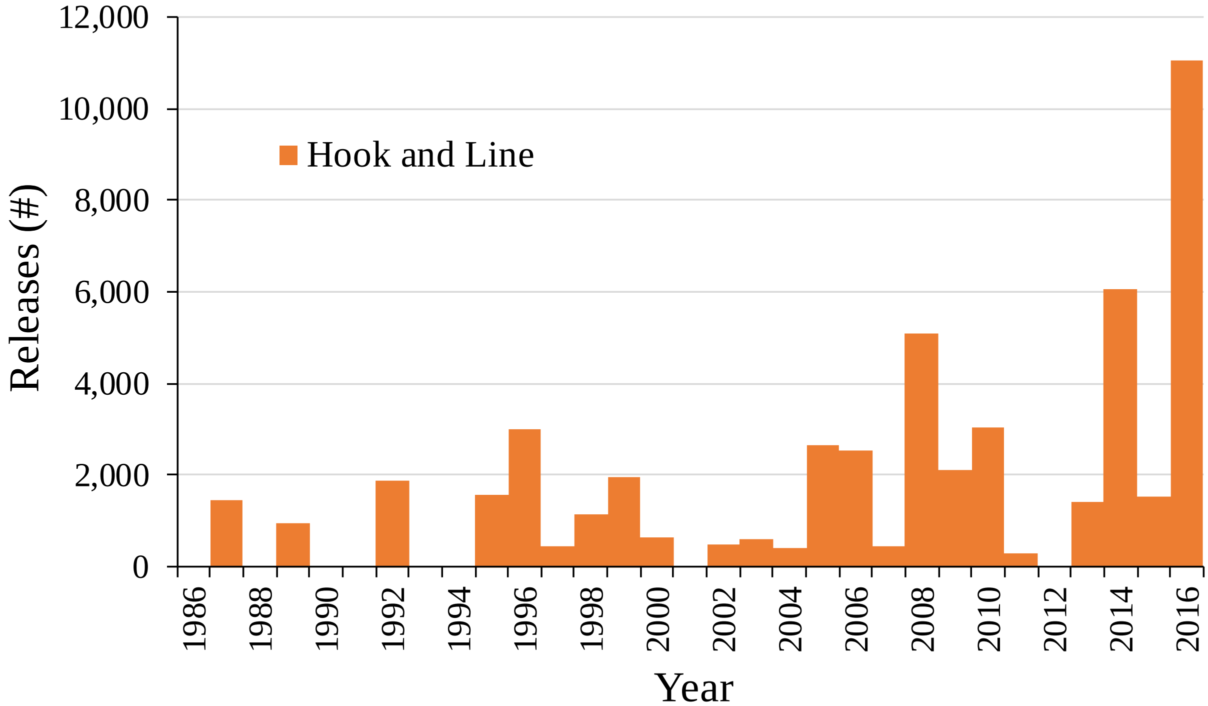


Figure 2.4.2.1. Recreational releases (MRFSS/MRIP) of Hogfish from hook and line gear in the WFL stock.

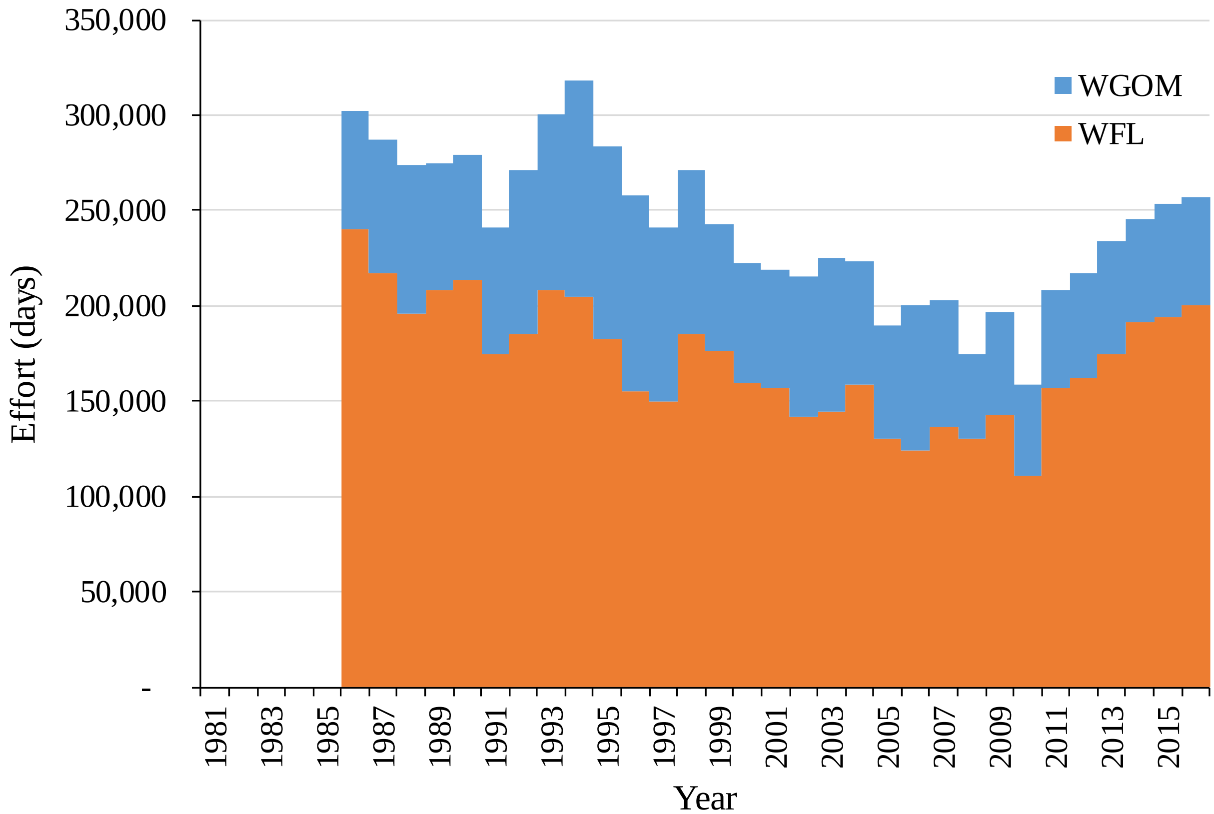


Figure 2.4.3.1. Total angler days from the Southeast Region Headboat Survey (SRHS) with the Western Gulf states other than FL (WGOM) separate.

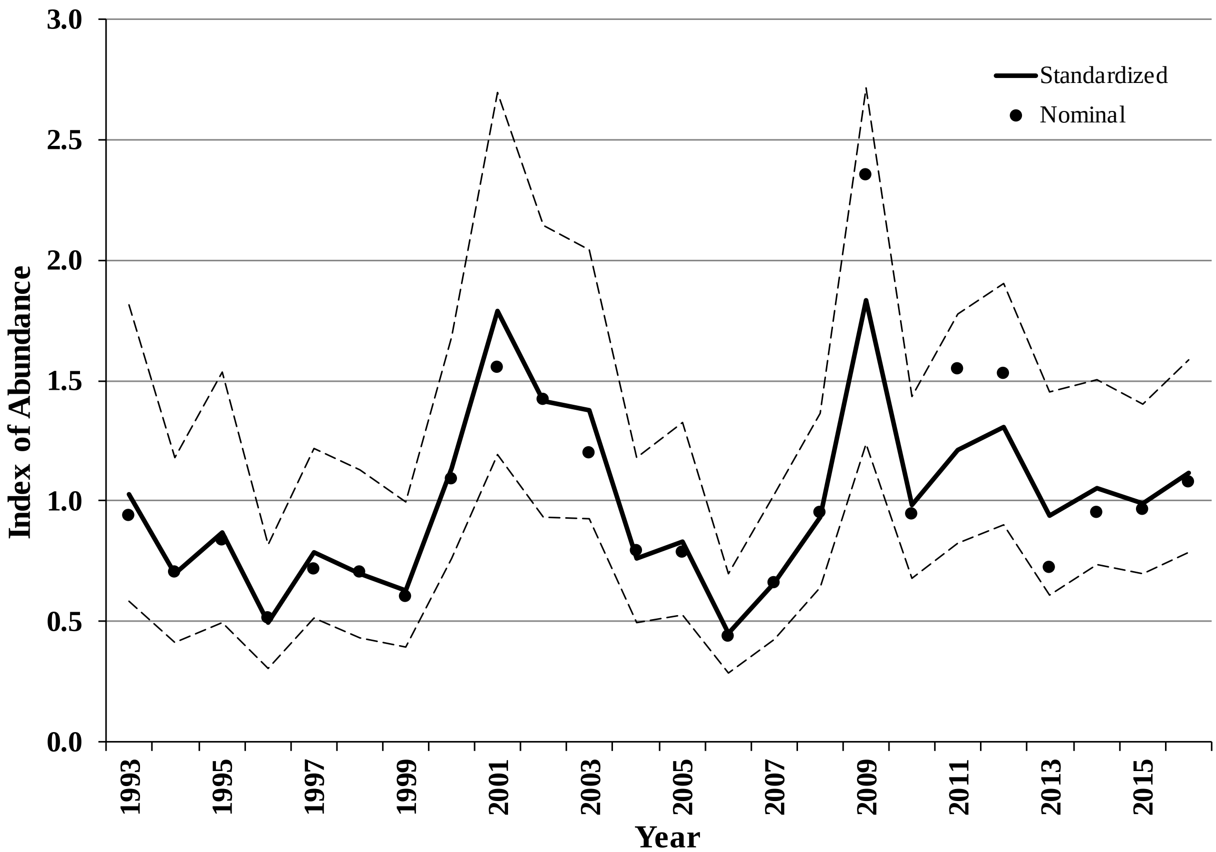


Figure 2.5.1.1. Commercial logbook index of abundance for spear fisheries in the WFL stock.

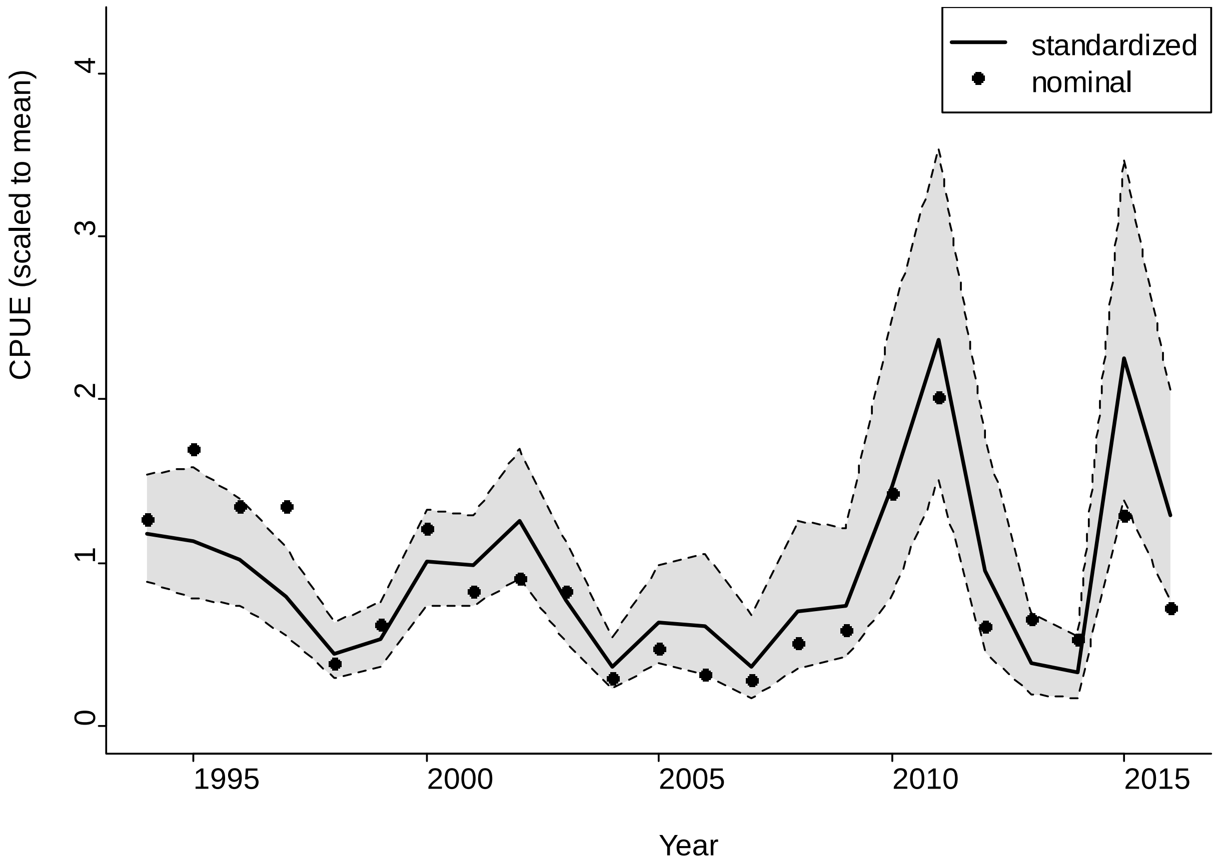


Figure 2.5.1.2. Standardized index of abundance from commercial Florida trip tickets for the WFL hook-and-line model.

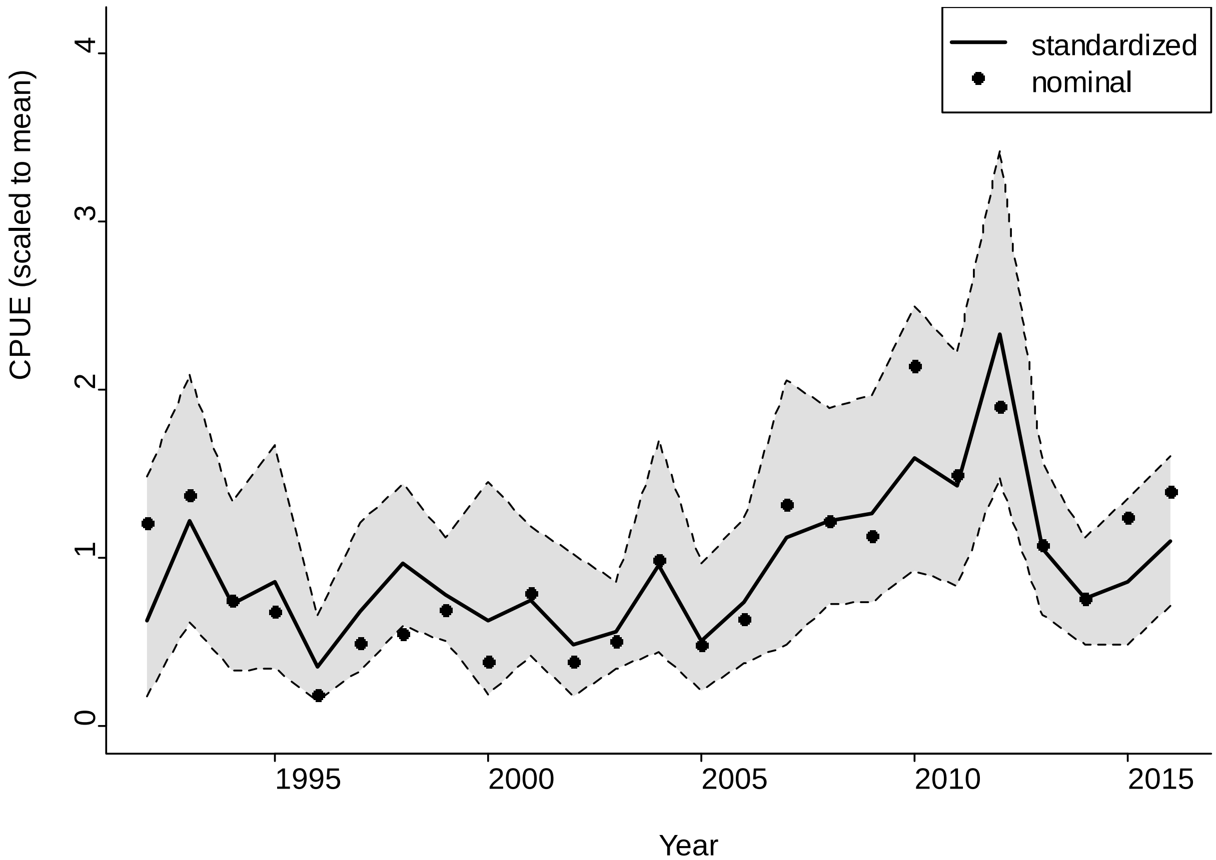


Figure 2.5.1.3.1 Standardized index of abundance from recreational MRFSS/MRIP intercept data for the WFL spear model.

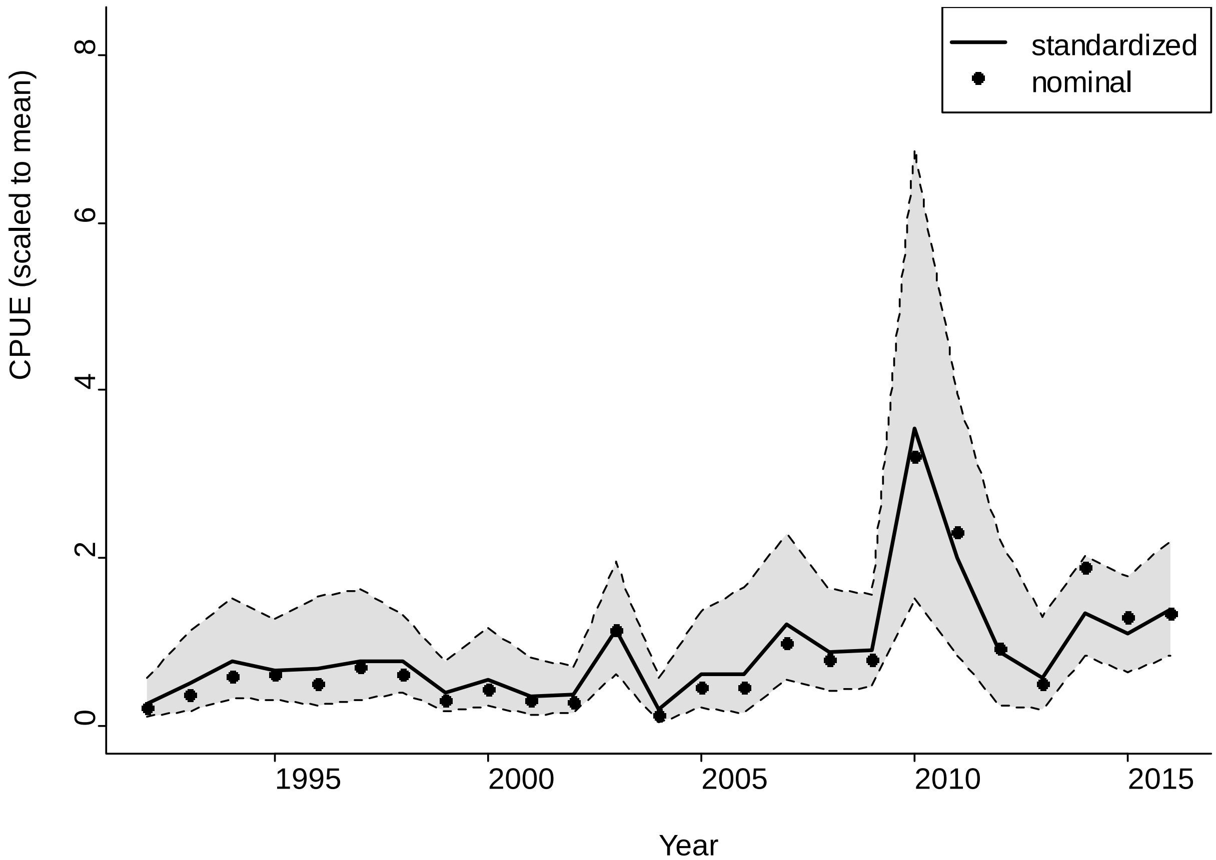


Figure 2.5.1.3.2 Standardized index of abundance from recreational MRFSS/MRIP intercept data for the WFL hook-and-line model.

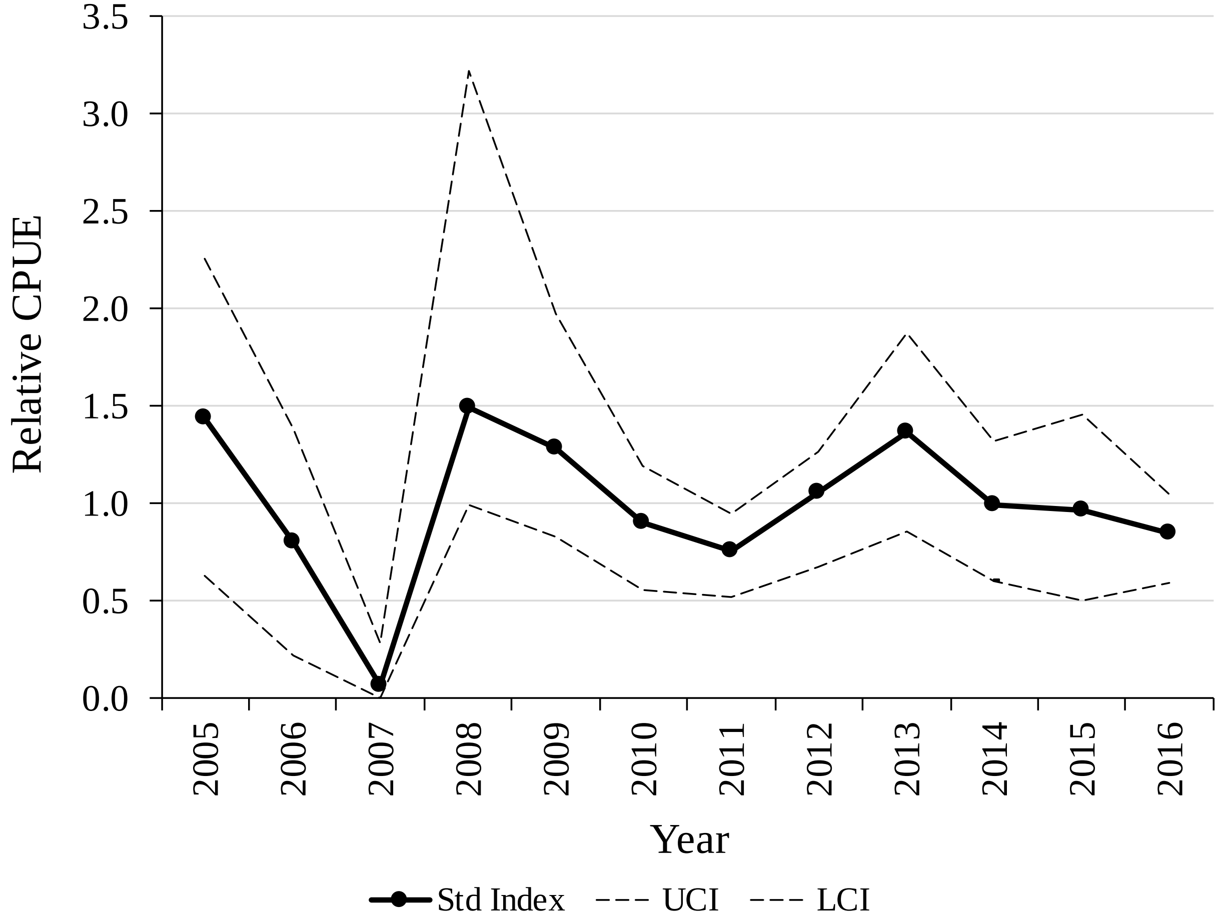


Figure 2.5.2.1. Annual estimates of relative abundance (MaxN) of Hogfish as determined via a generalized linear modeling analysis of data from the NMFS – Panama City and FWRI video surveys for the WFL stock.

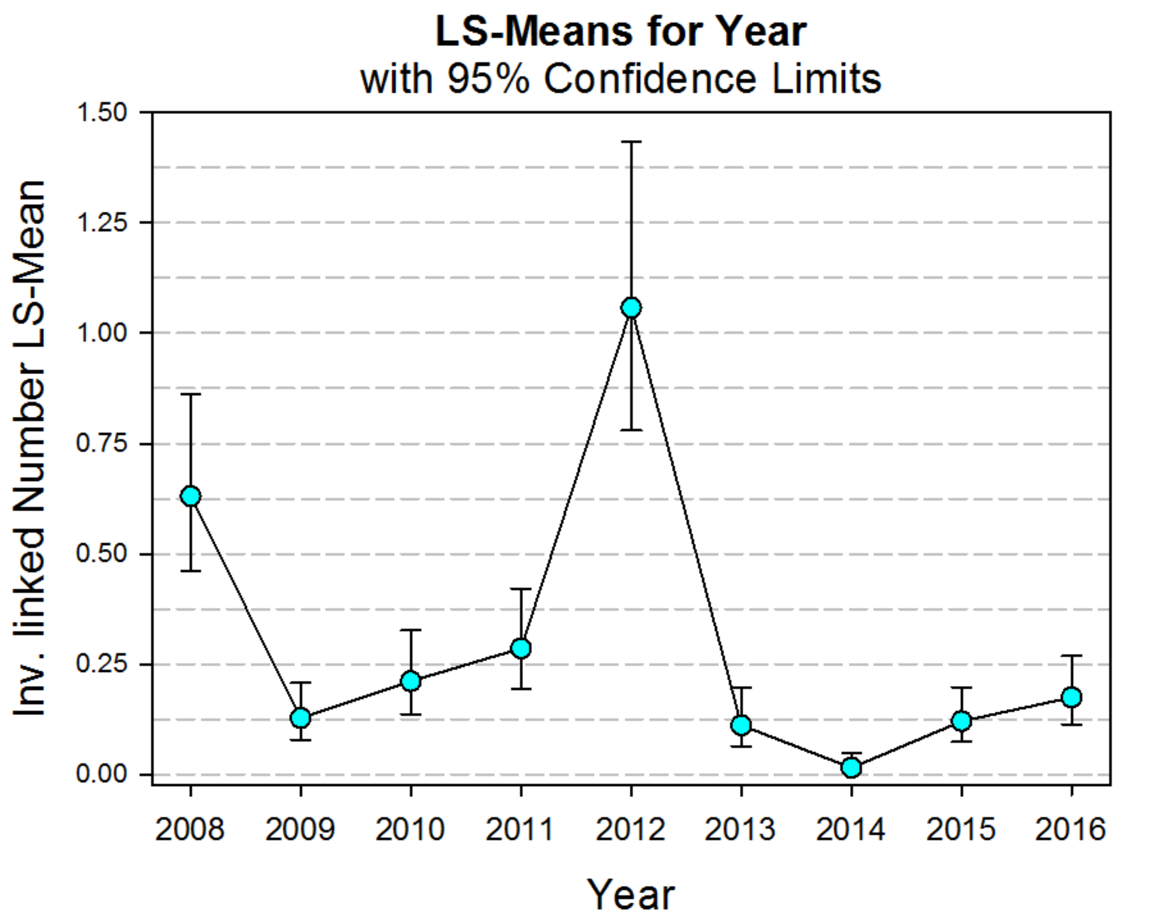


Figure 2.5.2.2. Annual estimates of relative abundance (Individuals Per Set) of Hogfish as determined via a generalized linear modeling analysis of data from the FWRI polyhaline seagrass trawl survey. Analyses were calculated using censored data sets.

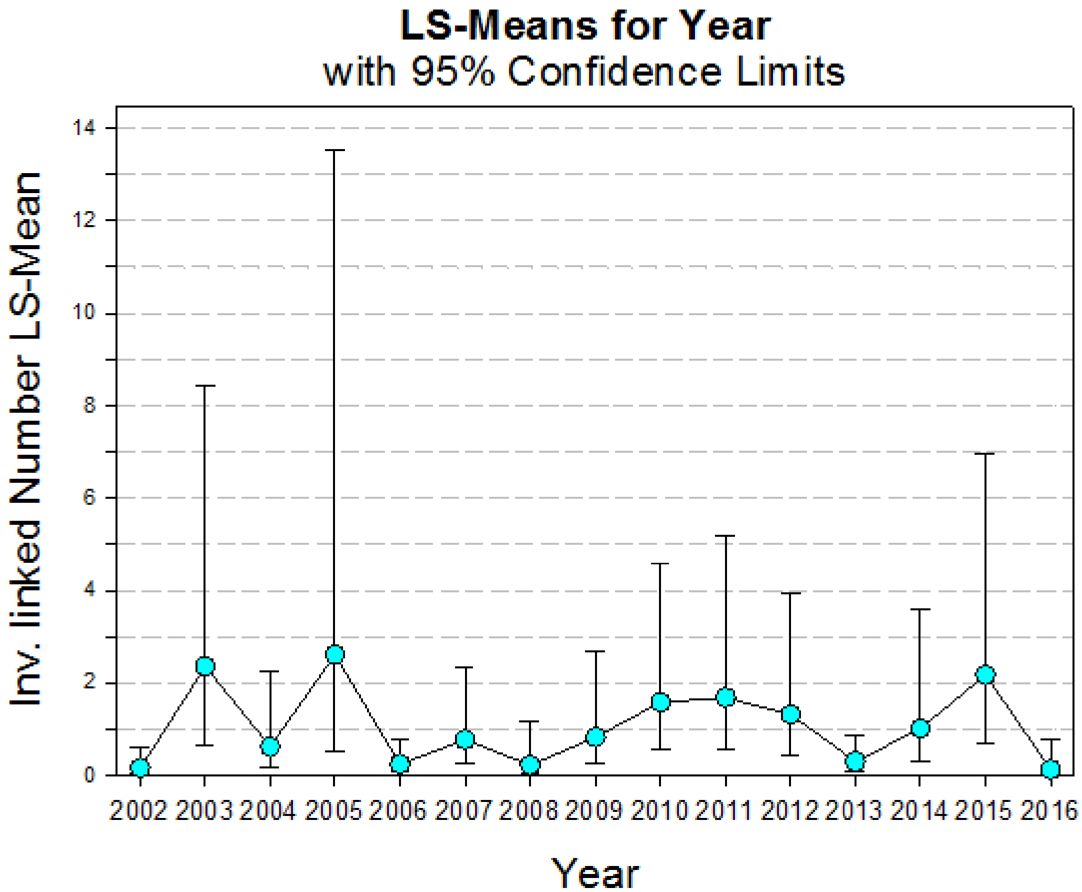


Figure 2.5.2.3. Annual estimates of relative abundance (Individuals Per Set) of Hogfish as determined via a generalized linear modeling analysis of data from the FWRI baitfish trawl survey.

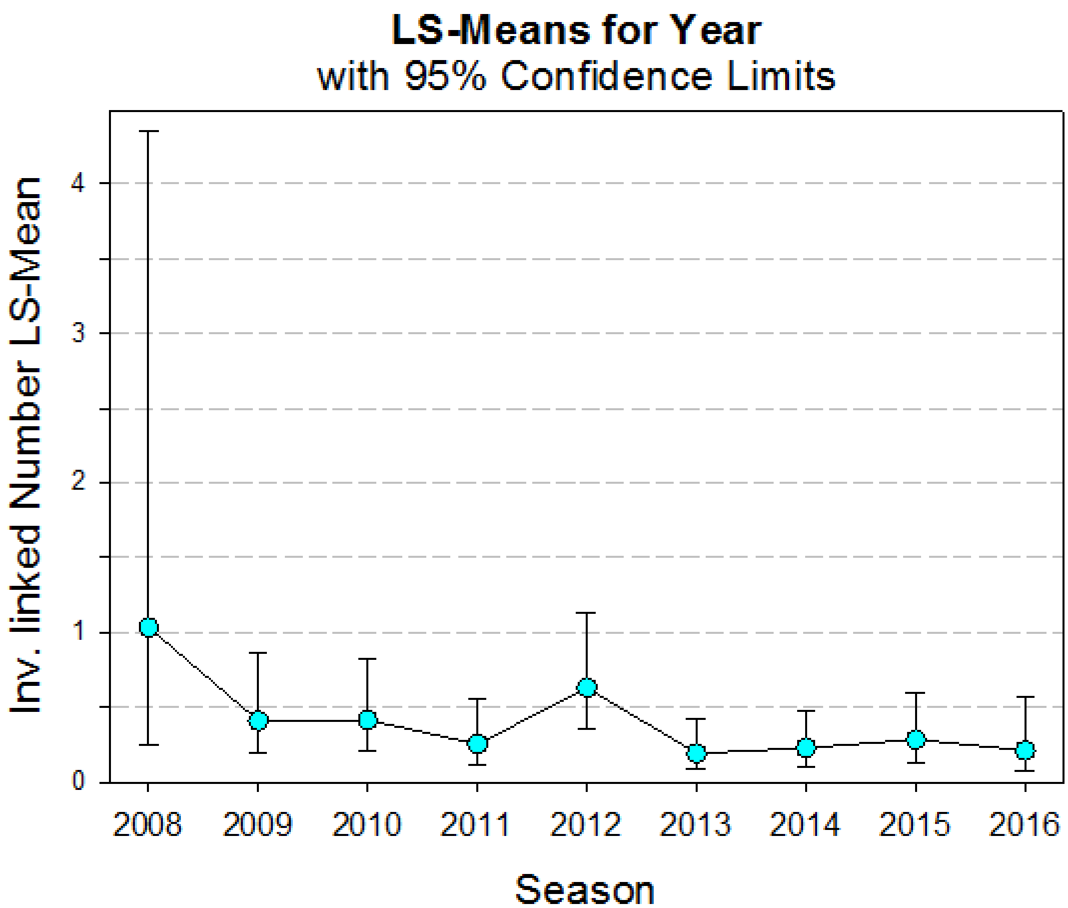


Figure 2.5.2.4. Annual estimates of relative abundance (Individuals per Set) of Hogfish as determined via a generalized linear modeling analysis of data from the summer FWRI SEAMAP trawl survey. Analyses were calculated using censored data sets.

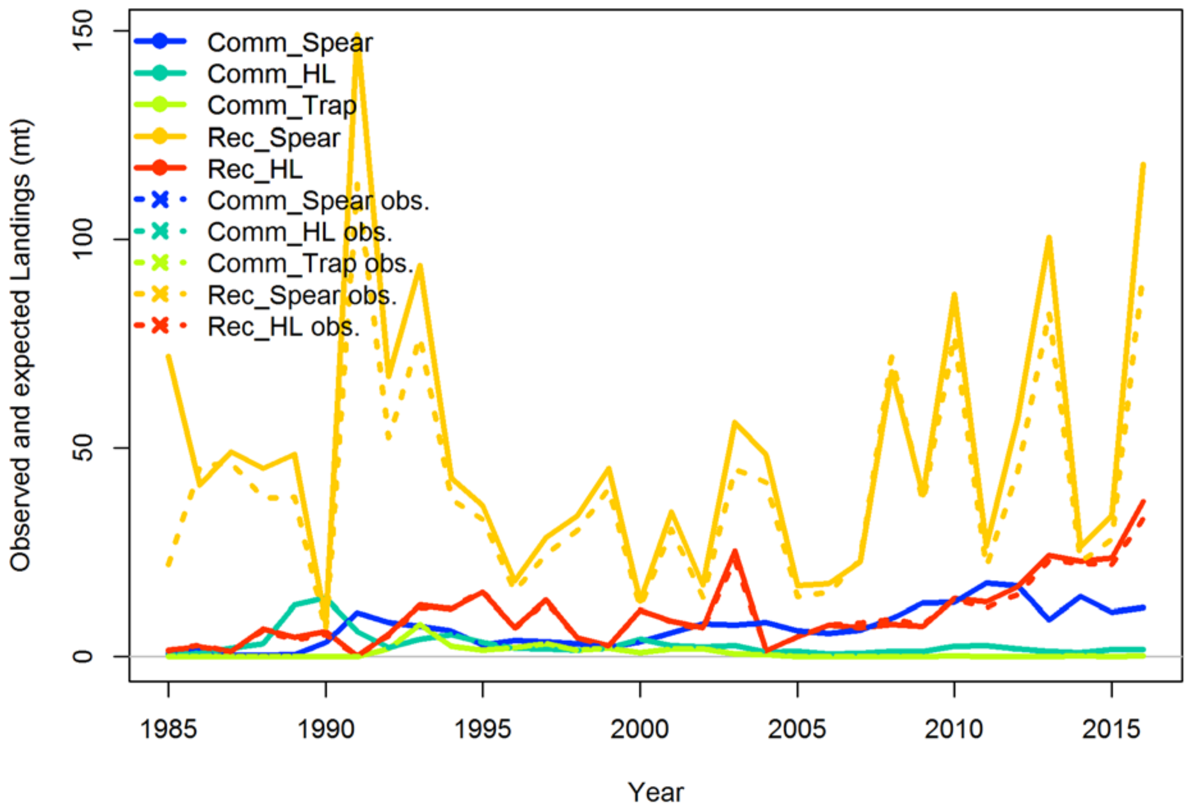


Figure 3.2.1.1.1. Estimated and observed landings for the WFL stock continuity model configuration.

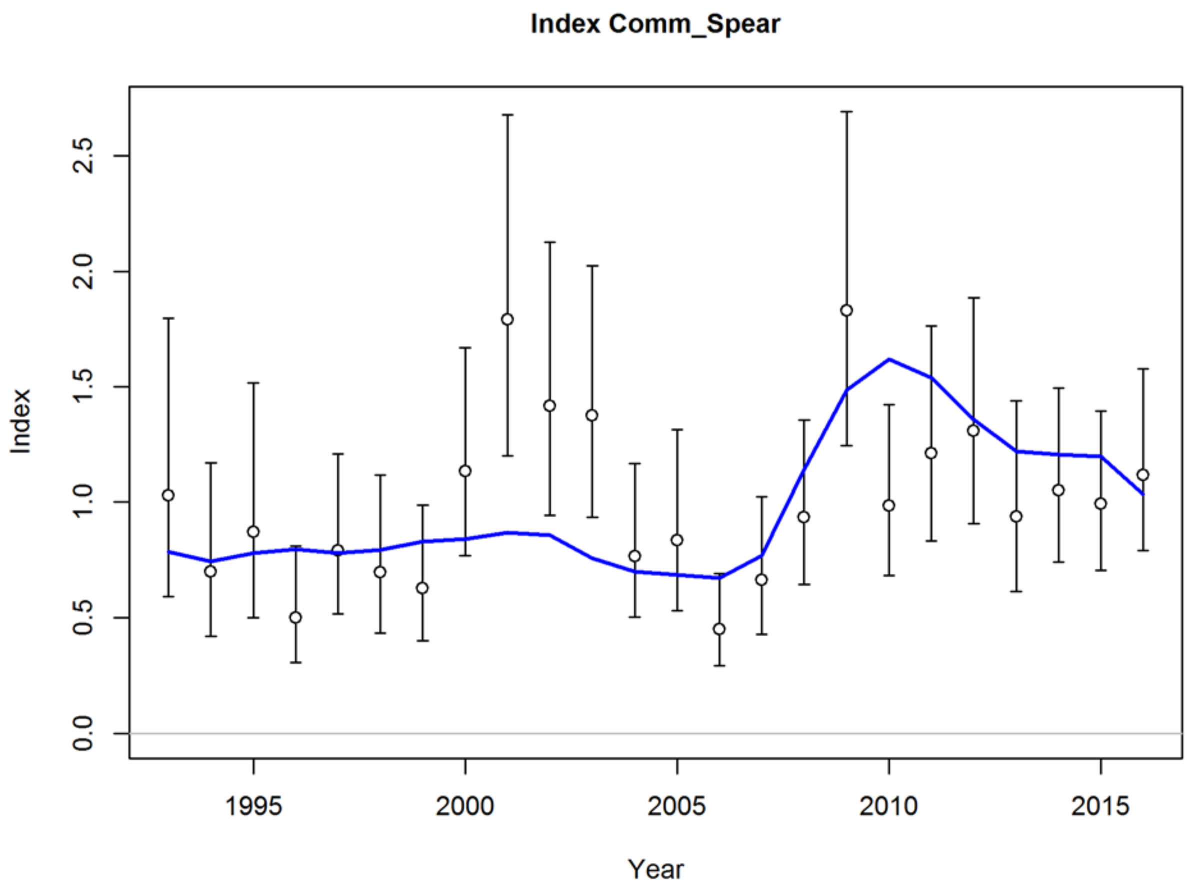


Figure 3.2.1.1.2.1. Model fit to the standardized commercial spear logbook index for the WFL stock continuity model configuration.

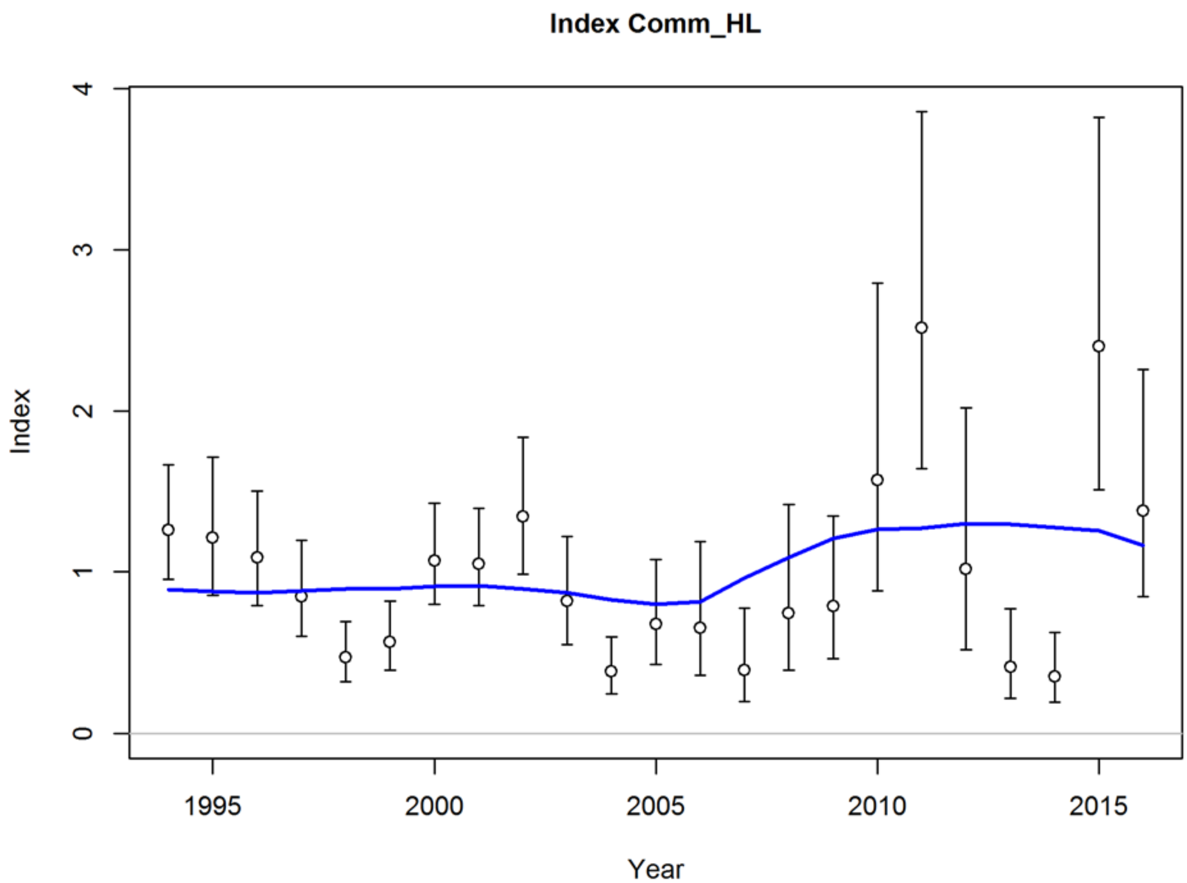


Figure 3.2.1.1.2.2. Model fit to the standardized commercial hook and line CPUE index for the WFL stock continuity model configuration.

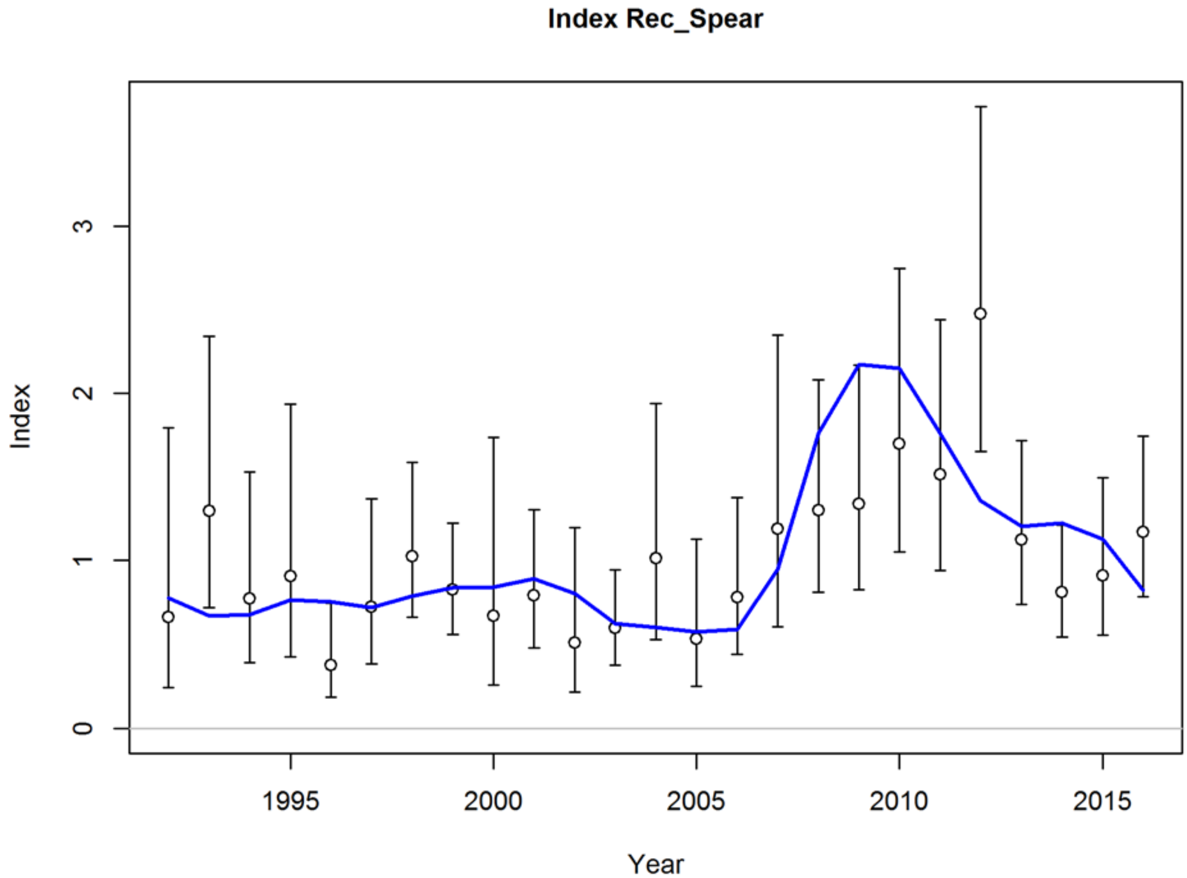


Figure 3.2.1.1.2.3. Model fit to the standardized recreational spear CPUE index for the WFL stock continuity model configuration.

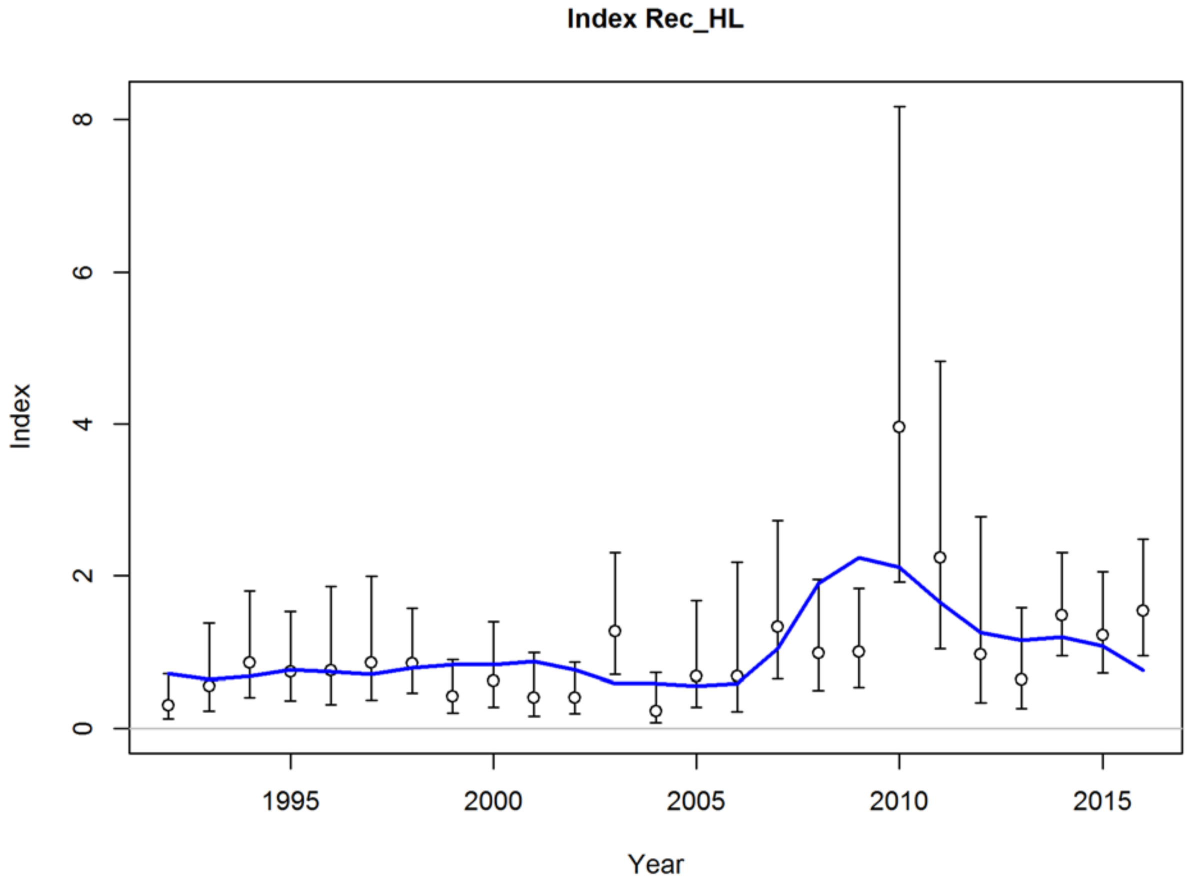


Figure 3.2.1.1.2.4. Model fit to the standardized recreational hook and line CPUE index for the WFL stock continuity model configuration.

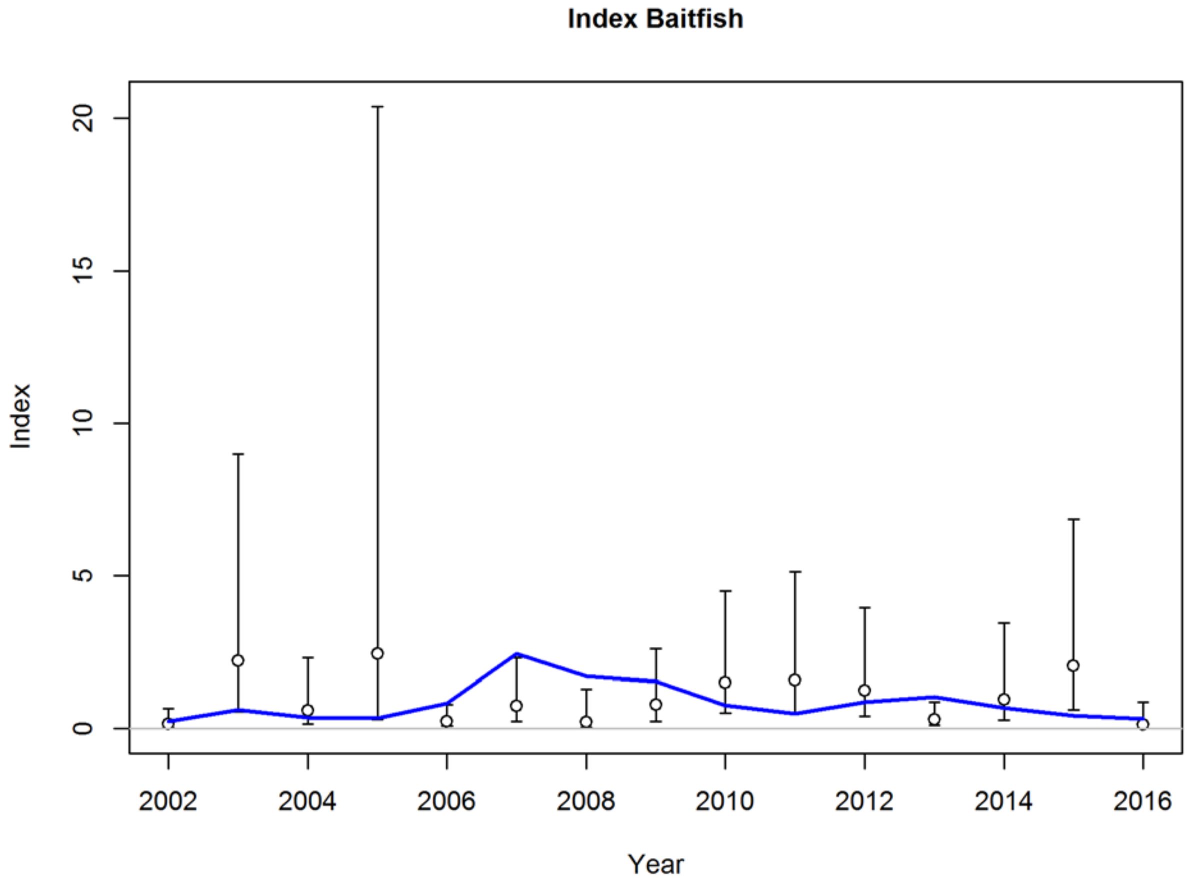


Figure 3.2.1.1.2.5. Model fit to the standardized baitfish trawl index for the WFL stock continuity model configuration.

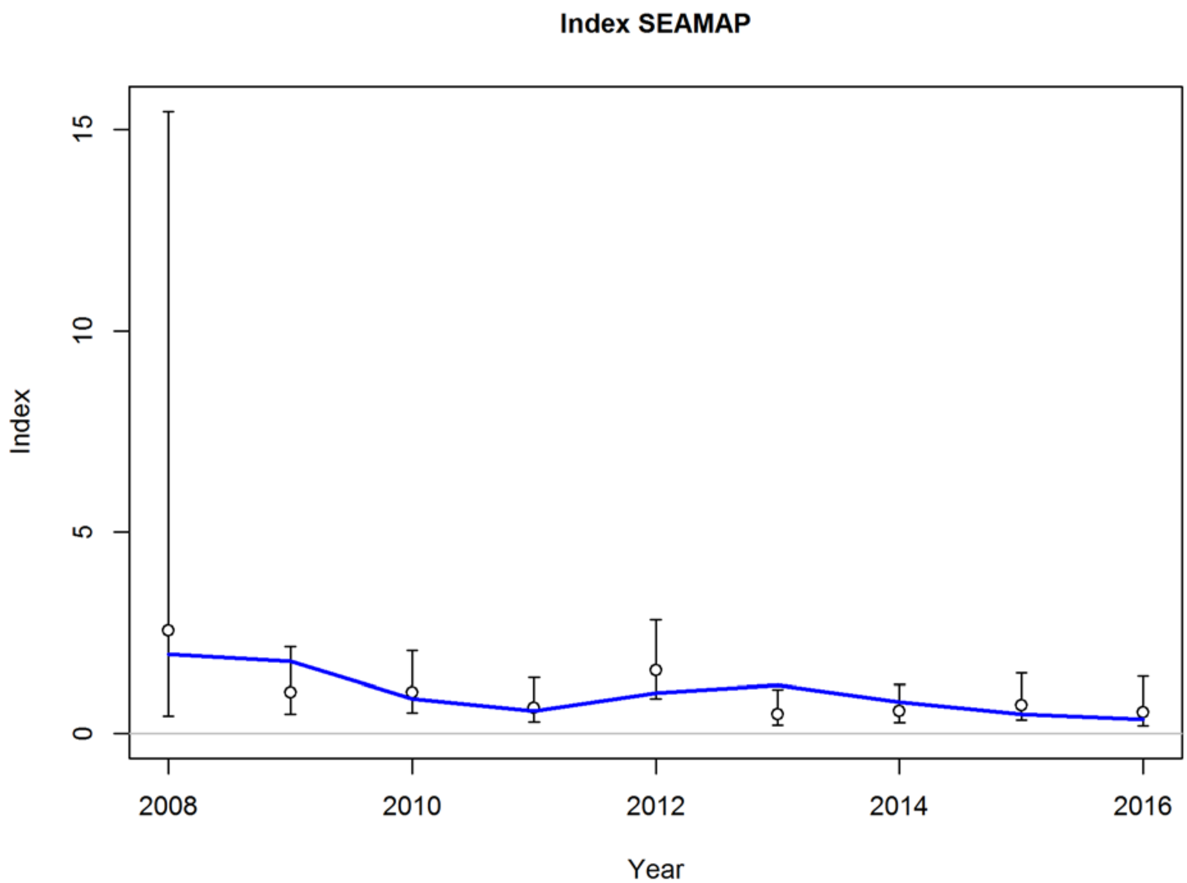


Figure 3.2.1.1.2.6. Model fit to the standardized SEAMAP trawl index for the WFL stock continuity model configuration.

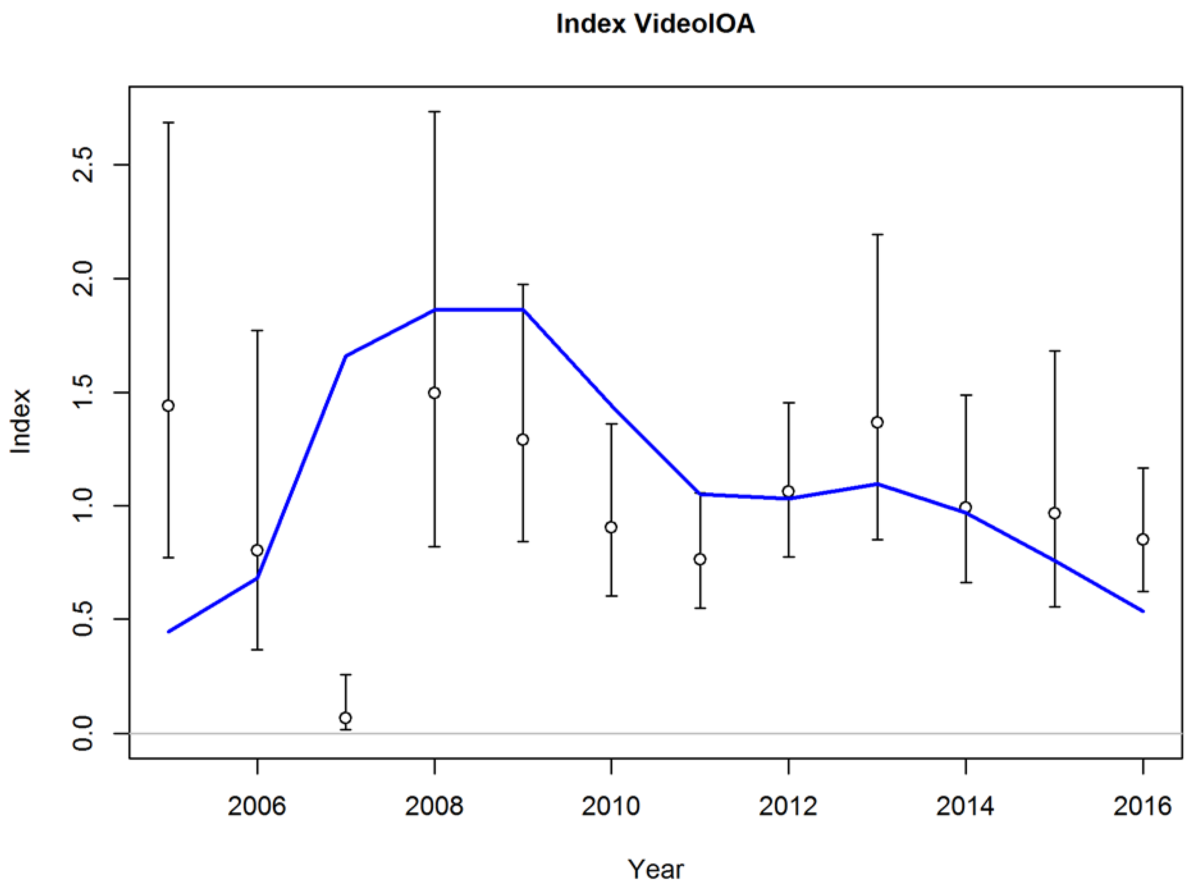


Figure 3.2.1.1.2.7. Model fit to the standardized FWRI video survey index for the WFL stock continuity model configuration.

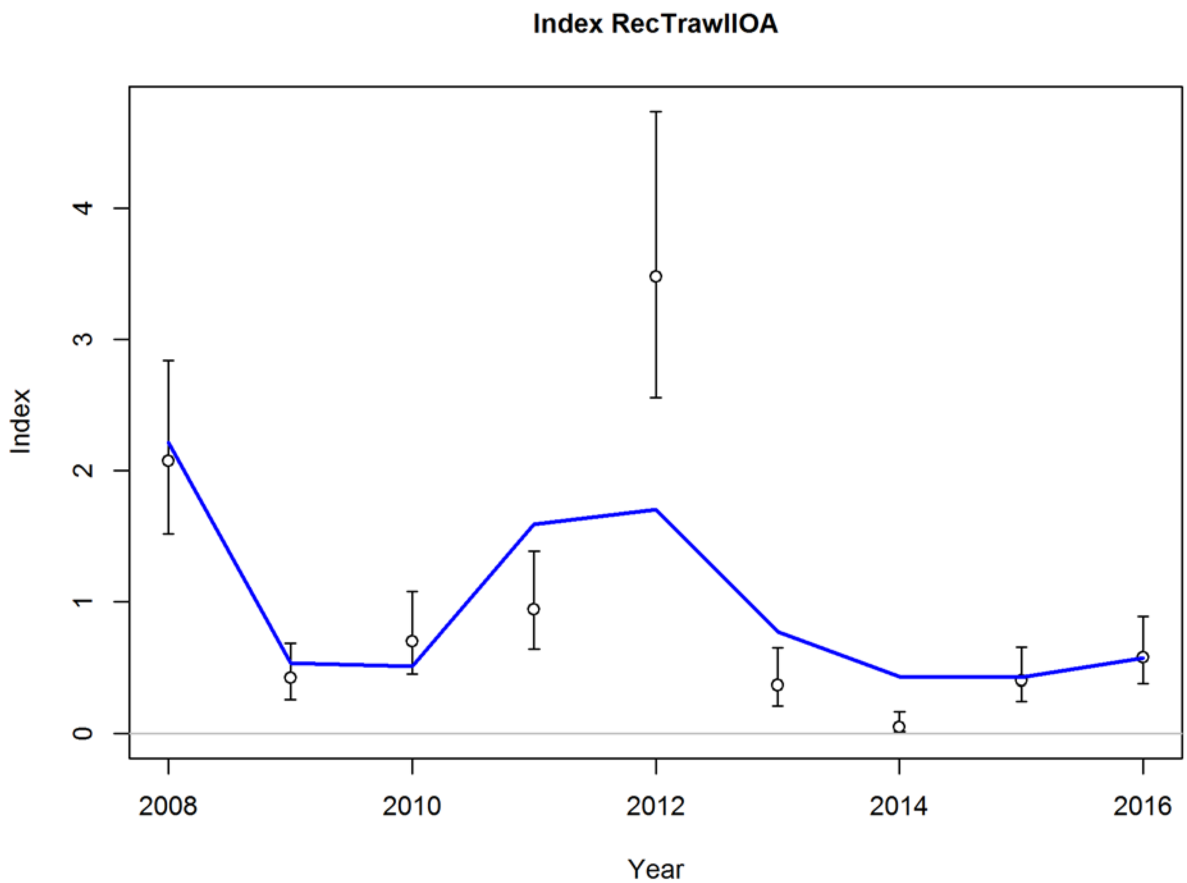
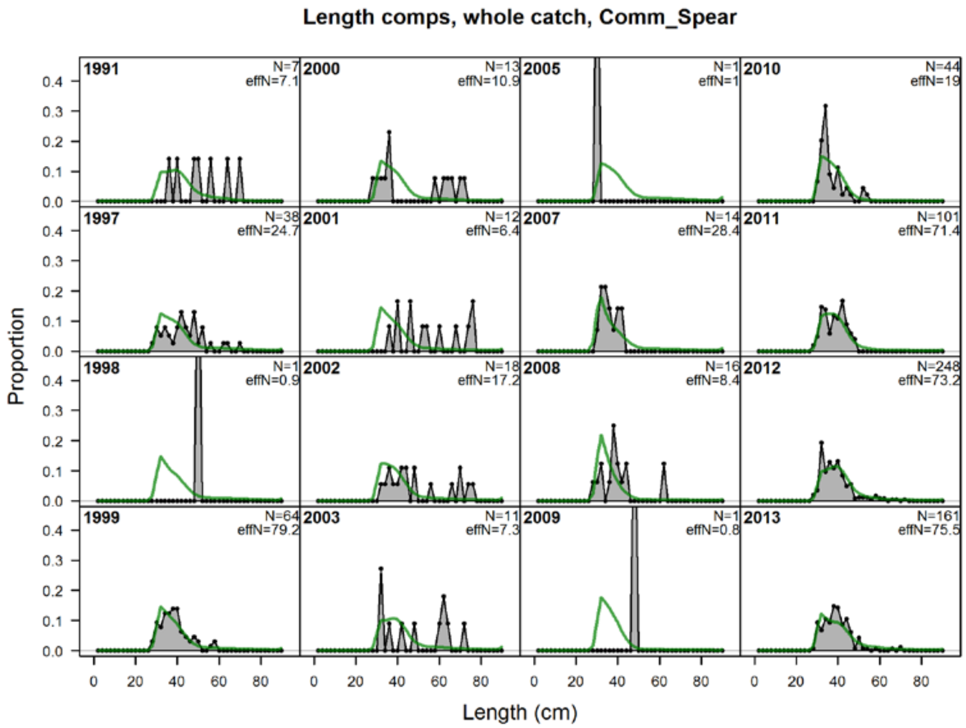


Figure 3.2.1.1.2.8. Model fit to the standardized FWRI age-0 seagrass trawl index for the WFL stock continuity model configuration.



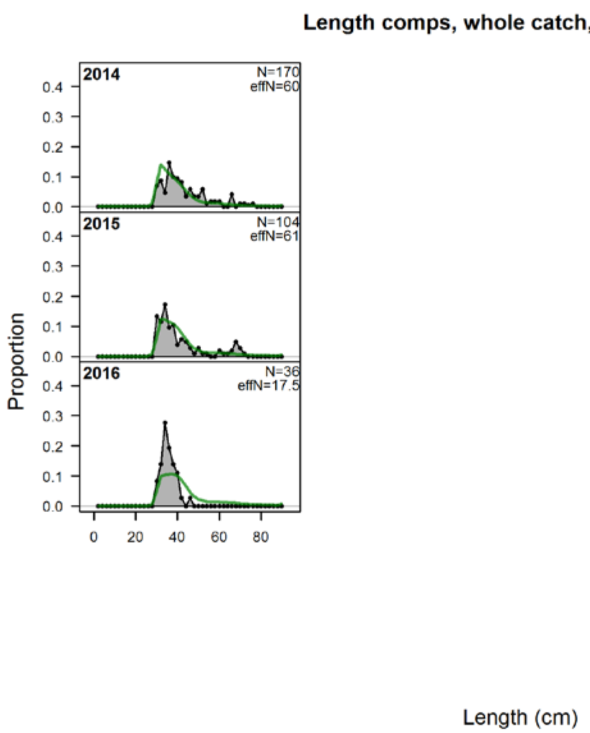


Figure 3.2.1.1.3.1. Observed and predicted length composition of landings from the commercial spear fishery of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

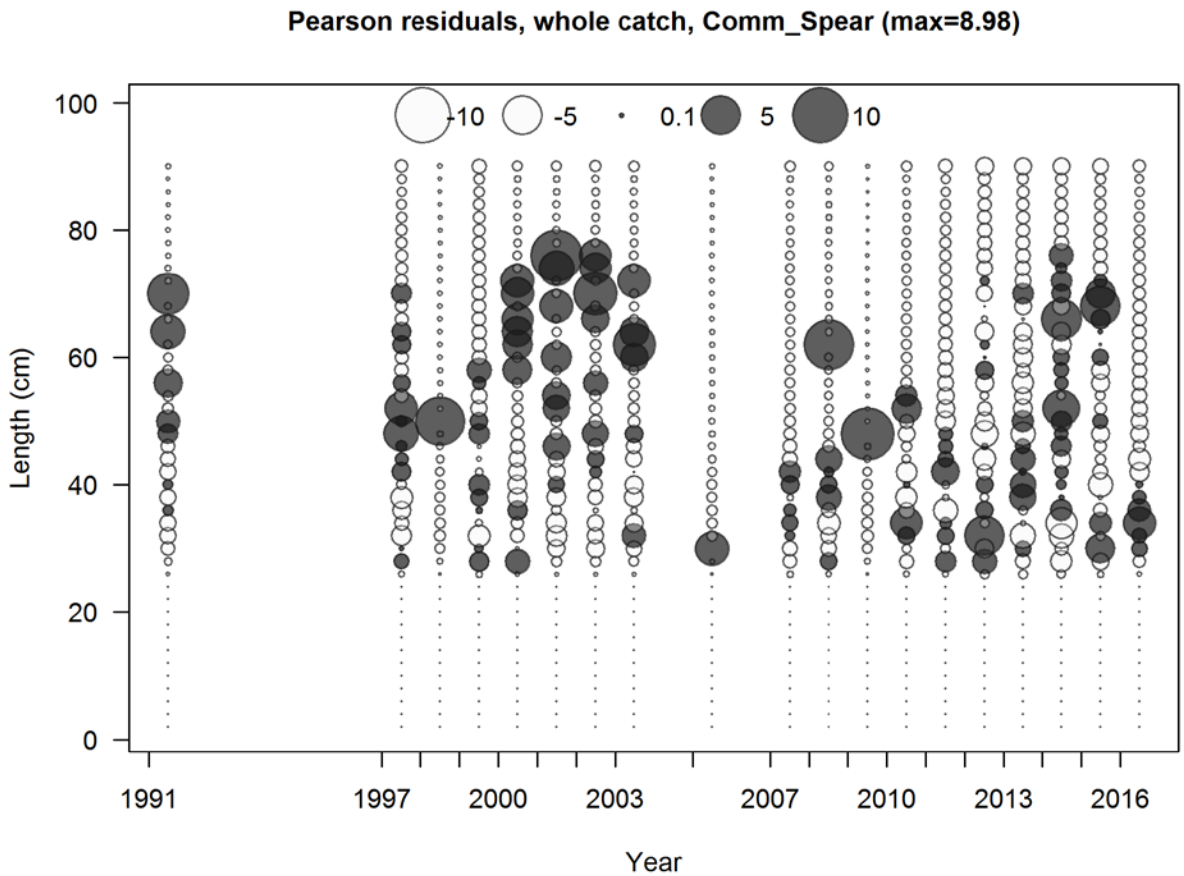


Figure 3.2.1.1.3.2. Pearson residuals for the length composition fit to the commercial spear fishery of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

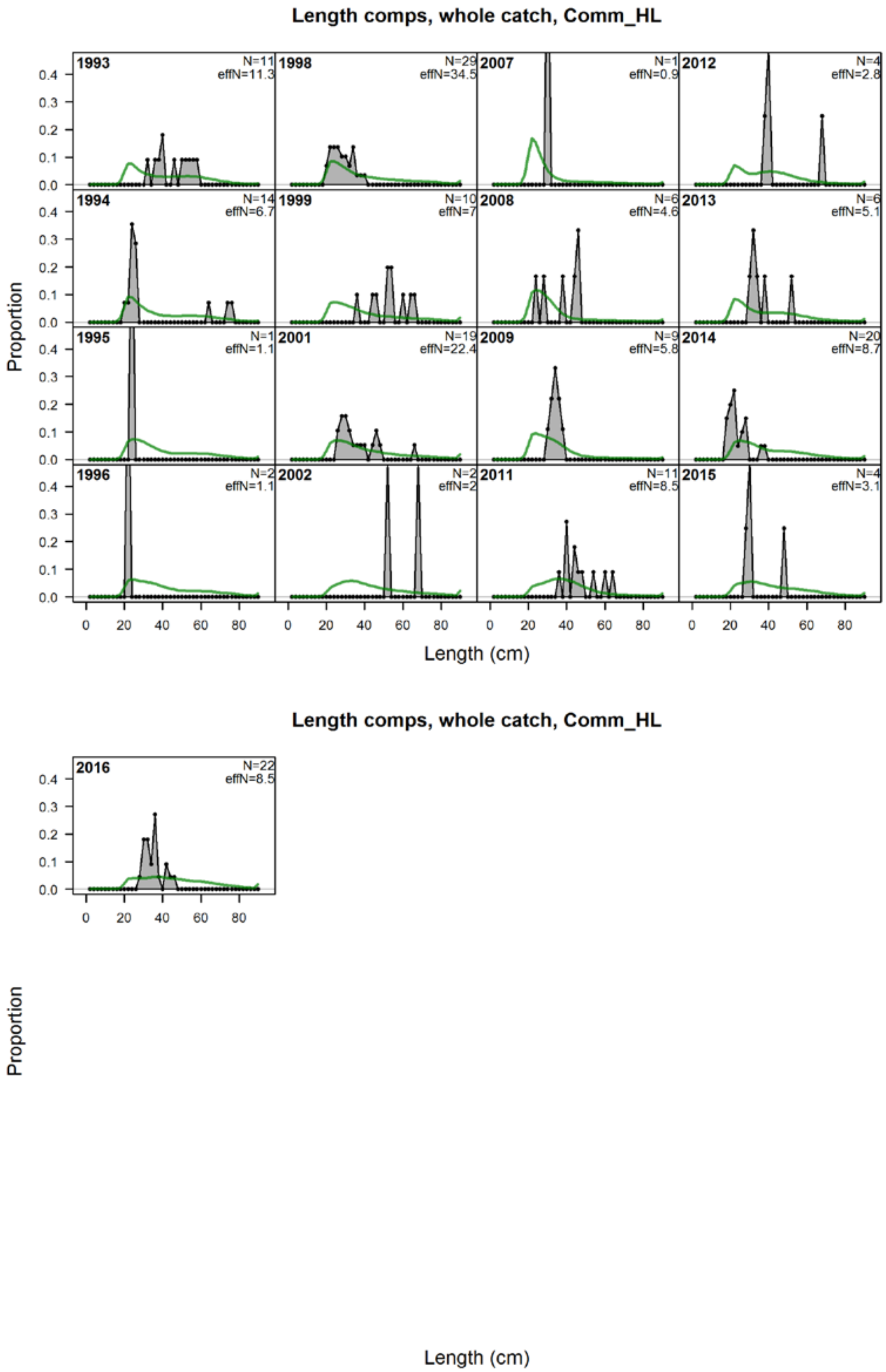


Figure 3.2.1.1.3.3. Observed and predicted length composition of landings from the commercial hook and line fishery of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

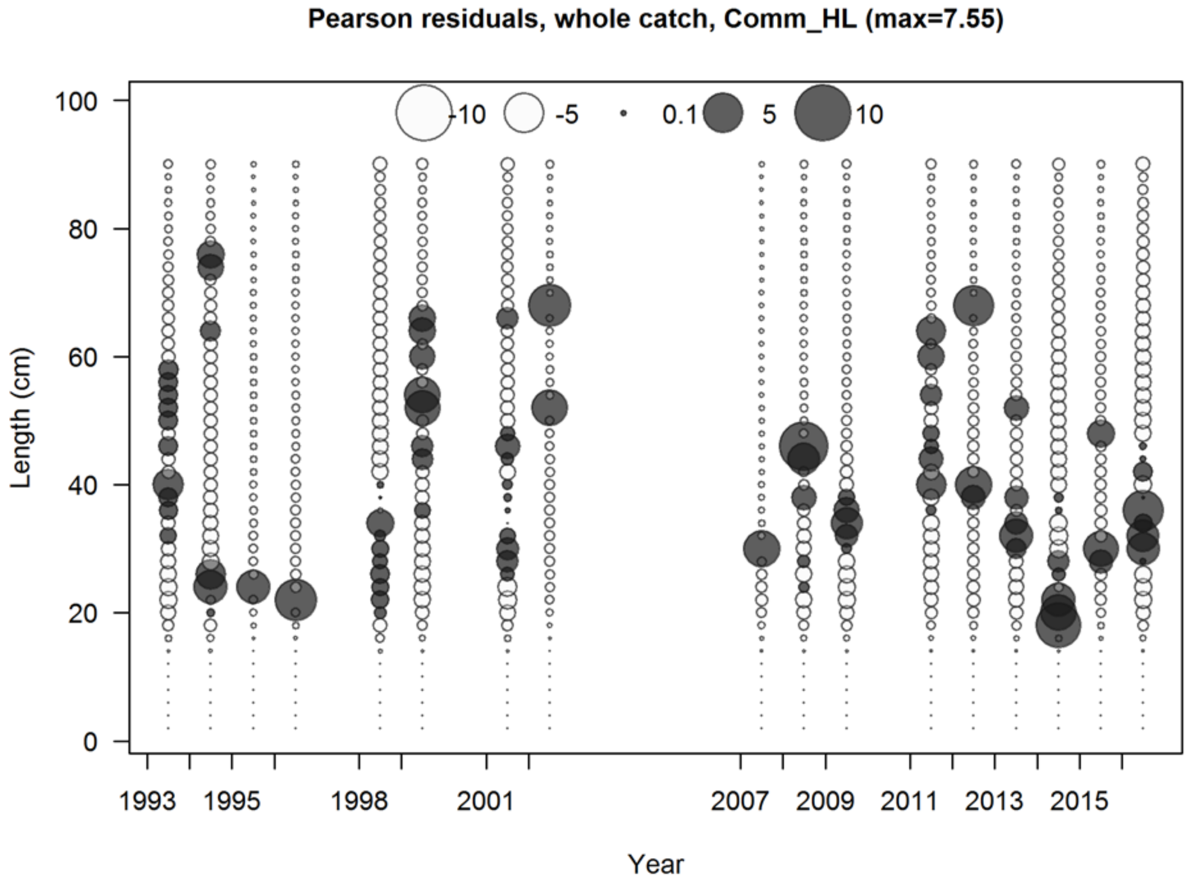


Figure 3.2.1.1.3.4. Pearson residuals for the length composition fit to the commercial hook and line fishery of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

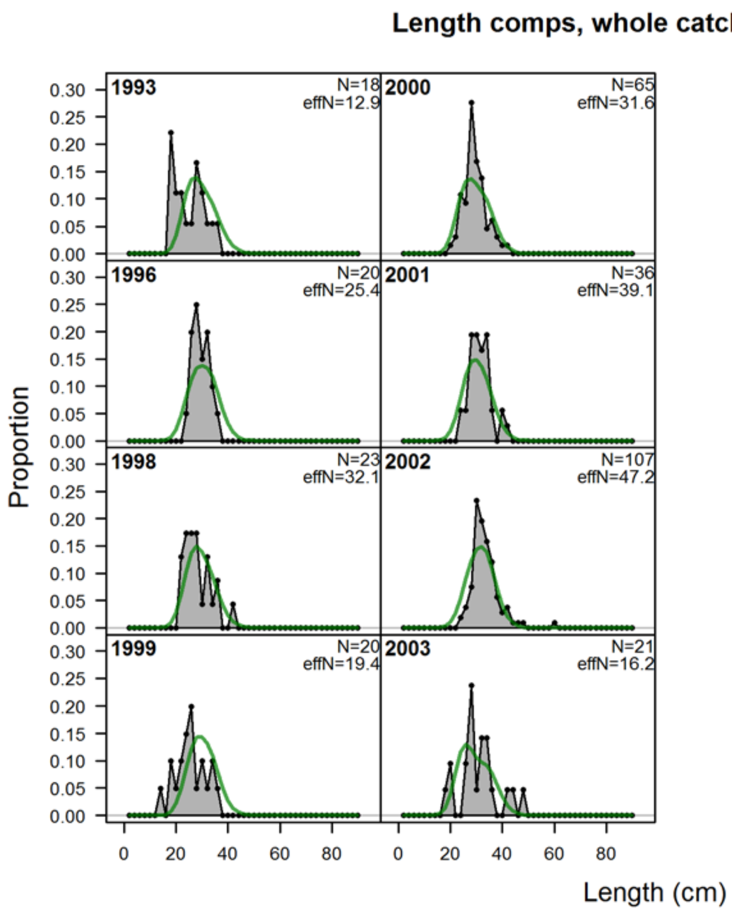


Figure 3.2.1.1.3.5. Observed and predicted length composition of landings from the commercial trap fishery of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

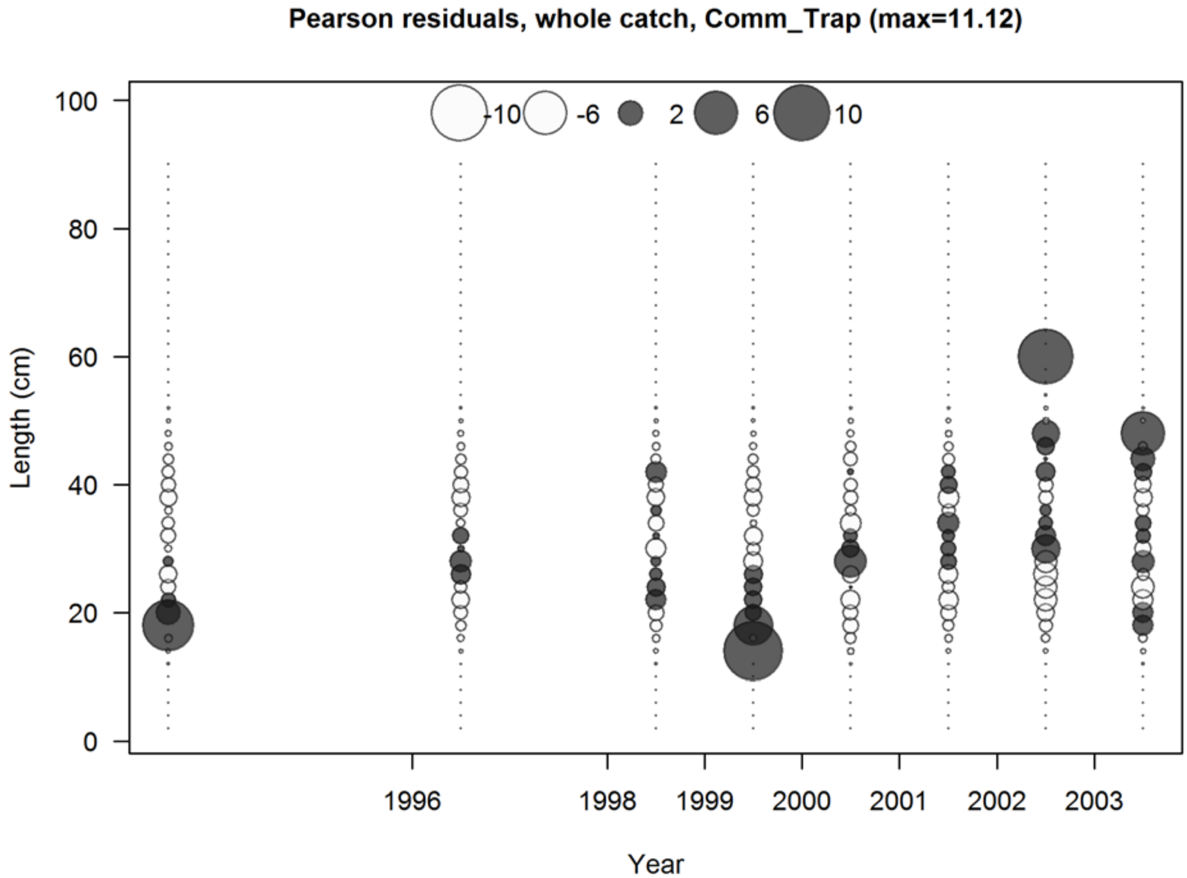
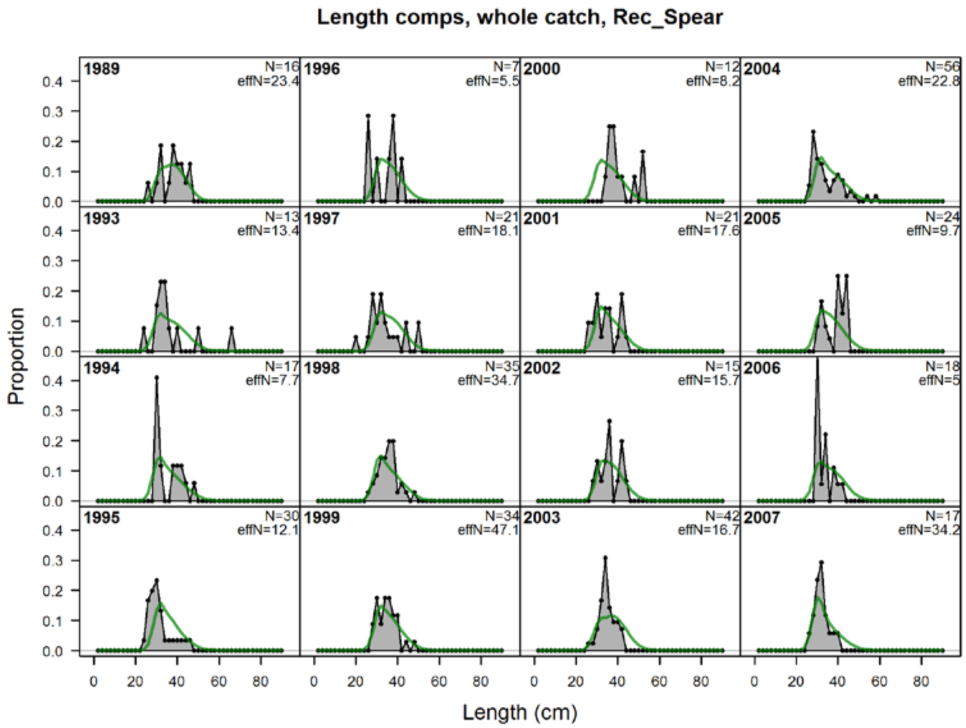


Figure 3.2.1.1.3.6. Pearson residuals for the length composition fit to the commercial trap fishery of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).



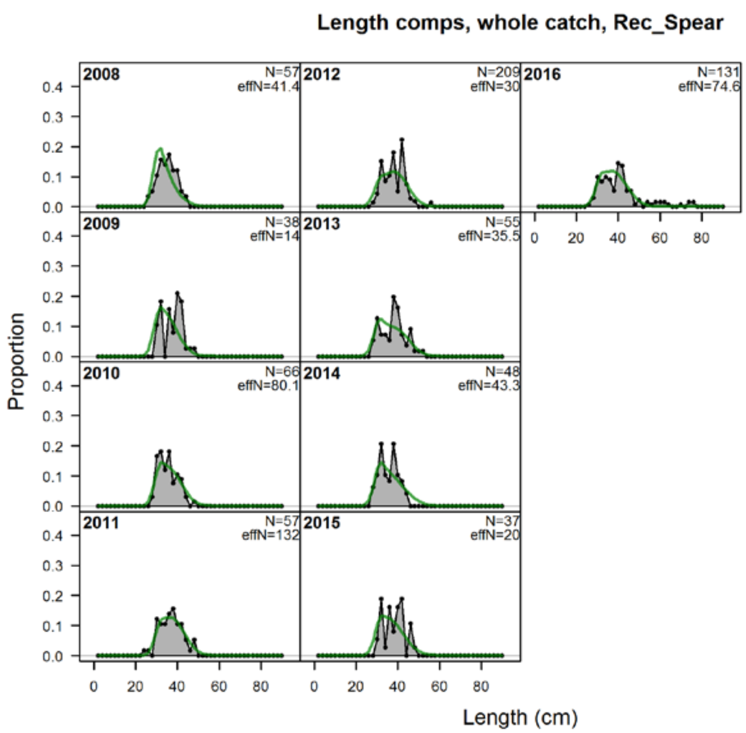


Figure 3.2.1.1.3.7. Observed and predicted length composition of landings from the recreational spear fishery of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

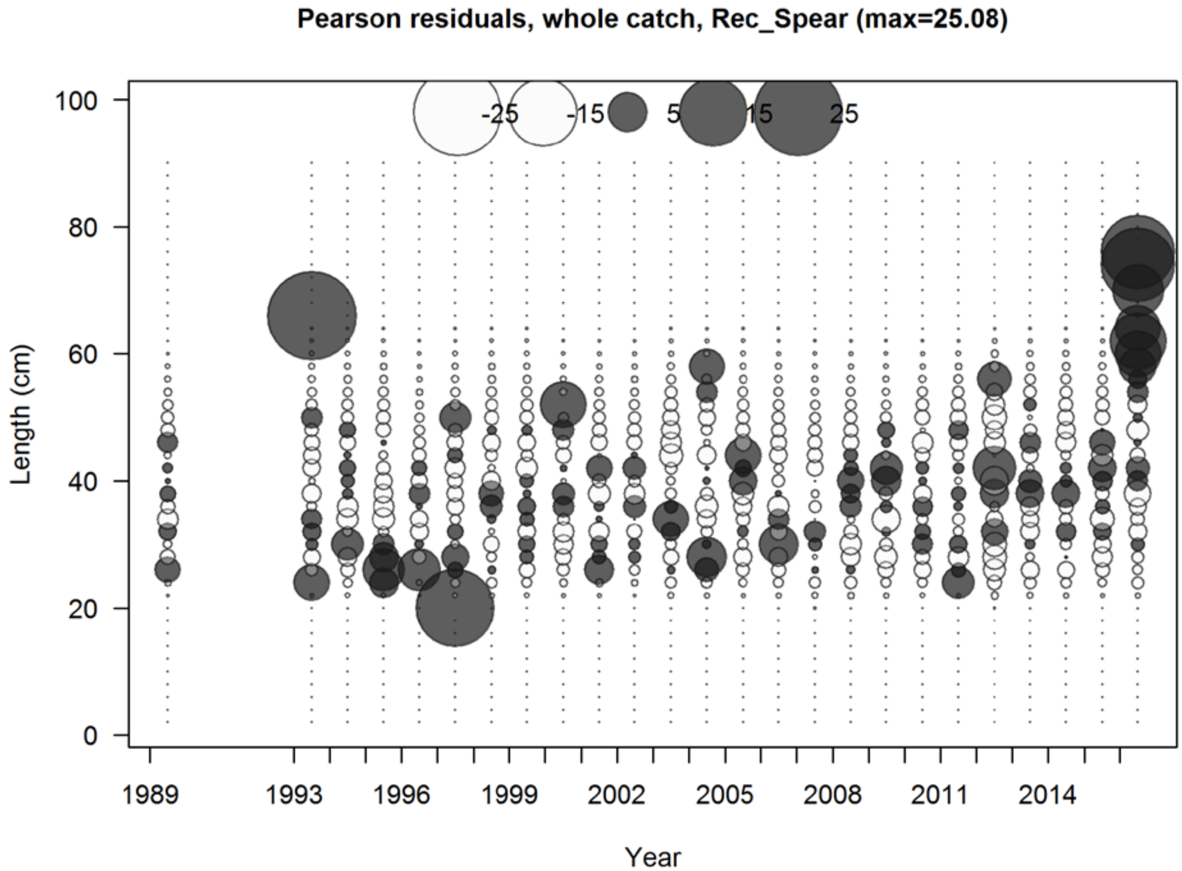
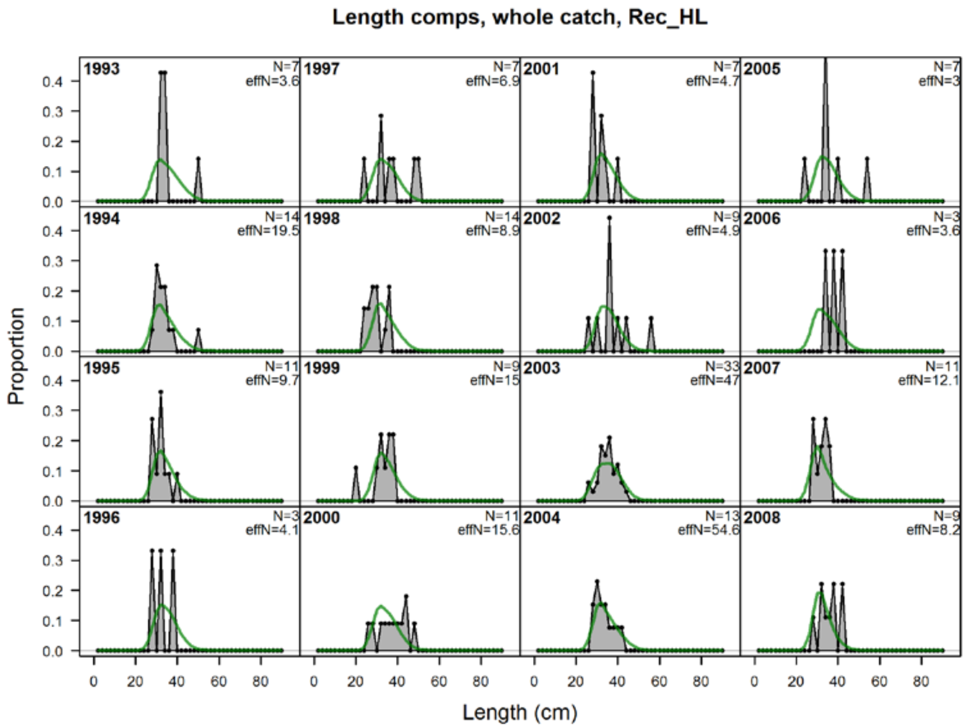


Figure 3.2.1.1.3.8. Pearson residuals for the length composition fit to the recreational spear fishery of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).



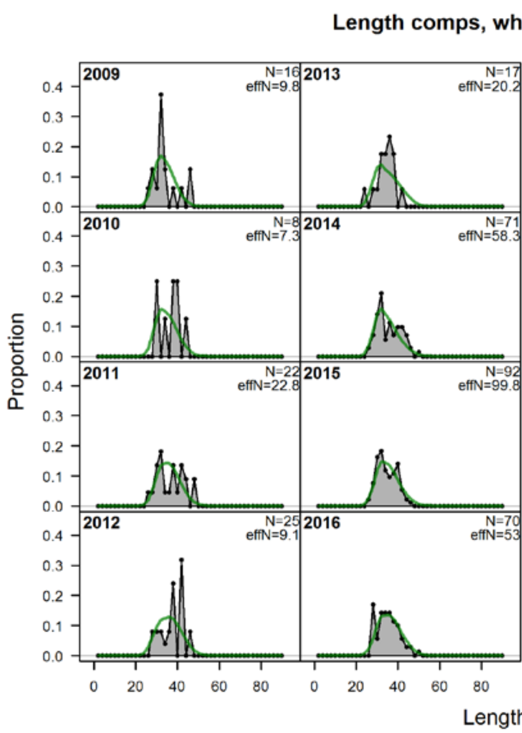


Figure 3.2.1.1.3.9. Observed and predicted length composition of landings from the recreational hook and line fishery of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

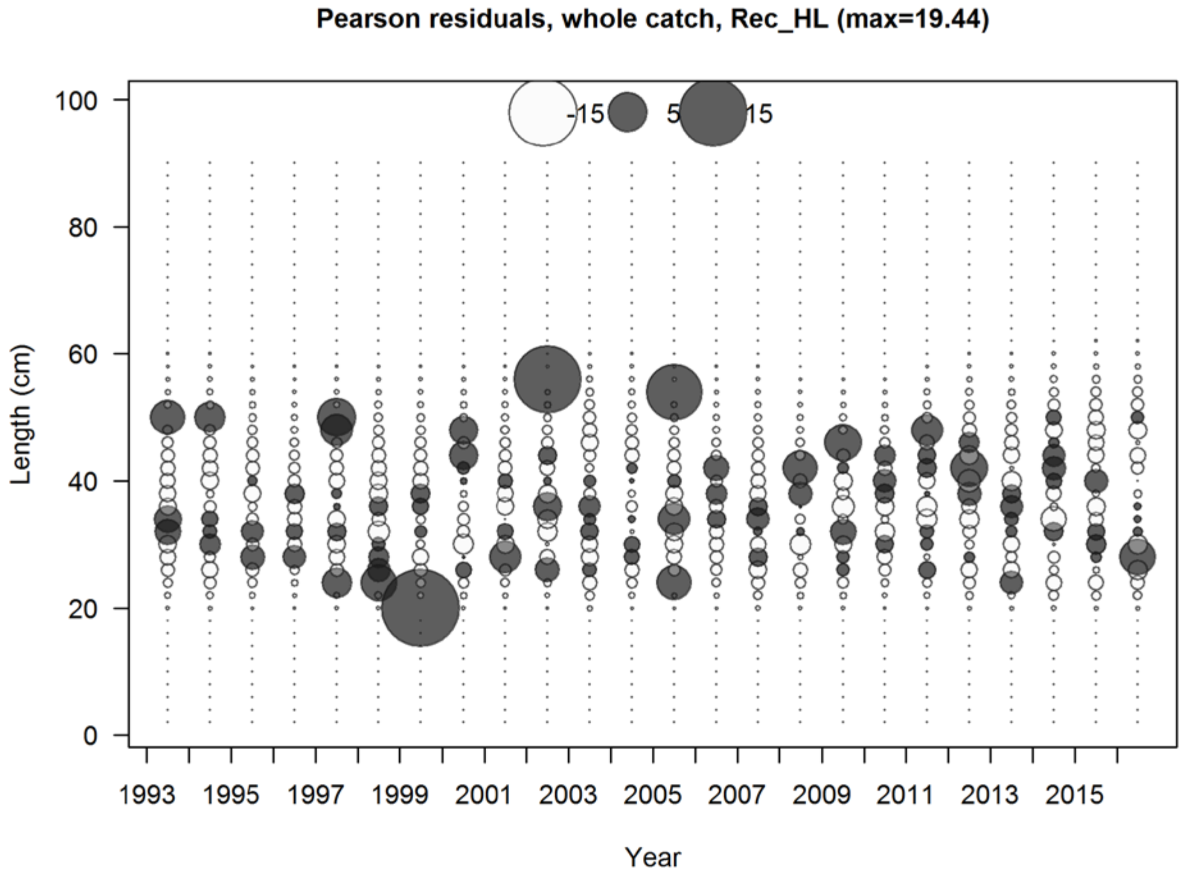


Figure 3.2.1.1.3.10. Pearson residuals for the length composition fit to the recreational hook and line fishery of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

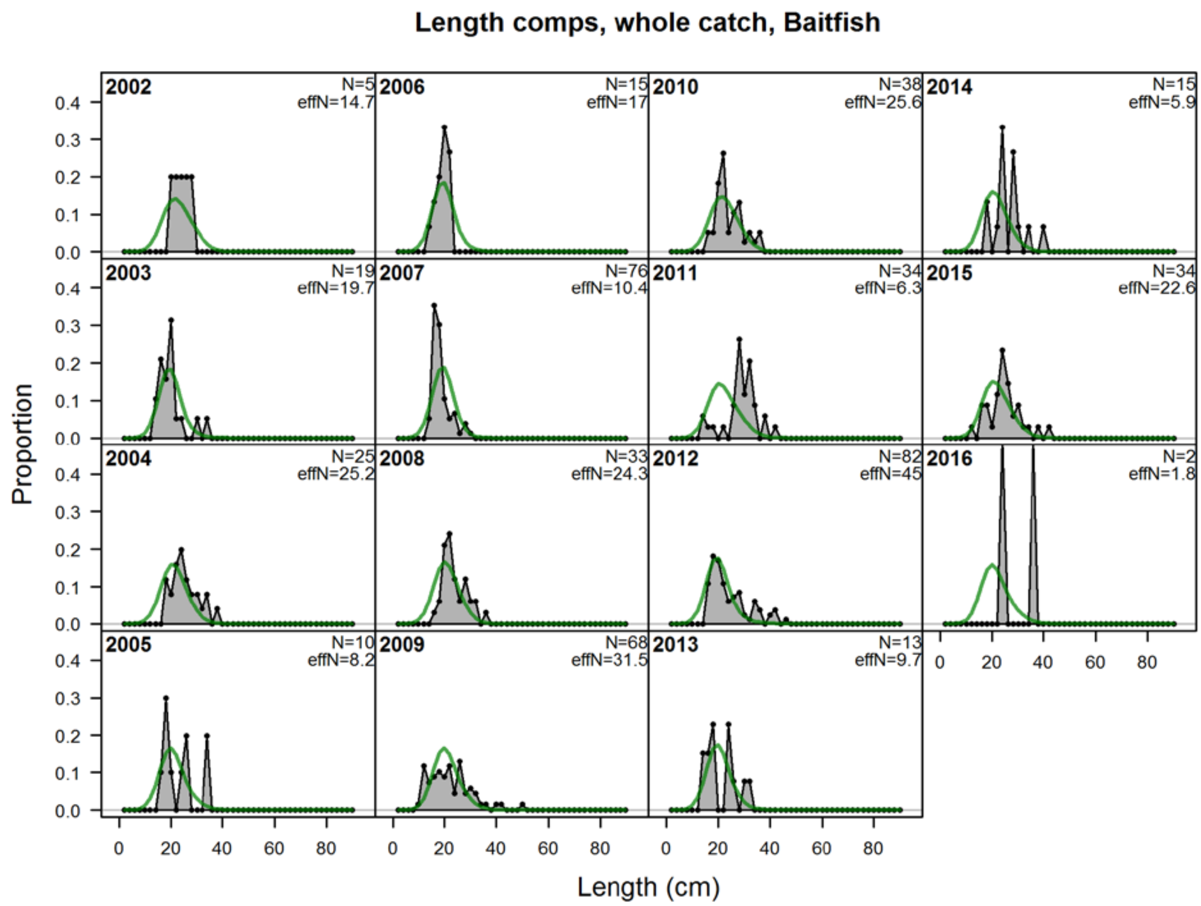


Figure 3.2.1.1.3.11. Observed and predicted length composition of landings from the baitfish trawl survey of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

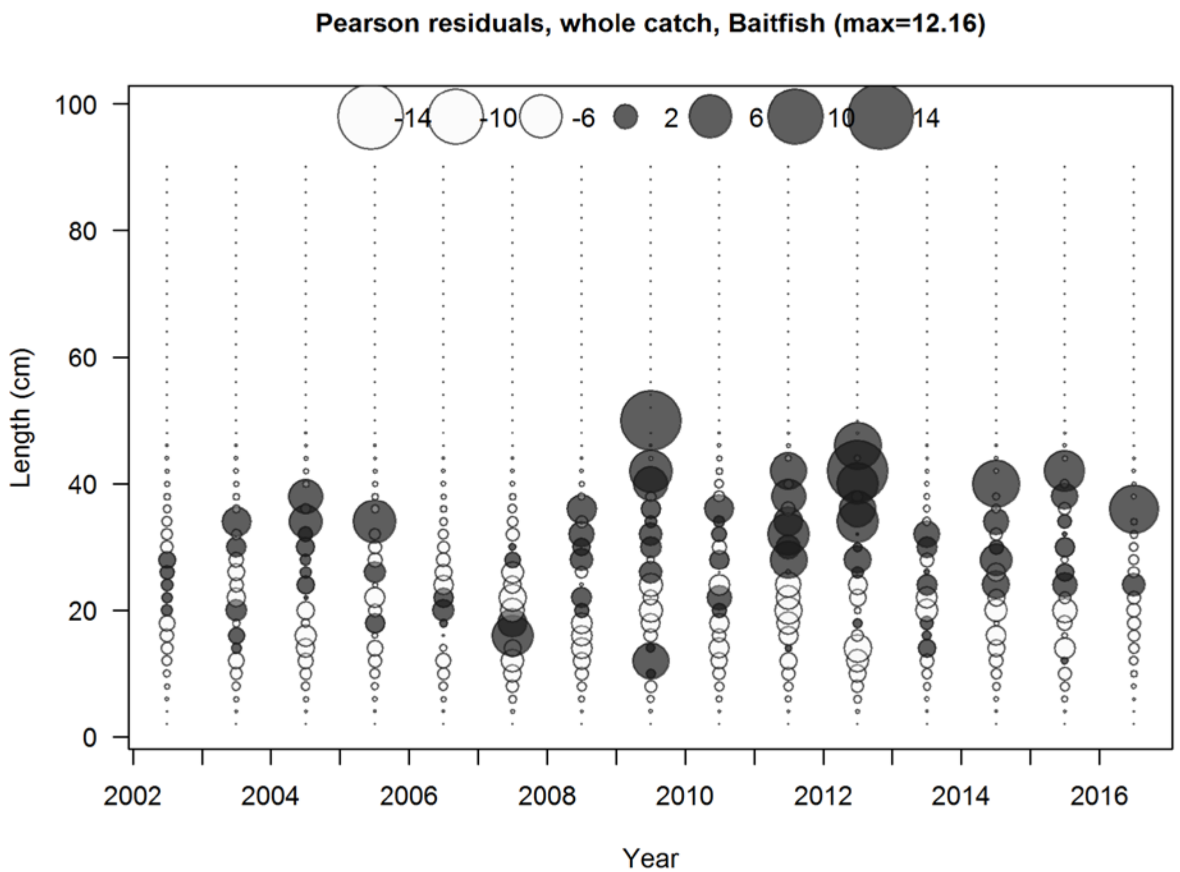


Figure 3.2.1.1.3.12. Pearson residuals for the length composition fit to the baitfish trawl survey of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

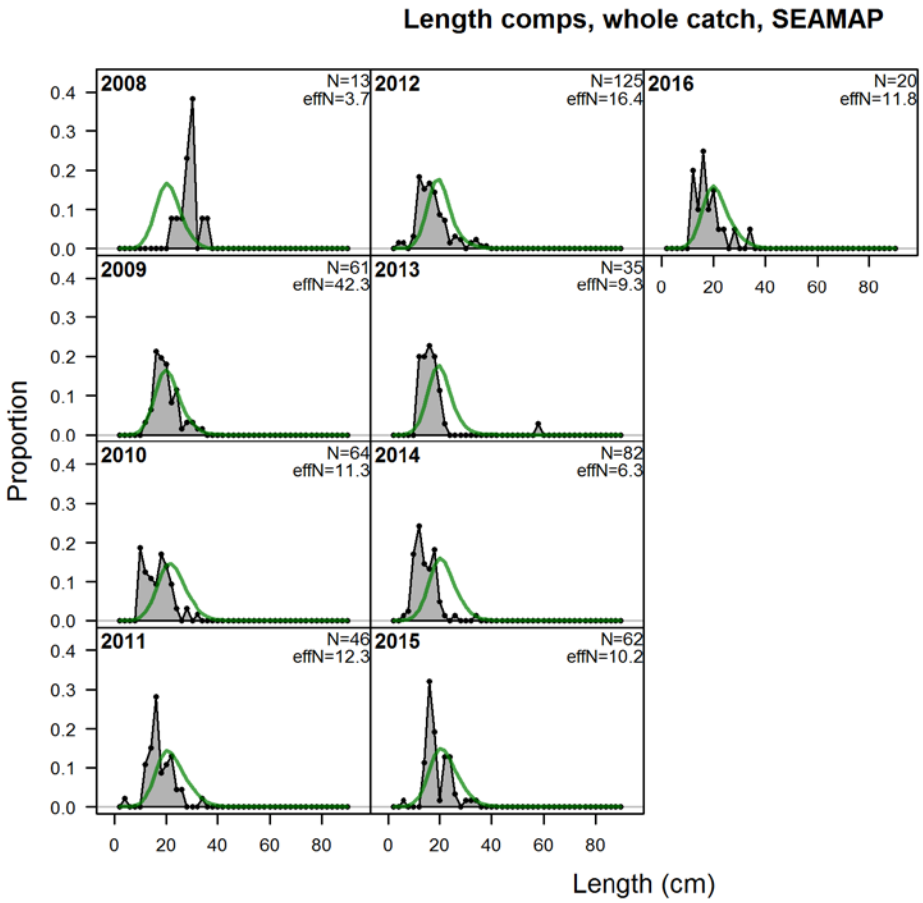


Figure 3.2.1.1.3.13. Observed and predicted length composition of landings from the SEAMAP trawl survey of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

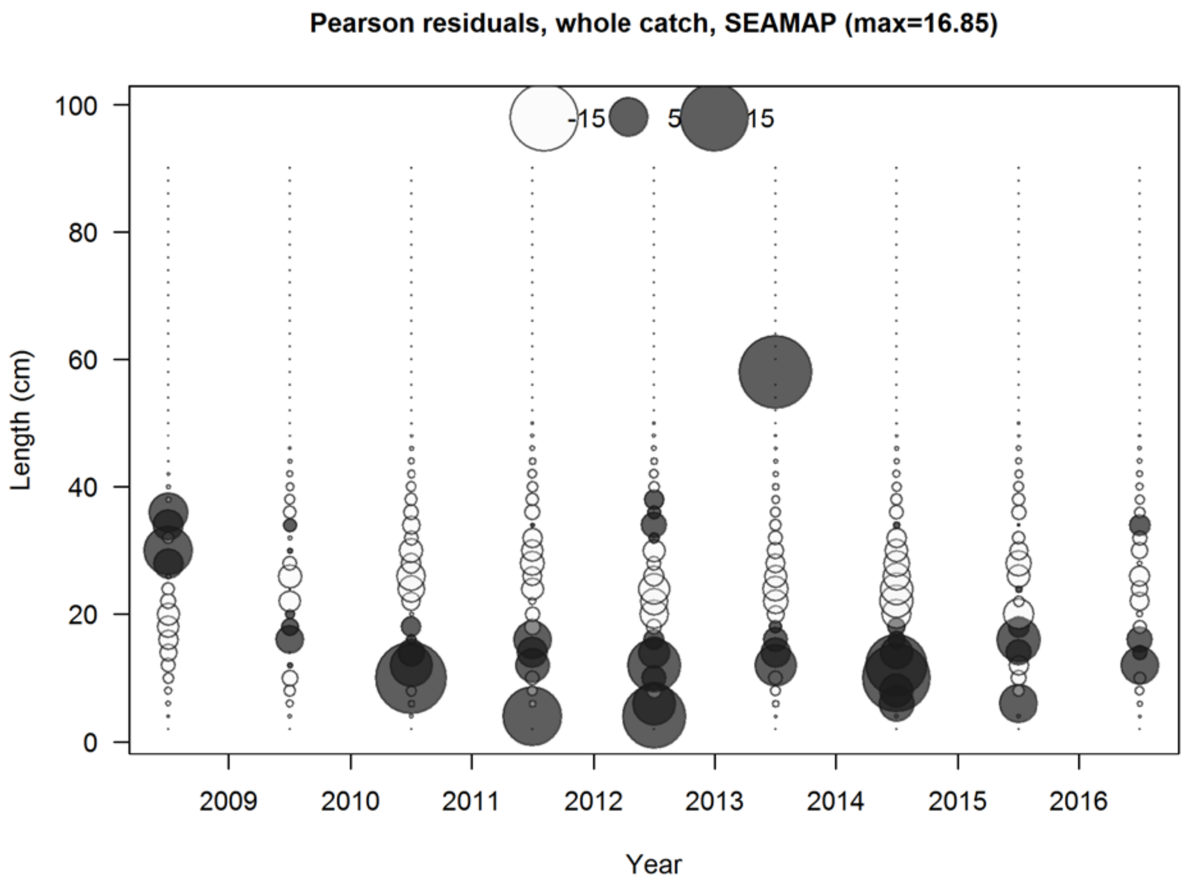


Figure 3.2.1.1.3.14. Pearson residuals for the length composition fit to the SEAMAP trawl survey of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

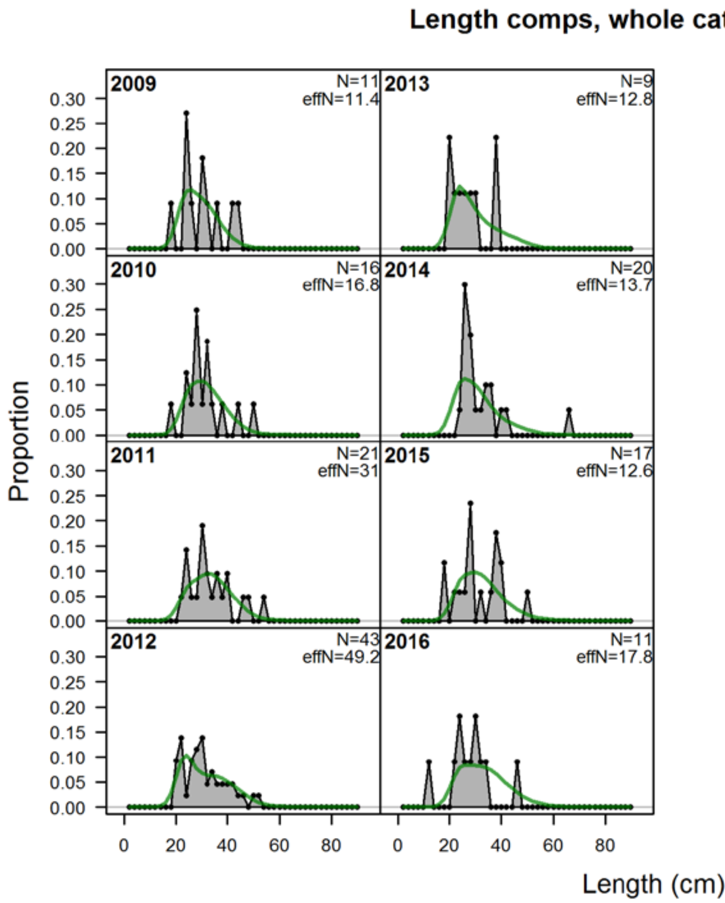


Figure 3.2.1.1.3.15. Observed and predicted length composition from the video survey of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

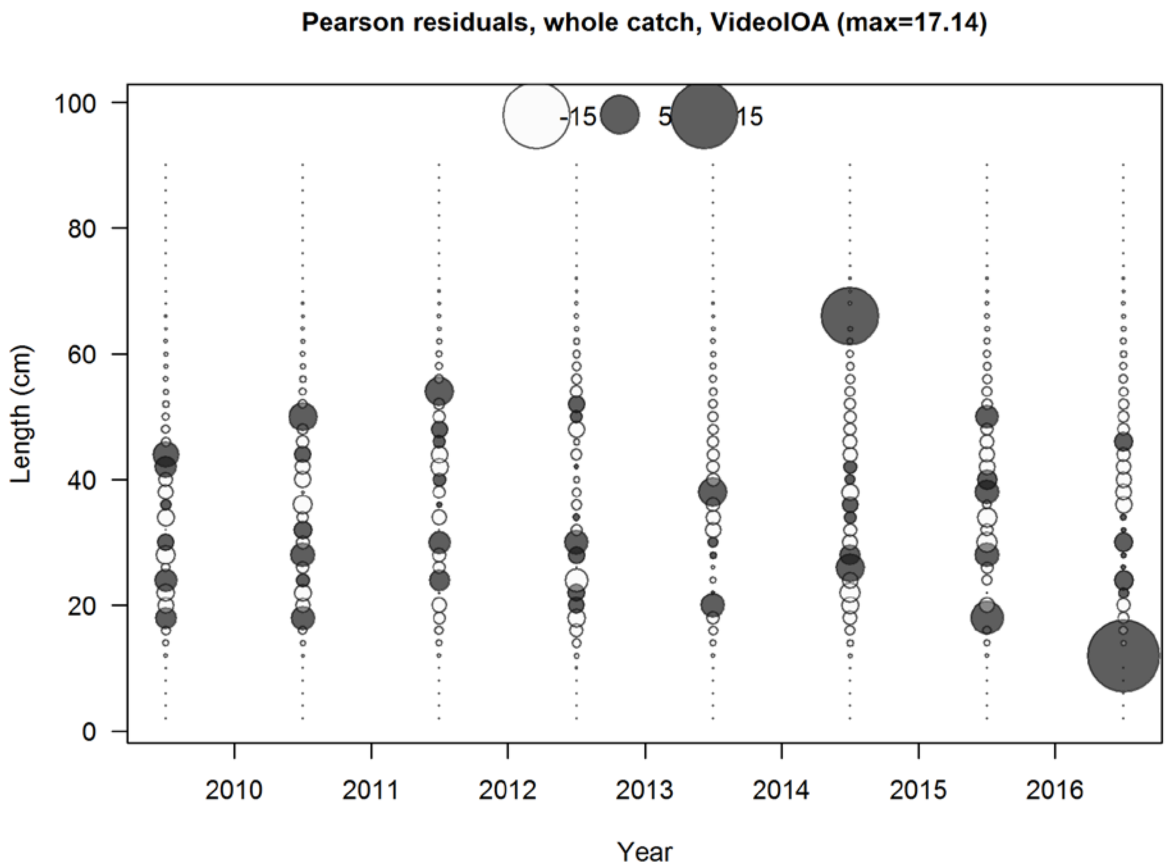


Figure 3.2.1.1.3.16. Pearson residuals for the length composition fit to the video survey of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

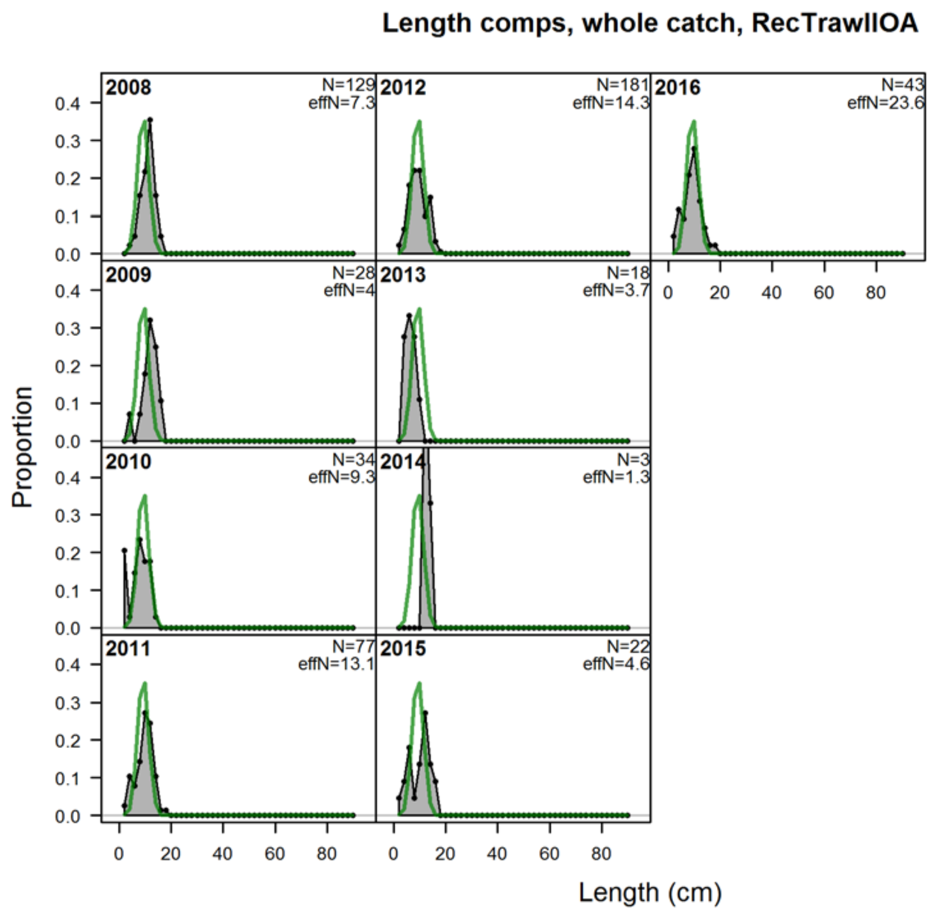


Figure 3.2.1.1.3.17. Observed and predicted length composition from the age-0 seagrass trawl survey of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.

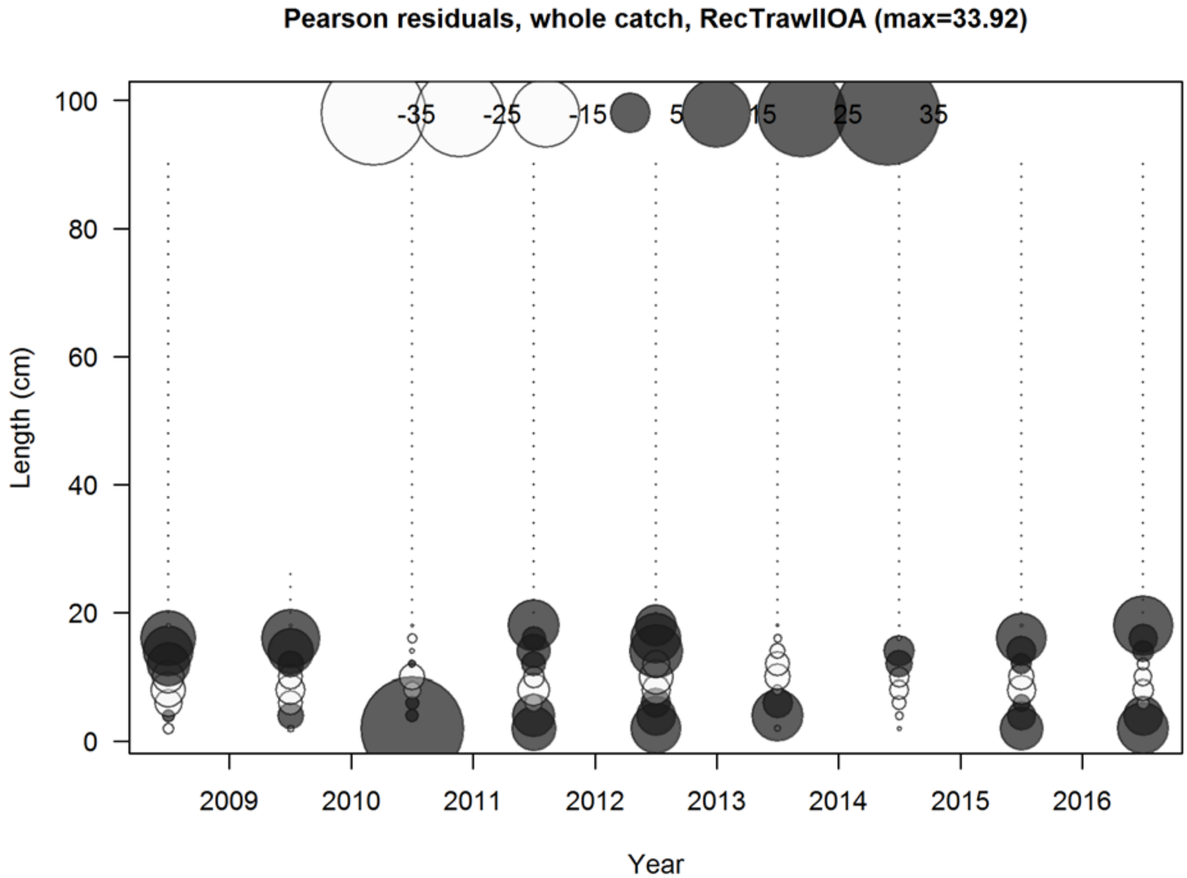


Figure 3.2.1.1.3.18. Pearson residuals for the length composition fit to the age-0 seagrass trawl survey of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

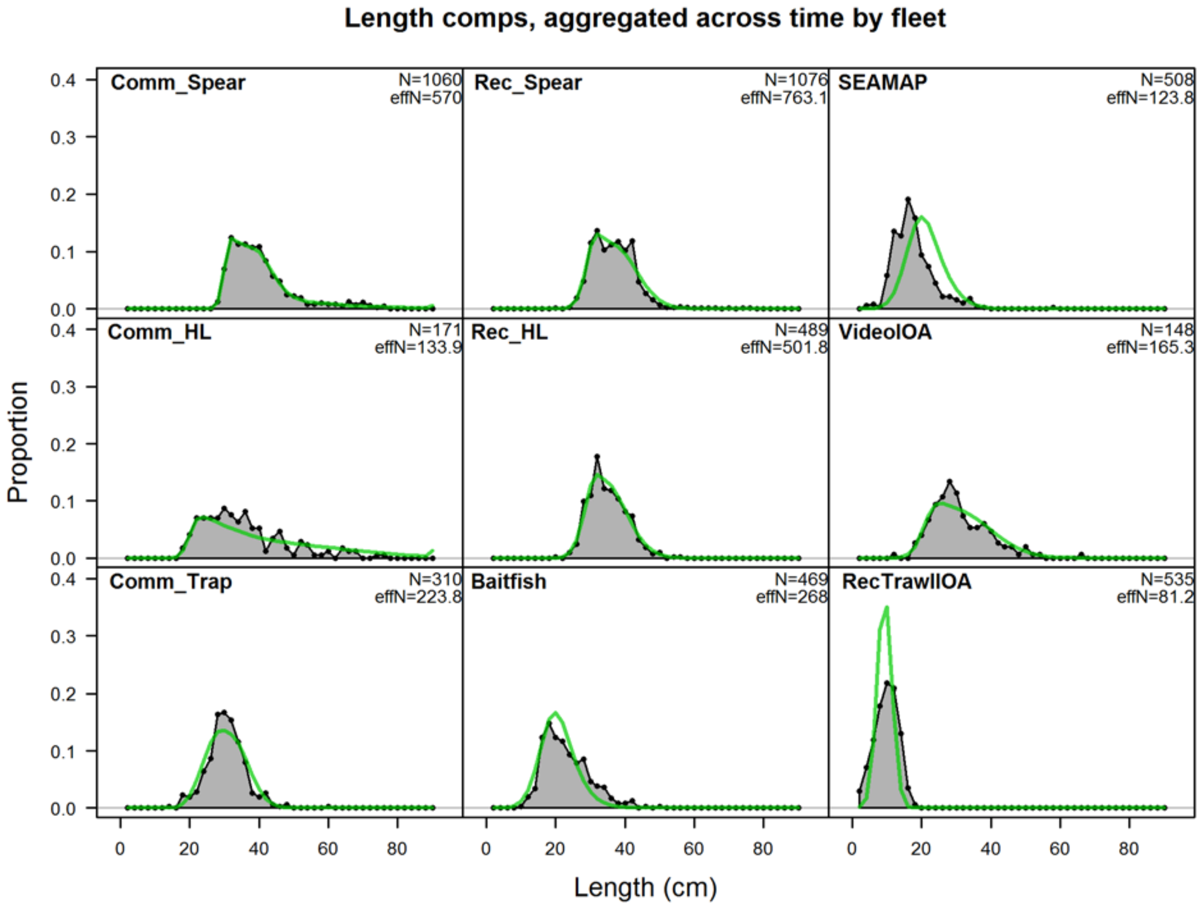
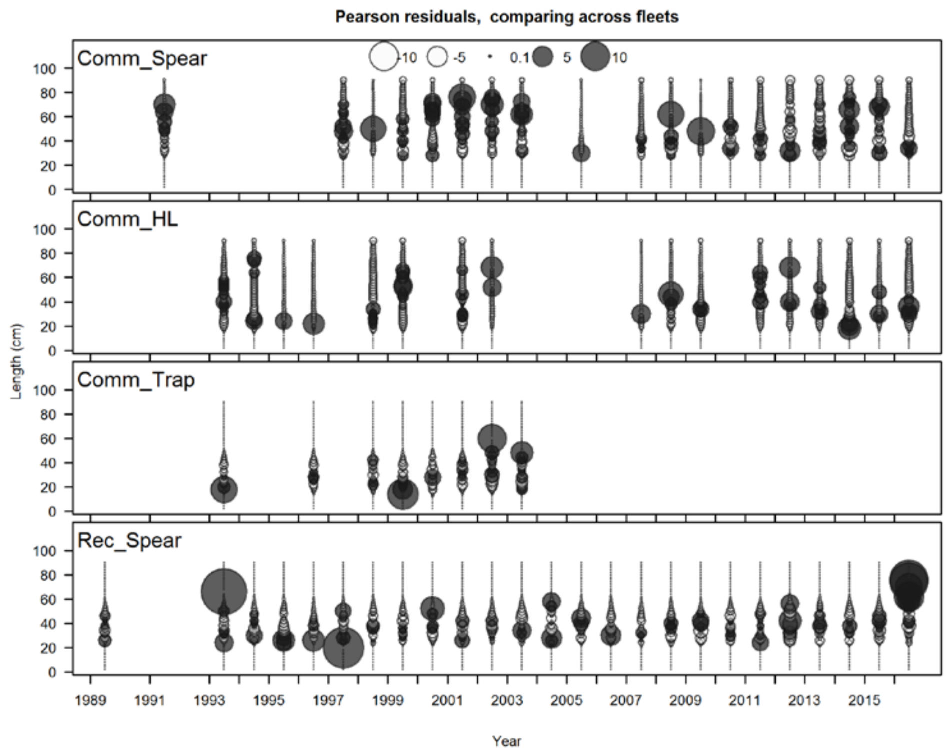


Figure 3.2.1.1.3.19. Observed and predicted length composition from all fisheries and surveys averaged across years of the WFL stock continuity model configuration. Observed sampled sizes were capped at a maximum of 200 fish.



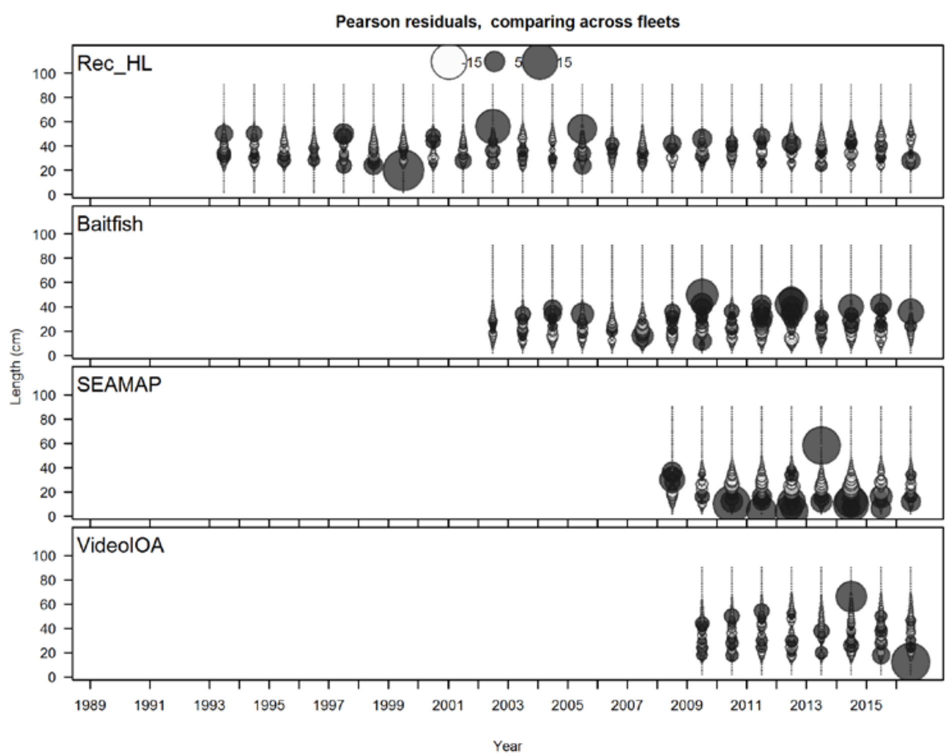


Figure 3.2.1.1.3.20. Pearson residuals for the length composition from all fisheries and surveys averaged across years of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

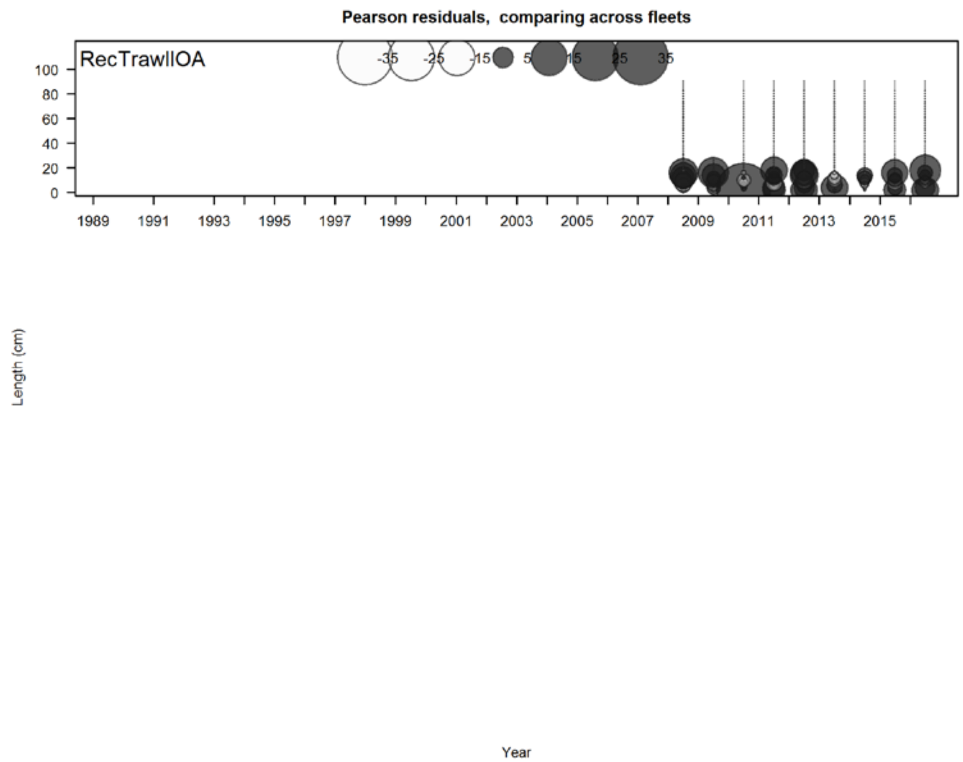


Figure 3.2.1.1.3.20 (continued). Pearson residuals for the length composition from all fisheries and surveys averaged across years of the WFL stock continuity model configuration. Solid blue circles are positive residuals (i.e., observed greater than predicted) and open circles are negative residuals (i.e., predicted greater than observed).

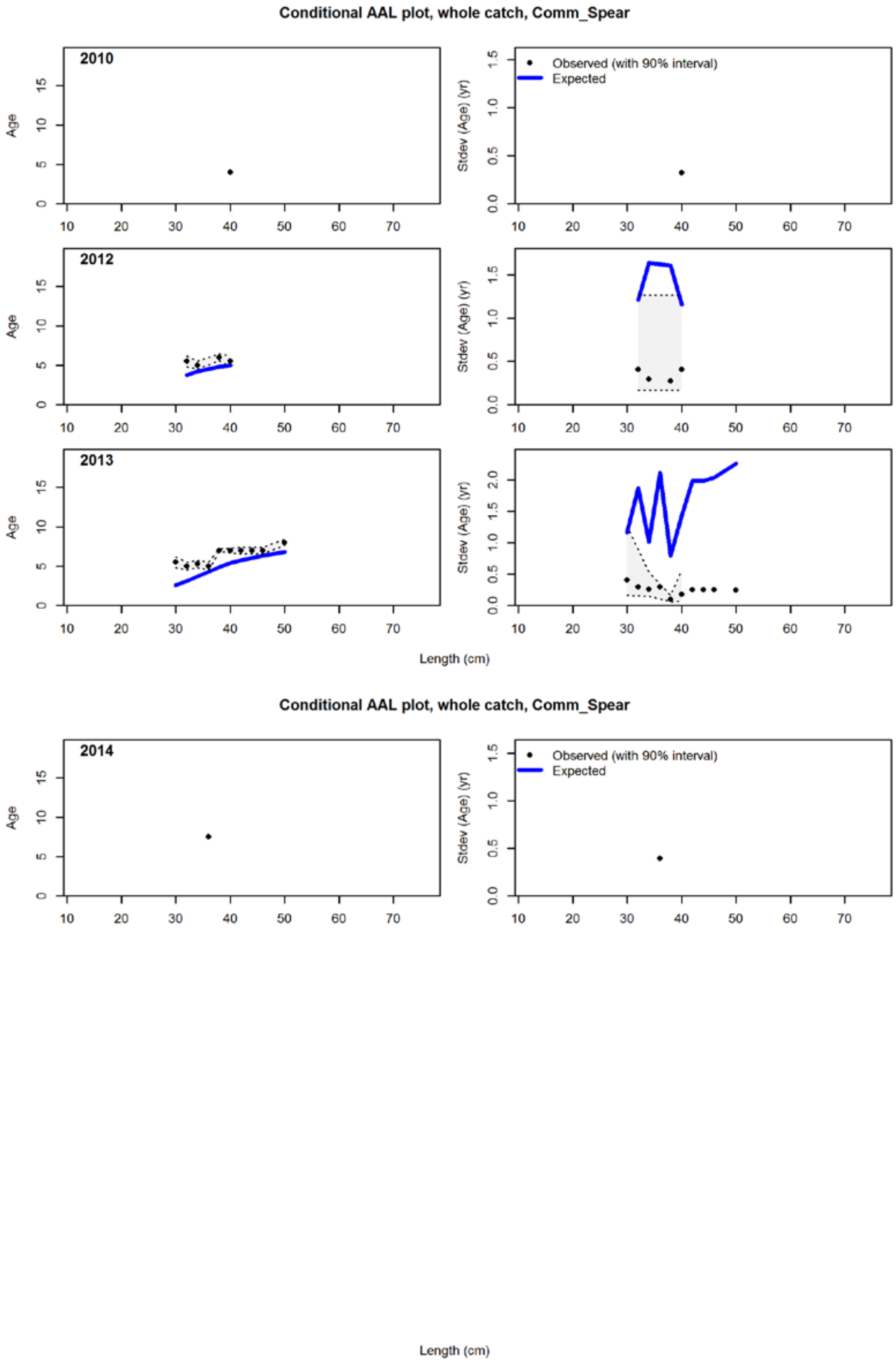


Figure 3.2.1.1.4.1. Observed and predicted age-at-length for the commercial spear fishery of the WFL stock continuity model configuration.

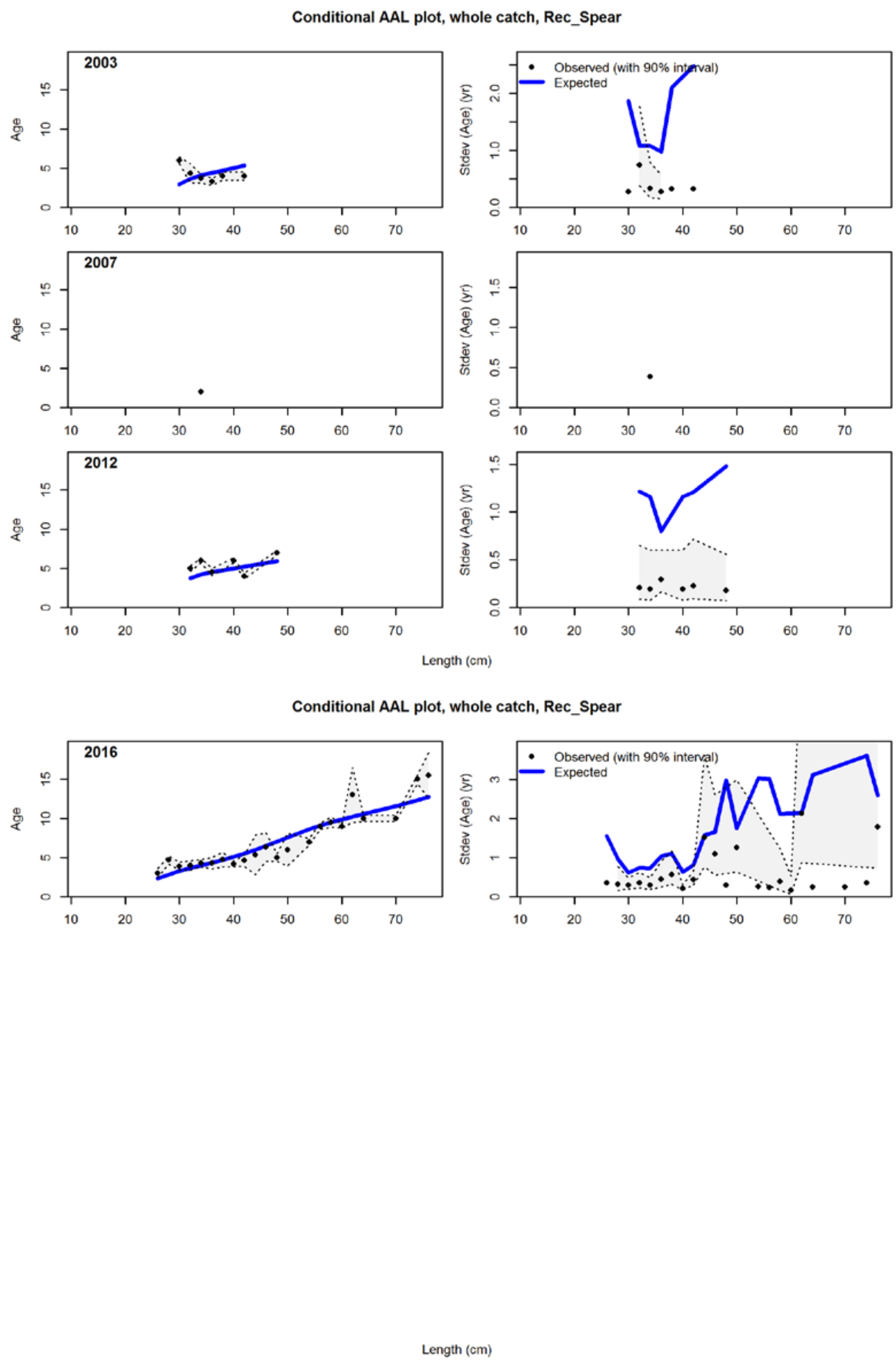


Figure 3.2.1.1.4.2. Observed and predicted age-at-length for the recreational spear fishery of the WFL stock continuity model configuration.

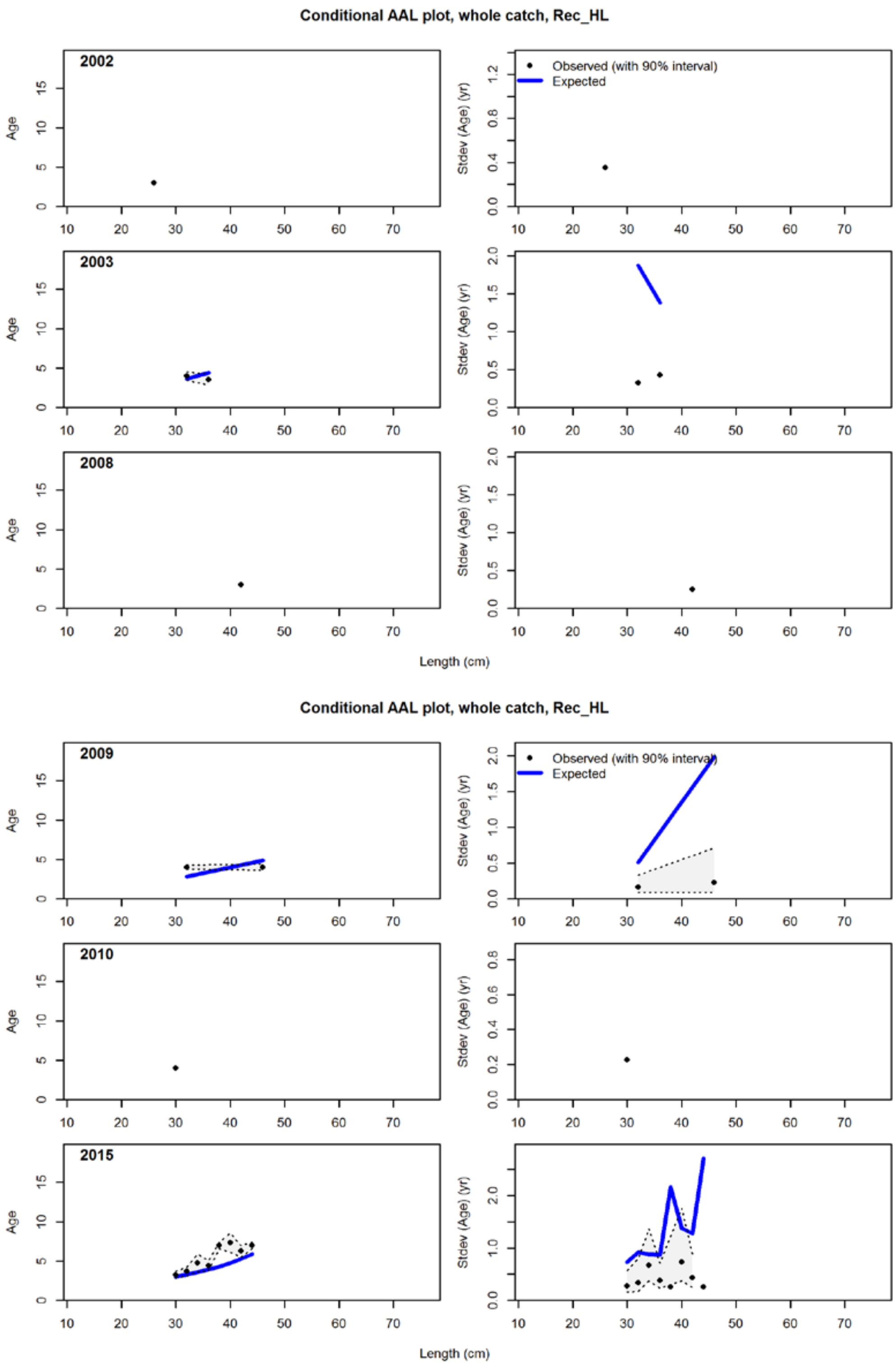


Figure 3.2.1.1.4.3. Observed and predicted age-at-length for the recreational hook and line fishery of the WFL stock continuity model configuration.

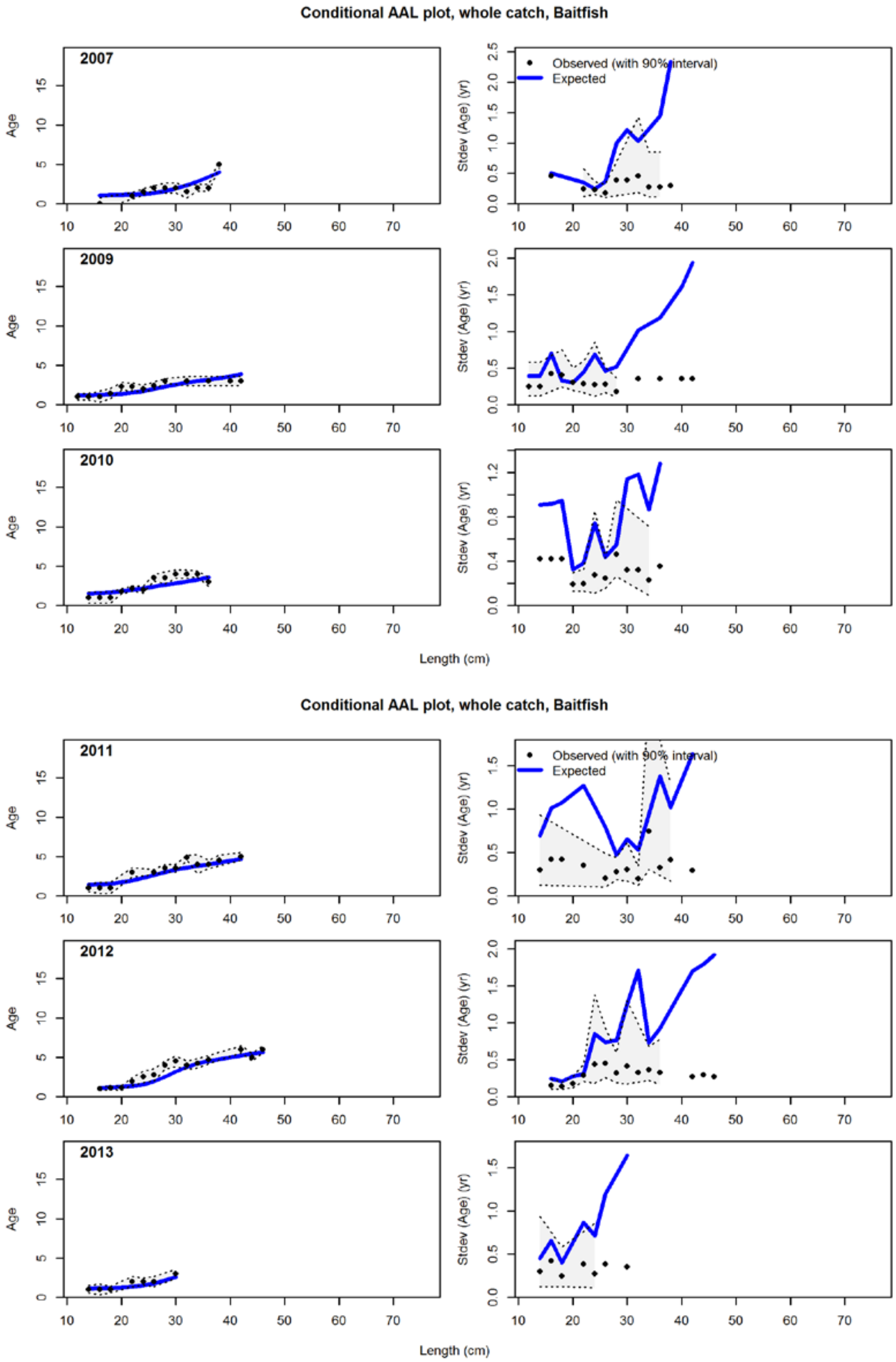


Figure 3.2.1.1.4.4. Observed and predicted age-at-length for the baitfish trawl survey of the WFL stock continuity model configuration.

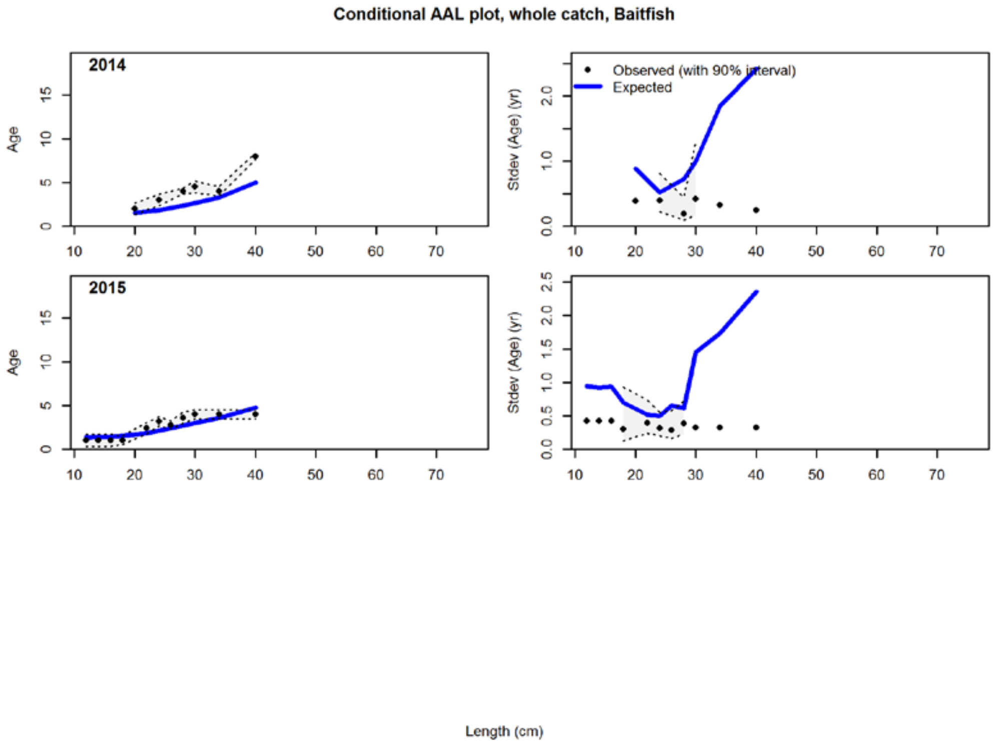


Figure 3.2.1.1.4.4 (continued). Observed and predicted age-at-length for the baitfish trawl survey of the WFL stock continuity model configuration.

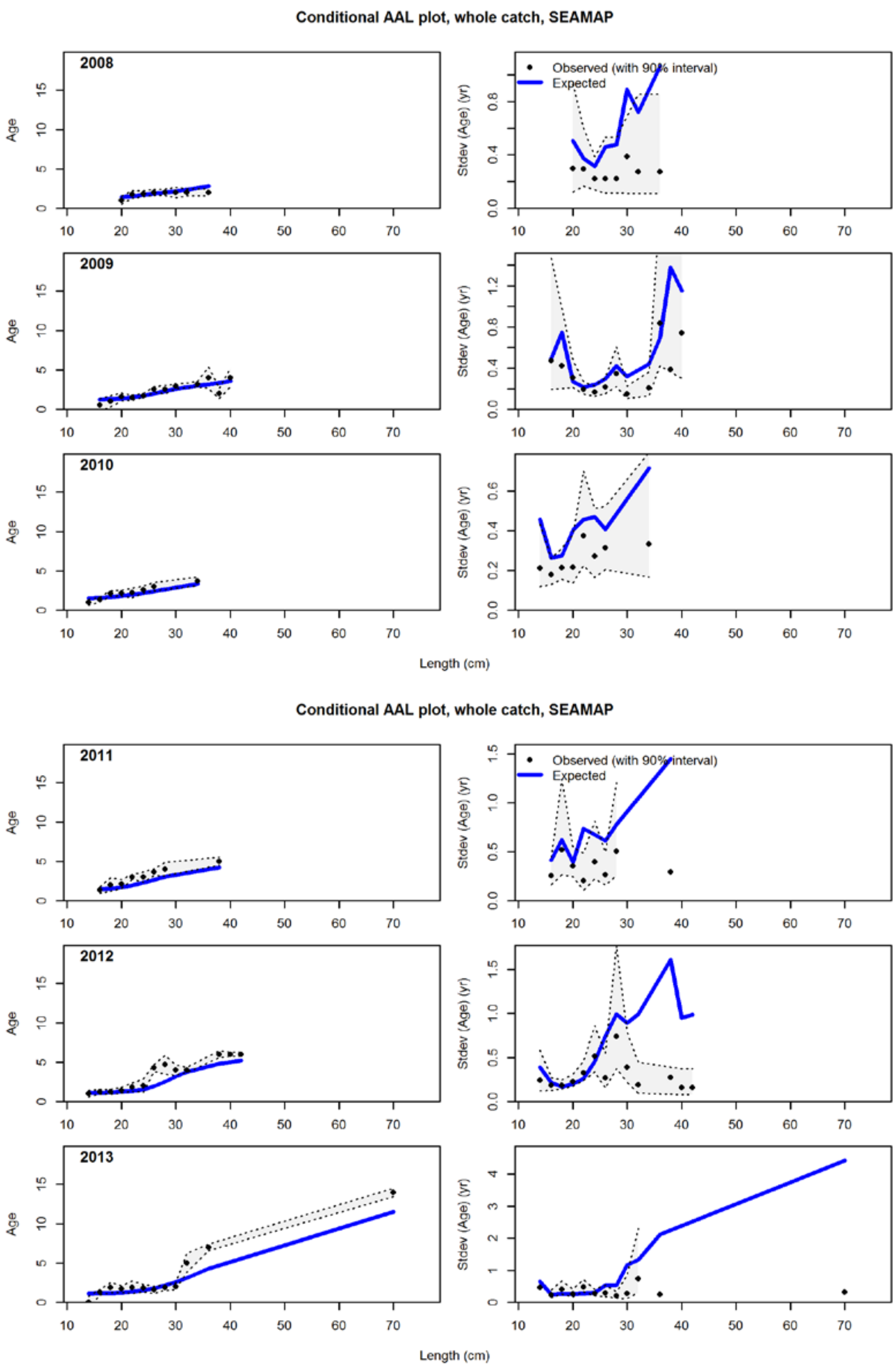


Figure 3.2.1.1.4.5. Observed and predicted age-at-length for the SEAMAP trawl survey of the WFL stock continuity model configuration.

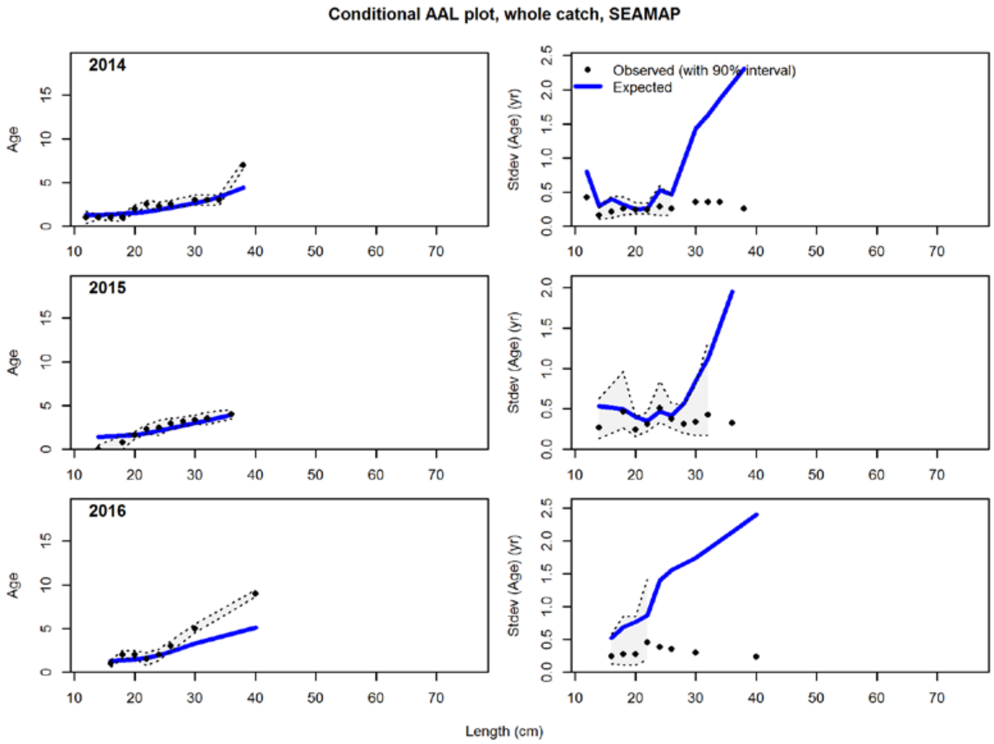


Figure 3.2.1.1.4.5 (continued). Observed and predicted age-at-length for the SEAMAP trawl survey of the WFL stock continuity model configuration.

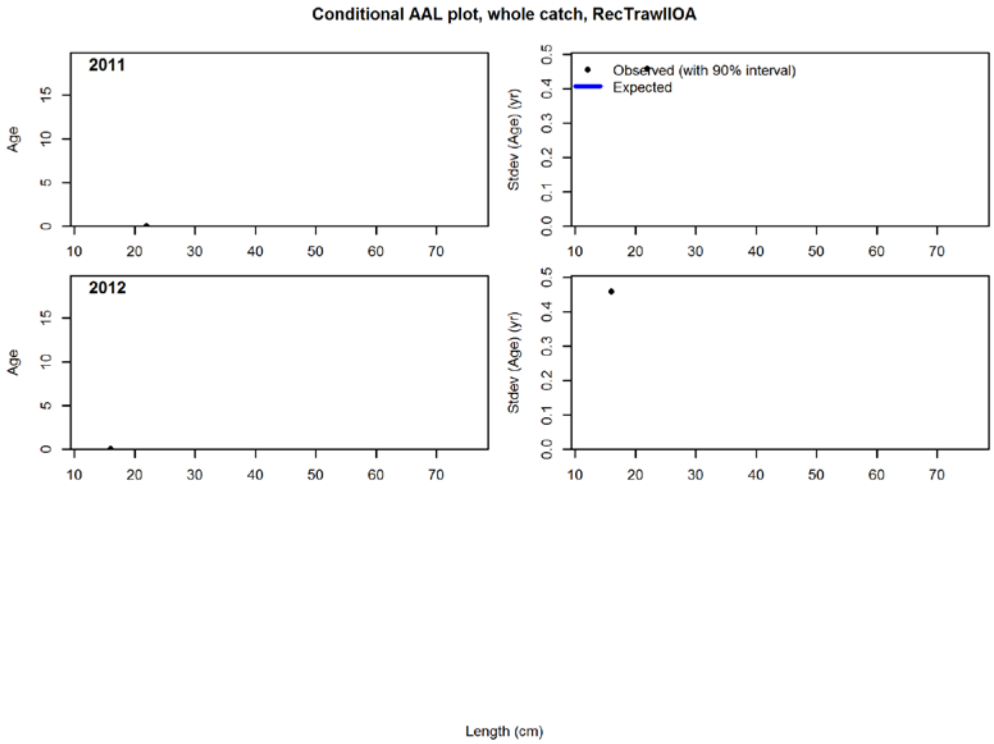


Figure 3.2.1.1.4.6. Observed and predicted age-at-length for the age-0 seagrass trawl Survey ('RecTRawlIOA') of the WFL stock continuity model configuration.

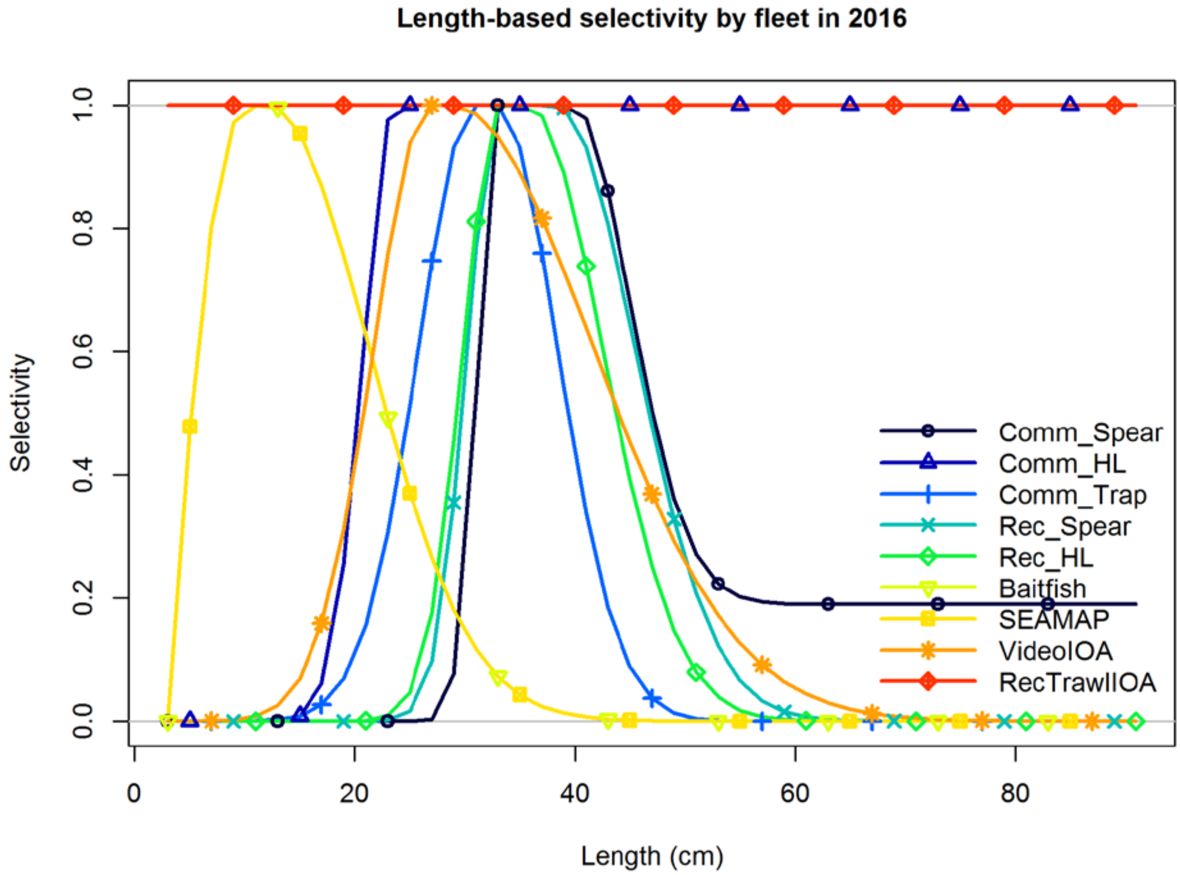


Figure 3.2.1.3.1. Estimated length-based selectivity functions for the fisheries and surveys in the WFL stock.

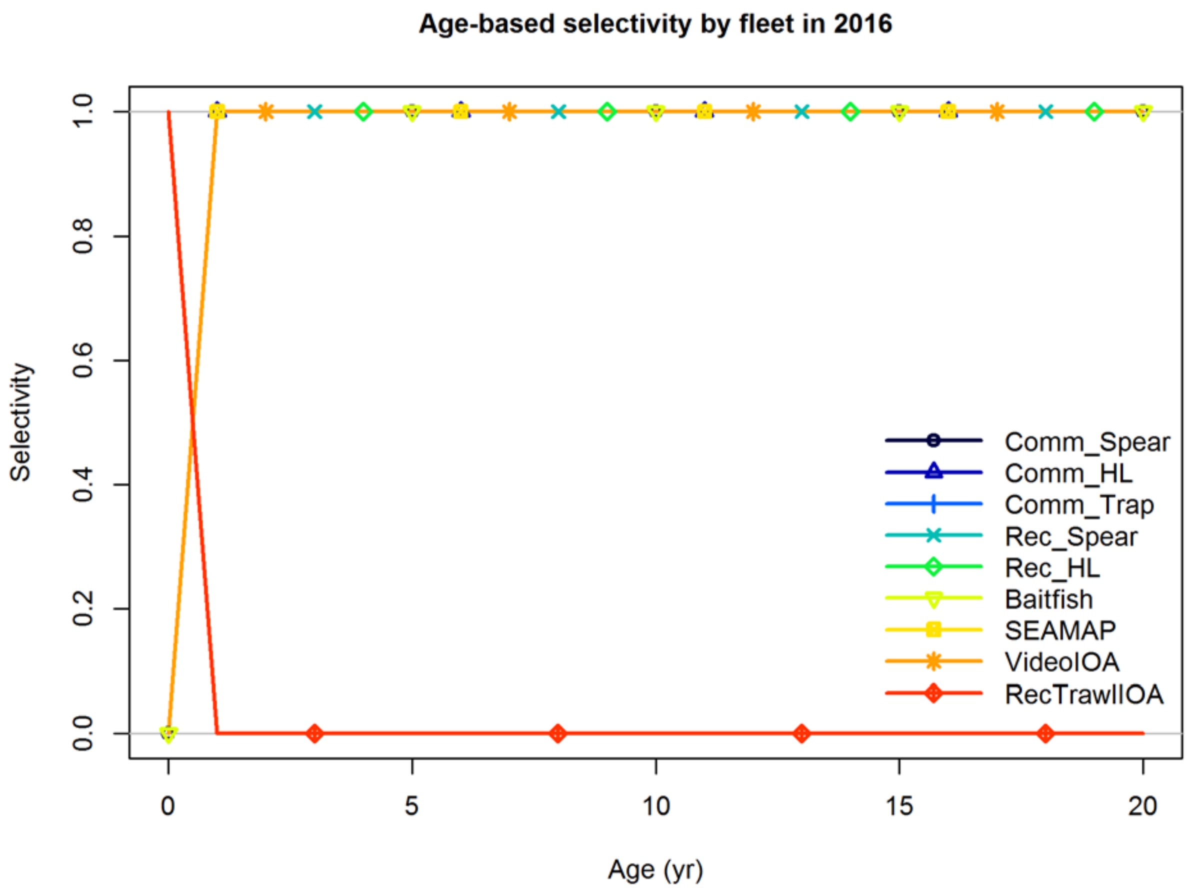


Figure 3.2.1.3.2. Age-based selectivity functions (i.e., ages across which the length-base selectivity functions apply for all fisheries/surveys except the age-0 seagrass trawl (‘RecTrawlIOA’), which was modeled with age for only age-0 individuals.

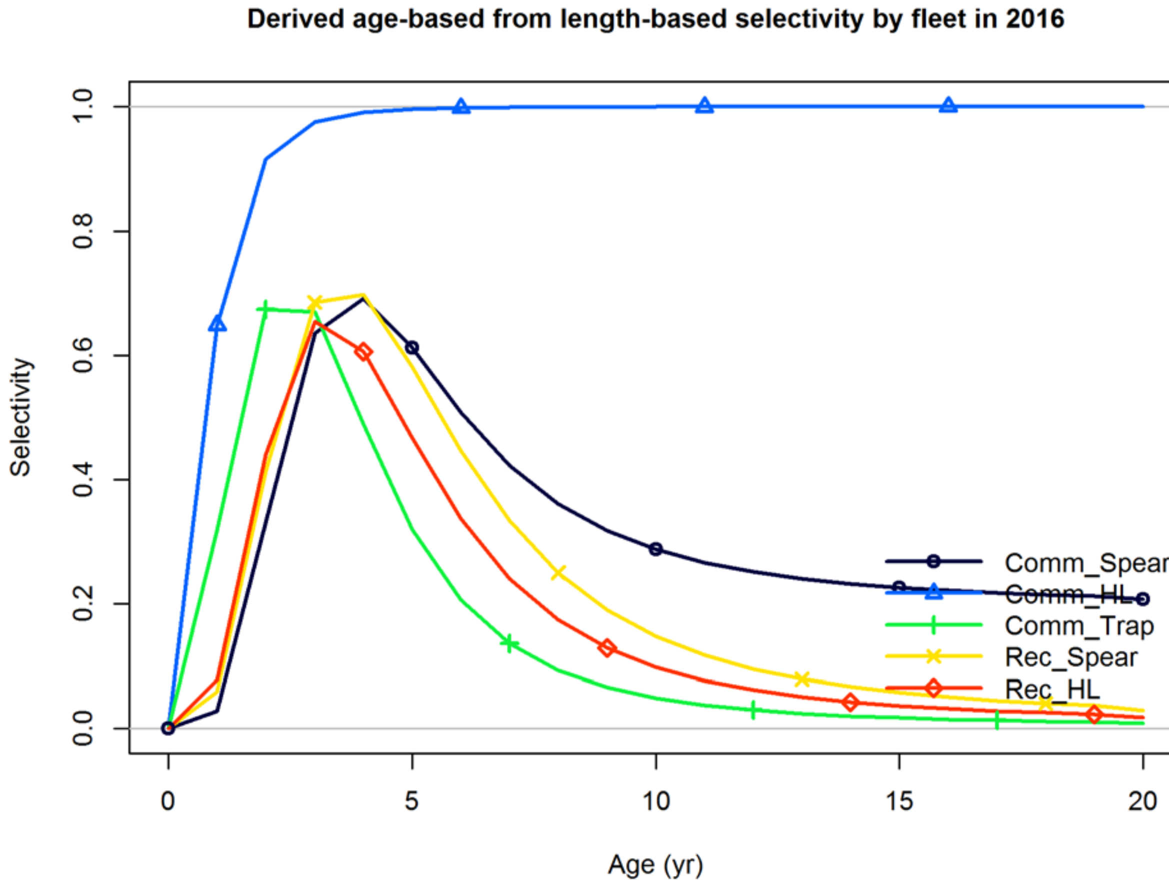


Figure 3.2.1.3.3. Derived age-based selectivity functions from the modeled length-base selectivity functions for the fisheries in the WFL stock.

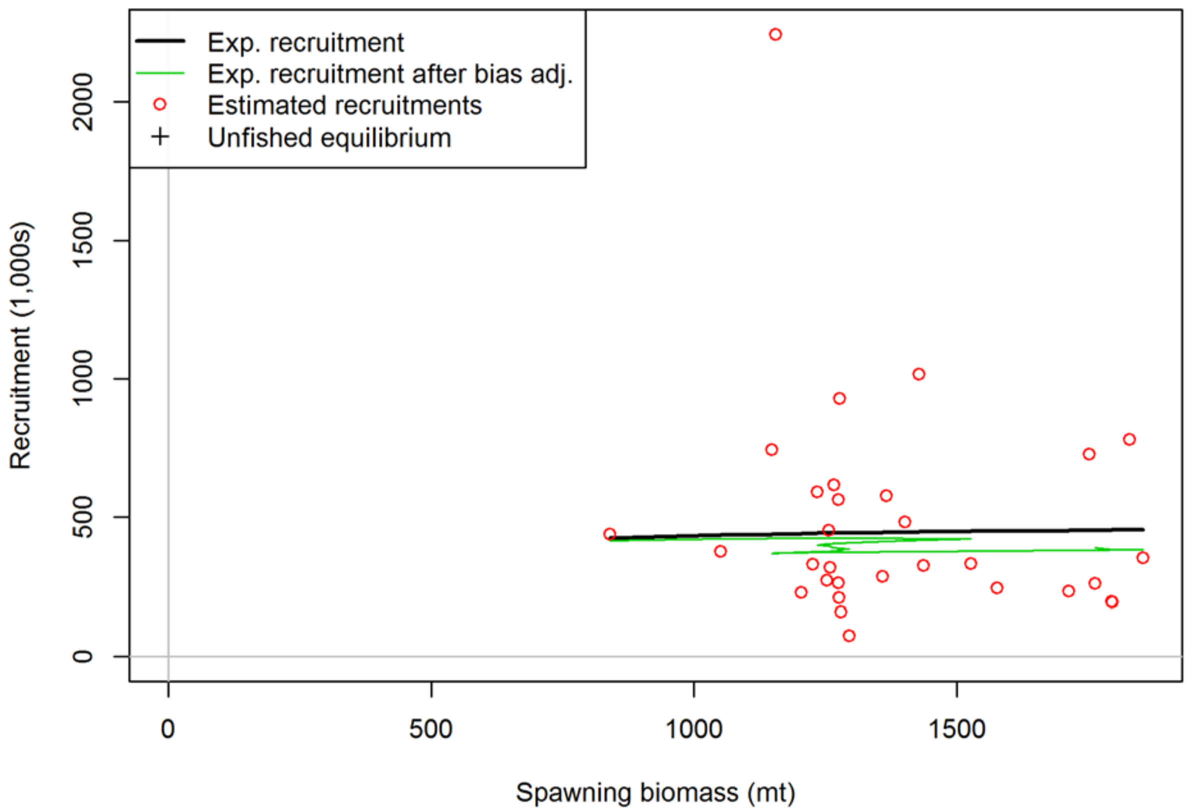


Figure 3.2.1.4.1. Predicted stock-recruitment relationship for the WFL stock continuity model configuration.

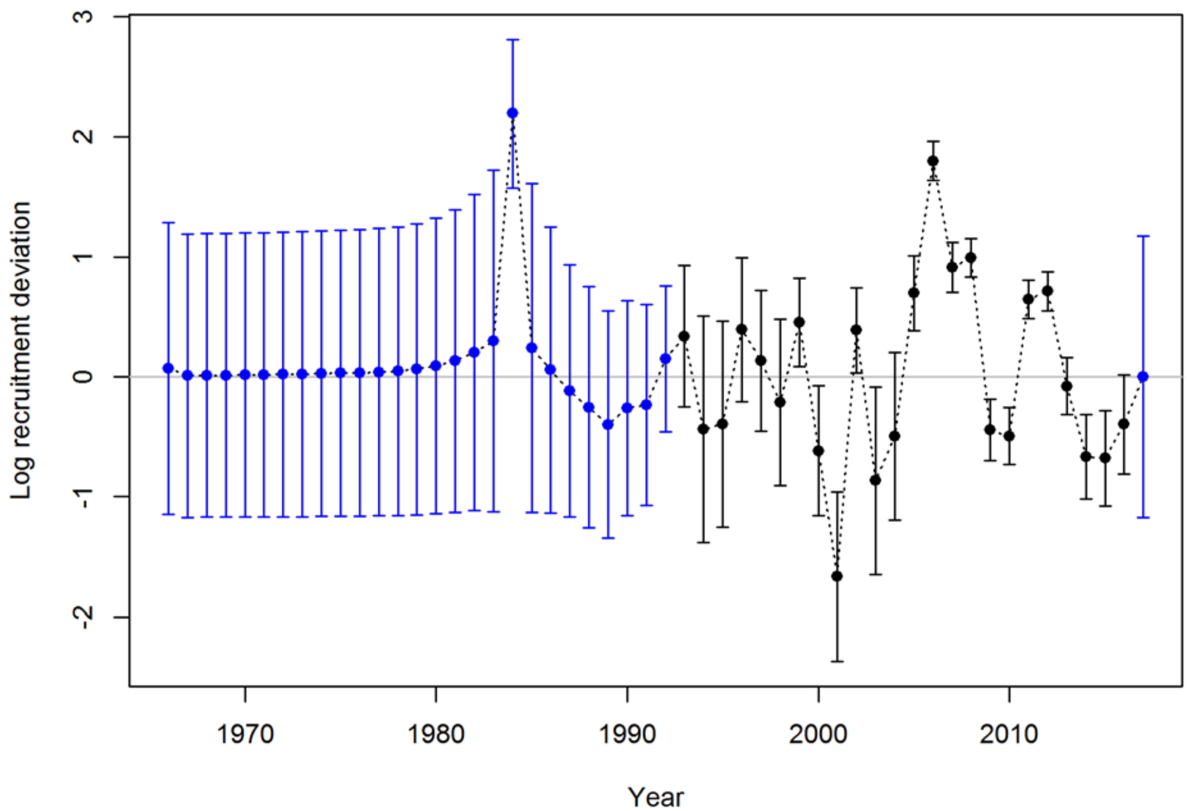


Figure 3.2.1.4.2. Recruitment deviations and measures of uncertainty for the WFL stock continuity model configuration.

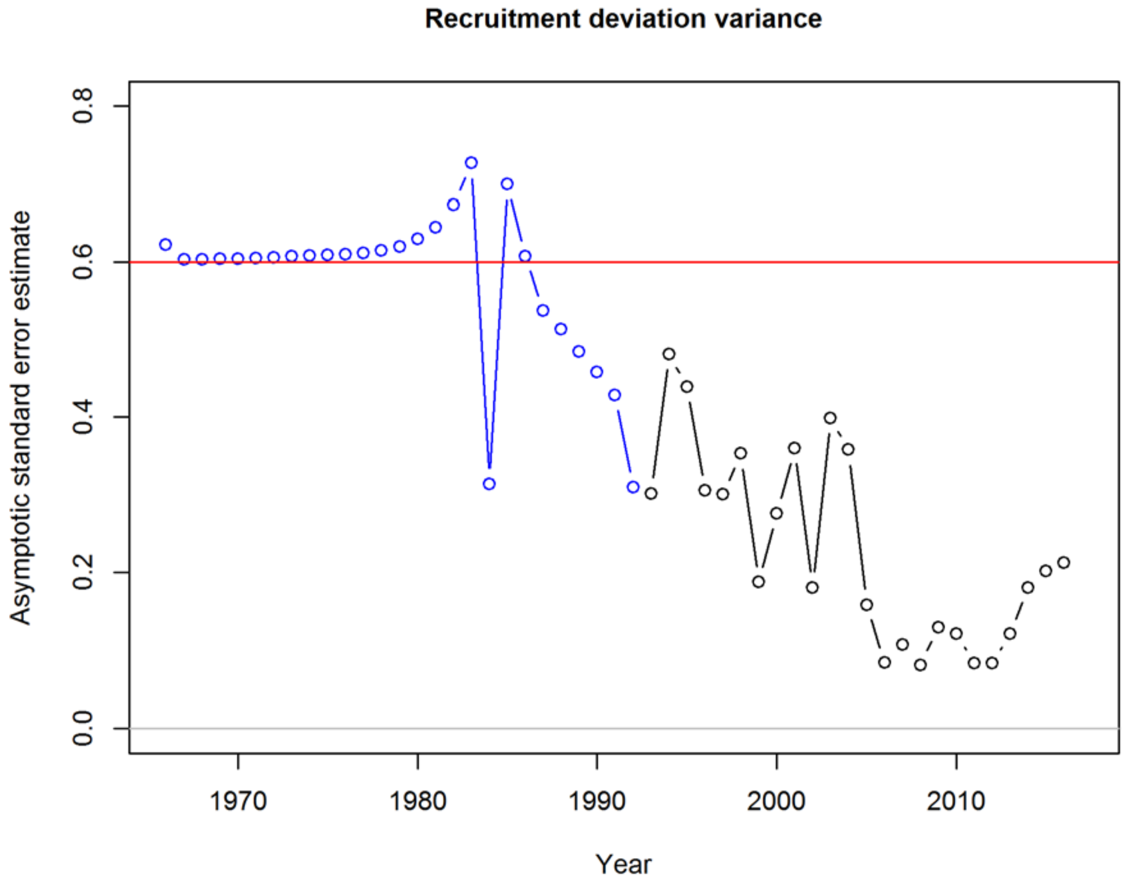


Figure 3.2.1.4.3. Recruitment deviation variance check for the WFL stock continuity model configuration.

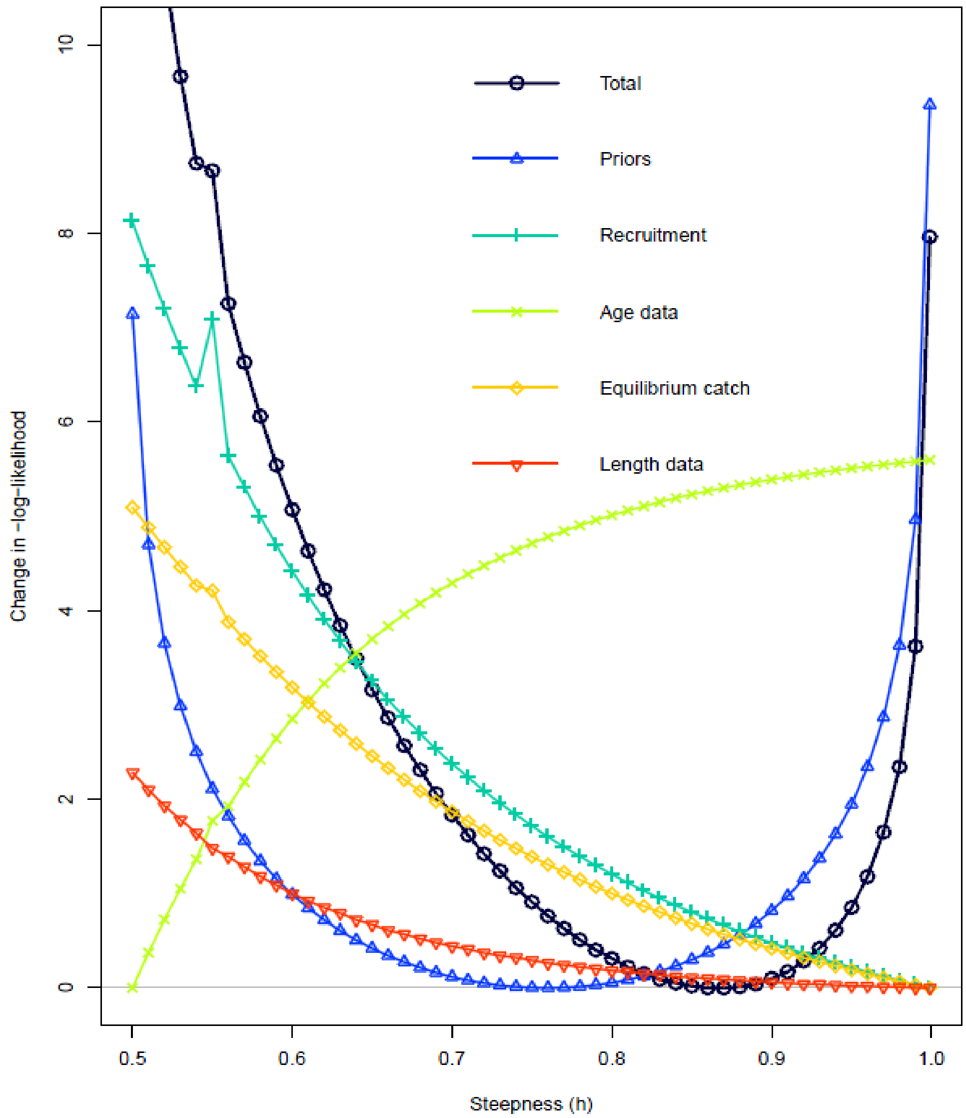


Figure 3.2.1.4.4. Likelihood profile of steepness for the WFL stock continuity model.

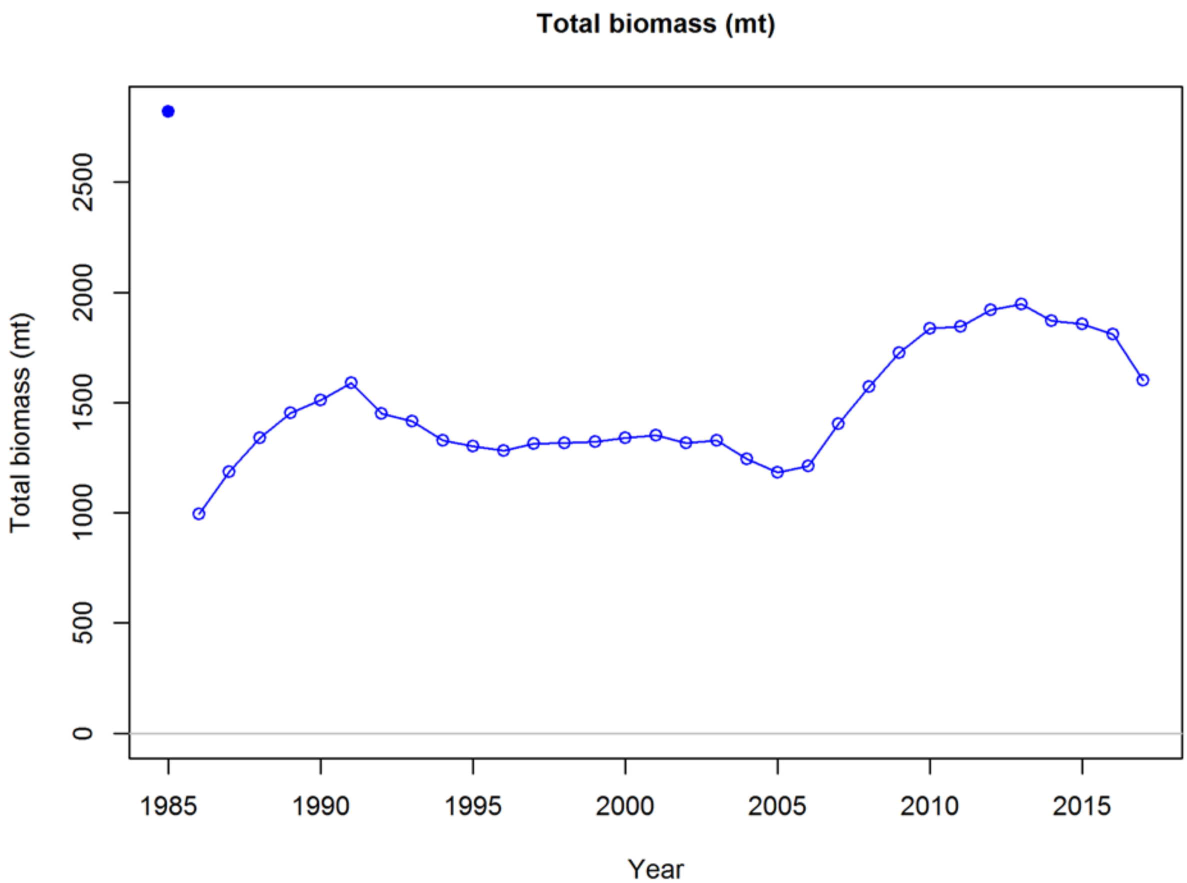


Figure 3.2.1.5.1. Predicted total biomass (metric tons) for the WFL stock continuity model configuration.

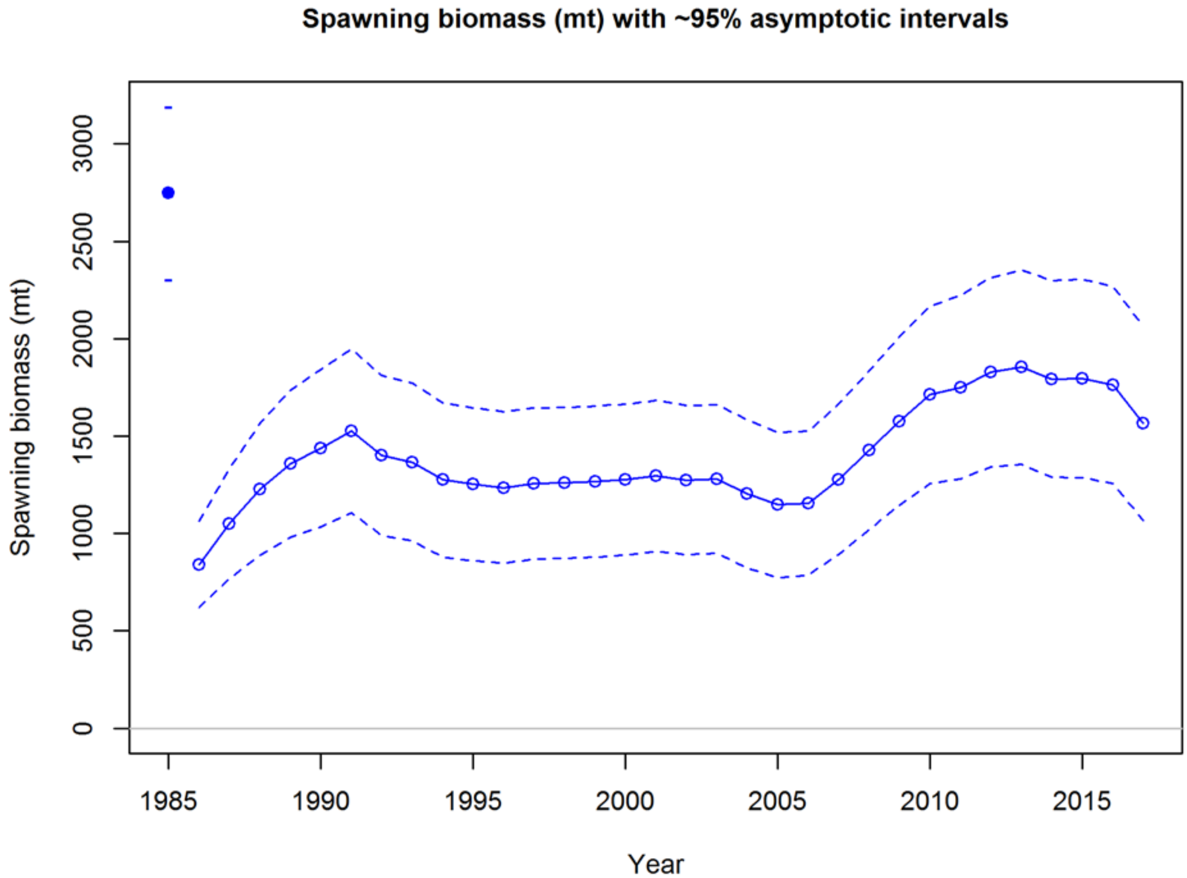


Figure 3.2.1.5.2. Predicted spawning biomass and associated 95% asymptotic error intervals for the WFL stock continuity model configuration.

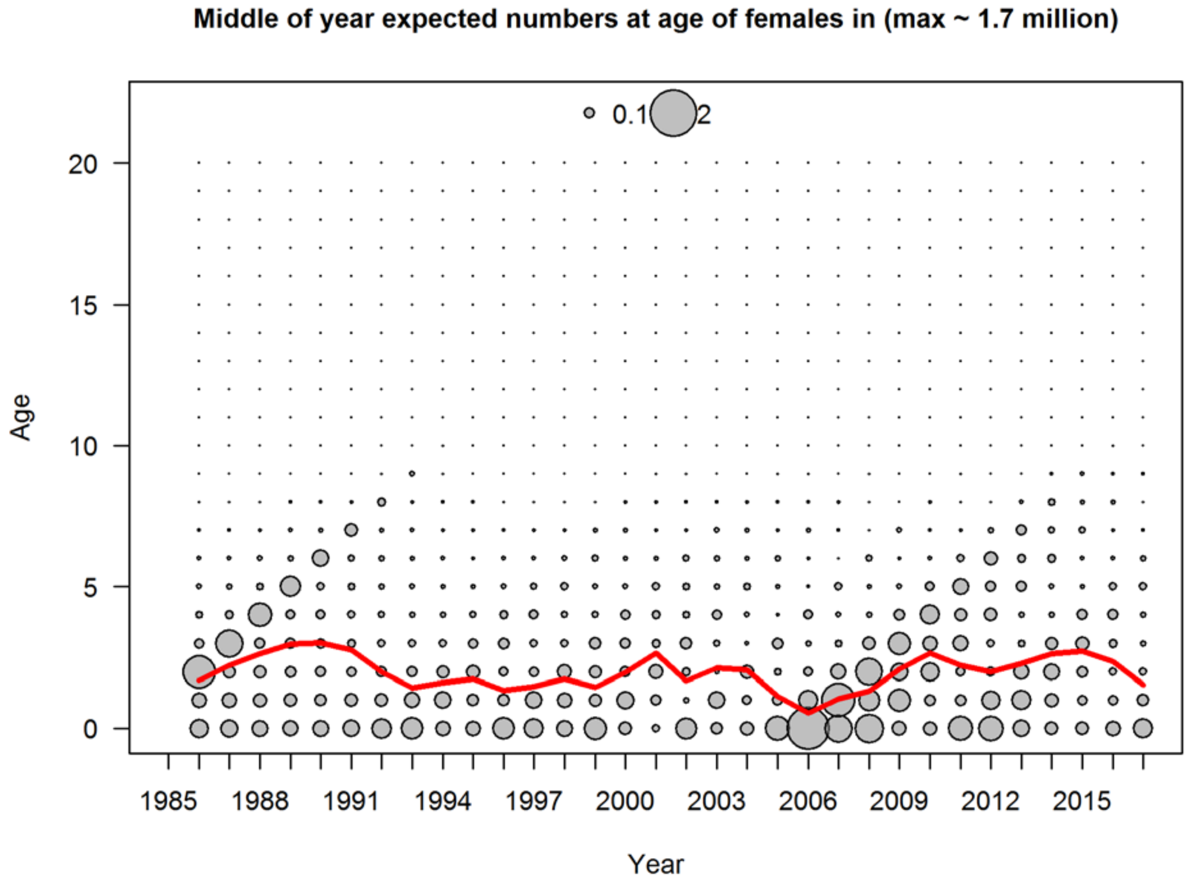


Figure 3.2.1.5.3. Predicted numbers-at-age (bubbles) and mean age (red line) of females for the WFL stock continuity model configuration.

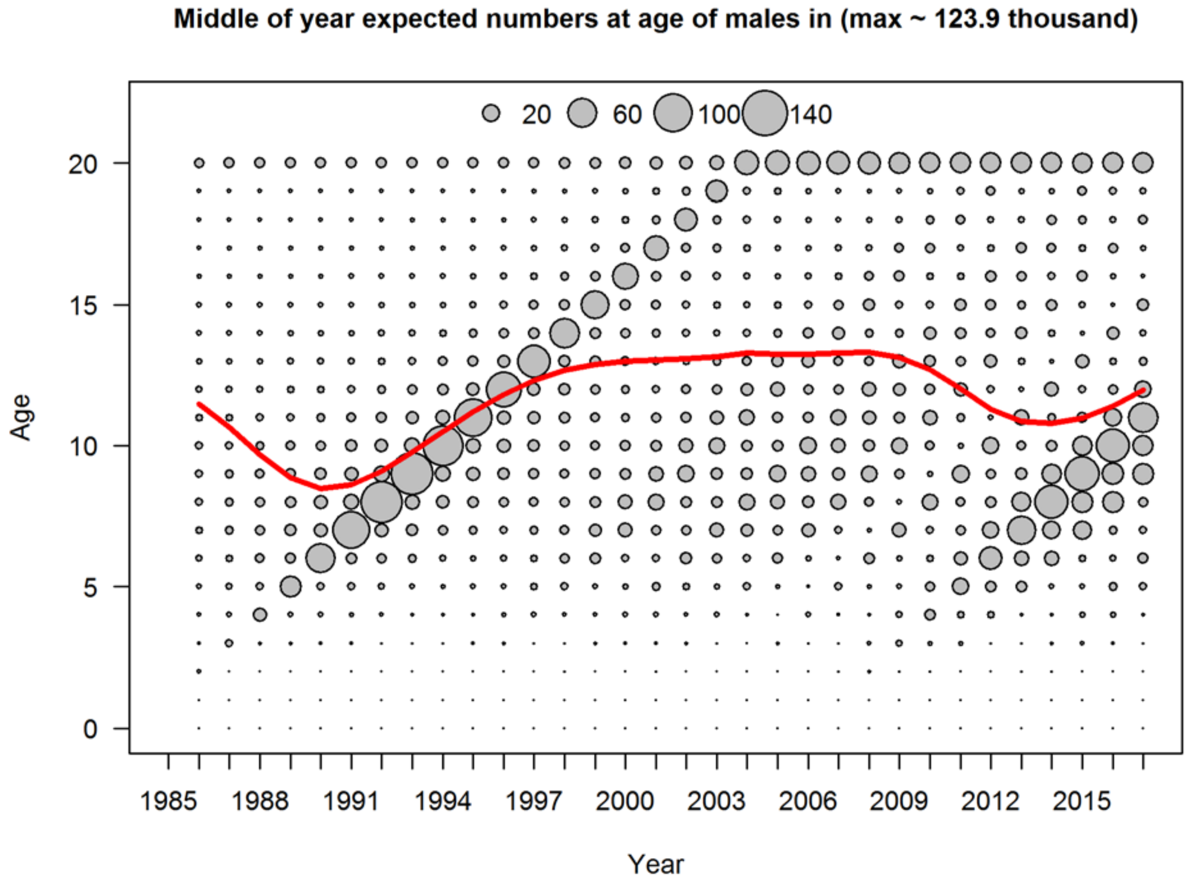


Figure 3.2.1.5.4. Predicted numbers-at-age (bubbles) and mean age (red line) of males for the WFL stock continuity model configuration.

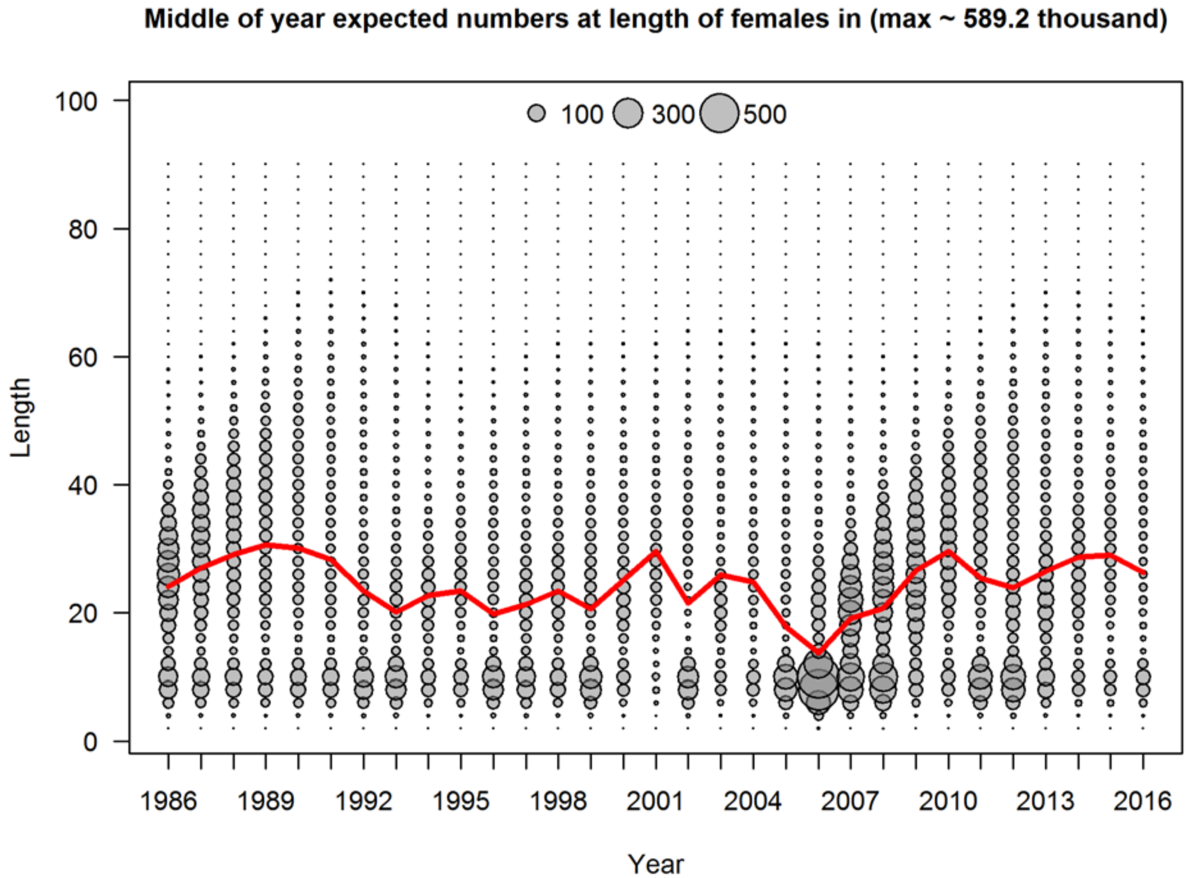


Figure 3.2.1.5.5. Predicted numbers-at-length (bubbles) and mean length (red line) of females for the WFL stock continuity model configuration.

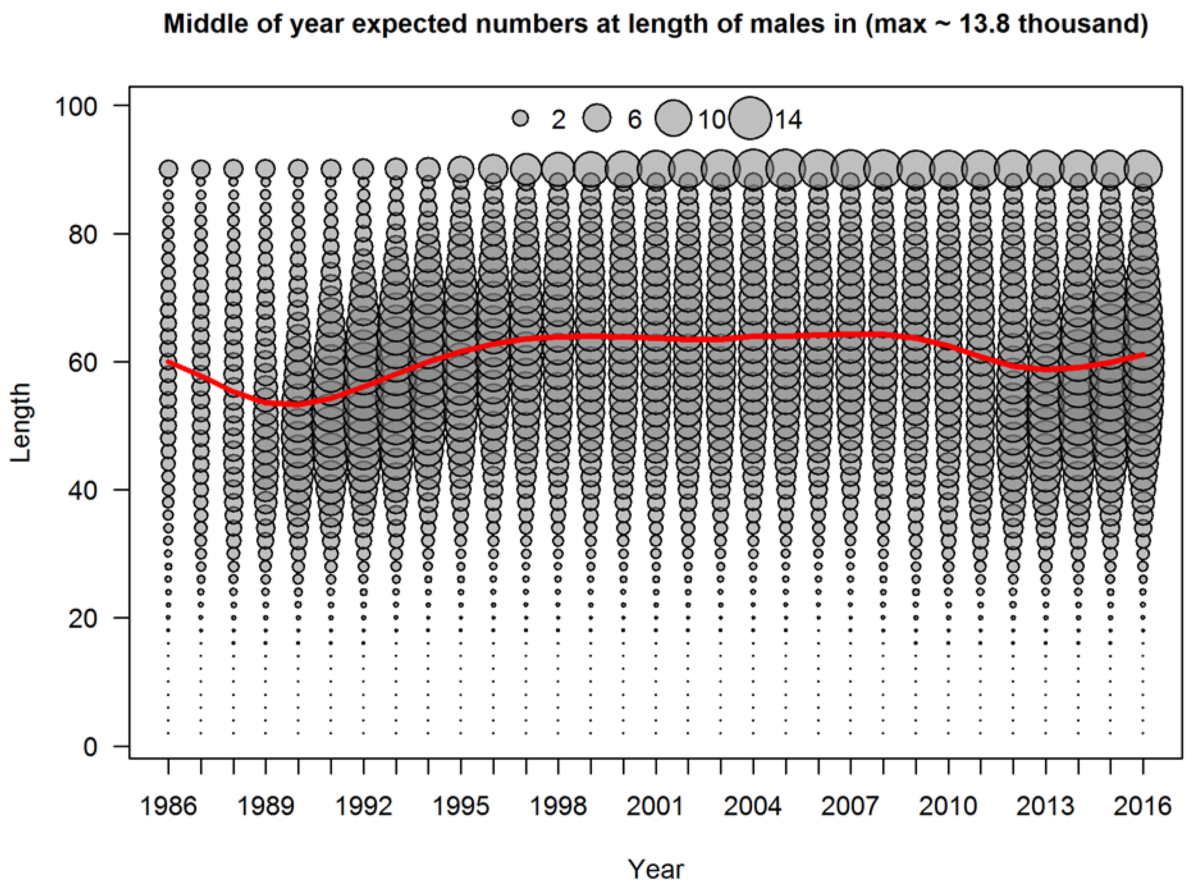


Figure 3.2.1.5.6. Predicted numbers-at-length (bubbles) and mean length (red line) of males for the WFL stock continuity model configuration.

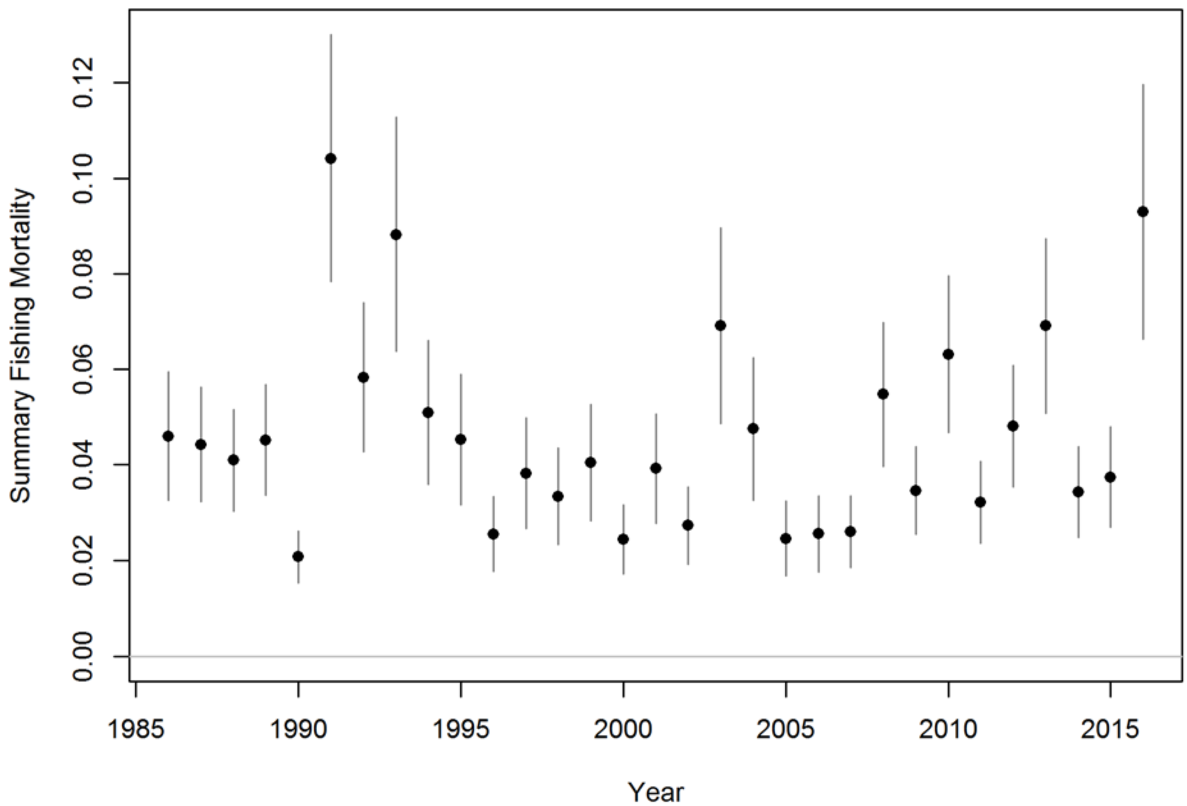


Figure 3.2.1.6.1. Predicted annual exploitation rate, calculated as the ratio of the total annual catch in biomass to the summary biomass at the beginning of the year, for the WFL stock continuity model configuration.

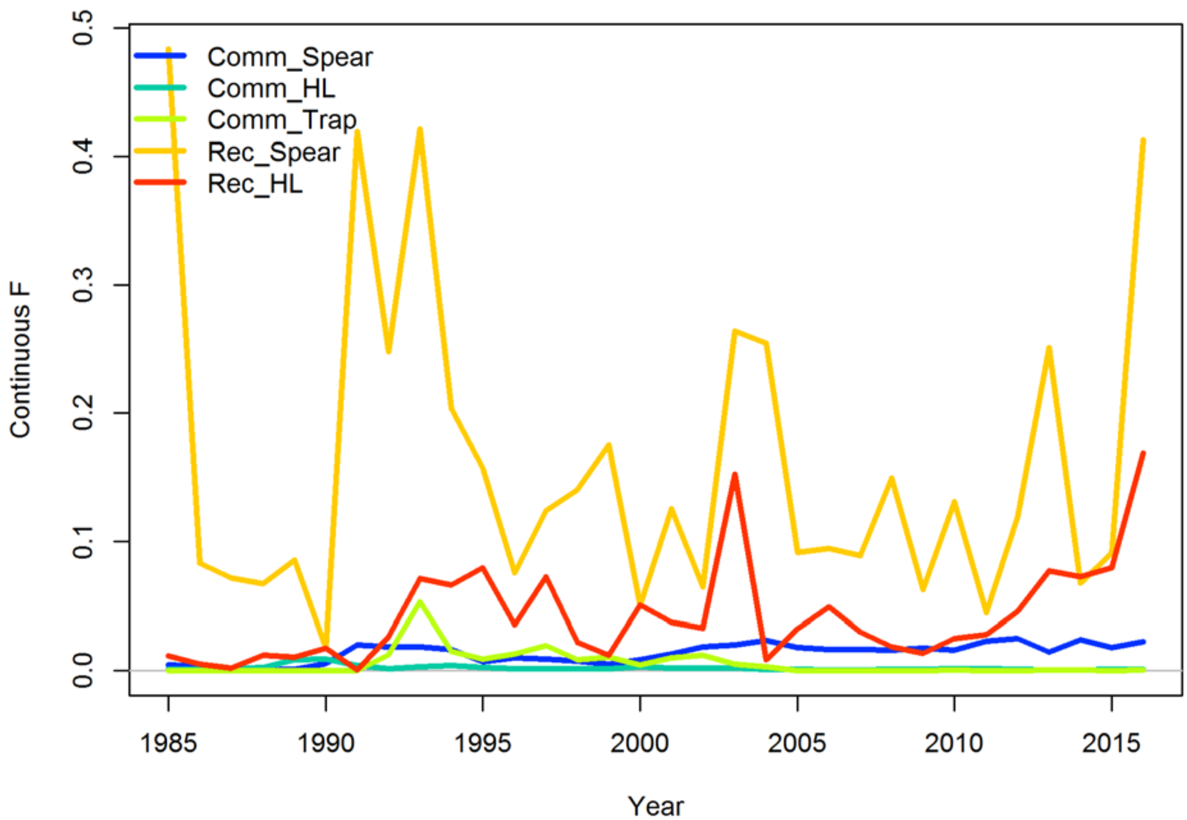


Figure 3.2.1.6.2. Predicted fleet specific continuous F rates for the WFL stock continuity model configuration.

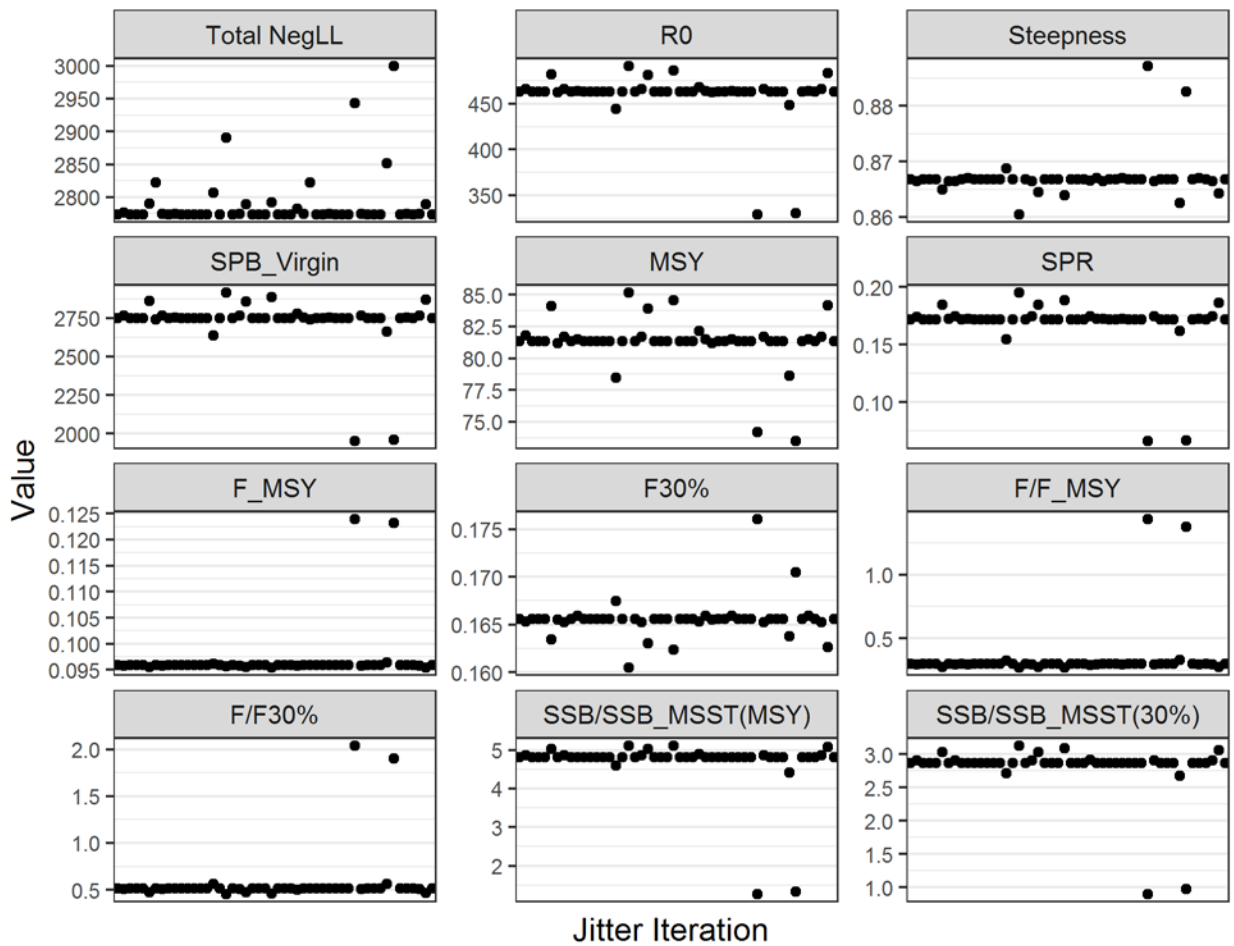


Figure 3.2.1.7.1. Total negative log-likelihood, stock-recruitment parameters, derived quantities, and stock-status reference points (current F/F_{MSY}, SSB/SSB_{MSST}, and SPR) from the jitter analysis to test for model convergence in the WFL stock continuity model.

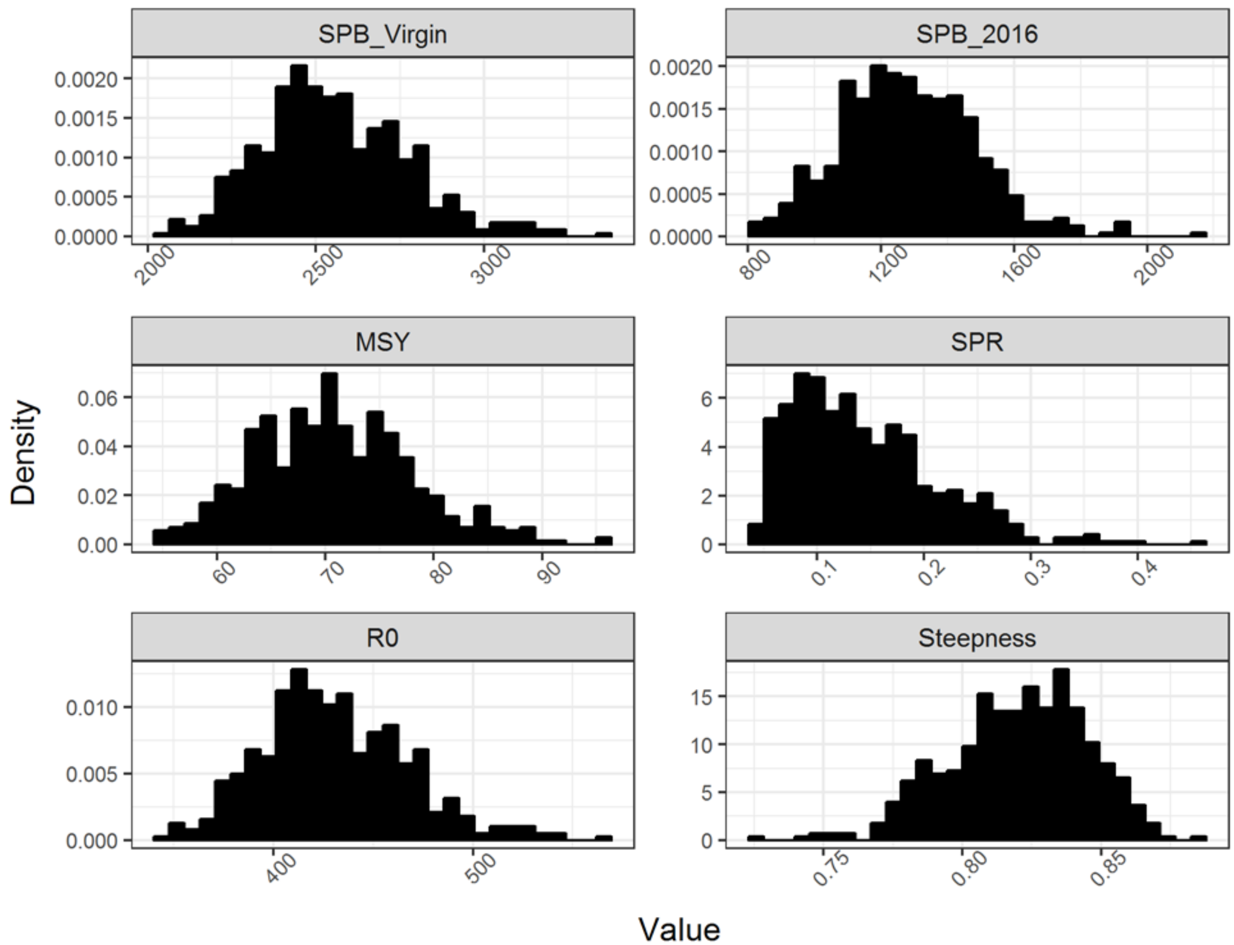


Figure 3.2.1.8.1.1. Density plots for derived quantities and stock-recruit parameters from the bootstrap analysis to test for model uncertainty in the WFL stock continuity model. SPR is the terminal year spawning potential ratio. F30% is presented here for reference to MSY.

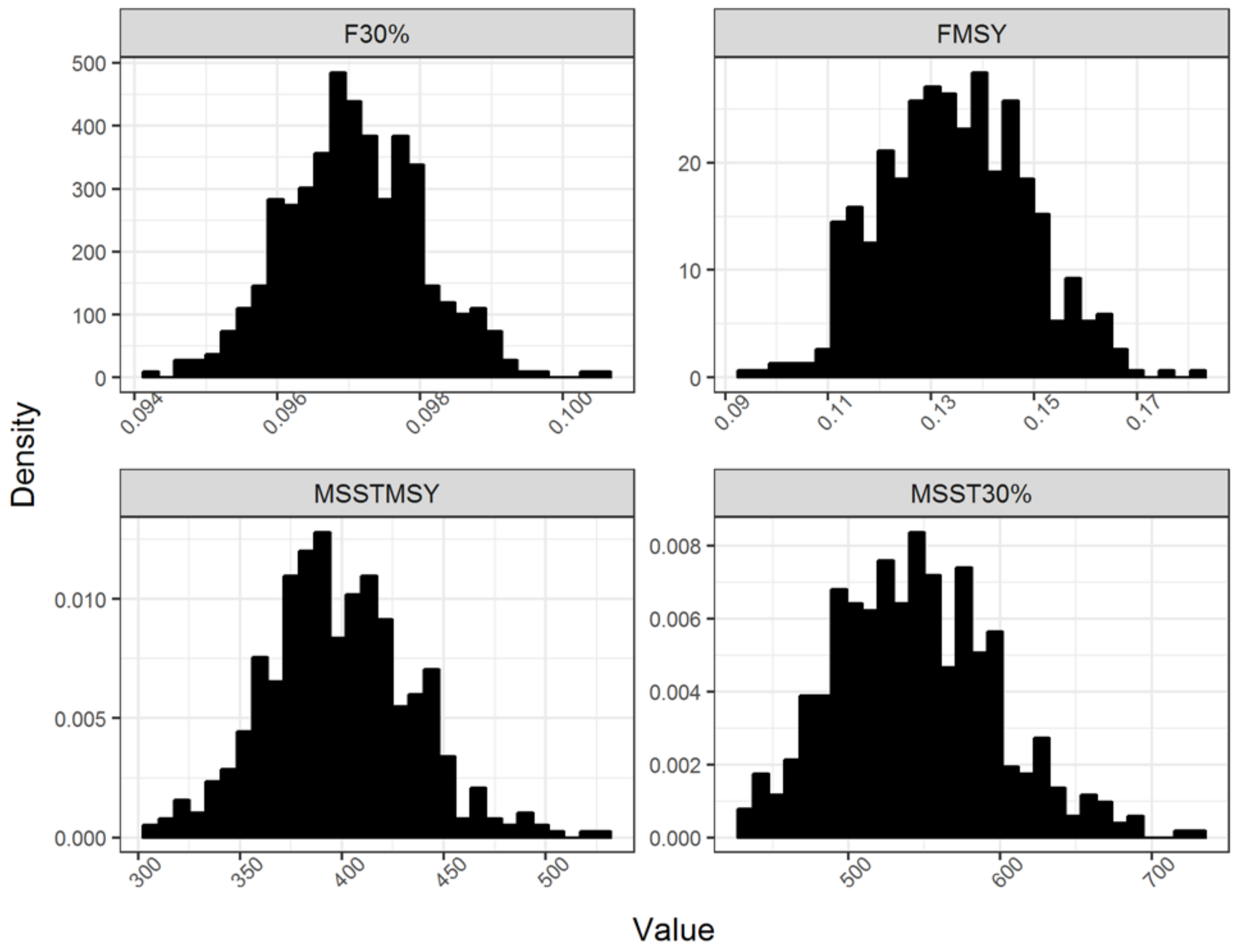


Figure 3.2.1.8.1.2. Density plots for biological reference points from the bootstrap analysis to test for model uncertainty in the WFL stock continuity model. Two alternatives are presented for maximum fishing mortality thresholds (MFMT: F_{MSY}, $F_{30\%}$) and their corresponding minimum stock size thresholds (MSST), calculated as (1-M)*$SSB_{REFERENCE}$ ($SSB_{REFERENCE}$: SSB_{MSY}, $SSB_{30\%}$). M=0.179 y^{-1} for the continuity model configuration.

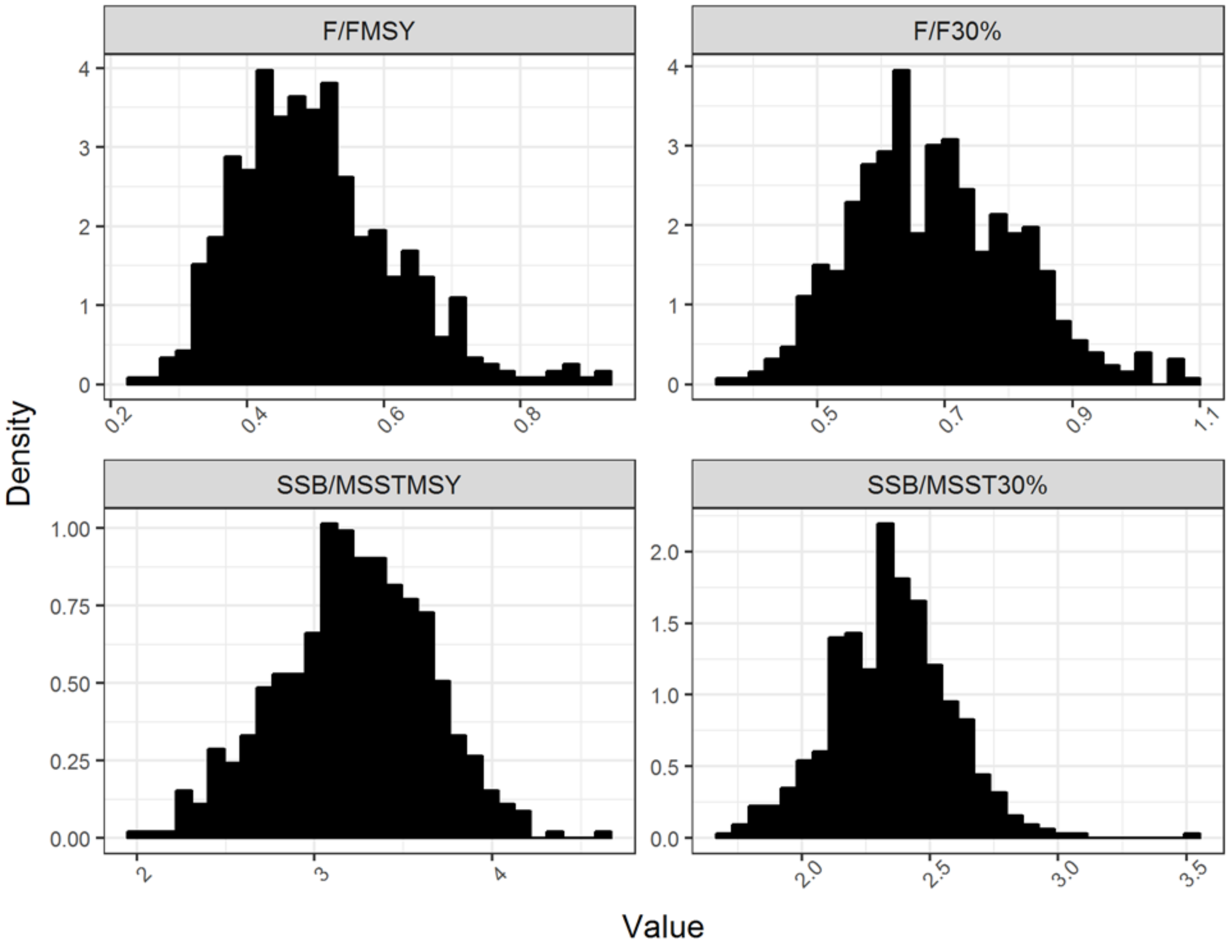


Figure 3.2.1.8.1.3. Density plots for stock status from the bootstrap analysis to test for model uncertainty in the WFL stock continuity model. Two alternatives are presented with maximum fishing mortality thresholds (MFMT: F_{MSY}, $F_{30\%}$) relative to the geometric mean of the most recent three years (2014-2016), and their corresponding minimum stock size thresholds (MSST), calculated as (1-M)*$SSB_{REFERENCE}$ ($SSB_{REFERENCE}$: SSB_{MSY}, $SSB_{30\%}$). M=0.179 y^{-1} for the continuity model configuration.

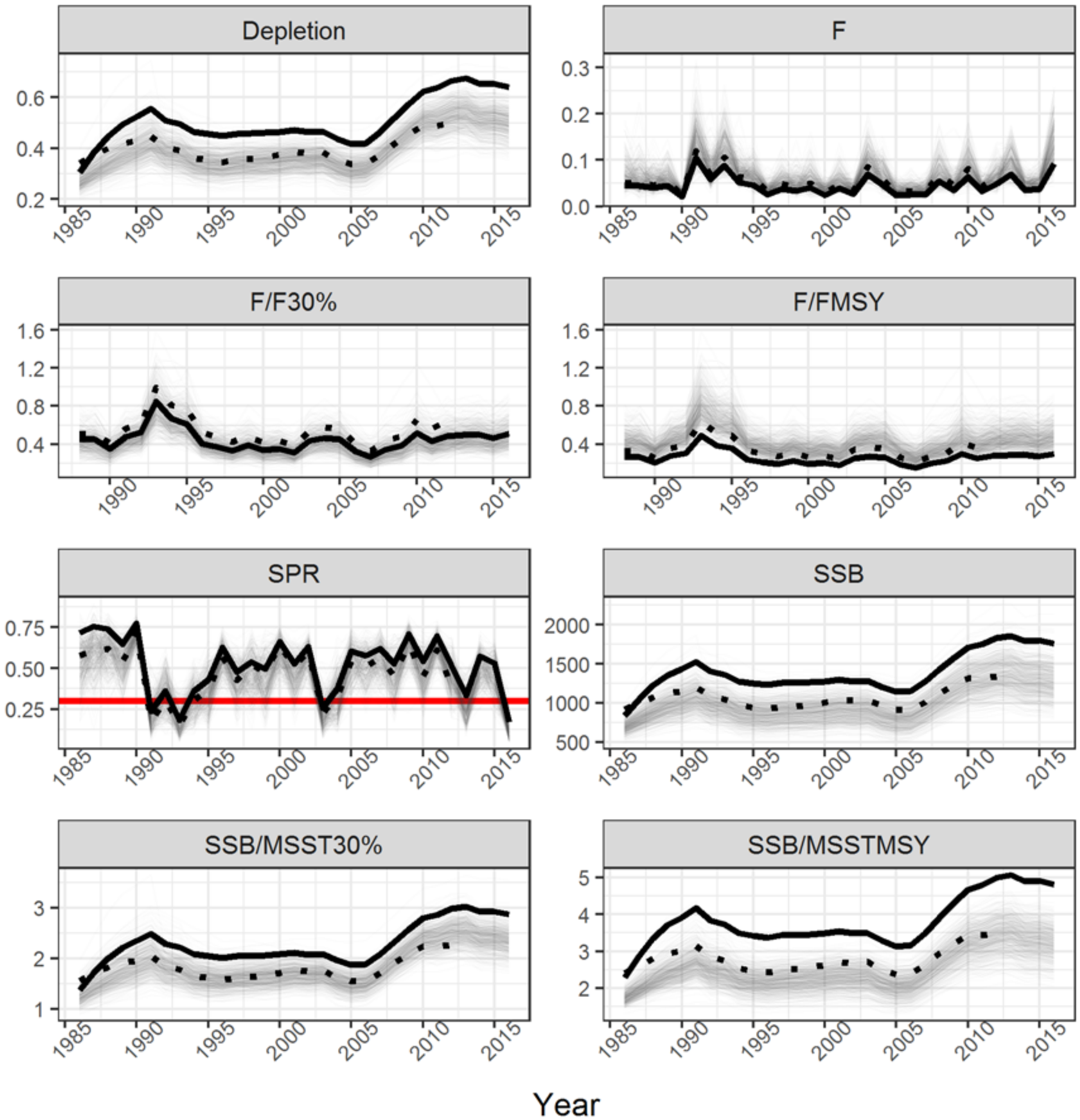


Figure 3.2.1.8.1.4. Time-series of derived quantities and stock status the WFL stock continuity model run (solid black lines), SEDAR 37 benchmark assessment (dotted black lines), and the 500 bootstrap iterations (lighter gray lines). A SPR reference level of 30% is presented on the SPR plot. The F plot displays the estimated year specific F values. The F/F_{MSY} and $F/F_{30\%}$ plots display calculated ratios using the $F_{Current}$ (geometric mean of the terminal three years).

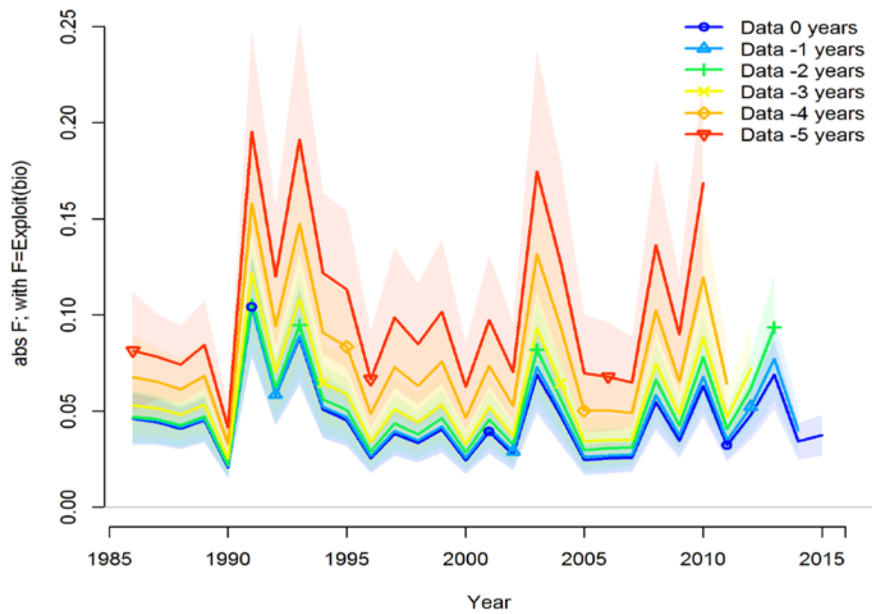


Figure 3.2.1.8.2.1. Retrospective analysis for the WFL stock continuity model run. The 2016 model run (solid blue line) is the base model.

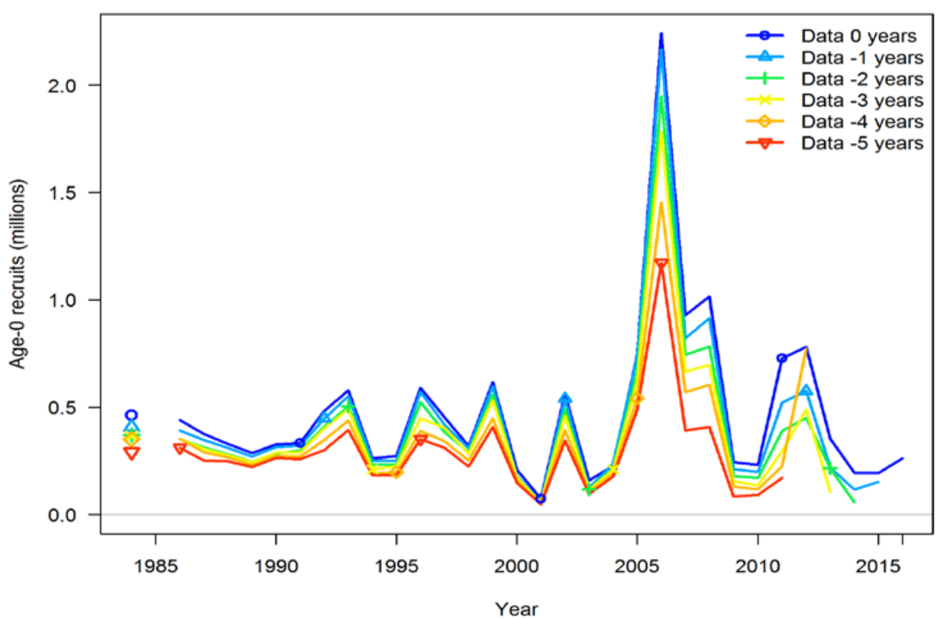


Figure 3.2.1.8.2.1 (continued). Retrospective analysis for the WFL stock continuity model run. The 2016 model run (solid blue line) is the base model.

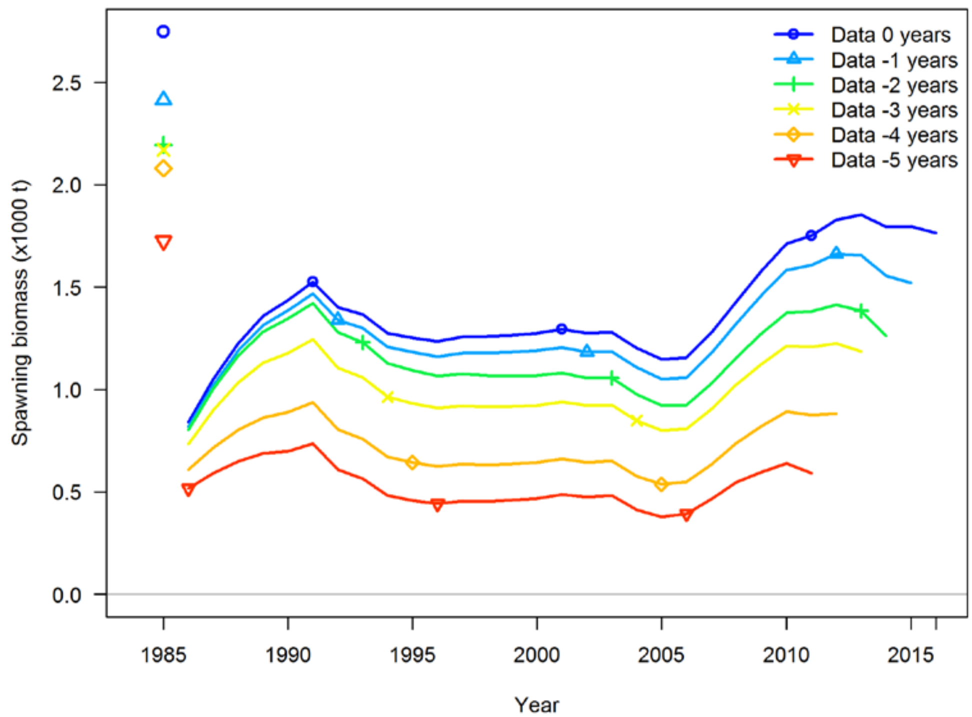


Figure 3.2.1.8.2.1 (continued). Retrospective analysis for the WFL stock continuity model run. The 2016 model run (solid blue line) is the base model.

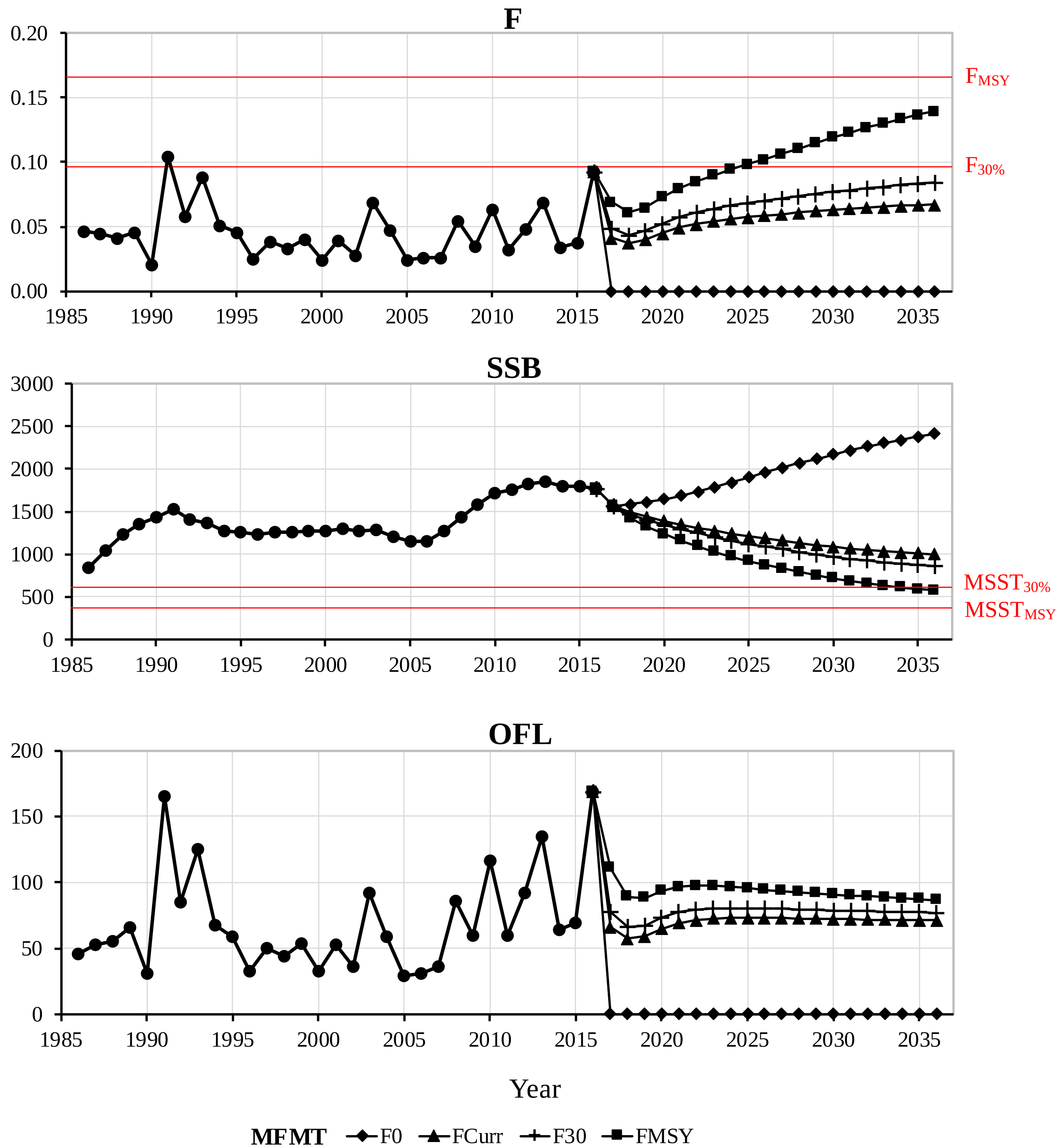


Figure 3.2.1.10. Projections for alternative MFMTs (F_{MSY}, $F_{30\%}$), F_0, and $F_{Current}$, where $F_{Current}$ is the geometric mean of the terminal three years (2014-2016). Red lines are corresponding targets (FMFMT, SSBMSST).

8. APPENDIX

8.1 WFL Continuity Model SS ADMB Code

8.1.1 Starter File

```
HOG_324F.dat
HOG_324F.ctl
0 # 0=use init values in control file; 1=use ss3.par
0 # run display detail (0,1,2)
1 # detailed age-structured reports in REPORT.SSO (0,1)
0 # write detailed checkup.sso file (0,1)
1 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms; 4=every,active)
1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
1 # Include prior_like for non-estimated parameters (0,1)
1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
1 # 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)
-2 # max yr for sdreport outputs (-1 for endyr; -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*B0; 2=rel X*Bmsy; 3=rel X*B_styr
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
1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum(Frates); 4=true F for range of ages
# 20 23 #_min and max age over which average F will be calculated
0 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
999 # check value for end of file
```

8.1.2 Data File

```
#C data file for simple example
#_observed data:
1986 #_styr
2016 #_endyr
1 #_nseas
12 #_months/season
1 #_spawn_seas
5 #_Nfleet
4 #_Nsurveys
1 #_N_areas
Comm_Spear%Comm_HL%Comm_Trap%Rec_Spear%Rec_HL%Baitfish%SEAMAP%VideoIOA%RecTrawlIOA
```

-1 -1 -1 -1 -1 0.3 0.5 0.5 0.5 #_surveytiming_in_season; Video/SEAMAP/RecTrawl=summer, baitfish=spring
1 1 1 1 1 1 1 1 1 1#_area_assignments_for_each_fishery_and_survey
1 1 1 2 2 #_units of catch: 1=bio; 2=num
0.1 0.1 0.1 0.41 0.46 #_se of log(catch) only used for init_eq_catch and for Fmethod 2 and 3; use -1 for discard only fleets
2 #_Ngenders #WTC -- biostat data not sufficient to split out sexes, very minimal age/length freq data
20 #_Nages
0.8 0.35 0 22 1.3 # init_equil_catch for 1986
#1.654100353 0.772771972 0 45.52075804 2.745264696 #init_equil_catch for 1986
67 #_N_lines_of_catch_to_read
#_catch_biomass(mtons):_columns_are_fisheries,year,season

#Comm_Spear	Comm_HL	Comm_Traps	Rec_Spear	Rec_HL	Year	Season
0	0.172531835	0	8.22450245	1.018312766	1950	1
0	6.047610991	0	8.480826074	1.05004935	1951	1
0	0.301759835	0	8.73718063	1.081789765	1952	1
0	2.274271969	0	8.993504255	1.11352635	1953	1
0	0.157559223	0	9.249827879	1.145262934	1954	1
0	2.122020435	0	9.506182435	1.177003349	1955	1
0	1.588103497	0	9.762506059	1.208739934	1956	1
0	4.241268325	0	10.01882968	1.240476518	1957	1
0	2.617737594	0	10.27518424	1.272216933	1958	1
0	1.752382293	0	11.31065497	1.400423238	1959	1
0	0.638519971	0	11.58597012	1.434511248	1960	1
0	0.508313736	0	12.82762563	1.588246221	1961	1
0	0.528492035	0	12.10010205	1.498168242	1962	1
0	0.45359237	0	12.36301393	1.53072055	1963	1
0	0.509142782	0	12.95864855	1.604468759	1964	1
0	0.353073652	0	13.68428535	1.694313127	1965	1
0	2.397755404	0	14.03698938	1.737983005	1966	1
0	1.633226264	0	15.26466417	1.889986961	1967	1
0	3.070777035	0	15.34446566	1.899867544	1968	1
0	2.184845908	0	16.12389115	1.996371731	1969	1
0	1.386261616	0	17.40637534	2.155161886	1970	1
0	1.600457405	0	21.82453228	2.702193836	1971	1
0	1.565522534	0	22.61673219	2.800279682	1972	1
0	0.597390429	0	23.90534068	2.959828115	1973	1
0	0.788523165	0	25.80842064	3.195457034	1974	1
0	1.726628044	0	26.93052857	3.334390281	1975	1
0	1.181140926	0	25.42497138	3.147980451	1976	1
0	3.583379723	0	22.87141648	2.831813294	1977	1
0	1.36077711	0	20.65704884	2.557642443	1978	1
0	2.313321087	0	22.15453309	2.743052726	1979	1
0	1.622046315	0	18.21459741	2.255231508	1980	1
0	0.667687969	0	0	5.29345646	1981	1
0	0.626411063	0	5.329090596	0	1982	1
0	1.110394122	0	20.58876015	0	1983	1
0.013101076	1.06075087	0	0	0	1984	1
1.339717036	1.012531343	0	0	0	1985	1
1.654100353	0.772771972	0	45.52075804	2.745264696	1986	1
0.328158343	1.950679962	0	46.4689627	1.213332125	1987	1
0.235831683	3.003674995	0	37.87690656	6.109542335	1988	1
0.486374198	12.28282779	0	38.0669843	3.985817436	1989	1

3.300527941	14.01691142	0	6.116190398	5.230400238	1990	1
10.40796149	6.009299712	0.011036363	113.3273081	0.094	1991	1
8.141350634	2.078835665	1.859598758	52.43263666	4.843938353	1992	1
7.11784228	4.069465717	7.664929867	76.5992564	11.68579079	1993	1
6.102551352	5.197526243	2.40857635	37.61065428	11.48048467	1994	1
2.709434089	3.290924721	1.529691072	32.70931061	15.59865469	1995	1
3.834561045	1.990595607	2.079260493	15.54517642	6.638228968	1996	1
3.508713664	1.80883982	3.086819527	24.28086346	13.07070996	1997	1
2.967150127	1.509598937	1.524791607	30.14540494	4.445129606	1998	1
2.081123603	1.910716421	1.963296557	40.0721825	2.509396156	1999	1
3.55639492	4.058439156	0.826389343	11.57430194	10.84934319	2000	1
5.595680521	2.638597424	1.846791318	30.38600582	8.325553708	2001	1
7.823852094	2.294815839	1.873936651	14.18346362	6.442868508	2002	1
7.451163774	2.599423376	0.605819036	44.83882949	23.03848743	2003	1
8.161338417	0.993593384	0.356056577	41.64891792	1.282606638	2004	1
6.143546628	1.198015305	0.011262189	14.33886875	4.593271379	2005	1
5.480641579	0.560836325	0.000464268	15.12207256	7.442074993	2006	1
6.326637047	0.747790785	0	23.05202356	7.989183909	2007	1
9.103291411	1.214200091	0	71.90893607	8.842517893	2008	1
12.69346876	1.170414388	0	37.08368436	7.599534191	2009	1
12.84852486	2.479031731	0.06618774	76.89004881	13.46125293	2010	1
17.46885353	2.544264356	0.029506994	21.44584868	11.71609103	2011	1
16.93367453	1.761752765	0	44.23504369	14.65915885	2012	1
8.728196061	1.152967564	0.040977846	82.51849399	22.84874909	2013	1
14.33778173	0.90762012	0.104322335	22.52524657	22.25880955	2014	1
10.63424846	1.71459918	0.011268945	27.99607771	21.96261055	2015	1
11.59338047	1.624175337	0.059694183	92.57282561	32.87131611	2016	1

#

142 #with baitfish 105 #_N_cpue_and_surveyabundance_observations

#_Units: 0=numbers; 1=biomass; 2=F

#_Errtype: -1=normal; 0=lognormal; >0=T

#_Fleet	Units	Errtype	
1	1	0	#Comm_Spear
2	1	0	#Comm_HL
3	1	0	#Comm_Trap
4	0	0	#Rec_Spear
5	0	0	#Rec_HL
6	0	0	#BaitfishIOA
7	0	0	#SEAMAPIOA
8	0	0	#VideoIOA
9	0	0	#RecTrawlIOA

#year	Seas	Index	ObsScaled	LOG(SE)	
#1994	1	1	0.571841531	0.281967545	#Comm_Spear_Tripticket
#1995	1	1	0.656672957	0.201310114	#Comm_Spear_Tripticket
#1996	1	1	0.578432717	0.153961104	#Comm_Spear_Tripticket
#1997	1	1	0.570068362	0.162287562	#Comm_Spear_Tripticket
#1998	1	1	0.549253142	0.184255997	#Comm_Spear_Tripticket
#1999	1	1	0.450972941	0.207356977	#Comm_Spear_Tripticket
#2000	1	1	0.553479874	0.158489501	#Comm_Spear_Tripticket
#2001	1	1	1.223249781	0.164451834	#Comm_Spear_Tripticket
#2002	1	1	1.058952255	0.151202662	#Comm_Spear_Tripticket
#2003	1	1	0.948803036	0.157937946	#Comm_Spear_Tripticket

#2004	1	1	0.8757605	0.17151877	#Comm_Spear_Tripticket
#2005	1	1	0.949777001	0.20167097	#Comm_Spear_Tripticket
#2006	1	1	0.773391949	0.207488664	#Comm_Spear_Tripticket
#2007	1	1	0.88546354	0.228892016	#Comm_Spear_Tripticket
#2008	1	1	1.300673317	0.142275951	#Comm_Spear_Tripticket
#2009	1	1	1.560628706	0.141098799	#Comm_Spear_Tripticket
#2010	1	1	1.702870185	0.137099234	#Comm_Spear_Tripticket
#2011	1	1	1.854998445	0.153614306	#Comm_Spear_Tripticket
#2012	1	1	1.934709762	0.148207403	#Comm_Spear_Tripticket
1993	1	1	1.028713159	0.284343847	#Comm_Spear_Logbook
1994	1	1	0.699030899	0.263077246	#Comm_Spear_Logbook
1995	1	1	0.870798355	0.283050801	#Comm_Spear_Logbook
1996	1	1	0.497454243	0.248774116	#Comm_Spear_Logbook
1997	1	1	0.790019057	0.216897908	#Comm_Spear_Logbook
1998	1	1	0.696055509	0.242097673	#Comm_Spear_Logbook
1999	1	1	0.627789008	0.230939698	#Comm_Spear_Logbook
2000	1	1	1.132946787	0.19797653	#Comm_Spear_Logbook
2001	1	1	1.791853425	0.204606256	#Comm_Spear_Logbook
2002	1	1	1.416116416	0.207785102	#Comm_Spear_Logbook
2003	1	1	1.374564717	0.197408364	#Comm_Spear_Logbook
2004	1	1	0.764748543	0.216365742	#Comm_Spear_Logbook
2005	1	1	0.833995222	0.231701553	#Comm_Spear_Logbook
2006	1	1	0.448639659	0.220345638	#Comm_Spear_Logbook
2007	1	1	0.661150407	0.22225585	#Comm_Spear_Logbook
2008	1	1	0.933686478	0.189926202	#Comm_Spear_Logbook
2009	1	1	1.830989342	0.196364764	#Comm_Spear_Logbook
2010	1	1	0.984947067	0.187907293	#Comm_Spear_Logbook
2011	1	1	1.211298349	0.191394897	#Comm_Spear_Logbook
2012	1	1	1.307879814	0.186854874	#Comm_Spear_Logbook
2013	1	1	0.938494676	0.218146879	#Comm_Spear_Logbook
2014	1	1	1.050691368	0.179460049	#Comm_Spear_Logbook
2015	1	1	0.991873189	0.173979642	#Comm_Spear_Logbook
2016	1	1	1.116264309	0.176573237	#Comm_Spear_Logbook
1994	1	2	1.259677599	0.141983622	#Comm_HL
1995	1	2	1.210497615	0.177669954	#Comm_HL
1996	1	2	1.090118108	0.164269268	#Comm_HL
1997	1	2	0.846843172	0.176836701	#Comm_HL
1998	1	2	0.468505104	0.198820995	#Comm_HL
1999	1	2	0.5654551	0.189588526	#Comm_HL
2000	1	2	1.067695626	0.148062323	#Comm_HL
2001	1	2	1.050486959	0.144929166	#Comm_HL
2002	1	2	1.344364216	0.159430151	#Comm_HL
2003	1	2	0.816966692	0.204836648	#Comm_HL
2004	1	2	0.382127911	0.225713484	#Comm_HL
2005	1	2	0.67705523	0.236825489	#Comm_HL
2006	1	2	0.651313759	0.307558869	#Comm_HL
2007	1	2	0.389891174	0.349366102	#Comm_HL
2008	1	2	0.742713157	0.330952199	#Comm_HL
2009	1	2	0.787518431	0.273796513	#Comm_HL
2010	1	2	1.571790826	0.29397503	#Comm_HL
2011	1	2	2.516548541	0.217819947	#Comm_HL
2012	1	2	1.01889866	0.348860729	#Comm_HL

2013	1	2	0.410500917	0.321488999	#Comm_HL
2014	1	2	0.348013359	0.297232526	#Comm_HL
2015	1	2	2.401951451	0.237002792	#Comm_HL
2016	1	2	1.381066396	0.25075512	#Comm_HL
1992	1	4	0.660100349	0.50998496	#Rec_Spear
1993	1	4	1.297363672	0.301115689	#Rec_Spear
1994	1	4	0.770980352	0.348890006	#Rec_Spear
1995	1	4	0.905547038	0.387393021	#Rec_Spear
1996	1	4	0.373556633	0.352671155	#Rec_Spear
1997	1	4	0.721370929	0.326273902	#Rec_Spear
1998	1	4	1.025595199	0.223315874	#Rec_Spear
1999	1	4	0.827379245	0.19980619	#Rec_Spear
2000	1	4	0.670197467	0.485776745	#Rec_Spear
2001	1	4	0.789867597	0.255465611	#Rec_Spear
2002	1	4	0.509669132	0.434866045	#Rec_Spear
2003	1	4	0.595197779	0.235444461	#Rec_Spear
2004	1	4	1.012581407	0.331568787	#Rec_Spear
2005	1	4	0.53174846	0.383476887	#Rec_Spear
2006	1	4	0.77776999	0.291656094	#Rec_Spear
2007	1	4	1.189035576	0.346876328	#Rec_Spear
2008	1	4	1.299061804	0.239832673	#Rec_Spear
2009	1	4	1.339591966	0.245879315	#Rec_Spear
2010	1	4	1.697980288	0.245504093	#Rec_Spear
2011	1	4	1.515372159	0.2426873	#Rec_Spear
2012	1	4	2.474773057	0.206611396	#Rec_Spear
2013	1	4	1.125123791	0.215692087	#Rec_Spear
2014	1	4	0.810395305	0.20566598	#Rec_Spear
2015	1	4	0.911103171	0.252947318	#Rec_Spear
2016	1	4	1.168637634	0.203807329	#Rec_Spear
#1991	1	5	1.581128308	1.167498181	#Rec_HL
1992	1	5	0.300588153	0.441648872	#Rec_HL
1993	1	5	0.556910548	0.462600585	#Rec_HL
1994	1	5	0.855715927	0.380676058	#Rec_HL
1995	1	5	0.742322887	0.369876148	#Rec_HL
1996	1	5	0.760116366	0.455795685	#Rec_HL
1997	1	5	0.857913255	0.431242395	#Rec_HL
1998	1	5	0.851086593	0.313693818	#Rec_HL
1999	1	5	0.421066165	0.385924123	#Rec_HL
2000	1	5	0.623928675	0.411542848	#Rec_HL
2001	1	5	0.400415821	0.46377305	#Rec_HL
2002	1	5	0.406304116	0.385857536	#Rec_HL
2003	1	5	1.272704335	0.303429404	#Rec_HL
2004	1	5	0.226775141	0.600018681	#Rec_HL
2005	1	5	0.682341709	0.45844689	#Rec_HL
2006	1	5	0.684354593	0.590960161	#Rec_HL
2007	1	5	1.332104865	0.365105577	#Rec_HL
2008	1	5	0.982452144	0.351214482	#Rec_HL
2009	1	5	0.99688771	0.311818632	#Rec_HL
2010	1	5	3.961461696	0.369480692	#Rec_HL
2011	1	5	2.241276949	0.391503571	#Rec_HL
2012	1	5	0.966251813	0.539405079	#Rec_HL
2013	1	5	0.638474479	0.461922046	#Rec_HL

2014	1	5	1.480374547	0.227121756	#Rec_HL
2015	1	5	1.221088194	0.266369718	#Rec_HL
2016	1	5	1.53708332	0.244931138	#Rec_HL
2002	1	6	0.150074804	0.749327888	#Baitfish
2003	1	6	2.205772348	0.716116004	#Baitfish
2004	1	6	0.581037277	0.704750561	#Baitfish
2005	1	6	2.435700037	1.083571342	#Baitfish
2006	1	6	0.232732826	0.611608599	#Baitfish
2007	1	6	0.72391223	0.590587284	#Baitfish
2008	1	6	0.214592944	0.908848699	#Baitfish
2009	1	6	0.774965715	0.618496869	#Baitfish
2010	1	6	1.48232764	0.565572839	#Baitfish
2011	1	6	1.577234759	0.600285268	#Baitfish
2012	1	6	1.231361426	0.594025181	#Baitfish
2013	1	6	0.282757761	0.565911665	#Baitfish
2014	1	6	0.949445206	0.658317349	#Baitfish
2015	1	6	2.035126543	0.618158181	#Baitfish
2016	1	6	0.122958484	0.995434413	#Baitfish
2008	1	7	2.54447033	0.920164909	#SEAMAP
2009	1	7	1.008414417	0.385790128	#SEAMAP
2010	1	7	1.019514869	0.356742965	#SEAMAP
2011	1	7	0.62655886	0.402175932	#SEAMAP
2012	1	7	1.553816637	0.303569997	#SEAMAP
2013	1	7	0.470905852	0.42147117	#SEAMAP
2014	1	7	0.560942853	0.387668177	#SEAMAP
2015	1	7	0.697355077	0.388651106	#SEAMAP
2016	1	7	0.518021105	0.51449768	#SEAMAP
#1993	1	8	1.6444887	0.170965268	#VideoIOA
#1994	1	8	0.7206501	0.29787878	#VideoIOA
#1995	1	8	1.3496534	0.241857644	#VideoIOA
#1996	1	8	0.675332	0.311630301	#VideoIOA
#1997	1	8	0.8176008	0.229446859	#VideoIOA
#2002	1	8	1.0447371	0.207385542	#VideoIOA
#2004	1	8	0.7336497	0.329140379	#VideoIOA
2005	1	8	1.439732981	0.317900954	#VideoIOA
2006	1	8	0.803490021	0.403293554	#VideoIOA
2007	1	8	0.06733551	0.68200364	#VideoIOA
2008	1	8	1.495600581	0.30758678	#VideoIOA
2009	1	8	1.288986661	0.217458874	#VideoIOA
2010	1	8	0.904796121	0.207923772	#VideoIOA
2011	1	8	0.761953871	0.166457658	#VideoIOA
2012	1	8	1.062321321	0.160405443	#VideoIOA
2013	1	8	1.366811591	0.241615955	#VideoIOA
2014	1	8	0.991933751	0.20664597	#VideoIOA
2015	1	8	0.965556391	0.283145804	#VideoIOA
2016	1	8	0.851481201	0.160174042	#VideoIOA
2008	1	9	2.074797105	0.160265368	#JuvTrawlIOA
2009	1	9	0.420486949	0.248226742	#JuvTrawlIOA
2010	1	9	0.69488923	0.223769372	#JuvTrawlIOA
2011	1	9	0.940995832	0.196779607	#JuvTrawlIOA
2012	1	9	3.479381443	0.157027036	#JuvTrawlIOA
2013	1	9	0.366856767	0.289807082	#JuvTrawlIOA

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2014	1	9	0.050010967	0.606961157	#JuvTrawlIOA
2015	1	9	0.397126563	0.253664227	#JuvTrawlIOA
2016	1	9	0.575455144	0.21972124	#JuvTrawlIOA
#
#
0 #_N_fleets_with_discard
0 #N discard obs
#
0 #_N_meanbodywt_obs
30 #_DF_for_meanbodywt_T-distribution_like
#
2 # length bin method: 1=use databins; 2=generate from binwidth,min,max below; 3=read vector
2 # binwidth for population size comp
2 # minimum size in the population (lower edge of first bin and size at age 0.00)
90 # maximum size in the population (lower edge of last bin)
#
-0.0001  #_comp_tail_compression
0.0001 #_add_to_comp
0 #_combine males into females at or below this bin number
45 #_N_LengthBins
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78
80 82 84 86 88 90
135 #_N_Length_obs
#Yr Seas Flt/Svy Gender Part Nsamp datavector(female-male)
#Year Seas Fleet Gender Part NsampRaw 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38
40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90
1991	1	1	0	0	7	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0
	1	0	0	0	1	1	0	0	1	0	0	0
	1	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	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	1	1	0	0	38	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	3	2	3	2	1
	3	5	3	2	5	1	3	0	1	0	0	1
	1	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	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	1	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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1999	1	1	0	0	64	0	0	0	0	0	0	0
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	9	4	3	2	3	2	0	0	1	2	0	0
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2000	1	1	0	0	13	0	0	0	0	0	0	0
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2001	1	1	0	0	12	0	0	0	0	0	0	0
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2002	1	1	0	0	18	0	0	0	0	0	0	0
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2003	1	1	0	0	11	0	0	0	0	0	0	0
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2005	1	1	0	0	1	0	0	0	0	0	0	0
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2007	1	1	0	0	14	0	0	0	0	0	0	0
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2008	1	1	0	0	16	0	0	0	0	0	0	0
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	2	1	2	0	0	0	0	0	0	0	0	2
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2009	1	1	0	0	1	0	0	0	0	0	0	0
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2010	1	1	0	0	44	0	0	0	0	0	0	0
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	5	1	2	1	0	0	2	1	0	0	0	0
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2011	1	1	0	0	101	0	0	0	0	0	0	0
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	11	17	9	6	4	0	0	0	0	0	0	0
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2012	1	1	0	0	248	0	0	0	0	0	0	0
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	33	21	12	14	2	3	3	3	1	4	2	2
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2013	1	1	0	0	161	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	15	11	17	15	24
	23	14	17	10	1	7	1	1	0	1	0	0
	0	1	0	2	0	0	0	0	0	0	0	0
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2014	1	1	0	0	170	0	0	0	0	0	0	0
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	16	14	6	10	6	6	10	2	3	3	3	0
	0	7	0	2	2	1	2	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2015	1	1	0	0	104	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	14	12	18	10	11
	4	6	5	3	1	3	1	1	0	0	2	1
	1	2	5	3	1	0	0	0	0	0	0	0
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2016	1	1	0	0	36	0	0	0	0	0	0	0
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	4	1	0	1	0	0	0	0	0	0	0	0
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1993	1	2	0	0	11	0	0	0	0	0	0	0
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1994	1	2	0	0	14	0	0	0	0	0	0	0
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1995	1	2	0	0	1	0	0	0	0	0	0	0
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1996	1	2	0	0	2	0	0	0	0	0	0	0
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1998	1	2	0	0	29	0	0	0	0	0	0	0
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1999	1	2	0	0	10	0	0	0	0	0	0	0
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	0	0	1	1	0	0	2	2	0	0	1	0
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2001	1	2	0	0	19	0	0	0	0	0	0	0
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	1	0	1	2	1	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2002	1	2	0	0	2	0	0	0	0	0	0	0
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	0	0	0	0	0	0	1	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2007	1	2	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2008	1	2	0	0	6	0	0	0	0	0	0	0
	0	0	0	0	1	0	1	0	0	0	0	1
	0	0	1	2	0	0	0	0	0	0	0	0
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2009	1	2	0	0	9	0	0	0	0	0	0	0
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2011	1	2	0	0	11	0	0	0	0	0	0	0
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	3	0	2	1	1	0	0	1	0	0	1	0
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2012	1	2	0	0	4	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2013	1	2	0	0	6	0	0	0	0	0	0	0
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	0	0	0	0	0	0	1	0	0	0	0	0
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2014	1	2	0	0	20	0	0	0	0	0	0	0
	0	3	4	5	1	2	3	0	0	0	1	1
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2015	1	2	0	0	4	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2016	1	2	0	0	22	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	4	4	2	6	1
	0	2	1	1	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
1993	1	3	0	0	18	0	0	0	0	0	0	0
	0	4	2	2	1	1	3	2	1	1	1	0
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1996	1	3	0	0	20	0	0	0	0	0	0	0
	0	0	0	0	1	4	5	3	4	2	1	0
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	0	0	0	0	0	0	0	0	0	0	0	
1998	1	3	0	0	23	0	0	0	0	0	0	0
	0	0	0	3	4	4	4	1	3	1	2	0
	0	1	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
1999	1	3	0	0	20	0	0	0	0	0	0	1
	0	2	1	2	3	4	1	2	1	2	1	0
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	0	0	0	0	0	0	0	0	0	0	0	
2000	1	3	0	0	65	0	0	0	0	0	0	0
	0	0	1	2	7	6	18	11	9	3	4	2
	1	1	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2001	1	3	0	0	36	0	0	0	0	0	0	0
	0	0	0	0	2	2	7	7	6	7	2	0
	2	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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2002	1	3	0	0	107	0	0	0	0	0	0	0
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2003	1	3	0	0	21	0	0	0	0	0	0	0
	0	1	2	0	0	2	5	1	3	3	1	0
	0	1	1	0	1	0	0	0	0	0	0	0
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1982	1	4	0	0	2	0	0	0	0	0	0	0
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1989	1	4	0	0	16	0	0	0	0	0	0	0
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1993	1	4	0	0	13	0	0	0	0	0	0	0
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1994	1	4	0	0	17	0	0	0	0	0	0	0
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1995	1	4	0	0	30	0	0	0	0	0	0	0
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1996	1	4	0	0	7	0	0	0	0	0	0	0
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	0	1	0	0	0	0	0	0	0	0	0	0
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1997	1	4	0	0	21	0	0	0	0	0	0	0
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	1	0	2	0	0	2	0	0	0	0	0	0
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1998	1	4	0	0	35	0	0	0	0	0	0	0
	0	0	0	0	0	1	2	3	5	5	7	7
	1	2	1	0	1	0	0	0	0	0	0	0
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1999	1	4	0	0	34	0	0	0	0	0	0	0
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	4	0	1	0	1	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2000	1	4	0	0	12	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	3	3
	1	1	0	0	1	0	2	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2001	1	4	0	0	21	0	0	0	0	0	0	0
	0	0	0	0	0	2	2	4	1	3	3	0
	1	4	1	0	0	0	0	0	0	0	0	0
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2002	1	4	0	0	15	0	0	0	0	0	0	0
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	1	3	1	0	0	0	0	0	0	0	0	0
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2003	1	4	0	0	42	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	3	7	13	6	4
	4	3	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2004	1	4	0	0	56	0	0	0	0	0	0	0
	0	0	0	0	0	3	13	8	7	4	2	4
	5	4	1	2	1	0	0	1	0	1	0	0
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2005	1	4	0	0	24	0	0	0	0	0	0	0
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	6	3	6	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2006	1	4	0	0	18	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	9	1	4	0	2
	1	1	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2007	1	4	0	0	17	0	0	0	0	0	0	0
	0	0	0	0	0	1	2	4	5	2	1	1
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2008	1	4	0	0	57	0	0	0	0	0	0	0
	0	0	0	0	0	2	3	6	9	8	10	7
	7	3	2	0	0	0	0	0	0	0	0	0
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2009	1	4	0	0	38	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	4	7	0	6	3
	8	7	1	1	1	0	0	0	0	0	0	0
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2010	1	4	0	0	66	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	11	12	8	12	5
	7	6	2	0	1	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2011	1	4	0	0	57	0	0	0	0	0	0	0
	0	0	0	0	1	1	0	7	6	6	8	9
	6	6	3	1	3	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2012	1	4	0	0	209	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	9	32	18	22	38
	11	47	16	6	4	0	0	0	3	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2013	1	4	0	0	55	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	7	4	4	3	11
	9	4	2	5	1	1	1	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2014	1	4	0	0	48	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	5	10	5	4	10
	5	4	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	

2015	1	4	0	0	37	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	7	1	6	3
	6	7	0	4	1	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2016	1	4	0	0	131	0	0	0	0	0	0	0
	0	0	0	0	0	1	4	13	11	13	12	7
	19	18	7	7	1	3	0	2	1	2	2	2
	1	0	0	1	0	2	2	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	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	1	5	0	0	7	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	3	0	0
	0	0	0	0	0	1	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
1994	1	5	0	0	14	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	4	3	3	1	1
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	0	0	0	0	0	0	0	0	0	0	0	
1995	1	5	0	0	11	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	1	4	1	1	0
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	0	0	0	0	0	0	0	0	0	0	0	
1996	1	5	0	0	3	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
1997	1	5	0	0	7	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	2	0	1	1
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
1998	1	5	0	0	14	0	0	0	0	0	0	0
	0	0	0	0	2	2	3	3	0	1	3	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
1999	1	5	0	0	9	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2000	1	5	0	0	11	0	0	0	0	0	0	0
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	1	1	2	0	1	0	0	0	0	0	0	0
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2001	1	5	0	0	7	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	0	2	1	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2002	1	5	0	0	9	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	0	0	4	0
	1	0	1	0	0	0	0	0	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2003	1	5	0	0	33	0	0	0	0	0	0	0
	0	0	0	0	0	2	1	2	6	5	7	3
	4	2	1	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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2004	1	5	0	0	13	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	3	2	2	1	1
	1	1	0	0	0	0	0	0	0	0	0	0
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2005	1	5	0	0	7	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	4	0	0
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2006	1	5	0	0	3	0	0	0	0	0	0	0
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	0	1	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2007	1	5	0	0	11	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	1	2	3	2	0
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	0	0	0	0	0	0	0	0	0	0	0	
2008	1	5	0	0	9	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	2	1	1	2
	0	2	0	0	0	0	0	0	0	0	0	0
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2009	1	5	0	0	16	0	0	0	0	0	0	0
	0	0	0	0	0	1	2	1	6	2	0	1
	0	1	0	2	0	0	0	0	0	0	0	0
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2010	1	5	0	0	8	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	0	1	0	2
	2	0	1	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2011	1	5	0	0	22	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	3	4	1	1	3
	1	3	2	0	2	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2012	1	5	0	0	25	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	2	2	1	2	6
	0	8	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2013	1	5	0	0	17	0	0	0	0	0	0	0
	0	0	0	0	1	0	1	1	3	3	4	3
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2014	1	5	0	0	71	0	0	0	0	0	0	0
	0	0	0	0	0	2	5	10	15	4	8	5
	7	7	5	2	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2015	1	5	0	0	92	0	0	0	0	0	0	0
	0	0	0	0	0	2	7	15	17	11	9	10
	13	5	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2016	1	5	0	0	70	0	0	0	0	0	0	0
	0	0	0	0	0	0	12	4	10	10	10	8
	7	4	2	2	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	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	1	6	0	0	5	0	0	0	0	0	0	0
	0	0	1	1	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2003	1	6	0	0	19	0	0	0	0	0	0	2
	4	3	6	1	1	0	0	1	0	1	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2004	1	6	0	0	25	0	0	0	0	0	0	0
	0	3	2	4	5	3	2	2	1	2	0	1
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2005	1	6	0	0	10	0	0	0	0	0	0	0
	1	3	1	0	1	2	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2006	1	6	0	0	15	0	0	0	0	0	0	1
	2	3	5	4	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
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2007	1	6	0	0	76	0	0	0	0	0	0	4
	27	23	8	4	5	1	3	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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2008	1	6	0	0	33	0	0	0	0	0	0	0
	1	2	7	8	4	2	4	2	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2009	1	6	0	0	68	0	0	0	0	1	8	5
	6	7	6	8	3	9	3	4	3	1	1	0
	1	1	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2010	1	6	0	0	38	0	0	0	0	0	0	0
	2	2	7	10	2	4	5	1	2	1	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2011	1	6	0	0	34	0	0	0	0	0	0	2
	1	1	0	1	0	3	9	4	7	3	0	2
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2012	1	6	0	0	82	0	0	0	0	0	0	0
	9	15	14	9	5	6	7	2	1	5	3	0
	2	3	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2013	1	6	0	0	13	0	0	0	0	0	0	2
	2	3	0	0	3	1	0	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2014	1	6	0	0	15	0	0	0	0	0	0	0
	0	2	0	1	5	0	4	1	0	1	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	

2015	1	6	0	0	34	0	0	0	0	0	1	0
	3	3	1	4	8	5	2	3	1	1	0	1
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2016	1	6	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2008	1	7	0	0	13	0	0	0	0	0	0	0
	0	0	0	1	1	1	3	5	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2009	1	7	0	0	61	0	0	0	0	0	2	4
	13	12	11	5	7	1	2	2	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
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2010	1	7	0	0	64	0	0	0	0	12	8	7
	6	11	9	6	2	0	2	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2011	1	7	0	0	46	0	1	0	0	0	5	7
	13	4	5	6	2	2	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2012	1	7	0	0	125	0	2	2	0	4	23	19
	21	18	11	9	2	4	3	0	2	3	1	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2013	1	7	0	0	35	0	0	0	0	0	7	7
	8	7	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2014	1	7	0	0	82	0	0	1	2	14	20	12
	11	15	4	1	0	1	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2015	1	7	0	0	62	0	0	1	0	0	0	7
	20	12	1	8	8	2	0	1	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	
2016	1	7	0	0	20	0	0	0	0	0	4	2
	5	2	3	1	1	0	1	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2009	1	8	0	0	11	0	0	0	0	0	0	0
	0	1	0	0	3	1	0	2	1	0	1	0
	0	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2010	1	8	0	0	16	0	0	0	0	0	0	0
	0	1	0	0	2	1	4	1	3	1	0	1
	0	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	

2011	1	8	0	0	21	0	0	0	0	0	0	0
	0	0	0	1	3	1	1	4	2	1	2	1
	2	0	0	1	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2012	1	8	0	0	43	0	0	0	0	0	0	0
	0	0	4	6	1	4	5	6	2	3	2	2
	2	2	1	1	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2013	1	8	0	0	9	0	0	0	0	0	0	0
	0	0	2	1	1	1	1	1	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2014	1	8	0	0	20	0	0	0	0	0	0	0
	0	0	0	0	1	6	4	1	1	2	2	0
	1	1	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2015	1	8	0	0	17	0	0	0	0	0	0	0
	0	2	0	1	1	1	4	0	1	0	1	3
	2	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2016	1	8	0	0	11	0	0	0	0	0	1	0
	0	0	0	1	2	1	1	2	1	1	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2008	1	9	0	0	129	0	3	6	20	28	46	20
	6	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2009	1	9	0	0	28	0	2	0	2	5	9	7
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2010	1	9	0	0	34	7	1	5	8	6	6	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2011	1	9	0	0	77	2	8	6	11	21	19	8
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2012	1	9	0	0	181	4	12	33	40	40	18	27
	6	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2013	1	9	0	0	18	0	5	6	5	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	
2014	1	9	0	0	3	0	0	0	0	0	2	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	

2015 1 9 0 0 22 1 2 4 1 3 6 3
2 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2016 1 9 0 0 43 2 5 4 9 12 6 3
1 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
#
19 #_N_age_bins
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1 #_N_ageerror_definitions; these define how SS will convert true age into a distribution of expected ages to represent the effect of ageing bias and imprecision
#true_age=0 1 2 etc.,
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
0.001 0.001
#
250 #_N_Agecomp_obs
1 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
1 #_combine males into females at or below this bin number
#Yr Seas Flt/Svy Gender Part Ageerr Lbin_lo Lbin_hi Nsamp datavector(female-male)
#Year Seas Fleet Gender Part AgeErr Lbin_lo Lbin_hi NsampRaw 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
2010 1 1 0 0 1 20 20 1 0 0 0 0
1 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
2012 1 1 0 0 1 16 16 2 0 0 0 0
0 1 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
2012 1 1 0 0 1 17 17 1 0 0 0 0
0 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
2012 1 1 0 0 1 19 19 1 0 0 0 0
0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
2012 1 1 0 0 1 20 20 2 0 0 0 0
0 1 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

2013	1	1	0	0	1	15	15	2	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	16	16	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	17	17	4	0	0	0	0
	0	3	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	18	18	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	19	19	7	0	0	0	0
	0	0	0	7	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	20	20	2	0	0	0	0
	0	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	21	21	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	22	22	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	23	23	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	1	0	0	1	25	25	1	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	1	0	0	1	18	18	2	0	0	0	0
	0	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	4	0	0	1	15	15	1	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	4	0	0	1	16	16	3	0	0	0	1
	1	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2003	1	4	0	0	1	17	17	3	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	4	0	0	1	18	18	4	0	0	0	3
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	4	0	0	1	19	19	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	4	0	0	1	21	21	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	4	0	0	1	17	17	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	4	0	0	1	16	16	2	0	0	0	0
	0	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	4	0	0	1	17	17	2	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	4	0	0	1	18	18	4	0	0	0	0
	2	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	4	0	0	1	20	20	2	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	4	0	0	1	21	21	2	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	4	0	0	1	24	24	2	0	0	0	0
	0	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	13	13	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	14	14	3	0	0	0	0
	1	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2016	1	4	0	0	1	15	15	8	0	0	0	3
	3	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	16	16	6	0	0	0	2
	2	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	17	17	7	0	0	0	1
	3	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	18	18	4	0	0	0	1
	1	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	19	19	4	0	0	0	1
	0	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	20	20	14	0	0	0	3
	6	5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	21	21	10	0	0	0	2
	3	4	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	22	22	3	0	0	0	1
	1	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	23	23	3	0	0	0	0
	0	2	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	24	24	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	25	25	3	0	0	0	0
	1	1	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	27	27	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	28	28	1	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2016	1	4	0	0	1	29	29	2	0	0	0	0
	0	0	0	0	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	30	30	2	0	0	0	0
	0	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	31	31	2	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	32	32	1	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	35	35	1	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	37	37	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	4	0	0	1	38	38	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2002	1	5	0	0	1	13	13	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	5	0	0	1	16	16	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2003	1	5	0	0	1	18	18	2	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	5	0	0	1	21	21	2	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	5	0	0	1	16	16	4	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	5	0	0	1	23	23	2	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2010	1	5	0	0	1	15	15	2	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	15	15	4	0	0	0	3
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	16	16	3	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	17	17	4	0	0	0	0
	3	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	18	18	5	0	0	0	0
	4	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	19	19	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	20	20	3	0	0	0	0
	0	0	1	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	21	21	4	0	0	0	0
	0	1	1	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	5	0	0	1	22	22	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	5	0	0	1	14	14	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	5	0	0	1	16	16	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	5	0	0	1	17	17	3	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	5	0	0	1	18	18	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2016	1	5	0	0	1	20	20	5	0	0	0	0
	1	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	5	0	0	1	23	23	2	0	0	0	0
	0	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	8	8	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	11	11	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	12	12	8	0	4	4	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	13	13	5	0	0	5	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	14	14	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	15	15	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	16	16	2	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	17	17	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	18	18	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2007	1	6	0	0	1	19	19	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	6	6	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2009	1	6	0	0	1	7	7	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	8	8	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	9	9	5	0	4	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	10	10	7	0	1	3	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	11	11	4	0	0	3	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	12	12	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	13	13	5	0	0	3	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	14	14	4	0	0	0	4
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	16	16	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	18	18	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	20	20	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	6	0	0	1	21	21	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	7	7	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2010	1	6	0	0	1	8	8	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	9	9	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	10	10	9	0	2	7	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	11	11	7	0	0	6	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	12	12	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	13	13	6	0	0	0	3
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	14	14	4	0	0	1	0
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	15	15	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	16	16	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	17	17	2	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	6	0	0	1	18	18	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	7	7	2	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	8	8	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2011	1	6	0	0	1	9	9	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	11	11	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	13	13	3	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	14	14	8	0	0	0	5
	2	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	15	15	4	0	0	0	2
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	16	16	6	0	0	0	0
	1	5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	17	17	2	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	18	18	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	19	19	2	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	6	0	0	1	21	21	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	8	8	8	0	8	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	9	9	13	0	12	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	10	10	9	0	8	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2012	1	6	0	0	1	11	11	10	0	4	3	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	12	12	2	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	13	13	4	0	0	2	1
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	14	14	5	0	0	0	1
	3	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	15	15	2	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	16	16	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	17	17	5	0	0	0	1
	2	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	18	18	3	0	0	0	0
	1	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	21	21	1	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	22	22	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	6	0	0	1	23	23	1	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	6	0	0	1	7	7	2	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	6	0	0	1	8	8	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2013	1	6	0	0	1	9	9	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	6	0	0	1	11	11	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	6	0	0	1	12	12	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	6	0	0	1	13	13	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	6	0	0	1	15	15	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	6	0	0	1	10	10	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	6	0	0	1	12	12	4	0	0	1	2
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	6	0	0	1	14	14	3	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	6	0	0	1	15	15	2	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	6	0	0	1	17	17	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	6	0	0	1	20	20	1	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	6	6	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	7	7	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2015	1	6	0	0	1	8	8	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	9	9	2	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	11	11	5	0	1	1	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	12	12	6	0	0	1	3
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	13	13	4	0	0	1	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	14	14	5	0	0	0	3
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	15	15	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	17	17	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	6	0	0	1	20	20	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	10	10	2	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	11	11	4	0	1	3	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	12	12	6	0	1	5	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	13	13	3	0	0	3	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2008	1	7	0	0	1	14	14	3	0	0	3	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	15	15	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	16	16	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2008	1	7	0	0	1	18	18	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	8	8	2	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	9	9	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	10	10	9	0	6	1	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	11	11	17	0	11	4	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	12	12	17	0	6	10	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	13	13	12	0	1	4	7
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	14	14	6	0	1	1	4
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	15	15	10	0	0	1	9
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	17	17	6	0	0	0	5
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2009	1	7	0	0	1	18	18	3	0	0	0	2
	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	19	19	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2009	1	7	0	0	1	20	20	2	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	7	7	4	0	4	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	8	8	12	0	8	4	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	9	9	12	0	1	10	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	10	10	6	0	0	5	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	11	11	5	0	1	2	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	12	12	5	0	0	2	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	13	13	7	0	0	2	3
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2010	1	7	0	0	1	17	17	3	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	8	8	6	0	4	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	9	9	3	0	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2011	1	7	0	0	1	10	10	9	0	4	0	5
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	11	11	3	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	12	12	4	0	0	1	2
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	13	13	5	0	0	0	2
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	14	14	3	0	0	0	1
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	7	0	0	1	19	19	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	7	7	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	8	8	10	0	8	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	9	9	19	0	17	1	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	10	10	17	0	13	2	1
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	11	11	14	0	9	1	2
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	12	12	7	0	4	1	0
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	13	13	4	0	0	0	0
	3	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2012	1	7	0	0	1	14	14	3	0	0	0	1
	0	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	15	15	4	0	0	0	1
	2	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	16	16	3	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	19	19	1	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	20	20	3	0	0	0	0
	0	0	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	7	0	0	1	21	21	3	0	0	0	0
	0	0	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	7	7	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	8	8	7	0	5	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	9	9	7	0	3	3	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	10	10	9	0	4	4	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	11	11	10	0	7	0	1
	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	12	12	11	0	4	6	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	13	13	5	0	2	3	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2013	1	7	0	0	1	14	14	7	0	1	6	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	15	15	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	16	16	2	0	0	0	0
	1	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	18	18	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2013	1	7	0	0	1	35	35	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	6	6	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	7	7	7	0	7	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	8	8	4	0	4	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	9	9	7	1	5	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	10	10	13	0	4	5	4
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	11	11	14	0	3	1	10
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	12	12	4	0	0	3	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	13	13	6	0	0	3	3
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2014	1	7	0	0	1	15	15	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	16	16	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	17	17	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2014	1	7	0	0	1	19	19	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	7	7	3	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	9	9	4	2	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	10	10	7	0	3	4	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	11	11	11	0	3	3	4
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	12	12	7	0	3	0	2
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	13	13	10	0	2	1	3
	4	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	14	14	6	0	0	1	3
	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	15	15	3	0	0	0	2
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2015	1	7	0	0	1	16	16	2	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

2015	1	7	0	0	1	18	18	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	8	8	3	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	9	9	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	10	10	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	11	11	2	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	12	12	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	13	13	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	15	15	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2016	1	7	0	0	1	20	20	1	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2011	1	9	0	0	1	11	11	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		
2012	1	9	0	0	1	8	8	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0		

#
0 #_N_MeanSize-at-Age_obs
#
0 #_N_environ_variables
0 #_N_environ_obs
0 # N sizefreq methods to read
#
0 # no tag data

#
0 # no morphcomp data
#
999

8.1.3 Control File

#hogfish SEDAR 37 - WFL stock control file
1 #_N_Growth_Patterns
1 #_N_Morphs_Within_GrowthPattern
1 #_Nblock_Patterns
#_Cond 0 #_blocks_per_pattern
2
begin and end years of blocks
#1999 GMFMC adopted consistent size regulations
1994 1998 1999 2012
#
1 #_fracfemale #wtc - I think this is sex ratio of recruits, of which all are female
3 #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4=agespec_withseasinterpolate
#_Age_natmort_by gender x growthpattern
#Lorenz05:
0.597 0.400 0.309 0.257 0.223 0.200 0.182 0.169 0.159 0.150 0.144 0.138 0.134 0.130 0.126 0.123 0.121 0.119
0.117 0.115 0.114
0.597 0.400 0.309 0.257 0.223 0.200 0.182 0.169 0.159 0.150 0.144 0.138 0.134 0.130 0.126 0.123 0.121 0.119
0.117 0.115 0.114
1 # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_speciific_K; 4=not implemented
1 #_Growth_Age_for_L1
999 #_Growth_Age_for_L2 (999 to use as Linf)
0 #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
0 #_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=read fec and wt from wtatage.ss
#_placeholder for empirical age-maturity by growth pattern
1 #_First_Mature_Age
3 #_fecundity 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
1 #_hermaphroditism option: 0=none; 1=age-specific fxn
-1 #_season of transition (-1 at end of each season)
1 #_include males in spawning biomass (0=no, 1=yes)
1 #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from female-GP1, 3=like SS2 V1.x)
2 #_env/block/dev_adjust_method (1=standard; 2=logistic transform keeps in base parm bounds; 3=standard w/ no bound check)
#
#_growth_parms
#_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
0.2 0.5 0.38 0.4 0 1 -3 0 0 0 0 0 0 0 # NatM_p_1_Fem_GP_1
7 21 18.54 18.54 -1 1 -3 0 0 0 0 0 0 0 # L_at_Amin_Fem_GP_1   This is for growth age=1 using adj age von bert, WFL life history study
70 100 84.89 84.89 -1 1 -3 0 0 0 0 0 0 0 # L_at_Amax_Fem_GP_1
0.05 0.8 0.1058 0.1058 -1 1 -3 0 0 0 0 0 0 0 # VonBert_K_Fem_GP_1
0.05 0.25 0.2 0.2 -1 0.05 -3 0 0 0 0 0 0 0 #_CV_young_Fem_GP_1
0.05 0.25 0.2 0.2 -1 0.05 -3 0 0 0 0 0 0 0 #_CV_old_Fem_GP_1

0.2 0.5 0.38 0.4 0 1 -3 0 0 0 0 0 0 0 # NatM_p_1_Mal_GP_1
7 21 18.54 18.54 -1 1 -3 0 0 0 0 0 0 0 # L_at_Amin_Mal_GP_1
70 100 84.89 84.89 -1 1 -3 0 0 0 0 0 0 0 # L_at_Amax_Mal_GP_1
0.05 0.8 0.1058 0.1058 -1 1 -3 0 0 0 0 0 0 0 # VonBert_K_Mal_GP_1
0.05 0.25 0.2 0.2 -1 0.05 -3 0 0 0 0 0 0 0 #_CV_young_Mal_GP_1
0.05 0.25 0.2 0.2 -1 0.05 -3 0 0 0 0 0 0 0 #_CV_old_Mal_GP_1
0.00002642 0.0001057 .00005284 .00005284 -1 0.2 -3 0 0 0 0 0 0 0 # Wtlen_1_Fem
1.373 4.118 2.745 2.745 -1 0.2 -3 0 0 0 0 0 0 0 # Wtlen_2_Fem
7.735 23.2 15.469570 15.469570 -1 0.2 -3 0 0 0 0 0 0 0 # Mat50%_Fem
-0.1472 -0.04907 -0.09815 -0.09815 -1 0.2 -3 0 0 0 0 0 0 0 # Mat_slope_Fem
-1 1 1 1 -1 0.2 -2 0 0 0 0 0 0 0 # Eg/kg_inter_Female #can't do fec relationship and include males
0 4 1 1 -1 0.2 -3 0 0 0 0 0 0 0 # Eg/kg_slope_wt_Female #can't do fec relationship and include males
0.00002642 0.0001057 .00005284 .00005284 -1 0.2 -3 0 0 0 0 0 0 0 # Wtlen_1_Mal
1.373 4.118 2.745 2.745 -1 0.2 -3 0 0 0 0 0 0 0 # Wtlen_2_Mal
1 15 7.5 7.5 -1 0 -4 0 0 0 0 0 0 0 # herm_inflection_age
1 5 2.15 2.15 -1 0 -4 0 0 0 0 0 0 0 # herm_stdev(in_age)
0 1 .999 .999 -1 0 -4 0 0 0 0 0 0 0 # herm_asymptotic_rate
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_GP_1
-4 4 0 0 -1 1 -4 0 0 0 0 0 0 0 # RecrDist_Area1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Seas_1
0 0 1 1 -1 0 -4 0 0 0 0 0 0 0 # CohortGrowDev
#
#_Cond 0 #custom_MG-env_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
#
#_Cond 0 #custom_MG-block_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
#_Cond No MG parm trends
#
#_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
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
#
#_Cond -4 #_MGparm_Dev_Phase
#
#_Spawner-Recruitment
3 #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop; 7=survival_3Parm
#_LO HI INIT PRIOR PR_type SD PHASE
1 40 10 10 -1 0.4 1 # SR_log(R0)
#0.2 1 0.8 0.8 0 .19 1 # SR_steep #normal prior from Shertzer and Conn (2012)
0.496 1 0.748 0.748 1 2 1 # SR_steep #symm beta prior
#0.2 1 0.81 0.81 0 .15 1 # SR_steep #prior from Joseph CYPR approach, based on Mangel et al 2013 and largely on M
0 2 0.6 0.6 -1 50 -4 # SR_sigmaR
-5 5 0 0 -1 50 -3 # SR_envlink
-5 5 0 0 -1 50 1 # SR_R1_offset
0 0.5 0 0 -1 50 -2 # SR_autocorr
0 #_SR_env_link
0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
1 #do_recdev: 0=none; 1=devvector; 2=simple deviations
1993 # first year of main recr_devs; early devs can preceed this era
2016 # last year of main recr_devs; forecast devs start in following year

2 #_recdev phase
1 # (0/1) to read 13 advanced options
1950 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
3 #_recdev_early_phase
0 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxphase+1)
1 #_lambda for Fcast_recr_like occurring before endyr+1

#from preliminary SS run based on Methot and Taylor 2011
1983.0 #_last_early_yr_nobias_adj_in_MPD
2004.9 #_first_yr_fullbias_adj_in_MPD
2015.9 #_last_yr_fullbias_adj_in_MPD
2016.8 #_first_recent_yr_nobias_adj_in_MPD
0.9509 #_max_bias_adj_in_MPD (1.0 to mimic pre-2009 models)
#1993 #_first_yr_fullbias_adj_in_MPD -- when commercial logbook indices begin
#2011 #_last_yr_fullbias_adj_in_MPD
#2012 #_first_recent_yr_nobias_adj_in_MPD
#1 #_max_bias_adj_in_MPD (-1 to override ramp and set biasadj=1.0 for all estimated recdevs)
0 #_period of cycles in recruitment (N parms read below)
-5 #min rec_dev
5 #max rec_dev
0 #_read_recdevs
#_end of advanced SR options
#
#Fishing Mortality info
0.06 # F ballpark for tuning early phases #WTC - this from McBride MARFIN project catch curve; same as McBride and Murphy 2003
1998 # F ballpark year (neg value to disable)
3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
3 # max F or harvest rate, depends on F_Method
if Fmethod=2; read overall start F value; overall phase; N detailed inputs to read
#0.01 1 1 #start F value; overall phase; N detailed inputs to read
Note: set the F rate in 1998 based on research survey catch curve
Here, first use proportion of landings in biomass to get rec spear trips % F (0.74)
then use this to scale the F rate est in 1998 (0.06) to spear:
#4 1998 1 0.0444 .25 5 #estimate at later phase to hopefully force close to magnitude
if Fmethod=3, then read number of tuning iterations in hybrid method
4
#_initial_F_parms - 1986 start
#Add a prior to estimates here due to difficulties converging without when estimating commercial selectivities
#rough estimate of fishing intensity from total landings relative to 1998 with independent F estimate of 0.06 across all fleets

#0.002444961		0.001142251		0		0.06728519	0.004057833
#_LO	HI	INIT	PRIOR	PR_type	SD	PHASE	
0.00001	.1	0.004	0.002	-3	.1	1	#_InitF_1CommSpear
0.00001	.1	0.001	0.001	-3	.1	-1	#_InitF_1CommHL - hitting lower bounds, fix to prior value
0	.1	0	0.01	-1	.1	-1	#_InitF_1CommTrap
0.00001	.5	0.25	0.25	1	1	1	#_InitF_2RecSpear
0.00001	.1	0.004	0.004	-3	.1	1	#_InitF_2RecHL

#
#_Q_setup

Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nobiasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_assign_to_parm
#_for_env-var:_enter_index_of_the_env-var_to_be_linked
#_Den-dep env-var extra_se Q_type
#0 0 0 4 #_1_CommSpear - target fishery, so provide for changes in targeting
0 0 0 0 #_1_CommSpear
0 0 0 0 #_2_CommHL
0 0 0 0 #_3_CommTraps - no CPUE
#0 0 0 4 #_4_RecSpear - target fishery, so provide for changes in targeting
0 0 0 0 #_4_RecSpear
0 0 0 0 #_5_RecHL
0 0 0 0 #_6_Baitfish
0 0 0 0 #_7_SEAMAP
0 0 0 0 #_8_VideoIOA
0 0 0 0 #_9_RecTrawlIOA
#
#1 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet with random q; 1=read a parm for each year of index
##_Q_parms(if_any)
model change in catchability for comm/rec fisheries as a result of changing reef fish regulations
LO HI INIT PRIOR PR_type SD PHASE
#-10 4 0 0 -1 99 1 #_1_CommSpear_1993
#-10 4 0 0 -1 99 -10 #_1_CommSpear_1994
#-10 4 0 0 -1 99 -10 #_1_CommSpear_1995
#-10 4 0 0 -1 99 -10 #_1_CommSpear_1996
#-10 4 0 0 -1 99 -10 #_1_CommSpear_1997
#-10 4 0 0 -1 99 -10 #_1_CommSpear_1998
#-10 4 0 0 -1 99 -10 #_1_CommSpear_1999
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2000
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2001
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2002
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2003
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2004
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2005
#-10 4 0 0 -1 99 1 #_1_CommSpear_2006 #limited access program in place
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2007
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2008
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2009
#-10 4 0 0 -1 99 1 #_1_CommSpear_2010 #grouper/tilefishes IFQ
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2011
#-10 4 0 0 -1 99 -10 #_1_CommSpear_2012
#-10 4 0 0 -1 99 1 #_4_RecSpear_1992
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1993
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1994
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1995
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1996
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1997
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1998
#-10 4 0 0 -1 99 -10 #_4_RecSpear_1999
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2000
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2001
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2002

#-10 4 0 0 -1 99 -10 #_4_RecSpear_2003
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2004
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2005
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2006
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2007
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2008
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2009
#-10 4 0 0 -1 99 1 #_4_RecSpear_2010 #grouper/tilefishes IFQ
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2011
#-10 4 0 0 -1 99 -10 #_4_RecSpear_2012
#
#_size_selex_types
#discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_discarded_dead
#_Pattern Discard Male Special

24	0	0	0	#_1_CommSpear	
24	0	0	0	#_2_CommHL	
24	0	0	0	#_3_CommTrap	
24	0	0	0	#_1_RecSpear	
24	0	0	0	#_2_RecHL	
24	0	0	0	#_6_BaitfishIOA	
#24	0	0	0	#_7_SEAMAP	
5	0	0	6	#_7_SEAMAP	
24	0	0	0	#_8_VideoIOA	
0	0	0	0	#_9_RecTrawlIOA	# use age selectivity as age0=1, age1+=0

#
#_age_selex_types
#_Pattern ___ Male Special

10	0	0	0	#_1_CommSpear	
10	0	0	0	#_2_CommHL	
10	0	0	0	#_3_CommTrap	
10	0	0	0	#_4_RecSpear	
10	0	0	0	#_5_RecHL	
10	0	0	0	#_6_BaitfishIOA	
10	0	0	0	#_7_SEAMAP	
10	0	0	0	#_8_VideoIOA	
11	0	0	0	#_9_RecTrawlIOA	# use age selectivity as age0=1, age1+=0

#Selectivity_parameters_to_be_estimated
#_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
#Double Norm params: 1=peak start; 2=peak width; 3=asc limb width; 4=desc limb width; 5=start value (0-1); 6=end value (0-1)
eg with 5=-15 (min), no selectivity at size 0; with 6=5 (max), flat-topped selectivity
#Comm-Spear as double normal

#_LO	HI	INIT	PRIOR	PR_type	SD	PHASE	env-var	use_dev	dev_minyr	dev_maxyr	dev_stddev	Block	Block_Fxn	description
15	40	32	32	-1	99	3	0	0	0	0	0	0	0	#_CommSpear_SizeSel_p1
-15	15	-2.8	-3	-1	99	4	0	0	0	0	0	0	0	#_CommSpear_SizeSel_p2
-15	15	1.4	5	-1	99	4	0	0	0	0	0	0	0	#_CommSpear_SizeSel_p3
-15	15	4.6	6	-1	99	4	0	0	0	0	0	0	0	#_CommSpear_SizeSel_p4

-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_CommSpear_SizeSel_p5
-15	15	-2	0	-1	99	4	0	0	0	0	0	0	0	#_CommSpear_SizeSel_p6
15	80	26	32	-1	99	3	0	0	0	0	0	0	0	#_CommHL_SizeSel_p1
-15	15	-5	-3	-1	99	-4	0	0	0	0	0	0	0	#_CommHL_SizeSel_p2
-15	15	3.6	0	-1	99	4	0	0	0	0	0	0	0	#_CommHL_SizeSel_p3
-15	15	6	6	-1	99	-4	0	0	0	0	0	0	0	#_CommHL_SizeSel_p4
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_CommHL_SizeSel_p5
-15	15	15	15	-1	99	-4	0	0	0	0	0	0	0	#_CommHL_SizeSel_p6
15	40	30	32	-1	99	3	0	0	0	0	0	0	0	#_CommTrap_SizeSel_p1
-15	15	-15	-3	-1	99	4	0	0	0	0	0	0	0	#_CommTrap_SizeSel_p2
-15	15	4	5	-1	99	4	0	0	0	0	0	0	0	#_CommTrap_SizeSel_p3
-15	15	4	6	-1	99	4	0	0	0	0	0	0	0	#_CommTrap_SizeSel_p4
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_CommTrap_SizeSel_p5
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_CommTrap_SizeSel_p6
15	40	32	32	-1	99	3	0	0	0	0	0	0	0	#_RecSpear_SizeSel_p1
-15	15	-1.9	-3	-1	99	4	0	0	0	0	0	0	0	#_RecSpear_SizeSel_p2
-15	15	2.5	5	-1	99	4	0	0	0	0	0	0	0	#_RecSpear_SizeSel_p3
-15	15	3.2	6	-1	99	4	0	0	0	0	0	0	0	#_RecSpear_SizeSel_p4
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_RecSpear_SizeSel_p5
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_RecSpear_SizeSel_p6
15	40	32	32	-1	99	3	0	0	0	0	0	0	0	#_RecHL_SizeSel_p1
-15	15	-15	-3	-1	99	4	0	0	0	0	0	0	0	#_RecHL_SizeSel_p2
-15	15	3	5	-1	99	4	0	0	0	0	0	0	0	#_RecHL_SizeSel_p3
-15	15	4.8	6	-1	99	4	0	0	0	0	0	0	0	#_RecHL_SizeSel_p4
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_RecHL_SizeSel_p5
-15	15	-15	-15	-1	99	-4	0	0	0	0	0	0	0	#_RecHL_SizeSel_p6

10 22 16 16 1 2 3 0 0 0 0 0 0
0 #_Baitfish_SizeSel_p1
-15 15 -9 -3 -1 99 -4 0 0 0 0 0 0
0 #_Baitfish_SizeSel_p2 #know this is tight peak and hits bounds with p1 if not fixed
-15 15 3 0 -1 99 4 0 0 0 0 0 0
0 #_Baitfish_SizeSel_p3
-15 15 5 6 -1 99 4 0 0 0 0 0 0
0 #_Baitfish_SizeSel_p4
-15 15 -15 -15 -1 99 -4 0 0 0 0 0 0
0 #_Baitfish_SizeSel_p5
-15 15 -15 -15 -1 99 -4 0 0 0 0 0 0
0 #_Baitfish_SizeSel_p6
-5 5 0 0 -1 99 -3 0 0 0 0 0 0
0 #_SEAMAP_SizeSel_p1 -- mirror
-5 5 0 0 -1 99 -3 0 0 0 0 0 0
0 #_SEAMAP_SizeSel_p2 -- mirror
6 50 21 21 -1 99 3 0 0 0 0 0 0
0 #_VideoIOA_SizeSel_p1
-15 15 -5 -3 -1 99 4 0 0 0 0 0 0
0 #_VideoIOA_SizeSel_p2
-15 15 5 5 -1 99 4 0 0 0 0 0 0
0 #_VideoIOA_SizeSel_p3
-15 15 6 6 -1 99 4 0 0 0 0 0 0
0 #_VideoIOA_SizeSel_p4
-15 15 -15 -15 -1 99 -4 0 0 0 0 0 0
0 #_VideoIOA_SizeSel_p5
-15 15 -15 -15 -1 99 -4 0 0 0 0 0 0
0 #_VideoIOA_SizeSel_p6
#Age -- set min-max age to just use size selectivity
0.1 0.9 0.1 0.1 -1 99 -1 0 0 0 0 0 0
0 # _RecTrawlIOA_AgeSel_p1
0.1 0.9 0.9 0.9 -1 99 -1 0 0 0 0 0 0
0 # _RecTrawlIOA_AgeSel_p2
#_Cond 0 #_custom_sel-env_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
#_Cond
#turn this block on for change in selectivity 1994 regulations
#1 #_custom_sel-blk_setup (0/1)
#15 40 30 30 -1 1 4 #_CommSpear_SizeSel_1P_1995
#-5 3 0 0 -1 1 4 #_CommSpear_SizeSel_2P_1995
#-4 12 4 4 -1 1 4 #_CommSpear_SizeSel_3P_1995
#15 40 30 30 -1 1 4 #_RecSpear_SizeSel_1P_1995
#-5 3 0 0 -1 1 4 #_RecSpear_SizeSel_2P_1995
#-4 12 4 4 -1 1 4 #_RecSpear_SizeSel_3P_1995
#15 40 32 32 -1 1 3 #_CommSpear_SizeSel_p1_1994
#-15 15 -9 -3 -1 1 4 #_CommSpear_SizeSel_p2_1994
#-15 15 5 5 -1 1 4 #_CommSpear_SizeSel_p3_1994
#15 40 32 32 -1 1 3 #_CommSpear_SizeSel_p1_1999
#-15 15 -9 -3 -1 1 4 #_CommSpear_SizeSel_p2_1999
#-15 15 5 5 -1 1 4 #_CommSpear_SizeSel_p3_1999
#15 80 32 32 -1 1 3 #_CommHL_SizeSel_p1_1994
#-15 15 -9 -3 -1 1 4 #_CommHL_SizeSel_p2_1994

```
#-15	15	5	5	-1	1	4	#_CommHL_SizeSel_p3_1994
#15	80	32	32	-1	1	3	#_CommHL_SizeSel_p1_1999
#-15	15	-9	-3	-1	1	4	#_CommHL_SizeSel_p2_1999
#-15	15	5	5	-1	1	4	#_CommHL_SizeSel_p3_1999
#15	40	32	32	-1	1	3	#_CommTrap_SizeSel_p1_1994
#-15	15	-9	-3	-1	1	4	#_CommTrap_SizeSel_p2_1994
#-15	15	5	5	-1	1	4	#_CommTrap_SizeSel_p3_1994
#15	40	32	32	-1	1	3	#_CommTrap_SizeSel_p1_1999
#-15	15	-9	-3	-1	1	4	#_CommTrap_SizeSel_p2_1999
#-15	15	5	5	-1	1	4	#_CommTrap_SizeSel_p3_1999
#15	40	32	32	-1	1	3	#_RecSpear_SizeSel_p1_1994
#-15	15	-9	-3	-1	1	4	#_RecSpear_SizeSel_p2_1994
#-15	15	5	5	-1	1	4	#_RecSpear_SizeSel_p3_1994
#15	40	32	32	-1	1	3	#_RecSpear_SizeSel_p1_1999
#-15	15	-9	-3	-1	1	4	#_RecSpear_SizeSel_p2_1999
#-15	15	5	5	-1	1	4	#_RecSpear_SizeSel_p3_1999
#15	40	32	32	-1	1	3	#_RecHL_SizeSel_p1_1994
#-15	15	-9	-3	-1	1	4	#_RecHL_SizeSel_p2_1994
#-15	15	5	5	-1	1	4	#_RecHL_SizeSel_p3_1994
#15	40	32	32	-1	1	3	#_RecHL_SizeSel_p1_1999
#-15	15	-9	-3	-1	1	4	#_RecHL_SizeSel_p2_1999
#-15	15	5	5	-1	1	4	#_RecHL_SizeSel_p3_1999
#_Cond No selex parm trends
#_Cond -4 # placeholder for selparm_Dev_Phase
#Turn next line on for change in selectivity 1994 regulations
#2 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to keep in base parm bounds;
3=standard w/ no bound check)
#
# Tag loss and Tag reporting parameters go next
0  # TG_custom:  0=no read; 1=read if tags exist
#_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0  #_placeholder if no parameters
#
1 #_Variance_adjustments_to_input_values
#_fleet: 1 2 3
0 0 0 0 0 0 0 0 0#_add_to_survey_CV
0 0 0 0 0 0 0 0 0 #_add_to_discard_stddev
0 0 0 0 0 0 0 0 0 #_add_to_bodywt_CV
1 1 1 1 1 1 1 1 1 #_mult_by_lencomp_N
1 1 1 1 1 1 1 1 1 #_mult_by_agecomp_N
1 1 1 1 1 1 1 1 1 #_mult_by_size-at-age_N
#
1 #_maxlambdaphase
1 #_sd_offset
#
0 # number of changes to make 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
#like_comp fleet/survey phase value sizefreq_method
#1 6 1 0.0 1  #turn off baitfish survey
#4 6 1 0.0 1  #turn off baitfish len comps
#5 6 1 0.0 1  #turn off baitfish agelen comps
```

#1 7 1 0.0 1 #turn off seamap survey
#4 7 1 0.0 1 #turn off seamap len comps
#5 7 1 0.0 1 #turn off seamap agelen comps
#1 8 1 0.0 1 #turn off video survey
#4 8 1 0.0 1 #turn off video len comps
#1 9 1 0.0 1 #turn off juv trawl survey
#4 9 1 0.0 1 #turn off juv trawl len comps
##
0 # (0/1) read specs for more stddev reporting
0 1 -1 5 1 5 1 -1 5 # placeholder for selex type, len/age, year, N selex bins, Growth pattern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
placeholder for vector of selex bins to be reported
placeholder for vector of growth ages to be reported
placeholder for vector of NatAges ages to be reported
999

8.1.4 Forecast File

#V3.24f
#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 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endyr)
0.3 # SPR target (e.g. 0.40)
0.3 # Biomass target (e.g. 0.40)
#_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
2010 2012 2010 2012 2010 2012
1 #Bmark_relF_Basis: 1 = use year range; 2 = set relF same as forecast below
#
2 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-last relF yrs); 5=input annual F scalar
20 # N forecast years
0.2 # F scalar (only used for Do_Forecast==5)
#_Fcast_years: beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
 2010 2012 2010 2012
2 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB))   # leave alone
0.01 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40) - leave this alone, this is west coast thing
0.001 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)   - leave this alone, this is west coast thing
1.0 # Control rule target as fraction of Flimit (e.g. 0.75)   # this is to do the F at OY - i.e. the 75 percent of Fmsy
3 #_N forecast loops (1-3) (fixed at 3 for now)   # leave alone
3 #_First forecast loop with stochastic recruitment   # leave alone
0 #_Forecast loop control #3 (reserved for future bells&whistles)   # leave alone
0 #_Forecast loop control #4 (reserved for future bells&whistles)   # leave alone
0 #_Forecast loop control #5 (reserved for future bells&whistles)   # leave alone
#get final 2012 landings info from data: commecial get from IFQ page, recreation may not be final and may have to do some hole filling - get with Vivian on this.
2013 #FirstYear for caps and allocations (should be after years with fixed inputs) # thsi is the year when to start the projections - remember triggefish, when we added the landings from the last year sicne they wanted manamagement advice from current year
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)
2013 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to set to 1999)

2012 # Rebuilder: year for current age structure (Yinit) (-1 to set to endyear+1)
#this is how we allocate fishing effort and mortality with the fleets - i.e we want a fixed effort for the shrimp fleets and constant level of closed season discards in the projections going forward - talk with Jake about how to do this
1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x fleet(col) below
Note that fleet allocation is used directly as average F if Do_Forecast=4
this will just give you retained biomass and won't have to back out the discards
3 # 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
Fleet relative F: rows are seasons, columns are fleets
#_Fleet: FISHERY1
1
max totalcatch by fleet (-1 to have no max)
-1 -1 -1 -1 -1
max totalcatch by area (-1 to have no max); must enter value for each fleet
-1
fleet assignment to allocation group (enter group ID# for each fleet, 0 for not included in an alloc group)
 0 0 0 0 0
#_Conditional on >1 allocation group
allocation fraction for each of: 0 allocation groups
no allocation groups
0 # Number of forecast catch levels to input (else calc catch from forecast F)
-1 # basis for input Fcast catch: 2=dead catch; 3=retained catch; 99=input Hrate(F) (units are from fleetunits; note new codes in SSV3.20)
Input fixed catch values
#Year Seas Fleet Catch(or_F)
#
999 # verify end of input

8.2 SEDAR 37 Research Recommendations

Significant advancements in the understanding of life history for Hogfish were made since the last assessment in 2004 (SEDAR 6), mainly resulting from the effort of R. McBride and A. Collins (FWC-FWRI) and their collaborators from the fisheries, resulting in numerous publications and datasets. In particular, the age samples collected in both the WFL and FLK/EFL stock represent the vast majority of samples available for both stocks, providing for stronger estimates of growth and maturity than available from fisheries dependent sources or surveys. While the life history is particularly well categorized in the WFL, where more research has focused (i.e., 2005-2007 life history study), questions still remain regarding the perceived differences in growth, maturity, and fecundity between the FLK/EFL and WFL stocks, and how these may be regulated by fishing pressures. In addition, life history studies and fisheries independent surveys are sorely needed for the GA-NC stock, particularly with respect to juveniles and mature females, since all available data is from fishery-dependent sources that catch primarily large, older males. Specific recommendations are as follows:

(1) Conduct focused life history studies in the FLK/EFL and GA-NC stocks across a range of sizes/ages in order to test for differences in growth, maturity, and fecundity relative to the WFL stock where more information is available. While estimates from the FLK/EFL exist from the earlier life history study (1995-2001), additional sampling across a broader age spectrum by targeting more remote regions with lower fishing pressure (e.g., Dry Tortugas) may allow for better estimates of functional relationships.

(2) Develop/improve fisheries-independent surveys for the GA-NC stock to specifically track Hogfish abundance. Currently, the SERFS video program only detects Hogfish in less than 5% of surveys, leading to difficulties in estimating abundance.

(3) Improve biostatistical sampling of Hogfish in all regions from fisheries-dependent sources for both length and age observations.

(4) Develop a life history study to ascertain the contribution of males to spawning reproductive potential (SRP). Appropriate determination of male contribution will provide more certainty in modeling reproduction, which has a strong influence on stock status and could be instrumental in designing appropriate management regulations with respect to size limits to protect the spawning biomass.

Addendum to SEDAR 37 Update Stock Assessment Report for Hogfish in the West Florida Shelf Stock 1986-2016

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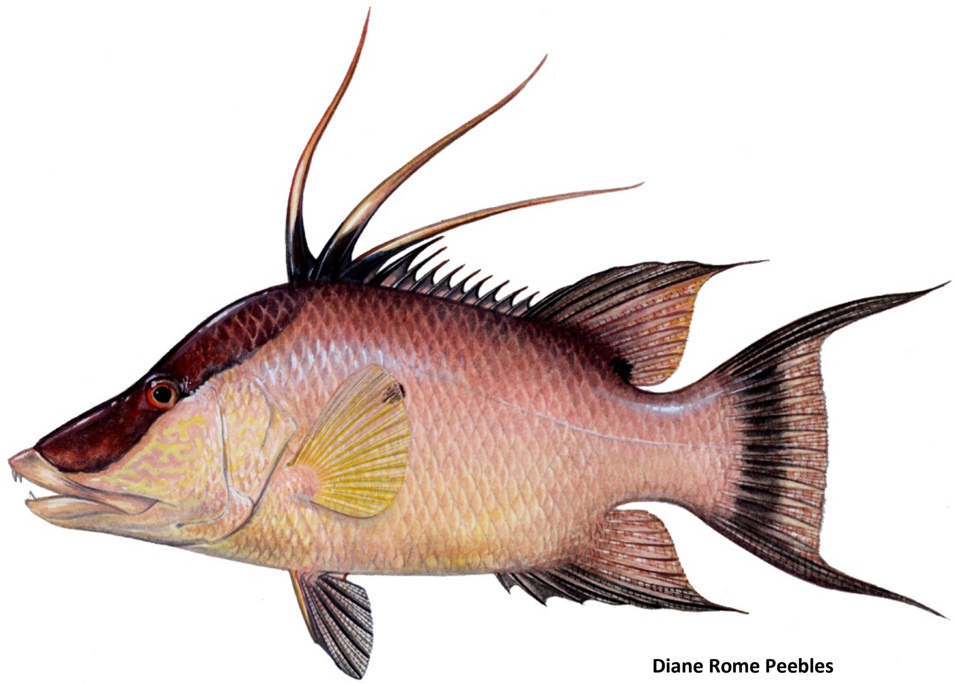

Addendum 1, 04/2018

Addendum to SEDAR 37 Update Stock Assessment Report for Hogfish in the West Florida Shelf Stock 1986-2016

Purpose

This addendum addresses the update of the SEDAR 37 benchmark assessment of the West Florida Shelf (WFL) Hogfish stock. The update stock assessment reported a management benchmark definition of MSST (Minimum Spawning Stock Threshold) that is outdated. The update assessment used an MSST definition equal to $(1\text{-}M)*SSB_{MFMT}$ consistent with SEDAR 37. The MSST definition has been updated by Amendment 44 (GMFMC 2017) to an MSST = 50% of $SSB_{30\%\ SPR}$. Therefore, GMFMC and SEDAR staff requested a correction of the MSST calculation and results within the SEDAR 37 update assessment report. This addendum provides the necessary replacement tables and figures to present results using the currently defined MSST.

Reference

GMFMC. 2017. Final Amendment 44 to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico: Minimum Stock Size Threshold (MSST) Revision for Reef Fish Stocks with Existing Status Determination Criteria. Gulf of Mexico Fishery Management Council. Tampa, Florida.

Tables

ADDENDUM: Table 3.2.1.7.1. Model quantities from the jitter analysis for the WFL stock continuity model.

Rank	TOTAL	Steepness	SPB_Virgin	F_MSY	MSY	F/F_MSY	SSB/SSB_MSST	SPR	R0
1	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
2	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
3	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
4	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
5	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
6	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
7	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
8	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
9	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
10	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
11	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
12	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
13	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
14	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
15	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
16	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
17	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
18	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
19	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
20	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
21	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
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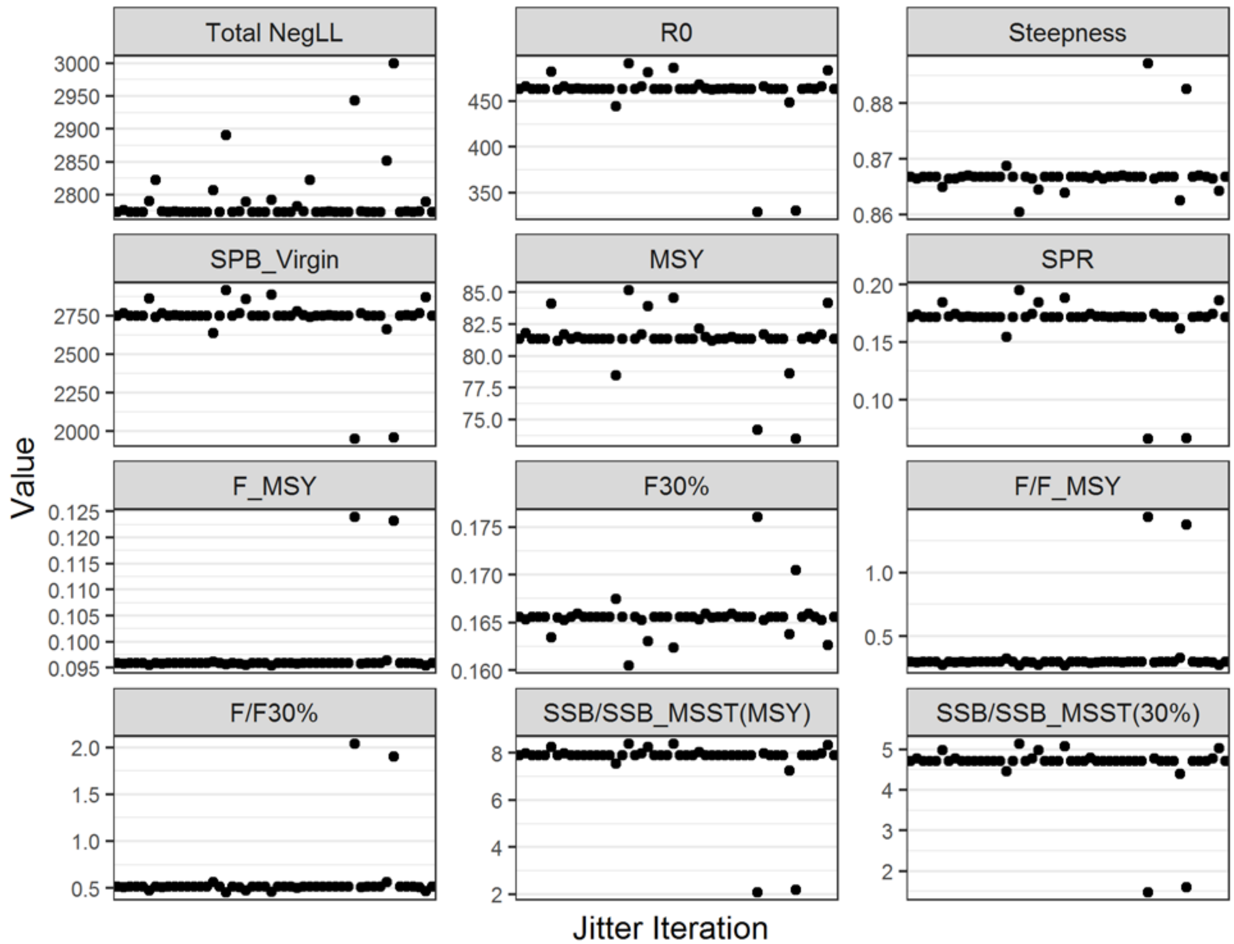
23	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
24	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
25	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
26	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
27	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
28	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
29	2773.56	0.866732	2747.6	0.095874	81.3146	0.2973239	4.8156054	0.17214	463.02451
30	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931275	4.8646705	0.17466	465.64801
31	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931277	4.8646705	0.17466	465.64801
32	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931277	4.8646705	0.17466	465.64801
33	2774.07	0.866474	2763.1	0.0957907	81.6672	0.2931277	4.8646705	0.17466	465.64801
34	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
35	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
36	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
37	2774.27	0.867032	2751.5	0.095906	81.5022	0.2970416	4.8123876	0.17239	463.68711
38	2775.99	0.86648	2766.5	0.095818	81.7926	0.2927395	4.8648841	0.17426	466.20712
39	2782.56	0.866528	2779.0	0.0957786	82.1369	0.2900076	4.892525	0.17441	468.31446
40	2789.08	0.864527	2856.6	0.095518	83.8807	0.2763818	5.033819	0.18460	481.40552
41	2789.48	0.864204	2868.6	0.0954529	84.1262	0.2735934	5.0709323	0.18660	483.42201
42	2789.82	0.86499	2860.6	0.0955509	84.097	0.2759064	5.0333578	0.18486	482.07996
43	2791.72	0.863914	2885.4	0.0954077	84.5375	0.2701571	5.1124951	0.18840	486.24859
44	2807.12	0.868739	2636.1	0.0961275	78.4795	0.3227763	4.5891784	0.15487	444.24668
45	2822.56	0.866457	2742.1	0.0959362	81.1717	0.2980606	4.8091508	0.17252	462.10401
46	2822.56	0.866458	2742.1	0.0959364	81.1703	0.2980712	4.8090234	0.17251	462.09477
47	2851.04	0.862517	2659.5	0.0963694	78.6232	0.3322891	4.4182386	0.16204	448.18227
48	2890.23	0.86046	2915.8	0.0956344	85.1699	0.2689213	5.1099863	0.19538	491.36636
49	2943.25	0.887197	1951.7	0.123942	74.1881	1.4361787	1.260627	0.06636	328.89548
50	2999.95	0.882519	1959.7	0.123208	73.4874	1.3731093	1.3362083	0.06721	330.24341

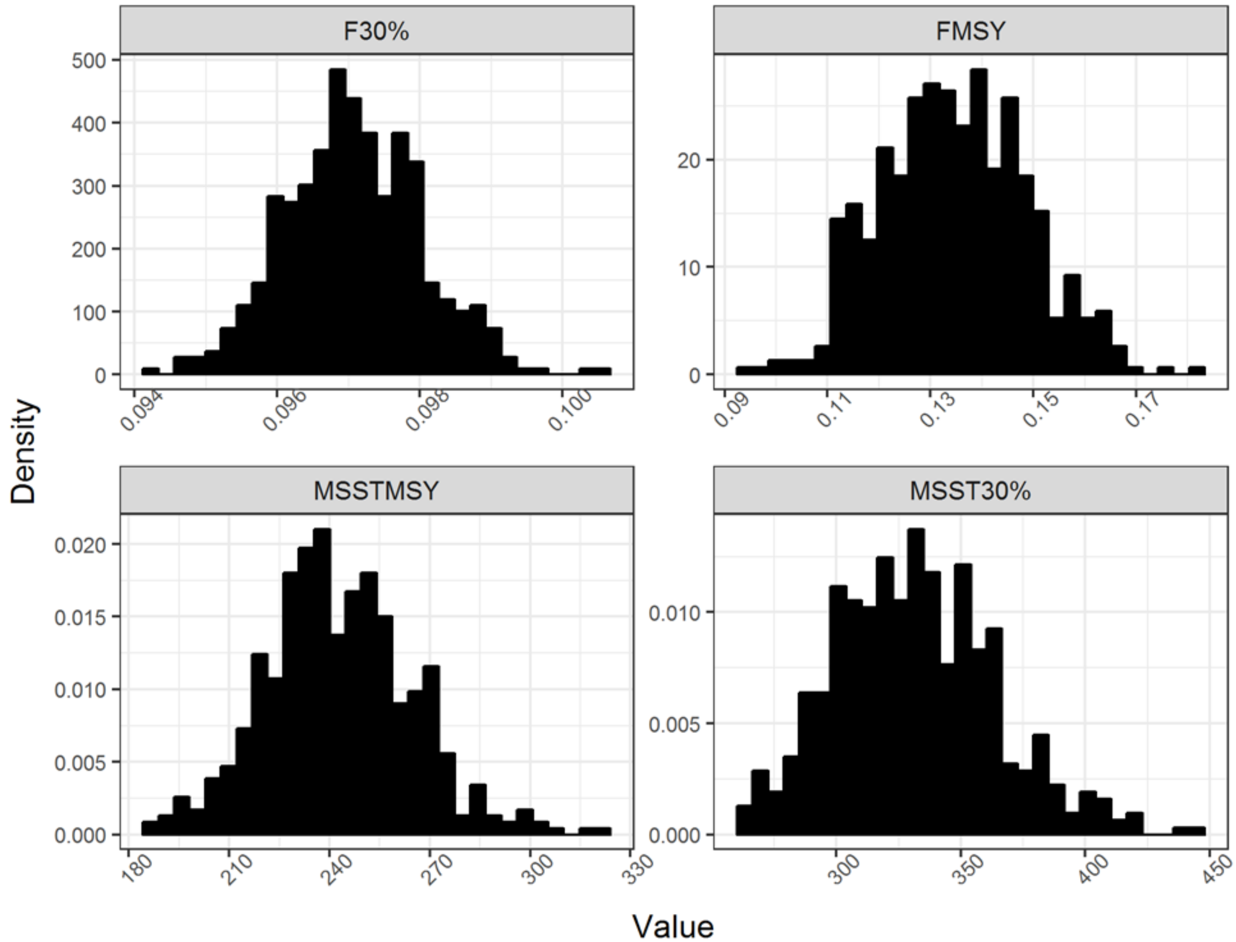
ADDENDUM: Table 3.2.1.8.1.1. Estimates of parameters, derived quantities, BRPs, and stock status from both the continuity run and bootstrap analyses for the WFL stock continuity model configuration. WHERE: MSST = (0.5)*$SSB_{REFERENCE}$ ($SSB_{REFERENCE}$: SSB_{MSY}, $SSB_{30\%}$).

Parameter/Quantity	**Continuity Run**	**Bootstrap Runs**						
		2.5%	**25%**	**50%**	**75%**	**97.5%**	**Mean**	**SD**
SSB_Virgin	2747.58	2189.35	2407.5	2534.52	2701.12	3058.46	2556.79	218.54
SSB_2016	1762.71	924.03	1135.12	1269.49	1419.32	1722.87	1282.00	205.67
MSY	81.31	58.23	65.17	70.22	75.37	86.36	70.76	7.28
SPR	0.17	0.053	0.09	0.13	0.18	0.29	0.14	0.07
R0	463.025	368.95	405.71	427.12	455.20	515.41	430.87	36.83
Steepness	0.87	0.77	0.80	0.82	0.84	0.86	0.82	0.025
FMSY	0.17	0.11	0.12	0.13	0.14	0.16	0.13	0.014
F/FMSY	0.30	0.32	0.42	0.49	0.57	0.76	0.50	0.12
MSSTMSY	222.92	199.55	228.92	241.35	255.92	289.49	242.72	22.04
SSB/MSSTMSY	7.90	3.87	4.83	5.31	5.79	6.54	5.28	0.69
F30%	0.096	0.095	0.096	0.097	0.098	0.099	0.097	0.0009
F/F30%	0.51	0.46	0.59	0.68	0.78	0.96	0.68	0.13
MSST30%	373.69	272.38	308.14	329.60	352.45	401.62	331.48	32.4
SSB/MSST30%	4.71	3.08	3.62	3.85	4.08	4.59	3.86	0.38

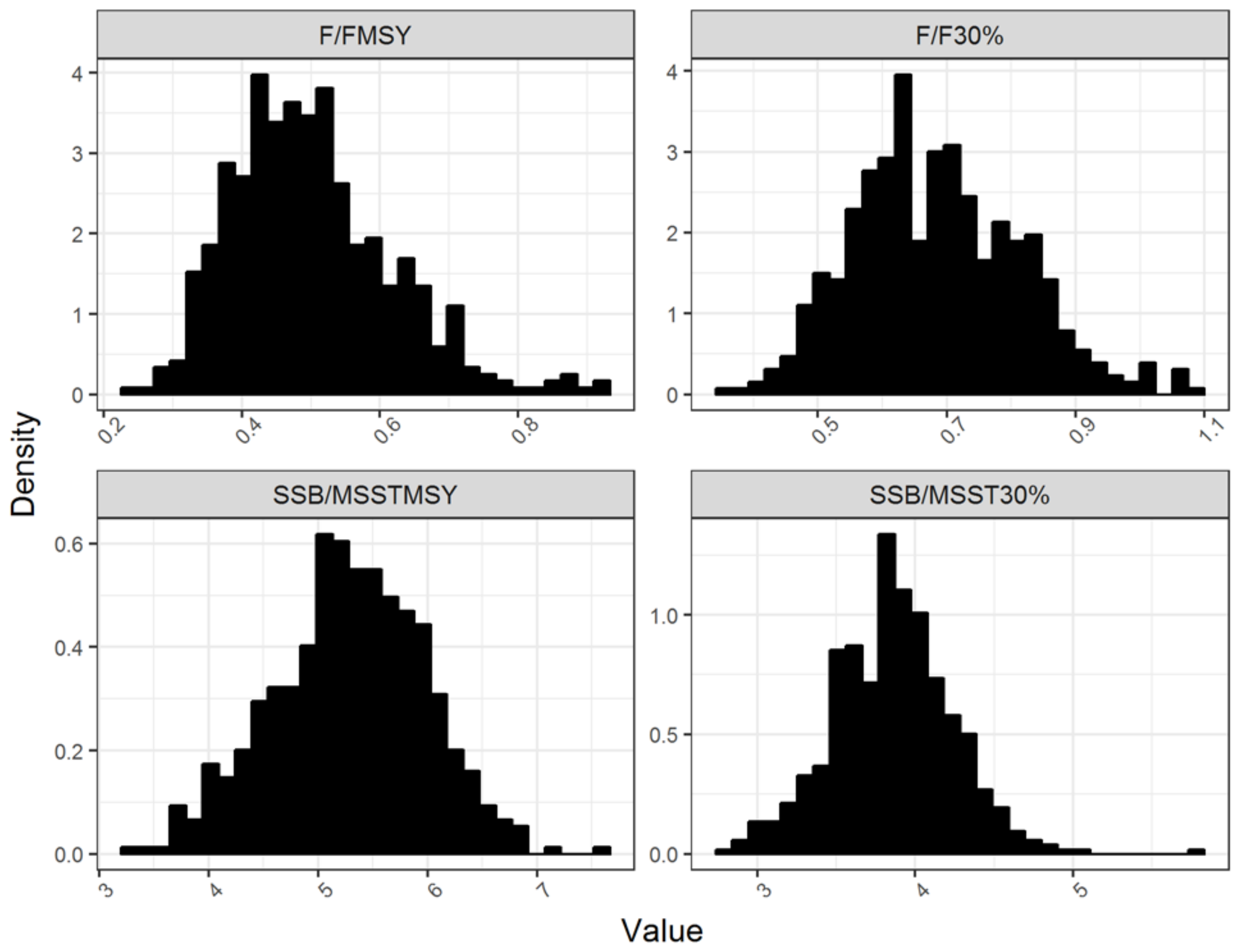
Figures



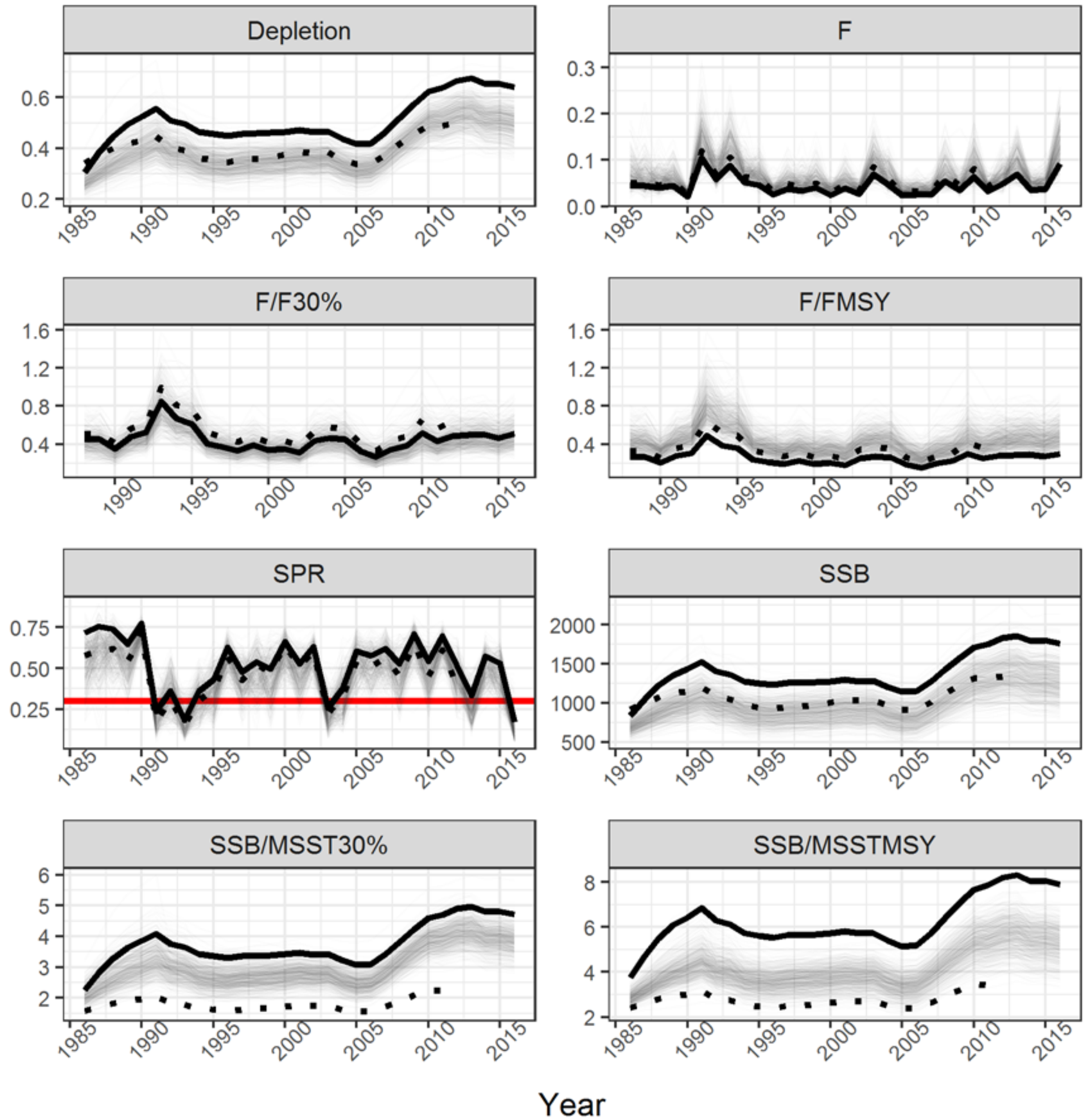
ADDENDUM: Figure 3.2.1.7.1. Total negative log-likelihood, stock-recruitment parameters, derived quantities, and stock-status reference points (current F/F_{MSY}, SSB/SSB_{MSST}, and SPR) from the jitter analysis to test for model convergence in the WFL stock continuity model.



ADDENDUM Figure 3.2.1.8.1.2. Density plots for biological reference points from the bootstrap analysis to test for model uncertainty in the WFL stock continuity model. Two alternatives are presented for maximum fishing mortality thresholds (MFMT: F_{MSY}, $F_{30\%}$) and their corresponding minimum stock size thresholds (MSST), calculated as (0.5)*$SSB_{REFERENCE}$ ($SSB_{REFERENCE}$: SSB_{MSY}, $SSB_{30\%}$).



ADDENDUM: Figure 3.2.1.8.1.3. Density plots for stock status from the bootstrap analysis to test for model uncertainty in the WFL stock continuity model. Two alternatives are presented with maximum fishing mortality thresholds (MFMT: F_{MSY}, $F_{30\%}$) relative to the geometric mean of the most recent three years (2014-2016), and their corresponding minimum stock size thresholds (MSST), calculated as (0.5)*$SSB_{REFERENCE}$ ($SSB_{REFERENCE}$: SSB_{MSY}, $SSB_{30\%}$).



ADDENDUM: Figure 3.2.1.8.1.4. Time-series of derived quantities and stock status for the WFL stock continuity model run (solid black lines), SEDAR 37 benchmark assessment (dotted black lines), and the 500 bootstrap iterations. NOTE: In SEDAR 37, SSB/MMST30% and SSB/MSSTMSY were calculated using MSST = 1-M_{target}*$SSB_{REFERENCE}$ ($SSB_{REFERENCE}$: SSB_{MSY}, $SSB_{30\%}$), M_{target} = 0.179.