SEDAR 9 Update Stock Assessment Report

Gulf of Mexico Gray Triggerfish

December 2011

Gulf of Mexico Fishery Management Council
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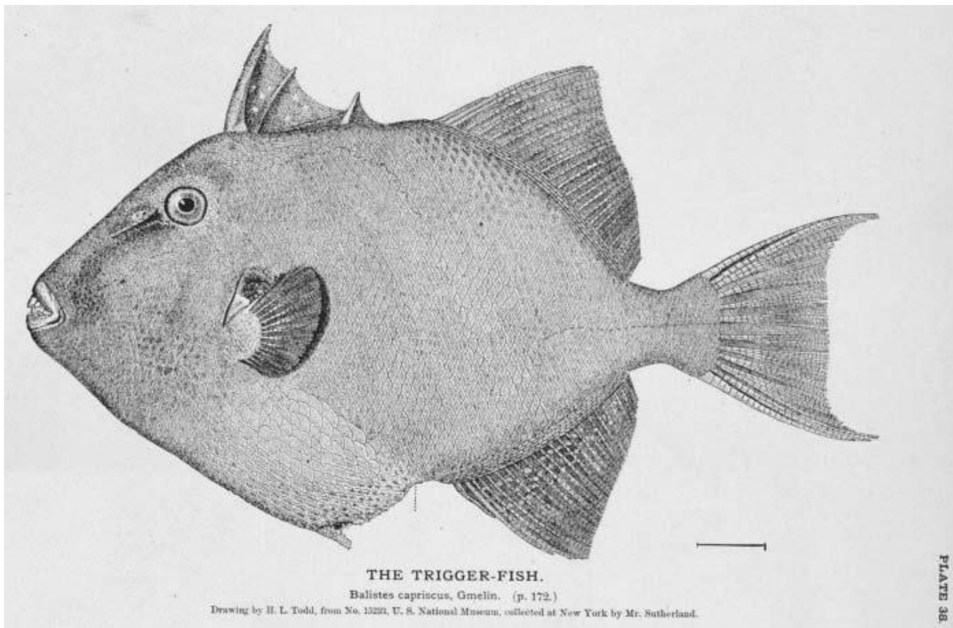
SEDAR 9 Update Stock Assessment Report

Section I:

2011 SEDAR 9 Update Assessment Report for Gray Triggerfish

Final Draft: March 21, 2012

Stock Assessment of Gray Triggerfish in the Gulf of Mexico: SEDAR Update Assessment



Miami, Florida

December, 2011

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1 EXECUTIVE SUMMARY

A SEDAR Update Assessment (UA) was conducted from June - December, 2011 by NMFS Southeast Fisheries Science Center (SEFSC) analysts. The objective of the UA was to update the 2006 SEDAR-9 benchmark assessment of gray triggerfish (*Balistes capriscus*) within US waters of the Gulf of Mexico.[1] Commercial and recreational fisheries statistical data, in addition to fishery independent data were updated through 2010. Any changes in the data since the last benchmark assessment (SEDAR 9) are noted in the text. Fishery dependent and independent indices of abundance were constructed with the updated data using the same methodology as in the last benchmark assessment. The same statistical catch at age model (SSASPM) that was used in SEDAR 9 was applied to the update assessment. Three scenarios were explored using SSASPM: a continuity model that was configured identical to the base model used in SEDAR 9, an update model that used a new age-length key and new von Bertalanffy growth function both derived from updated age-length data, and a final model that used an average (rather than time varying) shrimp bycatch and incorporated an index of Gulfwide shrimp effort, in addition to using the updated age-length key and von Bertalanffy growth function. Results from these three scenarios suggest that the stock is overfished and experiencing overfishing. Projection scenarios were explored for each of these three scenarios using Pro-2box Projection Software. For each SSASPM scenario, three projection scenarios were explored: where the catch in 2011 equals the total allowable catch (TAC) in 2011, where the effort in 2011 equals the effort in 2010, and where the catch in 2011 equals the average of the catch from 2007 through 2009. Within each of these projection scenarios, three sub-scenarios were examined: one where the fishing effort is set to the effort at SPR 30, one where the fishing effort is set to the effort at 75% SPR 30, and one where the fishing effort equals zero. Finally, projections were also run for each SSASPM scenario to determine what the TAC would have to be set at to rebuild the stock in ten years.

1.1 TERMS OF REFERENCE

On March 23, 2011, the Gulf of Mexico Fisheries Management Council (GMFMC) established the terms of reference for this UA. This assessment is intended to update those population status measures approved for the previous benchmark assessment and to provide overfishing limit (OFL) and a range of allowable biological catch (ABC) recommendations in compliance with annual catch limit (ACL) guidelines. A specific ABC recommendation will be the responsibility of the GMFMC Science and Statistical Committee (SSC), in compliance with Section 302 of the Magnuson-Stevens Act. Specific terms of reference are as follows:

[1] http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=09

1. Evaluate any relevant data and parameters to be included into the stock assessment model. This evaluation should be conducted with all relevant scientific input.
2. Update the approved SEDAR 9 gray triggerfish model base case, age-structured production model (SSASPM), with data through 2010.
3. Document any changes or corrections made to input datasets and tabulate complete updated input datasets. Provide tables of commercial and recreational landings and discards in pounds, both gutted and whole weight. Clarify units of measurement in all tables.
4. Provide complete updated tables of model parameter estimates and variances, as well as citations for model equations.
5. Update measures of uncertainty and provide representative measures of precision for stock parameter estimates.
6. Update estimates of stock status and SFA parameters; provide declarations of stock status relative to current SFA criteria.
7. Specify an OFL for each model run presented for review.
8. Evaluate future stock status for 2012-2017 according to the specifications in Table 2. Assume that any management changes will begin in 2012. Note that under the rebuilding plan, the gray triggerfish stock is required to be rebuilt (to the SSB_{MSY} level) by 2017.
9. Review the research and data recommendations from the previous assessment, note any which have been completed, and make any necessary additions or clarifications.
10. Develop a stock assessment workshop report to fully document the input data, methods, and results of the stock assessment update.

Table 1. Required SFA and MSRA Evaluations based on the new base model recommended by the Gulf Council's Science and Statistical Committee. Note: tr eggs = trillion eggs, ww=whole weight pounds.

Criteria	Definition	Current Value
Mortality Rate Criteria		
$F_{MSY\ proxy}$	$F_{30\%\ SPR}$	0.34
MFMT	F_{MSY} proxy	0.34

$F_{OY\ proxy}$	75% of $F_{30\%\ SPR}$	0.25
$F_{CURRENT}$	2010	0.35
$F_{CURRENT}$/MFMT	30% SPR	1.04
Base M		0.27
Biomass Criteria		
$SSB_{MSY\ proxy}$	Equil. egg production @ $F_{30\%\ SPR}$	1.78 x 10^{12} eggs
MSST	(1-M)*$SSB_{30\%\ SPR}$:M=0.27	1.30 x 10^{12} eggs
$SSB_{CURRENT\ (2010)}$	2010	6.90 x 10^{11} eggs
$SSB_{CURRENT}$/$SSB_{MSY\ proxy}$		0.39
$SSB_{CURRENT}$/MSST		0.53
Equilibrium MSY	Equilibrium Yield @ $F_{30\%\ SPR}$	984,410 pounds whole weight
Equilibrium OY	Equil. Yield @ 75% * $F_{30\%\ SPR}$	916,400 pounds whole weight
OFL	Annual Yield @ F_{MFMT}	
	2012	401,600
	2013	429,300
	2014	449,300
	2015	463,600
	2016	473,400
	2017	480,100
Annual OY	Annual Yield @ F_{OY}	
	2012	305,300
	2013	348,000
	2014	383,900

	2015	412,400
	2016	433,900
	2017	449,700
Generation Time		12.9 years
Rebuild Time	at F=0	3.03 years
Rebuild Time	at F_{MFMT}	6.25 years
Rebuild Time	at F_{OY}	5.04 years
TAC with Rebuild Time = 10 years		608,586 pounds whole weight

Table 2. Projection Scenario Details

Initial Assumptions

OPTION	**Value**
2011 base TAC	731,000 ww
Projection Period	6 yrs (2012-2017)
1^{st} year of change F, Yield	2012 (annual, or 3-year interval yields)

Note: Base total allowable catch (TAC) for 2011 source is Table 2.2.1 Amendment 30A. Management measures used moving averages for setting annual catch limits.

Scenarios to Evaluate (preliminary, to be modified as appropriate)
1. Landings fixed at 2012 target.
2. F_{OY}= 75% $_{FMSY}$ (project when OY will be achieved)
3. $F_{REBUILD}$ (if necessary)
4. F=0 (if necessary)
Output values
1. Landings
2. Discard

	3. Exploitation
	4. F/F_{MSY}
	5. B/B_{MSY}

1.2 Update Assessment Participants

Analytical Team

Jeff Isely, Team Lead Analyst.. SEFSC
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Assessment Reviewers

Clay Porch.. SEFSC
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Michael Schirripa……………………………………………………………………………… SEFSC

1.3 List of Update Workshop Working Papers & Documents

Document #	Title	Authors
Documents Prepared for the Update Assessment		
SEDAR-UPDATE-01	Updated Fishery-Dependent Indices of Abundance for Gulf of Mexico Gray Triggerfish	Jeff Isely Steve Saul
SEDAR-UPDATE-02	Summary of gray triggerfish age data from the northeastern Gulf of Mexico	Robert Alman
SEDAR-UPDATE-03	Recreational Survey Data for Gray Triggerfish in the Gulf of Mexico	Vivian Matter
SEDAR-UPDATE-04	Commercial Landings Data for Gray Triggerfish in the Gulf of Mexico	Rafik Orhun

SEDAR-UPDATE-05	Estimates of gray triggerfish as bycatch in the Gulf of Mexico Shrimp Fishery	Brian Linton
SEDAR-UPDATE-06	Statistical Catch-at-Age Model Input and Parameterization for the Gulf of Mexico Gray Triggerfish (Balistes Capriscus) Stock	Jeff Isely Steve Saul
SEDAR-UPDATE-07	Rebuilding Projections for the Gulf of Mexico Gray Triggerfish (Balistes capriscus) Stock	Steve Saul Jeff Isely

2 Background Information

2.1 Regulatory history

Effective Date	**Regulations**
November, 1984	- Reef Fish FMP - Prohibition on roller trawls and fish traps
November 24, 1999	- 12 inch TL minimum size limit - included in the 20-fish aggregate bag limit of reef fish
August 4, 2008	-Established ACLs and AMs using average annual recreational landings adjusted for commercial landings - Increased minimum size limit to 14 inches FL - established commercial quota of 80,000 pounds for 2008, 93,000 for 2009, and 106,000 pounds for 2010

3 Life History

3.1 Management Unit

Gray triggerfish is the only Balistid of 31 species of reef fish in the management unit for the Gulf of Mexico Reef Fish FMP. The jurisdiction of the GMFMC Reef Fish FMP includes all waters of the GOM bounded outside by 200 nautical miles (nm) and inside by state territorial waters within 3 nm of Alabama, Mississippi and Louisiana, and 3 leagues (~9 nm) of Florida and Texas.

3.2 Natural mortality

Additional age information collected during 2002-2010 supported the conclusion that the maximum age of gray triggerfish in the Gulf of Mexico is 16 years. Therefore, we used the natural mortality estimate (M) developed for Gulf of Mexico gray triggerfish during the 2006 benchmark assessment (M=0.27).

3.3 Age and growth

SEDAR 9 source documents provide detailed descriptions of gray triggerfish growth information used in the SEDAR 9 benchmark assessment. These same data were used in the continuity model. However, the SEDAR 9 Panel determined that aging techniques varied between data sources and recommended that the age at size relationship be re-estimated using ages determined from a single laboratory using the best available technique. Since then, the NMFS Panama City laboratory has refined the procedure for aging of gray triggerfish from their dorsal spines. Consequently, for the two alternative model configurations considered, the SEDAR 9 gray triggerfish age dataset (1992-2001, n = 2,762, Figure 3.1) was replaced with 2,565 gray triggerfish ages determined from spines by the Panama City Laboratory. Consistent with the 2006 SEDAR 9 benchmark assessment, a single von Bertalanffy growth model was derived using the new Panama City database by combining observations across area and sex strata (Figure 3.2). No additional data were used in the development of the growth model. Therefore, caution should be used when projecting size at age outside of the range in ages used in this assessment.

Catch-at-age frequencies were derived by applying age length keys to the catch-at-size. Commercial size distribution data were collected through the NMFS, SEFSC Trip Interview Program (TIP) while recreational size distributions were available through the Marine Recreational Fisheries Statistics Survey (MRFSS), NMFS Beaufort Laboratory Headboat Survey (HBS), and Texas Parks and Wildlife (TPWD) programs. Recorded data included the direct measurement of samples from catches from both commercial and recreational fisheries in the eastern and western Gulf. The resulting size distributions were converted to ages using two approaches. The first approach used the age-length key that was derived for SEDAR 9 (Table 3.1a), while the second approach used an age-length key derived using the new age database developed by the NMFS SEFSC Panama City laboratory (Table 3.1b). The age-length key developed using the new age database places substantially more fish into younger age classes and, in comparison to the age length key from SEDAR 9, does not allow larger fish to be assigned younger ages.

During SEDAR 9, the age-length key was applied to lengths that were smoothed using a categorical model (Agresti 2002) where a multinomial function was used to estimate the probability that a particular fish could occur within any of the defined cohorts (ages 1 to 10+) rather than stating with absolute certainty that the fish belonged to one given cohort. This allowed for estimation of variability for each estimate of frequency of individuals within a given cohort (Saul and Ingram 2007). This approach was used because the ageing data that was available for SEDAR 9 at the time showed highly variable correlation between length and age, where a given length could be assigned to multiple age classes. This variability existed generally across individuals sampled throughout the Gulf of Mexico, as well as spatially from one region of the Gulf of Mexico to another (Saul and Ingram 2007). Due to the research recommendations that resulted from these findings, the collection of additional hard parts and revision of ageing procedures for gray triggerfish by the Panama City NMFS lab have led to the compilation of an updated data set which was used to develop the new age-length key and growth function. In comparison to the age-length relationship developed from the data used in SEDAR 9, the age-length relationship developed using this new data set showed a much tighter relationship. As a result, when aging the catch for the two additional model configurations that were run besides the continuity model, the categorical model was not applied to the length data.

3.4 Reproductive biology

Gray triggerfish reproductive parameters used in the 2006 benchmark assessment were applied for the 2011 gray triggerfish assessment update.

3.5 Stock Definition

The 2006 SEDAR 9 benchmark assessment was conducted under the assumption that gray triggerfish exhibit homogeneous stock structure within the Gulf of Mexico. Perceived temporal and spatial differences in growth and mortality were thought to be the result of differences in exploitation and/or habitat characteristics, rather than due to any genetic differences. SEDAR 9 assumed the prolonged pelagic phase and the potential of wide dispersal likely contributes to the maintenance of a homogeneous stock structure. Studies are currently underway evaluating spatial genetic patterns.

4 COMMERCIAL FISHERIES

4.1 COMMERCIAL LANDINGS

Commercial landings statistics were available since 1962 from the NMFS SEFSC Statistics Division Accumulated Landings System (ALS). Historic data from the ALS used in the 2006 benchmark assessment were updated and data since 2006 were added (Table 4.1 and Figure 4.1). For landings from 1990-2010, gear and statistical area were assigned from fisher self-reported logbooks by year and state. The eastern and western regions were separated at approximately the Mississippi River. The eastern region included NMFS SEFSC statistical shrimp areas 1 - 12 and the western region including areas 13 - 21. Handline included electric reel (bandit rig), manual reel and manual handline. Substantive changes to the landings data since the previous 2006 benchmark evaluation include the addition of 20,810 lbs. in 1992 and 6,419 lbs. in 1999 in west Florida that had been previously misclassified. Other changes included the small reduction of catches in 2002-2004.

4.2 SHRIMP FISHERY BYCATCH

Gray triggerfish are caught incidental to the offshore shrimp fishery. Shrimp fishery bycatch of gray triggerfish was estimated with the same Bayesian model as was used in the SEDAR 9 assessment (SEDAR 2006). As done in the SEDAR 9 assessment, the median value of shrimp bycatch each year was used from the Bayesian analysis as it was thought to provide the best estimate of central tendency. Comparison of SEDAR 9 estimated shrimp bycatch with the values estimated for the update assessment found that the earlier years of the time series matched well, however there were differences in the most recent years (Table 4.2, Figure 4.2). These inconsistencies are likely due to the issues that SEDAR 9 identified with applying this Bayesian technique to these datasets. Specifically, for gray triggerfish, shrimp observer data were reported to be sparse, unbalanced, and non-random, which was thought to have contributed to the poor estimation consistency and high variance (Figure 4.2 SEDAR 9-DW-26). Despite this, the interannual gray triggerfish shrimp bycatch results in SEDAR 9 were considered to be the best information available and were used in the final base model, and thus also used in the update assessment continuity model.

Shrimp trawls catch both zero and one year old fish, which can be difficult to distinguish without direct aging. The SEDAR 9 stock assessment panel, however decided to set up the SSASPM stock assessment model to represent ages one through ten, where age ten is a plus group. The SEDAR 9 assessment analysts produced a catch series for age one equivalents by separating the total shrimp bycatch into age zero and age one fractions using an estimated total mortality of two for these age classes. This method of separating age zero from age one individuals in the shrimp bycatch was used for the continuity run, however it did not perform well when the fluctuations in bycatch are extremely large from one year to the next. This was particularly evident during the last three years of the time series when the overall shrimp bycatch was estimated at 14.28 million fish in 2008 and 1.3 million fish in 2009, in which case the method failed to estimate a positive number of age one bycatch in 2010 (Table 4.3). Accordingly, for the runs that included the new age-length key, the fraction of age one individuals in the shrimp bycatch was determined from the empirical shrimp bycatch numbers at size data by applying the von bertalanffy growth function to the sizes of the measured observations in the observer data to determine age. The fraction of age one fish in the total bycatch was calculated using this constant fraction each year (there were insufficient samples to determine annual fractions). Comparison of these approaches to estimating shrimp bycatch show that they each lead to different estimates (Table 4.3, Figure 4.2).

The continuity run and its equivalent with the new age-length key were fitted to the time series of annual bycatch estimates however, as SEDAR 9 pointed out, these annual values are highly uncertain. It was suggested to use the overall median bycatch for each year, which is far less uncertain. However, it would not be appropriate to simply input the same median value for all years, particularly given the observation that offshore shrimp effort has declined considerably over the last few years. As a result, a third alternative run was made using an alternative formulation of SSASPM that computes the predicted average bycatch level and compares it to the input value. In that case, the negative loglikelihood term for the bycatch changes from:

$$\sum_{y}^{Y} \frac{1}{2\sigma_y^2}\left(C_{input} - \hat{C}_y\right)^2 + log\sigma_y^2$$

to:

$$\frac{1}{2\sigma^2}\left(C_{input} - \frac{1}{Y}\sum_{y} \hat{C}_y\right)^2 + \ log\sigma^2$$

where C_{input} is the observed average (median if a lognormal error is assumed) bycatch level input into the model, $\hat{C}_y$ is the value of bycatch predicted by the model for each year *y*, σ^2 represents the variance term, and Y is the total number of years over which C_{input} was computed. In the projections, although shrimp fishery bycatch of gray triggerfish was included in the total removals, it was not counted as landings for the purposes of setting the TAC.

4.3 Shrimp Fishing Effort

For the 2011 UA, estimates of shrimp fishing effort (days, >10 fathoms) were provided by the NMFS SEFSC Galveston Laboratory (Table 4.4, Figure 4.3). Effort data were provided by region (Eastern and Western Gulf of Mexico) and for the entire Gulf of Mexico. For the final configuration of the assessment model, the analysts explored whether to incorporate shrimp effort from the Eastern Gulf, Western Gulf, or entire Gulf in the stock assessment model. In order to determine which region's shrimp effort to include in the final scenario, shrimp bycatch catch per unit effort was estimated for gray triggerfish and a t-test was used to determine if there was a statistical difference in CPUE between the Western and Eastern Gulf of Mexico. Results found that there was no statistically significant difference between the relative abundance of gray triggerfish bycatch between the Eastern and Western Gulf of Mexico (t-test, p=0.9124). As a result, the Gulfwide shrimp effort series was used in the last configuration of the assessment model and values were standardized to the mean of the series. Coefficients of variation were also estimated and incorporated. This effort series was not included in the previous SEDAR-9 benchmark evaluation and thus, was not included in the continuity run or the run that incorporates the new age-length key and growth function.

4.4 Commercial Size composition

The size composition of the commercial catch was estimated from the size structure of commercial samples stratified by year, season, gear and area using methods applied in the previous 2006 SEDAR-9 benchmark assessment. For details of this procedure, please refer to SEDAR 9 documents.

4.5 Commercial Discards

Consistent with the previous SEDAR 9 benchmark assessment, discards from commercial and recreational fleets were ignored because of the extremely low release mortality of gray triggerfish.

5 Recreational fisheries

5.1 Overview of components

Estimates of recreational retained catch (A+B1) and discards (B2) were available for the Gulf of Mexico from MRFSS since 1981 and from the Headboat survey since 1986. Texas Parks and Wildlife Division (TPWD) provided estimates of recreational landings in Texas. Headboat landings from the Florida Keys and Atlantic-based trips to the Dry Tortugas (areas 12 and 17) were not included in the Gulf of Mexico analysis. Ratios of discards to retained catch for the Headboat fishery are based on the ratios of discards from the MRFSS estimates. The size composition of the A+B1 retained catch was determined from size samples collected by MRFSS and other sources. Very limited size data have been collected on discarded fish from recreational fisheries. As determined during SEDAR 9, due to the low mortality of discarded gray triggerfish, discards were not included in the recreational catch.

5.2 Catch estimates

5.2.1 MRFSS

MRFSS recreational landings estimates did not vary between the previous SEDAR-9 benchmark and the UA (Table 5.1 and Figure 5.1).

5.2.2 Headboat Survey

Recreational landing estimates in the headboat sector did not vary between the previous SEDAR-9 benchmark and the UA (Table 5.2 and Figure 5.1) with the exception of the 1990 landings in the eastern Gulf of Mexico. The discrepancy in 1990 landings is due to an update in the database.

5.2.3 Texas

Differences between the update assessment values and those included in SEDAR 9 are because when SEDAR 9 occurred, data were not reconciled between the Headboat Survey and Texas Survey headboat mode. In addition, since SEDAR 9, Texas re-estimated their recreational landings over the catch history. Therefore, Texas recreational landings for the current update assessment represent a replacement of the Texas landings from the previous assessment (Table 5.3 and Figure 5.1)

6 Indices of abundance

All of the fishery-dependent and fishery-independent indices of abundance used in the SEDAR-9 base model were extended through 2010 for this update assessment. Eight indices of abundance were available for the SSASPM model. Five fishery-dependent indices were based on MRFSS data from the eastern Gulf of Mexico (western Gulf data were deemed insufficient), headboat data from the eastern and western Gulf of Mexico, and commercial logbook reports for handline gear from the eastern and western Gulf of Mexico (Table 6.1 and Figure 6.1). These indices are discussed in greater detail elsewhere (Sladek-Nowlis, SEDAR-9-AW07). Three fishery-independent indices were also used without respect to region. These included the NMFS SEAMAP Neuston net survey, bottom trawl survey, and video survey (Table 6.2 and Figure 6.1)

In the previous 2006 benchmark and the 2011 update assessments, commercial trips included in index calculations were selected based on the multispecies approach described by Stephens and MacCall (2004). However, this approach was not deemed suitable for recreational indexes due to inherent variability in recreational data. Therefore, in the 2006 benchmark assessment, only positive trips were used in recreational index development. In the update assessment, we developed a CPUE index for the recreational fisheries using a guild approach that selects trips based on the catch composition containing species that belong to the reef fish assemblage, as is now the accepted treatment for developing standardized CPUE indices for the recreational sectors. Consequently, we note minor differences in the recreational abundance indices between the SEDAR 9 benchmark assessment and this update assessment. This is particularly evident in the headboat index for the eastern Gulf of Mexico (Figure 6.1).

In the previous 2006 SEDAR 9 benchmark assessment, the analysts were unable to detect an effect of the 12-inch total length size limit on the length frequency distribution of the commercial catch. As a result, continuous commercial indices were estimated using the logbook data between 1993 and 2004. In 2008, the size limit was changed from 12 in TL to 14 in FL. We used a chi-squared test to evaluate whether there was an effect of the size limit change on the length frequency distributions of commercial fish caught (Figure 6.2). We determined the proportion of fish less than 14 in FL in the commercial catch decreased after the size limit was enacted (chi-squared = 41.0143, df=1, p-value < 0.001). We, therefore, included a variable in the index to account for this regulatory effect.

7 Stock assessment method

7.1. Model structure

As in the previous SEDAR 9 Benchmark Assessment, a statistical catch at age model (SSASPM) was used to evaluate the status of the Gulf of Mexico gray triggerfish stock. Structural and data choices for the base model used in the benchmark assessment are summarized in SEDAR-9-AW2-09. Input parameter choices were consistent with the benchmark assessment or were specified in the terms of reference. The update assessment extended the time period used in the benchmark assessment (1963-2004) through 2010. Management scenarios were projected through 2017 using Pro-2Box (Porch 2002). Pro-2Box was configured to produce biological reference points consistent with SSASPM results prior to model runs.

The time series for model implementation begins in 1963, at which point the stock was assumed to be unfished. The prehistoric period lasted through 1980. The historic period ranged from 1981 to 2010. As in the 2006 SEDAR-9 benchmark assessment, recreational and commercial directed fleets were input into the model separately as eastern and western Gulf of Mexico components, and bycatch in the shrimp fleet was input combined across eastern and western Gulf of Mexico components. The stock was modeled using 10 age classes spanning from ages 1 to 10+ years. The base model assumed a number of constraints and weightings that reflected the advice and input of the 2006 SEDAR-9 Assessment Review Panel. Data series were weighted using the same CV multipliers that were used in the previous SEDAR-9 benchmark assessment.

7.2 Model configurations

A continuity run and two alternative model configurations were developed as described below:

1) Continuity Run – Used the exact model parameter configuration, data treatment and data preparation as in the 2006 Benchmark Assessment, including using the original age-length key, growth function, recreational catch in weight, and annually estimated bycatch from the shrimp fishery. This is the strictest case of an update stock assessment with no change to the model, parameters, or data sources.
2) New Age-Length Key and Growth Curve – Used the exact configuration as in the Benchmark Assessment, except for the use of the new age-length key and von Bertalanffy growth function, which were based on the most recent Panama City gray triggerfish age data. In addition, shrimp bycatch values do not match those from the continuity run because a different method was used to determine the fraction of age one fish in the shrimp bycatch (see previous section on shrimp bycatch).
3) Gulfwide Shrimp Effort – This model also incorporated the new age-length key and growth curve, as done above with the recreational landings input in numbers as originally provided by MRFSS and the Headboat Survey. The shrimp bycatch was entered as the median of the shrimp bycatch series adjusted by the fraction of age one individuals in the catch. Finally, shrimp effort for the entire Gulf of Mexico was incorporated as an effort series.

The continuity run was intended to update the 2006 base run of gray triggerfish by simply adding additional years of observations to the benchmark base model configuration. The second model configuration (new age-length key and growth curve) is similar to the continuity run, but also incorporates the results of new studies on age and growth. Due to the numerous sources of data that went into the development of the former age-length key, SEDAR-9 recommended that the age and growth of gray triggerfish be reexamined using data from a single experienced laboratory. This recommendation resulted in a new dataset which was used to create the new age-length key and growth curve used in this and the next model configurations.

The final scenario (Gulfwide shrimp effort) includes the new age and growth work as well as an alternative way to model the bycatch of gray triggerfish from the offshore shrimp fishery that uses as inputs the overall median bycatch and the annual trends in Gulfwide offshore shrimp effort (see section 4.2). In addition, the recreational catches in numbers are fitted directly, rather than first converting those numbers to weight as was done in SEDAR 9. Incorporating the catch in numbers, which is the form in which the data is originally collected, avoids incorporating additional uncertainty into the assessment associated with computing average weights from MRFSS.

7.3 Model Input Parameters

The SSASPM model, as structured, included 45 process and observation error parameters. A number of life history parameters were treated as fixed and were previously defined in SEDAR 9. Estimates for these parameters were determined outside of the model either through previous research or through expert opinion. Parameters included:

- 1 natural mortality parameter (fixed)
- 2 Beverton and Holt S/R parameters (estimated)
- 4 von Bertalanffy/Richards growth parameters (fixed)
- 2 weight-length equation parameters (fixed)
- 5 fleet-specific 'catchability' parameters (fixed, not needed without effort data inputs)
- 8 index-specific catchability parameters (estimated)
- 5 fleet-specific effort parameters for the prehistoric period (linear interpolation from zero in 1963) where the recreational and shrimp bycatch fleets are fixed and the commercial fleets are estimated since commercial landings data go back to 1963
- 5 fleet-specific effort scale parameters for the period with useful data (estimated)
- 8 selectivity parameters for each of the fishery dependent and fishery independent indices of abundance. Recreational, commercial, larval, and video series using a logistic assumption, while shrimp bycatch and trawl used a double logistic assumption. The shrimp bycatch, larval, trawl and video series were fixed, while the recreational and commercial series were estimated.
- 2 catch observation error variance scalars, one for the shrimp bycatch and one for all other fleets (fixed)
- 1 index observation error variance scalar (fixed)
- 1 effort observation error variance scalar (fixed)
- 1 overall variance parameter (estimated)

In addition, there are annual process deviation parameters to allow for annual variations in recruitment and effort. To facilitate this description, the parameter input files for the three SSASPM model scenarios are included in the appendix of this document. For each estimated parameter, this table contains the initial estimates and parameter constraints (or priors). Those life history parameters that were treated as fixed were previously defined in SEDAR 9.

Estimates for these parameters were determined outside of the model either through previous research or through expert opinion.

- Maturity: 87.5% of 1-year olds and 100% of other age classes were assumed to be mature
- $Fecundity = 170289e^{0.3159*Age}$
- M = 0.27 for all modeled age classes
- $W(lbs.) = (4.4858 * 10^{-8}) * FL^{3.0203}$, where FL = fork length in mm.
- Continuity Model Growth Relationship: $FL(mm) = 423.4(1 - e^{-0.4269(t+0.6292)})$, where t is age in years
- Update and Value Added Models Growth Relationship: $FL(mm) = 904.9(1 - e^{-0.0742(t+2.3833)})$, where t is age in years

The variance of the parameter estimates were derived using an asymptotic variance-covariance matrix obtained from the inverse of the Hessian matrix.

7.4. Projections

Projections were made using PRO-2BOX (Porch, 2002b) in accordance with the terms of reference. Projections were run through 2017, beginning in 2012. Future selectivity was set equal to the 2010 selectivity vector. For each SSASPM scenario, three projection scenarios were explored: where the catch in 2011 equals the TAC in 2011 where the effort in 2011 equals the effort in 2010, and where the catch in 2011 equals the average of the catch from 2007 through 2009. This was done because total catch in 2011 is not yet known and updated management measures for this species cannot commence until 2012. The third scenario, where the catch in 2011 equals the average of the catch from 2007 through 2009, did not include the year 2010 because of the potential affect in catch due to the Deepwater Horizon Oil Spill Event and associated fishing area closures. Within each of these projection scenarios, three sub-scenarios were examined: one where the fishing effort is set to the effort at SPR 30, one where the fishing effort is set to the effort at 75% SPR 30, and one where the fishing effort equals zero. Finally, projections were also run for each projection scenario (2011 catch equals TAC in 2010, 2011 effort equals effort in 2010, 2011 catch equals average catch 2007-2009) to determine what the TAC would have to be set at to rebuild the stock in ten years. Three sources of model uncertainty were carried into the projections: the variance in fishing mortality at age in the terminal year, the variance in numbers at age in the terminal year, and the variance in future recruitment (SD=0.4, no autocorrelation). Probability density functions (PDF) were created from 500 bootstrap projections from the proportion of the 500 bootstraps for which $F>F_{MSY}$ for the years 2012-2017. The probability of overfishing was calculated for each of the three projection scenarios.

8 UPDATE ASSESSMENT RESULTS

8.1 DEFINITIONS

Current stock status is defined in terms of SSB in 2010. The maximum fishing mortality threshold (MFMT) is defined as $F_{30\%}$, and the minimum stock size threshold (MSST) is defined by the Council as (1-M)*$SSB_{30\%}$. Overfishing is defined as F > MFMT, and overfished as SSB < MSST.

8.2 BIOLOGICAL REFERENCE POINT ESTIMATION METHODS

Management reference points and sensitivities for the three model configurations were obtained with the PRO-2BOX projection software using the SSASPM-estimated Beverton-Holt stock recruitment relationship (See appendices for model input and output). Details of the calculation of these benchmarks are provided in the PRO-2BOX reference manual (Porch 2002). All benchmarks were calculated based on the selectivity vector estimated in the last year of the assessment a single overall growth curve, and include shrimp bycatch and directed fishing mortality.

8.3 RESULTS OF THE STATISTICAL CATCH AT AGE MODEL

8.3.1 CONTINUITY MODEL

Results from the continuity model run are compared with the results from SEDAR 9 benchmark assessment base model. For the commercial catch series, fits were very similar to those observed during SEDAR 9 with no extreme deviations from the observed values (Figure 8.1). The recreational catches and corresponding model fits tended to be lower in magnitude than those from SEDAR 9. This is largely due to a revision in Texas recreational landings (see Table 5.3 and Figure 5.1) and, since recreational catch in weight was used for the continuity run, a change in the approach used to estimate catch in weight for the recreational landings by the Southeast Fisheries Science Center. The high variances associated with the observed shrimp bycatch allowed a poor fit to these catches however the model fits between SEDAR 9 and the continuity are very similar. Note that there are few data available prior to 1981, and therefore the period from 1963 to 1980 primarily serves to help estimate the population age structure at the beginning of the time when we have more data (starting in 1981). In general, model fits to the indices of abundance captured the overall trend of the index across the entire time series, however were not able to capture the more detailed fluctuations in abundance that occurred over time periods of three to five years (Figure 8.2). Catches at age for each year and fleet were well fit by the model (Figure 8.3). Fits to model selectivity by the continuity model were nearly identical to those used by SEDAR 9 because the same selectivity functional forms and starting values were used (Figure 8.4). Model estimates of spawning stock biomass and fishing mortality showed similar trends to those observed during SEDAR 9, however did not track exactly for those years that the continuity model and the SEDAR 9 base model overlap (1963 through 2004). The new years of data that the continuity model incorporates (2005 through 2010) show a continued decline in spawning stock biomass and a sharp increase in fishing mortality (Figure 8.5). In addition, recruitment in the recent years drops abruptly. These differences and in particular the sharp drop in recruitment are due to the fact that the shrimp bycatch declined substantially in the recent years. The model assumed virgin SSB condition in 1963 and predicted a drop to one-fourth virgin SSB in the mid-1980s. It then predicted an increase through the early 1990s, followed by a drop to the minimum stock size threshold by the late-1990s. The stock was predicted to have risen about 25% by 2002 and then to have dropped below threshold levels by 2005, and have continued to decline through 2010. These results indicate that the stock is overfished and experiencing overfishing.

8.3.1.1 Projections: Continuity Model

As requested in the terms of reference, benchmarks for mortality rate and biomass, in conjunction with overfishing limit and annual OY projections can be found in Table 8.1. From the three scenarios evaluated, the scenario where the 2011 catch equals the TAC in 2011 shows the slowest population growth, while the scenario where the 2011 effort equals the effort in 2010 shows the fastest population growth, with the scenario where the 2011 catch equals the average of the catch 2007-2009 showing a population growth rate between the two (Figure 8.6). Since the stock is overfished and experiencing overfishing, all projection scenarios requested in the terms of reference show an increase in population spawning stock biomass and yield. Detailed tabulated results that include uncertainty and show annually projected spawning stock biomass, fishing mortality, yield, and recruitment from these projection scenarios can be found in the appendix. Recovery periods under the no fishing scenario ranged from three to four years (Figure 8.7). By comparison, the previous SEDAR-9 predicted that the stock would recover in 2.5 years under a no fishing condition. Probability density functions for the overfishing limit (OFL) were constructed by projecting at $F=F_{SPR30}$ during the projection interval (Figure 8.8). These probability density functions can be used to produce allowable biological catch (ABC) advice using the GFMSC control rule. Total removals ranging from zero to 1.5 million pounds were considered. Coarse summary tables of these probability density functions can be found in the appendix. In addition, Microsoft Excel worksheets will be provided together with this report to the Gulf of Mexico Fisheries Management Council Science and Statistical Committee that can be used to automatically calculate the yield in pounds given a selected probability for each scenario.

8.3.2 New Age-Length Key Model Configuration

Results from the model that incorporated the new age-length key and growth curve were compared with the results from the continuity model in order to evaluate how the new age-length key and alternative way of estimating age one shrimp bycatch may have affected the status of the stock. The fits to the catch series were very similar to those in the continuity run (Figure 8.9). The shrimp bycatch fit was similar however smaller in magnitude and also did not show a decline in shrimp bycatch in the recent years. Similar to the continuity run, model fits to the indices of abundance captured the overall trend of the index across the entire time series, however were not able to capture the more detailed fluctuations in abundance that occurred over time periods of three to five years (Figure 8.10). Catches at age for each year and fleet were well fit by the model (Figure 8.11). Model estimates of spawning stock biomass were very similar to what was estimated by the continuity run, however the model estimated a higher fishing mortality in the more recent years (Figure 8.12). In addition, because the shrimp bycatch does not drop to nearly zero as in the continuity model, the estimated recruitment in this model run (new age-length key) doesn't decrease as sharply.

8.3.2.1 Projections: New Age-Length Key Model Configuration

As requested in the terms of reference, benchmarks for mortality rate and biomass, in conjunction with overfishing limit and annual OY projections can be found in Table 8.2. Detailed tabulated results that include uncertainty showing annually projected spawning stock biomass, fishing mortality, yield, and recruitment from these projection scenarios can be found in the appendix. Recovery periods under the no fishing scenario ranged from about five to seven years (Figure 8.14). In comparison, this is double the time of the continuity model due to the effect of the new age-length key and alternative way to estimate shrimp bycatch. Probability density functions for the overfishing limit (OFL) were constructed by projecting at $F=F_{SPR30}$ during the projection interval (Figure 8.15). These probability density functions can be used to produce allowable biological catch (ABC) advice using the GMFMC/SSC control rule. Total removals ranging from zero to 1.5 million pounds were considered. Coarse summary tables of these probability density functions can be found in the appendix. In addition, Microsoft Excel worksheets will be provided together with this report to the Gulf of Mexico Fisheries Management Council Science and Statistical Committee that can be used to automatically calculate the yield in pounds given a selected probability for each scenario.

8.3.3 Gulfwide Shrimp Effort and New Age-Length Key Model Configuration

Results from the model that incorporated the Gulfwide shrimp effort and average shrimp bycatch were compared to the previously discussed model that only incorporated the new age-length key and annual variation in shrimp bycatch in order to evaluate how the changes that were made in this model configuration may have affected the status of the stock. This model was configured identical to the previous one, except that it included Gulfwide shrimp effort, median shrimp bycatch, and recreational catches in number of fish instead of weight. The model fit the recreational catch in numbers about the same as it fit the recreational catch in weight with some slight differences in the historic period for which recreational catch information is not available (Figure 8.16). The commercial catches fit very closely to the previous model configuration. Finally, fits to average shrimp bycatch are now influenced by the inclusion of the Gulfwide shrimp effort and show a decline in shrimp bycatch in the recent portion of the time series, however unlike the continuity run, the shrimp bycatch doesn't unrealistically go to zero. Similar to both the continuity run and the new age-length key model configuration, fits to the indices of abundance captured the overall trend of the index across the entire time series, however were not able to capture the more detailed fluctuations in abundance that occurred over time periods of three to five years (Figure 8.17). Catches at age for each year and fleet were well fit by the model (Figure 8.18). Model estimates of spawning stock biomass were very similar to what was estimated by the continuity run, however different from the previous model configuration, the model with Gulfwide shrimp effort shows a decline in fishing effort over the last four years of the time series (Figure 8.19) commensurate with the decline in the shrimp effort over the last ten years of the time series. This is contrary to the other model configurations in which shrimp bycatch is estimated to increase throughout most of the time series and remains constant during the recent years with interannual fluctuations.

8.3.3.1 Projections: Gulfwide Shrimp Effort and New Age-Length Key Model Configuration

As requested in the terms of reference, benchmarks for mortality rate and biomass, in conjunction with overfishing limit and annual OY projections can be found in Table 8.3. Detailed tabulated results that include uncertainty showing annually projected spawning stock biomass, fishing mortality, yield, and recruitment from these projection scenarios can be found in the appendix. Similar to the continuity run, recovery periods under the no fishing scenario ranged from about three to four and a half years (Figure 8.21). Probability density function for the overfishing limit (OFL) were constructed by projecting at $F=F_{SPR30}$ during the projection interval (Figure 8.22). These probability density functions can be used to produce allowable biological catch (ABC) advice using the GFMSC control rule. Total removals ranging from zero to 1.5 million pounds were considered. Coarse summary tables of these probability density functions can be found in the appendix. In addition, Microsoft Excel worksheets will be provided together with this report to the Gulf of Mexico Fisheries Management Council Science and Statistical Committee that can be used to automatically calculate the yield in pounds given a selected probability for each scenario.

8.4 Benchmarks, Stock Status and Model Selection

Patterns were generally consistent between the SEDAR-9 Benchmark assessment and the three update assessment model configurations, but each model configuration produced slightly different biological reference points (Figure 8.23). The fishing mortality rate in 2010 was estimated at 0.53 for the continuity run and the run with the new age-length key, and 0.35 for the run that included shrimp effort. The previous benchmark stock assessment reported a fishing mortality rate of 0.435. Estimates of F_{MSY} ranged from 0.25-0.34 depending upon model configuration, but F_{2010} was always above $F_{30\%SPR}$ indicating that the stock is currently undergoing overfishing. SSB_{MSY} estimates ranged from 1.67 – 1.78 trillion eggs across the model configurations. Estimates of $SSB_{current}$ ranged from 0.402 – 0.690 trillion eggs, resulting in a $SSB_{current}/SSB_{MSY}$ ratio ranging from 0.24 – 0.39. Therefore, each model configuration indicated the stock is currently overfished. Although the stock was approaching an overfishing condition in 2005, the previous SEDAR-9 benchmark assessment determined that it was not yet overfished. Shortly after the SEDAR 9 benchmark assessment, the definition of overfishing for gray triggerfish was changed in Amendment 30A from F at 20% SPR to F at 30% SPR, and the MSST was defined for gray triggerfish. These changes made in Amendment 30A moved gray triggerfish to a status of being overfished and experiencing overfishing based on the results of the SEDAR 9 benchmark assessment. Consequently, a rebuilding plan was established in 2006 to rebuild the stock within 10 years.

Of the three models developed for gray triggerfish, the third model configuration, which includes Gulfwide shrimp effort, the median shrimp bycatch, and the updated age-length key and von Bertalanffy growth function, is preferable to the assessment panel. This third model contains the least amount of uncertainty because it (1) uses the median shrimp bycatch to scale the magnitude of the bycatch and the shrimp effort data to inform the trend in bycatch over time, (2) uses the new age-length data that was collected and aged based on the recommendations compiled during the last benchmark assessment, and (3) uses the recreational catches in numbers rather than weight, eliminating the uncertainty produced by estimating the weight of the catch.

9 Addendum: SSC Requested Analyses and Final Recommendations

The Standing and Special Reef Fish Scientific and Statistical Committees (SSC) of the Gulf of Mexico Fishery Management Council met from January 9 through January 11 in Tampa, Florida to review this update stock assessment and make recommendations to the Council. Upon their review, the SSC accepted the Gulf-wide shrimp effort alternative run as the best scientific information available to evaluate the stock status of Gulf Gray Triggerfish. The SSC favored the alternative run over the strict update (continuity run) because:

- The treatment of shrimp bycatch was more appropriate (the median shrimp bycatch was used to scale the magnitude of the bycatch and the shrimp effort to inform the trend in bycatch over time).
- New age-length data were collected and used to develop a new age-length key (as recommended during the last benchmark assessment.
- Recreational catches were in numbers rather than weight, eliminating the uncertainty produced by estimating the weight of the catch.

This addendum summarizes several additional analyses requested by the SSC to address two particular concerns: (a) the possible effects of the circle hook regulations that went into effect in 2008 and (b) the apparently low number of young fish entering the population in recent years.

9.1 Possible effect of circle hooks

The SSC discussed their concern about whether the effects of the new circle hook requirements were adequately accounted for in the stock assessment. It was noted that the use of circle hooks could have affected both the size and number of gray triggerfish caught, which in turn could bias the assessment if not accounted for by the model. No direct studies of the selection properties of circle hooks were available for gray triggerfish, therefore the SSC focused on a closer examination of the available fisheries data. Plots of the catch at age the year before (2007) and after (2009) circle hooks were implemented revealed little change in the age composition of the catch after circle hooks were implemented (Figure 9.1). Similarly, an inspection of the fishery catch per unit effort (CPUE) trends did not reveal any obvious impact of circle hooks. All of the CPUE series showed a general decline beginning several years before circle hooks were implemented. While some of the CPUE series showed a slightly more rapid rate of decline from 2008 to 2009, others did not. In the absence of a consistent signal, it is difficult to distinguish a small increase in the rate of the overall declining trend from fluctuations due to the normal observation errors associated with fishery dependent data.

9.2 Adjustments to Projections to Determine OFL, ABC and Rebuilding Schedules

The SSC requested that the estimates of the TAC that is required to rebuild the stock in ten years be adjusted to account for the starting point of the rebuilding plan, which was in 2008 (i.e., to compute the TAC that will rebuild the stock by 2018). This was done and the corresponding plots can be found in Figure 9.2.

The SSC discussed using the P-star approach to recommend an ABC, however they felt that there was too much uncertainty in the model to apply this method. Therefore, they decided to set the ABC at the level corresponding to the yield at 75% of the F_{MSY} proxy ($F_{SPR\ 30\%}$) – this is consistent with the approach used to set red snapper ABC. A summary table describing the final, SSC accepted benchmarks and projections can be found in Tables 9.1 and 9.2. In addition, Table 1 in the Terms of Reference section contains a summary of the management benchmarks and projection yield steams from the SSC recommended models.

The SSC noted that the recruitment of this stock had dropped to low levels and stayed rather low over the past several years. The projection scenarios, however assume future recruitment will fluctuate about the level predicted by the spawner-recruit relationship. As a result, the average number of recruits in the first few years of the projections is much higher than indicated by the last few years of data. Given the steady decline and consistently low levels of recruitment in the recent years, the SSC was concerned that future recruitment was unlikely to increase at such a rapid rate and therefore that the projections might be overly optimistic. As a result, the SSC wanted to ensure that the allowable biological catch was sufficiently buffered, and requested an additional projection scenario be explored that assumed future recruitment would remain near recent (2005-2009) lower levels (Figures 9.3 and 9.4). This additional projection scenario was only used to determine the OFL and annual OY yield streams, and rebuilding times (Table 9.2). The SSC based their short-term ABC recommendations on the OFL and OY yield streams from this additional projection scenario. However, the SSC based stock status determination criteria (Table 9.1) and stock rebuilding times (Table 9.2) on the projections that used the estimated spawner-recruit relationship. Highlighted values in Table 9.2 represent those recommended by the SSC based on this discussion.

10 References

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11 TABLES

TABLE 3.1—PROBABILITY OF AGE GIVEN LENGTH CLASS. Probability of age given fork length (mm) for gray triggerfish. Table A represents the age-length key used during SEDAR-9 (from Hood and Johnson 1997; Ingram 2001; NMFS Panama City Lab unpublished data). Table B represents the age-length key developed for the update assessment derived from 2002-2010 gray triggerfish from Panama City NMFS Laboratory.

a) SEDAR-9

	100	**125**	**150**	**175**	**200**	**225**	**250**	**275**	**300**	**325**	**350**	**375**	**400**	**425**	**450**	**475**	**500**	**525**	**550**	**575**	**600**
1	1.00	0.98	No values reported for this group in SEDAR-9	0.00	0.61	0.12	0.33	0.24	0.19	0.12	0.06	0.05	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.01	0.00
2	0.00	0.02		0.53	0.40	0.27	0.29	0.27	0.29	0.30	0.19	0.14	0.13	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.00
3	0.00	0.00		0.47	0.00	0.12	0.15	0.21	0.22	0.19	0.32	0.31	0.25	0.16	0.14	0.14	0.03	0.04	0.01	0.01	0.00
4	0.00	0.00		0.00	0.00	0.15	0.10	0.11	0.14	0.18	0.19	0.19	0.27	0.31	0.21	0.22	0.13	0.09	0.16	0.09	0.20
5	0.00	0.00		0.00	0.00	0.23	0.08	0.10	0.09	0.11	0.11	0.13	0.16	0.17	0.30	0.23	0.27	0.16	0.10	0.22	0.22
6	0.00	0.00		0.00	0.00	0.11	0.02	0.07	0.04	0.08	0.07	0.08	0.05	0.11	0.14	0.20	0.17	0.30	0.18	0.22	0.20
7	0.00	0.00		0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.04	0.06	0.08	0.14	0.10	0.13	0.16	0.13	0.07	0.13	0.00
8	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.02	0.06	0.04	0.08	0.13	0.10	0.16	0.15
9	0.00	0.00		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.01	0.01	0.05	0.09	0.10	0.01	0.00
10	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.01	0.01	0.09	0.04	0.25	0.15	0.23

b) UPDATE ASSESSMENT

	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600
1	1.00	0.88	0.90	0.67	0.61	0.39	0.17	0.09	0.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.12	0.10	0.25	0.27	0.38	0.39	0.29	0.26	0.20	0.09	0.07	0.02	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.08	0.12	0.17	0.31	0.39	0.38	0.36	0.32	0.28	0.23	0.13	0.12	0.03	0.03	0.08	0.00	0.03	0.00
4	0.00	0.00	0.00	0.00	0.00	0.06	0.10	0.20	0.20	0.28	0.36	0.29	0.31	0.20	0.21	0.22	0.08	0.00	0.14	0.03	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.08	0.10	0.16	0.26	0.26	0.33	0.23	0.25	0.28	0.08	0.12	0.10	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.03	0.05	0.08	0.12	0.20	0.23	0.25	0.23	0.28	0.25	0.24	0.06
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.04	0.06	0.10	0.13	0.15	0.21	0.16	0.24	0.06
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.05	0.07	0.13	0.18	0.22	0.24	0.50
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.07	0.11	0.06	0.03	0.19
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.05	0.06	0.07	0.19

TABLE 4.1—COMMERCIAL LANDINGS (POUNDS, WHOLE WEIGHT) BY YEAR AND REGION. Totals include fish classified as gray trigger and unclassified triggerfish from Gulf of Mexico waters. Increase in West Gulf catch in 1992 and 1999 over previously published values is due to the addition of missing Florida data. SEDAR-9 values from SEDAR-9 report, page 166.

Year	SEDAR-9		Update Assessment		Difference	
	Commercial East	*Commercial West*	*Commercial East*	*Commercial West*	*Commercial East*	*Commercial West*
1963	3,100	4,200	3,100	4,200	0%	0%
1964	15,700	4,300	15,700	4,300	0%	0%
1965	17,400	4,300	17,400	4,300	0%	0%
1966	8,600	5,200	8,600	5,200	0%	0%
1967	12,200	5,200	12,200	5,200	0%	0%
1968	8,600	3,900	8,600	3,900	0%	0%
1969	14,600	7,700	14,600	7,700	0%	0%
1970	16,000	8,200	16,000	8,200	0%	0%
1971	30,500	9,900	30,500	9,900	0%	0%
1972	47,400	15,200	47,400	15,200	0%	0%
1973	40,000	13,200	40,000	13,200	0%	0%
1974	40,000	13,100	40,000	13,100	0%	0%
1975	62,000	16,000	62,000	16,000	0%	0%
1976	69,700	14,800	69,700	14,800	0%	0%
1977	50,096	9,290	50,096	9,290	0%	0%
1978	48,518	10,197	48,518	10,197	0%	0%
1979	65,670	35,733	65,670	35,733	0%	0%
1980	65,422	31,001	65,422	31,001	0%	0%
1981	64,498	25,362	64,498	25,362	0%	0%
1982	62,959	33,714	62,959	33,714	0%	0%
1983	49,588	23,831	49,588	23,831	0%	0%
1984	37,445	32,749	37,396	32,749	0%	0%
1985	54,840	37,786	54,840	37,786	0%	0%
1986	72,858	22,771	72,858	22,782	0%	0%
1987	89,313	34,290	89,313	34,290	0%	0%
1988	137,978	57,084	137,978	57,084	0%	0%
1989	230,361	87,271	230,361	87,271	0%	0%
1990	359,686	99,351	359,686	99,351	0%	0%
1991	341,319	103,211	341,319	103,211	0%	0%
1992	338,119	112,076	358,178	112,826	6%	1%
1993	381,279	177,448	381,532	177,478	0%	0%
1994	251,578	153,141	251,578	153,141	0%	0%
1995	207,212	130,664	207,212	130,664	0%	0%
1996	142,185	125,332	142,185	125,332	0%	0%
1997	107,780	76,909	107,780	76,909	0%	0%
1998	106,153	70,571	106,158	70,571	0%	0%
1999	116,194	102,826	122,462	102,977	5%	0%

2000	63,042	95,095	62,936	95,073	0%	0%
2001	108,464	67,718	108,541	67,638	0%	0%
2002	148,600	86,963	148,068	85,661	0%	-2%
2003	166,425	85,385	166,358	85,368	0%	0%
2004	141,411	77,122	143,200	77,138	1%	0%
2005			107,490	41,728		
2006			61,028	30,848		
2007			51,241	36,909		
2008			50,975	25,441		
2009			64,477	16,106		
2010			46,908	7,959		

TABLE 4.2—SHRIMP BYCATCH (NUMBERS OF FISH) COMPARISON OF ESTIMATES MADE DURING SEDAR 9 WITH THOSE MADE FOR THE UPDATE ASSESSMENT.

GRAY TRIGGERFISH SHRIMP BYCATCH ALL AGES (in numbers of fish)			
Year	*SEDAR 9 MEADIAN*	*Update Assessment MEDIAN*	*Percent Difference*
1972	3,479,000	3,735,000	7%
1973	1,321,000	1,369,000	4%
1974	1,576,000	1,712,000	8%
1975	1,003,000	1,115,000	10%
1976	808,500	806,000	0%
1977	1,795,000	1,857,000	3%
1978	6,776,000	6,669,000	-2%
1979	3,126,000	3,047,000	-3%
1980	5,725,000	5,940,000	4%
1981	5,190,000	5,138,000	-1%
1982	6,009,000	5,554,000	-8%
1983	1,858,000	1,841,000	-1%
1984	3,312,000	3,562,000	7%
1985	1,460,000	1,486,000	2%
1986	3,999,000	3,849,000	-4%
1987	5,564,000	5,409,000	-3%
1988	4,029,000	4,047,000	0%
1989	5,208,000	4,945,000	-5%
1990	2,576,000	2,441,000	-6%
1991	11,720,000	11,780,000	1%
1992	3,148,000	3,190,000	1%
1993	7,429,000	7,174,000	-4%
1994	4,912,000	4,314,000	-14%
1995	6,070,000	5,831,000	-4%

1996	7,223,000	7,356,000	2%
1997	4,586,000	4,348,000	-5%
1998	1,399,000	1,327,000	-5%
1999	6,240,000	6,674,000	7%
2000	2,640,000	13,540,000	81%
2001	19,150,000	13,720,000	-40%
2002	5,717,000	3,279,000	-74%
2003	1,045,000	3,991,000	74%
2004	120,400	3,160,000	96%
2005		1,898,000	
2006		3,275,000	
2007		4,669,000	
2008		14,280,000	
2009		1,292,000	
2010		3,171,000	

TABLE 4.3—SHRIMP BYCATCH (NUMBERS OF FISH) COMPARISON OF AGE ONE FISH ESTIMATED USING SEDAR 9 AND THIS UPDATE ASSESSMENT METHOD. The method of calculating age one shrimp bycatch fish using a mortality estimator as done in SEDAR 9 was compared with a direct empirical approach used in this update assessment which looks at the fraction of the sampled fish that were aged one and applies this ratio to the catch. The method used in SEDAR 9 does not include a value in 1972 because that value is used as the initial year of the forward calculating mortality estimation.

GRAY TRIGGERFISH SHRIMP BYCATCH AGE ONE					
Year	*SEDAR 9 Age 1 Equivalents*	*Update Assessment Age 1 Equivalents*	*Update Assessment Empirical Fraction of Age One Fish*	*Percent Difference: SEDAR 9 Age 1 Equivalents Compared With Update Assessment Age 1 Equivalents*	*Percent Difference: Update Assessment Age 1 Equivalents with Empirical Fraction of Age One Fish*
1972			359,135		
1973	112,249	120,509	131,635	7%	8%
1974	342,365	354,239	164,615	3%	-115%
1975	380,243	415,447	107,212	8%	-288%
1976	220,022	245,573	77,500	10%	-217%
1977	189,060	184,926	178,558	-2%	-4%
1978	460,267	477,608	641,250	4%	26%
1979	1,771,773	1,740,465	292,981	-2%	-494%
1980	606,333	589,187	571,154	-3%	-3%
1981	1,467,531	1,528,045	494,038	4%	-209%
1982	1,206,172	1,183,907	534,038	-2%	-122%
1983	1,463,222	1,343,080	177,019	-9%	-659%
1984	304,880	316,538	342,500	4%	8%

1985	855,200	921,290	142,885	7%	-545%
1986	279,440	277,533	370,096	-1%	25%
1987	1,044,593	1,004,251	520,096	-4%	-93%
1988	1,364,641	1,328,147	389,135	-3%	-241%
1989	905,848	915,659	475,481	1%	-93%
1990	1,287,059	1,214,545	234,712	-6%	-417%
1991	523,063	496,336	1,132,692	-5%	56%
1992	3,101,470	3,121,327	306,731	1%	-918%
1993	432,333	441,013	689,808	2%	36%
1994	1,952,302	1,882,106	414,808	-4%	-354%
1995	1,065,319	912,957	560,673	-17%	-63%
1996	1,498,795	1,454,725	707,308	-3%	-106%
1997	1,752,214	1,794,177	418,077	2%	-329%
1998	1,004,159	934,060	127,596	-8%	-632%
1999	242,770	232,769	641,731	-4%	64%
2000	1,656,129	1,774,954	1,301,923	7%	-36%
2001	490,438	3,424,666	1,319,231	86%	-160%
2002	5,116,968	3,250,122	315,288	-57%	-931%
2003	854,917	447,673	383,750	-91%	-17%
2004	167,150	1,019,660	303,846	84%	-236%
2005		717,323	182,500		-293%
2006		416,654	314,904		-32%
2007		830,058	448,942		-85%
2008		1,151,425	1,373,077		16%
2009		3,709,347	124,231		-2886%
2010		0	304,904		100%

TABLE 4.4—SHRIMP EFFORT ESTIMATES. Shrimp fleet fishing effort and coefficient of variation (CV) estimates represent days of shrimp fishing in the Gulf of Mexico. Values are standardized to the mean of the time series.

Year	Gulfwide Effort	Gulfwide CV
1981	0.92	0.59
1982	0.93	0.69
1983	0.82	0.61
1984	1.02	0.71
1985	0.99	0.57
1986	1.26	0.51
1987	1.22	0.52
1988	1.18	0.65
1989	1.14	0.53
1990	1.07	0.64
1991	1.25	0.58
1992	1.34	0.50

1993	1.27	0.54
1994	1.08	0.45
1995	1.02	0.57
1996	1.10	0.47
1997	1.28	0.61
1998	1.29	0.63
1999	1.06	0.65
2000	1.09	0.61
2001	1.18	0.78
2002	1.39	0.69
2003	1.13	0.48
2004	1.06	0.42
2005	0.80	0.65
2006	0.57	0.57
2007	0.46	0.57
2008	0.32	0.68
2009	0.41	0.65
2010	0.37	0.49

TABLE 5.1—RECREATIONAL LANDINGS (NUMBERS OF FISH, AB1) FOR THE MARINE RECREATIONAL FISHERY STATISTICS SURVEY (MRFSS) BY YEAR AND REGION. Totals include fish classified as gray trigger and unclassified triggerfish from Gulf of Mexico waters. Increase in West Gulf catch in 2004 over previously published values is due to the addition of missing MRFSS samples. Decrease in 1982 East Gulf Headboat catch over previously published values is due to a correction in classification of some samples.

Year	MRFSS SEDAR-9		MRFSS Update		MRFSS Difference	
	East	*West*	*East*	*West*	*East*	*West*
1981	307,135	38,763	307,135	38,763	0%	0%
1982	834,149	58,239	834,149	58,239	0%	0%
1983	159,396	198,156	159,396	198,156	0%	0%
1984	53,267	66,831	53,267	66,831	0%	0%
1985	104,775	15,559	104,775	15,559	0%	0%
1986	316,590	11,373	316,590	11,373	0%	0%
1987	438,551	4,732	438,551	4,732	0%	0%
1988	669,026	10,356	669,026	10,356	0%	0%
1989	727,140	49,453	727,140	49,453	0%	0%
1990	961,088	96,416	961,088	96,416	0%	0%
1991	658,143	98,121	658,143	98,121	0%	0%
1992	572,261	37,415	572,261	37,415	0%	0%
1993	528,962	16,596	528,962	16,596	0%	0%
1994	458,115	40,555	458,115	40,555	0%	0%
1995	502,196	65,345	502,196	65,345	0%	0%
1996	254,894	4,950	254,894	4,950	0%	0%
1997	257,813	14,321	257,813	14,321	0%	0%
1998	225,889	6,184	225,889	6,184	0%	0%
1999	178,960	32,055	178,960	32,055	0%	0%
2000	128,213	52,570	128,213	52,570	0%	0%
2001	198,300	18,654	198,300	18,654	0%	0%
2002	292,474	5,876	292,474	5,876	0%	0%
2003	353,300	12,880	353,300	12,880	0%	0%
2004	403,068	28,934	411,622	29,180	2%	1%
2005			259,723	9,233		
2006			173,399	22,639		
2007			183,356	8,096		
2008			124,245	35,422		
2009			120,703	3,356		
2010			93,074	0		

TABLE 5.2—RECREATIONAL LANDINGS (NUMBERS OF FISH, AB1) FOR THE HEADBOAT SURVEY. Totals include fish classified as gray trigger and unclassified triggerfish from Gulf of Mexico waters. Decrease in 1990 East Gulf Headboat catch over previously published values is due to a correction in classification of some samples.

Year	Headboat SEDAR-9		Headboat Update		Headboat Difference	
	East	*West*	*East*	*West*	*East*	*West*
1981						
1982						
1983						
1984						
1985						
1986	29,024	16,018	29,024	16,018	0%	0%
1987	22,033	16,697	22,033	16,697	0%	0%
1988	27,125	41,440	27,125	41,440	0%	0%
1989	55,630	24,892	55,630	24,892	0%	0%
1990	105,816	25,565	105,337	25,565	0%	0%
1991	58,121	31,138	58,121	31,138	0%	0%
1992	68,925	41,752	68,925	41,752	0%	0%
1993	58,787	44,184	58,787	44,184	0%	0%
1994	53,468	56,717	53,468	56,717	0%	0%
1995	45,825	51,841	45,825	51,841	0%	0%
1996	36,195	40,331	36,195	40,331	0%	0%
1997	34,458	29,227	34,458	29,227	0%	0%
1998	37,085	16,103	37,085	16,103	0%	0%
1999	34,143	6,838	34,143	6,838	0%	0%
2000	26,245	5,978	26,245	5,978	0%	0%
2001	32,563	7,494	32,563	7,494	0%	0%
2002	44,858	8,996	44,858	8,996	0%	0%
2003	46,468	17,015	46,468	17,015	0%	0%
2004	43,101	13,115	43,101	13,115	0%	0%
2005			36,952	11,321		
2006			23,087	10,821		
2007			20,796	11,957		
2008			18,852	3,735		
2009			11,003	1,102		
2010			9,038	414		

TABLE 5.3—RECREATIONAL LANDINGS (NUMBERS OF FISH, AB1) FOR THE TEXAS PARKS AND WILDLIFE SURVEY. Totals include fish classified as gray trigger and unclassified triggerfish from Gulf of Mexico waters. Differences between the update assessment values and those included in SEDAR 9 are because when SEDAR 9 occurred, data were not reconciled between the Headboat Survey and Texas Survey headboat mode. In addition, since SEDAR 9, Texas has re-estimated their landings and the new values for the update assessment represent a replacement of the previous landings.

Year	**Texas Parks and Wildlife**	
	Update	*SEDAR-*
1981		
1982		
1983	1,028	27,889
1984	449	36,599
1985	613	7,237
1986	1,647	4,425
1987	1,547	6,522
1988	3,240	14,058
1989	1,106	32,744
1990	4,677	9,190
1991	1,998	8,930
1992	5,658	72,429
1993	3,940	39,204
1994	5,340	6,302
1995	9,532	4,439
1996	4,615	2,317
1997	4,874	4,965
1998	5,840	4,852
1999	2,833	2,973
2000	6,401	6,741
2001	3,264	4,460
2002	1,942	2,767
2003	1,315	1,885
2004	3,792	
2005	4,387	
2006	5,859	
2007	3,368	
2008	4,239	
2009	1,467	
2010	347	

TABLE 5.4—RECREATIONAL LANDINGS IN WEIGHT (POUNDS OF FISH) FOR MRFSS, HEADBOAT, AND TEXAS PARKS AND WILDLIFE COMBINED.

Year	Recreational East (lbs.)	Recreational West (lbs.)
1981	639,424	111,298
1982	1,516,213	91,063
1983	337,656	362,039
1984	123,458	151,598
1985	218,017	66,944
1986	1,062,794	59,638
1987	1,168,210	35,343
1988	1,480,144	66,330
1989	1,293,423	135,102
1990	2,379,931	303,849
1991	1,832,019	295,327
1992	1,253,218	135,800
1993	1,247,900	124,461
1994	978,590	186,997
1995	982,678	256,524
1996	508,904	86,038
1997	596,379	97,863
1998	477,814	54,019
1999	366,221	109,644
2000	308,505	159,927
2001	402,284	55,433
2002	657,528	35,099
2003	744,685	57,199
2004	838,340	107,843
2005	533,835	50,862
2006	354,722	97,214
2007	392,192	44,469
2008	310,764	108,451
2009	386,944	14,212
2010	294,294	2,066

TABLE 6.1 FISHERY DEPENDENT INDICES OF ABUNDANCE AND COEFFICIENT OF VARIATION. Shows relative indices of abundance scaled to one and their associated coefficients of variation (CV). From left to right, the indices represent the Marine Recreational Fisheries Statistics Survey for the Eastern Gulf of Mexico (MRFSSE), Headboat Survey for the Eastern Gulf of Mexico (HBE), Headboat Survey for the Western Gulf of Mexico (HBW), commercial handline logbook index from the Eastern Gulf (CmHLE), and logbook index from the Western Gulf (CmHLW).

Year	MRFSSE	MRFSSE CV	HBE	HBE CV	HBW	HBW CV	CmHLE	CmHLE CV	CmHLW	CmHLW CV
1981	1.81	1.72								
1982	0.83	1.46								
1983	0.55	1.78								
1984	0.17	2.97								
1985	0.10	2.79								
1986	2.47	0.81	0.39	1.10	0.90	1.01				
1987	0.81	0.93	0.56	1.08	1.21	0.96				
1988	1.78	0.87	0.84	0.98	1.08	0.93				
1989	2.98	0.79	1.38	0.98	1.41	0.94				
1990	3.18	0.94	1.43	0.95	1.69	0.95				
1991	2.02	0.90	0.95	0.97	2.18	0.93				
1992	1.86	0.71	1.20	0.96	1.85	0.89				
1993	1.25	0.82	1.17	0.95	1.73	0.90	1.95	1.05	1.36	1.56
1994	1.50	0.79	1.17	0.97	1.84	0.88	1.89	0.97	2.10	1.26
1995	0.93	0.95	1.44	0.99	1.37	0.89	1.32	0.96	1.99	0.93
1996	0.83	0.92	1.26	0.98	1.33	0.94	0.92	1.01	1.39	0.98
1997	0.62	0.79	1.25	0.97	1.02	0.99	0.81	1.01	1.15	0.73
1998	0.68	0.68	1.25	0.96	0.95	1.00	0.90	1.02	1.27	0.72
1999	0.59	0.63	1.21	0.96	0.61	1.12	0.79	0.96	1.23	0.66
2000	0.39	0.65	0.98	0.99	0.43	1.08	0.59	1.02	0.92	0.79
2001	0.61	0.65	1.02	1.00	0.54	1.03	0.95	1.01	0.75	0.75
2002	0.64	0.64	1.28	1.00	0.56	1.04	1.37	0.94	0.91	0.69
2003	0.55	0.66	1.57	1.00	0.72	0.97	1.53	0.92	0.90	0.68
2004	0.88	0.61	1.05	1.00	0.84	0.95	1.15	0.96	0.80	0.69
2005	0.70	0.65	0.87	1.00	0.80	0.91	1.12	0.99	0.46	0.83
2006	0.49	0.68	0.69	1.03	0.63	0.93	0.62	1.03	0.48	0.82
2007	0.40	0.68	0.73	1.04	0.86	0.95	0.70	1.04	0.79	1.18
2008	0.20	0.74	0.66	1.01	0.38	1.19	0.52	1.04	0.65	1.41
2009	0.08	1.03	0.28	1.04	0.06	1.25	0.42	1.02	0.47	1.52
2010	0.08	0.76	0.38	1.09	0.04	1.37	0.46	1.04	0.38	1.78

TABLE 6.2 FISHERY INDEPENDENT INDICES OF ABUNDANCE AND COEFFICIENT OF VARIATION. Shows relative indices of abundance scaled to one and their associated coefficients of variation (CV). From left to right, the indices represent the fishery independent larval survey (Larval), fishery independent trawl survey (Trawl), and fishery independent reef fish video survey (Video).

Year	Larval GW-DN	Larval CV	TrawlGW	Trawl CV	VideoGW	Video CV
1981						
1982						
1983						
1984						
1985						
1986	0.87	1.00				
1987	0.40	1.77	0.57	0.99		
1988	0.42	1.20	0.47	0.96		
1989	0.22	1.15	1.10	0.71		
1990	0.37	1.02	0.20	1.25		
1991	0.74	0.68	3.66	0.52		
1992	2.99	0.92	0.20	1.40		
1993	0.79	0.73	2.08	0.62	1.52	0.20
1994	0.99	0.79	1.77	0.61	1.82	0.21
1995	1.04	0.79	0.83	0.80	0.77	0.22
1996	0.76	0.85	0.80	0.85	1.04	0.19
1997	0.72	1.03	0.42	0.98	1.87	0.16
1998			0.04	4.13		
1999	0.21	1.09	0.91	0.75		
2000	2.24	0.81	1.98	0.65		
2001	0.40	1.10	3.02	0.62		
2002	1.41	1.33	0.78	0.84	0.96	0.20
2003	0.69	0.87	0.61	0.91		
2004	0.40	1.03	0.71	0.78	0.79	0.23
2005			0.80	0.72	0.74	0.18
2006	1.80	0.81	0.62	0.90	0.64	0.19
2007	1.65	1.02	0.89	0.82	0.47	0.20
2008			1.10	0.56	0.54	0.23
2009			0.15	1.23	0.84	0.17
2010			0.30	1.41		

TABLE 8.1 SUMMARY TABLE AND MANAGEMENT CRITERIA EVALUATION FOR THE CONTINUITY RUN.

CONTINUITY RUN				
Criteria		**Definition**		**Value**
Mortality Rate Criteria				
FMSY proxy		F30% SPR		0.25
MFMT proxy		FMSY proxy		0.25
FOY proxy		75% of F30% SPR		0.18
FCURRENT		2010, or geometric mean of recent years		0.53
FCURRENT/MFMT proxy		30% SPR proxy		2.16
Base M		M		0.27
Biomass Criteria				
SSBMSY proxy		Equil. egg production @ F30% SPR		1.67E+12
MSST proxy		(1-M)*SSB30% SPR :M=0.27		1.22E+12
SSBCURRENT (2010)		2010, or geometric mean of recent years		4.03E+11
SSBCURRENT/SSBMSY proxy		SSBMSY proxy		0.24
Equilibrium MSY		Equilibrium Yield @ F30% SPR		1,206,500
Equilibrium OY proxy		Equil. Yield @ 75% * F30% SPR		981,900
OFL	**Annual Yield @ FMFMT**	**2011 Catch Equals TAC**	**2011 Effort Same as 2010**	**2011 Catch = Avg. of 2007-2009**
	2012	241,300	312,600	302,500
	2013	388,600	455,300	446,100
	2014	524,900	586,200	577,900
	2015	645,100	697,800	690,800
	2016	744,400	787,400	781,800
	2017	822,500	856,500	852,000
Annual OY	**Annual Yield @ FOY**			
	2012	186,700	241,900	234,100
	2013	313,200	367,500	360,000
	2014	435,900	487,800	480,800
	2015	548,500	594,600	588,500
	2016	645,000	683,900	678,800
	2017	723,500	755,100	751,000
Generation Time				
Rebuild Time at F=0		3.67	3.04	3.12
TAC w/ Rebuild Time = 10 years		592,085	683,728	674,764

TABLE 8.2 SUMMARY TABLE AND MANAGEMENT CRITERIA EVALUATION FOR THE NEW AGE-LENGTH KEY RUN.

NEW AGE-LENGTH KEY RUN				
Criteria		Definition		Value
Mortality Rate Criteria				
FMSY proxy		F30% SPR		0.27
MFMT proxy		FMSY proxy		0.27
FOY proxy		75% of F30% SPR		0.20
FCURRENT		2010, or geometric mean of recent years		0.53
FCURRENT/MFMT proxy		30% SPR proxy		1.95
Base M		M		0.27
Biomass Criteria				
SSBMSY proxy		Equil. egg production @ F30% SPR		1.539E+11
MSST proxy		(1-M)*SSB30% SPR :M=0.27		1.124E+11
SSBCURRENT (2010)		2010, or geometric mean of recent years		5.546E+10
SSBCURRENT/SSBMSY proxy		SSBMSY proxy		0.36
Equilibrium MSY		Equilibrium Yield @ F30% SPR		931,340
Equilibrium OY proxy		Equil. Yield @ 75% * F30% SPR		786,900
OFL	**Annual Yield @ FMFMT**	**2011 Catch Equals TAC**	**2011 Effort Same as 2010**	**2011 Catch = Avg. of 2007-2009**
	2012	141,500	230,400	203,700
	2013	199,200	298,900	269,400
	2014	285,300	383,500	354,900
	2015	378,400	465,300	440,400
	2016	461,800	535,300	514,700
	2017	532,900	593,000	576,300
Annual OY	**Annual Yield @ FOY**			
	2012	107,000	174,300	154,100
	2013	158,500	238,300	214,700
	2014	236,900	320,200	295,900
	2015	326,000	403,800	381,500
	2016	410,400	479,700	460,100
	2017	486,100	545,600	529,000
Generation Time				
Rebuild Time at F=0		6.69	5.09	5.50
TAC w/ Rebuild Time = 10 years		222,020	333,816	295,344

TABLE 8.3 SUMMARY TABLE AND MANAGEMENT CRITERIA EVALUATION FOR THE RUN WITH GULFWIDE SHRIMP EFFORT, AVERAGE SHRIMP BYCATCH, AND THE NEW AGE-LENGTH KEY.

AVERAGE BYCATCH AND GULFWIDE SHRIMP EFFORT RUN				
Criteria		Definition		Value
Mortality Rate Criteria				
FMSY proxy		F30% SPR		0.34
MFMT proxy		FMSY proxy		0.34
FOY proxy		75% of F30% SPR		0.25
FCURRENT		2010, or geometric mean of recent years		0.35
FCURRENT/MFMT proxy		30% SPR proxy		1.04
Base M		M		0.27
Biomass Criteria				
SSBMSY proxy		Equil. egg production @ F30% SPR		1.778E+12
MSST proxy		(1-M)*SSB30% SPR :M=0.27		1.298E+12
SSBCURRENT (2010)		2010, or geometric mean of recent years		6.898E+11
SSBCURRENT/SSBMSY proxy		SSBMSY proxy		0.39
Equilibrium MSY		Equilibrium Yield @ F30% SPR		984,410
Equilibrium OY proxy		Equil. Yield @ 75% * F30% SPR		1,071,000
OFL	**Annual Yield @ FMFMT**	**2011 Catch Equals TAC**	**2011 Effort Same as 2010**	**2011 Catch = Avg. of 2007-2009**
	2012	358,800	451,200	424,700
	2013	464,000	546,200	523,000
	2014	593,200	661,600	642,500
	2015	709,900	763,800	748,800
	2016	803,900	845,500	834,100
	2017	877,000	908,400	899,900
Annual OY	**Annual Yield @ FOY**			
	2012	272,200	342,600	322,400
	2013	371,800	439,300	420,200
	2014	495,800	556,100	539,200
	2015	614,900	665,700	651,600
	2016	717,500	759,100	747,700
	2017	802,500	835,700	826,600
Generation Time				
Rebuild Time at F=0		4.15	3.55	3.71
TAC w/ Rebuild Time = 10 years		544,905	630,093	608,586

TABLE 8.4 GOODNESS OF FIT STATISTICS FOR THE THREE SSASPM MODEL CONFIGURATIONS.

Model	AIC	Objective Function	Overall Percent CV
1. Continuity Run	566.130	77.065	9.975
2. New Age Length Key, new von Bertalanffy growth function, and alternative estimation of age one shrimp bycatch	272.418	-71.791	47.155
3. New Age Length Key, Recreational Catch in Numbers, Average Bycatch, Shrimp Effort for the entire Gulf of Mexico	189.369	-114.316	40.245

TABLE 9.1 FINAL TABLE OF MANAGEMENT ADVICE BASED ON THE SSC RECOMMENDED MODEL (SHRIMP EFFORT, AVERAGE BYCATCH, NEW AGE-LENGTH DATA, RECREATIONAL LANDINGS IN NUMBER).

Criteria	Definition	Value
Mortality Rate Criteria		
FMSY	F30% SPR	0.34
MFMT	FMSY proxy	0.34
FOY proxy	75% of F30% SPR	0.25
FCURRENT	2010	0.35
FCURRENT/MFMT proxy	30% SPR proxy	1.04
Base M	M	0.27
Biomass Criteria		
SSBMSY proxy	Equil. egg production @ F30% SPR	1.78E+12
MSST	(1-M)*SSB30% SPR :M=0.27	1.30E+12
SSBCURRENT (2010)	2010	6.90E+11
SSBCURRENT/SSBMSY proxy	SSBMSY proxy	0.39
Equilibrium MSY	Equilibrium Yield @ F30% SPR	984,410
Equilibrium OY proxy	Equil. Yield @ 75% * F30% SPR	916,400

TABLE 9.2 FINAL TABLE OF PROJECTION YIELD STREAMS AND CORRESPONDING TIMES TO REBUILD BASED ON TWO ASSUMPTIONS: FIRST, THAT FUTURE RECRUITMENT WILL FLUCTUATE ABOUT THE LEVEL PREDICTED BY THE SPAWNER-RECRUIT RELATIONSHIP AND SECOND, THAT FUTURE RECRUITMENT WOULD REMAIN NEAR RECENT (2005-2009) LOWER LEVELS. THE SSC BASED THEIR ABC ADVICE ON THE ANNUAL YIELD AT FOY UNDER THE ASSUMPTION THAT RECRUITMENT WAS AT RECENT (2005-2009) LOWER LEVELS. HIGHLIGHTED VALUES REPRESENT THOSE RECOMMENDED BY THE SSC.

Criteria	**Definition**	**Value**	
OFL	*Annual Yield @ FMFMT (pounds)*	*Assumes Recruitment at Level Predicted by Spawner-Recruit Relationship*	*Assumes Recruitment at Recent (2005-2009) Levels*
	2012	424,700	401,600
	2013	523,000	429,300
	2014	642,500	449,300
	2015	748,800	463,600
	2016	834,100	473,400
	2017	899,900	480,100
Annual OY	*Annual Yield @ FOY (pounds)*	*Assumes Recruitment at Level Predicted by Spawner-Recruit Relationship*	*Assumes Recruitment at Recent (2005-2009) Levels*
	2012	322,400	305,300
	2013	420,200	348,000
	2014	539,200	383,900
	2015	651,600	412,400
	2016	747,700	433,900
	2017	826,600	449,700
REBUILDING TIMES			
Criteria	**Definition**	**Value**	
Rebuild Time (years) to MSY	at F=0	3.71	
Rebuild Time (years) to MSY	at FMFMT	7.72	
Rebuild Time (years) to MSY	at FOY	6.21	
Rebuild Time (years) to MSY Proxy (SPR 30%)	at F=0	3.03	
Rebuild Time (years) to MSY Proxy (SPR 30%)	at FMFMT	6.25	
Rebuild Time (years) to MSY Proxy (SPR 30%)	at FOY	5.04	
TAC w/ Rebuild Time = 10 years		608,586	

11 Figures

Figure 3.1—Von Bertalanffy growth function used in 2006 SEDAR-9 benchmark assessment. Model was fit using data from Ingram (2005) and from the shrimp observer program.

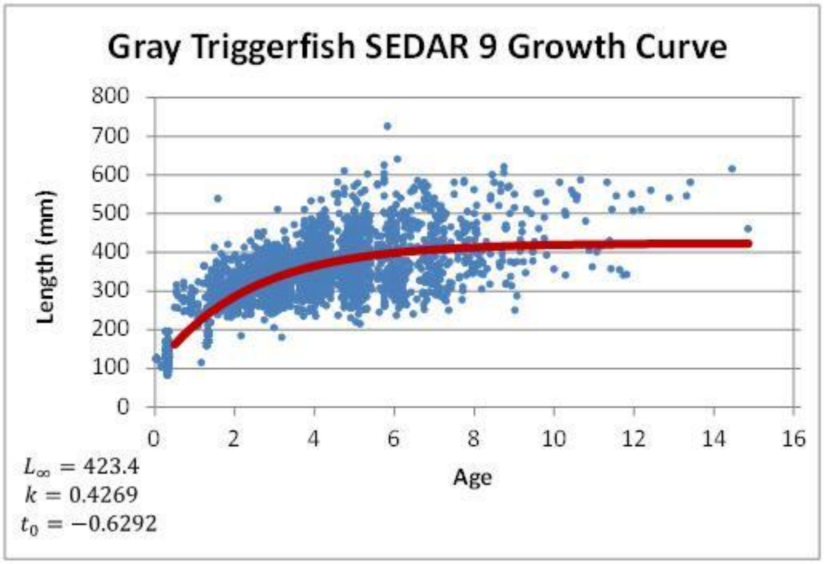


Figure 3.2—Von Bertalanffy growth function used in the 2011 update assessment. Model was fit using data collected from the National Marine Fisheries Service, SEFSC Panama City Laboratory's age sampling program, based on recommendations from SEDAR 9.

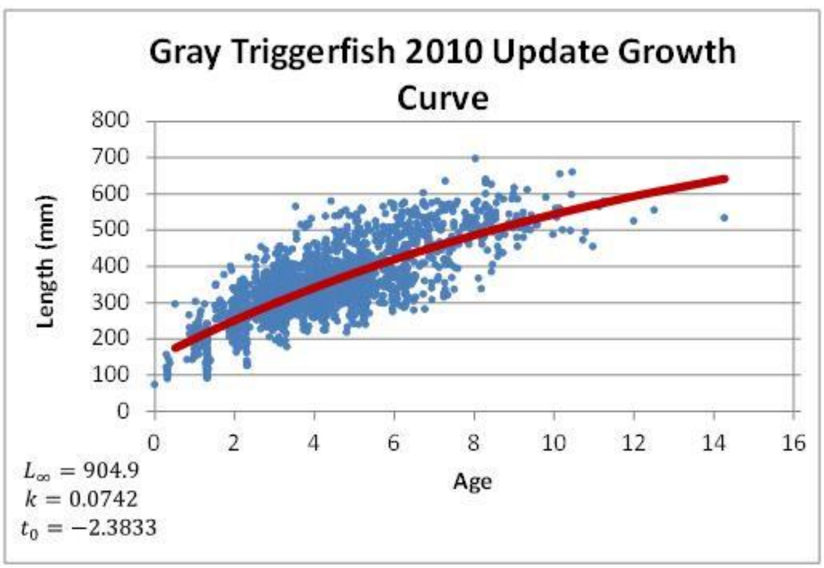


FIGURE 4.1—COMMERCIAL LANDINGS IN POUNDS FROM THE ACCUMULATED LANDINGS DATABASE IN POUNDS.

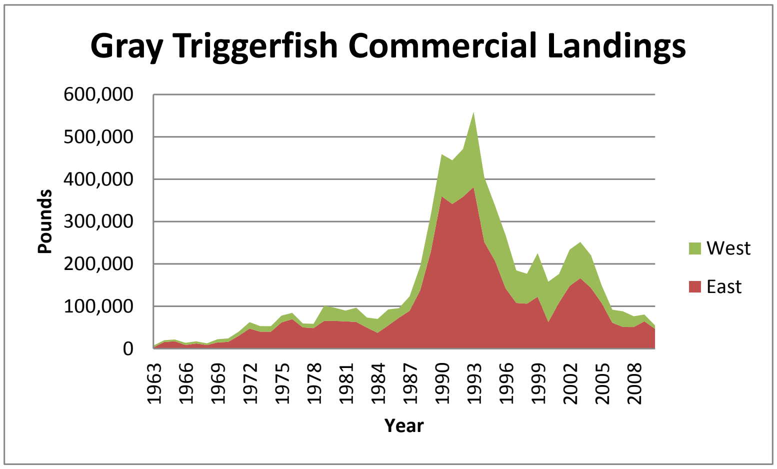
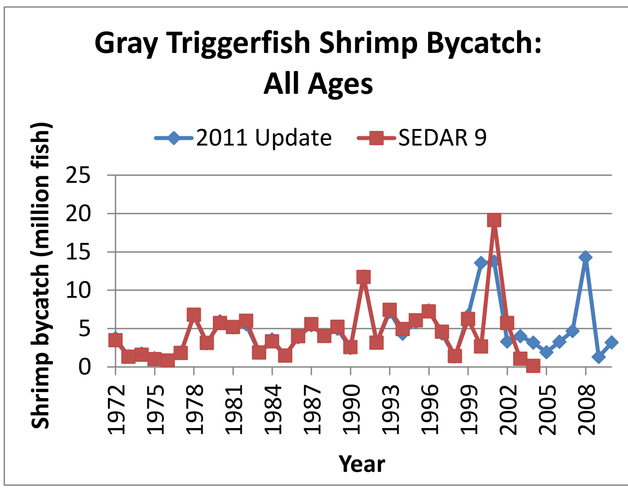
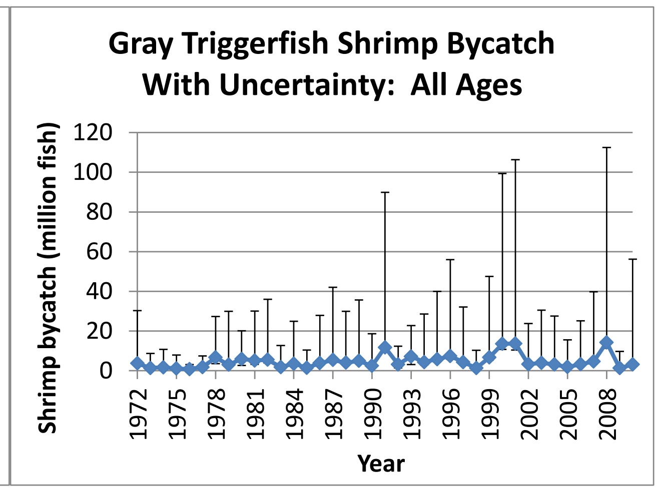


FIGURE 4.2—SHRIMP BYCATCH ESTIMATES, ALL AGES, UNCERTAINTY, AND ESTIMATED FRACTION OF AGE ONE BYCATCH.





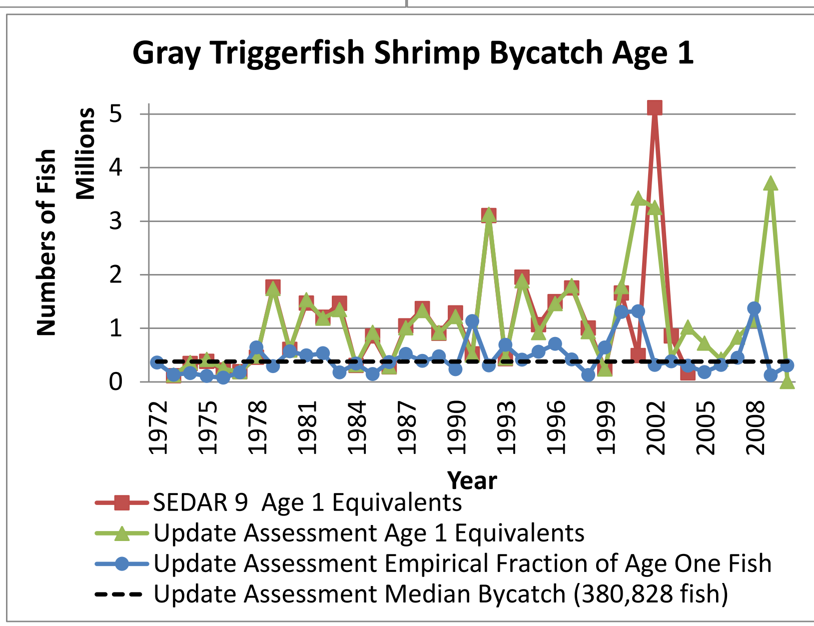


FIGURE 4.3—GULF OF MEXICO SHRIMP EFFORT IN FISHING DAYS IN WATERS GREATER THAN 10 FATHOMS STANDARDIZED TO THE MEAN WITH ERROR BARS REPRESENTING THE COEFFICIENTS OF VARIATION.

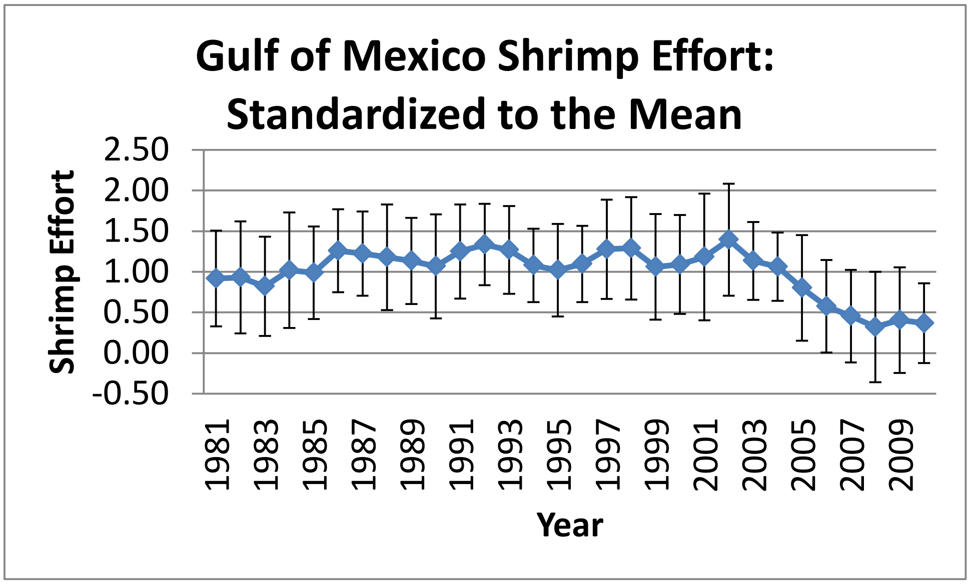


FIGURE 5.1—RECREATIONAL LANDINGS FROM MRFSS, HEADBOAT SURVEY, AND TEXAS PARKS AND WILDLIFE SURVEY IN NUMBERS OF FISH.

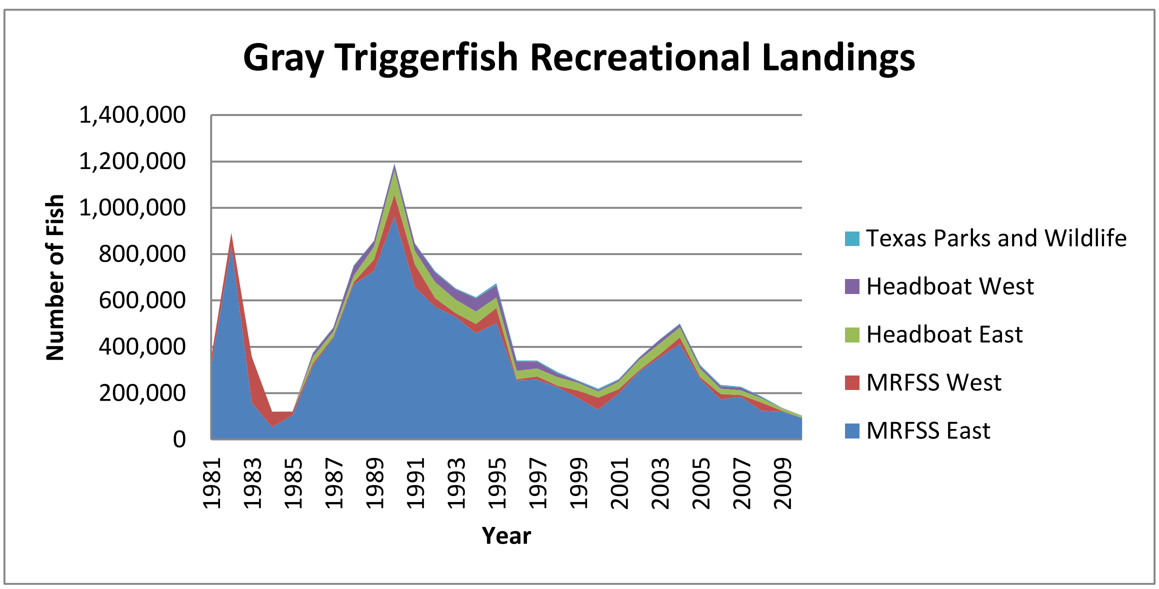


FIGURE 6.1—STANDARDIZED INDICES OF ABUNDANCE. Results compare updated indices of abundance standardized using generalized linear mixed modeling (GLMMIX) with the indices of abundance calculated and used for 2006 SEDAR-9. Plots represent three fishery dependent data series (Marine Recreational Fisheries Statistics Survey (MRFSS), headboat surveys, and commercial handline logbook records) for the eastern and western Gulf of Mexico (as indicated) and three fishery independent surveys.

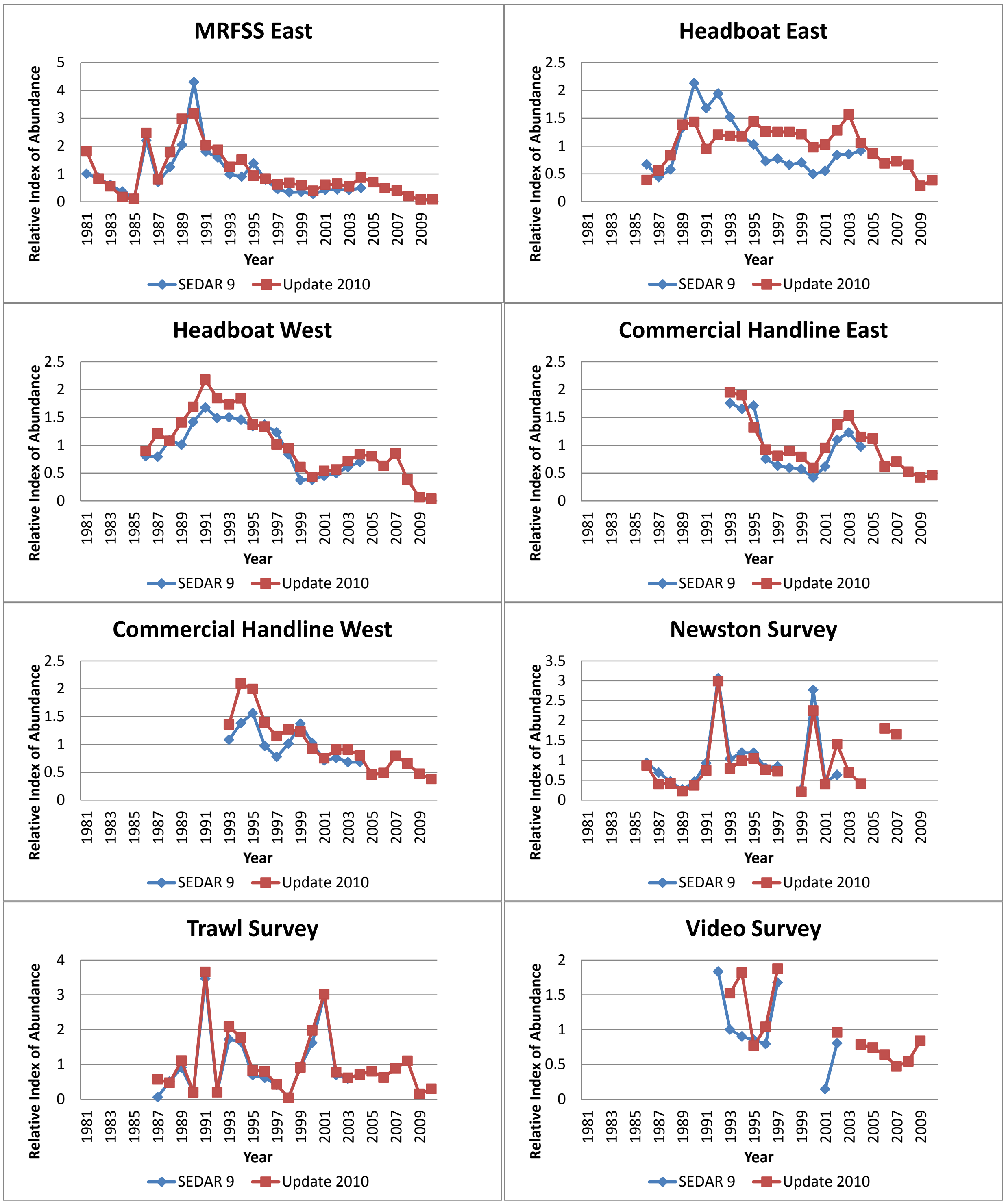
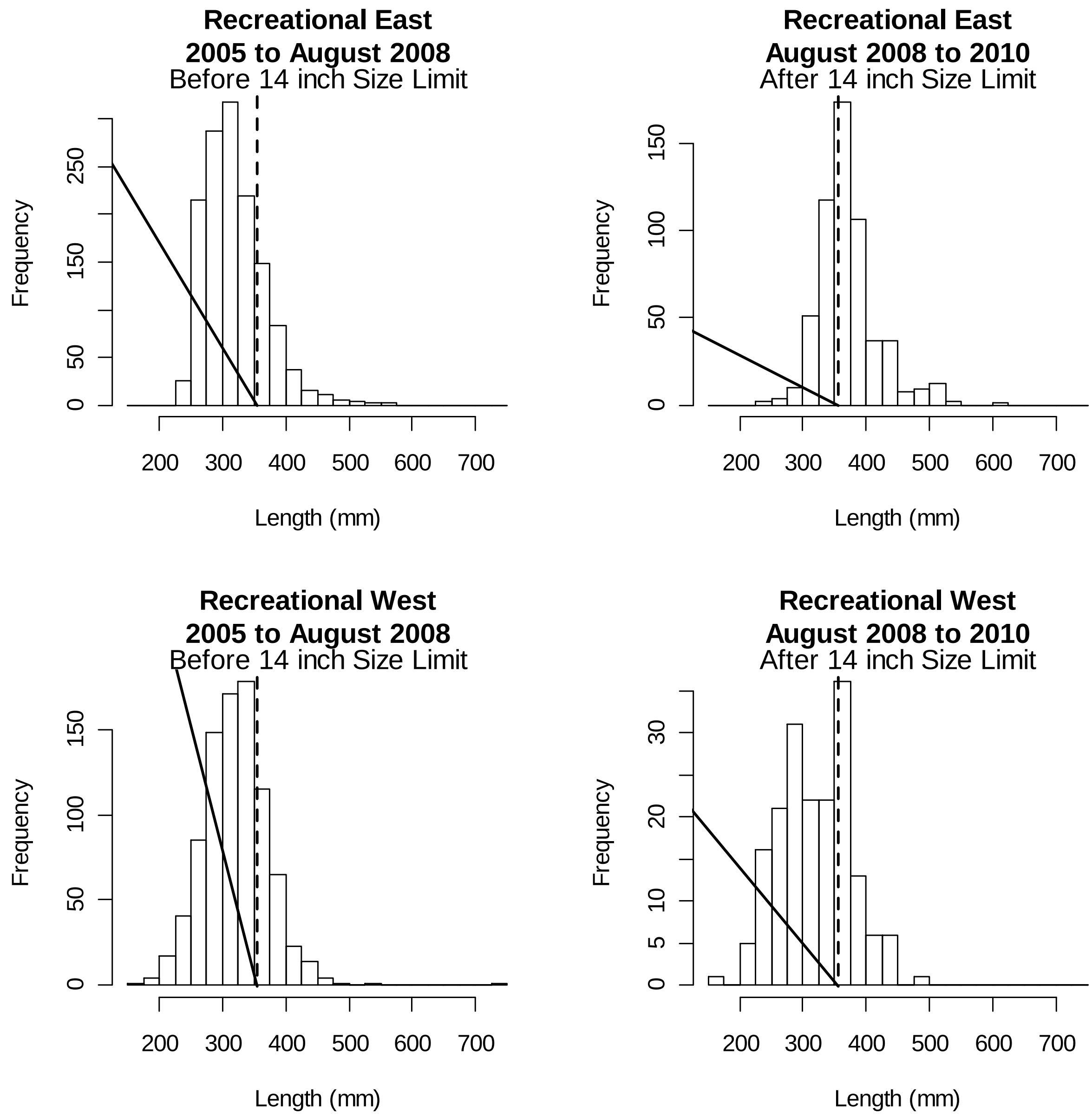


FIGURE 6.2—LENGTH FREQUENCY DISTRIBUTIONS BY SECTOR AND AREA. Dashed lines represents the Federal size limit for gray triggerfish. From 2005 to 2010, 71% of recreational catch and 36% of commercial catch was below the Federal and State of Alabama size limit, and 33% of recreational catch and 7% of commercial catch was below the State of Florida size limit.



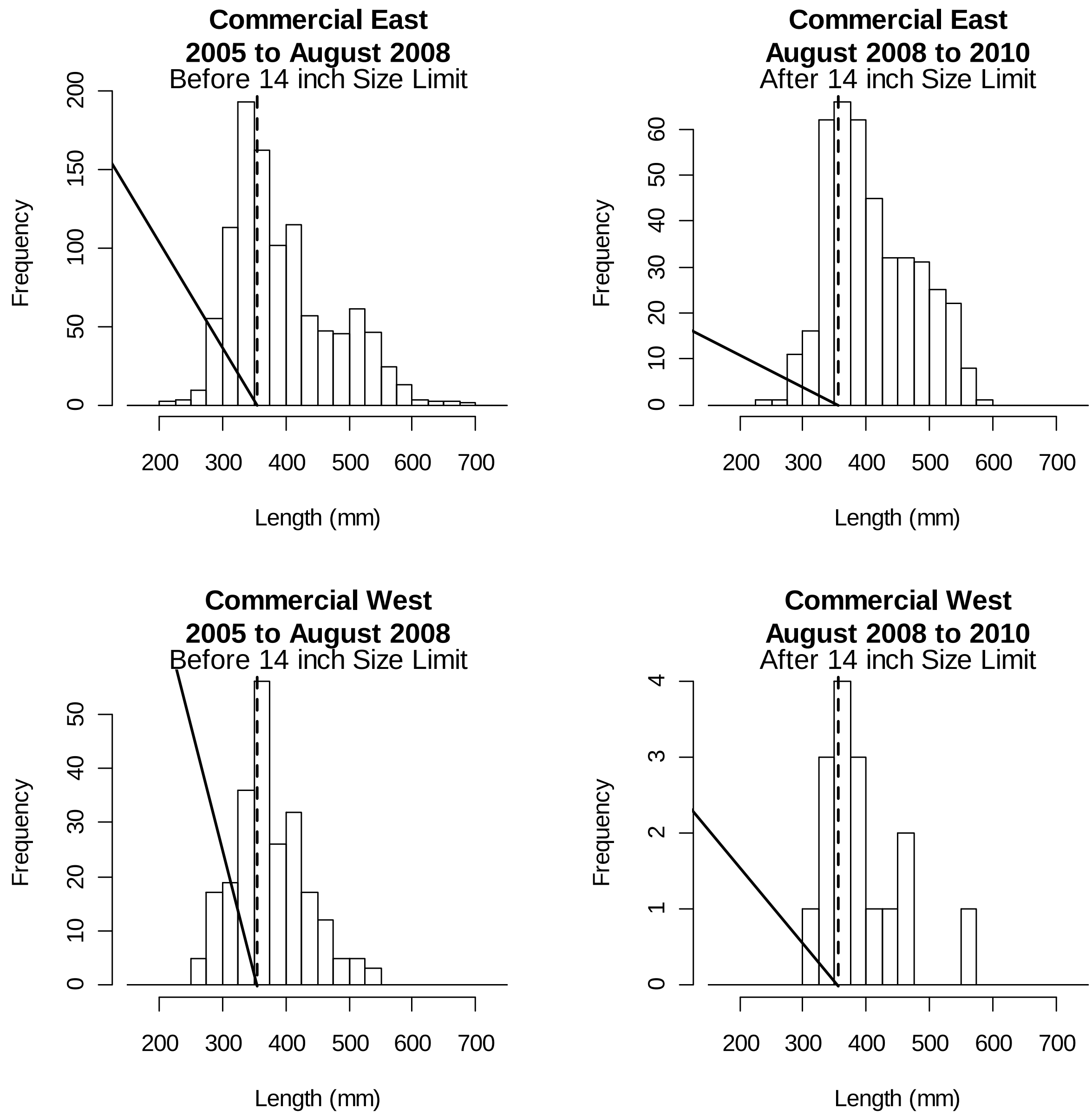
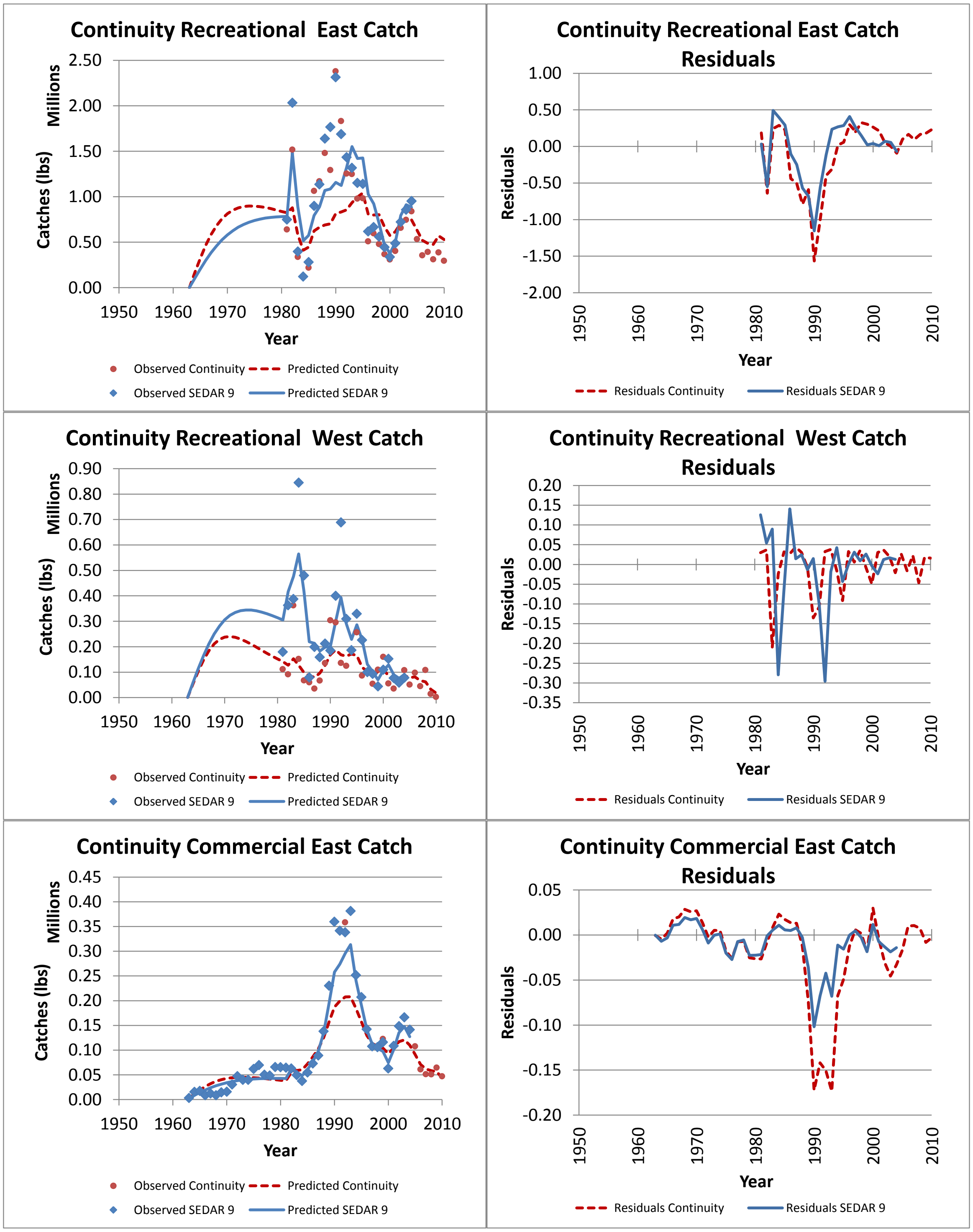
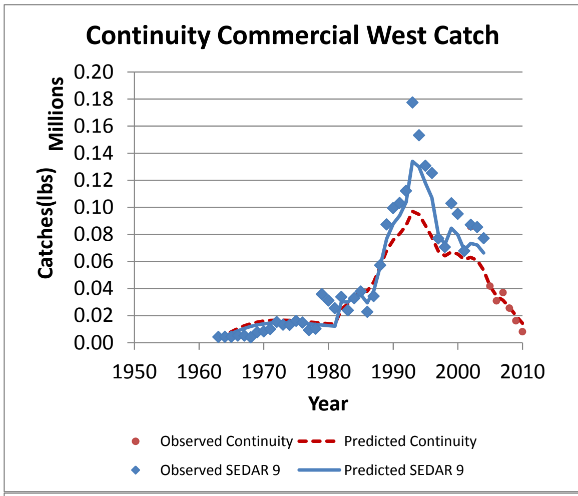
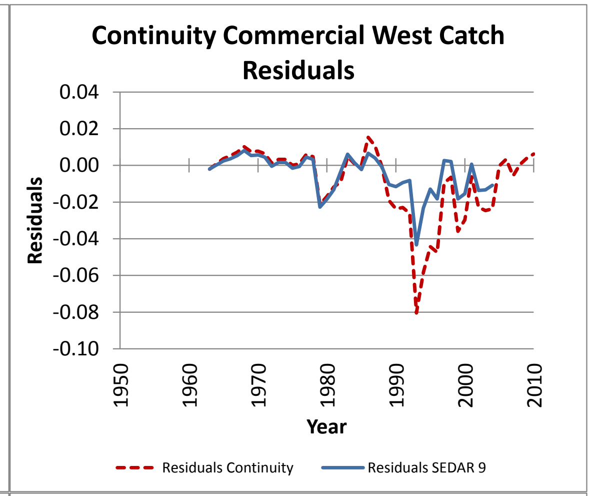
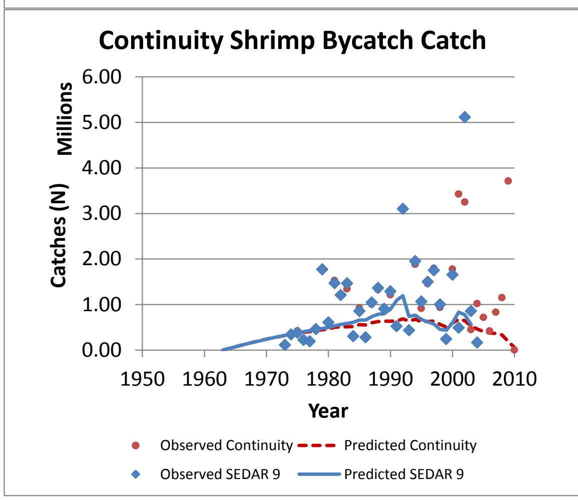

Commercial East
2005 to August 2008
Before 14 inch Size Limit
Frequency
Length (mm)
Commercial East
August 2008 to 2010
After 14 inch Size Limit
Frequency
Length (mm)
Commercial West
2005 to August 2008
Before 14 inch Size Limit
Frequency
Length (mm)
Commercial West
August 2008 to 2010
After 14 inch Size Limit
Frequency
Length (mm)

FIGURE 8.1—CONTINUITY MODEL FITS TO RECREATIONAL AND COMMERCIAL CATCHES.




Continuity Commercial West Catch
Catches(lbs) Millions
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1950 1960 1970 1980 1990 2000 2010
Year
Observed Continuity
Predicted Continuity
Observed SEDAR 9
Predicted SEDAR 9


Continuity Commercial West Catch Residuals
Residuals
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.08
-0.10
1950 1960 1970 1980 1990 2000 2010
Year
Residuals Continuity
Residuals SEDAR 9


Continuity Shrimp Bycatch Catch
Catches (N) Millions
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1950 1960 1970 1980 1990 2000 2010
Year
Observed Continuity
Predicted Continuity
Observed SEDAR 9
Predicted SEDAR 9

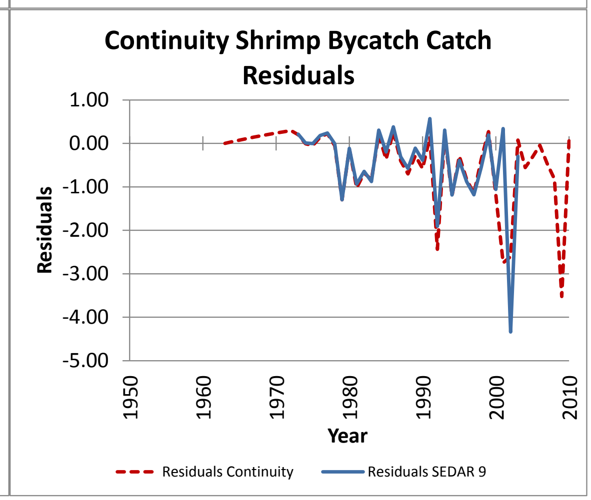

Continuity Shrimp Bycatch Catch Residuals
Residuals
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
1950 1960 1970 1980 1990 2000 2010
Year
Residuals Continuity
Residuals SEDAR 9

FIGURE 8.2—CONTINUITY MODEL FITS TO CPUE INDICES.

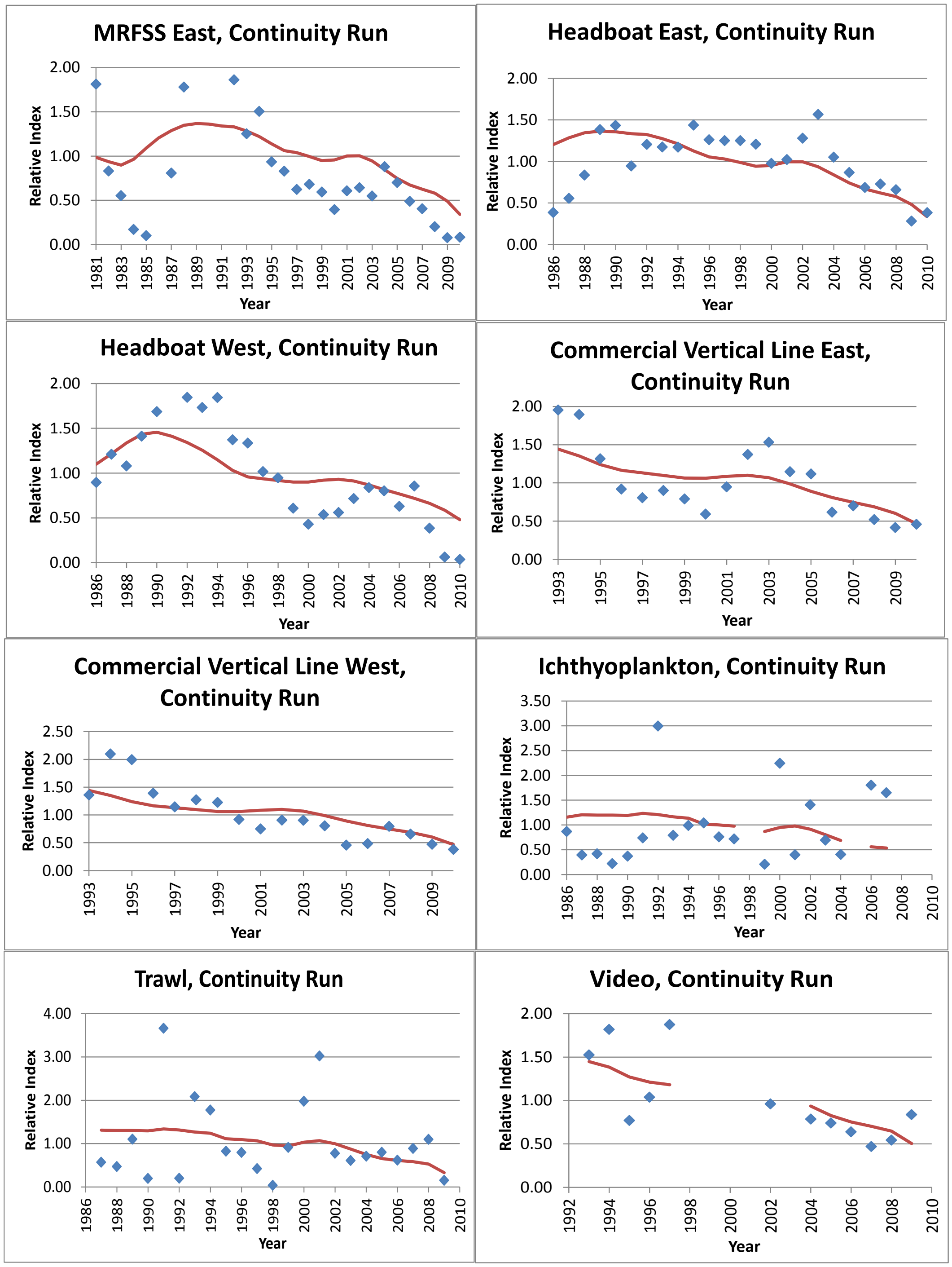
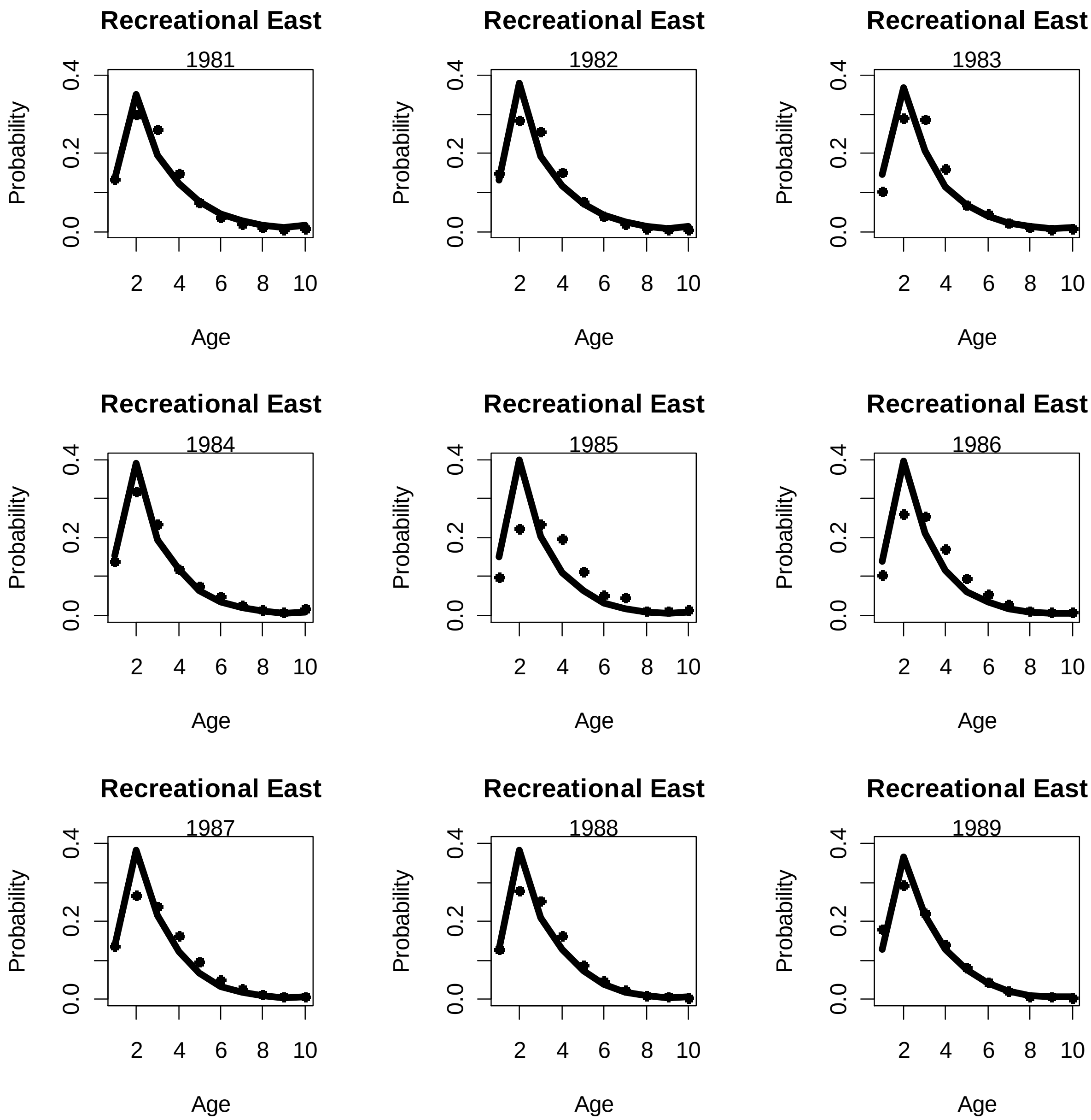
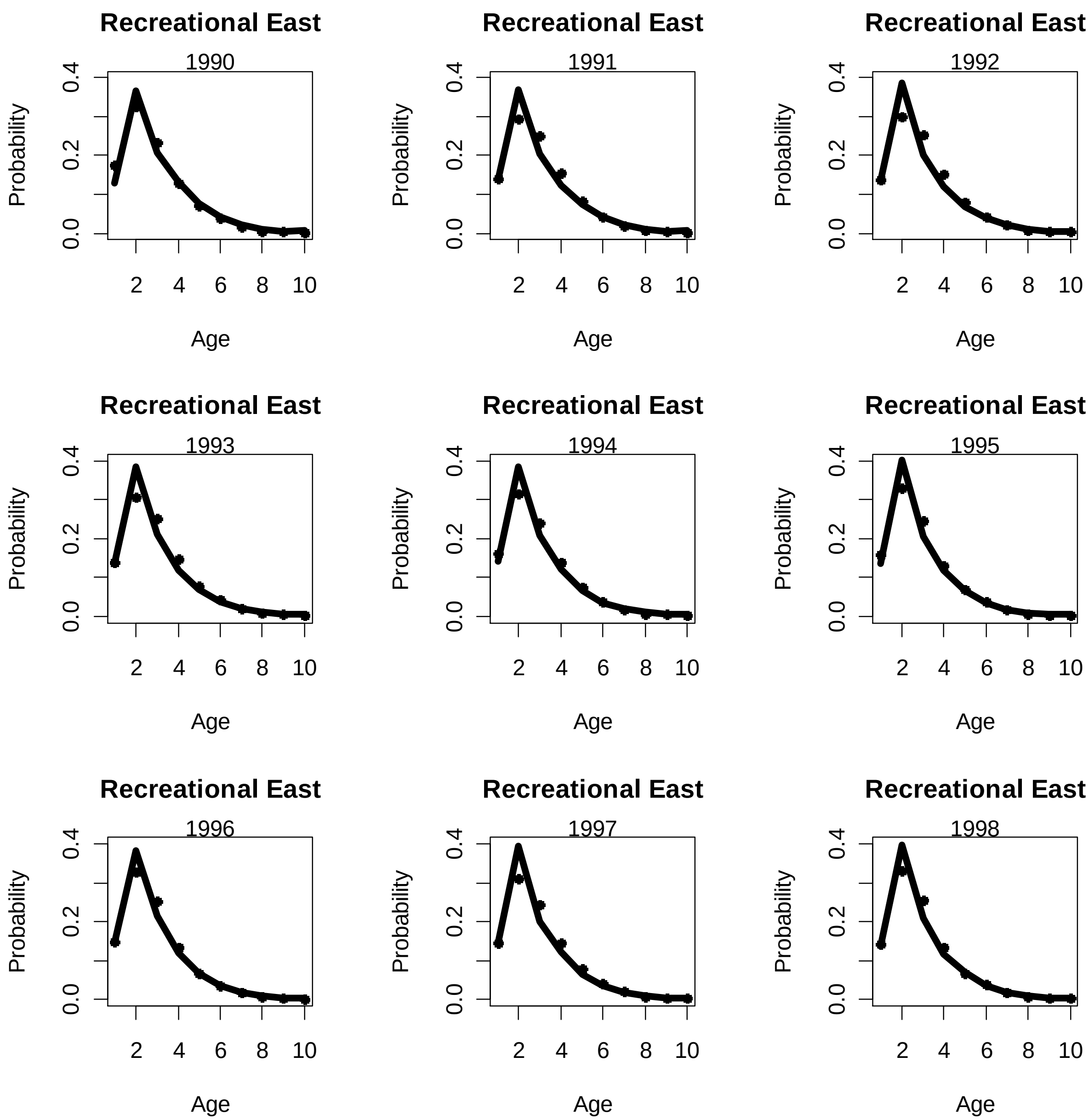
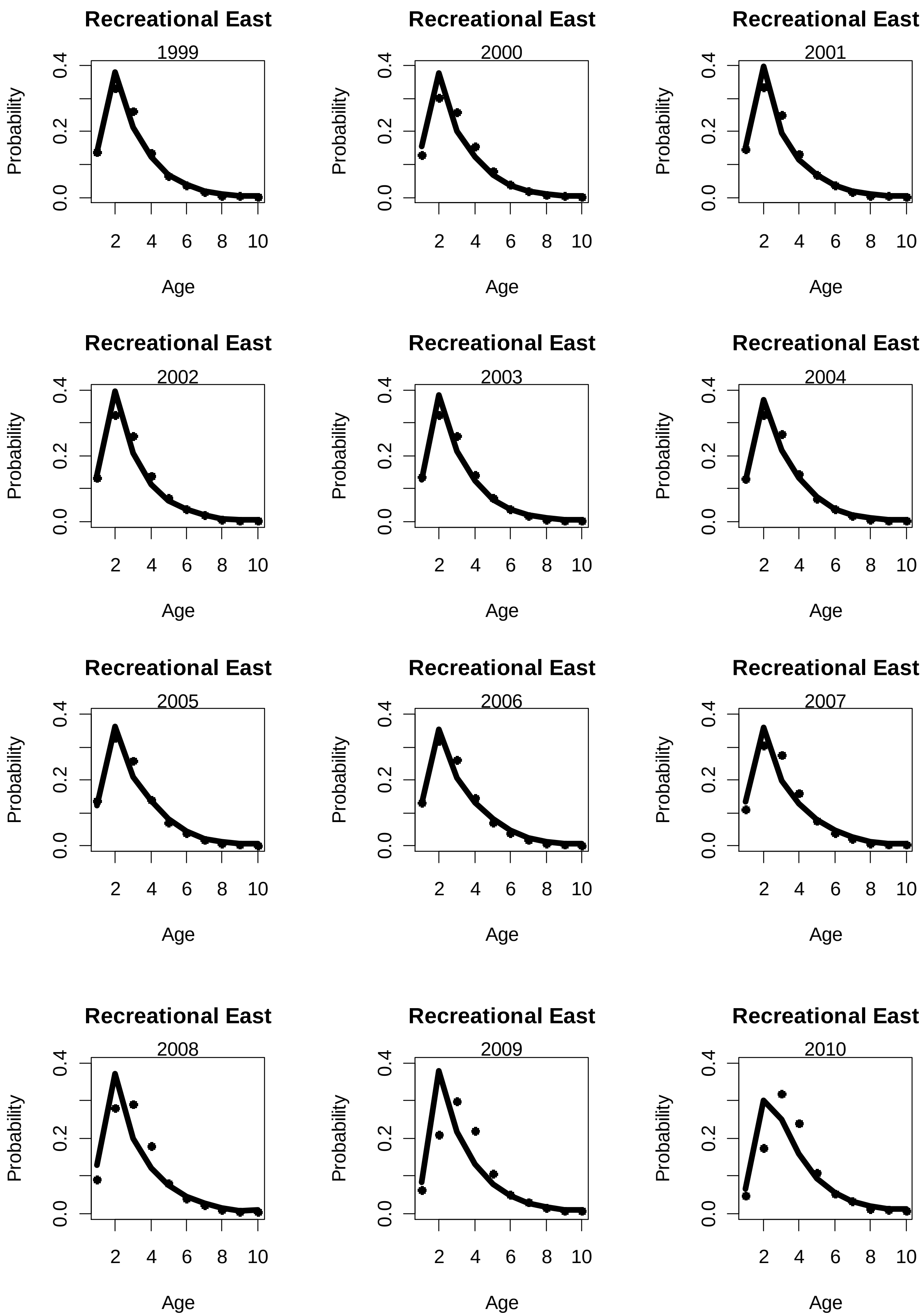
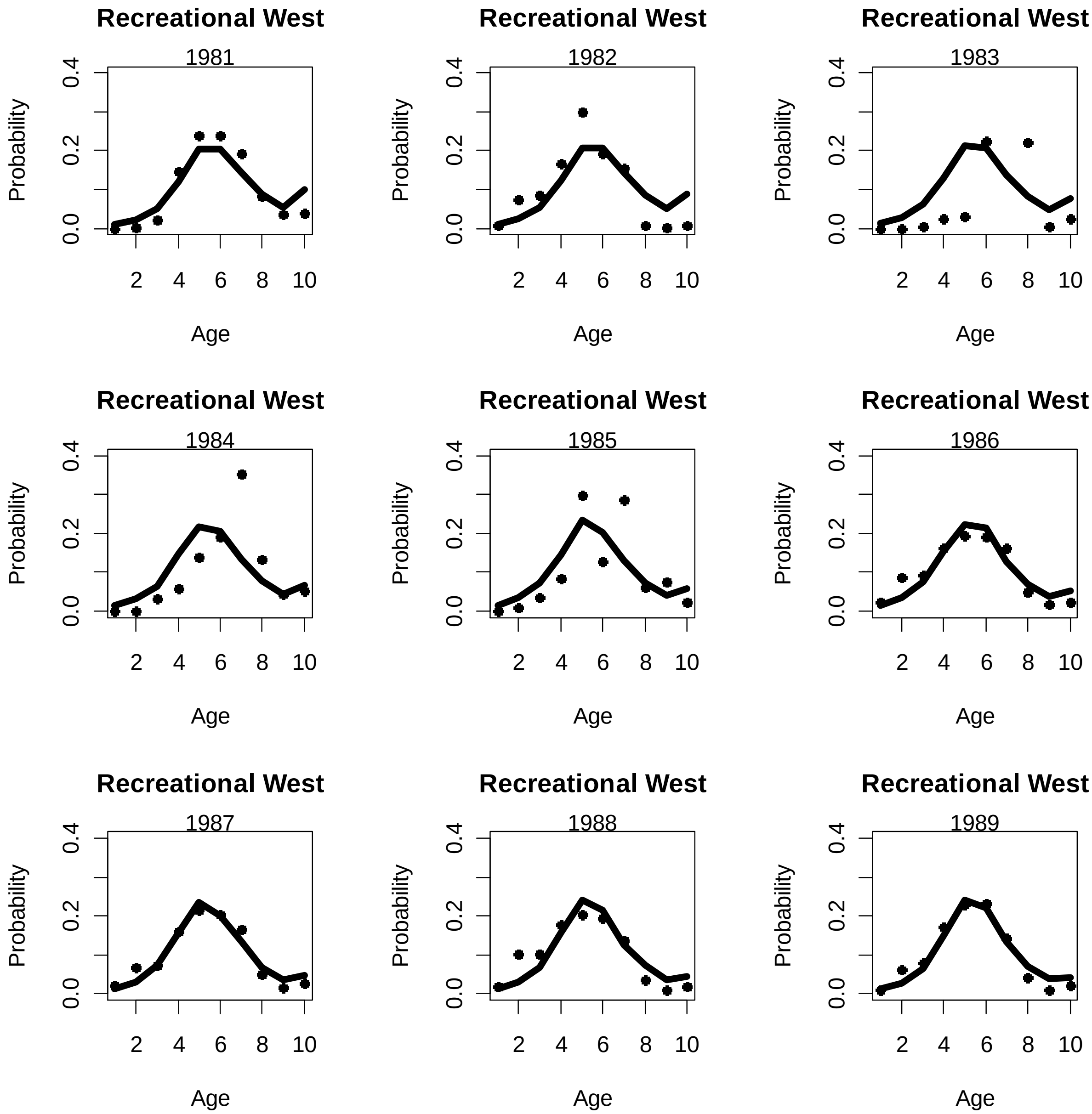


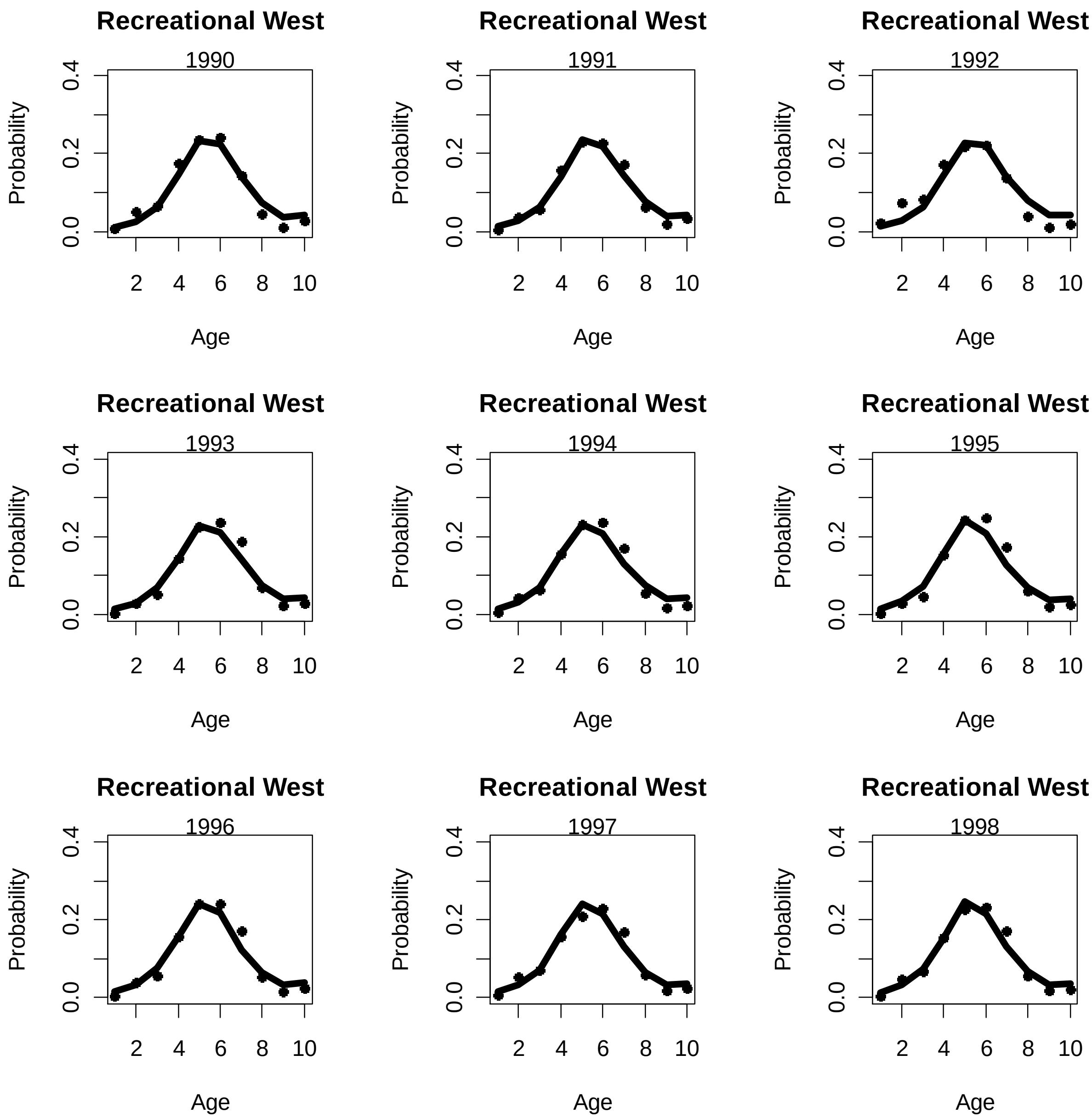
FIGURE 8.3—CONTINUITY MODEL FITS TO CATCH AT AGE.

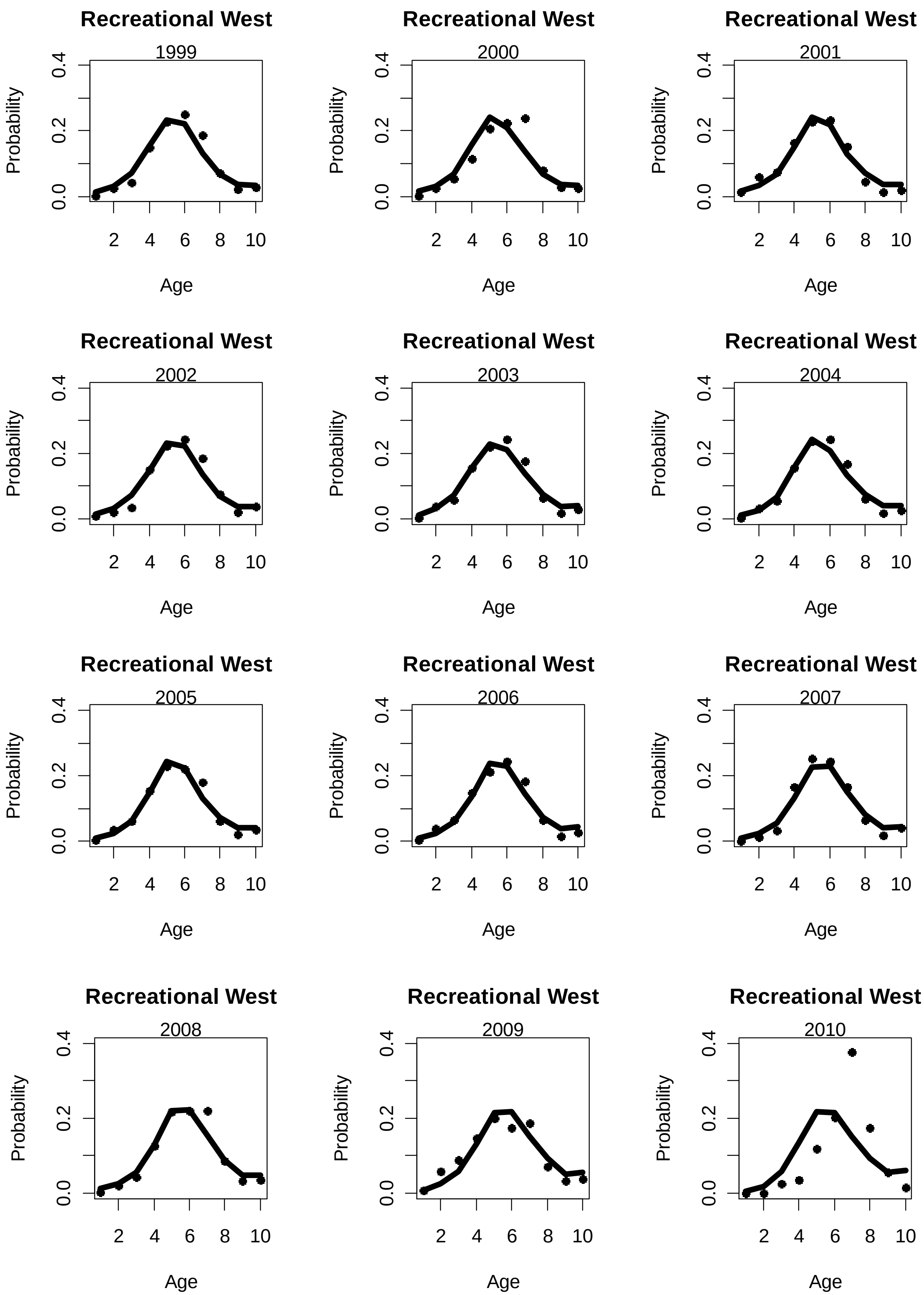


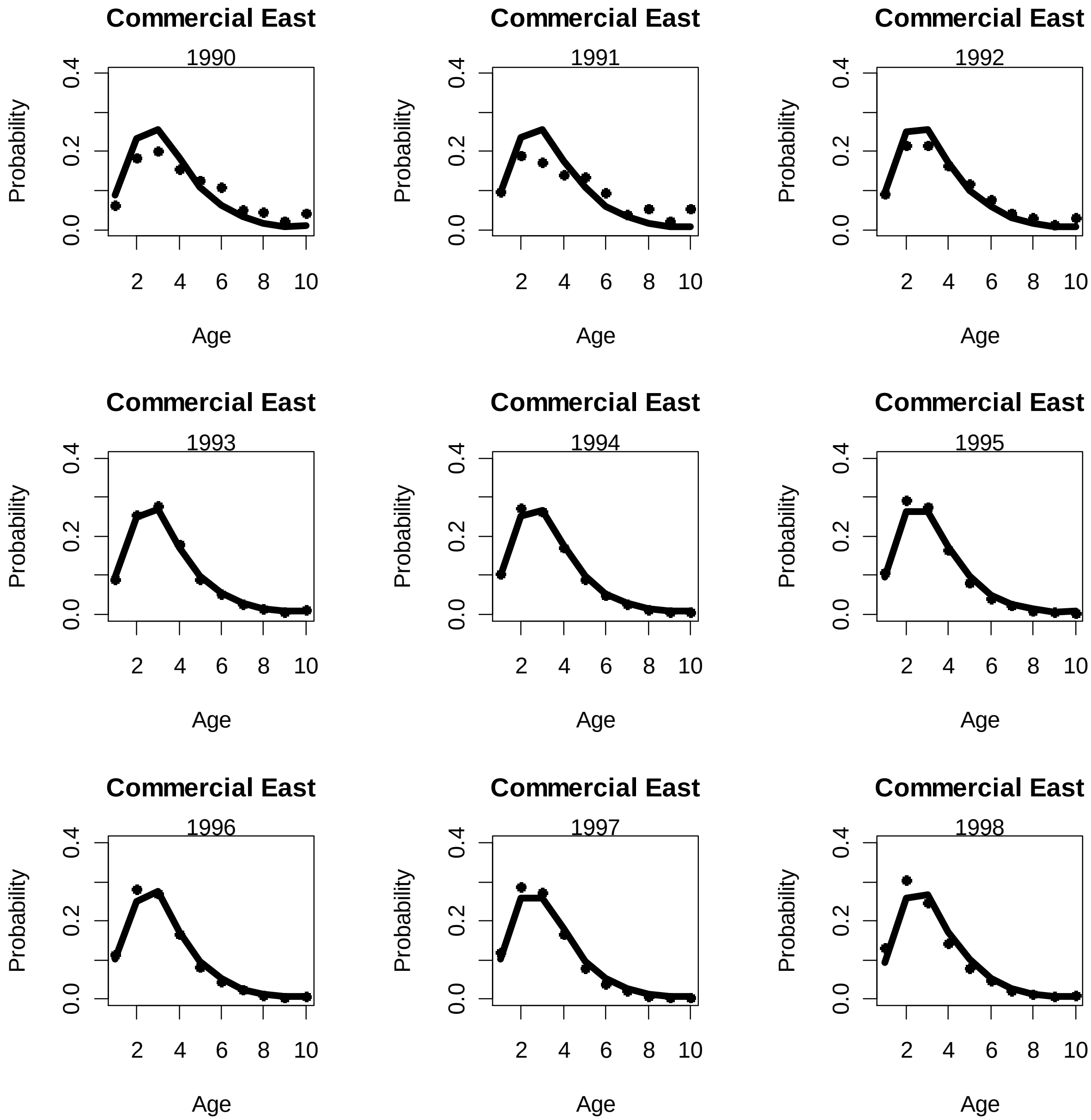

Recreational East
1990
Recreational East
1991
Recreational East
1992
Recreational East
1993
Recreational East
1994
Recreational East
1995
Recreational East
1996
Recreational East
1997
Recreational East
1998
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Recreational East
1999
Recreational East
2000
Recreational East
2001
Recreational East
2002
Recreational East
2003
Recreational East
2004
Recreational East
2005
Recreational East
2006
Recreational East
2007
Recreational East
2008
Recreational East
2009
Recreational East
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Recreational West
1981
Recreational West
1982
Recreational West
1983
Recreational West
1984
Recreational West
1985
Recreational West
1986
Recreational West
1987
Recreational West
1988
Recreational West
1989
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Recreational West
1990
Recreational West
1991
Recreational West
1992
Recreational West
1993
Recreational West
1994
Recreational West
1995
Recreational West
1996
Recreational West
1997
Recreational West
1998
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Recreational West
1999
Recreational West
2000
Recreational West
2001
Recreational West
2002
Recreational West
2003
Recreational West
2004
Recreational West
2005
Recreational West
2006
Recreational West
2007
Recreational West
2008
Recreational West
2009
Recreational West
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Commercial East
1990
Commercial East
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Commercial East
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Commercial East
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Commercial East
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Commercial East
1995
Commercial East
1996
Commercial East
1997
Commercial East
1998
Probability
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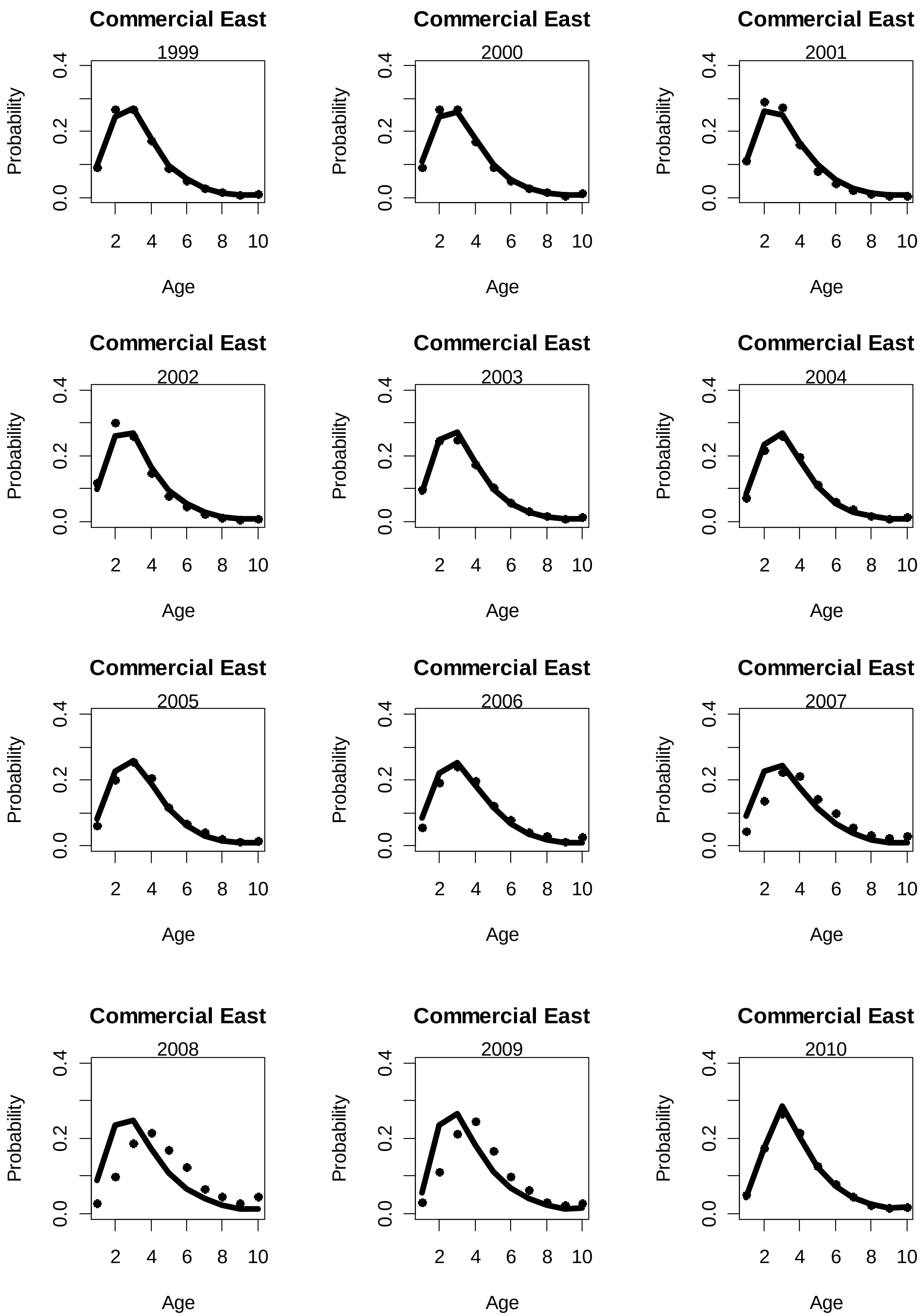
0.2
0.4
Age
2
4
6
8
10


Commercial East
1999
Commercial East
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Commercial East
2006
Commercial East
2007
Commercial East
2008
Commercial East
2009
Commercial East
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
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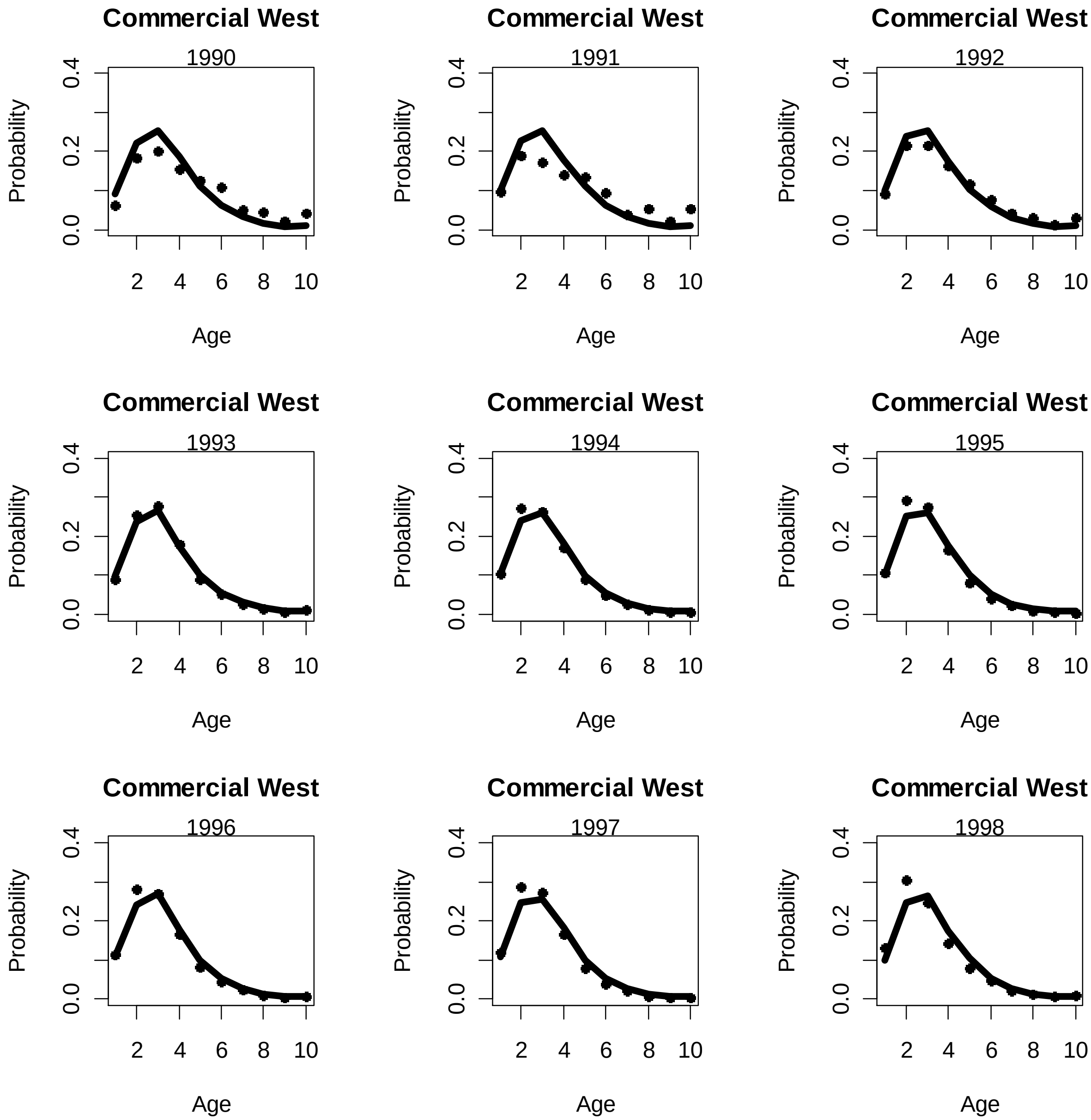
Commercial West
1990
Commercial West
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Commercial West
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Commercial West
1993
Commercial West
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Commercial West
1995
Commercial West
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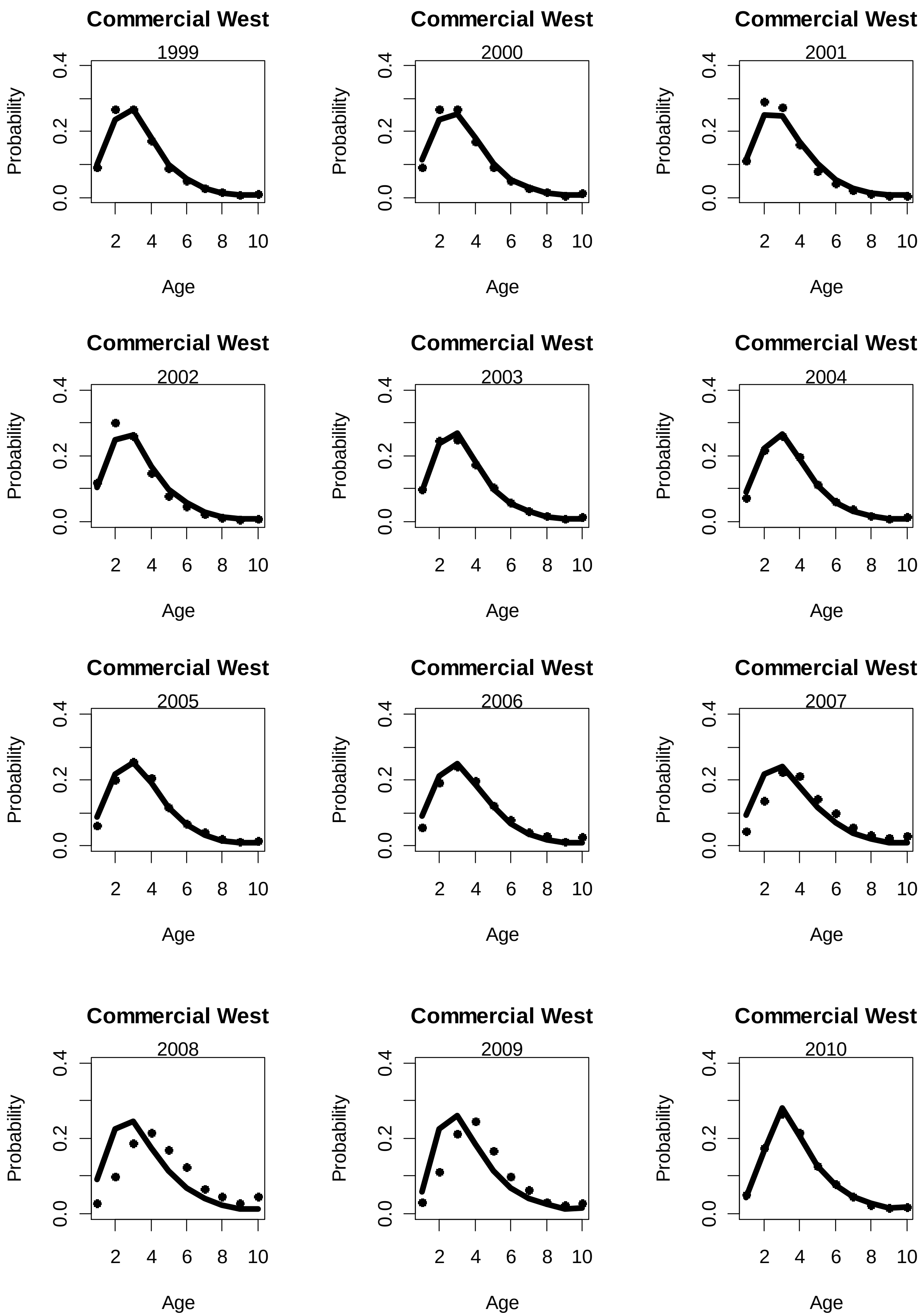
Commercial West
1997
Commercial West
1998
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Commercial West
1999
Commercial West
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Commercial West
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2006
Commercial West
2007
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Probability
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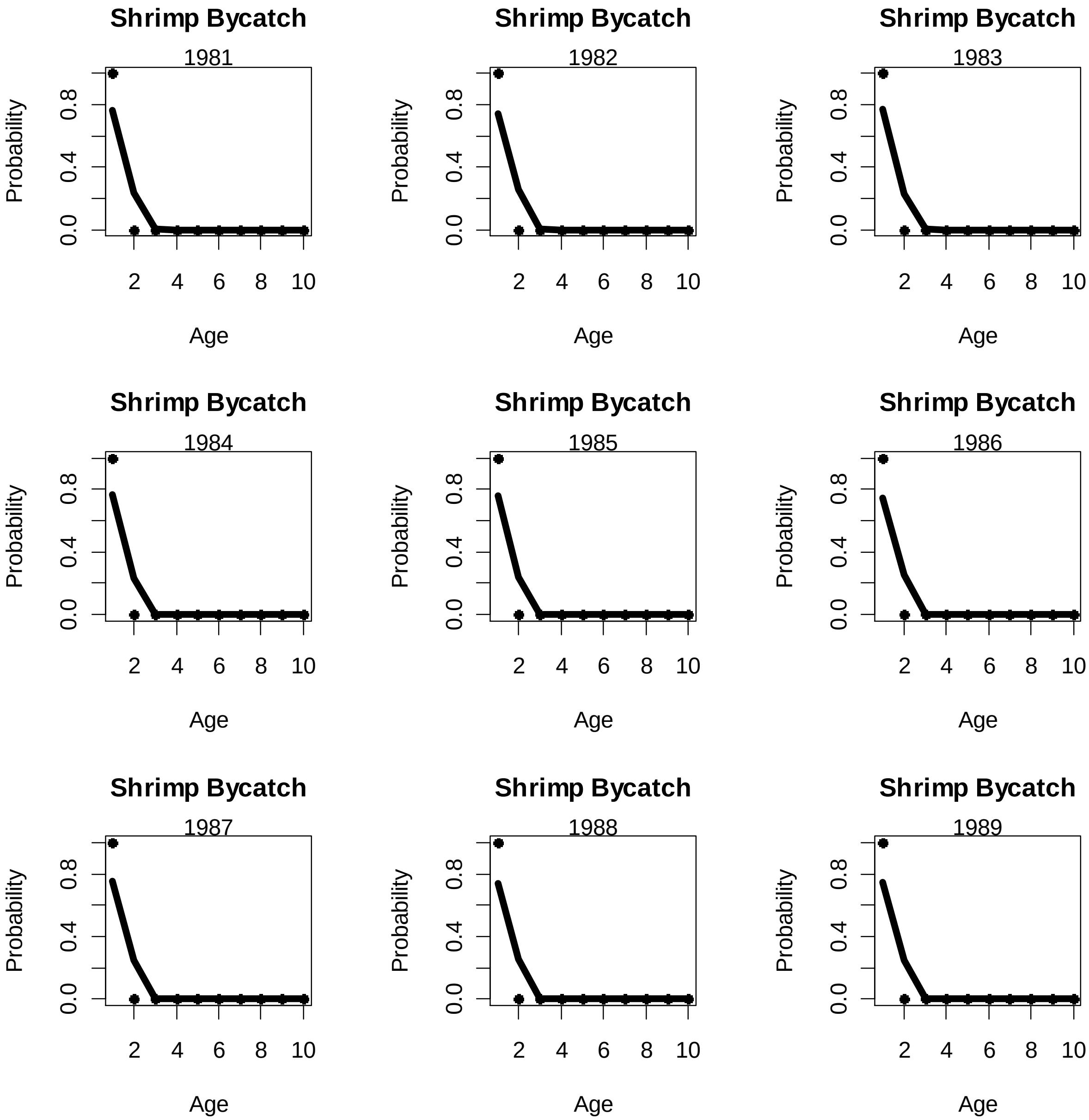
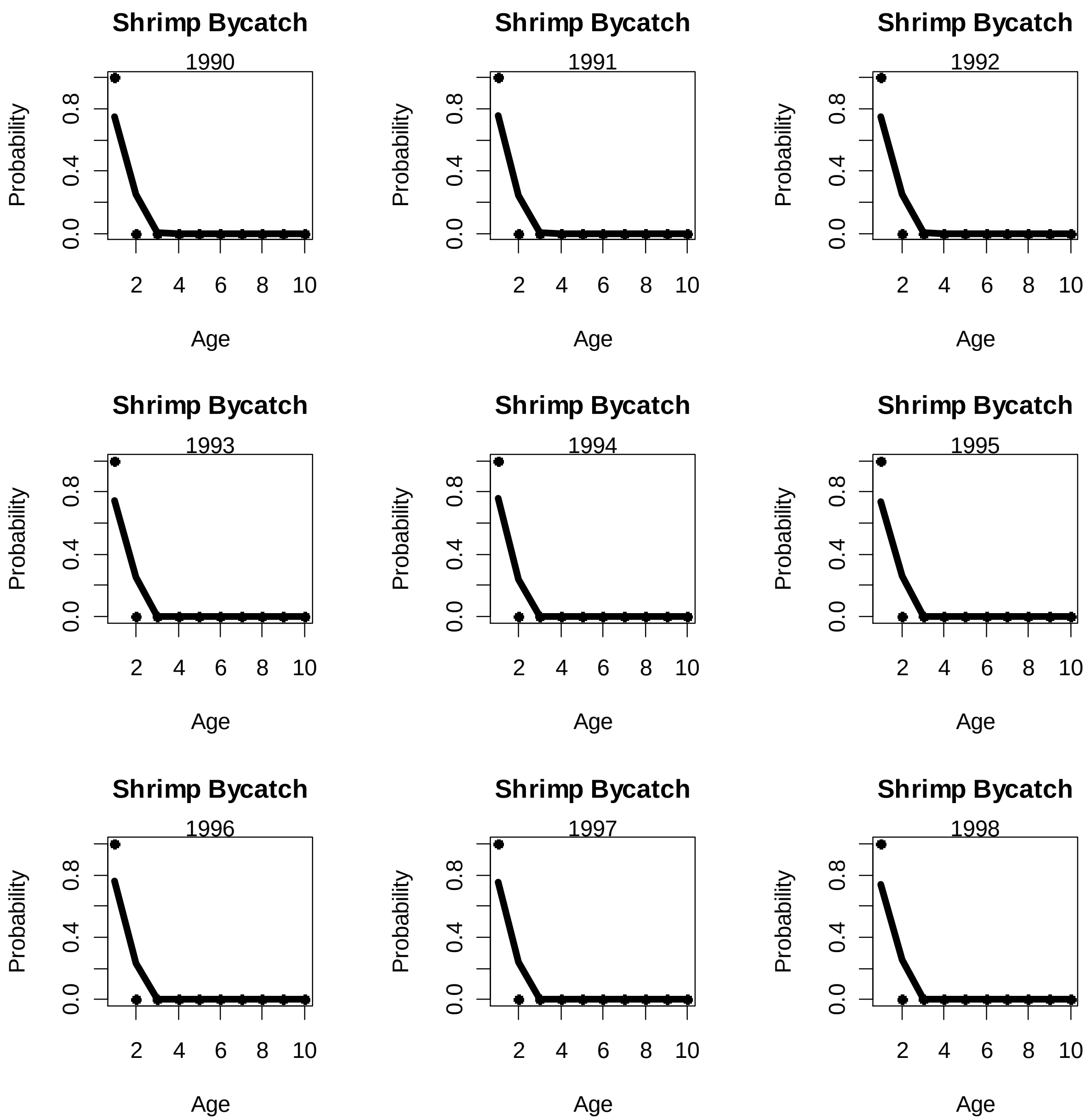
0.4
Age
2
4
6
8
10


Shrimp Bycatch
1981
Shrimp Bycatch
1982
Shrimp Bycatch
1983
Shrimp Bycatch
1984
Shrimp Bycatch
1985
Shrimp Bycatch
1986
Shrimp Bycatch
1987
Shrimp Bycatch
1988
Shrimp Bycatch
1989
Probability
0.0
0.4
0.8
Age
2
4
6
8
10


Shrimp Bycatch
1990
Shrimp Bycatch
1991
Shrimp Bycatch
1992
Shrimp Bycatch
1993
Shrimp Bycatch
1994
Shrimp Bycatch
1995
Shrimp Bycatch
1996
Shrimp Bycatch
1997
Shrimp Bycatch
1998
Probability
0.0
0.4
0.8
Age
2
4
6
8
10

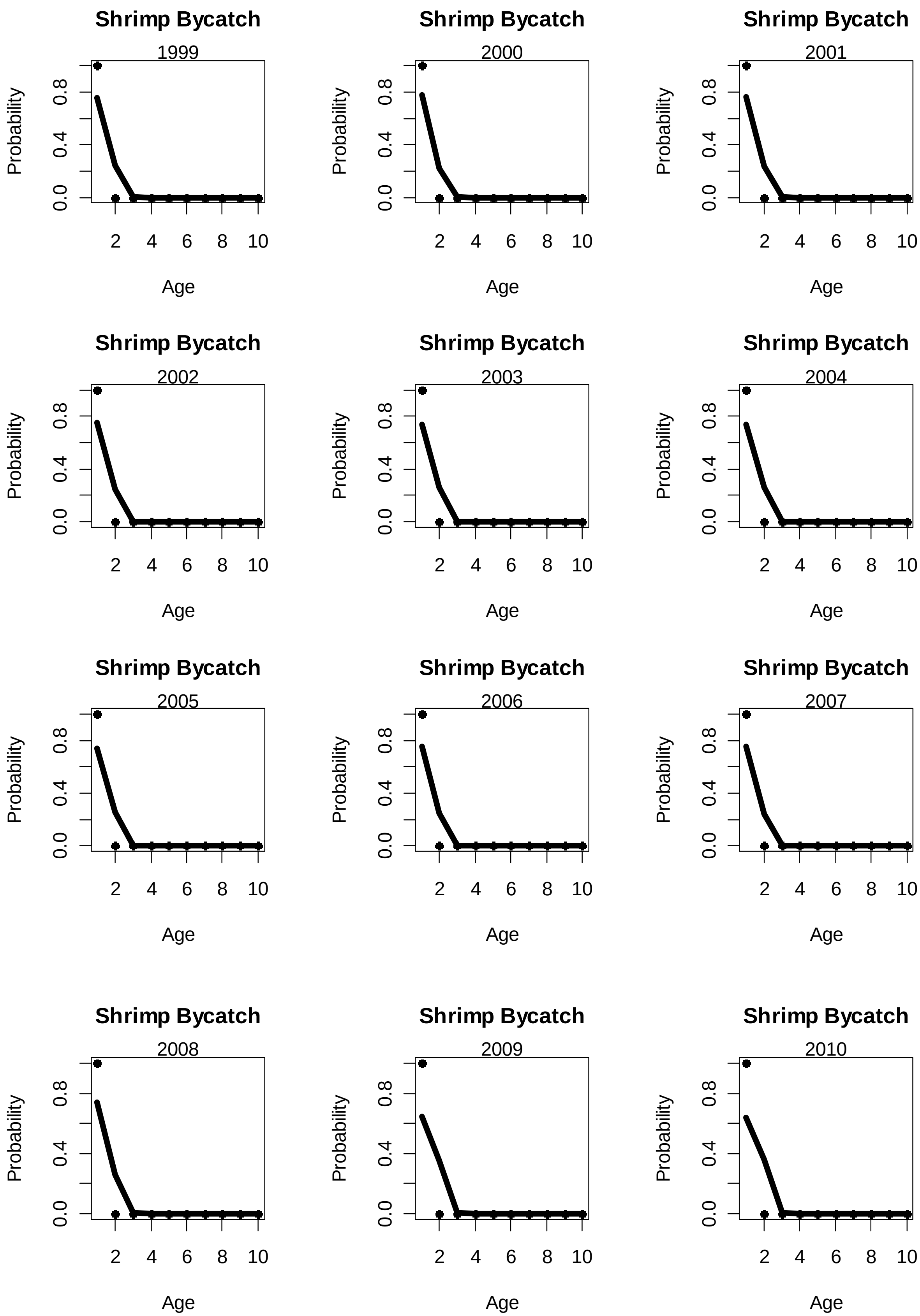

Shrimp Bycatch
1999
Shrimp Bycatch
2000
Shrimp Bycatch
2001
Shrimp Bycatch
2002
Shrimp Bycatch
2003
Shrimp Bycatch
2004
Shrimp Bycatch
2005
Shrimp Bycatch
2006
Shrimp Bycatch
2007
Shrimp Bycatch
2008
Shrimp Bycatch
2009
Shrimp Bycatch
2010
Probability
0.0
0.4
0.8
Age
2
4
6
8
10

FIGURE 8.4—CONTINUITY MODEL ESTIMATES OF SELECTIVITY AT AGE BY FLEET.

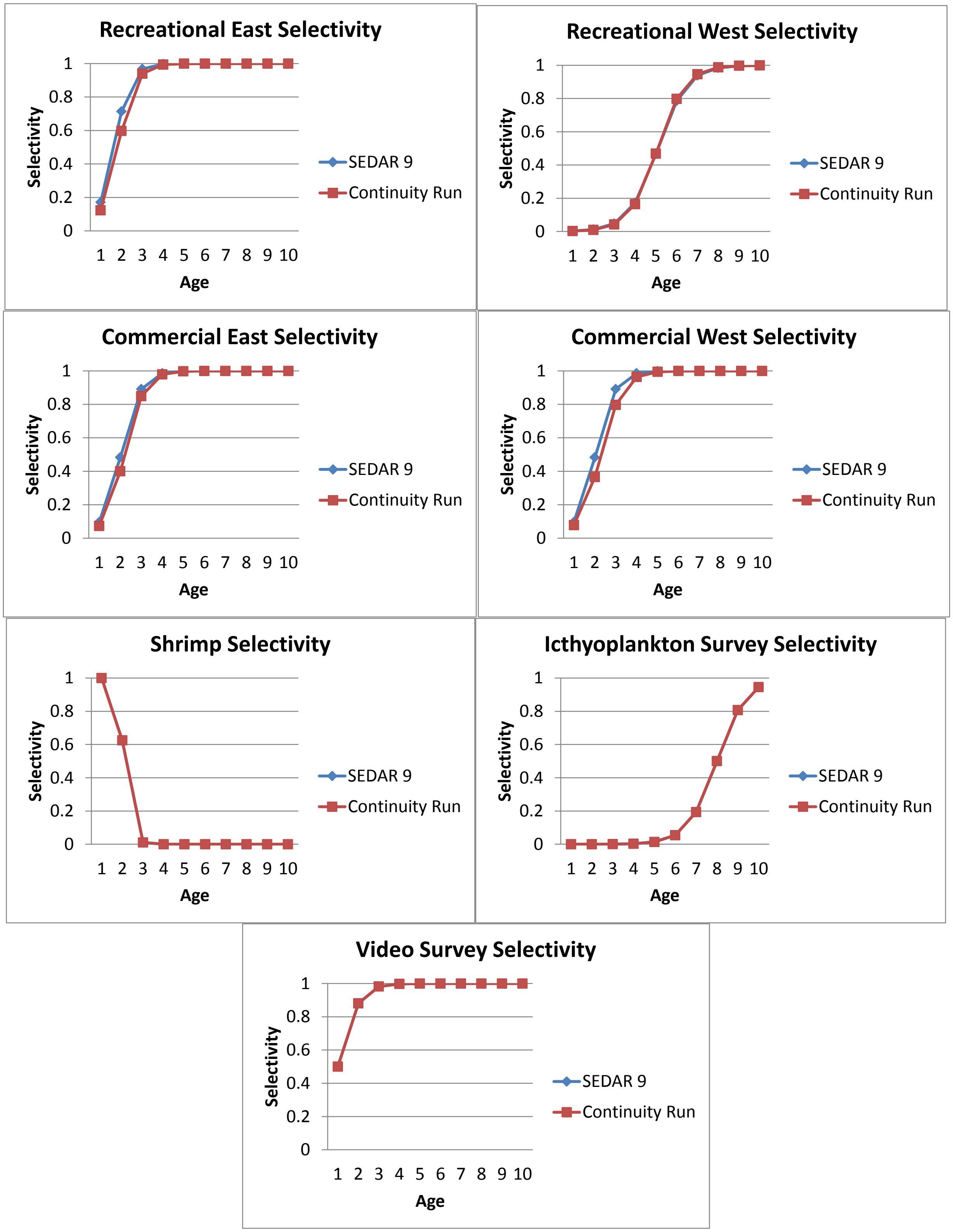
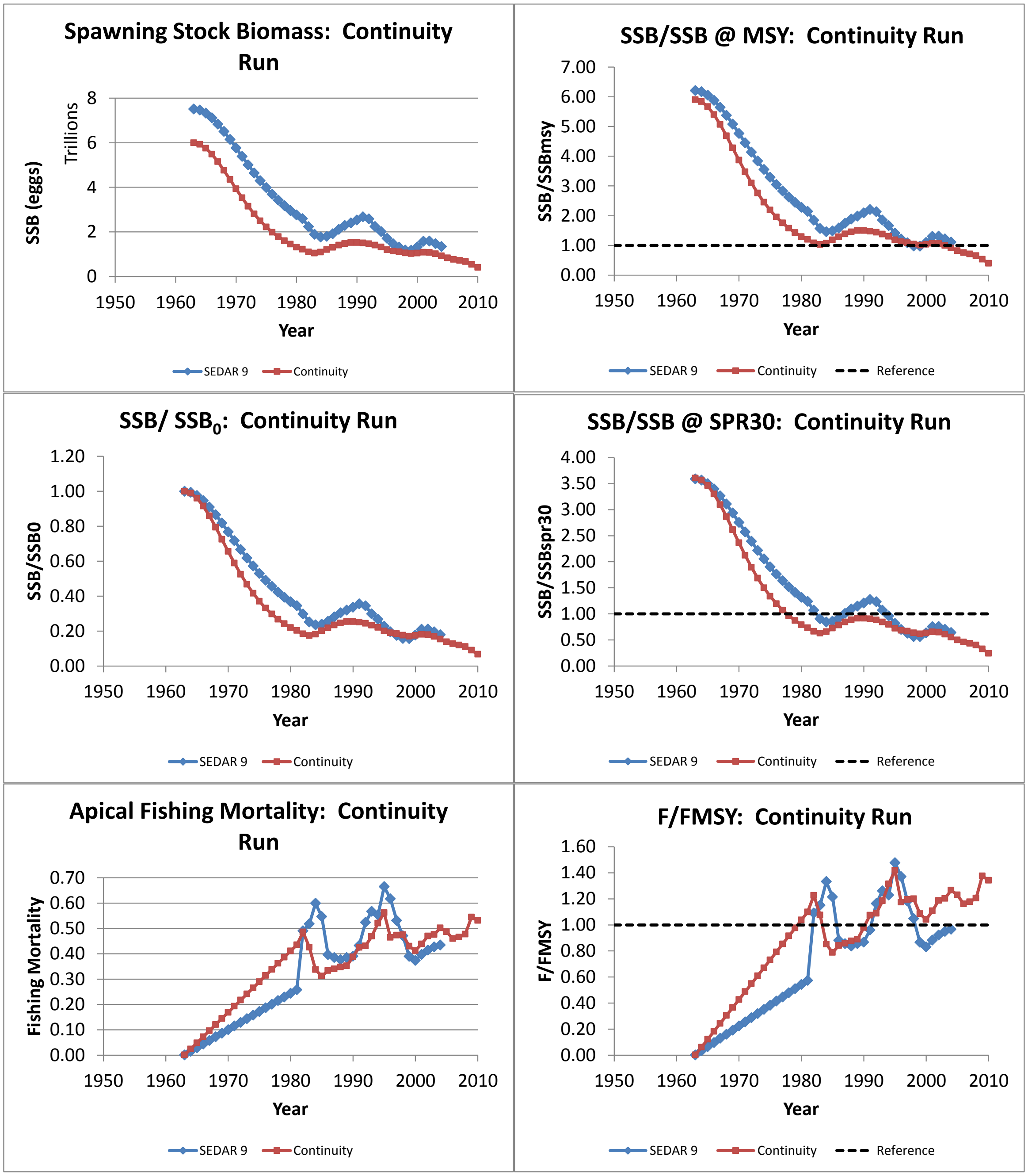


FIGURE 8.5—CONTINUITY MODEL ESTIMATES OF SPAWNING STOCK BIOMASS, FISHING MORTALITY, AND RECRUITMENT.



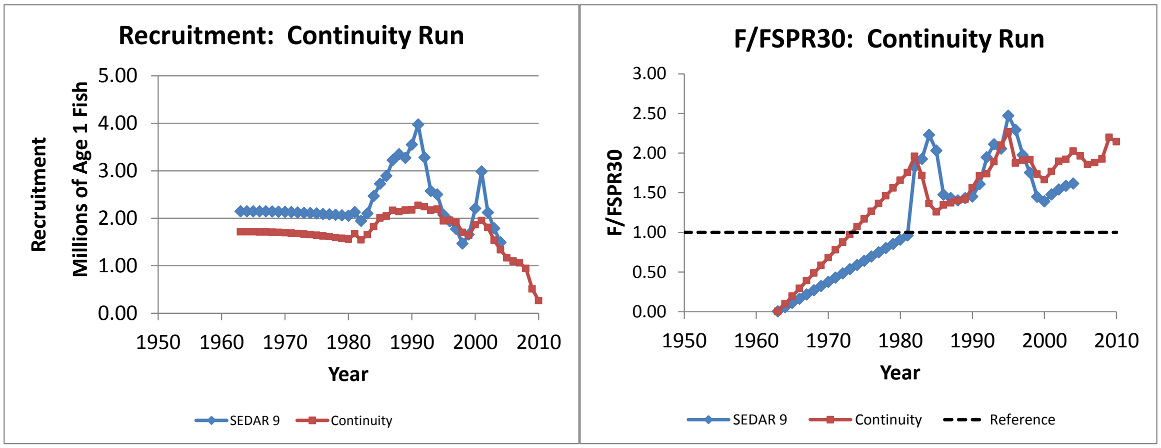


FIGURE 8.6—CONTINUITY MODEL PROJECTIONS OF SPAWNING STOCK BIOMASS UNDER THREE SCENARIOS (THE CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009) AND THREE SUB-SCENARIOS: AT SPR 30, AT 75% OF SPR 30, AND AT NO FISHING.

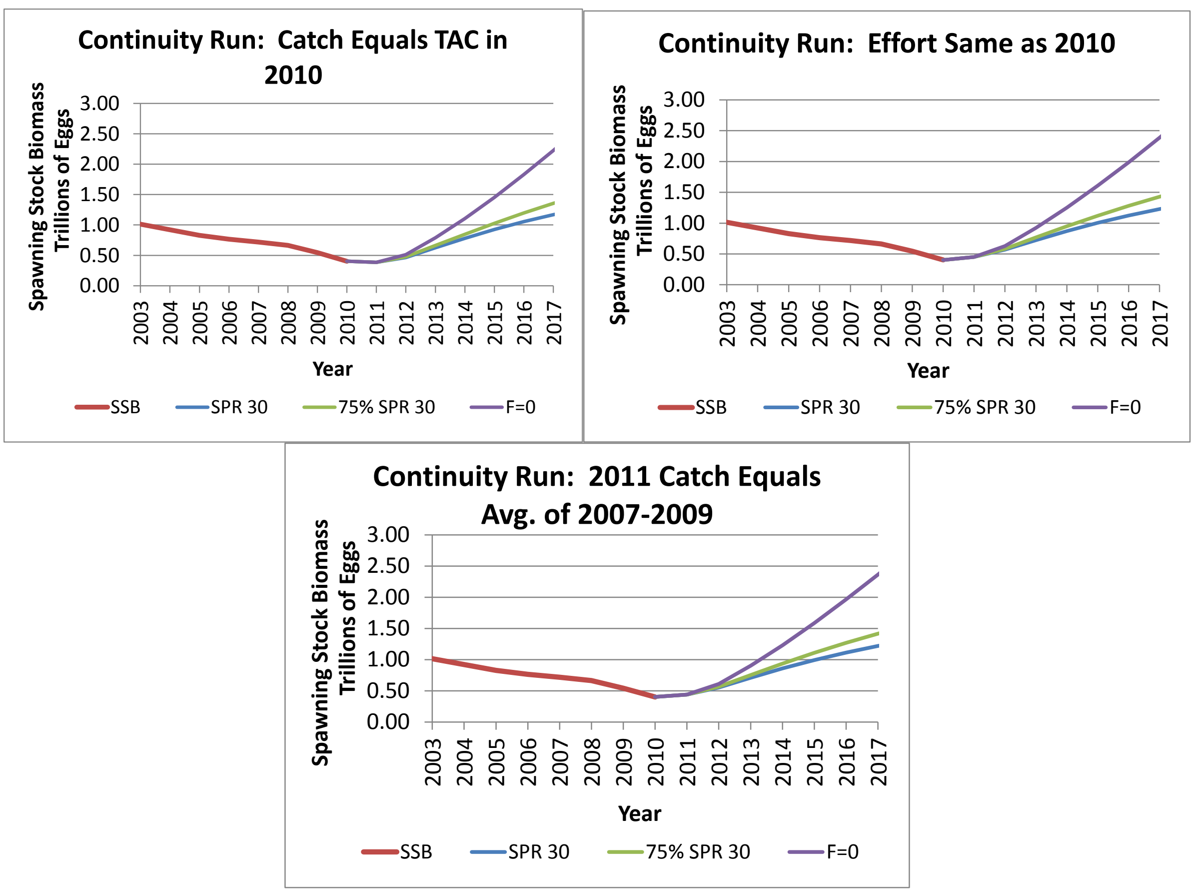


FIGURE 8.7—CONTINUITY MODEL TOTAL ALLOWABLE CATCHES TO REBUILD THE STOCK IN 10 YEARS UNDER THE THREE SCENARIOS: CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009.

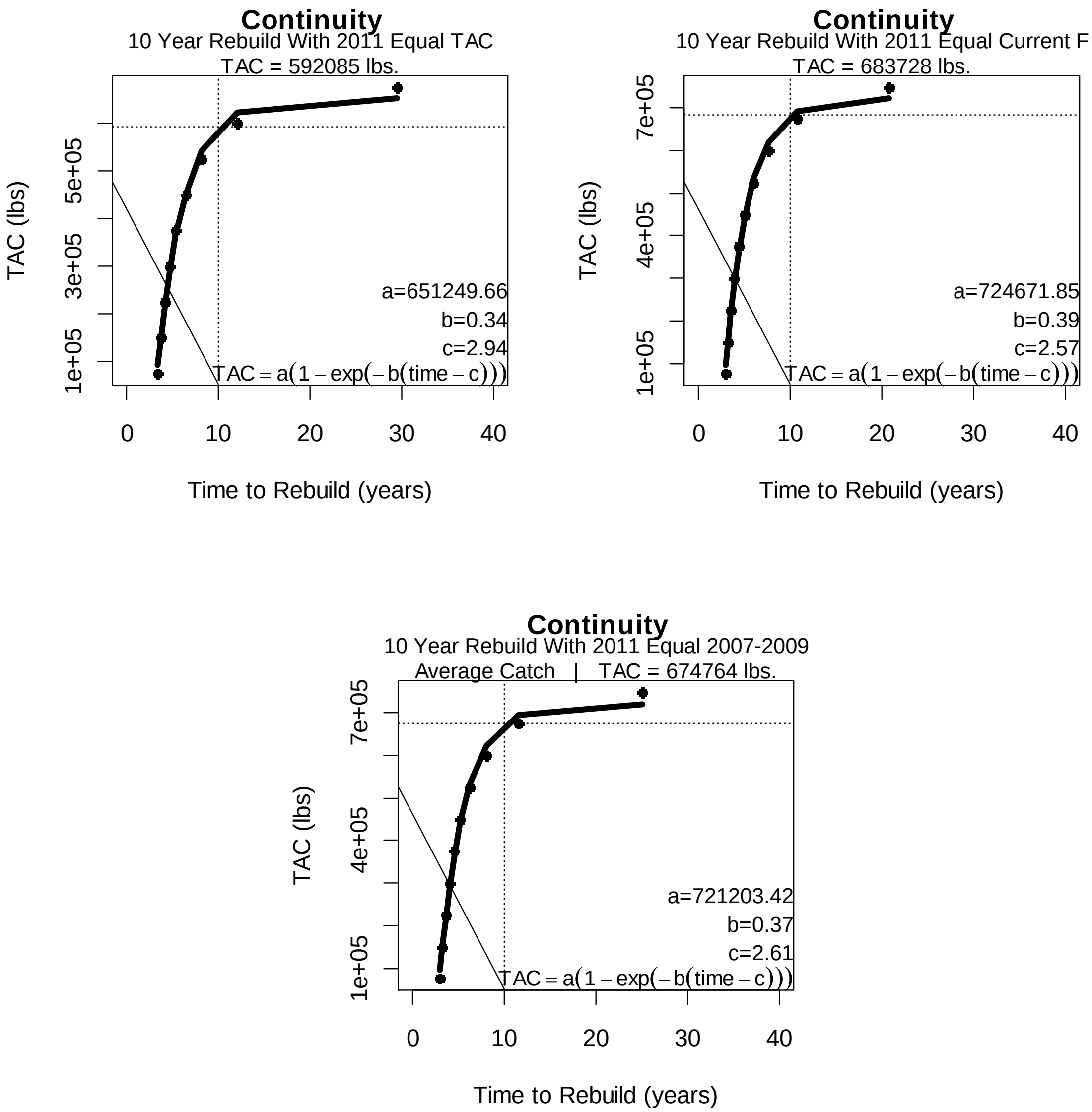
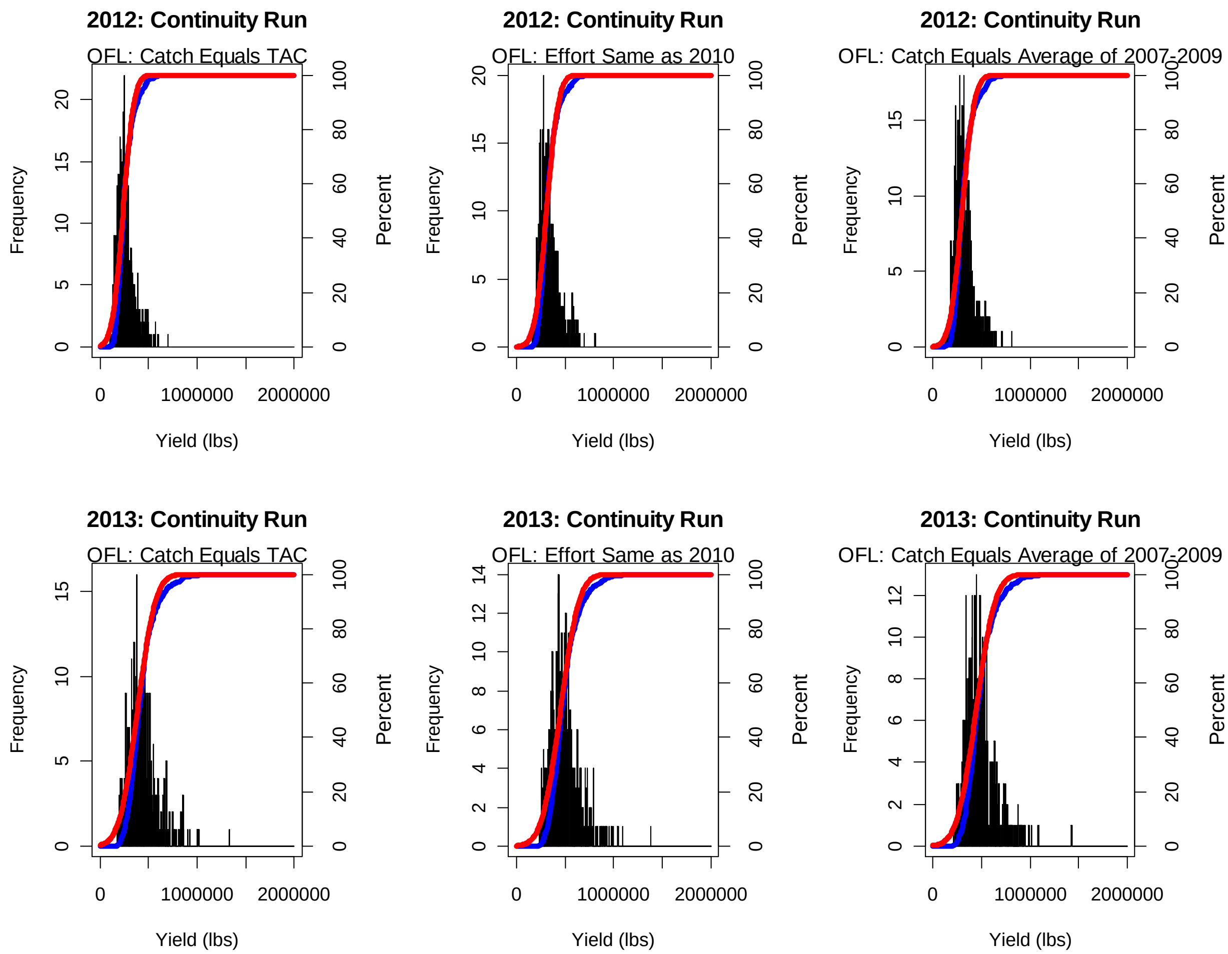
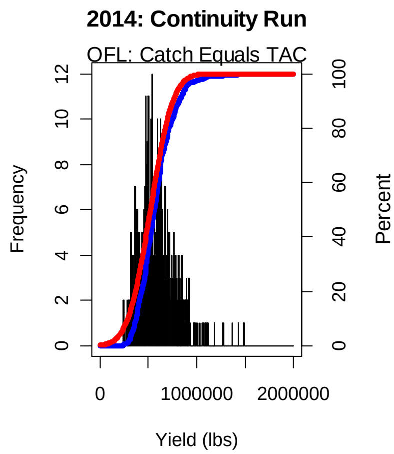
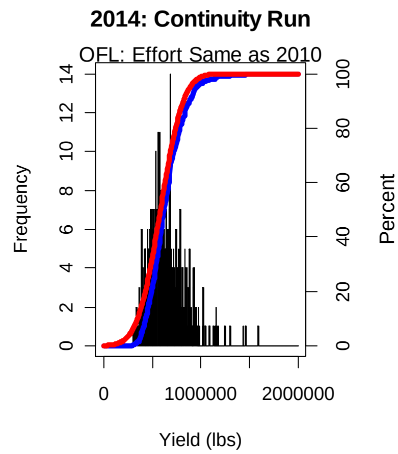
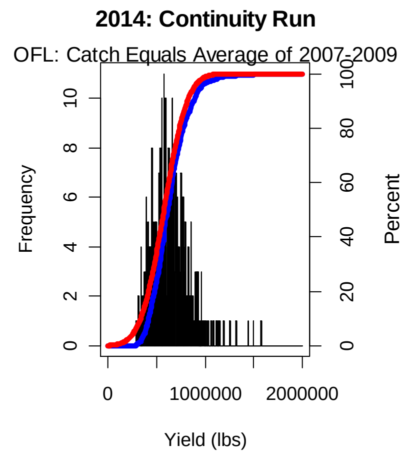


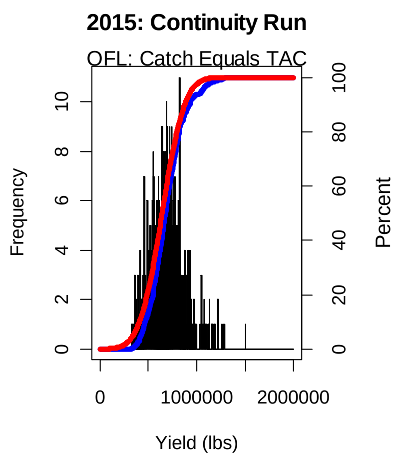
FIGURE 8.8—CONTINUITY MODEL ANNUALLY PROJECTED PROBABILITY DISTRIBUTIONS OF EXCEEDING THE OVERFISHING LIMIT UNDER THE THREE SCENARIOS: CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009.

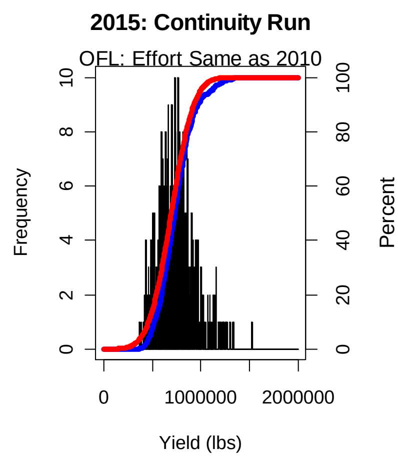


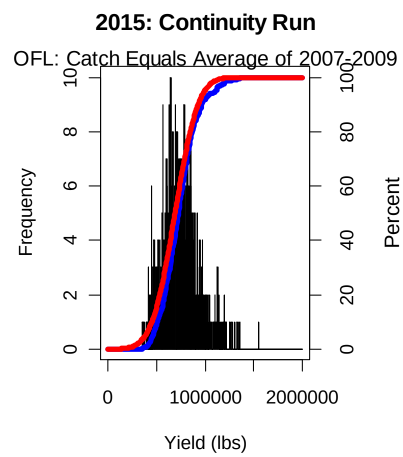

2014: Continuity Run
OFL: Catch Equals TAC
Frequency
Percent
0
1000000
2000000
Yield (lbs)


2014: Continuity Run
OFL: Effort Same as 2010
Frequency
Percent
0
1000000
2000000
Yield (lbs)


2014: Continuity Run
OFL: Catch Equals Average of 2007-2009
Frequency
Percent
0
1000000
2000000
Yield (lbs)


2015: Continuity Run
OFL: Catch Equals TAC
Frequency
Percent
0
1000000
2000000
Yield (lbs)


2015: Continuity Run
OFL: Effort Same as 2010
Frequency
Percent
0
1000000
2000000
Yield (lbs)


2015: Continuity Run
OFL: Catch Equals Average of 2007-2009
Frequency
Percent
0
1000000
2000000
Yield (lbs)

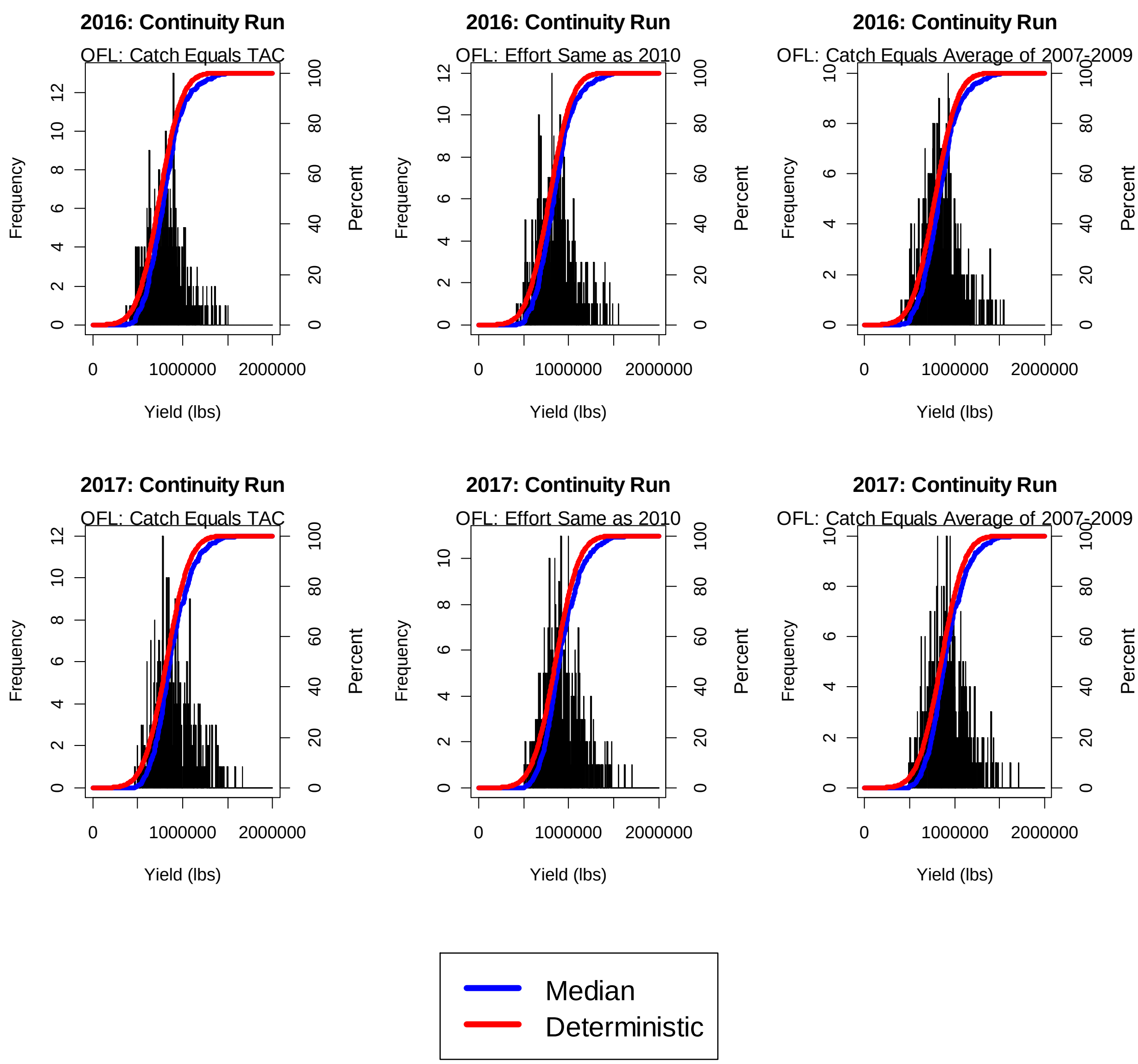
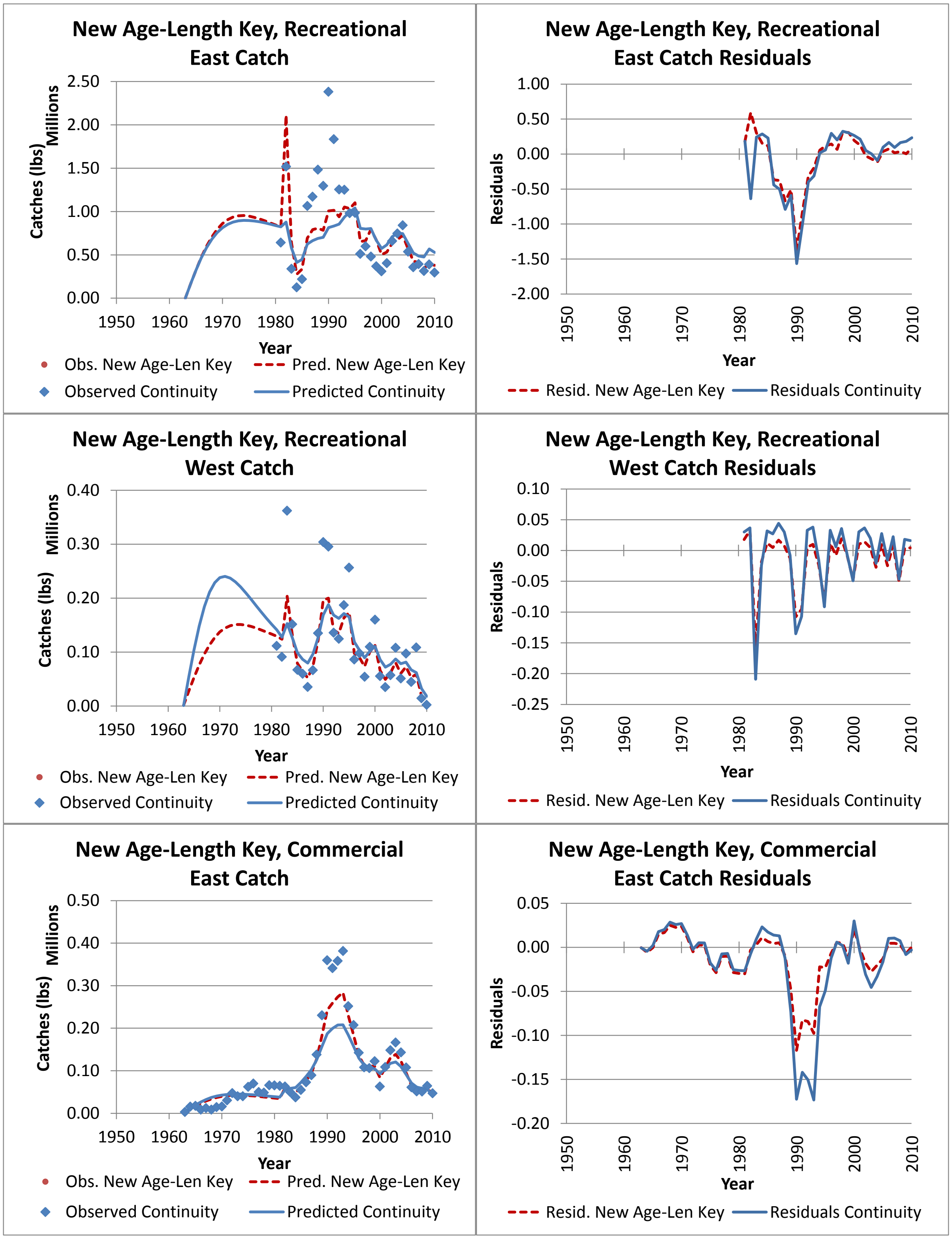
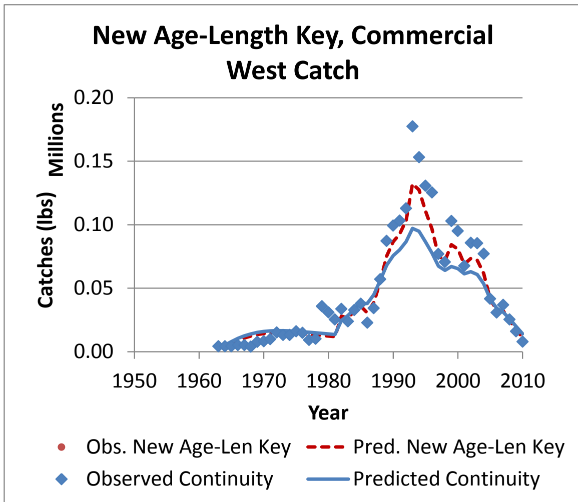
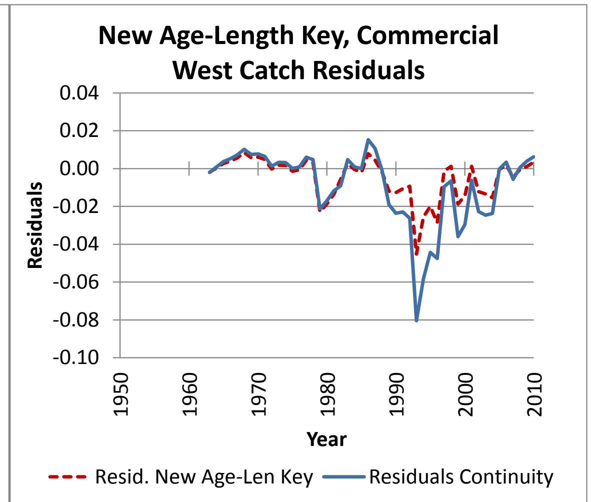
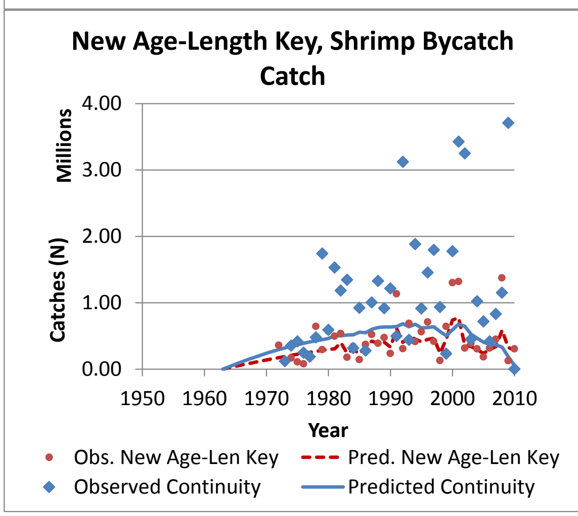

2016: Continuity Run
OFL: Catch Equals TAC
2016: Continuity Run
OFL: Effort Same as 2010
2016: Continuity Run
OFL: Catch Equals Average of 2007-2009
2017: Continuity Run
OFL: Catch Equals TAC
2017: Continuity Run
OFL: Effort Same as 2010
2017: Continuity Run
OFL: Catch Equals Average of 2007-2009
Frequency
Percent
Yield (lbs)
0
1000000
2000000
Median
Deterministic

FIGURE 8.9—NEW AGE-LENGTH KEY MODEL FITS TO RECREATIONAL AND COMMERCIAL CATCHES.




New Age-Length Key, Commercial West Catch
Millions
Catches (lbs)
0.20
0.15
0.10
0.05
0.00
1950
1960
1970
1980
1990
2000
2010
Year
Obs. New Age-Len Key
Pred. New Age-Len Key
Observed Continuity
Predicted Continuity


New Age-Length Key, Commercial West Catch Residuals
Residuals
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.08
-0.10
1950
1960
1970
1980
1990
2000
2010
Year
Resid. New Age-Len Key
Residuals Continuity


New Age-Length Key, Shrimp Bycatch Catch
Millions
Catches (N)
4.00
3.00
2.00
1.00
0.00
1950
1960
1970
1980
1990
2000
2010
Year
Obs. New Age-Len Key
Pred. New Age-Len Key
Observed Continuity
Predicted Continuity

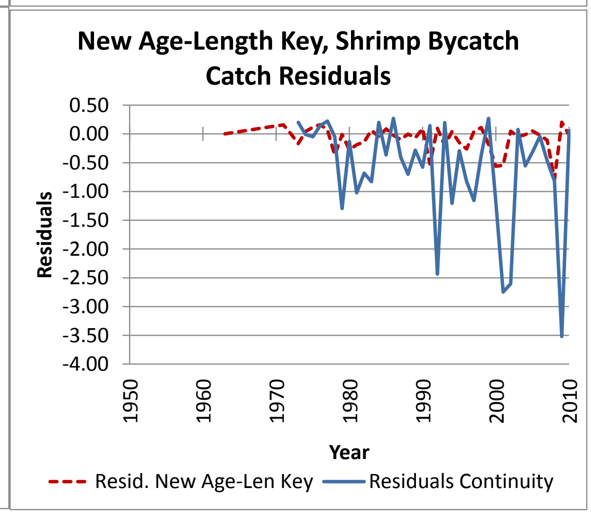

New Age-Length Key, Shrimp Bycatch Catch Residuals
Residuals
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
-4.00
1950
1960
1970
1980
1990
2000
2010
Year
Resid. New Age-Len Key
Residuals Continuity

FIGURE 8.10— NEW AGE-LENGTH KEY MODEL FITS TO CPUE INDICES.

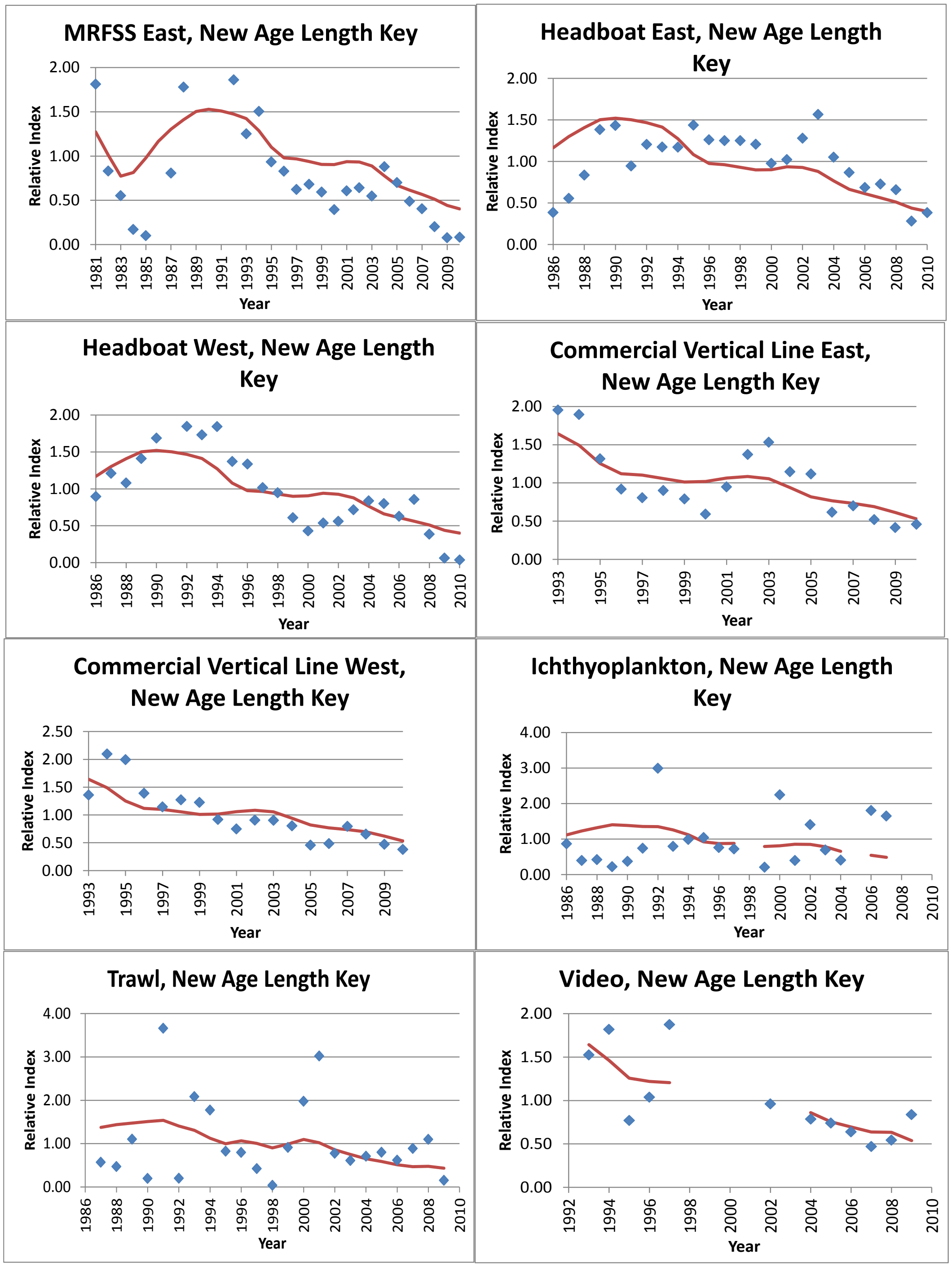
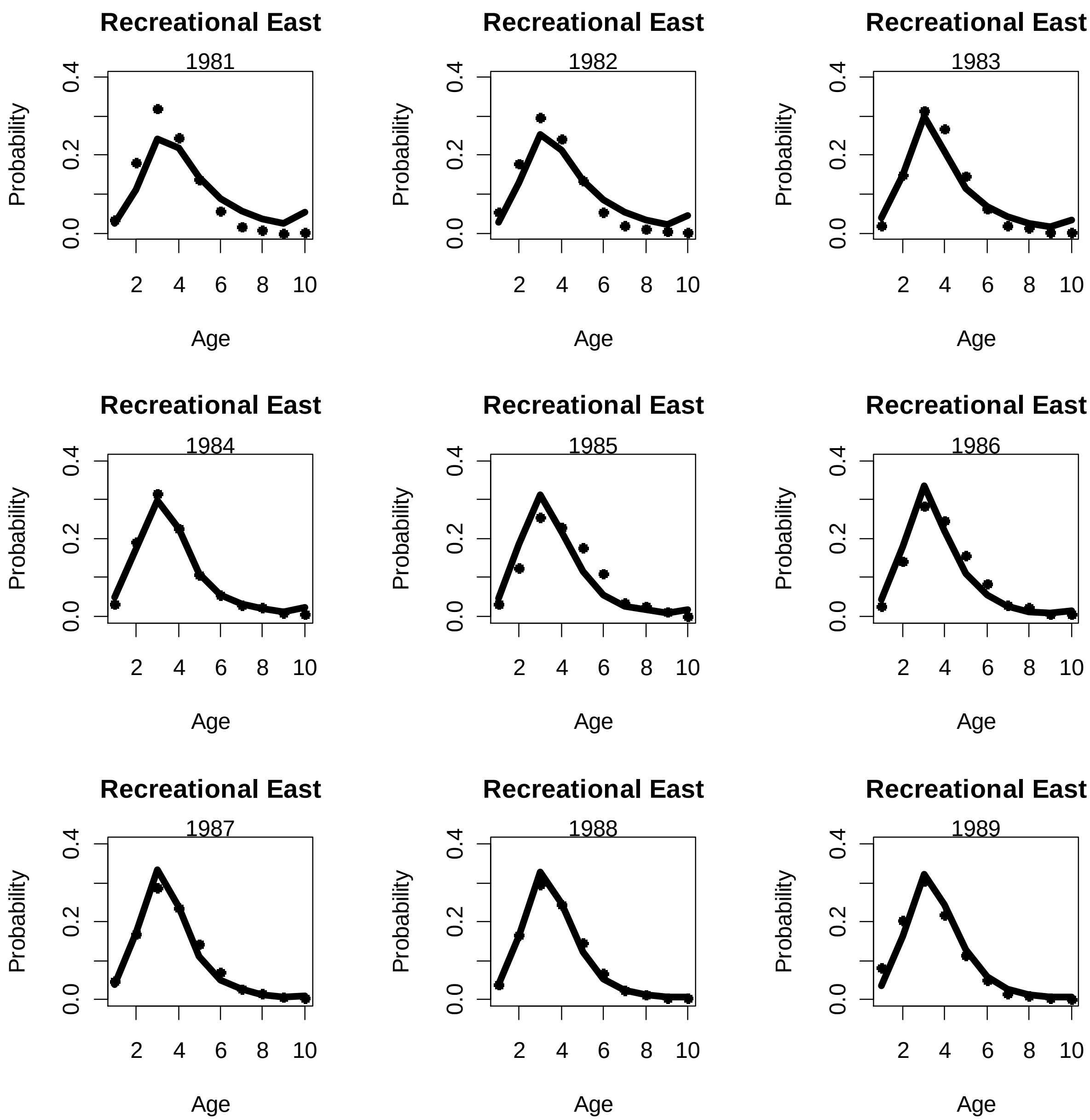
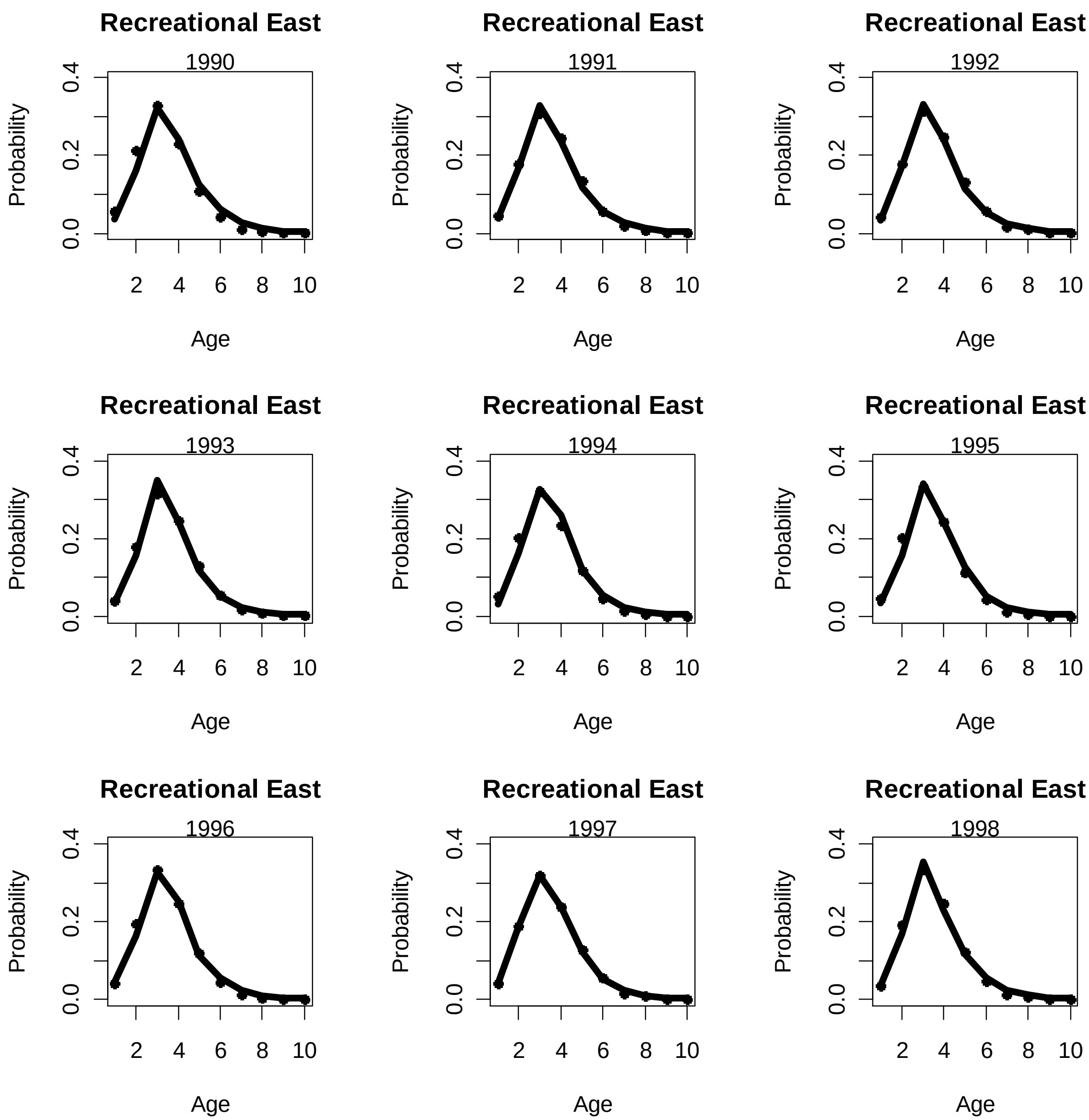
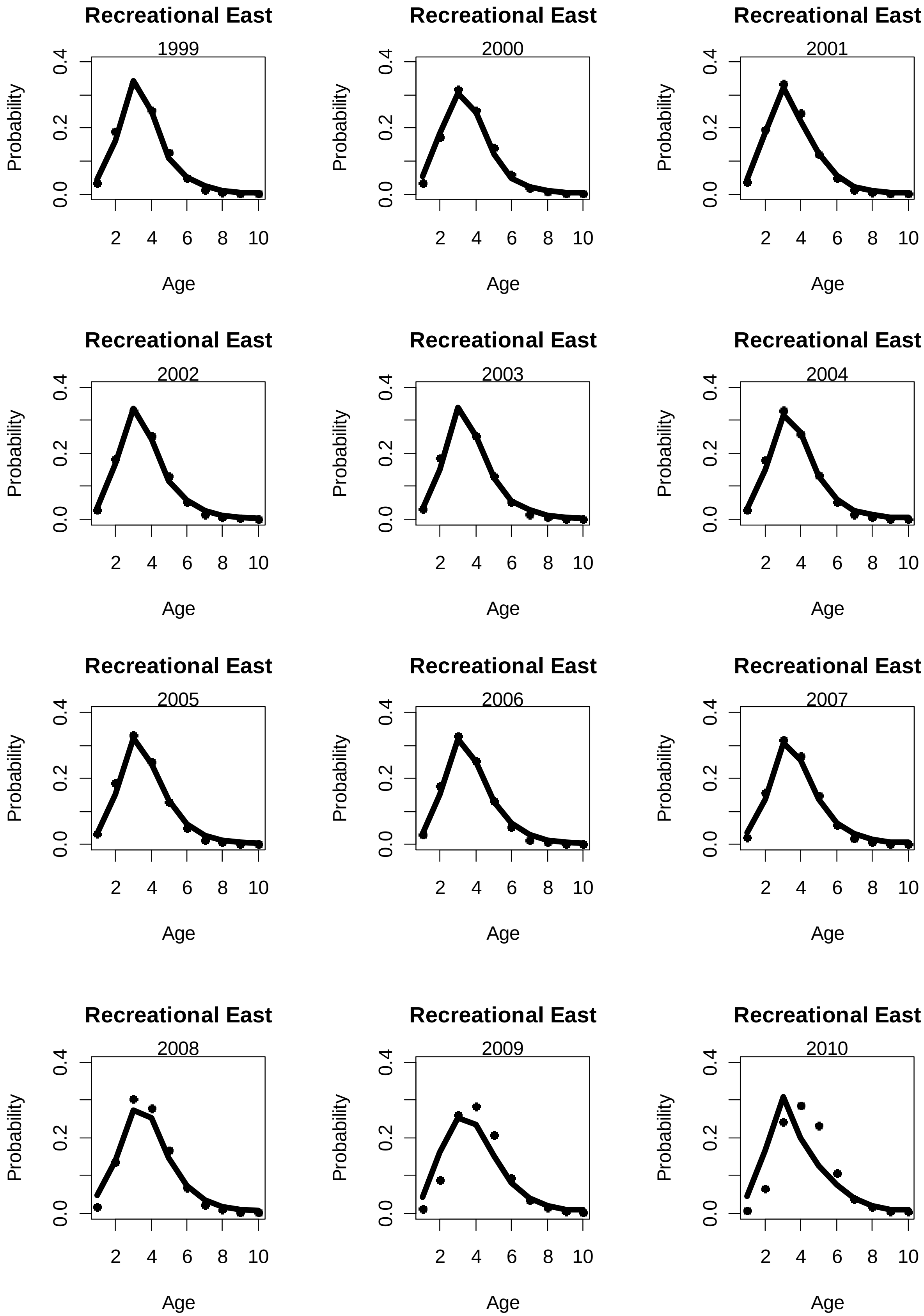
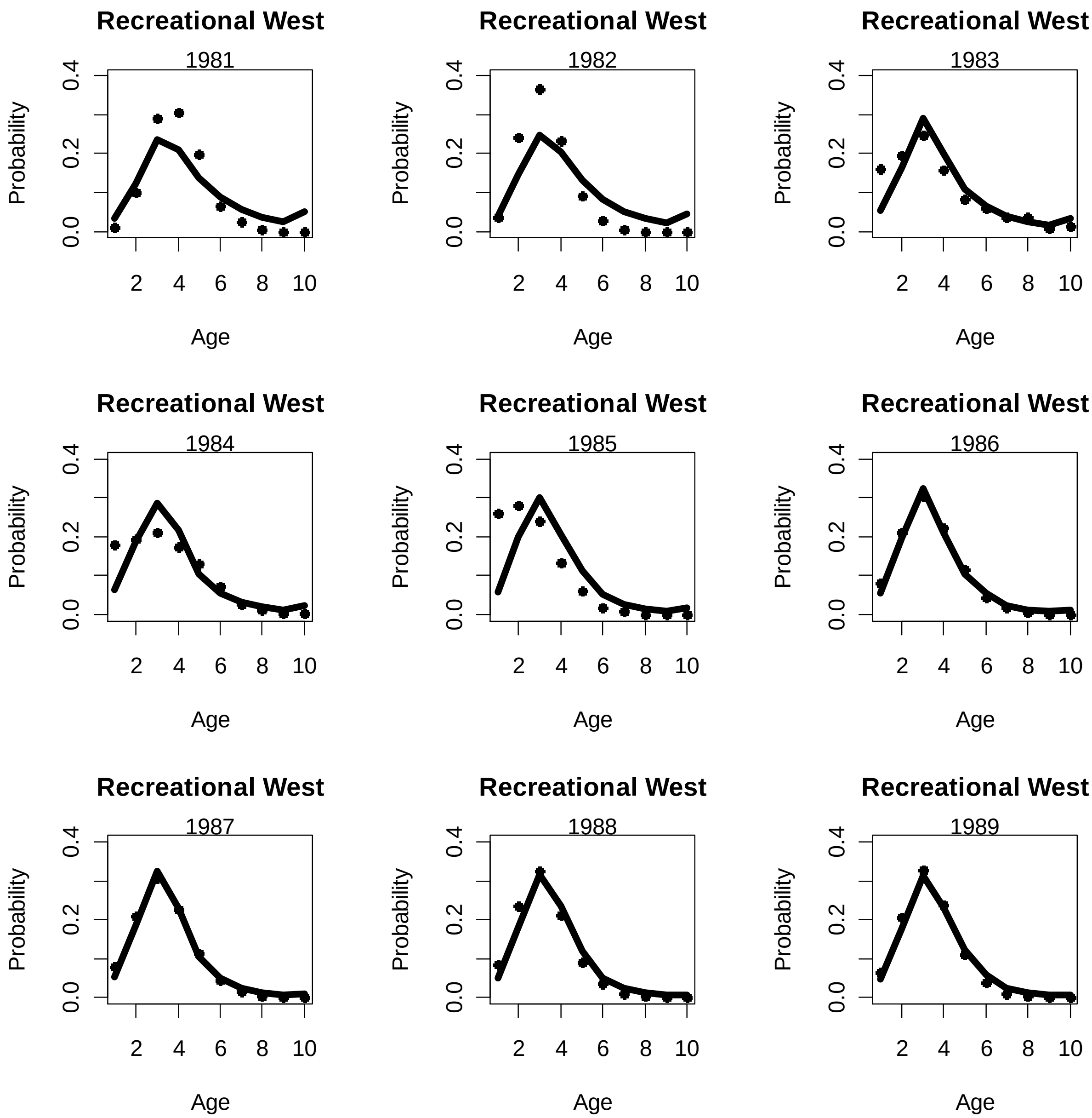


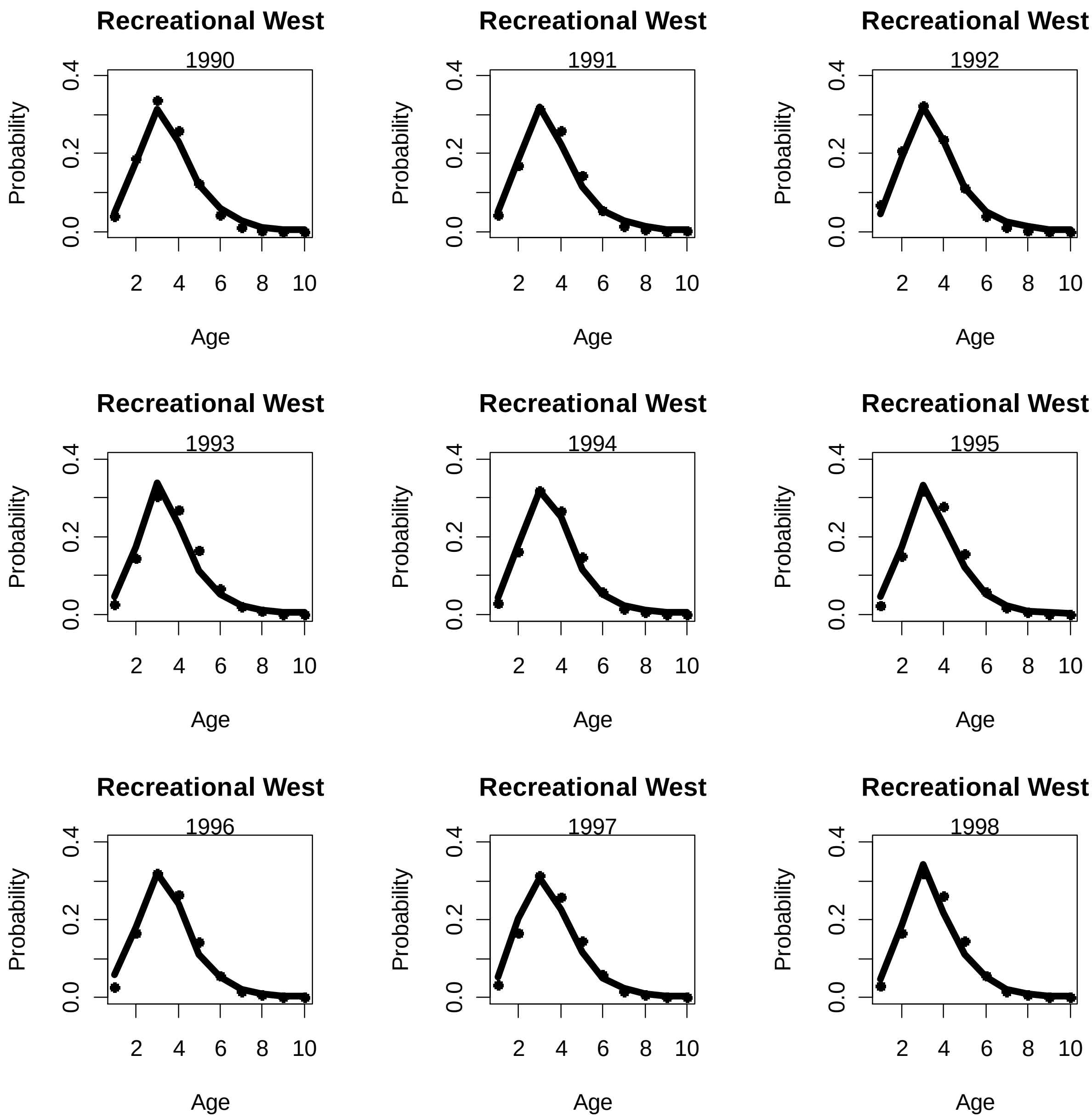
FIGURE 8.11— NEW AGE-LENGTH KEY MODEL FITS TO CATCH AT AGE.

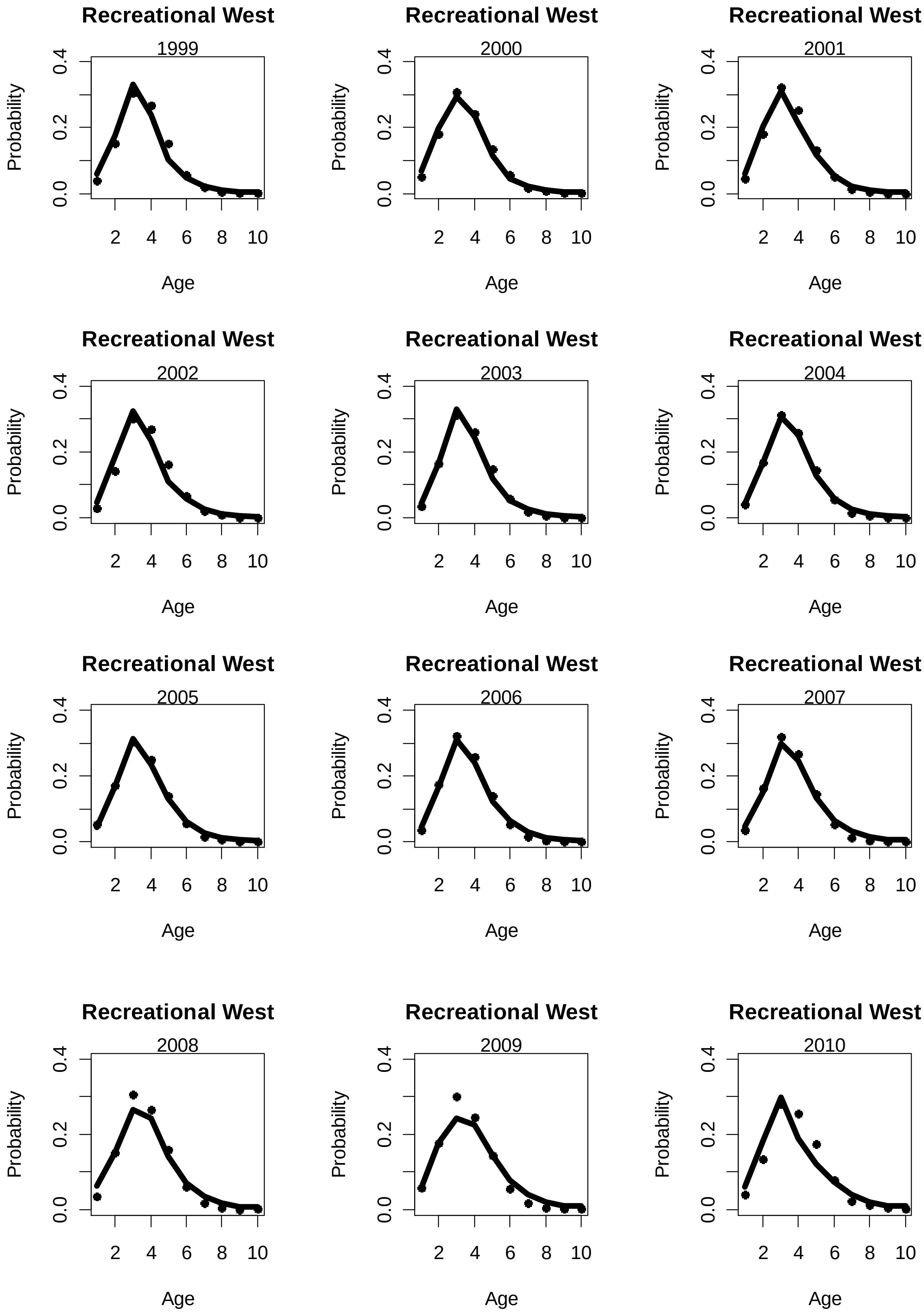


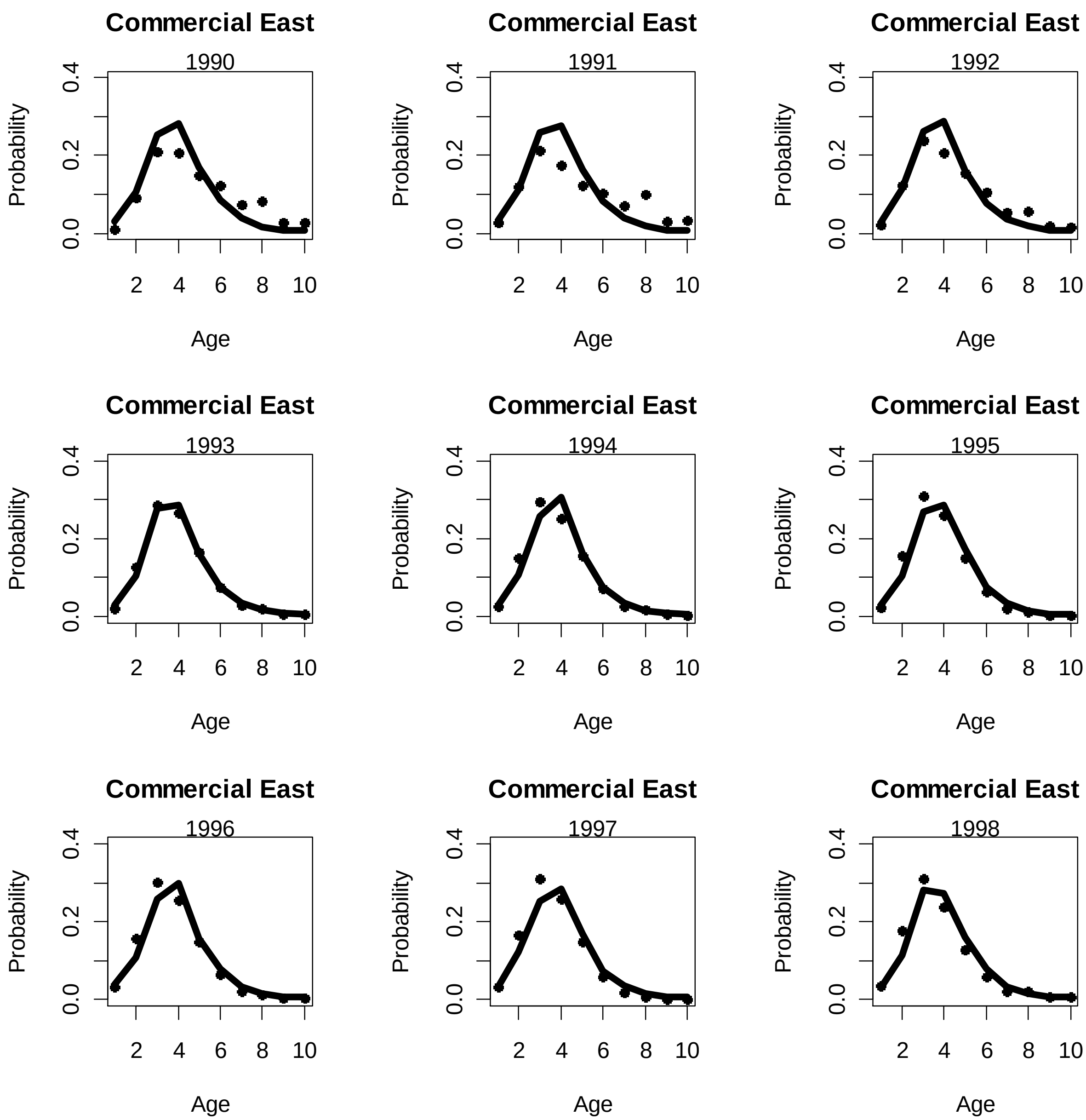

Recreational East
1990
Recreational East
1991
Recreational East
1992
Recreational East
1993
Recreational East
1994
Recreational East
1995
Recreational East
1996
Recreational East
1997
Recreational East
1998
Probability
0.0
0.2
0.4
Age
2
4
6
8
10

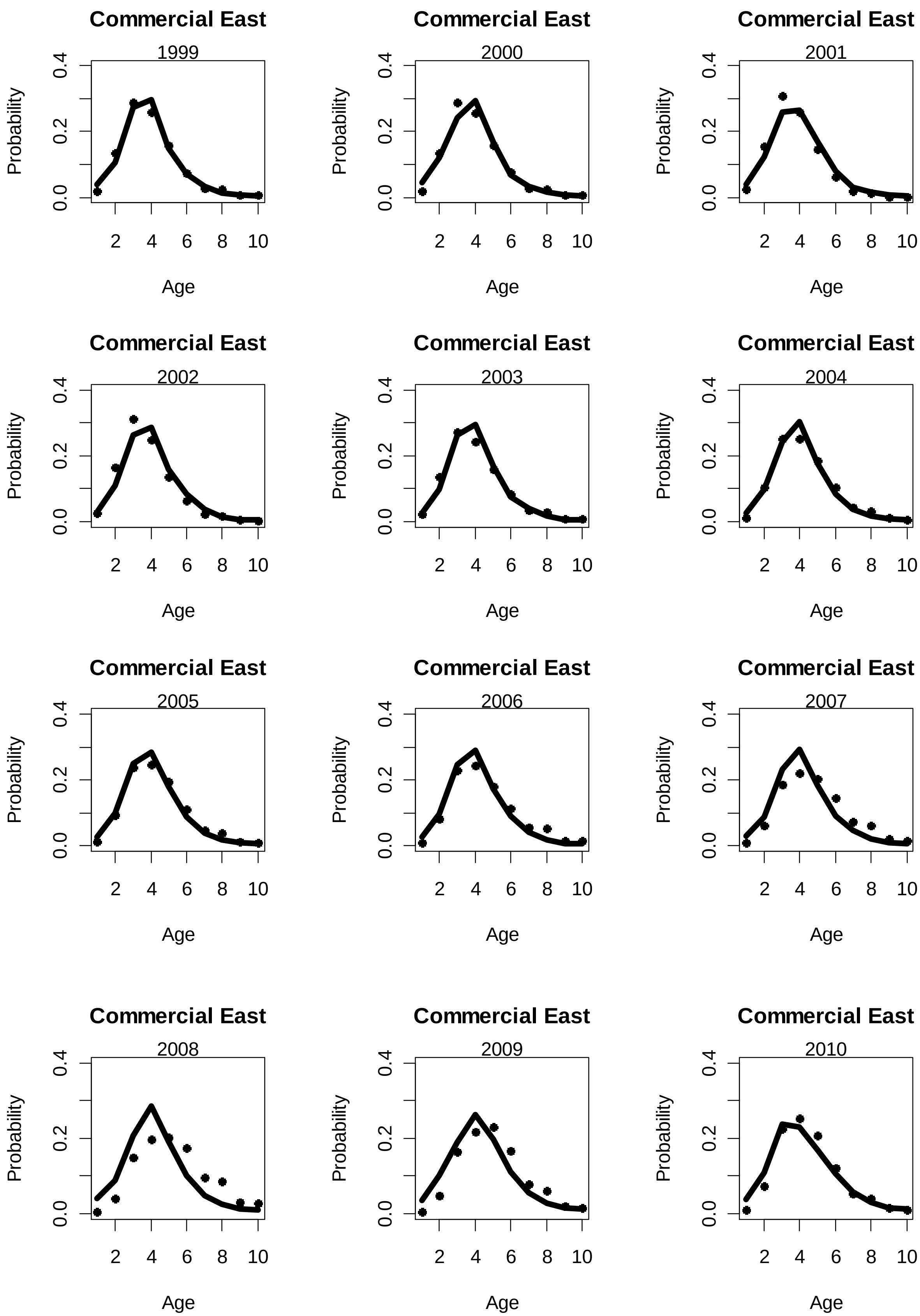

Recreational East
1999
Recreational East
2000
Recreational East
2001
Recreational East
2002
Recreational East
2003
Recreational East
2004
Recreational East
2005
Recreational East
2006
Recreational East
2007
Recreational East
2008
Recreational East
2009
Recreational East
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10

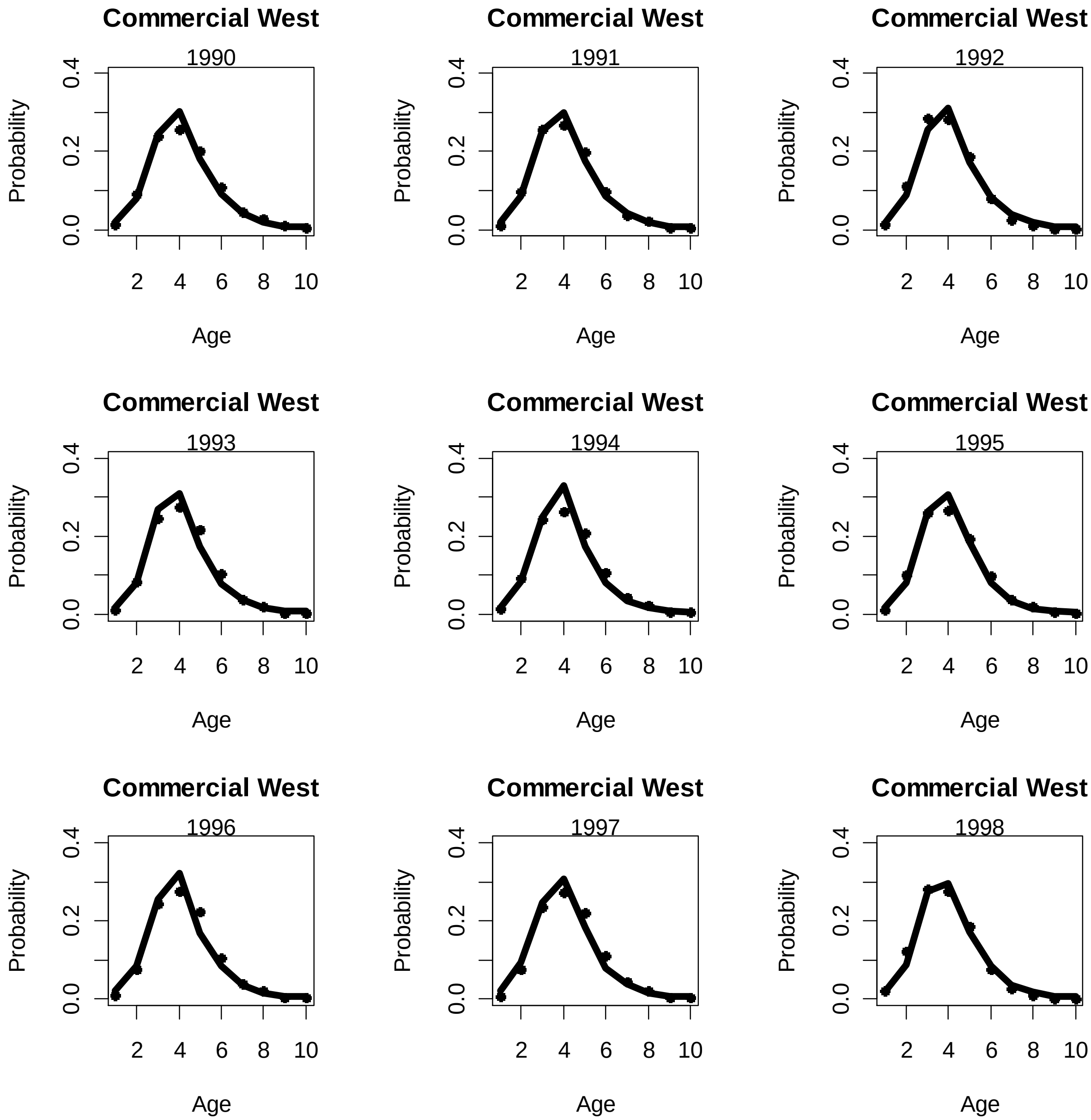

Recreational West
1981
Recreational West
1982
Recreational West
1983
Recreational West
1984
Recreational West
1985
Recreational West
1986
Recreational West
1987
Recreational West
1988
Recreational West
1989
Probability
0.0
0.2
0.4
Age
2
4
6
8
10

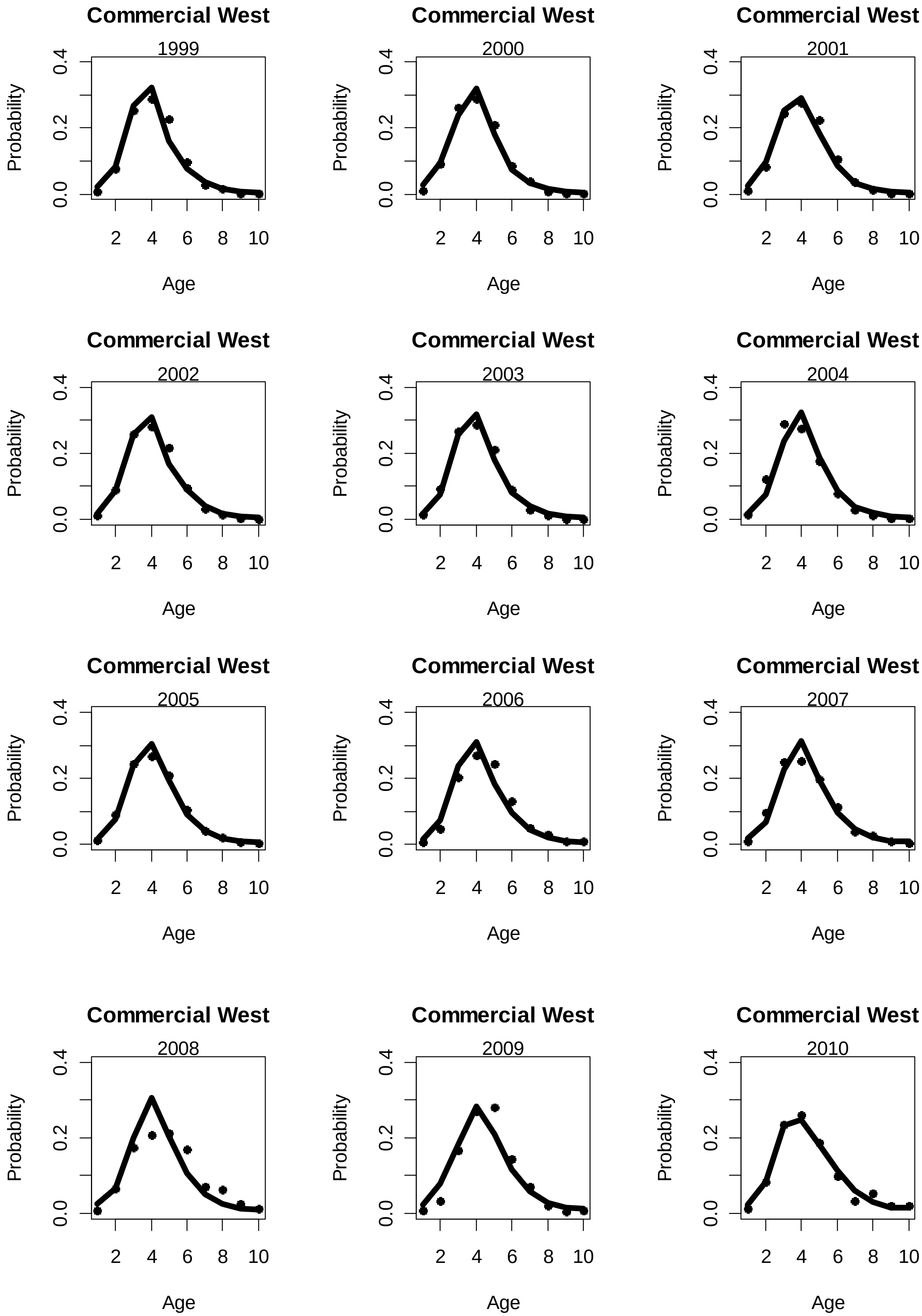

Recreational West
1990
Recreational West
1991
Recreational West
1992
Recreational West
1993
Recreational West
1994
Recreational West
1995
Recreational West
1996
Recreational West
1997
Recreational West
1998
Probability
0.0
0.2
0.4
Age
2
4
6
8
10

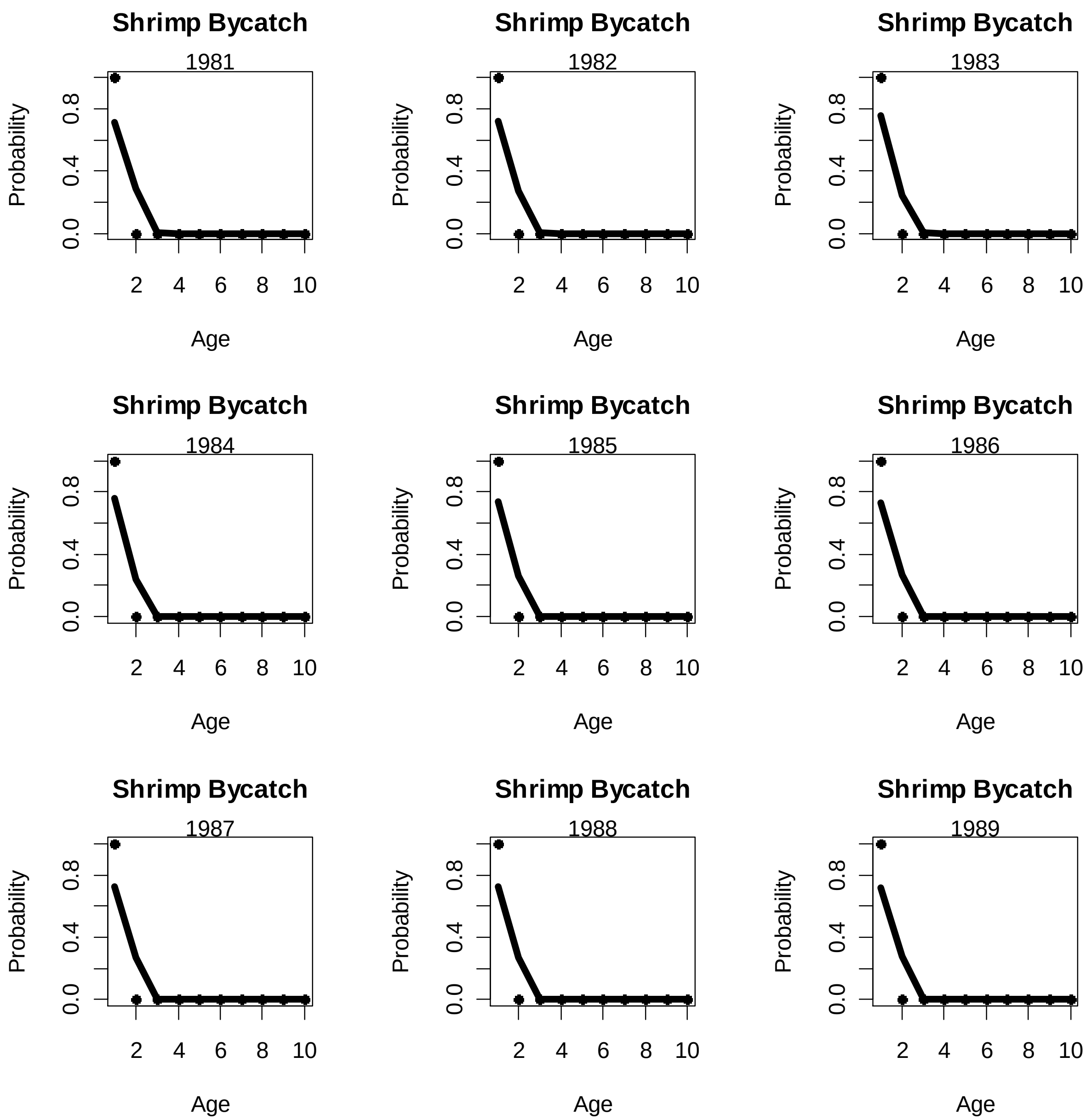

Recreational West
1999
Recreational West
2000
Recreational West
2001
Recreational West
2002
Recreational West
2003
Recreational West
2004
Recreational West
2005
Recreational West
2006
Recreational West
2007
Recreational West
2008
Recreational West
2009
Recreational West
2010
Probability
Age
0.0
0.2
0.4
2
4
6
8
10

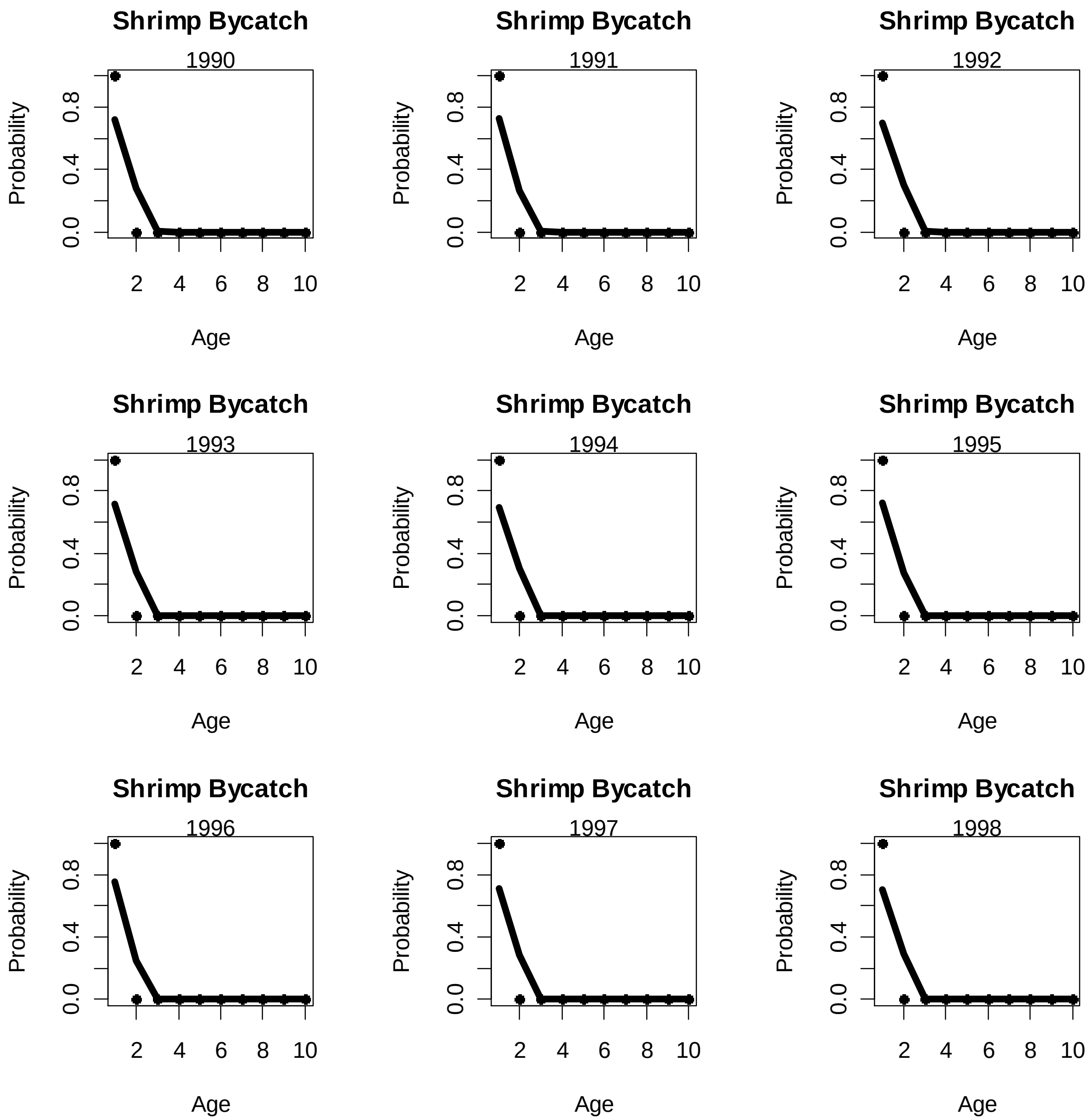

Commercial East
1990
Commercial East
1991
Commercial East
1992
Commercial East
1993
Commercial East
1994
Commercial East
1995
Commercial East
1996
Commercial East
1997
Commercial East
1998
Probability
Age
0.0
0.2
0.4
2
4
6
8
10


Commercial East
1999
Commercial East
2000
Commercial East
2001
Commercial East
2002
Commercial East
2003
Commercial East
2004
Commercial East
2005
Commercial East
2006
Commercial East
2007
Commercial East
2008
Commercial East
2009
Commercial East
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Commercial West
1990
Commercial West
1991
Commercial West
1992
Commercial West
1993
Commercial West
1994
Commercial West
1995
Commercial West
1996
Commercial West
1997
Commercial West
1998
Probability
Age
0.0
0.2
0.4
2
4
6
8
10


Commercial West
1999
Commercial West
2000
Commercial West
2001
Commercial West
2002
Commercial West
2003
Commercial West
2004
Commercial West
2005
Commercial West
2006
Commercial West
2007
Commercial West
2008
Commercial West
2009
Commercial West
2010
Probability
0.0 0.2 0.4
Age
2 4 6 8 10


Shrimp Bycatch
1981
Shrimp Bycatch
1982
Shrimp Bycatch
1983
Shrimp Bycatch
1984
Shrimp Bycatch
1985
Shrimp Bycatch
1986
Shrimp Bycatch
1987
Shrimp Bycatch
1988
Shrimp Bycatch
1989
Probability
0.0
0.4
0.8
Age
2
4
6
8
10


Shrimp Bycatch
1990
Shrimp Bycatch
1991
Shrimp Bycatch
1992
Shrimp Bycatch
1993
Shrimp Bycatch
1994
Shrimp Bycatch
1995
Shrimp Bycatch
1996
Shrimp Bycatch
1997
Shrimp Bycatch
1998
Probability
0.0
0.4
0.8
Age
2
4
6
8
10

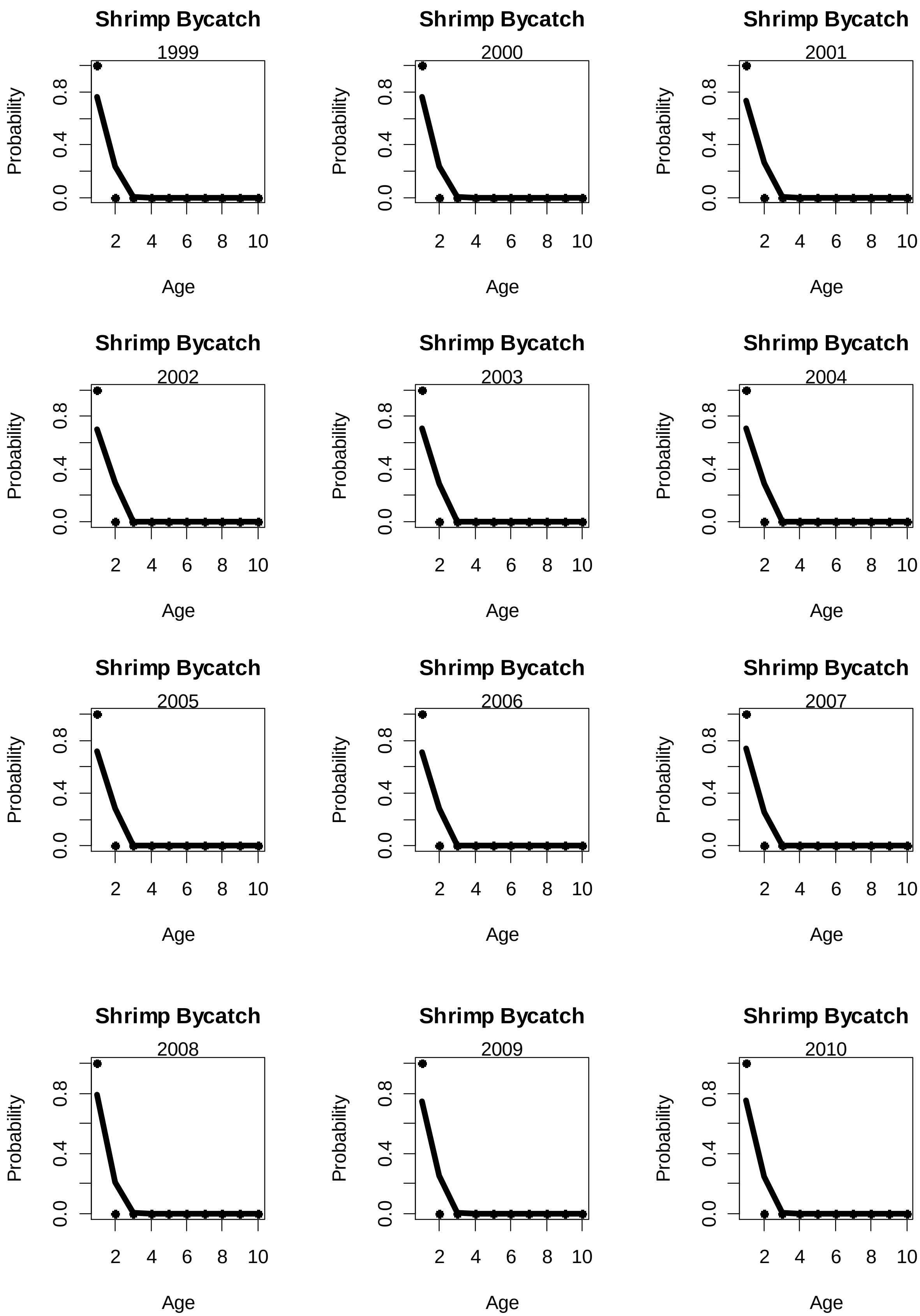
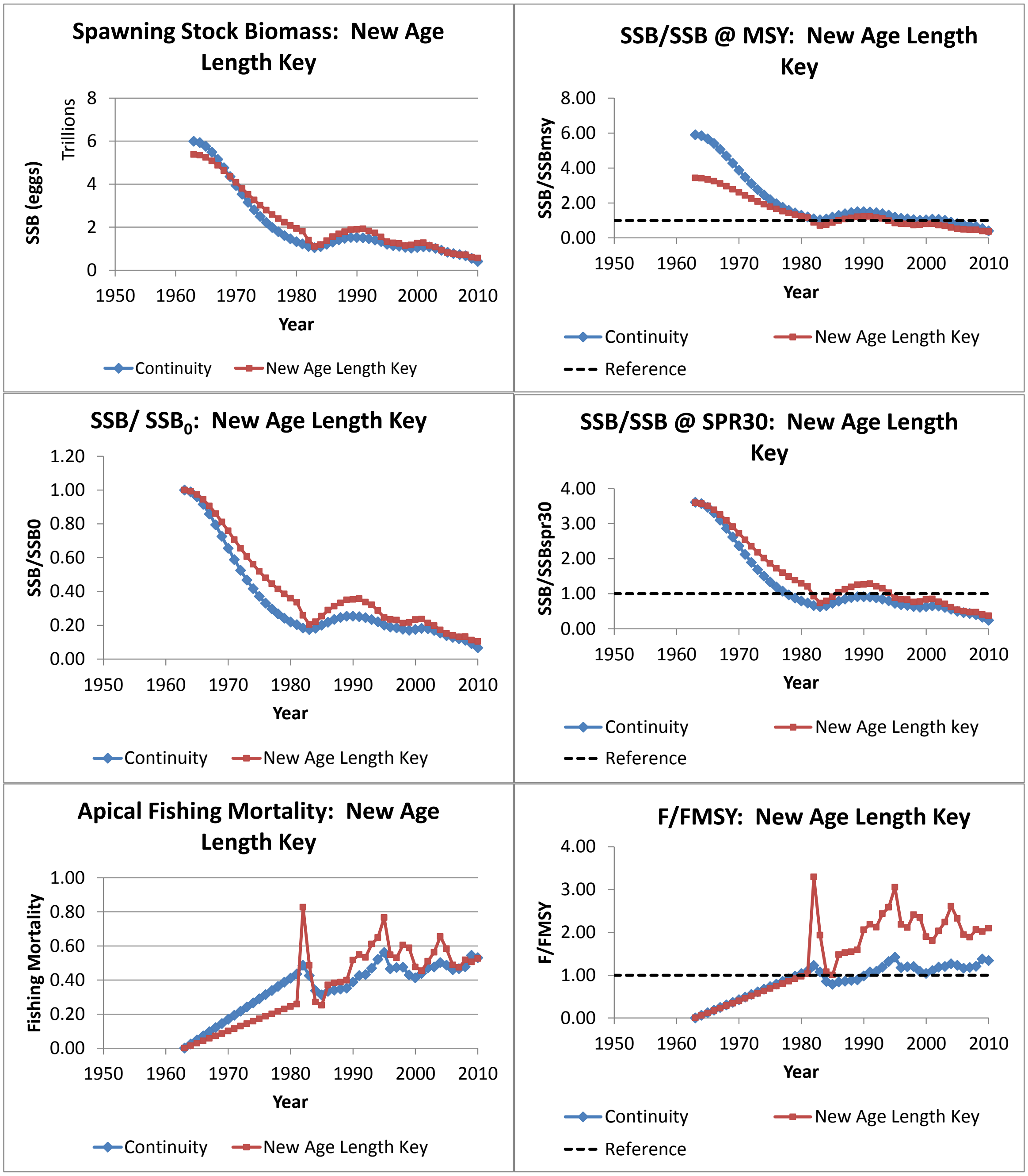

Shrimp Bycatch
1999
Shrimp Bycatch
2000
Shrimp Bycatch
2001
Shrimp Bycatch
2002
Shrimp Bycatch
2003
Shrimp Bycatch
2004
Shrimp Bycatch
2005
Shrimp Bycatch
2006
Shrimp Bycatch
2007
Shrimp Bycatch
2008
Shrimp Bycatch
2009
Shrimp Bycatch
2010
Probability
0.0
0.4
0.8
Age
2
4
6
8
10

FIGURE 8.12— NEW AGE-LENGTH KEY MODEL ESTIMATES OF SPAWNING STOCK BIOMASS, FISHING MORTALITY, AND RECRUITMENT.



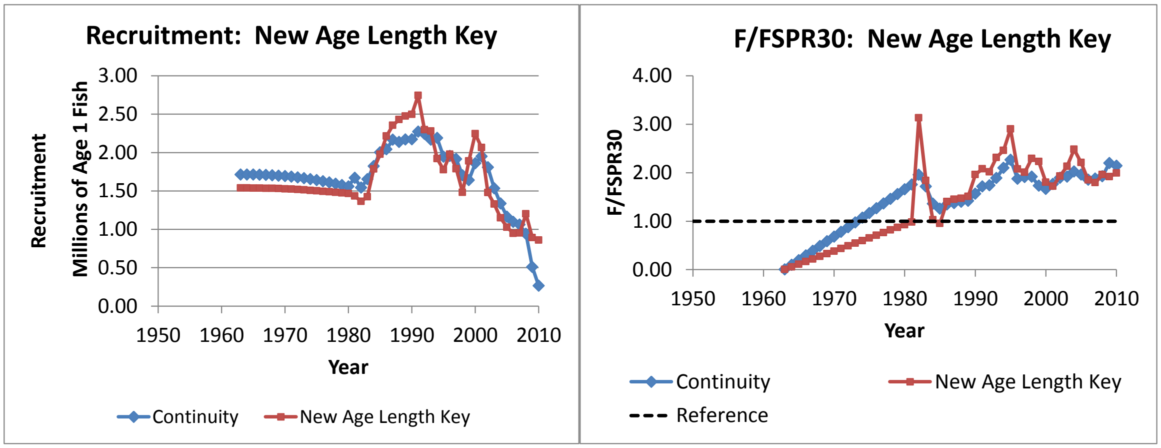


FIGURE 8.13— NEW AGE-LENGTH KEY MODEL PROJECTIONS OF SPAWNING STOCK BIOMASS UNDER THREE SCENARIOS (THE CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009) AND THREE SUB-SCENARIOS: AT SPR 30, AT 75% OF SPR 30, AND AT NO FISHING.

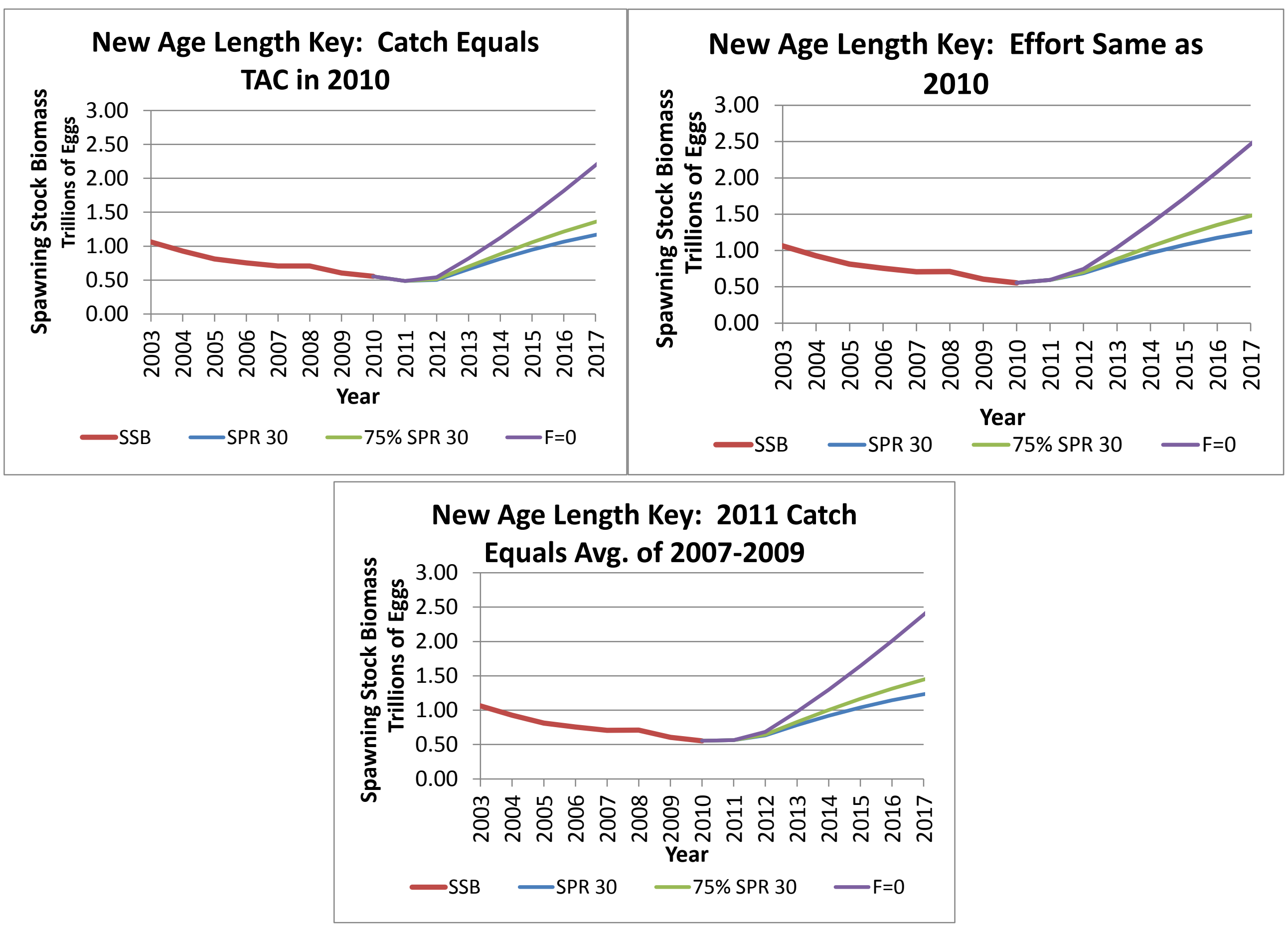


FIGURE 8.14— NEW AGE-LENGTH KEY MODEL TOTAL ALLOWABLE CATCHES TO REBUILD THE STOCK IN 10 YEARS UNDER THE THREE SCENARIOS: CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009.

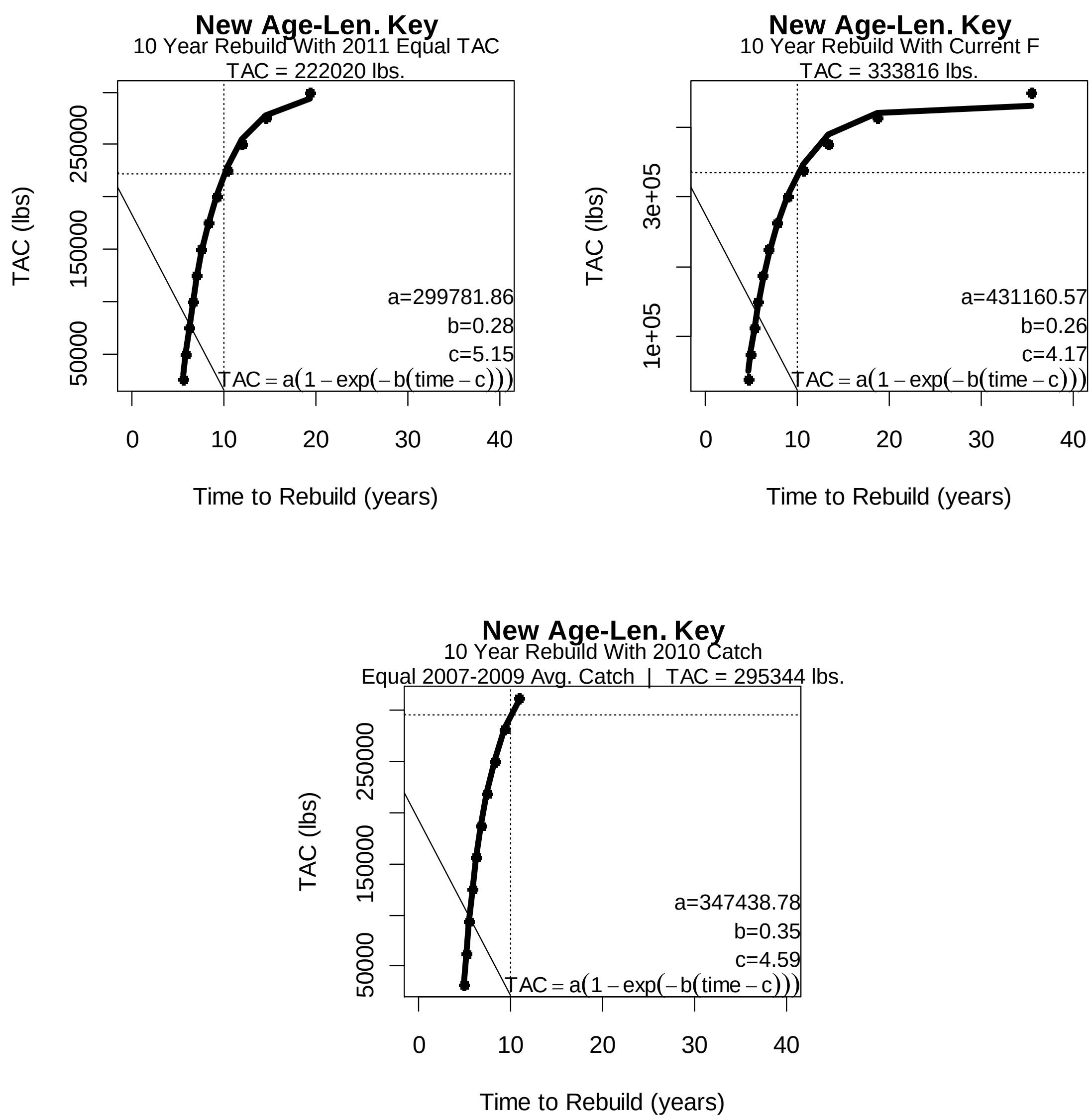
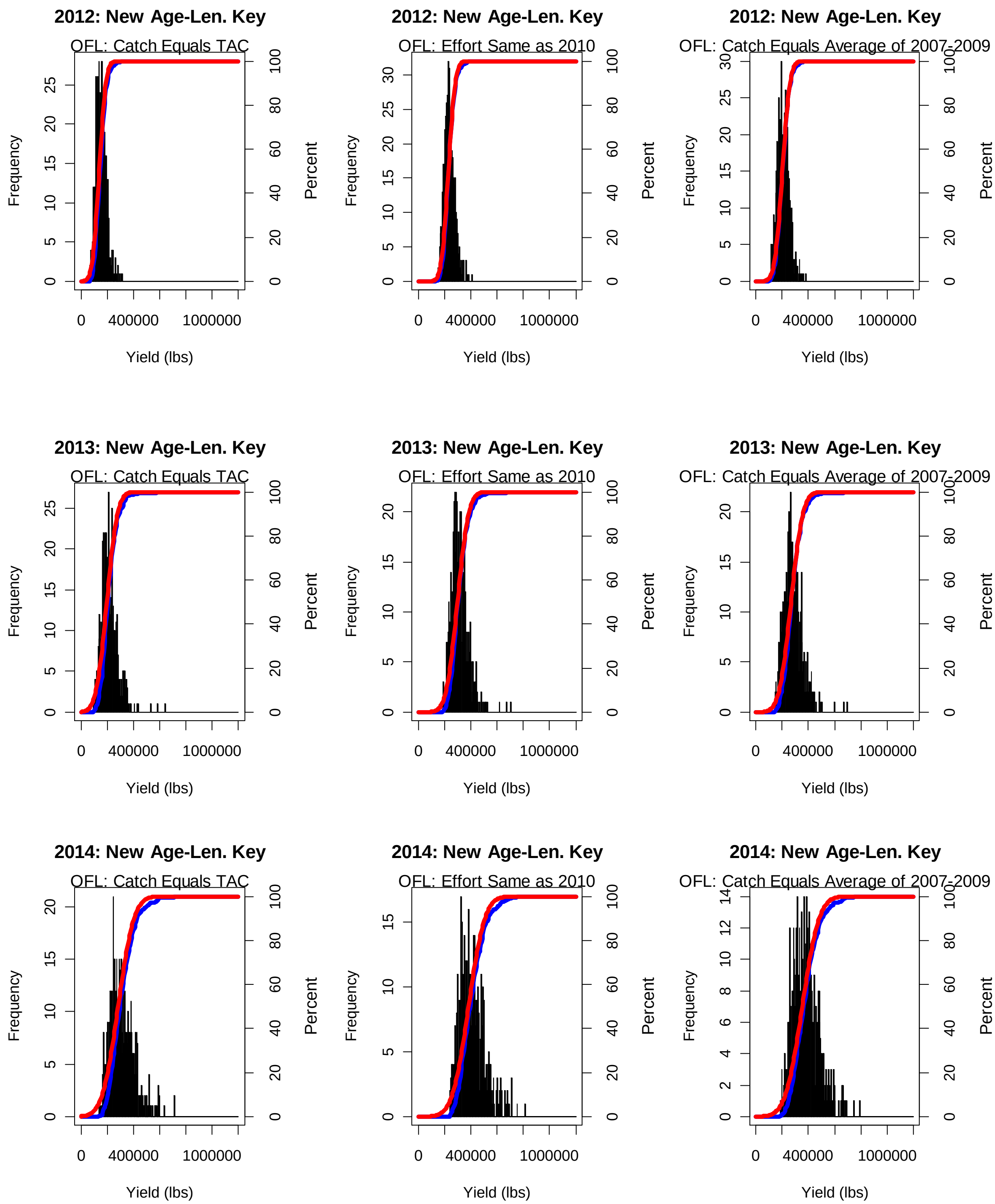


FIGURE 8.15— NEW AGE-LENGTH KEY MODEL ANNUALLY PROJECTED PROBABILITY DISTRIBUTIONS OF EXCEEDING THE OVERFISHING LIMIT UNDER THE THREE SCENARIOS: CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009.



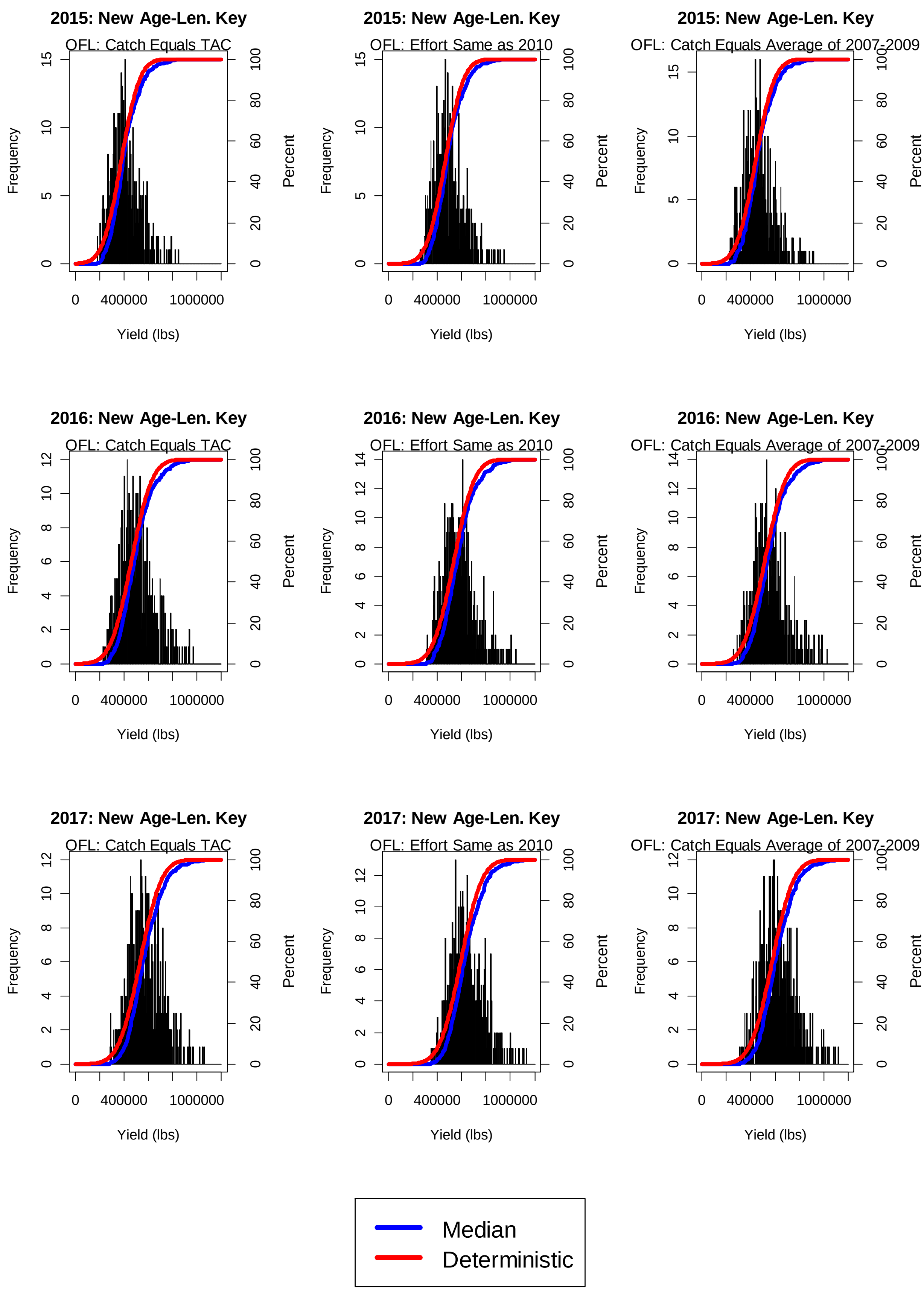
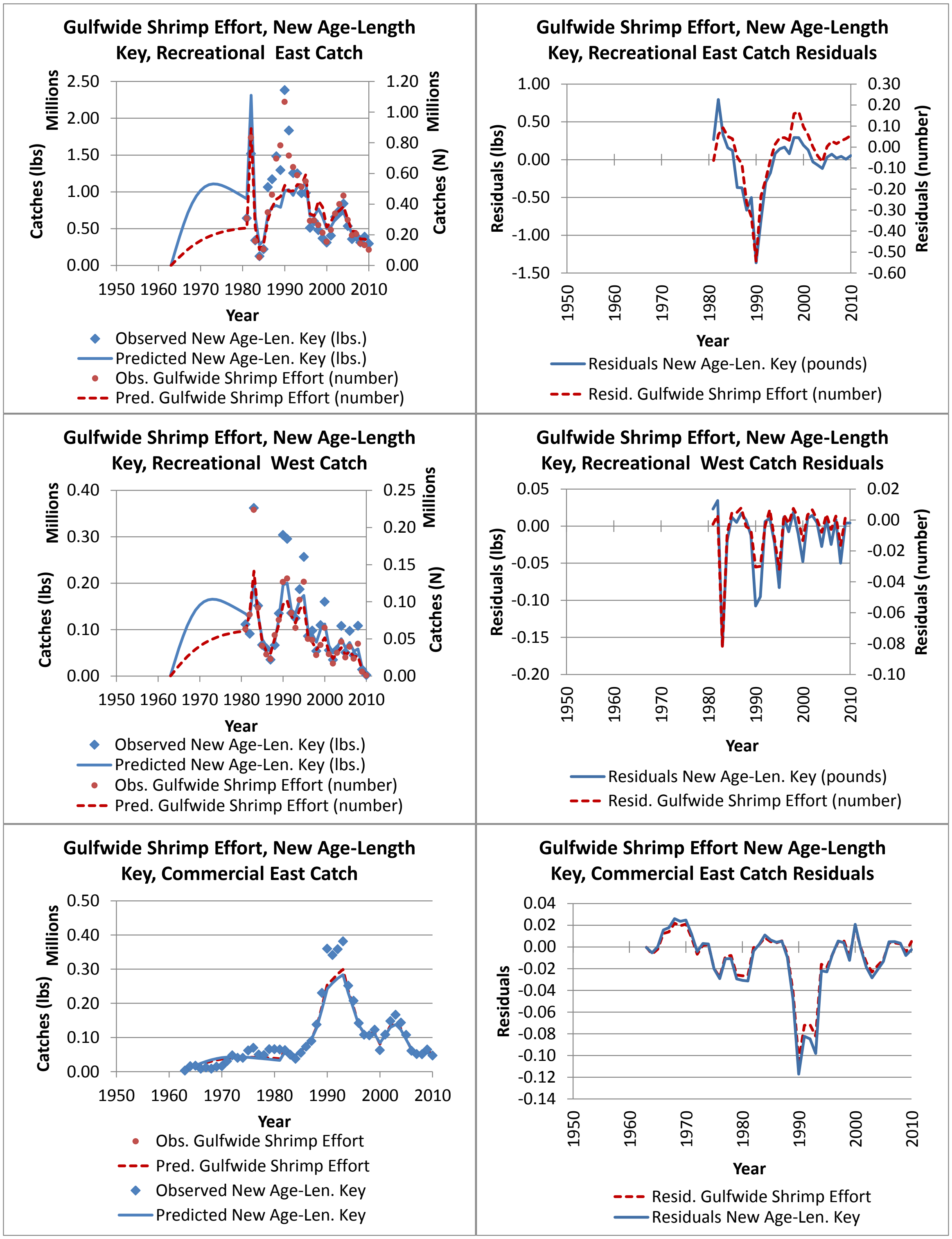

2015: New Age-Len. Key
OFL: Catch Equals TAC
2015: New Age-Len. Key
OFL: Effort Same as 2010
2015: New Age-Len. Key
OFL: Catch Equals Average of 2007-2009
2016: New Age-Len. Key
OFL: Catch Equals TAC
2016: New Age-Len. Key
OFL: Effort Same as 2010
2016: New Age-Len. Key
OFL: Catch Equals Average of 2007-2009
2017: New Age-Len. Key
OFL: Catch Equals TAC
2017: New Age-Len. Key
OFL: Effort Same as 2010
2017: New Age-Len. Key
OFL: Catch Equals Average of 2007-2009
Frequency
Percent
Yield (lbs)
0
400000
1000000
0
20
40
60
80
100
Median
Deterministic

FIGURE 8.16— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL FITS TO RECREATIONAL AND COMMERCIAL CATCHES.



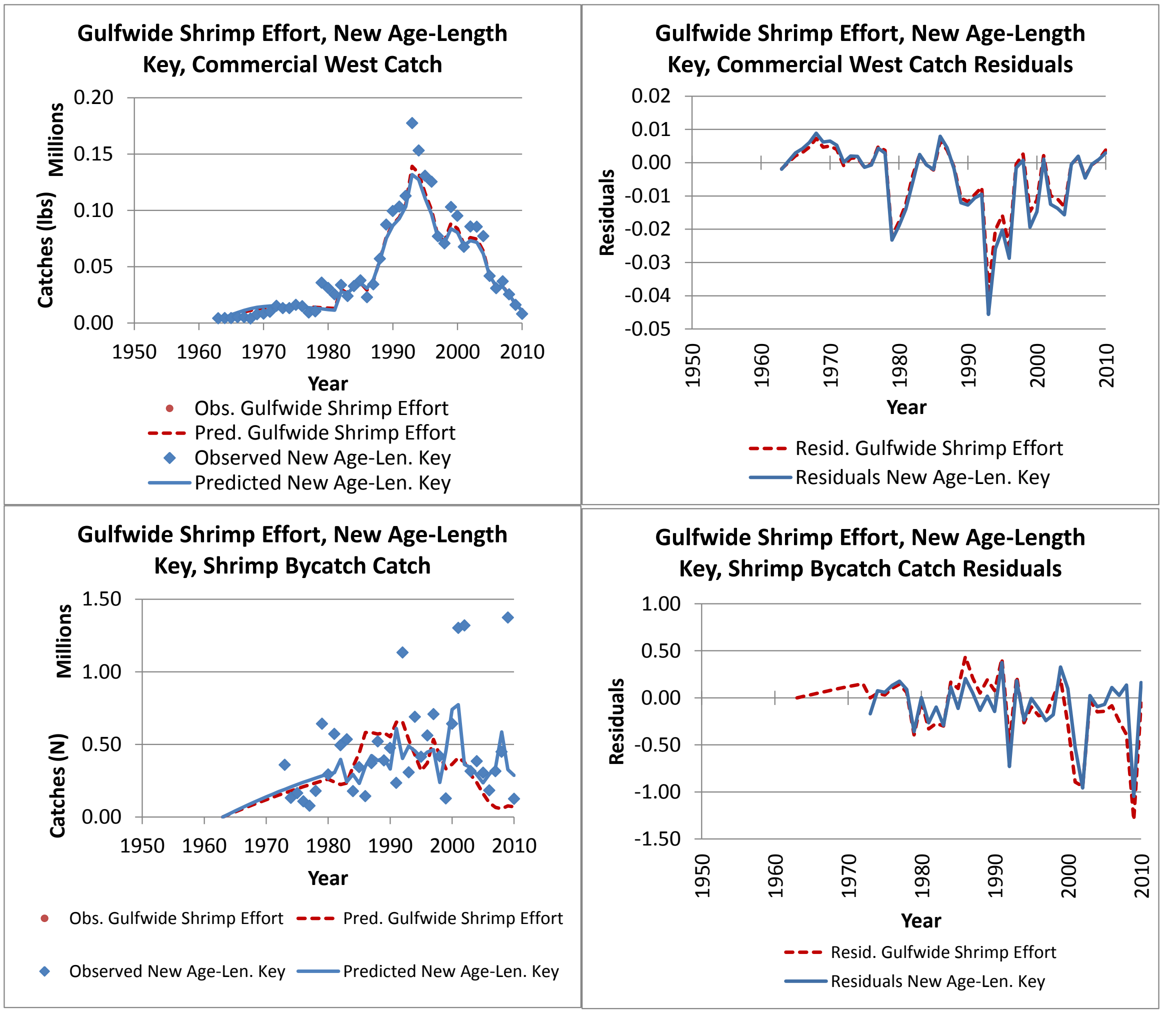

Gulfwide Shrimp Effort, New Age-Length Key, Commercial West Catch
Catches (lbs) Millions
0.20
0.15
0.10
0.05
0.00
1950 1960 1970 1980 1990 2000 2010
Year
Obs. Gulfwide Shrimp Effort
Pred. Gulfwide Shrimp Effort
Observed New Age-Len. Key
Predicted New Age-Len. Key
Gulfwide Shrimp Effort, New Age-Length Key, Commercial West Catch Residuals
Residuals
0.02
0.01
0.00
-0.01
-0.02
-0.03
-0.04
-0.05
1950 1960 1970 1980 1990 2000 2010
Year
Resid. Gulfwide Shrimp Effort
Residuals New Age-Len. Key
Gulfwide Shrimp Effort, New Age-Length Key, Shrimp Bycatch Catch
Catches (N) Millions
1.50
1.00
0.50
0.00
1950 1960 1970 1980 1990 2000 2010
Year
Obs. Gulfwide Shrimp Effort
Pred. Gulfwide Shrimp Effort
Observed New Age-Len. Key
Predicted New Age-Len. Key
Gulfwide Shrimp Effort, New Age-Length Key, Shrimp Bycatch Catch Residuals
Residuals
1.00
0.50
0.00
-0.50
-1.00
-1.50
1950 1960 1970 1980 1990 2000 2010
Year
Resid. Gulfwide Shrimp Effort
Residuals New Age-Len. Key

FIGURE 8.17— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL FITS TO CPUE INDICES.

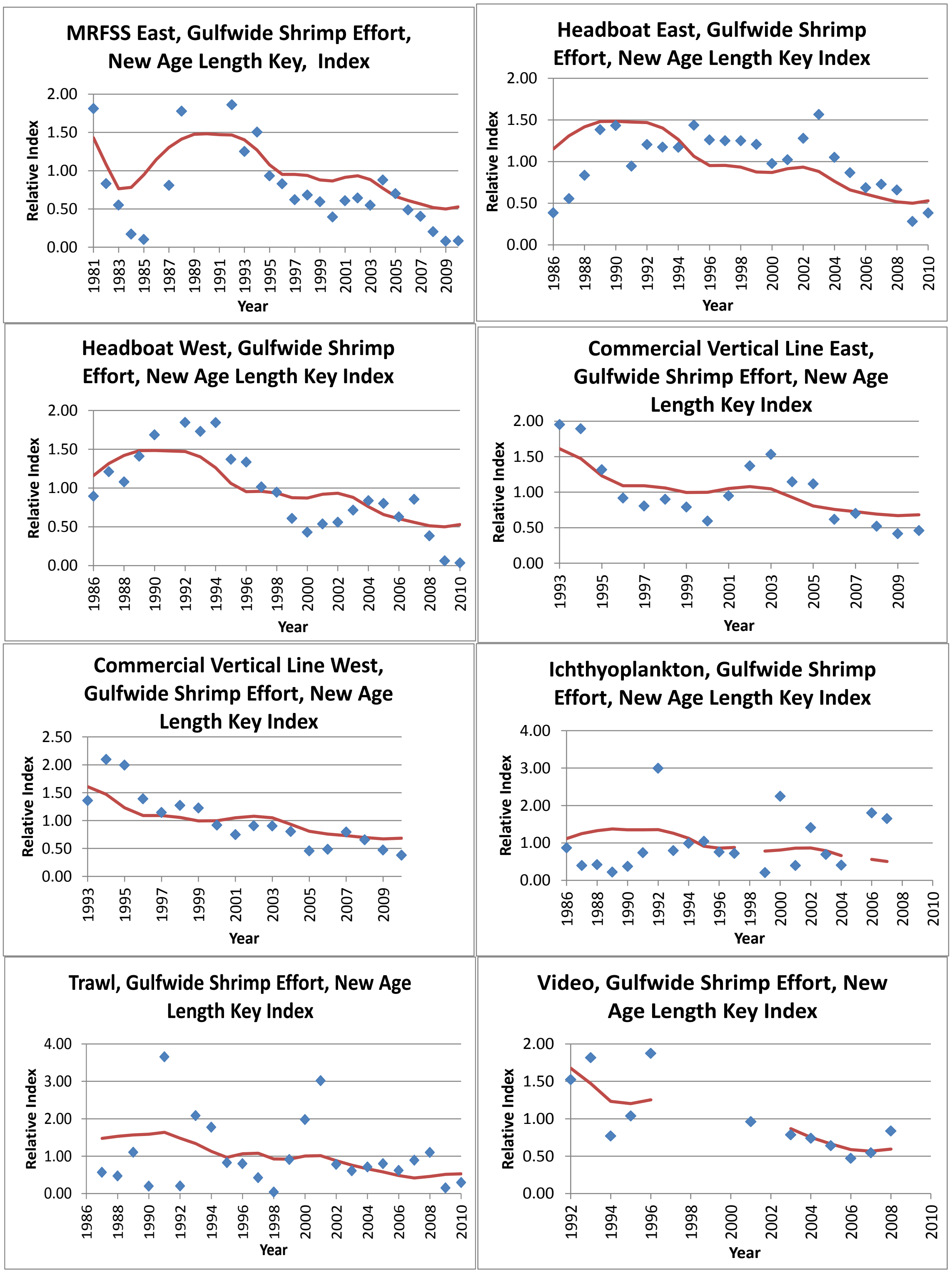
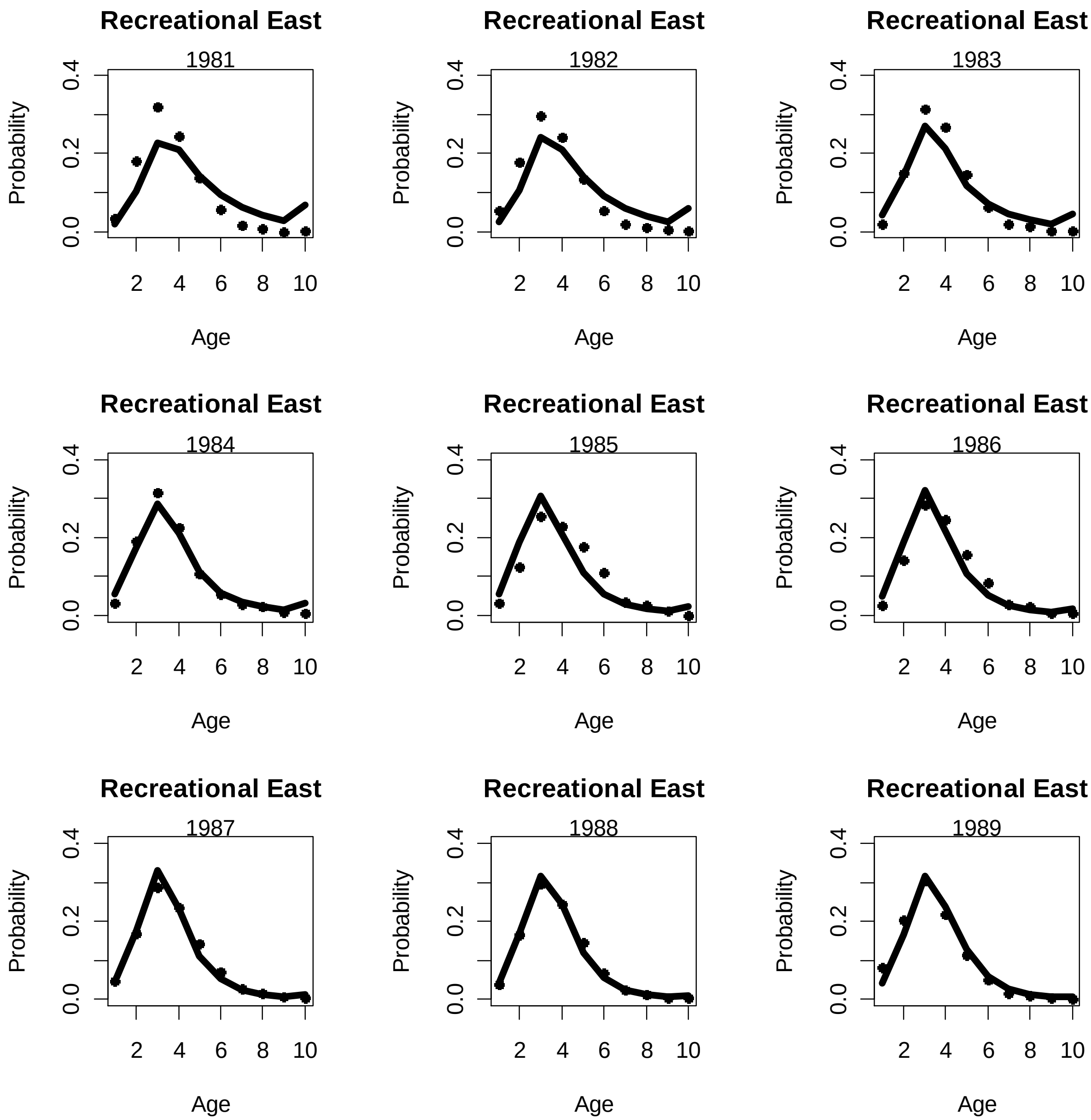
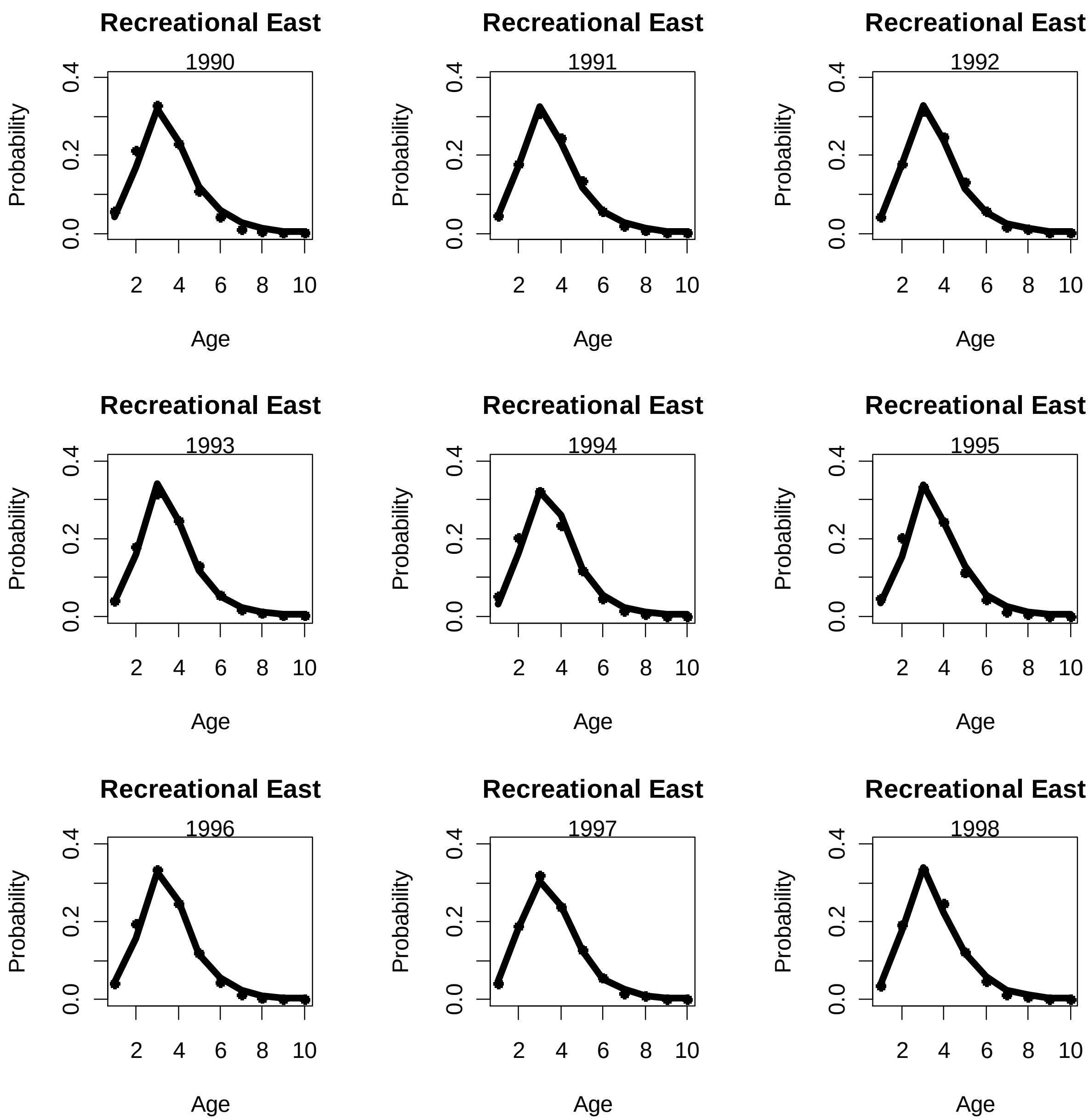
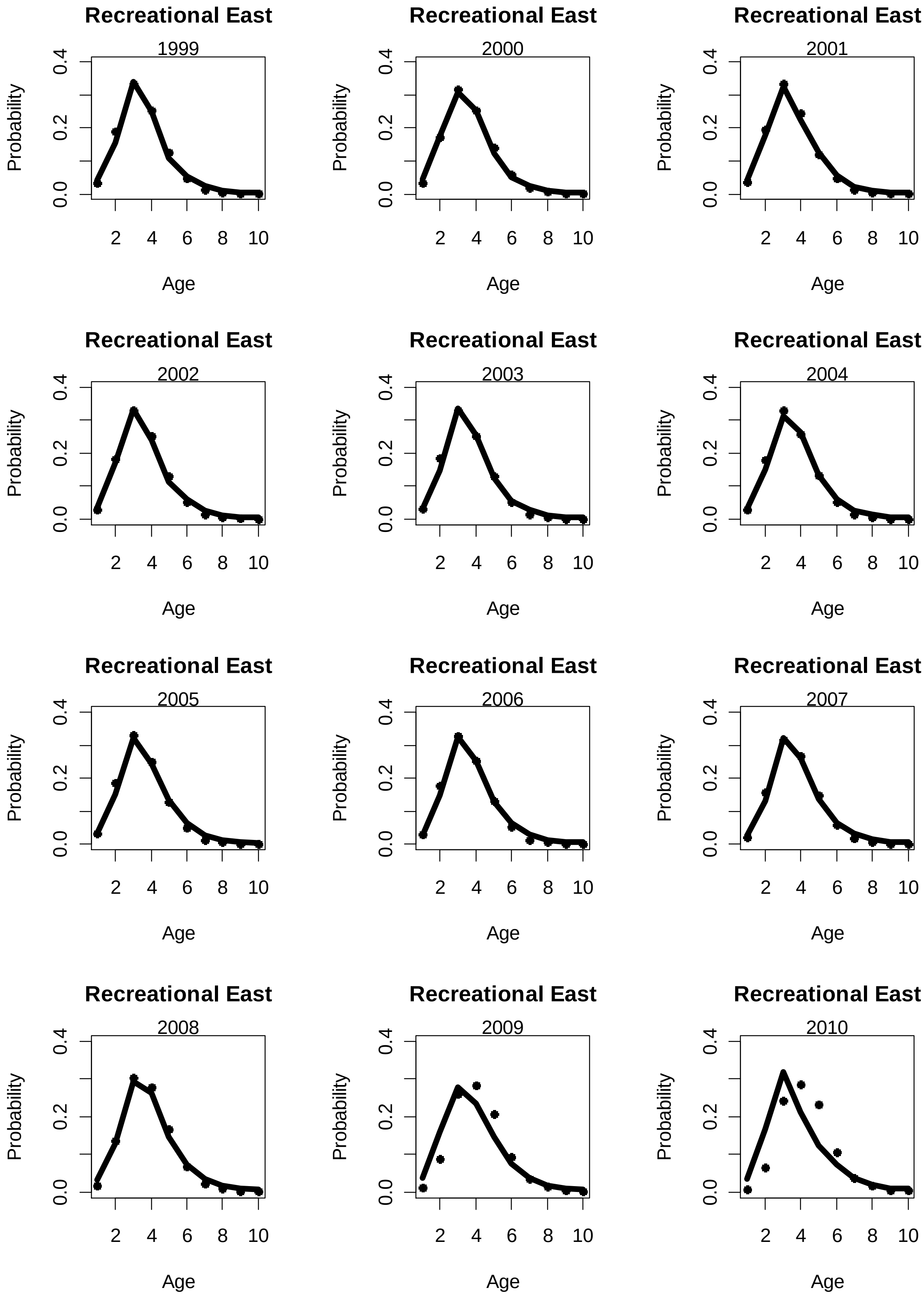
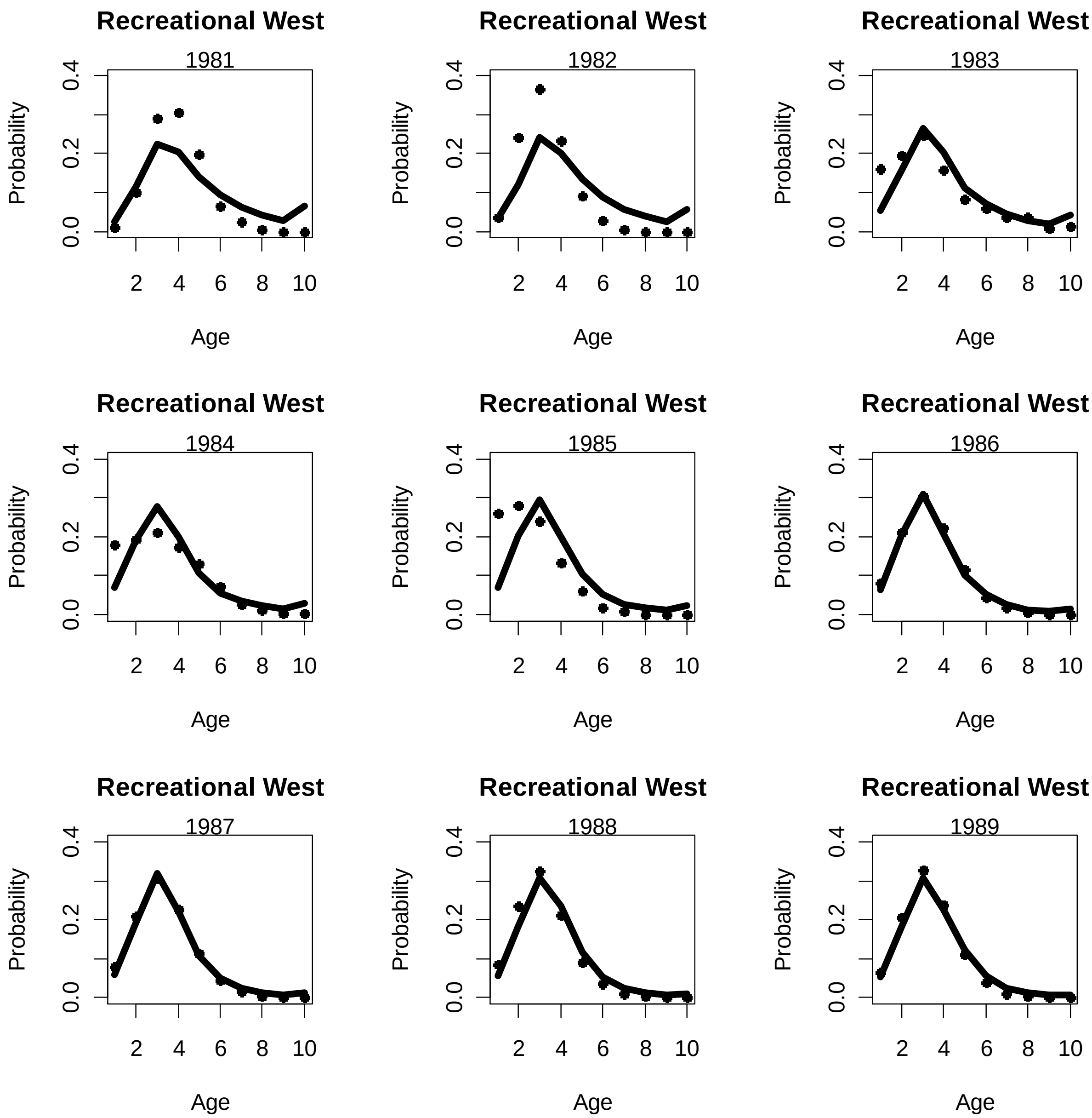


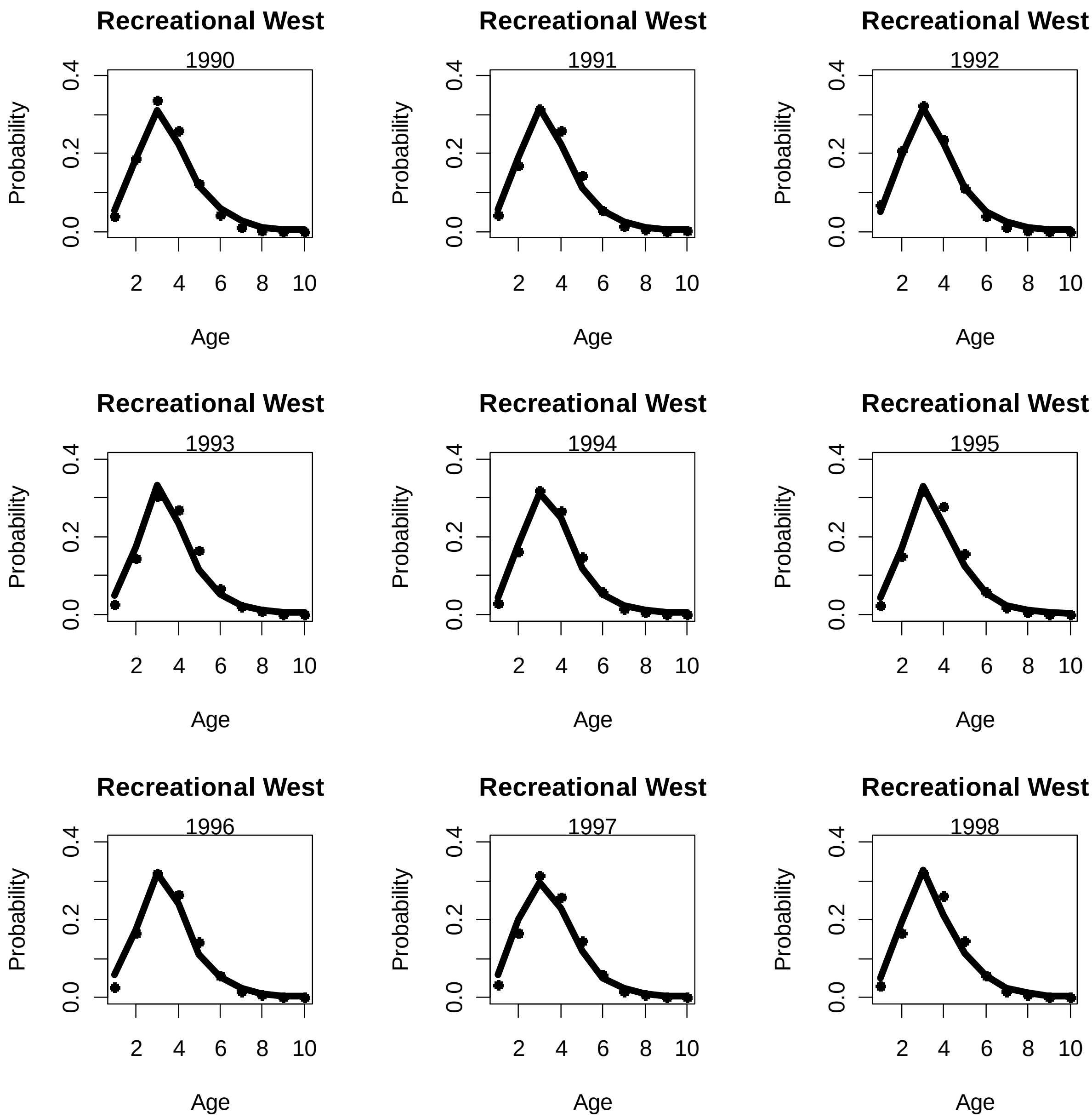
FIGURE 8.18— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL FITS TO CATCH AT AGE.

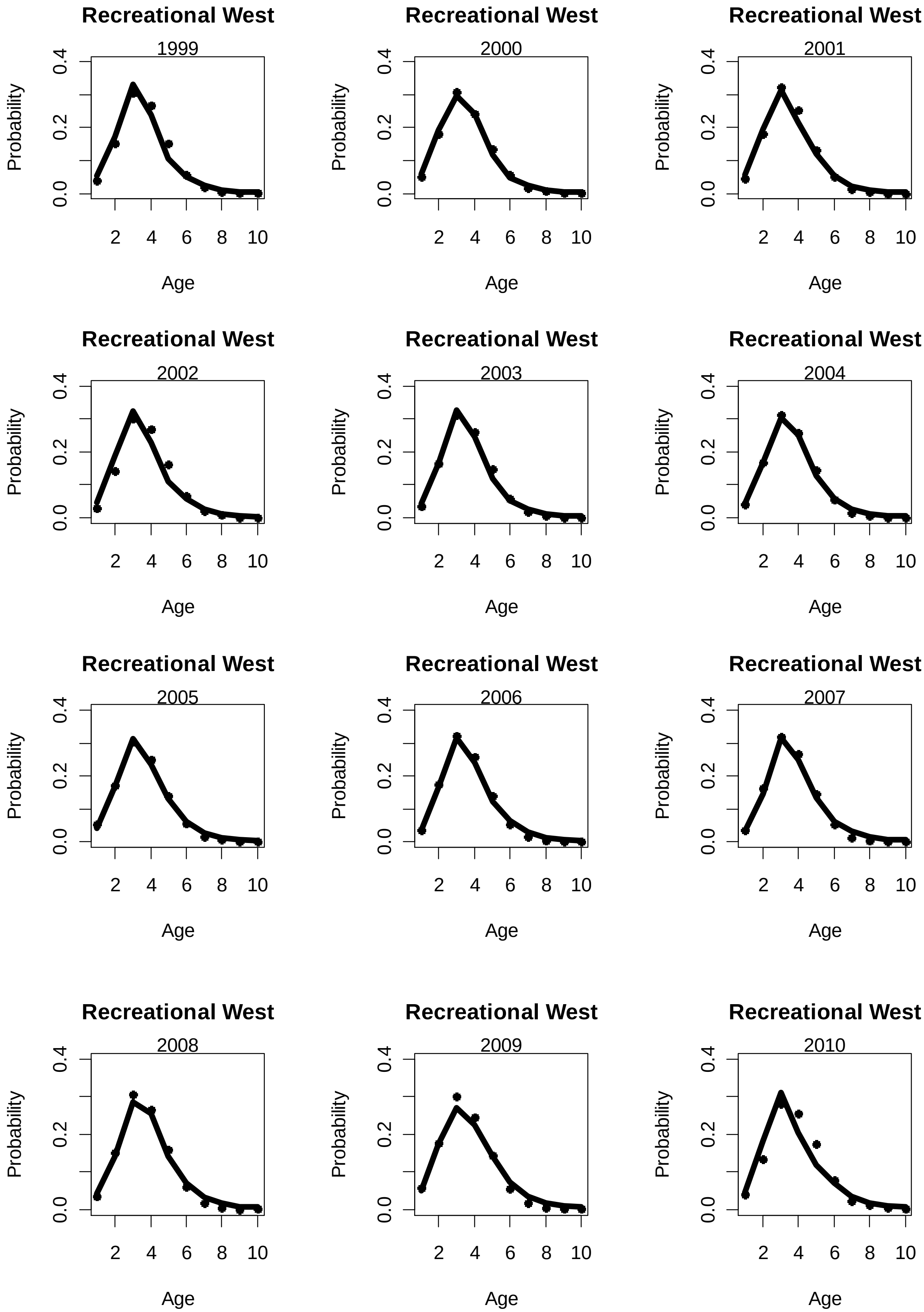


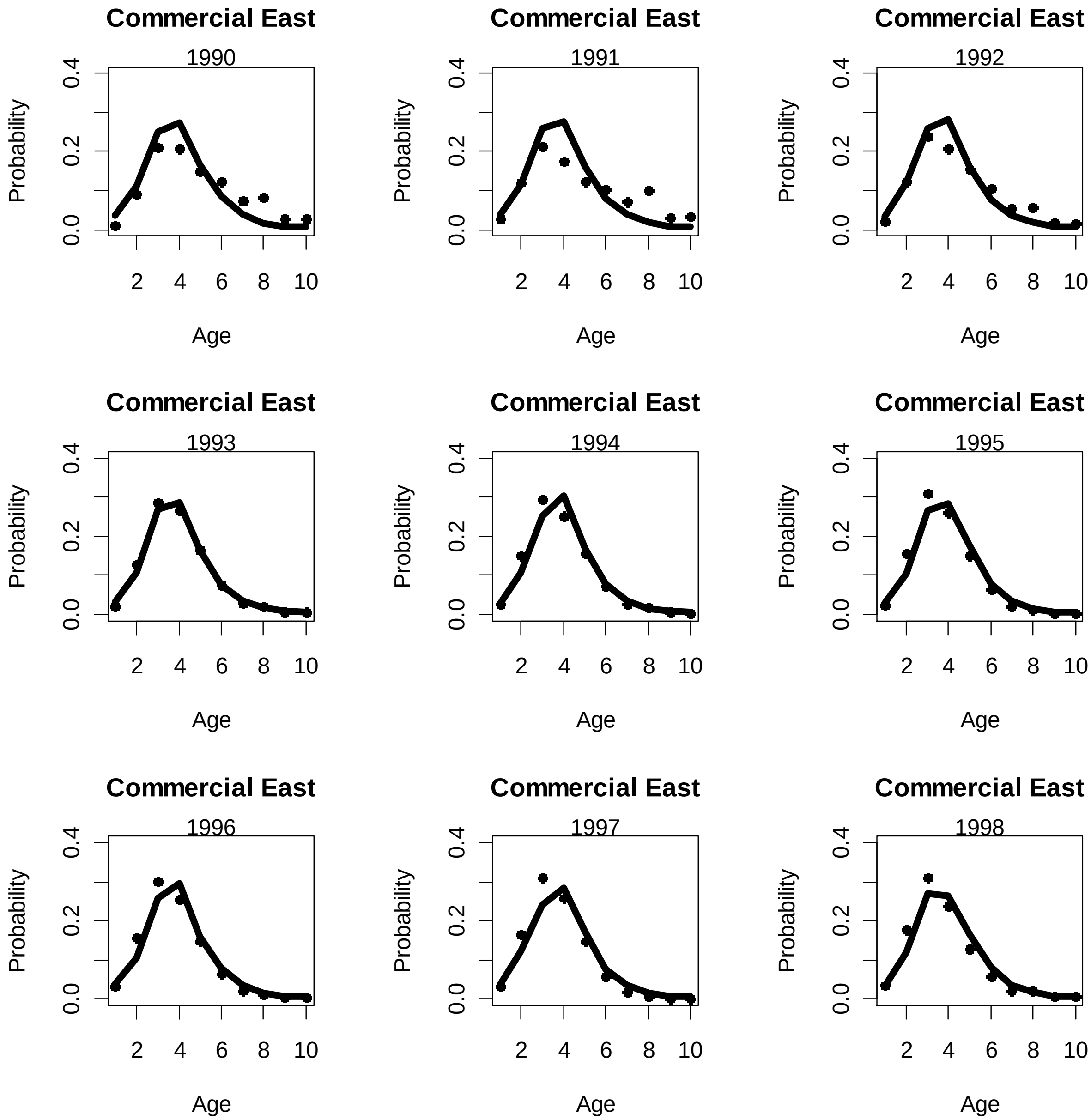

Recreational East
1990
Recreational East
1991
Recreational East
1992
Recreational East
1993
Recreational East
1994
Recreational East
1995
Recreational East
1996
Recreational East
1997
Recreational East
1998
Probability
Age
0.0
0.2
0.4
2
4
6
8
10

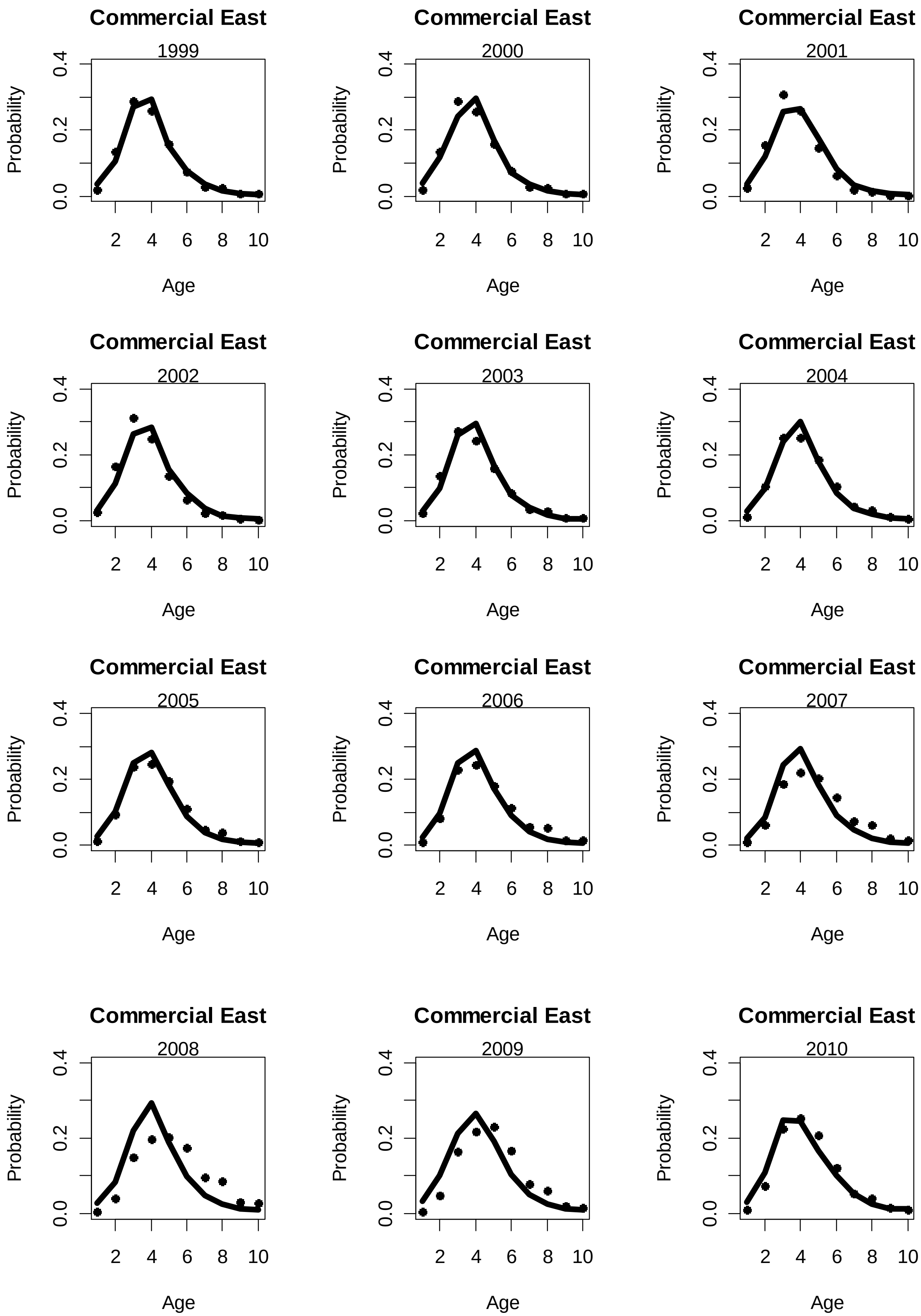

Recreational East
1999
Recreational East
2000
Recreational East
2001
Recreational East
2002
Recreational East
2003
Recreational East
2004
Recreational East
2005
Recreational East
2006
Recreational East
2007
Recreational East
2008
Recreational East
2009
Recreational East
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Recreational West
1981
Recreational West
1982
Recreational West
1983
Recreational West
1984
Recreational West
1985
Recreational West
1986
Recreational West
1987
Recreational West
1988
Recreational West
1989
Probability
Age
0.0
0.2
0.4
2
4
6
8
10


Recreational West
1990
1991
1992
1993
1994
1995
1996
1997
1998
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Recreational West
1999
Recreational West
2000
Recreational West
2001
Recreational West
2002
Recreational West
2003
Recreational West
2004
Recreational West
2005
Recreational West
2006
Recreational West
2007
Recreational West
2008
Recreational West
2009
Recreational West
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10


Commercial East
1990
Commercial East
1991
Commercial East
1992
Commercial East
1993
Commercial East
1994
Commercial East
1995
Commercial East
1996
Commercial East
1997
Commercial East
1998
Probability
Age
0.0
0.2
0.4
2
4
6
8
10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1999
Commercial East
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Commercial East
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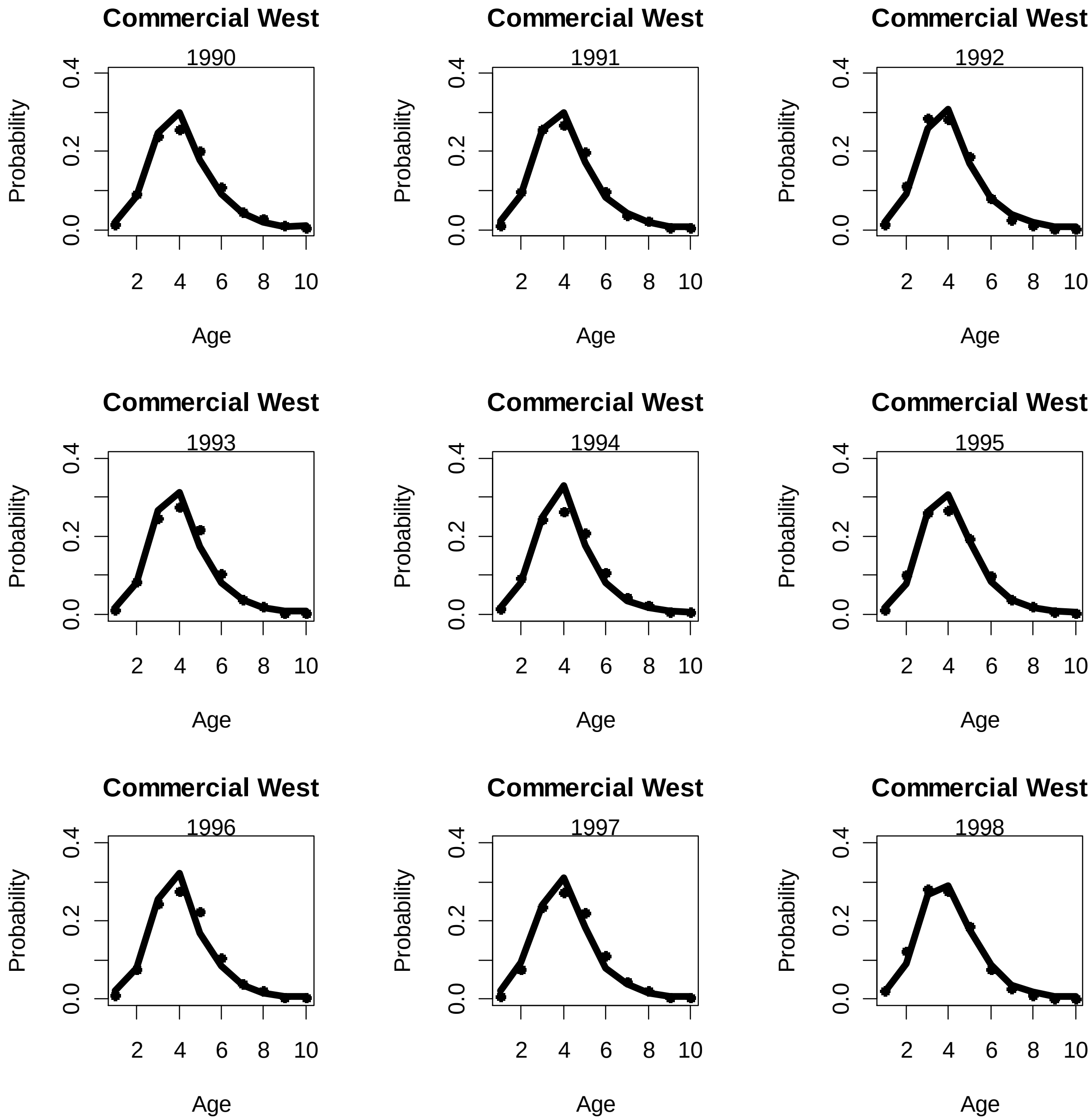
Commercial East
2002
Commercial East
2003
Commercial East
2004
Commercial East
2005
Commercial East
2006
Commercial East
2007
Commercial East
2008
Commercial East
2009
Commercial East
2010
Probability
0.0
0.2
0.4
Age
2
4
6
8
10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Commercial West
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1994
Commercial West
1995
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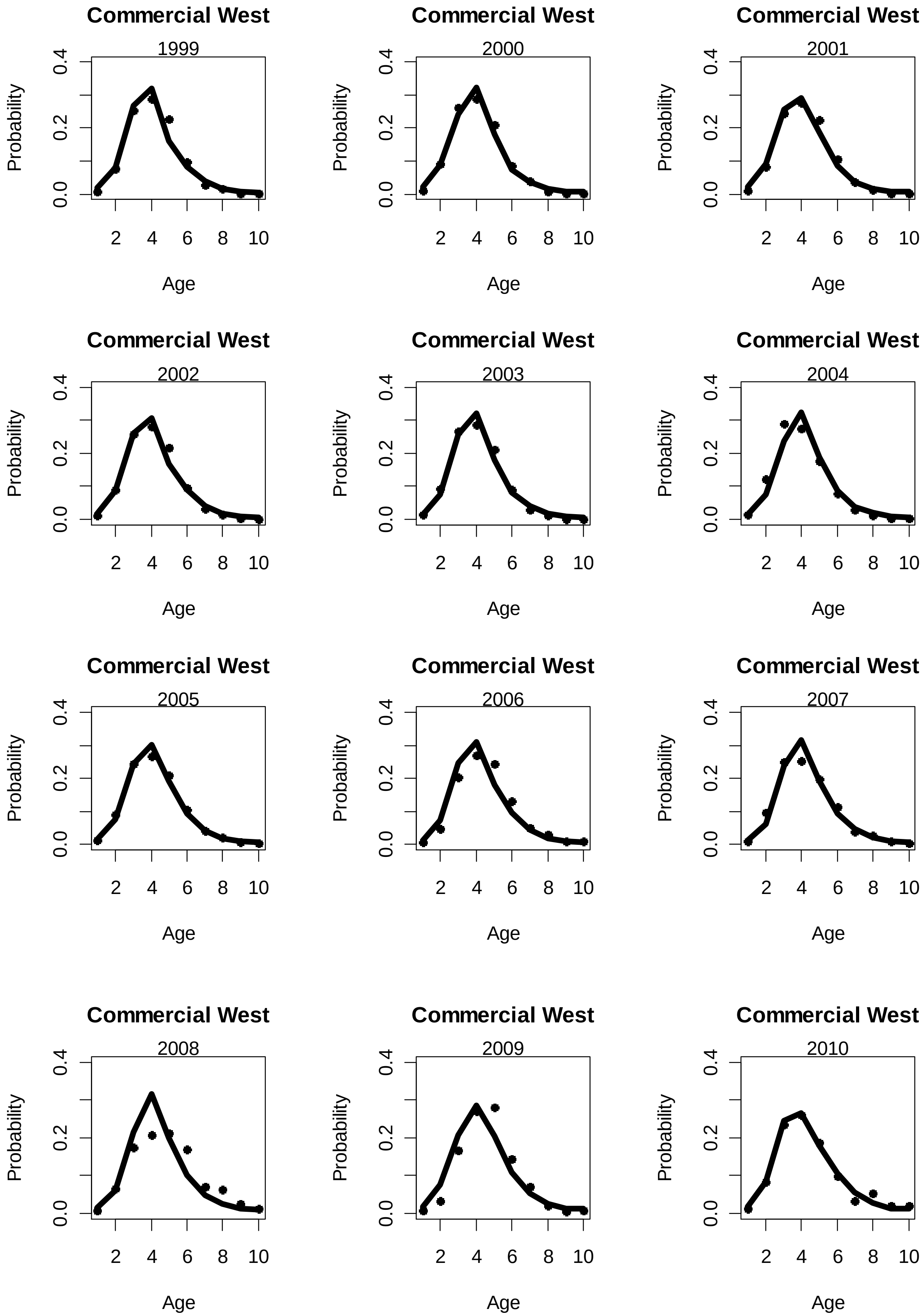
1997
Commercial West
1998
Probability
0.0
0.2
0.4
2
4
6
8
10
Age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Commercial West
2007
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Commercial West
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Probability
0.0
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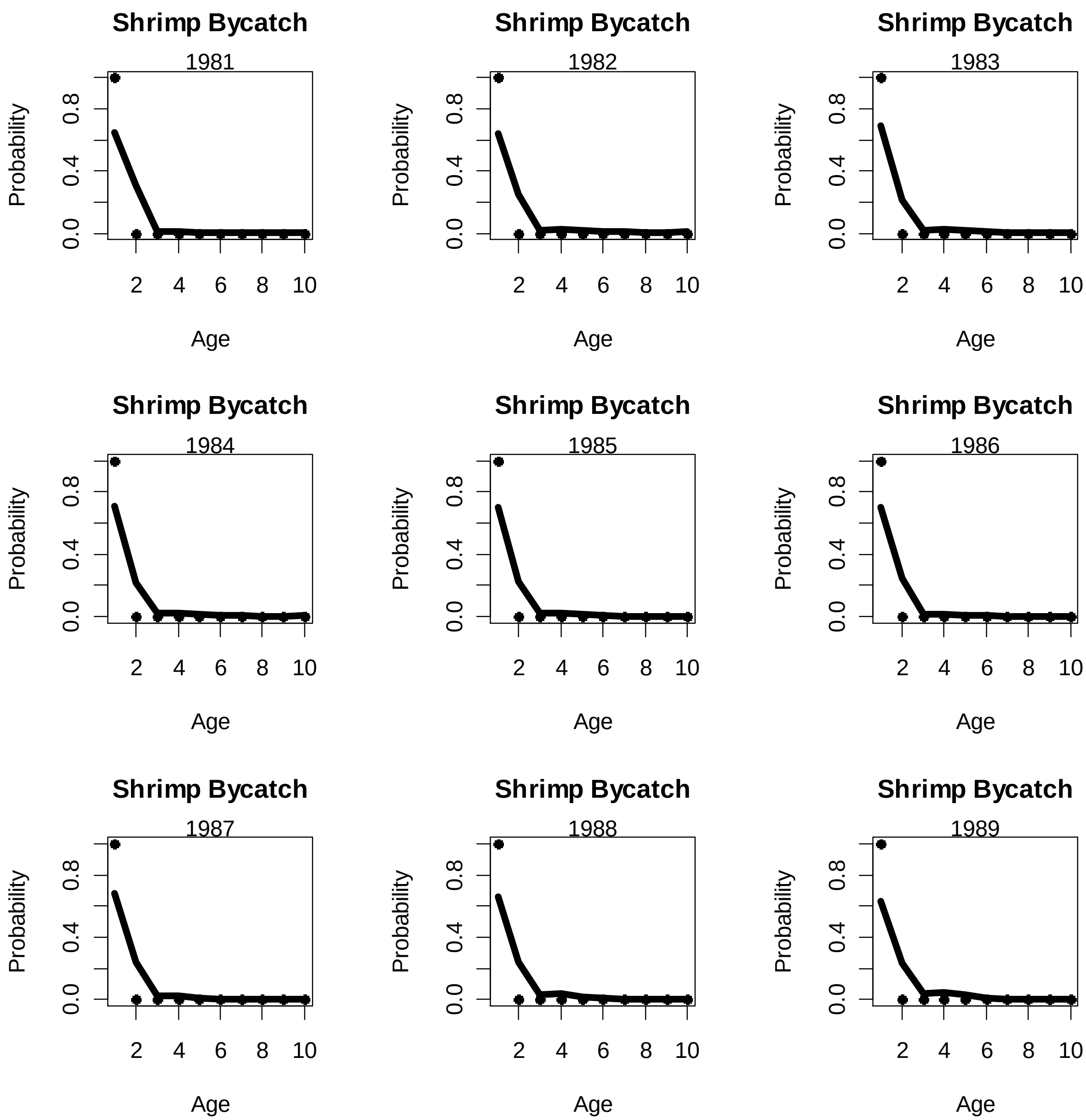
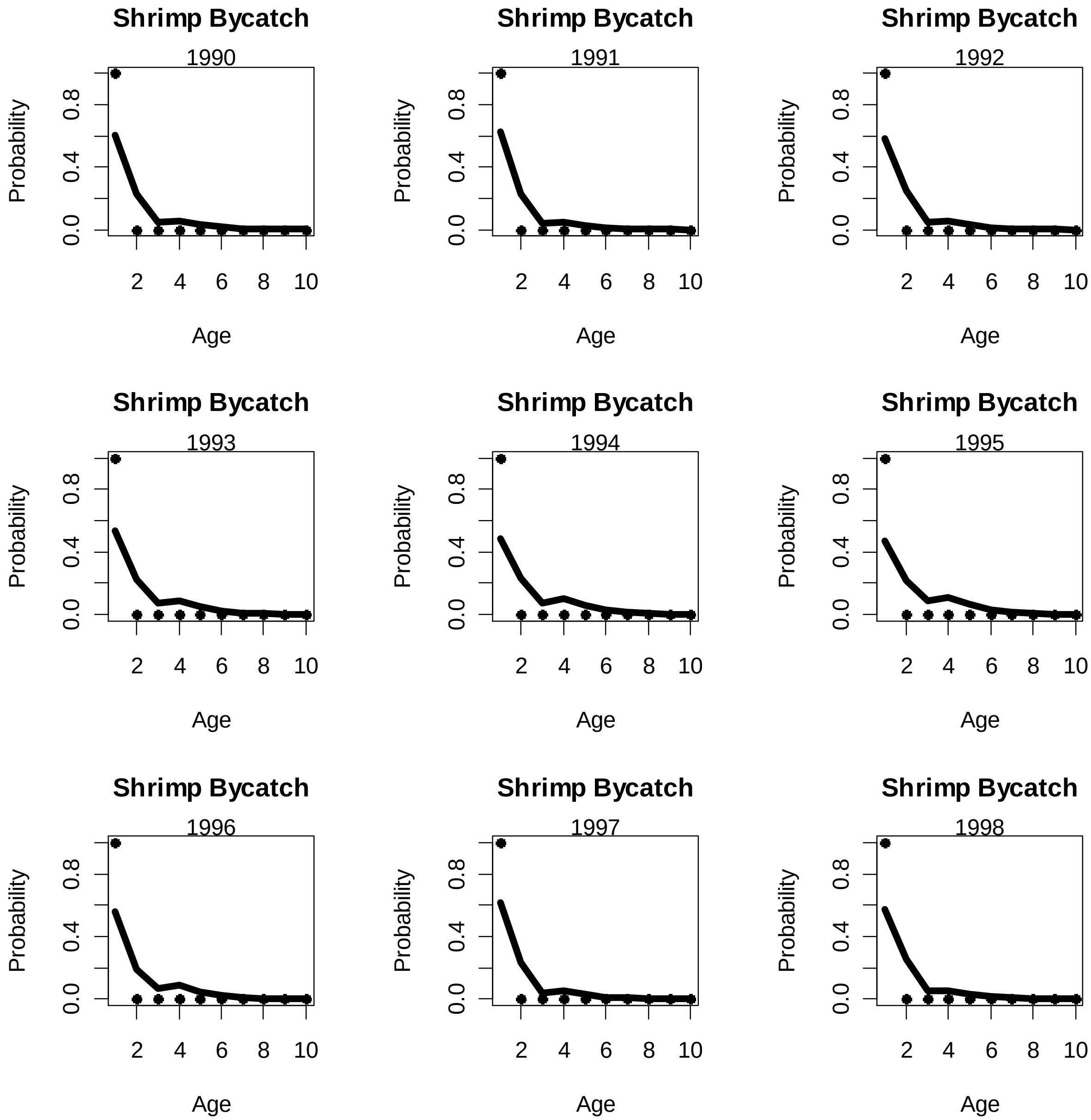
0.4
Age
2
4
6
8
10


Shrimp Bycatch
1981
Shrimp Bycatch
1982
Shrimp Bycatch
1983
Shrimp Bycatch
1984
Shrimp Bycatch
1985
Shrimp Bycatch
1986
Shrimp Bycatch
1987
Shrimp Bycatch
1988
Shrimp Bycatch
1989
Probability
0.0
0.4
0.8
Age
2
4
6
8
10


Shrimp Bycatch
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1992
Shrimp Bycatch
1993
Shrimp Bycatch
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Shrimp Bycatch
1995
Shrimp Bycatch
1996
Shrimp Bycatch
1997
Shrimp Bycatch
1998
Probability
0.0
0.4
0.8
Age
2
4
6
8
10

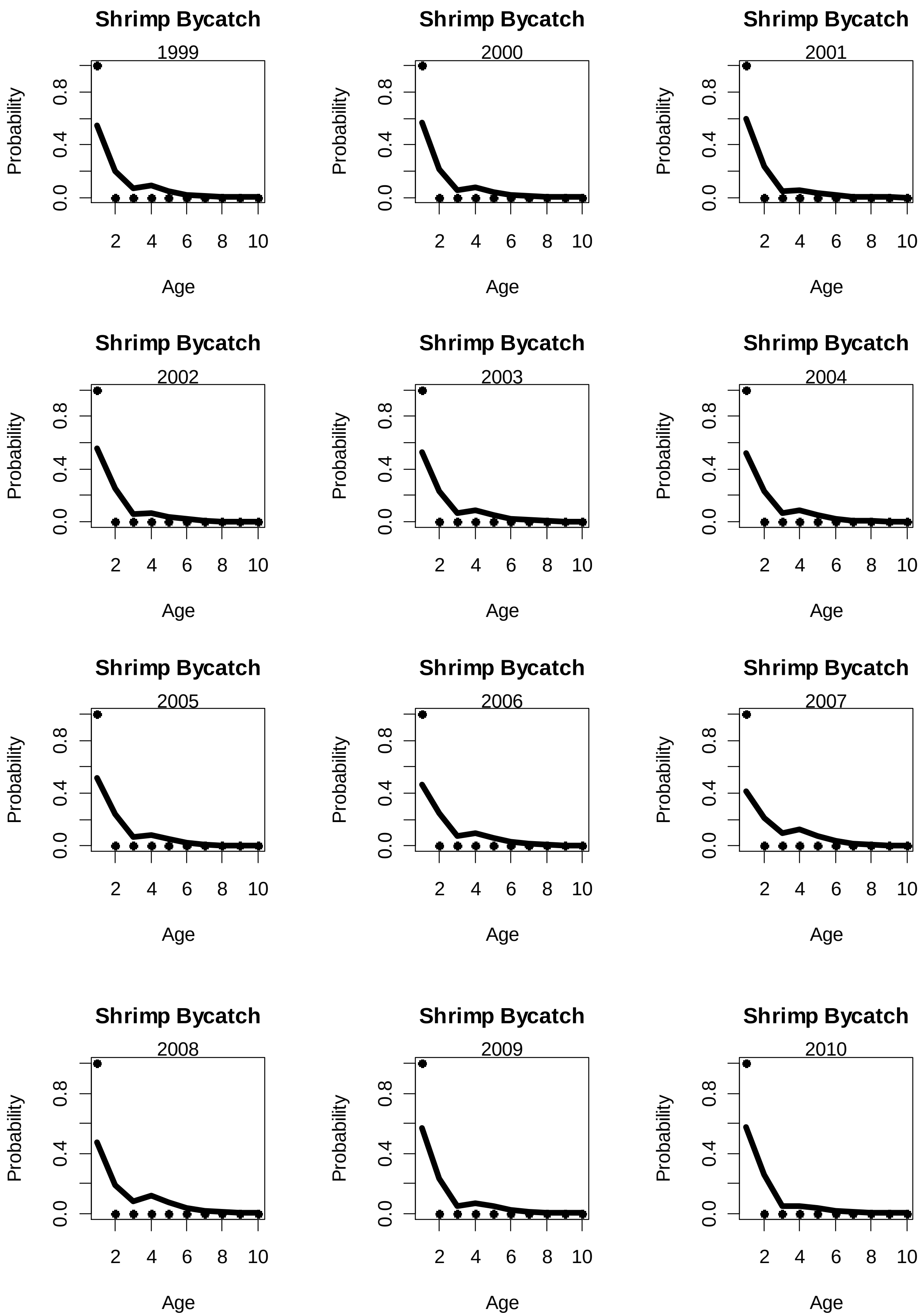
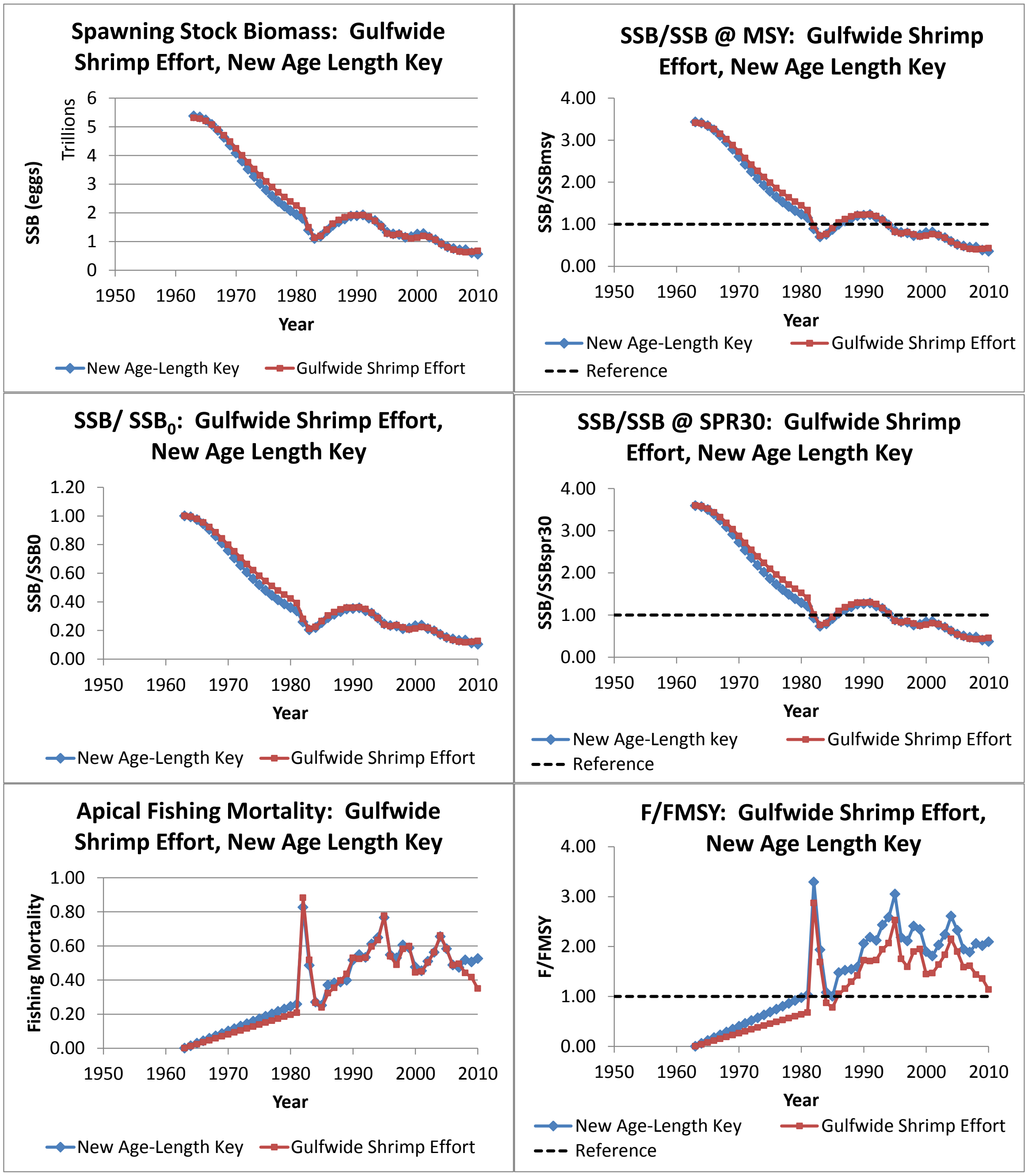

Shrimp Bycatch
1999
Shrimp Bycatch
2000
Shrimp Bycatch
2001
Shrimp Bycatch
2002
Shrimp Bycatch
2003
Shrimp Bycatch
2004
Shrimp Bycatch
2005
Shrimp Bycatch
2006
Shrimp Bycatch
2007
Shrimp Bycatch
2008
Shrimp Bycatch
2009
Shrimp Bycatch
2010
Probability
0.0
0.4
0.8
Age
2
4
6
8
10

FIGURE 8.19— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL ESTIMATES OF SPAWNING STOCK BIOMASS, FISHING MORTALITY, AND RECRUITMENT.



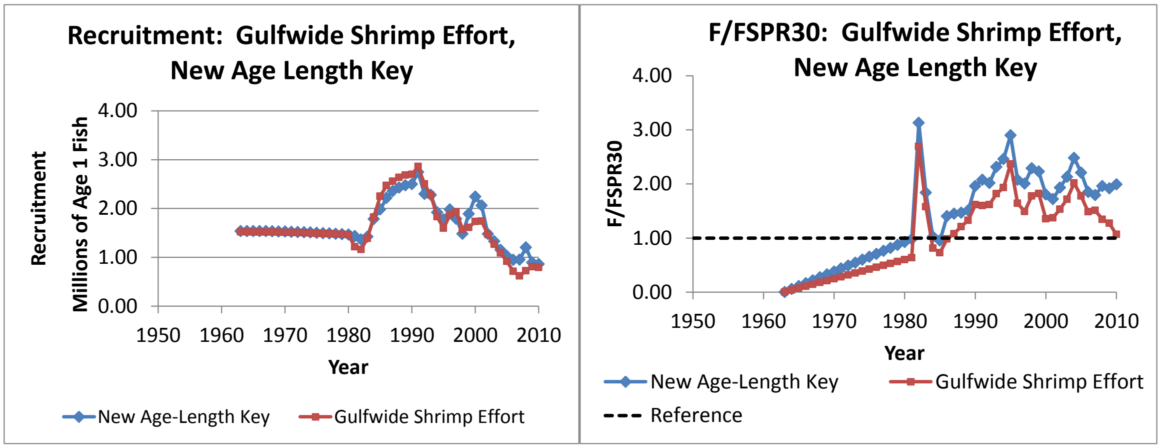


FIGURE 8.20— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL PROJECTIONS OF SPAWNING STOCK BIOMASS UNDER THREE SCENARIOS (THE CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009) AND THREE SUB-SCENARIOS: AT SPR 30, AT 75% OF SPR 30, AND AT NO FISHING.

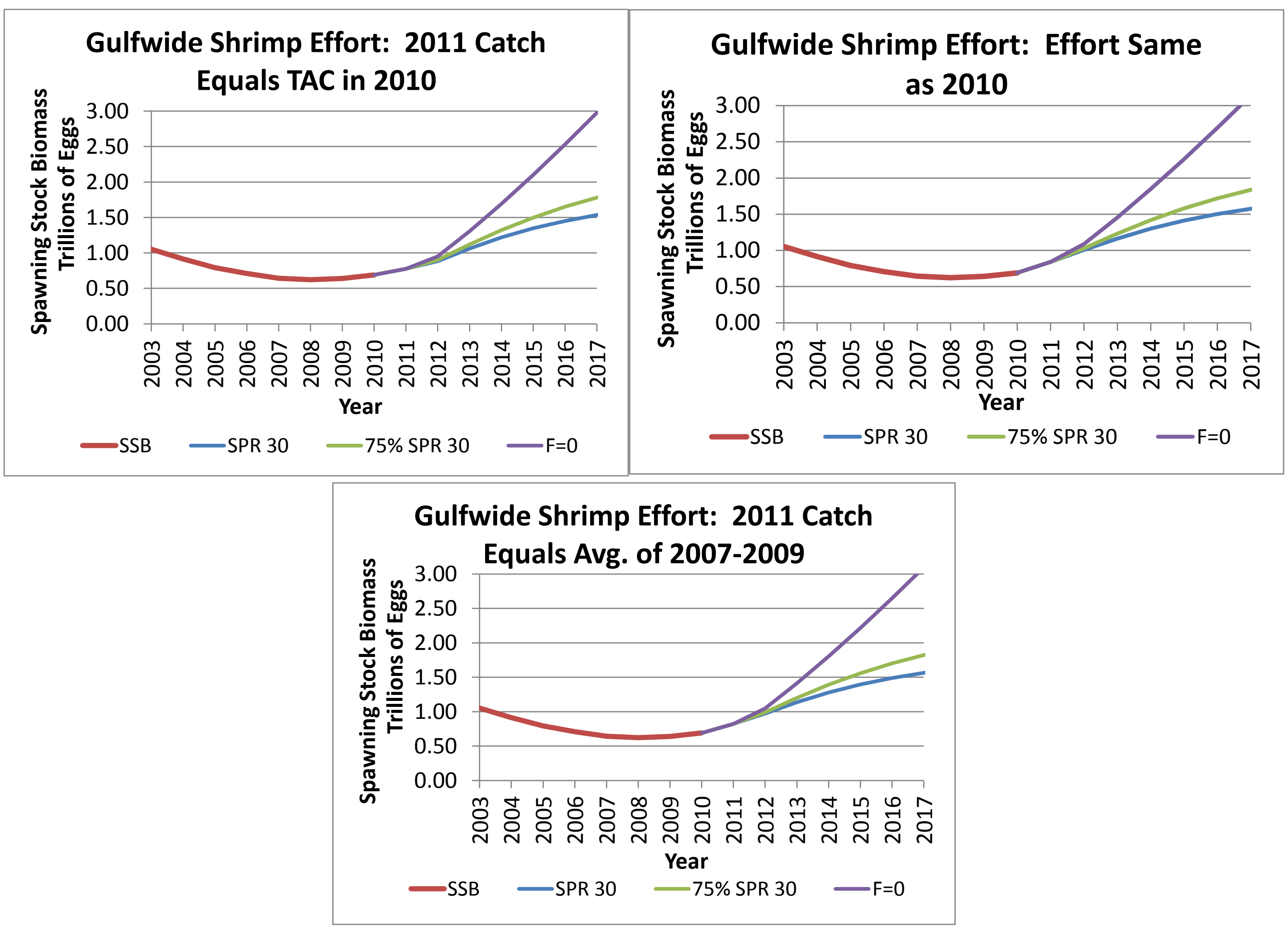


FIGURE 8.21— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL TOTAL ALLOWABLE CATCHES TO REBUILD THE STOCK IN 10 YEARS UNDER THE THREE SCENARIOS: CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009.

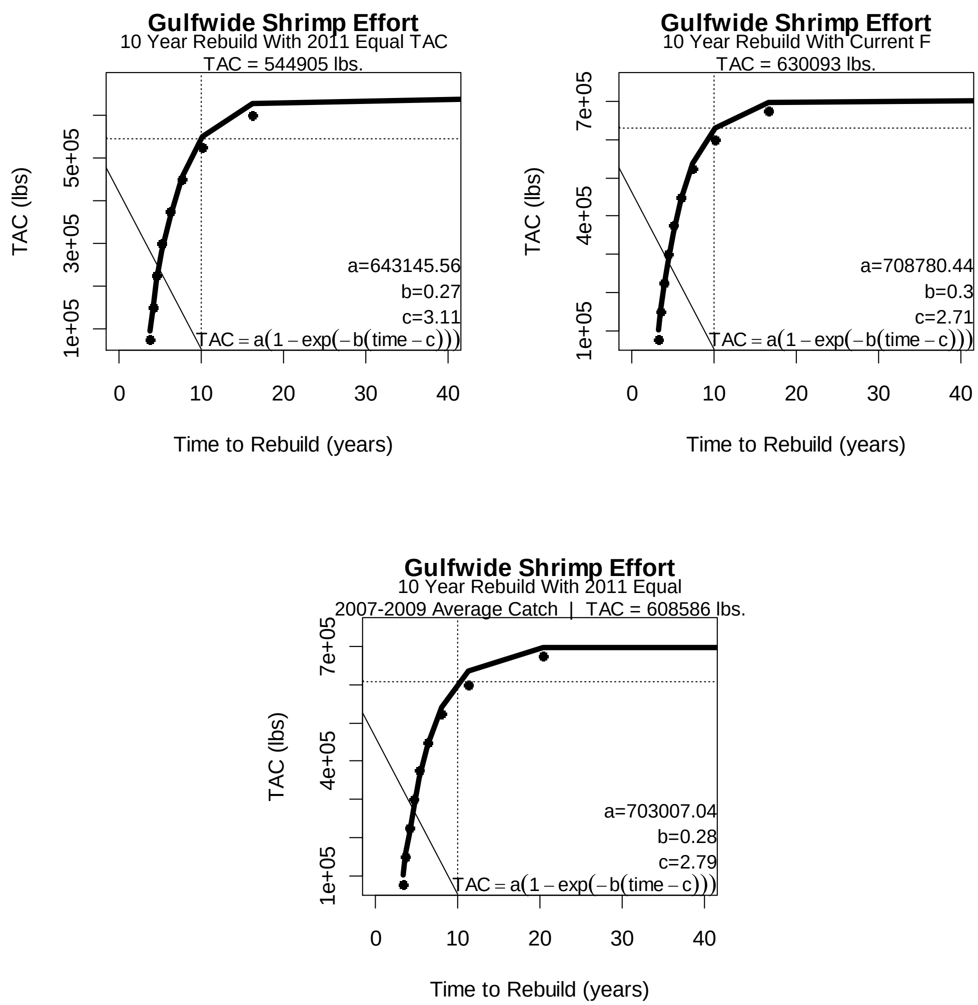
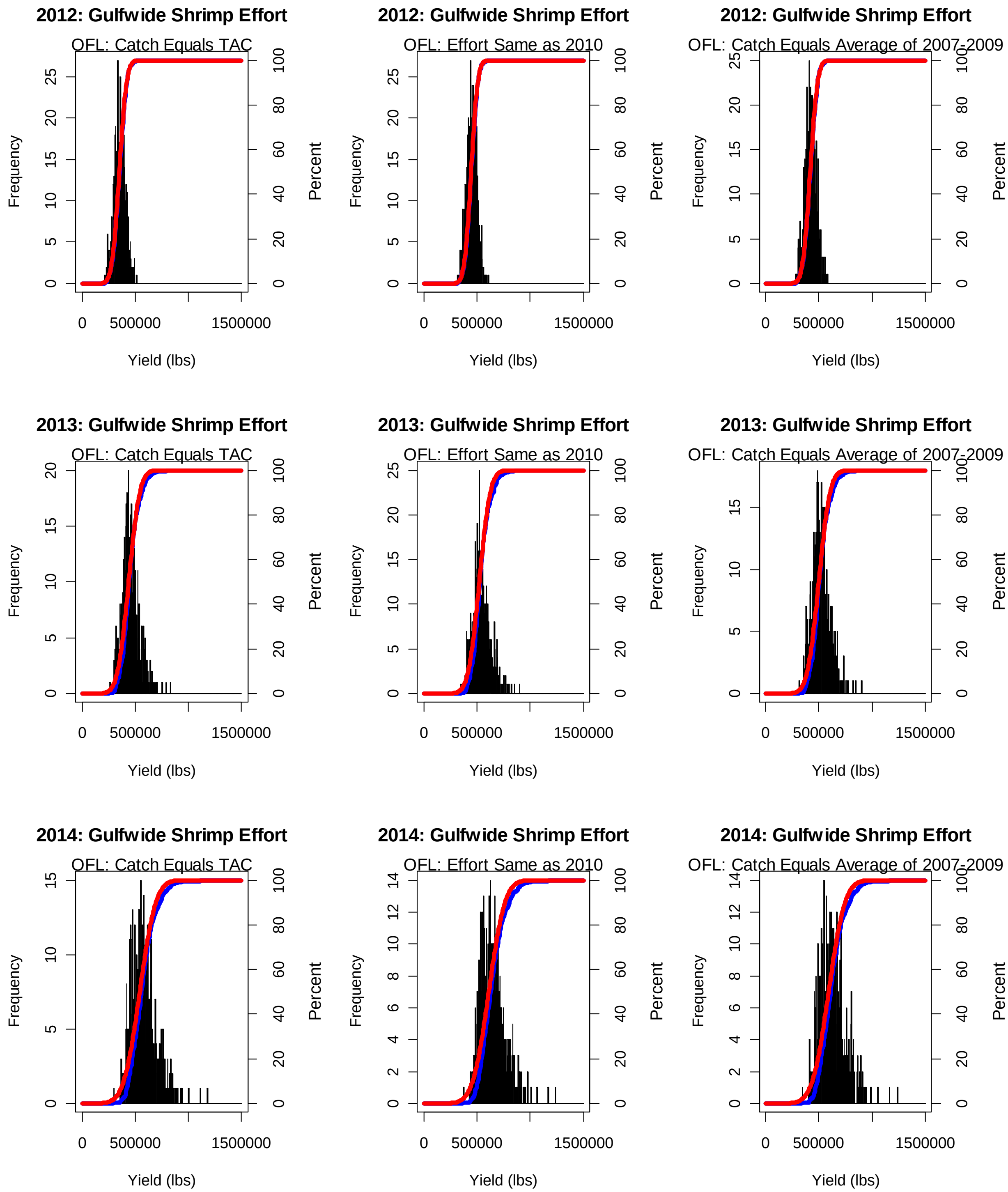


FIGURE 8.22— GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH MODEL ANNUALLY PROJECTED PROBABILITY DISTRIBUTIONS OF EXCEEDING THE OVERFISHING LIMIT UNDER THE THREE SCENARIOS: CATCH IN 2011 EQUALS THE CATCH IN 2010, THE EFFORT IN 2011 EQUALS THE EFFORT IN 2010, AND THE CATCH IN 2011 EQUALS THE AVERAGE OF THE CATCHES 2007-2009.



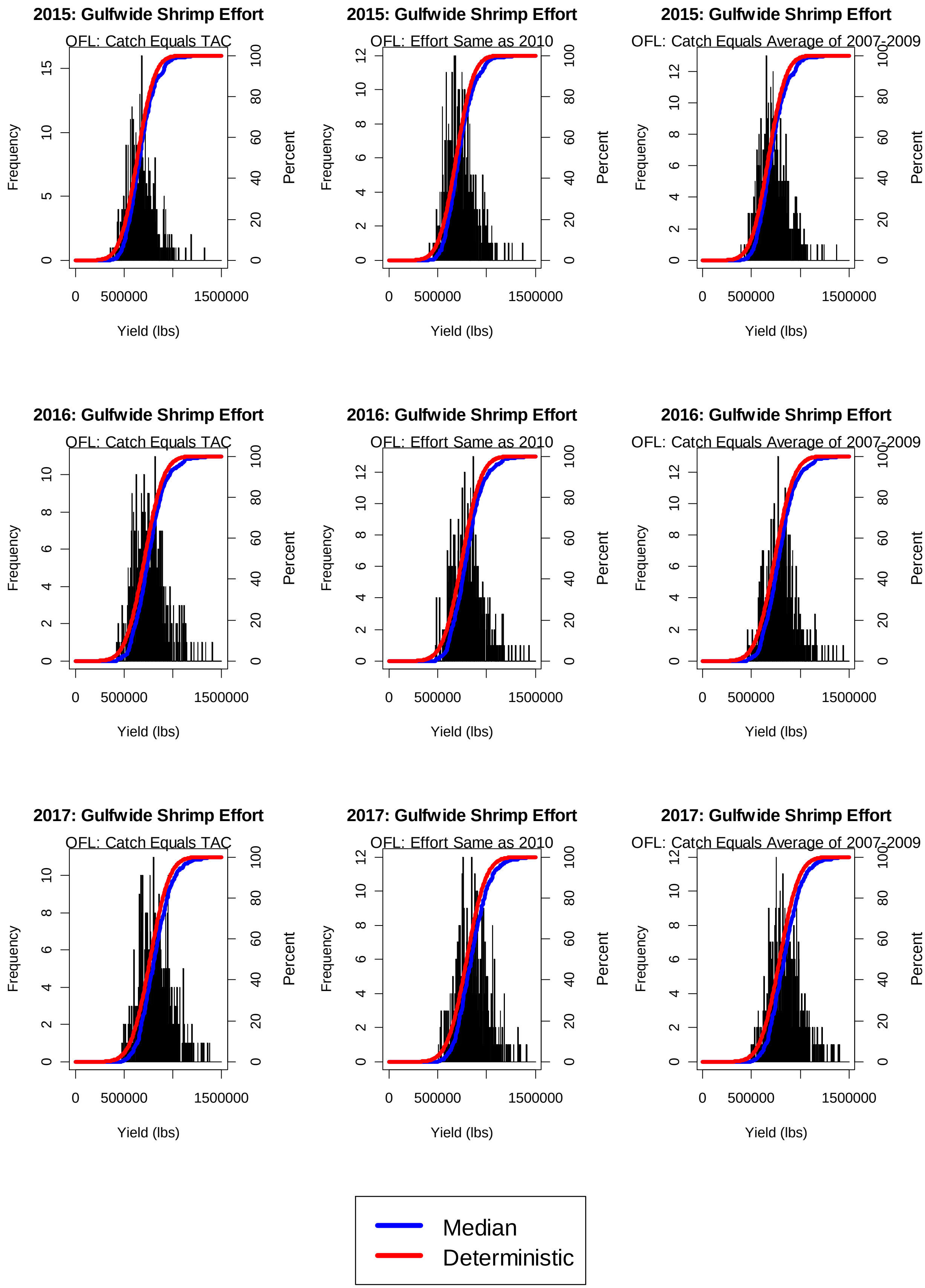

2015: Gulfwide Shrimp Effort
OFL: Catch Equals TAC
2015: Gulfwide Shrimp Effort
OFL: Effort Same as 2010
2015: Gulfwide Shrimp Effort
OFL: Catch Equals Average of 2007-2009
2016: Gulfwide Shrimp Effort
OFL: Catch Equals TAC
2016: Gulfwide Shrimp Effort
OFL: Effort Same as 2010
2016: Gulfwide Shrimp Effort
OFL: Catch Equals Average of 2007-2009
2017: Gulfwide Shrimp Effort
OFL: Catch Equals TAC
2017: Gulfwide Shrimp Effort
OFL: Effort Same as 2010
2017: Gulfwide Shrimp Effort
OFL: Catch Equals Average of 2007-2009
Frequency
Percent
Yield (lbs)
0
500000
1500000
Median
Deterministic

FIGURE 8.23—CONTROL RULE PLOT. Stock status comparison of continuity and update stock assessment model runs with that from SEDAR-9.

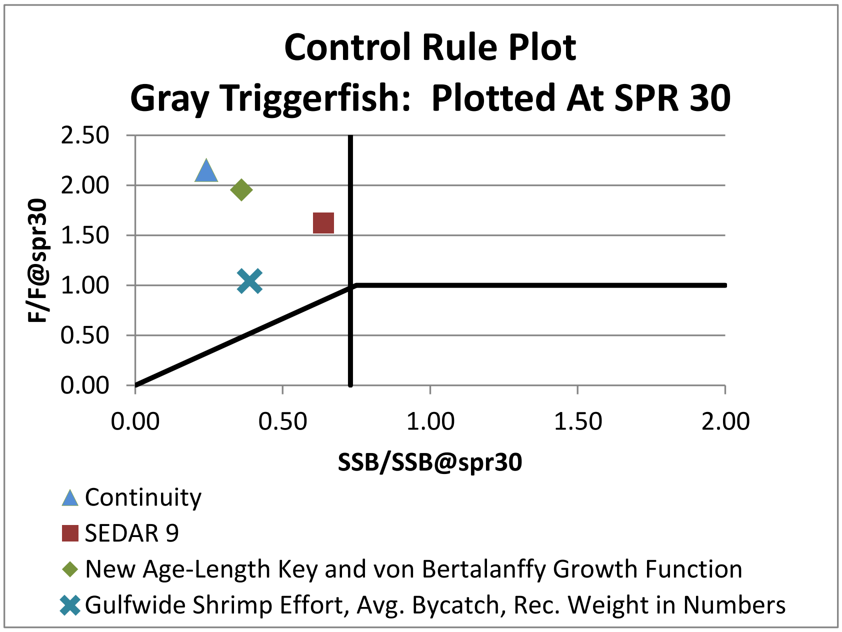


FIGURE 9.1—CATCH AT AGE BEFORE AND AFTER CIRCLE HOOKS WERE MANDATED.

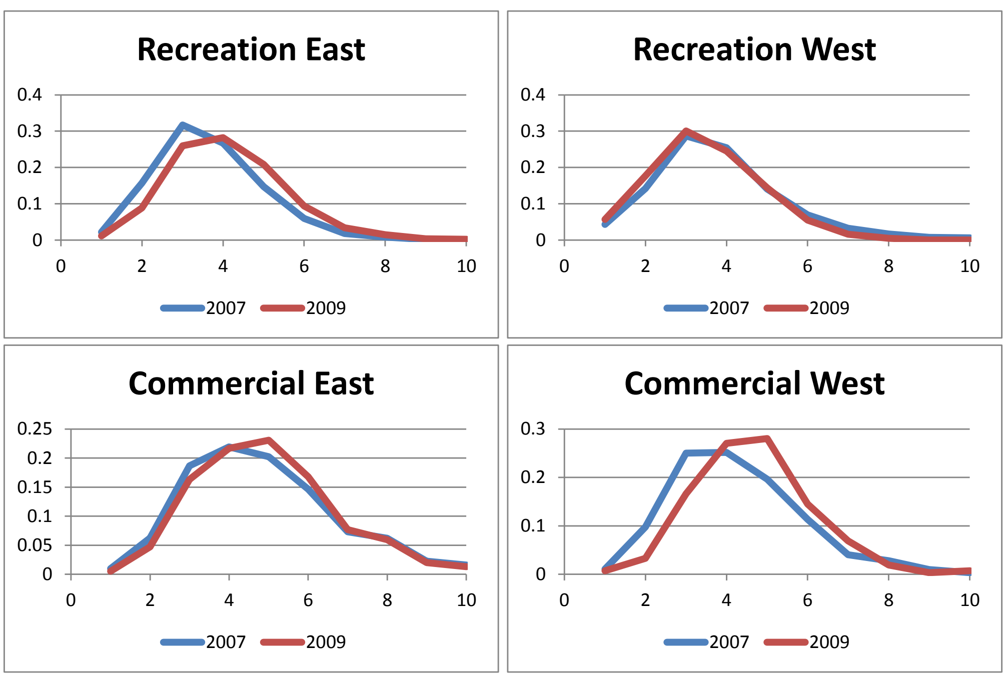


FIGURE 9.2—TAC NEEDED TO REBUILD THE STOCK IN 10 YEARS, ADJUSTED FOR THE YEAR (2008) WHEN THE CURRENT REBUILDING PLAN WAS IMPLEMENTED.

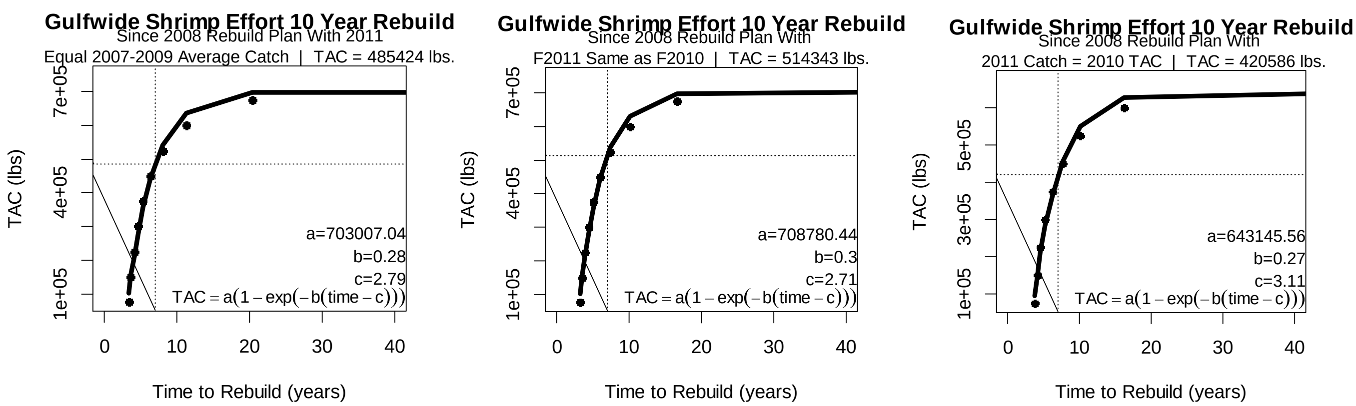


FIGURE 9.3—SPAWNING STOCK BIOMASS FROM THE PROJECTIONS REQUESTED AND ACCEPTED BY THE SSC THAT USED THE AVERAGE RECRUITMENT FROM 2005-2009 DUE TO THE INTER-ANNUAL VARIABILITY IN RECRUITMENT.

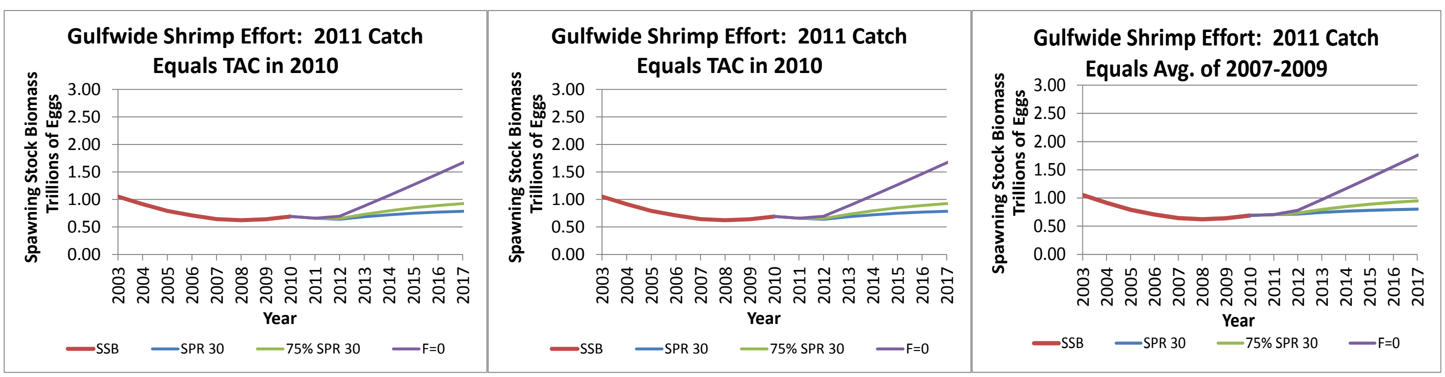
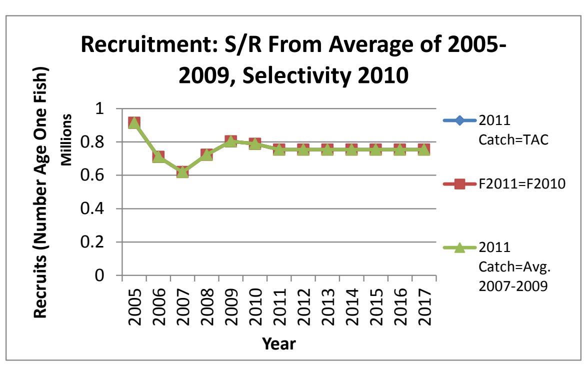


FIGURE 9.4— RECRUITMENT FROM THE PROJECTIONS REQUESTED AND ACCEPTED BY THE SSC THAT USED THE AVERAGE RECRUITMENT FROM 2005-2009 DUE TO THE INTER-ANNUAL VARIABILITY IN RECRUITMENT.



SEDAR 9 Update Stock Assessment Report

Section II:

Appendices and Supplementary Information

12 APPENDIXES

TABLE A-1: TABULATED RESULTS OF CONTINUITY RUN ANNUAL SPAWNING STOCK BIOMASS, FISHING MORTALITY, ABUNDANCE AND RECRUITS.

Year	SSB (trillion eggs)	SSB/SSBmsy	SSB/SSB F@spr30	Fishing Mortality	F/Fmsy	F/F@spr30	Abundance (millions of fish)	Recruits (millions of fish)
1963	5.99	4.88	3.61	0.00	0.00	0.00	7.24	1.71
1964	5.93	4.83	3.57	0.02	0.06	0.10	7.24	1.71
1965	5.75	4.68	3.46	0.05	0.12	0.20	7.13	1.71
1966	5.49	4.47	3.30	0.07	0.18	0.29	6.94	1.71
1967	5.15	4.19	3.10	0.10	0.24	0.39	6.70	1.71
1968	4.76	3.87	2.86	0.12	0.30	0.49	6.43	1.70
1969	4.35	3.54	2.61	0.14	0.37	0.58	6.15	1.70
1970	3.93	3.20	2.36	0.17	0.43	0.68	5.87	1.69
1971	3.53	2.87	2.12	0.19	0.49	0.78	5.59	1.68
1972	3.15	2.56	1.89	0.22	0.55	0.88	5.32	1.68
1973	2.80	2.28	1.69	0.24	0.61	0.97	5.07	1.67
1974	2.49	2.03	1.50	0.27	0.67	1.07	4.83	1.65
1975	2.22	1.81	1.34	0.29	0.73	1.17	4.61	1.64
1976	1.99	1.62	1.19	0.31	0.79	1.27	4.41	1.63
1977	1.78	1.45	1.07	0.34	0.85	1.36	4.21	1.61
1978	1.60	1.30	0.96	0.36	0.91	1.46	4.03	1.59
1979	1.45	1.18	0.87	0.39	0.98	1.56	3.87	1.58
1980	1.32	1.07	0.79	0.41	1.04	1.66	3.71	1.56
1981	1.22	0.99	0.73	0.44	1.10	1.75	3.69	1.67
1982	1.10	0.90	0.66	0.49	1.23	1.96	3.52	1.54
1983	1.04	0.85	0.63	0.43	1.08	1.72	3.46	1.65
1984	1.09	0.89	0.66	0.34	0.85	1.36	3.69	1.82
1985	1.20	0.98	0.72	0.31	0.79	1.26	4.11	2.00
1986	1.31	1.06	0.79	0.33	0.84	1.34	4.42	2.04
1987	1.40	1.14	0.84	0.34	0.86	1.37	4.71	2.17
1988	1.47	1.20	0.89	0.35	0.88	1.40	4.84	2.14
1989	1.52	1.24	0.91	0.35	0.89	1.42	4.92	2.17
1990	1.52	1.24	0.91	0.39	0.98	1.56	4.95	2.17
1991	1.50	1.22	0.90	0.43	1.07	1.72	5.00	2.27
1992	1.46	1.19	0.88	0.43	1.09	1.74	4.98	2.24
1993	1.40	1.14	0.84	0.47	1.18	1.89	4.83	2.17
1994	1.32	1.08	0.80	0.52	1.32	2.10	4.74	2.19
1995	1.20	0.98	0.72	0.56	1.42	2.27	4.38	1.94
1996	1.14	0.92	0.68	0.46	1.17	1.87	4.15	1.96
1997	1.11	0.90	0.67	0.47	1.20	1.91	4.06	1.91
1998	1.05	0.86	0.63	0.48	1.20	1.92	3.78	1.70
1999	1.02	0.83	0.61	0.43	1.09	1.73	3.59	1.64
2000	1.05	0.85	0.63	0.41	1.04	1.66	3.77	1.86
2001	1.08	0.88	0.65	0.44	1.11	1.77	3.96	1.95
2002	1.08	0.88	0.65	0.47	1.19	1.90	3.88	1.81
2003	1.01	0.83	0.61	0.48	1.20	1.92	3.52	1.53
2004	0.92	0.75	0.55	0.50	1.27	2.02	3.14	1.34
2005	0.83	0.68	0.50	0.49	1.23	1.96	2.75	1.16
2006	0.76	0.62	0.46	0.46	1.16	1.86	2.50	1.10
2007	0.72	0.58	0.43	0.47	1.18	1.88	2.36	1.06
2008	0.66	0.54	0.40	0.48	1.21	1.93	2.16	0.94
2009	0.54	0.44	0.33	0.54	1.38	2.20	1.62	0.51
2010	0.40	0.33	0.24	0.53	1.34	2.14	1.06	0.27

TABLE A-2: TABULATED RESULTS COMPARING THE CONTINUITY RUN ANNUAL SPAWNING STOCK BIOMASS, FISHING MORTALITY, ABUNDANCE AND RECRUITS WITH THE RESULTS FROM SEDAR 9.

Year	SSB (trillion eggs)		Abundance (millions of fish)		Recruits (millions of fish)		Fishing Mortality	
	SEDAR 9	*Update Assessment*	*SEDAR 9*	*Update Assessment*	*SEDAR 9*	*Update Assessment*	*SEDAR 9*	*Update Assessment*
1963	7.51	5.99	9.07	7.24	2.15	1.71	0.00	0.00
1964	7.46	5.93	9.07	7.24	2.15	1.71	0.01	0.02
1965	7.33	5.75	8.98	7.13	2.15	1.71	0.03	0.05
1966	7.11	5.49	8.83	6.94	2.14	1.71	0.04	0.07
1967	6.83	5.15	8.63	6.70	2.14	1.71	0.06	0.10
1968	6.51	4.76	8.41	6.43	2.14	1.70	0.07	0.12
1969	6.15	4.35	8.16	6.15	2.14	1.70	0.09	0.14
1970	5.77	3.93	7.91	5.87	2.13	1.69	0.10	0.17
1971	5.39	3.53	7.66	5.59	2.13	1.68	0.11	0.19
1972	5.01	3.15	7.40	5.32	2.12	1.68	0.13	0.22
1973	4.64	2.80	7.16	5.07	2.11	1.67	0.14	0.24
1974	4.30	2.49	6.92	4.83	2.11	1.65	0.16	0.27
1975	3.98	2.22	6.70	4.61	2.10	1.64	0.17	0.29
1976	3.69	1.99	6.48	4.41	2.09	1.63	0.19	0.31
1977	3.42	1.78	6.27	4.21	2.08	1.61	0.20	0.34
1978	3.18	1.60	6.08	4.03	2.07	1.59	0.22	0.36
1979	2.96	1.45	5.89	3.87	2.06	1.58	0.23	0.39
1980	2.76	1.32	5.72	3.71	2.05	1.56	0.24	0.41
1981	2.59	1.22	5.64	3.69	2.13	1.67	0.26	0.44
1982	2.24	1.10	5.36	3.52	1.94	1.54	0.49	0.49
1983	1.89	1.04	4.95	3.46	2.10	1.65	0.52	0.43
1984	1.77	1.09	5.19	3.69	2.47	1.82	0.60	0.34
1985	1.80	1.20	5.72	4.11	2.73	2.00	0.55	0.31
1986	1.92	1.31	6.24	4.42	2.89	2.04	0.40	0.33
1987	2.11	1.40	6.92	4.71	3.22	2.17	0.39	0.34
1988	2.28	1.47	7.44	4.84	3.35	2.14	0.38	0.35
1989	2.40	1.52	7.63	4.92	3.27	2.17	0.39	0.35
1990	2.53	1.52	8.01	4.95	3.55	2.17	0.39	0.39
1991	2.67	1.50	8.57	5.00	3.97	2.27	0.43	0.43
1992	2.58	1.46	8.10	4.98	3.28	2.24	0.52	0.43
1993	2.24	1.40	6.82	4.83	2.57	2.17	0.57	0.47
1994	2.01	1.32	6.14	4.74	2.50	2.19	0.55	0.52
1995	1.71	1.20	5.28	4.38	2.07	1.94	0.66	0.56
1996	1.47	1.14	4.56	4.15	1.93	1.96	0.62	0.46
1997	1.31	1.11	4.10	4.06	1.77	1.91	0.53	0.47
1998	1.18	1.05	3.58	3.78	1.46	1.70	0.47	0.48
1999	1.18	1.02	3.58	3.59	1.66	1.64	0.39	0.43
2000	1.33	1.05	4.26	3.77	2.21	1.86	0.37	0.41
2001	1.58	1.08	5.43	3.96	2.98	1.95	0.40	0.44
2002	1.59	1.08	5.17	3.88	2.12	1.81	0.41	0.47
2003	1.47	1.01	4.55	3.52	1.78	1.53	0.43	0.48
2004	1.35	0.92	3.96	3.14	1.49	1.34	0.43	0.50
2005		0.83		2.75		1.16		0.49
2006		0.76		2.50		1.10		0.46
2007		0.72		2.36		1.06		0.47
2008		0.66		2.16		0.94		0.48
2009		0.54		1.62		0.51		0.54
2010		0.40		1.06		0.27		0.53

TABLE A-3: PARAMETER ESTIMATES FROM CONTINUITY SSASPM MODEL.

Parameter Number	Description	Estimate	Std Dev	Parameter Number	Description	Estimate	Std Dev
1	Beverton & Holt - Alpha	1.71E+06	1.93E+05	51	Recruitment Deviation - 2005	-2.26E-01	1.68E-01
2	Beverton & Holt - Beta	3.16E+01	3.14E+00	52	Recruitment Deviation - 2006	-2.68E-01	1.76E-01
3	Index -Q MRFSSE	4.19E+01	8.31E+00	53	Recruitment Deviation - 2007	-2.84E-01	1.85E-01
4	Index -Q HBE	5.52E+01	1.31E+01	54	Recruitment Deviation - 2008	-3.89E-01	2.01E-01
5	Index -Q HBW	3.37E+02	8.95E+01	55	Recruitment Deviation - 2009	-9.88E-01	2.36E-01
6	Index -Q CmHLE	4.07E+01	1.15E+01	56	Recruitment Deviation - 2010	-1.59E+00	2.98E-01
7	Index -Q CmHLW	4.78E+01	9.34E+00	57	Effort Deviation - Rec-E -1981	9.99E-02	2.76E-01
8	Index -Q Larval	9.90E+02	4.26E+05	58	Effort Deviation - Rec-E -1982	2.34E-01	4.02E-01
9	Index -Q Trawl	7.48E+01	1.61E+01	59	Effort Deviation - Rec-E -1983	-1.20E-01	4.34E-01
10	Index -Q Video	5.60E-02	7.51E-03	60	Effort Deviation - Rec-E -1984	-5.14E-01	4.36E-01
11	Prehistoric Effort - Comm-E	2.20E-04	1.65E-04	61	Effort Deviation - Rec-E -1985	-5.50E-01	4.20E-01
12	Prehistoric Effort - Comm-W	1.87E-04	1.18E-04	62	Effort Deviation - Rec-E -1986	-3.22E-01	4.02E-01
13	Effort - Rec-E	2.08E-01	3.95E-02	63	Effort Deviation - Rec-E -1987	-3.36E-01	3.89E-01
14	Effort - Rec-W	1.26E-01	3.33E-02	64	Effort Deviation - Rec-E -1988	-3.57E-01	3.81E-01
15	Effort - Comm-E	3.63E-02	8.49E-03	65	Effort Deviation - Rec-E -1989	-3.65E-01	3.79E-01
16	Effort - Comm-W	1.75E-02	4.20E-03	66	Effort Deviation - Rec-E -1990	-2.14E-01	3.77E-01
17	Effort - Shirmp	3.00E-01	1.70E-04	67	Effort Deviation - Rec-E -1991	-1.67E-01	3.79E-01
18	Logistic Selectivity Par 1 - Rec-E	2.67E-02	2.77E+01	68	Effort Deviation - Rec-E -1992	-1.22E-01	3.84E-01
19	Logistic Selectivity Par 2 - Rec-E	1.04E+00	4.00E+01	69	Effort Deviation - Rec-E -1993	7.23E-03	3.88E-01
20	Logistic Selectivity Par 1 - Rec-W	6.83E-01	3.55E-02	70	Effort Deviation - Rec-E -1994	1.28E-01	3.89E-01
21	Logistic Selectivity Par 2 - Rec-W	5.07E+00	1.55E-01	71	Effort Deviation - Rec-E -1995	2.48E-01	3.95E-01
22	Logistic Selectivity Par 1 - Comm-E	4.79E-01	6.11E-02	72	Effort Deviation - Rec-E -1996	6.32E-02	3.94E-01
23	Logistic Selectivity Par 2 - Comm-E	2.12E+00	1.37E-01	73	Effort Deviation - Rec-E -1997	8.09E-02	4.01E-01
24	Logistic Selectivity Par 1 - Comm-W	5.16E-01	8.01E-02	74	Effort Deviation - Rec-E -1998	1.19E-01	4.16E-01
25	Logistic Selectivity Par 2 - Comm-W	2.19E+00	1.77E-01	75	Effort Deviation - Rec-E -1999	-2.25E-02	4.17E-01
26	Overall Variance	-9.98E-01	6.11E-02	76	Effort Deviation - Rec-E -2000	-1.75E-01	4.12E-01
27	Recruitment Deviation - 1981	8.16E-02	2.21E-01	77	Effort Deviation - Rec-E -2001	-1.39E-01	4.09E-01
28	Recruitment Deviation - 1982	1.18E-02	2.08E-01	78	Effort Deviation - Rec-E -2002	-6.35E-03	4.02E-01
29	Recruitment Deviation - 1983	9.67E-02	1.93E-01	79	Effort Deviation - Rec-E -2003	8.67E-02	3.90E-01
30	Recruitment Deviation - 1984	2.01E-01	1.81E-01	80	Effort Deviation - Rec-E -2004	1.76E-01	3.91E-01
31	Recruitment Deviation - 1985	2.89E-01	1.71E-01	81	Effort Deviation - Rec-E -2005	1.24E-01	3.98E-01
32	Recruitment Deviation - 1986	2.95E-01	1.64E-01	82	Effort Deviation - Rec-E -2006	2.95E-02	4.02E-01
33	Recruitment Deviation - 1987	3.43E-01	1.62E-01	83	Effort Deviation - Rec-E -2007	3.97E-02	4.02E-01
34	Recruitment Deviation - 1988	3.20E-01	1.60E-01	84	Effort Deviation - Rec-E -2008	9.28E-02	3.99E-01
35	Recruitment Deviation - 1989	3.29E-01	1.57E-01	85	Effort Deviation - Rec-E -2009	4.11E-01	4.53E-01
36	Recruitment Deviation - 1990	3.27E-01	1.55E-01	86	Effort Deviation - Rec-E -2010	6.35E-01	6.41E-01
37	Recruitment Deviation - 1991	3.71E-01	1.52E-01	87	Effort Deviation - Rec-W -1981	1.33E-01	4.33E-01
38	Recruitment Deviation - 1992	3.60E-01	1.53E-01	88	Effort Deviation - Rec-W -1982	1.73E-01	4.48E-01
39	Recruitment Deviation - 1993	3.29E-01	1.51E-01	89	Effort Deviation - Rec-W -1983	4.75E-01	4.54E-01
40	Recruitment Deviation - 1994	3.44E-01	1.52E-01	90	Effort Deviation - Rec-W -1984	3.22E-01	4.61E-01
41	Recruitment Deviation - 1995	2.32E-01	1.52E-01	91	Effort Deviation - Rec-W -1985	7.08E-03	4.59E-01
42	Recruitment Deviation - 1996	2.51E-01	1.53E-01	92	Effort Deviation - Rec-W -1986	-2.12E-01	4.56E-01
43	Recruitment Deviation - 1997	2.38E-01	1.55E-01	93	Effort Deviation - Rec-W -1987	-3.95E-01	4.52E-01
44	Recruitment Deviation - 1998	1.25E-01	1.58E-01	94	Effort Deviation - Rec-W -1988	-3.02E-01	4.44E-01
45	Recruitment Deviation - 1999	9.53E-02	1.55E-01	95	Effort Deviation - Rec-W -1989	-1.01E-01	4.32E-01
46	Recruitment Deviation - 2000	2.26E-01	1.54E-01	96	Effort Deviation - Rec-W -1990	1.58E-01	4.28E-01
47	Recruitment Deviation - 2001	2.69E-01	1.55E-01	97	Effort Deviation - Rec-W -1991	3.00E-01	4.40E-01
48	Recruitment Deviation - 2002	1.87E-01	1.56E-01	98	Effort Deviation - Rec-W -1992	2.44E-01	4.48E-01
49	Recruitment Deviation - 2003	2.51E-02	1.60E-01	99	Effort Deviation - Rec-W -1993	2.77E-01	4.49E-01
50	Recruitment Deviation - 2004	-1.05E-01	1.63E-01	100	Effort Deviation - Rec-W -1994	4.25E-01	4.49E-01

Table A-3 Continued: Parameter estimates from continuity SSASPM model.

Parameter Number	Description	Estimate	Std Dev	Parameter Number	Description	Estimate	Std Dev
101	Effort Deviation - Rec-W -1995	4.99E-01	4.52E-01	151	Effort Deviation - Comm-W -1985	-2.18E-01	4.49E-01
102	Effort Deviation - Rec-W -1996	2.48E-01	4.51E-01	152	Effort Deviation - Comm-W -1986	-3.21E-01	4.48E-01
103	Effort Deviation - Rec-W -1997	1.36E-01	4.49E-01	153	Effort Deviation - Comm-W -1987	-2.44E-01	4.46E-01
104	Effort Deviation - Rec-W -1998	6.42E-03	4.45E-01	154	Effort Deviation - Comm-W -1988	-8.79E-02	4.43E-01
105	Effort Deviation - Rec-W -1999	1.45E-01	4.45E-01	155	Effort Deviation - Comm-W -1989	6.94E-02	4.41E-01
106	Effort Deviation - Rec-W -2000	2.33E-01	4.56E-01	156	Effort Deviation - Comm-W -1990	1.79E-01	4.41E-01
107	Effort Deviation - Rec-W -2001	-4.20E-02	4.55E-01	157	Effort Deviation - Comm-W -1991	2.70E-01	4.43E-01
108	Effort Deviation - Rec-W -2002	-2.30E-01	4.49E-01	158	Effort Deviation - Comm-W -1992	3.77E-01	4.44E-01
109	Effort Deviation - Rec-W -2003	-1.43E-01	4.45E-01	159	Effort Deviation - Comm-W -1993	5.33E-01	4.46E-01
110	Effort Deviation - Rec-W -2004	2.45E-02	4.47E-01	160	Effort Deviation - Comm-W -1994	5.75E-01	4.49E-01
111	Effort Deviation - Rec-W -2005	-2.21E-02	4.51E-01	161	Effort Deviation - Comm-W -1995	5.69E-01	4.51E-01
112	Effort Deviation - Rec-W -2006	6.86E-02	4.52E-01	162	Effort Deviation - Comm-W -1996	5.27E-01	4.50E-01
113	Effort Deviation - Rec-W -2007	-6.52E-02	4.53E-01	163	Effort Deviation - Comm-W -1997	4.11E-01	4.49E-01
114	Effort Deviation - Rec-W -2008	-6.49E-02	4.60E-01	164	Effort Deviation - Comm-W -1998	3.93E-01	4.51E-01
115	Effort Deviation - Rec-W -2009	-5.96E-01	4.62E-01	165	Effort Deviation - Comm-W -1999	4.67E-01	4.52E-01
116	Effort Deviation - Rec-W -2010	-9.83E-01	4.69E-01	166	Effort Deviation - Comm-W -2000	4.46E-01	4.51E-01
117	Effort Deviation - Comm-E -1981	-9.78E-01	2.74E-01	167	Effort Deviation - Comm-W -2001	3.60E-01	4.49E-01
118	Effort Deviation - Comm-E -1982	-5.08E-01	4.35E-01	168	Effort Deviation - Comm-W -2002	3.72E-01	4.48E-01
119	Effort Deviation - Comm-E -1983	-3.91E-01	4.51E-01	169	Effort Deviation - Comm-W -2003	3.66E-01	4.48E-01
120	Effort Deviation - Comm-E -1984	-3.99E-01	4.52E-01	170	Effort Deviation - Comm-W -2004	3.15E-01	4.49E-01
121	Effort Deviation - Comm-E -1985	-3.32E-01	4.48E-01	171	Effort Deviation - Comm-W -2005	1.63E-01	4.49E-01
122	Effort Deviation - Comm-E -1986	-2.59E-01	4.45E-01	172	Effort Deviation - Comm-W -2006	6.68E-02	4.49E-01
123	Effort Deviation - Comm-E -1987	-1.81E-01	4.41E-01	173	Effort Deviation - Comm-W -2007	5.67E-02	4.49E-01
124	Effort Deviation - Comm-E -1988	-4.16E-02	4.36E-01	174	Effort Deviation - Comm-W -2008	-4.66E-02	4.49E-01
125	Effort Deviation - Comm-E -1989	1.42E-01	4.32E-01	175	Effort Deviation - Comm-W -2009	-1.72E-01	4.52E-01
126	Effort Deviation - Comm-E -1990	3.25E-01	4.32E-01	176	Effort Deviation - Comm-W -2010	-2.63E-01	4.62E-01
127	Effort Deviation - Comm-E -1991	4.19E-01	4.35E-01	177	Effort Deviation - SHRIMP -1981	2.82E-02	1.59E-01
128	Effort Deviation - Comm-E -1992	4.90E-01	4.38E-01	178	Effort Deviation - SHRIMP -1982	8.52E-02	2.02E-01
129	Effort Deviation - Comm-E -1993	5.34E-01	4.42E-01	179	Effort Deviation - SHRIMP -1983	6.00E-02	2.06E-01
130	Effort Deviation - Comm-E -1994	4.76E-01	4.49E-01	180	Effort Deviation - SHRIMP -1984	-5.22E-02	2.04E-01
131	Effort Deviation - Comm-E -1995	4.09E-01	4.53E-01	181	Effort Deviation - SHRIMP -1985	-8.58E-02	2.03E-01
132	Effort Deviation - Comm-E -1996	2.76E-01	4.50E-01	182	Effort Deviation - SHRIMP -1986	-1.43E-01	2.01E-01
133	Effort Deviation - Comm-E -1997	1.73E-01	4.49E-01	183	Effort Deviation - SHRIMP -1987	-9.81E-02	2.00E-01
134	Effort Deviation - Comm-E -1998	1.53E-01	4.52E-01	184	Effort Deviation - SHRIMP -1988	-5.55E-02	2.01E-01
135	Effort Deviation - Comm-E -1999	1.49E-01	4.53E-01	185	Effort Deviation - SHRIMP -1989	-4.58E-02	2.02E-01
136	Effort Deviation - Comm-E -2000	3.62E-02	4.51E-01	186	Effort Deviation - SHRIMP -1990	-4.12E-02	2.02E-01
137	Effort Deviation - Comm-E -2001	1.30E-01	4.48E-01	187	Effort Deviation - SHRIMP -1991	-6.67E-02	2.00E-01
138	Effort Deviation - Comm-E -2002	2.34E-01	4.46E-01	188	Effort Deviation - SHRIMP -1992	9.75E-03	2.02E-01
139	Effort Deviation - Comm-E -2003	2.93E-01	4.47E-01	189	Effort Deviation - SHRIMP -1993	-2.37E-02	2.02E-01
140	Effort Deviation - Comm-E -2004	2.77E-01	4.49E-01	190	Effort Deviation - SHRIMP -1994	4.46E-02	2.03E-01
141	Effort Deviation - Comm-E -2005	1.88E-01	4.50E-01	191	Effort Deviation - SHRIMP -1995	6.06E-02	2.03E-01
142	Effort Deviation - Comm-E -2006	3.95E-02	4.49E-01	192	Effort Deviation - SHRIMP -1996	9.31E-02	2.02E-01
143	Effort Deviation - Comm-E -2007	-1.95E-02	4.49E-01	193	Effort Deviation - SHRIMP -1997	1.31E-01	2.06E-01
144	Effort Deviation - Comm-E -2008	7.23E-03	4.50E-01	194	Effort Deviation - SHRIMP -1998	1.03E-01	2.07E-01
145	Effort Deviation - Comm-E -2009	1.01E-01	4.54E-01	195	Effort Deviation - SHRIMP -1999	2.77E-02	2.03E-01
146	Effort Deviation - Comm-E -2010	1.06E-01	4.67E-01	196	Effort Deviation - SHRIMP -2000	9.59E-02	1.99E-01
147	Effort Deviation - Comm-W -1981	-1.25E+00	2.77E-01	197	Effort Deviation - SHRIMP -2001	1.85E-01	2.02E-01
148	Effort Deviation - Comm-W -1982	-5.59E-01	4.36E-01	198	Effort Deviation - SHRIMP -2002	2.01E-01	2.04E-01
149	Effort Deviation - Comm-W -1983	-3.54E-01	4.50E-01	199	Effort Deviation - SHRIMP -2003	1.31E-01	2.04E-01
150	Effort Deviation - Comm-W -1984	-2.27E-01	4.51E-01	200	Effort Deviation - SHRIMP -2004	1.53E-01	2.05E-01

Table A-3 Continued: Parameter estimates from continuity SSASPM model.

Parameter Number	Description	Estimate	Std Dev
201	Effort Deviation - SHRIMP -2005	1.58E-01	2.07E-01
202	Effort Deviation - SHRIMP -2006	1.48E-01	2.08E-01
203	Effort Deviation - SHRIMP -2007	1.70E-01	2.09E-01
204	Effort Deviation - SHRIMP -2008	1.70E-01	2.15E-01
205	Effort Deviation - SHRIMP -2009	7.76E-02	2.31E-01
206	Effort Deviation - SHRIMP -2010	-5.36E-01	2.35E-01
207	Lifetime Reproductive Rate	3.16E+01	3.14E+00
208	r0	1.71E+06	1.93E+05
209	Bcurrent	4.03E+05	1.12E+05
210	Fcurrent	5.31E-01	2.73E-01
211	Bvirgin	5.99E+06	6.77E+05
212	B - 1963	5.99E+06	6.77E+05
213	B - 1964	5.93E+06	6.68E+05
214	B - 1965	5.75E+06	6.43E+05
215	B - 1966	5.49E+06	6.08E+05
216	B - 1967	5.15E+06	5.69E+05
217	B - 1968	4.76E+06	5.30E+05
218	B - 1969	4.35E+06	4.95E+05
219	B - 1970	3.93E+06	4.64E+05
220	B - 1971	3.53E+06	4.37E+05
221	B - 1972	3.15E+06	4.12E+05
222	B - 1973	2.80E+06	3.87E+05
223	B - 1974	2.49E+06	3.62E+05
224	B - 1975	2.22E+06	3.38E+05
225	B - 1976	1.99E+06	3.14E+05
226	B - 1977	1.78E+06	2.90E+05
227	B - 1978	1.60E+06	2.68E+05
228	B - 1979	1.45E+06	2.48E+05
229	B - 1980	1.32E+06	2.29E+05
230	B - 1981	1.22E+06	2.18E+05
231	B - 1982	1.10E+06	1.85E+05
232	B - 1983	1.04E+06	1.62E+05
233	B - 1984	1.09E+06	1.60E+05
234	B - 1985	1.20E+06	1.69E+05
235	B - 1986	1.31E+06	1.77E+05
236	B - 1987	1.40E+06	1.85E+05
237	B - 1988	1.47E+06	1.91E+05
238	B - 1989	1.52E+06	1.97E+05
239	B - 1990	1.52E+06	1.98E+05
240	B - 1991	1.50E+06	1.97E+05
241	B - 1992	1.46E+06	1.95E+05
242	B - 1993	1.40E+06	1.88E+05
243	B - 1994	1.32E+06	1.79E+05
244	B - 1995	1.20E+06	1.62E+05
245	B - 1996	1.14E+06	1.55E+05
246	B - 1997	1.11E+06	1.50E+05
247	B - 1998	1.05E+06	1.42E+05
248	B - 1999	1.02E+06	1.40E+05
249	B - 2000	1.05E+06	1.44E+05
250	B - 2001	1.08E+06	1.49E+05

Parameter Number	Description	Estimate	Std Dev
251	B - 2002	1.08E+06	1.47E+05
252	B - 2003	1.01E+06	1.41E+05
253	B - 2004	9.22E+05	1.28E+05
254	B - 2005	8.30E+05	1.16E+05
255	B - 2006	7.65E+05	1.10E+05
256	B - 2007	7.19E+05	1.08E+05
257	B - 2008	6.64E+05	1.05E+05
258	B - 2009	5.43E+05	9.80E+04
259	B - 2010	4.03E+05	1.12E+05
260	B1963 over B0	1.00E+00	9.33E-05
261	B1964 over B0	9.89E-01	1.79E-03
262	B1965 over B0	9.60E-01	6.65E-03
263	B1966 over B0	9.15E-01	1.37E-02
264	B1967 over B0	8.58E-01	2.20E-02
265	B1968 over B0	7.94E-01	3.04E-02
266	B1969 over B0	7.25E-01	3.80E-02
267	B1970 over B0	6.56E-01	4.41E-02
268	B1971 over B0	5.88E-01	4.84E-02
269	B1972 over B0	5.25E-01	5.09E-02
270	B1973 over B0	4.67E-01	5.16E-02
271	B1974 over B0	4.16E-01	5.09E-02
272	B1975 over B0	3.71E-01	4.93E-02
273	B1976 over B0	3.31E-01	4.70E-02
274	B1977 over B0	2.97E-01	4.44E-02
275	B1978 over B0	2.67E-01	4.16E-02
276	B1979 over B0	2.42E-01	3.89E-02
277	B1980 over B0	2.19E-01	3.63E-02
278	B1981 over B0	2.03E-01	3.58E-02
279	B1982 over B0	1.84E-01	3.11E-02
280	B1983 over B0	1.74E-01	2.75E-02
281	B1984 over B0	1.82E-01	2.70E-02
282	B1985 over B0	2.01E-01	2.82E-02
283	B1986 over B0	2.18E-01	2.92E-02
284	B1987 over B0	2.34E-01	3.04E-02
285	B1988 over B0	2.46E-01	3.14E-02
286	B1989 over B0	2.53E-01	3.21E-02
287	B1990 over B0	2.54E-01	3.20E-02
288	B1991 over B0	2.50E-01	3.17E-02
289	B1992 over B0	2.44E-01	3.11E-02
290	B1993 over B0	2.34E-01	2.99E-02
291	B1994 over B0	2.21E-01	2.86E-02
292	B1995 over B0	2.00E-01	2.62E-02
293	B1996 over B0	1.90E-01	2.52E-02
294	B1997 over B0	1.85E-01	2.45E-02
295	B1998 over B0	1.76E-01	2.35E-02
296	B1999 over B0	1.70E-01	2.32E-02
297	B2000 over B0	1.75E-01	2.39E-02
298	B2001 over B0	1.81E-01	2.44E-02
299	B2002 over B0	1.79E-01	2.41E-02
300	B2003 over B0	1.69E-01	2.30E-02

Parameter Number	Description	Estimate	Std Dev
301	B2004 over B0	1.54E-01	2.10E-02
302	B2005 over B0	1.38E-01	1.92E-02
303	B2006 over B0	1.28E-01	1.82E-02
304	B2007 over B0	1.20E-01	1.77E-02
305	B2008 over B0	1.11E-01	1.72E-02
306	B2009 over B0	9.06E-02	1.60E-02
307	B2010 over B0	6.72E-02	1.85E-02
308	N Age1_2010	2.66E+05	8.45E+04
309	N Age2_2010	2.62E+05	6.82E+04
310	N Age3_2010	2.11E+05	5.38E+04
311	N Age4_2010	1.34E+05	3.45E+04
312	N Age5_2010	8.00E+04	2.12E+04
313	N Age6_2010	4.73E+04	1.29E+04
314	N Age7_2010	2.83E+04	8.07E+03
315	N Age8_2010	1.65E+04	4.96E+03
316	N Age9_2010	9.54E+03	3.05E+03
317	N Age10_2010	1.07E+04	3.73E+03
318	F Age 1_2010	2.56E-01	6.58E-02
319	F Age 2_2010	5.31E-01	2.73E-01
320	F Age 3_2010	4.48E-01	2.74E-01
321	F Age 4_2010	4.59E-01	2.75E-01
322	F Age 5_2010	4.74E-01	2.76E-01
323	F Age 6_2010	4.89E-01	2.77E-01
324	F Age 7_2010	4.96E-01	2.78E-01
325	F Age 8_2010	4.98E-01	2.78E-01
326	F Age 9_2010	4.99E-01	2.78E-01
327	F Age 10_2010	4.99E-01	2.78E-01

TABLE A-4: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT FSPR30.

SSASPM Model Run: Continuity

SSB: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.026E+11	3.950E+11	5.405E+11	4.094E+11	3.838E+11	9.622E+10
2012	3.557E+11	4.939E+11	7.123E+11	5.156E+11	4.648E+11	1.419E+11
2013	4.762E+11	6.866E+11	9.515E+11	6.975E+11	6.258E+11	1.803E+11
2014	6.047E+11	8.369E+11	1.099E+12	8.546E+11	7.804E+11	2.006E+11
2015	7.372E+11	1.003E+12	1.264E+12	1.007E+12	9.246E+11	2.127E+11
2016	8.679E+11	1.119E+12	1.435E+12	1.139E+12	1.055E+12	2.249E+11
2017	9.728E+11	1.246E+12	1.611E+12	1.270E+12	1.170E+12	2.444E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.18	0.24	0.32	0.25	0.23	0.06
2012	0.21	0.30	0.43	0.31	0.28	0.08
2013	0.29	0.41	0.57	0.42	0.37	0.11
2014	0.36	0.50	0.66	0.51	0.47	0.12
2015	0.44	0.60	0.76	0.60	0.55	0.13
2016	0.52	0.67	0.86	0.68	0.63	0.13
2017	0.58	0.75	0.96	0.76	0.70	0.15

Fishing Mortality: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	1.24	1.71	2.00	1.67	0.96	0.31
2012	0.33	0.40	0.54	0.42	0.25	0.09
2013	0.33	0.40	0.54	0.42	0.25	0.09
2014	0.33	0.40	0.54	0.42	0.25	0.09
2015	0.33	0.40	0.54	0.42	0.25	0.09
2016	0.33	0.40	0.54	0.42	0.25	0.09
2017	0.33	0.40	0.54	0.42	0.25	0.09

Yield: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	637,900	731,000	731,000	708,699	731,000	49,652
2012	174,100	247,950	390,200	265,880	241,300	88,912
2013	280,700	407,800	613,900	432,916	388,600	144,636
2014	380,300	568,850	823,900	589,708	524,900	182,042
2015	467,900	686,050	928,300	698,412	645,100	181,734
2016	574,000	796,300	1,060,000	809,677	744,400	196,153
2017	646,200	861,500	1,171,000	890,259	822,500	201,681

Recruitment (at age 1): F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	*720,500*	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	714,300	1,178,000	1,986,000	1,296,480	1,171,000	571,325
2013	758,000	1,257,500	2,209,000	1,408,210	1,245,000	608,305
2014	788,500	1,317,000	2,155,000	1,422,680	1,347,000	575,587
2015	851,300	1,402,500	2,379,000	1,535,200	1,414,000	647,754
2016	842,700	1,437,000	2,378,000	1,535,650	1,460,000	629,586
2017	876,600	1,495,500	2,730,000	1,666,980	1,492,000	741,692

TABLE A-5: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.026E+11	3.950E+11	5.405E+11	4.094E+11	3.838E+11	9.622E+10
2012	3.743E+11	5.230E+11	7.510E+11	5.428E+11	4.756E+11	1.491E+11
2013	5.458E+11	7.770E+11	1.081E+12	7.903E+11	6.617E+11	2.025E+11
2014	7.298E+11	1.012E+12	1.332E+12	1.033E+12	8.478E+11	2.400E+11
2015	9.329E+11	1.278E+12	1.630E+12	1.285E+12	1.028E+12	2.685E+11
2016	1.144E+12	1.503E+12	1.916E+12	1.527E+12	1.198E+12	2.973E+11
2017	1.343E+12	1.751E+12	2.247E+12	1.779E+12	1.354E+12	3.370E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.18	0.24	0.32	0.25	0.23	0.06
2012	0.22	0.31	0.45	0.33	0.28	0.09
2013	0.33	0.47	0.65	0.47	0.40	0.12
2014	0.44	0.61	0.80	0.62	0.51	0.14
2015	0.56	0.76	0.98	0.77	0.61	0.16
2016	0.68	0.90	1.15	0.91	0.72	0.18
2017	0.80	1.05	1.35	1.07	0.81	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	1.24	1.71	2.00	1.67	0.96	0.31
2012	0.19	0.19	0.19	0.19	0.19	0.00
2013	0.19	0.19	0.19	0.19	0.19	0.00
2014	0.19	0.19	0.19	0.19	0.19	0.00
2015	0.19	0.19	0.19	0.19	0.19	0.00
2016	0.19	0.19	0.19	0.19	0.19	0.00
2017	0.19	0.19	0.19	0.19	0.19	0.00

Yield: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	637,900	731,000	731,000	708,699	731,000	49,652
2012	79,780	115,950	201,800	128,809	186,700	49,399
2013	133,500	214,550	345,100	230,152	313,200	90,538
2014	196,700	320,950	485,600	333,894	435,900	119,464
2015	260,000	401,800	585,500	417,144	548,500	133,177
2016	336,500	490,050	688,100	503,638	645,000	146,474
2017	396,100	556,450	781,000	572,889	723,500	149,979

Recruitment (at age 1): F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	714,300	1,178,000	1,986,000	1,296,480	1,171,000	571,325
2013	770,000	1,274,500	2,240,000	1,428,350	1,253,000	616,724
2014	810,900	1,348,000	2,237,000	1,461,690	1,365,000	590,087
2015	903,000	1,451,500	2,472,000	1,588,090	1,437,000	669,510
2016	870,400	1,487,000	2,461,000	1,593,090	1,486,000	652,594
2017	916,200	1,553,500	2,836,000	1,733,390	1,520,000	770,485

TABLE A-6: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F=0, 2011 Catch Equals TAC						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	3.026E+11	3.950E+11	5.405E+11	4.094E+11	3.838E+11	9.622E+10
2012	3.922E+11	5.462E+11	7.892E+11	5.666E+11	5.104E+11	1.549E+11
2013	6.152E+11	8.604E+11	1.198E+12	8.798E+11	7.887E+11	2.212E+11
2014	8.692E+11	1.199E+12	1.564E+12	1.218E+12	1.106E+12	2.758E+11
2015	1.176E+12	1.586E+12	2.000E+12	1.596E+12	1.454E+12	3.220E+11
2016	1.533E+12	1.992E+12	2.454E+12	1.992E+12	1.829E+12	3.659E+11
2017	1.886E+12	2.403E+12	3.001E+12	2.429E+12	2.225E+12	4.215E+11
SSB/SSB @ spr30: F=0, 2011 Catch Equals TAC						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.18	0.24	0.32	0.25	0.23	0.06
2012	0.23	0.33	0.47	0.34	0.31	0.09
2013	0.37	0.52	0.72	0.53	0.47	0.13
2014	0.52	0.72	0.94	0.73	0.66	0.17
2015	0.70	0.95	1.20	0.96	0.87	0.19
2016	0.92	1.19	1.47	1.19	1.09	0.22
2017	1.13	1.44	1.80	1.45	1.33	0.25
Fishing Mortality: F=0, 2011 Catch Equals TAC						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	1.24	1.71	2.00	1.67	0.96	0.31
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00
Yield: F=0, 2011 Catch Equals TAC						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	637,900	731,000	731,000	708,699	731,000	49,652
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
Recruitment (at age 1): F=0, 2011 Catch Equals TAC						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	714,300	1,178,000	1,986,000	1,296,480	1,171,000	571,325
2013	781,200	1,289,000	2,271,000	1,445,010	1,278,000	623,276
2014	834,300	1,375,000	2,297,000	1,493,590	1,417,000	602,682
2015	922,900	1,491,000	2,533,000	1,630,000	1,503,000	687,833
2016	888,500	1,525,000	2,531,000	1,637,040	1,559,000	669,547
2017	944,600	1,598,500	2,910,000	1,782,430	1,598,000	792,540

TABLE A-7: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
SSB: F at Fspr30, 2011 Effort Equals F in 2010						
2011	3.685E+11	4.615E+11	6.024E+11	4.757E+11	4.494E+11	9.473E+10
2012	4.601E+11	5.972E+11	8.063E+11	6.181E+11	5.691E+11	1.424E+11
2013	5.796E+11	7.769E+11	1.038E+12	7.958E+11	7.247E+11	1.808E+11
2014	6.997E+11	9.246E+11	1.190E+12	9.447E+11	8.708E+11	1.998E+11
2015	8.148E+11	1.081E+12	1.344E+12	1.088E+12	1.005E+12	2.122E+11
2016	9.334E+11	1.186E+12	1.509E+12	1.209E+12	1.124E+12	2.248E+11
2017	1.031E+12	1.303E+12	1.673E+12	1.329E+12	1.229E+12	2.438E+11
SSB/SSB @ spr30: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.22	0.28	0.36	0.28	0.27	0.06
2012	0.28	0.36	0.48	0.37	0.34	0.09
2013	0.35	0.47	0.62	0.48	0.43	0.11
2014	0.42	0.55	0.71	0.57	0.52	0.12
2015	0.49	0.65	0.81	0.65	0.60	0.13
2016	0.56	0.71	0.90	0.72	0.67	0.13
2017	0.62	0.78	1.00	0.80	0.74	0.15
Fishing Mortality: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.69	0.88	1.13	0.89	0.53	0.17
2012	0.33	0.40	0.54	0.42	0.25	0.09
2013	0.33	0.40	0.54	0.42	0.25	0.09
2014	0.33	0.40	0.54	0.42	0.25	0.09
2015	0.33	0.40	0.54	0.42	0.25	0.09
2016	0.33	0.40	0.54	0.42	0.25	0.09
2017	0.33	0.40	0.54	0.42	0.25	0.09
Yield: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	366,700	463,500	554,600	463,535	470,600	72,221
2012	232,800	316,050	462,700	334,749	312,600	95,977
2013	338,300	474,300	696,400	499,979	455,300	150,120
2014	431,700	626,150	888,400	651,200	586,200	184,531
2015	522,200	736,800	974,900	750,574	697,800	182,031
2016	612,600	838,700	1,104,000	854,002	787,400	196,399
2017	686,800	897,100	1,198,000	924,883	856,500	202,026
Recruitment (at age 1): F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	749,300	1,227,000	2,070,000	1,361,930	1,232,000	591,468
2013	809,100	1,338,000	2,335,000	1,482,310	1,316,000	635,179
2014	823,800	1,347,000	2,261,000	1,466,780	1,393,000	589,794
2015	878,700	1,429,000	2,422,000	1,566,550	1,444,000	660,459
2016	849,700	1,453,000	2,413,000	1,556,390	1,480,000	638,096
2017	883,700	1,509,000	2,740,000	1,682,420	1,506,000	748,146

TABLE A-8: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F at 75% Fspr30, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	3.685E+11	4.615E+11	6.024E+11	4.757E+11	4.494E+11	9.473E+10
2012	4.885E+11	6.282E+11	8.479E+11	6.515E+11	5.827E+11	1.499E+11
2013	6.560E+11	8.864E+11	1.186E+12	9.054E+11	7.680E+11	2.038E+11
2014	8.490E+11	1.132E+12	1.451E+12	1.148E+12	9.491E+11	2.404E+11
2015	1.048E+12	1.381E+12	1.745E+12	1.397E+12	1.121E+12	2.697E+11
2016	1.248E+12	1.607E+12	2.019E+12	1.634E+12	1.281E+12	2.997E+11
2017	1.448E+12	1.849E+12	2.357E+12	1.879E+12	1.428E+12	3.394E+11
SSB/SSB @ spr30: F at 75% Fspr30, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.22	0.28	0.36	0.28	0.27	0.06
2012	0.29	0.38	0.51	0.39	0.35	0.09
2013	0.39	0.53	0.71	0.54	0.46	0.12
2014	0.51	0.68	0.87	0.69	0.57	0.14
2015	0.63	0.83	1.04	0.84	0.67	0.16
2016	0.75	0.96	1.21	0.98	0.77	0.18
2017	0.87	1.11	1.41	1.13	0.85	0.20
Fishing Mortality: F at 75% Fspr30, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.69	0.88	1.13	0.89	0.53	0.17
2012	0.19	0.19	0.19	0.19	0.19	0.00
2013	0.19	0.19	0.19	0.19	0.19	0.00
2014	0.19	0.19	0.19	0.19	0.19	0.00
2015	0.19	0.19	0.19	0.19	0.19	0.00
2016	0.19	0.19	0.19	0.19	0.19	0.00
2017	0.19	0.19	0.19	0.19	0.19	0.00
Yield: F at 75% Fspr30, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	366,700	463,500	554,600	463,535	470,600	72,221
2012	105,100	150,000	244,600	162,573	241,900	55,069
2013	162,100	250,150	394,300	266,576	367,500	96,124
2014	226,500	357,850	529,200	369,913	487,800	123,146
2015	286,900	433,550	623,200	450,086	594,600	135,943
2016	362,000	521,350	723,400	533,546	683,900	148,004
2017	422,100	583,050	805,100	597,907	755,100	151,041
Recruitment (at age 1): F at 75% Fspr30, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	749,300	1,227,000	2,070,000	1,361,930	1,232,000	591,468
2013	818,300	1,354,500	2,368,000	1,501,220	1,324,000	643,207
2014	853,500	1,384,500	2,329,000	1,503,860	1,409,000	603,808
2015	922,100	1,477,000	2,501,000	1,617,310	1,466,000	681,421
2016	877,900	1,501,000	2,471,000	1,612,180	1,506,000	660,566
2017	924,100	1,564,500	2,848,000	1,747,480	1,534,000	776,465

TABLE A-9: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F=0, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.685E+11	4.615E+11	6.024E+11	4.757E+11	4.494E+11	9.473E+10
2012	5.064E+11	6.588E+11	8.864E+11	6.810E+11	6.268E+11	1.557E+11
2013	7.432E+11	9.884E+11	1.318E+12	1.012E+12	9.219E+11	2.222E+11
2014	1.021E+12	1.340E+12	1.713E+12	1.362E+12	1.251E+12	2.755E+11
2015	1.332E+12	1.743E+12	2.164E+12	1.748E+12	1.608E+12	3.218E+11
2016	1.690E+12	2.129E+12	2.632E+12	2.149E+12	1.987E+12	3.661E+11
2017	2.049E+12	2.555E+12	3.176E+12	2.589E+12	2.385E+12	4.212E+11

SSB/SSB @ spr30: F=0, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.22	0.28	0.36	0.28	0.27	0.06
2012	0.30	0.39	0.53	0.41	0.37	0.09
2013	0.45	0.59	0.79	0.61	0.55	0.13
2014	0.61	0.80	1.03	0.82	0.75	0.16
2015	0.80	1.04	1.30	1.05	0.96	0.19
2016	1.01	1.27	1.58	1.29	1.19	0.22
2017	1.23	1.53	1.90	1.55	1.43	0.25

Fishing Mortality: F=0, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.69	0.88	1.13	0.89	0.53	0.17
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	366,700	463,500	554,600	463,535	470,600	72,221
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	749,300	1,227,000	2,070,000	1,361,930	1,232,000	591,468
2013	824,500	1,367,000	2,392,000	1,516,820	1,348,000	649,481
2014	872,600	1,413,500	2,369,000	1,533,920	1,459,000	615,916
2015	939,600	1,520,500	2,572,000	1,657,180	1,529,000	698,974
2016	900,800	1,542,000	2,540,000	1,654,500	1,577,000	676,992
2017	948,600	1,607,000	2,928,000	1,795,090	1,610,000	797,896

TABLE A-10: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.517E+11	4.509E+11	5.994E+11	4.644E+11	4.406E+11	1.003E+11
2012	4.295E+11	5.813E+11	8.041E+11	5.999E+11	5.544E+11	1.505E+11
2013	5.534E+11	7.660E+11	1.041E+12	7.784E+11	7.110E+11	1.867E+11
2014	6.723E+11	9.119E+11	1.186E+12	9.288E+11	8.585E+11	2.050E+11
2015	8.075E+11	1.062E+12	1.332E+12	1.073E+12	9.937E+11	2.159E+11
2016	9.107E+11	1.174E+12	1.491E+12	1.196E+12	1.115E+12	2.268E+11
2017	1.021E+12	1.295E+12	1.664E+12	1.319E+12	1.221E+12	2.452E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.21	0.27	0.36	0.28	0.26	0.06
2012	0.26	0.35	0.48	0.36	0.33	0.09
2013	0.33	0.46	0.62	0.47	0.43	0.11
2014	0.40	0.55	0.71	0.56	0.51	0.12
2015	0.48	0.64	0.80	0.64	0.59	0.13
2016	0.55	0.70	0.89	0.72	0.67	0.14
2017	0.61	0.78	1.00	0.79	0.73	0.15

Fishing Mortality: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.75	1.00	1.42	1.04	0.59	0.27
2012	0.33	0.40	0.54	0.42	0.25	0.09
2013	0.33	0.40	0.54	0.42	0.25	0.09
2014	0.33	0.40	0.54	0.42	0.25	0.09
2015	0.33	0.40	0.54	0.42	0.25	0.09
2016	0.33	0.40	0.54	0.42	0.25	0.09
2017	0.33	0.40	0.54	0.42	0.25	0.09

Yield: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	507,609	508,000	5,447
2012	220,200	302,850	459,700	322,641	302,500	99,487
2013	325,800	459,150	681,400	489,187	446,100	153,985
2014	422,200	620,150	886,200	641,394	577,900	187,994
2015	511,400	728,150	972,600	741,932	690,800	185,590
2016	600,500	829,600	1,100,000	846,461	781,800	198,946
2017	674,000	892,500	1,189,000	918,819	852,000	203,370

Recruitment (at age 1): F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	747,600	1,223,000	2,054,000	1,350,960	1,225,000	591,621
2013	807,600	1,320,000	2,301,000	1,469,000	1,307,000	630,473
2014	818,100	1,343,000	2,218,000	1,458,950	1,387,000	588,025
2015	869,000	1,423,000	2,412,000	1,560,800	1,440,000	658,306
2016	850,000	1,451,500	2,415,000	1,552,490	1,478,000	636,051
2017	880,300	1,504,000	2,743,000	1,679,620	1,504,000	747,026

TABLE A-11: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.517E+11	4.509E+11	5.994E+11	4.644E+11	4.406E+11	1.003E+11
2012	4.532E+11	6.125E+11	8.478E+11	6.321E+11	5.676E+11	1.580E+11
2013	6.302E+11	8.695E+11	1.173E+12	8.848E+11	7.533E+11	2.095E+11
2014	8.150E+11	1.109E+12	1.434E+12	1.127E+12	9.353E+11	2.451E+11
2015	1.024E+12	1.374E+12	1.724E+12	1.377E+12	1.109E+12	2.725E+11
2016	1.235E+12	1.589E+12	1.998E+12	1.615E+12	1.270E+12	3.002E+11
2017	1.423E+12	1.834E+12	2.327E+12	1.861E+12	1.418E+12	3.389E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.21	0.27	0.36	0.28	0.26	0.06
2012	0.27	0.37	0.51	0.38	0.34	0.09
2013	0.38	0.52	0.70	0.53	0.45	0.13
2014	0.49	0.66	0.86	0.68	0.56	0.15
2015	0.61	0.82	1.03	0.82	0.66	0.16
2016	0.74	0.95	1.20	0.97	0.76	0.18
2017	0.85	1.10	1.39	1.11	0.85	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.75	1.00	1.42	1.04	0.59	0.27
2012	0.19	0.19	0.19	0.19	0.19	0.00
2013	0.19	0.19	0.19	0.19	0.19	0.00
2014	0.19	0.19	0.19	0.19	0.19	0.00
2015	0.19	0.19	0.19	0.19	0.19	0.00
2016	0.19	0.19	0.19	0.19	0.19	0.00
2017	0.19	0.19	0.19	0.19	0.19	0.00

Yield: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	507,609	508,000	5,447
2012	96,800	143,850	238,400	157,141	234,100	57,759
2013	155,500	242,900	395,500	261,152	360,000	98,821
2014	217,900	354,150	525,100	364,640	480,800	125,973
2015	277,500	429,200	625,300	445,059	588,500	138,667
2016	355,600	515,200	720,400	528,867	678,800	150,587
2017	415,300	578,300	810,700	593,800	751,000	152,894

Recruitment (at age 1): F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	747,600	1,223,000	2,054,000	1,350,960	1,225,000	591,621
2013	815,000	1,338,000	2,328,000	1,488,180	1,315,000	638,524
2014	843,600	1,375,000	2,301,000	1,496,470	1,404,000	602,034
2015	911,700	1,469,500	2,487,000	1,612,040	1,463,000	679,396
2016	876,600	1,500,500	2,481,000	1,608,650	1,503,000	658,649
2017	922,700	1,562,500	2,852,000	1,744,980	1,532,000	775,390

TABLE A-12: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE CONTINUITY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Continuity

SSB: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.517E+11	4.509E+11	5.994E+11	4.644E+11	4.406E+11	1.003E+11
2012	4.735E+11	6.425E+11	8.900E+11	6.606E+11	6.104E+11	1.645E+11
2013	7.099E+11	9.628E+11	1.300E+12	9.882E+11	9.034E+11	2.299E+11
2014	9.824E+11	1.321E+12	1.697E+12	1.337E+12	1.231E+12	2.836E+11
2015	1.291E+12	1.711E+12	2.129E+12	1.721E+12	1.587E+12	3.295E+11
2016	1.651E+12	2.108E+12	2.604E+12	2.122E+12	1.966E+12	3.728E+11
2017	2.014E+12	2.526E+12	3.153E+12	2.561E+12	2.364E+12	4.276E+11

SSB/SSB @ spr30: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.21	0.27	0.36	0.28	0.26	0.06
2012	0.28	0.38	0.53	0.40	0.37	0.10
2013	0.43	0.58	0.78	0.59	0.54	0.14
2014	0.59	0.79	1.02	0.80	0.74	0.17
2015	0.77	1.02	1.28	1.03	0.95	0.20
2016	0.99	1.26	1.56	1.27	1.18	0.22
2017	1.21	1.51	1.89	1.53	1.41	0.26

Fishing Mortality: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.75	1.00	1.42	1.04	0.59	0.27
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	507,609	508,000	5,447
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	720,500	1,191,000	2,050,000	1,298,950	1,190,000	520,112
2012	747,600	1,223,000	2,054,000	1,350,960	1,225,000	591,621
2013	825,900	1,353,000	2,355,000	1,503,960	1,339,000	644,855
2014	864,200	1,406,000	2,355,000	1,526,840	1,454,000	614,175
2015	935,400	1,512,500	2,565,000	1,652,300	1,526,000	697,077
2016	899,700	1,539,000	2,550,000	1,651,300	1,574,000	675,265
2017	950,400	1,607,000	2,927,000	1,792,830	1,608,000	796,952

TABLE A-13: TABULATED RESULTS OF THE NEW AGE-LENGTH KEY RUN ANNUAL SPAWNING STOCK BIOMASS, FISHING MORTALITY, ABUNDANCE AND RECRUITS.

Year	SSB (trillion eggs)	SSB/SSBmsy	SSB/SSB F@spr30	Fishing Mortality	F/Fmsy	F/F@spr30	Abundance (millions of fish)	Recruits (millions of fish)
1963	5.38	2.86	3.59	0.00	0.00	0.00	6.50	1.54
1964	5.34	2.84	3.57	0.01	0.06	0.06	6.49	1.54
1965	5.24	2.79	3.50	0.03	0.12	0.11	6.43	1.54
1966	5.08	2.70	3.39	0.04	0.17	0.16	6.33	1.54
1967	4.87	2.59	3.25	0.06	0.23	0.22	6.19	1.53
1968	4.63	2.46	3.09	0.07	0.29	0.27	6.03	1.53
1969	4.36	2.32	2.91	0.09	0.34	0.33	5.86	1.53
1970	4.08	2.17	2.73	0.10	0.40	0.38	5.69	1.53
1971	3.80	2.02	2.54	0.12	0.46	0.44	5.51	1.52
1972	3.52	1.88	2.35	0.13	0.52	0.49	5.34	1.52
1973	3.26	1.74	2.18	0.14	0.57	0.54	5.17	1.51
1974	3.02	1.61	2.01	0.16	0.63	0.60	5.01	1.51
1975	2.79	1.48	1.86	0.17	0.69	0.65	4.86	1.50
1976	2.58	1.37	1.72	0.19	0.74	0.71	4.71	1.49
1977	2.40	1.27	1.60	0.20	0.80	0.76	4.57	1.49
1978	2.23	1.18	1.49	0.22	0.86	0.82	4.44	1.48
1979	2.07	1.10	1.38	0.23	0.92	0.87	4.31	1.47
1980	1.94	1.03	1.29	0.24	0.97	0.93	4.19	1.47
1981	1.81	0.96	1.21	0.26	1.03	0.98	4.06	1.43
1982	1.39	0.74	0.93	0.83	3.29	3.13	3.87	1.36
1983	1.10	0.58	0.73	0.49	1.94	1.84	3.26	1.42
1984	1.18	0.63	0.79	0.27	1.08	1.03	3.71	1.78
1985	1.37	0.73	0.91	0.25	1.00	0.95	4.34	1.98
1986	1.56	0.83	1.04	0.37	1.48	1.40	5.10	2.21
1987	1.68	0.90	1.12	0.38	1.53	1.45	5.54	2.35
1988	1.78	0.95	1.19	0.39	1.55	1.47	5.83	2.43
1989	1.88	1.00	1.26	0.40	1.59	1.51	6.09	2.47
1990	1.90	1.01	1.27	0.52	2.06	1.96	6.25	2.50
1991	1.92	1.02	1.28	0.55	2.19	2.08	6.54	2.74
1992	1.81	0.97	1.21	0.53	2.12	2.02	6.02	2.30
1993	1.73	0.92	1.15	0.61	2.43	2.31	5.85	2.28
1994	1.54	0.82	1.03	0.65	2.59	2.46	5.21	1.92
1995	1.32	0.70	0.88	0.77	3.05	2.90	4.63	1.77
1996	1.26	0.67	0.84	0.55	2.18	2.08	4.42	1.98
1997	1.24	0.66	0.83	0.53	2.11	2.01	4.30	1.79
1998	1.14	0.61	0.76	0.61	2.41	2.29	3.89	1.48
1999	1.17	0.62	0.78	0.59	2.34	2.23	4.16	1.89
2000	1.25	0.67	0.84	0.48	1.90	1.80	4.54	2.24
2001	1.27	0.68	0.85	0.45	1.81	1.72	4.48	2.06
2002	1.15	0.61	0.77	0.51	2.03	1.93	3.82	1.48
2003	1.06	0.57	0.71	0.56	2.24	2.13	3.51	1.33
2004	0.93	0.49	0.62	0.66	2.61	2.48	3.09	1.15
2005	0.81	0.43	0.54	0.58	2.32	2.21	2.68	1.03
2006	0.75	0.40	0.50	0.49	1.95	1.85	2.44	0.95
2007	0.71	0.38	0.47	0.47	1.89	1.79	2.28	0.95
2008	0.71	0.38	0.47	0.52	2.06	1.96	2.39	1.20
2009	0.60	0.32	0.40	0.51	2.02	1.92	1.97	0.89
2010	0.56	0.30	0.37	0.53	2.10	1.99	1.87	0.86

TABLE A-14: PARAMETER ESTIMATES FROM THE NEW AGE-LENGTH KEY SSASPM MODEL.

Parameter Number	Description	Estimate	Std Dev	Parameter Number	Description	Estimate	Std Dev
1	Beverton & Holt - Alpha	1.54E+06	1.31E+05	51	Recruitment Deviation - 2003	-3.75E-02	1.39E-01
2	Beverton & Holt - Beta	3.25E+01	3.18E+00	52	Recruitment Deviation - 2004	-1.73E-01	1.37E-01
3	Index -Q MRFSSE	7.16E+01	9.08E+00	53	Recruitment Deviation - 2005	-2.66E-01	1.37E-01
4	Index -Q HBE	9.36E+01	1.42E+01	54	Recruitment Deviation - 2006	-3.25E-01	1.50E-01
5	Index -Q HBW	8.17E+01	1.27E+01	55	Recruitment Deviation - 2007	-3.08E-01	1.62E-01
6	Index -Q CmHLE	7.17E+01	1.37E+01	56	Recruitment Deviation - 2008	-6.24E-02	1.83E-01
7	Index -Q CmHLW	7.15E+01	1.26E+01	57	Recruitment Deviation - 2009	-3.59E-01	2.28E-01
8	Index -Q Larval	6.70E+00	1.01E+00	58	Recruitment Deviation - 2010	-3.64E-01	2.96E-01
9	Index -Q Trawl	6.60E+01	8.15E+00	59	Effort Deviation - Rec-E -1981	-4.31E-01	2.41E-01
10	Index -Q Video	4.81E-02	3.78E-03	60	Effort Deviation - Rec-E -1982	8.12E-01	3.29E-01
11	Prehistoric Effort - Comm-E	1.97E-04	8.14E-05	61	Effort Deviation - Rec-E -1983	1.26E-02	3.83E-01
12	Prehistoric Effort - Comm-W	1.66E-04	5.67E-05	62	Effort Deviation - Rec-E -1984	-7.90E-01	3.77E-01
13	Effort - Rec-E	3.24E-01	5.79E-02	63	Effort Deviation - Rec-E -1985	-7.23E-01	3.52E-01
14	Effort - Rec-W	3.97E-02	8.03E-03	64	Effort Deviation - Rec-E -1986	-1.27E-01	3.24E-01
15	Effort - Comm-E	5.79E-02	1.19E-02	65	Effort Deviation - Rec-E -1987	-8.85E-02	3.13E-01
16	Effort - Comm-W	2.79E-02	5.75E-03	66	Effort Deviation - Rec-E -1988	-1.50E-01	3.04E-01
17	Effort - Shirmp	2.29E-01	4.23E-02	67	Effort Deviation - Rec-E -1989	-2.51E-01	3.02E-01
18	Logistic Selectivity Par 1 - Rec-E	4.64E-01	3.69E-02	68	Effort Deviation - Rec-E -1990	-1.74E-02	2.95E-01
19	Logistic Selectivity Par 2 - Rec-E	2.64E+00	9.53E-02	69	Effort Deviation - Rec-E -1991	2.23E-02	3.00E-01
20	Logistic Selectivity Par 1 - Rec-W	5.00E-01	4.04E-02	70	Effort Deviation - Rec-E -1992	-2.25E-02	3.06E-01
21	Logistic Selectivity Par 2 - Rec-W	2.62E+00	1.12E-01	71	Effort Deviation - Rec-E -1993	1.30E-01	3.10E-01
22	Logistic Selectivity Par 1 - Comm-E	5.58E-01	5.19E-02	72	Effort Deviation - Rec-E -1994	2.12E-01	3.08E-01
23	Logistic Selectivity Par 2 - Comm-E	3.29E+00	1.70E-01	73	Effort Deviation - Rec-E -1995	4.36E-01	3.04E-01
24	Logistic Selectivity Par 1 - Comm-W	4.96E-01	5.02E-02	74	Effort Deviation - Rec-E -1996	4.03E-02	3.17E-01
25	Logistic Selectivity Par 2 - Comm-W	3.32E+00	1.60E-01	75	Effort Deviation - Rec-E -1997	7.50E-02	3.16E-01
26	Logistic Selectivity Par 1 - Larval	6.14E-02	1.58E+01	76	Effort Deviation - Rec-E -1998	2.82E-01	3.33E-01
27	Logistic Selectivity Par 2 - Larval	2.00E+00	4.83E-04	77	Effort Deviation - Rec-E -1999	1.62E-01	3.44E-01
28	Overall Variance	-4.72E-01	2.32E-02	78	Effort Deviation - Rec-E -2000	-1.22E-01	3.41E-01
29	Recruitment Deviation - 1981	-1.57E-02	2.20E-01	79	Effort Deviation - Rec-E -2001	-1.10E-01	3.32E-01
30	Recruitment Deviation - 1982	-6.08E-02	2.01E-01	80	Effort Deviation - Rec-E -2002	4.35E-02	3.17E-01
31	Recruitment Deviation - 1983	7.58E-03	1.76E-01	81	Effort Deviation - Rec-E -2003	1.41E-01	3.06E-01
32	Recruitment Deviation - 1984	2.62E-01	1.57E-01	82	Effort Deviation - Rec-E -2004	3.30E-01	3.00E-01
33	Recruitment Deviation - 1985	3.56E-01	1.48E-01	83	Effort Deviation - Rec-E -2005	2.35E-01	3.09E-01
34	Recruitment Deviation - 1986	4.52E-01	1.45E-01	84	Effort Deviation - Rec-E -2006	2.25E-02	3.16E-01
35	Recruitment Deviation - 1987	4.99E-01	1.40E-01	85	Effort Deviation - Rec-E -2007	3.54E-02	3.17E-01
36	Recruitment Deviation - 1988	5.23E-01	1.35E-01	86	Effort Deviation - Rec-E -2008	-5.51E-02	3.20E-01
37	Recruitment Deviation - 1989	5.36E-01	1.32E-01	87	Effort Deviation - Rec-E -2009	1.92E-01	3.32E-01
38	Recruitment Deviation - 1990	5.41E-01	1.33E-01	88	Effort Deviation - Rec-E -2010	2.83E-01	4.19E-01
39	Recruitment Deviation - 1991	6.34E-01	1.34E-01	89	Effort Deviation - Rec-W -1981	-1.66E-01	3.41E-01
40	Recruitment Deviation - 1992	4.56E-01	1.31E-01	90	Effort Deviation - Rec-W -1982	1.29E-01	3.69E-01
41	Recruitment Deviation - 1993	4.52E-01	1.30E-01	91	Effort Deviation - Rec-W -1983	9.83E-01	3.81E-01
42	Recruitment Deviation - 1994	2.86E-01	1.33E-01	92	Effort Deviation - Rec-W -1984	5.83E-01	3.75E-01
43	Recruitment Deviation - 1995	2.18E-01	1.32E-01	93	Effort Deviation - Rec-W -1985	-6.63E-02	3.66E-01
44	Recruitment Deviation - 1996	3.43E-01	1.31E-01	94	Effort Deviation - Rec-W -1986	-3.91E-01	3.62E-01
45	Recruitment Deviation - 1997	2.47E-01	1.40E-01	95	Effort Deviation - Rec-W -1987	-6.94E-01	3.61E-01
46	Recruitment Deviation - 1998	6.03E-02	1.37E-01	96	Effort Deviation - Rec-W -1988	-4.26E-01	3.57E-01
47	Recruitment Deviation - 1999	3.16E-01	1.40E-01	97	Effort Deviation - Rec-W -1989	4.01E-03	3.52E-01
48	Recruitment Deviation - 2000	4.84E-01	1.48E-01	98	Effort Deviation - Rec-W -1990	4.63E-01	3.50E-01
49	Recruitment Deviation - 2001	3.91E-01	1.49E-01	99	Effort Deviation - Rec-W -1991	5.15E-01	3.52E-01
50	Recruitment Deviation - 2002	5.52E-02	1.36E-01	100	Effort Deviation - Rec-W -1992	1.98E-01	3.56E-01

Table A-14 Continued: Parameter estimates from the new age-length key SSASPM model.

Parameter Number	Description	Estimate	Std Dev	Parameter Number	Description	Estimate	Std Dev
101	Effort Deviation - Rec-W -1993	1.93E-01	3.58E-01	151	Effort Deviation - Comm-W -1983	-5.23E-01	3.77E-01
102	Effort Deviation - Rec-W -1994	4.90E-01	3.60E-01	152	Effort Deviation - Comm-W -1984	-2.75E-01	3.76E-01
103	Effort Deviation - Rec-W -1995	7.19E-01	3.65E-01	153	Effort Deviation - Comm-W -1985	-2.72E-01	3.70E-01
104	Effort Deviation - Rec-W -1996	2.58E-01	3.60E-01	154	Effort Deviation - Comm-W -1986	-5.36E-01	3.65E-01
105	Effort Deviation - Rec-W -1997	1.92E-01	3.61E-01	155	Effort Deviation - Comm-W -1987	-3.87E-01	3.62E-01
106	Effort Deviation - Rec-W -1998	1.93E-02	3.66E-01	156	Effort Deviation - Comm-W -1988	-1.20E-01	3.58E-01
107	Effort Deviation - Rec-W -1999	3.78E-01	3.68E-01	157	Effort Deviation - Comm-W -1989	1.15E-01	3.55E-01
108	Effort Deviation - Rec-W -2000	4.93E-01	3.66E-01	158	Effort Deviation - Comm-W -1990	2.46E-01	3.55E-01
109	Effort Deviation - Rec-W -2001	-8.89E-02	3.62E-01	159	Effort Deviation - Comm-W -1991	3.56E-01	3.57E-01
110	Effort Deviation - Rec-W -2002	-3.89E-01	3.61E-01	160	Effort Deviation - Comm-W -1992	5.01E-01	3.57E-01
111	Effort Deviation - Rec-W -2003	-1.29E-01	3.60E-01	161	Effort Deviation - Comm-W -1993	7.94E-01	3.59E-01
112	Effort Deviation - Rec-W -2004	2.60E-01	3.61E-01	162	Effort Deviation - Comm-W -1994	8.54E-01	3.62E-01
113	Effort Deviation - Rec-W -2005	1.13E-01	3.61E-01	163	Effort Deviation - Comm-W -1995	8.86E-01	3.64E-01
114	Effort Deviation - Rec-W -2006	3.65E-01	3.61E-01	164	Effort Deviation - Comm-W -1996	8.65E-01	3.62E-01
115	Effort Deviation - Rec-W -2007	1.12E-01	3.61E-01	165	Effort Deviation - Comm-W -1997	6.34E-01	3.63E-01
116	Effort Deviation - Rec-W -2008	2.82E-01	3.62E-01	166	Effort Deviation - Comm-W -1998	6.25E-01	3.65E-01
117	Effort Deviation - Rec-W -2009	-7.60E-01	3.65E-01	167	Effort Deviation - Comm-W -1999	8.29E-01	3.68E-01
118	Effort Deviation - Rec-W -2010	-1.65E+00	3.78E-01	168	Effort Deviation - Comm-W -2000	7.82E-01	3.67E-01
119	Effort Deviation - Comm-E -1981	-1.75E+00	2.27E-01	169	Effort Deviation - Comm-W -2001	5.80E-01	3.63E-01
120	Effort Deviation - Comm-E -1982	-8.50E-01	3.66E-01	170	Effort Deviation - Comm-W -2002	6.21E-01	3.60E-01
121	Effort Deviation - Comm-E -1983	-5.85E-01	3.77E-01	171	Effort Deviation - Comm-W -2003	6.28E-01	3.60E-01
122	Effort Deviation - Comm-E -1984	-6.14E-01	3.77E-01	172	Effort Deviation - Comm-W -2004	5.87E-01	3.61E-01
123	Effort Deviation - Comm-E -1985	-4.84E-01	3.69E-01	173	Effort Deviation - Comm-W -2005	3.22E-01	3.61E-01
124	Effort Deviation - Comm-E -1986	-3.63E-01	3.62E-01	174	Effort Deviation - Comm-W -2006	1.58E-01	3.61E-01
125	Effort Deviation - Comm-E -1987	-2.47E-01	3.58E-01	175	Effort Deviation - Comm-W -2007	1.85E-01	3.61E-01
126	Effort Deviation - Comm-E -1988	-2.78E-02	3.52E-01	176	Effort Deviation - Comm-W -2008	-1.36E-02	3.62E-01
127	Effort Deviation - Comm-E -1989	2.48E-01	3.46E-01	177	Effort Deviation - Comm-W -2009	-2.68E-01	3.65E-01
128	Effort Deviation - Comm-E -1990	5.24E-01	3.44E-01	178	Effort Deviation - Comm-W -2010	-5.26E-01	3.76E-01
129	Effort Deviation - Comm-E -1991	6.29E-01	3.48E-01	179	Effort Deviation - SHRIMP -1981	-1.21E-01	2.29E-01
130	Effort Deviation - Comm-E -1992	7.19E-01	3.49E-01	180	Effort Deviation - SHRIMP -1982	2.52E-01	3.52E-01
131	Effort Deviation - Comm-E -1993	8.01E-01	3.54E-01	181	Effort Deviation - SHRIMP -1983	-2.96E-01	3.52E-01
132	Effort Deviation - Comm-E -1994	6.87E-01	3.60E-01	182	Effort Deviation - SHRIMP -1984	-3.32E-01	3.45E-01
133	Effort Deviation - Comm-E -1995	6.41E-01	3.64E-01	183	Effort Deviation - SHRIMP -1985	-7.31E-01	3.53E-01
134	Effort Deviation - Comm-E -1996	4.46E-01	3.61E-01	184	Effort Deviation - SHRIMP -1986	-4.23E-01	3.42E-01
135	Effort Deviation - Comm-E -1997	2.85E-01	3.62E-01	185	Effort Deviation - SHRIMP -1987	-2.86E-01	3.35E-01
136	Effort Deviation - Comm-E -1998	3.04E-01	3.67E-01	186	Effort Deviation - SHRIMP -1988	-4.11E-01	3.36E-01
137	Effort Deviation - Comm-E -1999	3.48E-01	3.69E-01	187	Effort Deviation - SHRIMP -1989	-3.89E-01	3.37E-01
138	Effort Deviation - Comm-E -2000	6.34E-02	3.66E-01	188	Effort Deviation - SHRIMP -1990	-6.15E-01	3.38E-01
139	Effort Deviation - Comm-E -2001	2.65E-01	3.63E-01	189	Effort Deviation - SHRIMP -1991	-4.49E-02	3.25E-01
140	Effort Deviation - Comm-E -2002	4.37E-01	3.58E-01	190	Effort Deviation - SHRIMP -1992	-3.52E-01	3.39E-01
141	Effort Deviation - Comm-E -2003	5.31E-01	3.57E-01	191	Effort Deviation - SHRIMP -1993	-1.03E-01	3.23E-01
142	Effort Deviation - Comm-E -2004	5.24E-01	3.59E-01	192	Effort Deviation - SHRIMP -1994	-2.84E-02	3.41E-01
143	Effort Deviation - Comm-E -2005	3.99E-01	3.61E-01	193	Effort Deviation - SHRIMP -1995	-1.58E-02	3.18E-01
144	Effort Deviation - Comm-E -2006	1.05E-01	3.60E-01	194	Effort Deviation - SHRIMP -1996	7.35E-03	3.11E-01
145	Effort Deviation - Comm-E -2007	-1.24E-02	3.60E-01	195	Effort Deviation - SHRIMP -1997	9.75E-02	3.63E-01
146	Effort Deviation - Comm-E -2008	1.86E-02	3.61E-01	196	Effort Deviation - SHRIMP -1998	-4.33E-01	3.49E-01
147	Effort Deviation - Comm-E -2009	1.88E-01	3.65E-01	197	Effort Deviation - SHRIMP -1999	9.59E-02	3.20E-01
148	Effort Deviation - Comm-E -2010	1.38E-01	3.80E-01	198	Effort Deviation - SHRIMP -2000	4.52E-01	3.04E-01
149	Effort Deviation - Comm-W -1981	-2.09E+00	2.29E-01	199	Effort Deviation - SHRIMP -2001	5.56E-01	3.08E-01
150	Effort Deviation - Comm-W -1982	-8.65E-01	3.65E-01	200	Effort Deviation - SHRIMP -2002	1.27E-02	3.27E-01

Table A-14 Continued: Parameter estimates from the new age-length key SSASPM model.

Parameter Number	Description	Estimate	Std Dev
201	Effort Deviation - SHRIMP -2003	8.00E-02	3.29E-01
202	Effort Deviation - SHRIMP -2004	6.60E-02	3.32E-01
203	Effort Deviation - SHRIMP -2005	-3.50E-02	3.37E-01
204	Effort Deviation - SHRIMP -2006	2.97E-01	3.26E-01
205	Effort Deviation - SHRIMP -2007	5.15E-01	3.07E-01
206	Effort Deviation - SHRIMP -2008	9.75E-01	2.89E-01
207	Effort Deviation - SHRIMP -2009	5.51E-01	4.63E-01
208	Effort Deviation - SHRIMP -2010	4.50E-01	4.18E-01
209	Lifetime Reproductive Rate	3.25E+01	3.18E+00
210	r0	1.54E+06	1.31E+05
211	Bcurrent	5.58E+05	9.89E+04
212	Fcurrent	5.26E-01	1.92E-01
213	Bvirgin	5.38E+06	4.58E+05
214	B - 1963	5.38E+06	4.58E+05
215	B - 1964	5.34E+06	4.54E+05
216	B - 1965	5.24E+06	4.41E+05
217	B - 1966	5.08E+06	4.24E+05
218	B - 1967	4.87E+06	4.03E+05
219	B - 1968	4.63E+06	3.82E+05
220	B - 1969	4.36E+06	3.62E+05
221	B - 1970	4.08E+06	3.45E+05
222	B - 1971	3.80E+06	3.32E+05
223	B - 1972	3.52E+06	3.20E+05
224	B - 1973	3.26E+06	3.10E+05
225	B - 1974	3.02E+06	3.01E+05
226	B - 1975	2.79E+06	2.91E+05
227	B - 1976	2.58E+06	2.82E+05
228	B - 1977	2.40E+06	2.72E+05
229	B - 1978	2.23E+06	2.62E+05
230	B - 1979	2.07E+06	2.51E+05
231	B - 1980	1.94E+06	2.41E+05
232	B - 1981	1.81E+06	2.31E+05
233	B - 1982	1.39E+06	1.54E+05
234	B - 1983	1.10E+06	1.32E+05
235	B - 1984	1.18E+06	1.37E+05
236	B - 1985	1.37E+06	1.49E+05
237	B - 1986	1.56E+06	1.56E+05
238	B - 1987	1.68E+06	1.60E+05
239	B - 1988	1.78E+06	1.65E+05
240	B - 1989	1.88E+06	1.73E+05
241	B - 1990	1.90E+06	1.73E+05
242	B - 1991	1.92E+06	1.75E+05
243	B - 1992	1.81E+06	1.65E+05
244	B - 1993	1.73E+06	1.53E+05
245	B - 1994	1.54E+06	1.39E+05
246	B - 1995	1.32E+06	1.18E+05
247	B - 1996	1.26E+06	1.13E+05
248	B - 1997	1.24E+06	1.11E+05
249	B - 1998	1.14E+06	1.07E+05
250	B - 1999	1.17E+06	1.10E+05

Parameter Number	Description	Estimate	Std Dev
251	B - 2000	1.25E+06	1.21E+05
252	B - 2001	1.27E+06	1.22E+05
253	B - 2002	1.15E+06	1.06E+05
254	B - 2003	1.06E+06	9.98E+04
255	B - 2004	9.27E+05	8.48E+04
256	B - 2005	8.13E+05	7.23E+04
257	B - 2006	7.55E+05	6.82E+04
258	B - 2007	7.07E+05	6.71E+04
259	B - 2008	7.09E+05	7.18E+04
260	B - 2009	6.04E+05	6.69E+04
261	B - 2010	5.58E+05	9.89E+04
262	B1963 over B0	1.00E+00	4.25E-05
263	B1964 over B0	9.93E-01	1.02E-03
264	B1965 over B0	9.74E-01	3.82E-03
265	B1966 over B0	9.44E-01	8.04E-03
266	B1967 over B0	9.06E-01	1.32E-02
267	B1968 over B0	8.60E-01	1.88E-02
268	B1969 over B0	8.11E-01	2.44E-02
269	B1970 over B0	7.59E-01	2.96E-02
270	B1971 over B0	7.06E-01	3.39E-02
271	B1972 over B0	6.55E-01	3.74E-02
272	B1973 over B0	6.06E-01	3.99E-02
273	B1974 over B0	5.61E-01	4.14E-02
274	B1975 over B0	5.19E-01	4.22E-02
275	B1976 over B0	4.80E-01	4.23E-02
276	B1977 over B0	4.45E-01	4.19E-02
277	B1978 over B0	4.14E-01	4.11E-02
278	B1979 over B0	3.85E-01	4.00E-02
279	B1980 over B0	3.60E-01	3.87E-02
280	B1981 over B0	3.36E-01	3.89E-02
281	B1982 over B0	2.59E-01	3.04E-02
282	B1983 over B0	2.04E-01	2.81E-02
283	B1984 over B0	2.20E-01	2.90E-02
284	B1985 over B0	2.54E-01	3.13E-02
285	B1986 over B0	2.89E-01	3.31E-02
286	B1987 over B0	3.13E-01	3.41E-02
287	B1988 over B0	3.32E-01	3.53E-02
288	B1989 over B0	3.49E-01	3.68E-02
289	B1990 over B0	3.53E-01	3.69E-02
290	B1991 over B0	3.57E-01	3.72E-02
291	B1992 over B0	3.37E-01	3.50E-02
292	B1993 over B0	3.21E-01	3.25E-02
293	B1994 over B0	2.87E-01	2.93E-02
294	B1995 over B0	2.46E-01	2.51E-02
295	B1996 over B0	2.34E-01	2.41E-02
296	B1997 over B0	2.31E-01	2.36E-02
297	B1998 over B0	2.12E-01	2.26E-02
298	B1999 over B0	2.17E-01	2.34E-02
299	B2000 over B0	2.33E-01	2.56E-02
300	B2001 over B0	2.36E-01	2.57E-02

Parameter Number	Description	Estimate	Std Dev
301	B2002 over B0	2.13E-01	2.24E-02
302	B2003 over B0	1.97E-01	2.11E-02
303	B2004 over B0	1.72E-01	1.80E-02
304	B2005 over B0	1.51E-01	1.55E-02
305	B2006 over B0	1.40E-01	1.46E-02
306	B2007 over B0	1.32E-01	1.40E-02
307	B2008 over B0	1.32E-01	1.48E-02
308	B2009 over B0	1.12E-01	1.33E-02
309	B2010 over B0	1.04E-01	1.82E-02
310	N Age1_2010	8.60E+05	2.60E+05
311	N Age2_2010	4.46E+05	1.32E+05
312	N Age3_2010	2.58E+05	6.07E+04
313	N Age4_2010	1.27E+05	2.63E+04
314	N Age5_2010	7.84E+04	1.59E+04
315	N Age6_2010	4.69E+04	1.01E+04
316	N Age7_2010	2.52E+04	5.90E+03
317	N Age8_2010	1.26E+04	3.19E+03
318	N Age9_2010	5.94E+03	1.64E+03
319	N Age10_2010	5.55E+03	1.69E+03
320	F Age 1_2010	3.27E-01	1.23E-01
321	F Age 2_2010	2.91E-01	8.98E-02
322	F Age 3_2010	3.35E-01	1.27E-01
323	F Age 4_2010	4.85E-01	1.80E-01
324	F Age 5_2010	5.20E-01	1.90E-01
325	F Age 6_2010	5.25E-01	1.92E-01
326	F Age 7_2010	5.26E-01	1.92E-01
327	F Age 8_2010	5.26E-01	1.92E-01
328	F Age 9_2010	5.26E-01	1.92E-01
329	F Age 10_2010	5.26E-01	1.92E-01

TABLE A-15: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.863E+11	4.993E+11	6.448E+11	5.093E+11	4.880E+11	1.034E+11
2012	3.882E+11	5.333E+11	7.289E+11	5.484E+11	5.024E+11	1.450E+11
2013	5.113E+11	7.118E+11	9.844E+11	7.281E+11	6.612E+11	1.836E+11
2014	6.350E+11	8.609E+11	1.160E+12	8.823E+11	8.114E+11	2.019E+11
2015	7.662E+11	1.018E+12	1.293E+12	1.026E+12	9.473E+11	2.094E+11
2016	8.765E+11	1.133E+12	1.447E+12	1.146E+12	1.065E+12	2.189E+11
2017	9.664E+11	1.238E+12	1.586E+12	1.262E+12	1.167E+12	2.330E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.25	0.32	0.42	0.33	0.32	0.07
2012	0.25	0.35	0.47	0.36	0.33	0.09
2013	0.33	0.46	0.64	0.47	0.43	0.12
2014	0.41	0.56	0.75	0.57	0.53	0.13
2015	0.50	0.66	0.84	0.67	0.62	0.14
2016	0.57	0.74	0.94	0.74	0.69	0.14
2017	0.63	0.80	1.03	0.82	0.76	0.15

Fishing Mortality: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	1.35	1.77	2.00	1.74	1.18	0.26
2012	0.32	0.39	0.49	0.40	0.27	0.07
2013	0.32	0.39	0.49	0.40	0.27	0.07
2014	0.32	0.39	0.49	0.40	0.27	0.07
2015	0.32	0.39	0.49	0.40	0.27	0.07
2016	0.32	0.39	0.49	0.40	0.27	0.07
2017	0.32	0.39	0.49	0.40	0.27	0.07

Yield: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	650,100	731,000	731,000	709,873	731,000	40,527
2012	106,400	150,450	205,800	153,702	141,500	39,938
2013	146,600	210,150	295,800	218,223	199,200	63,979
2014	208,100	301,300	430,600	315,764	285,300	94,630
2015	276,300	398,000	568,600	413,070	378,400	117,974
2016	350,600	487,050	697,100	503,520	461,800	133,307
2017	419,100	561,000	756,600	578,903	532,900	137,226

Recruitment (at age 1): F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	720,000	1,172,500	1,957,000	1,292,080	1,175,000	563,210
2013	710,500	1,192,000	2,090,000	1,331,760	1,184,000	574,628
2014	745,400	1,221,000	2,008,000	1,325,050	1,260,000	532,300
2015	792,400	1,295,000	2,205,000	1,419,210	1,310,000	597,086
2016	771,300	1,319,000	2,190,000	1,411,580	1,344,000	578,179
2017	804,900	1,368,500	2,485,000	1,525,310	1,367,000	677,857

TABLE A-16: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.863E+11	4.993E+11	6.448E+11	5.093E+11	4.880E+11	1.034E+11
2012	4.022E+11	5.540E+11	7.516E+11	5.699E+11	5.127E+11	1.504E+11
2013	5.640E+11	7.916E+11	1.104E+12	8.077E+11	6.989E+11	2.019E+11
2014	7.489E+11	1.013E+12	1.372E+12	1.035E+12	8.824E+11	2.352E+11
2015	9.341E+11	1.253E+12	1.599E+12	1.264E+12	1.056E+12	2.573E+11
2016	1.127E+12	1.464E+12	1.843E+12	1.478E+12	1.215E+12	2.818E+11
2017	1.311E+12	1.656E+12	2.106E+12	1.694E+12	1.359E+12	3.099E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.25	0.32	0.42	0.33	0.32	0.07
2012	0.26	0.36	0.49	0.37	0.33	0.10
2013	0.37	0.51	0.72	0.52	0.45	0.13
2014	0.49	0.66	0.89	0.67	0.57	0.15
2015	0.61	0.81	1.04	0.82	0.69	0.17
2016	0.73	0.95	1.19	0.96	0.79	0.18
2017	0.85	1.08	1.37	1.10	0.88	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	1.35	1.77	2.00	1.74	1.18	0.26
2012	0.20	0.20	0.20	0.20	0.20	0.00
2013	0.20	0.20	0.20	0.20	0.20	0.00
2014	0.20	0.20	0.20	0.20	0.20	0.00
2015	0.20	0.20	0.20	0.20	0.20	0.00
2016	0.20	0.20	0.20	0.20	0.20	0.00
2017	0.20	0.20	0.20	0.20	0.20	0.00

Yield: F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	650,100	731,000	731,000	709,873	731,000	40,527
2012	58,190	78,120	108,000	81,351	107,000	20,693
2013	88,030	121,100	168,600	126,939	158,500	37,072
2014	134,500	189,450	277,300	199,220	236,900	60,260
2015	189,700	269,050	388,100	279,141	326,000	79,643
2016	253,900	351,600	481,200	360,752	410,400	94,074
2017	318,300	423,400	572,100	437,403	486,100	102,544

Recruitment (at age 1): F at 75% Fspr30, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	720,000	1,172,500	1,957,000	1,292,080	1,175,000	563,210
2013	718,500	1,203,000	2,108,000	1,344,090	1,190,000	579,608
2014	757,700	1,242,000	2,061,000	1,351,410	1,275,000	542,285
2015	824,900	1,331,000	2,258,000	1,455,130	1,329,000	611,791
2016	785,400	1,358,000	2,253,000	1,451,400	1,365,000	594,158
2017	832,300	1,408,000	2,574,000	1,571,920	1,390,000	697,616

TABLE A-17: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F=0, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	3.863E+11	4.993E+11	6.448E+11	5.093E+11	4.880E+11	1.034E+11
2012	4.194E+11	5.774E+11	7.898E+11	5.930E+11	5.427E+11	1.548E+11
2013	6.442E+11	8.849E+11	1.212E+12	9.009E+11	8.180E+11	2.172E+11
2014	9.129E+11	1.202E+12	1.588E+12	1.227E+12	1.125E+12	2.660E+11
2015	1.207E+12	1.578E+12	1.963E+12	1.588E+12	1.459E+12	3.056E+11
2016	1.527E+12	1.943E+12	2.410E+12	1.966E+12	1.816E+12	3.468E+11
2017	1.881E+12	2.350E+12	2.918E+12	2.381E+12	2.193E+12	3.962E+11

SSB/SSB @ spr30: F=0, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.25	0.32	0.42	0.33	0.32	0.07
2012	0.27	0.37	0.51	0.39	0.35	0.10
2013	0.42	0.58	0.79	0.59	0.53	0.14
2014	0.59	0.78	1.03	0.80	0.73	0.17
2015	0.78	1.03	1.27	1.03	0.95	0.20
2016	0.99	1.26	1.57	1.28	1.18	0.23
2017	1.22	1.52	1.90	1.55	1.42	0.26

Fishing Mortality: F=0, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	1.35	1.77	2.00	1.74	1.18	0.26
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	650,100	731,000	731,000	709,873	731,000	40,527
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Catch Equals TAC

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	720,000	1,172,500	1,957,000	1,292,080	1,175,000	563,210
2013	724,700	1,214,000	2,132,000	1,356,800	1,206,000	584,264
2014	779,000	1,268,500	2,111,000	1,378,140	1,312,000	552,882
2015	844,100	1,360,500	2,312,000	1,490,600	1,377,000	627,320
2016	809,100	1,389,000	2,298,000	1,489,250	1,420,000	609,009
2017	856,500	1,449,500	2,639,000	1,615,510	1,450,000	717,584

TABLE A-18: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	4.932E+11	6.034E+11	7.611E+11	6.158E+11	5.943E+11	1.051E+11
2012	5.540E+11	7.060E+11	9.205E+11	7.302E+11	6.876E+11	1.490E+11
2013	6.726E+11	8.781E+11	1.158E+12	8.976E+11	8.322E+11	1.859E+11
2014	7.827E+11	1.008E+12	1.288E+12	1.033E+12	9.631E+11	2.022E+11
2015	8.957E+11	1.148E+12	1.418E+12	1.157E+12	1.077E+12	2.094E+11
2016	9.900E+11	1.244E+12	1.544E+12	1.256E+12	1.174E+12	2.179E+11
2017	1.057E+12	1.337E+12	1.672E+12	1.353E+12	1.257E+12	2.322E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.32	0.39	0.49	0.40	0.39	0.07
2012	0.36	0.46	0.60	0.47	0.45	0.10
2013	0.44	0.57	0.75	0.58	0.54	0.12
2014	0.51	0.65	0.84	0.67	0.63	0.13
2015	0.58	0.75	0.92	0.75	0.70	0.14
2016	0.64	0.81	1.00	0.82	0.76	0.14
2017	0.69	0.87	1.09	0.88	0.82	0.15

Fishing Mortality: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.62	0.76	0.94	0.77	0.53	0.12
2012	0.32	0.39	0.49	0.40	0.27	0.07
2013	0.32	0.39	0.49	0.40	0.27	0.07
2014	0.32	0.39	0.49	0.40	0.27	0.07
2015	0.32	0.39	0.49	0.40	0.27	0.07
2016	0.32	0.39	0.49	0.40	0.27	0.07
2017	0.32	0.39	0.49	0.40	0.27	0.07

Yield: F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	337,400	408,300	475,800	407,624	411,900	50,152
2012	189,600	233,100	288,800	237,250	230,400	41,140
2013	238,000	305,100	396,000	314,085	298,900	66,656
2014	297,400	398,550	537,800	410,951	383,500	97,012
2015	352,900	482,100	656,800	497,995	465,300	118,391
2016	417,300	563,900	764,600	577,342	535,300	132,632
2017	476,700	624,650	813,800	639,044	593,000	136,032

Recruitment (at age 1): F at Fspr30, 2011 Effort Equals F in 2010						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	762,300	1,227,500	2,045,000	1,353,820	1,232,000	584,459
2013	767,900	1,283,500	2,219,000	1,422,810	1,270,000	607,464
2014	785,700	1,271,000	2,129,000	1,379,980	1,316,000	552,334
2015	824,900	1,332,500	2,252,000	1,457,770	1,347,000	613,551
2016	781,200	1,341,500	2,223,000	1,436,780	1,369,000	588,193
2017	813,900	1,384,500	2,514,000	1,544,400	1,385,000	686,241

TABLE A-19: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	4.932E+11	6.034E+11	7.611E+11	6.158E+11	5.943E+11	1.051E+11
2012	5.758E+11	7.329E+11	9.546E+11	7.594E+11	7.022E+11	1.546E+11
2013	7.562E+11	9.815E+11	1.297E+12	1.001E+12	8.827E+11	2.051E+11
2014	9.292E+11	1.201E+12	1.554E+12	1.224E+12	1.054E+12	2.366E+11
2015	1.106E+12	1.436E+12	1.780E+12	1.443E+12	1.211E+12	2.585E+11
2016	1.281E+12	1.624E+12	2.019E+12	1.644E+12	1.352E+12	2.821E+11
2017	1.464E+12	1.824E+12	2.271E+12	1.846E+12	1.478E+12	3.100E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.32	0.39	0.49	0.40	0.39	0.07
2012	0.37	0.48	0.62	0.49	0.46	0.10
2013	0.49	0.64	0.84	0.65	0.57	0.13
2014	0.60	0.78	1.00	0.79	0.68	0.15
2015	0.72	0.93	1.16	0.94	0.79	0.17
2016	0.83	1.06	1.31	1.07	0.88	0.18
2017	0.95	1.18	1.48	1.20	0.96	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.62	0.76	0.94	0.77	0.53	0.12
2012	0.20	0.20	0.20	0.20	0.20	0.00
2013	0.20	0.20	0.20	0.20	0.20	0.00
2014	0.20	0.20	0.20	0.20	0.20	0.00
2015	0.20	0.20	0.20	0.20	0.20	0.00
2016	0.20	0.20	0.20	0.20	0.20	0.00
2017	0.20	0.20	0.20	0.20	0.20	0.00

Yield: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	337,400	408,300	475,800	407,624	411,900	50,152
2012	97,390	125,750	158,200	126,391	174,300	23,875
2013	135,500	178,150	234,600	184,287	238,300	42,233
2014	189,500	253,750	348,400	262,048	320,200	64,958
2015	242,600	330,800	451,500	341,075	403,800	82,831
2016	308,700	409,900	545,400	419,885	479,700	96,135
2017	371,500	476,050	629,200	490,266	545,600	103,893

Recruitment (at age 1): F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	762,300	1,227,500	2,045,000	1,353,820	1,232,000	584,459
2013	775,900	1,294,500	2,235,000	1,433,440	1,276,000	611,911
2014	807,100	1,299,500	2,158,000	1,403,860	1,329,000	561,421
2015	845,300	1,363,500	2,295,000	1,491,540	1,365,000	627,376
2016	800,300	1,378,000	2,271,000	1,475,260	1,390,000	603,697
2017	842,900	1,423,500	2,591,000	1,590,080	1,408,000	705,588

TABLE A-20: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	4.932E+11	6.034E+11	7.611E+11	6.158E+11	5.943E+11	1.051E+11
2012	6.027E+11	7.676E+11	9.979E+11	7.909E+11	7.445E+11	1.596E+11
2013	8.611E+11	1.097E+12	1.441E+12	1.123E+12	1.044E+12	2.217E+11
2014	1.129E+12	1.438E+12	1.815E+12	1.468E+12	1.369E+12	2.692E+11
2015	1.457E+12	1.834E+12	2.221E+12	1.843E+12	1.717E+12	3.091E+11
2016	1.791E+12	2.223E+12	2.657E+12	2.230E+12	2.083E+12	3.493E+11
2017	2.149E+12	2.624E+12	3.203E+12	2.651E+12	2.466E+12	3.987E+11

SSB/SSB @ spr30: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.32	0.39	0.49	0.40	0.39	0.07
2012	0.39	0.50	0.65	0.51	0.48	0.10
2013	0.56	0.71	0.94	0.73	0.68	0.14
2014	0.73	0.93	1.18	0.95	0.89	0.17
2015	0.95	1.19	1.44	1.20	1.12	0.20
2016	1.16	1.44	1.72	1.45	1.35	0.23
2017	1.40	1.70	2.08	1.72	1.60	0.26

Fishing Mortality: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.62	0.76	0.94	0.77	0.53	0.12
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	337,400	408,300	475,800	407,624	411,900	50,152
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	762,300	1,227,500	2,045,000	1,353,820	1,232,000	584,459
2013	782,200	1,304,500	2,251,000	1,444,320	1,290,000	616,133
2014	821,100	1,319,000	2,196,000	1,427,730	1,363,000	571,075
2015	864,700	1,398,500	2,355,000	1,524,360	1,410,000	641,905
2016	818,200	1,405,000	2,324,000	1,511,160	1,442,000	618,001
2017	860,200	1,464,500	2,654,000	1,632,070	1,466,000	724,883

TABLE A-21: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	4.491E+11	5.720E+11	7.273E+11	5.835E+11	5.656E+11	1.085E+11
2012	4.930E+11	6.548E+11	8.680E+11	6.703E+11	6.331E+11	1.546E+11
2013	6.160E+11	8.273E+11	1.114E+12	8.425E+11	7.828E+11	1.901E+11
2014	7.345E+11	9.633E+11	1.248E+12	9.847E+11	9.198E+11	2.058E+11
2015	8.459E+11	1.111E+12	1.372E+12	1.115E+12	1.041E+12	2.120E+11
2016	9.496E+11	1.210E+12	1.521E+12	1.221E+12	1.144E+12	2.197E+11
2017	1.029E+12	1.304E+12	1.653E+12	1.324E+12	1.232E+12	2.333E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.29	0.37	0.47	0.38	0.37	0.07
2012	0.32	0.43	0.56	0.44	0.41	0.10
2013	0.40	0.54	0.72	0.55	0.51	0.12
2014	0.48	0.63	0.81	0.64	0.60	0.13
2015	0.55	0.72	0.89	0.72	0.68	0.14
2016	0.62	0.79	0.99	0.79	0.74	0.14
2017	0.67	0.85	1.07	0.86	0.80	0.15

Fishing Mortality: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.80	1.02	1.35	1.06	0.69	0.22
2012	0.32	0.39	0.49	0.40	0.27	0.07
2013	0.32	0.39	0.49	0.40	0.27	0.07
2014	0.32	0.39	0.49	0.40	0.27	0.07
2015	0.32	0.39	0.49	0.40	0.27	0.07
2016	0.32	0.39	0.49	0.40	0.27	0.07
2017	0.32	0.39	0.49	0.40	0.27	0.07

Yield: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	508,000	508,000	0
2012	154,500	207,650	269,200	209,583	203,700	45,617
2013	201,500	273,200	368,500	282,853	269,400	70,602
2014	260,300	369,150	504,100	380,257	354,900	100,336
2015	331,900	455,700	630,700	470,559	440,400	121,694
2016	393,400	536,600	743,800	553,695	514,700	135,115
2017	459,100	602,300	795,600	619,866	576,300	137,873

Recruitment (at age 1): F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	753,000	1,218,000	2,020,000	1,336,720	1,218,000	580,263
2013	756,100	1,254,000	2,180,000	1,396,450	1,249,000	597,905
2014	765,400	1,255,000	2,085,000	1,363,710	1,302,000	546,542
2015	804,100	1,323,000	2,237,000	1,446,230	1,338,000	608,769
2016	778,000	1,334,000	2,217,000	1,429,090	1,362,000	584,991
2017	811,600	1,380,500	2,501,000	1,538,570	1,380,000	683,708

TABLE A-22: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	4.491E+11	5.720E+11	7.273E+11	5.835E+11	5.656E+11	1.085E+11
2012	5.123E+11	6.819E+11	8.989E+11	6.969E+11	6.464E+11	1.602E+11
2013	6.891E+11	9.226E+11	1.242E+12	9.380E+11	8.295E+11	2.092E+11
2014	8.676E+11	1.140E+12	1.487E+12	1.162E+12	1.005E+12	2.400E+11
2015	1.048E+12	1.381E+12	1.705E+12	1.385E+12	1.167E+12	2.606E+11
2016	1.234E+12	1.582E+12	1.947E+12	1.590E+12	1.314E+12	2.831E+11
2017	1.411E+12	1.768E+12	2.208E+12	1.797E+12	1.444E+12	3.101E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.29	0.37	0.47	0.38	0.37	0.07
2012	0.33	0.44	0.58	0.45	0.42	0.10
2013	0.45	0.60	0.81	0.61	0.54	0.14
2014	0.56	0.74	0.97	0.75	0.65	0.16
2015	0.68	0.90	1.11	0.90	0.76	0.17
2016	0.80	1.03	1.27	1.03	0.85	0.18
2017	0.92	1.15	1.43	1.17	0.94	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.80	1.02	1.35	1.06	0.69	0.22
2012	0.20	0.20	0.20	0.20	0.20	0.00
2013	0.20	0.20	0.20	0.20	0.20	0.00
2014	0.20	0.20	0.20	0.20	0.20	0.00
2015	0.20	0.20	0.20	0.20	0.20	0.00
2016	0.20	0.20	0.20	0.20	0.20	0.00
2017	0.20	0.20	0.20	0.20	0.20	0.00

Yield: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	508,000	508,000	0
2012	78,370	110,800	147,000	111,723	154,100	26,228
2013	114,100	160,250	219,800	165,844	214,700	44,059
2014	164,700	234,050	332,400	242,054	295,900	67,030
2015	219,800	312,400	439,300	321,296	381,500	85,206
2016	289,300	392,350	526,400	401,100	460,100	98,342
2017	347,700	458,500	611,100	473,478	529,000	105,627

Recruitment (at age 1): F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	753,000	1,218,000	2,020,000	1,336,720	1,218,000	580,263
2013	761,400	1,262,500	2,197,000	1,407,620	1,255,000	602,474
2014	784,000	1,281,500	2,128,000	1,388,400	1,315,000	555,904
2015	839,400	1,356,000	2,292,000	1,480,730	1,356,000	622,856
2016	794,800	1,370,000	2,267,000	1,468,050	1,383,000	600,674
2017	839,000	1,418,500	2,591,000	1,584,560	1,403,000	703,179

TABLE A-23: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE NEW AGE-LENGTH KEY RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: New Age Length Key

SSB: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	4.491E+11	5.720E+11	7.273E+11	5.835E+11	5.656E+11	1.085E+11
2012	5.356E+11	7.109E+11	9.324E+11	7.257E+11	6.851E+11	1.655E+11
2013	7.805E+11	1.037E+12	1.363E+12	1.051E+12	9.782E+11	2.271E+11
2014	1.065E+12	1.367E+12	1.736E+12	1.390E+12	1.299E+12	2.748E+11
2015	1.376E+12	1.755E+12	2.143E+12	1.761E+12	1.643E+12	3.145E+11
2016	1.697E+12	2.131E+12	2.586E+12	2.145E+12	2.007E+12	3.546E+11
2017	2.054E+12	2.534E+12	3.097E+12	2.565E+12	2.389E+12	4.036E+11

SSB/SSB @ spr30: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.29	0.37	0.47	0.38	0.37	0.07
2012	0.35	0.46	0.61	0.47	0.45	0.11
2013	0.51	0.67	0.89	0.68	0.64	0.15
2014	0.69	0.89	1.13	0.90	0.84	0.18
2015	0.89	1.14	1.39	1.14	1.07	0.20
2016	1.10	1.38	1.68	1.39	1.30	0.23
2017	1.33	1.65	2.01	1.67	1.55	0.26

Fishing Mortality: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.80	1.02	1.35	1.06	0.69	0.22
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	508,000	508,000	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	735,200	1,210,000	2,072,000	1,321,520	1,213,000	530,114
2012	753,000	1,218,000	2,020,000	1,336,720	1,218,000	580,263
2013	764,400	1,276,500	2,213,000	1,419,070	1,270,000	606,862
2014	803,800	1,301,500	2,171,000	1,413,180	1,350,000	565,841
2015	855,200	1,390,500	2,347,000	1,514,360	1,402,000	637,707
2016	816,600	1,400,500	2,321,000	1,504,560	1,437,000	615,148
2017	858,100	1,459,000	2,654,000	1,627,060	1,461,000	722,678

TABLE A-24: TABULATED RESULTS OF THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN ANNUAL SPAWNING STOCK BIOMASS, FISHING MORTALITY, ABUNDANCE AND RECRUITS.

Year	SSB (trillion eggs)	SSB/SSBmsy	SSB/SSB F@spr30	Fishing Mortality	F/Fmsy	F/F@spr30	Abundance (millions of fish)	Recruits (millions of fish)
1963	5.31	2.65	3.60	0.00	0.00	0.00	6.42	1.52
1964	5.28	2.64	3.58	0.01	0.04	0.04	6.42	1.52
1965	5.20	2.60	3.52	0.02	0.08	0.07	6.37	1.52
1966	5.07	2.53	3.43	0.04	0.11	0.11	6.28	1.52
1967	4.90	2.45	3.32	0.05	0.15	0.14	6.17	1.52
1968	4.70	2.35	3.18	0.06	0.19	0.18	6.04	1.51
1969	4.48	2.24	3.03	0.07	0.23	0.21	5.89	1.51
1970	4.24	2.12	2.87	0.08	0.26	0.25	5.75	1.51
1971	4.00	2.00	2.71	0.09	0.30	0.28	5.60	1.51
1972	3.76	1.88	2.55	0.10	0.34	0.32	5.45	1.50
1973	3.53	1.76	2.39	0.12	0.38	0.35	5.30	1.50
1974	3.30	1.65	2.24	0.13	0.41	0.39	5.16	1.49
1975	3.09	1.54	2.09	0.14	0.45	0.42	5.02	1.49
1976	2.89	1.45	1.96	0.15	0.49	0.46	4.89	1.49
1977	2.71	1.35	1.84	0.16	0.53	0.49	4.76	1.48
1978	2.54	1.27	1.72	0.17	0.56	0.53	4.64	1.47
1979	2.39	1.19	1.62	0.18	0.60	0.56	4.53	1.47
1980	2.25	1.12	1.52	0.20	0.64	0.60	4.42	1.46
1981	2.08	1.04	1.41	0.21	0.68	0.63	4.07	1.22
1982	1.49	0.74	1.01	0.88	2.87	2.69	3.76	1.16
1983	1.12	0.56	0.76	0.52	1.69	1.58	3.19	1.39
1984	1.19	0.59	0.81	0.27	0.87	0.81	3.68	1.82
1985	1.41	0.70	0.95	0.24	0.78	0.73	4.55	2.25
1986	1.61	0.81	1.09	0.32	1.05	0.98	5.33	2.47
1987	1.74	0.87	1.18	0.35	1.15	1.08	5.76	2.56
1988	1.84	0.92	1.25	0.40	1.29	1.21	6.08	2.64
1989	1.91	0.95	1.29	0.44	1.42	1.33	6.31	2.68
1990	1.90	0.95	1.29	0.53	1.73	1.62	6.42	2.70
1991	1.92	0.96	1.30	0.52	1.71	1.60	6.57	2.86
1992	1.86	0.93	1.26	0.53	1.73	1.62	6.26	2.50
1993	1.72	0.86	1.16	0.60	1.94	1.82	5.80	2.28
1994	1.52	0.76	1.03	0.63	2.07	1.93	5.07	1.83
1995	1.27	0.64	0.86	0.78	2.53	2.37	4.39	1.59
1996	1.22	0.61	0.82	0.54	1.75	1.64	4.21	1.87
1997	1.26	0.63	0.85	0.49	1.59	1.49	4.37	1.93
1998	1.17	0.59	0.80	0.58	1.90	1.78	4.01	1.57
1999	1.10	0.55	0.75	0.60	1.95	1.82	3.81	1.61
2000	1.13	0.57	0.77	0.44	1.45	1.36	3.88	1.73
2001	1.19	0.59	0.80	0.45	1.47	1.37	4.04	1.74
2002	1.15	0.58	0.78	0.50	1.64	1.53	3.82	1.47
2003	1.05	0.53	0.71	0.56	1.83	1.72	3.43	1.26
2004	0.91	0.46	0.62	0.66	2.15	2.02	3.02	1.09
2005	0.79	0.40	0.54	0.58	1.90	1.78	2.56	0.91
2006	0.71	0.35	0.48	0.49	1.59	1.49	2.18	0.71
2007	0.64	0.32	0.44	0.49	1.61	1.51	1.93	0.62
2008	0.62	0.31	0.42	0.44	1.44	1.34	1.89	0.72
2009	0.64	0.32	0.43	0.42	1.36	1.27	1.99	0.80
2010	0.67	0.33	0.45	0.35	1.14	1.07	2.05	0.79

TABLE A-25: PARAMETER ESTIMATES FROM THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH SSASPM MODEL.

Parameter Number	Description	Estimate	Std Dev		Parameter Number	Description	Estimate	Std Dev
1	Beverton & Holt - Alpha	1.52E+06	1.27E+05		51	Recruitment Deviation - 2002	6.76E-02	1.35E-01
2	Beverton & Holt - Beta	3.20E+01	3.15E+00		52	Recruitment Deviation - 2003	-7.60E-02	1.33E-01
3	Index -Q Shrimp Effort East	1.95E-01	2.17E-02		53	Recruitment Deviation - 2004	-2.14E-01	1.29E-01
4	Index -Q MRFSSE	7.11E+01	8.13E+00		54	Recruitment Deviation - 2005	-3.67E-01	1.31E-01
5	Index -Q HBE	9.29E+01	1.26E+01		55	Recruitment Deviation - 2006	-5.96E-01	1.38E-01
6	Index -Q HBW	8.15E+01	1.18E+01		56	Recruitment Deviation - 2007	-7.13E-01	1.52E-01
7	Index -Q CmHLE	7.02E+01	1.27E+01		57	Recruitment Deviation - 2008	-5.38E-01	1.68E-01
8	Index -Q CmHLW	7.02E+01	1.17E+01		58	Recruitment Deviation - 2009	-4.25E-01	2.31E-01
9	Index -Q Larval	6.77E+00	9.13E-01		59	Recruitment Deviation - 2010	-4.50E-01	3.14E-01
10	Index -Q Trawl	6.89E+01	7.52E+00		60	Effort Deviation - Rec-E -1981	-6.40E-01	2.45E-01
11	Index -Q Video	4.94E-02	3.67E-03		61	Effort Deviation - Rec-E -1982	9.36E-01	3.13E-01
12	Prehistoric Effort - Comm-E	2.09E-04	7.50E-05		62	Effort Deviation - Rec-E -1983	1.73E-02	3.56E-01
13	Prehistoric Effort - Comm-W	1.73E-04	5.11E-05		63	Effort Deviation - Rec-E -1984	-8.92E-01	3.50E-01
14	Effort - Rec-E	2.97E-01	5.29E-02		64	Effort Deviation - Rec-E -1985	-7.52E-01	3.35E-01
15	Effort - Rec-W	3.84E-02	7.66E-03		65	Effort Deviation - Rec-E -1986	-2.16E-01	3.18E-01
16	Effort - Comm-E	5.67E-02	1.16E-02		66	Effort Deviation - Rec-E -1987	-1.03E-01	3.06E-01
17	Effort - Comm-W	2.70E-02	5.53E-03		67	Effort Deviation - Rec-E -1988	-5.68E-02	2.92E-01
18	Effort - Shirmp	9.15E-01	1.56E-01		68	Effort Deviation - Rec-E -1989	-5.82E-02	2.86E-01
19	Logistic Selectivity Par 1 - Rec-E	4.73E-01	3.81E-02		69	Effort Deviation - Rec-E -1990	8.82E-02	2.82E-01
20	Logistic Selectivity Par 2 - Rec-E	2.65E+00	9.71E-02		70	Effort Deviation - Rec-E -1991	1.62E-02	2.90E-01
21	Logistic Selectivity Par 1 - Rec-W	5.07E-01	4.14E-02		71	Effort Deviation - Rec-E -1992	2.71E-02	2.92E-01
22	Logistic Selectivity Par 2 - Rec-W	2.62E+00	1.13E-01		72	Effort Deviation - Rec-E -1993	1.51E-01	2.98E-01
23	Logistic Selectivity Par 1 - Comm-E	5.72E-01	5.39E-02		73	Effort Deviation - Rec-E -1994	2.47E-01	2.94E-01
24	Logistic Selectivity Par 2 - Comm-E	3.31E+00	1.75E-01		74	Effort Deviation - Rec-E -1995	5.33E-01	2.88E-01
25	Logistic Selectivity Par 1 - Comm-W	4.96E-01	5.04E-02		75	Effort Deviation - Rec-E -1996	8.79E-02	3.01E-01
26	Logistic Selectivity Par 2 - Comm-W	3.31E+00	1.59E-01		76	Effort Deviation - Rec-E -1997	5.46E-02	3.03E-01
27	Logistic Selectivity Par 1 - Larval	5.55E-02	1.35E+01		77	Effort Deviation - Rec-E -1998	3.29E-01	3.21E-01
28	Logistic Selectivity Par 2 - Larval	2.00E+00	3.10E-04		78	Effort Deviation - Rec-E -1999	2.94E-01	3.30E-01
29	Overall Variance	-4.02E-01	1.82E-02		79	Effort Deviation - Rec-E -2000	-1.11E-01	3.26E-01
30	Recruitment Deviation - 1981	-1.81E-01	2.30E-01		80	Effort Deviation - Rec-E -2001	-2.42E-02	3.16E-01
31	Recruitment Deviation - 1982	-2.22E-01	2.08E-01		81	Effort Deviation - Rec-E -2002	1.13E-01	3.03E-01
32	Recruitment Deviation - 1983	-1.28E-02	1.82E-01		82	Effort Deviation - Rec-E -2003	2.25E-01	2.90E-01
33	Recruitment Deviation - 1984	2.92E-01	1.64E-01		83	Effort Deviation - Rec-E -2004	4.34E-01	2.83E-01
34	Recruitment Deviation - 1985	4.96E-01	1.53E-01		84	Effort Deviation - Rec-E -2005	3.29E-01	2.91E-01
35	Recruitment Deviation - 1986	5.69E-01	1.50E-01		85	Effort Deviation - Rec-E -2006	1.31E-01	2.98E-01
36	Recruitment Deviation - 1987	5.90E-01	1.44E-01		86	Effort Deviation - Rec-E -2007	1.90E-01	3.01E-01
37	Recruitment Deviation - 1988	6.13E-01	1.40E-01		87	Effort Deviation - Rec-E -2008	3.13E-02	3.12E-01
38	Recruitment Deviation - 1989	6.27E-01	1.35E-01		88	Effort Deviation - Rec-E -2009	6.06E-02	3.39E-01
39	Recruitment Deviation - 1990	6.29E-01	1.36E-01		89	Effort Deviation - Rec-E -2010	-8.10E-02	3.88E-01
40	Recruitment Deviation - 1991	6.87E-01	1.32E-01		90	Effort Deviation - Rec-W -1981	5.81E-03	3.07E-01
41	Recruitment Deviation - 1992	5.53E-01	1.32E-01		91	Effort Deviation - Rec-W -1982	6.71E-01	3.43E-01
42	Recruitment Deviation - 1993	4.61E-01	1.28E-01		92	Effort Deviation - Rec-W -1983	1.48E+00	3.57E-01
43	Recruitment Deviation - 1994	2.51E-01	1.27E-01		93	Effort Deviation - Rec-W -1984	9.03E-01	3.49E-01
44	Recruitment Deviation - 1995	1.24E-01	1.28E-01		94	Effort Deviation - Rec-W -1985	1.03E-01	3.41E-01
45	Recruitment Deviation - 1996	3.05E-01	1.27E-01		95	Effort Deviation - Rec-W -1986	-3.74E-01	3.39E-01
46	Recruitment Deviation - 1997	3.40E-01	1.42E-01		96	Effort Deviation - Rec-W -1987	-5.85E-01	3.37E-01
47	Recruitment Deviation - 1998	1.28E-01	1.43E-01		97	Effort Deviation - Rec-W -1988	-1.65E-01	3.33E-01
48	Recruitment Deviation - 1999	1.64E-01	1.35E-01		98	Effort Deviation - Rec-W -1989	1.00E-01	3.30E-01
49	Recruitment Deviation - 2000	2.45E-01	1.33E-01		99	Effort Deviation - Rec-W -1990	4.29E-01	3.29E-01
50	Recruitment Deviation - 2001	2.46E-01	1.34E-01		100	Effort Deviation - Rec-W -1991	4.84E-01	3.30E-01

Table A-25 Continued: Parameter estimates from the Gulfwide shrimp effort and average shrimp bycatch SSASPM model.

Parameter Number	Description	Estimate	Std Dev	Parameter Number	Description	Estimate	Std Dev
101	Effort Deviation - Rec-W -1992	2.65E-01	3.32E-01	151	Effort Deviation - Comm-W -1982	-9.53E-01	3.47E-01
102	Effort Deviation - Rec-W -1993	1.88E-01	3.35E-01	152	Effort Deviation - Comm-W -1983	-5.87E-01	3.60E-01
103	Effort Deviation - Rec-W -1994	5.28E-01	3.36E-01	153	Effort Deviation - Comm-W -1984	-2.78E-01	3.59E-01
104	Effort Deviation - Rec-W -1995	7.49E-01	3.40E-01	154	Effort Deviation - Comm-W -1985	-2.54E-01	3.51E-01
105	Effort Deviation - Rec-W -1996	2.79E-01	3.36E-01	155	Effort Deviation - Comm-W -1986	-5.61E-01	3.45E-01
106	Effort Deviation - Rec-W -1997	1.31E-01	3.37E-01	156	Effort Deviation - Comm-W -1987	-4.00E-01	3.41E-01
107	Effort Deviation - Rec-W -1998	-1.03E-01	3.41E-01	157	Effort Deviation - Comm-W -1988	-9.95E-02	3.38E-01
108	Effort Deviation - Rec-W -1999	1.54E-01	3.43E-01	158	Effort Deviation - Comm-W -1989	1.75E-01	3.35E-01
109	Effort Deviation - Rec-W -2000	3.37E-01	3.41E-01	159	Effort Deviation - Comm-W -1990	3.21E-01	3.35E-01
110	Effort Deviation - Rec-W -2001	-1.72E-01	3.38E-01	160	Effort Deviation - Comm-W -1991	4.21E-01	3.36E-01
111	Effort Deviation - Rec-W -2002	-5.22E-01	3.37E-01	161	Effort Deviation - Comm-W -1992	5.57E-01	3.36E-01
112	Effort Deviation - Rec-W -2003	-1.62E-01	3.36E-01	162	Effort Deviation - Comm-W -1993	8.74E-01	3.38E-01
113	Effort Deviation - Rec-W -2004	1.72E-01	3.36E-01	163	Effort Deviation - Comm-W -1994	9.17E-01	3.39E-01
114	Effort Deviation - Rec-W -2005	2.56E-02	3.37E-01	164	Effort Deviation - Comm-W -1995	9.52E-01	3.41E-01
115	Effort Deviation - Rec-W -2006	2.62E-01	3.37E-01	165	Effort Deviation - Comm-W -1996	9.36E-01	3.40E-01
116	Effort Deviation - Rec-W -2007	9.56E-02	3.38E-01	166	Effort Deviation - Comm-W -1997	6.65E-01	3.41E-01
117	Effort Deviation - Rec-W -2008	2.14E-01	3.40E-01	167	Effort Deviation - Comm-W -1998	6.52E-01	3.44E-01
118	Effort Deviation - Rec-W -2009	-1.05E+00	3.39E-01	168	Effort Deviation - Comm-W -1999	9.00E-01	3.47E-01
119	Effort Deviation - Rec-W -2010	-2.23E+00	3.48E-01	169	Effort Deviation - Comm-W -2000	8.46E-01	3.45E-01
120	Effort Deviation - Comm-E -1981	-1.86E+00	2.21E-01	170	Effort Deviation - Comm-W -2001	6.12E-01	3.42E-01
121	Effort Deviation - Comm-E -1982	-9.62E-01	3.48E-01	171	Effort Deviation - Comm-W -2002	6.68E-01	3.39E-01
122	Effort Deviation - Comm-E -1983	-6.57E-01	3.60E-01	172	Effort Deviation - Comm-W -2003	6.78E-01	3.38E-01
123	Effort Deviation - Comm-E -1984	-6.65E-01	3.59E-01	173	Effort Deviation - Comm-W -2004	6.43E-01	3.39E-01
124	Effort Deviation - Comm-E -1985	-4.91E-01	3.50E-01	174	Effort Deviation - Comm-W -2005	3.49E-01	3.39E-01
125	Effort Deviation - Comm-E -1986	-3.55E-01	3.43E-01	175	Effort Deviation - Comm-W -2006	1.72E-01	3.39E-01
126	Effort Deviation - Comm-E -1987	-2.41E-01	3.39E-01	176	Effort Deviation - Comm-W -2007	2.20E-01	3.40E-01
127	Effort Deviation - Comm-E -1988	3.40E-03	3.33E-01	177	Effort Deviation - Comm-W -2008	-1.20E-02	3.41E-01
128	Effort Deviation - Comm-E -1989	3.23E-01	3.28E-01	178	Effort Deviation - Comm-W -2009	-3.53E-01	3.43E-01
129	Effort Deviation - Comm-E -1990	6.31E-01	3.25E-01	179	Effort Deviation - Comm-W -2010	-7.40E-01	3.49E-01
130	Effort Deviation - Comm-E -1991	7.18E-01	3.28E-01	180	Effort Deviation - SHRIMP -1981	-1.50E-02	2.45E-01
131	Effort Deviation - Comm-E -1992	7.97E-01	3.29E-01	181	Effort Deviation - SHRIMP -1982	4.82E-02	2.82E-01
132	Effort Deviation - Comm-E -1993	8.81E-01	3.33E-01	182	Effort Deviation - SHRIMP -1983	-4.54E-02	2.67E-01
133	Effort Deviation - Comm-E -1994	7.33E-01	3.38E-01	183	Effort Deviation - SHRIMP -1984	8.07E-02	2.82E-01
134	Effort Deviation - Comm-E -1995	6.91E-01	3.42E-01	184	Effort Deviation - SHRIMP -1985	1.05E-01	2.58E-01
135	Effort Deviation - Comm-E -1996	4.80E-01	3.39E-01	185	Effort Deviation - SHRIMP -1986	2.77E-01	2.44E-01
136	Effort Deviation - Comm-E -1997	2.97E-01	3.40E-01	186	Effort Deviation - SHRIMP -1987	2.36E-01	2.44E-01
137	Effort Deviation - Comm-E -1998	3.21E-01	3.45E-01	187	Effort Deviation - SHRIMP -1988	1.81E-01	2.67E-01
138	Effort Deviation - Comm-E -1999	3.93E-01	3.48E-01	188	Effort Deviation - SHRIMP -1989	1.72E-01	2.47E-01
139	Effort Deviation - Comm-E -2000	5.74E-02	3.44E-01	189	Effort Deviation - SHRIMP -1990	1.16E-01	2.66E-01
140	Effort Deviation - Comm-E -2001	2.90E-01	3.42E-01	190	Effort Deviation - SHRIMP -1991	2.46E-01	2.55E-01
141	Effort Deviation - Comm-E -2002	4.79E-01	3.37E-01	191	Effort Deviation - SHRIMP -1992	3.45E-01	2.42E-01
142	Effort Deviation - Comm-E -2003	5.78E-01	3.36E-01	192	Effort Deviation - SHRIMP -1993	2.46E-01	2.45E-01
143	Effort Deviation - Comm-E -2004	5.70E-01	3.37E-01	193	Effort Deviation - SHRIMP -1994	1.93E-01	2.34E-01
144	Effort Deviation - Comm-E -2005	4.36E-01	3.39E-01	194	Effort Deviation - SHRIMP -1995	6.42E-02	2.52E-01
145	Effort Deviation - Comm-E -2006	1.12E-01	3.39E-01	195	Effort Deviation - SHRIMP -1996	1.18E-01	2.32E-01
146	Effort Deviation - Comm-E -2007	-9.10E-03	3.40E-01	196	Effort Deviation - SHRIMP -1997	4.47E-01	2.74E-01
147	Effort Deviation - Comm-E -2008	1.60E-02	3.41E-01	197	Effort Deviation - SHRIMP -1998	3.77E-01	2.71E-01
148	Effort Deviation - Comm-E -2009	1.51E-01	3.45E-01	198	Effort Deviation - SHRIMP -1999	1.45E-01	2.69E-01
149	Effort Deviation - Comm-E -2010	-6.17E-03	3.53E-01	199	Effort Deviation - SHRIMP -2000	1.56E-01	2.62E-01
150	Effort Deviation - Comm-W -1981	-2.19E+00	2.22E-01	200	Effort Deviation - SHRIMP -2001	2.57E-01	2.94E-01

Table A-25 Continued: Parameter estimates from the Gulfwide shrimp effort and average shrimp bycatch SSASPM model.

Parameter Number	Description	Estimate	Std Dev
201	Effort Deviation - SHRIMP -2002	3.15E-01	2.72E-01
202	Effort Deviation - SHRIMP -2003	2.05E-01	2.38E-01
203	Effort Deviation - SHRIMP -2004	1.39E-01	2.27E-01
204	Effort Deviation - SHRIMP -2005	-9.84E-02	2.73E-01
205	Effort Deviation - SHRIMP -2006	-4.00E-01	2.59E-01
206	Effort Deviation - SHRIMP -2007	-6.45E-01	2.58E-01
207	Effort Deviation - SHRIMP -2008	-8.81E-01	2.81E-01
208	Effort Deviation - SHRIMP -2009	-7.05E-01	2.80E-01
209	Effort Deviation - SHRIMP -2010	-8.25E-01	2.40E-01
210	Lifetime Reproductive Rate	3.20E+01	3.15E+00
211	r0	1.52E+06	1.27E+05
212	Bcurrent	6.71E+05	9.16E+04
213	Fcurrent	3.50E-01	1.13E-01
214	Bvirgin	5.31E+06	4.44E+05
215	B - 1963	5.31E+06	4.44E+05
216	B - 1964	5.28E+06	4.42E+05
217	B - 1965	5.20E+06	4.35E+05
218	B - 1966	5.07E+06	4.24E+05
219	B - 1967	4.90E+06	4.11E+05
220	B - 1968	4.70E+06	3.97E+05
221	B - 1969	4.48E+06	3.83E+05
222	B - 1970	4.24E+06	3.71E+05
223	B - 1971	4.00E+06	3.59E+05
224	B - 1972	3.76E+06	3.49E+05
225	B - 1973	3.53E+06	3.39E+05
226	B - 1974	3.30E+06	3.29E+05
227	B - 1975	3.09E+06	3.20E+05
228	B - 1976	2.89E+06	3.11E+05
229	B - 1977	2.71E+06	3.02E+05
230	B - 1978	2.54E+06	2.92E+05
231	B - 1979	2.39E+06	2.83E+05
232	B - 1980	2.25E+06	2.73E+05
233	B - 1981	2.08E+06	2.58E+05
234	B - 1982	1.49E+06	1.75E+05
235	B - 1983	1.12E+06	1.48E+05
236	B - 1984	1.19E+06	1.45E+05
237	B - 1985	1.41E+06	1.54E+05
238	B - 1986	1.61E+06	1.61E+05
239	B - 1987	1.74E+06	1.64E+05
240	B - 1988	1.84E+06	1.66E+05
241	B - 1989	1.91E+06	1.67E+05
242	B - 1990	1.90E+06	1.66E+05
243	B - 1991	1.92E+06	1.66E+05
244	B - 1992	1.86E+06	1.59E+05
245	B - 1993	1.72E+06	1.45E+05
246	B - 1994	1.52E+06	1.31E+05
247	B - 1995	1.27E+06	1.09E+05
248	B - 1996	1.22E+06	1.05E+05
249	B - 1997	1.26E+06	1.08E+05
250	B - 1998	1.17E+06	1.06E+05

Parameter Number	Description	Estimate	Std Dev
251	B - 1999	1.10E+06	1.01E+05
252	B - 2000	1.13E+06	1.05E+05
253	B - 2001	1.19E+06	1.08E+05
254	B - 2002	1.15E+06	1.02E+05
255	B - 2003	1.05E+06	9.47E+04
256	B - 2004	9.14E+05	8.04E+04
257	B - 2005	7.92E+05	6.86E+04
258	B - 2006	7.09E+05	6.25E+04
259	B - 2007	6.44E+05	5.89E+04
260	B - 2008	6.22E+05	6.05E+04
261	B - 2009	6.41E+05	6.77E+04
262	B - 2010	6.71E+05	9.16E+04
263	B1963 over B0	1.00E+00	3.91E-05
264	B1964 over B0	9.94E-01	7.92E-04
265	B1965 over B0	9.79E-01	2.98E-03
266	B1966 over B0	9.54E-01	6.33E-03
267	B1967 over B0	9.23E-01	1.05E-02
268	B1968 over B0	8.85E-01	1.52E-02
269	B1969 over B0	8.43E-01	2.00E-02
270	B1970 over B0	7.99E-01	2.46E-02
271	B1971 over B0	7.53E-01	2.88E-02
272	B1972 over B0	7.08E-01	3.24E-02
273	B1973 over B0	6.63E-01	3.53E-02
274	B1974 over B0	6.21E-01	3.76E-02
275	B1975 over B0	5.82E-01	3.92E-02
276	B1976 over B0	5.45E-01	4.02E-02
277	B1977 over B0	5.10E-01	4.08E-02
278	B1978 over B0	4.79E-01	4.09E-02
279	B1979 over B0	4.50E-01	4.07E-02
280	B1980 over B0	4.23E-01	4.02E-02
281	B1981 over B0	3.91E-01	4.04E-02
282	B1982 over B0	2.80E-01	3.25E-02
283	B1983 over B0	2.11E-01	2.98E-02
284	B1984 over B0	2.24E-01	2.94E-02
285	B1985 over B0	2.65E-01	3.17E-02
286	B1986 over B0	3.04E-01	3.38E-02
287	B1987 over B0	3.28E-01	3.50E-02
288	B1988 over B0	3.47E-01	3.62E-02
289	B1989 over B0	3.59E-01	3.68E-02
290	B1990 over B0	3.58E-01	3.67E-02
291	B1991 over B0	3.61E-01	3.66E-02
292	B1992 over B0	3.49E-01	3.51E-02
293	B1993 over B0	3.24E-01	3.18E-02
294	B1994 over B0	2.86E-01	2.84E-02
295	B1995 over B0	2.40E-01	2.39E-02
296	B1996 over B0	2.29E-01	2.29E-02
297	B1997 over B0	2.37E-01	2.35E-02
298	B1998 over B0	2.21E-01	2.30E-02
299	B1999 over B0	2.07E-01	2.19E-02
300	B2000 over B0	2.13E-01	2.27E-02

Parameter Number	Description	Estimate	Std Dev
301	B2001 over B0	2.24E-01	2.32E-02
302	B2002 over B0	2.17E-01	2.20E-02
303	B2003 over B0	1.98E-01	2.04E-02
304	B2004 over B0	1.72E-01	1.74E-02
305	B2005 over B0	1.49E-01	1.50E-02
306	B2006 over B0	1.33E-01	1.36E-02
307	B2007 over B0	1.21E-01	1.26E-02
308	B2008 over B0	1.17E-01	1.27E-02
309	B2009 over B0	1.21E-01	1.36E-02
310	B2010 over B0	1.26E-01	1.72E-02
311	N Age1_2010	7.88E+05	2.53E+05
312	N Age2_2010	5.55E+05	1.28E+05
313	N Age3_2010	3.39E+05	5.81E+04
314	N Age4_2010	1.68E+05	2.88E+04
315	N Age5_2010	9.45E+04	1.73E+04
316	N Age6_2010	5.47E+04	1.10E+04
317	N Age7_2010	2.80E+04	6.27E+03
318	N Age8_2010	1.37E+04	3.36E+03
319	N Age9_2010	6.42E+03	1.73E+03
320	N Age10_2010	6.03E+03	1.81E+03
321	F Age 1_2010	8.13E-02	1.55E-02
322	F Age 2_2010	1.07E-01	2.36E-02
323	F Age 3_2010	2.15E-01	7.32E-02
324	F Age 4_2010	3.19E-01	1.04E-01
325	F Age 5_2010	3.45E-01	1.11E-01
326	F Age 6_2010	3.49E-01	1.12E-01
327	F Age 7_2010	3.50E-01	1.13E-01
328	F Age 8_2010	3.50E-01	1.13E-01
329	F Age 9_2010	3.50E-01	1.13E-01
330	F Age 10_2010	3.50E-01	1.13E-01

TABLE A-26: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	6.436E+11	7.861E+11	9.742E+11	7.966E+11	7.753E+11	1.291E+11
2012	7.062E+11	9.100E+11	1.186E+12	9.309E+11	8.836E+11	1.892E+11
2013	8.655E+11	1.116E+12	1.453E+12	1.139E+12	1.062E+12	2.336E+11
2014	9.934E+11	1.281E+12	1.611E+12	1.303E+12	1.218E+12	2.556E+11
2015	1.122E+12	1.433E+12	1.756E+12	1.444E+12	1.347E+12	2.621E+11
2016	1.204E+12	1.536E+12	1.908E+12	1.550E+12	1.451E+12	2.688E+11
2017	1.294E+12	1.623E+12	2.053E+12	1.650E+12	1.535E+12	2.855E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.36	0.44	0.55	0.45	0.44	0.07
2012	0.40	0.51	0.67	0.52	0.50	0.11
2013	0.49	0.63	0.82	0.64	0.60	0.13
2014	0.56	0.72	0.91	0.73	0.68	0.14
2015	0.63	0.81	0.99	0.81	0.76	0.15
2016	0.68	0.86	1.07	0.87	0.82	0.15
2017	0.73	0.91	1.16	0.93	0.86	0.16

Fishing Mortality: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.78	0.99	1.28	1.01	0.69	0.19
2012	0.39	0.47	0.57	0.48	0.34	0.07
2013	0.39	0.47	0.57	0.48	0.34	0.07
2014	0.39	0.47	0.57	0.48	0.34	0.07
2015	0.39	0.47	0.57	0.48	0.34	0.07
2016	0.39	0.47	0.57	0.48	0.34	0.07
2017	0.39	0.47	0.57	0.48	0.34	0.07

Yield: F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	731,000	731,000	731,000	731,000	731,000	0
2012	294,400	365,400	436,000	364,421	358,800	54,582
2013	377,200	468,450	604,200	482,893	464,000	89,732
2014	475,800	615,250	816,400	629,954	593,200	133,789
2015	567,300	743,000	966,900	755,811	709,900	159,497
2016	646,800	849,250	1,084,000	864,191	803,900	177,486
2017	737,700	930,450	1,176,000	942,310	877,000	179,483

Recruitment (at age 1): F at Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	909,500	1,457,000	2,424,000	1,602,680	1,461,000	692,321
2013	902,400	1,514,500	2,622,000	1,673,180	1,498,000	711,337
2014	917,400	1,491,500	2,493,000	1,617,810	1,544,000	648,370
2015	966,700	1,556,000	2,639,000	1,703,670	1,576,000	716,873
2016	911,100	1,562,500	2,589,000	1,674,680	1,597,000	685,145
2017	943,100	1,614,000	2,928,000	1,796,610	1,611,000	798,878

TABLE A-27: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F at 75% Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	6.436E+11	7.861E+11	9.742E+11	7.966E+11	7.753E+11	1.291E+11
2012	7.311E+11	9.410E+11	1.229E+12	9.627E+11	9.007E+11	1.933E+11
2013	9.544E+11	1.227E+12	1.578E+12	1.250E+12	1.120E+12	2.486E+11
2014	1.147E+12	1.481E+12	1.870E+12	1.508E+12	1.321E+12	2.848E+11
2015	1.358E+12	1.748E+12	2.133E+12	1.752E+12	1.498E+12	3.065E+11
2016	1.558E+12	1.950E+12	2.405E+12	1.968E+12	1.651E+12	3.270E+11
2017	1.725E+12	2.148E+12	2.665E+12	2.179E+12	1.781E+12	3.557E+11
SSB/SSB @ spr30: F at 75% Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.36	0.44	0.55	0.45	0.44	0.07
2012	0.41	0.53	0.69	0.54	0.51	0.11
2013	0.54	0.69	0.89	0.70	0.63	0.14
2014	0.65	0.83	1.05	0.85	0.74	0.16
2015	0.76	0.98	1.20	0.99	0.84	0.17
2016	0.88	1.10	1.35	1.11	0.93	0.18
2017	0.97	1.21	1.50	1.23	1.00	0.20
Fishing Mortality: F at 75% Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.78	0.99	1.28	1.01	0.69	0.19
2012	0.25	0.25	0.25	0.25	0.25	0.00
2013	0.25	0.25	0.25	0.25	0.25	0.00
2014	0.25	0.25	0.25	0.25	0.25	0.00
2015	0.25	0.25	0.25	0.25	0.25	0.00
2016	0.25	0.25	0.25	0.25	0.25	0.00
2017	0.25	0.25	0.25	0.25	0.25	0.00
Yield: F at 75% Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	731,000	731,000	731,000	731,000	731,000	0
2012	152,000	202,250	260,300	203,968	272,200	41,560
2013	216,000	287,200	389,700	297,270	371,800	69,119
2014	300,800	402,550	550,700	417,306	495,800	102,754
2015	394,800	516,500	706,800	533,226	614,900	125,688
2016	484,600	626,900	830,900	644,104	717,500	141,947
2017	566,500	719,850	922,100	737,544	802,500	148,636
Recruitment (at age 1): F at 75% Fspr30, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	909,500	1,457,000	2,424,000	1,602,680	1,461,000	692,321
2013	910,900	1,525,500	2,638,000	1,683,250	1,503,000	715,482
2014	938,800	1,513,500	2,540,000	1,640,080	1,557,000	656,868
2015	985,300	1,593,500	2,684,000	1,735,620	1,593,000	730,144
2016	928,700	1,598,000	2,641,000	1,711,640	1,617,000	700,082
2017	977,300	1,651,000	3,013,000	1,841,340	1,635,000	817,755

TABLE A-28: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE TAC, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F=0, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	6.436E+11	7.861E+11	9.742E+11	7.966E+11	7.753E+11	1.291E+11
2012	7.617E+11	9.793E+11	1.273E+12	9.999E+11	9.501E+11	1.987E+11
2013	1.079E+12	1.365E+12	1.756E+12	1.395E+12	1.306E+12	2.677E+11
2014	1.406E+12	1.779E+12	2.197E+12	1.801E+12	1.691E+12	3.237E+11
2015	1.785E+12	2.227E+12	2.695E+12	2.241E+12	2.100E+12	3.698E+11
2016	2.189E+12	2.672E+12	3.217E+12	2.696E+12	2.529E+12	4.145E+11
2017	2.580E+12	3.156E+12	3.815E+12	3.188E+12	2.977E+12	4.719E+11

SSB/SSB @ spr30: F=0, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.36	0.44	0.55	0.45	0.44	0.07
2012	0.43	0.55	0.72	0.56	0.53	0.11
2013	0.61	0.77	0.99	0.79	0.73	0.15
2014	0.79	1.00	1.24	1.01	0.95	0.18
2015	1.00	1.25	1.52	1.26	1.18	0.21
2016	1.23	1.50	1.81	1.52	1.42	0.23
2017	1.45	1.78	2.15	1.79	1.67	0.27

Fishing Mortality: F=0, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.78	0.99	1.28	1.01	0.69	0.19
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	731,000	731,000	731,000	731,000	731,000	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Catch Equals TAC						
Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	909,500	1,457,000	2,424,000	1,602,680	1,461,000	692,321
2013	918,200	1,534,500	2,658,000	1,694,210	1,517,000	719,931
2014	953,100	1,536,000	2,578,000	1,664,350	1,591,000	666,254
2015	1,007,000	1,625,500	2,738,000	1,770,460	1,639,000	745,486
2016	948,500	1,629,500	2,704,000	1,751,260	1,673,000	715,969
2017	998,300	1,696,000	3,079,000	1,888,970	1,697,000	839,324

TABLE A-29: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F at Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	7.190E+11	8.558E+11	1.041E+12	8.649E+11	8.406E+11	1.285E+11
2012	8.423E+11	1.032E+12	1.308E+12	1.058E+12	1.006E+12	1.909E+11
2013	9.749E+11	1.218E+12	1.568E+12	1.247E+12	1.164E+12	2.355E+11
2014	1.078E+12	1.374E+12	1.706E+12	1.391E+12	1.301E+12	2.571E+11
2015	1.188E+12	1.507E+12	1.842E+12	1.514E+12	1.413E+12	2.635E+11
2016	1.262E+12	1.593E+12	1.970E+12	1.605E+12	1.502E+12	2.696E+11
2017	1.335E+12	1.666E+12	2.105E+12	1.692E+12	1.574E+12	2.861E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.40	0.48	0.59	0.49	0.47	0.07
2012	0.47	0.58	0.74	0.60	0.57	0.11
2013	0.55	0.69	0.88	0.70	0.65	0.13
2014	0.61	0.77	0.96	0.78	0.73	0.14
2015	0.67	0.85	1.04	0.85	0.79	0.15
2016	0.71	0.90	1.11	0.90	0.84	0.15
2017	0.75	0.94	1.18	0.95	0.89	0.16

Fishing Mortality: F at Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.40	0.49	0.59	0.49	0.35	0.07
2012	0.39	0.47	0.57	0.48	0.34	0.07
2013	0.39	0.47	0.57	0.48	0.34	0.07
2014	0.39	0.47	0.57	0.48	0.34	0.07
2015	0.39	0.47	0.57	0.48	0.34	0.07
2016	0.39	0.47	0.57	0.48	0.34	0.07
2017	0.39	0.47	0.57	0.48	0.34	0.07

Yield: F at Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	346,900	416,400	483,700	415,354	418,600	49,997
2012	393,400	454,500	519,400	456,361	451,200	50,117
2013	463,400	552,450	690,100	567,158	546,200	89,399
2014	547,800	684,000	883,500	701,639	661,600	134,649
2015	627,300	793,650	1,034,000	812,999	763,800	160,379
2016	694,200	898,000	1,141,000	909,341	845,500	178,471
2017	766,700	965,250	1,214,000	976,343	908,400	180,449

Recruitment (at age 1): F at Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	925,100	1,474,000	2,454,000	1,629,050	1,484,000	701,268
2013	939,100	1,556,500	2,684,000	1,711,280	1,531,000	726,425
2014	940,200	1,513,000	2,542,000	1,640,260	1,566,000	656,689
2015	976,000	1,580,000	2,660,000	1,719,160	1,590,000	723,461
2016	914,900	1,573,000	2,607,000	1,684,710	1,606,000	689,272
2017	947,300	1,621,000	2,943,000	1,803,960	1,618,000	802,074

TABLE A-30: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	7.190E+11	8.558E+11	1.041E+12	8.649E+11	8.406E+11	1.285E+11
2012	8.768E+11	1.071E+12	1.357E+12	1.097E+12	1.027E+12	1.949E+11
2013	1.082E+12	1.356E+12	1.716E+12	1.378E+12	1.232E+12	2.511E+11
2014	1.265E+12	1.604E+12	1.997E+12	1.625E+12	1.419E+12	2.879E+11
2015	1.455E+12	1.851E+12	2.252E+12	1.858E+12	1.581E+12	3.102E+11
2016	1.646E+12	2.043E+12	2.494E+12	2.060E+12	1.719E+12	3.309E+11
2017	1.798E+12	2.232E+12	2.748E+12	2.258E+12	1.837E+12	3.595E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.40	0.48	0.59	0.49	0.47	0.07
2012	0.49	0.60	0.76	0.62	0.58	0.11
2013	0.61	0.76	0.97	0.78	0.69	0.14
2014	0.71	0.90	1.12	0.91	0.80	0.16
2015	0.82	1.04	1.27	1.05	0.89	0.17
2016	0.93	1.15	1.41	1.16	0.97	0.19
2017	1.01	1.26	1.55	1.27	1.03	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.40	0.49	0.59	0.49	0.35	0.07
2012	0.25	0.25	0.25	0.25	0.25	0.00
2013	0.25	0.25	0.25	0.25	0.25	0.00
2014	0.25	0.25	0.25	0.25	0.25	0.00
2015	0.25	0.25	0.25	0.25	0.25	0.00
2016	0.25	0.25	0.25	0.25	0.25	0.00
2017	0.25	0.25	0.25	0.25	0.25	0.00

Yield: F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	346,900	416,400	483,700	415,354	418,600	49,997
2012	205,000	253,100	310,700	255,458	342,600	42,647
2013	269,900	340,000	443,400	350,782	439,300	70,933
2014	354,300	453,550	604,500	468,706	556,100	103,947
2015	437,300	562,450	752,200	579,374	665,700	126,313
2016	523,400	665,250	871,700	684,780	759,100	142,234
2017	598,700	755,050	960,600	771,745	835,700	149,011

Recruitment (at age 1): F at 75% Fspr30, 2011 Effort Equals F in 2010

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	925,100	1,474,000	2,454,000	1,629,050	1,484,000	701,268
2013	945,900	1,566,000	2,698,000	1,721,040	1,536,000	730,507
2014	952,400	1,536,000	2,581,000	1,662,440	1,578,000	665,144
2015	997,700	1,609,000	2,707,000	1,751,340	1,607,000	736,827
2016	932,900	1,606,500	2,651,000	1,722,090	1,627,000	704,450
2017	982,100	1,658,000	3,020,000	1,849,260	1,642,000	821,198

TABLE A-31: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 EFFORT EQUALS THE EFFORT IN 2010, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	7.190E+11	8.558E+11	1.041E+12	8.649E+11	8.406E+11	1.285E+11
2012	9.136E+11	1.117E+12	1.404E+12	1.142E+12	1.087E+12	2.000E+11
2013	1.242E+12	1.514E+12	1.921E+12	1.549E+12	1.454E+12	2.692E+11
2014	1.561E+12	1.934E+12	2.361E+12	1.964E+12	1.847E+12	3.250E+11
2015	1.948E+12	2.395E+12	2.858E+12	2.410E+12	2.261E+12	3.713E+11
2016	2.350E+12	2.848E+12	3.397E+12	2.866E+12	2.693E+12	4.158E+11
2017	2.748E+12	3.327E+12	3.978E+12	3.357E+12	3.139E+12	4.734E+11

SSB/SSB @ spr30: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.40	0.48	0.59	0.49	0.47	0.07
2012	0.51	0.63	0.79	0.64	0.61	0.11
2013	0.70	0.85	1.08	0.87	0.82	0.15
2014	0.88	1.09	1.33	1.11	1.04	0.18
2015	1.10	1.35	1.61	1.36	1.27	0.21
2016	1.32	1.60	1.91	1.61	1.51	0.23
2017	1.55	1.87	2.24	1.89	1.77	0.27

Fishing Mortality: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	0.40	0.49	0.59	0.49	0.35	0.07
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	346,900	416,400	483,700	415,354	418,600	49,997
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Effort Equals F in 2010						
Year	**Lower 80% CI**	**Median**	**Upper 80% CI**	**Average**	**Deterministic**	**Standard Deviation**
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	925,100	1,474,000	2,454,000	1,629,050	1,484,000	701,268
2013	950,500	1,577,500	2,715,000	1,731,690	1,550,000	734,865
2014	965,700	1,561,500	2,627,000	1,686,450	1,612,000	674,452
2015	1,016,000	1,639,000	2,761,000	1,786,050	1,653,000	752,128
2016	952,300	1,639,000	2,713,000	1,761,780	1,683,000	720,432
2017	1,002,000	1,702,500	3,095,000	1,897,060	1,704,000	842,850

TABLE A-32: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	6.961E+11	8.356E+11	1.025E+12	8.460E+11	8.230E+11	1.303E+11
2012	7.922E+11	9.987E+11	1.283E+12	1.021E+12	9.716E+11	1.933E+11
2013	9.379E+11	1.188E+12	1.546E+12	1.216E+12	1.136E+12	2.368E+11
2014	1.051E+12	1.344E+12	1.674E+12	1.366E+12	1.278E+12	2.579E+11
2015	1.171E+12	1.484E+12	1.812E+12	1.494E+12	1.394E+12	2.637E+11
2016	1.240E+12	1.578E+12	1.950E+12	1.589E+12	1.488E+12	2.697E+11
2017	1.326E+12	1.652E+12	2.088E+12	1.680E+12	1.563E+12	2.860E+11

SSB/SSB @ spr30: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.39	0.47	0.58	0.48	0.46	0.07
2012	0.45	0.56	0.72	0.57	0.55	0.11
2013	0.53	0.67	0.87	0.68	0.64	0.13
2014	0.59	0.76	0.94	0.77	0.72	0.15
2015	0.66	0.84	1.02	0.84	0.78	0.15
2016	0.70	0.89	1.10	0.89	0.84	0.15
2017	0.75	0.93	1.18	0.95	0.88	0.16

Fishing Mortality: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.50	0.63	0.79	0.63	0.44	0.11
2012	0.39	0.47	0.57	0.48	0.34	0.07
2013	0.39	0.47	0.57	0.48	0.34	0.07
2014	0.39	0.47	0.57	0.48	0.34	0.07
2015	0.39	0.47	0.57	0.48	0.34	0.07
2016	0.39	0.47	0.57	0.48	0.34	0.07
2017	0.39	0.47	0.57	0.48	0.34	0.07

Yield: F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	508,000	508,000	0
2012	360,800	430,450	499,500	429,446	424,700	55,227
2013	434,500	526,800	666,500	542,723	523,000	92,377
2014	522,900	667,200	874,000	681,043	642,500	136,575
2015	607,700	781,700	1,008,000	796,604	748,800	161,589
2016	678,600	881,350	1,122,000	896,456	834,100	179,012
2017	757,500	954,400	1,201,000	966,662	899,900	180,532

Recruitment (at age 1): F at Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	923,900	1,471,000	2,448,000	1,622,060	1,478,000	699,386
2013	927,800	1,546,000	2,668,000	1,700,810	1,522,000	722,102
2014	937,300	1,507,500	2,526,000	1,634,040	1,560,000	654,376
2015	972,200	1,573,000	2,654,000	1,714,840	1,586,000	721,564
2016	914,300	1,571,000	2,603,000	1,681,920	1,604,000	688,077
2017	946,200	1,619,500	2,938,000	1,801,900	1,616,000	801,231

TABLE A-33: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT 75% FSPR30. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	6.961E+11	8.356E+11	1.025E+12	8.460E+11	8.230E+11	1.303E+11
2012	8.204E+11	1.034E+12	1.325E+12	1.058E+12	9.912E+11	1.974E+11
2013	1.045E+12	1.316E+12	1.669E+12	1.341E+12	1.201E+12	2.521E+11
2014	1.224E+12	1.563E+12	1.961E+12	1.591E+12	1.391E+12	2.881E+11
2015	1.428E+12	1.823E+12	2.214E+12	1.827E+12	1.558E+12	3.094E+11
2016	1.620E+12	2.016E+12	2.473E+12	2.034E+12	1.701E+12	3.296E+11
2017	1.777E+12	2.205E+12	2.724E+12	2.235E+12	1.822E+12	3.580E+11

SSB/SSB @ spr30: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.39	0.47	0.58	0.48	0.46	0.07
2012	0.46	0.58	0.75	0.60	0.56	0.11
2013	0.59	0.74	0.94	0.75	0.68	0.14
2014	0.69	0.88	1.10	0.90	0.78	0.16
2015	0.80	1.03	1.25	1.03	0.88	0.17
2016	0.91	1.14	1.39	1.14	0.96	0.19
2017	1.00	1.24	1.53	1.26	1.02	0.20

Fishing Mortality: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.50	0.63	0.79	0.63	0.44	0.11
2012	0.25	0.25	0.25	0.25	0.25	0.00
2013	0.25	0.25	0.25	0.25	0.25	0.00
2014	0.25	0.25	0.25	0.25	0.25	0.00
2015	0.25	0.25	0.25	0.25	0.25	0.00
2016	0.25	0.25	0.25	0.25	0.25	0.00
2017	0.25	0.25	0.25	0.25	0.25	0.00

Yield: F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	508,000	508,000	0
2012	184,900	237,950	302,300	240,597	322,400	45,008
2013	249,500	324,950	432,300	335,431	420,200	72,799
2014	334,500	437,900	592,000	454,052	539,200	105,781
2015	426,500	549,200	740,600	566,199	651,600	127,871
2016	511,500	654,300	865,100	673,194	747,700	143,445
2017	589,300	745,050	948,600	762,001	826,600	149,710

Recruitment (at age 1): F at 75% Fspr30, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	923,900	1,471,000	2,448,000	1,622,060	1,478,000	699,386
2013	936,200	1,555,500	2,684,000	1,710,680	1,528,000	726,237
2014	948,100	1,529,000	2,565,000	1,656,270	1,573,000	662,856
2015	995,400	1,605,000	2,703,000	1,746,920	1,603,000	734,888
2016	932,400	1,604,500	2,650,000	1,719,190	1,625,000	703,171
2017	981,100	1,655,500	3,020,000	1,847,050	1,640,000	820,239

TABLE A-34: TABULATED PROJECTION RESULTS AND UNCERTAINTIES FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN SCENARIO WHERE THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009, AND SUB-SCENARIO OF F AT F=0. SSB is in eggs, yield is in pounds, and recruitment is in numbers of age one fish.

SSASPM Model Run: Gulfwide Shrimp Effort and New Age Length Key

SSB: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	6.961E+11	8.356E+11	1.025E+12	8.460E+11	8.230E+11	1.303E+11
2012	8.590E+11	1.081E+12	1.376E+12	1.101E+12	1.048E+12	2.029E+11
2013	1.187E+12	1.471E+12	1.880E+12	1.504E+12	1.412E+12	2.715E+11
2014	1.514E+12	1.891E+12	2.314E+12	1.917E+12	1.803E+12	3.273E+11
2015	1.899E+12	2.347E+12	2.820E+12	2.361E+12	2.216E+12	3.732E+11
2016	2.312E+12	2.797E+12	3.345E+12	2.817E+12	2.647E+12	4.176E+11
2017	2.695E+12	3.270E+12	3.934E+12	3.309E+12	3.094E+12	4.750E+11

SSB/SSB @ spr30: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.39	0.47	0.58	0.48	0.46	0.07
2012	0.48	0.61	0.77	0.62	0.59	0.11
2013	0.67	0.83	1.06	0.85	0.79	0.15
2014	0.85	1.07	1.30	1.08	1.01	0.18
2015	1.07	1.32	1.59	1.33	1.25	0.21
2016	1.30	1.57	1.88	1.59	1.49	0.24
2017	1.52	1.84	2.22	1.86	1.74	0.27

Fishing Mortality: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	0.50	0.63	0.79	0.63	0.44	0.11
2012	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00	0.00

Yield: F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	508,000	508,000	508,000	508,000	508,000	0
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0

Recruitment (at age 1): F=0, 2011 Catch Equals Average of 2007-2009 Catch

Year	Lower 80% CI	Median	Upper 80% CI	Average	Deterministic	Standard Deviation
2011	865,500	1,424,000	2,434,000	1,553,890	1,425,000	622,919
2012	923,900	1,471,000	2,448,000	1,622,060	1,478,000	699,386
2013	943,000	1,566,000	2,706,000	1,721,410	1,541,000	730,637
2014	962,600	1,554,000	2,612,000	1,680,410	1,606,000	672,194
2015	1,014,000	1,633,000	2,756,000	1,781,710	1,650,000	750,218
2016	951,800	1,636,000	2,713,000	1,758,870	1,680,000	719,136
2017	1,001,000	1,701,000	3,090,000	1,894,780	1,702,000	841,843

TABLE A-35: PROBABILITY DENSITY FUNCTION CONTINUITY RUN TABLE REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 CATCH EQUALS THE TAC.

Yield (lbs)	2012	2013	2014	2015	2016	2017
2,500	0.004	0.004	0.002	0.000	0.000	0.000
7,500	0.004	0.004	0.002	0.000	0.000	0.000
12,500	0.005	0.005	0.002	0.000	0.000	0.000
17,500	0.006	0.005	0.003	0.000	0.000	0.000
22,500	0.007	0.006	0.003	0.000	0.000	0.000
27,500	0.008	0.006	0.003	0.000	0.000	0.000
32,500	0.009	0.007	0.003	0.000	0.000	0.000
37,500	0.011	0.008	0.004	0.000	0.000	0.000
42,500	0.013	0.008	0.004	0.000	0.000	0.000
47,500	0.015	0.009	0.004	0.001	0.000	0.000
52,500	0.017	0.010	0.005	0.001	0.000	0.000
57,500	0.019	0.011	0.005	0.001	0.000	0.000
62,500	0.022	0.012	0.006	0.001	0.000	0.000
67,500	0.025	0.013	0.006	0.001	0.000	0.000
72,500	0.029	0.014	0.006	0.001	0.000	0.000
77,500	0.033	0.016	0.007	0.001	0.000	0.000
82,500	0.037	0.017	0.008	0.001	0.000	0.000
87,500	0.042	0.019	0.008	0.001	0.000	0.000
92,500	0.047	0.020	0.009	0.001	0.000	0.000
97,500	0.053	0.022	0.009	0.001	0.000	0.000
102,500	0.059	0.024	0.010	0.001	0.001	0.000
107,500	0.066	0.026	0.011	0.002	0.001	0.000
112,500	0.074	0.028	0.012	0.002	0.001	0.000
117,500	0.082	0.030	0.013	0.002	0.001	0.000
122,500	0.091	0.033	0.014	0.002	0.001	0.000
127,500	0.100	0.036	0.015	0.002	0.001	0.000
132,500	0.111	0.038	0.016	0.002	0.001	0.000
137,500	0.122	0.041	0.017	0.003	0.001	0.000
142,500	0.133	0.044	0.018	0.003	0.001	0.000
147,500	0.146	0.048	0.019	0.003	0.001	0.000
152,500	0.159	0.051	0.020	0.003	0.001	0.000
157,500	0.173	0.055	0.022	0.004	0.001	0.000
162,500	0.188	0.059	0.023	0.004	0.002	0.001
167,500	0.203	0.063	0.025	0.004	0.002	0.001
172,500	0.220	0.068	0.026	0.005	0.002	0.001
177,500	0.237	0.072	0.028	0.005	0.002	0.001
182,500	0.254	0.077	0.030	0.005	0.002	0.001
187,500	0.273	0.082	0.032	0.006	0.002	0.001
192,500	0.292	0.088	0.034	0.006	0.002	0.001

197,500	0.311	0.093	0.036	0.007	0.003	0.001
202,500	0.331	0.099	0.038	0.007	0.003	0.001
207,500	0.352	0.105	0.041	0.008	0.003	0.001
212,500	0.373	0.112	0.043	0.009	0.003	0.001
217,500	0.394	0.118	0.046	0.009	0.004	0.001
222,500	0.416	0.125	0.048	0.010	0.004	0.001
227,500	0.438	0.133	0.051	0.011	0.004	0.002
232,500	0.461	0.140	0.054	0.012	0.005	0.002
237,500	0.483	0.148	0.057	0.012	0.005	0.002
242,500	0.505	0.156	0.060	0.013	0.005	0.002
247,500	0.528	0.165	0.064	0.014	0.006	0.002
252,500	0.550	0.173	0.067	0.015	0.006	0.002
257,500	0.572	0.182	0.071	0.016	0.007	0.003
262,500	0.594	0.192	0.075	0.018	0.007	0.003
267,500	0.616	0.201	0.079	0.019	0.008	0.003
272,500	0.637	0.211	0.083	0.020	0.008	0.003
277,500	0.658	0.221	0.087	0.022	0.009	0.003
282,500	0.678	0.232	0.092	0.023	0.009	0.004
287,500	0.698	0.242	0.096	0.025	0.010	0.004
292,500	0.718	0.253	0.101	0.026	0.011	0.004
297,500	0.736	0.264	0.106	0.028	0.011	0.005
302,500	0.754	0.276	0.111	0.030	0.012	0.005
307,500	0.772	0.287	0.116	0.032	0.013	0.005
312,500	0.788	0.299	0.122	0.034	0.014	0.006
317,500	0.804	0.312	0.127	0.036	0.015	0.006
322,500	0.819	0.324	0.133	0.038	0.016	0.007
327,500	0.834	0.336	0.139	0.040	0.017	0.007
332,500	0.847	0.349	0.145	0.043	0.018	0.008
337,500	0.860	0.362	0.152	0.045	0.019	0.008
342,500	0.872	0.375	0.158	0.048	0.020	0.009
347,500	0.884	0.388	0.165	0.051	0.022	0.009
352,500	0.894	0.401	0.172	0.054	0.023	0.010
357,500	0.904	0.415	0.179	0.057	0.024	0.011
362,500	0.914	0.428	0.186	0.060	0.026	0.011
367,500	0.922	0.442	0.194	0.063	0.027	0.012
372,500	0.930	0.456	0.201	0.067	0.029	0.013
377,500	0.937	0.469	0.209	0.070	0.031	0.014
382,500	0.944	0.483	0.217	0.074	0.033	0.015
387,500	0.950	0.497	0.225	0.078	0.034	0.016
392,500	0.955	0.511	0.234	0.082	0.036	0.017
397,500	0.961	0.525	0.242	0.087	0.038	0.018
402,500	0.965	0.538	0.251	0.091	0.041	0.019
407,500	0.969	0.552	0.259	0.096	0.043	0.020
412,500	0.973	0.566	0.268	0.100	0.045	0.021
417,500	0.976	0.579	0.278	0.105	0.048	0.022

422,500	0.979	0.593	0.287	0.110	0.050	0.024
427,500	0.982	0.606	0.296	0.116	0.053	0.025
432,500	0.984	0.619	0.306	0.121	0.056	0.027
437,500	0.986	0.632	0.316	0.127	0.059	0.028
442,500	0.988	0.645	0.325	0.132	0.062	0.030
447,500	0.990	0.658	0.335	0.138	0.065	0.031
452,500	0.991	0.671	0.345	0.145	0.068	0.033
457,500	0.992	0.683	0.356	0.151	0.072	0.035
462,500	0.994	0.695	0.366	0.158	0.075	0.037
467,500	0.995	0.707	0.376	0.164	0.079	0.039
472,500	0.995	0.719	0.387	0.171	0.083	0.041
477,500	0.996	0.731	0.397	0.178	0.087	0.044
482,500	0.997	0.742	0.408	0.185	0.091	0.046
487,500	0.997	0.753	0.419	0.193	0.095	0.048
492,500	0.998	0.764	0.429	0.201	0.100	0.051
497,500	0.998	0.774	0.440	0.208	0.104	0.054
502,500	0.998	0.785	0.451	0.216	0.109	0.056
507,500	0.999	0.794	0.462	0.224	0.114	0.059
512,500	0.999	0.804	0.473	0.233	0.119	0.062
517,500	0.999	0.814	0.484	0.241	0.124	0.065
522,500	0.999	0.823	0.495	0.250	0.129	0.068
527,500	0.999	0.832	0.506	0.259	0.134	0.072
532,500	0.999	0.840	0.517	0.268	0.140	0.075
537,500	1.000	0.848	0.528	0.277	0.146	0.079
542,500	1.000	0.856	0.539	0.286	0.152	0.083
547,500	1.000	0.864	0.549	0.296	0.158	0.086
552,500	1.000	0.871	0.560	0.305	0.164	0.090
557,500	1.000	0.879	0.571	0.315	0.170	0.094
562,500	1.000	0.885	0.582	0.325	0.177	0.099
567,500	1.000	0.892	0.593	0.335	0.184	0.103
572,500	1.000	0.898	0.603	0.345	0.190	0.108
577,500	1.000	0.904	0.614	0.355	0.197	0.112
582,500	1.000	0.910	0.624	0.365	0.205	0.117
587,500	1.000	0.915	0.635	0.376	0.212	0.122
592,500	1.000	0.921	0.645	0.386	0.219	0.127
597,500	1.000	0.926	0.655	0.397	0.227	0.132
602,500	1.000	0.930	0.665	0.407	0.235	0.138
607,500	1.000	0.935	0.675	0.418	0.243	0.143
612,500	1.000	0.939	0.685	0.429	0.251	0.149
617,500	1.000	0.943	0.695	0.440	0.259	0.155
622,500	1.000	0.947	0.704	0.451	0.267	0.161
627,500	1.000	0.951	0.713	0.461	0.276	0.167
632,500	1.000	0.954	0.723	0.472	0.284	0.173
637,500	1.000	0.957	0.732	0.483	0.293	0.179
642,500	1.000	0.960	0.741	0.494	0.302	0.186

647,500	1.000	0.963	0.750	0.505	0.311	0.193
652,500	1.000	0.966	0.758	0.516	0.320	0.200
657,500	1.000	0.968	0.767	0.527	0.329	0.207
662,500	1.000	0.971	0.775	0.538	0.338	0.214
667,500	1.000	0.973	0.783	0.549	0.348	0.221
672,500	1.000	0.975	0.791	0.560	0.357	0.229
677,500	1.000	0.977	0.799	0.571	0.367	0.236
682,500	1.000	0.979	0.807	0.582	0.376	0.244
687,500	1.000	0.981	0.814	0.592	0.386	0.252
692,500	1.000	0.982	0.821	0.603	0.396	0.260
697,500	1.000	0.984	0.828	0.613	0.406	0.268
702,500	1.000	0.985	0.835	0.624	0.415	0.276
707,500	1.000	0.986	0.842	0.634	0.425	0.284
712,500	1.000	0.987	0.849	0.645	0.435	0.293
717,500	1.000	0.989	0.855	0.655	0.445	0.301
722,500	1.000	0.990	0.861	0.665	0.456	0.310
727,500	1.000	0.990	0.867	0.675	0.466	0.319
732,500	1.000	0.991	0.873	0.685	0.476	0.328
737,500	1.000	0.992	0.879	0.694	0.486	0.337
742,500	1.000	0.993	0.884	0.704	0.496	0.346
747,500	1.000	0.993	0.889	0.713	0.506	0.355
752,500	1.000	0.994	0.894	0.723	0.516	0.364
757,500	1.000	0.995	0.899	0.732	0.527	0.374
762,500	1.000	0.995	0.904	0.741	0.537	0.383
767,500	1.000	0.996	0.909	0.750	0.547	0.393
772,500	1.000	0.996	0.913	0.758	0.557	0.402
777,500	1.000	0.996	0.917	0.767	0.567	0.412
782,500	1.000	0.997	0.921	0.775	0.577	0.421
787,500	1.000	0.997	0.925	0.783	0.587	0.431
792,500	1.000	0.997	0.929	0.791	0.597	0.441
797,500	1.000	0.998	0.933	0.799	0.607	0.451
802,500	1.000	0.998	0.936	0.807	0.616	0.461
807,500	1.000	0.998	0.940	0.814	0.626	0.470
812,500	1.000	0.998	0.943	0.822	0.636	0.480
817,500	1.000	0.998	0.946	0.829	0.645	0.490
822,500	1.000	0.999	0.949	0.836	0.655	0.500
827,500	1.000	0.999	0.952	0.842	0.664	0.510
832,500	1.000	0.999	0.954	0.849	0.673	0.520
837,500	1.000	0.999	0.957	0.855	0.682	0.530
842,500	1.000	0.999	0.959	0.861	0.692	0.539
847,500	1.000	0.999	0.962	0.867	0.700	0.549
852,500	1.000	0.999	0.964	0.873	0.709	0.559
857,500	1.000	0.999	0.966	0.879	0.718	0.569
862,500	1.000	0.999	0.968	0.884	0.726	0.579
867,500	1.000	1.000	0.970	0.889	0.735	0.588

872,500	1.000	1.000	0.972	0.895	0.743	0.598
877,500	1.000	1.000	0.974	0.900	0.751	0.607
882,500	1.000	1.000	0.975	0.904	0.759	0.617
887,500	1.000	1.000	0.977	0.909	0.767	0.626
892,500	1.000	1.000	0.978	0.913	0.775	0.636
897,500	1.000	1.000	0.980	0.918	0.782	0.645
902,500	1.000	1.000	0.981	0.922	0.790	0.654
907,500	1.000	1.000	0.982	0.926	0.797	0.663
912,500	1.000	1.000	0.983	0.929	0.804	0.672
917,500	1.000	1.000	0.984	0.933	0.811	0.681
922,500	1.000	1.000	0.986	0.937	0.818	0.690
927,500	1.000	1.000	0.987	0.940	0.825	0.699
932,500	1.000	1.000	0.987	0.943	0.831	0.707
937,500	1.000	1.000	0.988	0.946	0.838	0.716
942,500	1.000	1.000	0.989	0.949	0.844	0.724
947,500	1.000	1.000	0.990	0.952	0.850	0.732
952,500	1.000	1.000	0.991	0.955	0.856	0.740
957,500	1.000	1.000	0.991	0.957	0.861	0.748
962,500	1.000	1.000	0.992	0.960	0.867	0.756
967,500	1.000	1.000	0.992	0.962	0.872	0.764
972,500	1.000	1.000	0.993	0.964	0.878	0.771
977,500	1.000	1.000	0.994	0.966	0.883	0.779
982,500	1.000	1.000	0.994	0.968	0.888	0.786
987,500	1.000	1.000	0.994	0.970	0.892	0.793
992,500	1.000	1.000	0.995	0.972	0.897	0.800
997,500	1.000	1.000	0.995	0.974	0.902	0.807
1,002,500	1.000	1.000	0.996	0.975	0.906	0.814
1,007,500	1.000	1.000	0.996	0.977	0.910	0.821
1,012,500	1.000	1.000	0.996	0.978	0.914	0.827
1,017,500	1.000	1.000	0.997	0.980	0.918	0.833
1,022,500	1.000	1.000	0.997	0.981	0.922	0.839
1,027,500	1.000	1.000	0.997	0.982	0.926	0.845
1,032,500	1.000	1.000	0.997	0.983	0.929	0.851
1,037,500	1.000	1.000	0.998	0.985	0.932	0.857
1,042,500	1.000	1.000	0.998	0.986	0.936	0.862
1,047,500	1.000	1.000	0.998	0.987	0.939	0.868
1,052,500	1.000	1.000	0.998	0.988	0.942	0.873
1,057,500	1.000	1.000	0.998	0.988	0.945	0.878
1,062,500	1.000	1.000	0.998	0.989	0.948	0.883
1,067,500	1.000	1.000	0.999	0.990	0.950	0.888
1,072,500	1.000	1.000	0.999	0.991	0.953	0.892
1,077,500	1.000	1.000	0.999	0.991	0.955	0.897
1,082,500	1.000	1.000	0.999	0.992	0.958	0.901
1,087,500	1.000	1.000	0.999	0.993	0.960	0.906
1,092,500	1.000	1.000	0.999	0.993	0.962	0.910

1,097,500	1.000	1.000	0.999	0.994	0.964	0.914
1,102,500	1.000	1.000	0.999	0.994	0.966	0.917
1,107,500	1.000	1.000	0.999	0.995	0.968	0.921
1,112,500	1.000	1.000	0.999	0.995	0.970	0.925
1,117,500	1.000	1.000	0.999	0.995	0.971	0.928
1,122,500	1.000	1.000	0.999	0.996	0.973	0.932
1,127,500	1.000	1.000	1.000	0.996	0.975	0.935
1,132,500	1.000	1.000	1.000	0.996	0.976	0.938
1,137,500	1.000	1.000	1.000	0.997	0.977	0.941
1,142,500	1.000	1.000	1.000	0.997	0.979	0.944
1,147,500	1.000	1.000	1.000	0.997	0.980	0.946
1,152,500	1.000	1.000	1.000	0.997	0.981	0.949
1,157,500	1.000	1.000	1.000	0.998	0.982	0.952
1,162,500	1.000	1.000	1.000	0.998	0.983	0.954
1,167,500	1.000	1.000	1.000	0.998	0.984	0.956
1,172,500	1.000	1.000	1.000	0.998	0.985	0.959
1,177,500	1.000	1.000	1.000	0.998	0.986	0.961
1,182,500	1.000	1.000	1.000	0.998	0.987	0.963
1,187,500	1.000	1.000	1.000	0.999	0.988	0.965
1,192,500	1.000	1.000	1.000	0.999	0.989	0.967
1,197,500	1.000	1.000	1.000	0.999	0.990	0.969
1,202,500	1.000	1.000	1.000	0.999	0.990	0.970
1,207,500	1.000	1.000	1.000	0.999	0.991	0.972
1,212,500	1.000	1.000	1.000	0.999	0.991	0.973
1,217,500	1.000	1.000	1.000	0.999	0.992	0.975
1,222,500	1.000	1.000	1.000	0.999	0.993	0.976
1,227,500	1.000	1.000	1.000	0.999	0.993	0.978
1,232,500	1.000	1.000	1.000	0.999	0.994	0.979
1,237,500	1.000	1.000	1.000	0.999	0.994	0.980
1,242,500	1.000	1.000	1.000	0.999	0.994	0.981
1,247,500	1.000	1.000	1.000	1.000	0.995	0.982
1,252,500	1.000	1.000	1.000	1.000	0.995	0.983
1,257,500	1.000	1.000	1.000	1.000	0.996	0.984
1,262,500	1.000	1.000	1.000	1.000	0.996	0.985
1,267,500	1.000	1.000	1.000	1.000	0.996	0.986
1,272,500	1.000	1.000	1.000	1.000	0.996	0.987
1,277,500	1.000	1.000	1.000	1.000	0.997	0.988
1,282,500	1.000	1.000	1.000	1.000	0.997	0.989
1,287,500	1.000	1.000	1.000	1.000	0.997	0.989
1,292,500	1.000	1.000	1.000	1.000	0.997	0.990
1,297,500	1.000	1.000	1.000	1.000	0.998	0.991
1,302,500	1.000	1.000	1.000	1.000	0.998	0.991
1,307,500	1.000	1.000	1.000	1.000	0.998	0.992
1,312,500	1.000	1.000	1.000	1.000	0.998	0.992
1,317,500	1.000	1.000	1.000	1.000	0.998	0.993

1,322,500	1.000	1.000	1.000	1.000	0.998	0.993
1,327,500	1.000	1.000	1.000	1.000	0.999	0.994
1,332,500	1.000	1.000	1.000	1.000	0.999	0.994
1,337,500	1.000	1.000	1.000	1.000	0.999	0.995
1,342,500	1.000	1.000	1.000	1.000	0.999	0.995
1,347,500	1.000	1.000	1.000	1.000	0.999	0.995
1,352,500	1.000	1.000	1.000	1.000	0.999	0.996
1,357,500	1.000	1.000	1.000	1.000	0.999	0.996
1,362,500	1.000	1.000	1.000	1.000	0.999	0.996
1,367,500	1.000	1.000	1.000	1.000	0.999	0.997
1,372,500	1.000	1.000	1.000	1.000	0.999	0.997
1,377,500	1.000	1.000	1.000	1.000	0.999	0.997
1,382,500	1.000	1.000	1.000	1.000	0.999	0.997
1,387,500	1.000	1.000	1.000	1.000	0.999	0.997
1,392,500	1.000	1.000	1.000	1.000	1.000	0.998
1,397,500	1.000	1.000	1.000	1.000	1.000	0.998
1,402,500	1.000	1.000	1.000	1.000	1.000	0.998
1,407,500	1.000	1.000	1.000	1.000	1.000	0.998
1,412,500	1.000	1.000	1.000	1.000	1.000	0.998
1,417,500	1.000	1.000	1.000	1.000	1.000	0.998
1,422,500	1.000	1.000	1.000	1.000	1.000	0.999
1,427,500	1.000	1.000	1.000	1.000	1.000	0.999
1,432,500	1.000	1.000	1.000	1.000	1.000	0.999
1,437,500	1.000	1.000	1.000	1.000	1.000	0.999
1,442,500	1.000	1.000	1.000	1.000	1.000	0.999
1,447,500	1.000	1.000	1.000	1.000	1.000	0.999
1,452,500	1.000	1.000	1.000	1.000	1.000	0.999
1,457,500	1.000	1.000	1.000	1.000	1.000	0.999
1,462,500	1.000	1.000	1.000	1.000	1.000	0.999
1,467,500	1.000	1.000	1.000	1.000	1.000	0.999
1,472,500	1.000	1.000	1.000	1.000	1.000	0.999
1,477,500	1.000	1.000	1.000	1.000	1.000	0.999
1,482,500	1.000	1.000	1.000	1.000	1.000	0.999
1,487,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-36: PROBABILITY DENSITY FUNCTION CONTINUITY RUN TABLE REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 EFFORT EQUALS THE EFFORT IN 2010.

Yield (lbs)	2012	2013	2014	2015	2016	2017
2,500	0.001	0.001	0.001	0.000	0.000	0.000
7,500	0.001	0.001	0.001	0.000	0.000	0.000
12,500	0.001	0.002	0.001	0.000	0.000	0.000
17,500	0.001	0.002	0.001	0.000	0.000	0.000
22,500	0.001	0.002	0.001	0.000	0.000	0.000
27,500	0.001	0.002	0.001	0.000	0.000	0.000
32,500	0.002	0.002	0.001	0.000	0.000	0.000
37,500	0.002	0.003	0.001	0.000	0.000	0.000
42,500	0.002	0.003	0.002	0.000	0.000	0.000
47,500	0.003	0.003	0.002	0.000	0.000	0.000
52,500	0.003	0.004	0.002	0.000	0.000	0.000
57,500	0.004	0.004	0.002	0.000	0.000	0.000
62,500	0.005	0.004	0.002	0.000	0.000	0.000
67,500	0.005	0.005	0.002	0.000	0.000	0.000
72,500	0.006	0.005	0.003	0.000	0.000	0.000
77,500	0.007	0.006	0.003	0.000	0.000	0.000
82,500	0.008	0.007	0.003	0.000	0.000	0.000
87,500	0.010	0.007	0.003	0.000	0.000	0.000
92,500	0.011	0.008	0.004	0.000	0.000	0.000
97,500	0.013	0.009	0.004	0.000	0.000	0.000
102,500	0.014	0.009	0.004	0.001	0.000	0.000
107,500	0.016	0.010	0.005	0.001	0.000	0.000
112,500	0.019	0.011	0.005	0.001	0.000	0.000
117,500	0.021	0.012	0.006	0.001	0.000	0.000
122,500	0.024	0.013	0.006	0.001	0.000	0.000
127,500	0.027	0.014	0.006	0.001	0.000	0.000
132,500	0.030	0.016	0.007	0.001	0.000	0.000
137,500	0.034	0.017	0.008	0.001	0.000	0.000
142,500	0.038	0.019	0.008	0.001	0.001	0.000
147,500	0.043	0.020	0.009	0.001	0.001	0.000
152,500	0.048	0.022	0.009	0.001	0.001	0.000
157,500	0.053	0.024	0.010	0.001	0.001	0.000
162,500	0.059	0.026	0.011	0.002	0.001	0.000
167,500	0.065	0.028	0.012	0.002	0.001	0.000
172,500	0.072	0.030	0.012	0.002	0.001	0.000
177,500	0.080	0.032	0.013	0.002	0.001	0.000
182,500	0.088	0.035	0.014	0.002	0.001	0.000
187,500	0.096	0.037	0.015	0.003	0.001	0.000
192,500	0.105	0.040	0.016	0.003	0.001	0.001

197,500	0.115	0.043	0.018	0.003	0.001	0.001
202,500	0.126	0.046	0.019	0.003	0.001	0.001
207,500	0.137	0.049	0.020	0.004	0.002	0.001
212,500	0.148	0.053	0.021	0.004	0.002	0.001
217,500	0.161	0.057	0.023	0.004	0.002	0.001
222,500	0.174	0.060	0.024	0.005	0.002	0.001
227,500	0.188	0.065	0.026	0.005	0.002	0.001
232,500	0.202	0.069	0.028	0.005	0.002	0.001
237,500	0.217	0.073	0.029	0.006	0.003	0.001
242,500	0.233	0.078	0.031	0.006	0.003	0.001
247,500	0.249	0.083	0.033	0.007	0.003	0.001
252,500	0.266	0.088	0.035	0.007	0.003	0.001
257,500	0.283	0.094	0.037	0.008	0.003	0.002
262,500	0.301	0.100	0.040	0.008	0.004	0.002
267,500	0.319	0.105	0.042	0.009	0.004	0.002
272,500	0.338	0.112	0.045	0.010	0.004	0.002
277,500	0.357	0.118	0.047	0.010	0.005	0.002
282,500	0.377	0.125	0.050	0.011	0.005	0.002
287,500	0.397	0.132	0.053	0.012	0.005	0.002
292,500	0.417	0.139	0.056	0.013	0.006	0.003
297,500	0.437	0.147	0.059	0.014	0.006	0.003
302,500	0.458	0.154	0.062	0.015	0.007	0.003
307,500	0.479	0.162	0.065	0.016	0.007	0.003
312,500	0.500	0.171	0.069	0.017	0.008	0.004
317,500	0.520	0.179	0.073	0.018	0.008	0.004
322,500	0.541	0.188	0.076	0.020	0.009	0.004
327,500	0.562	0.197	0.080	0.021	0.010	0.004
332,500	0.582	0.207	0.085	0.022	0.010	0.005
337,500	0.602	0.216	0.089	0.024	0.011	0.005
342,500	0.622	0.226	0.093	0.025	0.012	0.005
347,500	0.642	0.236	0.098	0.027	0.013	0.006
352,500	0.661	0.247	0.103	0.029	0.013	0.006
357,500	0.680	0.257	0.108	0.031	0.014	0.007
362,500	0.698	0.268	0.113	0.033	0.015	0.007
367,500	0.716	0.279	0.118	0.035	0.016	0.008
372,500	0.734	0.291	0.123	0.037	0.017	0.008
377,500	0.751	0.302	0.129	0.039	0.018	0.009
382,500	0.767	0.314	0.135	0.042	0.020	0.009
387,500	0.782	0.326	0.141	0.044	0.021	0.010
392,500	0.797	0.338	0.147	0.047	0.022	0.011
397,500	0.812	0.350	0.153	0.050	0.024	0.012
402,500	0.826	0.363	0.160	0.052	0.025	0.012
407,500	0.839	0.375	0.166	0.055	0.027	0.013
412,500	0.851	0.388	0.173	0.059	0.028	0.014
417,500	0.863	0.401	0.180	0.062	0.030	0.015

422,500	0.874	0.414	0.188	0.065	0.032	0.016
427,500	0.884	0.427	0.195	0.069	0.033	0.017
432,500	0.894	0.440	0.202	0.072	0.035	0.018
437,500	0.903	0.453	0.210	0.076	0.037	0.019
442,500	0.912	0.466	0.218	0.080	0.040	0.020
447,500	0.920	0.479	0.226	0.085	0.042	0.021
452,500	0.928	0.493	0.234	0.089	0.044	0.023
457,500	0.934	0.506	0.243	0.093	0.047	0.024
462,500	0.941	0.519	0.251	0.098	0.049	0.026
467,500	0.947	0.532	0.260	0.103	0.052	0.027
472,500	0.952	0.546	0.269	0.108	0.054	0.029
477,500	0.957	0.559	0.278	0.113	0.057	0.030
482,500	0.962	0.572	0.287	0.118	0.060	0.032
487,500	0.966	0.585	0.296	0.124	0.063	0.034
492,500	0.970	0.598	0.306	0.130	0.067	0.036
497,500	0.973	0.611	0.315	0.136	0.070	0.038
502,500	0.976	0.623	0.325	0.142	0.073	0.040
507,500	0.979	0.636	0.335	0.148	0.077	0.042
512,500	0.981	0.648	0.345	0.154	0.081	0.044
517,500	0.984	0.661	0.355	0.161	0.085	0.047
522,500	0.986	0.673	0.365	0.168	0.089	0.049
527,500	0.987	0.685	0.375	0.175	0.093	0.052
532,500	0.989	0.696	0.386	0.182	0.097	0.054
537,500	0.990	0.708	0.396	0.189	0.102	0.057
542,500	0.992	0.719	0.406	0.197	0.106	0.060
547,500	0.993	0.730	0.417	0.204	0.111	0.063
552,500	0.994	0.741	0.428	0.212	0.116	0.066
557,500	0.995	0.752	0.438	0.220	0.121	0.069
562,500	0.995	0.762	0.449	0.229	0.126	0.073
567,500	0.996	0.773	0.460	0.237	0.131	0.076
572,500	0.997	0.783	0.470	0.246	0.137	0.080
577,500	0.997	0.792	0.481	0.254	0.143	0.084
582,500	0.998	0.802	0.492	0.263	0.148	0.088
587,500	0.998	0.811	0.503	0.272	0.154	0.092
592,500	0.998	0.820	0.514	0.281	0.161	0.096
597,500	0.999	0.828	0.524	0.291	0.167	0.100
602,500	0.999	0.837	0.535	0.300	0.173	0.104
607,500	0.999	0.845	0.546	0.310	0.180	0.109
612,500	0.999	0.852	0.557	0.320	0.187	0.114
617,500	0.999	0.860	0.567	0.330	0.193	0.118
622,500	0.999	0.867	0.578	0.340	0.201	0.123
627,500	0.999	0.874	0.589	0.350	0.208	0.128
632,500	1.000	0.881	0.599	0.360	0.215	0.134
637,500	1.000	0.888	0.609	0.370	0.223	0.139
642,500	1.000	0.894	0.620	0.381	0.230	0.145

647,500	1.000	0.900	0.630	0.391	0.238	0.150
652,500	1.000	0.906	0.640	0.402	0.246	0.156
657,500	1.000	0.911	0.650	0.412	0.254	0.162
662,500	1.000	0.916	0.660	0.423	0.262	0.168
667,500	1.000	0.921	0.670	0.434	0.271	0.175
672,500	1.000	0.926	0.680	0.445	0.279	0.181
677,500	1.000	0.931	0.690	0.456	0.288	0.188
682,500	1.000	0.935	0.699	0.467	0.297	0.195
687,500	1.000	0.939	0.708	0.477	0.305	0.201
692,500	1.000	0.943	0.718	0.488	0.314	0.208
697,500	1.000	0.947	0.727	0.499	0.324	0.216
702,500	1.000	0.950	0.736	0.510	0.333	0.223
707,500	1.000	0.954	0.745	0.521	0.342	0.230
712,500	1.000	0.957	0.753	0.532	0.351	0.238
717,500	1.000	0.960	0.762	0.543	0.361	0.246
722,500	1.000	0.962	0.770	0.554	0.371	0.254
727,500	1.000	0.965	0.778	0.565	0.380	0.262
732,500	1.000	0.968	0.786	0.576	0.390	0.270
737,500	1.000	0.970	0.794	0.586	0.400	0.278
742,500	1.000	0.972	0.802	0.597	0.410	0.286
747,500	1.000	0.974	0.809	0.608	0.420	0.295
752,500	1.000	0.976	0.816	0.618	0.429	0.303
757,500	1.000	0.978	0.823	0.629	0.439	0.312
762,500	1.000	0.980	0.830	0.639	0.450	0.321
767,500	1.000	0.981	0.837	0.649	0.460	0.330
772,500	1.000	0.983	0.844	0.659	0.470	0.339
777,500	1.000	0.984	0.850	0.669	0.480	0.348
782,500	1.000	0.985	0.856	0.679	0.490	0.357
787,500	1.000	0.987	0.862	0.689	0.500	0.366
792,500	1.000	0.988	0.868	0.699	0.510	0.376
797,500	1.000	0.989	0.874	0.708	0.521	0.385
802,500	1.000	0.990	0.879	0.717	0.531	0.395
807,500	1.000	0.991	0.885	0.727	0.541	0.404
812,500	1.000	0.991	0.890	0.736	0.551	0.414
817,500	1.000	0.992	0.895	0.745	0.561	0.423
822,500	1.000	0.993	0.900	0.753	0.571	0.433
827,500	1.000	0.993	0.905	0.762	0.581	0.443
832,500	1.000	0.994	0.909	0.770	0.591	0.453
837,500	1.000	0.995	0.913	0.779	0.601	0.463
842,500	1.000	0.995	0.918	0.787	0.610	0.472
847,500	1.000	0.996	0.922	0.795	0.620	0.482
852,500	1.000	0.996	0.926	0.802	0.630	0.492
857,500	1.000	0.996	0.929	0.810	0.639	0.502
862,500	1.000	0.997	0.933	0.817	0.649	0.512
867,500	1.000	0.997	0.936	0.824	0.658	0.522

872,500	1.000	0.997	0.940	0.831	0.668	0.532
877,500	1.000	0.998	0.943	0.838	0.677	0.541
882,500	1.000	0.998	0.946	0.845	0.686	0.551
887,500	1.000	0.998	0.949	0.851	0.695	0.561
892,500	1.000	0.998	0.952	0.858	0.704	0.571
897,500	1.000	0.998	0.954	0.864	0.712	0.580
902,500	1.000	0.999	0.957	0.870	0.721	0.590
907,500	1.000	0.999	0.959	0.875	0.730	0.600
912,500	1.000	0.999	0.961	0.881	0.738	0.609
917,500	1.000	0.999	0.964	0.886	0.746	0.619
922,500	1.000	0.999	0.966	0.891	0.754	0.628
927,500	1.000	0.999	0.968	0.897	0.762	0.637
932,500	1.000	0.999	0.970	0.901	0.770	0.647
937,500	1.000	0.999	0.972	0.906	0.778	0.656
942,500	1.000	0.999	0.973	0.911	0.785	0.665
947,500	1.000	0.999	0.975	0.915	0.793	0.674
952,500	1.000	1.000	0.976	0.919	0.800	0.683
957,500	1.000	1.000	0.978	0.923	0.807	0.691
962,500	1.000	1.000	0.979	0.927	0.814	0.700
967,500	1.000	1.000	0.981	0.931	0.820	0.709
972,500	1.000	1.000	0.982	0.934	0.827	0.717
977,500	1.000	1.000	0.983	0.938	0.833	0.725
982,500	1.000	1.000	0.984	0.941	0.840	0.734
987,500	1.000	1.000	0.985	0.944	0.846	0.742
992,500	1.000	1.000	0.986	0.947	0.852	0.750
997,500	1.000	1.000	0.987	0.950	0.858	0.757
1,002,500	1.000	1.000	0.988	0.953	0.863	0.765
1,007,500	1.000	1.000	0.989	0.956	0.869	0.773
1,012,500	1.000	1.000	0.990	0.958	0.874	0.780
1,017,500	1.000	1.000	0.990	0.960	0.879	0.787
1,022,500	1.000	1.000	0.991	0.963	0.884	0.794
1,027,500	1.000	1.000	0.992	0.965	0.889	0.801
1,032,500	1.000	1.000	0.992	0.967	0.894	0.808
1,037,500	1.000	1.000	0.993	0.969	0.899	0.815
1,042,500	1.000	1.000	0.993	0.971	0.903	0.821
1,047,500	1.000	1.000	0.994	0.973	0.907	0.828
1,052,500	1.000	1.000	0.994	0.974	0.911	0.834
1,057,500	1.000	1.000	0.995	0.976	0.915	0.840
1,062,500	1.000	1.000	0.995	0.977	0.919	0.846
1,067,500	1.000	1.000	0.995	0.979	0.923	0.852
1,072,500	1.000	1.000	0.996	0.980	0.927	0.858
1,077,500	1.000	1.000	0.996	0.982	0.930	0.863
1,082,500	1.000	1.000	0.996	0.983	0.934	0.868
1,087,500	1.000	1.000	0.997	0.984	0.937	0.874
1,092,500	1.000	1.000	0.997	0.985	0.940	0.879

1,097,500	1.000	1.000	0.997	0.986	0.943	0.884
1,102,500	1.000	1.000	0.997	0.987	0.946	0.888
1,107,500	1.000	1.000	0.998	0.988	0.948	0.893
1,112,500	1.000	1.000	0.998	0.989	0.951	0.897
1,117,500	1.000	1.000	0.998	0.989	0.954	0.902
1,122,500	1.000	1.000	0.998	0.990	0.956	0.906
1,127,500	1.000	1.000	0.998	0.991	0.958	0.910
1,132,500	1.000	1.000	0.998	0.992	0.961	0.914
1,137,500	1.000	1.000	0.999	0.992	0.963	0.918
1,142,500	1.000	1.000	0.999	0.993	0.965	0.922
1,147,500	1.000	1.000	0.999	0.993	0.967	0.925
1,152,500	1.000	1.000	0.999	0.994	0.968	0.929
1,157,500	1.000	1.000	0.999	0.994	0.970	0.932
1,162,500	1.000	1.000	0.999	0.995	0.972	0.935
1,167,500	1.000	1.000	0.999	0.995	0.974	0.938
1,172,500	1.000	1.000	0.999	0.995	0.975	0.941
1,177,500	1.000	1.000	0.999	0.996	0.976	0.944
1,182,500	1.000	1.000	0.999	0.996	0.978	0.947
1,187,500	1.000	1.000	0.999	0.996	0.979	0.949
1,192,500	1.000	1.000	0.999	0.997	0.980	0.952
1,197,500	1.000	1.000	1.000	0.997	0.982	0.954
1,202,500	1.000	1.000	1.000	0.997	0.983	0.957
1,207,500	1.000	1.000	1.000	0.997	0.984	0.959
1,212,500	1.000	1.000	1.000	0.998	0.985	0.961
1,217,500	1.000	1.000	1.000	0.998	0.986	0.963
1,222,500	1.000	1.000	1.000	0.998	0.987	0.965
1,227,500	1.000	1.000	1.000	0.998	0.987	0.967
1,232,500	1.000	1.000	1.000	0.998	0.988	0.969
1,237,500	1.000	1.000	1.000	0.998	0.989	0.970
1,242,500	1.000	1.000	1.000	0.999	0.990	0.972
1,247,500	1.000	1.000	1.000	0.999	0.990	0.974
1,252,500	1.000	1.000	1.000	0.999	0.991	0.975
1,257,500	1.000	1.000	1.000	0.999	0.992	0.976
1,262,500	1.000	1.000	1.000	0.999	0.992	0.978
1,267,500	1.000	1.000	1.000	0.999	0.993	0.979
1,272,500	1.000	1.000	1.000	0.999	0.993	0.980
1,277,500	1.000	1.000	1.000	0.999	0.994	0.981
1,282,500	1.000	1.000	1.000	0.999	0.994	0.983
1,287,500	1.000	1.000	1.000	0.999	0.995	0.984
1,292,500	1.000	1.000	1.000	0.999	0.995	0.985
1,297,500	1.000	1.000	1.000	1.000	0.995	0.985
1,302,500	1.000	1.000	1.000	1.000	0.996	0.986
1,307,500	1.000	1.000	1.000	1.000	0.996	0.987
1,312,500	1.000	1.000	1.000	1.000	0.996	0.988
1,317,500	1.000	1.000	1.000	1.000	0.997	0.989

1,322,500	1.000	1.000	1.000	1.000	0.997	0.989
1,327,500	1.000	1.000	1.000	1.000	0.997	0.990
1,332,500	1.000	1.000	1.000	1.000	0.997	0.991
1,337,500	1.000	1.000	1.000	1.000	0.997	0.991
1,342,500	1.000	1.000	1.000	1.000	0.998	0.992
1,347,500	1.000	1.000	1.000	1.000	0.998	0.992
1,352,500	1.000	1.000	1.000	1.000	0.998	0.993
1,357,500	1.000	1.000	1.000	1.000	0.998	0.993
1,362,500	1.000	1.000	1.000	1.000	0.998	0.994
1,367,500	1.000	1.000	1.000	1.000	0.998	0.994
1,372,500	1.000	1.000	1.000	1.000	0.999	0.995
1,377,500	1.000	1.000	1.000	1.000	0.999	0.995
1,382,500	1.000	1.000	1.000	1.000	0.999	0.995
1,387,500	1.000	1.000	1.000	1.000	0.999	0.996
1,392,500	1.000	1.000	1.000	1.000	0.999	0.996
1,397,500	1.000	1.000	1.000	1.000	0.999	0.996
1,402,500	1.000	1.000	1.000	1.000	0.999	0.997
1,407,500	1.000	1.000	1.000	1.000	0.999	0.997
1,412,500	1.000	1.000	1.000	1.000	0.999	0.997
1,417,500	1.000	1.000	1.000	1.000	0.999	0.997
1,422,500	1.000	1.000	1.000	1.000	0.999	0.997
1,427,500	1.000	1.000	1.000	1.000	0.999	0.998
1,432,500	1.000	1.000	1.000	1.000	0.999	0.998
1,437,500	1.000	1.000	1.000	1.000	1.000	0.998
1,442,500	1.000	1.000	1.000	1.000	1.000	0.998
1,447,500	1.000	1.000	1.000	1.000	1.000	0.998
1,452,500	1.000	1.000	1.000	1.000	1.000	0.998
1,457,500	1.000	1.000	1.000	1.000	1.000	0.999
1,462,500	1.000	1.000	1.000	1.000	1.000	0.999
1,467,500	1.000	1.000	1.000	1.000	1.000	0.999
1,472,500	1.000	1.000	1.000	1.000	1.000	0.999
1,477,500	1.000	1.000	1.000	1.000	1.000	0.999
1,482,500	1.000	1.000	1.000	1.000	1.000	0.999
1,487,500	1.000	1.000	1.000	1.000	1.000	0.999
1,492,500	1.000	1.000	1.000	1.000	1.000	0.999
1,497,500	1.000	1.000	1.000	1.000	1.000	0.999
1,502,500	1.000	1.000	1.000	1.000	1.000	0.999
1,507,500	1.000	1.000	1.000	1.000	1.000	0.999
1,512,500	1.000	1.000	1.000	1.000	1.000	0.999
1,517,500	1.000	1.000	1.000	1.000	1.000	0.999
1,522,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-37: PROBABILITY DENSITY FUNCTION CONTINUITY RUN TABLE REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009.

Yield (lbs)	2012	2013	2014	2015	2016	2017
2,500	0.001	0.002	0.001	0.000	0.000	0.000
7,500	0.002	0.002	0.001	0.000	0.000	0.000
12,500	0.002	0.002	0.001	0.000	0.000	0.000
17,500	0.002	0.003	0.001	0.000	0.000	0.000
22,500	0.002	0.003	0.002	0.000	0.000	0.000
27,500	0.003	0.003	0.002	0.000	0.000	0.000
32,500	0.003	0.004	0.002	0.000	0.000	0.000
37,500	0.004	0.004	0.002	0.000	0.000	0.000
42,500	0.004	0.004	0.002	0.000	0.000	0.000
47,500	0.005	0.005	0.002	0.000	0.000	0.000
52,500	0.006	0.005	0.003	0.000	0.000	0.000
57,500	0.007	0.006	0.003	0.000	0.000	0.000
62,500	0.008	0.006	0.003	0.000	0.000	0.000
67,500	0.009	0.007	0.003	0.000	0.000	0.000
72,500	0.010	0.008	0.004	0.000	0.000	0.000
77,500	0.012	0.008	0.004	0.000	0.000	0.000
82,500	0.014	0.009	0.004	0.001	0.000	0.000
87,500	0.015	0.010	0.005	0.001	0.000	0.000
92,500	0.017	0.011	0.005	0.001	0.000	0.000
97,500	0.020	0.012	0.005	0.001	0.000	0.000
102,500	0.022	0.013	0.006	0.001	0.000	0.000
107,500	0.025	0.014	0.006	0.001	0.000	0.000
112,500	0.028	0.015	0.007	0.001	0.000	0.000
117,500	0.031	0.016	0.007	0.001	0.000	0.000
122,500	0.035	0.018	0.008	0.001	0.000	0.000
127,500	0.039	0.019	0.008	0.001	0.001	0.000
132,500	0.044	0.021	0.009	0.001	0.001	0.000
137,500	0.049	0.023	0.010	0.001	0.001	0.000
142,500	0.054	0.024	0.010	0.002	0.001	0.000
147,500	0.060	0.026	0.011	0.002	0.001	0.000
152,500	0.066	0.028	0.012	0.002	0.001	0.000
157,500	0.072	0.030	0.013	0.002	0.001	0.000
162,500	0.080	0.033	0.014	0.002	0.001	0.000
167,500	0.087	0.035	0.015	0.002	0.001	0.000
172,500	0.096	0.038	0.016	0.003	0.001	0.000
177,500	0.104	0.041	0.017	0.003	0.001	0.000
182,500	0.114	0.043	0.018	0.003	0.001	0.000
187,500	0.124	0.047	0.019	0.003	0.001	0.001
192,500	0.134	0.050	0.020	0.004	0.002	0.001

197,500	0.146	0.053	0.022	0.004	0.002	0.001
202,500	0.157	0.057	0.023	0.004	0.002	0.001
207,500	0.170	0.061	0.024	0.005	0.002	0.001
212,500	0.183	0.065	0.026	0.005	0.002	0.001
217,500	0.196	0.069	0.028	0.005	0.002	0.001
222,500	0.211	0.073	0.029	0.006	0.002	0.001
227,500	0.225	0.078	0.031	0.006	0.003	0.001
232,500	0.241	0.083	0.033	0.007	0.003	0.001
237,500	0.257	0.088	0.035	0.007	0.003	0.001
242,500	0.273	0.093	0.037	0.008	0.003	0.001
247,500	0.290	0.099	0.039	0.008	0.004	0.001
252,500	0.308	0.104	0.042	0.009	0.004	0.002
257,500	0.326	0.110	0.044	0.010	0.004	0.002
262,500	0.344	0.117	0.047	0.011	0.005	0.002
267,500	0.362	0.123	0.049	0.011	0.005	0.002
272,500	0.381	0.130	0.052	0.012	0.005	0.002
277,500	0.401	0.137	0.055	0.013	0.006	0.002
282,500	0.420	0.144	0.058	0.014	0.006	0.003
287,500	0.440	0.152	0.061	0.015	0.006	0.003
292,500	0.460	0.159	0.064	0.016	0.007	0.003
297,500	0.480	0.167	0.068	0.017	0.007	0.003
302,500	0.500	0.176	0.071	0.018	0.008	0.003
307,500	0.520	0.184	0.075	0.019	0.009	0.004
312,500	0.540	0.193	0.079	0.021	0.009	0.004
317,500	0.560	0.202	0.083	0.022	0.010	0.004
322,500	0.580	0.211	0.087	0.024	0.010	0.005
327,500	0.599	0.221	0.091	0.025	0.011	0.005
332,500	0.619	0.230	0.096	0.027	0.012	0.005
337,500	0.638	0.240	0.100	0.028	0.013	0.006
342,500	0.656	0.251	0.105	0.030	0.014	0.006
347,500	0.674	0.261	0.110	0.032	0.015	0.007
352,500	0.692	0.272	0.115	0.034	0.015	0.007
357,500	0.710	0.283	0.121	0.036	0.016	0.008
362,500	0.727	0.294	0.126	0.038	0.018	0.008
367,500	0.743	0.305	0.132	0.041	0.019	0.009
372,500	0.759	0.316	0.137	0.043	0.020	0.009
377,500	0.775	0.328	0.143	0.046	0.021	0.010
382,500	0.789	0.340	0.149	0.048	0.022	0.010
387,500	0.804	0.352	0.156	0.051	0.024	0.011
392,500	0.817	0.364	0.162	0.054	0.025	0.012
397,500	0.830	0.376	0.169	0.057	0.027	0.013
402,500	0.843	0.389	0.175	0.060	0.028	0.014
407,500	0.854	0.401	0.182	0.063	0.030	0.014
412,500	0.866	0.414	0.189	0.067	0.032	0.015
417,500	0.876	0.426	0.197	0.070	0.034	0.016

422,500	0.886	0.439	0.204	0.074	0.035	0.017
427,500	0.896	0.452	0.212	0.078	0.037	0.018
432,500	0.904	0.465	0.220	0.082	0.040	0.020
437,500	0.913	0.478	0.228	0.086	0.042	0.021
442,500	0.920	0.491	0.236	0.090	0.044	0.022
447,500	0.928	0.504	0.244	0.095	0.046	0.023
452,500	0.934	0.517	0.252	0.100	0.049	0.025
457,500	0.940	0.530	0.261	0.104	0.052	0.026
462,500	0.946	0.542	0.270	0.109	0.054	0.028
467,500	0.951	0.555	0.279	0.114	0.057	0.029
472,500	0.956	0.568	0.288	0.120	0.060	0.031
477,500	0.961	0.581	0.297	0.125	0.063	0.033
482,500	0.965	0.593	0.306	0.131	0.066	0.035
487,500	0.969	0.606	0.315	0.137	0.070	0.037
492,500	0.972	0.618	0.325	0.143	0.073	0.039
497,500	0.975	0.631	0.334	0.149	0.076	0.041
502,500	0.978	0.643	0.344	0.155	0.080	0.043
507,500	0.980	0.655	0.354	0.162	0.084	0.045
512,500	0.983	0.667	0.364	0.168	0.088	0.048
517,500	0.985	0.679	0.374	0.175	0.092	0.050
522,500	0.986	0.690	0.384	0.182	0.096	0.053
527,500	0.988	0.701	0.394	0.189	0.101	0.055
532,500	0.990	0.713	0.405	0.197	0.105	0.058
537,500	0.991	0.724	0.415	0.204	0.110	0.061
542,500	0.992	0.734	0.425	0.212	0.115	0.064
547,500	0.993	0.745	0.436	0.220	0.119	0.067
552,500	0.994	0.755	0.446	0.228	0.125	0.070
557,500	0.995	0.765	0.457	0.236	0.130	0.074
562,500	0.996	0.775	0.467	0.245	0.135	0.077
567,500	0.996	0.785	0.478	0.253	0.141	0.081
572,500	0.997	0.794	0.489	0.262	0.146	0.085
577,500	0.997	0.803	0.499	0.271	0.152	0.089
582,500	0.998	0.812	0.510	0.280	0.158	0.093
587,500	0.998	0.821	0.520	0.289	0.164	0.097
592,500	0.998	0.829	0.531	0.298	0.171	0.101
597,500	0.998	0.837	0.542	0.308	0.177	0.105
602,500	0.999	0.845	0.552	0.317	0.184	0.110
607,500	0.999	0.853	0.563	0.327	0.190	0.115
612,500	0.999	0.860	0.573	0.337	0.197	0.119
617,500	0.999	0.867	0.583	0.346	0.204	0.124
622,500	0.999	0.874	0.594	0.356	0.212	0.130
627,500	0.999	0.881	0.604	0.367	0.219	0.135
632,500	1.000	0.887	0.614	0.377	0.226	0.140
637,500	1.000	0.893	0.624	0.387	0.234	0.146
642,500	1.000	0.899	0.634	0.397	0.242	0.151

647,500	1.000	0.905	0.644	0.408	0.250	0.157
652,500	1.000	0.910	0.654	0.418	0.258	0.163
657,500	1.000	0.915	0.664	0.429	0.266	0.169
662,500	1.000	0.920	0.674	0.439	0.274	0.176
667,500	1.000	0.925	0.683	0.450	0.283	0.182
672,500	1.000	0.929	0.693	0.461	0.291	0.189
677,500	1.000	0.934	0.702	0.471	0.300	0.195
682,500	1.000	0.938	0.711	0.482	0.309	0.202
687,500	1.000	0.942	0.720	0.493	0.318	0.209
692,500	1.000	0.945	0.729	0.504	0.327	0.216
697,500	1.000	0.949	0.738	0.514	0.336	0.224
702,500	1.000	0.952	0.746	0.525	0.345	0.231
707,500	1.000	0.955	0.755	0.536	0.354	0.239
712,500	1.000	0.958	0.763	0.547	0.364	0.246
717,500	1.000	0.961	0.771	0.557	0.373	0.254
722,500	1.000	0.964	0.779	0.568	0.383	0.262
727,500	1.000	0.966	0.787	0.578	0.392	0.270
732,500	1.000	0.969	0.795	0.589	0.402	0.278
737,500	1.000	0.971	0.802	0.599	0.412	0.287
742,500	1.000	0.973	0.809	0.610	0.422	0.295
747,500	1.000	0.975	0.817	0.620	0.432	0.304
752,500	1.000	0.977	0.823	0.630	0.441	0.312
757,500	1.000	0.978	0.830	0.640	0.451	0.321
762,500	1.000	0.980	0.837	0.650	0.461	0.330
767,500	1.000	0.982	0.843	0.660	0.471	0.339
772,500	1.000	0.983	0.850	0.670	0.481	0.348
777,500	1.000	0.984	0.856	0.680	0.491	0.357
782,500	1.000	0.986	0.862	0.689	0.501	0.366
787,500	1.000	0.987	0.868	0.699	0.511	0.376
792,500	1.000	0.988	0.873	0.708	0.521	0.385
797,500	1.000	0.989	0.879	0.717	0.531	0.394
802,500	1.000	0.990	0.884	0.726	0.541	0.404
807,500	1.000	0.991	0.889	0.735	0.551	0.413
812,500	1.000	0.991	0.894	0.744	0.561	0.423
817,500	1.000	0.992	0.899	0.753	0.571	0.433
822,500	1.000	0.993	0.903	0.761	0.581	0.442
827,500	1.000	0.993	0.908	0.769	0.591	0.452
832,500	1.000	0.994	0.912	0.777	0.601	0.462
837,500	1.000	0.994	0.916	0.785	0.610	0.472
842,500	1.000	0.995	0.920	0.793	0.620	0.481
847,500	1.000	0.995	0.924	0.801	0.629	0.491
852,500	1.000	0.996	0.928	0.808	0.639	0.501
857,500	1.000	0.996	0.932	0.815	0.648	0.511
862,500	1.000	0.997	0.935	0.823	0.657	0.521
867,500	1.000	0.997	0.938	0.829	0.667	0.530

872,500	1.000	0.997	0.941	0.836	0.676	0.540
877,500	1.000	0.997	0.944	0.843	0.685	0.550
882,500	1.000	0.998	0.947	0.849	0.694	0.560
887,500	1.000	0.998	0.950	0.855	0.702	0.569
892,500	1.000	0.998	0.953	0.861	0.711	0.579
897,500	1.000	0.998	0.955	0.867	0.720	0.589
902,500	1.000	0.998	0.958	0.873	0.728	0.598
907,500	1.000	0.999	0.960	0.879	0.736	0.608
912,500	1.000	0.999	0.962	0.884	0.744	0.617
917,500	1.000	0.999	0.965	0.889	0.752	0.626
922,500	1.000	0.999	0.967	0.894	0.760	0.636
927,500	1.000	0.999	0.969	0.899	0.768	0.645
932,500	1.000	0.999	0.970	0.904	0.776	0.654
937,500	1.000	0.999	0.972	0.908	0.783	0.663
942,500	1.000	0.999	0.974	0.912	0.790	0.672
947,500	1.000	0.999	0.975	0.917	0.798	0.681
952,500	1.000	0.999	0.977	0.921	0.805	0.689
957,500	1.000	1.000	0.978	0.925	0.811	0.698
962,500	1.000	1.000	0.980	0.928	0.818	0.707
967,500	1.000	1.000	0.981	0.932	0.825	0.715
972,500	1.000	1.000	0.982	0.935	0.831	0.723
977,500	1.000	1.000	0.983	0.939	0.837	0.731
982,500	1.000	1.000	0.984	0.942	0.843	0.739
987,500	1.000	1.000	0.985	0.945	0.849	0.747
992,500	1.000	1.000	0.986	0.948	0.855	0.755
997,500	1.000	1.000	0.987	0.951	0.861	0.763
1,002,500	1.000	1.000	0.988	0.953	0.866	0.770
1,007,500	1.000	1.000	0.989	0.956	0.872	0.778
1,012,500	1.000	1.000	0.990	0.958	0.877	0.785
1,017,500	1.000	1.000	0.990	0.961	0.882	0.792
1,022,500	1.000	1.000	0.991	0.963	0.887	0.799
1,027,500	1.000	1.000	0.992	0.965	0.892	0.806
1,032,500	1.000	1.000	0.992	0.967	0.896	0.813
1,037,500	1.000	1.000	0.993	0.969	0.901	0.819
1,042,500	1.000	1.000	0.993	0.971	0.905	0.826
1,047,500	1.000	1.000	0.994	0.973	0.909	0.832
1,052,500	1.000	1.000	0.994	0.974	0.913	0.838
1,057,500	1.000	1.000	0.995	0.976	0.917	0.844
1,062,500	1.000	1.000	0.995	0.977	0.921	0.850
1,067,500	1.000	1.000	0.995	0.979	0.925	0.855
1,072,500	1.000	1.000	0.996	0.980	0.928	0.861
1,077,500	1.000	1.000	0.996	0.981	0.931	0.866
1,082,500	1.000	1.000	0.996	0.983	0.935	0.871
1,087,500	1.000	1.000	0.997	0.984	0.938	0.877
1,092,500	1.000	1.000	0.997	0.985	0.941	0.882

1,097,500	1.000	1.000	0.997	0.986	0.944	0.886
1,102,500	1.000	1.000	0.997	0.987	0.947	0.891
1,107,500	1.000	1.000	0.998	0.988	0.949	0.896
1,112,500	1.000	1.000	0.998	0.988	0.952	0.900
1,117,500	1.000	1.000	0.998	0.989	0.954	0.904
1,122,500	1.000	1.000	0.998	0.990	0.957	0.908
1,127,500	1.000	1.000	0.998	0.991	0.959	0.912
1,132,500	1.000	1.000	0.998	0.991	0.961	0.916
1,137,500	1.000	1.000	0.999	0.992	0.963	0.920
1,142,500	1.000	1.000	0.999	0.993	0.965	0.923
1,147,500	1.000	1.000	0.999	0.993	0.967	0.927
1,152,500	1.000	1.000	0.999	0.994	0.969	0.930
1,157,500	1.000	1.000	0.999	0.994	0.971	0.933
1,162,500	1.000	1.000	0.999	0.994	0.972	0.937
1,167,500	1.000	1.000	0.999	0.995	0.974	0.940
1,172,500	1.000	1.000	0.999	0.995	0.975	0.942
1,177,500	1.000	1.000	0.999	0.996	0.977	0.945
1,182,500	1.000	1.000	0.999	0.996	0.978	0.948
1,187,500	1.000	1.000	0.999	0.996	0.979	0.950
1,192,500	1.000	1.000	0.999	0.997	0.981	0.953
1,197,500	1.000	1.000	1.000	0.997	0.982	0.955
1,202,500	1.000	1.000	1.000	0.997	0.983	0.958
1,207,500	1.000	1.000	1.000	0.997	0.984	0.960
1,212,500	1.000	1.000	1.000	0.998	0.985	0.962
1,217,500	1.000	1.000	1.000	0.998	0.986	0.964
1,222,500	1.000	1.000	1.000	0.998	0.987	0.966
1,227,500	1.000	1.000	1.000	0.998	0.987	0.968
1,232,500	1.000	1.000	1.000	0.998	0.988	0.969
1,237,500	1.000	1.000	1.000	0.998	0.989	0.971
1,242,500	1.000	1.000	1.000	0.999	0.990	0.973
1,247,500	1.000	1.000	1.000	0.999	0.990	0.974
1,252,500	1.000	1.000	1.000	0.999	0.991	0.976
1,257,500	1.000	1.000	1.000	0.999	0.992	0.977
1,262,500	1.000	1.000	1.000	0.999	0.992	0.978
1,267,500	1.000	1.000	1.000	0.999	0.993	0.979
1,272,500	1.000	1.000	1.000	0.999	0.993	0.981
1,277,500	1.000	1.000	1.000	0.999	0.994	0.982
1,282,500	1.000	1.000	1.000	0.999	0.994	0.983
1,287,500	1.000	1.000	1.000	0.999	0.994	0.984
1,292,500	1.000	1.000	1.000	0.999	0.995	0.985
1,297,500	1.000	1.000	1.000	0.999	0.995	0.986
1,302,500	1.000	1.000	1.000	1.000	0.996	0.987
1,307,500	1.000	1.000	1.000	1.000	0.996	0.987
1,312,500	1.000	1.000	1.000	1.000	0.996	0.988
1,317,500	1.000	1.000	1.000	1.000	0.996	0.989

1,322,500	1.000	1.000	1.000	1.000	0.997	0.990
1,327,500	1.000	1.000	1.000	1.000	0.997	0.990
1,332,500	1.000	1.000	1.000	1.000	0.997	0.991
1,337,500	1.000	1.000	1.000	1.000	0.997	0.992
1,342,500	1.000	1.000	1.000	1.000	0.998	0.992
1,347,500	1.000	1.000	1.000	1.000	0.998	0.993
1,352,500	1.000	1.000	1.000	1.000	0.998	0.993
1,357,500	1.000	1.000	1.000	1.000	0.998	0.994
1,362,500	1.000	1.000	1.000	1.000	0.998	0.994
1,367,500	1.000	1.000	1.000	1.000	0.998	0.994
1,372,500	1.000	1.000	1.000	1.000	0.999	0.995
1,377,500	1.000	1.000	1.000	1.000	0.999	0.995
1,382,500	1.000	1.000	1.000	1.000	0.999	0.995
1,387,500	1.000	1.000	1.000	1.000	0.999	0.996
1,392,500	1.000	1.000	1.000	1.000	0.999	0.996
1,397,500	1.000	1.000	1.000	1.000	0.999	0.996
1,402,500	1.000	1.000	1.000	1.000	0.999	0.997
1,407,500	1.000	1.000	1.000	1.000	0.999	0.997
1,412,500	1.000	1.000	1.000	1.000	0.999	0.997
1,417,500	1.000	1.000	1.000	1.000	0.999	0.997
1,422,500	1.000	1.000	1.000	1.000	0.999	0.997
1,427,500	1.000	1.000	1.000	1.000	0.999	0.998
1,432,500	1.000	1.000	1.000	1.000	0.999	0.998
1,437,500	1.000	1.000	1.000	1.000	1.000	0.998
1,442,500	1.000	1.000	1.000	1.000	1.000	0.998
1,447,500	1.000	1.000	1.000	1.000	1.000	0.998
1,452,500	1.000	1.000	1.000	1.000	1.000	0.998
1,457,500	1.000	1.000	1.000	1.000	1.000	0.999
1,462,500	1.000	1.000	1.000	1.000	1.000	0.999
1,467,500	1.000	1.000	1.000	1.000	1.000	0.999
1,472,500	1.000	1.000	1.000	1.000	1.000	0.999
1,477,500	1.000	1.000	1.000	1.000	1.000	0.999
1,482,500	1.000	1.000	1.000	1.000	1.000	0.999
1,487,500	1.000	1.000	1.000	1.000	1.000	0.999
1,492,500	1.000	1.000	1.000	1.000	1.000	0.999
1,497,500	1.000	1.000	1.000	1.000	1.000	0.999
1,502,500	1.000	1.000	1.000	1.000	1.000	0.999
1,507,500	1.000	1.000	1.000	1.000	1.000	0.999
1,512,500	1.000	1.000	1.000	1.000	1.000	0.999
1,517,500	1.000	1.000	1.000	1.000	1.000	0.999
1,522,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-38: PROBABILITY DENSITY FUNCTION NEW AGE-LENGTH KEY RUN TABLE REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 CATCH EQUALS THE TAC.

Yield (lbs)	2012	2013	2014	2015	2016	2017
2,500	0.000	0.001	0.001	0.001	0.000	0.000
7,500	0.000	0.001	0.002	0.001	0.000	0.000
12,500	0.001	0.002	0.002	0.001	0.000	0.000
17,500	0.001	0.002	0.002	0.001	0.000	0.000
22,500	0.001	0.003	0.003	0.001	0.000	0.000
27,500	0.002	0.004	0.003	0.001	0.001	0.000
32,500	0.003	0.005	0.004	0.002	0.001	0.000
37,500	0.005	0.006	0.004	0.002	0.001	0.000
42,500	0.007	0.007	0.005	0.002	0.001	0.000
47,500	0.009	0.009	0.006	0.003	0.001	0.000
52,500	0.013	0.011	0.007	0.003	0.001	0.000
57,500	0.018	0.013	0.008	0.003	0.001	0.000
62,500	0.024	0.016	0.009	0.004	0.001	0.000
67,500	0.032	0.020	0.011	0.004	0.002	0.000
72,500	0.042	0.024	0.012	0.005	0.002	0.000
77,500	0.055	0.029	0.014	0.005	0.002	0.000
82,500	0.070	0.034	0.016	0.006	0.002	0.001
87,500	0.088	0.040	0.018	0.007	0.002	0.001
92,500	0.110	0.048	0.021	0.008	0.003	0.001
97,500	0.135	0.056	0.024	0.009	0.003	0.001
102,500	0.164	0.065	0.027	0.010	0.004	0.001
107,500	0.197	0.076	0.030	0.011	0.004	0.001
112,500	0.234	0.088	0.034	0.012	0.004	0.001
117,500	0.274	0.101	0.038	0.014	0.005	0.001
122,500	0.317	0.115	0.043	0.015	0.005	0.001
127,500	0.363	0.131	0.048	0.017	0.006	0.002
132,500	0.411	0.149	0.053	0.019	0.007	0.002
137,500	0.460	0.167	0.059	0.021	0.007	0.002
142,500	0.510	0.188	0.066	0.023	0.008	0.002
147,500	0.560	0.210	0.073	0.025	0.009	0.002
152,500	0.609	0.233	0.080	0.028	0.010	0.003
157,500	0.656	0.257	0.088	0.031	0.011	0.003
162,500	0.700	0.283	0.097	0.034	0.012	0.003
167,500	0.742	0.310	0.107	0.037	0.014	0.004
172,500	0.781	0.338	0.117	0.040	0.015	0.004
177,500	0.816	0.367	0.127	0.044	0.016	0.005
182,500	0.848	0.397	0.139	0.048	0.018	0.005
187,500	0.875	0.427	0.151	0.053	0.020	0.006
192,500	0.899	0.458	0.163	0.058	0.022	0.007

197,500	0.920	0.489	0.177	0.063	0.024	0.007
202,500	0.937	0.521	0.191	0.068	0.026	0.008
207,500	0.951	0.552	0.205	0.074	0.028	0.009
212,500	0.962	0.582	0.221	0.080	0.031	0.010
217,500	0.971	0.613	0.237	0.086	0.033	0.011
222,500	0.979	0.642	0.253	0.093	0.036	0.012
227,500	0.984	0.671	0.271	0.100	0.039	0.013
232,500	0.989	0.699	0.288	0.108	0.043	0.014
237,500	0.992	0.725	0.307	0.116	0.046	0.016
242,500	0.994	0.751	0.326	0.125	0.050	0.017
247,500	0.996	0.775	0.345	0.134	0.054	0.019
252,500	0.997	0.798	0.364	0.143	0.058	0.021
257,500	0.998	0.819	0.384	0.153	0.063	0.022
262,500	0.999	0.839	0.405	0.163	0.067	0.024
267,500	0.999	0.857	0.425	0.174	0.072	0.027
272,500	0.999	0.874	0.446	0.185	0.078	0.029
277,500	1.000	0.889	0.467	0.196	0.083	0.031
282,500	1.000	0.904	0.488	0.208	0.089	0.034
287,500	1.000	0.916	0.509	0.220	0.096	0.037
292,500	1.000	0.928	0.530	0.233	0.102	0.040
297,500	1.000	0.938	0.551	0.246	0.109	0.043
302,500	1.000	0.947	0.572	0.260	0.116	0.047
307,500	1.000	0.955	0.593	0.274	0.124	0.050
312,500	1.000	0.962	0.613	0.288	0.131	0.054
317,500	1.000	0.968	0.633	0.303	0.140	0.058
322,500	1.000	0.973	0.653	0.318	0.148	0.063
327,500	1.000	0.978	0.672	0.333	0.157	0.067
332,500	1.000	0.981	0.691	0.349	0.166	0.072
337,500	1.000	0.985	0.709	0.364	0.176	0.077
342,500	1.000	0.987	0.727	0.380	0.185	0.083
347,500	1.000	0.990	0.745	0.397	0.196	0.088
352,500	1.000	0.992	0.761	0.413	0.206	0.094
357,500	1.000	0.993	0.777	0.430	0.217	0.101
362,500	1.000	0.995	0.793	0.446	0.228	0.107
367,500	1.000	0.996	0.807	0.463	0.240	0.114
372,500	1.000	0.997	0.822	0.480	0.251	0.121
377,500	1.000	0.997	0.835	0.497	0.264	0.129
382,500	1.000	0.998	0.848	0.514	0.276	0.137
387,500	1.000	0.998	0.860	0.531	0.289	0.145
392,500	1.000	0.999	0.871	0.548	0.302	0.153
397,500	1.000	0.999	0.882	0.564	0.315	0.162
402,500	1.000	0.999	0.892	0.581	0.328	0.171
407,500	1.000	0.999	0.902	0.597	0.342	0.180
412,500	1.000	1.000	0.911	0.614	0.356	0.190
417,500	1.000	1.000	0.919	0.630	0.370	0.200

422,500	1.000	1.000	0.926	0.646	0.384	0.211
427,500	1.000	1.000	0.934	0.661	0.398	0.221
432,500	1.000	1.000	0.940	0.677	0.413	0.232
437,500	1.000	1.000	0.946	0.692	0.428	0.243
442,500	1.000	1.000	0.952	0.707	0.442	0.255
447,500	1.000	1.000	0.957	0.721	0.457	0.267
452,500	1.000	1.000	0.961	0.735	0.472	0.279
457,500	1.000	1.000	0.966	0.749	0.487	0.291
462,500	1.000	1.000	0.969	0.762	0.502	0.304
467,500	1.000	1.000	0.973	0.775	0.517	0.317
472,500	1.000	1.000	0.976	0.787	0.532	0.330
477,500	1.000	1.000	0.979	0.800	0.547	0.343
482,500	1.000	1.000	0.981	0.811	0.562	0.357
487,500	1.000	1.000	0.984	0.822	0.576	0.370
492,500	1.000	1.000	0.986	0.833	0.591	0.384
497,500	1.000	1.000	0.988	0.844	0.606	0.398
502,500	1.000	1.000	0.989	0.854	0.620	0.412
507,500	1.000	1.000	0.991	0.863	0.634	0.427
512,500	1.000	1.000	0.992	0.872	0.648	0.441
517,500	1.000	1.000	0.993	0.881	0.662	0.455
522,500	1.000	1.000	0.994	0.889	0.676	0.470
527,500	1.000	1.000	0.995	0.897	0.689	0.484
532,500	1.000	1.000	0.996	0.904	0.702	0.499
537,500	1.000	1.000	0.996	0.911	0.715	0.513
542,500	1.000	1.000	0.997	0.918	0.728	0.528
547,500	1.000	1.000	0.997	0.924	0.740	0.542
552,500	1.000	1.000	0.998	0.930	0.752	0.557
557,500	1.000	1.000	0.998	0.936	0.764	0.571
562,500	1.000	1.000	0.998	0.941	0.775	0.585
567,500	1.000	1.000	0.999	0.946	0.786	0.600
572,500	1.000	1.000	0.999	0.950	0.797	0.614
577,500	1.000	1.000	0.999	0.954	0.807	0.627
582,500	1.000	1.000	0.999	0.958	0.817	0.641
587,500	1.000	1.000	0.999	0.962	0.827	0.655
592,500	1.000	1.000	0.999	0.965	0.837	0.668
597,500	1.000	1.000	1.000	0.968	0.846	0.681
602,500	1.000	1.000	1.000	0.971	0.854	0.694
607,500	1.000	1.000	1.000	0.974	0.863	0.707
612,500	1.000	1.000	1.000	0.976	0.871	0.719
617,500	1.000	1.000	1.000	0.979	0.879	0.731
622,500	1.000	1.000	1.000	0.981	0.886	0.743
627,500	1.000	1.000	1.000	0.983	0.893	0.755
632,500	1.000	1.000	1.000	0.984	0.900	0.766
637,500	1.000	1.000	1.000	0.986	0.906	0.777
642,500	1.000	1.000	1.000	0.987	0.912	0.788

647,500	1.000	1.000	1.000	0.989	0.918	0.798
652,500	1.000	1.000	1.000	0.990	0.924	0.808
657,500	1.000	1.000	1.000	0.991	0.929	0.818
662,500	1.000	1.000	1.000	0.992	0.934	0.828
667,500	1.000	1.000	1.000	0.993	0.939	0.837
672,500	1.000	1.000	1.000	0.994	0.943	0.845
677,500	1.000	1.000	1.000	0.994	0.947	0.854
682,500	1.000	1.000	1.000	0.995	0.951	0.862
687,500	1.000	1.000	1.000	0.996	0.955	0.870
692,500	1.000	1.000	1.000	0.996	0.958	0.878
697,500	1.000	1.000	1.000	0.997	0.961	0.885
702,500	1.000	1.000	1.000	0.997	0.965	0.892
707,500	1.000	1.000	1.000	0.997	0.967	0.898
712,500	1.000	1.000	1.000	0.998	0.970	0.905
717,500	1.000	1.000	1.000	0.998	0.972	0.911
722,500	1.000	1.000	1.000	0.998	0.975	0.916
727,500	1.000	1.000	1.000	0.998	0.977	0.922
732,500	1.000	1.000	1.000	0.999	0.979	0.927
737,500	1.000	1.000	1.000	0.999	0.981	0.932
742,500	1.000	1.000	1.000	0.999	0.982	0.937
747,500	1.000	1.000	1.000	0.999	0.984	0.941
752,500	1.000	1.000	1.000	0.999	0.985	0.945
757,500	1.000	1.000	1.000	0.999	0.987	0.949
762,500	1.000	1.000	1.000	0.999	0.988	0.953
767,500	1.000	1.000	1.000	1.000	0.989	0.956
772,500	1.000	1.000	1.000	1.000	0.990	0.960
777,500	1.000	1.000	1.000	1.000	0.991	0.963
782,500	1.000	1.000	1.000	1.000	0.992	0.966
787,500	1.000	1.000	1.000	1.000	0.993	0.968
792,500	1.000	1.000	1.000	1.000	0.993	0.971
797,500	1.000	1.000	1.000	1.000	0.994	0.973
802,500	1.000	1.000	1.000	1.000	0.995	0.975
807,500	1.000	1.000	1.000	1.000	0.995	0.977
812,500	1.000	1.000	1.000	1.000	0.996	0.979
817,500	1.000	1.000	1.000	1.000	0.996	0.981
822,500	1.000	1.000	1.000	1.000	0.997	0.983
827,500	1.000	1.000	1.000	1.000	0.997	0.984
832,500	1.000	1.000	1.000	1.000	0.997	0.985
837,500	1.000	1.000	1.000	1.000	0.998	0.987
842,500	1.000	1.000	1.000	1.000	0.998	0.988
847,500	1.000	1.000	1.000	1.000	0.998	0.989
852,500	1.000	1.000	1.000	1.000	0.998	0.990
857,500	1.000	1.000	1.000	1.000	0.999	0.991
862,500	1.000	1.000	1.000	1.000	0.999	0.992
867,500	1.000	1.000	1.000	1.000	0.999	0.993

872,500	1.000	1.000	1.000	1.000	0.999	0.993
877,500	1.000	1.000	1.000	1.000	0.999	0.994
882,500	1.000	1.000	1.000	1.000	0.999	0.995
887,500	1.000	1.000	1.000	1.000	0.999	0.995
892,500	1.000	1.000	1.000	1.000	0.999	0.996
897,500	1.000	1.000	1.000	1.000	0.999	0.996
902,500	1.000	1.000	1.000	1.000	1.000	0.996
907,500	1.000	1.000	1.000	1.000	1.000	0.997
912,500	1.000	1.000	1.000	1.000	1.000	0.997
917,500	1.000	1.000	1.000	1.000	1.000	0.997
922,500	1.000	1.000	1.000	1.000	1.000	0.998
927,500	1.000	1.000	1.000	1.000	1.000	0.998
932,500	1.000	1.000	1.000	1.000	1.000	0.998
937,500	1.000	1.000	1.000	1.000	1.000	0.998
942,500	1.000	1.000	1.000	1.000	1.000	0.999
947,500	1.000	1.000	1.000	1.000	1.000	0.999
952,500	1.000	1.000	1.000	1.000	1.000	0.999
957,500	1.000	1.000	1.000	1.000	1.000	0.999
962,500	1.000	1.000	1.000	1.000	1.000	0.999
967,500	1.000	1.000	1.000	1.000	1.000	0.999
972,500	1.000	1.000	1.000	1.000	1.000	0.999
977,500	1.000	1.000	1.000	1.000	1.000	0.999
982,500	1.000	1.000	1.000	1.000	1.000	0.999
987,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-39: PROBABILITY DENSITY FUNCTION NEW AGE-LENGTH KEY RUN TABLE REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 EFFORT EQUALS THE EFFORT IN 2010.

Yield (lbs)	2012	2013	2014	2015	2016	2017
67,500	0.000	0.000	0.001	0.000	0.000	0.000
72,500	0.000	0.000	0.001	0.000	0.000	0.000
77,500	0.000	0.000	0.001	0.001	0.000	0.000
82,500	0.000	0.001	0.001	0.001	0.000	0.000
87,500	0.000	0.001	0.001	0.001	0.000	0.000
92,500	0.000	0.001	0.001	0.001	0.000	0.000
97,500	0.001	0.001	0.002	0.001	0.000	0.000
102,500	0.001	0.002	0.002	0.001	0.001	0.000
107,500	0.001	0.002	0.002	0.001	0.001	0.000
112,500	0.002	0.003	0.003	0.001	0.001	0.000
117,500	0.003	0.003	0.003	0.002	0.001	0.000
122,500	0.004	0.004	0.004	0.002	0.001	0.000
127,500	0.006	0.005	0.004	0.002	0.001	0.000
132,500	0.009	0.006	0.005	0.002	0.001	0.000
137,500	0.012	0.008	0.006	0.003	0.001	0.000
142,500	0.016	0.009	0.006	0.003	0.002	0.000
147,500	0.022	0.012	0.007	0.004	0.002	0.001
152,500	0.029	0.014	0.009	0.004	0.002	0.001
157,500	0.038	0.017	0.010	0.005	0.002	0.001
162,500	0.049	0.020	0.011	0.005	0.002	0.001
167,500	0.063	0.024	0.013	0.006	0.003	0.001
172,500	0.080	0.029	0.015	0.007	0.003	0.001
177,500	0.099	0.034	0.017	0.008	0.003	0.001
182,500	0.122	0.040	0.019	0.008	0.004	0.001
187,500	0.149	0.047	0.022	0.009	0.004	0.001
192,500	0.178	0.055	0.024	0.011	0.005	0.002
197,500	0.212	0.064	0.028	0.012	0.005	0.002
202,500	0.249	0.074	0.031	0.013	0.006	0.002
207,500	0.289	0.085	0.035	0.015	0.007	0.002
212,500	0.332	0.097	0.039	0.016	0.007	0.003
217,500	0.377	0.111	0.044	0.018	0.008	0.003
222,500	0.424	0.126	0.048	0.020	0.009	0.003
227,500	0.472	0.142	0.054	0.022	0.010	0.004
232,500	0.520	0.160	0.060	0.025	0.011	0.004
237,500	0.569	0.178	0.066	0.027	0.012	0.004
242,500	0.616	0.199	0.073	0.030	0.014	0.005
247,500	0.661	0.220	0.080	0.033	0.015	0.006
252,500	0.704	0.243	0.088	0.036	0.016	0.006
257,500	0.745	0.267	0.097	0.040	0.018	0.007

262,500	0.782	0.293	0.106	0.043	0.020	0.008
267,500	0.816	0.319	0.116	0.047	0.022	0.008
272,500	0.847	0.346	0.126	0.052	0.024	0.009
277,500	0.874	0.374	0.137	0.056	0.026	0.010
282,500	0.897	0.403	0.149	0.061	0.028	0.011
287,500	0.917	0.432	0.161	0.067	0.031	0.012
292,500	0.934	0.462	0.174	0.072	0.034	0.014
297,500	0.949	0.492	0.188	0.078	0.036	0.015
302,500	0.960	0.522	0.202	0.085	0.040	0.016
307,500	0.970	0.551	0.217	0.091	0.043	0.018
312,500	0.977	0.581	0.232	0.098	0.046	0.020
317,500	0.983	0.610	0.248	0.106	0.050	0.021
322,500	0.987	0.638	0.265	0.114	0.054	0.023
327,500	0.991	0.666	0.282	0.122	0.059	0.025
332,500	0.993	0.693	0.300	0.131	0.063	0.028
337,500	0.995	0.719	0.318	0.140	0.068	0.030
342,500	0.997	0.743	0.336	0.150	0.073	0.033
347,500	0.998	0.767	0.355	0.160	0.078	0.036
352,500	0.999	0.789	0.375	0.170	0.084	0.039
357,500	0.999	0.810	0.394	0.181	0.090	0.042
362,500	0.999	0.830	0.414	0.193	0.096	0.045
367,500	1.000	0.848	0.435	0.204	0.103	0.049
372,500	1.000	0.865	0.455	0.217	0.110	0.053
377,500	1.000	0.881	0.475	0.229	0.117	0.057
382,500	1.000	0.895	0.496	0.242	0.125	0.061
387,500	1.000	0.908	0.516	0.256	0.133	0.065
392,500	1.000	0.920	0.537	0.269	0.141	0.070
397,500	1.000	0.930	0.557	0.283	0.149	0.075
402,500	1.000	0.940	0.578	0.298	0.158	0.081
407,500	1.000	0.948	0.598	0.313	0.168	0.086
412,500	1.000	0.956	0.618	0.328	0.177	0.092
417,500	1.000	0.962	0.637	0.343	0.187	0.099
422,500	1.000	0.968	0.656	0.359	0.198	0.105
427,500	1.000	0.973	0.675	0.375	0.208	0.112
432,500	1.000	0.977	0.693	0.391	0.219	0.119
437,500	1.000	0.981	0.711	0.407	0.230	0.126
442,500	1.000	0.984	0.728	0.424	0.242	0.134
447,500	1.000	0.987	0.745	0.440	0.254	0.142
452,500	1.000	0.989	0.762	0.457	0.266	0.151
457,500	1.000	0.991	0.777	0.474	0.279	0.160
462,500	1.000	0.993	0.792	0.491	0.292	0.169
467,500	1.000	0.994	0.807	0.507	0.305	0.178
472,500	1.000	0.995	0.821	0.524	0.318	0.188
477,500	1.000	0.996	0.834	0.541	0.331	0.198
482,500	1.000	0.997	0.846	0.558	0.345	0.208

487,500	1.000	0.998	0.858	0.574	0.359	0.219
492,500	1.000	0.998	0.869	0.591	0.373	0.230
497,500	1.000	0.999	0.880	0.607	0.388	0.241
502,500	1.000	0.999	0.890	0.623	0.402	0.253
507,500	1.000	0.999	0.899	0.639	0.417	0.265
512,500	1.000	0.999	0.908	0.655	0.432	0.277
517,500	1.000	0.999	0.916	0.670	0.447	0.289
522,500	1.000	1.000	0.924	0.686	0.462	0.302
527,500	1.000	1.000	0.931	0.700	0.477	0.315
532,500	1.000	1.000	0.938	0.715	0.492	0.328
537,500	1.000	1.000	0.944	0.729	0.507	0.342
542,500	1.000	1.000	0.949	0.743	0.522	0.355
547,500	1.000	1.000	0.955	0.756	0.537	0.369
552,500	1.000	1.000	0.959	0.769	0.552	0.383
557,500	1.000	1.000	0.964	0.782	0.566	0.397
562,500	1.000	1.000	0.967	0.794	0.581	0.411
567,500	1.000	1.000	0.971	0.806	0.596	0.426
572,500	1.000	1.000	0.974	0.817	0.610	0.440
577,500	1.000	1.000	0.977	0.828	0.625	0.455
582,500	1.000	1.000	0.980	0.839	0.639	0.469
587,500	1.000	1.000	0.982	0.849	0.653	0.484
592,500	1.000	1.000	0.984	0.859	0.667	0.499
597,500	1.000	1.000	0.986	0.868	0.680	0.513
602,500	1.000	1.000	0.988	0.877	0.694	0.528
607,500	1.000	1.000	0.990	0.885	0.707	0.542
612,500	1.000	1.000	0.991	0.893	0.720	0.557
617,500	1.000	1.000	0.992	0.901	0.732	0.571
622,500	1.000	1.000	0.993	0.908	0.745	0.586
627,500	1.000	1.000	0.994	0.915	0.757	0.600
632,500	1.000	1.000	0.995	0.921	0.768	0.614
637,500	1.000	1.000	0.996	0.927	0.780	0.628
642,500	1.000	1.000	0.996	0.933	0.791	0.642
647,500	1.000	1.000	0.997	0.938	0.801	0.656
652,500	1.000	1.000	0.997	0.943	0.812	0.669
657,500	1.000	1.000	0.998	0.948	0.822	0.682
662,500	1.000	1.000	0.998	0.952	0.831	0.695
667,500	1.000	1.000	0.998	0.956	0.841	0.708
672,500	1.000	1.000	0.999	0.960	0.850	0.721
677,500	1.000	1.000	0.999	0.963	0.858	0.733
682,500	1.000	1.000	0.999	0.967	0.866	0.745
687,500	1.000	1.000	0.999	0.970	0.874	0.756
692,500	1.000	1.000	0.999	0.973	0.882	0.768
697,500	1.000	1.000	0.999	0.975	0.889	0.779
702,500	1.000	1.000	0.999	0.977	0.896	0.790
707,500	1.000	1.000	1.000	0.980	0.903	0.800

712,500	1.000	1.000	1.000	0.982	0.909	0.810
717,500	1.000	1.000	1.000	0.983	0.915	0.820
722,500	1.000	1.000	1.000	0.985	0.921	0.829
727,500	1.000	1.000	1.000	0.987	0.926	0.839
732,500	1.000	1.000	1.000	0.988	0.931	0.847
737,500	1.000	1.000	1.000	0.989	0.936	0.856
742,500	1.000	1.000	1.000	0.990	0.941	0.864
747,500	1.000	1.000	1.000	0.991	0.945	0.872
752,500	1.000	1.000	1.000	0.992	0.949	0.880
757,500	1.000	1.000	1.000	0.993	0.953	0.887
762,500	1.000	1.000	1.000	0.994	0.957	0.894
767,500	1.000	1.000	1.000	0.995	0.960	0.900
772,500	1.000	1.000	1.000	0.995	0.963	0.907
777,500	1.000	1.000	1.000	0.996	0.966	0.912
782,500	1.000	1.000	1.000	0.996	0.969	0.918
787,500	1.000	1.000	1.000	0.997	0.971	0.924
792,500	1.000	1.000	1.000	0.997	0.974	0.929
797,500	1.000	1.000	1.000	0.997	0.976	0.934
802,500	1.000	1.000	1.000	0.998	0.978	0.938
807,500	1.000	1.000	1.000	0.998	0.980	0.943
812,500	1.000	1.000	1.000	0.998	0.982	0.947
817,500	1.000	1.000	1.000	0.999	0.983	0.951
822,500	1.000	1.000	1.000	0.999	0.985	0.954
827,500	1.000	1.000	1.000	0.999	0.986	0.958
832,500	1.000	1.000	1.000	0.999	0.987	0.961
837,500	1.000	1.000	1.000	0.999	0.989	0.964
842,500	1.000	1.000	1.000	0.999	0.990	0.967
847,500	1.000	1.000	1.000	0.999	0.991	0.969
852,500	1.000	1.000	1.000	0.999	0.992	0.972
857,500	1.000	1.000	1.000	1.000	0.992	0.974
862,500	1.000	1.000	1.000	1.000	0.993	0.976
867,500	1.000	1.000	1.000	1.000	0.994	0.978
872,500	1.000	1.000	1.000	1.000	0.994	0.980
877,500	1.000	1.000	1.000	1.000	0.995	0.982
882,500	1.000	1.000	1.000	1.000	0.996	0.983
887,500	1.000	1.000	1.000	1.000	0.996	0.985
892,500	1.000	1.000	1.000	1.000	0.996	0.986
897,500	1.000	1.000	1.000	1.000	0.997	0.987
902,500	1.000	1.000	1.000	1.000	0.997	0.989
907,500	1.000	1.000	1.000	1.000	0.997	0.990
912,500	1.000	1.000	1.000	1.000	0.998	0.991
917,500	1.000	1.000	1.000	1.000	0.998	0.991
922,500	1.000	1.000	1.000	1.000	0.998	0.992
927,500	1.000	1.000	1.000	1.000	0.998	0.993
932,500	1.000	1.000	1.000	1.000	0.999	0.994

937,500	1.000	1.000	1.000	1.000	0.999	0.994
942,500	1.000	1.000	1.000	1.000	0.999	0.995
947,500	1.000	1.000	1.000	1.000	0.999	0.995
952,500	1.000	1.000	1.000	1.000	0.999	0.996
957,500	1.000	1.000	1.000	1.000	0.999	0.996
962,500	1.000	1.000	1.000	1.000	0.999	0.997
967,500	1.000	1.000	1.000	1.000	0.999	0.997
972,500	1.000	1.000	1.000	1.000	1.000	0.997
977,500	1.000	1.000	1.000	1.000	1.000	0.998
982,500	1.000	1.000	1.000	1.000	1.000	0.998
987,500	1.000	1.000	1.000	1.000	1.000	0.998
992,500	1.000	1.000	1.000	1.000	1.000	0.998
997,500	1.000	1.000	1.000	1.000	1.000	0.999
1,002,500	1.000	1.000	1.000	1.000	1.000	0.999
1,007,500	1.000	1.000	1.000	1.000	1.000	0.999
1,012,500	1.000	1.000	1.000	1.000	1.000	0.999
1,017,500	1.000	1.000	1.000	1.000	1.000	0.999
1,022,500	1.000	1.000	1.000	1.000	1.000	0.999
1,027,500	1.000	1.000	1.000	1.000	1.000	0.999
1,032,500	1.000	1.000	1.000	1.000	1.000	0.999
1,037,500	1.000	1.000	1.000	1.000	1.000	0.999
1,042,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-40: PROBABILITY DENSITY FUNCTION NEW AGE-LENGTH KEY RUN TABLE REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009.

Yield (lbs)	2012	2013	2014	2015	2016	2017
27,500	0.000	0.000	0.001	0.000	0.000	0.000
32,500	0.000	0.000	0.001	0.000	0.000	0.000
37,500	0.000	0.001	0.001	0.000	0.000	0.000
42,500	0.000	0.001	0.001	0.001	0.000	0.000
47,500	0.000	0.001	0.001	0.001	0.000	0.000
52,500	0.000	0.001	0.001	0.001	0.000	0.000
57,500	0.001	0.001	0.002	0.001	0.000	0.000
62,500	0.001	0.002	0.002	0.001	0.000	0.000
67,500	0.001	0.002	0.002	0.001	0.000	0.000
72,500	0.002	0.003	0.002	0.001	0.001	0.000
77,500	0.003	0.003	0.003	0.001	0.001	0.000
82,500	0.004	0.004	0.003	0.002	0.001	0.000
87,500	0.005	0.005	0.004	0.002	0.001	0.000
92,500	0.007	0.006	0.004	0.002	0.001	0.000
97,500	0.010	0.007	0.005	0.002	0.001	0.000
102,500	0.013	0.009	0.006	0.003	0.001	0.000
107,500	0.017	0.011	0.007	0.003	0.001	0.000
112,500	0.023	0.013	0.008	0.004	0.001	0.000
117,500	0.029	0.016	0.009	0.004	0.002	0.000
122,500	0.038	0.019	0.010	0.004	0.002	0.000
127,500	0.047	0.022	0.012	0.005	0.002	0.001
132,500	0.059	0.026	0.013	0.006	0.002	0.001
137,500	0.073	0.031	0.015	0.006	0.003	0.001
142,500	0.090	0.036	0.017	0.007	0.003	0.001
147,500	0.109	0.042	0.019	0.008	0.003	0.001
152,500	0.131	0.049	0.022	0.009	0.004	0.001
157,500	0.156	0.056	0.025	0.010	0.004	0.001
162,500	0.183	0.065	0.028	0.011	0.005	0.001
167,500	0.214	0.074	0.031	0.012	0.005	0.002
172,500	0.247	0.085	0.035	0.014	0.006	0.002
177,500	0.283	0.097	0.039	0.015	0.006	0.002
182,500	0.321	0.109	0.043	0.017	0.007	0.002
187,500	0.361	0.123	0.048	0.019	0.008	0.002
192,500	0.403	0.138	0.053	0.021	0.009	0.003
197,500	0.446	0.154	0.058	0.023	0.009	0.003
202,500	0.490	0.172	0.064	0.025	0.010	0.003
207,500	0.533	0.190	0.071	0.028	0.011	0.004
212,500	0.576	0.210	0.078	0.031	0.013	0.004
217,500	0.619	0.231	0.085	0.034	0.014	0.005

222,500	0.660	0.253	0.093	0.037	0.015	0.005
227,500	0.699	0.276	0.102	0.040	0.017	0.006
232,500	0.736	0.301	0.111	0.044	0.018	0.006
237,500	0.771	0.326	0.121	0.048	0.020	0.007
242,500	0.802	0.352	0.131	0.052	0.022	0.008
247,500	0.832	0.378	0.142	0.056	0.024	0.009
252,500	0.858	0.405	0.154	0.061	0.026	0.009
257,500	0.881	0.433	0.166	0.066	0.028	0.010
262,500	0.901	0.461	0.179	0.072	0.031	0.011
267,500	0.919	0.489	0.192	0.078	0.034	0.013
272,500	0.934	0.518	0.206	0.084	0.037	0.014
277,500	0.947	0.546	0.220	0.090	0.040	0.015
282,500	0.958	0.574	0.235	0.097	0.043	0.017
287,500	0.967	0.601	0.251	0.104	0.046	0.018
292,500	0.974	0.628	0.267	0.112	0.050	0.020
297,500	0.980	0.655	0.284	0.120	0.054	0.022
302,500	0.985	0.680	0.301	0.129	0.058	0.024
307,500	0.989	0.705	0.318	0.137	0.063	0.026
312,500	0.991	0.729	0.336	0.147	0.067	0.028
317,500	0.994	0.752	0.355	0.156	0.072	0.030
322,500	0.995	0.774	0.373	0.166	0.077	0.033
327,500	0.997	0.795	0.392	0.177	0.083	0.036
332,500	0.998	0.814	0.412	0.188	0.089	0.039
337,500	0.998	0.833	0.431	0.199	0.095	0.042
342,500	0.999	0.850	0.451	0.211	0.101	0.045
347,500	0.999	0.866	0.471	0.223	0.108	0.049
352,500	0.999	0.880	0.490	0.235	0.115	0.052
357,500	1.000	0.894	0.510	0.248	0.122	0.056
362,500	1.000	0.906	0.530	0.261	0.130	0.060
367,500	1.000	0.918	0.550	0.275	0.138	0.065
372,500	1.000	0.928	0.570	0.288	0.146	0.070
377,500	1.000	0.937	0.589	0.303	0.155	0.075
382,500	1.000	0.945	0.608	0.317	0.164	0.080
387,500	1.000	0.953	0.627	0.332	0.173	0.085
392,500	1.000	0.959	0.646	0.347	0.183	0.091
397,500	1.000	0.965	0.664	0.362	0.193	0.097
402,500	1.000	0.970	0.682	0.378	0.203	0.104
407,500	1.000	0.975	0.700	0.393	0.214	0.110
412,500	1.000	0.979	0.717	0.409	0.225	0.117
417,500	1.000	0.982	0.734	0.425	0.236	0.125
422,500	1.000	0.985	0.750	0.442	0.247	0.132
427,500	1.000	0.987	0.765	0.458	0.259	0.140
432,500	1.000	0.990	0.780	0.474	0.271	0.148
437,500	1.000	0.991	0.795	0.490	0.284	0.157
442,500	1.000	0.993	0.809	0.507	0.297	0.166

447,500	1.000	0.994	0.822	0.523	0.309	0.175
452,500	1.000	0.995	0.835	0.540	0.323	0.185
457,500	1.000	0.996	0.847	0.556	0.336	0.194
462,500	1.000	0.997	0.858	0.572	0.350	0.205
467,500	1.000	0.997	0.869	0.588	0.363	0.215
472,500	1.000	0.998	0.879	0.604	0.377	0.226
477,500	1.000	0.998	0.889	0.620	0.392	0.237
482,500	1.000	0.999	0.898	0.635	0.406	0.248
487,500	1.000	0.999	0.907	0.651	0.420	0.260
492,500	1.000	0.999	0.915	0.666	0.435	0.272
497,500	1.000	0.999	0.922	0.681	0.449	0.284
502,500	1.000	1.000	0.929	0.695	0.464	0.296
507,500	1.000	1.000	0.936	0.709	0.479	0.309
512,500	1.000	1.000	0.942	0.723	0.494	0.322
517,500	1.000	1.000	0.947	0.737	0.508	0.335
522,500	1.000	1.000	0.953	0.750	0.523	0.348
527,500	1.000	1.000	0.957	0.763	0.538	0.362
532,500	1.000	1.000	0.962	0.775	0.552	0.375
537,500	1.000	1.000	0.966	0.788	0.567	0.389
542,500	1.000	1.000	0.969	0.799	0.582	0.403
547,500	1.000	1.000	0.973	0.811	0.596	0.417
552,500	1.000	1.000	0.976	0.822	0.610	0.431
557,500	1.000	1.000	0.978	0.832	0.624	0.446
562,500	1.000	1.000	0.981	0.842	0.638	0.460
567,500	1.000	1.000	0.983	0.852	0.652	0.475
572,500	1.000	1.000	0.985	0.861	0.666	0.489
577,500	1.000	1.000	0.987	0.870	0.679	0.503
582,500	1.000	1.000	0.988	0.879	0.692	0.518
587,500	1.000	1.000	0.990	0.887	0.705	0.532
592,500	1.000	1.000	0.991	0.894	0.718	0.547
597,500	1.000	1.000	0.992	0.902	0.730	0.561
602,500	1.000	1.000	0.993	0.909	0.742	0.575
607,500	1.000	1.000	0.994	0.915	0.754	0.590
612,500	1.000	1.000	0.995	0.921	0.765	0.604
617,500	1.000	1.000	0.996	0.927	0.777	0.617
622,500	1.000	1.000	0.996	0.933	0.788	0.631
627,500	1.000	1.000	0.997	0.938	0.798	0.645
632,500	1.000	1.000	0.997	0.943	0.808	0.658
637,500	1.000	1.000	0.998	0.947	0.818	0.671
642,500	1.000	1.000	0.998	0.952	0.828	0.684
647,500	1.000	1.000	0.998	0.956	0.837	0.697
652,500	1.000	1.000	0.998	0.959	0.846	0.710
657,500	1.000	1.000	0.999	0.963	0.855	0.722
662,500	1.000	1.000	0.999	0.966	0.863	0.734
667,500	1.000	1.000	0.999	0.969	0.871	0.746

672,500	1.000	1.000	0.999	0.972	0.879	0.757
677,500	1.000	1.000	0.999	0.974	0.886	0.769
682,500	1.000	1.000	0.999	0.977	0.893	0.779
687,500	1.000	1.000	1.000	0.979	0.900	0.790
692,500	1.000	1.000	1.000	0.981	0.906	0.800
697,500	1.000	1.000	1.000	0.983	0.912	0.810
702,500	1.000	1.000	1.000	0.984	0.918	0.820
707,500	1.000	1.000	1.000	0.986	0.923	0.829
712,500	1.000	1.000	1.000	0.987	0.928	0.838
717,500	1.000	1.000	1.000	0.989	0.933	0.847
722,500	1.000	1.000	1.000	0.990	0.938	0.856
727,500	1.000	1.000	1.000	0.991	0.942	0.864
732,500	1.000	1.000	1.000	0.992	0.947	0.871
737,500	1.000	1.000	1.000	0.993	0.950	0.879
742,500	1.000	1.000	1.000	0.993	0.954	0.886
747,500	1.000	1.000	1.000	0.994	0.958	0.893
752,500	1.000	1.000	1.000	0.995	0.961	0.899
757,500	1.000	1.000	1.000	0.995	0.964	0.906
762,500	1.000	1.000	1.000	0.996	0.967	0.912
767,500	1.000	1.000	1.000	0.996	0.969	0.917
772,500	1.000	1.000	1.000	0.997	0.972	0.923
777,500	1.000	1.000	1.000	0.997	0.974	0.928
782,500	1.000	1.000	1.000	0.998	0.976	0.933
787,500	1.000	1.000	1.000	0.998	0.978	0.937
792,500	1.000	1.000	1.000	0.998	0.980	0.942
797,500	1.000	1.000	1.000	0.998	0.982	0.946
802,500	1.000	1.000	1.000	0.999	0.983	0.950
807,500	1.000	1.000	1.000	0.999	0.985	0.953
812,500	1.000	1.000	1.000	0.999	0.986	0.957
817,500	1.000	1.000	1.000	0.999	0.987	0.960
822,500	1.000	1.000	1.000	0.999	0.989	0.963
827,500	1.000	1.000	1.000	0.999	0.990	0.966
832,500	1.000	1.000	1.000	0.999	0.991	0.968
837,500	1.000	1.000	1.000	0.999	0.992	0.971
842,500	1.000	1.000	1.000	1.000	0.992	0.973
847,500	1.000	1.000	1.000	1.000	0.993	0.975
852,500	1.000	1.000	1.000	1.000	0.994	0.977
857,500	1.000	1.000	1.000	1.000	0.994	0.979
862,500	1.000	1.000	1.000	1.000	0.995	0.981
867,500	1.000	1.000	1.000	1.000	0.995	0.983
872,500	1.000	1.000	1.000	1.000	0.996	0.984
877,500	1.000	1.000	1.000	1.000	0.996	0.986
882,500	1.000	1.000	1.000	1.000	0.997	0.987
887,500	1.000	1.000	1.000	1.000	0.997	0.988
892,500	1.000	1.000	1.000	1.000	0.997	0.989

897,500	1.000	1.000	1.000	1.000	0.998	0.990
902,500	1.000	1.000	1.000	1.000	0.998	0.991
907,500	1.000	1.000	1.000	1.000	0.998	0.992
912,500	1.000	1.000	1.000	1.000	0.998	0.993
917,500	1.000	1.000	1.000	1.000	0.999	0.993
922,500	1.000	1.000	1.000	1.000	0.999	0.994
927,500	1.000	1.000	1.000	1.000	0.999	0.995
932,500	1.000	1.000	1.000	1.000	0.999	0.995
937,500	1.000	1.000	1.000	1.000	0.999	0.996
942,500	1.000	1.000	1.000	1.000	0.999	0.996
947,500	1.000	1.000	1.000	1.000	0.999	0.996
952,500	1.000	1.000	1.000	1.000	0.999	0.997
957,500	1.000	1.000	1.000	1.000	0.999	0.997
962,500	1.000	1.000	1.000	1.000	1.000	0.997
967,500	1.000	1.000	1.000	1.000	1.000	0.998
972,500	1.000	1.000	1.000	1.000	1.000	0.998
977,500	1.000	1.000	1.000	1.000	1.000	0.998
982,500	1.000	1.000	1.000	1.000	1.000	0.998
987,500	1.000	1.000	1.000	1.000	1.000	0.999
992,500	1.000	1.000	1.000	1.000	1.000	0.999
997,500	1.000	1.000	1.000	1.000	1.000	0.999
1,002,500	1.000	1.000	1.000	1.000	1.000	0.999
1,007,500	1.000	1.000	1.000	1.000	1.000	0.999
1,012,500	1.000	1.000	1.000	1.000	1.000	0.999
1,017,500	1.000	1.000	1.000	1.000	1.000	0.999
1,022,500	1.000	1.000	1.000	1.000	1.000	0.999
1,027,500	1.000	1.000	1.000	1.000	1.000	0.999
1,032,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-41: PROBABILITY DENSITY FUNCTION TABLE FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 CATCH EQUALS THE TAC.

Yield (lbs)	2012	2013	2014	2015	2016	2017
157,500	0.000	0.000	0.001	0.000	0.000	0.000
162,500	0.000	0.000	0.001	0.000	0.000	0.000
167,500	0.000	0.000	0.001	0.000	0.000	0.000
172,500	0.000	0.001	0.001	0.000	0.000	0.000
177,500	0.001	0.001	0.001	0.000	0.000	0.000
182,500	0.001	0.001	0.001	0.001	0.000	0.000
187,500	0.001	0.001	0.001	0.001	0.000	0.000
192,500	0.001	0.001	0.001	0.001	0.000	0.000
197,500	0.002	0.001	0.002	0.001	0.000	0.000
202,500	0.002	0.002	0.002	0.001	0.000	0.000
207,500	0.003	0.002	0.002	0.001	0.001	0.000
212,500	0.004	0.003	0.002	0.001	0.001	0.000
217,500	0.006	0.003	0.003	0.001	0.001	0.000
222,500	0.007	0.004	0.003	0.001	0.001	0.000
227,500	0.010	0.004	0.004	0.002	0.001	0.000
232,500	0.012	0.005	0.004	0.002	0.001	0.000
237,500	0.016	0.006	0.005	0.002	0.001	0.000
242,500	0.020	0.008	0.005	0.002	0.001	0.000
247,500	0.024	0.009	0.006	0.003	0.001	0.000
252,500	0.030	0.010	0.007	0.003	0.001	0.000
257,500	0.037	0.012	0.007	0.003	0.002	0.000
262,500	0.046	0.014	0.008	0.003	0.002	0.001
267,500	0.055	0.017	0.009	0.004	0.002	0.001
272,500	0.066	0.019	0.010	0.004	0.002	0.001
277,500	0.079	0.023	0.012	0.005	0.002	0.001
282,500	0.094	0.026	0.013	0.005	0.003	0.001
287,500	0.111	0.030	0.014	0.006	0.003	0.001
292,500	0.129	0.034	0.016	0.007	0.003	0.001
297,500	0.150	0.039	0.018	0.007	0.004	0.001
302,500	0.173	0.045	0.020	0.008	0.004	0.001
307,500	0.198	0.051	0.022	0.009	0.004	0.001
312,500	0.224	0.058	0.024	0.010	0.005	0.002
317,500	0.253	0.065	0.027	0.011	0.005	0.002
322,500	0.284	0.073	0.030	0.012	0.006	0.002
327,500	0.317	0.082	0.033	0.013	0.006	0.002
332,500	0.350	0.092	0.036	0.014	0.007	0.002
337,500	0.386	0.102	0.039	0.015	0.008	0.003
342,500	0.422	0.114	0.043	0.017	0.008	0.003
347,500	0.458	0.126	0.047	0.018	0.009	0.003

352,500	0.496	0.139	0.051	0.020	0.010	0.004
357,500	0.533	0.153	0.056	0.022	0.011	0.004
362,500	0.570	0.168	0.061	0.024	0.012	0.004
367,500	0.606	0.184	0.066	0.026	0.013	0.005
372,500	0.641	0.200	0.072	0.028	0.014	0.005
377,500	0.675	0.218	0.078	0.031	0.015	0.006
382,500	0.708	0.237	0.084	0.033	0.016	0.006
387,500	0.739	0.256	0.091	0.036	0.018	0.007
392,500	0.769	0.276	0.098	0.039	0.019	0.008
397,500	0.796	0.297	0.106	0.042	0.021	0.008
402,500	0.822	0.318	0.114	0.046	0.022	0.009
407,500	0.845	0.340	0.122	0.049	0.024	0.010
412,500	0.866	0.363	0.131	0.053	0.026	0.011
417,500	0.885	0.386	0.140	0.057	0.028	0.012
422,500	0.902	0.410	0.150	0.061	0.030	0.013
427,500	0.917	0.434	0.160	0.066	0.033	0.014
432,500	0.931	0.458	0.170	0.070	0.035	0.015
437,500	0.942	0.482	0.181	0.075	0.038	0.017
442,500	0.952	0.507	0.193	0.080	0.040	0.018
447,500	0.961	0.531	0.204	0.086	0.043	0.019
452,500	0.968	0.556	0.217	0.092	0.046	0.021
457,500	0.974	0.580	0.229	0.098	0.050	0.023
462,500	0.979	0.603	0.242	0.104	0.053	0.024
467,500	0.984	0.627	0.256	0.111	0.057	0.026
472,500	0.987	0.650	0.270	0.118	0.061	0.028
477,500	0.990	0.672	0.284	0.125	0.065	0.031
482,500	0.992	0.694	0.298	0.133	0.069	0.033
487,500	0.994	0.715	0.313	0.140	0.073	0.035
492,500	0.995	0.735	0.328	0.149	0.078	0.038
497,500	0.996	0.755	0.344	0.157	0.083	0.041
502,500	0.997	0.774	0.360	0.166	0.088	0.044
507,500	0.998	0.792	0.376	0.175	0.093	0.047
512,500	0.999	0.809	0.392	0.185	0.099	0.050
517,500	0.999	0.825	0.408	0.194	0.104	0.053
522,500	0.999	0.841	0.425	0.204	0.110	0.057
527,500	0.999	0.855	0.441	0.215	0.117	0.061
532,500	1.000	0.868	0.458	0.225	0.123	0.065
537,500	1.000	0.881	0.475	0.236	0.130	0.069
542,500	1.000	0.893	0.492	0.248	0.137	0.073
547,500	1.000	0.904	0.509	0.259	0.144	0.078
552,500	1.000	0.914	0.526	0.271	0.152	0.083
557,500	1.000	0.923	0.543	0.283	0.159	0.088
562,500	1.000	0.931	0.559	0.295	0.167	0.093
567,500	1.000	0.939	0.576	0.308	0.176	0.098
572,500	1.000	0.946	0.593	0.320	0.184	0.104

577,500	1.000	0.953	0.609	0.333	0.193	0.110
582,500	1.000	0.958	0.625	0.347	0.202	0.116
587,500	1.000	0.963	0.641	0.360	0.211	0.123
592,500	1.000	0.968	0.657	0.374	0.221	0.129
597,500	1.000	0.972	0.672	0.387	0.231	0.136
602,500	1.000	0.976	0.687	0.401	0.241	0.143
607,500	1.000	0.979	0.702	0.415	0.251	0.151
612,500	1.000	0.982	0.717	0.429	0.261	0.159
617,500	1.000	0.985	0.731	0.443	0.272	0.167
622,500	1.000	0.987	0.745	0.458	0.283	0.175
627,500	1.000	0.989	0.758	0.472	0.294	0.183
632,500	1.000	0.990	0.771	0.486	0.305	0.192
637,500	1.000	0.992	0.784	0.501	0.317	0.201
642,500	1.000	0.993	0.796	0.515	0.329	0.210
647,500	1.000	0.994	0.808	0.529	0.340	0.219
652,500	1.000	0.995	0.819	0.544	0.352	0.229
657,500	1.000	0.996	0.830	0.558	0.365	0.239
662,500	1.000	0.997	0.841	0.572	0.377	0.249
667,500	1.000	0.997	0.851	0.586	0.389	0.259
672,500	1.000	0.998	0.860	0.600	0.402	0.270
677,500	1.000	0.998	0.870	0.614	0.414	0.281
682,500	1.000	0.998	0.878	0.628	0.427	0.292
687,500	1.000	0.999	0.887	0.641	0.440	0.303
692,500	1.000	0.999	0.895	0.654	0.453	0.314
697,500	1.000	0.999	0.902	0.668	0.466	0.326
702,500	1.000	0.999	0.909	0.681	0.479	0.338
707,500	1.000	0.999	0.916	0.693	0.492	0.350
712,500	1.000	1.000	0.922	0.706	0.505	0.362
717,500	1.000	1.000	0.928	0.718	0.518	0.374
722,500	1.000	1.000	0.934	0.730	0.531	0.386
727,500	1.000	1.000	0.939	0.742	0.544	0.399
732,500	1.000	1.000	0.944	0.753	0.556	0.411
737,500	1.000	1.000	0.949	0.765	0.569	0.424
742,500	1.000	1.000	0.953	0.776	0.582	0.436
747,500	1.000	1.000	0.957	0.786	0.595	0.449
752,500	1.000	1.000	0.961	0.796	0.607	0.462
757,500	1.000	1.000	0.964	0.807	0.620	0.475
762,500	1.000	1.000	0.968	0.816	0.632	0.488
767,500	1.000	1.000	0.971	0.826	0.644	0.501
772,500	1.000	1.000	0.973	0.835	0.656	0.513
777,500	1.000	1.000	0.976	0.844	0.668	0.526
782,500	1.000	1.000	0.978	0.852	0.680	0.539
787,500	1.000	1.000	0.980	0.860	0.691	0.552
792,500	1.000	1.000	0.982	0.868	0.703	0.565
797,500	1.000	1.000	0.984	0.876	0.714	0.577

802,500	1.000	1.000	0.986	0.883	0.725	0.590
807,500	1.000	1.000	0.987	0.890	0.736	0.602
812,500	1.000	1.000	0.988	0.896	0.746	0.615
817,500	1.000	1.000	0.990	0.903	0.757	0.627
822,500	1.000	1.000	0.991	0.909	0.767	0.639
827,500	1.000	1.000	0.992	0.914	0.776	0.651
832,500	1.000	1.000	0.993	0.920	0.786	0.663
837,500	1.000	1.000	0.993	0.925	0.795	0.675
842,500	1.000	1.000	0.994	0.930	0.805	0.686
847,500	1.000	1.000	0.995	0.935	0.813	0.698
852,500	1.000	1.000	0.995	0.939	0.822	0.709
857,500	1.000	1.000	0.996	0.944	0.830	0.720
862,500	1.000	1.000	0.996	0.947	0.838	0.731
867,500	1.000	1.000	0.997	0.951	0.846	0.741
872,500	1.000	1.000	0.997	0.955	0.854	0.752
877,500	1.000	1.000	0.998	0.958	0.861	0.762
882,500	1.000	1.000	0.998	0.961	0.868	0.772
887,500	1.000	1.000	0.998	0.964	0.875	0.781
892,500	1.000	1.000	0.998	0.967	0.882	0.791
897,500	1.000	1.000	0.999	0.969	0.888	0.800
902,500	1.000	1.000	0.999	0.972	0.894	0.809
907,500	1.000	1.000	0.999	0.974	0.900	0.818
912,500	1.000	1.000	0.999	0.976	0.905	0.826
917,500	1.000	1.000	0.999	0.978	0.911	0.834
922,500	1.000	1.000	0.999	0.980	0.916	0.842
927,500	1.000	1.000	0.999	0.982	0.921	0.850
932,500	1.000	1.000	0.999	0.983	0.926	0.857
937,500	1.000	1.000	1.000	0.985	0.930	0.864
942,500	1.000	1.000	1.000	0.986	0.934	0.871
947,500	1.000	1.000	1.000	0.987	0.938	0.878
952,500	1.000	1.000	1.000	0.988	0.942	0.884
957,500	1.000	1.000	1.000	0.989	0.946	0.890
962,500	1.000	1.000	1.000	0.990	0.949	0.896
967,500	1.000	1.000	1.000	0.991	0.953	0.902
972,500	1.000	1.000	1.000	0.992	0.956	0.908
977,500	1.000	1.000	1.000	0.993	0.959	0.913
982,500	1.000	1.000	1.000	0.994	0.962	0.918
987,500	1.000	1.000	1.000	0.994	0.964	0.923
992,500	1.000	1.000	1.000	0.995	0.967	0.927
997,500	1.000	1.000	1.000	0.995	0.969	0.932
1,002,500	1.000	1.000	1.000	0.996	0.971	0.936
1,007,500	1.000	1.000	1.000	0.996	0.973	0.940
1,012,500	1.000	1.000	1.000	0.997	0.975	0.943
1,017,500	1.000	1.000	1.000	0.997	0.977	0.947
1,022,500	1.000	1.000	1.000	0.997	0.979	0.950

1,027,500	1.000	1.000	1.000	0.998	0.980	0.954
1,032,500	1.000	1.000	1.000	0.998	0.982	0.957
1,037,500	1.000	1.000	1.000	0.998	0.983	0.960
1,042,500	1.000	1.000	1.000	0.998	0.985	0.962
1,047,500	1.000	1.000	1.000	0.998	0.986	0.965
1,052,500	1.000	1.000	1.000	0.999	0.987	0.967
1,057,500	1.000	1.000	1.000	0.999	0.988	0.970
1,062,500	1.000	1.000	1.000	0.999	0.989	0.972
1,067,500	1.000	1.000	1.000	0.999	0.990	0.974
1,072,500	1.000	1.000	1.000	0.999	0.991	0.976
1,077,500	1.000	1.000	1.000	0.999	0.992	0.977
1,082,500	1.000	1.000	1.000	0.999	0.992	0.979
1,087,500	1.000	1.000	1.000	0.999	0.993	0.981
1,092,500	1.000	1.000	1.000	0.999	0.994	0.982
1,097,500	1.000	1.000	1.000	1.000	0.994	0.984
1,102,500	1.000	1.000	1.000	1.000	0.995	0.985
1,107,500	1.000	1.000	1.000	1.000	0.995	0.986
1,112,500	1.000	1.000	1.000	1.000	0.996	0.987
1,117,500	1.000	1.000	1.000	1.000	0.996	0.988
1,122,500	1.000	1.000	1.000	1.000	0.996	0.989
1,127,500	1.000	1.000	1.000	1.000	0.997	0.990
1,132,500	1.000	1.000	1.000	1.000	0.997	0.991
1,137,500	1.000	1.000	1.000	1.000	0.997	0.992
1,142,500	1.000	1.000	1.000	1.000	0.998	0.992
1,147,500	1.000	1.000	1.000	1.000	0.998	0.993
1,152,500	1.000	1.000	1.000	1.000	0.998	0.994
1,157,500	1.000	1.000	1.000	1.000	0.998	0.994
1,162,500	1.000	1.000	1.000	1.000	0.998	0.995
1,167,500	1.000	1.000	1.000	1.000	0.999	0.995
1,172,500	1.000	1.000	1.000	1.000	0.999	0.996
1,177,500	1.000	1.000	1.000	1.000	0.999	0.996
1,182,500	1.000	1.000	1.000	1.000	0.999	0.996
1,187,500	1.000	1.000	1.000	1.000	0.999	0.997
1,192,500	1.000	1.000	1.000	1.000	0.999	0.997
1,197,500	1.000	1.000	1.000	1.000	0.999	0.997
1,202,500	1.000	1.000	1.000	1.000	0.999	0.998
1,207,500	1.000	1.000	1.000	1.000	0.999	0.998
1,212,500	1.000	1.000	1.000	1.000	0.999	0.998
1,217,500	1.000	1.000	1.000	1.000	1.000	0.998
1,222,500	1.000	1.000	1.000	1.000	1.000	0.998
1,227,500	1.000	1.000	1.000	1.000	1.000	0.999
1,232,500	1.000	1.000	1.000	1.000	1.000	0.999
1,237,500	1.000	1.000	1.000	1.000	1.000	0.999
1,242,500	1.000	1.000	1.000	1.000	1.000	0.999
1,247,500	1.000	1.000	1.000	1.000	1.000	0.999

1,252,500	1.000	1.000	1.000	1.000	1.000	0.999
1,257,500	1.000	1.000	1.000	1.000	1.000	0.999
1,262,500	1.000	1.000	1.000	1.000	1.000	0.999
1,267,500	1.000	1.000	1.000	1.000	1.000	0.999
1,272,500	1.000	1.000	1.000	1.000	1.000	0.999
1,277,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-42: PROBABILITY DENSITY FUNCTION TABLE FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 EFFORT EQUALS THE EFFORT IN 2010.

Yield (lbs)	2012	2013	2014	2015	2016	2017
222,500	0.000	0.000	0.001	0.000	0.000	0.000
227,500	0.000	0.000	0.001	0.000	0.000	0.000
232,500	0.000	0.000	0.001	0.001	0.000	0.000
237,500	0.000	0.000	0.001	0.001	0.000	0.000
242,500	0.000	0.000	0.001	0.001	0.001	0.000
247,500	0.000	0.000	0.001	0.001	0.001	0.000
252,500	0.000	0.000	0.001	0.001	0.001	0.000
257,500	0.000	0.001	0.001	0.001	0.001	0.000
262,500	0.000	0.001	0.002	0.001	0.001	0.000
267,500	0.000	0.001	0.002	0.001	0.001	0.000
272,500	0.000	0.001	0.002	0.001	0.001	0.000
277,500	0.000	0.001	0.002	0.002	0.001	0.000
282,500	0.000	0.002	0.003	0.002	0.001	0.000
287,500	0.001	0.002	0.003	0.002	0.001	0.001
292,500	0.001	0.002	0.004	0.002	0.002	0.001
297,500	0.001	0.003	0.004	0.003	0.002	0.001
302,500	0.002	0.003	0.005	0.003	0.002	0.001
307,500	0.002	0.004	0.005	0.003	0.002	0.001
312,500	0.003	0.005	0.006	0.004	0.002	0.001
317,500	0.005	0.006	0.007	0.004	0.003	0.001
322,500	0.006	0.007	0.007	0.004	0.003	0.001
327,500	0.008	0.008	0.008	0.005	0.003	0.001
332,500	0.011	0.010	0.009	0.005	0.003	0.001
337,500	0.014	0.011	0.010	0.006	0.004	0.002
342,500	0.018	0.013	0.012	0.007	0.004	0.002
347,500	0.023	0.015	0.013	0.007	0.005	0.002
352,500	0.029	0.018	0.014	0.008	0.005	0.002
357,500	0.036	0.021	0.016	0.009	0.006	0.002
362,500	0.045	0.024	0.018	0.010	0.006	0.003
367,500	0.056	0.028	0.020	0.011	0.007	0.003
372,500	0.068	0.032	0.022	0.012	0.007	0.003

377,500	0.083	0.037	0.024	0.013	0.008	0.004
382,500	0.100	0.042	0.027	0.014	0.009	0.004
387,500	0.119	0.048	0.029	0.015	0.009	0.004
392,500	0.140	0.054	0.032	0.017	0.010	0.005
397,500	0.164	0.062	0.036	0.019	0.011	0.005
402,500	0.190	0.070	0.039	0.020	0.012	0.006
407,500	0.219	0.078	0.043	0.022	0.013	0.006
412,500	0.251	0.088	0.047	0.024	0.014	0.007
417,500	0.284	0.098	0.051	0.026	0.016	0.007
422,500	0.320	0.109	0.055	0.028	0.017	0.008
427,500	0.357	0.121	0.060	0.031	0.018	0.009
432,500	0.396	0.134	0.066	0.033	0.020	0.010
437,500	0.435	0.148	0.071	0.036	0.022	0.011
442,500	0.476	0.162	0.077	0.039	0.023	0.011
447,500	0.516	0.178	0.083	0.042	0.025	0.012
452,500	0.557	0.195	0.090	0.045	0.027	0.014
457,500	0.597	0.212	0.097	0.049	0.029	0.015
462,500	0.636	0.230	0.104	0.053	0.031	0.016
467,500	0.673	0.250	0.112	0.057	0.034	0.017
472,500	0.709	0.270	0.121	0.061	0.036	0.019
477,500	0.743	0.291	0.129	0.065	0.039	0.020
482,500	0.775	0.312	0.138	0.070	0.042	0.022
487,500	0.804	0.334	0.148	0.075	0.045	0.023
492,500	0.831	0.357	0.158	0.080	0.048	0.025
497,500	0.855	0.380	0.168	0.085	0.051	0.027
502,500	0.877	0.404	0.179	0.091	0.055	0.029
507,500	0.897	0.428	0.190	0.097	0.058	0.032
512,500	0.914	0.453	0.202	0.103	0.062	0.034
517,500	0.929	0.477	0.214	0.110	0.066	0.036
522,500	0.942	0.502	0.227	0.117	0.070	0.039
527,500	0.953	0.527	0.240	0.124	0.075	0.042
532,500	0.962	0.551	0.253	0.132	0.080	0.045
537,500	0.970	0.576	0.267	0.139	0.085	0.048
542,500	0.976	0.600	0.281	0.148	0.090	0.051
547,500	0.981	0.623	0.295	0.156	0.095	0.055
552,500	0.985	0.647	0.310	0.165	0.101	0.058
557,500	0.989	0.669	0.325	0.174	0.106	0.062
562,500	0.991	0.691	0.340	0.183	0.113	0.066
567,500	0.994	0.713	0.356	0.193	0.119	0.070
572,500	0.995	0.733	0.372	0.203	0.125	0.075
577,500	0.996	0.753	0.388	0.213	0.132	0.080
582,500	0.997	0.772	0.404	0.223	0.139	0.084
587,500	0.998	0.791	0.420	0.234	0.147	0.089
592,500	0.999	0.808	0.437	0.245	0.154	0.095
597,500	0.999	0.824	0.454	0.257	0.162	0.100

602,500	0.999	0.840	0.470	0.269	0.170	0.106
607,500	1.000	0.855	0.487	0.280	0.178	0.112
612,500	1.000	0.868	0.504	0.293	0.187	0.118
617,500	1.000	0.881	0.521	0.305	0.196	0.125
622,500	1.000	0.893	0.538	0.318	0.205	0.132
627,500	1.000	0.904	0.554	0.331	0.214	0.139
632,500	1.000	0.914	0.571	0.344	0.224	0.146
637,500	1.000	0.923	0.588	0.357	0.233	0.153
642,500	1.000	0.932	0.604	0.370	0.243	0.161
647,500	1.000	0.940	0.620	0.384	0.254	0.169
652,500	1.000	0.947	0.636	0.398	0.264	0.177
657,500	1.000	0.953	0.652	0.412	0.275	0.186
662,500	1.000	0.959	0.667	0.426	0.286	0.194
667,500	1.000	0.964	0.682	0.440	0.297	0.203
672,500	1.000	0.969	0.697	0.454	0.308	0.212
677,500	1.000	0.973	0.712	0.468	0.320	0.222
682,500	1.000	0.976	0.726	0.482	0.331	0.232
687,500	1.000	0.980	0.740	0.497	0.343	0.241
692,500	1.000	0.982	0.754	0.511	0.355	0.252
697,500	1.000	0.985	0.767	0.525	0.367	0.262
702,500	1.000	0.987	0.779	0.539	0.379	0.273
707,500	1.000	0.989	0.792	0.554	0.392	0.283
712,500	1.000	0.991	0.804	0.568	0.404	0.294
717,500	1.000	0.992	0.815	0.582	0.417	0.305
722,500	1.000	0.993	0.826	0.596	0.430	0.317
727,500	1.000	0.994	0.837	0.609	0.442	0.328
732,500	1.000	0.995	0.847	0.623	0.455	0.340
737,500	1.000	0.996	0.857	0.637	0.468	0.352
742,500	1.000	0.997	0.866	0.650	0.481	0.364
747,500	1.000	0.997	0.875	0.663	0.494	0.376
752,500	1.000	0.998	0.883	0.676	0.507	0.388
757,500	1.000	0.998	0.891	0.689	0.520	0.401
762,500	1.000	0.999	0.899	0.701	0.533	0.413
767,500	1.000	0.999	0.906	0.714	0.545	0.426
772,500	1.000	0.999	0.913	0.726	0.558	0.438
777,500	1.000	0.999	0.920	0.738	0.571	0.451
782,500	1.000	0.999	0.926	0.749	0.584	0.464
787,500	1.000	0.999	0.932	0.760	0.596	0.476
792,500	1.000	1.000	0.937	0.771	0.609	0.489
797,500	1.000	1.000	0.942	0.782	0.621	0.502
802,500	1.000	1.000	0.947	0.792	0.633	0.515
807,500	1.000	1.000	0.951	0.803	0.645	0.528
812,500	1.000	1.000	0.955	0.812	0.657	0.540
817,500	1.000	1.000	0.959	0.822	0.669	0.553
822,500	1.000	1.000	0.963	0.831	0.681	0.566

827,500	1.000	1.000	0.966	0.840	0.692	0.578
832,500	1.000	1.000	0.969	0.848	0.704	0.591
837,500	1.000	1.000	0.972	0.857	0.715	0.603
842,500	1.000	1.000	0.975	0.865	0.726	0.616
847,500	1.000	1.000	0.977	0.872	0.736	0.628
852,500	1.000	1.000	0.979	0.880	0.747	0.640
857,500	1.000	1.000	0.981	0.887	0.757	0.652
862,500	1.000	1.000	0.983	0.893	0.767	0.664
867,500	1.000	1.000	0.985	0.900	0.777	0.675
872,500	1.000	1.000	0.986	0.906	0.786	0.687
877,500	1.000	1.000	0.988	0.912	0.796	0.698
882,500	1.000	1.000	0.989	0.917	0.805	0.709
887,500	1.000	1.000	0.990	0.923	0.813	0.720
892,500	1.000	1.000	0.991	0.928	0.822	0.731
897,500	1.000	1.000	0.992	0.933	0.830	0.741
902,500	1.000	1.000	0.993	0.937	0.838	0.752
907,500	1.000	1.000	0.994	0.941	0.846	0.762
912,500	1.000	1.000	0.995	0.946	0.854	0.772
917,500	1.000	1.000	0.995	0.949	0.861	0.781
922,500	1.000	1.000	0.996	0.953	0.868	0.791
927,500	1.000	1.000	0.996	0.956	0.875	0.800
932,500	1.000	1.000	0.997	0.960	0.881	0.809
937,500	1.000	1.000	0.997	0.963	0.888	0.817
942,500	1.000	1.000	0.997	0.965	0.894	0.826
947,500	1.000	1.000	0.998	0.968	0.900	0.834
952,500	1.000	1.000	0.998	0.971	0.905	0.842
957,500	1.000	1.000	0.998	0.973	0.911	0.849
962,500	1.000	1.000	0.998	0.975	0.916	0.857
967,500	1.000	1.000	0.999	0.977	0.921	0.864
972,500	1.000	1.000	0.999	0.979	0.925	0.871
977,500	1.000	1.000	0.999	0.981	0.930	0.877
982,500	1.000	1.000	0.999	0.982	0.934	0.884
987,500	1.000	1.000	0.999	0.984	0.938	0.890
992,500	1.000	1.000	0.999	0.985	0.942	0.896
997,500	1.000	1.000	0.999	0.987	0.946	0.901
1,002,500	1.000	1.000	1.000	0.988	0.949	0.907
1,007,500	1.000	1.000	1.000	0.989	0.952	0.912
1,012,500	1.000	1.000	1.000	0.990	0.955	0.917
1,017,500	1.000	1.000	1.000	0.991	0.958	0.922
1,022,500	1.000	1.000	1.000	0.992	0.961	0.927
1,027,500	1.000	1.000	1.000	0.992	0.964	0.931
1,032,500	1.000	1.000	1.000	0.993	0.966	0.935
1,037,500	1.000	1.000	1.000	0.994	0.969	0.939
1,042,500	1.000	1.000	1.000	0.994	0.971	0.943
1,047,500	1.000	1.000	1.000	0.995	0.973	0.946

1,052,500	1.000	1.000	1.000	0.995	0.975	0.950
1,057,500	1.000	1.000	1.000	0.996	0.977	0.953
1,062,500	1.000	1.000	1.000	0.996	0.979	0.956
1,067,500	1.000	1.000	1.000	0.997	0.980	0.959
1,072,500	1.000	1.000	1.000	0.997	0.982	0.962
1,077,500	1.000	1.000	1.000	0.997	0.983	0.964
1,082,500	1.000	1.000	1.000	0.998	0.984	0.967
1,087,500	1.000	1.000	1.000	0.998	0.986	0.969
1,092,500	1.000	1.000	1.000	0.998	0.987	0.971
1,097,500	1.000	1.000	1.000	0.998	0.988	0.973
1,102,500	1.000	1.000	1.000	0.998	0.989	0.975
1,107,500	1.000	1.000	1.000	0.999	0.990	0.977
1,112,500	1.000	1.000	1.000	0.999	0.991	0.979
1,117,500	1.000	1.000	1.000	0.999	0.991	0.980
1,122,500	1.000	1.000	1.000	0.999	0.992	0.982
1,127,500	1.000	1.000	1.000	0.999	0.993	0.983
1,132,500	1.000	1.000	1.000	0.999	0.993	0.985
1,137,500	1.000	1.000	1.000	0.999	0.994	0.986
1,142,500	1.000	1.000	1.000	0.999	0.994	0.987
1,147,500	1.000	1.000	1.000	0.999	0.995	0.988
1,152,500	1.000	1.000	1.000	1.000	0.995	0.989
1,157,500	1.000	1.000	1.000	1.000	0.996	0.990
1,162,500	1.000	1.000	1.000	1.000	0.996	0.991
1,167,500	1.000	1.000	1.000	1.000	0.997	0.991
1,172,500	1.000	1.000	1.000	1.000	0.997	0.992
1,177,500	1.000	1.000	1.000	1.000	0.997	0.993
1,182,500	1.000	1.000	1.000	1.000	0.997	0.993
1,187,500	1.000	1.000	1.000	1.000	0.998	0.994
1,192,500	1.000	1.000	1.000	1.000	0.998	0.995
1,197,500	1.000	1.000	1.000	1.000	0.998	0.995
1,202,500	1.000	1.000	1.000	1.000	0.998	0.995
1,207,500	1.000	1.000	1.000	1.000	0.998	0.996
1,212,500	1.000	1.000	1.000	1.000	0.999	0.996
1,217,500	1.000	1.000	1.000	1.000	0.999	0.997
1,222,500	1.000	1.000	1.000	1.000	0.999	0.997
1,227,500	1.000	1.000	1.000	1.000	0.999	0.997
1,232,500	1.000	1.000	1.000	1.000	0.999	0.997
1,237,500	1.000	1.000	1.000	1.000	0.999	0.998
1,242,500	1.000	1.000	1.000	1.000	0.999	0.998
1,247,500	1.000	1.000	1.000	1.000	0.999	0.998
1,252,500	1.000	1.000	1.000	1.000	0.999	0.998
1,257,500	1.000	1.000	1.000	1.000	0.999	0.998
1,262,500	1.000	1.000	1.000	1.000	1.000	0.999
1,267,500	1.000	1.000	1.000	1.000	1.000	0.999
1,272,500	1.000	1.000	1.000	1.000	1.000	0.999

1,277,500	1.000	1.000	1.000	1.000	1.000	0.999
1,282,500	1.000	1.000	1.000	1.000	1.000	0.999
1,287,500	1.000	1.000	1.000	1.000	1.000	0.999
1,292,500	1.000	1.000	1.000	1.000	1.000	0.999
1,297,500	1.000	1.000	1.000	1.000	1.000	0.999
1,302,500	1.000	1.000	1.000	1.000	1.000	0.999
1,307,500	1.000	1.000	1.000	1.000	1.000	0.999
1,312,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-43: PROBABILITY DENSITY FUNCTION TABLE FOR THE GULFWIDE SHRIMP EFFORT AND AVERAGE SHRIMP BYCATCH RUN REPRESENTING THE PROBABILITY OF EXCEEDING THE OFL FOR THE SCENARIO THAT THE 2011 CATCH EQUALS THE AVERAGE ANNUAL CATCH 2007-2009.

Yield (lbs)	2012	2013	2014	2015	2016	2017
197,500	0.000	0.000	0.001	0.000	0.000	0.000
202,500	0.000	0.000	0.001	0.000	0.000	0.000
207,500	0.000	0.000	0.001	0.000	0.000	0.000
212,500	0.000	0.000	0.001	0.001	0.000	0.000
217,500	0.000	0.000	0.001	0.001	0.000	0.000
222,500	0.000	0.000	0.001	0.001	0.000	0.000
227,500	0.000	0.001	0.001	0.001	0.000	0.000
232,500	0.000	0.001	0.001	0.001	0.001	0.000
237,500	0.000	0.001	0.002	0.001	0.001	0.000
242,500	0.001	0.001	0.002	0.001	0.001	0.000
247,500	0.001	0.001	0.002	0.001	0.001	0.000
252,500	0.001	0.002	0.002	0.001	0.001	0.000
257,500	0.001	0.002	0.003	0.002	0.001	0.000
262,500	0.002	0.002	0.003	0.002	0.001	0.000
267,500	0.003	0.003	0.003	0.002	0.001	0.000
272,500	0.004	0.003	0.004	0.002	0.001	0.000
277,500	0.005	0.004	0.004	0.002	0.001	0.001
282,500	0.006	0.005	0.005	0.003	0.002	0.001
287,500	0.008	0.006	0.006	0.003	0.002	0.001
292,500	0.010	0.007	0.006	0.003	0.002	0.001
297,500	0.013	0.008	0.007	0.004	0.002	0.001
302,500	0.016	0.010	0.008	0.004	0.002	0.001
307,500	0.020	0.011	0.009	0.005	0.003	0.001
312,500	0.025	0.013	0.010	0.005	0.003	0.001
317,500	0.031	0.015	0.011	0.006	0.003	0.001
322,500	0.038	0.018	0.012	0.006	0.004	0.001
327,500	0.046	0.021	0.014	0.007	0.004	0.002
332,500	0.056	0.024	0.015	0.008	0.004	0.002
337,500	0.067	0.027	0.017	0.008	0.005	0.002

342,500	0.080	0.031	0.019	0.009	0.005	0.002
347,500	0.094	0.036	0.021	0.010	0.006	0.002
352,500	0.111	0.041	0.023	0.011	0.006	0.003
357,500	0.129	0.046	0.025	0.012	0.007	0.003
362,500	0.150	0.052	0.028	0.013	0.008	0.003
367,500	0.172	0.059	0.031	0.015	0.008	0.003
372,500	0.197	0.066	0.034	0.016	0.009	0.004
377,500	0.223	0.074	0.037	0.017	0.010	0.004
382,500	0.252	0.083	0.040	0.019	0.011	0.005
387,500	0.282	0.092	0.044	0.021	0.012	0.005
392,500	0.314	0.102	0.048	0.023	0.013	0.005
397,500	0.347	0.113	0.053	0.025	0.014	0.006
402,500	0.382	0.125	0.057	0.027	0.015	0.007
407,500	0.418	0.138	0.062	0.029	0.016	0.007
412,500	0.454	0.151	0.067	0.031	0.018	0.008
417,500	0.490	0.166	0.073	0.034	0.019	0.009
422,500	0.527	0.181	0.079	0.037	0.021	0.009
427,500	0.564	0.197	0.085	0.040	0.022	0.010
432,500	0.600	0.214	0.092	0.043	0.024	0.011
437,500	0.635	0.232	0.099	0.046	0.026	0.012
442,500	0.669	0.251	0.106	0.050	0.028	0.013
447,500	0.702	0.270	0.114	0.054	0.030	0.014
452,500	0.733	0.290	0.122	0.057	0.032	0.015
457,500	0.762	0.311	0.131	0.062	0.035	0.017
462,500	0.790	0.332	0.140	0.066	0.037	0.018
467,500	0.815	0.354	0.149	0.071	0.040	0.020
472,500	0.839	0.376	0.159	0.076	0.043	0.021
477,500	0.860	0.399	0.169	0.081	0.046	0.023
482,500	0.880	0.422	0.180	0.086	0.049	0.025
487,500	0.897	0.446	0.191	0.092	0.052	0.027
492,500	0.913	0.469	0.203	0.098	0.056	0.029
497,500	0.926	0.493	0.215	0.104	0.060	0.031
502,500	0.938	0.517	0.227	0.111	0.063	0.033
507,500	0.949	0.540	0.240	0.118	0.068	0.036
512,500	0.958	0.564	0.253	0.125	0.072	0.038
517,500	0.966	0.587	0.266	0.133	0.076	0.041
522,500	0.972	0.610	0.280	0.140	0.081	0.044
527,500	0.977	0.633	0.294	0.148	0.086	0.047
532,500	0.982	0.655	0.309	0.157	0.091	0.050
537,500	0.986	0.677	0.324	0.165	0.097	0.053
542,500	0.989	0.698	0.339	0.174	0.102	0.057
547,500	0.991	0.718	0.354	0.184	0.108	0.061
552,500	0.993	0.738	0.369	0.193	0.114	0.065
557,500	0.995	0.757	0.385	0.203	0.121	0.069
562,500	0.996	0.775	0.401	0.213	0.127	0.073

567,500	0.997	0.793	0.417	0.224	0.134	0.078
572,500	0.998	0.809	0.434	0.235	0.141	0.083
577,500	0.998	0.825	0.450	0.246	0.149	0.088
582,500	0.999	0.840	0.467	0.257	0.156	0.093
587,500	0.999	0.854	0.483	0.269	0.164	0.098
592,500	0.999	0.867	0.500	0.280	0.172	0.104
597,500	1.000	0.880	0.516	0.292	0.180	0.110
602,500	1.000	0.891	0.533	0.305	0.189	0.116
607,500	1.000	0.902	0.549	0.317	0.198	0.122
612,500	1.000	0.912	0.566	0.330	0.207	0.129
617,500	1.000	0.921	0.582	0.343	0.216	0.136
622,500	1.000	0.929	0.598	0.356	0.226	0.143
627,500	1.000	0.937	0.614	0.370	0.236	0.150
632,500	1.000	0.944	0.630	0.383	0.246	0.158
637,500	1.000	0.950	0.645	0.397	0.256	0.166
642,500	1.000	0.956	0.661	0.410	0.267	0.174
647,500	1.000	0.962	0.676	0.424	0.277	0.182
652,500	1.000	0.966	0.691	0.438	0.288	0.191
657,500	1.000	0.970	0.705	0.452	0.299	0.200
662,500	1.000	0.974	0.719	0.466	0.311	0.209
667,500	1.000	0.978	0.733	0.480	0.322	0.218
672,500	1.000	0.981	0.747	0.495	0.334	0.228
677,500	1.000	0.983	0.760	0.509	0.346	0.238
682,500	1.000	0.986	0.772	0.523	0.357	0.248
687,500	1.000	0.988	0.785	0.537	0.370	0.258
692,500	1.000	0.989	0.797	0.551	0.382	0.269
697,500	1.000	0.991	0.808	0.565	0.394	0.279
702,500	1.000	0.992	0.819	0.579	0.407	0.290
707,500	1.000	0.993	0.830	0.593	0.419	0.301
712,500	1.000	0.994	0.840	0.607	0.432	0.313
717,500	1.000	0.995	0.850	0.620	0.445	0.324
722,500	1.000	0.996	0.860	0.634	0.457	0.336
727,500	1.000	0.997	0.869	0.647	0.470	0.347
732,500	1.000	0.997	0.877	0.660	0.483	0.359
737,500	1.000	0.998	0.886	0.673	0.496	0.371
742,500	1.000	0.998	0.894	0.686	0.509	0.384
747,500	1.000	0.998	0.901	0.698	0.522	0.396
752,500	1.000	0.999	0.908	0.710	0.534	0.408
757,500	1.000	0.999	0.915	0.722	0.547	0.421
762,500	1.000	0.999	0.921	0.734	0.560	0.433
767,500	1.000	0.999	0.927	0.746	0.573	0.446
772,500	1.000	0.999	0.933	0.757	0.585	0.459
777,500	1.000	1.000	0.938	0.768	0.598	0.472
782,500	1.000	1.000	0.943	0.779	0.610	0.484
787,500	1.000	1.000	0.947	0.789	0.623	0.497

792,500	1.000	1.000	0.952	0.799	0.635	0.510
797,500	1.000	1.000	0.956	0.809	0.647	0.523
802,500	1.000	1.000	0.959	0.819	0.659	0.536
807,500	1.000	1.000	0.963	0.828	0.670	0.548
812,500	1.000	1.000	0.966	0.837	0.682	0.561
817,500	1.000	1.000	0.969	0.845	0.694	0.574
822,500	1.000	1.000	0.972	0.854	0.705	0.586
827,500	1.000	1.000	0.975	0.862	0.716	0.599
832,500	1.000	1.000	0.977	0.869	0.727	0.611
837,500	1.000	1.000	0.979	0.877	0.737	0.623
842,500	1.000	1.000	0.981	0.884	0.748	0.635
847,500	1.000	1.000	0.983	0.891	0.758	0.647
852,500	1.000	1.000	0.985	0.897	0.768	0.659
857,500	1.000	1.000	0.986	0.903	0.778	0.671
862,500	1.000	1.000	0.988	0.909	0.787	0.682
867,500	1.000	1.000	0.989	0.915	0.796	0.694
872,500	1.000	1.000	0.990	0.920	0.805	0.705
877,500	1.000	1.000	0.991	0.925	0.814	0.716
882,500	1.000	1.000	0.992	0.930	0.823	0.727
887,500	1.000	1.000	0.993	0.935	0.831	0.737
892,500	1.000	1.000	0.994	0.939	0.839	0.748
897,500	1.000	1.000	0.994	0.943	0.847	0.758
902,500	1.000	1.000	0.995	0.947	0.854	0.768
907,500	1.000	1.000	0.996	0.951	0.861	0.777
912,500	1.000	1.000	0.996	0.955	0.868	0.787
917,500	1.000	1.000	0.997	0.958	0.875	0.796
922,500	1.000	1.000	0.997	0.961	0.882	0.805
927,500	1.000	1.000	0.997	0.964	0.888	0.814
932,500	1.000	1.000	0.998	0.967	0.894	0.822
937,500	1.000	1.000	0.998	0.969	0.900	0.831
942,500	1.000	1.000	0.998	0.972	0.905	0.839
947,500	1.000	1.000	0.998	0.974	0.911	0.846
952,500	1.000	1.000	0.999	0.976	0.916	0.854
957,500	1.000	1.000	0.999	0.978	0.921	0.861
962,500	1.000	1.000	0.999	0.980	0.925	0.868
967,500	1.000	1.000	0.999	0.981	0.930	0.875
972,500	1.000	1.000	0.999	0.983	0.934	0.881
977,500	1.000	1.000	0.999	0.984	0.938	0.887
982,500	1.000	1.000	0.999	0.986	0.942	0.893
987,500	1.000	1.000	0.999	0.987	0.945	0.899
992,500	1.000	1.000	1.000	0.988	0.949	0.905
997,500	1.000	1.000	1.000	0.989	0.952	0.910
1,002,500	1.000	1.000	1.000	0.990	0.955	0.915
1,007,500	1.000	1.000	1.000	0.991	0.958	0.920
1,012,500	1.000	1.000	1.000	0.992	0.961	0.925

1,017,500	1.000	1.000	1.000	0.993	0.964	0.929
1,022,500	1.000	1.000	1.000	0.993	0.966	0.933
1,027,500	1.000	1.000	1.000	0.994	0.969	0.938
1,032,500	1.000	1.000	1.000	0.995	0.971	0.941
1,037,500	1.000	1.000	1.000	0.995	0.973	0.945
1,042,500	1.000	1.000	1.000	0.996	0.975	0.949
1,047,500	1.000	1.000	1.000	0.996	0.977	0.952
1,052,500	1.000	1.000	1.000	0.996	0.978	0.955
1,057,500	1.000	1.000	1.000	0.997	0.980	0.958
1,062,500	1.000	1.000	1.000	0.997	0.982	0.961
1,067,500	1.000	1.000	1.000	0.997	0.983	0.963
1,072,500	1.000	1.000	1.000	0.998	0.984	0.966
1,077,500	1.000	1.000	1.000	0.998	0.985	0.968
1,082,500	1.000	1.000	1.000	0.998	0.987	0.970
1,087,500	1.000	1.000	1.000	0.998	0.988	0.973
1,092,500	1.000	1.000	1.000	0.999	0.989	0.975
1,097,500	1.000	1.000	1.000	0.999	0.990	0.976
1,102,500	1.000	1.000	1.000	0.999	0.990	0.978
1,107,500	1.000	1.000	1.000	0.999	0.991	0.980
1,112,500	1.000	1.000	1.000	0.999	0.992	0.981
1,117,500	1.000	1.000	1.000	0.999	0.993	0.983
1,122,500	1.000	1.000	1.000	0.999	0.993	0.984
1,127,500	1.000	1.000	1.000	0.999	0.994	0.985
1,132,500	1.000	1.000	1.000	0.999	0.994	0.986
1,137,500	1.000	1.000	1.000	0.999	0.995	0.987
1,142,500	1.000	1.000	1.000	1.000	0.995	0.988
1,147,500	1.000	1.000	1.000	1.000	0.996	0.989
1,152,500	1.000	1.000	1.000	1.000	0.996	0.990
1,157,500	1.000	1.000	1.000	1.000	0.997	0.991
1,162,500	1.000	1.000	1.000	1.000	0.997	0.992
1,167,500	1.000	1.000	1.000	1.000	0.997	0.993
1,172,500	1.000	1.000	1.000	1.000	0.997	0.993
1,177,500	1.000	1.000	1.000	1.000	0.998	0.994
1,182,500	1.000	1.000	1.000	1.000	0.998	0.994
1,187,500	1.000	1.000	1.000	1.000	0.998	0.995
1,192,500	1.000	1.000	1.000	1.000	0.998	0.995
1,197,500	1.000	1.000	1.000	1.000	0.998	0.996
1,202,500	1.000	1.000	1.000	1.000	0.999	0.996
1,207,500	1.000	1.000	1.000	1.000	0.999	0.996
1,212,500	1.000	1.000	1.000	1.000	0.999	0.997
1,217,500	1.000	1.000	1.000	1.000	0.999	0.997
1,222,500	1.000	1.000	1.000	1.000	0.999	0.997
1,227,500	1.000	1.000	1.000	1.000	0.999	0.998
1,232,500	1.000	1.000	1.000	1.000	0.999	0.998
1,237,500	1.000	1.000	1.000	1.000	0.999	0.998

1,242,500	1.000	1.000	1.000	1.000	0.999	0.998
1,247,500	1.000	1.000	1.000	1.000	0.999	0.998
1,252,500	1.000	1.000	1.000	1.000	1.000	0.999
1,257,500	1.000	1.000	1.000	1.000	1.000	0.999
1,262,500	1.000	1.000	1.000	1.000	1.000	0.999
1,267,500	1.000	1.000	1.000	1.000	1.000	0.999
1,272,500	1.000	1.000	1.000	1.000	1.000	0.999
1,277,500	1.000	1.000	1.000	1.000	1.000	0.999
1,282,500	1.000	1.000	1.000	1.000	1.000	0.999
1,287,500	1.000	1.000	1.000	1.000	1.000	0.999
1,292,500	1.000	1.000	1.000	1.000	1.000	0.999
1,297,500	1.000	1.000	1.000	1.000	1.000	0.999
1,302,500	1.000	1.000	1.000	1.000	1.000	1.000

TABLE A-44: SSASPM DATA INPUT FILE FOR THE CONTINUITY RUN.

```
#/////////////////////////////////////////////////////////////////////////////////////////////

#/////////////////////////////////////////////////////////////////////////////////////////////

#// INPUT DATA FILE FOR PROGRAM SSASPM

#//	Gulf of Mexico Gray Triggerfish Update Assessment

#//	5-Dec-2011
#//
#//	Jeff Isely and Steve Saul
#//	NOAA SEFSC
#//
#//	305-361-4288
#//	jeff.isely@noaa.gov
#//
#//    Steve Saul
#//    305-361-4576
#//	steve.saul@noaa.gov
#//
#//
#//
#//   Important notes:
```

```
#//    (1) Comments may be placed BEFORE or AFTER any line of data, however they MUST begin

#//       with a # symbol in the first column.

#//    (2) No comments of any kind may appear on the same line as the data (the #

#//       symbol will not save you here)

#//    (3) Blank lines without a # symbol are not allowed.

#//

#// Manufactured data

#///////////////////////////////////////////////////////////////////////////////////////////////////////////////

#///////////////////////////////////////////////////////////////////////////////////////////////////////////////

#

##################################################################

# GENERAL INFORMATION

##################################################################

# first and last year of data

1963	2010

# number of years of historical period

18
```

Enter 0 to calculate an average historic effort, 1 for a linear trend in historic effort, or 2 for exponential trend in historic effort

2

first and last age of data

1 10

number of seasons (months) per year

12

type of overall variance parameter (1 = log scale variance, 2 = observation scale variance, 0=force equal weighting)

1

spawning season (integer representing season/month of year when spawning occurs)

7

maturity schedue (fraction mof each age class that is sexually mature

0.875 1 1 1 1 1 1 1 1 1

fecundity schedule (index of per capita fecundity of each age class)

0.233550188 0.320312472 0.439306345 0.60250562 0.826332301 1.133309048 1.554325539 2.131746751 2.923675959 4.009801403

##

CATCH INFORMATION

##

number of catch data series (if there are no series, there should be no entries after the next line below)

5

pdf of observation error for each series (1) lognormal, (2) normal

1 1 1 1 1

units (1=numbers, 2=weight)

2 2 2 2 1

season (month) when fishing begins for each series

1 1 1 1 1

season (month) when fishing ends for each series

12 12 12 12 12

set of catch variance parameters each series is linked to

1 1 1 1 1

set of q parameters each series is linked to

1 2 3 4 5

set of s parameters each series is linked to

1 2 3 4 5

set of e parameters each series is linked to

1 2 3 4 5

observed catches by set (no column for year allowed)

#Rec-E	Rec-W	Comm-E	Comm-W	Shrimp	Year		
-1	-1	3100	4200	-1	1963		
-1	-1	15700	4300	-1	1964		
-1	-1	17400	4300	-1	1965		
-1	-1	8600	5200	-1	1966		
-1	-1	12200	5200	-1	1967		
-1	-1	8600	3900	-1	1968		
-1	-1	14600	7700	-1	1969		
-1	-1	16000	8200	-1	1970		
-1	-1	30500	9900	-1	1971		
-1	-1	47400	15200	-1	1972		
-1	-1	40000	13200	120508.7383		1973	
-1	-1	40000	13100	354238.9213		1974	
-1	-1	62000	16000	415446.9851		1975	
-1	-1	69700	14800	245573.0462		1976	
-1	-1	50095.91433		9290.08567		184925.7788	1977
-1	-1	48518.03358		10196.70201		477608.2593	1978
-1	-1	65670.02238		35732.97762		1740464.759	1979
-1	-1	65421.67444		31001.22554		589186.925	1980
639424.4847		111297.753		64498	25362	1528045.385	1981
1516212.718		91063.21632		62959	33714	1183906.915	1982

337655.7022	362038.6665	49588	23831	1343079.948	1983
123457.835	151597.5061	37396	32749	316538.4076	1984
218017.4291	66944.32143	54840	37786	921289.7427	1985
1062794.35	59638.19075	72858	22782	277533.4535	1986
1168210.092	35343.38849	89313	34290	1004250.942	1987
1480143.566	66330.47262	137978	57084	1328146.508	1988
1293422.842	135102.2886	230361	87271	915658.6986	1989
2379931.438	303848.607	359686.4117	99351.16611	1214545.022	1990
1832019.478	295327.2362	341319.2026	103211.1835	496336.0582	1991
1253217.972	135799.6089	358177.9727	112826.2101	3121327.492	1992
1247900.266	124460.8901	381531.5075	177478.2607	441013.3668	1993
978590.2947	186996.7728	251578.1497	153141.426	1882105.975	1994
982677.6788	256524.3722	207212.3346	130664.3457	912957.4786	1995
508903.9744	86037.88743	142184.5893	125331.587	1454724.714	1996
596379.2127	97863.26435	107779.7801	76909.41274	1794177.106	1997
477814.3616	54019.4364	106158.3943	70570.68378	934060.1562	1998
366220.6732	109643.8491	122462.3887	102977.4007	232768.5459	1999
308505.1688	159927.0129	62935.64346	95072.79628	1774953.564	2000
402284.4041	55433.36073	108540.9904	67637.5925	3424665.627	2001
657527.8575	35099.22066	148068.2384	85661.3573	3250122.079	2002
744684.6332	57199.4863	166357.6757	85368.40281	447672.5953	2003
838339.8629	107842.8658	143200.3288	77137.7269	1019660.333	2004

533835.2013	50861.76627	107490.0733	41727.84625	717322.97	2005
354722.1973	97213.78156	61027.88879	30847.89191	416653.6278	2006
392191.994	44469.06759	51241.30343	36909.14177	830058.1685	2007
310764.0466	108451.469	50974.8579	25440.62825	1151424.718	2008
386944.0286	14211.63237	64476.67245	16106.27639	3709347.299	2009
294294.2487	2066.249422	46907.58094	7959.133699	0	2010

annual scaling factors for observation variance (relative annual CVs)

1	1	1	1	1	1963
1	1	1	1	1	1964
1	1	1	1	1	1965
1	1	1	1	1	1966
1	1	1	1	1	1967
1	1	1	1	1	1968
1	1	1	1	1	1969
1	1	1	1	1	1970
1	1	1	1	1	1971
1	1	1	1	1	1972
1	1	1	1	1	1973
1	1	1	1	1	1974
1	1	1	1	1	1975
1	1	1	1	1	1976

1	1	1	1	1	1977
1	1	1	1	1	1978
1	1	1	1	1	1979
1	1	1	1	1	1980
1	1	1	1	1	1981
1	1	1	1	1	1982
1	1	1	1	1	1983
1	1	1	1	1	1984
1	1	1	1	1	1985
1	1	1	1	1	1986
1	1	1	1	1	1987
1	1	1	1	1	1988
1	1	1	1	1	1989
1	1	1	1	1	1990
1	1	1	1	1	1991
1	1	1	1	1	1992
1	1	1	1	1	1993
1	1	1	1	1	1994
1	1	1	1	1	1995
1	1	1	1	1	1996
1	1	1	1	1	1997
1	1	1	1	1	1998

1	1	1	1	1	1999
1	1	1	1	1	2000
1	1	1	1	1	2001
1	1	1	1	1	2002
1	1	1	1	1	2003
1	1	1	1	1	2004
1	1	1	1	1	2005
1	1	1	1	1	2006
1	1	1	1	1	2007
1	1	1	1	1	2008
1	1	1	1	1	2009
1	1	1	1	1	2010

##

INDICES OF ABUNDANCE (e.g., CPUE) If there are no series, there should be no entries between the comment lines.

##

number of index data series

8

pdf of observation error for each series (1) lognormal, (2) normal

1 1 1 1 1 1 1 1

units (1=numbers, 2=weight)

1 1 1 2 2 1 1 1

season (month) when index begins for each series

1 1 1 1 1 10 9 5

season (month) when index ends for each series

12 12 12 12 12 11 11 8

option to (1) scale or (0) not to scale index observations

0 0 0 0 0 0 0 0

set of index variance parameters each series is linked to

1 1 1 1 1 1 1 1

set of q parameters each series is linked to

6 7 8 9 10 10 12 13

set of s parameters each series is linked to

1 1 2 3 4 5 7 8

observed indices by series (no column for year allowed)

MRFSSE HBE HBW CmHLE CmHLW LarvalGW-DN TrawlGW VideoGW Year

-1 -1 -1 -1 -1 -1 -1 -1 1963

-1 -1 -1 -1 -1 -1 -1 -1 1964

-1 -1 -1 -1 -1 -1 -1 -1 1965

-1	-1	-1	-1	-1	-1	-1	-1	1966
-1	-1	-1	-1	-1	-1	-1	-1	1967
-1	-1	-1	-1	-1	-1	-1	-1	1968
-1	-1	-1	-1	-1	-1	-1	-1	1969
-1	-1	-1	-1	-1	-1	-1	-1	1970
-1	-1	-1	-1	-1	-1	-1	-1	1971
-1	-1	-1	-1	-1	-1	-1	-1	1972
-1	-1	-1	-1	-1	-1	-1	-1	1973
-1	-1	-1	-1	-1	-1	-1	-1	1974
-1	-1	-1	-1	-1	-1	-1	-1	1975
-1	-1	-1	-1	-1	-1	-1	-1	1976
-1	-1	-1	-1	-1	-1	-1	-1	1977
-1	-1	-1	-1	-1	-1	-1	-1	1978
-1	-1	-1	-1	-1	-1	-1	-1	1979
-1	-1	-1	-1	-1	-1	-1	-1	1980
181169464.1	-1	-1	-1	-1	-1	-1	-1	1981
82995990.3	-1	-1	-1	-1	-1	-1	-1	1982
55143347.3	-1	-1	-1	-1	-1	-1	-1	1983
17028629.8	-1	-1	-1	-1	-1	-1	-1	1984
10067607.2	-1	-1	-1	-1	-1	-1	-1	1985
247102390.7	38591682.2	89507730.9	-1	-1	86712000	-1	-1	1986

80758667.6	55665867.1	121083652.7	-1	-1	39618000	56915000	-1	1987
177893740.9	83627853.3	107905138.8	-1	-1	41911000	47048000	-1	1988
297639106.2	138334688.7	141068409.3	-1	-1	22090000	110364000	-1	1989
317598693.3	143342442.1	168688141.4	-1	-1	37104000	19658000	-1	1990
202360938.3	94527038.6	217562757.5	-1	-1	74063000	365786000	-1	1991
186103129.9	120423389.3	184539432.1	-1	-1	299286000	20152000	-1	1992
125085643.7	117468715.1	173108551.9	195241855.7	135819655.5	79233000	208207000	152323	1993
150427766.4	117139856.4	184331545	189478704.3	209674007.3	98834000	177218000	181741	1994
93336773	143685264.6	137054713.8	131642771.6	199443210.9	104210000	82516000	076933	1995
82879141.4	126043298.8	133426658.9	91825242.4	138885962.3	75863000	79700000	103782	1996
62173193	125063603.3	101571065.8	80601019.8	114566762.3	71963000	42238000	187424	1997
68077150.4	125035314	94635716.9	90057913.7	127175275.3	-1	3838000	-1	1998
59298717.4	120759542.6	60799032.4	78978277.7	122584328.2	20762000	91021000	-1	1999
39423410	97716528.2	42964989.4	59306269.2	91840905.4	224433000	197695000	-1	2000

60758057.7 102319376 53735831.3 94848484.8 74903979.6 39802000 301992000 -1 2001

64256462 127909141.6 56031269.7 137092465.6 90536918.1 140706000 77812000 096094 2002

54827055.6 156553325.4 71589417.6 153234351.6 90428686.4 69343000 60959000 -1 2003

87888717.9 105156690.2 83712481.7 114702958.8 80372367 40493000 71116000 078571 2004

70093351.3 86782083.5 80087440.4 111754030.5 45578974.2 -1 80059000 074015 2005

48772161.5 68641597.9 62788907.3 61728771.5 48445343.6 180179000 61988000 063959 2006

40467087.7 72703423.8 85552692.7 69934999.7 79341807.1 165072000 88964000 047001 2007

20272152.2 65979886.4 38466842.9 52015070 65475703.5 -1 109901000 054424 2008

7790130.9 28236808.2 6227291.5 41617454.9 47153870.5 -1 15278000 083731 2009

8311322.4 38292582.7 3560288.2 45939358.3 37772243 -1 29572000 -1 2010

annual scaling factors for observation variance (relative annual CVs)

1 1 1 1 1 1 1 1 1963

1 1 1 1 1 1 1 1 1964

1 1 1 1 1 1 1 1 1965

1 1 1 1 1 1 1 1 1966

1 1 1 1 1 1 1 1 1967

1 1 1 1 1 1 1 1 1968

1	1	1	1	1	1	1	1	1969
1	1	1	1	1	1	1	1	1970
1	1	1	1	1	1	1	1	1971
1	1	1	1	1	1	1	1	1972
1	1	1	1	1	1	1	1	1973
1	1	1	1	1	1	1	1	1974
1	1	1	1	1	1	1	1	1975
1	1	1	1	1	1	1	1	1976
1	1	1	1	1	1	1	1	1977
1	1	1	1	1	1	1	1	1978
1	1	1	1	1	1	1	1	1979
1	1	1	1	1	1	1	1	1980
1.723110907	1	1	1	1	1	1	1	1981
1.455930585	1	1	1	1	1	1	1	1982
1.781041469	1	1	1	1	1	1	1	1983
2.974697713	1	1	1	1	1	1	1	1984
2.789326073	1	1	1	1	1	1	1	1985
0.81459698	1.103718297	1.013626161	1	1	1.001159804	1	1	1986
0.926576687	1.083577085	0.95630732	1	1	1.766449549	0.985234218	1	1987
0.869858347	0.984432683	0.933407213	1	1	1.20034587	0.958670434	1	1988

0.787957039	0.97908491	0.942136431	1	1	1.154497349	0.71316189	1	1989
0.943909375	0.946554642	0.951467987	1	1	1.023631016	1.246639742	1	1990
0.89807691	0.968129415	0.931356433	1	1	0.682627786	0.521675549	1	1991
0.708576466	0.95774845	0.885996822	1	1	0.924840527	1.396663183	1	1992
0.818376822	0.950671084	0.898813557	1.053659442	1.56419425	0.728398641	0.620051011	0.19523	1993
0.787977796	0.972908347	0.875344441	0.974117534	1.259691355	0.794491964	0.60711321	0.20935	1994
0.949350517	0.992919554	0.894926902	0.961503102	0.9324352	0.785042664	0.796672645	0.22289	1995
0.918893526	0.983184804	0.937183869	1.013035405	0.983609938	0.845958288	0.846049626	0.19042	1996
0.785268674	0.965793482	0.991382362	1.013298628	0.725082178	1.033986414	0.979281453	0.16351	1997
0.684116486	0.962757151	1.003321961	1.017568	0.720623458	1	4.133489894	1	1998
0.627486	0.95946358	1.115907168	0.962168732	0.661322866	1.090604548	0.754005428	1	1999
0.65320432	0.989347887	1.077377424	1.023504314	0.789199927	0.806659556	0.650743881	1	2000
0.649313215	0.997441868	1.026713404	1.006216943	0.753593543	1.1017366	0.623836006	1	2001
0.638277583	0.995665109	1.038902755	0.93955797	0.687901805	1.326655828	0.844742083	0.2024	2002

0.658172514	0.999301388	0.968314204	0.921567216	0.680380059	0.87187267	0.910600997	1	2003
0.61040695	1.004953386	0.954016349	0.962417589	0.687331349	1.030336136	0.779881031	0.22607	2004
0.645626028	1.000715497	0.913471119	0.992323709	0.831884721	1	0.715501705	0.17909	2005
0.684214328	1.02712399	0.927112254	1.029956232	0.820035396	0.80728088	0.899555693	0.19347	2006
0.682717453	1.038895746	0.946889575	1.037509942	1.183563766	1.023423909	0.816320211	0.19705	2007
0.739703734	1.007625939	1.191548652	1.037039036	1.412174679	1	0.556910412	0.22559	2008
1.029413737	1.041658561	1.252610922	1.016751201	1.523513803	1	1.232359987	0.16925	2009
0.763821762	1.086327145	1.371864715	1.037805006	1.783461705	1	1.41083971	1	2010

##

EFFORT OBSERVATIONS If there are no series, there should be no entries between the comment lines.

##

number of effort data series

0

##

AGE COMPOSITION OBSERVATIONS If there are no series, there should be no entries between the comment lines.

###

number of age-composition series (If there are no series,there should be no more entries in this section)

5

first year in age-composition series

1981

probability densities used for age-comp. series (0 = ignore, 3 = multinomial, 8 = robustified normal)

3 3 3 3 0

units (only 1=numbers, no other options at this time)

1 1 1 1 1

season (month) when age collections begin for each series

1 1 1 1 1

season (month) when age collections end for each series

12 12 12 12 7

age composition data for all years in the modern period

series year sample size Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age 9 Age 10+

1 1981 5 0.133351119 0.2936891 0.256398305 0.146385781 0.073565645 0.03660688 0.018897137 0.009194365 0.005181473 0.008121609

1 1982 9 0.146160474 0.277557591 0.250923868 0.149179905 0.074820355 0.039067422 0.020191528 0.008565647 0.00446345 0.004078513

1	1983	7	0.103298717	0.287176881	0.286002109	0.158233407	0.068307423	0.045161978	0.021558561	0.009818963	0.004028429	0.006494178
1	1984	2	0.135341282	0.311478035	0.228901093	0.11548469	0.073196647	0.047936335	0.02600317	0.014153157	0.007899837	0.017860876
1	1985	3	0.095671276	0.218387536	0.229825862	0.192779551	0.108904935	0.051023636	0.044604973	0.011062327	0.01114726	0.014141658
1	1986	25	0.103671514	0.255432974	0.250295629	0.168198197	0.094480121	0.054305059	0.029807134	0.012616671	0.007706066	0.00861546
1	1987	25	0.134582676	0.260728448	0.231424945	0.157847062	0.09371492	0.050414057	0.025864772	0.010991474	0.006786885	0.005660224
1	1988	25	0.125057675	0.272236759	0.246317665	0.159756451	0.085683935	0.045362319	0.023800715	0.00997784	0.005692282	0.005130141
1	1989	25	0.173535611	0.280656991	0.212554525	0.134057639	0.079086399	0.042875929	0.01941088	0.006738855	0.005268249	0.003721401
1	1990	25	0.168992631	0.315220041	0.226572644	0.125614978	0.068907977	0.038116168	0.016443837	0.005239176	0.003949471	0.002282783
1	1991	25	0.13820447	0.286097696	0.244946718	0.152291195	0.080183556	0.040610491	0.020322656	0.007390361	0.004563615	0.003261657
1	1992	25	0.136268998	0.29204434	0.246894588	0.149858495	0.077231899	0.040961083	0.020525024	0.007479367	0.004416836	0.003801406
1	1993	25	0.13583601	0.298989134	0.245792347	0.143917606	0.075196737	0.041895052	0.020463341	0.00795483	0.00523415	0.003827489
1	1994	25	0.157858469	0.304084932	0.23200896	0.134384794	0.071980461	0.037629376	0.017500589	0.005821279	0.004506786	0.003212632
1	1995	25	0.154357536	0.321999078	0.238258075	0.127703653	0.067173741	0.036295106	0.016431424	0.005401561	0.003710278	0.001868081
1	1996	25	0.146017534	0.320780258	0.24738375	0.132176004	0.067350437	0.03626271	0.016619685	0.005493024	0.003518316	0.002203941

1	1997	25	0.142473033	0.301668361	0.238031944	0.140879893	0.076644399	0.040015376	0.019879108	0.006566989	0.004990201	0.003609377
1	1998	25	0.13911574	0.323274399	0.24820724	0.131297629	0.066976926	0.038006635	0.018032504	0.005965898	0.00383593	0.002489558
1	1999	25	0.135676566	0.325189828	0.255560841	0.133496311	0.065164815	0.035909453	0.017033455	0.005603322	0.003457144	0.002238638
1	2000	25	0.125153043	0.296088323	0.254845964	0.152079146	0.077742154	0.039515606	0.020350589	0.007000898	0.004553848	0.002848959
1	2001	25	0.142568679	0.326670541	0.244565376	0.129623636	0.067830815	0.036878523	0.01712585	0.005487712	0.003530746	0.001793165
1	2002	25	0.12947709	0.318446258	0.256016969	0.137345859	0.06952409	0.03826261	0.018889558	0.006285875	0.003888549	0.002756131
1	2003	25	0.132461312	0.317390026	0.253332602	0.139254607	0.069577338	0.037162745	0.018223575	0.005812152	0.003694338	0.002037241
1	2004	25	0.127392109	0.316556898	0.259884914	0.141120489	0.068484708	0.036997541	0.018370301	0.006018715	0.003597358	0.002291007
1	2005	25	0.13362687	0.319871962	0.253011091	0.137505714	0.068132648	0.03675451	0.018060322	0.005813943	0.00371412	0.00231899
1	2006	25	0.128479685	0.312872711	0.256909674	0.141648492	0.070114961	0.038611111	0.019093053	0.006165574	0.003812164	0.00232156
1	2007	25	0.108277338	0.300900353	0.271238149	0.158283798	0.073970305	0.038572311	0.020653109	0.007904595	0.003906464	0.003099078
1	2008	25	0.090690763	0.279048472	0.28776328	0.177248064	0.080179592	0.039159937	0.022241851	0.008812073	0.003979223	0.003251931
1	2009	25	0.061565606	0.209368286	0.297358013	0.218120553	0.10585572	0.049140714	0.029853871	0.012925546	0.007096035	0.005491044
1	2010	25	0.047065039	0.173568525	0.317400803	0.239067296	0.108827127	0.051819657	0.032838569	0.012877626	0.008578554	0.007049702

2 1981 1 0 0.002217259 0.02229804 0.145559983 0.239887564 0.239548476 0.191531508 0.082694019
0.035889772 0.040373379

2 1982 1 0.007142862 0.074863625 0.086258633 0.168056549 0.298488785 0.192135137 0.156047254
0.006802862 0.001700716 0.008503578

2 1983 1 0 0 0.005005441 0.025162659 0.0301681 0.223213937 0.46279692 0.222673029 0.005005441
0.025974475

2 1984 3 0 0.000762183 0.031039825 0.058074673 0.139162967 0.189322373 0.35115365 0.133695498
0.043863503 0.052925327

2 1985 1 0 0.009146233 0.035556808 0.083241094 0.298938189 0.126304763 0.286401963 0.060633636
0.075319859 0.024457454

2 1986 22 0.022363108 0.087366636 0.092827775 0.15929071 0.192011597 0.188860721 0.159353184
0.049376809 0.017561657 0.021735964

2 1987 24 0.020626714 0.066207269 0.073692677 0.158535003 0.211479596 0.200793722 0.164464011
0.049913052 0.015142111 0.027180126

2 1988 17 0.017393251 0.102586055 0.102009307 0.17651752 0.202474739 0.194763426 0.136162774
0.036594384 0.008354686 0.019018222

2 1989 25 0.008384377 0.062336379 0.078538324 0.171595955 0.228123651 0.232580157 0.143841269
0.040969192 0.010829017 0.02141747

2 1990 25 0.006543518 0.0496698 0.065054761 0.174056481 0.234369775 0.241323555 0.143172456 0.046736243
0.011429634 0.026625901

2 1991 25 0.004028412 0.037440822 0.056106446 0.15893873 0.229708739 0.228077138 0.172054127
0.061656722 0.018182547 0.033806317

2 1992 25 0.020728916 0.074797994 0.081085247 0.170433229 0.21724573 0.218307176 0.136340714
0.039539291 0.010758063 0.019237305

2 1993 25 0.00302277 0.02847651 0.050978945 0.144205311 0.224018917 0.237737424 0.188051977
0.070697553 0.023501052 0.028520014

2 1994 25 0.004587936 0.043104087 0.062976058 0.155815156 0.230130236 0.236554435 0.169447587
0.055640307 0.01736033 0.023947518

2	1995	25	0.002414919	0.027609216	0.045967581	0.154221843	0.241752534	0.248821188	0.172677694	0.060714194	0.019334772	0.026486059
2	1996	25	0.004179199	0.037781286	0.057035213	0.156155964	0.239470994	0.240867797	0.170897289	0.052923095	0.015932067	0.023479615
2	1997	25	0.006666628	0.053602097	0.0716415	0.156444663	0.210291541	0.229930993	0.169027518	0.059170064	0.017872766	0.025352231
2	1998	25	0.005306098	0.047826368	0.066635872	0.153373569	0.226791675	0.232613137	0.171712055	0.054873131	0.019128564	0.021739531
2	1999	25	0.001886783	0.024147096	0.043308133	0.148604776	0.226089766	0.249481536	0.185976146	0.072166101	0.020838103	0.027501561
2	2000	25	0.001369858	0.02614689	0.052707476	0.114613412	0.20856279	0.22502451	0.23802049	0.080534497	0.027706884	0.025313194
2	2001	25	0.013709363	0.059242898	0.073416036	0.162386093	0.22464991	0.230494596	0.151588362	0.044488606	0.012549901	0.0202948
2	2002	25	0.007776351	0.020372784	0.035358275	0.15044611	0.222516258	0.240427744	0.184911876	0.073381016	0.021097097	0.037827715
2	2003	25	0.003045668	0.036573146	0.05796861	0.155072231	0.220504099	0.242283063	0.175209885	0.064309742	0.016841073	0.028192482
2	2004	25	0.002142846	0.032165408	0.05499865	0.156160708	0.235692876	0.243293338	0.168628931	0.061933114	0.018149908	0.026834221
2	2005	25	0.002727255	0.036344759	0.060862687	0.153432618	0.22808585	0.219949359	0.180752891	0.062433767	0.021079406	0.034331409
2	2006	25	0.002702688	0.03921924	0.063719104	0.149166644	0.211359991	0.244348545	0.183688974	0.064604144	0.015384959	0.025805712
2	2007	25	0	0.013121835	0.032884409	0.165455728	0.253817814	0.242839299	0.166323595	0.065884421	0.01867556	0.040997339
2	2008	25	0.00199999	0.019045301	0.042084681	0.127091039	0.216744373	0.219922456	0.219073661	0.085804854	0.032580831	0.035652815

2	2009	10	0.006666604	0.058490121	0.088017845	0.145547975	0.199711469	0.173755712	0.187868913	0.070324677	0.032073034	0.03754365
2	2010	3	0	0	0.024909917	0.035326549	0.118206273	0.20199266	0.376358745	0.174819417	0.053893154	0.014493285
3	1981	0	0	0	0	0	0	0	0	0	0	0
3	1982	0	0	0	0	0	0	0	0	0	0	0
3	1983	0	0	0	0	0	0	0	0	0	0	0
3	1984	0	0	0	0	0	0	0	0	0	0	0
3	1985	0	0	0	0	0	0	0	0	0	0	0
3	1986	0	0	0	0	0	0	0	0	0	0	0
3	1987	0	0	0	0	0	0	0	0	0	0	0
3	1988	0	0	0	0	0	0	0	0	0	0	0
3	1989	0	0	0	0	0	0	0	0	0	0	0
3	1990	7	0.062103831	0.183374151	0.201085449	0.155010054	0.125824906	0.107213224	0.049561503	0.046120253	0.022220943	0.043127195
3	1991	4	0.09552004	0.18670793	0.170976059	0.138612017	0.131882839	0.093843847	0.039858281	0.052126992	0.021095511	0.053912054
3	1992	5	0.090110017	0.21145162	0.212625515	0.160792822	0.115229759	0.077059916	0.042768554	0.029371277	0.014657379	0.030838379
3	1993	25	0.0879827	0.251618383	0.276079752	0.179001351	0.089111133	0.050225213	0.026481289	0.014214179	0.006349839	0.010241897
3	1994	25	0.101930418	0.268135767	0.260542382	0.168423559	0.088895985	0.048556359	0.02645883	0.011236146	0.006543325	0.006864228
3	1995	25	0.106721303	0.286781142	0.27145481	0.161835958	0.080079126	0.04065872	0.021717564	0.009125292	0.004599311	0.004192226

3	1996	25	0.111741549	0.2763052	0.26456991	0.162505375	0.079448648	0.042127015	0.022473167	0.009850427	0.004954661	0.00557509
3	1997	25	0.116991019	0.283939951	0.267445755	0.164091709	0.077857871	0.038865552	0.020479009	0.007813639	0.004168139	0.003653345
3	1998	25	0.127089496	0.29818734	0.242297493	0.139210033	0.078851788	0.045122324	0.021838489	0.012453839	0.005568849	0.00953465
3	1999	25	0.09135484	0.26508793	0.265070416	0.170547737	0.088301155	0.049681903	0.026922264	0.015845989	0.00636185	0.011851101
3	2000	25	0.090459941	0.264125006	0.264346176	0.169112352	0.089709999	0.050365185	0.027949525	0.016493327	0.006045775	0.012059102
3	2001	25	0.110200129	0.286846027	0.268070812	0.157373701	0.07794405	0.042617792	0.02157302	0.009628489	0.004939771	0.005856035
3	2002	25	0.115964669	0.295300938	0.256013958	0.146554814	0.07732407	0.044507789	0.023144431	0.010966766	0.006054213	0.009907597
3	2003	25	0.097488991	0.24133199	0.246772173	0.172445361	0.101446526	0.056716406	0.030955161	0.018147875	0.008684789	0.014181061
3	2004	25	0.071394964	0.216410055	0.259505238	0.195170649	0.112202717	0.061762862	0.037016256	0.018339319	0.009896826	0.01334981
3	2005	25	0.062307194	0.198467403	0.254216545	0.206455504	0.116425591	0.066526303	0.039876666	0.022094763	0.012314529	0.016510094
3	2006	25	0.054795405	0.192413645	0.241401984	0.196651308	0.122641612	0.078059489	0.041322797	0.029996016	0.013931978	0.026684831
3	2007	8	0.04352325	0.135541102	0.222764736	0.21012954	0.143146411	0.099892398	0.056162141	0.033026913	0.022633984	0.028959258
3	2008	7	0.028032345	0.096716216	0.187467512	0.213594685	0.16858235	0.122569282	0.065930749	0.044501142	0.027684509	0.044367764
3	2009	9	0.028503455	0.109426294	0.211805229	0.244699112	0.166566223	0.098326676	0.062523436	0.03036423	0.021198701	0.025690134

3	2010	10	0.048836147	0.17274996	0.264681302	0.214884176	0.124486842	0.076817521	0.044855511	0.021603854	0.013198185	0.015526592
4	1981	0	0	0	0	0	0	0	0	0	0	0
4	1982	0	0	0	0	0	0	0	0	0	0	0
4	1983	0	0	0	0	0	0	0	0	0	0	0
4	1984	0	0	0	0	0	0	0	0	0	0	0
4	1985	0	0	0	0	0	0	0	0	0	0	0
4	1986	0	0	0	0	0	0	0	0	0	0	0
4	1987	0	0	0	0	0	0	0	0	0	0	0
4	1988	0	0	0	0	0	0	0	0	0	0	0
4	1989	0	0	0	0	0	0	0	0	0	0	0
4	1990	25	0.062103831	0.183374151	0.201085449	0.155010054	0.125824906	0.107213224	0.049561503	0.046120253	0.022220943	0.043127195
4	1991	25	0.09552004	0.18670793	0.170976059	0.138612017	0.131882839	0.093843847	0.039858281	0.052126992	0.021095511	0.053912054
4	1992	25	0.090110017	0.21145162	0.212625515	0.160792822	0.115229759	0.077059916	0.042768554	0.029371277	0.014657379	0.030838379
4	1993	25	0.0879827	0.251618383	0.276079752	0.179001351	0.089111133	0.050225213	0.026481289	0.014214179	0.006349839	0.010241897
4	1994	25	0.101930418	0.268135767	0.260542382	0.168423559	0.088895985	0.048556359	0.02645883	0.011236146	0.006543325	0.006864228
4	1995	25	0.106721303	0.286781142	0.27145481	0.161835958	0.080079126	0.04065872	0.021717564	0.009125292	0.004599311	0.004192226
4	1996	25	0.111741549	0.2763052	0.26456991	0.162505375	0.079448648	0.042127015	0.022473167	0.009850427	0.004954661	0.00557509

4	1997	25	0.116991019	0.283939951	0.267445755	0.164091709	0.077857871	0.038865552	0.020479009	0.007813639	0.004168139	0.003653345
4	1998	12	0.127089496	0.29818734	0.242297493	0.139210033	0.078851788	0.045122324	0.021838489	0.012453839	0.005568849	0.00953465
4	1999	6	0.09135484	0.26508793	0.265070416	0.170547737	0.088301155	0.049681903	0.026922264	0.015845989	0.00636185	0.011851101
4	2000	4	0.090459941	0.264125006	0.264346176	0.169112352	0.089709999	0.050365185	0.027949525	0.016493327	0.006045775	0.012059102
4	2001	10	0.110200129	0.286846027	0.268070812	0.157373701	0.07794405	0.042617792	0.02157302	0.009628489	0.004939771	0.005856035
4	2002	15	0.115964669	0.295300938	0.256013958	0.146554814	0.07732407	0.044507789	0.023144431	0.010966766	0.006054213	0.009907597
4	2003	21	0.097488991	0.24133199	0.246772173	0.172445361	0.101446526	0.056716406	0.030955161	0.018147875	0.008684789	0.014181061
4	2004	8	0.071394964	0.216410055	0.259505238	0.195170649	0.112202717	0.061762862	0.037016256	0.018339319	0.009896826	0.01334981
4	2005	14	0.062307194	0.198467403	0.254216545	0.206455504	0.116425591	0.066526303	0.039876666	0.022094763	0.012314529	0.016510094
4	2006	2	0.054795405	0.192413645	0.241401984	0.196651308	0.122641612	0.078059489	0.041322797	0.029996016	0.013931978	0.026684831
4	2007	6	0.04352325	0.135541102	0.222764736	0.21012954	0.143146411	0.099892398	0.056162141	0.033026913	0.022633984	0.028959258
4	2008	1	0.028032345	0.096716216	0.187467512	0.213594685	0.16858235	0.122569282	0.065930749	0.044501142	0.027684509	0.044367764
4	2009	1	0.028503455	0.109426294	0.211805229	0.244699112	0.166566223	0.098326676	0.062523436	0.03036423	0.021198701	0.025690134
4	2010	1	0.048836147	0.17274996	0.264681302	0.214884176	0.124486842	0.076817521	0.044855511	0.021603854	0.013198185	0.015526592
5	1981	1	1	0	0	0	0	0	0	0	0	0

5	1982	1	1	0	0	0	0	0	0	0	0	0
5	1983	1	1	0	0	0	0	0	0	0	0	0
5	1984	1	1	0	0	0	0	0	0	0	0	0
5	1985	1	1	0	0	0	0	0	0	0	0	0
5	1986	1	1	0	0	0	0	0	0	0	0	0
5	1987	1	1	0	0	0	0	0	0	0	0	0
5	1988	1	1	0	0	0	0	0	0	0	0	0
5	1989	1	1	0	0	0	0	0	0	0	0	0
5	1990	1	1	0	0	0	0	0	0	0	0	0
5	1991	1	1	0	0	0	0	0	0	0	0	0
5	1992	1	1	0	0	0	0	0	0	0	0	0
5	1993	1	1	0	0	0	0	0	0	0	0	0
5	1994	1	1	0	0	0	0	0	0	0	0	0
5	1995	1	1	0	0	0	0	0	0	0	0	0
5	1996	1	1	0	0	0	0	0	0	0	0	0
5	1997	1	1	0	0	0	0	0	0	0	0	0
5	1998	1	1	0	0	0	0	0	0	0	0	0
5	1999	1	1	0	0	0	0	0	0	0	0	0
5	2000	1	1	0	0	0	0	0	0	0	0	0
5	2001	1	1	0	0	0	0	0	0	0	0	0
5	2002	1	1	0	0	0	0	0	0	0	0	0
5	2003	1	1	0	0	0	0	0	0	0	0	0

5	2004	1	1	0	0	0	0	0	0	0	0	0
5	2005	1	1	0	0	0	0	0	0	0	0	0
5	2006	1	1	0	0	0	0	0	0	0	0	0
5	2007	1	1	0	0	0	0	0	0	0	0	0
5	2008	1	1	0	0	0	0	0	0	0	0	0
5	2009	1	1	0	0	0	0	0	0	0	0	0
5	2010	1	1	0	0	0	0	0	0	0	0	0

TABLE A-45: SSASPM PARAMETER INPUT FILE FOR THE CONTINUITY RUN.

```
####################################################################################################

# PARAMETER INPUT FILE--Gray Triggerfish August 2011

####################################################################################################

#

#================================================================================

# Total number of process parameters (must match number of entries in 'Specifications 1' section)

#================================================================================

58

#================================================================================

# Number of sets of each class of parameters (must be at least 1)

#================================================================================

# q (catchability)
```

```
# | Effort
# | | Vulnerability (selectivity)
# | | | catch observation variance scalar
# | | | | index variance scalar
# | | | | | effort variance scalar
# | | | | | |
#------------------------------------------------------------------------------------------------------------------------------------
13	5	8	2	1	1
#================================================================================
# Specifications 1: process parameters and observation error parameters
#================================================================================
# class (nature) of parameter (1=constant, 2-4 = polynomial of degree x)
# | best estimate (or central tendency of prior)
# | | lower bound upper bound
# | | | | phase to estimate (-1 = don't estimate)
# | | | | | prior density (1= lognormal, 2=normal, 3=uniform)
# | | | | | | prior variance
# | | | | | | |
#------------------------------------------------------------------------------------------------------------------------------------
# Natural mortality rate
1	0.27	0.19	0.41	-3	1	0.25
# Recruitment (10=Beverton/Holt, 11=Ricker)
```

10	20000000	1000000	1000000000		1	3	1	
10	32	1.1	100	2	1	0.0098		

Growth (type 8 = von Bertalanfy/Richards, Linf, K, t0, m, a, b (weight=al^b))

8	423.4	0.0001	1000000	-1	0	1		
8	0.4269	0	2	-1	0	1		
8	-0.6292	-5	5	-1	0	1		
8	1	0	10	-1	0	1		
8	4.49E-08	0	100	-1	0	1		
8	3.0203	0	5	-1	0	1		
#	catchability							
1	1	1.00E-10	10	-1	0	1	#	Rec-E
1	1	1.00E-10	10	-1	0	1	#	Rec-W
1	1	1.00E-10	10	-1	0	1	#	Comm-E
1	1	1.00E-10	10	-1	0	1	#	Comm-W
1	1	1.00E-10	10	-1	0	1	#	Shrimp
1	0.1	0.001	1000	1	0	1	#	MRFSSE
1	0.1	0.001	1000	1	0	1	#	HBE
1	0.1	0.001	1000	1	0	1	#	HBW
1	0.1	0.001	1000	1	0	1	#	CmHLE
1	0.1	0.001	1000	1	0	1	#	CmHLW
1	0.1	0.001	1000	1	0	1	#	Larval
1	0.1	0.001	1000	1	0	1	#	Trawl

1	0.1	0.001	1000	1	0	1	#	Video

effort for 'prehistoric' period when data is sparse (Fix at anything if linear estimation is used)

1	0.0001	-1.00E-32	1.1	-4	0	1	#	Rec-E
1	0.0001	-1.00E-32	1.1	-4	0	1	#	Rec-W
1	0.0001	0.000001	1.1	4	0	1	#	Comm-E
1	0.0001	0.000001	1.1	4	0	1	#	Comm-W
1	0.0001	-1.00E-32	1.1	-4	0	1	#	Shr

effort for period with useful data

1	0.001	0.00001	0.3	1	0	1	#	Rec-E
1	0.001	0.00001	0.3	1	0	1	#	Rec-W
1	0.001	0.00001	0.3	1	0	1	#	Comm-E
1	0.001	0.00001	0.3	1	0	1	#	Comm-W
1	0.001	0.00001	0.3	1	0	1	#	Shr

vulnerability (selectivity) (5=knife edge, 6=logistic, 7=gamma, 15 = double logistic)

6	0.4	0	2	3	0	1	#	Rec-E
6	1.65	0.5	10	4	0	0.0625		
6	0.7	0	2	3	0	1	#	Rec-W
6	1.2	0.5	10	4	0	0.0625		
6	0.5	0	2	3	0	1	#	Comm-E
6	1.2	0.5	10	4	0	0.0625		
6	0.7	0	2	3	0	1	#	Comm-W
6	1.7	0.5	10	4	0	0.0625		

15	0	-1	10	-3	0	0.0625	#Shrimp		
15	0.01	0	2	-4	0	1			
15	2.1	-1	10	-3	0	0.0625			
15	0.2	0	2	-4	0	1			
15	0.99592986		0	1	-4	0	1		
6	0.7	0	2	-3	0	0.0625	#Larval		
6	8	0	10	-4	0	1			
15	0	-1	10	-3	0	0.0625	#Trawl		
15	0.01	0	2	-4	0	1			
15	2.1	-1	10	-3	0	0.0625			
15	0.2	0	2	-4	0	1			
15	0.99592986		0	1	-4	0	1		
6	0.5	0	2	-3	0	1	#Video		
6	1	0.5	10	-4	0	0.0625			
#	catch	observation		error	variance	scalar			
1	1	0.01	5	-1	0	1	#	All	others
1	2	0.01	5	-1	0	1	#	Shrimp	
#	index	observation		error	variance	scalar			
1	1.5	0.1	5	-1	0	1			
#	effort	observation		error	variance	scalar			
1	1	0.1	5	-1	0	1			

#==

#	Specifications		2:00	process	ERROR	parameters					
#===											
#	best	estimate	(or	central	tendency	of	prior)				
#	|	lower	bound	upper	bound						
#	|	|	phase	to	estimate	(<0	=	don't	estimate)		
#	|	|	|	|	prior	density	(1=lognormal,		2=normal,	3=uniform)	
#	|	|	|	|	|	prior	variance				
#	|	|	|	|	|	|					
#---											
#	overall	variance	(negative	value	indicates	a	CV)				
-0.2	-2	-0.01	3	0	1						
#	recruitment		process	variation	parameters		(allows	year	to	year	fluctuations)
#	correlationcoefficient										
0	-1.00E-32	0.99	-1	0	1						
#	variance	scalar	(multiplied	by	overall	variance)					
0.15	0	1.00E+20	-1	0	1						
#	annual	deviation	parameters		(last	entry	is	arbitrary	for	deviations)	
0	-5	5	4	1	1						
#	catchability		process	variation	parameters		(allows	year	to	year	fluctuations)
#	correlationcoefficients										
0	-1.00E-32	0.99	-1	0	1	#	Rec-E				
0	-1.00E-32	0.99	-1	0	1	#	Rec-W				

0	-1.00E-32	0.99	-1	0	1	#	Comm-E
0	-1.00E-32	0.99	-1	0	1	#	Comm-W
0	-1.00E-32	0.99	-1	0	1	#	Shrimp
0	-1.00E-32	0.99	-1	0	1	#	MRFSSE
0	-1.00E-32	0.99	-1	0	1	#	HBE
0	-1.00E-32	0.99	-1	0	1	#	HBW
0	-1.00E-32	0.99	-1	0	1	#	CmHLE
0	-1.00E-32	0.99	-1	0	1	#	CmHLW
0	-1.00E-32	0.99	-1	0	1	#	Larval
0	-1.00E-32	0.99	-1	0	1	#	Trawl
0	-1.00E-32	0.99	-1	0	1	#	Video
#	variance	scalars	(multiplied	by	overall	variance)	
0	-1.00E-32	1.00E+20	-1	0	1	#	Rec-E
0	-1.00E-32	1.00E+20	-1	0	1	#	Rec-W
0	-1.00E-32	1.00E+20	-1	0	1	#	Comm-E
0	-1.00E-32	1.00E+20	-1	0	1	#	Comm-W
0	-1.00E-32	1.00E+20	-1	0	1	#	Shrimp
0	-1.00E-32	1.00E+20	-1	0	1	#	MRFSSE
0	-1.00E-32	1.00E+20	-1	0	1	#	HBE
0	-1.00E-32	1.00E+20	-1	0	1	#	HBW
0	-1.00E-32	1.00E+20	-1	0	1	#	CmHLE
0	-1.00E-32	1.00E+20	-1	0	1	#	CmHLW

0	-1.00E-32	1.00E+20	-1	0	1	#	Larval				
0	-1.00E-32	1.00E+20	-1	0	1	#	Trawl				
0	-1.00E-32	1.00E+20	-1	0	1	#	Video				
#	annual	deviation	parameters		(last	entry	is	arbitrary	for	deviations)	
0	-5	5	-1	0	1	#	Rec-E				
0	-5	5	-1	0	1	#	Rec-W				
0	-5	5	-1	0	1	#	Comm-E				
0	-5	5	-1	0	1	#	Comm-W				
0	-5	5	-1	0	1	#	Shrimp				
0	-5	5	-1	0	1	#	MRFSSE				
0	-5	5	-1	0	1	#	HBE				
0	-5	5	-1	0	1	#	HBW				
0	-5	5	-1	0	1	#	CmHLE				
0	-5	5	-1	0	1	#	CmHLW				
0	-5	5	-1	0	1	#	Larval				
0	-5	5	-1	0	1	#	Trawl				
0	-5	5	-1	0	1	#	Video				
#	effort	process	variation	parameters		(allows	year	to	year	fluctuations)	
#	correlation	coefficients									
0.5	0	0.99	-1	0	1	#	Rec-E				
0.5	0	0.99	-1	0	1	#	Rec-W				
0.5	0	0.99	-1	0	1	#	Comm-E				

0.5	0	0.99	-1	0	1	#	Comm-W			
0.5	0	0.99	-1	0	1	#	Shr			
#	variance	scalars	(multiplied	by	overall	variance)				
0.223	0	1.00E+20	-1	0	1	#	Rec-E			
0.223	0	1.00E+20	-1	0	1	#	Rec-W			
0.223	0	1.00E+20	-1	0	1	#	Comm-E			
0.223	0	1.00E+20	-1	0	1	#	Comm-W			
0.0392	0	1.00E+20	-1	0	1	#	Shr			
#	annual	deviation	parameters		(last	entry	is	arbitrary	for	deviations)
0.0001	-5	5	2	1	1	#	Rec-E			
0.0001	-5	5	2	1	1	#	Rec-W			
0.0001	-5	5	2	1	1	#	Comm-E			
0.0001	-5	5	2	1	1	#	Comm-W			
0.0001	-5	5	2	1	1	#	Shr			

TABLE A-46: PRO-2BOX PROJECTION INPUT FILE FOR THE CONTINUITY RUN.

```
#*************************************************************************

#----------INPUT DATA FILE FOR PROGRAM PROJECT--------------------------

#*data entry is free-format.  Null lines and comments must be

#*initiated here by pound signs (#) asterisks (*) or dashes (-).  Do not,

#*however, interrupt a stream of vector inputs with a comment.

#*************************************************************************

#000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

# Enter control information common to both areas/stocks

#000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

 1    MODEL_TYPE  (1 = no mixing or diffusion mixing at beginning of year or 2 = overlap)

 1    N_BOX  {number of sexes/areas/stocks -- enter 1 or 2}

 500  N_LOOPS {number of bootstrap projections, enter 0 if only a single deterministic run and a negative integer if wyou want the program to check the ASC-II file bad.out for bad runs}

 80   CI {confidence interval in percent (e.g., 80)}

-12345  SEED {random number seed (should be a negative integer)}

 0    PATCH (>0)=number of recruitments replace with estimates from spawner-recruit curve, (<=0)=don't do it

 1    YR_BOX (1)=maximize y/r and msy of sex/area/stock 1 alone, or (2) of sex/area/stock 2 alone, or (3) of both stocks combined

 1    SR_BOX (0)=not a sex-specific analysis(1)=compute ssb of sex 1 only, or (2) of sex 2 only, or (3) of both sexes combined

 1    SEX_FRACTION = fraction of population belonging to sex 1 at age of recruitment (immaterial if SR_BOX<1 or N_box=1)

 2    WEIGHT_TYPE (0) use growth curve for all weights (1) use growth curve only for plus group projections 2) Use Observed Weights for all ages

 1963 2010 2050  {FIRST year, LAST year in data, Last year to PROJECT}

 1 10 10 10 First age followed by last ages for sex/area/stock 1 and 2 (a total of three entries)
```

```
#--------------------------------------------------------------------------
# Enter the selectivity option: two positive integers indicate the first and
#      last years for a geometric mean of the F's at age.  Any negative value indicates
#      that the user specified vectors in the selectivity file are to be used (otherwise
#      the selectivity file values are used to modify the geometric mean)
2010 2010 ##Check that this is what you want.
#--------------------------------------------------------------------------
# Enter the first and last years to use for recruitment and the first and last years for ssb
 1964 2010 1963 2009
# Error type for recruitment
 1
#1111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111
# Enter area specific growth information for area/stock 1
#1111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111
 1       N_GEARS(area 1)
 -14.0  average age of the plus-group at the BEGINNING of the last year (-x) = compute from growth curve
 1 1 1 1 1 1 1 1 1 1    #FEC*Maturity is already input in WAA.txt
# curve type (1=von Bertalanffy or Chapman Richards, 2=Gompertz)
# |  Linfinity
# |  |     k
# |  |     |     tO
# |  |     |     |        Chapman-Richards skew parameter (m=1 for von Bert) - ignored if Gompertz used
```

```
# |  |    |    |       |    weight parameter a of w=al^b
# |  |    |    |       |    |       weight parameter b of w=al^b
# |  |    |    |       |    |       |      time of year for growth equation (in months)
# |  |    |    |       |    |       |      |   offset to accout for dif between vpa age and growth curve age
# |  |    |    |       |    |       |      |     |
 1 423.4  0.4269  -0.6292  1    1        0    6     0    SSB (works if Fecundity in EGGS is used in SSASPM and born on July 1)
 1 423.4  0.4269  -0.6292  1  4.49e-08  3.0203     6     0    Fishery 1
#222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
# Enter area specific growth information for area/stock 2 (if any)
#222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
#FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
# Enter file information
#FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
# file type (0=asc-ii, default=VPA-2box binary format)
# |   file name
# |   |
 0  QUOTAS.txt               file with catch/effort limit scenarios
 0  NAA.txt                  stock size in numbers
 0  FAA.txt                  fishing mortality rate
 0  WAA.txt                  average weight at age
 0  CAA.txt                  catch at age
 0  M.txt                    natural mortality rate
```

0 S.txt selectivity modifiers

0 RECRUITS.TXT stock-recruitment parameters

0 T.txt transfer coefficients

0 DISCARDS.txt proportion from each fishery that is discarded

0 NSIG.txt standard deviation at age on abundance in terminal year

0 FSIG.txt standard deviation at age on fishing mortality in terminal year

END OF FILE

TABLE A-47: PRO-2BOX PROJECTION QUOTAS FILE FOR THE CONTINUITY RUN.

**Enter the number of catch/effort scenarios to run

9

#---

**SCENARIO 1 2011 Landings fixed at 2011 Fspr30, 2011 Catch equals TAC

#---

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

1 1 731 100*1000000

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

1 1 2 100*-30 area 1

-1

#--

**SCENARIO 2 PROJECT at 75% SPR 30, 2011 Catch equals TAC

#--

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

 1 1 731 100*1000000

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

 1 1   2 100*0.186   area 1 (fix F at 75% Fspr30)

-1

#--

**SCENARIO 3 CATCH AND (F = 0), 2011 Catch equals TAC

#--

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

 1 1 731 100*0.0

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

 1 1   2   100*0.00   area 1 (F=0)

-1

#---

**SCENARIO 4 2011 Landings fixed at 2011 Fspr30, Effort in 2011 Same as 2010

#---

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

  1 1 10000000 100*1000000

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

 1 1   -999 100*-30   area 1

-1

#---

**SCENARIO 5 PROJECT at 75% SPR 30, Effort in 2011 Same as 2010

#---

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

  1 1 10000000 100*1000000

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

1 1 -999 100*0.186 area 1 (fix F at 75% Fspr30)

-1

#---

**SCENARIO 6 CATCH AND (F = 0), Effort in 2011 Same as 2010

#---

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

1 1 10000000 100*0.0

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

1 1 -999 100*0.00 area 1 (F=0)

-1

#---

**SCENARIO 7 2011 Landings fixed at 2011 Fspr30, 2011 Catch equals average annual removals 2007 through 2009

#---

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

1 1 508 100*1000000

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

1 1 2 100*-30 area 1

-1

#--

**SCENARIO 8 PROJECT at 75% SPR 30, 2011 Catch equals average annual removals 2007 through 2009

#--

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

1 1 508 100*1000000

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

1 1 2 100*0.186 area 1 (fix F at 75% Fspr30)

-1

#--

**SCENARIO 9 CATCH AND (F = 0), 2011 Catch equals average annual removals 2007 through 2009

#--

**Enter the total allowable catch (thousand pounds) for each projection year (2011-2050)

1 1 508 100*0.0

-1

**Enter the fixed fully-selected fishing mortality rates by year (2005-2017)

1 1 2 100*0.00 area 1 (F=0)

-1

SEDAR 9 Update Stock Assessment Report

Section III:

Gulf of Mexico Fishery Management Council Scientific and Statistical Committee Review Report

2011 SEDAR 9 Update Assessment for Gray Triggerfish Gulf of Mexico Fishery Management Council Scientific and Statistical Committee Review Summary Report

21 May 2012

Review of Gray Triggerfish Update Assessment

Southeast Fisheries Science Center (SEFSC) staff reviewed the gray triggerfish update assessment. The assessment updated fishery dependent and independent data through 2010. One change from the original inputs was that updated age and growth data from the Panama City laboratory was used in two alternative runs based on recommendations for revisions to the age analysis process made during SEDAR 9. The original age and growth data, which was used in the continuity run, had come from several different labs, and there were questions about the standardization of the methodology and experience of those doing the aging. The new data resulted in a von Bertalanffy growth equation and age-length key that moved fish at a given length into younger age classes, but provided a better fit to the data. Other changes included re-estimation of Texas recreational catch data over the entire catch history, and addition of mis-classified commercial landings in 1992 and 1999. In addition, three approaches were considered to estimate the number of age one fish in the shrimp trawl bycatch. A continuity model run and two alternative runs were made:

- Continuity Run: exact model parameter configuration, data treatment, and data preparation as in 2006 benchmark assessment.

- New Age-Length Key and Growth Curve: incorporated new age-length key and von Bertalanffy growth function estimated from recent Panama City gray triggerfish age data and alternative estimation of annually varying shrimp bycatch.

- Gulfwide Shrimp Effort: used new age-length key and growth curve as above, recreational landings input as numbers of fish, shrimp bycatch entered as the median each year (rather than annually varying), and incorporated shrimp effort time series for the entire Gulf of Mexico.

The results of all of the model runs indicated that overfishing was occurring, and spawning stock biomass levels (measured in terms of egg production) were substantially lower than in the SEDAR 9 assessment.

Projection runs were made with fishing effort set to $F_{SPR\ 30\%}$ (proxy for F_{MSY}), 75% of $F_{SPR\ 30\%}$ (proxy for F_{OY}), and F = 0.

After reviewing the presentation, SSC members asked for the following additional analyses:

1. Calculate apical F by fishery over time: currently not printed out by a state-space age-structured production model (SSASPM).
2. Provide a table of age at selectivity (by sector/gear).
3. Plot F at age across the entire assessment.
4. Plot new phase plot using $F_{SPR\ 30\%}$.
5. Adjust plots of the rebuilding time based on the start of rebuilding plan in 2008.
6. Plot the stock recruitment data.
7. Look into the difference between the parameterization of the gray trigger SSASPM model and that from vermilion snapper.
8. Evaluate age comp before and after 2008 implementation of circle hooks.
9. Check numbers in the F/F_{MSY} and $F/F_{SPR\ 30\%}$ plots – they are correct

SEFSC staff provided responses to the above requests except for items 1, 7, and 8, which would require more analyses than could be done during the SSC meeting.

Estimates of both F_{MSY} and the $F_{SPR\ 30\%}$ proxy were evaluated in the assessment. In order to decide whether to use the actual estimate of F_{MSY} or the proxy for management advice, the SSC examined the stock-recruit curve. The data did not provide a strong fit to the curve, and as a result the SSC concluded that they did not have confidence in using the actual F_{MSY} estimate. Therefore, management advice was based on the proxy.

After evaluating the continuity run and two alternative model runs, the SSC moved to accept the Gulfwide shrimp effort model run.

> **The SSC moves to accept the Gulf-wide shrimp effort alternative run as the best scientific information available to evaluate the stock status of Gulf Gray Triggerfish.**

Motion passed 15 to 0 (1 absent).

The SSC's rationale for accepting the alternative run rather than the strict update (continuity run) was as follows:

- Median shrimp bycatch was used to scale the magnitude of the bycatch and the shrimp effort to inform the trend in bycatch over time.
- New age-length data was collected and aged based on the recommendations compiled during the last benchmark assessment.
- Recreational catches were in numbers rather than weight, eliminating the uncertainty produced by estimating the weight of the catch.

To determine ABC, SEFSC staff provided a spreadsheet that could provide the yield at any given probability of exceeding $F_{SPR30\%}$ (OFL proxy). The SSC evaluated yield streams at both 30% and 10% probability levels. Initially, a motion was made to recommend ABC for 2012 and 2013 at the 10% probability level. Although this was below the range of 30% to 50% probability that would be considered in a Tier 1 ABC control rule, it was noted that there is a fair amount of uncertainty in the assessment, and that this would set the ABC at approximately the 2010 catch levels. It was also noted that OFL was defined as the MSY proxy and not the yield at $F_{Rebuild}$, which was unknown. However, due to concerns that the ABC was more conservative than what the ABC control rule would call for, the motion failed on a tie vote.

The SSC moves to recommend the OFL in 2012 & 2013 be set at 348,000 lbs for the Gulf Gray Triggerfish directed fishery.

Motion failed 8-8

A motion was then made to recommend ABC for 2012 and 2013 at the 30% probability level. However, this motion was withdrawn after SSC members indicated that they would first like to see projection reruns that used average recruitment during 2005-2009. This request was made because the recruitment graphs showed wide fluctuations in recruitment over time. There was concern that the stock might have dropped to very low levels where depensatory mortality rather than compensatory mortality might be in effect. If recruitment has changed over time, then a recent average might be more representative of recruitment in future years. There were also concerns that the assessment had not captured some portions of gray triggerfish life history resulting in the large variation in recruitment.

SEFSC staff provided the results of the reruns the next day. In addition to evaluating the use of average recruitment vs. the spawner-recruit curve originally used in the SSASPM model, SEFSC staff also provided runs comparing gear selectivity values from 2007-2009 vs. 2010 in order to evaluate whether there was an impact in selectivity from the 2010 Deepwater Horizon oil spill. Thus, four variations on the model rerun were presented. The selectivity scenarios showed no significant differences in selectivity, but the reruns that used the gear selectivity values from 2007-2009 did not exclude shrimp trawl bycatch from the amount of harvestable catch. Therefore, the SSC selected the model run that used recruitment average of 2005-2009 with 2010 selectivity. The SSC also accepted the recommendation of the assessment scientists to estimate 2011 catches as the average catch from 2007-2009.

OFL, defined as the yield at $F_{SPR\ 30\%}$ (proxy for F_{MSY}) was calculated as 401,600 pounds whole weight for 2012.

The SSC returned to a discussion of setting ABC based on a selected P* probability of overfishing level. However, some SSC members felt that there was too much uncertainty in the model to apply this method. One SSC member suggested that the probability distribution function should be based on a weighted average of the PDFs from all of the model runs, with the selected model run having a higher weighting. This would help to account for intra-model uncertainty. Eventually, SSC members decided that use of the P* approach was inappropriate until a new benchmark assessment is produced. The SSC decided instead to set ABC at the level corresponding to the yield at 75% of the F_{MSY} proxy ($F_{SPR\ 30\%}$), which is consistent with the approach used to set red snapper ABC. SSC members were also concerned that the stock did not appear to be responding to the original rebuilding plan that was implemented in 2008, and decided that ABC should remain at the 2012 level until a new stock assessment is produced rather than increase annually with increases in OFL. In addition, a suggestion was made that the Council consider setting the annual catch limit (ACL) below the ABC due to uncertainty about the effectiveness of management measures. SEFSC staff calculated the directed yield for 2012 at 75% of the $F_{SPR\ 30\%}$ to be 305,300 pounds whole weight.

The SSC moves to recommend the ABC for Gulf Gray Triggerfish be 305,300lbs (whole weight) for 2012 and 2013. This ABC is based on the projected yield of 2012 at 75% of $F_{SPR\ 30\%}$ for the model run, assuming recruitment is the average of 2005-2009 with the 2010 selectivities.

Motion passed 15-0, with one abstention.

SSC members felt that, given that gray triggerfish is in a rebuilding plan, and a benchmark assessment is not scheduled until 2015, annual evaluations of projection reruns and stock status should be conducted to determine if any change in the trend of the stock biomass has occurred.

The SSC moves to request an annual report on the status of Gulf Gray Triggerfish.

Motion passed *unanimously*.

The evaluation of the gray triggerfish update assessment was completed with a very brief summary of an experimental run of the Stock Synthesis 3 (SS3) assessment model. The purpose of the run was to determine if the SS3 model could be used to replicate the results of the SEDAR 9 assessment that used SSASPM. The results were consistent with SEDAR 9. Since the SS3 model can replicate earlier results, but is more flexible than SSASPM, it will likely be used in future gray triggerfish assessments.