Status of Bocaccio, *Sebastes paucispinis*, in the Conception, Monterey and Eureka INPFC areas for 2015

by

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Executive Summary

Stock

This assessment reports the status of the Bocaccio rockfish (*Sebastes paucispinis*) off of the West Coast of the United States, from the U.S.-Mexico border to Cape Blanco, Oregon (representing the Conception, Monterey and Eureka INPFC areas). Although the range extends considerably further north, there is some evidence that there are two demographic clusters of Bocaccio, centered around southern/central California and the West Coast of British Columbia, with a relative rarity of Bocaccio (particularly smaller fish) in the region between Cape Mendocino and the mouth of the Columbia River. This is supported by apparent differences in growth, maturity and longevity, although genetic evidence seems to indicate a single West Coast population. Within the stock area, there is also evidence of limited demographic separation, which is treated through some separation of fleets and data. These and other issues related to stock identification and relative levels of demographic mixing and isolation remain important research questions for future assessments.

Catches

Bocaccio rockfish have long been one of the most important targets of both commercial and recreational fisheries in California waters, accounting for between 25 and 30% of the commercial rockfish (*Sebastes*) historical catch over the past century. However, this percentage has declined in recent years as a result of stock declines, management actions and the development of alternative fisheries (particularly the widow rockfish fishery in the early 1980s). The catch history for this assessment begins in 1892, and relies heavily on the catch reconstruction efforts and products recently developed for historical California groundfish landings. Total catches, including both commercial and recreational fisheries, have been low in recent years as compared to those in the late period of the last century (Figure 1and Table 1).

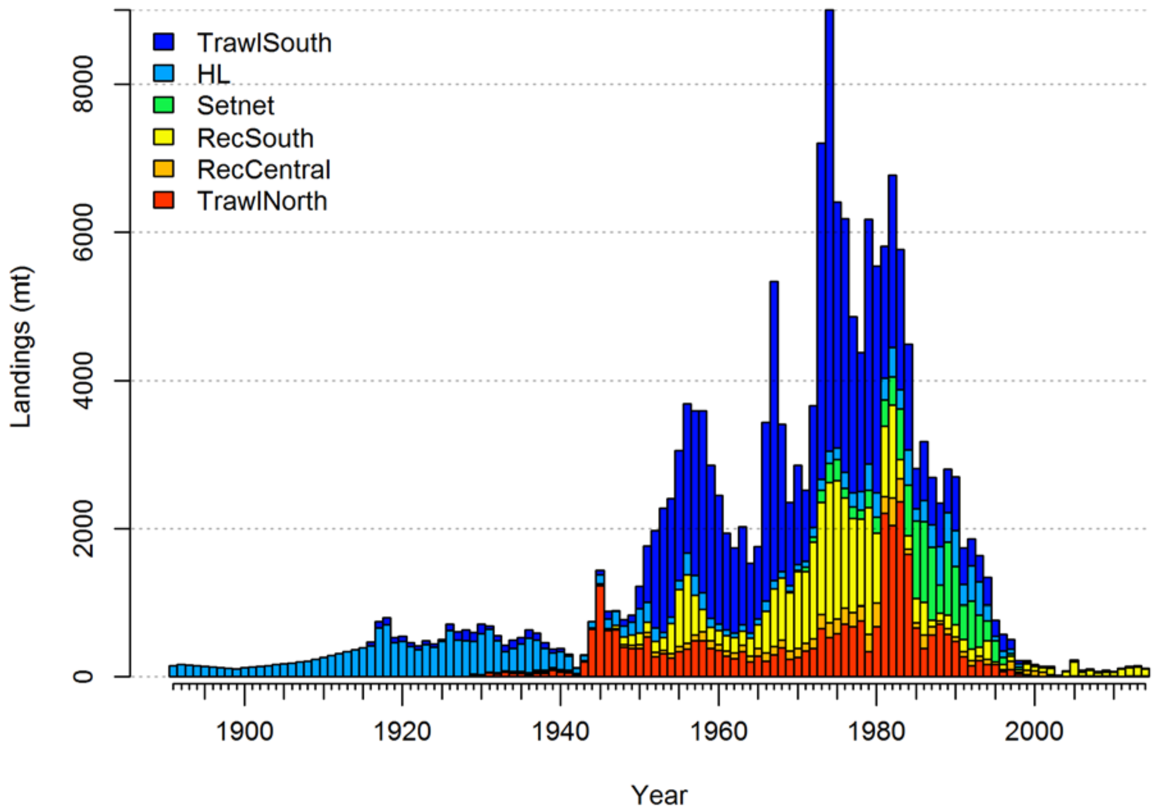

Figure 1. Time series of total catches of Bocaccio (in metric tons) and catches by six fisheries from 1892 to 2014 (HL = hook-and-line fishery).

Table 1: Estimated recent catches (mt) of Bocaccio from six fisheries and sum of annual total catches.

Year	Trawl south	Hook-and-line	Setnet	Recreational south	Recreational central	Trawl north	Total
2005	24.6	1.5	0.2	191.9	11.1	0.4	229.7
2006	15.8	10.0	0.0	52.1	12.2	1.0	91.1
2007	5.2	10.9	0.0	80.2	9.3	1.5	107.1
2008	7.5	3.6	0.0	49.3	3.7	4.2	68.3
2009	19.8	2.6	0.0	52.0	8.8	1.3	84.5
2010	12.9	1.8	0.0	50.1	6.5	2.1	73.4
2011	7.9	2.5	0.0	99.3	4.1	1.9	115.7
2012	11.4	3.5	0.0	119.1	5.7	2.0	141.7
2013	14.3	3.9	0.0	125.9	5.0	1.3	150.4
2014	4.1	6.1	0.0	93.4	6.1	4.2	113.9

Data and assessment

The last full assessment of Bocaccio rockfish was done in 2009 in Stock Synthesis 3 (version 3.03a), and subsequently updated (with the same software) in 2011 and 2013. This assessment uses a recent version of the Stock Synthesis 3 (version 3.24U, August 28, 2014). This assessment uses the same assessment boundaries from the U.S./Mexico border to Cape Blanco, OR, and the same starting year (1892) as in the 2009 assessment. This model includes catch and length-frequency from six fisheries, two trawl fisheries (north and south of 38° N, labelled as "TrawlSouth" and "TrawlNorth", respectively), a hook-and-line fishery (labelled as "HL"), a set net (gillnet, labelled as "Setnet") fishery and recreational fisheries south and north of Point Conception, CA (labelled as "RecSouth" and "RecCentral"). This assessment includes age data, recently obtained from the Bocaccio ageing project in the Southwest Fisheries Science Center. This is a significant addition to the assessment, as age data had not been included in assessments of this species since 1995 due to difficulties associated with age determination. Fisheries-dependent relative abundance (CPUE) indices from both trawl fisheries (one index) and recreational fisheries (five indices), are included. Fisheries-independent data used in the past assessments and continued here include the CalCOFI larval abundance time series and the triennial trawl survey index; the NWFSC trawl survey (also referred to as combo trawl survey), the NWFSC Southern California Bight hook-and-line survey, and the coast wide pelagic juvenile index. A recruitment index based on power plant impingement data is also included in the base model. The growth and the natural mortality rates are estimated in the base model, while one of stock-recruitment parameters (steepness) is fixed at a prior value of 0.773.

Stock biomass and spawning output

The spawning output was estimated to be very slightly below the estimated unfished levels in the beginning of the modeled period, due to very moderate fishing pressure that began no later than the 1850s. The spawning output trajectory continues a very moderate decline until about 1950, but is estimated to have declined steeply from the early 1950s through the early 1960s as catches rose from several hundred to several thousand tons. The biomass increased sharply thereafter, as a result of one or several very strong recruitment events in the early 1960s, exceeding the mean unfished biomass level through the early 1970s, when catches again began to climb rapidly to their peak levels, which was associated with high fishing mortality rates and a subsequent rapid drop in spawning output. Fishing mortality remained high throughout the 1980s and 1990s, even as catches, biomass and spawning output declined rapidly. Fishing mortality declined towards the end of the 1990s, in response to severe management restrictions, and coincident with a series of several strong year classes (following a decade of very poor recruitment) that began in 1999. Since the early 2000s, spawning output has been increasing steadily. The base model estimates increasing trends of total biomass and spawning outputs, and a current (2015) depletion level of 36.8% (Figure 2 to Figure 4 and Table 2).

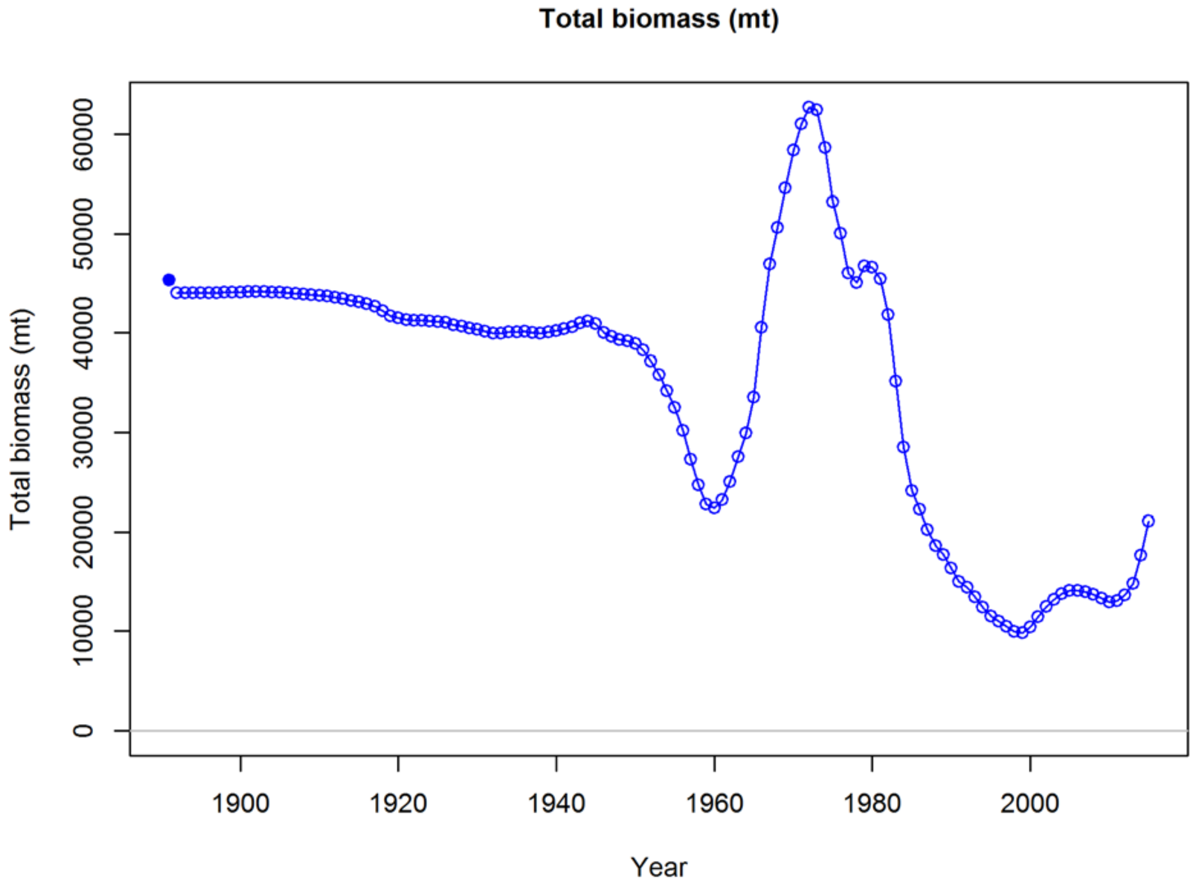

Figure 2. Estimated total biomass (defined as biomass for all fish age 1 and older).

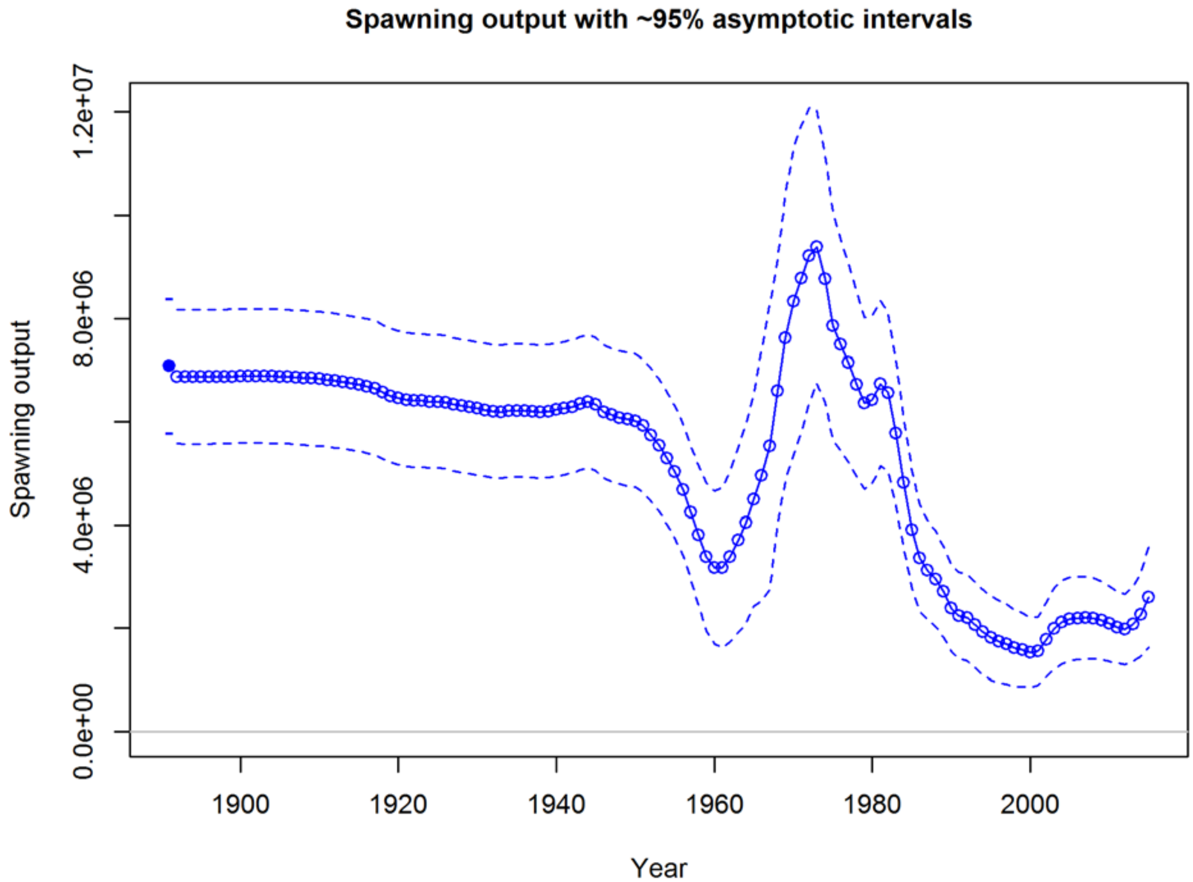

Figure 3. Estimated spawning output with 95% confident intervals.

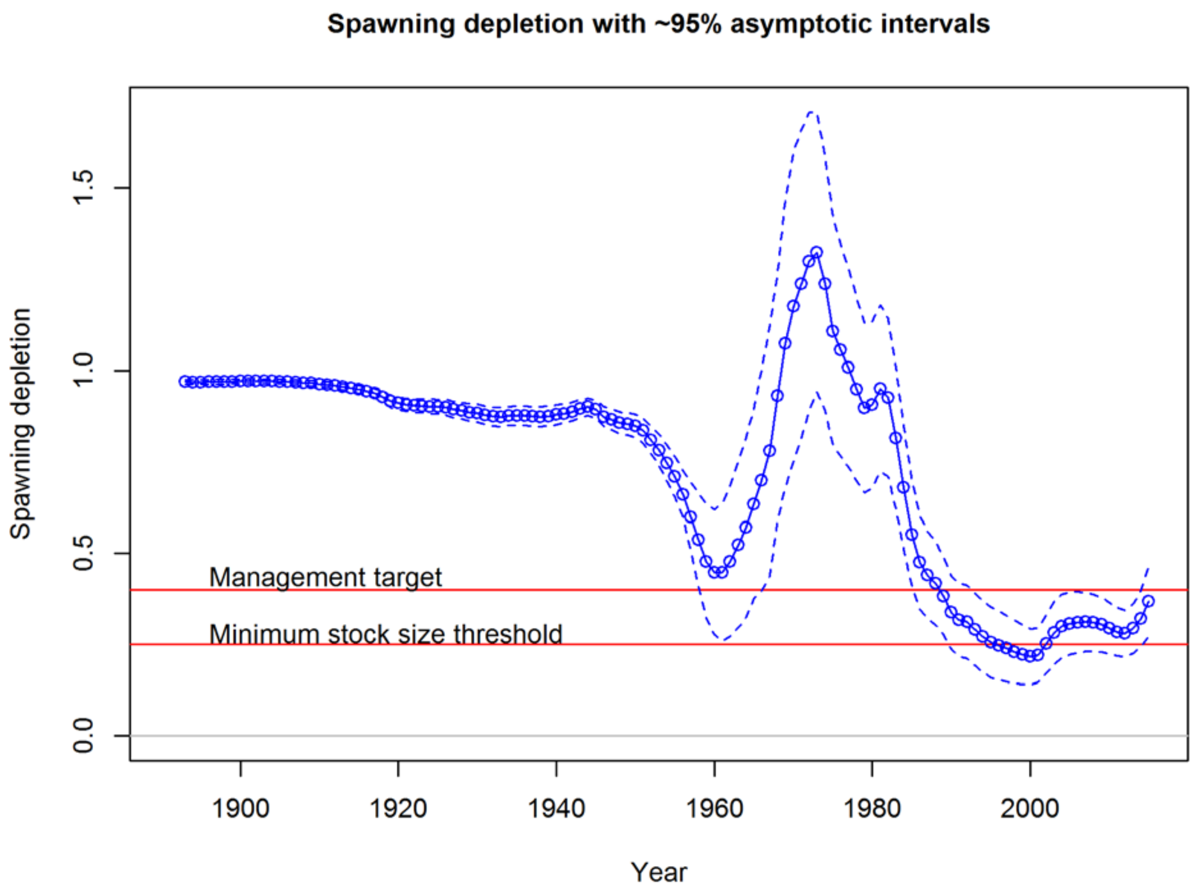

Figure 4. Estimated stock depletion with 95% asymptotic intervals.

Table 2: Estimated recent trends in estimated spawning outputs, recruitment, and stock depletion.

Year	Spawning output (10^6 eggs)	~95% confident interval	Recruitment (10^6)	~95% confident interval	Stock depletion (%)	~95% confident interval
2005	2171	1362 - 2981	2031	1175 - 3511	30.6	22.1 - 39.2
2006	2194	1386 - 3002	1259	672 - 2361	31.0	22.6 - 39.4
2007	2206	1407 - 3005	1191	653 - 2174	31.1	23.0 - 39.3
2008	2191	1408 - 2974	980	516 - 1862	30.9	23.1 - 38.7
2009	2153	1394 - 2912	2053	1169 - 3605	30.4	22.9 - 37.8
2010	2085	1356 - 2814	5605	3313 - 9482	29.4	22.4 - 36.4
2011	2009	1312 - 2707	5341	2956 - 9649	28.4	21.8 - 34.9
2012	1982	1296 - 2667	3364	1696 - 6672	28.0	21.6 - 34.4
2013	2078	1354 - 2803	20483	10614 - 39528	29.3	22.5 - 36.1
2014	2265	1456 - 3073	2497	989 - 6304	32.0	24.2 - 39.7
2015	2607	1634 - 3579	5709	1096 - 29743	36.8	27.0 - 46.5

Recruitment

Recruitment for Bocaccio is highly variable, with a small number of year classes tending to dominate the catch in any given fishery or region. Recruitment appears to have been at very low levels throughout most of the 1990s, but several recent year classes (1999, 2010, and 2013) have been relatively strong given the decline in spawner abundance, and have resulted in an increase in abundance and spawning output. The 2013 recruitment appears to be high, which is expected to lead to high biomass levels over the next few years (Figure 5 and Table 2).

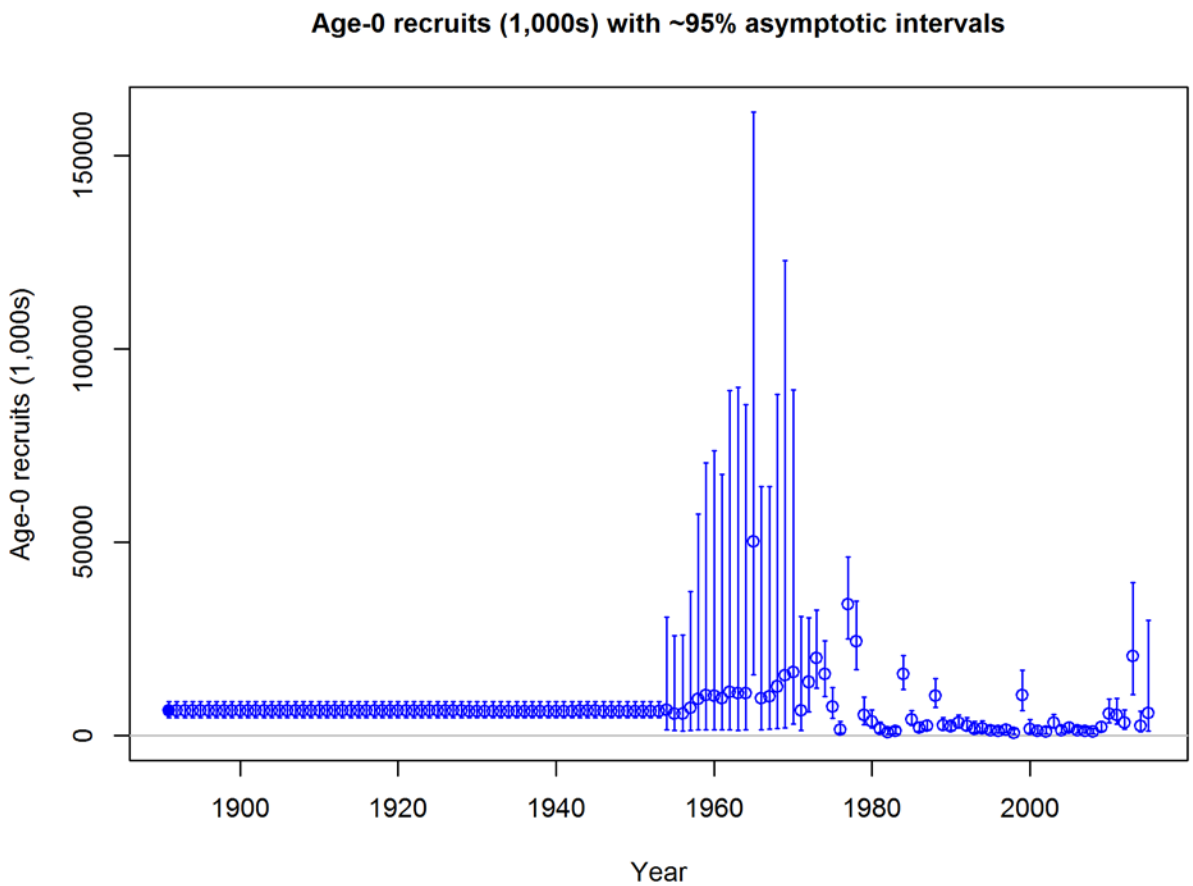

Figure 5. Estimated annual recruits with 95% asymptotic intervals.

Exploitation status

The 2015 spawning output is estimated to be at 36.8% of the unfished spawning output (Table 2). The base model indicates that the exploitation rates for Bocaccio rockfish has remained at low levels since the turn of the millennia, and the population has been increasing accordingly (Figure 6 to Figure 8, and Table 3).

Table 3 Recent trend in harvest rate and spawning potential ratio (SPR).

Year	Harvest rate	SPR (%)
2005	0.0163	82.7
2006	0.0065	93.0
2007	0.0077	90.8
2008	0.0050	93.7
2009	0.0064	92.0
2010	0.0057	92.2
2011	0.0089	88.1
2012	0.0104	89.3
2013	0.0103	91.1
2014	0.0065	94.6

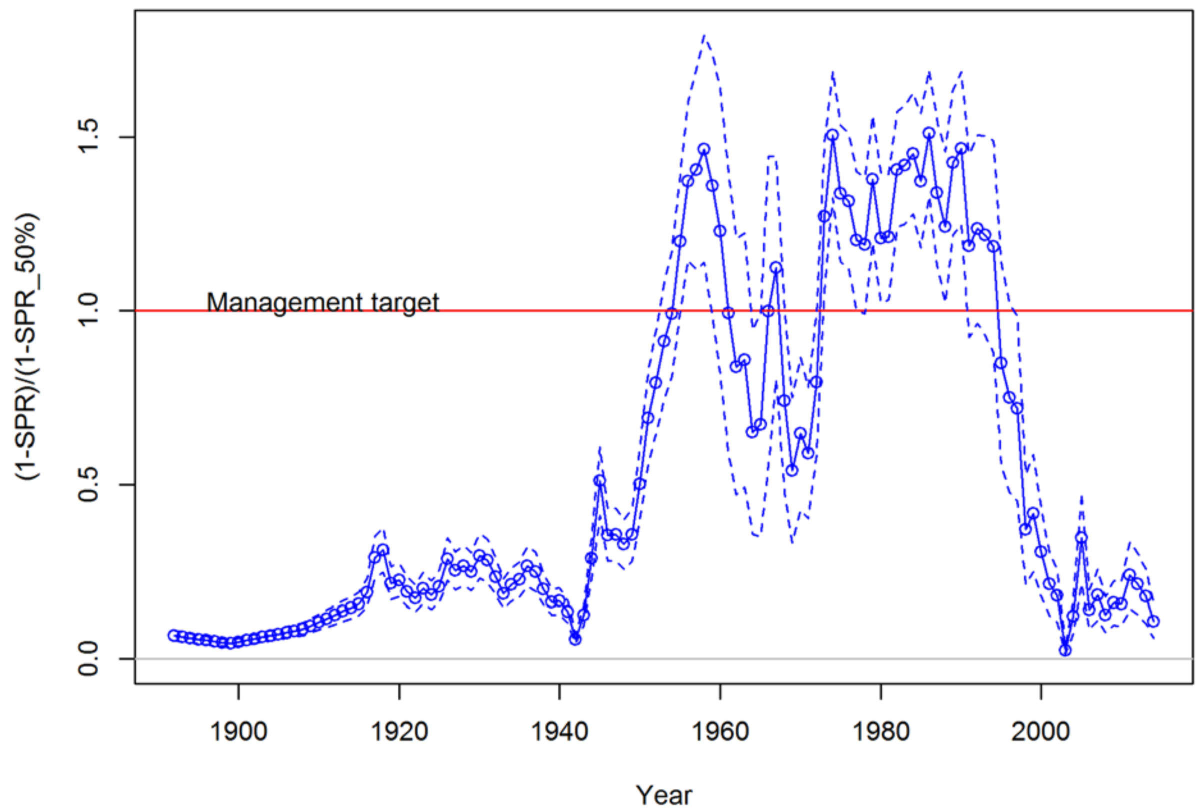

Figure 6. Time series of relative SPR with the target level of 50% for the base model. Values of relative SPR about 1.0 (red line, management target) indicate harvests in excess of the current overfishing proxy.

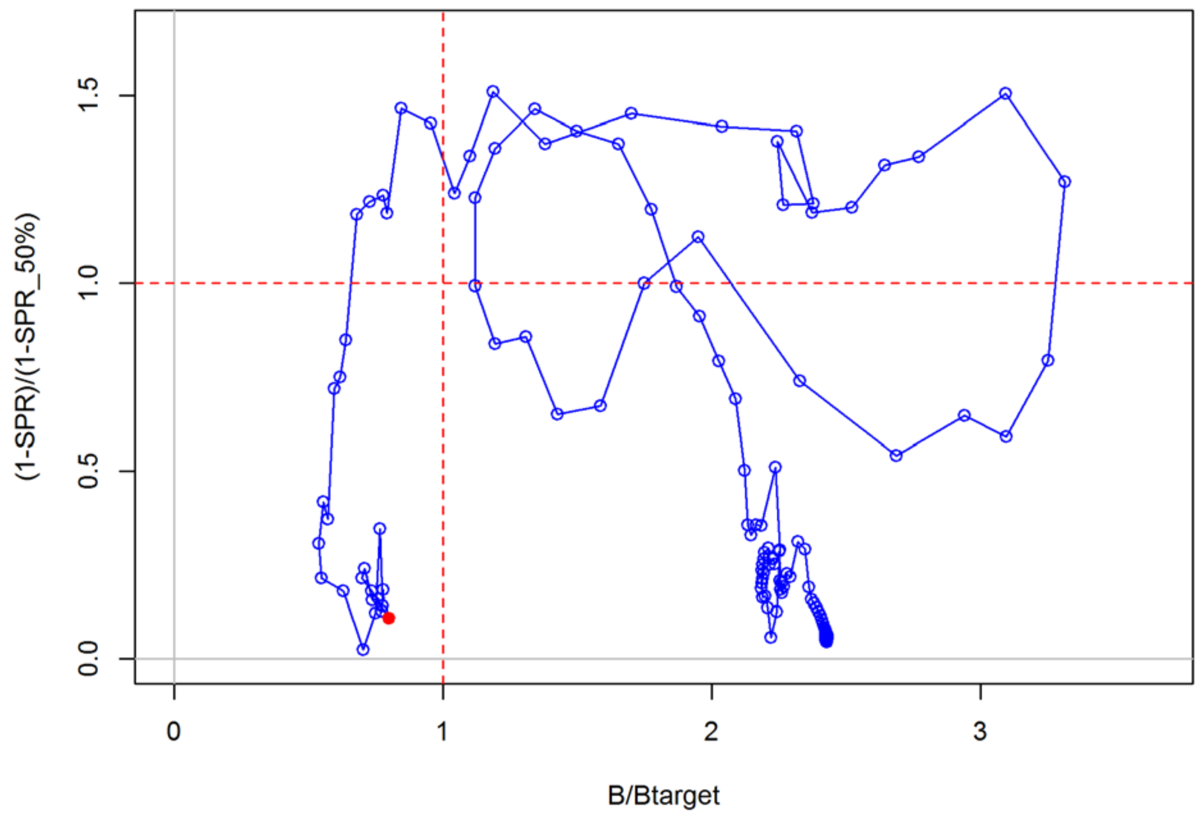

Figure 7. Phase plot of relative SPR with the target level of 50% versus relative stock depletion (labelled as B/Btarget) for the base model. Relative stock depletion is the spawning outputs divided by the spawning output corresponding to 40% of the unfished spawning output. The red end point indicates the year 2014.

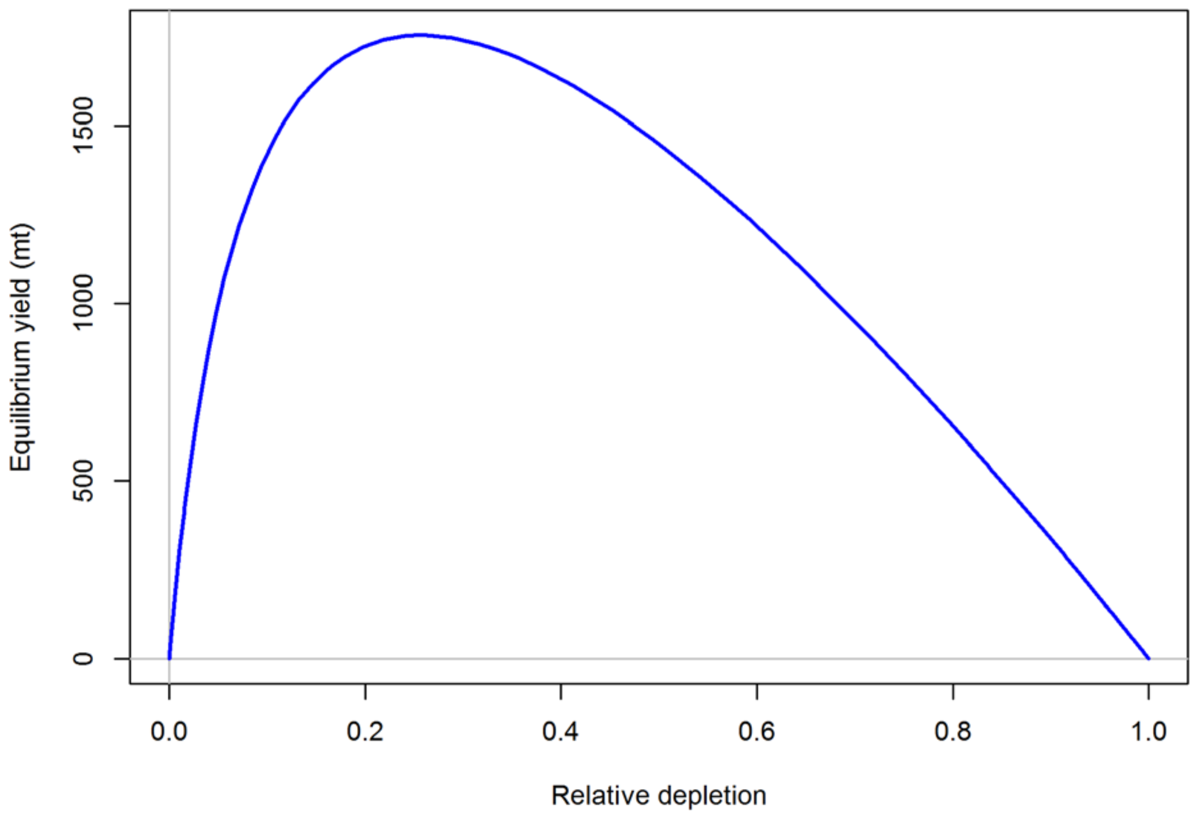

Figure 8. Equilibrium yield curve for the base model.

Ecosystem considerations

Bocaccio are an important component of coastal food webs by virtue of being both fairly abundant (historically more so) and very piscivorous. Although there are no published quantitative food habits studies of this species, they have long been described as primarily piscivorous, and young Bocaccio are known to prey on other young-of-year (YOY) rockfish, surfperch, jack mackerel and other small inshore fish species (Phillips 1964, Nelson 2001). The high recruitment variability exhibited by this species may serve to constrain or limit recruitment of co-occurring species at times, and the dynamics of this interaction could be revealing with respect to patterns of recruitment variability observed in other species. Adults in deeper waters feed on small rockfish, Pacific hake, sablefish, anchovies, mesopelagic fishes, and squids, particularly California market squids.

Reference points

Summary of reference points for the base model is presented in Table 4, including the unfished summary biomass, unfished spawning output, mean unfished recruitment and the proxy estimates for MSY based on the $SPR_{50\%}$ rate as well as the fishing mortality rate associated with a spawning stock output of 40% of the unfished level and with MSY estimated based on the spawner/recruit relationship and yield curve. The corresponding yields for these three estimates vary between 1,528 mt based on the SPR target and 1,755 mt based on the MSY estimate. The unfished total biomass is estimated to be 45,254 mt, which was similar to that estimated in the 2013 assessment update (45,476 mt). Unfished spawning output and virgin recruitment are also comparable with those in the 2013 assessment.

Table 4: Summary of reference points for the base model.

Quantity	Estimate	Low 2.5% limit	High 97.5% limit
Unfished Spawning output (10^6 eggs)	7088	5784	8392
Unfished age 1+ biomass (mt)	45254	37139	53369
Unfished recruitment (R_0)	6429	4669	8854
Depletion (2015)	36.8%	27.0%	46.5%
Reference points based on $SB_{40\%}$			
Proxy spawning biomass ($B_{40\%}$)	2835	2313	3357
SPR resulting in $B_{40\%}$ ($SPR_{50\%}$)	0.444	0.444	0.444
Exploitation rate resulting in $B_{40\%}$	0.086	0.073	0.099
Yield with *SPR* at $B_{40\%}$ (mt)	1632	1222	2042
Reference points based on SPR proxy for MSY			
Spawning biomass	3263	2663	3864
SPR_{proxy}	50%		
Exploitation rate corresponding to SPR_{proxy}	0.070	0.060	0.081
Yield with SPR_{proxy} at SB_{SPR} (mt)	1528	1145	1911
Reference points based on estimated MSY values			
Spawning biomass at *MSY* (SB_{MSY})	1824	1484	2164
SPR_{MSY}	0.312	0.308	0.316
Exploitation rate corresponding to SPR_{MSY}	0.137	0.116	0.158
MSY (mt)	1755	1310	2200

Management performance

Bocaccio rockfish were formally designated as overfished in March of 1999, after the groundfish FMP was amended to incorporate the mandates of the Sustainable Fisheries Act reauthorization to the MSFCMA. The rebuilding policy adopted by the PFMC held the rebuilding optimum (OY) constant at 100 MT for the years 2000-2002, with the intention of switching to a constant fishing rate policy beginning in 2003. However, due to an extremely pessimistic 2002 assessment, the 2003 OY was set to 20 tons. A more optimistic assessment in 2003 led to a 2004 OY of 199 tons. The OY or more recently ACL values have been set at a range of values between 218 and 362 tons since then (Table 5), with estimated catches (including discards) typically observed to be less than half of the adopted values in most years since 2005. A summary of recent catches, regulations, and stock status between 2005 and 2015 is presented in Table 5. A summary of catch distribution data as the basis for the apportionment of Bocaccio ACL and OFL estimates North and South of 40°10' N latitude is listed in Appendix C.

Unresolved problems and major uncertainties

For this assessment, steepness (*h*) is treated as fixed, with natural mortality (M) estimated for this assessments. This is a reversal from past practices of estimating steepness and fixing natural mortality, however likelihood profiles indicated that there was more information available to the model to estimate natural mortality than there was steepness. Sensitivity analyses conducted here and for other models demonstrate the covariance among these two parameters, such that there is rarely adequate data to reliably estimate both simultaneously. Moreover, because Bocaccio exhibit very large recruitment variability, estimations of the stock-recruitment relationship for this species are highly uncertain

As identified in the 2009 assessment, there is clear tension in the model between several key indices, particularly the CalCOFI index and the southern recreational CPUE index, which tend to reflect a more optimistic view of stock status, and the trawl CPUE and triennial survey index, which tend to reflect a more pessimistic view of stock status. This tension still exists in this assessment.

The 2013 assessment update identified the 2010 recruitment as a major uncertainty as the year class may not have fully recruited to the fisheries or may not been sampled adequately by the surveys. Data from the latest years confirm that it was a relatively strong year class. However, the latest data indicate there may be an even stronger year class in 2013, as informed by composition data from some fisheries and surveys suggested (particularly the NWFSC survey). The strength of this year class is also a major uncertainty for this assessment, and will also have large influences on the stock projections for the next few years.

Decision table

A decision table was constructed during the STAR Panel review that was based on two major sources of uncertainties and four forecast catch streams (Table 6). The basis for the alternative states of nature were based on the observation that a key uncertainty for this stock is the magnitude of both recent and future recruitment, which is highly variable for this stock. Given the high uncertainty associated with the magnitude of the 2013 year class, and the observation that some recent year classes (such as 2010) were initially estimated to be higher than subsequently realized, two forms of uncertainty in recruitment were combined in this decision table. The low productivity (pessimistic) state of nature was defined by low steepness ($h = 0.6$) and low 2013 recruitment (~12.5 percentile of the uncertainty of the 2013 recruitment estimate), while the high productivity state of nature was defined by high steepness ($h = 0.9$) and high 2013 recruitment (~87.5 percentile of the uncertainty of the 2013 recruitment estimate). The 2013 recruitments were scaled by adding a faux survey with a q=1 and a very small CV for the numbers of age 0 fish in 2013; the recruitment deviation value was still included in the model estimation (as were all other parameters, including natural mortality).

This approach had the effect of accounting for both near term and longer term uncertainty in recruitment with respect to stock productivity, which is a key uncertainty in the estimation of stock status. Four catch streams were included for each scenario, with the adopted ACL values used for 2015-2016 used for each one. The low catch stream was represented by status quo catches (average of total catch in 2010-2014 period), the catches associated with the adopted rebuilding SPR rate (0.777) in the low productivity scenario, the catches associated with the rebuilding SPR rate in the base model scenario, and the base model estimate of ACL catches under the SPR=0.50 harvest rate policy. Note that the 2015 model estimated depletion levels were more pessimistic under the low productivity scenario (27.5%), and more optimistic (43.3%) in the high productivity scenario; yet in all scenarios except the low productivity scenario with the base model ACL catches, the spawning output was forecast to increase. Under the base model, the stock is expected to rebuild by 2016 (assuming adopted ACL catches), under the low productivity scenario the stock is not expected to rebuild until 2018 with status quo catches and 2019 with rebuilding SPR associated catches. Under the high productivity scenario the stock is estimated to be rebuilt and to stay at high levels in the foreseeable future. However, it should be recognized that all of the projections include deterministic recruitment, and the actual future stock trajectories should be expected to be considerably more variable. Projections of ACLs (based on SPR = 0.777) and corresponding OFLs from 2015 to 2024 are listed in Table 6a.

Research and data needs

Stock structure and stock boundaries for Bocaccio rockfish on the West Coast remains an important issue to consider with respect to both future assessments and future management actions.

Since large scale area closures and other management actions were initiated in 2001, the spatial distributions of fishing effort (fishing mortality) have changed over both large and small spatial scales. This confounds the interpretation of survey indices for surveys that do not sample in the Cowcod Conservation Areas (CCAs), although the decision to begin sampling for the NWFSC hook and line survey within the CCAs should begin to address this issue with time. .

Recently updated reproductive biology data (maturity and fecundity) show some differences in length and weight specific fecundity in Bocaccio from those used in the past assessments. Regional differences (southern and northern California, as well as southern Oregon), and multiple brood spawning, are poorly understood.

As Bocaccio is one of the most abundant and important piscivorous rockfish species, and its interactions with other predator and prey species are poorly known, information regarding diet and movement patterns associated with habitat and prey abundance are key in order to further understand its roles in the ecosystem of the California waters. Northward migratory behaviors of juvenile and young adults are indicated by length frequency data, but such behaviors are also poorly understood. Studies on these behaviors and their associations with oceanographic or other ecological factors can help future assessments in defining stock structure as well as explaining high variability in stock recruitments.

Table 5: Summary table of recent catches, regulations, and stock status between 2005 and 2015.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Commercial landings (mt)	27	27	18	15	24	17	12	17	20	14	
Estimated total catch (mt)	230	91	107	68	85	73	116	142	150	114	
OFL (mt)	566	549	602	618	793	793	737	732	884	881	1444
ACL (mt)	307	308	218	218	288	288	263	274	320	337	349
1-SPR (%)	82.7	93.0	90.8	93.7	92.0	92.2	88.1	89.3	91.1	94.6	
Exploitation rate	0.016	0.006	0.008	0.005	0.006	0.006	0.009	0.010	0.010	0.006	
Age 0+ biomass (mt)	14075	14041	13954	13672	13267	12850	12951	13600	14536	17622	21032
Spawning output (10^6 eggs)	2171	2194	2206	2191	2153	2085	2009	1982	2078	2265	2607
Spawning output (low 2.5%)	1362	1386	1407	1408	1394	1356	1312	1296	1354	1456	1634
Spawning output (high 97.5%)	2981	3002	3005	2974	2912	2814	2707	2667	2803	3073	3579
Recruitment	2031	1259	1191	980	2053	5605	5341	3364	20483	2497	5709
Recruitment (low 2.5%)	1175	672	653	516	1169	3313	2956	1696	10614	989	1096
Recruitment (high 97.5%)	3511	2361	2174	1862	3605	9482	9649	6672	39528	6304	29743
Depletion (%)	30.6	31.0	31.1	30.9	30.4	29.4	28.4	28.0	29.3	32.0	36.8
Depletion (low 2.5%)	22.1	22.6	23.0	23.1	22.9	22.4	21.8	21.6	22.5	24.2	27.0
Depletion (high 97.5%)	39.2	39.4	39.3	38.7	37.8	36.4	34.9	34.4	36.1	39.7	46.5

Table 6. Decision table based on three states of nature and four alternative future catch streams. States of nature are defined as low recruitment potential (*h*=0.6) and pessimistic estimate of the 2013 recruit, and high recruitment potential (h=0.9) and optimistic estimate of the 2013 recruit. Spawning output has unit of billions of eggs.

			State of nature					
			Low state of nature (*h* = 0.60, low 2013 recruitment)		Base (*h*=0.773, estimated 2013 recruitment)		High state of nature (*h* = 0.90, high 2013 recruitment)	
Management decision	Year	Catch (mt)	Spawning output	Depletion (%)	Spawning output	Depletion (%)	Spawning output	Depletion (%)
Average catch (2010-14)	2015	349	2.03	27.5	2.61	36.8	3.07	43.3
	2016	362	2.39	32.3	3.25	45.8	3.97	56.0
	2017	119	2.70	36.5	3.81	53.8	4.76	67.0
	2018	119	2.99	40.4	4.26	60.1	5.33	75.1
	2019	119	3.26	44.0	4.63	65.3	5.76	81.2
	2020	119	3.52	47.6	4.94	69.7	6.08	85.7
	2021	119	3.78	51.1	5.21	73.5	6.31	88.9
	2022	119	4.02	54.4	5.43	76.6	6.48	91.3
	2023	119	4.26	57.6	5.62	79.3	6.60	92.9
	2024	119	4.49	60.7	5.78	81.5	6.68	94.1
Low state of nature model rebuilding SPR (0.777) catches	2015	349	2.03	27.5	2.61	36.8	3.07	43.3
	2016	362	2.39	32.3	3.25	45.8	3.97	56.0
	2017	587	2.70	36.5	3.81	53.8	4.76	67.0
	2018	581	2.92	39.5	4.19	59.2	5.27	74.2
	2019	586	3.12	42.2	4.49	63.4	5.62	79.2
	2020	596	3.31	44.7	4.73	66.7	5.87	82.7
	2021	607	3.48	47.0	4.91	69.3	6.02	84.9
	2022	617	3.63	49.1	5.05	71.3	6.11	86.1
	2023	626	3.78	51.2	5.16	72.8	6.16	86.8
	2024	634	3.92	53.0	5.25	74.0	6.17	86.9
Base model rebuilding SPR (0.777) catches	2015	349	2.03	27.5	2.61	36.8	3.07	43.3
	2016	362	2.39	32.3	3.25	45.8	3.97	56.0
	2017	853	2.70	36.5	3.81	53.8	4.76	67.0
	2018	800	2.88	38.9	4.15	58.5	5.22	73.6
	2019	770	3.03	41.0	4.40	62.1	5.54	78.0
	2020	758	3.18	43.0	4.60	64.9	5.74	80.9
	2021	755	3.31	44.8	4.75	67.1	5.87	82.7
	2022	755	3.44	46.5	4.87	68.7	5.94	83.6
	2023	757	3.56	48.2	4.96	70.0	5.96	84.0
	2024	758	3.68	49.7	5.03	71.0	5.96	84.0
Base model ACL catch (SPR=0.5 with P*=0.45 and sigma=0.36)	2015	349	2.03	27.5	2.61	36.8	3.07	43.3
	2016	362	2.39	32.3	3.25	45.8	3.97	56.0
	2017	2213	2.70	36.5	3.81	53.8	4.76	67.0
	2018	1951	2.68	36.2	3.95	55.7	5.02	70.7
	2019	1793	2.63	35.6	4.00	56.5	5.14	72.4
	2020	1705	2.59	35.0	4.02	56.7	5.17	72.8
	2021	1654	2.54	34.3	4.00	56.4	5.13	72.3
	2022	1622	2.49	33.6	3.96	55.9	5.05	71.2
	2023	1601	2.44	32.9	3.92	55.2	4.96	69.8
	2024	1585	2.39	32.3	3.86	54.5	4.85	68.3

Table 6a. Projections of ACL and OFL from 2015 to 2024. Both ACLs and OFLs for 2015 and 2016 (bold and italic) are from current regulations. ACLs from 2017 to 2024 are from the rebuilding SPR = 0.777 (third catch stream in the decision table), and OFLs are calculated sequentially from corresponding years.

Year	ACL (mt)	OFL (mt)
2015	***349***	***1,444***
2016	***362***	***1,351***
2017	853	2,310
2018	800	2,174
2019	771	2,094
2020	758	2,059
2021	755	2,047
2022	755	2,046
2023	756	2,049
2024	759	2,054

1 Introduction

1.1 Basic Information

The name Bocaccio is derived from the Italian for “bigmouth,” Bocaccio were also often called “bocacc” by early Italian fishermen, “merou” by Portuguese fishermen, “jack” by some American fishermen, and “andygumps” by some British Columbia fishermen. Additional alternate names include “tomcod” for young Bocaccio caught around wharfs, salmon grouper, longjaw, and many others (Love et al. 2002). The genus, *Sebastes*, is Latin for magnificent, of course, and the species name, *paucispinis*, is a reference to the paucity of head spines relative to most other species of *Sebastes*. The body shape is best described as elongate, and laterally compressed, and the fish has a very large mouth (thus the name) and a protruding lower jaw with a prominent knob at the end of their lower jaw. The upper jaw (maxillary) also extends to beyond the eye, distinguishing Bocaccio from the often co-occurring chilipepper rockfish (Miller and Lea 1972). Underwater, juvenile and adult Bocaccio appear pink, pink-brown, gray, or red. Upon capture, most appear a brighter reddish or salmon color mixed with brown; however, considerable variation in colors and mottled patterns have been reported (Love et al. 2002). Both juvenile and adult stages grow rapidly, although growth slows considerably in mature adults; maximum reported sizes are 91 cm and to approximately 8 kg. In an extensive review of phylogenetic relationships among *Sebastes*, Hyde and Vetter (2007) found that Bocaccio were most closely related to both chilipepper (*S. goodei*) and shortbelly (*S. jordani*) rockfish, although that lineage dated back approximately 6 million years. Adult systematics are described in more detail in Phillips (1957; 1964) and Love et al. (2002); larval distribution and descriptions are provided by Moser (1967; 1996); and pelagic juvenile life history stages and growth are described in Woodbury and Ralston (1991).

1.2 Life History and Stock Distribution

1.2.1 General life history and stock distribution

The distribution of Bocaccio has been described as ranging from Stepovak Bay on the Alaskan Peninsula (as well as Kodiak Island, Alaska) to Punta Blanca, Baja California (Miller and Lea 1972; Eschmeyer et al. 1983; Love et al. 2002). It is abundant off southern and central California, uncommon between Cape Mendocino and the Oregon/Washington border, and moderately abundant from the Oregon-Washington border into Queen Charlotte Sound and Hecata Strait, British Columbia. The southern U.S. stock (the stock evaluated in past assessments) was petitioned for listing under the U.S. Endangered Species Act (ESA) in 2002. Although this petition was denied, Bocaccio have been listed as a “Species of Concern” by the NMFS since 2002. More recently, a 2007 petition was made to list the Puget Sound population of Bocaccio (and other rockfish species) as endangered. Following a status review of available data on catches and abundance trends (Drake et al. 2010), NMFS listed the Puget Sound/ Georgia Basin Discrete Population Segment (DPS) of Bocaccio as Endangered in 2010.

The U.S. stock assessment has traditionally assessed Bocaccio from the U.S./Mexico border to either Cape Mendocino (MacCall 2002; MacCall 2003; and the 2005 and 2007 updates), or through the Eureka INPFC area to Cape Blanco (Ralston et al. 1996; MacCall et al. 1999, Field et al. 2009 and recent updates). This has been based on a conceptual model of two centers of population density, one around southern and central California and another from Queen Charlotte Sound through the Northwest Coast of Washington State. Both historical and recent catch statistic and surveys suggest low relative abundance levels of Bocaccio between approximately Cape Mendocino and the Columbia River mouth (essentially, the Eureka and Columbia INPFC areas; Figure 9). Similarly, a summary of Bocaccio catches in Russian trawl surveys conducted off of the U.S. West Coast from 1963 to 1978, prior to what has been estimated to be the greatest period of depletion of this stock or stocks, is consistent with a pattern of low abundance from north of Cape Mendocino through Oregon, with higher catches in southern and northern regions (Figure 10). As mentioned earlier, the Puget Sound/Georgia Basin stock is also currently considered to be a discrete population segment (DSP; Drake et al. 2010).

Although the southern/central California “stock” and the British Columbia “stock,” as well as the more recently described Puget Sound/Georgia Basin stock, are treated independently by their respective management entities, an accurate understanding of stock structure both among and within these regions remains unclear. Wishard et al. (1980) described electrophoretic patterns in a series of samples collected between the Southern California Bight and Cape Mendocino. Although the PGI-1 and ADH loci were polymorphic and heterozygosity was high, there was no genetic differentiation among the samples at these or three other loci. However, no samples were collected and evaluated north of Cape Mendocino. Matala et al. (2004) used likelihood tests of homogeneity of allele frequencies at seven highly polymorphic microsatellite loci to evaluate population connectivity along eight regions of the West Coast (Queen Charlotte Island, Vancouver Island , Monterey Bay, four locations in the Southern California Bight [Point Conception, Tanner Banks, Santa Barbara Channel, and Santa Monica Bay], and Punta Colnett, Mexico). Unfortunately, there were no samples evaluated from Northern California, Oregon or Washington, nor from the Puget Sound/Georgia Basin region. Analysis based on fixation index (F_{ST}) values revealed no statistically significant geographic divergence or evidence for isolation-by-distance (Matala et al. 2004). However, an ad hoc method for partitioning the samples based on genetic and geographic homogeneity could not reject the possibility of some population structure related to geographic location. These patterns appeared to be related to oceanographic features, possibly suggesting limited gene flow between British Columbia and California, as well as limited flow around Point Conception, California. However, a re-analysis of the same data (D.E. Pearse, FED/SWFSC, pers. comm.) using the Bayesian partitioning program STRUCTURE 2.0 (Pritchard et al. 2000), found no support for the presence of population genetic structure among the samples of Bocaccio analyzed by Matala et al. (2004; Figure 5). This most recent analysis suggests that, from a population genetic perspective, all Bocaccio from British Colombia, Canada, to Baja, Mexico, should probably be considered to be a single, panmictic unit.

As Waples et al. (2008) and Berntson and Moran (2009) suggest, demographic independence does not necessarily require strong evidence of genetic isolation. As pointed out by Waples et al. (2008), population genetic analyses typically have considerable power to identify separate populations connected only by low levels of migration but struggle to identify differentiation at the level of connectivity that would indicate demographically coupled stocks. Similarly, Berntson and Moran (2009) suggest that while relatively few migrants per generation will typically result in low F_{ST} values, indicative of a single evolutionary genetic population, such low levels of migration would likely not be sufficient to result in rebuilding stocks in regions where there might be a wide disparity in abundance. Thus, although the failure to identify clear evidence of population genetic structure among Bocaccio populations in the Canadian/Northern U.S. region and the southern/central California region suggests that some migratory connectivity exists, the apparent differences in growth rates, size (and presumably age) at maturity, and longevity suggest that some level of demographic independence is likely.

We maintain the tradition of distinguishing the southern Bocaccio population unit from the northern unit in this assessment, and, as in 2009, we suggest that the geographic range of the southern Bocaccio stock corresponds to the waters south of Cape Blanco, Oregon (the northern boundary of the Eureka INPFC area), to the U.S./Mexico border. This is consistent with the suggestion of a break in population distribution based on both historical and recent abundance data, the paucity of data in the northern part of the range, and a long history of previous assessments.

1.2.2 Habitat preferences and movement patterns

Like all *Sebastes*, Bocaccio are primitively viviparous and bear live young at parturition. They copulate during September-October, although fertilization is often delayed, and embryonic development takes at least a month to complete, with larvae hatching internally (Moser 1967). Parturition occurs during the winter months (Wyllie Echeverria, 1987) and larvae eventually metamorphose into pelagic juveniles (Moser and Boehlert, 1991). The combined larval and juvenile pelagic phase typically lasts about 150 days, consequently the spatial dispersal of larvae and juveniles likely links populations among fairly broad regions. Bocaccio appear to orient higher in the water column than juveniles of most other winter-spawning rockfish species (Ross and Larson 2003), and propagule dispersal tends to be greater at shallower depths (Peterson et al. 2010). The rapid growth of Bocaccio is initiated at the juvenile stage; Woodbury and Ralston (1991) describe linear species-specific growth rates (and interannual variability in the same) for juvenile rockfish in approximately the first 50 to 150 days of life, in which those for Bocaccio ranged from 0.56 to 0.97 mm/day, the highest rate amongst the species evaluated. Settlement to littoral and demersal habitats begins in late spring and extends throughout the summer months.

Pelagic Bocaccio Young-of-the-Year (YOY) typically recruit to shallow habitats, and subadult Bocaccio are more common in shallower water than adults, with average size becoming notably larger at greater depths. Strong year classes frequently lead to high densities and high catches of young Bocaccio from piers and other shore structures from the early summer through winter of the first year of life; data describing such events are discussed in greater detail in the section on the pier fishery survey data. Adult Bocaccio are typically described as occurring in a broad range of habitats and depths; they develop large mid-water aggregations, and high densities tend to be more associated with more complex substrates. As with many other shelf species of rockfish, there is a clear trend towards larger fish at greater depths as well as towards higher latitudes.

In southern California, juveniles often recruit to oil platforms, often in large numbers during strong recruitment years. For example, in 2003, Love et al. (2006) estimated a minimum of 430,000 juvenile (age ~0.75 yrs.) Bocaccio recruiting to just 8 oil platforms in the Santa Barbara Channel. They estimated that this represented approximately 20% of the average number of juveniles in any given year, and further estimated that densities of juveniles around oil platforms that year tended to be greater than the density of juveniles over nearby shallow habitat areas more typically considered juvenile habitat. Their results also suggested very high patchiness in the distribution of juvenile Bocaccio; over 80% of the total estimated number of juveniles recruited to just one platform (Grace); two other platforms in the immediate vicinity accounted for another 10% of the total numbers of recruits, but at widely disparate densities. Although they acknowledge that considerable uncertainty exists with respect to the potential role of platforms in providing recruitment habitat, Love et al. (2006) suggest that Bocaccio and other rockfish that recruit to these structures likely represent production that would have been lost to the population in the absence of these structures. Love et al. (2005) also estimated higher densities of adult Bocaccio at platform habitat relative to the densities on nearby natural reefs, suggesting that platforms could represent a source of sub-adults to neighboring natural habitats. An analysis of the potential for submersible surveys of the oil platforms to inform estimates of recruitment was undertaken previously (Field et al. 2010), but the performance was found to be somewhat marginal, and the narrow geographic scope of this work led us to pursue alternative sources for pre-recruit indices. Some analysis of the habitat relationships inferred from these submersible surveys supports the widely observed phenomena of Bocaccio having stronger high substrate habitat associations with increased size and age, is included in the 2009 assessments.

With respect to movement patterns, the evidence for most rockfish suggests that the bulk of the adults are highly sedentary, with some ontogenetic movement to greater depths common for most shelf and slope species. However, some rockfish have shown fairly extensive movements, usually of late juvenile and early adult stages. For example, Hartmann (1987) reported the results of tagging studies of nearly 25 species of rockfish from over 10,000 fish tagged in the Southern California Bight (olive, blue, widow, Bocaccio, kelp and copper rockfish comprised over 90% of both the fish tagged and recaptured). The total number of recaptures was 696, of which 606 were recaptured at or very near to the site of tagging. Of the remaining 90 only 12 (of four species) moved greater than 10 km. Most of these were juvenile Bocaccio, which moved as far as 150 km. By contrast, no movement was observed in adult Bocaccio, although relatively few were tagged. Lea et al. (1999) found no movement for Bocaccio rockfish, although they only had three tags returned (out of 56 deployed). However, in a movement study using fish captured and surgically implanted with acoustic transmitters, most spent only a small fraction of their time in the 12 square kilometer study area, with frequent small scale movements in both horizontal and vertical planes (Starr et al. 2001). By contrast, six greenspotted rockfish tagged in the same study exhibited substantially lower movement rates.

1.3 Ecosystem Considerations

Bocaccio are an important component of coastal food webs by virtue of being both fairly abundant (historically more so) and very piscivorous. Although there are no published quantitative food habits studies of this species, they have long been described as primarily piscivorous, and young Bocaccio are known to prey on other young-of-year (YOY) rockfish, surfperch, jack mackerel and other small inshore fish species (Phillips 1964, Nelson 2001). Phillips (1964) stated that even before completing their first year of life, young Bocaccio prey on other young-of-year rockfish, surfperch, jack mackerel and other small inshore species, and indeed this tendency may begin during the pelagic stage, during which Bocaccio YOY tend to feed on larger prey items (including other larval and juvenile fishes) than other pelagic *Sebastes* YOY (Reilly et al. 1992). Such predation has been associated with localized declines in the abundance of other YOY rockfish, such as kelp rockfish, in coastal ecosystems (Nelson 2001). Consequently, the high recruitment variability exhibited by this species may serve to constrain or limit recruitment of co-occurring species at times, or to act as a mechanism for density dependent mortality (Adams and Howard 1996, Hobson et al. 2001, Johnson 2006). Consequently, the dynamics of this interaction could be revealing with respect to patterns of recruitment variability observed in other species.

Adults in deeper waters feed on small rockfish, Pacific hake, sablefish, anchovies, mesopelagic fishes, and squids, particularly California market squids. Adults in deeper waters feed on small rockfish, Pacific hake and sablefish, anchovies, mesopelagic fishes, and squids, particularly California market squids. Pelagic juveniles are preyed upon by a wide range of predators, including seabirds, salmon, lingcod, and marine mammals (Merkle 1957; Sydeman et al. 2001). Predators of larger adults are likely limited to larger piscivorous fishes, sharks and marine mammals, although few studies have identified rockfish prey to the species level.

Ongoing investigations into the reproductive ecology of Bocaccio suggest that reproductive output is likely to be more variable from year to year than previously thought, likely through both size-dependent and interannual variability in the frequency of multiple broods. Environmentally driven changes in relative fecundity could also have important implications for estimating both historical and future relative spawning abundance under climate change scenarios, as could environmentally driven differences in year to year recruitment success.

1.4 Management History and Performance

As the management history is closely linked to the history of many of the past assessments, highlights from previous modeling approaches are included in this section, and the Assessment History section focuses on the transition from the 2009 assessment to this assessment. Together with chilipepper rockfish (*Sebastes goodei*), Bocaccio have long been one of the most important rockfish species in California commercial fisheries, particularly off of central and southern California. Before 1982, domestic groundfish fisheries were managed by state management agencies, and, in California waters, there were few restrictions on harvest other than prohibitions on trawl fishing in state waters (within 3 miles of shore) and minimum mesh size requirements. Foreign fisheries caught significant volumes of some groundfish (Rogers 2003) in offshore waters of the West Coast from 1966 through 1976, at which point harvest was limited by passage of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), which extended U.S. control over living marine resources within 200 miles of the coastline. The Pacific Fishery Management Council (PFMC) assumed management responsibility for West Coast groundfish when the Groundfish Fishery Management Plan (FMP) became effective in September 1982 (see Appendix A for detail listing of management history).

From 1983 through 1990, the PFMC routinely adopted an acceptable biological catch (ABC) for Bocaccio of 4,100 metric ton (mt) for the Monterey INPFC area and 2,000 mt for the Conception area. Landings in other areas were considered too small to warrant a separate ABC. These ABCs were based solely on historical (domestic) landings during selected periods; however, actual landings were a (declining) fraction of the allowable landings throughout this period. In response to concerns about Bocaccio stock conditions, an assessment was conducted in 1990 (Bence and Hightower 1990). The assessment results initially resulted in a recommendation for an 800 mt ABC for the combined Conception-Monterey-Eureka INPFC areas for 1991; however, a harvest guideline of 1,100 mt was ultimately adopted for both 1991 and 1992. During those two years, actual harvest exceeded the harvest guideline by 300-500 mt. Management measures used to constrain rockfish catches were primarily effort controls, with trip limits for commercial fisheries (trawl and fixed gear) and daily bag limits in recreational fisheries. Trip limits were implemented for all rockfish species as a complex through 1990, generally limited to 40,000 lbs per trip. Species-specific trip limits began to be implemented in 1991, when trip limits were constrained to 25,000 lbs per trip of which no more than 5,000 lbs could be Bocaccio; however, these limits were relaxed to 50,000 lbs per trip of which no more than 10,000 lbs could be Bocaccio in 1992.

In 1992 the PFMC reviewed a new assessment for Bocaccio (Bence and Rogers 1992). The ABC estimated from that assessment, based on strict adherence to the target fishing mortality rate at that time ($F_{35\%}$), was 1,540 mt. The assessment also projected that spawning and total biomass were expected to continue to decline under status quo harvest rates and recommended that the 1,100 mt ABC be maintained. However, the PFMC adopted the 1,540 ton ABC (with the harvest guideline the same) for 1993 and 1994. The new assessment had also accommodated some expected discard in the trawl and set net fisheries that often fished to the trip limits. In 1994 the Council determined that few trips were being impacted by trip limits, such that the discard-based reduction was unnecessary, and the ABC and harvest guideline was adjusted to 1,700 mt for 1995 and 1996. During this period, trip limits were replaced by monthly catch limits, which fluctuated in values throughout the year in response to efforts to achieve, but not exceed, harvest guidelines. Actual catches of Bocaccio during this period were far below harvest guidelines, presumably in response to declining availability associated with continued harvest and ocean conditions that led to a long period of very poor recruitment.

A stock assessment conducted in 1996 (Ralston et al. 1996) indicated that the stock was in severe decline, and the PFMC drastically reduced the ABC to 265 mt in 1997 and to 230 mt, with adoption of an $F_{40\%}$ policy, in 1998 and 1999. In March of 1999, the stock was formally designated as overfished after the groundfish FMP was amended to incorporate the mandates of the Sustainable Fisheries Act reauthorization to the MSFCMA. Later that year, an assessment by MacCall et al. (1999) estimated that the southern stock was only 2.1 percent of the unfished spawning output. Perhaps ironically, both the management regime and the climate regime shifted almost simultaneously; the decade-long string of poor recruitments ended in 1999 with early indications of a strong 1999 year class. The rebuilding policy adopted by the PFMC held the rebuilding OY constant at 100 mt for the years 2000-2002, with the intention of switching to a constant fishing rate policy beginning in 2003. Trip limits for trawl and fixed gear fisheries were reduced substantially during this period; in recreational fisheries, a two-fish daily bag limit was imposed for Bocaccio, and additional time-area closures were implemented in 2002 to reduce the recreational catch of Bocaccio.

The 2002 assessment (MacCall 2002) utilized more information (particularly recreational fisheries CPUE indices and recruitment indices) and examined both a California-wide model as well as individual models for the areas north and south of Point Conception. The regional models provided a more optimistic perspective of stock status in the southern region and a more pessimistic perspective of the central/northern California region, due to the absence of evidence for the strong 1999 year class in fisheries data from the northern area. However, the review panel recommended that a single, coast wide model be used to provide management advice. This model estimated that the stock spawning output was at only 4.8% of the unfished level, and the subsequent rebuilding analysis estimated that the stock would take nearly 100 years to rebuild to target levels (40% of the unfished output). The results of this assessment, combined with pessimistic assessments of other rockfish species coast wide, contributed to severe management constraints in 2003, including significant area closures and a near total cessation of recreational and commercial fisheries in shelf and shelf break waters. The estimated total catch of Bocaccio declined to approximately 11 mt in 2003, roughly 10% of the total catch in 2002 and less than 1% of the catch ten years prior. Total mortality in 2003 fisheries was restricted to a 20 mt OY as a means of conserving the stock while allowing for limited fishing opportunities.

The 2003 Bocaccio assessment differed greatly from the 2002 assessment. Both the CalCOFI time series and the recreational CPUE indices showed increasing trends as a result of the strong 1999 year class. However, the recreational CPUE indices were adjusted to account for regulatory changes (principally bag limit changes), and all of these indices were in conflict with the triennial trawl survey time series. The most recent triennial survey data was from 2001 and showed little evidence of an increase in abundance (although the length frequency data was indicative of a strong 1999 cohort). The STAR Panel recommended the use of two assessment models, each of which excluded the conflicting data, as a means of bracketing uncertainty from the very different signals between the recreational CPUE data and the triennial survey. However, the STAT did not agree with this approach, and developed and presented a third “hybrid” model (STATc) that incorporated the data from all of the indices. The SSC recommended, and the Council approved the STAT model, which resulted in only modest improvement in estimated stock size, but had very significant impacts on the estimated productivity of the stock and rebuilding scenarios. These results were more optimistic with respect to the rebuilding outlook for Bocaccio, suggesting the stock could rebuild to B_{MSY} within 25 years while sustaining an OY of approximately 300 mt in 2004. The 2004 OY was set at 199 mt.

The 2003 assessment was updated in 2005 (MacCall 2006), with new length frequency data, and new data for the triennial survey and the CalCOFI larval abundance index, both of which suggested an increasing upwards trajectory for the stock. Importantly, the updated triennial trawl survey index (updated with a 2004 data point, now the last point in that time series) was now consistent with the increase in abundance suggested in the 2003 model with the recreational CPUE and CalCOFI indices. The updated base-case (STATc) model continued to forecast a slow increase in biomass (spawning output) from the estimated 2006 value of 10.7% to approximately 20% over the coming decade. The 2006 OY was ultimately set at 218 mt. The assessment was updated again in 2007 (MacCall 2008) without a major change in the perception of stock status.

The 2009 assessment (Field et al. 2009) used Stock Synthesis 3 (version 3.03a), expanded the northern boundary of the area modeled from Cape Mendocino, CA to Cape Blanco, OR, and began the model at 1892 rather than 1950. That model included catch and length-frequency from six fisheries, two trawl fisheries (north and south of 38° N), a hook-and-line fishery, a set net (gillnet) fishery, and recreational fisheries south and north of Point Conception, CA. Fisheries-dependent relative abundance (CPUE) indices, unchanged from the 2003 assessment, were used for the trawl fishery and the two recreational fisheries; a recruitment (age-0) index based on recreational pier fishing was also included, revised from the 2003 assessment. As in the 2003 assessment (and subsequent updates), the CalCOFI larval abundance time series and the triennial trawl survey index were used as fisheries independent survey data, and new fisheries independent indices include the NWFSC trawl survey, the NWFSC Southern California Bight hook and line survey, and a revised (coast wide) pelagic juvenile index. Steepness was estimated with an informative prior to be 0.57. Biomass and spawning output trajectories in the 2009 model were very comparable to those in previous (2003-2007) models, with low abundance in the 1950s, a series of strong recruitments in the 1950s, and high abundance through the early 1970s, when catches began to climb rapidly to their peak levels. This then was associated with high fishing mortality rates and a rapid drop in spawning output through the 1980s and 1990s, even as catches followed the decline in abundance. In response to severe management restrictions, and coincident with very strong recruitment in 1999 (following a decade of very poor recruitment through the 1990-1998 period), spawning output was estimated to be increasing steadily, and the 2009 base model estimated the 2009 depletion to be 28% of unfished larval output in 2009 with a corresponding SPR of 0.95 and forecast of continued increase in spawning output.

The 2011 and 2013 assessment updates (Field 2011, Field 2013) varied very little from the 2009 results, although, due to some of the key uncertainties encountered in the 2011 update, a small number of structural changes were made to the model. As a result of those changes, the 2011 model did not conform to the strict definition of an "update" as defined by the PFMC terms of reference, and the model and associated changes were reviewed in the 2009 "mop up" panel. The issue in the 2011 update was that the length composition data from the 2010 NWFSC trawl survey was dominated by small (Age 0) individuals, which had an overly strong influence on the model results in the initial (pre-review) model in that the 2010 year class was estimated to be as much as an order of magnitude larger than any previously observed year class. As a consequence, a narrow range of analyses were explored to address the potential magnitude of this year class, and the resulting model assumed that the NWFSC trawl survey does not provide an accurate index of age 0 abundance. The index and associated length composition data were revised to remove age 0 fish (fish smaller than 20 cm), and age selectivity was fixed to be non-selective for age 0 fish. Additionally, in order to account for what is in all likelihood one or several strong incoming year classes (2009, 2010), a new time series was added based on southern California power plant impingement survey data for YOY Bocaccio. This index extends nearly 30 years, and was found to have a strong correlation with the model estimated recruitment time series (Field et al. 2010). The resulting 2011 model estimates of relative larval production, recruitment and other trends changed only modestly from the 2009 model results, with a slightly more pessimistic estimate of stock status relative to the 2009 model, with depletion in the year 2011 estimated at 26%, relative to the 30% projected from the 2009 model. However, strong estimates of the 2009 and 2010 year classes were projected to lead to additional increases in abundance. The 2013 update (Field 2013) varied very little from the 2011 update, although the estimated year class strength of the 2009 and 2010 year classes increased, with the result that the relative larval output was projected to be at 38 and 43% of unfished in 2014 and 2015, respectively, as those year classes matured and grew. Recent trends in commercial landings and estimated total catch relative to the management guidelines (harvest specifications) is listed in Table 5 in the Executive Summary section.

1.5 Fisheries off Canada, Alaska, and Mexico

There is a fair amount of data and information on the status of Bocaccio in Canadian waters, where landings have ranged from several hundred to over 1,000 mt per year in recent decades. In 2002, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed Bocaccio as threatened (COSEWIC 2002) based on an apparent population decline of more than 95% over a two decade period. However, in 2011 the stock was not recommended for listing under the Canadian Species at Risk Act (SARA). A stock assessment was conducted in 2004 (Stanley and Starr 2004), for which past declines were unclear, and it suggested that Bocaccio had been widespread over their habitat and stable in abundance since the mid-1990s. Interestingly, one of these surveys was described as suggesting a peak relative abundance in the 1980s, noting that the abundance levels observed in that period might not be appropriate rebuilding targets (Stanley and Starr 2004). Another assessment in 2009 (Stanley et al. 2009, DFO 2009) used a Bayesian surplus production model fitted to one fishery-dependent and six fishery-independent abundance indices and a reconstructed catch history that stretched back to 1935. In their base model, the biomass was estimated to have declined from the 1930s through the early 2000s, with the greatest decline between the mid-1980s through the mid-1990s and some suggestion of a flattening of the biomass trend since the late 1990s. The model estimated a posterior median for the estimated 2008 biomass of 2,324 mt (posterior mean of 3,022 mt), with the posterior median relative stock size (B_{08}/B_{MSY}) of 0.111 (posterior mean 0.155). That assessment was updated in 2012 (DFO 2012) with similar results, and it suggested that the decline has continued after 2002 despite total catches being among the lowest in the history of the fishery.

Even less is known about the abundance and distribution of Bocaccio at the southern end of their range. MacCall (2003) used the CalCOFI larval abundance data from the 1950s and 1960s (CalCOFI cruises ceased to sample Mexican waters in the 1970s) to estimate that the historical distribution of spawning abundance over the assessment range. He found that approximately 4.6 percent of larvae were encountered in Mexican waters, 46 percent in southern California waters, and 50 percent in central/northern California waters (from Pt. Conception to Bodega Bay). No information is available on catches or stock status and trends of Bocaccio in waters off northern Baja California; and although there is presumably population connectivity between the Southern California Bight and Baja California, we are constrained to treating the stock as distinct north of the U.S./Mexico border. As Mexican oceanographers have begun occupying the historical CalCOFI stations off of the Baja Peninsula in recent monitoring efforts, the potential to include or analyze data from these efforts should be revisited in the future.

2 Assessment

2.1 Data

Summary of data sources and time periods of each data set are presented in Figure 11. Details of each data set are described in the corresponding sections below.

2.1.1 Fishery fleets and catches

There are six fishery fleets defined in this assessment: (1) the southern and south-central California trawl fishery, including all trawl-caught fish landed south of 38° N ("TrawlSouth"); (2) the hook-and-line fishery ("HL"); (3) the setnet fishery (most gillnet, "Setnet"); (4) the southern California (all catches south of Point Conception) recreational fishery ("RecSouth"); (5) the central and northern California recreational fishery, including any southern Oregon recreational catches ("RecCenteral"); and (6) the northern California (north of 38° N) and southern Oregon trawl fishery ("TrawlNorth"). Bocaccio have long been described as one of the dominant rockfish species for both commercial and recreational fisheries throughout California. Although landings of many California groundfish are typically reported in single species market categories, group market categories have been the most common approach for sorting rockfish catches in California, with a trend towards single species categories in recent years due to regulatory constraints. Recent trend in commercial catches and estimated total catch relative to the management guidelines are listed in Table 5. Estimated annual catches by each fleet, along with total annual catches, are presented in Figure 12 and Table 7.

2.1.1.1 Commercial fishery catches

The catch history for Bocaccio through the 2000s is largely unchanged from the 2009 model and subsequent updates, which relied primarily on the catch reconstruction from Ralston et al. (2010) for California catches (see details in Field et al. 2009, Field 2013). Historical catches from three southern Oregon ports were extracted from recently completed Oregon historical reconstruction project (Karnowski et al. 2014, details below). Catches for 2002 through 2013 were taken from West Coast Groundfish Observer Program (WCGOP) total mortality estimates (e.g., Bellman et al. 2010, Sommers et al. 2014). Catches for 2014 were provided by John DeVore of the PFMC (personal comm.). A small amount of catches from the NWFSC trawl survey from 2003 through 2014 were added to the catches of the "TrawlSouth" fishery.

Bocaccio have long been one of the most important rockfish species in California fisheries, having been described as a "common market fish" in California fish markets as early as the 1850s (Jordan 1884). Total rockfish landings in California were reported to be approximately 2,000 to 3,500 mt statewide from the early part of the 20th century, dipping slightly in the late 1930s and into the beginning of the war years in the 1940s, of which Bocaccio was approximately 20% of the total catch (Ralston et al. 2010). During this period, slightly more than half of the total California catch was taken south of Point Conception, with the majority of the remainder coming from central California ports (particularly San Francisco and Monterey). Although paranzella trawling (and later otter-board trawling) have been an important source of marine fisheries landings in central California since 1876, most of the trawl catch in early years was composed of flatfish (petrale and English sole) fished over soft bottom in relatively shallow waters that were typically fairly close to ports (Clark 1935, Scofield), and rockfish catches were primarily from hook-and-line fisheries (Wolford 1930; Phillips 1949). Block summary data collected by the (as then known) California Department of Fish and Game indicate that fisheries for rockfish and other groundfish exhibited a strong pattern of sequentially fishing in deeper waters, further from port, and in more inclement weather from the 1930s through the 2000s (Miller et al. 2014). Through the shift in dominance from hook-and-line to trawl gear in rockfish (and other) fisheries, Bocaccio remained the most significant rockfish species in California throughout the 1960s and 1970s, representing approximately 33% to 35% of the statewide catch throughout that era. Bocaccio typically comprised a modest (generally 5-10%) fraction of the rockfish catch in northern California, and a greater (often greater than 50%) fraction of the catch in central California. The catch reconstruction estimates of the species composition of the catch developed in Ralston et al. (2010) are consistent with other reports throughout that period (e.g., Nitsos 1965 and Gunderson et al. 1974).

Historical catches of Bocaccio from three southern Oregon ports (Brookings, Gold Beach, and Port Orford, all south of 43º N latitude) were extracted from the Oregon historical reconstruction project (Karnowski et al., 2014, data provided by V. Gertseva of NWFSC). The project provides estimates for two time periods: (1) late time period (1978 to 1986) with landing ports identified and (2) early time period (1892 to 1977) with catches from all ports pooled. For the late time period, catches from three southern ports are summarized and added to the estimates of the "TrawlNorth" fishery. For the early time period, because port names are not available, catches are estimated using a ratio of catches from three southern ports to all ports in the late time period. Bocaccio catches in Oregon for the time period between 1987 and 2002 were downloaded from the PacFIN database, and were also added to the estimates of the "TrawlNorth" fishery. Annual catches from three southern Oregon ports are listed in Table 8.

2.1.1.2 Recreational fishery catches

Catch estimates of Bocaccio in recreational fisheries were obtained from Ralston et al. (2010) through 1980 and from the Recreational Fisheries Information Network (RecFIN, through Marine Recreational Fisheries Statistics Survey) through 2014 (these total mortality estimates are also reported in the WCGOP total mortality reports). As RecFIN records include a significant fraction of "unknown" rockfish catches (labelled as "rockfish genus"), the proportion of Bocaccio observed in the "known" catches was applied to the reported catches of "unknown" rockfish and the total Bocaccio catch was adjusted by:

$$Total\ catch = (\mathrm{A} + \mathrm{B1}) + \frac{U(A + B1)}{T - (A + B1)} \tag{1}$$

where *A* and *B1* are RecFIN estimates of Types *A* and *B1*, respectively. *U* is RecFIN estimate of "unknown" rockfish, and *T* is RecFIN estimate of all rockfish. RecFIN also reports Bocaccio estimates by GMT (GMT scorecard) between 2010 and 2014, which are very much same as the sum of A and B1, and are used as total Bocaccio catches for those years. Annual estimates of all these estimates by two regions are listed in Table 9 and Table 10.

2.1.2 Biology data and parameters

2.1.2.1 Length-weight relationship

The length-weight relationship was re-estimated in the 2009 assessment using a total of 5,050 weight and length observations from the triennial trawl survey, the NWFSC combined trawl survey, the SWFSC groundfish ecology cruise dataset and the NWFSC hook-and-line survey in the Southern California Bight (Figure 13). Estimates were based on bias-corrected data from a log linear regression between fork length (cm) and weight (kg). The estimated values were a = 7.355 E-06, b = 3.11359, which are very similar to the values carried over from the 1996 assessment (then based solely on several hundred fish from the triennial survey) of 6.19 E-06 and 3.1712 for a and b, respectively. This same length-weight relationship is used in this assessment.

2.1.2.2 Growth

The stock synthesis approach uses the Schnute (1981) parameterization of the von Bertalanffy growth equation (Methot and Wetzel 2013). Bocaccio have long been described as having very rapid growth during the early years of life, which can be tracked by the progression of strong cohorts in fisheries length frequency data. Past assessments have typically estimated the growth coefficient (K) internally, while fixing L_{min} and L_{max} based on the length frequency data (MacCall et al. 2002; MacCall 2003). The 2003 assessment (and subsequent updates) fixed values for L_{min} at 27 cm (for an age of 1.5 years) and L_{max} at 65.6 and 75.9 cm for males and females, respectively, with K estimated as 0.184 and 0.210 for females and males, respectively. In the 2009 assessment, several options were explored for modeling growth. The final model treated L_{min} as a fixed value for age 1.5, based on wave-specific length frequency data from recreational fisheries in the 1970s, in which age-1 fish were caught in extremely high abundance. Fish were estimated to be 26 cm long at age 1.5 from that analysis. The Canadian Bocaccio assessment estimated a L_{inf} of 78.32 and 69.98 for females and males, with corresponding von-Bertalanffy growth parameters (*K* values) of 0.163 and 0.108 respectively. This suggests that Bocaccio in Canada tend to grow larger and slower than fish in the southern region; consistent with observations regarding apparent greater longevity and age at maturity, as discussed later in this section.

This issue was revisited in this assessment. Young-of-the-year (YOY) Bocaccio from the pelagic juvenile trawl survey have been aged using daily increment analysis since the late 1980s, and age (in days) data are available for 478 fish ranging from 35 to 170 days of age. Methods for ageing the fish are described in Woodbury and Ralston (1991), and the survey is described in more detail in Ralston et al. (2013) and elsewhere in this document. Note that most fish were caught in the "core" (Central California) area; however, the recruitment index used in this assessment is from the extended survey area, which, importantly, has included southern California waters since 2004. Regressions were fitted based on the assumption of both a liner relationship and a power function relationship: both relationships explained the majority of the variance (r^2 was 0.88 and 0.91 respectively, Figure 14). The linear relationship indicated that the average 183 day old (0.5 year) should be 101 mm, while the power relationship suggested that a 183 day old fish should be 109 mm. However, one caveat to these results is that only a small number (7) of Bocaccio from the southern region have been aged; those data suggest a faster growth rate for YOY in this region (red triangles on Figure 14). Similarly a comparison of widow rockfish from the core area and the northern area (Oregon) suggested a slower growth rate for the more northerly fishes for that species (Field and Kashef, unpublished data). A more robust evaluation of the relative differences in growth rates by species and regions is ongoing, but, from these preliminary results, it appears very likely that growth rates are more rapid in the Southern California Bight, the region where the greatest abundance of YOY Bocaccio are encountered.

In order to better understand the likely size at age for age-0 fish, we also evaluated the size distribution by calendar date of YOY (and age 1) Bocaccio encountered in the NWFSC trawl survey. Between 2003 and 2014, a total of 617 Bocaccio were aged from Combo survey catches, the length distribution by binned Julian day is shown in Figure 15 (a small number of fish from different time periods were excluded). Based on a comparison with the size distribution of age-1 fish from the same survey, it seems likely that a fairly high number of these fish were mis-aged (Bocaccio are notoriously difficult to age, described elsewhere in this assessment), and were likely to actually be age-1 fish. If we assume that all of the fish larger than 200 mm were mis-aged (a reasonable assumption, given too that the actual spawning and recruitment for Bocaccio takes place over an extended time period in southern waters; this analysis is based on an assumption of a January 1st birthdate for all fish), Figure 15 shows that there are clear modes of average sizes by Julian day bins that progress rapidly over fairly short time periods. Based on the size distribution of fish observed in this survey, one might assume that 140 to 150 mm was a reasonable estimate for the size at age 0.5 for Bocaccio, although it should also be noted that the survey selectivity for such small fish is low, and thus the survey would be strongly biased towards the larger, faster growing individuals at this young age. Nevertheless, this provides some basis for evaluating alternatives for fixing the length at age 0.5, as well as some criteria for evaluating whether estimated values are reasonable.

2.1.2.3 Maturity

The 2009 assessment compared results from four previous studies describing the proportion of female Bocaccio mature as a function of body length. Lengths were standardized to centimeters fork length using the equations form Echeverria and Lenarz (1984). Phillips (1964) found that 50% of females from statewide samples in California were mature by 40.4 cm, and indicated a few were mature by 34.9 cm. Gunderson et al. (1980) examined 84 female Bocaccio from 34°08' to 40°26' N latitude (central California), finding that 50% were mature by 48.2 cm. Wyllie Echeverria (1987) estimated length at 50% maturity as 46.5 cm based on samples from central and northern California. Wyllie Echeverria reported interannual differences in size at maturity, although the reported lengths at 50% maturity differ by only 1 cm for Bocaccio. No significant regional differences (north and south of Point Arena) were detected in the latter study. Love et al. (1990) reported lengths of 35.3 cm and 43.0 cm at 50% and 99% maturity for specimens collected in the Southern California Bight. Thus, the estimated proportion of mature females at length differed among studies.

Differences in maturity at length among these studies may be due to spatial or temporal variation (including density dependence) in length at maturity, or changes in methodology such as determination of maturity stages. Love et al. (1990) report a larger proportion of fish maturing at smaller sizes relative to the other studies, based on samples from the Southern California Bight (SCB). Phillips (1964) combined statewide samples from CA, reporting a higher proportion of mature females at a given length relative to Love et al (1990). Wyllie Echeverria (1987) and Gunderson (1980) based their maturity estimates on fish captured north of Point Conception, and both studies estimated larger lengths at 50% maturity than were reported for the studies that included SCB data. However, temporal changes in maturity at length may have caused the observed differences among studies, and there is insufficient overlap in the timing of the surveys to eliminate either possibility. Regarding definitions of maturity stages, it is important to recognize the difficulty in distinguishing ovaries of immature rockfish (those that have never spawned) from ovaries of mature individuals in early stages of vitellogenesis or during resting periods (Wyllie Echeverria, 1987). Errors in assignment of rockfish maturity stages are most likely to occur during non-spawning seasons (Wyllie Echeverria 1987).

The 2009 assessment used maturity data from four sources: CalCOM California commercial port sampling data; Groundfish Ecology cruises conducted by the NMFS Southwest Fisheries Science Center conducted by the Fisheries Ecology Division off Monterey; the West Coast triennial trawl survey conducted along the West Coast of California; and the Department of Fisheries and Oceans, Canada (R. Stanley, DFO, pers.com.). Interannual and regional variations in lengths at maturity were examined for fish collected from California, though no consistent trends in either were observed. However, regional differences in length at maturity have been reported in previous studies (Haldorson and Love 1991), and fish from Canadian waters appeared to mature at larger sizes (49.2 cm and 57.3 cm for lengths at 50% and 95% maturity, respectively). The 2009 assessment considered all observations taken in U.S. waters between October and June, and excluded fish collected from the south of Point Conception and specimens with stage 2 (early vitellogenic) ovaries. Maturity data was pooled across years and areas. Estimated lengths at 50%

and 95% maturity were 39.9 cm and 48.1 cm, respectively (the corresponding slope parameter was 0.359; Table 11).

To update maturity estimates for this assessment, data was obtained for female Bocaccio off the West Coast of North America from three different sources: 1) CalCOM, 2) the NMFS Southwest Fisheries Science Center (SWFSC) Groundfish Ecology cruise conducted by the Fisheries Ecology Division, and 3) the NMFS SWFSC hook-and-line collections by the Early Life History team.

CalCOM maturity data are collected by port samplers in California, who have recorded maturity stages of female Bocaccio landed by commercial vessels since 1993. Sample sizes vary considerably over time (1993-Jan 2015) and by port complex. Central California port complexes have the highest number of observations, sample sizes decrease in the more northern California ports, and very few are available from ports south of Pt. Conception. The SWFSC Groundfish Ecology cruise collected rockfish maturity data from 2001-2007 in central California (Monterey area). The majority of samples were collected during peak parturition season for Bocaccio (January-April). Bocaccio were collected opportunistically from hook-and-line collections made by the SWFSC off central and southern California between 2009 and 2015. Sampling was conducted during the reproductive season (August-March).

Maturity classifications obtained from the data sources were compiled, and the following ovarian staging scheme, based on macroscopic appearance of whole ovaries, applied: stage 1= immature, stage 2=early vitellogenic, stage 3=late vitellogenic, stage 4=fertilized or eyed-larvae present, stage 5=spent, stage 6=recovering (note: this was the same staging scheme applied in the 2009 assessment). Seasonal patterns of ovarian development (Figure 16) demonstrated that September to January was the most appropriate window of time to consider maturity estimates: during this time period <25% of ovaries were classified as stage 5 or 6. Misclassification, particularly between immature and spent/resting ovaries, occurs most frequently outside of the reproductive season (Hunter et al. 1992): by temporally restricting the specimens used for maturity estimates to September-January, the potential for misclassification was reduced.

Stage 2 ovaries were included in the updated estimates. A subset of ovaries from the NMFS SWFSC hook-and-line collections have been examined histologically (n=109). The majority (n = 24) of those macroscopically assigned to stage 2 (n = 25) showed normal development, and the fish would have been expected to successfully reproduce in reproductive season of capture. Other rockfish species are known to have mass atresia events, whereby developing oocytes are resorbed, making successful reproduction in the current year unlikely (Lefebvre and Field 2015). These ovaries may superficially resemble stage 2 ovaries; however, mass atresia does not appear to occur frequently in Bocaccio, as only 1 ovary (<1%) examined histologically was found to have this phenomenon occurring. Additionally, looking at the seasonal trends from the combined macroscopic data set (Figure 16), the percentage of stage 2 ovaries declined between September-January in accordance with increasing stage 3 and 4 ovaries, as would be expected if females with stage 2 ovaries were mature.

For the base model, fish with stage 1 ovaries were considered immature while fish with stage 2, 3, 4, 5, or 6 ovaries were considered mature. Only specimens collected between September through January were included to minimize ovarian stage misclassification, and data from all years were pooled due to data imbalances between data sets. Specimens collected in the Southern California Bight (n=76) were included, as much of the biomass for this species occurs in those waters. The proportion of individuals mature at a given length was modeled using generalized linear models (GLM) with binomial error structures and logit link functions. The response variable was binary (immature=0, mature=1), and covariates were fork length and data source. Data source was found to be insignificant (p>0.05), thus the simplest model was used as the base model. The estimated lengths at 50% and 95% maturity were 37.7 cm and 46.5 cm, respectively (corresponding slope parameter=0.334; Table 11; Figure 17).

Additional sensitivity analyses were conducted to determine how temporal expansion (sensitivity 1), exclusion of stage 2 ovaries (sensitivities 2 and 4), and exclusion of samples from the Southern California Bight (sensitivities 2 and 3) affected estimates of maturity and slope parameters. Results of the sensitivity analyses demonstrated that the largest change to estimates of the length at 50% maturity was due to whether or not stage 2 ovaries were included in the model (Table 11; Figure 18).

Although the length compositions of mature fish do not vary considerably among studies, there are differences in the distribution of lengths for immature fish, which may provide evidence of differences in gear selectivity (Figure 4, top panel). Selectivity differences are expected between the samples from scientific surveys and commercial landings, but smaller differences were also detected between the Early Life History and Groundfish Ecology surveys (Figure 4, bottom panel). If fish landed by the commercial fisheries are generally larger than the survey fish, then it is possible that a bias may be introduced into maturity estimates based on commercial samples because smaller (possibly mature) fish are not caught in the fishery. Methodological differences among studies may also introduce variability in maturity estimates. Given the effect of data source on maturity estimates, we examined an alternative data set that did not include the samples from the commercial fishery. Estimated lengths at 50% and 95% maturity were 37.6 cm and 43.7 cm, respectively (Table 11).

Analysis of interannual and regional changes in maturity at size was not conducted here due to inconsistency in spatial and temporal coverage in the available data sets. The need for balanced data to effectively evaluate interannual and spatial variation in length at maturity remains an area worthy of exploration for Bocaccio.

2.1.2.4 Fecundity

A linear model for relative fecundity as a function of weight has been used in Bocaccio assessments since 1996. The 2009 assessment compared an analysis by Ralston (1996) using data reported in Phillips (1964) to that of a hierarchical linear model for relative fecundity reported in Dick (2009) which estimated relative fecundity as a function of weight for 40 species of *Sebastes*. The comparison showed similar results, but a slightly steeper slope in the Dick (2009) model. The 2009 assessment used a relationship reported by Dick (2009):

$$\frac{E}{W} = 192.5 + 49.3W \qquad (2)$$

where E is number of eggs (x1,000) and W is weight in kilograms.

For the 2015 assessment, fecundity parameters were updated to reflect newly available data from ongoing reproductive ecology studies (Beyer et al. unpublished) and historic fecundity estimates (Phillips 1964; MacGregor 1970; Love et al. 1990). Fecundity data for 113 female Bocaccio were compiled from females collected throughout California over a time period ranging from the 1960s to 2015. Two additional studies, which estimated fecundity of Bocaccio from outside of the assessed stock range, were excluded for this update (Snytko and Borets 1973; Ralston and MacFarlane 2010). All studies used a similar form of the gravimetric method to subsample eggs or larvae from the gonad and to estimate female fecundity, and applied a linear model (described above) to develop the size-dependent relative fecundity relationship used in the assessment.

The updated analysis (which included the original data from Phillips (1964)) similarly showed that Bocaccio had a significantly positive size-dependent relative fecundity relationship (a = 254.858, b = 20.0, P = 0.001), however the slope was not as steep as reported by Dick (2009) and Phillips (1964) for the 2009 assessment. A steeper slope (b) indicates a greater disproportionate increase in larval output from larger, older females, whereas a slope of zero would indicate that larval production was equal to spawning biomass regardless of age or size structure of the population.

The original Phillips (1964) study, which had a steeper slope compared with the other California studies collected 10 species of *Sebastes* by sampling fish markets mainly near northern and central California (Eureka, Fort Bragg and Monterey) in addition to scientific cruises in southern California, however, it is unclear the exact location where Bocaccio were collected. In comparison, MacGregor (1970) and Love et al. (1990) sampled primarily from southern California, and Beyer et al (unpublished) sampled from both southern and central California. There is some evidence that the slope of the size-dependent relative fecundity relationship increases at more northerly latitudes and may be the result of changes in the reproductive strategy of fish in the southern range.

An analysis of all Bocaccio fecundity studies, including fish from Baja, Mexico to Vancouver, Canada showed a pattern of increasing slope at more northerly latitudes. Unfortunately, without further research, it is hard, or nearly impossible to distinguish whether this is indeed a regional effect or potentially methodological differences by study (Vancouver and Oregon fish were collected by Snytko and Borets (1973) and Mexico fish collected by Ralston and MacFarlane (2010)). However, another indicator of true regional differences in reproductive output is that Bocaccio is one of 12 (known) species of *Sebastes* capable of producing multiple broods. Multiple broods are commonly reported in southern California (MacGregor 1970; Love et al. 1990; Ralston and MacFarlane 2010), less so in central California (Beyer et al. 2015), and are undocumented north of central California. The phenomenon of producing two or potentially three broods over a single year complicates the estimates of annual fecundity for this species, since secondary broods were shown to increase overall egg production (in some cases doubling the annual reproductive effort; MacGregor 1970; Beyer et al. 2015).

Additionally, maternal size and condition likely influence the number of broods produced. Love et al. 1990 reported up to three broods a year among large Bocaccio collected from southern California (although the methods of identification were unclear). Also, Ralston and MacFarlane (2010) found that secondary broods were more common among Bocaccio females weighing greater than 2 kg. The phenomena of multiple brooding should be consideration for additional research since the effect of larger females producing a greater number of broods will essentially increase annual fecundity and increase the slope of the size-dependent relative fecundity relationship. This could also explain the increase in slope of the size-dependent relative fecundity relationship by region, as northern females may produce only a single, more highly fecund brood a year, and southern fish may produce multiple, lesser fecund broods a year.

This phenomena has been the subject of recent investigations using both microscopic and histological methods to better identify second (and potentially third) broods (Beyer et al. 2015; also S. Sogard, S. Beyer, D. Stafford, N. Kashef, L. Lefebvre and J. Field; unpublished data). Because of the lack of data on secondary broods, the proportion of females in the population producing secondary broods and frequency with which they do so is unknown.

Lastly, the capability of Bocaccio to produce secondary broods has the potential to extend the parturition season, such that larvae may have a better chance of encountering more favorable conditions for survival and growth (match-mismatch hypothesis). More work is needed to better understand the mechanistic drivers of the multiple brooding phenomena and how it relates to geographic range, environmental conditions, female size, population production, and recruitment.

The updated weight specific fecundity function used in this assessment is as following:

$$\frac{E}{W} = 254.9 + 20.0W \qquad (3)$$

where E is number of eggs (x1,000) and W is weight in kilograms. A comparison plot between the functions used in the 2009 and this year's assessments is presented in Figure 19. Spawning output per female by length is presented in Figure 20. The sex ratio for Bocaccio is assumed to be 1:1 between females and males in this assessment.

2.1.2.5 Natural mortality (*M*)

Although age determinations of Bocaccio are known to be imprecise, Ralston and Ianelli (1996) reported that the maximum known age of Bocaccio is 45 years. Piner et al. (2006) used radiocarbon levels measured in otoliths from fish taken off the coast of Washington state to confirm that Bocaccio can live up to at least 37 years. Andrews et al. (2005) used lead-radium dating in an attempt to independently age Bocaccio otoliths, but found that measured levels of lead and radium were among the lowest in the literature, resulting in poor age resolution. Their results were consistent with longevity of 30-40 years. The Canadian assessment (Stanley et al. 2009) documents age frequencies for over 900 aged Bocaccio, in which the maximum ages were 57 for males and 52 for females (99% ages were 52 and 46 for males and females respectively). Based on those ages they used the Hoenig (1983) relationship with the bias correction suggested by MacCall (2003) to derive estimates of total mortality of 0.097 and 0.086 for females and males respectively. The difficulties encountered in ageing Bocaccio, which may be greater in the southern part of the range, are discussed in greater detail in the section on age data.

In 1996, Ralston and Ianelli (1996) reviewed the information relating to the natural mortality rate of Bocaccio and used a natural mortality rate of 0.15 in their model. Due to computational problems in the then-current SS1 program (subsequently fixed), MacCall (1999) was unable to develop a model with the 0.15 mortality rate and developed a model with M set to 0.2, which was adopted as the base model. In the 2002 assessment, MacCall examined both M = 0.15 and M = 0.25, but retained M = 0.2 as the base model because it was consistent with the previous assessment and rebuilding analysis. During discussions following the 2002 STAR Panel, it was generally agreed that M = 0.2 was probably too high, and lower values of natural mortality rate should be considered. MacCall (2003) used the Hoenig (1983) method to estimate a total mortality rate of 0.092 for the maximum age of 45, but noted that this estimate is a geometric mean, and estimated that a bias-corrected total mortality rate should be approximately 0.1. However, the 2003 STAR Panel recommended a natural mortality rate of 0.15, and this value has been used in subsequent updates (MacCall 2005; MacCall 2007, Field et al. 2009).

It might be noted that the maximum age of 45 was from fish in the northern part of the range, for which the maximum age has more recently been estimated as 57 (as noted above). Of the more than 1300 fish aged using break-and-burn methods for the 1996 assessment (fishery-dependent samples from 1988, 1991 and 1994), the oldest was 37 years. This would correspond to a total mortality (Z) of approximately 0.121 (with the bias adjustment), still quite below the rate of 0.15 used in past assessments (particularly given the high fishing mortality rates known to have been taking place in the decades preceding sample collection). Despite this, in the absence of convincing evidence for a different value, this estimate (M = 0.15) had been used in the assessments since 2003.

The maximum age is found to be 34 years old from our Bocaccio ageing project. Based on this observation and related biological and oceanographic factors, priors for *M* are obtained using the method developed O. Hamel (NWFSC, personal communications; see also his publication, Hamel 2015). Table 12 lists *M* priors based on two methods. The first method is solely based on the maximum age and the estimated M prior is 0.129. The second method, which includes GSI, temperature and other factors, estimates M prior to be 0.244. Based on these information and reviews from the past STAR Panels, the nature mortality at the same rate (0.15) as in the last three full assessments was used in the base model prior to the STAR Panel review. Comprehensive sensitivity analyses were conducted to evaluate the effects of *M* values on the assessment outputs in the later sections. During the STAR Panel review, however, it was recommended that the natural mortality be estimated internally in the base model.

2.1.2.6 Development of Bocaccio ageing criteria and addition of ageing data

Since the mid-1990s, stock assessments of Bocaccio have excluded age composition data, as this species has long been considered too difficult to age and reliable ageing criteria could be developed (Ralston and Ianelli 1998, MacCall et al. 1999). Since reliable ages were not available, all stock assessments for this species have relied on length based approaches. The resulting assessment models have been considered robust, as the combination of very rapid growth and highly variable recruitment in this stock have allowed for the resolution of strong cohorts (and, subsequently, growth) within the modeling framework (Ralston and Iannelli 1998, MacCall 1999, Field 2013). Despite this, an ongoing research recommendation in most assessments since that time has been for the development of ageing criteria for southern Bocaccio, the production ageing of a reasonable fraction of existing age structures (current archives include over 60,000 age structures for this species), and the subsequent evaluation of the resulting composition data in the assessment model.

Efforts to develop ageing criteria for this species began in the early 1980s and have continued intermittently as new approaches became available. Initial age determination efforts used surface ageing of whole otoliths, break-and-burn methods were explored in the late 1980s, as were thin sectioning and image processing techniques. The key challenges have always been the presence of numerous false annuli (marks that seemed to be real annuli but did not persist around the otolith) and the difficulty in identifying the inner annuli. Past efforts to age this species in California waters resulted in a very low level of agreement both between and within age readers, with age differences of more than 5 years on fish presumed to be less than 25 years old typical. This was also observed in efforts conducted to validate age estimates using lead-radium disequilibria and bomb carbon. Specifically, Andrews et al. (2005) found that measured levels of lead and radium were among the lowest in the literatures, resulting in poor age resolution (they estimated a maximum age estimate of approximately 37 years, based on samples from California waters).

A small number of age estimates have also been developed and validated for Bocaccio off of Washington State based on bomb radiocarbon methods (Piner et al. 2006); that study also estimated a maximum age of at least 37 years. Bocaccio in Canada have been aged with break-and-burn methods, with maximum ages as old as 57 years, although the criteria used to develop these age estimates have not been described nor do those estimates seem to have been formally validated (Stanley et al. 2009). Growth and maturity patterns also appear to vary among the larger scale regions of the California Current, with Bocaccio in southern waters growing faster and maturing at smaller sizes than fish in northern waters (described in the 2009 assessment and elsewhere in this document); this appears to correspond with greater difficulty in ageing fish from the southern extent of the range.

Based on the observation that age structures from Washington State were less difficult to age, we examined otoliths collected from Washington and observed that the pattern of presumed annuli were, in fact, easier to identify than was typically observed in otoliths from California. As a result, another effort to develop a set of ageing criteria for this species was initiated, and through comparison of otoliths from northern and southern waters, a set of age determination criteria were developed. These included the use of the break and burn method combined with a ¾ view that includes the ventral side of the otolith and a high percentage of cross reads. The age determination methods and criteria are documented separately in Pearson et al. (2015). Although ageing error is still fairly high for this species (discussed in next section), these criteria have enabled us to estimate over 8,000 ages from both commercial fisheries and fishery-independent surveys to support this assessment. Numbers of fish aged from four fisheries and the NWFSC trawl survey are presented in Table 13. All age data are structured as conditional age-at-length matrixes in the assessment to aid estimations of growth and potentially for estimating natural mortality.

2.1.2.7 Ageing error analysis

A total of 1,428 otoliths from various sources (fisheries and the NWFSC survey) were selected for ageing error analysis. Some of these otoliths were intentionally selected (fish with length greater than 65 cm) to ensure large fish were representative in the analysis. Ageing error data were analyzed using an ADMB program written by Andrè Punt (University of Washington) with front end R programs and output analysis written by James Thorson (NWFSC). Plots of ageing bias and errors are presented in Figure 21. Comparisons of ageing bias and ageing errors with true age and no errors are presented in Figure 22. Estimated ageing bias and ageing errors from the analysis were used in the assessment.

2.1.3 Fishery independent data

2.1.3.1 CalCOFI larval abundance data

The historical ichthyoplankton abundance data, collected from California Cooperative Oceanic and Fisheries Investigations (CalCOFI) surveys, was first used in the Bocaccio stock assessment in 1996 (see Jacobson et al. 1996). Although it was not included in the 1999 assessment due to the re-analysis of the CalCOFI dataset during that period, it was used again beginning in the 2002 and subsequent assessments. Egg or larval abundance data from these surveys have also been used in stock assessments for other important West Coast species, including northern anchovy (Jacobson and Lo 1994), Pacific sardine (Hill et al. 2007), shortbelly rockfish (Field et al. 2007), Cowcod (Butler et al. 1999, Dick and MacCall 2014) and California sheephead (Alonzo et al. 2004). Both the sampling region and seasonality have changed substantially over time, and there have been several changes to the sampling gear through the history of the survey as well (from silk to nylon nets in 1969, and from ring nets to bongo nets in 1978; see review in McClatchie 2014). However, data are used in a GLM format, relative abundance data are standardized to the volume of water sampled, and analyses of residual patterns conducted during the 2015 STAR Panel did not indicate that such changes influenced the index in a biased manner.

The CalCOFI survey began in 1951, with early objectives to do monthly sampling of ichthyoplankton over nearly the entirety of the California Current, as the primary impetus for the survey was to evaluate the distribution and abundance (and mechanisms that could be leading to the then ongoing declines in) California sardine (*Sardinops sagax*). However, the program recognized the value in quantifying all ichthyoplankton to the lowest taxonomic resolution possible, an objective which is ongoing. Bocaccio are one of only several *Sebastes* species for which larvae are readily identifiable using morphometric methods (Moser et al. 1977), however as these criteria were not developed until several decades of collections had been made, most of these larvae were not identified to the species level in initial plankton sorting efforts. Instead, the core CalCOFI area dataset (lines 76.7, which begins just north of Pt. Conception on the shoreward end, to line 93.3 which begins just off of San Diego) was initially reanalyzed following the development of morphological criteria that allowed for conclusive identification to the species level. Data for the central California region are only available for a subset of years, although historical samples are currently being enumerated from 1968 back to 1951 (W. Watson, SWFSC, pers. comm.). Table 14 shows the number of samples available, the number of positive samples, and the percent positive samples for the core (southern California) area and for the central California region for the 1951-2014 time period, including only samples collected during the spawning season for Bocaccio (November through May), and excluding samples taken in far offshore regions where Bocaccio and other rockfish larvae have been rarely, or never, encountered. Figure 23 shows the locations of the stations used in this analysis, defined as what are now considered to be "core" area stations relative to those that are considered non-core stations. Figure 24 shows the relative proportion positive for core stations only over the duration of the time period (again, limited to data collected during the months of November through May), to provide a general sense of the spatial distribution of positive samples (as well as the approximate habitat distribution available for spawning adults in the survey region).

We developed the CalCOFI index consistent with the approach from past assessments, in which we used tow specific information and a delta-GLM approach to derive an index of spawning output. Fixed effects in the model included year (fixed to spawning season, such that data from November and December are used to estimate the year effect for the following year, along with the January-May data from that year), month and line-station effects. In past assessments we have explored alternatives to the line.station factor approach, including combinations of line, distance from shore, and depth; and future explorations should continue to evaluate improvements to the index. Based on AIC criteria, we used a lognormal distribution for the positive model, and a complementary log (cloglog) link function for the binomial model.

These estimates and the associated standard errors estimated from a jackknife routine were used in the model as a relative index of population spawning output (Figure 25). The trends suggested by both the raw data (percent positive tows and catch rates of positive tows) suggest that relative abundance was declining through the 1950s, but increased sharply in the 1960s through the early 1970s, after which the index declines similar to the decline observed in other indices. Throughout the time series, there is considerable high frequency year-to-year variability in larval distribution and abundance that may be related to variability in climate, oceanographic features and circulation patterns, or variable reproductive output (MacGregor 1986, Moser et al. 2000; Lenarz et al. 1995).

2.1.3.2 Larval production estimates

In addition to the relative abundance estimates based on the delta-GLM model, we consider estimates of absolute biomass developed by Ralston and MacFarlane (2010), for the Southern California Bight (SCB, U.S. waters south of Point Conception). These estimates are developed from an estimation of the spawning output necessary to produce observed daily rates of larval production, using a methodology developed first by Ralston et al. (2003) for shortbelly rockfish (*Sebastes jordani*) and subsequently used in an assessment of that unfished population (Field et al. 2007). Ralston and MacFarlane expanded the daily rates of larval production observed in the CalCOFI Ichthyoplankton surveys during 2002-2003, a year in which sampling in the Southern California Bight was enhanced within the region currently encompassed by the Cowcod Conservation Areas (CCA's) as part of an effort to improve the assessment of that stock. Their results indicate that in 2002 and 2003 there were approximately 3,470 and 5,921 mt, respectively, of female spawning biomass in the Southern California Bight, corresponding to 6,953 and 10,656 mt of total biomass. Interestingly, their results also indicate that the concentration of Bocaccio in the years of their survey was strongly centered around the Cowcod Conservation Areas (CCA's), which have been closed to fishing since 2001, and which was not typical of the long-term average distribution of larval abundance through the duration of the time-series (Figure 26). While the causes of this shift in distribution are unclear (certainly it is not reasonable to think that it was the result of a 1-2 year closure), the consequence does have implications for the interpretation of data from those indices that sample in the Conception area but avoid sampling within the Cowcod Conservation Areas themselves. Additional details can be found in the manuscript included in the assessment background materials.

2.1.3.3 Triennial trawl survey

A primary source of fishery independent information for most managed and assessed groundfish species in the California Current in early years is the West Coast triennial trawl survey conducted between 1977 and 2004 (e.g., Weinberg et al. 2002). The survey, however, had limited coverages in southern California, as no trawls were conducted south of Point of Conception (34.5ºN, Figure 27). As the general consensus from recent data workshops has been to exclude 1977 data, we have not used these data in our analysis, but continue to report the data here. We obtained both stratum-specific area swept biomass estimates and haul-specific survey data from 1980 to 2004 (M. Wilkins, AFSC; B. Horness, NWFSC), both of which were generated after excluding bad performance tows and "water hauls," in which few benthic organisms were noted (Zimmermann et al. 2001). Hauls conducted by foreign vessels were also excluded.

We used the same data as in the 2009 stock assessment (Field et al. 2009). Catch rates in log scale pooled over years are shown relative to the latitude and longitude in Figure 27. The proportions of positive catch haul, and the raw catch rates of positive hauls by latitude and depth are shown in Figure 28 and Figure 29, respectively. These figures show similar proportions of positive catch tows between latitudes 34 and 38, and general decreasing trend toward the northern areas. Proportions of positive tows are high between depths of 200 m and 250 m, and are very low at depths greater than 350 m. The numbers of total hauls and percentages of positive catch hauls by latitude zones and depth zones are presented in Table 15 and Table 16, respectively.

The data are analyzed using the analytical programs recently developed by the NWFSC for delta-GLMM and length frequency analysis. We also used the same latitude and depth stratifications as in the 2009 assessment with one exception, that one depth stratum was changed from 150 m to 155 m to meet the depth stratum requirement in the new analytical programs. There were nine latitude and depth strata defined by three latitude zones (32-38, 38-40.5, and 40.5 to 43 latitude degrees, respectively) and by three depth zones (55 to 155, 155 to 250, and 250-350 meter depths, respectively).

The delta-GLMM model uses depth and latitude strata as fixed effects, and vessel/year as a random effect. The model assumes a log-normal error variance. Models with gamma or inverse Gaussian error distributions failed to converge, likely due to low sample sizes in many strata. Estimates of median annual biomass and CVs are based on MCMC simulations of six chains. Each chain has 300,000 iterations with the first 20% iterations as burn-in iterations and a thinning factor of 120. Estimated annual biomass and CVs, along the total survey catches, are shown in Table 17 and Figure 30. The Q-Q plot (Figure 31) shows adequate fits of the delta-GLMM model to the positive catch rate data. Longer MCMC iterations (up to 5 million iterations each chain) were conducted and their results were very similar to those with 300,000 iterations.

In many West Coast stock assessments (Stewart 2007, Haltuch *et al*. 2013, He et al. 2013), the triennial trawl survey has been treated as a two-period sampling schemes (1980 to 1992 and 1995 to 2004). This stratification was done because the survey timing changed seasonally from mid-July to late September between 1980 and 1992, to May to July between 1994 and 2004. We also attempted to split this survey into two time periods, but the Delta-GLMM analysis failed to converge for the late time period as the estimated CVs were very large. The reason for the failing of this analysis may be due to the fact that catches of Bocaccio for the late time period were very low. For example, only 53 kg and 67 kg of Bocaccio were caught for the entire survey in the years of 1998 and 2001, respectively (Table 17). Thus, the triennial trawl survey was treated as one consecutive survey in this assessment with a selectivity time block for the late time period to mimic changes in survey seasons.

Analysis of length measurement data from the survey showed that there are more large fish in deeper waters and in northern areas (Figure 32 and Figure 33). Most length measurement data, however, were taken in the southern area (Table 18). It was noted that in the early years of the trawl survey, length measurements were not taken from every haul, and, in fact, most hauls with only a small number of Bocaccio (less than 10 fish) in the catch did not report length frequency information (Figure 34). This may have led to a bias in which larger fish were disproportionately excluded from the length frequency data, as the mean weight of fish in the hauls with no length frequency data tended to be greater than the mean weight of fish in hauls that did include length frequency data. Length frequency data were analyzed using an R program developed by the NWFSC and are shown in Figure 35.

For the length composition data, the initial effective sample sizes (input N) for this survey were calculated using the approach developed by Stewart (2008) in which:

$$N_{eff} = N_{tow} + 0.0707N_{fish} \quad if \ \frac{N_{fish}}{N_{tow}} < 55 \tag{4}$$

$$N_{eff} = 4.89N_{tow} \quad if \ \frac{N_{fish}}{N_{tow}} \geq 55 \tag{5}$$

In this method, tows are individual survey trawl tows, and the maximum input N_{eff} is capped at 400.

2.1.3.4 Northwest Fishery Science Center (NWFSC) trawl survey

The Northwest Fishery Science Center has conducted combined shelf and slope trawl surveys (hereafter referred as NWFSC trawl survey) since 2003, based on a random-grid design from depths of 55 to 1280 meters. Additional details on this survey and design are available in the abundance and distribution reports by Keller et al. (2008). Spatial locations of raw catch rates (in log scale) are shown in Figure 36. As for the triennial survey, only trawls conducted in less than 350 m depths are used in the analysis.

The proportions of positive catch haul and the raw catch rates of positive hauls by latitude and depth are shown in Figure 37 and Figure 38, respectively. These figures show similar patterns as for the triennial trawl survey. The numbers of total hauls and percentages of positive catch hauls by latitude zones and depth zones are presented in Table 19 and Table 20, respectively. Summaries of raw catch data by latitude, depth, and year are listed in Table 21.

The data are analyzed using the same program and data stratifications as for the triennial trawl survey data, with exceptions of different latitude stratifications because this survey covers a wider area (to south latitude of 32 degree). The same delta-GLMM model and error structures used for the triennial survey were used for the analysis. The Q-Q plot (Figure 39) shows adequate fits of the delta-GLMM model to the positive catch rate data. Estimated annual biomass and associated CVs are shown in Table 22 and Figure 40.

Analysis of length measurement data from the survey showed that there are more large fish in deeper waters and in northern areas (Figure 41 and Figure 42), a similar pattern observed in the triennial survey data. The similar patterns are also observed for the age frequency data (Figure 43 and Figure 44). Length frequency data are based on the expanded length frequencies provided by Beth Horness (NWFSC) and analyzed using an R program developed by the NWFSC and are shown in Figure 45. Strong year classes of the 2010 and 2013 are clearly evident. Numbers of fish that had length measurements and were aged by year and latitude from this survey are presented in Table 23 and Table 24, respectively.

2.1.3.5 NWFSC Southern California Bight hook-and-line survey

Since 2004 the NWFSC has conducted a hook-and-line survey (here after referred as NWFSC hook-and-line survey) for rockfish in the region south of Point Conception, using essentially recreational gear types, surveying locations that are either likely or known sites where recreational fishing occurs, and chartering recreational (CPFV) vessels to conduct the survey (Harms et al. 2008; Harms et al. 2010). Importantly, this survey does not include fishing sites within the Cowcod Conservation Areas, a large region closed to commercial and recreational fishing in order to rebuild the cowcod rockfish (*S. levis*). Consequently, the trends inferred from this index should be interpreted with some caution.

Bocaccio rockfish are among the most frequently encountered species in the survey, representing approximately 25% of all fishes encountered. Harms et al. (2010) standardized catch rates of Bocaccio rockfish using a Bayesian Generalized Linear Model to account for site, fishing time, survey vessel, angler, and other statistically significant effects. Their results are moderately indicative of a downward trend in the biomass vulnerable to this survey from 2004 to 2010 and show relatively high catch rates in the last four year (Figure 46).

Length frequency plot and numbers of length samples are presented in Figure 47 and Table 25, respectively. As with the NWFSC combined survey and the southern recreational fishery length frequency data, the length-frequency distributions are dominated by the 1999 year class from 2004-2006, with signs of the incoming 2003 year class and relatively strong 2005 year class. The last four years of data also clearly show strong 2010 year class.

2.1.3.6 Power plant recruitment index (Southern California)

An index of juvenile (age 0) abundance based in power plant impingement data has been used in previous assessments, including the 2011 and 2013 models. This index represents data collected from coastal cooling water intakes at Southern California electrical generating stations from 1972 to the present, and have been previously described by Love et al. (1998), Miller et al. (2009), and Field et al. (2010), with respect to trends in abundance of *Sebastes* species, queenfish *(Seriphus politus*), and bocaccio, respectively. The dataset includes observations on as many as 1.8 million fish (off all species) encountered during heat treatments of water taken into intakes for cooling southern California power plants.

The three principle “types” of survey data include “normal operations” (fish sampled off of intake screens during normal operations), “heat treatments” (periodic events in which a given volume of water is treated at high temperatures to kill off biofouling organisms, all fishes in that known volume of water are subsequently enumerated), and a third set (“fish chase”) data that are unique to the San Onofre power plant. We use the “normal operations” and “heat treatment” data, considering each treatment to be a factor in the Delta GLM. Although the frequency of all of these sampling methods is irregular over the 43 year time series--a result of changes in operating schedules, regulatory requirements and changes in ownership over time--the time series is uninterrupted at the annual scale from 1972-2014. However, due to the shutdown of the San Onofre Nuclear Power Plant, as well as reduced operations and monitoring at several other plants, the availability of data has been declining in recent years (Table 26).

The impingement index was developed using a Delta GLM approach, comparable to the CalCOFI and other indices, with AIC used to determine the appropriate error distributions and covariates. Year effects are independently estimated covariates which reflect a relative index of abundance for each year. Error estimates for these parameters are developed with a jackknife routine; however, as this routine requires more than one positive observation per year, error estimates were not available for years with a single positive observation. We used the largest estimated CV (1.11) as a plausible estimate of the uncertainty for these points. The other model covariates included month and location (the power plant, five total), and the type of sample (heat treatments or normal operations). The results have previously been demonstrated to be highly correlated to model estimates of relative year class strength when the model is run without the index (Field et al. 2010, Field 2013), and, indeed, trends in recent years seem to be consistent with other data sources (weak 2012, strong 2013 year classes). The estimated index values and their associated CVs are presented in Table 26 and Figure 48.

2.1.3.7 Pelagic juvenile trawl survey

The Fishery Ecology Division of the Southwest Fishery Science Center has conducted a standardized pelagic juvenile trawl survey during May-June aboard the NOAA R/V David Starr Jordan every year since 1983. The primary purpose of the survey is to estimate the abundance of pelagic juvenile rockfishes (*Sebastes spp*.) and to develop indices of year-class strength for use in groundfish stock assessments on the U. S. West Coast. This is possible because the survey samples young-of-the-year rockfish when they are ~100 days old, an ontogenetic stage that occurs after year-class strength is established, but well before cohorts recruit to commercial and recreational fisheries. This survey has encountered tremendous interannual variability in the abundance of the ten species that are routinely indexed, as well as high apparent synchrony in abundance among the ten most frequently encountered species. Past assessments have used this survey as an index of year-class strength, including assessments for widow rockfish (He et al. 2005), Pacific hake (Helser et al. 2006), shortbelly rockfish (Field et al. 2007) and chilipepper rockfish (Field 2008).

Historically, the survey was conducted between 36°30' and 38°20' N latitude (approximately Carmel to just north of Point Reyes, CA), but starting in 2004 the spatial coverage expanded to effectively cover the entire range of shortbelly rockfish indexed in this model, from Cape Mendocino in the north to the U.S./Mexico border. Additionally, since 2001 juvenile rockfish data are available from a comparable survey conducted by the Pacific Whiting Conservation Cooperative and the Northwest Fisheries Science Center (spanning from just south of Monterey Bay to Westport, WA; see Sakuma et al. 2006). Comparison of the coastwide data have revealed two types of shifts in the distribution of most pelagic species, in which species characterized by a more southerly geographic range (e.g., Bocaccio, shortbelly, and squarespot rockfish) were caught in relatively large numbers south of Point Conception, while species with more northerly distributions (widow, canary, and yellowtail rockfish) were caught in moderate numbers north of Cape Mendocino. Thus the near absence of fish in the core survey area during the 2005-2007 period, which saw two of the lowest abundance levels of juvenile rockfish ever observed in the core area time series, was associated with an apparent redistribution of fish, both to the north and the south.

The survey index is calculated after the raw catch data are adjusted to a common age of 100 days to account for interannual differences in age structure. For this assessment cycle, a number of survey indices were developed by S. Ralston (SWFSC) as a combined index that uses both SWFSC and NWFSC/PWCC survey data (Ralston et al. 2014, unpublished report, available upon request). As the core area index seems to have failed to capture the magnitude of the 1999 year class for most stocks, the recommendations from the juvenile rockfish survey workshop held in 2005 were to exclude the core juvenile indices unless a convincing case could be made otherwise. The coastwide juvenile Bocaccio index from 2004 to 2014 (Figure 49) was developed by integrating the results of both surveys in an ANOVA model with year, latitude, vessel, period, and depth effects, was used to inform the relative year class strength for the years 2001-2006. Past assessments have used a power coefficient to transform the index (He et al. 2006), based on the assumption of a compensatory relationship between pelagic juvenile abundance and subsequent recruitment to the adult population following settlement (Adams and Howard 1996). However, due to the short duration of the time series, a power transformation was not estimated for the coastwide index in this assessment.

2.1.4 Fishery dependent data

2.1.4.1 Northern California trawl CPUE indices

Ralston (1999) developed a CPUE index of Bocaccio abundance based on California trawl logbooks that was initially used in the assessment (Figure 50). Because the logbooks do not identify most individual species such as Bocaccio, Ralston applied species compositions from local port sampling to the overall catch rates of rockfish from the trawl logbooks. This assessment uses Ralston's "area-weighted" index of Bocaccio CPUE, and the associated standard errors (average CV is 32%).

2.1.4.2 Recreational fishery CPUE indices

Recreational CPUE indices were developed for the 2003 assessment (MacCall 2003) using catch and effort data from two sources, the RecFIN database (Wade Van Buskirk, Pers. Comm.) and the Northern California partyboat monitoring conducted by CDFG (Deb Wilson-Vandenberg, Pers. Comm.). These two sources contain different kind of information and were treated differently in the 2003 assessment: for the RecFIN data, only the partyboat catch and effort data were used, as Bocaccio catch rates from private boats appeared to be less consistent than those from partyboats.

MacCall (2003) developed indices based on the RecFIN data using a multispecies discriminant function analysis (Stephens and MacCall 2004) to identify which fishing trips are appropriate to include in calculation of a CPUE index of abundance. The concept behind the method is that the species mix in the catch of a fisherman or a fishing trip is indicative of the habitat where fishing occurred, allowing discrimination between those trips where the target species (Bocaccio in this case) could have been caught and trips where Bocaccio were unlikely to have been caught. Essentially, given the various fishing strategies of CPFV operators across many different habitats, seasons, and target species, the latter trips are not informative, and should be excluded from the CPUE analysis. The approach involves identifying the general list of species commonly caught on fishing trips in the region under consideration, and then converting trip records to a vector of presences (1) and absences (0) of those species.

For each trip record, the probability of the target species (Bocaccio) being present was fit by maximum likelihood using a logit function based on an indicator function consisting of the sum of estimated species-specific coefficients, such that these coefficients include large positive values for species that consistently co-occur with Bocaccio (e.g., chilipepper and bank rockfish), and large negative values for species that occur in habitats where Bocaccio are unlikely to be encountered (e.g., oceanic species such as albacore, and nearshore species such as barracuda). Figure 30 shows an example of these coefficients for the southern California recreational index (for additional details, see past assessments, including responses to past STAR Panels). Next, each trip record is assigned an estimated probability that Bocaccio could have been encountered. The trip records are sorted by descending probability, and a threshold probability is chosen for exclusion of trips from the CPUE calculation. After additional refinements to account for discards and other factors (see MacCall 2003 or Stephens and MacCall 2004 for a greater detailed description of the analysis), a delta-GLM model is applied to the retention-corrected records to arrive at a relative abundance index, with year and wave effects estimated as factors.

The resulting indices (Figure 51 and Figure 52) were also corrected to account for the expected impact of bag limits and for intentional avoidance of Bocaccio in the post-2000 period, although the behavioral changes associated with increased regulatory activity from 2000 onward are difficult to fully understand. Consequently, the post-2000 data points should be interpreted as being more uncertain than previous points, and, following the 2003 assessment, the index was not updated due to the expectation of even greater bias as a result of management activities. Consequently, the indices included in this assessment are unchanged from those developed in the 2003 assessment (and subsequent updates), and additional details (including additional analyses conducted for past STAR Panels) should be referred to from those documents or from the publication that originated from this analysis by Stephens and MacCall (2004). It is also worth noting that the approach has subsequently been applied in many other West Coast groundfish stock assessments for which recreational catches and effort represent a significant fraction of the fishery, including those for gopher rockfish (Key et al. 2006), yelloweye rockfish (Wallace et al. 2006), blue rockfish (Key et al. 2008), and black rockfish (Sampson et al. 2008).

2.1.4.3 California CPFV recreational fishery survey

In addition to the indices derived from the MRFSS (Marine Recreational Fisheries Statistics Survey) data, the California Department of Fish and Wildlife (CDFW) conducted on-board monitoring of party boat catches (Commercial Passenger Fishing Vessel survey, hereafter referred to as CPFV survey) in central California from 1988 to 1998 and from both southern and central/northern California from 2004 to 2014. The onboard observer program collects drift specific information at each fishing stop on an observed trip. At each fishing stop recorded information includes start and end times; start and end location (latitude/longitude); start and end depth; number of observed anglers (a subset of the total anglers); and the catch (retained and discarded) by species of the observed anglers.

Data for the onboard observer indices for the recreational CPFV fleet are from three sampling programs. CDFW conducted an onboard observer program in Central California from 1987-1998 (Reilly et al. 1998). These data were previously used in the 2013 assessment at the level of a fishing trip. Since the 2013 assessment, the original data sheets were acquired, and data were keypunched to the level of fishing stop. One caveat of this data is that location data were recorded at a finer scale than the catch data. We aggregated the relevant location information (time and number of observed anglers) to match the available catch information.

CDFW implemented a coastwide sampling program in 1999 (Monk et al. 2014). Cal Poly has conducted an independent onboard sampling program as of 2003 for boats in Port San Luis and Morro Bay (Stephens et al, 2006), but follows the protocols established in Reilly et al. (1998), and modified to reflect sampling changes that CDFW has also adopted, e.g., observing fish as they are landed instead of at the level of a fisher’s bag. Therefore, the Cal Poly data area incorporated in the same index as the CDFW data from 1999-2014.

Data were analyzed at the drift level and catch was taken to be the sum of observed retained and discarded fish. Prior to any analyses, a preliminary data filter was applied. Trips and drifts meeting the following criteria were excluded from analyses:

1. Trips outside U.S. waters
2. Drifts in San Diego Harbor
3. Drifts missing the starting coordinates (1999-2014 only)
4. Drifts identified as having possible erroneous location, observed anglers, or time data.

Separate indices were created for the 1987-1998 and 1999-2014 datasets due to the number of regulation changes occurring throughout the time period. The 1987 samples were only from Monterey and excluded from the analysis. The later index starts in 2004, after hook regulations were implemented and the bag limits for Bocaccio were consistent (see Appendix A for regulations history). Separate indices for north and south of Pt. Conception were calculated for the 2004-2014 time period.

For central California between 1988 and 1998, the filtered dataset included 5,499 drifts, of which 1,605 (29%) were positive Bocaccio encounters. Sampling was sparse north of Pt. Arena, and we therefore removed these samples from the index. Reefs were grouped into four regions, Pt. Sal to Ragged Point, Ragged Point to southern Monterey Bay, northern Monterey Bay to San Francisco, and the Farallon Islands.

The selected data contained categorical variables for YEAR (11 levels), WAVE (4 levels), REGION (4 levels), and four depth bins (DEPTH: 0-39 m, 40-79 m, 80-119 m, and 120+ m). Depths greater than 120 m were combined due to lower samples sizes in depths greater than 120 m. A lognormal model of the positives was selected of a gamma by a deltaAIC of 240.27. Model selection via AIC selected a model with a YEAR:DEPTH interaction for the binomial model. Exploratory analysis revealed the interaction is likely driven by the low sample sizes in 1990 and 1991, which are reflected in the standard errors of the main effects model. The binary model used a logit transformation which was indistinguishable from the alternatives. In both sub-models, stepwise BIC removed all interaction terms. Both the final positive model and binomial models without interactions retained YEAR, DEPTH and REGION. The YEAR effects are shown in Figure 53.

For central California between 2004 and 2014, the filtered dataset included 8,065 drifts, of which 650 (8%) were drifts with positive Bocaccio encounters. Positive encounters of Bocaccio were too sparse to support a model exploring interactions with depth in the CPUE index. Wave 1 (January/February) was removed as it was only sampled in 2004. Bocaccio were not encountered in depths greater than 83 m. Only 12 drifts encountered Bocaccio at depths greater than 80 m, which was set as the depth cutoff. Depths bins were aggregated to 40 m to increase sample sizes. Reefs were grouped into four regions, Farallon Islands, Monterey to Pt. Sur, Ragged Point to Avila, and Point Sal. The selected data contained categorical variables for YEAR (11 levels), WAVE (4 levels), two depth bins (0-39 m and 40-79 m), and REGION (4 levels). A lognormal model for the positives was selected over a gamma by a deltaAIC of 33.1. Model selection selected a model with a year/depth interaction for the binomial model. In both submodels, stepwise BIC removed all interaction terms. The final positive model without interactions retained YEAR, and the binomial portion retained only YEAR, REGION and DEPTH. The YEAR effects are shown in Figure 54.

For southern California between 2004 and 2014, the filtered dataset included 14,261 drifts, of which 3,623 (25%) drifts with positive encounters. Positive encounters of Bocaccio were too sparse (<10 in 9 of 13 years) to support a model exploring regional (north/south) differences in the CPUE index. Additional covariates explored included depth as well as 2-month waves (CDFW does not sample in waves 1 or 6). Reefs were grouped into nine regions, northern Channel Islands, southern Channel Islands, Pt. Conception to Oxnard, Oxnard to Malibu, Santa Monica, Rancho Palos Verdes, Long Beach, Newport Beach to Oceanside, and Oceanside to the U.S./Mexico border. There were few observed trips deeper than 120 m, therefore, drifts deeper than 120 m were filtered out from the data. The selected data contained categorical variables for YEAR (11 levels), WAVE (5 levels), and six depth bins (DEPTH: 0-19 m, 20-39 m, 40-59 m,60-79 m,80-99 m,100-119 m)). Model selection via AIC selected a lognormal model with YEAR, WAVE, DEPTH, REGION, YEAR*WAVE, and YEAR*REGION, while a binomial with YEAR, DEPTH, REGION, WAVE, YEAR*REGION and WAVE*DEPTH was selected. The YEAR*REGION interactions seem to be driven by high CPUE in the northern and southern Channel Islands in 2011. In both sub-models, stepwise BIC removed all interaction terms. Both the final positive model and binary models without interactions retained YEAR, DEPTH and REGION. The YEAR effects are shown in Figure 55.

2.1.4.4 Fishery length composition data

The length composition of commercial landings (here broken out into trawl, hook-and-line, and set net fisheries) were obtained from the CalCOM database, and cover the years 1977-2014, although there were some years with no data or only small samples. Length data with sexes not identified were not used in the previous assessments (Field et al. 2009, Field 2013), but they were included in this assessment. Summaries of annual numbers of sampling trips and fish measured for length compositions for four commercial fisheries are listed in Table 27 to Table 30. The initial effective sample sizes (input *N*) for these fisheries were calculated using the approach developed by Stewart (2008) in which:

$$N_{eff} = N_{trip} + 0.138N_{fish} \quad if \ \frac{N_{fish}}{N_{trip}} < 44 \qquad (6)$$

$$N_{eff} = 7.06N_{trip} \quad if \ \frac{N_{fish}}{N_{trip}} \geq 44 \qquad (7)$$

In this method, trips are considered equivalent to port complex-day in CalCOM, and the maximum input, N_{eff}, is capped at 400. This approach tended to result in N_{eff} values for most fisheries and surveys that were more precise than the model-estimated effective sample sizes, but not to the magnitude at which trips alone tended to result in lower effective sample sizes than those estimated by the model. Figure 56 to Figure 59 show the length compositions for Bocaccio by year caught in six fisheries. These data include both sexed and unsexed length composition data, with more unsexed data from recent years.

A careful evaluation of the raw (individual fish) versus expanded (based on fish ticket and port information) length frequency data was conducted in the 2009 assessment, and the results showed that it was more appropriate to use raw length observations than expanded observations. We adapted the same approach in this assessment. This is consistent with past assessments (MacCall 2003, MacCall 2007) for which length frequency data were "sharpened," essentially adjusted using the Von Bertalanffy growth curve to grow (or shrink) observed length data to reflect the length at the middle of the year (the time at which the predicted length frequencies are estimated by the model). As length composition data is based on expansion methods that typically borrow over time (months, seasons) and space (ports), sharpening was not possible with the expanded length data.

Although we did not continue with the sharpening approach, based on what we considered to be reasonable model performance with the unadjusted length frequency data, concerns over borrowing across both seasons and ports led us to evaluate more closely the differences among raw versus expanded length composition data. This evaluation suggested that while the differences between raw and expanded length frequencies were typically negligible, where there were differences, they tended to result in an apparent coarsening of the length frequency data, which would presumably add noise to the model.

Most of the recreational length frequency data are from the 1980-2014 period (exclusive of the MRFSS hiatus of 1990-1992 and very few length data from the northern region in 2003) and, as in past assessments, the length frequencies and catches are divided into southern and northern components (Figure 60 and Figure 61). Summaries of annual numbers of sampling trips and fish measured for length compositions for four commercial fisheries are listed in Table 31. As in prior assessments, strong year classes tend to show up earlier in southern California fisheries than in northern California fisheries, with northern California fisheries tending to catch larger individuals. The 1999, 2003, 2010 and 2013 year classes are particularly prominent in these data in the southern fisheries, with a suggestion of a strong 2005 year class as well. Sampling is generally more comprehensive in southern California, where Bocaccio represent a significant fraction of the total recreational rockfish catch than those in northern California.

As in the 2009 assessment, two other sources of length information were considered as well; one is length frequency information for the years 1959-1961 and 1966 from Miller and Gotshall (1965) and Miller and Odemar (1968; and additional unpublished CDFG data). These data were collected as part of an exhaustive effort to evaluate recreational fisheries in the central and northern California region by CDFG, from which the recreational catch reconstruction effort in Ralston et al. (2010) drew from considerably. Beyond the summaries reported in the publications, the raw length frequency and species composition data for Monterey Bay area recreational skiff and CPFV fisheries were recovered from paper forms by Jan Mason (ERD, SWFSC; pers. com.) with some of the results reported in Mason (1995) and Mason (1998).

Although the currently available data are limited to this region, this region was responsible for slightly more than 1/3rd of the recreational rockfish catch in central/northern California fisheries during this period. Additional paper records exist for Half Moon Bay, San Francisco, and Bodega Bay recreational fisheries, and efforts to digitize and utilize these data are also being implemented. While the early 1960s data suggest a consistent size mode without particular evidence of extremely strong recent year classes, the 1966 length frequency data is consistent with both a strong year class several years earlier (approximately 1962-63) as well as a strong year class that year (1966) based on the high frequency of 20-30 cm fish (Figure 24 in Field et al. 2009). Moreover, the percentage of the total rockfish catch represented by Bocaccio also shifts during this period, from a range of 2-5% of the total recreational catch in from 1959-1964, to a range of 5-9% of the total rockfish catch from 1966 through 1972. This is consistent with the perceived increase in the relative abundance of Bocaccio in the mid-1960s as evidenced from the CalCOFI data and recent assessments. However, as it seems likely that the recreational fishery had a more limited spatial distribution (across both latitude and depth) and it is not clear how compatible these data are with later length data, this information is not currently included in the model.

2.2 History of Modeling Approaches and Transitions to Current SS Program

2.2.1 Previous assessments

The stock was first assessed in 1985, and since then it has been fully assessed or updated 12 times. The stock was declared to be overfished in 1999. Subsequently, the stock was fully assessed 2002 and 2003 and 2009, and updated in 2005, 2007, 2011 and 2013.

(http://www.pcouncil.org/groundfish/stock-assessments/by-species/bocaccio-rockfish/). Details of the assessment history were described more fully in Section 1.5.

2.2.2 Transition to current SS model, changes in model structure, and additions of new data

Many changes have occurred since the 2009 assessment, including many improvements in the SS program, and data analysis tools (i.e. Delta-GLMM). New biological samples have been examined and analyzed, and new fishery and survey data have also been available since the 2009 assessment. Below is a list of major additions of data, and significant changes of model structures. More details are described in the corresponding sections.

2.2.2.1 Addition of age data

A major effort over the last three years has been invested in the development of age determination criteria for Bocaccio (Pearson et al. 2015), and subsequent production ageing of over 8,000 otoliths collected since 1978. The new age data are included in the assessment model, as is an aging error matrix developed from over 2000 double-reads (both within and among reader). Details on ageing method and inclusion of age data in the assessment model are in the Development of Bocaccio Ageing section (2.1.2.6).

2.2.2.2 Addition of recreational onboard observer indices

Two new indices from the CDFW's onboard observers were developed and included in the assessment. Details are in the California CPFV Recreational Fishery Survey section.

2.2.2.3 Fishery and survey selectivity functions

Length-based selectivity function was used in the 2009 assessment for all fisheries and surveys, with two exceptions: (1) selectivity pattern 30 for the CalCOFI survey, which sets expected survey abundance equal to spawning biomass (population fecundity), and (2) selectivity pattern 33 for the pelagic juvenile trawl survey, which sets expected survey abundance equal to age 0 recruitment. The same setting was used in this assessment. In the 2009 assessment, different selectivity functions were used to model either asymptotic or dome-shaped selectivity. In this assessment, we use a double-normal selectivity function (type 24 in the SS program) to model both asymptotic and dome-shaped selectivity. The double-normal selectivity function is a six-parameter function that is more flexible and capable of mimicking many selectivity patterns (Methot and Wetzel 2013), and it is widely used for many West Coast groundfish stock assessments. However, shapes (asymptotic or dome) are kept to be similar to those used in the 2009 assessment.

Selectivity for the triennial survey was fixed in the 2009 assessment model. It is now actively estimated, but continues to provide an unusual looking selectivity function. This was the subject of STAR Panel discussion and additional sensitivity runs and should continue to be the subject of future analysis. Time varying selectivity before and after 2001 is implemented for four major fisheries: the southern and northern trawl fisheries and the southern and central recreational fisheries.

2.2.2.4 Internal estimation of extra standard deviations for indices

In the 2009 assessment, extra standard deviations (SDs) were added to the variance adjustment matrix to account for variability in the model fitting of expected abundance to indices. Currently, the more commonly adopted practice is to let the SS program internally estimate extra SDs in the data weighting process. This approach was used in the current assessment.

2.2.2.5 Other changes in model structure and data

1) The means to estimate time varying growth was incorporated in the 2009 assessment model as a sensitivity (but was not included in the base model). This feature is not included in this model.
2) An index of age 0 abundance from recreational pier fishing datasets is removed from model fitting in this assessment by setting $\lambda = 0$.

2.2.3 Responses to 2009 STAR Panel recommendations

The 2009 STAR Panel provided the following prioritized recommendations for future research and data collection:

1. The location of the northern and southern boundaries of this stock, and the extent to which it mixes with the Canadian and Mexican stocks, are major uncertainties in this assessment. Three approaches which might help reduce these uncertainties are otolith elemental analysis, parasitology, and co-operative research with Canadian and Mexican colleagues (e.g., evaluation of data from the Mexican analogue of the CalCOFI survey).
   No significant progress has been made in this area of research.

2. The reliability of the recCEN index could be improved by an evaluation of the spatial distribution of fishing effort and fish size.
   The Central California recreational index (from onboard observer data collected from 1987-1998) benefited from the keypunching of higher resolution location data and revised methods for developing the CPUE index by linking catches more explicitly to habitat information. Additional efforts are ongoing.

3. The Panel endorses the continued processing of historical CalCOFI samples from the northern transects, which will produce additional data for this assessment.
   Progress in sorting out Sebastes from samples taken off of Central California in the 1960s has been very slow, due to competing priorities and limited resources for sorting fish larvae. One competing priority is the identification of all Sebastes to the species level in the recent (mid-1990s to present) collections, an ongoing effort that should yield results in very near future and should help spur additional refinements to the CalCOFI data more generally.

4. Neither the triennial nor the NWFSC shelf-slope surveys are well suited to Bocaccio. Research to develop a survey methodology that is more appropriate for species like Bocaccio could improve the assessment.
   We recognized that both surveys, although well designed and conducted, are not well suited for Bocaccio, as catches of this species seem to be relatively low as compared to other groundfish species (i.e. flatfishes). Developing a survey methodology for this species, and other Sebastes species, will require a long-term and multiple agency plan. A number of efforts are currently ongoing, including various ROV and drop-video camera research efforts throughout the West Coast that should ultimately lead to a comprehensive in-situ survey of highly structured habitat to inform stock assessments.

5. SS3 implements new options for bias adjustment of stock recruit relationships that have been used with little or no peer review. Simulation testing is needed to confirm that bias adjustment is justified in all cases. Guidelines should be developed on how to configure bias adjustment settings to reflect the biological characteristics of the stock and the available assessment information.
   The bias adjustment method of stock recruit relationship used in the 2009 assessment has been further developed and a research paper on this method was published (Methot and Taylor 2011) and is currently implemented in the r4ss program. This method is widely used in many West Coast groundfish assessments and is also used in this assessment.

6. Develop methods to incorporate uncertainty in natural mortality and/or steepness in model configurations in which these parameters are fixed. The delta method for propagating uncertainty (McCall in prep.) is a promising approach that warrants further evaluation.
   Priors for both natural mortality and steepness have been updated for the West Coast groundfish species (see related sections). The uncertainties in the estimated assessment outputs (spawning outputs and stock depletion) contributed from both parameters are also analyzed using the delta method.

7. The Panel recognizes the difficulty of developing a precise age estimation method for this species but notes that such a method could substantially improve the assessment.
   Considerable effort was put in to develop age determination criteria for Bocaccio (Pearson et al. 2015) over the past several years, and as a result, age estimates are available for over 8,000 fish, with over 1,000 of these including multiple reads in order to better estimate the error in age estimation. All of these data are included in the current assessment model.

8. The Panel notes that there is no recent histology to confirm macroscopic staging for determination of proportion mature at length, but acknowledges that the assessment is not particularly sensitive to the values used.
   More ovary samples have been collected since the 2009 assessment, and subjected to both macroscopic and histological examination to better assess not only maturity but the potential for atresia and/or skipped spawning, and to better understand the phenomena of multiple brood production in this species. A new maturity function has been developed based on both recently collected and historical data, as has a new fecundity function. Additional investigations into the reproductive ecology of this species are ongoing.

2.3 Model Description

2.3.1 Modeling software

The modeling software used in this assessment is Stock Synthesis 3 (SS3, version 4.23U, 8/29/2014), developed by Richard Methot (Methot and Wetzel 2013). R programs developed at the NWFSC, including R software packages for delta-GLMM, ageing error analysis, and r4ss software, were used in analyzing data and producing graphics for this assessment (r4ss, Taylor *et al*. 2012).

2.3.2 Basic model structures and general model specifications

This assessment is based on an age-structured population model, commonly used in U.S. West Coast groundfish stock assessments. The population model has two sexes with a range of ages between 0 and 21 years old (age-plus group) and with a range of length bins between 10 cm to 76 cm at 2 cm interval. There are six fishing fleets and ten survey indices.

The general model specifications are very similar to the 2009 assessment (last full assessment). Major changes to this assessment include addition of the conditional age-at-length (CAAL) data; changes of all length selectivity to the double-normal function (but keeping the same shapes of selectivity curves); and addition of two recently developed onboard recreational fishery indices. Details of changes of this assessment to the 2009 assessment are described in the previous section (Transition to Current SS program).

2.3.3 Estimated and fixed parameters

There are a total of 162 parameters being estimated in the base model. Major estimated parameters include logarithm virgin recruitment (*lnR0*), steepness (*h*), growth parameters (L_1

[same for both sexes], L_2, K for both sexes), recruitment deviation parameters and extra standard deviations (SD) for index catchability coefficients. Details on each category of parameters (life history, stock-recruitment, and selectivity) are described below.

2.3.3.1 Parameter priors

Uninformative uniform priors are used on all parameters except natural mortality (M) and steepness (h). Priors for M are provided by O. Hamel (NWFSC, personal comm.). The prior used for h was updated and provided by J. Thorson (NWFSC, personal comm.), and has mean of 0.773 and standard deviation of 0.147.

2.3.3.2 Life history parameters

All parameters for the length-weight relationships, maturity, and fecundity are externally estimated and fixed in the base model. Natural mortality rates (M) are set to be same for both sexes and estimated internally in the base model. All growth parameters are sex-specific and are internally estimated, with the exception of L_1 for males, which is set to be same for females.

2.3.3.3 Stock-recruitment parameters

The stock-recruit relationship is modeled as the Beverton-Holt function with two parameters (*lnR0* and h). The virgin recruitment parameter (*lnR0*) is internally estimated while the steepness parameter (h) is fixed at a prior value of 0.773. Recruitment deviations are estimated between 1954 and 2013. Standard deviation for recruitment deviations (σ_R) is fixed at 1.0, the same values used since the 2002 assessment, and is slightly less than the RMSE value (1.01) of estimated main recruitment deviations. A bias correction procedure, developed by Methot and Taylor (2011) and availed in the r4ss program, is used. This procedure provides five ramp parameters to approximate unbiased estimates of log-normally distributed recruitments.

2.3.3.4 Selectivity parameters

Selectivity functions for fisheries and surveys are all length-based and modeled as double-normal selectivity specified in the SS software with exceptions for the CalCOFI index (as function of spawning biomass) , the pelagic juvenile trawl survey index (recruitment, age 0 abundance), and the power plan impingement index (recruitment, age 0 abundance). The double-normal function has six parameters and is very flexible, as it can effectively model both asymptotic and dome-shaped selectivity. No sex offsets are used, so that both females and males are subject to the same selectivity in all fisheries and surveys. The same shapes of selectivity used in the 2009 are employed in this assessment. A time block is used for four fisheries (two trawl and two recreational fisheries) from 2003 to 2014 to reflect management changes during the time period.

2.4 Model Selection and Evaluation

2.4.1 Key assumptions and alternative models considered

Key assumptions for the base model include the two most important functions (1) constant natural mortality for all ages and sexes for the whole time period; and (2) Beverton-Holt stock-recruit relationship, with steepness parameters being fixed at prior (0.773) in the base model. Extensive sensitivity and profile analysis are conducted to evaluate effects of these assumptions on the assessment outputs, including two-dimensional profile analysis of both M and steepness parameters.

Other alternative models considered include using the harmonic mean and Francis weighting methods (see the Data Weighting Section below). We also considered an alternative model by extending the time period for the recruitment deviations to a much early time period (i.e. to the beginning of the model period of 1892) and found that this alternative model is very unstable, giving unrealistic estimates of recruitment deviations in the early time period (mostly during the 1940s) during which no data were available to estimate recruitment. Based on these results, we elected not to extend the time period for the recruitment deviations to the early time period and use year of 1954 as the earliest year in which recruitment deviation is estimated.

2.4.2 Data weighting

Initial data-weighting for the base model is based on input sample sizes for the compositional data and internally estimated extra SDs for abundance indices. Three data-weighting methods are exploited, in which extra SDs for abundance indices are internally estimated, and compared in our model evaluation: (1) default weighting, in which no weighting is adjusted for the composition data; (2) Francis' weighting method, that takes account of correlations of composition data between years (Francis 2011) ; and (3) one-time harmonic mean weighting, in which the composition data are weighted one time using the estimated harmonic means (a common method used in many recent West Coast Groundfish assessments). During the STAR Panel review, a fourth weighting scheme was explored, in which we used the Francis weighing method for the length composition data and the harmonic mean weighting method for the CAAL data. This method was adopted in the base model. A sensitivity analysis comparing three weighting methods is conducted later in the uncertainty analysis sections.

2.4.3 Model convergence, jitter and phase analysis runs

The base model converged well and seems to be relatively stable with maximum gradient component being less than 0.0001 in almost all runs. All estimated parameters are within reasonable ranges, and the SS3 program produces no warning. A jitter analysis of N = 30 with a jitter setting of 0.05 (randomly jitter initial parameter values by 5% of their standard deviations) has 50% of repeated runs converged at a minimum negative log likelihood value (Table 34). There are a couple of repeated runs with log likelihood values drifted by 0.5 likelihood unit. These runs, however, appeared to have minimum effects on the model outputs (less than 0.2% of difference in the estimated stock depletions). Phase analysis was done by alternating parameter estimation phases for different parameters, and the analysis indicated no effects on the model outputs.

2.5 Response to 2015 STAR Panel Recommendations

There were a total eighteen requests from the STAR Panel during the 2015 STAR Panel review. More details on each requested are in the STAR Panel report.

Request No. 1: Develop a prioritized list of significant changes to the CalCOFI index over time to compare the residual pattern in fits to the survey with respect to these changes.

Rationale: There have been a number of changes in survey design and gear. These changes may affect the comparability of the index over time. It is useful to be aware of these and examine if model residuals are associated with these changes.

STAT Response: The STAT provided a detailed summary of changes in survey design (primarily changes in the sampling frequency and in the type of plankton net used to collect ichthyoplankton) that occurred in 1969, 1978, 1984, and 2003. They indicated these periods in time-series plots of survey indices and model residuals. There was little pattern in residuals during these periods, suggesting that modeling changes in survey catchability is not warranted.

Request No. 2: Normalize all indices and provide time series plots in which groups of comparable indices are plotted together.

Rationale: To assess the comparability of indices prior to incorporation in the assessment model.

STAT Response: The index comparison plots did not indicate good correspondence between spawner and juvenile indices, or between adult indices in the southern or central/northern areas. The Panel found this comparison to be valuable and recommends that it be included as routine part of Stock Synthesis output plots.

Request No. 3: Provide time series plots in which groups of comparable index residuals are plotted together.

Rationale: Runs of positive or negative residuals that are consistent across indices may indicate changes in stock productivity or some other factor that consistently affects catchability for multiple indices.

STAT Response: Residuals patterns, while variable, were not consistent across indices (below). This result suggests that changes in productivity or catchability did not occur.

Request No. 4: Provide a comparison of mean catch rates inside and outside the Cowcod Conservation Areas (CCA) for the NWFSC hook and line survey in years the survey was conducted in the CCAs. Also provide a time series of mean catch rates and compare to the derived GLM index. Alternatively, if a GLM model has been run with the area inside the CCAs with a region effect, provide estimates of regional effects inside and outside the CCAs.

Rationale: Provide some indication of how much of the stock is inside of the area closed to the fisheries and most surveys.

STAT Response: Responses were provided by NWFSC staff, who noted that data were only available inside the CCAs for the 2014 survey year (but are expected to be available in 2015 and future years). Catch rates were approximately double inside the closed area compared to outside, suggesting that there may be a closed area effect on Bocaccio rockfish abundance. Depth patterns in CPUE suggested that the effect was larger at shallower depths. This is consistent with a domed selectivity in fisheries that are excluded from the CCAs.

Request No. 5: Provide a sensitivity run in which the NWFSC hook and line survey selectivity forced to be asymptotic, and provide fits to the composition data.

Rationale: It is generally good to have at least one index with asymptotic selectivity, for inferences on total mortality rates.

STAT Response: Using asymptotic selectivity resulted in a slightly worse fit to length composition data for the NWFSC hook and line survey, the use of dome-shaped selectivity for this survey is warranted based on the fit and on AIC criteria (as well as the observation that larger, older fish are often found in deeper habitats than those sampled by the survey). . Unfortunately no age data are available for the hook and line survey. This outcome led to a discussion about natural mortality. While it is useful to have a fleet with asymptotic selectivity to estimate M, it is not an absolute requirement, and the northern trawl fishery is estimated to be asymptotic after the selectivity break in 2001. Re-examination of the likelihood profile for M suggested that a plausible estimate could be obtained even with weaker assumptions.

Request No. 6: Explore alternative time blocking for fisheries as follows:

a) Trawl fishery, north and south: explore alternative time blocks in 2000 (CCA and small footrope restrictions implemented) and 2003 (RCA implementation).
b) Recreation fishery: explore an alternative time block in 2003 (RCA implementation).

Rationale: These time blockings are more consistent with changes in management regulations.

STAT Response: The model was not sensitive to these changes in selectivity blocks. However, the length composition data were fit a little better with a time block in 2003. The new blocking is more consistent with regulatory changes so the Panel and the STAT agreed to adopt the new blocking in 2003, subject to examination of impacts on weighting. The effects of this change were minor so the Panel did not need to see full output from this change.

Request No. 7: Provide a run using age-specific pattern of natural mortality recommended by Brodziak et al. (2011). Provide likelihood components, fits to composition data, and estimated selectivity patterns

Rationale: Several estimated selectivity patterns are very unusual. The NWFSC trawl survey has a curiously flat selection pattern at young ages, and triennial survey has a strongly peaked selectivity at young ages. Such strong differences in selectivity in surveys using similar sampling gear is suspicious. The Panel wants to explore if this could be the result of using an M that is too low for the young fish.

STAT Response: The largest impact of increasing M on juveniles was to increase R_0, which is an expected result. The additional younger fish are then killed off by the higher M so that there was little impact on model results. The NWFSC trawl survey selectivity for small lengths decreased only a little, and triennial survey retained its very sharp peak. It was suggested to experiment with an even higher juvenile mortality rate, but this seemed best to consider for future assessments. There was no compelling reason to adopt a higher juvenile M in this assessment.

Request No. 8: Compare estimates of year-class strengths from 2009, 2011, and 2013 assessments with the new base case.

Rationale: To evaluate the magnitude of revisions to recent estimates of year class strength that occurred as assessments were updated.

STAT Response: The 2015 assessment resulted in a large revision in the estimated size of the 2010 year class compared to the 2013 assessment (below). The 2015 assessment also indicates a large 2013 year class, but the uncertainty in this estimate is very high, and the initial estimate may be reduced in subsequent assessments. Several factors led to reduction in the estimated magnitude of the 2010 year class. First, application of the Francis method for reweighting the length composition data resulted in lower weights being given to these data. In addition, although several data sources are still consistent with an above average 2010 year class, none of the recent fishery-independent indices show a strong increase in relative abundance that would be expected with a 2010 year class of the magnitude estimated in the 2013 model.

Request No. 9: Provide marginal age composition fits.

Rationale: Examine how well age data are fit.

STAT Response: The fits looked reasonable overall. This did not provide motivation to change the model formulation (see Appendix C).

Request No. 10: Explore alternative weighting for conditional age-at-length data. Alternatives include the 1) input sample size for age composition data, 2) using the Francis weighting method A, and 3) Francis weighting method B (report values of A & B) for the conditional age-at-length with the revised base case. For 2) and 3) continue to use the Francis adjustment for the length composition data.

Rationale: Assessment results are sensitive to weighting and this needs to be explored.

STAT Response: The Francis method A resulted in a fairly extreme down-weighting of age composition data. The Francis method B was more moderate in down-weighting the age data and led to a weighting comparable to the harmonic mean weighting method.

Request No. 11: Revise the base case model with a time block in 2003 for the trawl fishery (north and south) and recreational fishery (central and southern) fleets.

Rationale: Follow-up to request No. 6.

STAT Response: This model configuration did not result in much change to model outputs, but was considered the new base model for subsequent evaluation.

Request No. 12: Provide a run where the conditional age-at-length data are reweighted using the harmonic mean method; length composition data should continue to be weighted using the Francis method.

Rationale: Follow-up action to request No. 10. This approach mirrors what was done for the China rockfish, in which the Francis method is used for length composition data, and the harmonic mean weighting method for conditional age composition data.

STAT Response: The impact of this change in model configuration was not large overall; however, it did make a big difference in the size of the 2013 year class. The Francis method was considered an acceptable approach for length composition data, but its application to conditional age-at-length data is less straightforward. The method using the harmonic mean is well-established and based on the properties of the multinomial distribution. The Panel recommended this approach as the new base model for subsequent evaluation.

Request No. 13: Provide likelihood profiles on M with and without asymptotic selectivity on the NWFSC hook and line survey (give the highest priority to the profile without asymptotic selectivity)

Rationale: To better understand the impacts of this assumption, and to assess the strength of information about M in the assessment.

STAT Response: The M profiles were shifted toward higher M when the NWFSC hook and line survey selectivity was fixed to be asymptotic compared to the modestly domed selectivity that resulted without this constraint. This is to be expected. The M profiles for the asymptotic selectivity configuration indicated less data conflict between length and age composition data than the model configuration that did not use this constraint. However, the M profiles had similar curvatures in both cases. The results based on asymptotic selectivity indicated a worse fit, and the estimate of M=0.2 was very different than the prior. Since it is possible that selectivity is lower for the largest fish in this survey, the Panel did not adopt this model formulation. The Panel emphasizes that future data and analysis may lead to a different conclusion.

Request No. 14: Provide model runs as follows: a) steepness (*h*) and *M* estimated using the current priors, b) *h* fixed and *M* estimated using current prior, and c) *M* fixed and *h* estimated using the current prior.

Rationale: To better understand how well are these key parameters estimated.

STAT Response: Although all runs were clustered closely together (below), the Panel concluded M is better estimated than steepness in the model. As a result, the Panel considered it more appropriate to estimate M in the model, and use bracketing runs with different values of steepness to characterize uncertainty, but the Panel needs to see these results with the agreed weighting scheme.

Request No. 15: Provide model runs where the strength of the 2013 year class varies such that the lower value is at the 12.5 percentile of the uncertainty in the 2013 year class estimate and the upper value is at the 87.5 percentile. Include 10-year forecasts.

Rationale: The size of this year class is likely to have a large impact on stock forecasts.

STAT Response: The STAT developed an approach using a dummy young-of-the-year survey to set the magnitude of the 2013 year class at a specified value. The approach worked well, though estimated recruitments in other years, as well as other productivity parameters, are slightly affected by the choice of recruitment size in 2013. The approach of bracketing 2013 year class captured uncertainty in stock projections, and could form the basis for a decision table.

Request No. 16: Fix steepness at the mean of the prior (h = 0.773) and estimate M; tune the conditional age at length data using the harmonic mean, and length compositions using the Francis method for proposed new base case.

Rationale: Follow-up to request no. 14.

STAT Response: The Panel concluded that this model formulation should be the base configuration for management advice.

Request No. 17: Provide two decision tables that alternatively vary steepness and the magnitude of the 2013 year class as follows:

Table for steepness: low biomass state of nature h = 0.6 (~12.5 percentile); base case h = prior (0.773); high biomass state of nature h = 0.9 (~87.5 percentile).

Table for 2013 year class magnitude: low biomass state of nature = value at 12.5 percentile, base case = point estimate; high biomass state of nature = value at 87.5 percentile.

Rationale: These are the major sources of uncertainty that were identified during the review. The Panel was considering whether providing two decision table would add value to the stock assessment.

STAT Response: The decision tables were provided. The three catch streams used for the tables were based on status quo catches, the rebuilding SPR applied to the base model, and ACL catches as estimated by the base model. The Panel noted that stock projections were not highly sensitive to choices for steepness. This is partly because M was estimated in the three alternatives, but it also suggests that there is not much structural uncertainty in the assessment. The decision table with respect to the 2013 year class was similar to the steepness sensitivity table. The STAT suggested that it would be preferable to combine these two sources of uncertainty into a single decision table. The Panel agreed, and requested that the estimated M values be reported for the low and high biomass scenarios.

Projected catches from the rebuilding SPR applied to the low biomass scenario were not provided. The Panel requested that these projections be added as a fourth row in the decision table.

Request No. 18: Provide a decision table with the low biomass state of nature defined by low steepness (h = 0.6) and low 2013 recruitment (~12.5 percentile of the uncertainty of the recruitment estimate); high biomass state of nature defined by high steepness (h = 0.9) and high 2013 recruitment (~87.5 percentile of the uncertainty of the recruitment estimate). Use same catch streams as in request no. 17 and add a catch stream associated with the low biomass state of nature assuming SPR = 77.7% (the rebuilding harvest control rule). Include M estimates for both states of nature.

Rationale: To obtain a pair of bracketing runs for the decision table.

STAT Response: These runs were agreed to form a suitable basis for characterizing uncertainty around the base model.

2.6 Base-Model Results

Table 35 details all of the common parameters used in the base model, except estimated recruitment deviations. Statues of all actively estimated parameters show that all these parameters are within defined boundaries, although standard deviations (SD) of some parameters are large. Estimated growth functions for both sexes and related CVs are shown in Figure 66. Fits to the relative abundance indices (in log space) for all of the indices used in the model are shown as Figure 67 to Figure 77. Fits to the CPUE indices were generally reasonable. The model was able to replicate the trends of both the trawl fishery and southern recreational fishery fairly well, though the model fits to the central/northern recreational fishery were poor, particularly in the last several years of the index. The fit to the CPFV CPUE index (Figure 71, labelled as "CDFWEarlyOB") completely missed the rapid rise and fall in catch rates from 1989 through 1992 that appears to have resulted from a strong 1988 year class. It is possible that a disproportionate influence of larger fish in the catches in some later years, when the fishery may have explored fishing grounds not widely exploited by recreational fleets earlier in the fishery, resulted in a selectivity curve that failed to predict higher catches of smaller fish from strong cohorts. Alternatively, strong year classes may have resulted in large numbers of fish being available in atypical habitat types (e.g., soft bottom) prior to dispersal, or fisheries may have targeted abundant year classes, resulting in higher catch rates and relatively greater catches of smaller individuals. Some greater exploration of this would be worthwhile. Notable differences also existed in the recent years for three indices: the juvenile indices between 2010 and 2014 (Figure 75) and both onboard recreational indices in the latest two years (Figure 76 and Figure 77). The model predicted a general increasing trend in these years while the aforementioned three indices showed flat or decreasing trends. Although the relative lack of conflicting information facilitates the fit to the early years of the CalCOFI index (Figure 70), this index captures the rapid decline in the 1970s through the 1990s and the increase in abundance in the post 1999 era that are observed in other indices and, consequently, predicted by the model.

The use of the GLMM for the triennial trawl survey index also resulted in a relative improvement to the model fit to the data (as compared to pre-2009 assessments), although there is some suggestion of autocorrelation in the residuals such that the model underestimates the index in early years and overestimates the index in several years towards the end of the time series. As described earlier, there is considerable evidence that both past and present trawl survey methods are ill-suited for sampling Bocaccio.

All estimated selectivity functions are generally well estimated (Figure 78 to Figure 93). One exception is the estimated selectivity for the triennial survey (Figure 90), in which fish in a very narrow length range (between 24 cm to 26 cm) are selected much more than other length groups, resulting in a narrow spike in the selectivity curve. This could result from length data not being selected randomly during the survey (see the early description of the survey). All selectivities are estimated to be dome-shaped, except for the late time period of the northern California trawl fishery (Figure 87).

In general, the length composition data fit reasonably well in most fishing fleets and surveys (Figure 94 to Figure 106), particularly the southern recreational fishery and south/central trawl fishery, both of which clearly demonstrate the modal progression of strong year classes. There are some patterns of autocorrelation in the residuals to the length composition data that suggest an inability to perfectly fit the strong year class modes; this could be a consequence of slight differences in the timing of landings for some fisheries (as growth during the first several years is sufficiently rapid that data early or late in the year may not match expected length frequencies in the middle of the year), the geographic areas of given fleets (which may tend to capture slightly smaller or larger fish depending on the region), or variability in growth rates with differences in oceanographic conditions. The CAAL data for all fishing fleets and surveys are also generally well fit (Figure 107 and Figure 111).

The base model results for time series of fishing mortality, summary biomass, spawning output, stock depletion, and age-0 recruitment and recruitment deviations are shown from Figure 112 to Figure 117 and Table 36 to Table 37. The stock-recruit curve and the estimated recruitment bias adjustments are shown as Figure 118 and Figure 119. The initial unfished summary (age 1+) biomass is estimated to be 43,971 mt, with a spawning output (SSB_0) of 6,871 x 10^6 larvae and mean age-0 recruitment (R_0) of 6,414 x 10^3 recruits, all of which are comparable to those in the 2009 assessment (see comparisons to historical assessments below). The estimated natural mortality (M) for the base model was 0.178.

The summary biomass, spawning output, and recruitment in 1892 (when the catch history begins) are slightly below the estimated unfished levels, due to the presumed existence of a very moderate fishery beginning in the 1850s. The population trajectory exhibited a very moderate decline until about 1950, and then declined steeply, as catches rose from several hundred to several thousand metric tons, reaching a local minimum in 1961 of the unfished spawning output, which was associated with harvest rates significantly above the (current) target levels. The biomass increased sharply thereafter, as a result of one or several very strong recruitment events in the early 1960s (informed primarily by the CalCOFI time series). The biomass exceeded the mean unfished biomass level through the early 1970s, when catches again began to climb rapidly to their peak levels, associated with high (SPR of less than 0.2) fishing mortality rates and a rapid drop in biomass. By the mid-1980s, depletion was at approximately 30% of the unfished level, and, by the early 1990s, depletion was at about 17%. Fishing mortality remained high throughout this period, even as catches declined rapidly, and recruitment during the 1990s was at very low levels (except 1999). The biomass increased in recent years (Figure 113) due to high recruits in 2010 and 2013. Fishing mortality declined in the late 1990s (Figure 112), in response to severe management restrictions. By 2002, SPR was generally close to or above 0.9, and, in concert with a strong 1999 year class and fairly good year class in 2003, spawning output increased steadily in the 2000s. There were two particularly strong year classes (2010 and 2013, Figure 116), with the latter being the highest in the last 20 years. The base model estimates a current (2015) stock depletion level of 36.8% and a 2014 SPR of 94.6%.

2.7 Uncertainty and Sensitivity Analyses

2.7.1 Likelihood profiles on key assessment parameters

2.7.1.1 Likelihood profile on steepness (*h*)

A profile of steepness is conducted on a range between 0.35 and 0.975; the outputs are shown from Figure 120 to Figure 123 and summary outputs from the selected profile runs are shown in Table 38. The profile of steepness shows that the best fit occurs at h around 0.56 and the model is not very informative on estimating steepness (small differences in log likelihoods). However, as seen in the figures, different components have different effects on estimating steepness values. In general, CAAL data and parameter priors have better fits with high steepness values; length composition and recruitment data have better fits with low steepness values; and index data have better fits at intermediate steepness values. The estimated growth parameters remain very similar with changes in steepness. As expected, the stock is less depleted with higher steepness values (Figure 124, Table 38). Figure 124 also shows that as steepness increases, both estimated virgin recruitment (lnR_0) and natural mortality (M) decreases.

2.7.1.2 Likelihood profile on natural mortality (*M*)

A profile of natural mortality (M) was conducted on a range between 0.10 and 0.27; outputs are shown as Figure 125 to Figure 128 and summary outputs from the selective profile runs are shown in Table 39. The results indicate that the model has a better fit with M around 0.18. The results show that different components have different effects on estimating natural mortality. Both length and index data have better fits with natural mortality around 0.16, while recruitment estimates have better fits at higher natural mortality values. The estimated growth parameters remain very similar with changes in steepness. Figure 129 shows that as natural mortality increases, the estimated virgin recruitment (lnR_0) increases and the stock is less depleted.

2.7.1.3 Two-dimension likelihood profile on steepness and natural mortality

A two-dimensional profile of steepness and natural mortality was conducted on a similar range of profiles for steepness and natural mortality, and the outputs are shown as Figure 130 to Figure 132. The minimum log-likelihood value occurs at h = 0.55 and M = 0.195, with the estimated stock depletion at 31.7%. The results show that there are moderate correlations between the two parameters (Figure 130), and both steepness and natural mortality have large effects on the estimated stock depletions if both are fixed in the assessment model (Figure 131).

2.7.1.4 Likelihood profile on virgin recruitment ($ln(R_0)$)

A profile of logarithm of virgin recruitment ($ln(R_0)$) was conducted on a range between 8.2 and 9.6; outputs are shown as Figure 133 to Figure 135, and summary outputs from the selective profile runs are shown in Table 40. The results indicate that the model has a best fit with $ln(R_0)$ = 8.7. The results show that different components have different effects on estimating natural mortality. Recruitments have better fits with high $ln(R_0)$ values, while length data have better fits at low values of $ln(R_0)$. The estimated growth parameters remain very similar with changes in $ln(R_0)$.

2.7.2 Sensitivity analysis

2.7.2.1 Sensitivity to data-weighting methods

The base model uses the one-time Francis weighting method for the length composition data and the one-time harmonic mean weighting method for the conditional age-at-length data. A sensitivity analysis on the data-weighting was conducted on three alternative data-weighting methods: (1) default data-weighing, in which no change in variance adjustments to input sample sizes was made; (2) one-time harmonic data-weighting method, which has been commonly used in many West Coast groundfish assessments in recent years and was used in the 2009 Bocaccio assessment, and (3) one-time Francis weighting method, in which the method A was used for weighing conditional age-at-length data (see the r4ss descriptions for details). Outputs from these three alternative methods are compared with the base model output (Figure 137 to Figure 139, Table 41). The Francis' method gives relatively small weights to length composition and CAAL data, resulting in the stock being the most depleted (stock depletion = 34.4%), while the other two alternative weighting methods (default and harmonic mean weights) indicate that the stock is above 40% of unfished level. The greatest difference among the three weighting methods are estimated recruits (Figure 139); the default and harmonic mean methods give much higher 2013 recruit estimates than that of the Francis method, which is an important factor in determining the current and future stock status.

2.7.2.2 Sensitivity to maturity functions

As the maturity function used in this assessment was updated with newly obtained data, a sensitivity analysis was conducted to assess its effects on the assessment output (Figure 140 to Figure 142, Table 42). Overall, model outputs from all four maturity functions are similar. As expected, when females mature at a smaller size (Sensitivity 1 maturity), the stock is less depleted, and when females mature at a larger size (Sensitivity 2 maturity), the stock is more depleted.

2.7.2.3 Sensitivity to fishery selectivity blocks

The base model has a time block in 2003 on selectivity functions for four fisheries (southern and northern trawl fisheries, and southern and northern California recreational fisheries) to reflect management changes during the time period. Comparisons of the model outputs with and without the time block are presented as Figure 143 to Figure 145 and Table 43. The model fit to the length composition data is better with the time block than without the time block. There are small differences in model fitting to other data. The estimated stock depletion without time block is 39.7% versus 36.8% with time block.

2.7.3 Variance analysis using the delta method

Variance analyses on spawning outputs and stock depletion using the delta method (MacCall 2013, R program provided by Nick Grunloh of CSTAR, UCSC) are presented in Figure 146 and Figure 147. In the analysis, the two most influential parameters (M and h) are selected to show their contributions to the uncertainties in the estimated spawning outputs and stock depletion. The results show that M is the dominant parameter that contributes to uncertainties in estimating stock depletion in the late time period (Figure 147). Natural mortality also has large influence on the estimation uncertainties of spawning output in the late time period (Figure 146).

2.7.4 Retrospective analysis

The retrospective analyses (Figure 148 to Figure 150, Table 44) do not seem to show a major shift in perception of stock status when data from the last one to four years are removed, indicating that there are no significant biases in model estimation with or without data from recent years. Recruitment year classes since 1999 seem to be reasonably represented and estimated with reductions of data from the recent years (Figure 151). It is likely that a retrospective analysis without the most recent years' data have greater uncertainties in estimating strong recruitment year classes. For example, the retrospective analysis without the last four years of data shows the 2015 stock depletion at 35.3%. This is the lowest estimate among all retrospective analysis, probably because it does not foresee the 2010 and 2013 strong year classes.

3 Reference Points

A summary of reference points for the base model is presented in Table 45, including the unfished summary biomass, unfished spawning output, mean unfished recruitment and the proxy estimates for MSY based on the $SPR_{50\%}$ rate as well as the fishing mortality rate associated with a spawning stock output of 40% of the unfished level and with MSY estimated based on the spawner/recruit relationship and yield curve. The corresponding yields for these three estimates vary between 1,525 mt, based on the SPR target, and 1,755 mt, based on the MSY estimate. The unfished total biomass is estimated to be 45,254 mt, and is very similar to the estimate in the 2013 assessment update. Unfished spawning output and virgin recruitment are also comparable with those in the 2013 assessment. Summary of recent trend in catches, regulations, and stock status is presented in Table 46.

4 Harvest Projections and Decision Tables

Harvest projections and a decision table based on four future catch scenarios (four catch streams) are presented in details in the Decision table section in the Executive Summary.

5 Regional Management Considerations

As described in the 2009 assessment, the stock structure for Bocaccio is poorly understood. The decision to extend the boundaries of what we consider to be the southern subpopulation from Cape Mendocino to Cape Blanco was based on the observation that catches (both fishery and survey-derived) do not end abruptly at Cape Mendocino, but rather tend to taper off to the north. As such, the fish in this region were more likely to originate from the southern subpopulation than the subpopulation distributed to the north. However, either boundary is imperfect. There is clearly a need to devote additional effort into understanding population structure and connectivity, and to evaluating trends in abundance in the waters of the Pacific Northwest, as discussed in the research needs section below.

6 Research Needs

Stock structure for Bocaccio rockfish on the West Coast remains an important issue to consider in future assessments, as well as for management. Although reanalysis of the genetic evidence suggests there is no genetic differentiation among the major oceanographic provinces in the California Current, there are broad gaps in the sampling and additional samples or analysis could be beneficial, particularly given the apparent regional differences in growth, maturity, and longevity, are indicative of moderate demographic isolation. This assessment does not address population abundance levels or trends in the Columbia or U.S. Vancouver INPFC areas, which might be considered more likely to be comparable to those observed in Canadian waters than waters south of Cape Blanco. However, this issue has yet to be resolved. It is possible that more refined genetic analysis, trace elements analysis of archived otoliths (Elsdon et al. 2008) or parasitology studies, could potentially shed some light on population structure, connectivity and/or movement patterns throughout their range. Ideally, such efforts would be conducted in coordination with Canadian and Mexican researchers. As noted in the STAR Panel report, improved means for evaluating stock boundaries is needed for all rockfish (and potentially other West Coast assessments).

Since large scale area closures and other management actions were initiated in 2001, the spatial distributions of fishing effort (fishing mortality) have changed over both large and small spatial scales. Not only has this effectively truncated several abundance indices (recreational CPUE), this confounds the interpretation of survey indices for surveys that do not sample in the Cowcod Conservation Areas (CCAs), as insights from larval surveys suggest that the greatest abundance of Bocaccio is found in that area. This, in turn, infers that fishing mortality is greater on the fraction of the stock currently outside of the CCAs. Exploration of the potential spatial differences in relative abundance and population trends on both fine and broad spatial scales should continue.

Recently updated reproductive biology data (maturity and fecundity) show some differences in length and weight specific fecundity in Bocaccio from those used in the past assessments. Regional differences (southern and northern California, as well as southern Oregon), and multiple brood spawning, are poorly understood. If multiple broods are more likely to result from larger, older individuals, then this could result in an increase in the relative steepness of the size-dependent fecundity relationship. Environmentally driven changes in relative fecundity, particularly if manifest through variation in the number of broods produced by females under different productivity conditions, could also have important implications for estimating both historical and future relative spawning abundance. More data collections, particularly from the southern regions, and sample analysis will provide important information for future assessments.

Continued evaluation of the coastwide pelagic juvenile index (as well as other sources of recruitment information) should continue, particularly with respect to an improved understandings of the mechanisms that drive such strong variability in cohort strength, the potential use of a compensatory relationship between pelagic YOY and the population at later ages, and the overall utility of a pre-recruit index in better informing future abundance and productivity trends.

As Bocaccio is one of the most abundant and important piscivorous rockfish species, and its interactions with other predator and prey species are poorly known, dietary studies along with its movement patterns that are associated with habitats and prey abundance are key information to further understand its roles in the ecosystem in the California waters. Northward migratory behaviors of juvenile and young adults are indicated by length frequency data, but such behaviors are also poorly understood. Studies on the behaviors and its associations with oceanographic or other ecological factors can help future assessments in defining stock structure as well as explaining high variability in stock recruitments.

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9 Tables

Table 7: Estimated catches (mt) of Bocaccio from six fisheries and sum of annual total catches.

Year	Trawl south	Hook-and-line	Setnet	Recreational south	Recreational central	Trawl north	Total
1892	0	167	0	0	0	0	167
1893	0	157	0	0	0	0	158
1894	0	148	0	0	0	0	148
1895	0	139	0	0	0	0	139
1896	0	131	0	0	0	0	131
1897	0	123	0	0	0	0	123
1898	0	115	0	0	0	0	116
1899	0	108	0	0	0	0	108
1900	0	119	0	0	0	0	119
1901	0	131	0	0	0	0	131
1902	0	142	0	0	0	0	142
1903	0	154	0	0	0	0	154
1904	0	165	0	0	0	0	165
1905	0	176	0	0	0	0	176
1906	0	188	0	0	0	0	188
1907	0	199	0	0	0	0	199
1908	0	210	0	0	0	0	210
1909	0	237	0	0	0	0	237
1910	0	263	0	0	0	0	263
1911	0	289	0	0	0	0	289
1912	0	316	0	0	0	0	316
1913	0	342	0	0	0	0	342
1914	0	368	0	0	0	0	368
1915	0	395	0	0	0	0	395
1916	55	419	0	0	0	0	474
1917	86	661	0	0	0	0	747
1918	97	701	0	0	0	1	799
1919	66	463	0	0	0	0	529
1920	68	482	0	0	0	0	550
1921	56	406	0	0	0	0	463
1922	49	367	0	0	0	0	417
1923	55	434	0	0	0	0	489
1924	37	405	0	0	0	0	443
1925	30	475	0	0	0	1	506
1926	83	627	0	0	0	1	711

Table (continued): Estimated catches (mt) of Bocaccio from six fisheries and sum of annual total catches. . ***NOTE: Commercial catches from 2006 are approximate numbers using the WCGOP estimates from south of 40^{o}10' and they are to be updated using total mortality from the WCGOP estimates from south of 43^o.***

Year	Trawl south	Hook-and-line	Setnet	Recreational south	Recreational central	Trawl north	Total
1927	111	497	0	0	0	2	610
1928	151	483	0	2	2	1	639
1929	119	441	0	4	5	28	598
1930	136	551	0	6	6	17	715
1931	46	578	0	8	7	50	689
1932	69	431	0	10	9	37	556
1933	90	257	0	12	11	59	429
1934	109	317	0	14	13	42	494
1935	91	369	0	16	15	43	534
1936	108	474	0	16	17	18	632
1937	92	408	0	28	20	41	589
1938	76	295	0	22	19	48	461
1939	50	200	0	20	17	86	373
1940	46	238	0	14	24	61	383
1941	32	187	0	13	22	54	310
1942	8	72	0	7	12	28	127
1943	8	70	0	7	11	204	300
1944	3	84	0	5	9	647	748
1945	55	127	0	7	12	1229	1430
1946	112	122	0	12	21	623	891
1947	6	198	0	37	17	639	897
1948	82	150	0	102	34	404	772
1949	94	177	0	133	44	387	834
1950	304	328	0	157	54	380	1222
1951	765	262	0	136	63	538	1764
1952	1311	181	0	152	55	274	1973
1953	1678	70	0	171	47	314	2281
1954	1598	89	0	411	58	255	2411
1955	1765	123	0	761	69	345	3062
1956	2006	300	0	917	77	379	3680
1957	2219	271	0	530	77	488	3585
1958	2460	214	0	301	123	490	3588
1959	2063	125	0	178	103	387	2855
1960	1732	93	0	185	81	358	2449
1961	1297	81	0	212	68	277	1935

Table (continued): Estimated catches (mt) of Bocaccio from six fisheries and sum of annual total catches.

Year	Trawl south	Hook-and-line	Setnet	Recreational south	Recreational central	Trawl north	Total
1962	1147	68	0	204	80	243	1743
1963	1314	85	0	194	89	339	2021
1964	943	70	0	244	75	200	1533
1965	966	81	0	319	107	281	1753
1966	2410	130	0	564	118	206	3428
1967	4036	118	0	770	111	300	5336
1968	1996	81	0	832	104	396	3410
1969	1133	78	17	785	111	236	2359
1970	1341	82	15	1039	118	262	2858
1971	961	82	59	967	104	346	2519
1972	1648	123	71	1309	123	387	3661
1973	4537	152	167	1511	186	654	7207
1974	5956	164	262	1893	201	530	9005
1975	3316	158	285	1865	200	586	6411
1976	3425	219	123	1489	216	714	6186
1977	2381	189	158	1265	194	678	4865
1978	1879	248	125	1174	196	761	4382
1979	3299	351	235	1714	230	342	6172
1980	3055	335	216	943	317	677	5543
1981	1779	300	356	941	230	2205	5812
1982	2328	393	387	1249	371	2043	6772
1983	1891	268	671	266	308	2366	5770
1984	1421	480	685	182	67	1655	4491
1985	545	163	1047	325	68	664	2811
1986	789	288	1092	435	176	387	3168
1987	643	307	976	92	106	569	2693
1988	590	523	370	107	44	712	2346
1989	593	395	983	183	82	572	2808
1990	724	487	783	160	68	476	2699
1991	498	271	468	160	68	273	1739
1992	360	479	640	160	68	149	1857
1993	358	444	432	118	68	216	1635
1994	377	211	263	253	68	170	1341
1995	215	69	281	35	3	165	768
1996	226	93	92	69	32	67	578

Table (continued). Estimated catches (mt) of Bocaccio from six fisheries and sum of annual total catches.

Year	Trawl south	Hook-and-line	Setnet	Recreational south	Recreational central	Trawl north	Total
1997	136	58	35	73	112	96	509
1998	41	42	39	34	26	33	215
1999	19	21	7	81	61	31	220
2000	14	7	1	60	75	8	164
2001	9	8	1	64	54	6	141
2002	28	0	0	86	9	21	144
2003	5	0	0	12	0	0	17
2004	14	2	0	61	2	4	83
2005	25	2	0	192	11	0	230
2006	16	10	0	52	12	1	91
2007	5	11	0	80	9	1	107
2008	8	4	0	49	4	4	68
2009	20	3	0	52	9	1	85
2010	13	2	0	50	7	2	73
2011	8	2	0	99	4	2	116
2012	11	3	0	119	6	2	142
2013	14	4	0	126	5	1	150
2014	4	6	0	93	6	4	114

Table 8: Estimated catches (mt) of Bocaccio from three southern Oregon ports between 1892 and 2002.

Year	Catch (mt)	Year	Catch (mt)	Year	Catch (mt)	Year	Catch (mt)
1892	0.2	1927	0.2	1962	12.4	1997	1.7
1893	0.2	1928	0.2	1963	12.8	1998	1.3
1894	0.2	1929	0.2	1964	10.0	1999	4.9
1895	0.1	1930	0.2	1965	7.7	2000	1.2
1896	0.1	1931	0.2	1966	10.0	2001	1.1
1897	0.1	1932	0.2	1967	5.4	2002	1.1
1898	0.1	1933	0.2	1968	4.6		
1899	0.1	1934	0.2	1969	12.6		
1900	0.1	1935	0.2	1970	11.9		
1901	0.1	1936	0.2	1971	21.9		
1902	0.1	1937	0.3	1972	7.6		
1903	0.1	1938	0.2	1973	5.8		
1904	0.1	1939	0.2	1974	4.2		
1905	0.1	1940	0.9	1975	7.1		
1906	0.1	1941	1.3	1976	8.7		
1907	0.1	1942	2.3	1977	4.7		
1908	0.1	1943	7.4	1978	15.1		
1909	0.1	1944	11.8	1979	56.1		
1910	0.1	1945	17.5	1980	91.2		
1911	0.1	1946	11.0	1981	40.5		
1912	0.1	1947	7.3	1982	133.7		
1913	0.1	1948	6.9	1983	120.3		
1914	0.2	1949	6.3	1984	72.7		
1915	0.2	1950	5.4	1985	11.1		
1916	0.2	1951	5.7	1986	9.1		
1917	0.2	1952	6.2	1987	14.8		
1918	0.2	1953	9.8	1988	16.6		
1919	0.2	1954	9.2	1989	19.3		
1920	0.2	1955	9.7	1990	13.5		
1921	0.2	1956	29.4	1991	10.0		
1922	0.2	1957	18.8	1992	16.1		
1923	0.2	1958	7.7	1993	12.9		
1924	0.2	1959	8.4	1994	20.7		
1925	0.2	1960	12.9	1995	2.7		
1926	0.2	1961	11.2	1996	4.6		

Table 9: Estimated catches (mt) of Bocaccio from recreational fisheries in Southern California from 1981 to 2014. Catch estimates between 1990 and 1992 were averages of adjacent years since there were no RecFIN estimates during those years.

Year	RecFIN landing (Type A)	RecFIN discard (Type B1)	Additional discard from rockfish genus group	Total Bocaccio catch	GMT scorecard
1981	812.8	28.0	100.6	941.4	
1982	1107.7	50.3	91.4	1249.4	
1983	248.4	16.5	1.3	266.2	
1984	163.4	13.2	5.5	182.1	
1985	298.4	22.6	4.0	325.0	
1986	405.0	23.0	7.0	435.1	
1987	84.2	5.4	2.0	91.5	
1988	90.9	15.7	0.0	106.5	
1989	177.7	1.0	4.3	183.0	
1990				***160.3***	
1991				***160.3***	
1992				***160.3***	
1993	98.6	10.8	8.6	118.0	
1994	183.2	31.4	38.3	252.9	
1995	28.7	1.8	4.0	34.5	
1996	63.8	3.3	1.4	68.5	
1997	39.2	9.9	23.6	72.8	
1998	28.5	0.0	5.6	34.1	
1999	67.1	4.0	10.2	81.3	
2000	43.2	8.4	7.9	59.5	
2001	54.3	5.9	3.4	63.6	
2002	73.3	2.5	10.2	86.0	
2003	8.9	1.9	1.3	12.1	
2004	52.4	7.9	1.1	61.4	
2005	157.9	11.9	22.1	191.9	
2006	40.9	5.8	5.4	52.1	
2007	65.7	7.4	7.1	80.2	
2008	37.7	4.4	7.2	49.3	
2009	42.9	5.3	3.8	52.0	
2010					50.1
2011					99.3
2012					119.1
2013					125.9
2014					93.4

Table 10: Estimated catches (mt) of Bocaccio from recreational fisheries in northern California from 1981 to 2014. Catch estimates between 1990 and 1992 were averages of adjacent years since there were no RecFIN estimates during those years. Catch estimates for years of 1993 and 1994 were set to be same as in 1992 because RecFIN estimates for these two years were from relatively small sampling effort (Field 2009).

Year	RecFIN landing (Type A)	RecFIN discard (Type B1)	Additional discard from rockfish genus group	Total Bocaccio catch	GMT scorecard
1981	228.3	1.3	0.8	230.4	
1982	357.5	0.5	13.1	371.1	
1983	295.4	6.0	6.3	307.6	
1984	66.4	0.5	0.0	66.9	
1985	63.6	2.1	2.3	67.9	
1986	166.9	4.3	5.1	176.3	
1987	95.0	7.6	3.8	106.4	
1988	32.9	11.2	0.3	44.3	
1989	77.6	0.0	4.3	81.9	
1990				***68.0***	
1991				***68.0***	
1992				***68.0***	
1993	16.5	2.4	49.1	***68.0***	
1994	5.3	0.0	62.7	***68.0***	
1995	2.7	0.0	0.6	3.3	
1996	25.0	0.9	6.5	32.4	
1997	107.1	0.4	4.1	111.6	
1998	22.9	0.0	3.1	26.0	
1999	53.0	0.0	7.5	60.5	
2000	60.1	0.1	14.8	75.1	
2001	48.8	0.0	5.2	54.1	
2002	8.2	0.0	0.8	9.0	
2003	0.0	0.0	0.0	0.0	
2004	2.2	0.0	0.1	2.3	
2005	10.7	0.0	0.3	11.1	
2006	11.8	0.0	0.3	12.2	
2007	9.1	0.0	0.2	9.3	
2008	3.4	0.2	0.2	3.7	
2009	7.1	1.3	0.4	8.7	
2010					6.5
2011					4.1
2012					5.7
2013					5.0
2014					6.1

Table 11: Maturity estimates for female Bocaccio. Lengths at 50% and 95% maturity (L.50 and L.95, respectively) were estimated using generalized linear models with binomial error structures and logit link functions. Sensitivity analyses were conducted altering the type of samples included in the model (as noted). A sensitivity analysis was also conducted excluding commercial samples. SCB=Southern California Bight.

Model	Month	Stage 2 included	SCB included	N	L.50 (cm)	L.95 (cm)	Slope
2009 Assess.	Oct-Jun	N	N	2,569	39.9	48.1	0.359
2015 Base	Sep-Jan	Y	Y	1,692	37.7	46.5	0.334
Sensitivity 1	Oct-Jun	Y	Y	3,188	37.4	46.6	0.318
Sensitivity 2	Sep-Jan	N	N	1,021	41.0	49.0	0.370
Sensitivity 3	Sep-Jan	Y	N	1,616	38.0	46.7	0.339
Sensitivity 4	Sep-Jan	N	Y	1,097	40.3	48.9	0.344
Research	Sep-Jan	Y	N	256	37.6	43.7	0.483

Table 12: Estimated priors for natural mortality for both sexes using two methods (provided by Owen Hamel, NWFSC). The first method uses only maximum ages only and the second one uses combination of maximum ages, GSI, and weighting factors from different estimates. Lognormal priors are used in the assessment. SCB = Southern California Bight.

Area	Mean (log, max age based)	SD (log, max age based)	Mean (arithmetic, max. age based)	Mean (log, multiple factors)	SD (log, multiple factors)	Mean (arithmetic multiple factors)
SCB	-1.95829	0.51547	0.14110	-1.44715	0.27562	0.23524
Central California	-2.02081	0.51625	0.13255	-1.35406	0.27748	0.25819
Whole assessment area	-2.05066	0.51664	0.12865	-1.41104	0.27697	0.24389
North of assessment area	-2.54965	0.52433	0.08962	-1.51340	0.27877	0.22016

Table 13: Numbers of fish aged (N) by year for four commercial fisheries and the NWFSC survey. A total of 8,155 fish were aged. Note that there are large numbers of age-0 fish from the NWFSC in recent years.

Trawl south		Hook-and-line		Setnet		Trawl north		NWFSC survey		
Year	N	Year	N	Year	N	Year	N	Year	N	N (age 0)
1980	32	1986	112	1985	18	1978	256	2003	109	15
1985	121	1987	136	1986	6	1980	145	2004	226	34
1986	116	1988	44	1987	20	1985	209	2005	195	55
1987	141	1989	111	1990	49	1986	190	2006	102	42
1988	135					1987	137	2007	87	1
1989	185					1988	178	2008	77	3
1990	139					1989	105	2009	96	21
1991	266					1991	301	2010	199	142
1992	295					1992	180	2011	99	33
1993	341					1993	210	2012	504	121
1994	258					1994	269	2013	503	170
1994	371					1999	7	2014	686	72
2004	104									
Total N	**2504**	**Total N**	**471**	**Total N**	**110**	**Total N**	**2187**	**Total N**	**2883**	**694**

Table 14: Number of positive samples, total available samples (in the November-May time period) and percent positive tows for the CalCOFI Ichthyoplankton data, 1951-1980.

Year	South positives	Total	% pos	North positives	Total	% pos
1951	32	128	25%	n/a		
1952	42	190	22%	n/a		
1953	59	240	24%	n/a		
1954	92	259	35%	n/a		
1955	56	180	31%	n/a		
1956	31	210	14%	n/a		
1957	44	205	21%	n/a		
1958	54	251	21%	n/a		
1959	37	291	12%	n/a		
1960	57	307	18%	n/a		
1961	23	100	23%	n/a		
1962	26	94	27%	n/a		
1963	28	118	23%	n/a		
1964	29	136	21%	n/a		
1965	34	119	28%	n/a		
1966	62	193	32%	n/a		
1967	12	52	23%	n/a		
1968	26	50	52%	n/a		
1969	71	205	34%	38	120	31%
1970	7	51	13%	0	33	0%
1972	66	161	40%	47	120	39%
1973	0	4	0%	1	13	7%
1975	65	306	21%	23	99	23%
1976	13	64	20%	0	29	0%
1978	27	284	9%	15	116	12%
1979	0	169	0%	0	64	0%
1980	0	145	0%	0	72	0%

Table 15 (continued). Number of positive samples, total available samples (in the November-May time period) and percent positive tows for the CalCOFI Ichthyoplankton data, 1980-2014.

Year	South positives	Total	% pos	North positives	Total	% pos
1981	25	270	9%	16	130	12%
1982	0	85	0%	0	42	0%
1983	6	83	7%	2	44	4%
1984	31	165	18%	17	107	15%
1985	5	86	5%			
1986	6	131	4%			
1987	9	135	6%			
1988	19	142	13%			
1989	13	96	13%			
1990	9	135	6%			
1991	21	135	15%			
1992	17	91	18%			
1993	4	96	4%			
1994	13	146	8%	0	15	0%
1995	2	89	2%			
1996	19	92	20%			
1997	9	97	9%			
1998	5	120	4%	0	19	0%
1999	8	118	6%			
2000	8	96	8%			
2001	6	93	6%			
2002	10	118	8%			
2003	14	143	9%	4	46	8%
2004	11	99	11%	3	46	6%
2005	16	146	10%	1	44	2%
2006	13	149	8%	4	28	14%
2007	11	108	10%	4	10	40%
2008	13	176	7%	1	20	5%
2009	28	484	5%	1	35	2%
2010	10	149	6%	3	21	14%
2011	17	142	11%	3	43	6%
2012	11	161	6%	1	15	6%
2013	10	155	6%	0	30	0%
2014	5	80	6%	1	20	5%

Table 15: Numbers of hauls and percentages of positive hauls by year and by depth zone from triennial trawl survey between 1977 and 2004. Note that the 1977 data were not used in the assessment.

	Depth zone (m)			
Year	55-155	155-250	250-350	**Sum by year**
Number of hauls				
1977	77	70	77	**224**
1980	47	19	10	**76**
1983	84	23	17	**124**
1986	82	15	5	**102**
1989	146	30	21	**197**
1992	134	21	18	**173**
1995	114	35	21	**170**
1998	119	39	24	**182**
2001	122	35	25	**182**
2004	98	30	19	**147**
Sum by depth	**1023**	**317**	**237**	**1577**
Percentage of positive hauls				**Mean by year**
1977	51.9	78.6	23.4	**51.3**
1980	61.7	94.7	40.0	**65.5**
1983	28.6	73.9	29.4	**44.0**
1986	47.6	80.0	40.0	**55.9**
1989	34.9	60.0	19.0	**38.0**
1992	14.9	33.3	11.1	**19.8**
1995	19.3	40.0	14.3	**24.5**
1998	9.2	28.2	0.0	**12.5**
2001	9.0	34.3	4.0	**15.8**
2004	17.3	33.3	36.8	**29.2**
Mean by depth	**29.5**	**55.6**	**21.8**	

Table 16: Numbers of hauls and percentages of positive hauls by year and by latitude zone from triennial trawl survey between 1977 and 2004. Note that the 1977 data were not used in the assessment.

	Latitude zone (degree north)			
Year	<38	38-40.5	40.5-43	**Sum by year**
Number of hauls				
1977	119	81	24	**224**
1980	23	28	25	**76**
1983	30	40	54	**124**
1986	29	42	31	**102**
1989	98	51	48	**197**
1992	73	48	52	**173**
1995	67	55	48	**170**
1998	72	56	54	**182**
2001	72	56	54	**182**
2004	60	40	47	**147**
Sum by depth	**643**	**497**	**437**	**1577**
Percentage of positive hauls				**Mean by year**
1977	48.7	66.7	4.2	**39.9**
1980	73.9	71.4	56.0	**67.1**
1983	43.3	40.0	31.5	**38.3**
1986	79.3	61.9	12.9	**51.4**
1989	56.1	23.5	12.5	**30.7**
1992	26.0	14.6	5.8	**15.5**
1995	34.3	23.6	6.3	**21.4**
1998	22.2	10.7	0.0	**11.0**
2001	16.7	16.1	5.6	**12.8**
2004	25.0	42.5	4.3	**23.9**
Mean by depth	**42.6**	**37.1**	**13.9**	

Table 17: Estimated biomass of Bocaccio and CVs using GLMM analysis for the triennial survey between 1980 and 2004, along with survey catches.

Year	Biomass (mt)	Standard error (ln)	Survey catch (mt)
1980	10517	0.389	1.209
1983	9183	0.426	3.238
1986	4044	0.501	1.758
1989	2748	0.385	5.559
1992	1710	0.574	0.530
1995	954	0.454	0.242
1998	342	0.582	0.053
2001	575	0.581	0.067
2004	2359	0.478	0.561

Table 18: Numbers of length measurements by year and latitude zone from triennial trawl survey between 1977 and 2004. Note that the 1977 data were not used in the assessment.

	Latitude zone			
Year	32-38	38-40.5	40.5-43	**Sum by year**
1977	699	278	0	**977**
1980	247	224	38	**509**
1983	102	327	49	**478**
1986	81	87	42	**210**
1989	1308	49	2	**1359**
1992	375	15	4	**394**
1995	126	37	3	**166**
1998	48	10	0	**58**
2001	50	18	3	**71**
2004	153	61	4	**218**
Sum by latitude	**3189**	**1106**	**145**	**4440**

Table 19: Numbers of hauls and percentages of positive hauls by year and by depth zone from NWFSC trawl survey between 2003 and 2014.

	Depth zone (m)			
Year	55-155	155-250	250-350	**Sum by year**
Number of hauls				
2003	92	47	31	**170**
2004	98	26	23	**147**
2005	129	39	31	**199**
2006	110	38	25	**173**
2007	119	35	30	**184**
2008	128	36	29	**193**
2009	140	43	29	**212**
2010	138	50	29	**217**
2011	137	46	22	**205**
2012	144	49	21	**214**
2013	92	28	20	**140**
2014	118	50	29	**197**
Sum by depth	**1445**	**487**	**319**	**2251**
Percentage of positive hauls				**Mean by year**
2003	15.2	31.9	12.9	**20.0**
2004	19.4	30.8	13.0	**21.1**
2005	16.3	43.6	3.2	**21.0**
2006	20.9	23.7	12.0	**18.9**
2007	12.6	28.6	6.7	**15.9**
2008	9.4	19.4	10.3	**13.1**
2009	10.0	11.6	17.2	**13.0**
2010	13.8	18.0	27.6	**19.8**
2011	7.3	17.4	9.1	**11.3**
2012	15.3	34.7	19.0	**23.0**
2013	33.7	39.3	20.0	**31.0**
2014	49.2	54.0	20.7	**41.3**
Mean by depth	**18.6**	**29.4**	**14.3**	

Table 20: Numbers of hauls and percentages of positive hauls by year and by latitude zone from NWFSC trawl survey between 2003 and 2014.

	Latitude zone (degree north)				
Year	32-34.5	34.5-38	38-40.5	40.5-43	**Sum by year**
Number of hauls					
2003	37	43	34	56	**170**
2004	39	41	39	28	**147**
2005	50	50	49	50	**199**
2006	48	46	45	34	**173**
2007	58	52	33	41	**184**
2008	50	65	42	36	**193**
2009	63	71	34	44	**212**
2010	61	62	45	49	**217**
2011	56	58	48	43	**205**
2012	62	66	42	44	**214**
2013	33	32	47	28	**140**
2014	58	59	43	37	**197**
Sum by depth	**615**	**645**	**501**	**490**	**2251**
Percentage of positive hauls					**Mean by year**
2003	21.6	30.2	23.5	7.1	**20.6**
2004	23.1	26.8	25.6	0.0	**18.9**
2005	28.0	28.0	16.3	6.0	**19.6**
2006	22.9	23.9	26.7	2.9	**19.1**
2007	20.7	23.1	3.0	4.9	**12.9**
2008	4.0	16.9	19.0	2.8	**10.7**
2009	12.7	14.1	14.7	2.3	**10.9**
2010	27.9	25.8	6.7	0.0	**15.1**
2011	19.6	12.1	4.2	0.0	**9.0**
2012	40.3	18.2	14.3	0.0	**18.2**
2013	39.4	46.9	31.9	10.7	**32.2**
2014	44.8	66.1	48.8	13.5	**43.3**
Mean by depth	**25.4**	**27.7**	**19.6**	**4.2**	

Table 21: Summary statistics of total catch (mt) and raw CPUE for the NWFSC survey between 2003 and 2014. Latitude zone is rounded latitude, and depth zone is defined by middle point of each depth zone.

Latitude zone	Total catch (Kg)	Raw CPUE (kg/ha)	Depth zone (m)	Total catch (Kg)	Raw CPUE (kg/ha)	Year	Total catch (Kg)	Raw CPUE (kg/ha)
32	91	0.258	100	2162	0.520	2003	184	0.188
33	338	0.363	200	2469	1.348	2004	929	1.175
34	1820	1.509	300	1569	1.860	2005	385	0.367
35	136	0.166	400	5	0.005	2006	349	0.343
36	1130	3.069	500	0	0.000	2007	226	0.220
37	489	0.796	600	0	0.000	2008	251	0.234
38	1735	3.076	700	0	0.000	2009	103	0.094
39	78	0.170	800	0	0.000	2010	87	0.074
40	66	0.119	900	0	0.000	2011	76	0.068
41	6	0.008	1000	0	0.000	2012	1353	1.131
42	8	0.010	1100	0	0.000	2013	485	0.694
43	16	0.020	1200	0	0.000	2014	1778	1.641
44	13	0.011						
45	0	0.000						
46	1	0.002						
47	37	0.043						
48	241	0.528						

Table 22: Estimated biomass of Bocaccio and CVs using GLMM analysis for NWFSC survey between 2003 and 2014.

Year	Biomass (mt)	Standard error (ln)
2003	1443.0	0.4685
2004	8611.6	0.5277
2005	2431.4	0.4592
2006	3544.8	0.4894
2007	2256.8	0.5303
2008	2486.8	0.5992
2009	2032.1	0.5831
2010	1152.5	0.4807
2011	813.0	0.6434
2012	4101.7	0.4983
2013	5190.7	0.4449
2014	4128.2	0.3643

Table 23: Numbers of length measurements by year and latitude zone from NWFSC trawl survey between 2003 and 2014.

	Latitude zone (degree north)				
Year	32-34.5	34.5-38	38-40.5	40.5-43	**Sum by year**
2003	32	25	25	9	**91**
2004	51	397	32	0	**480**
2005	80	151	22	15	**268**
2006	92	97	22	1	**212**
2007	98	46	1	4	**149**
2008	7	73	21	1	**102**
2009	26	63	8	3	**100**
2010	212	56	3	0	**271**
2011	79	17	3	0	**99**
2012	658	135	14	0	**807**
2013	500	260	71	5	**836**
2014	316	466	210	16	**1008**
Sum by latitude	**2151**	**1786**	**432**	**54**	**4423**

Table 24: Numbers of fish aged by year and latitude zone from NWFSC trawl survey between 2003 and 2014.

	Latitude zone (degree north)				
Year	32-34.5	34.5-38	38-40.5	40.5-43	**Sum by year**
2003	37	26	25	21	**109**
2004	53	141	32	0	**226**
2005	79	79	22	15	**195**
2006	55	26	20	1	**102**
2007	38	45	1	3	**87**
2008	7	48	21	1	**77**
2009	26	59	8	3	**96**
2010	131	65	3	0	**199**
2011	79	17	3	0	**99**
2012	400	90	14	0	**504**
2013	236	191	71	5	**503**
2014	207	315	148	16	**686**
Sum by latitude	**1348**	**1102**	**368**	**65**	**2883**

Table 25 Summary of annual numbers of sampling trips, defined by vessel/date counts; fish measured for length composition; and computed effective sample sizes for sexed fish from the NWFSC hook-and-line survey.

Year	Number of trip	Number of fish measured	Effective sample size
2004	19	786	127.47
2005	20	659	110.94
2006	22	728	122.46
2007	19	641	107.46
2008	22	665	113.77
2009	20	590	101.42
2010	22	269	59.12
2011	22	769	128.12
2012	23	1079	171.90
2013	27	1132	183.22
2014	23	1033	165.55

Table 26 Number of observations, number of positive observations, proportions of positive, Delta GLM index value, and jackknife (or borrowed) estimate of CV (two positive observations were necessary to develop a year covariate and associated CV).

Year	Number of positive	Sample size	Number locations with data	Proportion of positive	Index	CV
1972	19	30	3	0.633	1.088	0.570
1973	14	28	3	0.500	0.261	0.641
1974	14	42	4	0.333	0.162	0.475
1975	24	42	4	0.571	0.314	0.413
1976	12	54	5	0.222	0.024	0.426
1977	21	57	5	0.368	0.766	0.470
1978	19	57	5	0.333	0.131	0.561
1979	16	93	5	0.172	0.051	0.407
1980	12	88	5	0.136	0.020	0.514
1981	6	78	5	0.076	0.009	0.657
1982	3	69	5	0.043	0.001	0.763
1983	0	85	5	0.000	n/a	n/a
1984	10	80	5	0.125	0.019	0.522
1985	15	85	5	0.176	0.026	0.367
1986	10	87	5	0.114	0.014	0.417
1987	3	82	5	0.036	0.006	0.703
1988	23	83	5	0.277	0.159	0.448
1989	8	79	5	0.101	0.021	0.726
1990	6	82	5	0.073	0.007	0.585
1991	17	78	5	0.217	0.041	0.392
1992	4	90	5	0.044	0.017	0.638
1993	1	87	5	0.011	n/a	n/a
1994	1	87	5	0.011	n/a	n/a
1995	5	74	5	0.067	0.019	0.711
1996	2	81	5	0.024	0.006	0.787
1997	2	82	5	0.024	0.004	0.807
1998	0	70	5	0.000	n/a	n/a
1999	9	56	5	0.160	0.059	0.588
2000	7	62	5	0.112	0.012	0.592
2001	2	74	5	0.027	0.001	0.825

Table (continued). Number of observations, number of positive observations, percent positive, DGLM index value, and jackknife (or borrowed) estimate of CV (two positive observations were necessary to develop a year covariate and associated CV).

Year	Number of positive	Sample size	Number locations with data	Proportion of positive	Index	CV
2002	6	75	5	0.080	0.012	0.531
2003	10	73	5	0.136	0.049	0.692
2004	2	65	5	0.030	0.002	0.759
2005	13	68	5	0.191	0.085	0.419
2006	1	68	5	0.014	n/a	n/a
2007	4	64	5	0.062	0.003	0.797
2008	3	73	5	0.041	0.004	0.691
2009	9	40	4	0.225	0.082	0.419
2010	13	82	4	0.158	0.055	0.450
2011	2	83	4	0.024	0.006	2.882
2012	2	65	4	0.030	0.055	0.777
2013	5	60	4	0.083	0.131	0.605
2014	1	46	3	0.021	n/a	n/a

Table 27 Summary of annual numbers of sampling trips, defined by port complex-day counts; fish measured for length compositions; and computed effective sample sizes for sexed fish from two commercial trawl fisheries. Effective sample sizes were calculated using Ian Stewart's method, and maximum effective size was set to be 400. Note that only annual samples with N fish greater than 30 were used in the assessment model.

	Trawl south			Trawl north		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1977				45	300	317.7
1978	56	963	395.4	81	583	400.0
1979	58	1085	400.0	40	170	63.5
1980	100	992	400.0	108	725	400.0
1981	77	631	400.0	93	792	400.0
1982	117	1492	400.0	117	1118	400.0
1983	116	1524	400.0	143	1146	400.0
1984	157	1799	400.0	100	890	400.0
1985	159	1151	400.0	97	593	400.0
1986	100	1891	400.0	74	543	400.0
1987	92	1748	400.0	87	975	400.0
1988	86	1180	400.0	67	522	400.0
1989	81	721	400.0	56	351	395.4
1990	96	1496	400.0	63	398	400.0
1991	89	1911	400.0	38	556	114.7
1992	64	1370	400.0	12	210	41.0
1993	46	1063	324.8	11	230	42.7
1994	16	313	59.2	14	272	51.5
1995	11	240	44.1	17	154	38.3
1996	23	349	71.2	6	59	14.1
1997	21	352	69.6	6	70	15.7
1998	19	281	57.8	7	106	21.6
1999	18	417	75.5	5	21	7.9
2000	4	53	11.3	5	65	14.0
2001	11	372	62.3	4	16	6.2
2002	14	160	36.1	6	107	20.8
2003	1	2	1.3			
2004	13	118	29.3			
2005	1	4	1.6	1	2	1.3
2006						
2007	3	10	4.4	2	2	2.3
2008	1	2	1.3	4	16	6.2
2009	2	2	2.3			
2010				2	6	2.8
2011						
2012	12	122	28.8			
2013	5	43	10.9	6	8	7.1
2014	1	25	4.5	5	5	5.7

Table 28 Summary of annual numbers of sampling trips, defined by port complex-day counts; fish measured for length compositions; and computed effective sample sizes for unsexed fish from two commercial trawl fisheries. Effective sample sizes were calculated using Ian Stewart's method, and maximum effective size was set to be 400. Note that only annual samples with N fish greater than 30 were used in the assessment model.

	Trawl south			Trawl north		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1977				1	4	1.6
1978	17	201	44.7			
1979	39	235	71.4	1	1	1.1
1980	6	9	7.2	18	73	28.1
1981	5	5	5.7	1	1	1.1
1982	1	1	1.1			
1983	4	85	15.7			
1984	7	111	22.3			
1985	5	26	8.6	1	3	1.4
1986	13	22	16.0			
1987	5	99	18.7			
1988	4	6	4.8			
1989	12	24	15.3			
1990	25	100	38.8			
1991	9	68	18.4			
1992	4	72	13.9			
1993	25	350	73.3			
1994	33	468	97.6	3	73	13.1
1995	28	352	76.6	1	1	1.1
1996	15	200	42.6	4	62	12.6
1997	27	567	105.2	1	15	3.1
1998	6	54	13.5			
1999	3	4	3.6	1	5	1.7
2000	5	37	10.1			
2001	10	158	31.8	1	16	3.2
2002	3	48	9.6	3	60	11.3
2003						
2004	2	5	2.7			
2005						
2006						
2007	1	1	1.1			
2008	1	1	1.1			
2009				1	16	3.2
2010				1	17	3.3
2011	4	30	8.1	3	14	4.9
2012	7	75	17.4	5	110	20.2
2013	9	125	26.3	4	147	24.3
2014	9	85	20.7	5	84	16.6

Table 29 Summary of annual numbers of sampling trips, defined by port complex-day counts; fish measured for length compositions; and computed effective sample sizes for sexed fish from commercial hook-and-line and set net fisheries. Effective sample sizes were calculated using Ian Stewart's method and maximum effective size was set to be 400. Note that only annual samples with N fish greater than 30 were used in the assessment model.

	Hook-and-line			Setnet		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1978				9	73	19.1
1980	7	50	13.9			
1983	5	55	12.6	9	60	17.3
1984	4	47	10.5	8	46	14.3
1985	10	94	23.0	110	847	400.0
1986	21	259	56.7	126	1260	400.0
1987	20	227	51.3	96	1049	400.0
1988	7	82	18.3	67	960	400.0
1989	12	112	27.5	85	1401	400.0
1990	5	68	14.4	75	916	400.0
1991	18	122	34.8	24	384	77.0
1992	29	342	76.2	50	1186	353.0
1993	26	295	66.7	23	447	84.7
1994	12	226	43.2	9	196	36.0
1995	6	90	18.4	7	204	35.2
1996	19	318	62.9	4	121	20.7
1997	13	265	49.6	3	84	14.6
1998	7	191	33.4	5	127	22.5
1999	6	98	19.5			
2000	6	44	12.1			
2001	8	152	29.0			
2006	6	35	10.8			

Table 30 Summary of annual numbers of sampling trips, defined by port complex-day counts; fish measured for length compositions; and computed effective sample sizes for unsexed fish from commercial hook-and-line and set net fisheries. Effective sample sizes were calculated using Ian Stewart's method and maximum effective size was set to be 400. Note that only annual samples with N fish greater than 30 were used in the assessment model.

	Hook-and-line			Setnet		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1979	20	541	94.7			
1980	5	183	30.3			
1981	12	260	47.9			
1982	12	244	45.7			
1983	5	113	20.6	15	338	61.6
1984	12	151	32.8	69	947	400.0
1985	11	131	29.1	100	1156	400.0
1986	16	245	49.8	25	372	76.3
1987	6	64	14.8	18	207	46.6
1988	6	80	17.0	19	252	53.8
1989	18	324	62.7	17	99	30.7
1990	8	89	20.3	17	40	22.5
1991	9	143	28.7	8	137	26.9
1992	38	375	89.8	13	163	35.5
1993	48	547	338.9	19	486	86.1
1994	41	347	88.9	32	675	125.2
1995	22	179	46.7	30	498	98.7
1996	40	473	105.3	22	233	54.2
1997	24	259	59.7	9	105	23.5
1998	21	306	63.2	7	112	22.5
2001	8	108	22.9			
2002	4	61	12.4			
2006	6	45	12.2			
2007	5	42	10.8			
2008	8	20	10.8			
2009	11	41	16.7			
2010	9	35	13.8			
2011	7	24	10.3			
2012	6	48	12.6			
2013	8	110	23.2			
2014	29	244	62.7			

Table 31 Summary of annual numbers of sampling trips, defined by month-site counts; fish measured for length compositions; and computed effective sample sizes for unsexed fish from two recreational fisheries. Effective sample sizes were calculated using Ian Stewart's method, and maximum effective size was set to be 400.

	Recreational south			Recreational central		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1980	494	2606	400	318	252	318
1981	388	2233	388	56	252	56
1982	332	1828	332	73	311	73
1983	134	706	134	79	359	79
1984	123	594	123	66	187	66
1985	311	1338	311	367	558	367
1986	220	1299	220	332	944	332
1987	39	132	39	52	225	52
1988	29	79	29	25	57	25
1989	98	490	98	33	119	33
1993	57	211	57	31	75	31
1994	80	377	80	27	57	27
1995	18	35	18	26	74	26
1996	41	116	41	65	244	65
1997	19	54	19	136	699	136
1998	44	106	44	70	296	70
1999	501	463	400	128	639	128
2000	325	525	325	62	272	62
2001	83	380	83	62	326	62
2002	311	726	311	30	179	30
2003	32	124	32			
2004	755	914	400	29	80	29
2005	812	1470	400	64	274	64
2006	911	1882	400	78	281	78
2007	1073	2148	400	332	266	332
2008	1059	1817	400	59	165	59
2009	953	2095	400	69	215	69
2010	960	1877	400	53	185	53
2011	1066	3250	400	353	187	353
2012	840	3812	400	52	148	52
2013	960	4235	400	36	67	36
2014	770	2901	400	45	111	45

Table 32 Summary of annual numbers of sampling trips, defined by month-site counts; fish measured for length compositions; and computed effective sample sizes for unsexed fish from two recreational fisheries. Effective sample sizes were calculated using Ian Stewart's method, and maximum effective size was set to be 400.

	CDFW early year			Mirror recreational south		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1975						400
1976						400
1977						400
1978						400
1986						400
1987						400
1988	131	1227	300			341
1989	163	1435	361			400
1990	58	976	193			
1991	59	871	179			
1992	161	1702	396			
1993	137	1159	297			
1994	111	721	210			
1995	121	750	225			
1996	105	580	185			
1997	122	982	258			
1998	65	433	125			

Table 33 Summary of annual numbers of sampling trips, defined by month-site counts; fish measured for length compositions; and computed effective sample sizes for unsexed fish from two recreational fisheries. Effective sample sizes were calculated using Ian Stewart's method, and maximum effective size was set to be 400.

	Recreational south			Recreational central		
Year	N sample	N fish	Effective sample size	N sample	N fish	Effective sample size
1980	494	2606	400	318	252	318
1981	388	2233	388	56	252	56
1982	332	1828	332	73	311	73
1983	134	706	134	79	359	79
1984	123	594	123	66	187	66
1985	311	1338	311	367	558	367
1986	220	1299	220	332	944	332
1987	39	132	39	52	225	52
1988	29	79	29	25	57	25
1989	98	490	98	33	119	33
1993	57	211	57	31	75	31
1994	80	377	80	27	57	27
1995	18	35	18	26	74	26
1996	41	116	41	65	244	65
1997	19	54	19	136	699	136
1998	44	106	44	70	296	70
1999	501	463	400	128	639	128
2000	325	525	325	62	272	62
2001	83	380	83	62	326	62
2002	311	726	311	30	179	30
2003	32	124	32			
2004	755	914	400	29	80	29
2005	812	1470	400	64	274	64
2006	911	1882	400	78	281	78
2007	1073	2148	400	332	266	332
2008	1059	1817	400	59	165	59
2009	953	2095	400	69	215	69
2010	960	1877	400	53	185	53
2011	1066	3250	400	353	187	353
2012	840	3812	400	52	148	52
2013	960	4235	400	36	67	36
2014	770	2901	400	45	111	45

Table 34 Summary of jitter analysis of the base model to test the model stability.

Variable	Value
Minimum likelihood	2983.19
Maximum likelihood	2983.69
Likelihood difference between min. and max. likelihood	0.5
Minimum MGC (maximum gradient component)	1.43E-05
Maximum MGC (maximum gradient component)	9.97E-05
Stock depletion at min likelihood (%)	36.7752
Stock depletion at max likelihood (%)	36.5935
Depletion difference (%) between min and max likelihood	-0.1817
Number of jitter runs	30
Proportion of runs at minimum likelihood	0.5
Proportion of runs at maximum likelihood	0.03333

Table 35: List of parameters used in the base model, including bounds (minimum and maximum), estimation phase (negative values indicate not estimated), status (indicates if parameters are near bounds), estimated values and standard deviations (SD). Recruitment deviations are actively estimated parameters but are not listed here (plotted in figures). Bold parameters are exponential offset parameters from females.

No.	Parameter label	Minimum	Maximum	Phase	Active count	Status	Value	SD
1	NatM_p_1_Fem_GP_1	0.05	0.4	2	1	OK	0.178	0.013
2	L_at_Amin_Fem_GP_1	1	45	2	2	OK	18.377	0.355
3	L_at_Amax_Fem_GP_1	60	80	2	3	OK	67.34	0.659
4	VonBert_K_Fem_GP_1	0.05	0.25	2	4	OK	0.226	0.007
5	CV_young_Fem_GP_1	0.05	0.25	6	5	OK	0.118	0.006
6	CV_old_Fem_GP_1	0.05	0.25	6	6	OK	0.077	0.004
7	**NatM_p_1_Mal_GP_1**	**-0.5**	**0.5**	**-2**			**0**	
8	**L_at_Amin_Mal_GP_1**	**-1**	**1**	**-2**			**0**	
9	**L_at_Amax_Mal_GP_1**	**-1**	**1**	**2**	**7**	**OK**	**-0.083**	**0.01**
10	**VonBert_K_Mal_GP_1**	**-1**	**1**	**2**	**8**	**OK**	**0.081**	**0.031**
11	**CV_young_Mal_GP_1**	**-1**	**1**	**6**	**9**	**OK**	**-0.074**	**0.06**
12	**CV_old_Mal_GP_1**	**-1**	**1**	**6**	**10**	**OK**	**0.003**	**0.06**
13	Wtlen_1_Fem	-3	3	-3			0	
14	Wtlen_2_Fem	-3	4	-3			3.114	
15	Mat50%_Fem	30	60	-3			37.7	
16	Mat_slope_Fem	-3	3	-3			-0.334	
17	Eggs/kg_inter_Fem	-3	300	-3			254.9	
18	Eggs/kg_slope_wt_Fem	-3	30	-3			20	
19	Wtlen_1_Mal	-3	3	-3			0	
20	Wtlen_2_Mal	-3	4	-3			3.114	
21	SR_LN(R0)	6	15	1	11	OK	8.769	0.164
22	SR_BH_steep	0.21	0.99	-2			0.773	

Table (continued): List of parameters used in the base model, including bounds (minimum and maximum), estimation phase (negative values indicate not estimated), status (indicates if parameters are near bounds), and estimated values and standard deviations (SD). Recruitment deviations are actively estimated parameters but are not listed here (plotted in figures).

No.	Parameter label	Minimum	Maximum	Phase	Active count	Status	Value	SD
23	SR_sigmaR	0	2	-4			1	
24	InitF_1TrawlSouth	0	0.1	-1			0	
25	InitF_2HL	0.0001	0.05	1	83	OK	0.006	0.001
26	InitF_3Setnet	0	0.1	-1			0	
27	InitF_4RecSouth	0	0.1	-1			0	
28	InitF_5RecCentral	0	0.1	-1			0	
29	InitF_6TrawlNorth	0	0.1	-1			0	
30	Q_extraSD_1_TrawlSouth	0.0001	1	4	84	OK	0.045	0.077
31	Q_extraSD_4_RecSouth	0.0001	1	4	85	OK	0.328	0.104
32	Q_extraSD_5_RecCentral	0.0001	1	5	86	OK	0.397	0.106
33	Q_extraSD_7_CalCOFI	0.0001	1	4	87	OK	0.141	0.046
34	Q_extraSD_9_CDFWEarlyOB	0.0001	1	4	88	OK	0.262	0.09
35	Q_extraSD_10_NWFSCHook	0.0001	1	4	89	OK	0.228	0.067
36	Q_extraSD_11_NWFSCTrawl	0.0001	1	4	90	OK	0.014	0.108
37	Q_extraSD_12_Juvenile	0.0001	1	4	91	OK	0.334	0.153
38	Q_extraSD_14_PPIndex	0.0001	1	4	92	OK	0.387	0.118
39	Q_extraSD_17_RecSouthOB	0.0001	1	4	93	OK	0.272	0.08
40	Q_extraSD_18_RecCentralOB	0.0001	1	4	94	OK	0.254	0.101
41	SizeSel_1P_1_TrawlSouth	16	60	3	95	OK	43.58	1.006
42	SizeSel_1P_2_TrawlSouth	-20	1	4	96	OK	-11.864	122.792
43	SizeSel_1P_3_TrawlSouth	1	10	4	97	OK	4.429	0.169
44	SizeSel_1P_4_TrawlSouth	-1	9	4	98	OK	4.461	0.35

Table (continued): List of parameters used in the base model, including bounds (minimum and maximum), estimation phase (negative values indicate not estimated), status (indicates if parameters are near bounds), and estimated values and standard deviations (SD). Recruitment deviations are actively estimated parameters but are not listed here (plotted in figures).

No.	Parameter label	Minimum	Maximum	Phase	Active count	Status	Value	SD
45	SizeSel_1P_5_TrawlSouth	-30	0	4	99	OK	-16.213	224.045
46	SizeSel_1P_6_TrawlSouth	-5	5	4	100	OK	-1.435	0.342
47	SizeSel_2P_1_HL	16	60	3	101	OK	50.07	1.691
48	SizeSel_2P_2_HL	-20	0	3	102	OK	-11.301	145.083
49	SizeSel_2P_3_HL	1	12	3	103	OK	4.844	0.259
50	SizeSel_2P_4_HL	-1	9	3	104	OK	4.013	0.759
51	SizeSel_2P_5_HL	-15	0	3	105	OK	-7.73	11.299
52	SizeSel_2P_6_HL	-5	5	3	106	OK	-0.679	0.554
53	SizeSel_3P_1_Setnet	16	60	3	107	OK	47.627	1.091
54	SizeSel_3P_2_Setnet	-20	0	3	108	OK	-12.152	121.145
55	SizeSel_3P_3_Setnet	1	10	3	109	OK	3.615	0.312
56	SizeSel_3P_4_Setnet	-1	9	3	110	OK	3.892	0.479
57	SizeSel_3P_5_Setnet	-10	3	3	111	OK	-6.349	1.529
58	SizeSel_3P_6_Setnet	-5	5	3	112	OK	-1.813	0.505
59	SizeSel_4P_1_RecSouth	16	60	3	113	OK	37.874	1.068
60	SizeSel_4P_2_RecSouth	-20	0	3	114	OK	-10.898	161.492
61	SizeSel_4P_3_RecSouth	1	10	3	115	OK	4.651	0.166
62	SizeSel_4P_4_RecSouth	-1	9	3	116	OK	5.58	0.212
63	SizeSel_4P_5_RecSouth	-10	2	3	117	OK	-6.987	2.25
64	SizeSel_4P_6_RecSouth	-10	9	3	118	OK	-3.566	1.187
65	SizeSel_5P_1_RecCentral	16	60	3	119	OK	46.921	2.349
66	SizeSel_5P_2_RecCentral	-20	0	3	120	OK	-11.254	146.445

Table (continued): List of parameters used in the base model, including bounds (minimum and maximum), estimation phase (negative values indicate not estimated), status (indicates if parameters are near bounds), and estimated values and standard deviations (SD). Recruitment deviations are actively estimated parameters but are not listed here (plotted in figures).

No.	Parameter label	Minimum	Maximum	Phase	Active count	Status	Value	SD
67	SizeSel_5P_3_RecCentral	1	10	3	121	OK	5.523	0.251
68	SizeSel_5P_4_RecCentral	-1	9	3	122	OK	3.787	1.324
69	SizeSel_5P_5_RecCentral	-10	2	3	123	OK	-5.679	1.8
70	SizeSel_5P_6_RecCentral	-10	9	3	124	OK	0.238	0.479
71	SizeSel_6P_1_TrawlNorth	16	60	3	125	OK	45.38	1.156
72	SizeSel_6P_2_TrawlNorth	-5	5	4	126	OK	-0.964	0.564
73	SizeSel_6P_3_TrawlNorth	1	15	4	127	OK	3.761	0.262
74	SizeSel_6P_4_TrawlNorth	-5	5	4	128	OK	3.021	1.444
75	SizeSel_6P_5_TrawlNorth	-15	0	4	129	OK	-9.02	5.591
76	SizeSel_6P_6_TrawlNorth	-10	10	4	130	OK	0.282	0.471
77	SizeSel_8P_1_Triennial	16	60	2	131	OK	27.611	2.388
78	SizeSel_8P_2_Triennial	-20	0	2	132	OK	-12.31	117.597
79	SizeSel_8P_3_Triennial	1	10	2	133	OK	1.832	1.744
80	SizeSel_8P_4_Triennial	-20	3	2	134	OK	-8.5	257.144
81	SizeSel_8P_5_Triennial	-999	1	-4			-999	
82	SizeSel_8P_6_Triennial	-5	5	2	135	OK	-0.926	0.677
83	SizeSel_9P_1_CDFWEarlyOB	-1	10	-3			-1	
84	SizeSel_9P_2_CDFWEarlyOB	-1	10	-3			-1	
85	SizeSel_10P_1_NWFSCHook	16	60	3	136	OK	44.76	3.47
86	SizeSel_10P_2_NWFSCHook	-5	5	3	137	OK	-1.533	1.712
87	SizeSel_10P_3_NWFSCHook	-1	10	3	138	OK	4.734	0.438
88	SizeSel_10P_4_NWFSCHook	-1	9	3	139	OK	4.332	1.513

Table (continued): List of parameters used in the base model, including bounds (minimum and maximum), estimation phase (negative values indicate not estimated), status (indicates if parameters are near bounds), and estimated values and standard deviations (SD). Recruitment deviations are actively estimated parameters but are not listed here (plotted in figures).

No.	Parameter label	Minimum	Maximum	Phase	Active count	Status	Value	SD
89	SizeSel_10P_5_NWFSCHook	-15	-5	3	140	OK	-12.05	54.771
90	SizeSel_10P_6_NWFSCHook	-5	5	3	141	OK	-2.026	1.468
91	SizeSel_11P_1_NWFSCTrawl	13	60	3	142	OK	23.212	0.839
92	SizeSel_11P_2_NWFSCTrawl	-20	0	3	143	OK	-11.613	135.026
93	SizeSel_11P_3_NWFSCTrawl	-5	15	3	144	OK	-4.71	7.632
94	SizeSel_11P_4_NWFSCTrawl	-1	9	3	145	OK	6.528	0.919
95	SizeSel_11P_5_NWFSCTrawl	-15	5	3	146	OK	0.482	0.88
96	SizeSel_11P_6_NWFSCTrawl	-5	5	3	147	OK	-2.255	2.542
97	SizeSel_15P_1_Free1	-1	20	-3			-1	
98	SizeSel_15P_2_Free1	-1	20	-3			-1	
99	SizeSel_16P_1_MirrorRecS	-1	20	-3			-1	
100	SizeSel_16P_2_MirrorRecS	-1	20	-3			-1	
101	SizeSel_17P_1_RecSouthOB	-1	20	-3			-1	
102	SizeSel_17P_2_RecSouthOB	-1	20	-3			-1	
103	SizeSel_18P_1_RecCentralOB	-1	20	-3			-1	
104	SizeSel_18P_2_RecCentralOB	-1	20	-3			-1	
105	SizeSel_1P_1_TrawlSouth_BLK1	16	70	2	148	OK	59.865	6.167
106	SizeSel_1P_3_TrawlSouth_BLK1	1	10	4	149	OK	5.578	0.538
107	SizeSel_1P_4_TrawlSouth_BLK1	-1	9	4	150	OK	4.128	7.839
108	SizeSel_1P_6_TrawlSouth_BLK1	-5	5	4	151	OK	0.393	5.177
109	SizeSel_4P_1_RecSouth_BLK1	16	60	2	152	OK	38.2	0.857
110	SizeSel_4P_3_RecSouth_BLK1	1	15	4	153	OK	4.305	0.16

Table (continued): List of parameters used in the base model, including bounds (minimum and maximum), estimation phase (negative values indicate not estimated), status (indicates if parameters are near bounds), and estimated values and standard deviations (SD). Recruitment deviations are actively estimated parameters but are not listed here (plotted in figures).

No.	Parameter label	Minimum	Maximum	Phase	Active count	Status	Value	SD
111	SizeSel_4P_4_RecSouth_BLK1	-5	5	4	154	OK	4.769	0.185
112	SizeSel_4P_6_RecSouth_BLK1	-10	10	4	155	OK	-3.868	0.704
113	SizeSel_5P_1_RecCentral_BLK1	16	60	2	156	OK	44.168	2.436
114	SizeSel_5P_3_RecCentral_BLK1	1	10	4	157	OK	4.66	0.379
115	SizeSel_5P_4_RecCentral_BLK1	-1	9	4	158	OK	4.357	0.999
116	SizeSel_5P_6_RecCentral_BLK1	-5	5	4	159	OK	-0.889	0.591
117	SizeSel_6P_1_TrawlNorth_BLK1	16	60	2	160	OK	46.789	9.295
118	SizeSel_6P_3_TrawlNorth_BLK1	1	15	4	161	OK	4.893	1.166
119	SizeSel_6P_4_TrawlNorth_BLK1	-5	5	4	162	OK	-0.027	113.354
120	SizeSel_6P_6_TrawlNorth_BLK1	-10	10	4	163	OK	8.452	31.433
121	SizeSel_8P_1_Triennial_BLK2	16	60	2	164	OK	22.93	0.136
122	SizeSel_8P_3_Triennial_BLK2	1	15	4	165	OK	1.216	0.806
123	SizeSel_8P_4_Triennial_BLK2	-15	5	4	166	OK	-7.552	46.594
124	SizeSel_8P_6_Triennial_BLK2	-10	10	4	167	OK	-1.929	0.57

Table 36: Time series of estimated recruitment deviations and associated standard deviation (SD) from the base model.

Year	Recruitment deviation	SD	Year	Recruitment deviation	SD
1954	0.0519	0.9063	1985	0.0846	0.1928
1955	-0.1069	0.9017	1986	-0.6327	0.2502
1956	-0.1047	0.9134	1987	-0.4195	0.2182
1957	0.1553	1.0120	1988	1.0277	0.1027
1958	0.4388	1.1598	1989	-0.3349	0.2530
1959	0.5555	1.2655	1990	-0.4477	0.2260
1960	0.5575	1.3145	1991	-0.0778	0.1874
1961	0.4968	1.2841	1992	-0.3329	0.2588
1962	0.6382	1.4262	1993	-0.7308	0.3646
1963	0.5897	1.4749	1994	-0.5959	0.3013
1964	0.5906	1.3561	1995	-1.0128	0.3223
1965	2.0962	0.6816	1996	-1.0728	0.3145
1966	0.4350	1.2027	1997	-0.7865	0.2594
1967	0.4710	1.1677	1998	-1.6198	0.4730
1968	0.6820	1.2749	1999	1.1694	0.1414
1969	0.8726	1.4336	2000	-0.6455	0.4279
1970	0.9138	1.0782	2001	-1.0639	0.3828
1971	0.0880	0.9147	2002	-1.2329	0.3321
1972	1.2001	0.4180	2003	-0.0495	0.1694
1973	1.5726	0.2438	2004	-0.9783	0.2641
1974	1.3384	0.2129	2005	-0.5385	0.1905
1975	0.6071	0.2485	2006	-1.0187	0.2475
1976	-0.9750	0.4305	2007	-1.0755	0.2303
1977	2.1224	0.1389	2008	-1.2692	0.2592
1978	1.7898	0.1867	2009	-0.5264	0.2041
1979	0.2753	0.3091	2010	0.4848	0.1747
1980	-0.1023	0.3039	2011	0.4445	0.2218
1981	-0.8625	0.3550	2012	-0.0147	0.2866
1982	-1.6881	0.4540	2013	1.7816	0.2671
1983	-1.3287	0.3591	2014	-0.4022	0.4518
1984	1.3864	0.0939			

Table 37: Time series of estimated key summary outputs from the base model.

No.	Age 1+ biomass (mt)	Spawning output (10^6 eggs)	Stock depletion (%)	Age-0 recruits	Total catch (mt)l	SPR (%)	Relative exploitation rate (%)
1892	43971	6871	96.9	6414	167	96.7	0.4
1893	43955	6869	96.9	6414	158	96.8	0.4
1894	43947	6868	96.9	6414	148	97.0	0.3
1895	43947	6868	96.9	6414	139	97.2	0.3
1896	43955	6870	96.9	6414	131	97.4	0.3
1897	43969	6872	97.0	6414	123	97.5	0.3
1898	43989	6875	97.0	6415	116	97.7	0.3
1899	44014	6879	97.1	6415	108	97.8	0.2
1900	44045	6884	97.1	6415	119	97.6	0.3
1901	44062	6887	97.2	6415	131	97.4	0.3
1902	44064	6887	97.2	6416	142	97.2	0.3
1903	44054	6886	97.2	6415	154	96.9	0.3
1904	44032	6883	97.1	6415	165	96.7	0.4
1905	44000	6878	97.0	6415	176	96.5	0.4
1906	43958	6871	96.9	6414	188	96.2	0.4
1907	43908	6863	96.8	6414	199	96.0	0.5
1908	43851	6854	96.7	6413	210	95.8	0.5
1909	43788	6844	96.6	6412	237	95.3	0.5
1910	43704	6830	96.4	6411	263	94.8	0.6
1911	43602	6813	96.1	6410	289	94.2	0.7
1912	43482	6794	95.9	6409	316	93.7	0.7
1913	43346	6772	95.5	6407	342	93.2	0.8
1914	43197	6747	95.2	6405	368	92.7	0.9
1915	43036	6721	94.8	6404	395	92.2	0.9
1916	42864	6692	94.4	6401	474	90.5	1.1
1917	42626	6654	93.9	6399	747	85.5	1.8
1918	42131	6576	92.8	6393	799	84.4	1.9
1919	41620	6494	91.6	6386	529	89.2	1.3
1920	41422	6459	91.1	6384	550	88.7	1.3
1921	41233	6426	90.7	6381	463	90.4	1.1
1922	41160	6410	90.4	6380	417	91.3	1.0
1923	41151	6406	90.4	6379	489	89.9	1.2
1924	41080	6393	90.2	6378	443	90.8	1.1
1925	41068	6389	90.1	6378	506	89.7	1.2
1926	40999	6377	90.0	6377	711	85.7	1.7

Table (continued): Time series of estimated key summary outputs from the base model.

Year	Age 1+ biomass (mt)	Spawning output (10^6 eggs)	Stock depletion (%)	Age-0 recruits	Total catch (mt)l	SPR (%)	Relative exploitation rate (%)
1927	40728	6335	89.4	6374	610	87.4	1.5
1928	40574	6309	89.0	6372	639	86.7	1.6
1929	40402	6282	88.6	6369	598	87.5	1.5
1930	40286	6262	88.3	6368	715	85.3	1.8
1931	40065	6226	87.8	6365	689	85.9	1.7
1932	39893	6196	87.4	6362	556	88.3	1.4
1933	39874	6191	87.3	6362	429	90.7	1.1
1934	39991	6207	87.6	6363	494	89.4	1.2
1935	40042	6215	87.7	6364	534	88.7	1.3
1936	40050	6216	87.7	6364	632	86.8	1.6
1937	39956	6201	87.5	6362	589	87.5	1.5
1938	39908	6194	87.4	6362	461	90.0	1.2
1939	39994	6206	87.6	6363	373	91.9	0.9
1940	40168	6233	87.9	6365	383	91.8	1.0
1941	40324	6257	88.3	6367	310	93.3	0.8
1942	40545	6291	88.8	6370	127	97.2	0.3
1943	40935	6353	89.6	6375	300	93.8	0.7
1944	41129	6384	90.1	6378	748	85.6	1.8
1945	40862	6342	89.5	6374	1430	74.5	3.5
1946	39928	6193	87.4	6362	891	82.3	2.2
1947	39576	6135	86.6	6357	897	82.2	2.3
1948	39253	6080	85.8	6352	772	83.6	2.0
1949	39074	6051	85.4	6349	834	82.2	2.1
1950	38845	6015	84.9	6346	1222	74.9	3.1
1951	38226	5921	83.5	6338	1764	65.5	4.6
1952	37070	5745	81.1	6321	1973	60.4	5.3
1953	35722	5541	78.2	6300	2281	54.4	6.4
1954	34102	5293	74.7	6607	2411	50.4	7.1
1955	32451	5032	71.0	5609	3062	40.1	9.4
1956	30126	4683	66.1	5580	3680	31.4	12.2
1957	27164	4246	59.9	7158	3585	29.7	13.2
1958	24562	3806	53.7	9377	3588	26.8	14.6
1959	22602	3386	47.8	10372	2855	32.1	12.6
1960	22240	3172	44.8	10295	2449	38.6	11.0
1961	23064	3170	44.7	9688	1935	50.4	8.4

Table (continued): Time series of estimated key summary outputs from the base model.

Year	Age 1+ biomass (mt)	Spawning output (10^6 eggs)	Stock depletion (%)	Age-0 recruits	Total catch (mt)l	SPR (%)	Relative exploitation rate (%)
1962	24898	3382	47.7	11264	1743	58.1	7.0
1963	27374	3709	52.3	10868	2021	57.1	7.4
1964	29816	4042	57.0	10997	1533	67.5	5.1
1965	32876	4495	63.4	50176	1753	66.4	5.3
1966	40400	4955	69.9	9629	3428	50.0	8.5
1967	46818	5524	77.9	10087	5336	43.8	11.4
1968	50478	6594	93.0	12646	3410	63.0	6.8
1969	54368	7617	107.5	15465	2359	72.9	4.3
1970	58217	8332	117.6	16210	2858	67.7	4.9
1971	60940	8773	123.8	6484	2519	70.5	4.1
1972	62554	9212	130.0	13710	3661	60.3	5.9
1973	62232	9390	132.5	19920	7207	36.5	11.6
1974	58460	8767	123.7	15699	9005	24.7	15.4
1975	53121	7852	110.8	7503	6411	33.1	12.1
1976	50005	7491	105.7	1537	6186	34.3	12.4
1977	45606	7148	100.9	33921	4865	39.9	10.7
1978	44778	6729	94.9	24212	4382	40.6	9.8
1979	46677	6358	89.7	5301	6172	31.1	13.2
1980	46562	6423	90.6	3637	5543	39.6	11.9
1981	45449	6741	95.1	1707	5812	39.4	12.8
1982	41823	6562	92.6	746	6772	29.8	16.2
1983	35154	5775	81.5	1057	5770	29.1	16.4
1984	28328	4819	68.0	15696	4491	27.4	15.9
1985	24073	3910	55.2	4169	2811	31.4	11.7
1986	22218	3366	47.5	1994	3168	24.5	14.3
1987	20193	3118	44.0	2440	2693	33.0	13.3
1988	18476	2953	41.7	10287	2346	38.0	12.7
1989	17663	2707	38.2	2596	2808	28.7	15.9
1990	16332	2391	33.7	2267	2699	26.7	16.5
1991	14964	2242	31.6	3241	1739	40.7	11.6
1992	14375	2204	31.1	2503	1857	38.3	12.9
1993	13402	2063	29.1	1658	1635	39.2	12.2
1994	12378	1925	27.2	1869	1341	40.8	10.8
1995	11458	1811	25.5	1214	768	57.5	6.7
1996	10938	1746	24.6	1134	578	62.5	5.3

Table (continued): Time series of estimated key summary outputs from the base model.

Year	Age 1+ biomass (mt)	Spawning output (10^6 eggs)	Stock depletion (%)	Age-0 recruits	Total catch (mt)l	SPR (%)	Relative exploitation rate (%)
1997	10452	1689	23.8	1497	509	64.1	4.9
1998	9964	1618	22.8	644	215	81.5	2.2
1999	9653	1575	22.2	10398	220	79.1	2.3
2000	10387	1527	21.5	1680	164	84.7	1.6
2001	11448	1554	21.9	1111	141	89.3	1.2
2002	12469	1781	25.1	971	144	91.0	1.2
2003	13132	1995	28.1	3253	17	98.8	0.1
2004	13778	2120	29.9	1302	83	93.9	0.6
2005	14075	2171	30.6	2031	230	82.7	1.6
2006	14041	2194	31.0	1259	91	93.0	0.6
2007	13954	2206	31.1	1191	107	90.8	0.8
2008	13672	2191	30.9	980	69	93.7	0.5
2009	13267	2153	30.4	2053	85	92.0	0.6
2010	12850	2085	29.4	5605	73	92.2	0.6
2011	12951	2009	28.4	5341	116	88.1	0.9
2012	13600	1982	28.0	3364	142	89.3	1.0
2013	14536	2078	29.3	20483	150	91.1	1.0
2014	17622	2265	32.0	2497	114	94.6	0.6
2015	21032	2607	36.8	5709			

Table 38: Summaries of key assessment outputs and likelihood values from selected likelihood profile runs on steepness. Note that male growth parameters are exponential offsets from female parameters, and depletion and SPR ratio are for the year of 2015.

	h = 0.350	h = 0.500	h = 0.650	h = 0.775	h = 0.850	h = 0.975
M (both sexes)	0.204	0.191	0.182	0.179	0.179	0.180
Steepness	**0.350**	**0.500**	**0.650**	**0.775**	**0.850**	**0.975**
lnR0	9.396	9.062	8.866	8.783	8.758	8.742
Depletion (%)	23.676	28.733	33.563	37.326	39.35	42.218
SPR ratio	0.228	0.232	0.225	0.215	0.208	0.198
Female Lmin	18.339	18.375	18.383	18.384	18.382	18.378
Female Lmax	67.433	67.354	67.325	67.326	67.333	67.348
Female K	0.226	0.226	0.226	0.226	0.226	0.226
Male Lmin (offset)	0	0	0	0	0	0
Male Lmax (offset)	-0.085	-0.084	-0.083	-0.083	-0.083	-0.083
Male K (offset)	0.085	0.083	0.082	0.081	0.081	0.082
Negative log-likelihood						
TOTAL	2984.21	2981.56	2982.04	2983.1	2983.81	2985.35
Catch	0	0	0	0	0	0
Equil_catch	0	0	0	0	0	0
Survey	-23.408	-25.48	-25.964	-25.643	-25.266	-24.508
Length_comp	704.135	704.829	705.561	705.948	706.082	706.189
Age_comp	2277.12	2276.59	2276.28	2276.04	2275.92	2275.74
Recruitment	22.963	23.933	25.395	26.45	26.945	27.549
Forecast_Recruitment	0.011	0.049	0.072	0.079	0.08	0.081
Parm_priors	3.365	1.613	0.675	0.201	0.031	0.271
Parm_softbounds	0.019	0.023	0.024	0.024	0.024	0.024

Table 39: Summaries of key assessment outputs and likelihood values from selected likelihood profile runs on female natural mortality. Note that male growth parameters are exponential offsets from female parameters, and depletion and SPR ratio are for the year of 2015.

	M = 0.10	M = 0.15	M = 0.18	M = 0.20	M = 0.23	M = 0.27
M (both sexes)	**0.10**	**0.15**	**0.18**	**0.2**	**0.23**	**0.27**
Steepness	0.773	0.773	0.773	0.773	0.773	0.773
lnR0	8.032	8.49	8.791	9.007	9.372	10.027
Depletion (%)	23.128	31.81	37.146	40.64	44.924	49.785
SPR ratio	0.42	0.28	0.215	0.179	0.134	0.079
Female Lmin	18.462	18.409	18.375	18.364	18.344	18.343
Female Lmax	66.975	67.311	67.338	67.292	67.194	67.007
Female K	0.23	0.227	0.226	0.226	0.226	0.227
Male Lmin (offset)	0	0	0	0	0	0
Male Lmax (offset)	-0.074	-0.08	-0.083	-0.084	-0.086	-0.088
Male K (offset)	0.056	0.074	0.081	0.086	0.092	0.099
Negative log-likelihood						
TOTAL	3006.9	2985.65	2983.21	2984.17	2988.91	2999.40
Catch	0	0	0	0	0	0
Equil_catch	0	0	0	0	0	0
Survey	-19.317	-26.459	-25.661	-24.109	-21.048	-16.192
Length_comp	706.836	705.345	706.037	706.681	708.217	711.232
Age_comp	2287.96	2279.08	2276.12	2275.17	2275.5	2278.21
Recruitment	31.164	27.526	26.407	25.965	25.509	25.022
Forecast_Recruitment	0.111	0.094	0.08	0.073	0.068	0.068
Parm_priors	0.119	0.044	0.211	0.365	0.632	1.029
Parm_softbounds	0.02	0.018	0.018	0.024	0.025	0.026

Table 40: Summaries of key assessment outputs and likelihood values from selected likelihood profile runs on virgin recruitment (lnR0). Note that male growth parameters are exponential offsets from female parameters, and depletion and SPR ratio are for the year of 2015.

	lnR0 = 8.2	lnR0 = 8.4	lnR0 = 8.6	lnR0 = 8.75	lnR0 = 9.0	lnR0 = 9.6
M (both sexes)	0.178	0.178	0.178	0.178	0.178	0.178
Steepness	0.773	0.773	0.773	0.773	0.773	0.773
lnR0	**8.200**	**8.400**	**8.600**	**8.750**	**9.000**	**9.600**
Depletion (%)	29.911	31.412	33.741	36.339	43.73	55.534
SPR ratio	0.466	0.367	0.282	0.226	0.148	0.068
Female Lmin	18.473	18.443	18.409	18.381	18.323	18.225
Female Lmax	67.266	67.237	67.267	67.329	67.532	67.846
Female K	0.226	0.226	0.226	0.226	0.226	0.228
Male Lmin (offset)	0	0	0	0	0	0
Male Lmax (offset)	-0.082	-0.082	-0.082	-0.083	-0.084	-0.081
Male K (offset)	0.078	0.078	0.08	0.081	0.081	0.07
Negative log-likelihood						
TOTAL	3003.4	2991.9	2985.06	2983.22	2986.08	3002.66
Catch	0	0	0	0	0	0
Equil_catch	0	0	0	0	0	0
Survey	-20.938	-25.859	-27.157	-26.059	-20.184	-5.024
Length_comp	700.95	702.83	704.692	705.804	707.911	711.595
Age_comp	2281.14	2279.67	2277.7	2276.42	2274.86	2276.67
Recruitment	41.886	34.91	29.503	26.758	23.228	19.19
Forecast_Recruitment	0.148	0.131	0.106	0.084	0.042	0.016
Parm_priors	0.196	0.196	0.196	0.196	0.196	0.196
Parm_softbounds	0.017	0.018	0.018	0.018	0.019	0.021

Table 41: Summaries of key assessment outputs and likelihood values from sensitivity runs with four different data-weighting methods. Note that likelihood values are not comparable because different data-weighting methods are used, and they are listed here for references only. Also note that male growth parameters are exponential offsets from female parameters, and depletion and SPR ratio are for the year of 2015. The base model used Francis weight for the length composition data and harmonic mean weight for the conditional age-at-length data.

Weighting method	Default weight	Harmonic mean weight	Francis weight	Base
M (both sexes)	0.201	0.198	0.168	0.178
Steepness	0.773	0.773	0.773	0.773
lnR0	8.907	8.862	8.611	8.76861
Depletion (%)	53.2	47.9	34.4	36.8
SPR ratio	0.105	0.144	0.268	0.21931
Female Lmin	17.49	17.307	17.727	18.3773
Female Lmax	68.087	67.685	67.877	67.3399
Female K	0.22	0.221	0.218	0.226336
Male Lmin (offset)	0	0	0	0
Male Lmax (offset)	-0.105	-0.097	-0.079	-0.0829
Male K (offset)	0.12	0.099	0.063	0.080771
Negative log-likelihood				
TOTAL	14021.3	4863.89	2097.65	2983.19
Catch	0	0	0	3.24E-10
Equil_catch	0	0	0	7.79E-14
Survey	4.379	-6.927	-25.866	-25.7921
Length_comp	6713.95	2457.91	665.182	705.959
Age_comp	7264.59	2378.93	1429.45	2276.26
Recruitment	37.589	33.442	28.722	26.4684
Forecast_Recruitment	0.412	0.152	0.011	0.080897
Parm_priors	0.375	0.348	0.133	0.196165
Parm_softbounds	0.028	0.025	0.018	0.018405

Table 42: Summaries of key assessment outputs and likelihood values from sensitivity analysis on four different maturity functions (see Figure 18). Note that male growth parameters are exponential offsets from female parameters, and depletion and SPR ratio are for the year of 2015.

Index weighting	Base	Sensitivity 1 maturity (mature younger)	Maturity function used in 2009 assessment	Sensitivity 2 maturity (mature older)
M (both sexes)	0.178	0.178	0.178	0.178
Steepness	0.773	0.773	0.773	0.773
lnR0	8.769	8.769	8.773	8.777
Depletion (%)	36.775	36.985	35.375	34.7016
SPR ratio	0.219	0.219	0.221	0.222335
Female Lmin	18.377	18.377	18.378	18.3774
Female Lmax	67.34	67.341	67.339	67.3405
Female K	0.226	0.226	0.226	0.226392
Male Lmin (offset)	0	0	0	0
Male Lmax (offset)	-0.083	-0.083	-0.083	-0.08289
Male K (offset)	0.081	0.081	0.081	0.080594
Negative log-likelihood				
TOTAL	2983.19	2983.19	2983.41	2983.55
Catch	0	0	0	3.21E-10
Equil_catch	0	0	0	9.32E-14
Survey	-25.792	-25.784	-25.637	-25.5191
Length_comp	705.959	705.949	706.029	706.059
Age_comp	2276.26	2276.27	2276.21	2276.19
Recruitment	26.468	26.465	26.506	26.53
Forecast_Recruitment	0.081	0.081	0.08	0.080304
Parm_priors	0.196	0.196	0.197	0.197784
Parm_softbounds	0.018	0.018	0.018	0.018411

Table 43: Summaries of key assessment outputs and likelihood values from sensitivity analysis on time blocks (from 2003 to 2014) on selectivity functions for four fisheries Note that likelihood values are not comparable because different numbers of parameters are estimated, and they are listed here for references only.

Index weighting	Base	No time blocks on selectivity
M (both sexes)	0.178	0.187
Steepness	0.773	0.773
lnR0	8.769	8.886
Depletion (%)	36.775	39.712
SPR ratio	0.219	0.207
Female Lmin	18.377	18.373
Female Lmax	67.34	67.219
Female K	0.226	0.227
Male Lmin (offset)	0	0
Male Lmax (offset)	-0.083	-0.083
Male K (offset)	0.081	0.082
No. parameter	167	151
Negative log-likelihood		
TOTAL	2983.19	3028.02
Catch	0	0
Equil_catch	0	0
Survey	-25.792	-26.185
Length_comp	705.959	752.269
Age_comp	2276.26	2276.11
Recruitment	26.468	25.465
Forecast_Recruitment	0.081	0.081
Parm_priors	0.196	0.263
Parm_softbounds	0.018	0.013

Table 44: Summaries of key assessment outputs and likelihood values from retrospective analysis from all data to four years of less data. Note that likelihood values are not comparable because different data are used, and they are listed here for references only. Also note that male growth parameters are exponential offsets from female parameters, and depletion and SPR ratio are for year of 2015.

Year of data available	Base (all data)	One year less data	Two year less data	Three year less data	Four year less data
M (both sexes)	0.178	0.177	0.176	0.176	0.177
Steepness	0.773	0.773	0.773	0.773	0.773
lnR0	8.769	8.766	8.755	8.757	8.758
Depletion (%)	36.8	40.8	48.7	41.4	35.3
SPR ratio	0.21931	0.245203	0.21697	0.292044	0.3648
Female Lmin	18.3773	19.2743	20.0989	19.8785	19.9997
Female Lmax	67.3399	67.5628	68.3108	69.2209	69.5764
Female K	0.226336	0.220636	0.21082	0.204371	0.201613
Male Lmin (offset)	0	0	0	0	0
Male Lmax (offset)	-0.0829	-0.08475	-0.09189	-0.10451	-0.1107
Male K (offset)	0.080771	0.075918	0.084184	0.111579	0.124707
Negative log-likelihood					
TOTAL	2983.19	2886.15	2786.27	2682.61	2622.48
Catch	3.24E-10	3.14E-10	3.1E-10	3.07E-10	2.97E-10
Equil_catch	7.79E-14	1.3E-13	2.75E-13	1.59E-13	3.72E-14
Survey	-25.7921	-24.5941	-22.6031	-20.2651	-29.5808
Length_comp	705.959	684.618	666.614	635.917	629.591
Age_comp	2276.26	2200.49	2116.21	2042.93	1999.12
Recruitment	26.4684	25.4181	25.8448	23.8159	23.1291
Forecast_Recruitment	0.080897	3.8E-17	7.04E-15	9.25E-14	1.7E-11
Parm_priors	0.196165	0.192057	0.183212	0.180768	0.191958
Parm_softbounds	0.018405	0.025018	0.025712	0.02782	0.028194

Table 45: Summary of reference points for the base model.

Quantity	Estimate	Low 2.5% limit	High 97.5% limit
Unfished Spawning biomass (mt)	7088	5784	8392
Unfished age 1+ biomass (mt)	45254	37139	53369
Unfished recruitment (R_0)	6429	4669	8854
Depletion (2015)	36.8%	27.0%	46.5%
Reference points based on $SB_{40\%}$			
Proxy spawning biomass ($B_{40\%}$)	2835	2313	3357
SPR resulting in $B_{40\%}$ ($SPR_{50\%}$)	0.444	0.444	0.444
Exploitation rate resulting in $B_{40\%}$	0.086	0.073	0.099
Yield with *SPR* at $B_{40\%}$ (mt)	1632	1222	2042
Reference points based on SPR proxy for MSY			
Spawning biomass	3263	2663	3864
SPR_{proxy}	50%		
Exploitation rate corresponding to SPR_{proxy}	0.070	0.060	0.081
Yield with SPR_{proxy} at SB_{SPR} (mt)	1528	1145	1911
Reference points based on estimated MSY values			
Spawning biomass at *MSY* (SB_{MSY})	1824	1484	2164
SPR_{MSY}	0.312	0.308	0.316
Exploitation rate corresponding to SPR_{MSY}	0.137	0.116	0.158
MSY (mt)	1755	1310	2200

Table 46: Summary table of recent catches, regulations, and stock status between 2005 and 2015.

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Commercial landings (mt)	27	27	18	15	24	17	12	17	20	14	
Estimated total catch (mt)	230	91	107	68	85	73	116	142	150	114	
OFL (mt)	566	549	602	618	793	793	737	732	884	881	1444
ACL (mt)	307	308	218	218	288	288	263	274	320	337	349
1-SPR (%)	82.7	93.0	90.8	93.7	92.0	92.2	88.1	89.3	91.1	94.6	
Exploitation rate	0.016	0.006	0.008	0.005	0.006	0.006	0.009	0.010	0.010	0.006	
Age 0+ biomass (mt)	14075	14041	13954	13672	13267	12850	12951	13600	14536	17622	21032
Spawning output (10^6 eggs)	2171	2194	2206	2191	2153	2085	2009	1982	2078	2265	2607
Spawning output (low 2.5%)	1362	1386	1407	1408	1394	1356	1312	1296	1354	1456	1634
Spawning output (high 97.5%)	2981	3002	3005	2974	2912	2814	2707	2667	2803	3073	3579
Recruitment	2031	1259	1191	980	2053	5605	5341	3364	20483	2497	5709
Recruitment (low 2.5%)	1175	672	653	516	1169	3313	2956	1696	10614	989	1096
Recruitment (high 97.5%)	3511	2361	2174	1862	3605	9482	9649	6672	39528	6304	29743
Depletion (%)	30.6	31.0	31.1	30.9	30.4	29.4	28.4	28.0	29.3	32.0	36.8
Depletion (low 2.5%)	22.1	22.6	23.0	23.1	22.9	22.4	21.8	21.6	22.5	24.2	27.0
Depletion (high 97.5%)	39.2	39.4	39.3	38.7	37.8	36.4	34.9	34.4	36.1	39.7	46.5

10 Figures

Figure 9. Map of the West Coast INPFC management areas. This assessment covers the Bocaccio stock in the Eureka, Monterey and Conception management areas (adapted from Field et al., 2009).

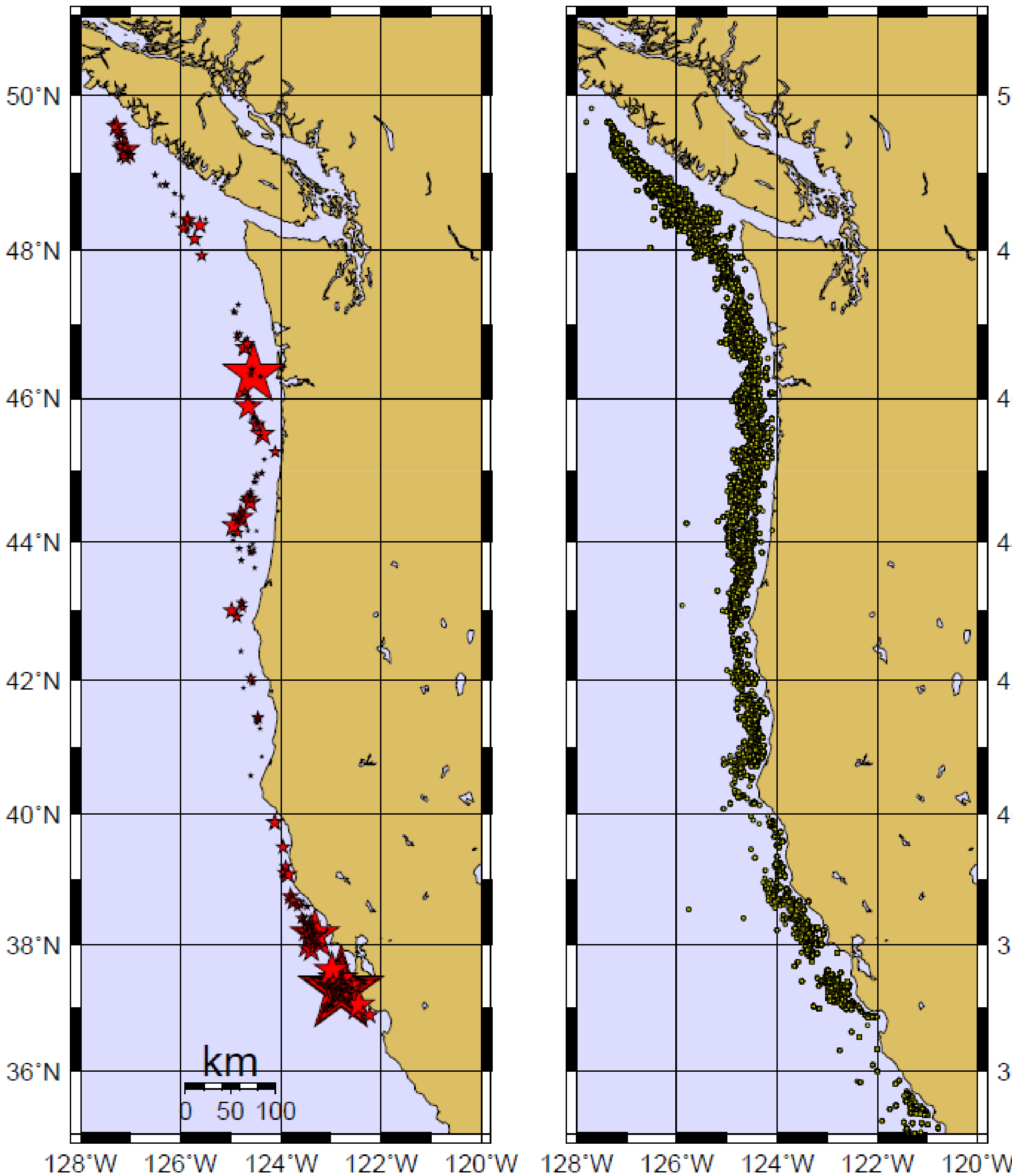


Figure 10. Locations of Russian trawls where Bocaccio were caught (left panel) versus tow locations where no Bocaccio were found (right panel) from trawls taken between 1963-1978. Stars are sized proportional to the square root of the total number caught per tow (adapted from Field et al., 2009).

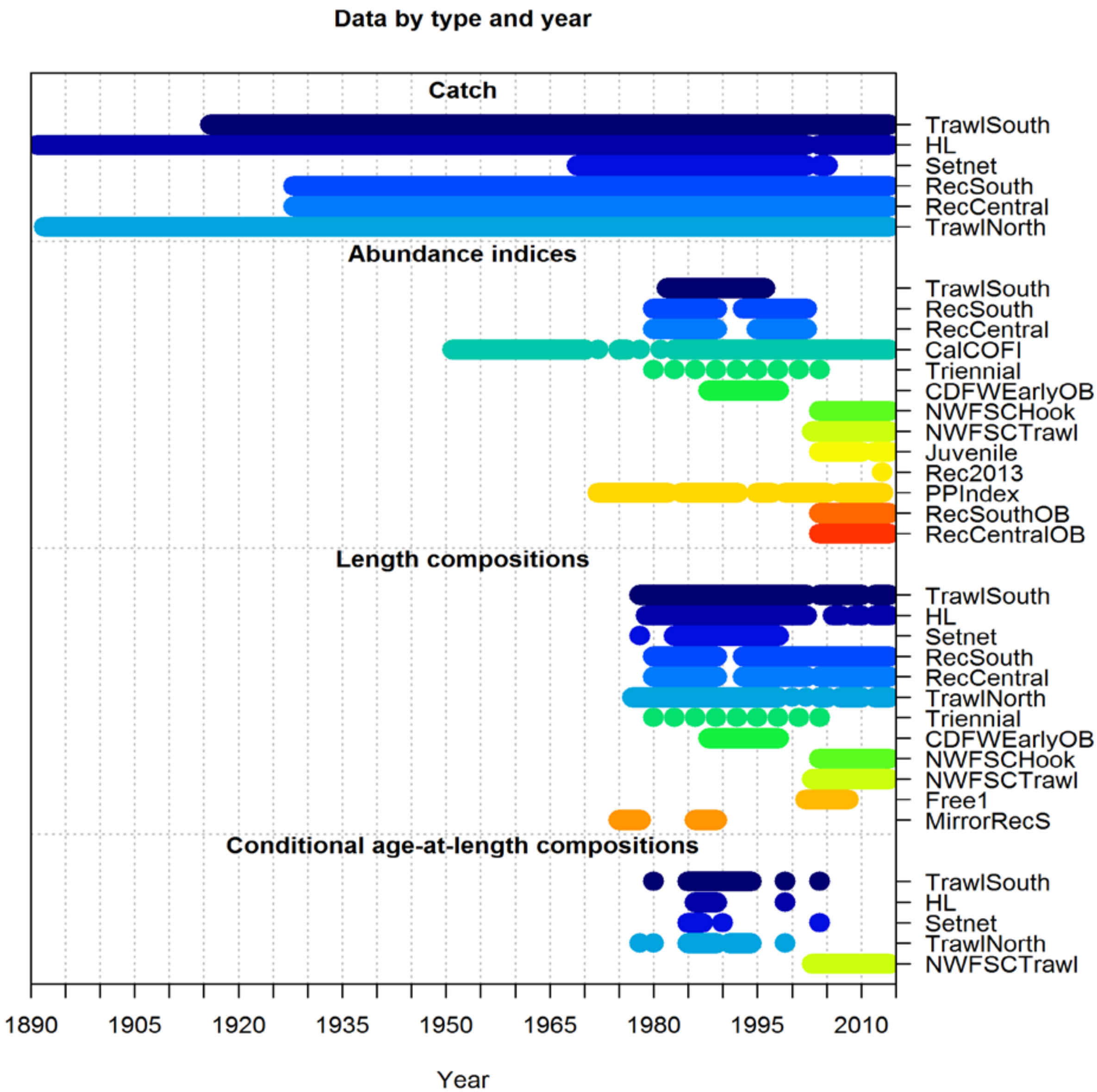


Figure 11. Summary of available data sources for the assessment.

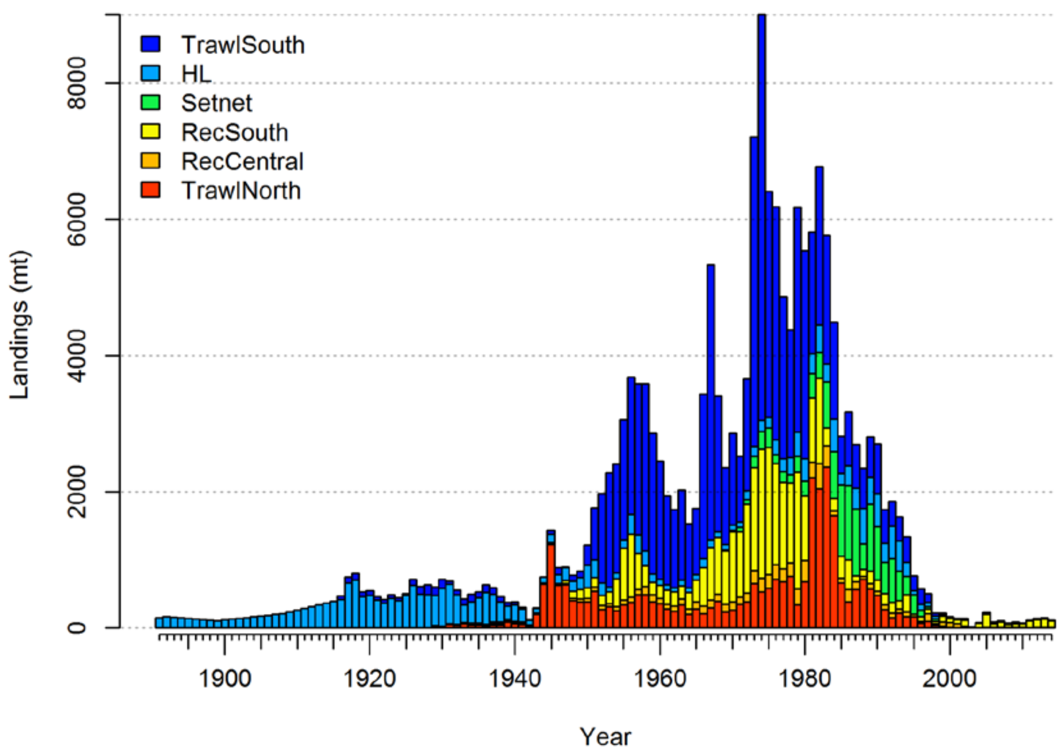


Figure 12. Time series of total landings and landings by six fisheries from 1892 to 2014.

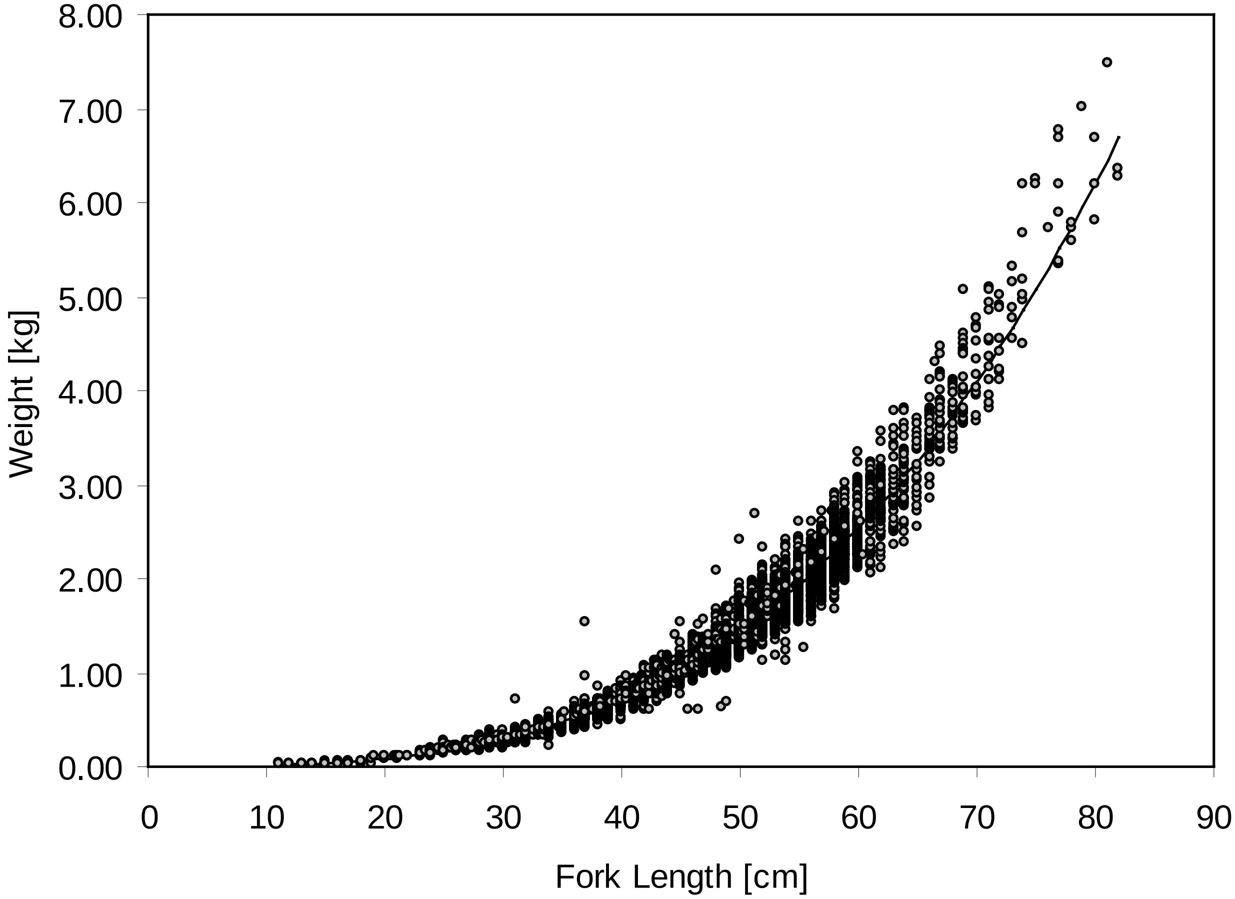


Figure 13. Length-weight relationship for Bocaccio used in the assessment (adapted from Field et al., 2009).

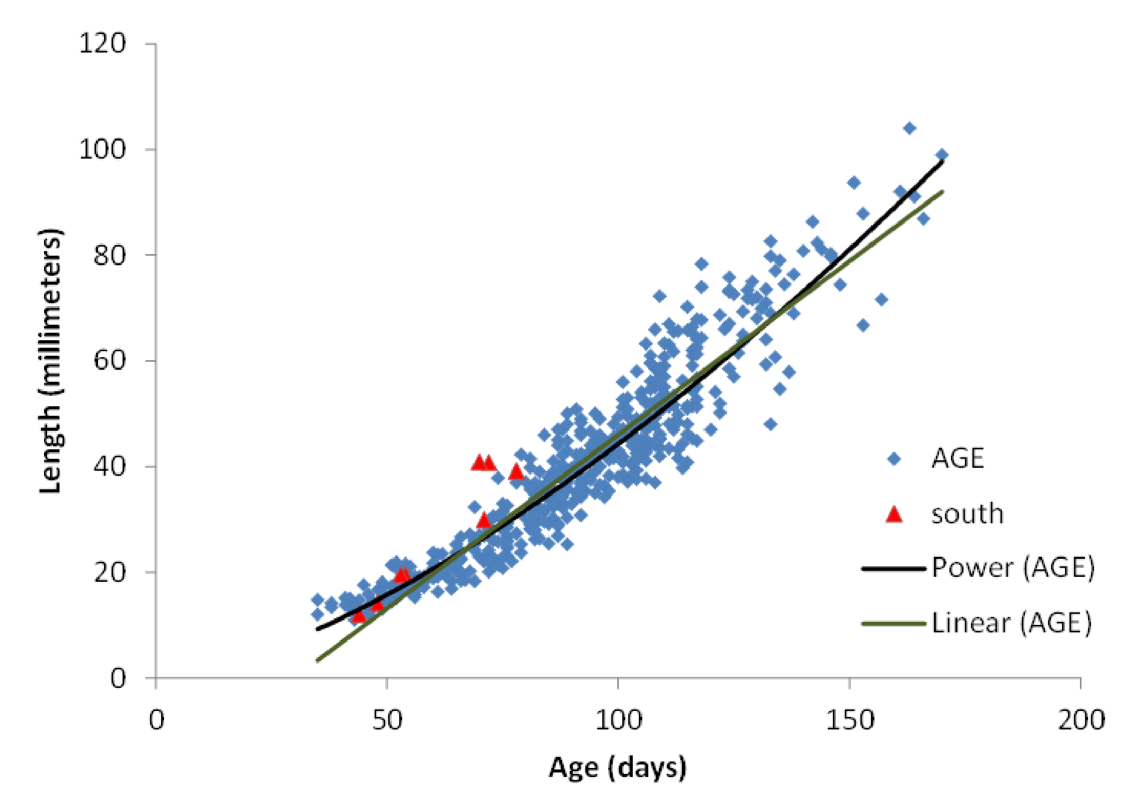


Figure 14. Age-length relationship of Young-of-the-Year (YOY) Bocaccio, caught in juvenile rockfish surveys, fit using both linear and power function relationships.

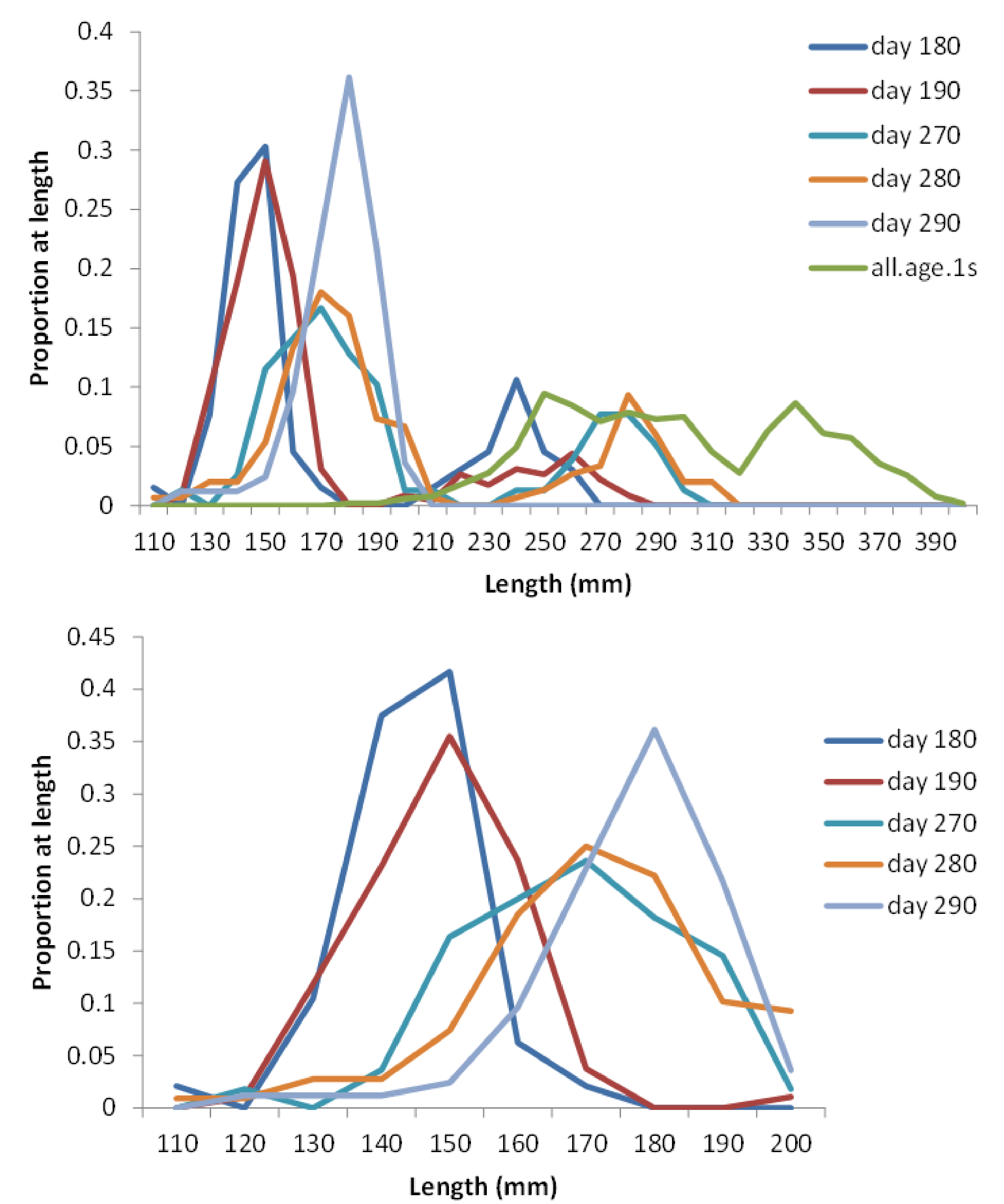


Figure 15. Length frequency distribution of age 0 fish caught in the NWFSC trawl survey by binned Julian day of capture, top graph shows fish estimated to be age 1 from same dataset, bottom graph shows length distribution of age 0 fish when fish larger than 200 mm are assumed to be mis-aged.

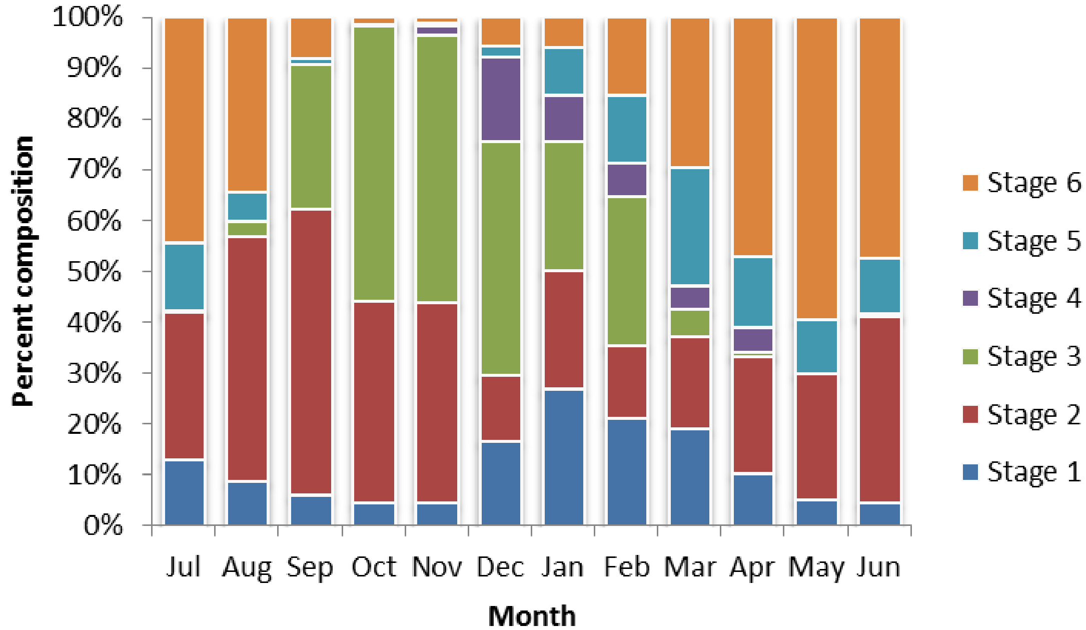


Figure 16. L Seasonal pattern of ovarian development in female Bocaccio (n=4,228). Samples from the Southern California Bight were excluded. Stages of ovarian development: 1=immature, 2=early vitellogenic, 3=late vitellogenic, 4=fertilized or eyed-larvae, 5=spent, 6=recovering.

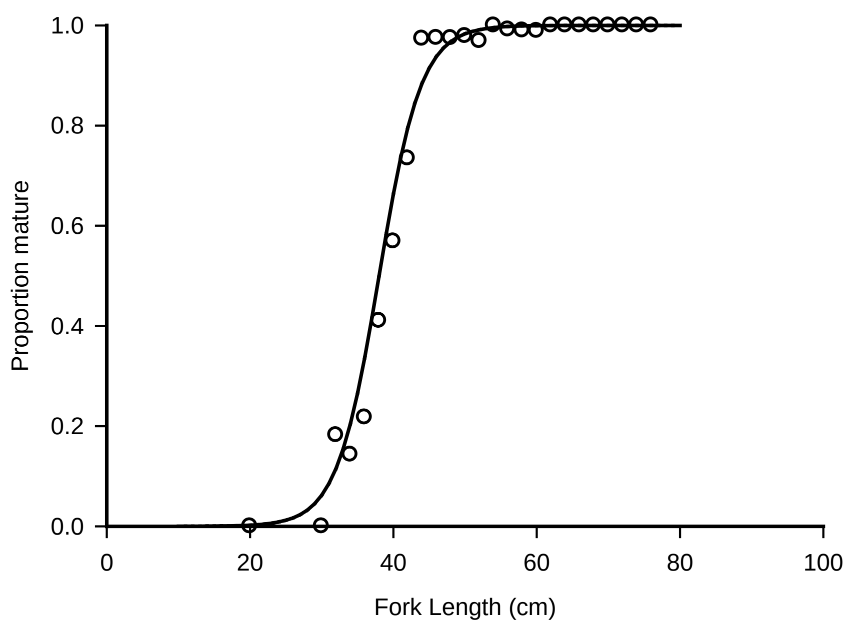


Figure 17. Logistic curve representing the proportion of female Bocaccio that are mature as a function of body length. The solid line is the proportion predicted mature by the base model GLM with binomial error structure and logit link functions; the open circles are the observed proportion (2-cm length bins) for California, all years pooled.

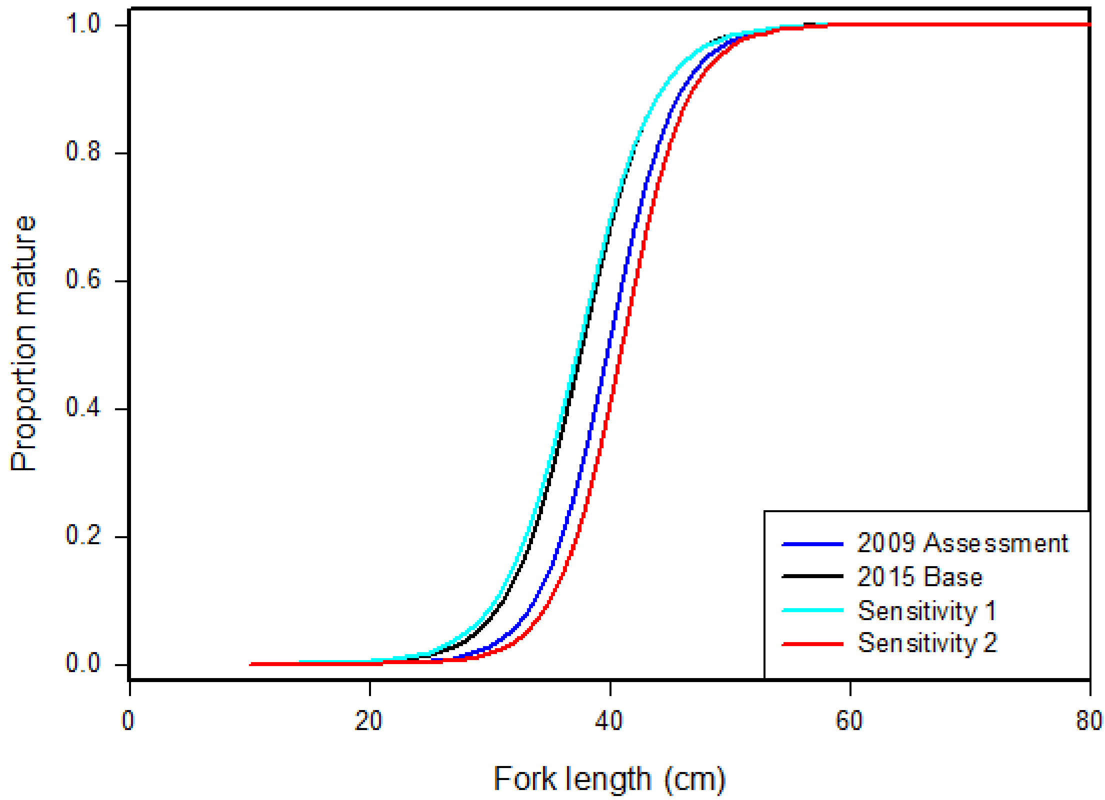


Figure 18. Logistic curves representing the proportion of female Bocaccio mature as a function of length. The base model is compared to parameters used in the 2009 assessment as well as to parameters estimated in sensitivity analyses. Sensitivity 1 and 2 represent the least and most conservative, respectively, of the sensitivity analyses.

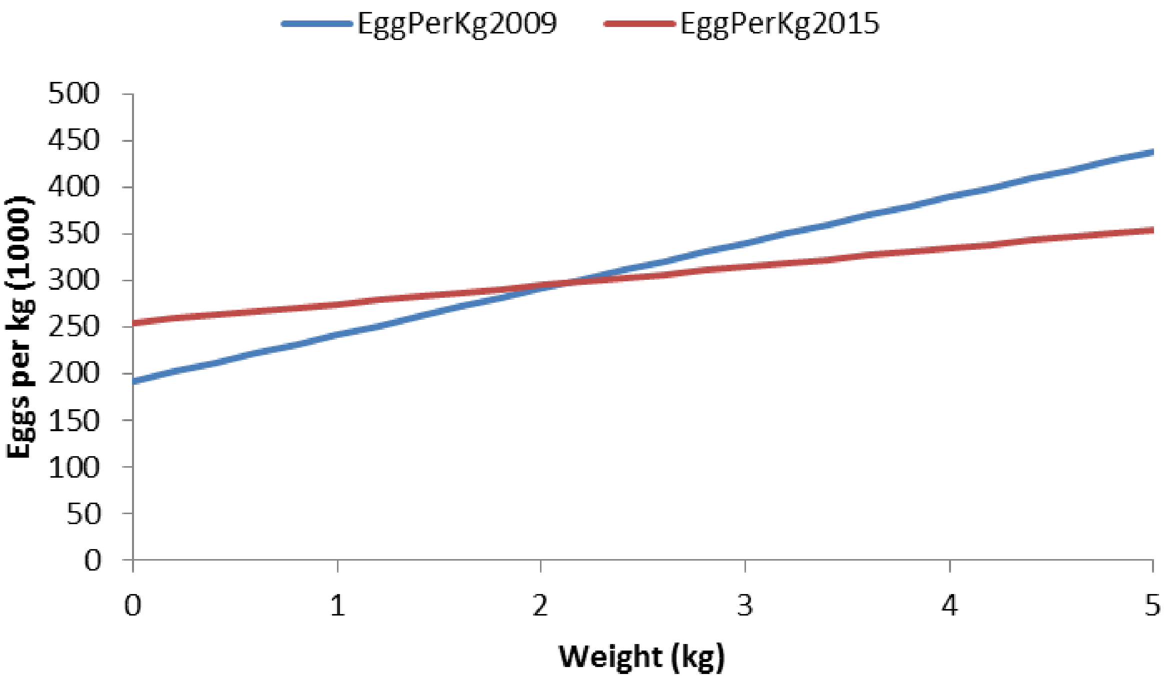


Figure 19. Comparisons of relative fecundity functions used in the 2009 assessment and the updated fecundity function used in this assessment.

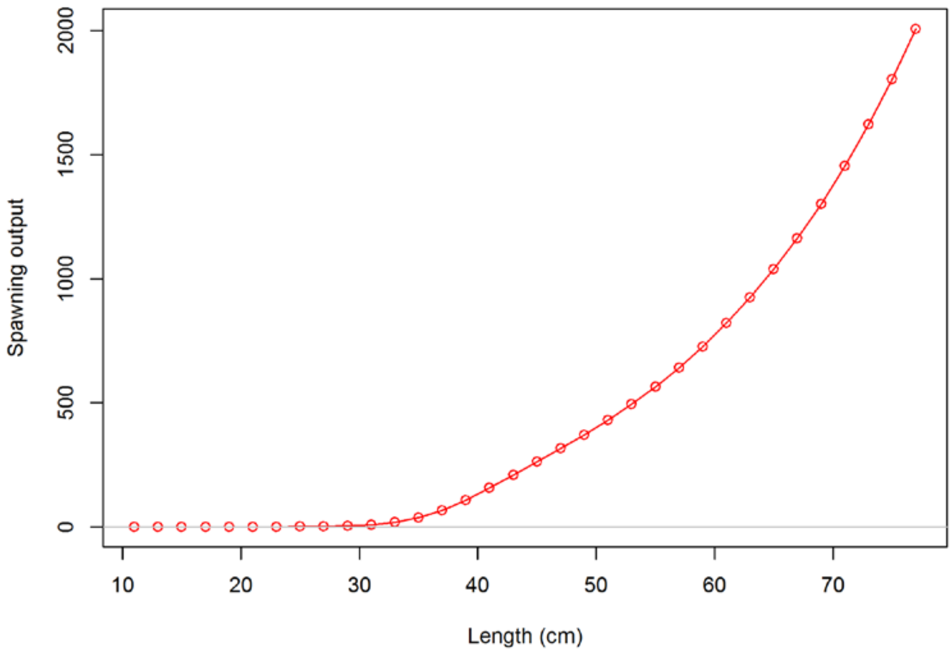


Figure 20. Spawning outputs per female by length.

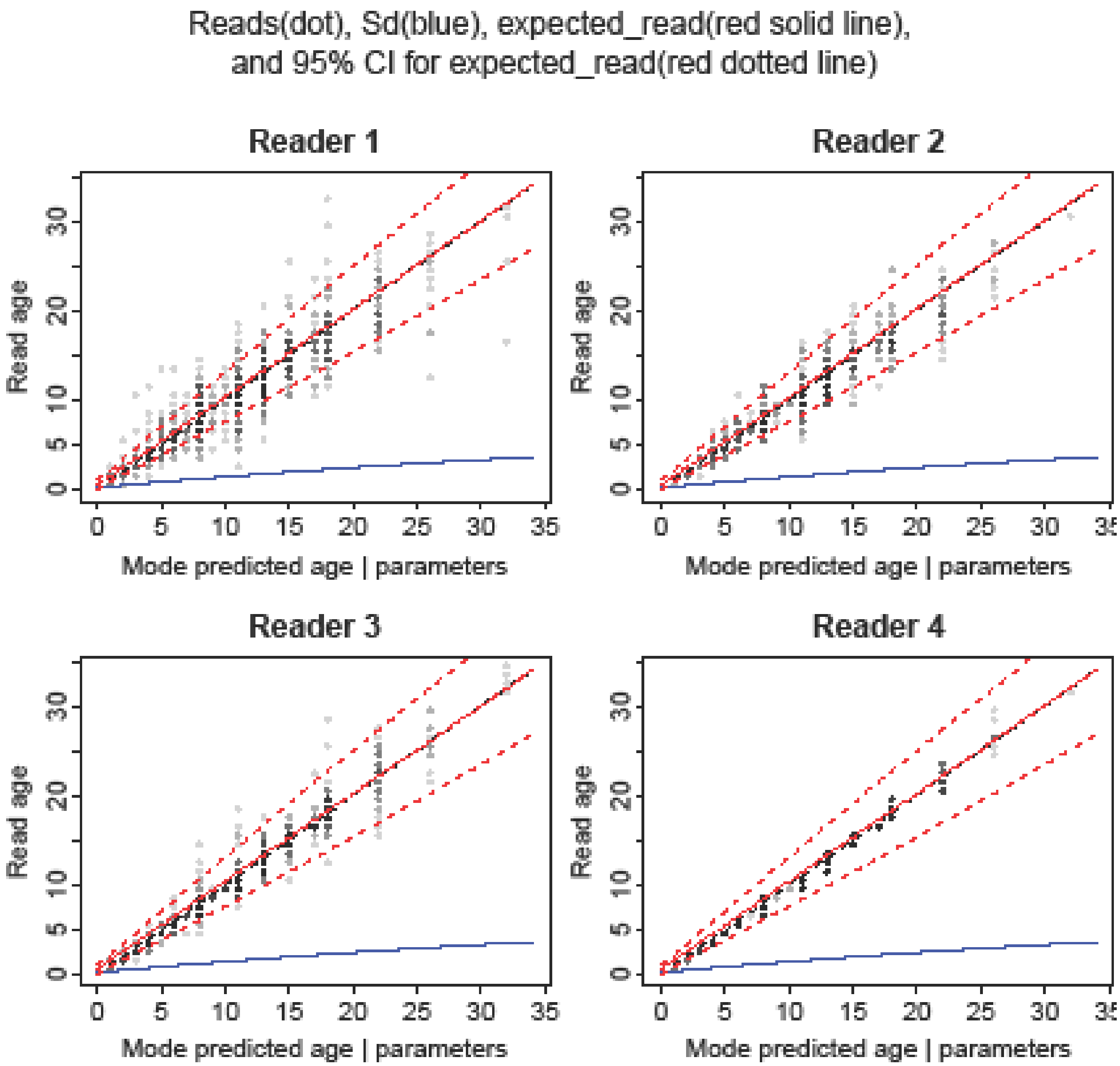


Figure 21. Plots of aging bias and errors at different age classes by four readers. Line and dot symbols are specified at top of the figure. The graph was produced from a R program written by J. Thorson. Readers 1 and 2 are double reads from the same ager and Readers 3 and 4 are double reads from the second reader.

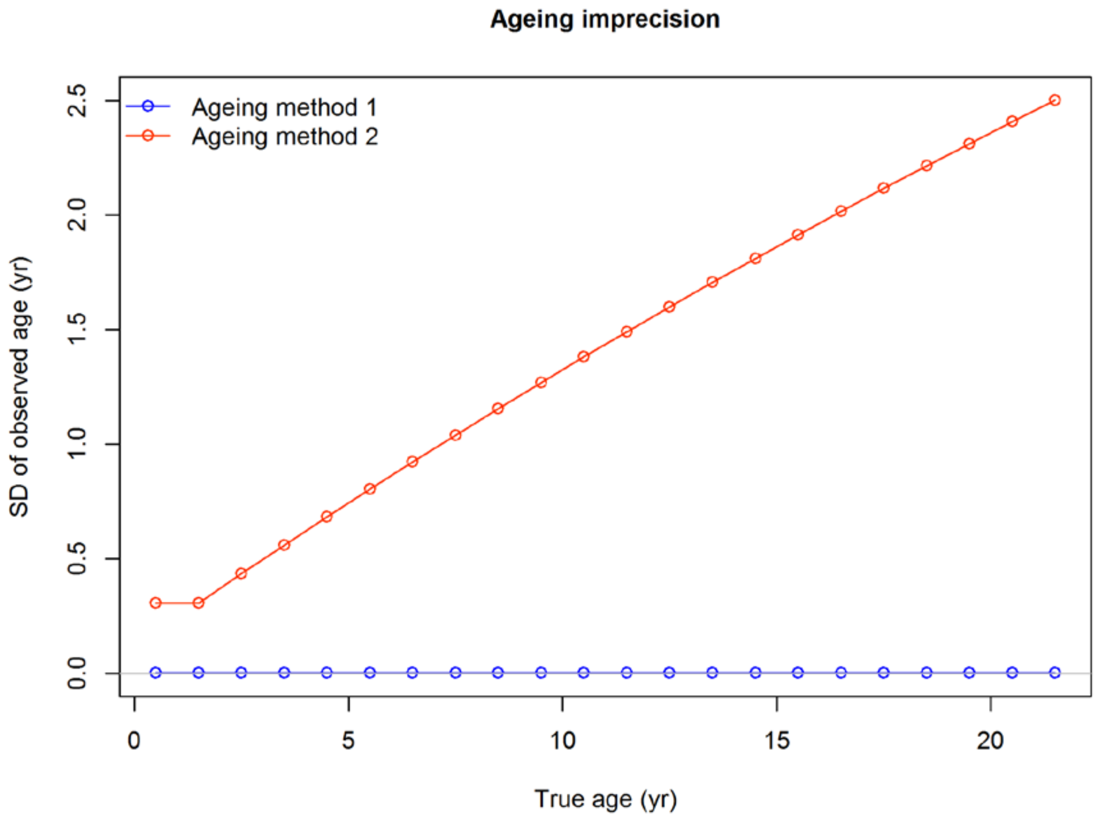


Figure 22. Standard deviations (SD) of observed age at different age group ("True age") for two ageing methods. Ageing method 1 assumes very small ageing error and is included here for reference. Ageing method 2 is estimated and used in the assessment model.

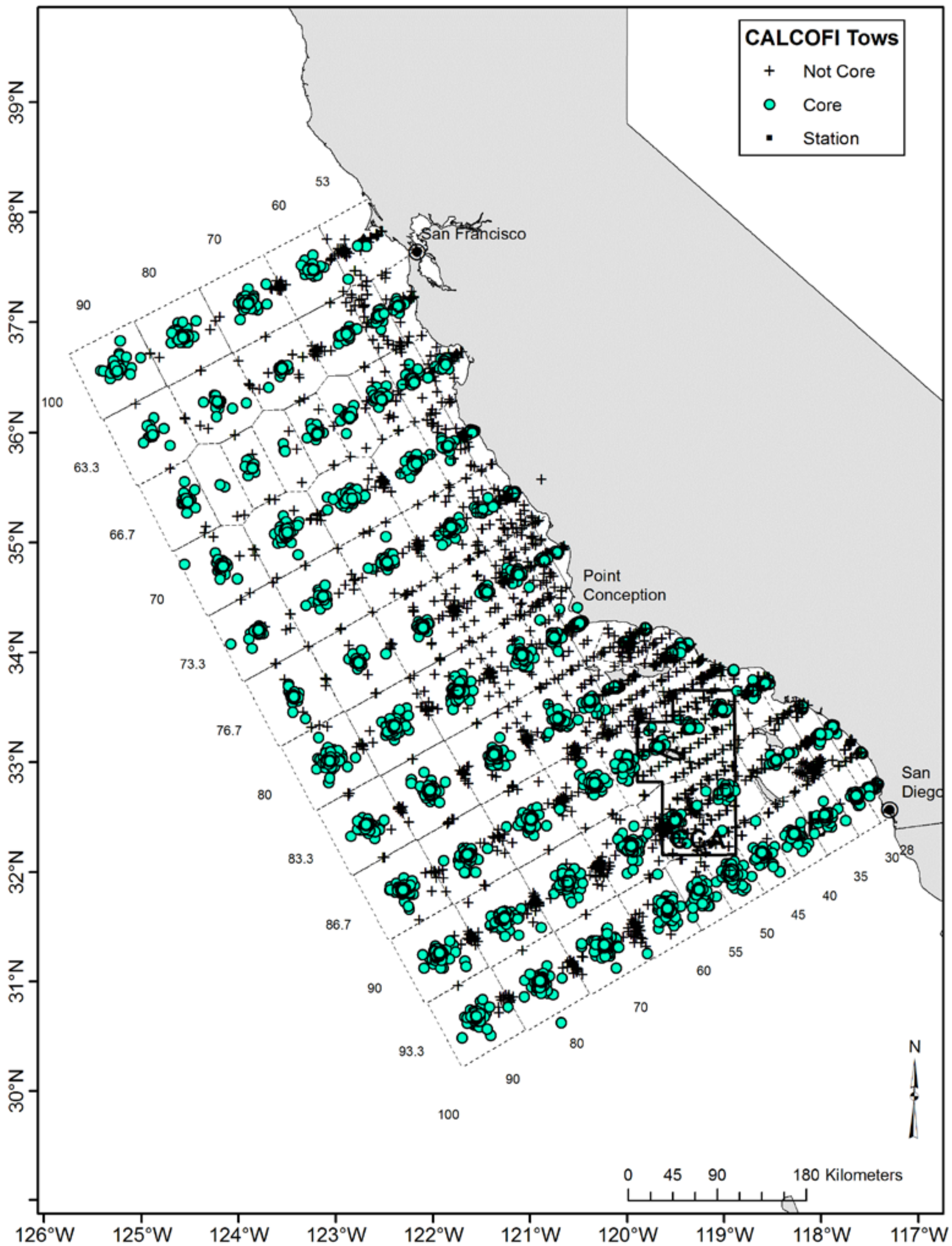


Figure 23. Tow locations relative to the idealized station for both standard and non-standard stations sampled over the duration of the CalCOFI survey (excludes stations in Mexican waters and offshore of station 100).

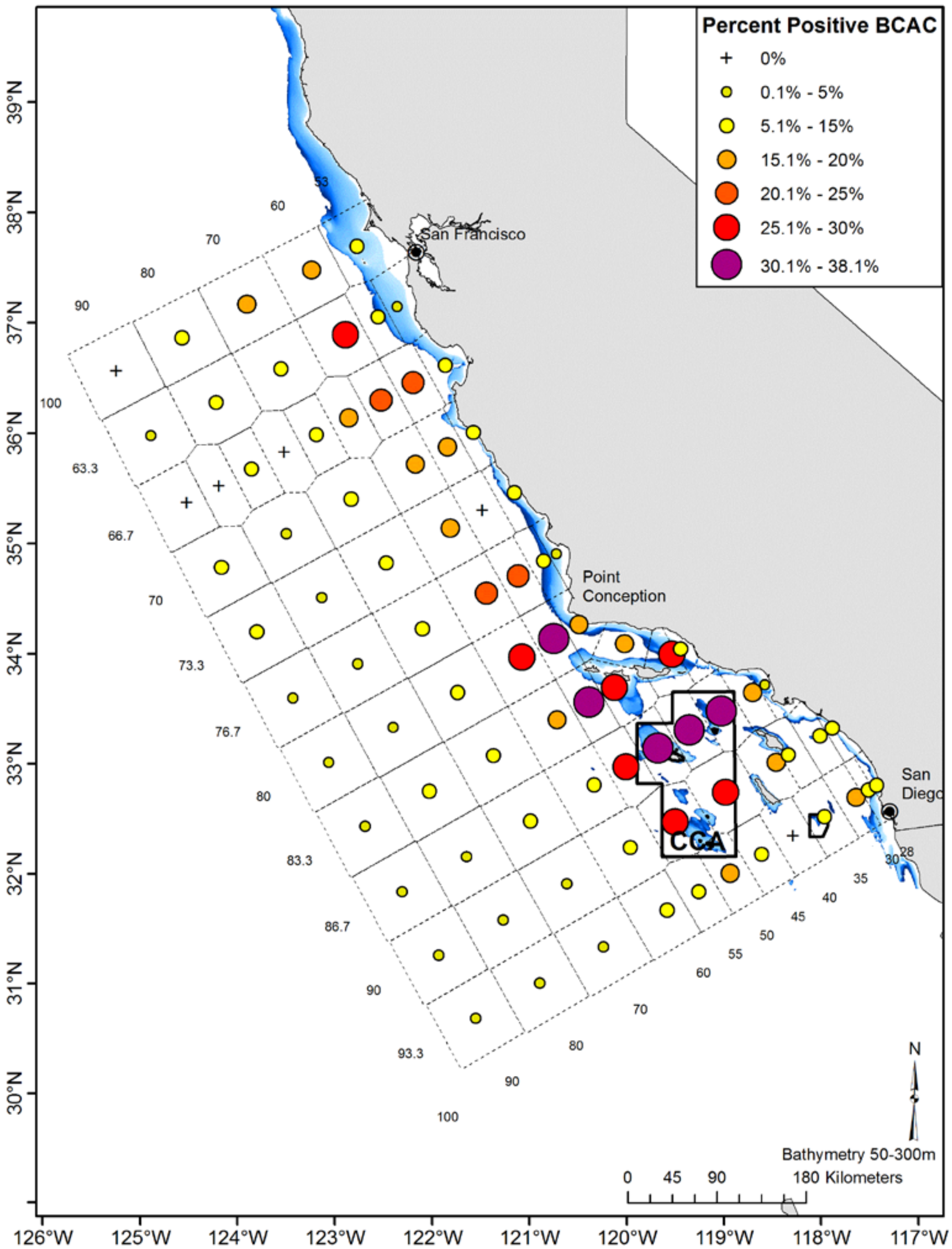


Figure 24. Standard CalCOFI stations and proportion positive (over the duration of the time series) for those stations, with available mature adult habitat (~50 to 350 meter depth range) for context.

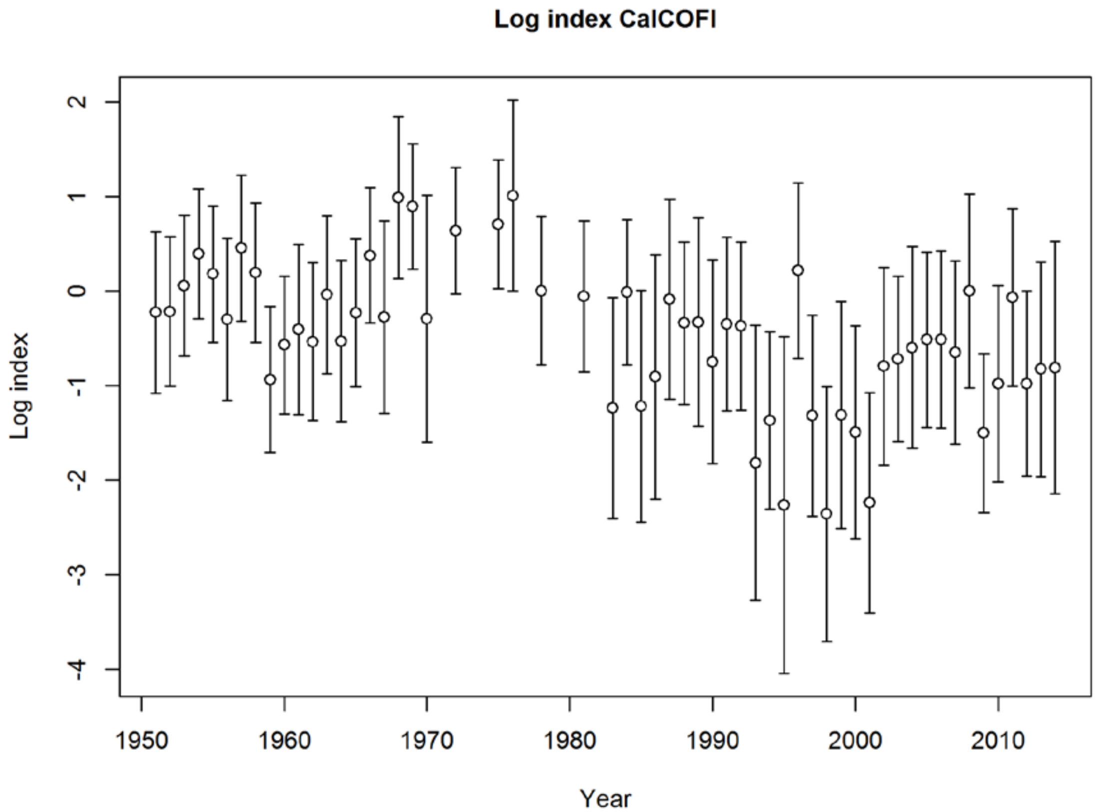


Figure 25. CalCOFI larval abundance indices (in log scale), with asymptotic standard errors based on a jackknife routine.

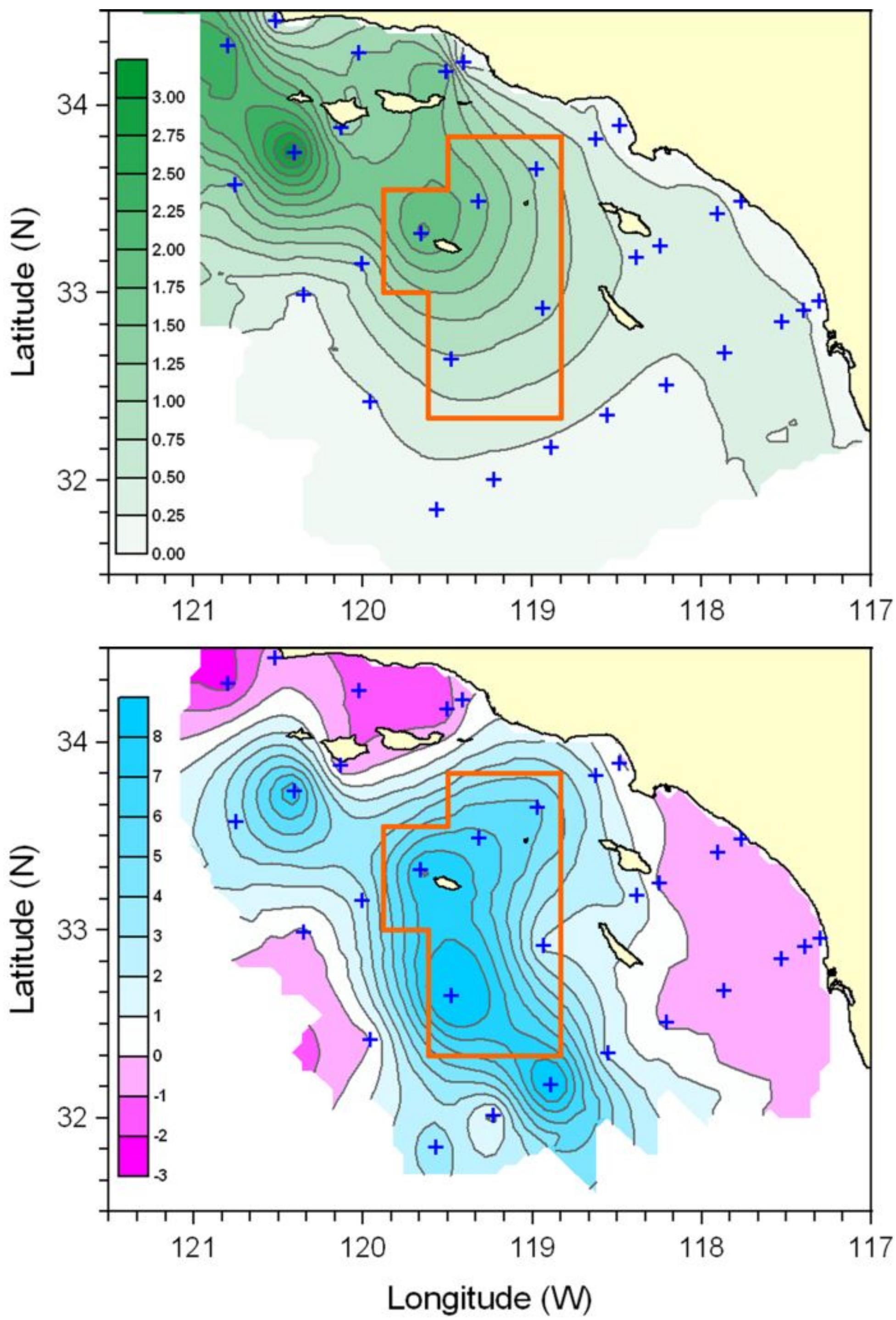


Figure 26. Spatial distribution of Bocaccio larvae in the Southern California Bight (top) based on estimated station effects [#/10 m^2] from a delta-GLM analysis of the entire CalCOFI time series (1951-2005). Bottom figure reflects the spatial distribution of Bocaccio larvae in 2002-03 represented as anomalies from the long-term mean distribution (Ralston and MacFarlane 2010).

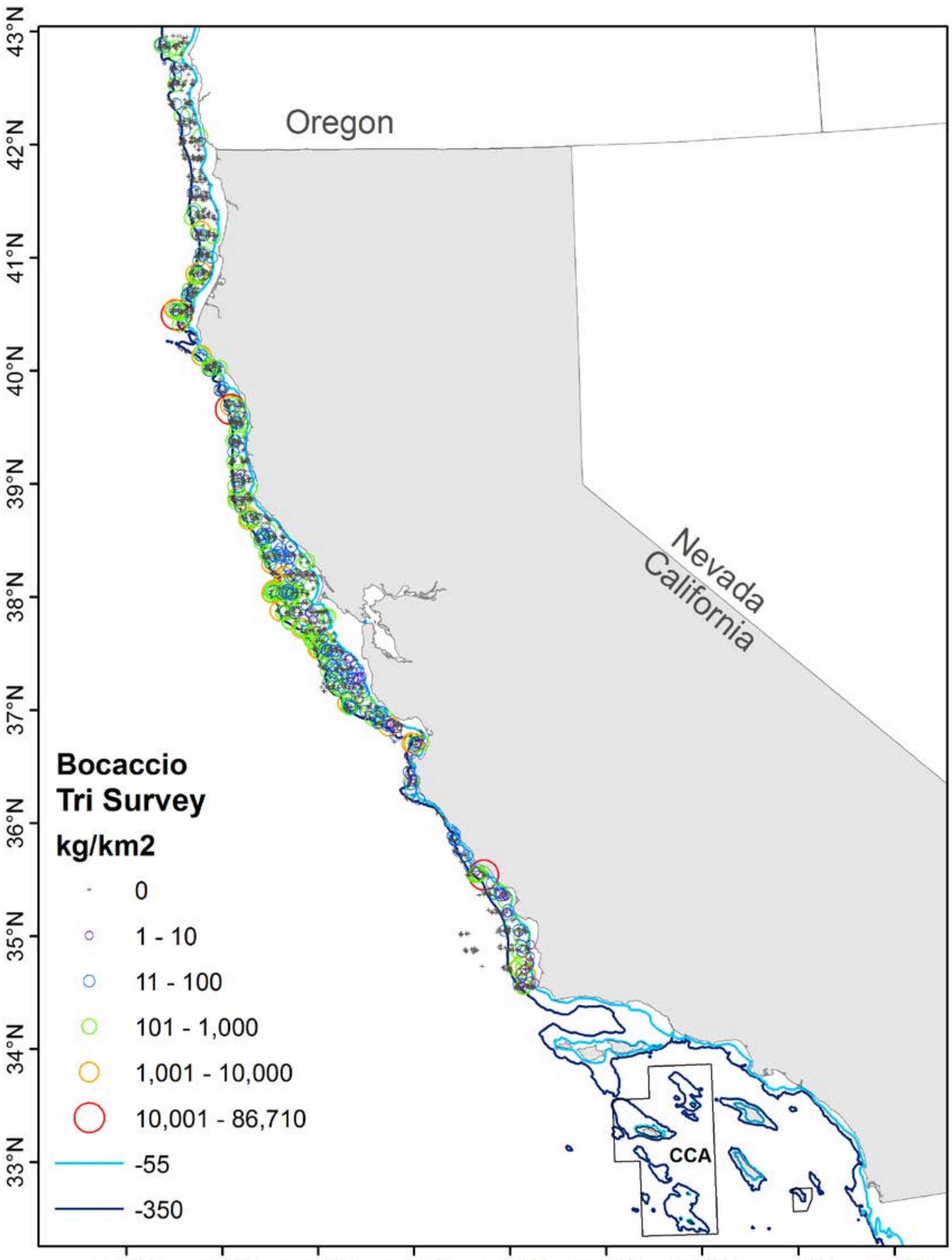


Figure 27. Spatial distribution of raw catch rates of Bocaccio from triennial trawl survey between 1980 and 2004. Depth contour lines of 55m and 350m and the CCA area are shown. Note that sizes and color of circles represent catch rate in log scales (Credit of Rebecca Miller, SWFSC).

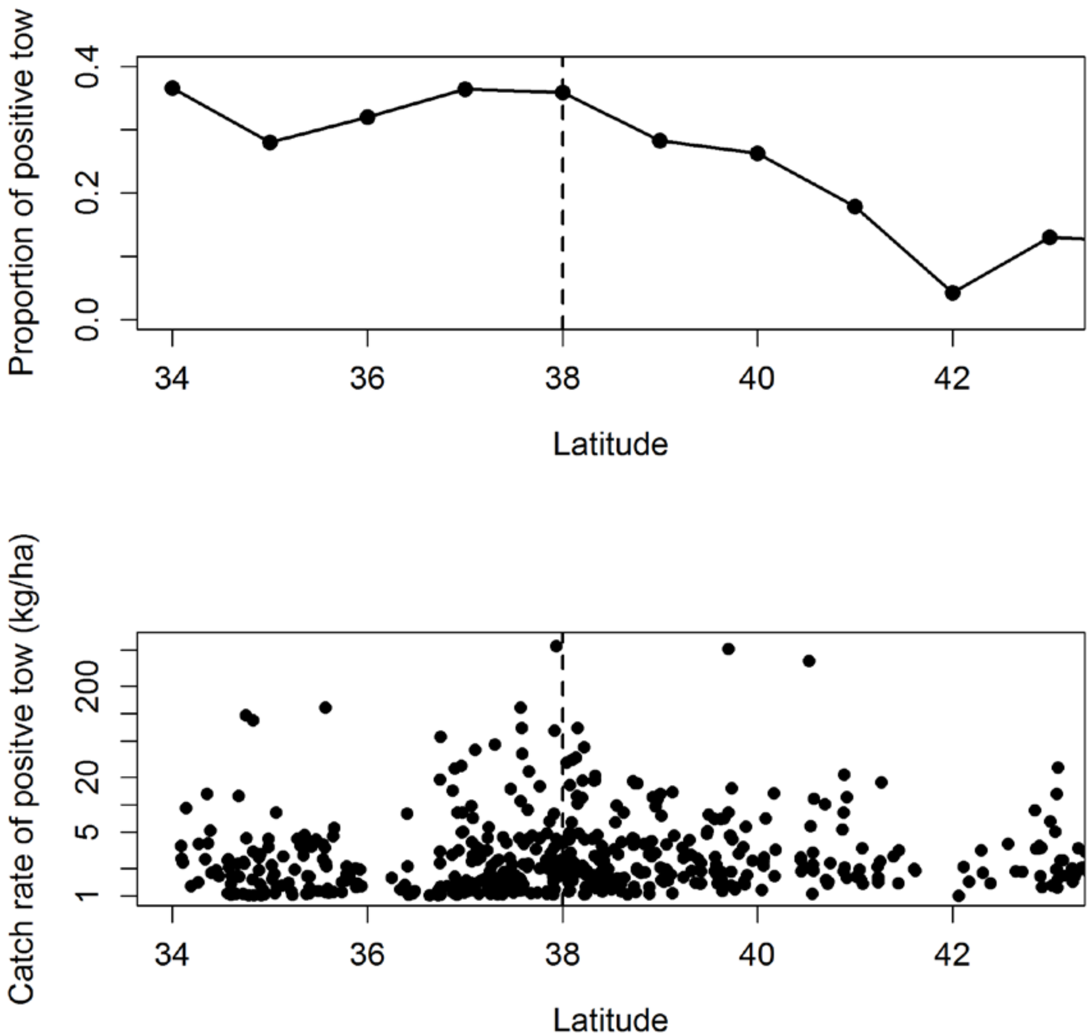
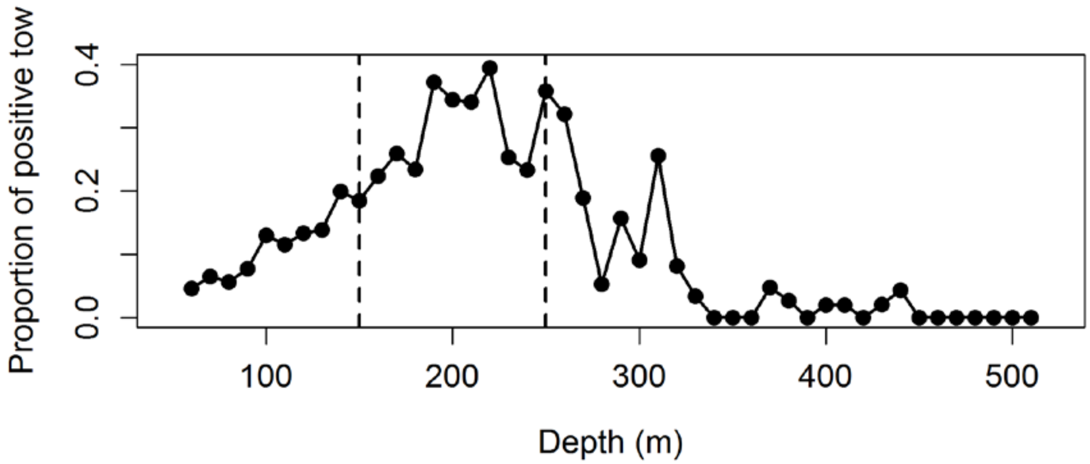


Figure 28. Plots of the proportion of positive tows (top panel) and the raw catch rates of positive tows (bottom panel) by latitude for triennial survey data. All data, including the 1977 data, were used. Vertical lines show 38 degree latitude. Note that y-axis on the bottom panel is in log-scale.



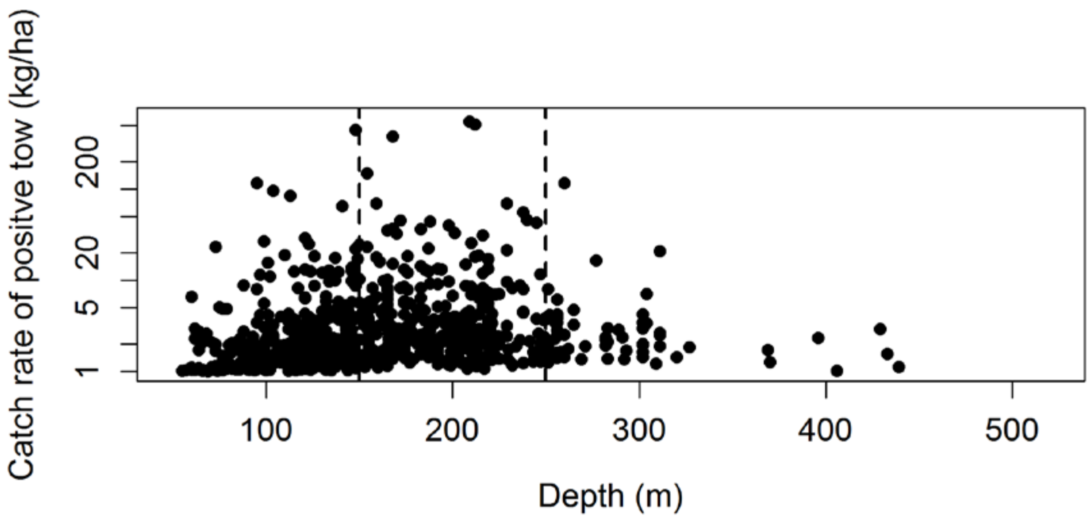


Figure 29. Plots of the proportion of positive tows (top panel) and the raw catch rates of positive tows (bottom panel) by depth zones (10m interval) for triennial survey data. All data, including the 1977 data, were used. Vertical lines show 150 and 250 depths. Note that y axis on the bottom panel is in log-scale.

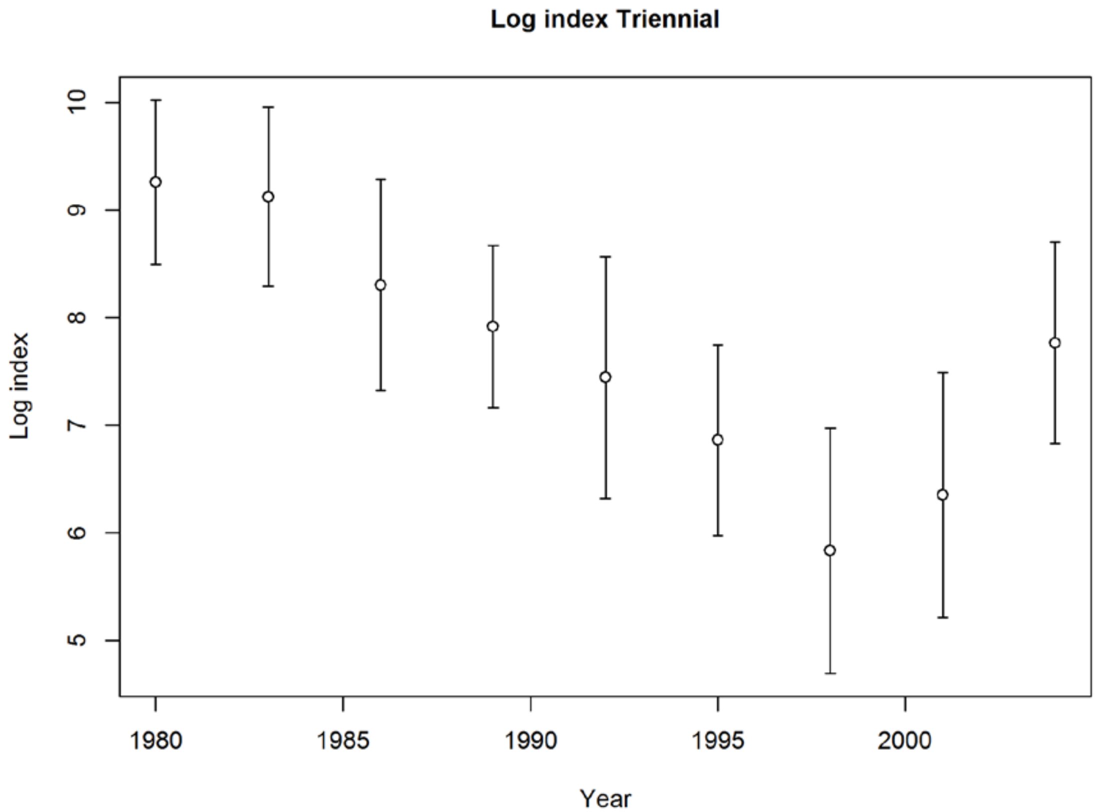


Figure 30. Estimated biomass (mt in log scale) from the GLMM analysis for the triennial trawl survey between 1980 and 2004.

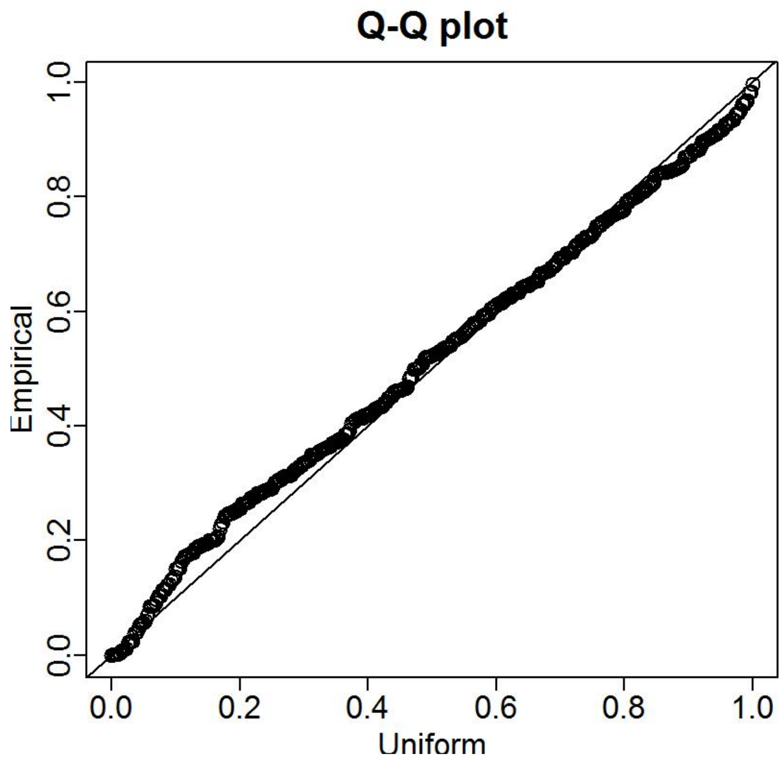


Figure 31. A Bayesian Q-Q plot used to validate the goodness of fit of the stratified delta-GLMM for the triennial trawl survey between 1980 and 2004.

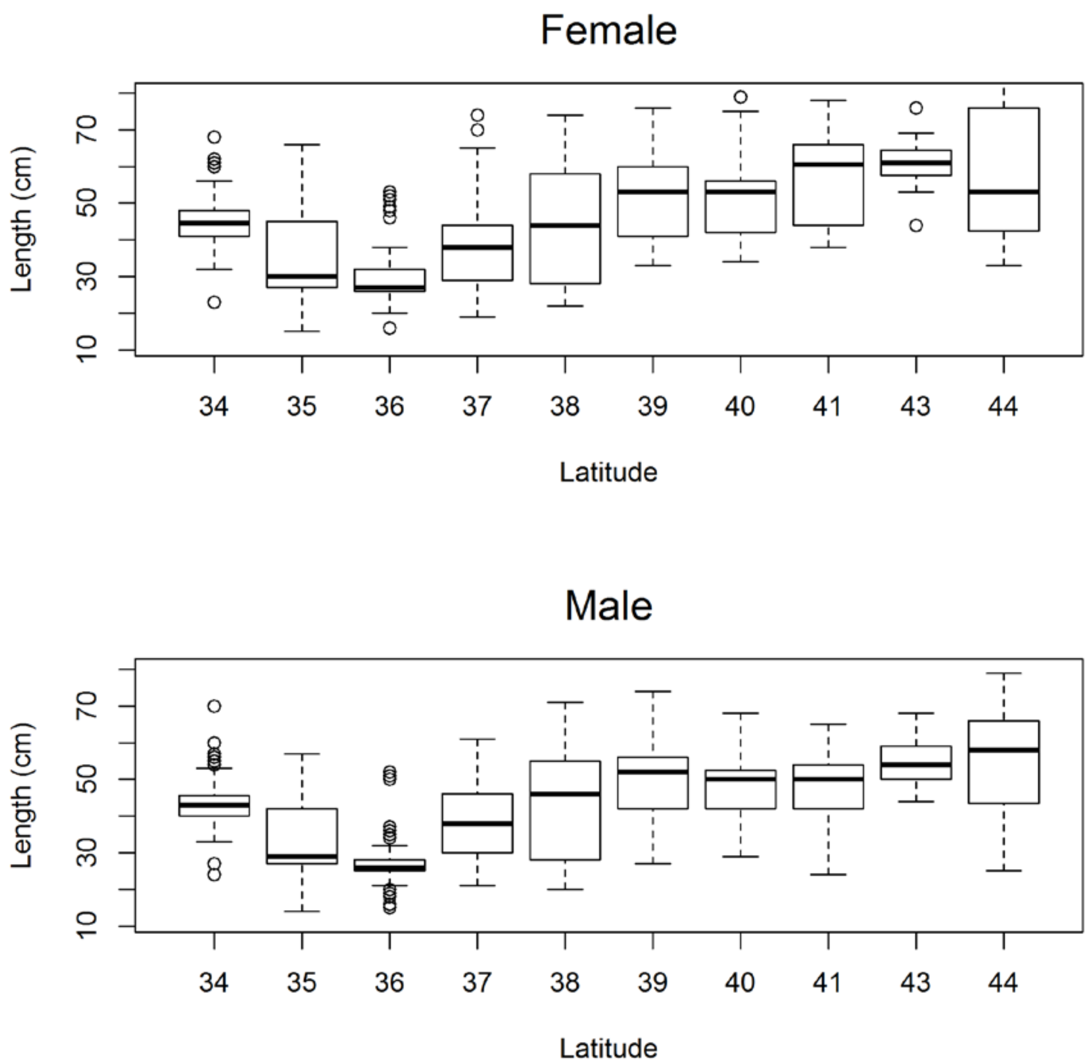


Figure 32. Comparison box plots of raw length data from the triennial survey data by sex and by latitude. All data, including the 1977 data, were used. Data from north of latitude 44 degree were grouped into the 44 degree bin.

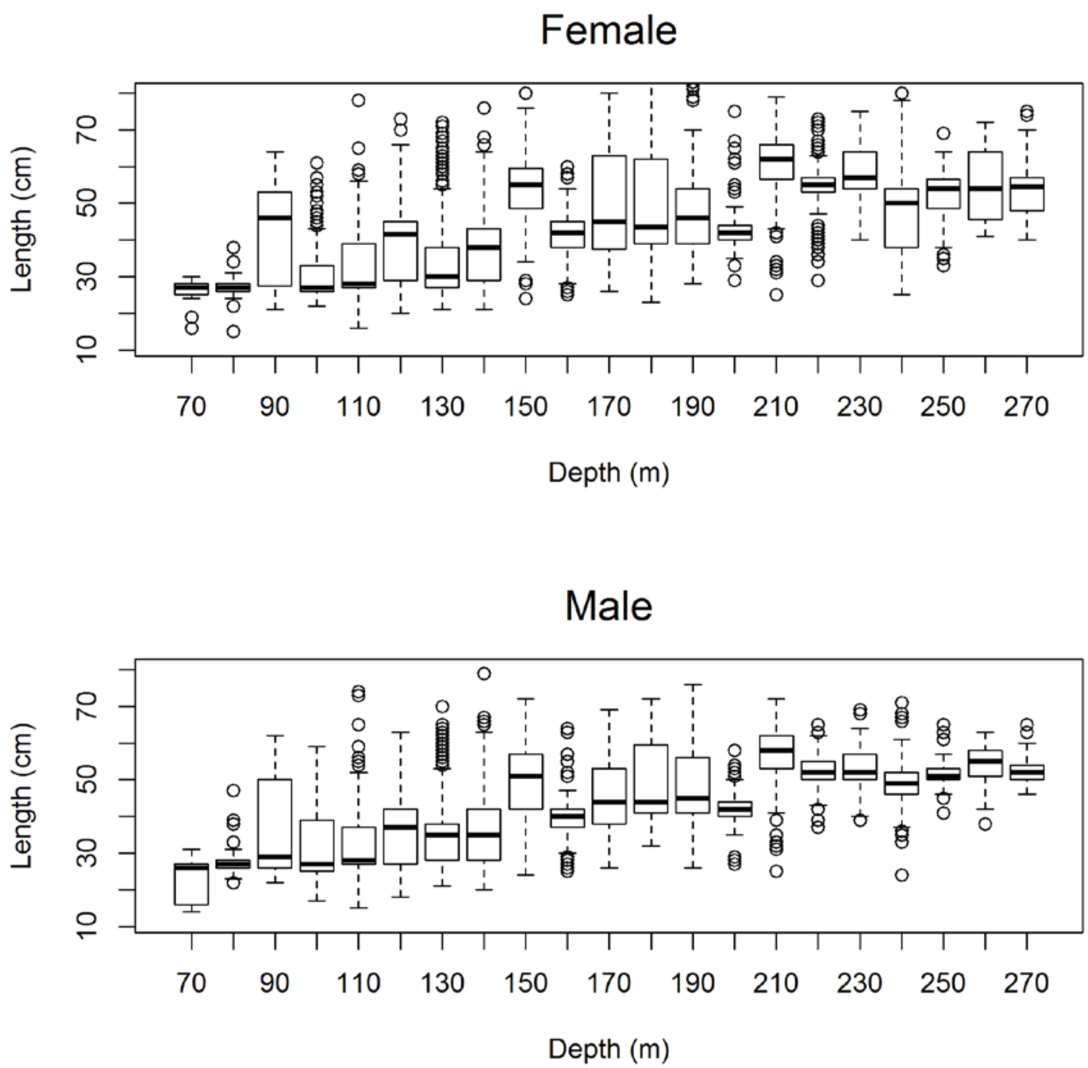


Figure 33. Comparison box plots of raw length data from the triennial survey data by sex and by depth zones (10m interval). All data, including the 1977 data, were used. Data from depths less than 70m and greater than 270 were grouped into 70m and 270m bins, respectively.

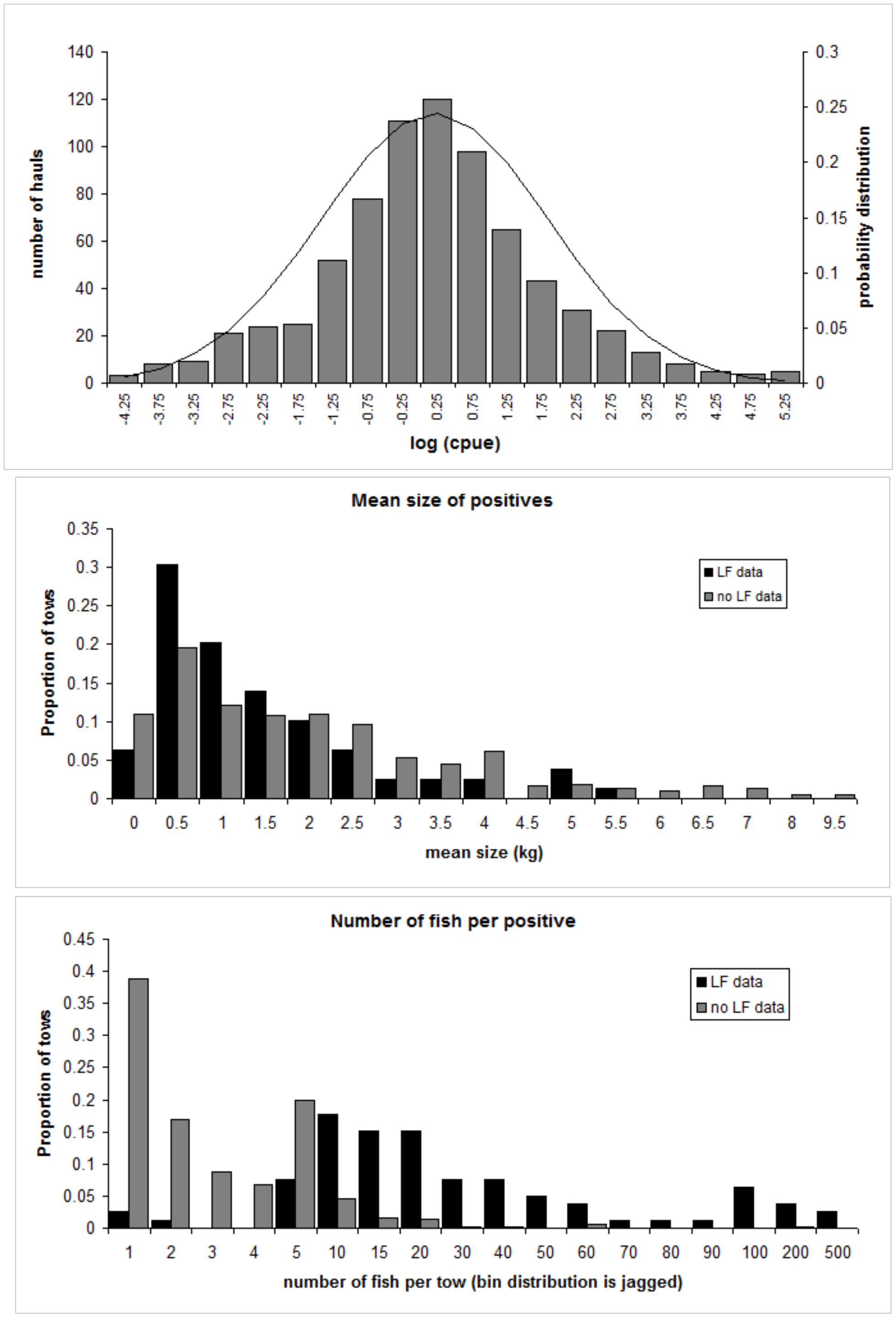


Figure 34. Frequency distributions of Bocaccio CPUE for the triennial trawl survey (top, in log scale), average weight (middle), and number of fish per haul for hauls with and without length frequency (LF) data (bottom, figure from Field et al. 2009).

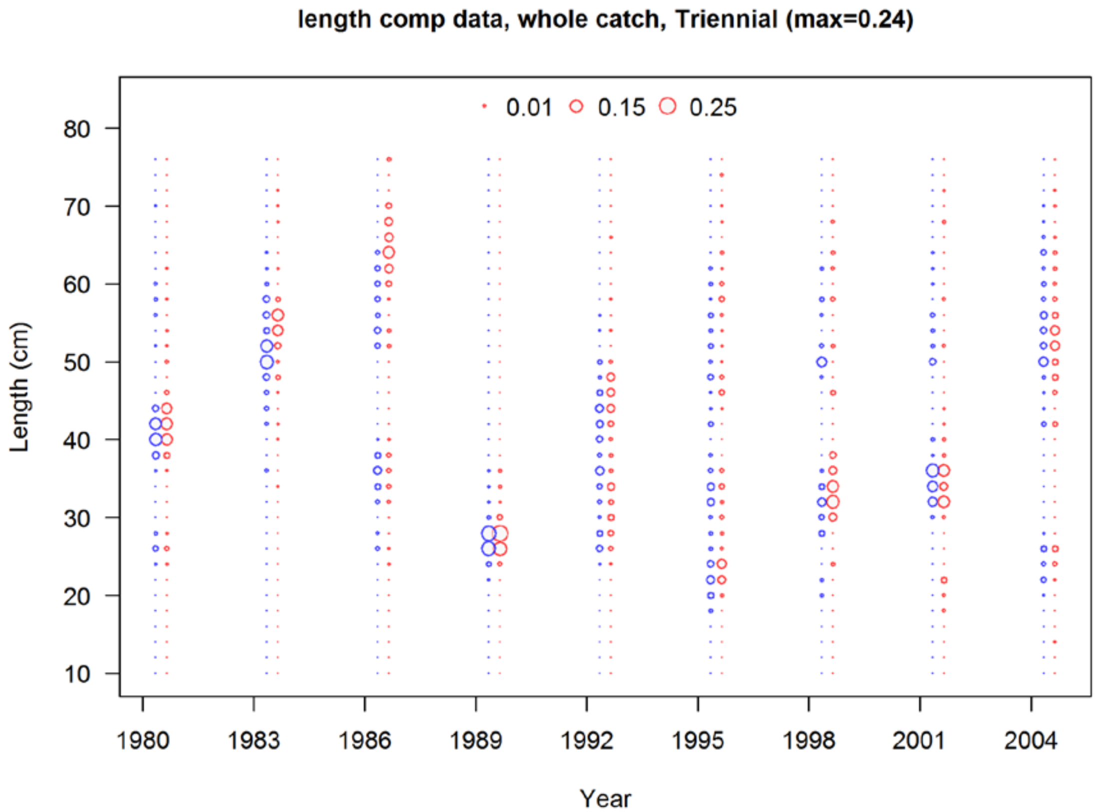


Figure 35. Plots of length frequency distributions of females (red) and males (blue) from the triennial trawl survey between 1980 and 2004.

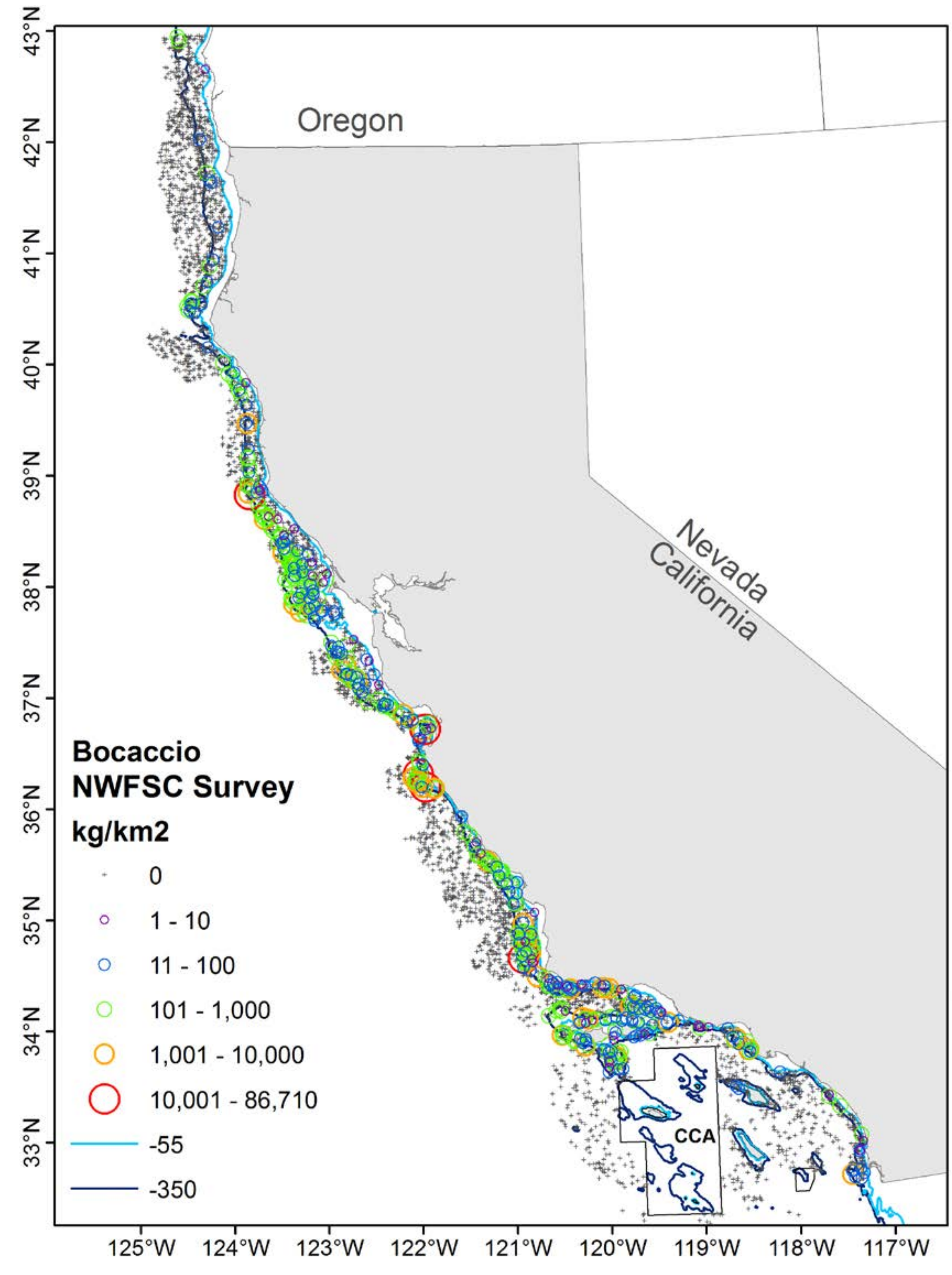


Figure 36. Spatial distribution of raw catch rates of Bocaccio from NWFSC trawl survey between 2003 and 2014. Depth contour lines of 55m and 350m and the CCA area are shown. Note that sizes and color of circles represent catch rate in log scales (Credit of Rebecca Miller, SWFSC).

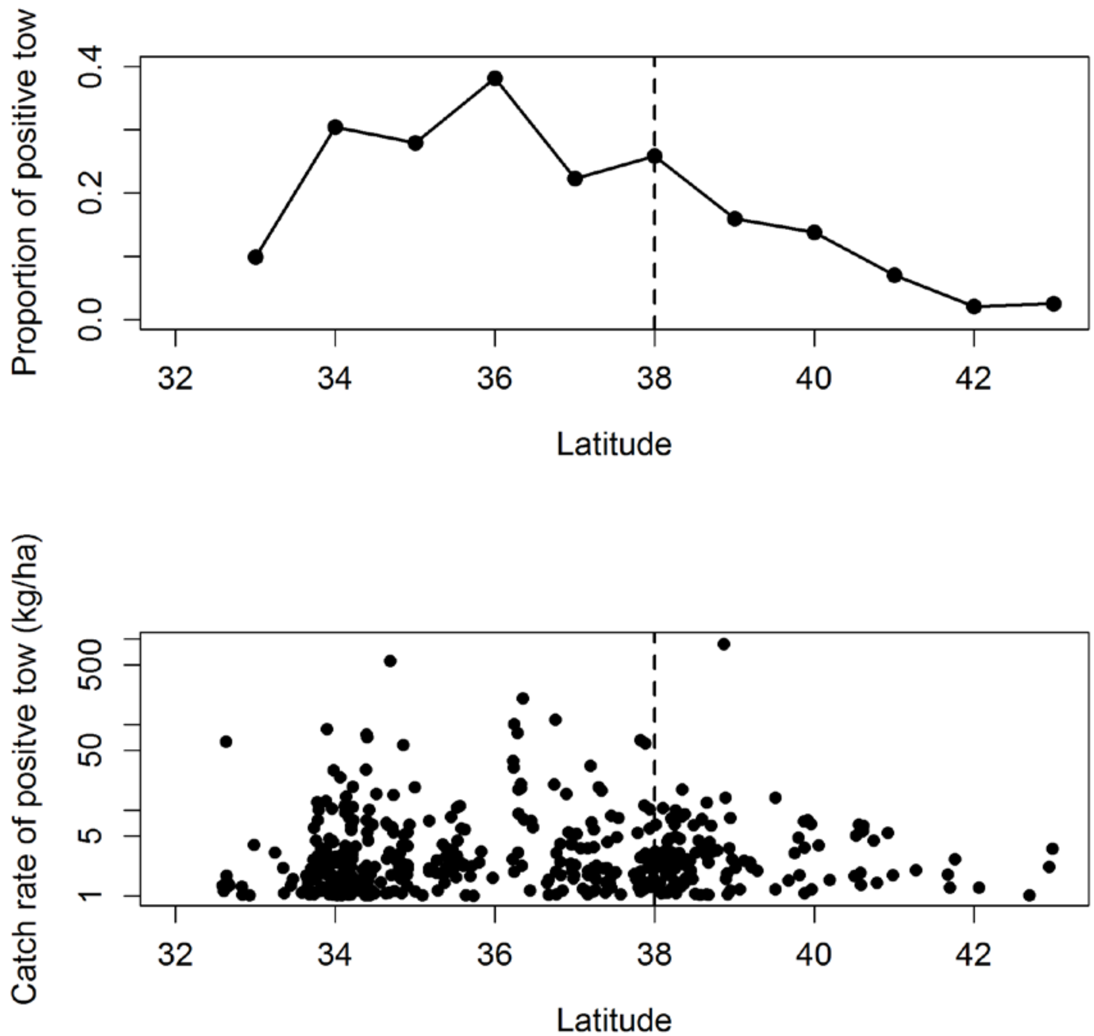


Figure 37. Plots of the proportion of positive tows (top panel) and the raw catch rates of positive tows (bottom panel) by latitude for NWFSC survey data. Vertical lines show 38 degree latitude. Note that y-axis on the bottom panel is in log-scale.

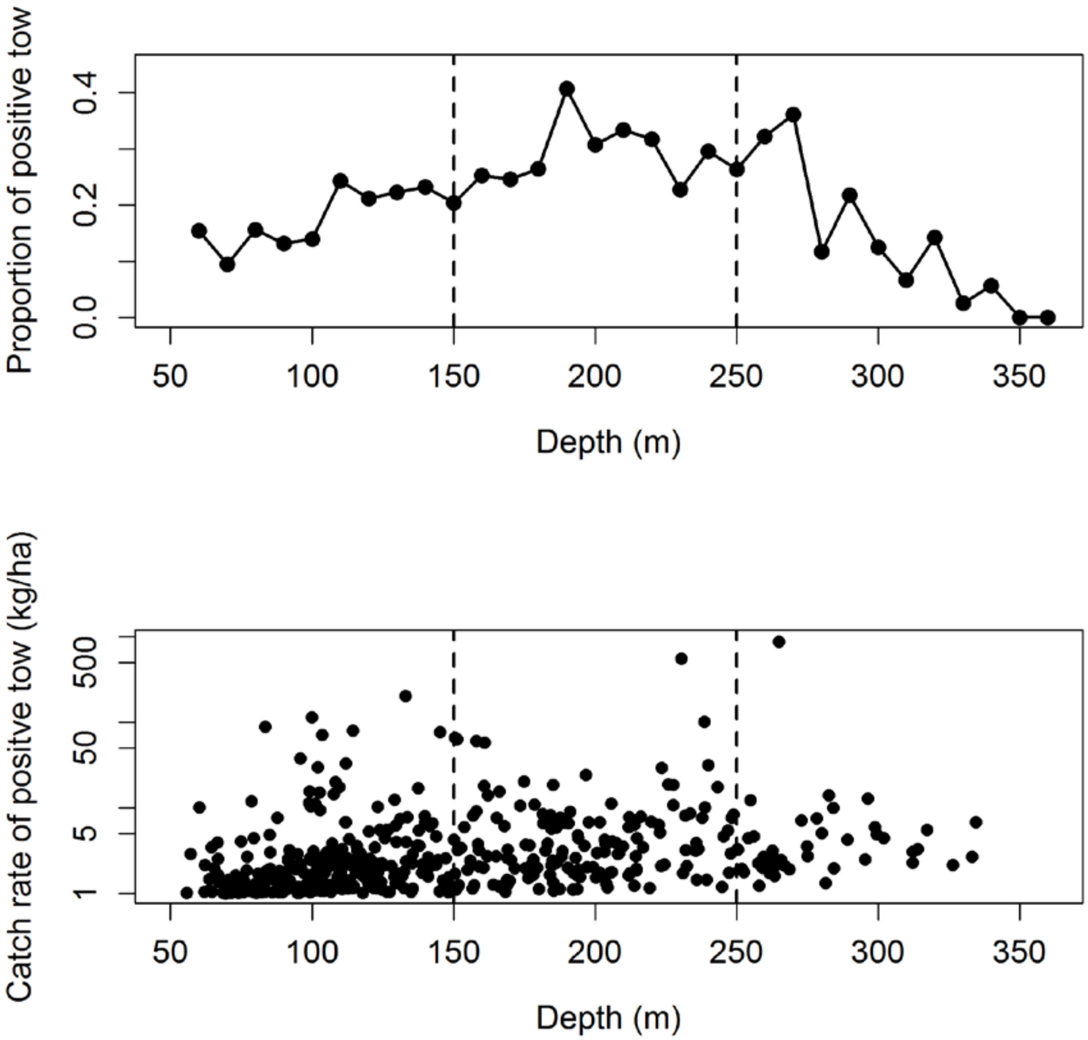


Figure 38. Plots of the proportion of positive tows (top panel) and the raw catch rates of positive tows (bottom panel) by depth zones (10m interval) for NWFSC survey data. Vertical lines show 150 and 250 depths. Note that y axis on the bottom panel is in log-scale.

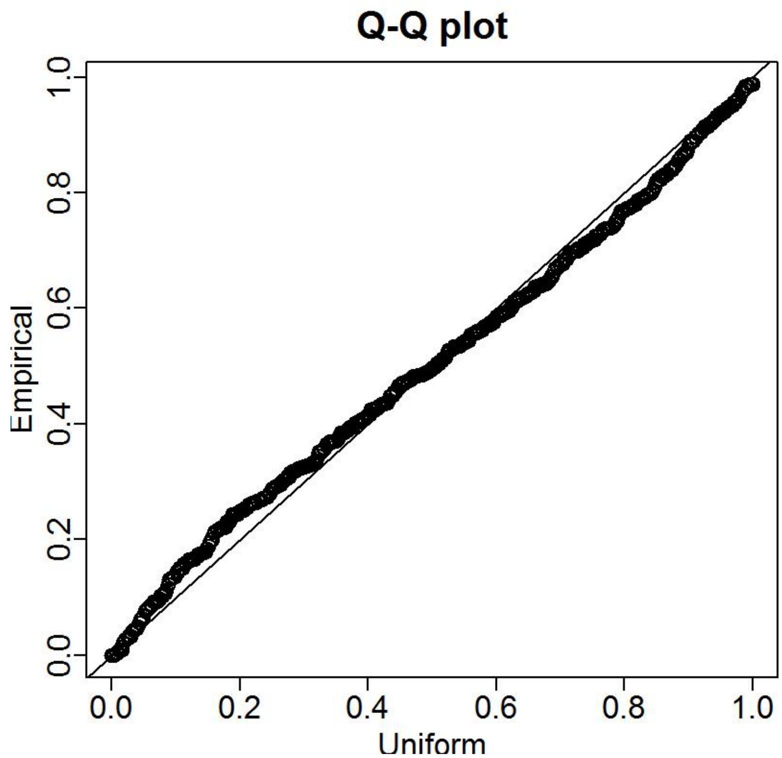


Figure 39. A Bayesian Q-Q plot used to validate the goodness of fit of the stratified delta-GLMM for the NWFSC trawl survey between 2003 and 2014.

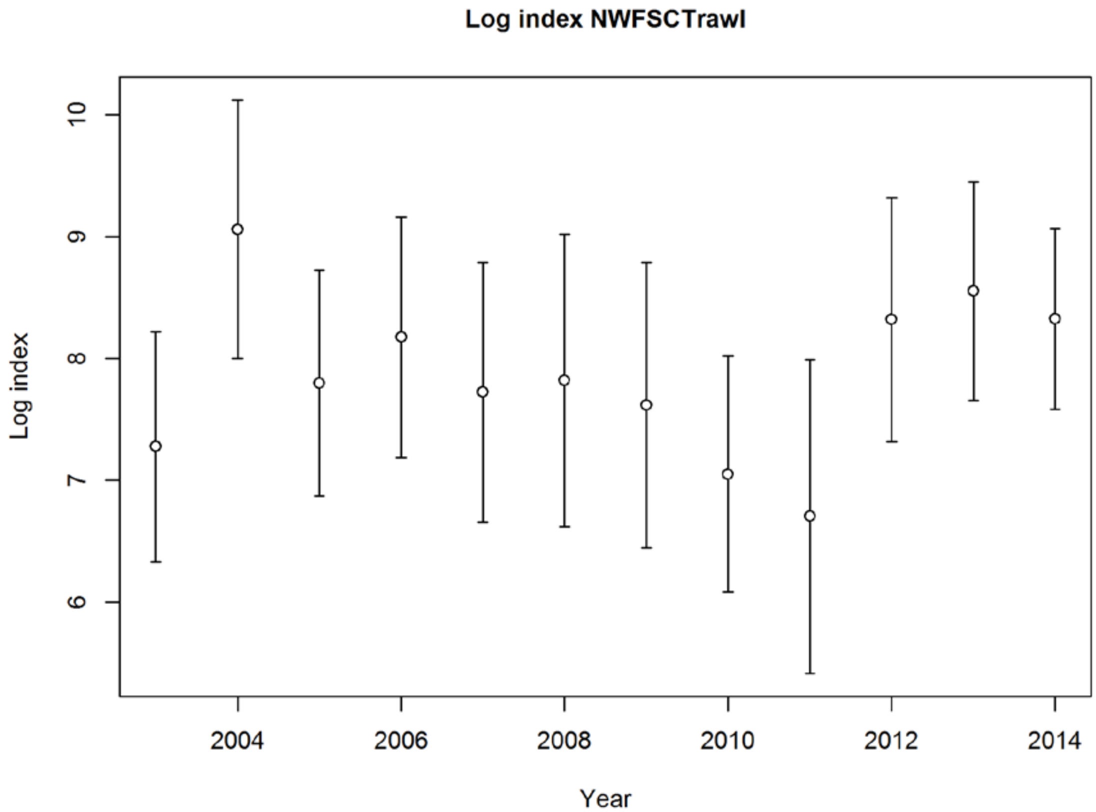


Figure 40. Estimated biomass (mt in log scale) from the GLMM analysis for NWFSC trawl survey between 2003 and 2014.

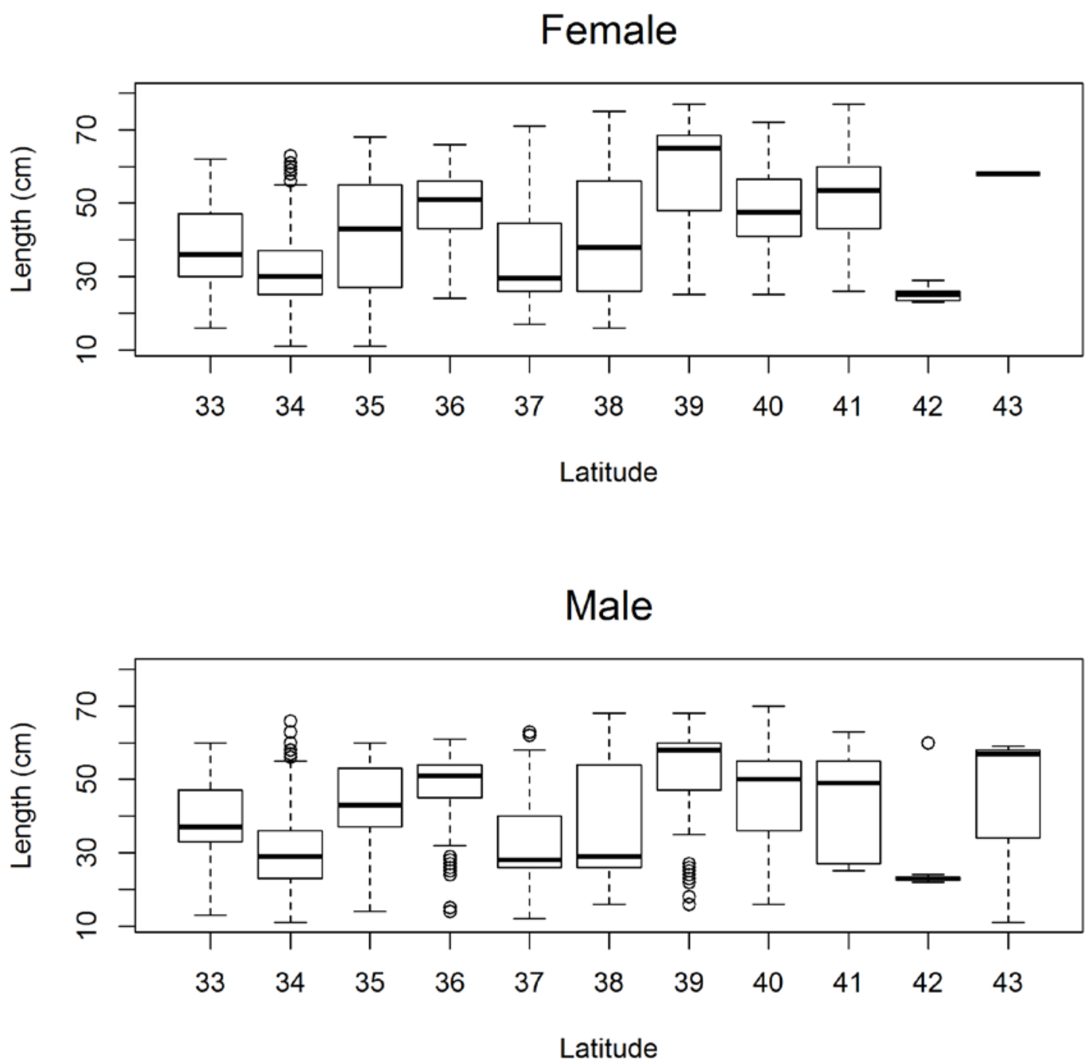


Figure 41. Comparison box plots of raw length data from NWFSC survey data by sex and by latitude.

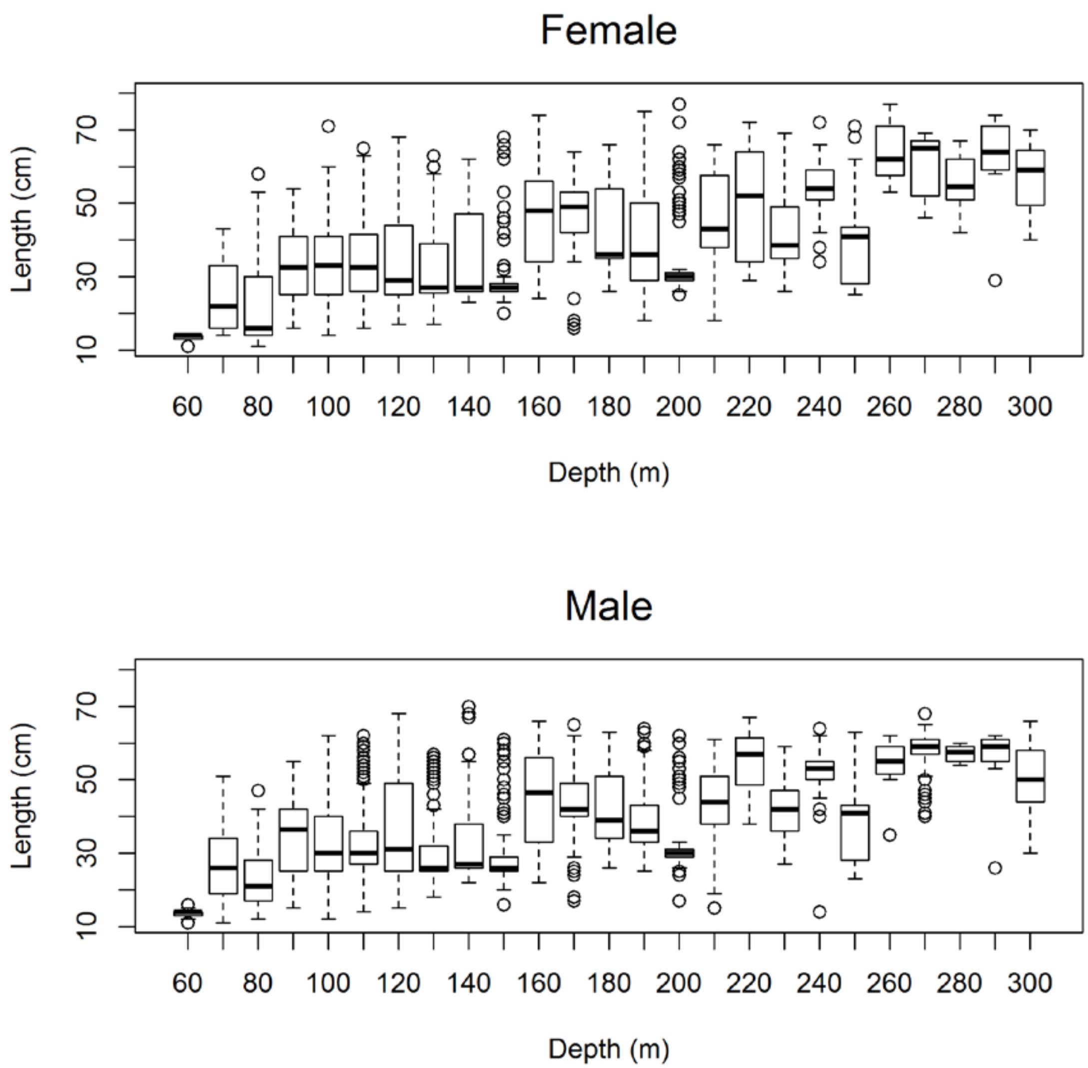


Figure 42. Comparison box plots of raw length data from NWFSC survey data by sex and by depth zones (10m interval). Data from depths less than 60m and greater than 300 were grouped into 60m and 300m bins, respectively.

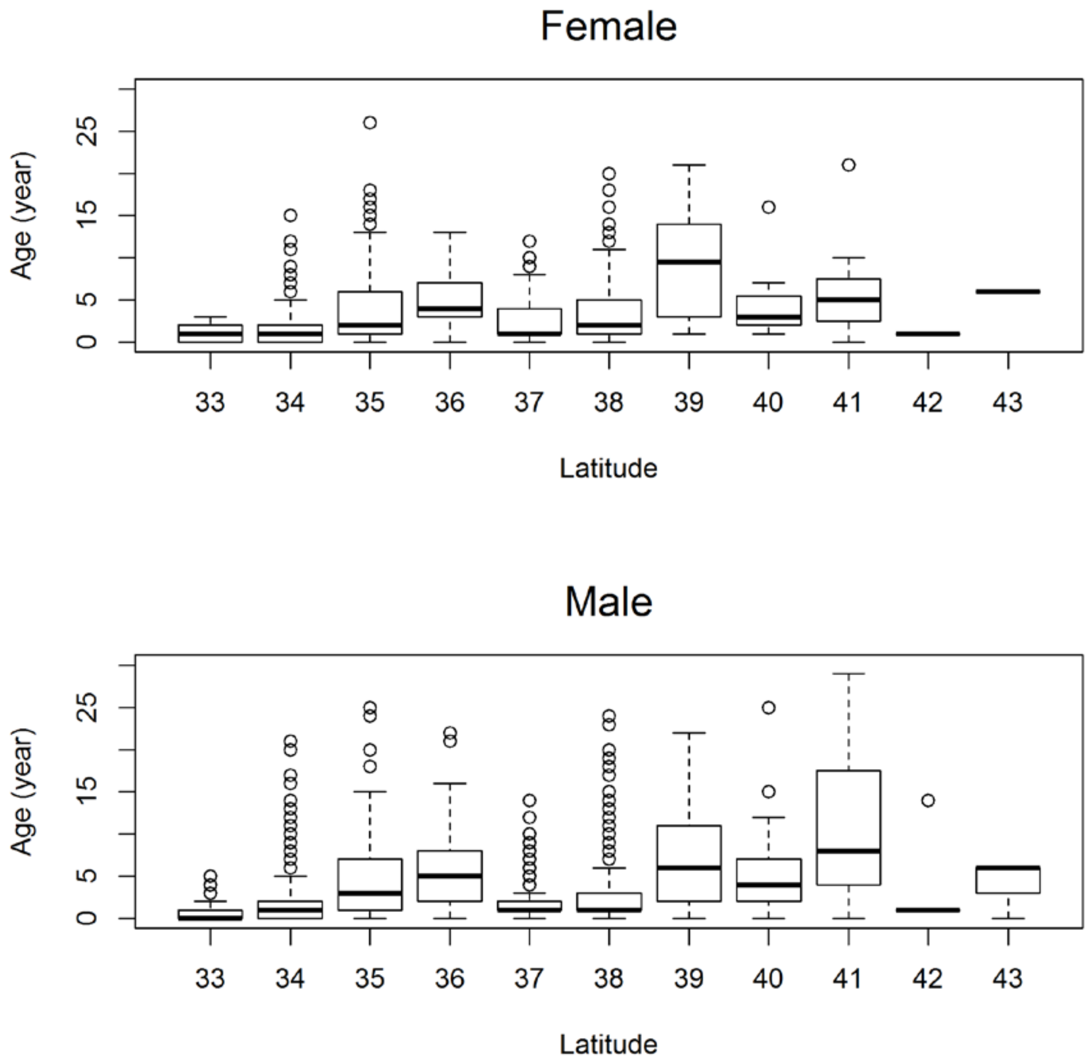


Figure 43. Comparison box plots of raw age data from NWFSC survey data by sex and by latitude.

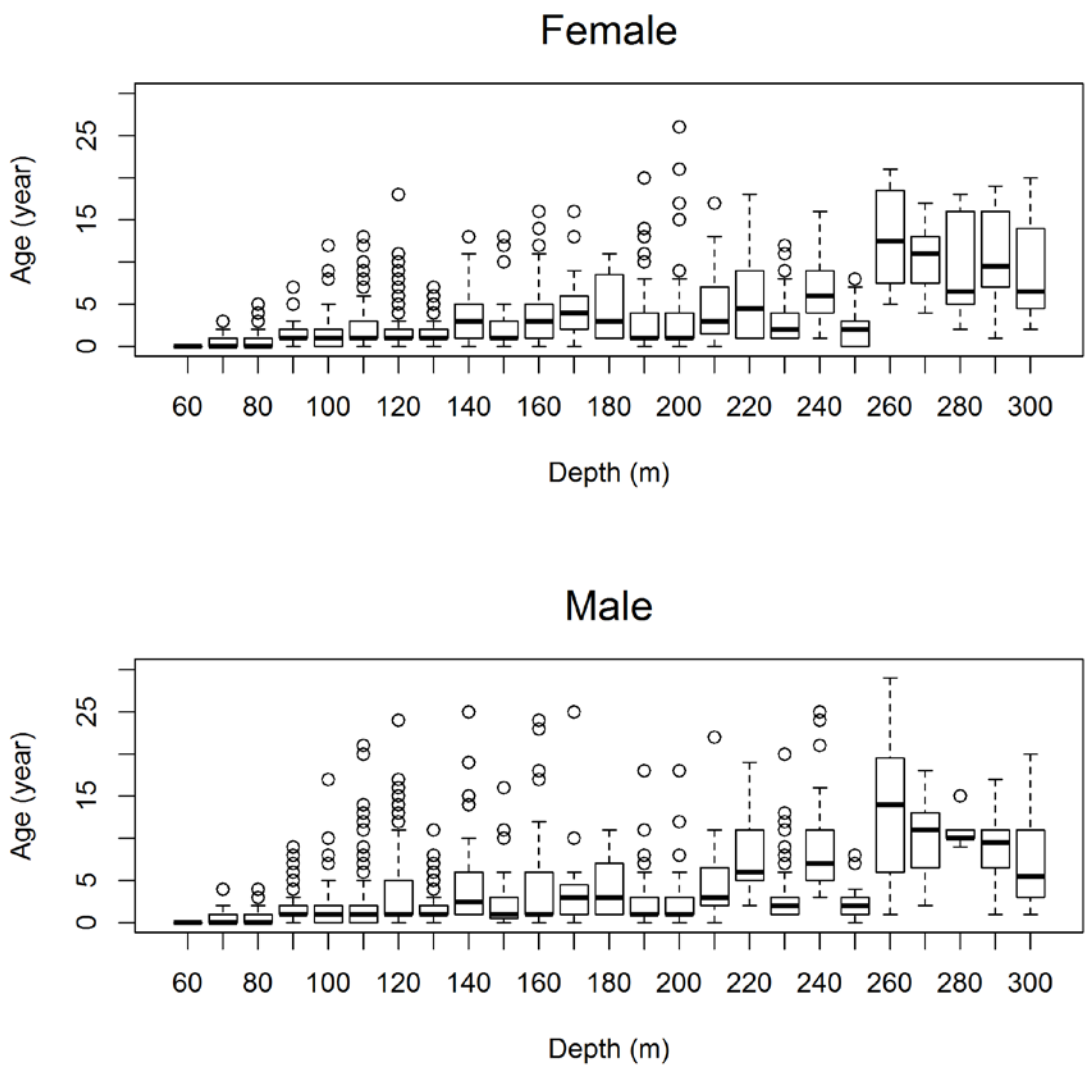


Figure 44. Comparison box plots of raw age data from NWFSC survey data by sex and by depth zones (10m interval). Data from depths less than 60m and greater than 300 were grouped into 60m and 300m bins, respectively.

Figure 45. Plots of length frequency distributions of females (red) and males (blue) from the NWFSC trawl survey between 2003 and 2014.

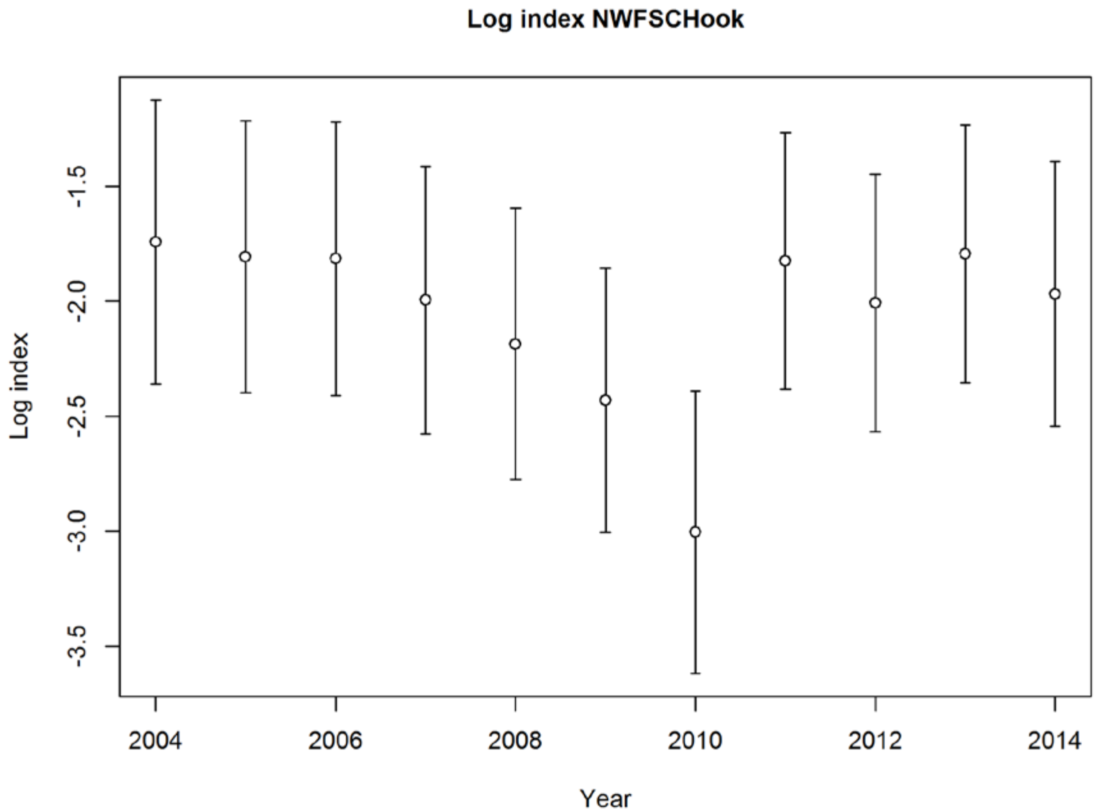


Figure 46. CPUE indices of Bocaccio abundance from the NWFSC hook-and-line survey in the California Bight.

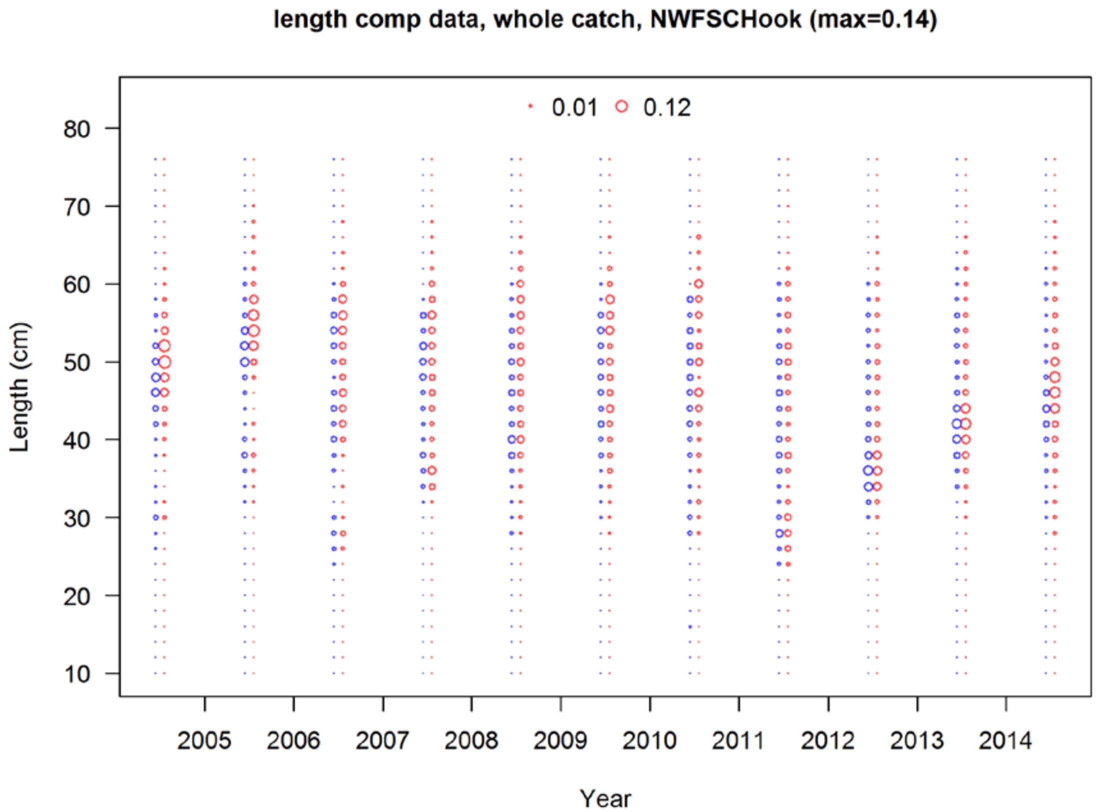


Figure 47. Plots of length frequency distributions of females (red) and males (blue) from the NWFSC hook-and-line survey between 2004 and 2014.

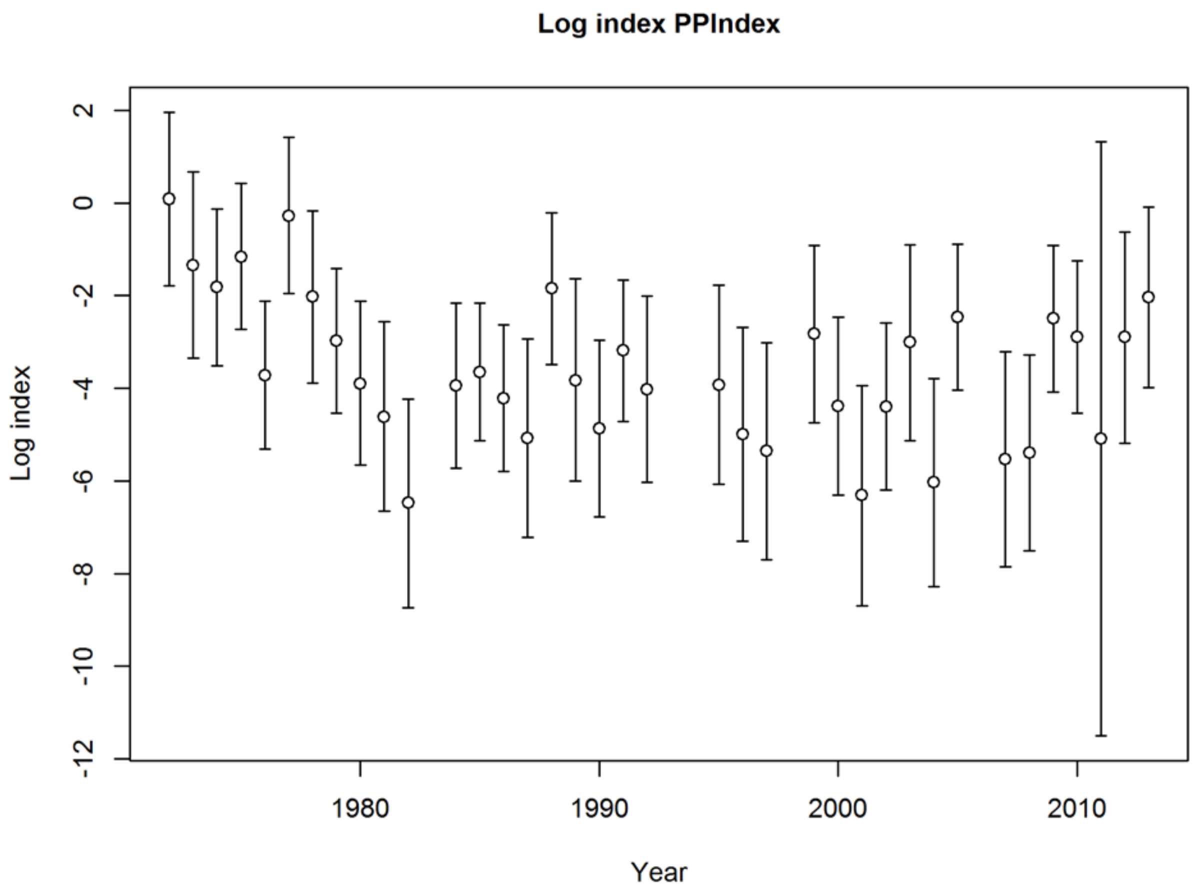


Figure 48. Juvenile indices (in log scale) of Bocaccio recruitment from the power plant impingement.

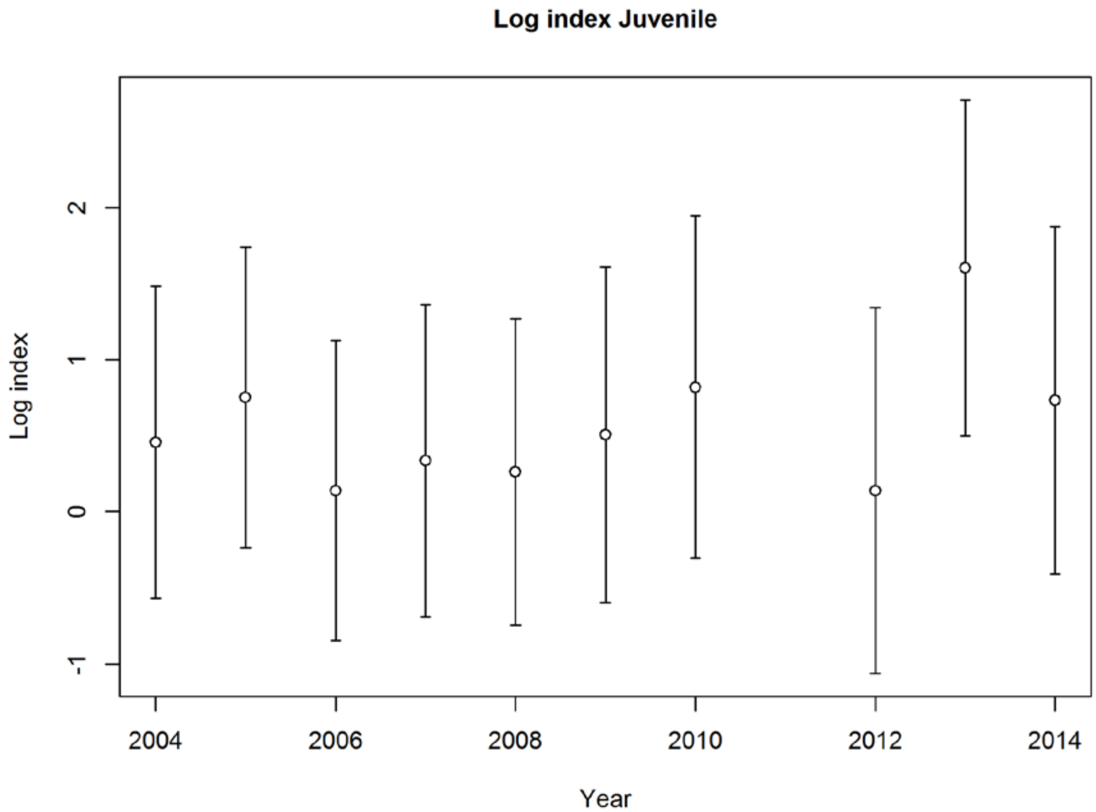


Figure 49. Juvenile indices (in log scale) of Bocaccio from the pelagic juvenile trawl survey.

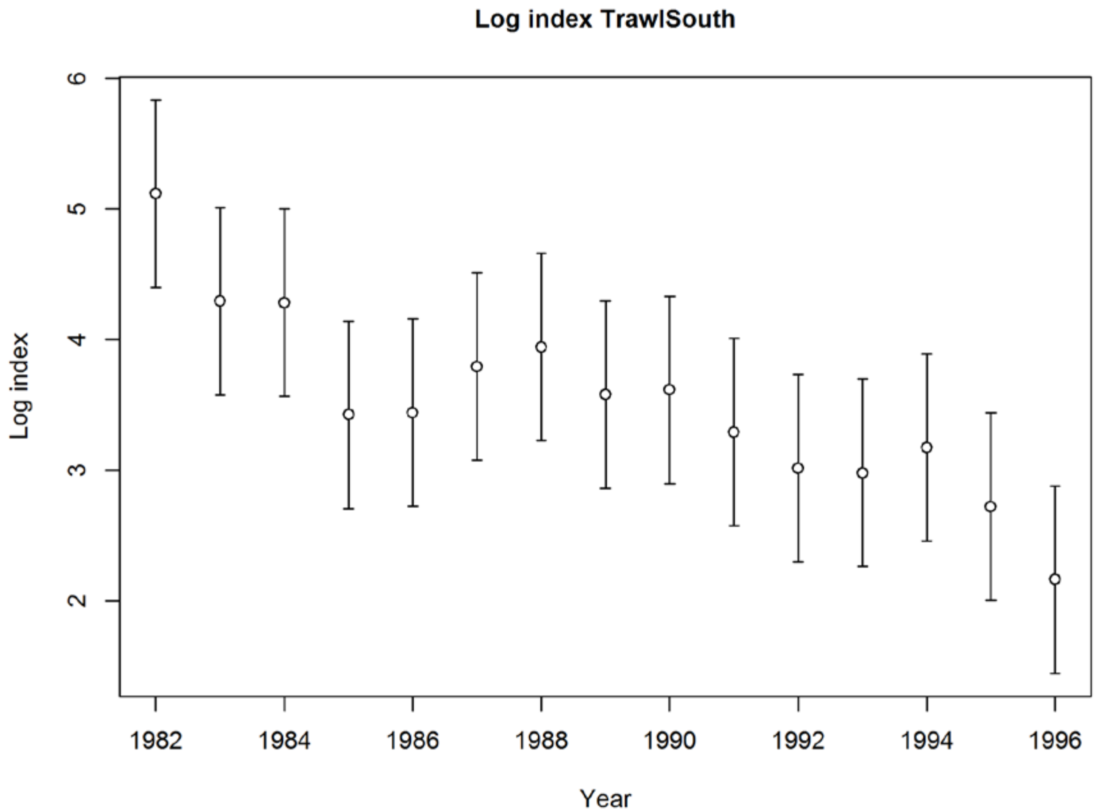


Figure 50. Trawl fishery CPUE index (in log scale) of Bocaccio abundance developed in Ralston (1998).

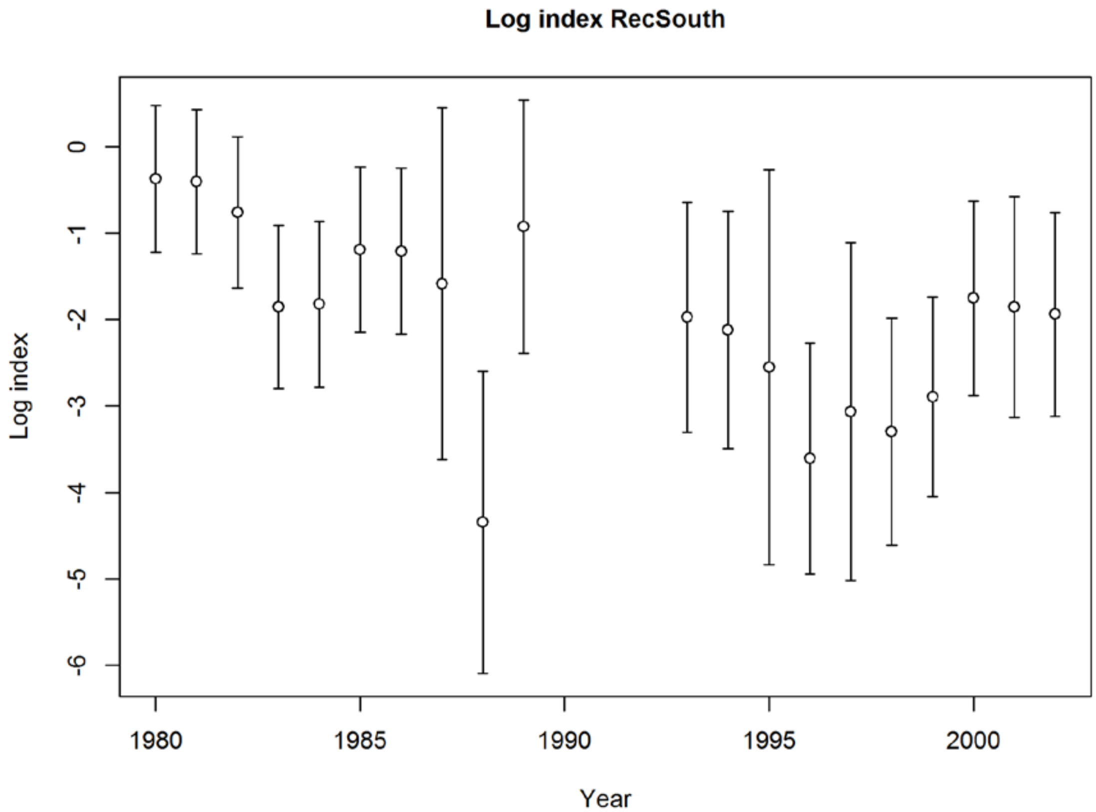


Figure 51. CPUE indices of Bocaccio abundance from the southern California recreational fishery.

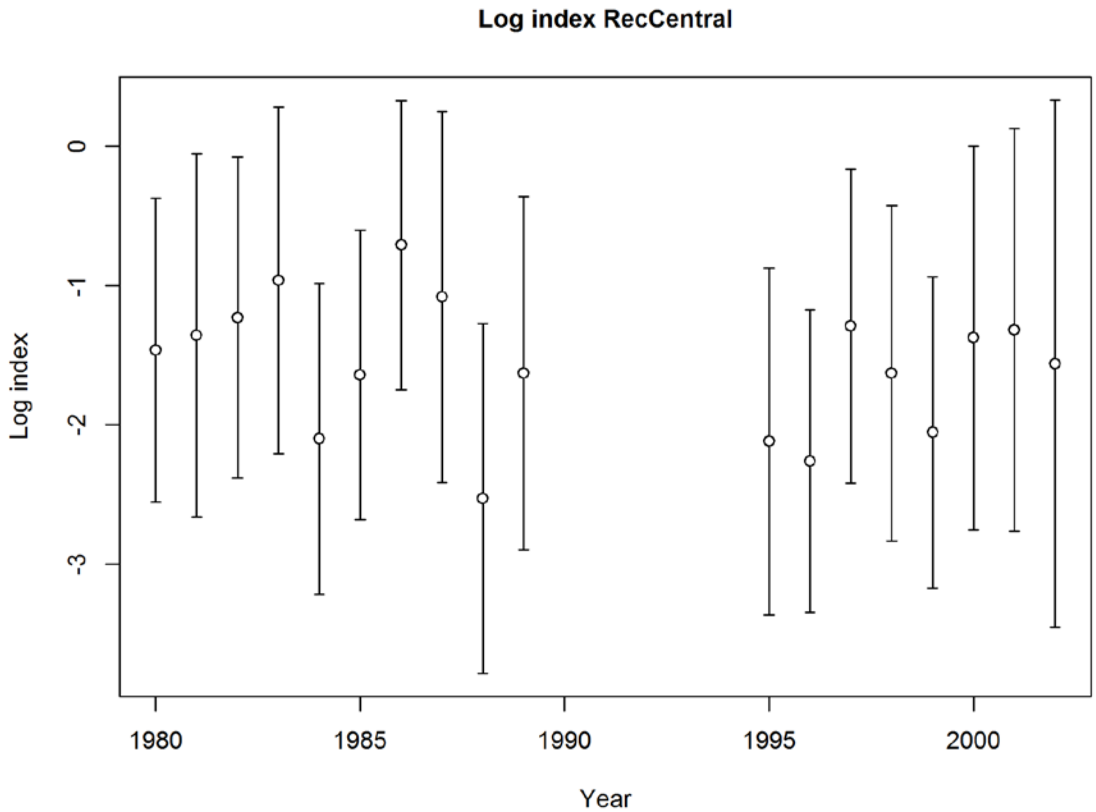


Figure 52. CPUE indices of Bocaccio abundance from the central California recreational fishery.

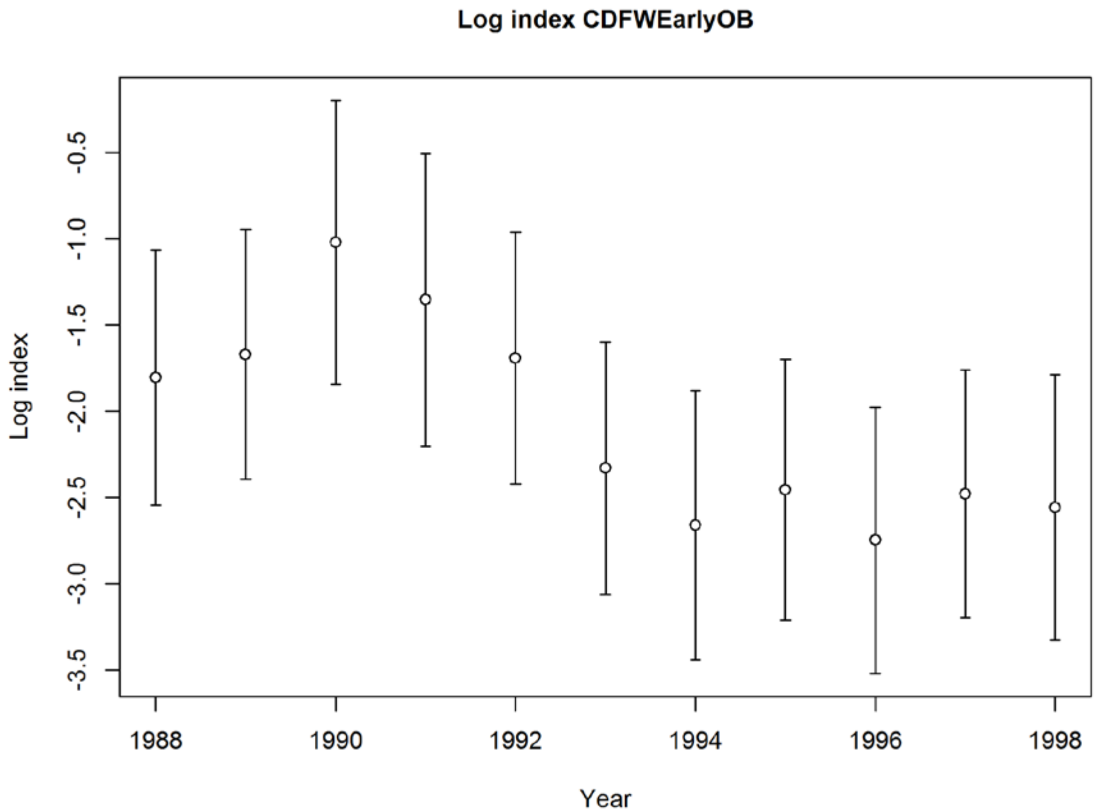


Figure 53. CPUE indices of Bocaccio abundance from the early years of the southern California onboard recreational survey.

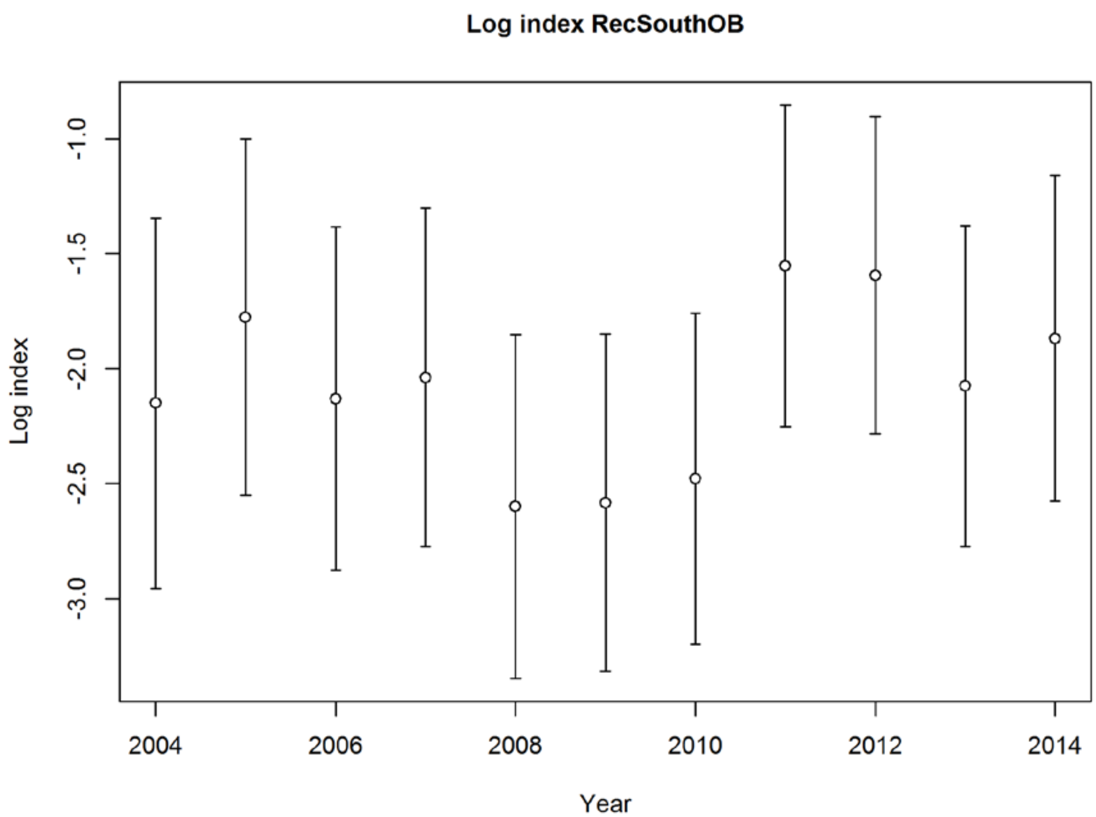


Figure 54. CPUE indices of Bocaccio abundance from the southern California onboard recreational survey.

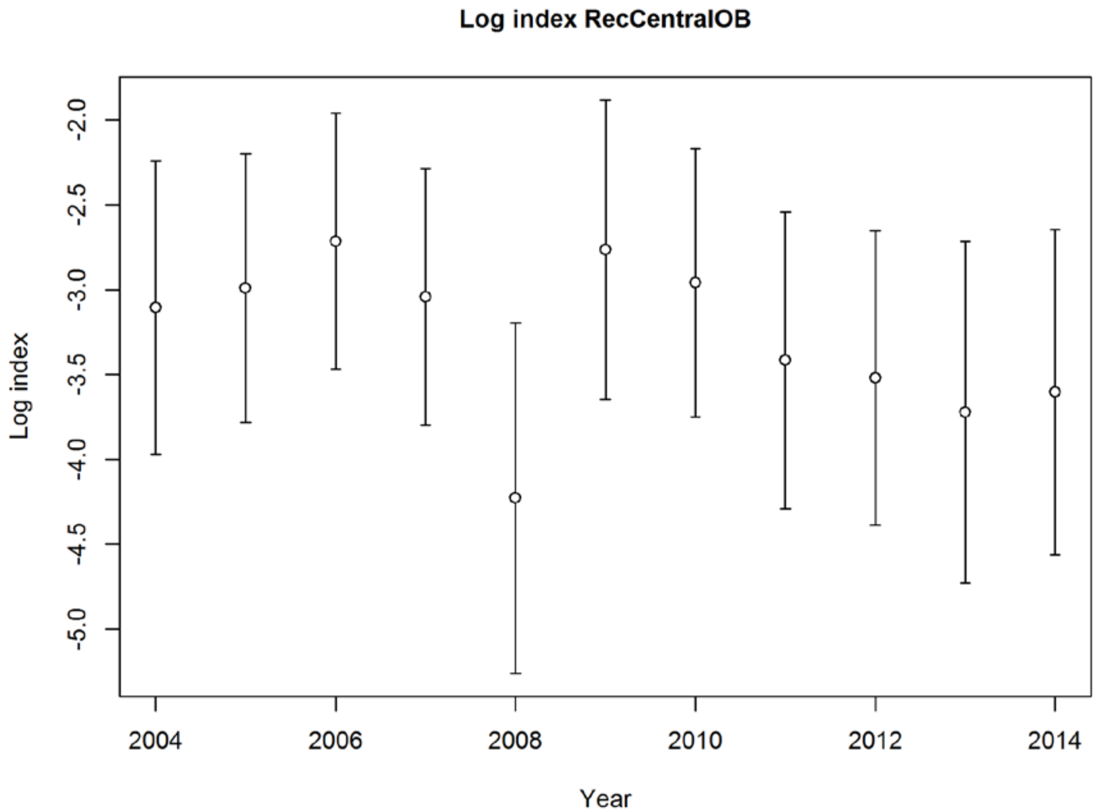


Figure 55. CPUE indices of Bocaccio abundance from the central California onboard recreational survey.

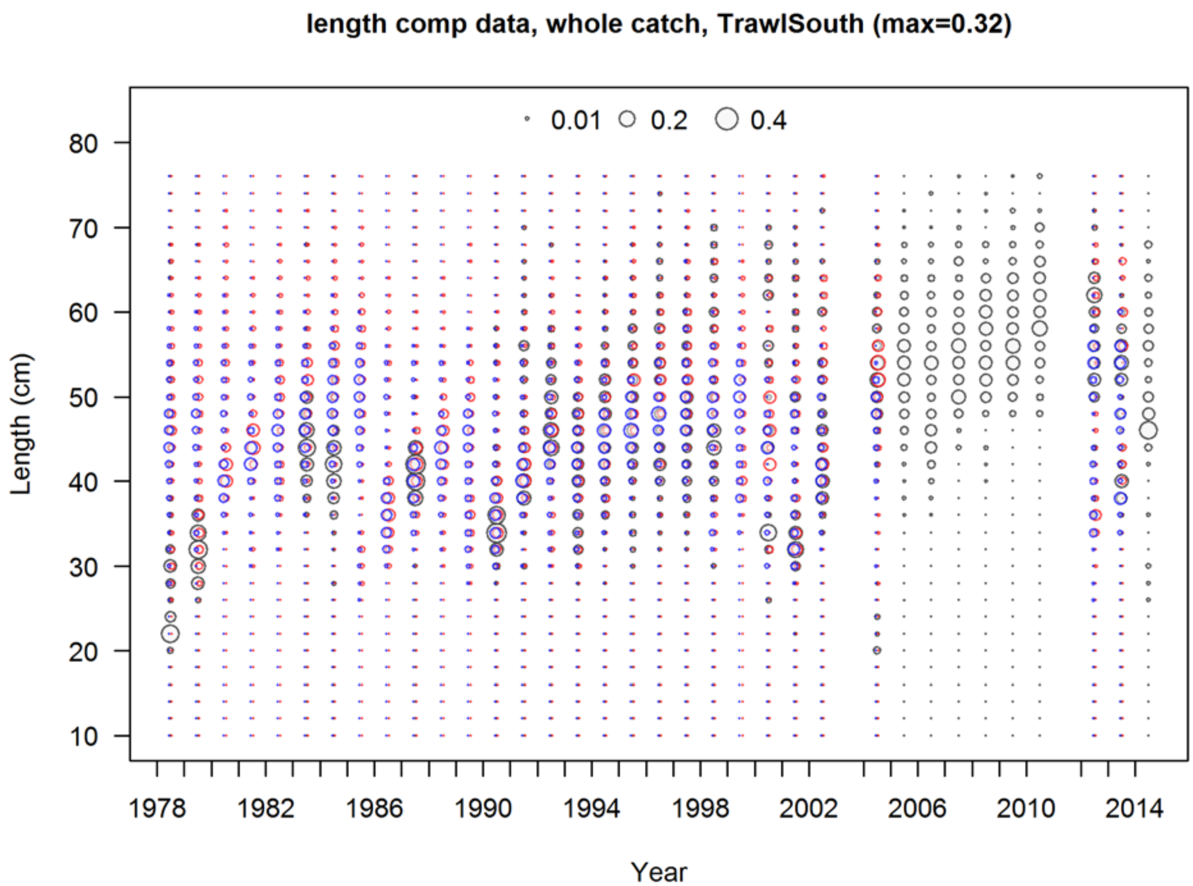


Figure 56. Plots of length frequency distributions of females (red), males (blue), and unsexed (black) fish from the Southern California trawl fishery between 1978 and 2014.

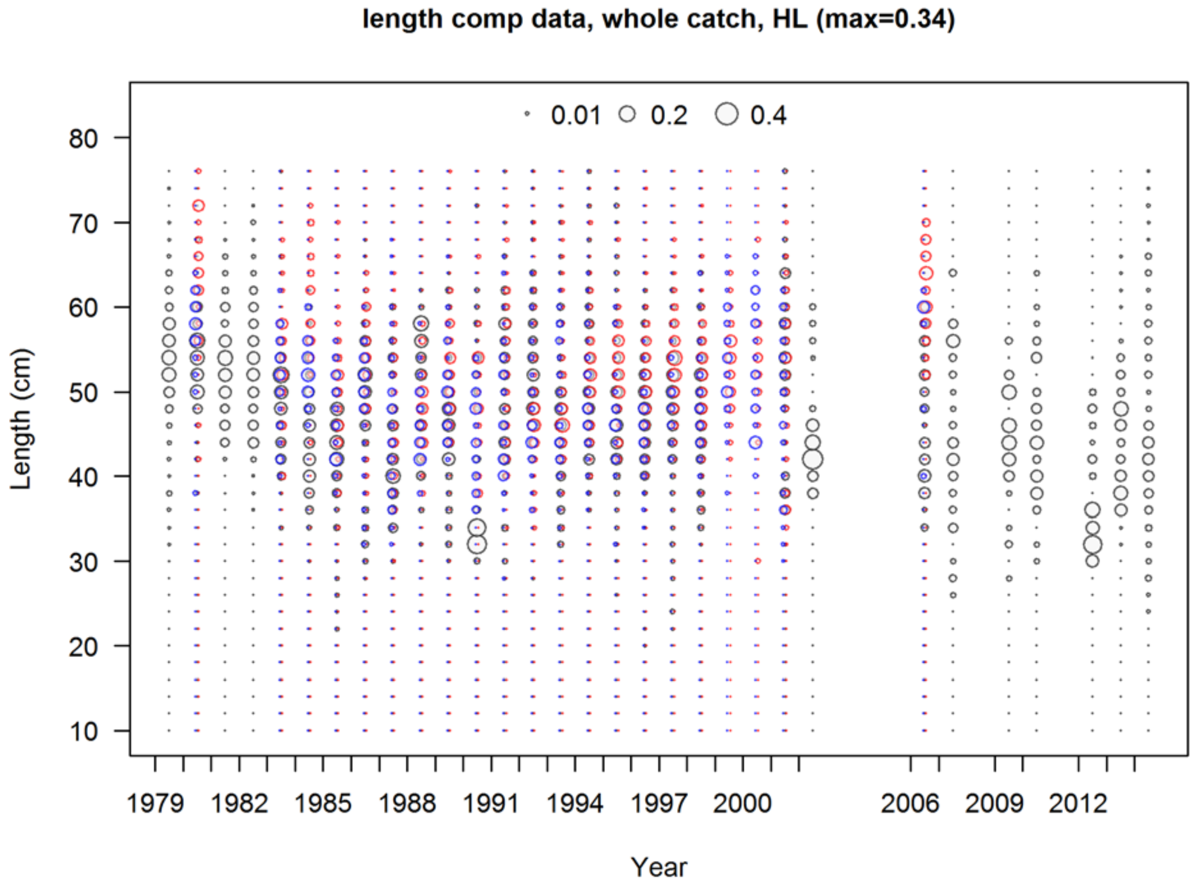


Figure 57. Plots of length frequency distributions of females (red), males (blue), and unsexed (black) fish from the hook-and-line fishery between 1979 and 2014.

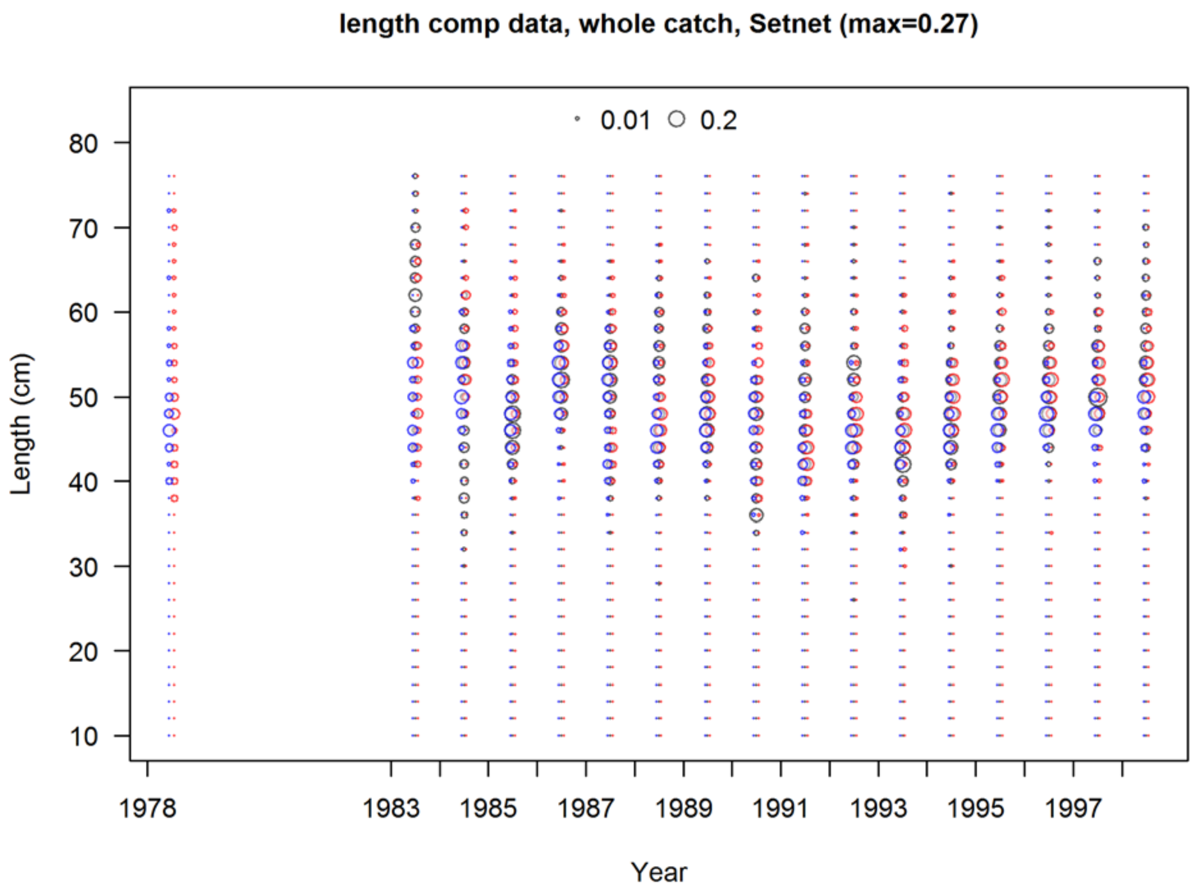


Figure 58. Plots of length frequency distributions of females (red), males (blue), and unsexed (black) fish from the setnet fishery between 1978 and 1998.

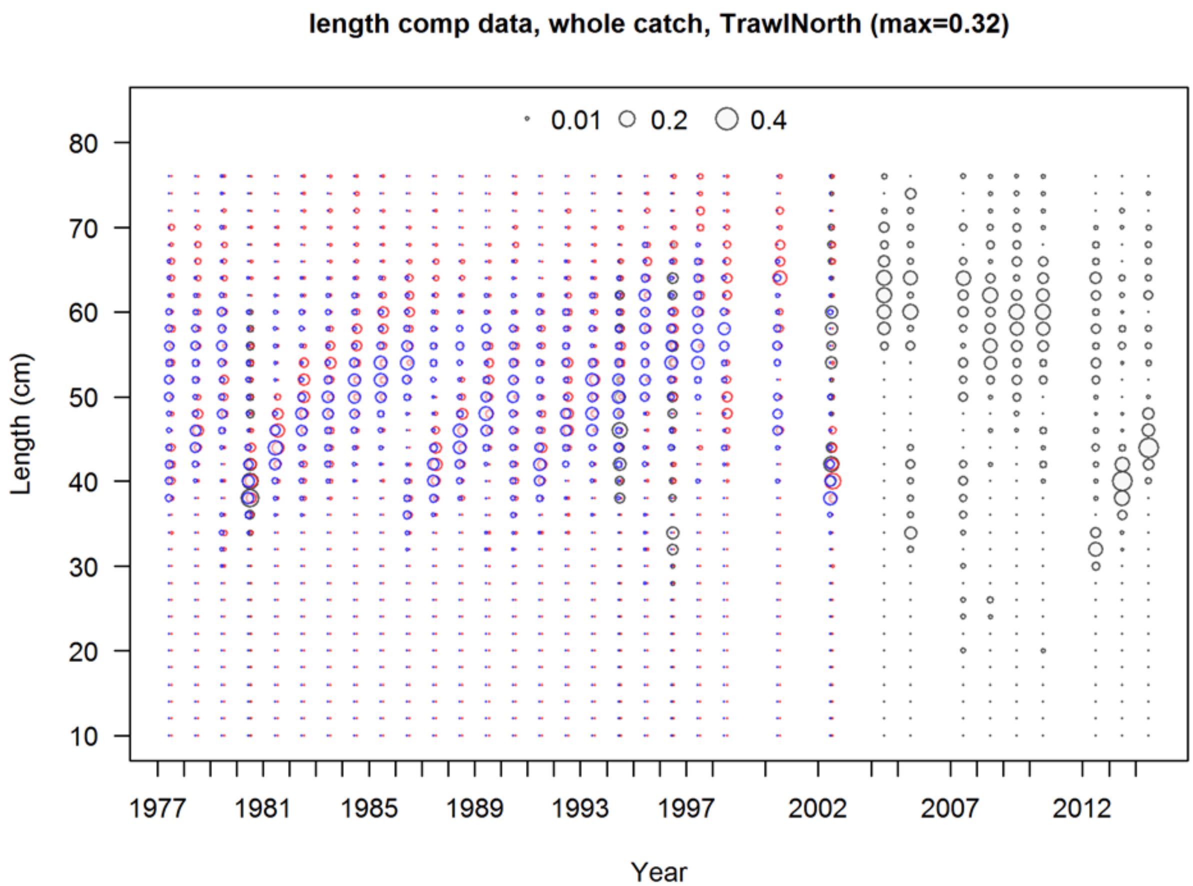


Figure 59. Plots of length frequency distributions of females (red), males (blue), and unsexed (black) fish from the Northern California trawl fishery between 1977 and 2014.

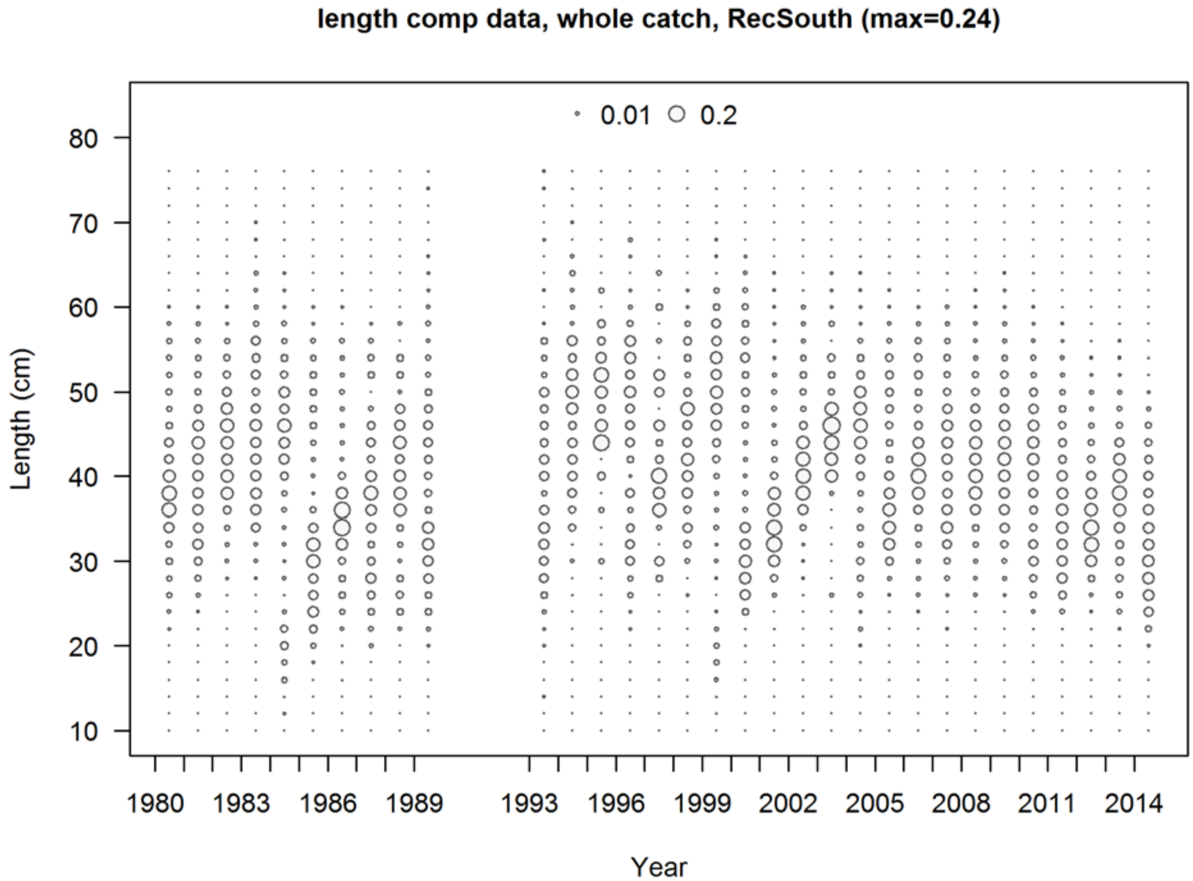


Figure 60. Plots of length frequency distributions of unsexed fish from the Southern California recreational fishery between 1980 and 2014.

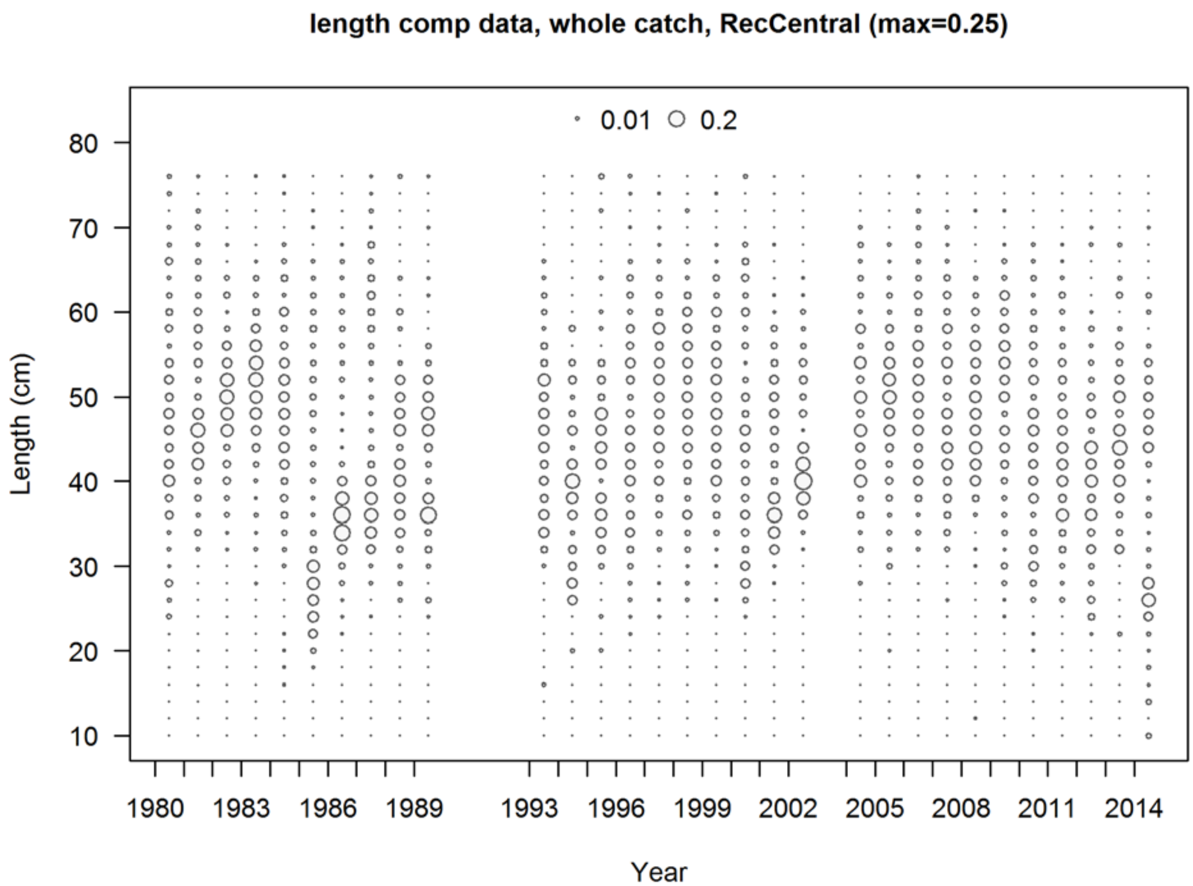


Figure 61. Plots of length frequency distributions of unsexed fish from the central California recreational fishery between 1980 and 2014.

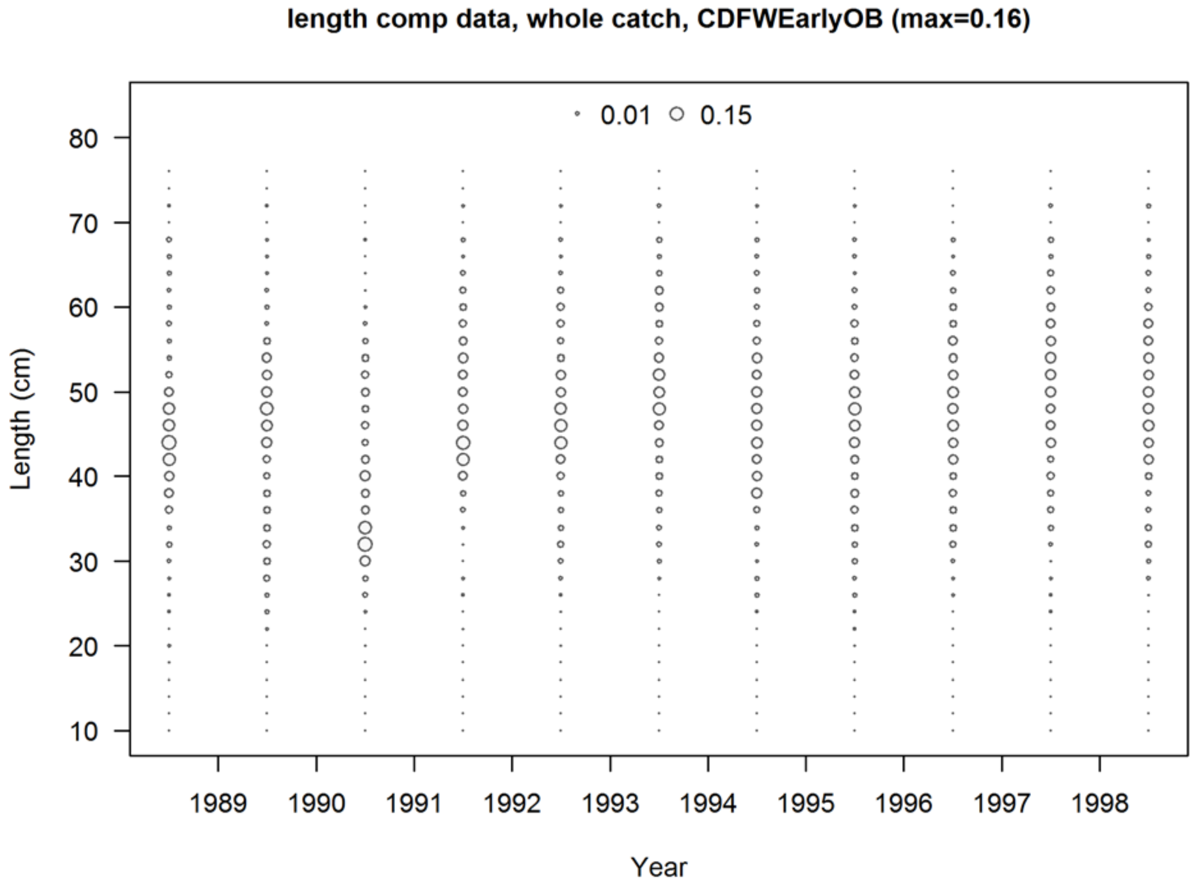


Figure 62. Plots of length frequency distributions of unsexed fish from the CFGCPUE survey between 1987 and 1998.

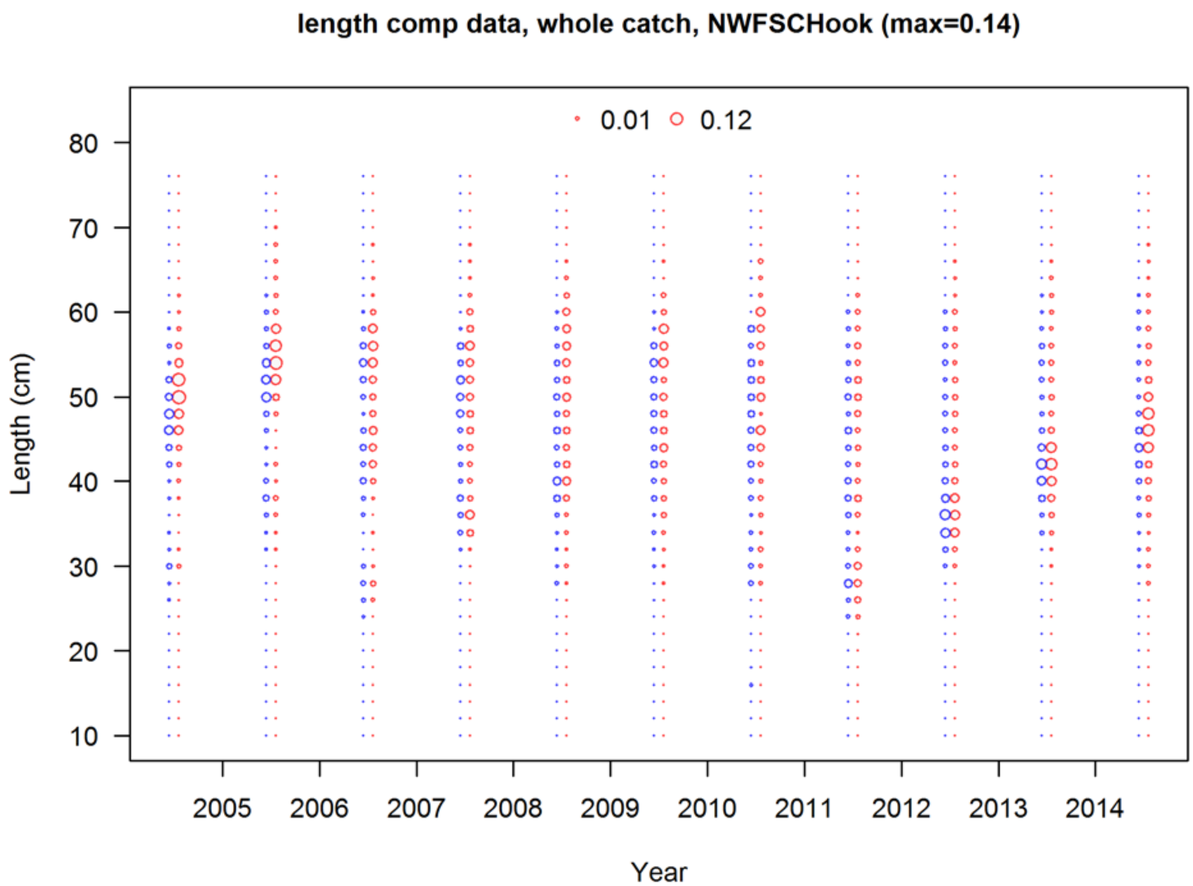


Figure 63. Plots of length frequency distributions of females (red) and males (blue) from the NWFSC hook-and-line survey between 2004 and 2012.

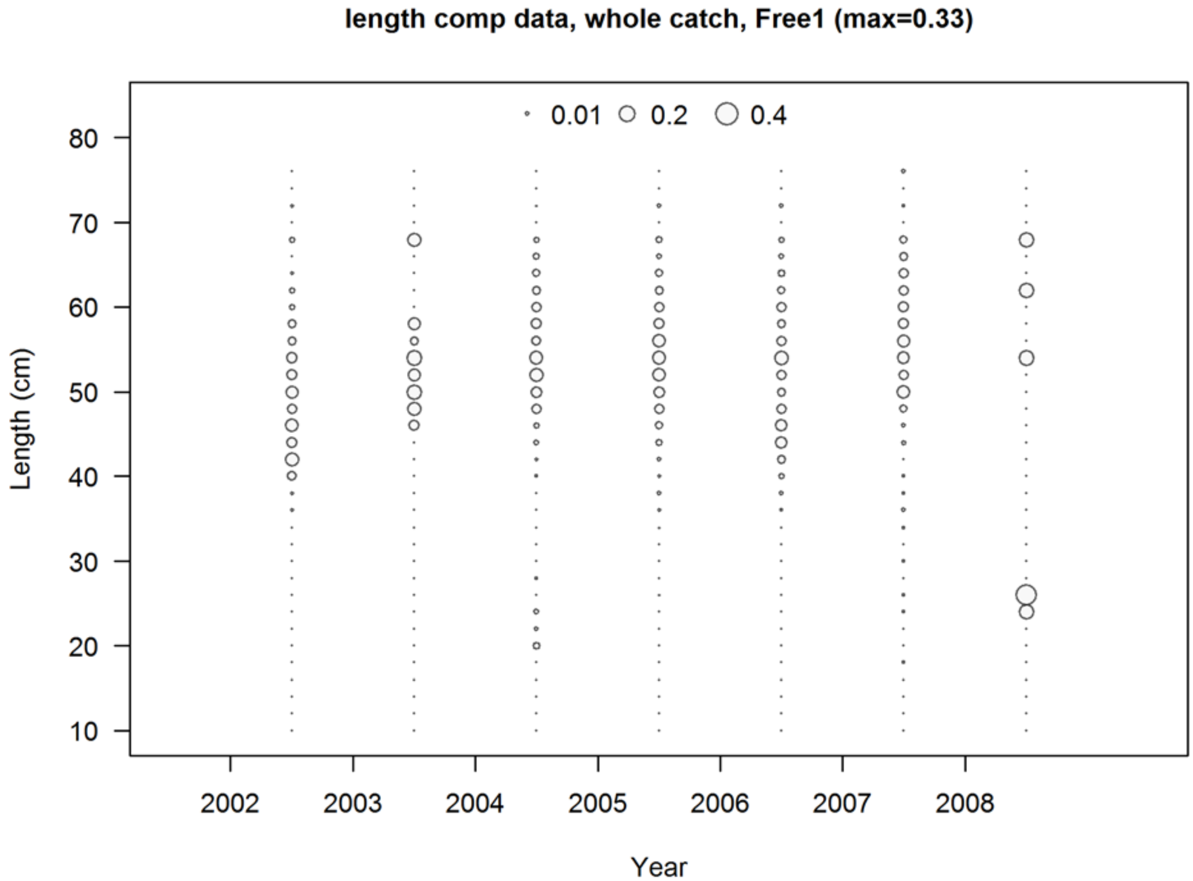


Figure 64. Plots of length frequency distributions of unsexed fish from the Free1 data between 2002 and 2008.

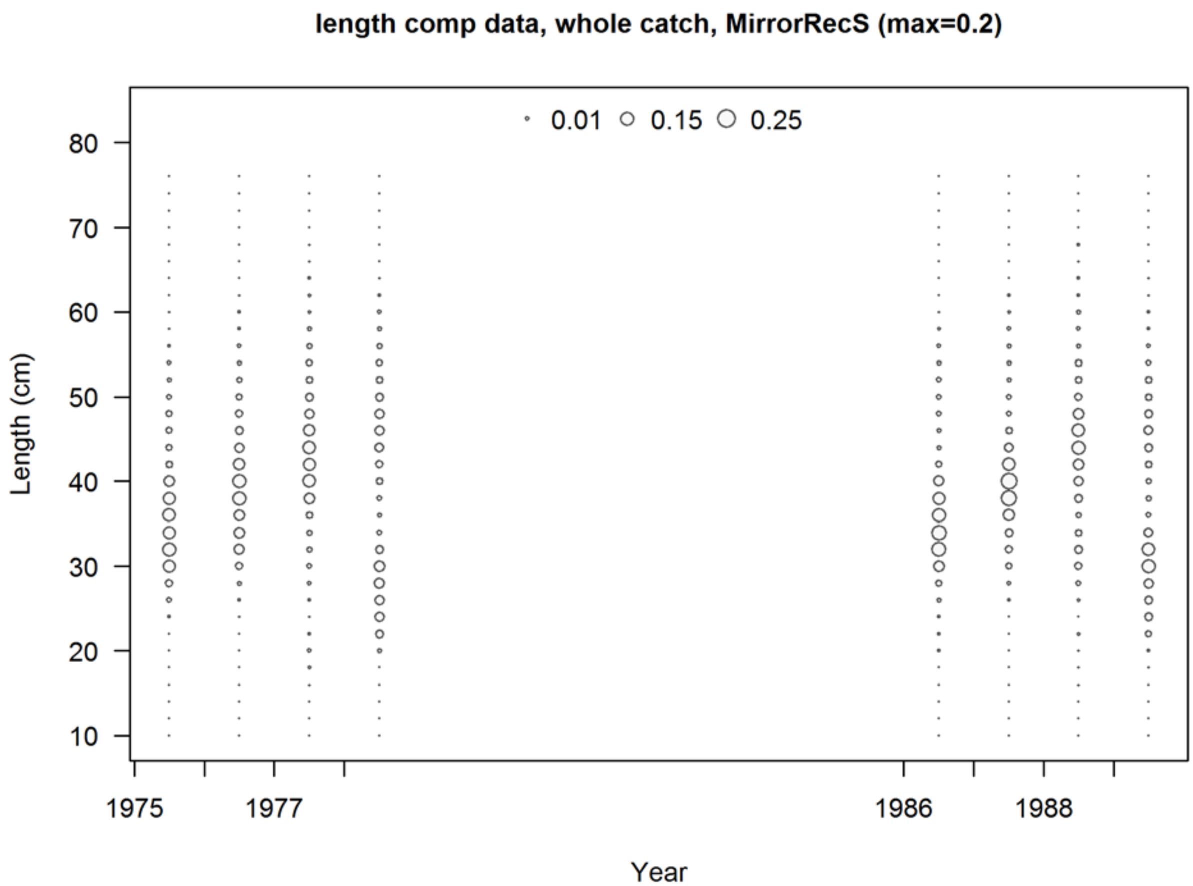


Figure 65. Plots of length frequency distributions of unsexed fish from MirrorRecS data between 1975 and 1989.

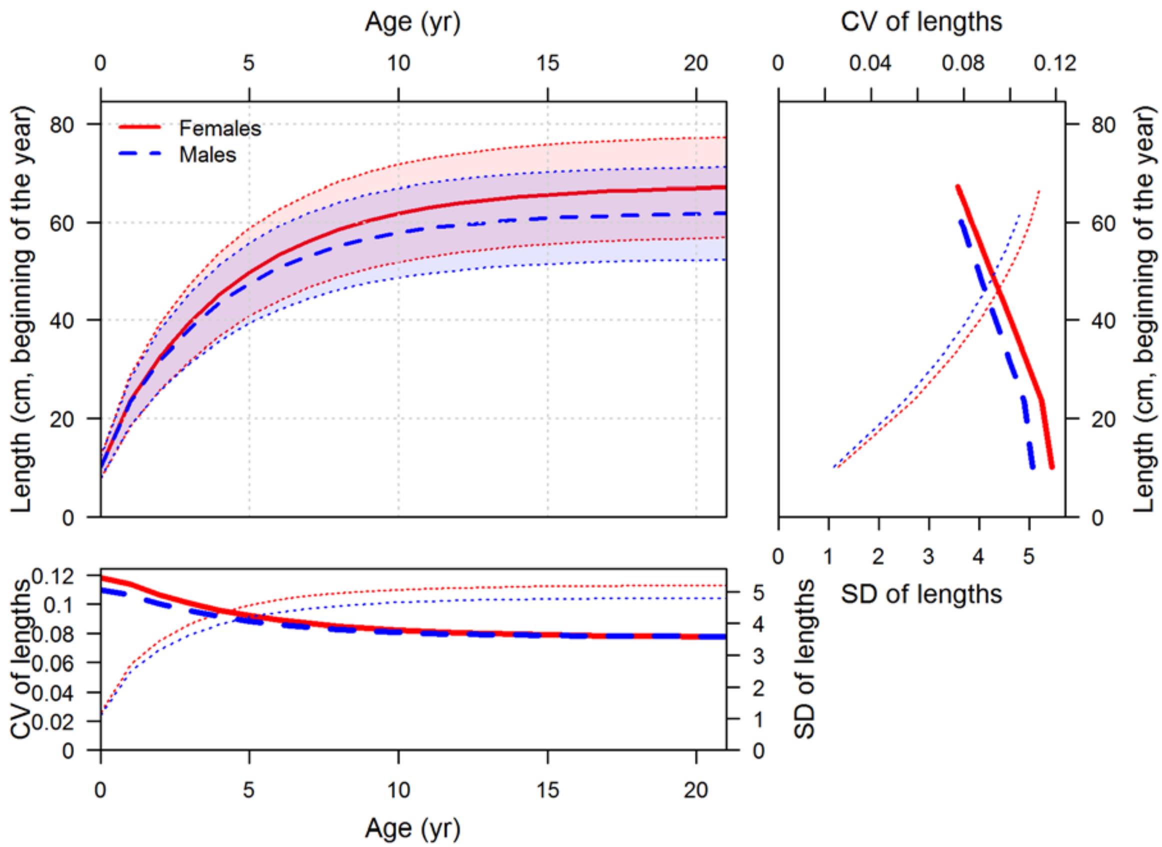


Figure 66. Estimated growth functions for both sexes and their variability. Top left: growth functions by sex; Top right: CV and SD by length; Bottom: CV and SD by age.

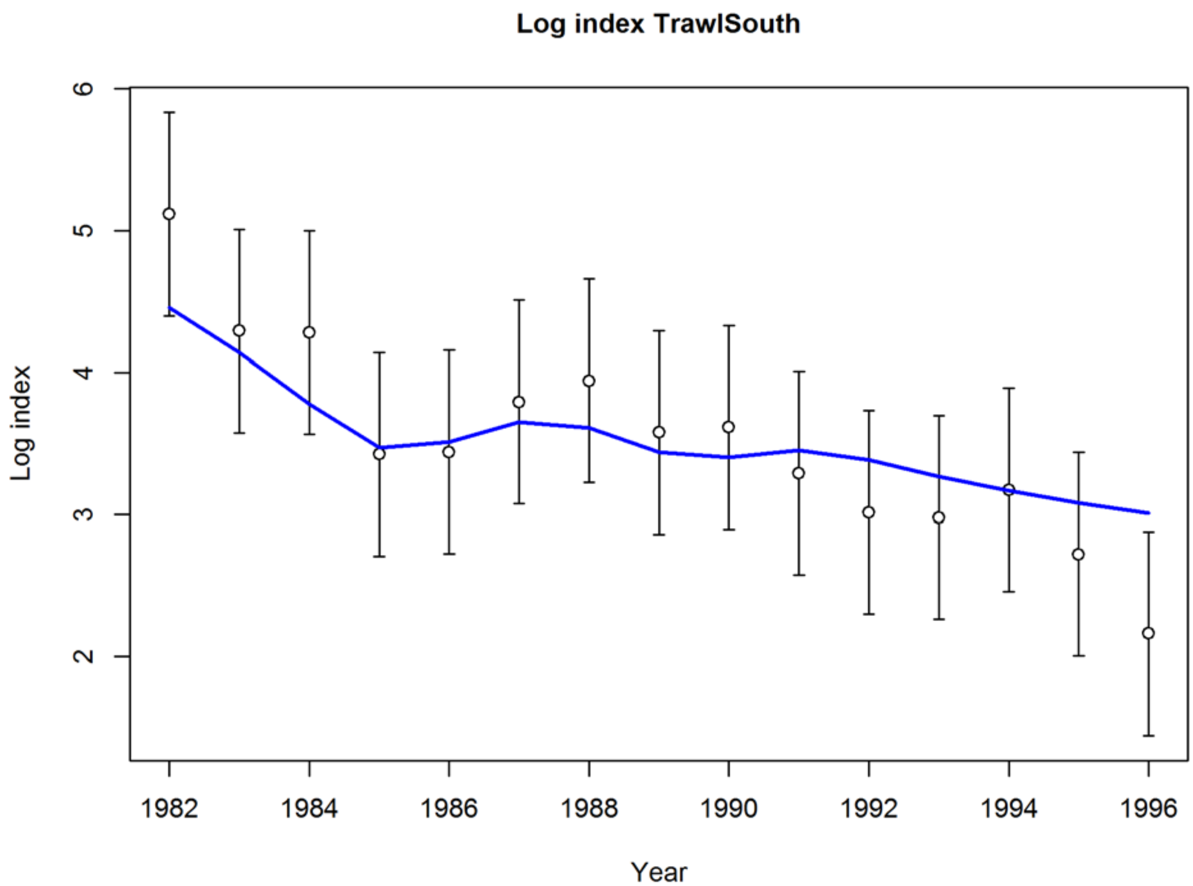


Figure 67. Observed and expected indices (in log scale) for the Southern California trawl fishery.

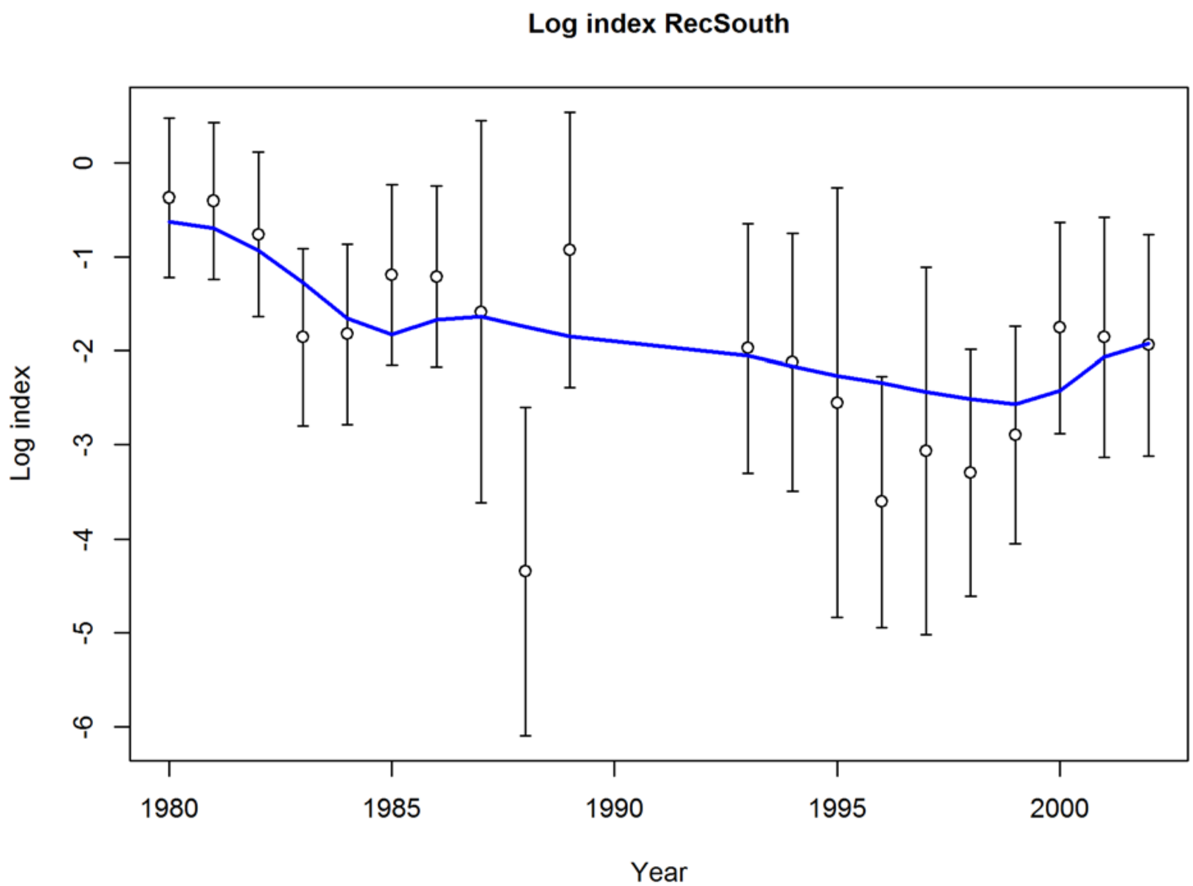


Figure 68. Observed and expected indices (in log scale) for the Southern California recreational fishery.

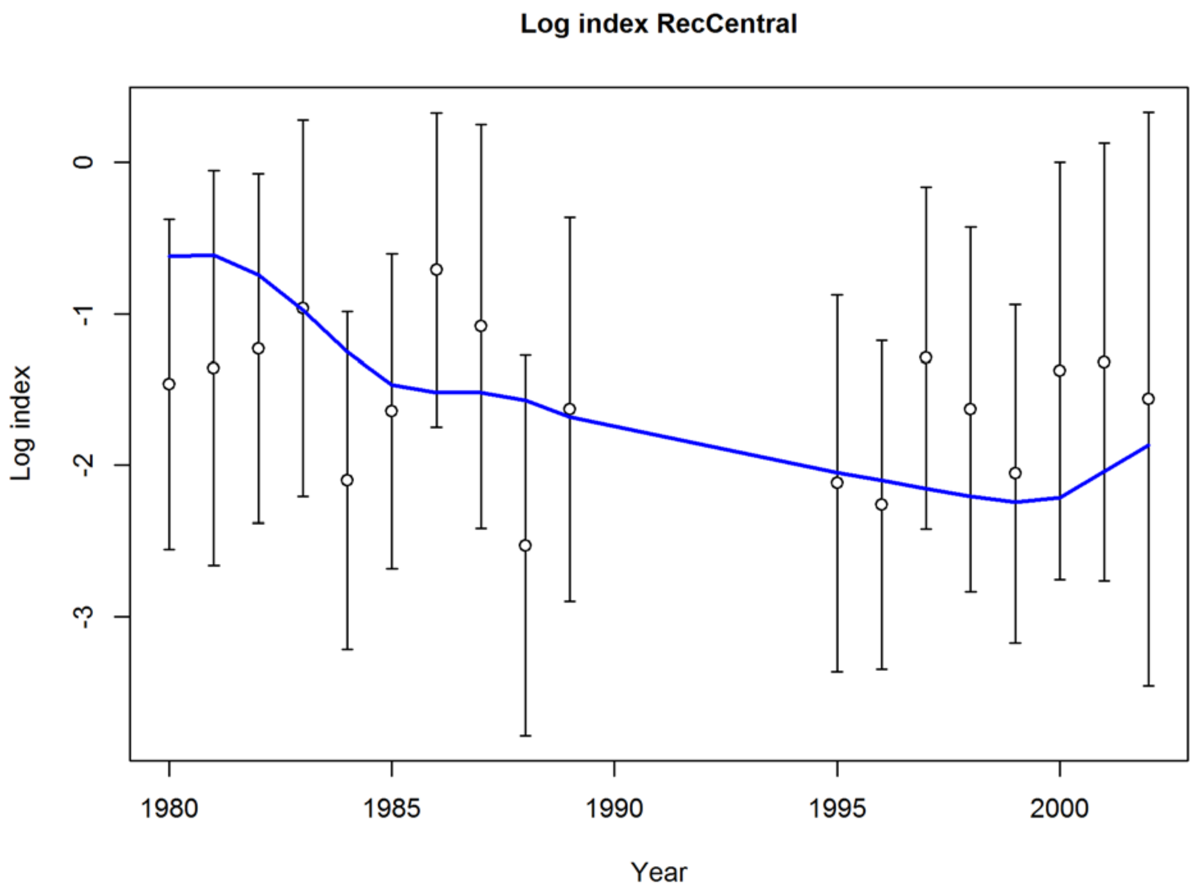


Figure 69. Observed and expected indices (in log scale) for the Central California recreational fishery.

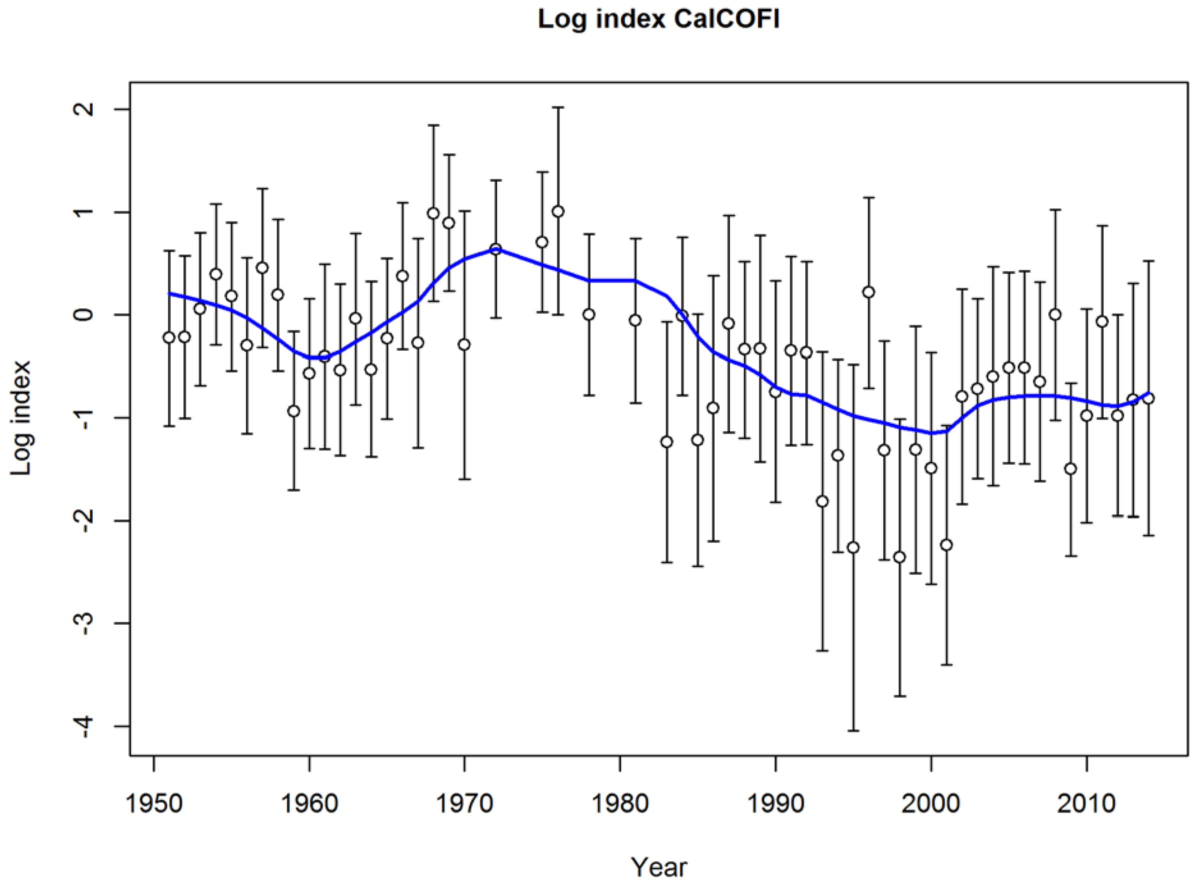


Figure 70. Observed and expected indices (in log scale) for the CalCOFI survey.

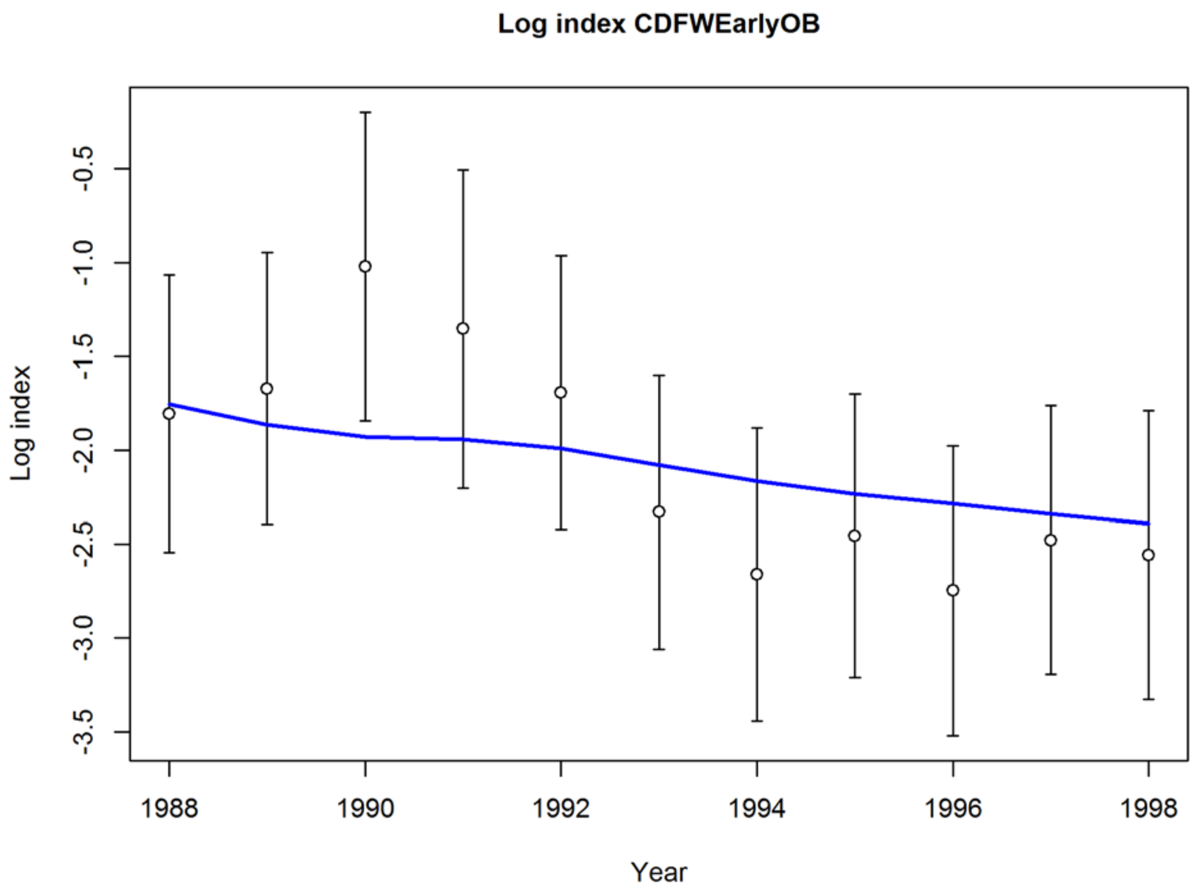


Figure 71. Observed and expected indices (in log scale) for the CDFW early year onboard observer indices.

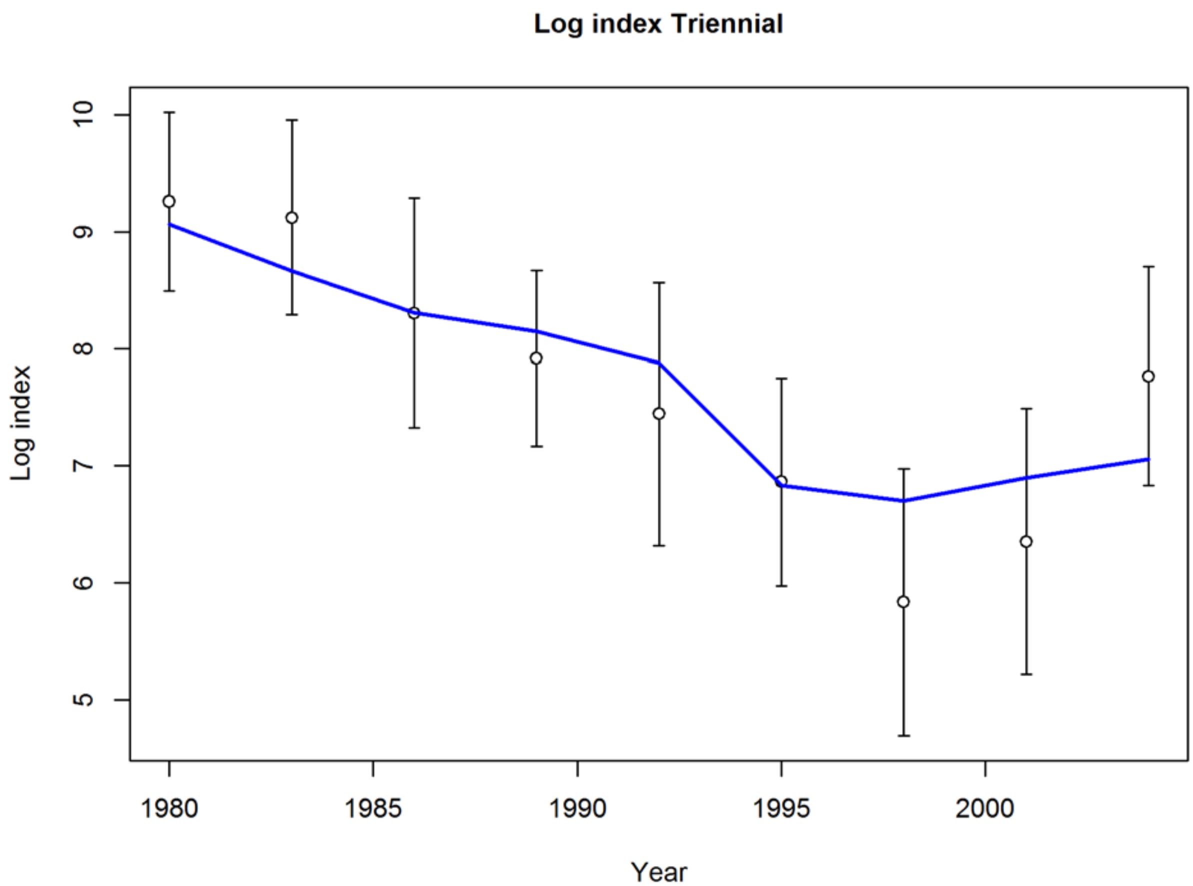


Figure 72. Observed and expected indices (in log scale) for the triennial trawl survey.

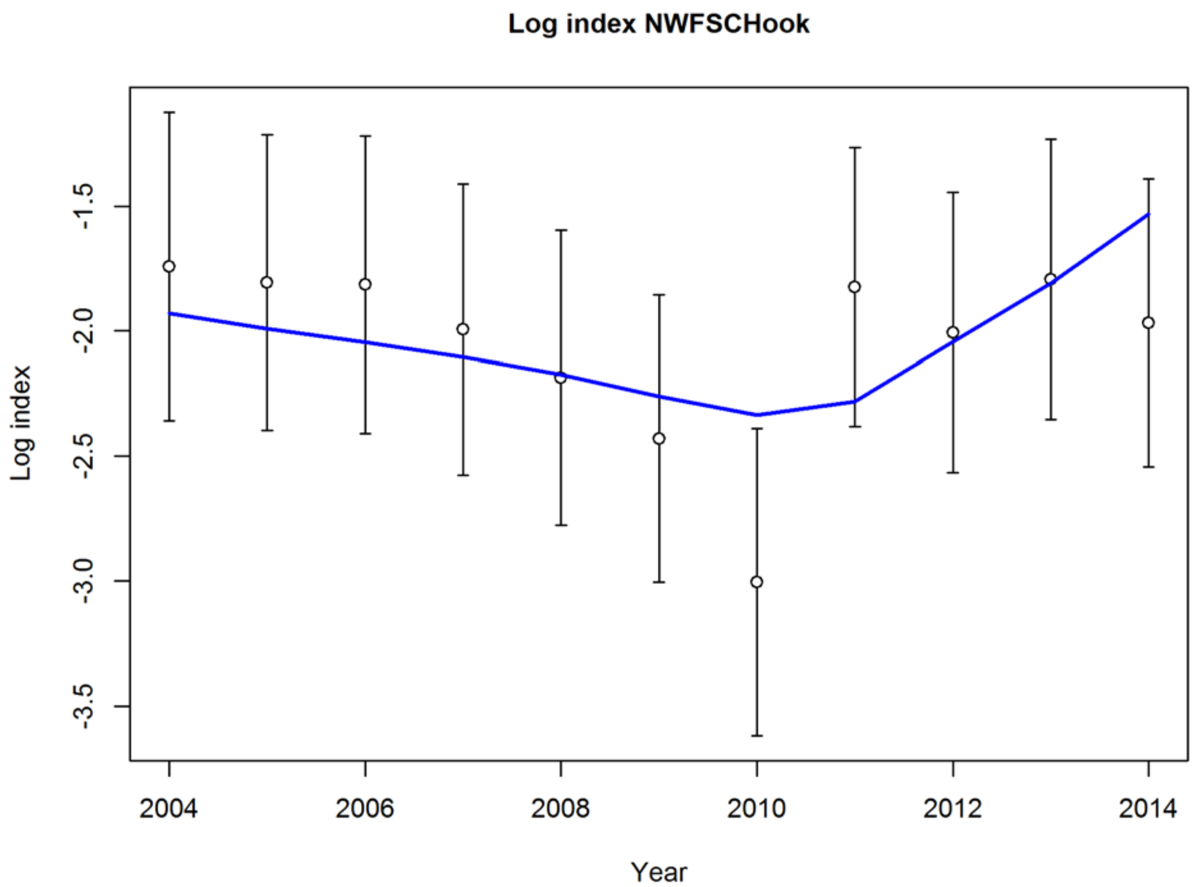


Figure 73. Observed and expected indices (in log scale) for the NWFSC hook-and-line survey

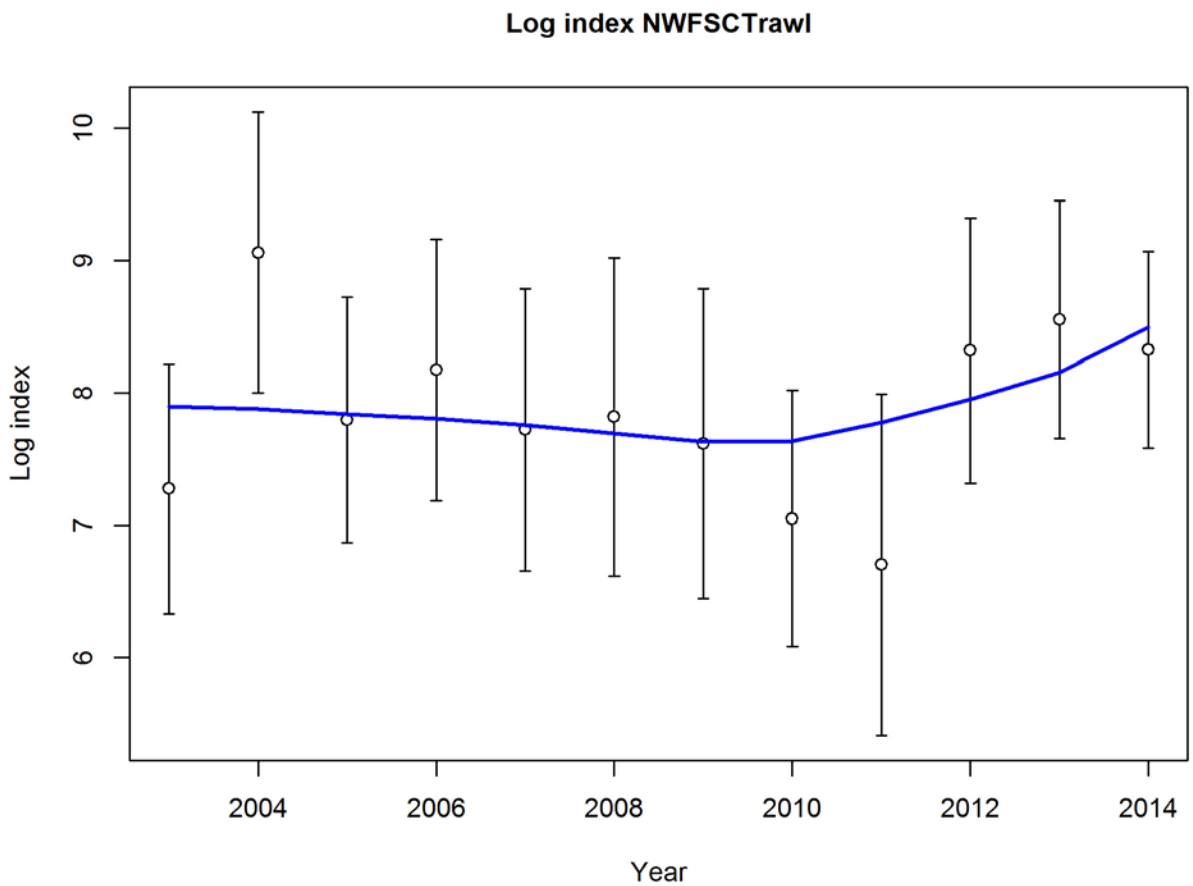


Figure 74. Observed and expected indices (in log scale) for the NWFSC trawl survey.

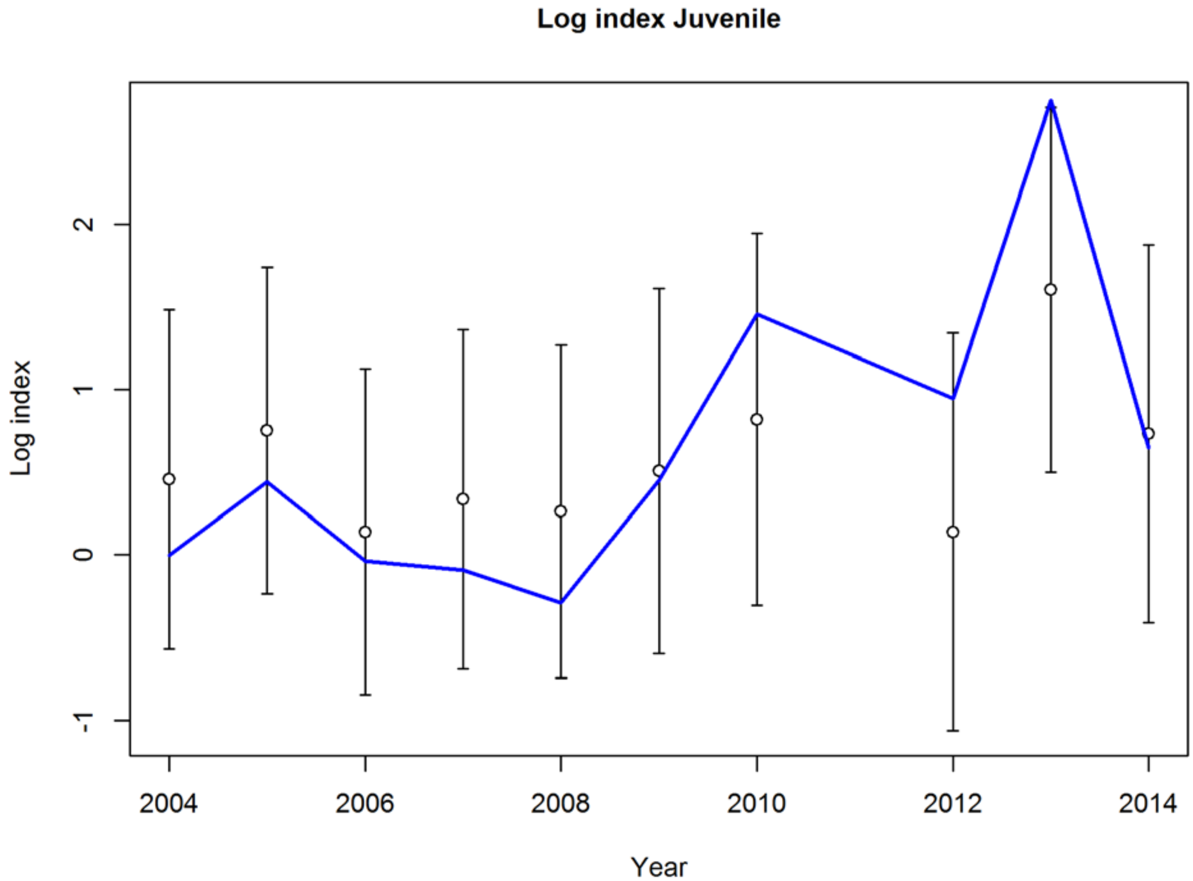


Figure 75. Observed and expected indices (in log scale) for pelagic juvenile trawl survey.

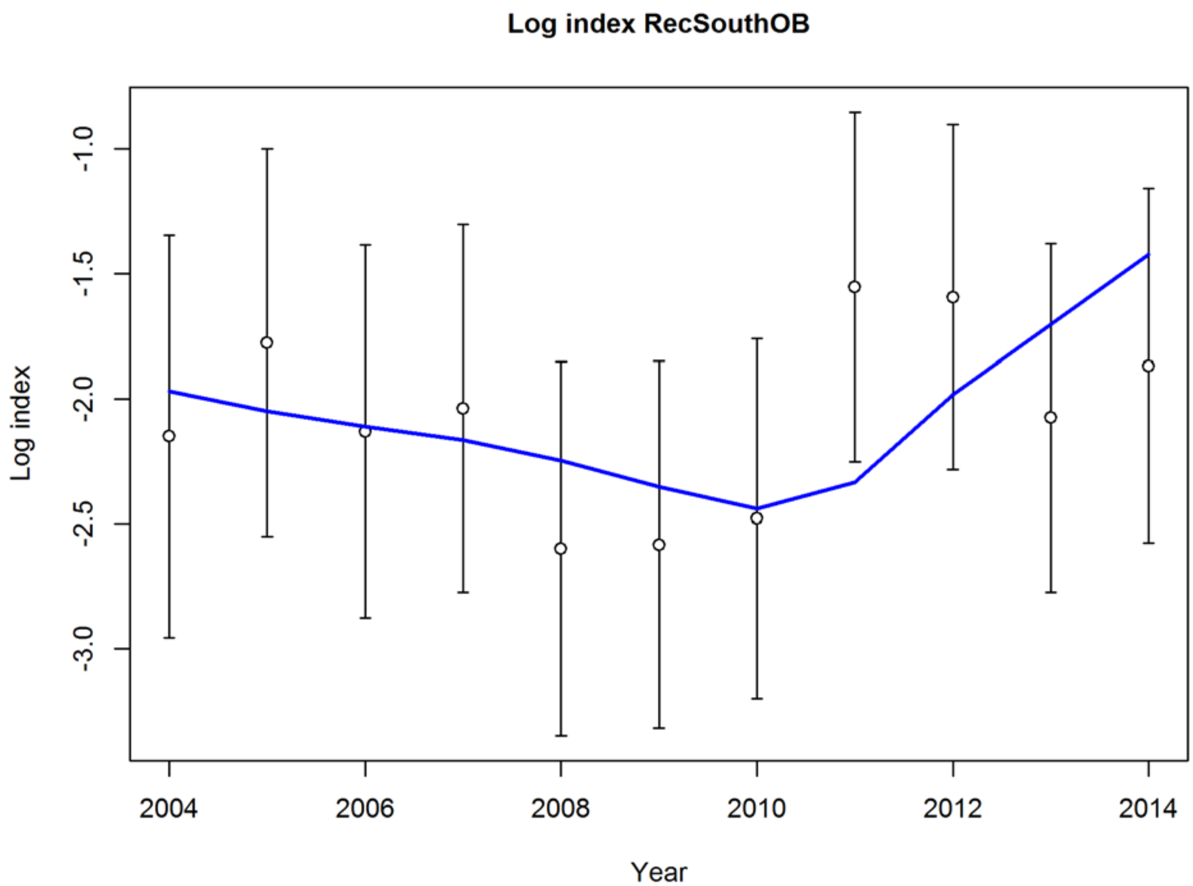


Figure 76. Observed and expected indices (in log scale) for the southern California onboard recreational CPUE indices

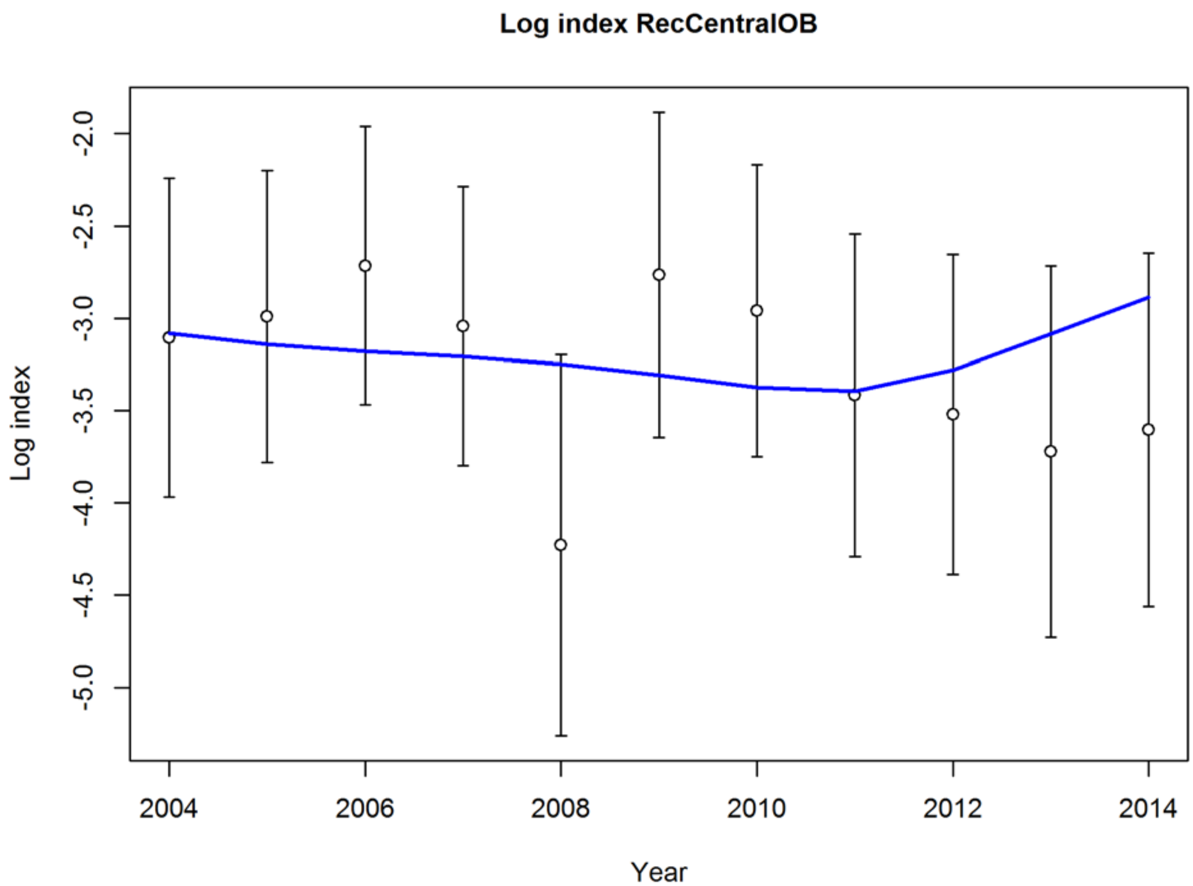


Figure 77. Observed and expected indices (in log scale) for the central California onboard recreational CPUE indices

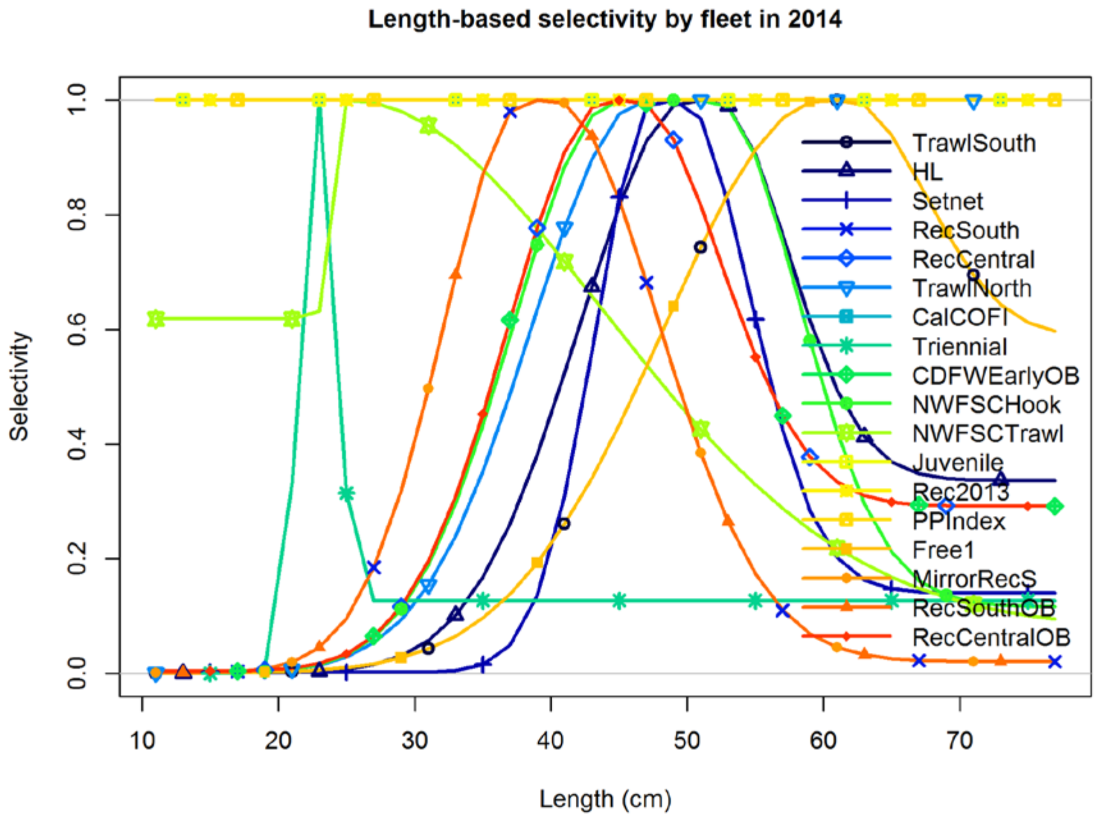


Figure 78. Estimated length selectivity functions for all fishery fleets and surveys in 2014 (the last year that these functions were estimated in the assessment model).

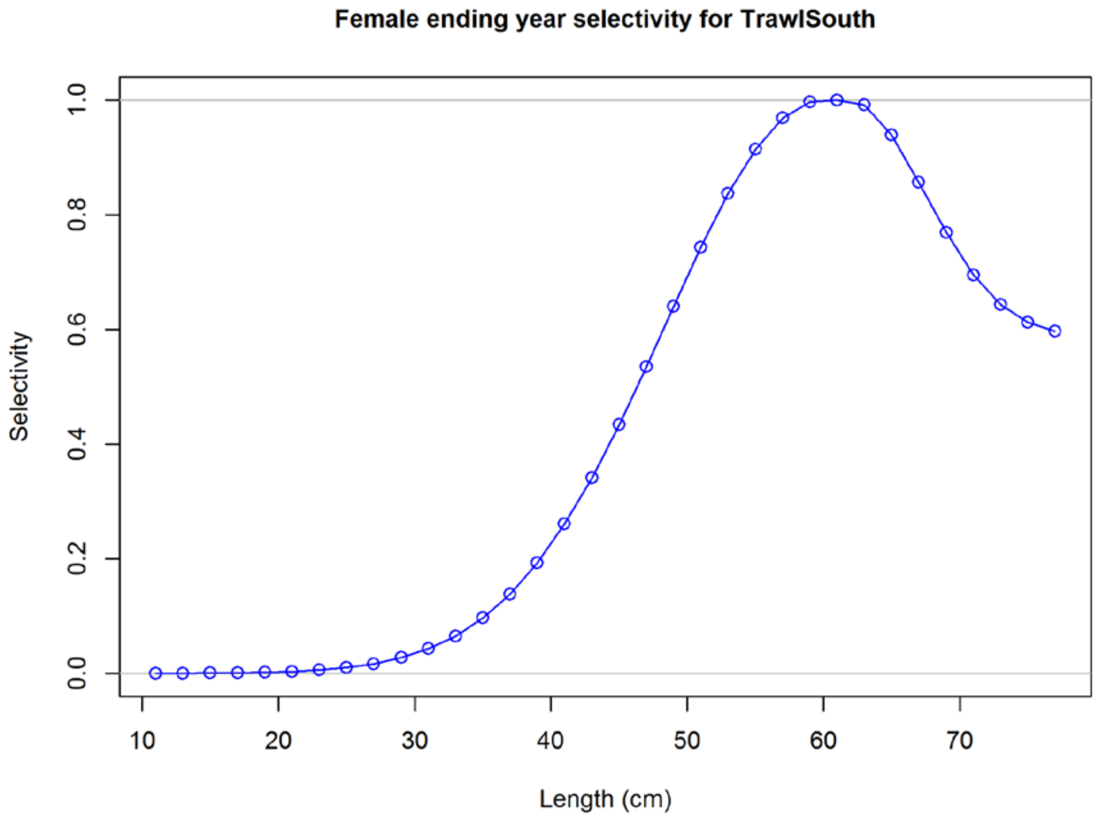


Figure 79. Estimated the ending year length selectivity function for the southern California trawl fishery (same for both sexes).

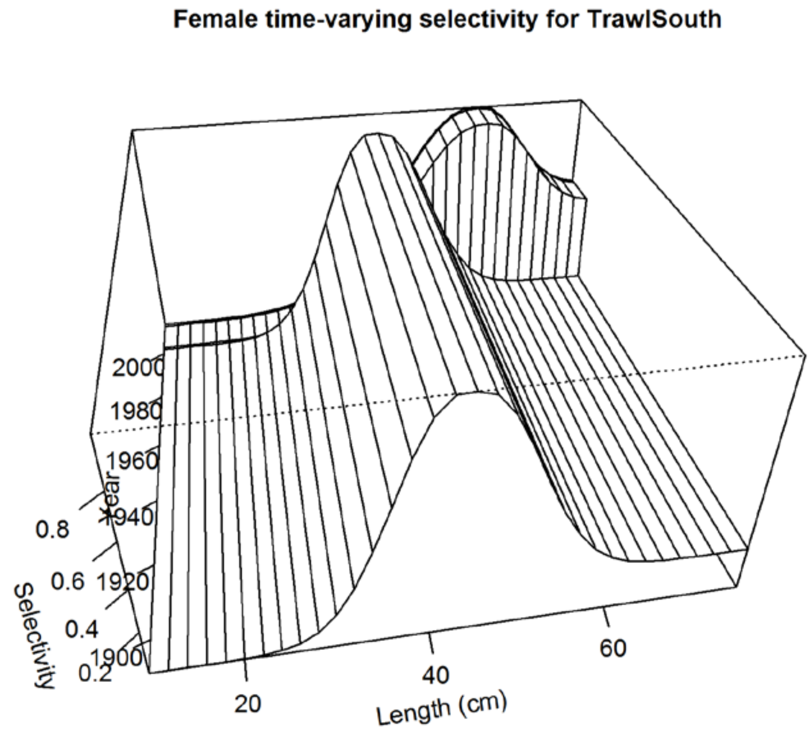


Figure 80. Estimated time varying (block in 2001) length selectivity functions for the southern California trawl fishery (same for both sexes).

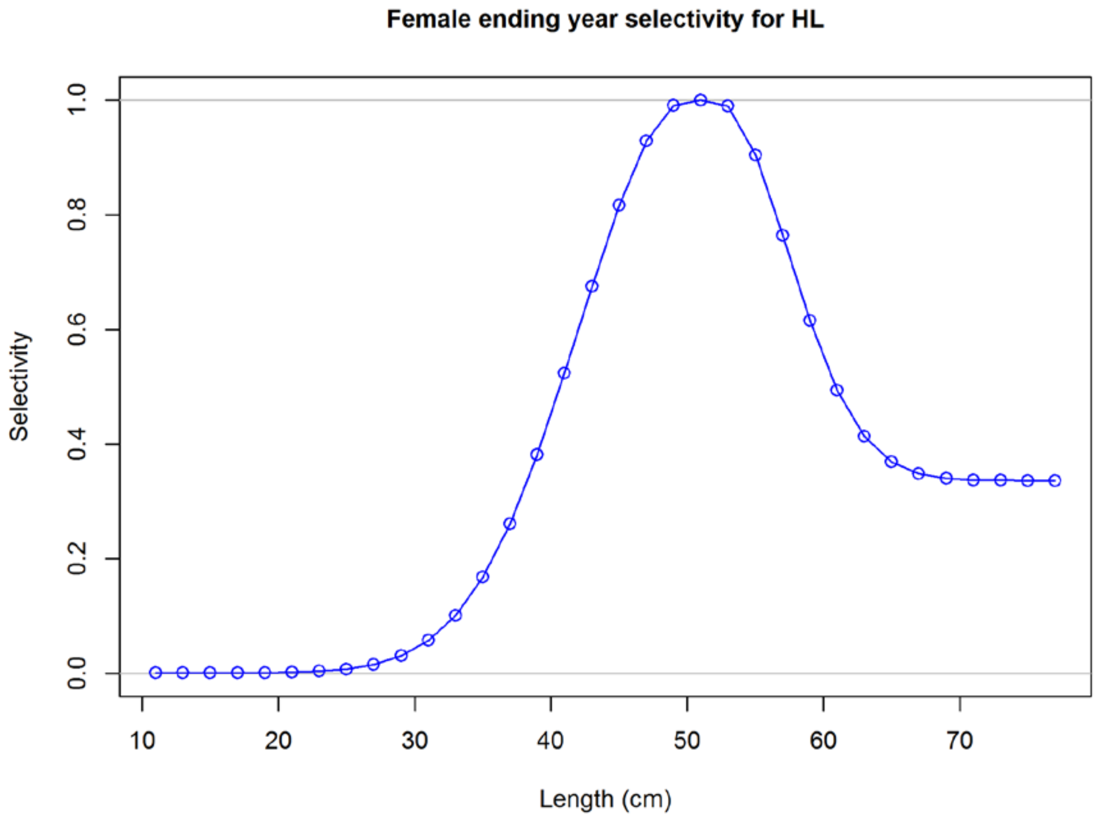


Figure 81. Estimated length selectivity function for the hook-and-line fishery (same for both sexed).

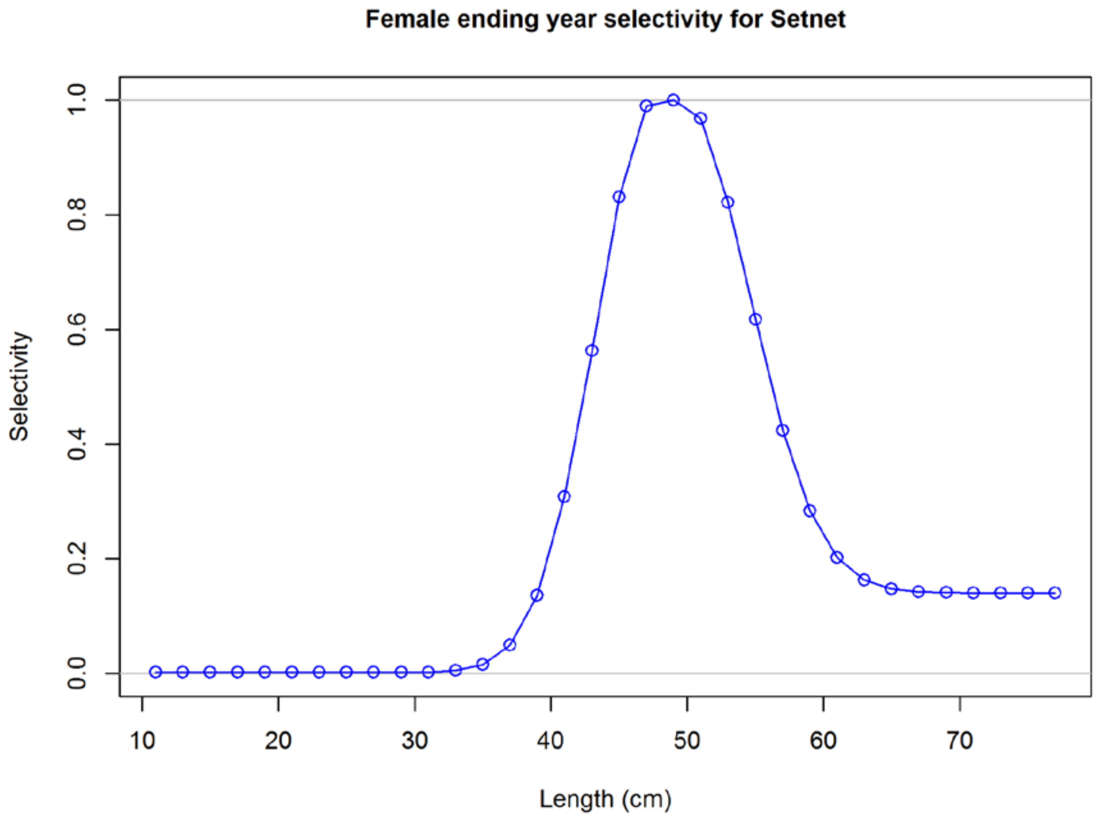


Figure 82. Estimated length selectivity functions for the setnet fishery (same for both sexed).

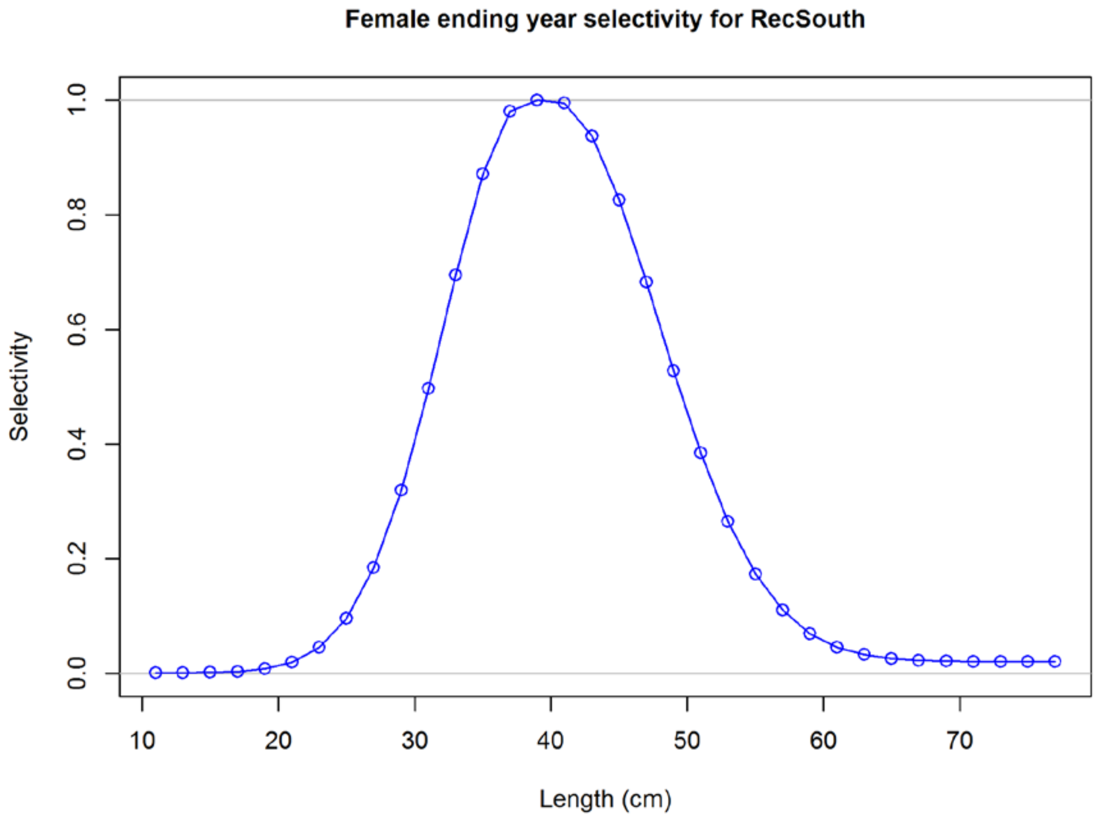


Figure 83. Estimated length selectivity function for the southern California recreational fishery (unsexed data for this fishery) in 2014.

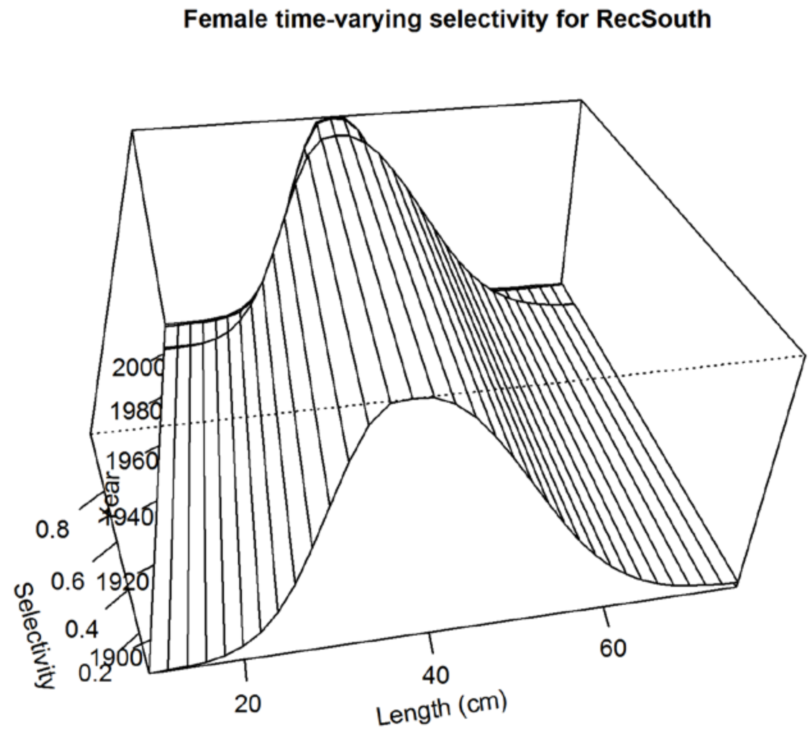


Figure 84. Estimated time varying (block in 2001) length selectivity functions for the central California recreational fishery.

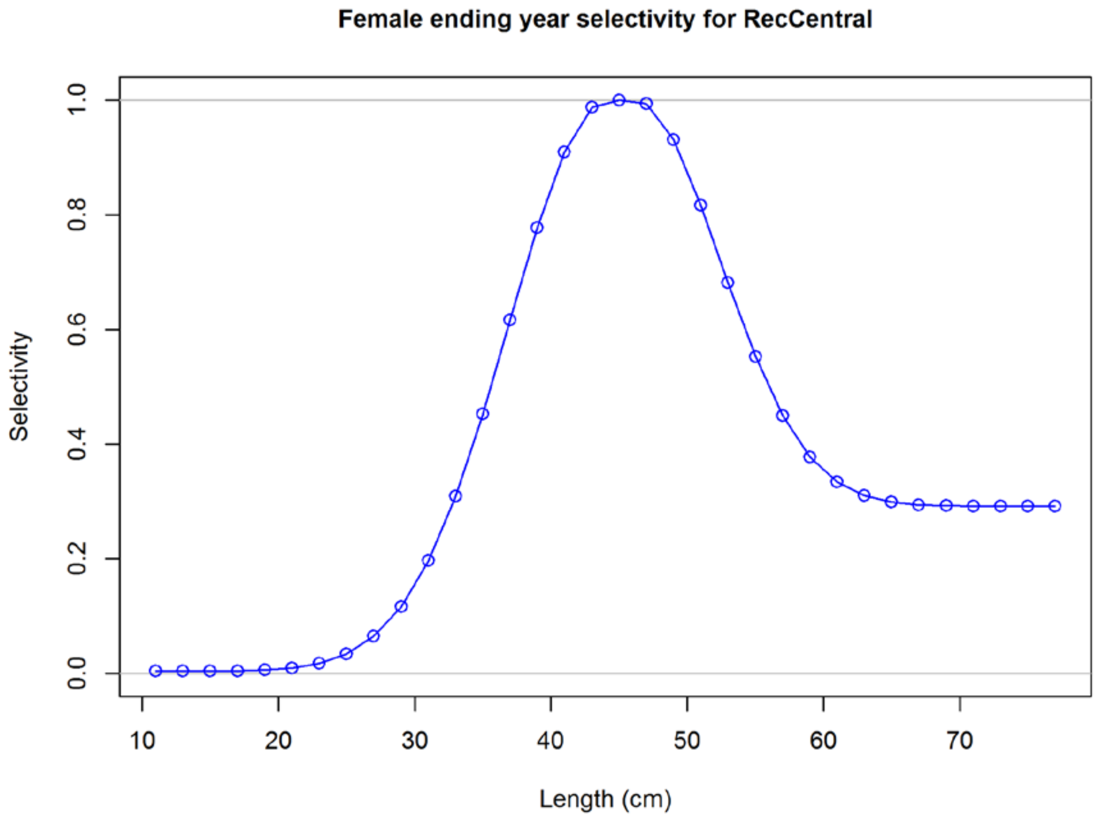


Figure 85. Estimated length selectivity function for the central California recreational fishery in 2014.

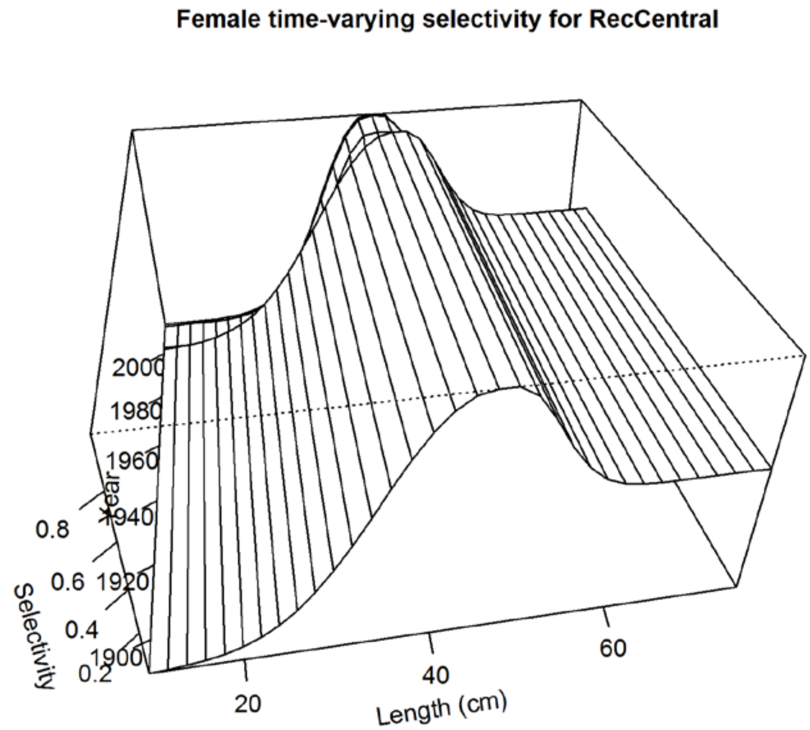


Figure 86. Estimated time varying (block in 2001) length selectivity function for the northern California trawl fishery.

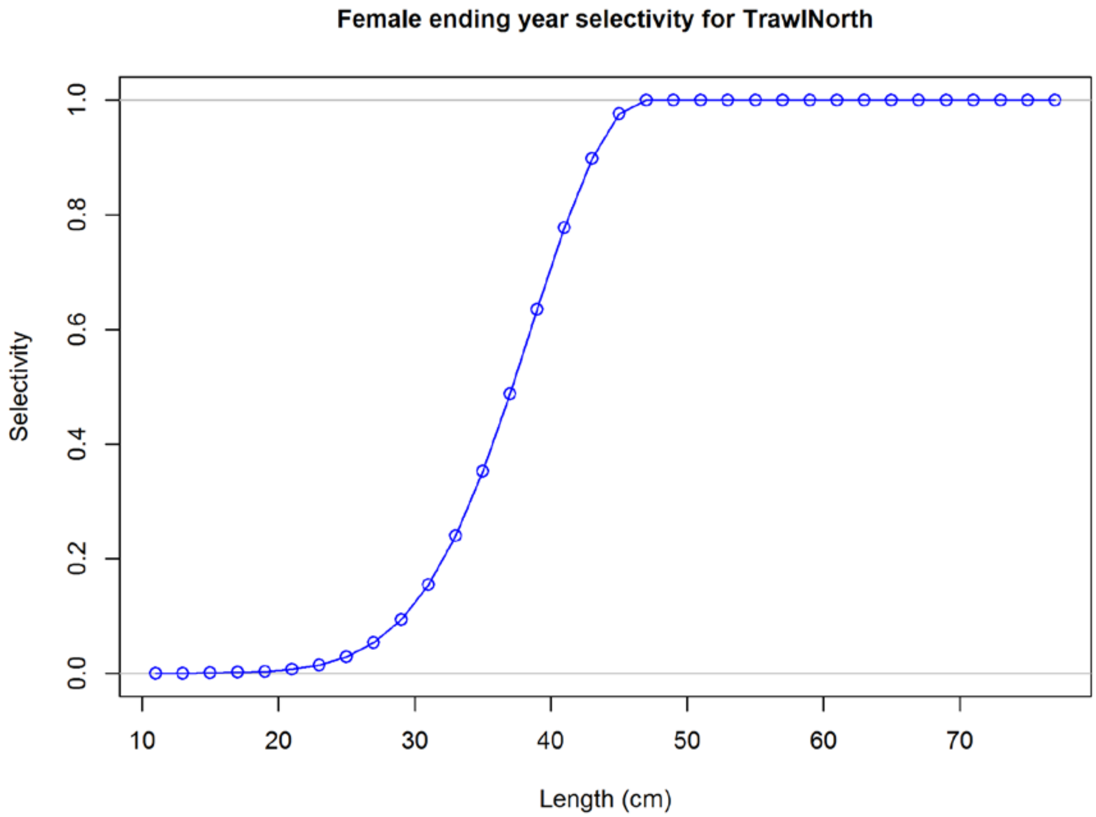


Figure 87. Estimated length selectivity function for the northern California trawl fishery in 2014.

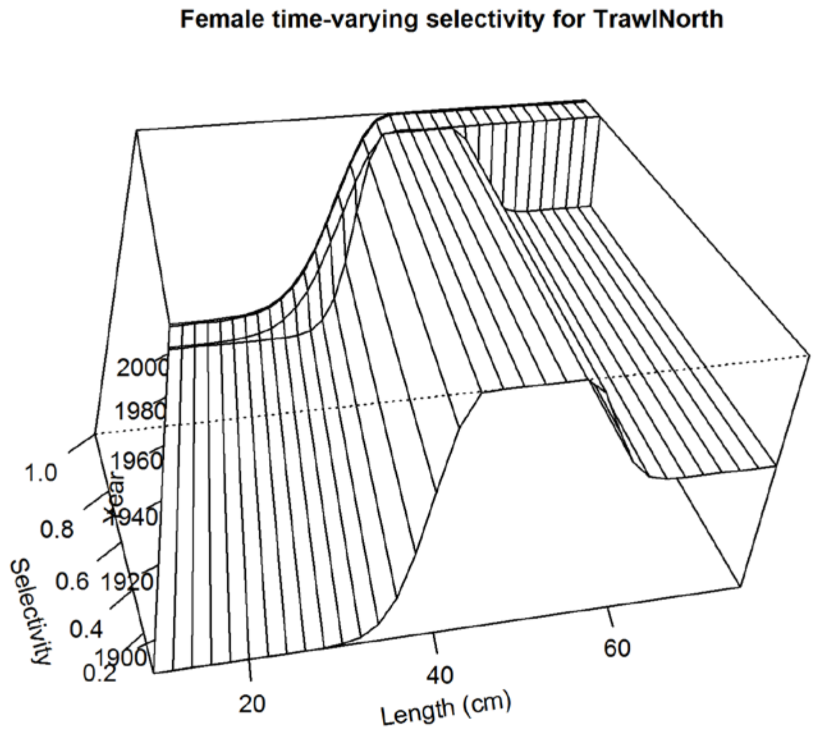


Figure 88. Estimated time varying (block in 2001) length selectivity function for the northern California trawl fishery.

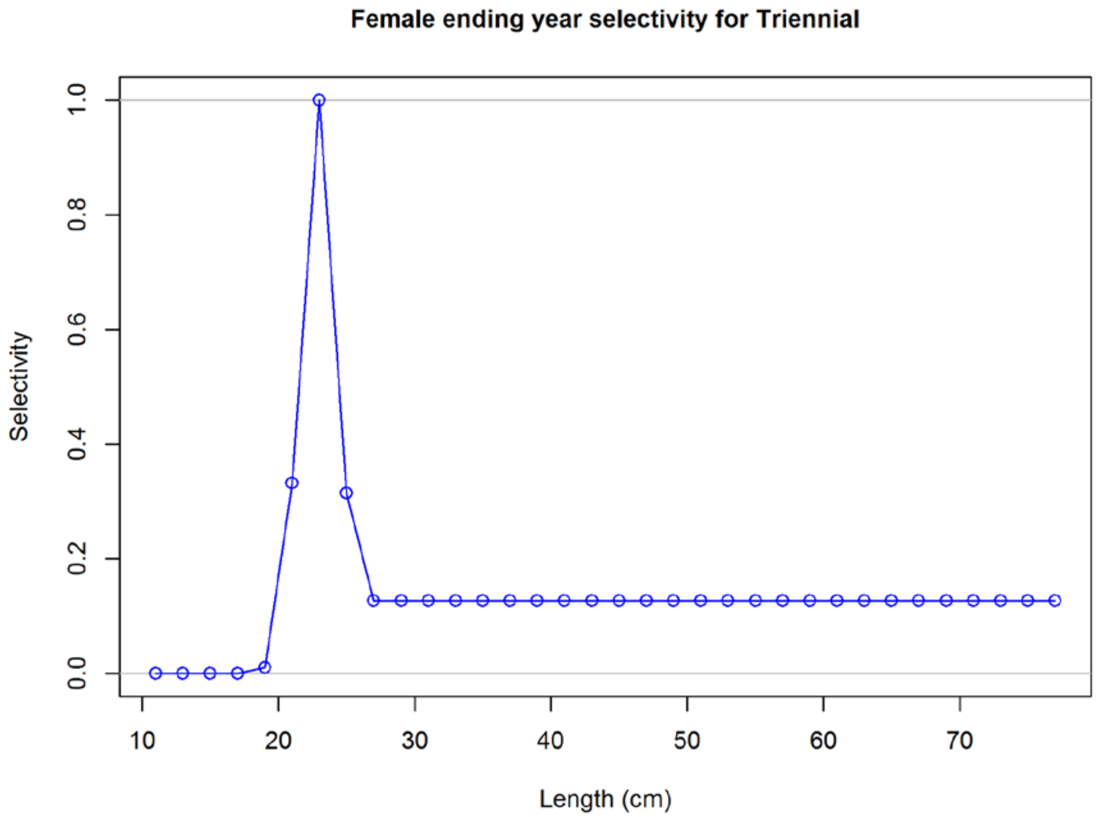


Figure 89. Estimated length-based selectivity functions for the triennial trawl survey.

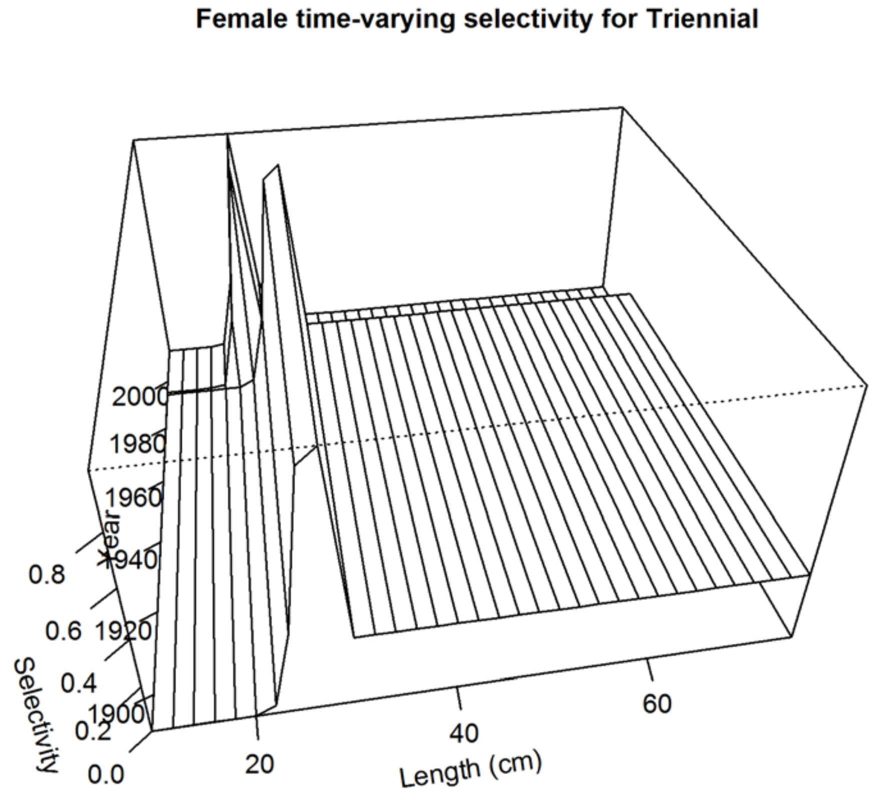


Figure 90. Estimated time varying (block in 1995) length selectivity function for the triennial trawl survey.

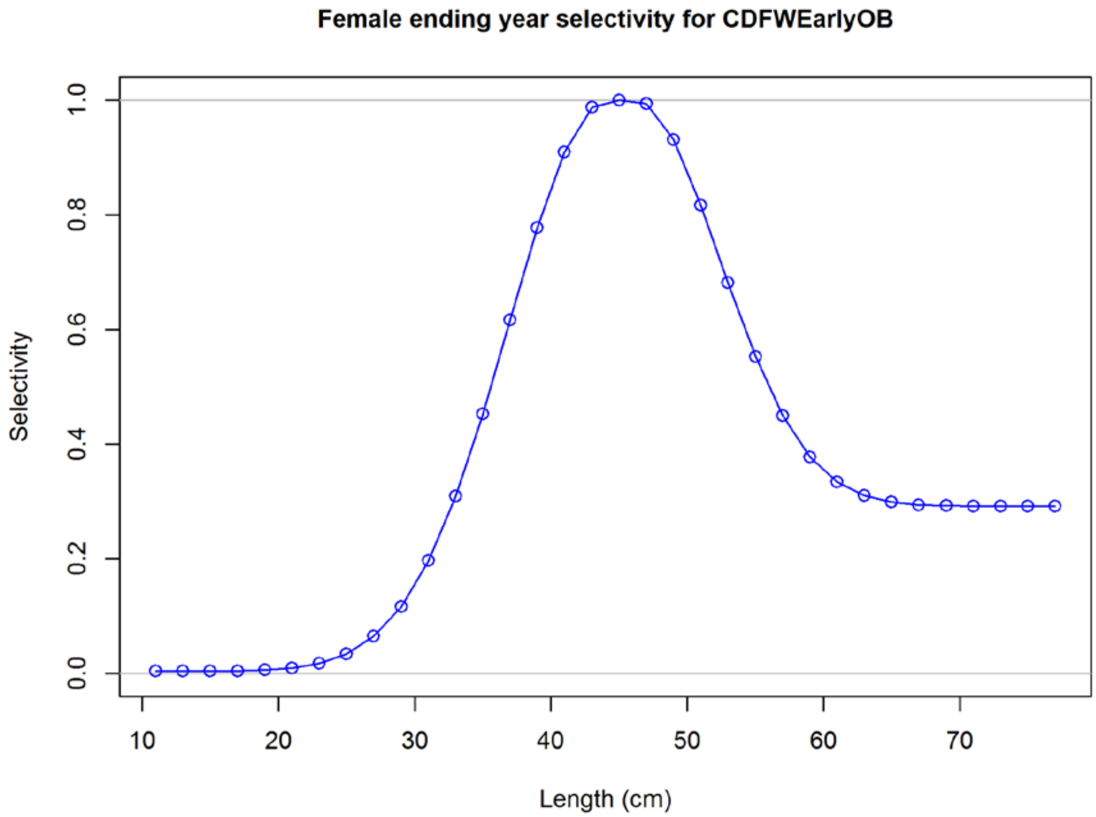


Figure 91. Estimated length-based selectivity functions the early years of the CDFW CPUE survey.

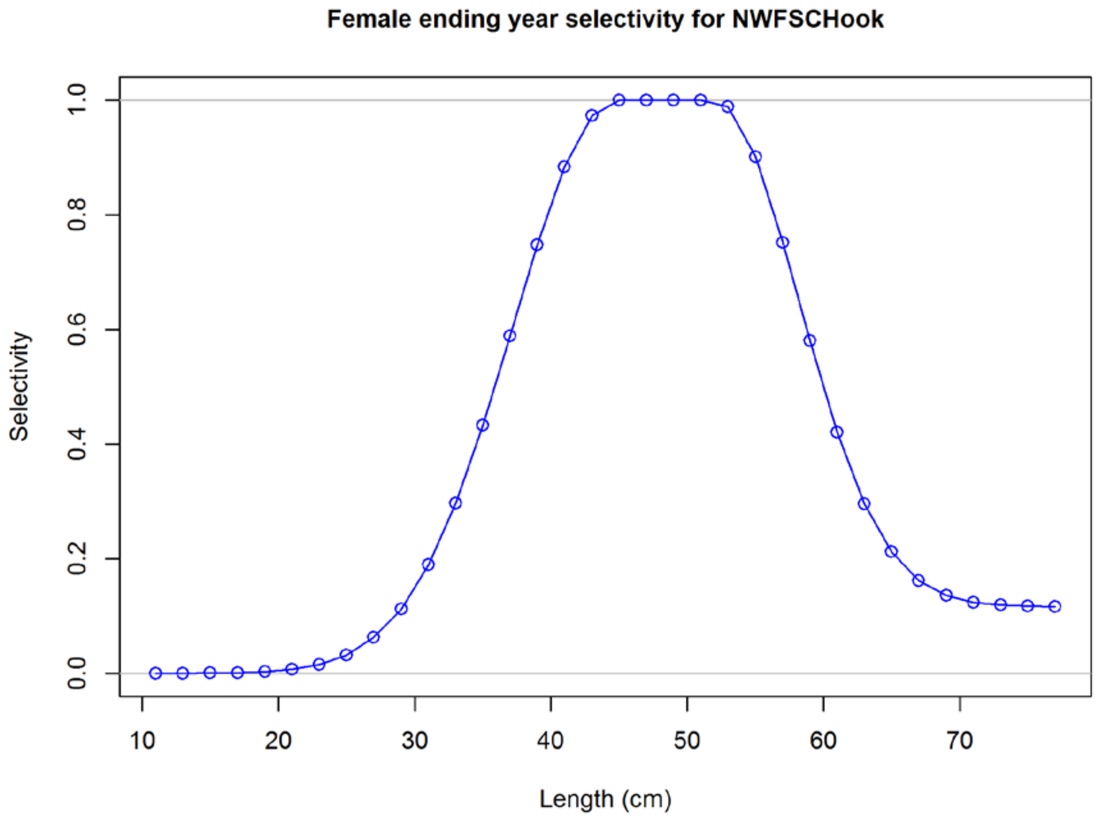


Figure 92. Estimated length selectivity functions for the southern California trawl fishery.

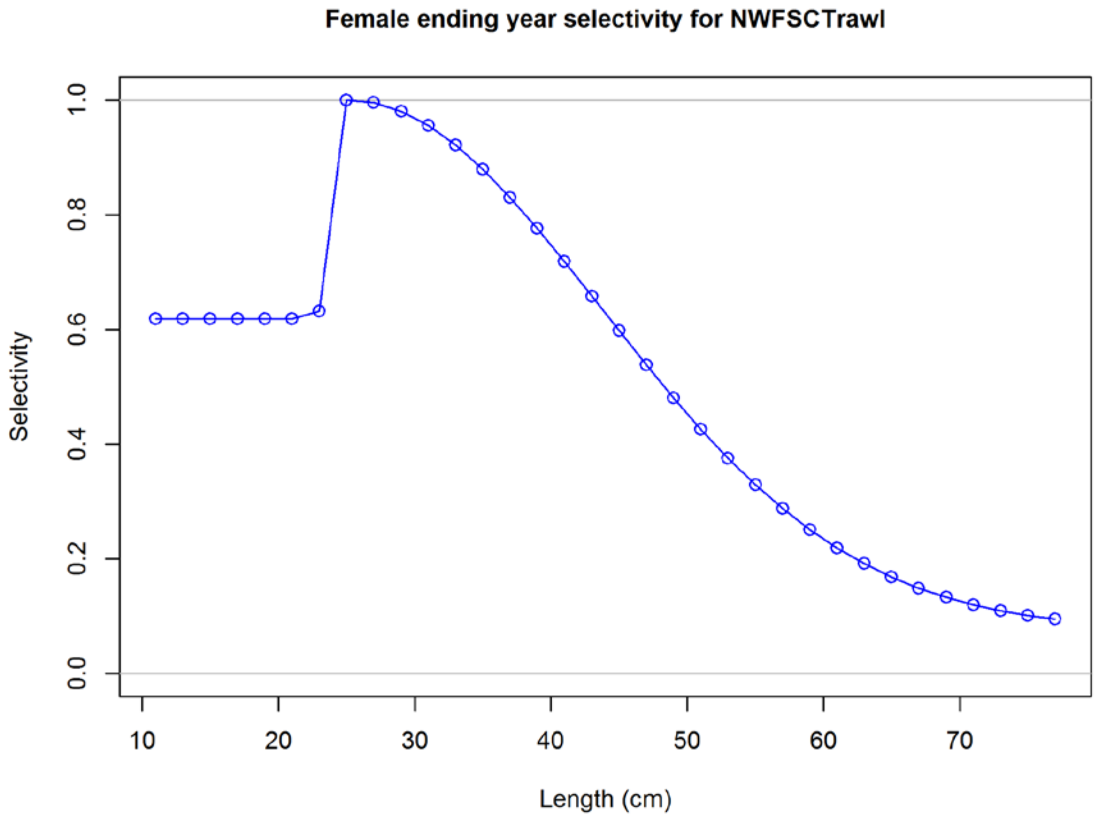


Figure 93. Estimated length selectivity functions for the southern California trawl fishery.

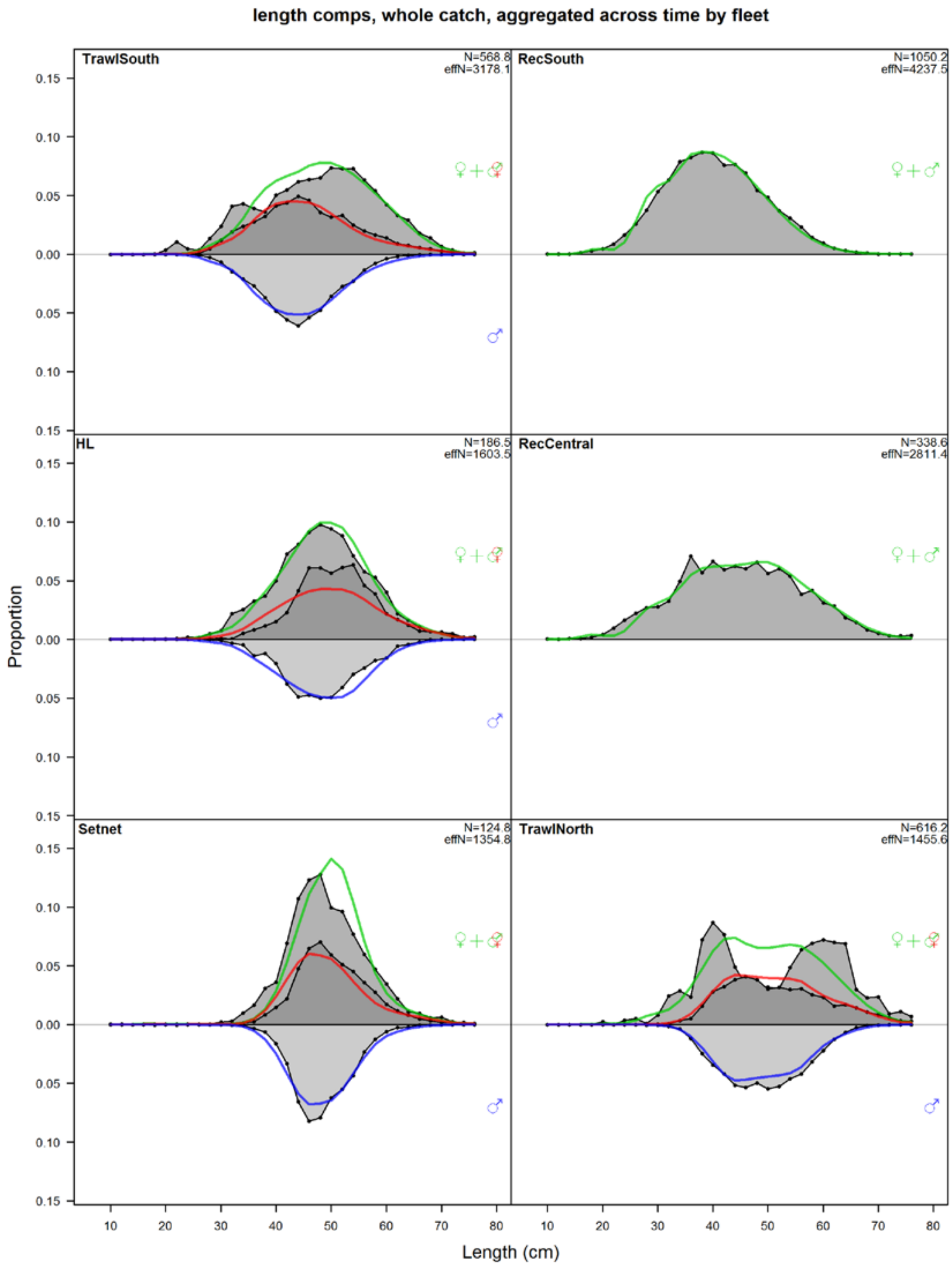


Figure 94. Observed and expected length composition by sex (female, male, and/or unsexed) by fleets aggregated over all years.

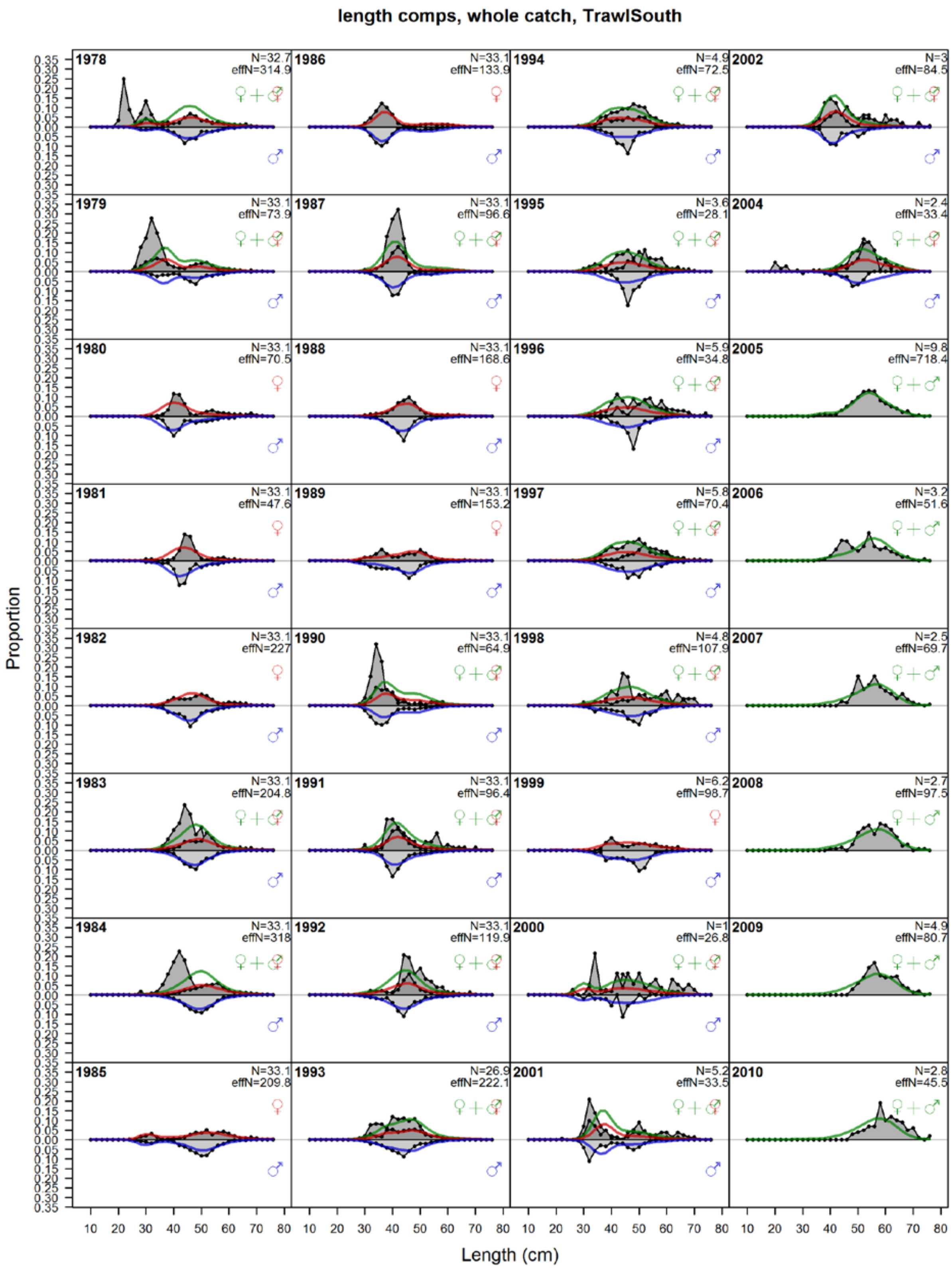


Figure 95. Observed and expected length composition by sex (female, male, and/or unsexed) for the Southern California trawl fishery.

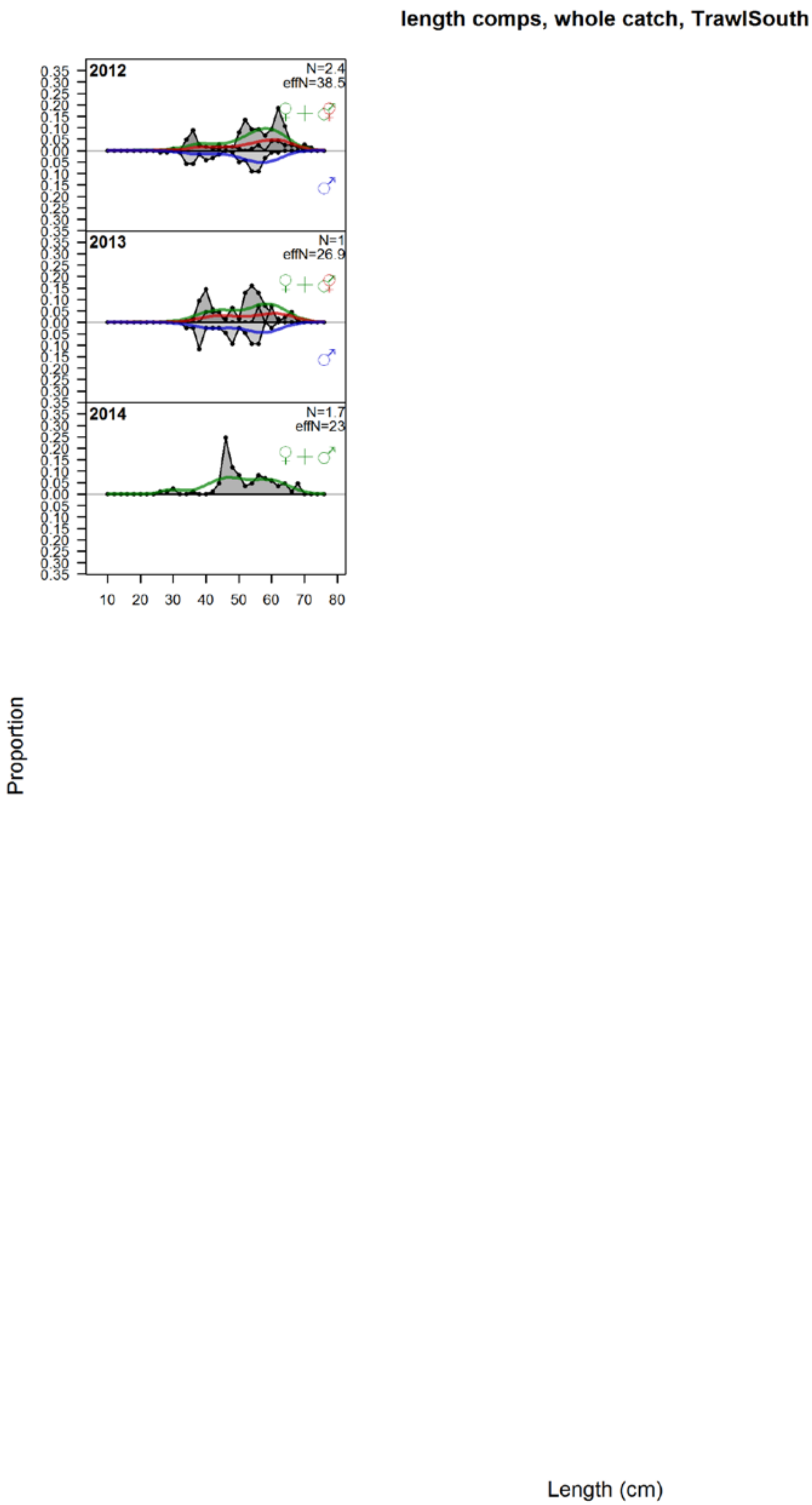


Figure (continued). Observed and expected length composition by sex (female, male, and/or unsexed) for the Southern California trawl fishery.

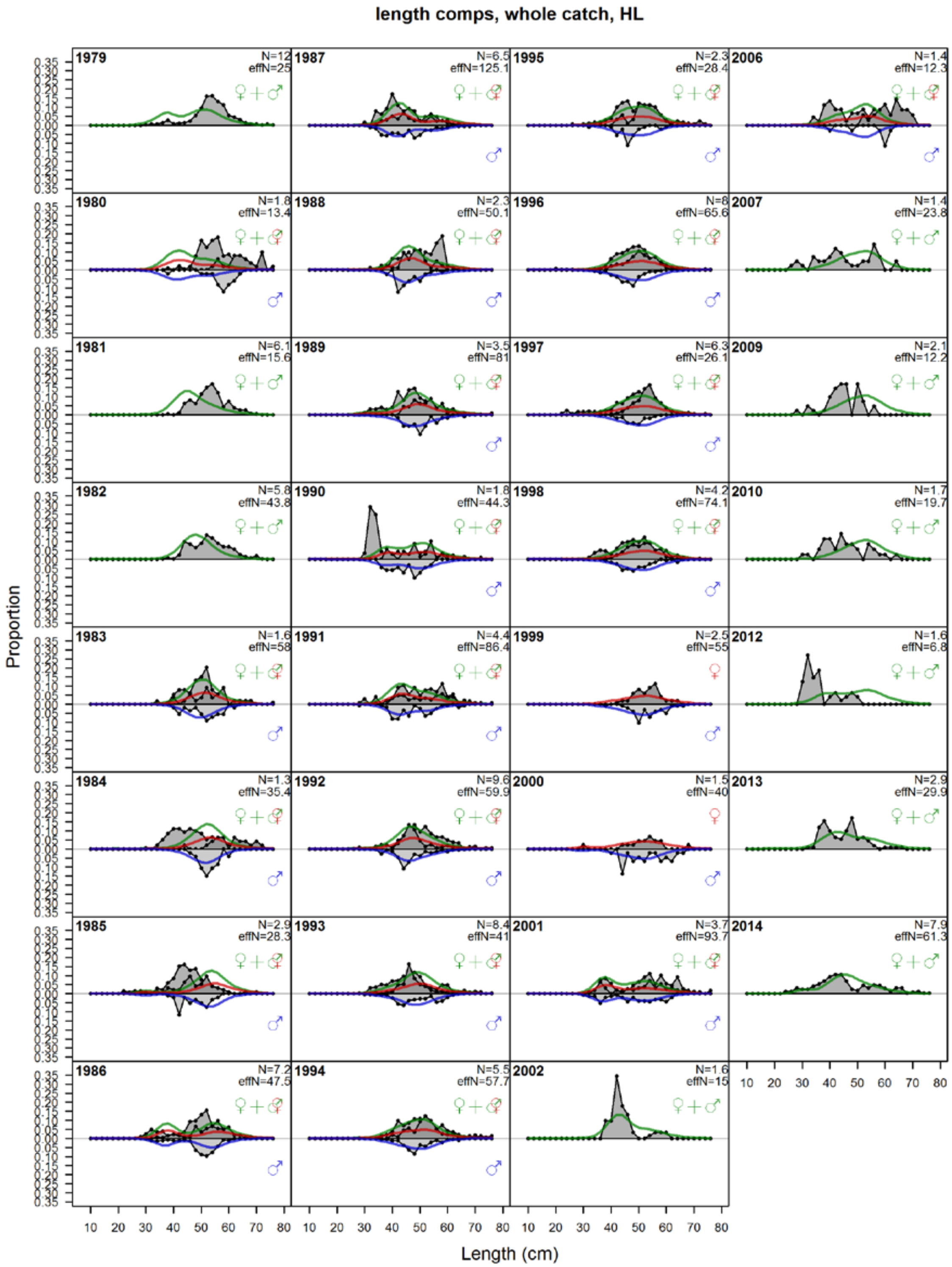


Figure 96. Observed and expected length composition by sex (female, male, and/or unsexed) for the hook-and-line fishery.

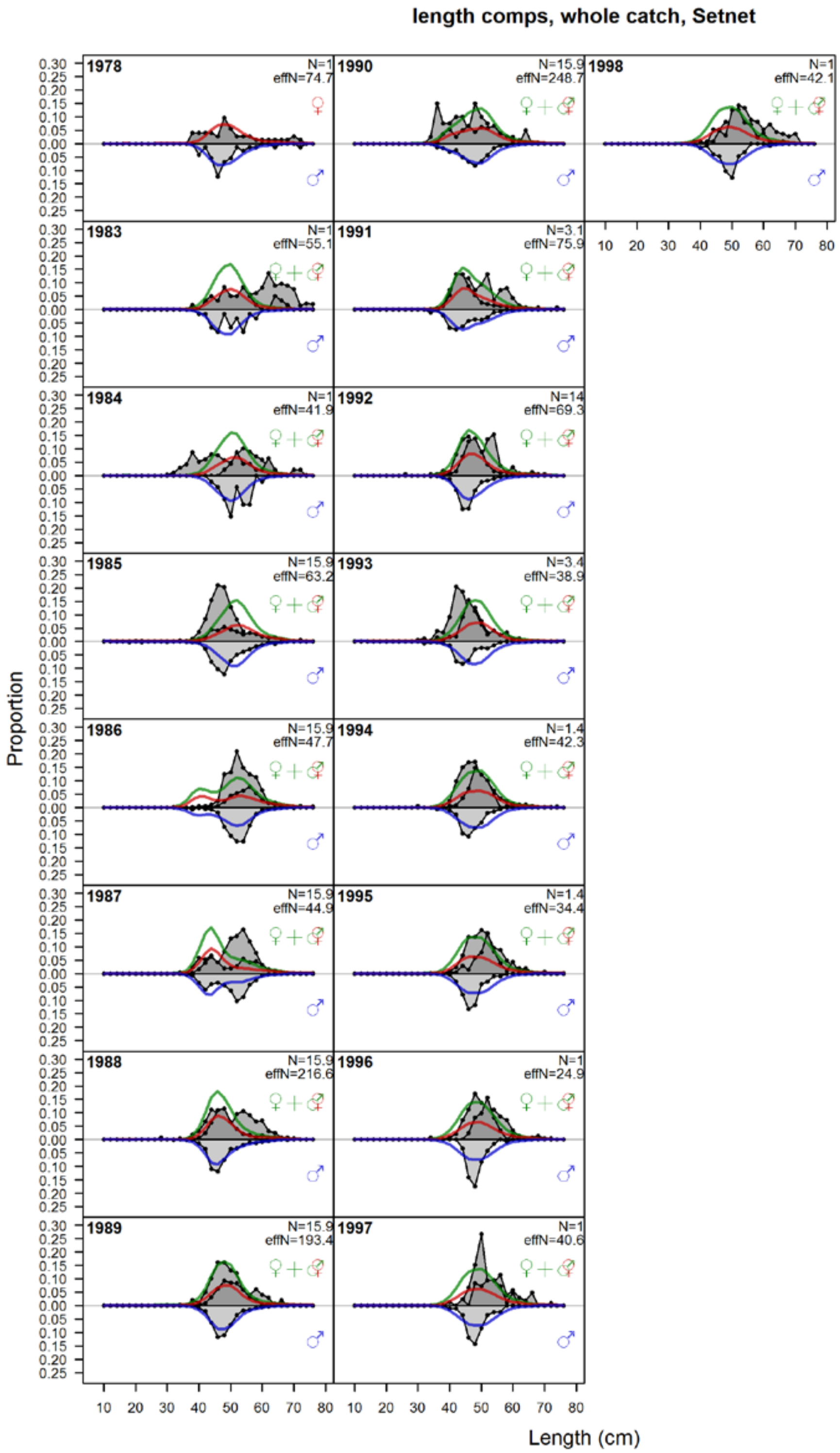


Figure 97. Observed and expected length composition by sex (female, male, and/or unsexed) for the setnet fishery.

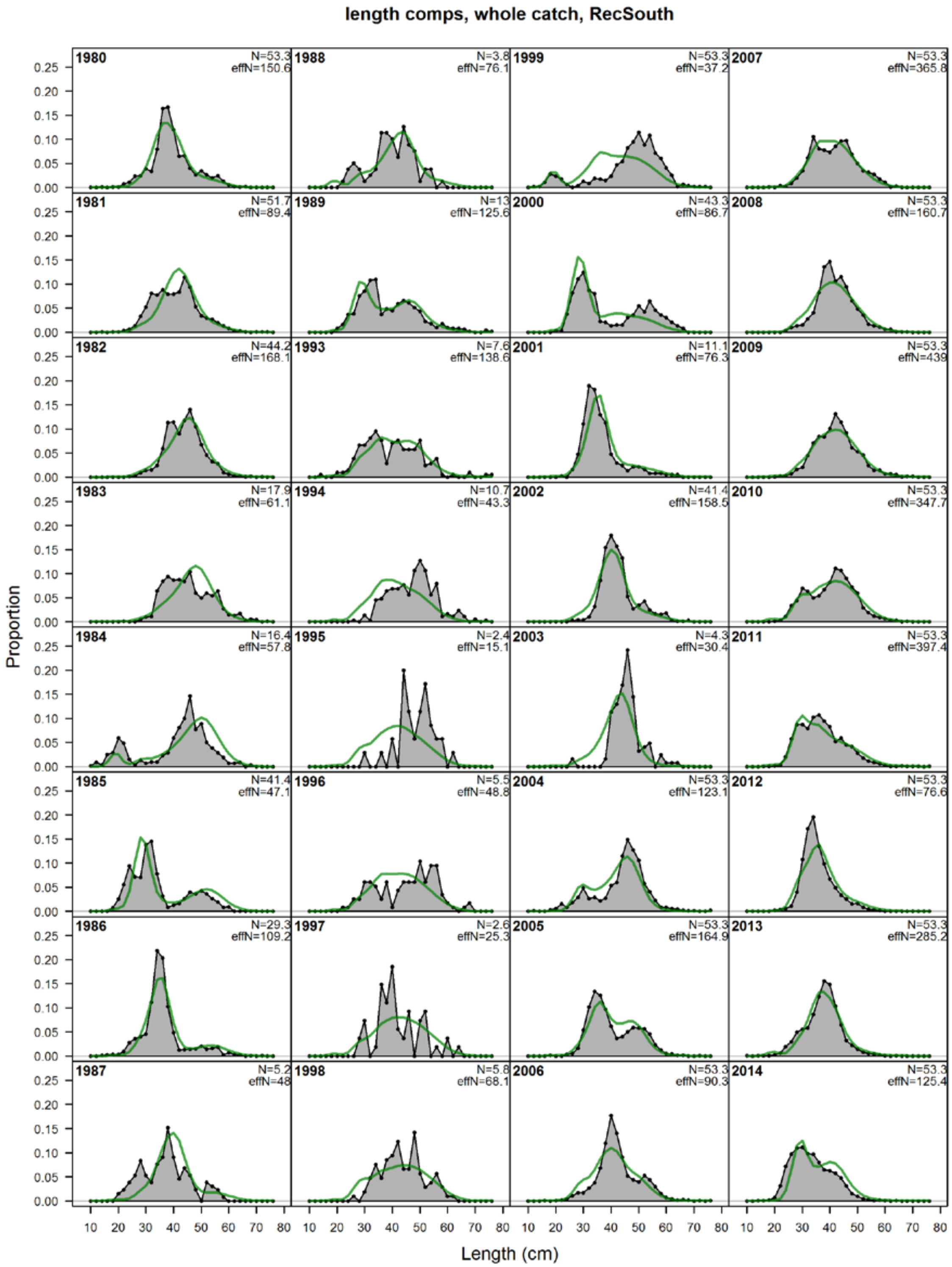


Figure 98. Observed and expected length composition for unsexed fish for the Southern California recreational fishery.

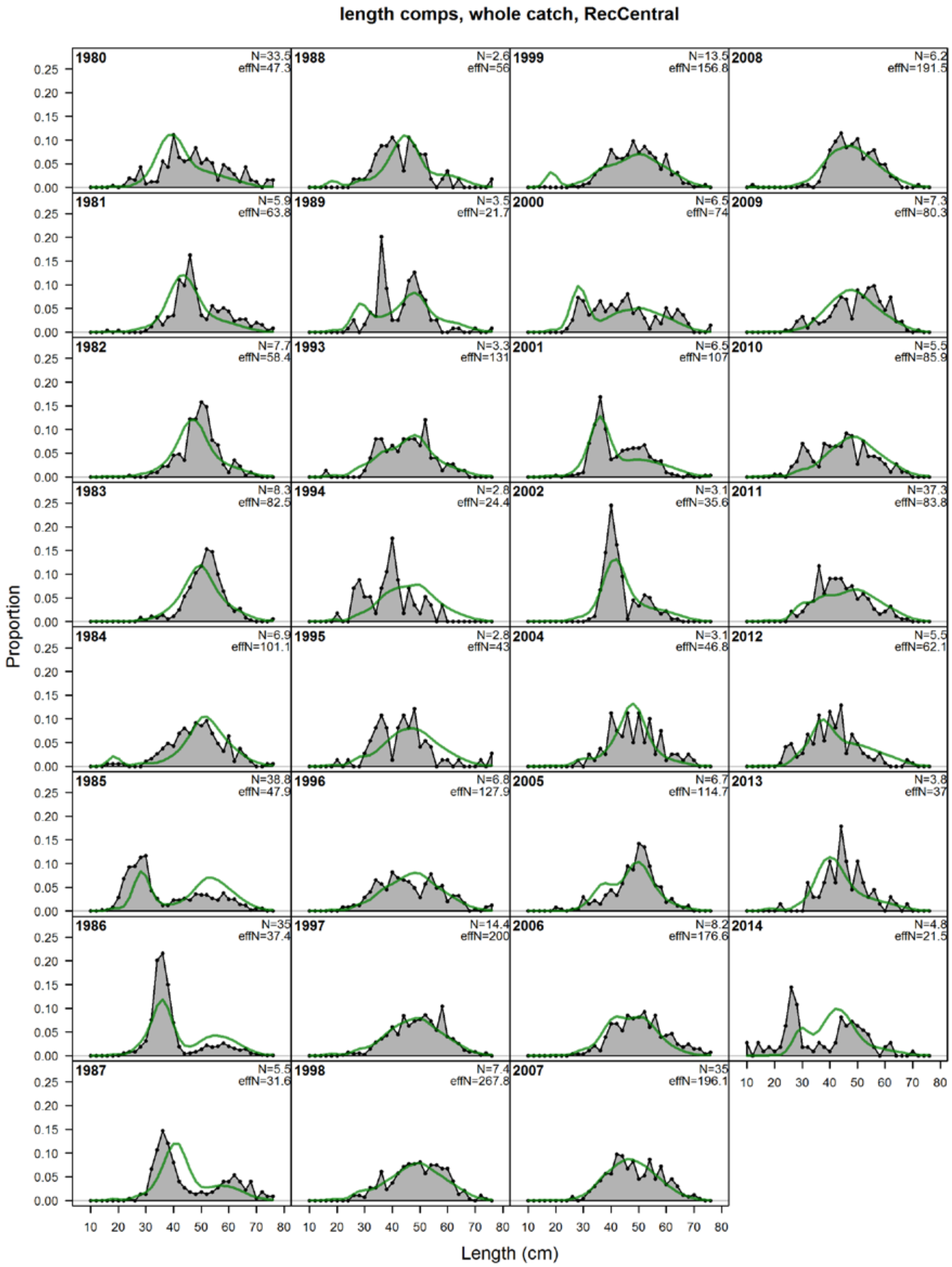


Figure 99. Observed and expected length composition for unsexed fish for the Central California recreational fishery.

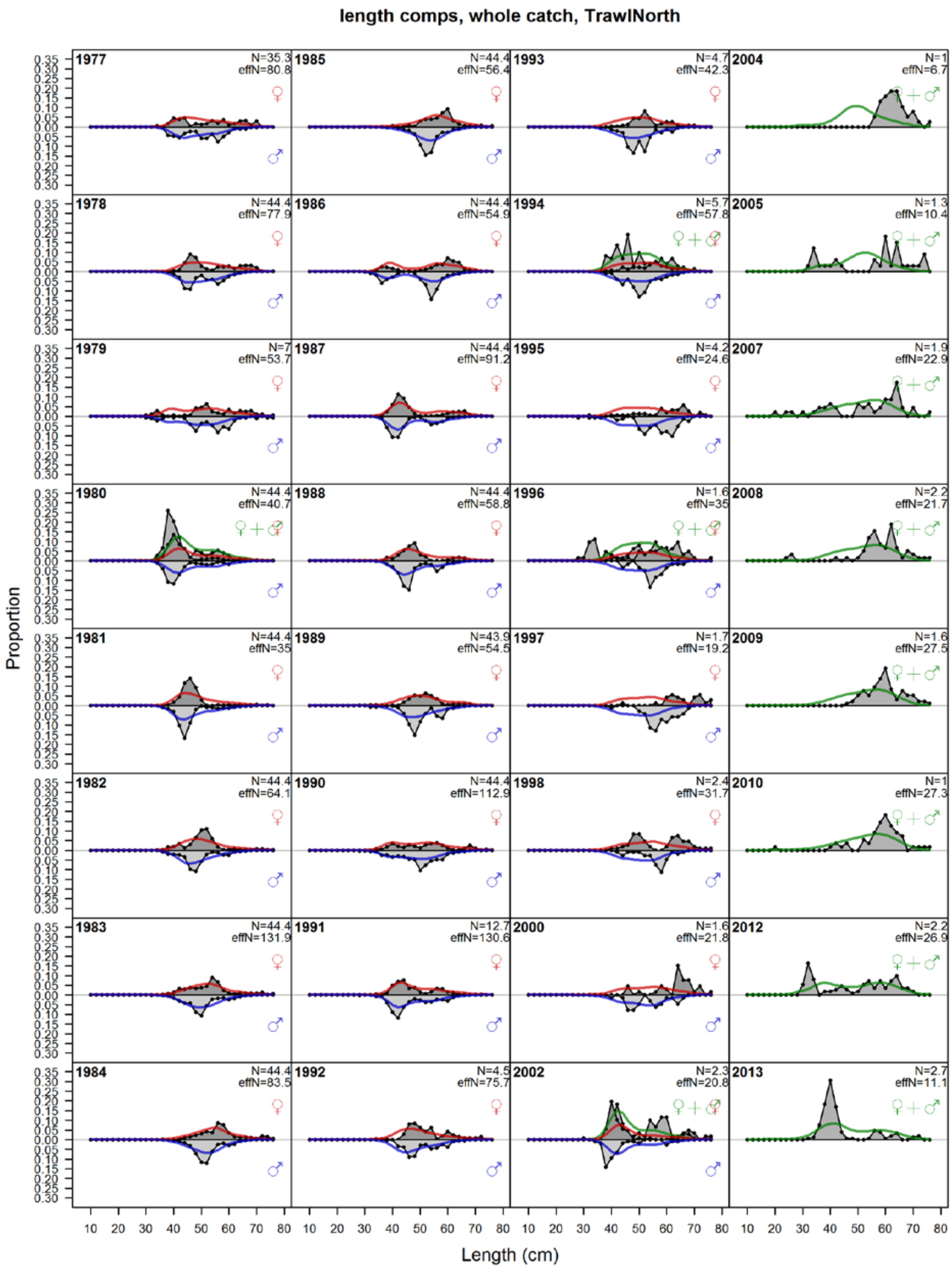
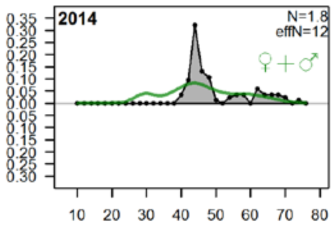


Figure 100. Observed and expected length composition by sex (female, male, and/or unsexed) by the Central California trawl fishery.

length comps, whole catch, TrawlNorth



Proportion

Length (cm)

Figure (continued). Observed and expected length composition by sex (female, male, and/or unsexed) by the Central California trawl fishery.

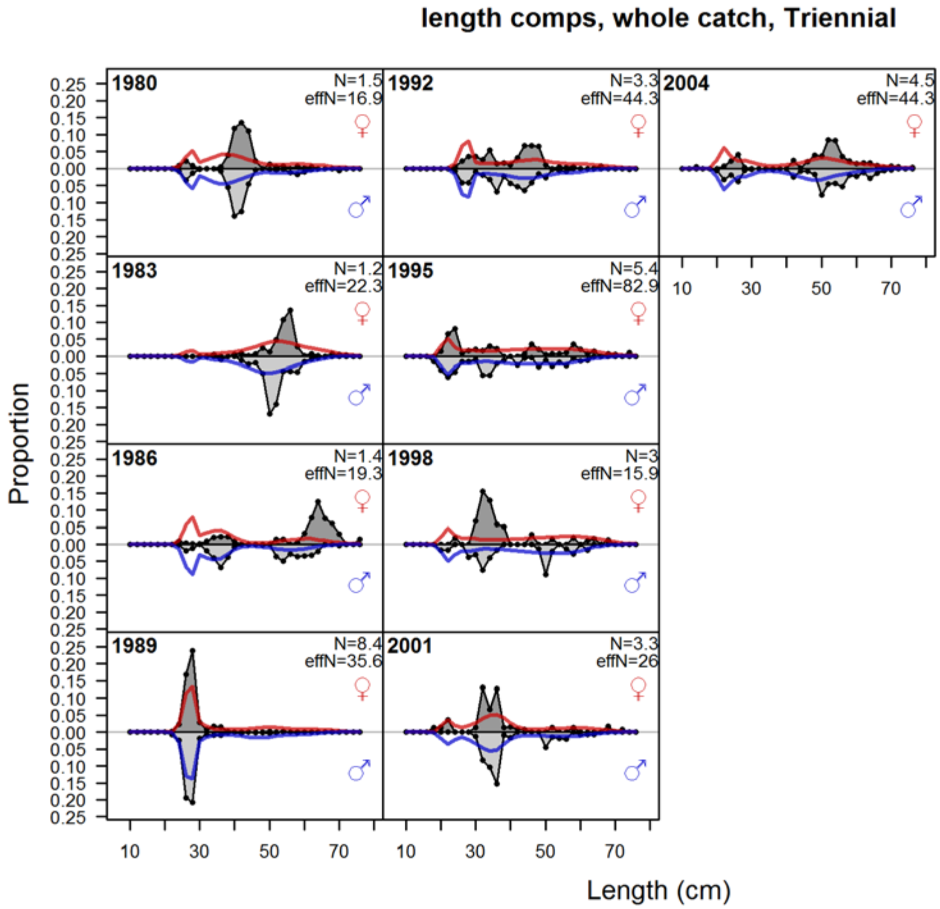


Figure 101. Observed and expected length composition by sex (female, male, and/or unsexed) for the triennial trawl survey.

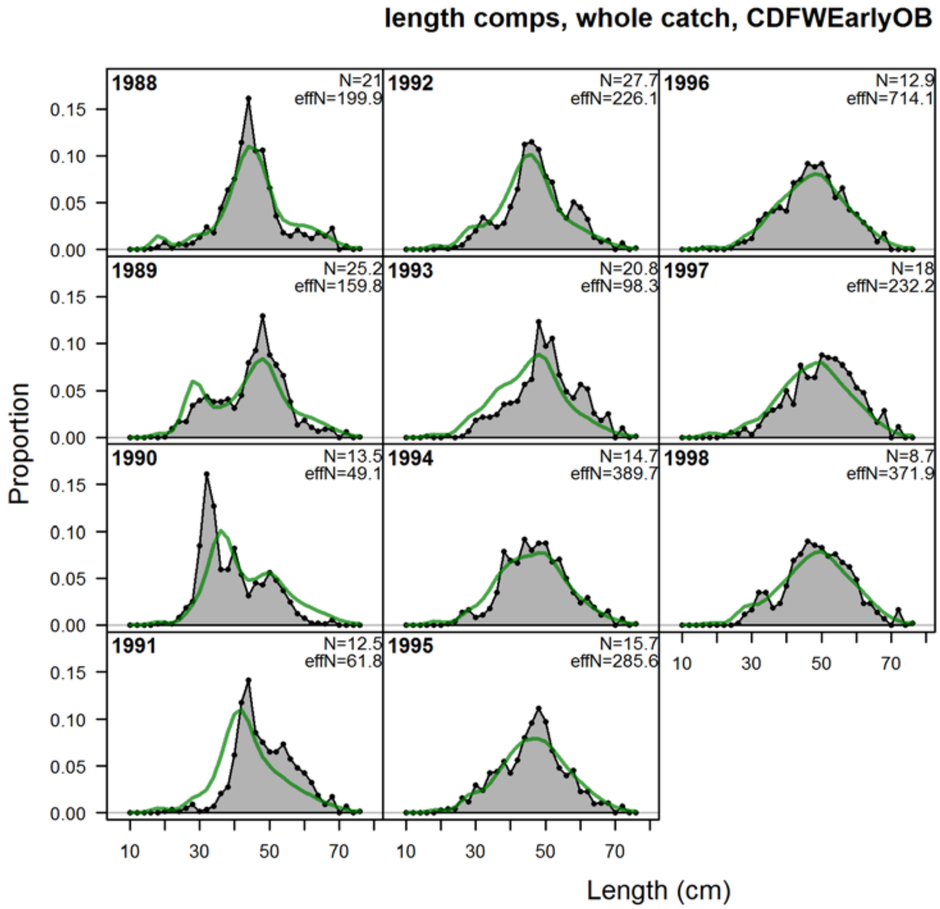


Figure 102. Observed and expected length composition for unsexed fish the early years of the CDFW CPUE survey.

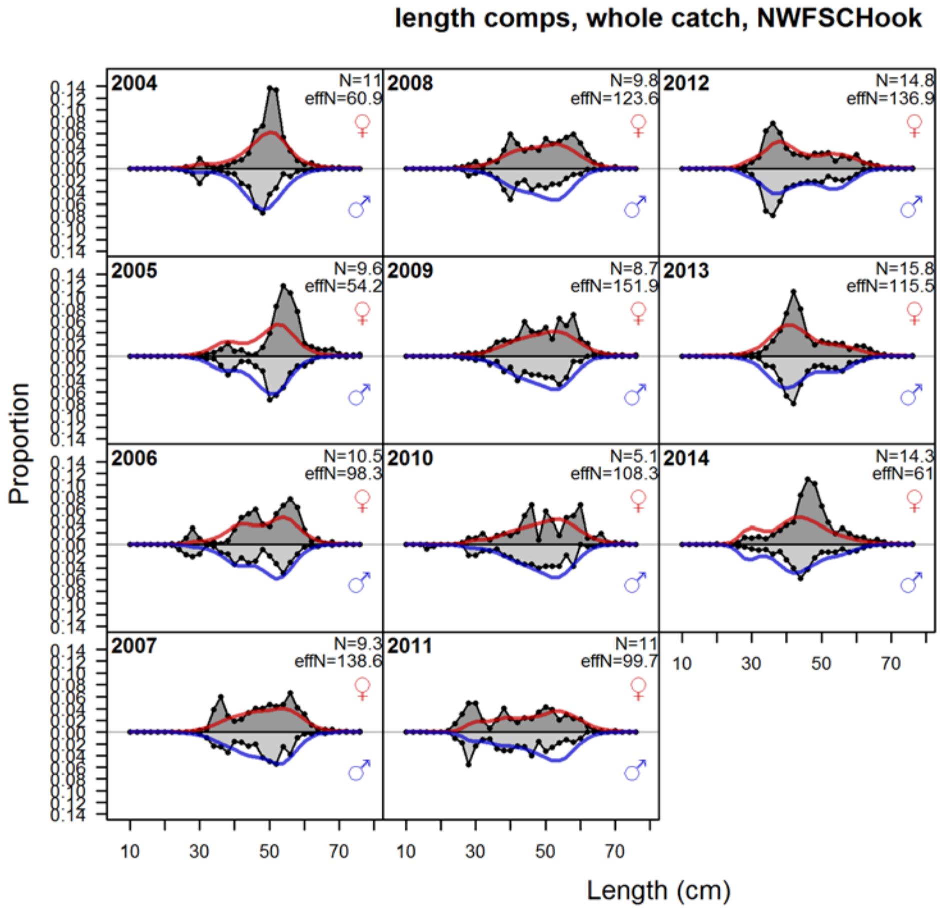


Figure 103. Observed and expected length composition by sex (female, male, and/or unsexed) for the NWFSC hook-and-line survey.

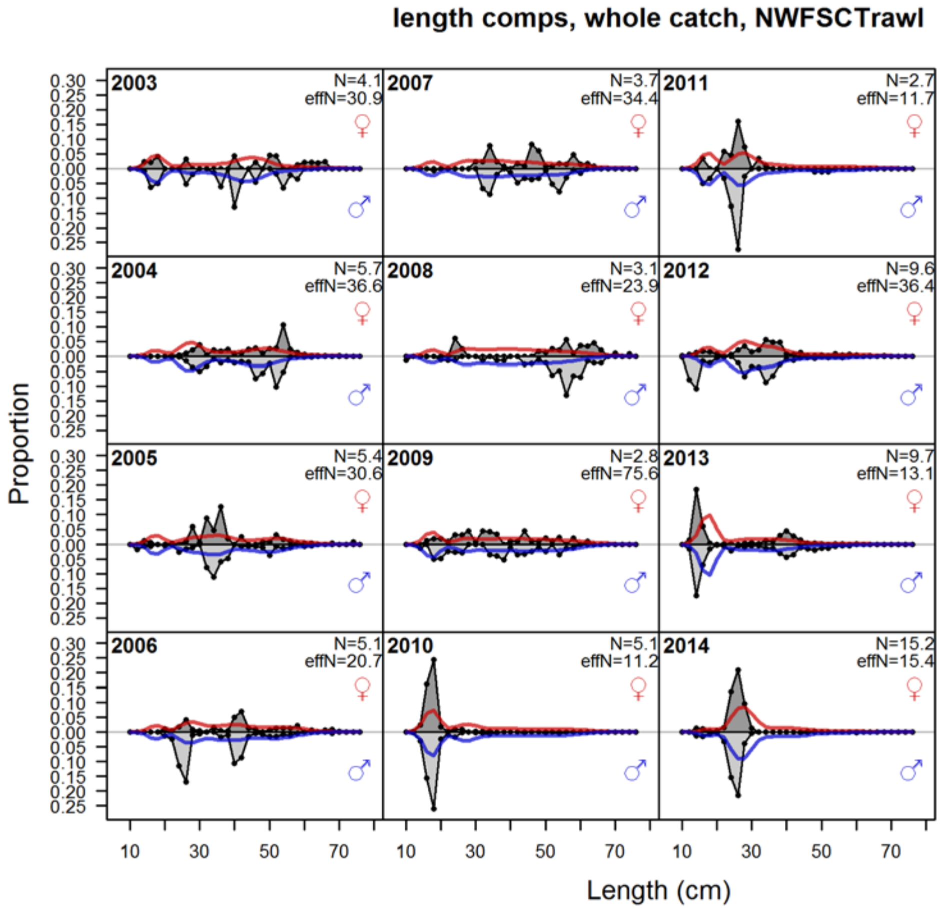


Figure 104. Observed and expected length composition by sex (female and male) for the NWFSC survey.

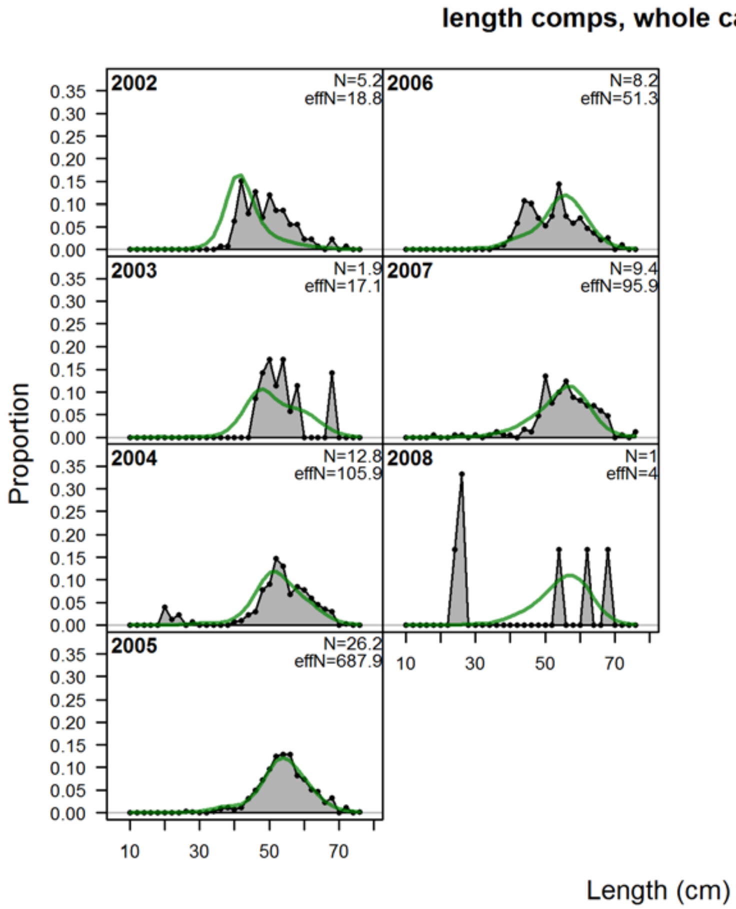


Figure 105. Observed and expected length composition for unsexed fish for the Free1 length composition. Note that the data are not included in likelihood computation. Note that this figure is only for showing fits to the data as the data were not included in the likelihood calculation.

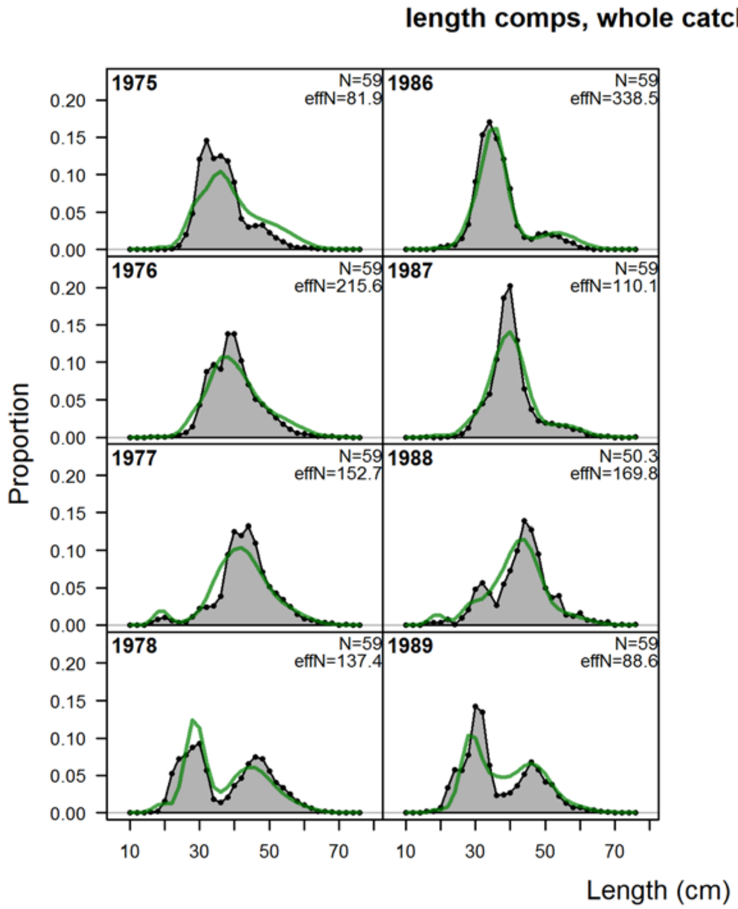


Figure 106. Observed and expected length composition for unsexed fish for the MirrorRecS length data.

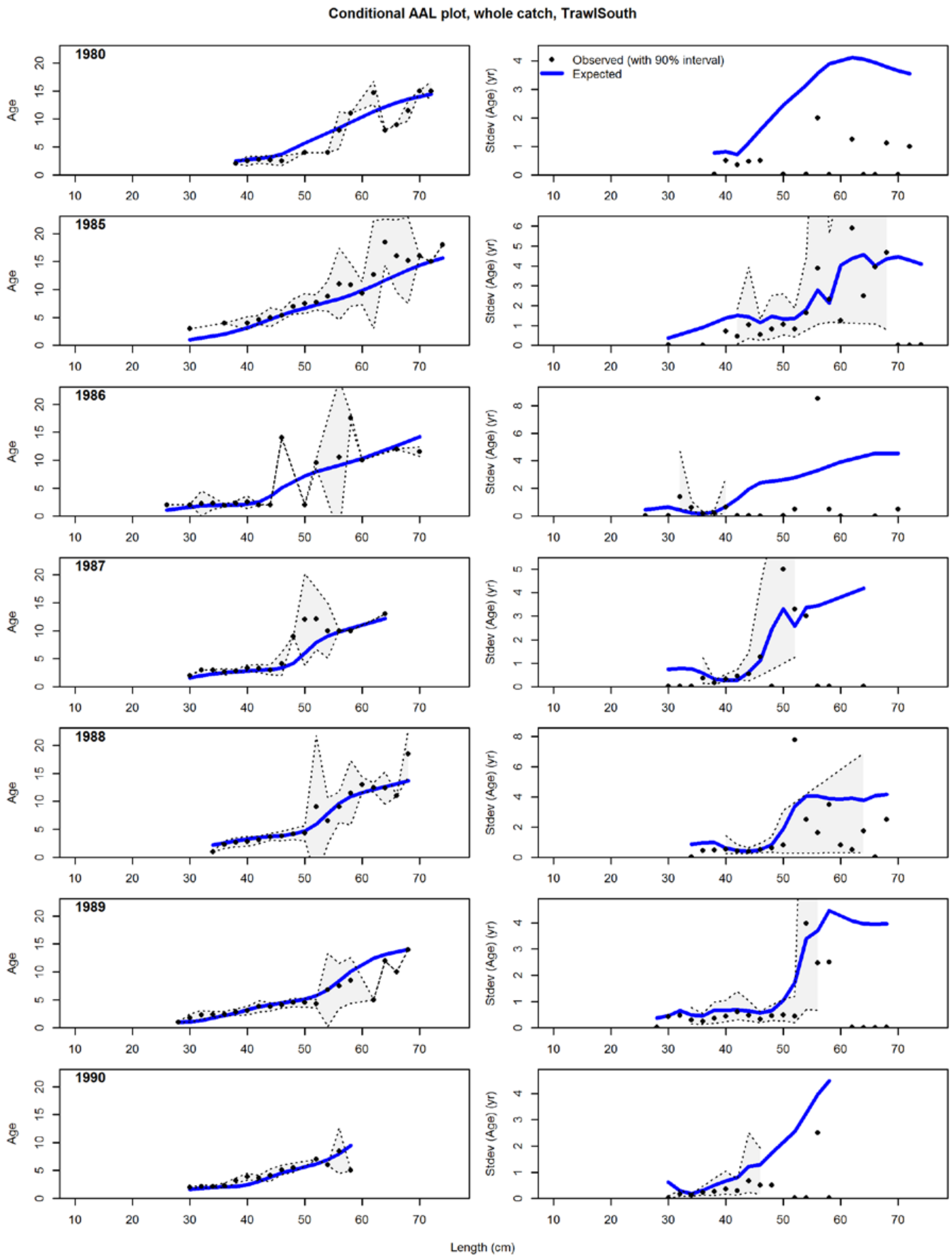


Figure 107. Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the southern California trawl fishery (left panel = mean; right panel = standard deviation).

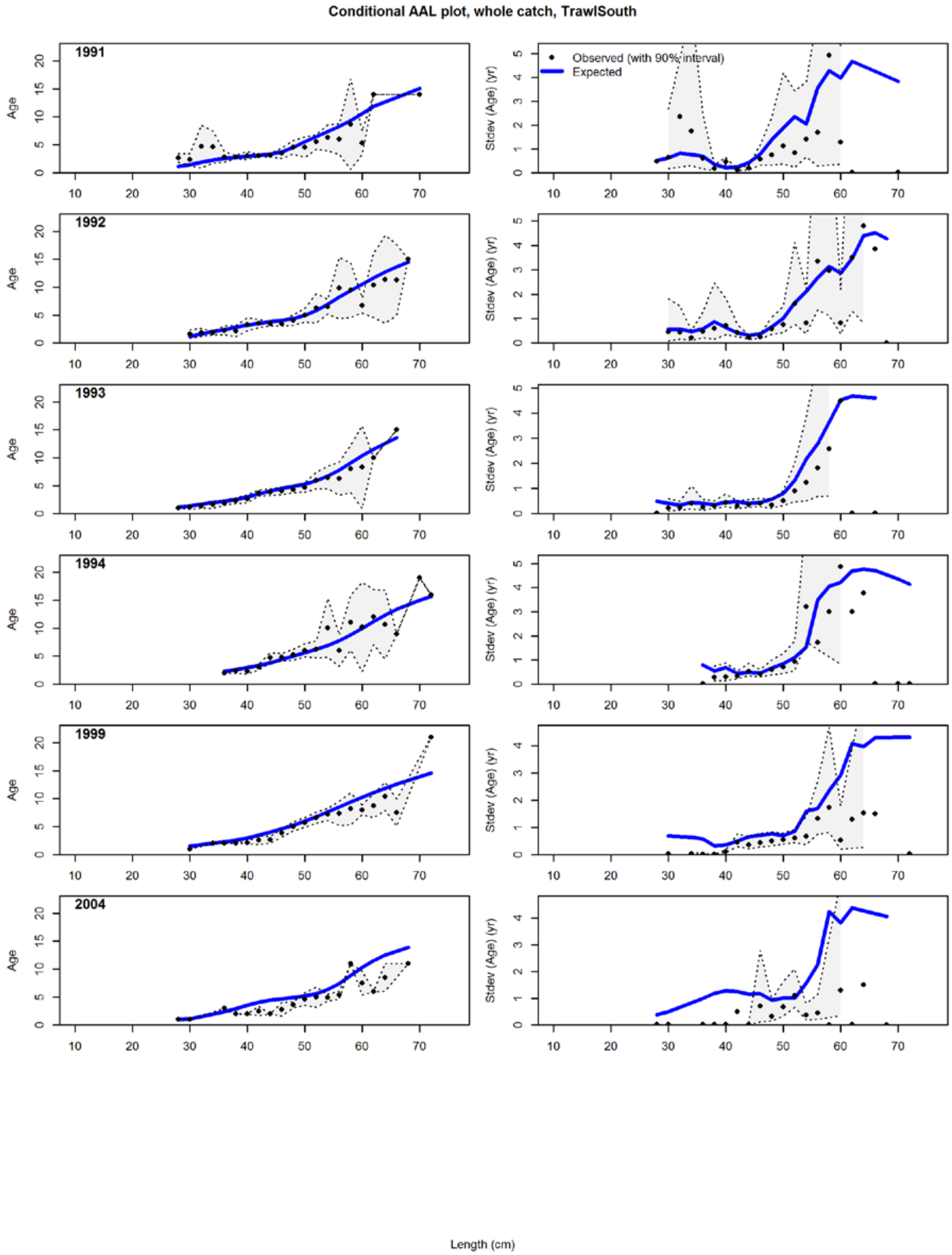


Figure (continued). Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the southern California trawl fishery (left panel = mean; right panel = standard deviation).

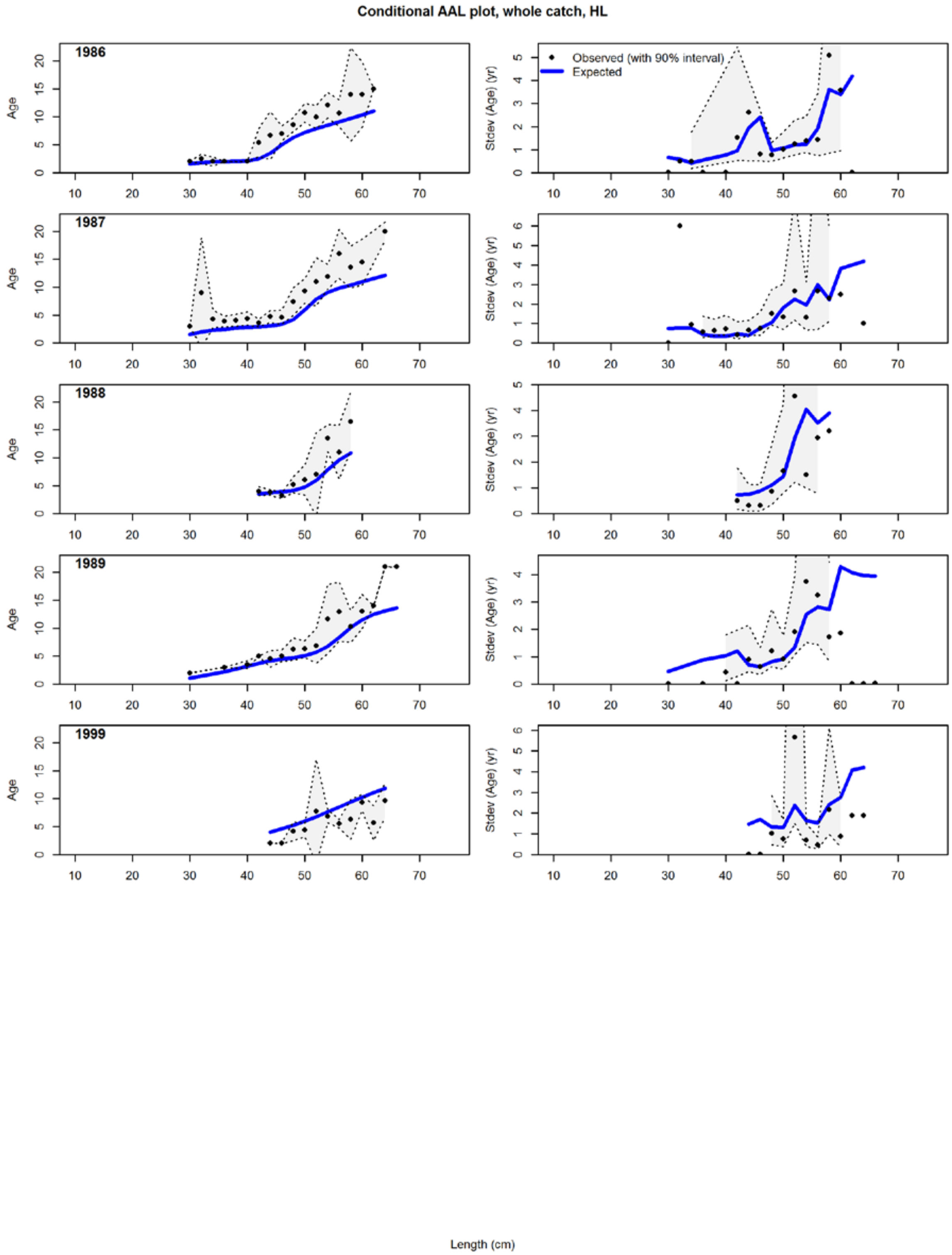


Figure 108. Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the hook-and-line fishery (left panel = mean; right panel = standard deviation).

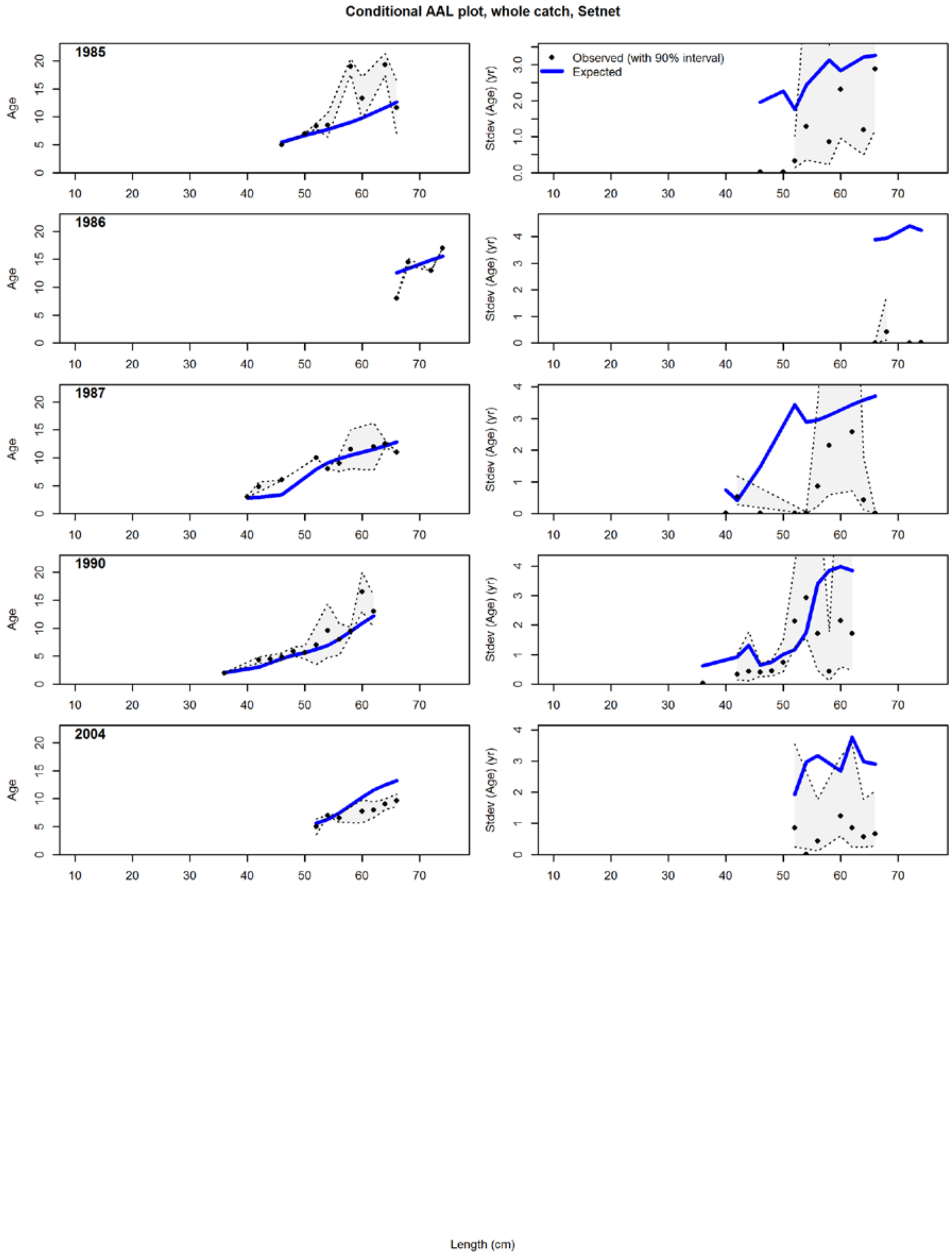


Figure 109. Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the setnet fishery (left panel = mean; right panel = standard deviation).

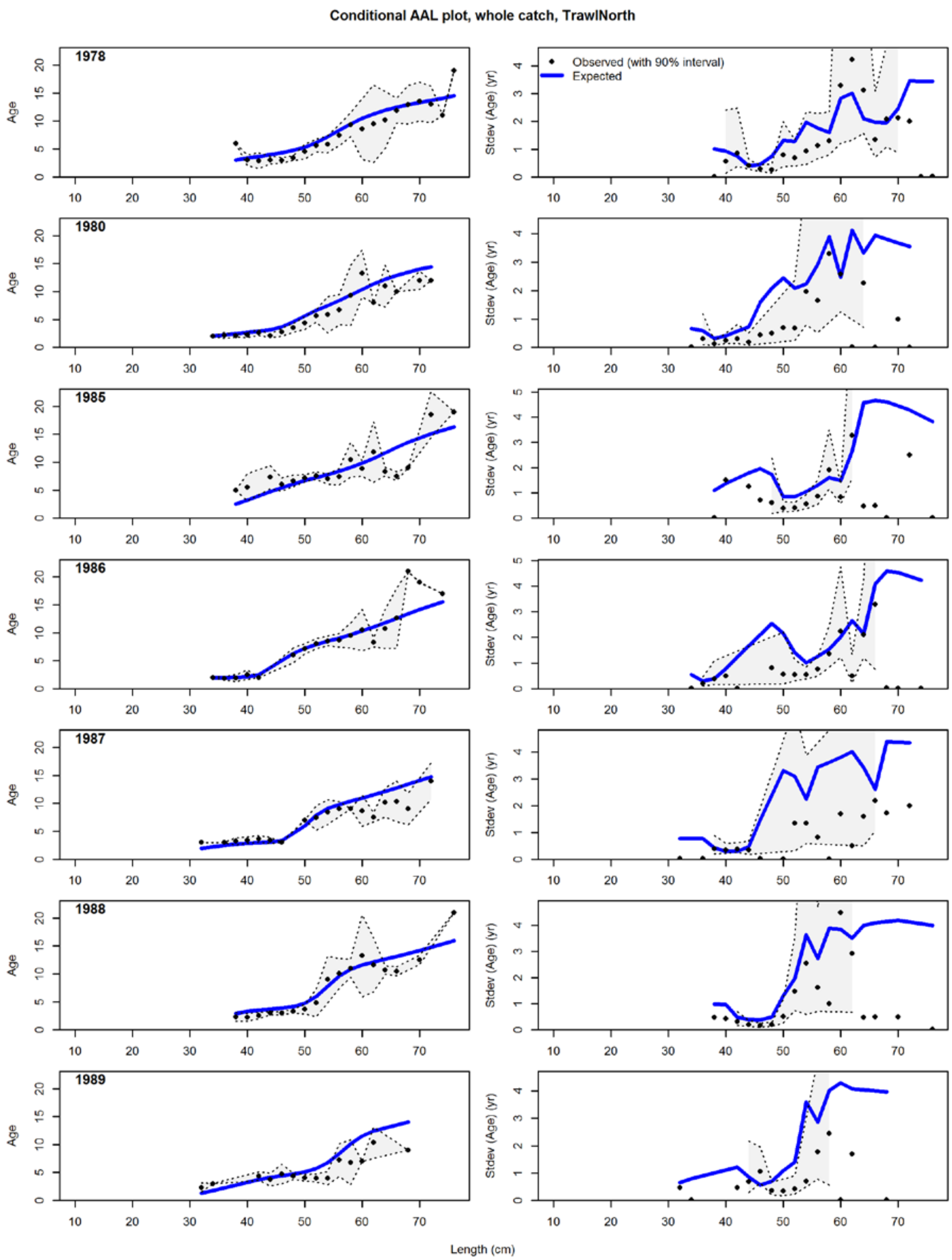


Figure 110. Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the northern California trawl fishery (left panel = mean; right panel = standard deviation).

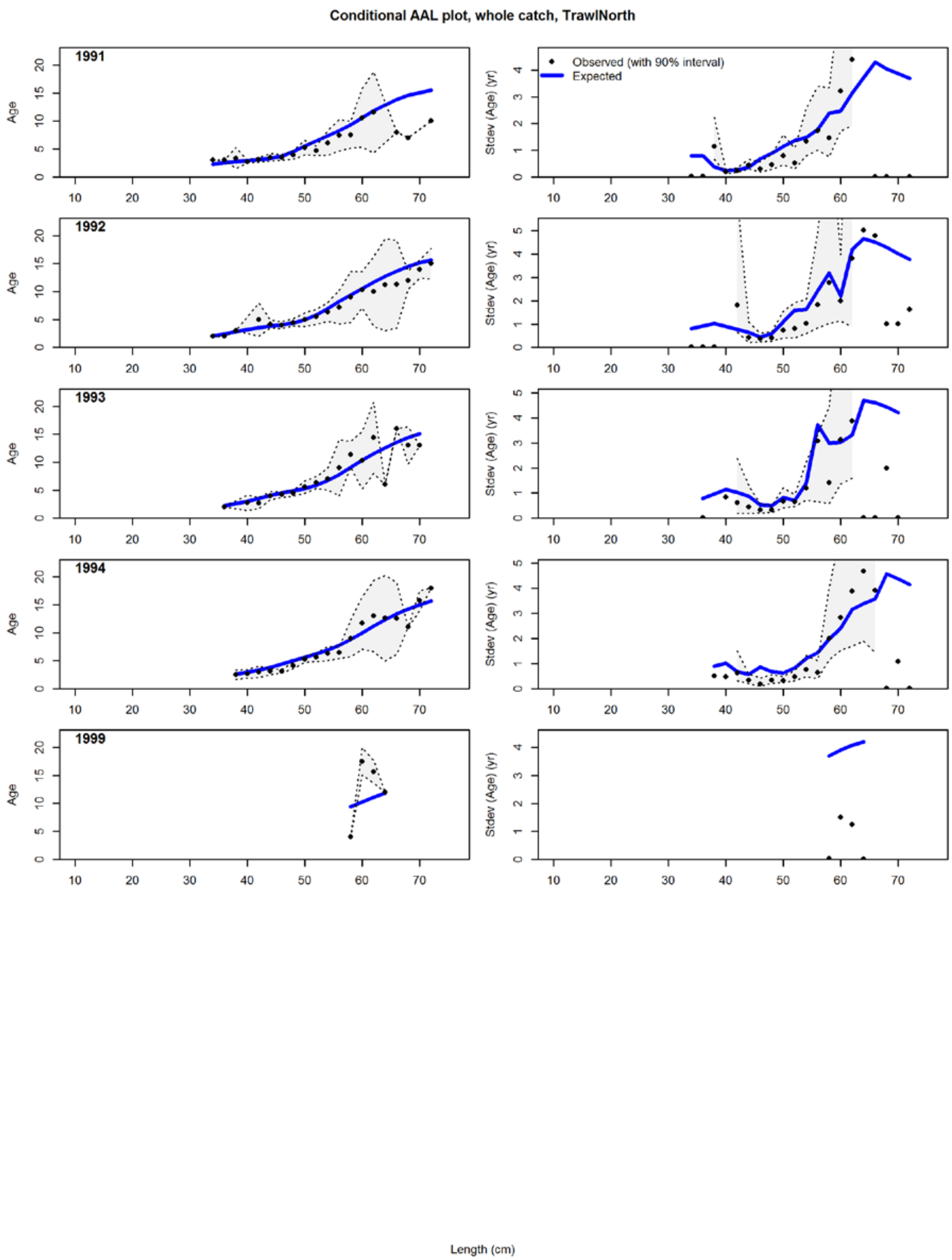


Figure (continued). Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the northern California trawl fishery (left panel = mean; right panel = standard deviation).

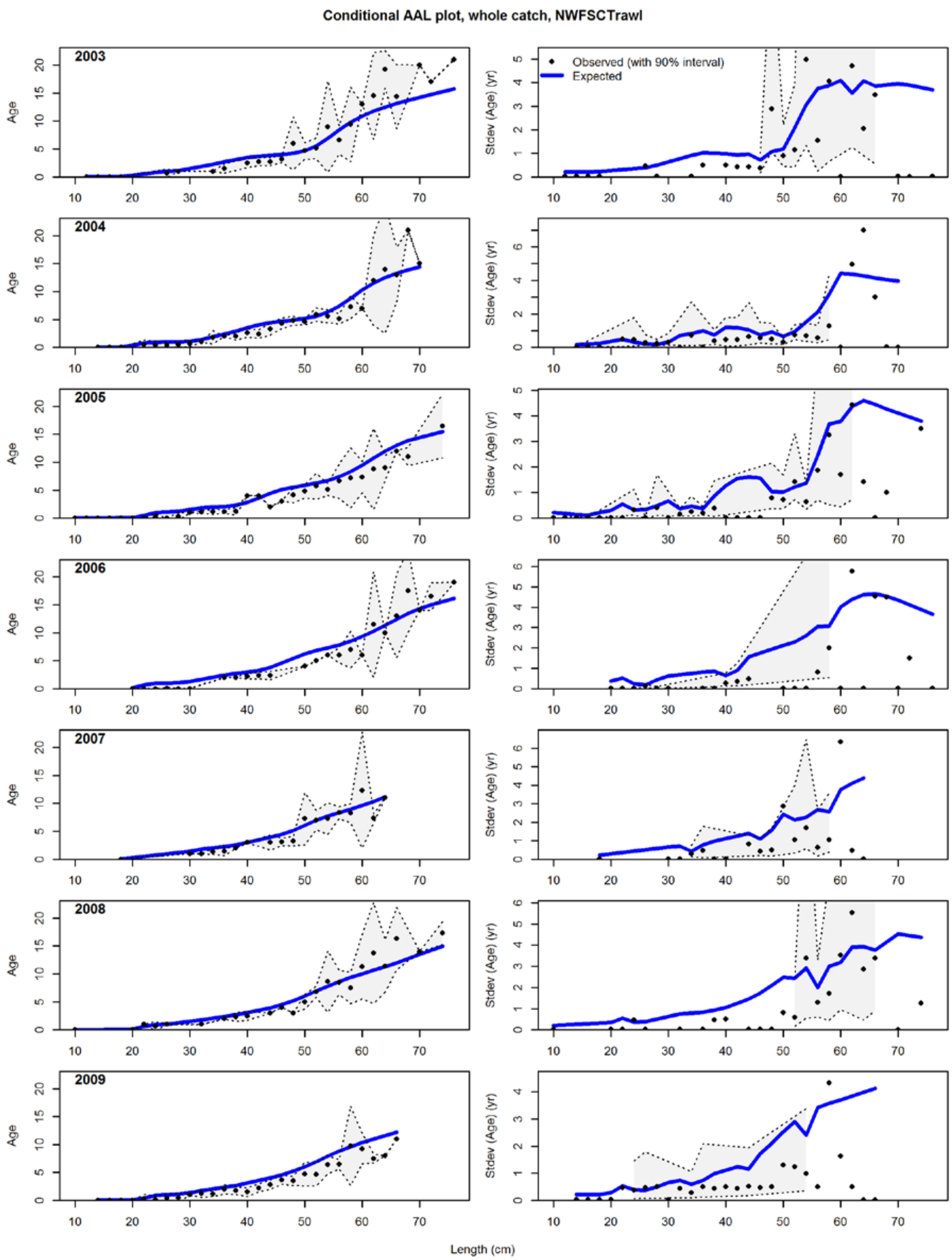


Figure 111. Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the NWFSC trawl survey (left panel = mean; right panel = standard deviation).

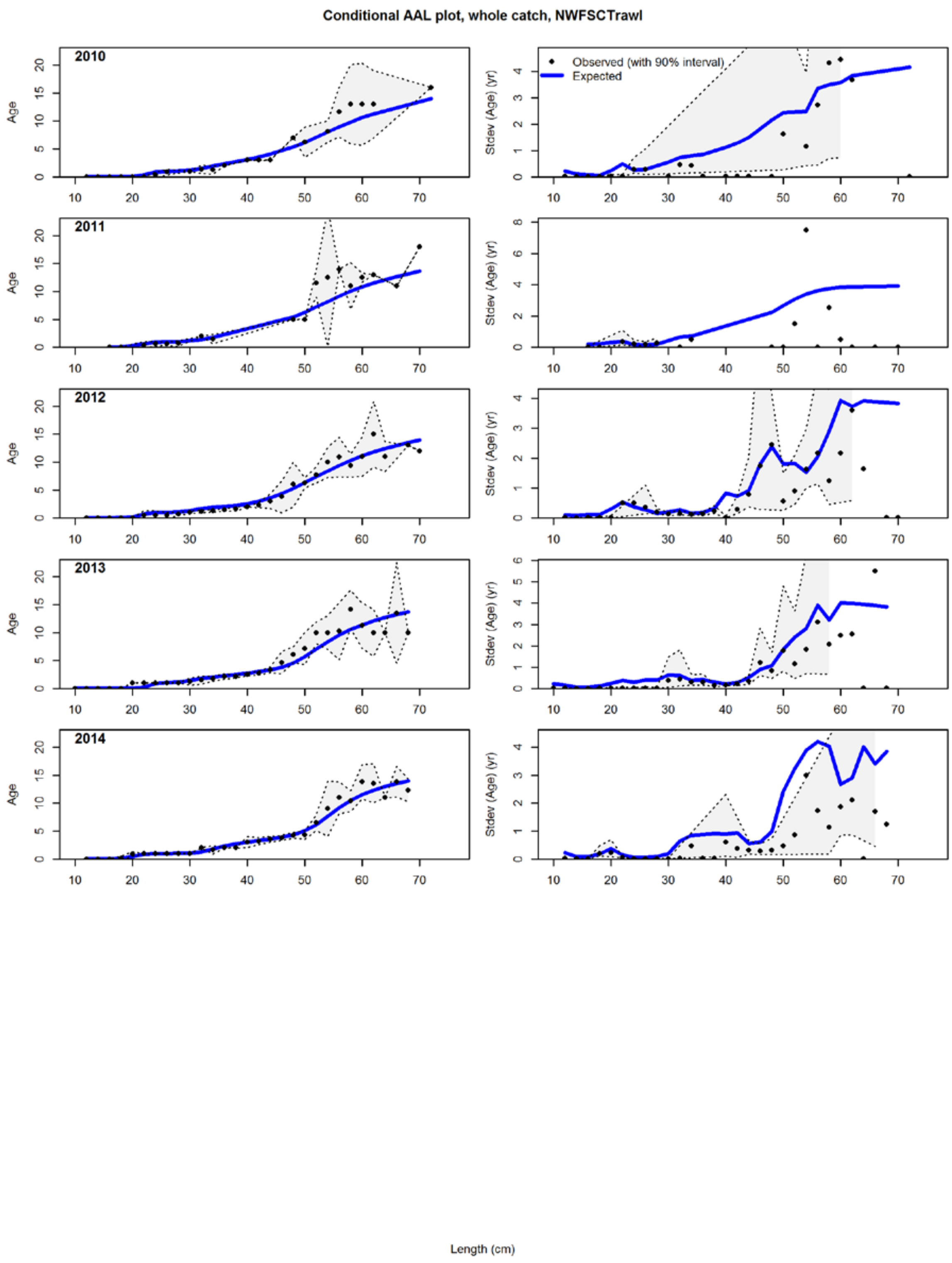


Figure (continued). Comparisons of observed (black dot) and expected (blue line) conditional length-at-age by year for the NWFSC trawl survey (left panel = mean; right panel = standard deviation).

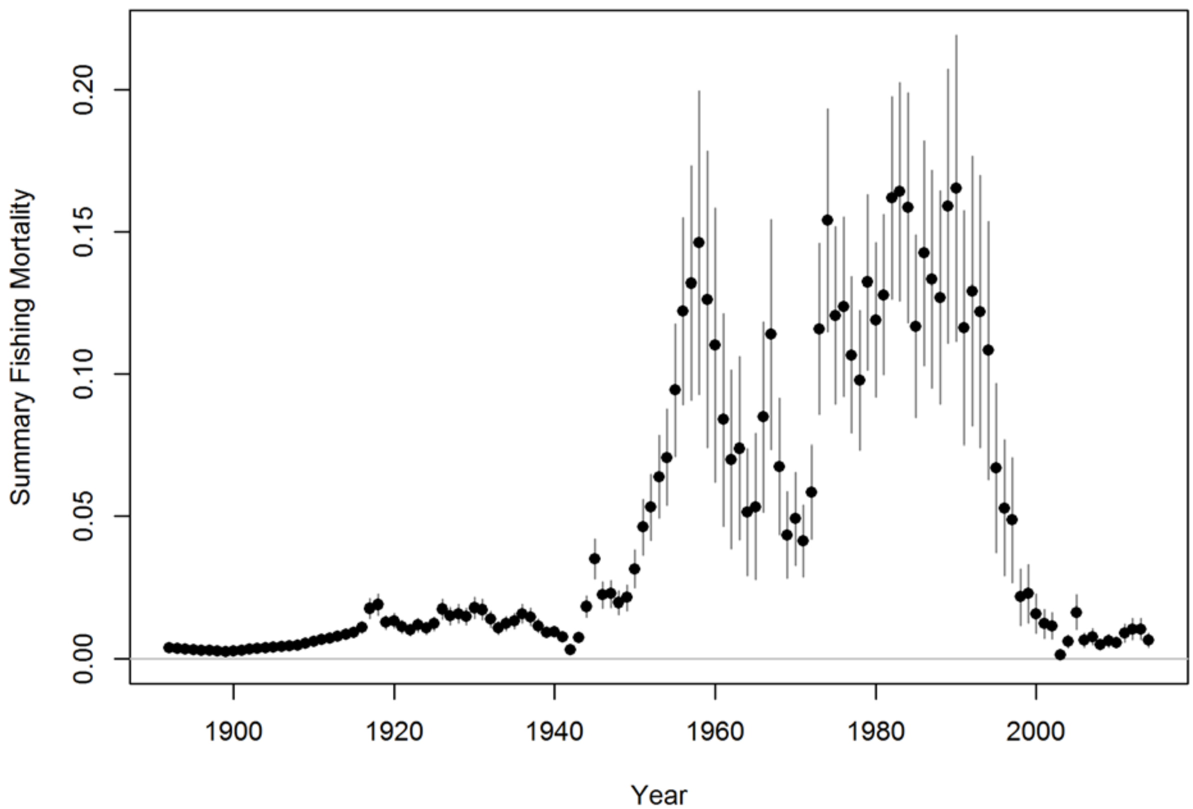


Figure 112. Estimated total fishing mortality.

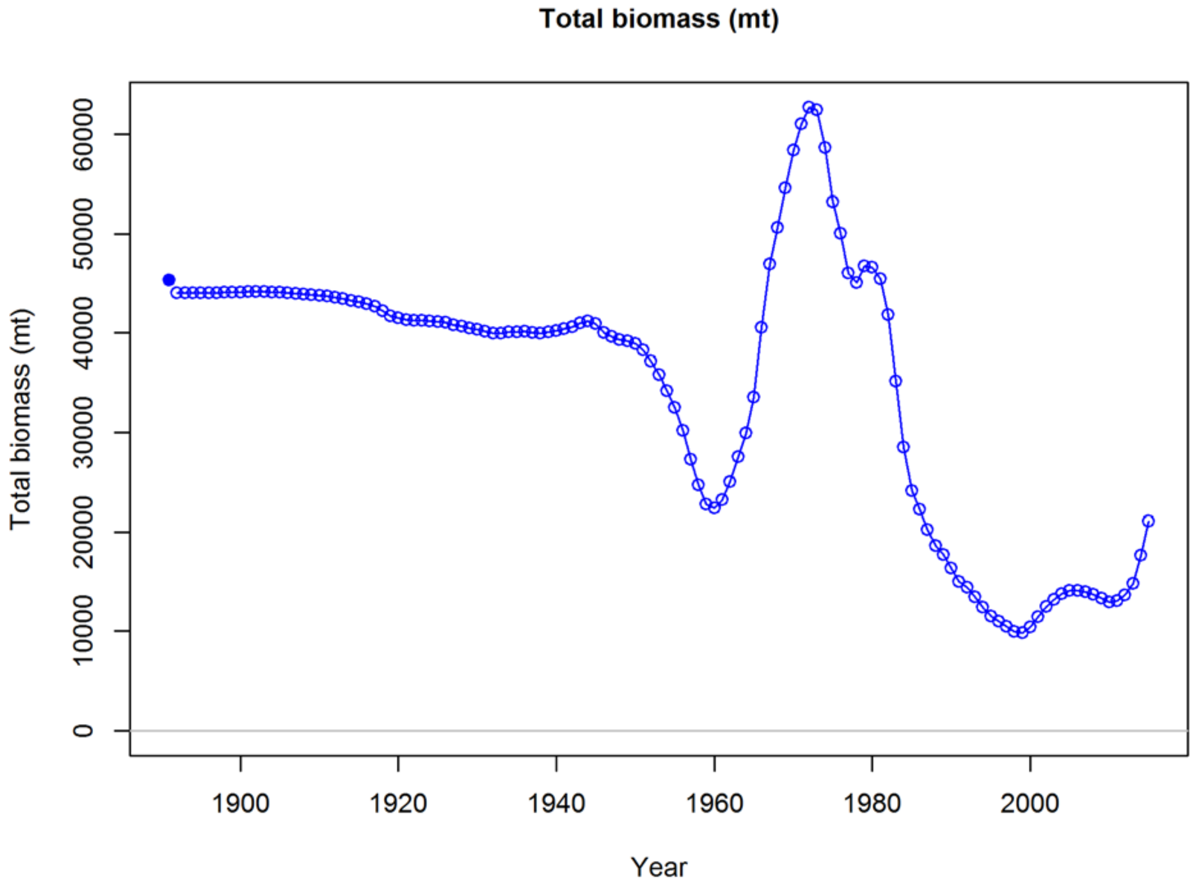


Figure 113. Estimated total biomass (defined as biomass for all fish age 1 and older).

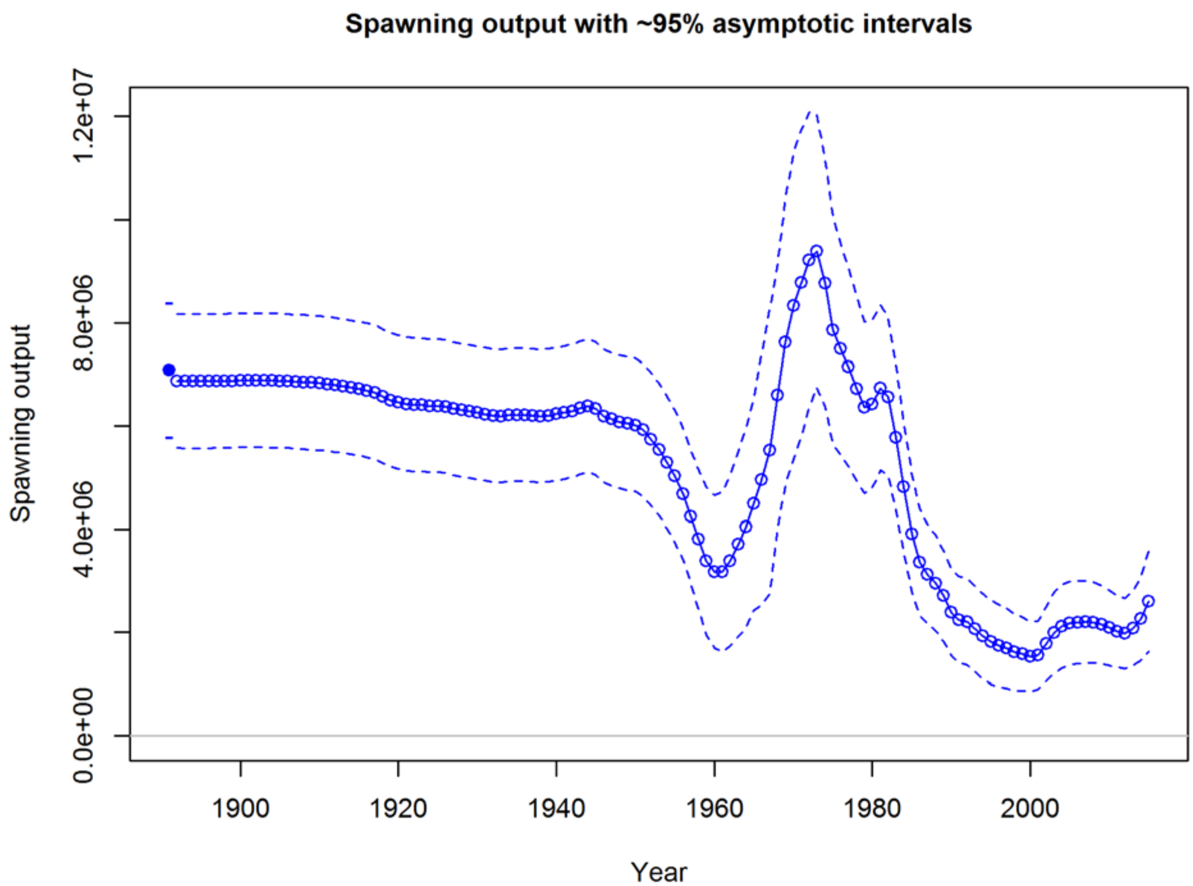


Figure 114. Estimated spawning output with 95% confident intervals.

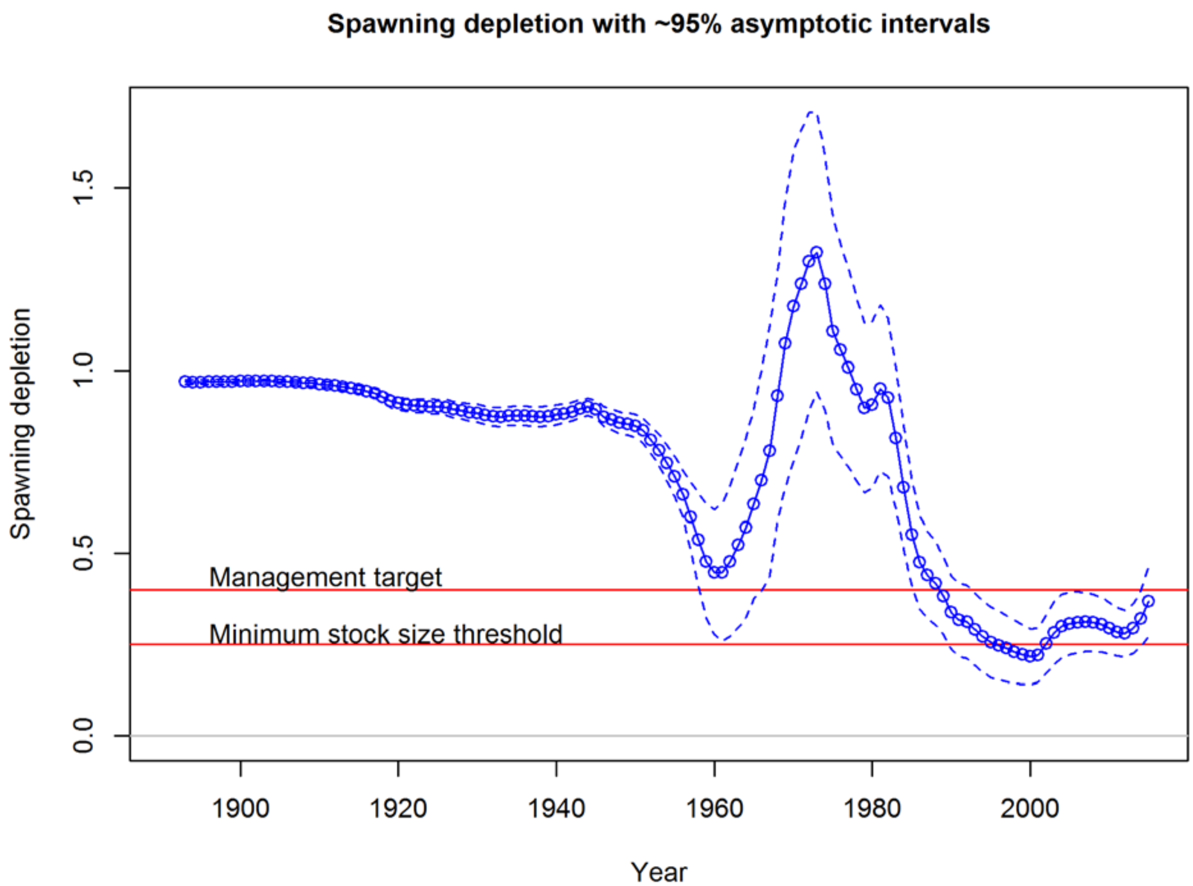


Figure 115. Estimated stock depletion with 95% asymptotic intervals.

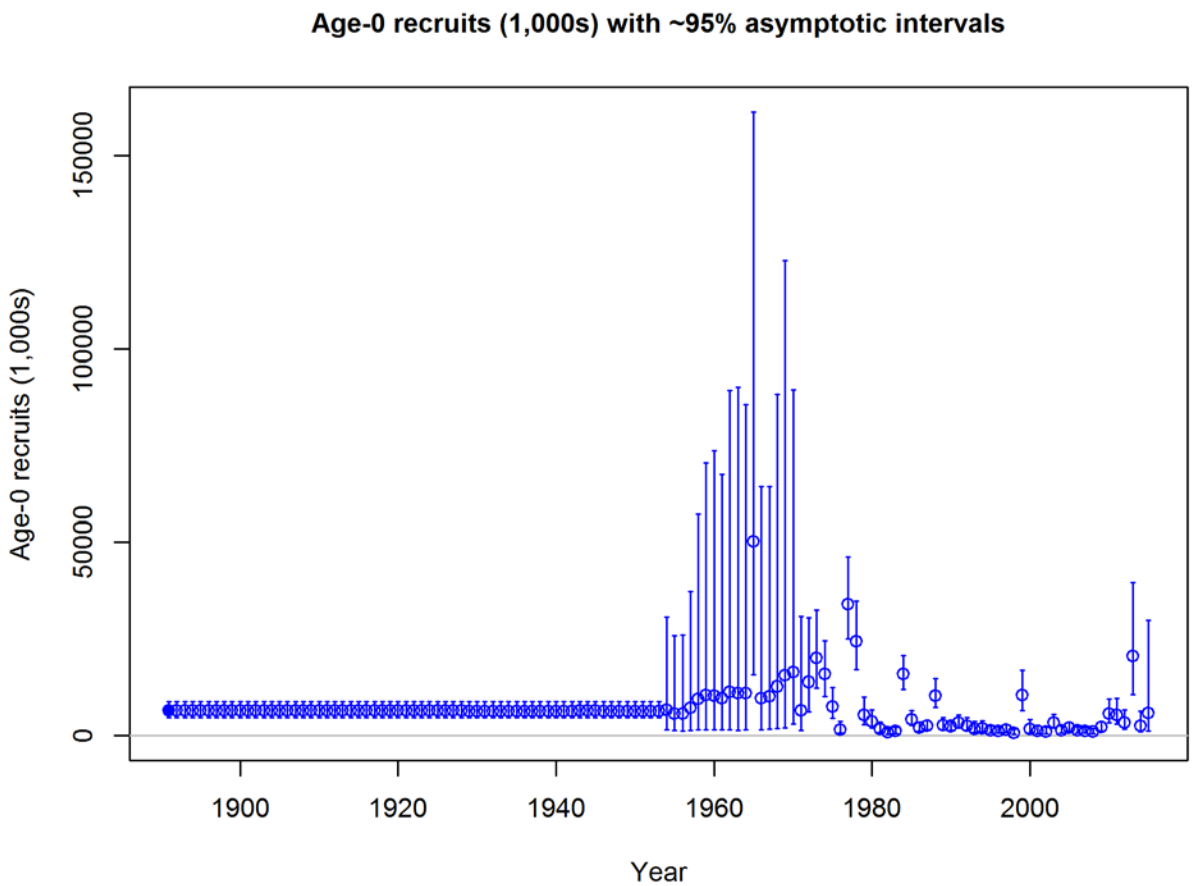


Figure 116. Estimated annual recruits with 95% asymptotic intervals.

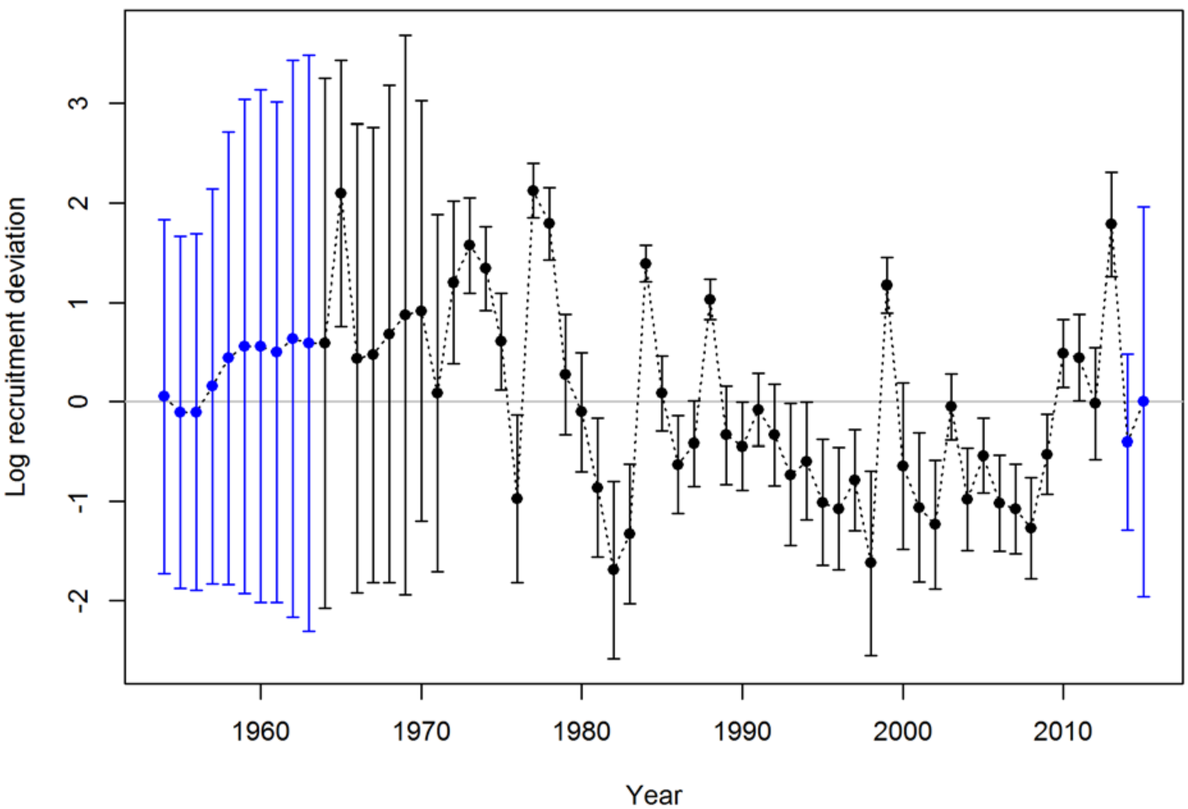


Figure 117. Estimated annual recruitment deviations (dots) and 95% confidence intervals for main recruitment deviation time period (black) and the early and late recruitment deviation time periods (blue).

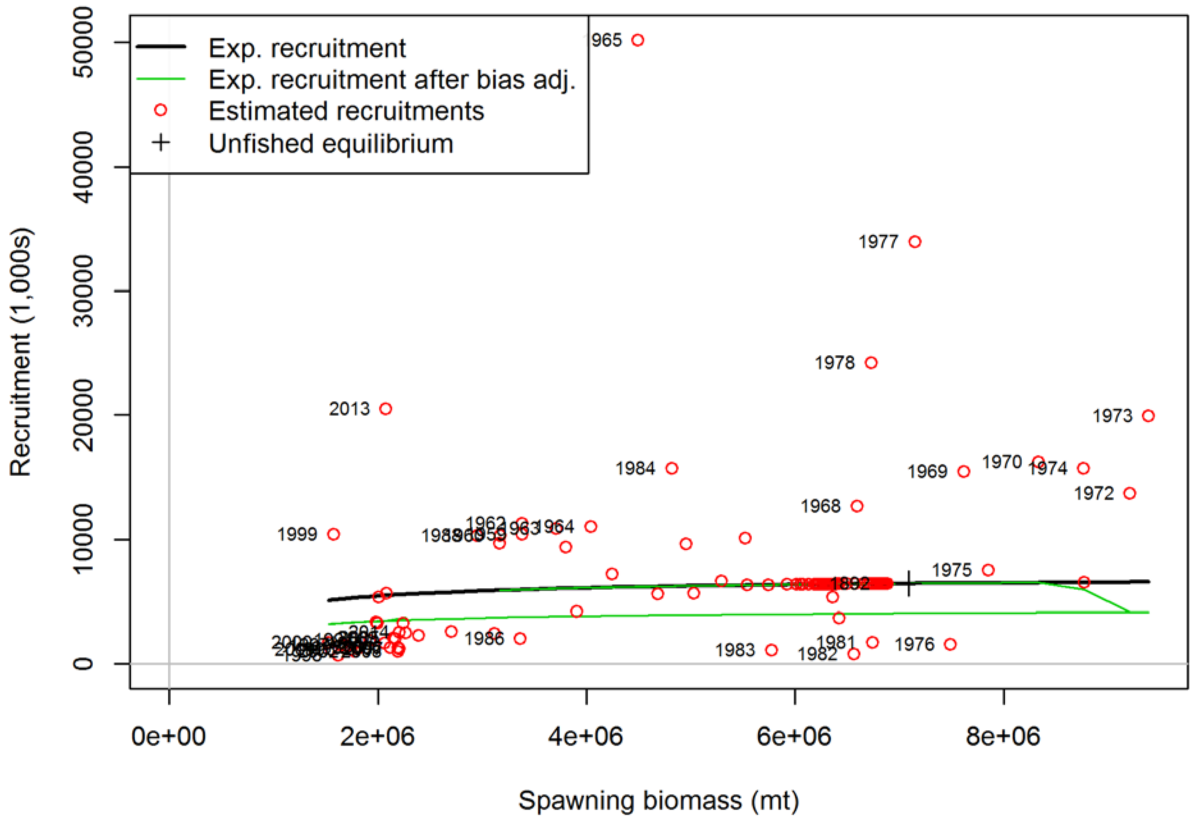


Figure 118. Estimated stock-recruitments relationship. Note that the label for x-axis should be "Spawning output".

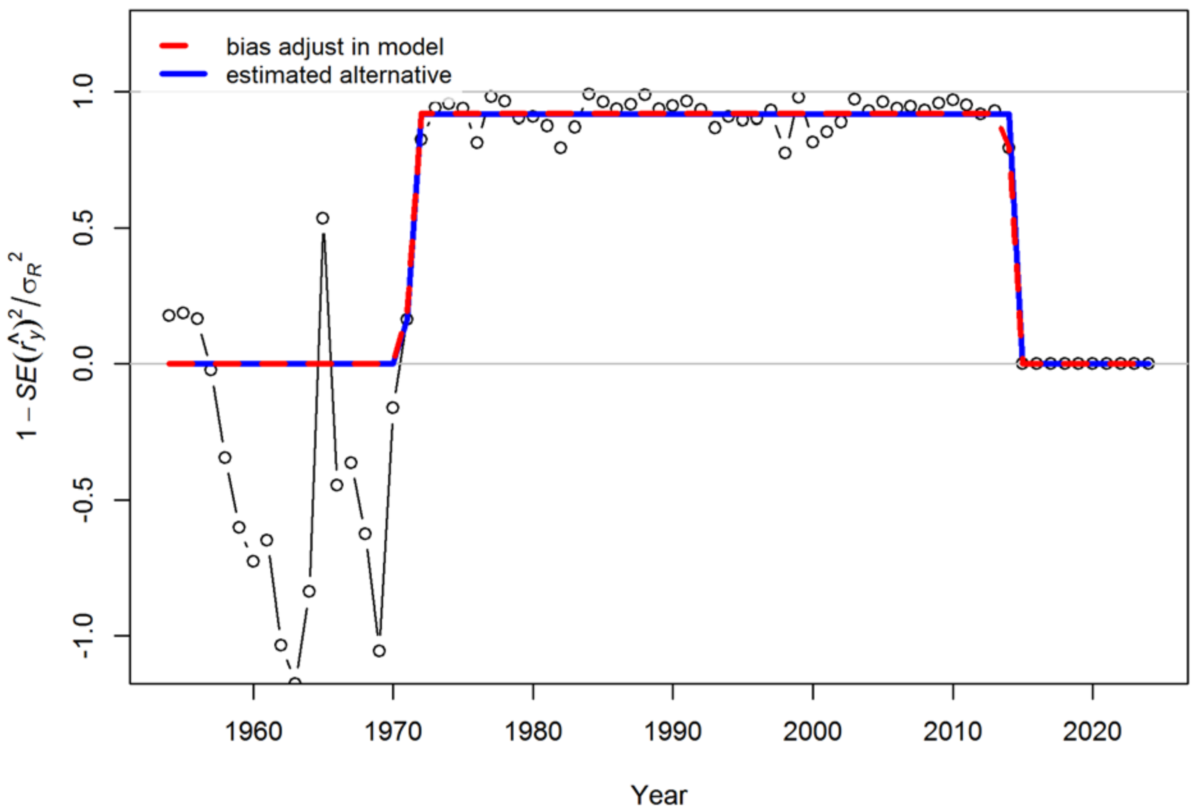


Figure 119. Estimated time series of recruitment bias adjustments showing that bias adjustments used in the base model are similar to those calculated using the method provided by Methot and Taylor (2011).

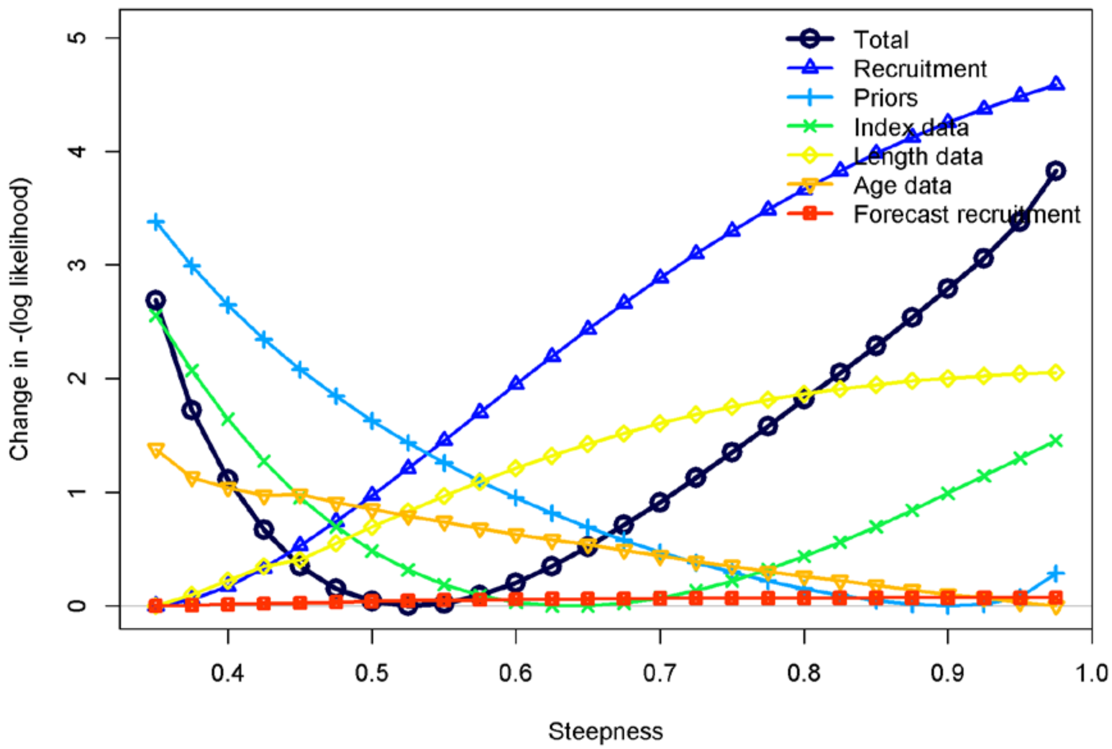


Figure 120. Likelihood profile for total and each data component at different values of steepness parameter.

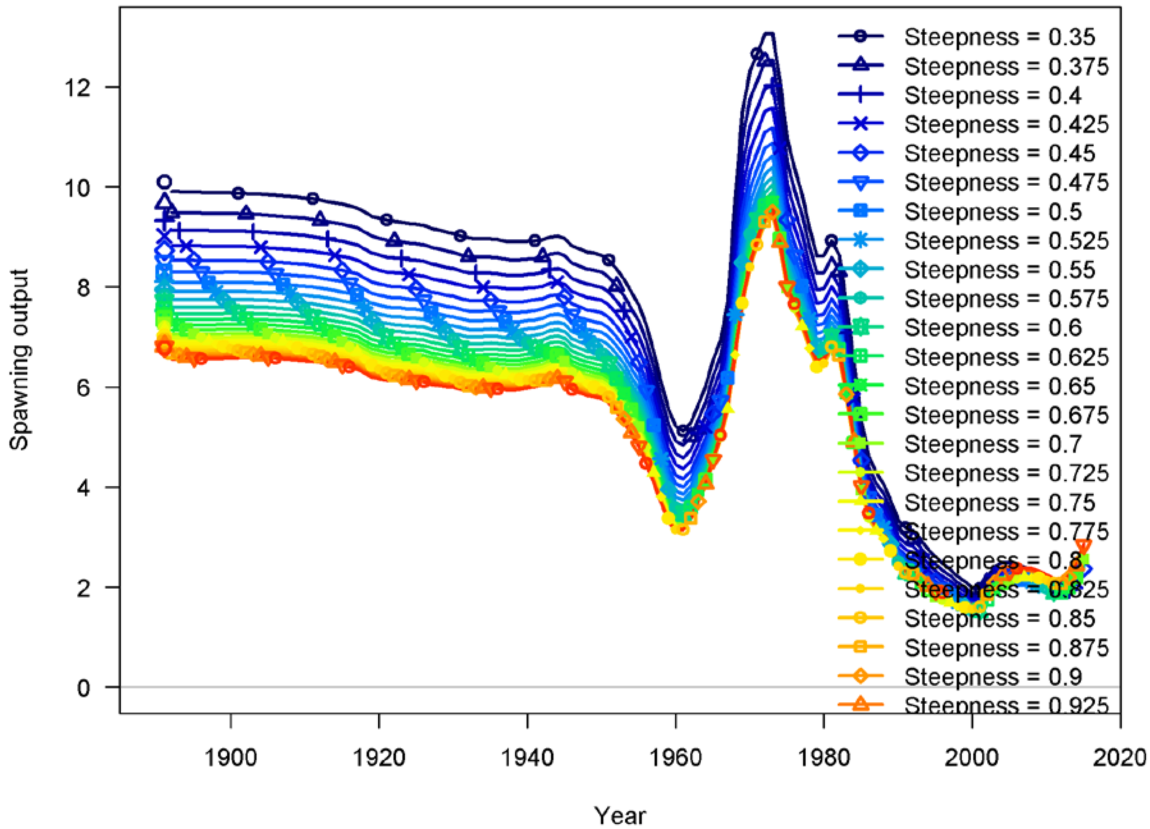


Figure 121. Time series of spawning outputs (billions of eggs) at different values of steepness parameter.

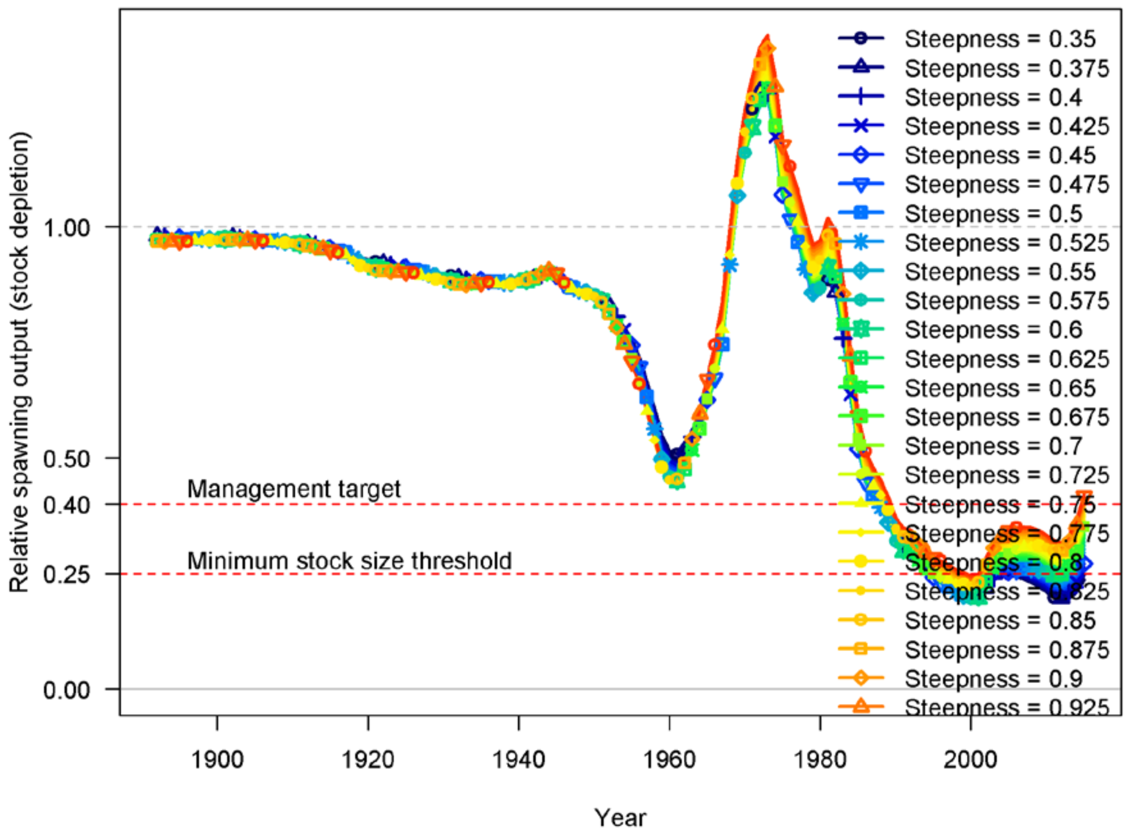


Figure 122. Time series of stock depletion at different values of steepness parameter.

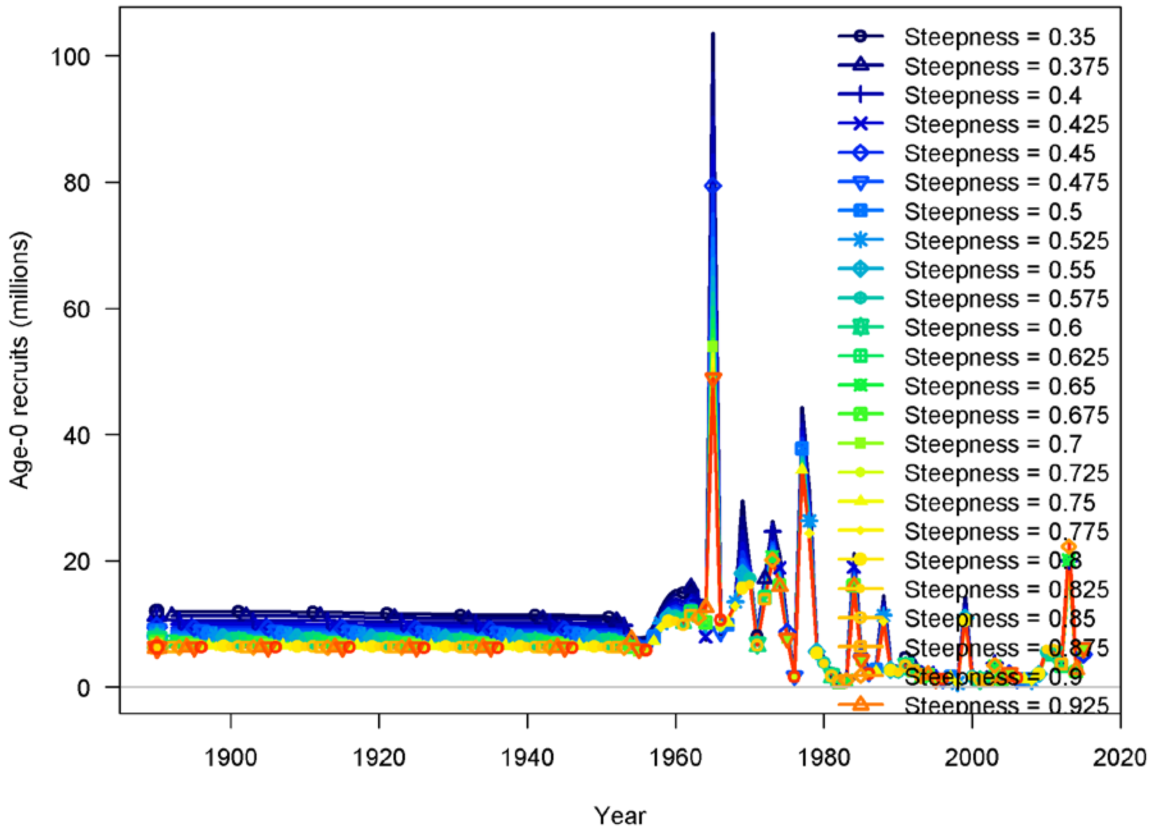


Figure 123. Time series of recruitment at different values of steepness parameter.

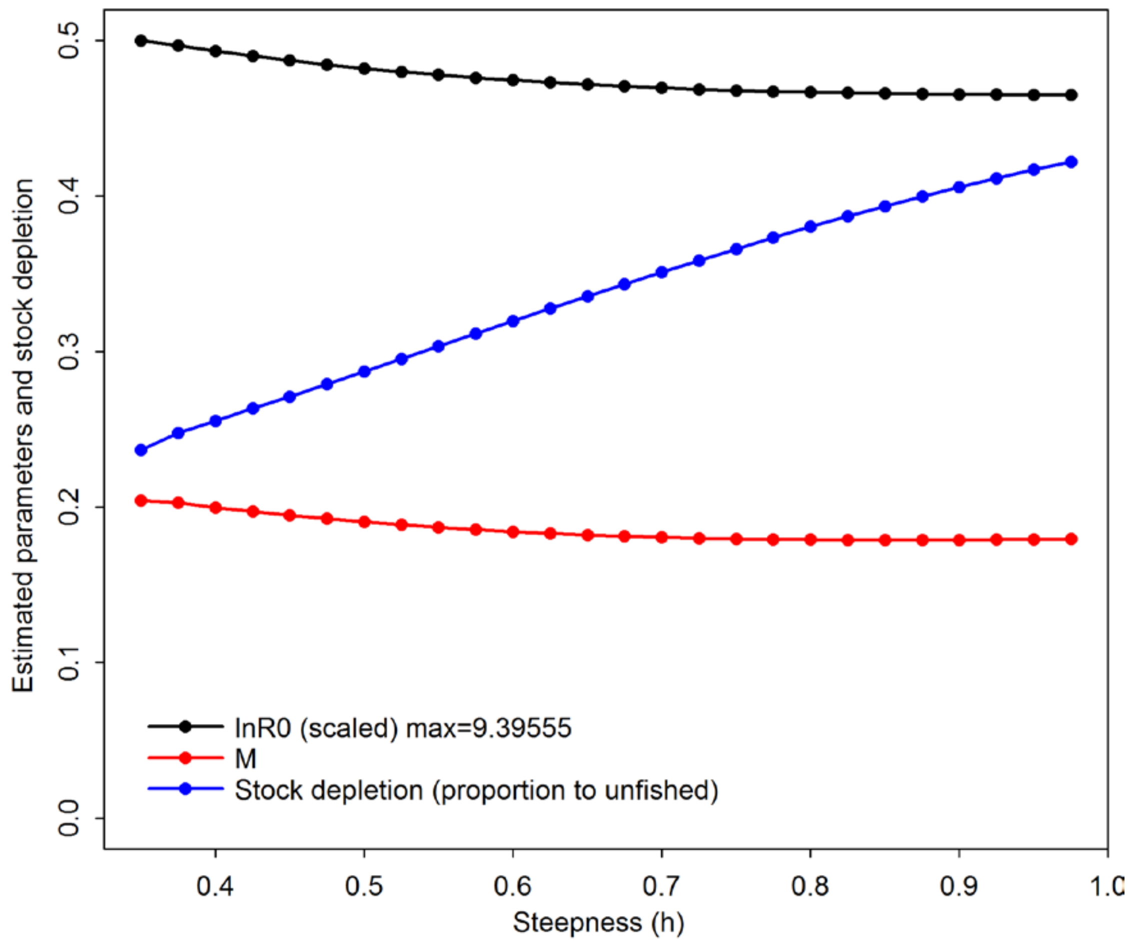


Figure 124. Estimated parameters and stock depletion at different steepness (h) from *h* profile analysis. Steepness (*h*) is fixed at 0.773 in the model.

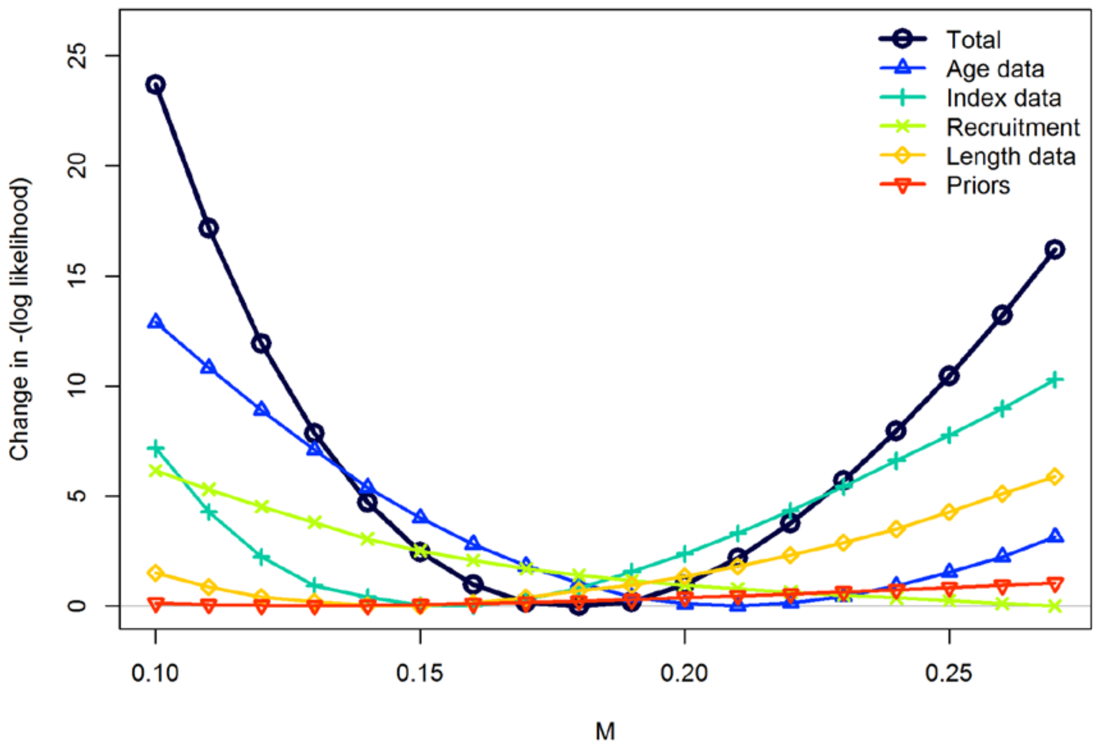


Figure 125. Likelihood profile for total and each data component at different values of female natural mortality parameter.

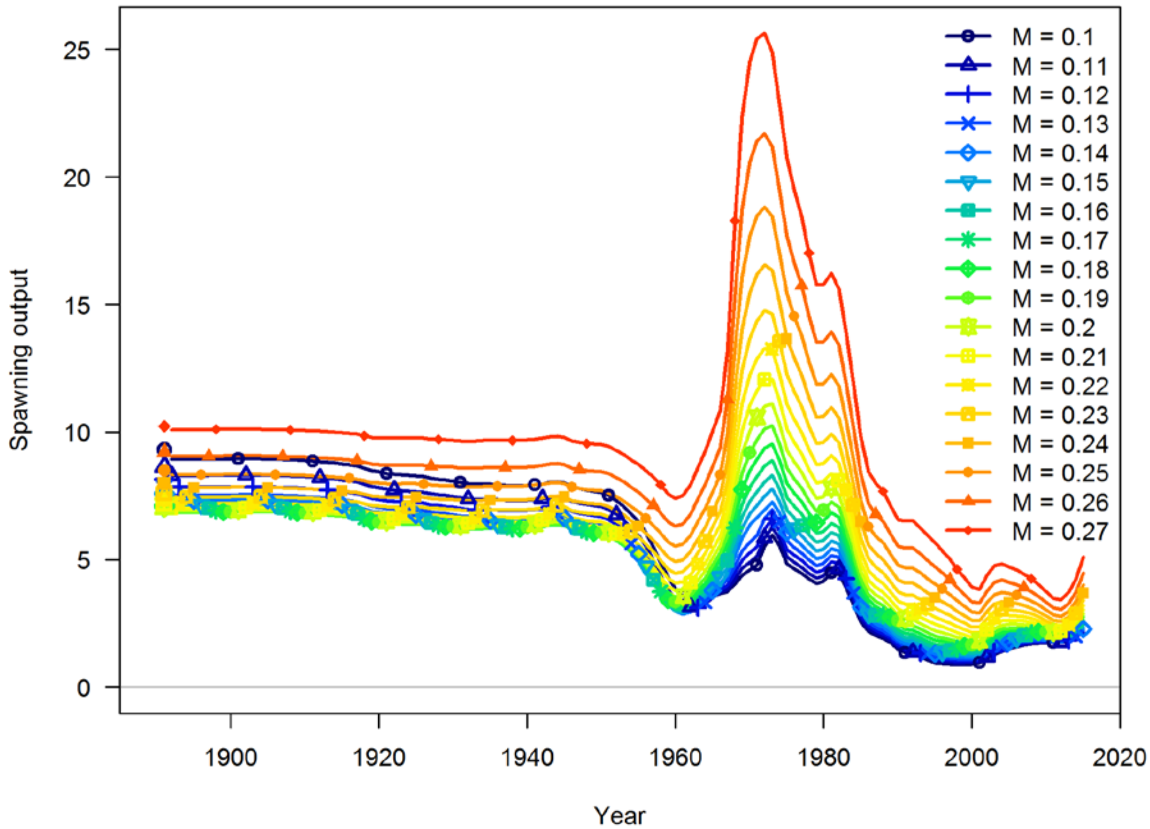


Figure 126. Time series of spawning outputs (billions of eggs) at different values of female natural mortality parameter.

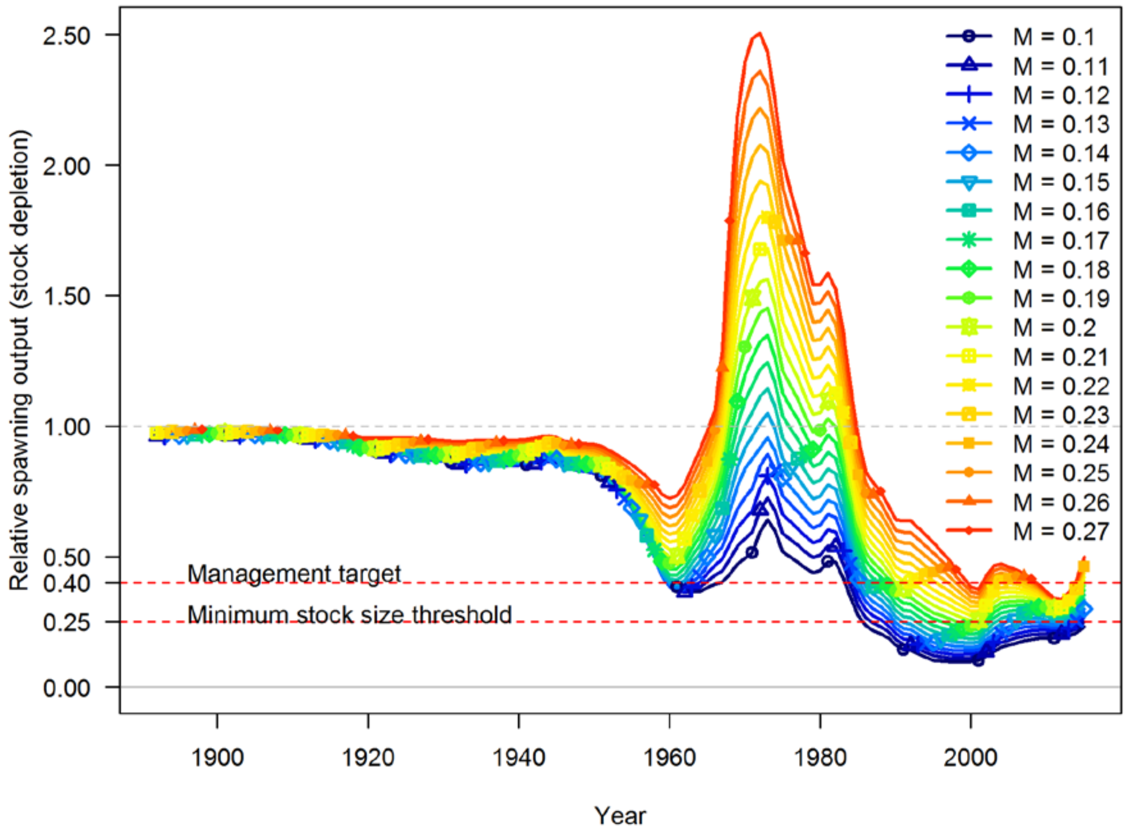


Figure 127. Time series of stock depletion (relative spawning biomass) at different values of female natural mortality parameter.

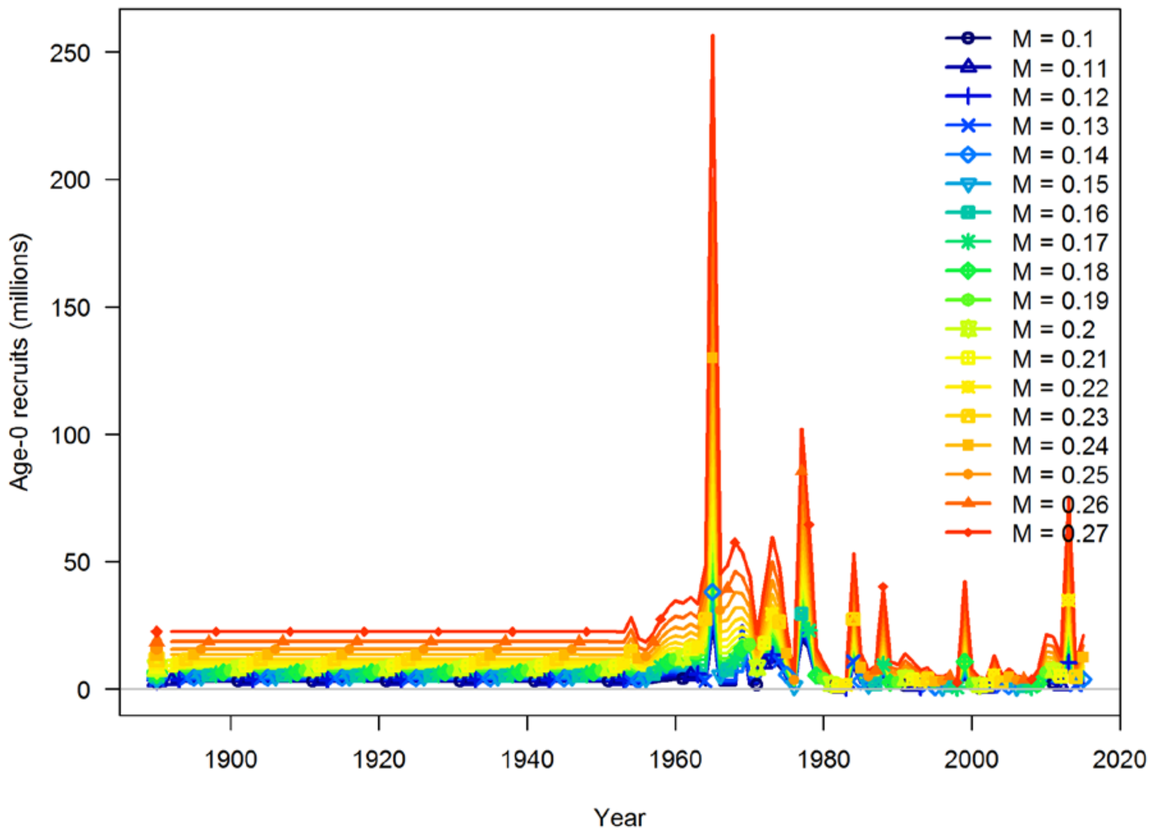


Figure 128. Time series of recruitment at different values of female natural mortality parameter.

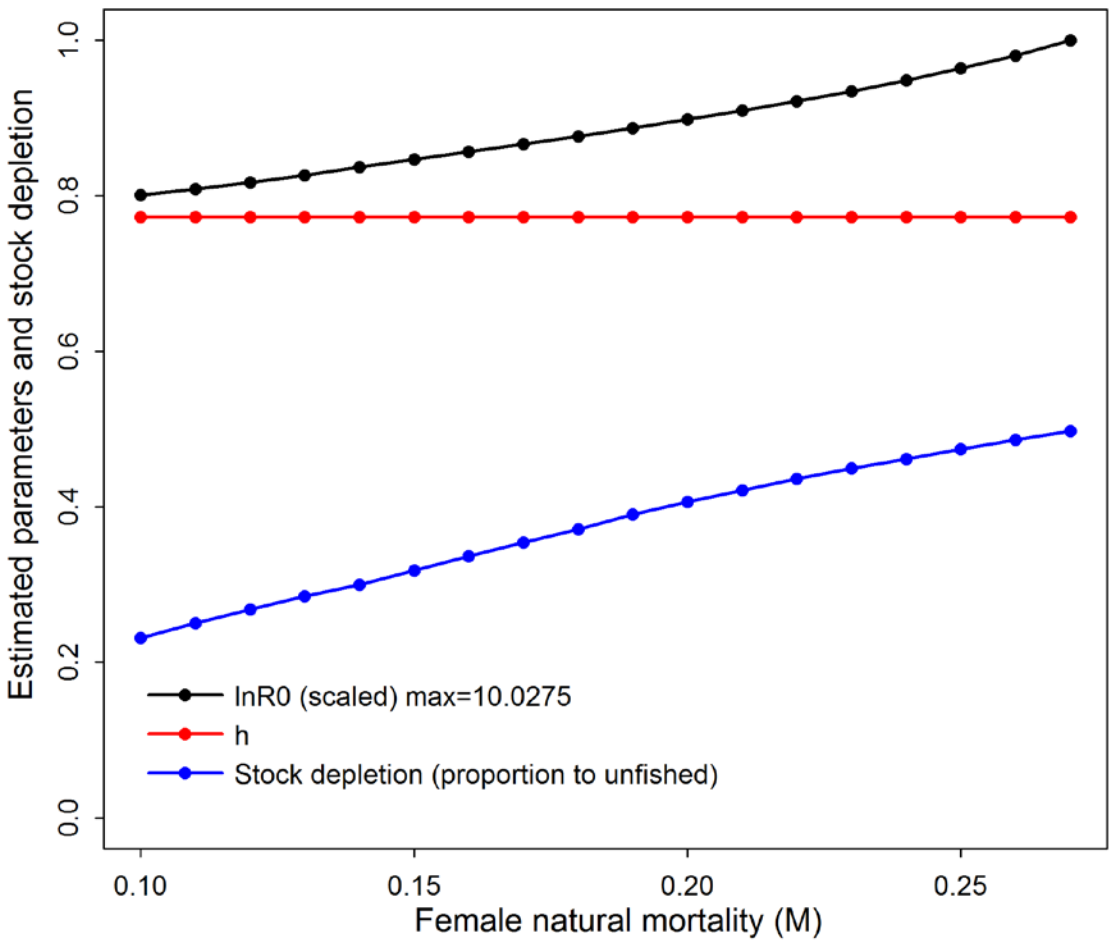


Figure 129. Estimated parameters and stock depletion at different female natural mortality (*M*) from *M* profile analysis (male *M* is the same as female *M*). Steepness (*h*) is fixed at 0.773 in the model.

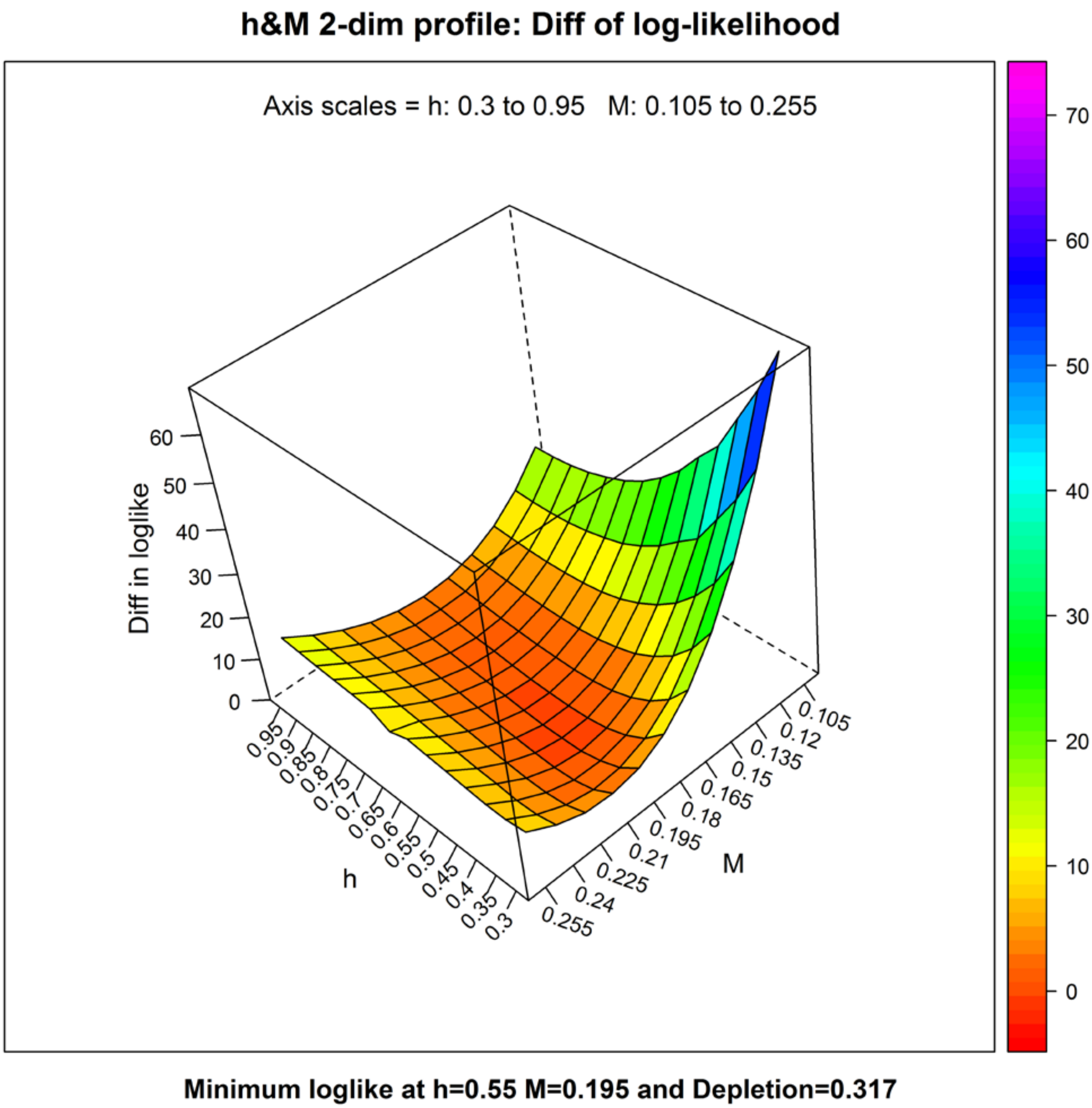


Figure 130. Two-dimension likelihood profile for different total log-likelihood at different values of steepness and natural mortality parameters.

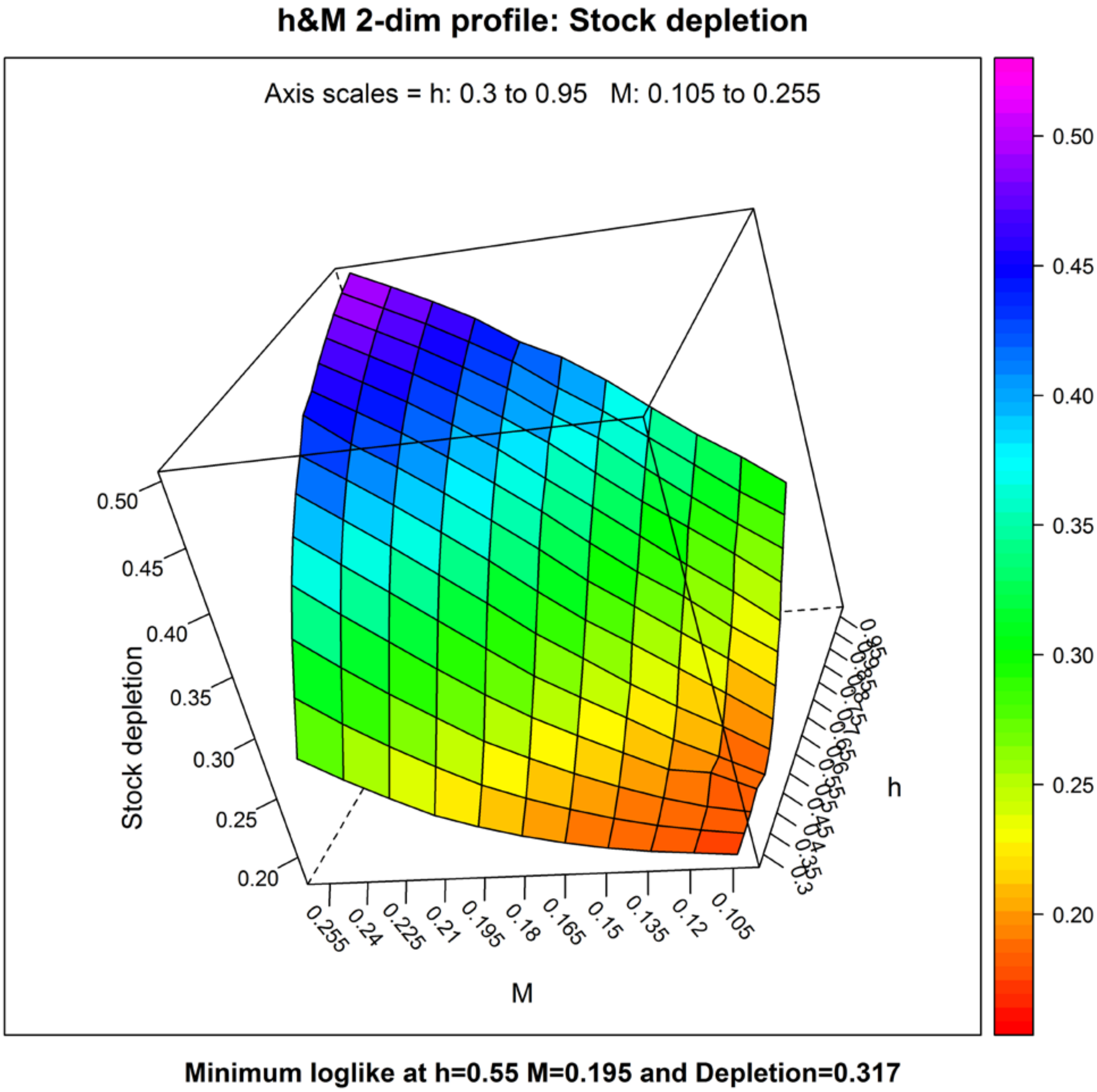


Figure 131. Two-dimension likelihood profile for stock depletion at different values of steepness and natural mortality parameters.

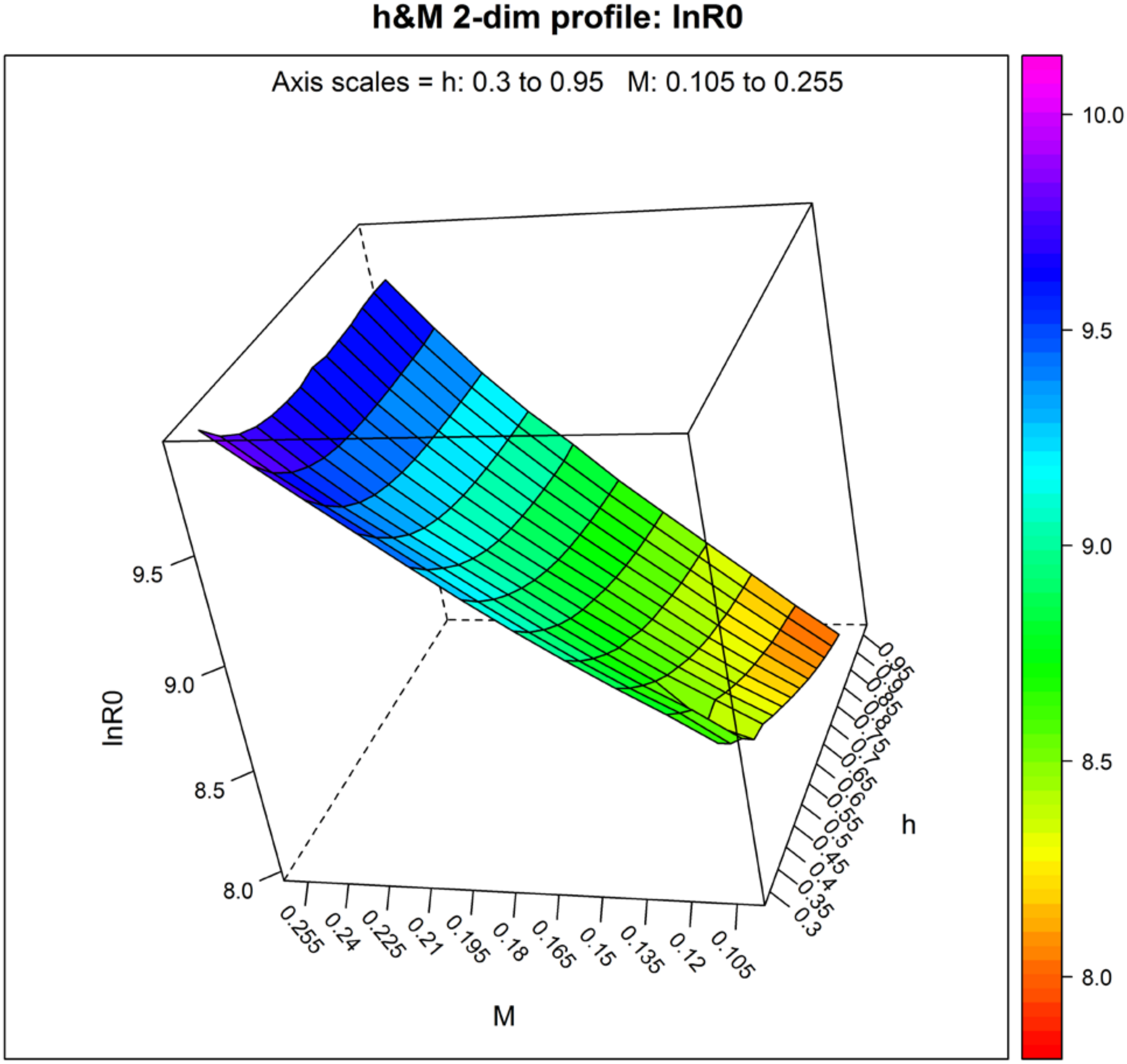


Figure 132. Two-dimension likelihood profile for logarithms virgin recruitment at different values of steepness and natural mortality parameters.

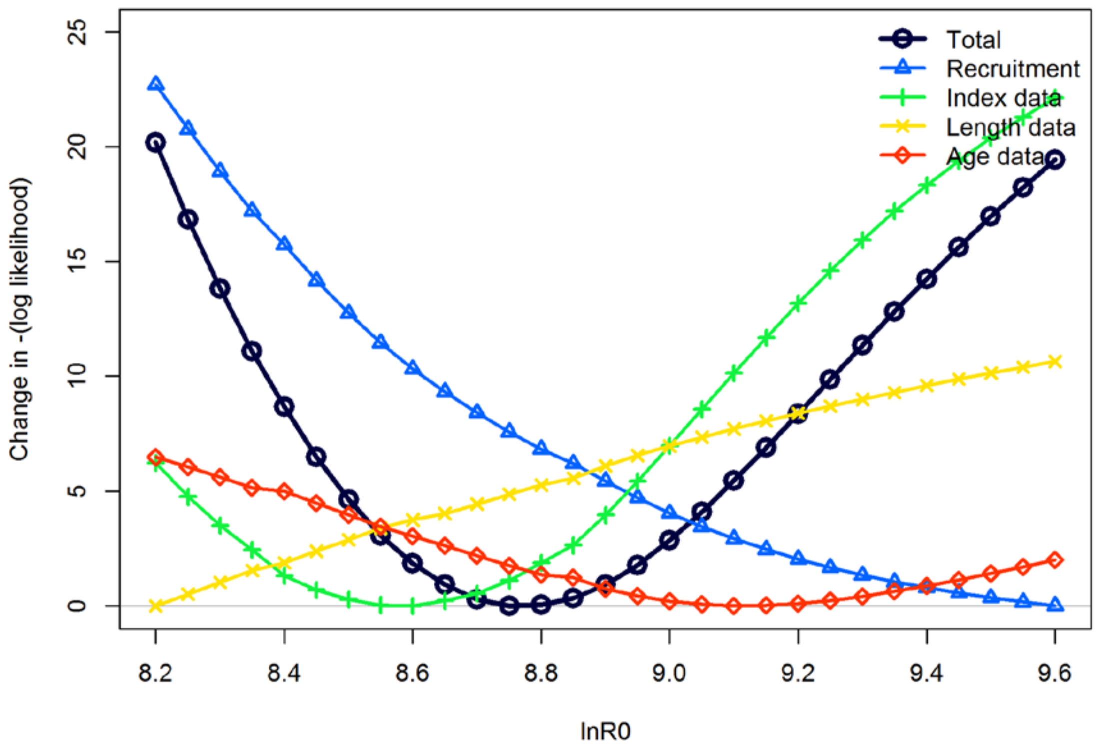


Figure 133. Likelihood profile for total and each data component at different values of logarithms virgin recruitment parameter.

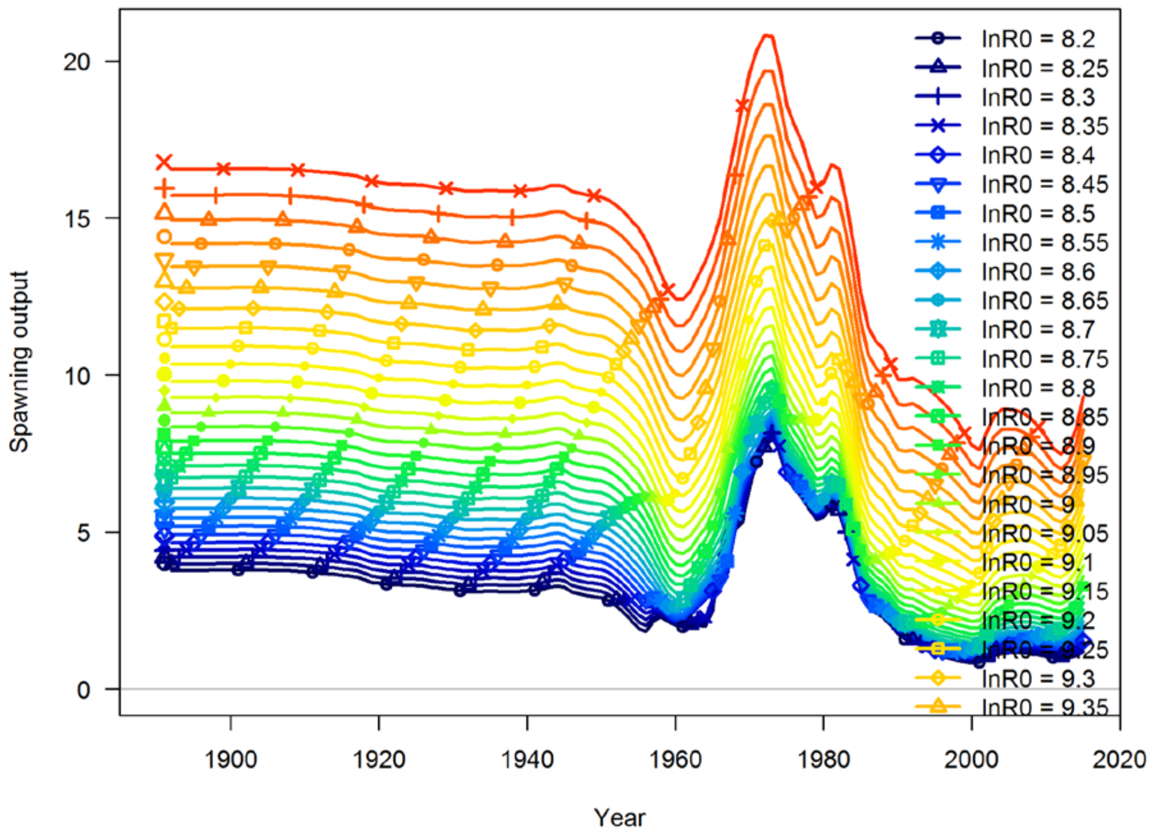


Figure 134. Time series of spawning outputs (billions of eggs) at different values of logarithms virgin recruitment parameter.

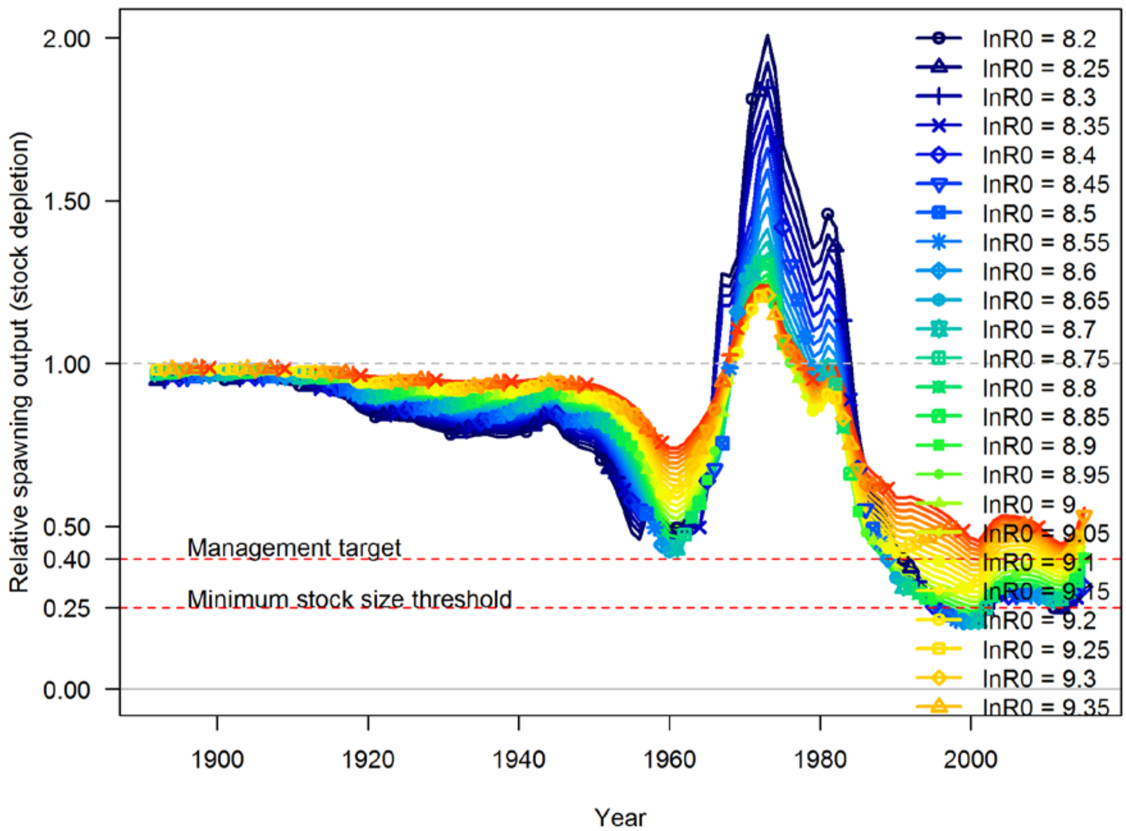


Figure 135. Time series of stock depletion (relative spawning biomass) at different values of logarithms virgin recruitment parameter.

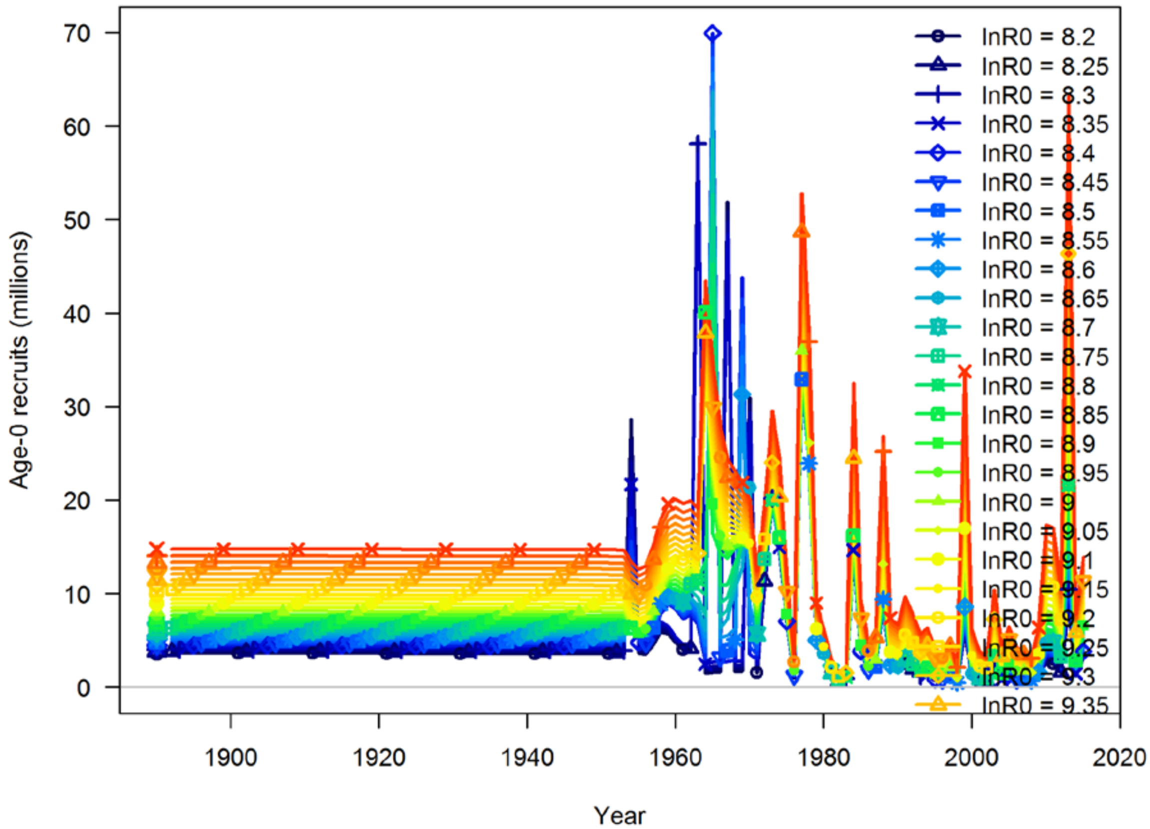


Figure 136. Time series of recruitment at different values of logarithms virgin recruitment parameter.

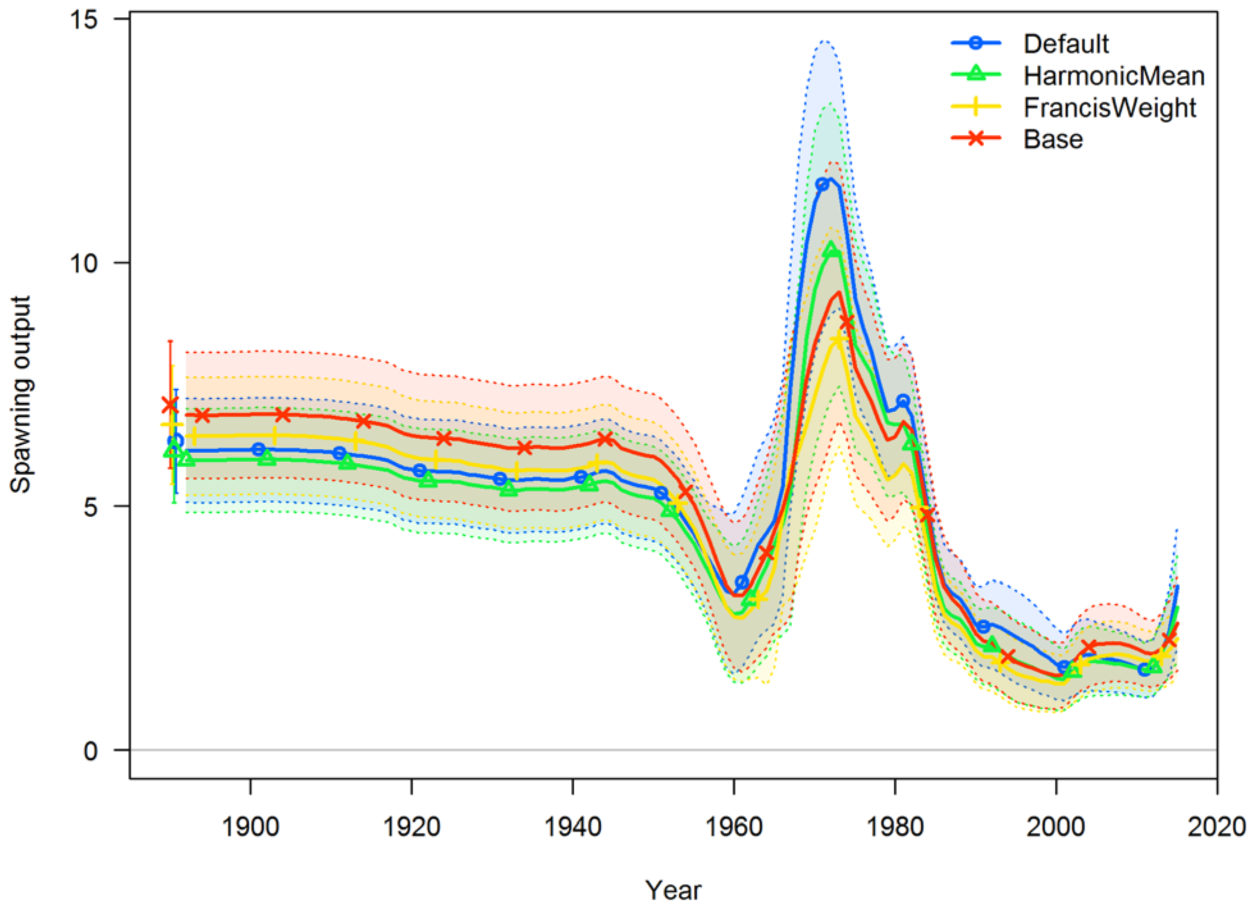


Figure 137. Time series of spawning outputs (billions of eggs) for model runs with different data-weighting methods. Colored dash lines are corresponding 95% asymptotic intervals.

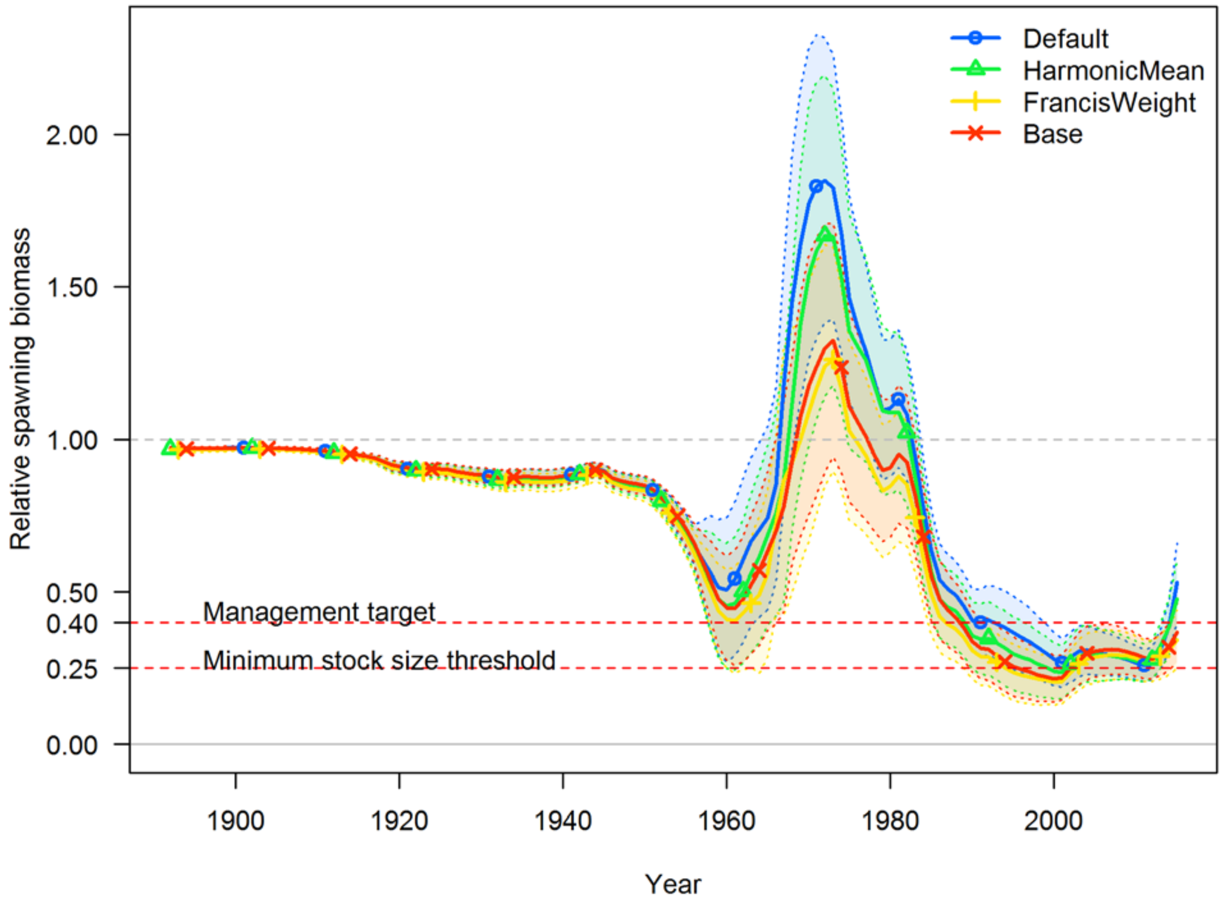


Figure 138. Time series of stock depletion for model runs with different data-weighting methods. Colored dash lines are corresponding 95% asymptotic intervals.

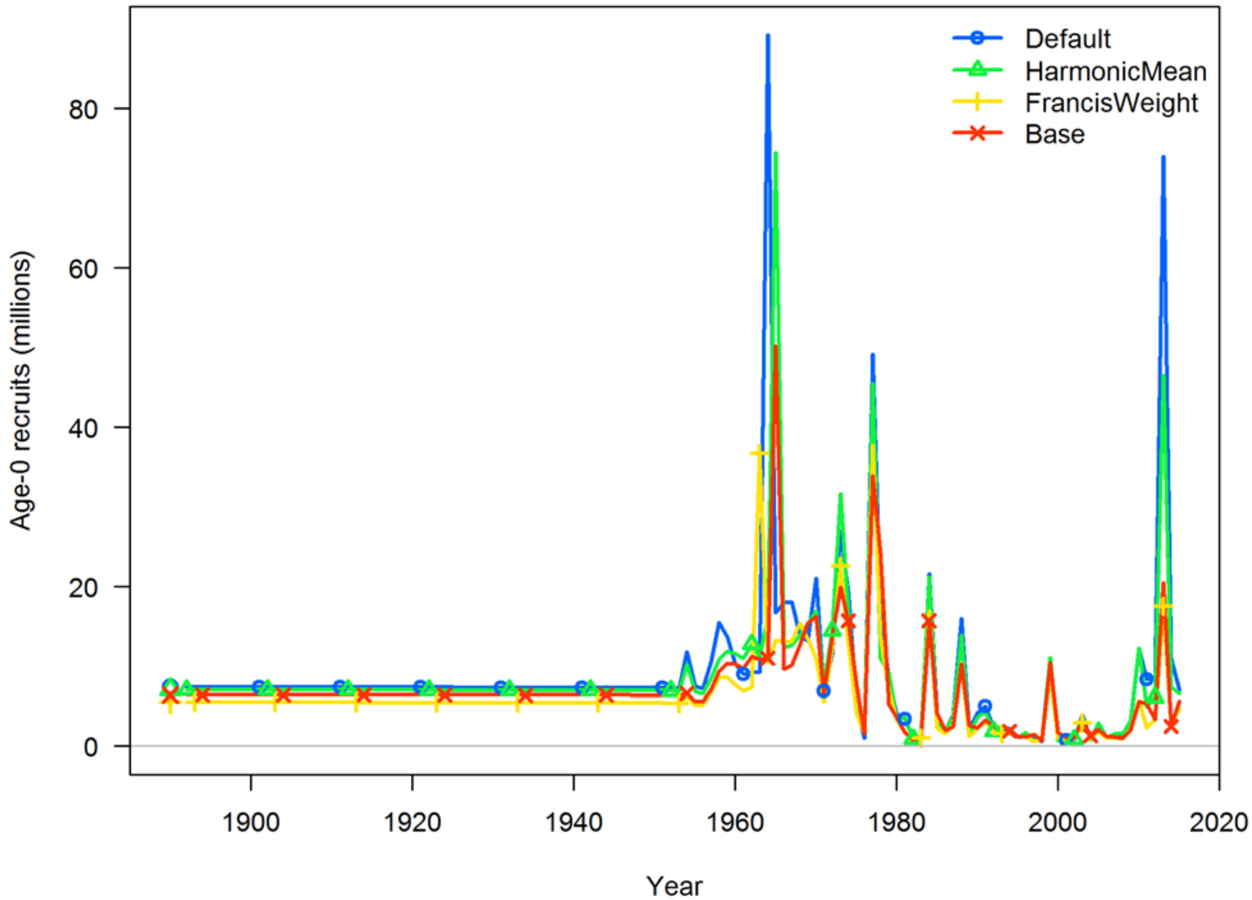


Figure 139. Time series of stock recruits for model runs with different data-weighting methods.

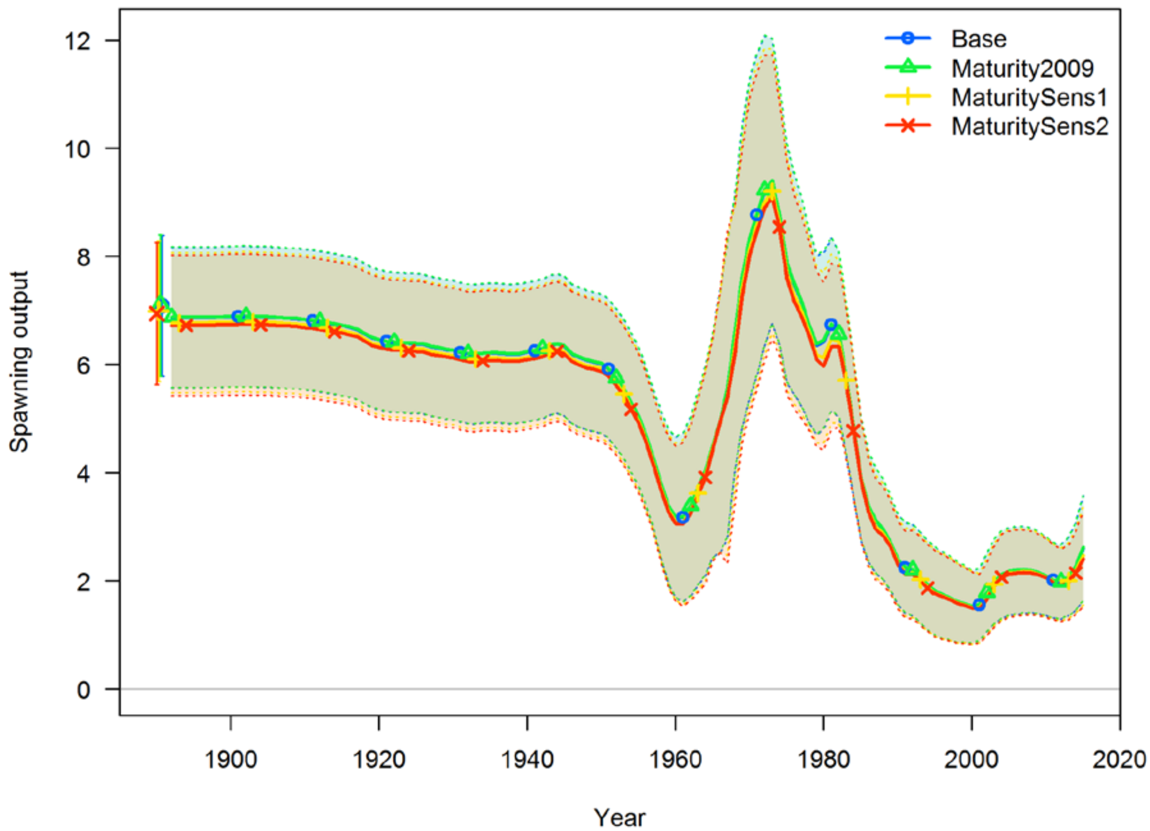


Figure 140. Time series of spawning outputs (billions of eggs) from sensitivity analysis on four different maturity functions (see Figure 18).

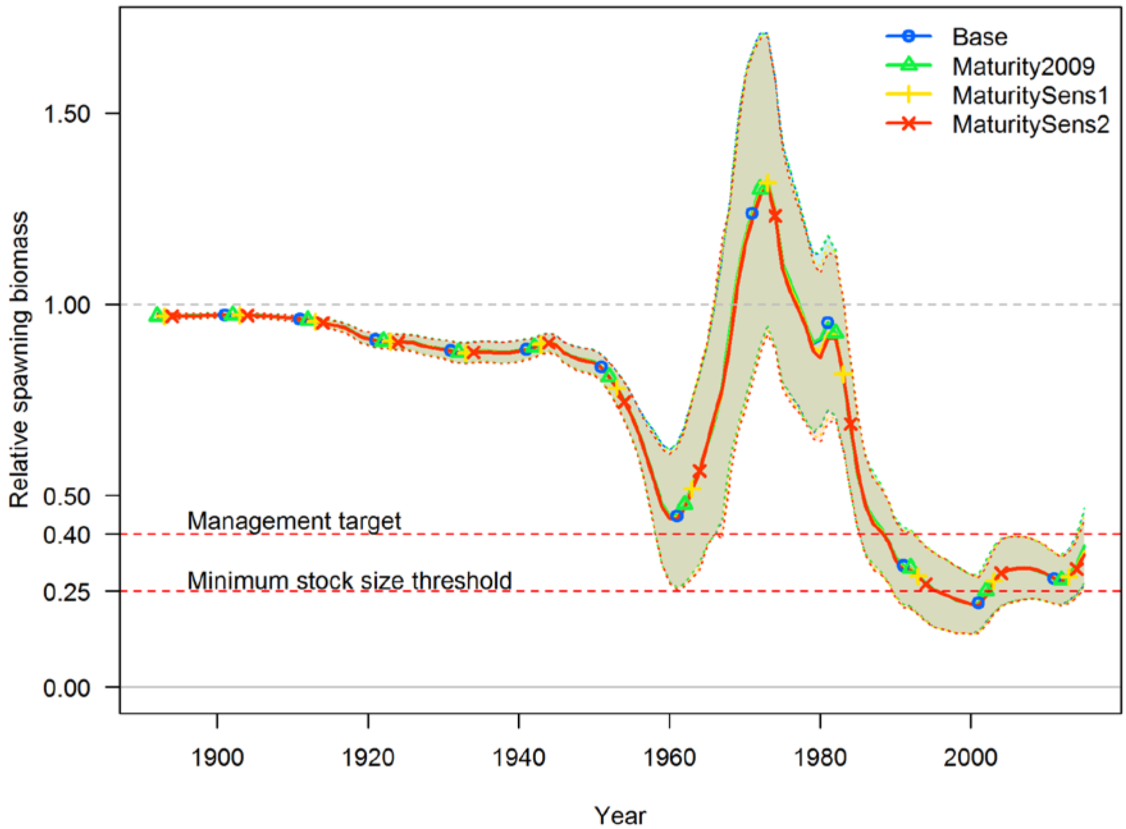


Figure 141. Time series of stock depletion from sensitivity analysis on four different maturity functions (see Figure 18).

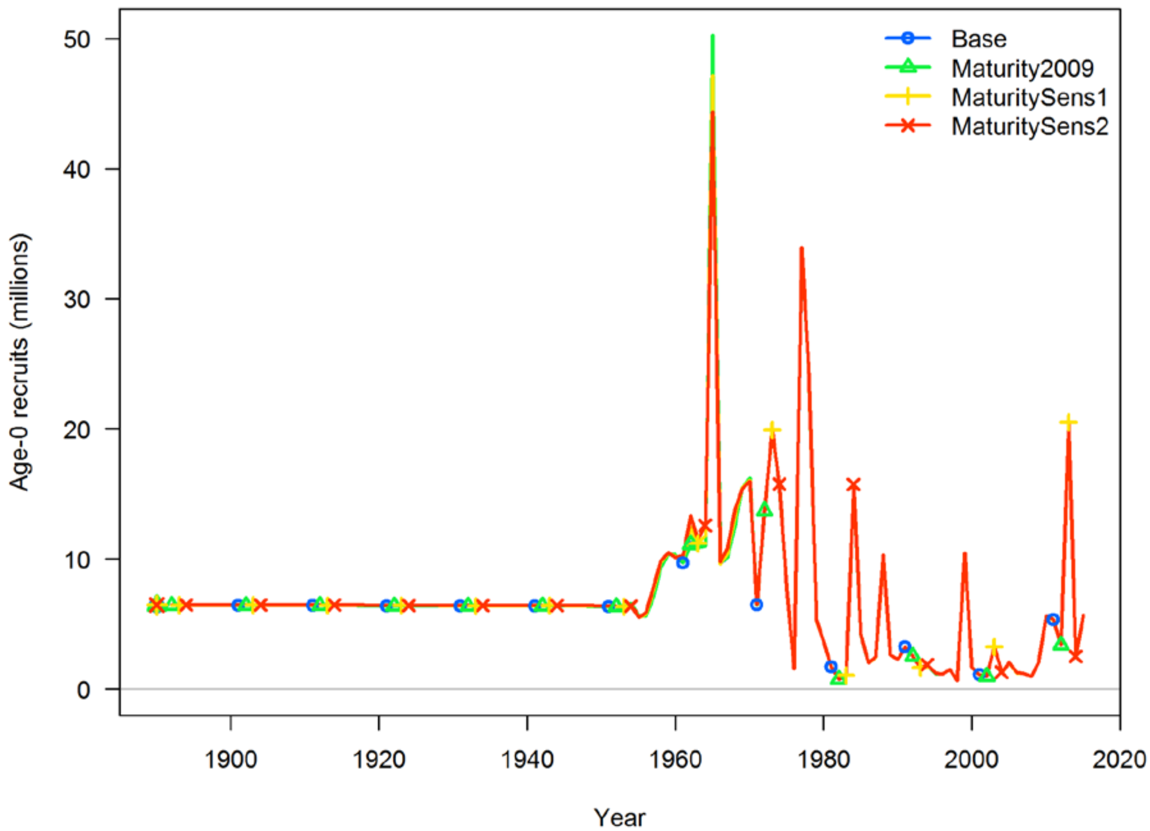


Figure 142. Time series of recruits from sensitivity analysis on four different maturity functions (see Figure 18).

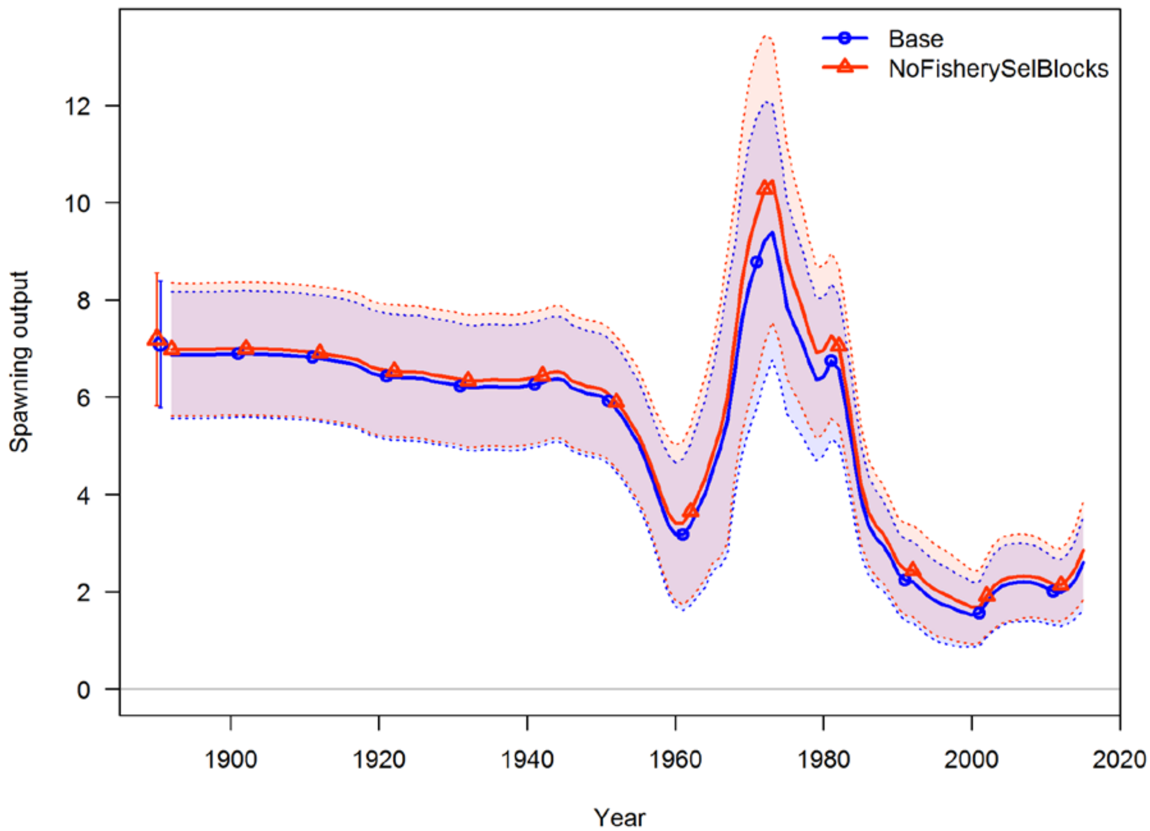


Figure 143. Time series of spawning outputs (billions of eggs) from sensitivity analysis of no fishery selectivity blocks.

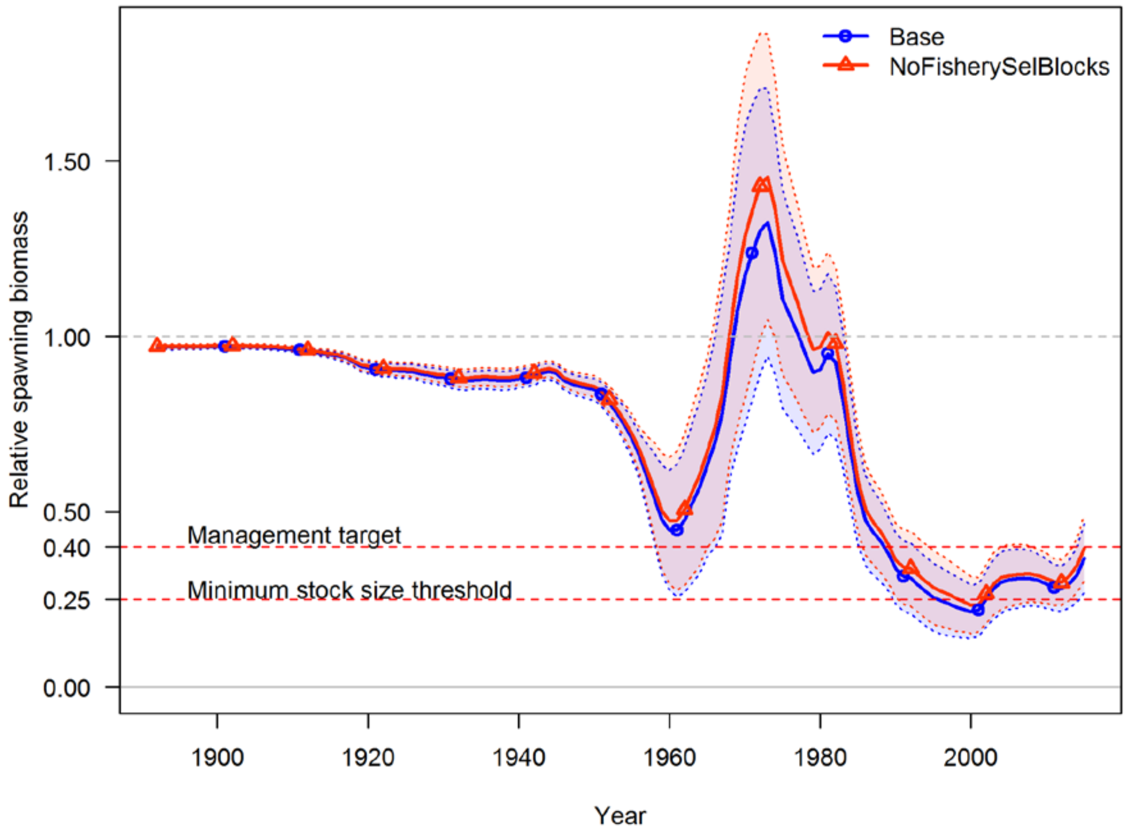


Figure 144. Time series of stock depletion from sensitivity analysis of no fishery selectivity blocks.

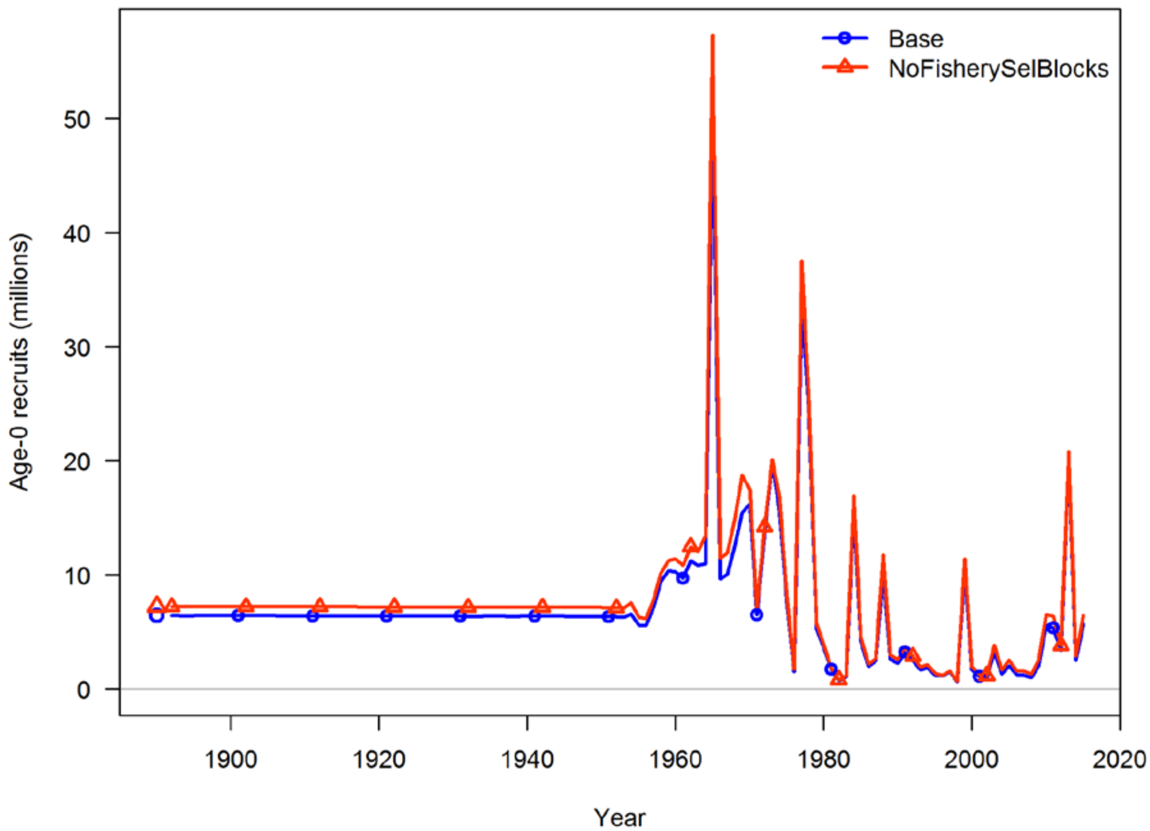


Figure 145. Time series of recruits from sensitivity analysis of no fishery selectivity blocks.

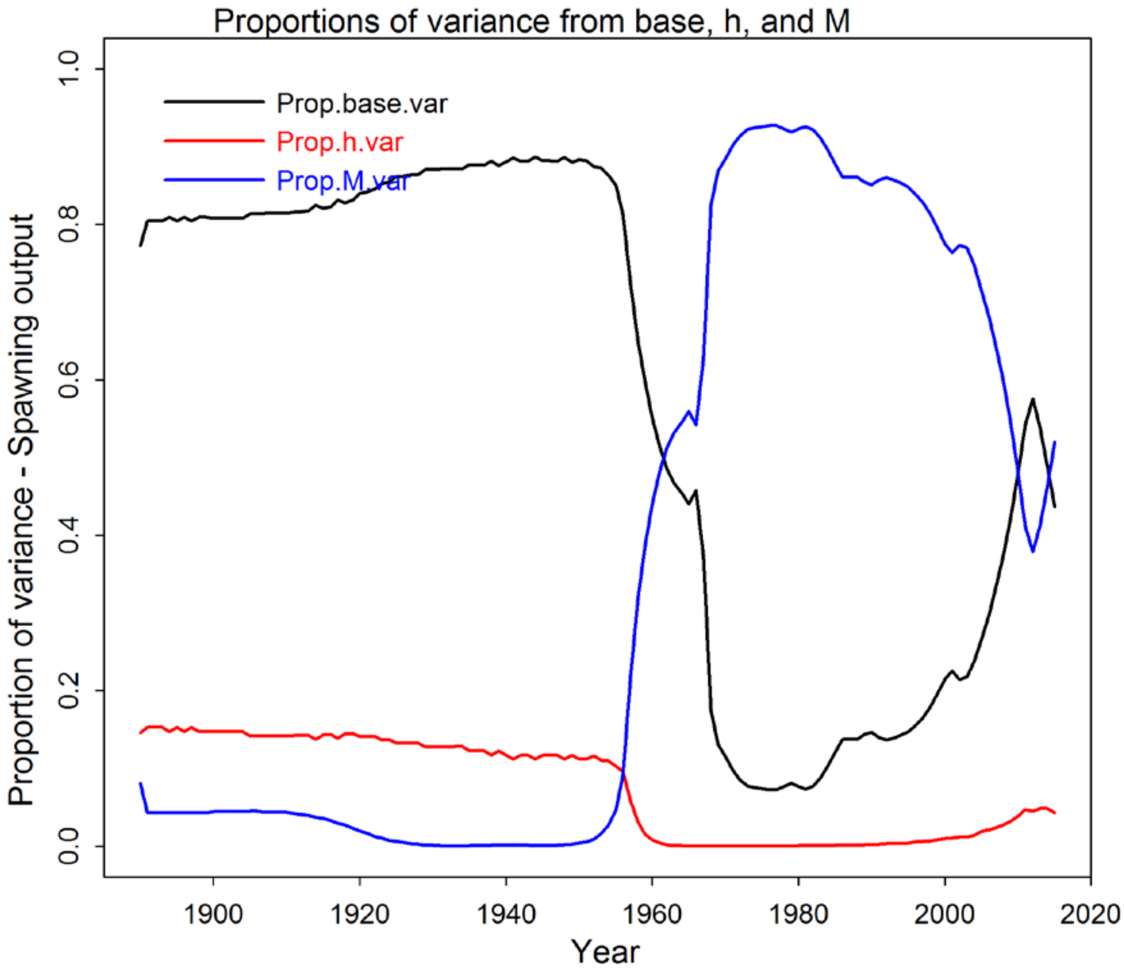


Figure 146. Time series of proportional variances of spawning outputs from three model components estimated by the delta method.

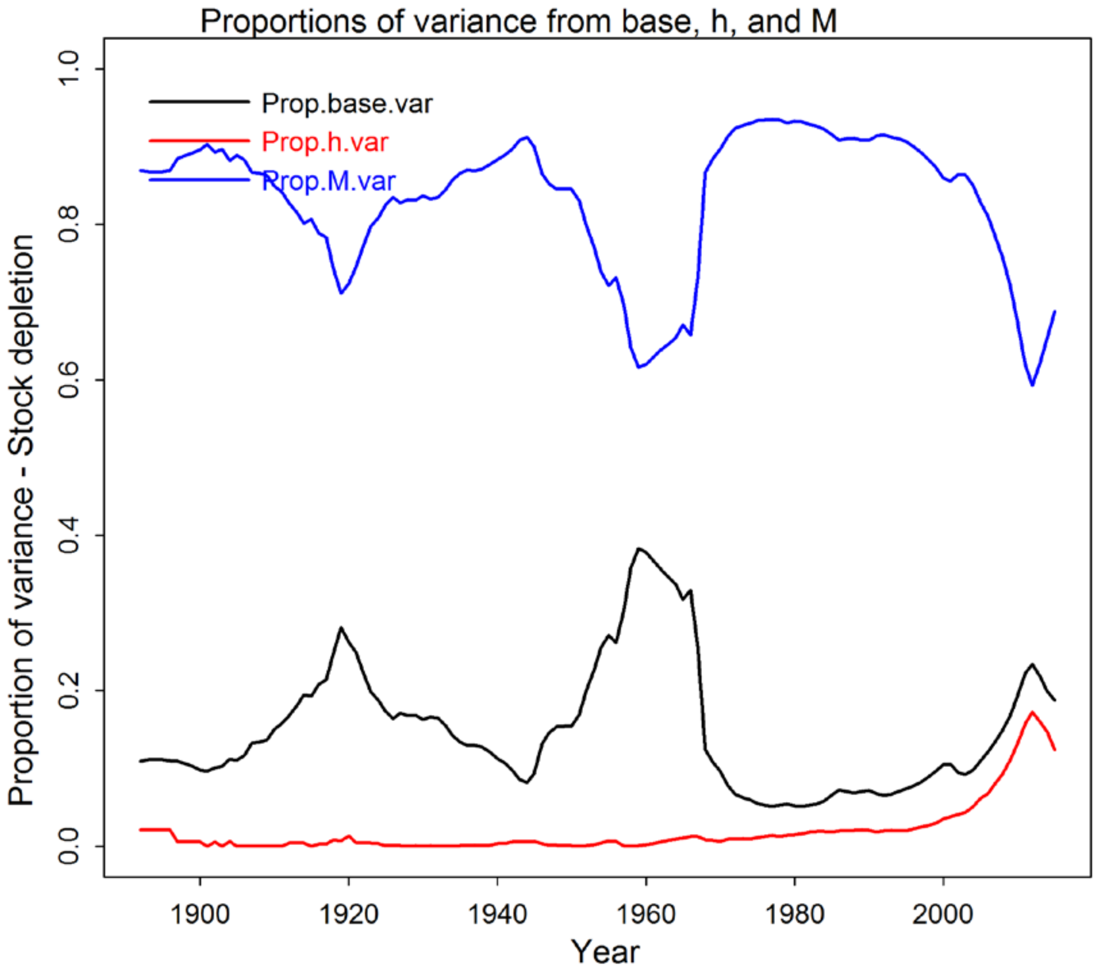


Figure 147. Time series of proportional variances of stock depletion from three model components estimated by the delta method.

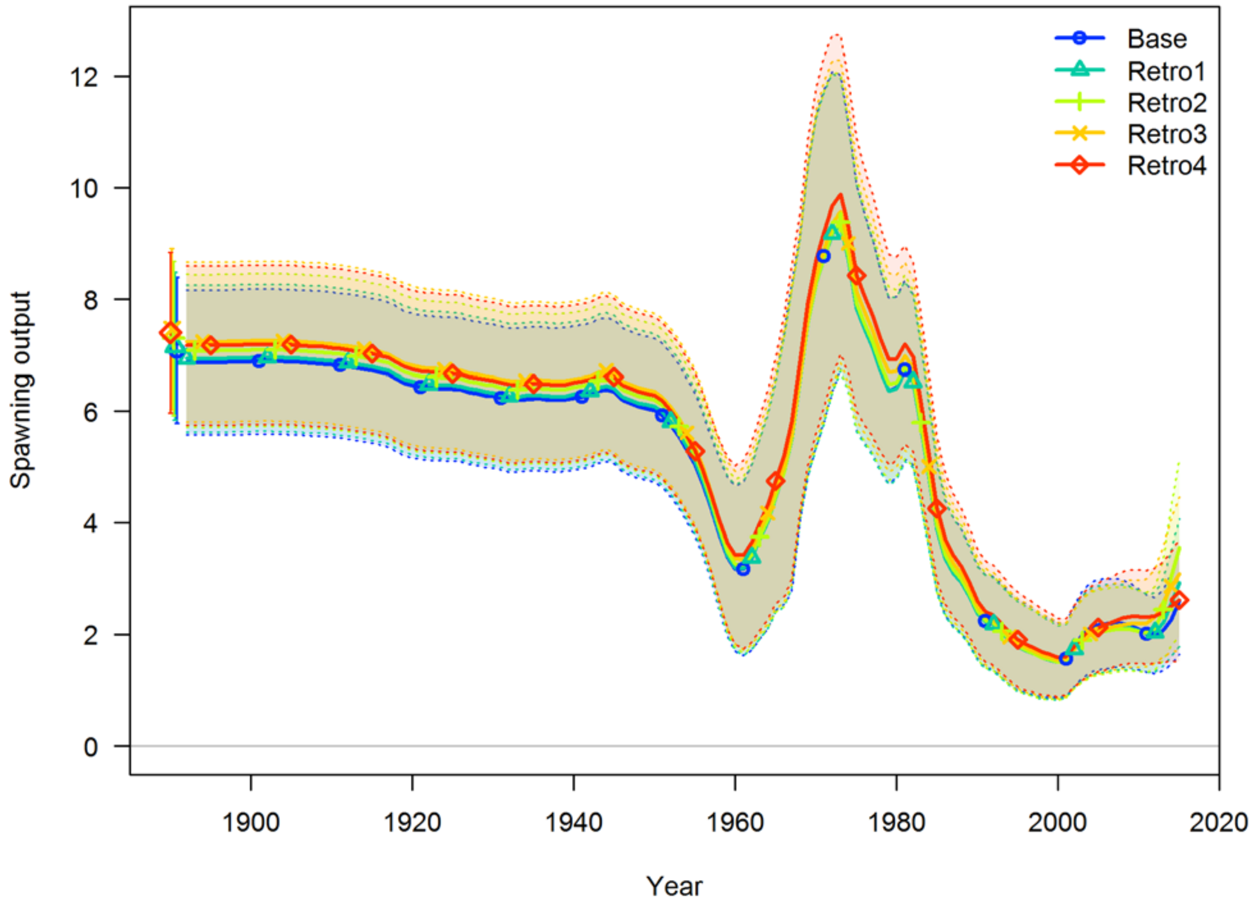


Figure 148. Time series of spawning outputs (billions of eggs) from retrospective analysis to four less years of data.

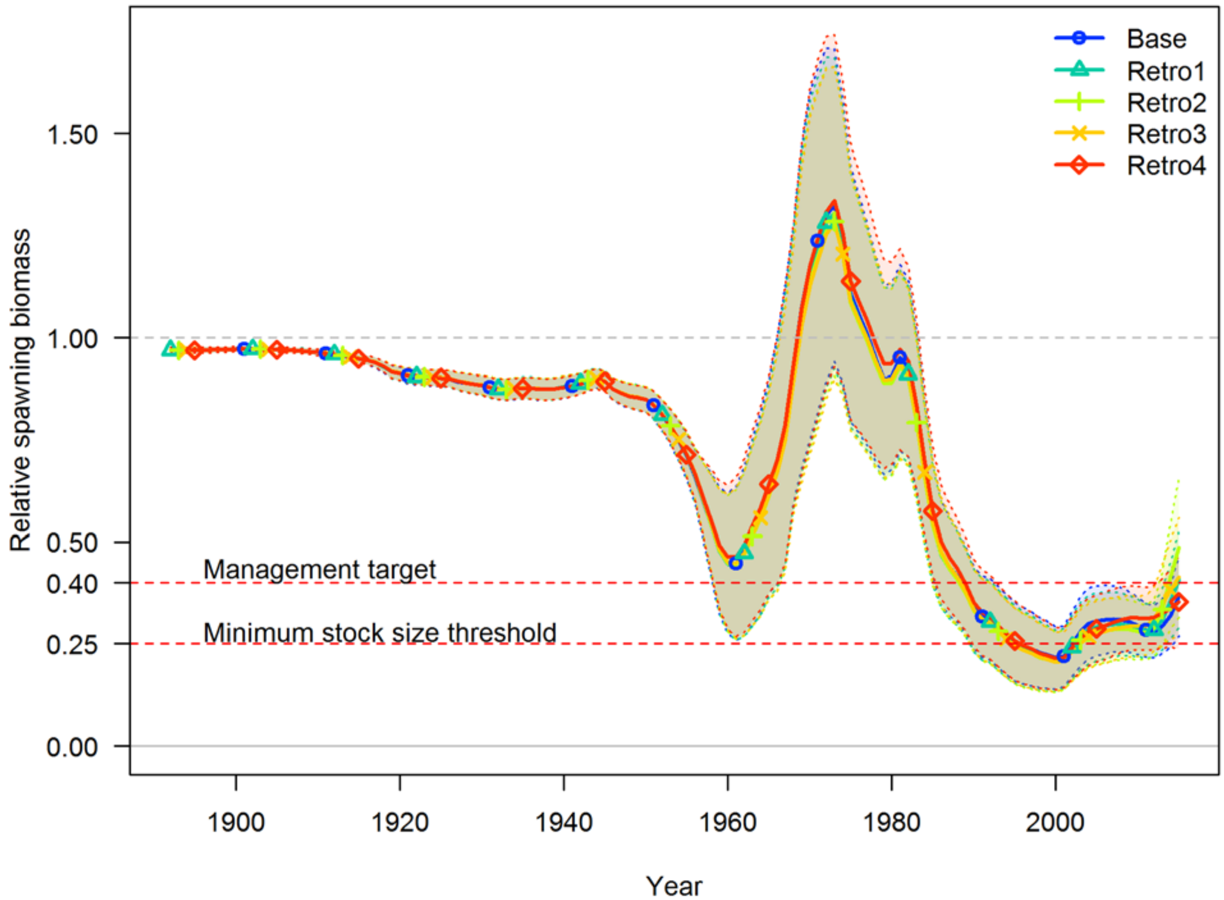


Figure 149. Time series of stock depletion (relative spawning biomass) from retrospective analysis to four less years of data.

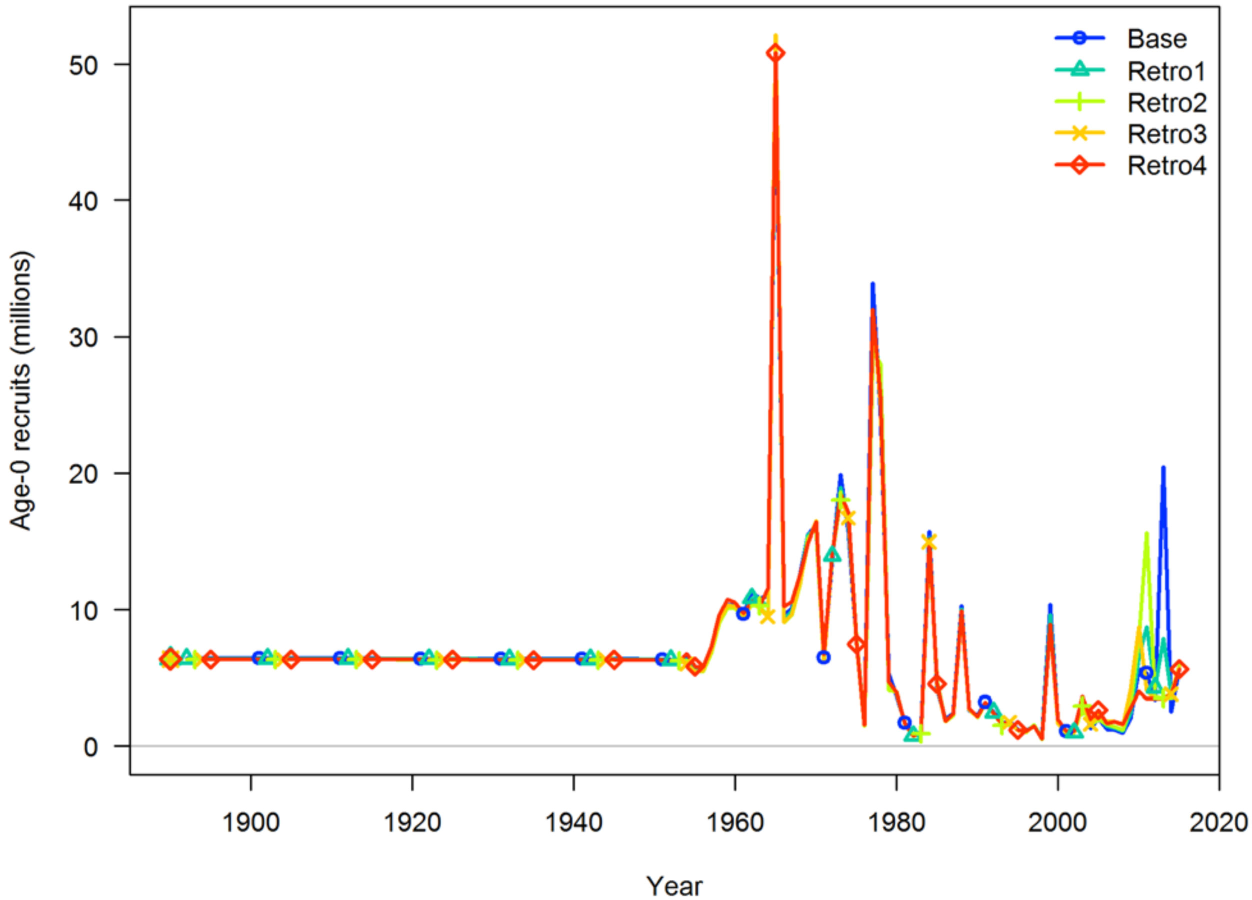


Figure 150. Time series of recruitment from retrospective analysis to four less years of data.

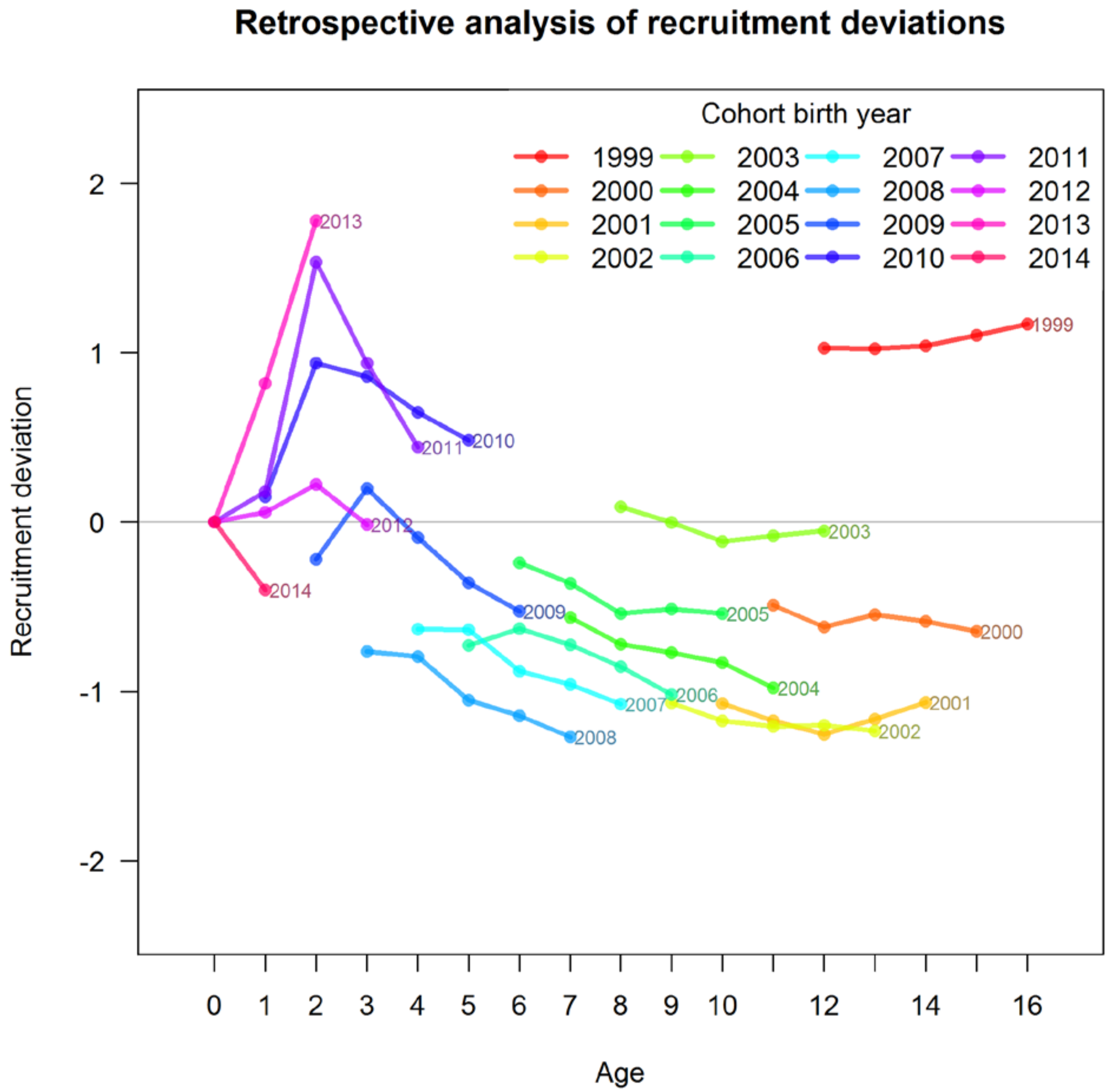


Figure 151. Recruitment deviations estimated from the retrospective analysis for year classes between 1999 and 2014.

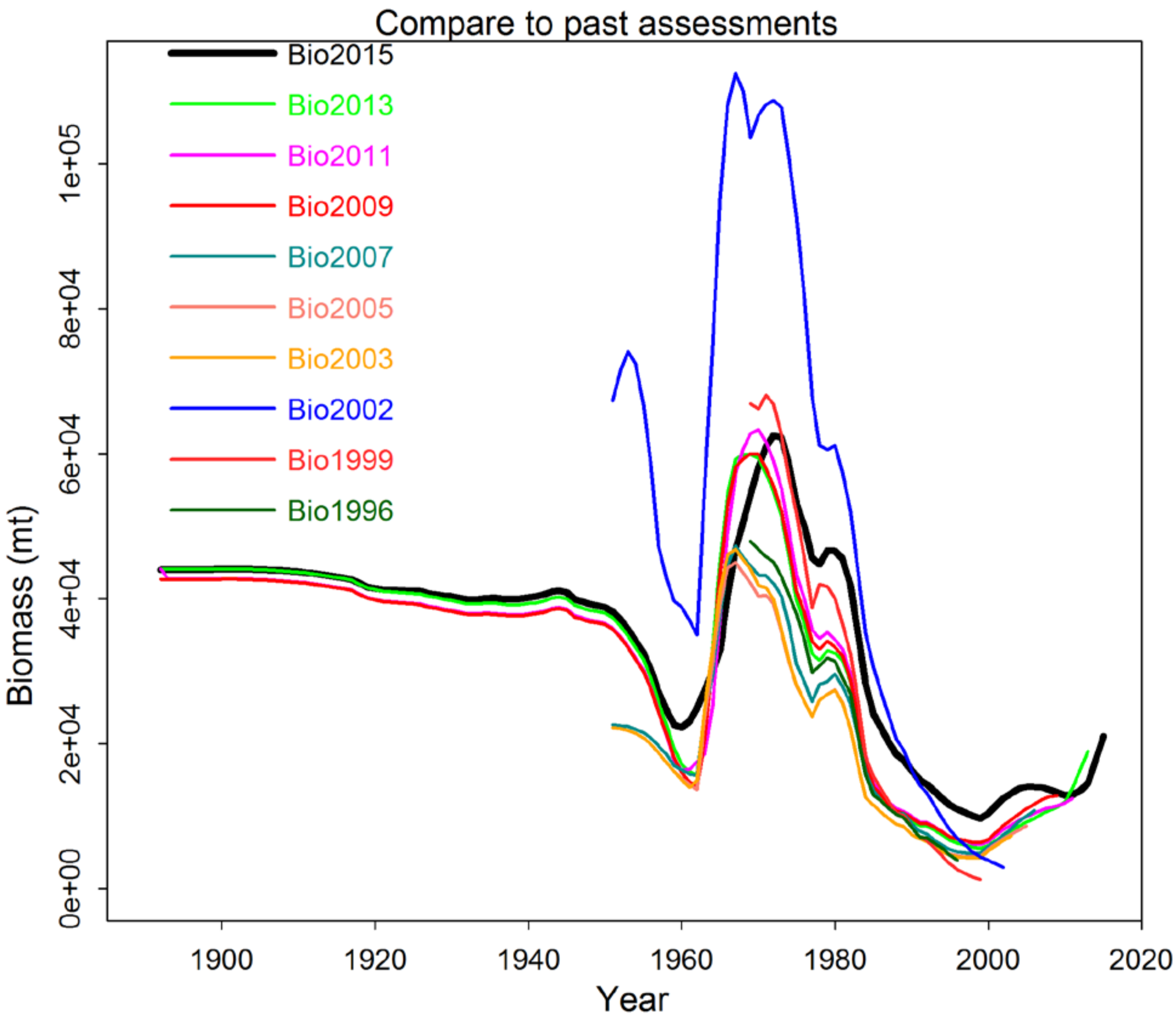


Figure 152. Comparisons of time series of biomass with past nine stock assessments.

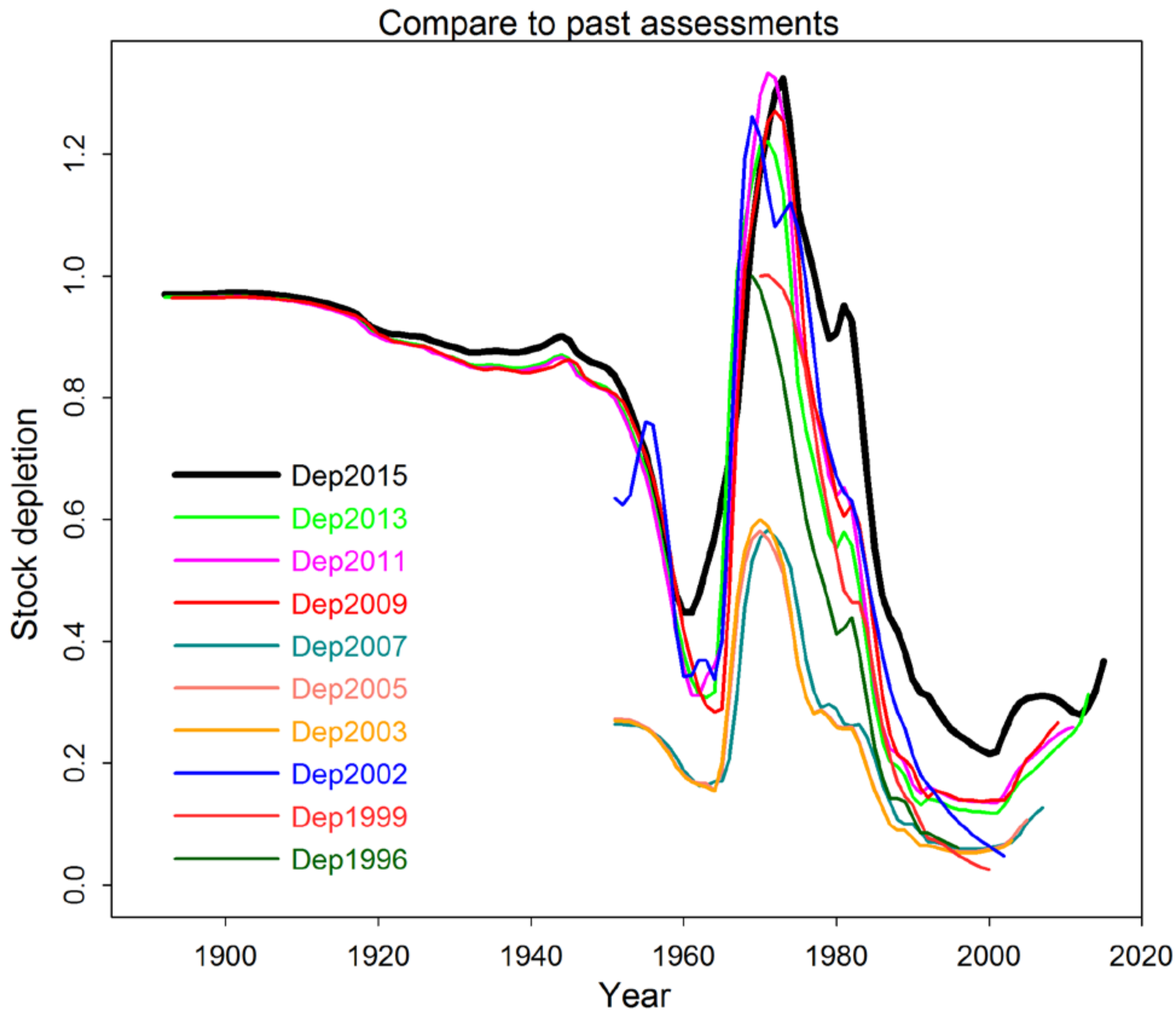


Figure 153. Comparisons of time series of stock depletion with past nine stock assessments.

Appendix A. History of Management Measures Affecting the Bocaccio Fishery

This table is downloaded from the fishery regulation website and contains all regulations related to Bocaccio from south of Cape Blanco.

Regulation date	Location ID	Regulation
9/10/1983	4300 South	Continued 40,000-pound trip limit on Sebastes complex south of 43N latitude; no limit on number of trips.
1/1/1984	4300 South	Continued 40,000-pound trip limit on Sebastes complex south of 4300 (changed to 4250 on February, 12, 1984); no limit on trip frequency.
5/6/1984	ALL	Specified that fishing for groundfish on a Sebastes complex trip may occur on only one side of Cape Blanco (4250), which allows southern caught fish to be landed north of Cape Blanco using the southern trip limit of 40,000 pounds with appropriate declaration of intent.
5/6/1984	Eureka Monterey Conception	Recommended no change in Sebastes complex trip limit of 40,000 pounds in the Eureka, Monterey, and Conception areas.
8/1/1984	ALL	Vessel operators on combined groundfish/Sebastes complex trips allowed to fish on both sides of a line at 4250 N latitude (Cape Blanco), but landings of Sebastes complex in excess of 3,000 pounds controlled by the trip limit/trip frequency in effect north of the line (Vancouver and Columbia areas). Appropriate advance declaration of intent required.
1/10/1985	ALL	If fishers fish on both sides of the Cape Blanco line during a trip, the northern limit on Sebastes complex applies.
1/10/1985	ALL	Landings of Sebastes complex and widow rockfish smaller than 3,000 pounds unrestricted.
1/10/1985	Cape Blanco South	For Sebastes complex south of Cape Blanco, established a 40,000-pound trip limit without a trip frequency.
9/1/1985	ALL	Changed the management boundary line separating northern and southern trip limits for the Sebastes complex from Cape Blanco (4250' N latitude) northward 30 miles to the north jetty at Coos Bay (4322' N latitude).
1/1/1986	ALL	For Sebastes complex north of Coos Bay, established 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000

		pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). For Sebastes complex south of Coos Bay, established 40,000-pound trip limit; no trip frequency. Landings of less than 3,000 pounds of Sebastes complex and widow rockfish unrestricted. Fishers fishing the Sebastes complex on both sides of the Coos Bay line during a trip must conform with the northern (more restrictive) trip limit.
1/1/1987	Coos Bay South	For Sebastes complex south of Coos Bay, established 40,000-pound trip limit; no trip frequency limit.
5/3/1987	ALL	Changed the definition of fishing week from Sunday through Saturday to Wednesday through Tuesday for Sebastes complex and widow rockfish.
1/1/1988	ALL	For Sebastes complex north of Coos Bay, established a 25,000-pound weekly trip limit of which no more than 10,000 pounds may be yellowtail rockfish (or 50,000 pounds biweekly of which no more than 20,000 pounds may be yellowtail rockfish, or 12,500 pounds twice per week, of which no more than 5,000 pounds may be yellowtail rockfish; biweekly and twice weekly landings require appropriate declaration to state in which fish are landed). No restriction on landings less than 3,000 pounds. For Sebastes complex south of Coos Bay, established a 40,000-pound trip limit; no trip frequency restriction.
1/1/1989	Coos Bay South	For Sebastes complex south of Coos Bay, established a 40,000-pound trip limit; no trip frequency restriction.
7/26/1989	ALL	Reduced the trip limit for yellowtail rockfish to 3,000 pounds or 20% of the Sebastes complex, whichever is greater.
1/1/1990	Coos Bay South	For Sebastes complex south of Coos Bay, established the trip limit at 40,000 pound; no trip frequency restriction.
7/25/1990	ALL	Reduced the weekly trip limit for yellowtail rockfish caught with any gear north of Coos Bay to 3,000 pounds or 20% of the Sebastes complex, whichever is greater. Biweekly and twice weekly landing options remain in effect.
1/1/1991	Coos Bay South	For Sebastes complex south of Coos Bay, the trip limit established at 25,000 pounds, including no more than 5,000 pounds of Bocaccio; no trip frequency restriction; harvest guideline for bocaccio set at 1,100 mt (ABC = 800 mt).

1/1/1992	4030 South	For the Sebastes complex, established a cumulative landing limit per specified 2 week period of 50,000 pounds. Within this 50,000 pounds, no more than no more than 10,000 pounds cumulative may be Bocaccio landed south of Cape Mendocino, California (4030 latitude). All landings count toward the 50,000-pound limit.
1/1/1993	4030 South	For Sebastes complex established a cumulative landing limit per specified 2-week period of 50,000 pounds. Within this 50,000 pounds, no more than 10,000 pounds cumulative may be Bocaccio caught south of Cape Mendocino, California (4030 latitude). All landings count toward the cumulative limits. If a vessel fishes in the more restrictive area at any time during the 2-week period, the more restrictive limit applies for that vessel.
1/1/1993	Cape Mendocino Coos Bay	For Sebastes complex established a cumulative landing limit per specified 2-week period of 50,000 pounds between Cape Mendocino and Coos Bay. All landings count toward the cumulative limits. If a vessel fishes in the more restrictive area at any time during the 2-week period, the more restrictive limit applies for that vessel.
10/6/1993	4030 South	Increased the cumulative trip limit for Bocaccio caught south of Cape Mendocino, California from 10,000 pounds to 15,000 pounds per 2-week period.
1/1/1994	4030 South	For Sebastes complex, Bocaccio and yellowtail, cumulative limit of 80,000 pounds per calendar month, no more than 30,000 pounds may be Bocaccio caught south of Cape Mendocino, California (4030 latitude).
9/1/1994	4030 South	Increased the cumulative trip limit for the Sebastes complex caught south of Cape Mendocino, California (4030 latitude) in the limited entry groundfish fishery from 80,000 pounds to 100,000 pounds per calendar month.
1/1/1995	4030 4530	Cumulative limit for Sebastes Complex of 50,000 pounds per month between Cape Lookout and Cape Mendocino, California (4030 latitude), no more than 30,000 pounds may be yellowtail rockfish
1/1/1995	4030 South	For Sebastes complex, cumulative limit of 100,000 pounds per month south of Cape Mendocino.
1/1/1995	4030 South	For Bocaccio, the cumulative limit is 30,000 pounds per month south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the Sebastes complex).
5/1/1995	Cape lookout South	For Sebastes complex, Bocaccio and yellowtail, cumulative limit of 80,000 pounds per calendar month,

		no more than 30,000 pounds may be yellowtail rockfish caught south of Cape Lookout.
8/1/1995	ALL	Increased the monthly cumulative trip limit for canary rockfish from 6,000 pounds (2,722 kg) to 9,000 pounds (4,082 kg). The Sebastes complex limit was not increased.
1/1/1996	ALL	for fishing in areas with different trip limits for the same species: Trip limits for a species or species complex may differ in different geographic areas along the coast. The following "crossover" provisions apply to all vessels (limited entry and open access) operating in different geographical areas with different cumulative or "per trip" limits for the same species, except for species with daily-trip-limits (nontrawl sablefish, open access thornyhead), black rockfish off Washington State, or those otherwise exempted by a State declaration procedure (yellowtail rockfish and the Sebastes complex off Washington and Oregon).
1/1/1996	ALL	Sebastes complex and Bocaccio 200,000 pounds per 2-months south of Cape Mendocino. For Bocaccio, the cumulative limit is 60,000 pounds per 2-months south of Cape Mendocino, and no limit north of Cape Mendocino (other than the limit on the Sebastes complex).
1/1/1996	Cape Lookout Cape Mendocino	Sebastes complex and yellowtail 100,000 pounds per 2-months between Cape Lookout and Cape Mendocino, California (4030 latitude), no more than 70,000 pounds may be yellowtail rockfish caught between Cape Lookout and Cape Mendocino
11/1/1996	Cape Lookout Cape Mendocino	The cumulative trip limit for the Sebastes complex taken between Cape Mendocino and Cape Lookout is 50,000 pounds per month, of which no more than 35,000 pounds may be yellowtail rockfish and no more than 9,000 pounds may be canary rockfish
1/1/1997	4030 South	measures for open access gear except trawls (may not exceed 50% of any two-month cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex that applies to the same area or gear): Rockfish cumulative limit of 40,000 pounds per month which includes, south of Cape Mendocino, a trip limit of 300 pounds Bocaccio not to exceed 2,000 pounds cumulative per month. Setnets, which are legal gear only south of 3800 latitude, will be subject to the 40,000-pound monthly cumulative limit but not the per trip limit, and will have a cumulative limit of 4,000 pounds of Bocaccio per month

5/1/1997	4030 South	Sebastes Complex (Including Yellowtail Rockfish and Bocaccio) reduced the two-month cumulative limit on Bocaccio to 10,000 pounds south of Cape Mendocino.
5/1/1997	4030 South	Open Access south of Cape Mendocino, trip limit reduction for hook-and-line and trap gear for Bocaccio from 300 pounds to 250 pounds with no change to the monthly trip limit (2000 pounds).
10/1/1997	4030 South	changed from two-month limits to one-month limits for Sebastes complex 75,000 pounds south of Cape Mendocino, no more than 5,000 pounds of which may be Bocaccio south of Cape Mendocino, and no more than 10,000 pounds of which may be canary rockfish coastwide
10/1/1997	ALL	Sebastes complex coastwide no more than 10,000 pounds of which may be canary rockfish
1/1/1998	4030 South	Sebastes Complex (Including yellowtail, canary and Bocaccio rockfish): limited entry fishery Cumulative limit of 150,000 pounds per two-months south of Cape Mendocino. For Bocaccio, the cumulative limit is 2,000 pounds per two-months south of Cape Mendocino, and no limit north
1/1/1998	ALL	for open access gear except trawls Open access landings may not exceed 50% of any two-month cumulative limit or any other limit for the limited entry fishery for any groundfish species or complex that applies to the same area, unless specifically authorized (as for Bocaccio caught with setnets and lingcod).
1/1/1998	ALL	Rockfish: for open access gear except trawls , For rockfish, a cumulative limit of 40,000 pounds per month coastwide, including a trip limit for hook-and-line and pot gear of 10,000 pounds of rockfish per trip, which includes, south of Cape Mendocino, a trip limit of 250 pounds Bocaccio not to exceed 1,000 pounds cumulative per month. Setnets, which are legal gear only south of 3800 latitude, are subject to the 40,000-pound monthly cumulative limit, but not the per-trip limit, and have a cumulative limit of 2,000 pounds of Bocaccio per month.
5/1/1998	4030 South	Bocaccio, South of Cape Mendocino: increase the per-trip limit to 500 pounds, retaining the one-month cumulative limit of 1,000 pounds.
7/1/1998	4030 South	Limited Entry Sebastes Complex: south of Cape Mendocino, decreased the 2-month cumulative limit to 40,000 pounds.
7/1/1998	ALL	Open Access Rockfish: removed overall rockfish monthly limit and replaced it with limits for component rockfish species: for Sebastes complex, monthly

		cumulative limit is 33,000 pounds, for widow rockfish, monthly cumulative trip limit is 3,000 pounds, for Pacific Ocean Perch, monthly cumulative trip limit is 4,000 pounds.
10/1/1998	4030 South	Sebastes complex South of Cape Mendocino: Limited Entry: decreased monthly limit to 15,000 pounds.
1/1/1999	3800 South	for open access gear: Bocaccio: setnet and trammel net gears, legal only south of 3800 N latitude, 1,000 pounds per month.
1/1/1999	4030 South	for the limited entry fishery Sebastes Complex (including Yellowtail Rockfish, Canary Rockfish, and Bocaccio):South of Cape Mendocino, California, Phase1: 13,000 pounds per period; Phase 2: 6,500 pounds per period; Phase 3: 5,000 pounds per period.
1/1/1999	4030 South	for the limited entry fishery Sebastes Complex (including Yellowtail Rockfish, Canary Rockfish, and Bocaccio):Bocaccio: south of Cape Mendocino, Phase 1: 750 pounds per month; Phase 2: 750 pounds per month; Phase 3: 750 pounds per month
1/1/1999	4030 South	for open access gear: Sebastes complex: south of Cape Mendocino, 2,000 pounds per month.
1/1/1999	ALL	for the limited entry fishery A new three phase cumulative limit period system is introduced for 1999. Phase 1 is a single cumulative limit period that is 3 months long, from January 1 - March 31. Phase 2 has 3 separate 2 month cumulative limit periods of April 1 - May 31, June 1 - July 31, and August 1 - September 30. Phase 3 has 3 separate 1 month cumulative limit periods of October 1-31, November 1-30, and December 1-31. For all species except Pacific ocean perch and Bocaccio, there will be no monthly limit within the cumulative landings limit periods. An option to apply cumulative trip limits lagged by 2 weeks (from the 16th to the 15th) was made available to limited entry trawl vessels when their permits were renewed for 1999. Vessels that are authorized to operate in this "B" platoon may take and retain, but may not land, groundfish during January 1-15, 1999.
1/1/1999	ALL	for the limited entry fishery Sebastes Complex (including Yellowtail Rockfish, Canary Rockfish, and Bocaccio):Canary Rockfish: coastwide, Phase 1: 9,000 pounds per period; Phase 2: 9,000 pounds per period; Phase 3: 3,000 pounds per period
1/1/1999	ALL	for open access gear: Bocaccio: 500 pounds per month, except for setnet and trammel net gears.
4/1/1999	4030 South	For “A” Platoon Vessels: Limited Entry Canary Rockfish: south of Cape Mendocino, decreased 2-

		month cumulative limit from 9,000 pounds to 6,500 pounds. Landings of canary rockfish south of Cape Mendocino are limited by and count against the overall Sebastes complex 2-month cumulative limit south of Cape Mendocino, which is 6,500 pounds.
4/1/1999	ALL	For “A” Platoon Vessels: Limited Entry and Open Access Sebastes complex: north and south of Cape Mendocino, if a vessel takes and retains, possesses, or lands any splitnose or chilipepper rockfish south of Cape Mendocino, then the more restrictive Sebastes complex cumulative trip limit applies throughout the same cumulative limit period, no matter where the Sebastes complex is taken and retained, possessed, or landed.
4/16/1999	4030 South	For “B” Platoon Vessels: Limited Entry and Open Access Sebastes complex: north and south of Cape Mendocino, if a vessel takes and retains, possesses, or lands any splitnose or chilipepper rockfish south of Cape Mendocino, then the more restrictive Sebastes complex cumulative trip limit applies throughout the same cumulative limit period, no matter where the Sebastes complex is taken and retained, possessed, or landed.
4/16/1999	4030 South	For ”B” Platoon Vessels: Limited Entry Canary Rockfish: south of Cape Mendocino, decreased 2-month cumulative limit from 9,000 pounds to 6,500 pounds. Landings of canary rockfish south of Cape Mendocino are limited by and count against the overall Sebastes complex 2-month cumulative limit south of Cape Mendocino, which is 6,500 pounds.
6/1/1999	4030 South	Limited Entry, Platoon ”A”: Sebastes complex: south of Cape Mendocino, limited entry 2 month cumulative trip limit for the periods June 1 through July 31 and August 1 through September 30 decreased from 6,500 pounds to 3,500 pounds, within which: (1) Bocaccio monthly trip limit of 750 pounds decreased and changed to a 2-month cumulative trip limit of 1,000 pounds with a 500 pounds per trip limit, and (2) canary rockfish 2-month cumulative trip limit decreased to 3,500 pounds.
6/1/1999	4030 South	Limited Entry, Platoon ”B”: Sebastes complex: south of Cape Mendocino, limited entry 2 month cumulative trip limit for the periods June 1 through July 31 and August 1 through September 30 decreased from 6,500 pounds to 3,500 pounds, within which: (1) Bocaccio monthly trip limit of 750 pounds decreased and changed to a 2-month cumulative trip limit of 1,000

		pounds with a 500 pounds per trip limit, and (2) canary rockfish 2-month cumulative trip limit decreased to 3,500 pounds.
10/1/1999	4030 South	Limited Entry Sebastes Complex, "A" platoon: decreased 1-month cumulative trip limits from 5,000 pounds (south of Cape Mendocino) to a coastwide limit of 500 pounds per month.
10/1/1999	ALL	Limited Entry, "A" platoon: The 1-month cumulative trip limits for canary rockfish, coastwide; Bocaccio, south of Cape Mendocino; and other species in the Sebastes complex, which count together towards the overall Sebastes complex limit, may not exceed the 500-pound cumulative monthly limit.
10/16/1999	4030 South	Limited Entry Sebastes Complex, "B" platoon: decreased 1-month cumulative trip limits from 5,000 pounds (south of Cape Mendocino) to a coastwide limit of 500 pounds per month.
10/16/1999	ALL	Limited Entry, "B" platoon: The 1-month cumulative trip limits for canary rockfish, coastwide; Bocaccio, south of Cape Mendocino; and other species in the Sebastes complex, which count together towards the overall Sebastes complex limit, may not exceed the 500-pound cumulative monthly limit.
1/1/2000	3600 4010	Bocaccio, limited entry fixed gear, 300 lbs per month
1/1/2000	3600 4010	Bocaccio, Open Access gear except exempted trawl, 200 lbs per month
1/1/2000	3600 South	Bocaccio, limited entry fixed gear, closed
1/1/2000	3600 South	Bocaccio, Open Access gear except exempted trawl, closed
1/1/2000	4010 South	Limited entry trawl, small footrope or midwater trawl only, Bocaccio, 300 lbs per month
3/1/2000	3600 4010	Bocaccio, Open Access gear except exempted trawl, closed
3/1/2000	3600 4010	Bocaccio, limited entry fixed gear, closed
3/1/2000	3600 South	Bocaccio, Open Access gear except exempted trawl, 200 lbs per month
3/1/2000	3600 South	Bocaccio, limited entry fixed gear, 300 lbs per month
5/1/2000	3600 4010	Bocaccio, limited entry fixed gear, 500 lbs per month
5/1/2000	3600 4010	Bocaccio rockfish, Open Access gear except exempted trawl, 200 lbs per month
5/1/2000	3600 South	Bocaccio, limited entry fixed gear, 500 lbs per month
5/1/2000	4010 South	Limited entry trawl, small footrope or midwater trawl only, Bocaccio, 500 lbs per month
11/1/2000	3600 4010	Bocaccio, limited entry fixed gear, 300 lbs per month
11/1/2000	3600 South	Bocaccio, limited entry fixed gear, 300 lbs per month

11/1/2000	4010 South	Limited entry trawl, small footrope or midwater trawl only, Bocaccio, 300 lbs per month
1/1/2001	3427 4010	Bocaccio, open access, 200 lbs per month
1/1/2001	3427 4010	Bocaccio, limited entry fixed gear, 300 lbs per month
1/1/2001	3427 South	Bocaccio, limited entry fixed gear, closed
1/1/2001	3427 South	Bocaccio, open access, closed
1/1/2001	4010 South	Bocaccio, limited entry trawl, small footrope or midwater trawl only, 300 lbs per month
3/1/2001	3427 4010	Bocaccio, open access, closed
3/1/2001	3427 South	Bocaccio, open access, 200 lbs per month
4/1/2001	3427 4010	Bocaccio, limited entry fixed gear, closed
4/1/2001	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per month
5/1/2001	4010 South	Bocaccio, limited entry trawl, small footrope or midwater trawl only, 500 lbs per month
7/1/2001	3427 4010	Bocaccio, open access, 200 lbs per month
7/1/2001	3427 4010	Bocaccio, limited entry fixed gear, 500 lbs per month
7/1/2001	3427 South	Bocaccio, open access, 200 lbs per month
10/1/2001	4010 South	Bocaccio, limited entry trawl, small footrope or midwater trawl only, 300 lbs per month
11/1/2001	3427 4010	Bocaccio, limited entry fixed gear, 300 lbs per month
1/1/2002	3427 4010	Bocaccio, open access, 200 lbs per month
1/1/2002	3427 4010	Bocaccio, limited entry fixed gear, 200 lbs per month
1/1/2002	3427 South	Bocaccio, open access, closed
1/1/2002	3427 South	Bocaccio, limited entry fixed gear, closed
1/1/2002	4010 South	Bocaccio, limited entry trawl, midwater or small footrope only, 600 lbs per 2 months
3/1/2002	3427 4010	Bocaccio, limited entry fixed gear, closed
3/1/2002	3427 4010	Bocaccio, open access, closed
3/1/2002	3427 South	Bocaccio, limited entry fixed gear, 200 lbs per month
3/1/2002	3427 South	Bocaccio, open access, 200 lbs per month
5/1/2002	4010 South	Bocaccio, limited entry trawl, midwater or small footrope only, 1000 lbs per 2 months
7/1/2002	3427 4010	Bocaccio, open access, 200 lbs per month
7/1/2002	3427 4010	Bocaccio, limited entry fixed gear, 200 lbs per month
9/1/2002	3427 4010	Bocaccio, limited entry fixed gear, closed
9/1/2002	3427 4010	Bocaccio, open access, closed
11/1/2002	3427 South	Bocaccio, open access, closed
11/1/2002	3427 South	Bocaccio, limited entry fixed gear, closed
11/1/2002	4010 South	Bocaccio, limited entry trawl, midwater or small footrope only, 600 lbs per 2 months
1/1/2003	4010 North	minor shelf rockfish north including widow, yellowtail, Bocaccio and chilipepper, open access gears, 200 lbs per month

1/1/2003	4010 North	minor shelf rockfish north including widow, yellowtail, Bocaccio and chilipepper, limited entry fixed gear, 200 lbs per month
1/1/2003	4010 North	minor shelf rockfish north and widow rockfish, chilipepper and Bocaccio, Limited entry trawl gear, small footrope or midwater trawl only, 300 lbs per month
1/1/2003	4010 South	Bocaccio, open access gear, closed
1/1/2003	4010 South	Bocaccio, limited entry fixed gear, closed
1/1/2003	4010 South	Bocaccio, limited entry trawl, small footrope or midwater trawl only, closed
5/1/2003	4010 North	minor shelf rockfish north and widow rockfish and chilipepper and Bocaccio, Limited entry trawl gear, small footrope or midwater trawl only, 1000 lbs per month no more than 200 lbs per month may be yelloweye rockfish
11/1/2003	4010 North	minor shelf rockfish north and widow rockfish and chilipepper and Bocaccio, Limited entry trawl gear, small footrope or midwater trawl only, 300 lbs per month
1/1/2004	3427 4010	Bocaccio, limited entry fixed gear, 200 lbs per 2 months
1/1/2004	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2004	3427 South	Bocaccio, open access gear, closed
1/1/2004	3427 South	Bocaccio, limited entry fixed gear, closed
1/1/2004	4010 North	minor shelf rockfish north including widow rockfish, yellowtail rockfish, Bocaccio, and chilipepper rockfish, open access gear, 200 lbs per month
1/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio, chilipepper and yellowtail rockfish, limited entry fixed gear, 200 lbs per month
1/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio and chilipepper, large footrope, limited entry trawl, closed
1/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio and chilipepper, small footrope, limited entry trawl, 300 lbs per month
1/1/2004	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 100 lbs per month
1/1/2004	4010 South	Bocaccio, limited entry trawl, small footrope, closed
3/1/2004	3427 4010	Bocaccio, open access gear, closed
3/1/2004	3427 4010	Bocaccio, limited entry fixed gear, closed
3/1/2004	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
3/1/2004	3427 South	Bocaccio, open access gear, 100 lbs per 2 months

5/1/2004	3427 4010	Bocaccio, limited entry fixed gear, 100 lbs per 2 months
5/1/2004	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio and chilipepper, small footrope, limited entry trawl, 1000 lbs per month, no more than 200 lbs per month of yelloweye rockfish
7/1/2004	3427 4010	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
7/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio and chilipepper, large footrope, limited entry trawl, 300 lbs per 2 months
7/1/2004	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months
9/1/2004	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
11/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio and chilipepper, large footrope, limited entry trawl, 300 lbs per 2 months
11/1/2004	4010 North	minor shelf rockfish north including widow, Bocaccio and chilipepper, small footrope, limited entry trawl, 300 lbs per month
11/1/2004	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months
11/1/2004	4010 South	Bocaccio, limited entry trawl, small footrope, 300 lbs per 2 months
1/1/2005	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2005	3427 4010	Bocaccio, limited entry fixed gear, 200 lbs per 2 months
1/1/2005	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2005	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, yellowtail, Bocaccio, chilipepper and cowcod, open access gears, 200 lbs per month
1/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish, limited entry trawl gear, midwater trawl for widow rockfish, before the primary whiting season - closed; during the primary whiting season , in trips with at least 10000 lbs of whiting - combined widow rockfish and yellowtail rockfish 500 lbs per trip with a cumulative limit of 1500 lbs of widow rockfish per month. Midwater trawl permitted in the RCA. After the primary whiting season - closed
1/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish,

		limited entry trawl gear, large and small footrope, 300 lbs per 2 months
1/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish, limited entry trawl gear, selective flatfish gear, 300 lbs per month
1/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, yellowtail, chilipepper, Bocaccio, and cowcod, limited entry fixed gear, 200 lbs per month
1/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish, limited entry trawl gear, multiple bottom trawl gear, 300 lbs per month
1/1/2005	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months
1/1/2005	4010 South	Bocaccio, limited entry trawl, small footrope trawl, closed
3/1/2005	3427 4010	Bocaccio, limited entry fixed gear, closed
3/1/2005	3427 4010	Bocaccio, open access gear, closed
3/1/2005	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2005	3427 South	Bocaccio, open access gear, closed
5/1/2005	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2005	3427 4010	Bocaccio, limited entry fixed gear, 100 lbs per 2 months
5/1/2005	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2005	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
5/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish, limited entry trawl gear, multiple bottom trawl gear, 300 lbs per 2 months of which no more than 200 lbs per month may be yelloweye rockfish
5/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish, limited entry trawl gear, selective flatfish gear, 1000 lbs per month no more than 200 lbs per month of which may be yelloweye rockfish
7/1/2005	3427 4010	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
9/1/2005	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
11/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish, limited entry trawl gear, selective flatfish gear, 300 lbs per month
11/1/2005	4010 North	minor shelf rockfish north including shortbelly, widow, Bocaccio, chilipepper, cowcod, and yelloweye rockfish,

		limited entry trawl gear, multiple bottom trawl gear, 300 lbs per month
1/1/2006	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2006	3427 4010	Bocaccio, limited entry fixed gear, 200 lbs per 2 months
1/1/2006	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2006	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, selective flatfish trawl gear, 300 lbs per month
1/1/2006	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail rockfish, open access gear, 200 lbs per month
1/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow, yellowtail, Bocaccio, chilipepper, and cowcod, limited entry fixed gear, 200 lbs per month
1/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, large and small footrope gear, 150 lbs per month
1/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2006	4010 South	Bocaccio, limited entry trawl, large footrope and midwater trawl, 150 lbs per month
1/1/2006	4010 South	Bocaccio, limited entry trawl, small footrope, closed
3/1/2006	3427 4010	Bocaccio, limited entry fixed gear, closed
3/1/2006	3427 4010	Bocaccio, open access gear, closed
3/1/2006	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2006	3427 South	Bocaccio, open access gear, closed
3/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, large and small footrope gear, 300 lbs per 2 months
3/1/2006	4010 South	Bocaccio, limited entry trawl, large footrope and midwater trawl, 300 lbs per 2 months
5/1/2006	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2006	3427 4010	Bocaccio, limited entry fixed gear, 100 lbs per 2 months
5/1/2006	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2006	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months

5/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, selective flatfish trawl gear, 1000 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
5/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, multiple bottom trawl gear, 300 lbs per 2 months, no more than 200 lbs per 2 months of which may be yelloweye rockfish
7/1/2006	3427 4010	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
9/1/2006	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
11/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, selective flatfish trawl gear, 300 lbs per month
11/1/2006	4010 North	minor shelf rockfish north including shortbelly, widow rockfish, yelloweye, Bocaccio, chilipepper, and cowcod, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2007	3427 4010	Bocaccio, limited entry fixed gear, 200 lbs per 2 months
1/1/2007	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2007	3427 South	Bocaccio limited, limited entry fixed gear, 300 lbs per 2 months
1/1/2007	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month
1/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
1/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, large and small footrope gear, 300 lbs per 2 months
1/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
1/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2007	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months

1/1/2007	4010 South	Bocaccio, limited entry trawl, small footrope trawl, closed
3/1/2007	3427 4010	Bocaccio, open access gear, closed
3/1/2007	3427 4010	Bocaccio, limited entry fixed gear, closed
3/1/2007	3427 South	Bocaccio, open access gear, closed
3/1/2007	3427 South	Bocaccio limited, limited entry fixed gear, closed
5/1/2007	3427 4010	Bocaccio, limited entry fixed gear, 100 lbs per 2 months
5/1/2007	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2007	3427 South	Bocaccio limited, limited entry fixed gear, 300 lbs per 2 months
5/1/2007	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
5/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 1000 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
7/1/2007	3427 4010	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
9/1/2007	3427 4010	Bocaccio, limited entry fixed gear, Bocaccio included in minor shelf south rockfish limits
9/1/2007	3427 4010	minor shelf rockfish south including yellowtail, shortbelly and widow rockfish, limited entry fixed gear, 500 lbs per 2 months (including Bocaccio)
9/1/2007	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio and widow rockfish, limited entry fixed gear, 3000 lbs per 2 months
9/1/2007	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
11/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
11/1/2007	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2008	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2008	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio, chilipepper and widow rockfish, limited entry fixed gear, 2500 lbs per 2 months of

		which no more than 500 lbs per 2 months may be species other than chilipepper
1/1/2008	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2008	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, large and small footrope gear, 300 lbs per 2 months
1/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
1/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
1/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month
1/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2008	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months
1/1/2008	4010 South	Bocaccio, limited entry trawl, small footrope trawl, closed
3/1/2008	3427 4010	Bocaccio, open access gear, closed
3/1/2008	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2008	3427 South	Bocaccio, open access gear, closed
5/1/2008	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2008	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2008	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
5/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 1000 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
5/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
9/1/2008	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months

11/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
11/1/2008	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2009	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2009	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio, chilipepper and widow rockfish, limited entry fixed gear, 2500 lbs per 2 months of which no more than 500 lbs per 2 months may be species other than chilipepper
1/1/2009	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2009	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, large and small footrope gear, 300 lbs per 2 months
1/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
1/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month
1/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
1/1/2009	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months
1/1/2009	4010 South	Bocaccio, limited entry trawl, small footrope trawl, closed
3/1/2009	3427 4010	Bocaccio, open access gear, closed
3/1/2009	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2009	3427 South	Bocaccio, open access gear, closed
5/1/2009	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2009	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2009	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months

5/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
5/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 1000 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
9/1/2009	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
11/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
11/1/2009	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2010	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2010	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio, chilipepper and widow rockfish, limited entry fixed gear, 2500 lbs per 2 months of which no more than 500 lbs per 2 months may be species other than chilipepper
1/1/2010	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2010	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, large and small footrope gear, 300 lbs per 2 months
1/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
1/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
1/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month

1/1/2010	4010 South	Bocaccio, limited entry trawl, large footrope or midwater trawl, 300 lbs per 2 months
1/1/2010	4010 South	Bocaccio, limited entry trawl, small footrope trawl, closed
3/1/2010	3427 4010	Bocaccio, open access gear, closed
3/1/2010	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2010	3427 South	Bocaccio, open access gear, closed
5/1/2010	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2010	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2010	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
5/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
5/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 1000 lbs per month, no more than 200 lbs per month of which may be yelloweye rockfish
9/1/2010	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
11/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, selective flatfish trawl, 300 lbs per month
11/1/2010	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yelloweye, limited entry trawl, multiple bottom trawl gear, 300 lbs per month
1/1/2011	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2011	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio, chilipepper and widow rockfish, limited entry fixed gear, 2500 lbs per 2 months of which no more than 500 lbs per 2 months may be species other than chilipepper
1/1/2011	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2011	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2011	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month
1/1/2011	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
1/1/2011	ALL	Bocaccio managed in part by IFQ

3/1/2011	3427 4010	Bocaccio, open access gear, closed
3/1/2011	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2011	3427 South	Bocaccio, open access gear, closed
5/1/2011	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2011	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2011	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
9/1/2011	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2012	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2012	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio, chilipepper and widow rockfish, limited entry fixed gear, 2500 lbs per 2 months of which no more than 500 lbs per 2 months may be species other than chilipepper
1/1/2012	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2012	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2012	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month
1/1/2012	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
3/1/2012	3427 4010	Bocaccio, open access gear, closed
3/1/2012	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2012	3427 South	Bocaccio, open access gear, closed
5/1/2012	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2012	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2012	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
9/1/2012	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
9/1/2012	3427 South	Bocaccio, limited entry fixed gear, 500 lbs per 2 months
1/1/2013	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2013	3427 4010	minor shelf rockfish south including yellowtail, shortbelly, Bocaccio, chilipepper and widow rockfish, limited entry fixed gear, 2500 lbs per 2 months of which no more than 500 lbs per 2 months may be species other than chilipepper
1/1/2013	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
1/1/2013	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
1/1/2013	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow, and yellowtail, limited entry fixed gear, 200 lbs per month

1/1/2013	4010 North	minor shelf rockfish north including Bocaccio, chilipepper, cowcod, shortbelly, widow and yellowtail, open access gears, 200 lbs per month
3/1/2013	3427 4010	Bocaccio, open access gear, closed
3/1/2013	3427 South	Bocaccio, limited entry fixed gear, closed
3/1/2013	3427 South	Bocaccio, open access gear, closed
5/1/2013	3427 4010	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2013	3427 South	Bocaccio, open access gear, 100 lbs per 2 months
5/1/2013	3427 South	Bocaccio, limited entry fixed gear, 300 lbs per 2 months
7/1/2013	3427 South	Bocaccio, limited entry fixed gear, 500 lbs per 2 months
7/1/2013	3427 South	Bocaccio, open access gear, 200 lbs per 2 months
9/1/2013	3427 4010	Bocaccio, open access gear, 200 lbs per 2 months
1/1/2014	3427 4010	non-trawl, limited entry, minor shelf rockfish including shortbelly, widow, and yellowtail rockfish, Bocaccio, chilipepper, 2500 lbs per 2 months of which no more than 500 lbs may be species other than chilipepper
1/1/2014	3427 4010	non-trawl, open access, Bocaccio, 200 lbs per 2 months
1/1/2014	3427 South	non-trawl, limited entry, Bocaccio, 300 lbs per 2 months
1/1/2014	3427 South	non-trawl, open access, Bocaccio, 100 lbs per 2 months
1/1/2014	4010 North	non-trawl, limited entry, minor shelf rockfish including shortbelly, widow, and yellowtail rockfish, Bocaccio, chilipepper, and cowcod, 200 lbs per month
1/1/2014	4010 North	non-trawl, open access, minor shelf rockfish including shortbelly, widow, yellowtail, Bocaccio, chilipepper rockfish, and cowcod, 200 lbs per month
3/1/2014	3427 4010	non-trawl, open access, Bocaccio, closed
3/1/2014	3427 South	non-trawl, open access, Bocaccio, closed
3/1/2014	3427 South	non-trawl, limited entry, Bocaccio, closed
5/1/2014	3427 4010	non-trawl, open access, Bocaccio, 100 lbs per 2 months
5/1/2014	3427 South	non-trawl, limited entry, Bocaccio, 300 lbs per 2 months
5/1/2014	3427 South	non-trawl, open access, Bocaccio, 100 lbs per 2 months
7/1/2014	3427 South	non-trawl, open access, Bocaccio, 200 lbs per 2 months
7/1/2014	3427 South	non-trawl, limited entry, Bocaccio, 500 lbs per 2 months
9/1/2014	3427 4010	non-trawl, open access, Bocaccio, 200 lbs per 2 months

Appendix B. Reef delineation and Drift Selection Methodologies for analysis of California CPFV Recreational Data

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Methodology

CDFW 1987-1998

We identified reefs as potential habitat for Bocaccio in California using a variety of newly available spatial data sources, including 2, 3 and 5m bathymetry, substrate, lithology and Habitat Suitability geodatabases. Available data sources varied by latitude. To delineate reefs from Point Conception to the Oregon border we used a 2 m binary raster layer (3 m for Cordell Bank) for substrate, where 1 = rough, and 0 = smooth habitat (California Seafloor Mapping Project; data available from http://seafloor.otterlabs.org/index.html). Rough and smooth substrate was identified by CSMP using 2 rugosity indices based upon bathymetric data, surface:planar area (SA:PA), and vector ruggedness measure (VRM). We considered areas identified as 'rough' as reef habitat. For reefs named Asilomar, Cypress Point, Portuguese Ledge, and Point Joe only a portion of the reefs were mapped at the 2m resolution, therefore to identify the remaining reef, we used either a 5 m resolution VRM dataset, where the VRM cutoff was > 0.001 (Young et al. , 2010). For all reefs derived from either 2m, 3m or 5m resolution, we applied a 5m buffer around each reef habitat for potential error in positional accuracy and all reefs with an area greater than or equal to 100 m^2 were included. We identified seven reefs outside of the 2m layer that contained a significant number of CPFV points, which we decided to include in the indices. Big Reef, Blunts Reef, Isle of St. James, Point Sur Deep, Sandhill Ledge, portions of San Gregario and Soap Bank reefs were located just outside of 2m, 3m and 5m 'footprint', therefore for these reefs we used the 2005 Habitat Suitability Probability (HSP) geodatabase for a number of rocky reef associated species (NMFS, 2005). The HSP is a modeled output from Essential Fish Habitat geodatabase and is based upon habitat data, depth, and location, where input data are NMFS trawl datasets. All spatial data was projected to NAD 1983 UTM Zone 10.

Reef systems were grouped and stratified by depth at a spatial scale biologically meaningful to reef-associated rockfish. We considered patches of rocky habitat greater than ~200 m apart as different reefs. If a reef system has contiguous habitat (no channels > 200m) it remained intact, no matter how large the reef. A small number of reefs were merged into 'super reefs' to accommodate 1980s-1990s CDFW location codes that overlapped multiple reefs. Reef areas were calculated using the zonal stats tool in ArcGIS, stratified by the depth bins 0-19m, 20-39 m, 40-59m, 60-79m, 80-99m and >100 m using the CSMP depth raster (2 m, 3m or 5m resolution). To get depths for those reefs outside the CSMP 'footprint' we used the NOAA Coastal Relief Model raster dataset (90m) for California, and 100m digital elevation model (DEM) bathymetry from the Active Tectonics and Seafloor Mapping Lab for Oregon.

CDFW 1999-2014

For each species, the following methods were applied to identify regions of suitable habitat, and to determine the number of drifts to include in the analysis. The locations of positive encounters were mapped, using the drift starting locations. Regions of suitable habitat were defined by creating detailed hulls (similar to an alpha hull) with a 0.01 decimal degree buffer around a location or cluster of locations (Data East 2003). Any portion of a region that intersected with land was removed. As an example of the buffers, a region with only one positive encounter has an ellipsoid area of 3.22km^2. Each drift (both positive and zero-catch) was assigned to the region with which it intersected. Drifts that did not intersect with a region were considered structural zeroes, i.e., outside of the species habitat, and not used in analyses. For each species, data were filtered to exclude regions that did not consistently produce catch of the species of interest (i.e. having fewer than 5 years with positive observations).

CPFV drift selection

CDFW 1987-1998

The available GIS and Loran coordinates for the 1987-1998 CDFW provided enough information to assign each fishing location to a reef. Each fishing location was assigned to one of 459 CDFW fishing locations, regardless of whether an exact location was recorded. These fishing location codes allowed us to match fishing stops on a trip that didn't have coordinates to a reef. Of the 1921 drifts with positive Bocaccio encounters, 197 were not located on an assigned reef. Due to the nature of the dataset and uncertainty around coordinate data, the 197 drifts occurring outside of known habitat were filtered out of the data for analyses.

CDFW 1999-2014

For each CPFV location in the California 1999-2014 we selected all drifts that occurred within a predefined detailed hull as described in the section above. Detailed hulls retained for analyses.

Appendix C. Catch distribution data as the basis for the apportionment of Bocaccio ACL and OFL estimates North and South of 40°10’ N

In order to inform the distribution of ACL and OFL values, the relative distribution of catch for the region South of 43° N (the assessment area) were examined. The base years for the evaluation were 1980-2000, based on the assumption of greater uncertainty in the species composition of the catch prior to 1980, and the potential impact of regulatory impacts on the distribution of effort in the post- 2000 period. The NWFSC bottom trawl survey data were evaluated and assumed to be a poor proxy for distribution, as the fraction of the assessment area catch North of Mendocino was less than 1%, considerably less than the estimated landings. There are four data sources that were used to calculate the specifications:

1. Commercial landings (all fishing gears) from the CalCOM database from eleven fishing port complexes between 1980 and 2000 (compiled by Don Pearson);
2. Recreational landing from the RecFIN database from California between 1980 and 2000, taken from the 2015 Bocaccio stock assessment. All recreational catches were assigned to the south of Mendocino region, given the paucity of recreational catches North of Mendocino;
3. Landing estimates from the Oregon historical catch reconstruction from three southern Oregon ports (Brookings, Gold Beach, and Port Orford) between 1980 and 1986;
4. Landing estimates from the PacFIN database from the same three southern Oregon Ports between 1987 and 2000.

Among the eleven fishing ports in the CalCOM database, two port complexes (Crescent City and Eureka) are in the area of north of Cape Mendocino, while all other port complexes are south of Cape Mendocino. Total catches from the south of Mendocino are sum of catches from the nine southern ports and all recreational catches in the same time period, while total catches from the north of Mendocino are sum of the two northern ports summarized from the CalCOM data, Oregon historical catches between 1980 and 1986, and the PacFIN estimates between 1987 and 2000 (Table C1). Table C2 lists estimated ACL and OFL from 2017 to 2024 based on the apportionment ratios provided in Table 1.

Table C1. Catches of Bocaccio (mt) by data sources and areas from 1980 to 2000.

Data source	South of Cape Mendocino	North of Cape Mendocino
CalCOM (1980-2000)	41,600	3,385
Recreational (RecFIN, 1980-2000)	8,344	
Oregon historical (1980-1986)		479
Oregon PacFIN (1987-2000)		140
Sum	**49,944**	**4,004**
Proportion	**0.9258**	**0.0742**

Table C2. Estimated ACL and OFL values for 2017-2024, for the assessment area North and South of 40° 10 N, based on the apportionment ratios provided in Table 1.

Year	ACL (mt)	OFL (mt)	ACL (South of 40 100	OFL (South of 40 10)	ACL (North of 40 10)	OFL (North of 40 10)
2015	349	1,444				
2016	362	1,351				
2017	853	2,310	790	2139	63	171
2018	800	2,174	741	2013	59	161
2019	771	2,094	714	1939	57	155
2020	758	2,059	702	1906	56	153
2021	755	2,047	699	1895	56	152
2022	755	2,046	699	1894	56	152
2023	756	2,049	700	1897	56	152
2024	759	2,054	703	1902	56	152

Appendix D. Model fits to marginal age composition data

During the STAR Panel review, the Panel requested (Request #9, see Response to STAR Panel Recommendation Section) a model run to check how well the model fits to the marginal age composition data. We used a simplified method by including all age composition data in the data file and setting sample sized to a minimum value of one, and then re-ran the model. This method is a quick way to obtain model fits to the data without additional changes in the model input files. Model fits to marginal age composition data are presented in Figures C1 to C6.

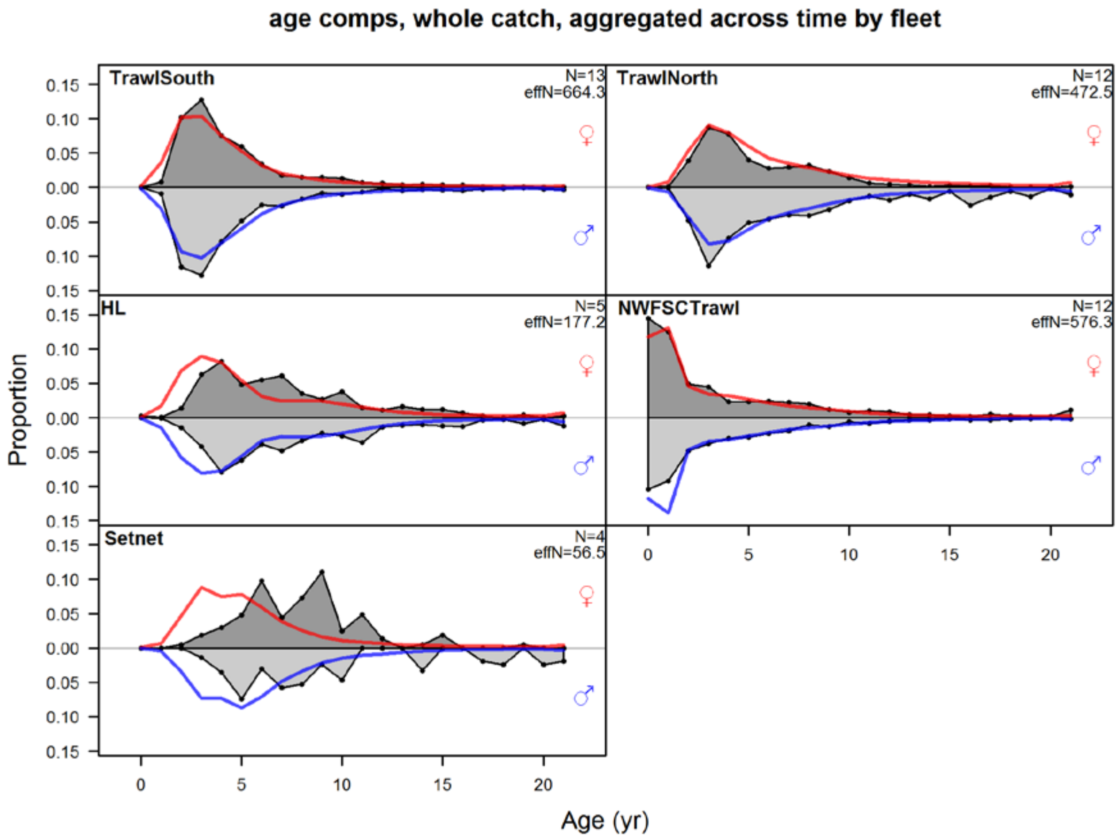

Figure C1. Observed and expected age composition by sex for five fleets/survey aggregated over all years.

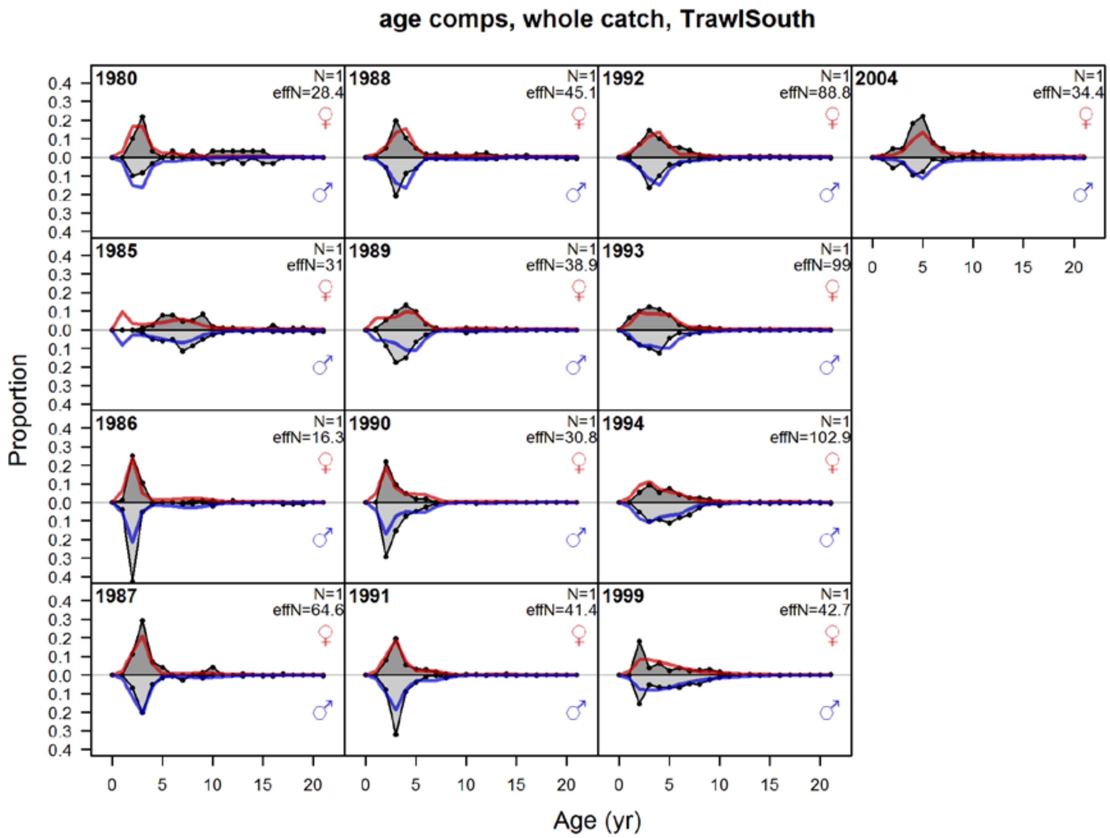

Figure C2. Observed and expected age composition by sex for the Southern California trawl fishery.

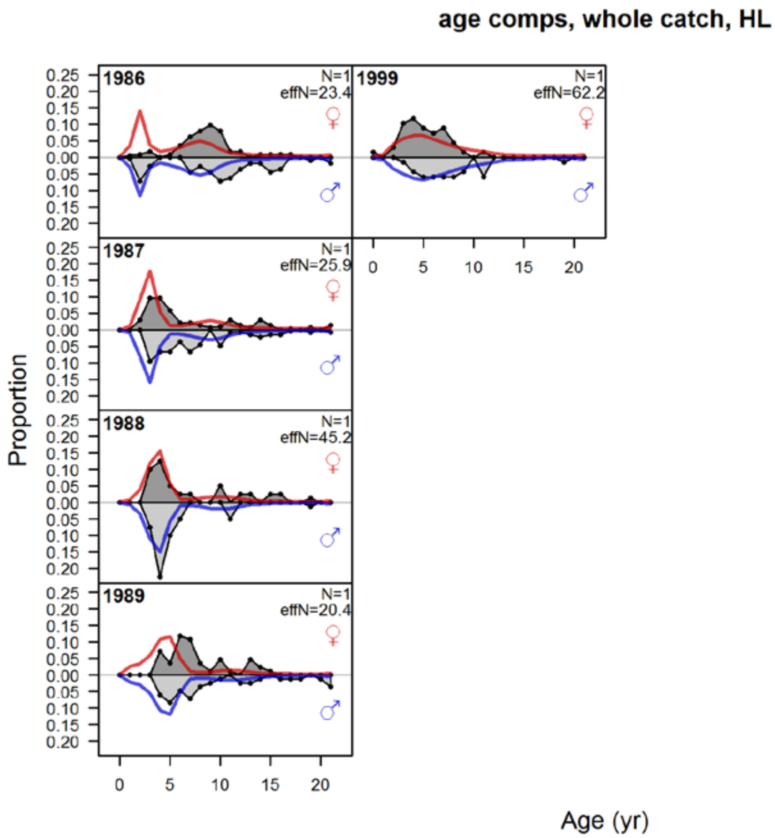

Figure C3. Observed and expected age composition by sex for the hook-and-line fishery.

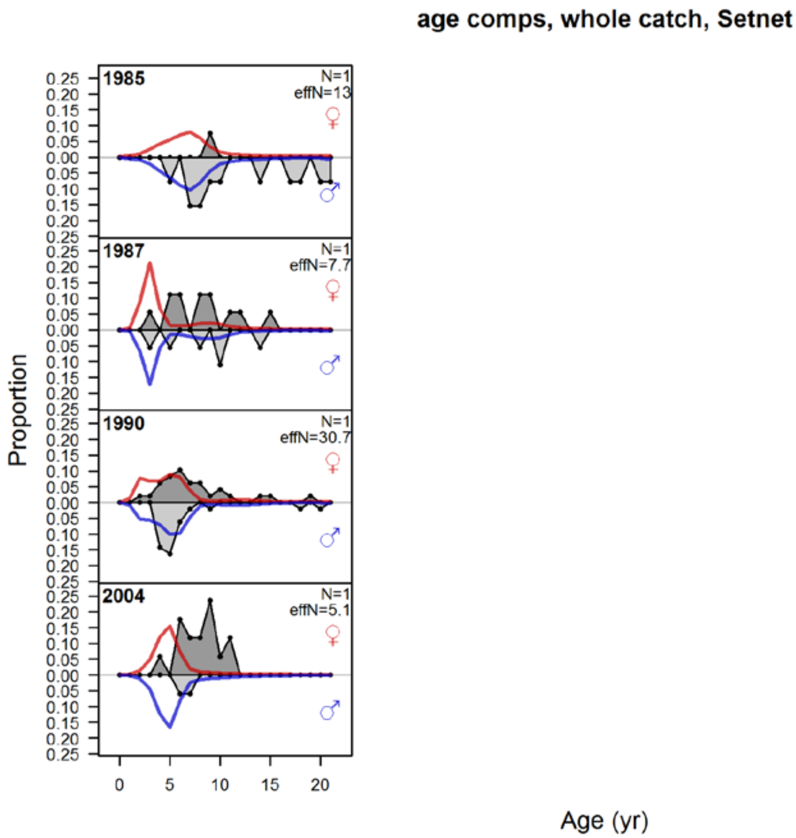

Figure C4. Observed and expected age composition by sex for the setnet fishery.

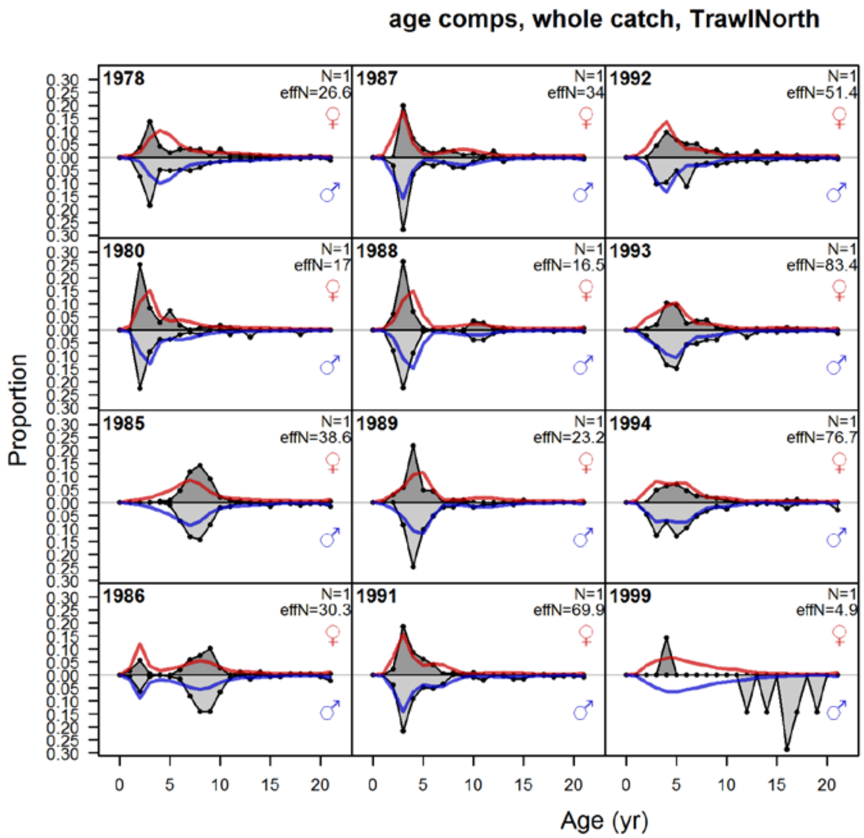

Figure C5. Observed and expected age composition by sex for the Northern California trawl fishery.

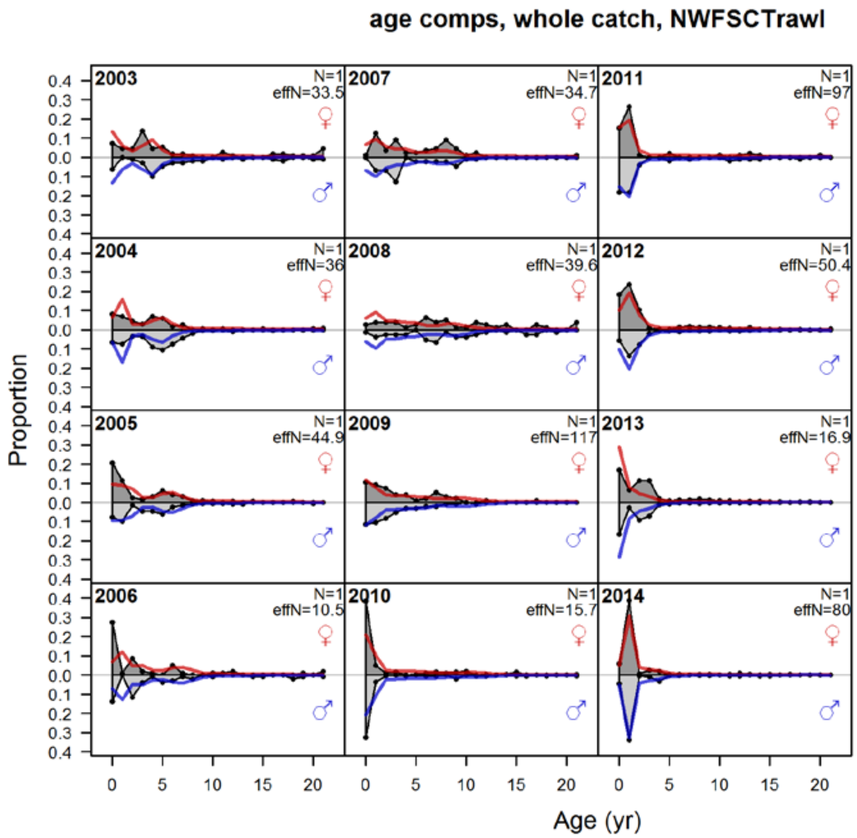

Figure C1. Observed and expected age composition by sex for the NWFSC trawl survey.

Appendix E. Input Files of the Base Model to the SS3 Program

Appendix E.1. Data File (boc1.dat)

#V3.24U
#_SS-V3.24U-
fast;_08/29/2014;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_11.2_Win64
#_Number_of_datafiles: 3

1892 #_styr
2014 #_endyr
1 #_nseas
12 #_months/season
1 #_spawn_seas
6 #_Nfleet
12 #_Nsurveys
1 #_N_areas
TrawlSouth%HL%Setnet%RecSouth%RecCentral%TrawlNorth%CalCOFI%Triennial%CDFWEarlyOB%NWFSCHook%NWFSCTrawl%Juvenile%Rec2013%PPIndex%Free1%MirrorRecS%RecSouthOB%RecCentralOB
0.5 0.5 0.5 0.5 0.5 0.5 0.1 0.5 0.5 0.78 0.66 0.5 0.5 0.5 0.5 0.5 0.5 0.5 #_surveytiming_in_season
for state of nature run with Rec2013 set surveytimeing = 0
#0.5 0.5 0.5 0.5 0.5 0.5 0.1 0.5 0.5 0.78 0.66 0.5 0 0.5 0.5 0.5 0.5 0.5 #_surveytiming_in_season
SCB hook and line, and NWFSC combo based on Julian days
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 #_area_assignments_for_each_fishery_and_survey
1 1 1 1 1 1 #_units of catch: 1=bio; 2=num
0.01 0.01 0.01 0.01 0.01 0.01 #_se of log(catch) only used for init_eq_catch and for Fmethod 2 and 3

2 #_Ngenders
21 #_Nages
0 152.72 0 0 0 0 #_init_equil_catch_for_each_fishery
123 #_N_lines_of_catch_to_read
#_catch_biomass(mtons):_columns_are_fisheries,year,season

#TWL	HKL	NET	RecSou	RecNor	ORWA_all	year	season
0.00	166.77	0.00	0.00	0.00	0.18	1892	1
0.00	157.40	0.00	0.00	0.00	0.18	1893	1
0.00	148.03	0.00	0.00	0.00	0.18	1894	1
0.00	138.66	0.00	0.00	0.00	0.14	1895	1
0.00	130.93	0.00	0.00	0.00	0.13	1896	1
0.00	123.20	0.00	0.00	0.00	0.13	1897	1
0.00	115.47	0.00	0.00	0.00	0.13	1898	1
0.00	107.73	0.00	0.00	0.00	0.13	1899	1
0.00	119.20	0.00	0.00	0.00	0.13	1900	1
0.00	130.66	0.00	0.00	0.00	0.13	1901	1
0.00	142.12	0.00	0.00	0.00	0.13	1902	1

0.00	153.59	0.00	0.00	0.00	0.13	1903	1
0.00	165.05	0.00	0.00	0.00	0.14	1904	1
0.00	176.36	0.00	0.00	0.00	0.14	1905	1
0.00	187.68	0.00	0.00	0.00	0.14	1906	1
0.00	198.99	0.00	0.00	0.00	0.14	1907	1
0.00	210.30	0.00	0.00	0.00	0.14	1908	1
0.00	236.64	0.00	0.00	0.00	0.14	1909	1
0.00	262.98	0.00	0.00	0.00	0.14	1910	1
0.00	289.32	0.00	0.00	0.00	0.15	1911	1
0.00	315.66	0.00	0.00	0.00	0.15	1912	1
0.00	342.00	0.00	0.00	0.00	0.15	1913	1
0.00	368.34	0.00	0.00	0.00	0.15	1914	1
0.00	394.68	0.00	0.00	0.00	0.15	1915	1
54.77	418.96	0.00	0.00	0.00	0.31	1916	1
85.57	661.43	0.00	0.00	0.00	0.47	1917	1
96.66	701.13	0.00	0.00	0.00	0.88	1918	1
66.00	463.10	0.00	0.00	0.00	0.32	1919	1
67.82	482.28	0.00	0.00	0.00	0.38	1920	1
56.38	406.03	0.00	0.00	0.00	0.49	1921	1
49.37	367.12	0.00	0.00	0.00	0.41	1922	1
55.07	434.14	0.00	0.00	0.00	0.24	1923	1
36.97	405.15	0.00	0.00	0.00	0.43	1924	1
29.85	474.63	0.00	0.00	0.00	1.04	1925	1
83.20	627.09	0.00	0.00	0.00	0.98	1926	1
111.29	497.26	0.00	0.00	0.00	1.67	1927	1
150.62	482.90	0.00	1.99	2.39	1.41	1928	1
119.43	441.16	0.00	3.99	4.79	28.28	1929	1
135.62	551.00	0.00	5.99	5.51	16.93	1930	1
45.59	578.08	0.00	7.99	7.34	49.79	1931	1
68.87	430.61	0.00	9.99	9.18	37.44	1932	1
89.53	257.34	0.00	11.98	11.02	59.43	1933	1
108.88	316.57	0.00	13.98	12.85	41.56	1934	1
90.51	369.17	0.00	15.98	14.69	43.36	1935	1
107.86	473.58	0.00	15.98	16.53	17.93	1936	1
91.98	408.44	0.00	27.51	19.59	41.38	1937	1
76.46	295.45	0.00	22.18	19.27	47.76	1938	1
49.95	200.11	0.00	19.63	16.85	86.36	1939	1
45.57	238.49	0.00	14.07	24.27	60.60	1940	1
32.44	187.35	0.00	13.00	22.43	54.36	1941	1
7.90	72.10	0.00	6.91	11.91	27.80	1942	1
7.56	70.44	0.00	6.60	11.39	203.57	1943	1
2.94	83.63	0.00	5.42	9.35	647.02	1944	1
55.17	127.08	0.00	7.23	12.47	1228.55	1945	1
111.53	122.33	0.00	12.45	21.47	622.94	1946	1
5.57	198.21	0.00	37.32	16.99	638.87	1947	1
81.94	150.23	0.00	102.08	33.90	404.34	1948	1
94.00	176.56	0.00	132.83	43.94	386.73	1949	1
303.66	327.61	0.00	156.82	53.55	380.10	1950	1
765.29	262.44	0.00	135.78	63.17	537.78	1951	1
1310.96	180.88	0.00	151.62	54.97	274.21	1952	1
1678.25	70.20	0.00	171.23	46.81	314.30	1953	1

1597.98	89.11	0.00	410.71	58.19	255.01	1954	1
1764.99	122.87	0.00	760.57	69.38	344.66	1955	1
2006.22	299.57	0.00	917.14	77.46	379.29	1956	1
2219.46	271.26	0.00	529.88	76.80	487.65	1957	1
2459.84	213.50	0.00	301.14	123.49	489.80	1958	1
2062.66	125.38	0.00	177.61	102.75	387.08	1959	1
1731.86	92.91	0.00	185.13	81.26	357.50	1960	1
1297.35	80.89	0.00	211.89	68.50	276.84	1961	1
1147.09	68.25	0.00	204.46	80.38	242.74	1962	1
1314.09	85.06	0.00	194.38	88.71	339.02	1963	1
942.79	70.17	0.00	244.36	74.98	200.45	1964	1
965.94	81.03	0.00	319.14	106.55	280.78	1965	1
2410.23	129.52	0.00	564.30	118.21	206.04	1966	1
4036.28	117.90	0.00	770.19	111.44	300.15	1967	1
1996.47	80.71	0.00	832.18	103.90	396.49	1968	1
1132.64	78.02	17.41	785.00	110.52	235.63	1969	1
1341.14	82.39	15.06	1039.41	117.87	262.03	1970	1
961.36	81.56	58.73	966.96	104.45	345.62	1971	1
1648.11	122.56	70.95	1308.70	123.08	387.17	1972	1
4537.05	151.53	167.30	1510.62	186.09	654.19	1973	1
5956.32	164.10	261.65	1892.59	200.89	529.74	1974	1
3316.02	158.13	285.36	1865.23	200.29	585.68	1975	1
3424.73	218.88	123.10	1489.03	215.70	714.18	1976	1
2381.40	188.75	158.08	1265.09	193.57	678.27	1977	1
1878.87	247.93	124.75	1174.03	195.63	760.57	1978	1
3299.31	351.15	235.32	1713.94	230.22	342.23	1979	1
3054.60	335.10	215.90	942.92	316.85	677.34	1980	1
1779.30	300.20	356.20	941.39	230.37	2204.97	1981	1
2328.10	393.40	387.00	1249.41	371.15	2043.08	1982	1
1891.20	267.60	670.90	266.18	307.62	2366.31	1983	1
1420.90	480.20	685.30	182.11	66.92	1655.12	1984	1
544.60	163.00	1047.00	325.04	67.91	663.89	1985	1
789.40	287.70	1091.60	435.09	176.28	387.47	1986	1
642.70	306.70	976.00	91.54	106.38	569.33	1987	1
590.00	522.90	370.10	106.54	44.34	712.04	1988	1
592.90	395.40	983.20	182.95	81.91	571.71	1989	1
724.20	487.40	783.30	160.27	68.02	476.14	1990	1
498.40	270.70	468.50	160.27	68.02	273.04	1991	1
359.70	479.20	640.30	160.27	68.02	149.38	1992	1
357.70	444.00	432.00	118.01	68.02	215.59	1993	1
376.60	210.90	262.60	252.95	68.02	170.20	1994	1
214.90	68.70	281.20	34.51	3.32	165.09	1995	1
225.80	92.60	91.80	68.53	32.37	67.32	1996	1
136.30	57.60	34.90	72.83	111.55	95.50	1997	1
41.20	41.60	39.20	34.09	25.95	33.27	1998	1
19.00	21.00	7.20	81.28	60.54	30.88	1999	1
13.50	7.00	0.70	59.50	75.12	7.78	2000	1
9.20	7.80	0.90	63.57	54.08	5.53	2001	1
28.04	0.13	0.01	86.02	9.01	20.67	2002	1
5.07	0.00	0.00	12.09	0.02	0.31	2003	1
13.86	1.84	0.21	61.37	2.31	3.52	2004	1

```
24.64	1.50	0.17	191.88	11.05	0.43	2005	1

# new data from "C:\XiHe1\Boc2015\Landing\AllLanding1\bocaccio.WCGOP.summary 7_2_2015.xlsx"
15.81	10.01	0.00	52.11	12.22	0.98	2006	1
5.22	10.88	0.00	80.19	9.33	1.47	2007	1
7.54	3.83	0.00	49.29	3.71	4.37	2008	1
19.83	2.67	0.00	51.99	8.75	1.35	2009	1
12.87	1.76	0.00	50.07	6.54	2.15	2010	1
7.88	2.52	0.00	99.26	4.06	1.93	2011	1
11.43	3.49	0.00	119.08	5.65	2.01	2012	1
14.34	3.94	0.00	125.87	4.97	1.29	2013	1

# for 2014: Use Don Pearson's CalCOM data
# C:\XiHe1\Boc2015\Landing\CalCOM\Analysis1\CalCOMLanding1.csv
4.1	6.1		0	93.43	6.1	4.2			2014	1

223 #_N_cpue_and_surveyabundance_observations
#_Units:  0=numbers; 1=biomass; 2=F
#_Errtype:  -1=normal; 0=lognormal; >0=T
#_Fleet Units Errtype
1  1 0 # TrawlSouth
2  1 0 # HL
3  1 0 # Setnet
4  1 0 # RecSouth
5  1 0 # RecCentral
6  1 0 # TrawlNorth
7  1 0 # CalCOFI
8  1 0 # Triennial
9  1 0 # CDFWEarlyOB
10 0 0 # NWFSCHook
11 1 0 # NWFSCTrawl
12 0 0 # Juvenile
13 0 0 # PierJuv
14 0 0 # PPIndex
15 1 0 # Free1
16 1 0 # MirrorRecS
17 1 0 # RecSouthOB
18 1 0 # RecCentralOB

#_year seas index obs se(log)
1982	1	1	166.4	0.32	#areaweightedCPUEfromRalston
1983	1	1	73.1	0.32	#areaweightedCPUEfromRalston
1984	1	1	72.3	0.32	#areaweightedCPUEfromRalston
1985	1	1	30.7	0.32	#areaweightedCPUEfromRalston
1986	1	1	31.2	0.32	#areaweightedCPUEfromRalston
1987	1	1	44.4	0.32	#areaweightedCPUEfromRalston
1988	1	1	51.6	0.32	#areaweightedCPUEfromRalston
1989	1	1	35.8	0.32	#areaweightedCPUEfromRalston
1990	1	1	37.1	0.32	#areaweightedCPUEfromRalston
1991	1	1	26.9	0.32	#areaweightedCPUEfromRalston
```

1992	1	1	20.4	0.32	#areaweightedCPUEfromRalston	
1993	1	1	19.7	0.32	#areaweightedCPUEfromRalston	
1994	1	1	23.9	0.32	#areaweightedCPUEfromRalston	
1995	1	1	15.2	0.32	#areaweightedCPUEfromRalston	
1996	1	1	8.7		0.32	#areaweightedCPUEfromRalston

new index from E.J.
copied from:
C:\XiHe1\Boc2015\SurveyData\RecIndex\FileFromEJ_6_30_2015\RecIndexSouthandNorth EJ 6_30_2015.xlsx

1980	1	4	0.688955	0.104645
1981	1	4	0.667132	0.097095
1982	1	4	0.466432	0.118905
1983	1	4	0.156180	0.154105
1984	1	4	0.161413	0.162402
1985	1	4	0.303510	0.161176
1986	1	4	0.297863	0.163000
1987	1	4	0.204818	0.710965
1988	1	4	0.012929	0.563370
1989	1	4	0.396170	0.419357
1993	1	4	0.138849	0.351320
1994	1	4	0.120043	0.373490
1995	1	4	0.078031	0.838230
1996	1	4	0.027095	0.354264
1997	1	4	0.046507	0.670058
1998	1	4	0.036851	0.341936
1999	1	4	0.055291	0.262221
2000	1	4	0.172703	0.247952
2001	1	4	0.156119	0.324511
2002	1	4	0.143590	0.273021

new index from E.J.
copied from:
C:\XiHe1\Boc2015\SurveyData\RecIndex\FileFromEJ_6_30_2015\RecIndexSouthandNorth EJ 6_30_2015.xlsx

1980	1	5	0.231740	0.159580
1981	1	5	0.256751	0.268096
1982	1	5	0.292698	0.191779
1983	1	5	0.381294	0.237932
1984	1	5	0.122401	0.172715
1985	1	5	0.193727	0.133823
1986	1	5	0.491712	0.132981
1987	1	5	0.339294	0.282665
1988	1	5	0.079644	0.243365
1989	1	5	0.196146	0.251015
1995	1	5	0.120062	0.239255
1996	1	5	0.104155	0.157752
1997	1	5	0.274892	0.177956
1998	1	5	0.195743	0.217914
1999	1	5	0.127999	0.173120

2000	1	5	0.252611	0.305464	
2001	1	5	0.267550	0.340544	
2002	1	5	0.209870	0.568706	

from John 3/16/2015
"C:\XiHe1\Boc2015\SurveyData\CalCOFI\FromJohnField_3_16_2015Email\calcofi.updated.through.2014.xlsx"

1951	1	7	0.79648996	0.2945373	#CalCOFIindex
1952	1	7	0.80290218	0.2624176	#CalCOFIindex
1953	1	7	1.05773462	0.2394509	#CalCOFIindex
1954	1	7	1.47927525	0.2100839	#CalCOFIindex
1955	1	7	1.19367575	0.2286978	#CalCOFIindex
1956	1	7	0.73978117	0.2967465	#CalCOFIindex
1957	1	7	1.57196016	0.2540871	#CalCOFIindex
1958	1	7	1.2143268	0.2355737	#CalCOFIindex
1959	1	7	0.39143742	0.2529052	#CalCOFIindex
1960	1	7	0.56531417	0.2303192	#CalCOFIindex
1961	1	7	0.66567119	0.3188335	#CalCOFIindex
1962	1	7	0.58352847	0.2846315	#CalCOFIindex
1963	1	7	0.96054673	0.2843564	#CalCOFIindex
1964	1	7	0.58875942	0.2944037	#CalCOFIindex
1965	1	7	0.79120271	0.258125	#CalCOFIindex
1966	1	7	1.45638532	0.22334	#CalCOFIindex
1967	1	7	0.75919773	0.3789407	#CalCOFIindex
1968	1	7	2.68208326	0.295707	#CalCOFIindex
1969	1	7	2.44255332	0.1963256	#CalCOFIindex
1970	1	7	0.74392831	0.5249121	#CalCOFIindex
1972	1	7	1.88874566	0.1994202	#CalCOFIindex
1975	1	7	2.02613286	0.2070174	#CalCOFIindex
1976	1	7	2.73943637	0.3742858	#CalCOFIindex
1978	1	7	1.00145865	0.2581415	#CalCOFIindex
1981	1	7	0.94385225	0.2681981	#CalCOFIindex
1983	1	7	0.28946973	0.45436	#CalCOFIindex
1984	1	7	0.98393717	0.251082	#CalCOFIindex
1985	1	7	0.29565651	0.4839168	#CalCOFIindex
1986	1	7	0.40247449	0.5175289	#CalCOFIindex
1987	1	7	0.91636505	0.39735	#CalCOFIindex
1988	1	7	0.71096337	0.2962861	#CalCOFIindex
1989	1	7	0.71922027	0.422592	#CalCOFIindex
1990	1	7	0.47262656	0.4093025	#CalCOFIindex
1991	1	7	0.70439911	0.3266862	#CalCOFIindex
1992	1	7	0.6889728	0.3133616	#CalCOFIindex
1993	1	7	0.16246543	0.6001224	#CalCOFIindex
1994	1	7	0.25392993	0.3368373	#CalCOFIindex
1995	1	7	0.10411116	0.7681762	#CalCOFIindex
1996	1	7	1.24272296	0.3324872	#CalCOFIindex
1997	1	7	0.26727579	0.3999509	#CalCOFIindex
1998	1	7	0.09449302	0.5462151	#CalCOFIindex
1999	1	7	0.26913295	0.4710914	#CalCOFIindex
2000	1	7	0.22408121	0.432179	#CalCOFIindex
2001	1	7	0.10643091	0.4536377	#CalCOFIindex

2002	1	7	0.45021134	0.3936044	#CalCOFIindex
2003	1	7	0.48782356	0.305258	#CalCOFIindex
2004	1	7	0.54829334	0.4026705	#CalCOFIindex
2005	1	7	0.59758258	0.3319298	#CalCOFIindex
2006	1	7	0.59843985	0.3359784	#CalCOFIindex
2007	1	7	0.52088189	0.3535419	#CalCOFIindex
2008	1	7	0.99705875	0.3813683	#CalCOFIindex
2009	1	7	0.22259676	0.2882542	#CalCOFIindex
2010	1	7	0.37403333	0.3894335	#CalCOFIindex
2011	1	7	0.93313037	0.3373173	#CalCOFIindex
2012	1	7	0.37480566	0.3573365	#CalCOFIindex
2013	1	7	0.43653592	0.4381894	#CalCOFIindex
2014	1	7	0.44392032	0.5400968	#CalCOFIindex

new data: copied from C:\XiHe1\Boc2015\SurveyData\Triennial\GLMM\GLMM2\TriOnePeriodMod2_300K6CH_FinalDiagnostics\Model=1\ResultsByYear.csv

#Year	Raw	RawCV	IndexMedian	CvMedian
1980	1	8	10517.24299	0.389372561
1983	1	8	9183.383845	0.426019489
1986	1	8	4044.405112	0.501319322
1989	1	8	2747.53676	0.385343522
1992	1	8	1710.307269	0.573981959
1995	1	8	954.4122382	0.453701898
1998	1	8	341.6576879	0.58219922
2001	1	8	574.9072	0.580727618
2004	1	8	2359.410825	0.478472116

New early year CDFW onboard data from Melissa Monk
copied from first table
"C:\XiHe1\Boc2015\SurveyData\RecOnBoardIndex\MelissaMonk_Bocaccio_2015_onboard_indices_5_20_2015\Bocaccio\Onboard Observer Index_bocaccio.docx"

1988	1	9	0.1644	0.1163
1989	1	9	0.1881	0.1077
1990	1	9	0.3601	0.1578
1991	1	9	0.258	0.171
1992	1	9	0.1839	0.1102
1993	1	9	0.0972	0.1119
1994	1	9	0.0698	0.1372
1995	1	9	0.0858	0.124
1996	1	9	0.064	0.1322
1997	1	9	0.0838	0.1048
1998	1	9	0.0775	0.1301

New NWFSC hook survey data: see John Harms email 6/2/2015
copied from: C:\XiHe1\Boc2015\SurveyData\NWFSCHookSurvey\IndexDataNewAndOld.xlsx

2004	1	10	0.1753	0.087
2005	1	10	0.1644	0.0742
2006	1	10	0.1629	0.0764
2007	1	10	0.1361	0.0696

```
2008	1	10	0.1124	0.0733
2009	1	10	0.088	0.0655
2010	1	10	0.0496	0.0861
2011	1	10	0.1615	0.0573
2012	1	10	0.1345	0.0583
2013	1	10	0.1663	0.0586
2014	1	10	0.1398	0.0664

# New NWFSC survey index
# copied from:
"C:\XiHe1\Boc2015\SurveyData\NWFSC\GLMM\GLMM2\CompModelOutputs\CompPlots.xlsx" sheet "Mod1Lognormal_NIter"
2003	1	11	1443.048		0.46845
2004	1	11	8611.627		0.52771
2005	1	11	2431.367		0.45924
2006	1	11	3544.764		0.48938
2007	1	11	2256.840		0.53032
2008	1	11	2486.804		0.59922
2009	1	11	2032.118		0.58309
2010	1	11	1152.483		0.48066
2011	1	11	813.038		0.64335
2012	1	11	4101.673		0.49832
2013	1	11	5190.706		0.44490
2014	1	11	4128.184		0.36434

# pre-Recruit data copied from
"C:\XiHe1\Boc2015\SurveyData\PreRecruit\JohnFieldData3_20_2015.xlsx"
#Year	Sea	Flt	obc		CV
2004	1	12	1.58	0.19
2005	1	12	2.12	0.17
2006	1	12	1.15	0.17
2007	1	12	1.4		0.19
2008	1	12	1.3		0.18
2009	1	12	1.66	0.23
2010	1	12	2.27	0.24
2012	1	12	1.15	0.28
2013	1	12	4.97	0.23
2014	1	12	2.08	0.25

# FORMER Pier Index - NOW SET 2013 RECRUITMENT STRENGTH
# high 2013 recruitment
#2013	1	13	28614	0.001
# low 2013 recruitment
2013	1	13	12352	0.001


# new impingement data: J.Filed email (5/29/2015)
# file:
"C:\XiHe1\Boc2015\SurveyData\PowerPlanImpingementIndex\FromJohnField_5_29_2015\impingement.data.xlsx"
#year	season	index	value	CV
```

1972	1	14	1.088188491	0.5701433
1973	1	14	0.26130561	0.6413674
1974	1	14	0.16246101	0.4752052
1975	1	14	0.314982774	0.4132529
1976	1	14	0.024355966	0.4267465
1977	1	14	0.766112767	0.4701393
1978	1	14	0.131985388	0.5613393
1979	1	14	0.051113495	0.4070668
1980	1	14	0.020416885	0.514682
1981	1	14	0.00991909	0.657004
1982	1	14	0.001530578	0.763082
1984	1	14	0.019396945	0.5223624
1985	1	14	0.026121949	0.3679607
1986	1	14	0.014791018	0.417842
1987	1	14	0.006205231	0.703323
1988	1	14	0.159230988	0.4484642
1989	1	14	0.021885344	0.7265933
1990	1	14	0.007645105	0.585007
1991	1	14	0.041218986	0.3926404
1992	1	14	0.017849571	0.6383911
1995	1	14	0.019826207	0.7112009
1996	1	14	0.006825961	0.7877138
1997	1	14	0.004710183	0.8071707
1999	1	14	0.059146252	0.5886516
2000	1	14	0.012449297	0.592144
2001	1	14	0.001803981	0.8251601
2002	1	14	0.012308619	0.5315938
2003	1	14	0.04929068	0.6922826
2004	1	14	0.002387446	0.7599794
2005	1	14	0.085471954	0.4197021
2007	1	14	0.003944476	0.7976753
2008	1	14	0.004545811	0.6910086
2009	1	14	0.082412216	0.4195808
2010	1	14	0.055573781	0.4503977
2011	1	14	0.006148802	2.8821535
2012	1	14	0.055066728	0.777818
2013	1	14	0.131187936	0.6052936

Revised: New recemt year CDFW onboard data from Melissa Monk
copied from third table
"C:\XiHe1\Boc2015\SurveyData\RecOnBoardIndex\MelissaMonk_Bocaccio_2015_onboard_indices_6_29_2015\Bocaccio_sCA_index.xlsx"

2004	1	17	0.11645598	0.13855585
2005	1	17	0.16932067	0.12297018
2006	1	17	0.11873048	0.10831339
2007	1	17	0.1303311	0.10325648
2008	1	17	0.07433272	0.10857316
2009	1	17	0.07558596	0.10214033
2010	1	17	0.08384153	0.09479367
2011	1	17	0.21167112	0.08381404

2012	1	17	0.2032648	0.07990956
2013	1	17	0.12550161	0.08310415
2014	1	17	0.15434002	0.08894021

Revised: New recemt year CDFW onboard data from Melissa Monk
copied from third table
"C:\XiHe1\Boc2015\SurveyData\RecOnBoardIndex\MelissaMonk_Bocaccio_2015_onboard_indices_6_29_2015\Bocaccio_nCA_index.xlsx"

2004	1	18	0.04470332	0.186673869
2005	1	18	0.05020191	0.149682175
2006	1	18	0.06622036	0.130094604
2007	1	18	0.04766266	0.131626314
2008	1	18	0.01458387	0.273077386
2009	1	18	0.06298665	0.195511589
2010	1	18	0.05182237	0.149894475
2011	1	18	0.0328735	0.191757933
2012	1	18	0.02961301	0.188874458
2013	1	18	0.02415813	0.259758224
2014	1	18	0.02720965	0.235279573

0 #_N_fleets_with_discard
#_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
#_discard_errtype: >0 for DF of T-dist(read CV below); 0 for normal with CV; -1 for normal with se; -2 for lognormal
#_Fleet units errtype
1 2 30 # FISHERY1
0 #_N_discard_obs

0 #_N_meanbodywt_obs
30 #_DF_meanwt

2 # length bin method: 1=use databins; 2=generate from binwidth,min,max below; 3=read vector
2 # binwidth for population size comp
10 # minimum size in the population (lower edge of first bin and size at age 0.00)
76 # maximum size in the population (lower edge of last bin)

-1 #_comp_tail_compression
1e-007 #_add_to_comp
0 #_combine males into females at or below this bin number
34 #_N_LengthBins
10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76

296 #_N_Length_obs

#Yr		Se	Fi	Ge	Pa	NS		F16	F18	F20	F22
	F24	F26	F28	F30	F32	F34	F36	F38	F40	F42	F44
	F46	F48	F50	F52	F54	F56	F58	F60	F62	F64	F66
	F68	F70	F72	F74	F76	M16	M18	M20	M22	M24	M26
	M28	M30	M32	M34	M36	M38	M40	M42	M44	M46	M48

	M50	M52	M54	M56	M58	M60	M62	M64	M66	M68	M70
	M72	M74	M76								
1978	1	1	0	0	44.738	0	0	0	0	0	7
	50	18	5	14	27	13	4	5	5	2	5
	5	11	7	4	7	5	0	0	1	0	2
	3	1	0	0	0	0	0	0	0	0	0
	7	50	18	5	14	27	13	4	5	5	2
	5	5	11	7	4	7	5	0	0	1	0
	2	3	1	0	0	0	0				
1979	1	1	0	0	71.43	0	0	0	0	0	0
	0	0	6	30	41	65	47	28	8	1	2
	1	1	2	0	1	0	0	0	1	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	6	30	41	65	47	28	8	1
	2	1	1	2	0	1	0	0	0	1	0
	0	0	1	0	0	0	0				
1983	1	1	0	0	15.73	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	5	9	12
	20	16	7	10	0	0	2	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	5	9
	12	20	16	7	10	0	0	2	1	0	0
	0	0	1	0	0	0	0				
1984	1	1	0	0	22.318	0	0	0	0	0	0
	0	0	0	2	0	1	2	6	12	19	25
	20	10	4	4	2	2	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	0	1	2	6	12	19
	25	20	10	4	4	2	2	2	0	0	0
	0	0	0	0	0	0	0				
1987	1	1	0	0	18.662	0	0	0	0	0	0
	0	0	0	0	1	0	0	2	18	27	32
	17	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	2	18	27
	32	17	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1990	1	1	0	0	38.8	0	0	0	0	0	0
	0	0	0	1	4	15	32	23	3	7	3
	3	1	0	2	0	2	2	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	4	15	32	23	3	7
	3	3	1	0	2	0	2	2	2	0	0
	0	0	0	0	0	0	0				
1991	1	1	0	0	18.384	0	0	0	0	0	0
	0	0	0	0	2	0	1	2	11	11	8
	6	4	3	1	3	3	6	1	2	1	1
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	1	2	11	11
	8	6	4	3	1	3	3	6	1	2	1
	1	1	0	1	0	0	0				

1992	1	1	0	0	13.936	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	1	4
	15	14	8	10	6	5	3	3	0	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	1
	4	15	14	8	10	6	5	3	3	0	1
	0	0	1	0	0	0	0				
1993	1	1	0	0	73.3	0	0	0	0	0	0
	0	0	0	3	7	27	29	28	21	42	37
	39	34	38	24	11	4	2	2	0	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	3	7	27	29	28	21	42
	37	39	34	38	24	11	4	2	2	0	1
	0	1	0	0	0	0	0				
1994	1	1	0	0	97.584	0	0	0	0	0	0
	0	0	0	3	1	5	6	24	26	34	37
	44	45	55	50	47	26	22	13	9	6	8
	3	1	1	1	0	1	0	0	0	0	0
	0	0	0	0	3	1	5	6	24	26	34
	37	44	45	55	50	47	26	22	13	9	6
	8	3	1	1	1	0	1				
1995	1	1	0	0	76.576	0	0	0	0	0	0
	0	0	0	1	6	9	14	11	6	17	30
	32	39	25	36	28	25	22	24	9	5	8
	1	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	6	9	14	11	6	17
	30	32	39	25	36	28	25	22	24	9	5
	8	1	4	0	0	0	0				
1996	1	1	0	0	42.6	0	0	0	0	0	0
	0	0	0	0	0	2	3	5	5	14	23
	16	9	18	9	17	19	8	16	8	7	6
	6	4	1	1	3	0	0	0	0	0	0
	0	0	0	0	0	0	2	3	5	5	14
	23	16	9	18	9	17	19	8	16	8	7
	6	6	4	1	1	3	0				
1997	1	1	0	0	105.246	0	0	0	0	0	0
	0	0	0	0	2	6	10	19	31	41	35
	40	55	55	64	43	38	35	29	27	12	10
	7	3	3	2	0	0	0	0	0	0	0
	0	0	0	0	0	2	6	10	19	31	41
	35	40	55	55	64	43	38	35	29	27	12
	10	7	3	3	2	0	0				
1998	1	1	0	0	13.452	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	2	4	3
	9	8	1	3	3	1	2	3	4	1	3
	2	2	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	2	4
	3	9	8	1	3	3	1	2	3	4	1
	3	2	2	2	0	0	0				
2000	1	1	0	0	10.106	0	0	0	0	0	0
	0	0	1	0	0	2	8	1	1	0	0

	4	3	0	1	1	2	3	1	0	3	2
	1	2	1	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	2	8	1	1	0
	0	4	3	0	1	1	2	3	1	0	3
	2	1	2	1	0	0	0				
2001	1	1	0	0	31.804	0	0	0	0	0	0
	1	0	0	1	11	33	22	11	6	3	2
	0	6	8	14	4	4	4	6	6	2	6
	4	2	2	0	0	0	0	0	0	0	0
	0	1	0	0	1	11	33	22	11	6	3
	2	0	6	8	14	4	4	4	6	6	2
	6	4	2	2	0	0	0				
2002	1	1	0	0	9.624	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	6	7	6
	3	5	3	2	3	3	0	0	3	1	1
	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	6	7
	6	3	5	3	2	3	3	0	0	3	1
	1	1	0	0	1	0	0				
2004	1	1	0	0	48.672	0	0	0	0	0	12
	4	7	0	2	0	0	0	0	0	2	6
	7	9	24	27	42	36	16	17	16	8	5
	6	1	2	0	0	0	0	0	0	0	0
	12	4	7	0	2	0	0	0	0	0	2
	6	7	9	24	27	42	36	16	17	16	8
	5	6	1	2	0	0	0				
2005	1	1	0	0	118.356	0	0	0	0	0	0
	0	0	2	1	0	0	2	6	8	5	8
	21	34	49	66	85	88	86	55	45	34	27
	15	17	3	4	0	1	0	0	0	0	0
	0	0	0	2	1	0	0	2	6	8	5
	8	21	34	49	66	85	88	86	55	45	34
	27	15	17	3	4	0	1				
2006	1	1	0	0	38.806	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	5	11
	20	19	13	10	14	27	14	11	13	9	7
	4	4	1	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	5
	11	20	19	13	10	14	27	14	11	13	9
	7	4	4	1	0	2	0				
2007	1	1	0	0	30.806	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	2	8	20	11	14	20	13	10	8	5
	8	4	2	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	2	8	20	11	14	20	13	10	8
	5	8	4	2	1	0	1				
2008	1	1	0	0	32.802	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	2	0	4	12	15	17	11	18	17	14	9
	3	4	0	1	1	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	1
	1	2	0	4	12	15	17	11	18	17	14
	9	3	4	0	1	1	0				
2009	1	1	0	0	59.186	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	6	12	18	28	33	20	18	18	19
	10	7	3	4	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	6	12	18	28	33	20	18	18
	19	10	7	3	4	0	1				
2010	1	1	0	0	33.8	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	3	4	5	7	7	19	10	12	10
	9	5	6	1	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	3	4	5	7	7	19	10	12
	10	9	5	6	1	0	2				
2012	1	1	0	0	17.35	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	0	1
	2	0	0	6	10	7	7	5	7	14	8
	2	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	0
	1	2	0	0	6	10	7	7	5	7	14
	8	2	0	2	1	0	0				
2013	1	1	0	0	26.25	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	12	18	7
	3	2	8	2	16	20	16	9	5	2	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	12	18
	7	3	2	8	2	16	20	16	9	5	2
	1	0	1	0	0	0	0				
2014	1	1	0	0	20.73	0	0	0	0	0	0
	0	0	1	1	2	0	0	1	0	0	1
	4	21	10	7	3	4	7	6	5	3	4
	1	4	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	2	0	0	1	0	0
	1	4	21	10	7	3	4	7	6	5	3
	4	1	4	0	0	0	0				
1978	1	1	3	0	395.36	0	0	0	0	0	0
	0	0	4	20	40	26	15	8	13	19	20
	47	67	54	32	30	19	26	17	15	12	8
	10	6	3	1	0	0	0	0	0	0	0
	0	0	0	2	14	13	10	4	10	19	27
	48	80	60	60	23	22	23	17	10	3	4
	0	0	1	0	0	0	1				
1979	1	1	3	0	400	0	0	0	0	1	0
	0	0	3	31	55	64	75	66	42	27	20
	17	29	41	48	52	36	15	18	15	11	7
	3	7	4	2	0	0	0	0	0	0	0
	1	0	0	1	4	3	16	26	19	18	12

	17	39	55	70	33	21	24	16	13	5	2
	0	0	1	0	0	0	0				
1980	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	0	3	2	5	10	33	115	111
	65	14	6	16	24	30	20	17	13	10	11
	9	15	6	5	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	7	20	63	101
	68	23	23	33	24	27	20	16	7	9	7
	1	0	1	0	0	0	0				
1981	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	1	6	7	2	2	4	9	35
	87	80	32	8	4	8	9	12	5	7	4
	2	1	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	3	3	4	8	6	26
	79	73	27	11	20	14	11	10	5	2	1
	1	0	0	0	0	0	0				
1982	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	1	2	6	2	11	37	61	55
	52	55	74	87	79	46	19	18	27	25	20
	18	7	5	6	3	0	0	0	0	0	0
	0	0	0	0	1	1	8	10	20	49	59
	62	91	160	114	56	39	42	25	20	11	4
	4	0	0	0	0	0	0				
1983	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	1	1	5	11	16	31
	68	74	69	73	141	98	39	24	29	14	22
	15	10	6	9	0	2	0	0	0	0	0
	0	0	0	0	1	2	1	3	9	11	25
	65	108	127	147	93	64	58	24	15	9	2
	2	0	0	0	0	0	0				
1984	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	8	11	26
	45	48	60	78	93	97	110	71	47	26	27
	20	16	12	7	5	1	0	0	0	0	0
	0	0	0	0	0	0	1	1	5	10	31
	56	94	134	155	165	133	99	53	23	16	9
	3	2	0	0	0	0	0				
1985	1	1	3	0	400	0	0	0	0	0	0
	0	1	3	18	22	35	15	1	5	8	8
	15	31	43	40	58	31	43	49	37	22	9
	11	15	10	3	1	3	0	0	0	0	0
	0	0	0	6	9	12	21	7	3	3	11
	33	43	63	77	96	94	62	35	24	7	2
	3	3	0	0	0	0	0				
1986	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	1	36	88	157	231	190	120	37
	13	7	9	18	26	28	16	24	24	15	8
	4	2	3	0	0	0	0	0	0	0	0
	0	0	0	3	2	19	82	155	184	150	69
	16	11	13	20	35	23	22	18	6	3	1
	1	0	0	1	0	0	0				

1987	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	5	29	53	82	172	227
	173	64	5	10	6	9	15	10	7	6	2
	2	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	5	17	42	59	123	215
	203	101	15	9	20	20	26	10	2	2	0
	0	0	0	0	0	0	0				
1988	1	1	3	0	400	0	0	0	0	0	0
	0	0	1	1	7	13	15	19	24	46	82
	97	117	82	41	18	10	8	7	9	5	7
	3	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	3	8	8	24	39	68
	99	149	81	33	9	15	18	5	2	1	0
	0	1	1	0	0	0	0				
1989	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	4	13	15	27	43	27	16	15
	22	28	25	42	28	15	4	6	2	2	2
	4	3	0	0	1	0	0	0	0	0	0
	0	0	0	2	4	11	22	27	29	28	29
	28	45	64	47	17	9	4	6	3	1	0
	1	0	0	0	0	0	0				
1990	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	2	18	65	141	121	124	90	22
	32	10	17	11	11	24	13	8	7	2	0
	4	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	4	38	87	138	147	131	65
	29	23	22	31	19	15	10	6	5	1	0
	0	0	0	0	0	0	0				
1991	1	1	3	0	400	0	0	0	0	0	0
	0	0	0	4	8	5	7	24	95	194	211
	133	71	40	20	16	23	21	25	15	3	7
	2	4	3	2	0	1	0	0	0	0	0
	0	0	0	2	6	10	5	10	49	156	259
	181	106	51	35	33	24	24	10	8	0	6
	1	0	1	0	0	0	0				
1992	1	1	3	0	400	0	0	0	0	0	0
	0	0	1	2	8	32	28	33	18	15	39
	107	150	85	39	24	14	22	20	22	15	10
	6	2	3	0	1	1	0	0	0	0	0
	0	0	0	0	1	7	17	25	29	21	54
	113	149	89	49	46	19	20	10	13	4	5
	2	0	0	0	0	0	0				
1993	1	1	3	0	324.76	0	0	0	0	0	0
	0	0	0	2	15	30	19	17	53	57	43
	51	55	56	48	28	20	20	12	7	4	3
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	8	22	19	31	46	60
	71	93	63	36	21	22	14	7	5	1	0
	0	0	0	0	0	0	0				
1994	1	1	3	0	59.194	0	0	0	0	0	0
	0	0	0	0	0	0	1	6	13	9	12

	11	15	12	16	15	8	4	0	4	1	2
	1	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	4	5	9	11
	26	29	43	22	9	9	8	0	2	1	1
	1	0	0	0	0	0	0				
1995	1	1	3	0	44.12	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	4
	5	13	13	8	27	8	6	4	3	4	3
	3	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	1	4
	9	21	42	23	19	9	3	0	1	0	1
	0	0	0	0	0	0	0				
1996	1	1	3	0	71.162	0	0	0	0	0	0
	0	0	0	0	0	1	0	2	1	2	16
	8	2	16	22	29	18	17	14	10	5	1
	0	1	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	1	0	0	3	1	10
	12	19	30	59	21	9	11	4	2	1	0
	0	0	0	0	0	0	0				
1997	1	1	3	0	69.576	0	0	0	0	0	0
	0	0	1	0	0	0	0	2	2	3	3
	8	11	13	20	31	16	14	13	13	5	4
	6	1	3	3	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	7	8
	14	12	31	23	29	15	14	6	10	4	1
	1	2	0	0	0	0	0				
1998	1	1	3	0	57.778	0	0	0	0	0	0
	0	0	0	0	0	2	6	6	6	2	6
	8	7	10	16	9	10	13	9	8	3	2
	8	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	3	9	5	5	6
	8	9	19	23	27	10	13	8	0	2	0
	0	1	0	0	0	0	0				
1999	1	1	3	0	75.546	0	0	0	0	0	0
	0	0	0	0	0	0	0	4	17	27	16
	10	8	13	15	15	11	14	8	7	5	7
	2	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	5	4	22	17
	16	16	21	27	44	38	16	5	3	1	0
	0	0	0	0	0	0	0				
2000	1	1	3	0	11.314	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	1	1	6
	2	6	3	6	2	1	0	2	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	1	1	3
	0	6	3	2	0	1	0	0	0	0	0
	0	0	0	0	0	0	0				
2001	1	1	3	0	62.336	0	0	0	0	0	0
	0	0	0	3	10	37	27	10	18	3	4
	1	6	15	12	17	7	5	2	5	1	5
	1	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	2	15	41	22	11	13	6
	7	7	15	19	14	7	2	1	0	1	0
	0	0	0	0	0	0	0				
2002	1	1	3	0	36.08	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	6	9	13
	10	5	1	1	7	7	6	3	3	6	6
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	1	2	2	10	14
	15	5	6	4	8	5	2	1	0	0	0
	0	0	0	0	0	0	0				
2004	1	1	3	0	29.284	0	0	0	0	0	0
	0	0	0	1	0	0	1	1	0	0	1
	3	2	5	8	17	18	13	1	6	2	4
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	1	2
	1	3	3	9	8	5	1	0	0	0	0
	0	0	0	0	0	0	0				
2012	1	1	3	0	28.836	0	0	0	0	0	0
	0	0	0	0	1	0	6	11	3	2	1
	1	2	2	1	0	1	3	0	5	5	3
	3	2	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	0	1	7	7	2	5
	4	2	0	1	6	5	11	11	4	1	1
	0	0	0	0	0	0	0				
2013	1	1	3	0	10.934	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	2
	2	0	0	0	0	0	3	0	3	0	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	5	1
	1	1	2	4	1	2	4	4	0	1	0
	0	0	0	0	0	0	0				
1979	1	2	0	0	94.658	0	0	0	0	0	0
	0	0	0	0	2	4	4	7	15	5	6
	8	13	29	51	87	88	71	61	29	24	17
	7	4	4	1	3	1	0	0	0	0	0
	0	0	0	0	0	2	4	4	7	15	5
	6	8	13	29	51	87	88	71	61	29	24
	17	7	4	4	1	3	1				
1980	1	2	0	0	30.254	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	4
	1	2	14	30	23	30	33	14	16	9	1
	0	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	4	1	2	14	30	23	30	33	14	16	9
	1	0	4	0	0	0	0				
1981	1	2	0	0	47.88	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	3
	16	21	16	30	39	44	32	12	19	10	7
	7	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0

	3	16	21	16	30	39	44	32	12	19	10
	7	7	2	1	0	0	0				
1982	1	2	0	0	45.672	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	1	6
	24	21	16	22	33	29	22	17	17	14	7
	4	2	5	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	1
	6	24	21	16	22	33	29	22	17	17	14
	7	4	2	5	1	0	0				
1983	1	2	0	0	20.594	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	1	6	9
	9	7	15	17	23	9	6	4	0	1	1
	2	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	2	0	1	6
	9	9	7	15	17	23	9	6	4	0	1
	1	2	0	0	0	0	1				
1984	1	2	0	0	32.838	0	0	0	0	0	0
	0	0	0	0	1	0	3	8	13	17	17
	14	17	15	13	8	10	7	3	4	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	3	8	13	17
	17	14	17	15	13	8	10	7	3	4	1
	0	0	0	0	0	0	0				
1985	1	2	0	0	29.078	0	0	0	0	0	0
	2	1	2	2	1	0	4	3	8	11	20
	21	17	18	10	5	4	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	2	2	1	0	4	3	8	11
	20	21	17	18	10	5	4	2	0	0	0
	0	0	0	0	0	0	0				
1986	1	2	0	0	49.81	0	0	0	0	0	0
	0	0	0	2	6	12	9	10	3	4	6
	9	23	24	32	38	17	24	11	7	4	1
	1	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	6	12	9	10	3	4
	6	9	23	24	32	38	17	24	11	7	4
	1	1	2	0	0	0	0				
1987	1	2	0	0	14.832	0	0	0	0	0	0
	0	0	0	0	1	0	5	4	6	11	7
	5	6	5	1	3	4	3	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	5	4	6	11
	7	5	6	5	1	3	4	3	1	2	0
	0	0	0	0	0	0	0				
1988	1	2	0	0	17.04	0	0	0	0	0	0
	0	0	0	0	0	1	0	2	0	5	5
	6	8	5	3	8	7	12	15	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	2	0	5
	5	6	8	5	3	8	7	12	15	2	1
	0	0	0	0	0	0	0				

1989	1	2	0	0	62.712	0	0	0	0	0	0
	0	0	0	1	4	10	10	13	9	13	41
	26	44	47	30	25	10	10	6	9	10	3
	2	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	1	4	10	10	13	9	13
	41	26	44	47	30	25	10	10	6	9	10
	3	2	0	0	1	0	0				
1990	1	2	0	0	20.282	0	0	0	0	0	0
	0	0	0	0	3	26	22	4	1	2	4
	2	1	2	3	4	6	1	3	2	2	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	3	26	22	4	1	2
	4	2	1	2	3	4	6	1	3	2	2
	0	0	0	0	1	0	0				
1991	1	2	0	0	28.734	0	0	0	0	0	0
	0	0	0	1	4	0	6	0	3	4	13
	15	8	13	7	11	12	10	16	6	8	1
	3	0	1	0	0	1	0	0	0	0	0
	0	0	0	0	1	4	0	6	0	3	4
	13	15	8	13	7	11	12	10	16	6	8
	1	3	0	1	0	0	1				
1992	1	2	0	0	89.75	0	0	0	0	0	0
	0	0	1	3	1	1	3	4	5	3	18
	25	39	50	36	46	32	25	25	19	14	12
	0	4	5	0	2	2	0	0	0	0	0
	0	0	0	1	3	1	1	3	4	5	3
	18	25	39	50	36	46	32	25	25	19	14
	12	0	4	5	0	2	2				
1993	1	2	0	0	338.88	0	0	0	0	0	0
	0	0	0	2	2	18	20	28	26	39	40
	53	59	64	51	25	18	14	26	26	7	6
	9	2	6	5	1	0	0	0	0	0	0
	0	0	0	0	2	2	18	20	28	26	39
	40	53	59	64	51	25	18	14	26	26	7
	6	9	2	6	5	1	0				
1994	1	2	0	0	88.886	0	0	0	0	0	0
	0	0	0	1	0	1	0	5	7	13	34
	25	30	37	38	29	27	17	26	15	12	7
	3	5	3	5	2	5	0	0	0	0	0
	0	0	0	0	1	0	1	0	5	7	13
	34	25	30	37	38	29	27	17	26	15	12
	7	3	5	3	5	2	5				
1995	1	2	0	0	46.702	0	0	0	0	0	0
	0	0	1	0	1	2	3	3	5	7	18
	22	24	14	19	13	10	8	8	5	2	4
	3	1	1	4	1	0	0	0	0	0	0
	0	0	0	1	0	1	2	3	3	5	7
	18	22	24	14	19	13	10	8	8	5	2
	4	3	1	1	4	1	0				
1996	1	2	0	0	105.2740		0	0	0	0	4
	2	1	1	0	0	1	3	4	10	30	42

	45	52	60	63	52	31	23	21	13	7	3
	1	1	1	0	1	1	0	0	0	0	0
	4	2	1	1	0	0	1	3	4	10	30
	42	45	52	60	63	52	31	23	21	13	7
	3	1	1	1	0	1	1				
1997	1	2	0	0	59.742	0	0	0	0	0	0
	2	6	1	4	4	5	4	4	6	7	17
	16	24	29	33	29	29	11	10	7	5	2
	1	1	1	0	1	0	0	0	0	0	0
	0	2	6	1	4	4	5	4	4	6	7
	17	16	24	29	33	29	29	11	10	7	5
	2	1	1	1	0	1	0				
1998	1	2	0	0	63.228	0	0	0	0	0	0
	0	0	0	0	0	3	11	16	14	9	19
	28	30	33	30	38	23	16	9	15	3	7
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	11	16	14	9
	19	28	30	33	30	38	23	16	9	15	3
	7	2	0	0	0	0	0				
2001	1	2	0	0	22.904	0	0	0	0	0	0
	0	0	0	0	0	1	0	8	9	6	1
	2	1	5	7	10	12	6	11	6	5	10
	3	2	0	1	0	2	0	0	0	0	0
	0	0	0	0	0	0	1	0	8	9	6
	1	2	1	5	7	10	12	6	11	6	5
	10	3	2	0	1	0	2				
2002	1	2	0	0	12.418	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	6	6	21
	11	8	2	0	0	1	2	2	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	6	6
	21	11	8	2	0	0	1	2	2	2	0
	0	0	0	0	0	0	0				
2006	1	2	0	0	12.21	0	0	0	0	0	0
	0	0	0	0	0	0	2	1	5	6	4
	4	1	3	3	4	2	4	3	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	1	5	6
	4	4	1	3	3	4	2	4	3	3	0
	0	0	0	0	0	0	0				
2007	1	2	0	0	10.796	0	0	0	0	0	0
	0	0	1	2	1	0	3	2	2	3	5
	4	2	1	1	2	2	6	3	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	2	1	0	3	2	2	3
	5	4	2	1	1	2	2	6	3	0	0
	2	0	0	0	0	0	0				
2009	1	2	0	0	16.658	0	0	0	0	0	0
	0	0	0	1	0	2	1	0	1	4	6
	7	7	0	7	3	0	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	1	0	2	1	0	1	4
	6	7	7	0	7	3	0	2	0	0	0
	0	0	0	0	0	0	0				
2010	1	2	0	0	13.83	0	0	0	0	0	0
	0	0	0	0	1	1	0	2	4	4	2
	5	3	3	2	0	3	2	1	1	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	0	2	4	4
	2	5	3	3	2	0	3	2	1	1	0
	1	0	0	0	0	0	0				
2012	1	2	0	0	12.624	0	0	0	0	0	0
	0	0	0	0	6	13	7	9	0	2	3
	1	2	3	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	6	13	7	9	0	2
	3	1	2	3	2	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2013	1	2	0	0	23.18	0	0	0	0	0	0
	0	0	0	0	0	1	1	13	17	11	7
	6	11	19	6	7	5	2	0	1	1	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	13	17	11
	7	6	11	19	6	7	5	2	0	1	1
	1	1	0	0	0	0	0				
2014	1	2	0	0	62.672	0	0	0	0	0	0
	0	3	3	8	6	6	10	13	17	23	26
	26	17	6	4	11	8	12	11	7	3	8
	8	1	2	3	1	1	0	0	0	0	0
	0	0	3	3	8	6	6	10	13	17	23
	26	26	17	6	4	11	8	12	11	7	3
	8	8	1	2	3	1	1				
1980	1	2	3	0	13.9	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	0	0	1	3	1	1	4	4
	3	2	1	5	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	1	1	1	4	6	4	3
	1	0	0	0	0	0	0				
1983	1	2	3	0	12.59	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	1	3	1	2	5	2	3	5	0	1	1
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	3	1	2	1	3	5	4	3	3	0	1
	0	0	0	0	0	0	0				
1984	1	2	3	0	10.486	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	1	2	3	3	0	3	2
	2	1	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	1	2	5	7	5	4	0	2	0
	0	0	0	0	0	0	0				
1985	1	2	3	0	22.972	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	3	2	2
	6	9	4	5	9	4	3	2	1	0	0
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	11	2	5	3	5	7	3	2	0	0	0
	0	0	0	0	0	0	0				
1986	1	2	3	0	56.742	0	0	0	0	0	0
	0	0	0	1	0	0	2	1	4	6	4
	2	3	17	9	14	17	14	13	16	5	5
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	3	4	3	2	3
	3	2	4	17	23	25	20	11	2	3	0
	0	0	0	0	0	0	0				
1987	1	2	3	0	51.326	0	0	0	0	0	0
	0	0	0	0	1	0	1	6	7	11	8
	15	9	6	6	5	11	5	6	3	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	4	12	13	10
	10	13	6	16	12	6	6	3	4	3	0
	1	1	1	0	0	0	0				
1988	1	2	3	0	18.316	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	1	1
	8	5	9	9	4	1	4	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	10	7	5	3	5	2	1	0	1	0	0
	0	0	0	0	0	0	0				
1989	1	2	3	0	27.456	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	5	5	9	7	7	10	4	7	1	3	0
	1	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	7	7	6	12	7	1	5	2	2	0
	0	1	0	0	0	0	0				
1990	1	2	3	0	14.384	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	2	0
	3	2	6	1	2	7	0	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	4	4
	3	5	2	7	5	3	2	0	0	0	0
	0	0	0	0	0	0	0				
1991	1	2	3	0	34.836	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	4	6
	6	3	4	3	4	3	6	7	4	5	1
	0	2	0	1	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	1	2	10
	10	4	8	1	3	8	6	3	1	1	0
	2	1	0	0	0	0	0				

1992	1	2	3	0	76.196	0	0	0	0	0	0
	0	0	0	0	0	0	5	8	8	2	10
	25	46	37	15	5	9	2	4	6	4	3
	1	2	2	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	1	9	2	4
	16	37	25	10	13	5	8	5	2	5	2
	2	1	0	0	0	0	0				
1993	1	2	3	0	66.71	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	2	4	14
	16	48	25	15	12	6	3	4	2	4	2
	2	2	4	1	0	1	0	0	0	0	0
	0	0	0	0	0	1	1	2	2	2	7
	17	19	11	10	8	8	4	14	12	6	2
	0	0	0	0	0	0	0				
1994	1	2	3	0	43.188	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	4	2
	10	13	8	21	28	22	12	6	5	6	1
	0	0	4	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	3
	3	9	14	19	8	10	5	2	5	1	1
	2	0	0	0	0	0	0				
1995	1	2	3	0	18.42	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	5	1	3	11	10	10	9	5	2	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	1
	5	2	10	5	2	1	0	0	2	1	0
	0	0	0	0	0	0	0				
1996	1	2	3	0	62.884	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	0	7	10
	10	15	24	33	26	21	23	12	4	1	3
	0	1	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	4	2	9
	12	21	20	28	12	7	3	3	1	0	0
	0	0	0	0	0	0	0				
1997	1	2	3	0	49.57	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	5	10	17	21	38	44	25	17	10	5	2
	2	3	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	1
	5	4	12	12	14	5	5	2	1	0	0
	0	0	0	0	0	0	0				
1998	1	2	3	0	33.358	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	1	5
	8	13	16	14	17	17	10	11	3	1	0
	2	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	3
	5	11	10	12	8	8	5	3	0	1	0
	3	0	0	0	0	0	0				
1999	1	2	3	0	19.524	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	2	2	6	8	6	9	11	4	2	2	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	1	2	4	10	3	7	4	3	5	1
	1	1	0	0	0	0	0				
2000	1	2	3	0	12.072	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	1	1	1	2	2	3	2	2	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	6	1	3	2	3	1	1	3	2	3
	1	1	0	0	0	0	0				
2001	1	2	3	0	28.976	0	0	0	0	0	0
	0	0	0	0	0	1	3	10	5	0	3
	1	4	3	5	6	11	5	8	4	5	3
	2	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	2	2	8	3	2
	1	3	7	3	6	6	7	5	5	7	3
	0	0	0	0	0	0	0				
2006	1	2	3	0	10.83	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	2	3	4	2	5
	3	3	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	1	0	0	0	0	1	4	1
	0	0	0	0	0	0	0				
1983	1	3	0	0	61.644	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	7
	17	11	14	12	11	11	19	21	28	46	30
	33	30	26	5	8	7	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	7	17	11	14	12	11	11	19	21	28	46
	30	33	30	26	5	8	7				
1984	1	3	0	0	400	0	0	0	0	0	0
	0	0	0	0	4	10	28	40	83	49	57
	76	71	54	45	75	96	84	69	56	28	6
	5	2	4	4	1	0	0	0	0	0	0
	0	0	0	0	0	4	10	28	40	83	49
	57	76	71	54	45	75	96	84	69	56	28
	6	5	2	4	4	1	0				
1985	1	3	0	0	400	0	1	0	0	0	0
	0	0	1	0	2	1	5	4	11	41	97
	180	244	234	150	95	43	16	13	4	6	0
	4	1	2	1	0	0	0	1	0	0	0
	0	0	0	1	0	2	1	5	4	11	41
	97	180	244	234	150	95	43	16	13	4	6
	0	4	1	2	1	0	0				
1986	1	3	0	0	76.336	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	4	9	46	49	78	55	46	42	24	6	7
	2	0	0	2	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	1
	1	4	9	46	49	78	55	46	42	24	6
	7	2	0	0	2	0	0				
1987	1	3	0	0	46.566	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	5	12	11
	14	7	17	27	29	34	25	16	6	1	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	5	12
	11	14	7	17	27	29	34	25	16	6	1
	1	1	0	0	0	0	0				
1988	1	3	0	0	53.776	0	0	0	0	0	0
	0	0	0	2	0	0	1	0	5	8	17
	28	25	25	13	24	27	23	17	18	8	6
	2	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	2	0	0	1	0	5	8
	17	28	25	25	13	24	27	23	17	18	8
	6	2	2	1	0	0	0				
1989	1	3	0	0	30.662	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	1	5
	10	16	16	13	12	5	4	6	4	3	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	1
	5	10	16	16	13	12	5	4	6	4	3
	0	2	0	0	0	0	0				
1990	1	3	0	0	22.52	0	0	0	0	0	0
	0	0	0	0	0	0	1	6	3	3	4
	4	2	6	4	3	0	0	1	1	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	6	3	3
	4	4	2	6	4	3	0	0	1	1	0
	2	0	0	0	0	0	0				
1991	1	3	0	0	26.906	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	10	15
	16	16	10	13	18	5	10	11	6	2	1
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	10
	15	16	16	10	13	18	5	10	11	6	2
	1	0	1	0	0	1	0				
1992	1	3	0	0	35.494	0	0	0	0	0	0
	0	0	1	0	0	0	1	1	3	2	13
	22	24	19	11	22	25	6	2	5	1	1
	2	1	1	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1	1	3	2
	13	22	24	19	11	22	25	6	2	5	1
	1	2	1	1	0	0	0				
1993	1	3	0	0	86.068	0	0	0	0	0	0
	0	0	0	0	0	1	2	19	17	45	100
	91	56	62	37	17	10	11	4	6	6	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	19	17	45

	100	91	56	62	37	17	10	11	4	6	6
	0	1	1	0	0	0	0				
1994	1	3	0	0	125.15	0	0	0	0	0	0
	0	0	0	0	4	0	0	1	2	16	66
	102	114	115	74	66	43	23	16	10	8	7
	2	1	1	1	3	0	0	0	0	0	0
	0	0	0	0	0	4	0	0	1	2	16
	66	102	114	115	74	66	43	23	16	10	8
	7	2	1	1	1	3	0				
1995	1	3	0	0	98.724	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	0	4	12
	34	68	68	81	74	48	44	25	13	10	8
	2	1	3	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	0	4
	12	34	68	68	81	74	48	44	25	13	10
	8	2	1	3	0	0	1				
1996	1	3	0	0	54.154	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	5
	17	26	40	32	29	26	20	17	8	3	1
	2	3	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	5	17	26	40	32	29	26	20	17	8	3
	1	2	3	1	1	0	0				
1997	1	3	0	0	23.49	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	7	16	28	10	9	12	4	6	3	2
	5	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	7	16	28	10	9	12	4	6	3
	2	5	0	0	1	0	0				
1998	1	3	0	0	22.456	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	6	6	9	9	16	15	10	9	6	8	5
	4	3	4	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	6	6	9	9	16	15	10	9	6	8
	5	4	3	4	0	0	0				
1978	1	3	3	0	19.074	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	3	3
	3	2	7	4	2	2	2	1	1	1	1
	1	1	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	1	4	9	5	4	1	2	1	1	0	0
	1	0	0	0	1	0	0				
1983	1	3	3	0	17.28	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	2
	3	2	5	3	3	5	3	1	0	0	3
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	4	5	1	4	2	5	1	2	0	0
	0	0	0	0	0	0	0				

1984	1	3	3	0	14.348	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2	4	2	2	1	1	3	1
	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	2	4	7	2	5	5	0	1	0
	0	0	0	0	0	0	0				
1985	1	3	3	0	400	0	0	0	1	1	2
	2	1	0	0	1	0	0	1	4	8	14
	38	35	47	38	32	22	28	25	17	12	14
	7	3	3	5	0	0	0	0	0	0	2
	0	3	0	0	0	1	0	0	1	3	4
	23	63	88	103	60	42	32	24	15	11	3
	7	1	0	0	0	0	0				
1986	1	3	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	2	1	0	2	7	7
	4	8	28	56	67	80	99	67	37	21	14
	7	8	2	4	1	4	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	9	3
	8	10	24	91	133	158	159	84	30	12	7
	4	0	0	1	0	0	0				
1987	1	3	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	16	42
	65	45	20	20	28	57	44	48	35	17	11
	5	4	2	1	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	5	7	35
	63	42	36	45	67	107	93	43	26	7	3
	3	1	0	0	0	0	0				
1988	1	3	3	0	400	1	0	0	0	0	0
	0	0	0	0	0	1	1	0	2	5	24
	61	105	111	62	38	20	16	10	14	8	7
	4	4	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	2	2	13
	34	104	113	72	34	31	19	10	12	8	5
	2	0	2	0	0	0	0				
1989	1	3	3	0	400	0	0	0	0	0	0
	0	0	0	0	2	0	4	3	4	4	12
	43	89	130	120	117	84	45	30	6	8	9
	5	4	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	0	0	1	13
	28	90	165	155	100	50	26	21	12	8	5
	0	1	0	1	0	0	0				
1990	1	3	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	1	2	7	33	49	24
	45	60	41	58	53	60	35	25	11	11	4
	4	3	1	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1	12	16	28
	23	46	61	76	60	39	15	5	5	1	0
	0	0	0	0	0	0	0				
1991	1	3	3	0	76.992	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	5	21	51

	51	34	21	10	8	6	5	4	4	2	0
	1	2	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	4	1	8	26
	28	24	16	14	15	11	4	3	0	1	0
	0	0	0	0	0	0	0				
1992	1	3	3	0	353	0	0	0	0	0	0
	0	0	0	0	0	0	3	6	8	7	20
	83	151	164	106	50	20	12	16	6	11	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	3	3	8	15
	64	147	145	66	29	22	13	4	2	1	0
	0	0	0	0	0	0	0				
1993	1	3	3	0	84.686	0	0	0	0	0	0
	0	0	0	0	3	5	0	7	3	8	9
	41	69	51	29	12	19	11	15	3	5	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	1	1	3	6
	33	37	31	13	10	11	6	1	0	0	0
	0	0	0	0	0	0	0				
1994	1	3	3	0	36.048	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	7	14	29	24	20	10	0	1	2	2	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	2
	5	19	21	15	11	4	3	1	0	0	0
	0	0	0	0	0	0	0				
1995	1	3	3	0	35.152	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	6	3	12	16	31	17	8	2	9	1	4
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	6	16	27	24	8	6	2	2	0	0	0
	0	0	0	0	0	0	0				
1996	1	3	3	0	20.698	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	3	10	12	19	10	4	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	17	21	10	5	2	0	1	0	0
	0	0	0	0	0	0	0				
1997	1	3	3	0	14.592	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	2	0	7	6	8	8	6	1	4	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	3	10	12	7	3	2	2	0	0	0
	0	0	0	0	0	0	0				
1998	1	3	3	0	22.526	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	6	4	16	16	10	9	3	5	1	0
	1	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	2
	1	5	6	13	16	6	4	0	0	0	1
	0	0	0	0	0	0	0				
1980	1	6	0	0	28.074	0	0	0	0	0	0
	0	0	0	0	0	0	2	5	19	15	9
	1	1	4	3	2	3	4	3	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	5	19	15
	9	1	1	4	3	2	3	4	3	2	0
	0	0	0	0	0	0	0				
1994	1	6	0	0	13.074	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	6	5	10
	5	14	2	7	3	3	2	5	3	5	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	6	5
	10	5	14	2	7	3	3	2	5	3	5
	2	1	0	0	0	0	0				
1996	1	6	0	0	12.556	0	0	0	0	0	0
	0	0	0	1	1	6	7	0	3	2	1
	1	2	4	5	2	3	6	3	3	4	6
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	1	6	7	0	3	2
	1	1	2	4	5	2	3	6	3	3	4
	6	1	1	0	0	0	0				
2002	1	6	0	0	11.28	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	5	11
	5	0	1	2	1	6	4	7	7	1	1
	2	3	2	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5
	11	5	0	1	2	1	6	4	7	7	1
	1	2	3	2	0	1	1				
2004	1	6	0	0	7.244	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	5	6	7	7
	4	2	3	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	5	6	7
	7	4	2	3	1	0	1				
2005	1	6	0	0	11.554	0	0	0	0	0	0
	0	0	0	0	0	1	4	1	1	1	2
	1	0	0	0	0	0	2	1	6	1	5
	1	1	1	1	3	0	0	0	0	0	0
	0	0	0	0	0	0	1	4	1	1	1
	2	1	0	0	0	0	0	2	1	6	1
	5	1	1	1	1	3	0				
2007	1	6	0	0	17.348	0	0	0	0	0	1
	0	1	1	0	1	0	1	2	2	3	2
	0	0	0	3	2	3	1	2	4	4	8
	2	0	2	0	0	1	0	0	0	0	0
	1	0	1	1	0	1	0	1	2	2	3

	2	0	0	0	3	2	3	1	2	4	4
	8	2	0	2	0	0	1				
2008	1	6	0	0	20.004	0	0	0	0	0	0
	0	1	2	0	0	0	0	0	0	0	1
	0	1	0	1	3	7	9	5	4	11	4
	1	3	2	1	1	1	0	0	0	0	0
	0	0	1	2	0	0	0	0	0	0	0
	1	0	1	0	1	3	7	9	5	4	11
	4	1	3	2	1	1	1				
2009	1	6	0	0	14.244	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	2	5	7	5	9	13	18	8	3
	7	5	5	2	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2	5	7	5	9	13	18	8
	3	7	5	5	2	2	1				
2010	1	6	0	0	8.59	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	1	2
	1	2	0	0	3	2	5	8	10	7	5
	4	0	1	1	1	1	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	1
	2	1	2	0	0	3	2	5	8	10	7
	5	4	0	1	1	1	1				
2012	1	6	0	0	20.18	0	0	0	0	0	0
	0	0	0	0	6	18	9	0	2	2	3
	5	3	1	2	6	8	4	8	4	8	11
	4	4	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	6	18	9	0	2	2
	3	5	3	1	2	6	8	4	8	4	8
	11	4	4	2	0	0	0				
2013	1	6	0	0	24.286	0	0	0	0	0	0
	0	0	0	0	0	1	2	11	27	45	25
	6	1	1	0	0	1	7	6	1	3	5
	0	0	2	3	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	11	27	45
	25	6	1	1	0	0	1	7	6	1	3
	5	0	0	2	3	0	0				
2014	1	6	0	0	16.592	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	8
	27	11	9	1	0	2	3	3	0	5	3
	3	3	2	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	8	27	11	9	1	0	2	3	3	0	5
	3	3	3	2	0	1	0				
1977	1	6	3	0	317.7	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	5	14	12
	14	1	5	4	5	10	6	11	3	5	9
	10	3	9	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	13	14
	16	10	7	7	18	18	11	23	15	9	2
	3	3	1	1	0	0	0				

1978	1	6	3	0	400	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	3	5
	27	52	42	16	8	4	15	15	16	9	17
	18	19	12	2	1	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	7
	18	51	53	19	12	24	23	37	27	14	9
	3	1	0	0	0	0	0				
1979	1	6	3	0	63.46	0	0	0	0	0	0
	0	0	0	0	1	2	5	1	0	1	0
	1	1	7	8	11	4	3	2	6	3	5
	4	5	2	2	0	1	0	0	0	0	0
	0	0	0	0	0	1	2	4	2	0	1
	0	2	7	13	6	5	8	14	9	11	4
	1	1	0	2	0	1	1				
1980	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	8	17	61	98	62
	46	13	3	8	8	11	10	6	2	2	7
	5	1	4	2	1	2	0	0	0	0	0
	0	0	0	0	0	0	0	7	29	78	86
	51	22	5	9	10	14	12	4	5	13	0
	3	0	0	0	0	0	0				
1981	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	4	14	36
	92	112	74	24	2	0	4	2	3	2	4
	2	4	5	2	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	7	12	25
	81	132	70	16	2	7	7	12	8	11	6
	3	2	1	0	0	0	0				
1982	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	1	3	20	22	38
	13	35	75	116	124	67	18	4	5	9	5
	3	4	8	8	5	5	0	0	0	0	0
	0	0	0	0	0	0	0	2	9	20	24
	25	38	109	121	64	24	10	14	26	28	8
	5	3	0	0	0	0	0				
1983	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	9	16	39
	33	44	40	44	53	104	77	30	11	7	11
	10	11	11	15	4	9	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	4	16
	36	48	49	102	123	64	25	19	17	28	20
	10	2	1	0	0	0	0				
1984	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	2
	9	14	21	28	37	34	78	68	32	13	9
	12	10	6	17	13	5	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	4
	9	15	28	64	103	108	54	23	16	26	21
	6	3	0	0	0	0	0				
1985	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	3	0

	1	6	2	18	23	23	28	43	55	20	9
	3	3	3	5	1	3	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	3	9	11	22	55	85	78	30	17	17	8
	6	0	0	0	0	0	0				
1986	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	4	14	13	9	5
	0	1	0	4	7	11	20	20	38	29	26
	9	4	4	2	1	0	0	0	0	0	0
	0	0	0	0	0	1	4	9	32	21	15
	4	0	0	5	22	36	77	50	19	11	8
	6	1	1	0	0	0	0				
1987	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	2	5	23	59	112
	92	46	12	2	1	3	4	9	16	21	23
	25	9	2	4	2	0	0	0	0	0	0
	0	0	0	0	0	1	1	1	12	57	105
	105	53	13	5	4	21	41	36	26	12	5
	3	2	0	0	0	0	0				
1988	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	10	6	16
	29	40	48	17	12	1	1	1	3	7	10
	8	2	2	1	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	9	16
	32	67	78	19	10	6	10	28	17	6	5
	2	0	0	0	0	0	0				
1989	1	6	3	0	395.36	0	0	0	0	0	0
	0	0	0	1	1	2	2	1	0	1	1
	6	13	19	17	23	18	13	3	2	3	3
	3	3	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	2	2	1	1	1
	4	14	34	53	29	14	5	19	23	6	5
	1	1	0	0	0	0	0				
1990	1	6	3	0	400	0	0	0	0	0	0
	0	0	0	0	0	0	3	2	7	14	9
	6	11	9	5	11	14	16	10	5	1	1
	4	10	4	1	2	1	0	0	0	0	0
	0	0	0	0	1	1	2	3	10	9	14
	12	13	18	19	41	31	22	19	19	7	6
	3	2	0	0	0	0	0				
1991	1	6	3	0	114.7280		0	0	0	0	0
	0	0	0	0	0	0	3	1	5	28	39
	43	19	21	8	4	9	19	18	9	7	2
	2	2	1	2	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	3	2	22	49
	66	35	19	11	15	21	20	12	13	17	7
	1	0	0	0	0	0	0				
1992	1	6	3	0	40.98	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	1	0	0
	6	17	18	13	9	13	1	4	9	5	3
	2	2	2	3	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	1	0
	7	8	19	18	6	5	10	9	5	8	2
	1	1	0	0	0	0	0				
1993	1	6	3	0	42.74	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	2	3	10	10	19	10	2	4	6	6	2
	1	2	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	3
	5	7	24	31	17	29	12	3	7	3	6
	1	0	0	0	0	0	0				
1994	1	6	3	0	51.536	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	1
	6	3	6	6	5	10	14	8	7	4	4
	6	1	4	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	2
	11	18	11	22	35	29	14	10	11	7	5
	4	1	0	0	0	0	0				
1995	1	6	3	0	38.252	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	1	1
	1	1	2	2	2	1	1	6	3	5	5
	9	4	0	3	1	0	0	0	0	0	0
	0	0	0	0	1	0	1	1	1	0	0
	3	2	0	1	10	14	9	7	13	12	16
	8	2	4	0	0	0	0				
1996	1	6	3	0	14.142	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	1	0	3	2	3	3	4	4	0	0
	2	3	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	0	2	3	8	5	4	2	1
	1	1	0	0	0	0	0				
1997	1	6	3	0	15.66	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	1	0	3	4	3
	2	0	3	4	1	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	2	3	8	9	5	6	4
	4	3	1	0	0	0	0				
1998	1	6	3	0	21.628	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	2	3	9	9	5	2	0	0	2	7	8
	5	5	2	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	3	1	1	1	3	3	8	12	5	1
	2	1	0	0	0	0	0				
2000	1	6	3	0	13.97	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	0	1	0	0	1	3	2	0	10
	5	5	1	3	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	1	5	5	3	0	2	4	3	1	1
	3	1	0	0	0	0	0				
2002	1	6	3	0	20.766	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	6	21	11
	6	5	0	1	0	1	0	0	0	1	0
	3	3	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	15	10
	7	2	1	1	2	0	0	0	0	3	1
	1	0	0	0	0	0	0				

copied from
C:\XiHe1\Boc2015\LengthData\RecFisheries\RecFINLengthComp6\LengthComp3ForSS.csv

1980	1	4	0	0	400	1	0	3	0	2	3
	20	30	63	64	101	87	208	427	435	312	169
	173	104	68	89	68	52	64	33	15	5	4
	5	1	0	0	0	0	1	0	3	0	2
	3	20	30	63	64	101	87	208	427	435	312
	169	173	104	68	89	68	52	64	33	15	5
	4	5	1	0	0	0	0				
1981	1	4	0	0	388.3	0	0	1	0	1	2
	7	13	31	74	116	181	172	197	177	176	187
	256	210	118	76	67	60	45	31	18	6	6
	1	0	1	2	1	0	0	0	1	0	1
	2	7	13	31	74	116	181	172	197	177	176
	187	256	210	118	76	67	60	45	31	18	6
	6	1	0	1	2	1	0				
1982	1	4	0	0	331.82	0	0	0	0	0	0
	0	3	5	16	25	27	44	108	207	208	164
	215	256	192	123	83	59	51	18	11	4	5
	1	2	0	1	0	0	0	0	0	0	0
	0	0	3	5	16	25	27	44	108	207	208
	164	215	256	192	123	83	59	51	18	11	4
	5	1	2	0	1	0	0				
1983	1	4	0	0	134.43	0	0	0	0	0	0
	1	0	0	3	7	8	45	59	66	61	62
	59	73	42	35	42	38	45	19	10	9	12
	2	4	3	0	1	0	0	0	0	0	0
	0	1	0	0	3	7	8	45	59	66	61
	62	59	73	42	35	42	38	45	19	10	9
	12	2	4	3	0	1	0				
1984	1	4	0	0	122.97	1	5	2	15	17	35
	29	9	2	8	4	6	6	14	17	35	48
	59	87	46	53	30	23	17	11	4	4	5
	0	2	0	0	0	0	1	5	2	15	17
	35	29	9	2	8	4	6	6	14	17	35
	48	59	87	46	53	30	23	17	11	4	4
	5	0	2	0	0	0	0				
1985	1	4	0	0	310.64	0	0	0	1	10	34
	74	126	96	94	185	194	104	42	11	17	22
	35	53	49	57	49	35	26	11	12	1	0

	0	0	0	0	0	0	0	0	0	1	10
	34	74	126	96	94	185	194	104	42	11	17
	22	35	53	49	57	49	35	26	11	12	1
	0	0	0	0	0	0	0				
1986	1	4	0	0	220.26	0	0	2	3	5	5
	13	36	47	52	60	145	284	264	133	63	16
	18	19	20	27	19	21	25	3	9	5	3
	0	1	0	1	0	0	0	0	2	3	5
	5	13	36	47	52	60	145	284	264	133	63
	16	18	19	20	27	19	21	25	3	9	5
	3	0	1	0	1	0	0				
1987	1	4	0	0	39.22	0	0	0	0	0	2
	3	5	7	11	7	5	10	12	20	12	6
	9	7	3	0	5	4	3	1	0	0	0
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	2	3	5	7	11	7	5	10	12	20	12
	6	9	7	3	0	5	4	3	1	0	0
	0	0	0	0	0	0	0				
1988	1	4	0	0	28.9	0	0	0	0	0	0
	1	3	4	3	1	2	3	9	9	8	5
	10	7	6	1	3	3	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	3	4	3	1	2	3	9	9	8
	5	10	7	6	1	3	3	0	1	0	0
	0	0	0	0	0	0	0				
1989	1	4	0	0	97.62	0	0	0	0	0	4
	8	18	19	37	42	53	54	18	24	22	29
	32	30	25	21	11	9	5	9	5	4	4
	3	1	0	0	2	1	0	0	0	0	0
	4	8	18	19	37	42	53	54	18	24	22
	29	32	30	25	21	11	9	5	9	5	4
	4	3	1	0	0	2	1				
1993	1	4	0	0	57.12	0	0	1	0	0	2
	2	3	8	14	14	17	20	16	6	15	16
	12	12	12	16	5	6	8	1	0	1	0
	0	2	0	0	1	1	0	0	1	0	0
	2	2	3	8	14	14	17	20	16	6	15
	16	12	12	12	16	5	6	8	1	0	1
	0	0	2	0	0	1	1				
1994	1	4	0	0	80.03	0	0	0	0	0	0
	0	0	1	0	5	1	17	18	24	26	26
	29	21	40	48	40	21	30	4	6	4	9
	4	0	2	0	1	0	0	0	0	0	0
	0	0	0	1	0	5	1	17	18	24	26
	26	29	21	40	48	40	21	30	4	6	4
	9	4	0	2	0	1	0				
1995	1	4	0	0	17.83	0	0	0	0	0	0
	0	0	0	0	1	0	0	1	0	2	0
	7	4	2	4	6	3	2	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	1	0	2

	0	7	4	2	4	6	3	2	2	0	1
	0	0	0	0	0	0	0				
1996	1	4	0	0	41.01	0	0	0	0	0	0
	1	1	3	3	7	7	6	3	7	1	5
	7	7	7	12	7	11	11	4	2	1	0
	1	2	0	0	0	0	0	0	0	0	0
	0	1	1	3	3	7	7	6	3	7	1
	5	7	7	7	12	7	11	11	4	2	1
	0	1	2	0	0	0	0				
1997	1	4	0	0	19.45	0	0	0	0	0	0
	0	0	0	2	4	0	1	8	6	10	3
	2	5	0	4	5	0	1	0	2	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	4	0	1	8	6	10
	3	2	5	0	4	5	0	1	0	2	0
	1	0	0	0	0	0	0				
1998	1	4	0	0	43.63	0	0	0	0	0	0
	0	0	1	0	2	5	8	5	9	10	13
	7	7	15	6	3	4	6	3	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	2	5	8	5	9	10
	13	7	7	15	6	3	4	6	3	1	1
	0	0	0	0	0	0	0				
1999	1	4	0	0	400	0	1	1	5	13	11
	8	3	0	2	6	4	9	8	7	11	22
	25	38	44	53	41	50	33	28	19	12	1
	3	2	1	1	1	0	0	1	1	5	13
	11	8	3	0	2	6	4	9	8	7	11
	22	25	38	44	53	41	50	33	28	19	12
	1	3	2	1	1	1	0				
2000	1	4	0	0	324.76	0	0	0	0	0	2
	2	20	43	58	65	46	42	12	11	7	8
	8	16	19	29	22	34	24	19	16	11	7
	4	0	0	0	0	0	0	0	0	0	0
	2	2	20	43	58	65	46	42	12	11	7
	8	8	16	19	29	22	34	24	19	16	11
	7	4	0	0	0	0	0				
2001	1	4	0	0	83.44	0	0	0	0	0	0
	1	0	6	18	42	72	69	49	43	18	11
	9	5	8	8	6	3	3	3	2	2	2
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	6	18	42	72	69	49	43	18
	11	9	5	8	8	6	3	3	3	2	2
	2	0	0	0	0	0	0				
2002	1	4	0	0	310.64	0	0	0	0	0	0
	0	0	2	3	3	7	23	62	112	130	114
	96	38	20	25	31	18	12	11	13	2	1
	1	2	0	0	0	0	0	0	0	0	0
	0	0	0	2	3	3	7	23	62	112	130
	114	96	38	20	25	31	18	12	11	13	2
	1	1	2	0	0	0	0				

2003	1	4	0	0	32.11	0	0	0	0	0	0
	0	0	2	0	0	0	0	0	2	14	16
	21	30	18	4	5	6	0	3	1	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	0	0	0	0	0	2	14
	16	21	30	18	4	5	6	0	3	1	1
	1	0	0	0	0	0	0				
2004	1	4	0	0	400	0	1	0	0	3	5
	14	8	17	27	44	24	27	20	25	49	55
	105	136	116	97	52	37	21	8	8	5	4
	2	1	1	0	0	2	0	1	0	0	3
	5	14	8	17	27	44	24	27	20	25	49
	55	105	136	116	97	52	37	21	8	8	5
	4	2	1	1	0	0	2				
2005	1	4	0	0	400	0	0	0	0	2	0
	0	5	8	24	80	150	197	185	143	91	54
	60	74	87	86	83	68	34	18	8	6	3
	3	0	0	1	0	0	0	0	0	0	2
	0	0	5	8	24	80	150	197	185	143	91
	54	60	74	87	86	83	68	34	18	8	6
	3	3	0	0	1	0	0				
2006	1	4	0	0	400	0	0	0	1	0	1
	2	8	19	31	31	50	71	128	225	334	264
	170	97	82	73	99	82	56	28	13	7	2
	4	2	0	1	0	1	0	0	0	1	0
	1	2	8	19	31	31	50	71	128	225	334
	264	170	97	82	73	99	82	56	28	13	7
	2	4	2	0	1	0	1				
2007	1	4	0	0	400	0	0	1	1	3	0
	9	6	18	44	74	133	228	173	167	158	185
	208	210	148	107	74	69	58	38	24	3	6
	0	1	1	0	0	1	0	0	1	1	3
	0	9	6	18	44	74	133	228	173	167	158
	185	208	210	148	107	74	69	58	38	24	3
	6	0	1	1	0	0	1				
2008	1	4	0	0	400	0	0	0	0	0	0
	0	7	18	24	27	51	74	151	247	267	193
	209	171	120	89	65	31	25	20	12	12	2
	1	1	0	0	0	0	0	0	0	0	0
	0	0	7	18	24	27	51	74	151	247	267
	193	209	171	120	89	65	31	25	20	12	12
	2	1	1	0	0	0	0				
2009	1	4	0	0	400	0	0	0	0	0	1
	4	6	14	33	43	94	148	177	174	210	275
	238	192	127	110	95	51	30	30	14	14	10
	1	2	2	0	0	0	0	0	0	0	0
	1	4	6	14	33	43	94	148	177	174	210
	275	238	192	127	110	95	51	30	30	14	14
	10	1	2	2	0	0	0				
2010	1	4	0	0	400	1	0	0	0	0	2
	6	20	63	83	130	119	94	102	126	154	208

	199	170	135	111	54	35	23	17	12	5	6
	0	2	0	0	0	0	1	0	0	0	0
	2	6	20	63	83	130	119	94	102	126	154
	208	199	170	135	111	54	35	23	17	12	5
	6	0	2	0	0	0	0				
2011	1	4	0	0	400	0	0	0	2	1	5
	11	66	186	283	284	256	334	348	307	268	170
	191	145	135	89	59	38	29	21	8	3	1
	5	1	1	1	0	2	0	0	0	2	1
	5	11	66	186	283	284	256	334	348	307	268
	170	191	145	135	89	59	38	29	21	8	3
	1	5	1	1	1	0	2				
2012	1	4	0	0	400	0	0	2	0	1	8
	14	21	44	152	410	655	745	517	374	256	186
	128	97	58	63	32	19	13	9	2	2	2
	1	0	1	0	0	0	0	0	2	0	1
	8	14	21	44	152	410	655	745	517	374	256
	186	128	97	58	63	32	19	13	9	2	2
	2	1	0	1	0	0	0				
2013	1	4	0	0	400	2	0	2	2	5	13
	25	84	127	211	236	248	365	524	658	629	437
	276	138	97	62	34	22	20	10	5	1	2
	0	0	0	0	0	0	2	0	2	2	5
	13	25	84	127	211	236	248	365	524	658	629
	437	276	138	97	62	34	22	20	10	5	1
	2	0	0	0	0	0	0				
2014	1	4	0	0	400	0	0	1	1	4	20
	89	208	282	318	322	283	280	232	188	182	167
	136	90	44	27	11	7	2	4	2	0	1
	0	0	0	0	0	0	0	0	1	1	4
	20	89	208	282	318	322	283	280	232	188	182
	167	136	90	44	27	11	7	2	4	2	0
	1	0	0	0	0	0	0				
1980	1	5	0	0	317.7	0	0	0	0	1	0
	1	5	4	11	2	3	3	14	11	28	16
	14	15	21	13	15	13	4	12	10	7	3
	11	4	3	0	4	4	0	0	0	0	1
	0	1	5	4	11	2	3	3	14	11	28
	16	14	15	21	13	15	13	4	12	10	7
	3	11	4	3	0	4	4				
1981	1	5	0	0	55.78	0	0	0	1	0	1
	0	0	0	0	1	3	8	4	8	9	28
	25	41	23	9	7	14	11	13	11	6	7
	7	3	5	4	1	2	0	0	0	1	0
	1	0	0	0	0	1	3	8	4	8	9
	28	25	41	23	9	7	14	11	13	11	6
	7	7	3	5	4	1	2				
1982	1	5	0	0	72.92	0	0	0	0	0	0
	0	1	0	0	0	3	3	7	7	14	15
	11	38	38	49	46	24	21	8	3	11	7
	1	3	1	0	0	0	0	0	0	0	0

	0	0	1	0	0	0	3	3	7	7	14
	15	11	38	38	49	46	24	21	8	3	11
	7	1	3	1	0	0	0				
1983	1	5	0	0	78.54	0	0	0	0	0	0
	0	0	0	3	1	4	3	5	2	4	9
	19	26	37	42	55	53	36	23	13	8	10
	3	1	0	0	0	2	0	0	0	0	0
	0	0	0	0	3	1	4	3	5	2	4
	9	19	26	37	42	55	53	36	23	13	8
	10	3	1	0	0	0	2				
1984	1	5	0	0	65.81	0	0	0	1	1	1
	1	0	0	0	2	3	5	7	9	8	13
	15	13	17	16	18	13	9	6	12	2	7
	4	2	0	0	1	1	0	0	0	1	1
	1	1	0	0	0	2	3	5	7	9	8
	13	15	13	17	16	18	13	9	6	12	2
	7	4	2	0	0	1	1				
1985	1	5	0	0	367.12	0	0	1	1	5	16
	38	52	53	63	65	24	15	7	7	13	13
	15	13	20	19	19	15	13	21	14	14	8
	7	1	3	3	0	0	0	0	1	1	5
	16	38	52	53	63	65	24	15	7	7	13
	13	15	13	20	19	19	15	13	21	14	14
	8	7	1	3	3	0	0				
1986	1	5	0	0	331.82	0	0	0	0	0	1
	5	8	8	18	29	72	190	204	142	66	18
	4	5	8	13	21	17	19	25	19	15	11
	14	5	3	2	1	1	0	0	0	0	0
	1	5	8	8	18	29	72	190	204	142	66
	18	4	5	8	13	21	17	19	25	19	15
	11	14	5	3	2	1	1				
1987	1	5	0	0	52.05	0	0	0	0	0	0
	0	1	0	3	3	15	24	33	27	18	9
	6	4	3	4	3	4	6	9	9	12	9
	5	9	1	4	2	2	0	0	0	0	0
	0	0	1	0	3	3	15	24	33	27	18
	9	6	4	3	4	3	4	6	9	9	12
	9	5	9	1	4	2	2				
1988	1	5	0	0	24.87	0	0	0	0	0	0
	0	0	1	1	1	2	4	5	5	6	5
	2	6	5	4	4	1	0	1	2	0	1
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	1	1	1	2	4	5	5	6
	5	2	6	5	4	4	1	0	1	2	0
	1	0	0	0	0	0	1				
1989	1	5	0	0	33.42	0	0	0	0	0	0
	0	1	3	0	2	5	4	24	11	3	3
	7	13	15	10	8	3	3	0	0	1	1
	0	0	1	0	0	1	0	0	0	0	0
	0	0	1	3	0	2	5	4	24	11	3

	3	7	13	15	10	8	3	3	0	0	1
	1	0	0	1	0	0	1				
1993	1	5	0	0	31.35	0	0	0	1	0	0
	0	0	0	0	1	3	6	6	4	5	4
	6	6	6	5	9	3	3	1	2	2	1
	1	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	1	3	6	6	4	5
	4	6	6	6	5	9	3	3	1	2	2
	1	1	0	0	0	0	0				
1994	1	5	0	0	26.87	0	0	0	0	0	1
	0	0	4	5	3	3	1	4	6	10	5
	1	4	2	1	3	2	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	4	5	3	3	1	4	6	10
	5	1	4	2	1	3	2	0	2	0	0
	0	0	0	0	0	0	0				
1995	1	5	0	0	26.21	0	0	0	0	0	1
	0	1	0	0	2	4	6	8	6	1	6
	8	6	9	3	4	3	0	1	1	0	1
	0	0	0	1	0	2	0	0	0	0	0
	1	0	1	0	0	2	4	6	8	6	1
	6	8	6	9	3	4	3	0	1	1	0
	1	0	0	0	1	0	2				
1996	1	5	0	0	64.67	0	0	0	0	0	0
	2	2	3	3	7	10	16	14	11	20	17
	16	15	12	7	14	19	12	13	5	8	8
	4	0	1	0	2	3	0	0	0	0	0
	0	2	2	3	3	7	10	16	14	11	20
	17	16	15	12	7	14	19	12	13	5	8
	8	4	0	1	0	2	3				
1997	1	5	0	0	136.46	0	0	0	0	0	0
	1	5	3	4	2	10	20	25	30	42	31
	59	44	51	54	60	51	38	73	28	25	18
	8	6	6	1	4	0	0	0	0	0	0
	0	1	5	3	4	2	10	20	25	30	42
	31	59	44	51	54	60	51	38	73	28	25
	18	8	6	6	1	4	0				
1998	1	5	0	0	69.85	0	0	0	0	0	0
	0	0	3	3	2	8	8	18	7	11	17
	21	23	23	24	17	22	22	20	20	12	4
	6	1	0	3	1	0	0	0	0	0	0
	0	0	0	3	3	2	8	8	18	7	11
	17	21	23	23	24	17	22	22	20	20	12
	4	6	1	0	3	1	0				
1999	1	5	0	0	128.18	0	0	1	1	0	0
	0	0	3	1	4	6	17	25	30	51	40
	39	44	63	47	55	47	40	25	44	17	20
	6	6	1	2	4	0	0	0	1	1	0
	0	0	0	3	1	4	6	17	25	30	51
	40	39	44	63	47	55	47	40	25	44	17
	20	6	6	1	2	4	0				

2000	1	5	0	0	61.54	0	0	0	0	0	0
	0	2	7	20	18	10	13	18	12	16	13
	18	22	11	14	8	2	9	5	14	8	13
	10	5	0	0	0	4	0	0	0	0	0
	0	0	2	7	20	18	10	13	18	12	16
	13	18	22	11	14	8	2	9	5	14	8
	13	10	5	0	0	0	4				
2001	1	5	0	0	61.99	0	0	0	0	0	1
	0	1	1	2	3	23	36	55	33	12	14
	18	19	20	20	22	14	11	11	3	2	1
	0	2	0	0	1	1	0	0	0	0	0
	1	0	1	1	2	3	23	36	55	33	12
	14	18	19	20	20	22	14	11	11	3	2
	1	0	2	0	0	1	1				
2002	1	5	0	0	29.7	0	0	0	0	0	0
	0	0	0	0	0	1	2	12	26	44	29
	17	1	8	6	10	9	5	3	4	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	12	26	44
	29	17	1	8	6	10	9	5	3	4	1
	1	0	0	0	0	0	0				
2004	1	5	0	0	29.04	0	0	0	0	0	0
	0	0	0	1	0	2	1	3	2	9	6
	5	9	4	9	4	8	2	6	1	2	2
	1	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	2	1	3	2	9
	6	5	9	4	9	4	8	2	6	1	2
	2	1	2	1	0	0	0				
2005	1	5	0	0	63.81	0	0	0	0	0	2
	1	0	1	1	8	4	6	4	9	12	9
	16	26	24	39	37	26	15	14	5	7	3
	2	3	0	0	0	0	0	0	0	0	0
	2	1	0	1	1	8	4	6	4	9	12
	9	16	26	24	39	37	26	15	14	5	7
	3	2	3	0	0	0	0				
2006	1	5	0	0	77.78	0	0	0	0	0	0
	0	0	1	1	1	3	6	3	11	19	19
	15	24	22	23	26	17	24	11	12	13	7
	5	7	4	4	1	2	0	0	0	0	0
	0	0	0	1	1	1	3	6	3	11	19
	19	15	24	22	23	26	17	24	11	12	13
	7	5	7	4	4	1	2				
2007	1	5	0	0	331.82	0	0	0	0	0	0
	0	0	2	0	1	5	8	11	15	15	26
	25	18	22	12	14	23	12	19	9	12	8
	3	2	3	1	0	0	0	0	0	0	0
	0	0	0	2	0	1	5	8	11	15	15
	26	25	18	22	12	14	23	12	19	9	12
	8	3	2	3	1	0	0				
2008	1	5	0	0	58.77	0	1	0	0	0	0
	0	0	0	0	1	1	0	2	7	13	16

	19	14	15	17	10	12	13	8	8	4	3
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	0	0	1	1	0	2	7	13
	16	19	14	15	17	10	12	13	8	8	4
	3	0	0	0	1	0	0				
2009	1	5	0	0	68.67	0	0	0	0	0	0
	0	1	1	5	7	2	6	4	5	7	12
	16	15	6	19	16	20	21	14	10	16	5
	5	1	0	1	0	0	0	0	0	0	0
	0	0	1	1	5	7	2	6	4	5	7
	12	16	15	6	19	16	20	21	14	10	16
	5	5	1	0	1	0	0				
2010	1	5	0	0	52.53	0	0	0	0	0	1
	1	0	4	6	13	10	6	4	13	12	12
	12	17	16	5	14	8	8	7	5	2	5
	2	2	0	0	0	0	0	0	0	0	0
	1	1	0	4	6	13	10	6	4	13	12
	12	12	17	16	5	14	8	8	7	5	2
	5	2	2	0	0	0	0				
2011	1	5	0	0	353	0	0	0	0	0	0
	0	0	4	2	4	7	8	22	11	17	17
	17	13	14	9	11	9	5	3	4	6	2
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	4	2	4	7	8	22	11	17
	17	17	13	14	9	11	9	5	3	4	6
	2	1	1	0	0	0	0				
2012	1	5	0	0	52.42	0	0	0	0	0	0
	1	6	7	3	4	10	7	16	8	17	12
	19	4	10	7	4	3	2	4	1	0	0
	0	2	1	0	0	0	0	0	0	0	0
	0	1	6	7	3	4	10	7	16	8	17
	12	19	4	10	7	4	3	2	4	1	0
	0	0	2	1	0	0	0				
2013	1	5	0	0	36.25	0	0	0	0	0	0
	1	0	0	0	0	4	2	2	4	7	4
	12	7	3	7	4	2	3	1	0	2	1
	0	1	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	4	2	2	4	7
	4	12	7	3	7	4	2	3	1	0	2
	1	0	1	0	0	0	0				
2014	1	5	0	0	45.32	3	0	3	1	2	1
	2	7	16	12	2	2	1	3	2	1	3
	9	7	8	7	6	5	2	0	2	3	0
	0	0	1	0	0	0	3	0	3	1	2
	1	2	7	16	12	2	2	1	3	2	1
	3	9	7	8	7	6	5	2	0	2	3
	0	0	0	1	0	0	0				

new triSurvey
Program: C:\XiHe1\Boc2015\SurveyData\Triennial\LengthFreq\Analysis1.r
Output: C:\XiHe1\Boc2015\SurveyData\Triennial\LengthFreq\TriSurveyLenCompForSS3.txt

```
#yr season fleet gender partition Nsamp F10 F12 F14 F16 F18
F20 F22 F24 F26 F28 F30 F32 F34 F36 F38 F40
F42 F44 F46 F48 F50 F52 F54 F56 F58 F60 F62
F64 F66 F68 F70 F72 F74 F76 M10 M12 M14 M16
M18 M20 M22 M24 M26 M28 M30 M32 M34 M36
M38 M40 M42 M44 M46 M48 M50 M52 M54 M56
M58 M60 M62 M64 M66 M68 M70 M72 M74 M76
1980 1 8 3 0 11 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.81 2.23 0.81 0.00 0.00 0.00 0.59 3.90 11.87 13.59
11.07 2.20 0.00 1.20 0.45 0.69 0.00 0.60 0.05 0.41 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 0.81 3.45 1.42 0.20 0.00 0.00 0.78 5.48 13.80
12.58 4.67 0.36 0.05 0.21 0.45 0.24 1.20 1.81 1.01 0.26
0.16 0.00 0.00 0.60 0.00 0.00 0.00
1983 1 8 3 0 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 0.52 0.00 0.06 0.57 0.96
0.25 0.64 2.42 1.21 4.91 10.82 13.59 2.85 0.18 0.79 0.23
0.00 0.68 0.45 0.44 0.04 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 1.04 0.00 0.00
1.11 2.28 1.94 4.99 16.86 14.07 4.29 4.46 4.55 1.60 0.83
0.40 0.00 0.00 0.00 0.00 0.00 0.00
1986 1 8 3 0 10 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.95 0.47 0.24 0.24 1.00 2.15 2.35 2.23 0.88 0.00
0.00 0.00 0.00 0.00 1.49 1.49 0.00 0.64 3.31 7.74 12.42
7.61 5.98 2.99 0.00 0.00 1.49 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.24 1.92 1.21 0.00 1.84 3.88 6.71 3.68 0.69
0.00 0.00 0.00 0.13 0.00 3.58 4.94 2.79 3.58 3.39 3.26
2.14 0.00 0.00 0.32 0.00 0.00 0.00
1989 1 8 3 0 61 0.00 0.00 0.00 0.01 0.00 0.00
0.24 2.32 16.89 23.79 2.95 0.80 1.80 1.49 0.31 0.00 0.02
0.01 0.00 0.06 0.15 0.06 0.15 0.05 0.04 0.02 0.00 0.03
0.01 0.01 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.04 0.00
0.00 0.66 2.49 19.42 20.70 1.76 0.75 0.83 0.91 0.08 0.00
0.24 0.02 0.16 0.18 0.25 0.07 0.02 0.04 0.08 0.04 0.00
0.00 0.00 0.01 0.00 0.00 0.00 0.00
1992 1 8 3 0 24 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.45 2.12 3.56 3.60 2.50 5.38 1.45 1.63 1.13 3.11
6.69 6.72 6.50 0.99 0.00 0.57 0.28 0.55 0.00 0.00 0.18
0.77 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.14 0.00 0.79 4.32 4.28 1.00 1.87 3.36 6.87 2.27 4.42
5.38 6.51 4.16 1.65 2.77 0.28 0.56 0.77 0.00 0.00 0.14
0.13 0.00 0.00 0.00 0.00 0.18 0.00
1995 1 8 3 0 39 0.00 0.00 0.00 0.00 0.00 1.51
6.58 8.09 1.00 1.64 2.11 1.61 2.96 2.22 0.00 0.00 0.00
0.76 3.55 1.96 0.52 0.74 0.69 1.16 3.47 2.08 0.69 1.46
0.00 0.72 0.46 0.00 1.02 0.00 0.00 0.00 0.00 0.00 1.59
4.05 6.12 4.53 1.49 1.49 1.00 5.42 5.54 2.07 1.23 0.00
2.58 0.69 0.50 3.12 1.12 2.89 1.69 2.67 0.62 1.44 1.11
0.00 0.00 0.00 0.00 0.00 0.00 0.00
1998 1 8 3 0 22 0.00 0.00 0.00 0.00 0.00 0.00
0.00 1.83 0.00 0.00 6.77 15.42 12.94 5.95 5.09 0.00 0.00
```

```
0.00	2.78	0.00	0.00	1.61	0.00	0.00	1.98	0.00	1.19	1.77
0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.77	1.66	0.00	0.00	3.76	3.10	7.58	3.93	1.66	0.00	0.00
0.00	0.00	0.00	1.23	8.94	1.98	0.00	1.23	2.84	0.00	1.71
0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	1	8	3	0	24	0.00	0.00	0.00	0.00	1.36	1.36
3.70	0.00	0.00	0.00	1.28	13.12	6.67	12.75	1.41	1.65	0.89
0.89	0.00	0.00	0.00	1.30	0.00	0.00	1.30	0.00	0.00	0.00
0.00	1.67	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.37	8.19	10.29	15.34	0.92	1.72
0.00	0.00	0.00	0.00	4.40	1.41	1.82	2.10	0.00	0.79	0.79
0.72	0.00	0.00	0.00	0.00	0.00	0.00
2004	1	8	3	0	33	0.00	0.00	0.42	0.00	0.00	0.00
0.60	2.20	4.12	0.30	0.00	0.00	0.00	0.00	0.00	0.00	2.39
0.20	2.01	3.83	3.67	8.51	8.33	3.62	2.28	1.36	1.55	1.64
0.95	0.34	0.77	0.48	0.00	0.30	0.00	0.00	0.00	0.00	0.00
0.60	3.26	1.88	3.84	0.67	0.34	0.00	0.00	0.34	0.00	0.00
2.48	0.76	0.91	1.76	7.88	4.69	4.51	5.32	2.05	2.39	1.13
2.96	1.34	0.60	0.45	0.00	0.00	0.00

# 2015 NWFSC survey length comps
# C:\XiHe1\Boc2015\SurveyData\NWFSC\LengthFreq2\LengthCompsForSS.csv
#Year	Season	Fleet	gender	partition		nSamps	F10	F12	F14	F16	F18
	F20	F22	F24	F26	F28	F30	F32	F34	F36	F38	F40
	F42	F44	F46	F48	F50	F52	F54	F56	F58	F60	F62
	F64	F66	F68	F70	F72	F74	F76	M10	M12	M14	M16
	M18	M20	M22	M24	M26	M28	M30	M32	M34	M36	M38
	M40	M42	M44	M46	M48	M50	M52	M54	M56	M58	M60
	M62	M64	M66	M68	M70	M72	M74	M76
2003	1	11	3	0	45.56490	0	2.419279676	2.009105601
	3.97081917	0	0	0	3.218965253	0	0	0	0
	0	0	4.336678619	0	0	2.172999379	0	4.443244745
	4.175070912	0	0	1.248634951	2.087535456	2.087535456
	1.958284461	2.355709289	0	0	0	0	0	0	0
	0.868971144	6.305514182	5.062858188	0	0	0	5.327075358
	1.958284461	0	0	1.437587596	6.083413492	0	13.01003586
	4.336678619	0	4.711418578	0	0	1.761858119	6.692387908
	2.355709289	3.60434424	0	0	0	0	0	0	0
	0	0
2004	1	11	3	0	62.936	0	0	0	0	0	0
	0.121786643	0.29607686	1.103779405	2.104500246	3.928769429
	0.312775162	2.143404313	1.610276519	2.311686389	0.854915167
	0.969759971	2.365245448	2.740172393	1.103779405	2.546788737
	2.818535332	10.60382765	2.424596139	1.304497324	0.612870981
	0.270434006	0.15265279	0.15265279	0	0.170988446	0	0
	0	0	0	0	0	0	0	0.359987783	0.316225783
	1.513672648	3.652882088	4.954673041	3.361622566	1.000720842
	2.318235804	1.326445983	2.278222126	1.833308457	2.096908879
	7.34824065	5.657842052	2.410225315	10.31321765	5.223361439
	0.15265279	0	0.15265279	0.289473317	0.140014043	0
	0.137321205	0.137321205	0	0	0
```

2005 1 11 3 0 59.089 0 0 1.317597851 0.679959233
0 0 0.387146332 0 1.19828141 5.914832623 0.648414422
8.650983759 4.729855418 12.71520755 1.945243265 0 2.51503646
0 0 0.929729118 0.96488593 3.320392336 1.789144612
0.996852141 0.447286153 0.447286153 0.447286153 0 0
0.440664151 0 0 0.881328301 0 0 1.78282361
0.588214401 0.587492001 0 0.387146332 0 2.625563698
1.585427742 1.143138191 0 7.738110646 11.09245579 5.895508416
4.839238855 0 0.563171193 0.558595991 0.558595991 0.992036139
3.638128044 0.579665998 1.383998473 1.099131976 0 0.549565988
0.444577152 0 0 0 0 0 0 0
2006 1 11 3 0 56.52340 0 0 0 0
1.126514612 0.587679 1.743579788 4.162819007 1.00879181
0.570225392 0 1.68031046 0.488611966 0.488611966 4.955845044
7.035673927 1.273623592 0.9212121 0 0.609852205 1.422290928
1.381818149 1.381818149 2.32880994 0 0.721519675 0
0.721519675 0.844674468 0.346044487 0 0 0 0 0
0 0 0 1.175357999 2.337314121 11.49386853 16.83231268
1.05144629 0.609852205 0 0 1.68761248 1.070458255
10.61041321 8.643409438 1.55737829 0.46060605 0.9212121
1.460092237 1.531064305 0.853134125 1.112890113 0.419777075 0
0 0 0 0.369954149 0 0 0 0
2007 1 11 3 0 41.09990 0 0 0 0 0
0 0 0 0 2.270265843 2.408009613 7.806845251
2.256498527 0.809871237 0 1.619671872 0.788337741 8.240198023
6.126102974 0.809871237 0.809871237 1.619671872 1.535514735
4.780294804 1.403419095 1.62263714 0.812765903 0 0 0
0 0 0 0 0 0 0 0.710111141 0 0
0 0 0 0 6.840167806 8.680399153 2.123767472 0
1.397064949 4.859086217 3.239343744 3.680109687 3.239414345
0.812765903 5.390575248 7.925667785 3.143537339 0.618470232
1.619671872 0 0 0 0 0 0 0 0
2008 1 11 3 0 33.84770 0 0 0 0 0
0 5.976418341 2.581775337 0 0 0 0 0 0
0 0 0 0 1.612848407 1.364173212 2.673683197
2.219666866 5.660617836 1.102469475 3.709310592 3.488816697
4.454344877 2.20493895 0 1.102469475 0 0.904209068 0
1.360349618 0 0 0 0 1.035910624 1.290958476
1.290958476 0 0 0 1.290958476 0 1.290958476
1.290958476 0 0 2.715317882 2.386347222 1.102469475
2.20493895 6.297458585 4.745079602 13.03930371 6.658575754
6.920987563 1.612848407 2.20493895 2.20493895 0 0 0
0 0
2009 1 11 3 0 31.07 0 0 0 1.244314124
1.870996217 1.870996217 1.113853977 3.185343909 3.355206641
4.683338276 0.965015239 4.516956338 4.286945492 3.546650293 0
1.146573437 1.146573437 4.603001558 1.146573437 1.083222992
2.131081121 1.146573437 2.336587179 0 2.287716836 0
1.190013742 0 0 0 0 0 0 0 0 0
1.244314124 0 4.986306558 4.855846411 2.357471941 2.532625479
2.906741183 0 0 0 3.452251169 3.983837979 5.274098579

1.146573437 3.46673127 3.328891841 2.293146874 1.146573437
2.336587179 0 3.526600921 1.190013742 1.113853977 0 0
0 0 0 0 0 0 0
2010 1 11 3 0 56.23040 0.160516091 2.383822164
16.06649566 24.3941021 1.797492555 0.216926853 0.867764946
0.867764946 0 0.216926853 0.216581657 0.216581657 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0.160516091
3.017515527 15.7099083 26.15002731 2.32480805 0.867736179
1.762915432 0.216926853 0 0.216926853 0.402412114 0.649744972
0.216926853 0 0 0 0.217300815 0 0 0.217300815
0 0.464058347 0 0 0 0 0 0 0 0
0 0 0
2011 1 11 3 0 29.42350 0 0 3.496865345 0
0 5.847706752 4.557848637 15.94414614 7.384737679 0
3.386477487 1.107478177 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 5.025647179 3.350481447 0
3.322434532 12.79254282 27.39493656 2.777994421 0 0 0
0 0 0 0 0 0 1.184119747 1.242463329
1.184119747 0 0 0 0 0 0 0 0 0
0 0 0
2012 1 11 3 0 105.7619 0.174925809 0.524777428
1.225749802 1.599542939 1.540033316 0.78361686 0 0.571843054
2.099862589 3.413290404 1.468714265 2.15729642 5.669127789
4.808480761 4.780839386 0.737669795 0.680967332 1.295423277
0.173204945 0.185057395 0.367555005 0.173204945 0.87770509
0.367555005 0.540759951 0.367555005 0 0.171548614 0
0.131560041 0 0 0 0 0.174925809 7.871790481
10.84905701 1.467359085 2.184518335 0.568100175 0.346366869 0
2.310603877 6.738278981 3.614115214 3.826190171 8.655385831
6.510909847 2.538854954 0.927674674 1.281462769 0.543319736
0.367555005 0.735131521 0.226143019 0.367555005 0.33451442
0.540759951 0 0.131560041 0 0 0 0 0 0
0 0
2013 1 11 3 0 106.1759 0.066745552 1.487716123
18.59504138 6.185712762 0.456062758 0 0.22786664 0.274968744
0.110651724 0.342498453 0.555729703 0.171209689 1.398190496
1.003034949 3.017664673 4.581938188 2.844880081 1.550844013
0.40185712 0.534056673 0.297386393 0.106348748 0.300845907
0.15377374 0.085604845 0.162491714 0.07688687 0 0 0
0 0 0 0 0 1.421978772 17.48855049 6.981506362
1.471453114 0.274975334 0.549944078 2.109677393 0.471231903
0.936809971 0.356824135 0.428011044 1.196537086 1.297930493
2.99705256 4.404936285 3.516935111 1.176379652 1.558230898
2.001219989 1.357144189 1.336934039 0.69196206 0.46130804
0.38442117 0.07688687 0 0 0.061151024 0 0 0
0 0
2014 1 11 3 0 166.9726 0 0.047072879 1.302877358
1.039650699 0.314243895 0.468531551 1.53378242 13.78361047
20.961187 9.734404438 1.34262228 0.135374582 0 0 0

	0.083846182		0.144400063		0.058577888		0.294628923		0.175741293		
	0.076262642		0	0	0	0	0.06926656		0	0	0
	0	0	0	0	0	0	0.047072879		1.16377967		
	1.430325081		0.70476569		0.252927082		3.148176193		15.43654755		
	21.58090108		3.961247653		0.391406796		0	0	0	0	0
	0	0.078063161		0.174070473		0	0	0	0	0	0
	0.064635565		0	0	0	0	0	0	0	0	

on board early recreational data

1988	1	9	0	0	300.3	0	0	0	1	4	10
	2	7	6	9	16	30	22	54	78	92	140
	198	129	130	80	44	22	18	26	20	15	22
	18	28	0	5	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1989	1	9	0	0	361	0	0	0	1	0	1
	13	24	24	49	57	63	55	55	59	45	65
	114	133	186	126	111	95	55	19	26	15	10
	12	12	0	9	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1990	1	9	0	0	192.6	0	0	0	0	1	2
	1	8	18	25	83	157	124	58	58	80	53
	31	44	42	55	47	36	24	12	7	2	2
	1	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1991	1	9	0	0	179.1	0	0	0	0	0	1
	3	1	4	8	1	3	6	18	24	54	103
	123	75	66	57	57	64	50	42	37	28	16
	8	15	0	6	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1992	1	9	0	0	395.8	0	0	0	0	0	4
	2	4	9	21	34	59	50	41	49	78	109
	191	196	181	132	122	73	58	86	77	56	23
	15	17	0	12	0	3	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1993	1	9	0	0	296.9	0	0	0	1	0	0
	2	0	1	8	21	25	25	28	41	43	45
	66	72	143	113	122	78	57	49	66	60	30
	21	29	0	12	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				

1994	1	9	0	0	210.4	0	0	0	0	0	0
	1	3	10	12	6	8	13	25	57	50	48
	66	58	63	63	49	51	36	25	17	21	14
	8	11	0	5	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1995	1	9	0	0	224.5	0	0	0	0	0	2
	3	3	12	9	22	18	32	33	41	32	42
	60	72	84	73	50	36	30	34	17	17	7
	8	8	0	5	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1996	1	9	0	0	185	0	0	0	1	0	0
	0	1	4	5	7	18	22	24	26	24	41
	43	53	51	53	45	32	38	25	22	17	13
	5	10	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1997	1	9	0	0	257.5	0	0	0	0	0	0
	1	5	4	9	3	12	24	29	33	49	35
	75	63	63	86	83	82	76	67	52	47	29
	16	28	0	11	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1998	1	9	0	0	124.7	0	0	0	0	0	0
	0	0	1	5	7	15	15	8	10	18	30
	33	39	37	36	32	33	29	27	21	10	10
	6	3	0	7	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				

New NWFSC hook survey

2004	1	10	3	0	127.468	0	0	0	0	0	0
	0	0	2	0	13	5	1	2	5	9	12
	20	50	57	108	105	42	24	11	6	7	3
	1	1	1	0	0	0	0	0	0	0	0
	0	0	1	4	7	20	7	4	3	6	7
	20	24	51	59	35	26	7	11	4	3	1
	1	0	0	0	0	0	0				
2005	1	10	3	0	110.942	0	0	0	0	0	0
	0	0	0	0	2	3	4	8	14	6	7
	2	2	10	26	56	79	71	50	14	11	8
	7	8	3	1	1	2	0	0	0	0	0
	0	0	0	0	1	1	3	3	10	20	14
	6	6	11	16	48	43	35	18	11	10	6
	1	0	0	0	1	0	0				

2006	1	10	3	0	122.4640		0	0	0	0	0
	1	1	8	20	7	2	3	1	5	18	33
	37	43	25	22	37	48	56	45	18	4	7
	2	3	0	1	0	0	0	0	0	0	0
	1	1	6	13	15	12	1	2	10	12	25
	17	23	21	6	14	24	36	22	12	3	2
	2	0	1	0	0	0	0				
2007	1	10	3	0	107.4580		0	0	0	0	0
	0	0	0	0	2	4	25	39	18	12	14
	21	26	26	30	28	30	43	27	20	8	3
	3	3	1	1	0	1	0	0	0	0	0
	0	0	0	0	0	2	6	15	16	22	10
	11	15	13	28	32	35	16	24	6	2	2
	0	1	0	0	0	0	0				
2008	1	10	3	0	113.77	0	0	0	0	0	0
	0	1	2	4	8	3	9	8	21	39	28
	20	24	21	34	28	31	35	39	29	16	7
	4	0	2	0	0	0	0	0	0	0	0
	0	0	0	1	8	5	4	6	11	24	35
	17	13	24	19	22	18	18	11	7	6	1
	1	1	0	0	0	0	0				
2009	1	10	3	0	101.42	0	0	0	0	0	0
	0	1	2	3	3	4	7	14	16	15	18
	35	25	24	29	17	38	31	42	17	13	2
	3	2	1	1	0	1	0	0	0	0	0
	0	0	0	2	2	4	3	8	5	15	11
	24	15	18	18	21	21	28	21	5	5	0
	0	0	0	0	0	0	0				
2010	1	10	3	0	59.122	0	0	0	0	0	0
	0	0	1	3	3	5	2	4	5	4	6
	13	18	2	15	11	4	12	13	18	3	3
	5	1	1	1	0	0	0	0	0	2	1
	0	0	0	0	5	5	3	3	2	5	6
	8	9	9	11	10	10	10	5	10	0	1
	1	0	0	0	0	0	0				
2011	1	10	3	0	128.1220		0	0	0	0	0
	2	11	24	38	38	15	5	16	31	18	13
	19	18	26	33	30	16	23	18	17	8	3
	2	0	2	0	0	0	0	0	0	0	0
	0	0	8	14	43	18	10	9	22	24	24
	18	19	31	12	25	20	14	10	13	8	0
	0	1	0	0	0	0	0				
2012	1	10	3	0	171.9020		0	0	0	0	0
	0	0	1	4	11	21	69	83	65	37	27
	25	21	28	28	29	14	23	19	25	10	10
	5	0	2	1	0	1	0	0	0	0	0
	0	0	0	1	4	11	28	77	85	60	36
	31	27	24	24	25	14	20	22	18	11	2
	0	0	0	0	0	0	0				
2013	1	10	3	0	183.2160		0	0	0	0	0
	0	2	1	3	5	6	16	29	49	83	125

	91	39	22	30	26	24	24	14	19	20	13
	6	4	1	0	0	1	0	0	0	0	0
	0	0	0	0	2	2	4	17	20	45	76
	91	53	27	19	18	23	22	27	13	11	8
	1	0	0	0	0	0	0				
2014	1	10	3	0	165.554	0	0	0	0	0	1
	0	0	3	12	11	14	10	17	25	34	38
	86	114	106	67	38	19	28	19	12	13	6
	9	5	1	1	0	1	0	0	0	0	0
	0	0	1	3	4	8	10	9	17	12	27
	42	60	44	24	13	14	13	8	13	11	6
	2	0	2	0	0	0	0				

Free1

2002	1	15	0	0	24.38	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	8	19
	10	16	9	15	11	11	7	7	3	3	1
	0	3	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2003	1	15	0	0	8.83	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	5	6	4	6	2	4	0	0	0
	0	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2004	1	15	0	0	60.36	0	0	0	0	0	12
	4	7	0	2	0	0	0	0	0	2	3
	7	9	24	28	45	40	21	26	24	18	14
	11	9	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2005	1	15	0	0	123.2	0	0	0	0	0	0
	0	0	2	1	0	0	2	6	8	5	8
	21	34	49	66	85	88	88	56	50	35	32
	16	22	0	8	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2006	1	15	0	0	38.8	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	5	11
	20	19	13	10	14	27	14	11	13	9	7
	4	5	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2007	1	15	0	0	44.46	0	0	0	0	1	0
	0	1	1	0	1	0	1	2	1	1	0

	3	2	8	23	13	17	21	15	14	12	12
	10	8	0	1	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
2008	1	15	0	0	2.828	0	0	0	0	0	0
	0	1	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				

MirrorRecS

1975	1	16	0	0	400	0	0	0	3	8	18
	22	124	435	1059	2645	3183	2660	2729	2587	1969	910
	662	705	717	495	354	236	129	69	57	41	19
	10	12	0	7	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1976	1	16	0	0	400	0	0	0	7	5	9
	35	91	160	381	1136	2293	2505	2364	3574	3567	2634
	1841	1329	1140	895	687	463	292	154	131	87	43
	31	31	0	14	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1977	1	16	0	0	400	0	0	0	35	86	114
	66	36	48	126	252	276	290	438	1081	1428	1372
	1514	1256	815	587	485	389	279	162	96	77	49
	41	25	0	8	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1978	1	16	0	0	400	0	0	0	24	26	293
	978	1346	1444	1622	1729	1059	343	261	389	669	863
	1218	1390	1348	1042	752	625	464	295	189	106	41
	34	21	0	6	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1986	1	16	0	0	400	0	0	0	3	1	17
	23	25	60	139	373	629	701	610	497	335	133
	68	58	86	91	79	72	47	38	13	8	2
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1987	1	16	0	0	400	0	0	0	1	0	0
	1	3	15	36	100	134	171	305	548	596	382

191 110 66 57 54 48 45 31 29 13 6
3 3 0 0 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1988 1 16 0 0 341 0 0 0 7 6 7
14 1 17 38 89 106 80 49 103 137 186
260 239 178 93 69 73 26 22 30 12 11
7 8 0 1 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1989 1 16 0 0 400 0 0 0 9 11 33
167 289 286 390 715 679 318 117 120 134 183
260 340 290 207 190 113 65 33 33 16 16
7 4 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0

22 #_N_age_bins
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

2 #_N_ageerror_definitions

vector 1: small errors and no bias
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001
0.001 0.001 0.001 0.001 0.001 0.001 0.001

Vector 2: Using all double read data from Don's file:
"C:\XiHe1\Boc2015\AgeData\Don_4_1_2015\DonAllLengthAndAgeData_4_1_2015Formated"
Analysis outputs: "C:\XiHe1\Boc2015\AgeData\AgeingError3\Setting6": agemat.rep
Use only data from south of 43
0.4920 1.4760 2.4599 3.4439 4.4279 5.4119 6.3958 7.3798 8.3638 9.3478 10.331711.3157
12.299713.283714.267615.251616.235617.219618.203519.187520.171521.1554
0.3077 0.3077 0.4346 0.5595 0.6825 0.8035 0.9227 1.0400 1.1554 1.2691 1.3809 1.4910
1.5994 1.7061 1.8111 1.9145 2.0162 2.1164 2.2150 2.3120 2.4076 2.5016

CAAL data
882
3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
0 #_combine males into females at or below this bin number

C:\XiHe1\Boc2015\AgeData\AgeAtLength\ALLCAALData3\AllCAALData.csv
#Yr Se Fi Ge Pa Ae LL LH NS F0 F1 F2
F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13
F14 F15 F16 F17 F18 F19 F20 F21 M0 M1 M2

	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
	M14	M15	M16	M17	M18	M19	M20	M21			
1980	1	1	3	0	2	38	38	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	40	40	2	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	42	42	7	0	0	1
	5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	44	44	3	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	46	46	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	50	50	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	54	54	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	56	56	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	58	58	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	62	62	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	1
	0	1	1	0	0	0	0	0			
1980	1	1	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	68	68	4	0	0	0
	0	0	0	0	0	0	0	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	1	3	0	2	72	72	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	30	30	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	36	36	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	40	40	4	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	42	42	5	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	44	44	7	0	0	0
	0	1	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	1	1	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	46	46	13	0	0	0
	0	1	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	3	2	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	48	48	9	0	0	0
	0	0	1	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	3	1	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	50	50	13	0	0	0
	0	0	2	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	0	4	1	1	1	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	52	52	15	0	0	0
	0	0	1	2	0	0	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	3	2	2	2	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	54	54	11	0	0	0
	0	0	0	1	0	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	3	1	0	1	0	0
	0	0	1	0	0	0	0	0			
1985	1	1	3	0	2	56	56	6	0	0	0
	0	0	0	0	1	0	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	1	0			
1985	1	1	3	0	2	58	58	13	0	0	0
	0	0	0	1	0	2	4	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	1	0	0	0	1	0	1	0			
1985	1	1	3	0	2	60	60	3	0	0	0
	0	0	0	0	0	1	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	62	62	3	0	0	0
	0	0	0	0	0	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1985	1	1	3	0	2	64	64	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	1	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	66	66	6	0	0	0
	0	0	0	0	0	0	1	0	1	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1			
1985	1	1	3	0	2	68	68	5	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	1	1	0	0	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	70	70	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	1	3	0	2	74	74	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	26	26	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	30	30	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	32	32	8	0	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	2
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	34	34	27	0	0	6
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	16
	1	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	36	36	34	0	0	8
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	18

	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	38	38	22	0	0	7
	6	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	8
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	40	40	6	0	0	3
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	42	42	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	44	44	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	46	46	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0			
1986	1	1	3	0	2	50	50	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	52	52	2	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	56	56	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0			
1986	1	1	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	0	0	0			
1986	1	1	3	0	2	60	60	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	3	0	2	70	70	2	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	32	32	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	34	34	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	36	36	8	0	0	2
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	38	38	24	0	0	4
	9	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	11	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	40	40	35	0	0	3
	11	3	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	6	4	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	42	42	34	0	0	5
	13	4	1	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	5	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	44	44	11	0	0	1
	3	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	46	46	8	0	0	1
	1	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	48	48	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	50	50	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	52	52	8	0	0	0
	0	0	0	0	0	0	1	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	1	0	0	0	0
	0	1	1	0	0	0	0	1			
1987	1	1	3	0	2	54	54	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	56	56	2	0	0	0
	0	0	0	0	0	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	34	34	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	36	36	4	0	0	3
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	38	38	3	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	40	40	11	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	3	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	42	42	19	0	0	1
	3	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	5	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	44	44	28	0	0	2
	4	4	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	10	1	5	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	46	46	24	0	0	0
	10	2	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	5	1	1	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	48	48	15	0	0	0
	4	1	2	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	3	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	50	50	7	0	0	0
	2	1	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	52	52	3	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0			
1988	1	1	3	0	2	54	54	2	0	0	0
	0	1	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	56	56	3	0	0	0
	0	0	0	0	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	60	60	3	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	62	62	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	64	64	5	0	0	0
	0	0	0	0	0	0	0	0	2	2	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	1	3	0	2	68	68	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1989	1	1	3	0	2	28	28	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	30	30	4	0	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	32	32	3	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	34	34	12	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	6
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	36	36	17	0	0	5
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4

	5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	38	38	11	0	0	1
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	3	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	40	40	14	0	0	0
	2	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	6	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	42	42	14	0	0	0
	2	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	5	4	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	44	44	16	0	0	0
	1	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	4	5	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	46	46	22	0	0	0
	2	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	8	4	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	48	48	23	0	0	0
	3	2	3	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	8	4	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	50	50	16	0	0	0
	1	9	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	52	52	11	0	0	0
	0	4	4	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	54	54	5	0	0	0
	1	0	2	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	56	56	6	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	1	0	0	0	0	2	1	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	58	58	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	62	62	1	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	66	66	2	0	0	0
	0	0	0	0	0	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	30	30	5	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	32	32	18	0	0	7
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	9
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	34	34	43	0	0	19
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	18
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	36	36	18	0	0	7
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	38	38	10	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	6	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	40	40	10	0	0	0
	2	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	42	42	12	0	0	0
	2	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	44	44	7	0	0	0
	2	2	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	46	46	7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	4	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	48	48	4	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	52	52	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	54	54	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	56	56	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1990	1	1	3	0	2	58	58	1	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	28	28	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	30	30	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	32	32	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	34	34	5	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	36	36	6	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	38	38	23	0	0	3
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	14	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	40	40	65	0	0	10
	12	1	1	0	0	0	0	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	11
	24	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	42	42	57	0	0	3
	20	5	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	20	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	44	44	31	0	0	2
	12	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	11	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	46	46	17	0	0	2
	5	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	4	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	48	48	9	0	0	1
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	2	4	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	50	50	7	0	0	0
	0	2	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	52	52	6	0	0	0
	0	1	1	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	54	54	11	0	0	0
	0	2	1	0	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	3	0	0	1	0	0	0	1	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	56	56	5	0	0	0
	0	2	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	58	58	3	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	1	0	0	0	0	0	0			
1991	1	1	3	0	2	60	60	6	0	0	0
	1	0	3	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	3	0	2	62	62	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0			
1991	1	1	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	30	30	5	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	32	32	8	0	2	4
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	34	34	13	0	0	7
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	36	36	11	0	1	4
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	38	38	6	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	40	40	12	0	0	3
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	5	1	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	42	42	26	0	0	0
	5	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	9	5	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	44	44	52	0	0	1
	11	9	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	15	12	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	46	46	50	0	0	2
	16	8	5	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	12	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	48	48	25	0	0	0
	6	4	2	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	6	2	1	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	50	50	19	0	0	0
	1	3	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	2	1	4	3	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	52	52	12	0	0	0
	1	1	1	1	1	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	1	1	0	0	1	0	0	1	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	54	54	11	0	0	0
	0	0	1	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	1	1	2	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	56	56	9	0	0	0
	0	0	0	2	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	0	0	0	1	1	0	0
	1	0	0	0	0	0	0	1			
1992	1	1	3	0	2	58	58	8	0	0	0
	0	1	1	0	1	1	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	1
	0	0	1	0	0	0	0	0			
1992	1	1	3	0	2	60	60	11	0	0	0
	0	0	1	5	3	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	62	62	8	0	0	0
	0	1	0	0	3	0	0	1	0	0	0
	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0			
1992	1	1	3	0	2	64	64	5	0	0	0
	0	0	0	0	1	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	1			
1992	1	1	3	0	2	66	66	3	0	0	0
	0	0	0	1	0	0	0	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	1	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	28	28	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	30	30	11	0	6	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	32	32	18	0	8	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	6	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	34	34	11	0	2	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	4
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	36	36	16	0	2	6
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	6
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	38	38	31	0	2	12
	7	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	3
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	40	40	27	0	1	4
	6	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	10
	3	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	42	42	31	0	0	1
	5	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	9	6	5	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	44	44	45	0	0	2
	7	3	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	7	17	2	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	46	46	43	0	0	0
	8	4	3	0	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	8	10	5	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	48	48	33	0	0	1
	5	10	7	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	50	50	25	0	0	0
	2	11	2	4	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	3	0	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	52	52	15	0	0	0
	0	3	5	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	4	1	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	54	54	9	0	0	0
	0	1	3	0	1	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	56	56	8	0	0	1
	0	1	2	0	0	1	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	58	58	6	0	0	0
	0	0	1	2	0	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0			
1993	1	1	3	0	2	60	60	3	0	0	0
	1	0	0	0	0	1	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	62	62	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	36	36	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	38	38	12	0	0	5
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	40	40	10	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4

	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	42	42	33	0	0	5
	4	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	13	4	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	44	44	35	0	0	0
	6	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	7	10	4	3	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	46	46	55	0	0	1
	8	2	2	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	3	9	11	10	4	2	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	48	48	31	0	0	0
	1	4	3	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	3	6	3	4	1	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	50	50	25	0	0	0
	0	3	4	5	2	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	2	1	1	1	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	52	52	21	0	0	0
	2	1	4	3	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	3	2	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	54	54	16	0	0	0
	1	2	2	2	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	2	0	0	0
	0	1	0	1	1	0	0	2			
1994	1	1	3	0	2	56	56	4	0	0	0
	0	0	3	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	1	0	0	0	0	0	0	0			
1994	1	1	3	0	2	60	60	5	0	0	0
	0	0	1	0	0	2	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0			
1994	1	1	3	0	2	62	62	2	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0			
1994	1	1	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0			
1994	1	1	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	1	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	30	30	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	34	34	5	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	36	36	8	0	0	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	38	38	39	0	0	17
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	22
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	40	40	44	0	0	25
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	13

	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	42	42	30	0	0	12
	1	1	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	8
	6	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	44	44	23	0	0	8
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5
	3	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	46	46	26	0	0	2
	5	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	4	8	4	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	48	48	31	0	0	0
	1	8	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	5	7	7	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	50	50	51	0	0	0
	3	5	2	2	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	3	9	10	4	6	2	1	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	52	52	46	0	0	0
	0	7	1	2	2	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	4	5	8	4	6	2	1	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	54	54	17	0	0	0
	0	1	0	2	3	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	4	3	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	56	56	18	0	0	0
	0	2	2	4	0	3	3	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	3	0	0	0	0	0
	0	0	1	0	0	0	0	0			
1999	1	1	3	0	2	58	58	11	0	0	0
	0	0	2	3	0	0	2	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	0	0
	1	0	0	0	0	0	0	0			
1999	1	1	3	0	2	60	60	8	0	0	0
	0	0	0	0	2	3	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	62	62	4	0	0	0
	0	0	0	0	1	1	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	64	64	5	0	0	0
	0	0	0	0	0	1	0	2	1	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	66	66	2	0	0	0
	0	0	0	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	28	28	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	30	30	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	36	36	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	38	38	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	40	40	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	42	42	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	44	44	5	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	46	46	5	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	48	48	10	0	0	0
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	50	50	13	0	0	1
	0	2	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	4	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	52	52	22	0	0	0
	0	11	5	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	1	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	54	54	16	0	0	0
	0	4	11	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	56	56	12	0	0	0
	0	1	7	3	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	58	58	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	60	60	6	0	0	0
	0	0	0	2	2	0	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	62	62	2	0	0	0
	0	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	64	64	4	0	0	0
	0	0	0	0	2	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	1	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	1	0	0	2	36	36	6	0	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	1	0	0	2	30	30	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	0	0	2	32	32	4	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	1	0	0	2	52	52	2	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	1	0	0	2	42	42	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	0	0	2	28	28	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	0	0	2	30	30	4	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	1	0	0	2	32	32	4	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	1	0	0	2	36	36	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	30	30	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	32	32	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	34	34	5	0	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	36	36	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	40	40	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	42	42	5	0	0	0
	1	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	44	44	3	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	46	46	3	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	48	48	20	0	0	0
	0	0	0	3	4	1	1	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	1	1	2	2	1	1	1
	0	0	0	0	0	0	0	0			
1986	1	2	3	0	2	50	50	18	0	0	0
	0	0	0	0	1	1	2	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	1	3	3	1	1
	1	1	1	0	0	0	0	0			
1986	1	2	3	0	2	52	52	16	0	0	0
	0	0	1	0	1	4	2	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	1	2	0
	0	0	2	0	0	0	0	0			
1986	1	2	3	0	2	54	54	18	0	0	0
	0	0	0	0	0	1	3	3	0	1	0
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	1	0	0
	1	2	1	0	0	0	0	1			
1986	1	2	3	0	2	56	56	9	0	0	0
	0	0	0	0	0	1	1	3	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	2	0	0	0	0	0	0			
1986	1	2	3	0	2	58	58	3	0	0	0
	0	0	0	0	0	0	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1986	1	2	3	0	2	60	60	4	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	1	0	0			
1986	1	2	3	0	2	62	62	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	30	30	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	32	32	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0			
1987	1	2	3	0	2	34	34	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	1	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	36	36	9	0	0	1
	0	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	1	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	38	38	14	0	0	2
	3	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	2	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	40	40	13	0	0	0
	3	4	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	42	42	8	0	0	0
	2	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	44	44	17	0	0	1
	0	4	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	2	0	1	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	46	46	11	0	0	0
	2	1	2	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	48	48	16	0	0	0
	2	0	0	1	1	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	1	1	1	1	0	2	1	1	0
	1	0	0	0	0	0	0	0			
1987	1	2	3	0	2	50	50	10	0	0	0
	0	0	0	0	1	0	0	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	3	0	0	0	0	1
	1	0	0	0	0	0	0	0			
1987	1	2	3	0	2	52	52	7	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	1	0	2	0	0	0
	0	0	0	0	0	1	0	0			
1987	1	2	3	0	2	54	54	9	0	0	0
	0	0	0	0	0	0	1	1	1	0	0
	2	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	2	0	0	1
	0	0	1	0	0	0	0	0			
1987	1	2	3	0	2	56	56	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	1			
1987	1	2	3	0	2	58	58	8	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	1	1	0	0	0	0	0	1	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	1	1	0	0	0	0	0	0			
1987	1	2	3	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	2	3	0	2	64	64	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	42	42	5	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	3	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	44	44	5	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	46	46	5	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	48	48	6	0	0	0
	1	0	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	50	50	8	0	0	0
	0	3	1	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	1	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	52	52	4	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0

	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	54	54	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	56	56	4	0	0	0
	0	0	0	1	0	0	0	1	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	42	42	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	44	44	9	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	2	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	46	46	12	0	0	0
	0	2	0	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	0	2	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	48	48	10	0	0	0
	0	2	0	3	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	50	50	14	0	0	0
	0	0	2	1	3	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	3	2	0	1	0	1	0
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	52	52	12	0	0	0
	0	0	0	1	5	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	1	0	0	0	0	0
	0	0	0	0	1	0	1	0			
1989	1	2	3	0	2	54	54	6	0	0	0
	0	1	1	2	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0			
1989	1	2	3	0	2	56	56	7	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	1	0
	1	0	0	0	0	0	0	2			
1989	1	2	3	0	2	58	58	8	0	0	0
	0	0	0	0	0	0	1	1	1	0	2
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0			
1989	1	2	3	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	62	62	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1999	1	2	3	0	2	44	44	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	46	46	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	48	48	7	0	0	0
	4	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	50	50	10	0	0	0
	2	3	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	52	52	4	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0			
1999	1	2	3	0	2	54	54	11	0	0	0
	0	1	0	1	1	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	3	1	1	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	56	56	15	0	0	0
	0	2	5	2	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	58	58	7	1	0	0
	0	1	0	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	0	1	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	60	60	6	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	1	0	2	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	62	62	3	0	0	0
	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	2	3	0	2	64	64	3	0	0	0
	0	0	0	0	1	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	0	0	2	46	46	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	2	0	0	2	54	54	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	0	0	0	0	0	0			
1988	1	2	0	0	2	58	58	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0			
1989	1	2	0	0	2	30	30	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	36	36	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	40	40	4	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	42	42	4	0	0	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	44	44	4	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	46	46	4	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	48	48	8	0	0	0
	1	0	0	2	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	2	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	50	50	4	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	52	52	2	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	54	54	4	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	1	1	0	0	0			
1989	1	2	0	0	2	56	56	5	0	0	0
	0	0	0	0	1	0	0	1	0	0	0
	0	0	0	0	1	0	0	0	0	0	0

	0	0	0	0	1	0	0	1	0	0	0
	0	0	0	0	1	0	0	0			
1989	1	2	0	0	2	58	58	2	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	2	0	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0			
1989	1	2	0	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1985	1	3	3	0	2	46	46	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	3	3	0	2	50	50	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	3	3	0	2	52	52	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	3	3	0	2	54	54	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	3	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	1	0			
1985	1	3	3	0	2	60	60	3	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	1	0	0	0	0			
1985	1	3	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1			
1985	1	3	3	0	2	66	66	3	0	0	0
	0	0	0	0	1	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0			
1986	1	3	3	0	2	66	66	2	0	0	0
	0	0	0	0	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	3	3	0	2	68	68	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	3	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	3	3	0	2	74	74	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	40	40	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	42	42	5	0	0	0
	1	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	46	46	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	52	52	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	54	54	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	56	56	2	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0			
1987	1	3	3	0	2	62	62	2	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	64	64	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1987	1	3	3	0	2	66	66	2	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	36	36	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	42	42	3	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	44	44	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	46	46	9	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	3	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	48	48	8	0	0	0
	0	0	1	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	3	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	50	50	6	0	0	0
	0	1	1	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	52	52	7	0	0	0
	1	0	1	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0			
1990	1	3	3	0	2	54	54	5	0	0	0
	0	0	1	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	1	0			
1990	1	3	3	0	2	56	56	2	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1990	1	3	3	0	2	62	62	2	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	52	52	2	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	54	54	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	56	56	2	0	0	0
	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	60	60	4	0	0	0
	0	0	0	2	0	1	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	62	62	2	0	0	0
	0	0	0	0	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	1	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	3	3	0	2	66	66	3	0	0	0
	0	0	0	0	0	0	2	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	38	38	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	40	40	5	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	42	42	9	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	2	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	44	44	39	0	0	3
	7	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	7
	19	1	1	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	46	46	39	0	0	3
	11	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	7
	12	3	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	48	48	21	0	0	0
	10	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	4	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	50	50	11	0	0	0
	3	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	52	52	18	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	5	4	5	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	54	54	11	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	4	2	1	1	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	56	56	17	0	0	0
	0	1	0	2	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	2	2	2	3	0	1	0	1
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	58	58	22	0	0	0
	0	0	1	3	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	5	1	3	2	2	2
	0	0	0	0	1	0	0	0			
1978	1	6	3	0	2	60	60	7	0	0	0
	1	0	1	0	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	0	0	0	0	0	0			
1978	1	6	3	0	2	62	62	6	0	0	0
	0	0	0	0	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1978	1	6	3	0	2	64	64	12	0	0	0
	0	1	0	2	1	3	1	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2			
1978	1	6	3	0	2	66	66	13	0	0	0
	0	0	0	0	0	1	1	3	1	2	2
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0			
1978	1	6	3	0	2	68	68	13	0	0	0
	0	0	1	0	0	0	0	2	2	1	1
	2	2	0	1	0	0	0	1	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	70	70	8	0	0	0
	0	0	0	0	0	0	0	2	0	1	1
	2	1	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	72	72	2	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	74	74	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1978	1	6	3	0	2	76	76	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	34	34	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	36	36	6	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	38	38	23	0	0	7
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	11
	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	40	40	16	0	0	7
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	42	42	10	0	0	6
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	44	44	10	0	0	5
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	46	46	2	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	48	48	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	50	50	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	52	52	7	0	0	0
	0	1	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	54	54	8	0	0	0
	0	1	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	56	56	6	0	0	0
	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	1	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	58	58	3	0	0	0
	0	0	1	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	60	60	11	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	2	1	1	0
	1	0	1	0	2	0	0	1			
1980	1	6	3	0	2	62	62	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	64	64	6	0	0	0
	0	0	0	0	0	1	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	1	0	1
	0	0	1	0	0	0	0	0			
1980	1	6	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	70	70	2	0	0	0
	0	0	0	0	0	0	0	0	1	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	38	38	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	40	40	2	0	0	0
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	44	44	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	46	46	4	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	48	48	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	3	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	50	50	29	0	0	0
	0	0	0	3	3	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	5	6	7	3	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	52	52	36	0	0	0
	0	0	1	3	4	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	2	8	10	4	1	1	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	54	54	30	0	0	0
	0	0	0	2	3	3	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	5	6	7	1	0	0	0
	0	1	0	0	0	0	0	0			
1985	1	6	3	0	2	56	56	25	0	0	0
	0	0	0	2	2	3	3	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	3	4	2	1	1	0	1
	0	0	0	1	0	0	0	0			
1985	1	6	3	0	2	58	58	21	0	0	0
	0	0	0	0	3	6	5	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	2	0	0	1	0	1	1			
1985	1	6	3	0	2	60	60	30	0	0	0
	0	0	0	0	7	11	6	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	1	0	0	0	1	0	0	0			
1985	1	6	3	0	2	62	62	11	0	0	0
	0	0	0	0	3	1	2	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	1	0	2			
1985	1	6	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	2	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	72	72	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	3	0	2	76	76	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	34	34	3	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	36	36	13	0	2	5
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	6
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	38	38	9	0	0	3
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	40	40	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	42	42	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	48	48	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	50	50	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	3	2	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	52	52	16	0	0	0
	0	0	0	1	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	5	3	2	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	54	54	36	0	0	0
	0	0	0	0	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	1	4	9	12	4	2	0	1
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	56	56	28	0	0	0
	0	0	0	1	3	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	4	8	4	5	0	0	1
	0	0	1	0	0	0	0	0			
1986	1	6	3	0	2	58	58	22	0	0	0
	0	0	0	1	3	2	2	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	3	5	1	0	0	1
	0	1	0	0	0	0	0	1			
1986	1	6	3	0	2	60	60	15	0	0	0
	0	0	0	1	0	3	5	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	0	0	0
	0	0	0	0	0	0	0	2			
1986	1	6	3	0	2	62	62	10	0	0	0
	0	0	0	0	2	3	5	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	64	64	17	0	0	0
	0	0	0	0	0	6	4	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	1	0	1	1			
1986	1	6	3	0	2	66	66	5	0	0	0
	0	0	0	0	0	1	1	0	0	0	0
	2	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	6	3	0	2	74	74	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	32	32	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	36	36	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	38	38	13	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	8	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	40	40	26	0	0	0
	8	2	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	10	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	42	42	28	0	0	0
	7	1	1	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	11	5	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	44	44	17	0	0	0
	6	6	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	3	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	46	46	2	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	50	50	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	52	52	5	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	1	1	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	54	54	9	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	3	3	0	0	0	1
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	56	56	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	1	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	58	58	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	60	60	3	0	0	0
	0	0	0	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	62	62	2	0	0	0
	0	0	0	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	64	64	6	0	0	0
	0	0	0	0	1	0	1	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	66	66	11	0	0	0
	0	0	0	0	1	2	3	2	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1987	1	6	3	0	2	68	68	4	0	0	0
	0	0	0	0	0	3	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	6	3	0	2	72	72	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	38	38	3	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	40	40	4	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	42	42	15	0	0	3
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5
	5	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	44	44	24	0	0	0
	7	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3

	11	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	46	46	35	0	0	2
	8	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	19	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	48	48	39	0	0	2
	18	8	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	5	5	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	50	50	13	0	0	0
	5	1	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	52	52	12	0	0	0
	5	3	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	2	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	54	54	5	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	1	1	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	56	56	9	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	1	2	3	1	1
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	58	58	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	1	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	60	60	4	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	1			
1988	1	6	3	0	2	62	62	5	0	0	0
	0	0	0	0	0	0	1	2	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0			
1988	1	6	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	0	0	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	66	66	2	0	0	0
	0	0	0	0	0	0	0	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	70	70	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	6	3	0	2	76	76	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	32	32	3	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	34	34	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	42	42	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	44	44	8	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	3	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	46	46	21	0	0	0
	1	2	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	3	6	7	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	48	48	18	0	0	0
	0	2	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	10	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	50	50	13	0	0	0
	0	6	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	2	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	52	52	15	0	0	1
	1	8	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	54	54	4	0	0	0
	1	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	56	56	9	0	0	0
	0	1	0	3	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	2	0	0	0	0	0
	1	0	0	0	0	0	0	0			
1989	1	6	3	0	2	58	58	5	0	0	0
	0	2	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	60	60	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	62	62	3	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0			
1989	1	6	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	34	34	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	36	36	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	38	38	18	0	0	1
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4

	9	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	40	40	45	0	0	7
	12	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	8
	14	4	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	42	42	47	0	0	4
	11	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	24	1	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	44	44	38	0	0	1
	13	3	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	12	8	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	46	46	20	0	0	0
	6	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	6	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	48	48	20	0	0	0
	5	5	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	4	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	50	50	17	0	0	0
	0	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	3	1	3	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	52	52	16	0	0	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	6	3	3	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	54	54	19	0	0	0
	1	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	5	4	2	0	1	0	0	0	0
	0	0	0	1	0	0	0	0			
1991	1	6	3	0	2	56	56	18	0	0	0
	0	3	2	5	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	1	0	0	0	1	0	0
	1	2	0	0	0	0	0	0			
1991	1	6	3	0	2	58	58	13	0	0	0
	1	0	2	3	1	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	1	0	0	1	3	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	60	60	14	0	0	0
	0	1	3	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	1	0	0	0	0
	1	1	0	1	2	0	0	1			
1991	1	6	3	0	2	62	62	9	0	0	0
	0	0	3	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	1	1	1			
1991	1	6	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	68	68	1	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1991	1	6	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	34	34	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	36	36	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	38	38	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	42	42	7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	1	0	2	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	44	44	11	0	0	0
	0	1	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	2	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	46	46	32	0	0	0
	4	6	0	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	8	7	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	48	48	29	0	0	0
	5	4	2	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	6	5	4	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	50	50	15	0	0	0
	2	3	2	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	1	2	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	52	52	12	0	0	0
	0	2	3	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	2	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	54	54	17	0	0	0
	0	3	1	2	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	5	0	1	2	0	1	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	56	56	10	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	3	2	1	0	0	0	0
	1	0	0	0	0	0	0	0			
1992	1	6	3	0	2	58	58	7	0	0	0
	0	0	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	0	0	2	0	0	0
	0	0	0	1	0	0	0	0			
1992	1	6	3	0	2	60	60	17	0	0	0
	0	0	1	2	2	3	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	1
	2	1	0	0	0	0	0	1			
1992	1	6	3	0	2	62	62	5	0	0	0
	0	0	0	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	1	0	0	0			
1992	1	6	3	0	2	64	64	4	0	0	0
	0	0	1	0	0	0	0	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0			
1992	1	6	3	0	2	66	66	3	0	0	0
	0	0	0	0	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0			
1992	1	6	3	0	2	68	68	2	0	0	0
	0	0	0	0	0	0	0	0	1	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	70	70	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1992	1	6	3	0	2	72	72	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	36	36	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	40	40	4	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	42	42	6	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	44	44	9	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	5	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	46	46	27	0	0	0
	1	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	6	8	9	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	48	48	39	0	0	0
	0	8	0	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	4	13	10	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	50	50	22	0	0	0
	0	4	5	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	4	3	1	1	2	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	52	52	48	0	0	0
	0	7	8	2	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	5	5	9	3	4	0	0	1	0
	0	0	1	0	0	0	0	0			
1993	1	6	3	0	2	54	54	20	0	0	0
	1	1	4	1	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2	0	4	2	0	1	0	0
	0	1	0	0	0	0	0	0			
1993	1	6	3	0	2	56	56	4	0	0	0
	0	0	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	58	58	8	0	0	0
	0	0	0	0	0	1	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	2
	1	0	0	0	0	0	0	0			
1993	1	6	3	0	2	60	60	9	0	0	0
	0	0	1	0	1	3	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	1	0	0	0	0	0	1			
1993	1	6	3	0	2	62	62	8	0	0	0
	0	0	0	0	1	2	0	0	0	0	0
	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	2			
1993	1	6	3	0	2	64	64	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	68	68	2	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1993	1	6	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	38	38	4	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	40	40	3	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	42	42	12	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	5	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	44	44	24	0	0	0
	5	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5
	9	2	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	46	46	14	0	0	0
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	10	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	48	48	28	0	0	0
	1	4	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	6	8	6	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	50	50	41	0	0	0
	1	3	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	5	13	13	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	52	52	34	0	0	0
	1	1	2	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	2	12	6	5	2	1	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	54	54	24	0	0	0
	0	4	2	4	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	1	1	3	4	2	0	3	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	56	56	24	0	0	0
	0	1	7	3	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	3	2	2	1	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	58	58	17	0	0	0
	0	2	1	3	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	3	0	1	2
	0	0	0	0	0	0	0	1			
1994	1	6	3	0	2	60	60	14	0	0	0
	0	0	3	1	1	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	4	1	0	0	0	1			
1994	1	6	3	0	2	62	62	9	0	0	0
	0	0	1	0	2	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	2	0	0	0	0	2			
1994	1	6	3	0	2	64	64	8	0	0	0
	0	0	1	0	0	2	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	3			
1994	1	6	3	0	2	66	66	7	0	0	0
	0	0	0	0	0	3	1	0	0	0	0
	0	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
1994	1	6	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	70	70	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1994	1	6	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	6	3	0	2	58	58	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1999	1	6	3	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	1	0	0			
1999	1	6	3	0	2	62	62	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	1	1	0	0	0	0			
1999	1	6	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	34	34	4	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	36	36	6	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	38	38	18	0	0	9
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	9
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	40	40	6	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	42	42	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	44	44	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	46	46	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	48	48	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	50	50	4	0	0	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	52	52	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1980	1	6	0	0	2	56	56	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	0	0	2	54	54	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	0	0	2	56	56	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1985	1	6	0	0	2	66	66	2	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	12	12	3	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	14	14	3	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	16	16	4	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	18	18	4	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	26	26	3	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	28	28	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	34	34	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	36	36	2	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	40	40	4	0	0	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	42	42	4	0	0	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	44	44	4	0	0	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	46	46	11	0	0	1
	6	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	48	48	8	0	0	0
	0	1	2	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0

	0	3	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	50	50	13	0	0	0
	2	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	2	0	0	2	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	52	52	8	0	0	0
	1	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	54	54	6	0	0	0
	0	0	1	1	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	56	56	5	0	0	0
	0	0	2	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	58	58	5	0	0	0
	0	0	0	0	1	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	0	0	0	0	0
	0	0	0	1	0	0	0	0			
2003	1	11	3	0	2	60	60	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	62	62	6	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	1	0	0	0	0	2	0	0	0
	0	0	0	1	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	64	64	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0			
2003	1	11	3	0	2	66	66	5	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
2003	1	11	3	0	2	70	70	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0			
2003	1	11	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0			
2003	1	11	3	0	2	76	76	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1			
2004	1	11	3	0	2	14	14	8	5	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	18	18	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	22	22	2	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	24	24	5	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	26	26	12	4	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	28	28	19	5	5	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	5	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	30	30	11	2	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	3	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	32	32	4	0	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	34	34	5	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	36	36	3	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	38	38	11	0	0	5
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	2
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	40	40	5	0	0	1
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	42	42	5	0	0	2
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	44	44	6	0	0	0
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	46	46	12	0	0	0
	0	3	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	3	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	48	48	10	0	0	0
	0	1	4	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	50	50	30	0	0	0
	0	7	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	1	7	9	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	52	52	25	0	0	0
	0	3	3	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	3	7	2	1	0	0	0	1	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	54	54	17	0	0	0
	0	0	2	0	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	3	2	4	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	56	56	14	0	0	0
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	6	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	58	58	8	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2	2	2	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	62	62	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	1	0	1	0	0	1	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	64	64	2	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	66	66	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	1	0	0	0	0	0			
2004	1	11	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2004	1	11	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	10	10	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	12	12	6	6	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	14	14	11	8	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	16	16	15	9	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	6	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	18	18	2	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	20	20	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	22	22	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	24	24	8	6	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	26	26	8	5	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	28	28	6	2	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	30	30	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	32	32	13	0	8	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	34	34	8	0	3	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	36	36	16	0	7	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	6	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	38	38	5	0	2	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	40	40	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	42	42	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	44	44	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	46	46	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	48	48	11	0	0	0
	2	1	3	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	3	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	50	50	14	0	0	0
	1	0	4	3	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	52	52	14	0	0	0
	0	1	1	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	2	2	2	1	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	54	54	17	0	0	0
	0	2	3	3	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4	3	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	56	56	8	0	0	0
	0	0	0	0	0	0	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	3	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	58	58	5	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	60	60	6	0	0	0
	0	0	0	1	1	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	62	62	5	0	0	0
	0	0	1	0	2	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	68	68	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	1	0	1	0
	0	0	0	0	0	0	0	0			
2005	1	11	3	0	2	74	74	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	1	0			
2006	1	11	3	0	2	20	20	4	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	22	22	4	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	24	24	10	7	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	26	26	18	13	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	28	28	5	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	30	30	2	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	36	36	4	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	38	38	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	40	40	10	0	0	4
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4

	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	42	42	8	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	44	44	3	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	50	50	2	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	52	52	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	54	54	2	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	56	56	3	0	0	0
	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	58	58	6	0	0	0
	0	0	0	1	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	60	60	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	62	62	4	0	0	0
	0	0	0	1	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	66	66	3	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2006	1	11	3	0	2	68	68	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	1	0	0	1			
2006	1	11	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0			
2006	1	11	3	0	2	72	72	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	1	0	0	0			
2006	1	11	3	0	2	76	76	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0			
2007	1	11	3	0	2	18	18	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	30	30	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	32	32	4	0	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	34	34	12	0	6	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	36	36	5	0	2	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	38	38	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	40	40	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	44	44	3	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	46	46	11	0	0	0
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	6	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	48	48	8	0	0	0
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	4	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	50	50	4	0	0	0
	0	0	0	0	1	1	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	52	52	7	0	0	0
	0	0	1	2	1	2	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	54	54	7	0	0	0
	0	1	1	0	1	2	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	56	56	6	0	0	0
	0	0	0	0	1	2	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	58	58	8	0	0	0
	0	0	0	1	0	1	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	1	0	0	3	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	60	60	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	62	62	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2007	1	11	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	10	10	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	20	20	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	22	22	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	24	24	3	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	26	26	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	32	32	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	36	36	2	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	38	38	3	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	40	40	2	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	44	44	2	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	46	46	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	48	48	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	50	50	3	0	0	0
	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	52	52	6	0	0	0
	0	0	0	1	2	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	54	54	5	0	0	0
	0	0	0	0	0	1	0	0	1	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	56	56	12	0	0	0
	0	0	0	2	1	2	0	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	1	1	1	1	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	58	58	6	0	0	0
	0	0	1	1	0	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	60	60	6	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	1	0	0	0	1	0	0	0	0	0	0
	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	62	62	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	0	1	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	64	64	5	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	1	0	0	0
	0	0	0	0	0	0	0	0			
2008	1	11	3	0	2	66	66	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	0	1	1	0	0	0	0			
2008	1	11	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0			
2008	1	11	3	0	2	74	74	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	0	1	0	0			
2009	1	11	3	0	2	14	14	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	18	18	4	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	20	20	4	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	22	22	3	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	24	24	5	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	26	26	5	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	28	28	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	30	30	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	32	32	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	34	34	7	0	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	36	36	6	0	1	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	38	38	4	0	1	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	40	40	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	42	42	4	0	0	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	44	44	7	0	0	1
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	46	46	3	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	48	48	2	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	50	50	4	0	0	0
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	52	52	3	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	54	54	8	0	0	0
	0	0	1	1	3	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	56	56	2	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	58	58	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	60	60	4	0	0	0
	0	0	0	0	0	1	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	62	62	2	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2009	1	11	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	12	12	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	14	14	18	9	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	9	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	16	16	44	22	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	22	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	18	18	59	32	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	27	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	20	20	6	4	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	22	22	5	4	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	24	24	12	5	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	1	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	26	26	7	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	30	30	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	32	32	3	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	34	34	4	0	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	36	36	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	40	40	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	42	42	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	44	44	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	48	48	1	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	50	50	5	0	0	0
	0	0	1	1	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	54	54	8	0	0	0
	0	0	0	1	1	1	2	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	56	56	5	0	0	0
	0	0	0	0	0	0	0	1	0	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	1	0	0	0	0	0	0			
2010	1	11	3	0	2	58	58	5	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	2	0	1	0	0
	0	0	0	0	0	0	0	0			
2010	1	11	3	0	2	60	60	5	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	1	0
	0	0	0	0	0	0	0	1			
2010	1	11	3	0	2	62	62	4	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	1	0	0	0			
2010	1	11	3	0	2	72	72	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0			
2011	1	11	3	0	2	16	16	5	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	18	18	2	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	22	22	9	2	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	24	24	18	4	9	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	3	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	26	26	26	2	10	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	7	7	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	28	28	17	2	5	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	5	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	32	32	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	34	34	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	48	48	2	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	50	50	1	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	52	52	2	0	0	0
	0	0	0	0	0	0	0	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	54	54	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	56	56	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	58	58	4	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	1	0	0	0	1	0	0
	1	0	0	0	0	0	0	0			
2011	1	11	3	0	2	60	60	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	62	62	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	66	66	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2011	1	11	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0			
2012	1	11	3	0	2	12	12	21	19	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	14	14	33	30	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	16	16	17	8	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	9	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	18	18	18	10	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	8	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	20	20	7	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	22	22	2	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	24	24	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	26	26	9	4	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	28	28	40	15	16	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	6	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	30	30	45	3	21	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	17	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	32	32	29	0	14	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	10	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	34	34	73	0	38	11
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	15	9
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	36	36	59	0	23	12
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	11	13
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	38	38	26	0	4	8
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	7	6
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	40	40	6	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	42	42	12	0	0	6
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2

	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	44	44	12	0	0	4
	1	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	46	46	5	0	0	1
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	48	48	3	0	0	0
	0	0	0	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	50	50	11	0	0	0
	0	0	1	5	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	52	52	14	0	0	0
	0	0	1	1	1	2	5	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	54	54	24	0	0	0
	0	0	0	1	2	4	0	2	2	1	5
	0	0	1	0	0	0	0	1	0	0	0
	0	1	0	2	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	56	56	15	0	0	0
	0	0	0	0	1	1	1	1	2	0	1
	2	1	0	0	0	0	0	1	0	0	0
	0	0	1	1	0	0	1	1	0	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	58	58	8	0	0	0
	0	0	0	0	0	1	1	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	0	2	0	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	60	60	3	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	1	0	0	0	0	0	0	0			
2012	1	11	3	0	2	62	62	5	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	1	0	0	1	0	0	0

	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	64	64	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	0	1
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0			
2012	1	11	3	0	2	70	70	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	10	10	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	12	12	8	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	6	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	14	14	84	32	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	52	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	16	16	59	37	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	22	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	18	18	18	15	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	20	20	2	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	22	22	6	0	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	24	24	12	0	10	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	26	26	5	0	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	28	28	8	0	6	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	30	30	5	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	32	32	6	0	2	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	34	34	16	0	3	6
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	4
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	36	36	14	0	0	6
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	4
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	38	38	33	0	0	13
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	15
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	40	40	68	0	0	17
	22	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	18
	8	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	42	42	51	0	0	12
	20	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5

	11	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	44	44	23	0	0	0
	7	2	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	11	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	46	46	14	0	0	0
	4	3	0	0	3	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	48	48	19	0	0	0
	0	2	2	3	2	3	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	50	50	11	0	0	0
	0	0	1	1	0	4	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	52	52	9	0	0	0
	0	0	0	0	1	1	1	2	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	54	54	8	0	0	0
	0	0	0	0	0	1	2	1	1	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	56	56	4	0	0	0
	0	0	0	0	0	0	0	0	1	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	58	58	7	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	1	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	1	0	0	0	0	0	0	0			
2013	1	11	3	0	2	60	60	4	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	62	62	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	1	1	0	0	0	1	1
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	66	66	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2013	1	11	3	0	2	68	68	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	12	12	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	14	14	28	13	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	16	16	29	17	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	12	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	18	18	14	8	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	20	20	9	1	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	5	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	22	22	38	1	22	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	15	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	24	24	161	0	90	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	71	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	26	26	190	0	111	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	79	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	28	28	75	0	30	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	45	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	30	30	23	0	9	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	14	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	32	32	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	34	34	3	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	36	36	2	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	38	38	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	40	40	5	0	0	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	42	42	5	0	0	0
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	44	44	17	0	0	0
	7	5	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	2	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	46	46	21	0	0	0
	5	7	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	2	5	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	48	48	14	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	11	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	50	50	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	52	52	4	0	0	0
	0	0	0	2	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	54	54	2	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	56	56	4	0	0	0
	0	0	0	0	0	1	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	58	58	5	0	0	0
	0	0	0	0	0	0	1	0	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	60	60	11	0	0	0
	0	0	0	0	0	0	0	0	0	1	3
	1	1	0	1	0	0	1	0	0	0	0
	0	0	0	0	0	1	0	0	0	1	0
	0	1	0	0	0	0	0	0			
2014	1	11	3	0	2	62	62	9	0	0	0
	0	0	0	0	0	0	1	1	1	1	0
	0	2	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0			
2014	1	11	3	0	2	64	64	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0			
2014	1	11	3	0	2	66	66	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	2	1	0	0	0	0	0	0			
2014	1	11	3	0	2	68	68	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	1	0	0	0	0	0	0	0			

#
MEAN SIZE-AT-AGE
----
0 #_number of size-at-age observations; negative value excludes from likelihood
ENVIRONMENTAL DATA
----
0 #_number of environmental variables
0 #_number of environmental observations
0 # no wtfreq data
0 # no tag data
0 # no morphcomp data

#
999 #_end of data file

ENDDATA

Appendix E.2. Control File (boc1.ctl)

#V3.24U
#_data_and_control_files: boc1.dat // boc1.ctl
#_SS-V3.24U-
fast;_08/29/2014;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_11.2_Win64
1 #_N_Growth_Patterns
1 #_N_Morphs_Within_GrowthPattern
#_Cond 1 #_Morph_between/within_stdev_ratio (no read if N_morphs=1)
#_Cond 1 #vector_Morphdist_(-1_in_first_val_gives_normal_approx)
#
#_Cond 0 # N recruitment designs goes here if N_GP*nseas*area>1
#_Cond 0 # placeholder for recruitment interaction request
#_Cond 1 1 1 # example recruitment design element for GP=1, seas=1, area=1
#
#_Cond 0 # N_movement_definitions goes here if N_areas > 1
#_Cond 1.0 # first age that moves (real age at begin of season, not integer) also cond on do_migration>0
#_Cond 1 1 1 2 4 10 # example move definition for seas=1, morph=1, source=1 dest=2, age1=4, age2=10

#
2 #_Nblock_Patterns
 1 1 #_blocks_per_pattern
begin and end years of blocks
 2003 2014
 1995 2014
#
0.5 #_fracfemale
0 #_natM_type:_0=1Parm;
1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4=agespec_withseasinterpolate
  #_no additional input for selected M option; read 1P per morph
1 # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_speciific_K; 4=not implemented
0.5 #_Growth_Age_for_L1
25 #_Growth_Age_for_L2 (999 to use as Linf)
0 #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
0 #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A); 4 logSD=F(A)
1 #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-maturity by GP; 4=read age-fecundity by GP; 5=read fec and wt from wtatage.ss; 6=read length-maturity by GP
#_placeholder for empirical age- or length- maturity by growth pattern (female only)
1 #_First_Mature_Age
1 #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b; (4)eggs=a+b*L; (5)eggs=a+b*W
0 #_hermaphroditism option: 0=none; 1=age-specific fxn
2 #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from female-GP1, 3=like SS2 V1.x)
2 #_env/block/dev_adjust_method (1=standard; 2=logistic transform keeps in base parm bounds; 3=standard w/ no bound check)
#
#_growth_parms
#_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
 0.05 0.4 0.177807 -2.05066 3 0.516638 2 0 0 0 0 0.5 0 0 # NatM_p_1_Fem_GP_1
 1 45 18.3773 17.7256 -1 99 2 0 0 0 0 0.5 0 0 # L_at_Amin_Fem_GP_1
 60 80 67.3399 67.8153 -1 99 2 0 0 0 0 0.5 0 0 # L_at_Amax_Fem_GP_1
 0.05 0.25 0.226336 0.219878 -1 99 2 0 0 0 0 0.5 0 0 # VonBert_K_Fem_GP_1
 0.05 0.25 0.118216 0.116225 -1 99 6 0 0 0 0 0.5 0 0 # CV_young_Fem_GP_1
 0.05 0.25 0.0774223 0.0741631 -1 99 6 0 0 0 0 0.5 0 0 # CV_old_Fem_GP_1
 -0.5 0.5 0 0 -1 99 -2 0 0 0 0 0.5 0 0 # NatM_p_1_Mal_GP_1
 -1 1 0 0 -1 99 -2 0 0 0 0 0.5 0 0 # L_at_Amin_Mal_GP_1
 -1 1 -0.0828973 -0.0767574 -1 99 2 0 0 0 0 0.5 0 0 # L_at_Amax_Mal_GP_1
 -1 1 0.0807707 0.0575865 -1 99 2 0 0 0 0 0.5 0 0 # VonBert_K_Mal_GP_1
 -1 1 -0.0737669 -0.067776 -1 99 6 0 0 0 0 0.5 0 0 # CV_young_Mal_GP_1
 -1 1 0.00278005 0.0729374 -1 99 6 0 0 0 0 0.5 0 0 # CV_old_Mal_GP_1
 -3 3 7.355e-006 7.36e-006 -1 99 -3 0 0 0 0 0.5 0 0 # Wtlen_1_Fem
 -3 4 3.11359 3.11359 -1 99 -3 0 0 0 0 0.5 0 0 # Wtlen_2_Fem
 30 60 37.7 37.7 -1 99 -3 0 0 0 0 0.5 0 0 # Mat50%_Fem
 -3 3 -0.33397 -0.33397 -1 99 -3 0 0 0 0 0.5 0 0 # Mat_slope_Fem
 -3 300 254.9 254.9 -1 99 -3 0 0 0 0 0.5 0 0 # Eggs/kg_inter_Fem
 -3 30 20 20 -1 99 -3 0 0 0 0 0.5 0 0 # Eggs/kg_slope_wt_Fem

-3 3 7.355e-006 7.36e-006 -1 99 -3 0 0 0 0 0.5 0 0 # Wtlen_1_Mal
-3 4 3.11359 3.11359 -1 99 -3 0 0 0 0 0.5 0 0 # Wtlen_2_Mal
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_GP_1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Area_1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Seas_1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # CohortGrowDev
#
#_Cond 0 #custom_MG-env_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
#
#_Cond 0 #custom_MG-block_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
#_Cond No MG parm trends
#
#_seasonal_effects_on_biology_parms
0 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,malewtlen2,L1,K
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
#
#_Cond -4 #_MGparm_Dev_Phase
#
#_Spawner-Recruitment
3 #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop;
7=survival_3Parm; 8=Shepard_3Parm
#_LO HI INIT PRIOR PR_type SD PHASE
6 15 8.76861 8.6 -1 99 1 # SR_LN(R0)
0.21 0.99 0.773 0.773 2 0.147 -2 # SR_BH_steep
0 2 1 1 -1 99 -4 # SR_sigmaR
-5 5 0 0 -1 99 -3 # SR_envlink
-5 5 0 0 -1 99 -4 # SR_R1_offset
0 0.5 0 0 -1 99 -3 # SR_autocorr
0 #_SR_env_link
0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
1 #do_recdev: 0=none; 1=devvector; 2=simple deviations
1964 # first year of main recr_devs; early devs can preceed this era
2013 # last year of main recr_devs; forecast devs start in following year
2 #_recdev phase
1 # (0/1) to read 13 advanced options
1954 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
2 #_recdev_early_phase
0 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxphase+1)
1 #_lambda for Fcast_recr_like occurring before endyr+1
1970.78 #_last_early_yr_nobias_adj_in_MPD
1971.86 #_first_yr_fullbias_adj_in_MPD
2013.85 #_last_yr_fullbias_adj_in_MPD
2014.97 #_first_recent_yr_nobias_adj_in_MPD
0.9197 #_max_bias_adj_in_MPD (-1 to override ramp and set biasadj=1.0 for all estimated
recdevs)
0 #_period of cycles in recruitment (N parms read below)
-5 #min rec_dev
5 #max rec_dev
61 #_read_recdevs

#_end of advanced SR options
#
#_placeholder for full parameter lines for recruitment cycles
Specified recr devs to read
#_Yr Input_value # Final_value
1954 0.0518461 # 0.0518461
1955 -0.106855 # -0.106855
1956 -0.104737 # -0.104737
1957 0.155287 # 0.155287
1958 0.438775 # 0.438775
1959 0.555504 # 0.555504
1960 0.557534 # 0.557534
1961 0.496846 # 0.496846
1962 0.638184 # 0.638184
1963 0.58973# 0.58973
1964 0.590588 # 0.590588
1965 2.09616# 2.09616
1966 0.434999 # 0.434999
1967 0.470984 # 0.470984
1968 0.682005 # 0.682005
1969 0.872629 # 0.872629
1970 0.913772 # 0.913772
1971 0.0880331 # 0.0880331
1972 1.20007# 1.20007
1973 1.57256# 1.57256
1974 1.33844# 1.33844
1975 0.607134 # 0.607134
1976 -0.975031 # -0.975031
1977 2.12242# 2.12242
1978 1.78977# 1.78977
1979 0.275339 # 0.275339
1980 -0.102317 # -0.102317
1981 -0.862529 # -0.862529
1982 -1.68807 # -1.68807
1983 -1.32869 # -1.32869
1984 1.38639# 1.38639
1985 0.0845608 # 0.0845608
1986 -0.632668 # -0.632668
1987 -0.41946 # -0.41946
1988 1.02766# 1.02766
1989 -0.334905 # -0.334905
1990 -0.44772 # -0.44772
1991 -0.0778201 # -0.0778201
1992 -0.332932 # -0.332932
1993 -0.730764 # -0.730764
1994 -0.595931 # -0.595931
1995 -1.0128 # -1.0128
1996 -1.07275 # -1.07275
1997 -0.786507 # -0.786507
1998 -1.61975 # -1.61975
1999 1.16938# 1.16938

2000	-0.645505	#	-0.645505
2001	-1.06385	#	-1.06385
2002	-1.23291	#	-1.23291
2003	-0.0495487	#	-0.0495487
2004	-0.978288	#	-0.978288
2005	-0.538547	#	-0.538547
2006	-1.01866	#	-1.01866
2007	-1.07553	#	-1.07553
2008	-1.26922	#	-1.26922
2009	-0.526369	#	-0.526369
2010	0.484835	#	0.484835
2011	0.444521	#	0.444521
2012	-0.014731	#	-0.014731
2013	1.78156#	1.78156	
2014	-0.402235	#	-0.402235

#
all recruitment deviations
#DisplayOnly 0.0518461 # Early_RecrDev_1954
#DisplayOnly -0.106855 # Early_RecrDev_1955
#DisplayOnly -0.104737 # Early_RecrDev_1956
#DisplayOnly 0.155287 # Early_RecrDev_1957
#DisplayOnly 0.438775 # Early_RecrDev_1958
#DisplayOnly 0.555504 # Early_RecrDev_1959
#DisplayOnly 0.557534 # Early_RecrDev_1960
#DisplayOnly 0.496846 # Early_RecrDev_1961
#DisplayOnly 0.638184 # Early_RecrDev_1962
#DisplayOnly 0.58973 # Early_RecrDev_1963
#DisplayOnly 0.590588 # Main_RecrDev_1964
#DisplayOnly 2.09616 # Main_RecrDev_1965
#DisplayOnly 0.434999 # Main_RecrDev_1966
#DisplayOnly 0.470984 # Main_RecrDev_1967
#DisplayOnly 0.682005 # Main_RecrDev_1968
#DisplayOnly 0.872629 # Main_RecrDev_1969
#DisplayOnly 0.913772 # Main_RecrDev_1970
#DisplayOnly 0.0880331 # Main_RecrDev_1971
#DisplayOnly 1.20007 # Main_RecrDev_1972
#DisplayOnly 1.57256 # Main_RecrDev_1973
#DisplayOnly 1.33844 # Main_RecrDev_1974
#DisplayOnly 0.607134 # Main_RecrDev_1975
#DisplayOnly -0.975031 # Main_RecrDev_1976
#DisplayOnly 2.12242 # Main_RecrDev_1977
#DisplayOnly 1.78977 # Main_RecrDev_1978
#DisplayOnly 0.275339 # Main_RecrDev_1979
#DisplayOnly -0.102317 # Main_RecrDev_1980
#DisplayOnly -0.862529 # Main_RecrDev_1981
#DisplayOnly -1.68807 # Main_RecrDev_1982
#DisplayOnly -1.32869 # Main_RecrDev_1983
#DisplayOnly 1.38639 # Main_RecrDev_1984
#DisplayOnly 0.0845608 # Main_RecrDev_1985
#DisplayOnly -0.632668 # Main_RecrDev_1986

#DisplayOnly -0.41946 # Main_RecrDev_1987
#DisplayOnly 1.02766 # Main_RecrDev_1988
#DisplayOnly -0.334905 # Main_RecrDev_1989
#DisplayOnly -0.44772 # Main_RecrDev_1990
#DisplayOnly -0.0778201 # Main_RecrDev_1991
#DisplayOnly -0.332932 # Main_RecrDev_1992
#DisplayOnly -0.730764 # Main_RecrDev_1993
#DisplayOnly -0.595931 # Main_RecrDev_1994
#DisplayOnly -1.0128 # Main_RecrDev_1995
#DisplayOnly -1.07275 # Main_RecrDev_1996
#DisplayOnly -0.786507 # Main_RecrDev_1997
#DisplayOnly -1.61975 # Main_RecrDev_1998
#DisplayOnly 1.16938 # Main_RecrDev_1999
#DisplayOnly -0.645505 # Main_RecrDev_2000
#DisplayOnly -1.06385 # Main_RecrDev_2001
#DisplayOnly -1.23291 # Main_RecrDev_2002
#DisplayOnly -0.0495487 # Main_RecrDev_2003
#DisplayOnly -0.978288 # Main_RecrDev_2004
#DisplayOnly -0.538547 # Main_RecrDev_2005
#DisplayOnly -1.01866 # Main_RecrDev_2006
#DisplayOnly -1.07553 # Main_RecrDev_2007
#DisplayOnly -1.26922 # Main_RecrDev_2008
#DisplayOnly -0.526369 # Main_RecrDev_2009
#DisplayOnly 0.484835 # Main_RecrDev_2010
#DisplayOnly 0.444521 # Main_RecrDev_2011
#DisplayOnly -0.014731 # Main_RecrDev_2012
#DisplayOnly 1.78156 # Main_RecrDev_2013
#DisplayOnly -0.402235 # Late_RecrDev_2014
#DisplayOnly 0 # ForeRecr_2015
#DisplayOnly 0 # ForeRecr_2016
#DisplayOnly 0 # ForeRecr_2017
#DisplayOnly 0 # ForeRecr_2018
#DisplayOnly 0 # ForeRecr_2019
#DisplayOnly 0 # ForeRecr_2020
#DisplayOnly 0 # ForeRecr_2021
#DisplayOnly 0 # ForeRecr_2022
#DisplayOnly 0 # ForeRecr_2023
#DisplayOnly 0 # ForeRecr_2024
#DisplayOnly 0 # Impl_err_2015
#DisplayOnly 0 # Impl_err_2016
#DisplayOnly 0 # Impl_err_2017
#DisplayOnly 0 # Impl_err_2018
#DisplayOnly 0 # Impl_err_2019
#DisplayOnly 0 # Impl_err_2020
#DisplayOnly 0 # Impl_err_2021
#DisplayOnly 0 # Impl_err_2022
#DisplayOnly 0 # Impl_err_2023
#DisplayOnly 0 # Impl_err_2024
#
#Fishing Mortality info
0.2 # F ballpark for annual F (=Z-M) for specified year

-1999 # F ballpark year (neg value to disable)
3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
2.9 # max F or harvest rate, depends on F_Method
no additional F input needed for Fmethod 1
if Fmethod=2; read overall start F value; overall phase; N detailed inputs to read
if Fmethod=3; read N iterations for tuning for Fmethod 3
5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
#
#_initial_F_parms
#_LO HI INIT PRIOR PR_type SD PHASE
 0 0.1 0 0.01 -1 99 -2 # InitF_1TrawlSouth
 0.0001 0.05 0.00585879 0.007 -1 99 1 # InitF_2HL
 0 0.1 0 0.01 -1 99 -2 # InitF_3Setnet
 0 0.1 0 0.01 -1 99 -2 # InitF_4RecSouth
 0 0.1 0 0.01 -1 99 -2 # InitF_5RecCentral
 0 0.1 0 0.01 -1 99 -2 # InitF_6TrawlNorth
#
#_Q_setup
 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nobiasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_assign_to_parm
#_for_env-var:_enter_index_of_the_env-var_to_be_linked
#_Den-dep env-var extra_se Q_type
 0 0 1 0 # 1 TrawlSouth
 0 0 0 0 # 2 HL
 0 0 0 0 # 3 Setnet
 0 0 1 0 # 4 RecSouth
 0 0 1 0 # 5 RecCentral
 0 0 0 0 # 6 TrawlNorth
 0 0 1 0 # 7 CalCOFI
 0 0 0 0 # 8 Triennial
 0 0 1 0 # 9 CDFWEarlyOB
 0 0 1 0 # 10 NWFSCHook
 0 0 1 0 # 11 NWFSCTrawl
 0 0 1 0 # 12 Juvenile
 0 0 0 0 # 13 Rec2013   # set to 0 0 0 2 # 13 Rec2013
 0 0 1 0 # 14 PPIndex
 0 0 0 0 # 15 Free1
 0 0 0 0 # 16 MirrorRecS
 0 0 1 0 # 17 RecSouthOB
 0 0 1 0 # 18 RecCentralOB
#
#_Cond 0 #_If q has random component, then 0=read one parm for each fleet with random q; 1=read a parm for each year of index
#_Q_parms(if_any);Qunits_are_ln(q)
LO HI INIT PRIOR PR_type SD PHASE
 0.0001 1 0.0454897 0.04 -1 99 4 # Q_extraSD_1_TrawlSouth
 0.0001 1 0.327629 0.49 -1 99 4 # Q_extraSD_4_RecSouth
 0.0001 1 0.397071 0.66 -1 99 5 # Q_extraSD_5_RecCentral
 0.0001 1 0.141189 0.16 -1 99 4 # Q_extraSD_7_CalCOFI
 0.0001 1 0.26159 0.25 -1 99 4 # Q_extraSD_9_CDFWEarlyOB
 0.0001 1 0.227724 0.22 -1 99 4 # Q_extraSD_10_NWFSCHook

0.0001 1 0.0144308 0.02 -1 99 4 # Q_extraSD_11_NWFSCTrawl
0.0001 1 0.333607 0.39 -1 99 4 # Q_extraSD_12_Juvenile
0.0001 1 0.387465 0.38 -1 99 4 # Q_extraSD_14_PPIndex
0.0001 1 0.272491 0.44 -1 99 4 # Q_extraSD_17_RecSouthOB
0.0001 1 0.253869 0.23 -1 99 4 # Q_extraSD_18_RecCentralOB

activate next line for state of nature runs
-1 1 0 0.01 -1 99 -4 # Q_pier (fix 2013)

#
#_size_selex_types
#discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_discarded_dead
#_Pattern Discard Male Special
24 0 0 0 # 1 TrawlSouth
24 0 0 0 # 2 HL
24 0 0 0 # 3 Setnet
24 0 0 0 # 4 RecSouth
24 0 0 0 # 5 RecCentral
24 0 0 0 # 6 TrawlNorth
30 0 0 0 # 7 CalCOFI
24 0 0 0 # 8 Triennial
5 0 0 5 # 9 CDFWEarlyOB
24 0 0 0 # 10 NWFSCHook
24 0 0 0 # 11 NWFSCTrawl
33 0 0 0 # 12 Juvenile
0 0 0 0 # 13 PierJuv
0 0 0 0 # 14 PPIndex
5 0 0 1 # 15 Free1
5 0 0 4 # 16 MirrorRecS
5 0 0 4 # 17 RecSouthOB
5 0 0 5 # 18 RecCentralOB
#
#_age_selex_types
#_Pattern ___ Male Special
11 0 0 0 # 1 TrawlSouth
11 0 0 0 # 2 HL
11 0 0 0 # 3 Setnet
11 0 0 0 # 4 RecSouth
11 0 0 0 # 5 RecCentral
11 0 0 0 # 6 TrawlNorth
11 0 0 0 # 7 CalCOFI
11 0 0 0 # 8 Triennial
11 0 0 0 # 9 CDFWEarlyOB
11 0 0 0 # 10 NWFSCHook
11 0 0 0 # 11 NWFSCTrawl
11 0 0 0 # 12 Juvenile
11 0 0 0 # 13 PierJuv
11 0 0 0 # 14 PPIndex
11 0 0 0 # 15 Free1
11 0 0 0 # 16 MirrorRecS
11 0 0 0 # 17 RecSouthOB

11 0 0 0 # 18 RecCentralOB
#_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
16 60 43.5796 43.7321 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_1P_1_TrawlSouth
-20 1 -11.8636 -11.8577 -1 10 4 0 0 0 0 0.5 0 0 # SizeSel_1P_2_TrawlSouth
1 10 4.42901 4.42101 -1 10 4 0 0 0 0 0.5 1 2 # SizeSel_1P_3_TrawlSouth
-1 9 4.46058 4.59596 -1 10 4 0 0 0 0 0.5 1 2 # SizeSel_1P_4_TrawlSouth
-30 0 -16.2133 -16.2796 -1 10 4 0 0 0 0 0.5 0 0 # SizeSel_1P_5_TrawlSouth
-5 5 -1.43461 -1.51897 -1 10 4 0 0 0 0 0.5 1 2 # SizeSel_1P_6_TrawlSouth
16 60 50.0699 50.2935 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_2P_1_HL
-20 0 -11.3013 -11.1769 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_2P_2_HL
1 12 4.84391 4.85455 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_2P_3_HL
-1 9 4.01284 4.09085 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_2P_4_HL
-15 0 -7.73001 -7.65174 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_2P_5_HL
-5 5 -0.679325 -0.891802 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_2P_6_HL
16 60 47.6266 47.7691 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_3P_1_Setnet
-20 0 -12.1519 -12.0492 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_3P_2_Setnet
1 10 3.61475 3.62227 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_3P_3_Setnet
-1 9 3.89202 4.00071 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_3P_4_Setnet
-10 3 -6.34896 -6.40904 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_3P_5_Setnet
-5 5 -1.81281 -1.92151 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_3P_6_Setnet
So variable
Recruitment, are they rebuilt
Yet? Sorry, but no.
16 60 37.8737 37.8456 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_4P_1_RecSouth
-20 0 -10.8979 -4.03328 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_4P_2_RecSouth
1 10 4.65068 4.63756 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_4P_3_RecSouth
-1 9 5.58011 5.56413 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_4P_4_RecSouth
-10 2 -6.98725 -6.9658 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_4P_5_RecSouth
-10 9 -3.56635 -3.8711 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_4P_6_RecSouth
16 60 46.921 47.65 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_5P_1_RecCentral
-20 0 -11.2539 -11.3327 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_5P_2_RecCentral
1 10 5.52264 5.55578 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_5P_3_RecCentral
-1 9 3.7868 3.88992 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_5P_4_RecCentral
-10 2 -5.67895 -5.46783 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_5P_5_RecCentral
-10 9 0.238467 0.0533028 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_5P_6_RecCentral
16 60 45.3805 45.9359 -1 10 3 0 0 0 0 0.5 1 2 # SizeSel_6P_1_TrawlNorth
-5 5 -0.964416 -0.853133 -1 10 4 0 0 0 0 0.5 0 0 # SizeSel_6P_2_TrawlNorth
1 15 3.76057 3.8369 -1 10 4 0 0 0 0 0.5 1 2 # SizeSel_6P_3_TrawlNorth
-5 5 3.02073 2.9507 -1 10 4 0 0 0 0 0.5 1 2 # SizeSel_6P_4_TrawlNorth
-15 0 -9.02002 -9.40927 -1 10 4 0 0 0 0 0.5 0 0 # SizeSel_6P_5_TrawlNorth
-10 10 0.2819 0.0689498 -1 10 4 0 0 0 0 0.5 1 2 # SizeSel_6P_6_TrawlNorth
16 60 27.6111 28.0443 -1 10 2 0 0 0 0 0.5 2 2 # SizeSel_8P_1_Triennial
-20 0 -12.3096 -12.004 -1 10 2 0 0 0 0 0.5 0 0 # SizeSel_8P_2_Triennial
1 10 1.8321 1.92642 -1 10 2 0 0 0 0 0.5 2 2 # SizeSel_8P_3_Triennial
-20 3 -8.49997 -4.99989 -1 10 2 0 0 0 0 0.5 2 2 # SizeSel_8P_4_Triennial
-999 1 -999 -999 -1 10 -4 0 0 0 0 0.5 0 0 # SizeSel_8P_5_Triennial
-5 5 -0.925779 -0.913258 -1 10 2 0 0 0 0 0.5 2 2 # SizeSel_8P_6_Triennial
-1 10 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_9P_1_CDFWEarlyOB
-1 10 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_9P_2_CDFWEarlyOB
16 60 44.7602 43.8236 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_10P_1_NWFSCHook

-5 5 -1.53322 -1.42363 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_10P_2_NWFSCHook
-1 10 4.73391 4.66827 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_10P_3_NWFSCHook
-1 9 4.3325 4.31619 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_10P_4_NWFSCHook
-15 -5 -12.0499 -12.0962 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_10P_5_NWFSCHook
-5 5 -2.02641 -2.34605 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_10P_6_NWFSCHook
13 60 23.2121 23.1912 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_11P_1_NWFSCTrawl
-20 0 -11.613 -11.5426 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_11P_2_NWFSCTrawl
-5 15 -4.71033 -4.71677 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_11P_3_NWFSCTrawl
-1 9 6.52843 6.55647 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_11P_4_NWFSCTrawl
-15 5 0.481589 0.377822 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_11P_5_NWFSCTrawl
-5 5 -2.25518 -2.93515 -1 10 3 0 0 0 0 0.5 0 0 # SizeSel_11P_6_NWFSCTrawl
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_15P_1_Free1
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_15P_2_Free1
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_16P_1_MirrorRecS
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_16P_2_MirrorRecS
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_17P_1_RecSouthOB
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_17P_2_RecSouthOB
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_18P_1_RecCentralOB
-1 20 -1 -1 -1 99 -3 0 0 0 0 0.5 0 0 # SizeSel_18P_2_RecCentralOB
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_1P_1_TrawlSouth
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_1P_2_TrawlSouth
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_2P_1_HL
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_2P_2_HL
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_3P_1_Setnet
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_3P_2_Setnet
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_4P_1_RecSouth
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_4P_2_RecSouth
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_5P_1_RecCentral
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_5P_2_RecCentral
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_6P_1_TrawlNorth
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_6P_2_TrawlNorth
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_7P_1_CalCOFI
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_7P_2_CalCOFI
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_8P_1_Triennial
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_8P_2_Triennial
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_9P_1_CDFWEarlyOB
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_9P_2_CDFWEarlyOB
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_10P_1_NWFSCHook
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_10P_2_NWFSCHook
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_11P_1_NWFSCTrawl
0 41 34 34 0 99 -1 0 0 0 0 0.5 0 0 # AgeSel_11P_2_NWFSCTrawl
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_12P_1_Juvenile
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_12P_2_Juvenile
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_13P_1_PierJuv
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_13P_2_PierJuv
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_14P_1_PPIndex
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_14P_2_PPIndex
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_15P_1_Free1
0 41 40 40 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_15P_2_Free1
0 41 0 0 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_16P_1_MirrorRecS
0 41 40 40 -1 99 -1 0 0 0 0 0.5 0 0 # AgeSel_16P_2_MirrorRecS

0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_17P_1_RecSouthOB
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_17P_2_RecSouthOB
0 41 0.1 0.1 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_18P_1_RecCentralOB
0 41 34 34 -1 99 -2 0 0 0 0 0.5 0 0 # AgeSel_18P_2_RecCentralOB
#_Cond 0 #_custom_sel-env_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
1 #_custom_sel-blk_setup (0/1)
16 70 59.865 57.2955 -1 10 2 # SizeSel_1P_1_TrawlSouth_BLK1repl_2003
1 10 5.57778 5.78733 -1 10 4 # SizeSel_1P_3_TrawlSouth_BLK1repl_2003
-1 9 4.12777 4.07747 -1 10 4 # SizeSel_1P_4_TrawlSouth_BLK1repl_2003
-5 5 0.392998 0.0218787 -1 10 4 # SizeSel_1P_6_TrawlSouth_BLK1repl_2003
16 60 38.1995 37.5583 -1 10 2 # SizeSel_4P_1_RecSouth_BLK1repl_2003
1 15 4.30544 4.22662 -1 10 4 # SizeSel_4P_3_RecSouth_BLK1repl_2003
-5 5 4.76919 4.80844 -1 10 4 # SizeSel_4P_4_RecSouth_BLK1repl_2003
-10 10 -3.86819 -4.06332 -1 10 4 # SizeSel_4P_6_RecSouth_BLK1repl_2003
16 60 44.1685 43.4264 -1 10 2 # SizeSel_5P_1_RecCentral_BLK1repl_2003
1 10 4.65969 4.60145 -1 10 4 # SizeSel_5P_3_RecCentral_BLK1repl_2003
-1 9 4.35688 4.86781 -1 10 4 # SizeSel_5P_4_RecCentral_BLK1repl_2003
-5 5 -0.888652 -1.24814 -1 10 4 # SizeSel_5P_6_RecCentral_BLK1repl_2003
16 60 46.7888 44.323 -1 10 2 # SizeSel_6P_1_TrawlNorth_BLK1repl_2003
1 15 4.89293 4.66351 -1 10 4 # SizeSel_6P_3_TrawlNorth_BLK1repl_2003
-5 5 -0.0265696 -0.0248232 -1 10 4 # SizeSel_6P_4_TrawlNorth_BLK1repl_2003
-10 10 8.45151 8.38712 -1 10 4 # SizeSel_6P_6_TrawlNorth_BLK1repl_2003
16 60 22.9305 22.9248 -1 10 2 # SizeSel_8P_1_Triennial_BLK2repl_1995
1 15 1.21594 1.34611 -1 10 4 # SizeSel_8P_3_Triennial_BLK2repl_1995
-15 5 -7.55207 -7.36054 -1 10 4 # SizeSel_8P_4_Triennial_BLK2repl_1995
-10 10 -1.92865 -1.94337 -1 10 4 # SizeSel_8P_6_Triennial_BLK2repl_1995
#_Cond No selex parm trends
#_Cond -4 # placeholder for selparm_Dev_Phase
1 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to keep in base parm bounds; 3=standard w/ no bound check)
#
Tag loss and Tag reporting parameters go next
0 # TG_custom: 0=no read; 1=read if tags exist
#_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0 #_placeholder if no parameters
#
1 #_Variance_adjustments_to_input_values
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 #_add_to_survey_CV
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 #_add_to_discard_stddev
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 #_add_to_bodywt_CV
0.0827 0.1265 0.0398 0.1332 0.1056 0.111 1 0.1372 0.0699 0.0861 0.091 1 1 1 0.2125 0.1474 1 1 #_mult_by_lencomp_N
0.2241 0.3322 0.6781 1 1 0.2477 1 1 1 1 0.2214 1 1 1 1 1 1 1 #_mult_by_agecomp_N
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 #_mult_by_size-at-age_N
#
4 #_maxlambdaphase
1 #_sd_offset
#
54 # number of changes to make to default Lambdas (default value is 1.0)
Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=sizeage; 8=catch; 9=init_equ_catch;

10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14=Morphcomp; 15=Tag-comp; 16=Tag-negbin; 17=F_ballpark
#like_comp fleet/survey phase value sizefreq_method
```
 1 1 1 1 1
 1 2 1 1 1
 1 3 1 1 1
 1 4 1 1 1
 1 5 1 1 1
 1 6 1 1 1
 1 7 1 1 1
 1 8 1 1 1
 1 9 1 1 1
 1 10 1 1 1
 1 11 1 1 1
 1 12 1 1 1
 1 13 1 0 1                    # set to 1 13 1 1 1          # for low and hight state of nature runs
 1 14 1 1 1
 1 15 1 1 1
 1 16 1 1 1
 1 17 1 1 1
 1 18 1 1 1
 4 1 1 1 1
 4 2 1 1 1
 4 3 1 1 1
 4 4 1 1 1
 4 5 1 1 1
 4 6 1 1 1
 4 7 1 1 1
 4 8 1 1 1
 4 9 1 1 1
 4 10 1 1 1
 4 11 1 1 1
 4 12 1 1 1
 4 13 1 1 1
 4 14 1 1 1
 4 15 1 0 1
 4 16 1 1 1
 4 17 1 0 1
 4 18 1 0 1
 5 1 1 1 1
 5 2 1 1 1
 5 3 1 1 1
 5 4 1 1 1
 5 5 1 1 1
 5 6 1 1 1
 5 7 1 1 1
 5 8 1 1 1
 5 9 1 1 1
 5 10 1 1 1
 5 11 1 1 1
 5 12 1 1 1
```

```
 5 13 1 1 1
 5 14 1 1 1
 5 15 1 0 1
 5 16 1 1 1
 5 17 1 0 1
 5 18 1 0 1
#
# lambdas (for info only; columns are phases)
#  1 1 1 1 #_CPUE/survey:_1
#  0 0 0 0 #_CPUE/survey:_2
#  0 0 0 0 #_CPUE/survey:_3
#  1 1 1 1 #_CPUE/survey:_4
#  1 1 1 1 #_CPUE/survey:_5
#  0 0 0 0 #_CPUE/survey:_6
#  1 1 1 1 #_CPUE/survey:_7
#  1 1 1 1 #_CPUE/survey:_8
#  1 1 1 1 #_CPUE/survey:_9
#  1 1 1 1 #_CPUE/survey:_10
#  1 1 1 1 #_CPUE/survey:_11
#  1 1 1 1 #_CPUE/survey:_12
#  0 0 0 0 #_CPUE/survey:_13
#  1 1 1 1 #_CPUE/survey:_14
#  0 0 0 0 #_CPUE/survey:_15
#  0 0 0 0 #_CPUE/survey:_16
#  1 1 1 1 #_CPUE/survey:_17
#  1 1 1 1 #_CPUE/survey:_18
#  1 1 1 1 #_lencomp:_1
#  1 1 1 1 #_lencomp:_2
#  1 1 1 1 #_lencomp:_3
#  1 1 1 1 #_lencomp:_4
#  1 1 1 1 #_lencomp:_5
#  1 1 1 1 #_lencomp:_6
#  0 0 0 0 #_lencomp:_7
#  1 1 1 1 #_lencomp:_8
#  1 1 1 1 #_lencomp:_9
#  1 1 1 1 #_lencomp:_10
#  1 1 1 1 #_lencomp:_11
#  0 0 0 0 #_lencomp:_12
#  0 0 0 0 #_lencomp:_13
#  0 0 0 0 #_lencomp:_14
#  0 0 0 0 #_lencomp:_15
#  1 1 1 1 #_lencomp:_16
#  0 0 0 0 #_lencomp:_17
#  0 0 0 0 #_lencomp:_18
#  1 1 1 1 #_agecomp:_1
#  1 1 1 1 #_agecomp:_2
#  1 1 1 1 #_agecomp:_3
#  0 0 0 0 #_agecomp:_4
#  0 0 0 0 #_agecomp:_5
#  1 1 1 1 #_agecomp:_6
#  0 0 0 0 #_agecomp:_7
```

0 0 0 0 #_agecomp:_8
0 0 0 0 #_agecomp:_9
0 0 0 0 #_agecomp:_10
1 1 1 1 #_agecomp:_11
0 0 0 0 #_agecomp:_12
0 0 0 0 #_agecomp:_13
0 0 0 0 #_agecomp:_14
0 0 0 0 #_agecomp:_15
0 0 0 0 #_agecomp:_16
0 0 0 0 #_agecomp:_17
0 0 0 0 #_agecomp:_18
1 1 1 1 #_init_equ_catch
1 1 1 1 #_recruitments
1 1 1 1 #_parameter-priors
1 1 1 1 #_parameter-dev-vectors
1 1 1 1 #_crashPenLambda
0 0 0 0 # F_ballpark_lambda
0 # (0/1) read specs for more stddev reporting
 # 0 1 -1 5 1 5 1 -1 5 # placeholder for selex type, len/age, year, N selex bins, Growth pattern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
 # placeholder for vector of selex bins to be reported
 # placeholder for vector of growth ages to be reported
 # placeholder for vector of NatAges ages to be reported
999

Appendix E.3. Starter File (starter.ss)

#V3.24U
#C starter comment here
boc1.dat
boc1.ctl
0 # 0=use init values in control file; 1=use ss3.par
1 # run display detail (0,1,2)
2 # detailed age-structured reports in REPORT.SSO (0,1)
0 # write detailed info from first call to echoinput.sso (0,1)
0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms; 4=every,active)
1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
1 # Include prior_like for non-estimated parameters (0,1)
1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
3 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and higher are bootstrap
7 # Turn off estimation for parameters entering after this phase
10 # MCeval burn interval
2 # MCeval thin interval
0.0 # jitter initial parm value by this fraction
-1 # min yr for sdreport outputs (-1 for styr)
-2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs
0 # N individual STD years
#vector of year values

0.0001 # final convergence criteria (e.g. 1.0e-04)
0 # retrospective year relative to end year (e.g. -4)
1 # min age for calc of summary biomass
1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B_styr
1 # Fraction (X) for Depletion denominator (e.g. 0.4)
1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY); 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum(Frates); 4=true F for range of ages
#COND 10 15 #_min and max age over which average F will be calculated with F_reporting=4
0 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
999 # check value for end of file

Appendix E.4. Forecast File (forecast.ss)

#V3.24U
#C generic forecast file
for all year entries except rebuilder; enter either: actual year, -999 for styr, 0 for endyr, neg number for rel. endyr
1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endyr)
0.5 # SPR target (e.g. 0.40)
0.777 # rebuidling SPR - second catch stream
0.4 # Biomass target (e.g. 0.40)
#_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
0 0 0 0 0 0
2014 2014 2014 2014 2014 2014 # after processing
1 #Bmark_relF_Basis: 1 = use year range; 2 = set relF same as forecast below
#
1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-last relF yrs); 5=input annual F scalar
10 # N forecast years
1 # F scalar (only used for Do_Forecast==5)
#_Fcast_years: beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
0 0 0 0
2014 2014 2011 2014 # after processing
1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB))
0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40); (Must be > the no F level below)
0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)

1 # Control rule target as fraction of Flimit (e.g. 0.75)
0.956 # control rule target as fraction Flimit (third catch stream - based on sigma)

3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch with allocations applied)
3 #_First forecast loop with stochastic recruitment

```
0	#_Forecast loop control #3 (reserved for future bells&whistles)
0	#_Forecast loop control #4 (reserved for future bells&whistles)
0	#_Forecast loop control #5 (reserved for future bells&whistles)
2025  #FirstYear for caps and allocations (should be after years with fixed inputs)
0	# stddev of log(realized catch/target catch) in forecast (set value>0.0 to cause active
impl_error)
0	# Do West Coast gfish rebuilder output (0/1)
2000 # Rebuilder:  first year catch could have been set to zero (Ydecl)(-1 to set to 1999)
2015 # Rebuilder:  year for current age structure (Yinit) (-1 to set to endyear+1)
1	# fleet relative F:  1=use first-last alloc year; 2=read seas(row) x fleet(col) below
# Note that fleet allocation is used directly as average F if Do_Forecast=4
2	# basis for fcast catch tuning and for fcast catch caps and allocation  (2=deadbio;
3=retainbio; 5=deadnum; 6=retainnum)
# Conditional input if relative F choice = 2
# Fleet relative F:  rows are seasons, columns are fleets
#_Fleet:  TrawlSouth HL Setnet RecSouth RecCentral TrawlNor
# max totalcatch by fleet (-1 to have no max) must enter value for each fleet
 -1 -1 -1 -1 -1 -1
# max totalcatch by area (-1 to have no max); must enter value for each fleet
 -1
# fleet assignment to allocation group (enter group ID# for each fleet, 0 for not included in an
alloc group)
 0 0 0 0 0 0
#_Conditional on >1 allocation group
# allocation fraction for each of: 0 allocation groups
# no allocation groups
60	# Number of forecast catch levels to input (else calc catch from forecast F)
-1	# code means to read fleet/time specific basis (2=dead catch; 3=retained catch; 99=F)  as
below (units are from fleetunits; note new codes in SSV3.20)
# Input fixed catch values
#Year Seas Fleet Catch(or_F) Basis
2015	1	1	29.68939903	2
2015	1	2	10.44583557	2
2015	1	3	0	2
2015	1	4	286.0493244	2
2015	1	5	16.02359505	2
2015	1	6	6.791845926	2
2016	1	1	30.79530788	2
2016	1	2	10.83493547	2
2016	1	3	0	2
2016	1	4	296.7044568	2
2016	1	5	16.62046249	2
2016	1	6	7.044837322	2
2017	1	1	10.124	2
2017	1	2	3.562	2
2017	1	3	0	2
2017	1	4	97.542	2
2017	1	5	5.464	2
2017	1	6	2.316	2
2018	1	1	10.124	2
2018	1	2	3.562	2
```

2018	1	3	0	2
2018	1	4	97.542	2
2018	1	5	5.464	2
2018	1	6	2.316	2
2019	1	1	10.124	2
2019	1	2	3.562	2
2019	1	3	0	2
2019	1	4	97.542	2
2019	1	5	5.464	2
2019	1	6	2.316	2
2020	1	1	10.124	2
2020	1	2	3.562	2
2020	1	3	0	2
2020	1	4	97.542	2
2020	1	5	5.464	2
2020	1	6	2.316	2
2021	1	1	10.124	2
2021	1	2	3.562	2
2021	1	3	0	2
2021	1	4	97.542	2
2021	1	5	5.464	2
2021	1	6	2.316	2
2022	1	1	10.124	2
2022	1	2	3.562	2
2022	1	3	0	2
2022	1	4	97.542	2
2022	1	5	5.464	2
2022	1	6	2.316	2
2023	1	1	10.124	2
2023	1	2	3.562	2
2023	1	3	0	2
2023	1	4	97.542	2
2023	1	5	5.464	2
2023	1	6	2.316	2
2024	1	1	10.124	2
2024	1	2	3.562	2
2024	1	3	0	2
2024	1	4	97.542	2
2024	1	5	5.464	2
2024	1	6	2.316	2

999