Status of greenstriped rockfish (*Sebastes elongatus*) along the outer coast of California, Oregon, and Washington

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Executive Summary

Stock

Greenstriped rockfish (*Sebastes elongatus*) are a small rockfish (maximum size near 45 cm) named after their slim shape and predominant green stripes. They have also been called strawberry rockfish, watermelons, poinsettas, serena, and reina. These rockfish can be found in abundance from British Columbia to Northern Baja California, but range from Chirikof Island in the Aleutian Islands (Gulf of Alaska) to central Baja California, and inhabit depths between 12 and 500 meters. Data show an increase in mean length with depth, suggesting that maturing fish move to deeper water. This species of rockfish is found with other congeners or alone in a wide range of habitats, including rocky outcroppings, but unlike most other species of rockfish they tend to prefer mud or sand bottoms.

This assessment is concerned with the stock of greenstriped rockfish on the outer west coast of the United States from the California/Mexico border to the Washington/Canada border, excluding Puget Sound, and is the first assessment of the greenstriped rockfish population in this area. A recent genetic study found very little genetic variation along the entire West Coast and the extent of migration is unknown. Therefore, this is a coast-wide, single-area assessment, but fishing fleets are separated geographically when possible in an attempt to capture varying geographic patterns in the fisheries data. Past studies have noted that greenstriped rockfish from Southern California exhibit different growth and maturity patterns when compared to greenstriped rockfish from Northern areas, but more recent survey data do not clearly support regional differences. In addition, data from Southern California that would be necessary to assess that area separately were limited, thus this assessment assumed one area. It is believed that this assessment has captured the overall trend in the greenstriped rockfish population and constitutes the best available science regarding the current status of greenstriped rockfish.

Catches

Greenstriped rockfish have not often been targeted by any fishery, thus discards as well as landings are an important component of the total fishing mortality on the stock. The majority of landings of greenstriped rockfish have occurred in the trawl fishery, but a small proportion has been observed in the hook and line, net, and recreational fisheries.

Landings for five different fleets were determined from species composition data. Landings increased in the mid 1940's, slumped in the early 1960's, then increased substantially in the late 1960's. Foreign trawl fisheries occurred between 1966 and 1976 and contributed to a large proportion of the catches during that time. Throughout the 1990's, landings were at high levels until a dramatic decline in recent years, which is likely due primarily to recent management actions aimed at reducing the bycatch of stocks on rebuilding plans.

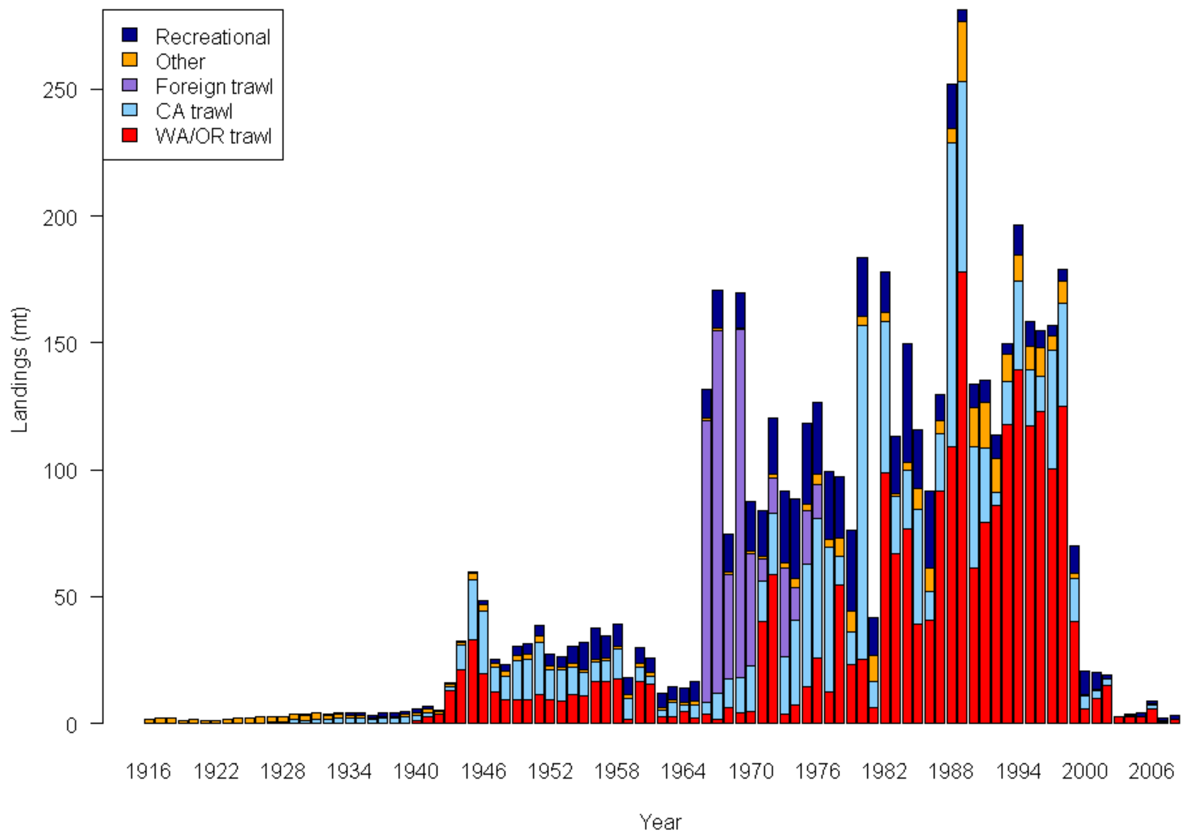

Figure a. Landings (mt) of greenstriped rockfish from five different fleets.

Table a. Recent landings for five fleets (mt).

Year	WA/OR trawl	CA trawl	Foreign	Other-gear	Total commercial	All recreational
1999	40.095	17.019	0.000	1.917	59.030	10.999
2000	5.657	5.146	0.000	0.431	11.234	9.454
2001	10.116	2.962	0.000	0.502	13.580	6.577
2002	15.287	2.229	0.000	0.150	17.666	1.380
2003	2.628	0.080	0.000	0.010	2.717	0.264
2004	2.808	0.177	0.000	0.015	3.000	0.657
2005	2.783	0.083	0.000	0.012	2.878	1.567
2006	5.710	1.840	0.000	0.082	7.632	1.017
2007	0.754	0.212	0.000	0.009	0.975	1.318
2008	1.615	0.066	0.000	0.042	1.723	1.674

Data and Assessment

Greenstriped rockfish off the west coast of the US was assessed here for the first time using the length- and age-structured model called Stock Synthesis (version 3.03a). Population parameters were estimated using fishery landings and length data from five fleets, abundance indices and length data from the National Marine Fisheries Service (NMFS) triennial survey, and abundance indices, length data, and age data from the Northwest Fisheries Science Center (NWFSC) survey. The Triennial survey was split into two series (1980–1992 and 1995–2004) based on changes in survey timing. The NWFSC survey added a considerable amount of information, including age data, which were fit in the model as conditional age-at-length vectors.

The base case model estimated parameters for male and female selectivities of all of the domestic fishing fleets, length-at-age relationships for males and females, and recruitment deviations for the last four decades. Natural mortality and steepness were not estimated and are sources of a considerable amount of uncertainty. Spawning biomass is usually the quantity used in evaluating stock status. However, greenstriped rockfish show an increase in fecundity per kg of body weight with increasing weight, which can lead spawning biomass to be a biased measure of stock productivity when older and larger fish have been removed through fishing. Therefore, the relationship between the number of eggs per kg of body weight and the fish weight was included in the model and the spawning stock quantity of interest that is reported is spawning output, which can be interpreted as the number of eggs which are produced annually by the mature females.

Uncertainty in the parameter estimates was determined in two ways. First, approximate asymptotic 95% confidence intervals were calculated using the base model. Second, fixed values of natural mortality and the fraction of greenstriped rockfish discarded were varied above and below the values assumed in the base model to define a range of the states of nature.

Stock biomass and spawning output

The estimated spawning output started to significantly decline in the 1960's, when the landings increased, and continued to decline until the late 1990's. The spawning output has increased quickly in the last decade from a low near 59% of unfished spawning output in 1999 to approximately 81% of unfished spawning output in 2009. Approximate confidence intervals based on the asymptotic variance estimates showed that the uncertainty in the estimated spawning output is high, but depletion is less uncertain. The various states of nature show that uncertainty in spawning output is much larger than the estimated uncertainty using only the base model.

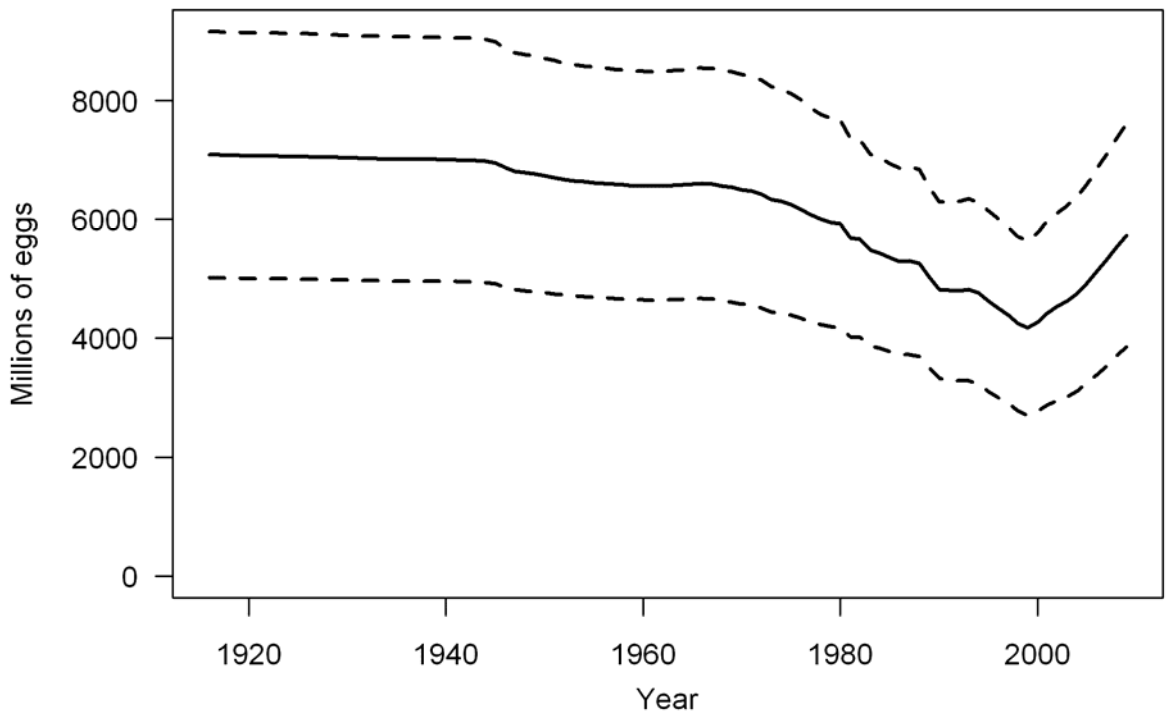

Figure b. Estimated spawning output (1916-2009) for the base case model (solid line) with an approximate asymptotic 95% confidence interval (thick dashed lines). The interval of spawning output over the states of nature is much larger as can be seen in Table b.

Table b. Recent trend in estimated female spawning output (millions of eggs) and relative depletion of spawning output. The range of the states of nature represent the largest amount of uncertainty which includes assumptions regarding the amount of natural mortality and the fraction of greenstriped rockfish discarded.

Output Year	Millions of eggs	~95% confidence interval	Range of states of nature	depletion (%)	~95% confidence interval	Range of states of nature
2000	4,275	2,774-5,776	846-39,138	60.7	51.9-69.5	38.8-92.0
2001	4,425	2,880-5,971	885-39,812	62.9	53.9-71.8	40.6-93.6
2002	4,540	2,962-6,118	918-40,146	64.5	55.5-73.5	42.2-94.3
2003	4,633	3,029-6,236	948-40,294	65.8	56.8-74.9	43.6-94.6
2004	4,760	3,124-6,395	987-40,623	67.6	58.6-76.6	45.5-95.2
2005	4,924	3,246-6,601	1,032-41,270	69.9	60.9-78.9	47.8-96.5
2006	5,120	3,391-6,848	1,083-42,186	72.7	63.7-81.6	50.3-98.3
2007	5,323	3,542-7,104	1,134-43,190	75.5	66.7-84.4	52.9-100.3
2008	5,533	3,701-7,366	1,188-44,201	78.5	69.8-87.2	55.7-102.2
2009	5,736	3,857-7,616	1,241-45,160	81.4	72.8-89.9	58.4-103.9

Recruitment

Recruitment deviations were estimated starting in 1970 and recruitment before then was assumed equal to mean recruitment as determined by the stock recruitment relationship. The estimates showed that recruitment is highly variable for greenstriped rockfish with high values in 1971, 1984, 1993, and 1998, and low estimates of recruitment in the 1990's, early 1970's, and 2006. The uncertainty in the estimated recruitment was high prior to 1985, but decreased in the 1990's and early 2000's when the age data were most informative. The age data from the NWFSC survey were very consistent with these estimates and precisely showed a very strong 1993 cohort.

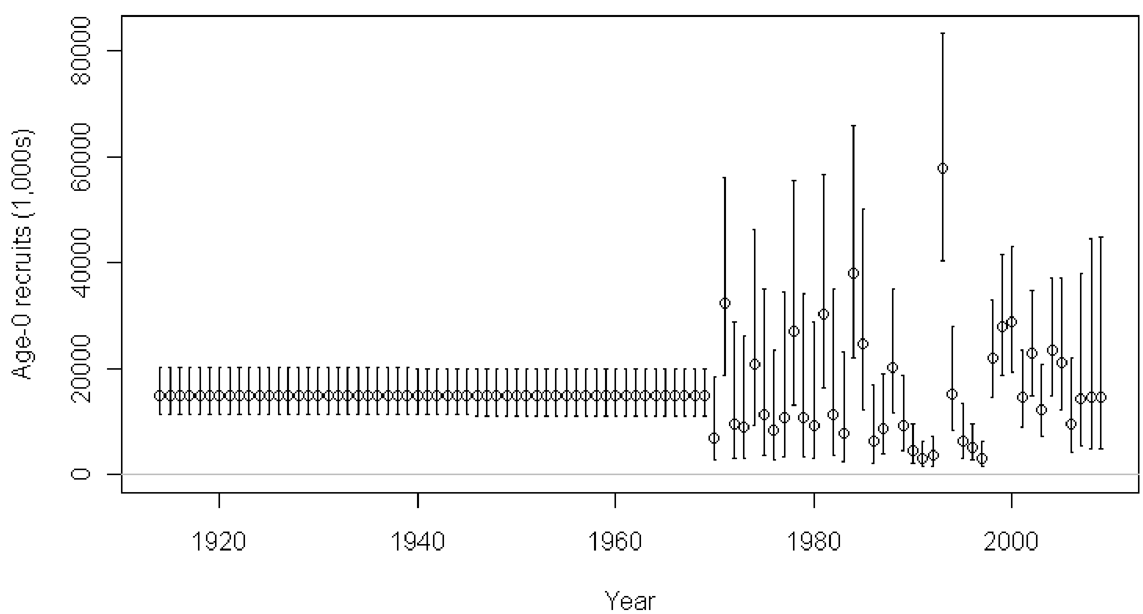

Figure c. Time series of estimated recruitments for the base case model (round points) with approximate asymptotic 95% confidence interval (vertical bars).

Table c. Recent estimated trend in greenstriped rockfish recruitment with approximate 95% confidence intervals determined from the base model and uncertainty in the estimated recruitment determined by varying the value of natural mortality and the fraction discarded.

Year	Recruits	CI	statesNature
1999	27,898	3,772-20,6339	4,354-277,599
2000	28,772	3,888-21,2907	4,541-280,850
2001	14,508	1,922-109,504	2,262-142,962
2002	22,849	3,076-169,740	3,592-222,280
2003	12,358	1,621-94,191	1,905-122,243
2004	23,634	3,158-176,886	3,610-236,339
2005	21,237	2,761-163,356	3,201-217,559
2006	9,576	1,121-81,822	1,484-97,416
2007	14,264	1,545-131,718	2,287-145,497
2008	14,585	1,455-146,173	2,360-146,029

Reference Points

Reference points were calculated using the estimated selectivities and a fleet distribution based on the proportions of the average landings from each fleet in the last two years. Sustainable total yields (landings plus discards) were 738 mt when using an $SPR_{50\%}$ reference harvest rate and ranged from 159 to 5,783 mt when varying the states of nature. The value for 40% of the unfished spawning output (analogous to $B_{40\%}$) was 2,836 million eggs.

The recent catches (landings plus discards) have been much less than the range of potential long-term yields calculated using an $SPR_{50\%}$ reference point. As a result, the spawning output and biomass of the stock has been steadily increasing over the last decade.

Exploitation status

The spawning output of greenstriped rockfish reached a low in the late 1990's before beginning to increase throughout the last decade. The estimated depletion has remained above the 40% of unfished spawning output target and it is unlikely that the stock has ever fallen below this threshold. Throughout the 1970's, 1980's, and 1990's the exploitation rate and *SPR* have generally increased and occasionally exceeded current estimates of the harvest rate limit ($SPR_{50\%}$). Recent exploitation rates on greenstriped rockfish have been very small, which is primarily due to management actions in the late 1990's and early 2000's to rebuild other species.

Table d. Summary of greenstriped rockfish reference points from the base case model. Values are calculated using a fishery distribution based the average of the landings from 2007 and 2008.

Quantity	**Estimate**	**~95% Confidence interval**	**Range of states of nature**
Unfished spawning output (millions of eggs)	7,090	5,021-9,158	2,003-44,450
Unfished age 2+ biomass (mt)	33,526	23,722-43,329	9,024-221,290
Unfished recruitment (R0, thousands)	15,041	2,073-109,131	2,540-146,121
Depletion (2009)	80.9%	72.4–89.4%	58.6–103.0%
Reference points based on $SB_{40\%}$			
Proxy spawning output ($B_{40\%}$)	2,836	2,009-3,663	801-17,780
SPR resulting in $B_{40\%}$ ($SPR_{B40\%}$)	46.7%	NA	NA
Exploitation rate resulting in $B_{40\%}$	0.0494	0.0483-0.0504	0.0408-0.057
Yield with $SPR_{B40\%}$ at $B_{40\%}$ (mt)	765	540-989	165-5,992
Reference points based on SPR proxy for MSY			
Spawning output at SPR (SB_{SPR}) (millions of eggs)	3,101	2,196-4,006	876-19,443
SPR_{proxy}	50.0%	NA	NA
Exploitation rate corresponding to SPR_{proxy}	0.0442	0.0434-0.0451	0.0364-0.0512
Yield with SPR_{proxy} at SB_{SPR} (mt)	738	522-955	159-5,783
Reference points based on estimated MSY values			
Spawning output at *MSY* (SB_{MSY}) (millions of eggs)	2,039	1,443-2,635	583-12,623
SPR_{MSY}	36.7%	36.4-36.9%	36.3-37%
Exploitation rate corresponding to SPR_{MSY}	0.0682	0.0668-0.0696	0.0562-0.0791
MSY (mt)	803	568-1,038	173-6,314

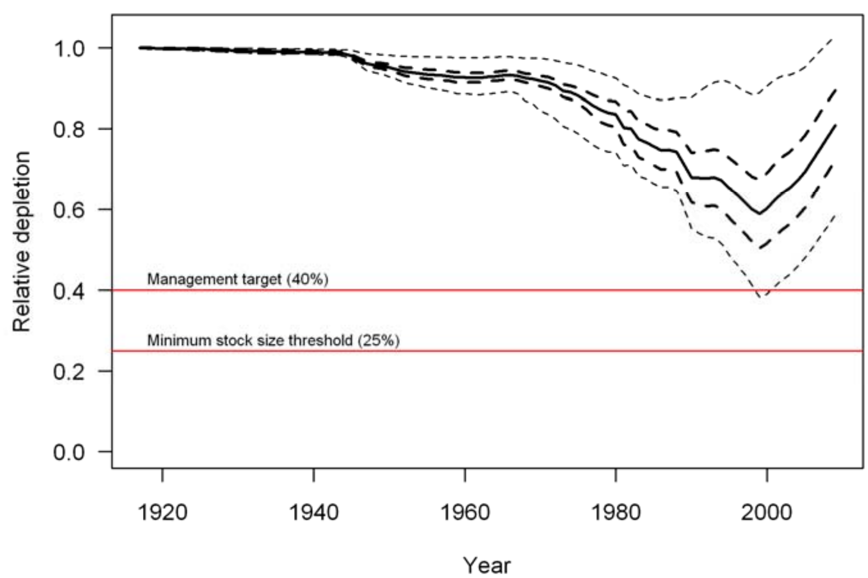

Figure d: Estimated relative depletion with approximate 95% asymptotic confidence intervals (thick dashed lines) for the base case assessment model and estimated depletion over the range of the states of nature (thin dashed lines).

Table e. Recent trend in spawning potential ratio (1-SPR) and summary exploitation rate (catch divided by biomass of age-2 and older fish).

Year	Estimated 1-SPR (%)	~95% confidence interval	Range of states of nature	Summary harvest rate (proportion)	~95% confidence interval	Range of states of nature
1999	73.5	78.7-68.2	94-47.4	1.81	1.36-2.25	0.4-4.18
2000	92.4	94.4-90.4	98.4-80.3	0.41	0.3-0.52	0.1-0.96
2001	92.6	94.4-90.9	98.5-81.4	0.4	0.3-0.5	0.1-0.89
2002	92.1	94.2-90	98.5-79.8	0.43	0.31-0.56	0.1-0.98
2003	98.8	99.2-98.4	99.8-96.7	0.06	0.04-0.08	0.01-0.13
2004	98.7	99.1-98.3	99.8-96.4	0.07	0.05-0.09	0.02-0.14
2005	98.7	99.1-98.3	99.7-96.4	0.06	0.04-0.09	0.02-0.14
2006	96.5	97.4-95.7	99.3-90.8	0.18	0.14-0.22	0.04-0.39
2007	99.5	99.6-99.3	99.9-98.5	0.03	0.02-0.03	0.01-0.06
2008	99.2	99.5-99	99.8-97.8	0.04	0.03-0.05	0.01-0.09

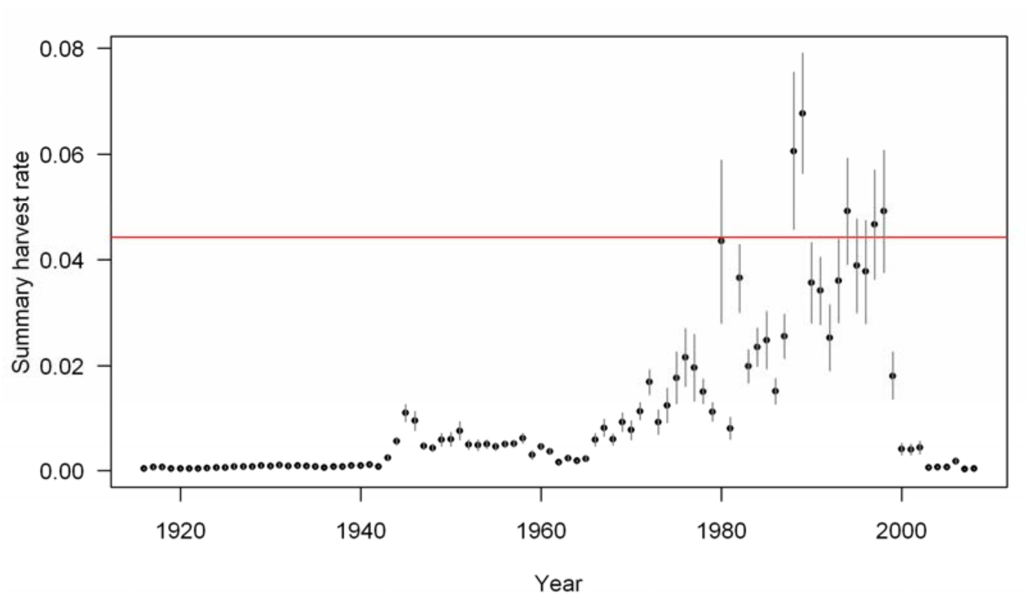

Figure e. Time series of estimated summary harvest rate (total catch divided by age 2 and older biomass) for the base case model (round points) with approximate 95% asymptotic confidence intervals (grey lines). The red line is the harvest rate at the overfishing proxy using $SPR_{50\%}$.

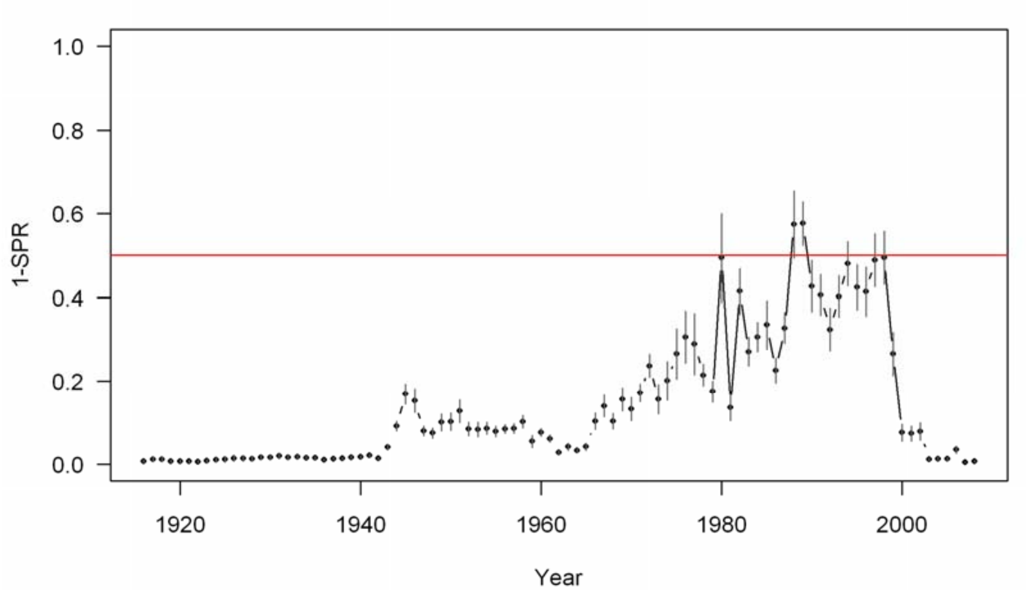

Figure f. Estimated spawning potential ratio (SPR) from the base case model with approximate 95% asymptotic confidence intervals. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis. The management target is plotted as a red horizontal line and values above this reflect harvests in excess of the overfishing proxy based on $SPR_{50\%}$.

Management performance

Greenstriped rockfish are currently managed as part of the minor shelf rockfish mixed-species group and have never been managed with a species-specific OY or ABC. Exploitation rates, on greenstriped rockfish in particular, have rarely exceeded the *MSY* proxy levels and the base case model did not predict that the stock has ever fallen below the target biomass defined as 40% of unfished spawning output. Recently, the exploitation rates have fallen drastically due to management measures implemented to reduce the impacts of fishing on other species of rockfish.

Table f. Recent trend in total catch and commercial landings (mt) relative to management guidelines.

Year	ABC (mt)	OY (mt)	Commercial Landings (mt)	Recreational Landings (mt)	Estimated[1] Total Catch (mt)
1999	—	—	59.0	11.0	394.1
2000	—	—	11.2	9.5	90.6
2001	—	—	13.6	6.6	90.9
2002	—	—	17.7	1.4	102.2
2003	—	—	2.7	0.3	14.6
2004	—	—	3.0	0.7	16.9
2005	—	—	2.9	1.6	16.8
2006	—	—	7.6	1.0	48.4
2007	—	—	1.0	1.3	7.3
2008	—	—	1.7	1.7	11.0

[1] Total annual catches reflect the commercial landings plus the model estimated discarded biomass, as well as recreational landings.

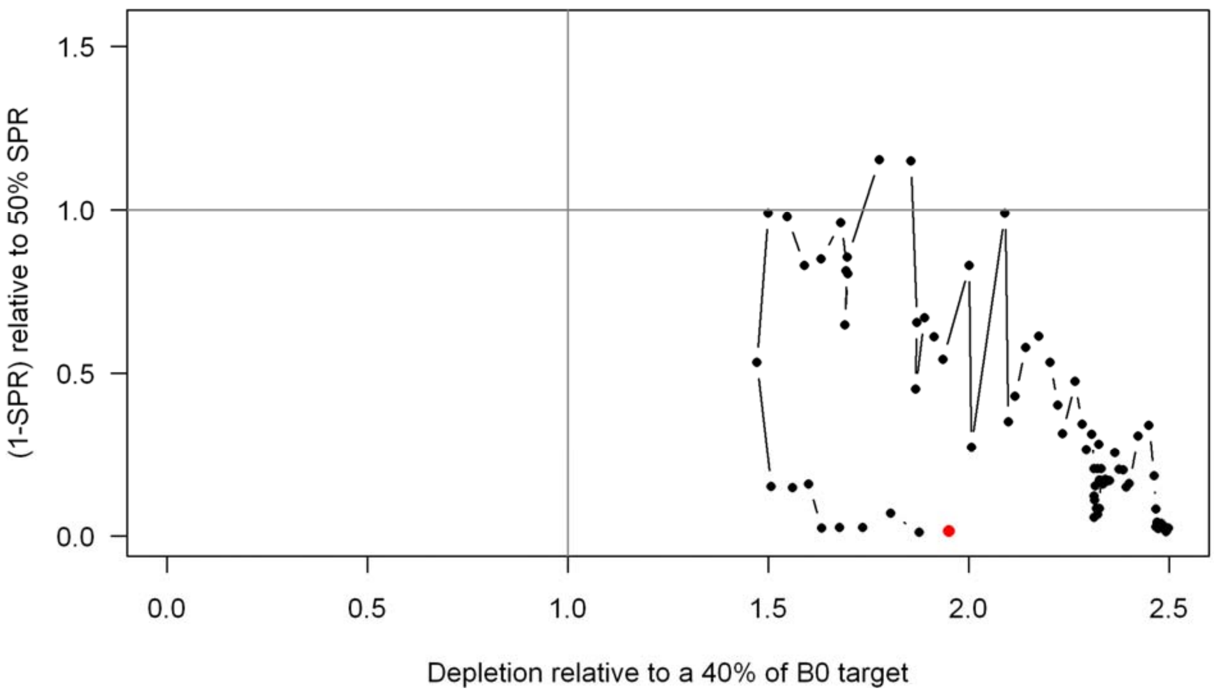

Figure g. Phase plot of estimated relative (1-*SPR*) vs. relative spawning biomass for the base case model. The relative (1-*SPR*) is (1-*SPR*) divided by 0.5 (the harvest rate limit). Relative depletion is the annual spawning output divided by the spawning output corresponding to 40% of the unfished spawning output. The red point indicates the current year (2008).

Unresolved problems and major uncertainties

The base case assessment model for greenstriped rockfish was developed to balance parsimony and realism with the goal of estimating a biomass trajectory for the population of greenstriped rockfish on the outer west coast of the United States. The model contained many assumptions to achieve parsimony and used many sources of data to estimate reality, but there will always be unresolved problems as well as uncertainty in the estimates.

The information in the model on discarding practices came from West Coast Groundfish Observer data collected since 2002 and the historical discarding practices are uncertain. Data are available from a discarding study in the mid-1980's, but due to a small number of samples and unexpected patterns, the data were not included in the model. However, the fraction of the catch that was discarded was included as an axis of uncertainty for the states of nature to provide an insight into the overall uncertainty.

An assumption that affected the estimated stock status was the value of natural mortality. This parameter was fixed in the base model at a value determined from otoliths collected in recent years during the NWFSC groundfish surveys. Changes to this parameter resulted in greater changes to the estimated depletion than any other factor for which model sensitivity was tested. The model with all of the data estimated natural mortality at a lower value than the fixed value of 0.08, and predicted a more depleted stock. As with the base model, though, recent exploitation rates were low and an increasing trend was predicted such that the stock status was forecasted to likely be above the target level within 2 years.

Natural mortality was also included as an axis of uncertainty in the states of nature to characterize this variability in the level of depletion.

One difficulty in the base case assessment was that the estimated length-based selectivity for some fleets showed an increasing selectivity up to the largest size modeled. There may be explanations for why a fleet would show this selectivity pattern for greenstriped rockfish, but the base case model forced the selectivity to reach its peak just before the largest length class modeled. Initial sensitivity analyses to this assumption showed that although the fit to the length frequency data changed, the consequences of bounding selectivity had little effect on the interpretation of current stock status.

An additional uncertainty in the base case model included the accuracy of the reconstructed landings time series. Sensitivity analyses to doubling and halving the landings scaled the population up and down, respectively, but did not change the estimates of stock depletion. However, increasing or decreasing the historical landings resulted in higher or lower predicted potential yields, respectively.

Approximate asymptotic confidence intervals were used to show uncertainty in the estimated parameters of the base model. Natural mortality and the fraction discarded were chosen to characterize states of nature to provide an indication of the overall uncertainty in the model. The base case model showed wide confidence intervals around spawning output throughout the time series, and estimated that depletion has been somewhat uncertain over the last decade. The range of the states of nature resulted in even wider confidence intervals around the estimated parameters, indicating that there is a considerable amount of uncertainty in model. In spite of these issues and uncertainties, it is apparent is that the recent trend in the population is likely increasing, some strong recruitment has occurred within the last 20 years, and the stock is unlikely to be at risk given the current catch levels.

Forecasts

Forecasts and projections of the greenstriped rockfish population up to the year 2020 were constructed under the assumption that future catches would never reach the calculated OY. The average catch from 2007 and 2008 was used for the catches in 2009 and 2010 and allocated to the fisheries based on the average proportion of these catches. The landings and distribution of catches among fleets for 2011 and beyond were assumed equal to the average of the fleet specific landings from 2000–2003. This forecast table is meant to be representative of the status quo, yet still be conservative since landings in 2000–2003 were higher than more recent landings, although not as high as landings observed in the 1980's and 1990's.

Forecasting with these status quo catches resulted in stock and ABC increases over time. Projections were also done for the alternative states of nature and showed increasing stock size for each case. A decision table was not created because it is likely that harvest rates will remain low and alternative harvest scenarios were not suggested by the STAR panel members.

Table g: Projection of potential ABC, OY, landings and catch, summary biomass (age 2 and older), spawning biomass, and depletion for the base case model based on the status quo. Landings in 2009 and 2010 are a total of 9 mt, determined from the average of the 2007 and 2008 landings for each fleet and allocated to each fleet based on the proportion caught in 2007 and 2008. Forecasted landings after 2010 are 20 mt (the average of 2000–2003) and allocated to each fleet based on the average distribution in 2000–2003.

Year	ABC (mt)	OY (mt)	Total Catch (mt)	Landings (mt)	Age 2+ biomass (mt)	Spawning output (million eggs)	Depletion (%)
2009	1,347	1,347	9	3	29,248	5,736	80.9
2010	1,390	1,390	9	3	29,876	5,932	83.7
2011	1,429	1,429	94	20	30,421	6,113	86.2
2012	1,458	1,458	93	20	30,808	6,249	88.1
2013	1,482	1,482	93	20	31,127	6,358	89.7
2014	1,501	1,501	92	20	31,386	6,445	90.9
2015	1,517	1,517	91	20	31,594	6,513	91.9
2016	1,529	1,529	90	20	31,759	6,568	92.6
2017	1,538	1,538	89	20	31,888	6,612	93.3
2018	1,546	1,546	88	20	31,988	6,647	93.8
2019	1,552	1,552	87	20	32,064	6,675	94.1
2020	1,556	1,556	87	20	32,121	6,697	94.5

[1] The ABC here is the calculated total catch determined by F_{SPR}.

Projection table incorporating states of nature

Table h. Summary table of 12-year projections beginning in 2011 for alternate states of nature based on two axes of uncertainty. Columns range over natural mortality and rows range over the fraction discarded. There are no probabilities associated with these states of nature other than the base model (center square) is the most probable scenario.

State of nature (fraction discarded)		Year	Landed catch (mt)	M=0.06 Depletion (%)	M=0.06 Spawning output (million)	M=0.08 Depletion (%)	M=0.08 Spawning output (million)	M=0.10 Depletion (%)	M=0.10 Spawning output (million)
State of nature (fraction discarded)	Low fraction discarded	2011	20	66.9	1,340	88.8	2,904	106.2	9,316
		2012	20	68.7	1,375	90.5	2,957	107.3	9,409
		2013	20	70.2	1,407	91.7	2,999	107.9	9,465
		2014	20	71.6	1,434	92.7	3,031	108.3	9,493
		2015	20	72.8	1,458	93.5	3,056	108.3	9,500
		2016	20	73.9	1,479	94.1	3,076	108.3	9,492
		2017	20	74.8	1,499	94.6	3,092	108.0	9,474
		2018	20	75.7	1,517	95.0	3,105	107.8	9,449
		2019	20	76.5	1,533	95.3	3,114	107.4	9,418
		2020	20	77.3	1,548	95.5	3,121	107.0	9,384
	Base fraction discarded	2011	20	63.9	3,324	86.2	6,113	105.2	17,324
		2012	20	65.9	3,427	88.1	6,249	106.5	17,540
		2013	20	67.6	3,517	89.7	6,358	107.4	17,680
		2014	20	69.1	3,596	90.9	6,445	107.8	17,758
		2015	20	70.5	3,666	91.9	6,513	108.0	17,791
		2016	20	71.7	3,729	92.6	6,568	108.0	17,791
		2017	20	72.8	3,786	93.3	6,612	107.9	17,768
		2018	20	73.8	3,838	93.8	6,647	107.7	17,728
		2019	20	74.7	3,886	94.1	6,675	107.3	17,675
		2020	20	75.5	3,930	94.5	6,697	107.0	17,614
	High fraction discarded	2011	20	64.7	7,903	85.9	14,969	105.5	46,891
		2012	20	66.6	8,133	87.9	15,306	106.8	47,469
		2013	20	68.2	8,333	89.4	15,576	107.6	47,844
		2014	20	69.7	8,509	90.6	15,790	108.1	48,053
		2015	20	70.9	8,665	91.6	15,960	108.3	48,141
		2016	20	72.1	8,805	92.4	16,097	108.3	48,140
		2017	20	73.1	8,932	93.0	16,206	108.2	48,075
		2018	20	74.1	9,048	93.5	16,294	107.9	47,963
		2019	20	75.0	9,155	93.9	16,364	107.6	47,818
		2020	20	75.8	9,253	94.2	16,419	107.2	47,650

State of nature (natural mortality)

Research and data needs

There are four topics for which additional research would greatly improve the assessment of greenstriped rockfish.

1. **Landings:** improving certainty of the commercial and recreational landings would result in a better estimate of the total yield as well as an improved understanding of the population dynamics of greenstriped rockfish. The landings have been determined in the best possible manner given the time constraints of this assessment, but there is still uncertainty in the catch reconstruction and in recent landings. The state of California has produced reconstructed and current landings for many species, which have been accepted as the best possible information. However, a similar reconstruction is not available for Oregon and Washington landings, although such a product is of interest to fisheries managers and stock assessors. Additionally, some errors were found in the PacFIN database of recent landings during the current catch reconstruction and are being reconciled. Further error checking may be worthwhile for greenstriped rockfish as well as other species.
2. **Discards:** discarding at sea is common practice for greenstriped rockfish and the levels of historical discards are poorly known due to a lack of data. The West Coast Groundfish Observer Program (WCGOP) has contributed greatly to the understanding of discard rates and size compositions. However, it would be useful to review what information is available from the past to understand discarding practices and to determine how reliable that information is.
3. **Natural mortality:** the value for natural mortality in the base case model was fixed at 0.08, which was determined from the maximum age observed in recent survey data. Other published estimates of natural mortality for greenstriped rockfish range from 0.09 to 0.149 and are based on maximum age, catch curve analyses, and gonadosomatic indices. The data used in the base model supported a natural mortality near 0.065. All of these estimates of natural mortality are uncertain and given the correlation between natural mortality and stock status, it would be useful to have a better understanding of the plausible range of values.
4. **Stock structure:** there is some evidence that the life history of greenstriped rockfish in Southern California may be different from greenstriped rockfish in Northern areas. Understanding and quantifying the differences in length, weight, ages, maturity, and fecundity (as well as the number of broods per year) would be helpful to determine if the model should incorporate these differences.

Table i. Summary of recent trends in estimated greenstriped rockfish exploitation and stock levels from the base case model.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Commercial landings (mt)	59.0	11.2	13.6	17.7	2.7	3.0	2.9	7.6	1.0	1.7	1.3
Recreational landings (mt)	11.0	9.5	6.6	1.4	0.3	0.7	1.6	1.0	1.3	1.7	1.5
Total catch (mt)	394.1	90.6	90.9	102.2	14.6	16.9	16.8	48.4	7.3	11.0	9.2
ABC (mt)											
OY (mt)											
1-SPR	26.5%	7.6%	7.4%	7.9%	1.2%	1.3%	1.3%	3.5%	0.5%	0.8%	0.6%
Exploitation rate (catch/ age 2+ biomass)	0.0181	0.0041	0.0040	0.0043	0.0006	0.0007	0.0006	0.0018	0.0003	0.0004	0.0003
Age 2+ biomass (mt)	21,822	22,044	22,703	23,507	24,214	25,140	25,948	26,883	27,785	28,540	29,248
Spawning output (millions of eggs)	4,173	4,275	4,425	4,540	4,633	4,760	4,924	5,120	5,323	5,533	5,736
~95% confidence interval	2,711-5,636	2,774-5,776	2,880-5,971	2,962-6,118	3,029-6,236	3,124-6,395	3,246-6,601	3,391-6,848	3,542-7,104	3,701-7,366	3,857-7,616
Range of states of nature	827–38,453	845–39,138	885–39,812	918–40,146	948–40,294	987–40,623	1,032–41,270	1,083–42,186	1,134–43,190	1,188–44,201	1,241–45,160
Recruitment	27,898	28,772	14,508	22,849	12,358	23,634	21,237	9,576	14,264	14,585	14,656
~95% confidence interval	3,772-206,339	3,888-212,907	1,922-109,504	3,076-169,740	1,621-94,191	3,158-176,886	2,761-163,356	1,121-81,822	1,545-131,718	1,455-146,173	1,462-146,886
Range of states of nature	4,354–277,599	4,541–280,850	2,262–142,962	3,592–222,280	1,905–122,243	3,610–236,339	3,201–217,559	1,484–97,416	2,287–145,497	2,360–146,029	2,377–146,377
Depletion (%)	58.9%	60.3%	62.4%	64.0%	65.3%	67.1%	69.4%	72.2%	75.1%	78.0%	80.9%
~95% confidence interval	50.4-67.3	51.5-69.1	53.5-71.3	55-73	56.3-74.4	58.2-76.1	60.5-78.4	63.3-81.1	66.2-83.9	69.3-86.8	72.4-89.4
Range of states of nature	38.4–88.9	39.1–90.6	40.9–92.2	42.5–93.0	43.9–93.3	45.8–93.9	48.0–95.3	50.5–97.1	53.1–99.1	55.9–101.1	58.6–103.0

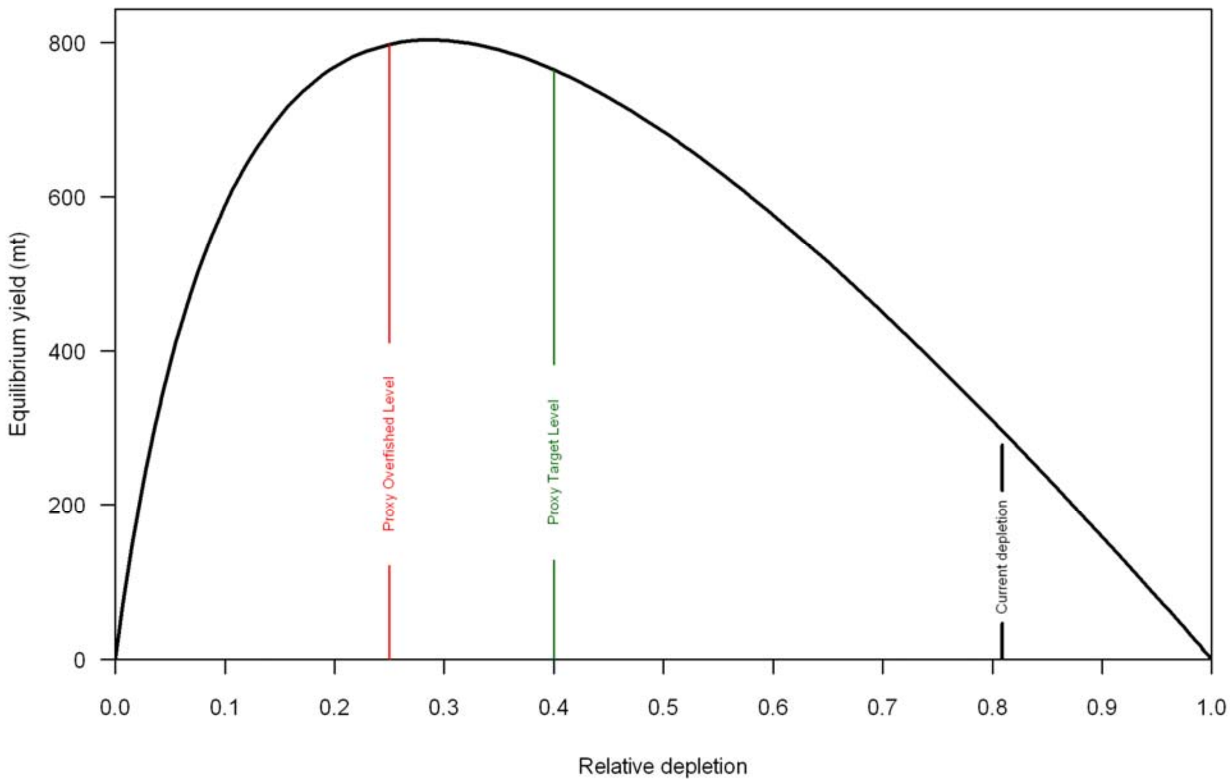

Figure j: Equilibrium yield curve (derived from reference point values reported in table i) for the base case model. Values are based on 2008 fishery selectivity and distribution. The depletion is relative to unfished spawning output.

1 Introduction

Greenstriped rockfish (*Sebastes elongatus*) are a small rockfish (maximum size near 45 cm) named after their slim shape and obvious green stripes. They have also been called strawberry rockfish, watermelons, poinsettas, serena, and reina, and have had the scientific names *Sebastodes elongatus* and *Pteropodus elongatus* (Love et al. 2002, Shaw & Gunderson 2006). This species is often observed in commercial and recreational fisheries, but due to its small size and reputed short shelf life, they are typically discarded (Love et al. 2002, Shaw & Gunderson 2006).

This assessment is focused on the population of greenstriped rockfish on the outer West Coast of the United States. This includes waters off of California, Oregon, and Washington, but does not include Puget Sound or Canadian waters.

1.1 Distribution and stock structure

Greenstriped rockfish can be found in abundance from British Columbia to Northern Baja California, but range from Chirikof Island in the Aleutian Islands (Gulf of Alaska) to central Baja California (Love et al 2002). Adults may inhabit depths between 12 and 500 meters, but are more commonly found between 100 and 250 m, and adults typically move to deeper water as they mature (Love et al 2002, Shaw & Gunderson 2006). This species of rockfish is found with other congeners or alone in a wide range of habitats, which include rocky outcroppings. However, unlike most other species of rockfish they seem to prefer mud or sand bottoms (Love et al 2002, Shaw & Gunderson 2006).

A genetic study of greenstriped rockfish was recently undertaken by Jon Hess (pers comm., NWFSC, NOAA) to study the stock structure of greenstriped rockfish. The genetic variability was remarkably low and showed less variability than most other rockfish species, even when including samples from Puget Sound. However, latitudinal differences in life-history traits have been observed, which are discussed in more detail below.

1.2 Life history and ecosystem interactions

Typical of other species of the genus *Sebastes*, greenstriped rockfish are long-lived with maximum observed ages greater than 50 years (Love et al 2002). Females grow larger than males, but typically mature at about the same length, between 18 and 24 cm, which corresponds to an age between 7 and 10 years. A latitudinal cline in maturity has been observed with fish maturing at a smaller size in the southern areas (Wyllie Echeverria 1987).

Greenstriped rockfish give birth to live young and the fecundity of a 0.5 kilogram female is on average around 200,000 eggs (Dick 2009), although a wide range of fecundity has been reported (Love et al 2002). The reproductive development of males and females is slightly offset with mating occurring in December through February, fertilization occurring in early spring, and parturition occurring about a month later in late spring (Shaw & Gunderson 2006). Females have the ability to store sperm during the time between copulation and fertilization to ensure the availability of spermatozoa when oocyte maturation has occurred (Shaw & Gunderson 2006). However, in southern latitudes, parturition may occur from January to July and females in Southern California may release two broods during this time (Love et al 2002). Juveniles settle to the bottom at about 3 cm in length in autumn and are commonly found along the interface of fine sand and clay. Maturing adults typically move to deeper water (Love et al 2002).

A wide range of prey items make up the diet of greenstriped rockfish. They will feed from the water column or the bottom on such things as fish, krill, shrimps, copepods, amphipods, and squid. Other fish species may prey on greenstriped rockfish. They have been found in the stomachs of king salmon (Love et al 2002) and reefs with small numbers of piscivorous rockfish had much higher numbers of small rockfish, such as greenstriped rockfish, than reefs with high numbers of piscivorous rockfish (PFMC and NMFS 2006).

1.3 Historical and current fishery

Greenstriped rockfish are a bycatch species with little market value mainly due to its small size, and it has been reported that fillets from this species have a short shelf life (Love et al 2002). As a result, there has not been a long-term directed fishery for this species. However, greenstriped rockfish are often observed in landings from various fisheries, although in small proportions. The most common occurrence of greenstriped rockfish is in trawl fisheries, but they are often caught in recreational fisheries, especially when fishing vessels drift off of the rocks.

After many attempts to start trawl fisheries off the west coast of the United States in the late 1800's, the availability of the otter trawl and the diesel engine in the mid-1920's helped the trawl fisheries expand (Douglas 1998). The trawl fisheries really became established during World War II when demand increased for shark livers and bottomfish. A mink food fishery also developed during World War II (Jones & Harry 1961). Foreign fleets began fishing for rockfish in the mid 1960's until the EEZ was implemented in 1977 (Rogers 2003). Since 1977, landings of rockfish were high until management restrictions were implemented in 2000.

Greenstriped rockfish are often caught in bottom trawls, but a long-term directed fishery has not occurred for this species and historical discarding rates are not well known. There have been many reports of greenstriped rockfish occurring in various fisheries, even as early as 1884 (Goode 1884). Fishermen report that greenstriped rockfish are ubiquitous, but are rarely if ever caught in great numbers. More detailed information of the fisheries by state is given in Section 2.1.1. when discussing the reconstructed landings.

1.4 Management history

Greenstriped rockfish outside of Puget Sound have not previously been assessed on the US west coast, and have not had individually specified ABC's or OY's. Beginning in 1983, the species was managed under ABC's and OY's for the Other Rockfish category, and per trip or cumulative limits for the *Sebastes* Complex. Since 2000, greenstriped rockfish have been included in the Minor Shelf Rockfish assemblage, with regard to OY's and cumulative limits. As late as 1998, cumulative limits for the *Sebastes* Complex were as high as 40,000 lb per two months. By 2000, landings of greenstriped rockfish were constrained by shelf rockfish limits of 300–1,000 lb per month.

1.5 Fisheries in Canada and Alaska

The exact details of fisheries in Canada and Alaska are unknown, but greenstriped rockfish is unlikely to have been targeted in either of these fisheries. Greenstriped rockfish are managed as part of a mixed-species category in Alaska, and details of Canada's fisheries for greenstriped rockfish are unknown at this time.

2 Data

The following sources of data were used in building this assessment:

1. Fishery dependent data:
   a. landings by state from various sources,
   b. lengths from port sampling,
   c. discard lengths from at-sea observations,
   d. discard mortality estimates from at-sea observations,
   e. discard mean weights from at-sea observations

2. Fishery independent data:
   a. relative abundance indices from the Triennial and NWFSC surveys,
   b. length frequencies from both surveys, and
   c. conditional age-at-length frequencies from the NWFSC survey.

The data sources and years of availability are summarized in Table 1 and Table 2. Estimates of biological relationships, such as fecundity, maturity, length-weight and length-at-age relationships, were either determined from the published literature or from the survey data.

2.1 Fishery dependent data

Greenstriped rockfish are not often targeted by any fishery, thus discards as well as landings are an important component of the total fishing mortality on the stock. Landings from the Pacific Fishery Information Network (PacFIN, Pacific States Marine Fisheries Commission) show that the majority of landings of greenstriped rockfish have occurred in the trawl fishery, but a small proportion has been seen in the hook and line, net, and recreational fisheries. An even smaller amount has been observed in the shrimp trawl fishery, but is not as substantial as the other fisheries. Table 3 shows the proportion of greenstriped rockfish landings from PacFIN reported for each gear type.

2.1.1 Historical catch reconstruction

Species composition sampling is used to determine the landings of greenstriped rockfish from the general market categories in which they were recorded. PacFIN serves as a clearinghouse for commercial landings data since the early 1980's, and before that, landings for each state were reconstructed using the assumptions described below.

2.1.1.1 Washington

Historical commercial landings of two gear types, trawl and longline, were reconstructed for greenstriped rockfish landed in Washington. No evidence of recreational landings was found and it was assumed that they constitute a negligible amount of the total mortality.

Washington's trawl fishery

Washington's coastal trawl fishery began in the early 1930's off of Cape Flattery and landings increased substantially by the 1940's (Tagart & Kimura 1982). In 1946, rockfish landings experienced a sharp decline, presumably in response to weakened market demand following World War II. After a period of steady landings of around 5,000 metric tons (mt) annually, landings rapidly increased in the 1960's, followed by a decline in the mid-1970's and a further increase in the late 1970's. Before the mid-1970's, most of the rockfish and POP catch came from Canadian waters. The implementation of the EEZ brought higher landings in WA from US waters and US landings rose to over 10,000 mt up until 1983. After that time, rockfish landings declined to around a 500 mt in the late 1990's.

Most of the rockfish landed in the Washington trawl fishery were historically categorized into two market categories: "Pacific Ocean Perch" (POP) or "other rockfish" (URCK). Additional market categories were added in the mid-1980's, but only POP and URCK were used to determine the landings of greenstriped rockfish. Figure 2 shows the amount landed in each category before proportioning out the species.

WDF began sampling rockfish landings for species composition in November 1966 and Tagart & Kimura (1982) reported the estimated landings of various rockfish species, including greenstriped rockfish when it was observed, for the years 1966–1979. Greenstriped rockfish were not often reported and the highest proportion of greenstriped observed in POP and other rockfish landings was 0.0012 in 1977.

Theresa Tsou (pers comm., WDFW) provided species composition data from landings for 1967–2009. From these data, the years 1968–1994 were used to calculate average proportions of greenstriped rockfish in the UPOP and URCK market categories from which greenstriped rockfish landings were calculated using historical landings. These years were chosen because landings in these two market categories were consistently sampled for species compositions. The average proportion of greenstriped in UPOP landings between 1968–1994 was 0.000840 and the average proportion of greenstriped in URCK landings between 1968–1994 was 0.000864. The average proportion of greenstriped in the sum of UPOP and URCK landings between 1968–1994 was 0.000860. The proportion of greenstriped rockfish in the URCK category substantially increased after 1994, when additional market categories were available (Figure 3).

A database of historical Washington landings (Greg Lippert, WDFW, pers comm.) contained landings from Puget Sound and was used to calculate a proportion of the US and Canadian rockfish landings (without POP) that were not from Puget Sound. POP was excluded because it was assumed all POP were caught outside of Puget Sound. From 1949 to 1969, the proportion of landings outside of Puget Sound were greater than 0.95 (Table 4). These estimates agreed closely with estimates calculated using data from research reports on the Washington trawl fishery (Holmberg et al. 1962, Holmberg et al. 1967). Prior to 1949, when POP and rockfish landings were not separated, it was assumed that 99% of the landings came from outside of Puget Sound.

Catches from US waters were derived from Forrester (1967) and Tagart & Kimura (1982). Forrester (1967) reports the separate US vessel and Canadian vessel catches of POP and rockfish for PSMFC areas near British Columbia in the years 1954–1965. Catches south of PSMFC area 3B were not reported, but it is likely that a large proportion of the catch south of 3B came from Oregon vessels. The proportion of Washington landings caught in US waters was calculated as the ratio between the US vessel catch in area 3B and the total catch by US vessels. It is unclear if area 3C as used by Forrester (1967) includes a portion of US waters. Tagart & Kimura (1982) report catches by PSMFC area for the years 1966–1979 and there was little catch in the areas south of 3B.

Historical landings of greenstriped rockfish were determined as follows for the periods shown.

< 1930: Assumed no catch of greenstriped rockfish.

1930–1934: The Pacific Fisherman Yearbook rockfish landings were used and it was assumed that all landings were caught in US waters. It was assumed that 1% of the total catch was from

Puget Sound, thus was removed (1% was used because POP could have been aggregated with rockfish). The proportion of greenstriped rockfish used was 0.00086.

1935–1941: Dept. of Fisheries WA reported landings (1955 Commercial Fishing Statistics, WA Dept Fisheries) were used instead of the Pacific Fisherman Yearbook. The sources are quite different, and the Pacific Fisherman Yearbook states it is reporting foodfish only (there was a substantial mink food fishery). I used 0.00086 as the proportion of greenstriped rockfish in the landings since POP landings were not separated. For US catches, I assumed a linear decrease from 100% of the catches in US waters in 1934 to 17.65% catches from US waters in 1946 (calculated from the average percentage of catch of rockfish+POP in US waters between 1954-1974, see Forrester 1967 and Tagart & Kimura 1982). However, it is likely that fishing vessels stayed closer to home during the war years. Puget Sound catches were assumed to comprise 1% of the total landings and were removed.

1942–1948: Fish & Wildlife Service reports (Pacific Coast Fisheries) were used to determine rockfish landings instead of the Pacific Fisherman Yearbook or Dept of Fisheries WA reported landings (1955 Commercial Fishing Statistics, WA Dept Fisheries). The Pacific Fisherman Yearbook was typically less than the other two sources, which were not much different. The value 0.00086 was used as the proportion of greenstriped rockfish in the landings. For US catches, the linear decrease to 17.65%, as above, was used and it was furthermore assumed that 17.65% of the catch came from US waters between 1946–1948. It was also assumed that 1% of the total catch came from Puget Sound.

1949–1951: A database of Washington landings provided by Greg Lippert (pers comm., WDFW) was used to determine landings of combined rockfish and POP for these years. The value 0.00086 was used as the proportion of greenstriped rockfish in the landings. For US catches, it was furthermore assumed that 17.65% of the catch came from US waters between 1946–1948. The proportion of landings that occurred outside of Puget Sound were determined from the database and ranged between 99.2% and 99.7% for these years.

1952–1965: The database of Washington landings was used for separated rockfish and POP landings. Values of 0.000864 and 0.00084 were used as the proportion of greenstriped rockfish in the other rockfish and POP categories, respectively. The proportion of landings from US waters were determined for the years 1954–1965 using data reported by Forrester (1967) and ranged from 3.1–40.2% for rockfish landings and 9.9–46.4% for POP landings. The proportions of rockfish and POP landings from US waters for the years 1952–1953 were 0.215 and 0.143, respectively, which were the averages of the proportions from US waters in the years 1954–1974 (before the proportion of landings caught in US waters began steadily increasing). Tagart & Kimura 1982 report that prior to 1968, POP landings were invariably 100% Pacific Ocean perch and species composition does not need to be applied. However, after discussions with Fish & Wildlife Biologists and noticing that greenstriped rockfish have been landed with POP catches after 1968, it was considered unreasonable given the large catch of POP prior to 1968 that no greenstriped rockfish would have been caught or landed in this category.

1966–1979: Landings of POP and rockfish were obtained from Tagart & Kimura (1982) for US waters only. Proportion of 0.00084 and 0.001097 were applied to the POP and rockfish landings, respectively, to obtain the landings of greenstriped rockfish. Tagart & Kimura report area specific landings, thus catches from US waters were calculated directly. The estimated landings of greenstriped rockfish increase rapidly near the end of this series, which is due to the domestic fleet taking more catch from US waters.

1980–1980: The estimate of greenstriped rockfish landings for this single year was obtained from a spreadsheet supplied to me by Vlada Gertsvena (pers comm., NWFSC, NOAA) which was supplied to her by Jack Tagart. This spreadsheet is called ROCKFI~2.xls and has the catch of greenstriped rockfish listed. Therefore, no proportions needed to be applied.

1980–2006: The estimates of greenstriped rockfish landings were obtained from PacFIN (extraction on May 11, 2009). These landings matched very closely with the spreadsheet called ROCKFI~2.xls supplied by Jack Tagart by way of Vladlena Gertseva (pers comm., NWFSC, NOAA).

The historical landings of greenstriped rockfish in the Washington trawl fishery were low until the late 1970's when the EEZ was implemented and US vessels fished more often in US waters. The various data sources are mostly in close agreement (Figure 4).

Washington longline fishery

The longline fishery contributes a small amount of greenstriped rockfish landings when compared to the trawl fishery. However, total rockfish landings were available from the Washington landings database for longline gear between 1949 and 1969, and from the Washington fish ticket data between 1970 and 1980 (pers comm., Theresa Tsou, WDFW).

Jack Tagart provided Vlada Gertsvena (NWFSC, NOAA Fisheries) with a spreadsheet containing species composition data for longline gear (called LLSPP~2.xls). Using these data from the period 1994–1998, the proportion of greenstriped rockfish observed in longline landings was 0.001863, and greenstriped rockfish were observed in three of the five years. This value is quite a bit higher than the proportion of greenstriped rockfish observed in Washington trawl landings, which may be due to the small number of years and the highest proportion of greenstriped rockfish observed in 1997 at 0.0073.

Longline landings of greenstriped rockfish have always been a small proportion of the total landings when compared to the trawl fishery (Figure 4).

Washington recreational landings

Historical recreational landings of greenstriped rockfish from Washington were not available. The mortality of recreational fisheries on greenstriped rockfish in Washington is uncertain, but it is likely to be a small proportion of the total mortality.

2.1.1.2 Oregon

Oregon's trawl fishery

Most of the rockfish landed from the Oregon trawl fishery were historically categorized into two market categories: "Pacific Ocean Perch" (POP) and "other rockfish" (UNRK). Both groups contained many species of *Sebastes* and *Sebastolobus* (Douglas 1998). In 1984, new market categories were created for widow rockfish (*Sebastes entomelas*), thornyhead rockfish (*Sebastolobus sp.*), and small rockfish. A yellowtail rockfish (*Sebastes flavidus*) category was added in 1985.

Landings have been sampled since 1962 to determine species composition in the market categories. Prior to about 1991, this consisted of taking random samples from the landings. Since then, cluster sampling has been employed to determine the species composition of the landings. Species compositions determined from Oregon trawl landings between 1963 and 1993 were used to determine the proportion of greenstriped rockfish in the various market categories. The historical reconstruction of the trawl fishery landings of greenstriped rockfish is given below. No reconstruction was attempted for other fisheries in Oregon.

< 1928: Landings of greenstriped rockfish were assumed to be minimal and set equal to zero for this time period.

1928–1949: Cleaver (1951) reported the landings of rockfish caught by trawl and longline gear. Trawl catches mainly consisted of black rockfish (*Sebastes melanops*), yellowtail rockfish (*S. flavidus*), canary rockfish (*S. pinniger*), and Pacific ocean perch (*S. alutus*), while the longline fishery primarily caught yelloweye rockfish (*S. ruberrimus*). Pacific ocean perch were first fished regularly in 1945 and recorded separately in mid-1949. The proportion of greenstriped applied to the total rockfish landings from 1928–1949 was calculated by dividing the total expanded sample weight of greenstriped rockfish by the total landed weight of the sampled landings for Pacific ocean perch and rockfish between 1963 and 1983 (see Douglas 1998). The estimated proportion was 0.003526. Scrapfish or landings for minkfood were first recorded in 1941 and increased greatly in the late 1940's. Cleaver (1951) reported that approximately 12% of these landings were rockfish. Therefore, the same proportion as above was applied to 12% of the scrapfish (minkfood) landings, which amounts to about 317 mt of greenstriped in 1948.

1950–1953: Smith (1956) reported Pacific ocean perch and other rockfish landings for this period as well as scrapfish landings. Separate proportions of greenstriped in the POP and UNRK categories were calculated using data from 1963–1983 (Douglas 1998) and applied to the landings. Scrapfish was assumed to be composed of 12% rockfish except for in 1953 when Jones & Harry reported scrapfish to be composed of 13% rockfish (scrapfish landings in 1953 also came from Jones & Harry 1961). The proportion of greenstriped rockfish in the UNRK category was applied to these percentages of the scrapfish landings to determine the weight of the greenstriped rockfish landed. The proportion of greenstriped rockfish in the POP and UNRK categories was estimated at 0.00136 and 0.004258, respectively.

1954–1955: Pacific ocean perch and rockfish landings were compiled from Pacific Coast States Fisheries reports (C.F.S. No. 1366 and C.F.S. No. 1580). The same proportions for greenstriped rockfish used in the POP and UNRK categories for the data from 1950–1953 were used here. Scrapfish landings came from Jones & Harry (1961) as well as the percentage of rockfish in the scrapfish landings (1954=23% and 1955=15%). The proportion of greenstriped rockfish in the rockfish category was applied to the estimated rockfish weight in the scrapfish landings.

1956–1962: The publication called "The Big Book" was used for landings of Pacific ocean perch and rockfish landings between 1956 and 1962. There were two categories for rockfish: one called "other rockfish" and the other called "rockfish". The "other rockfish" category listed commercial as its use while the use for the "rockfish" category was labeled as animal food. These categories were treated the same and summed before applying the rockfish proportion for greenstriped landings as was done for 1950–1953 landings. The proportion of greenstriped in the POP category was used as above. Scrapfish landings were reported by Jones & Harry (1961) for the years 1956-1957 and by Niska (1969) for the years 1958-1962. The proportion of rockfish in the scrapfish landings from 1956 was reported by Jones & Harry (1961) as 0.30, and the proportions for 1958–1962 were reported by Niska (1969).

The proportion for 1957 was unavailable, thus the average of the proportions of rockfish landed in scrapfish landings for the years 1958–1965 (Niska 1969) was used (0.094).

1963–1983: Douglas (1998) reported expanded weights of greenstriped rockfish in the POP and UNRK landings by PSMFC area. These weights were summed over all PSMFC areas to find the weight of greenstriped rockfish for each year. The proportion of greenstriped rockfish in each category was calculated by dividing the weight of sampled greenstriped rockfish by the total weight of the samples. The total landings of greenstriped in each year was calculated as the year specific proportion of greenstriped in the market category times the yearly total landings in the market category, summed over POP and UNRK market categories. Scrapfish landings as well as the proportion of rockfish in these landings for the years 1963–1965 were taken from Niska (1969). The scrapfish landings for the years 1966–1977 were calculated by adding the animal food category landings for PSMFC areas 2A, 2B, 2C, and 3A in the Big Book. The Big Book scrapfish landings for the years 1956–1962 were similar to those reported by Niska (1969). The average of the proportions of rockfish landed in scrapfish landings for the years 1958–1965 (Niska 1969) was used to estimate the weight of rockfish (0.094). It was assumed that there were no scrapfish landings after 1977.

1984–1986: In 1984 widow rockfish (*Sebastes entomelas*) and small rockfish market categories were introduced and the year specific proportions of greenstriped rockfish were calculated for these two market categories. The market categories for yellowtail rockfish (*Sebastes flavidus*) and thornyheads (*Sebastolobus sp.*) were not used in this reconstruction as they observed a very small proportion of greenstriped rockfish. The year specific proportions were multiplied by the yearly landings in each market category, and then summed over market categories to obtain the total landings of greenstriped rockfish.

Figure 5 shows the reconstructed landings series and how it is similar to the recent landings from PacFIN. Landings were generally small until the 1980’s. Figure 6 shows the estimated landings for each market category used in the reconstruction. Most of the landings come from the general rockfish categories, but there is one year with a large amout of greenstriped rockfish estimated to have been landed in the widow category and may be the result of an error or limited sampling.

Oregon recreational landings

Oregon Department of Fish & Wildlife (ODFW) has collected recreational landings for the period 1973–1992, but has reported only numbers of total rockfish for the years 1973–1978 and numbers for each species between 1979–1992. Converting these numbers to weight would require an estimate of average weight and a species proportion for the years reporting only total numbers, resulting in extra uncertainty. Therefore, given the small number of recreational landings, a historical reconstruction of Oregon’s recreational fisheries prior to 1979 was not done. The landings from 1979 to present are described in section 2.1.2.2.

2.1.1.3 California

California’s commercial fisheries

Historical commercial fishery landings were obtained from the California Cooperative Groundfish Survey, also know as CALCOM (pers comm., Don Pearson, NMFS). Reconstructed landings for the gear categories trawl (TWL), other (OTH), and unknown (UNK) were provided for 1916–1968. All trawl landings were used to reconstruct the trawl fishery. The landings for the other (OTH) gear pertain to nets, diving, and spears (CalCOM documentation) and there were considerable landings in the early period (Figure 7). The gear type "OTH" showed an increase landings in later years. Because the total mortality of both of these gears appeared to be substantial, the landings were added together to create a non-trawl gear type.

California's recreational fisheries

Reconstructed landings for recreational fisheries were provided by John Field (pers comm., SWFSC, NOAA; June 26, 2009) for the years 1928–1980. These landings were recently revised and are slightly less than the recreational landings downloaded from CalCOM (Figure 8).

2.1.2 Recent commercial and recreational landings

An extraction on May 11, 2009 from the PacFIN system, administered by the Pacific States Fishery Management Council, was used to determine the landings of greenstriped rockfish for the recent time period from 1981–2008. Recreational landings for 1980–2008 were downloaded from the RecFIN website (Pacific State Marine Fisheries Commission, 2009) and included estimated retained catch as well as estimated discarded dead catch. Historical and recent landings are reported in Table 5 and Table 6.

2.1.2.1 Washington

Washington's commercial landings

All landings of greenstriped rockfish in the PacFIN database were listed under the species group GSRK and trawl gear (TWL). Landings reconstructed from Tagart & Kimura (1982) match closely with the PacFIN landings except for two years in the early 1990's where the PacFIN landings were quite a bit lower (Figure 4). In general, Washington landings increased throughout the 1980's, declined significantly in the late 1990's, and since 2005, have been very small. The trawl landings of greenstriped rockfish in Washington have been a small proportion of the total coastwide landings (Figure 9).

Washington's recreational landings

The only year for which recreational landings were available in ocean only areas of Washington was 1981, and were small compared to recreational landings from Oregon and California.

2.1.2.2 Oregon

Oregon's recent commercial landings

Landings since 1987 were available for Oregon commercial fisheries from the PacFIN system. No landings from Oregon before 1987 were reported in this extraction. All catches landed at Oregon ports were reported specifically as greenstriped rockfish (code GSRK), which were determined by applying species compositions to the landings in the shelf rockfish category (pers. comm.., Mark Karnowski, ODFW). Landings were listed by the gear types HKL (hook and line), TWL (trawl), and TWS (shrimp trawl). TWL landings comprised 92% of the total landings reported for these three gear types. The TWS landings made up 7% of the landings, but the landings reported in 1996 were 86.9% of the landings reported for all years of TWS (87.4 mt in 1996 and the average of other years was 1.0 mt). It is likely that this large amount in 1996 reported for TWS is the result of a recording error where yellowtail rockfish were accidentally listed as greenstriped rockfish (pers comm., Mark Karnowski, ODFW). Without the TWS landings, HKL landings comprised 1.1% of the total TWL and HKL landings for all years from 1987 to 2008.

Recent trawl landings of greenstriped rockfish in Oregon were high in the late 1980's and throughout the 1990's. Landings greatly decreased in 2000 and have remained low (averaged 2,725 tons). As with Washington landings, PacFIN catches matched closely with overlapping historical reconstruction, except in the early 1990's when PacFIN landings were lower than the reconstructed landings (Figure 5). Oregon trawl landings of greenstriped rockfish have been a major component of the coastwide trawl landings (Figure 9).

Landings of greenstriped rockfish from gears other than trawl gear were a small proportion of the total coastwide other-gear landings and most landings in Oregon occurred in the 1990's (Figure 11).

Oregon's recent recreational landings and discards

RecFIN (Pacific State Marine Fisheries Commission, 2009) did not have recreational landings available for all years since 1979, but numbers of fish were available from ODFW (pers comm., Mark Karnowski, ODFW). Therefore, an average weight of all recreational landings was determined using the numbers of fish provided by ODFW and the weights provided by RecFIN. The numbers of fish provided by ODFW were then converted to weight by multiplying by this average weight, resulting in estimates of the recreational landings for years missing from the RecFIN data.

Oregon recreational landings of greenstriped rockfish have averaged around 500 kg per year over this period, and have been low compared to recreational landings from California (Figure 10).

2.1.2.3 California

California's recent commercial landings

Estimated landings from 1969–2008 were provided for California from CalCOM (pers comm., Don Pearson, NOAA) and were determined from actual landings and species compositions. Five gear types were reported in these data: FPT refers to pots and traps, HKL is troll, hook and line, and longline, MDT refers to midwater trawls, NET is gillnets, and TWL refers to all bottom type trawls including bottomfish and shrimp gear. These gear types were summarized in trawl and other-gear categories. Trawl gear included any landings labeled TWL or MDT. Midwater trawls were included because some greenstriped rockfish appeared in this gear category and Oregon samples from the widow market category showed greenstriped, which likely contained some midwater trawling. The other-gear category included NET and HKL gear types. The FPT gear category showed a very small amount of landings and was not included.

The trawl landings of greenstriped rockfish in California were large prior to 1980, reduced but substantial in the 1980's and 1990's, and minimal since 2001 (averaging less than 1 ton per year). Figure 9 shows these landings relative to the three states. Landings from other gears were substantial in the 1970's and 1980's, increased in the 1990's, and reduced to a very small amount in the recent decade (Figure 11).

California's recent recreational catches

Recreational catches in California were extracted from RecFIN (Pacific State Marine Fisheries Commission, 2009) since 1981 and included estimated landed weight and estimated discarded dead weight for ocean only areas. A large amount of greenstriped rockfish were landed in the recreational fishery in the early 1980's, and then decreased, but remained substantial, in the 1990's. Landings have been very small since 2003, which coincides both with numerous management restrictions as well as a change from the Marine Recreational Fisheries Statistic Survey (MRFSS) to the California Recreational Fisheries Survey (CRFS).

2.1.3 Discards

Greenstriped rockfish have not had any significant market in the past and have likely been discarded at sea. Two sources of data were available with discard information. These included three years of data collected from Oregon vessels in the mid-1980's (Pikitch et al 1988; data obtained from John Wallace, NWFSC, NOAA) and recent data since 2002 collected as part of the West Coast groundfish observer program (WCGOP data obtained from Eliza Heery, NWFSC, NOAA).

The data used in the study by Pikitch et al (1988) contained retained and discarded weights of the catch for trawl fisheries targeting bottomfish, deepwater dover, near shore mixed species, or shrimp in the years 1985–1987. Lengths were taken from a small number of tows in 1986 and 1987. The ratio of the observed discards to the total observed catch for each year and strategy is shown in Table 7 and ranged from 0.23 to 0.62. The length frequencies showed a strong size selection to retain greenstriped rockfish larger than 29 cmwith none discarded above 30 cm (Figure 12). This size selective discarding resulted in large average weights for the retained portion of the catch with discards averaging close to 0.25 kg and retained catch averaging more than 0.41 kg (Table 8).

Landed and discarded mortality estimates, mean weights of discards, and length frequencies of discarded greenstriped rockfish were available from WCGOP data for the trawl, limited entry fixed gear (longline and pot), and shrimp fisheries. The shrimp fishery did not show any landed greenstriped rockfish in the years 2004, 2005, and 2007, but the WCGOP reported 6.44, 2.74, and 2.76 metric tons of discarded greenstriped rockfish in these years, respectively. These data were not used in this assessment. The discard rates (discard weight divided by total catch weight) for the trawl and fixed gear fisheries are shown in Table 9 and ranged from 0.78 to 0.98 for trawl fisheries north of 40° 10' N and from 0.90 to 1.0 for trawl fisheries south of 40° 10' N. Fixed gear fisheries showed very high discard rates greater than 0.98. All of these discard rates are much larger than the discard rates from the Pikitch et al (1988) data.

Length frequencies were estimated for the trawl fishery in Oregon and Washington combined, the trawl fishery in California, and the coastwide fixed gear fishery. Table 10 shows the number of samples available for years and gears with length data. The discard length frequencies from the WCGOP showed a large proportion of fish greater than 20 cm, unlike the Pikitch et al (1988) data, suggesting that the recent fishery is not size selective (Figure 13). Furthermore, the fixed gear fishery appears to discard only large fish, which is possibly due to the selection of only large fish.

The mean weight of the discards from the WCGOP for the Oregon and Washington trawl fishery, the California trawl fishery, and the fixed gear fishery are shown in Table 11. The California trawl fishery had the smallest mean weights and the fixed gear fishery had the highest mean weights, which were more than twice the California trawl fishery.

2.1.4 Foreign catches

Foreign catches in US water were available by INPFC area from Rogers (2003) and occurred between 1966 and 1976. Reported catches of greenstriped rockfish from the Soviet Union, Japan, Poland, Bulgaria, and East Germany were summed and tabulated by INPFC area (Table 12). The Soviet Union caught the highest proportion of greenstriped rockfish in all years except in 1975 when Poland caught a slightly higher amount, and total foreign landings peaked in 1967 at 143 metric tons (Table 12).

Rogers (2003) reported that there were unlikely any discards of rockfish in the foreign catch (based on observations by United States fishermen and biologists). At the start of the series (1966–1970) the foreign catches comprise a very large proportion of the total domestic and foreign landings of greenstriped rockfish, which may be due to the lack of discarding by the foreign fleet (Figure 14). The entire time series of domestic and foreign trawl landings is shown in Figure 15.

2.1.5 Fishery logbooks

Logbook data for greenstriped rockfish were downloaded from PacFIN on May 11, 2009. There were 349 observations for the years 1993–2007 from different types of trawl gear, and all observations were reported by California. Table 13 shows the number of logbook observations by year and the small percentage of observed catch in most years (except 2003–2005). Due to the small sample sizes and changes in management over the period represented, it is unlikely that these data index the coastwide abundance of greenstriped rockfish. Therefore, no further analyses were done using these data.

2.1.6 Abundance indices

Due to the small sample sizes by year, the small proportion of the landings that were observed, the complication of discards, and changes in management over the period represented, it is unlikely that the logbook data adequately index the coastwide abundance of greenstriped rockfish. Therefore, a catch-per-unit-effort series was not calculated.

2.1.7 Fishery biological sampling

Biological data from commercial fisheries for greenstriped rockfish were extracted from PacFIN (PSMFC) on July 6, 2009. The only useful data available in this extraction were lengths taken during port sampling in California, Oregon, and Washington. The data were classified as groundfish trawl (TWL), shrimp trawl (TWS), hook and line (HKL), or net (NET), and 309 observations could not be classified as a particular gear. There were 60 observations removed that had a missing length, and 10 observations were removed that recorded a length of 55 cm or greater. There were no hauls outside of US waters in this extraction.

Table 14 shows the number of landings sampled as well as the number of lengths taken for each year since 1978 trawl and non-trawl gear, and the three states. California has regularly sampled a large number of landings during this time period. Oregon and Washington started regularly sampling trawl landings in 1996 and non-trawl (all hook and line) landings in 2000. Oregon, however, has sampled few landings compared to California and Washington. The number of lengths recorded by sex and gear are shown in Table 15 and Table 16.

Length frequencies for trawl and non-trawl gear were estimated using these data (Figure 16). Samples were weighted up to the total landing then combined into state specific length frequencies. Washington did not have the total weight of the landing recorded, thus was expanded to the total landing weight by a factor of 6.3, which is the median expansion for the Oregon landings. Oregon and Washington trawl length frequencies were combined by simply adding the expanded numbers at length and sex together for each year. They were not expanded to total state landings because the sparse samples from Oregon would swamp the length frequency and cause peaks at particular lengths. The expansion factors for the non-trawl gear length samples were much less than the trawl gear landing expansions and the Washington lengths were not arbitrarily expanded. The predicted numbers at length for each state were added to create a coast-wide length frequency. The majority of the samples came from California landings and it is uncertain whether or not this introduced any a bias to be concerned of (Table 16).

In some years, the gender of the sampled fish was not recorded. Therefore, length samples with an average number of males per tow less than 0.5 or a large percentage of unsexed samples were estimated for both sexes combined.

Shaw & Gunderson (2006) aged 123 greenstriped rockfish from Oregon landings in 1995. However, these data were unavailable at the time of this report. Also, there are length data available from commercial passenger fishing vessel (CPFV) surveys in California, but these data were made available after the model was finalized and could not be included.

A summary of the biological data available for greenstriped rockfish, reported by PacFIN on June 19, 2009, reports that there are maturity data available. The data available for this assessment did not contain maturity information (every observation was coded 'U'), but these data are typically macroscopic samples, when available, and can be subject to a large amount of error.

Recreational length data were available from RecFIN with the most informative data coming from the 1990's (Figure 17). Length data were collected in California from Commercial Passenger Fishing Vessels (CPFV), but were not available until this assessment was complete, thus were not included.

2.2 Fishery independent data

2.2.1 NWFSC trawl survey

The NWFSC fishery-independent shelf and slope trawl survey produces three sources of information: an index of relative abundance, length-frequency distributions, and age-frequency distributions. Only years in which the NWFSC survey included the continental shelf are considered (2003-2008).

The NWFSC survey is based on a random-grid design; covering the coastal waters from a depth of 55 m to 1,280 m (Keller et al. 2007). This design uses four industry chartered vessels per year, assigned to a roughly equal number of randomly selected grid cells and is divided into two 'passes' of the coast which are executed from north to south. Two vessels fish during each pass, which have been conducted from late-May to early-October each year. This design therefore incorporates both vessel-to-vessel differences in catchability as well as variance associated with selecting a relatively small number (~700) of possible cells from a very large population of possible cells spread from the Mexican to the Canadian border. Much effort has been expended on appropriate analysis methods for this type of data, culminating in the West Coast trawl survey workshop held in Seattle in November 2006 (see background materials).

The NWFSC survey commonly encounters greenstriped rockfish along the U.S. west coast (Table 17, Figure 18). The survey did not fish shallower than 54 meters and no greenstriped rockfish were caught deeper than 450 meters in any year. Figure 19 shows that the percentage of positive tows and the catch rate over depth peak around 180 meters and decline as depth increases. Figure 19 also shows that the prevalence and density of greenstriped are generally higher in the northern latitudes.

Figure 20 displays the mean fish length per tow of greenstriped rockfish against tow depth and shows large variation in length for both sexes in the shallow to middle depths with both the occurrence of small and large greenstriped rockfish. As depth increases, the range in lengths decreases with the majority of observations being composed of larger fish.

A Generalized Linear Mixed Model (GLMM) model based approach was used to estimate index of abundance for greenstriped, which was endorsed by the trawl survey workshop for use in West Coast stock assessments. The GLMM approach, which includes both fixed and random effects, explicitly captures vessel-specific differences in catchability (due to engine power, trawling experience of the skipper, etc.) via inclusion of random effects. The GLMM approach explicitly models both the zero catches as well as allows for skewness in the distribution of catch rates through the use of a Gamma or lognormal error structure. These factors result in the GLMM approach being robust to a few large tows and likely more reflective of actual trends in population abundance.

When implementing the GLMM approach, it is recommended that there are at least three positive tows in each stratum/year combination. Since the Conception, Monterey, and Eureka areas had fewer than three observations in some years by depth strata, the original stratification of five INPFC areas and three depth zones was collapsed. Because depth showed a strong trend in catch rates and with lower catch rates in the south, the five INPFC strata were collapsed into three areas by state: California (south of 42N), Oregon (42N – 46N), and Washington (north of 46N). Three splits by depth remained with breaks creating a shallow depth (54.864-125 m), a middle depth (125 m-182.88 m) and a deep depth (182.88 m – 500 m). The predicted values plotted against the residuals for the positive tow model are shown in Figure 21.

The biomass index from the GLMM showed a fluctuating trend with the highest biomass estimate peaking around 20,500 metric tons in 2008 (Table 18, Figure 22). The biomass by area, estimated by GLMM analysis, shows the highest biomass in the middle depth for each of the three areas with the largest contribution from the Oregon middle depth (Figure 23). Also, an increasing trend in biomass for each of the three depths within the Washington strata compared to the reference year of 2003 was estimated. The biomass trends in each of the other two areas by depth were relatively constant or slightly lower than the biomass estimated in the reference year.

Length bins from 10 to 40 cm in increments of 1 cm were used to summarize the length frequency of the survey catches in each year. Table 17 shows the number of lengths sampled during the survey. The first bin includes all observations less than 11 cm and the last bin includes all fish larger than 40 cm. The length frequency distributions for the NWFSC survey from 2003–2008 are plotted in Figure 24.

Age-frequency data from the NWFSC survey (Table 17, Figure 25) were included in the model as conditional age-at-length distributions by sex and year. Age-at-length observations can be thought of as entries in an age-length key (matrix), with age across the columns and length down the rows. The approach consists of tabulating the sums within rows as the standard length-frequency distribution and, instead of also tabulating the sums to the age margin, the distribution of ages in each row of the age-length key is treated as a separate observation conditioned on the row (length) from which it came. This approach has several benefits for analysis above the standard use of marginal age compositions. First, age structures are generally collected as a subset of the fish that have been measured. If the ages are to be used to create an external age-length key to transform the lengths to ages, then the uncertainty due to sampling and missing data in the key are not included in the resulting age-compositions used in the stock assessment. If the marginal age compositions are used with the length compositions in the assessment, the information content on sex-ratio and year class strength is largely double-counted as the same fish are contributing to likelihood components that are assumed to be independent. Using conditional age-distributions for each length bin allows only the additional information provided by the limited age data (relative to the generally far more numerous length observations) to be captured, without creating a 'double-counting' of the data in the total likelihood. The second major benefit of using conditional age-composition observations is that in addition to being able to estimate the basic growth parameters (L_{minAge}, L_{maxAge}, K) inside the assessment model, the distribution of lengths at a given age, governed by two parameters for the standard deviation of length at a young age and the standard deviation at an older age, are also quite reliably estimated. This information could only be reliably derived from marginal age-composition observations where very strong and well-separated cohorts exist and where they were quite accurately aged and measured. By fully estimating the growth specifications within the stock assessment model, this major source of uncertainty is included in the assessment results, and bias due to size-based selectivity is avoided. Therefore, to retain objective weighting of the length and age data, and to fully include the uncertainty in growth parameters (and avoid potential bias due to external estimation where size-based selectivity is operating) conditional age-at-length compositions were developed using the NWFSC trawl survey age data.

Age distributions included bins from age 1 to age 45, with the last bin including all fish aged 45 or greater (Figure 25). Approximately 3,472 fish were sampled for age, compared to 17,678 fish sampled for length (Table 17). These data show the growth trajectory of females reaching a maximum size near 34 cm and males reaching a maximum size of about 29 cm (Figure 26). It is often useful to compute the marginal age-compositions to allow for easier visual tracking of strong cohorts and offer a more familiar summary view of the data, although this information is still imparted to the model using conditional age-at-length observations. The NWFSC age distributions show a strong 1993 cohort through the years, starting at age ten in 2003 and ending at age 15 in 2008 (Figure 25). There is also indication of a strong cohort or a number of years of strong cohorts in the late 1990's (Figure 25).

2.2.2 Triennial trawl survey

The triennial shelf trawl survey conducted by NMFS starting in 1977 is the second source of fishery-independent data regarding the abundance of greenstriped rockfish (Dark and Wilkins 1994). The sampling methods used in the survey over the 24-year period are most recently described in Weinberg et al. (2002). The basic design was a series of equally spaced transects from which searches for tows in a specific depth range were initiated (Figure 27). The survey design has changed slightly over the period of time (Table 19, Figure 28). In general, all of the surveys were conducted in the mid-summer through early fall: the survey in 1977 was conducted from early July through late September; the surveys from 1980 through 1989 ran from mid-July to late September; the survey in 1992 spanned from mid-July through early October; the survey in 1995 was conducted from early June to late August; the 1998 survey ran from early June through early August; and the 2001, 2004 surveys were conducted in May-July (Figure 28). Haul depths ranged from 91–457 m during the 1977 survey with no hauls shallower than 91 m. The surveys in 1980, 1983, and 1986 covered the West Coast south to 36.8°N latitude and a depth range of 55–366 meters. The surveys in 1989 and 1992 covered the same depth range but extended the southern range to 34.5°N (near Point Conception). From 1995–2004, the surveys covered the depth range 55–500 meters and surveyed south to 34.5°N. In the final year of the triennial series (2004), the Fishery Resource and Monitoring division (FRAM) at the NWFSC undertook the survey from the AFSC and followed very similar protocols as the AFSC.

Given the different depths surveyed during 1977 the results from the 1977 survey were not included in this assessment. Water hauls (Zimmermann et al. 2003) and tows located in Canadian and Mexican waters were also excluded from the analysis of this survey and the Conception area (south of 36°N latitude) was removed from the analysis since it was not surveyed in the early years.

Similarly to the NWFSC trawl survey, greenstriped rockfish were encountered throughout the West Coast (Table 20, Figure 29). Larger catch rates were observed around depths of 180 m with an increase in positive tows and catch rates with increasing latitude (Figure 30). An analysis of the mean length by depth showed a similar pattern to the observations in the NWFSC trawl survey (Figure 31) and the same depth stratification was used for the triennial survey (54.864–125 m, 125–182.88 m and 182.88–500 m). The same latitudinal stratification was also used for the analysis of the triennial survey (36°N-42°N, 42°N-46°N, and 46°N-49°N).

A GLMM based estimator, similar to the GLMM used for the NWFSC survey, was used to estimate a triennial index of abundance for greenstriped rockfish over the years 1980–2004. The estimated total biomass by stratum for each survey index is given in Table 18 and Figure 32, and range from 1,575 metric tons in 1980 to 5,551 metric tons in 2004. A general trend of increasing biomass was observed over the triennial trawl survey time-series. These estimates of biomass were smaller than the swept area estimates of biomass from the NWFSC survey and showed larger standard errors (Table 18, Figure 32).

Size distributions (fork length in cm) were calculated following the same procedures as the NWFSC survey. The numbers of fish and number of hauls represented in each year of the survey are presented in Table 20. The length frequency distributions generally show evidence of larger fish in 1980, 1983, and 1986 compared to the latter years, some very small fish in 1998, and an increase in mean length from 1998 to 2004 (Figure 33). There may be information on strong cohorts in these data.

Age data for greenstriped rockfish from the Triennial survey were not available at this time, although Shaw & Gunderson (2006) reported having analyzed 342 ages.

2.2.3 Additional fishery independent data

There have been other surveys along the west coast of the United States, but these have typically covered the slope area whereas greenstriped rockfish are more commonly distributed along the continental shelf. Therefore, no additional fishery independent sources of data were considered.

2.2.4 Research removals

Research removals have historically been a very small proportion of the total removals by all fisheries. However, with greatly reduced fisheries landings, the research removals have been greater than fisheries landings for the last two years, although they have remained small relative to historical landings (Table 21).

2.3 Biological Data

Biological relationships were determined mostly from results published in the literature and data collected recently in the NWFSC survey.

2.3.1 Weight-at-length

Published relationships between weight and length were available from Shaw & Gunderson (2006) and Love et al (1990). Love et al (1990) used data collected between 1980 and 1987 from trawling (1 cm mesh in the cod end) and hook and line sampling in the Southern California Bight (south of Point Conception). It is unclear exactly which data Shaw and Gunderson (2006) used to determine weight at length, but they were definitely collected north of Point Conception. Data from the NWFSC survey for the years 2003–2008 were also available to predict weight-at-length relationships. One observation in 2003 was omitted as an obvious outlier (29 cm fish at 0.09 kg).

Weight-at-length relationships from Shaw & Gunderson (2006) predicted larger fish than the Love et al (1990) weight-at-length relationship for sexes combined (Figure 34). The NWFSC survey predicted weight-at-length was in between the Shaw & Gunderson (2006) and Love et al (1990) predictions. Shaw & Gunderson (2006) used nonlinear regression to estimate the parameters of the relationship whereas Love et al (1990) and the analysis of the NWFSC survey data used linear regression of the log transformed data. However, the differences seen are likely due to sampling error, area differences, year differences, or all of the above.

Sex-specific weight-at-length relationships were estimated using data from all years of the NWFSC survey south and north of the CA/OR border (Figure 35). Southern fish are on average smaller than northern fish, and a greater difference was observed between southern and northern females than for southern and northern males (Figure 36). Yearly weight-at-length relationships were predicted from the NWFSC survey data (Figure 37). The 2003 relationship predicted the smallest fish and the 2004 relationship predicted the largest fish, on average, although the difference between years was small (Figure 38).

2.3.2 Maturity and fecundity

Shaw & Gunderson (2006) reported the results of a microscopic maturity study using commercial samples from Oregon collected in 1995. The length at 50% mature ($L_{0.5}$) was 23.04 and 20.97 cm for males and females, respectively. They also reported that very few fish of either sex were mature by a length of 15 cm. Other sources have published information on maturity showing maturity at a smaller size in southern samples (Table 23). Love et al (1990) report maturity at a very small size in California, but these samples came from the California Bight. Wyllie Echeverria (1987) used samples taken mostly from central and northern California and reported maturity at size estimates similar to Shaw & Gunderson (2006). The estimates provided by Shaw & Gunderson (2006) are used in this assessment.

A meta-analysis on the relationship between fecundity (eggs per weight as a function of weight) was performed by Dick (2009) on many species of rockfish. The estimated intercept and slope in the linear relationship for greenstriped rockfish were 371,200 and 63,300, respectively.

2.3.3 Natural mortality

The only published estimates of natural mortality found were from Shaw & Gunderson (2006). They provided estimates of M based on three methods: maximum age using the method of Hoenig (1983) (M=0.092), a catch curve analysis (M=0.149 and 0.142 for females and males, respectively), and GSI methods (M=0.149 for females). A natural mortality rate of 0.145 would be synonymous with a maximum age of 29 using Hoenig's (1983) method, which is approximately the maximum age reported by Love et al (1990) for both males and females.

Based on the maximum ages observed for female and male fish from the NWFSC survey (51 and 49 years, respectively), the Hoenig (1983) method predicts natural mortality values of 0.08118 for females and 0.08452 for males (Table 25).

2.3.4 Length at age

Age data were only available from the NWFSC survey and were used to investigate length-at-age relationships. Shaw & Gunderson (2006) report ages from the 1995 triennial survey and Oregon landings sampled in 1995. However, these data were not available at the time of this assessment.

Length-at-age relationships for female and male greenstriped rockfish were estimated using the NWFSC survey data. Ages were determined by the Cooperative Ageing Project laboratory in Newport, OR and a discussion of the aging error is given below. The maximum ages for females and males were 51 and 49, respectively. Figure 26 shows the length at age for females and males as well as the predicted parameters of the von Bertalanffy growth curve. The maximum length is estimated at 33.64 and 28.48 for females and males, respectively. Figure 26 also show the standard deviation at age and the coefficient of variation (CV) at age. The CV at age shows a more linear trend over age than the standard deviation.

Splitting the survey data at the Oregon/California border into northern and southern areas shows a higher occurrence of older fish in the northern area (Figure 39). In addition, the northern fish are predicted to grow larger at a slower rate (Table 24). Estimated growth curves using data from each year of the survey showed very small differences.

2.3.5 Sex ratios

Greenstriped rockfish are small fish and show dimorphic growth. These qualities can result in skewed sex ratios observed in the commercial and survey landings if females and males are differentially selected. The commercial trawl data, based on sexed length data, show a higher percentage of females, but the survey data show a more equal ratio of males to females (Table 26).

2.3.6 Ageing precision and bias

The greenstriped rockfish age data are limited to the NWFSC survey ages recently completed by the Cooperative Ageing Project (CAP) laboratory in Newport, Oregon. Additionally, one limited study produced ages for greenstriped rockfish from commercial samples. However, the authors are not able to obtain those data at this time. All of the survey otoliths are aged using the break and burn method and one set of double reads are available from the CAP to estimate ageing bias and imprecision for this stock assessment. This analysis uses simultaneous estimation of bias and imprecision in a rigorous statistical framework programmed in AD Model Builder (Otter Research Ltd. 2005) by A. Punt, University of Washington (Punt et al. 2008). This program estimates the underlying age distribution of a sample from up to three double- or cross-reads for each age structure, and can do this for multiple samples simultaneously. The most important assumption of the estimation technique is that at least one ageing method must be unbiased, so it is therefore not an age-validation. Functional forms can be explored for each method for both the bias (none, linear, type 2) and the imprecision (constant CV, or type 2 increase in CV with age). Because the technique requires that the underlying age structure of each sample be estimated, a reasonably large quantity of data spread over the entire range of ages present in the sample is needed (Punt et al. 2008). A few very old ages do not contribute appreciable information but require many more parameters in the underlying model and create instability during estimation. For this reason, each analysis must be truncated at a maximum age that is reasonably well represented in all samples. The ageing error estimation also requires that one reader be specified as unbiased.

Ages of less than 40 years are well represented in the data and there are not strong differences between the ages from reader 1 and reader 2 (Figure 41 and Figure 42). Greenstriped rockfish ages have not been validated to determine reader biases and both readers were specified as unbiased in the ageing error models. Table 27 shows the different model fits to the data as well as the likelihoods, with the best model highlighted. The best model for the greenstriped break and burn ages included nonlinear standard deviation (Table 27). The observed number of ages plotted against the predicated number of ages show that the final model selected fits the data well (Figure 43). Generally, greenstriped rockfish ages from the CAP are accurate and have a low level of imprecision (Table 28, Figure 44). The standard deviation for the greenstriped rockfish ages increases from 0.134 to an asymptote of 0.974 at age 23.

3 History of Modeling Approaches

3.1.1 Previous assessments

Greenstriped rockfish are not a species targeted by any large fishery and have not been assessed as a single species in the past. However, an assessment on the species complex called “other slope rockfish” in the Gulf of Alaska, in which greenstriped rockfish is considered one of 17 different species, was done in 1999. This assessment basically consisted of determining the current exploitable biomass by calculating the average biomass of the complex from the three most recent surveys. In early 2007, a petition was submitted to list greenstriped rockfish in Puget Sound as an endangered or threatened species. However, it was determined that listing greenstriped was not warranted (Federal Register April 23, 2009).

3.1.2 GAP and GMT input

The Groundfish Advisory Subpanel (GAP) representative (Bob Alverson) and Groundfish Management Team (GMT) representative (Rob Jones) were contacted in the early stages of the assessment. Bob Alverson (Fishing Vessels Owner’s Association) noted that greenstriped rockfish are not often seen in the fisheries that he is familiar with. Rob Jones (Northwest Indian Fisheries Commission) noted that the PFMC has a policy of managing stock regionally to the extent possible and encouraged investigating an area specific model. He also provided advice on species compositions of the POP complex and thought that the catches were likely not 100% POP, although he made the suggestion to contact more knowledgeable people. Finally, Rob thought that it was worth trying to include as many fisheries as possible and remove them if evidence suggests they are incompatible.

3.1.3 Response to previous review panel recommendations in 2005

This is the first time that greenstriped rockfish have been assessed. Hence, there are no recommendations from previous assessments.

4 Model Description

An age-structured stock assessment model was used to predict the biomass trajectory of greenstriped rockfish. An approach of parsimony was attempted because this was a first assessment and data were limited for many of the fisheries. This allowed for the determination of general trends in the biomass over time instead of getting caught up in details that may not be relevant.

Stock Synthesis v3.03a was used to estimate the parameters of the model. R4SS, revision 259, along were R version 2.9.1 were used to investigate and plot model fits.

4.1 New modeling approaches

This is the first time that West Coast greenstriped rockfish have been assessed thus is a new modeling approach for this stock. The modeling approach used in this assessment is similar to recent assessments done at the NWFSC for other species of rockfish.

4.2 General model specifications and assumptions

Stock Synthesis has many options when setting up a model and the assessment model for greenstriped rockfish was set up in the following manner.

4.2.1 Definitions of fleets and areas

The availability of data was the main determination of fleets and areas. Greenstriped rockfish are frequently observed in West Coast fisheries and surveys, but have not always been sampled or have been recorded as part of another species complex. Therefore, accurate data are often limited.

Trawl fisheries had sufficient data to split the West Coast into two fleets: Oregon and Washington (WA/OR) and California (CA). Splitting at the California/Oregon border was chosen because landings were available by state and sampling programs differ between states. Oregon and Washington were combined because there were few length samples available from Oregon (Table 14). The foreign trawl fleet (1966–1976) was kept separate from the domestic trawl fleet because it was reported that no discarding had occurred. However, even though high catches came from all along the West Coast, this fleet was treated as a coast-wide fleet with the same selectivity as the California trawl fleet, which was chosen because there were earlier length frequencies from California which more closely matched the time period in which the foreign fleet was fishing.

The other-gear and recreational fisheries were treated as separate fleets covering the entire West Coast. These fleets were not split by states because there were limited data from Oregon and Washington for these fisheries. Therefore, California landings and length frequencies provided most of the information for these fleets. It is likely that more landings occurred in Oregon and Washington than are being accounted for, and it may be worthwhile to further investigate the impact of the Oregon and Washington fisheries on greenstriped rockfish.

4.2.2 Other specifications

The specifications of the assessment are listed in Table 29. Basically, the model is a two-sex, age-structured model starting in 1916 with ages pooled at 50 years. The Triennial survey was split into an early and a late series based mostly on timing of the survey (Figure 28), and the timing of the early series was specified to occur 60% of the way through the year instead of half way through, as with the late Triennial series, NWFSC survey, and all fleets.

The specification of when to estimate recruitment deviations is an assumption that may drive some of the model uncertainty. The earliest length-composition data occur in 1978 and it was decided to begin estimating recruitment deviations in 1970 after consideration of starting earlier. Furthermore, recruitment deviations in the 1970's were not precisely estimated, thus the bias correction was linearly ramped into the model between 1970 and 1986. The full bias correction occurred between 1986 and 2005, with no bias correction occurring for 2008 and onward into the forecasts.

The recommended selectivity type in Stock Synthesis is the double normal and was used in this assessment with separate selectivity-at-length relationships for females and males. Estimating a separate curve for males did not greatly improve the likelihood in initial runs, but keeping them separate helped control the variation in recruitment (σ_R). This is discussed more in section 4.8.2.

4.3 Data sources and weighting

The data are explained in detail in Section 2 and summarized in Table 1and Table 2. Briefly, there is one survey split into two series with length data for each year, a recent survey series with length and age data, length frequencies of retained and discarded catch from four fisheries, estimates of average weights of discards in recent years, and estimates of discarded catch from observer data. It is important to properly weight these data relative to each other so that each contributes to the likelihood appropriately. This was done in an iterative manner of mainly adjusting the effective sample size of the length frequency data. The data were weighted as follows.

The survey indices were standardized using a generalized linear mixed model and Markov chain Monte Carlo was used to estimate the variances of the estimates for each year. The effective sample sizes for the length frequencies were initially chosen based on an analysis performed by Ian Stewart (pers comm.)NWFSC, NOAA). He provided an estimate of the maximum effective sample size for each length frequency from the NWFSC survey data from which the effective number of samples per tow was calculated, which is typically much less than the total number of length samples taken. Figure 45 shows that the effective sample size is approximately a monotonic function of the number of greenstriped rockfish measured and that measuring more than 20 fish per tow does not offer much gain in effective sampling effort.

The Triennial survey sampled a minimum of 27 greenstriped rockfish per tow, when the species was measured. Because a large number of greenstriped rockfish were measured per tow, but a small percentage of tows were measured in some years, the starting effective sample sizes for the Triennial length compositions were determined by multiplying the number of tows by 4.5. This value is approximately the maximum expansion from the number of tows to the effective sample size seen in the analysis on NWFSC survey data done by Ian Stewart. The effective sample size for the Triennial survey length-composition data were then tuned from there. These initial values were not assumed to be the maximum effective sample sizes because of differences between the surveys and when they chose to measure greenstriped rockfish. Also, because few tows were measured, there is less possibility of observing rare size classes and biases could occur due to sampling tows with a larger catch of greenstriped rockfish. These concerns lead to omitting the 1980 length frequency data from this assessment.

4.4 Estimated and fixed parameters

There are 102 estimated parameters in the greenstriped rockfish base assessment model, of which 36 are recruitment deviates prior to 2006 and 15 are forecast recruitment deviates. The estimated parameters other than recruitment deviates represent initial recruitment, length-at-age, selectivity, and retention. Fixed parameters include natural mortality, steepness, and dome-shaped selectivity parameters. A listing of all parameters, whether or not they were fixed, initial values for these parameters, as well as bounds and priors are shown in Table 29, Table 30, and Table 31.

4.5 Model selection and evaluation

The base case assessment model for greenstriped rockfish was developed to balance parsimony and realism, and the goal was to estimate a biomass trajectory for the population of greenstriped rockfish on the outer west coast of the United States. The model contains many assumptions to achieve parsimony and uses many different sources of data to estimate reality. A series of investigative model runs were done to achieve the final base case model.

4.5.1 Models explored

Many models were explored before selecting the initial base case model. Despite some evidence of geographical differences in growth and maturity (Love et al 2002, NWFSC survey data), only coast-wide models were developed, due to the paucity of region-specific data and the observation that the greatest differences in growth and maturity originated from samples south of Point Conception, where the density of greenstriped rockfish is much lower than north of Point Conception. The trawl fishery was split into northern and southern fleets to capture some of the geographic differences in exploitation.

Other explorations included determining the significance of dome-shaped selectivity, separate female and male selectivity, the use of discard ratios vs. specifying discard amounts, and the year in which the estimation of recruitment deviations was initiated. Dome-shaped selectivity was not significant in any models that we tested. Separating female and male selectivity did not drastically improve the overall likelihood, but when there were not separate selectivities the estimated recruitment deviations were ill-behaved, thus sex specific selectivities were retained. Estimates of the total discard mortality were used because these are estimates that are not explicitly related to the landings of greenstriped rockfish (discard total mortality is expanded to the fleet using total landings of groundfish). Therefore, when the catch history is changed as a sensitivity, the estimate of total discards will remain the same instead of scaling it up or down by a ratio. Finally, it was determined to start estimating recruitment deviations in 1970 because patterns emerged in the deviations before that time. These patterns were not cleared up by changing the amount of bias correction applied.

4.5.2 Investigating key assumptions and structural choices

A number of sensitivities were done to investigate the major areas of concern and are reported later. During the model exploration phase, many of the key assumptions were explored and decisions were made that made the most sense when attempting to balance parsimony and reality.

4.5.3 Convergence status

Proper convergence was determined by starting the minimization process from dispersed values of the maximum likelihood estimates to determine if the model found a better minimum. This was repeated 50 times and a better minimum was not found. The model does not appear to have convergence issues, the final maximum gradient was low (Table 32), and the Hessian was always inverted. It was not expected that this model would have convergence issues, especially since natural mortality and steepness were fixed.

4.6 Response to STAR panel recommendations

The STAR panel made a number of recommendations that were adopted into the base case model. These recommendations were:

- remove the 1980 triennial survey length-frequency data (but not the 1980 survey index),
- re-run the ageing-precision and bias-estimation model assuming no bias in the ageing process,
- ramp in the recruitment bias correction from 1970 to 1986, and
- fix recruitment variability at 0.6,

There was considerable discussion regarding two areas that were incorporated into the states of nature. These were the use of early discard data that showed no discarding of large greenstriped rockfish, and whether or not natural mortality should be estimated. The early discard data covered a small period of time in the mid 1980’s, a small area of the coast, and there were few length samples. However, this early data showed a very different pattern of discarding than recent data. It was decided to omit these data and to instead incorporate the fraction of discards into the model uncertainty.

The data supported values of natural mortality that were less than the fixed value of 0.08. Due to uncertainty whether or not the estimates of female and male natural mortality were realistic or were caused by model mis-specification, it was decided to keep natural mortality fixed at 0.08 and to incorporate it as an additional source of model uncertainty.

Overall, the STAR process went smoothly and there were no disagreements that could not be resolved.

4.7 Base case model results

The base case model parameter estimates along with approximate asymptotic standard errors are shown in Table 33 and the likelihood components are shown in Table 32. The peak selectivity parameters for the WA/OR trawl and other-gear fleets were estimated near the upper bound of 44 cm. This parameter defines at what length the fish are fully selected by the fleet and an estimate at the upper bound signifies that the selectivity continues to increase to the largest modeled size class. Estimates of key derived parameters and approximate 95% asymptotic confidence intervals are shown in Table 34. Many of the derived parameters related to productivity (such as unfished spawning output and *MSY*) were highly correlated with the estimated unfished recruitment (R_0).

4.7.1 Appropriateness of the parameter estimates

The parameter estimates seemed reasonable, based on previous publications describing the biology of greenstriped rockfish and previous assessments of other species of groundfish. The estimated initial recruitment parameter results in an unfished biomass of age 2+ individuals of 33,500 metric tons.

The estimates of survey catchability for the NWFSC survey catchability were 2.6 times the late Triennial survey series and over 4 times the catchability of the early Triennial survey. Much of the difference can be accounted for by differences between the survey designs, area covered, net configurations, and skipper experience. In addition, it is likely that there were improvements made in the Triennial survey implementation that may have improved catchability over time. It is believed that these estimates of catchability are reasonable for greenstriped rockfish, which are less associated with rocks than other species of rockfish. But, more importantly, the estimate of catchability is greatly influenced by the methods used to expand the catch rates up to a biomass estimate. The choices of strata areas, the total area of interest, and the effective swept area of the net can all cause large biases in the resulting estimate of biomass. This model analytically estimates the catchability parameter, treating it as a nuisance parameter, and is focused on fitting the trend in the survey rather than the absolute biomass. Catchability is a scaling parameter and accounts for any overall bias in the time series that may have occurred during the analysis.

It was anticipated that the retention curves would have a low asymptote due to expected high discard rates, and this was verified in the parameter estimates (Figure 47). Selectivity curves for the WA/OR trawl and other-gear fleets did not asymptote at 1, which is unintuitive, but is likely related to estimating the appropriate "kept fish" curve with a low propensity to keep fish of any size class. The "kept fish" curves are shown in Figure 48 and are more intuitive than looking at selectivity and retention. Stock Synthesis provided a warning when the upper bound on peak selectivity was set larger than the largest observed length bin, and due to fear that calculations may not be correct, the peak selectivity parameter was bounded at 44 cm. Sensitivity analyses showed that lowering the bound on the peak parameter had little effect on the overall conclusions.

Survey selectivity curves showed 50% selectivity around 15–20 cm (Figure 46). However, the early Triennial selectivity was shifted to the right of the other survey selectivity curves, which may be an artifact of the short time series and the split of the series at the years 1992 and 1995. A large year class was estimated in 1993 and the shift in selectivity may actually be related to the large influx of smaller fish seen in the later Triennial series. If related to recruitment, the shift in the Triennial selectivity curves would cause a loss of information about recruitment in the early 1990's. Nonetheless, the recruitment estimate in 1993 was the largest recruitment in the time series (Figure 49), and was strongly supported by age data from the NWFSC survey. Other strong years of recruitment were 1971, 1984, and 1998, which were all within a year or two of strong El Niño events (1973, 1983, 1992, 1998, from NOAA_CIRES CDC). Low recruitment occurred in a number of years in the late 1970's, throughout the 1990's, and in 2006 (Figure 49). The uncertainty in the estimates of recruitment was large except for during the 1990's, when recruitment was strongly informed by the NWFSC age data. It is of mild concern that there were higher than average recruitments in 1992 and 1993, but very small recruitments for 3 years before and 4 years after these strong events. This could be indicative of true recruitment variability, but there is a slight possibility that this could be a result of bias towards a single cohort in the ageing data (as was seen in the hake assessment; pers comm., Owen Hamel & Ian Stewart). The recruitment variability was fixed at 0.6 to account for the possibility that the data pertaining to the strongest cohorts were biased high, which would result in a upward biased estimate of recruitment variability.

There were no surprises in the estimated growth parameters (Figure 50). The model estimated length-at-age curve is steeper at young ages than the empirical growth curve, which is expected because of selectivity. The asymptote of the growth curve is clearly defined. The CV of the length-at-age is fit as a linear function with age in the model, and although the empirical CV is noisy, the fit is as good as expected.

4.7.2 Fits to the data

There are four types of data for which the fits are discussed: survey abundance indices, discard biomass and discard average weight estimates, length composition data (lfs), and conditional age-at-length observations.

Fits to the three series of survey abundances are shown in Figure 51. The increasing trend in the early Triennial survey is fit poorly with a slightly decreasing predicted population trajectory. The late Triennial series is fit well, and in spite of the variability in the NWFSC survey, the increasing trend is captured by the model.

The total discards showed a lot of variability between years and were not given a lot of weight in the model. They were included to guide the model and to provide comparisons of how the model was able to fit these data. The model was able to somewhat closely fit the discards in only some years (Figure 52). It appears that total discarded biomass may better be fit with a skewed probability distribution function. Fits to the mean weight of discards are relatively good for the trawl fisheries, but are mostly underestimated for the other-gear fleet (Figure 53).

Fits to the length-composition data are displayed in two different ways: the fitted line is drawn over the plotted proportions at length, and the Pearson residuals at length are shown for each year. Also shown is the estimated effective sample size plotted against the actual sample size used in the likelihood and input sample sizes are compared to the calculated effective sample sizes in Table 35.

The WA/OR trawl predicted length frequencies showed few serious departures from the observed length frequencies. The 2003 and 2008 fitted sex-specific length frequencies were shifted to the right of the observations (Figure 54), and the combined sex length frequencies showed opposite biases in the fits for the years 1996 and 1997 (Figure 55). The discard length frequencies were very noisy and it was difficult to tell where lack of fit may have occurred. The lack of fit to the 2003 and 2008 length frequencies may be due to a difference in discarding practices, but few 2003 discard length observations were available and 2008 discard length observations were not available at the time of this assessment. The input sample sizes were mostly similar to the calculated effective sample sizes (Figure 56).

There were many years of length frequency data for the CA Trawl fleet and the observed sizes of fish in the years 1993, 2003, and 2004 were much smaller fish than predicted (Figure 57 and Figure 58). The length frequencies for 2003 and 2004 contained few observations and are likely a poor representation of the actual landings. The discard length frequencies were noisy, but the general pattern seemed to be fit (Figure 57). The input sample sizes matched well with the calculated effective sample sizes (Figure 59).

Length frequencies for the other-gear fleet were estimated for combined sexes and were available for all but one year since 1979. The predicted length frequencies for years with the largest sample sizes (1985, 1989, 1994, 1996, and 1998) captured the overall trend very well (Figure 60 and Figure 61). Recent years (20052008) had fewer sample sizes than most of the other years (Table 35) and typically observed larger fish than were predicted, except in 2008 when a large number of small fish were observed (Figure 60 and

Figure 61). The discard length frequency from 2007 underpredicted some of the larger length classes (Figure 60 and Figure 61). The input sample sizes were similar to the effective sample sizes and captured the same trend (Figure 62).

Recreational length frequencies were estimated for combined sexes and were comprised of landings and discards combined. The model captured the general trend in the length frequencies for years with the largest sample sizes (1993–2001), except in 1997 when a few specific lengths dominated the data (Figure 63 and Figure 64). No serious lack of fit was observed for other years. The input sample sizes mostly matched the effective sample sizes (Figure 65) except in 1997 when the effective sample is much smaller than the input, and 2001 and 2002 when small input sample sizes produce large effective sample sizes (Table 35).

The early Triennial survey took few lengths of greenstriped rockfish in the early years, but sampling increased over time. However, fewer than 50% of the tows with greenstriped rockfish in any year were sampled for lengths (Table 20). The fit was visually best to the length frequency in the last year (1992) of the series (Figure 66). A trend in the lack of fit was apparent for females, with a progression from under-predicting large fish early in the time series to the slight over-prediction of large fish in 1989 (Figure 67). The general trend in the effective sample size compared to the predicted sample size was captured although a rather large effective sample size was calculated for 1992 (Figure 68).

The proportion of tows with greenstriped rockfish sampled for lengths was much higher in the late Triennial survey series (Table 20). Fits to these length frequencies were decent and captured the observed bimodal distribution in later years due to the strong 1993 year class (Figure 69). However, the predicted length frequencies did not quite reach the high proportions in these peaks (Figure 70). The input sample sizes matched the effective sample sizes in all years except that the effective sample size for the 1995 length frequency (the unimodal length frequency) was double the input sample size (Figure 71).

Many length samples were used to estimate the length frequencies in recent years from the NWFSC survey. There were no strong patterns in the length frequencies, but some cohorts were apparent (Figure 72). The general patterns in the length frequencies were fit and no obvious biases were seen (Figure 73). The input sample sizes were determined by an analysis done by Ian Stewart (pers comm., NWFSC, NOAA) and were entered as the maximum sample size and were expected to only be tuned downward. The effective sample sizes were greater than the input sample sizes in all years except 2007 (Table 35, Figure 78).

Pearson residuals for the conditional age-at-length reveal no obvious biases in the fit to these data, although there are some large residuals for older ages-at-length (Figure 75). The conditional age-at-length data and fits are often difficult to visualize, thus the implied fits to the marginal age compositions were calculated and shown in Figure 76 and Figure 77. The trends of strong cohorts in the age data are captured by the predicted age composition, but the high frequencies of the 1993 and 1998 cohorts are often under-predicted. Input sample sizes were simply the number of fish observed at each length, and were similar to calculated effective sample sizes (Figure 78).

4.7.3 Population trajectory

The predicted spawning output in millions of eggs (a proxy for spawning biomass) is given in Table 36 and plotted in Figure 79 and shows a decline starting in the late 1960's and reaching a low in the late 1990's before showing a recent increase. The predicted summary biomass (age 2+) shows a similar pattern (Figure 79). Estimated depletion possibly dips below the 40% of unfished spawning output in the late 1990's with a very small probability (Figure 80).

Estimated recruits showed strong cohorts in 1971, 1981, 1984, 1993, and 1998–2000 (Table 36, Figure 49). Lower than average recruitment events occurred throughout the period for which recruits were estimated, with extremely low recruitment occurring throughout most of the 1990's. However, the strong recruitment events balance these low recruitment events and the population is predicted to increase in the last decade after rockfish landings decreased.

Approximate asymptotic standard deviations are given in Table 37.

4.8 Uncertainty and sensitivity analysis

Two types of uncertainty are presented for the assessment of greenstriped rockfish. First, uncertainty in the parameter estimates was determined using approximate asymptotic estimates of the standard error. These estimates were based on the likelihood theory that the inverse of the Hessian matrix (the second derivative of the parameter vector) approaches the true uncertainty of the parameter estimates as the sample size approaches infinity. This approach takes into account the uncertainty in the data and supplies correlation estimates between parameters, but does not capture possible skewness in the error distribution of the parameters and may not accurately estimate the standard error in some cases.

The second type of uncertainty that is presented is related to modeling error. This uncertainty cannot be captured in the base case model as it is related to errors in the assumptions used in the base case model. Therefore, sensitivity analyses were done where assumptions were modified to determine the effect they have on the model results.

4.8.1 Parameter uncertainty

Parameter estimates are shown in Table 33 along with approximate asymptotic standard errors. No parameters showed large uncertainty. Correlations between parameters were mostly below 0.9, except that correlations between the male offset selectivity parameters were around 0.95. Estimates of key derived parameters are given in Table 34 along with approximate 95% asymptotic confidence intervals. There is a considerable amount of uncertainty in the estimates of biomass and the coefficient of variation (CV) on the 2009 estimate of depletion was 5.4%. The confidence interval on current depletion is entirely above the management target of 40% of the unfished spawning output level.

4.8.2 Sensitivity analysis

Sensitivity analysis was performed to determine the model behavior under different assumptions than those of the base case model. Six sensitivities were conducted to explore the potential differences in model structure and assumptions such as uncertainty in reconstructed landings, the values assumed for steepness and natural mortality, and the amount of discarding. Likelihood values and estimates of key parameters are shown in Table 38 and predicted population trajectories are shown in Figure 81.

Most of the sensitivity analyses had little effect on the current status of the stock. Doubling or halving the landings did not significantly change the overall fit to the data and current depletion remained approximately the same, but the estimated biomass and potential yield from the stock significantly increased or decreased, respectively. The estimated steepness parameter was 1 (the upper bound) suggesting that there is not enough contrast in the data to estimate the reduction in recruitment at low population sizes. At this unrealistically high value, the overall likelihood improved slightly and estimated depletion increased by 0.03.

Using early (1980's) discard data and estimating natural mortality had the greatest effect on the model results. Using early discard data resulted in a lower discard fraction prior to 2000, along with lower spawning output and lower sustainable yields, but did not change the overall depletion much. The estimates of sex-specific natural mortality were lower than the fixed value of 0.08 in the base case model, and resulted in lower estimates of biomass, spawning output, potential yield, and depletion.

4.8.3 Retrospective analysis

A retrospective analysis was conducted by running the model using data only through 2003, 2004, 2005, 2006, and 2007 and estimating current values for the start of the year after data ends (Table 39, Figure 82). The unfished spawning output estimated in the 2009 assessment was intermediate when compared to retrospective model runs finishing in 2004-2008. The lowest estimated trajectory of unfished spawning output was in the 2004 retrospective run, but also showed the fastest rate of increase for the recent trajectory. In this run, the NWFSC survey had only one abundance estimate (2003), thus the data point was removed and no abundance estimates from the NWFSC survey were fitted. Overall, the retrospective analysis did not show any severe patterns and also indicated that the NWFSC survey data adds important information regarding the recent trend in the population.

4.8.4 Likelihood profiles

Likelihood profiles were developed for the steepness parameter and the female and male natural mortality parameters. The model estimated steepness at 1.0, but the likelihood profile (Figure 83) showed that the confidence interval of estimated steepness extends to a lower value near 0.4 and that depletion is not largely affected over the range of steepness. Figure 84 shows a joint likelihood profile over female natural mortality (x-axis) and the difference between male and female natural mortalities (y-axis). The data show that it is highly probable that male natural mortality is greater than female natural mortality and that it is likely that natural mortality is less than the assumed value of 0.08. Estimated depletion increases with the value of natural mortality, but does not change much with an increasing difference between male and female natural mortalities.

5 Reference points

Reference points were calculated using the estimated selectivities and a fleet distribution based on the proportions of the average landings from each fleet in the last two years. The last two years were used to determine the fleet distribution because landings of greenstriped rockfish were variable and the last two years better captures reality. Reference points were based on different scenarios: 1) a target spawning biomass of 40% ($B_{40\%}$), 2) a target SPR of 50% ($SPR_{50\%}$), and 3) a target of estimated *MSY*. Estimates of spawning output, exploitation rates, and long-term sustainable yield for each of these scenarios are shown in Table 34.

With a $B_{40\%}$ target, the MSY-proxy spawning output was 2,836 millions of eggs, producing a long-term yield of 765 mt (95% CI = 540–989 mt). This corresponds to an exploitation rate around 4.9% and an SPR of 46.7%. When using $SPR_{50\%}$ as a proxy for *MSY,* the target spawning output was greater (3,101 million eggs) and the long-term sustainable yield was less (738 mt with an approximate 95% confidence interval of 522–955). The corresponding exploitation rate was about 4.4%. The spawning output at maximum sustainable yield was lower than the other two scenarios, at about 29% of unfished spawning output (2,209 mt). *MSY* was therefore estimated at 803 mt (95% CI = 568–1,0.38), corresponding to an SPR_{MSY} of 36.7% and an exploitation rate near 6.8%.

Historically, exploitation rates have exceeded the overfishing threshold based on $SPR_{50\%}$ in two years occurring in the late 1990's (Figure 85). Harvest rates, calculated by dividing the entire catch by the age 2+ biomass, exceed the threshold harvest rate based on $SPR_{50\%}$ more often in the 1990's (Figure 86). Also shown (Figure 87) is the phase plot of the trajectory for greenstriped rockfish relative to the threshold $SPR_{50\%}$ exploitation level and the $B_{40\%}$ biomass target. The trajectory has mostly been in the low exploitation rate and high biomass quadrant, although exploitation levels have exceeded the target in two separate years. More recently, exploitation on greenstriped rockfish has been low and the population size has been increasing, which is likely a result of management measures implemented to lower the exploitation of overfished rockfish stocks.

The estimated equilibrium curve is shown in Figure 88 with target thresholds based on $B_{40\%}$ and target thresholds based on *MSY* plotted. Current depletion is also plotted and is currently much greater than the management target level.

6 Harvest projections and decision tables

Forecasts and projections of the greenstriped rockfish population up to the year 2020 were constructed under the assumption that future catches would never reach the calculated OY. The average catch from 2007 and 2008 was used for the catches in 2009 and 2010 and distributed among the fisheries based on the average proportion of these catches by fleet. The landings and fleet distribution for 2011 and beyond were assumed equal to the average of the fleet specific landings from 2000–2003. This forecast table is meant to be representative of the status quo, yet still be conservative since landings in 2000–2003 were higher than more recent landings, although not as high as landings observed in the 1980's and 1990's.

Forecasting with these status quo catches resulted in the stock and the ABC increasing over time (Table 40). Fleet catch distribution was determined from the years 2000–2003 and allocated more to the trawl fisheries than would have been the case if based on 2007 and 2008 landings. The resulting discard fraction is much higher, with almost 5 times the biomass being discarded as landed, illustrating the importance of the assumed distribution of catch in the projection process.

A summary table was constructed using two axes of uncertainty which are considered to be the areas of the assessment that are most uncertain. A decision table was not created because the STAR panel did not recommend alternative harvest scenarios. The first axis of uncertainty was the fraction of the catch that is discarded, with low and high levels of discarding when compared to the base case. The low level of discarding was set to be similar to the level of discarding determined from the sensitivity analysis using early discard data. These data indicated that all fish over about 30 cm were retained whereas the later discard data used in the base case model showed that a high proportion of fish over 30 cm were discarded. The high level of discarding was determined by increasing the fraction discarded from the base case model by an amount proportional to the low fraction case. The retention asymptote for the WA/OR trawl fishery was increased by a factor of 2.5 and the CA trawl retention asymptote was increased by a factor of 3. The second axis of uncertainty used low and high values of natural mortality. The low value of 0.06 was near the value of natural mortality that would be estimated if allowed to in the base case model. The high value of natural mortality (0.10) was the same distance from the base case value as the low value, except in the opposite direction, and meant to agree somewhat with values seen in published reports. No probabilities are associated with the states of nature other than that the base case model is the most probable.

As seen in the sensitivity runs, the fraction discarded influenced the spawning output and size of the stock, and the natural mortality influenced both the size of the stock as well as the level of depletion. Forecasts of spawning output and depletion are presented in Table 41 for all 9 possible combinations of the base model and the two axes of uncertainty. The worst-case scenario in terms of depletion was with the base level of discarding and low natural mortality, but the stock was still forecasted to increase and maintain a status greater than the 40% of unfished spawning output. The best case scenarios were when natural mortality was high. The stock was predicted to exceed unfished spawning output because of recent large recruitments.

7 Regional management considerations

The outer West Coast population of greenstriped rockfish was modeled as a single stock and spatial aspects of this coast-wide population were addressed through the geographic separation of data sources where possible. There is little genetic evidence of biologically distinct stocks throughout the West Coast and although there is evidence that mature fish move into deeper water, there is no information on latitudinal movement. Studies of greenstriped rockfish in Southern California indicate that the life-history of these fish may differ from fish found north of Point Conception (see Love et al 1990). However, the greater proportion of biomass is found north of Point Conception and trying to account for these differences may prove to be futile. Additionally, the data showed that greenstriped rockfish in California did not commonly reach the older ages commonly seen in Oregon and Washington greenstriped rockfish, and it is uncertain whether or not this is due to a difference in natural mortality, fishing pressure, or both. With the continued collection of regional data on greenstriped rockfish, regional patterns may emerge and a spatially explicit model may be an option for future assessments.

8 Research needs

There are four topics for which additional research would greatly improve the assessment of greenstriped rockfish.

1. **Landings:** improving certainty of the commercial and recreational landings would result in a better estimate of the total yield as well as an improved understanding of the population dynamics of greenstriped rockfish. The landings have been determined in the best possible manner given the time constraints of this assessment, but there is still uncertainty in the catch reconstruction and in recent landings. The state of California has produced reconstructed and current landings for many species, which have been accepted as the best possible information. However, a similar reconstruction is not available for Oregon and Washington landings, although such a product is of interest to fisheries managers and stock assessors. Additionally, some errors were found in the PacFIN database of recent landings during the current catch reconstruction and are being reconciled. Further error checking may be worthwhile for greenstriped rockfish as well as other species.
2. **Discards:** discarding at sea is common practice for greenstriped rockfish and the levels of historical discards are poorly known due to a lack of data. The West Coast Groundfish Observer Program (WCGOP) has contributed greatly to the understanding of discard rates and size compositions. However, it would be useful to review what information is available from the past to understand discarding practices and to determine how reliable that information is.
3. **Natural mortality:** the value for natural mortality in the base case model was fixed at 0.08, which was determined from the maximum age observed in recent survey data. Other published estimates of natural mortality for greenstriped rockfish range from 0.09 to 0.149 and are based on maximum age, catch curve analyses, and gonadosomatic indices. The data used in the base model supported a natural mortality near 0.065. All of these estimates of natural mortality are uncertain and given the correlation between natural mortality and stock status, it would be useful to have a better understanding of the plausible range of values.
4. **Stock structure:** there is some evidence that the life history of greenstriped rockfish in Southern California may be different from greenstriped rockfish in Northern areas. Understanding and quantifying the differences in length, weight, ages, maturity, and fecundity (as well as the number of broods per year) would be helpful to determine if the model should incorporate these differences.

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11 Tables

Table 1: Summary of data sources used in the greenstriped rockfish assessment for the years 1916 to 1990. "C" refers to combined sexes and "S" refers to separate sexes.

	1916-1927	1928-1965	1966-1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Landings																	
WA/OR trawl																	
CA trawl																	
Foreign																	
Other-gear																	
Recreational																	
Abundance indices																	
Triennial																	
NWFSC																	
Length Frequencies																	
WA/OR trawl																	
CA trawl					S	S	C	C	S	S	S	S	S	S	S	S	S
Other-gear						C	C	C		C	C	C	C	C	C	C	C
Recreational							C		C		C	C	C	C	C	C	C
Triennial										S			S			S	
NWFSC																	
Discards LFs																	
WA/OR trawl																	
CA trawl																	
Other-gear																	
Discard mean weight & total mortality																	
WA/OR trawl																	
CA trawl																	
Other-gear																	
Age-at-length																	
NWFSC																	

Table 2: Summary of data sources used in the greenstriped rockfish assessment for the years 1991 to 2008. "C" refers to combined sexes and "S" refers to separate sexes.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Landings																		
WA/OR trawl																		
CA trawl																		
Foreign																		
Other-gear																		
Recreational																		
Abundance indices																		
Triennial																		
NWFSC																		
LFs																		
WA/OR trawl						C	C	S	S	S	S	S	S	S		S	S	S
CA trawl	C	C	S	S	S	S	S	S	S	S	S	S	C	C	C	C	C	
Other-gear	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Recreational			C	C	C	C	C	C	C	C	C	C	C					
Triennial		S			S			S			S			S				
NWFSC													S	S	S	S	S	S
Discards LFs																		
WA/OR trawl													C		C	C	C	
CA trawl												C				C	C	
Other-gear															C		C	
Discard mean weight & total mortality																		
WA/OR trawl												C	C	C	C	C	C	
CA trawl												C	C	C	C	C	C	
Other-gear												C	C	C	C	C	C	
Age-at-length																		
NWFSC													S	S	S	S	S	S

Table 3: Percentage of greenstriped rockfish landings in each gear category as reported by PacFIN.

Year	Hook & line	Net	Pot	Trawl	Shrimp trawl
1981	0.36	0.05	0.00	0.58	0.00
1982	0.04	0.02	0.00	0.94	0.00
1983	0.05	0.01	0.00	0.94	0.00
1984	0.05	0.07	0.00	0.88	0.00
1985	0.03	0.06	0.00	0.91	0.00
1986	0.30	0.01	0.00	0.69	0.00
1987	0.04	0.00	0.00	0.95	0.00
1988	0.02	0.00	0.00	0.97	0.01
1989	0.08	0.01	0.00	0.90	0.01
1990	0.10	0.02	0.00	0.87	0.01
1991	0.13	0.01	0.00	0.85	0.01
1992	0.12	0.01	0.00	0.86	0.01
1993	0.06	0.01	0.00	0.93	0.00
1994	0.05	0.00	0.00	0.94	0.00
1995	0.05	0.00	0.00	0.93	0.02
1996	0.07	0.00	0.00	0.93	0.00
1997	0.03	0.00	0.00	0.97	0.00
1998	0.05	0.00	0.00	0.95	0.00
1999	0.03	0.00	0.00	0.97	0.00
2000	0.04	0.00	0.00	0.96	0.01
2001	0.04	0.00	0.00	0.96	0.00
2002	0.01	0.00	0.00	0.99	0.00
2003	0.00	0.00	0.10	0.90	0.00
2004	0.01	0.00	0.00	0.99	0.00
2005	0.00	0.00	0.00	1.00	0.00
2006	0.01	0.00	0.00	0.99	0.00
2007	0.01	0.00	0.01	0.98	0.00
2008	0.02	0.00	0.00	0.98	0.00
All years	0.07	0.01	0.00	0.92	0.01

Table 4: Proportion of rockfish catches that were caught outside of Puget Sound used in the catch reconstruction for Washington.

Year	Non-PS	Year	Non-PS
1949	0.9946	1960	0.9788
1950	0.9969	1961	0.9891
1951	0.9920	1962	0.9920
1952	0.9899	1963	0.9772
1953	0.9579	1964	0.9765
1954	0.9742	1965	0.9837
1955	0.9892	1966	0.9933
1956	0.9813	1967	0.9890
1957	0.9774	1968	0.9958
1958	0.9859	1969	0.9969
1959	0.9855		

Table 5: Commercial landings (mt) of greenstriped rockfish for each state and gear.

	Domestic trawl			Foreign trawl			Other-gear			
Year	**WA**	**OR**	**CA**	**WA**	**OR**	**CA**	**WA**	**OR**	**CA**	**Total**
1916	0.000	0.000	0.207	0.000	0.000	0.000	0.000	0.000	1.287	1.49
1917	0.000	0.000	0.321	0.000	0.000	0.000	0.000	0.000	2.084	2.41
1918	0.000	0.000	0.377	0.000	0.000	0.000	0.000	0.000	1.983	2.36
1919	0.000	0.000	0.262	0.000	0.000	0.000	0.000	0.000	1.148	1.41
1920	0.000	0.000	0.267	0.000	0.000	0.000	0.000	0.000	1.252	1.52
1921	0.000	0.000	0.220	0.000	0.000	0.000	0.000	0.000	1.115	1.34
1922	0.000	0.000	0.190	0.000	0.000	0.000	0.000	0.000	1.080	1.27
1923	0.000	0.000	0.205	0.000	0.000	0.000	0.000	0.000	1.398	1.60
1924	0.000	0.000	0.118	0.000	0.000	0.000	0.000	0.000	1.872	1.99
1925	0.000	0.000	0.084	0.000	0.000	0.000	0.000	0.000	2.134	2.22
1926	0.000	0.000	0.302	0.000	0.000	0.000	0.000	0.000	2.628	2.93
1927	0.000	0.000	0.494	0.000	0.000	0.000	0.000	0.000	2.278	2.77
1928	0.000	0.129	0.667	0.000	0.000	0.000	0.000	0.000	1.961	2.76
1929	0.000	0.224	1.455	0.000	0.000	0.000	0.000	0.000	1.891	3.57
1930	0.000	0.208	1.198	0.000	0.000	0.000	0.000	0.000	1.988	3.39
1931	0.000	0.159	1.476	0.000	0.000	0.000	0.000	0.000	2.416	4.05
1932	0.000	0.058	1.525	0.000	0.000	0.000	0.000	0.000	1.852	3.43
1933	0.000	0.085	2.239	0.000	0.000	0.000	0.000	0.000	1.268	3.59
1934	0.003	0.093	1.936	0.000	0.000	0.000	0.000	0.000	1.208	3.24
1935	0.104	0.085	1.910	0.000	0.000	0.000	0.000	0.000	1.025	3.12
1936	0.174	0.212	1.349	0.000	0.000	0.000	0.000	0.000	0.585	2.32
1937	0.145	0.269	1.982	0.000	0.000	0.000	0.000	0.000	0.532	2.93
1938	0.166	0.244	1.990	0.000	0.000	0.000	0.000	0.000	0.570	2.97
1939	0.157	0.182	2.617	0.000	0.000	0.000	0.000	0.000	0.717	3.67
1940	0.152	1.083	2.124	0.000	0.000	0.000	0.000	0.000	0.860	4.22
1941	0.226	2.280	1.635	0.000	0.000	0.000	0.000	0.000	1.413	5.55
1942	0.315	3.325	0.314	0.000	0.000	0.000	0.000	0.000	0.687	4.64
1943	0.864	12.133	1.774	0.000	0.000	0.000	0.000	0.000	0.804	15.57
1944	1.223	19.947	9.777	0.000	0.000	0.000	0.000	0.000	1.051	32.00
1945	2.411	30.547	23.677	0.000	0.000	0.000	0.000	0.000	2.402	59.04
1946	0.875	19.036	24.322	0.000	0.000	0.000	0.000	0.000	2.781	47.01
1947	0.457	11.974	9.707	0.000	0.000	0.000	0.000	0.000	1.841	23.98
1948	0.742	8.496	9.178	0.000	0.000	0.000	0.000	0.000	2.419	20.83
1949	0.867	8.628	15.377	0.000	0.000	0.000	0.255	0.000	1.992	27.12
1950	0.832	8.825	15.582	0.000	0.000	0.000	0.167	0.000	1.984	27.39
1951	0.682	10.630	20.552	0.000	0.000	0.000	0.257	0.000	2.341	34.46
1952	0.905	8.737	11.825	0.000	0.000	0.000	0.180	0.000	1.306	22.95
1953	0.498	8.465	12.294	0.000	0.000	0.000	0.075	0.000	1.013	22.35
1954	1.121	10.333	10.980	0.000	0.000	0.000	0.136	0.000	1.190	23.76
1955	0.929	10.079	9.423	0.000	0.000	0.000	0.156	0.000	0.732	21.32
1956	0.947	15.594	7.540	0.000	0.000	0.000	0.056	0.000	0.992	25.13
1957	0.822	15.708	8.198	0.000	0.000	0.000	0.095	0.000	1.042	25.87
1958	1.353	16.437	11.570	0.000	0.000	0.000	0.028	0.000	1.092	30.48
1959	0.756	0.724	8.466	0.000	0.000	0.000	0.067	0.000	1.349	11.36
1960	0.933	15.792	5.497	0.000	0.000	0.000	0.074	0.000	1.631	23.93
1961	1.104	14.607	3.196	0.000	0.000	0.000	0.041	0.000	1.110	20.06

	Domestic trawl			Foreign trawl			Other-gear			
Year	**WA**	**OR**	**CA**	**WA**	**OR**	**CA**	**WA**	**OR**	**CA**	**Total**
1962	1.020	1.490	2.725	0.000	0.000	0.000	0.047	0.000	0.999	6.28
1963	0.927	1.917	5.316	0.000	0.000	0.000	0.030	0.000	1.247	9.44
1964	1.130	3.478	2.706	0.000	0.000	0.000	0.040	0.000	0.918	8.27
1965	0.616	1.556	5.395	0.000	0.000	0.000	0.030	0.000	1.149	8.75
1966	2.937	1.037	4.519	37.000	60.000	14.000	0.018	0.000	0.888	120.40
1967	1.155	0.559	10.245	21.000	30.000	92.000	0.015	0.000	1.012	155.99
1968	3.291	2.800	11.540	7.750	8.250	25.000	0.008	0.000	1.037	59.68
1969	3.979	0.376	13.708	9.250	27.750	0.000	0.025	0.000	0.913	56.00
1970	2.052	2.684	18.239	11.000	33.000	0.000	0.001	0.000	0.926	67.90
1971	2.226	38.186	15.592	4.500	4.500	0.000	0.000	0.000	1.160	66.16
1972	1.642	57.249	23.895	4.750	5.250	4.000	0.000	0.000	1.743	98.53
1973	0.988	2.690	22.850	7.750	14.250	13.000	0.000	0.000	2.039	63.57
1974	0.985	6.207	33.306	2.750	5.250	5.000	0.002	0.000	3.609	57.11
1975	2.065	12.337	48.643	2.000	6.000	13.000	0.007	0.000	2.479	86.53
1976	6.028	19.605	55.321	1.000	3.000	9.000	0.000	0.000	4.265	98.22
1977	10.738	1.592	57.335	0.000	0.000	0.000	0.085	0.000	2.968	72.72
1978	16.128	38.455	11.287	0.000	0.000	0.000	0.143	0.000	6.933	72.95
1979	18.608	4.501	13.140	0.000	0.000	0.000	0.152	0.000	7.904	44.30
1980	7.547	17.714	131.475	0.000	0.000	0.000	0.056	0.000	3.468	160.26
1981	2.177	4.087	10.230	0.000	0.000	0.000	0.000	0.000	10.411	26.91
1982	2.591	96.000	59.965	0.000	0.000	0.000	0.000	0.000	3.749	162.30
1983	18.055	48.833	22.725	0.000	0.000	0.000	0.000	0.000	1.236	90.85
1984	1.629	75.300	23.003	0.000	0.000	0.000	0.000	0.000	3.233	103.17
1985	20.571	18.510	45.325	0.000	0.000	0.000	0.000	0.000	8.081	92.49
1986	9.497	31.350	11.237	0.000	0.000	0.000	0.000	0.000	9.144	61.23
1987	8.027	83.820	22.527	0.000	0.000	0.000	0.000	0.124	4.960	119.46
1988	9.599	99.675	119.639	0.000	0.000	0.000	0.000	0.000	5.635	234.55
1989	37.377	140.589	74.919	0.000	0.000	0.000	0.000	0.000	23.748	276.63
1990	14.032	47.353	47.915	0.000	0.000	0.000	0.000	0.000	15.190	124.49
1991	18.438	60.700	29.551	0.000	0.000	0.000	0.000	4.854	12.836	126.38
1992	18.881	67.112	4.891	0.000	0.000	0.000	0.000	1.456	11.902	104.24
1993	4.470	113.257	17.167	0.000	0.000	0.000	0.000	2.236	8.352	145.48
1994	3.353	135.850	34.879	0.000	0.000	0.000	0.000	0.178	10.506	184.77
1995	18.638	98.583	22.326	0.000	0.000	0.000	0.000	0.559	8.568	148.67
1996	10.313	112.512	14.548	0.000	0.000	0.000	0.000	0.768	10.564	148.71
1997	5.420	94.892	47.149	0.000	0.000	0.000	0.000	2.592	2.871	152.92
1998	11.201	113.979	40.162	0.000	0.000	0.000	0.000	0.125	8.720	174.19
1999	3.668	36.427	17.038	0.000	0.000	0.000	0.000	0.205	1.712	59.05
2000	0.484	5.172	5.156	0.000	0.000	0.000	0.000	0.045	0.385	11.24
2001	6.807	3.309	2.962	0.000	0.000	0.000	0.000	0.273	0.229	13.58
2002	11.802	3.485	2.229	0.000	0.000	0.000	0.000	0.003	0.147	17.67
2003	1.631	0.997	0.080	0.000	0.000	0.000	0.000	0.010	0.000	2.72
2004	1.693	1.115	0.177	0.000	0.000	0.000	0.000	0.015	0.000	3.00
2005	0.002	2.781	0.083	0.000	0.000	0.000	0.000	0.000	0.012	2.88
2006	0.410	5.300	1.840	0.000	0.000	0.000	0.000	0.000	0.082	7.63
2007	0.001	0.753	0.212	0.000	0.000	0.000	0.000	0.000	0.009	0.98
2008	0.000	1.615	0.066	0.000	0.000	0.000	0.000	0.001	0.041	1.72

Table 6: Recreational landings (mt) of greenstriped rockfish for each state. Also shown are the total recreational landings for each year and the proportion of landings from the recreational fishery compared to total landings from commercial and recreational fisheries.

Year	WA	OR	CA	Recreational Total	Prop
1928	0.000	0.000	0.143	0.143	0.05
1929	0.000	0.000	0.286	0.286	0.07
1930	0.000	0.000	0.342	0.342	0.09
1931	0.000	0.000	0.456	0.456	0.10
1932	0.000	0.000	0.570	0.570	0.14
1933	0.000	0.000	0.684	0.684	0.16
1934	0.000	0.000	0.798	0.798	0.20
1935	0.000	0.000	0.911	0.911	0.23
1936	0.000	0.000	1.006	1.006	0.30
1937	0.000	0.000	1.241	1.241	0.30
1938	0.000	0.000	1.215	1.215	0.29
1939	0.000	0.000	1.049	1.049	0.22
1940	0.000	0.000	1.395	1.395	0.25
1941	0.000	0.000	1.289	1.289	0.19
1942	0.000	0.000	0.685	0.685	0.13
1943	0.000	0.000	0.655	0.655	0.04
1944	0.000	0.000	0.538	0.538	0.02
1945	0.000	0.000	0.717	0.717	0.01
1946	0.000	0.000	1.234	1.234	0.03
1947	0.000	0.000	1.250	1.250	0.05
1948	0.000	0.000	2.671	2.671	0.11
1949	0.000	0.000	3.340	3.340	0.11
1950	0.000	0.000	4.107	4.107	0.13
1951	0.000	0.000	4.303	4.303	0.11
1952	0.000	0.000	4.343	4.343	0.16
1953	0.000	0.000	4.153	4.153	0.16
1954	0.000	0.000	6.775	6.775	0.22
1955	0.000	0.000	10.803	10.803	0.34
1956	0.000	0.000	12.442	12.442	0.33
1957	0.000	0.000	8.616	8.616	0.25
1958	0.000	0.000	8.487	8.487	0.22
1959	0.000	0.000	6.711	6.711	0.37
1960	0.000	0.000	6.267	6.267	0.21
1961	0.000	0.000	5.564	5.564	0.22
1962	0.000	0.000	5.750	5.750	0.48
1963	0.000	0.000	5.313	5.313	0.36
1964	0.000	0.000	5.957	5.957	0.42
1965	0.000	0.000	7.923	7.923	0.48
1966	0.000	0.000	11.365	11.365	0.09
1967	0.000	0.000	14.532	14.532	0.09
1968	0.000	0.000	14.854	14.854	0.20
1969	0.000	0.000	13.867	13.867	0.20
1970	0.000	0.000	19.645	19.645	0.22
1971	0.000	0.000	17.508	17.508	0.21
1972	0.000	0.000	21.800	21.800	0.18
1973	0.000	0.000	27.823	27.823	0.30
1974	0.000	0.000	31.618	31.618	0.36
1975	0.000	0.000	31.920	31.920	0.27
1976	0.000	0.000	28.122	28.122	0.22
1977	0.000	0.000	26.410	26.410	0.27
1978	0.000	0.000	24.266	24.266	0.25
1979	0.000	0.464	31.531	31.994	0.42
1980	0.000	0.671	22.734	23.405	0.13
1981	0.112	0.559	14.006	14.677	0.35
1982	0.000	0.869	15.204	16.072	0.09
1983	0.000	0.980	21.333	22.313	0.20
1984	0.000	0.352	46.046	46.398	0.31
1985	0.000	1.316	22.089	23.405	0.20
1986	0.000	0.177	30.212	30.390	0.33
1987	0.000	0.236	9.947	10.183	0.08
1988	0.000	0.084	17.087	17.171	0.07
1989	0.000	0.319	4.330	4.650	0.02
1990	0.000	0.482	8.600	9.082	0.07
1991	0.000	0.519	8.600	9.119	0.07
1992	0.000	0.904	8.600	9.504	0.08
1993	0.000	1.334	2.928	4.261	0.03
1994	0.000	1.484	10.120	11.604	0.06
1995	0.000	0.643	9.395	10.037	0.06
1996	0.000	0.785	5.611	6.396	0.04
1997	0.000	0.574	3.586	4.159	0.03
1998	0.000	0.774	3.790	4.564	0.03
1999	0.000	0.637	10.362	10.999	0.16
2000	0.000	0.342	9.112	9.454	0.46
2001	0.000	0.321	6.256	6.577	0.33
2002	0.000	0.159	1.221	1.380	0.07
2003	0.000	0.157	0.108	0.264	0.09
2004	0.329	0.099	0.230	0.657	0.18
2005	0.783	0.090	0.694	1.567	0.35
2006	0.508	0.094	0.414	1.017	0.12
2007	0.659	0.083	0.576	1.318	0.57
2008	0.837	0.081	0.756	1.674	0.49

Table 7: Estimates of the proportion of greenstriped rockfish discarded (divided by landings + discards) by year from different fishing strategies from the Pikitch et al (1988) data. BRF: bottom rockfish, DWD: deepwater dover; NSM: nearshore mixed species, SHR: shrimp, and NON-SHR combines the BRF, DWD, and NSM strategies.

Year	BRF	DWD	NSM	SHR	NON-SHR
1985	0.253	0.419	0.434		0.366
1986	0.596	0.376	0.225	0.391	0.395
1987	0.568	0.620	0.284	0.567	0.463

Table 8: Average weights (kg) of the discarded and retained portions of the catch in the Pikitch et al (1988) data.

Year	Type	BRF	DWD	NSM	SHR	NON-SHR
1985	Discard	0.2758	0.3183	0.2487		0.2583
	Retained	0.3238	0.4944	0.5340		0.4147
1986	Discard	0.2388	0.2652	0.2403	0.0863	0.2468
	Retained	0.5028	0.4629	0.9060	0.4320	0.6041
1987	Discard	0.2998	0.2778	0.1980	0.2056	0.2608
	Retained	0.4943	0.5139	0.4876	0.5131	0.4922

Table 9: Estimates of the proportion of greenstriped rockfish discarded (divided by landings + discards) by year and stratum (north and south of 40°10') for trawl and fixed gears as estimated from the WCGOP data.

	Trawl		Fixed Gear
Year	North	South	Coastwide
2002	0.777	0.913	0.999
2003	0.984	0.980	0.993
2004	0.843	0.997	0.997
2005	0.955	0.993	0.994
2006	0.807	1.000	0.999
2007	0.943	0.899	0.988

Table 10: The number of trips, number of tows, and number of lengths used to estimate the WCGOP discard length frequencies.

Year	Fishery	# trips	# tows	# samples
2003	WA/OR Trawl	4	11	33
2005	WA/OR Trawl	2	4	5
2006	WA/OR Trawl	54	103	381
2007	WA/OR Trawl	32	43	145
2002	CA Trawl	3	5	20
2006	CA Trawl	33	44	156
2007	CA Trawl	21	38	165
2008	CA Trawl	3	4	10
2005	Fixed gear	1	2	5
2006	Fixed gear	1	1	2
2007	Fixed gear	7	12	27

Table 11: Mean weight of discards for the different gear types from the WCGOP data.

Year	OR/WA Trawl	CA Trawl	Fixed gear
2002	0.2463	0.1862	0.5022
2003	0.2796	0.1749	0.5035
2004	0.2421	0.2120	0.3646
2005	0.3420	0.1848	0.4851
2006	0.2943	0.2002	0.4300
2007	0.2864	0.2259	0.4485

Table 12: Foreign catches (mt) of greenstriped rockfish by INPFC area (from Rogers (2003)).

Year	Monterey	Eureka	Columbia	US Vancouver	Total
1966	14	0	80	17	111
1967	92	0	40	11	143
1968	17	8	11	5	41
1969	0	0	37	0	37
1970	0	0	44	0	44
1971	0	0	6	3	9
1972	0	4	7	3	14
1973	2	11	19	3	35
1974	0	5	7	1	13
1975	2	11	8	0	21
1976	1	8	4	0	13

Table 13: Number of logbook observations for greenstriped rockfish and the percentage of observed catch compared to the total landings in CA.

Year	1993	1994	1995	1996	1997	1998	1999
Number of observations	30	11	77	62	14	9	12
Percentage of CA landings	1.57	1.57	8.47	3.50	0.48	0.20	2.19

Year	2000	2001	2002	2003	2004	2005	2006	2007
Number of observations	37	15	15	6	32	18	9	2
Percentage of CA landings	10.61	3.02	3.91	38.07	60.77	41.53	3.90	1.50

Table 14: The number of landings sampled by commercial trawl and other (net and hook and line) gears used to estimate length frequencies. Also shown are which years use a sex-specific length frequencies (FM) or a combined sex length frequency (B). The other-gear uses combined sex length frequencies for every year.

	Trawl			Trawl LF type		Other-gear		
Year	**WA**	**OR**	**CA**	**WA/OR**	**CA**	**WA**	**OR**	**CA**
1978	0	0	26		FM	0	0	1
1979	0	0	12		FM	0	0	6
1980	0	0	28		B	0	0	2
1981	0	0	13		B	0	0	5
1982	0	0	28		FM	0	0	0
1983	0	0	56		FM	0	0	5
1984	0	0	51		FM	0	0	5
1985	0	0	83		FM	0	0	17
1986	0	0	43		FM	0	0	6
1987	0	0	43		FM	0	0	17
1988	0	0	41		FM	0	0	9
1989	0	0	34		FM	0	0	25
1990	0	0	45		FM	0	0	4
1991	0	0	47		B	0	0	7
1992	0	0	23		B	0	0	18
1993	0	0	20		FM	0	0	26
1994	0	0	30		FM	0	0	33
1995	0	1	24	B	FM	0	0	11
1996	33	4	27	B	FM	0	0	30
1997	30	6	42	B	FM	0	0	14
1998	27	2	33	FM	FM	0	0	22
1999	15	6	28	FM	FM	1	0	5
2000	6	1	18	FM	FM	1	2	2
2001	9	4	13	FM	FM	0	1	7
2002	37	3	14	FM	FM	6	0	3
2003	18	3	4	FM	B	6	0	0
2004	9	3	8	FM	B	1	1	0
2005	0	1	5	FM	B	3	0	0
2006	1	5	3	FM	B	0	0	3
2007	1	4	5	FM	B	1	1	0
2008				FM	B	0	1	6

Table 15: Number of lengths recorded by state and sex for trawl gear.

	WA			OR			CA		
Year	**F**	**M**	**U**	**F**	**M**	**U**	**F**	**M**	**U**
1978	0	0	0	0	0	0	47	38	1
1979	0	0	0	0	0	0	34	23	0
1980	0	0	0	0	0	0	41	8	1
1981	0	0	0	0	0	0	21	1	0
1982	0	0	0	0	0	0	82	31	0
1983	0	0	0	0	0	0	128	67	0
1984	0	0	0	0	0	0	124	39	1
1985	0	0	0	0	0	0	259	143	1
1986	0	0	0	0	0	0	97	49	0
1987	0	0	0	0	0	0	109	35	1
1988	0	0	0	0	0	0	71	41	2
1989	0	0	0	0	0	0	91	41	2
1990	0	0	0	0	0	0	88	51	2
1991	0	0	0	0	0	0	112	17	5
1992	0	0	0	0	0	0	28	11	10
1993	0	0	0	0	0	0	39	13	10
1994	0	0	0	0	0	0	46	28	32
1995	0	0	0	2	0	0	91	58	61
1996	0	0	539	180	84	0	61	28	22
1997	0	0	382	227	141	0	194	65	101
1998	406	108	3	83	38	0	146	100	21
1999	108	27	2	240	119	0	95	103	16
2000	150	25	0	77	1	0	349	50	2
2001	67	24	166	177	97	0	240	56	1
2002	1194	819	41	30	5	0	76	46	4
2003	166	114	19	61	53	0	9	1	70
2004	196	59	2	39	13	0	25	12	181
2005	0	0	0	23	7	0	29	8	1
2006	1	0	0	150	42	0	37	7	0
2007	1	0	0	48	26	0	38	3	1
2008	0	0	0	89	19	0	0	1	1

Table 16: Number of lengths recorded by state and sex for the other-gear fleet.

	WA			OR			CA		
Year	**F**	**M**	**U**	**F**	**M**	**U**	**F**	**M**	**U**
1978	0	0	0	0	0	0	0	0	1
1979	0	0	0	0	0	0	1	0	16
1980	0	0	0	0	0	0	0	0	6
1981	0	0	0	0	0	0	0	1	5
1983	0	0	0	0	0	0	0	0	7
1984	0	0	0	0	0	0	0	0	22
1985	0	0	0	0	0	0	11	5	34
1986	0	0	0	0	0	0	1	0	10
1987	0	0	0	0	0	0	8	7	22
1988	0	0	0	0	0	0	1	2	15
1989	0	0	0	0	0	0	10	2	116
1990	0	0	0	0	0	0	0	0	6
1991	0	0	0	0	0	0	5	1	3
1992	0	0	0	0	0	0	6	0	62
1993	0	0	0	0	0	0	9	1	52
1994	0	0	0	0	0	0	7	1	152
1995	0	0	0	0	0	0	0	0	35
1996	0	0	0	0	0	0	0	0	216
1997	0	0	0	0	0	0	3	0	42
1998	0	0	0	0	0	0	0	0	210
1999	1	1	0	0	0	0	0	0	46
2000	0	0	3	11	6	0	2	0	1
2001	0	0	0	1	0	0	1	0	22
2002	148	26	24	0	0	0	0	0	3
2003	145	10	2	0	0	0	0	0	0
2004	34	11	0	2	2	0	0	0	0
2005	3	2	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	5
2007	1	0	0	11	1	0	0	0	0
	0	0	0	1	0	0	0	0	17

Table 17: Summary of the tow data and samples of greenstriped rockfish for the NWFSC survey.

Year	Number of tows	Number of tows with greenstriped	Percent of tows with greenstriped
2003	558	134	24.0
2004	497	142	28.6
2005	674	185	27.4
2006	652	182	27.9
2007	696	168	24.1
2008	685	150	21.9

Year	Number of tows with lengths taken	Percent greenstriped tows with lengths taken	Number of male lengths	Number of female lengths	Number of unsexed lengths
2003	133	99.3	1754	1757	46
2004	140	98.6	1256	1449	13
2005	182	98.4	1961	2015	32
2006	182	100.0	1521	1628	18
2007	168	100.0	1144	1184	34
2008	150	100.0	929	877	60

Year	Number of tows with ages taken	Percent greenstriped tows with ages taken	Number of male ages	Number of female ages	Number of unsexed ages
2003	65	48.5	294	289	9
2004	139	97.9	248	277	9
2005	180	97.3	278	300	12
2006	182	100.0	255	267	8
2007	167	99.4	288	357	15
2008	149	99.3	276	261	29

Table 18: Estimates of biomass (mt) and standard errors (of the natural log of biomass) for the Triennial and NWFSC surveys.

	Triennial			NWFSC		
Year	**Estimate (B)**	**log(B)**	**SE(logB)**	**Estimate (B)**	**log(B)**	**SE(logB)**
1980	1,575	3.20	0.3038			
1981						
1982						
1983	3,084	3.49	0.2314			
1984						
1985						
1986	3,944	3.60	0.2457			
1987						
1988						
1989	5,044	3.70	0.2539			
1990						
1991						
1992	5,184	3.71	0.2506			
1993						
1994						
1995	4,583	3.66	0.2417			
1996						
1997						
1998	4,545	3.66	0.2541			
1999						
2000						
2001	5,546	3.74	0.2402			
2002						
2003				14,377	4.16	0.2211
2004	5,551	3.74	0.2544	10,012	4.00	0.2363
2005				17,807	4.25	0.2296
2006				11,083	4.04	0.2095
2007				14,547	4.16	0.2245
2008				20,636	4.31	0.2292

Table 19: Depth ranges and limits of the southern latitude in the Triennial survey for the different years.

Years	**Depth range (m)**	**Southern latitude**
1977	91–457	34.05
1980–1986	55–366	36.8
1989–1992	55–366	34.5
1995–2004	55–500	34.5

Table 20: Summary of the tow data and samples of greenstriped rockfish from the Triennial survey.

Year	Number of Tows	Number of Tows with Greenstriped	Percent of Tows with Greenstriped
1980	301	123	40.9
1983	479	260	54.3
1986	483	239	49.5
1989	410	228	55.6
1992	403	202	50.1
1995	398	175	44.0
1998	422	214	50.7
2001	419	180	43.0
2004	346	149	43.1

Year	Number of tows with lengths taken	Percentage of greenstriped tows with lengths taken	Number of male lengths	Number of female lengths	Number of unsexed lengths
1980	3	2.4	52	42	0
1983	20	7.7	500	723	0
1986	33	13.8	493	709	0
1989	102	44.7	1864	1992	41
1992	44	21.8	1075	1133	8
1995	141	80.6	2454	2149	204
1998	188	87.9	2476	2598	8
2001	171	95.0	2297	2605	141
2004	146	98.0	2204	2002	97

Table 21: Research removals (mt) compared to landings (no discards) from all fisheries. The right column shows the percentage of research removals compared to the fisheries landings.

Year	All fisheries	Triennial	NWFSC	% Research
1977	72.72	0.52		0.71
1980	160.26	0.35		0.22
1983	90.85	1.39		1.53
1986	61.23	1.45		2.36
1989	276.63	1.93		0.70
1992	104.24	1.58		1.52
1995	148.67	1.51		1.02
1998	174.19	1.46		0.84
2001	13.58	2.10		15.43
2003	2.72		1.87	68.68
2004	3.00	1.78	1.06	94.80
2005	2.88		2.12	73.81
2006	7.63		1.42	18.65
2007	0.98		2.13	218.66
2008	1.72		2.47	143.22

Table 22: Weight-at-length parameters for greenstriped rockfish from three different sources. Weight is in kg and length is in cm.

	Love et al (1990)	Shaw & Gunderson (2006)		NWFSC survey	
Year scollected	1980-1987		1995		2003-2008
	Both sexes	Female	Male	Female	Male
a	7.90E-06	6.49E-06	5.69E-06	7.40E-06	8.24E-06
b	3.127	3.2145	3.2597	3.167	3.131

Table 23: Estimates of length (cm) at 50% maturity and length (cm) at 100% maturity from various sources.

	Year collected	Love et al (1990) 1980-1987		Love et al (2002)		Shaw & Gunderson (2006) 1995		Wyllie Echeverria (1987)	
		Female	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
OR/WA	L50%			24	22	21	23		
	L100%			29	31	28	30		
CA	L50%	19	18	18	18			23*	23*
	L100%	25	26	26	26			27*	27*

* Length in total length

Table 24: Estimated parameters of the von Bertalanffy growth curve for greenstriped rockfish from various sources.

	Year collected	Love et al (1990) 1980-1987		Shaw & Gunderson (2006) 1995		Westrheim & Harling (1975)* 1963–1974		NWFSC survey 2003-2008	
		Female	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
North (OR/WA/BC)	Linf			37.5	30.1	35.2	37.0	33.9	29.0
	k			0.08	0.11	0.12	0.077	0.11	0.13
	t0			-3.47	-3.27	-0.1	-2.7	-3.25	-3.08
South (CA)	Linf	37.3	29.7					31.9	26.7
	k	0.10	0.12					0.13	0.17
	t0	-2.36	-2.73					-2.51	-2.20

*Ages based on surface reads

Table 25: Estimates of natural mortality (M) based on Hoenig's (1983) method using maximum age.

Maximum Age	M	Maximum Age	M
27	0.154	49	0.085
29	0.144	51	0.081
31	0.134	53	0.078
33	0.126	55	0.075
35	0.119	57	0.073
37	0.112	59	0.070
39	0.106	61	0.068
41	0.101	63	0.066
43	0.096	65	0.064
45	0.092	67	0.062
47	0.088	69	0.060

Table 26: **Percentage of females in length samples from the commercial trawl data and the survey data.**

	WA/OR trawl		CA trawl		Triennial survey		NWFSC survey	
Year	**# tows**	**% female**	**# tows**	**% female**	**# tows**	**% female**	**# tows**	**% female**
1978			25	61				
1979			12	62				
1980					3	53		
1981								
1982			28	74				
1983			56	60	20	57		
1984			50	76				
1985			82	72				
1986			43	74	33	60		
1987			42	79				
1988			40	64				
1989			33	71	102	52		
1990			44	65				
1991								
1992					44	51		
1993			15	77				
1994			19	58				
1995	1	100	16	74	141	47		
1996			17	68				
1997			30	67				
1998	28	76	28	55	188	51		
1999	19	71	28	48				
2000	7	93	17	77				
2001	10	69	13	74	171	57		
2002	39	60	13	40				
2003	20	56					133	52
2004	12	76			146	48	140	52
2005	1	78					182	53
2006	8	65					182	53
2007	5	68					168	49
2008	8	78					150	52

Table 27: Model runs used for model selection. Bias options are 0=none, 1=linear, 2=type 2. Standard deviation options are 1=constant CV, 2=type 2 increase in CV with age. The line colored in green represents the best model chosen.

Likeli-hood	Min Age	Max Age	Reference Age	Minus Group	Plus Group	Bias Options	Standard Deviation Options	Maximum Standard Deviation	Maximum Age Error
1932.9	1	48	10	1	35	0, 0	1, -1	10	10
1932.9	1	48	8	1	35	0, 0	1, -1	10	10
1932.9	1	48	6	1	35	0, 0	1, -1	10	10
1932.9	1	48	12	1	35	0, 0	1, -1	10	10
1960.4	1	48	14	1	35	0, 0	1, -1	10	10
1932.9	1	48	10	1	40	0, 0	1, -1	10	10
1944.6	1	48	10	1	45	0, 0	1, -1	10	10
1941.7	1	48	10	1	30	0, 0	1, -1	10	10
1876.5	1	48	10	1	40	0, 0	1, 2	10	10

Table 28: Estimated aging error determined from double reads of ages collected in the NWFSC survey. Ageing error was assumed to be unbiased.

True Age	Standard Deviation	True Age	Standard Deviation	True Age	Standard Deviation
1	0.134	18	0.971	35	0.974
2	0.366	19	0.972	36	0.974
3	0.534	20	0.973	37	0.974
4	0.655	21	0.973	38	0.974
5	0.743	22	0.973	39	0.974
6	0.807	23	0.974	40	0.974
7	0.853	24	0.974	41	0.974
8	0.887	25	0.974	42	0.974
9	0.911	26	0.974	43	0.974
10	0.928	27	0.974	44	0.974
11	0.941	28	0.974	45	0.974
12	0.95	29	0.974	46	0.974
13	0.957	30	0.974	47	0.974
14	0.962	31	0.974	48	0.974
15	0.965	32	0.974	49	0.974
16	0.968	33	0.974	50	0.974
17	0.97	34	0.974		

Table 29: Specifications of the assessment model.

Starting year	1916
Population characteristics	
Maximum age	50
Genders	2
Population lengths	5-45 cm by 1 cm bins
Summary biomass (mt)	Age 2+
Data characteristics	
Data lengths	10-40 cm by 1 cm bins
Data ages	1-45
Minimum age for growth calcs	1
Maximum age for growth calcs	45
First mature age	2
Starting year of estimated recruitment	1970
Fishery characteristics	
Fishery timing	0.5
Early Triennial survey timing	0.6
Late Triennial survey timing	0.5
NWFSC survey timing	0.5
Fishing mortality method	Exploitation rate
Maximum exploitation rate	0.9
Catchability	linear and analytic calc
Selectivity	Double normal

Table 30: Description of recruitment, survey, and fishery parameters in the base case assessment model.

Parameter	Initial value	Number estimated	Bounds (low, high)	Prior distribution
Stock and recruitment				
Ln(R0)	9	1	(1, 99)	
Steepness (h)	0.692	0	(0.2, 1.0)	Beta(0.692, 0.205)
σ_r	0.60	0	(0, 2)	
Ln(Main Recruitment Deviations): 1970-2005	0	36	(-3, 3)	
Ln(Forecast Recruitment Deviations): 2006-2020	0	15	(-3, 3)	
Catchability				
ln(q) – NWFSC survey	Analytic solution			
ln(q) – early Triennial survey	Analytic solution			
ln(q) – late Triennial survey	Analytic solution			
Selectivity (asympotitc, sex specific, some with retention curves)				
Fisheries:				
Length at peak selectivity	34	4	(12, 44)	
Width of top	3	0	(-5, 3)	
Ascending width	4.1	4	(-4, 12)	
Descending width	6	0	(-2, 6)	
Initial selectivity	-5	4	(-15, 5)	
Final selectivity	-4[1]	0	(-5, 5)	
Male peak offset	0	2	(-15, 15)	
Male ascending width offset	0	2	(-15, 15)	
Male descending width offset	0	0	(-15, 15)	
Male final offset	0	0	(-15, 15)	
Retention inflection	25	3	(10, 39)	
Retention slope	3	3	(0.1, 10)	
Retention asymptote	0.3	3	(0.001, 0.7)	
Retention male offset	0	0	(-10, 10)	
Time block parameters	--	0	--	
Surveys:				
Length at peak selectivity	21	3	(12, 44)	
Width of top	3	0	(-5, 3)	
Ascending width	3.7	3	(-4, 12)	
Descending width	6	0	(-2, 6)	
Initial selectivity	-5	3	(-15, 5)	
Final selectivity	-4[1]	0	(-5, 5)	
Male peak offset	0	3	(-15, 15)	
Male ascending width offset	0	3	(-15, 15)	
Male descending width offset	0	0	(-15, 15)	
Male final offset	0	0	(-15, 15)	

[1]: When not estimated, was set to -999 which causes the curve to decline like a normal curve

Table 31: Description of biological parameters in the base case assessment model.

Parameter	Initial value	Number estimated	Bounds (low, high)	Prior distribution
Biological				
Females:				
Natural mortality (M, female)	0.08	0	(0.02, 0.4)	N(0.08, 0.035)
Length at age 1	11.9	1	(3, 25)	
Length at age 45	33.4	1	(25, 60)	
von Bertalanffy K	0.105	1	(0.03, 0.8)	
SD of length at age 1	0.09	1	(0.001, 1)	
SD of length at age 45	0.09	1	(0.001, 1)	
Maturity inflection	20.97	0	(10, 50)	
Maturity slope	-0.66	0	(-3, 3)	
Fecundity intercept	371200	0	(-3, 3e6)	
Fecundity slope	63300	0	(-3, 3e6)	
Males:				
Natural mortality (M, male)	0.08	0	(0.02, 0.4)	N(0.08, 0.035)
Length at age 1	11.8	1	(3, 25)	
Length at age 45	28.4	1	(25, 60)	
von Bertalanffy K	0.136	1	(0.03, 0.8)	
SD of length at age 1	0.08	1	(0.001, 1)	
SD of length at age 45	0.08	1	(0.001, 1)	

[1]: When not estimated, was set to -999 which causes the curve to decline like a normal curve

Table 32: Likelihood components and other quantities related to the minimization of the base case model.

Description	Values
Nparameters	102
Gradient	0.00002
Negative log-likelihoods	
Total	4077.61
Indices	-10.33
Length-frequency data	1697.91
Age-frequency data	2380.78
Discard biomass	39.78
Discard mean weight	-43.07
Recruitment	12.39
Priors	0.0
Forecast recruitment	0.12

Table 33: Parameter estimates and approximate asymptotic standard deviations for the base case model.

Stock and recruitment	Est	SD
Ln(R0)	9.62	0.15

Catchability

	early Triennial	late Triennial	NWFSC
ln(q)	0.20	0.32	0.84

Selectivity (asympotitc, sex specific, some with retention curves)

Fisheries:	WA/OR trawl		CA trawl		Other		Recreational	
	Est	SD	Est	SD	Est	SD	Est	SD
Length at peak selectivity	43.97	0.81	24.65	1.07	44.00	0.04	26.96	0.80
Ascending width	5.03	0.16	3.57	0.56	4.87	0.06	3.77	0.20
Initial selectivity	-5.48	1.58	-10.39	68.57	-12.76	40.97	-9.29	27.48
Male peak offset	4.24	4.51	3.79	2.50	NA	NA	NA	NA
Male ascending width offset	0.82	0.44	1.08	1.08	NA	NA	NA	NA
Retention inflection	30.61	1.17	30.90	0.55	22.69	0.29	NA	NA
Retention slope	3.10	0.32	2.65	0.17	0.39	0.21	NA	NA
Retention asymptote	0.40	0.08	0.33	0.10	0.11	0.03	NA	NA

Surveys:	early Triennial		late Triennial		NWFSC	
	Est	SD	Est	SD	Est	SD
Length at peak selectivity	27.62	0.76	24.96	0.98	26.77	0.70
Ascending width	3.88	0.20	3.82	0.24	4.03	0.16
Initial selectivity	-6.00	2.16	-5.51	0.92	-4.68	0.73
Male peak offset	0.26	1.09	0.35	1.09	-0.68	0.94
Male ascending width offset	0.01	0.28	0.15	0.30	-0.12	0.25

Biological

	Females		Males	
	Est	SD	Est	SD
Length at age 1	9.25	0.21	9.21	0.21
Length at age 45	33.67	0.14	28.47	0.12
von Bertalanffy K	0.11	0.003	0.15	0.004
CV at age 1	0.09	0.003	0.07	0.003
CV at age 45	0.07	0.003	0.09	0.005

Table 34: Estimates of key derived parameters and reference points with approximate 95% asymptotic confidence intervals.

Quantity	Estimate	~95% Confidence interval	Range of states of nature
Unfished spawning output (millions of eggs)	7,090	5,021-9,158	2,003-44,450
Unfished age 2+ biomass (mt)	33,526	23,722-43,329	9,024-221,290
Unfished recruitment (R0, thousands)	15,041	2,073-109,131	2,540-146,121
Depletion (2009)	80.9%	72.4–89.4%	58.6–103.0%
Reference points based on $SB_{40\%}$			
Proxy spawning output ($B_{40\%}$)	2,836	2,009-3,663	801-17,780
SPR resulting in $B_{40\%}$ ($SPR_{B40\%}$)	46.7%	NA	NA
Exploitation rate resulting in $B_{40\%}$	0.0494	0.0483-0.0504	0.0408-0.057
Yield with $SPR_{B40\%}$ at $B_{40\%}$ (mt)	765	540-989	165-5,992
Reference points based on $SPR_{50\%}$			
Spawning output at SPR (SB_{SPR}) (millions of eggs)	3,101	2,196-4,006	876-19,443
$SPR_{50\%}$	50.0%	NA	NA
Exploitation rate corresponding to $SPR_{50\%}$	0.0442	0.0434-0.0451	0.0364-0.0512
Yield with $SPR_{50\%}$ at SB_{SPR} (mt)	738	522-955	159-5,783
Reference points based on estimated MSY values			
Spawning output at *MSY* (SB_{MSY}) (millions of eggs)	2,039	1,443-2,635	583-12,623
SPR_{MSY}	36.7%	36.4-36.9%	36.3-37%
Exploitation rate corresponding to SPR_{MSY}	0.0682	0.0668-0.0696	0.0562-0.0791
MSY (mt)	803	568-1,038	173-6,314

Table 35: Input sample sizes compared to calculated effective sample size for the length composition data.

Year	WA/OR Trawl N	WA/OR Trawl effN	CA Trawl N	CA Trawl effN	Other-gear N	Other-gear effN	Recreational N	Recreational effN	Triennial N	Triennial effN	NWFSC N	NWFSC effN
1978			75	25								
1979			36	27	12	4						
1980			28	51	4	5	6	12				
1981			13	7	10	5						
1982			84	60			3	4				
1983			168	99	10	4			140	221		
1984			150	65	10	11	18	18				
1985			246	369	34	43	24	20				
1986			129	148	12	21	12	5	231	224		
1987			126	99	34	26	6	2				
1988			120	115	18	10	15	6				
1989			99	90	50	64			714	505		
1990			132	88	8	4						
1991			141	184	14	4						
1992			69	24	36	35			308	1212		
1993			45	27	52	27	27	12				
1994			57	72	66	40	90	61				
1995			48	41	22	29	51	35	564	1206		
1996	198	271	51	76	60	61	45	90				
1997	180	112	90	181	28	18	36	5				
1998	196	151	84	99	44	37	27	30	752	769		
1999	133	216	84	42	12	96	75	122				
2000	49	28	51	64	10	10	27	23				
2001	70	141	39	35	16	19	21	57	684	472		
2002	273	389	39	23	18	11	9	58				
2003	140	115	4	5	12	11	9	6			611	646
2004	84	45	8	7	4	14			584	545	649	788
2005			5	8	6	4					605	923
2006	56	61	3	14	6	2					595	641
2007	35	53	5	7	4	5					447	444
2008	56	43			14	7					191	239
ratio of means		1.10		0.97		1.00		1.13		1.30		1.19

Table 36: Time-series of population estimates from the base case model.

Year	Total biomass (mt)	Spawning output (million eggs)	Depletion	Age-0 recruits	Total catch (mt)	SPR	Relative exploitation rate
1916	33,673	7,090	1.00	15,041	13.2	0.0075	0.0004
1917	33,662	7,086	1.00	15,040	21.3	0.0120	0.0006
1918	33,643	7,081	1.00	15,039	20.8	0.0118	0.0006
1919	33,627	7,076	1.00	15,038	12.4	0.0071	0.0004
1920	33,618	7,073	1.00	15,037	13.3	0.0076	0.0004
1921	33,609	7,071	1.00	15,037	11.8	0.0067	0.0004
1922	33,602	7,069	1.00	15,036	11.2	0.0064	0.0003
1923	33,596	7,067	1.00	15,036	14.2	0.0081	0.0004
1924	33,588	7,064	1.00	15,035	17.8	0.0101	0.0005
1925	33,577	7,061	1.00	15,034	19.9	0.0113	0.0006
1926	33,565	7,057	1.00	15,034	26.0	0.0147	0.0008
1927	33,548	7,052	0.99	15,032	24.4	0.0138	0.0007
1928	33,533	7,048	0.99	15,031	23.6	0.0134	0.0007
1929	33,520	7,044	0.99	15,030	29.7	0.0168	0.0009
1930	33,501	7,039	0.99	15,029	28.6	0.0162	0.0009
1931	33,485	7,035	0.99	15,028	34.5	0.0195	0.0010
1932	33,464	7,029	0.99	15,027	29.4	0.0168	0.0009
1933	33,448	7,025	0.99	15,026	30.0	0.0172	0.0009
1934	33,432	7,021	0.99	15,025	27.2	0.0156	0.0008
1935	33,419	7,018	0.99	15,024	25.9	0.0149	0.0008
1936	33,408	7,015	0.99	15,024	18.6	0.0106	0.0006
1937	33,404	7,015	0.99	15,023	23.4	0.0134	0.0007
1938	33,396	7,013	0.99	15,023	23.8	0.0136	0.0007
1939	33,388	7,011	0.99	15,023	29.5	0.0169	0.0009
1940	33,375	7,008	0.99	15,022	31.4	0.0176	0.0009
1941	33,360	7,005	0.99	15,021	38.4	0.0210	0.0012
1942	33,341	7,000	0.99	15,020	26.2	0.0137	0.0008
1943	33,335	6,998	0.99	15,019	81.9	0.0412	0.0025
1944	33,278	6,984	0.99	15,016	184.4	0.0916	0.0056
1945	33,127	6,947	0.98	15,007	360.3	0.1690	0.0109
1946	32,817	6,871	0.97	14,988	309.3	0.1529	0.0095
1947	32,566	6,809	0.96	14,973	151.8	0.0801	0.0047
1948	32,474	6,786	0.96	14,967	139.5	0.0750	0.0043
1949	32,400	6,767	0.95	14,962	188.7	0.1008	0.0059
1950	32,283	6,737	0.95	14,954	191.2	0.1024	0.0059
1951	32,169	6,709	0.95	14,947	242.5	0.1276	0.0076
1952	32,011	6,671	0.94	14,937	156.0	0.0850	0.0049
1953	31,944	6,654	0.94	14,932	152.9	0.0839	0.0048
1954	31,883	6,639	0.94	14,928	159.0	0.0862	0.0050
1955	31,821	6,623	0.93	14,924	144.8	0.0790	0.0046
1956	31,776	6,612	0.93	14,921	158.8	0.0843	0.0050
1957	31,723	6,598	0.93	14,918	161.1	0.0858	0.0051
1958	31,672	6,585	0.93	14,914	193.6	0.1025	0.0061
1959	31,592	6,566	0.93	14,909	93.7	0.0551	0.0030
1960	31,608	6,570	0.93	14,910	143.6	0.0765	0.0046

1961	31,582	6,562	0.93	14,908	114.9	0.0614	0.0037
1962	31,585	6,562	0.93	14,908	48.6	0.0285	0.0015
1963	31,648	6,578	0.93	14,912	72.5	0.0423	0.0023
1964	31,687	6,588	0.93	14,915	57.7	0.0329	0.0018
1965	31,739	6,600	0.93	14,918	71.7	0.0419	0.0023
1966	31,775	6,610	0.93	14,921	185.1	0.1034	0.0059
1967	31,699	6,593	0.93	14,916	256.4	0.1405	0.0081
1968	31,555	6,560	0.93	14,907	185.7	0.1034	0.0059
1969	31,485	6,543	0.92	14,903	288.9	0.1561	0.0092
1970	31,304	6,504	0.92	7,017	239.5	0.1324	0.0077
1971	31,168	6,477	0.91	32,449	350.5	0.1714	0.0113
1972	30,999	6,425	0.91	9,599	518.4	0.2367	0.0169
1973	30,673	6,337	0.89	8,843	281.5	0.1563	0.0092
1974	30,572	6,305	0.89	20,713	377.9	0.2005	0.0124
1975	30,399	6,250	0.88	11,398	533.9	0.2656	0.0177
1976	30,059	6,169	0.87	8,270	646.7	0.3059	0.0216
1977	29,584	6,075	0.86	10,899	577.1	0.2887	0.0196
1978	29,170	6,001	0.85	26,936	438.2	0.2142	0.0151
1979	28,948	5,954	0.84	10,693	321.6	0.1746	0.0112
1980	28,826	5,930	0.84	9,299	1,249.3	0.4944	0.0435
1981	27,818	5,692	0.80	30,401	222.0	0.1359	0.0080
1982	27,904	5,676	0.80	11,260	1,008.5	0.4144	0.0365
1983	27,261	5,492	0.77	7,689	540.3	0.2709	0.0199
1984	27,120	5,430	0.77	38,075	633.9	0.3054	0.0235
1985	27,032	5,359	0.76	24,726	663.0	0.3344	0.0248
1986	26,998	5,296	0.75	6,233	405.4	0.2251	0.0151
1987	27,239	5,305	0.75	8,650	695.2	0.3271	0.0256
1988	27,212	5,264	0.74	20,223	1,641.8	0.5745	0.0606
1989	26,271	5,039	0.71	9,179	1,767.6	0.5765	0.0677
1990	25,210	4,816	0.68	4,542	894.9	0.4271	0.0356
1991	24,886	4,807	0.68	3,182	847.5	0.4059	0.0341
1992	24,496	4,797	0.68	3,525	618.9	0.3237	0.0253
1993	24,285	4,818	0.68	57,939	869.7	0.4020	0.0360
1994	23,977	4,767	0.67	15,195	1,154.3	0.4803	0.0492
1995	23,455	4,628	0.65	6,472	905.8	0.4242	0.0388
1996	23,206	4,512	0.64	5,095	872.9	0.4141	0.0377
1997	22,978	4,389	0.62	3,054	1,069.9	0.4888	0.0467
1998	22,511	4,254	0.60	22,041	1,103.1	0.4948	0.0491
1999	22,048	4,173	0.59	27,898	394.1	0.2655	0.0181
2000	22,319	4,275	0.60	28,772	90.6	0.0761	0.0041
2001	22,961	4,425	0.62	14,508	90.9	0.0736	0.0040
2002	23,663	4,540	0.64	22,849	102.2	0.0789	0.0043
2003	24,420	4,633	0.65	12,358	14.6	0.0118	0.0006
2004	25,280	4,760	0.67	23,634	16.9	0.0132	0.0007
2005	26,176	4,924	0.69	21,237	16.8	0.0127	0.0006
2006	27,072	5,120	0.72	9,576	48.4	0.0349	0.0018
2007	27,887	5,323	0.75	14,264	7.3	0.0052	0.0003
2008	28,680	5,533	0.78	14,585	11.0	0.0076	0.0004
2009	29,391	5,736	0.81	14,656	9.2	0.0061	0.0003

Table 37: Asymptotic standard deviation estimates for spawning biomass and recruitment.

Year	Spawning output (millions)	Age-0 recruits	Year	Spawning output (millions)	Age-0 recruits	Year	Spawning output (millions)	Age-0 recruits
1916	1,055	2,247	1947	1,017	2,238	1978	897	10,252
1917	1,055	2,247	1948	1,013	2,237	1979	894	6,936
1918	1,055	2,247	1949	1,010	2,236	1980	852	5,854
1919	1,054	2,247	1950	1,006	2,235	1981	849	9,902
1920	1,054	2,247	1951	1,001	2,234	1982	824	7,089
1921	1,054	2,247	1952	994	2,232	1983	816	4,698
1922	1,053	2,247	1953	992	2,231	1984	809	10,880
1923	1,053	2,247	1954	989	2,230	1985	800	9,186
1924	1,053	2,247	1955	987	2,230	1986	805	3,439
1925	1,053	2,247	1956	985	2,229	1987	804	3,620
1926	1,052	2,246	1957	984	2,229	1988	775	5,809
1927	1,052	2,246	1958	983	2,229	1989	756	3,490
1928	1,052	2,246	1959	980	2,228	1990	761	1,757
1929	1,051	2,246	1960	980	2,228	1991	768	1,185
1930	1,050	2,246	1961	980	2,228	1992	780	1,364
1931	1,050	2,246	1962	981	2,228	1993	782	10,798
1932	1,049	2,246	1963	983	2,229	1994	773	4,842
1933	1,049	2,246	1964	984	2,229	1995	765	2,475
1934	1,048	2,245	1965	986	2,230	1996	757	1,697
1935	1,047	2,245	1966	988	2,230	1997	746	1,143
1936	1,047	2,245	1967	989	2,230	1998	746	4,570
1937	1,047	2,245	1968	989	2,230	1999	766	5,734
1938	1,046	2,245	1969	987	2,230	2000	788	5,949
1939	1,046	2,245	1970	985	3,682	2001	805	3,655
1940	1,045	2,245	1971	982	9,262	2002	818	4,945
1941	1,045	2,245	1972	976	5,869	2003	834	3,357
1942	1,044	2,244	1973	965	5,288	2004	856	5,524
1943	1,044	2,244	1974	960	8,886	2005	882	6,137
1944	1,042	2,244	1975	951	7,101	2006	909	4,261
1945	1,038	2,243	1976	936	4,752	2007	935	7,632
1946	1,027	2,240	1977	919	7,002	2008	959	9,024

Table 38: Results from the sensitivity runs.

Description	Base Case	Half landings	Double landings	Estimate steepness	Estimate mortality	Early discard data
Nparameters	102	102	102	103	104	102
Gradient	0.00002	0.00015	0.00107	0.00011	0.00001	0.00007
Negative log-likelihoods						
Total	4077.61	4077.22	4077.84	4076.95	4068.01	4082.07
Indices	-10.33	-10.23	-10.4	-10.54	-8.91	-10.72
Length-frequency data	1697.91	1696.87	1699.15	1697.19	1686.99	1702.28
Age-frequency data	2380.78	2381.02	2380.57	2381.39	2376.53	2379.47
Discard biomass	39.78	39.74	39.82	39.78	40.13	40.55
Discard mean weight	-43.07	-42.73	-43.61	-43.07	-42.51	-43.5
Recruitment	12.39	12.43	12.15	12.34	15.45	13.85
Priors	0	0	0	-0.275	0.167	0
Forecast recruitment	0.119	0.112	0.132	0.111	0.132	0.126
Select parameters						
Stock-recruit, productivity						
R_0	9.62	9.50	9.82	9.63	8.93	9.06
Steepness (*h*)	0.69	0.69	0.69	1.00	0.69	0.69
Recruitment Variability (out)	0.84	0.84	0.84	0.84	0.84	0.83
Female M	0.080	0.080	0.080	0.080	0.060	0.080
Male M	0.080	0.080	0.080	0.080	0.070	0.080
Survey catchability & selectivity						
Early Triennial catchability (*q*)	0.17	0.19	0.14	0.17	0.26	0.29
Late Triennial catchability (*q*)	0.24	0.28	0.19	0.23	0.45	0.40
NWFSC catchability (*q*)	0.63	0.72	0.50	0.59	1.14	1.05
Individual growth						
Female length at age min	9.25	9.26	9.25	9.25	9.31	9.27
Female length at age max	33.67	33.67	33.67	33.68	33.58	33.74
Female von Bertalanffy *K*	0.11	0.11	0.11	0.11	0.12	0.11
Female CV of length-at-age min	0.09	0.09	0.09	0.09	0.09	0.09
Female CV of length-at-age max	0.07	0.07	0.07	0.07	0.07	0.07
Male length at age min	9.21	9.22	9.21	9.22	9.20	9.16
Male length at Linf	28.47	28.47	28.46	28.46	28.57	28.45
Male von Bertalanffy *K*	0.15	0.15	0.15	0.15	0.15	0.15
Male CV of length-at-age min	0.07	0.07	0.07	0.07	0.07	0.07
Male CV of length-at-age max	0.09	0.09	0.09	0.09	0.08	0.09
Management quantities						
Spawning Output (million eggs)	7,090	6,279	8,722	7,148	5,546	4,055
2009 Spawning output	5,736	5,015	7,171	6,093	3,319	3,337
2009 Depletion	0.81	0.80	0.82	0.85	0.60	0.82
2009 1-*SPR*	0.01	0.01	0.00	0.01	0.01	0.01
2008 exploitation rate	0.0004	0.0004	0.0004	0.0004	0.0006	0.0007
SSB MSY	2,039	1,808	2,503	1,036	1,581	1,170
MSY	803	712	986	1,202	467	459

Table 39. Results from the retrospective model runs.

Year Assessed	Last year of data	Unfished Spawning Output (millions of eggs)	Year assessed SO (millions of eggs)	Assessed Depletion	2009 Depletion
2009	2008	7,090	5,736	80.9%	80.9%
2008	2007	6,733	5,005	74.3%	77.4%
2007	2006	6,076	4,158	68.4%	76.4%
2006	2005	7,741	5,223	67.5%	76.5%
2005	2004	7,152	4,520	63.2%	74.1%
2004	2003	4,310	2,099	48.7%	65.0%

Table 40: Projection of potential ABC, OY, landings and catch, summary biomass (age 2 and older), spawning biomass, and depletion for the base case model based on the status quo. Landings in 2009 and 2010 are a total of 9 mt, determined from the average of the 2007 and 2008 landings for each fleet and allocated to each fleet based on the proportion caught in 2007 and 2008. Forecasted landings after 2010 are 20 mt (the average of 2000–2003) and allocated to each fleet based on the average allocation in 2000–2003.

Year	ABC (mt)	OY (mt)	Total Catch (mt)	Landings (mt)	Age 2+ biomass (mt)	Spawning output (million eggs)	Depletion
2009	1,347	1,347	9	3	29,248	5,736	80.9
2010	1,390	1,390	9	3	29,876	5,932	83.7
2011	1,429	1,429	94	20	30,421	6,113	86.2
2012	1,458	1,458	93	20	30,808	6,249	88.1
2013	1,482	1,482	93	20	31,127	6,358	89.7
2014	1,501	1,501	92	20	31,386	6,445	90.9
2015	1,517	1,517	91	20	31,594	6,513	91.9
2016	1,529	1,529	90	20	31,759	6,568	92.6
2017	1,538	1,538	89	20	31,888	6,612	93.3
2018	1,546	1,546	88	20	31,988	6,647	93.8
2019	1,552	1,552	87	20	32,064	6,675	94.1
2020	1,556	1,556	87	20	32,121	6,697	94.5

[1] The ABC here is the calculated total catch determined by $F_{SPR50\%}$.

Table 41: Summary of 12-year projections beginning in 2011 for alternate states of nature based on two axes of uncertainty. Columns range over natural mortality and rows range over the fraction discarded. There are no probabilities associated with these states of nature other than the base model (center square) is the most probable scenario.

State of nature (fraction discarded)		Year	Landed catch (mt)	M=0.06 Depletion (%)	M=0.06 Spawning output (million)	M=0.08 Depletion (%)	M=0.08 Spawning output (million)	M=0.10 Depletion (%)	M=0.10 Spawning output (million)
	Low fraction discarded	2011	20	66.9	1,340	88.8	2,904	106.2	9,316
		2012	20	68.7	1,375	90.5	2,957	107.3	9,409
		2013	20	70.2	1,407	91.7	2,999	107.9	9,465
		2014	20	71.6	1,434	92.7	3,031	108.3	9,493
		2015	20	72.8	1,458	93.5	3,056	108.3	9,500
		2016	20	73.9	1,479	94.1	3,076	108.3	9,492
		2017	20	74.8	1,499	94.6	3,092	108.0	9,474
		2018	20	75.7	1,517	95.0	3,105	107.8	9,449
		2019	20	76.5	1,533	95.3	3,114	107.4	9,418
		2020	20	77.3	1,548	95.5	3,121	107.0	9,384
	Base fraction discarded	2011	20	63.9	3,324	86.2	6,113	105.2	17,324
		2012	20	65.9	3,427	88.1	6,249	106.5	17,540
		2013	20	67.6	3,517	89.7	6,358	107.4	17,680
		2014	20	69.1	3,596	90.9	6,445	107.8	17,758
		2015	20	70.5	3,666	91.9	6,513	108.0	17,791
		2016	20	71.7	3,729	92.6	6,568	108.0	17,791
		2017	20	72.8	3,786	93.3	6,612	107.9	17,768
		2018	20	73.8	3,838	93.8	6,647	107.7	17,728
		2019	20	74.7	3,886	94.1	6,675	107.3	17,675
		2020	20	75.5	3,930	94.5	6,697	107.0	17,614
	High fraction discarded	2011	20	64.7	7,903	85.9	14,969	105.5	46,891
		2012	20	66.6	8,133	87.9	15,306	106.8	47,469
		2013	20	68.2	8,333	89.4	15,576	107.6	47,844
		2014	20	69.7	8,509	90.6	15,790	108.1	48,053
		2015	20	70.9	8,665	91.6	15,960	108.3	48,141
		2016	20	72.1	8,805	92.4	16,097	108.3	48,140
		2017	20	73.1	8,932	93.0	16,206	108.2	48,075
		2018	20	74.1	9,048	93.5	16,294	107.9	47,963
		2019	20	75.0	9,155	93.9	16,364	107.6	47,818
		2020	20	75.8	9,253	94.2	16,419	107.2	47,650

12 Figures

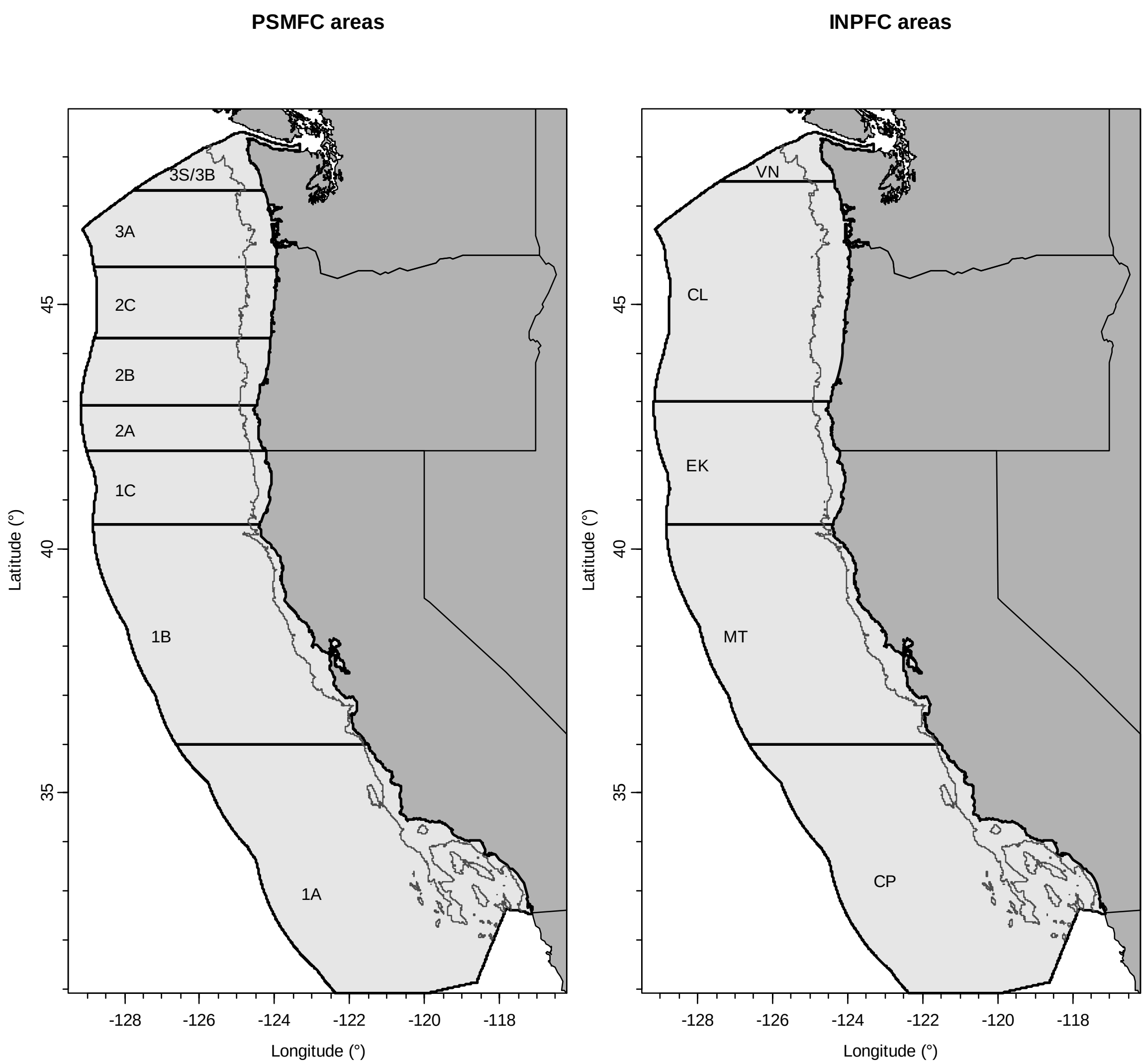

Figure 1: Map showing PSMFC and INPFC boundaries used in the 2009 assessment. The solid gray line off the coast is the 300 fathom depth contour.

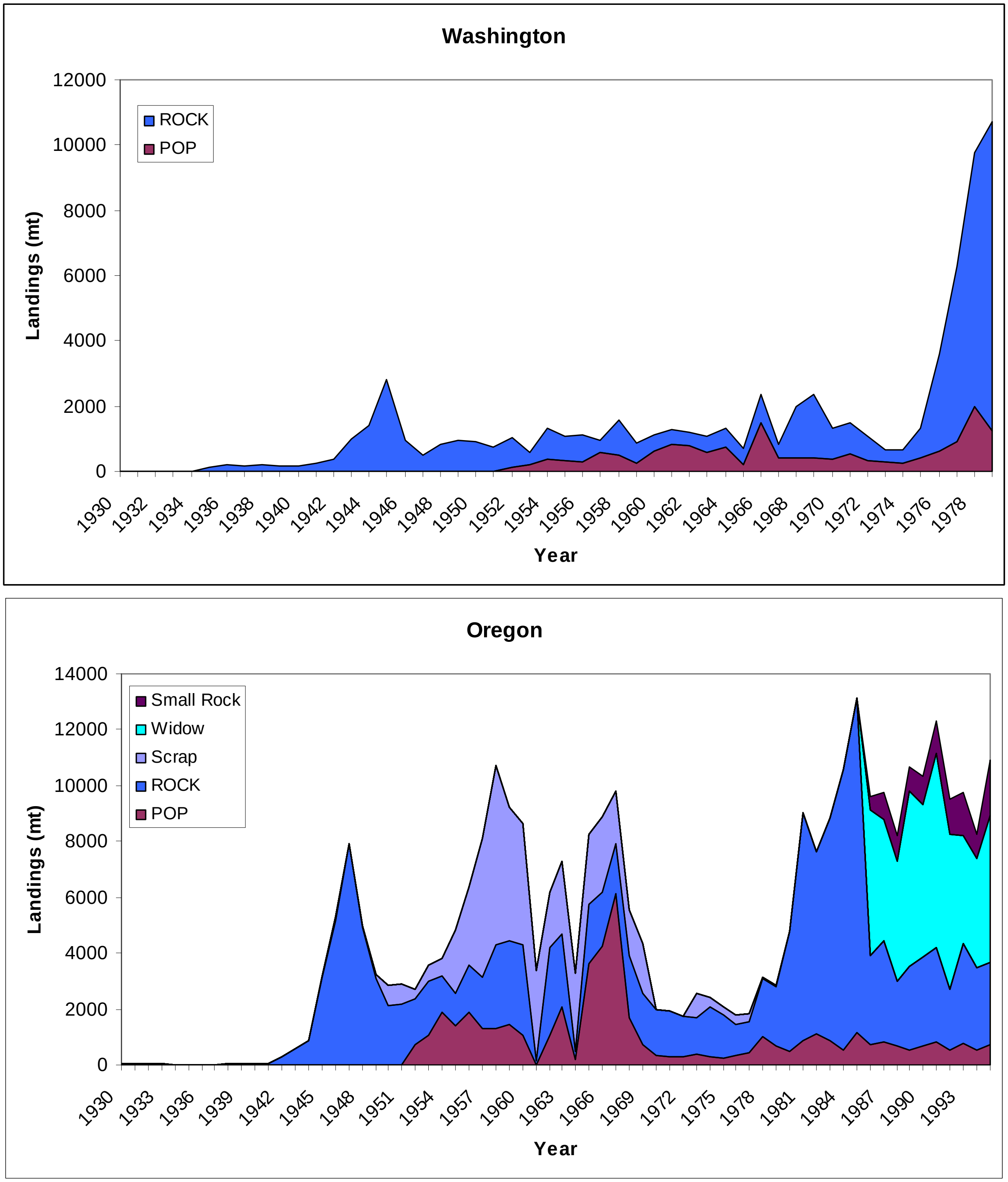

Figure 2: Landings for Washington and Oregon of each market category used in the historical catch reconstruction. Different proportions were applied to each market category to estimate the landings of greenstriped rockfish.

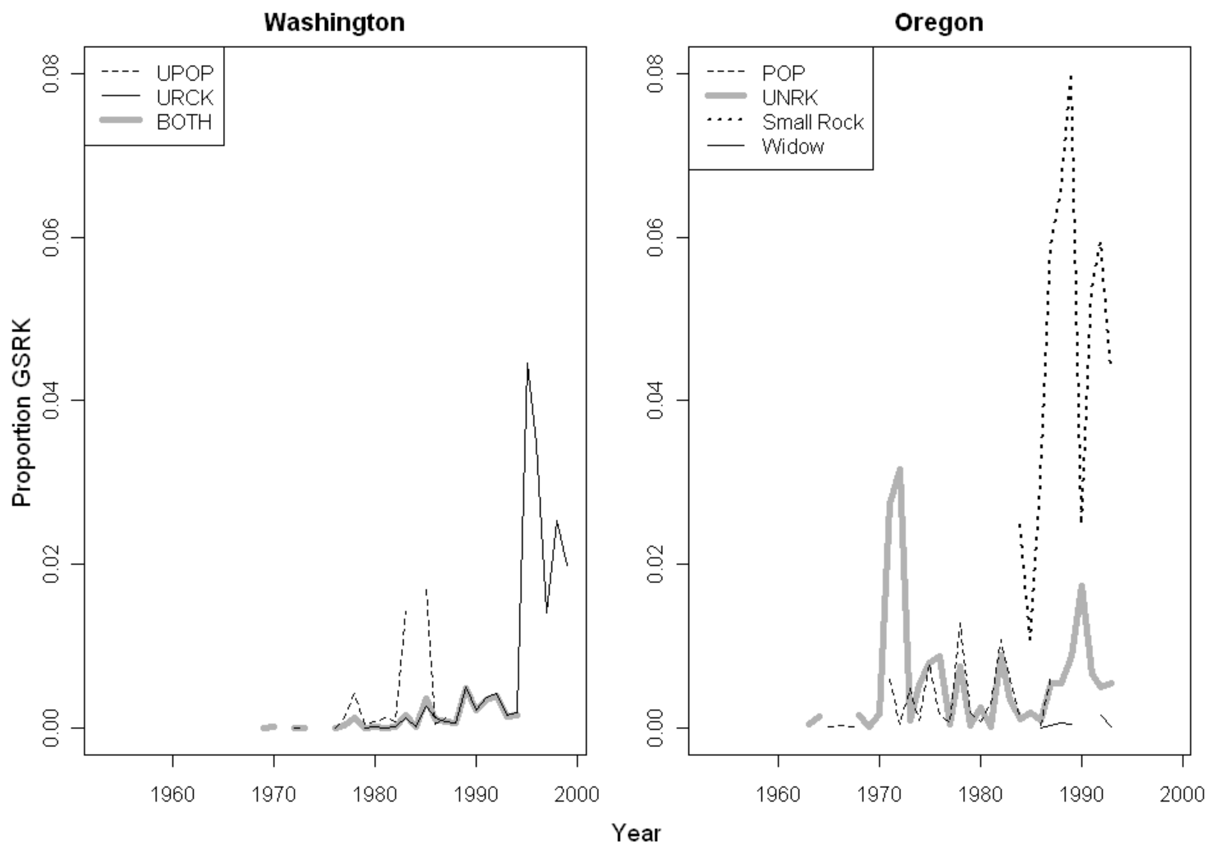

Figure 3: Proportion of greenstriped rockfish (GSRK) used to construct the historical landings as estimated from species composition sampling of different market categories for Oregon and Washington. See text for a full explanation of how these proportions were used.

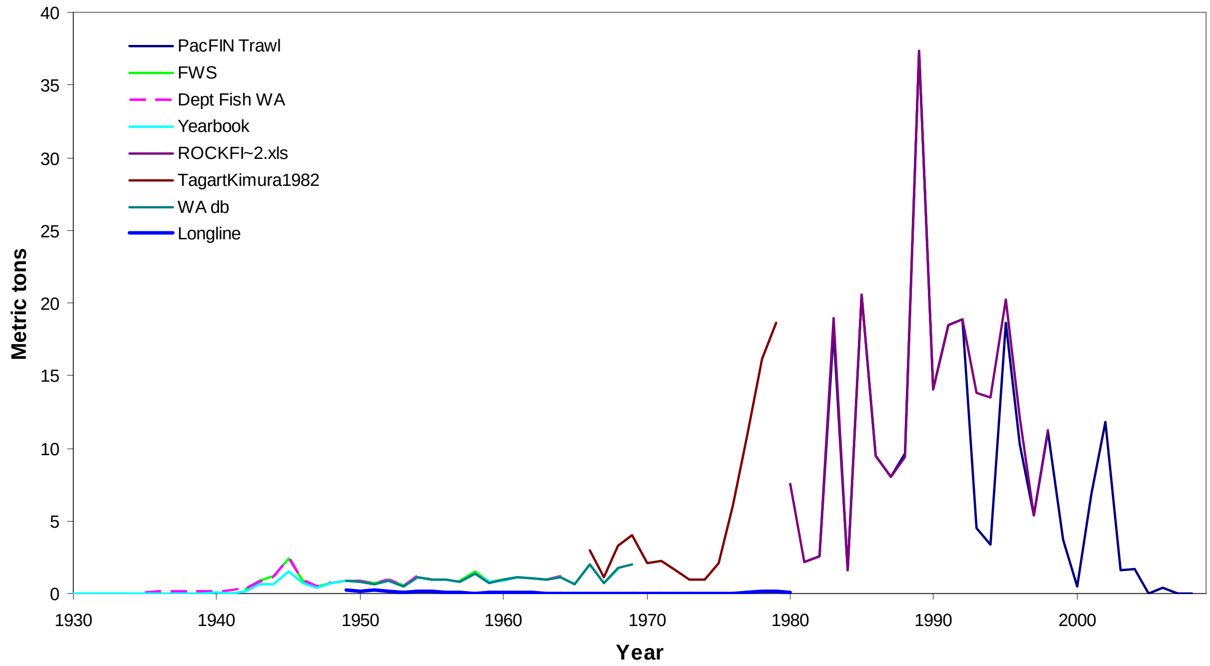

Figure 4: Landings of greenstriped rockfish from Washington trawl vessels as determined from different data sources.

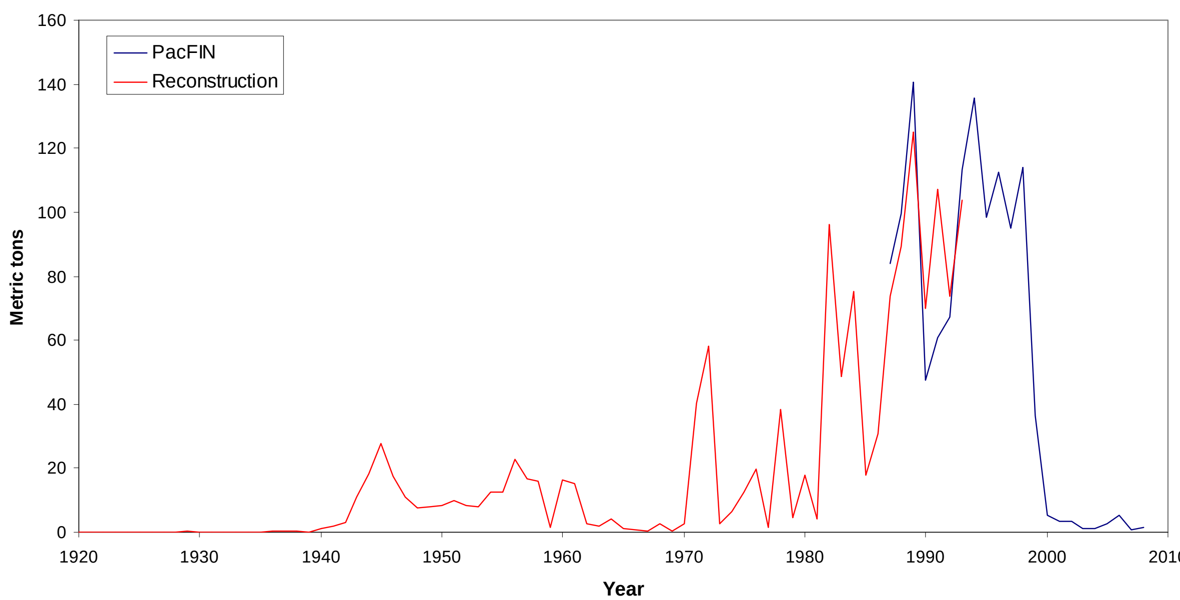

Figure 5: Landings of greenstriped rockfish from Oregon trawl vessels as determined from different data sources.

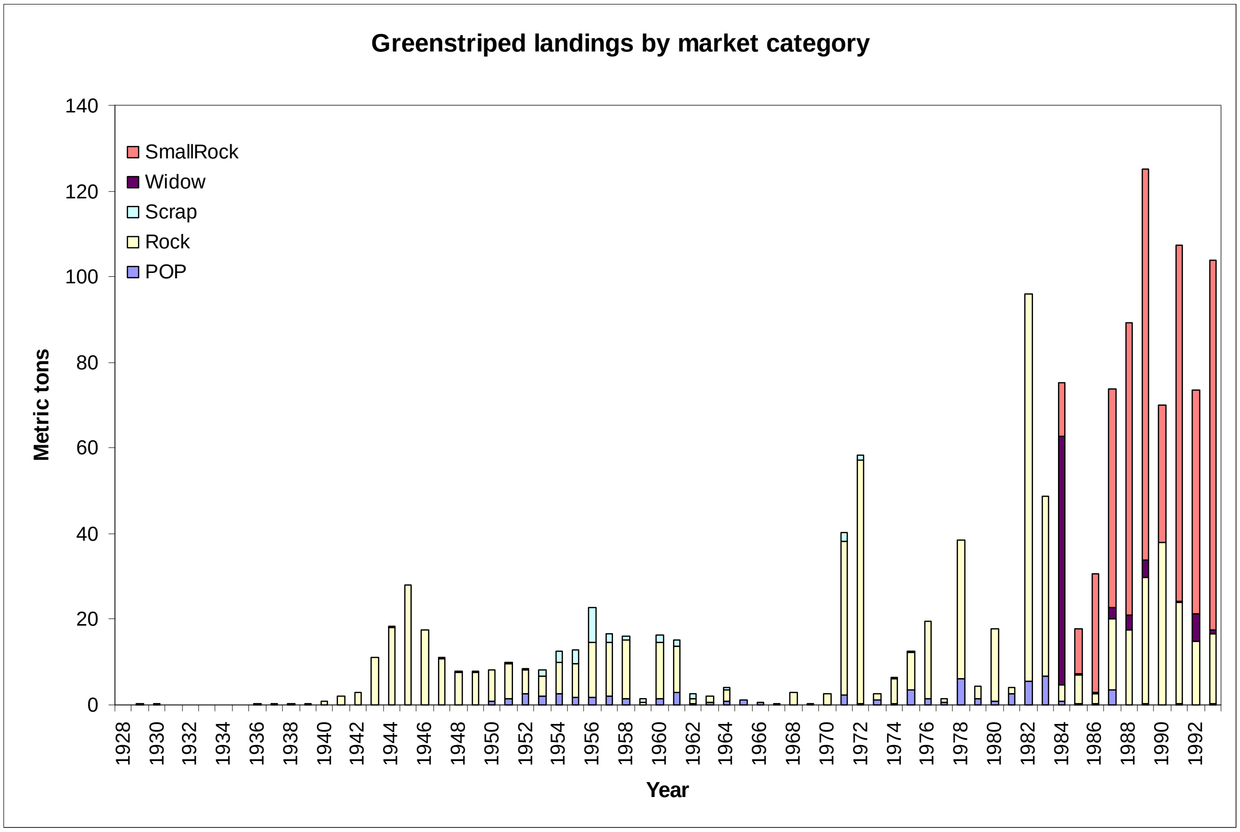

Figure 6: Landings of greenstriped rockfish in Oregon as determined from the different market categories.

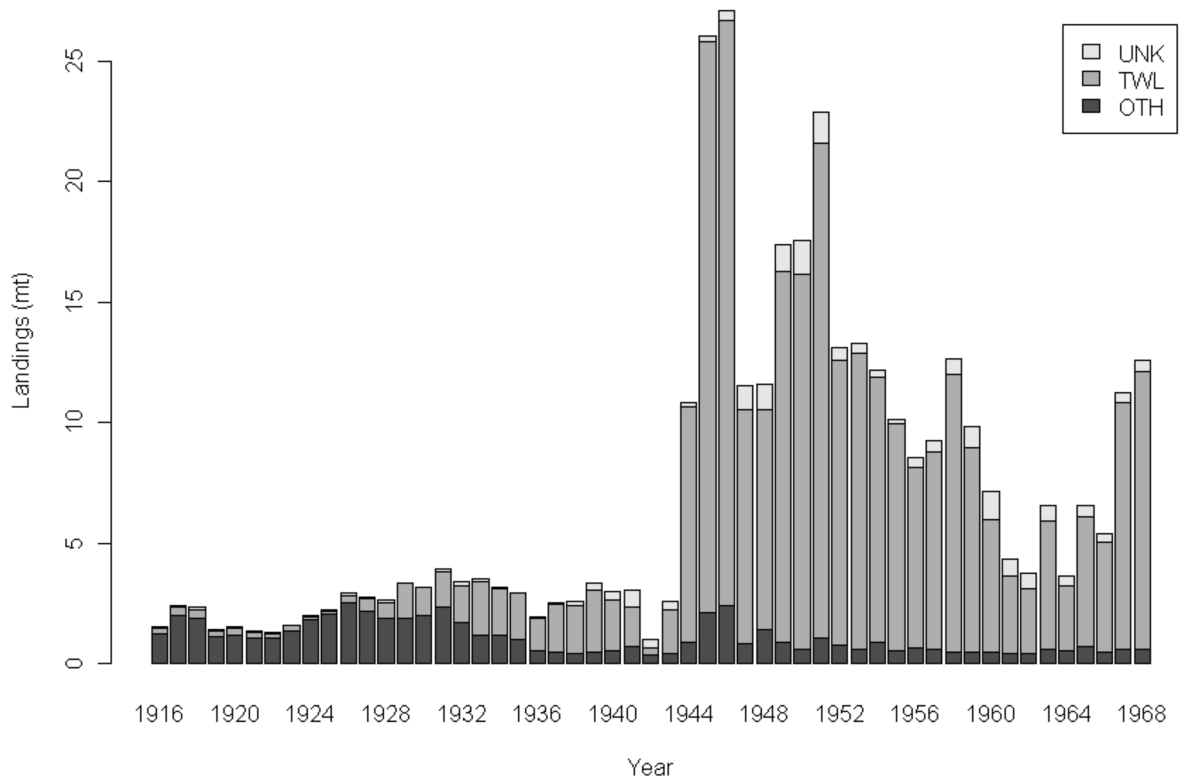

Figure 7: California reconstructed landings (tons) for the three gear categories unknown (UNK), trawl (TWL), and other (OTH).

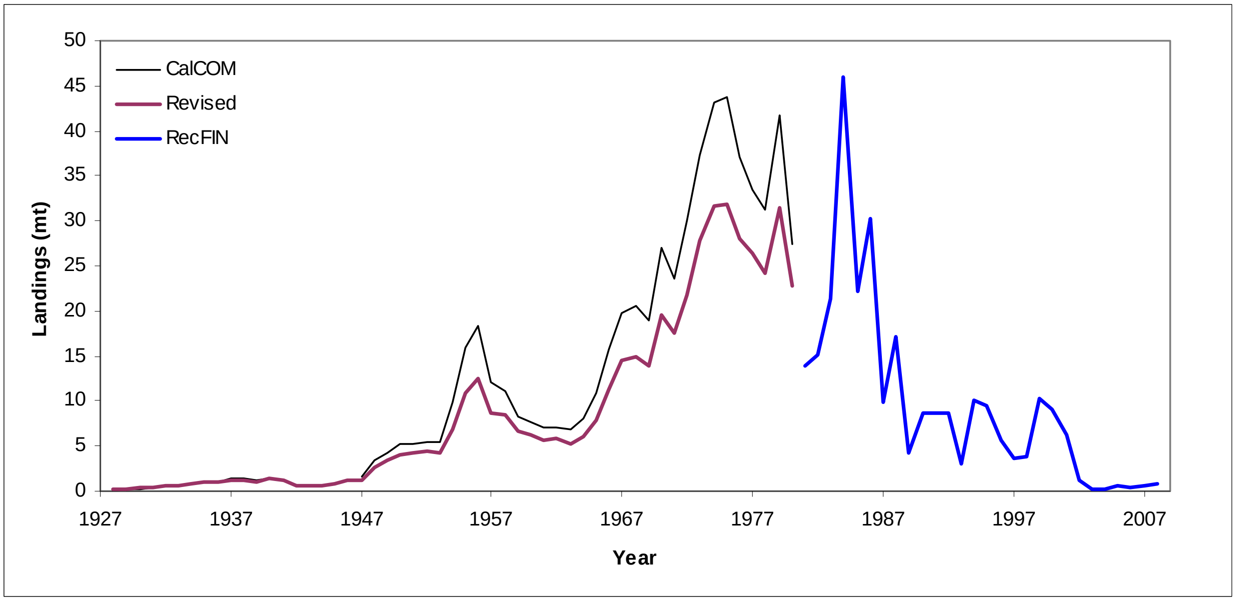

Figure 8: Reconstructed California recreational landings downloaded from CalCOM and revised by John Field (SWFSC, NOAA). Recent landings from RecFIN are also shown.

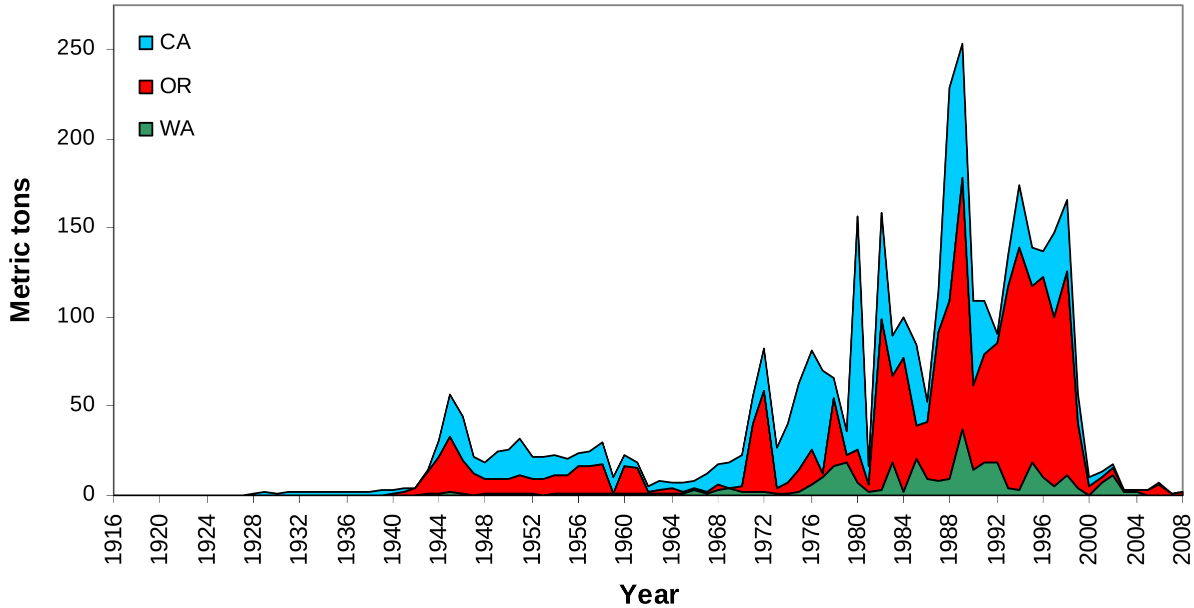

Figure 9: Full time series of domestic trawl landings for each state.

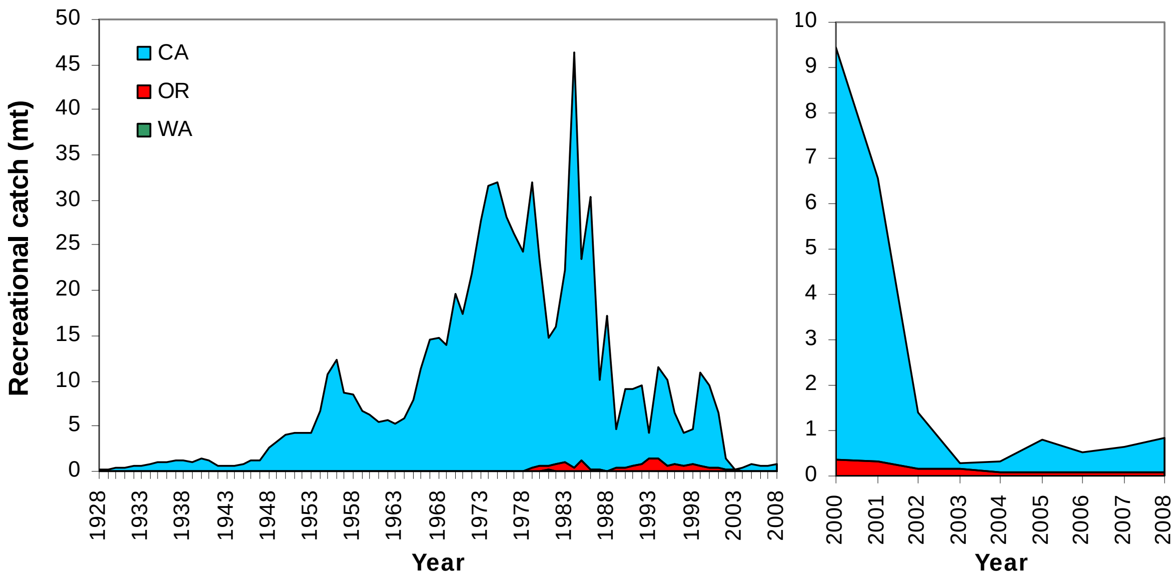

Figure 10: Recreational catches from California, Oregon, and Washington. The full time series is shown on the left and the current decade is shown on the right.

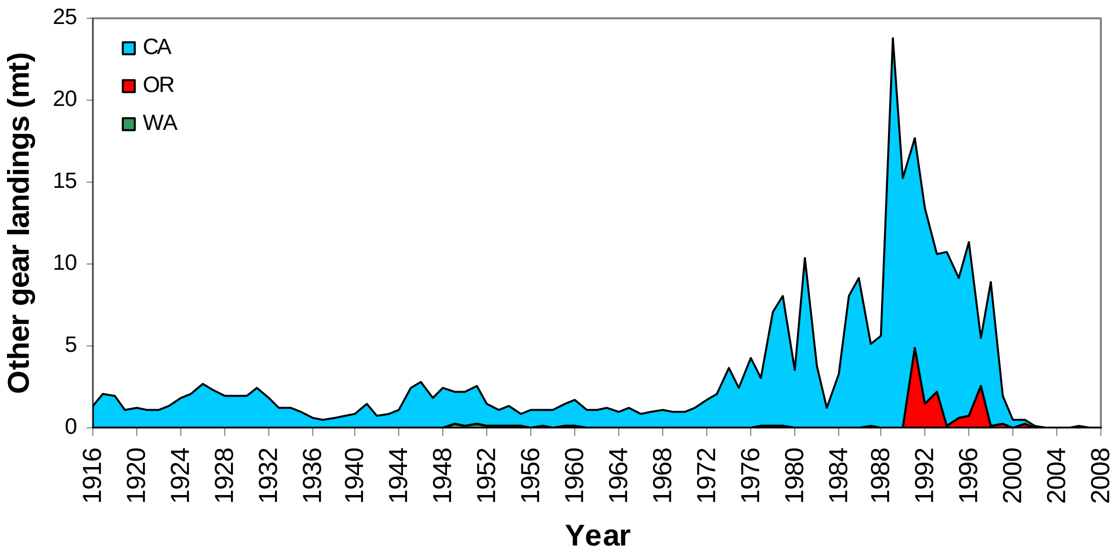

Figure 11: The full time series of landings from gears other than trawl for each state.

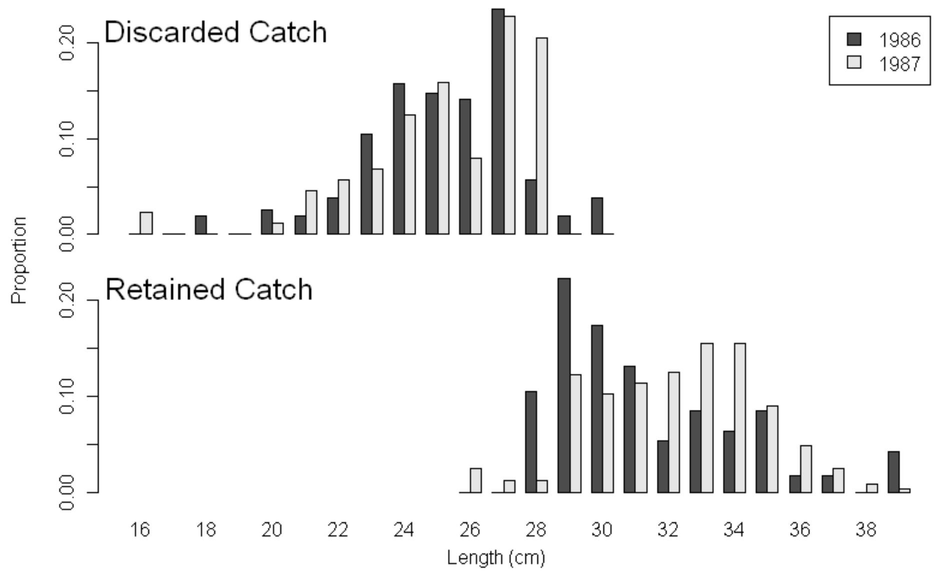

Figure 12: Length frequencies of discarded and retained catch from the Pikitch et al (1988) data.

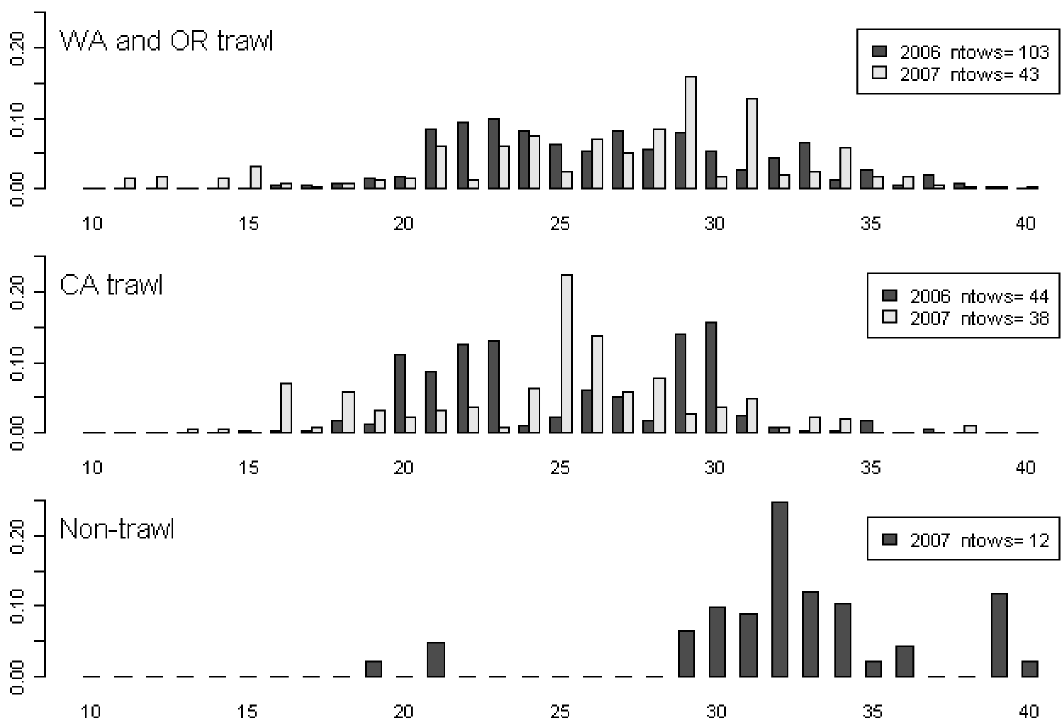

Figure 13: WCGOP length frequencies of discards from the Washington and Oregon trawl fisheries, California trawl fisheries, and coastwide non-trawl (fixed gear) fisheries. Only years with the largest number of sampled tows are shown.

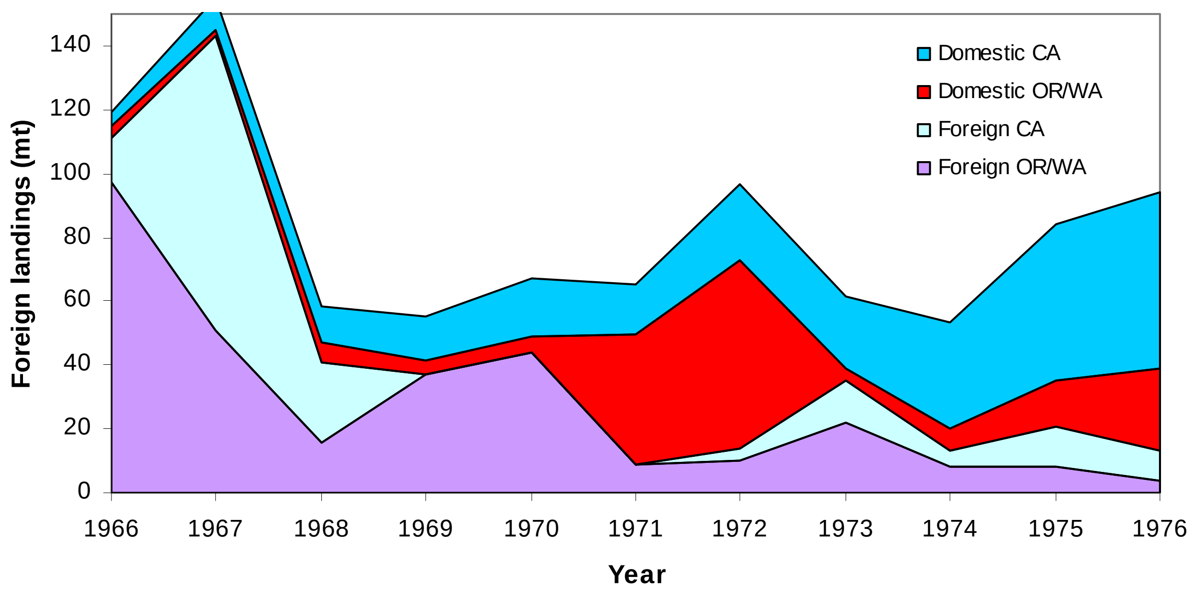

Figure 14: Foreign and domestic landings of greenstriped rockfish for the years 1966–1976.

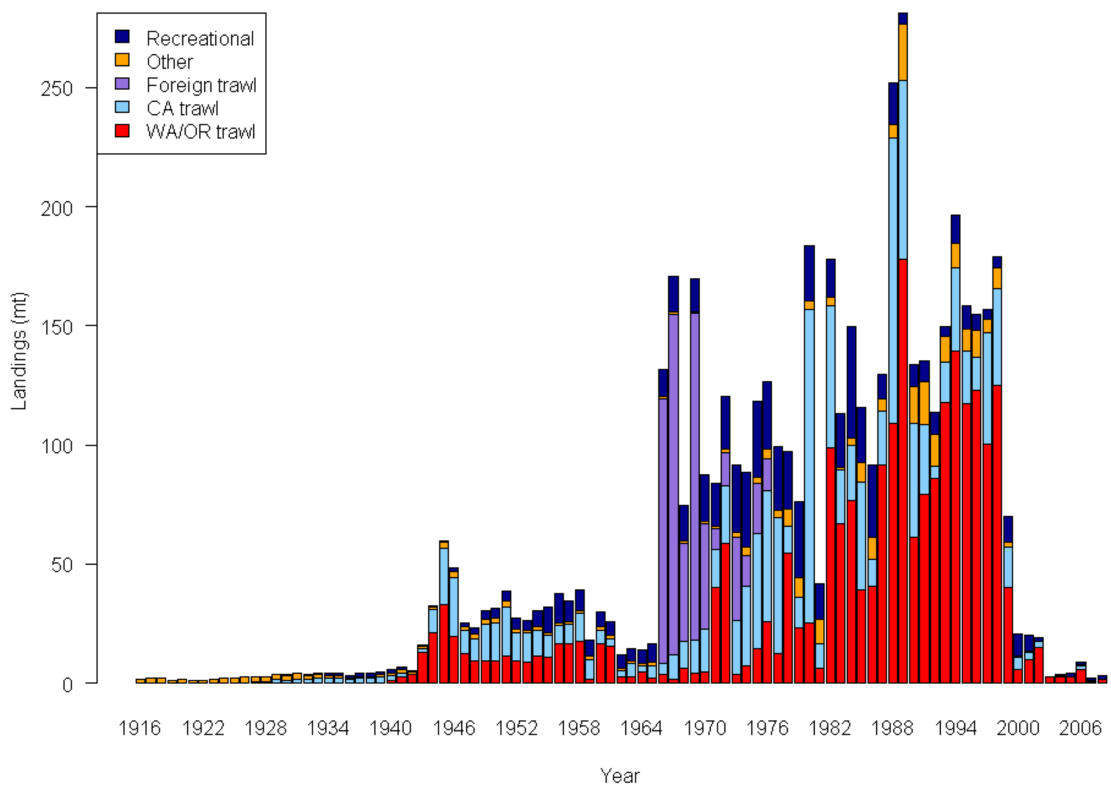

Figure 15: Entire time series of foreign and domestic trawl landings, other-gear landings, and recreational landings of greenstriped rockfish. Foreign, recreational, and other-gear landings are tabulated coastwide over all three states and domestic landings are summarized for CA and OR/WA.

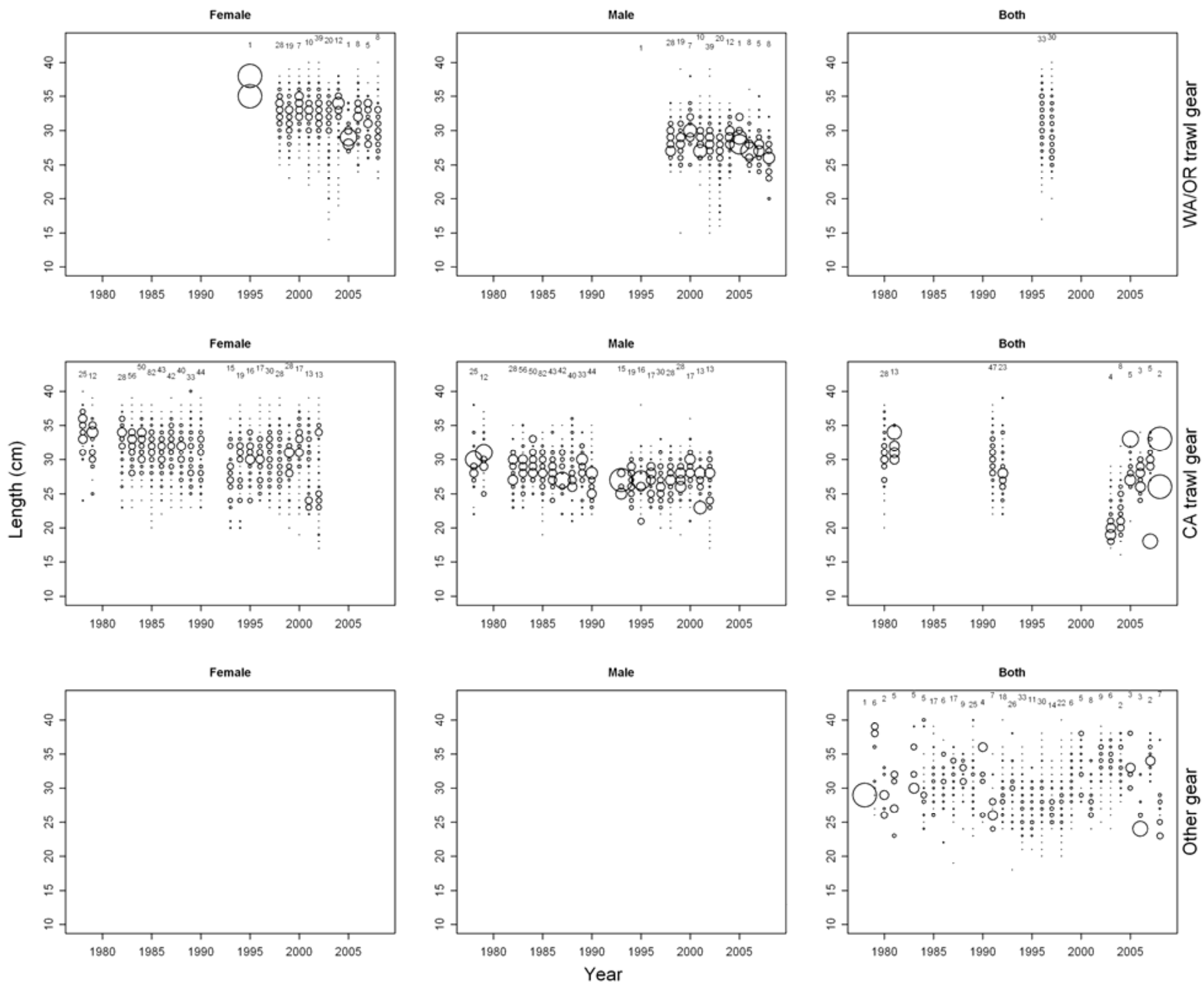

Figure 16: Estimated commercial length frequencies for three different gears and females, males, or both sexes combined, depending on how they were used in the model. The numbers of tows are listed above each length frequency (length frequencies with 1 tow were not fit by the model).

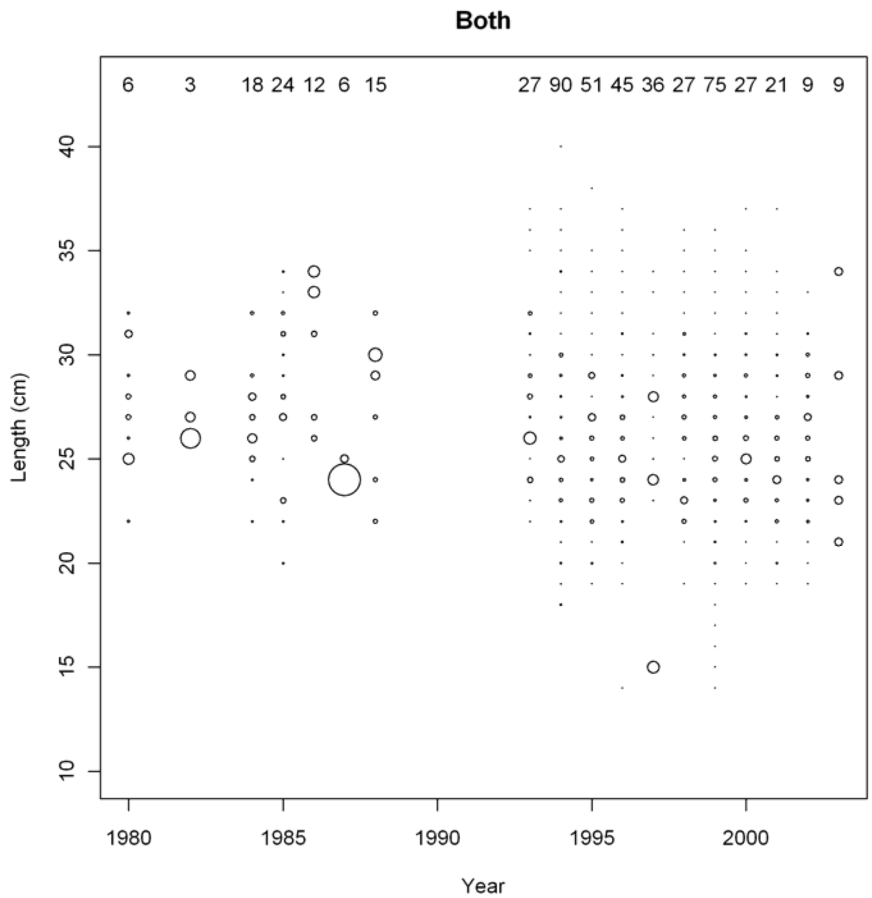

Figure 17: Length frequencies for combined sexes from recreational landings.

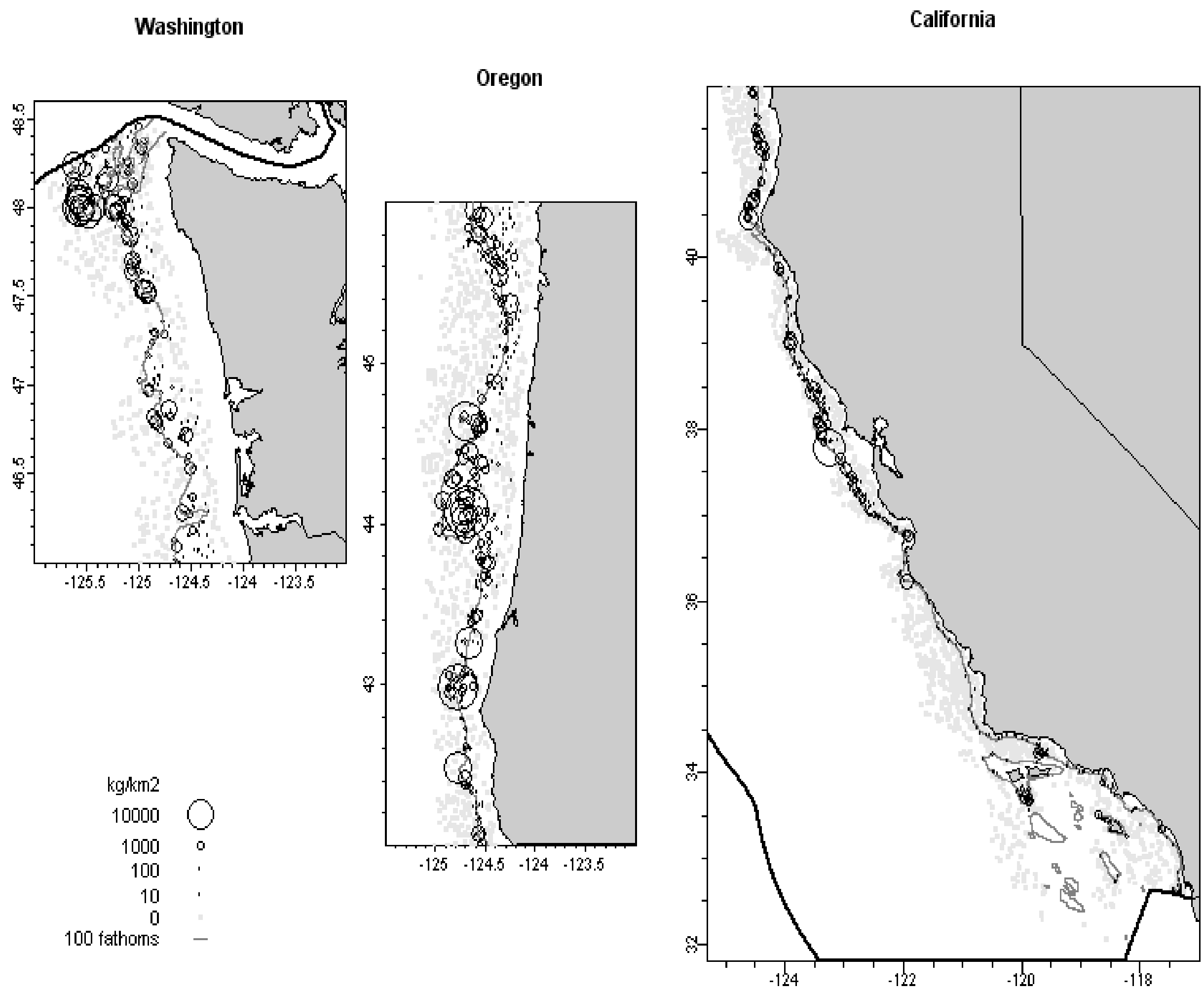

Figure 18: Catch rates over all years for the NWFSC survey.

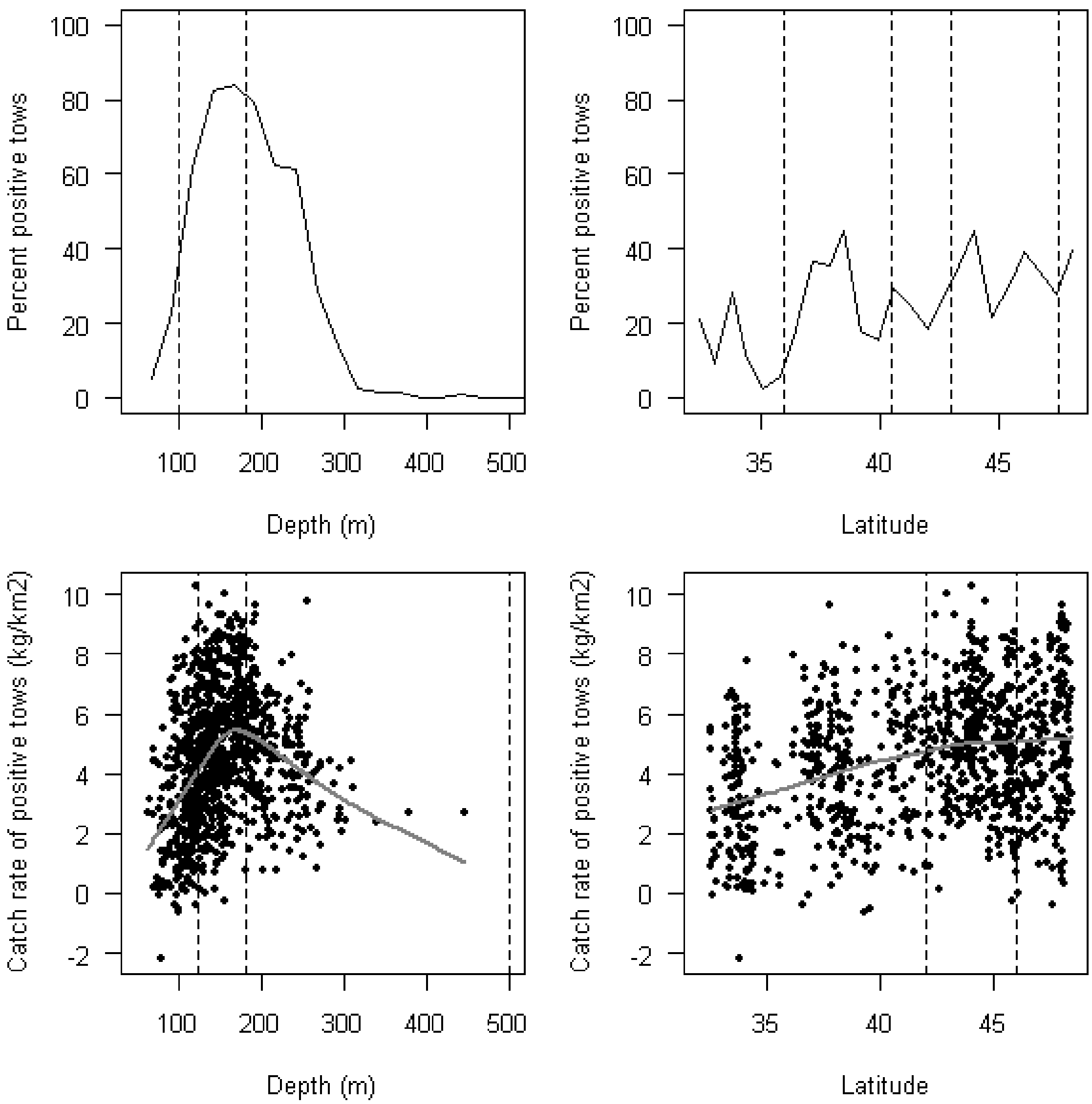

Figure 19: Plots of the percentage of positive tows and the catch rates for positive tows over depth and latitude.

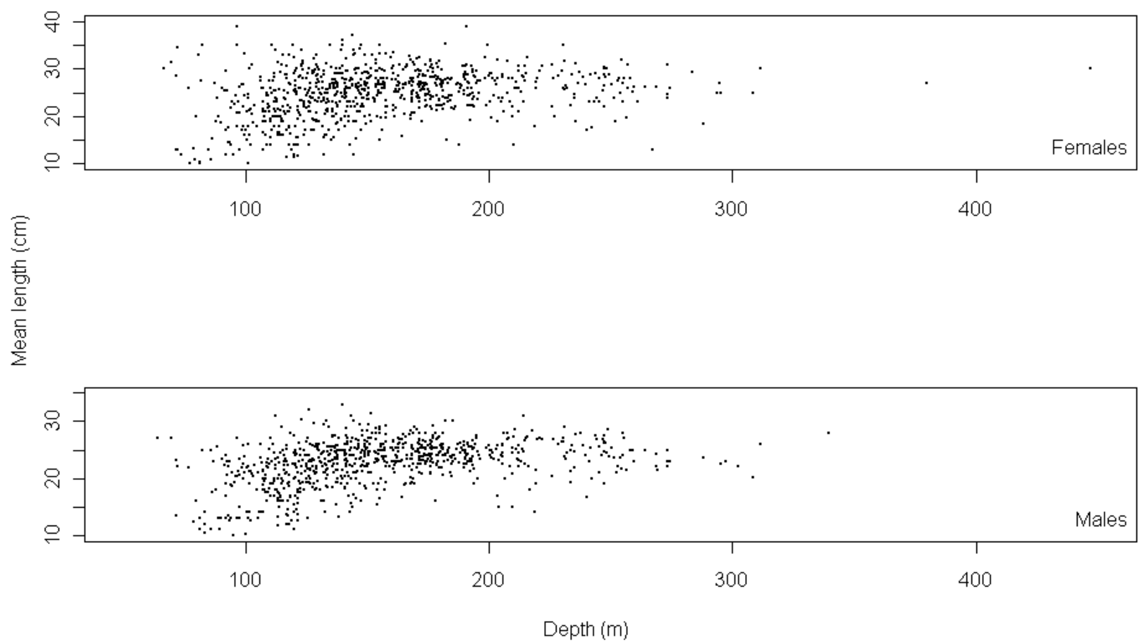

Figure 20: NWFSC survey mean length per tow by depth for females and males.

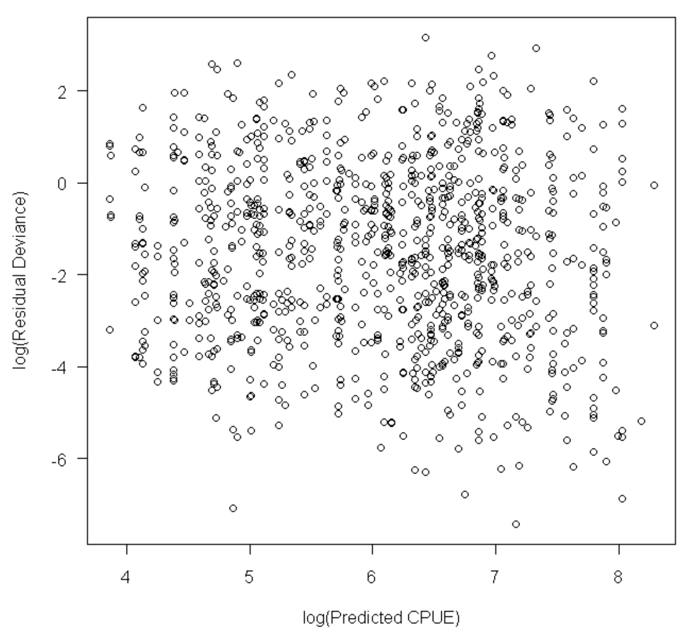

Figure 21: Plot of the predicted values against residuals for the positive tow model used in the GLMM.

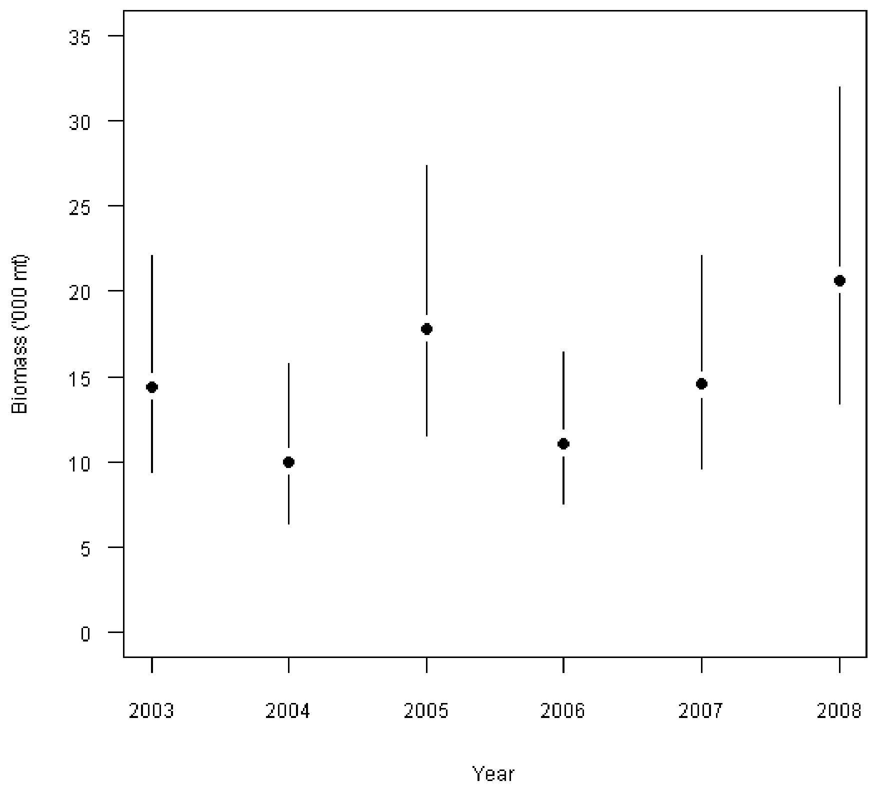

Figure 22: GLMM biomass estimates for the NWFSC survey.

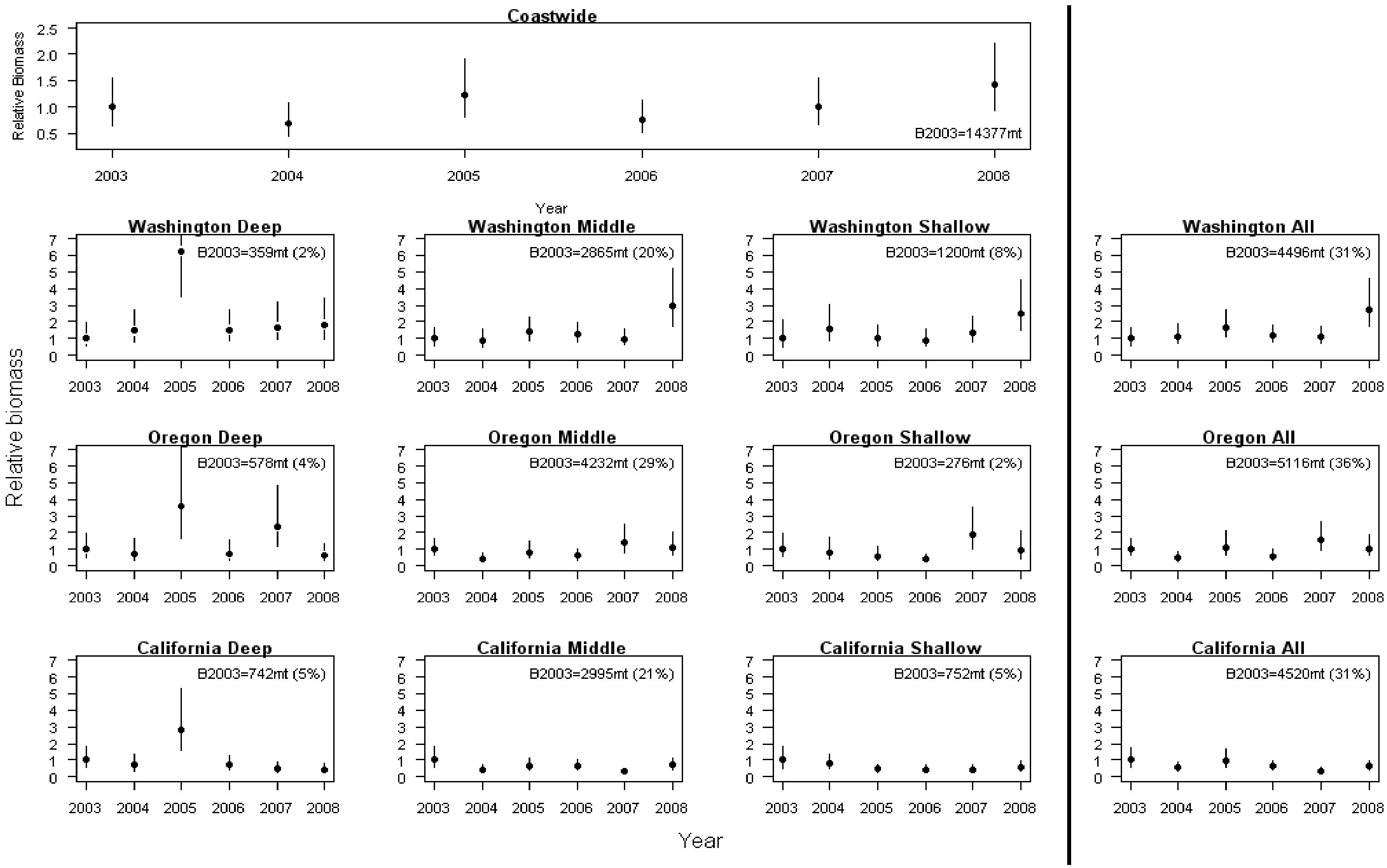

Figure 23: Plots of the estimated biomass relative to the year 2003 for each strata chosen for the GLMM using the NWFSC survey. The top wide plot is the entire coast and the plots to the right of the solid line are summer over depth.

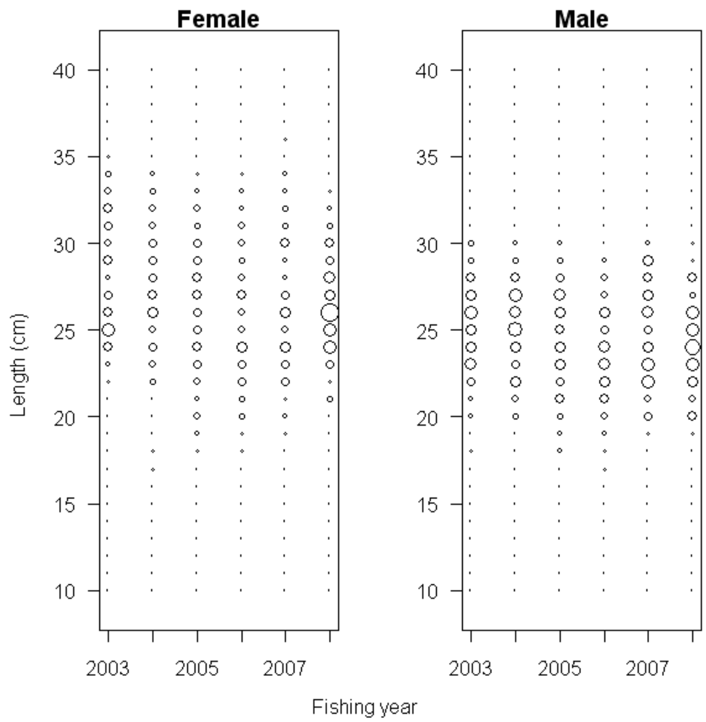

Figure 24: Length frequencies for the NWFSC survey.

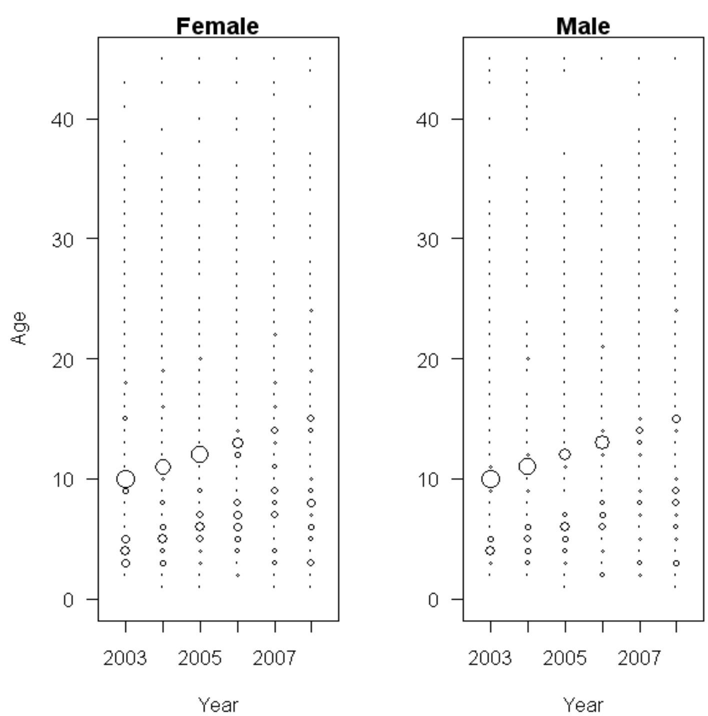

Figure 25: Age frequencies from the NWFSC survey. The omission of a circle indicates that no observation occurred at that age.

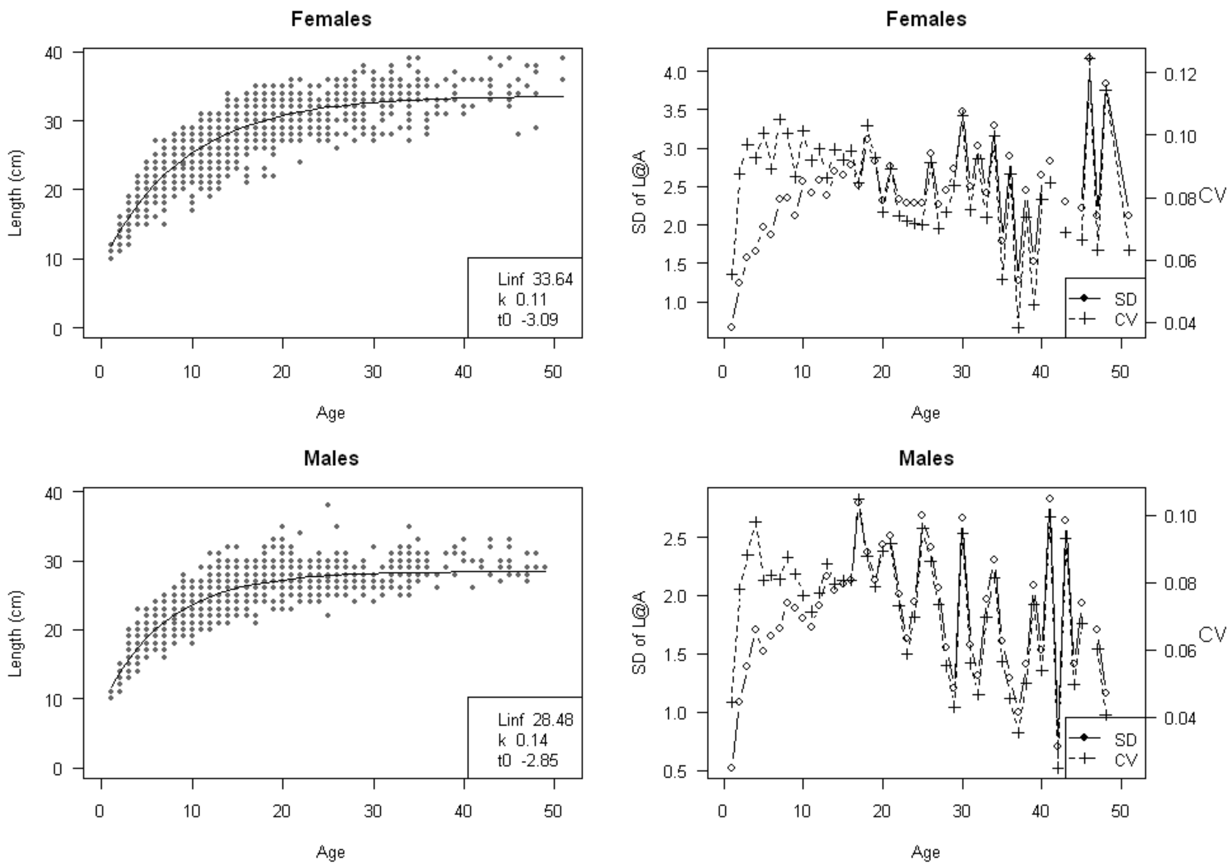

Figure 26: Length-at-age, standard deviation at age, and CV at age from all years of the NWFSC survey.

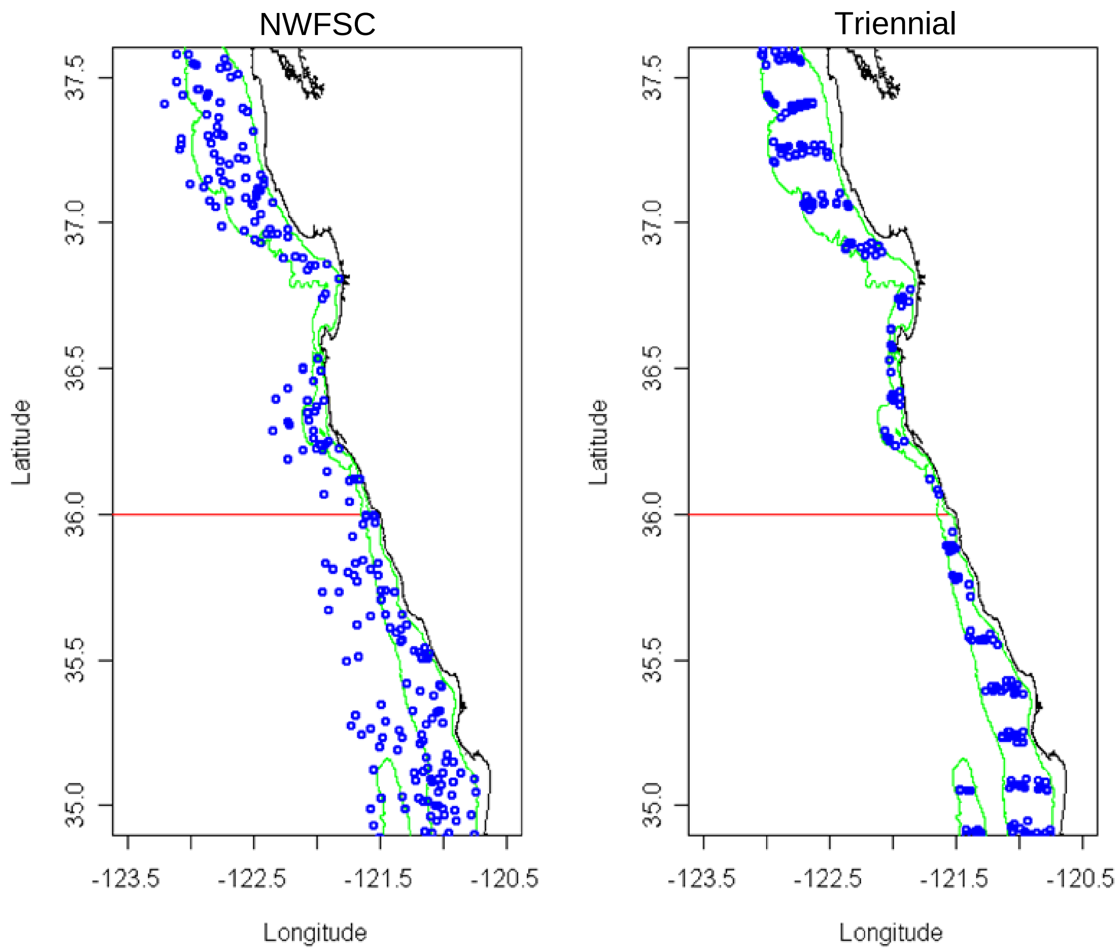

Figure 27: Survey tow locations in 2004, showing the difference in station design for the NWFSC survey relative to the Triennial trawl survey (Figure from Stewart (2007)).

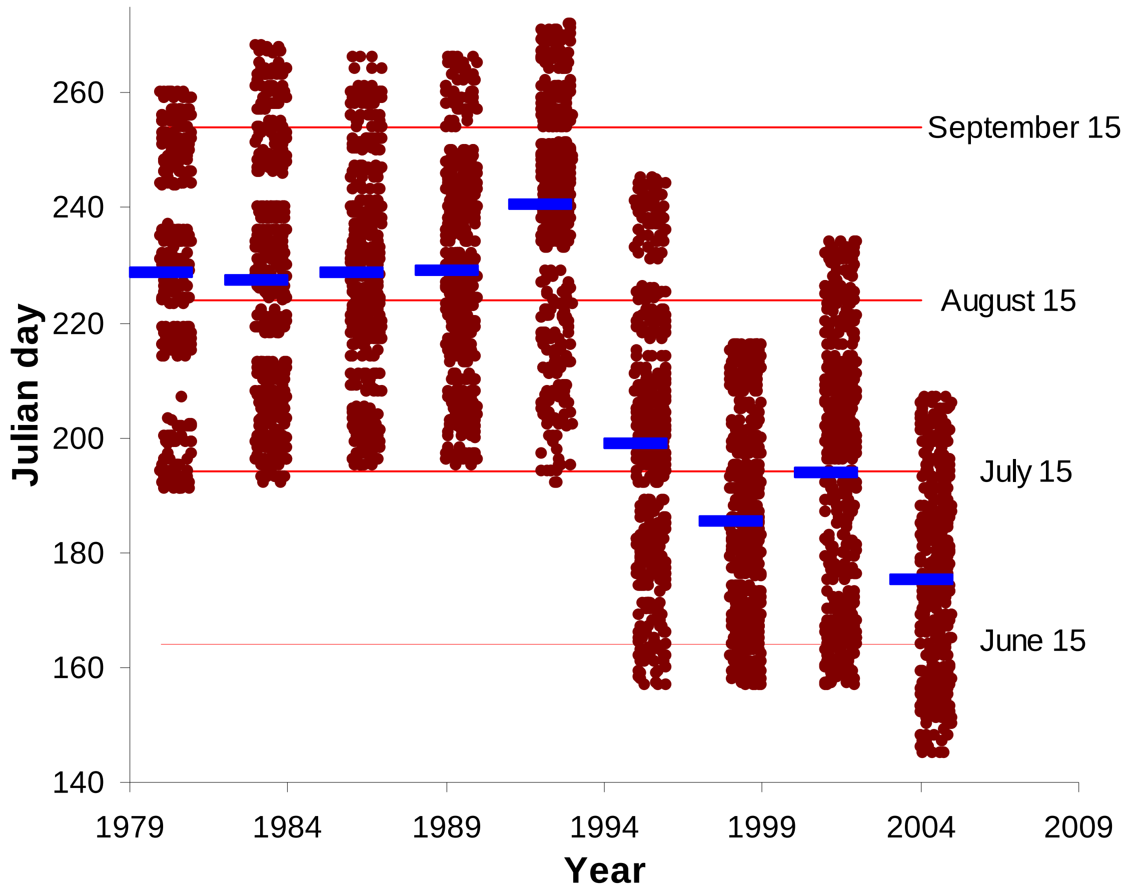

Figure 28: Distribution of dates of operation for the triennial survey (1980-2004). Solid bars show the mean date for each survey year, points represent individual hauls dates, but are jittered to allow better delineation of the distribution of individual points (Figure from Stewart (2007)).

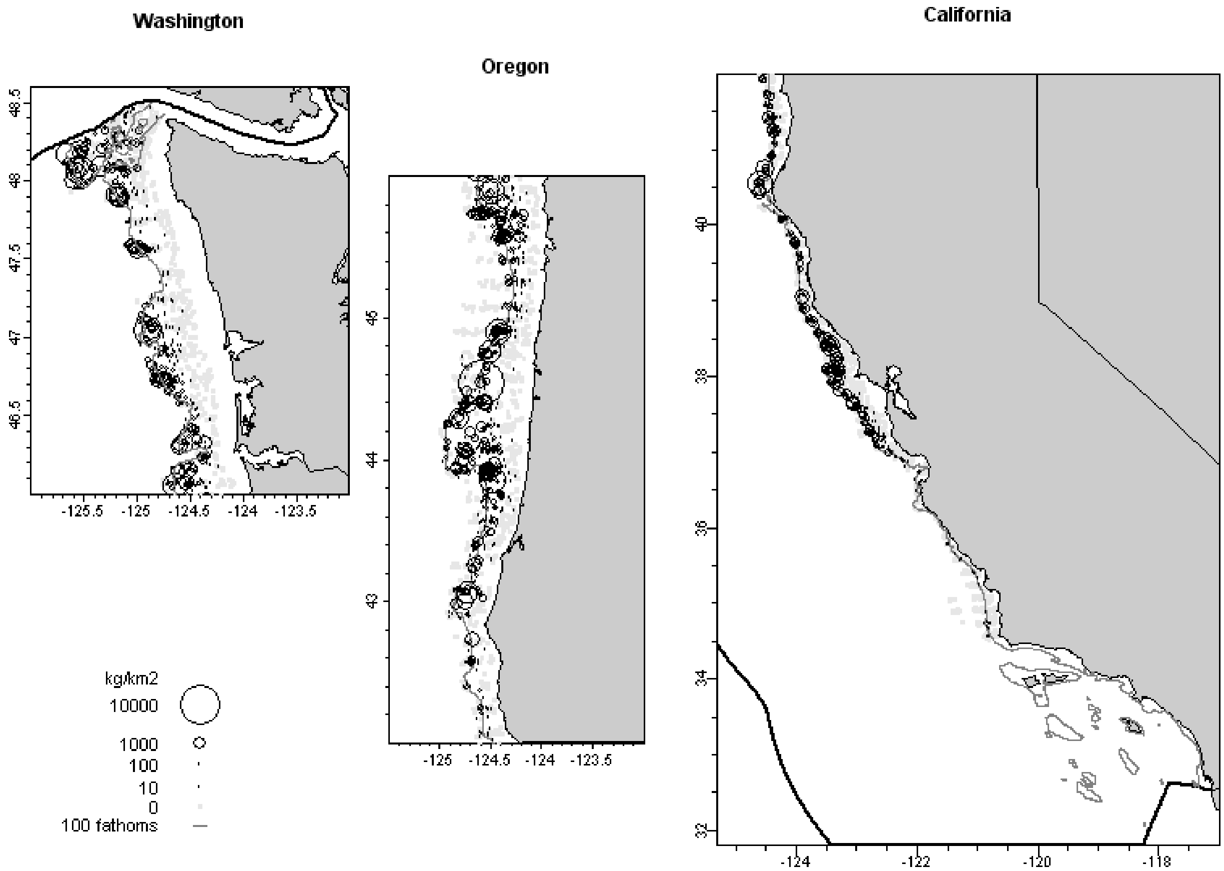

Figure 29: Catch rates over all years for the Triennial survey.

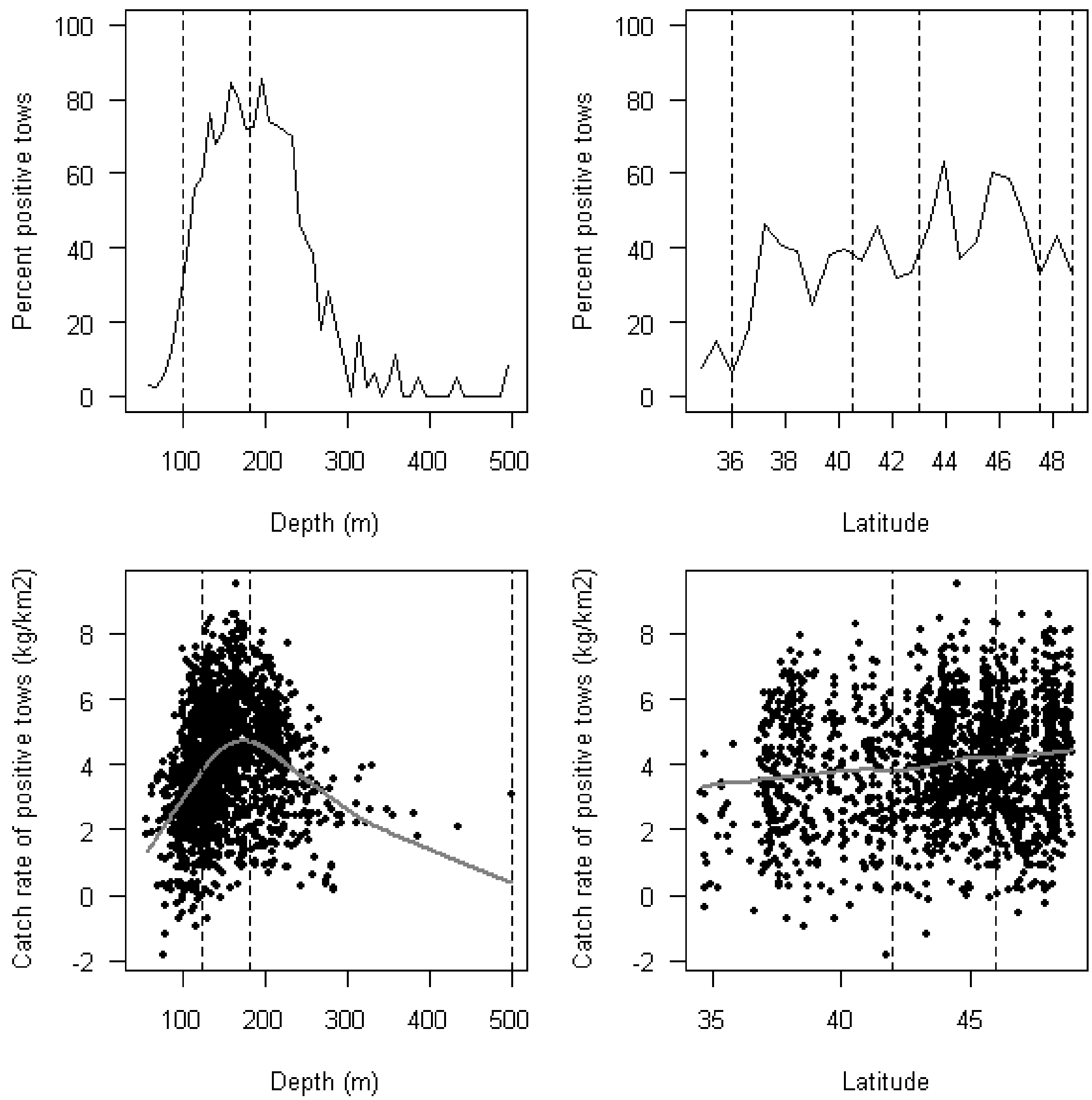

Figure 30: Plots of the percentage of positive tows and the catch rates for positive tows over depth and latitude.

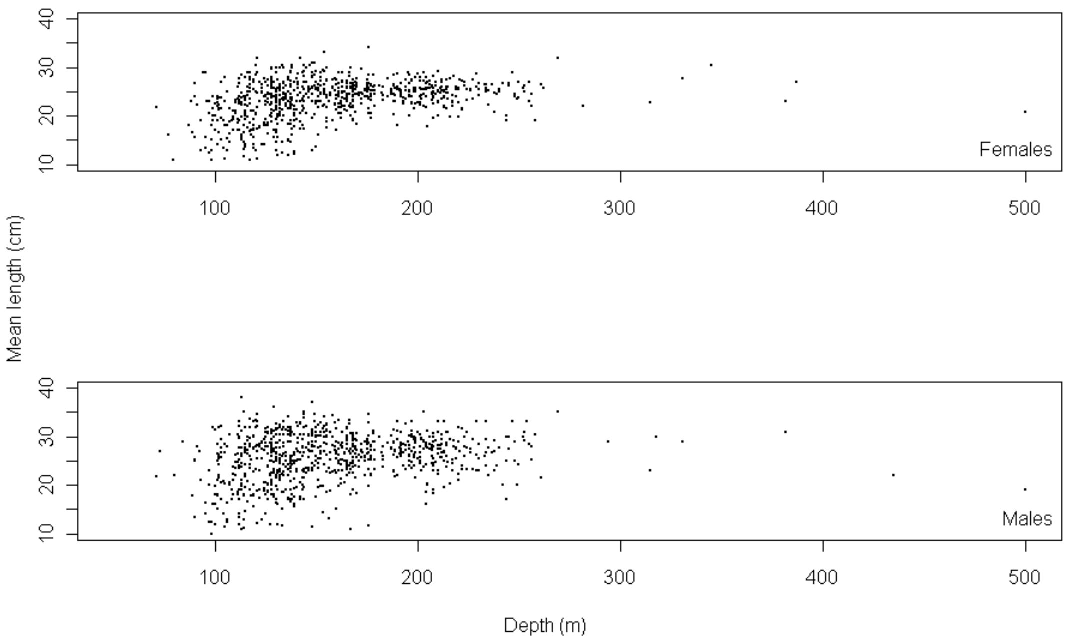

Figure 31: The mean length per tow from the Triennial survey data plotted over depth for females and males.

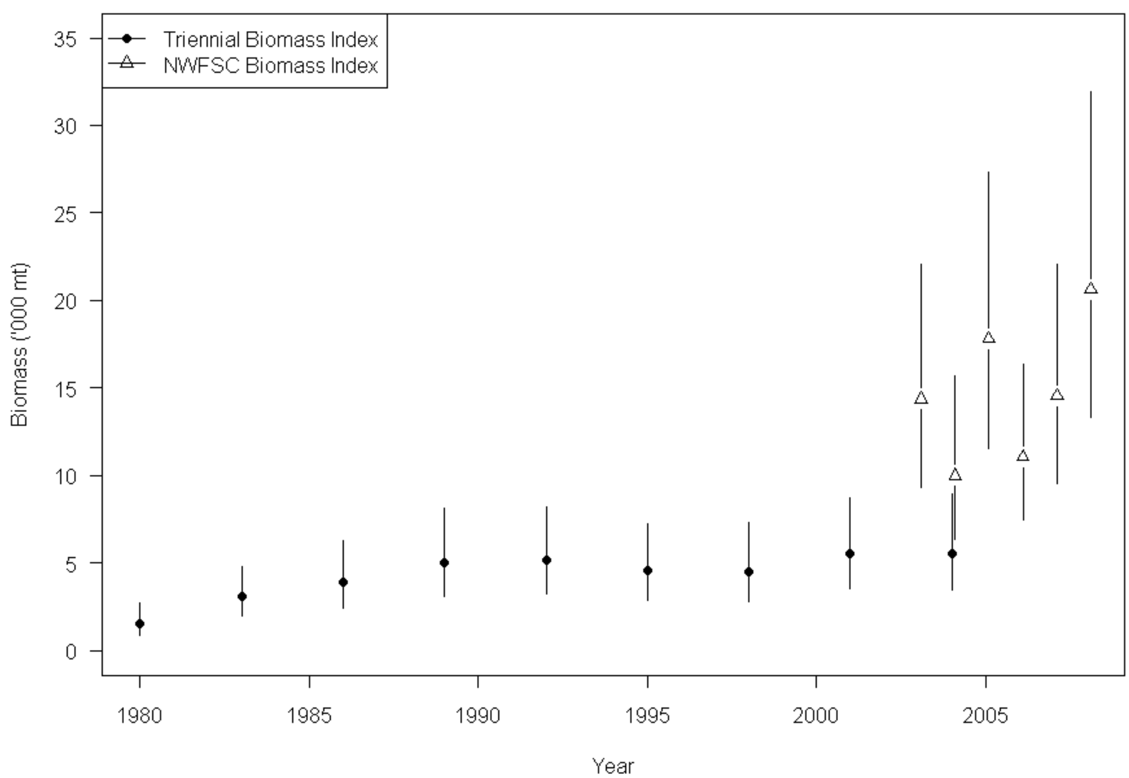

Figure 32: GLMM biomass estimates for the Triennial survey and the NWFSC survey.

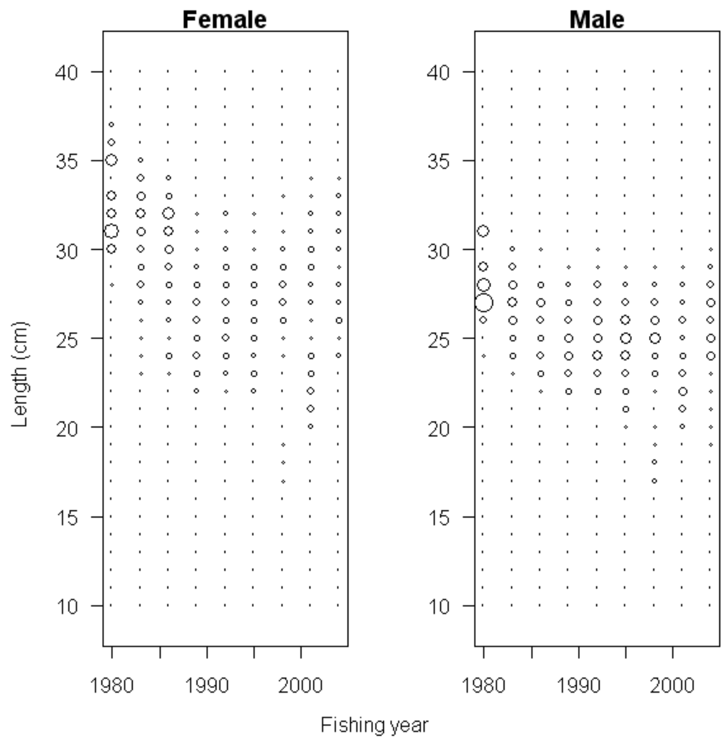

Figure 33: Plots of length frequencies from the Triennial survey.

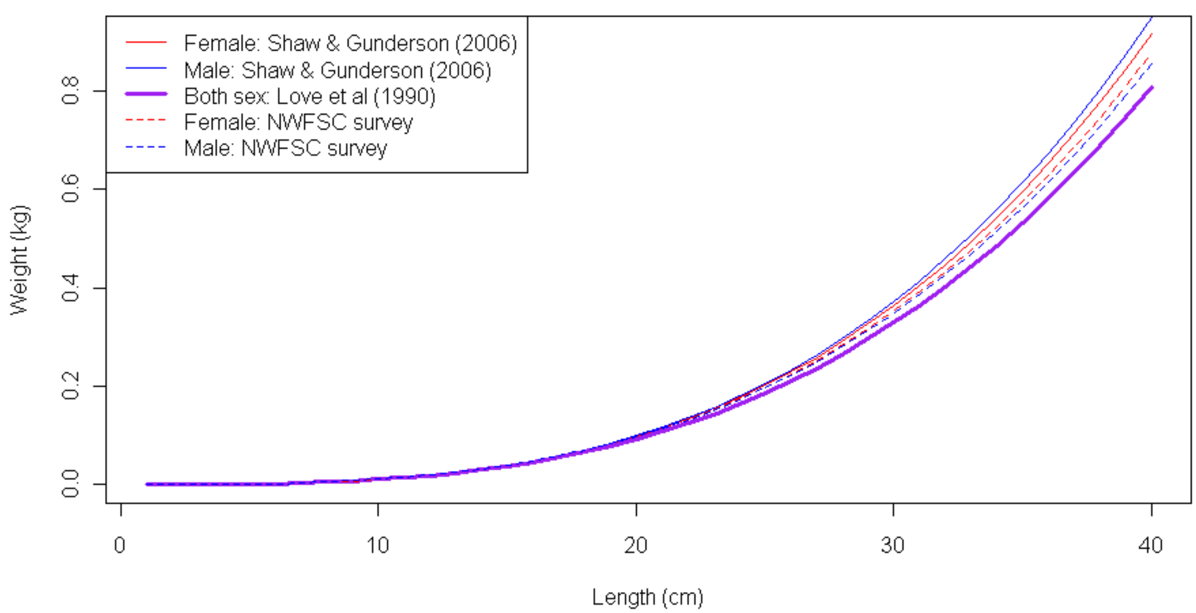

Figure 34: Weight- length relationships from Shaw and Gunderson (2006), Love et al (1990), and data collected during the NWFSC survey.

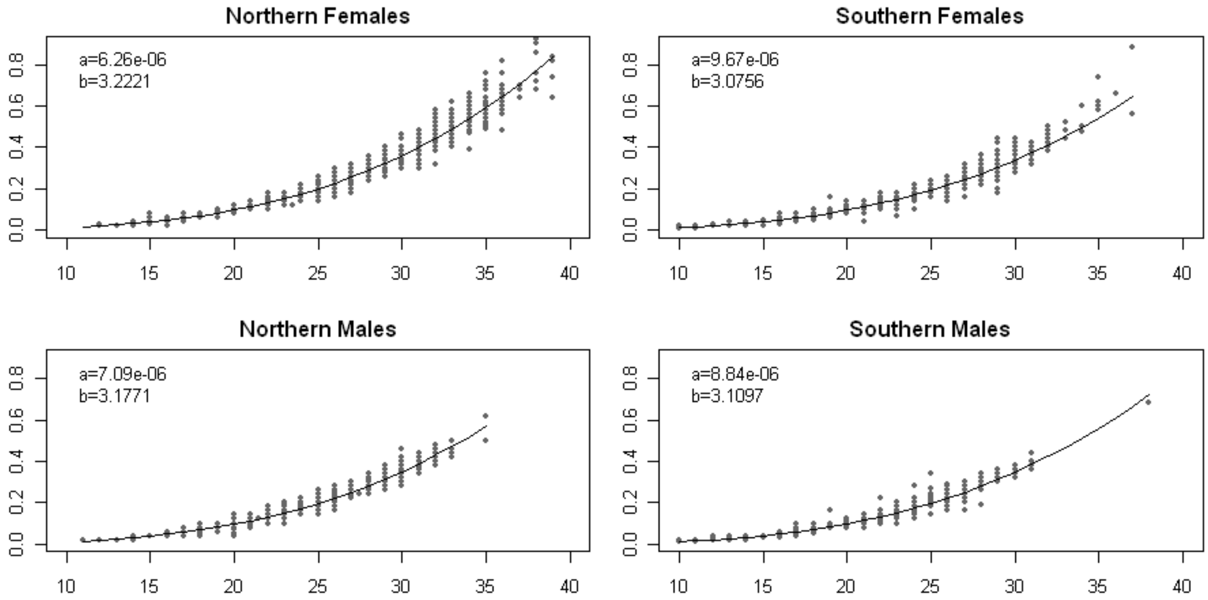

Figure 35: Weight-length relationships for females and males north and south of 42°N (CA/OR border).

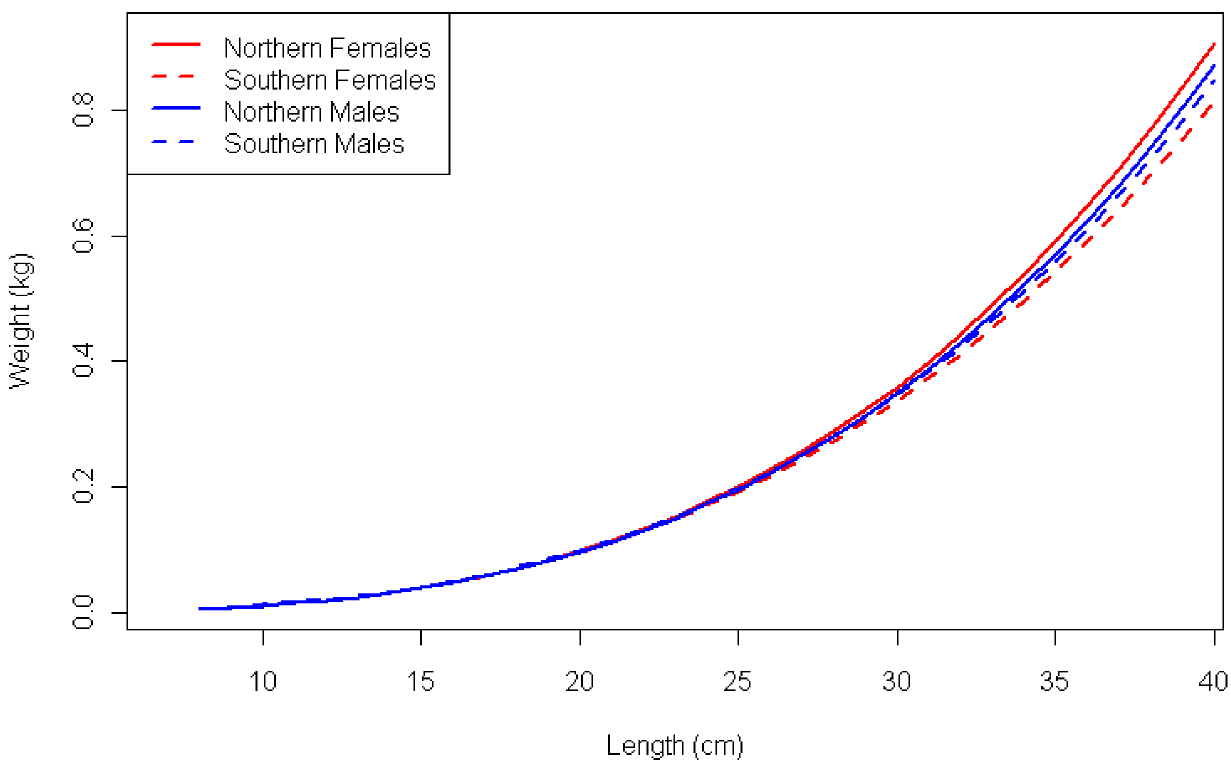

Figure 36: Weight length relationships north and south of 42°N by sex from the NWFSC survey data.

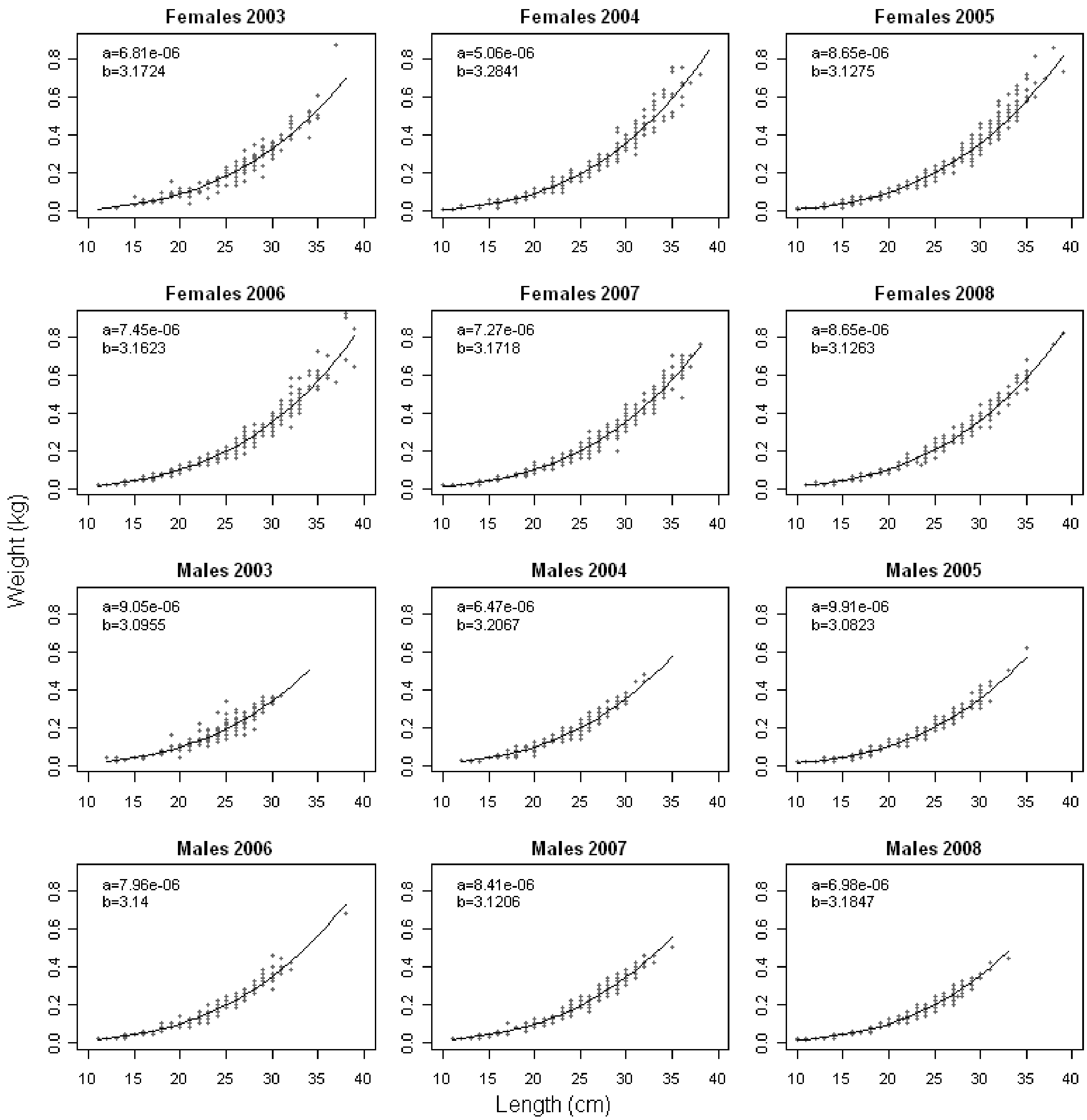

Figure 37: Yearly estimates of the weight-at-length relationship for greenstriped rockfish using NWFSC survey data.

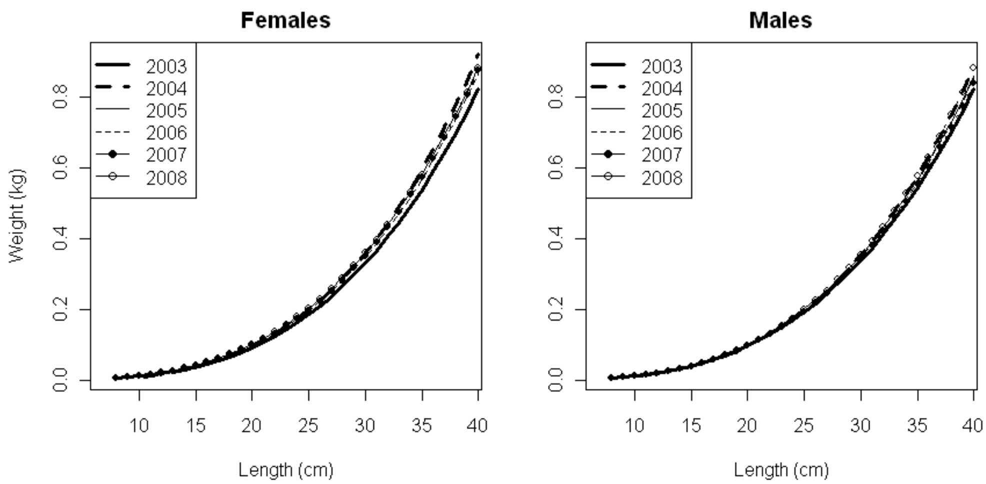

Figure 38: Comparison of yearly estimates, by sex, of the weight-at-length relationship for greenstriped rockfish using NWFSC survey data.

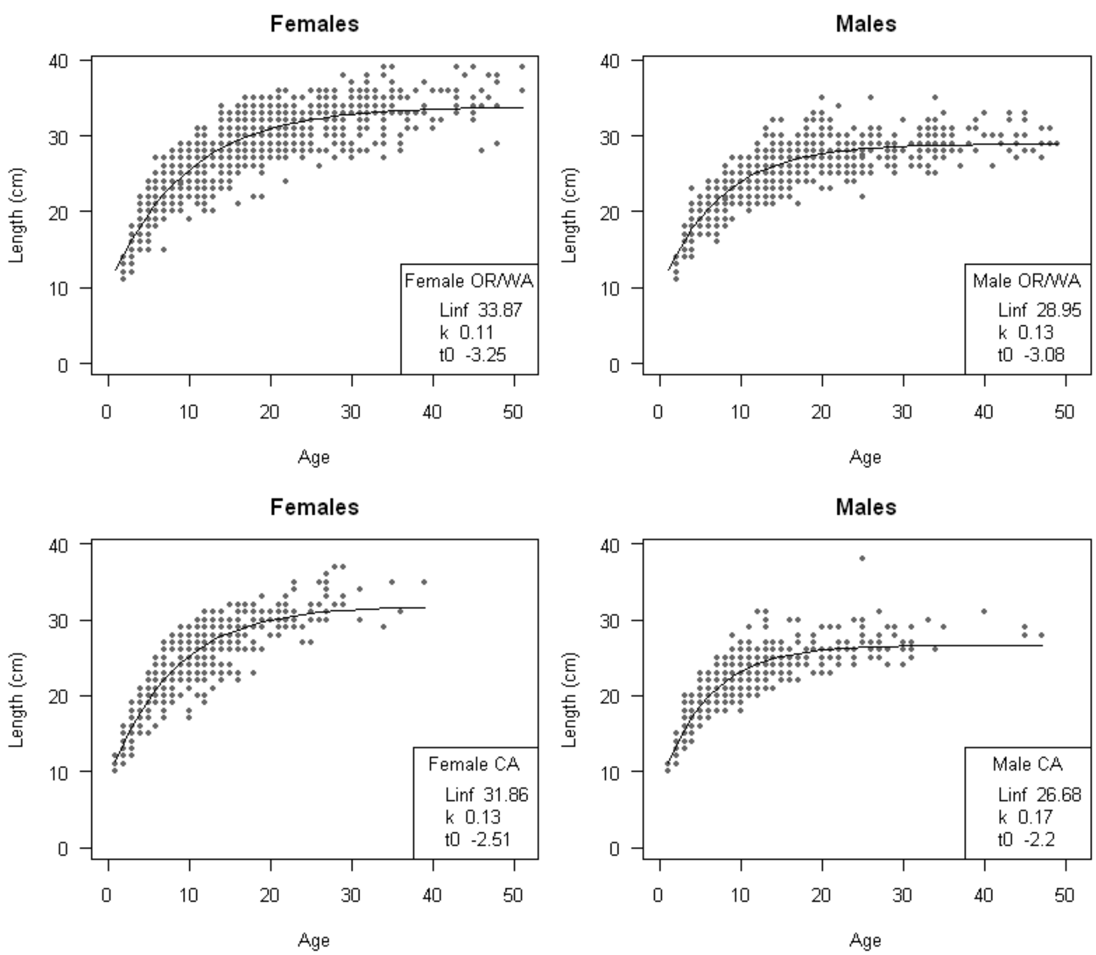

Figure 39: Length-at-age and predicted von Bertalanffy growth curves for female and male greenstriped rockfish sampled in the NWFSC survey from OR/WA (North) and CA (South).

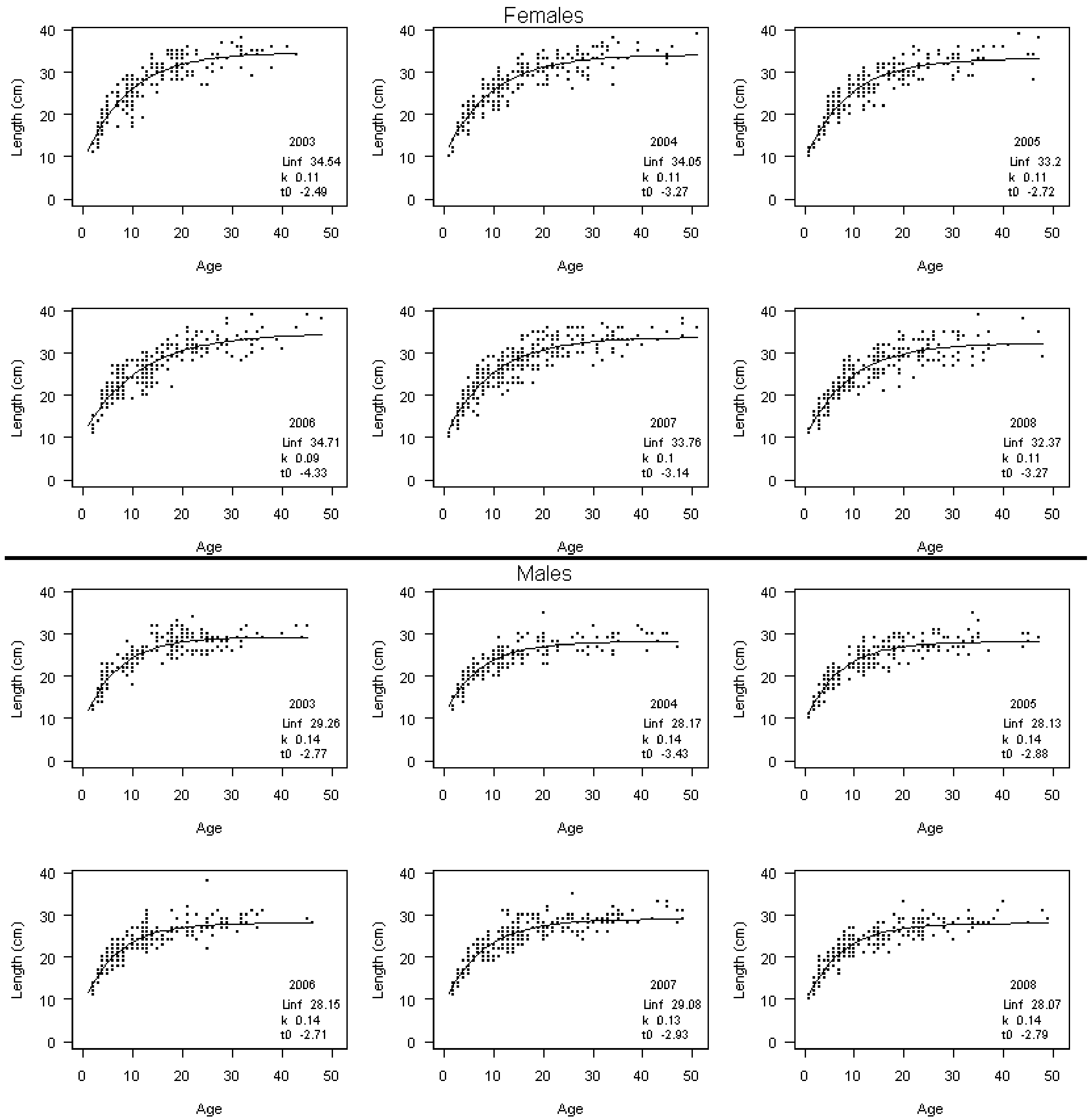

Figure 40: Estimated von Bertalanffy growth curves by year for females and males using the age data from the NWFSC survey.

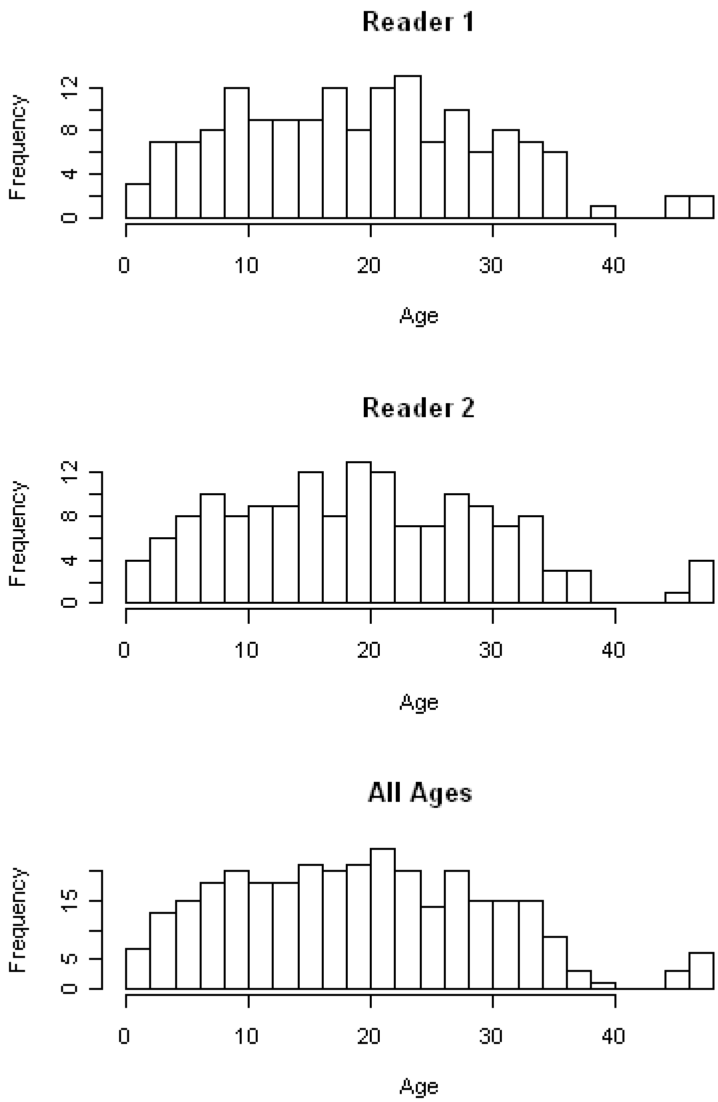

Figure 41: Histograms of greenstriped rockfish double reads for each age reader and all ages combined.

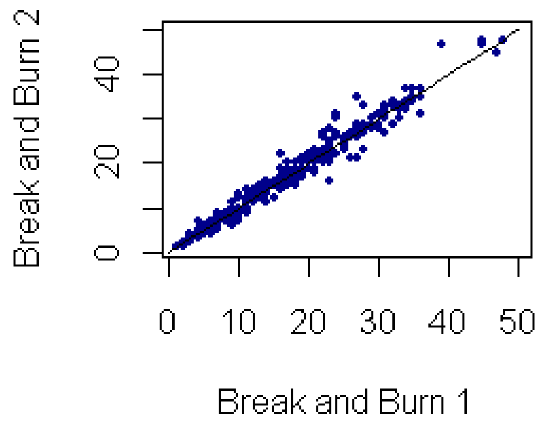

Figure 42: Scatter plot of the double read data from readers 1 and 2. The black line is the one-to-one line.

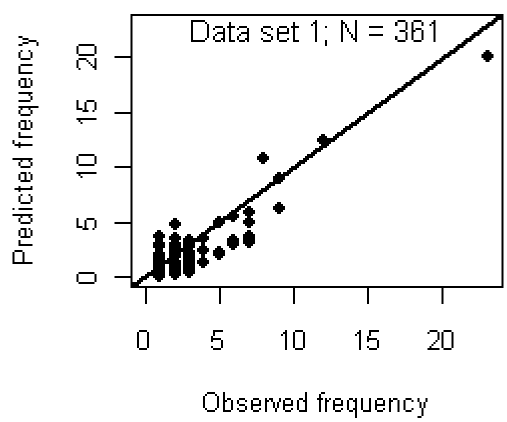

Figure 43: Points show the observed versus predicted number of ages. The black line is the one-to-one line and indicates a perfect fit.

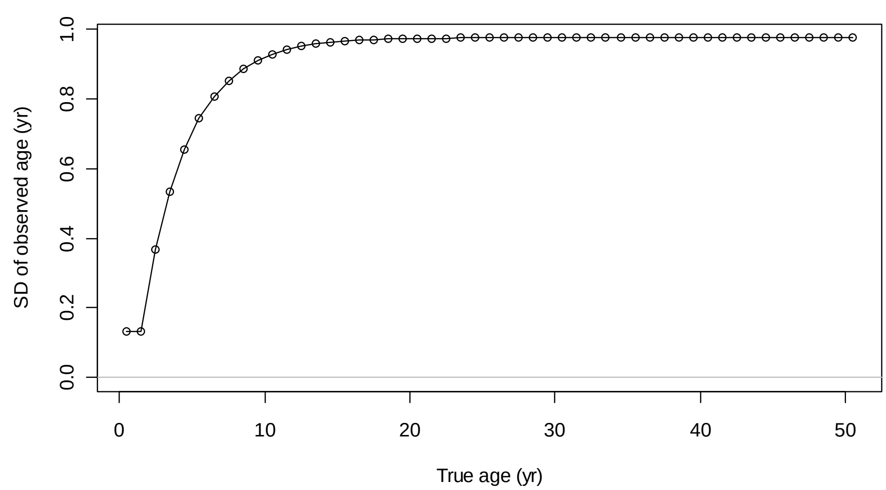

Figure 44: Model estimates of the standard deviation for the ageing error.

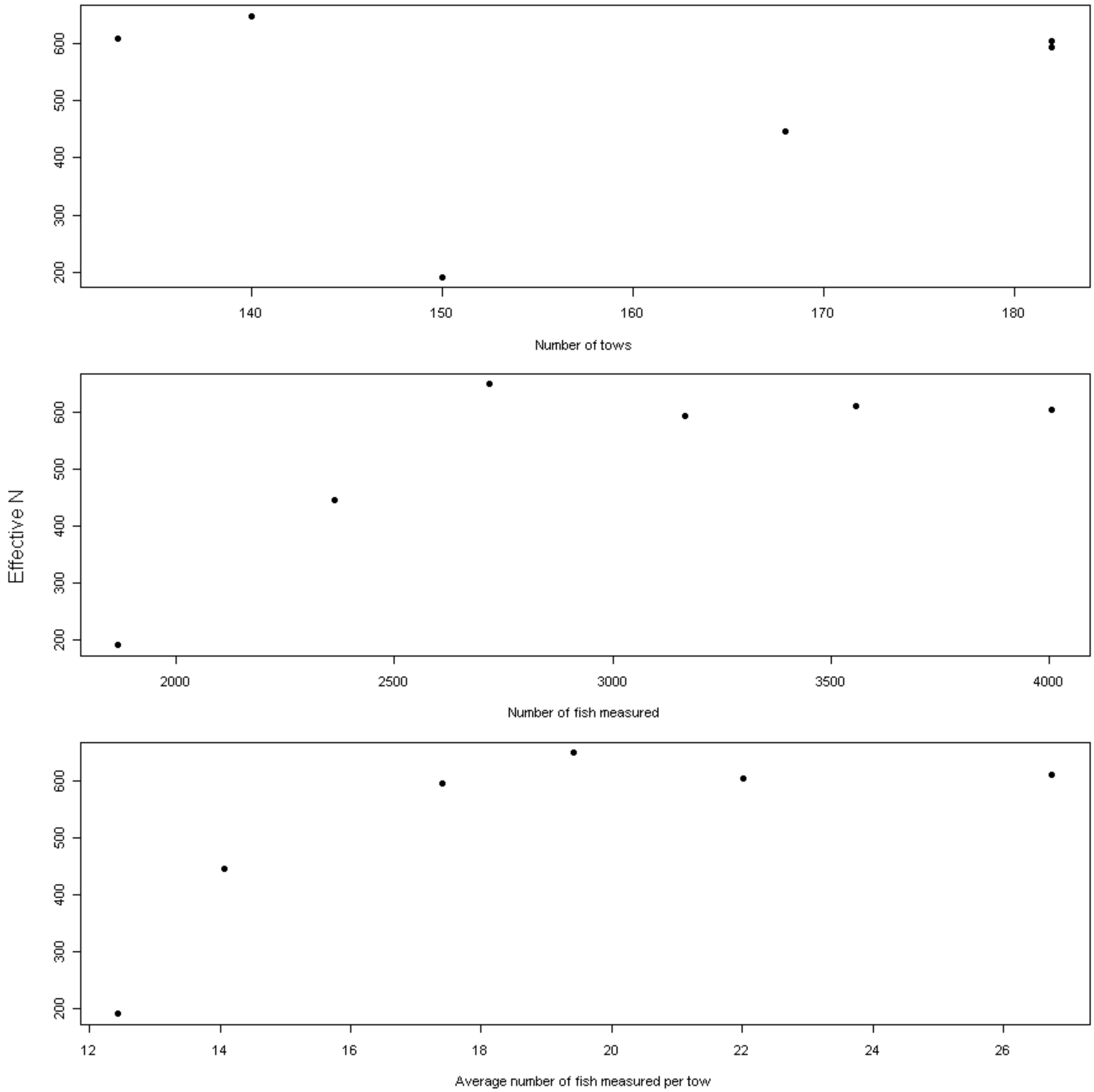

Figure 45: Effective N determined from the NWFSC survey plotted against the number of tows, the number of greenstriped rockfish measured, and the average number of greenstriped rockfish measured per tow.

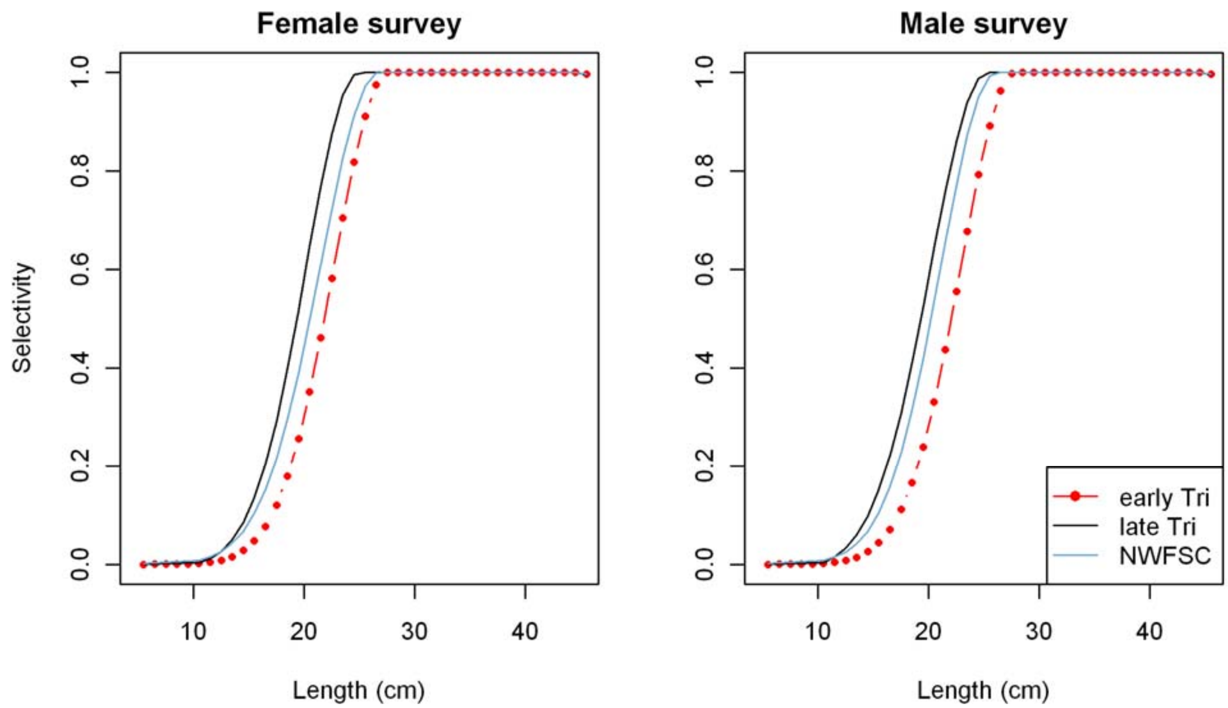

Figure 46: Estimated survey selectivity curves for females and males.

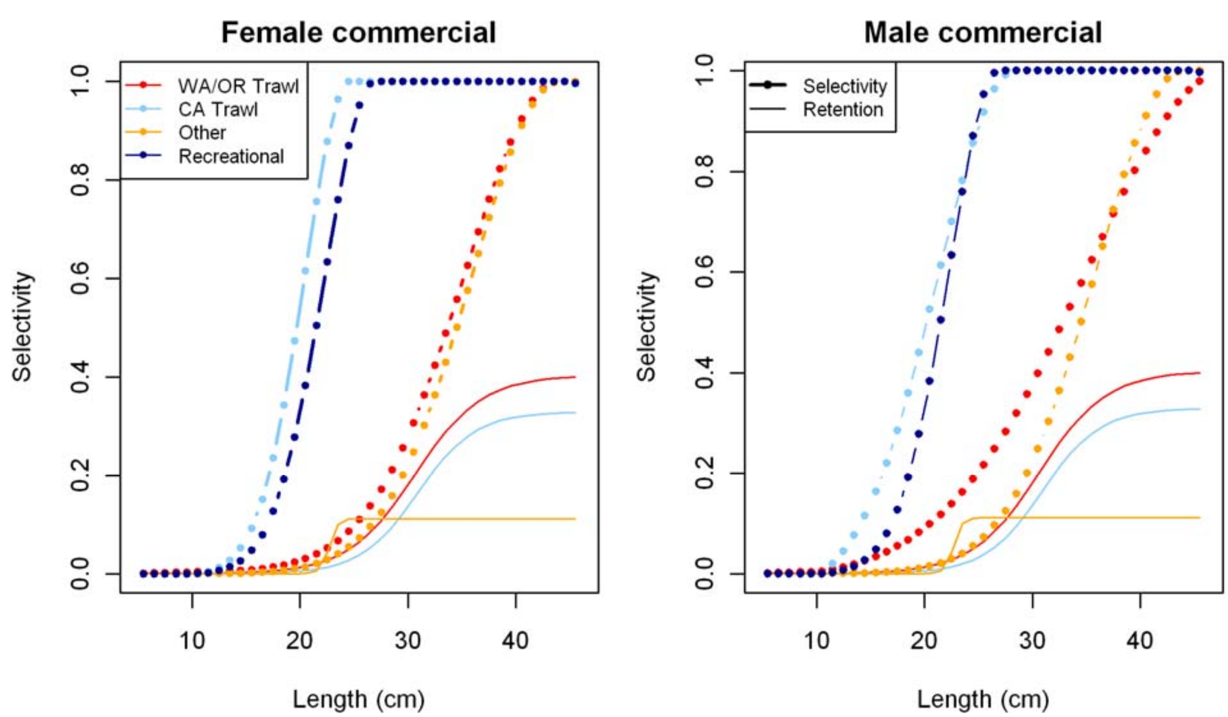

Figure 47: Estimated selectivity and retention curves for the domestic commercial fleets. The foreign fleet mirrors the CA Trawl selectivity without retention. The recreational fleet has discards included in the catch, thus does not model retention separate from selectivity. The fish at size kept by the fleet are determined from the product of selectivity and retention.

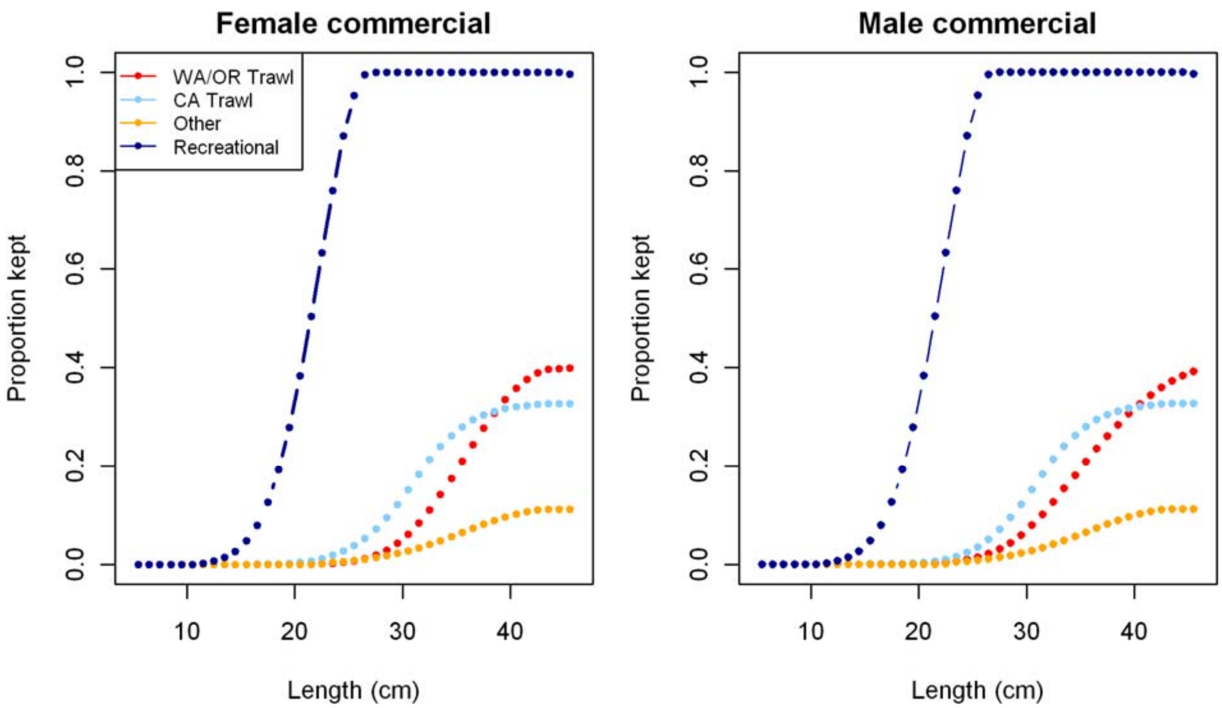

Figure 48: The kept fish selectivity curves determined from the product of selectivity and retention for each domestic fleet. Landings for recreational fisheries include discards thus are not explicitly modeled.

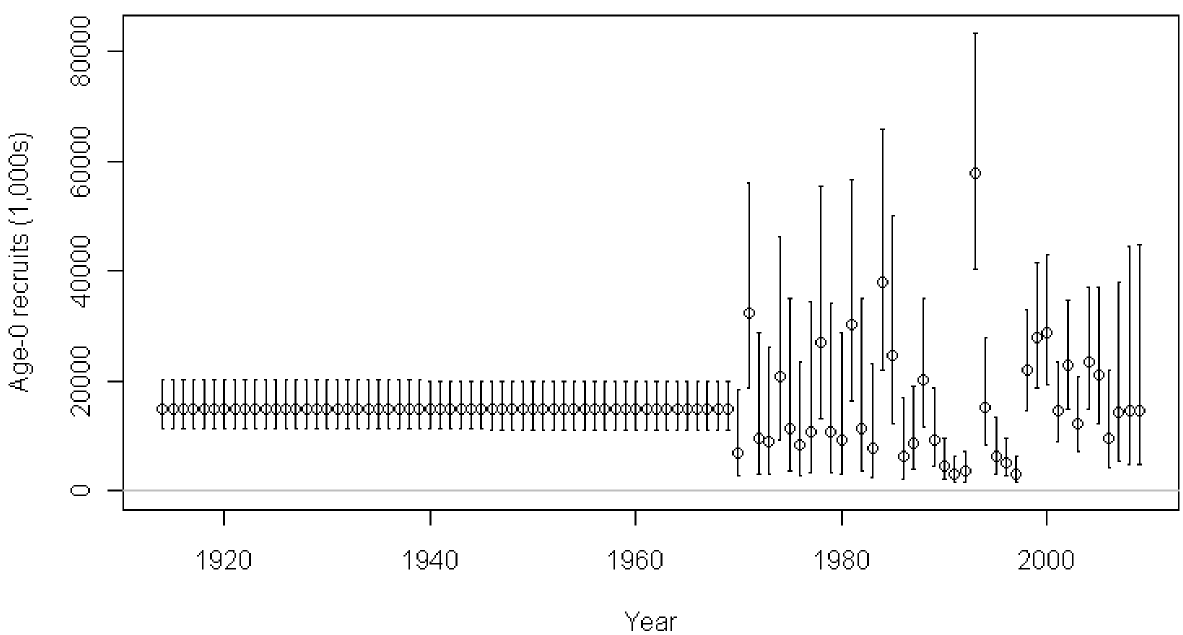

Figure 49: Estimated recruitment with approximate 95% asymptotic confidence intervals.

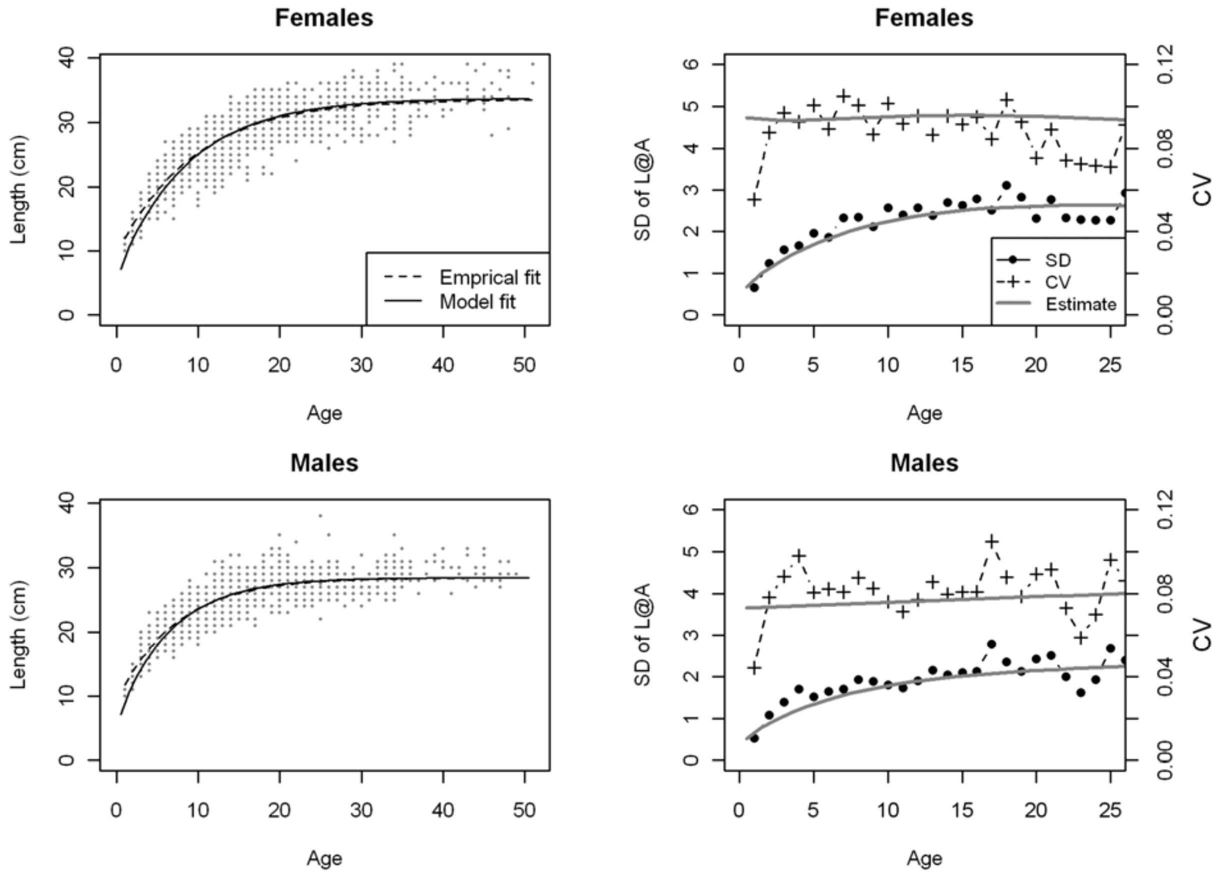

Figure 50: Fits to the length-at-age for females and males (left plots). Also shown are the fits to the CV of the growth curve as a function of age (fit directly in the model) and implied fits to the standard deviation (SD) of the growth curve at age.

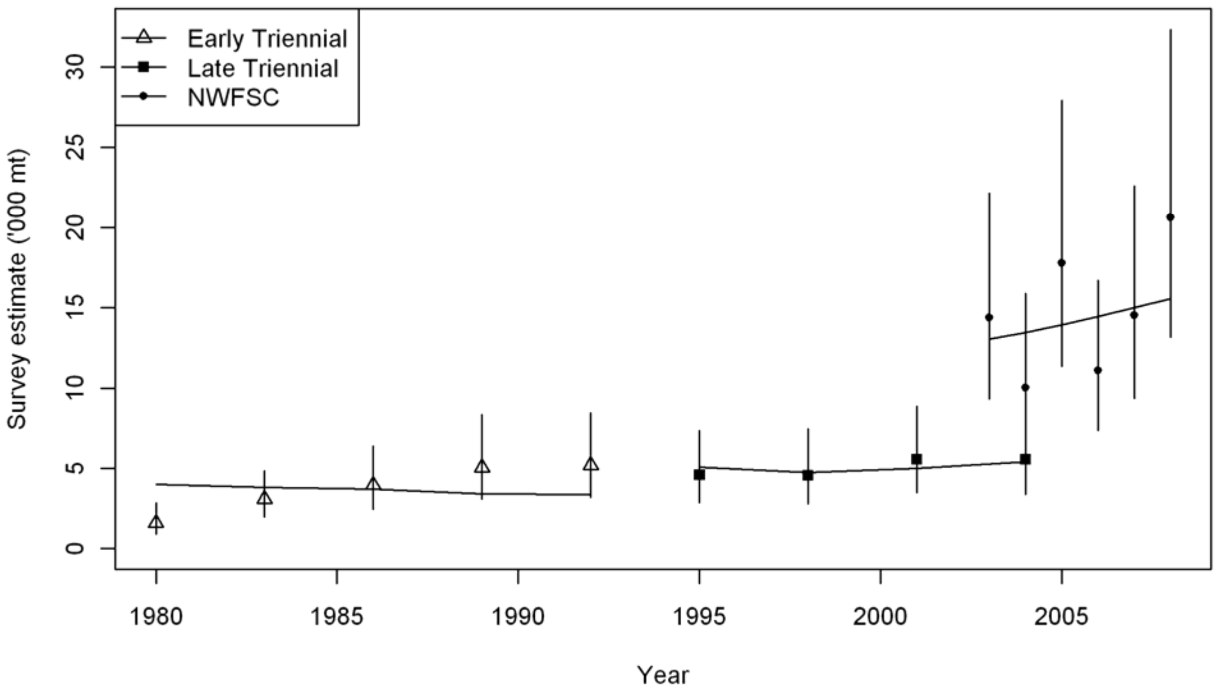

Figure 51: Fits from the base case model to the survey abundance indices with 95% confidence intervals on the observations.

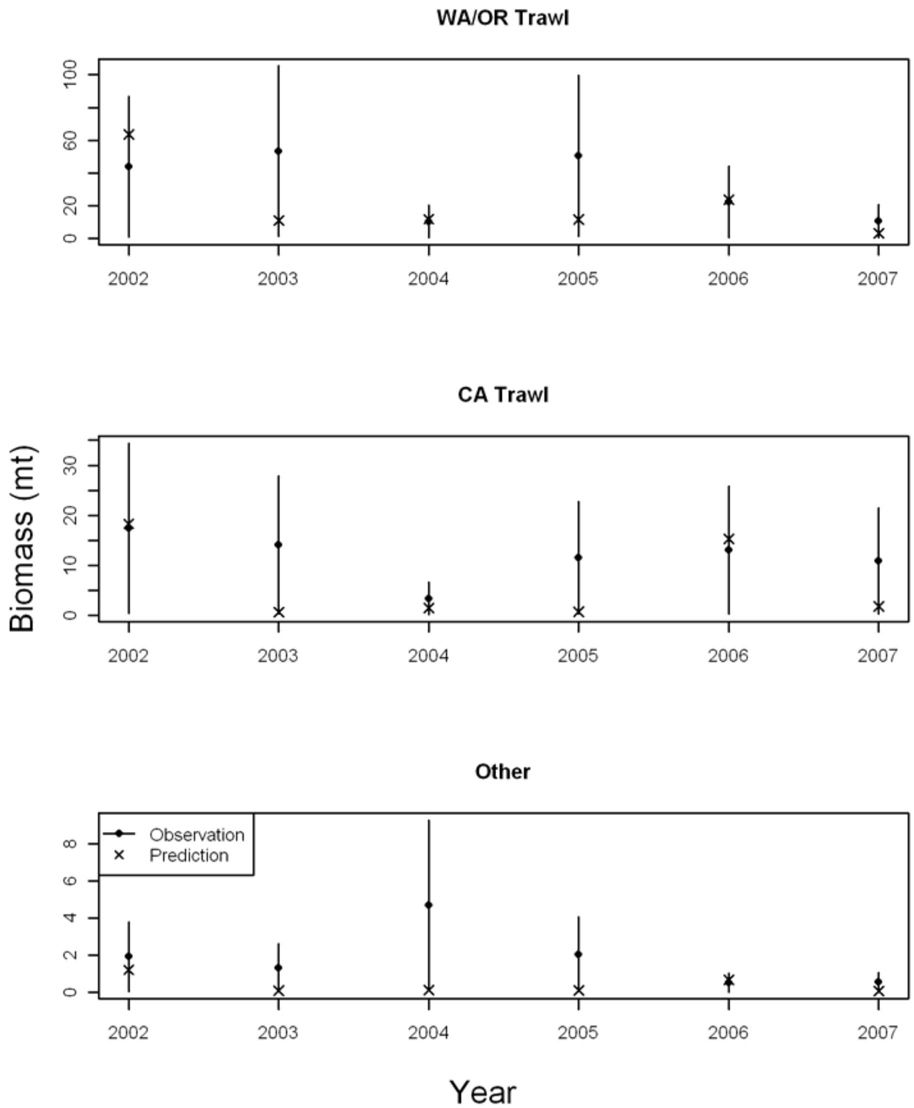

Figure 52: Fits to the total discards (mt) by fleet and year.

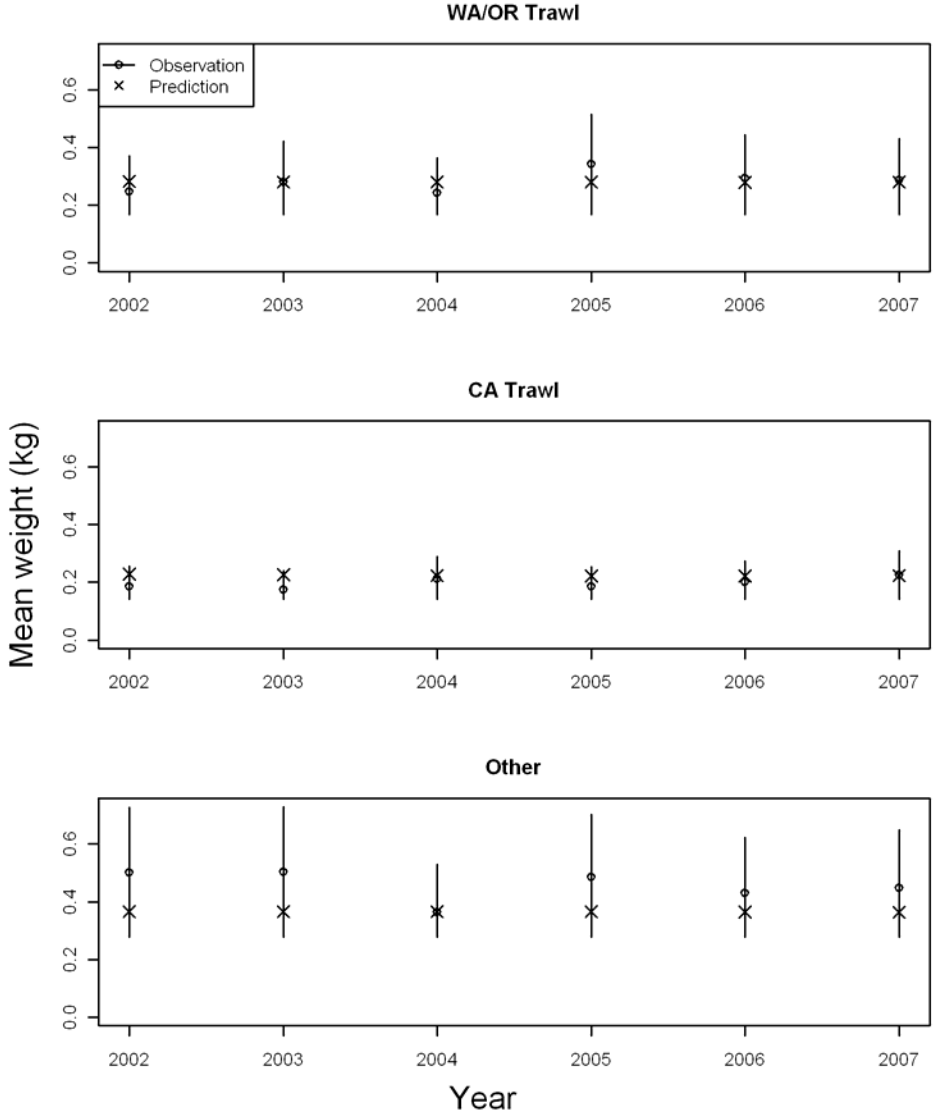

Figure 53: Fits to the mean weight of discards.

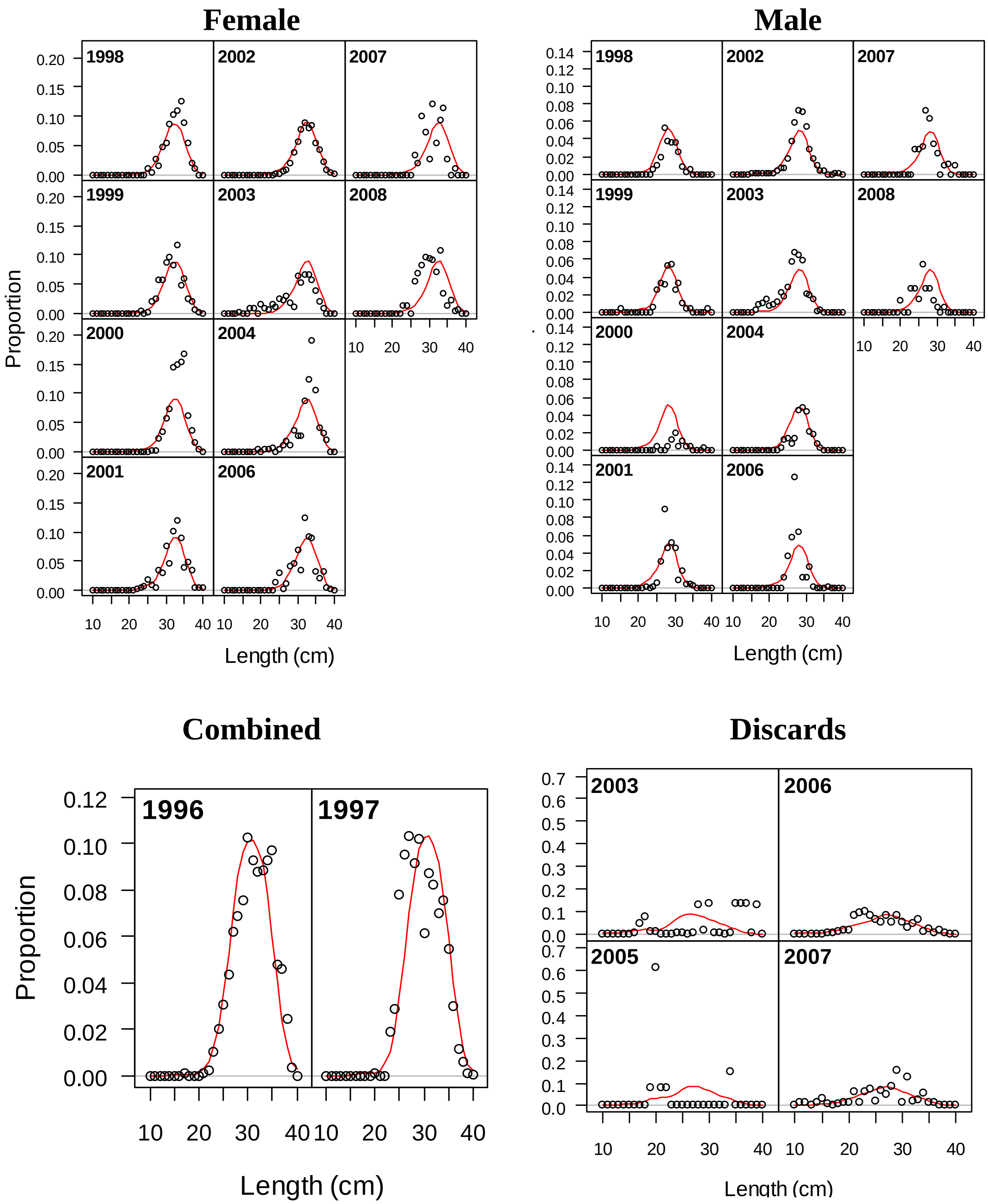

Figure 54: Fits to length compositions from the WA/OR trawl fleet.

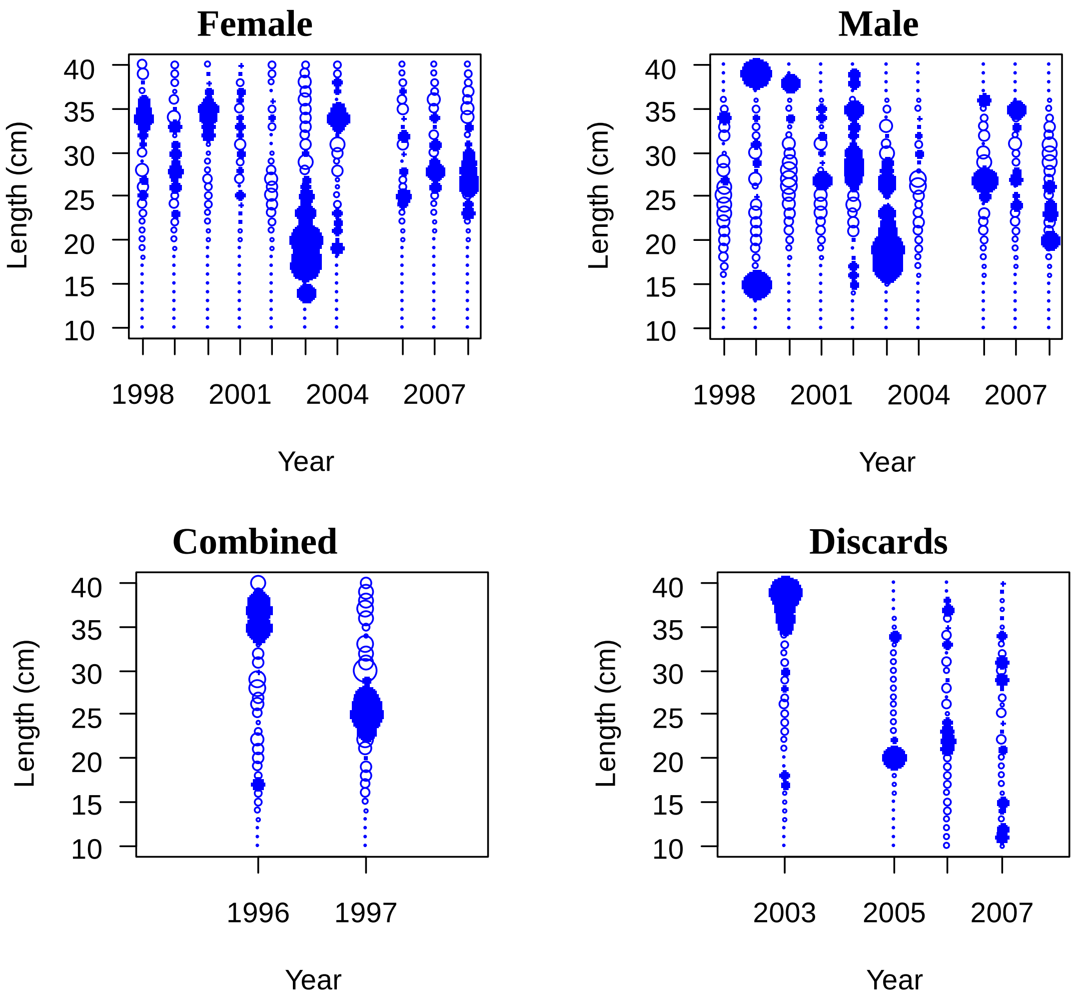

Figure 55: Pearson residuals for the retained and discarded length composition data from the WA/OR trawl fleet.

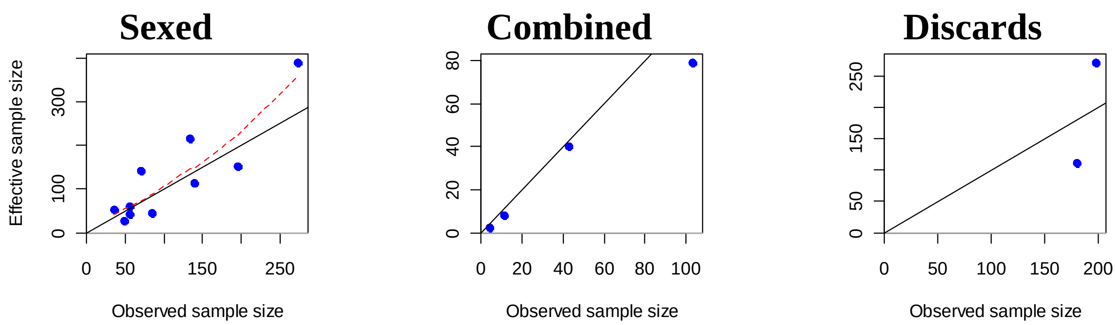

Figure 56: Effective sample size plotted against the entered sample size in the model for the WA/OR trawl fleet.

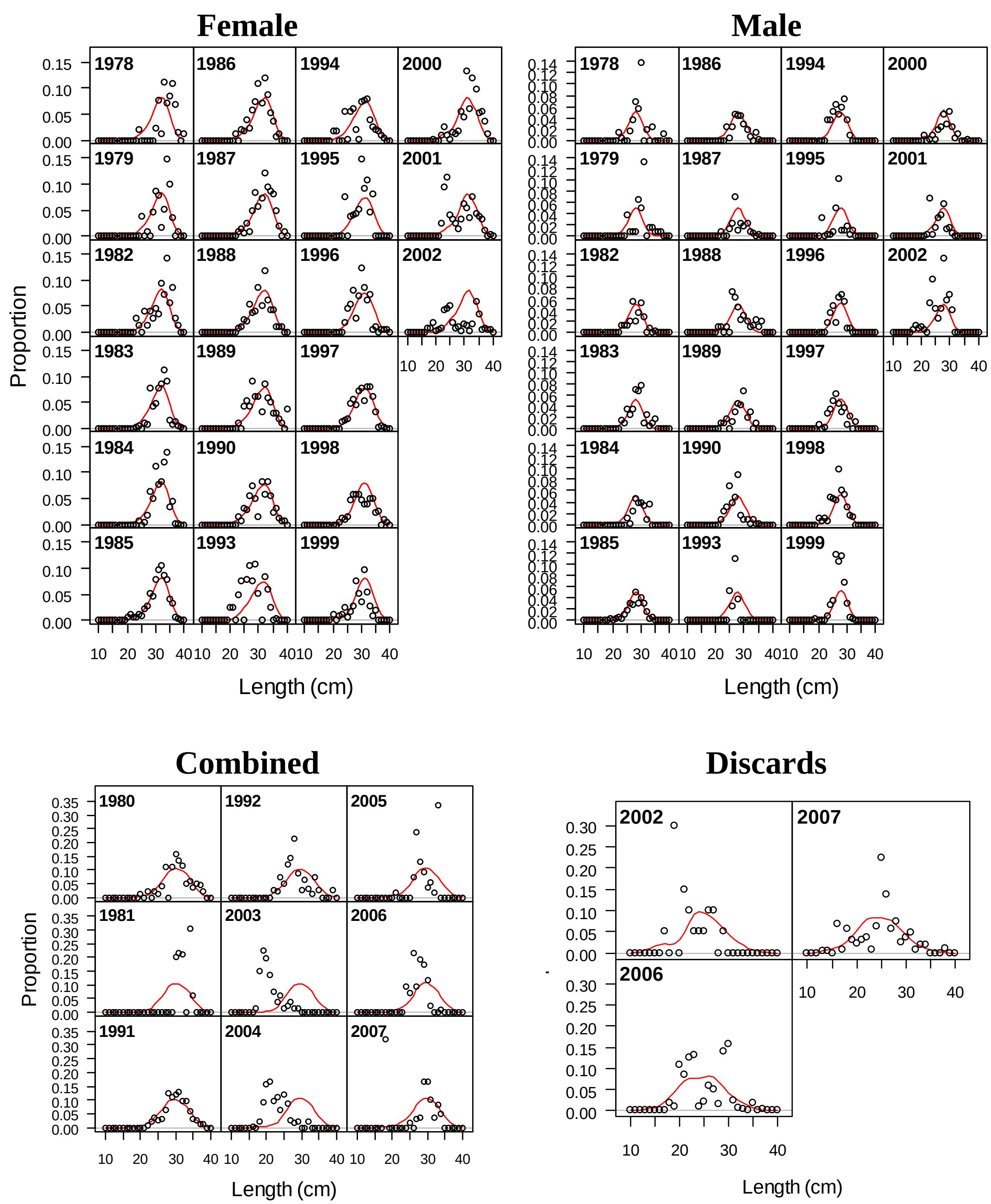

Figure 57: Fits to length compositions from the CA trawl fleet.

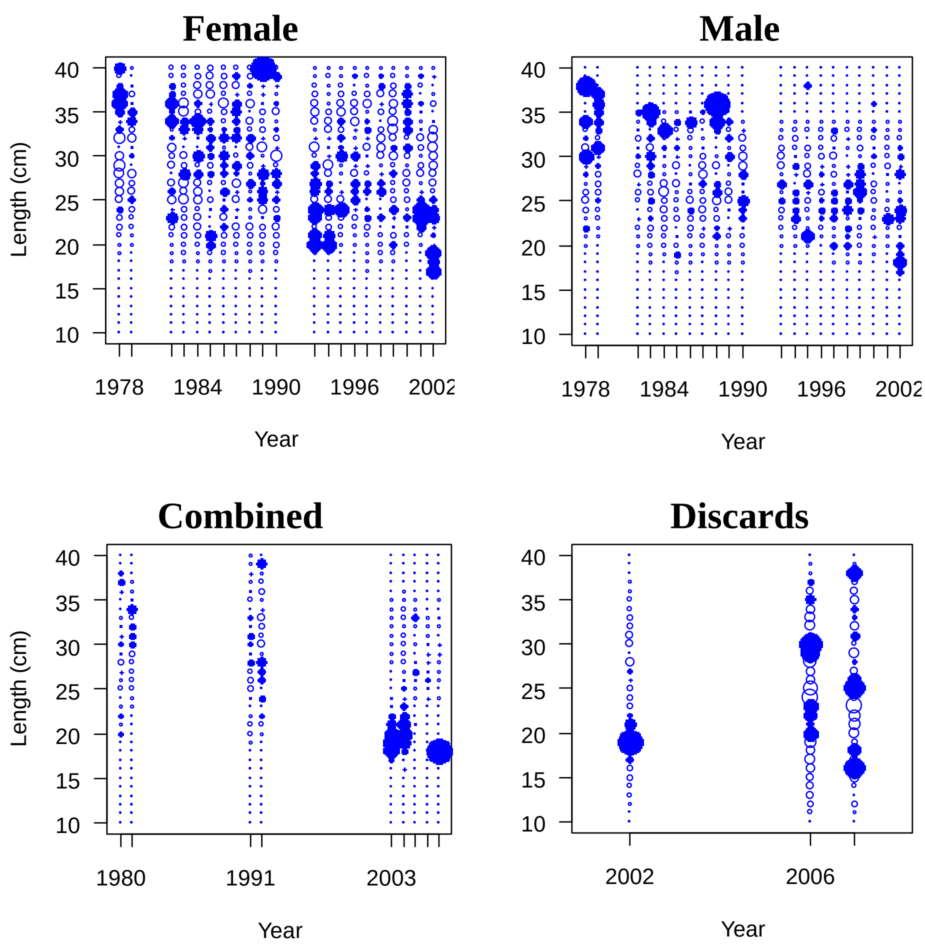

Figure 58: Pearson residuals for the retained and discarded length composition data from the CA trawl fleet.

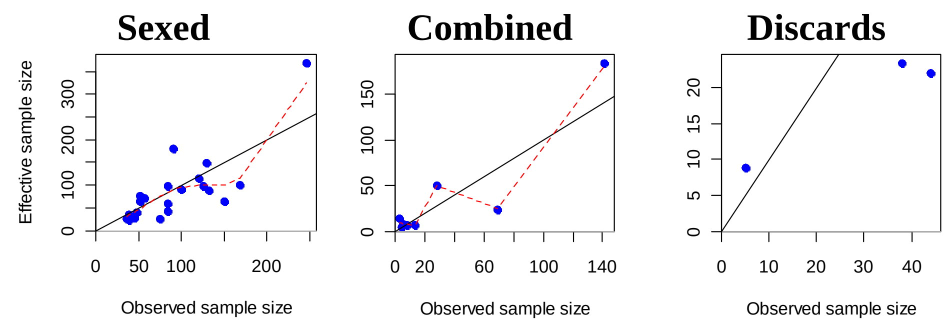

Figure 59: Effective sample size plotted against the entered sample size in the model for the CA trawl fleet.

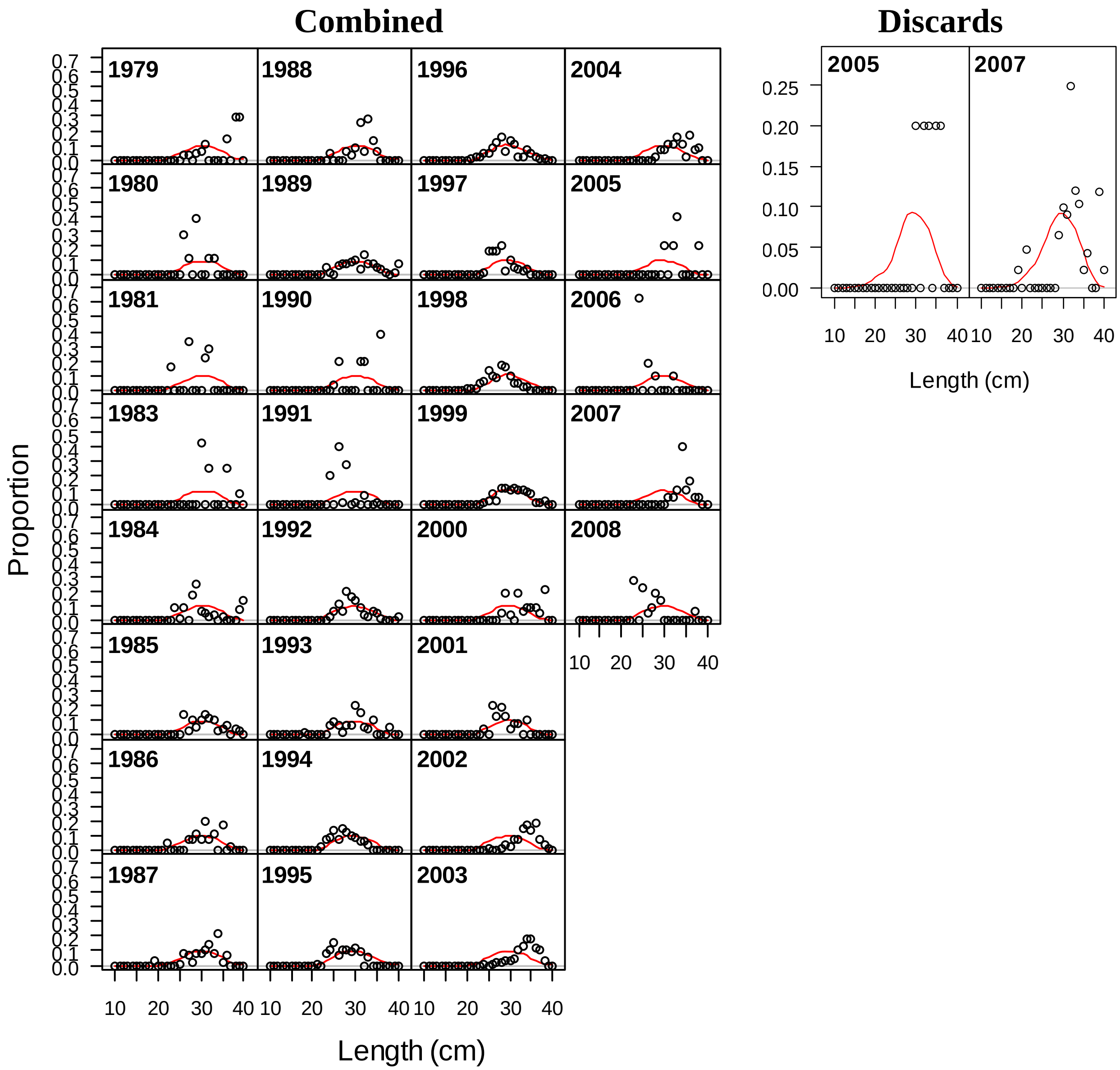

Figure 60: Fits to length compositions from the other-gear fleet.

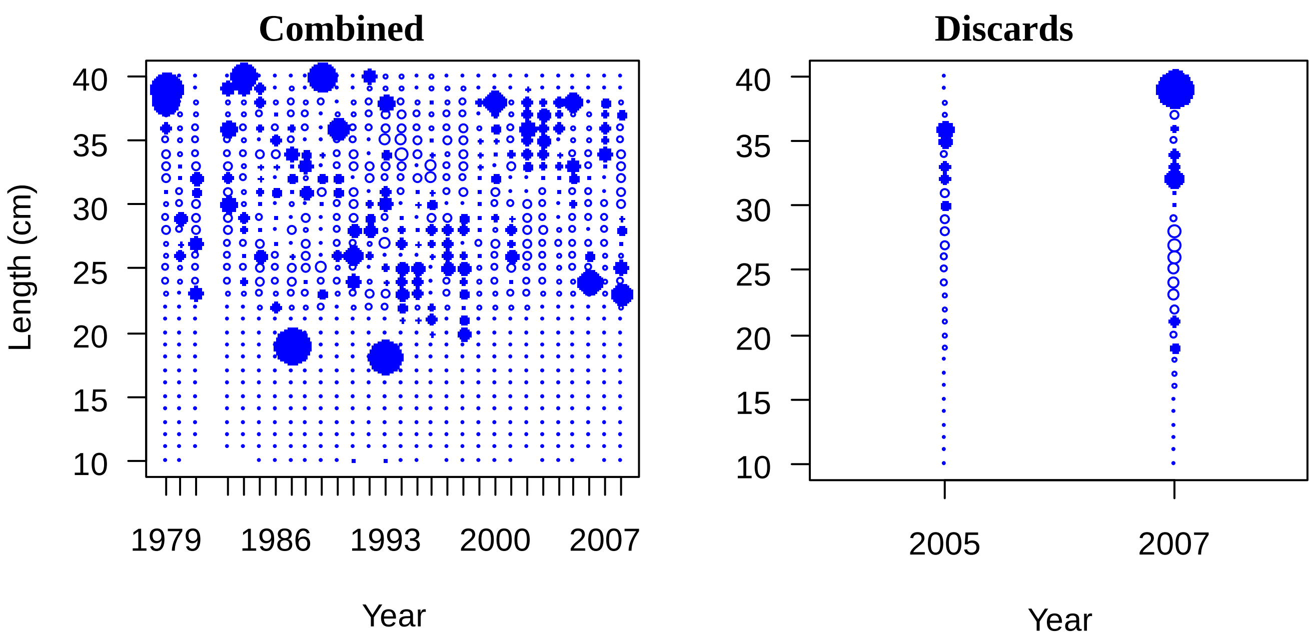

Figure 61: Pearson residuals for the retained and discarded length composition data from the other-gear fleet.

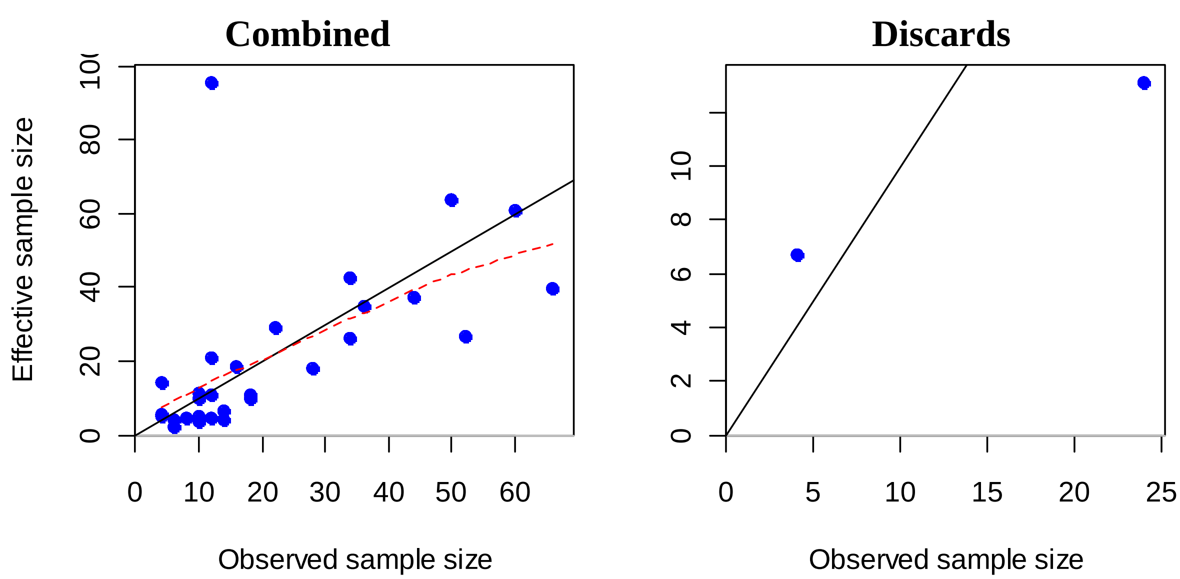

Figure 62: Effective sample size plotted against the entered sample size in the model for the other-gear fleet.

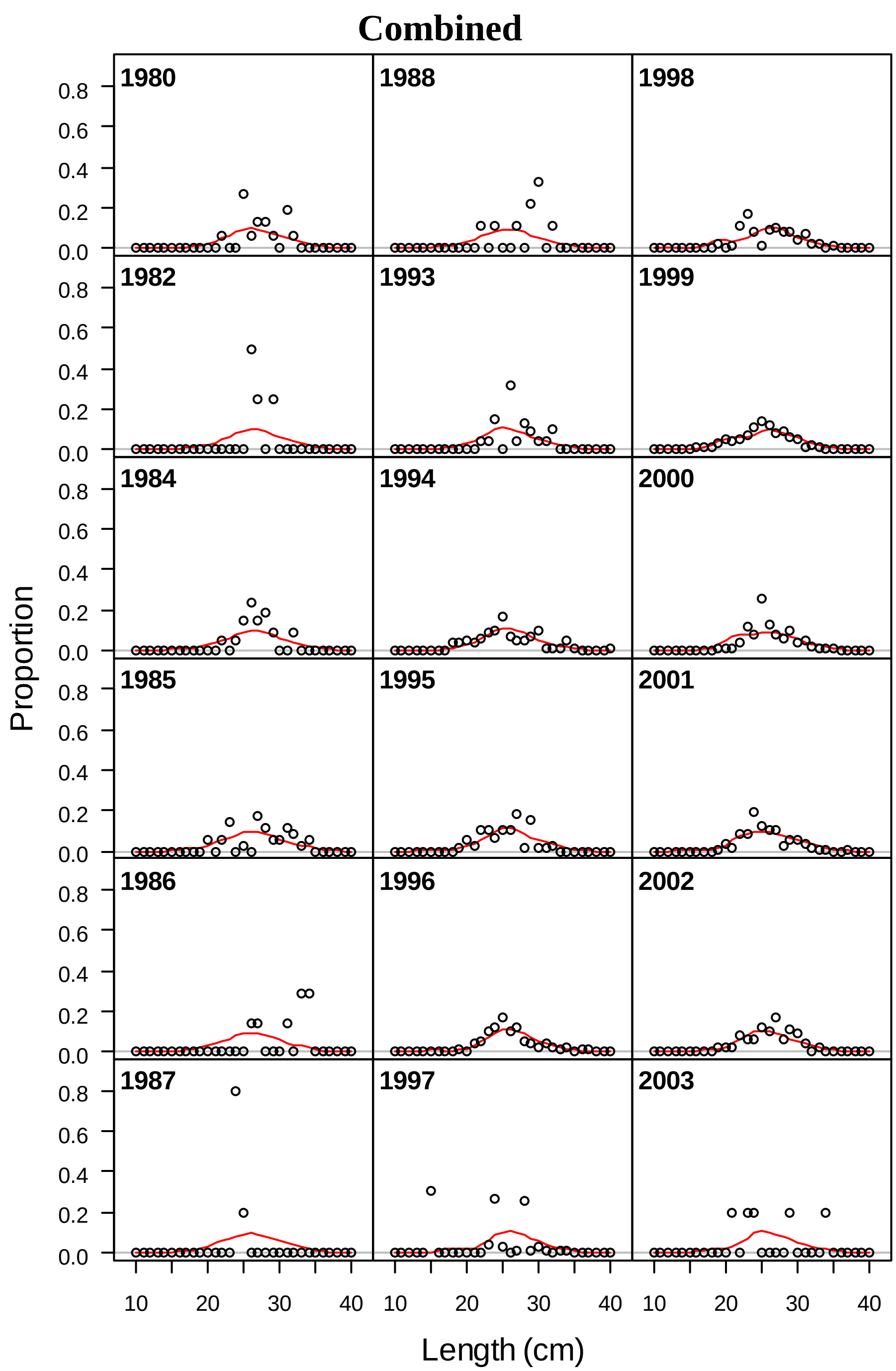

Figure 63: Fits to length compositions from the Recreational fleet.

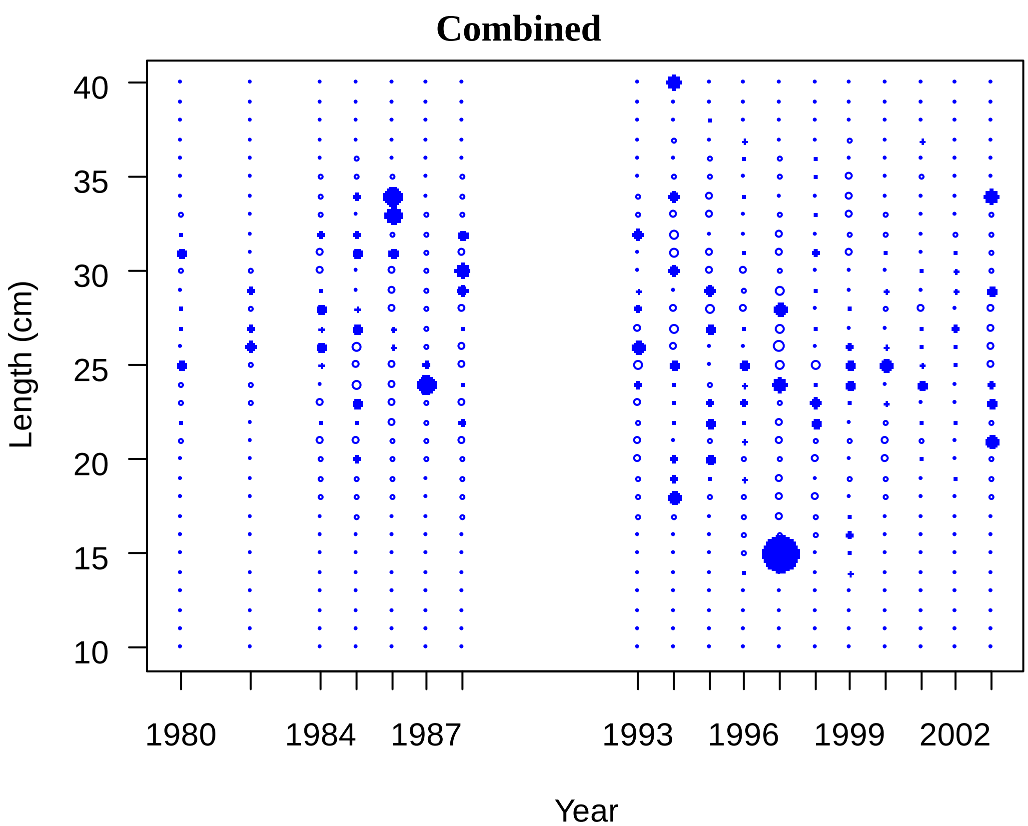

Figure 64: Pearson residuals for the combined sex length composition data from the Recreational fleet.

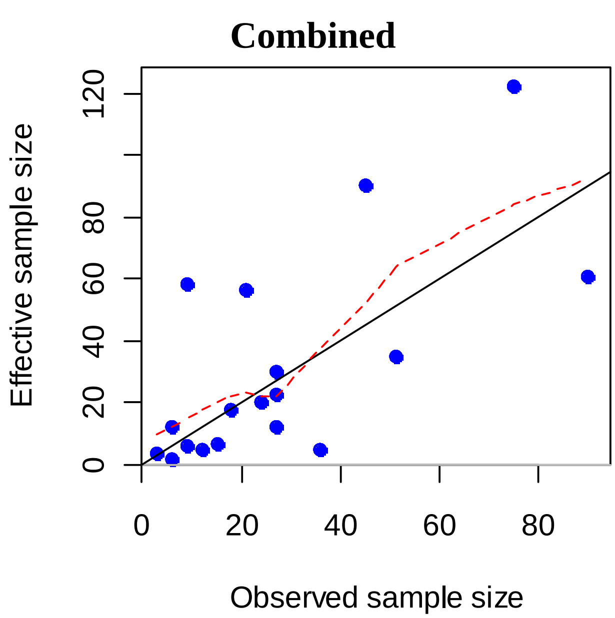

Figure 65: Effective sample size plotted against the entered sample size in the model for the ecreational fleet.

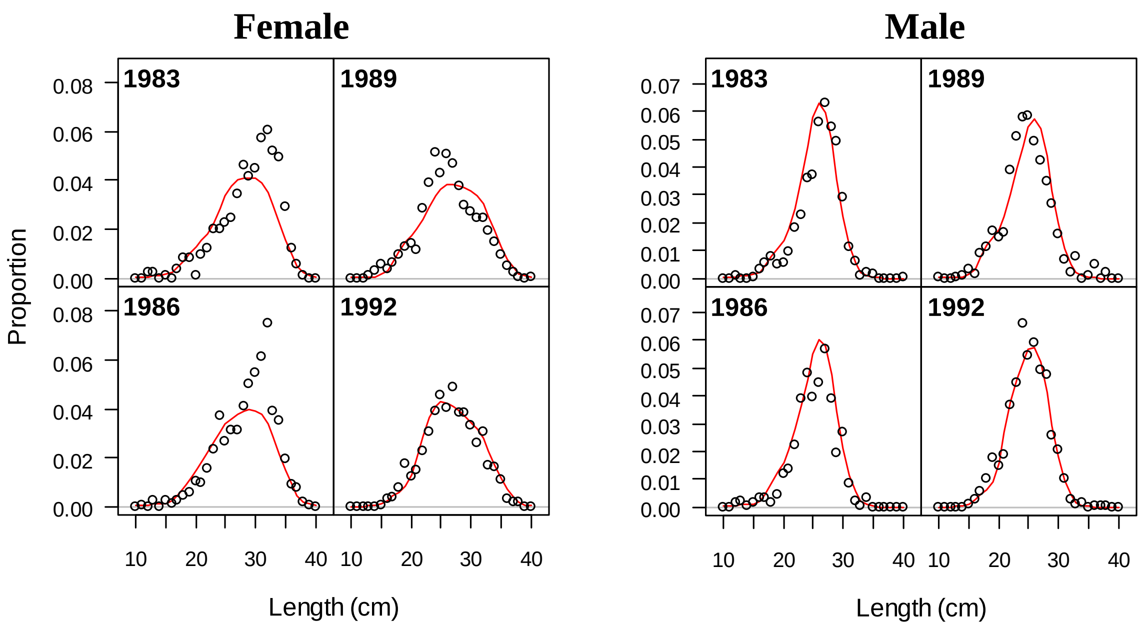

Figure 66: Fits to length compositions from the early Triennial survey.

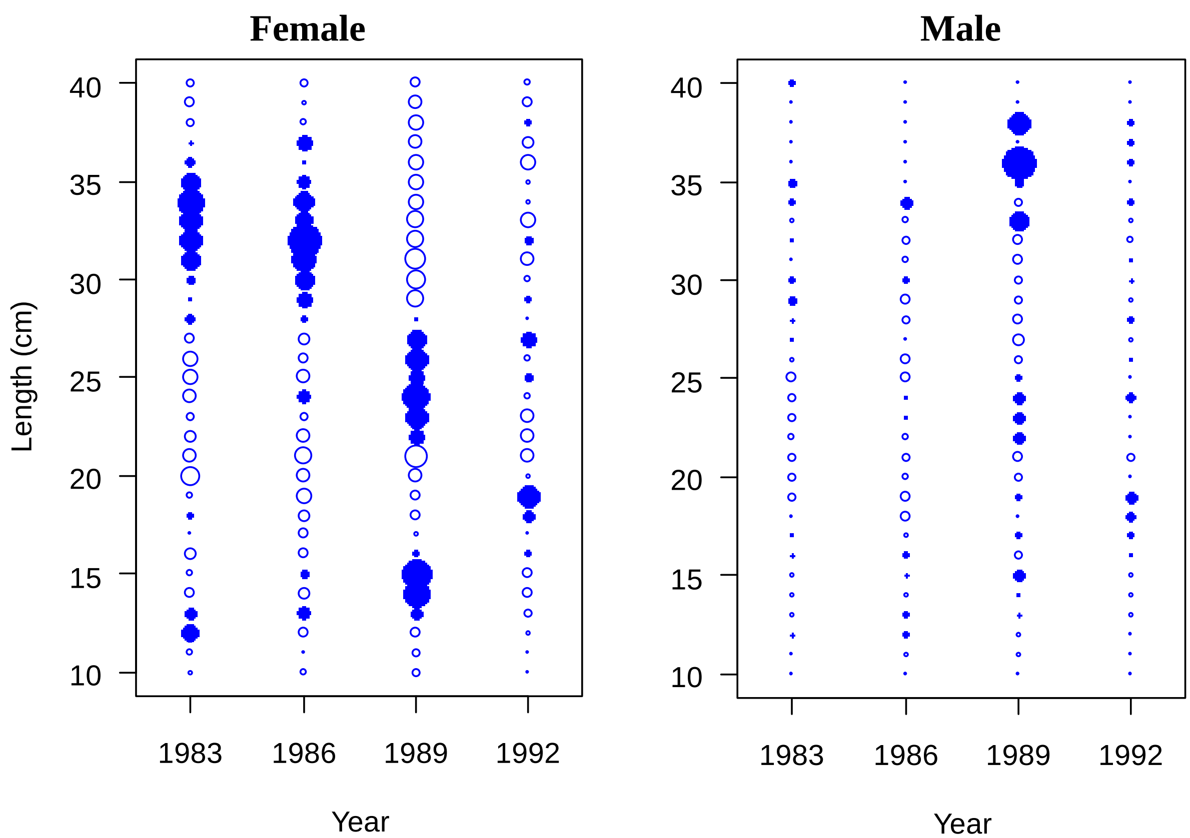

Figure 67: Pearson residuals for the length composition data from the early Triennial survey.

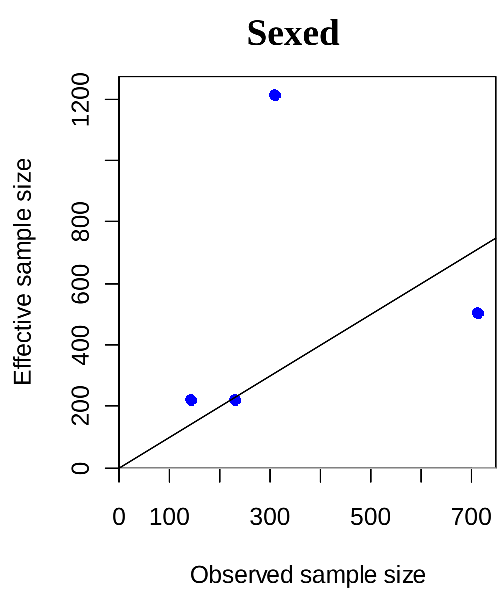

Figure 68: Effective sample size plotted against the entered sample size in the model for the early Triennial survey.

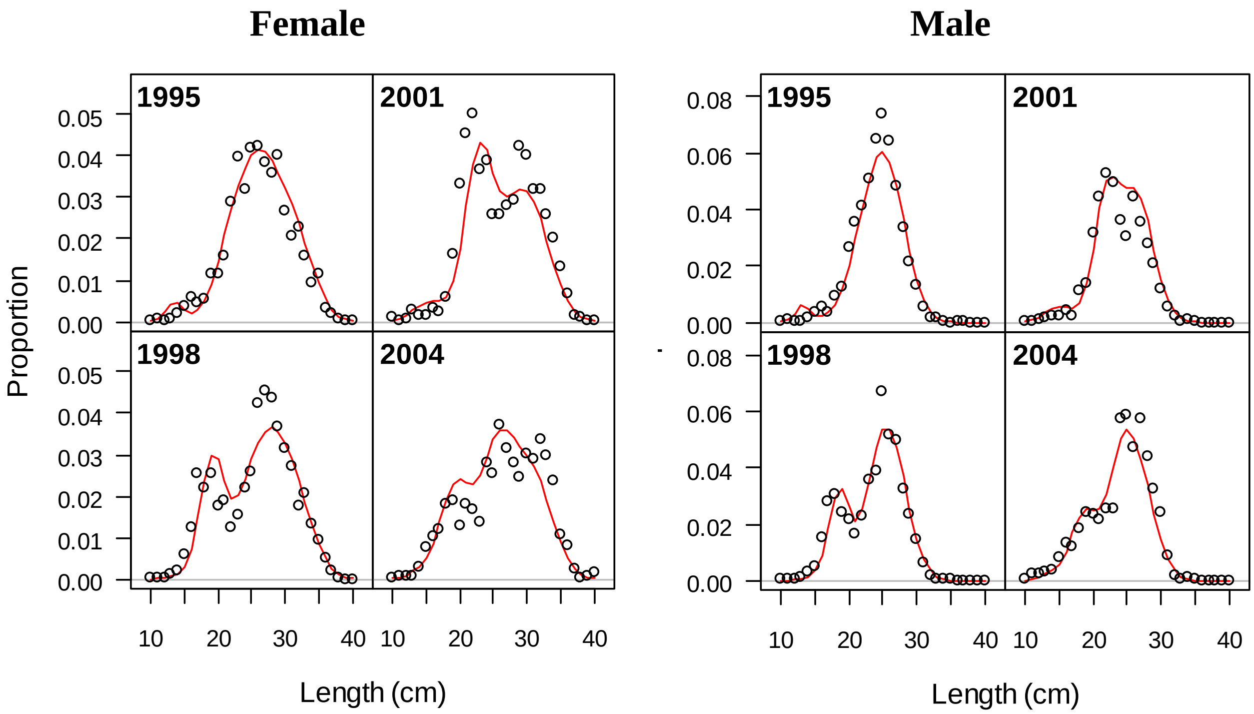

Figure 69: Fits to length compositions from the late Triennial survey.

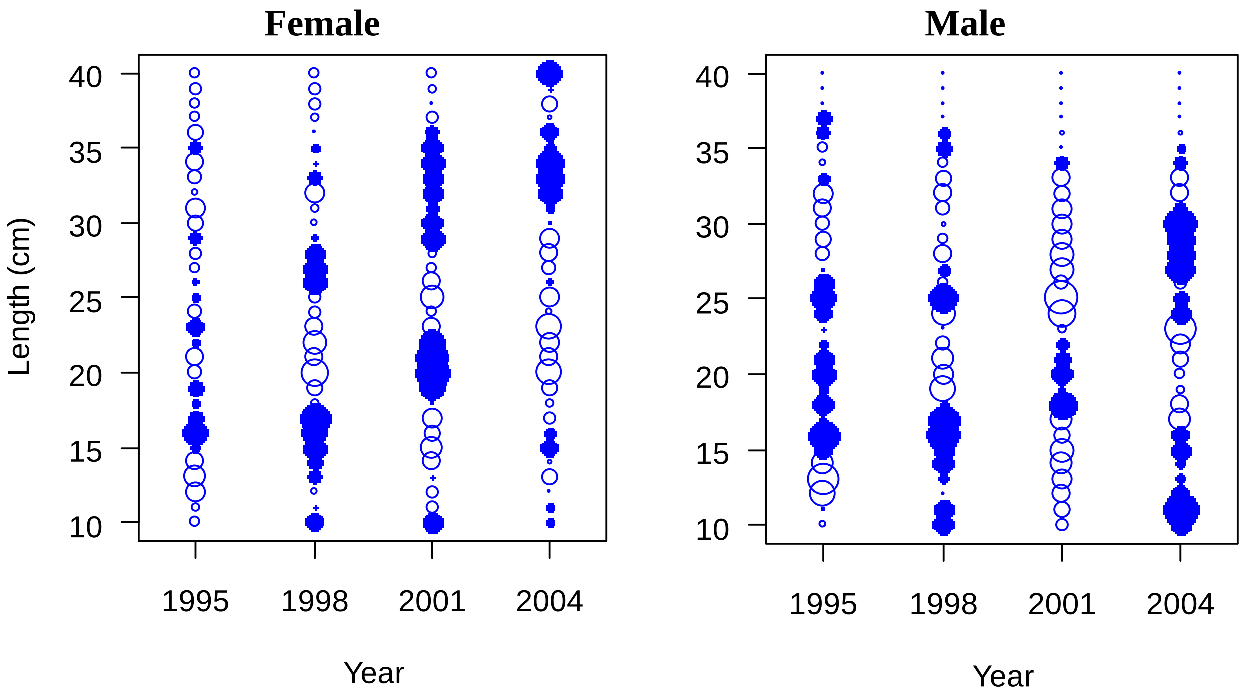

Figure 70: Pearson residuals for the length composition data from the late Triennial survey.

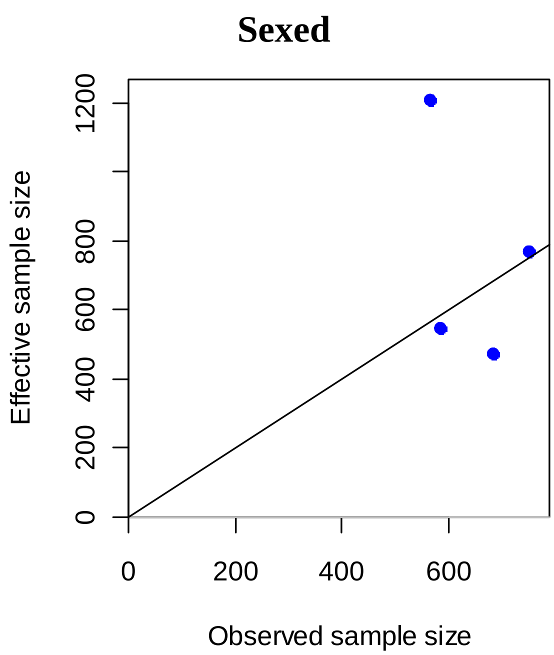

Figure 71: Effective sample size plotted against the entered sample size in the model for the late Triennial survey.

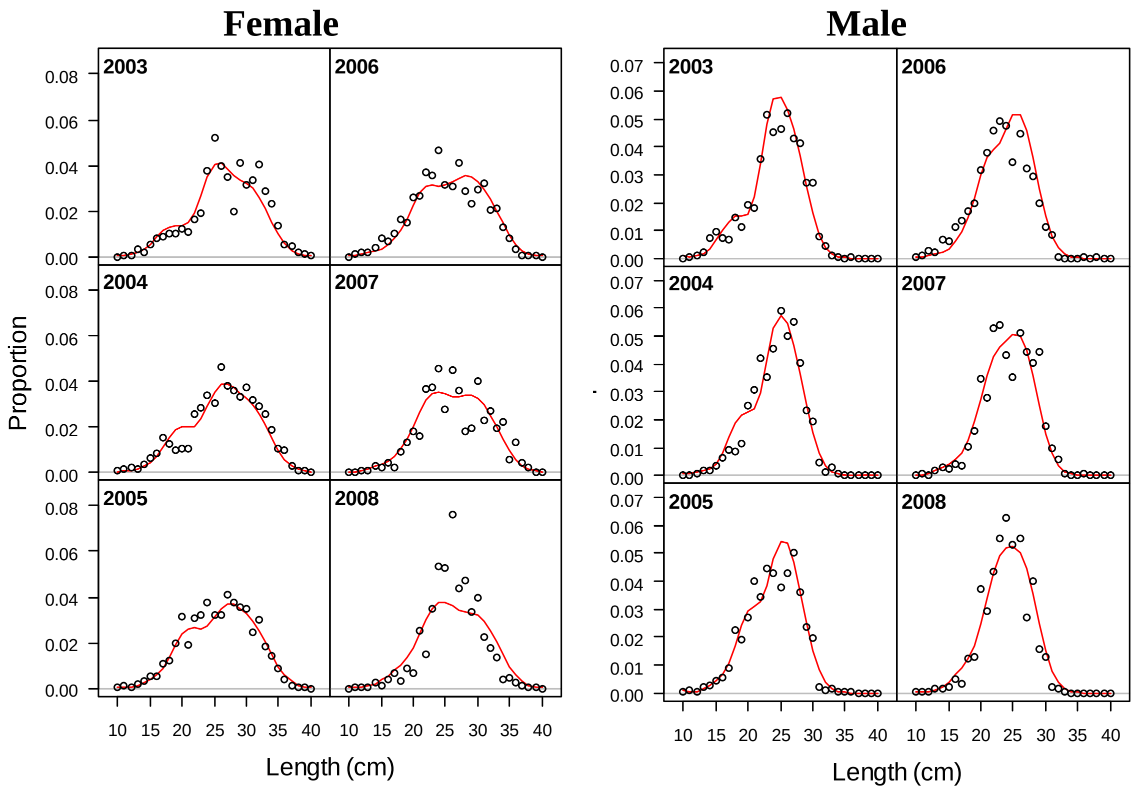

Figure 72: Fits to length compositions from the NWFSC survey.

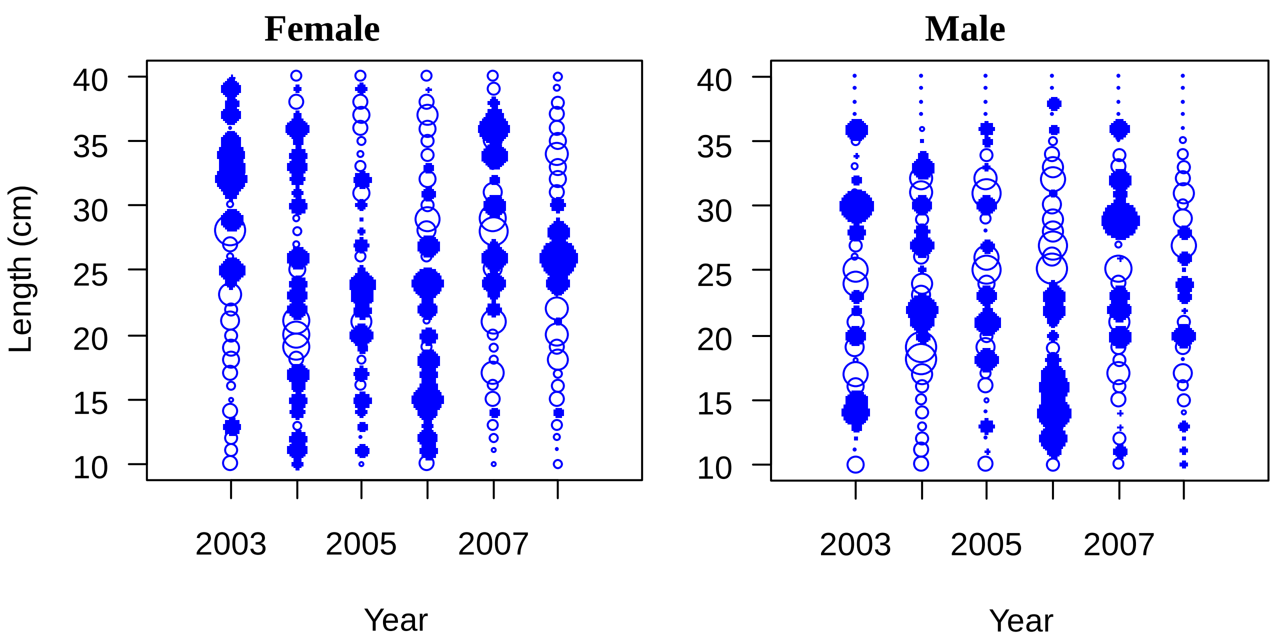

Figure 73: Pearson residuals for the length composition data from the NWFSC survey.

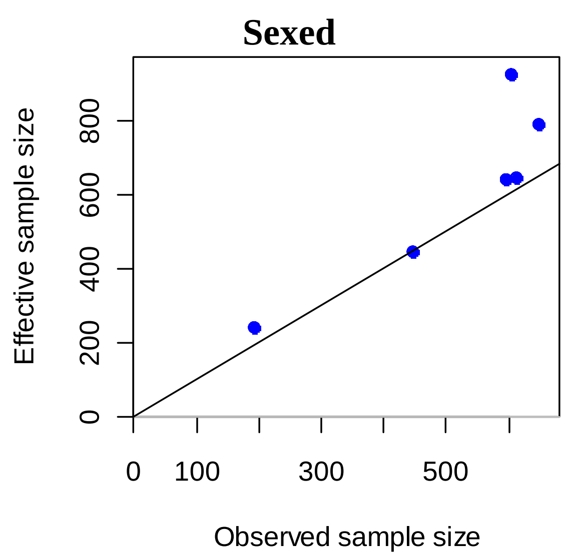

Figure 74: Effective sample size plotted against the entered sample size in the model for the NWFSC survey.

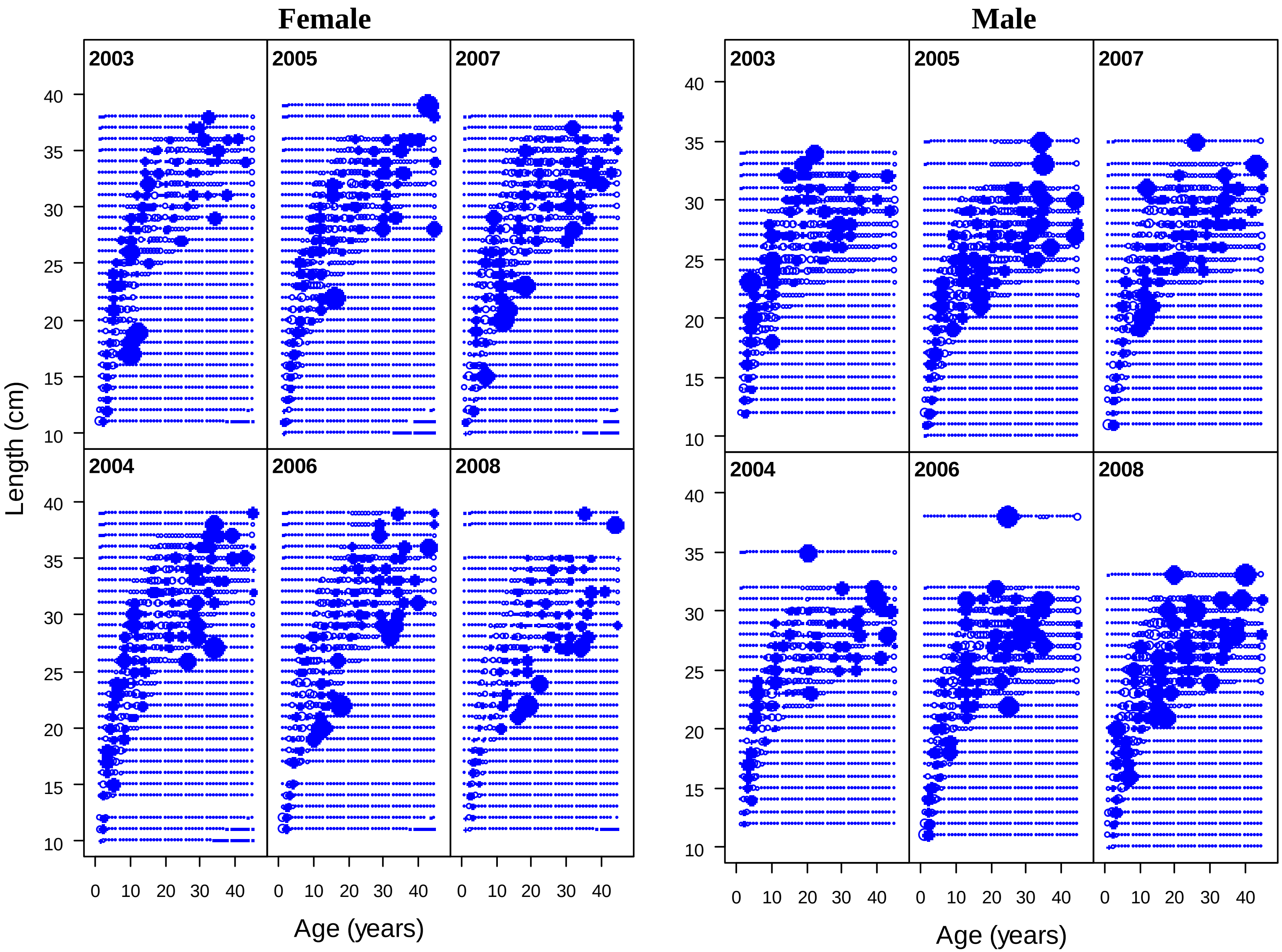

Figure 75: Pearson residuals for the fits to conditional age-at-length compositions from the NWFSC survey.

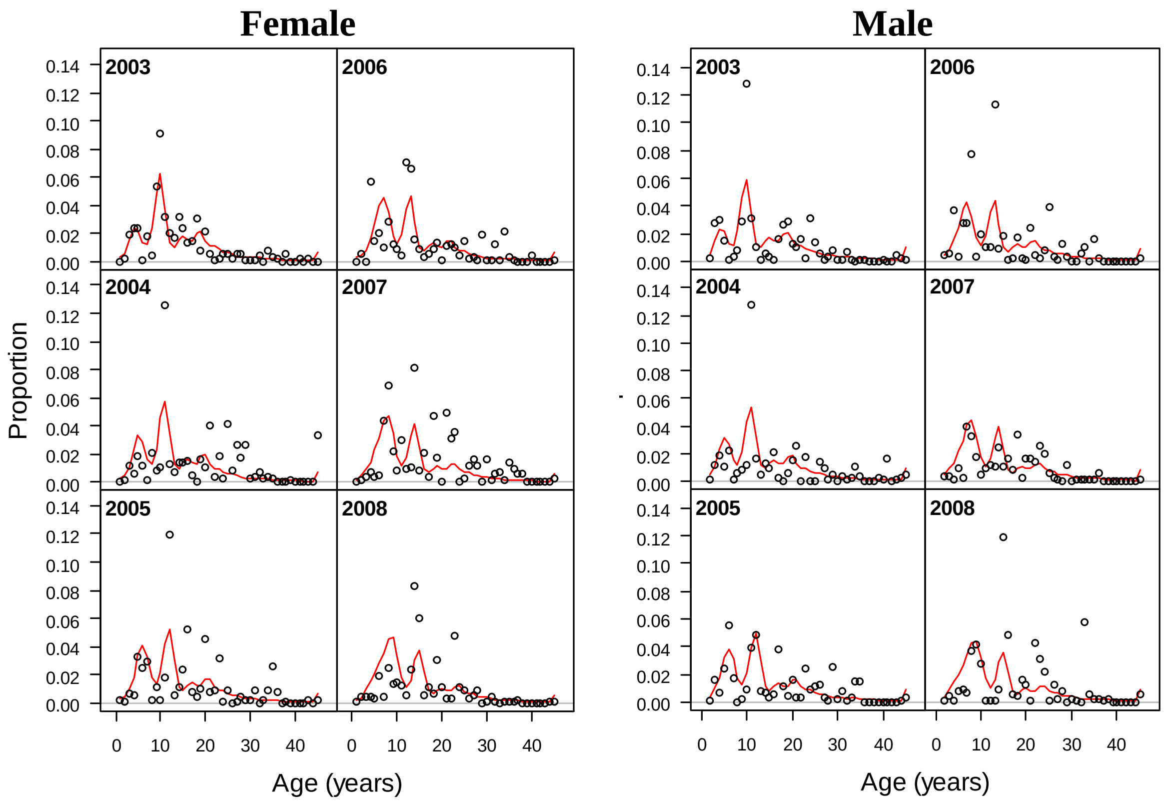

Figure 76: Implied fits to age compositions from the NWFSC survey. These are plotted for reference as the conditional age-at-length compositions are fit by the model.

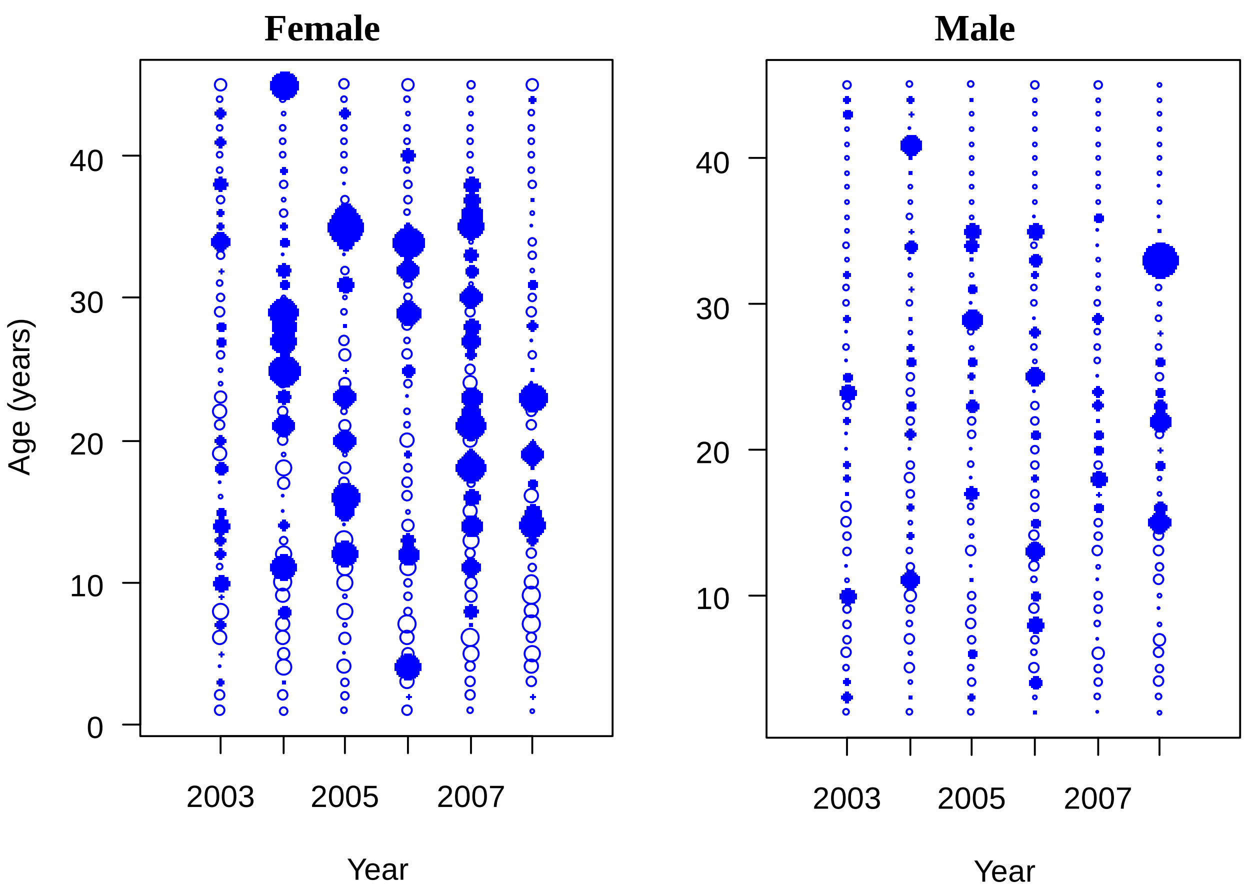

Figure 77: Pearson residuals for the implied fits to the age composition data from the NWFSC survey. These are presented for reference as the conditional age-at-length composition data are fitted by the model.

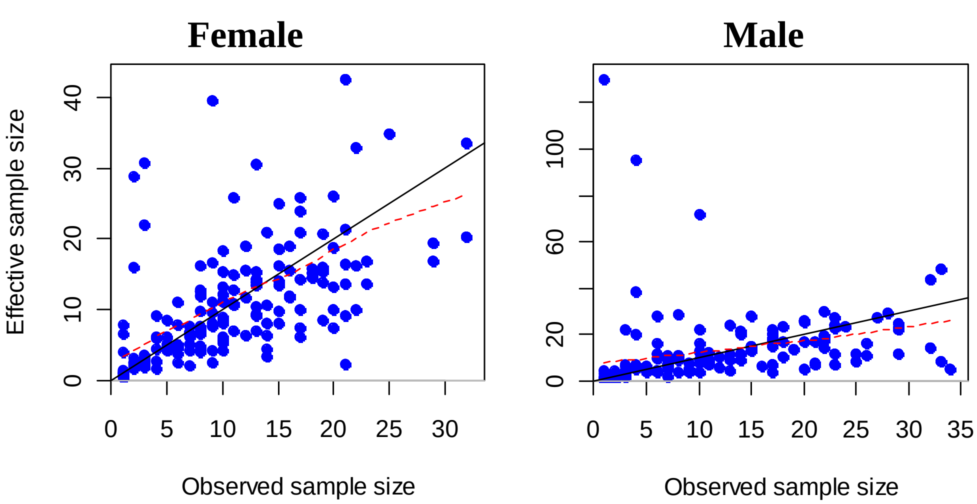

Figure 78: Effective sample size plotted against the entered sample size in the model for the NWFSC survey.

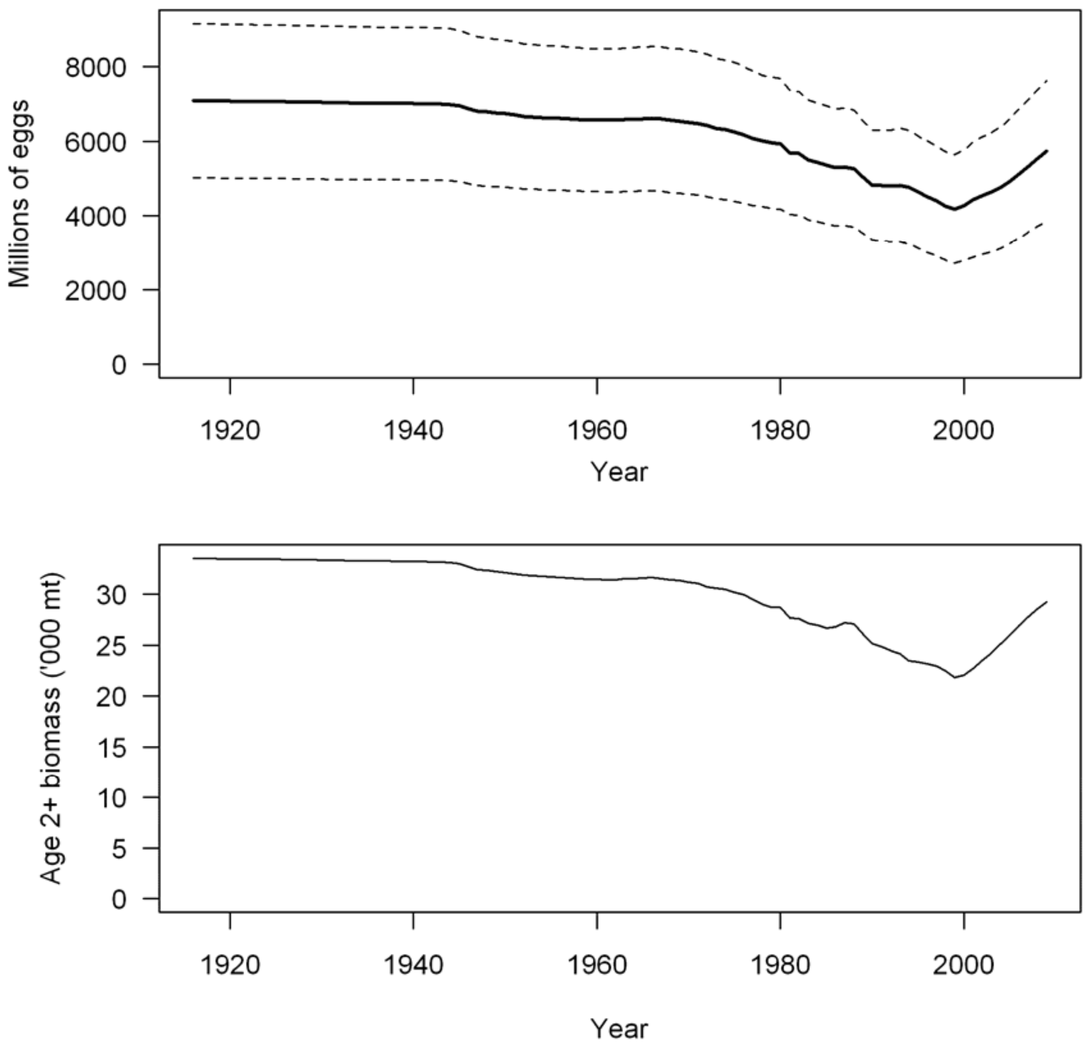

Figure 79: The predicted trajectory of spawning output in millions of eggs with approximate 95% asymptotic confidence intervals (top panel) and the predicted summary biomass (age 2+, bottom panel).

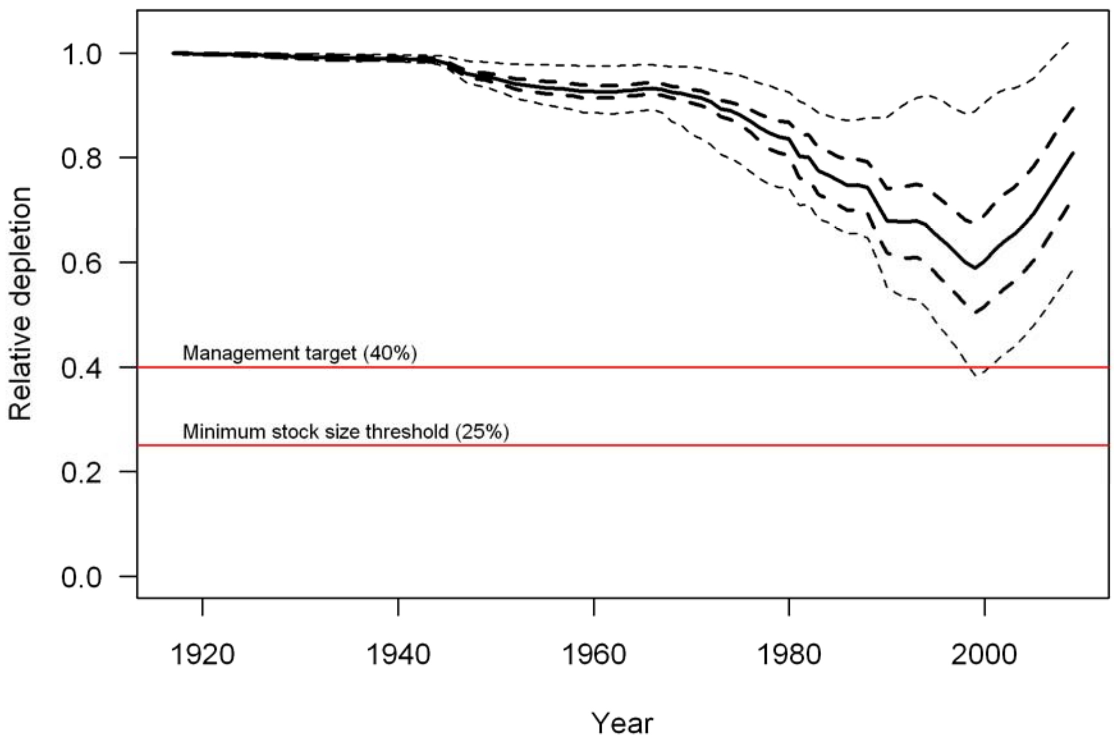

Figure 80: Estimated depletion as a function of unfished spawning output (solid line) with approximate 95% asymptotic confidence intervals (thick dashed lines) and the extreme range over the states of nature (thin dashed lines). Management thresholds are drawn as red horizontal lines.

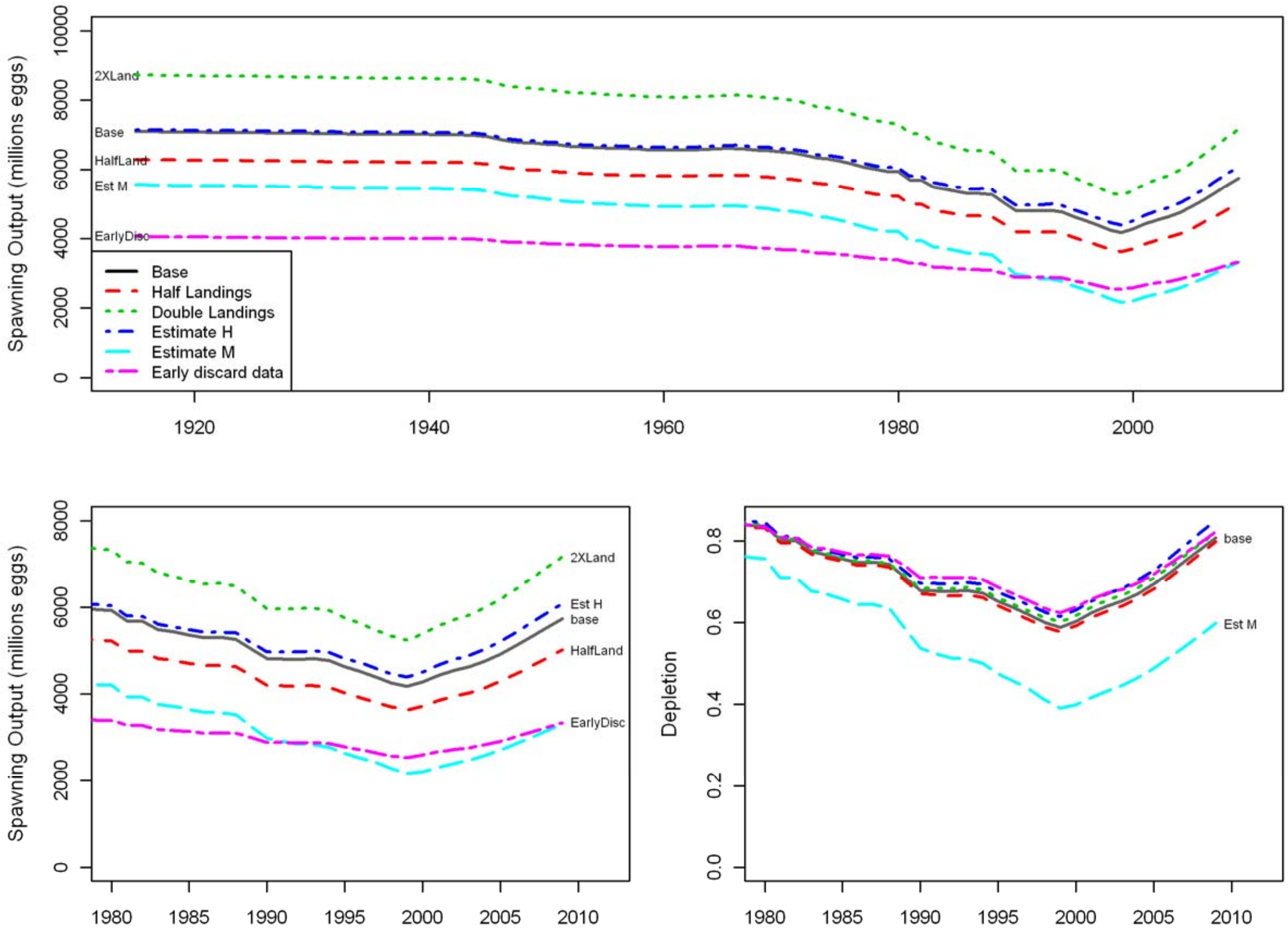

Figure 81: Sensitivity runs.

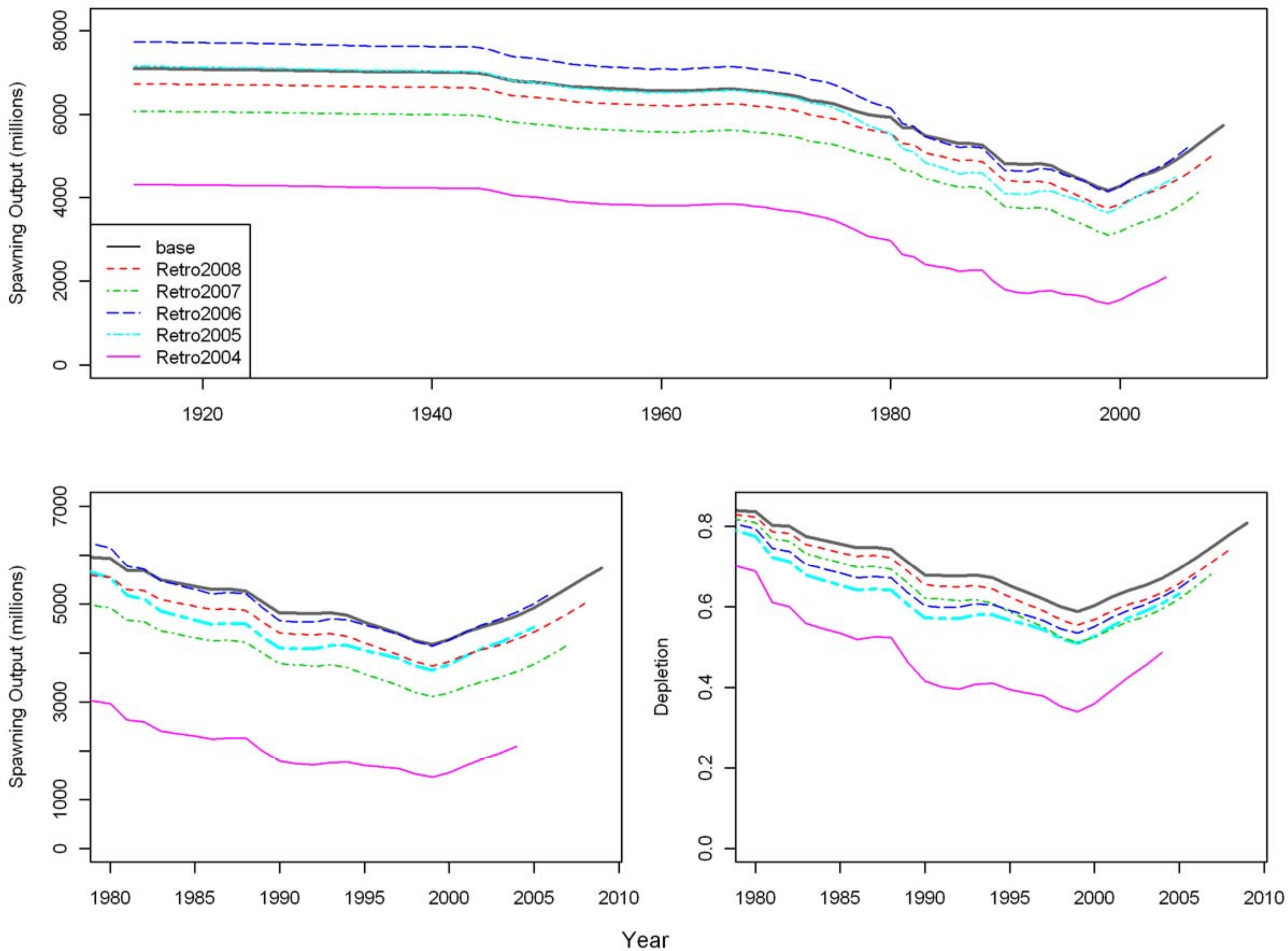

Figure 82. Results from a 5-year retrospective analysis. Each year of retrospective is performed as if the assessment were conducted in that year (i.e., retrospective in 2007 includes data through 2006).

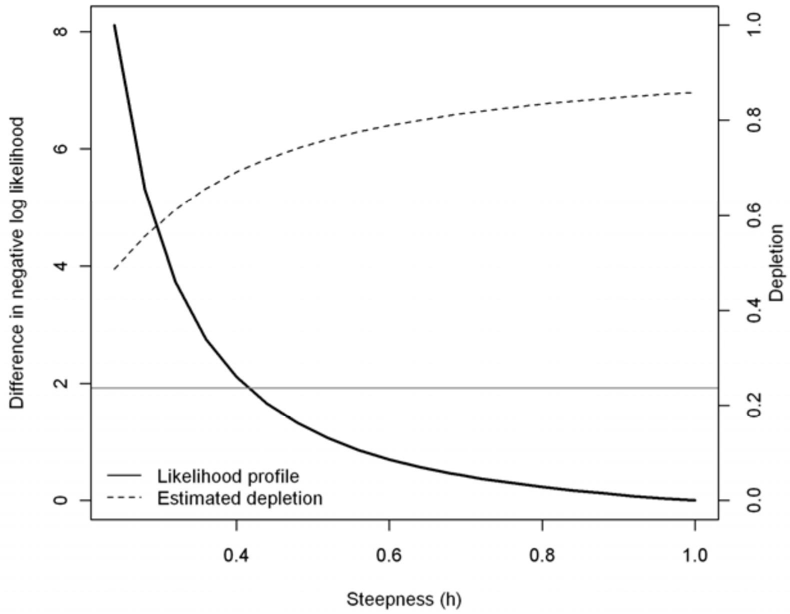

Figure 83: Likelihood profile on steepness (h). The horizontal line is the approximate 95% confidence interval and the dashed line show estimated depletion over steepness.

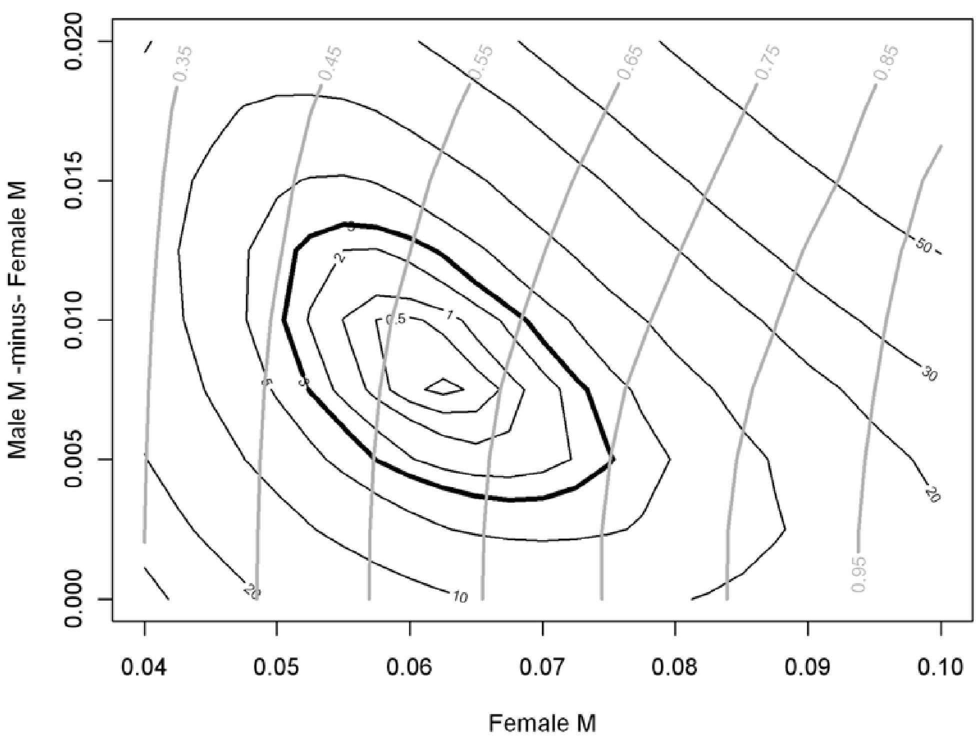

Figure 84: Likelihood profile on female natural mortality and the difference between male and female natural mortality. Black contour lines are the difference in negative log-likelihood and the bold line indicates an approximate 95% joint confidence interval. The gray, nearly vertical contour lines indicate the estimated level of depletion at that combination of male and female natural mortality.

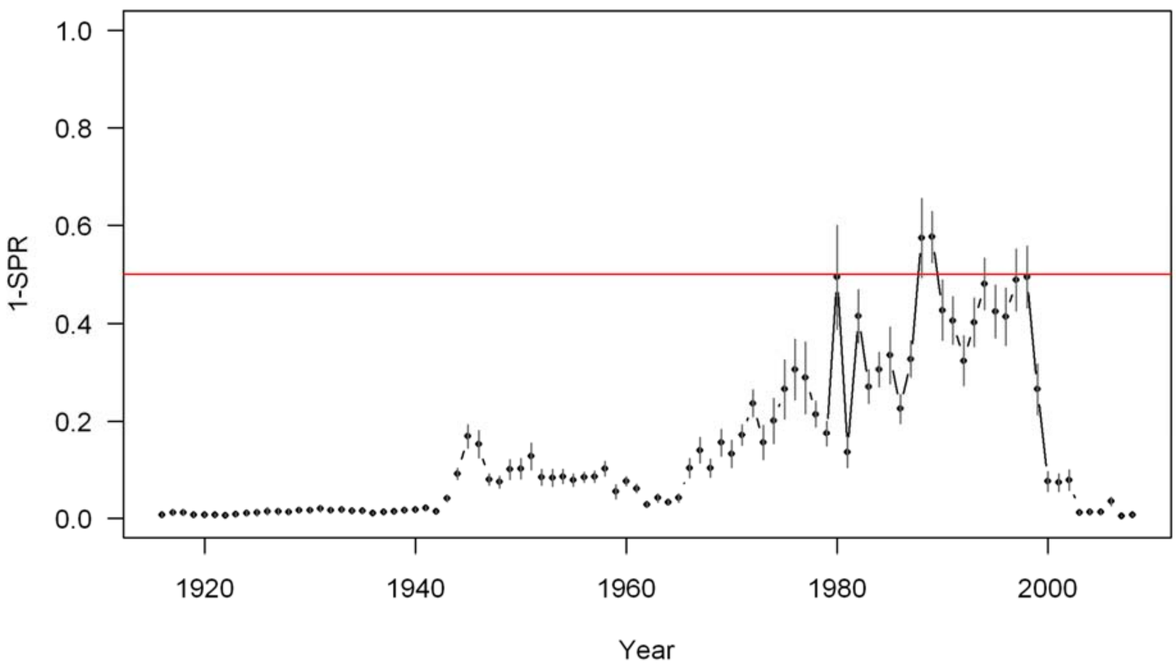

Figure 85: Estimated spawning potential ratio (shown as 1-SPR) from the base case model with approximate 95% asymptotic confidence intervals. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis. The management target is plotted as a red horizontal line and values above this reflect harvests in excess of the overfishing proxy based on $SPR_{50\%}$.

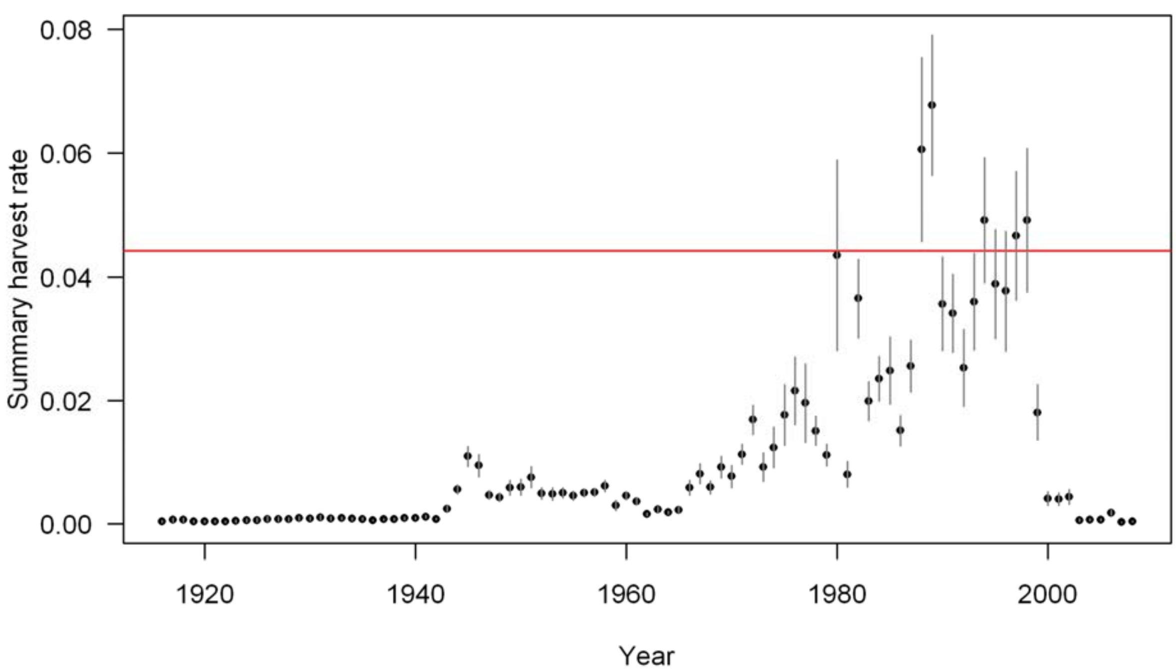

Figure 86: Time series of estimated summary harvest rate (total catch divided by age 2 and older biomass) for the base case model (round points) with approximate 95% asymptotic confidence intervals (grey lines). The red line is the harvest rate at the overfishing proxy using $SPR_{50\%}$.

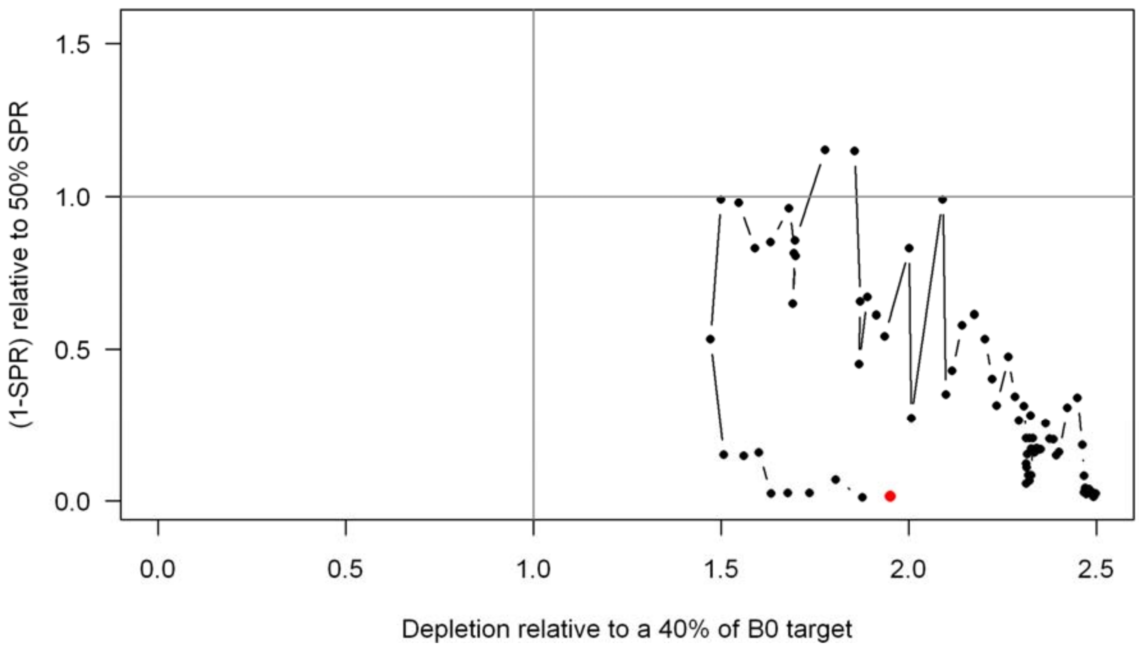

Figure 87: Phase plot of the predicted trajectory for greenstriped rockfish relative to the $SPR_{50\%}$ harvest rate and $B_{40\%}$ target. The red dot shows the current value (2008).

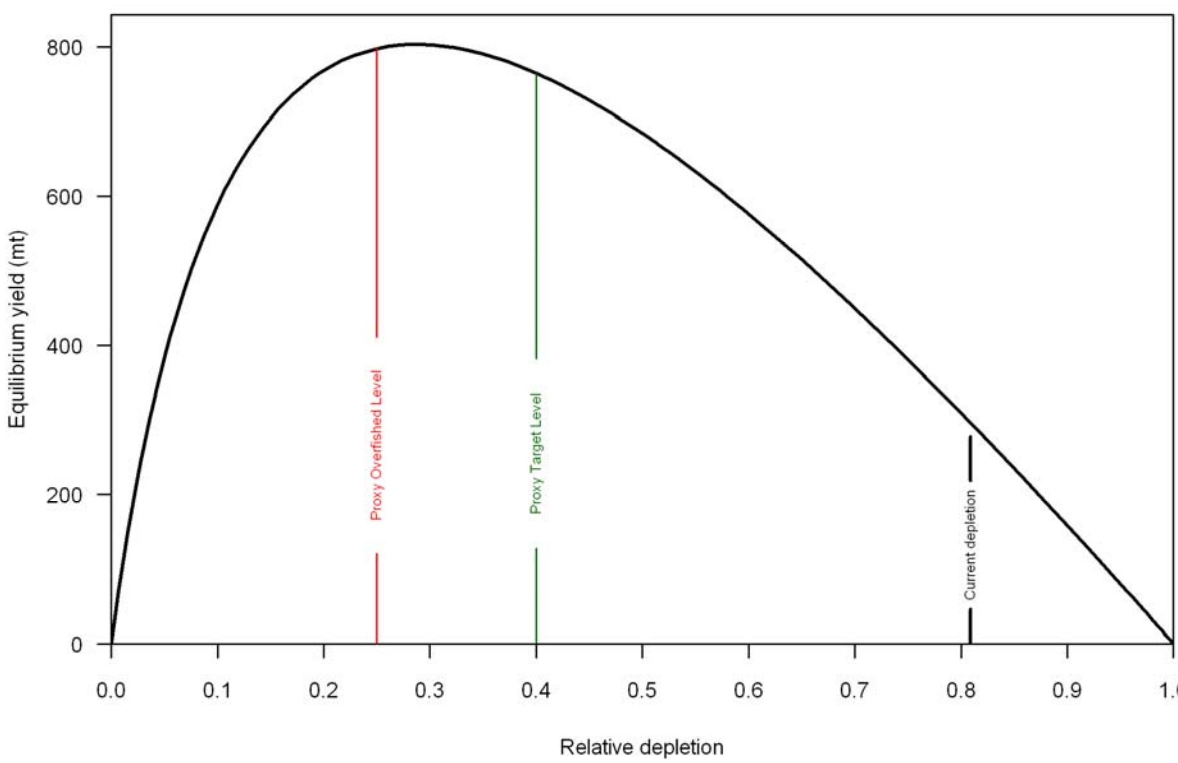

Figure 88: Estimated equilibrium yield with target levels based on 40% of unfished spawning output (solid lines) and target levels based on the spawning output at *MSY* (dashed lines).

Appendix A: Numbers at age matrix

Gender	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50		
1	1916	7521	6942	6409	5916	5461	5041	4654	4296	3966	3661	3379	3119	2880	2658	2454	2265	2091
	1930	1782	1645	1518	1402	1294	1194	1103	1018	940	867	801	739	682	630	581	537	495
	457	422	390	360	332	307	283	261	241	223	205	190	175	162	149	1791		
1	1917	7520	6942	6409	5916	5461	5041	4653	4296	3965	3660	3379	3119	2879	2657	2453	2264	2090
	1929	1781	1644	1518	1401	1293	1194	1102	1017	939	867	800	739	682	629	581	536	495
	457	422	389	359	332	306	283	261	241	222	205	190	175	162	149	1790		
1	1918	7520	6942	6409	5916	5461	5041	4653	4295	3965	3660	3378	3118	2878	2656	2452	2263	2089
	1928	1780	1643	1516	1400	1292	1193	1101	1016	938	866	799	738	681	629	580	536	494
	456	421	389	359	331	306	282	261	241	222	205	189	175	161	149	1787		
1	1919	7519	6941	6408	5916	5461	5041	4653	4295	3964	3659	3377	3117	2877	2656	2451	2262	2088
	1927	1779	1642	1515	1399	1291	1192	1100	1015	937	865	798	737	680	628	580	535	494
	456	421	388	359	331	306	282	260	240	222	205	189	175	161	149	1785		
1	1920	7519	6941	6408	5916	5461	5041	4653	4295	3964	3659	3377	3117	2877	2655	2451	2262	2088
	1927	1778	1641	1515	1398	1290	1191	1099	1015	937	864	798	737	680	628	579	535	494
	456	421	388	358	331	305	282	260	240	222	205	189	174	161	149	1784		
1	1921	7518	6941	6407	5915	5461	5041	4653	4295	3964	3659	3377	3117	2877	2655	2450	2261	2087
	1926	1778	1641	1514	1398	1290	1190	1099	1014	936	864	797	736	679	627	579	534	493
	455	420	388	358	331	305	282	260	240	222	205	189	174	161	149	1783		
1	1922	7518	6940	6407	5915	5460	5041	4653	4295	3965	3659	3377	3117	2877	2655	2450	2261	2087
	1926	1777	1640	1514	1397	1289	1190	1098	1014	936	864	797	736	679	627	579	534	493
	455	420	388	358	330	305	281	260	240	221	204	189	174	161	148	1781		
1	1923	7518	6940	6407	5914	5460	5040	4653	4295	3965	3659	3377	3117	2877	2655	2450	2261	2087
	1926	1777	1640	1514	1397	1289	1190	1098	1013	935	863	797	735	679	626	578	534	493
	455	420	387	358	330	305	281	260	240	221	204	189	174	161	148	1780		
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	1925	1777	1640	1513	1396	1289	1189	1097	1013	935	863	796	735	678	626	578	533	492
	454	419	387	357	330	305	281	259	240	221	204	188	174	161	148	1779		
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	1925	1776	1639	1513	1396	1288	1189	1097	1012	934	862	796	734	678	626	577	533	492
	454	419	387	357	330	304	281	259	239	221	204	188	174	160	148	1777		
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	1924	1776	1639	1512	1395	1287	1188	1096	1012	933	861	795	734	677	625	577	532	491
	454	419	386	357	329	304	280	259	239	221	204	188	174	160	148	1775		
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	1924	1775	1638	1511	1394	1286	1187	1095	1011	933	861	794	733	676	624	576	532	491
	453	418	386	356	329	303	280	259	239	220	203	188	173	160	148	1772		
1	1928	7516	6938	6405	5913	5459	5039	4651	4294	3963	3658	3376	3116	2876	2654	2448	2259	2084
	1923	1774	1637	1510	1393	1286	1186	1094	1010	932	860	793	732	676	624	575	531	490
	452	418	385	356	328	303	280	258	238	220	203	187	173	160	147	1769		

1	1929	7515	6938	6405	5913	5458	5039	4651	4293	3963	3657	3376	3115	2875	2653	2448	2259	2084
	1923	1774	1636	1510	1393	1285	1186	1094	1009	931	859	793	732	675	623	575	531	490
	452	417	385	355	328	303	279	258	238	220	203	187	173	159	147	1767		
1	1930	7515	6937	6404	5912	5458	5038	4650	4292	3962	3656	3374	3114	2874	2652	2447	2258	2083
	1922	1773	1636	1509	1392	1284	1185	1093	1008	930	858	792	731	674	622	574	530	489
	451	417	384	355	327	302	279	257	238	219	202	187	173	159	147	1764		
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	1921	1772	1635	1508	1391	1284	1184	1092	1008	930	858	791	730	674	622	574	529	488
	451	416	384	354	327	302	279	257	237	219	202	187	172	159	147	1762		
1	1932	7513	6936	6404	5912	5457	5037	4650	4291	3960	3655	3372	3112	2872	2650	2445	2256	2082
	1920	1771	1634	1507	1390	1283	1183	1091	1007	929	857	790	729	673	621	573	529	488
	450	415	383	354	327	301	278	257	237	219	202	186	172	159	147	1759		
1	1933	7513	6936	6403	5911	5457	5037	4649	4291	3960	3654	3372	3111	2871	2649	2444	2255	2081
	1920	1771	1634	1507	1390	1282	1183	1091	1006	928	856	790	729	672	620	572	528	487
	450	415	383	353	326	301	278	256	237	218	202	186	172	159	146	1756		
1	1934	7512	6935	6402	5911	5456	5036	4648	4290	3959	3653	3371	3110	2870	2648	2443	2254	2080
	1919	1770	1633	1506	1389	1282	1182	1090	1006	928	856	789	728	672	620	572	528	487
	449	415	382	353	326	301	277	256	236	218	201	186	172	158	146	1754		
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	1918	1770	1633	1506	1389	1281	1182	1090	1005	927	855	789	728	671	619	571	527	486
	449	414	382	353	325	300	277	256	236	218	201	186	171	158	146	1752		
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	1918	1769	1632	1506	1389	1281	1182	1090	1005	927	855	789	728	671	619	571	527	486
	449	414	382	352	325	300	277	256	236	218	201	185	171	158	146	1750		
1	1937	7512	6934	6401	5909	5455	5035	4648	4289	3958	3652	3370	3109	2869	2647	2442	2253	2079
	1918	1769	1632	1506	1389	1281	1182	1090	1005	927	855	789	728	671	619	571	527	486
	448	414	382	352	325	300	277	255	236	218	201	185	171	158	146	1748		
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	1917	1769	1632	1505	1389	1281	1182	1090	1005	927	855	789	728	671	619	571	527	486
	448	414	382	352	325	300	277	255	236	217	201	185	171	158	146	1747		
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	1917	1768	1631	1505	1389	1281	1182	1090	1005	927	855	789	727	671	619	571	527	486
	448	413	381	352	325	300	276	255	235	217	200	185	171	158	145	1745		
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	1916	1768	1631	1505	1388	1280	1181	1090	1005	927	855	788	727	671	619	571	526	486
	448	413	381	352	324	299	276	255	235	217	200	185	171	157	145	1743		
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	1915	1767	1630	1504	1387	1280	1181	1089	1005	927	855	788	727	670	618	570	526	485
	448	413	381	351	324	299	276	255	235	217	200	185	170	157	145	1741		
1	1942	7510	6933	6400	5908	5454	5034	4646	4287	3956	3649	3367	3106	2866	2644	2439	2250	2075
	1914	1766	1629	1503	1386	1279	1180	1088	1004	926	854	788	726	670	618	570	526	485
	447	412	380	351	324	299	276	254	235	216	200	184	170	157	145	1738		
1	1943	7510	6933	6400	5908	5454	5034	4647	4288	3957	3650	3368	3107	2866	2644	2439	2250	2075
	1914	1766	1629	1502	1386	1278	1179	1088	1003	925	854	787	726	670	618	570	525	484
	447	412	380	351	324	298	275	254	234	216	200	184	170	157	145	1735		

1	1944	7508	6932	6399	5908	5453	5034	4646	4287	3955	3649	3366	3105	2864	2641	2436	2247	2072
	1911	1762	1625	1499	1383	1275	1176	1085	1001	923	851	785	724	668	616	568	524	483
	446	411	379	350	322	297	274	253	234	216	199	183	169	156	144	1728		
1	1945	7503	6931	6399	5907	5451	5030	4640	4280	3947	3640	3357	3095	2854	2632	2426	2237	2063
	1902	1753	1617	1491	1375	1268	1169	1078	994	917	846	780	719	663	612	564	520	480
	442	408	376	347	320	295	272	251	232	214	197	182	168	155	143	1714		
1	1946	7494	6927	6397	5905	5448	5023	4628	4264	3927	3619	3335	3073	2832	2610	2405	2216	2043
	1882	1735	1599	1474	1359	1252	1154	1064	981	905	834	769	709	654	603	556	513	473
	436	402	371	342	315	291	268	248	228	211	194	179	165	153	141	1688		
1	1947	7486	6918	6394	5904	5447	5020	4622	4253	3913	3601	3316	3054	2813	2592	2387	2199	2026
	1867	1720	1585	1460	1345	1240	1143	1053	971	895	825	761	701	647	596	550	507	467
	431	397	366	338	312	287	265	244	226	208	192	177	163	151	139	1666		
1	1948	7483	6911	6386	5901	5448	5025	4628	4258	3916	3602	3314	3050	2809	2587	2382	2194	2021
	1861	1714	1579	1455	1340	1235	1138	1049	966	891	821	757	698	643	593	547	504	465
	429	395	364	336	310	286	264	243	224	207	191	176	162	150	138	1655		
1	1949	7481	6908	6379	5894	5446	5026	4632	4264	3922	3605	3315	3049	2806	2583	2378	2190	2016
	1857	1710	1575	1450	1336	1231	1134	1045	963	887	818	754	695	640	590	544	502	463
	427	393	363	334	308	284	262	242	223	206	190	175	161	149	137	1645		
1	1950	7477	6906	6377	5888	5438	5021	4630	4264	3922	3605	3313	3045	2800	2576	2371	2182	2009
	1850	1703	1568	1444	1330	1225	1128	1039	957	882	813	749	690	636	587	541	499	460
	424	391	360	332	306	282	260	240	221	204	188	174	160	148	136	1632		
1	1951	7473	6902	6375	5886	5432	5014	4626	4261	3921	3605	3312	3042	2795	2570	2364	2175	2002
	1843	1696	1562	1438	1324	1219	1122	1034	952	877	808	745	686	632	583	537	495	457
	421	388	358	330	304	280	258	238	220	203	187	172	159	147	135	1619		
1	1952	7468	6899	6371	5883	5429	5007	4616	4253	3914	3599	3307	3037	2789	2562	2355	2166	1992
	1833	1687	1553	1429	1315	1211	1115	1026	945	871	802	739	681	627	578	533	491	453
	417	385	355	327	301	278	256	236	218	201	185	171	158	145	134	1603		
1	1953	7466	6894	6368	5881	5429	5007	4615	4251	3915	3601	3310	3040	2792	2563	2354	2163	1989
	1829	1683	1549	1425	1311	1207	1111	1023	942	867	799	736	678	624	575	530	489	450
	415	383	353	325	300	276	255	235	217	200	184	170	157	144	133	1592		
1	1954	7464	6892	6364	5878	5426	5007	4615	4249	3912	3601	3311	3043	2794	2565	2355	2162	1987
	1827	1680	1545	1422	1308	1204	1108	1020	939	864	796	733	675	622	573	528	486	448
	413	381	351	324	298	275	253	234	215	199	183	169	156	144	132	1583		
1	1955	7462	6890	6362	5874	5424	5005	4614	4250	3911	3599	3312	3044	2797	2568	2357	2163	1986
	1824	1677	1542	1418	1305	1200	1104	1016	935	861	792	730	672	619	570	525	484	446
	411	379	349	322	297	273	252	232	214	197	182	168	155	143	132	1572		
1	1956	7461	6888	6360	5872	5420	5003	4613	4251	3913	3599	3311	3046	2799	2571	2360	2166	1987
	1824	1676	1540	1416	1302	1198	1102	1014	933	858	790	727	669	616	568	523	482	444
	409	377	347	320	295	272	251	231	213	196	181	167	154	142	131	1563		
1	1957	7459	6887	6359	5871	5419	5000	4612	4251	3914	3602	3312	3046	2801	2573	2363	2168	1989
	1825	1675	1538	1413	1299	1195	1099	1011	930	855	787	724	667	614	565	520	479	442
	407	375	345	318	293	270	249	230	212	195	180	166	153	141	130	1552		
1	1958	7457	6885	6357	5869	5417	4999	4610	4249	3914	3603	3314	3046	2800	2574	2364	2171	1991
	1827	1675	1537	1411	1297	1192	1096	1008	927	852	784	721	664	611	562	518	477	439
	405	373	343	316	292	269	248	228	211	194	179	165	152	140	129	1541		

1	1959	7454	6884	6356	5868	5415	4996	4606	4244	3910	3599	3312	3045	2798	2571	2363	2170	1991
	1827	1675	1536	1409	1293	1188	1092	1004	923	849	780	718	660	608	559	515	474	436
	402	370	341	314	290	267	246	227	209	193	178	164	151	139	128	1528		
1	1960	7455	6881	6354	5867	5415	4996	4606	4245	3910	3601	3314	3049	2802	2575	2366	2174	1997
	1832	1680	1541	1413	1296	1190	1093	1004	923	849	780	718	660	607	559	514	473	436
	401	370	340	314	289	266	245	226	208	192	177	163	151	139	128	1523		
1	1961	7454	6882	6352	5865	5414	4996	4607	4246	3911	3601	3315	3050	2805	2578	2368	2175	1998
	1834	1683	1543	1415	1297	1190	1092	1003	921	847	778	716	658	605	557	512	472	434
	400	368	339	312	288	265	244	225	207	191	176	162	150	138	127	1513		
1	1962	7454	6881	6352	5863	5413	4996	4609	4249	3915	3605	3318	3053	2809	2582	2372	2179	2001
	1838	1687	1547	1418	1300	1192	1093	1003	921	846	778	715	657	604	556	511	470	433
	398	367	338	311	286	264	243	224	206	190	175	162	149	137	127	1505		
1	1963	7456	6881	6352	5864	5412	4996	4610	4252	3919	3610	3324	3059	2815	2589	2380	2187	2008
	1844	1694	1554	1426	1307	1198	1098	1007	924	848	779	716	658	605	557	512	471	433
	399	367	338	311	286	264	243	224	206	190	175	162	149	137	126	1503		
1	1964	7457	6883	6352	5863	5412	4994	4608	4251	3919	3611	3326	3062	2818	2593	2385	2192	2014
	1849	1698	1559	1431	1312	1203	1103	1011	927	850	781	717	659	606	557	512	471	433
	399	367	338	311	286	264	243	224	206	190	175	161	149	137	126	1499		
1	1965	7459	6884	6354	5863	5412	4995	4607	4251	3920	3614	3330	3067	2823	2597	2390	2197	2020
	1855	1703	1564	1436	1318	1209	1108	1015	931	853	783	719	660	607	558	513	472	434
	399	367	338	311	286	263	243	223	206	190	175	161	148	137	126	1496		
1	1966	7460	6886	6355	5865	5411	4993	4607	4248	3918	3613	3330	3068	2825	2600	2392	2201	2024
	1860	1708	1568	1440	1322	1213	1113	1020	935	857	785	721	662	608	559	513	472	434
	399	367	338	311	286	263	242	223	206	189	175	161	148	137	126	1493		
1	1967	7458	6887	6356	5865	5411	4988	4598	4238	3904	3599	3317	3056	2815	2592	2385	2194	2019
	1856	1706	1567	1438	1320	1212	1112	1020	935	857	785	720	661	607	557	512	471	433
	398	366	337	310	285	262	241	222	205	188	174	160	147	136	125	1484		
1	1968	7454	6885	6357	5866	5409	4984	4588	4222	3886	3577	3295	3036	2797	2576	2372	2182	2008
	1847	1698	1560	1433	1315	1208	1109	1017	933	855	784	718	658	604	555	510	468	430
	396	364	335	308	283	261	240	221	203	187	172	159	146	135	124	1471		
1	1969	7451	6881	6355	5867	5412	4987	4590	4221	3881	3570	3285	3025	2787	2567	2364	2176	2002
	1841	1694	1557	1431	1314	1206	1107	1016	932	855	784	718	658	603	554	508	467	429
	394	363	333	307	282	259	239	220	202	186	171	158	145	134	123	1461		
1	1970	3509	6878	6351	5865	5411	4984	4585	4212	3868	3553	3266	3004	2766	2547	2346	2160	1988
	1829	1682	1547	1422	1307	1200	1101	1011	928	852	781	716	656	601	551	506	464	426
	392	360	331	304	280	257	237	218	201	185	170	157	144	133	122	1447		
1	1971	16224	3239	6349	5862	5410	4986	4586	4212	3865	3546	3256	2992	2751	2533	2332	2148	1977
	1820	1674	1540	1416	1301	1196	1098	1008	925	849	779	714	655	600	550	504	462	424
	390	358	329	303	278	256	235	217	199	183	169	155	143	132	121	1435		
1	1972	4800	14977	2990	5860	5407	4986	4589	4216	3867	3546	3250	2981	2738	2516	2315	2130	1961
	1804	1659	1526	1403	1289	1185	1088	999	916	841	772	708	649	595	545	499	458	420
	385	354	325	299	275	253	232	214	197	181	166	153	141	130	120	1413		
1	1973	4422	4431	13824	2759	5403	4979	4583	4210	3860	3536	3238	2964	2717	2492	2288	2103	1934
	1778	1635	1503	1381	1269	1166	1071	983	902	827	759	696	638	585	536	491	450	412
	378	347	319	293	269	247	227	209	192	177	163	150	138	127	117	1379		

1	1974	10357	4082	4090	12758	2544	4977	4578	4206	3859	3535	3236	2961	2711	2484	2278	2091	1922
	1767	1625	1494	1373	1261	1159	1064	978	897	823	755	693	636	583	534	489	448	411
	376	345	317	291	267	246	226	208	191	176	162	149	137	126	116	1365		
1	1975	5699	9560	3768	3774	11763	2342	4571	4195	3847	3525	3226	2951	2700	2470	2263	2075	1904
	1750	1608	1479	1359	1249	1147	1054	968	889	816	749	687	630	578	530	485	445	407
	373	342	314	288	264	243	223	205	189	173	160	147	135	124	114	1346		
1	1976	4135	5261	8825	3476	3478	10813	2146	4175	3822	3498	3201	2927	2676	2447	2238	2049	1879
	1724	1583	1455	1337	1229	1129	1037	952	875	803	737	676	620	569	522	478	438	402
	368	337	309	283	260	239	219	202	185	170	157	144	132	122	112	1318		
1	1977	5449	3817	4856	8142	3203	3195	9898	1957	3795	3467	3168	2896	2646	2418	2209	2020	1848
	1693	1553	1426	1310	1203	1105	1015	932	856	786	722	662	607	557	511	469	429	394
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1	1978	13468	5030	3523	4480	7501	2942	2925	9027	1779	3444	3141	2869	2620	2393	2186	1997	1825
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1	1979	5347	12433	4643	3251	4133	6913	2709	2689	8288	1632	3154	2874	2621	2391	2181	1990	1816
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1	1980	4650	4936	11476	4285	3000	3809	6365	2491	2470	7604	1496	2889	2630	2397	2185	1992	1816
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1	1981	15201	4292	4555	10580	3937	2739	3448	5713	2220	2191	6727	1321	2548	2317	2110	1923	1752
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1	1982	5630	14032	3962	4205	9762	3631	2523	3174	5254	2040	2012	6174	1211	2336	2123	1933	1760
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1	1983	3845	5197	12949	3654	3871	8957	3316	2294	2873	4740	1836	1806	5530	1083	2084	1891	1718
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	313	286	262	241	220	202	185	169	155	142	130	119	110	101	92	1073		
1	1984	19037	3549	4796	11948	3369	3564	8229	3040	2098	2624	4322	1671	1642	5021	982	1887	1710
	1552	1410	1281	1164	1058	963	877	801	732	670	613	562	515	472	433	397	364	333
	305	280	256	235	215	197	181	165	151	139	127	116	107	98	90	1043		
1	1985	12363	17574	3275	4425	11014	3100	3272	7537	2778	1913	2387	3925	1515	1487	4538	886	1701
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1	1986	3116	11412	16220	3022	4077	10120	2839	2985	6853	2519	1732	2158	3544	1366	1339	4083	797
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1	1987	4325	2877	10534	14969	2787	3757	9314	2609	2739	6280	2306	1583	1970	3231	1244	1218	3710
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1	1988	10111	3993	2655	9718	13798	2565	3450	8531	2383	2497	5712	2093	1434	1781	2915	1121	1095
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1	1989	4589	9334	3684	2447	8922	12579	2316	3085	7564	2100	2190	4991	1823	1246	1543	2519	966
	942	2858	555	1060	955	862	778	704	637	577	523	475	432	394	360	329	301	275
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1	1991	1591	2097	3910	7942	3126	2063	7451	10379	1888	2487	6043	1664	1721	3894	1412	958	1178
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1	1996	2547	2987	6471	22757	1275	1058	1384	2554	5122	1987	1291	4586	6284	1125	1458	3484	944
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	835	847	1884	672	449	544	870	328	314	938	180	338	301	269	241	216	194	174
	157	142	128	117	106	97	88	80	73	67	61	56	51	47	43	473		
1	1998	11021	1410	2170	2541	5493	19225	1070	881	1143	2093	4166	1604	1035	3651	4967	883	1136
	2699	727	736	1633	581	387	469	749	281	269	804	154	289	257	230	205	184	165
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1	1999	13949	10173	1300	2001	2339	5037	17545	971	795	1027	1873	3714	1425	915	3216	4359	772
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1	2000	14386	12877	9389	1200	1845	2153	4628	16083	889	726	937	1706	3378	1294	830	2915	3946
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	140	125	113	101	91	83	75	68	62	57	52	47	43	39	36	393		
1	2001	7254	13280	11886	8667	1107	1701	1985	4263	14809	818	668	861	1569	3106	1190	763	2678
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1	2004	11817	5704	9735	5706	10445	9347	6812	870	1335	1556	3340	11593	640	522	673	1224	2422
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1	2008	7292	6584	4080	8353	8580	4141	7067	4141	7577	6779	4939	630	968	1128	2419	8393	463
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1	2009	7328	6732	6078	3766	7710	7920	3822	6523	3822	6994	6256	4558	582	893	1040	2232	7745
	427	349	449	817	1616	618	396	1390	1881	332	426	1007	270	272	602	213	142	171
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1	2010	7361	6765	6214	5610	3477	7117	7311	3528	6020	3527	6455	5774	4207	537	824	960	2060
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1	2011	7389	6795	6245	5736	5179	3209	6570	6748	3257	5557	3256	5957	5329	3882	496	760	886
	1901	6595	364	297	382	696	1376	526	338	1184	1601	283	362	857	230	232	512	182
	121	146	232	87	83	248	47	89	79	70	63	56	50	45	41	421		
1	2012	7365	6821	6271	5760	5280	4746	2922	5935	6050	2901	4924	2874	5244	4681	3404	434	665
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1	2013	7336	6799	6295	5784	5301	4838	4321	2640	5322	5389	2570	4346	2530	4606	4104	2981	380
	581	676	1447	5014	276	225	290	526	1040	398	255	893	1207	213	273	645	173	174
	385	137	91	109	174	65	62	186	36	67	59	53	47	42	38	381		
1	2014	7305	6772	6275	5806	5323	4858	4405	3904	2367	4740	4775	2269	3826	2222	4039	3594	2607
	332	507	590	1262	4368	240	196	252	458	904	346	221	775	1048	185	237	560	150
	151	334	118	79	95	151	57	54	161	31	58	51	46	41	37	363		
1	2015	7271	6743	6250	5787	5344	4878	4423	3980	3500	2108	4200	4215	1997	3360	1948	3536	3143
	2278	289	443	514	1099	3803	209	170	219	398	785	300	192	673	909	161	206	485
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1	2016	7237	6712	6224	5765	5326	4897	4442	3996	3568	3118	1868	3708	3710	1754	2947	1706	3093
	2747	1989	253	386	448	957	3309	182	148	190	345	682	261	167	584	789	139	178
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1	2017	7202	6680	6195	5740	5306	4881	4459	4013	3583	3178	2763	1649	3263	3259	1538	2580	1492
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1	2018	7167	6648	6166	5714	5283	4862	4444	4028	3598	3191	2816	2439	1451	2866	2858	1347	2257
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1	2019	7132	6616	6136	5687	5259	4841	4427	4015	3612	3205	2828	2486	2147	1275	2513	2502	1178
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1	2020	7099	6584	6106	5659	5234	4819	4408	4000	3600	3217	2840	2496	2188	1885	1118	2201	2189
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2	1916	7521	6942	6409	5916	5461	5041	4654	4296	3966	3661	3379	3119	2880	2658	2454	2265	2091
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	1929	1781	1644	1517	1401	1293	1194	1102	1017	939	867	800	738	682	629	581	536	495
	457	422	389	359	332	306	283	261	241	222	205	190	175	162	149	1790		
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	1928	1780	1643	1516	1400	1292	1193	1101	1016	938	866	799	738	681	629	580	536	495
	457	421	389	359	332	306	283	261	241	222	205	189	175	161	149	1788		
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	454	420	387	357	330	305	281	260	240	221	204	188	174	161	148	1779		
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	1924	1776	1639	1512	1396	1288	1188	1097	1012	934	862	796	734	678	626	577	533	492
	454	419	387	357	330	304	281	259	239	221	204	188	174	160	148	1778		
2	1932	7513	6936	6404	5911	5457	5037	4650	4291	3961	3656	3374	3114	2873	2652	2447	2259	2084
	1924	1775	1638	1511	1395	1287	1188	1096	1012	934	862	795	734	677	625	577	533	492
	454	419	387	357	329	304	281	259	239	221	204	188	174	160	148	1776		
2	1933	7513	6936	6403	5911	5457	5037	4649	4291	3960	3655	3373	3113	2873	2651	2447	2258	2084
	1923	1774	1637	1511	1394	1287	1187	1096	1011	933	861	795	733	677	625	577	532	491
	453	419	386	357	329	304	280	259	239	221	204	188	174	160	148	1775		
2	1934	7512	6935	6402	5911	5456	5036	4648	4290	3960	3654	3372	3112	2872	2650	2446	2257	2083
	1922	1774	1637	1510	1394	1286	1187	1095	1011	933	861	794	733	676	624	576	532	491
	453	418	386	356	329	304	280	259	239	220	203	188	173	160	148	1773		
2	1935	7512	6935	6402	5910	5456	5036	4648	4290	3959	3654	3372	3111	2871	2649	2445	2256	2082
	1921	1773	1636	1510	1393	1286	1186	1095	1010	932	860	794	733	676	624	576	532	491
	453	418	386	356	329	303	280	258	239	220	203	188	173	160	148	1772		
2	1936	7512	6935	6402	5910	5455	5035	4648	4289	3959	3653	3371	3111	2871	2649	2444	2255	2081
	1921	1772	1636	1509	1393	1285	1186	1094	1010	932	860	793	732	676	624	576	531	490
	453	418	385	356	328	303	280	258	238	220	203	188	173	160	147	1771		
2	1937	7512	6934	6401	5909	5455	5035	4648	4289	3959	3653	3371	3111	2870	2649	2444	2255	2081
	1920	1772	1635	1509	1393	1285	1186	1094	1010	932	860	793	732	676	623	575	531	490
	452	417	385	356	328	303	280	258	238	220	203	187	173	160	147	1770		
2	1938	7511	6934	6401	5909	5454	5035	4647	4289	3958	3653	3371	3110	2870	2648	2444	2255	2081
	1920	1772	1635	1509	1392	1285	1185	1094	1009	931	859	793	732	675	623	575	531	490
	452	417	385	355	328	303	280	258	238	220	203	187	173	160	147	1768		
2	1939	7511	6934	6401	5909	5454	5034	4647	4288	3958	3652	3370	3110	2870	2648	2443	2254	2080
	1919	1771	1634	1508	1392	1284	1185	1093	1009	931	859	793	731	675	623	575	530	490
	452	417	385	355	328	303	279	258	238	220	203	187	173	159	147	1767		
2	1940	7511	6934	6401	5909	5454	5034	4646	4288	3957	3651	3369	3109	2869	2647	2442	2254	2079
	1919	1770	1634	1507	1391	1283	1184	1093	1008	931	859	792	731	675	623	574	530	489
	452	417	385	355	328	302	279	258	238	219	203	187	173	159	147	1766		
2	1941	7511	6933	6401	5908	5454	5033	4645	4287	3956	3651	3369	3108	2868	2646	2442	2253	2079
	1918	1770	1633	1507	1390	1283	1184	1092	1008	930	858	792	731	674	622	574	530	489
	451	416	384	355	327	302	279	257	238	219	202	187	172	159	147	1764		
2	1942	7510	6933	6400	5908	5454	5033	4645	4287	3956	3650	3368	3108	2867	2645	2441	2252	2078
	1917	1769	1632	1506	1389	1282	1183	1092	1007	929	858	791	730	674	622	574	529	489
	451	416	384	354	327	302	279	257	237	219	202	187	172	159	147	1762		
2	1943	7510	6933	6400	5908	5454	5034	4646	4287	3956	3650	3368	3108	2867	2645	2441	2252	2077
	1917	1768	1632	1505	1389	1282	1183	1091	1007	929	857	791	730	674	621	573	529	488
	451	416	384	354	327	302	278	257	237	219	202	187	172	159	147	1760		

2	1944	7508	6932	6399	5907	5452	5032	4644	4285	3953	3647	3365	3104	2864	2642	2437	2249	2074
	1914	1765	1629	1503	1386	1279	1180	1089	1005	927	855	789	728	672	620	572	528	487
	450	415	383	353	326	301	278	256	237	218	202	186	172	158	146	1756		
2	1945	7503	6931	6399	5905	5449	5027	4637	4277	3945	3638	3355	3094	2854	2632	2428	2239	2065
	1905	1757	1621	1495	1379	1273	1174	1083	999	922	851	785	724	668	617	569	525	485
	447	413	381	351	324	299	276	255	235	217	200	185	171	158	145	1745		
2	1946	7494	6927	6397	5903	5443	5017	4624	4261	3926	3617	3334	3072	2832	2611	2407	2219	2046
	1887	1740	1605	1480	1365	1259	1162	1072	989	912	842	776	716	661	610	563	519	479
	442	408	376	347	321	296	273	252	233	215	198	183	169	156	144	1725		
2	1947	7486	6918	6393	5902	5442	5013	4616	4250	3913	3603	3317	3055	2815	2593	2390	2203	2030
	1872	1726	1591	1467	1353	1248	1151	1062	980	904	834	769	710	655	604	557	514	474
	438	404	373	344	317	293	270	249	230	212	196	181	167	154	142	1708		
2	1948	7483	6911	6386	5900	5444	5018	4621	4253	3914	3602	3315	3052	2810	2588	2384	2197	2025
	1866	1720	1586	1462	1348	1243	1147	1058	976	900	830	766	707	652	601	555	512	472
	436	402	371	342	316	292	269	248	229	211	195	180	166	153	142	1699		
2	1949	7481	6908	6379	5893	5444	5021	4626	4258	3918	3604	3316	3051	2808	2585	2381	2193	2020
	1862	1716	1582	1458	1344	1239	1143	1054	972	897	827	763	704	649	599	553	510	471
	434	401	370	341	315	290	268	247	228	211	194	179	166	153	141	1692		
2	1950	7477	6906	6377	5887	5436	5018	4626	4259	3918	3603	3314	3048	2803	2580	2374	2186	2013
	1855	1709	1575	1451	1338	1233	1137	1049	967	892	823	759	700	646	596	550	507	468
	432	398	367	339	313	289	266	246	227	209	193	178	165	152	140	1681		
2	1951	7473	6902	6374	5884	5429	5011	4623	4259	3919	3603	3312	3045	2800	2575	2369	2180	2007
	1848	1702	1568	1445	1332	1228	1132	1043	962	887	818	755	696	642	592	546	504	465
	429	396	365	337	311	287	265	244	225	208	192	177	164	151	139	1671		
2	1952	7468	6899	6371	5881	5426	5003	4613	4252	3915	3600	3308	3040	2794	2568	2361	2171	1998
	1839	1693	1560	1437	1324	1220	1124	1037	956	881	813	749	691	637	588	542	500	462
	426	393	363	335	309	285	263	242	224	206	191	176	162	150	138	1657		
2	1953	7466	6894	6368	5879	5426	5003	4610	4249	3915	3603	3312	3043	2795	2568	2360	2170	1995
	1836	1690	1556	1433	1320	1216	1121	1033	952	878	809	746	688	635	585	540	498	460
	424	391	361	333	307	283	262	241	223	205	190	175	161	149	137	1649		
2	1954	7464	6892	6364	5877	5424	5002	4610	4246	3912	3603	3314	3046	2798	2570	2360	2169	1994
	1833	1687	1552	1429	1316	1212	1117	1029	949	874	806	743	685	632	583	538	496	457
	422	389	359	331	306	282	260	240	222	204	189	174	161	148	137	1640		
2	1955	7462	6890	6362	5873	5421	5001	4610	4246	3909	3600	3315	3048	2801	2572	2362	2169	1993
	1832	1684	1549	1426	1312	1209	1113	1026	945	871	803	740	682	629	580	535	494	455
	420	387	357	330	304	281	259	239	221	203	188	173	160	148	136	1632		
2	1956	7461	6888	6360	5871	5418	4999	4609	4247	3910	3599	3313	3049	2803	2575	2364	2171	1994
	1831	1683	1548	1424	1310	1206	1110	1023	942	868	800	738	680	627	578	533	492	453
	418	386	356	328	303	280	258	238	220	203	187	172	159	147	135	1624		
2	1957	7459	6887	6358	5870	5416	4996	4608	4246	3911	3599	3311	3047	2804	2577	2367	2173	1995
	1832	1683	1546	1422	1307	1203	1107	1020	939	865	797	735	677	624	576	531	489	451
	416	384	354	327	301	278	257	237	218	202	186	172	158	146	135	1615		
2	1958	7457	6885	6357	5868	5415	4994	4604	4244	3910	3599	3311	3045	2802	2577	2369	2175	1996
	1833	1683	1545	1420	1305	1201	1105	1017	936	862	794	732	675	622	573	528	487	449
	414	382	353	325	300	277	255	236	217	201	185	171	158	145	134	1607		

2	1959	7454	6884	6356	5866	5412	4991	4601	4239	3906	3596	3309	3043	2798	2573	2367	2174	1996
	1832	1682	1544	1418	1303	1198	1101	1013	933	859	791	729	671	619	570	526	485	447
	412	380	350	323	298	275	254	234	216	199	184	170	157	144	133	1596		
2	1960	7455	6881	6354	5866	5413	4992	4603	4241	3907	3598	3312	3047	2802	2576	2369	2179	2002
	1838	1686	1548	1421	1305	1199	1102	1014	933	858	790	728	670	618	569	525	484	446
	411	379	350	323	297	274	253	234	215	199	183	169	156	144	133	1591		
2	1961	7454	6882	6352	5864	5412	4992	4603	4242	3907	3598	3312	3048	2804	2577	2369	2178	2003
	1840	1689	1550	1422	1306	1199	1102	1013	931	857	789	726	669	616	568	523	482	444
	410	378	348	321	296	273	252	233	215	198	183	168	155	143	132	1584		
2	1962	7454	6881	6352	5862	5411	4992	4604	4243	3909	3600	3314	3050	2806	2581	2372	2180	2004
	1843	1693	1554	1426	1308	1201	1103	1013	931	856	788	725	668	615	566	522	481	443
	409	377	347	320	295	272	251	232	214	197	182	168	155	143	132	1578		
2	1963	7456	6881	6352	5864	5411	4994	4606	4247	3914	3605	3320	3056	2813	2588	2379	2187	2010
	1848	1699	1560	1432	1314	1206	1107	1016	934	858	789	726	668	615	567	522	481	443
	409	377	347	320	295	272	251	232	214	197	182	168	155	143	132	1576		
2	1964	7457	6883	6352	5863	5411	4992	4606	4248	3916	3608	3323	3059	2816	2591	2384	2192	2015
	1851	1702	1565	1437	1319	1210	1111	1019	936	860	790	727	669	615	567	522	481	443
	408	376	347	320	295	272	251	231	213	197	181	167	154	143	131	1573		
2	1965	7459	6884	6354	5863	5411	4993	4606	4249	3918	3611	3327	3064	2820	2595	2389	2197	2020
	1857	1706	1568	1442	1324	1215	1115	1023	939	862	792	728	670	616	567	522	481	443
	408	376	347	319	295	272	250	231	213	196	181	167	154	142	131	1570		
2	1966	7460	6886	6355	5864	5410	4992	4606	4247	3918	3612	3328	3066	2823	2598	2391	2200	2024
	1861	1710	1571	1444	1328	1220	1119	1027	942	865	794	730	671	617	567	522	481	443
	408	376	346	319	294	271	250	231	213	196	181	167	154	142	131	1567		
2	1967	7458	6887	6356	5864	5408	4987	4598	4239	3907	3602	3319	3057	2815	2592	2385	2195	2019
	1857	1708	1569	1442	1325	1218	1119	1027	942	865	794	729	669	615	566	520	479	441
	406	374	345	318	293	270	249	229	212	195	180	166	153	141	130	1557		
2	1968	7454	6885	6357	5864	5406	4981	4588	4226	3893	3585	3303	3042	2802	2579	2374	2184	2009
	1849	1700	1563	1436	1319	1213	1115	1024	940	862	791	726	667	613	563	518	476	438
	404	372	342	315	291	268	247	228	210	194	179	165	152	140	129	1544		
2	1969	7451	6881	6355	5866	5408	4983	4588	4223	3888	3579	3295	3034	2794	2572	2368	2179	2005
	1844	1696	1560	1434	1318	1210	1113	1023	939	862	791	726	666	612	562	516	475	437
	402	370	341	314	289	267	246	227	209	193	178	164	151	139	128	1535		
2	1970	3509	6878	6351	5863	5407	4980	4582	4215	3876	3565	3280	3018	2778	2557	2353	2166	1993
	1833	1686	1551	1426	1311	1204	1106	1017	935	859	788	723	663	609	559	514	472	434
	399	367	338	312	287	264	244	225	207	191	176	162	150	138	127	1520		
2	1971	16224	3239	6349	5860	5405	4981	4583	4214	3873	3559	3271	3008	2767	2546	2343	2156	1984
	1825	1679	1544	1420	1306	1200	1103	1013	931	856	786	721	662	607	557	512	470	432
	397	366	336	310	285	263	242	223	206	190	175	161	149	137	126	1508		
2	1972	4800	14977	2989	5857	5401	4977	4581	4211	3868	3551	3261	2995	2753	2530	2327	2141	1970
	1812	1666	1532	1409	1296	1191	1095	1006	924	849	781	717	658	604	554	508	467	429
	394	362	333	307	282	260	240	221	203	187	173	159	147	135	125	1490		
2	1973	4422	4431	13823	2757	5394	4967	4570	4200	3854	3535	3242	2973	2729	2506	2302	2116	1946
	1789	1645	1513	1391	1279	1176	1081	993	912	838	770	708	650	596	547	502	461	423
	388	357	328	302	278	256	236	217	200	184	170	157	144	133	123	1464		

2	1974	10357	4082	4090	12752	2541	4968	4569	4199	3855	3535	3240	2969	2722	2497	2293	2106	1935
	1779	1636	1504	1383	1271	1169	1075	988	908	834	766	704	647	594	545	500	459	421
	387	355	326	300	276	254	234	215	198	183	168	155	143	132	122	1450		
2	1975	5699	9560	3767	3772	11750	2338	4565	4193	3848	3529	3233	2960	2712	2485	2279	2091	1920
	1765	1622	1491	1371	1260	1159	1065	979	900	827	760	698	641	589	541	496	455	418
	383	352	323	297	273	251	231	213	196	181	166	153	141	130	120	1431		
2	1976	4135	5261	8824	3474	3473	10796	2144	4176	3829	3509	3213	2940	2690	2463	2255	2067	1897
	1741	1599	1470	1351	1242	1142	1049	965	887	815	749	688	632	580	534	490	450	412
	378	347	319	293	269	247	228	209	193	178	164	151	139	128	118	1405		
2	1977	5449	3817	4855	8134	3196	3188	9886	1958	3807	3483	3187	2914	2664	2435	2228	2039	1868
	1713	1572	1444	1327	1219	1121	1030	947	870	800	735	675	620	570	523	481	442	405
	372	341	313	287	264	243	223	205	189	174	160	147	136	125	115	1373		
2	1978	13468	5030	3523	4476	7485	2935	2920	9035	1786	3466	3166	2893	2644	2415	2206	2017	1845
	1690	1550	1422	1306	1200	1102	1013	931	856	786	723	664	610	561	515	473	435	399
	366	336	308	283	260	239	219	202	185	171	157	145	133	123	113	1345		
2	1979	5347	12433	4643	3250	4125	6891	2698	2682	8286	1636	3171	2895	2643	2413	2202	2011	1838
	1681	1539	1410	1293	1188	1091	1002	921	846	778	715	657	603	554	509	468	430	395
	362	333	305	280	257	236	217	199	183	168	155	143	131	121	111	1324		
2	1980	4650	4936	11476	4284	2996	3800	6342	2481	2463	7605	1500	2906	2651	2419	2207	2014	1838
	1680	1536	1406	1288	1181	1084	996	915	840	772	710	652	599	551	506	465	427	392
	360	331	303	278	255	234	215	198	182	167	154	141	130	120	110	1309		
2	1981	15201	4292	4554	10560	3926	2732	3446	5721	2228	2203	6778	1334	2578	2347	2139	1950	1778
	1622	1481	1353	1238	1135	1040	955	877	805	740	680	624	574	527	484	445	409	375
	345	317	291	267	245	225	206	189	174	160	147	135	124	114	105	1249		
2	1982	5630	14032	3962	4203	9741	3619	2517	3173	5265	2049	2025	6227	1225	2366	2154	1963	1789
	1630	1487	1357	1240	1135	1040	953	875	803	738	677	622	572	525	483	444	408	374
	344	316	290	266	244	224	206	189	173	159	146	134	124	114	105	1240		
2	1983	3845	5197	12947	3649	3860	8915	3300	2287	2873	4751	1844	1818	5580	1096	2114	1922	1749
	1593	1451	1322	1206	1102	1008	923	846	776	712	654	601	552	507	466	428	393	361
	332	304	280	257	236	217	199	182	167	153	141	130	119	110	101	1191		
2	1984	19037	3549	4796	11937	3359	3547	8177	3021	2089	2621	4328	1677	1652	5065	994		1916
	1741	1584	1441	1312	1196	1091	996	911	834	764	701	643	591	542	498	458	420	386
	355	326	299	275	252	232	213	195	179	164	151	139	127	117	107	99	1166	
2	1985	12363	17574	3275	4421	10986	3085	3251	7477	2756	1903	2382	3927	1520	1495	4580	898	
	1730	1571	1428	1299	1182	1077	982	896	819	750	687	630	578	531	488	448	411	378
	347	319	293	269	247	227	208	191	176	161	148	136	124	114	105	97	1136	
2	1986	3116	11412	16219	3019	4067	10081	2824	2968	6810	2505	1726	2157	3552	1373	1350	4131	809
	1558	1414	1285	1169	1063	968	883	806	736	674	617	566	520	477	438	402	369	339
	312	286	263	242	222	204	187	172	158	145	133	122	112	103	94	1107		
2	1987	4325	2877	10533	14960	2782	3744	9269	2593	2721	6237	2292	1577	1970	3241	1252	1230	3762
	737	1418	1286	1169	1062	966	880	802	732	669	612	561	514	472	433	398	365	335
	308	283	260	239	219	201	185	170	156	143	131	120	110	101	93	1090		
2	1988	10111	3993	2654	9707	13763	2554	3429	8469	2364	2475	5662	2077	1427	1780	2925	1129	1108
	3386	663	1274	1156	1049	954	867	789	719	656	600	549	503	461	423	388	356	327
	300	276	254	233	214	196	180	166	152	140	128	118	108	99	91	1060		

2	1989	4589	9334	3683	2440	8875	12501	2304	3072	7538	2092	2180	4967	1816	1244	1548	2539	978
	959	2927	572	1100	997	904	822	747	679	619	565	516	472	432	396	363	333	306
	281	258	237	218	200	184	169	155	142	131	120	110	101	93	85	988		
2	1990	2271	4236	8608	3385	2232	8070	11295	2068	2740	6685	1845	1914	4342	1582	1080	1340	2193
	843	825	2515	491	942	853	774	702	638	580	528	481	440	402	368	337	309	284
	261	239	220	202	185	170	156	144	132	121	111	102	94	86	79	913		
2	1991	1591	2097	3909	7929	3110	2043	7363	10269	1873	2475	6022	1658	1717	3887	1414	964	
	1195	1954	751	734	2235	436	837	757	686	623	566	514	468	427	390	356	326	299
	274	252	231	212	195	179	164	151	138	127	117	107	98	90	83	76	878	
2	1992	1763	1469	1934	3601	7289	2851	1868	6709	9328	1697	2236	5427	1492	1541	3484	1265	862
	1067	1743	669	653	1990	388	744	673	610	553	502	456	415	379	346	316	289	265
	243	223	205	188	173	158	146	134	123	113	103	95	87	80	74	846		
2	1993	28969	1627	1355	1783	3315	6698	2615	1710	6129	8504	1544	2031	4921	1350	1393	3146	1141
	777	961	1568	601	587	1787	348	668	604	547	496	450	409	372	339	310	283	259
	237	218	200	183	168	155	142	130	120	110	101	93	85	78	72	823		
2	1994	7597	26742	1501	1248	1639	3038	6120	2382	1552	5548	7677	1390	1824	4412	1208	1245	2807
	1017	691	854	1393	534	521	1584	309	592	535	484	439	398	362	329	300	274	250
	229	210	192	177	162	149	137	125	115	106	97	89	82	75	69	791		
2	1995	3236	7013	24668	1381	1145	1497	2764	5541	2147	1394	4962	6842	1236	1617	3901	1066	1096
	2468	893	606	749	1219	467	455	1384	270	516	467	422	383	347	315	287	261	239
	218	200	183	168	154	141	130	119	109	100	92	85	78	71	65	748		
2	1996	2547	2987	6470	22716	1269	1048	1366	2513	5021	1939	1255	4455	6128	1104	1442	3473	948
	973	2189	791	537	662	1078	413	402	1222	238	455	411	372	337	306	278	253	230
	210	192	176	161	148	135	124	114	105	96	88	81	74	68	63	716		
2	1997	1527	2352	2756	5959	20872	1163	957	1244	2280	4542	1749	1128	3997	5486	986		1286
	3092	843	864	1942	701	475	586	953	365	355	1079	210	402	363	328	298	270	245
	223	203	185	169	155	142	130	119	109	100	92	85	78	71	66	60	686	
2	1998	11021	1410	2169	2536	5465	19063	1057	866	1120	2046	4060	1558	1003	3542	4851	871	
	1133	2721	741	759	1703	615	416	513	834	319	311	943	183	351	317	287	260	236
	214	195	177	162	148	135	124	113	104	95	88	80	74	68	62	57	651	
2	1999	13949	10173	1300	1996	2325	4989	17318	956	780	1004	1826	3611	1381	886	3125	4270	765
	994	2384	648	663	1488	536	363	447	727	278	270	821	160	305	276	249	226	205
	186	169	154	140	128	117	108	99	90	83	76	70	64	59	54	615		
2	2000	14386	12877	9389	1199	1838	2137	4577	15859	874	712	915	1662	3283	1255	805		2834
	3871	693	900	2158	587	600	1346	485	328	404	657	251	244	742	144	276	249	225
	204	185	168	153	139	127	116	106	97	89	82	75	69	63	58	53	605	
2	2001	7254	13280	11886	8664	1106	1695	1970	4217	14606	804	655	842	1529	3019	1154	740	
	2605	3558	637	827	1984	539	552	1237	446	302	371	604	231	225	681	133	254	229
	207	187	170	154	140	128	117	107	97	89	82	75	69	63	58	53	604	
2	2002	11424	6696	12258	10969	7994	1020	1562	1815	3885	13450	740	603	774	1406	2777	1061	680
	2395	3271	586	761	1823	495	507	1136	410	277	341	555	212	206	626	122	233	210
	190	172	156	142	129	117	107	98	90	82	75	69	63	58	53	604		
2	2003	6179	10546	6181	11312	10120	7372	940	1440	1672	3577	12379	681	554	712	1293	2553	975
	625	2201	3005	538	699	1674	455	466	1044	376	255	313	509	195	189	575	112	214
	193	175	158	143	130	118	108	98	90	82	75	69	63	58	53	604		

2	2004	11817	5704	9735	5706	10442	9341	6804	868	1329	1543	3300	11422	628	511	657	1193	2355
	900	577	2030	2772	496	644	1545	420	429	963	347	235	289	470	180	175	530	103
	197	178	161	146	132	120	109	99	91	83	76	69	64	58	54	606		
2	2005	10618	10908	5265	8986	5266	9638	8621	6279	801	1226	1424	3045	10539	580	472		606
		1100	2172	830	532	1873	2557	458	594	1425	387	396	888	320	217	267	433	166
	161	489	95	182	164	149	135	122	111	101	92	84	76	70	64	59	54	608
2	2006	4788	9802	10070	4860	8295	4861	8895	7956	5795	739	1131	1314	2810	9723	535	435	
	559	1015	2004	766	491	1727	2359	422	548	1314	357	365	819	295	200	246	400	153
	149	451	88	168	151	137	124	113	102	93	85	77	71	64	59	54	611	
2	2007	7132	4420	9048	9294	4485	7654	4484	8204	7337	5343	681	1043	1211	2589	8960	493	
	401	515	935	1846	705	452	1591	2173	389	505	1211	329	337	754	272	184	227	368
	141	137	416	81	155	140	126	114	104	94	86	78	71	65	59	54	612	
2	2008	7292	6584	4080	8352	8579	4140	7064	4139	7572	6772	4931	629	962	1118	2390	8269	455
	370	476	863	1704	651	417	1469	2005	359	466	1117	304	311	696	251	170	209	340
	130	126	383	75	143	129	116	105	96	87	79	72	66	60	55	615		
2	2009	7328	6732	6078	3766	7710	7919	3822	6520	3820	6989	6249	4551	580	888	1031	2205	7630
	420	342	439	796	1572	601	385	1355	1850	331	430	1031	280	287	642	231	157	193
	313	120	117	354	69	132	119	107	97	88	80	73	66	61	55	618		
2	2010	7361	6765	6214	5610	3477	7117	7310	3527	6018	3526	6450	5768	4200	535	820	952	
	2035	7041	387	315	405	735	1451	554	355	1250	1707	306	397	951	258	264	593	214
	145	178	289	111	108	326	63	121	110	99	90	81	74	67	61	56	622	
2	2011	7389	6795	6245	5736	5179	3209	6569	6747	3256	5554	3254	5953	5323	3876	494	756	
	878	1878	6498	357	291	374	678	1339	511	328	1154	1575	282	366	878	239	244	547
	197	133	164	267	102	99	301	59	112	101	92	83	75	68	62	56	625	
2	2012	7365	6821	6271	5757	5275	4743	2923	5943	6064	2909	4938	2882	5255	4688	3408	434	
	663	770	1645	5688	313	254	327	593	1170	447	286	1008	1376	246	320	766	208	213
	478	172	116	143	233	89	87	263	51	98	88	80	72	66	60	54	595	
2	2013	7336	6799	6295	5781	5294	4832	4320	2644	5342	5419	2586	4373	2544	4629	4122	2992	381
	581	674	1440	4976	274	222	286	518	1022	390	250	880	1202	215	279	669	182	186
	417	150	102	125	203	78	76	230	45	85	77	70	63	57	52	567		
2	2014	7305	6772	6274	5803	5316	4849	4400	3908	2377	4774	4818	2290	3861	2241	4070	3619	2625
	334	509	590	1260	4352	239	194	250	453	893	341	218	769	1050	188	244	584	159
	162	364	131	89	109	178	68	66	200	39	75	67	61	55	50	540		
2	2015	7271	6743	6250	5784	5337	4869	4416	3981	3513	2124	4244	4266	2022	3401	1970	3574	3175
	2300	292	446	516	1102	3805	209	170	218	395	780	298	191	672	917	164	213	510
	139	142	318	115	78	95	155	59	58	175	34	65	59	53	48	515		
2	2016	7237	6712	6223	5762	5319	4888	4435	3995	3579	3139	1888	3758	3767	1781	2990	1730	3134
	2782	2014	256	390	451	963	3326	183	148	191	345	681	260	167	586	800	143	186
	446	121	124	278	100	68	83	135	52	50	153	30	57	51	46	492		
2	2017	7202	6680	6195	5737	5299	4872	4452	4012	3591	3198	2791	1672	3318	3318	1566	2625	1517
	2747	2437	1763	224	341	395	842	2907	160	130	166	302	595	227	146	512	699	125
	162	389	106	108	242	87	59	73	118	45	44	133	26	50	45	470		
2	2018	7167	6648	6165	5711	5276	4853	4437	4028	3606	3209	2843	2472	1476	2923	2917	1375	2303
	1330	2406	2133	1543	196	298	345	736	2540	139	113	145	264	520	198	127	447	610
	109	142	340	92	94	212	76	52	64	103	39	38	116	23	43	449		

2	2019	7132	6616	6135	5684	5252	4832	4420	4014	3620	3223	2853	2518	2182	1300	2570	2561	1206
	2018	1165	2106	1866	1349	171	261	302	643	2219	122	99	127	230	454	173	111	390
	533	95	124	297	81	82	185	67	45	55	90	34	34	102	20	430		
2	2020	7099	6584	6106	5656	5227	4810	4401	3999	3608	3235	2865	2527	2223	1922	1143	2256	2247
	1057	1767	1019	1842	1632	1180	150	228	264	562	1939	106	86	111	201	396	151	97
	341	465	83	108	259	70	72	161	58	39	48	79	30	29	89	393		

Appendix B: SS2 Data file

```
#C Greenstriped rockfish assessment, 2009. A Hicks, M Haltuch, C Wetzel

1916 #_styr
2008 #_endyr
1 #_nseas
12 #_months/season
1 #_spawn_seas
5 #N fisheries
3 #N surveys
1 #N_areas
WO_TWL%CA_TWL%Foreign%OTH%Rec%earlyTri%lateTri%NWFSC
0.5 0.5 0.5 0.5 0.5 0.6 0.5 0.5 #timing_in_season
1 1 1 1 1 1 1 1 #_area_assignments_for_each_fishery_and_survey
1 1 1 1 1 #_units of catch:  1=bio; 2=num
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
50 #_Nages

0 0 0 0 0 #_init_equil_catch_for_each_fishery
93            #_N_lines_of_catch_to_read
#WO-TWL       CA_TWL Foreign      Other  All_Rec      Year   Season
0.000000      0.206838     0.000000     1.287295     0.000000     1916   1
0.000000      0.321143     0.000000     2.084257     0.000000     1917   1
0.000000      0.376482     0.000000     1.982652     0.000000     1918   1
0.000000      0.261723     0.000000     1.147589     0.000000     1919   1
0.000000      0.267166     0.000000     1.251461     0.000000     1920   1
0.000000      0.220446     0.000000     1.114930     0.000000     1921   1
0.000000      0.189602     0.000000     1.079550     0.000000     1922   1
0.000000      0.204570     0.000000     1.398425     0.000000     1923   1
0.000000      0.117934     0.000000     1.872429     0.000000     1924   1
0.000000      0.084368     0.000000     2.133698     0.000000     1925   1
0.000000      0.301639     0.000000     2.627661     0.000000     1926   1
0.000000      0.494416     0.000000     2.277487     0.000000     1927   1
0.128931      0.667234     0.000000     1.961333     0.142972     1928   1
0.224276      1.454671     0.000000     1.890573     0.285718     1929   1
0.207636      1.197937     0.000000     1.988095     0.341918     1930   1
0.158899      1.475990     0.000000     2.416287     0.455815     1931   1
0.058645      1.524524     0.000000     1.851564     0.569757     1932   1
0.085209      2.238932     0.000000     1.268244     0.683654     1933   1
0.095751      1.935479     0.000000     1.207463     0.797597     1934   1
0.189520      1.909624     0.000000     1.025119     0.911494     1935   1
0.386220      1.348530     0.000000     0.584681     1.006068     1936   1
0.413546      1.981745     0.000000     0.531610     1.241029     1937   1
0.410689      1.990363     0.000000     0.570166     1.214993     1938   1
```

0.338487	2.617228	0.000000	0.717130	1.049159	1939	1
1.234997	2.123719	0.000000	0.859558	1.394706	1940	1
2.505555	1.635200	0.000000	1.412940	1.289064	1941	1
3.640470	0.314340	0.000000	0.687192	0.684834	1942	1
12.996952	1.774000	0.000000	0.803766	0.654942	1943	1
21.169484	9.776730	0.000000	1.050973	0.537779	1944	1
32.958021	23.677068	0.000000	2.401772	0.716948	1945	1
19.910900	24.321623	0.000000	2.780521	1.233862	1946	1
12.431419	9.707330	0.000000	1.841131	1.249511	1947	1
9.238229	9.177988	0.000000	2.418555	2.671387	1948	1
9.494813	15.377235	0.000000	2.246783	3.339846	1949	1
9.657031	15.582259	0.000000	2.151000	4.107460	1950	1
11.310997	20.551817	0.000000	2.598838	4.302732	1951	1
9.642494	11.824699	0.000000	1.486098	4.343419	1952	1
8.962830	12.294168	0.000000	1.088164	4.152684	1953	1
11.453113	10.979657	0.000000	1.325416	6.775445	1954	1
11.007927	9.422474	0.000000	0.887469	10.802801	1955	1
16.540943	7.540066	0.000000	1.047198	12.441993	1956	1
16.530095	8.198229	0.000000	1.136870	8.616032	1957	1
17.789249	11.569781	0.000000	1.119794	8.486759	1958	1
1.479384	8.466302	0.000000	1.415691	6.710627	1959	1
16.725012	5.497086	0.000000	1.705533	6.267240	1960	1
15.710971	3.196012	0.000000	1.151243	5.564172	1961	1
2.510220	2.725183	0.000000	1.045791	5.750009	1962	1
2.843932	5.316103	0.000000	1.277806	5.312882	1963	1
4.607643	2.705678	0.000000	0.957266	5.956756	1964	1
2.171382	5.394574	0.000000	1.179347	7.923488	1965	1
3.974049793	4.51914078	111.000000	0.905762	11.365210	1966	1
1.714035526	10.24483727	143.000000	1.027412	14.531512	1967	1
6.091179756	11.54029708	41.000000	1.044301	14.854061	1968	1
4.355214180	13.70801501	137.000000	0.937563	13.866682	1969	1
4.735580784	18.23849561	44.000000	0.927221	19.644541	1970	1
40.41181285	15.59223772	9.000000	1.159836	17.507532	1971	1
58.89063981	23.89479246	14.000000	1.742749	21.800420	1972	1
3.677728076	22.85016923	35.000000	2.039207	27.822948	1973	1
7.191105379	33.30547336	13.000000	3.611005	31.618427	1974	1
14.40098673	48.64324576	21.000000	2.486301	31.919930	1975	1
25.63270751	55.32103263	13.000000	4.265129	28.122228	1976	1
12.330196	57.334529	0.000000	3.052775	26.410008	1977	1
54.583324	11.286739	0.000000	7.075718	24.265786	1978	1
23.108548	13.139664	0.000000	8.056267	31.994485	1979	1
25.261276	131.474656	0.000000	3.523705	23.404743	1980	1
6.264192	10.229869	0.000000	10.410852	14.677474	1981	1
98.590500	59.754898	0.000000	3.748941	16.072291	1982	1
66.887771	22.704566	0.000000	1.236039	22.312702	1983	1
76.929174	22.875117	0.000000	3.233206	46.398345	1984	1
39.081161	45.316146	0.000000	8.080748	23.404875	1985	1
40.846914	11.236844	0.000000	9.144422	30.389683	1986	1

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91.846700    22.527211    0.000000     5.084333     10.183350    1987   1
109.273300   119.638616   0.000000     5.635432     17.170577    1988   1
177.965400   74.919398    0.000000     23.747829    4.649984     1989   1
61.385700    47.914776    0.000000     15.190355    9.082392     1990   1
79.138400    29.551089    0.000000     17.689657    9.119499     1991   1
85.993100    4.890633     0.000000     13.357810    9.504342     1992   1
117.726900   17.166657    0.000000     10.588250    4.261421     1993   1
139.202200   34.878532    0.000000     10.684406    11.604128    1994   1
117.220200   22.228294    0.000000     9.141253     10.037456    1995   1
122.825700   14.027344    0.000000     11.331666    6.396238     1996   1
100.312000   46.976747    0.000000     13.480286    4.159257     1997   1
125.179400   40.161068    0.000000     9.335813     4.563740     1998   1
40.094500    17.018786    0.000000     1.916858     10.999129    1999   1
5.656700     5.146459     0.000000     0.430500     9.453923     2000   1
10.116100    2.961958     0.000000     0.502164     6.577154     2001   1
15.287400    2.228953     0.000000     0.149710     1.380499     2002   1
2.627600     0.079832     0.000000     0.009500     0.264404     2003   1
2.808200     0.176901     0.000000     0.015000     0.657211     2004   1
2.782800     0.083007     0.000000     0.011793     1.566750     2005   1
5.709800     1.839771     0.000000     0.082100     1.016868     2006   1
0.754300     0.212281     0.000000     0.008618     1.318406     2007   1
1.615200     0.065771     0.000000     0.041723     1.673739     2008   1

#Abundance indices
15
#Year  Seas   Fleet  Value  SE(log(B))
1980   1      6      1575   0.3038
1983   1      6      3084   0.2314
1986   1      6      3944   0.2457
1989   1      6      5044   0.2569
1992   1      6      5184   0.2506
1995   1      7      4583   0.2417
1998   1      7      4545   0.2541
2001   1      7      5546   0.2402
2004   1      7      5551   0.2544
2003   1      8      14377  0.2211
2004   1      8      10012  0.2363
2005   1      8      17807  0.2296
2006   1      8      11083  0.2095
2007   1      8      14547  0.2245
2008   1      8      20636  0.2294


#_Discards
1      #disc_type    #(1=biomass,2=fraction)
18     #nobs_disc
#Year  Seas   Fleet  Biomass      CV
2002   1      1      43.86177056  0.5
```

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2003	1	1	53.29386781	0.5
2004	1	1	10.20911305	0.5
2005	1	1	50.47125921	0.5
2006	1	1	22.37683188	0.5
2007	1	1	10.48218693	0.5
2002	1	2	17.40984386	0.5
2003	1	2	14.05822074	0.5
2004	1	2	3.348662521	0.5
2005	1	2	11.49649226	0.5
2006	1	2	13.02483862	0.5
2007	1	2	10.87963754	0.5
2002	1	4	1.913925787	0.5
2003	1	4	1.317844337	0.5
2004	1	4	4.680108314	0.5
2005	1	4	2.042349887	0.5
2006	1	4	0.512297389	0.5
2007	1	4	0.541259598	0.5


#_Mean_BodyWt
18	#nobs_mnwt	#N_observations
#from Eliza Heery. Observer data.
#converted pounds to kilograms
#cv's: double the between year cv
#YEAR	SEASON	Fleet	Partition	Value	CV
2002	1	1	1	0.246346343	0.26
2003	1	1	1	0.279586332	0.26
2004	1	1	1	0.242089111	0.26
2005	1	1	1	0.342013119	0.26
2006	1	1	1	0.29432019	0.26
2007	1	1	1	0.286386059	0.26
2002	1	2	1	0.186162224	0.19
2003	1	2	1	0.17486449	0.19
2004	1	2	1	0.211989129	0.19
2005	1	2	1	0.184787021	0.19
2006	1	2	1	0.200210541	0.19
2007	1	2	1	0.225933345	0.19
2002	1	4	1	0.502204958	0.23
2003	1	4	1	0.503522616	0.23
2004	1	4	1	0.364592765	0.23
2005	1	4	1	0.48506137	0.23
2006	1	4	1	0.430045559	0.23
2007	1	4	1	0.448477454	0.23


#Population length bins
```

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

#Length bins
-1     #min_tail     #min_proportion_for_compressing_tails_of_observed_composition
0.0001 #min_comp     #constant_added_to_expected_frequencies
0 #_combine males into females at or below this bin number
#_Length_Composition_Data



31     #nlength      #N_length_bins



#len_bins(1,nlength)       #_lower_edge_of_length_bins
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

#LENGTH_COMPOSITIONS:Replicates_(by_state)_must_be_contigent_within_Year-Seas-Fleet-Sex



#lendata(1,nobsl,1,6+gender*nlength)    #Sorted_by_year_fleet_mkt:_0:Survey_1:Discard_2:Fisheries
120    #nobs length
#WO LFs


                                                                                 nTows
#7     year   Season Fleet  gender partition     nSamps F10    F11    F12    F13    F14    F15    F16    F17    F18    F19    F20
       F21    F22    F23    F24    F25    F26    F27    F28    F29    F30    F31    F32    F33    F34    F35    F36    F37    F38
       F39    F40    M10    M11    M12    M13    M14    M15    M16    M17    M18    M19    M20    M21    M22    M23    M24    M25
       M26    M27    M28    M29    M30    M31    M32    M33    M34    M35    M36    M37    M38    M39    M40

       -1995  1      1      3      2      7      0      0      0      0      0      0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0      0      0      0      0      30     0      0      30     0      0      0
       0      0      0      0      0      0      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
       1998   1      1      3      2      196    0      0      0      0      0      0      0      0      0      0      0      0      0
       0      0      45.66  18.9   114.898715    66.14  204.576145    226.451004    364.927149    431.252289    461.089719
       527.373574    371.59743     231.52 80.278715     48.778715     0      0      0      0      0      0      0      0      0      0
       0      0      0      0      0      0      23.62  40.94  83.46  220.398715    155.81743     152.533574    154.113574    105.52
       36.178715     12.6   25.2   0      0      0      0      0      0             #      28
       1999   1      1      3      2      133    0      0      0      0      0      0      0      0      0      0      0      0      0
       22.684825     0      11.221996     102.561633    124.087706    288.946739    293.714797    444.585349    481.89076
       417.041034    596.841541    239.747973    302.458316    126.150716    99.510716     29.343478     6.3    0      0      0      0
       0      0      22.68482      0      0      0      0      0      0      0      0      28.984825     127.937661    165.2674
```

160.426299 264.656245 277.106665 125.903121 168.24439 51.567451 20.553224 19.28 0 0 0 0
19.28 0 # 19
2000 1 1 3 2 49 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 6.3 6.3 53.732471 85.126166 139.177551 181.528025 356.862355 366.966072
382.320992 415.829155 151.564942 89.995554 37.8 12.6 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 12.6 0 0 12.6 31.5 48.863083 12.6 25.2 12.6 12.6 0
0 0 6.3 0 0 # 7
2001 1 1 3 2 70 0 0 0 0 0 0 0 0 0 0 0 0
2.998353 4.497529 8.995058 21.595058 12.177082 4.497529 41.099951 35.797441 90.079915
55.85427 120.822695 141.777402 107.19556 47.743724 57.633858 41.56256 4.661355 6.3
4.661355 0 0 0 0 0 0 0 0 0 0 0 0 1.499176 0
1.499176 7.495881 35.39094 106.302486 54.025616 61.734798 53.741227 10.103186 23.247064
6.3 6.3 3.070866 0 0 0 0 0 # 10
2002 1 1 3 2 273 0 0 0 0 0 0 0 0 0 0 0 0 0
0 18.9 25.2 69.3 113.4 257.28143 485.1 740.462562 986.960501 1145.842105 1026.655237 1088.763158
704.58143 554.021053 296.49486 114.434483 37.8 11.960377 0 0 0 0 6.3 12.6
12.6 6.3 6.3 18.9 6.3 44.1 94.5 88.2 233.1 478.8 762.3 945.655535 918.520755 704.960377 359.1
239.4 126 56.7 50.4 0 0 6.3 6.3 0 # 39
2003 1 1 3 2 140 0 0 0 0 6.3 0 0 25.2 25.2 0 40.061111
21.16111 14.861111 42.639867 27.569444 65.338748 62.930386 78.499773 50.523398 29.362287
178.474948 144.604313 182.649252 180.535205 159.47041 107.316667 56.7 25.2 0 0 0 0 0
0 0 0 0 6.3 25.2 29.72222 40.27042 18.9 25.2 33.904423 61.981776 49.149178
77.814159 156.90309 185.383293 176.929138 164.105628 56.606918 52.463492 39.863492 2.063492
6.3 0 0 0 0 0 0 # 20
2004 1 1 3 2 84 0 0 0 0 0 0 0 0 0 6.3 1.048387
6.3 6.3 12.641463 0 7.348387 21.927826 35.600473 18.941463 67.100473 52.438107
52.446387 161.584494 227.848387 351.523826 196.380927 76.689851 57.698 37.8 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 6.341463 20.938107 26.231183 13.58972
25.2 83.031314 89.248387 81.941463 37.8 32.589851 12.6 6.3 0 0 0 0 0 0
12
-2005 1 1 3 2 7 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 32.666667 81.666667 125.801418 58.035461 27.801418 0 13.900709
13.900709 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 41.702128 30.234043 13.900709 0 16.333333 0 0 0
0 0 0 0 0 # 1
2006 1 1 3 2 56 0 0 0 0 0 0 0 0 0 0 0 0 0
0 30.798 70.292308 7.342154 27.746394 102.030702 109.483337 166.704654 81.171835 297.948676
223.589137 215.697926 77.038642 49.049272 76.754863 12.36 4.12 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 30.798 89.4 140.58462 305.359779 154.346154 30.815625
30.798 60.598 4.12 0.998 0 0 5.346154 0 0 0 0 # 8
2007 1 1 3 2 35 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 3.340538 1.996 9.716689 7.027613 2.689076 11.61844 5.296634 8.956537
10.957903 2.634731 0 0.998 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 2.689076 2.689076 2.994 7.027613 6.029613 3.340538 2.342538 0
0.998 1.111111 0 0.998 0 0 0 0 0 # 5
2008 1 1 3 2 56 0 0 0 0 0 0 0 0 0 0 0 0 0
30 30 0 120 150 181.311475 210 204.398154 197.972218 154.38332 231.833283 76.091889
29.26882 47.895589 11.116279 11.658537 0 1.034483 0 0 0 0 0 0 0 0

```
	0	0	30	0	0	60	60	31.311475	120	60	60	30	12.150762	0	11.658537	0
	0	0	0	0	0	0	0		#	8
#WO LFs


																nTows
#6	year	Season	Fleet	gender	partition		nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38
	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40

	1996	1	1	0	2	198	0	0	0	0	0	0	0	6.28	0	0	0	6.76
	12.56	50.34	101.08	153.04	220.16	310.74	346.72	379.78	515.74	465.58	441.6	446	467.66	488.36	240.32	232.92	124.22	18.9	0
	0	0	0	0	0	0	0	6.28	0	0	0	6.76	12.56	50.34	101.08	153.04	220.16	310.74
	346.72	379.78	515.74	465.58	441.6	446	467.66	488.36	240.32	232.92	124.22	18.9	0		#	33
	1997	1	1	0	2	180	0	0	0	0	0	0	0	0	0	0	12.6	0	0
	180.316206	274.690514	752.764822	920.20365	994.443915	885.18433	985.04448	590.211769	838.137498
	793.750174	671.925238	729.715903	526.759849	286.66	113.4	55.2	12.6	6.3	0	0	0	0	0	0
	0	0	0	0	12.6	0	0	180.316206	274.690514	752.764822	920.20365	994.443915
	885.18433	985.04448	590.211769	838.137498	793.750174	671.925238	729.715903	526.759849	286.66	113.4
	55.2	12.6	6.3		#	30
#CA commercial LFs. 2003-2007 has bothsex LFs.


																		#

#3	year	Season	Fleet	gender	partition		nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38
	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40		#

	1978	1	2	3	2	75	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	30	0	0	0	0	0.00E+00	36.7	115.087481	16.76923	170.4484	110.01827
	129.99174	166.769231	103.40485	23.469231	0	16.76923	0	0	0	0	0	0	0	0
	0	0	0	0	19.95098	6.7	0	0	26.8	53.469231	103.4	83.63846	208.58748	0
	30	0	36.869231	0	0	0	16.76923	0	0		#	25	FM	1978
	1979	1	2	3	2	36	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	30	0	6.511111	0	36.511111	66.51111	60	13.02222	39.89048	113.98413
	76.40159	26.868254	0	6.511111	1.547619	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	30	6.511111	6.511111	6.511111	50.35714	39.89048
	101.81343	0	13.02222	13.022222	6.511111	6.511111	6.511111	0	0	0		#
	12	FM	1979
	1982	1	2	3	2	84	0	0	0	0	0	0	0	0	0	0	0	0	0
	60	30	0	90	30	90	60	102.80135	80.36	213.8628	162.86635	320.62074	126.60857
	194.624341	60	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	30	30	30	44.257778	123.464286	43.242063	80.08582	118.78632	60	0	16.27357	0
	8.72	0	0	0	0	0		#	28	FM	1982
```

1983 1 2 3 2 168 0 0 0 0 0 0 0 0 0 0 0 0 0
6.416667 18.83333 0 38.878205 30 266.991699 146.471698 166.83087 270.211029 301.57851
393.87772 317.84975 54.93722 25.883187 42.45699 18.242408 4.692308 0 0 0 0 0
0 0 0 0 0 0 0 0 0 48.83333 30 123.695402 86.521739 122.198179
238.719715 237.08534 268.28455 30 83.414872 18.83333 30 57.625187 0 0 0 0 0
56 FM 1983
1984 1 2 3 2 150 0 0 0 0 0 0 0 0 0 0 0 0 0
0 15.66667 0 13.396226 44.465316 152.704338 119.8719 275.64105 185.0431 201.66246
292.43806 341.17626 85.5371 110.82907 5.8 1.118812 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 30 2.963636 55.379284 112.133858 96.56518
94.17528 80.68674 22.291528 90 0 0 0 0 0 0 0 # 50 FM
1984
1985 1 2 3 2 246 0 0 0 0 0 0 0 0 0 0 30
62.616863 29.69551 41.076863 68.86069 57.490196 129.364717 160.958563 316.00972 273.528571
468.78892 583.279547 641.6573 520.60067 475.4446 250.34034 199.906405 41.50305 13.49619 0
0 0 0 0 0 0 0 0 0 0 17.86 0 18.9 27.36 21.79333 59.29959
103.273333 188.318343 173.328876 310.087778 180.79948 245.69259 181.56884 90 13.63636 30 0
0 0 0 0 0 # 82 FM 1985
1986 1 2 3 2 129 0 0 0 0 0 0 0 0 0 0 0 0
30 0 51.68627 44.894737 99.387407 62.385628 149.631765 188.179051 283.58649 185.172542
309.39356 224.61828 139.18886 93.26281 15.921569 30 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 62.59615 10.48 60 121.38723 115.892999
111.38883 76.463 48.83068 13.802241 0 38.169071 2.22 0 0 0 0 0 #
43 FM 1986
1987 1 2 3 2 126 0 0 0 0 0 0 0 0 0 0 0 0 0
30 47.50962 23.017145 90 31.048544 176.28314 290.788462 196.26637 260.721321 423.10647
329.41913 300.25437 282.43962 174.93 64.38614 0 29.32 0 0 0 0 0 0 0
0 0 0 0 0 30 0 0 45.643499 84.93 245.072043 35.300971 78.55816
65.39737 84.93 30 17.50962 0 7.54902 0 0 0 0 0 # 42 FM
1987
1988 1 2 3 2 120 0 0 0 0 0 0 0 0 0 0 0 0 0
21.06383 29.87 68.676566 60 156.210196 111.02 120 247.75569 150.22 339.73524 179.84 124.87388
123.10383 30 30 30 0 0 0 0 0 0 0 0 0 0 0 0 0
30 30 0 30 0 210 183.06 132.04 63.06 83.26242 60 30 38.70076 62.242424 30
60 0 0 0 0 # 40 FM 1988
1989 1 2 3 2 99 0 0 0 0 0 0 0 0 0 0 0 0 0
30 0 131.44 165.728627 131.44 287.796669 193.75451 196.49499 98.577255 269.39604 188.39803
164.62657 94.28863 90 60 30 0 120 0 0 0 0 0 0 0 0 0 0
0 0 30 30 54.88636 0 41.44 94.288627 142.145882 132.86588 215.71451 60
90.283137 0 30 0 0 0 0 0 0 # 33 FM 1989
1990 1 2 3 2 132 0 0 0 0 0 0 0 0 0 0 0 0 0
60 30 120 106.74 206.883495 272.831957 180 60 303.727409 216.49966 308.52801 203.03329
86.8835 120 47.33 30 30 0 0 0 0 0 0 0 0 0 0 0 0 0
30 90 120 253.53 145.824176 180 327.517843 58.10784 31.5289 33.42105 3.421053 30
2.126437 2.126437 0 0 0 0 0 # 44 FM 1990
1991 1 2 0 2 141 0 0 0 0 0 0 0 0 0 0 0 0
20.82 48.52857 90 60 78.496522 158.81296 306.884141 269.498467 297.2265 309.691498
233.48917 232.55494 143.16404 69.88 68.38 24.627451 24.627451 0 0 0 0 0 0 0

0 0 0 0 0 0 0 20.82 48.52857 90 60 78.496522 158.81296 306.884141
269.498467 297.2265 309.691498 233.48917 232.55494 143.16404 69.88 68.38 24.627451 24.627451 0
0 # 47 B 1991
1992 1 2 0 2 69 0 0 0 0 0 0 0 0 0 0 0 0
30 24.375 78.75 54.375 134.888614 158.67157 238.026468 96.24 30 69.87415 33.08163 11.19346
81.66327 30 0 0 0 30 0 0 0 0 0 0 0 0 0 0
0 30 24.375 78.75 54.375 134.888614 158.67157 238.026468 96.24 30 69.87415 33.08163
11.19346 81.66327 30 0 0 0 30 0 # 23 B 1992
1993 1 2 3 2 45 0 0 0 0 0 0 0 0 0 0 30 30 0
60 90 0 95.08 125.08 90 130.16 60.4 0 100.16 70.48 30 0 5.08 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 64.147059 30 130.16
44.170909 0 0 0 0 0 0 0 0 0 0 0 0 # 15 FM
1993
1994 1 2 3 2 57 0 0 0 0 0 0 0 0 0 0 30 30 0
0 90 2.28 90 97.717391 34.92 2.28 120 122.46 128.39914 62.46 40.80154 32.46 30
15.48077 4.92 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
60 60 85.198367 105.480769 75.480769 97.38 120 60 15.48077 0 0 0 0 0 0
0 0 0 # 19 FM 1994
1995 1 2 3 2 48 0 0 0 0 0 0 0 0 0 0 0 0 0
0 67.11 1.68 35.04 36.72 38.66 46.03 132.34653 83.300297 97.04653 40.73 72.15 1.81 1.68 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 30 1.81 3.62 3.49 6.85
45.77 91.94 10.21 8.79 15.38 3.49 8.69 0 0 0 0 0 1.81 0 0 # 16
FM 1995

1996 1 2 3 2 51 0 0 0 0 0 0 0 0 0 0 0 0 0
0 30 74.509804 90 133.529412 43.529412 119.019608 205.82757 143.745098 104.9334
120.98107 9.4 18.0665 1.757282 10.21569 9.153061 9.153061 0 0 0 0 0
0 0 0 0 0 0 0 0 30 60 80.889804 29.019608 104.509804 113.745098
91.64857 14.5098 10.91034 1.757282 0 0 0 0 0 0 0 0 #
17 FM 1996
1997 1 2 3 2 90 0 0 0 0 0 0 0 0 0 0 0 0 0
60 77.68 89.3 227.008421 273.54 217.205 340.606809 371.39961 257.099608 391.384 388.22246
295.80471 146.43798 10.219592 18.01881 16.259608 0 0 0 0 0 0 0 0
0 0 0 30 0 8.84 126.965 167.68 239.06 298.125 216.965 139.06 181.6 30
106.25961 0 56.34 0 0 0 0 0 0 0 # 30 FM 1997
1998 1 2 3 2 84 0 0 0 0 0 0 0 0 0 0 0 0
18.584906 78.5 55.5 90 277 341.691373 336.364906 338.344906 277.76 221.76 231.5 289.62626
284.39265 128.06626 143.917574 0 60 23.252525 0 0 0 0 0 0 0 0 0
0 0 60 30 60 30 288.5 262.52 259.78 574.02 351.48 318.62626 180 90 85.22 0 0 0
0 0 0 0 0 # 28 FM 1998
1999 1 2 3 2 84 0 0 0 0 0 0 0 0 0 0 37.38 0
30 39.7 88.30941 23.360784 63.470196 98.750196 274.200784 185.511978 126.34925 348.738824
191.1 94.36072 35.13131 65.91412 0 0 0 0 0 0 0 0 0 0 0 0
0 0 9.7 0 0 0 30 99.26 125.58 420.569412 371.668235 412.918824 243.02941
105.86941 18.52 7.38 0 0 0 0 0 0 0 0 # 28 FM 1999
2000 1 2 3 2 51 0 0 0 0 0 0 0 0 0 0.998 0 0
12.26 34.38 13.78 3.04 18.94 15.954593 22.228396 74.063187 60.87061 176.928319 79.13909
159.49862 131.15116 71.19724 72.152329 47.63812 17.04006 0 0 0 0 0 0 0

```
0	0	0	0	0	0	12.26	0	2.12	12.26	2.12	26.3	31.2	60.696	38.68	68.46	32.59703
5.18	14.38	0	0	2.12	0	0	0	0		#	17	FM	2000
2001	1	2	3	2	39	0	0	0	0	0	0	0	0	0	0	0	0
20.88	80.8	97.52	36.48	28.524242	22.224242	13.142485	28.030727	52.91013	47.938182	30.04497
64.74867	37.92648	33.96873	28.554	9.518	0	4.26	0	0	0	0	0	0	0	0
0	0	0	0	2.14	59.66	2.14	13.984242	28.724242	32.884242	50.948421	10.92224	13.058
4.16	0	0	0	0	0	0	0	0	0		#	13	FM	2001
2002	1	2	3	2	39	0	0	0	0	0	0	0	4	3.769231	7.538462	1
2.769231	3.769231	18.449231	19.76	21.4	7.777778	4	4.769231	1	6.56	5.26	1	7.12
25.66	15.18	2.86	3	1.86	1.86	0	0	0	0	0	0	0	0	2	5.769231	3	4
2	0	22.44923	40.56	17.68	11.098462	18.529231	55.909231	24.16	28.72	16.6	0	0	0	0
0	0	0	0	0		#	13	FM	2002
#CA commercial LFs. 2003-2007 has bothsex LFs.

																		#

#1	year	Season	Fleet	gender	partition	nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38
	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40		#

1980	1	2	0	2	28	0	0	0	0	0	0	0	0	0	0	13.36	0
30	0	30	16.34146	53.173077	143.17308	0	145.632653	210	175.632653	150	66.68
79.71571	47.23913	62.861772	60	30	0	0	0	0	0	0	0	0	0	0
0	13.36	0	30	0	30	16.34146	53.173077	143.17308	0	145.632653	210	175.632653
150	66.68	79.71571	47.23913	62.861772	60	30	0	0		#	28	B	1980
1981	1	2	0	2	13	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	110.55556	118.411111	116.18644	0.998	165.78644	32.64783	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	110.55556	118.411111	116.18644	0.998	165.78644	32.64783	0	0	0
0	0		#	13	B	1981
2003	1	2	0	2	4	0	0	0	0	0	0	0	0.998	11.982	17.98	15.974	10.986
5.99	2.998	4.992	1	1.998	2.996	1.252747	1.252747	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.998	11.982	17.98	15.974	10.986	5.99	2.998	4.992	1
1.998	2.996	1.252747	1.252747	0	0	0	0	0	0	0	0	0	0	0		#
4	B	2003
2004	1	2	0	2	8	0	0	0	0	0	0	1	0	5	21	36	39
22	25	15	27.32	20	6	4	5	0	0	4.48	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	5	21	36	39	22	25	15	27.32	20	6	4
5	0	0	4.48	0	0	0	0	0	0	0	0		#	8	B	2004
2005	1	2	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0.998	0
0	0	0	3.992	12.974	6.986	4.99	1.996	2.994	1	18.36308	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.998	0	0	0	0	3.992	12.974
6.986	4.99	1.996	2.994	1	18.36308	0	0	0	0	0	0	0		#	5	B
2005
2006	1	2	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0
0	16.66667	12.5	37.5	16.66667	33.333333	30.164667	20.83333	4.166667	0	0	1.998	0
```

```
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	16.66667	12.5	37.5	16.66667	33.333333	30.164667	20.83333	4.166667	0	0	1.998	0	0
	0	0	0	0		#	3	B	2006
	2007	1	2	0	2	5	0	0	0	0	0	0	0	0	19.375	0	0	0	0
	0	0	0.998	0	1.996	1.998	9.998	10	6	2.04	5	3	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	19.375	0	0	0	0	0	0	0.998	0	1.996	1.998
	9.998	10	6	2.04	5	3	0	0	0	0	0	0		#	5	B	2007
	-2008	1	2	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.998	0	0	0	0	0	0	0.998	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.998	0	0	0
	0	0	0	0.998	0	0	0	0	0	0	0		#	2	B	2008
#OTH LFs: all bothsex LFs

																#
#2	year	Season	Fleet	gender	partition		nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38
	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40		#	nTows

	-1978	1	4	0	2	2	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	0	0	0	0	0	0	0	0	0	0
	0.5	0	0	0	0	0	0	0	0	0	0	0		#	1	-1978
	1979	1	4	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.016030218	0.016030218	0	0.02058917	0.029070972	0.056091647	0	0	0	0
	0.072437551	0	0.144875119	0.144875106	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.016030218	0.016030218	0	0.02058917	0.029070972	0.056091647	0	0	0
	0	0.072437551	0	0.144875119	0.144875106	0		#	6	1979
	1980	1	4	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.135685726	0.057157143	0	0.192842845	0	0	0.057157143	0.057157143	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.135685726	0.057157143	0	0.192842845	0	0	0.057157143	0.057157143	0	0	0	0	0
	0	0		#	2	1980
	1981	1	4	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.082125154	0	0	0	0.16436565	0	0	0	0.109364367	0.144144829	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.082125154	0
	0	0	0.16436565	0	0	0	0.109364367	0.144144829	0	0	0	0	0	0	0	0
		#	5	1981
	1983	1	4	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.214135582	0	0.124860897	0	0	0	0.124860897	0	0
	0.036142625	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.214135582	0	0.124860897	0	0	0	0.124860897	0	0	0.036142625	0
		#	5	1983
	1984	1	4	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.040862442	0.003661121	0.040862442	0	0.085386005	0.126248449	0.029439012	0.024254925	0.013958023
	0.020593804	0	0.010296902	0	0	0	0.034812291	0.069624583	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.040862442	0.003661121	0.040862442	0	0.085386005	0.126248449
```

```
0.029439012  0.024254925  0.013958023  0.020593804  0  0.010296902  0  0  0  0.034812291  0.069624583
#  5  1984
1985  1  4  0  2  34  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0.072446171  0.016411649  0.050923433  0.025465298  0.051092934  0.068790489  0.056382005
0.054063982  0.014999549  0.024057001  0.032647759  0  0.020691228  0.012028501  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0.072446171  0.016411649  0.050923433
0.025465298  0.051092934  0.068790489  0.056382005  0.054063982  0.014999549  0.024057001  0.032647759  0
0.020691228  0.012028501  0  #  17  1985
1986  1  4  0  2  12  0  0  0  0  0  0  0  0  0  0  0  0
0.025372853  0  0  0  0  0.038687992  0.038687992  0.057975461  0.038687992  0.10149297  0.038687992
0.057975461  0  0.087860693  0  0.014570595  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0.025372853  0  0  0  0  0.038687992  0.038687992  0.057975461  0.038687992
0.10149297  0.038687992  0.057975461  0  0.087860693  0  0.014570595  0  0  0  #  6
1986
1987  1  4  0  2  34  0  0  0  0  0  0  0  0  0  0.014009383  0  0
0  0  0  0.005818254  0.038189006  0.034791093  0.011084851  0.042584835  0.039036182  0.050059021
0.071845848  0.042715527  0.108418674  0.009576414  0.031870912  0  0  0  0  0  0  0  0  0
0  0  0  0  0.014009383  0  0  0  0  0  0.005818254  0.038189006  0.034791093
0.011084851  0.042584835  0.039036182  0.050059021  0.071845848  0.042715527  0.108418674  0.009576414  0.031870912  0
0  0  0  #  17  1987
1988  1  4  0  2  18  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0.023403677  0  0  0  0.027992082  0.013996041  0.040836768  0.130562123  0.027581441  0.141249782
0.067537359  0.026840727  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0.023403677  0  0  0.027992082  0.013996041  0.040836768  0.130562123
0.027581441  0.141249782  0.067537359  0.026840727  0  0  0  0  0  #  9  1988
1989  1  4  0  2  50  0  0  0  0  0  0  0  0  0  0  0  0  0
0.023338446  0.009991295  0  0.03164546  0.038437631  0.040796605  0.043213102  0.048610467  0.021393677
0.071450012  0.039158302  0.040607806  0.023196551  0.017237547  0.007669656  0  0.006187761  0.037065681  0  0
0  0  0  0  0  0  0  0  0  0  0.023338446  0.009991295  0  0.03164546
0.038437631  0.040796605  0.043213102  0.048610467  0.021393677  0.071450012  0.039158302  0.040607806  0.023196551
0.017237547  0.007669656  0  0.006187761  0.037065681  #  25  1989
1990  1  4  0  2  8  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0.014831262  0.099333869  0  0  0  0  0.099333869  0.097444366  0  0  0
0.189056633  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0.014831262  0.099333869  0  0  0  0  0.099333869  0.097444366  0  0  0
0.189056633  0  0  0  0  #  4  1990
1991  1  4  0  2  14  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0.10184781  0  0.20369562  0.009558532  0.13579708  0  0.009558532  0  0.034330011  0  0
0.005212415  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0.10184781  0  0.20369562  0.009558532  0.13579708  0  0.009558532  0  0.034330011  0  0
0.005212415  0  0  0  0  0  #  7  1991
1992  1  4  0  2  36  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0.01430957  0.027810104  0.05288389  0.031500526  0.099155201  0.077004823  0.065808303  0.040359532
0.015355394  0.010659887  0.027501854  0.021173213  0.004842067  0  0  0  0.011635636  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0.01430957  0.027810104  0.05288389  0.031500526
0.099155201  0.077004823  0.065808303  0.040359532  0.015355394  0.010659887  0.027501854  0.021173213  0.004842067  0
0  0  0.011635636  #  18  1992
```

```
1993	1	4	0	2	52	0	0	0	0	0	0	0	0	0.010087966	0	0	0
0	0	0.030758591	0.044947065	0.035823283	0.006416027	0.035619419	0.031218451	0.100951595	0.077835427
0.028940165	0.018486056	0.050488017	0	0	0	0.028427938	0	0	0	0	0	0	0
0	0	0.010087966	0	0	0	0	0	0.030758591	0.044947065	0.035823283	0.006416027
0.035619419	0.031218451	0.100951595	0.077835427	0.028940165	0.018486056	0.050488017	0	0	0
0.028427938	0	0		#	26	1993
1994	1	4	0	2	66	0	0	0	0	0	0	0	0	0	0	0
0.00075336	0.010825706	0.039031179	0.044469227	0.066735737	0.037383658	0.072032725	0.059977141	0.050047378
0.042130895	0.028461988	0.030020383	0.016031904	0.000699573	0.000699573	0.000699573	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.00075336	0.010825706	0.039031179	0.044469227
0.066735737	0.037383658	0.072032725	0.059977141	0.050047378	0.042130895	0.028461988	0.030020383	0.016031904
0.000699573	0.000699573	0.000699573	0	0	0	0		#	33	1994
1995	1	4	0	2	22	0	0	0	0	0	0	0	0	0	0	0
0.001383826	0	0.039080652	0.054583233	0.079470507	0.03374237	0.054891811	0.053491362	0.044460281
0.060124079	0.049381231	0	0.029390648	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.001383826	0	0.039080652	0.054583233	0.079470507	0.03374237
0.054891811	0.053491362	0.044460281	0.060124079	0.049381231	0	0.029390648	0	0	0	0	0	0
0		#	11	1995
1996	1	4	0	2	60	0	0	0	0	0	0	0	0	0	0	0.000367147
0.002359549	0.007574552	0.010497428	0.020001437	0.025316059	0.043071285	0.062904933	0.079693167	0.0304532
0.068276403	0.053717168	0.008346542	0.012062644	0.034508332	0.02208991	0.010234632	0.004262805	0.004262806	0
0	0	0	0	0	0	0	0	0	0	0	0.000367147	0.002359549	0.007574552
0.010497428	0.020001437	0.025316059	0.043071285	0.062904933	0.079693167	0.0304532	0.068276403	0.053717168
0.008346542	0.012062644	0.034508332	0.02208991	0.010234632	0.004262805	0.004262806	0	0		#
30	1996
1997	1	4	0	2	28	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.007207079	0.07919189	0.081927424	0.083820133	0.103897715	0.011737891	0.049717576	0.02901972
0.018683294	0.014046856	0.020750422	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.007207079	0.07919189	0.081927424	0.083820133	0.103897715
0.011737891	0.049717576	0.02901972	0.018683294	0.014046856	0.020750422	0	0	0	0	0	0
#	14	1997
1998	1	4	0	2	44	0	0	0	0	0	0	0	0	0	0	0.00181855
0.00278002	0.004021508	0.022381581	0.02962796	0.063947646	0.048312266	0.044432384	0.084344195	0.077096563
0.047198525	0.025928952	0.023621136	0.011994326	0.010232289	0.001131049	0.000377016	0.000377016	0	0
0.000377016	0	0	0	0	0	0	0	0	0	0	0.00181855	0.00278002	0.004021508
0.022381581	0.02962796	0.063947646	0.048312266	0.044432384	0.084344195	0.077096563	0.047198525	0.025928952
0.023621136	0.011994326	0.010232289	0.001131049	0.000377016	0.000377016	0	0	0.000377016		#
22	1998
1999	1	4	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.005151048	0.01257301	0.037719032	0.01257301	0.055443092	0.055718719	0.053447802	0.055443092
0.050707878	0.050292044	0.048572078	0.038601562	0.005151048	0.005151048	0.01345554	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.005151048	0.01257301	0.037719032
0.01257301	0.055443092	0.055718719	0.053447802	0.055443092	0.050707878	0.050292044	0.048572078	0.038601562
0.005151048	0.005151048	0.01345554	0	0		#	6	1999
2000	1	4	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.024846609	0.093479032	0.015212212	0	0.090690125	0.027635517	0.040058822
0.040058822	0.040058822	0.024846609	0.103113429	0	0	0	0	0	0	0	0	0	0	0
```

```
0	0	0	0	0	0	0	0	0	0.024846609	0.093479032	0.015212212	0	0.090690125
0.027635517	0.040058822	0.040058822	0.040058822	0.024846609	0.103113429	0	0	#	5	2000
2001	1	4	0	2	16	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.021307785	0	0.100031535	0.061754225	0.097900758	0.061754225	0.02301241	0.040484794	0.040484794	0
0.053269473	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0.021307785	0	0.100031535	0.061754225	0.097900758	0.061754225	0.02301241	0.040484794
0.040484794	0	0.053269473	0	0	0	0	0	0	#	8	2001
2002	1	4	0	2	18	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0.008481532	0	0.002479246	0.004958492	0.015503251	0.014875476	0.039667935	0.034709443
0.071898132	0.084294361	0.069418886	0.094211345	0.034709443	0.019833967	0.004958492	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.008481532	0	0.002479246	0.004958492
0.015503251	0.014875476	0.039667935	0.034709443	0.071898132	0.084294361	0.069418886	0.094211345	0.034709443
0.019833967	0.004958492	0	#	9	2002
2003	1	4	0	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.003184713	0	0.003184713	0.006369427	0.006369427	0.012738854	0.015923567	0.022292994	0.050955414
0.066878981	0.092356688	0.092356688	0.057324841	0.054140127	0.015923567	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.003184713	0	0.003184713	0.006369427	0.006369427
0.012738854	0.015923567	0.022292994	0.050955414	0.066878981	0.092356688	0.092356688	0.057324841	0.054140127
0.015923567	0	0	#	6	2003
2004	1	4	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.012777829	0.032845513	0.034674838	0.054742522	0.054742522	0.078468856
0.056571847	0.010948504	0.087588036	0.032845513	0.043794018	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0.012777829	0.032845513	0.034674838
0.054742522	0.054742522	0.078468856	0.056571847	0.010948504	0.087588036	0.032845513	0.043794018	0	0
#	2	2004
2005	1	4	0	2	6	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	0.2	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	0
0.1	0	0.1	0.2	0	0	0	0	0.1	0	0	#	3	2005
2006	1	4	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.318511797	0	0.090744102	0	0.045372051	0	0	0	0.045372051	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.318511797	0	0.090744102	0	0.045372051	0	0	0	0.045372051	0	0	0	0	0	0
0	0	#	3	2006
2007	1	4	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0.027385247	0.027385247	0.054770522	0.198762196	0.054770522
0.08215577	0.027385247	0.027385247	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0.027385247	0.027385247	0.054770522	0.198762196
0.054770522	0.08215577	0.027385247	0.027385247	0	0	#	2	2007
2008	1	4	0	2	14	0	0	0	0	0	0	0	0	0	0	0	0	0
0.133644856	0	0.112149536	0.022429907	0.044859814	0.089719629	0.067289722	0	0	0	0	0	0
0	0.029906535	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.133644856	0	0.112149536	0.022429907	0.044859814	0.089719629	0.067289722	0	0	0	0	0	0
0	0.029906535	0	0	0	#	7
#3	#Rec LFs	Season	Fleet	gender	partition	nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19
F20	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37
F38	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
```

M25 M26 M27 M28 M29 M30 M31 M32 M33 M34 M35 M36 M37 M38 M39 M40
nSamps
1980 1 5 0 0 6 0 0 0 0 0 0 0 0 0 0 0 0
0.06818182 0 0 0.272727273 0.068181818 0.13636364 0.13068182 0.0625 0 0.193181818 0.068181818 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.06818182 0 0 0.272727273 0.068181818 0.13636364 0.13068182 0.0625 0 0.193181818 0.068181818 0
0 0 0 0 0 0 0 # 2
1982 1 5 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.5 0.25 0 0.25 0 0 0 0 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 0.25 0
0.25 0 0 0 0 0 0 0 0 0 0 0 # 1
1984 1 5 0 0 18 0 0 0 0 0 0 0 0 0 0 0 0
0.05263158 0 0.05263158 0.144736842 0.236842105 0.14473684 0.18421053 0.09210526 0 0
0.092105263 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.05263158 0 0.05263158 0.144736842 0.236842105 0.14473684 0.18421053 0.09210526 0
0 0.092105263 0 0 0 0 0 0 0 0 # 6
1985 1 5 0 0 24 0 0 0 0 0 0 0 0 0 0 0.058333333 0
0.05952381 0.14880952 0 0.029761905 0 0.17619048 0.11785714 0.05833333 0.05833333 0.116666667
0.088095238 0.029761905 0.058333333 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.058333333 0 0.05952381 0.14880952 0 0.029761905 0 0.17619048 0.11785714
0.05833333 0.05833333 0.116666667 0.088095238 0.029761905 0.058333333 0 0 0 0 0 0
8
1986 1 5 0 0 12 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.142857143 0.14285714 0 0 0 0.142857143 0 0.285714286 0.285714286 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.142857143 0.14285714 0 0 0 0.142857143 0 0.285714286 0.285714286 0 0 0 0
0 0 # 4
1987 1 5 0 0 6 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.8 0.2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0.8 0.2 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 # 2
1988 1 5 0 0 15 0 0 0 0 0 0 0 0 0 0 0 0
0.11111111 0 0.11111111 0 0 0.11111111 0 0.22222222 0.33333333 0 0.111111111 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0.11111111 0 0.11111111 0 0 0.11111111 0 0.22222222 0.33333333 0 0.111111111 0 0
0 0 0 0 0 0 # 5

1993 1 5 0 0 27 0 0 0 0 0 0 0 0 0 0 0 0
0.03768888 0.03768888 0.14955906 0.003262751 0.313697226 0.03932026 0.13310756 0.09511956 0.03768888
0.039320258 0.102768818 0 0 0.004572423 0.004572423 0.001633008 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0.03768888 0.03768888 0.14955906 0.003262751 0.313697226
0.03932026 0.13310756 0.09511956 0.03768888 0.039320258 0.102768818 0 0 0.004572423 0.004572423
0.001633008 0 0 0 # 9
1994 1 5 0 0 90 0 0 0 0 0 0 0 0 0.04329532 0.034172896
0.044308925 0.034462497 0.06023697 0.08383944 0.10107419 0.167968473 0.072287511 0.05302044 0.04817303
0.06522029 0.10240737 0.006959118 0.006342547 0.008734926 0.047951654 0.00550662 0.003560386 0.000446145 0
0 0.01003126 0 0 0 0 0 0 0 0 0.04329532 0.034172896 0.044308925
0.034462497 0.06023697 0.08383944 0.10107419 0.167968473 0.072287511 0.05302044 0.04817303 0.06522029

0.10240737 0.006959118 0.006342547 0.008734926 0.047951654 0.00550662 0.003560386 0.000446145 0 0
0.01003126 # 30
1995 1 5 0 0 51 0 0 0 0 0 0 0 0 0 0.013310716
0.053269511 0.02664808 0.10040279 0.10763057 0.06663352 0.101754963 0.106570958 0.18427513 0.020336
0.15607605 0.01703551 0.014106031 0.027443394 0.001458077 0.000795315 0.000729039 0 0 0.001524353 0
0 0 0 0 0 0 0 0 0 0 0.013310716 0.053269511 0.02664808 0.10040279
0.10763057 0.06663352 0.101754963 0.106570958 0.18427513 0.020336 0.15607605 0.01703551 0.014106031
0.027443394 0.001458077 0.000795315 0.000729039 0 0 0.001524353 0 0 # 17
1996 1 5 0 0 45 0 0 0 0 0.008691607 0 0 0 0 0.015297228
0.006373845 0.046471125 0.05180198 0.10592172 0.11762641 0.172789144 0.100822639 0.11984532 0.05499718
0.04602413 0.02185318 0.044638952 0.024110204 0.017900519 0.019011128 0.004988669 0.010857692 0.009977339 0
0 0 0 0 0 0 0.008691607 0 0 0 0 0.015297228 0.006373845 0.046471125
0.05180198 0.10592172 0.11762641 0.172789144 0.100822639 0.11984532 0.05499718 0.04602413 0.02185318
0.044638952 0.024110204 0.017900519 0.019011128 0.004988669 0.010857692 0.009977339 0 0 0 #
15
1997 1 5 0 0 36 0 0 0 0 0 0.3055488 0 0 0 0 0 0
0 0.03888803 0.27082735 0.031154901 0.004182459 0.01589335 0.26073475 0.01171089 0.03199139
0.008364919 0 0.00846948 0.012233694 0 0 0 0 0 0 0 0 0
0.3055488 0 0 0 0 0 0 0.03888803 0.27082735 0.031154901 0.004182459
0.01589335 0.26073475 0.01171089 0.03199139 0.008364919 0 0.00846948 0.012233694 0 0 0 0
0 0 # 12
1998 1 5 0 0 27 0 0 0 0 0 0 0 0 0 0.025169243 0
0.012584621 0.11324901 0.17617212 0.07998554 0.017049846 0.097022799 0.10739368 0.0880546 0.08472726
0.04221909 0.07663303 0.025187676 0.026307129 0.008955618 0.012572037 0.006716714 0 0 0 0
0 0 0 0 0 0 0 0 0.025169243 0 0.012584621 0.11324901 0.17617212
0.07998554 0.017049846 0.097022799 0.10739368 0.0880546 0.08472726 0.04221909 0.07663303 0.025187676
0.026307129 0.008955618 0.012572037 0.006716714 0 0 0 0 0 # 9
1999 1 5 0 0 75 0 0 0 0 0.00268554 0.00268554 0.01074216 0.01074216
0.01385827 0.026656399 0.049348976 0.042665253 0.05098603 0.06596528 0.11481815 0.137396448 0.123786194
0.08565265 0.09419415 0.06284314 0.05156856 0.015611475 0.022597586 0.008514382 0.003088927 0.000440008
0.003152729 0 0 0 0 0 0 0 0 0.00268554 0.00268554 0.01074216 0.01074216
0.01385827 0.026656399 0.049348976 0.042665253 0.05098603 0.06596528 0.11481815 0.137396448 0.123786194
0.08565265 0.09419415 0.06284314 0.05156856 0.015611475 0.022597586 0.008514382 0.003088927 0.000440008
0.003152729 0 0 0 0 # 25
2000 1 5 0 0 27 0 0 0 0 0 0 0 0 0.007349769
0.006858655 0.007349769 0.04027131 0.11357293 0.07487919 0.257533693 0.130231166 0.07516635 0.05796636
0.09388658 0.0429823 0.049701195 0.014356267 0.007071641 0.013751181 0.006858655 0 0.000212986 0 0
0 0 0 0 0 0 0 0 0 0 0.007349769 0.006858655 0.007349769 0.04027131
0.11357293 0.07487919 0.257533693 0.130231166 0.07516635 0.05796636 0.09388658 0.0429823 0.049701195
0.014356267 0.007071641 0.013751181 0.006858655 0 0.000212986 0 0 0 # 9
2001 1 5 0 0 21 0 0 0 0 0 0 0 0 0.010202317
0.039017263 0.020404635 0.08822004 0.08642803 0.19685311 0.1206274 0.106824265 0.10352352 0.03060695
0.05161172 0.05582108 0.037208452 0.021144055 0.010502386 0.010502386 0 0 0.010502386 0 0 0
0 0 0 0 0 0 0 0 0 0.010202317 0.039017263 0.020404635 0.08822004
0.08642803 0.19685311 0.1206274 0.106824265 0.10352352 0.03060695 0.05161172 0.05582108 0.037208452
0.021144055 0.010502386 0.010502386 0 0 0.010502386 0 0 0 # 7
2002 1 5 0 0 9 0 0 0 0 0 0 0 0 0 0.019230399
0.019230399 0.019230399 0.08048278 0.06481357 0.06125238 0.118943582 0.106835552 0.17521031 0.0648328

```
	0.11395792	0.09116634	0.045583169	0	0.019230399	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0.019230399	0.019230399	0.019230399	0.08048278	0.06481357	0.06125238
	0.118943582	0.106835552	0.17521031	0.0648328	0.11395792	0.09116634	0.045583169	0	0.019230399	0	0
	0	0	0	0	0		#	3
	2003	1	5	0	0	9	0	0	0	0	0	0	0	0	0	0
	0.200039968	0	0.20003997	0.20003997	0	0	0	0	0.19984013	0	0	0	0
	0.200039968	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.200039968	0	0.20003997	0.20003997	0	0	0	0	0.19984013	0	0	0	0
	0.200039968	0	0	0	0	0	0		#	3
#1	PikitchLFs	Season	Fleet	gender	partition	nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19
	F20	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37
	F38	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40
	-1986	1	1	0	1	6	0	0	0	0	0	0	0	0	0.01890948	0
	0.02599534	0.01890948	0.03781896	0.10479814	0.1572779	0.147079	0.14090114	0.2348537	0.05672845
	0.01890948	0.03781896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.01890948	0	0.02599534	0.01890948	0.03781896	0.10479814	0.1572779	0.147079
	0.14090114	0.2348537	0.05672845	0.01890948	0.03781896	0	0	0	0	0	0	0	0	0
	0		#	6
	-1987	1	1	0	1	3	0	0	0	0	0	0	0.02272727	0	0	0
	0.01136364	0.04545455	0.05681818	0.06818182	0.125	0.1590909	0.07954545	0.2272727	0.20454545	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02272727	0
	0	0	0.01136364	0.04545455	0.05681818	0.06818182	0.125	0.1590909	0.07954545	0.2272727
	0.20454545	0	0	0	0	0	0	0	0	0	0	0	0		#	3
#1	#WO trawl discard LFs


																	# trips	#
tows/sets	# samples
	2003	1	1	0	1	11	0	0	0	0	0	0	0.006726457	0.045964126	0.07455157
	0.012612108	0.012612108	0	0	0	0.003363229	0.003363229	0	0.003363229	0.131165919	0.013452915
	0.134529148	0.003363229	0.006726457	0	0.003363229	0.137892377	0.137892377	0.134529148	0.003363229
	0.131165919	0	0	0	0	0	0	0	0.006726457	0.045964126	0.07455157	0.012612108
	0.012612108	0	0	0	0.003363229	0.003363229	0	0.003363229	0.131165919	0.013452915	0.134529148
	0.003363229	0.006726457	0	0.003363229	0.137892377	0.137892377	0.134529148	0.003363229	0.131165919	0
	#	4	11	33
	2005	1	1	0	1	4	0	0	0	0	0	0	0	0	0	0.076923077
	0.615384615	0.076923077	0.076923077	0	0	0	0	0	0	0	0	0	0	0
	0.153846154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.076923077	0.615384615	0.076923077	0.076923077	0	0	0	0	0	0	0	0	0	0	0
	0.153846154	0	0	0	0	0	0		#	2	4	5
	2006	1	1	0	1	103	0	0	0.000437097	0.000874194	0	0.000568226	0.004283553
	0.005318016	0.007722051	0.013564583	0.01716335	0.083835245	0.094872749	0.099701874	0.083073551	0.061853712
	0.053063601	0.081199222	0.05424085	0.080309328	0.053694564	0.027025148	0.043272624	0.063816193	0.01252625
	0.025126136	0.004877049	0.019275987	0.006512748	0.001311292	0.000480807	0	0	0.000437097	0.000874194	0
	0.000568226	0.004283553	0.005318016	0.007722051	0.013564583	0.01716335	0.083835245	0.094872749	0.099701874
	0.083073551	0.061853712	0.053063601	0.081199222	0.05424085	0.080309328	0.053694564	0.027025148	0.043272624
```

```
	0.063816193	0.01252625	0.025126136	0.004877049	0.019275987	0.006512748	0.001311292	0.000480807		#
	54	103	381
	2007	1	1	0	1	43	0	0.013333601	0.017265331	0	0.014221554	0.031581865	0.006113039
	0.002437672	0.006764524	0.011719067	0.01522728	0.061099081	0.01266017	0.060419611	0.075852897	0.023078972
	0.07014206	0.05078181	0.084654771	0.158448711	0.01579202	0.127083903	0.018250312	0.024555867	0.057930219
	0.015812461	0.016027228	0.004146728	0.000971193	0.001648705	0.001979345	0	0.013333601	0.017265331	0
	0.014221554	0.031581865	0.006113039	0.002437672	0.006764524	0.011719067	0.01522728	0.061099081	0.01266017
	0.060419611	0.075852897	0.023078972	0.07014206	0.05078181	0.084654771	0.158448711	0.01579202	0.127083903
	0.018250312	0.024555867	0.057930219	0.015812461	0.016027228	0.004146728	0.000971193	0.001648705	0.001979345
	#	32	43	145
#1	#CA trawl discard LFs


										# trips	#
tows/sets	# samples
	2002	1	2	0	1	5	0	0	0	0	0	0	0	0.05	0	0.3	0	0.15
	0.1	0.05	0.05	0.05	0.1	0.1	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.05	0	0.3	0	0.15	0.1	0.05	0.05	0.05	0.1	0.1	0
	0.05	0	0	0	0	0	0	0	0	0	0	0		#	3	5	20
	2006	1	2	0	1	44	0	0	0	0	0.00042302	0.001353664	0.001626276	0.002538119
	0.017350866	0.010920964	0.109693937	0.086219767	0.125703612	0.130800062	0.010378088	0.022476457	0.059470178
	0.051363707	0.016413172	0.138850739	0.157055875	0.023266094	0.006768318	0.002876535	0.002453515	0.017597628	0
	0.003976387	0.00042302	0	0	0	0	0	0.00042302	0.001353664	0.001626276	0.002538119
	0.017350866	0.010920964	0.109693937	0.086219767	0.125703612	0.130800062	0.010378088	0.022476457	0.059470178
	0.051363707	0.016413172	0.138850739	0.157055875	0.023266094	0.006768318	0.002876535	0.002453515	0.017597628	0
	0.003976387	0.00042302	0	0		#	33	44	156
	2007	1	2	0	1	38	0	0	0	0.004058743	0.004754527	0.00057982	0.070158267
	0.007653629	0.057699131	0.030240854	0.022629561	0.030990817	0.036586666	0.007802366	0.062968494	0.225061064
	0.13741237	0.057467203	0.075918031	0.025547508	0.037111143	0.047661236	0.008065946	0.020641606	0.019366001	0
	0	0	0.009625018	0	0	0	0	0	0.004058743	0.004754527	0.00057982	0.070158267
	0.007653629	0.057699131	0.030240854	0.022629561	0.030990817	0.036586666	0.007802366	0.062968494	0.225061064
	0.13741237	0.057467203	0.075918031	0.025547508	0.037111143	0.047661236	0.008065946	0.020641606	0.019366001	0
	0	0	0.009625018	0	0		#	21	38	165
#2	#OTH discard LFs


										# trips	# sets #
samples
	2005	1	4	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0.2	0	0.2	0.2	0	0.2	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
	0.2	0	0.2	0.2	0	0.2	0.2	0	0	0	0		#	1	2	5
	-2006	1	4	0	1	2	0	0	0.5	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	0	0	0
	0	0.5	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	0	0		#	1	1	2
	2007	1	4	0	1	24	0	0	0	0	0	0	0	0	0	0.021480502	0
	0.047257105	0	0	0	0	0	0	0	0.064441507	0.098810311	0.09021811	0.249173827
```

```
      0.120290813  0.103106411  0.021480502  0.042961005  0  0  0.119299405  0.021480502  0  0  0  0  0
      0  0  0  0  0.021480502  0  0.047257105  0  0  0  0  0  0  0  0.064441507
      0.098810311  0.09021811  0.249173827  0.120290813  0.103106411  0.021480502  0.042961005  0  0  0.119299405
      0.021480502  #  7  12  27
#7    Triennial  season fleet  gender partition  Nsamp  F10  F11  F12  F13  F14  F15  F16  F17  F18  F19
      F20  F21  F22  F23  F24  F25  F26  F27  F28  F29  F30  F31  F32  F33  F34  F35  F36  F37
      F38  F39  F40  M10  M11  M12  M13  M14  M15  M16  M17  M18  M19  M20  M21  M22  M23  M24
      M25  M26  M27  M28  M29  M30  M31  M32  M33  M34  M35  M36  M37  M38  M39  M40
      nTows  4.5 times ntows is about the max seen in Ian's analysis of effective sample size

      -1980  1  6  3  0  21  0  0  0  0  0  0  0  0  0  0  0  0  0
      0  0  0  1.929114  0.3714314  2.239427  0  6.541043  9.717526  6.602161  6.602161
      1.9291138  7.7884123  4.9833601  3.1153649  1.55768247  0  0  0  0  0  0.37143136  0  0
      0  0  0  0  1.8679952  0  0  0  2.610858  0.9920568  4.417734  12.206147
      8.780469  6.657161  0.9309382  7.7884123  0  0  0  0  0  0  0  0  0  #
      3
      1983  1  6  3  0  140  0  0  0.226326271  0.22632627  0  0.08933525  0  0.3887245
      0.8011203  0.8362707  0.08933525  0.9327506  1.221452  2.034108  2.001538  2.242589  2.475857
      3.4803672  4.646195  4.170651  4.517709  5.766701  6.106775  5.211646  4.9775702  2.9395052
      1.2121657  0.5460978  0.126441  0  0  0  0  0.089335248  0  0  0.0450827  0.3425697
      0.526665  0.761743  0.4915468  0.5664963  0.981078  1.845008  2.300777  3.595259  3.7409019
      5.648497  6.308554  5.468165  4.920537  2.9034089  1.1266986  0.6309182  0.07556877  0.19391562
      0.11884648  0  0  0  0  0.05087224  #  20
      1986  1  6  3  0  231  0  0.02980703  0  0.24760257  0  0.21542289  0.1000837
      0.2700387  0.4745536  0.5808799  1.02412656  0.9782412  1.544523  2.363202  3.718319  2.708609
      3.145357  3.1646422  4.090699  5.031476  5.476977  6.190824  7.563696  3.935828  3.519433
      1.9733032  0.9209025  0.8002101  0.17552014  0.065860239  0  0  0  0.141487185  0.21223078
      0.03700109  0.17264251  0.3585739  0.3527107  0.1799611  0.4188901  1.2212821  1.387574  2.228897
      3.910215  4.851295  3.9937451  4.479305  5.718406  3.895358  1.972904  2.7090332  0.8328868
      0.2213605  0.06871941  0.3253837  0  0  0  0  0  0  #  33

      1989  1  6  3  0  714  0  0  0  0.0759914  0.282662  0.56784898  0.3650342
      0.6177382  0.9490945  1.281808  1.40568812  1.1638044  2.830246  3.8856 5.147772  4.30682
      5.104657  4.6939468  3.800431  3.002956  2.754439  2.492599  2.468575  1.956285  1.4862104
      0.9818316  0.5056929  0.2475539  0.05293053  0  0.008129875  0.01588  0  0  0.04890286
      0.06362992  0.33194904  0.1513198  0.8973443  1.1334919  1.7033358  1.4639122  1.662406  3.926039
      5.133918  5.818979  5.8567983  4.956435  4.252763  3.480439  2.665931  1.5963623  0.6546728
      0.2087039  0.79961625  0  0.06847271  0.4876966  0  0.1846614  0  0  #  102

      1992  1  6  3  0  308  0  0  0  0  0  0.04031529  0.2991579  0.4020495
      0.7947556  1.7634174  1.22648203  1.5006771  2.278953  3.048258  3.919363  4.550648  4.03405
      4.9224453  3.869494  3.890469  3.348001  2.587267  3.066285  1.664554  1.6429851  1.0824263
      0.309587  0.1907126  0.19266935  0.013897935  0.012783069  0  0  0  0  0  0.08540427
      0.2683799  0.5803159  1.0296567  1.77926  1.4894736  1.894045  3.696399  4.465038  6.642037
      5.4932591  5.918703  4.925363  4.781561  2.586168  2.0479537  1.0337016  0.2735988  0.10463804
      0.13748371  0.01401043  0.0339489  0.0339489  0.0339489  0  0  #  44
```

```
#4	Triennial	season	fleet	gender	partition	Nsamp	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19
	F20	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37
	F38	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40
	nTows	4.5 times ntows is about the max seen in Ian's analysis of effective sample size

	1995	1	7	3	0	564	0	0.04556199	0.009592339	0.05718982	0.1945807	0.36684876
	0.5706273	0.4614608	0.5598155	1.1630056	1.16760865	1.6001331	2.875052	3.965582	3.215946
	4.218284	4.254362	3.8437851	3.5871	4.029101	2.65923	2.057025	2.304456	1.585195
	0.9439792	1.1660608	0.3059178	0.2007445	0.08540253	0.010962091	0	0.01358	0.07872538
	0.009592339	0.04040713	0.19367752	0.3676455	0.5353776	0.3498392	0.9574984	1.2725876	2.6712552
	3.60071	4.158581	5.115958	6.556397	7.3989836	6.453281	4.858789	3.371324	2.188903
	1.3078498	0.5534802	0.1611144	0.19674452	0.03817546	0	0.02165585	0.0232552	0	0	0
	#	141
	1998	1	7	3	0	752	0.04214282	0.01389631	0.015257334	0.12253804	0.2249278	0.61225597
	1.2551388	2.5451996	2.2185892	2.5490438	1.75811589	1.893212	1.239839	1.539979	2.1858
	2.615129	4.250804	4.535355	4.38777	3.688151	3.180757	2.737064	1.76189	2.094227
	1.3493888	0.9256345	0.489973	0.2136089	0.04931299	0.007570938	0	0.04541	0.05230457
	0.026920405	0.10264645	0.27789357	0.51179376	1.5495318	2.7982624	3.0743802	2.4581767	2.1633101
	1.651312	2.30225	3.580523	3.886436	6.7635396	5.185077	4.976247	3.25619	2.388459
	1.4610065	0.6448628	0.1925781	0.06147363	0.02679646	0.04403092	0.01601642	0	0	0	0
	#	188
	2001	1	7	3	0	684	0.127	0.02984677	0.066191318	0.27914529	0.162141	0.14863954
	0.3190304	0.2289152	0.601892	1.6328815	3.31684667	4.5594066	5.004676	3.679	3.878629
	2.582621	2.586741	2.7918044	2.955758	4.225502	4.011672	3.21084	3.188308	2.567751
	2.0267604	1.3302573	0.681052	0.1623939	0.1099532	0.021317976	0	0.007734	0.01999913
	0.069096488	0.17094259	0.2280819	0.24158071	0.3964838	0.2141742	1.1189088	1.3999136	3.1798696
	4.474259	5.304557	5.014745	3.643561	3.0532054	4.45621	3.547925	2.826701	2.085682
	1.1679692	0.5287323	0.2248301	0.0434872	0.08308112	0.01127006	0	0	0	0	0		#
	171
	2004	1	7	3	0	584	0.02886225	0.05667161	0.088643682	0.06337708	0.2909071	0.77770714
	1.0142427	1.1872569	1.7931102	1.8879389	1.2924348	1.8266252	1.674093	1.39962	2.812173
	2.571172	3.731649	3.1669016	2.821798	2.481794	3.023749	2.881844	3.398994	2.989447
	2.3812345	1.0924387	0.8007927	0.2501281	0.01535444	0.054519538	0.148080288	0.06468263	0.24714374
	0.215119625	0.2968275	0.39161853	0.82096484	1.3269117	1.2100237	1.8507094	2.4188054	2.3641819
	2.190688	2.526842	2.544111	5.742231	5.9061532	4.709998	5.771834	4.408517	3.284227
	2.4534614	0.9149242	0.1967146	0.02873853	0.08751787	0.02349303	0	0	0	0	0		#
	146
#1	NWFSC	Season	Fleet	gender	partition	nSamps	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
	F21	F22	F23	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38
	F39	F40	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40			nSamps

	2003	1	8	3	0	611	0	0.01518784	0.03407803	0.29135197	0.1998197	0.5345429
	0.7769233	0.8855414	0.986772	1.040631	1.1890995	1.074411	1.67248	1.900239	3.765033
	5.238265	3.998875	3.484828	1.988694	4.125877	3.127503	3.380346	4.062595	2.868021
	2.345776	1.3536676	0.5529992	0.48531903	0.19384473	0.13052637	0.0283802	0	0.06013208
	0.07504851	0.1999401	0.7025151	0.9590589	0.7439348	0.6904753	1.4645048	1.102938	1.940659
```

```
	1.777761	3.594236	5.190614	4.529133	4.664583	5.241652	4.319586	4.147546	2.714612
	2.707058	0.7902208	0.43248078	0.12253679	0.053469	0	0.0436789	0	0	0	0		#
	610	133	610
	2004	1	8	3	0	649	0.06339911	0.12295476	0.18522087	0.14171218	0.3872081	0.602596
	0.8481998	1.5532564	1.2726658	0.9590487	1.0259573	1.047911	2.536072	2.814122	3.37909
	3.086286	4.621874	3.801745	3.574192	3.3631 3.728632	3.182832	2.908621	2.536198
	1.863284	1.0698282	0.9537357	0.31752994	0.04870867	0.06051138	0	0	0	0.04962072
	0.1585248	0.1777498	0.3579171	0.6543697	0.9254518	0.8545867	1.12748	2.50282	3.088837
	4.243786	3.517249	4.550749	5.915517	5.040721	5.546848	4.025236	2.315364	1.963667
	0.4665899	0.10990601	0.27136217	0.06349417	0.01566159	0	0	0	0	0		#	649
	140	649
	2005	1	8	3	0	605	0.05161683	0.10583221	0.07089331	0.15258036	0.2959939	0.5547591
	0.5165981	1.1019572	1.2489772	1.9995507	3.1557262	1.916505	3.057988	3.251281	3.750985
	3.242535	3.242741	4.108334	3.785607	3.550931	3.517297	2.450259	2.987885	1.854235
	1.422432	0.8832508	0.408853	0.13473407	0.0445325	0.07707867	0	0.009643536	0.06421911
	0.05680788	0.1928949	0.2393919	0.4206667	0.5202258	0.9174088	2.2305218	1.928182	2.687618
	4.050524	3.427168	4.454893	4.287548	3.794744	4.290189	5.029548	3.64106	2.381554
	1.9537 0.1781557	0.08643466	0.15535598	0.01166396	0.02460676	0.02332791	0	0	0	0		#
	604	182	604
	2006	1	8	3	0	595	0	0.13606171	0.21488465	0.21099746	0.3824409	0.7953277
	0.6898728	1.0497256	1.6632414	1.5248685	2.6298843	2.676742	3.728883	3.588865	4.680447
	3.136194	3.078269	4.151106	2.912694	2.359396	2.975683	3.223648	2.053339	2.127089
	1.288461	0.8106138	0.3312925	0.06214001	0.04479529	0.05711456	0	0.01810423	0.09197299
	0.28068581	0.206703	0.664489	0.5993475	1.1442053	1.3731298	1.710694	1.952824	3.172072
	3.820685	4.602643	4.94467	4.766819	3.43307	4.49652	3.214068	2.931727	1.94779
	1.12472	0.8305791	0.06215833	0	0	0	0.01039705	0	0.01585011	0	0		#
	594	182	594
	2007	1	8	3	0	447	0.01712272	0.02722212	0.04942167	0.10334259	0.3084881	0.2267037
	0.4218456	0.2252965	0.9197015	1.3302846	1.8133408	1.572232	3.668786	3.722058	4.608307
	2.789593	4.53248	3.579098	1.781929	1.967949	4.045169	2.315753	2.689167	1.929951
	2.225998	0.5331688	1.335864	0.45914157	0.18548282	0	0	0	0.06418466	0.0312922
	0.1903187	0.2831503	0.2623053	0.4243234	0.3487613	1.0476879	1.606798	3.469544	2.796282
	5.289385	5.416524	4.322472	3.550475	5.109694	4.425211	4.055225	4.456309	1.800741
	0.9630667	0.59878617	0.04816283	0	0.00965267	0.04475009	0	0	0	0		#	446
	168	446
	2008	1	8	3	0	191	0	0.02721223	0.02459759	0.03144266	0.2664089	0.1353796
	0.3619978	0.6663395	0.2992864	0.8659887	0.6487891	2.512347	1.480334	3.476381	5.392469
	5.317777	7.64524	4.411358	4.771525	3.335769	3.955814	2.262313	1.778616	1.332965
	0.398316	0.4693919	0.2807606	0.09812714	0.02984567	0.02338957	0	0.057389289	0.0468708
	0.0449248	0.1560699	0.1743512	0.2333081	0.48382	0.3361757	1.2031057	1.286172	3.757559
	2.91301	4.384377	5.536756	6.296894	5.327316	5.534986	2.691175	4.009081	1.569383
	1.275305	0.2185087	0.1352139	0.02806654	0	0	0	0	0	0	0		#	191
	150	191

#_AGE_DATA
45	#n_abins	#_N_agebins	#(<=_#_of_age,_the_model_always_start_at_age_0)
#age_bins1(1,n_abins)	#_lower_age_of_agebins
```

```
1      2      3      4      5      6      7      8      9      10     11     12     13     14     15     16     17 18 19 20 21 22 23
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

#_Age_error


1      #N_ageerr
#age_err(1,N_ageerr,1,2,0,nages) #_vector_with_stddev_of_ageing_precision_for_each_AGE_and_type


#perfect_age_(ageerr=1_given_but_not_used)


#-1    -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -
1      -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -1     -
1      -1     -1
#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  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
-1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -
1.0    -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -
1.0    -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0   -1.0 -1.0

0.134  0.134  0.366  0.534  0.655  0.743  0.807  0.853  0.887  0.911  0.928  0.941  0.950  0.957  0.962  0.965  0.968  0.970  0.971
       0.972  0.973  0.973  0.973  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974
       0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974  0.974 0.974 0.974



#_AGE_COMPOSITIONS(duplicates_must_be_contigent_within_Year-Seas-Fleet-Sex_because_of_ageerr_and_states)


315    #nobsa
3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
1 #_combine males into females at or below this bin number
#NWFSC_F      year   Season Fleet  gender partition     ageErr LbinLo LbinHi nSamps F1     F2     F3     F4     F5     F6     F7
       F8     F9     F10    F11    F12    F13    F14    F15    F16    F17    F18    F19    F20    F21    F22    F23    F24    F25
       F26    F27    F28    F29    F30    F31    F32    F33    F34    F35    F36    F37    F38    F39    F40    F41    F42    F43
       F44    F45    F1.1   F1.2   F1.3   F1.4   F1.5   F1.6   F1.7   F1.8   F1.9   F1.10  F1.11  F1.12  F1.13  F1.14  F1.15  F1.16
       F1.17  F1.18  F1.19  F1.20  F1.21  F1.22  F1.23  F1.24  F1.25  F1.26  F1.27  F1.28  F1.29  F1.30  F1.31  F1.32  F1.33  F1.34
       F1.35  F1.36  F1.37  F1.38  F1.39  F1.40  F1.41  F1.42  F1.43  F1.44  F1.45
       2003   1      8      1      0      1      11     11     1      0      100    0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
       0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      100    0
       0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      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 8 1 0 1 12 12 1 0 0 100 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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 8 1 0 1 13 13 3 0 33.33333 66.66667 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0	0	0	100															
2005	1	8	1	0	1	10	10	2	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	11	11	6	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	12	12	2	50	50	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	13	13	2	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	14	14	1	0	0	100	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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	8	1	0	1	15	15	4	0	0	75	25	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
75	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	16	16	8	0	0	75	25	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
75	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	17	17	4	0	0	25	75	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	18	18	10	0	0	0	50	40	0	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	0	0	0
50	40	0	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															
2005	1	8	1	0	1	19	19	10	0	0	0	10	60	0	30	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	60	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	20	20	20	0	0	0	0	30	50	15	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	0
0	30	50	15	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															
2005	1	8	1	0	1	21	21	13	0	0	0	0	23.076923	38.461538				
15.384615	15.384615	0	0	0	7.692308	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	23.076923	38.461538	15.384615	15.384615	0	0	0				
7.692308	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	22	22	13	0	0	0	0	15.384615	30.769231				
7.692308	7.692308	7.692308	0	0	15.384615	0	7.692308	0	7.692308	0	0	0						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	15.384615	30.769231	7.692308					

7.692308 7.692308 0 0 15.384615 0 7.692308 0 7.692308 0 0 0 0 0
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 8 1 0 1 23 23 13 0 0 0 0 15.384615 30.769231
46.153846 0 0 0 0 0 7.692308 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 15.384615 30.769231 46.153846 0 0 0 0 0
7.692308 0 0 0 0 0 0 0 0 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 8 1 0 1 24 24 22 0 0 0 0 4.545455 18.181818
22.727273 0 18.181818 0 4.545455 31.818182 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 4.545455 18.181818 22.727273 0 18.181818 0
4.545455 31.818182 0 0 0 0 0 0 0 0 0 0 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 8 1 0 1 25 25 17 0 0 0 0 0 17.647059 11.764706 0
11.764706 5.882353 17.647059 17.647059 11.764706 5.882353 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 17.647059 11.764706 0 11.764706
5.882353 17.647059 17.647059 11.764706 5.882353 0 0 0 0 0 0 0 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 8 1 0 1 26 26 17 0 0 0 0 0 0 5.882353 0
17.647059 0 5.882353 52.941176 5.882353 5.882353 0 0 0 5.882353 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 5.882353 0 17.647059 0
5.882353 52.941176 5.882353 5.882353 0 0 0 5.882353 0 0 0 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 8 1 0 1 27 27 19 0 0 0 0 0 0 0 0
5.263158 15.789474 5.263158 36.842105 5.263158 10.526316 10.526316 0 0 0 0
5.263158 5.263158 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
5.263158 15.789474 5.263158 36.842105 5.263158 10.526316 10.526316 0 0 0 0
5.263158 5.263158 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 8 1 0 1 28 28 17 0 0 0 0 0 0 0 0
5.882353 0 5.882353 47.058824 0 0 0 0 5.882353 0 5.882353 5.882353 0
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5.882353 0 5.882353 47.058824 0 0 0 0 5.882353 0 5.882353 5.882353 0
0 5.882353 5.882353 0 0 0 0 0 5.882353 0 0 0 0 0 0 0
0 0 0 0 0 0 0 5.882353
2005 1 8 1 0 1 29 29 29 0 0 0 0 0 0 0 0
3.448276 0 6.896552 34.482759 6.896552 0 0 10.344828 6.896552 3.448276 0
10.344828 3.448276 3.448276 0 0 0 0 0 0 0 3.448276 0 0
3.448276 3.448276 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 3.448276 0 6.896552 34.482759 6.896552 0 0 10.344828

6.896552 3.448276 0 10.344828 3.448276 3.448276 0 0 0 0 0 0 0
3.448276 0 0 3.448276 3.448276 0 0 0 0 0 0 0 0 0 0 0
2005 1 8 1 0 1 30 30 18 0 0 0 0 0 0 0 0 0 0
0 22.222222 0 0 5.555556 0 5.555556 5.555556 11.111111 11.111111 16.666667
16.666667 0 0 0 0 0 0 0 0 5.555556 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
22.222222 0 0 5.555556 0 5.555556 5.555556 11.111111 11.111111 16.666667
16.666667 0 0 0 0 0 0 0 0 5.555556 0 0 0 0 0 0 0
0 0 0 0 0 0 0
2005 1 8 1 0 1 31 31 9 0 0 0 0 0 0 0 0 0 0
0 11.111111 0 0 22.222222 22.222222 0 11.111111 0 0 0 0 11.111111 0
11.111111 0 0 0 0 0 11.111111 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11.111111 0 0
22.222222 22.222222 0 11.111111 0 0 0 0 11.111111 0 11.111111 0 0 0
0 0 11.111111 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2005 1 8 1 0 1 32 32 18 0 0 0 0 0 0 0 0 0 0
0 0 0 0 16.666667 11.111111 11.111111 5.555556 5.555556 11.111111 0 0
5.555556 0 11.111111 0 0 11.111111 5.555556 0 0 0 0 5.555556 0 0
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0 0 0 0 16.666667 11.111111 11.111111 5.555556 5.555556 11.111111 0 0
5.555556 0 11.111111 0 0 11.111111 5.555556 0 0 0 0 5.555556 0 0
0 0 0 0 0 0 0 0 0
2005 1 8 1 0 1 33 33 7 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 14.285714 0 0 0 0 0 0 14.285714 0 0
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14.285714 14.285714 0 0 0 14.285714 14.285714 0 0 0 0 0 0 0 0
0
2005 1 8 1 0 1 34 34 8 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 12.5 0 12.5 0 0 12.5 0 12.5 0 0
12.5 12.5 0 0 0 0 0 0 0 0 0 0 0 0 0 25 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 12.5 0
12.5 0 0 12.5 0 12.5 0 0 12.5 12.5 0 0 0 0 0 0 0 0 0
0 0 0 0 25
2005 1 8 1 0 1 35 35 4 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 25 0 0 0 25 0 0
0 0 0 0 25 25 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
25 0 0 0 25 0 0 0 0 0 0 25 25 0 0 0 0 0 0
0 0 0 0
2005 1 8 1 0 1 36 36 5 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 20 0 0 0 0 0 0 0
0 20 0 0 0 0 20 0 20 0 20 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
20 0 0 0 0 0 0 0 0 20 0 0 0 0 20 0 20 0
20 0 0 0 0 0

2005	1	8	1	0	1	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	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	100															
2005	1	8	1	0	1	39	39	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	100	0	0															
2006	1	8	1	0	1	11	11	1	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	12	12	6	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	13	13	3	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	14	14	1	0	0	100	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	15	15	3	0	33.33333		0	66.666667		0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33.33333		0	66.666667		0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	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	8	1	0	1	17	17	7	0	0	0	71.428571		28.571429		0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	71.428571		28.571429		0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	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	8	1	0	1	18	18	5	0	0	0	20	40	40	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	19	19	11	0	0	0	27.272727	27.272727	18.181818				
9.090909	9.090909	0	9.090909	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	27.272727	27.272727	18.181818	9.090909	9.090909	0						
9.090909	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	20	20	10	0	0	0	10	10	40	10	10	0	0
0	10	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
10	10	40	10	10	0	0	0	10	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															
2006	1	8	1	0	1	21	21	13	0	0	0	7.692308	30.769231	23.076923				
7.692308	23.076923	0	0	0	7.692308	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	7.692308	30.769231	23.076923	7.692308	23.076923	0	0					
0	7.692308	0	0	0	0	0	0	0	0	0	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	8	1	0	1	22	22	22	0	0	0	0	9.090909	31.818182				
31.818182	13.636364	0	0	0	0	4.545455	4.545455	0	0	0	4.545455	0	0					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	9.090909	31.818182	31.818182	13.636364	0				
0	0	0	4.545455	4.545455	0	0	0	4.545455	0	0	0	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	8	1	0	1	23	23	20	0	0	0	0	10	20	15	25	0	0
5	10	5	5	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	10	20	15	25	0	0	5	10	5	5	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															
2006	1	8	1	0	1	24	24	23	0	0	0	0	0	0	26.086957			
4.347826	13.043478	4.347826	4.347826	21.73913	17.391304	8.695652	0	0	0	0	0							
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	26.086957	4.347826				
13.043478	4.347826	4.347826	21.73913	17.391304	8.695652	0	0	0	0	0	0	0						
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	8	1	0	1	25	25	8	0	0	0	0	0	12.5	25	12.5	0	0
0	12.5	25	12.5	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	12.5	25	12.5	0	0	0	12.5	25	12.5	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
2006 1 8 1 0 1 26 26 17 0 0 0 0 0 0 11.764706
17.647059 0 0 0 11.764706 23.529412 11.764706 5.882353 0 17.647059 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 11.764706 17.647059 0 0 0
11.764706 23.529412 11.764706 5.882353 0 17.647059 0 0 0 0 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 8 1 0 1 27 27 21 0 0 0 0 0 4.761905 4.761905
4.761905 4.761905 0 9.52381 19.047619 38.095238 4.761905 4.761905 4.761905 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 4.761905 4.761905
4.761905 4.761905 0 9.52381 19.047619 38.095238 4.761905 4.761905 4.761905 0 0
0 0 0 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 8 1 0 1 28 28 16 0 0 0 0 0 0 0 0 6.25
12.5 6.25 6.25 37.5 0 6.25 0 6.25 0 0 6.25 0 6.25 0 0 0 0 0 0
0 0 0 6.25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 6.25 12.5 6.25 6.25 37.5 0 6.25 0 6.25 0 0 6.25 0
6.25 0 0 0 0 0 0 0 0 0 6.25 0 0 0 0 0 0 0 0
0 0 0 0 0
2006 1 8 1 0 1 29 29 10 0 0 0 0 0 0 0 0 0 0
0 0 30 10 0 10 0 10 10 0 0 0 0 10 0 0 0 0 0
10 0 0 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 30 10 0 10 0 10 10 0 0 0
0 10 0 0 0 0 0 10 0 0 10 0 0 0 0 0 0 0 0
0 0 0 0
2006 1 8 1 0 1 30 30 12 0 0 0 0 0 0 0 0 0 0
0 8.333333 8.333333 0 8.333333 8.333333 0 0 8.333333 8.333333 0
8.333333 16.666667 0 8.333333 0 0 0 8.333333 0 0 0 0 8.333333 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 8.333333 8.333333 0 8.333333 8.333333 0 0 8.333333 8.333333 0
8.333333 16.666667 0 8.333333 0 0 0 8.333333 0 0 0 0 8.333333 0
0 0 0 0 0 0 0 0 0 0
2006 1 8 1 0 1 31 31 13 0 0 0 0 0 0 0 0 0 0
0 0 0 0 7.692308 0 15.384615 0 7.692308 0 7.692308 15.384615
7.692308 7.692308 7.692308 0 7.692308 0 0 0 0 0 0 0 0
7.692308 0 0 0 7.692308 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 7.692308 0 15.384615 0 7.692308 0 7.692308
15.384615 7.692308 7.692308 7.692308 0 7.692308 0 0 0 0 0 0 0 0
7.692308 0 0 0 7.692308 0 0 0 0 0
2006 1 8 1 0 1 32 32 12 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 8.333333 8.333333 8.333333 8.333333 0 16.666667 16.666667
8.333333 0 0 0 0 8.333333 8.333333 0 0 0 0 8.333333 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 8.333333 8.333333 8.333333 8.333333 0 16.666667 16.666667

8.333333	0	0	0	0	8.333333	8.333333	0	0	0	0	8.333333	0	0	0				
0	0	0	0	0	0	0	0											
2006	1	8	1	0	1	33	33	13	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	7.692308	0	0	0	7.692308	15.384615	0	0					
7.692308	0	7.692308	0	15.384615	0	0	7.692308	7.692308	7.692308	7.692308	0							
0	0	7.692308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	7.692308	0	0	0	7.692308	15.384615	0	0				
7.692308	0	7.692308	0	15.384615	0	0	7.692308	7.692308	7.692308	7.692308	0							
0	0	7.692308	0	0	0	0	0	0										
2006	1	8	1	0	1	34	34	5	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	20	0	0	0	40	0	0	0	20	0	0
0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
40	0	0	0	20	0	0	0	20	0	0	0	0	0	0	0	0	0	0
0	0	0	0															
2006	1	8	1	0	1	35	35	7	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	28.571429	0	14.285714	14.285714	0				
14.285714	0	0	0	0	0	0	14.285714	0	14.285714	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	28.571429	0	14.285714	14.285714	0	14.285714	0	0	0	0				
0	0	14.285714	0	14.285714	0	0	0	0	0	0	0	0	0	0				
2006	1	8	1	0	1	36	36	3	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	33.333333	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	33.333333	0	0	0	0	0	0	33.333333	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	33.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
33.333333	0	0	0	0	0	0	33.333333	0	0									
2006	1	8	1	0	1	37	37	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0														
2006	1	8	1	0	1	38	38	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	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
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0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	50														
2006	1	8	1	0	1	39	39	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	50	0	0	0	0	0	0	0	0	0	0	50	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0
0	0	0	50															
2007	1	8	1	0	1	10	10	1	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	11	11	1	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	12	12	1	0	0	100	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	13	13	3	0	66.66667		33.33333		0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66.66667		33.33333		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	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	8	1	0	1	14	14	10	0	50	50	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	15	15	7	0	0	71.42857		14.285714		0	0		
14.285714		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	71.42857		14.285714		0	0	14.285714		0	0	0	0	0	0	0
0	0	0	0	0	0	0	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	8	1	0	1	16	16	8	0	0	50	37.5	0	12.5	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	0	0	0	
50	37.5	0	12.5	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	0														
2007	1	8	1	0	1	17	17	3	0	0	33.33333		33.333333		33.333333		0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	33.33333		33.333333		33.333333		0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	8	1	0	1	18	18	9	0	0	11.11111		44.444444		22.222222		0	
22.222222		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0 0 0 0 11.11111 44.444444 22.222222 0 22.222222 0 0 0 0 0 0
0 0 0 0 0 0 0 0 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 8 1 0 1 19 19 9 0 0 0 55.555556 11.111111 22.222222
11.111111 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 55.555556 11.111111 22.222222 11.111111 0 0 0 0 0 0
0 0 0 0 0 0 0 0 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 8 1 0 1 20 20 8 0 0 0 25 12.5 25 0 25 0 0
0 12.5 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
25 12.5 25 0 25 0 0 0 12.5 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
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2007 1 8 1 0 1 21 21 5 0 0 0 20 20 20 0 20 0 0
0 0 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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20 20 20 0 20 0 0 0 0 20 0 0 0 0 0 0 0 0 0
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0 0 0 0
2007 1 8 1 0 1 22 22 14 0 0 0 0 7.142857 14.285714
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0 0 0 0 0 0 0 0 0 0 7.142857 14.285714 42.857143 7.142857
7.142857 7.142857 14.285714 0 0 0 0 0 0 0 0 0 0 0 0 0
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2007 1 8 1 0 1 23 23 19 0 0 0 0 0 5.263158 15.789474
15.789474 15.789474 0 15.789474 5.263158 5.263158 5.263158 5.263158 5.263158 0
5.263158 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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15.789474 15.789474 15.789474 0 15.789474 5.263158 5.263158 5.263158 5.263158
5.263158 0 5.263158 0 0 0 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 8 1 0 1 24 24 23 0 0 0 0 4.347826 0 17.391304
8.695652 26.086957 8.695652 13.043478 4.347826 0 13.043478 4.347826 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 4.347826 0 17.391304 8.695652
26.086957 8.695652 13.043478 4.347826 0 13.043478 4.347826 0 0 0 0 0 0
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0 0 0 0 0
2007 1 8 1 0 1 25 25 15 0 0 0 0 0 0 33.333333
6.666667 26.666667 6.666667 20 6.666667 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 33.333333 6.666667 26.666667 6.666667
20 6.666667 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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2007 1 8 1 0 1 26 26 32 0 0 0 0 0 0 12.5 25 18.75 0
9.375 3.125 9.375 12.5 0 3.125 0 3.125 3.125 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 12.5 25 18.75 0 9.375 3.125 9.375 12.5 0 3.125 0 3.125 3.125 0 0 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 8 1 0 1 27 27 32 0 0 0 0 0 0 3.125 0 15.625 0
6.25 6.25 15.625 18.75 3.125 6.25 6.25 3.125 3.125 0 6.25 3.125 0 0 0 0 0 0 0
3.125 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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3.125 0 0 0 0 0 0 0 3.125 0 0 0 0 0 0 0 0 0 0
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2007 1 8 1 0 1 28 28 16 0 0 0 0 0 0 0 6.25 0 0
12.5 6.25 0 18.75 12.5 18.75 12.5 0 0 0 6.25 0 0 0 0 0 0 0 0
0 0 6.25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 6.25 0 0 12.5 6.25 0 18.75 12.5 18.75 12.5 0 0 0 6.25 0
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2007 1 8 1 0 1 29 29 25 0 0 0 0 0 0 0 0 12 4
0 8 12 12 8 8 4 4 4 0 0 8 4 4 4 0 0 0 0
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4 4 4 0 0 0 0 0 0 0 0 0 0 4 0 0 0 0 0
0 0 0 0
2007 1 8 1 0 1 30 30 29 0 0 0 0 0 0 0 0 0 0
0 3.448276 0 24.137931 3.448276 3.448276 0 10.344828 6.896552 0 3.448276
6.896552 10.344828 0 10.344828 0 3.448276 3.448276 0 0 6.896552 0 0
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6.896552 0 0 3.448276 0 0 0 0 0 0 0 0 0 0 0
2007 1 8 1 0 1 31 31 15 0 0 0 0 0 0 0 0 0 0
0 0 13.333333 6.666667 0 6.666667 0 20 0 6.666667 13.333333 0
13.333333 6.666667 0 0 0 0 0 0 6.666667 0 0 6.666667 0 0 0
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0 13.333333 6.666667 0 6.666667 0 20 0 6.666667 13.333333 0 13.333333
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2007 1 8 1 0 1 32 32 10 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 10 10 0 0 20 0 0 0 10 0 20 0
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20 0 0 0 10 0 20 0 0 10 0 0 0 0 0 10 0 0
10 0 0 0 0 0
2007 1 8 1 0 1 33 33 21 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 4.761905 0 0 9.52381 4.761905 0 19.047619 4.761905 0
0 4.761905 0 4.761905 0 0 0 4.761905 4.761905 4.761905 9.52381 9.52381
4.761905 4.761905 0 0 0 0 4.761905 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 4.761905 0 0 9.52381 4.761905 0
19.047619 4.761905 0 0 4.761905 0 4.761905 0 0 0 4.761905 4.761905
4.761905 9.52381 9.52381 4.761905 4.761905 0 0 0 0 4.761905 0 0
2007 1 8 1 0 1 34 34 20 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 5 5 0 0 0 10 15 5 0 10 0 5 5 0
10 0 0 10 5 0 0 0 0 10 0 0 0 0 0 5 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 5 5 0 0 0 10
15 5 0 10 0 5 5 0 10 0 0 10 5 0 0 0 0 10 0
0 0 0 0 5
2007 1 8 1 0 1 35 35 8 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 25 12.5 12.5 0 0 12.5 0 0 0 0 0 0
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12.5 0 0 0 0 0 0 0 0 0 0 12.5 0 0 0 0 0 0 0
0 0 0 25
2007 1 8 1 0 1 36 36 10 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 10 0 0 0 10 10 10 10 0
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10 0 0 10
2007 1 8 1 0 1 37 37 2 0 0 0 0 0 0 0 0 0 0
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0 0 0 100
2008 1 8 1 0 1 11 11 1 100 0 0 0 0 0 0 0 0 0
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0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 100 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 8 1 0 1 12 12 2 50 0 50 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 50 0
50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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 8 1 0 1 13 13 1 0 0 100 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	14	14	7	0	57.14286	42.85714	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57.14286	42.85714	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	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	8	1	0	1	15	15	5	0	40	20	20	20	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	
20	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	1	0	1	16	16	9	0	11.11111	77.77778	0	11.111111	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	11.11111	77.77778	0	11.111111	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	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	8	1	0	1	17	17	8	0	0	50	12.5	37.5	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	0	0	0	0	
50	12.5	37.5	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	0	0														
2008	1	8	1	0	1	18	18	3	0	0	33.33333	0	66.666667	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	33.33333	0	66.666667	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	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	8	1	0	1	19	19	9	0	0	11.11111	22.222222	22.222222					
33.333333	11.111111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	11.11111	22.222222	22.222222	33.333333	11.111111	0	0	0					
0	0	0	0	0	0	0	0	0	0	0	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	8	1	0	1	20	20	8	0	0	0	12.5	37.5	25	12.5	0	0	0
12.5	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
12.5	37.5	25	12.5	0	0	0	12.5	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															
2008	1	8	1	0	1	21	21	16	0	0	0	0	6.25	31.25	18.75	31.25	6.25	0
0	0	0	0	0	6.25	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0 6.25 31.25 18.75 31.25 6.25 0 0 0 0 0 0 6.25 0 0 0 0 0 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 8 1 0 1 22 22 15 0 0 0 0 0 26.666667 13.333333
13.333333 6.666667 13.333333 6.666667 13.333333 0 0 0 0 0 0 6.666667 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 26.666667 13.333333 13.333333
6.666667 13.333333 6.666667 13.333333 0 0 0 0 0 0 6.666667 0 0 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 8 1 0 1 23 23 15 0 0 0 0 0 13.333333 6.666667
26.666667 33.333333 6.666667 0 0 13.333333 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 13.333333 6.666667 26.666667 33.333333
6.666667 0 0 13.333333 0 0 0 0 0 0 0 0 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 8 1 0 1 24 24 15 0 0 0 0 0 0 20 26.666667
13.333333 13.333333 0 0 6.666667 6.666667 6.666667 0 0 0 0 0 0
6.666667 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 20 26.666667 13.333333
13.333333 0 0 6.666667 6.666667 6.666667 0 0 0 0 0 0 6.666667 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 8 1 0 1 25 25 11 0 0 0 0 0 0 0 18.181818 0
9.090909 27.272727 0 0 9.090909 18.181818 9.090909 0 0 9.090909 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 18.181818 0 9.090909 27.272727 0
0 9.090909 18.181818 9.090909 0 0 9.090909 0 0 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 8 1 0 1 26 26 18 0 0 0 0 0 0 0 11.111111
5.555556 16.666667 0 11.111111 11.111111 5.555556 22.222222 5.555556 0 0
11.111111 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 11.111111
5.555556 16.666667 0 11.111111 11.111111 5.555556 22.222222 5.555556 0 0
11.111111 0 0 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 8 1 0 1 27 27 13 0 0 0 0 0 0 0 15.384615
7.692308 15.384615 0 15.384615 0 0 0 0 7.692308 7.692308 0 0 0 0
0 7.692308 0 0 0 7.692308 0 7.692308 0 0 0 7.692308 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 15.384615
7.692308 15.384615 0 15.384615 0 0 0 0 7.692308 7.692308 0 0 0 0
0 7.692308 0 0 0 7.692308 0 7.692308 0 0 0 7.692308 0 0 0
0 0 0 0 0 0 0 0
2008 1 8 1 0 1 28 28 22 0 0 0 0 0 0 0 4.545455
4.545455 0 4.545455 0 0 18.181818 27.272727 0 0 0 4.545455 0 0 0
4.545455 0 9.090909 9.090909 4.545455 0 0 0 4.545455 0 0 0 0
4.545455 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
4.545455 4.545455 0 4.545455 0 0 18.181818 27.272727 0 0 0 4.545455 0

0 0 4.545455 0 9.090909 9.090909 4.545455 0 0 0 4.545455 0 0 0
0 4.545455 0 0 0 0 0 0 0 0 0
2008 1 8 1 0 1 29 29 21 0 0 0 0 0 0 0 0
4.761905 0 0 0 4.761905 14.285714 14.285714 4.761905 9.52381 4.761905
4.761905 4.761905 4.761905 0 4.761905 4.761905 0 0 0 4.761905 0
4.761905 0 0 0 4.761905 0 0 0 0 0 0 0 0 0 0
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14.285714 14.285714 4.761905 9.52381 4.761905 4.761905 4.761905 4.761905 0
4.761905 4.761905 0 0 0 4.761905 0 4.761905 0 0 0 4.761905 0 0
0 0 0 0 0 0 0 0 4.761905
2008 1 8 1 0 1 30 30 10 0 0 0 0 0 0 0 0 0 0
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0 10 0 0 0 0 10 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 20 10 0 0 10 0 0 0
20 10 0 0 10 0 0 0 10 0 0 0 0 10 0 0 0 0 0
0 0 0 0
2008 1 8 1 0 1 31 31 16 0 0 0 0 0 0 0 0 0 0
0 0 0 12.5 6.25 0 0 6.25 12.5 12.5 6.25 0 0 25 6.25 0 0 0 0
0 0 0 0 6.25 0 0 6.25 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 12.5 6.25 0 0 6.25 12.5 12.5 6.25 0
0 25 6.25 0 0 0 0 0 0 0 0 6.25 0 0 6.25 0 0 0 0
0 0 0 0
2008 1 8 1 0 1 32 32 10 0 0 0 0 0 0 0 0 0 0
0 0 0 0 20 20 10 0 0 0 0 0 0 0 10 0 10 0 0
0 0 0 0 0 0 0 20 0 0 0 10 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 20 20 10 0 0 0 0 0
0 0 10 0 10 0 0 0 0 0 0 0 0 0 20 0 0 0
10 0 0 0 0
2008 1 8 1 0 1 33 33 10 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 10 20 0 10 10 10 20 10 0 0 0
0 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 10 20 0
10 10 10 20 10 0 0 0 0 10 0 0 0 0 0 0 0 0 0
0 0 0 0 0
2008 1 8 1 0 1 34 34 6 0 0 0 0 0 0 0 0 0 0
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16.666667 0 0 16.666667 0 0 0 0 0 0 0 0 0 0
2008 1 8 1 0 1 35 35 8 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 12.5 0 0 0 0 12.5 0 12.5 0 12.5 0
12.5 12.5 0 0 0 0 0 12.5 0 0 0 0 0 0 0 12.5 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 12.5 0 0 0
0 12.5 0 12.5 0 12.5 0 12.5 12.5 0 0 0 0 0 12.5 0 0 0 0
0 0 0 12.5
2008 1 8 1 0 1 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 0

```
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	100	0
	2008	1	8	1	0	1	39	39	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
	0	0	0	0
#NWFSC_M	year	Season	Fleet	gender	partition	ageErr	LbinLo	LbinHi	nSamps	M1	M2	M3	M4	M5	M6	M7
	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43
	M44	M45	M1.1	M1.2	M1.3	M1.4	M1.5	M1.6	M1.7	M1.8	M1.9	M1.10	M1.11	M1.12	M1.13	M1.14	M1.15	M1.16
	M1.17	M1.18	M1.19	M1.20	M1.21	M1.22	M1.23	M1.24	M1.25	M1.26	M1.27	M1.28	M1.29	M1.30	M1.31	M1.32	M1.33	M1.34
	M1.35	M1.36	M1.37	M1.38	M1.39	M1.40	M1.41	M1.42	M1.43	M1.44	M1.45
	2003	1	8	2	0	1	12	12	2	0	100	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	13	13	2	0	100	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	14	14	3	0	0	66.666667	33.333333	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	66.666667	33.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	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	8	2	0	1	15	15	6	0	0	66.666667	33.333333	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	66.666667	33.333333	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	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	8	2	0	1	16	16	8	0	0	75	25	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	75	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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	8	2	0	1	17	17	7	0	0	42.857143	42.857143	14.285714	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
```

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 42.857143 42.857143 14.285714 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 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 8 2 0 1 18 18 13 0 0 0 69.230769 23.076923 0 0 0
0 7.692308 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 69.230769 23.076923 0 0 0 0 7.692308 0 0 0 0 0 0
0 0 0 0 0 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 8 2 0 1 19 19 16 0 0 0 50 50 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
50 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 20 20 17 0 0 0 47.058824 47.058824 0 0 0
5.882353 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 47.058824 47.058824 0 0 0 5.882353 0 0 0 0 0 0 0
0 0 0 0 0 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 8 2 0 1 21 21 11 0 0 0 9.090909 18.181818 18.181818 0
27.272727 0 27.272727 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 9.090909 18.181818 18.181818 0 27.272727 0 27.272727 0 0
0 0 0 0 0 0 0 0 0 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 8 2 0 1 22 22 12 0 0 0 0 8.333333 0 8.333333
16.666667 8.333333 58.333333 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 8.333333 0 8.333333 16.666667 8.333333 58.333333 0
0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 23 23 23 0 0 0 4.347826 4.347826 4.347826 0
0 8.695652 56.521739 17.391304 0 0 0 0 4.347826 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 4.347826 4.347826 4.347826 0 0 8.695652
56.521739 17.391304 0 0 0 0 4.347826 0 0 0 0 0 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 8 2 0 1 24 24 34 0 0 0 0 0 0 0 5.882353
8.823529 64.705882 11.764706 2.941176 0 0 0 0 0 2.941176 2.941176 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 5.882353 8.823529 64.705882
11.764706 2.941176 0 0 0 0 0 2.941176 2.941176 0 0 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 8 2 0 1 25 25 33 0 0 0 0 0 0 3.030303 0
12.121212 48.484848 9.090909 3.030303 0 0 0 0 9.090909 3.030303 0
3.030303 0 3.030303 0 3.030303 3.030303 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
3.030303 0 12.121212 48.484848 9.090909 3.030303 0 0 0 0 9.090909
3.030303 0 3.030303 0 3.030303 0 3.030303 3.030303 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
2003 1 8 2 0 1 26 26 20 0 0 0 0 0 0 0 0 0
15 5 5 0 5 5 0 0 10 5 0 5 10 5 10 5 5 0 5
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 15 5 5 0 5 5 0 0 10 5 0 5
10 5 10 5 5 0 5 0 5 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
2003 1 8 2 0 1 27 27 15 0 0 0 0 0 0 0 0 0
20 0 6.666667 6.666667 0 20 0 0 6.666667 13.333333 6.666667 0 0 0
0 0 0 6.666667 0 6.666667 0 0 6.666667 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 20 0
6.666667 6.666667 0 20 0 0 6.666667 13.333333 6.666667 0 0 0 0 0
0 6.666667 0 6.666667 0 0 6.666667 0 0 0 0 0 0 0 0 0
0 0 0 0
2003 1 8 2 0 1 28 28 18 0 0 0 0 0 0 0 0
5.555556 0 0 0 0 5.555556 0 5.555556 11.111111 16.666667 5.555556 0
0 5.555556 0 5.555556 5.555556 0 5.555556 16.666667 0 0 11.111111 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
5.555556 0 0 0 0 5.555556 0 5.555556 11.111111 16.666667 5.555556 0
0 5.555556 0 5.555556 5.555556 0 5.555556 16.666667 0 0 11.111111 0 0
0 0 0 0 0 0 0 0 0 0 0
2003 1 8 2 0 1 29 29 24 0 0 0 0 0 0 0 0 0 0
0 0 0 0 12.5 4.166667 0 4.166667 8.333333 8.333333 8.333333 4.166667 0
4.166667 16.666667 4.166667 4.166667 0 4.166667 0 4.166667 0 4.166667 0 0
4.166667 0 0 0 0 0 0 0 4.166667 0 0 0 0 0 0 0
0 0 0 0 0 0 0 12.5 4.166667 0 4.166667 8.333333 8.333333
8.333333 4.166667 0 4.166667 16.666667 4.166667 4.166667 0 4.166667 0
4.166667 0 4.166667 0 0 4.166667 0 0 0 0 0 0 0 4.166667 0
2003 1 8 2 0 1 30 30 15 0 0 0 0 0 0 0 0 0 0
0 0 0 6.666667 6.666667 0 13.333333 6.666667 0 20 6.666667 13.333333 0
6.666667 6.666667 0 0 0 0 0 0 0 0 0 6.666667 0 0 0 0
6.666667 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 6.666667 6.666667 0 13.333333 6.666667 0 20 6.666667 13.333333 0
6.666667 6.666667 0 0 0 0 0 0 0 0 0 6.666667 0 0 0 0
6.666667 0 0 0 0 0
2003 1 8 2 0 1 31 31 5 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 20 0 20 20 0 0 20 0 0 0 0 0
0 0 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 20 0 20 20 0
0 20 0 0 0 0 0 0 0 20 0 0 0 0 0 0 0 0 0
0 0 0 0

2003	1	8	2	0	1	32	32	8	0	0	0	0	0	0	0	0	0	0
0	0	0	12.5	12.5	0	0	12.5	12.5	12.5	0	0	0	0	0	0	0	0	0
0	0	0	12.5	0	0	0	0	0	0	0	0	0	12.5	0	12.5	0	0	0
0	0	0	0	0	0	0	0	0	0	12.5	12.5	0	0	12.5	12.5	12.5	0	0
0	0	0	0	0	0	0	0	0	0	12.5	0	0	0	0	0	0	0	0
0	12.5	0	12.5															
2003	1	8	2	0	1	33	33	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	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	8	2	0	1	34	34	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	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	8	2	0	1	12	12	1	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	13	13	2	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	14	14	1	0	0	0	100	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	15	15	7	0	14.28571		71.428571		14.285714		0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	14.28571		71.428571		14.285714		0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	8	2	0	1	16	16	6	0	0	66.666667		33.333333		0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	66.666667		33.333333		0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	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 8 2 0 1 17 17 7 0 0 71.428571 28.571429 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 71.428571 28.571429 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 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 8 2 0 1 18 18 10 0 0 10 70 20 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
10 70 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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 8 2 0 1 19 19 8 0 0 0 25 37.5 25 0 12.5 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 0 0
25 37.5 25 0 12.5 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
2004 1 8 2 0 1 20 20 17 0 0 0 5.882353 47.058824 23.529412
5.882353 5.882353 0 5.882353 5.882353 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 5.882353 47.058824 23.529412 5.882353 5.882353 0
5.882353 5.882353 0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 21 21 17 0 0 0 5.882353 47.058824 17.647059
5.882353 5.882353 5.882353 0 11.764706 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 5.882353 47.058824 17.647059 5.882353 5.882353
5.882353 0 11.764706 0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 22 22 23 0 0 0 0 13.043478 21.73913 0
4.347826 17.391304 0 30.434783 8.695652 4.347826 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 13.043478 21.73913 0 4.347826 17.391304 0
30.434783 8.695652 4.347826 0 0 0 0 0 0 0 0 0 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 8 2 0 1 23 23 26 0 0 0 0 0 15.384615 3.846154 0
11.538462 3.846154 23.076923 15.384615 3.846154 3.846154 0 3.846154 0 0 0
7.692308 7.692308 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 15.384615 3.846154 0
11.538462 3.846154 23.076923 15.384615 3.846154 3.846154 0 3.846154 0 0 0
7.692308 7.692308 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 8 2 0 1 24 24 20 0 0 0 0 0 5 0 5 10 5
60 5 0 5 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 5 0 5 10 5 60 5 0 5 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
2004 1 8 2 0 1 25 25 26 0 0 0 0 0 0 0 3.846154 0
3.846154 42.307692 3.846154 3.846154 3.846154 3.846154 7.692308 3.846154 0 0
7.692308 7.692308 0 0 0 0 0 0 0 3.846154 0 0 0 0
3.846154 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 3.846154 0 3.846154 42.307692 3.846154 3.846154 3.846154 3.846154 7.692308
3.846154 0 0 7.692308 7.692308 0 0 0 0 0 0 0 3.846154 0 0
0 0 3.846154 0 0 0 0 0 0 0 0 0 0 0 0
2004 1 8 2 0 1 26 26 29 0 0 0 0 0 0 0 0 0
6.896552 27.586207 13.793103 0 3.448276 3.448276 6.896552 0 0 10.344828 0
6.896552 0 3.448276 0 0 0 3.448276 3.448276 0 0 0 3.448276 0
3.448276 0 0 0 0 0 0 3.448276 0 0 0 0 0 0 0
0 0 0 0 6.896552 27.586207 13.793103 0 3.448276 3.448276 6.896552 0 0
10.344828 0 6.896552 0 3.448276 0 0 0 3.448276 3.448276 0 0 0
3.448276 0 3.448276 0 0 0 0 0 0 3.448276 0 0 0 0 0
2004 1 8 2 0 1 27 27 14 0 0 0 0 0 0 0 0 0 0
21.428571 7.142857 14.285714 0 0 0 0 0 0 7.142857 14.285714 0
14.285714 0 0 0 0 0 7.142857 0 7.142857 0 0 0 0 0 0 0
0 0 0 0 0 0 7.142857 0 0 0 0 0 0 0 0
21.428571 7.142857 14.285714 0 0 0 0 0 0 7.142857 14.285714 0
14.285714 0 0 0 0 0 7.142857 0 7.142857 0 0 0 0 0 0 0
0 0 0 0 0 0 7.142857
2004 1 8 2 0 1 28 28 8 0 0 0 0 0 0 0 0 0 0
0 0 0 0 25 0 0 0 12.5 12.5 0 12.5 12.5 0 0 0 0 0 0
0 0 0 0 0 12.5 0 0 0 0 0 0 0 12.5 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 25 0 0 0 12.5 12.5 0
12.5 12.5 0 0 0 0 0 0 0 0 0 0 0 12.5 0 0 0 0 0
0 0 12.5 0 0
2004 1 8 2 0 1 29 29 11 0 0 0 0 0 0 0 0 0 0
9.090909 0 0 0 0 9.090909 0 0 9.090909 9.090909 0 0 0 0 0
9.090909 0 9.090909 0 0 9.090909 0 18.181818 18.181818 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 9.090909 0
0 0 0 9.090909 0 0 9.090909 9.090909 0 0 0 0 0 9.090909 0
9.090909 0 0 9.090909 0 18.181818 18.181818 0 0 0 0 0 0 0 0
0 0 0
2004 1 8 2 0 1 30 30 11 0 0 0 0 0 0 0 0 0 0
0 0 0 0 9.090909 0 9.090909 0 0 18.181818 0 0 0 0 0 0
9.090909 0 0 0 0 0 0 9.090909 9.090909 0 0 0 0 0
9.090909 9.090909 0 9.090909 9.090909 0 0 0 0 0 0 0 0 0 0
0 0 0 0 9.090909 0 9.090909 0 0 18.181818 0 0 0 0 0 0
9.090909 0 0 0 0 0 0 9.090909 9.090909 0 0 0 0 0
9.090909 9.090909 0 9.090909 9.090909
2004 1 8 2 0 1 31 31 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 100 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0															
2004	1	8	2	0	1	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	0	0	0	0
50	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	50	0	0
0	0	0	0															
2004	1	8	2	0	1	35	35	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	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	8	2	0	1	10	10	1	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	11	11	3	100	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	12	12	3	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	13	13	4	0	50	50	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	2	0	1	14	14	4	0	25	50	25	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	
50	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	2	0	1	15	15	3	0	33.33333		66.666667		0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33.33333		66.666667		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0 0 0 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 8 2 0 1 16 16 7 0 0 71.428571 28.571429 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 71.428571 28.571429 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 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 8 2 0 1 17 17 9 0 0 0 66.666667 22.222222 11.111111 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 66.666667 22.222222 11.111111 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 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 8 2 0 1 18 18 15 0 0 6.666667 33.333333 40 13.333333
6.666667 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 6.666667 33.333333 40 13.333333 6.666667 0 0 0 0 0 0
0 0 0 0 0 0 0 0 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 8 2 0 1 19 19 10 0 0 0 30 30 20 10 0 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 0
30 30 20 10 0 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
2005 1 8 2 0 1 20 20 17 0 0 0 5.882353 35.294118 23.529412
29.411765 0 0 0 0 5.882353 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 5.882353 35.294118 23.529412 29.411765 0 0 0 0
5.882353 0 0 0 0 0 0 0 0 0 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 8 2 0 1 21 21 21 0 0 0 0 9.52381 52.380952
14.285714 0 0 0 9.52381 9.52381 0 0 0 0 4.761905 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 9.52381 52.380952 14.285714 0 0 0
9.52381 9.52381 0 0 0 0 4.761905 0 0 0 0 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 8 2 0 1 22 22 32 0 0 0 0 9.375 34.375 15.625 0 3.125
9.375 3.125 6.25 3.125 3.125 0 6.25 6.25 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 9.375 34.375 15.625 0 3.125 9.375 3.125 6.25 3.125 3.125 0 6.25 6.25 0 0 0 0
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 8 2 0 1 23 23 22 0 0 0 0 0 18.181818 0 0
4.545455 4.545455 9.090909 31.818182 9.090909 4.545455 9.090909 0 0 0
4.545455 0 4.545455 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 18.181818 0 0

4.545455 4.545455 9.090909 31.818182 9.090909 4.545455 9.090909 0 0 0
4.545455 0 4.545455 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 8 2 0 1 24 24 17 0 0 0 0 0 0 0 0 0 0
17.647059 52.941176 5.882353 5.882353 0 0 0 11.764706 0 0 0 0 0
5.882353 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 17.647059 52.941176
5.882353 5.882353 0 0 0 11.764706 0 0 0 0 0 5.882353 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2005 1 8 2 0 1 25 25 25 0 0 0 0 0 0 0 0 8 0
4 44 4 8 12 0 4 8 0 0 0 0 0 0 0 0 0 0 0
0 4 0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 8 0 4 44 4 8 12 0 4 8 0 0 0 0
0 0 0 0 0 0 0 0 4 0 4 0 0 0 0 0 0 0 0
0 0 0 0
2005 1 8 2 0 1 26 26 17 0 0 0 0 0 0 0 0 0 0
11.764706 29.411765 5.882353 0 0 0 0 5.882353 0 11.764706 0 5.882353
5.882353 0 5.882353 0 5.882353 0 5.882353 0 0 0 0 0 0 0
5.882353 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 11.764706 29.411765 5.882353 0 0 0 0 5.882353 0 11.764706 0
5.882353 5.882353 0 5.882353 0 5.882353 0 5.882353 0 0 0 0 0 0
0 5.882353 0 0 0 0 0 0 0 0
2005 1 8 2 0 1 27 27 27 0 0 0 0 0 0 0 0
3.703704 0 3.703704 14.814815 0 3.703704 3.703704 3.703704 7.407407 3.703704
3.703704 14.814815 0 0 0 3.703704 7.407407 7.407407 3.703704 0 0
3.703704 3.703704 3.703704 0 0 0 0 0 0 0 0 0 0
3.703704 0 0 0 0 0 0 0 0 3.703704 0 3.703704 14.814815 0
3.703704 3.703704 3.703704 7.407407 3.703704 3.703704 14.814815 0 0 0
3.703704 7.407407 7.407407 3.703704 0 0 3.703704 3.703704 3.703704 0 0 0
0 0 0 0 0 0 0 0 3.703704 0
2005 1 8 2 0 1 28 28 12 0 0 0 0 0 0 0 0 0 0
0 8.333333 0 0 0 16.666667 8.333333 0 0 16.666667 0 0 0
8.333333 0 0 0 0 0 0 0 8.333333 0 16.666667 0 0 0 0 0
0 0 0 0 0 16.666667 0 0 0 0 0 0 0 0 0 0 0
8.333333 0 0 0 16.666667 8.333333 0 0 16.666667 0 0 0 8.333333 0
0 0 0 0 0 0 8.333333 0 16.666667 0 0 0 0 0 0 0 0
0 0 16.666667
2005 1 8 2 0 1 29 29 14 0 0 0 0 0 0 0 0 0 0
0 7.142857 0 7.142857 0 0 7.142857 7.142857 7.142857 14.285714 0
7.142857 0 0 0 0 0 7.142857 7.142857 0 7.142857 0 0 7.142857
7.142857 0 0 0 0 0 0 0 0 0 7.142857 0 0 0 0 0 0
0 0 0 0 0 7.142857 0 7.142857 0 0 7.142857 7.142857 7.142857
14.285714 0 7.142857 0 0 0 0 0 7.142857 7.142857 0 7.142857 0 0
7.142857 7.142857 0 0 0 0 0 0 0 0 0 7.142857
2005 1 8 2 0 1 30 30 10 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 10 10 0 10 0 0 10 0 10 10 0 0
0 0 0 0 0 20 0 0 0 0 0 0 0 0 10 10 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 10 10 0 10 0

0	10	0	10	10	0	0	0	0	0	0	0	20	0	0	0	0	0	0
0	0	10	10															
2005	1	8	2	0	1	31	31	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	33.333333			
33.333333		0	0	0	0	0	33.333333		0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	33.333333		33.333333		0	0	0	0	0		
33.333333		0	0	0	0	0	0	0	0	0	0	0	0					
2005	1	8	2	0	1	33	33	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
0	0	0	0															
2005	1	8	2	0	1	35	35	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0
0	0	0	0															
2006	1	8	2	0	1	11	11	1	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	12	12	5	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	13	13	3	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	14	14	6	0	83.33333		16.666667		0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83.33333		16.666667		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	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	8	2	0	1	15	15	3	0	0	100	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
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	8	2	0	1	16	16	3	0	0	33.333333	33.333333	33.333333	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	33.333333	33.333333	33.333333	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	8	2	0	1	17	17	6	0	0	16.666667	50	16.666667	16.666667	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	16.666667	50	16.666667	16.666667	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	8	2	0	1	18	18	9	0	0	0	55.555556	0	11.111111
11.111111	22.222222	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	55.555556	0	11.111111	11.111111	22.222222	0	0	0	0
0	0	0	0	0	0	0	0	0	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	8	2	0	1	19	19	10	0	0	0	10	10	40	10	30	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	10	40	10	30	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	20	20	14	0	0	0	14.285714	14.285714	50
7.142857	14.285714	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	14.285714	14.285714	50	7.142857	14.285714	0	0	0	0
0	0	0	0	0	0	0	0	0	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	8	2	0	1	21	21	13	0	0	0	0	15.384615	15.384615
38.461538	23.076923	0	0	0	0	7.692308	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	15.384615	15.384615	38.461538	23.076923	0	0	0
0	7.692308	0	0	0	0	0	0	0	0	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	8	2	0	1	22	22	22	0	0	0	0	4.545455	18.181818
18.181818	13.636364	4.545455	4.545455	4.545455	4.545455	18.181818	0	4.545455	0	0
0	0	0	0	0	0	0	4.545455	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.545455	18.181818
18.181818	13.636364	4.545455	4.545455	4.545455	4.545455	18.181818	0	4.545455	0	0
0	0	0	0	0	0	0	4.545455	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
2006	1	8	2	0	1	23	23	23	0	0	0	0	0	4.347826	21.73913
13.043478	0	4.347826	17.391304	8.695652	21.73913	4.347826	0	4.347826	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
```

0 0 0 0 0 0 0 0 0 0 0 0 4.347826 21.73913 13.043478 0
4.347826 17.391304 8.695652 21.73913 4.347826 0 4.347826 0 0 0 0 0 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 8 2 0 1 24 24 29 0 0 0 0 0 6.896552 6.896552
3.448276 0 3.448276 6.896552 6.896552 31.034483 13.793103 3.448276 3.448276
3.448276 3.448276 0 0 0 0 6.896552 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
6.896552 6.896552 3.448276 0 3.448276 6.896552 6.896552 31.034483 13.793103
3.448276 3.448276 3.448276 3.448276 0 0 0 0 6.896552 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2006 1 8 2 0 1 25 25 21 0 0 0 0 0 0 0 0
4.761905 4.761905 0 9.52381 52.380952 9.52381 0 4.761905 0 0 0 0
4.761905 4.761905 0 0 0 4.761905 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
4.761905 4.761905 0 9.52381 52.380952 9.52381 0 4.761905 0 0 0 0
4.761905 4.761905 0 0 0 4.761905 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0
2006 1 8 2 0 1 26 26 29 0 0 0 0 0 0 0 0
3.448276 0 0 10.344828 31.034483 13.793103 6.896552 0 3.448276 3.448276
3.448276 0 6.896552 6.896552 0 6.896552 0 0 0 0 0 0 3.448276 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 3.448276 0 0 10.344828 31.034483 13.793103 6.896552 0 3.448276
3.448276 3.448276 0 6.896552 6.896552 0 6.896552 0 0 0 0 0 0
3.448276 0 0 0 0 0 0 0 0 0 0 0 0 0 0
2006 1 8 2 0 1 27 27 22 0 0 0 0 0 0 0 0 0
4.545455 4.545455 4.545455 4.545455 0 4.545455 0 0 4.545455 4.545455
13.636364 9.090909 4.545455 0 4.545455 13.636364 4.545455 0 4.545455 4.545455 0
0 0 0 0 9.090909 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 4.545455 4.545455 4.545455 4.545455 0 4.545455 0 0
4.545455 4.545455 13.636364 9.090909 4.545455 0 4.545455 13.636364 4.545455 0
4.545455 4.545455 0 0 0 0 0 9.090909 0 0 0 0 0 0 0 0
0 0
2006 1 8 2 0 1 28 28 13 0 0 0 0 0 0 0 0 0 0
0 7.692308 7.692308 0 0 0 0 0 0 0 23.076923 0 0 0
7.692308 0 0 7.692308 23.076923 0 0 7.692308 7.692308 0 0 0 0 0
0 0 0 0 0 0 7.692308 0 0 0 0 0 0 0 0 0 0 0
7.692308 7.692308 0 0 0 0 0 0 0 23.076923 0 0 0 7.692308 0
0 7.692308 23.076923 0 0 7.692308 7.692308 0 0 0 0 0 0 0 0
0 0 0 7.692308
2006 1 8 2 0 1 29 29 9 0 0 0 0 0 0 0 0 0 0
0 0 22.222222 0 0 0 0 0 11.111111 0 0 0 0 0 11.111111 0
0 22.222222 11.111111 0 0 11.111111 0 0 0 0 0 0 0 0 0 0
0 0 11.111111 0 0 0 0 0 0 0 0 0 0 0 22.222222 0
0 0 0 0 11.111111 0 0 0 0 0 11.111111 0 0 22.222222
11.111111 0 0 11.111111 0 0 0 0 0 0 0 0 0 0 0 0
11.111111

2006	1	8	2	0	1	30	30	7	0	0	0	0	0	0	0	0	0	0
0	0	14.285714		0	0	0	0	0	0	0	14.285714		0	14.285714		0	0	
14.285714		0	0	0	0	0	14.285714		14.285714		0	14.285714		0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
14.285714		0	0	0	0	0	0	0	14.285714		0	14.285714		0	0	14.285714		0
0	0	0	0	14.285714		14.285714		0	14.285714		0	0	0	0	0	0	0	0
0	0																	
2006	1	8	2	0	1	31	31	5	0	0	0	0	0	0	0	0	0	0
0	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	20	0	0	0	0	20	0	0	0	0
0	0	0	0	20	0	0	0	0	0	0	20	0	20	0	0	0	0	0
0	0	0	0															
2006	1	8	2	0	1	32	32	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0															
2006	1	8	2	0	1	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	100	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0															
2007	1	8	2	0	1	11	11	2	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0															
2007	1	8	2	0	1	12	12	1	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	13	13	6	0	83.33333		16.666667		0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83.33333		16.666667		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	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	8	2	0	1	14	14	14	0	50	50	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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 8 2 0 1 15 15 5 0 0 80 20 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
80 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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 8 2 0 1 16 16 10 0 0 40 50 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 0 0 0 0
40 50 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 0 0
2007 1 8 2 0 1 17 17 6 0 0 16.666667 33.333333 50 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 16.666667 33.333333 50 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 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 8 2 0 1 18 18 1 0 0 0 0 100 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
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0 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 19 19 7 0 0 0 14.285714 14.285714 14.285714 0
28.571429 14.285714 14.285714 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 14.285714 14.285714 14.285714 0 28.571429 14.285714
14.285714 0 0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 20 20 10 0 0 0 0 10 30 0 20 10
10 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 10 30 0 20 10 10 20 0 0 0 0 0 0 0 0 0 0
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 8 2 0 1 21 21 11 0 0 0 0 27.272727 0 27.272727
9.090909 9.090909 0 0 0 18.181818 9.090909 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 27.272727 0 27.272727 9.090909 9.090909 0 0
0 18.181818 9.090909 0 0 0 0 0 0 0 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 8 2 0 1 22 22 18 0 0 0 0 5.555556 0 33.333333
16.666667 0 11.111111 16.666667 5.555556 5.555556 5.555556 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 5.555556 0 33.333333 16.666667 0

11.111111 16.666667 5.555556 5.555556 5.555556 0 0 0 0 0 0 0 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 8 2 0 1 23 23 23 0 0 0 0 0 17.391304 8.695652
17.391304 17.391304 4.347826 0 13.043478 4.347826 4.347826 8.695652 4.347826 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 17.391304 8.695652
17.391304 17.391304 4.347826 0 13.043478 4.347826 4.347826 8.695652 4.347826 0 0
0 0 0 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 8 2 0 1 24 24 32 0 0 0 0 0 0 6.25 12.5 12.5 0
12.5 3.125 9.375 15.625 12.5 6.25 3.125 0 0 3.125 0 0 0 0 0 0 0 3.125 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 6.25 12.5 12.5 0 12.5 3.125 9.375 15.625 12.5 6.25 3.125 0 0 3.125 0 0
0 0 0 0 0 3.125 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2007 1 8 2 0 1 25 25 21 0 0 0 0 0 0 0 0 9.52381
0 0 9.52381 9.52381 28.571429 4.761905 4.761905 4.761905 0 0 9.52381
14.285714 0 0 0 0 0 4.761905 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 9.52381 0
0 9.52381 9.52381 28.571429 4.761905 4.761905 4.761905 0 0 9.52381
14.285714 0 0 0 0 0 4.761905 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2007 1 8 2 0 1 26 26 33 0 0 0 0 0 0 0 0
6.060606 0 3.030303 9.090909 18.181818 21.212121 6.060606 6.060606 0 0
3.030303 3.030303 0 3.030303 0 6.060606 0 3.030303 3.030303 3.030303 0 0
3.030303 0 3.030303 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 6.060606 0 3.030303 9.090909 18.181818 21.212121
6.060606 6.060606 0 0 3.030303 3.030303 0 3.030303 0 6.060606 0
3.030303 3.030303 3.030303 0 0 3.030303 0 3.030303 0 0 0 0 0 0
0 0 0 0 0 0
2007 1 8 2 0 1 27 27 18 0 0 0 0 0 0 0 0 0 0
0 5.555556 5.555556 16.666667 5.555556 0 0 5.555556 5.555556 11.111111
5.555556 16.666667 0 5.555556 11.111111 0 0 0 5.555556 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 5.555556 5.555556 16.666667 5.555556 0 0 5.555556 5.555556
11.111111 5.555556 16.666667 0 5.555556 11.111111 0 0 0 5.555556 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0
2007 1 8 2 0 1 28 28 20 0 0 0 0 0 0 0 0 0 0
0 0 0 10 5 0 5 0 10 5 0 5 10 0 0 0 5 0
10 5 0 5 5 5 0 0 5 0 5 0 0 0 0 0 5 0 0
0 0 0 0 0 0 0 0 0 0 0 10 5 0 5 0 10 5 0
5 10 0 0 0 5 0 10 5 0 5 5 5 0 0 5 0 5 0
0 0 0 0 5
2007 1 8 2 0 1 29 29 22 0 0 0 0 0 0 0 0 0 0
0 0 0 0 4.545455 0 0 4.545455 9.090909 0 0 0 18.181818
4.545455 9.090909 9.090909 0 4.545455 4.545455 0 4.545455 9.090909 4.545455 0
4.545455 0 0 0 0 0 0 4.545455 0 0 4.545455 0 0 0 0 0

0 0 0 0 0 0 0 0 0 4.545455 0 0 4.545455 9.090909 0 0
0 18.181818 4.545455 9.090909 9.090909 0 4.545455 4.545455 0 4.545455
9.090909 4.545455 0 4.545455 0 0 0 0 0 0 4.545455 0 0
4.545455
2007 1 8 2 0 1 30 30 15 0 0 0 0 0 0 0 0 0 0
0 0 6.666667 0 6.666667 6.666667 6.666667 6.666667 6.666667 0 0 0 0
0 13.333333 6.666667 0 0 6.666667 0 0 0 6.666667 13.333333 6.666667
6.666667 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 6.666667 0 6.666667 6.666667 6.666667 6.666667 6.666667 0 0
0 0 0 13.333333 6.666667 0 0 6.666667 0 0 0 6.666667 13.333333
6.666667 6.666667 0 0 0 0 0 0 0 0 0
2007 1 8 2 0 1 31 31 7 0 0 0 0 0 0 0 0 0 0
0 14.285714 14.285714 0 0 0 0 0 0 0 14.285714 0 0 0 0 0
0 0 0 0 0 0 0 0 14.285714 0 0 14.285714 0 0 0 0 0
0 28.571429 0 0 0 0 0 0 0 0 0 0 0 14.285714 14.285714 0
0 0 0 0 0 14.285714 0 0 0 0 0 0 0 0 0 0 0
0 0 14.285714 0 0 14.285714 0 0 0 0 0 0 28.571429
2007 1 8 2 0 1 32 32 3 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 33.333333 0 0 0 0 0 0 0
0 0 0 0 0 33.333333 0 0 0 0 0 0 0 0 0 0
33.333333 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 33.333333 0 0 0 0 0 0 0 0 0 0 0 0
33.333333 0 0 0 0 0 0 0 0 0 0 33.333333
2007 1 8 2 0 1 33 33 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 50 0 50 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 50 0 50
2007 1 8 2 0 1 35 35 1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 100 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2008 1 8 2 0 1 10 10 4 100 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 100 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 8 2 0 1 11 11 4 75 25 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 75 25 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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	8	2	0	1	12	12	1	0	100	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	13	13	5	0	40	60	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	2	0	1	14	14	4	0	25	75	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	2	0	1	15	15	10	0	20	50	30	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	
50	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	8	2	0	1	16	16	6	0	0	50	33.333333		0	0	16.666667		0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	50	33.333333		0	0	16.666667		0	0	0	0	0	0	0	0	0	0	0
0	0	0	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	8	2	0	1	17	17	6	0	0	50	16.666667		16.666667		0		
16.666667		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	50	16.666667		16.666667		0	16.666667		0	0	0	0	0	0	0
0	0	0	0	0	0	0	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	8	2	0	1	18	18	9	0	0	11.111111		0	33.333333		55.555556		0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	11.111111		0	33.333333		55.555556		0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	8	2	0	1	19	19	13	0	0	7.692308		7.692308		30.769231			
46.153846		7.692308		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	7.692308		7.692308		30.769231		46.153846		7.692308		0	0	0
0	0	0	0	0	0	0	0	0	0	0	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	8	2	0	1	20	20	10	0	0	10	0	20	10	20	20	10	
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
10	0	20	10	20	20	10	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														
2008	1	8	2	0	1	21	21	28	0	0	0	0	3.571429		14.285714			
14.285714		14.285714		25	14.285714		0	3.571429		0	7.142857		0	0	3.571429		0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	3.571429		14.285714		14.285714			
14.285714		25	14.285714		0	3.571429		0	7.142857		0	0	3.571429		0	0	0	0
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	8	2	0	1	22	22	17	0	0	0	0	0	11.764706		5.882353		
29.411765		17.647059		23.529412		0	0	0	0	11.764706		0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	11.764706		5.882353		29.411765		17.647059			
23.529412		0	0	0	0	11.764706		0	0	0	0	0	0	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	8	2	0	1	23	23	19	0	0	0	0	0	0	10.526316			
5.263158		26.315789		5.263158		5.263158		0	5.263158		21.052632		10.526316		5.263158		0	0
5.263158		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.526316			
5.263158		26.315789		5.263158		5.263158		0	5.263158		21.052632		10.526316		5.263158		0	0
5.263158		0	0	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	8	2	0	1	24	24	23	0	0	0	0	0	0	4.347826			
21.73913		17.391304		4.347826		4.347826		0	8.695652		0	8.695652		13.043478		4.347826		0
0	0	0	4.347826		0	4.347826		0	0	0	0	0	4.347826		0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4.347826		21.73913		17.391304		4.347826		4.347826		0	8.695652		0	8.695652		13.043478		
4.347826		0	0	0	0	4.347826		0	4.347826		0	0	0	0	0	4.347826		0
0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2008	1	8	2	0	1	25	25	29	0	0	0	0	0	0	0	17.241379		
6.896552		3.448276		0	3.448276		0	3.448276		34.482759		6.896552		3.448276		0	0	
3.448276		3.448276		0	3.448276		6.896552		0	3.448276		0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.241379		6.896552		3.448276		0	3.448276		0	3.448276		34.482759		6.896552		3.448276		0
0	3.448276		3.448276		0	3.448276		6.896552		0	3.448276		0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0						
2008	1	8	2	0	1	26	26	25	0	0	0	0	0	0	0	4	0	0
0	0	4	8	36	0	0	4	8	0	4	8	8	8	0	0	0	0	4
0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	4	0	0	0	0	4	8	36	0	0	4	8	0	4	8
8	8	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0
0	0	0	0															
2008	1	8	2	0	1	27	27	20	0	0	0	0	0	0	0	0	5	
10	0	0	0	10	10	0	0	5	0	5	0	15	10	15	5	0	0	5

```
	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	5	10	0	0	0	10	10	0	0	5	0	5	0
	15	10	15	5	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0
	0	0	0	0	0
	2008	1	8	2	0	1	28	28	17	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	11.764706	5.882353	0	0	5.882353	0	0	5.882353	11.764706
	5.882353	0	0	0	5.882353	0	5.882353	0	0	0	5.882353	5.882353
	5.882353	11.764706	0	0	0	0	0	0	0	11.764706	0	0	0	0	0	0
	0	0	0	0	0	0	0	11.764706	5.882353	0	0	5.882353	0	0
	5.882353	11.764706	5.882353	0	0	0	5.882353	0	5.882353	0	0	0
	5.882353	5.882353	5.882353	11.764706	0	0	0	0	0	0	0	11.764706
	2008	1	8	2	0	1	29	29	17	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	5.882353	17.647059	0	5.882353	11.764706
	11.764706	5.882353	0	5.882353	5.882353	0	0	5.882353	0	5.882353	5.882353	0
	0	0	5.882353	0	0	0	0	0	0	5.882353	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	5.882353	17.647059	0	5.882353
	11.764706	11.764706	5.882353	0	5.882353	5.882353	0	0	5.882353	0	5.882353
	5.882353	0	0	0	5.882353	0	0	0	0	0	0	5.882353
	2008	1	8	2	0	1	30	30	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	33.333333	0	0	0	0	0	0	0	66.666667	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.333333	0
	0	0	0	0	0	0	66.666667	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	2008	1	8	2	0	1	31	31	4	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0
	0	0	0	25	0	0	0	0	0	25	0	0	0	0	0	25	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	25	0	0	0	0	0	0	0	0	25	0	0	0	0	0	25	0	0
	0	0	0	25
	2008	1	8	2	0	1	33	33	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0
	0	0	0	0
#NWFSC	marginalAgeCompsToSeeFit	Season	Fleet	gender	partition	ageErr	LbinLo	LbinHi	nSamps	F1	F2	F3	F4	F5
	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23
	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41
	F42	F43	F44	F45	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32
	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45
#negative sample size means it predict values, but doesn't include them in likelihood
	2003	1	8	3	0	1	-1	-1	-1	0	0.1684609	1.91076175	2.3378802	2.4393571
	0.1247426	1.8488839	0.4024796	5.3670328	9.1655683	3.1531643	2.0669476	1.6441454	3.148978
	2.363701	1.386132	1.4665968	3.08153889	0.7470274	2.10298486	0.5694276	0.1003579	0.2271473
	0.56433317	0.5984852	0.1870479	0.59248649	0.5752332	0.04271165	0.07071722	0.14143445	0.3907266
	0.02828531	0.80307989	0.2953173	0.23874672	0	0.4976052	0	0	0.23874672	0	0.23874672	0
```

0 0 0.19503825 2.8273808 2.9768765 1.5303993 0.08185365 0.3215046 0.7710594 2.9035392
12.9204938 3.06806406 1.04829019 0.08107747 0.5808556 0.3265301 0.10772374 1.5998971 2.6727336
2.8737468 1.24477442 0.98717673 1.55347597 0.1721606 3.126632 1.349025 0.5043091 0.09117374
0.2728987 0.817890376 0.05995706 0.03415198 0.6598192 0.1143154 0 0.03018243 0.02963083 0 0
0 0.03415198 0 0 0.42273127 0.2387467 0.04271165
2004 1 8 3 0 1 -1 -1 -1 0.02244955 0.1248884 1.1750461 0.6537071
1.8484838 1.1947921 0.1887075 2.0535001 0.8659826 1.0177351 12.7163276 1.2887098 0.7277019
1.43633 1.394322 1.5277313 0.5424393 0.03868648 1.643111 1.06385773 4.0534722 0.3734726
1.9130365 0.22514445 4.1778374 0.8683656 2.6978319 1.7592012 2.64349589 0.22468273 0.41614773
0.7307005 0.24407215 0.40660052 0.2633179 0 0.07741144 0 0.18692994 0 0 0
0.02840566 0 3.39920586 0 0.1188682 1.2394834 1.8400139 1.1172164 2.24558585 0.08598906
0.5727123 0.8340115 1.1369958 12.87288708 1.60566599 0.44557942 1.3594546 0.9886369 2.12583013
0.2399706 0 0.62948 1.58987281 2.641431 0.05159651 1.7853419 0 0 1.412998
0.9459976 0.14616318 0.454341718 0.03189672 0.40739312 0.129957 0.3103665 1.01979741 0.36331742 0
0 0 0.213491306 0.18720184 1.617127 0.08037154 0.16800737 0.2261192 0.54498895
2005 1 8 3 0 1 -1 -1 -1 0.1129301 0.1091984 0.66947504 0.5174699
3.2437167 2.457091 2.9744212 0.2202126 1.1456337 0.2411908 1.8116457 12.091771 0.5960283
1.111288 2.326187 5.2548518 0.7324615 0.37441602 1.046853 4.55522406 0.8133989 0.911302
3.1365541 0.04829039 0.8279476 0 0.08646057 0.4746541 0.17479306 0.19107406 0.87312574 0
0.18972136 0.90602175 2.5803887 0.80629377 0 0.1046302 0 0.01891961 0 0 0.22728427 0
0.22206623 0.0517807 0.09254697 1.6538928 0.7128116 2.4642052 5.60183267 1.76254615 0
0.2142901 0.9497849 3.98604176 4.83275414 0.79472673 0.699614 0.3680548 0.55516036 3.8638553
1.0980796 0.4381236 1.57691022 0.34455789 0.27909988 2.4594639 0.942276 1.1452966 1.2483084
0.28490845 0.06070762 2.519113327 0.24359563 0.83433159 0.1144802 0.2831291 1.46593706 1.45203505 0
0.012435444 0 0 0 0 0 0 0.1254065 0.28291355
2006 1 8 3 0 1 -1 -1 -1 0 0.5346896 0.02064028 5.6992075 1.5039036
2.0676459 1.0478924 2.8428844 1.2227701 0.8899352 0.3837285 7.0666936 6.6367254 1.553552
0.878794 0.2732665 0.5369687 0.90709168 1.3356089 0.04463412 1.1231502 1.2301508 0.9842847
0.40347541 1.5206958 0.1725049 0.34233599 0.03688511 1.9276408 0.02939454 0.04445504 1.26669
0.14109583 2.12184622 0.3261705 0.03658598 0 0 0.02020684 0.40513388 0 0 0.0201987 0
0.04472162 0 0.43910904 0.5491152 3.6516646 0.3498123 2.76462106 2.80037882 7.7962215
0.2655256 1.9556719 1.02033748 0.98825277 11.40950938 0.9074519 1.8390115 0.07504409 0.1506315
1.7575737 0.1680118 0.07133848 2.38847067 0.44141665 0.2573065 0.733207 3.9488557 0.3274688
0.11233618 1.30791966 0.273885073 0 0.01486312 0.5157974 1.0377931 0.01797656 1.64131621
0.18514592 0 0 0 0 0 0 0 0 0.19270364
2007 1 8 3 0 1 -1 -1 -1 0.03307023 0.1062836 0.35425671 0.6845311
0.4207272 0.4421434 4.4419205 6.9365297 2.1934478 0.792326 2.981139 0.9156027 1.0847627
8.134581 0.782379 2.0726534 0.3557474 4.77783552 1.7750687 0.05081813 4.9892027 3.0842691
3.5964882 0.02830914 0.2027356 1.1462258 1.63439469 1.21951027 0 1.60580919 0.17168508
0.5994868 0.72855895 0.10177206 1.3969166 0.99183698 0.60048798 0.5817989 0.02340277 0.01236462 0
0.009626404 0.01429433 0 0.26625313 0 0.33290839 0.41289 0.1880086 1.0168205 0.21704887
4.01668482 3.2852045 1.7704466 0.4570584 0.92646397 1.2055523 1.12822998 2.4804965 1.0734956
1.62735806 0.849028 3.432383 0.2537306 1.60889798 1.69471604 1.42716645 2.5698076 2.040062
0.5534756 0.2563867 0.10786436 0.06306116 1.19774348 0.01868906 0.10080879 0.1035312 0.1277804
0.14811492 0.12137701 0.55322607 0.009847482 0.01380795 0.042852972 0 0 0.01476333 0.0152797 0
0.195678443
2008 1 8 3 0 1 -1 -1 -1 0.03347094 0.3957489 0.46509031 0.4450802
0.3577377 1.8758146 0.3703152 2.4694815 1.3046985 1.472012 1.2207224 0.5383509 2.3651519

```
       8.303457     6.040476     0.5789263    1.1220445    0.64213718   3.0202229    1.13609818   0.2993177    0.3477174
       4.7828732    1.11792771   0.8994291    0.3592127    0.58636013   0.92159529   0      0.13267341   0.47180426
       0.1123763    0      0.04268791   0.1209287    0.08430781   0.18916914   0      0      0      0.01024383   0      0
       0.1123763    0.07850308   0.07856073   0.11211635   0.3997611    0.1228883    0.7799707    0.93330118   0.71930172
       3.6943502    4.1134367    2.7831234    0.07101871   0.03132313   0.13365557   0.9428428    11.9900475   4.83329012
       0.5210062    0.4098379    1.6255107    1.29973833   0.07032355   4.2910882    3.0667089    2.182357     0.1322029
       1.2189663    0.197818     0.75911962   0.008399493  0.15502422   0.02301774   0      5.7859215    0.54234542
       0.25429844   0.14123287   0.044349935  0.14123287   0.006950372  0.01003328   0      0      0      0      0.546986834


0      #nobsal      #_Number_of_size_at_age_observations    #Skip_reading
#2003  2      2      2      2      3      110    10     10     10     10     10     10     10     10     10     10     10     10
       10     10     10     10     10     4      30     62     42     18     19     7      10     1      10     10     10     10
       10     10
#      10     10     10     10     10     10     10     10     10     10     10     10     10     10     10     10     10     4
       30     62     42     18     19     7      10     1      10     10     10     10     10     10


#_environmental_data
0      #N_envvar
0      #N_observations
#1980  1      1      #env_temp(1,N_envdata,1,3) #Skip


0      # N sizefreq methods to read
#25    #Sizefreq N bins per method
#2     #Sizetfreq units(bio/num) per method
#3     #Sizefreq scale(kg/lbs/cm/inches) per method
#1e-005       #Sizefreq mincomp per method
#0     #Sizefreq N obs per method
#_Sizefreq bins
#26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 68 72 76 80 90
#_Year season Fleet Partition Gender SampleSize <data>
#1 1971 1 1 3 0 125  0 0 0 0 0 0 0 0 0 4 1 1 2 4 1 5 6 2 3 11 8 4 5 0 0 0 0 0 0 0 0 0 0 1 0 1 3 0 3 4 2 4 5 9 17 8 3 8 0 0

0 # no tag data

0 # no morphcomp (stock) data

999

ENDDATA
```

Appendix C: SS2 Control file

```
#C 2009 coastwide greenstriped rockfish assessment in SS3

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_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

0 #_Nblock_Patterns
#3 2 #_blocks_per_pattern
# begin and end years of blocks
#1977 1985 1986 1997 1998 2008
#1986 1997 1998 2008

0.5    #_fracfemale
0      #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4=agespec_withseasinterpolate
#2 #_N_breakpoints
# 4 15 # age(real) at M breakpoints


1       # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=not implemented; 4=not implemented
1.0     #_Growth_Age_for_L1 (minimum age for growth calcs)
45.0 #_Growth_Age_for_L2 (999 to use as Linf) (maximum age for growth calcs)
0.0     #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
1       #_CV_Growth_Pattern:  0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)    #plots of sd at age support a constant sd
across ages
1       #_maturity_option:  1=length logistic; 2=age logistic; 3=read age-maturity matrix by growth_pattern; 4=read age-
fecundity
#_placeholder for empirical age-maturity by growth pattern
2      #_First_Mature_Age
1      #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
0      #hermaphrodite
1      #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from female-GP1, 3=like SS2 V1.x)
1      #_env/block/dev_adjust_method (1=standard; 2=with logistic trans to keep within base parm bounds)


#_growth_parms
#GP_1_Female
#LO          HI           INIT   PRIOR  PR_type      SD           PHASE  env-var      use_dev      dev_minyr dev_maxyr
dev_stddev   Block  Block_Fxn
```

```
0.02   0.40   0.08   0.08   0             0.035  -5            0             0             0                 0             0.5
              0             0                    #1 F_M_young
3             25            11.9   14.0   -1            10            2             0             0             0                 0
              0.5                  0             0                    #2 F_L@Amin (Amin is age entered above)
25            60            33.4   33.4   -1            10            3             0             0             0                 0
              0.5                  0             0                    #3 F_L@Amax
0.03   0.8           0.105  0.105  -1            0.8           2             0             0             0                 0
       0.5                  0             0                    #4 F_VBK
0.001  1.00   0.09   3.00   -1            0.8           3             0             0             0                 0
       0.5                  0             0                    #5 F_CV@AFIX
0.001  1.00   0.09   3.00   -1            0.8           4             0             0             0                 0
       0.5                  0             0                    #6 F_CV@AFIX2=ln(SD@AFIX2/SD@AFIX)
#GP_1:::Male (Direct Estimation)
0.02   0.70   0.08   0.08   0             0.035  -5            0             0             0                 0             0.5
              0             0                    #7 M_young
3             25            11.8   14.0   -1            10            2             0             0             0                 0
              0.5                  0             0                    #8 M_L@Amin
25            60            28.4   28.5   -1            10            3             0             0             0                 0
              0.5                  0             0                    #9 M_L@Amax
0.03   0.8           0.136  0.136  -1            0.8           2             0             0             0                 0
       0.5                  0             0                    #10 M_VBK
0.001  1.00   0.08   2.50   -1            0.8           3             0             0             0                 0
       0.5                  0             0                    #11 M2_CV@AFIX
0.001  1.00   0.08   2.50   -1            0.8           4             0             0             0                 0
       0.5                  0             0                    #12 M2_CV@AFIX2

#LW_female
#LO           HI            INIT          PRIOR         PR_type       SD     PHASE  env-var       use_dev       dev_minyr dev_maxyr
dev_stddev    Block  Block_Fxn
-3            3             7.4016E-06    2.05E-06      0             0.8    -3            0             0             0      0
       0.5    0      0      #WL_intercept_female
1             5             3.167         3.165         0             0.8    -3            0             0             0      0
       0.5    0      0      #WL_slope_female
#Female_maturity
10            50            20.97         20.97         0             0.8    -3     0      0      0      0      0.5    0      0
       #mat_intercept   #From Shaw and Gunderson 2006
-3            3             -0.66         -0.66         0             0.8    -3     0      0      0      0      0.5    0      0
       #mat_slope          #From Shaw and Gunderson 2006 (converted to cm)
#Fecundity #use EJ's meta-analysis
#-3           3             1                    1                    0             1      -3     0      0      0      0      0.5    0
       0      #intercept
#-3           3             0                    0                    0             1      -3     0      0      0      0      0.5    0
       0      #slope
-3            3000000       371200        1                    0             1      -3     0      0      0      0      0.5    0      0
       #intercept
-3            3000000       63300         0                    0             1      -3     0      0      0      0      0.5    0      0
       #slope
```

```
#LW_Male
-3          3           8.2378E-06   3.12E-06     0           0.8    -3     0      0      0      0      0.5    0      0
      #WL_intercept_male
-3          5           3.131        3.131        0           0.8    -3     0      0      0      0      0.5    0      0
      #WL_slope_slope_male


#LO     HI      INIT    PRIOR   PR_type SD  PHASE   env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
#Allocate_R_by_areas_x_gmorphs
0      1      1      0.2    0      9.8    -3     0      0      0      0      0.5    0      0      #frac to GP 1 in area 1
#Allocate_R_by_areas_(1_areain_this_case)
0      1      1      1      0      9.8    -3     0      0      0      0      0.5    0      0      #frac R in area 1
#Allocate_R_by_season_(2seasons_in_this_case)
#LO          HI          INIT         PRIOR        PR_type      SD     PHASE  env-var      use_dev      dev_minyr dev_maxyr
dev_stddev   Block  Block_Fxn
-4          4           0                   1                   0            9.8    -3           0            0
      0            0                   0.5          0      0      #frac R in season 1 (in log space)

#CohortGrowDev
#SS3 manual says it must be given a value of 1 and a negative phase
#LO    HI     INIT   PRIOR  PR_type      SD     PHASE  env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
0      1      1      1      -1     0      -4     0      0      0      0      0      0      0

#_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

#_seasonal_effects_on_biology_parms
0 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,L1,K,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
#_LO   HI     INIT   PRIOR  PR_type      SD     PHASE
1             99     9             9            -1           10           1            #Ln(R0)
0.2           1      0.692  0.692  2            0.205  -5          #steepness(h)---base_case  #Prior from Dorn (his mu=, sd= in
beta space)
0             2      0.6           0.6    0            5            -99          #sigmaR
-5            5      0             0            0            1            -99          #Env_link_parameter
-5            5      0             0            0            0.2          -2           # SR_R1_offset
0             0      0             0            -1           0            -99                # 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

1987   # first year of main recr_devs; early devs can preceed this era
2005   # last year of main recr_devs; forecast devs start in following year
3      #_recdev phase
1      # (0/1) to read 11 advanced options
1970   #_Cond 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
4      #_recdev_early_phase
5      #_Cond 0 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxphase+1)
1      #_Cond 1 #_lambda for prior_fore_recr occurring before endyr+1
1970   #_last_early_yr_nobias_adj_in_MPD
1987   #_first_yr_fullbias_adj_in_MPD
2005   #_last_yr_fullbias_adj_in_MPD
2008   #_first_recent_yr_nobias_adj_in_MPD
1      #max bias
0      #reserved for future use
-3     #min rec_dev
3      #max rec_dev
0      #_read_recdevs
#_end of advanced SR options

#Fishing Mortality info
0.1    # F ballpark for tuning early phases
-2001  # F ballpark year (neg value to disable)
1      # F_Method:  1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
0.9    # max F or harvest rate, depends on F_Method
# no additional F input needed for Fmethod 1
# read overall start F value; overall phase; N detailed inputs to read for Fmethod 2
# NUM ITERATIONS, FOR CONDITION 3
#5     # read N iterations for tuning for Fmethod 3 (recommend 3 to 7)
#Fleet Year Seas F_value se phase (for detailed setup of F_Method=2)

#_initial_F_parms
#_LO HI INIT PRIOR PR_type       SD PHASE
0      1      0      0.0001 0            99     -1     #Fleet1_(WO_TWL)
0      1      0      0.0001 0            99     -1     #Fleet2_(CA_TWL)
0      1      0      0.0001 0            99     -1     #Fleet3_(FOR)
0      1      0      0.0001 0            99     -1     #Fleet4_(OTH)
0      1      0      0.0001 0            99     -1     #Fleet5_(REC)

#_Q_setup
# A=do power, B=env-var, C=extra SD,
#D=devtype(<0=mirror, 0/1=none, 2=cons, 3=rand, 4=randwalk)
#E=0=num/1=bio, F=err_type
#A     B      C      D      E      F
```

```
0      0      0      0      1      0      #Fleet1_(WO_TWL)
0      0      0      0      1      0      #Fleet2_(CA_TWL)
0      0      0      0      1      0      #Fleet3_(For)
0      0      0      0      1      0      #Fleet4_(Oth)
0      0      0      0      1      0      #Fleet5_(REC)
0      0      0      0      1      0      #Late Triennial
0      0      0      0      1      0      #Early Triennial
0      0      0      0      1      0      #NWFSC

#_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)
# LO HI INIT PRIOR PR_type SD PHASE
#-5    5      -0.4462       -0.4   0      5      1      #

#Seltype(1,2*Ntypes,1,4)   #SELEX_&_RETENTION_PARAMETERS
#Size_Slectivity,_enter_4_cols
#N_sel Do_retain     Do_male       Special
24          1                   3             0      #Fleet1_(WO_TWL)
24          1                   3             0      #Fleet2_(CA_TWL)
5           0                   0             2      #Fleet3_(For)    #mirrors CA, no discards
24          1                   0             0      #Fleet4_(OTH)
24          0                   0             0      #Fleet5_(REC)
24          0                   3             0      #Late Triennial
24          0                   3             0      #Early Triennial
24          0                   3             0      #NWFSC
#Age_selectivity    #set_to_1
10          0                   0             0      #Fleet1_(WO_TWL)is Logistic
10          0                   0             0      #Fleet2_(CA_TWL)is Logistic
10          0                   0             0      #Fleet3_(For)   is Logistic
10          0                   0             0      #Fleet4_(OTH)   is Logistic
10          0                   0             0      #Fleet5_(REC)   is Logistic
10          0                   0             0      #Late Triennial is Logistic
10          0                   0             0      #Early Triennialis Logistic
10          0                   0             0      #NWFSC

#Selectivity parameters
#LO    HI     INIT   PRIOR  PR_TYPE      SD     PHASE  env-var       use_dev       dev_yr1       dev_yr2       dev_sd nblks  blk_pat
      #
#Size_selectivity for FISHERY WO TRAWL
#FEMALE
#LO           HI     INIT   PRIOR  PR_TYPE      SD     PHASE  env-var       use_dev       dev_yr1       dev_yr2       dev_sd nblks
      blk_pat       #
12            44     34.0   43.1   -1           5      1      0      0      0      0      0.5    0      0      #PEAK (see
Selex24.xls)
-5            3      3.0           0.7          -1            5      -4     0      0      0      0      0.5    0      0      #TOP
(see Selex24.xls)
```

```
-4      12      4.1             3.42    -1              5       2       0       0       0       0       0.5     0       0       #ASC_WIDTH
(see Selex24.xls)
-2      6       6.0             0.21    -1              5       -4      0       0       0       0       0.5     0       0       #DSC_WIDTH
(see Selex24.xls)
-15     5       -5.0    -8.9    -1              5       3       0       0       0       0       0.5     0       0       #INIT (see
Selex24.xls)
-5      5       -999    0.15    -1              5       -5      0       0       0       0       0.5     0       0       #FINAL (see
Selex24.xls)
#-5     5       -4.0    0.15    -1              5       4       0       0       0       0       0.5     0       0       #FINAL (see
Selex24.xls)
#RETENTION
10      39      25              15              -1              9       2       0       0       0       0       0       0       0       #
Retain_1 Inflection
0.1     10      3               3               -1              9       2       0       0       0       0       0       0       0       #
Retain_2 Slope
0.001  0.7     0.30    1               -1              9       1       0       0       0       0       0       0       0       # Retain_3 Asymptote
-10     10      0               0               -1              9       -2      0       0       0       0       0       0       0       #
Retain_4 Male offset (additive)
#...DO_MALE (AS OFFSET)
-15     15              0               0       -1              5       3       0       0       0       0       0.5     0       0       #PEAK
(see Selex24.xls)
-15     15              0               0       -1              5       4       0       0       0       0       0.5     0       0
        #ASC_WIDTH (see Selex24.xls)
-15     15              0               0       -1              5       -4      0       0       0       0       0.5     0       0
        #DSC_WIDTH (see Selex24.xls)
-15     15              0               0       -1              5       -4      0       0       0       0       0.5     0       0       #FINAL
(see Selex24.xls)
#Size_selectivity for FISHERY CA TRAWL
#FEMALE
#LO     HI      INIT    PRIOR   PR_TYPE         SD      PHASE   env-var         use_dev         dev_yr1         dev_yr2         dev_sd nblks
        blk_pat         #
12      44      34.0    43.1    -1              5       1       0       0       0       0       0.5     0       0       #PEAK (see
Selex24.xls)
-5      3       3.0             0.7             -1              5       -4      0       0       0       0       0.5     0       0       #TOP
(see Selex24.xls)
-4      12      4.1             3.42    -1              5       2       0       0       0       0       0.5     0       0       #ASC_WIDTH
(see Selex24.xls)
-2      6       6.0             0.21    -1              5       -4      0       0       0       0       0.5     0       0       #DSC_WIDTH
(see Selex24.xls)
-15     5       -5.0    -8.9    -1              5       3       0       0       0       0       0.5     0       0       #INIT (see
Selex24.xls)
-5      5       -999    0.15    -1              5       -5      0       0       0       0       0.5     0       0       #FINAL (see
Selex24.xls)
#-5     5       -4.0    0.15    -1              5       4       0       0       0       0       0.5     0       0       #FINAL (see
Selex24.xls)
#RETENTION
```

```
10          39    25          15          -1          9     2     0     0     0     0     0     0     0     #
Retain_1 Inflection
0.1         10    3           3           -1          9     2     0     0     0     0     0     0     0     #
Retain_2 Slope
0.001  0.7  0.30  1           -1          9     1     0     0     0     0     0     0     0     # Retain_3 Asymptote
-10         10    0           0           -1          9     -2    0     0     0     0     0     0     0     #
Retain_4 Male offset (additive)
#...DO_MALE (AS OFFSET)
-15         15          0           0     -1          5     3     0     0     0     0     0.5   0     0     #PEAK
(see Selex24.xls)
-15         15          0           0     -1          5     4     0     0     0     0     0.5   0     0
      #ASC_WIDTH (see Selex24.xls)
-15         15          0           0     -1          5     -4    0     0     0     0     0.5   0     0
      #DSC_WIDTH (see Selex24.xls)
-15         15          0           0     -1          5     -4    0     0     0     0     0.5   0     0     #FINAL
(see Selex24.xls)
#Size_selectivity for FISHERY FOREIGN TRAWL
#FEMALE
#LO         HI    INIT  PRIOR PR_TYPE     SD    PHASE env-var     use_dev     dev_yr1     dev_yr2     dev_sd nblks
      blk_pat     #
-2 60 0 0 -1 0.2 -4 0 0 0 0 0.5 0 0 #MinBin_#_in_Fishery_1
-2 60 0 0 -1 0.2 -4 0 0 0 0 0.5 0 0 #MaxBin_#_in_Fishery_1
#Size_selectivity for FISHERY OTH
#LO         HI    INIT  PRIOR PR_TYPE     SD    PHASE env-var     use_dev     dev_yr1     dev_yr2     dev_sd nblks
      blk_pat     #
12          44    34.0  43.1  -1          5     1     0     0     0     0     0.5   0     0     #PEAK (see
Selex24.xls)
-5          3     3.0         0.7         -1          5     -4    0     0     0     0     0.5   0     0     #TOP
(see Selex24.xls)
-4          12    4.1         3.42  -1          5     2     0     0     0     0     0.5   0     0     #ASC_WIDTH
(see Selex24.xls)
-2          6     6.0         0.21  -1          5     -4    0     0     0     0     0.5   0     0     #DSC_WIDTH
(see Selex24.xls)
-15         5     -5.0  -8.9  -1          5     3     0     0     0     0     0.5   0     0     #INIT (see
Selex24.xls)
-5          5     -999  0.15  -1          5     -5    0     0     0     0     0.5   0     0     #FINAL (see
Selex24.xls)
#-5         5     -4.0  0.15  -1          5     4     0     0     0     0     0.5   0     0     #FINAL (see
Selex24.xls)
#RETENTION
10          39    25          15          -1          9     2     0     0     0     0     0     0     0     #
Retain_1 Inflection
0.1         10    3           3           -1          9     2     0     0     0     0     0     0     0     #
Retain_2 Slope
0.001  0.7  0.20  1           -1          9     1     0     0     0     0     0     0     0     # Retain_3 Asymptote
-10         10    0           0           -1          9     -2    0     0     0     0     0     0     0     #
Retain_4 Male offset (additive)
```

```
#Size_selectivity for FISHERY RECREATIONAL COASTWIDE (both sex combined)
#LO	HI	INIT	PRIOR	PR_TYPE	SD	PHASE	env-var	use_dev	dev_yr1	dev_yr2	dev_sd	nblks
	blk_pat	#
15	44	28.0	43.1	-1	5	1	0	0	0	0	0.5	0	0	#PEAK (see
Selex24.xls)
-5	3	3.0		0.7	-1		5	-3	0	0	0	0	0.5	0	0	#TOP
(see Selex24.xls)
-4	12	4.1		3.42	-1		5	2	0	0	0	0	0.5	0	0	#ASC_WIDTH
(see Selex24.xls)
-2	6	6.0		0.21	-1		5	-3	0	0	0	0	0.5	0	0	#DSC_WIDTH
(see Selex24.xls)
-15	5	-5.0	-8.9	-1	5	3	0	0	0	0	0.5	0	0	#INIT (see
Selex24.xls)
-5	5	-999	0.15	-1	5	-4	0	0	0	0	0.5	0	0	#FINAL (see
Selex24.xls)
#-5	5	-4.0	0.15	-1	5	4	0	0	0	0	0.5	0	0	#FINAL (see
Selex24.xls)
#Size_selectivity for SURVEY EARLY TRIENNIAL
#FEMALE
#LO	HI	INIT	PRIOR	PR_TYPE	SD	PHASE	env-var	use_dev	dev_yr1	dev_yr2	dev_sd	nblks
	blk_pat	#
15	44	21.0	43.1	-1	5	1	0	0	0	0	0.5	0	0	#PEAK (see
Selex24.xls)
-5	3	3.0		0.7	-1		5	-2	0	0	0	0	0.5	0	0	#TOP
(see Selex24.xls)
-4	12	3.7		3.42	-1		5	1	0	0	0	0	0.5	0	0	#ASC_WIDTH
(see Selex24.xls)
-2	6	6.0		0.21	-1		5	-2	0	0	0	0	0.5	0	0	#DSC_WIDTH
(see Selex24.xls)
-15	5	-5.0	-8.9	-1	5	3	0	0	0	0	0.5	0	0	#INIT (see
Selex24.xls)
-5	5	-999	0.15	-1	5	-4	0	0	0	0	0.5	0	0	#FINAL (see
Selex24.xls)
#...DO_MALE (AS OFFSET)
-15	15	0	0	-1	5	3	0	0	0	0
	0.5	0	0	#PEAK (see Selex24.xls)
-15	15	0	0	-1	5	3	0	0	0	0
	0.5	0	0	#ASC_WIDTH (see Selex24.xls)
-15	15	0	0	-1	5	-3	0	0	0	0
	0.5	0	0	#DSC_WIDTH (see Selex24.xls)
-15	15	0	0	-1	5	-3	0	0	0	0
	0.5	0	0	#FINAL (see Selex24.xls)
#Size_selectivity for SURVEY LATE TRIENNIAL
#FEMALE
#LO	HI	INIT	PRIOR	PR_TYPE	SD	PHASE	env-var	use_dev	dev_yr1	dev_yr2	dev_sd	nblks
	blk_pat	#
```

```
15          44    21.0  43.1  -1          5     1     0     0     0     0     0.5   0     0     #PEAK (see
Selex24.xls)
-5          3     3.0         0.7         -1          5     -2    0     0     0     0     0.5   0     0     #TOP
(see Selex24.xls)
-4          12    3.7         3.42  -1          5     1     0     0     0     0     0.5   0     0     #ASC_WIDTH
(see Selex24.xls)
-2          6     6.0         0.21  -1          5     -2    0     0     0     0     0.5   0     0     #DSC_WIDTH
(see Selex24.xls)
-15         5     -5.0  -8.9  -1          5     3     0     0     0     0     0.5   0     0     #INIT (see
Selex24.xls)
-5          5     -999  0.15  -1          5     -4    0     0     0     0     0.5   0     0     #FINAL (see
Selex24.xls)
#...DO_MALE (AS OFFSET)
-15   15    0           0           -1          5     3           0           0           0           0
      0.5         0           0           #PEAK (see Selex24.xls)
-15   15    0           0           -1          5     3           0           0           0           0
      0.5         0           0           #ASC_WIDTH (see Selex24.xls)
-15   15    0           0           -1          5     -3          0           0           0           0
      0.5         0           0           #DSC_WIDTH (see Selex24.xls)
-15   15    0           0           -1          5     -3          0           0           0           0
      0.5         0           0           #FINAL (see Selex24.xls)
#Size_selectivity for SURVEY NWFSC
#FEMALE
#LO         HI    INIT  PRIOR PR_TYPE     SD    PHASE env-var     use_dev     dev_yr1     dev_yr2     dev_sd nblks
      blk_pat     #
15          44    21.0  43.1  -1          5     1     0     0     0     0     0.5   0     0     #PEAK (see
Selex24.xls)
-5          3     3.0         0.7         -1          5     -2    0     0     0     0     0.5   0     0     #TOP
(see Selex24.xls)
-4          12    3.7         3.42  -1          5     1     0     0     0     0     0.5   0     0     #ASC_WIDTH
(see Selex24.xls)
-2          6     6.0         0.21  -1          5     -2    0     0     0     0     0.5   0     0     #DSC_WIDTH
(see Selex24.xls)
-15         5     -5.0  -8.9  -1          5     3     0     0     0     0     0.5   0     0     #INIT (see
Selex24.xls)
-5          5     -999  0.15  -1          5     -4    0     0     0     0     0.5   0     0     #FINAL (see
Selex24.xls)
#...DO_MALE (AS OFFSET)
-15   15    0           0           -1          5     3           0           0           0           0
      0.5         0           0           #PEAK (see Selex24.xls)
-15   15    0           0           -1          5     3           0           0           0           0
      0.5         0           0           #ASC_WIDTH (see Selex24.xls)
-15   15    0           0           -1          5     -3          0           0           0           0
      0.5         0           0           #DSC_WIDTH (see Selex24.xls)
-15   15    0           0           -1          5     -3          0           0           0           0
      0.5         0           0           #FINAL (see Selex24.xls)
```

```
#0 #_custom block setup (0/1)
#-20 20 0 0 -1 99 4
#2    #logistic bounding

# 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

0 #_Variance_adjustments_to_input_values
#_1 2 3
#  0 0 0 #_add_to_fleet and survey_CV
#  0 0 0 #_add_to_discard_stddev
#  0 0 0 #_add_to_bodywt_CV
#  1 1 1 #_mult_by_lencomp_N
#  1 1 1 #_mult_by_agecomp_N
#  1 1 1 #_mult_by_size-at-age_N
30 #_DF_for_discard_like
30 #_DF_for_meanbodywt_like

15 #_maxlambdaphase
1 #_sd_offset

0 # number of changes to make to default Lambdas (default value is 1.0)
# Like_comp codes:  1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=sizeage; 8=catch;
# 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14=Morphcomp; 15=Tag-comp; 16=Tag-negbin
#like_comp fleet/survey  phase  value  sizefreq_method
#5 1 1 0.5 1  #commercial age comps
#5 2 1 0.5 1  #commercial age comps
#5 3 1 0.5 1  #commercial age comps
#5 4 1 0.5 1  #commercial age comps
#5 5 1 0.5 1  #commercial age comps
#5 6 1 0.5 1  #commercial age comps
#4 1 1 0.5 1  #commercial lgth comps
#4 2 1 0.5 1  #commercial lgth comps
#4 3 1 0.5 1  #commercial lgth comps
#4 4 1 0.5 1  #commercial lgth comps
#4 5 1 0.5 1  #commercial lgth comps
#4 6 1 0.5 1  #commercial lgth comps
#5 8 1 0.1 1  #survey Age conditionals
#4 8 1 0.1 1  #survey lgth comps
#4 7 1 0.1 1  #triennial survey lgth comps
#2 1 1 20 1
#2 2 1 20 1
#2 3 1 20 1
#2 4 1 20 1
#2 5 1 20 1
#2 6 3 20 1
```

```
#2 1 3 5 1
#2 2 3 5 1
#2 3 3 5 1
#2 4 3 5 1
#2 5 3 5 1
#2 6 3 5 1
#2 1 4 1 1
#2 2 4 1 1
#2 3 4 1 1
#2 4 4 1 1
#2 5 4 1 1
#2 6 4 1 1
#3 1 1 10 1
#3 2 1 10 1
#3 3 1 10 1
#3 4 1 10 1
#3 5 1 10 1
#3 6 1 10 1
#4 1 1 1 1
#4 2 1 1 1
#4 3 1 1 1
#5 1 1 1 1
#5 2 1 1 1

0 # (0/1) read specs for more stddev reporting
# 1 1 -1 5 1 5 # selex type, len/age, year, N selex bins, Growth pattern, N growth ages
# -5 16 27 38 46 # vector with selex std bin picks (-1 in first bin to self-generate)
# 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-generate)

999
```

Appendix D: SS2 Starter file

```
#C Greenstriped 2009 assessment (Allan Hicks, Melissa Haltuch, Chantel Wetzel)
gsrk09.dat
gsrk09.ctl
0 # 0=use init values in control file; 1=use ss3.par
1 # run display detail (0,1,2)
1 # detailed age-structured reports in REPORT.SSO (0,1)
0 # write detailed checkup.sso file (0,1)
0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms; 4=every,active)
1 # Cumulative Report
0 # Include prior_like for non-estimated parameters (0,1)
1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
1 # Number of bootstrap datafiles to produce (N-2), 1 means reporduce data, 2 means add expected values
10 # Turn off estimation for parameters entering after this phase
1 # MCMC burn interval
1 # MCMC thin interval
0.0001 # 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
# 1973 1976
0.0001 # final convergence criteria (e.g. 1.0e-04)
0 # retrospective year relative to end year (e.g. -4)
2 # min age for calc of summary biomass
1 # Depletion basis:  denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B_styr
1 # Fraction (X) for Depletion denominator (e.g. 0.4)
4 # (1-SPR)_reporting:  0=skip; 1=rel(1-SPR); 2=rel(1-SPR_MSY); 3=rel(1-SPR_Btarget); 4=notrel
1 # F_std reporting: 0=skip; 1=exploit(Bio); 2=exploit(Num); 3=sum(frates)
0 # F_report_basis: 0=raw; 1=rel Fspr; 2=rel Fmsy ; 3=rel Fbtgt
999 # check value for end of file
```

Appendix E: SS2 Forecast file

```
1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=F(endyr); 5=Ave F (enter yrs);
6=read Fmult
# -4  # first year for recent ave F for option 5 (not yet implemented)
# -1  # last year for recent ave F for option 5 (not yet implemented)
# 0.74  # F multiplier for option 6 (not yet implemented
0 # first year to use for averaging selex to use in forecast (e.g. 2004; or use -x to
be rel endyr)
0 # last year to use for averaging selex to use in forecast
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)
0.4 # Biomass target (e.g. 0.40)
12 # N forecast years
1 # read 10 advanced options
 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
endyear+1)
 2002 # Rebuilder:  year for current age structure (Yinit) (-1 to set to endyear+1)
 1 # Control rule method (1=west coast adjust catch; 2=adjust F)
 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40)
 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
 1 # Control rule fraction of Flimit (e.g. 0.75)
 0 # basis for max forecast catch by seas and area (0=none; 1=deadbio; 2=retainbio;
3=deadnum; 4=retainnum)
 0 # 0= no implementation error; 1=use implementation error in forecast (not coded
yet)
 3.19 # stddev of log(realized F/target F) in forecast (not coded yet)
# end of advanced options
# max forecast catch
# rows are seasons, columns are areas
#use fleet allocation determined from average catches over last 2 years
2 # fleet allocation (in terms of F) (1=use endyr pattern, no read; 2=read below)
0.416429556   0.048866457   0      0.008847217   0.525856769

10 # Number of forecast catch levels to input (rest calc catch from forecast F
1 # basis for input forecatch:  1=retained catch; 2=total dead catch
#catches for 2009 and 2010 are average of 2007 and 2008 (last 2 years)
#Year  Season Fleet  Catch
2009   1      1      1.185
2009   1      2      0.139
2009   1      3      0.000
2009   1      4      0.025
2009   1      5      1.496
2010   1      1      1.185
2010   1      2      0.139
2010   1      3      0.000
2010   1      4      0.025
2010   1      5      1.496


999 # verify end of input
```