Status of the U.S. canary rockfish resource in 2007

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Executive Summary

Stock

This assessment reports the status of the canary rockfish (*Sebastes pinniger*) resource off the coast of the United States from southern California to the U.S.-Canadian border using data through 2006. The resource is modeled as a single stock. Spatial aspects of the coast-wide population are addressed through geographic separation of data sources/fleets where possible and consideration of residual patterns that may be a result of inherent stock structure. There is currently no genetic evidence that there are distinct biological stocks of canary rockfish off the U.S. coast and very limited tagging data to describe adult movement, which may be significant across depth and latitude. Future efforts to specifically address regional management concerns will require a more spatially explicit model that likely includes the portion of the canary rockfish stock residing in Canadian waters off Vancouver Island.

Catches

Catch of canary rockfish is first reported in 1916 in California. Since that time, annual catch has ranged from 46.5 mt in 2004 to 5,544 in 1982 and totaled almost 150,000 mt over the time-series. Canary rockfish have been primarily caught by trawl fleets, on average comprising ~85% of the annual catches, with the Oregon fleet removing as much as 3,941 mt in 1982. Historically just 10% of the catches have come from non-trawl commercial fisheries, although this proportion reached 24% and 358 mt in 1997. Recreational removals have averaged just 6% of the total catch, historically, but have become relatively more important as commercial landings have been substantially reduced in recent years. Recreational catches reached 59% of the total with 30 mt caught in 2003. Total catches after 1999 have been reduced by an order of magnitude in an attempt to rebuild a stock determined to be overfished on the basis of the 1999 assessment.

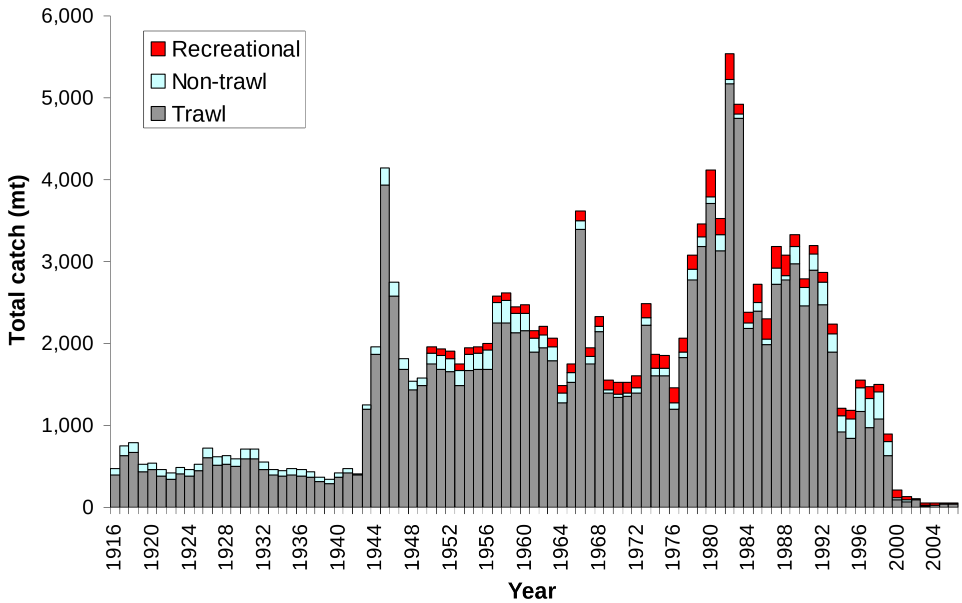

Figure a. Canary rockfish catch history by major source, 1916-2006.

Table a. Recent commercial fishery catches (mt) by fleet.

Year	Southern California trawl	Northern California trawl	Oregon trawl	Washington trawl	Southern California non-trawl	Northern California non-trawl	Oregon-Washington non-trawl	At-sea whiting bycatch
1997	31.96	142.66	589.85	203.44	29.78	73.80	254.42	3.63
1998	8.41	149.45	716.05	203.01	23.33	57.25	250.13	5.47
1999	7.36	96.25	387.85	139.97	8.53	28.59	123.97	5.63
2000	1.71	11.24	46.62	32.66	2.52	5.50	10.25	2.35
2001	1.44	9.43	33.13	19.65	1.60	4.96	11.00	4.05
2002	0.36	14.62	32.60	33.29	0.02	0.08	3.15	5.24
2003	0.23	0.31	5.02	6.24	0.00	0.08	6.89	0.93
2004	0.61	1.95	7.67	7.73	0.02	0.06	4.68	5.22
2005	0.72	2.84	4.91	25.90	0.06	0.09	1.79	1.44
2006	3.57	2.28	2.91	15.64	0.00	0.00	3.11	1.09

Data and Assessment

This assessment used the Stock Synthesis 2 integrated length-age structured model. The model includes catch, length- and age-frequency data from 11 fishing fleets, including trawl, non-trawl and recreational sectors. Biological data is derived from both port and on-board observer sampling programs. The National Marine Fisheries Service (NMFS) triennial bottom trawl survey and Northwest Fisheries Science Center (NWFSC) trawl survey relative biomass indices and biological sampling provide fishery independent information on relative trend and demographics of the canary stock. The Southwest Fisheries Science Center (SWFSC)/NWFSC/Pacific Whiting Conservation Cooperative (PWCC) coast-wide pre-recruit survey provides a source of recent recruitment strength information.

New analysis of the triennial survey data led to separating the series into two parts (1980-1992, 1995-2004) to allow for potential changes in catchability due to timing of survey operations. Accommodation of potential changes in fishery selectivity due to management actions including the adoption of canary-specific trip limits in 1995, small-footrope requirements in 1999, closure of the RCA in 2002 and use of selective flatfish trawl starting in 2005 was also added in this assessment. These and other changes have resulted in a change in the estimate of current stock status and large increase in the perception of uncertainty regarding this quantity in comparison to the most recent 2005 and earlier assessments.

The base case assessment model includes parameter uncertainty from a variety of sources, but underestimates the considerable uncertainty in recent trend and current stock status. For this reason, in addition to asymptotic confidence intervals (based upon the model's analytical estimate of the variance near the converged solution), two alternate states of nature regarding stock productivity (via the steepness parameter of the stock-recruitment relationship) are presented. The base case model (steepness = 0.51) is considered to be twice as likely as the two alternate states (steepness = 0.35, 0.72) based on the results of a meta-analysis of west coast rockfish (M. Dorn, personal communication). In order to best capture this source of uncertainty, all three states of nature will be used as probability-weighted input to the rebuilding analysis.

Stock biomass

Canary rockfish were relatively lightly exploited until the early 1940's, when catches increased and a decline in biomass began. The rate of decline in spawning biomass accelerated during the late 1970s, and finally reached a minimum (13% of unexploited) in the mid 1990s. The canary rockfish spawning stock biomass is estimated to have been increasing since that time, in response to reductions in harvest and above average recruitment in the preceding decade. However, this trend is very uncertain. The estimated relative depletion level in 2007 is 32.4% (~95% asymptotic interval: 24-41%, ~75% interval based on the range of states of nature: 12-56%), corresponding to 10,544 mt (asymptotic interval: 7,776-13,312 mt, states of nature interval: 4,009-17,519) of female spawning biomass in the base model.

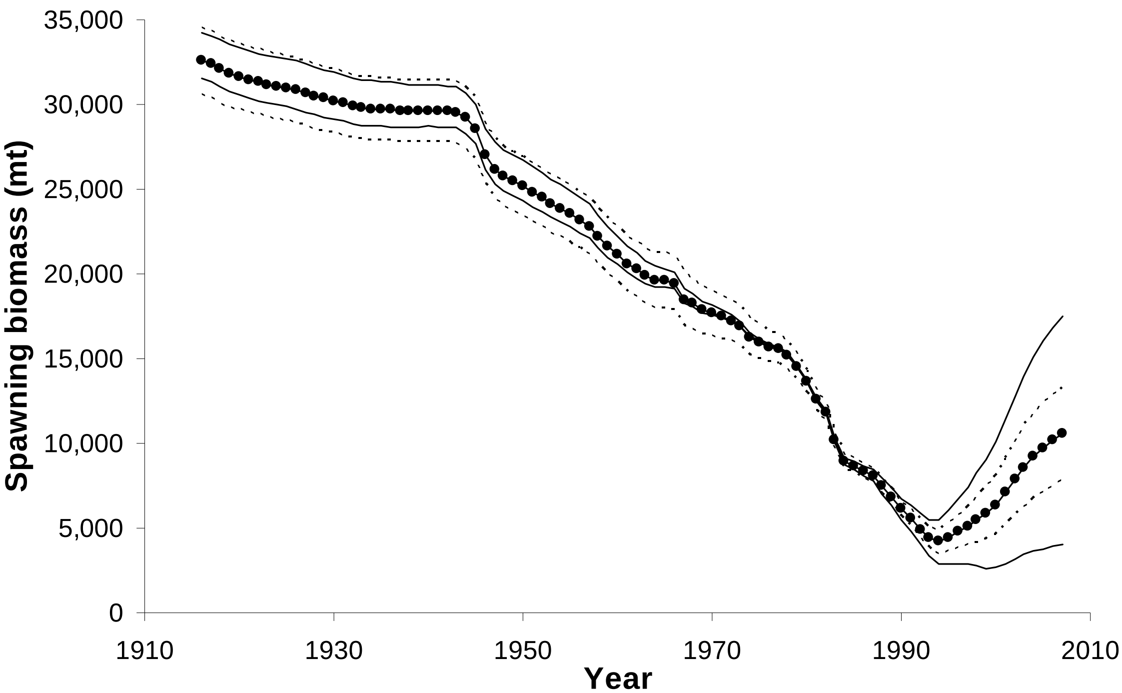

Figure b. Estimated spawning biomass time-series (1916-2007) for the base case model (round points) with approximate asymptotic 95% confidence interval (dashed lines) and alternate states of nature (light lines).

Table b. Recent trend in estimated canary rockfish spawning biomass and relative depletion level.

Year	Spawning biomass (mt)	~95% confidence interval	Range of states of nature	Estimated depletion	~95% confidence interval	Range of states of nature
1998	5,499	4,177-6,820	2,761-8,241	16.9%	NA	8.1-26.2
1999	5,826	4,296-7,357	2,610-9,073	17.9%	NA	7.6-28.8
2000	6,364	4,618-8,111	2,644-10,144	19.5%	NA	7.7-32.2
2001	7,149	5,190-9,109	2,918-11,477	22.0%	NA	8.5-36.4
2002	7,910	5,750-10,070	3,184-12,779	24.3%	NA	9.3-40.6
2003	8,603	6,264-10,942	3,417-13,985	26.4%	NA	10.0-44.4
2004	9,226	6,736-11,715	3,628-15,076	28.3%	NA	10.6-47.9
2005	9,749	7,140-12,359	3,795-16,019	29.9%	NA	11.1-50.9
2006	10,183	7,482-12,884	3,918-16,825	31.3%	23.1-39.4	11.4-53.4
2007	10,544	7,776-13,312	4,009-17,519	32.4%	24.1-40.7	11.7-55.6

Recruitment

The degree to which canary rockfish recruitment declined over the last 50 years is closely related to the level of productivity (stock-recruit steepness) modeled for the stock. High steepness values imply little relationship between spawning stock and recruitment, while low steepness values cause a strong correlation. After a period of above average recruitments, recent year-class strengths have generally been low, with only 1999 and 2001 producing large estimated recruitments (the 2007 recruitment is based only on the stock-recruit function). There is little information other than the pre-recruit index to inform the assessment model about recruitments subsequent to 2002, so those estimates will likely be updated in future assessments. As the larger recruitments from the late 1980s and early 1990s move through the population in future projections, the effects of recent poor recruitment will tend to slow the rate of recovery.

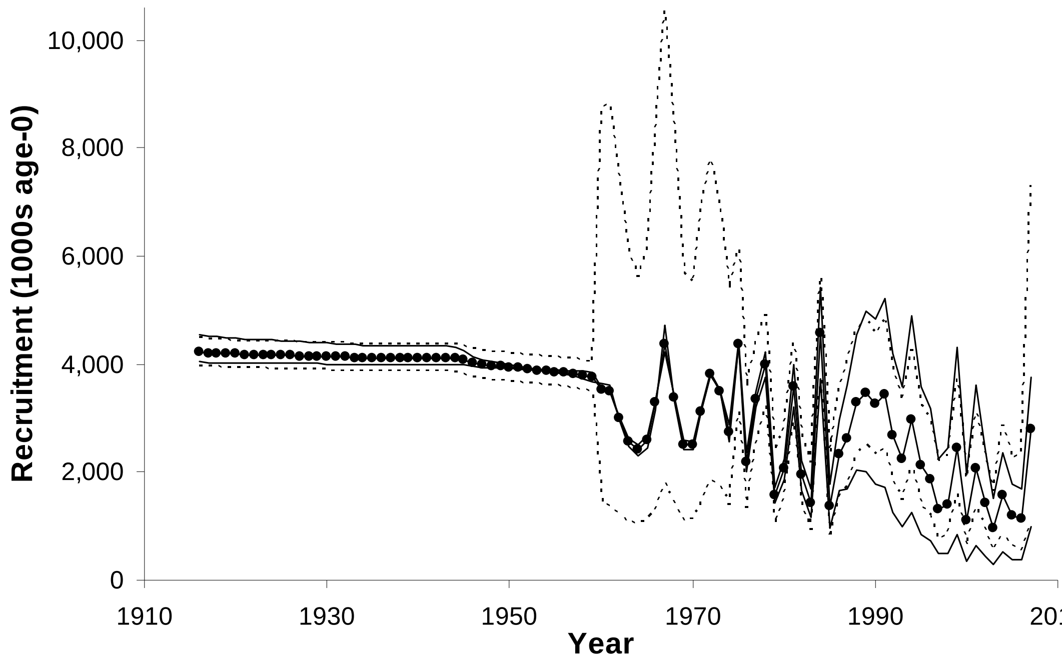

Figure c. Time series of estimated canary rockfish recruitments for the base case model (round points) with approximate asymptotic 95% confidence interval (dashed lines) and alternate states of nature (light lines).

Table c. Recent estimated trend in canary rockfish recruitment.

Year	Estimated recruitment (1000s)	~95% confidence interval	Range of states of nature
1998	1,391	841-2,299	484-2,453
1999	2,449	1,606-3,735	841-4,318
2000	1,099	638-1,893	351-1,938
2001	2,061	1,359-3,124	643-3,613
2002	1,432	905-2,267	447-2,383
2003	955	547-1,667	302-1,515
2004	1,565	854-2,869	520-2,373
2005	1,182	627-2,231	390-1,771
2006	1,144	548-2,389	367-1,699
2007	2,807	1,078-7,313	991-3,745

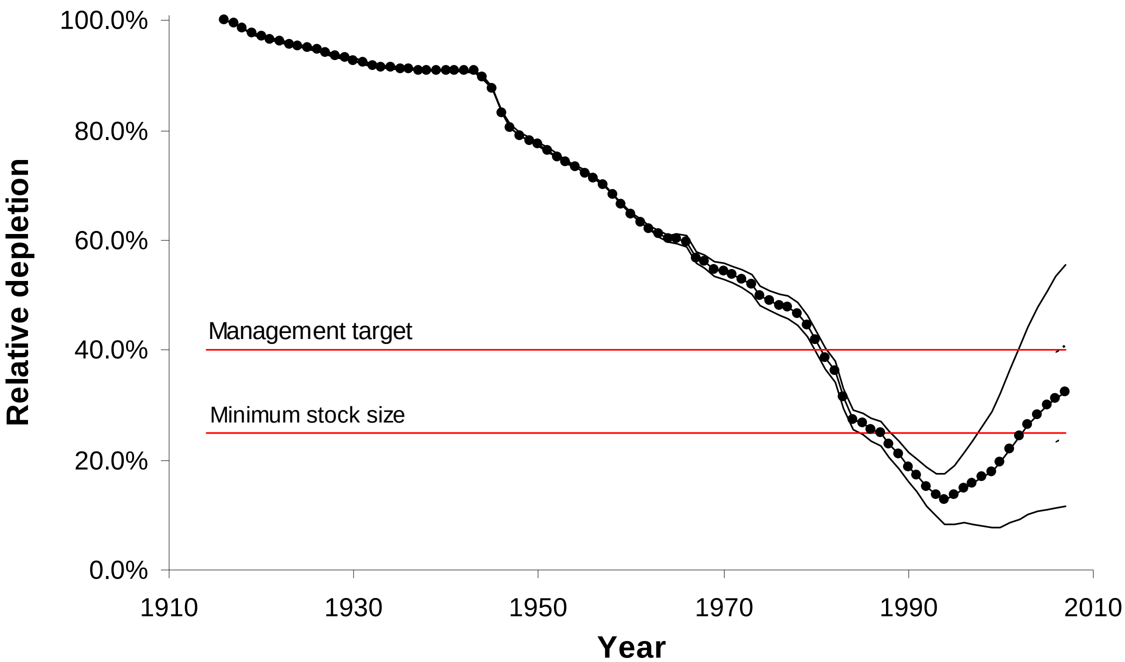

Figure d. Time series of depletion level as estimated in the base case model (round points) with approximate asymptotic 95% confidence interval (2006-2007 only, dashed lines) and alternate states of nature (light lines).

Reference points

Unfished spawning stock biomass was estimated to be 32,561 mt in the base case model. This is slightly smaller than the equilibrium value estimated in the 2005 assessment. The target stock size ($SB_{40\%}$) is therefore 13,024 mt. Maximum sustained yield (MSY) applying current fishery selectivity and allocations (a 'bycatch-only' scenario) was estimated in the assessment model to occur at a spawning stock biomass of 12,394 mt and produce an MSY catch of 1,169 mt (SPR = 52.9%). This is nearly identical to the yield, 1,167 mt, generated by the SPR (54.4%) that stabilizes the stock at the $SB_{40\%}$ target. The fishing mortality target/overfishing level (SPR = 50.0%) generates a yield of 1,161 mt at a stock size of 11,161 mt.

When selectivity and allocation from the mid 1990s (1994-1998) was applied, to mimic reference points under a targeted fishery scenario, the yield increased to 1,578 mt from a slightly smaller stock size (12,211 mt), but a similar rate of exploitation (SPR=52.5%). This is due to higher relative selection of older and larger fish when the fishery was targeting instead of avoiding canary rockfish. These values are appreciably higher than those from previous assessment models due primarily to the difference in steepness.

Exploitation status

The abundance of canary rockfish was estimated to have dropped below the $SB_{40\%}$ management target in 1981 and the overfished threshold in 1987. In hindsight, the spawning stock biomass passed through the target and threshold levels at a time when the annual catch was averaging more than twice the current estimate of the MSY. The stock remains below the rebuilding target, although the spawning stock biomass appears to have been increasing since 1999. The degree of increase is very sensitive to the value for steepness (state of nature), and is projected to slow as recent (and below average) recruitments begin to contribute to the spawning biomass. Fishing mortality rates in excess of the current F-target for rockfish of $SPR_{50\%}$ are estimated to have begun in the late 1970s and persisted through 1999. Recent management actions appear to have curtailed the rate of removal such that overfishing has not occurred since 1999, and recent SPR values are in excess of 95%. Relative exploitation rates (catch/biomass of age-5 and older fish) are estimated to have been less than 1% since 2001. These patterns are largely insensitive to the three states of nature.

Table d. Recent trend in spawning potential ratio (SPR) and relative exploitation rate (catch/biomass of age-5 and older fish).

Year	Estimated SPR (%)	Range of states of nature	Relative exploitation rate	Range of states of nature
1997	31.6%	16.9-41.9	0.0889	0.0607-0.1652
1998	33.2%	16.8-44.3	0.0873	0.0576-0.1778
1999	48.9%	26.1-61.0	0.0506	0.0323-0.1146
2000	84.0%	65.7-89.7	0.0112	0.0070-0.0271
2001	89.7%	76.5-93.5	0.0067	0.0041-0.0165
2002	92.2%	81.9-95.1	0.0050	0.0031-0.0126
2003	95.4%	88.3-97.2	0.0023	0.0014-0.0058
2004	96.3%	90.6-97.8	0.0020	0.0012-0.0051
2005	96.3%	90.5-97.7	0.0021	0.0013-0.0055
2006	96.5%	90.7-97.9	0.0019	0.0011-0.0049

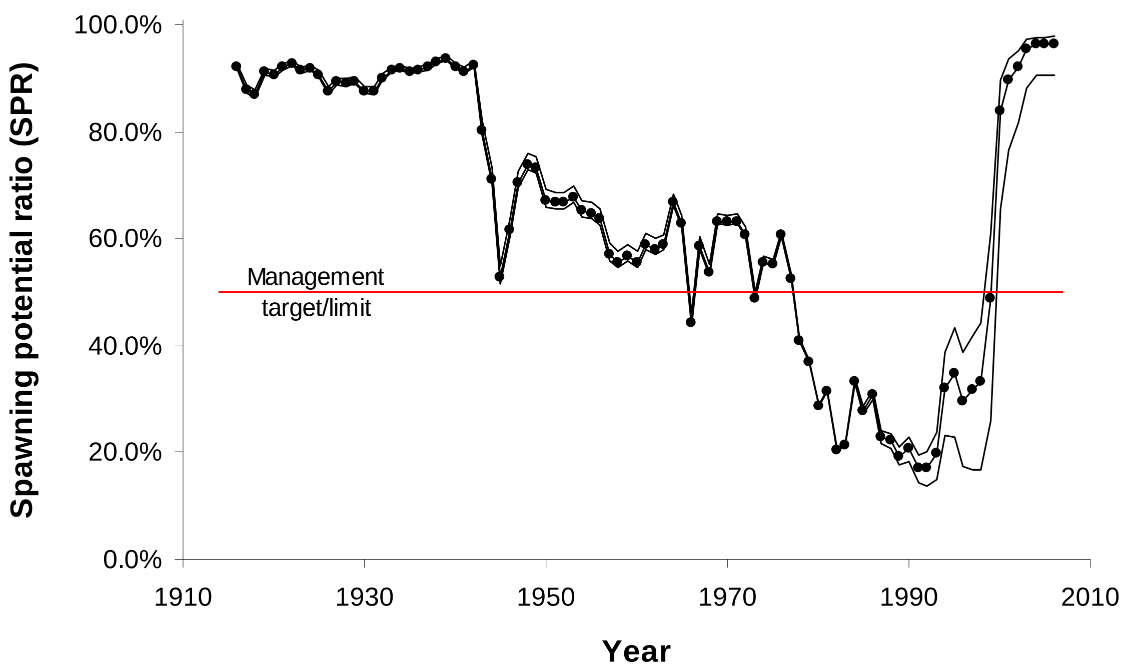

Figure e. Time series of estimated spawning potential ratio (SPR) for the base case model (round points) and alternate states of nature (light lines). Values of SPR below 0.5 reflect harvests in excess of the current overfishing proxy.

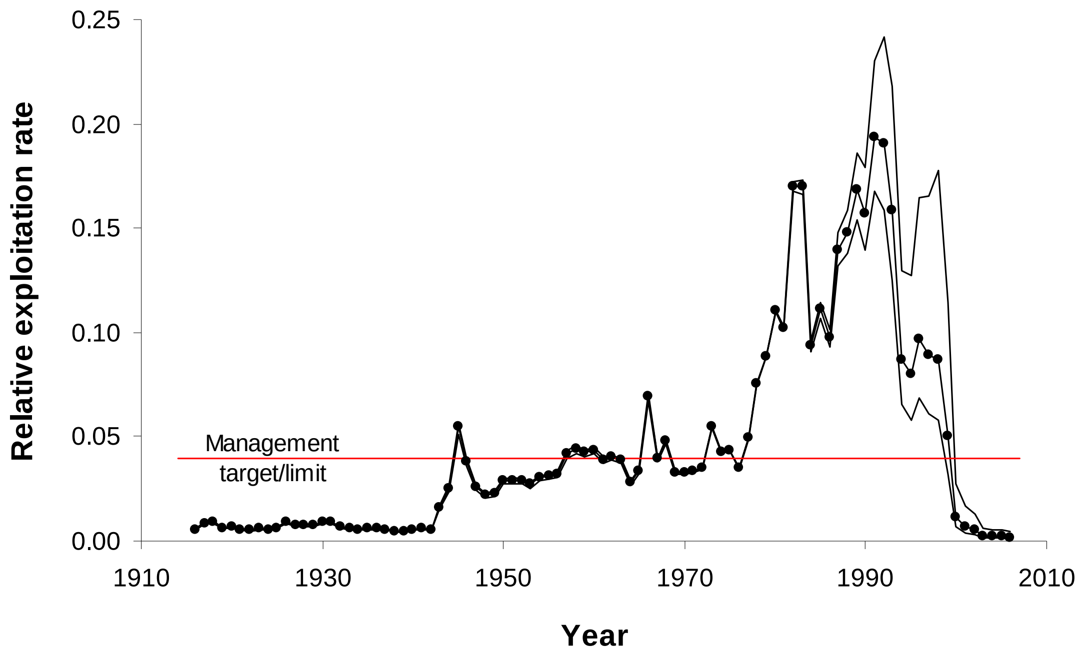

Figure f. Time series of estimated relative exploitation rate (catch/age 5 and older biomass, lower panel) for the base case model (round points) and alternate states of nature (light lines). Values of relative exploitation rate in excess of horizontal line are above the rate corresponding to the overfishing proxy from the base case.

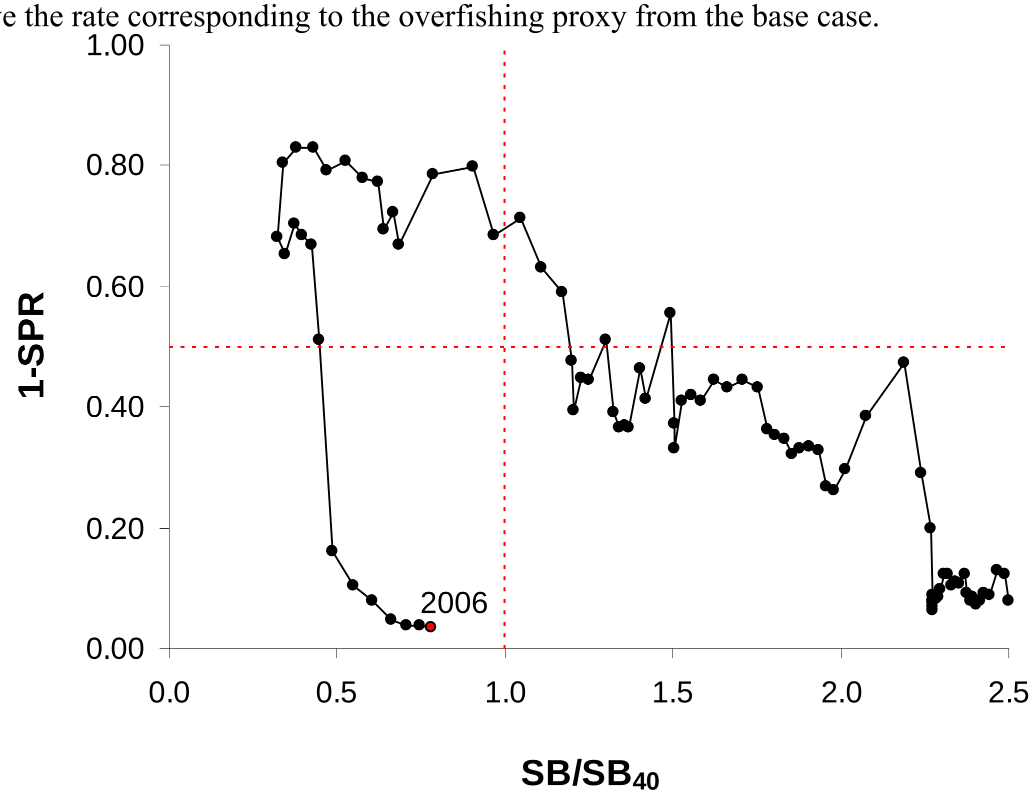

Figure g. Estimated spawning potential ratio relative to the proxy target of 50% vs. estimated spawning biomass relative to the proxy 40% level from the base case model. Higher biomass occurs on the right side of the x-axis, higher exploitation rates occur on the upper side of the y-axis.

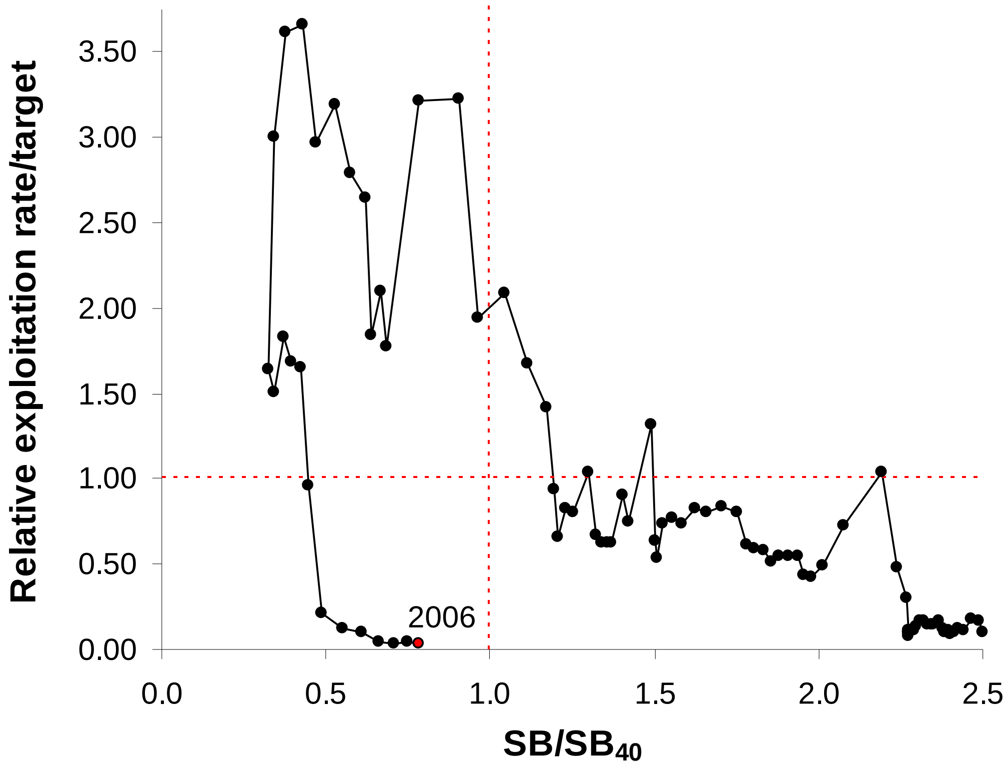

Figure g. Phase plot of estimated fishing intensity vs. relative spawning biomass for the base case model. Fishing intensity is the relative exploitation rate divided by the level corresponding to the overfishing proxy (0.040). Relative spawning biomass is annual spawner abundance divided by the 40% rebuilding target.

Management performance

Following the 1999 declaration that the canary rockfish stock was overfished the canary OY was reduced by over 70% in 2000 and by the same margin again over the next three years. Managers employed several tools in an effort to constrain catches to these dramatically lower targets. These included: reductions in trip/bag limits for canary and co-occuring species, the institution of spatial closures, and new gear restrictions intended to reduce trawling in rocky shelf habitats and the coincident catch of rockfish in shelf flatfish trawls. In recent years, the total mortality has been near the OY, but well below the ABC. Since the overfished determination in 1999, the total 7-year catch (644 mt) has been only 13% above the sum of the OYs for 2000-2006. This level of removals represents only 35% of the sum of the ABCs for that period. The total 2006 catch (47 mt) is <1% of the peak catch that occurred in the early 1980s.

Table e. Recent trend in estimated total canary rockfish catch and commercial landings (mt) relative to management guidelines.

Year	ABC (mt)	OY (mt)	Commercial landings (mt)[1]	Total Catch (mt)
1997	1,220[2]	1,000[2]	1,113.8	1,478.8
1998	1,045[2]	1,045[2]	1,182.4	1,494.2
1999	1,045[2]	857[2]	665.7	898.0
2000	287	200	60.6	208.4
2001	228	93	42.8	133.6
2002	228	93	48.6	106.8
2003	272	44	8.5	51.0
2004	256	47.3	10.7	46.5
2005	270	46.8	10.9	51.4
2006	279	47	8.2	47.1

[1]Excludes all at-sea whiting, recreational and research catches.
[2]Includes the Columbia and Vancouver INPFC areas only.

Unresolved problems and major uncertainties

Parameter uncertainty is explicitly captured in the asymptotic confidence intervals reported throughout this assessment for key parameters and management quantities. These intervals reflect the uncertainty in the model fit to the data sources included in the assessment, but do not include uncertainty associated with alternative model configurations, weighting of data sources (a combination of input sample sizes and relative weighting of likelihood components), or fixed parameters. Specifically, there appears to be conflicting information between the length- and age-frequency data regarding the degree of stock decline, making the model results sensitive to the relative weighting of each. This issue is explored in the assessment, but cannot be fully resolved at this time. The relationship between the degree of dome in the selectivity curves and the increase in female natural mortality with age remains a source of uncertainty that is included in model results, as it has been in previous assessments for canary rockfish. Uncertainty in the steepness parameter of the stock-recruitment relationship is significant and will likely persist in future assessments; this uncertainty is included in the assessment and rebuilding projections through explicit consideration of the three states of nature.

Forecasts

The forecast reported here will be replaced by the rebuilding analysis to be completed in September-October 2007 following SSC review of the stock assessment. In the interim, the total catch in 2007 and 2008 is set equal to the OY (44 mt). The exploitation rate for 2009 and beyond is based upon an SPR of 88.7%, which approximates the harvest level in the current rebuilding plan. Uncertainty in the rebuilding forecast will be based upon the three states of nature for steepness and random variability in future recruitment deviations for each rebuilding simulation. Current medium-term forecasts predict slow increases in abundance and available catch, with OY values for 2009 and 2010 increasing by nearly four times the value of 44 mt from the 2005 assessment. This is largely attributable to the revised perception of steepness, based on meta-analysis of other rockfish species. The following table shows the projection of expected canary rockfish catch, spawning biomass and depletion.

Table f. Projection of potential canary rockfish ABC, OY, spawning biomass and depletion for the base case model based on the SPR= 0.887 fishing mortality target used for the last rebuilding plan (OY) and $F_{50\%}$ overfishing limit/target (ABC). Assuming the OY of 44 mt is met in 2007 and 2008.

Year	ABC (mt)	OY (mt)	Age 5+ biomass (mt)	Spawning biomass (mt)	Depletion
2007	973	44	25,995	10,544	32.4%
2008	978	44	26,417	10,840	33.3%
2009	981	162	26,859	11,072	34.0%
2010	980	162	26,995	11,194	34.4%
2011	992	164	27,018	11,254	34.6%
2012	1,026	169	27,440	11,266	34.6%
2013	1,074	177	27,985	11,260	34.6%
2014	1,124	185	28,656	11,280	34.6%
2015	1,171	193	29,445	11,368	34.9%
2016	1,214	200	30,332	11,545	35.5%
2017	1,253	207	31,297	11,812	36.3%
2018	1,290	213	32,317	12,156	37.3%

Decision table

Because canary rockfish is currently managed under a rebuilding plan, this decision table is only intended to better compare and contrast the base case with uncertainty among states of nature. The results of the rebuilding plan will integrate these three states of nature as well as projected recruitment variability. Further, various alternate probabilities of rebuilding by target and limit time-periods as well as fishing mortality rates will be evaluated in the rebuilding analysis. Relative probabilities of each state of nature are based on a meta-analysis for steepness of west coast rockfish (M. Dorn, AFSC, personal communication). Landings in 2007-2008 are 44 mt for all cases. Selectivity and fleet allocations are projected at the average 2003-2006 values.

Table g. Decision table of 12-year projections for alternate states of nature (columns) and management options (rows) beginning in 2009. Relative probabilities of each state of nature are based on a meta-analysis for steepness of west coast rockfish (M. Dorn, AFSC, personal communication). Landings in 2007-2008 are 44 mt for all cases. Selectivity and fleet allocations are projected at the average 2003-2006 values.

			State of nature					
			Low steepness (0.35)		Base case (steepness = 0.51)		High steepness (0.72)	
Relative probability			0.25		0.5		0.25	
Management decision	Year	Catch (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)
Rebuilding SPR 88.7% catches from low steepness state of nature	2009	56	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	56	12.0%	4,100	34.5%	11,236	60.1%	18,932
	2011	56	11.9%	4,078	34.8%	11,339	60.8%	19,156
	2012	59	11.8%	4,042	35.0%	11,396	61.2%	19,270
	2013	62	11.7%	4,003	35.1%	11,436	61.3%	19,313
	2014	65	11.6%	3,979	35.3%	11,502	61.4%	19,343
	2015	67	11.6%	3,984	35.7%	11,638	61.7%	19,423
	2016	70	11.7%	4,025	36.4%	11,866	62.2%	19,590
	2017	72	12.0%	4,102	37.4%	12,188	63.0%	19,852
	2018	74	12.3%	4,209	38.7%	12,591	64.1%	20,199
Rebuilding SPR 88.7% catches from base case	2009	162	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	162	11.8%	4,058	34.4%	11,194	60.0%	18,890
	2011	164	11.7%	3,994	34.6%	11,254	60.5%	19,069
	2012	169	11.4%	3,914	34.6%	11,266	60.8%	19,138
	2013	177	11.2%	3,831	34.6%	11,260	60.7%	19,135
	2014	185	11.0%	3,762	34.6%	11,280	60.7%	19,118
	2015	193	10.9%	3,719	34.9%	11,368	60.8%	19,150
	2016	200	10.8%	3,710	35.5%	11,545	61.2%	19,266
	2017	207	10.9%	3,733	36.3%	11,812	61.8%	19,475
	2018	213	11.0%	3,781	37.3%	12,156	62.8%	19,767
Rebuilding SPR 88.7% catches from high steepness state of nature	2009	273	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	271	11.7%	4,014	34.2%	11,150	59.8%	18,845
	2011	272	11.4%	3,905	34.3%	11,164	60.3%	18,978
	2012	277	11.0%	3,780	34.2%	11,130	60.3%	19,001
	2013	285	10.7%	3,654	34.0%	11,079	60.2%	18,951
	2014	293	10.3%	3,542	34.0%	11,055	60.0%	18,891
	2015	300	10.1%	3,459	34.1%	11,100	59.9%	18,880
	2016	307	9.9%	3,408	34.5%	11,235	60.2%	18,953
	2017	313	9.9%	3,389	35.2%	11,461	60.7%	19,122
	2018	319	9.9%	3,394	36.1%	11,763	61.5%	19,374
Status quo (catch = 44 mt)	2009	44	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	44	12.0%	4,104	34.5%	11,241	60.1%	18,937
	2011	44	11.9%	4,088	34.9%	11,349	60.8%	19,166
	2012	44	11.8%	4,057	35.0%	11,411	61.2%	19,285
	2013	44	11.7%	4,024	35.2%	11,456	61.4%	19,334
	2014	44	11.7%	4,005	35.4%	11,529	61.5%	19,371
	2015	44	11.7%	4,018	35.8%	11,673	61.8%	19,459
	2016	44	11.9%	4,069	36.6%	11,911	62.3%	19,635
	2017	44	12.1%	4,157	37.6%	12,244	63.2%	19,908
	2018	44	12.5%	4,277	38.9%	12,660	64.3%	20,268

Research and data needs

Progress on a number of research topics would substantially improve the ability of this assessment to reliably and precisely model canary rockfish population dynamics in the future and provide better monitoring of progress toward rebuilding:

1. Expanded Assessment Region: Given the high occurrence of canary rockfish close to the US-Canada border, a joint US-Canada assessment should be considered in the future.
2. Many assessments are deriving historical catch by applying various ratios to the total rockfish catch prior to the period when most species were delineated. A comprehensive historical catch reconstruction for all rockfish species is needed, to compile a best estimated catch series that accounts for all the catch and makes sense for the entire group.
3. Habitat relationships: The historical and current relationship between canary rockfish distribution and habitat features should be investigated to provide more precise estimates of abundance from the surveys, and to guide survey augmentations that could better track rebuilding through targeted application of newly developed survey technologies. Such studies could also assist determining the possibility of dome-shaped selectivity, aid in evaluation of spatial structure and the use of fleets to capture geographically-based patterns in stock characteristics.
4. Meta-population model: The spatial patterns show patchiness in the occurrence of large vs. small canary; reduced occurrence of large/old canary south of San Francisco; and concentrations of canary rockfish near the US-Canada border. The feasibility of a meta-population model that has linked regional sub-populations should be explored as a more accurate characterization of the coast-wide population's structure. Tagging of other direct information on adult movement will be essential to this effort.
5. Increased computational power and/or efficiency is required to move toward fully Bayesian approaches that may better integrate over both parameter and model uncertainty.
6. Additional exploration of surface ages from the late 1970s and inclusion into or comparison with the assessment model, or re-aging of the otoliths could improve the information regarding that time period when the stock underwent the most dramatic decline. Auxiliary biological data collected by ODFW from recreational catches and hook-and-line projects may also increase the performance of the assessment model in accurately estimating recent trends and stock size.
7. Due to inconsistencies between studies and scarcity of appropriate data, new data is needed on both the maturity and fecundity relationships for canary rockfish.
8. Re-evaluation of the pre-recruit index as a predictor of recent year class strength should be ongoing as future assessments generate a longer series of well-estimated recent recruitments to compare with the coast-wide survey index.
9. Meta-analysis or other summary of the degree of recruitment variability and the relative steepness for other rockfish and groundfish stocks should be ongoing, as this information is likely to be very important for model results (as it is here) in the foreseeable future.

Rebuilding projections

The rebuilding projections will be presented in a separate document after the assessment has been reviewed in September 2007.

Table h. Summary of recent trends in estimated canary rockfish exploitation and stock levels from the base case model; all values reported at the beginning of the year.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Commercial landings (mt)[1]	1,182.4	665.7	60.6	42.8	48.6	8.5	10.7	10.9	8.2	NA
Total catch (mt)	1,494.2	898.0	208.4	133.6	106.8	51.0	46.5	51.4	47.1	NA
ABC (mt)	1,045[2]	1,045[2]	287	228	228	272	256	270	279	172
OY	1,045[2]	857[2]	200	93	93	44	47.3	46.8	47.0	44
SPR	33.2%	48.9%	84.0%	89.7%	92.2%	95.4%	96.3%	96.3%	96.5%	NA
Exploitation rate										
(catch/age 5+ biomass)	0.0873	0.0506	0.0112	0.0067	0.0050	0.0023	0.0020	0.0021	0.0019	NA
Age 5+ biomass (mt)	17,125	17,733	18,659	20,078	21,275	22,333	23,583	24,402	25,317	25,995
Spawning biomass (mt)	5,499	5,826	6,364	7,149	7,910	8,603	9,226	9,749	10,183	10,544
~95% Confidence interval	4,177-	4,296-	4,618-	5,190-	5,750-	6,264-	6,736-	7,140-	7,482-	7,776-
	6,820	7,357	8,111	9,109	10,070	10,942	11,715	12,359	12,884	13,312
Range of states of nature	2,761-	2,610-	2,644-	2,918-	3,184-	3,417-	3,628-	3,795-	3,918-	4,009-
	8,241	9,073	10,144	11,477	12,779	13,985	15,076	16,019	16,825	17,519
Recruitment (1000s)	1,391	2,449	1,099	2,061	1,432	955	1,565	1,182	1,144	2,807
~95% Confidence interval	841-	1,606-	638-	1,359-	905-	547-	854-	627-	548-	1,078-
	2,299	3,735	1,893	3,124	2,267	1,667	2,869	2,231	2,389	7,313
Range of states of nature	484-	841-	351-	643-	447-	302-	520-	390-	367-	991-
	2,453	4,318	1,938	3,613	2,383	1,515	2,373	1,771	1,699	3,745
Depletion	16.9%	17.9%	19.5%	22.0%	24.3%	26.4%	28.3%	29.9%	31.3%	32.4%
~95% Confidence interval	NA	NA	NA	NA	NA	NA	NA	NA	23.1-9.4	24.1-40.7
Range of states of nature	8.1-26.2	7.6-28.8	7.7-32.2	8.5-36.4	9.3-40.6	10.0-44.4	10.6-47.9	11.1-50.9	11.4-53.4	11.7-55.6

[1]Excludes all at-sea whiting, recreational and research catches.

[2]Includes the Columbia and Vancouver INPFC areas only.

Table i. Summary of canary rockfish reference points from the base case model. Values are based on 1994-1998 fishery selectivity and allocation to better approximate the performance of a targeted fishery rather than a bycatch-only scenario.

Quantity	Estimate	~95% Confidence interval	Range of states of nature
Unfished spawning stock biomass (SB_0, mt)	32,561	30,594-34,528	34,262-31,498
Unfished 5+ biomass (mt)	86,036	NA	91,980-82,744
Unfished recruitment (R_0, thousands)	4,210	3,961-4,458	4,540-4,035
Reference points based on $SB_{40\%}$			
MSY Proxy Spawning Stock Biomass ($SB_{40\%}$)	13,024	12,237-13,811	12,599-13704.7
SPR resulting in $SB_{40\%}$ ($SPR_{SB40\%}$)	54.4%	54.4-54.4	45.8-68.5
Exploitation rate resulting in $SB_{40\%}$	0.0457	NA	0.0277-0.0600
Yield with $SPR_{SB40\%}$ at $SB_{40\%}$ (mt)	1,574	1,477-1,672	996-2,034
Reference points based on SPR proxy for MSY			
Spawning Stock Biomass at SPR (SB_{SPR})(mt)	11,161	10,487-11,835	1,654-14,053
$SPR_{MSY\text{-}proxy}$	50.0%	NA	NA
Exploitation rate corresponding to SPR	0.0528	NA	0.0524-0.0539
Yield with $SPR_{MSY\text{-}proxy}$ at SB_{SPR} (mt)	1,572	1,476-1,668	238-1,962
Reference points based on estimated MSY values			
Spawning Stock Biomass at *MSY* (SB_{MSY}) (mt)	12,211	11,529-12,893	9,524-15,042
SPR_{MSY}	52.5%	52.1-52.8	37.0-70.5
Exploitation Rate corresponding to SPR_{MSY}	0.0487	NA	0.0254-0.0794
MSY (mt)	1,578	1,481-1,675	1,002-2,104

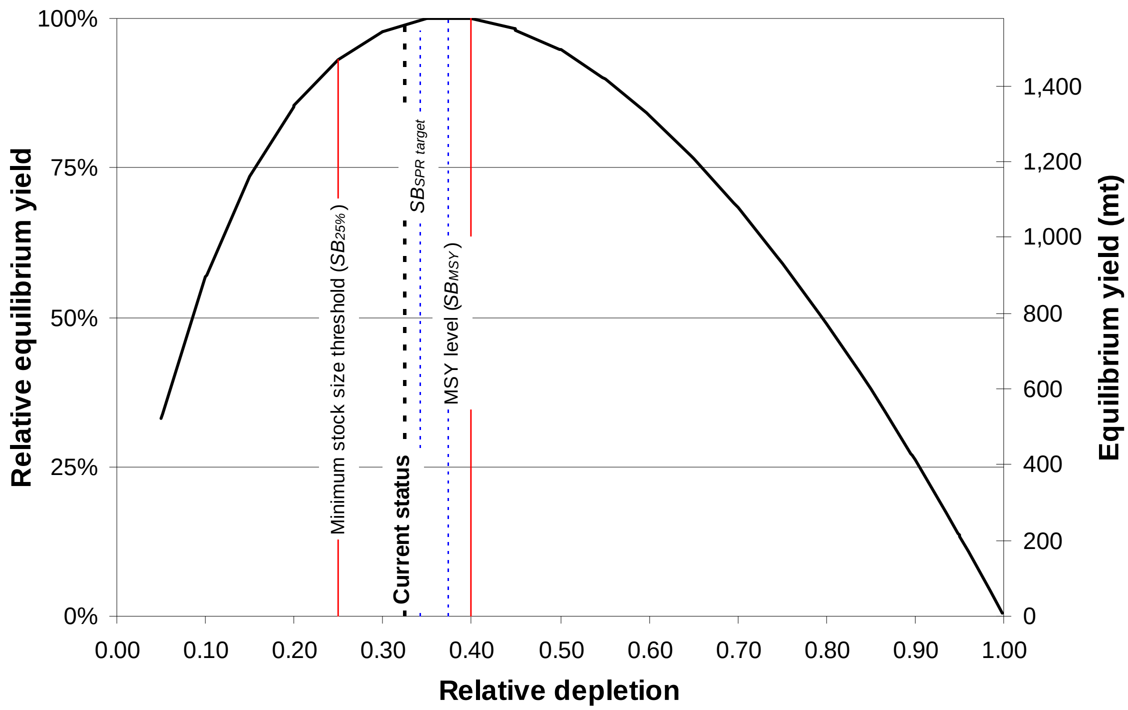

Figure h. Equilibrium yield curve (derived from reference point values reported in table i) for the base case model. Values are based on 1994-1998 fishery selectivity and allocation to better approximate the performance of a targeted fishery rather than a bycatch-only scenario.

1. Introduction

1.1 Distribution and Stock Structure

Canary rockfish (*Sebastes pinniger*) are distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California; however, the species is most abundant from British Columbia to central California (Miller and Lea 1972, Hart 1973, Love et al. 2002). Adults are primarily found along the continental shelf shallower than 300 m, although they are occasionally observed in deeper waters. Juvenile canary rockfish are found in shallow and intertidal areas (Love et al. 2002).

There exists little direct information regarding the likely stock structure of canary rockfish off the U.S. Pacific coast. Limited tagging research conducted off Oregon found that of 10 canary rockfish recovered, 4 moved over 25 km, and 3 moved more than 100 km (DeMott 1983). A single canary from that study moved 326 km to the south, and those that moved the farthest also moved to much greater depths than the shallow reefs at which they had been tagged. Early genetic research found patterns suggestive of some population structuring between the northern California/southern Oregon and northern Oregon/southern Washington, but this work was based on limited sampling and also found evidence of reduced gene flow between shallow and deeper areas (Wishard et al. 1980). There is ongoing research on the population genetics of canary rockfish, which may be more tractable with modern methods such as microsatellites (Gomez-Uchida et al. 2003), however there is currently no published research indicating separate stocks of canary rockfish within U.S. waters.

There are few biogeographic boundaries clearly applicable to rockfish on the U.S. and Canadian west coasts. South of Point Conception, a much different and more diverse mix of rockfish species occurs than farther to the north (Love et al. 2002). However, canary rockfish are not found in large numbers south of Point Conception. The divergence zone at the northern edge of Vancouver Island likely creates a barrier for pelagic dispersal and productivity for many species (Ware and McFarlane 1989); therefore it is the southern portion of the B.C. canary resource is most likely to have dynamics linked to the U.S. resource. It is likely that canary rockfish cross the U.S. Canadian border as pelagic larvae, juveniles, and possibly adults making their ontogenetic shift to deeper water or moving between areas of rocky habitat.

The 2002 assessment integrated what had previously been separate north-south assessments based on the observations of highest density occurring near headlands and International North Pacific Fisheries Commission (INPFC) boundaries commonly used to delineate management and assessment areas (Methot and Piner 2002). They reasoned that splitting stocks or assessments at any INPFC boundaries would divide high-density areas that most likely are biologically linked. This logic was followed in the 2005 assessment, separating fishing fleets geographically (Figure 1) to account for potential spatial patterns while retaining a coast-wide assessment area (Methot and Stewart 2005). All U.S. assessments have used the U.S.-Canadian border as the northern boundary for the stock, although the basis for this choice appears to be largely based on consistency with current management needs.

Given the lack of clear information regarding the status of distinct biological populations, this assessment treats the U.S. canary rockfish resource from the Mexican border to the Canadian border as a single coast-wide stock.

1.2 Life history and ecosystem interactions

Canary rockfish spawn in the winter, producing pelagic larvae and juveniles that remain in the upper water column for 3-4 months (Love et al. 2002). These juveniles settle in shallow water around nearshore rocky reefs, where they may congregate for up to three years (Boehlert 1980, Sampson 1996) before moving into deeper water. The mean size of individuals captured in the trawl survey shows a characteristic ontogenetic shift to deeper water with increasing body size (Figure 2). The degree to which this ontogenetic shift may be accompanied by a component of latitudinal dispersal from shallow rocky reefs is unknown.

Adult canary rockfish primarily inhabit areas in and around rocky habitat. They form very dense schools, leading to an extremely patchy population distribution that is reflected in both fishery and survey encounter rates (see discussion of data below). This distribution may have effects on the calculation and interpretation of population indices and age- or size-composition data.

Canary rockfish are reported to have a diverse diet. Pelagic juveniles consume copepods, amphipods and krill; adults consume krill and many species of small fish (Love et al. 2002). The degree to which variability in food supply may affect body condition, spawning success or annual growth is unknown. Canary rockfish are a medium to large-bodied rockfish; achieving a maximum size of around 70 cm. Female canary rockfish reach slightly larger sizes than males.

Canary rockfish are relatively long-lived, with a maximum observed age of 95 years, however only males are commonly observed above the age of 50, while females tend to be rare above age 30. The degree to which this pattern reflects behavioral differences translating to reduced availability to fishery and survey fishing gear, or an increase in relative mortality for older females has been the focus of much discussion and remains unclear. A similar pattern has been observed for yellowtail rockfish (*Sebastes flavidus*), a closely related, but more pelagic species with a similar distribution (Wallace and Lai 2005).

Although ecosystem factors have not been explicitly modeled in this assessment, there are several important aspects of the recent California current ecosystem that appear to warrant consideration. Lingcod, a potentially important predator of small canary have rebuilt over the last decade from an overfished level to over 50% of the estimated unexploited equilibrium spawning biomass (Jagielo and Wallace 2005). To the extent that the component of natural mortality of canary rockfish added by predation from lingcod and other predators has been increasing over recent years, recruitment may be underestimated. This effect could also lead to longer than predicted rebuilding times for canary rockfish. The effects of the Pacific Decadal Oscillation (PDO) on California current temperature and productivity (Mantua et al. 1997) may also contribute to non-stationary dynamics for canary rockfish. The prevalence of a strong 1999 year-class for many west coast groundfish species suggest that environmentally driven recruitment variation may be correlated among species with relatively diverse life-history strategies. Much research is currently underway to explore these phenomena, and it appears likely that more explicit exploration of ecosystem processes and influences may be possible in future canary rockfish stock assessments.

1.3 Historical and Current Fishery

The rockfish fishery off the U.S. Pacific coast developed first off California late in the 19th century and was catching an average of almost 2,500 metric tons per year over the period 1916-1940 (Bureau of Commercial Fisheries 1949). To the north, the rockfish fishery developed slowly and became established during the early 1940s, when the United States became involved in World War II and wartime shortages of red meat created an increased demand for other sources of protein (Harry and Morgan 1961, Alverson et al. 1964). Rockfish catches dropped somewhat following the war, and were generally stable from the 1950s to the 1960s.

Historically, the vast majority of canary rockfish off the U.S. Pacific coast have been harvested by commercial trawling vessels, followed by hook-and-line (primarily vertical longline), shrimp trawls, and various miscellaneous gears (e.g., nets and pots). In 1977, when the Magnuson Fishery Conservation and Management Act (MFCMA) was enacted, the large foreign-dominated rockfish fishery that had developed since the late 1960s was replaced by a domestic fishery that continues today. Canary rockfish were also sought by recreational anglers and considered to be a moderately important species caught in the private vessel and charter boat fisheries off Washington, Oregon, and northern California.

A full description of the historical catch reconstruction for canary rockfish is provided under "2.3.1 Historical fishery reconstruction". Reconstructed historical catches from 1916 to 2006 ranged from 46.5 mt in 2004 to 5,544 in 1982 and totaled almost 150,000 mt over the time-series (Figure 3). Canary rockfish have been caught primarily by the trawl fleets, on average comprising ~85% of the annual catches, with the Oregon fleet removing a peak of 3,941 mt in 1982. Historically just 10% of the catches have come from non-trawl commercial fisheries, although this proportion reached 24% and 358 mt in 1997. Recreational removals have averaged just 6% of the total catch, historically, but have become relatively more important as commercial landings have been substantially reduced in recent years, recreational catches reached 59% of the total with 30 mt caught in 2003. Total catches after 1999 have been reduced by an order of magnitude in an attempt to rebuild a stock determined to be overfished on the basis of the 1999 assessment (Figure 4). Recent fishery removals (landings and discards) have been distributed very heterogeneously across the coast relative to total trawl effort, with a very few locations producing most of the canary catch (Figure 5).

1.4 Management History and performance

The first regulations established on the canary rockfish fishery off the U.S. Pacific coast were implemented in 1983 as trip limits (40,000 lb per trip) on the Sebastes complex (a market category that includes mixed-rockfish species) harvested from the U.S. Vancouver and Columbia INPFC areas (PMFC, 2002). Commercial vessels were not required to separate most rockfish catches into individual species, but rather, only into mixed-species categories, such as the Sebastes complex. Port biologists in each state routinely sample particular market categories (e.g., Sebastes complex) to determine the actual species composition of these mixed-species categories. Since 1967, various port sampling programs have been utilized by state and federal marine fishery agencies to determine the species compositions of the commercial groundfish landings off the U.S. Pacific coast (Sampson and Crone 1997). Stratified, multistage sampling designs are currently used in the port sampling programs for purposes of evaluating the species compositions of the total landings, as well as for obtaining biological data on individual species (Crone 1995, Sampson and Crone 1997).

From 1983 through 1994, canary rockfish were monitored as part of the Sebastes complex, with various trip limits imposed over this 10-yr span. In 1993 and 1994, commercial fishermen communicated that fewer canary rockfish were being caught in their rockfish tows (PMFC, 2002). The 1994 canary rockfish stock assessment (Sampson and Stewart 1994) confirmed that the observed declines in the field were likely the result of a population that had not responded favorably to recent levels of fishing pressure and further recommended that the canary rockfish quota (Acceptable Biological Catch or ABC) be reduced to allow the stock to recover. Beginning in 1995, the ABC for canary rockfish was reduced nearly 60%, to 1,250 mt. In 1995, trip limits specific to canary rockfish (cumulative monthly trip limit of 6,000 lb) were imposed and commercial vessels were expected to sort the canary rockfish from the mixed-species categories, such as the Sebastes complex. For 1998, catches of canary rockfish were regulated using a two-month cumulative trip limit of 40,000 lb for the Sebastes complex, of which, no more than 15,000 lb (38%) could be composed of canary rockfish, i.e., although this species was allocated its own market category, it is still being managed as part of the mixed-species complex. The ABC was further reduced to 1,045 mt.

The two stock assessments conducted in 1999 (California and Washington-Oregon) found the stock to be depleted and an overfished determination was made for 2000. Subsequently, commercial and recreational fishing opportunities were severely restricted and recent removals have been primarily from bycatch. Canary rockfish have become a limiting species for fisheries that target other commercially important species on the continental shelf. The OY in 2003 was 44 mt; only about 1% of the peak annual catches of the early 1980s. Management regulations were sufficiently strict to keep the catch that year to only 51 mt. Canary rockfish remains one of the most intensively followed species by regulatory agencies, NGO's (conservation groups) and industry. Table xx summarizes the coast-wide ABC's and catch in recent years.

Beginning in 2000, shelf rockfish species (including canary) could no longer be retained by vessels using bottom trawl footropes with a diameter of greater than 8 inches. The use of small footrope gear increases the risk of gear loss in rocky areas. This restriction was intended to provide an incentive for fishers to avoid high-relief, rocky habitat, thus reducing the exposure of many depleted species to trawling. This incentive was reinforced through reductions in landing limits for most shelf rockfish species.

During 2002 the "Rockfish Conservation Area" (RCA) was implemented to reduce bycatch of overfished rockfish species such as canary in the northern portion of the coast and bocaccio rockfish in the south. The RCA has since been used as a management tool in each year, prohibiting most commercial fishing on the continental shelf. Specific boundaries for the RCA have varied between bimonthly periods in response to changing discard rates and fishery dynamics. In 2003, the shoreward boundary of the RCA ranged from the shoreline to 100 fm (183 m), and the seaward boundary from 200 to 250 fm (366-457 m). Small-footrope gear was required shoreward of the RCA when these areas were open, and retention of canary rockfish was limited to 100 to 300 lbs per month for the limited entry trawl fisheries north and south of 40º10’. Retention of canary rockfish was prohibited in the limited entry fixed gear fishery. In 2004, the shoreward boundary of the RCA ranged from the shoreline to 75 fm (137 m) and the seaward boundary from 150 to 250 fm (274-457 m). This dynamic pattern of the closed area extending from the shoreline (or 75 fm) out to 150 fm (274 m), 200 fm (366 m) or 250 fm (457 m) has continued through 2007. Deeper depths are generally closed in the winter months and there are a number of latitudinal differences in the extent of the current RCA, however the large majority of depths deeper than 75 fm (137 m) where canary rockfish occur are now closed to all commercial on-bottom fishing for groundfish. It is possible that by closing most of the depth range of the species the RCA has influenced the size range of canary rockfish available to the fishery. Smaller canary rockfish are available to the fishery when the shoreward boundary is set at 137 m, while some of the larger fish may occur in the closed area.

Bimonthly trip limits have remained very small in recent years. Beginning in 2005, the modified “flatfish” trawl gear has been required shoreward of the RCA. This gear was found to reduce the catch-per-unit-effort of canary rockfish relative to standard commercial gear in pilot experiments (King et al. 2004).

Recreational limits have also been substantially reduced over recent years. After first reducing bag limits, since 2003 all three states have allowed no retention of canary rockfish during recreational fishing. Mortality associated with this fishery is now comprised of discard mortality from fish that are caught while targeting other species such as Pacific halibut (*Hippoglossus stenolepis*) or other rockfish.

Beginning in 2000, when the stock was first managed as an overfished species management harvest guidelines were dramatically reduced (Table 1). Since that time, the fishery has been far below ABC levels (< 300 mt). Although commercial landings have been well below OY values, total catch has exceeded the OY in most recent years (Table 1, Figure 4). The cumulative ABC from 2000-2006 has been 1,820 mt, with the associated OYs summing to less than one-third of that value, at 571 mt. Cumulative commercial landings have been just 190 mt, however the best estimate of total catch, based on discard estimates and other sources of mortality has been 645 mt.

1.5 Fisheries in Canada and Alaska

Canary rockfish in Canadian waters appear to have similar life-history characteristics (Stanley et al. 2005). Longevity appears consistent with our coast, with a maximum observed age of 84 years, although they may mature somewhat later, around 13 years old. The rapid disappearance of females older than age 20-25 is clearly observed in the Canadian samples summarized in 2005 (Stanley et al. 2005; p.15).

The canary rockfish resource in Canadian waters is estimated to be stable in each of three areas: the coast of Vancouver Island, central Queen Charlotte Sound and the north coast (Stanley et al. 2005). Removals by the trawl fishery have been relatively stable since 1996 (Figure 6) at just under 500 mt for the Vancouver Island area, but were around twice that level over the preceding decade. Indices of abundance for the west coast of Vancouver Island indicate a decline of 29-77% (shrimp survey) and 92-95% (U.S. triennial trawl survey extending into Canadian waters in a few years) of values observed in the mid-1970s (Stanley et al. 2005), indicating a trend similar to that observed in the U.S. over this time period.

It is difficult to conclude what the current status of canary rockfish is off Alaska. In the federal waters off the Gulf of Alaska, canary rockfish are assessed and managed as a minor part of an assemblage including seven species of demersal shelf rockfishes (DSR; O'Connell et al. 2005, O'Connell and Carlile 2006). The primary component of this 'non-commercial' group is yelloweye rockfish (*Sebastes ruberrimus*), although quillback (*Sebastes maliger*), copper (*Sebastes caurinus*), china (*Sebastes nebulosus*), tiger (*Sebastes nigrocinctus*) and rosethorn (*Sebastes helvomaculatus*) are also included. The primary biomass estimate of yelloweye rockfish is based on submersible observations. The exploitable biomass of yelloweye was estimated to have increased 5% from 2005 to 19,558 mt in 2006. Recent removals indicated that overfishing is not occurring. The ABC for yelloweye was inflated by 4.2% in 2006 to account for the other species in the assemblage based on the relative species distribution of the catch. Canary rockfish have comprised around 1% of the DSR catch over the period 2001-2005, accounting for < 4 mt each year. No direct indices of canary abundance in the Gulf of Alaska have been reported.

2. Assessment

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

1) Fishery independent data including bottom trawl survey-based indices of abundance and biological data (age and length) from 2003-2006 (NWFSC survey) and 1980-2004 (Triennial survey)
2) Pre-recruit survey index of recruitment strength from 2001-2006
3) Estimates of fecundity, maturity, length-weight relationships and ageing error from various sources
4) Commercial (targeted and bycatch) and recreational landings from 1916-2006
5) Estimates of discard rates, total mortality and discard mortality (recreational only) from various sources
6) Research catches from 1977-2006
7) Fishery biological data (age and length) from 1968-2006

Data availability by source and year, as well as a delineation between data available for the 2005 assessment and what is new in this analysis, is presented in Table 2. A description of each of the specific data sources is presented below.

2.1 Fishery Independent Data

2.1.1 NWFSC trawl survey

Since the completion of the 2005 canary rockfish stock assessment, a large quantity of data from a new fishery independent source, the NWFSC shelf and slope trawl survey, has become available. Three sources of information are produced by this survey: an index of relative abundance, length-frequency distributions, and age-frequency distributions. Since canary rockfish are only found on the continental shelf, only those years in which the NWFSC survey included the shelf depths are considered here (2003-2006).

The NWFSC survey is based on a random-grid design; covering the coastal waters from a depth of 55 m to 700 fm (technical memoranda describing the specific methods used in this survey are currently in review). This design uses four vessels per year, assigned to a roughly equal number of randomly selected grid cells divided into two 'passes' of the coast 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 encounters canary infrequently, generally in less than 10% of the total tows conducted (Table 3, including slope tows, beyond the depth distribution for canary). However, when canary aggregations are encountered catches can be as large as 4.9 mt in a single 12-15 minute tow; this equates to an average density of approximately 1 kg $\cdot 2.5\ m^{-2}$. During the period 2003-2006, there have been only 5 tows that captured more than 200 kg of canary rockfish, 2004: 924 kg, 2005: 907 kg, 2006: 4,942, 1,250 and 653 kg. These large tows and many of the smaller ones are located primarily off the northern Washington coast near the Canadian border, or off northern California (Figure 7). The presence of infrequent very large tows creates a strongly right-skewed distribution of catch rates, still visible after log-transformation (Figure 8). These very large catches do not appear to be dominated by either very large individuals or very small individuals (Figure 9), indicating that these areas represent neither recruitment 'hot-spots', nor unexploited 'pockets' of very old canary rockfish.

Two indices of abundance are available from this time series: a design-based estimator relying on the mean catch-per-unit-effort in each of several strata, and an index based on a Generalized Linear Mixed Model (GLMM) approach which was endorsed by the trawl survey workshop for use in west coast stock assessments. These two methods are based on fundamentally different approaches to the data. In the GLMM approach, vessel-specific differences in catchability (due to engine power, trawling experience of the skipper, etc.) are explicitly captured via inclusion of random effects. In contrast, the design-based estimator relies on the balance of the design (which may be difficult to assess, given that this balance must occur through random allocation of cells in quality habitat for the species of interest). Further, due to the presence of a large number of tows capturing none of a given species and a few tows showing very high catch rates, the design-based estimator may be very sensitive to one or a small number of very large tows. 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 much more robust to a few large tows and likely more reflective of actual trends in population abundance, especially for patchily-distributed or infrequently encountered species like canary rockfish.

The biomass index based on either method shows similar trends of relatively flat biomass over the period 2003-2005 and an increase in 2006 (Table 4, Figure 10). The increase in the design-based estimator, largely a function of the 3 large tows in 2006 is clearly biologically implausible, and the associated variance renders this point quite uninformative in an assessment model context. In contrast, the 2006 value for the GLMM based estimator, while still heavily leveraged by the single very large tow in 2006 (Figure 11), is at least on the same order of magnitude as the rest of the time-series, although the variance remains large.

Survey catches of smaller canary (< 40 cm, the length at 50% maturity) show a spatial pattern that differs from total catch rates. Small canary are encountered across the coast, with no very large catch rates, but many smaller ones, especially in Central and southern California (Figure 12). This pattern differs substantially from catches observed in the triennial survey (see section below) even in 2004 (Figure 13), when both surveys were conducted nearly simultaneously. This is perhaps related to differences in survey design; the NWFSC design being randomized, while the triennial survey included limited searches from fixed transect lines (Figure 14); however this link is speculative at best. However, the NWFSC survey has expended slightly greater relative effort in shallow water where small canary might be more common than the triennial survey (Figure 15).

Twenty-eight bins from 12 to 66 cm were used to summarize the length frequency of the survey catches in each year, the first bin including all observations less than 12 cm and the last bin including all fish larger than 66 cm. These bins are populated with a modest, but consistent degree of sampling: 32-56 tows and 423-623 fish per year (Table 5). Broadly, the length frequency distributions for the NWFSC survey from 2003-2006 show a range of sizes captured from a few 12-14 cm individuals out to some 64 cm females (Figure 17). No clear cohorts, nor any obvious trend, are visible in the length data; however the size distributions for both males and females in 2006 showed very few small canary rockfish.

Age-frequency data from the NWFSC survey was compiled as conditional age-at-length distributions by sex and year. Individual length- and age-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, instead 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 to using conditional age-composition observations is that in addition to being able to estimate the basic growth parameters (L_{age-1}, L_{age-20}, K) inside the assessment model, the distribution of lengths at a given age, usually governed by two parameters -- the CV of length at some young age and the CV at a much older age -- are also quite reliably estimated. This information could only be derived from marginal age-composition observations where very strong and well-separated cohorts existed, that were quite accurately aged and measured; rare conditions at best. 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 for the NWFSC trawl survey age data.

Age distributions included 35 bins from age 1 to age 35, with the last bin including all fish of greater age. Approximately half as many fish were sampled for age as for length, but these fish were collected from a similar number of tows (Table 5). These distributions show a tight range of ages at a given length, and clearly show the growth trajectory of females reaching larger sizes than males for a given age (Figure 18). It is often useful for interpretation to compute the marginal age-compositions, and include these in the assessment model (with the likelihood contribution turned off, so they do not affect model fit in any way) for comparison of the ‘implied’ fit to the margin of the age-length key. The marginal age compositions allow for easier visual tracking of strong cohorts (although this information is still imparted to the model using conditional age-at-length observations, it is harder to visualize) and offer a view of the data more familiar for those accustomed to diagnosing model fit based on marginal age-composition data. Although these NWFSC age distributions seem to show some diagonal structure, close inspection reveals that it does not track consistently through any of the recent cohorts (Figure 19). This time series is short, and does not encompass the period when substantial reductions in the canary population occurred, and so may be relatively uninformative in the assessment model, except for estimation of growth parameters.

2.1.2 Triennial trawl survey

The largest source of fishery-independent data regarding the abundance of canary rockfish is the triennial shelf trawl survey conducted by NMFS starting in 1977 (Dark and Wilkins 1994). The sampling methods used in the survey over the 21-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. In some parts of the coast this led to a very non-random allocation of stations with regard to the entire shelf area (Figure 14). 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 20). The initial year of the survey in 1977 was based on a sampling design that spanned from 50 to 260 fm (91 to 475 m), i.e., it did not come as far inshore (30 fm) as the subsequent surveys conducted on a triennial basis from 1980 to 2001. The index was constrained in all years to only Monterey-US Vancouver INPFC areas and depths from 55-366m to produce the only consistent time-series available. Surveys that have extended south of Monterey have detected only very small abundances relative to the north, so lack of sampling in this area does not influence the relative index. Because of the large number of 'water hauls' eliminated in 1977, especially in the US Vancouver INPFC area, and because the sampling depths were not the same as the other years, the 1977 survey year was not used in the assessment. A full description of the water haul issue can be found in Zimmerman et al. (2001).

The bottom trawl survey provides information on the spatial distribution of canary rockfish from approximately 34 to 49° North latitude and 55-300+ m bottom depth. The pattern of increasing mean body size with depth is similar to that observed in the NWFSC survey. Catch rates are generally lower than those observed in the NWFSC survey (Figure 8), but the general areas where canary have been found recently are quite consistent (Figure 7). The small fish found shallower than 90m occur patchily along the coast, not spread over wide areas as seen in the NWFSC survey (Figure 12). Small canary rockfish were notably absent from the triennial survey in 2004, when they were observed quite frequently in the NWFSC survey (Figure 13). This is not due to sampling intensity, as the number of tows and fish sampled are similar to those in the NWFSC survey (Table 6).

A relative index of stock biomass was derived from the triennial shelf trawl survey using both the design- and GLMM-based approaches (Table 4, Figure 16). Both methods generally show a decline in the population through the mid 1990s and then a flat or slightly increasing trajectory. For the design-based approach, the catch-per-unit-effort (CPUE) index was created from the swept-area estimates of biomass (Gunderson and Sample 1980) from samples in the 30-200 fm (55-366 m) depth range. The same stratification was used for the GLMM-based estimates, which, although they show a similar trend, are somewhat lower on an absolute scale. This is likely largely due to the difference between the arithmetic mean catch rate for the design-based approach being much larger than the median of the lognormal distribution of catch rates assumed in the GLMM analysis. When plotted on a more appropriate scale, the GLMM-based index appears smoother, and shows a stronger and more consistent increase in abundance since the mid-1990s (Figure 11). This index is slightly lower than the NWFSC, indicating a difference in either catchability, selectivity (also supported by the difference in length distributions in 2004), or both. It is uncertain why the 1980 observation was lower than 1983 when the population was likely declining rapidly under very large removals, but this pattern is present for both index approaches and for other species, as well.

Size distributions (fork length in cm) were calculated following the standard estimation methods used throughout the survey series (Dark and Wilkins 1994). The numbers of fish and number of hauls represented in each year of the survey are presented in Table 6. Length-frequency distributions by sex for canary rockfish sampled in the survey for the years 1983-2004 (lengths were collected over a very limited geographic range in 1980, and have been excluded in past assessments) show a modest decline in mean size between 1983 and 2001 (Figure 21). However, relatively large fish of both sexes were again encountered in 2004.

Conditional age-frequency distributions were calculated using the same approach applied to the NWFSC trawl survey ages. These distributions were based on a very heterogeneous number of fish among years, with 1983 having the largest relative sample size and some years missing entirely (Table 6). The pattern of relatively little variation about the dimorphic growth curve is evident in the conditional plots for males and females (Figure 22, Figure 23) as it was for the NWFSC data. Note that no otoliths were analyzed from the surveys conducted in 1986 or 1998. In 1992 all age samples were taken from north of 46°N and, although the sample size is relatively small, may not be representative of the coast-wide population. When summed to the marginal distributions (again used for interpretation, but not contributing to the total likelihood) little evidence of strong or consistent cohorts is evident in either the female or male age distributions (Figure 24). The abundance of males at ages greater than 20-25 is evident in the triennial survey distributions, although the data are clearly quite noisy. This pattern is observed in all of the canary datasets available and was a topic of much investigation in the 2002 and 2005 assessments. It was generally concluded that this pattern was due to a combination of reduced availability of larger females to survey and fishery gear, as well as increased natural mortality of older females beginning after maturation (approximately 7-8 yrs); however this is a topic for continued exploration.

2.1.3 Pre-recruit survey

A mid-water trawl survey of pre-recruit pelagic juvenile rockfish (*Sebastes* sp.) and Pacific hake (*Merluccius productus*) has been conducted by the Southwest Fisheries Science Center (SWFSC) since 1981. Until 2000, this survey consisted of 1-3 passes over a relatively limited area from 36º-39º North latitude (the “core-area”) off the central California coast (roughly 25% of the U.S. coastline). Beginning in 2001, the PWCC/NWFSC contributed a second vessel, and the geographic extent of this survey was dramatically increased to cover nearly the entire U.S. coastline. The survey spanned 35º-45º from 2001-2003, 33º-47º in 2004, and 33 º-48 º in 2005-2006. In 2006, a workshop was held to evaluate the application of pre-recruit indices as auxiliary information to estimate and predict year class strengths in stock assessments and to better understand how the distribution of specific species and the extent of survey coverage might influence the use of these data (Pre-Recruit Survey Workshop, September 13-15, 2006, SWFSC, Summary Report Prepared by: J. Hastie and S. Ralston).

The pre-recruit catches of canary rockfish over this time series were compared with assessment model estimates of recruitment and the distribution of catch rates in those years with nearly coast-wide coverage (2001-2006) were compared with catch rates within the “core-area”. Smoothed catch rates by latitude show that much of the pre-recruit catch has occurred north of the “core-area” over the period 2001-2006, with 2005 and 2006 showing almost no catch south of 40º (Figure 25). Based on this analysis, the pre-recruit survey workshop recommended not using the longer core-area index for canary and other species with more northerly or southerly distributions, but instead using the shorter coast-wide index (Pre-Recruit Survey Workshop, September 13-15, 2006, SWFSC, Summary Report Prepared by: J. Hastie and S. Ralston).

Subsequent to the pre-recruit workshop, three estimators were developed as relative indices of recruitment strength based on the 2001-2006 pre-recruit catches ("Coastwide Pre-Recruit Indices from SWFSC and PWCC/NWFSC Midwater Trawl Surveys (2001-2006)", S. Ralston, SWFSC, unpublished analysis). All three of these indices showed a very similar trend for canary rockfish among recent years, with 2002 and 2004 being somewhat stronger year classes than 2001, 2003 and 2005-2006 (Figure 26). The ANOVA was the recommended approach, because it accounts for a number of likely factors influencing pre-recruit catches including depth, vessel, and period effects as well as a year x latitude interaction. In contrast to the index values, the sampling variance estimated from each approach differed substantially, with an average CV from the design-based estimator of 0.31, 0.32 from the Delta-GLM approach and 0.05 from the ANOVA-based analysis. The largest of these was used, since it had a comparable value to the CVs of the trawl surveys. This appeared preferable to merely applying a constant CV over the time series since it at least captured some of the inter-annual differences due to sampling variance. The final index used for comparison in this assessment is shown in Figure 27.

2.1.4 Canadian survey data

The NMFS triennial trawl survey extended into Canadian waters in a few years. The trend in biomass for the Canadian area has been used as a relative index of the Canadian resource off Vancouver Island and shows a declining trend similar to that observed in adjacent U.S. waters. A Canadian fishery-independent groundfish bottom trawl survey for the area off Vancouver Island was initiated in 2004, but since no more recent data is available it does not yet constitute an index. A fishery-independent shrimp survey was conducted off Vancouver Island over the period 1975-2005. This index has been quite variable, but has shown a 60-80% decline depending on how it analyzed (Stanley et al. 2005). In total, Canadian surveys for the area most likely to be linked to the U.S. resource, the waters off Vancouver Island, have shown similar declining trends to those observed for U.S. areas.

2.1.5 Other fishery independent data

A cooperative fishery independent hook-and-line survey targeting rockfish in the Southern California Bight has been conducted annually by the NWFSC using chartered sport-fishing vessels since 2004. This survey is based on multi-hook rod and reel gear similar to that used in the recreational fishery. Around 100 representative 'stations' comprised of a patch of rocky bottom or set of GPS coordinates over likely habitat are sampled each year using a fixed number of hooks for a fixed duration at each site. Catch rates, length- and age-frequency distributions as well as individual weights and genetic samples are routinely collected for all species encountered. Although this survey shows promise for use in Vermilion (*Sebastes miniatus*) and bocaccio rockfish stock assessments, few canary have yet been encountered (30 in all years combined). Data from this survey were not included in this assessment; however it may prove worth investigating in the future.

Beginning in 2005, Oregon State researchers performed hook-and-line sampling at 17 locations from Washington to California (personal communication, D. Sampson and S. Heppell, Oregon State University). This project also used chartered sport fishing vessels to sample areas of rocky habitat with known canary rockfish populations using rod-and-reel gear. During 2005 and 2006, 528 canary rockfish were collected; sex, weight, length, age, and maturity information was recorded for each. Many relatively large and old female canary rockfish were observed among the fish captured. Final assignment to sex of all sampled canary is pending histological analysis and, when complete, may be used for comparison with predicted age-and length-compositions in future assessments. The appropriate selectivity curve to apply to these data to make them comparable to model predictions is unknown, and would likely need to be derived within the assessment model.

Another cooperative project was performed by the NWFSC in 2005 to assess the applicability of using echo-integration and underwater video cameras to enumerate widow rockfish (*Sebastes entomelas*). A cable-mounted towed camera sled, and a midwater trawl net with no codend and a video camera mounted in the net were successfully used to observe both widow and canary rockfish. This project was preliminary, but documented that these species could be located and enumerated via these methods and that length-frequency data could be collected as fish were herded through the trawl gear (but not actually captured). No quantitative results are available for canary rockfish and the project has not been extended, due to reductions in funding for cooperative research.

A similar project specifically targeting canary rockfish was undertaken in 2006 by OSU researchers (personal communication, D. Sampson and S. Heppell, Oregon State University). This effort used ‘rock-hopper’ bottom trawl gear to sample very rough bottom habitat with a trawl net that included a camera mounted near an angled grate (instead of a cod-end) at the back of the trawl. The grate was used to move canary out of the trawl and through the field of view at a relatively fixed distance from the trawl-mounted camera. From the recorded video, fish passing through the net could be enumerated, identified to species, and length estimated based on lasers mounted with the camera. A number of trawl sets were made during 2006, and some very dense aggregations of canary rockfish were encountered. Enumeration of the fish encountered is ongoing and results, including density estimates, may be available soon, although not in time for comparison with this stock assessment (personal communication, S. Heppell, OSU). These density estimates may allow insight into the encounter rate of other surveys and commercial fishing operations of large canary aggregations as well as the size and frequency of these aggregations. Further, this type of research could provide valuable data, in the form of an index of abundance, to the canary assessment if it can be conducted in a systematic fashion over broad areas of the coast.

2.2 Biological Data

The following section outlines a number of biological parameters estimated outside the assessment model from a variety of data sources. These values are treated as fixed and therefore uncertainty reported for the stock assessment results does not include any uncertainty associated with these quantities.

2.2.1 Weight-Length

The weight-length relationship is based on the standard power function:

$$W = a\ (L^b)$$

where weight is measured in grams and length in centimeters. The parameters used are those from the 2005 assessment and represent weight-length data pooled from all sources (fishery and survey) and both sexes (Table 7, Figure 28). Canary rockfish were roughly: 0.06 kg at 15 cm, 0.51 kg at 31 cm, 1.19 kg at 41 cm, 2.31 kg 51 cm and 5.29 kg at 67 cm.

2.2.2 Maturity and fecundity

Canary rockfish off the U.S. Pacific coast exhibit a protracted spawning period ranging from September through March, probably peaking in January and February (Love et al. 2002). Like many *Sebastes* species, canary rockfish are ovoviviparous, whereby eggs are internally fertilized within females and hatched eggs are released as live young (Love et al. 2002). Past assessments have explored maturity-at-age and maturity-at-length relationships for female canary rockfish from a variety of data sources. Maturity information is generally sparse, and has not been collected in a systematic fashion across time, and does not always agree between studies. The most consistent maturity schedules have been based on specimens sampled during the months of September through February, which generally represent the spawning months for canary rockfish off Oregon and Washington. Further, to minimize biases likely present in the original sample data, maturity information for ages (and lengths) with extremely low sample sizes (e.g., <10 specimens) have been omitted from the maturity-related analysis and occasional old (and large) fish (e.g., >20 years of age and >55 cm in length) that were recorded as immature have been removed from the analysis, given the strong likelihood that the maturity of these animals was misidentified. The maturity schedule for female canary rockfish used in the 2005 assessment model was based on observations from the Oregon and Washington combined trawl fishery and is retained in the current assessment as no new maturity data are yet available. The length at 50% maturity is 40.5 cm, with only 5% mature at 29 cm and 93% by 51 cm (Table 7, Figure 28).

Although some rockfish show fecundity relationships that increase more steeply with length than does body weight (e.g., darkblotched; Rogers 2005) there are no data suggesting this pattern for canary rockfish. The only published fecundity data (Gunderson et al. 1980) show a linear relationship with length, although this is only over a limited range of lengths, and similar to the assumption that fecundity is a function of weight (Figure 29). In this assessment, fecundity was assumed to be proportional to female body weight (Table 7, Figure 28), and therefore estimates of spawning biomass, not spawning output are used in the calculation of reference points.

2.2.3 Natural Mortality

Beginning with the 1990 canary assessment (Golden and Wood 1990), this species has been modeled with a single natural mortality rate for males and young females and an increasing rate of natural mortality with age for females. Golden and Wood used an estimate of M = 0.06 for males of all ages and young females and 0.15 for old females. Subsequent assessments conducted in 1994 (Sampson and Stewart 1994) and 1996 (Sampson 1996) relied on similar model configurations and used roughly the same estimates of M, with a constant M of 0.06 for males of all ages and young females (less than 9 years of age), and age-dependent M for older females that increased in a linear fashion from 0.06 (age 9) to roughly 0.18 (age 25). Early research applicable to groundfish stocks found off the Pacific coast of Canada also indicated that old female canary rockfish were much less common in the sample data than were males, and supported total mortality estimates (Z) for males in the range of 0.03-0.07 and 0.11-0.24 for females (Archibald et al. 1981). Recent review of data for canary rockfish stock off Canada led to the conclusion that an age-averaged M of 0.02-0.04 for males and 0.06-0.08 for females was generally appropriate (Stanley et al. 2005).

This assessment remains consistent with older analyses and fixes the rate of natural mortality at 0.06 for males and young females. The degree of increase for older females (age 14+) is treated as an estimated parameter as in 2002 (there M was linked directly to maturity) and 2005.

2.2.4 Ageing Precision and Bias

Much new information has been collected on ageing error and imprecision since the 2005 assessment was completed. A cross-read study was initiated between the Cooperative Ageing Program (CAP, a joint effort between the NWFSC and Pacific States Marine Fisheries Commission that has replaced an older Oregon Department of Fish and Wildlife ageing lab) and Washington Department of Fish and Wildlife age readers. These two facilities exchanged thousands of otoliths for duplicate comparative age readings and re-read many historically collected structures that had been aged at different times and by different methods (break-and-burn or surface ageing - done prior to about 1983) and readers. An additional (and substantial) effort was made to age many structures that had been collected over the last 30 years but never aged. These new data allowed (required) a full reconsideration of ageing bias and imprecision for available methods and readers across all ageing data available for canary rockfish.

In the 2005 assessment, a single ageing error key determining the level of bias in observed vs. true age and imprecision (the degree of variability in observed age at true age) was used to ‘smear’ model expectations in the observation sub-model of SS2 and generate appropriate predictions to compare with observed age-frequency data (Methot 2005). Age-validation of break-and-burn age readings through the bomb radiocarbon method (Piner et al. 2005) had indicated that there was a small negative bias associated with the production aging of canary rockfish at the CAP lab. Although based on a small number of individual fish (n=16), the average production age was 2.9 years less than the estimated age via bomb radiocarbon analysis. A linear relationship assuming no bias at age 0 was fit to the observations; this fit resulted in an estimated bias of -2.77 years at age 30 (Figure 30). This relationship was applied to all ages used in the model. The appropriate level of imprecision was estimated by comparing independent readings from two age readers. It was assumed that each reader has a normal distribution of possible age readings for each fish. The standard deviation of this normal distribution was estimated by computing a normal distribution of possible ages for each age reader, computing the probability that they would agree, be off by 1, 2, 3 or 4 years, then using the Excel Solver routine to search for the value of the standard deviation that would best match the observed frequency distribution of comparisons between the two readers. All historically surface-read ages were excluded, due to known (but not quantified in the assessment) levels of bias and imprecision associated with using this method for a long-lived species (Boehlert and Yoklavich 1984).

No new radiocarbon studies have been conducted, although a simulation experiment was performed to elucidate whether the small sample size associated with the 2005 study would translate into more uncertainty in the stock assessment results if the degree of bias were estimated inside the assessment model likelihood (I. Stewart and K. Piner, manuscript in review). The result of this exercise was that this source of uncertainty did translate into slightly wider confidence intervals for management quantities. Further, it was found that the assumption of linear bias was appropriate (relative to two other functional forms) given information in the other data in the assessment model, and that increases in the sample size were unlikely to resolve the uncertainty in functional form.

For the current analysis, all sources of ageing information were revisited both through inspection of the various cross- and double-read efforts as well as through simultaneous estimation of bias and imprecision for all studies in a rigorous statistical framework programmed in AD Model Builder (Otter Research Ltd. 2005) by A. Punt, University of Washington (personal communication).

Very close agreement was observed between recent CAP ages and older reads done by ODFW during the mid-1980s (Figure 31). This consistency within a single facility over time is not surprising, as break-and-burn methods and equipment have not changed substantially over this period and experienced readers generally train their replacements and others in the lab. When CAP and ODFW ages were compared with recent WDFW ages, a slight negative bias was observed for the CAP ages, especially for the oldest fish in the samples (Figure 32). This pattern was in part responsible for the recent additional work completed by WDFW and very consistent with the estimates of bias generated by the radiocarbon validation (Piner et al. 2005).

Re-ageing of historical samples read by ODFW for WDFW in the mid-1980s revealed two problematic issues. Very large dispersion, was observed in comparative reads (as much as 50-60 years in some cases) indicating that some type of error had occurred in the raw data, transfer of data between labs, or translation of data between databases over time (Figure 33). Because of this result these age data were not included in the current assessment, and an extensive effort to supplement those years with recent age reading was made by WDFW where additional samples existed that had not previously been aged. The end result was that the sample sizes remained roughly equivalent for the Washington fishery over that time period but the quality of the data has been substantially improved. Second, an excess of fish aged to be 25 years old was observed (Figure 33). It was discovered that this pattern existed only for a small subset of years in the mid-1980s and was due to an effort to make the ageing process more efficient. Specifically, the ager would not spend large amounts of additional time counting rings beyond the oldest age used in stock assessments at the time (25), but would just record the age as 25+, the "+" not being carried through from paper to electronic data. The few cases of this type of age "binning" that remained in the ODFW and WDFW databases were re-aged for consistency with current needs (this and recent assessment models explicitly deal with fish to 35 years).

A further comparison of historical surface-read ages and current WDFW break-and-burn techniques was also performed. Like many other species (Boehlert and Yoklavich 1984), surface methods for canary appear quite biased above approximately age 20, and never record ages in excess of about 40 years (Figure 34).

A statistical program to simultaneously estimate bias and imprecision from multiple ageing methods was written by A. Punt, (University of Washington) for use in generating inputs to SS2. This program estimates the underlying age distribution of a sample from up to four 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 (personal communication, A. Punt, unpublished results). 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 well represented in all samples.

Four separate canary rockfish data sets were available for this analysis: 1) CAP x CAP/ODFW, 2) WDFW x surface, 3) WDFW x CAP and 4) WDFW x WDFW x CAP. Evaluation of these data showed a very long tail of old ages, with most of the individual reads between the ages of ~5-20 (Figure 35). Exploration of the estimability of ageing bias and imprecision over various maximum ages resulted in the choice of age 20 as the largest age to include in the analysis. A step-wise approach to complexity resulted in a final model where WDFW ages were assumed to be unbiased and have a linear CV with age, CAP/ODFW ages had a linear bias and linear CV, and surface ages had a type 2 form of bias and linear CV. Functional forms were extrapolated from age 20 to age 35, the maximum age in the assessment model (Figure 36). The relationships obtained from this analysis were very consistent with both visual inspection of the raw data, and comparison with the radiocarbon analysis used in the 2005 assessment (Table 8, Figure 32, Figure 34).

2.2.5 Research removals

Research catches have historically been only a tiny fraction of the total removals from the canary rockfish population. However, as total mortality has been very low since 2000, the relative contribution of research removals to the total has increased. This was particularly true in 2006, when research catches comprised 7.8 mt out of an estimated 47.1 mt of total removals (Table 9). Research catches are now explicitly accounted for in the stock assessment.

2.3 Fishery Dependent Data

2.3.1 Historical Catch Reconstruction

In the 2005 assessment, a reconstruction of historical removals was undertaken to more realistically reflect both the cumulative removals that have occurred from the coast-wide canary rockfish population as well as capture some of the variability during the time series. Documented landings of "rockfishes" were assembled from a variety of sources; this type of aggregated data was all that was available as individual species were not routinely identified until the 1960s. Since most landings were not identified by gear type, the focus of this effort was directed at trawl landings or mixed categories. Results are shown in Figure 3 and Table 9.

By state, historical catches were derived via the following data sources and methods:

California: Previous assessments used a ratio of 0.176 trawl-caught canary rockfish to total rockfish catch over the period 1942-1963. Based on landings derived from the California Department of Fish and Game bulletins summarized in a historical review (Bureau of Commercial Fisheries 1949), this ratio was applied back to the beginning of fully documented landings in California in 1916. Fish and Wildlife Service current fishery statistics series documents were available for nearly all of the period 1942-1964 (1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965) and closely matched the total from the source above and the implied total from the ratio. The division of these landings between the northern and southern fleets was unknown, so they were included as aggregate observations, but it seems likely that the removals may be appropriately characterized through the northern selectivity pattern, as the stock would have been quite lightly exploited during this period. A similar approach was used to reconstruct the California non-trawl landings, although these fleets represented a much smaller proportion of the total rockfish category (0.034). Early reports indicate that rockfish comprised only 5% of the total catches of the early non-trawl fishery in California (Clark 1935), and that the proportion of nearshore species, such as black rockfish (*Sebastes melanops*) may have been much higher in the early years (before the mid 1940s) of the non-trawl fishery (Scofield 1948, Phillips 1964). However, this landings reconstruction generates reasonable cumulative total removals prior to that period, and the reconstructed series is quite close to the series used in the 2002 assessment.

Oregon: For the previous assessment, as time-series of total rockfish landings was derived from the following sources: 1928-1949 from Cleaver (1951), 1950-1953 from Smith (1956), 1954-1955 from Fish and Wildlife Service current fishery statistics series (1955, 1956), 1956 from the Pacific Fisherman Yearbook (1957), 1957-1961 from the Fish and Wildlife series (1958, 1959, 1960, 1961, 1962), 1962-1967 from the Oregon fish commission (Meierjurgen et al. 1966) and 1968-1970 from the Pacific Marine Fisheries commission annual reports (1970a, 1971). Additional series were available from the Fish and Wildlife series 1942-1953, 1962-1964, the Pacific Fisherman yearbook series from 1944-1945 (1947), and the National Fisherman 1968-1969 (1970b). There was very close agreement between the landings from these additional series and the series used in the reconstruction. For the period 1967-1970, the ratio of canary landings to the total rockfish landings was 0.241 (range = 0.075-0.374). This ratio was applied throughout the time series to approximate the canary landings by year.

Washington: Total rockfish catch prior to 1967 was derived for the current assessment from the following sources: 1930-1941 and 1956 from the Pacific Fisherman yearbook, 1942-1955 and 1957-1964 from the Fish and Wildlife series, 1965-1970 from the Pacific Marine Fisheries Commission reports. These series were quite similar with two exceptions, the catches from 1945, estimated to be 7,300 mt in the Pacific Fisherman Yearbook and 11,552 mt in the Fish and Wildlife series, and the landings from 1958-1960. The Fish and Wildlife statistics were used where available, because they specifically excluded Pacific ocean perch (POP) landings, where the Pacific Fisherman yearbook was somewhat unclear on whether POP had been included in the rockfish totals or not. The landings from the Pacific Fisherman in 1963-1966 and the National Fisherman 1967-1968 were much higher than the PMFC reports, also presumably due to the inclusion of POP. For the period 1967-1970, the ratio of U.S. canary landings to the total rockfish landings was 0.079 (range = 0.050-0.119). This ratio reflects the exclusion of both the portion of the landings caught in Canadian waters, estimated to be 0.149 in 1953 (Alverson 1956), and the portion of the total rockfish landings that are specifically canary, estimated to be 24% in Oregon by the above ratio. This value, 0.079, was applied throughout the time series to approximate the Washington canary landings by year.

No further changes were made to the historical reconstruction during this assessment, as no new information has become available.

2.3.2 Recent Landings (1981 to present)

Recent landings reflect the most current information from the PacFIN, CalCOM, NORPAC, RECFIN and State recreational databases. Commercial landings estimates of canary rockfish from 1981 to 2006 were generated from the PacFIN database (Extraction: June, 2007, Daspit et al. 1997) for Oregon and Washington. California commercial landings were based on the CalCOM data and species and gear expansions for the period prior to 1981 where the two sources do not currently agree. The at-sea catches occurring incidentally to the whiting fishery were generated from the NORPAC database (V. Tuttle, personal communication) and included in the trawl totals.

A new commercial fleet is included in this assessment in an effort to better describe the current removals from the canary rockfish resource and to best utilize all of the available biological data. Bycatch of canary rockfish in the at-sea whiting fishery has previously been added to trawl fishery removals, and biological sampling information used for comparative purposes only. This source is now treated as a separate fleet, so that both removals and biological data can be included following the same methods applied to other fleets. This source of mortality occurs as a very small percentage (by weight) of canary bycatch during midwater trawling for whiting. Mandatory on-board observers sample as many rockfish as possible (focusing on overfished species) in addition to their primary goal of sampling whiting as they are processed.

2.3.3 Discards

Discard of canary rockfish by commercial trawling vessels was assumed to be minor prior to 1995, when trip limits specific to this species went into effect. Some research

(Sampson and Stewart 1994, from: Pikitch et al., 1988), indicated that market-induced discard (e.g., unacceptable sizes or lack of a market) was insignificant and the small amounts (roughly 1%) of discard in the 1980s and early 1990s were due to management-related causes (e.g., regulations on rockfish species in general). In the 1996 assessment (Sampson 1996), a discard rate of 1.23% was developed for trawl-related catches made from 1983 to 1994, when canary rockfish where regulated as part of the Sebastes complex, and a rate of 16% was used for 1995. The 16% discard rate for the trawl fishery was established by the Groundfish Management Team (GMT) of the Pacific Fishery Management Council (PFMC) following discussions regarding predicted levels of discard (150 mt) associated with the newly adopted harvest guideline in 1995 for canary rockfish in the northern INPFC areas (roughly 1,000 mt). The value of 16% was based on the discard rate calculated for widow rockfish as part of the Pikitch et al. study (1988).

The 2005 assessment used the discard rates developed in previous assessments up to 1999. These were 0.0123% for all commercial fleets until 1994 and then 16% for all commercial fleets until 1999. Beginning with the year 2001, there were discard observations collected by the West Coast Groundfish Observer Program that were considered applicable to some fleets. The trawl fleets had a discard rate based on at-sea observer data on a year-specific basis for 2002-2004, with pooled estimates from all years used to generate estimates for 2000-2001 (2000 was included because regulatory changes in footrope size made this year more similar to the subsequent period than the late 1990s). These estimates ranged from 14.8% (California trawl fleet in 2000) to 75.7% for the Washington trawl fleet in 2000, and are given in Table 10. The non-trawl fleets were assumed to have discarded 4 mt coast-wide in each year, based on the total discard mortality calculated for 2003 associated with nearshore rockfish fisheries and the fixed gear sablefish fishery by the Groundfish Management Team (J. Hastie; personal communication). Recreational discarding was incorporated through the use of the landed and discarded dead (A + B1) categories.

Discard rates used for 2004 and 2006 were calculated to be consistent with total mortality estimates created for the Pacific Council and the GMT. By working backward from the total mortality, or total discard by weight and the current landings estimate, a likely discard rate was developed for each fleet. Because the delineations over geography, between gear types and tribal vs. non-tribal sectors often differ from GMT "scorecards" and other summaries available from the Council, it may be misleading to compare the actual discard rates and comparisons should focus on total mortality values. Where updated landings, bycatch estimates or research catches were available the most up to date information has been included in this assessment.

Biological sampling has been conducted as part of the West Coast Groundfish Observer program since its inception in 2001. These data were not used in the 2005 assessment. The current assessment treats observations of the discarded canary rockfish in a similar manner to those collected from port samples. Biological observations from each tow are expanded from the fish actually measured to the total number of fish in the biological sample. This number is then further expanded to the estimated total number of fish in the discard for that tow. Expanded length- (or age-) frequencies were then brought to the fleet level by multiplying each value by the ratio of total discarded weight for that fleet to the total discard that was sampled by the observer program. This allowed port and observer samples to be combined into a set of biological observations representing the entire catch of canary rockfish for that fleet and year. Observer samples comprised most of the biological data for the commercial trawl and non-trawl fleets in 2004-2006, due to limitations on landing canary restricting the access of port samplers to a very small fraction of the total mortality.

2.3.4 Recreational Fishery

Estimates of recreational catch from 1980-2006 were generated through use of the RecFIN information system and also obtained directly from the states of Oregon and Washington. For much of the time series (but to a lesser degree in Washington), estimates were based on data gathered using MRFFS sampling protocols. However, in more recent years, estimates for some segments of the recreational fishery have relied primarily on data collection programs administered by the state agencies. The MRFFS procedure has generally been used to estimate effort of recreational fishermen, through use of phone surveys, and species catch composition and CPUE through port sampling of individual trips. The recreational fleet in California was divided (around San Francisco Bay) into southern and northern components, in the assessment, to reflect the tendency for the southern fleet to capture much smaller canary than the northern fleet. Recreational landings were compiled from the following sources by state and time period: Washington, 1975-2006 from state sampling program (F. Wallace, personal communication). Oregon: 1981-2000 from RecFIN, 2001-2006 from State sampling (D. Bodenmiller, personal communication), California: Estimates from the 1999 assessment (Williams, 1999) 1950-1979; 1980-2006 RecFIN split into northern and southern areas through post-stratification of the RecFIN estimates. Missing data from 1990-1992 were interpolated based on adjacent years. CPFV landings were added where missing (1993-1995) based on CPFV landings expanded from the logbooks (D. Wilson-Vandenberg personal communication; July, 2005). In Washington and Oregon, catches prior to the late 1970s were small enough in comparison to other removals that no reconstruction was attempted.

An analysis is currently underway to revise the methods used to estimate recreational catches from California for all species. Results from this effort are expected to be available in late 2007 and may substantially revise the time-series for some species. Qualitative evaluation of the magnitude of change on canary estimates was provided by California Department of Fish and Game staff and suggested no large effect on canary removals, but this topic will likely need to be revisited in the next assessment cycle.

Recreational length-frequency distributions were compiled from data available through RecFIN. Oregon and Washington were combined and the distributions constructed through weighting the length frequencies by the sampled catch via the standard RecFIN method. California length-frequency distributions used the raw length-frequency observations, and were divided into the northern and southern fleets based on the county in which the sampling took place. The northern area included all counties north of the San Francisco bay area. Counties which were not adjacent to the coast were excluded because the location of the fishing activity was unknown.

2.3.5 Foreign Catches

From the late 1960s through the early 1970s, foreign trawling enterprises harvested considerable amounts of rockfish off Washington and Oregon, and along with the domestic trawling fleet, landed large quantities of canary rockfish. Foreign catch estimates have not been revised in the current assessment, but follow those used in the 2002 and 2005 assessments, and reflect the large body of work that has gone into a thorough allocation of species to the foreign removals (see: Rogers 2003). These removals are included in the trawl fleets by state as was done in the 2002 and 2005 assessments.

2.3.6 Fishery Logbooks

A California trawl fishery CPUE time series was developed in the 2002 assessment through the use of GLM techniques applied to censored logbook data. This CPUE series was not updated for the 2005 assessment and was removed from the final model due to uncertainty about the proportionality of canary catch rates to population abundance. The California Department of Fish and Game charter boat logbook CPUE series, generated in the 2002 assessment was also removed from the final assessment model in 2005 for similar reasons. Given recent spatial and temporal closures imposed on the recreational fisheries from all three states, as well as regulations prohibiting the retention of canary rockfish, it is doubtful that a meaningful extension could be generated for this series. These data are generally consistent with model trends and would provide little new information; they are therefore not included in the base case model for this assessment.

2.3.7 Fishery Biological Sampling

Commercial landings of rockfish and the biological characteristics of these landings were not consistently sampled for scientific purposes until the early 1960s (Niska 1976). Statewide sampling programs to determine species compositions of the landed catches began in the late 1960s (Golden and Wood 1990). The first rigorous monitoring programs that included routine collection of biological data (e.g., sex, age, size, maturity states, etc.) were begun in 1980. Currently, port biologists employed by each state fishery agency (California Department Fish and Game, Oregon Department of Fish and Wildlife - ODFW, and Washington Department of Fish and Wildlife - WDFW) collect species-composition information and biological data from the landed catches of commercial trawling vessels that have completed their fishing trips. The sampling sites are commonly processing facilities located at ports along the coasts of California, Oregon and Washington. The monitoring programs currently in place are generally based on stratified, multistage sampling designs.

Commercial length-frequency distributions were developed for each fleet for which observations were available, following the same bin structure as was used for research observations. A variety of methods and stratification schemes for expanding the length-frequency data were explored as a result of both sparse (few trips and/or individual fish) sampling in many years for some fleets, and patchy (most trips or individuals coming from one or more portions of the spatial strata) sampling over space within and among years. For each fleet, the raw observations (compiled from the PacFIN and CalCOM databases) were expanded to the sample level, to allow for any fish that were not measured, then to the trip level to account for the relative size of the landing from which the sample was obtained. These expanded length observations were then combined within years for each fleet. Where observer data and port data were both available, observations were weighted based on the ratio of landings to discards for that fleet in that year. Age frequencies were computed in the same manner. Sampling statistics for each fleet and year are given in Table 11, Table 12, Table 13, Table 14, Table 15, and clearly show the different sampling targets employed over different time periods and between state agencies.

The weighted length-frequency distributions are shown in Figure 37, Figure 38, Figure 39, Figure 40, Figure 41, Figure 42, Figure 43, Figure 44, Figure 45, and Figure 46. Where a large proportion of the annual observations were recorded as unidentified sex, both sexes were combined and are treated as such in the model. By fleet, a number of important patterns are visible in the data. The southern California trawl samples, although clearly quite noisy, show the somewhat smaller fish generally encountered in the southern extent of the species range (Figure 37). The much more data rich northern California trawl fleet captured much larger fish than the southern fleet in the early part of the time-series and has shown a decline in mean length of the catch from 1978 to the mid-1990s, with little change thereafter (Figure 38). The Oregon trawl fleet has also shown a decline in size of canary captured from the late 1970s to the mid 1990s (Figure 39). The length data from the Washington trawl fleet prior to 1976 are not delineated to sex and it is unclear why the 1975 observation shows such small fish (Figure 40); this observation was removed pending further investigation of the raw data. Sex-specific length distributions from the Washington trawl fleet show a similar pattern to those in the Oregon trawl fleet with perhaps slightly less decline in mean size of canary encountered (Figure 41). Both the southern and northern California non-trawl fleets show very large declines in mean size of canary rockfish through the entire time-series (Figure 42). The Oregon-Washington non-trawl fleet shows a drop in mean size only between 1995 and 2000, although data are mostly absent prior to this period (Figure 43). All three recreational fleets appear to target much smaller canary rockfish, in the 25-30 cm range (Figure 44, Figure 45). The canary rockfish captured as bycatch in the at-sea whiting fishery appear to be limited to a very small range of sizes between 42 and 58 cm (Figure 46).

Weighted age-frequency distributions were compiled by fleet for break-and-burn ages only. Although surface ages could be used with the newly developed bias and imprecision described above this task was not completed for the current assessment. Recent ages from Washington are separated such that the appropriate age-error key can be applied in the assessment model (duplicate observations occurred only for the Washington trawl fleet). The possibility of treating all commercial age data as conditional age-at-length data was explored, and the entire set of compositions were compiled, but model run time (> 12 hrs) prohibited this approach at present. Therefore, marginal commercial age-frequency distributions were compiled and are presented in Figure 47, Figure 48, Figure 49, Figure 50, Figure 51, Figure 52, and Figure 53. As described below, the non-orthogonal nature of length and age data was considered when data weighting was performed.

Age data for southern and northern California were very sparse (no data between 1986 and 2000), but only fish younger than age 18 have been observed in recent years (Figure 47, Figure 48). Age compositions for the Oregon trawl fleet show a clear decline in both males and females older than ~ age 20 throughout the time-series. Further, the sex-ratio skewed toward males at older ages is also quite pronounced (Figure 49). Only a modest decline in older fish (mostly the males) is visible in the Washington trawl age data from either ageing lab (Figure 50, Figure 51). Data for the Oregon and Washington non-trawl fleet is sparse enough that little pattern can reliably be discerned (Figure 52). Age data from the at-sea whiting fishery was available only for 2003-2005 and shows little pattern, although canary < age 6 are never encountered in this mid-water fishery, indicating the potential for a behavioral difference with age (Figure 53). No age data are included for any of the recreational fleets. Although some age data are available from the Oregon recreational fleet, they are not included in the current assessment, but should be explored in the future.

Although lack of fit due to changes in growth over time can be diagnosed through model results, a preliminary evaluation of the mean size at age for the most reliably aged fish (WDFW aged in the last year) was performed. No clear trends were visible over the age range of 6-15 although inter-annual variability and sampling noise can be hard to delineate (Figure 54). Based on this and other preliminary exploration of the raw data, no effort was made in this assessment to explore changes in canary growth rates over time.

In aggregate, the biological data from fishery sources shows no evidence of strong year-classes moving through the population. This could be due to low recruitment variability, noisy data, or both. Further, declines in mean size and age seem to show a latitudinal cline, with more extreme declines to the south, and very little decline observed in Washington. The degree to which this is due to changes in selectivity, differential fishing mortality by latitude or other factors is unknown.

In the 2005 assessment, sparse (< 5 trips sampled) length- or age-frequency observations from commercial sources were aggregated into "super-years"; the SS2 model can generate similarly aggregated predictions for direct comparison. This approach has the benefit of allowing the data to inform the model about the relative selectivity for a fishing fleet without erroneously appearing to add information about recruitment deviations that may be due to small noisy samples or spatial changes in sampling effort over time. Re-evaluation of this approach led to the conclusion that, when weighted (and iteratively re-weighted) appropriately, there is no strong reason to add pre-processing to the data.

2.4 History of Modeling Approaches

2.4.1 Previous assessments

The first formal assessment of the canary rockfish resource off the U.S. Pacific coast was done in 1984 (Golden and Demory 1984).The final results from the initial assessment in 1984 were largely based on qualitative examinations of trends in age and size distributions generated from both fishery and survey data. The 1984 research also included exploratory efforts to fit dynamic models to time series data, using tools such as, Virtual Population Analysis and Stock Reduction Analysis. However, due largely to highly variable sample data and its lack of availability in all years, results from the modeling were not considered scientifically valid. The 1984 assessment concluded that the canary rockfish resource was generally stable at that time and that the current restrictions were still applicable, i.e., the ABC for canary rockfish was roughly 2,700 mt in the early 1980s.

The canary rockfish assessment conducted in 1990 (Golden and Wood 1990) was the first evaluation to incorporate separable catch-at-age analysis and in particular, the first to use the Stock Synthesis Model (Methot 1989, 2000). All subsequent stock assessments have used the Stock Synthesis Model to evaluate the status of the canary rockfish population off the U.S. Pacific coast, although the model has undergone considerable development since the first program was presented in 1988. The basic theoretical foundation and parameter estimation techniques utilized in early synthesis models are described in Methot (2000). Data sources included in the 1990 assessment model were commercial landings from the fishery (1967-89), age-distribution data from the fishery (1980-88), commercial trawl effort index from the fishery (logbook data from 1980-87), CPUE index from the survey (1977-89), and size-distribution data from the survey (1977-89). The Columbia INPFC area was the only portion of the canary rockfish resource formally modeled in 1990. The 1990 assessment was the first to propose the two, broad assumptions (alternative scenarios or states of nature) regarding the absence of old females in the sample information relative to males: (1) the females are subject to a different rate of natural mortality than males (e.g., age-dependent natural mortality for females or possibly, constant, but elevated natural mortality rates for females); or (2) the females are less vulnerable to the fishing and sampling gears (e.g., dome-shaped selectivity for females and asymptotic selectivity for males). The scenarios above have been generally explored in all subsequent assessments. Based on a $F_{35\%}$ management model, results from the 1990 assessment indicated the ABC for the canary rockfish resource in the Columbia INPFC area should be decreased by roughly 30% from 2,100 mt to 1,500 mt; no changes were recommended for ABCs for the other INPFC areas (800 mt for the U.S. Vancouver INPFC area and 600 mt for the Eureka INPFC area). Through 1989, the fishery had not achieved the ABCs recommended for canary rockfish.

The assessment conducted in 1994 again utilized the age-based version of the Stock Synthesis Model to evaluate the status of the canary rockfish population in the Columbia, INPFC area, as well as the U.S. Vancouver INPFC area (Sampson and Stewart 1994). The data sources in the previous assessment (1990) were updated with statistics from the 1990s, with the exception of the commercial trawl effort index from the fishery, which was omitted from the set of data sources due to sample and estimation biases associated with logbook data. Results from the 1994 assessment (for both scenarios described above) clearly indicated that the current level of F exerted on the canary rockfish population exceeded $F_{20\%}$ (the overfishing threshold at that time) and thus, the researchers recommended that the ABC be reduced to allow the stock to recover (Sampson and Stewart 1994). Ultimately, the Pacific Fishery Management Council (PFMC) adopted an ABC for canary rockfish of 1,250 mt for 1995-96, which was a substantial reduction (nearly 60%) from the previous ABC of 2,900 mt (1991-94).

In 1996, the canary rockfish stock was assessed using similar modeling methods and configurations as were used in the previous assessment conducted in 1994 (Sampson 1996). Data sources were again updated with newly derived statistics (1995-96) and an age-based version of the Stock Synthesis Model was employed. One difference between the 1994 and 1996 assessments was the manner in which error associated with age-distribution data from the fisheries was accommodated. In the 1996 assessment, a single, percent-agreement error structure was used to describe the variability in the age-related data, whereas in 1994, an error-transition matrix was used to standardize multiple sets of age estimates generated from two age readers. Newly obtained data supported findings from the 1994 analyses and final results further indicated that the canary rockfish stock had suffered fishing in excess of

$F_{20\%}$. For both scenarios, annual yields based on $F_{35\%}$ were estimated to be roughly 1,200 mt per year for 1997-99.

In 1999, two age-structured stock assessments were adopted. An assessment was completed by Williams et al. (1999) for the southern INPFC areas (Eureka and Monterey). A separate assessment was conducted for the Northern INPFC areas (Columbia and US Vancouver) by Crone et al. (Crone et al. 1999). Both assessments concluded that the abundance of canary rockfish was below the overfished threshold. A major source of uncertainty was the role that natural mortality and adult movements played in the relative lack of old females. The northern assessment was performed using an age-based stock synthesis model and relied on age distributions to summarize changes in the age-structure. The Southern assessment was a length-based (although still age-structured) model in an ADMB format. The paucity of otolith-aged fish in the Southern area was the reason why lengths were used in the south to describe changes in the age-structure. That assessment also tried to account for effects of sized-based removals on population growth. The subsequent rebuilding analysis relied upon recruitment information from the northern area where the larger portion of the stock occurs.

The 2002 assessment unified the previous northern and southern assessments into a coast-wide model. New data that had become available since the previous assessment conducted in 1999 were: Commercial fisheries landing data for 1999-2001; Biological data from the commercial trawl fisheries for 1999-2001, including sex, age, and length information, research survey data from the NMFS shelf trawl survey for 2001, including CPUE and biological data and the CPUE from the California recreational fishery. However, previously assembled fishery size- and age-composition data were not re-compiled. This assessment focused on the exploration of two states of nature that were considered in previous assessments: age-dependent M for females versus dome-shaped female selectivity. Together with the STAR panel, it was concluded that these need not represent discrete hypotheses and that both scenarios could be modeled simultaneously. The 2002 assessment concluded that the canary stock was still at very low levels, 8% of the estimated unexploited conditions.

The 2005 assessment converted and updated the 2002 effort using Stock Synthesis 2. The largest changes were: Re-configure the spatial separation of fisheries to separate northern and southern California due to the large north-south difference in occurrence of larger fish and the widely varying north-south distribution of fishery sampling. Fishery removals were divided among 10 fleets: 1) Southern California trawl, 2) Northern California trawl, 3) Oregon trawl, 4) Washington trawl, 5) Southern California non-trawl, 6) Northern California non-trawl, 7) Oregon and Washington non-trawl, 8) Southern California recreational, 9) Northern California recreational, 10) Oregon and Washington recreational. Oregon and Washington non-trawl and recreational landings were combined due to the relatively small total removals by those fisheries and their low level of consistent biological sampling. Recalculate all the fishery catch, size and age composition data. Introduce the mean size-at-age data from the survey and fishery to provide additional information on growth and to attempt to better differentiate age selectivity from size-selectivity. Extend the modeled period back to 1916 when first significant catches occurred. Extend maximum age in the data file to 35+ per request from previous review. Switch from age-based selectivity to length-based selectivity. That pattern assumed asymptotic selectivity for males and allowed dome-shaped selectivity for females.

Selectivity was the subject of much exploration, ultimately leading to the choice of a length-based parameterization. Information from radiocarbon studies of canary ageing techniques was included to guide the degree of bias likely occurring in production ageing, and the degree of ageing precision was re-estimated from double-read projects. Differential male-female selectivity was allowed for the data sources with suitable data (northern California trawl, Oregon trawl, Washington trawl, shelf trawl survey). Iterative re-weighting was used to adjust all input sample sizes and survey standard error, in some cases resulting in large increases (or decreases) in input sample size relative to the number of trips/hauls actually sampled. Trawl and recreational fishery CPUE were dropped from the model because there has been insufficient work to validate the potential degree of non-linearity in the abundance to CPUE relationship. The parameters defining the variability in size-at-age were fixed at values estimated outside the model from the trawl survey size-age data, rather than allow the model to update these values. The factor that most influenced the model result is the exclusion of a male-female difference in selectivity which causes the ending biomass to be highest among these model runs and the steepness parameter to have the highest value (0.45). The eight parameters used to implement this selectivity difference for three fisheries and the triennial survey caused the base model to fit 24 log-likelihood units better than the model configuration without these parameters, with most of the improvement coming from two parameters for the OR and the WA trawl fisheries. Without allowing for differential male-female selectivity, the smaller decline in abundance during the 1980s-1990s degrades the fit to the trawl survey by 1.2 log-likelihood units, and so is the worst fit to the trawl survey among all these sensitivity runs. At the SSC review of the canary rockfish assessment (Sept. 27-30, 2005; Seattle, WA) it was concluded that the parametric variance around a single base model underestimated the overall uncertainty in the canary rockfish assessment. After considerable deliberation, the SSC and STAT concluded that the Base and Alternate models were equally likely and supported a statistically based blend of the two models as the basis for the rebuilding analysis. The level of relative depletion for the 2005 base case was estimated to be 0.038 when the stock reached its minimum level in 2000, then increasing to 0.057 in 2005. In the alternate 2005 model, the minimum was 0.065 in 1999 and the value in 2005 was estimated to be 0.113.

A retrospective over the canary rockfish assessments since 1994 shows that there has been a large degree of consistency in relative population trend, although estimates of absolute scale have varied substantially among years and alternate models within years (Figure 55).

2.4.2 Pre-assessment workshop, GAP and GMT input

Based on suggestions received before and during the pre-assessment workshop held in April, 2007, a number of questions regarding canary life history and data sources were explored. Participants in the pre-assessment workshop provided valuable observations and information on the canary rockfish resource. Movement of schools of canary among fishing grounds has been observed, specifically near the Canadian border. Anecdotal reports of changes in latitudinal and depth distribution associated with water temperature and possibly El Nino cycles were also discussed. No clear trends in the diel cycles of water column use were identified, although this too was a source of discussion. Behavioral changes due to tidal currents were also generally noted. Infrequent encounters with large canary rockfish in shallow water were reported, indicating that there may be factors other than ontogenetic movement to deeper water that govern canary distribution.

There was general agreement among fishermen contacted that appreciable discarding of canary rockfish before management-imposed limits became important was quite unlikely. This is understood to be caused by the price, desirability and lack of incentive for sorting of smaller fish. This is very important in light of the current assumption of a 1% discard rate prior to the mid-1990s.

A question was raised regarding the effect of Bycatch Reduction Devices (BRDs) in the pink shrimp fishery. Oregon Department of Fish and Wildlife researchers (personal communication, R. Hannah) have investigated the magnitude and species composition of rockfish bycatch in the pink shrimp fishery before, during and after transition to full use of BRDs (Hannah and Jones 2007). Rates of canary bycatch were 0.03-0.84% from various time periods within 1981-2000. Little relationship between shrimp landings and canary landings is present (Figure 56). Bycatch of canary rockfish in the pink-shrimp fishery appears to have been an infrequent occurrence, with years of high encounter rates quite rare. The ratio of canary bycatch (reasonably represented by landings prior to 2000) to pink shrimp catch has been variable, with large value observed in 1988. BRDs were required in 2003, but allowed and used in portions of the fishery during 2001-2002, leaving 2000 as the year when canary landings were highly restricted, but BRDs not yet fully used. BRDs have subsequently reduced the capture of canary and other rockfish to the degree that observer activities were suspended in 2006 due to extremely low rates of bycatch. Observer coverage has resumed in 2007 as part of an effort to justify the clean nature of the current pink-shrimp fishery. Although there is some potential for discarded bycatch of canary rockfish in 2000 (that would be unaccounted for in this assessment) it is unlikely to be a major source of bias in stock assessment results.

2.4.3 Response to the review panel recommendations in 2005

The STAR and “Follow-up” panel reports from the 2005 review outlined a number of research and modeling recommendations that should be explored in subsequent assessments. In the current assessment, as many of these recommendations as was possible were evaluated and substantial progress was made on many of them. Progress is outlined below by specific recommendation.

- *Consideration of a regional analysis of fishery dynamics, and potential linkages with Canadian canary resources.*

  This topic remains an important area for future research. Information on adult movement and collaboration with Canadian scientists will be essential to making progress toward more spatially explicit and geographically comprehensive analyses.

- *Evaluate the determination of appropriate weighting of data sources.*

  The use of conditional age-at-length data reduces the need for subjective weighting of age and length data from the same fish treated independently in the likelihood calculation. Further, the introduction of a method for generating input sample sizes that accounts for both the number of fish and the number of trips or hauls sampled has greatly reduced the need for extensive iterative re-weighting. As in many assessments, conflicting signal from different sources of data are explored through sensitivity testing.

- *Field studies of relative abundance of canary rockfish in different habitats using alternative gears such as hook-and-line gear and submersible line transects should be continued. Careful thought is needed to design studies that augment traditional bottom trawl surveys and can be integrated into the assessment.*

  Efforts described above have succeeded in pilot studies documenting methods for surveying canary rockfish abundance through the use of hook-and-line, open-codend trawl gear and video technology. Although not yet attempted over broad spatial scales, substantial progress toward new methods has been made.

- *Assessment results for canary rockfish depend on distinguishing between relatively subtle processes such as increasing natural mortality for females and domed-shaped sex-specific fishery selectivity. The selection of one model configuration over another may depend more on the parametric form used to model the process rather than the underlying process itself. There needs to be more testing of stock assessment models using simulated data to get a better sense of how well these processes can be estimated.*

  The approach to selectivity parameterization and complexity is the basis for much exploration in this assessment. Broad simulation studies of assessment model behavior are very much warranted for many aspects of stock assessment, but not particularly tractable during the development of a model for one specific species. However, the use of the bootstrap function built into SS2 allows evaluation of the estimability of model parameters conditioned on data availability and error structure and the model results themselves. A limited bootstrap has been completed for this assessment.

- *The approach of modeling the fisheries of each state separately as competing fisheries operating on a unit stock is needs to be investigated more fully. Differences between state fisheries could be due to different historical patterns of exploitation in each state or simply an artifact of different sampling methods.*

  Exploration into combining fleets is made in this assessment. Moving toward more spatially explicit models will require geographic separation of fleets, and so fleet simplification appears less important than a better understanding of how assessment models are sensitive to this approach in a general context.

- *The canary rockfish assessment states: "Several of the issues raised here: meta-analysis for survey q, meta-analysis for recruitment variability, and alternative procedures for inclusion of recruitment indexes are not unique to the canary rockfish assessment. Work on these issues during the 2006 off-cycle year would improve consistency in approach among all the assessments." The Panel strongly supports this recommendation.*

  These topics remain important areas for future research and may be addressed in 2008 stock assessment workshops.

2.5 Model Description

2.5.1 Link from the 2005 to current assessment model

The bridge from the 2005 stock assessment model to the current base case followed three general steps: 1) upgrade to the newest version of SS2, requiring a switch from double-logistic selectivity (no longer supported) to double normal selectivity; 2) rebuild all of the data inputs to reflect the best information currently available, including catch series, fishery biological data, and GLMM-based indices of survey abundance and 3) re-evaluate estimation of steepness, growth and selectivity parameters. A thorough description of the 2007 assessment model is presented separately below; this section linking the two models is intended only to more clearly identify where substantive changes were made.

The double-normal selectivity option used in the current base case model is simpler than the double-logistic used in the 2005 assessment by 2 parameters (6 vs. 8). Selectivity is now modeled via: an initial selectivity for the smallest length (or age) bin, an ascending width (normal shape, except scaled between the initial and peak values), a parameter describing the location (in length or age) of the peak of selectivity, the width of the flat top to selectivity, a descending width and a final selectivity at the largest length (or age) bin (Methot 2007). By fixing the initial selectivity at 0, and the width of the top to a very small quantity (this parameter becomes redundant as the descending width or final selectivity become large) the selectivity shapes estimated in the 2005 assessment were closely matched. Where near asymptotic selectivity was estimated, the descending width was also fixed, since it no longer had any influence on the derived selectivity curve. This change had very little effect on assessment results (Figure 57).

Rebuilding the data streams was performed as described above. This incorporated substantial new assessment data (Table 2), as well as the addition of the at-sea whiting fleet, research catches, the improved ageing-error definitions and the introduction of conditional age-at-length data for survey fleets. Because of the use of conditional age data in place of marginal age-frequency distributions and mean-length at age data used in 2005 the parameters describing the distribution of length at a given age were also freely estimable. These changes had a larger effect than the selectivity parameterization, serving to increase the estimate of SB0 and current stock size, but had little effect on relative trend over the time series (Figure 57).

Changes to the stock-recruit relationship included fixing steepness at 0.511 (see description of priors and model below), estimating a reduced time series of recruitment deviations (1960+ instead of 1952+ in the 2005 assessment), and increasing the degree of recruitment variability (σ_r) from 0.4 to 0.5. The coast-wide pre-recruit index was included to add information regarding the most recent recruitment strengths. The use of discrete time-blocks for changes in fishery selectivity prior to recent management actions was revisited and a more a priori approach to adding these blocks was used that resulted in fewer selectivity parameters and no changes prior to 1995 for any fleets except the Washington and Oregon trawl fisheries (see exploration of complexity in selectivity parameters below). The triennial survey index was partitioned into two time-periods (1980-1992 and 1995-2004) based on the change in survey timing; for each period a separate catchability parameter was applied. In aggregate, these changes result in a similar time series of spawning biomass prior to the early 1990s, but a much more rapid recovery since that period (Figure 57).

2.5.2 Summary of data for fleets and areas

Fishery removals were divided among 11 fleets: 1) Southern California trawl, 2) Northern California trawl, 3) Oregon trawl, 4) Washington trawl, 5) Southern California non-trawl, 6) Northern California non-trawl, 7) Oregon and Washington non-trawl, 8) Southern California recreational, 9) Northern California recreational, 10) Oregon and Washington recreational and 11) the canary bycatch from the at-sea whiting fishery. Removals associated with research projects (the trawl surveys, and other much smaller sources of permitted mortality due to scientific research) are treated as a fishing fleet, only in that the removals are included in the total. The data available for each fleet are described in Table 2; data that were not previously included in the assessment are clearly identified.

2.5.3 Modeling software

This assessment used the Stock Synthesis 2 modeling framework written by Dr. Richard Methot at the NWFSC. The most recent version (2.00g) was used, since it included many improvements and corrections to the older version (1.20) used during the 2005 assessment (Methot 2007). The change in SS2 version required a re-parameterization of the selectivity function, moving from the very generic double logistic to a somewhat simpler and more stable double-normal curve. For the selectivity shapes modeled in this assessment, there was very little change due to the version and selectivity upgrade. The most important change from version 1.20 to 2.00 involved a revision of the calculation of the linear ramp for natural mortality. This produced a small change in the estimated value for natural mortality for old females (Figure 58) that had a small effect on the estimation of SB_0.

2.5.4 Sample Weighting

Indices of relative abundance all had variance estimates generated as part of the analysis of raw catch data. These variances are converted to standard deviations in log space (as is required by SS2) and used as the starting point for iterative re-weighting. Initial input sample size for compositional data was based on a method developed by the author and S. Miller, as part of the data and modeling workshop in 2006 (see background materials). Briefly, this method was based on analysis of the input and model-derived effective sample sizes from stock assessments completed in 2005 for west coast groundfish. It makes the input sample size a function of both the number of fish sampled and the number of trips or hauls sampled. A piece-wise linear regression was used to estimate the increase in effective sample size per sample based on fish-per-sample and the maximum effective sample size for large numbers of individual fish. These values are likely to represent a reasonable starting point that generally reflects the degree of observation error commensurate with sampling a given number of fish from a given number of samples.

This assessment follows the iterative re-weighting approach to developing consistency between the input sample sizes (or standard errors) and the effective sample sizes based on model fit. This approach attempts to reduce the potential for particular data sources to have a disproportionate effect of total model fit, while creating estimates of uncertainty that are commensurate with the uncertainty inherent in the input data. Iterative re-weighting was applied to the length, age and survey data from all fleets. This consisted of comparing the mean input sample size for compositional data with the mean effective sample size based on model fit. Where the input sample size was greater, this implied the model was unable to fit the data in a manner that was consistent with the level of variability expected in the data and so a multiplicative scalar was used to reduce the input sample size for all length- or age-composition samples for that fleet accordingly. For index data, the mean input standard error was compared with the root-mean-squared-error of the model fit to assess consistency of data and model fit. Where the mean effective sample size was greater than the mean input sample size, no change was made. This choice reflects the post-hoc nature of model tuning and the potential for increasing weight on those data sources that are consistent with model predictions, thereby reducing the perceived uncertainty in model results. Table 16 shows the results of this re-weighting for compositional data, with the length data from a few fleets down-weighted slightly and the at-sea whiting bycatch data down-weighted substantially. This is not unexpected, since the sampling for at-sea data is on a per haul basis, and those fishing operations tend to move only when the large aggregations of whiting they are targeting move. Therefore, fish within hauls would be expected to be less representative of independent samples, and even fish from multiple hauls may be collected from a very small geographic area. Table 17 reports the results for index data. A small additional variance component was added to the early triennial observations (0.04) and the pre-recruit index (0.11) resulting in reasonably close agreement between mean input standard errors and root-mean-squared-errors as well as a similar degree of observation error for all survey indices. Both the late-period triennial observations and the NWFSC survey series fit better than would be expected, based on input variances, so no change in input values was warranted. Iterative re-weighting had little effect on overall model results, although broad scale weighting of length and age data (see below) showed a much greater effect.

A second weighting issue arises when both length and age data are included from the same individual fish and samples. In this case, it is theoretically appealing to treat the age data as conditional to the length observations (as described above) and avoid duplication of the information content. This is the approach taken for survey data. However, due to the technical constraints described above (run times), this approach was not feasible for all of the commercial sampling in this assessment at this time. Instead the approach taken is to use the lambda values (emphasis; a direct multiplier on the likelihood component) reducing the lambdas to 0.5 for length and age data from a given fleet where both types of data are available. This is consistent with previous canary assessments, and many other west coast groundfish assessments.

2.5.5 Priors

Uniform (noninformative) priors were applied to all estimated parameters in the base case model. Parameter bounds were selected to be sufficiently wide to avoid truncating the searching procedure during maximum likelihood estimation. All parameter bounds and priors are provided in this document (Table 18).

The use of a prior on stock-recruitment steepness (M. Dorn, AFSC, personal communication) was explored during the STAR panel. Concern over the influence of recently revised (2007 assessments) steepness profiles led to the recalculation of the posterior predictive distribution from the meta-analysis performed in 2006 removing the darkblotched rockfish profile. The revised prior was shifted to slightly lower steepness values than the earlier analysis, resulting in a distribution with the mean of the middle 50% equal to 0.511, the mean of the lower 50% equal to 0.345 and the mean of the upper 50%

equal to 0.72 (Figure 59). Many preliminary model runs explored the estimation of steepness with and without informative priors. Based on the tendency of the model to estimate an implausibly high value for steepness, the base case uses the mean of the middle 50% of the prior distribution (0.511) as a point estimate, and a 'states-of-nature" approach to uncertainty in this parameter.

2.5.6 General model specifications

Stock synthesis has a broad suite of structural options available for each application. Where possible, the 'default' or most commonly used approaches are applied to this stock assessment.

The assessment is sex-specific, including separate growth curves for males and females, and therefore tracking the spawning biomass of only females for use in calculating management quantities. Further, as has been done in previous canary assessments (and discussed above) natural mortality is allowed to increase (linearly) for females starting at age 6 and reaching an estimated asymptote at age 14, after which mortality is constant. Males and young females are assumed to have a natural mortality of 0.06.

For the internal population dynamics, ages 0-39 are individually tracked, with the accumulator age of 40 determining when the 'plus-group' calculations are applied. As there is little growth occurring at this age and the data are accumulated at age 35, this should be a robust choice (there needs to be enough space between the data 'plus-group' and that of the dynamics to avoid ageing error moving very old fish into observations of younger ages where this is unwarranted).

There are no explicit areas structuring the modeled dynamics of this assessment. No seasons are used to structure removals or biological predictions, so data collection is assumed to be relatively continuous throughout the year. Fishery removals occur instantaneously at the mid-point of each year and recruitment on the 1st of January. Since the time-series is started in 1916, the stock is assumed to be in equilibrium at the beginning of the modeled period. The sex-ratio at birth is fixed at 1:1, although by allowing increased natural mortality on females, size-based selectivity, and dimorphic growth is can vary appreciably due to differential mortality by age and sex.

2.5.7 Estimated and fixed parameters

A full list of all estimated parameters and values of key parameters that are fixed is provided in Table 18.

Time-invariant sex-specific growth is fully estimated in this assessment. This requires nine parameters, with the length at age 1 assumed to be equal for males and females.

The log of the unexploited recruitment level for the Beverton-Holt stock-recruit function is treated as an estimated parameter in this assessment. Recruitment deviations are estimated for each year of the period informed by the data (1960+) based on evaluation of the variance of the early deviations. This approach may underestimate uncertainty in recruitment variability (and therefore derived quantities like spawning biomass) in the early years of the model. However, it provides for an efficient maximum likelihood minimization and may reduce unwarranted patterns in early deviations.

Double-normal selectivity was used for all fishing and survey fleets in the base case model. The initial selectivity parameter was fixed to a value of -9.0 resulting in the smallest length bin always having a derived selectivity value of 0.0. An exception to this was applied to the NWFSC trawl survey, where the initial selectivity was estimated, based on the frequency of small fish relative to all other fleets in the model. The ascending width parameter was estimated for all fleets, as was the peak and final selectivity parameters. For fishing fleets, the width of the flat-top on selectivity was fixed at -4.0, as this parameter is often redundant. For surveys this parameter was estimated. Where estimated selectivity curves were strongly asymptotic, then the descending width parameter was fixed at a value of 4.0 to avoid full redundancy as the estimated final selectivity parameter approached the upper bound and the derived selectivity value for lengths greater than the peak selectivity approached 1.0. For fleets that showed strongly dome-shaped selectivity, the descending width parameter was estimated to allow the ability to fit a greater range of domed shapes. For survey fleets, catchability parameters were directly estimated.

A relatively simple approach to time-blocks was applied. When a time-block was added to the specification for a fleet, three parameters were allowed to vary: the ascending width, the peak and the final selectivity parameter. This was intended to allow flexibility in the full curve (ascending side, location and descending side) with the minimum amount of parameters.

2.6 Model Selection and Evaluation

2.6.1 Key assumptions and structural choices

All structural choices for stock assessment models are likely to be important under some circumstances. In this assessment these choices are generally made to 1) be as objective as possible, and 2) follow generally accepted methods of approaching similar models and data. The relative effect on assessment results of each of these choices is often unknown; however an effort is made to explore alternate choices through sensitivity analysis.

The fleet structure from the 2005 assessment is retained, and as the fundamental organization of the data the choice of how to divide fleets (and therefore what degrees of complexity are feasible for modeling of selectivity) is certainly very important. However, with the ‘mirror’ selectivity curves between fleets, a nested approach can be taken to the complexity of the fleet structure that allows model comparison without necessarily estimating separate selectivity curves for each fleet. This is explored below.

The use of a fixed value for natural mortality for males and young females is also a very important assumption. The effect of this choice was explored through the use of a likelihood profile, but in reality natural mortality is likely to vary over time (and possibly space) and may be non-stationary where predation or environmental factors have directional instead of random patterns during the modeled period.

Growth is assumed to be time-invariant. This is a common assumption that has very important implications for estimation of selectivity and management quantities.

The most important assumption in this model is the use of a point estimate (0.511) for steepness derived from meta-analysis of west coast rockfish species (M. Dorn, AFSC, personal communication). This choice was the subject of extensive exploration prior-to and during the STAR panel and its importance is reflected in the states of nature reported in this document.

2.6.2 Alternate models explored

Many variations on the base case model were explored during this analysis (leading up to and during the STAR panel), only the most relevant and recent of which are reported in this document. Many of these are reported as sensitivity analyses, retrospective analyses, or are based on alternate weightings of the input data. All of these types of runs are described below.

Prior to the STAR panel, a detailed exploration was made to evaluate: 1) the complexity in the number of fleets, 2) the use of time-blocks in selectivity to approximate changes in the fishery, 3) the application of sex-specific selectivity and 4) the use of age-based instead of length-based selectivity.

By forcing the selectivity curve for one or more fleets to be identical to another fleet ('mirroring' in SS2), evaluation of the degradation in fit caused by reducing the fleet complexity is possible. Because this approach is dynamic (the estimated values for selectivity parameters are not manually fixed at the same values for multiple fleets, but are applied to multiple fleets during estimation) the results should be similar to combining the data outside the assessment model. All combinations that were explored produced large degradations in total model likelihood. Combining even relatively minor fleets (with regard to data quality and quantity) still produced substantial degradation in model fit: southern and northern California fleets were combined for recreational (+98 negative log-likelihood units), non-trawl (+84 negative log-likelihood units) and trawl gears (+45 negative log-likelihood units).

A step-wise approach to adding time-varying selectivity parameters was utilized, based on changes in management that, *a priori*, might reasonably induce changes in fishery selectivity, either through fishing behavior or through spatial changes in fishing opportunity. This is in contrast to the 2005 assessment's block structure which was developed through searching for time-periods where parameters could be added to make the largest improvements in model fit. That (somewhat *post-hoc*) approach sought to characterize the removals as accurately as possible, and generally attributed lack-of-fit to process error (change in selectivity) over observation error. That approach led to different time blocks for every fleet in the model (Table 19), some close to regulatory changes, others corresponding more to changes in data availability (the first year of age data available) or just visually identified 'breaks' in the raw observations..

Based on known and likely very influential changes in management, four candidate time-blocks were identified for use in this assessment: 1) 1995, when the first canary-specific trip limits were imposed, 2) 2000, when canary were first managed as overfished and OYs were drastically reduced, 3) 2002, when the Rockfish Conservation Areas (RCA) were first implemented, eliminating large portions of historical fishing grounds from legal rockfish harvest, and 4) 2005, when selectivity flatfish trawl gear was required shoreward of the RCA. The improvement in model fit (in negative log-likelihood) ranged from negligible to 90 units among fleets and time-blocks (Table 20). Those improvements of more than 10 likelihood units are retained in the base case. Three parameters would require at least 6 units of likelihood in a strict likelihood ratio test; however there are many reasons why these tests are not exactly applicable to assessment models and might overestimate the number of parameters needed. This choice was somewhat subjective and could be explored in future assessments. Generally, all but the 2005 block was warranted for addition in one or more fleets, with all but the two California trawl fleets and the northern California recreational fleet requiring one to three time blocks. In aggregate, this approach substantially improved the fit to the compositional data, although at the cost of 36 additional parameters. The ascending width, peak and final selectivity parameters were estimated for each block. A single exception was that, later in model evaluation, the ascending width parameter for the northern California non-trawl fleet was found to be poorly defined and was fixed at a value of 3.5. This had no obvious effect on modeled results or uncertainty about those results.

During the STAR panel, it was generally agreed that including an additional time block for trawl fleets with appreciable data prior to the conversion of older fishing gear to high-rise and larger footrope gear was warranted. Although this transition in gear was not instantaneous, 1979 emerged as a reasonable approximation to the average year for the Oregon and Washington trawl fisheries (California fleets did not have data prior to this period). This block was therefore added to the base case following the approach used for later changes in fishery selectivity.

Given the degree of exploration devoted to sex-specific selectivity curves in the 2005 assessment, it seemed worthwhile to explore how the fit to the data might be improved by adding sex-specific offsets to selectivity (2 parameters, one defining the difference at the peak selectivity, the second the difference at the final selectivity). Previous assessment models found that allowing females to be less selected than males at larger sizes or older ages improved model fit. The results of this exploration did not support addition of selectivity parameters to allow sex specific selectivity; little improvement for any fleet (maximum of -4 units of log-likelihood) was observed (Table 21). On further exploration it was determined that the peak parameters in the 2005 assessment had been fixed, likely due to behavior of the double-logistic used in that version of SS2. With these parameters now estimated, it would appear that this year's assessment model has more ability to match selectivity with dimorphic growth and create sex-specific expectations that are quite consistent with the observed data without the introduction of sex-specific selectivity curves.

A final exploration into age-based selectivity was performed, both with and without offsets allowed for male vs. female selectivity. The results of this exercise were somewhat inconclusive (Table 22): the Oregon and Washington trawl fleets fit better (-34 log likelihood units together), but other fleets showed little change, and survey fleets fit worse (+29 units total). There are many reasons to favor length-based selectivity as a default over age-based selectivity based on biological and fishery processes. Swimming speed, foraging behavior and other physical processes are clearly a function of fish size, as are vulnerability to a specific fishery mesh- or hook-size. Although there may be behaviors that are fundamentally age-based, these are less obviously related to selectivity. It appeared to be inconsistent to have both age-and length based selectivity for relatively similar fleets within the same model, so length-based selectivity was retained throughout.

Many runs were explored estimating steepness with varying degrees of constraint and various selectivity options. These runs were generally very consistent with regard to the model's inability to estimate the quantity. In all cases the estimated value for steepness was very close to 1.0. Values of this magnitude for a long-lived rockfish are quite implausible. That the model has gone from very low estimates of steepness in recent assessments to very high estimates in this assessment likely reflects pathological behavior of age-structured models dealing with relatively noninformative data from a one-way trip and low recruitment variability in general. In the base case model leading up to the STAR panel this parameter was fixed at 0.35, the maximum likelihood value for the survey index data (considered to be the most informative source for this parameter due to the rate of increase in the index of relative abundance). Discussion at the panel resulted in little agreement on whether the information from this series was reliable, however when the decision was made to partition the series into two periods (1980-1992, 1995-2004) the issue became moot as there was no appreciable curvature in the likelihood surface for this component in the profile on steepness. See the likelihood profile section below for more detail on this supporting analysis.

2.6.3 Convergence status

It is the author's experience that convergence testing through use of overdispersed starting values often requires very extreme values to actually explore new areas of the multivariate likelihood surface. For this reason, a good target for convergence testing is to 'jitter' or randomly adjust starting values between reasonable upper and lower bounds by a factor that produces low (~20-40%) rates of successful model estimation. When too much over-dispersion is included the approach is very inefficient, when too little, other minima are unlikely to be identified.

With a large quantity of data from many sources and many selectivity parameters to estimate, this assessment was relatively poorly behaved, and worse, showed many signs of convergence even when the global minimum was not reached. Preliminary convergence trials were performed (prior to the STAR panel) using a 'jitter' value of 0.1 for the base case model. Jitter is an SS2 option which allows the generation of a uniform random number equal to the product of the input value and the range between upper and lower parameter bounds for each parameter. These random numbers are then added to initial parameter values in the input files and the model minimization started at these new conditions. Twenty-five of these trials got close to the global minima, 17 appeared to converge based on inverting the Hessian and small gradients, but only 4 actually reached the global MLE. There are many potentially contributing factors, but this behavior may be primarily due to multivariate parameter correlation and 'ridges' in the likelihood surface making the search difficult. Further, conflicting signal from various data sources can cause shifts that yield very similar results, but with different combinations of parameters or values for specific likelihood components. Results of runs that appeared to converge all showed very similar levels of ending depletion and spawning biomass, suggesting that only very minor components in the likelihood were affecting the last stages of the search algorithm. This exercise was repeated for the final base-case model (after the STAR panel) and did not reveal any new likelihood minima. These results, in conjunction with other convergence checks, indicate that it is likely that the base case model result represents the global minimum.

2.7 Response to STAR panel recommendations

During the STAR panel review a large number of auxiliary analyses were performed to explore data sources, better understand model performance and to converge on a single base case model on which both the STAT and STAR panel were in agreement. These goals were largely achieved, and there were no outstanding disagreements between the STAT and the STAR panel. There were many areas of future research identified.

Basic data exploration focused primarily on the triennial survey and how survey catches may have been influenced by methodological changes. Patterns in catch rate as a function of time of day, and day of the year were both evaluated. Although no conclusive evidence was found for either of these factors to directly affect catch rates for canary rockfish, the large change in triennial survey timing between 1980-1992 and 1995-2004 (Figure 20) was identified as a major concern. The decision was made to allow for changes in catchability between these two periods pending a more thorough evaluation of catch rates of multiple species. Exploration of mean length (and the total mortality rate implied by observed declines in mean length) for various fleets was conducted, as was consistency of length-frequency data with mean weight observations from early (1991-2003) at-sea whiting bycatch. Evaluation of the likelihood contribution of each fleet to profiles on key model output such as steepness, natural mortality, and equilibrium recruitment was made for a series of models intermediate to the original STAT base case and the final base case presented here. Various approaches to determining a value of recruitment variability (σ_r) were applied and consideration was given to consistency of reference points and the time-series of recruitment deviations, as well as potential bias in each method. There was a discussion of calculating reference points based on fishery selectivity and allocation from a period of targeted canary fishing rather than bycatch only. Numerous other sensitivity analyses were also performed.

Specific changes made during the STAR review to the original base case developed by the STAT included:

1) Use uniform priors instead of diffuse normal priors
2) Use the analytic solutions for catchability parameters instead of treating them as free parameters.
3) Include the coast-wide pre-recruit index in the base case.
4) Use the mean of the middle 50% of the steepness prior (0.511) as the base case; consider this value to be twice as likely as the mean of the lower 25% (0.345) and the mean of the upper 25% (0.72) in reporting uncertainty via a ‘states-of-nature’ approach instead of using only the asymptotic intervals and for decision table and rebuilding analyses.
5) Begin recruitment deviations in 1960 instead of the first year of the modeled period (1916).
6) Use a value for recruitment variability (σ_r) of 0.50 reflecting a compromise between the level of variability observed from relatively unconstrained deviations and iterative tuning (instead of 0.30, derived only from iterative tuning).
7) Allow the initial selectivity parameter for the NWFSC survey to be freely estimated.
8) Split the triennial survey time-series into two periods (1980-1992, 1995-2004) with separate catchability parameters.

2.8 Base case model results

The biological parameters estimated from the base case model appear to be quite reasonable and consistent with previous assessments (Table **23**) and inspection of the raw data. Female and male canary rockfish showed similar growth trajectories to about age 10, with females growing to a maximum size (59 cm) that was about 7 cm larger than males

(Table 24, Figure 60). Males are estimated to grow slightly faster than females, with both sexes showing a relatively tight distribution of lengths for a given age and with the relative CV decreasing with age. As in the 2005 assessment, natural mortality for females is estimated to increase from 0.06 at age 6 to 0.097 at age 14 (Figure 61, Table 25). With this difference in sex-specific natural mortality, a male-dominated sex-ratio would be expected for older ages. However, the level of fishing mortality, especially in the last 20 years, has increased the relative proportion of females over that predicted for equilibrium conditions (Figure 62).

Estimated selectivity curves for the NWFSC and triennial surveys were generally similar, although the NWFSC survey selected more small canary (Figure 63). The catchability values for the NWFSC and triennial surveys are much smaller than in the 2005 assessment. This is likely to be primarily a function of the use of GLMM-based time-series, which is smaller on an absolute scale due to accounting for lognormally distributed catch rates. Catchability for fully selected canary in the NWFSC survey was estimated to be 0.114, also 0.114 for the early triennial survey (1980-1992) and 0.054 for the later triennial survey (1995-2004).

Selectivity curves for the various fishing fleets largely showed the expected pattern of trawl fleets capturing the largest canary (Figure 64, Figure 65, and Figure 66), non-trawl fleets mixed (Figure 67, Figure 68, and Figure 69) but still capturing larger fish than the recreational fleets (Figure 70, Figure 71). The new at-sea whiting bycatch fleet captures only very large canary (Figure 69). Values estimated for each of the time blocks also generally make sense: smaller fish are becoming more common in most fleets as management moves them into shallower water. Not all time-blocks conformed to this pattern, with the Oregon-Washington non-trawl fishery 2000-2001 selectivity shifting dramatically to toward smaller fish and then back to larger fish in 2002+ (Figure 69). These patterns follow the small and then larger fish found in the length-frequency distributions for those years (Figure 43). The Washington trawl selectivity in 2000+ selects smaller fish than in previous years, but is very close to asymptotic; the cause of this is unknown (Figure 66).

The base case model was able to fit the survey indices quite well (Figure 72), despite the relatively small contribution to the total likelihood value. The root-mean-squared-error (*rmse*) for the fit to the NWFSC survey is 0.44, the early triennial survey, 0.45 and the late triennial survey 0.05 in log space. These values are close to or larger than the mean input standard errors for each (0.52, 0.43 and 0.05), except that the fit to the late triennial survey was much better than expected (Table 17). The base case model fit the coastwide pre-recruit index slightly worse than the inflated input standard error (0.31 + an additional 0.11 added) with an *rmse* of 0.5 (Figure 73). This lack of fit reflects conflict between other data sources and the index in 2001 and 2002 as well as the contribution of σ_r drawing subsequent recruitments away from the index and toward the stock-recruit expectation.

The base case model fit the length and age distributions from the NWFSC and triennial surveys slightly better than expected based on the input sample sizes (Table 16, Figure 74, Figure 75, Figure 76, and Figure 77). Although there is some lack-of-fit in specific years of the two time-series of length-frequency data (Figure 78, Figure 79), there are no strong trends in the Pearson residuals (Figure 80, Figure 81). The implied fit to the marginal age-frequency data (not included in the likelihood, but used for comparison only) was also reasonably good for both surveys although the data are clearly quite noisy (Figure 82, Figure 83). The Pearson residuals reflect the noise in the data both within and between years (Figure 84, Figure 85). Pearson residuals for the fit to survey conditional age-at-length data are somewhat difficult to interpret, but generally show the effect of small sample-sizes within rows on each year-specific key as well as a few fish that deviate from expected growth pattern dramatically (Figure 86, Figure 87, and Figure 88).

Fits to the fishery length- and age-frequency data required little tuning to make average effective sample sizes equal to or greater than average input sample sizes (Table 16, Appendix A). Fits were varied, but generally reflect the heterogeneity in data quantity and quality among fleets. It is uncertain whether patterns observed in the fit to these data (and residual plots) are a function of heterogeneity in sampling intensity over areas or ports within each fleet (observation error) or more continuous changes in fishery selectivity that is reflected in the size and age of the fish captured (process error).

The estimated recruitment deviations show relatively low variability when compared to other rockfish species, but somewhat higher variability than was observed in the 2005 assessment; the input value for the standard deviation was 0.50 and the *rmse* over the period 1960-2006 was 0.41. The choice of start year is based on the estimated variance for the deviations (Figure 89) showing that the value is very close to σ_r in 1960. Extending the series to earlier years produced little change and standard deviations for the additional deviation near 0.5. There is a period in the late 1980s and early 1990s that shows 10 sequential recruitment deviations above the zero line (Figure 89) and longer time-series of recruitment deviations tended to show some balancing in the very early values to allow for this period. The time-series of estimated recruitments shows a strong relationship with the decline in spawning biomass even with a steepness value of 0.511 (Figure 90). The increased recruitment variability and variance of those recruits (over 2005 estimates) can be seen in the time-series; further, the level of steepness used had a very large effect on the magnitude of the recruitments in the last 20 years, but very little effect prior to that period (Figure 91).

The biomass time series shows a strong decline to the mid-1990s and then a relatively rapid recovery since that time, with increasing uncertainty in the point estimate as the signal regarding recent recruitments from the data becomes weak (Figure 92). The relative magnitude of steepness plays a very large role in this recovery, as all three stats of nature generate similar time-series' prior to the early 1990s but differ by a factor of four in estimated 2007 spawning biomass. Canary rockfish were relatively lightly exploited until the early 1940's, when catches increased and a decline in biomass began. The rate of decline in spawning biomass accelerated during the late 1970s, and finally reached a minimum (13% of unexploited) in the mid 1990s. The canary rockfish spawning stock biomass is estimated to have been increasing since that time, in response to reductions in harvest and above average recruitment in the preceding decade. The estimated relative depletion level in 2007 is 32.4% (~95% asymptotic interval: 24-41%, ~75% interval based on the range of states of nature: 12-56%), corresponding to 10.544 mt (asymptotic interval: 7,776-13,312 mt, states of nature interval: 4,009-17,519) of female spawning biomass in the base model. The time series of population trends for the base case is reported in Table 26, and the uncertainty in Table 27. Predicted numbers at age from the base case for females and males are provided in Table 28 and Table 29.

2.9 Uncertainty and Sensitivity Analysis

The base case assessment model includes parameter uncertainty from a variety of sources, but underestimates the considerable uncertainty in recent trend and current stock status. For this reason, in addition to asymptotic confidence intervals (based upon the model's analytical estimate of the variance near the converged solution), two alternate states of nature regarding stock productivity (via the steepness parameter of the stock-recruitment relationship) are presented. Much additional exploration of uncertainty due to structural choices, other fixed parameters and data weighting was performed prior to the STAR panel. Some of that exploration of other sources of uncertainty is provided below.

2.9.1 Sensitivity analysis

Sensitivity analysis was divided into three general areas of uncertainty: 1) selectivity structural choices, 2) treatment of survey data and 3) exploration of consistency between survey data, length data and age data through increasing the relative emphasis on each.

In model runs prior to the STAR panel, two alternate approaches were considered for the structure of selectivity parameters. For the first, the Washington and Oregon trawl fleets were allowed to have the slightly better-fitting age-based selectivity. This run resulted in a slight increase in the absolute magnitude of spawning biomass in recent years and a slightly higher level of current depletion. As expected from the evaluation of alternate models, the length and age data fit slightly better for these two fleets. The second sensitivity run, explored the choice of *a priori* selected time-blocks vs. those selected to most improve the model fit to compositional data. In this alternate model, those blocks which were not included in the base case model, but had been in the 2005 assessment were added back in. This required the addition of 39 parameters, but did improve the model fit by 219 units of log-likelihood. These changes resulted in a slight reduction in the estimate of current stock levels, more closely matching the results of the 2005 assessment (this sensitivity was conducted with steepness fixed at 0.35).

Three other model runs prior to the STAR panel explored the treatment of survey data relative to the base case model. The first used the design-based estimators instead of the GLMM-based values as the index of relative abundance. This run estimated slightly lower recruitments in recent years, but otherwise had little effect on model results. The second sensitivity run of this set was intended to evaluate whether non-linearity in the triennial survey abundance index (potentially caused by extrapolation into untrawlable habitat, density-dependent changes in distribution of other factors) is an important consideration in this assessment. One additional parameter was added to allow non-linearity in the relationship between vulnerable biomass and expected survey index values. This parameter was estimated to be 0.186 (the power term is 1+estimated parameter) so that the survey is found to be slightly more sensitive to changes in abundance than a linear relationship would allow. However, this had a negligible effect on model results. The third survey-related sensitivity run removed the triennial survey time-series. Other than a slight increase in the estimate of unexploited spawning biomass, this sensitivity also had little effect on model results. In aggregate, these runs showed that the treatment of the survey data is not particularly important for pre-STAR base case model results.

Following the STAR panel two additional sensitivity runs were conducted to evaluate the effects of a) splitting the triennial survey series and b) excluding the pre-recruit index. Retaining the triennial survey series as a single index reduced the estimate of current depletion from 32.4% to 29.3%, but had little additional effect of model predictions (Table 30, Figure 93). Excluding the pre-recruit index reduced the 2002 and 2004 recruitment estimates, but increased 2005 and 2006 as they tended to follow the stock-recruit expectation instead of the lower-than-average values observed in the index itself (Figure 94). It will clearly be many years before this series can be 'validated' through corroboration of recruitment strengths reliably estimated via other types of data.

Additional sensitivity runs on the pre-STAR model were intended only to highlight any inconsistencies in the information content of the main type of data included in this stock assessment, length, age and survey data. To do this, the emphasis (lambda) on each type of data was increased by an order of magnitude (from 1.0 to 10.0). When age data were greatly emphasized, estimates of unexploited spawning biomass decreased substantially, and recent trend was nearly flat, with little recovery evident since the mid-1990s. Greatly increasing the emphasis on the length data had the opposite effect; the estimate of unexploited spawning biomass went up appreciably and recent trend was rapidly increasing. By contrast, increasing the emphasis on only those sources of data from the surveys led to the same early period trend in spawning biomass (indicating this source of information lies in the age data from the one of the surveys) and little change in current stock size. This apparently conflicting signal between the age and length data in the canary assessment was identified in the 2005 assessment and underscores the importance of weighting of data sources.

2.9.2 Retrospective analysis

A retrospective analysis was conducted by running the model using data only through 2003 or 2004, 2005, and 2006 (Figure 95). The results do not show any strong patterns that would be of concern. As would be expected, the signal for recent year classes drops out as more years of data are excluded from the analysis, resulting in the expectation from stock-recruit curve dominating the estimated recruitments (Figure 96).

The second type of retrospective addresses assessment error, or at least the historical context of the current result given previous analyses. The 2007 base case model shows a relative trend over the last 50 years that is very similar to the last 5 canary rockfish stock assessments through the early 1990s (Figure 97). However, after this period the 2007 base case predicts a much more rapid recovery, based primarily on the change in steepness of the stock-recruit function. The 2002 and 2005 assessment results are quite consistent with the state-of-nature using a steepness value of 0.35. Little consistency is apparent in recruitment time-series among assessments, although the general magnitude is reasonably conserved.

2.9.3 Likelihood profiles

The likelihood profile for steepness shows that the best fitting values > 0.7 (Table 31, Figure 98). In the pre-STAR model, the only data source that showed a minimum within the biologically plausible range for steepness was the triennial survey, likely due to the information regarding the decrease and increase in the stock around the mid-1900s. This minimum (0.35) was used as the basis for the pre-STAR base case value used in this assessment. With the triennial survey split into two series, there is now less than one unit of negative log-likelihood difference in the profile values for the survey index likelihood component. This change reflects the loss of linkage between the declining and ascending portions of the series. The value of steepness is highly correlated with the stocks ability to recover in recent years and therefore current depletion level (Figure 99). This was the case in the 2005 assessment as well.

A likelihood profile was calculated for the natural mortality parameter for males and young females using the pre-STAR base case model. Natural mortality governs the basic productivity of the stock and is therefore expected to be correlated with many management quantities. The value used in the base case model (0.06) fit the data slightly worse than a value of 0.07 in terms of total likelihood, but did fit the survey data better than larger or smaller values. Although current depletion was highly correlated with natural mortality, it was not as sensitive to changes in this parameter as to steepness

2.9.4 Parametric bootstrap using SS2

There is a built-in option to create bootstrap data-sets using SS2. This feature creates a parametric bootstrap using the error assumptions and sample sizes from the input data to generate new observations about the fitted model expectations. It is therefore, not a variance estimation exercise, but an exploration of the question: If the assessment was true, and the same relative quantity of data were available, how reliably could the parameters and derived quantities be re-estimated?

This method was applied to the pre-STAR model: replicate data sets (50) were created via the bootstrap and then the (preliminary) base case model was fitted to each. Summary of any quantities in each model is possible, but for this analysis only a few key quantities were considered: unexploited spawning biomass, current (2007) spawning biomass, current depletion and the parameter defining increased natural mortality for old females. The results showed that estimation of the general trend in the canary rockfish stock is reasonably consistent with the available data. However, the degree of increase in female natural mortality tended to be underestimated. Unexploited spawning biomass was slightly overestimated and 2007 spawning biomass was underestimated, with the net result of the two being that current depletion tends to be slightly underestimated. All of these biases were well within the reasonable range of the confidence intervals for each quantity.

3. Rebuilding parameters

The rebuilding projections will be presented in a separate document after the assessment has been reviewed in September 2007. The base case assessment model includes parameter uncertainty from a variety of sources, but still likely underestimates the true uncertainty in recent trend and current stock status. For this reason, the three states of nature for stock-recruit steepness will be resampled in proportion to their relative probability and combined for the rebuilding analysis, similar to the approach taken in the 2005 assessment. This will allow the rebuilding analysis will incorporate a broader range of uncertainty by including uncertainty in the fixed value for steepness as well as annual variability in future recruitments.

4. Reference points

The abundance of canary rockfish was estimated to have dropped below the $SB_{40\%}$ management target in 1981 and the overfished threshold in 1987. In hindsight, the spawning stock biomass passed through the target and threshold levels at a time when the annual catch was averaging more than twice the current estimate of the MSY. The stock remains below the rebuilding target, although the spawning stock biomass appears to have been increasing since 1999 (Figure 100). The degree of increase is very sensitive to the value for steepness (state of nature), and is projected to slow as recent (and below average) recruitments begin to contribute to the spawning biomass. The estimated relative depletion level in 2007 is 32.4% (~95% asymptotic interval: 24-41%, ~75% interval based on the range of states of nature: 12-56%), corresponding to 10,544 mt (asymptotic interval: 7,776-13,312 mt, states of nature interval: 4,009-17,519) of female spawning biomass in the base model. Fishing mortality rates in excess of the current F-target for rockfish of $SPR_{50\%}$ are estimated to have begun in the late 1970s and persisted through 1999 (Figure 101, Figure 102, Figure 104, Figure 103, and Figure 105). Recent management actions appear to have curtailed the rate of removal such that overfishing has not occurred since 1999, and recent SPR values are in excess of 95%. Relative exploitation rates (catch/biomass of age-5 and older fish) are estimated to have been less than 1% since 2001. These patterns are largely insensitive to the three states of nature.

Unfished spawning stock biomass was estimated to be 32,561 mt in the base case model. This is slightly smaller than the equilibrium value estimated in the 2005 assessment. The target stock size ($SB_{40\%}$) is therefore 13,024 mt. Maximum sustained yield (MSY) applying current fishery selectivity and allocations (a 'bycatch-only' scenario) was estimated in the assessment model to occur at a spawning stock biomass of 12,394 mt and produce an MSY catch of 1,169 mt (SPR = 52.9%). This is nearly identical to the yield, 1,167 mt, generated by the SPR (54.4%) that stabilizes the stock at the $SB_{40\%}$ target. The fishing mortality target/overfishing level (SPR = 50.0%) generates a yield of 1,161 mt at a stock size of 11,161 mt.

When selectivity and allocation from the mid 1990s (1994-1998) was applied, to mimic reference points under a targeted fishery scenario, the yield increased to 1,578 mt from a slightly smaller stock size (12,211 mt), but a similar rate of exploitation (SPR=52.5%). Similar increases are observed in the other reference points (Figure 106). This is due to higher relative selection of older and larger fish when the fishery was targeting instead of avoiding canary rockfish. These values are appreciably higher than those from previous assessment models due primarily to the difference in steepness.

As suggested by the STAR panel, the 'dynamic' unexploited spawning biomass calculation was performed for comparison with the current 'static' approach. The dynamic calculation consists of eliminating the catch time-series, and re-running the model without re-estimating any of the parameters (but starting from the maximum likelihood values). This run generates a time-series of spawning biomass estimates that can be interpreted as the level that would have occurred in the absence of fishing, conditioned on the model parameters and stock-recruitment relationship. By calculating relative depletion based on the spawning biomass estimated from each year of this series, an alternate view of the effect of fishing on the stock can be constructed. In the case of canary, the results of the two estimators are quite similar, the differences reflecting periods of relatively poor recruitment (the dynamic depletion tends to be higher than the static value as these recruitments move through the spawning biomass) or good recruitment (the dynamic depletion tends to be lower than the static value following these periods, such as has been observed in the most recent years (Figure 107).

5. Harvest projections and decision tables

The forecast reported here will be replaced by the rebuilding analysis to be completed following SSC review of the stock assessment. In the interim, the total catch in 2007 and 2008 is set equal to the OY (44 mt). The exploitation rate for 2009 and beyond is based upon an SPR of 88.7%, which approximates the harvest level in the current rebuilding plan. Uncertainty in the rebuilding forecast will be based upon the three states of nature for steepness and random variability in future recruitment deviations for each rebuilding simulation. Current medium-term forecasts predict slow increases in abundance and available catch, with OY values for 2009 and 2010 increasing by nearly four times the value of 44 mt from the 2005 assessment (Table 32). This is largely attributable to the revised perception of steepness, based on meta-analysis of other rockfish species.

Because canary rockfish is currently managed under a rebuilding plan, a decision table is presented only intended to better compare and contrast the base case with uncertainty among states of nature (Table 33). The results of the rebuilding plan will integrate these three states of nature as well as projected recruitment variability. Further, various alternate probabilities of rebuilding by target and limit time-periods as well as fishing mortality rates will be evaluated in the rebuilding analysis. Relative probabilities of each state of nature are based on a meta-analysis for steepness of west coast rockfish (M. Dorn, AFSC, personal communication). Landings in 2007-2008 are 44 mt for all cases. Selectivity and fleet allocations are projected at the average 2003-2006 values.

6. Regional management considerations

The resource is modeled as a single stock. Spatial aspects of the coast-wide population are addressed through geographic separation of data sources/fleets where possible and consideration of residual patterns that may be a result of inherent stock structure. There is currently no genetic evidence that there are distinct biological stocks of canary rockfish off the U.S. coat and very limited tagging data to describe adult movement, which may be significant across depth and latitude. Future efforts to specifically address regional management concerns will require a more spatially explicit model that likely includes the portion of the canary rockfish stock residing in Canadian waters off Vancouver Island.

7. Research needs

Progress on a number of research topics would substantially improve the ability of this assessment to reliably and precisely model canary rockfish population dynamics in the future and provide better monitoring of progress toward rebuilding:

1. Expanded Assessment Region: Given the high occurrence of canary rockfish close to the US-Canada border, a joint US-Canada assessment should be considered in the future.
2. Many assessments are deriving historical catch by applying various ratios to the total rockfish catch prior to the period when most species were delineated. A comprehensive historical catch reconstruction for all rockfish species is needed, to compile a best estimated catch series that accounts for all the catch and makes sense for the entire group.
3. Habitat relationships: The historical and current relationship between canary rockfish distribution and habitat features should be investigated to provide more precise

estimates of abundance from the surveys, and to guide survey augmentations that could better track rebuilding through targeted application of newly developed survey technologies. Such studies could also assist determining the possibility of dome-shaped selectivity, aid in evaluation of spatial structure and the use of fleets to capture geographically-based patterns in stock characteristics.

4. Meta-population model: The spatial patterns show patchiness in the occurrence of large vs. small canary; reduced occurrence of large/old canary south of San Francisco; and concentrations of canary rockfish near the US-Canada border. The feasibility of a meta-population model that has linked regional sub-populations should be explored as a more accurate characterization of the coast-wide population's structure. Tagging of other direct information on adult movement will be essential to this effort.
5. Increased computational power and/or efficiency is required to move toward fully Bayesian approaches that may better integrate over both parameter and model uncertainty.
6. Additional exploration of surface ages from the late 1970s and inclusion into or comparison with the assessment model, or re-aging of the otoliths could improve the information regarding that time period when the stock underwent the most dramatic decline. Auxiliary biological data collected by ODFW from recreational catches and hook-and-line projects may also increase the performance of the assessment model in accurately estimating recent trends and stock size.
7. Due to inconsistencies between studies and scarcity of appropriate data, new data is needed on both the maturity and fecundity relationships for canary rockfish.
8. Re-evaluation of the pre-recruit index as a predictor of recent year class strength should be ongoing as future assessments generate a longer series of well-estimated recent recruitments to compare with the coast-wide survey index.
9. Meta-analysis or other summary of the degree of recruitment variability and the relative steepness for other rockfish and groundfish stocks should be ongoing, as this information is likely to be very important for model results (as it is here) in the foreseeable future.

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9. Literature cited

Alverson, D. L. 1956. An appraisal of the fish ticket system in respect to the Washington otter-trawl fishery. Washington Department of Fisheries Fisheries Research Papers **1**:59-69.

Alverson, D. L., A. T. Pruter, and L. L. Ronholt. 1964. A study of the demersal fishes and fisheries of the northeastern Pacific Ocean. H.R. MacMillan Lectures in Fisheries.

Anonymous. 1947. Oregon trawl fish landings, Washington trawl fish landings -- 1930 to 1946. Pages p. 263, 273 *in* Pacific Fisherman Yearbook.

Anonymous. 1957. Oregon trawl fish landings - 1956. Pages p. 213 *in* Pacific Fisherman Yearbook.

Anonymous. 1970a. 22nd annual report of the Pacific Marine Fisheries Commisson. Pacific Marine Fisheries Commission, Portland, Oregon.

Anonymous. 1970b. Oregon landings of selected fish and shellfish. Pages 149 *in* National Fisherman.

Anonymous. 1971. 23rd annual report of the Pacific Marine Fisheries Commission. Pacific Marine Fisheries Commission, Portland, Oregon.

Archibald, C. P., W. Shaw, and B. M. Leaman. 1981. Growth and mortality estimates of rockfishes (Scorpaenidae) from B.C. coastal waters, 1977-1979. Canadian Technical Report of Fisheries and Aquatic Sciences **1048**:57 p.

Boehlert, G. W. 1980. Size composition, age composition, and growth of canary rockfish, *Sebastes pinniger*, and splitnose rockfish, *S. diploproa*, from the 1977 rockfish survey. Marine Fisheries Review **42**:57-63.

Boehlert, G. W., and M. M. Yoklavich. 1984. Variability in age estimates in *Sebastes* as a function of methodology, different readers, and different laboratories. California Fish and Game **70**:210-224.

Bureau of Commercial Fisheries. 1949. The commercial fish catch of California for the year 1947 with an historical review 1916-1947. California Fish and Game Fish Bulletin **74**:1-273.

Clark, G. H. 1935. San Francisco trawl fishery. California Fish and Game **21**:22-37.

Cleaver, F. C. 1951. Fisheries statistics of Oregon. Oregon Fish Commission **16**:1-175.

Crone, P. R. 1995. Sampling design and statistical considerations for the commercial groundfish fishery of Oregon. Canadian Journal of Fisheries and Aquatic Sciences **52**:716-732.

Crone, P. R., K. Piner, R. D. Methot, R. J. Conser, and T. Builder. 1999. Status of the canary resource off Oregon and Washington in 1999. *in* Status of the Pacific coast groundfish fishery through 1998 and recommended acceptable biological catches for 1999: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.

Dark, T. A., and M. E. Wilkins. 1994. Distribution, abundance and biological characteristics of groundfish off the coast of Washington, Oregon and California, 1977-1986. NOAA Technical Report NMFS **117**:1-73.

Daspit, W. P., P. R. Crone, and D. B. Sampson. 1997. Pacific fisheries information network. Pages 147-166 *in* D. B. Sampson and P. R. Crone, editors. Commercial fisheries data collection procedures for U. S. Pacific coast groundfish, NOAA Technical Memorandum NMFS-NWFSC-31.

DeMott, G. E. 1983. Movement of tagged lingcod and rockfishes off Depoe Bay, Oregon. M.Sc. Thesis. Oregon State University. 55 p.
Fish and Wildlife Service. 1943. Pacific Coast Fisheries - 1942. Current Fishery Statistics **180**.
Fish and Wildlife Service. 1944. Pacific Coast Fisheries - 1943. Current Fishery Statistics **276**.
Fish and Wildlife Service. 1945. Pacific Coast Fisheries - 1944. Current Fishery Statistics **332**.
Fish and Wildlife Service. 1946. Pacific Coast Fisheries - 1945. Current Fishery Statistics **385**.
Fish and Wildlife Service. 1947. Pacific Coast Fisheries - 1946. Current Fishery Statistics **481**.
Fish and Wildlife Service. 1948. Pacific Coast Fisheries - 1947. Current Fishery Statistics **488**.
Fish and Wildlife Service. 1949. Pacific Coast Fisheries - 1948. Current Fishery Statistics **580**.
Fish and Wildlife Service. 1950. Pacific Coast States Fisheries - 1949. Current Fishery Statistics **653**.
Fish and Wildlife Service. 1951. Pacific Coast States Fisheries - 1950. Current Fishery Statistics **764**.
Fish and Wildlife Service. 1952. Pacific Coast States Fisheries - 1951. Current Fishery Statistics **876**.
Fish and Wildlife Service. 1953. Pacific Coast States Fisheries - 1952. Current Fishery Statistics **1026**.
Fish and Wildlife Service. 1954. Pacific Coast States Fisheries - 1953. Current Fishery Statistics **1188**.
Fish and Wildlife Service. 1955. Pacific Coast States Fisheries - 1954. Current Fishery Statistics **1366**.
Fish and Wildlife Service. 1956. Pacific Coast States Fisheries - 1955. Current Fishery Statistics **1580**.
Fish and Wildlife Service. 1958. Pacific Coast States Fisheries - 1957. Current Fishery Statistics **1961**.
Fish and Wildlife Service. 1959. Pacific Coast States Fisheries - 1958. Current Fishery Statistics **2205**.
Fish and Wildlife Service. 1960. Pacific Coast States Fisheries - 1959. Current Fishery Statistics **2441**.
Fish and Wildlife Service. 1961. Pacific Coast States Fisheries - 1960. Current Fishery Statistics **2795**.
Fish and Wildlife Service. 1962. Pacific Coast Fisheries - 1961. Current Fishery Statistics **3122**.
Fish and Wildlife Service. 1963. Pacific Coast Fisheries - 1962. Current Fishery Statistics **3449**.
Fish and Wildlife Service. 1964. Pacific Coast Fisheries - 1963. Current Fishery Statistics **3694**.
Fish and Wildlife Service. 1965. Pacific Coast Fisheries - 1964. Current Fishery Statistics **4002**.

Golden, J. T., and R. L. Demory. 1984. A progress report on the status of canary rockfish (*Sebastes pinniger*) in the INPFC Vancouver, Columbia, and Eureka areas in 1984. *in* Status of the Pacific coast groundfish fishery and recommendations for management in 1985. Pacific Fishery Management Council, Portland, Oregon.

Golden, J. T., and C. Wood. 1990. Status of canary rockfish in the INPFC Vancouver. Columbia and Eureka areas and recommended ABC for 1991. *in* Status of the Pacific coast groundfish fishery through 1990 and recommended acceptable biological catches for 1991: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.

Gomez-Uchida, D., E. A. Hoffman, R. Ardren, and M. A. Banks. 2003. Microsatellite markers for the heavily exploited canary (*Sebastes pinniger*) and other rockfish species. Molecular Ecology Notes **3**:387-389.

Gunderson, D. R., P. Callahan, and B. Goiney. 1980. Maturation and fecundity of four species of *Sebastes*. Marine Fisheries Review **42**:74-79.

Gunderson, D. R., and T. M. Sample. 1980. Distribution and abundance of rockfish off Washington, Oregon, and California during 1977. Marine Fisheries Review **42**:2-16.

Hannah, R. W., and S. A. Jones. 2007. Effectiveness of bycatch reduction devices (BRDs) in the ocean shrimp (*Pandalus jordani*) trawl fishery. Fisheries Research **85**:217-225.

Harry, G. Y., Jr., and A. R. Morgan. 1961. History of the Oregon trawl fishery, 1884-1961. Fish Commission of Oregon Research Briefs **9**:5-26.

Hart, J. L. 1973. Pacific Fishes of Canada, Fisheries Research Board of Canada, Bulletin 180. St. Andrews, N.B., Canada. 740 p.

Jagielo, T. H., and F. R. Wallace. 2005. Assessment of lingcod (*Ophiodon elongatus*) for the Pacific Fishery Management Council in 2005.

King, S. E., R. W. Hannah, S. J. Parker, K. M. Matteson, and S. A. Berkeley. 2004. Protecting rockfish through gear design: development of a selective flatfish trawl for the U.S. west coast bottom trawl fishery. Canadian Journal of Fisheries and Aquatic Sciences **61**:487-496.

Love, M. S., M. Yoklavich, L. Thorsteinson, and J. Butler. 2002. The rockfishes of the northeast Pacific. University of California Press, Berkeley.

Mantua, N. J., S. R. Hare, Y. Zhang, J. R. Wallace, and R. C. Francis. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bulletin of the American Meteorological Society **78**:1069-1079.

Meierjurgen, H. P., E. G. Huffschmidt, L. N. Hall, and R. W. Schoning. 1966. Biennial report July 1, 1964 - June 30, 1966. Fish Commission of Oregon, Portland, Oregon.

Methot, R. D. 1989. Synthetic estimates of historical abundance and mortality for northern anchovy. American Fisheries Society Symposium **6**:66-82.

Methot, R. D. 2000. Technical description of the Stock Synthesis assessment program. National Marine Fisheries Service, Seattle.

Methot, R. D. 2005. Technical description of the Stock Synthesis II assessment program.

Methot, R. D. 2007. User manual for the integrated analysis program Stock Synthesis 2 (SS2): Model version 2.00a.

Methot, R. D., and K. Piner. 2002. Status of the canary rockfish resource off California, Oregon and Washington in 2001. *in* Status of the Pacific coast groundfish fishery

through 2002: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.
Methot, R. D., and I. J. Stewart. 2005. Status of the U.S. canary rockfish resource in 2005.
Miller, D. J., and R. N. Lea. 1972. Guide to the coastal marine fishes of California.
O'Connell, V., C. Brylinsky, and D. Carlile. 2005. Chapter 13: Assessment of the demersal shelf rockfish for 2006 in the southeast outside district of the Gulf of Alaska. Pages 781-823 *in* Stock assessment and fishery evaluation report fot the groundfish resources of the Gulf of Alaska. North Pacific Fishery Management Council.
O'Connell, V., and D. Carlile. 2006. 13 Demersal shelf rockfishes (executive summary). Pages 399-405 *in* Appendix B Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska. North Pacific Fishery Management Council.
Otter Research Ltd. 2005. An introduction to AD Model Builder Version 7.1.1 for use in nonlinear modeling and statistics. *in*, Sidney, B.C., Canada.
Pacific Fishery Management Council. 2002. Status of the Pacific coast groundfish fishery through 2001 and acceptable biological catches for 2002: Stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland Oregon.
Phillips, J. B. 1964. Life history studies on ten species of rockfish (Genus Sebastodes). California Fish and Game Fish Bulletin **126**:70 p.
Piner, K. R., O. S. Hamel, J. L. Menkel, J. R. Wallace, and C. E. Hutchinson. 2005. Age validation of canary rockfish (*Sebastes pinniger*) from off the Oregon coast (USA) using the bomb radiocarbon method. Canadian Journal of Fisheries and Aquatic Sciences **62**:1060-1066.
Rogers, J. B. 2003. Species allocation of *Sebastes* and *Sebastolobus* sp. caught by foreign countries from 1965 through 1976 off Washington, Oregon, and California, USA. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-57, 117 p.
Rogers, J. B. 2005. Status of the darkblotched rockfish (*Sebastes crameri*) resource in 2005.
Sampson, D. B. 1996. Stock status of canary rockfish off Oregon and Washington in 1996. *in* Status of the Pacific coast groundfish fishery through 1996 and recommended acceptable biological catches for 1997: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.
Sampson, D. B., and P. R. Crone. 1997. Commercial fisheries data collection procedures for U.S. Pacific coast groundfish. NOAA Technical Memorandum NMFS-MWFSC-31.
Sampson, D. B., and E. M. Stewart. 1994. Status of the canary rockfish resource off Oregon and Washington in 1994. *in* Status of the Pacific coast groundfish fishery through 1994 and recommended acceptable biological catches for 1995: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.
Scofield, W. L. 1948. Trawling gear in California. California Fish and Game Fish Bulletin **72**:1-50.
Smith, H. S. 1956. Fisheries statistics of Oregon 1950-1953. Fish Commission of Oregon **22**.
Stanley, R. D., P. Starr, N. Olsen, K. Rutherford, and S. S. Wallace. 2005. Status report on canary rockfish, *Sebastes pinniger*. Canadian Science Advisory Secratariat Research Document 2005/089.
Wallace, J. R., and H.-L. Lai. 2005. Status of the yellowtail rockfish in 2004.

Ware, D. M., and G. A. McFarlane. 1989. Fisheries production domains in the northeast Pacific Ocean. Pages 359-379 *in* R. J. Beamish and G. A. McFarlane, editors. Effects of ocean variability on recruitment and an evaluation of parameters used in stock assessment models. Canadian Special Publication of Fisheries and Aquatic Sciences 108.

Weinberg, K. L., M. E. Wilkins, F. R. Shaw, and M. Zimmermann. 2002. The 2001 Pacific west coast bottom trawl survey of groundfish resources: estimates of distribution, abundance, and length and age composition. U. S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-128. 140 p. + Appendices.

Williams, E. H., S. Ralston, A. D. MacCall, D. Woodbury, and D. E. Pearson. 1999. Stock assessment of the canary rockfish resource in the waters off southern Oregon and California in 1999. *in* Status of the Pacific coast groundfish fishery through 1998 and recommended acceptable biological catches for 1999: stock assessment and fishery evaluation. Pacific Fishery Management Council, Portland, Oregon.

Wishard, L. N., F. M. Utter, and D. R. Gunderson. 1980. Stock separation of five rockfish species using naturally occurring biochemical genetic markers. Marine Fisheries Review **42**:64-73.

Zimmermann, M., M. E. Wilkins, K. L. Weinberg, R. R. Lauth, and F. R. Shaw. 2001. Retrospective analysis of suspiciously small catches in the National Marine Fisheries Service west coast triennial bottom trawl survey. NOAA Proc. Rep. 2001-03.

10. Tables

Table 1. Recent trend in estimated total canary rockfish catch and commercial landings (mt) relative to management guidelines.

Year	ABC (mt)	OY (mt)	Landings (mt)[1]	Total Catch (mt)
1997	1,220[2]	1,000[2]	1,113.8	1,478.8
1998	1,045[2]	1,045[2]	1,182.4	1,494.2
1999	1,045[2]	857[2]	665.7	898.0
2000	287	200	60.6	208.4
2001	228	93	42.8	133.6
2002	228	93	48.6	106.8
2003	272	44	8.5	51.0
2004	256	47.3	10.7	46.5
2005	270	46.8	10.9	51.4
2006	279	47	8.2	47.1

[1]Excludes all at-sea whiting, recreational and research catches.
[2]Includes the Columbia and Vancouver INPFC areas only.

Table 2. Summary of data sources available in 2007. "X" denotes data used in 2005, "N" denotes new data.

	1916-1927	1928-1931	1932-1949	1950-1965	1966-1967	1968-1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Catches																																								
S. CA trawl												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
N. CA trawl	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
OR trawl		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
WA trawl			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
S. CA non-trawl												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
N. CA non-trawl	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
OR/WA non-trl																				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
S. CA Rec.														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
N. CA Rec.				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
OR/WA Rec.									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
At-sea whiting																									X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
Foreign					X	X	X	X	X	X																														
Research											X			X			X			X			X			X			X			X			X		X	X	N	N
WCGOP discards																																			X	X	X	X	N	N
Fishery Data																																								
Age																																								
S. CA trawl														X	X		X	X	X																	X	X			
N. CA trawl														X	X	X	X	X	X		X														X	X	X			
OR trawl														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
WA trawl														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
OR/WA non-trl																															X	X		X	X	X		X	N	N
WCGOP discards																																						N	N	
At-sea whiting																																					N	N	N	
Length																																								
At-sea whiting																																					N	N	N	N
S. CA trawl												X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	
N. CA trawl												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
OR trawl							X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
WA trawl						X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
S. CA non-trawl												X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X					
N. CA non-trawl															X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X	X			
OR/WA non-trl														X								X		X						X	X	X	X	X	X	X		X		N
S. CA Rec.														X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	N	N

Table 2. Continued. Summary of data sources available in 2007. “X” denotes data used in 2005, “N” denotes new data.

	1916 - 1927	1928 - 1931	1932 - 1949	1950 - 1965	1966 - 1967	1968 - 1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Fishery Data																																								
Length																																								
N. CA Rec.														X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	N	N
OR/WA Rec.														X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X			
WCGOP discards																																			N	N	N	N	N	N
Survey data																																								
Index																																								
Triennial survey														X			X			X			X			X			X			X			X			X		
NWFSC survey																																					N	N	N	N
Pre-recruit index																																			N	N	N	N	N	N
Age																																								
Triennial survey																	X						X			X			X						X			X		
NWFSC survey																																					N	N	N	N
Length																																								
Triennial survey																	X			X			X			X			X			X			X			X		
NWFSC survey																																					N	N	N	N
For comparison																																								
PGCT hook-and-line																																							N	N
YOY core area																	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N
NWFSC Hook and Line																																						N	N	N
N. CA trawl CPUE																X	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
OR/WA Rec.																																	N	N	N					
N. CA Rec. CPFV CPUE																					X	X	X	X	X	X	X	X	X	X	X	X								

Table 3. Summary of sampling used in the calculation of biomass indices for the shelf trawl surveys.

	Triennial		NWFSC	
Year	Number of tows	Positive tows	Number of tows	Positive tows
1980	314	77	NA	NA
1983	493	185	NA	NA
1986	484	169	NA	NA
1989	452	93	NA	NA
1992	431	69	NA	NA
1995	450	43	NA	NA
1998	479	86	NA	NA
2001	474	74	NA	NA
2003	NA	NA	558	50
2004	383	63	497	41
2005	NA	NA	674	56
2006	NA	NA	652	32

Table 4. The GLMM-based survey indices of biomass (median posterior values, mt) by strata. Strata with both surveys available include both indices (Triennial/NWFSC). Note that strata-specific values represent the marginal medians and so do not add to the integrated total.

					Total	
Year	Conception-Monterey	Eureka	Columbia	US Vancouver	Triennial	NWFSC
1980	139.4	257.9	1,079.5	392.7	1,969.4	NA
1983	737.0	295.0	1,602.1	1,065.8	3,768.4	NA
1986	188.4	551.9	1,035.5	523.5	2,419.7	NA
1989	313.3	131.0	592.3	573.7	1,691.3	NA
1992	53.5	23.3	361.2	93.5	558.3	NA
1995	90.4	47.0	299.7	34.4	505.8	NA
1998	146.2	70.3	249.6	131.7	631.4	NA
2001	77.5	118.7	423.6	117.7	764.3	NA
2003	164.9	243.1	672.3	630.5	NA	1,845.5
2004	142.5/354.4	129.5/83.8	589.6/591.2	111.0/526.5	1,016.7	1,768.0
2005	353.5	368.4	424.1	566.3	NA	1,912.8
2006	129.6	655.1	266.8	3901.1	NA	5,387.4

Table 5. Summary of data used to produce NWFSC survey length and age-at-length frequencies.

	Length data		Age-at-length data	
Year	Number of Samples	Number of fish	Number of samples	Number of Fish
2003	50	423	48	262
2004	41	550	41	288
2005	56	622	55	277
2006	32	623	32	247

Table 6. Summary of data used to produce triennial survey length and age-at-length frequencies.

	Length data		Age-at-length data	
Year	Number of samples	Number of fish	Number of samples	Number of Fish
1983	44	3,064	21	1,627
1986	44	2,544	0	0
1989	77	1,411	20	254
1992	34	407	9	176
1995	41	616	37	241
1998	84	422	0	0
2001	74	398	74	367
2004	62	412	60	211

Table 7. Summary of fixed biological parameters used in this stock assessment

Quantity	Value	Source
Natural mortality	0.06	All canary assessments since 1994, males and females < age 6, with a linear ramp to an estimated value for females age 14+.
Weight-length coefficient (*a*)	0.0000155	2005 assessment, pooled over both sexes from fishery and survey data combined.
Weight-length exponent (*b*)	3.03	
Length at 50% maturity	40.5	2005 assessment Oregon and Washington trawl fisheries sampled during fall and winter months only.
Maturity logistic slope	-0.25	
Fecundity eggs/gram intercept	1.0	No fecundity relationship available, so weight is assumed to be a reasonable proxy.
Fecundity slope	0.0	

Table 8. Estimates of ageing bias (mean observed age at true age) and precision (SD of observed age at true age) for CAP and WDFW break-and-burn reads as well as surface reads.

	CAP			WDFW		Surface	
True age	Obs. age	SD	Obs. age (radiocarbon study, not used in model)	Obs. age	SD	Obs. age	SD
0.50	0.50	0.10	0.50	0.50	0.11	0.50	0.17
1.50	1.42	0.10	1.41	1.50	0.11	1.42	0.17
2.50	2.34	0.20	2.32	2.50	0.23	2.34	0.33
3.50	3.26	0.29	3.22	3.50	0.34	3.33	0.50
4.50	4.17	0.39	4.13	4.50	0.45	4.60	0.67
5.50	5.09	0.49	5.04	5.50	0.56	5.81	0.83
6.50	6.01	0.59	5.95	6.50	0.68	6.95	1.00
7.50	6.93	0.68	6.85	7.50	0.79	8.04	1.17
8.50	7.85	0.78	7.76	8.50	0.90	9.08	1.34
9.50	8.77	0.88	8.67	9.50	1.02	10.07	1.50
10.50	9.69	0.98	9.58	10.50	1.13	11.01	1.67
11.50	10.61	1.07	10.49	11.50	1.24	11.91	1.84
12.50	11.52	1.17	11.39	12.50	1.36	12.76	2.00
13.50	12.44	1.27	12.30	13.50	1.47	13.57	2.17
14.50	13.36	1.37	13.21	14.50	1.58	14.34	2.34
15.50	14.28	1.47	14.12	15.50	1.69	15.07	2.50
16.50	15.20	1.56	15.02	16.50	1.81	15.77	2.67
17.50	16.12	1.66	15.93	17.50	1.92	16.43	2.84
18.50	17.04	1.76	16.84	18.50	2.03	17.06	3.00
19.50	17.96	1.86	17.75	19.50	2.15	17.66	3.17
20.50	18.87	1.95	18.66	20.50	2.26	18.24	3.34
21.50	19.79	2.05	19.56	21.50	2.37	18.78	3.50
22.50	20.71	2.15	20.47	22.50	2.48	19.17	3.67
23.50	21.63	2.25	21.38	23.50	2.60	19.64	3.84
24.50	22.55	2.34	22.29	24.50	2.71	20.10	4.01
25.50	23.47	2.44	23.20	25.50	2.82	20.53	4.17
26.50	24.39	2.54	24.10	26.50	2.94	20.93	4.34
27.50	25.31	2.64	25.01	27.50	3.05	21.32	4.51
28.50	26.22	2.74	25.92	28.50	3.16	21.69	4.67
29.50	27.14	2.83	26.83	29.50	3.27	22.04	4.84
30.50	28.06	2.93	27.73	30.50	3.39	22.37	5.01
31.50	28.98	3.03	28.64	31.50	3.50	22.69	5.17
32.50	29.90	3.13	29.55	32.50	3.61	22.99	5.34
33.50	30.82	3.22	30.46	33.50	3.73	23.28	5.51
34.50	31.74	3.32	31.37	34.50	3.84	23.56	5.67
35.50	32.66	3.42	32.27	35.50	3.95	23.82	5.84
36.50	33.57	3.52	33.18	36.50	4.07	24.02	6.01
37.50	34.49	3.61	34.09	37.50	4.18	24.22	6.17
38.50	35.41	3.71	35.00	38.50	4.29	24.42	6.34
39.50	36.33	3.81	35.90	39.50	4.40	24.62	6.51
40.50	37.25	3.91	36.81	40.50	4.52	24.82	6.68

Table 9. Total catches (mt) of canary rockfish by fleet used in the assessment model. Foreign catches are included in state trawl fisheries. See text for description of sources.

Year	S. CA trawl / N. CA trawl	Oregon trawl	WA trawl	S. CA non-trawl / N. CA non-trawl	OR-WA non-trawl	At-sea whiting bycatch	S. CA rec. / N. CA rec.	OR/WA rec.	Research catches
1916	397.05	0.00	0.00	76.81	0.00	0.00	0.00	0.00	0.00
1917	627.50	0.00	0.00	121.39	0.00	0.00	0.00	0.00	0.00
1918	665.34	0.00	0.00	128.70	0.00	0.00	0.00	0.00	0.00
1919	435.72	0.00	0.00	84.29	0.00	0.00	0.00	0.00	0.00
1920	454.69	0.00	0.00	87.96	0.00	0.00	0.00	0.00	0.00
1921	384.35	0.00	0.00	74.35	0.00	0.00	0.00	0.00	0.00
1922	348.06	0.00	0.00	67.33	0.00	0.00	0.00	0.00	0.00
1923	411.39	0.00	0.00	79.58	0.00	0.00	0.00	0.00	0.00
1924	382.84	0.00	0.00	74.06	0.00	0.00	0.00	0.00	0.00
1925	443.03	0.00	0.00	85.70	0.00	0.00	0.00	0.00	0.00
1926	608.69	0.00	0.00	117.75	0.00	0.00	0.00	0.00	0.00
1927	515.84	0.00	0.00	99.78	0.00	0.00	0.00	0.00	0.00
1928	518.20	8.16	0.00	100.24	0.00	0.00	0.00	0.00	0.00
1929	487.25	14.19	0.00	94.25	0.00	0.00	0.00	0.00	0.00
1930	583.22	13.14	0.00	112.82	0.00	0.00	0.00	0.00	0.00
1931	587.44	10.06	0.00	113.64	0.00	0.00	0.00	0.00	0.00
1932	454.95	3.69	0.04	88.01	0.00	0.00	0.00	0.00	0.00
1933	386.46	5.39	0.00	74.76	0.00	0.00	0.00	0.00	0.00
1934	371.63	5.86	0.30	71.89	0.00	0.00	0.00	0.00	0.00
1935	389.96	5.40	2.30	75.43	0.00	0.00	0.00	0.00	0.00
1936	371.62	13.41	2.96	71.89	0.00	0.00	0.00	0.00	0.00
1937	346.38	17.03	2.64	67.00	0.00	0.00	0.00	0.00	0.00
1938	293.58	15.47	3.90	56.79	0.00	0.00	0.00	0.00	0.00
1939	269.04	11.49	4.09	52.04	0.00	0.00	0.00	0.00	0.00
1940	288.21	68.56	9.05	55.75	0.00	0.00	0.00	0.00	0.00
1941	274.89	144.08	3.39	53.18	0.00	0.00	0.00	0.00	0.00
1942	114.41	210.19	65.81	22.27	0.00	0.00	0.00	0.00	0.00
1943	222.74	766.49	212.71	42.52	0.00	0.00	0.00	0.00	0.00
1944	518.38	1,258.48	88.40	99.22	0.00	0.00	0.00	0.00	0.00
1945	1,071.18	1,937.94	926.43	205.53	0.00	0.00	0.00	0.00	0.00
1946	900.07	1,215.83	467.02	172.12	0.00	0.00	0.00	0.00	0.00
1947	685.43	755.22	243.97	131.62	0.00	0.00	0.00	0.00	0.00
1948	524.45	519.74	396.17	100.23	0.00	0.00	0.00	0.00	0.00
1949	480.92	528.54	481.83	92.13	0.00	0.00	0.00	0.00	0.00
1950	654.04	633.70	463.03	125.54	0.00	0.00	82.80	0.00	0.00
1951	886.91	409.14	387.38	170.09	0.00	0.00	82.80	0.00	0.00
1952	864.64	418.88	369.45	166.04	0.00	0.00	82.80	0.00	0.00
1953	986.13	334.79	160.20	189.33	0.00	0.00	82.80	0.00	0.00
1954	1,019.54	421.04	229.79	195.40	0.00	0.00	82.80	0.00	0.00
1955	1,022.58	442.74	216.84	196.42	0.00	0.00	82.80	0.00	0.00
1956	1,204.82	271.93	207.15	230.84	0.00	0.00	82.80	0.00	0.00
1957	1,297.96	779.74	171.37	249.06	0.00	0.00	77.70	0.00	0.00
1958	1,438.70	599.62	216.94	275.39	0.00	0.00	88.30	0.00	0.00
1959	1,232.16	658.62	242.52	235.90	0.00	0.00	82.40	0.00	0.00
1960	1,105.60	834.55	219.31	211.60	0.00	0.00	108.40	0.00	0.00
1961	873.75	760.81	260.34	167.05	0.00	0.00	98.30	0.00	0.00
1962	792.75	795.34	362.74	151.87	0.00	0.00	104.00	0.00	0.00
1963	947.66	544.63	292.02	181.23	0.00	0.00	105.30	0.00	0.00
1964	571.02	489.43	215.56	114.41	0.00	0.00	94.20	0.00	0.00
1965	561.91	483.87	480.38	116.43	0.00	0.00	113.80	0.00	0.00
1966	534.58	2,127.32	729.91	106.31	0.00	0.00	117.90	0.00	0.00
1967	483.95	854.51	414.09	84.03	0.00	0.00	117.10	0.00	0.00
1968	686.44	788.70	671.26	60.75	0.00	0.00	120.20	0.00	0.00
1969	167.05	671.26	558.87	38.47	0.00	0.00	123.50	0.00	0.00

Table 9. Continued. Total catches (mt) of canary rockfish by fleet used in the assessment model.

Year	S. CA trawl	N. CA trawl	Oregon trawl	WA trawl	S. CA non-trawl	N. CA non-trawl	OR-WA non-trawl	At-sea whiting bycatch	S. CA rec.	N. CA rec.	OR/WA rec	Research catches
1970	188.32		679.36	472.82	44.55		0.00	0.00	139.10		0.00	0.00
1971	196.42		702.64	454.59	46.57		0.00	0.00	0.00		0.00	0.00
1972	301.71		927.41	163.00	68.85		0.00	0.00	0.00		0.00	0.00
1973	771.49		1,306.06	146.81	92.13		0.00	0.00	0.00		0.00	0.00
1974	523.44		602.41	480.92	85.05		0.00	0.00	0.00		0.00	0.00
1975	504.20		525.46	575.07	87.07		0.00	0.00	0.00		4.01	0.00
1976	454.59		283.49	454.59	85.05		0.00	0.00	0.00		2.11	0.00
1977	331.07		489.01	991.19	67.83		0.00	0.00	0.00		4.47	11.66
1978	22.10	639.95	990.18	1,126.86	3.25	130.62	0.00	0.00	150.50		10.30	0.00
1979	9.87	308.50	1,750.53	1,118.76	3.09	106.03	0.00	0.00	159.20		4.86	0.00
1980	30.38	413.40	2,309.41	945.63	14.20	75.66	0.00	0.00	136.90	159.01	34.98	5.31
1981	34.18	494.02	2,082.84	514.45	39.24	165.68	0.00	0.00	35.05	118.04	48.89	0.00
1982	0.90	797.72	3,941.26	435.11	36.91	11.58	0.00	0.00	34.33	241.28	44.47	0.00
1983	7.39	499.24	3,580.68	650.80	46.55	10.90	0.00	0.00	11.63	93.99	6.82	10.49
1984	29.61	358.07	1,188.43	612.87	56.90	3.05	0.00	0.00	31.77	75.66	26.65	0.00
1985	15.03	305.93	1,029.50	1,037.98	107.44	3.42	0.00	0.00	43.47	120.33	63.37	0.00
1986	0.79	167.71	902.13	899.06	12.40	42.16	15.64	0.00	61.40	165.45	24.21	11.78
1987	0.00	211.00	1,491.39	1,016.63	20.61	24.36	160.00	0.00	57.02	168.13	34.34	0.00
1988	0.50	226.58	1,576.42	979.31	24.35	26.44	0.00	0.00	46.59	137.65	56.59	0.00
1989	6.80	175.77	1,573.63	1,208.85	111.27	104.31	0.00	0.00	29.71	85.89	31.56	5.10
1990	15.72	310.17	1,029.44	1,099.96	69.10	139.26	17.35	0.00	10.02	61.34	38.43	0.00
1991	7.84	138.10	1,776.39	971.64	136.87	24.05	27.91	5.06	10.02	61.34	43.75	0.00
1992	6.97	218.13	1,423.29	825.03	49.38	77.80	152.43	1.81	10.02	61.34	38.43	1.17
1993	42.03	48.02	1,513.80	289.81	26.70	81.32	116.69	0.72	0.00	64.82	51.07	0.00
1994	13.89	106.05	644.15	149.54	41.37	52.81	104.87	4.83	0.00	53.46	38.78	0.00
1995	30.10	101.84	548.61	161.15	53.89	60.59	118.68	0.31	1.23	68.33	43.53	1.07
1996	101.06	116.26	758.21	189.85	72.11	52.88	166.36	1.35	2.49	60.59	25.24	0.00
1997	31.96	142.66	589.85	203.44	29.78	73.80	254.42	3.63	1.75	100.85	46.68	0.00
1998	8.41	149.45	716.05	203.01	23.33	57.25	250.13	5.47	1.14	25.46	53.49	0.97
1999	7.36	96.25	387.85	139.97	8.53	28.59	123.97	5.63	2.81	62.05	35.02	0.00
2000	1.71	11.24	46.62	32.66	2.52	5.50	10.25	2.35	0.41	76.64	18.46	0.00
2001	1.44	9.43	33.13	19.65	1.60	4.96	11.00	4.05	0.00	33.37	13.34	1.61
2002	0.36	14.62	32.60	33.29	0.02	0.08	3.15	5.24	0.21	6.00	11.13	0.13
2003	0.23	0.31	5.02	6.24	0.00	0.08	6.89	0.93	0.06	18.05	12.10	1.08
2004	0.61	1.95	7.67	7.73	0.02	0.06	4.68	5.22	1.48	9.11	5.76	2.24
2005	0.72	2.84	4.91	25.90	0.06	0.09	1.79	1.44	1.49	0.83	6.82	4.54
2006	3.57	2.28	2.91	15.64	0.00	0.00	3.11	1.09	5.73	1.03	3.98	7.78

Table 10. Canary rockfish discard rates applied to commercial fishing landings to generate the catches used in the assessment model.

Year	Southern CA trawl	Northern CA trawl	Oregon trawl	Washington trawl	Southern CA non-trawl	Northern CA non-trawl	OR-WA non-trawl
1916-1994	0.0123	0.0123	0.0123	0.0123	0.0123	0.0123	0.0123
1995-1999	0.160	0.160	0.160	0.160	0.160	0.160	0.160
2000	0.148	0.148	0.435	0.757	0.160	0.160	0.160
2001	0.282	0.282	0.600	0.644	0.160	0.160	0.160
2002	0.236	0.236	0.473	0.482	0.160	0.160	0.160
2003	0.190	0.190	0.448	0.285	NA	0.877	0.877
2004	0.646	0.646	0.512	0.381	0.730	0.730	0.730
2005	0.729	0.729	0.190	0.801	0.592	0.592	0.592
2006	0.708	0.708	0.185	0.783	NA	NA	0.776

Table 11. Summary of sampling effort generating length-frequency distributions used in the assessment model for the trawl fleets.

Year	Southern California		Northern California		Oregon		Washington	
	N trips	N fish	N trips	N fish	N trips	N fish	N trips	N fish
1968	0	0	0	0	0	0	2	402
1969	0	0	0	0	0	0	2	718
1970	0	0	0	0	0	0	1	268
1971	0	0	0	0	0	0	8	1,804
1972	0	0	0	0	0	0	2	501
1973	0	0	0	0	1	51	1	230
1974	0	0	0	0	4	370	0	0
1975	0	0	0	0	0	0	5	1,244
1976	0	0	0	0	2	89	3	716
1977	0	0	0	0	8	750	2	481
1978	7	16	63	363	7	670	5	911
1979	2	2	30	168	6	600	8	799
1980	11	25	80	261	20	996	18	1,654
1981	8	10	50	176	8	633	18	1,765
1982	4	5	72	349	20	1,358	13	1,300
1983	7	12	118	409	30	2,836	17	1,650
1984	10	64	73	312	21	2,064	17	1,550
1985	25	56	69	391	29	1,891	18	1,750
1986	3	4	53	389	16	1,545	17	1,649
1987	0	0	61	306	35	1,751	25	1,300
1988	3	3	49	269	23	1,148	19	950
1989	3	15	42	232	23	1,130	18	900
1990	6	21	43	317	22	1,099	17	850
1991	6	20	29	170	22	869	22	1,100
1992	9	43	20	186	34	1,364	20	999
1993	21	210	13	42	22	1,113	17	854
1994	6	64	10	87	15	750	15	750
1995	5	60	11	213	16	847	22	1,100
1996	12	224	12	218	19	1,162	15	750
1997	16	239	7	116	28	1,545	17	847
1998	8	114	6	96	28	1,560	25	845
1999	5	50	9	255	28	1,517	18	743
2000	5	27	5	59	18	545	7	229
2001	9	83	7	107	34	908	13	320
2002	3	10	15	263	76	1,454	38	690
2003	7	17	5	50	45	427	29	376
2004	5	7	9	88	79	433	62	574
2005	7	16	2	5	85	724	78	1,383
2006	15	30	0	0	54	355	35	623

Table 12. Summary of sampling effort generating length-frequency distributions used in the assessment model for the non-trawl and at-sea whiting fleets.

	Southern California		Northern California		Washington and Oregon		At-sea whiting	
Year	N trips	N fish	N trips	N fish	N trips	N fish	N hauls	N fish
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	1	1	0	0	0	0	0	0
1979	1	10	0	0	0	0	0	0
1980	4	30	0	0	1	22	0	0
1981	0	0	1	5	0	0	0	0
1982	0	0	4	38	0	0	0	0
1983	0	0	2	6	0	0	0	0
1984	0	0	1	1	0	0	0	0
1985	4	32	0	0	0	0	0	0
1986	29	100	0	0	0	0	0	0
1987	14	120	0	0	0	0	0	0
1988	13	94	0	0	3	287	0	0
1989	27	330	0	0	0	0	0	0
1990	19	84	0	0	1	100	0	0
1991	9	65	6	142	0	0	0	0
1992	100	1,086	48	755	0	0	0	0
1993	99	345	55	1,070	0	0	0	0
1994	93	647	55	1,410	0	0	0	0
1995	54	310	29	1,013	0	0	0	0
1996	68	458	38	932	1	37	0	0
1997	57	482	23	625	11	538	0	0
1998	31	122	14	265	8	335	0	0
1999	17	109	50	679	5	168	0	0
2000	0	0	16	148	24	176	0	0
2001	5	25	24	218	29	191	0	0
2002	0	0	3	22	6	54	0	0
2003	2	2	9	33	5	27	85	165
2004	17	93	51	167	10	57	103	221
2005	6	11	29	126	8	19	180	320
2006	12	81	17	123	2	37	165	247

Table 13. Summary of sampling effort generating length-frequency distributions used in the assessment model for the recreational fleets.

Year	Southern California		Northern California		Washington and Oregon	
	N trips	N fish	N trips	N fish	N trips	N fish
1968	0	0	0	0	0	0
1969	0	0	0	0	0	0
1970	0	0	0	0	0	0
1971	0	0	0	0	0	0
1972	0	0	0	0	0	0
1973	0	0	0	0	0	0
1974	0	0	0	0	0	0
1975	0	0	0	0	0	0
1976	0	0	0	0	0	0
1977	0	0	0	0	0	0
1978	0	0	0	0	0	0
1979	0	0	0	0	0	0
1980	129	546	61	334	85	263
1981	70	229	45	224	35	110
1982	88	264	66	383	78	224
1983	88	246	50	197	27	50
1984	105	311	72	242	89	338
1985	179	687	104	432	110	352
1986	156	716	107	671	51	158
1987	47	149	57	469	73	248
1988	70	183	61	212	107	379
1989	120	494	19	82	42	161
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	97	211	84	337	118	530
1994	44	75	78	391	116	604
1995	70	253	51	231	100	596
1996	126	637	84	458	77	336
1997	148	1177	53	585	110	433
1998	128	592	27	144	172	738
1999	141	637	62	346	160	765
2000	58	298	30	90	101	375
2001	52	155	13	21	67	182
2002	37	100	11	17	64	154
2003	8	8	25	38	16	36
2004	93	148	28	54	19	24
2005	18	27	17	27	0	0
2006	19	38	9	14	8	16

Table 14. Summary of sampling effort generating age-frequency distributions used in the assessment model for the trawl fleets.

	Southern California		Northern California		Oregon		Washington	
Year	N trips	N fish	N trips	N fish	N trips	N fish	N trips	N fish
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	0	0	0	8	394	11	620
1981	4	6	43	155	2	60	20	1,031
1982	0	0	51	210	0	0	3	298
1983	3	4	113	392	29	2,724	10	997
1984	10	63	68	300	19	1,856	8	646
1985	14	36	62	365	24	1,204	12	1,197
1986	0	0	0	0	16	807	17	1,308
1987	0	0	1	1	29	1,448	17	897
1988	0	0	0	0	8	397	24	948
1989	0	0	0	0	22	1,044	29	887
1990	0	0	0	0	20	998	26	850
1991	0	0	0	0	22	850	21	997
1992	0	0	0	0	32	1,280	24	999
1993	0	0	0	0	22	1,110	22	848
1994	0	0	0	0	4	200	15	749
1995	0	0	0	0	14	794	22	1,100
1996	0	0	0	0	18	1,093	16	749
1997	0	0	0	0	28	1,537	17	843
1998	0	0	0	0	28	1,554	24	829
1999	0	0	0	0	28	1,516	17	737
2000	0	0	0	0	17	506	9	227
2001	0	0	1	28	24	734	15	306
2002	1	6	5	69	52	1,009	45	595
2003	1	2	3	41	37	249	32	271
2004	1	1	4	43	68	383	69	541
2005	3	4	2	5	73	582	78	1,035
2006	0	0	0	0	0	0	23	345

Table 15. Summary of sampling effort generating age-frequency distributions used in the assessment model for the non-trawl and at-sea whiting fleets.

	Southern California		Northern California		Washington and Oregon		At-sea whiting	
Year	N trips	N fish	N trips	N fish	N trips	N fish	N hauls	N fish
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0
1997	0	0	0	0	1	17	0	0
1998	0	0	0	0	4	87	0	0
1999	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0
2001	0	0	0	0	5	39	0	0
2002	0	0	0	0	1	8	0	0
2003	0	0	0	0	3	14	82	143
2004	0	0	0	0	7	33	102	175
2005	0	0	0	0	6	17	173	265
2006	0	0	0	0	0	0	0	0

Table 16. Input and effective sample sizes used for tuning the composition data in the base model.

Type of data	Fleet	Input adjustment	Average input after adjustment	Average effective N	Harmonic mean effective N
Length	S. Cal. trawl	0.91	13.90	13.93	5.54
	N. Cal. trawl	1	63.46	65.61	40.42
	OR trawl	1	135.36	212.04	110.16
	WA trawl	1	98.31	229.02	110.04
	S. Cal. non-trawl	0.84	48.28	48.12	8.67
	N. Cal. non-trawl	1	77.42	119.72	10.52
	OR-WA non-trawl	1	25.71	54.67	20.18
	S. Cal. rec	0.92	123.43	123.87	34.77
	N. Cal. rec	0.92	78.27	79.21	41.21
	OR-WA rec	0.9	109.60	109.74	42.80
	At-sea hake fishery	1	149.93	159.76	76.81
	NWFSC trawl survey	1	83.57	139.98	124.81
	Triennial survey (1980-1992)	1	167.15	250.18	156.87
	Triennial survey (1995-2004)	1	97.34	121.11	67.54
Age	S. Cal. trawl	1	6.73	7.73	3.91
	N. Cal. Trawl	0.98	51.23	51.57	7.53
	OR trawl	1	133.81	232.65	153.81
	WA trawl – WDFW error	1	57.24	75.88	13.24
	WA trawl – CAP error	1	68.49	118.71	87.84
	OR-WA non-trawl	1	8.10	21.64	15.58
	At-sea hake fishery	0.36	52.49	53.78	29.18
	NWFSC trawl survey	1	4.52	5.14	1.95
	Triennial survey (1980-1992)	1	6.08	8.06	2.39
	Triennial survey (1995-2004)	1	5.98	5.51	2.45

Table 17. Adjusted mean input standard errors and root-mean-squared error (RMSE) of fits to index data used to tune the base model. ~95% confidence interval intersection is reported as number of predictions inside the interval/number of data points.

Fleet	Additional variance added	Mean input standard error after adjustment	RMSE	~95% CI intersection
NWFSC trawl survey	0.00	0.52	0.44	4/4
Triennial survey (1980-1992)	0.04	0.43	0.45	5/5
Triennial survey (1995-2004)	0.00	0.43	0.05	4/4
Pre-recruit index	0.11	0.42	0.50	6/6

Table 18. Description of model parameters in the base case assessment model.

Parameter	Number estimated	Bounds (low, high)	Prior (Mean, SD)
Natural mortality (*M*, male and female to age 6)	-	NA	Fixed at 0.06
Natural mortality (*M*, female age 14+, as exp. offset)	1	(-3,3)	Uniform
Stock and recruitment			
Ln(R_0)	1	(5,11)	Uniform
Steepness (*h*)	-	NA	Fixed at 0.511
σ_r	-	NA	Fixed at 0.50
Ln(Recruitment deviations): 1960-2007	48	(-10, 10)	Uniform
Catchability			
Ln(*Q*) – NWFSC survey	-	Analytic solution	
Ln(*Q*) – Triennial survey (1980-1992)	-	Analytic solution	
Ln(*Q*) – Triennial survey (1995-2004)	-	Analytic solution	
Ln(*Q*) – Pre-recruit survey	-	Analytic solution	
Selectivity (double normal)			
Fisheries:			
Length at peak selectivity	25	(20,60)	Uniform
Width of top (as logistic)	-	NA	Fixed at -4.0
Ascending width (as exp[width])	24	(-1,10)	Uniform
Descending width (as exp[width])	7	NA	Fixed at 1.0
Initial selectivity (as logistic)	-	NA	Fixed at -9.0
Final selectivity (as logistic)	23	(-5,5)	Uniform
Surveys:			
Length at peak selectivity	2	(15,66)	Uniform
Width of top (as logistic)	2	(-4,4)	Uniform
Ascending width (as exp[width])	2	(-1,10)	Uniform
Descending width (as exp[width])	-	NA	Fixed at 1.0
Initial selectivity (as logistic)	1	(-5,5)	Fixed at -9.0
Final selectivity (as logistic)	2	(-5,5)	Uniform
Individual growth			
Females:			
Length at age 1	1	(2,10)	Uniform
Length at age 20	1	(45,75)	Uniform
von Bertalanffy *K*	1	(0.01,0.25)	Uniform
CV of length at age 1	1	(0.01,0.25)	Uniform
CV of length at age 20 offset to age 1	1	(-3,3)	Uniform
Males:			
Length at age 1 offset to females	-	NA	Fixed at 0.0
Length at age 20 offset to females	1	(-3,3)	Uniform
von Bertalanffy K offset to females	1	(-3,3)	Uniform
CV of length at age 1 offset to females	1	(-3,3)	Uniform
CV of length at age 20 offset to females	1	(-3,3)	Uniform
Total: 99 + 48 recruitment deviations = 147 estimated parameters			

Table 19. Time blocks used in the 2005 assessment to allow for changes in fishery selectivity.

Fleet	Block 1	Block 2
S. California trawl	1997-2004	NA
N. California trawl	1980-1997	1998-2004
Oregon trawl	1980-1993	1994-2004
Washington trawl	1980-1992	1993-2004
S. Cal. non-trawl	1980-1991	1992-2004
N. Cal. non-trawl	1991-1997	1998-2004
OR-WA non-trawl	1990-2004	NA
S. Cal. Recreational	1996-2002	2003-2004
N. Cal. Recreational	1989-1995	1996-2004
OR-WA Recreational	1991-2004	NA

Table 20. Relative change in total negative log likelihood caused by adding time blocks for ascending width, peak and final selectivity parameters (3 additional for each block) by commercial fishing fleet. Improvements (negative values) >10 units indicate reasonably justified complexity that was included in the approach to selectivity retained in the base case model. Blocks were generally explored in a forward direction starting with the 1995+ break point.

Time period	1995+	2000+	2002+	2005+
Regulatory change potentially causing difference in selectivity	Canary specific trip limits imposed	Canary first managed as overfished; small footrope trawl gear required	RCA closed	Selective flatfish trawl required shoreward of the RCA
S. California trawl	-2	-6	-8	-6
N. California trawl	-5	-4	-3	0
Oregon trawl	**-24**	**-90**	-1	-10
Washington trawl	-1	**-18**	-1	-2
S. California non-trawl	-2	**-50**	-1	-1
N. California non-trawl	**-44**	**-25**	**-37**	-3
OR-WA non-trawl	-8	**-11**	**-17**	-1
S. Cal. Recreational	NA	**-16**	**-12**	-1
N. Cal. Recreational	NA	-10	-6	-4
OR-WA Recreational	NA	**-15**	-7	-3

Table 21. Relative change in total negative log likelihood caused by adding offsets (difference at peak and final selectivity for females compared to males, 2 parameters) for female length-based selectivity by fleet. Only those fleets with sex-specific length or age data are included. This exploration was conducted after accounting for reasonably justified time blocks in selectivity.

Fleet	Change in negative log likelihood
Southern California trawl	-1
N. Cal. Trawl	-1
OR trawl	-4
WA trawl	0
OR-WA non-trawl	-1
At-sea whiting fishery	-1
NWFSC survey	0
Triennial survey	0

Table 22. Relative change in total negative log likelihood caused by allowing selectivity to be a function of age instead of length by fleet and then further allowing female selectivity to be offset to male selectivity. This exploration was conducted after accounting for reasonably justified time blocks in selectivity.

	Change in negative log likelihood	
Fleet	Age-based selectivity	And offset female to male selectivity
Southern California trawl	-1	NA
N. Cal. trawl	-4	NA
OR trawl	-27	0
WA trawl	-7	0
OR-WA non-trawl	+4	NA
At-sea whiting fishery	+2	NA
NWFSC survey	+16	NA
Triennial survey	+13	NA

Table 23. Comparison of summary 2005 and 2007 base case model results.

Model	2005	2007
Description	Base case	Base case
Convergence		
Maximum gradient component	0.000688	0.000085
Likelihood penalties	0.0	0.0
Negative log-likelihoods		
Total	*2,792.3*	4,393.4
Indices	*-0.2*	-8.1
Length-frequency data	*1,845.0*	2,103.7
Age-frequency data	*634.9*	2,316.0
Recruitment	*-37.0*	-17.4
Priors	*9.2*	0.0
Forecast recruitment	*-6.4*	-0.7
Select parameters		
Stock-recruit, productivity		
R_0	4,728	4,210
Steepness (*h*)	0.329	0.511
Female M age 14+	0.093	0.097
Survey catchability and selectivity		
NWFSC survey catchability (*Q*)	NA	0.114
NWFSC survey peak selectivity	NA	66.000
NWFSC survey width of selectivity top	NA	-3.863
NWFSC survey ascending width	NA	7.175
NWFSC survey final selectivity	NA	-1.660
NWFSC survey final selectivity	NA	4.459
1980-1992 Triennial survey catchability (*Q*)	0.696	0.114
1995-2004 Triennial survey catchability (*Q*)	0.696	0.054
Triennial survey peak selectivity	52.6 Not est.	66.000
Triennial survey width of selectivity top	NA	-3.465
Triennial survey ascending width	NA	7.272
Triennial survey final selectivity	NA	4.453
Individual growth		
Female and male length at age 1	6.254	4.113
Female mean length at age 20	58.077	59.096
Female von Bertalanffy *K*	0.140	0.141
Female CV of length-at-age at age 1	0.15 Not est.	0.145
Female CV of length-at-age at age 20	0.056 Not est.	0.039
Male mean length at age 20	51.668	52.029
Male von Bertalanffy *K*	0.175	0.181
Male CV of length-at-age at age 1	0.15 Not est.	0.152
Male CV of length-at-age at age 20	0.047 Not est.	0.041
Management quantities		
SB_0	34,798	32,561
2007 Spawning biomass	NA	10,544
2005 Depletion	5.7%	29.9%
2007 Depletion	NA	32.4%
2006 *SPR*	NA	96.5%
2006 Exp. rate: yield/age 5+ Biomass	NA	0.002

Table 24. Canary rockfish growth parameters.

Parameter	Value	SD
Females:		
Length at age 1	4.113	0.555
Length at age 20	59.096	0.313
von Bertalanffy *K*	0.141	0.003
CV of length at age 1	0.145	0.011
CV of length at age 20	0.039	NA
Males:		
Length at age 1	4.113	Not est.
Length at age 20	52.030	NA
von Bertalanffy *K*	0.181	NA
CV of length at age 1	0.152	NA
CV of length at age 20	0.041	NA

Table 25. Canary rockfish catchability and productivity parameters.

Parameter	Value	SD
Catchability:		
NWFSC survey catchability (*Q*)	0.114	NA
1980-1992 triennial survey catchability (*Q*)	0.114	NA
1995-2004 triennial survey catchability (*Q*)	0.054	NA
Productivity:		
R_0	4,210	127
Steepness (*h*)	0.511	Not est.
Female natural mortality (*M*) age 14+	0.097	NA

Table 26. Time-series of population estimates from the base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1916	87,633	32,561	100.0%	4,210	474	92.0%	0.006
1917	87,172	32,378	99.4%	4,204	749	87.8%	0.009
1918	86,457	32,092	98.6%	4,195	794	87.0%	0.009
1919	85,722	31,796	97.7%	4,186	520	91.1%	0.006
1920	85,285	31,617	97.1%	4,180	543	90.7%	0.006
1921	84,846	31,438	96.6%	4,174	459	92.0%	0.006
1922	84,512	31,302	96.1%	4,170	415	92.7%	0.005
1923	84,237	31,194	95.8%	4,166	491	91.4%	0.006
1924	83,903	31,065	95.4%	4,162	457	92.0%	0.006
1925	83,618	30,958	95.1%	4,158	529	90.8%	0.006
1926	83,276	30,830	94.7%	4,154	726	87.6%	0.009
1927	82,755	30,633	94.1%	4,147	616	89.3%	0.008
1928	82,362	30,486	93.6%	4,142	627	89.0%	0.008
1929	81,975	30,341	93.2%	4,137	596	89.5%	0.007
1930	81,635	30,214	92.8%	4,133	709	87.6%	0.009
1931	81,199	30,050	92.3%	4,127	711	87.5%	0.009
1932	80,779	29,893	91.8%	4,122	547	90.2%	0.007
1933	80,537	29,808	91.5%	4,119	467	91.5%	0.006
1934	80,386	29,759	91.4%	4,117	450	91.8%	0.006
1935	80,261	29,722	91.3%	4,116	473	91.3%	0.006
1936	80,118	29,679	91.1%	4,114	460	91.6%	0.006
1937	79,995	29,644	91.0%	4,113	433	92.0%	0.006
1938	79,904	29,621	91.0%	4,112	370	93.1%	0.005
1939	79,879	29,624	91.0%	4,112	337	93.7%	0.004
1940	79,887	29,641	91.0%	4,113	422	92.2%	0.005
1941	79,814	29,622	91.0%	4,112	476	91.3%	0.006
1942	79,693	29,578	90.8%	4,111	413	92.5%	0.005
1943	79,642	29,558	90.8%	4,110	1,244	80.3%	0.016
1944	78,797	29,193	89.7%	4,097	1,964	71.1%	0.025
1945	77,297	28,539	87.6%	4,072	4,141	52.6%	0.055
1946	73,756	27,052	83.1%	4,014	2,755	61.6%	0.038
1947	71,703	26,192	80.4%	3,978	1,816	70.5%	0.026
1948	70,653	25,760	79.1%	3,960	1,541	73.9%	0.022
1949	69,926	25,480	78.3%	3,947	1,583	73.2%	0.023
1950	69,199	25,211	77.4%	3,935	1,959	67.1%	0.029
1951	68,132	24,824	76.2%	3,918	1,936	66.7%	0.029
1952	67,111	24,472	75.2%	3,901	1,902	66.7%	0.029
1953	66,146	24,141	74.1%	3,886	1,753	67.9%	0.027
1954	65,345	23,875	73.3%	3,873	1,949	65.2%	0.031
1955	64,368	23,529	72.3%	3,856	1,961	64.7%	0.031
1956	63,402	23,179	71.2%	3,838	1,998	63.7%	0.032

Table 26. continued. Time-series of population estimates from the base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1957	62,420	22,828	70.1%	3,820	2,576	56.9%	0.042
1958	60,907	22,229	68.3%	3,789	2,619	55.5%	0.044
1959	59,394	21,640	66.5%	3,756	2,452	56.8%	0.042
1960	58,088	21,129	64.9%	3,527	2,479	55.7%	0.044
1961	56,802	20,619	63.3%	3,496	2,160	58.9%	0.039
1962	55,856	20,259	62.2%	2,997	2,207	58.0%	0.041
1963	54,876	19,899	61.1%	2,571	2,071	58.9%	0.039
1964	54,032	19,624	60.3%	2,418	1,485	66.8%	0.028
1965	53,743	19,587	60.2%	2,597	1,756	62.9%	0.033
1966	53,129	19,450	59.7%	3,288	3,616	44.3%	0.069
1967	50,664	18,492	56.8%	4,359	1,954	58.6%	0.039
1968	49,702	18,255	56.1%	3,387	2,327	53.7%	0.048
1969	48,286	17,840	54.8%	2,510	1,559	63.3%	0.033
1970	47,681	17,679	54.3%	2,497	1,524	63.1%	0.033
1971	47,193	17,472	53.7%	3,123	1,521	63.3%	0.033
1972	46,744	17,221	52.9%	3,817	1,604	60.9%	0.035
1973	46,171	16,920	52.0%	3,490	2,482	48.9%	0.055
1974	44,704	16,285	50.0%	2,745	1,863	55.7%	0.043
1975	43,963	15,979	49.1%	4,364	1,862	55.2%	0.044
1976	43,200	15,697	48.2%	2,198	1,460	60.6%	0.035
1977	42,916	15,588	47.9%	3,346	2,060	52.5%	0.049
1978	42,161	15,232	46.8%	3,986	3,074	41.0%	0.075
1979	40,366	14,472	44.4%	1,581	3,461	36.8%	0.089
1980	38,287	13,622	41.8%	2,070	4,125	28.6%	0.111
1981	35,724	12,576	38.6%	3,591	3,532	31.6%	0.102
1982	33,693	11,787	36.2%	1,941	5,544	20.3%	0.170
1983	29,669	10,206	31.3%	1,429	4,918	21.5%	0.170
1984	26,489	8,895	27.3%	4,572	2,383	33.1%	0.093
1985	25,655	8,676	26.6%	1,367	2,726	27.7%	0.111
1986	24,437	8,334	25.6%	2,321	2,303	30.7%	0.097
1987	23,679	8,114	24.9%	2,631	3,183	22.9%	0.140
1988	22,079	7,485	23.0%	3,287	3,074	22.2%	0.148
1989	20,572	6,867	21.1%	3,478	3,333	19.4%	0.169
1990	18,821	6,127	18.8%	3,267	2,791	20.7%	0.157
1991	17,686	5,616	17.2%	3,429	3,203	17.0%	0.194
1992	16,258	4,939	15.2%	2,676	2,866	17.0%	0.191
1993	15,300	4,426	13.6%	2,232	2,235	19.7%	0.159
1994	15,147	4,202	12.9%	2,982	1,210	31.9%	0.087
1995	16,043	4,463	13.7%	2,116	1,189	34.7%	0.080
1996	16,955	4,841	14.9%	1,877	1,546	29.6%	0.097
1997	17,486	5,144	15.8%	1,305	1,479	31.6%	0.089

Table 26. continued. Time-series of population estimates from the base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1998	18,019	5,499	16.9%	1,391	1,494	33.2%	0.087
1999	18,475	5,826	17.9%	2,449	898	48.9%	0.051
2000	19,292	6,364	19.5%	1,099	208	84.0%	0.011
2001	20,642	7,149	22.0%	2,061	134	89.7%	0.007
2002	21,911	7,910	24.3%	1,432	107	92.2%	0.005
2003	23,036	8,603	26.4%	955	51	95.4%	0.002
2004	24,110	9,226	28.3%	1,565	47	96.3%	0.002
2005	25,039	9,749	29.9%	1,182	51	96.3%	0.002
2006	25,803	10,183	31.3%	1,144	47	96.5%	0.002
2007	26,499	10,544	32.4%	2,807	NA	NA	NA

Table 27. Asymptotic standard deviation estimates for spawning biomass and recruitment.

Year	SD Spawning biomass (mt)	SD Age-0 recruits (1000s)	Year	SD Spawning biomass (mt)	SD Age-0 recruits (1000s)	Year	SD Spawning biomass (mt)	SD Age-0 recruits (1000s)
1916	1,003	127	1955	851	132	1994	359	539
1917	1,001	127	1956	846	132	1995	416	452
1918	996	127	1957	841	132	1996	489	424
1919	992	126	1958	839	133	1997	575	350
1920	988	126	1959	835	134	1998	674	355
1921	985	126	1960	833	1,689	1999	781	522
1922	982	126	1961	833	1,712	2000	891	304
1923	979	126	1962	833	1,423	2001	1,000	433
1924	976	126	1963	833	1,163	2002	1,102	333
1925	973	126	1964	831	1,069	2003	1,193	271
1926	970	126	1965	826	1,169	2004	1,270	485
1927	966	126	1966	813	1,595	2005	1,331	385
1928	962	126	1967	802	2,021	2006	1,378	436
1929	958	126	1968	765	1,593	2007	1,412	1,425
1930	955	127	1969	725	1,072			
1931	951	127	1970	687	1,026			
1932	948	127	1971	650	1,267			
1933	945	127	1972	615	1,410			
1934	943	127	1973	580	1,221			
1935	941	127	1974	547	956			
1936	939	127	1975	507	750			
1937	937	127	1976	470	546			
1938	935	127	1977	436	459			
1939	934	127	1978	411	418			
1940	933	127	1979	393	327			
1941	932	127	1980	351	328			
1942	930	127	1981	315	360			
1943	929	127	1982	287	311			
1944	924	128	1983	257	306			
1945	918	128	1984	236	478			
1946	907	129	1985	225	381			
1947	900	130	1986	218	486			
1948	894	130	1987	215	573			
1949	888	130	1988	215	573			
1950	882	131	1989	220	568			
1951	876	131	1990	232	550			
1952	869	131	1991	251	579			
1953	862	131	1992	278	513			
1954	856	131	1993	313	449			

Table 28. Female numbers at age (1000s) predicted by the base case model 1916-2007.

Age (yr)	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
0	2,105	2,102	2,098	2,093	2,090	2,087	2,085	2,083	2,081	2,079	2,077	2,074	2,071	2,069	2,066	2,064	2,061	2,059	2,059	2,058	2,057	2,056
1	1,982	1,982	1,980	1,975	1,971	1,968	1,966	1,963	1,962	1,960	1,958	1,956	1,953	1,951	1,948	1,946	1,943	1,941	1,939	1,939	1,938	1,937
2	1,867	1,867	1,867	1,864	1,860	1,856	1,854	1,851	1,849	1,847	1,846	1,844	1,842	1,839	1,837	1,835	1,833	1,830	1,828	1,827	1,826	1,825
3	1,758	1,758	1,758	1,758	1,756	1,752	1,748	1,746	1,743	1,741	1,740	1,738	1,737	1,735	1,732	1,730	1,728	1,726	1,724	1,721	1,720	1,719
4	1,656	1,656	1,656	1,656	1,656	1,653	1,650	1,646	1,644	1,642	1,640	1,639	1,637	1,635	1,634	1,631	1,629	1,627	1,626	1,623	1,621	1,620
5	1,559	1,559	1,559	1,559	1,559	1,559	1,557	1,554	1,550	1,548	1,546	1,544	1,543	1,541	1,540	1,538	1,536	1,534	1,532	1,531	1,528	1,526
6	1,469	1,468	1,467	1,467	1,467	1,467	1,467	1,465	1,462	1,459	1,457	1,454	1,453	1,452	1,450	1,449	1,447	1,445	1,444	1,442	1,441	1,439
7	1,383	1,381	1,379	1,378	1,379	1,379	1,379	1,380	1,378	1,375	1,371	1,368	1,367	1,365	1,364	1,362	1,361	1,360	1,359	1,357	1,356	1,354
8	1,296	1,292	1,288	1,285	1,287	1,288	1,289	1,289	1,289	1,287	1,284	1,279	1,277	1,275	1,274	1,272	1,270	1,271	1,271	1,269	1,268	1,267
9	1,210	1,204	1,197	1,192	1,193	1,194	1,196	1,197	1,197	1,197	1,195	1,189	1,186	1,184	1,183	1,180	1,178	1,179	1,180	1,180	1,179	1,178
10	1,124	1,117	1,109	1,102	1,101	1,101	1,103	1,105	1,106	1,106	1,105	1,100	1,096	1,093	1,092	1,089	1,087	1,087	1,088	1,090	1,090	1,089
11	1,039	1,033	1,023	1,015	1,012	1,010	1,012	1,014	1,015	1,016	1,015	1,012	1,009	1,005	1,003	1,000	997	997	999	1,000	1,001	1,001
12	956	950	941	932	928	924	924	926	927	929	928	925	923	920	918	914	911	911	912	913	914	915
13	876	871	862	854	848	844	842	842	843	845	845	842	841	839	836	832	829	828	829	830	831	832
14	799	794	786	778	773	768	765	763	763	764	765	763	762	760	759	755	752	750	751	751	752	753
15	725	721	714	707	702	697	693	691	689	688	689	688	687	686	685	682	679	677	677	677	678	678
16	658	654	648	642	637	633	629	626	623	621	621	619	619	618	618	615	613	612	611	611	611	611
17	597	594	588	582	579	574	571	568	564	562	560	558	558	557	557	555	553	553	552	551	551	551
18	542	539	534	529	525	522	518	515	512	509	507	504	502	502	502	501	499	499	499	498	497	497
19	492	489	485	480	477	473	471	468	465	462	459	456	454	452	452	451	450	450	450	450	449	448
20	446	444	440	436	433	430	427	425	422	420	417	413	410	408	407	407	406	406	406	406	406	405
21	405	403	399	395	393	390	388	386	383	381	378	375	372	369	368	366	366	366	366	366	366	366
22	368	366	362	359	357	354	352	350	348	346	343	340	337	335	333	331	329	329	330	330	330	330
23	334	332	329	326	324	321	320	318	316	314	312	309	306	304	301	299	297	297	297	298	298	298
24	303	301	299	296	294	292	290	289	287	285	283	280	278	276	274	271	269	268	268	268	268	269
25	275	273	271	268	267	265	263	262	260	259	257	255	253	250	248	246	244	242	242	242	242	242
26	250	248	246	244	242	240	239	238	236	235	233	231	229	227	226	223	221	220	219	218	218	218
27	227	225	223	221	220	218	217	216	214	213	212	210	208	206	205	203	201	199	198	197	197	197
28	206	204	203	201	199	198	197	196	195	194	192	190	189	187	186	184	182	181	180	179	178	177
29	187	186	184	182	181	180	179	178	177	176	174	173	171	170	169	167	166	164	163	162	161	160
30	169	168	167	165	164	163	162	161	160	159	158	157	156	154	153	152	150	149	148	147	146	145
31	154	153	152	150	149	148	147	146	146	145	144	142	141	140	139	138	136	135	135	134	133	132
32	140	139	138	136	135	134	134	133	132	131	130	129	128	127	126	125	124	123	122	121	121	120
33	127	126	125	124	123	122	121	121	120	119	118	117	116	115	115	113	112	112	111	110	110	109
34	115	114	113	112	111	111	110	110	109	108	107	106	106	105	104	103	102	101	101	100	99	99
35	104	104	103	102	101	100	100	99	99	98	98	97	96	95	94	93	93	92	91	91	90	90
36	95	94	93	92	92	91	91	90	90	89	89	88	87	86	86	85	84	83	83	82	82	81
37	86	85	85	84	83	83	82	82	81	81	80	80	79	78	78	77	76	76	75	75	74	74
38	78	78	77	76	76	75	75	74	74	73	73	72	72	71	71	70	69	69	68	68	67	67
39	71	70	70	69	69	68	68	67	67	67	66	66	65	65	64	63	63	62	62	62	61	61
40	696	692	686	679	675	670	666	663	659	655	651	645	640	634	629	624	618	613	610	606	602	598

Table 28. continued.

Age (yr)	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
0	2,056	2,056	2,056	2,056	2,055	2,055	2,048	2,036	2,007	1,989	1,980	1,974	1,968	1,959	1,951	1,943	1,936	1,928	1,919	1,910	1,894	1,878
1	1,937	1,936	1,936	1,937	1,936	1,936	1,935	1,929	1,918	1,890	1,873	1,865	1,859	1,853	1,845	1,837	1,830	1,824	1,816	1,807	1,799	1,784
2	1,824	1,824	1,824	1,824	1,824	1,824	1,823	1,823	1,817	1,806	1,780	1,764	1,756	1,750	1,745	1,737	1,730	1,723	1,717	1,710	1,702	1,694
3	1,719	1,718	1,718	1,717	1,717	1,718	1,717	1,717	1,716	1,711	1,701	1,676	1,661	1,654	1,649	1,643	1,636	1,629	1,623	1,617	1,610	1,603
4	1,619	1,619	1,618	1,618	1,617	1,617	1,618	1,617	1,617	1,616	1,611	1,602	1,579	1,564	1,556	1,551	1,547	1,540	1,533	1,527	1,522	1,515
5	1,525	1,525	1,524	1,524	1,523	1,523	1,523	1,523	1,522	1,521	1,521	1,517	1,508	1,481	1,466	1,459	1,455	1,450	1,443	1,437	1,431	1,426
6	1,437	1,436	1,435	1,435	1,434	1,434	1,433	1,432	1,430	1,430	1,430	1,431	1,427	1,410	1,384	1,371	1,364	1,359	1,355	1,348	1,342	1,335
7	1,353	1,351	1,351	1,350	1,349	1,350	1,348	1,345	1,339	1,339	1,341	1,342	1,343	1,331	1,314	1,290	1,276	1,269	1,265	1,259	1,252	1,244
8	1,266	1,265	1,264	1,263	1,262	1,263	1,260	1,254	1,242	1,240	1,244	1,248	1,250	1,243	1,229	1,214	1,190	1,177	1,170	1,164	1,156	1,146
9	1,177	1,177	1,176	1,174	1,173	1,175	1,171	1,162	1,142	1,137	1,141	1,148	1,152	1,147	1,138	1,125	1,110	1,087	1,074	1,065	1,055	1,045
10	1,088	1,088	1,088	1,087	1,085	1,086	1,081	1,071	1,044	1,034	1,037	1,044	1,050	1,048	1,041	1,033	1,021	1,005	983	969	955	943
11	1,001	1,001	1,001	1,001	999	999	993	981	949	936	936	941	947	947	944	937	930	917	902	880	861	847
12	916	916	917	916	916	915	907	894	859	843	840	843	847	848	847	844	839	830	818	802	777	758
13	834	835	835	835	834	834	826	811	775	757	752	752	754	753	753	753	751	744	736	724	703	679
14	754	756	758	757	757	756	748	733	697	678	671	669	668	666	665	666	667	663	656	648	630	611
15	680	681	683	684	683	683	674	660	625	605	597	594	591	587	585	585	587	585	581	575	561	545
16	612	614	616	617	616	616	608	595	561	542	533	528	524	519	515	514	515	515	513	509	497	485
17	552	553	555	555	556	556	549	536	505	487	477	471	466	460	455	453	453	452	451	449	440	429
18	497	498	499	500	501	501	495	483	454	437	428	422	416	409	404	400	399	397	396	395	388	380
19	448	449	450	451	451	452	446	435	409	393	384	378	372	365	359	354	352	349	348	347	341	335
20	405	405	406	406	406	407	402	392	368	354	346	340	334	326	320	315	312	309	306	305	299	294
21	366	365	366	366	366	366	362	353	332	319	311	305	300	293	287	281	277	274	270	268	263	258
22	330	330	330	330	330	330	326	318	299	287	280	275	269	263	257	252	247	243	240	237	231	227
23	298	298	298	298	297	297	293	286	269	258	252	248	243	236	231	226	222	217	213	210	204	200
24	269	269	269	269	269	268	264	257	242	233	227	223	219	213	208	203	199	194	190	187	181	176
25	242	243	243	243	243	242	238	232	218	209	204	201	197	192	187	182	178	174	170	166	161	156
26	218	219	219	219	219	219	215	209	196	189	184	181	177	173	168	164	161	156	153	149	144	139
27	197	197	198	198	198	198	194	189	177	170	166	163	159	155	152	148	145	141	137	134	129	124
28	177	178	178	178	178	178	176	171	160	153	149	146	144	140	137	133	130	127	123	120	115	111
29	160	160	161	161	161	161	158	154	144	138	135	132	129	126	123	120	117	114	111	108	104	99
30	145	145	145	145	145	145	143	139	130	125	122	119	117	114	111	108	106	103	100	97	93	89
31	131	131	131	131	131	131	129	125	118	113	110	107	105	102	100	97	95	93	90	88	84	80
32	119	119	118	118	118	118	116	113	106	102	99	97	95	92	90	88	86	83	81	79	76	72
33	108	108	107	107	106	106	105	102	96	92	90	88	86	83	81	79	77	75	73	71	68	65
34	98	98	97	97	96	96	94	92	86	83	81	79	77	75	73	71	70	68	66	64	61	59
35	89	89	88	88	87	87	85	83	78	75	73	71	70	68	66	64	63	61	59	58	55	53
36	81	81	80	80	79	79	77	75	70	67	66	64	63	61	60	58	57	55	53	52	50	48
37	73	73	73	72	72	71	70	68	63	61	59	58	57	55	54	53	51	50	48	47	45	43
38	67	66	66	66	65	65	63	61	57	55	53	52	51	50	49	47	46	45	44	42	40	39
39	61	60	60	60	59	59	58	56	52	50	48	47	46	45	44	43	42	41	39	38	36	35
40	595	592	589	586	582	578	566	547	510	486	471	459	447	433	420	408	397	385	373	361	344	329

Table 28. continued.

Age (yr)	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
0	1,764	1,748	1,499	1,285	1,209	1,299	1,644	2,180	1,693	1,255	1,249	1,561	1,909	1,745	1,372	2,182	1,099	1,673	1,993	791	1,035	1,796
1	1,769	1,661	1,646	1,411	1,210	1,139	1,223	1,548	2,053	1,595	1,182	1,176	1,470	1,798	1,644	1,293	2,055	1,035	1,575	1,877	745	975
2	1,680	1,666	1,564	1,550	1,329	1,140	1,072	1,152	1,458	1,933	1,502	1,113	1,107	1,385	1,693	1,548	1,217	1,935	975	1,484	1,767	701
3	1,595	1,582	1,569	1,473	1,460	1,252	1,074	1,010	1,085	1,373	1,820	1,414	1,048	1,043	1,304	1,594	1,458	1,146	1,822	918	1,397	1,664
4	1,508	1,501	1,488	1,476	1,386	1,373	1,177	1,010	950	1,020	1,291	1,711	1,330	986	980	1,226	1,498	1,370	1,077	1,713	863	1,305
5	1,420	1,412	1,405	1,394	1,381	1,298	1,285	1,101	944	888	953	1,205	1,599	1,241	918	913	1,141	1,394	1,275	1,003	1,595	789
6	1,331	1,322	1,316	1,310	1,298	1,289	1,210	1,196	1,025	878	826	885	1,121	1,484	1,148	849	844	1,054	1,289	1,178	928	1,436
7	1,239	1,233	1,228	1,222	1,215	1,209	1,198	1,120	1,110	950	816	766	822	1,038	1,367	1,059	783	778	973	1,186	1,085	832
8	1,141	1,136	1,134	1,130	1,123	1,122	1,114	1,098	1,032	1,020	878	753	707	757	947	1,252	970	718	714	885	1,078	966
9	1,039	1,034	1,033	1,032	1,026	1,028	1,026	1,008	1,002	938	936	805	691	647	682	860	1,137	883	653	641	791	946
10	937	931	932	931	929	933	932	914	911	900	853	851	732	626	577	614	774	1,028	795	577	560	680
11	838	832	832	832	831	838	838	817	818	809	812	769	767	659	553	514	547	694	913	690	493	470
12	747	739	737	736	736	744	746	724	725	719	723	725	688	685	576	489	454	487	609	780	579	405
13	664	654	650	648	647	655	658	636	637	631	637	641	643	609	594	505	427	401	422	513	645	467
14	591	577	571	567	566	573	576	555	556	550	555	561	564	565	523	516	439	375	345	353	420	513
15	529	511	501	495	493	498	500	481	481	477	480	485	490	492	482	452	446	383	321	286	286	331
16	471	457	443	434	430	433	435	416	416	412	416	420	423	427	419	416	390	389	327	265	231	225
17	419	407	396	384	377	378	378	360	360	356	359	363	366	368	363	361	359	340	332	270	215	182
18	371	361	352	342	333	331	329	313	312	308	310	313	316	318	312	313	311	313	291	274	219	169
19	328	320	313	304	297	292	289	272	270	267	268	271	273	275	269	269	270	272	267	240	222	172
20	289	283	277	270	264	261	255	238	235	231	232	234	236	237	232	232	232	235	232	220	195	175
21	254	249	245	239	234	232	227	210	206	201	201	202	204	204	200	200	200	203	201	192	179	154
22	223	219	216	211	207	206	202	188	182	176	175	175	176	177	173	173	173	175	173	166	156	142
23	196	192	189	186	183	182	179	167	162	155	153	153	153	153	149	149	149	151	150	143	135	123
24	172	168	166	164	161	161	159	148	144	139	135	134	133	132	129	129	129	130	129	124	117	107
25	152	148	146	143	142	142	140	131	128	123	121	118	116	115	112	111	111	112	112	107	101	93
26	135	131	128	126	124	124	124	116	113	109	107	105	103	101	97	96	96	97	96	92	87	80
27	120	116	113	111	109	109	109	102	100	97	95	94	92	89	85	84	83	84	83	80	75	69
28	107	103	100	98	96	96	95	90	88	86	84	83	82	80	75	74	73	73	72	69	65	60
29	96	92	89	87	85	84	84	79	77	75	75	74	72	71	67	65	63	63	63	60	56	52
30	86	82	80	77	75	75	74	69	68	66	66	65	64	63	60	58	56	56	54	52	49	45
31	77	74	71	69	67	66	65	61	60	58	58	57	57	56	53	52	50	49	48	45	42	39
32	69	66	64	62	60	59	58	54	52	51	51	50	50	49	47	46	45	44	42	40	37	34
33	62	60	57	55	53	52	51	48	46	45	45	44	44	43	41	41	40	39	38	35	32	29
34	56	54	52	50	48	47	46	42	41	40	39	39	39	38	37	36	35	35	33	31	29	26
35	51	48	47	45	43	42	41	38	37	35	35	34	34	33	32	32	31	31	30	28	26	23
36	46	44	42	40	39	38	37	34	33	31	31	30	30	29	28	28	27	27	26	25	23	20
37	41	39	38	36	35	34	33	30	29	28	27	27	26	26	25	24	24	24	23	22	20	18
38	37	35	34	33	31	31	30	27	26	25	24	24	23	23	22	21	21	21	21	19	18	16
39	33	32	31	29	28	28	27	25	24	22	22	21	21	20	19	19	19	18	18	17	16	14
40	314	299	286	274	263	256	248	226	217	206	200	193	187	180	169	163	157	154	148	138	127	114

Table 28. continued.

Age (yr)	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0	970	715	2,286	684	1,161	1,315	1,644	1,739	1,634	1,715	1,338	1,116	1,491	1,058	939	652	695	1,225	550	1,030	716	477
1	1,691	914	673	2,153	644	1,093	1,239	1,548	1,638	1,538	1,615	1,260	1,051	1,404	997	884	614	655	1,153	518	970	674
2	918	1,592	860	634	2,027	606	1,029	1,167	1,458	1,542	1,449	1,521	1,187	990	1,322	939	832	578	617	1,086	487	914
3	660	864	1,499	810	597	1,908	571	969	1,098	1,373	1,452	1,364	1,432	1,118	932	1,245	884	784	545	581	1,023	459
4	1,561	618	812	1,407	759	558	1,785	534	908	1,031	1,288	1,364	1,282	1,346	1,050	876	1,170	831	737	512	546	963
5	1,209	1,433	576	753	1,292	695	510	1,635	492	842	953	1,194	1,266	1,194	1,250	977	811	1,091	775	686	479	513
6	722	1,092	1,325	529	680	1,165	624	459	1,482	450	765	871	1,094	1,167	1,094	1,147	891	748	1,008	716	640	449
7	1,305	647	1,001	1,209	474	610	1,041	558	411	1,335	403	690	790	1,001	1,059	991	1,036	814	688	931	667	599
8	747	1,151	580	902	1,070	422	539	919	490	362	1,170	354	613	713	894	939	881	931	741	634	864	622
9	852	641	997	514	785	942	365	465	782	417	305	985	304	543	625	773	818	773	837	682	587	802
10	816	703	530	863	437	678	791	305	380	640	334	244	809	263	467	527	659	701	686	769	629	542
11	573	647	555	449	718	369	550	638	239	299	486	252	190	682	222	385	441	553	615	628	706	579
12	388	437	490	461	366	594	291	430	480	182	216	349	188	157	569	181	318	364	480	561	575	647
13	329	288	321	400	369	298	457	222	315	357	127	150	252	153	130	458	148	259	314	436	511	524
14	375	240	207	259	317	297	225	342	159	230	242	85	105	201	125	104	371	119	222	284	396	464
15	409	269	169	166	204	253	223	167	243	115	154	161	59	83	164	100	84	299	102	200	256	358
16	263	293	190	136	130	162	189	164	118	175	76	101	111	47	68	131	80	67	254	92	181	232
17	179	188	206	152	106	104	121	139	116	85	116	50	70	87	38	54	106	65	57	229	83	163
18	145	128	132	165	119	85	77	89	99	84	57	77	35	55	72	31	44	85	55	52	207	75
19	134	103	90	106	130	95	64	57	63	71	56	37	53	27	45	57	25	35	73	50	47	187
20	137	96	73	72	83	104	71	47	41	46	48	37	26	42	22	36	46	20	30	65	45	42
21	139	98	68	58	57	67	78	53	34	30	31	32	25	20	34	18	29	38	17	27	59	41
22	122	100	69	54	46	46	50	58	38	25	20	21	22	20	17	28	15	24	32	15	25	53
23	113	88	70	56	43	37	34	38	42	28	17	13	14	17	17	13	22	12	20	29	14	22
24	98	81	62	57	44	35	28	26	27	31	19	11	9	11	14	13	11	18	10	18	26	13
25	85	70	57	50	45	36	26	21	19	20	21	13	8	7	9	12	11	9	16	9	17	24
26	74	61	50	46	40	36	27	20	15	14	14	14	9	6	6	8	9	9	8	14	8	15
27	64	53	43	40	37	32	28	20	14	11	9	9	10	7	5	5	6	8	8	7	13	7
28	55	46	38	35	32	30	24	21	15	11	8	6	6	8	6	4	4	5	7	7	6	11
29	48	40	33	30	28	26	23	18	15	11	7	5	4	5	6	5	3	3	4	6	6	6
30	41	34	28	26	24	23	20	17	13	11	7	5	4	3	4	5	4	3	3	4	5	6
31	36	30	24	23	21	20	17	15	12	10	8	5	3	3	3	3	4	3	2	3	3	5
32	31	26	21	20	18	17	15	13	11	9	7	5	4	3	2	2	3	3	3	2	2	3
33	27	22	18	17	16	15	13	11	10	8	6	5	4	3	2	2	2	2	3	2	2	2
34	24	19	16	15	14	13	11	10	8	7	6	4	3	3	2	2	2	2	2	3	2	2
35	21	17	14	13	12	11	10	9	7	6	5	4	3	3	2	2	1	1	1	2	2	2
36	18	15	12	11	10	10	8	7	6	5	4	3	3	2	2	2	2	1	1	1	2	2
37	16	13	11	10	9	8	7	6	5	5	4	3	2	2	2	2	2	1	1	1	1	1
38	15	12	9	9	8	7	6	6	5	4	3	3	2	2	2	2	1	1	1	1	1	1
39	13	10	8	8	7	6	6	5	4	4	3	2	2	2	2	1	1	1	1	1	1	1
40	103	83	67	61	55	50	43	37	31	26	20	16	12	11	11	10	9	9	8	9	9	9

Table 28. continued.

Age (yr)	2004	2005	2006	2007
0	783	591	572	1,404
1	450	737	557	539
2	635	423	694	524
3	861	598	399	654
4	432	810	563	375
5	903	406	762	529
6	480	848	381	715
7	420	451	796	358
8	559	393	421	744
9	578	520	366	392
10	743	536	482	339
11	500	686	495	445
12	532	460	630	454
13	592	486	420	576
14	477	538	443	383
15	420	432	488	401
16	324	381	392	442
17	210	294	345	355
18	148	190	266	313
19	68	134	172	241
20	170	61	121	156
21	38	154	56	110
22	37	35	139	50
23	48	33	31	126
24	20	44	30	28
25	11	18	40	27
26	21	10	17	36
27	14	19	9	15
28	7	12	18	8
29	10	6	11	16
30	5	9	6	10
31	5	5	9	5
32	4	5	4	8
33	3	4	4	4
34	2	3	4	4
35	2	2	2	3
36	2	1	2	2
37	2	2	1	1
38	1	2	1	1
39	1	1	2	1
40	9	9	9	9

Table 29. Male numbers at age (1000s) predicted by the base case model 1916-2007.

Age (yr)	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
0	2,105	2,102	2,098	2,093	2,090	2,087	2,085	2,083	2,081	2,079	2,077	2,074	2,071	2,069	2,066	2,064	2,061	2,059	2,059	2,058	2,057	2,056
1	1,982	1,982	1,980	1,975	1,971	1,968	1,966	1,963	1,962	1,960	1,958	1,956	1,953	1,951	1,948	1,946	1,943	1,941	1,939	1,939	1,938	1,937
2	1,867	1,867	1,867	1,864	1,860	1,856	1,854	1,851	1,849	1,847	1,846	1,844	1,842	1,839	1,837	1,835	1,833	1,830	1,828	1,827	1,826	1,825
3	1,758	1,758	1,758	1,758	1,756	1,752	1,748	1,746	1,743	1,741	1,740	1,738	1,737	1,735	1,732	1,730	1,728	1,726	1,724	1,721	1,720	1,719
4	1,656	1,656	1,656	1,656	1,656	1,653	1,650	1,646	1,644	1,642	1,640	1,638	1,637	1,635	1,634	1,631	1,629	1,627	1,625	1,623	1,621	1,620
5	1,559	1,559	1,559	1,559	1,559	1,559	1,557	1,554	1,550	1,548	1,546	1,544	1,543	1,541	1,540	1,538	1,536	1,534	1,532	1,530	1,528	1,526
6	1,469	1,467	1,466	1,466	1,467	1,467	1,467	1,465	1,462	1,459	1,456	1,454	1,452	1,451	1,450	1,448	1,447	1,445	1,443	1,442	1,440	1,438
7	1,383	1,380	1,378	1,377	1,378	1,378	1,379	1,379	1,377	1,374	1,371	1,368	1,366	1,364	1,363	1,361	1,360	1,359	1,358	1,357	1,355	1,354
8	1,302	1,298	1,293	1,290	1,292	1,293	1,294	1,295	1,294	1,293	1,289	1,284	1,282	1,280	1,279	1,277	1,275	1,275	1,276	1,275	1,273	1,272
9	1,227	1,221	1,214	1,209	1,209	1,210	1,212	1,213	1,213	1,213	1,211	1,205	1,202	1,200	1,199	1,196	1,194	1,194	1,195	1,196	1,195	1,193
10	1,155	1,149	1,140	1,133	1,131	1,132	1,134	1,136	1,136	1,136	1,136	1,131	1,127	1,123	1,122	1,119	1,117	1,117	1,118	1,120	1,120	1,119
11	1,088	1,082	1,072	1,063	1,060	1,058	1,059	1,062	1,063	1,064	1,063	1,059	1,056	1,052	1,050	1,047	1,044	1,044	1,046	1,047	1,048	1,048
12	1,025	1,018	1,009	999	995	991	991	992	994	995	995	991	989	986	983	979	976	976	977	979	980	981
13	965	959	950	940	935	930	928	928	928	930	930	928	926	924	921	917	913	913	913	914	916	917
14	909	903	895	885	880	874	871	869	868	869	870	868	866	865	863	859	855	853	854	855	856	857
15	856	851	843	834	828	823	818	815	813	813	813	811	810	809	808	805	801	799	799	799	800	801
16	806	801	794	785	780	775	770	766	763	761	760	758	758	757	756	753	751	749	748	747	748	748
17	759	755	747	740	735	729	725	721	717	714	712	709	708	707	707	705	703	702	701	700	699	700
18	715	711	704	697	692	687	683	679	675	671	668	664	662	661	661	660	658	657	657	656	655	655
19	673	669	663	656	652	647	643	640	636	632	628	623	620	618	618	617	615	615	615	615	614	613
20	634	630	624	618	614	610	606	603	599	595	591	586	582	579	578	576	575	575	575	575	575	575
21	597	594	588	582	578	574	571	568	564	560	557	551	547	544	541	539	538	538	538	539	538	538
22	562	559	554	548	545	541	538	535	531	528	524	519	515	511	508	505	503	503	503	504	504	504
23	530	526	522	516	513	509	506	504	500	497	494	489	485	481	478	474	471	470	470	471	471	472
24	499	496	491	486	483	480	477	474	471	468	465	461	457	453	449	446	442	440	440	440	441	441
25	470	467	463	458	455	452	449	447	444	441	438	434	430	427	423	419	416	413	412	412	412	413
26	442	440	436	431	429	426	423	421	418	416	413	409	405	402	399	395	391	389	387	386	385	386
27	417	414	410	406	404	401	398	396	394	392	389	385	382	379	376	372	368	366	364	362	361	361
28	392	390	386	383	380	378	375	373	371	369	366	363	360	357	354	350	347	344	342	340	339	338
29	369	367	364	360	358	356	353	352	349	347	345	342	339	336	333	330	327	324	322	320	319	317
30	348	346	343	339	337	335	333	331	329	327	325	322	319	317	314	311	308	306	304	302	300	298
31	328	326	323	320	318	315	314	312	310	308	306	303	301	298	296	293	290	288	286	284	282	281
32	309	307	304	301	299	297	295	294	292	290	288	285	283	281	279	276	273	271	269	268	266	264
33	291	289	286	283	282	280	278	277	275	273	271	269	267	264	262	260	257	256	254	252	251	249
34	274	272	270	267	265	263	262	261	259	257	256	253	251	249	247	245	242	241	239	238	236	235
35	258	256	254	251	250	248	247	245	244	242	241	238	237	235	233	231	228	227	225	224	222	221
36	243	241	239	237	235	234	232	231	230	228	227	225	223	221	219	217	215	214	212	211	209	208
37	229	227	225	223	222	220	219	218	216	215	214	212	210	208	206	205	203	201	200	199	197	196
38	215	214	212	210	209	207	206	205	204	202	201	199	198	196	194	193	191	189	188	187	186	185
39	203	202	200	198	196	195	194	193	192	191	189	188	186	185	183	181	180	178	177	176	175	174
40	3,254	3,236	3,208	3,178	3,158	3,138	3,121	3,105	3,087	3,070	3,050	3,022	2,998	2,975	2,952	2,925	2,898	2,877	2,860	2,843	2,825	2,808

Table 29. continued.

Age (yr)	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
0	2,056	2,056	2,056	2,056	2,055	2,055	2,048	2,036	2,007	1,989	1,980	1,974	1,968	1,959	1,951	1,943	1,936	1,928	1,919	1,910	1,894	1,878
1	1,937	1,936	1,936	1,937	1,936	1,936	1,935	1,929	1,918	1,890	1,873	1,865	1,859	1,853	1,845	1,837	1,830	1,824	1,816	1,807	1,799	1,784
2	1,824	1,824	1,824	1,824	1,824	1,824	1,823	1,823	1,817	1,806	1,780	1,764	1,756	1,750	1,745	1,737	1,730	1,723	1,717	1,710	1,702	1,694
3	1,719	1,718	1,718	1,717	1,717	1,718	1,717	1,717	1,716	1,711	1,701	1,676	1,661	1,654	1,648	1,643	1,636	1,629	1,623	1,617	1,610	1,603
4	1,619	1,619	1,618	1,618	1,617	1,617	1,618	1,617	1,616	1,616	1,611	1,602	1,579	1,563	1,555	1,550	1,546	1,539	1,532	1,526	1,521	1,514
5	1,525	1,525	1,524	1,524	1,523	1,523	1,523	1,523	1,521	1,521	1,521	1,517	1,508	1,480	1,464	1,457	1,453	1,448	1,441	1,435	1,429	1,423
6	1,436	1,436	1,435	1,434	1,434	1,434	1,433	1,431	1,429	1,429	1,429	1,430	1,426	1,409	1,382	1,368	1,361	1,356	1,352	1,345	1,339	1,331
7	1,352	1,351	1,350	1,349	1,349	1,349	1,347	1,344	1,337	1,337	1,339	1,341	1,342	1,330	1,313	1,287	1,273	1,266	1,261	1,256	1,248	1,240
8	1,271	1,270	1,269	1,268	1,267	1,268	1,266	1,259	1,246	1,244	1,247	1,252	1,254	1,248	1,234	1,218	1,193	1,179	1,172	1,165	1,157	1,147
9	1,193	1,192	1,192	1,190	1,189	1,191	1,187	1,179	1,159	1,152	1,156	1,162	1,167	1,162	1,153	1,140	1,124	1,100	1,086	1,077	1,067	1,056
10	1,118	1,118	1,118	1,117	1,116	1,117	1,112	1,102	1,076	1,066	1,067	1,074	1,080	1,078	1,070	1,062	1,049	1,033	1,010	995	981	969
11	1,048	1,048	1,048	1,048	1,047	1,047	1,041	1,030	1,000	986	984	989	994	994	990	983	975	962	946	922	903	887
12	981	982	982	982	981	982	975	962	929	912	908	910	913	913	911	908	902	892	879	862	835	814
13	918	919	920	920	919	920	912	899	863	845	839	838	839	837	836	834	832	824	814	801	779	752
14	858	860	862	862	861	862	854	840	803	784	776	773	771	768	765	764	764	759	751	741	722	701
15	802	804	806	807	807	807	799	785	749	728	719	714	710	705	701	699	700	697	692	684	668	649
16	749	751	754	755	755	756	748	734	698	678	667	661	656	649	643	640	640	638	635	629	616	600
17	701	702	704	706	707	707	700	687	652	631	621	613	607	599	592	587	586	583	581	577	566	553
18	655	656	658	660	660	662	655	642	609	589	578	570	563	554	546	540	537	533	531	528	519	508
19	613	614	615	616	617	618	613	601	568	549	539	531	523	513	505	498	494	489	486	483	475	466
20	574	574	575	576	577	578	572	561	531	513	503	495	487	477	468	460	455	450	445	441	434	426
21	538	538	538	539	539	540	535	524	496	479	469	461	453	444	435	426	421	415	409	405	397	389
22	504	504	504	504	504	505	500	490	463	447	438	431	423	413	404	396	390	383	377	372	364	356
23	472	472	473	472	472	472	467	457	432	417	409	402	394	385	376	368	362	355	349	343	334	326
24	442	442	443	442	442	441	436	427	404	390	382	375	368	359	351	343	337	330	323	317	308	300
25	413	414	414	415	414	414	408	399	377	364	356	350	344	336	327	320	314	307	300	294	285	276
26	386	387	388	388	388	388	382	373	352	340	332	327	321	313	306	298	292	286	279	273	264	255
27	361	362	363	363	363	363	358	350	329	317	310	305	299	292	285	279	273	266	260	254	245	236
28	338	338	339	340	340	340	336	328	309	297	290	285	279	273	266	260	255	248	242	236	228	219
29	316	316	317	318	318	318	314	307	289	278	271	266	261	254	248	243	238	232	226	220	212	204
30	297	296	297	297	297	298	294	287	271	260	254	249	244	238	232	226	222	216	211	205	198	190
31	279	278	278	278	278	278	275	269	253	244	238	233	228	222	216	211	207	202	197	192	184	177
32	263	262	261	260	260	260	257	252	237	228	223	218	213	207	202	197	193	188	184	179	172	165
33	247	246	245	244	243	243	240	235	222	213	208	204	200	194	189	184	180	176	171	167	161	154
34	233	232	231	230	228	228	225	220	207	200	195	191	187	182	177	172	168	164	160	156	150	144
35	220	218	217	216	215	214	211	206	194	187	182	179	175	170	166	161	157	153	149	145	140	134
36	207	206	205	204	202	201	198	193	181	174	171	167	164	159	155	151	147	143	139	136	130	125
37	195	194	193	192	190	189	186	181	170	163	159	156	153	149	145	141	138	134	130	127	122	117
38	184	183	182	181	179	178	175	170	159	153	149	146	143	140	136	132	129	126	122	118	114	109
39	173	172	171	170	169	168	165	160	150	143	140	137	134	130	127	124	121	118	114	111	106	102
40	2,792	2,778	2,766	2,750	2,732	2,715	2,665	2,587	2,421	2,314	2,246	2,188	2,129	2,060	1,996	1,934	1,881	1,822	1,764	1,707	1,632	1,558

Table 29. continued.

Age (yr)	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
0	1,764	1,748	1,499	1,285	1,209	1,299	1,644	2,180	1,693	1,255	1,249	1,561	1,909	1,745	1,372	2,182	1,099	1,673	1,993	791	1,035	1,796
1	1,769	1,661	1,646	1,411	1,210	1,139	1,223	1,548	2,053	1,595	1,182	1,176	1,470	1,798	1,644	1,293	2,055	1,035	1,575	1,877	745	975
2	1,680	1,666	1,564	1,550	1,329	1,140	1,072	1,152	1,458	1,933	1,502	1,113	1,107	1,385	1,693	1,548	1,217	1,935	975	1,484	1,767	701
3	1,595	1,582	1,569	1,473	1,460	1,252	1,073	1,010	1,085	1,373	1,820	1,414	1,048	1,043	1,304	1,594	1,458	1,146	1,822	918	1,397	1,663
4	1,507	1,500	1,487	1,475	1,385	1,373	1,176	1,009	949	1,019	1,290	1,709	1,329	984	979	1,224	1,496	1,367	1,076	1,710	861	1,301
5	1,417	1,409	1,403	1,391	1,379	1,296	1,283	1,098	942	886	951	1,202	1,595	1,238	915	910	1,137	1,389	1,271	999	1,589	784
6	1,327	1,319	1,313	1,307	1,295	1,286	1,207	1,192	1,022	875	824	882	1,118	1,479	1,144	846	840	1,050	1,284	1,173	923	1,429
7	1,235	1,229	1,224	1,218	1,211	1,205	1,195	1,117	1,106	947	813	764	820	1,035	1,361	1,055	780	775	969	1,179	1,079	828
8	1,142	1,137	1,135	1,131	1,124	1,124	1,116	1,099	1,033	1,021	879	754	709	758	948	1,253	970	718	714	885	1,077	965
9	1,050	1,045	1,045	1,043	1,038	1,039	1,037	1,020	1,013	949	946	814	698	654	690	869	1,149	892	660	648	800	957
10	962	956	956	956	953	957	956	941	936	925	877	874	752	643	593	631	795	1,054	816	594	578	702
11	879	873	872	872	870	877	878	860	860	851	853	807	805	690	580	540	574	727	959	727	522	499
12	803	795	793	792	792	799	802	783	784	778	781	783	741	737	621	527	490	524	657	847	632	445
13	735	725	721	719	718	726	729	711	712	706	712	715	717	678	661	562	476	446	472	576	729	533
14	678	663	656	652	651	658	661	643	645	639	644	650	653	654	606	597	506	433	399	411	493	609
15	631	610	600	593	590	596	598	580	582	578	582	587	593	595	583	546	537	460	387	347	349	408
16	584	568	552	541	536	539	541	523	524	520	525	530	535	539	529	525	490	487	410	334	294	288
17	540	525	513	497	488	490	490	472	472	468	473	478	482	486	479	476	471	445	433	354	282	241
18	497	485	474	462	449	446	444	426	426	421	425	429	434	437	431	430	427	427	395	373	298	232
19	457	446	437	427	417	410	404	386	384	379	382	386	390	393	388	387	386	387	379	340	314	244
20	419	410	402	394	385	380	371	351	347	342	344	346	350	353	349	348	347	349	343	325	286	257
21	383	376	370	362	355	351	345	322	316	309	310	312	314	317	313	313	312	314	310	294	274	234
22	349	343	338	332	326	324	318	298	289	281	280	281	283	285	281	280	280	282	278	266	247	223
23	320	313	309	304	300	298	293	275	268	258	254	254	254	256	252	252	251	253	250	239	223	202
24	293	286	282	278	274	273	270	254	247	239	233	231	230	230	226	226	225	227	225	214	200	182
25	269	262	258	254	250	250	247	233	228	220	216	211	209	208	204	203	202	204	201	192	180	164
26	248	241	236	232	229	228	227	214	209	203	199	196	191	189	184	182	181	183	180	172	162	147
27	229	222	217	212	209	208	207	196	192	186	183	180	177	173	167	165	163	164	162	155	145	132
28	212	205	200	195	191	190	189	179	176	171	168	166	163	160	153	150	147	148	145	139	130	118
29	197	190	185	180	176	174	172	163	160	156	154	153	150	148	142	137	134	133	131	125	116	106
30	183	176	171	166	162	160	158	149	146	143	141	140	138	136	130	127	123	121	118	112	104	95
31	171	164	159	154	150	148	145	136	134	130	129	128	127	125	120	117	113	111	107	101	94	85
32	159	153	148	143	138	136	134	125	122	119	118	117	116	115	110	108	105	103	98	92	85	77
33	148	142	138	133	129	126	123	115	112	109	107	107	106	105	101	99	96	95	91	84	77	69
34	138	133	128	123	120	117	114	106	104	100	98	97	96	96	93	91	88	87	84	78	71	63
35	129	124	120	115	111	109	106	99	96	92	90	89	88	87	84	83	81	80	77	72	65	58
36	120	116	112	107	104	101	99	91	89	85	83	82	81	80	77	76	74	73	71	66	60	53
37	112	108	104	100	97	95	92	85	82	79	77	75	74	73	70	69	68	67	65	61	55	49
38	105	101	97	93	90	88	86	79	76	73	71	70	68	67	64	63	62	61	59	56	51	45
39	98	94	91	87	84	82	80	74	71	68	66	64	63	62	59	58	56	56	54	51	47	41
40	1,489	1,422	1,364	1,306	1,255	1,221	1,180	1,086	1,042	989	956	925	896	867	820	787	755	735	700	645	584	514

Table 29. continued.

Age (yr)	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
0	970	715	2,286	684	1,161	1,315	1,644	1,739	1,634	1,715	1,338	1,116	1,491	1,058	939	652	695	1,225	550	1,030	716	477
1	1,691	914	673	2,153	644	1,093	1,239	1,548	1,638	1,538	1,615	1,260	1,051	1,404	997	884	614	655	1,153	518	970	674
2	918	1,592	860	634	2,027	606	1,029	1,167	1,458	1,542	1,449	1,521	1,187	990	1,322	939	832	578	617	1,086	487	914
3	660	864	1,499	810	597	1,908	571	969	1,098	1,372	1,452	1,364	1,432	1,117	932	1,245	884	784	545	581	1,023	459
4	1,557	616	811	1,405	756	556	1,778	532	906	1,029	1,285	1,361	1,280	1,344	1,048	874	1,167	830	736	511	546	963
5	1,200	1,423	573	750	1,283	689	506	1,620	488	836	947	1,187	1,259	1,188	1,244	972	807	1,086	772	684	478	513
6	716	1,082	1,313	526	675	1,155	618	454	1,464	445	758	864	1,085	1,159	1,086	1,139	885	743	1,002	713	637	448
7	1,297	641	990	1,197	470	606	1,031	552	406	1,316	398	682	782	992	1,050	982	1,027	807	682	926	664	597
8	746	1,150	578	896	1,065	421	538	915	487	359	1,158	351	609	709	890	935	877	926	738	632	863	622
9	861	649	1,010	517	790	948	369	471	789	420	307	991	306	546	629	778	824	779	842	686	590	809
10	842	730	553	892	450	696	815	316	395	663	347	253	839	271	478	540	677	720	703	783	641	553
11	609	695	602	482	765	391	585	683	258	323	528	275	207	729	234	405	464	583	646	655	733	600
12	428	490	556	518	407	657	322	479	542	206	248	404	218	178	626	196	344	396	520	602	613	687
13	378	337	382	474	433	346	532	259	372	424	154	184	311	185	152	521	166	291	352	486	564	575
14	448	292	258	323	392	365	277	421	197	287	309	111	139	261	157	126	439	140	258	328	455	529
15	509	342	220	216	266	329	289	217	317	151	206	220	83	116	222	130	105	368	124	241	308	426
16	340	385	255	184	177	222	258	225	162	240	107	145	161	68	98	183	109	88	325	116	226	288
17	239	256	285	213	151	148	173	200	166	122	169	74	105	133	58	81	153	91	78	304	108	212
18	200	179	188	237	174	125	115	134	147	125	85	117	54	87	113	48	68	128	80	73	285	101
19	192	149	132	157	193	144	97	88	98	111	87	59	84	44	73	93	40	57	113	75	68	267
20	202	143	109	109	128	160	112	75	65	74	76	60	42	69	37	60	78	33	50	106	70	64
21	212	150	104	91	89	106	124	86	55	48	51	52	43	34	58	31	50	65	29	47	99	66
22	193	158	109	87	74	74	82	95	63	41	33	35	37	35	29	48	26	42	57	28	44	93
23	184	143	115	91	70	61	57	63	70	47	28	23	25	31	30	24	40	21	37	54	26	41
24	167	137	104	95	74	58	47	44	46	52	32	19	16	20	26	24	20	34	19	35	50	24
25	150	124	100	87	78	61	45	36	32	34	36	22	14	13	17	21	20	17	30	18	33	47
26	135	111	90	83	70	64	47	34	26	24	23	24	16	11	11	14	18	17	15	28	17	31
27	121	100	81	75	67	58	50	36	25	20	16	16	17	13	9	9	12	15	15	14	26	16
28	109	90	73	67	61	56	45	38	26	19	14	11	11	14	11	8	8	10	13	14	13	24
29	97	80	65	60	55	50	43	34	28	20	13	9	8	9	12	9	7	7	9	12	13	12
30	87	72	59	54	49	45	39	33	25	21	14	9	7	6	8	10	7	5	6	8	12	12
31	78	65	52	49	44	41	35	30	24	19	14	9	6	5	5	7	8	6	5	5	8	11
32	70	58	47	44	39	36	31	27	22	18	13	10	7	5	5	5	5	7	6	5	5	7
33	63	52	42	39	35	33	28	24	19	16	12	9	7	5	4	4	4	5	6	5	4	5
34	57	47	38	35	32	29	25	21	17	15	11	8	6	6	5	4	3	3	4	6	5	4
35	52	42	34	31	28	26	23	19	16	13	10	8	6	5	5	4	3	3	3	4	5	5
36	47	38	31	28	26	23	20	17	14	12	9	7	5	5	4	4	3	2	2	3	4	5
37	44	35	28	26	23	21	18	15	13	10	8	6	5	4	4	4	3	3	2	2	2	3
38	40	33	26	23	21	19	16	14	11	9	7	5	4	4	4	3	3	3	2	2	2	2
39	37	30	24	21	19	17	15	12	10	8	6	5	4	4	3	3	3	2	2	2	2	2
40	458	367	289	259	228	204	171	141	112	91	69	51	40	36	33	30	28	26	25	25	26	26

Table 29. continued.

Age (yr)	2004	2005	2006	2007
0	783	591	572	1,404
1	450	737	557	539
2	635	423	694	524
3	861	598	399	654
4	432	810	563	375
5	902	406	761	529
6	479	846	381	714
7	419	450	795	357
8	559	393	422	746
9	584	525	370	397
10	760	549	494	347
11	520	714	516	464
12	564	489	671	485
13	646	531	459	631
14	540	607	499	432
15	497	508	571	469
16	401	467	477	537
17	271	377	439	449
18	199	255	354	413
19	95	187	240	333
20	251	90	176	225
21	60	236	84	166
22	62	57	222	79
23	87	58	53	209
24	39	82	55	50
25	23	36	77	52
26	44	21	34	73
27	29	42	20	32
28	15	27	39	19
29	23	14	25	37
30	11	22	13	24
31	12	11	20	12
32	10	11	10	19
33	7	10	10	10
34	4	6	9	10
35	4	4	6	8
36	4	4	4	6
37	5	4	3	4
38	3	4	4	3
39	2	3	4	4
40	26	27	28	30

Table 30. Summary results of sensitivity to splitting the triennial time-series.

Model	2007	a
Description	Base case	No triennial split
Convergence		
Maximum gradient component	0.000085	0.000081
Likelihood penalties	0.0	0.0
Negative log-likelihoods		
Total	4,393.4	4,396.6
Indices	-8.1	-5.4
Length-frequency data	2,103.7	2,105.9
Age-frequency data	2,316.0	2,315.9
Recruitment	-17.4	-19.2
Priors	0.0	0.0
Forecast recruitment	-0.7	-0.7
Select parameters		
Stock-recruit, productivity		
R_0	4,210	4,149
Steepness (*h*)	0.511	0.511
Female M age 14+	0.097	0.096
Survey catchability and selectivity		
NWFSC survey catchability (*Q*)	0.114	0.127
NWFSC survey peak selectivity	66.000	66.000
NWFSC survey width of selectivity top	-3.863	-3.629
NWFSC survey ascending width	7.175	7.204
NWFSC survey final selectivity	-1.660	-1.801
NWFSC survey final selectivity	4.459	4.450
1980-1992 Triennial survey catchability (*Q*)	0.114	0.088
1995-2004 Triennial survey catchability (*Q*)	0.054	0.088
Triennial survey peak selectivity	66.000	66.000
Triennial survey width of selectivity top	-3.465	-3.550
Triennial survey ascending width	7.272	7.284
Triennial survey final selectivity	4.453	4.450
Individual growth		
Female and male length at age 1	4.113	4.103
Female mean length at age 20	59.096	59.098
Female von Bertalanffy *K*	0.141	0.141
Female CV of length-at-age at age 1	0.145	0.145
Female CV of length-at-age at age 20	0.039	0.039
Male mean length at age 20	52.029	52.050
Male von Bertalanffy *K*	0.181	0.180
Male CV of length-at-age at age 1	0.152	0.153
Male CV of length-at-age at age 20	0.041	0.041
Management quantities		
SB_0	32,561	32,457
2007 Spawning biomass	10,544	9,519
2007 Depletion	32.4%	29.3%
2006 *SPR*	96.5%	96.1%
2006 Exp. rate: yield/age 5+ Biomass	0.002	0.002

Table 31. Total negative log-likelihood values for the profile on steepness (*h*)

Steepness (*h*)	Negative log-likelihood
0.345	4,408.13
0.428	4,399.23
0.4695	4,396.06
0.511	4,393.42
0.56	4,390.66
0.6155	4,388.40
0.72	4,384.94

Table 32. Projection of potential canary rockfish ABC, OY, spawning biomass and depletion for the base case model based on the SPR= 0.887 fishing mortality target used for the last rebuilding plan (OY) and $F_{50\%}$ overfishing limit/target (ABC). Assuming the OY of 44 mt is met in 2007 and 2008.

Year	ABC (mt)	OY (mt)	Age 5+ biomass (mt)	Spawning biomass (mt)	Depletion
2007	973	44	25,995	10,544	32.4%
2008	978	44	26,417	10,840	33.3%
2009	981	162	26,859	11,072	34.0%
2010	980	162	26,995	11,194	34.4%
2011	992	164	27,018	11,254	34.6%
2012	1,026	169	27,440	11,266	34.6%
2013	1,074	177	27,985	11,260	34.6%
2014	1,124	185	28,656	11,280	34.6%
2015	1,171	193	29,445	11,368	34.9%
2016	1,214	200	30,332	11,545	35.5%
2017	1,253	207	31,297	11,812	36.3%
2018	1,290	213	32,317	12,156	37.3%

Table 33. Decision table of 12-year projections for alternate states of nature (columns) and management options (rows) beginning in 2009. Relative probabilities of each state of nature are based on a meta-analysis for steepness of west coast rockfish (M. Dorn, AFSC, personal communication). Landings in 2007-2008 are 44 mt for all cases. Selectivity and fleet allocations are projected at the average 2003-2006 values.

			State of nature					
			Low steepness (0.35)		Base case (steepness = 0.51)		High steepness (0.72)	
Relative probability			0.25		0.5		0.25	
Management decision	Year	Catch (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)
Rebuilding SPR 88.7% catches from low steepness state of nature	2009	56	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	56	12.0%	4,100	34.5%	11,236	60.1%	18,932
	2011	56	11.9%	4,078	34.8%	11,339	60.8%	19,156
	2012	59	11.8%	4,042	35.0%	11,396	61.2%	19,270
	2013	62	11.7%	4,003	35.1%	11,436	61.3%	19,313
	2014	65	11.6%	3,979	35.3%	11,502	61.4%	19,343
	2015	67	11.6%	3,984	35.7%	11,638	61.7%	19,423
	2016	70	11.7%	4,025	36.4%	11,866	62.2%	19,590
	2017	72	12.0%	4,102	37.4%	12,188	63.0%	19,852
	2018	74	12.3%	4,209	38.7%	12,591	64.1%	20,199
Rebuilding SPR 88.7% catches from base case	2009	162	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	162	11.8%	4,058	34.4%	11,194	60.0%	18,890
	2011	164	11.7%	3,994	34.6%	11,254	60.5%	19,069
	2012	169	11.4%	3,914	34.6%	11,266	60.8%	19,138
	2013	177	11.2%	3,831	34.6%	11,260	60.7%	19,135
	2014	185	11.0%	3,762	34.6%	11,280	60.7%	19,118
	2015	193	10.9%	3,719	34.9%	11,368	60.8%	19,150
	2016	200	10.8%	3,710	35.5%	11,545	61.2%	19,266
	2017	207	10.9%	3,733	36.3%	11,812	61.8%	19,475
	2018	213	11.0%	3,781	37.3%	12,156	62.8%	19,767
Rebuilding SPR 88.7% catches from high steepness state of nature	2009	273	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	271	11.7%	4,014	34.2%	11,150	59.8%	18,845
	2011	272	11.4%	3,905	34.3%	11,164	60.3%	18,978
	2012	277	11.0%	3,780	34.2%	11,130	60.3%	19,001
	2013	285	10.7%	3,654	34.0%	11,079	60.2%	18,951
	2014	293	10.3%	3,542	34.0%	11,055	60.0%	18,891
	2015	300	10.1%	3,459	34.1%	11,100	59.9%	18,880
	2016	307	9.9%	3,408	34.5%	11,235	60.2%	18,953
	2017	313	9.9%	3,389	35.2%	11,461	60.7%	19,122
	2018	319	9.9%	3,394	36.1%	11,763	61.5%	19,374
Status quo (catch = 44 mt)	2009	44	12.0%	4,099	34.0%	11,072	59.0%	18,583
	2010	44	12.0%	4,104	34.5%	11,241	60.1%	18,937
	2011	44	11.9%	4,088	34.9%	11,349	60.8%	19,166
	2012	44	11.8%	4,057	35.0%	11,411	61.2%	19,285
	2013	44	11.7%	4,024	35.2%	11,456	61.4%	19,334
	2014	44	11.7%	4,005	35.4%	11,529	61.5%	19,371
	2015	44	11.7%	4,018	35.8%	11,673	61.8%	19,459
	2016	44	11.9%	4,069	36.6%	11,911	62.3%	19,635
	2017	44	12.1%	4,157	37.6%	12,244	63.2%	19,908
	2018	44	12.5%	4,277	38.9%	12,660	64.3%	20,268

11. Figures

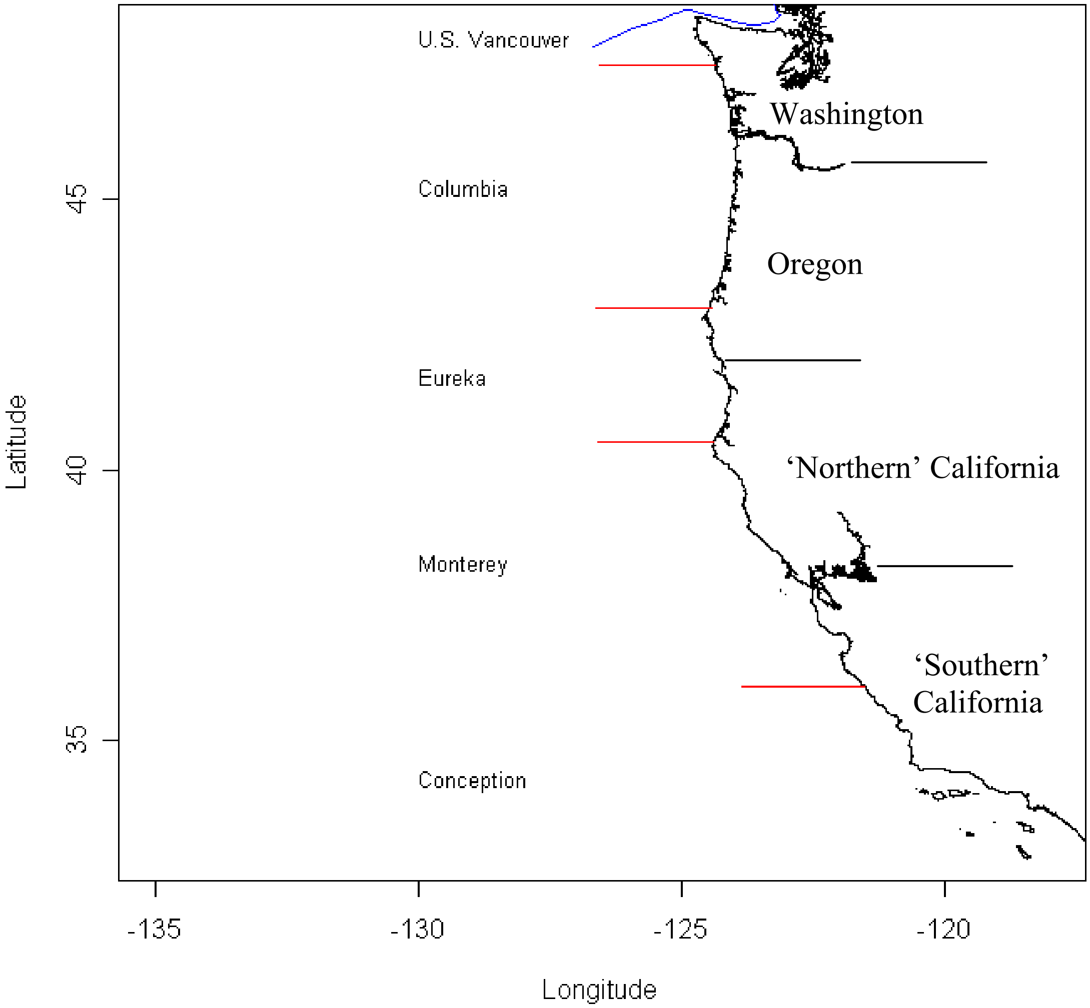


Figure 1. Map showing INPFC, and state/fleet boundaries used in the 2005 and current assessment.

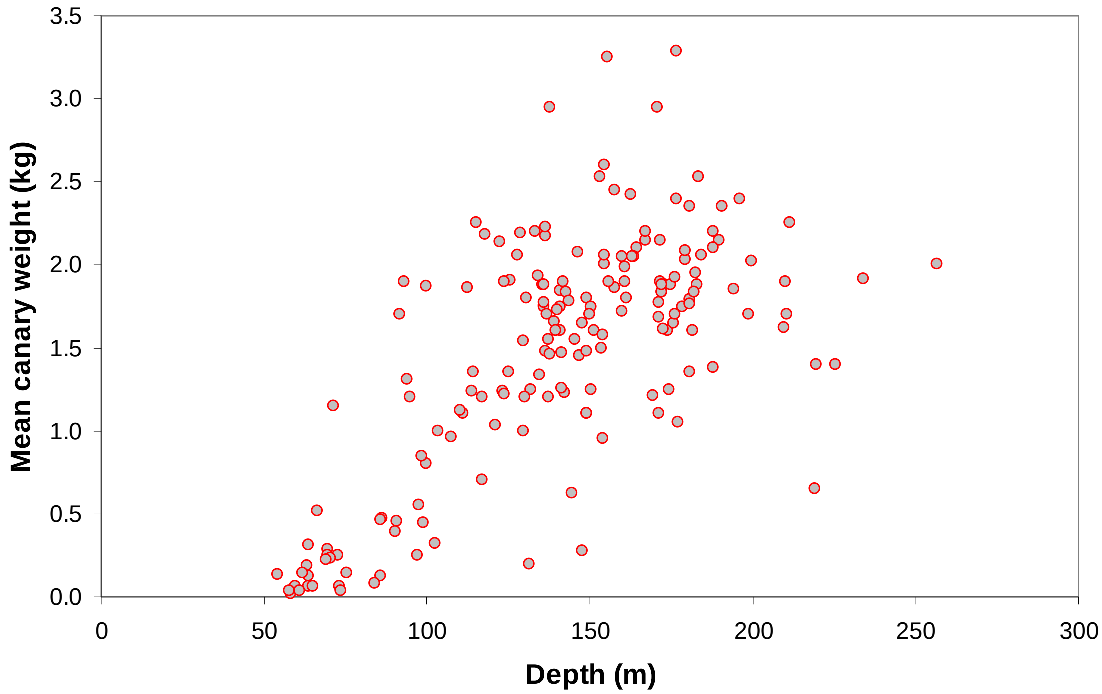


Figure 2. Relationship between mean individual weight and depth in NWFSC survey catches 2003-2006.

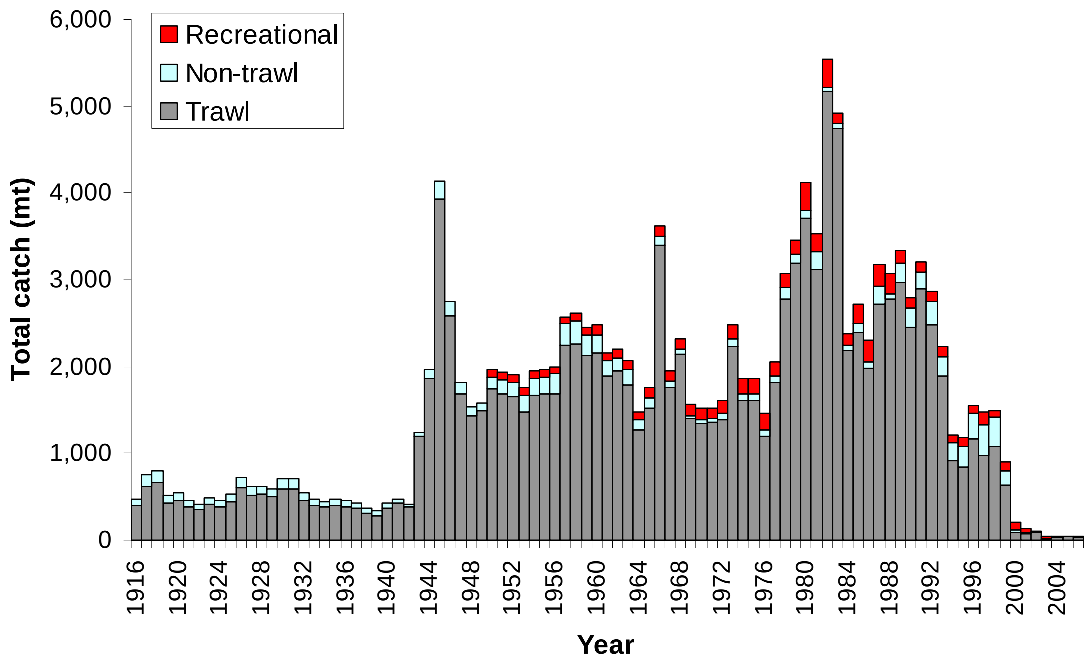


Figure 3. Distribution of total catch among trawl, non-trawl and recreational fisheries 1916-2006.

Figure 4. Distribution of recent total catch among trawl, non-trawl and recreational fisheries. Large reductions after 1999 were a result of the overfished declaration based on the 1999 stock assessment.

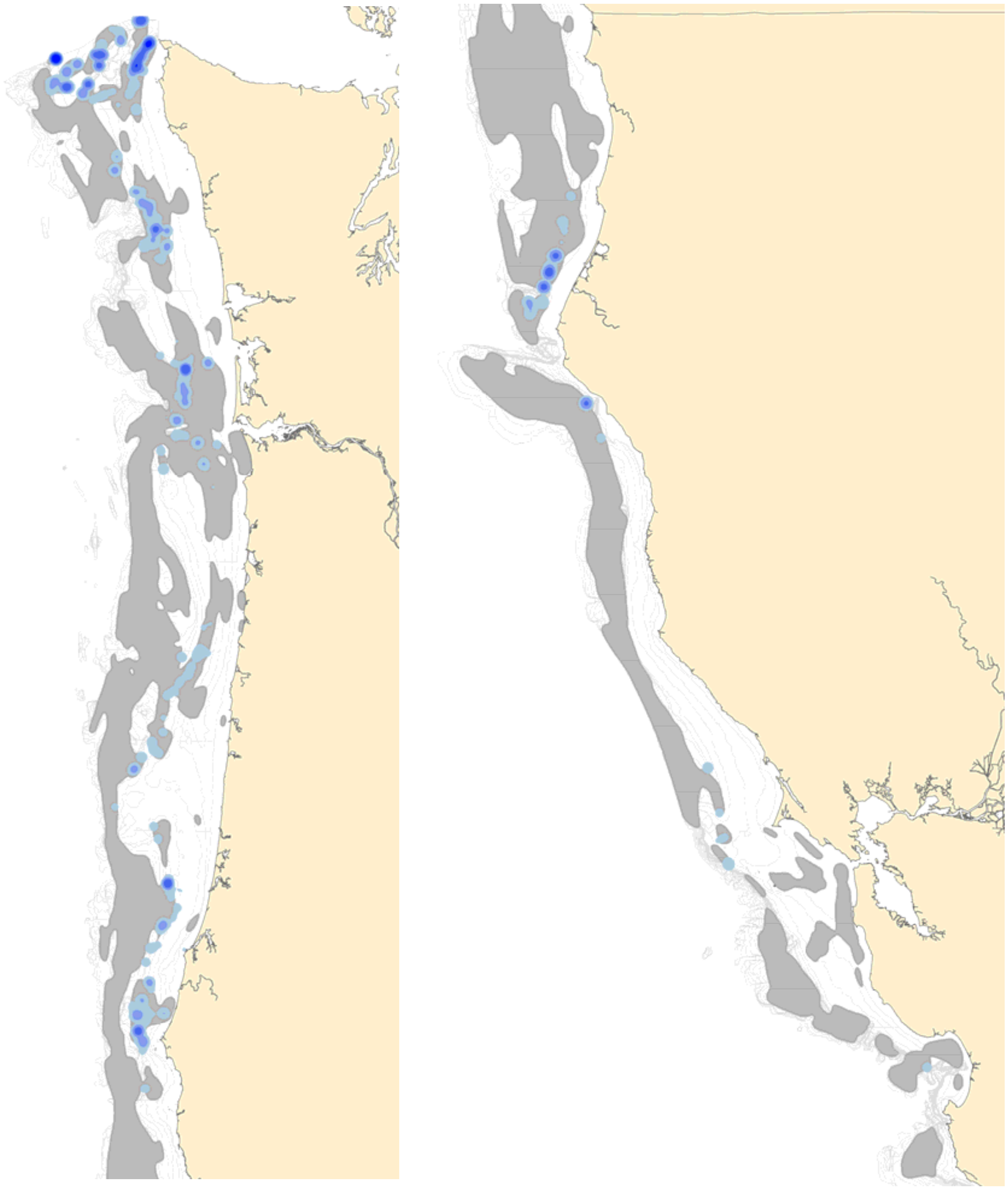


Figure 5. Contour of catch (landings and observed discards) rates of canary rockfish from the commercial trawl fishery, 2001-2005. Grey areas indicate trawl effort.

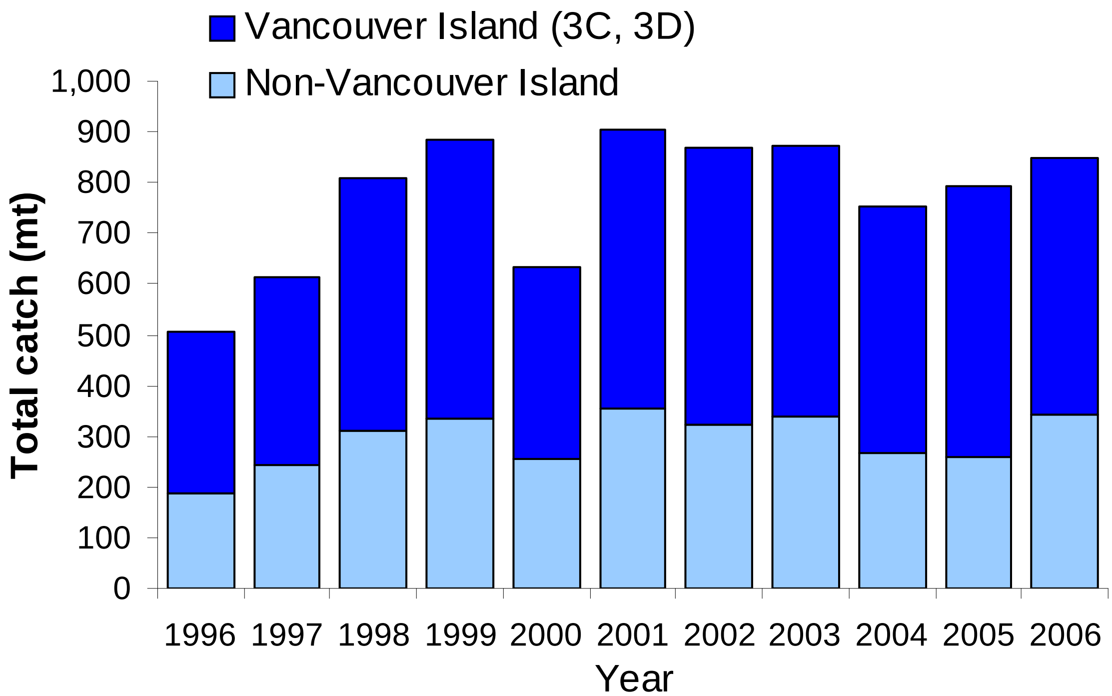


Figure 6. Recent catches of canary rockfish in the Canadian commercial fishery. Data courtesy of R. Stanley, DFO.

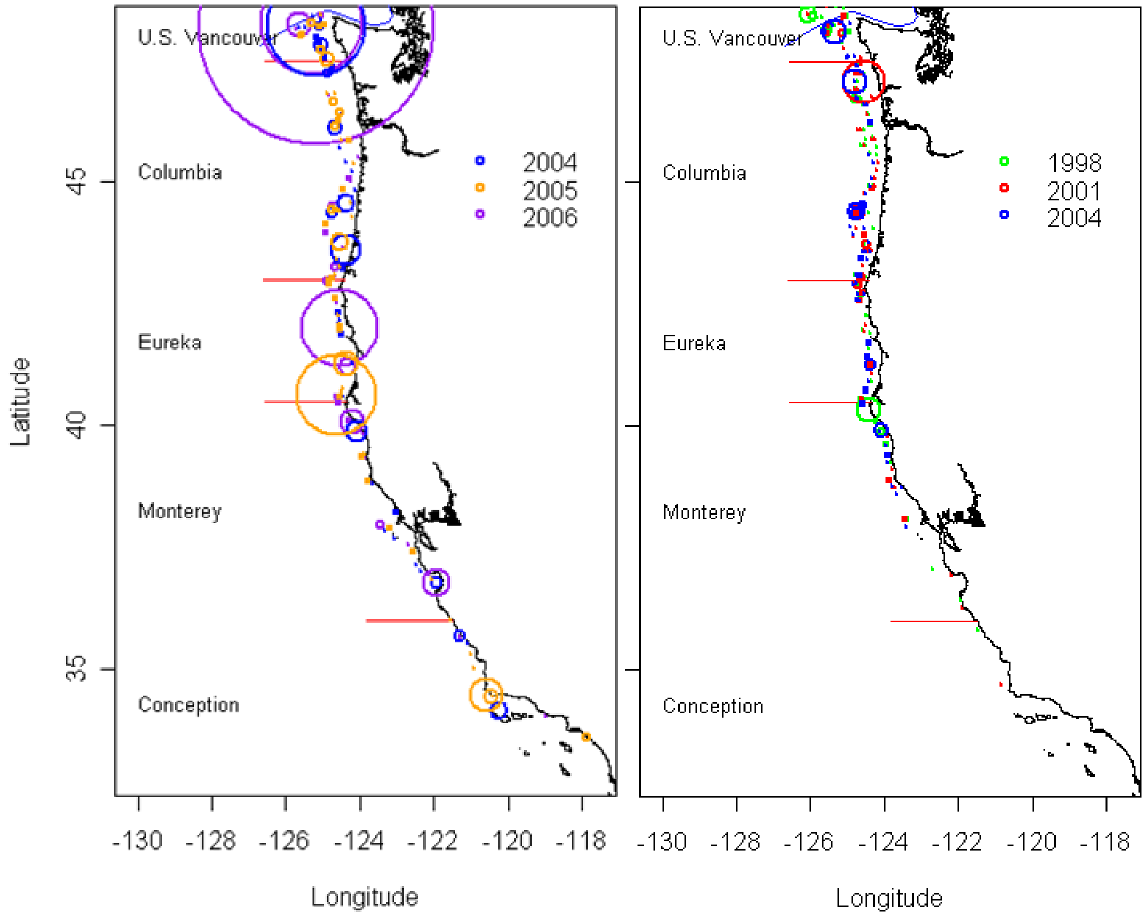


Figure 7. Distribution of canary catch rates in the recent NWFSC (left panel) and Triennial (right panel) trawl surveys. Legend circles indicate catch rates of 10 kg·ha^{-1}.

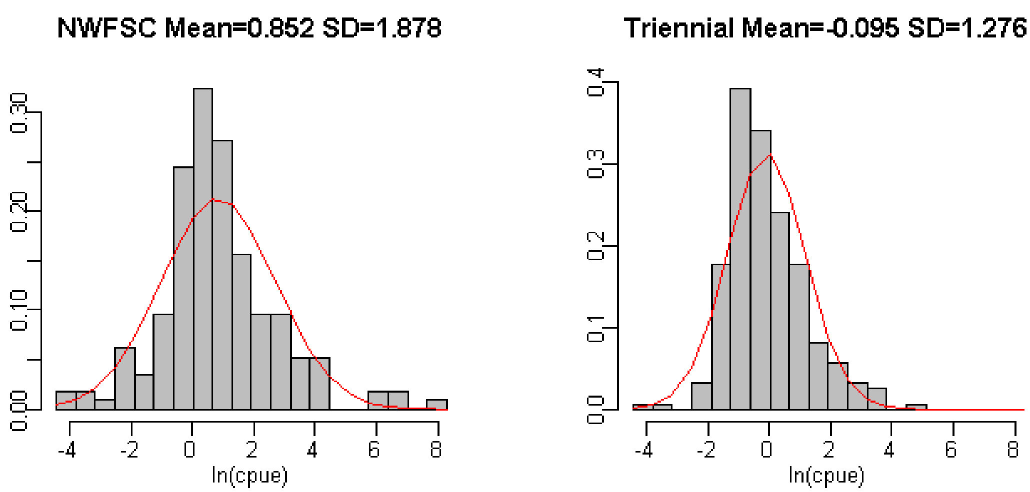


Figure 8. Frequency distribution of log (canary catch rates (kg·ha^{-1})) for positive hauls in the recent (1998-2006) NWFSC (left panel) and Triennial (right panel) trawl surveys.

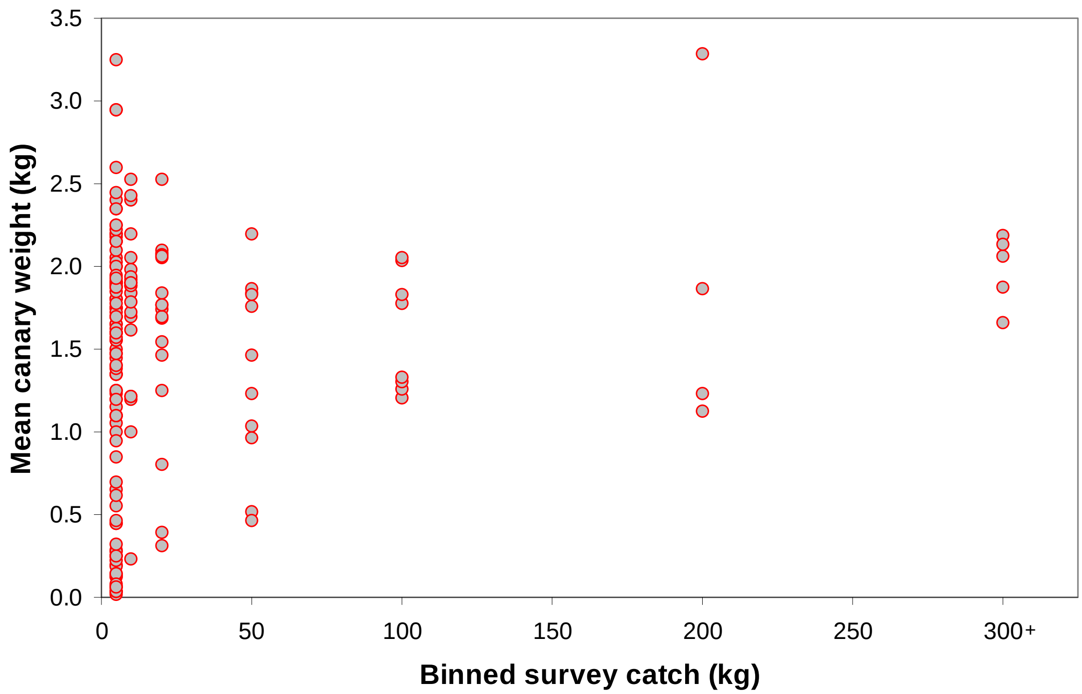


Figure 9. Mean individual weight at binned survey catch levels showing that the largest catches are not dominated by very large or very small individuals.

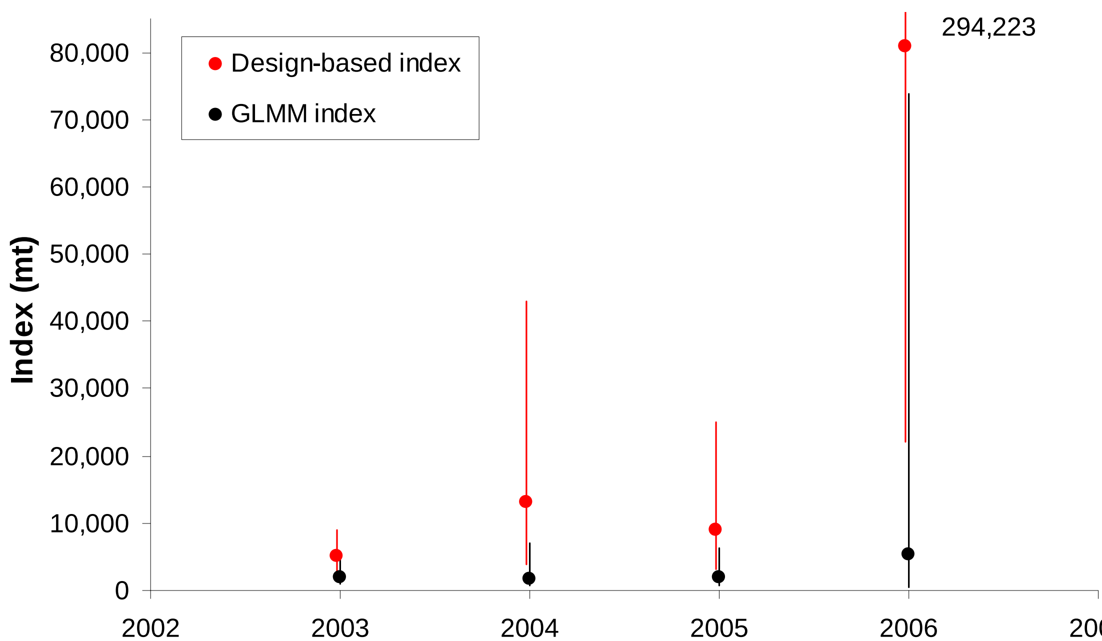


Figure 10. Comparison of GLMM vs. design-based indices of abundance from the NWFSC survey 2003-2006. Vertical lines indicate +/- 95% confidence intervals based on an assumption of lognormal error.

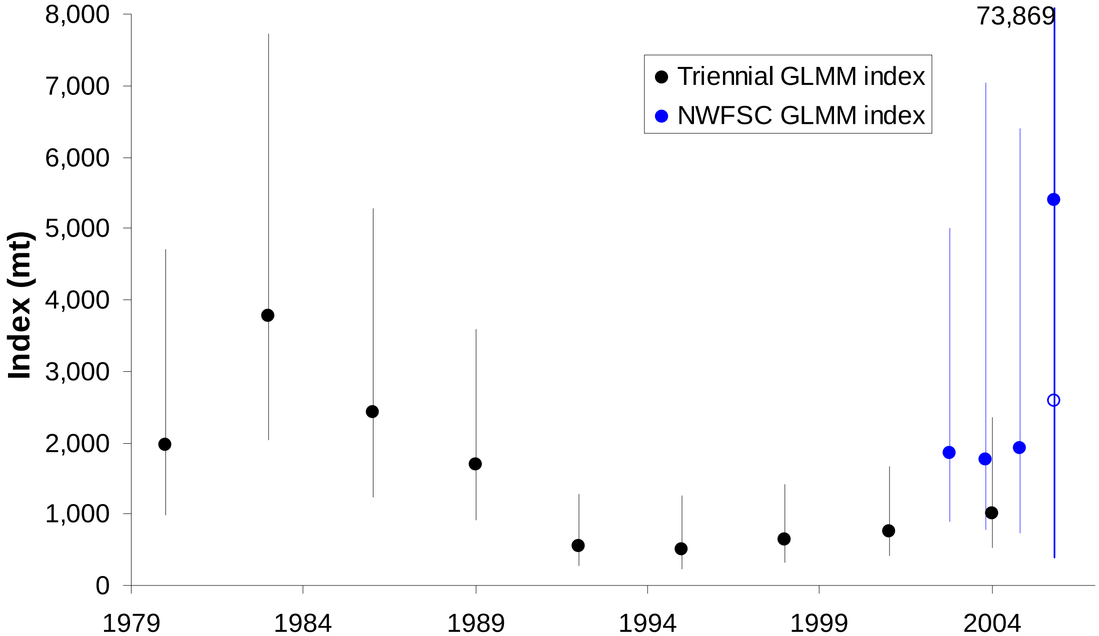


Figure 11.Triennial and NWFSC GLMM indices. The open circle for the NWFSC (2006) shows (for comparison only) the effect of removing the single largest tow from the data. Vertical lines indicate +/- 95% confidence intervals based on lognormal error.

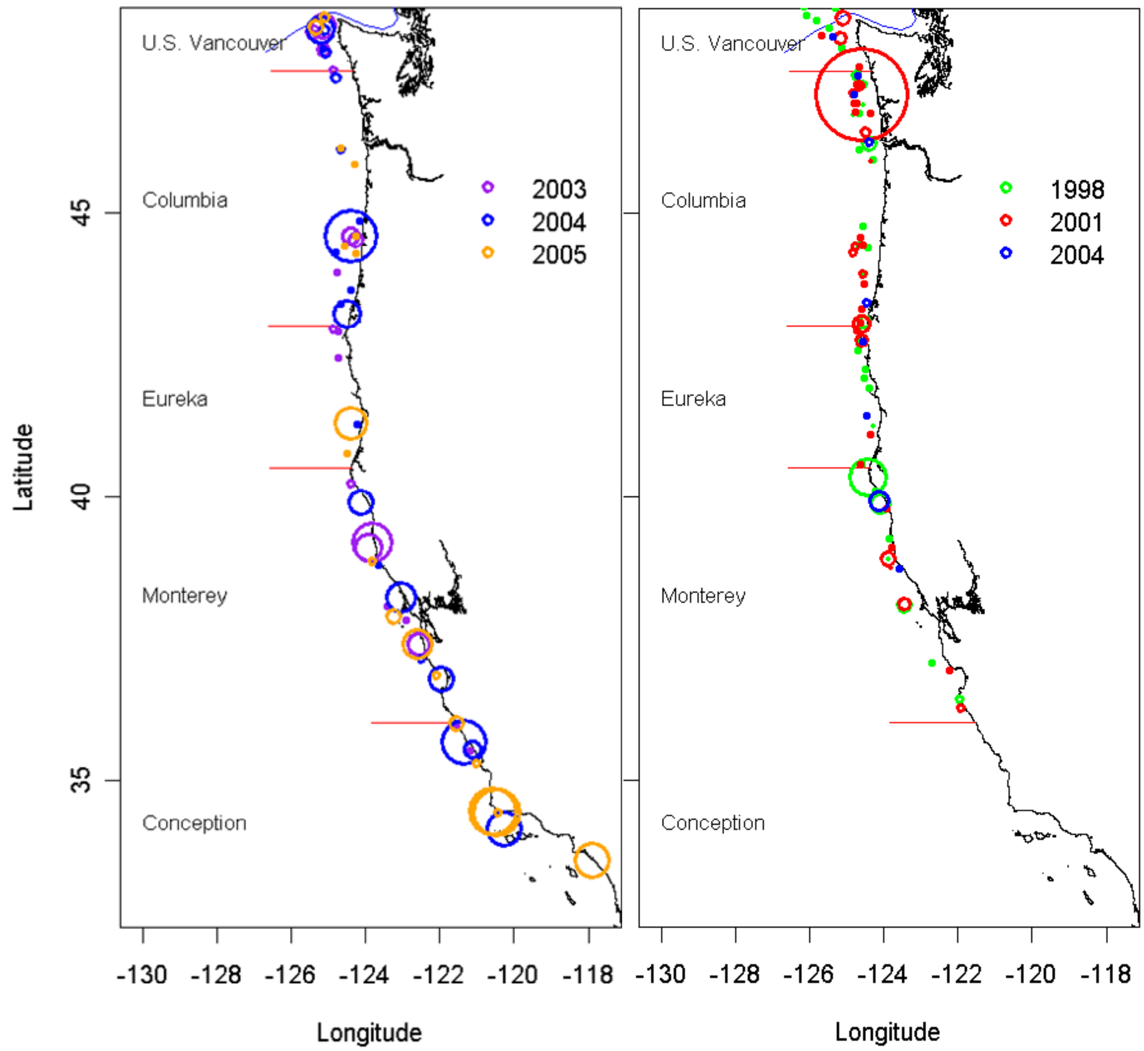


Figure 12. Survey catch rates of small (< 40 cm) canary rockfish around 2004, showing the higher catch rates for the NWFSC survey, especially south of San Francisco, relative to the Triennial trawl survey. Legend circles indicate catch rates of 10 individuals per hectare. The two are directly comparable only for 2004 when they were conducted nearly simultaneously.

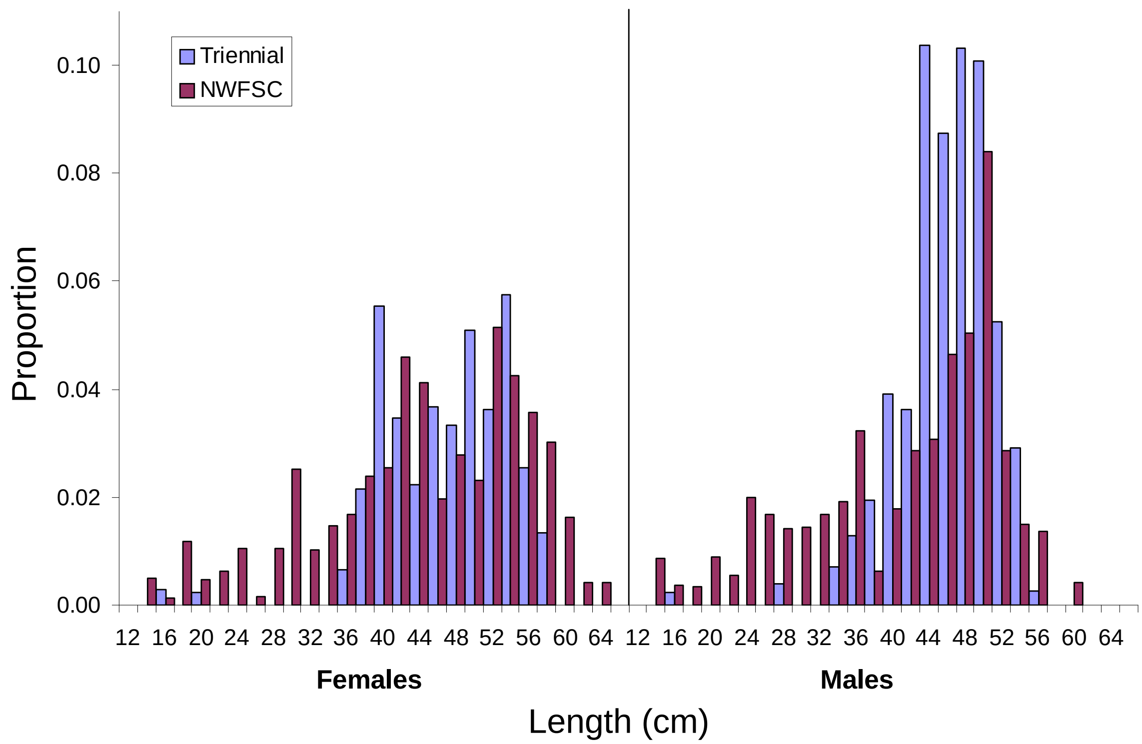


Figure 13. Length-frequency distributions for males and females from the 2004 NWFSC and triennial trawl surveys.

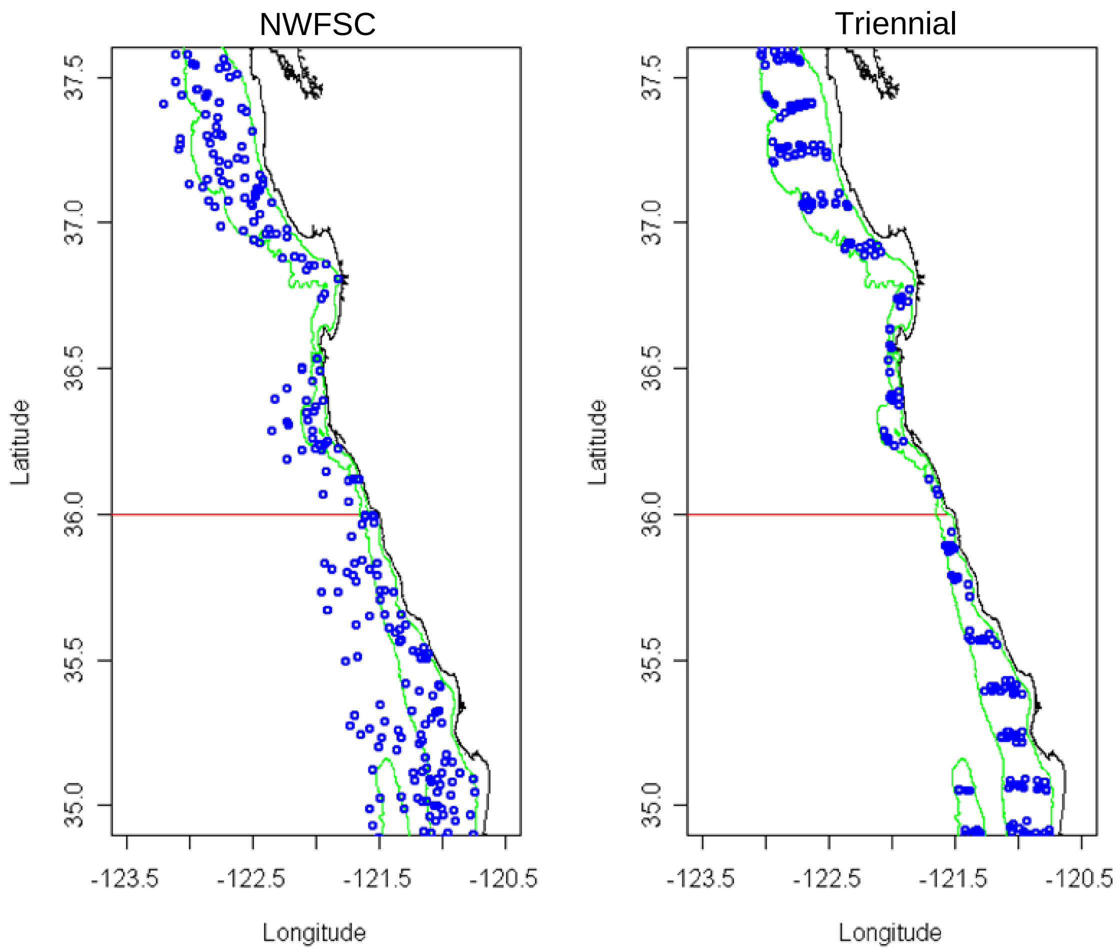


Figure 14. Survey tow locations in 2004, showing the difference in station design for the NWFSC survey relative to the Triennial trawl survey.

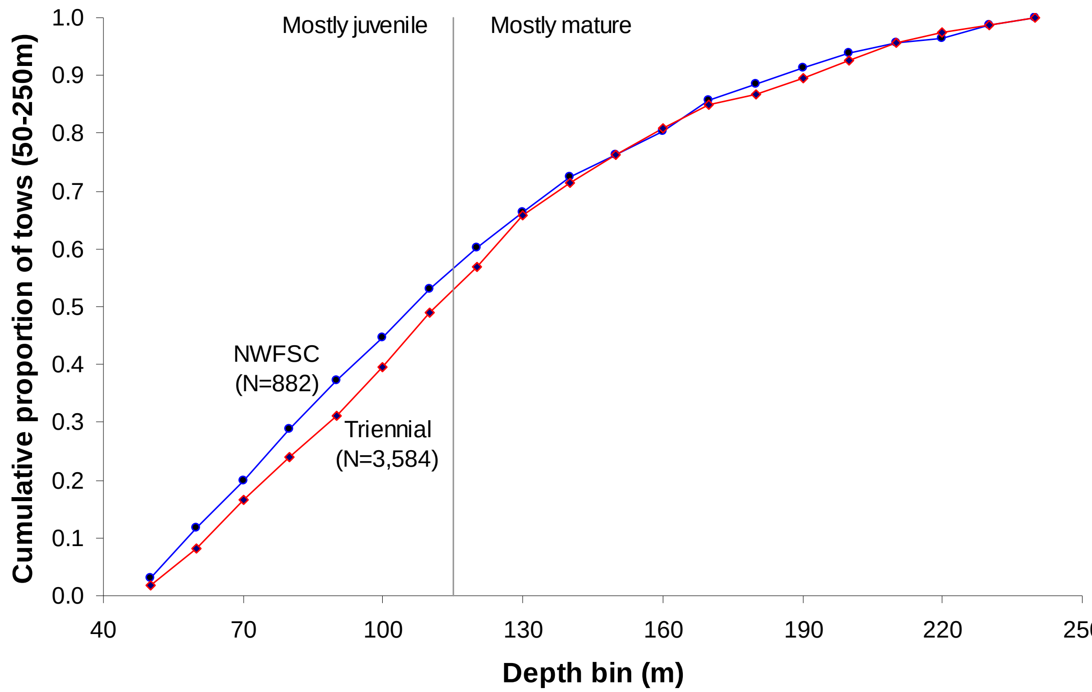


Figure 15. Relative effort (tows completed) by 10m depth bin for the NWFSC and triennial surveys.

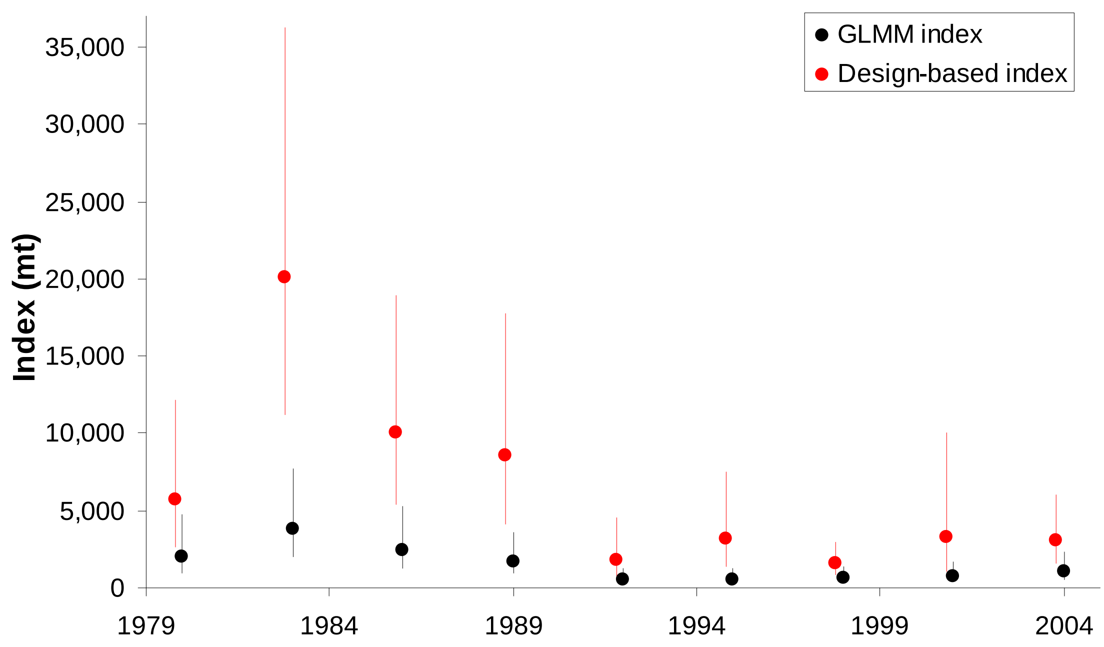


Figure 16. Comparison of GLMM vs. design-based indices of abundance from the triennial survey 1980-2004. Vertical lines indicate +/- 95% confidence intervals based on an assumption of lognormal error.

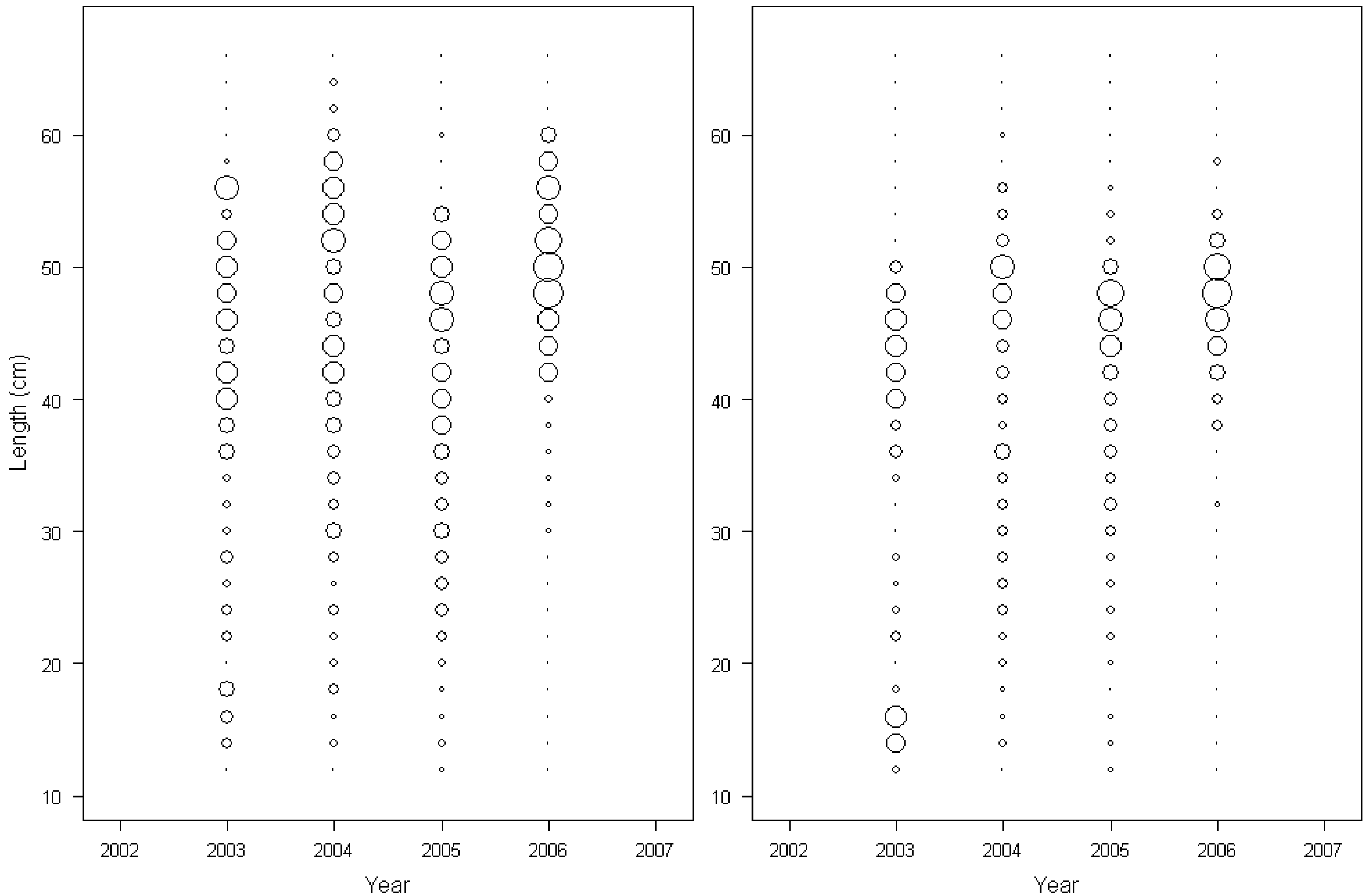


Figure 17. Length-frequency distributions for female (left panel) and male (right panel) canary rockfish from the NWFSC bottom trawl survey. The largest female bubble represents a proportion of 0.08, males represents 0.13.

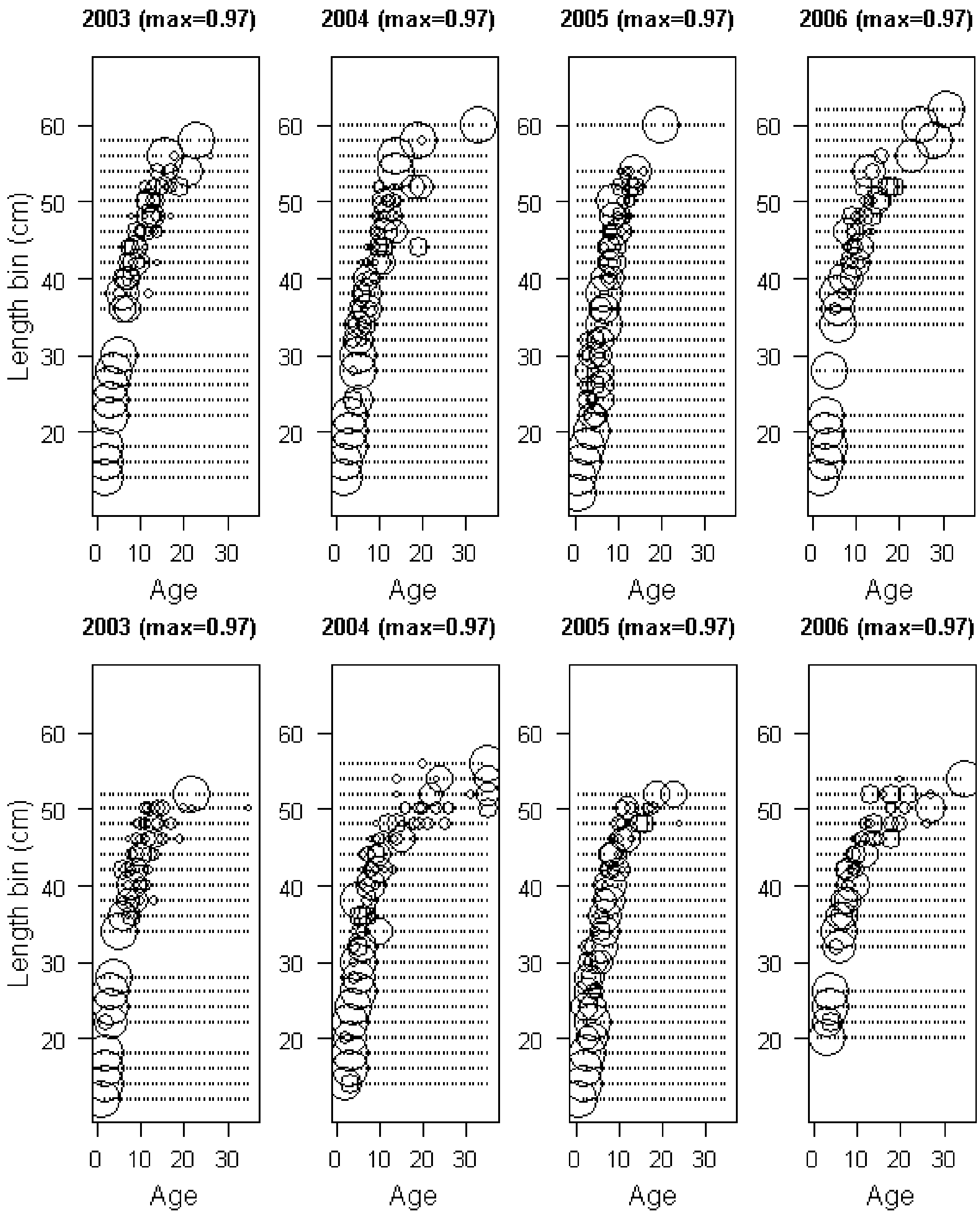


Figure 18. Conditional age-frequency distributions for female (upper panels) and male (lower panels) canary rockfish from the NWFSC survey. Largest circle in each panel represents the maximum proportion value listed in the title.

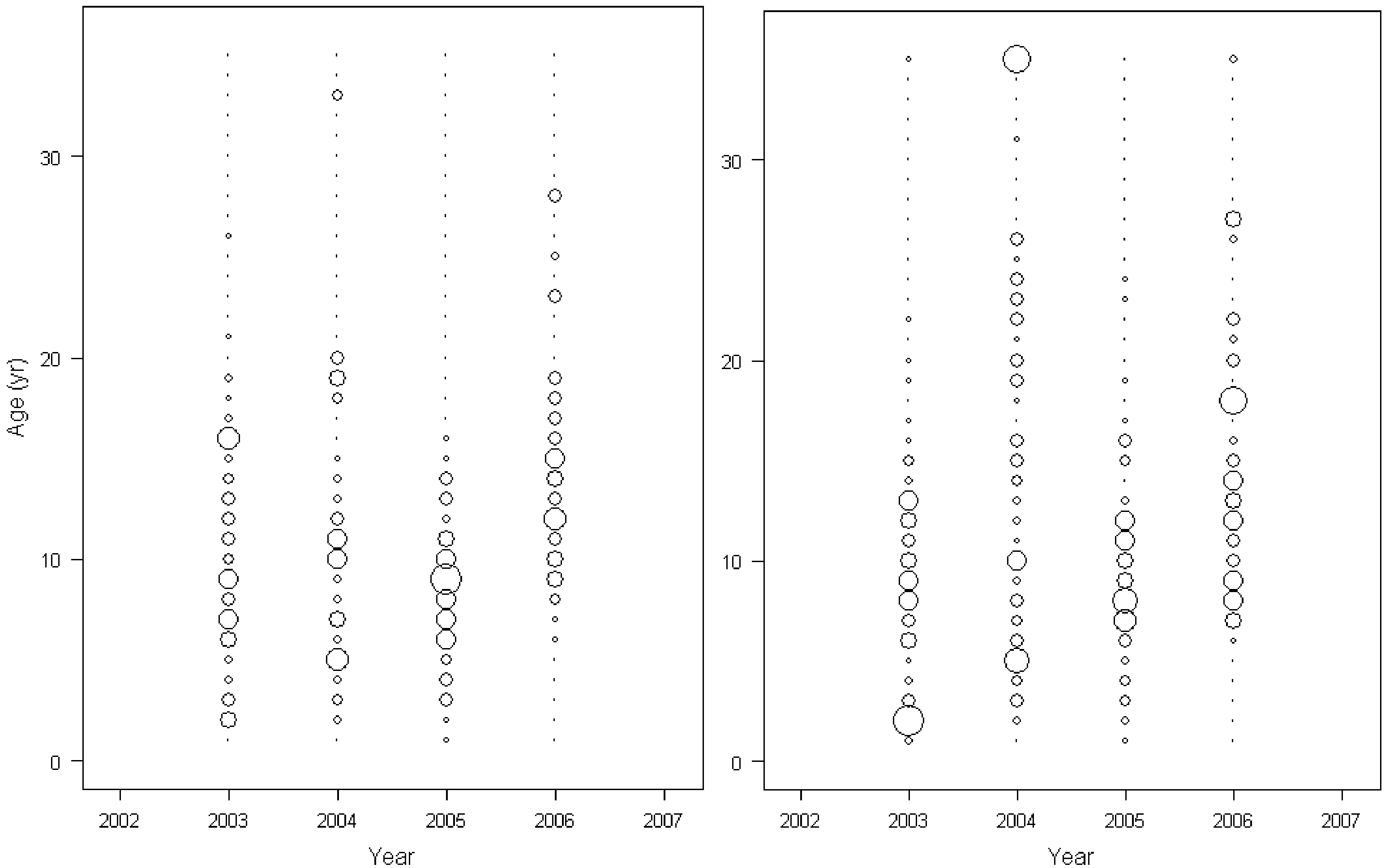


Figure 19. Marginal age-frequency distributions for female (left panel) and male (right panel) canary rockfish from the NWFSC survey. The largest female bubble represents a proportion of 0.13, males represents 0.12. Note that these plots are intended to provide another view of the age data and are for comparison only, as the conditional age-frequency distributions are contributing to the total likelihood.

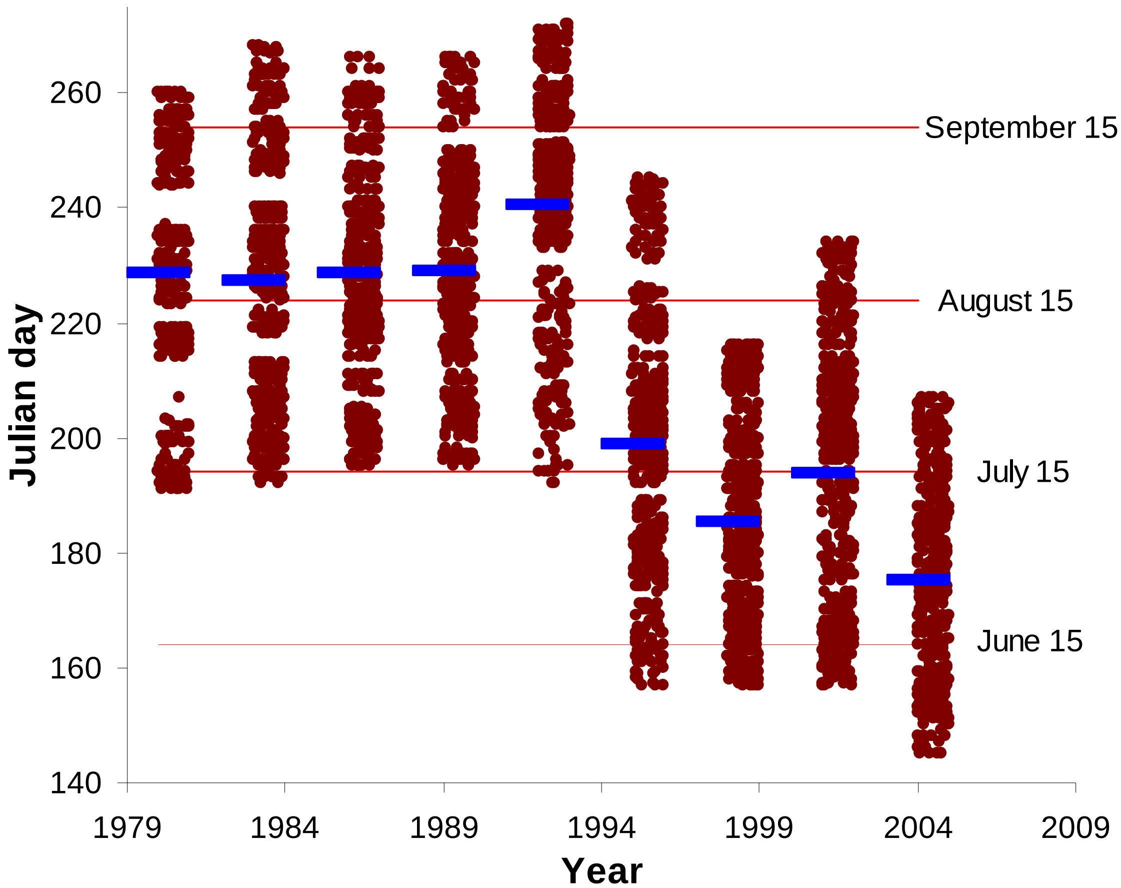


Figure 20. Distribution of dates of operation for the triennial survey (1980-2004). Solid bars show the mean date for each survey year, points represent individual hauls dates, but are jittered to allow better delineation of the distribution of individual points.

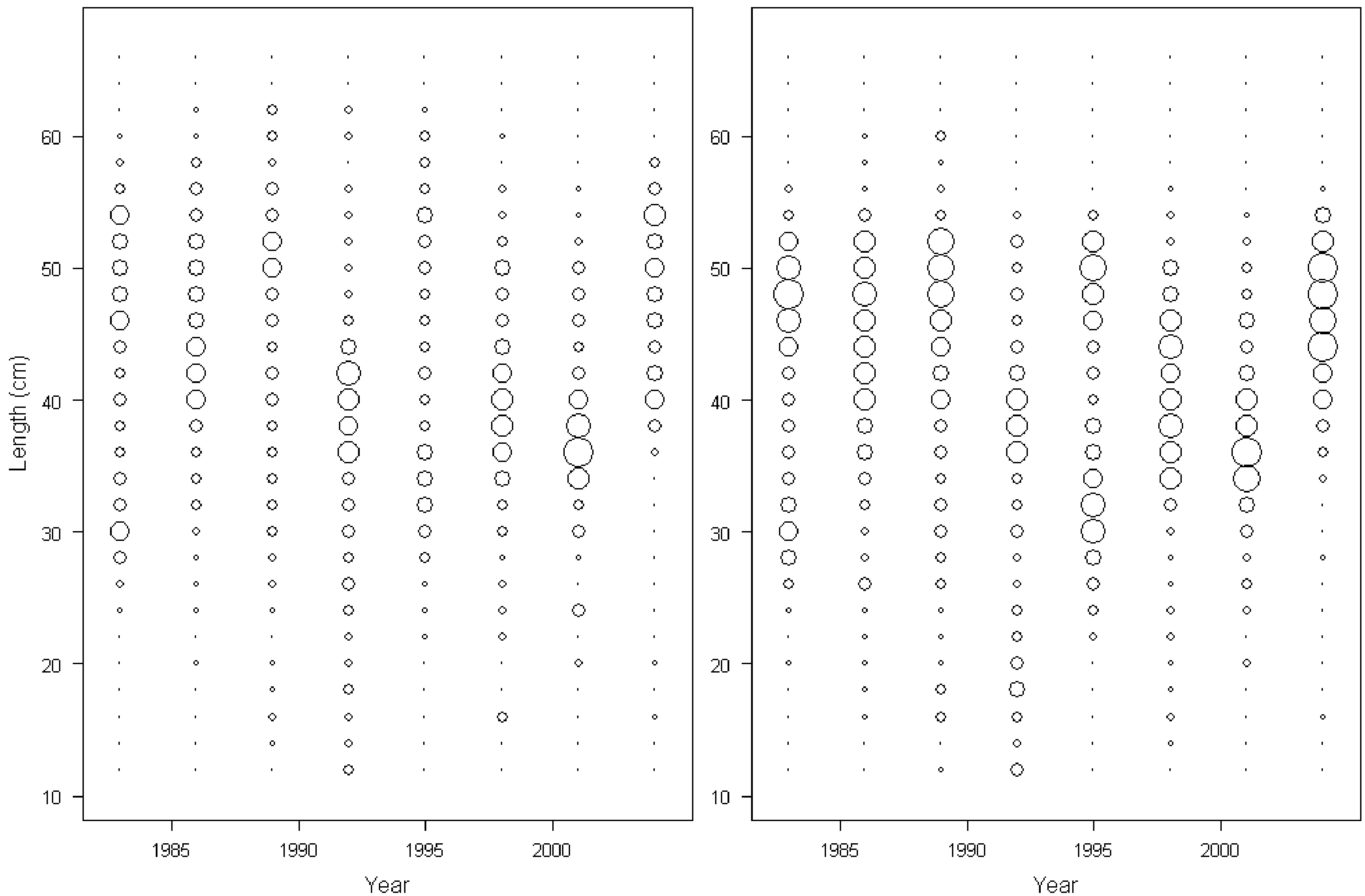


Figure 21. Length-frequency distributions for female (left panel) and male (right panel) canary rockfish from the triennial bottom trawl survey. The largest female bubble represents a proportion of 0.12, males represents 0.10.

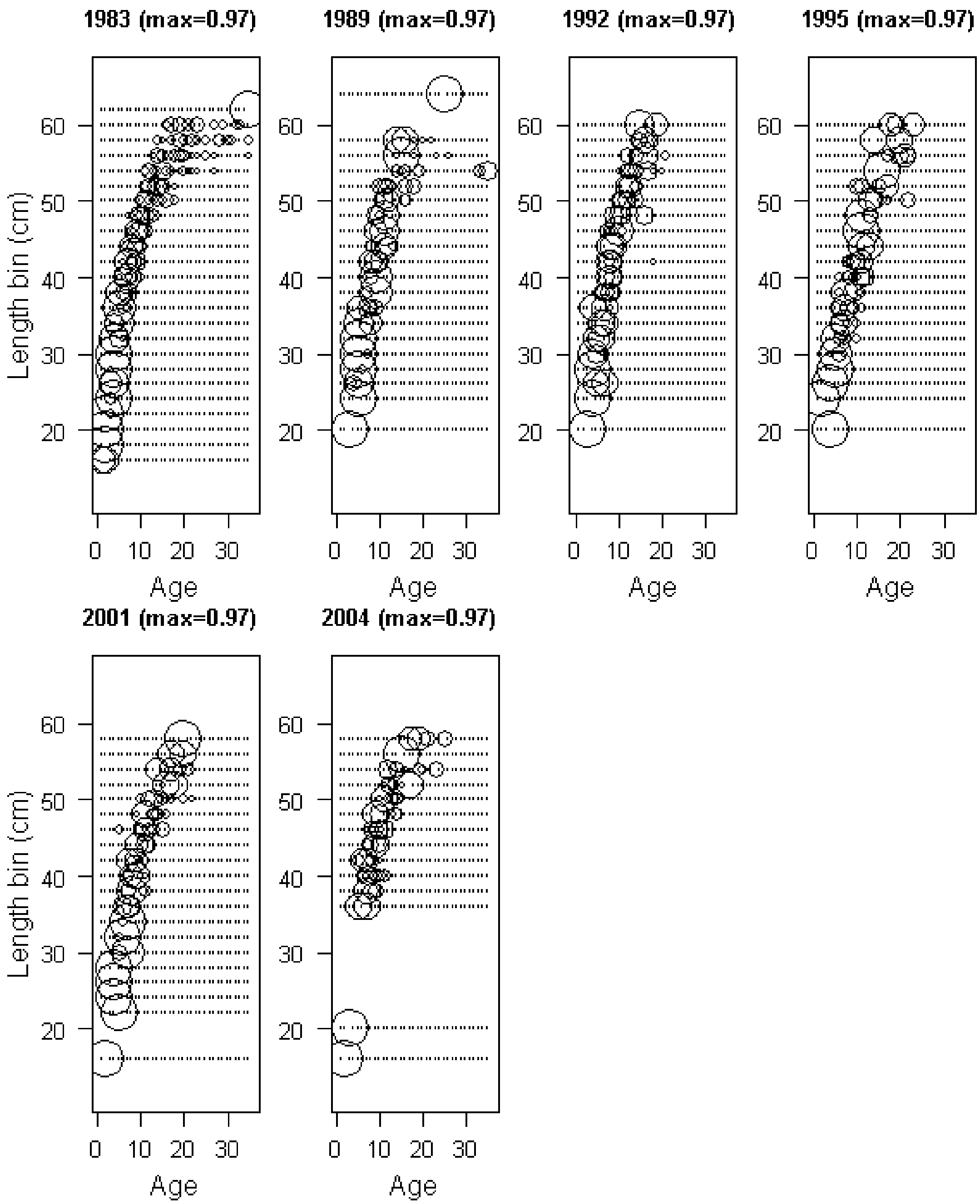


Figure 22. Conditional age-frequency distributions for female canary rockfish from the NMFS triennial survey.

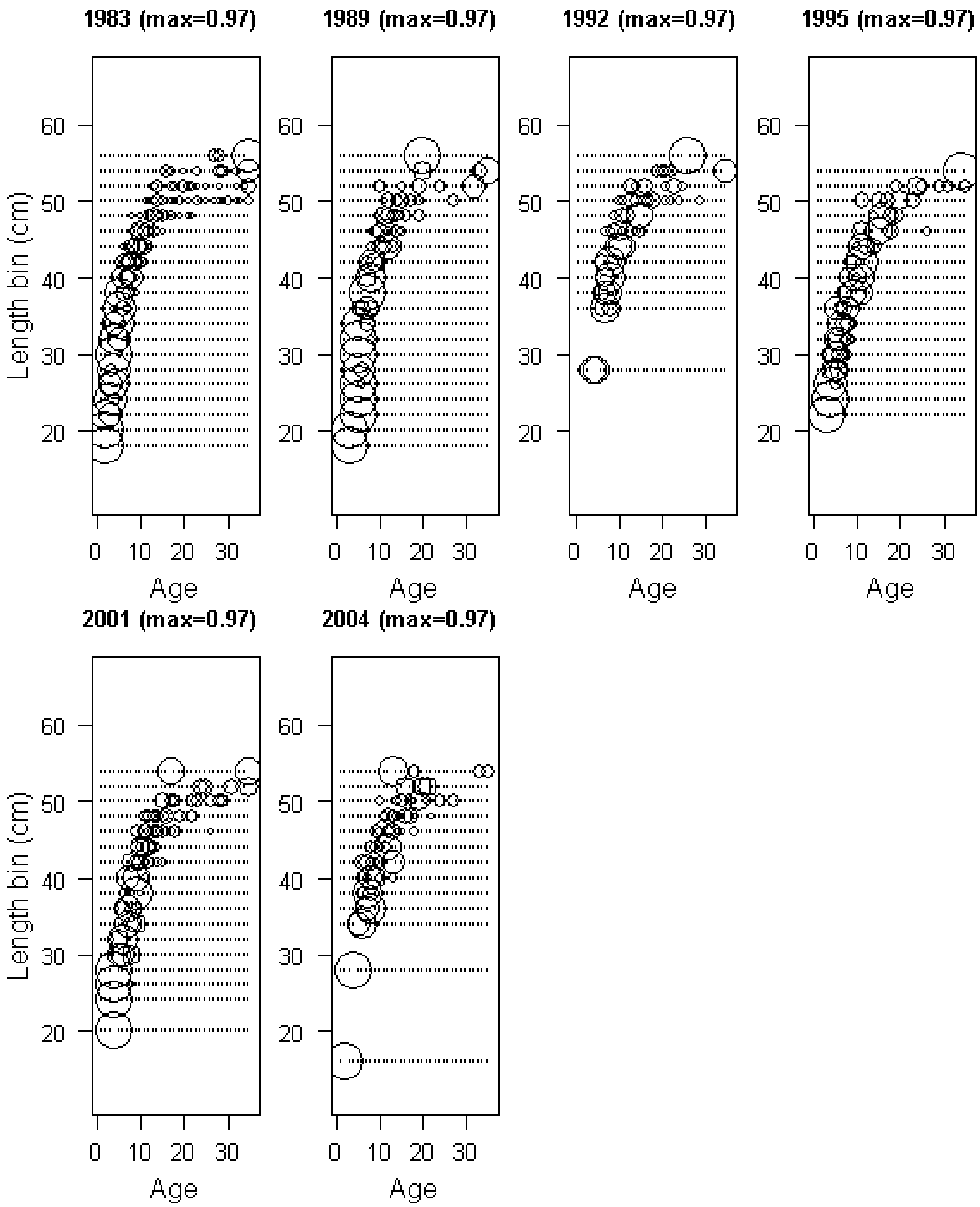


Figure 23. Conditional age-frequency distributions for male canary rockfish from the NMFS triennial survey.

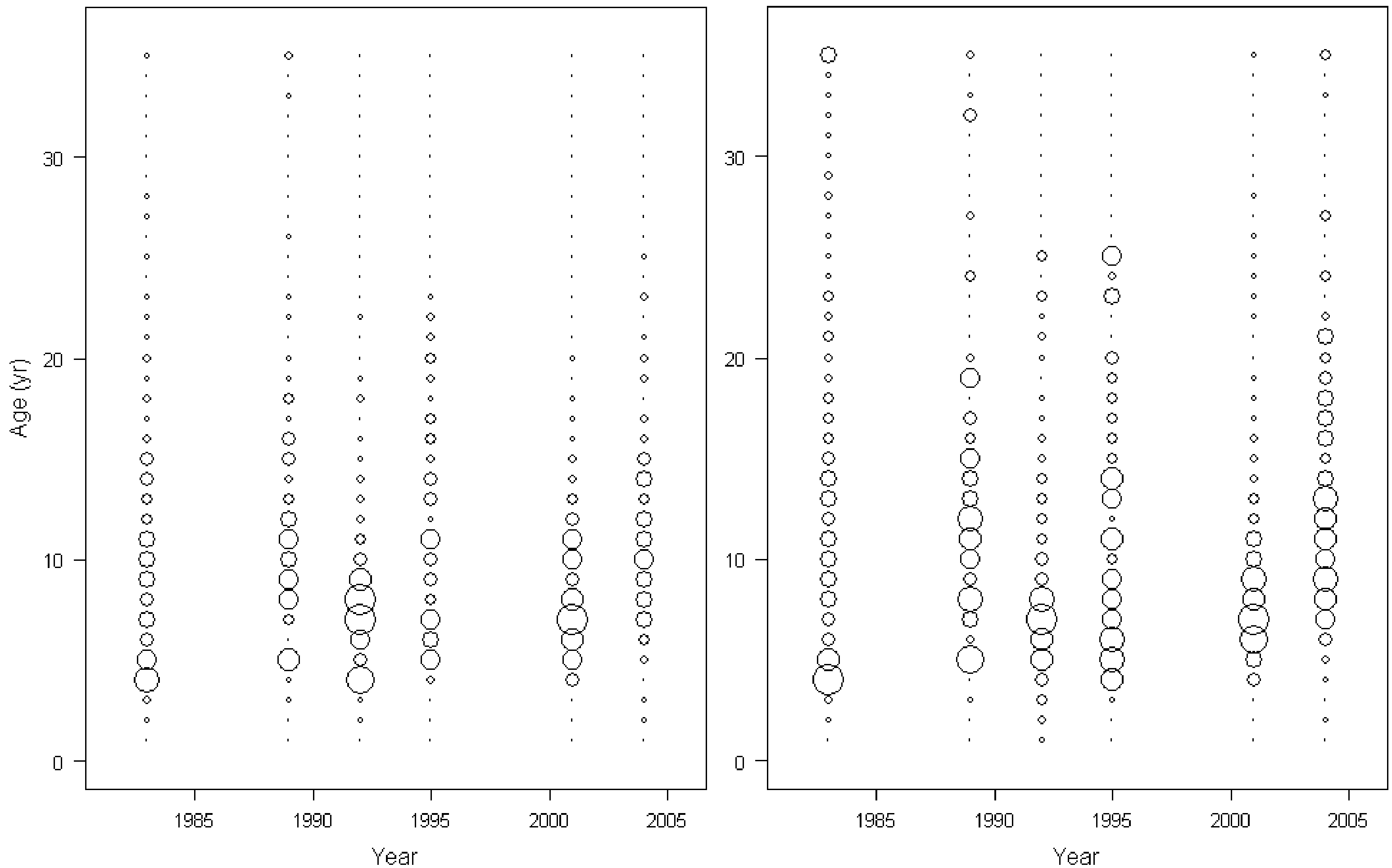


Figure 24. Marginal age-frequency distributions for female (left panel) and male (right panel) canary rockfish from the triennial survey. The largest female bubble represents a proportion of 0.12, males represents 0.10. Note that these plots are intended to provide another view of the age data and are for comparison only, as the conditional age-frequency distributions are contributing to the total likelihood.

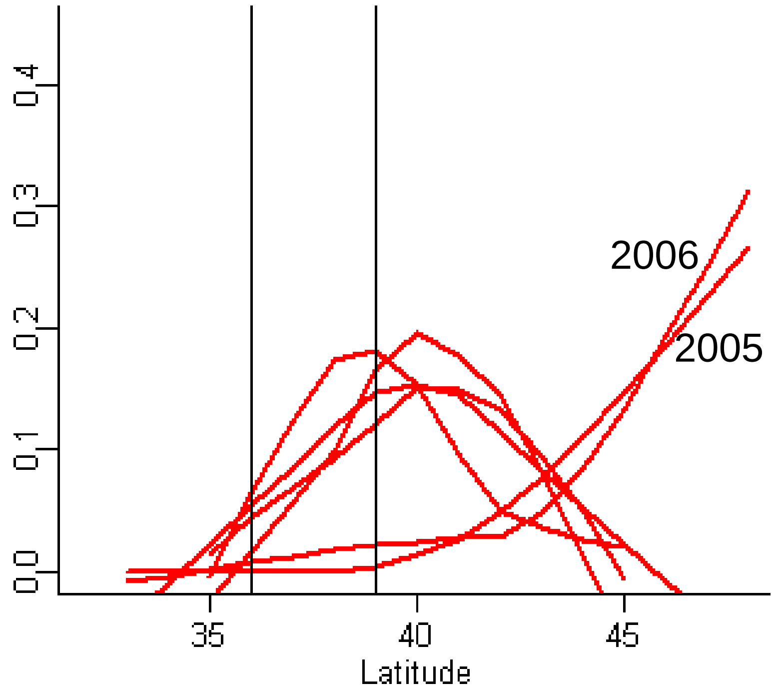


Figure 25. Coast-wide pre-recruit canary rockfish catches, 2001-2006, binned and smoothed over latitude, showing the northward distribution of catches in 2005 and 2006. Vertical lines indicate the "core area" survey conducted from 1983-2006.

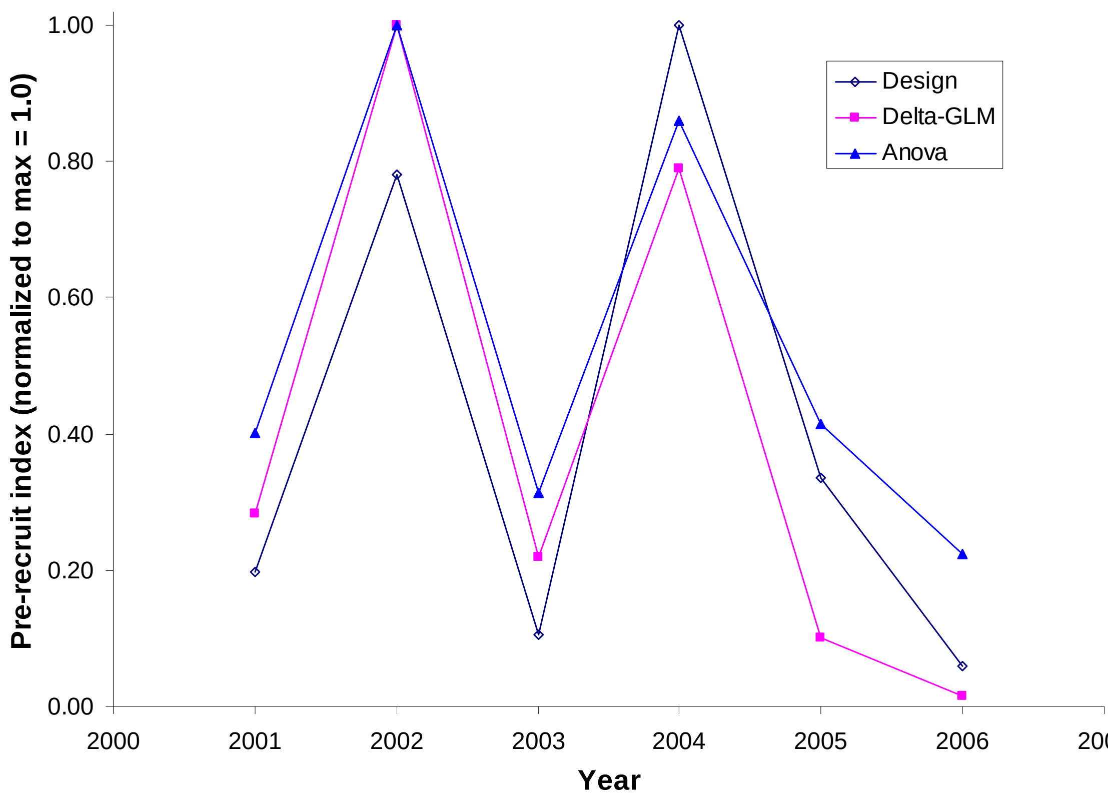


Figure 26. Comparison of alternate estimators for the pre-recruit index (Provided by S. Ralston, SWFSC).

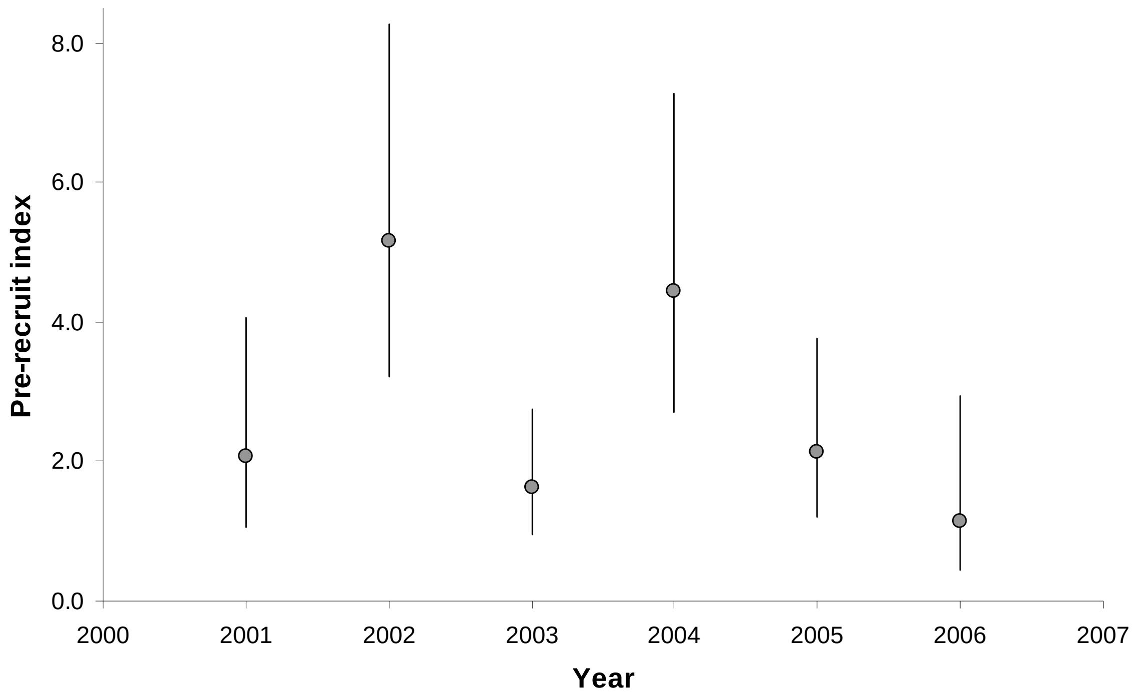


Figure 27. Coast-wide pre-recruit index for canary rockfish, 2001-2006.

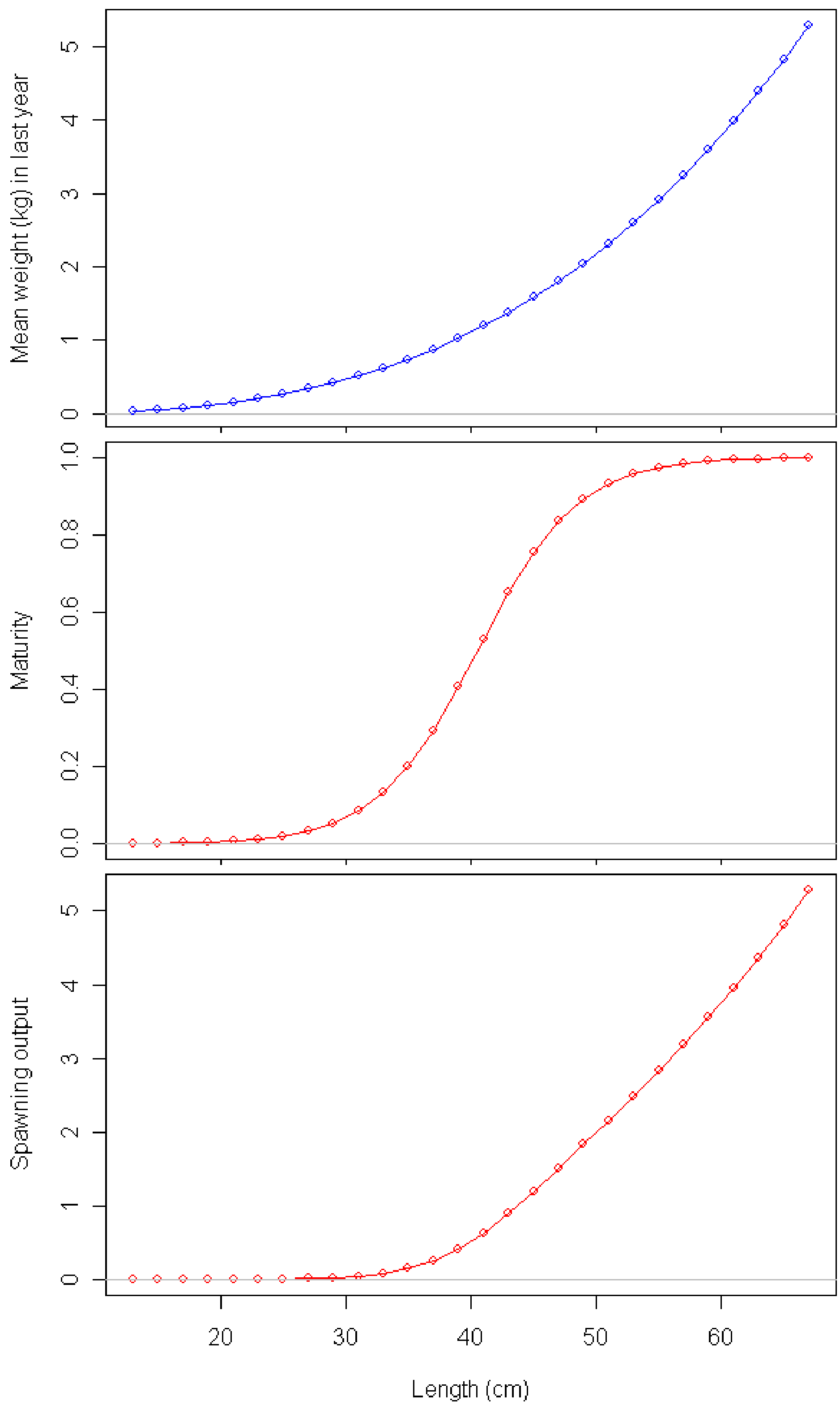


Figure 28. Biological relationships used for canary rockfish weight-length relationship (both sexes, upper panel), maturity ogive (females only, center panel) and spawning output (lower panel) as a function of length.

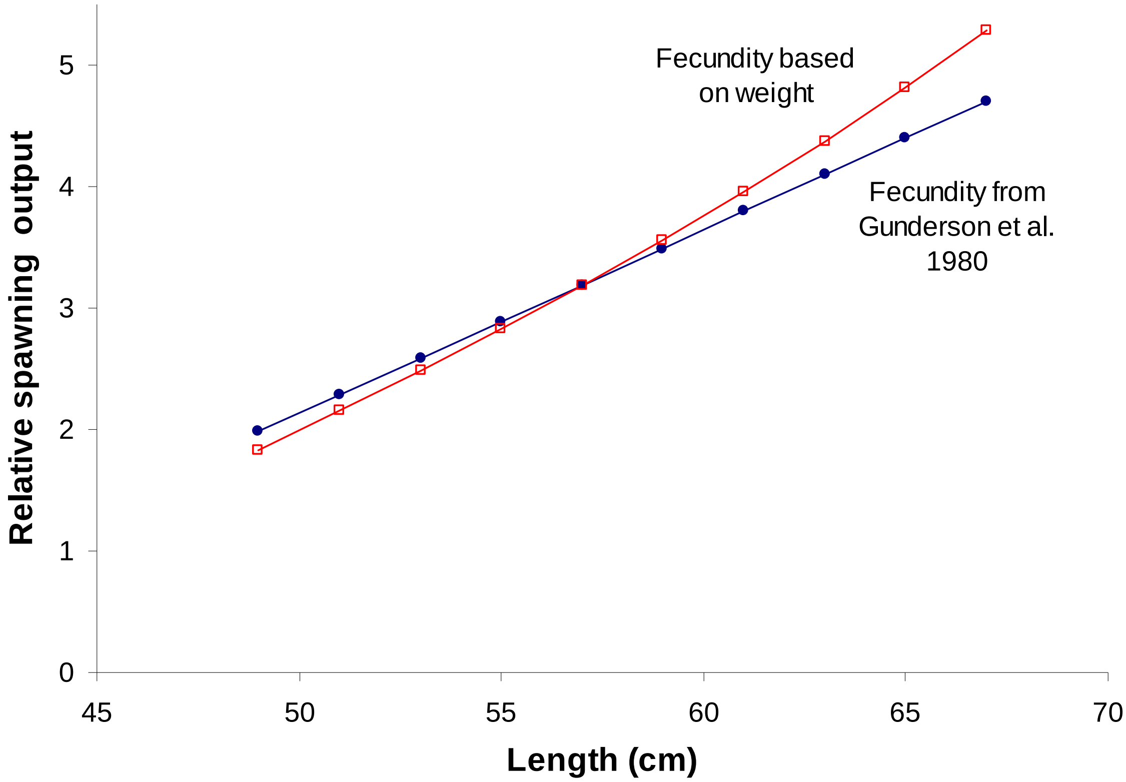


Figure 29. Fecundity-at-length relationships based on the assumption that fecundity is proportional to body weight (used in this assessment) and a linear relationship between fecundity and length using observations from a limited range of lengths (Gunderson et al. 1980).

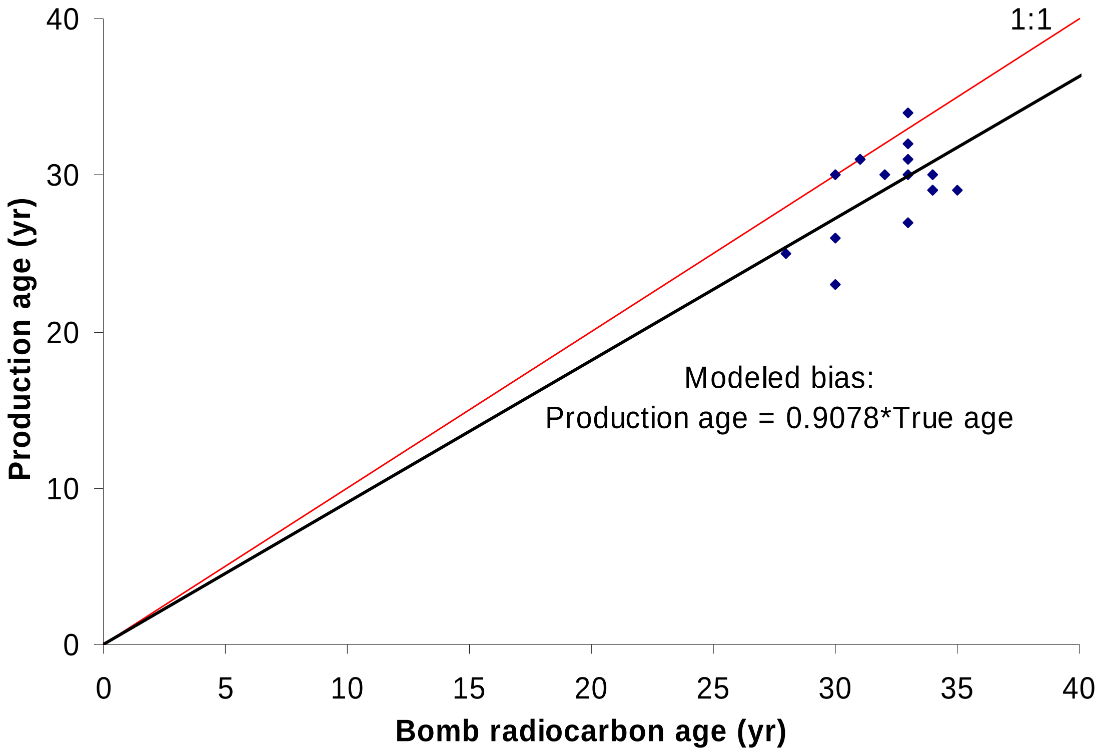


Figure 30. Ageing bias assumed in the 2005 assessment model based on bomb radiocarbon analysis of 16 canary rockfish otoliths (Data from: Piner et al. 2005).

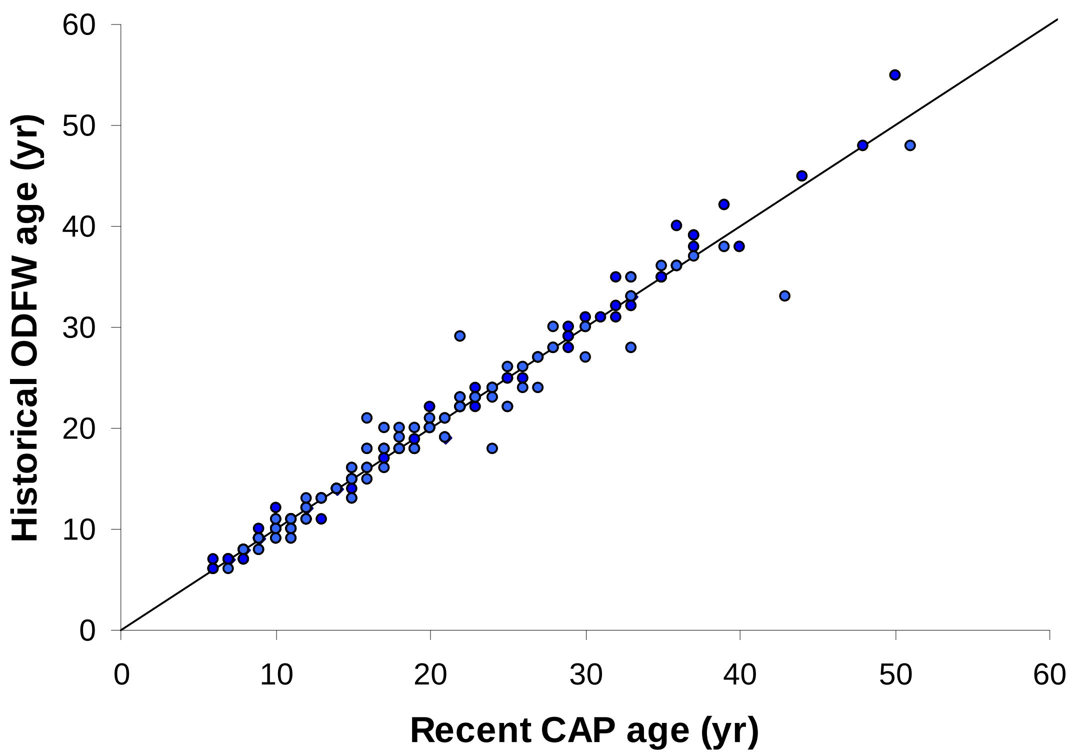


Figure 31. Comparison of cross-reads between recent CAP agers and ~100 otoliths from the mid-1980s.

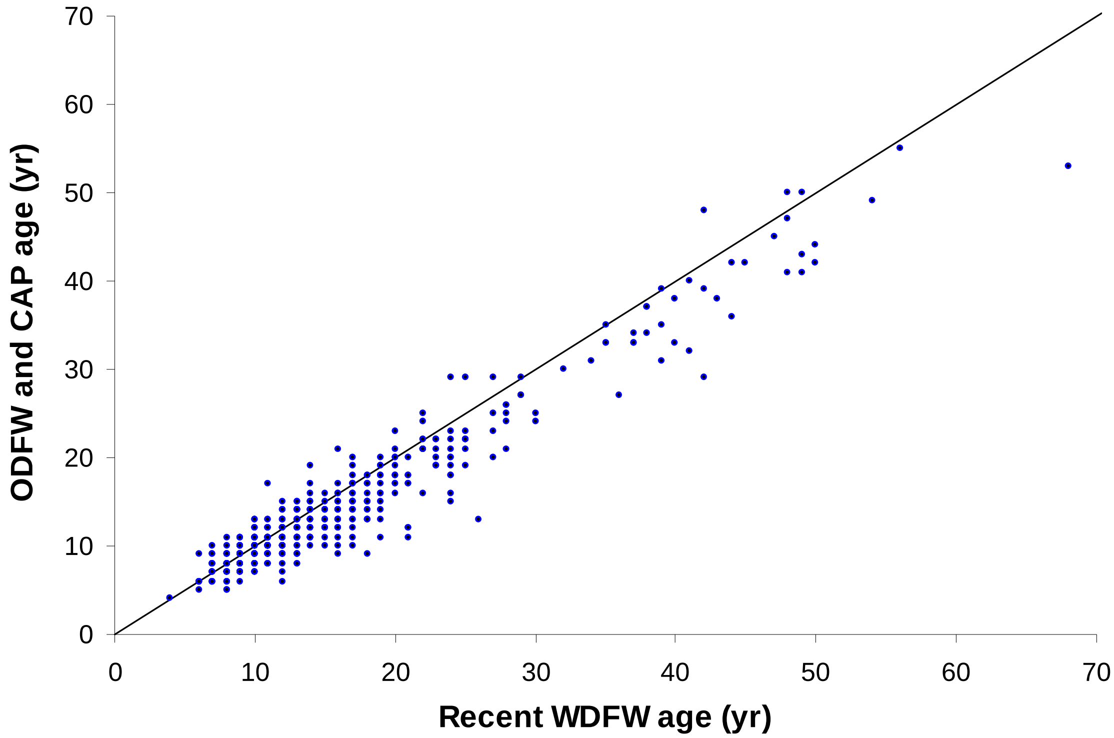


Figure 32. Comparison of cross-reads between ODFW/CAP agers and WDFW agers for ~600 otoliths. Solid line indicates the 1:1 relationship, the increased frequency of points below the line indicates a small, but consistent bias toward underageing by ODFW/CAP readers that is accounted for in the ageing error keys used in the stock assessment model.

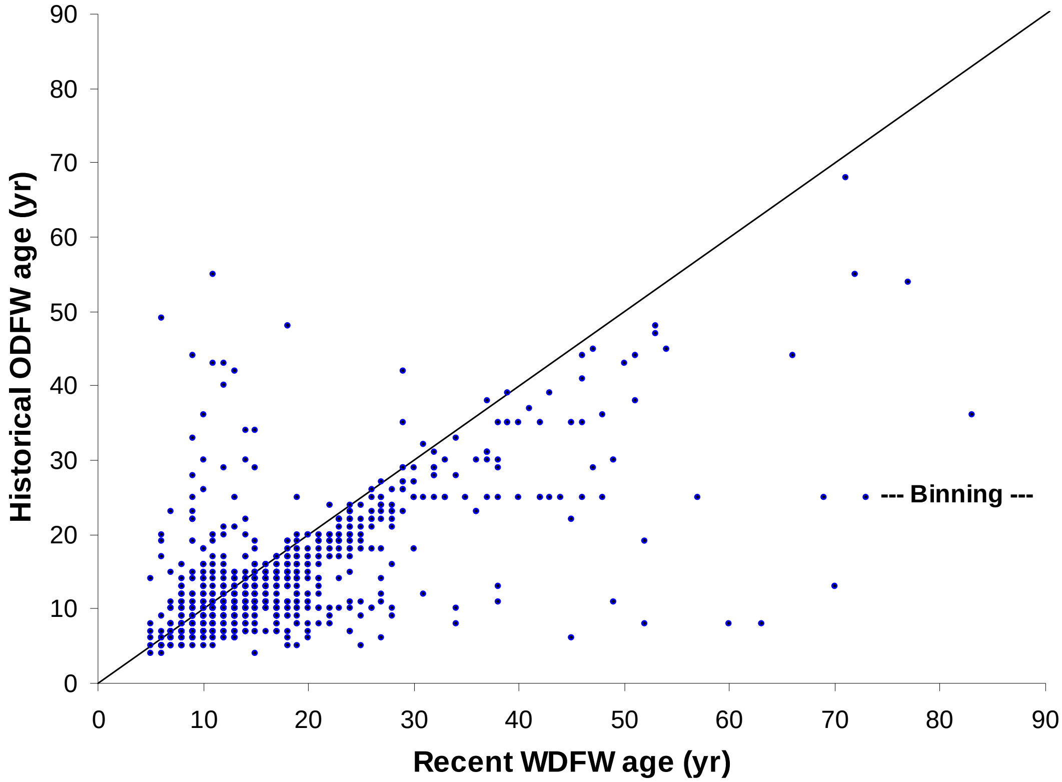


Figure 33. Comparison of cross-reads between recent WDFW agers and ~1600 otoliths from the mid-1980s. These data were the impetus to resolve both the issue of 'binned' ages and the ultimate removal of low-quality age data from the assessment data.

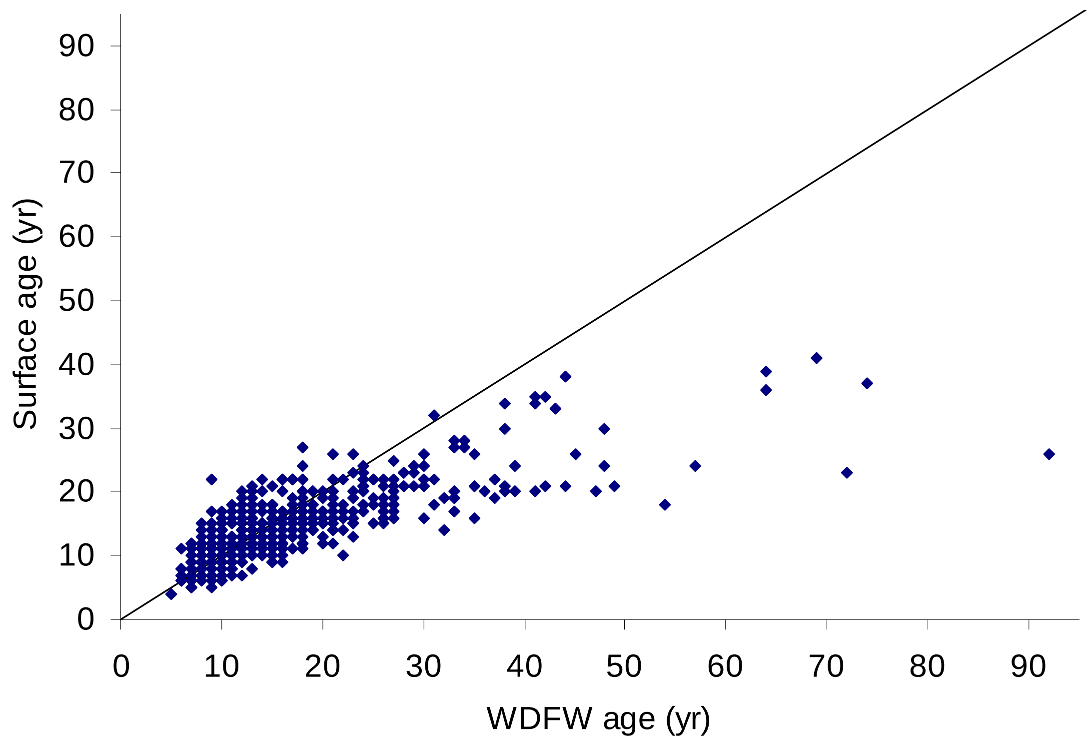


Figure 34. Comparison of cross-reads between surface read ages and WDFW agers for ~800 otoliths. Solid line indicates the 1:1 relationship; the increased frequency of points below the line at older ages indicates a bias toward underageing by ODFW surface methods.

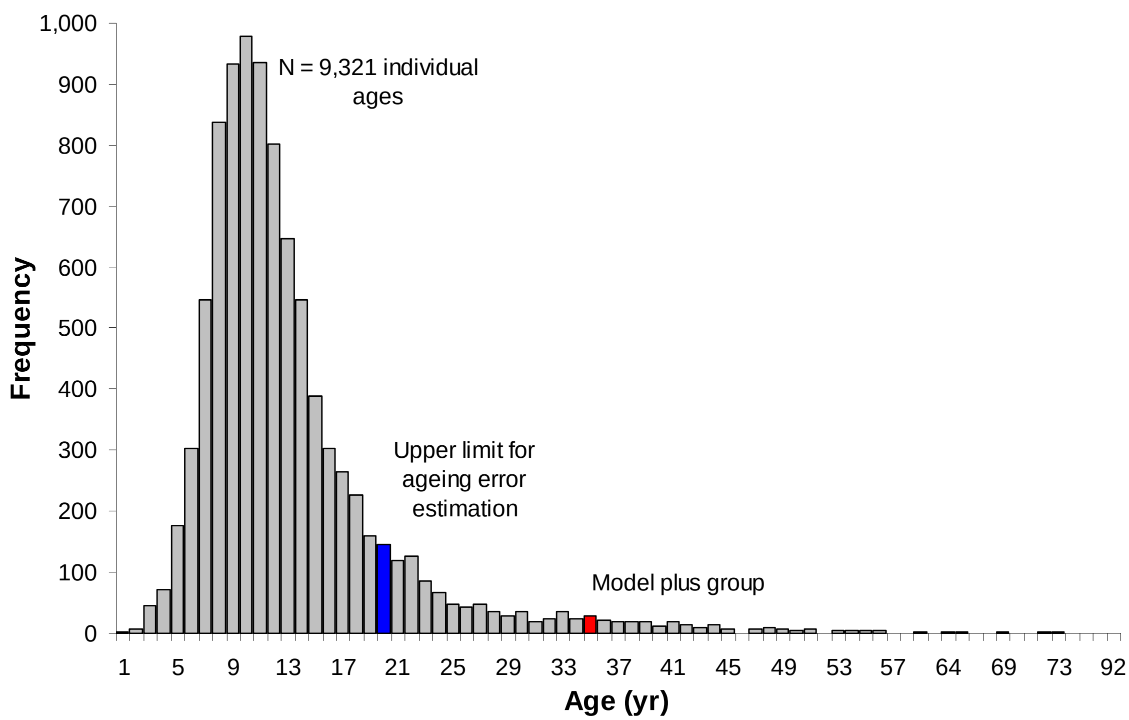


Figure 35. Distribution of double- and triple-reads used to calculate the ageing error keys.

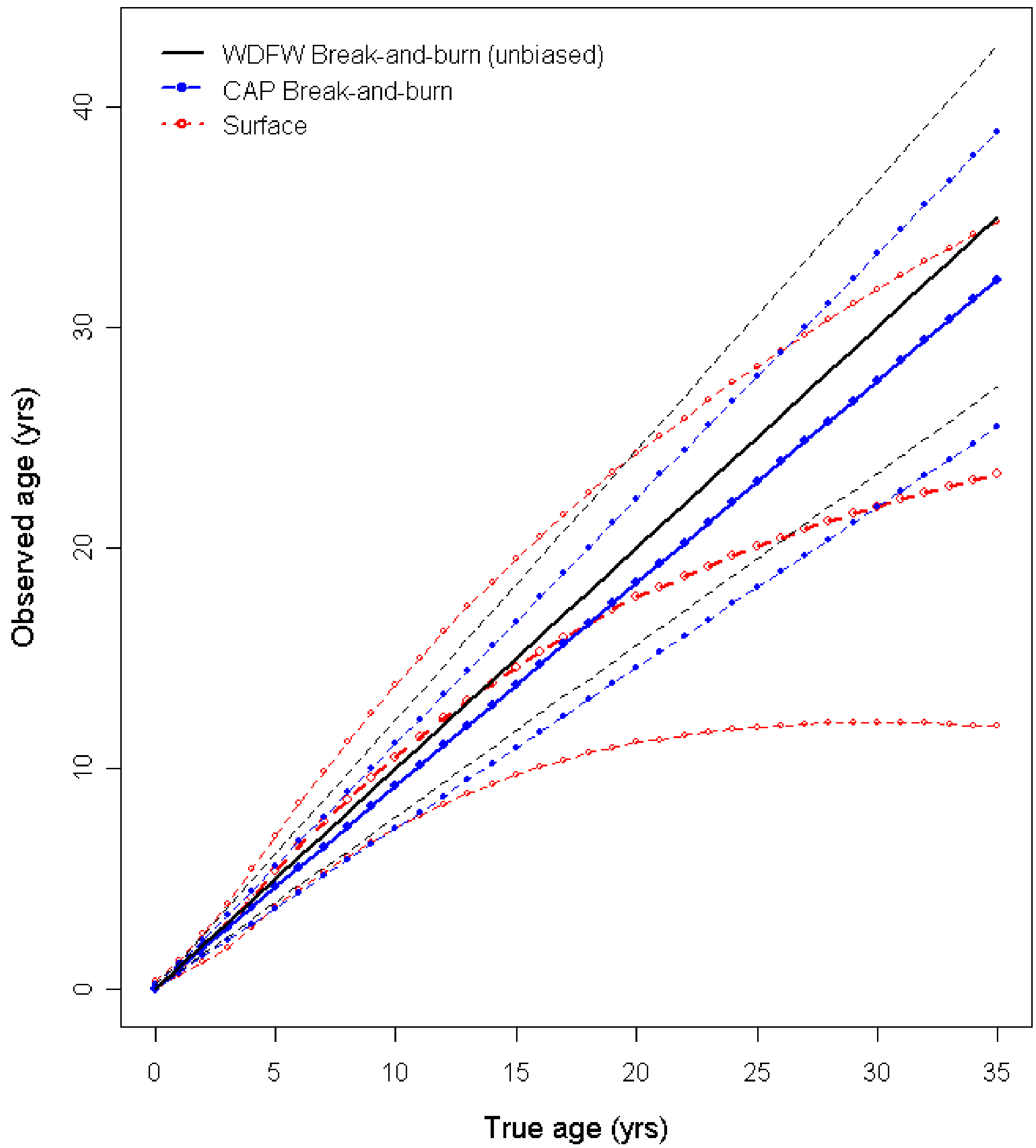


Figure 36. Estimates of relative bias and precision (+/- 1.96 SDs indicated by the lighter lines for each series) for the WDFW ageing lab, the CAP ageing lab and all ages based on surface reading methodology.

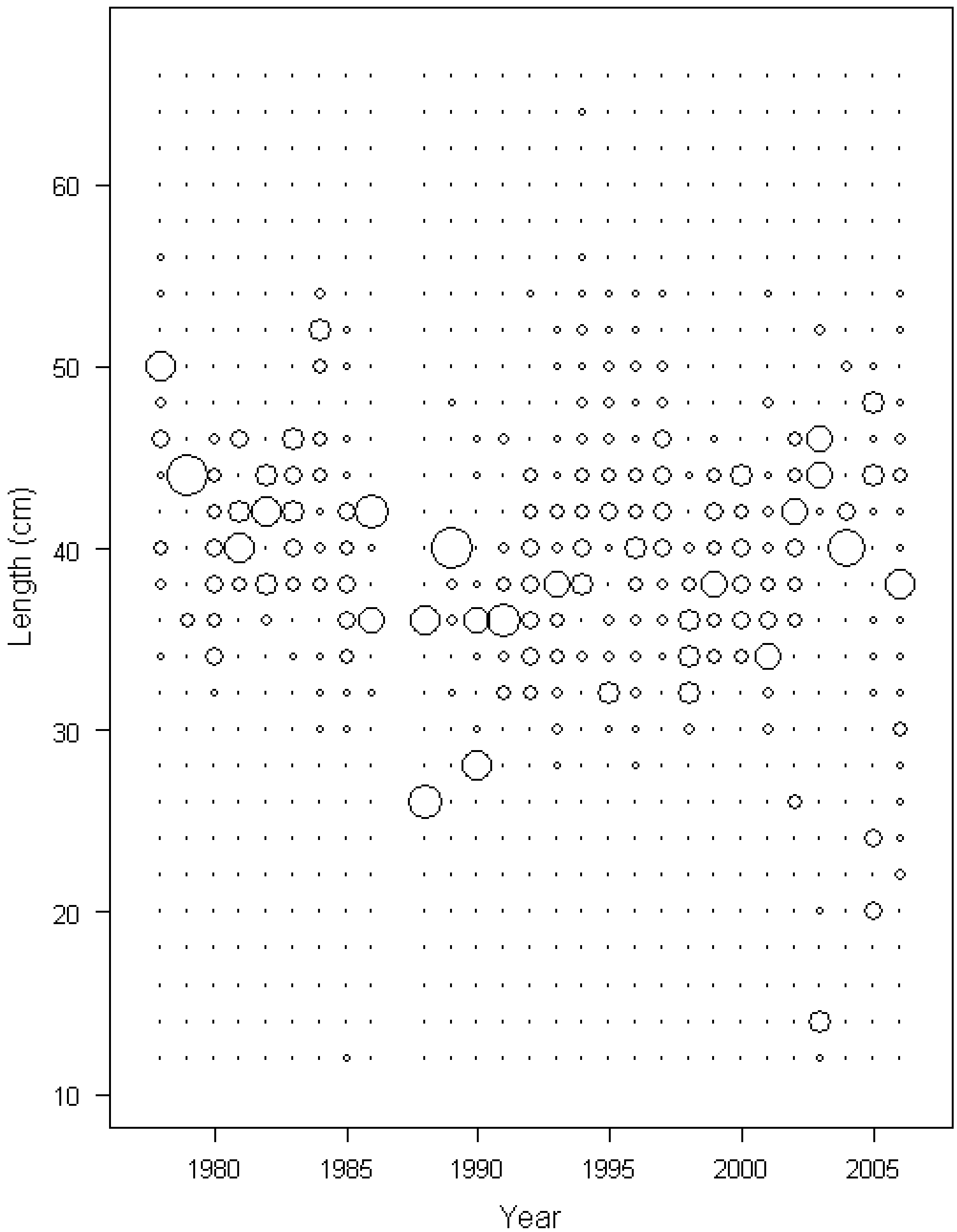


Figure 37. Length-frequency data for the southern California trawl fleet, sexes combined. The largest bubble represents a proportion of 0.85.

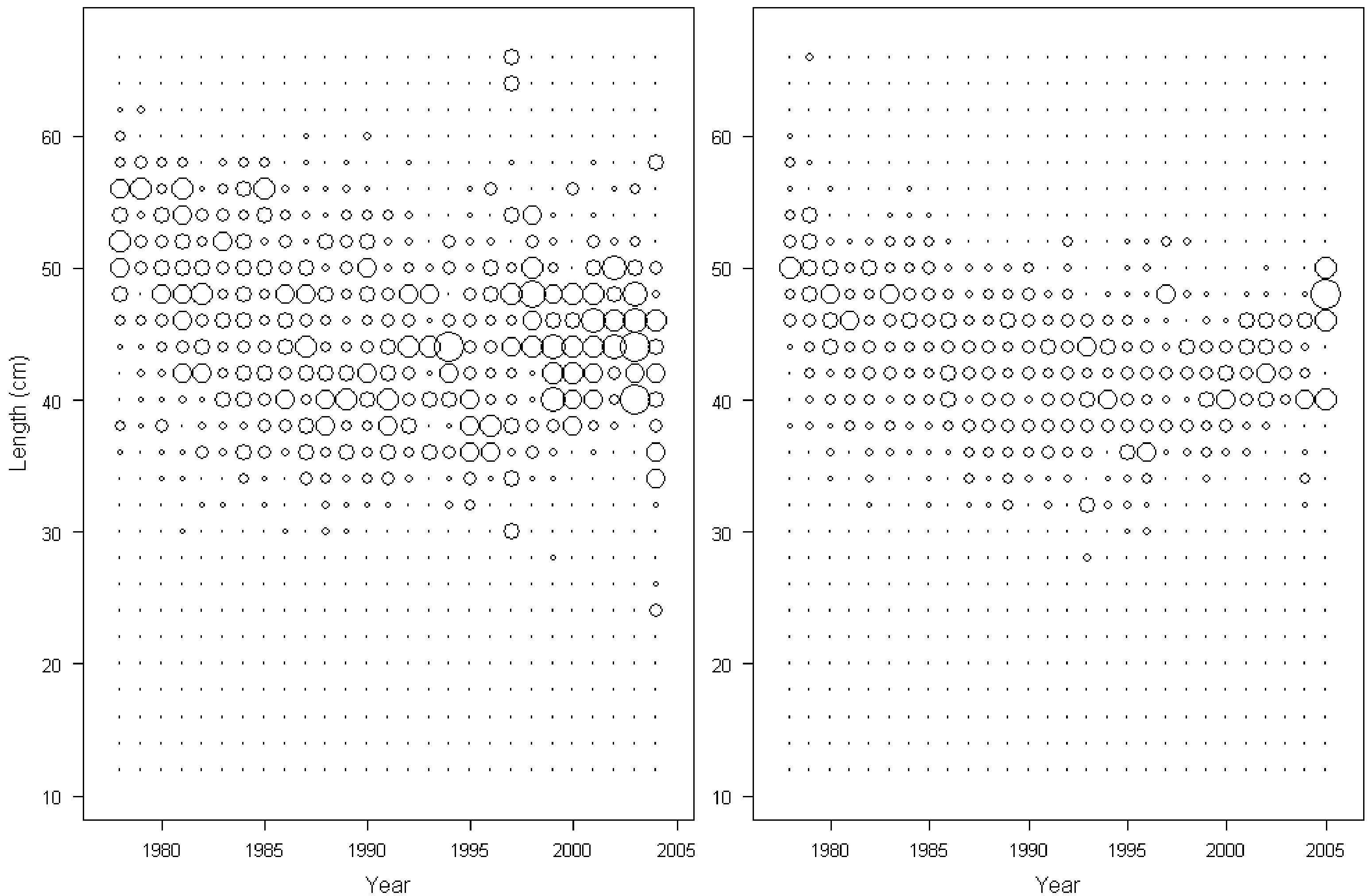


Figure 38. Length-frequency data for female (left panel) and male (right panel) canary rockfish from the northern California trawl fleet. The largest female bubble represents a proportion of 0.17, males represents 0.39.

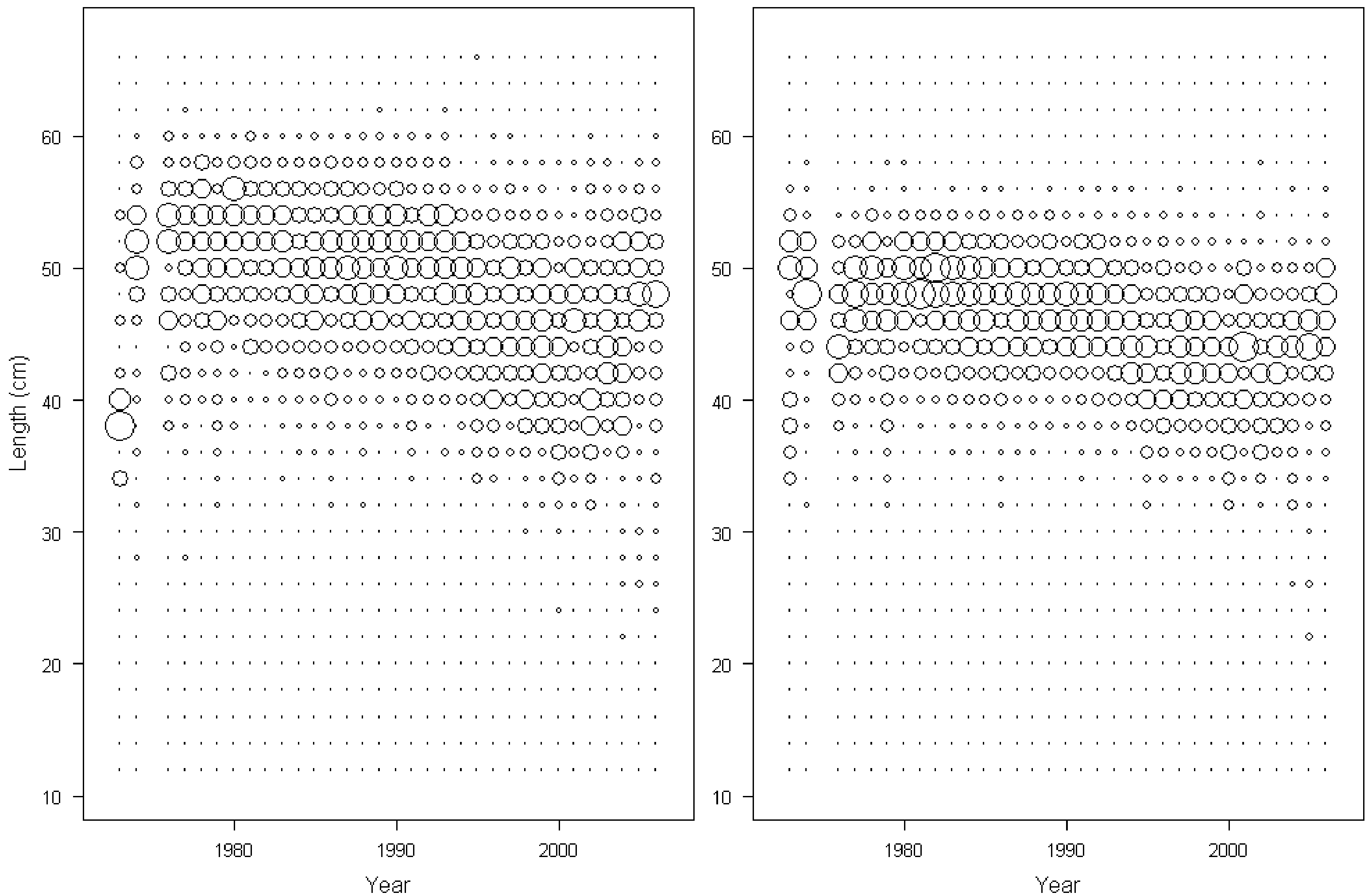


Figure 39. Length-frequency data for female (left panel) and male (right panel) canary rockfish from the Oregon trawl fleet. The largest female bubble represents a proportion of 0.15, males represents 0.20.

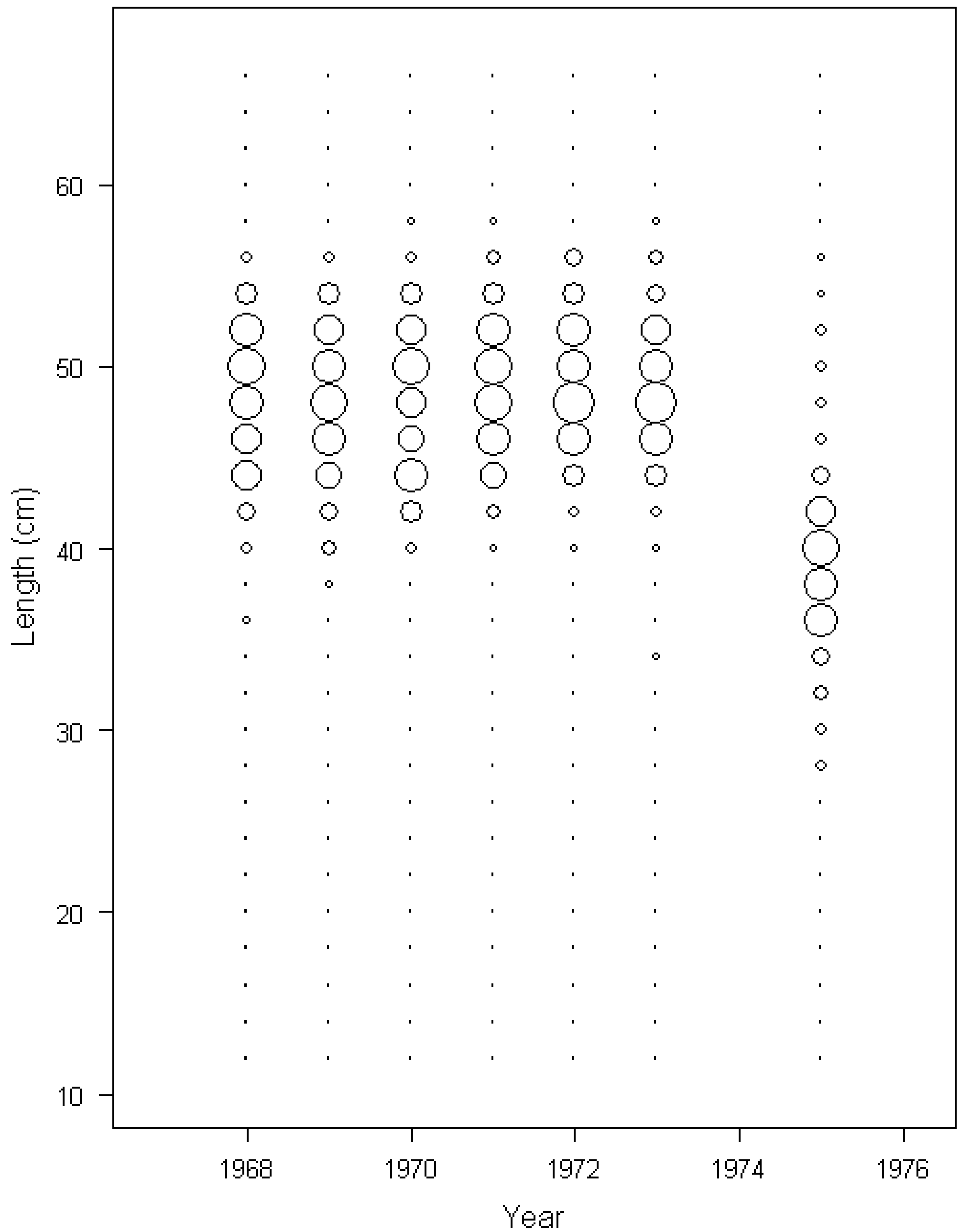


Figure 40. Combined-sex length-frequency data for the early Washington trawl fleet, when sex-specific information was not collected. The largest bubble represents a proportion of 0.27.

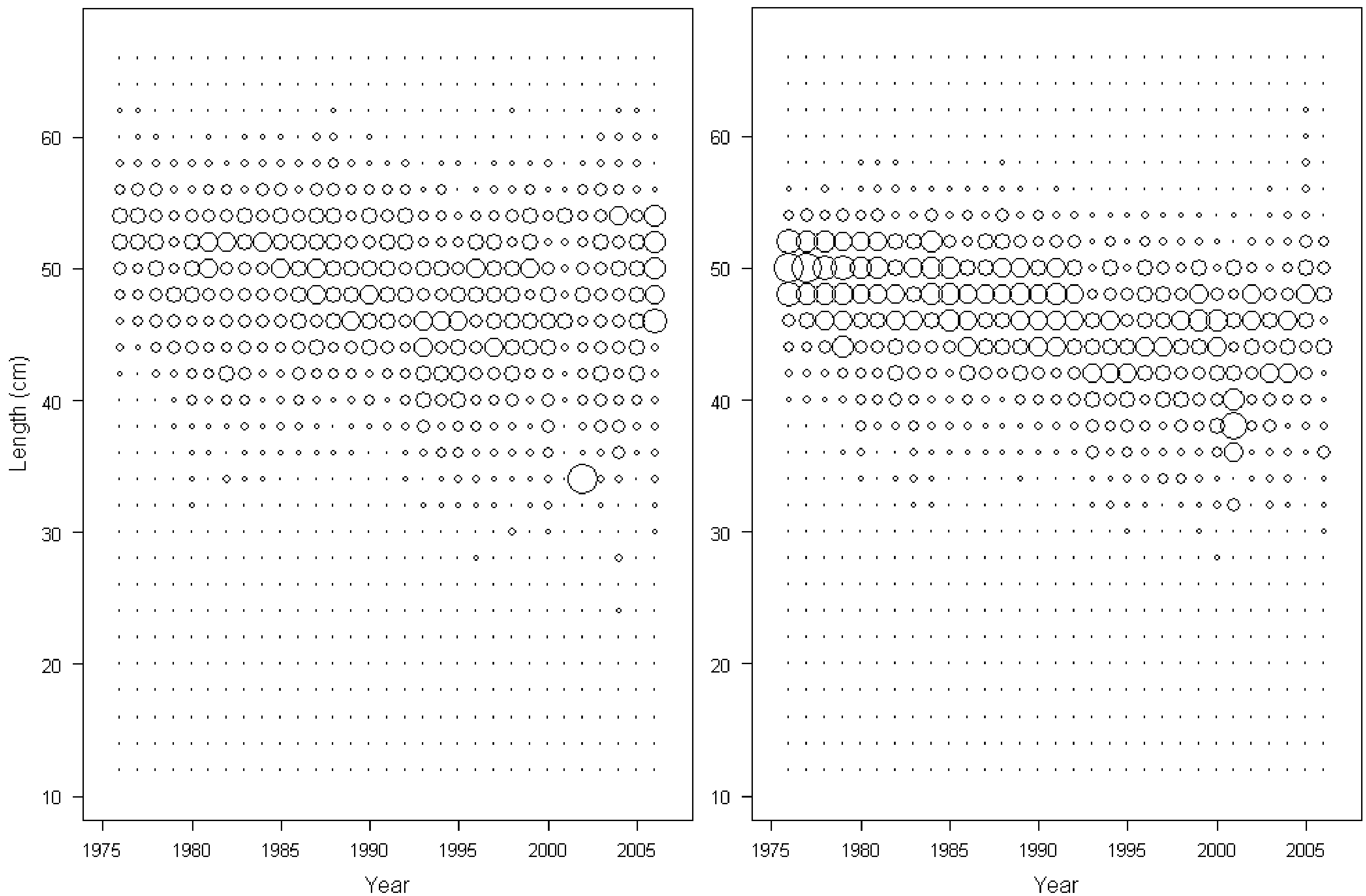


Figure 41. Length-frequency data for female (left panel) and male (right panel) canary rockfish from the Washington trawl fleet. The largest female bubble represents a proportion of 0.20, males represents 0.24.

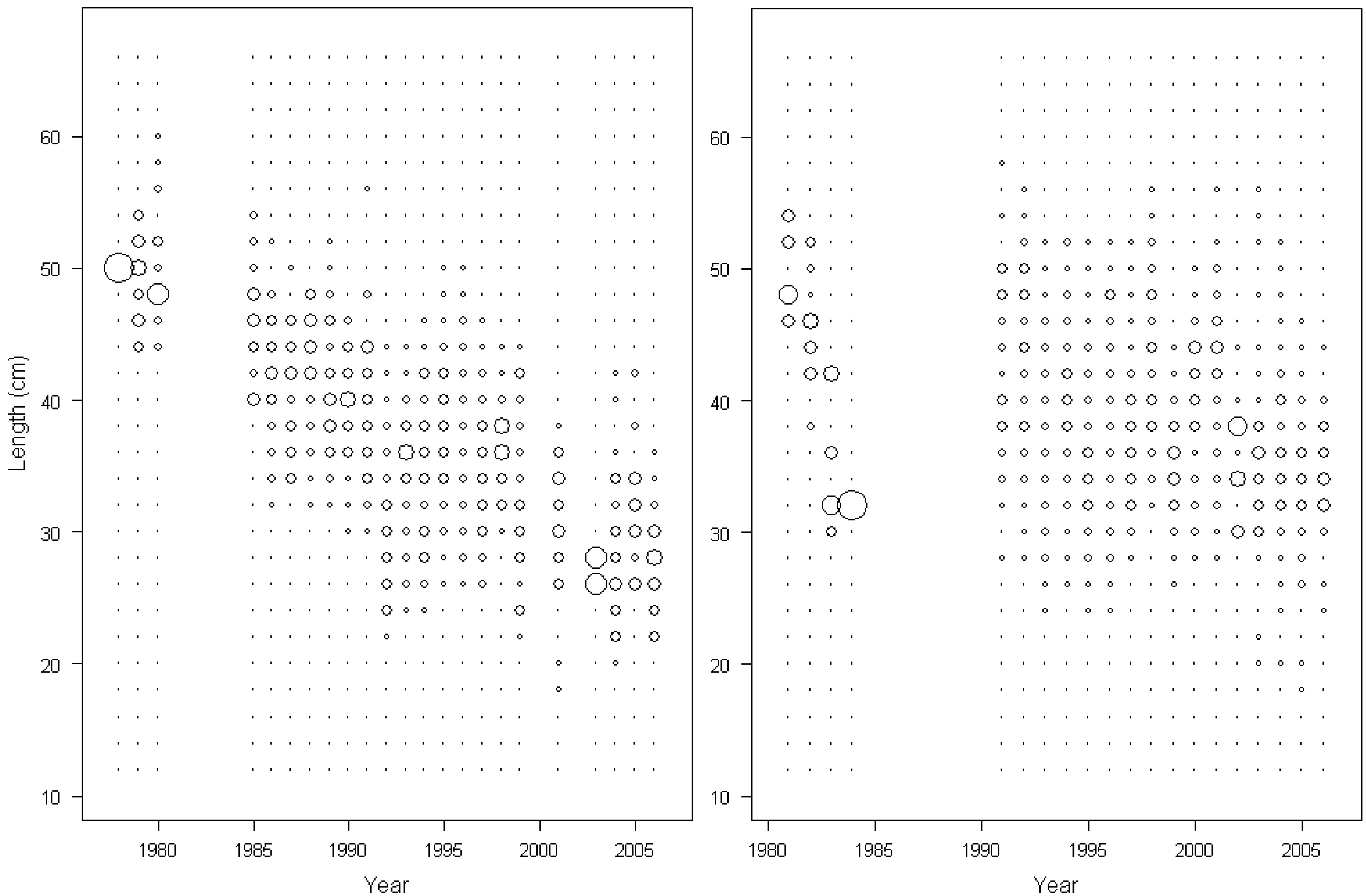


Figure 42. Length-frequency data for canary rockfish from the southern (left panel) and northern (right panel) California non-trawl fleets, sexes combined. The largest southern bubble represents a proportion of 0.97, northern represents 0.97.

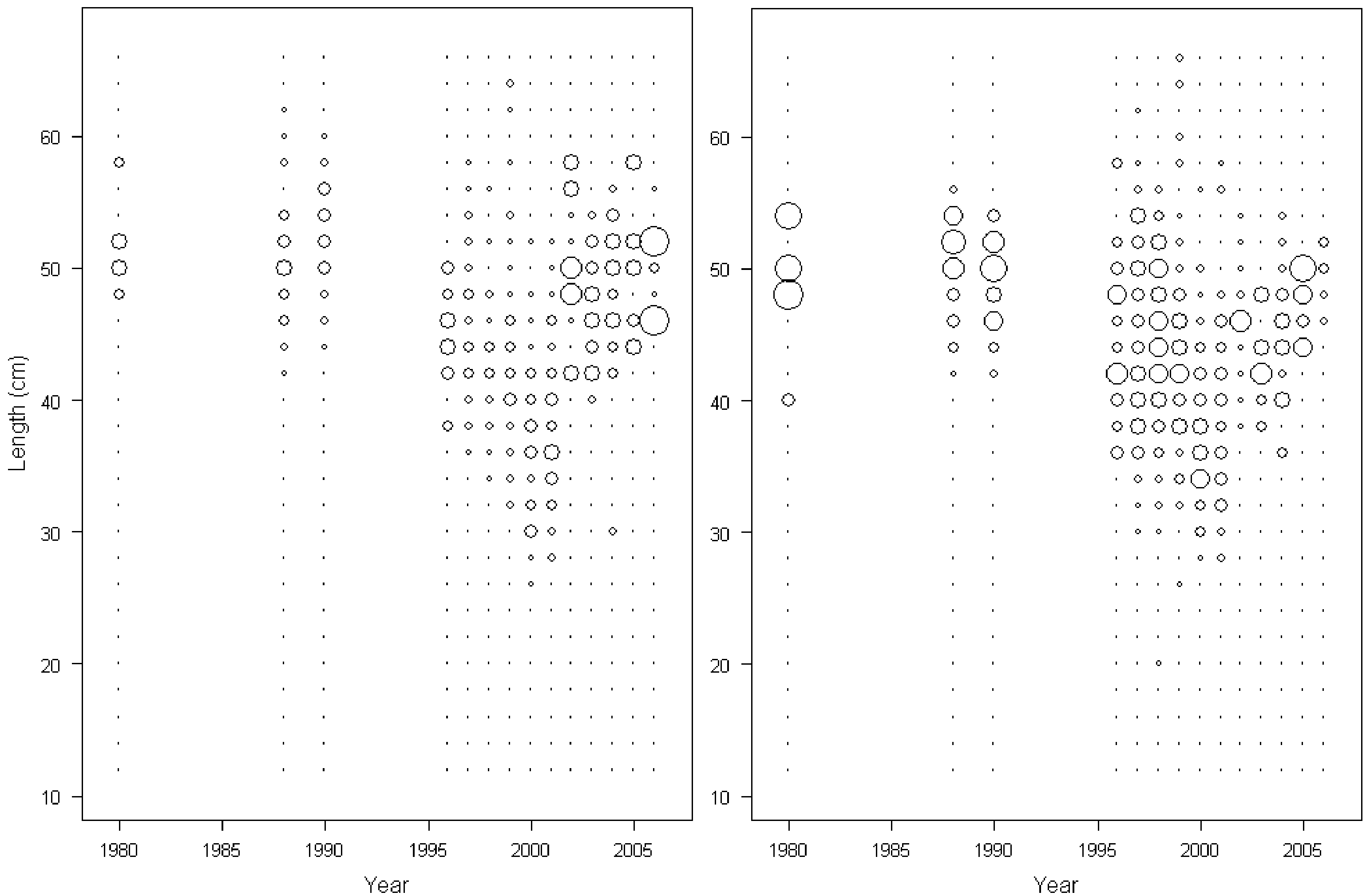


Figure 43. Length-frequency data for female (left panel) and male (right panel) canary rockfish from the combined Oregon and Washington non-trawl fleet. The largest female bubble represents a proportion of 0.41, males represents 0.22.

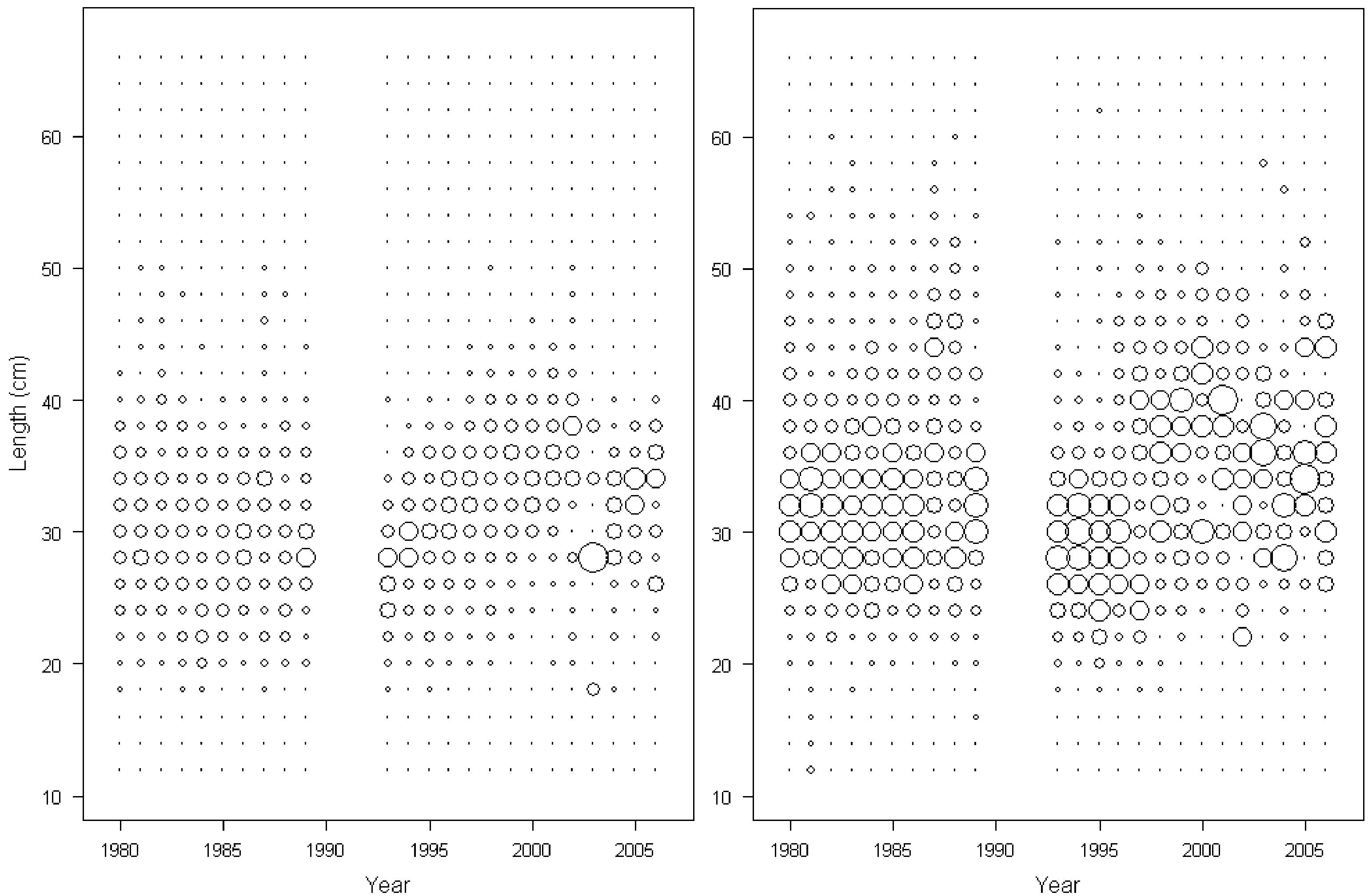


Figure 44. Length-frequency data for canary rockfish from the southern (left panel) and northern (right panel) California recreational fleets, sexes combined. The largest southern bubble represents a proportion of 0.61, northern represents 0.28.

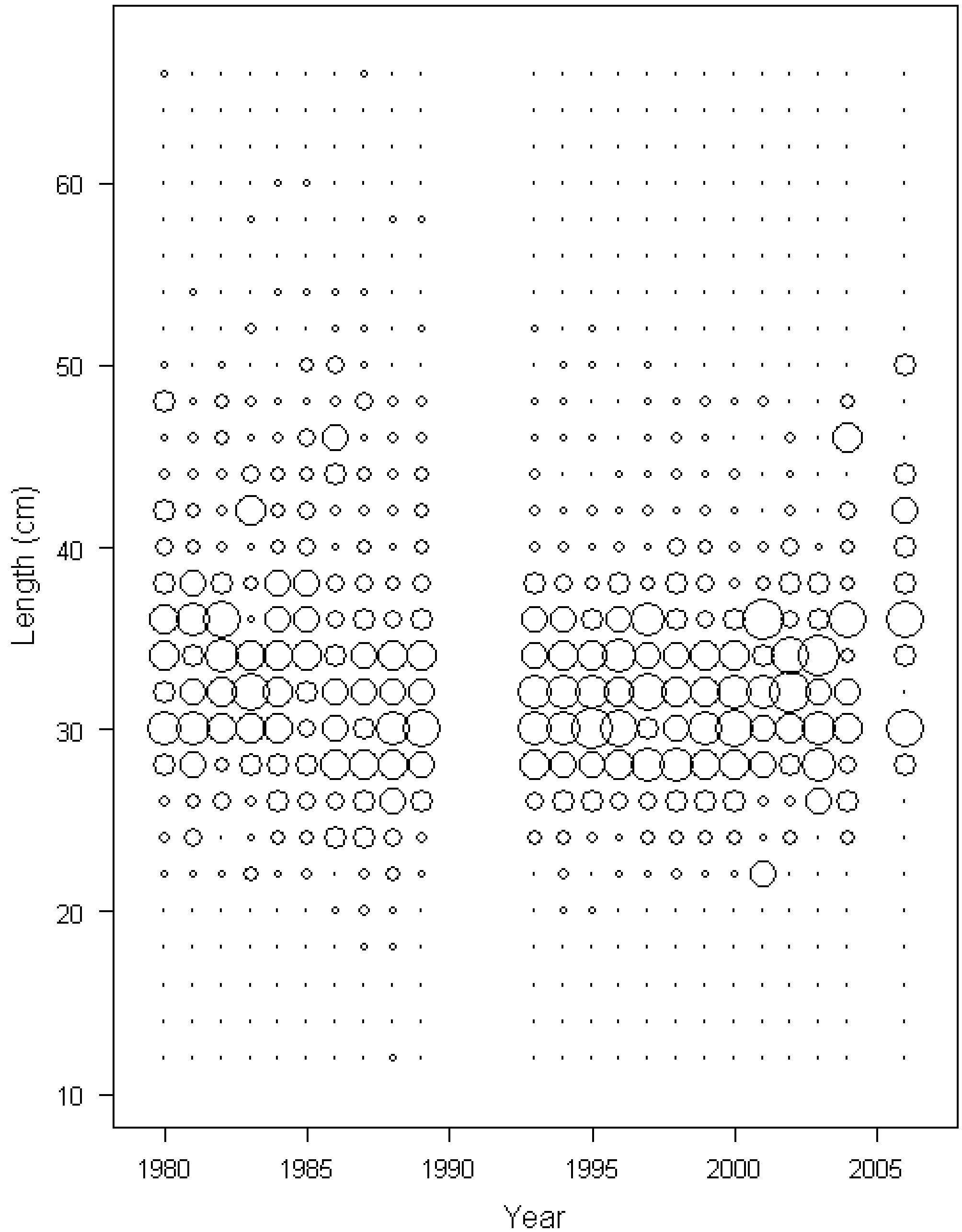


Figure 45. Length-frequency data for canary rockfish from the Oregon and Washington recreational fleet, sexes combined. The largest bubble represents a proportion of 0.28.

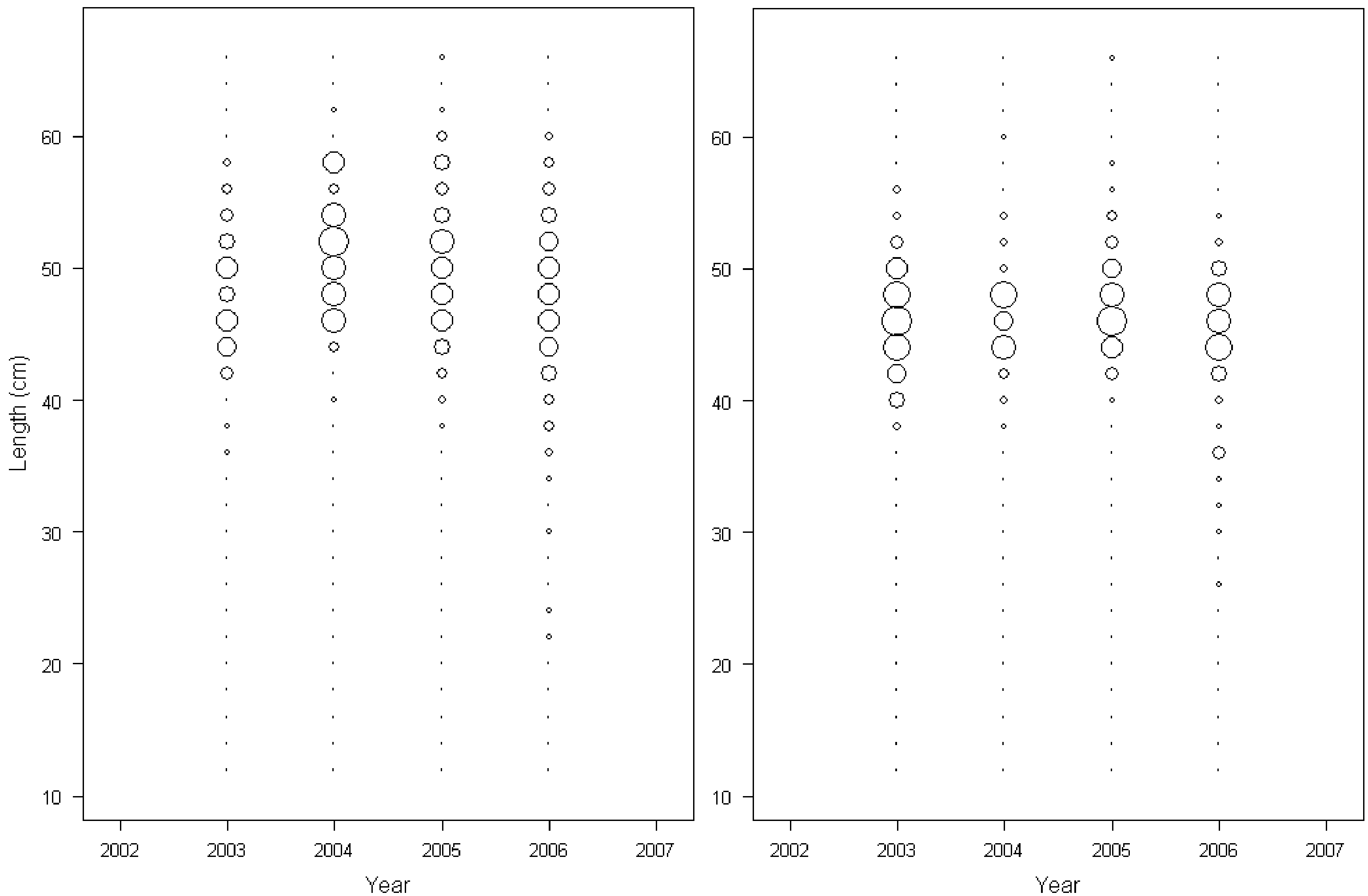


Figure 46. Length-frequency data for bycatch of female (left panel) and male (right panel) canary rockfish from the at-sea whiting fleet. The largest female bubble represents a proportion of 0.15, males represents 0.13.

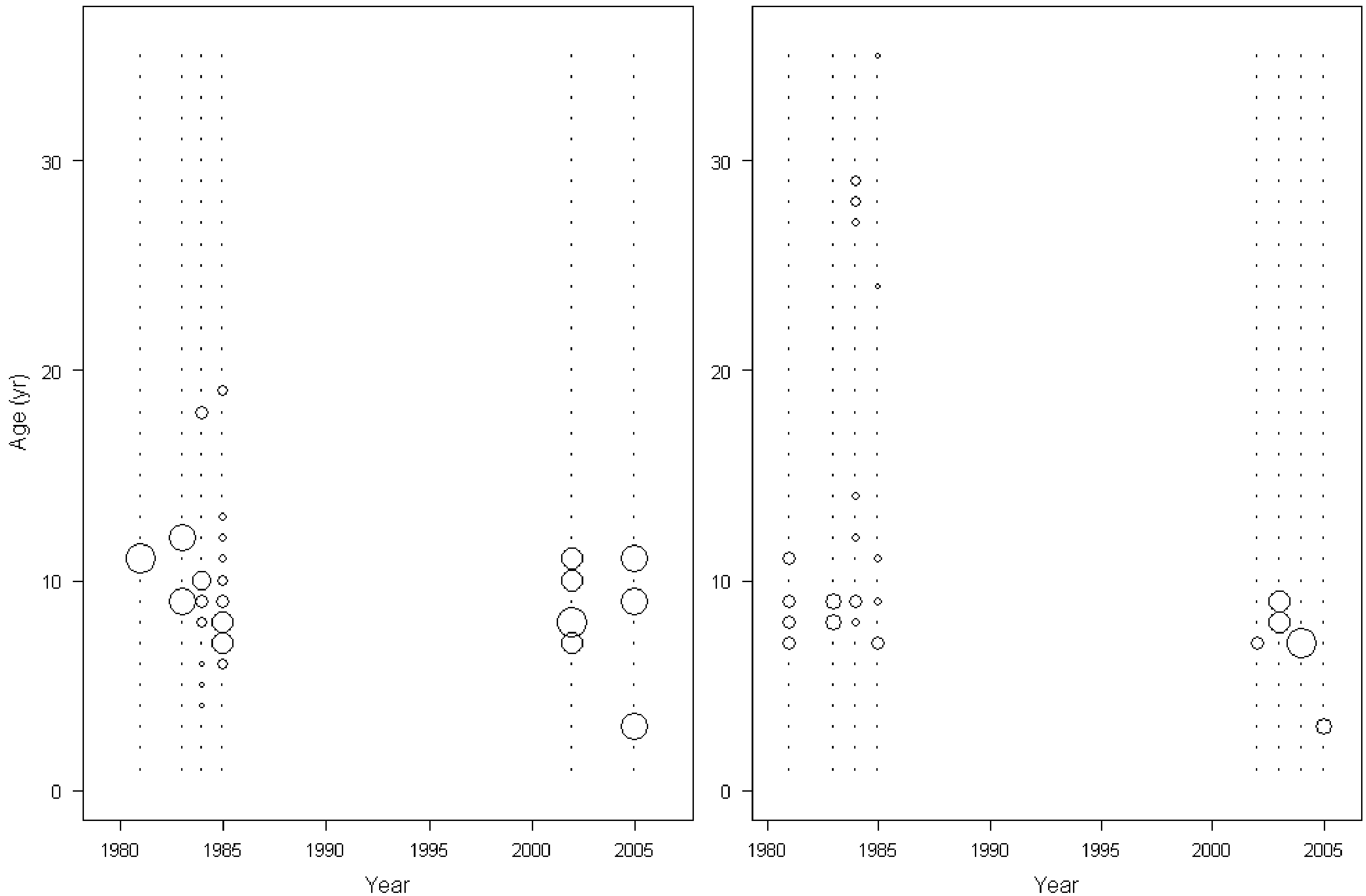


Figure 47. Age-frequency data for female (left panel) and male (right panel) canary rockfish from the southern California trawl fleet. The largest female bubble represents a proportion of 0.31, males represents 0.97.

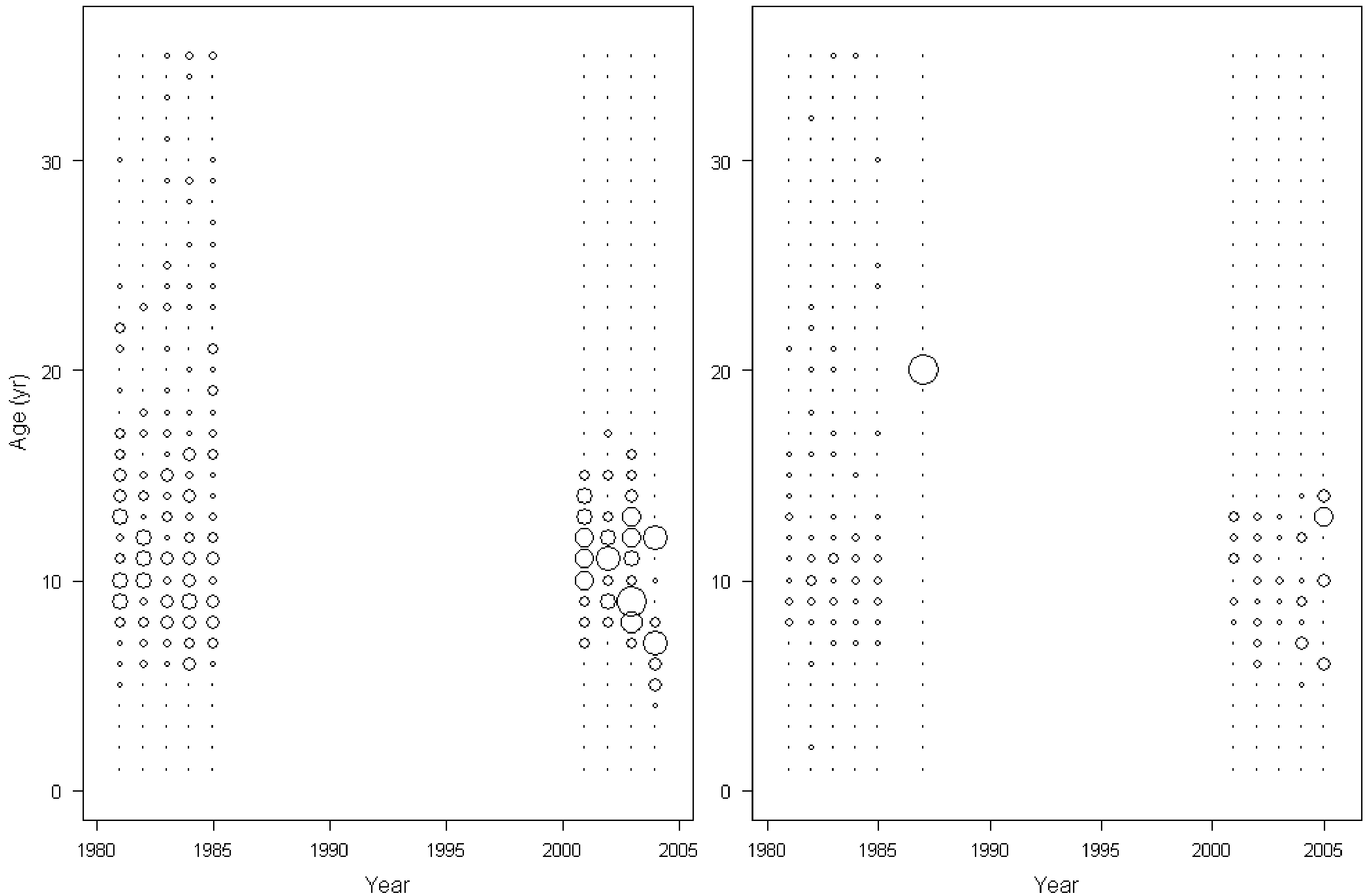


Figure 48. Age-frequency data for female (left panel) and male (right panel) canary rockfish from the Northern California trawl fleet. The largest female bubble represents a proportion of 0.23, males represents 0.97.

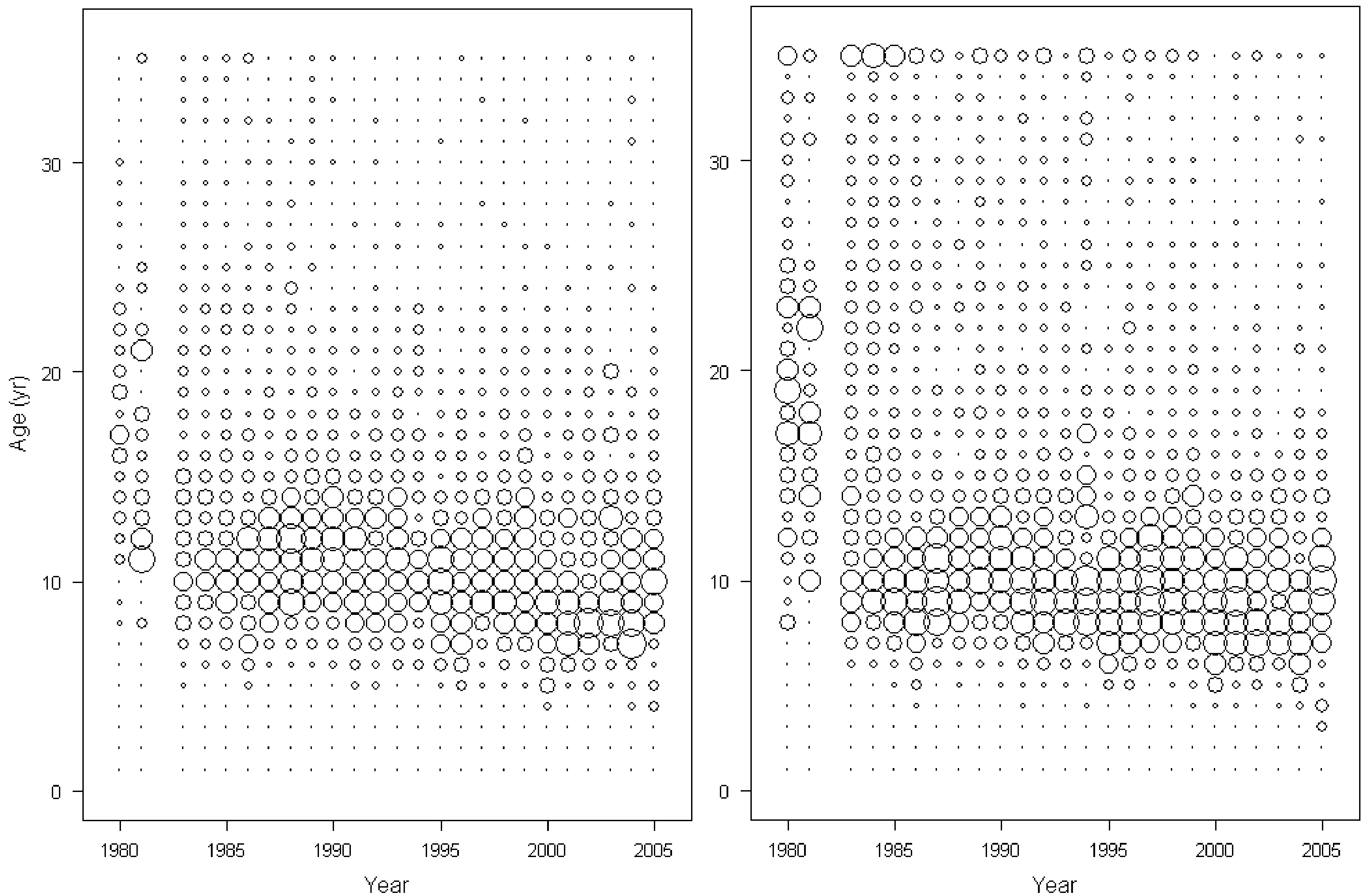


Figure 49. Age-frequency data for female (left panel) and male (right panel) canary rockfish from the Oregon trawl fleet. The largest female bubble represents a proportion of 0.10, males represents 0.10.

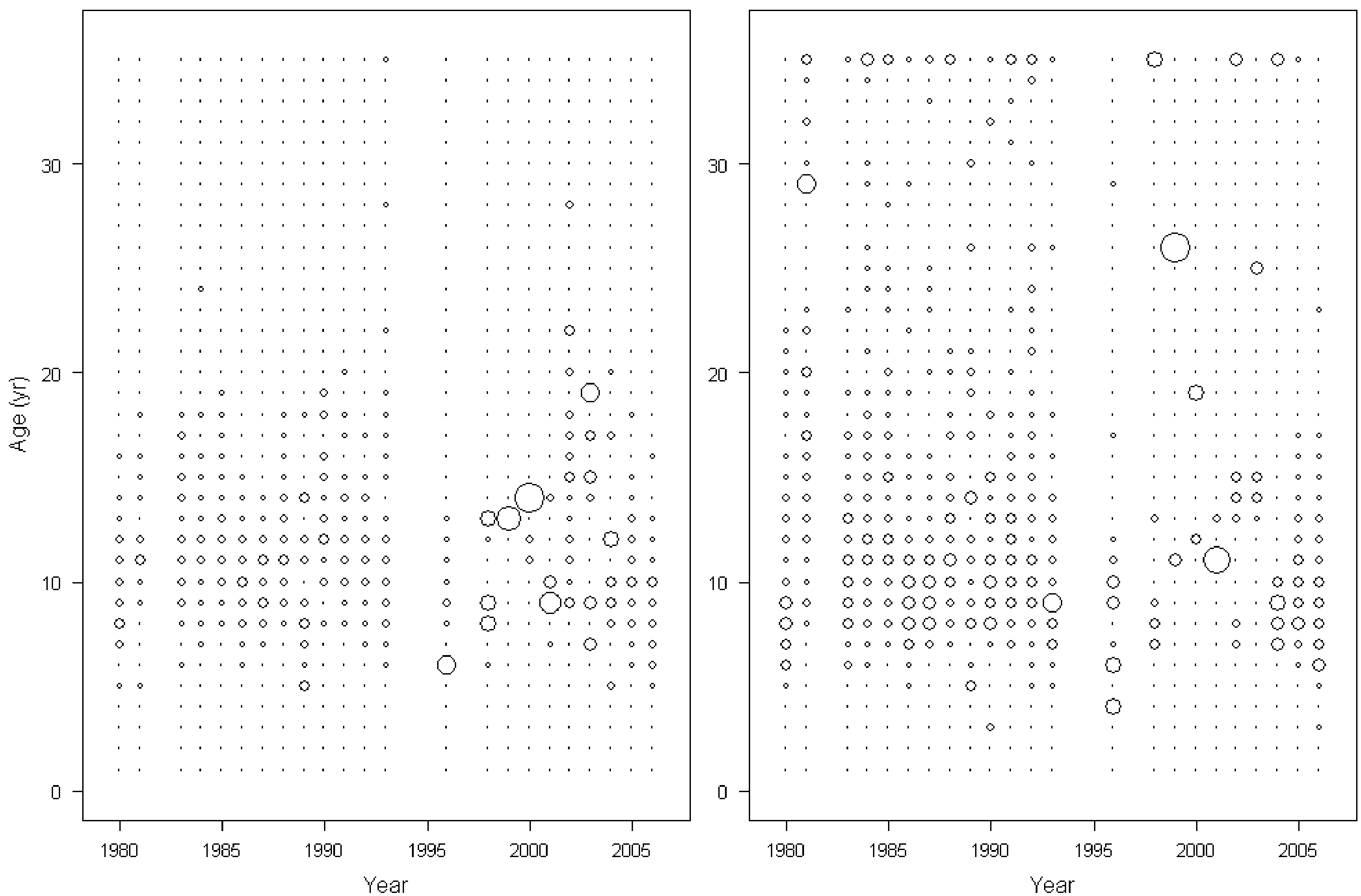


Figure 50. Age-frequency data for female (left panel) and male (right panel) canary rockfish from the Washington trawl fleet by WDFW agers (assumed to be unbiased). The largest female bubble represents a proportion of 0.68, males represents 0.42.

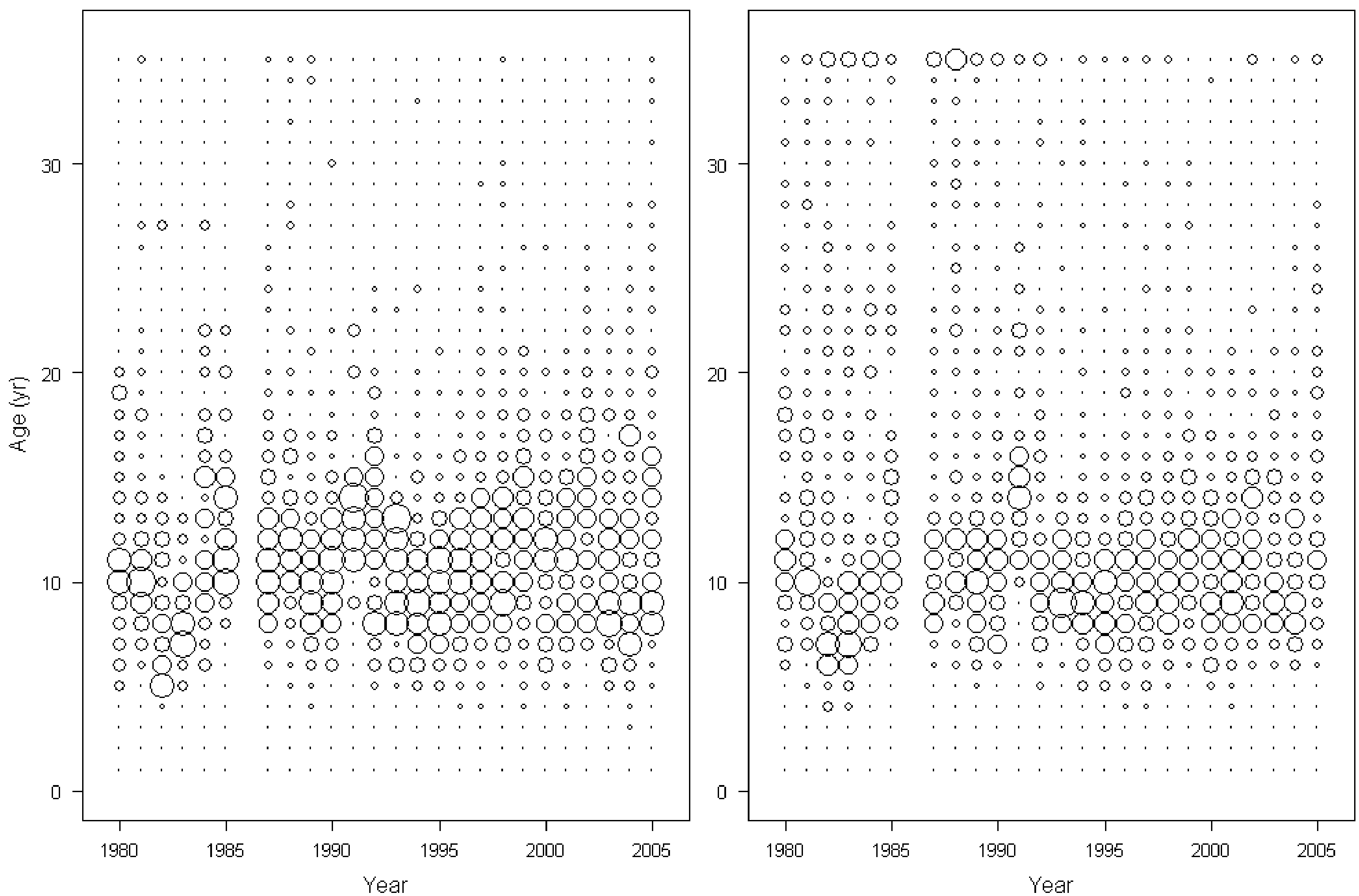


Figure 51. Age-frequency data for female (left panel) and male (right panel) canary rockfish from the Washington trawl fleet by CAP agers. The largest female bubble represents a proportion of 0.10, males represents 0.15.

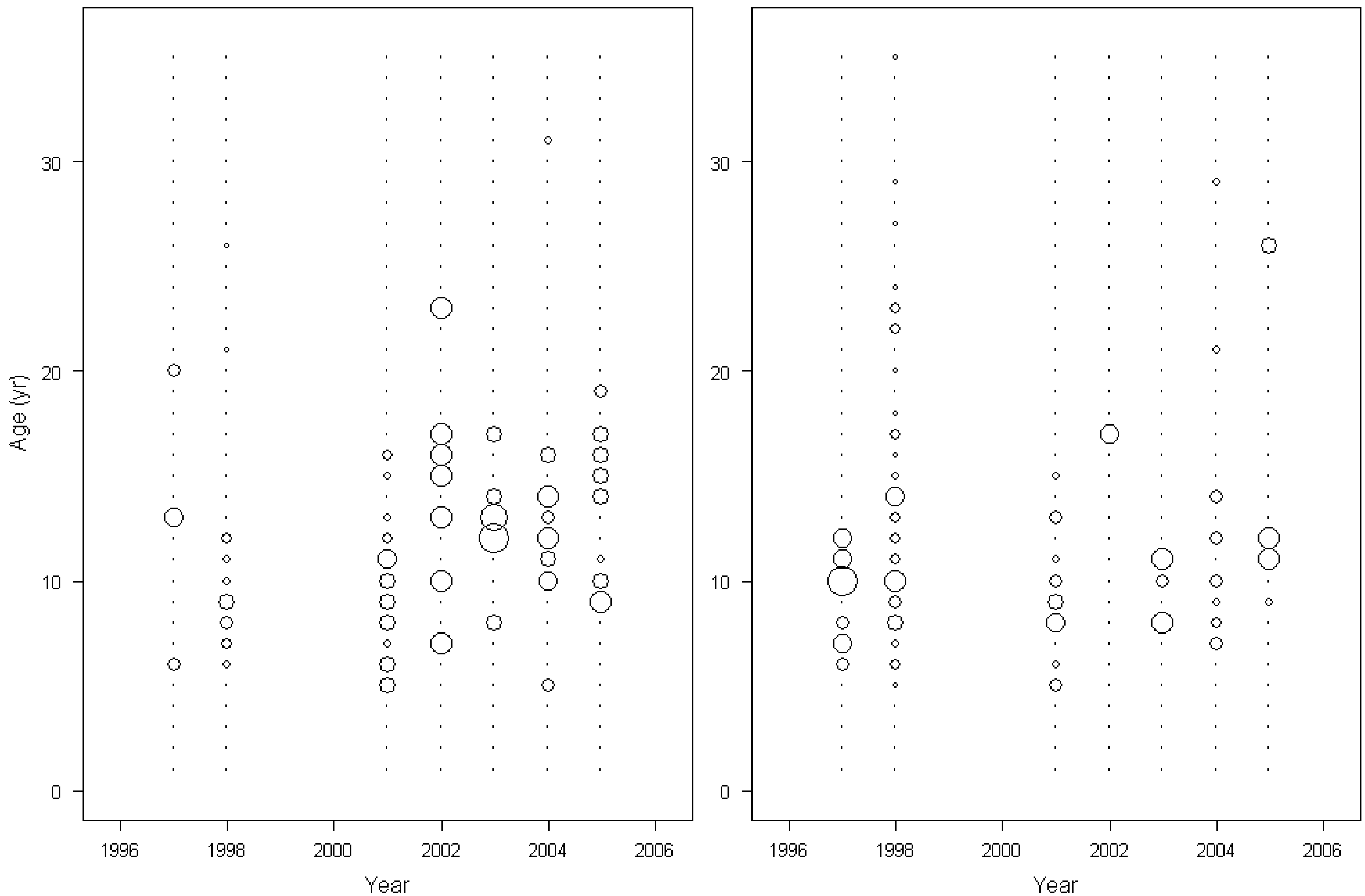


Figure 52. Age-frequency data for female (left panel) and male (right panel) canary rockfish from the Oregon and Washington non-trawl fleet. The largest female bubble represents a proportion of 0.25, males represents 0.28.

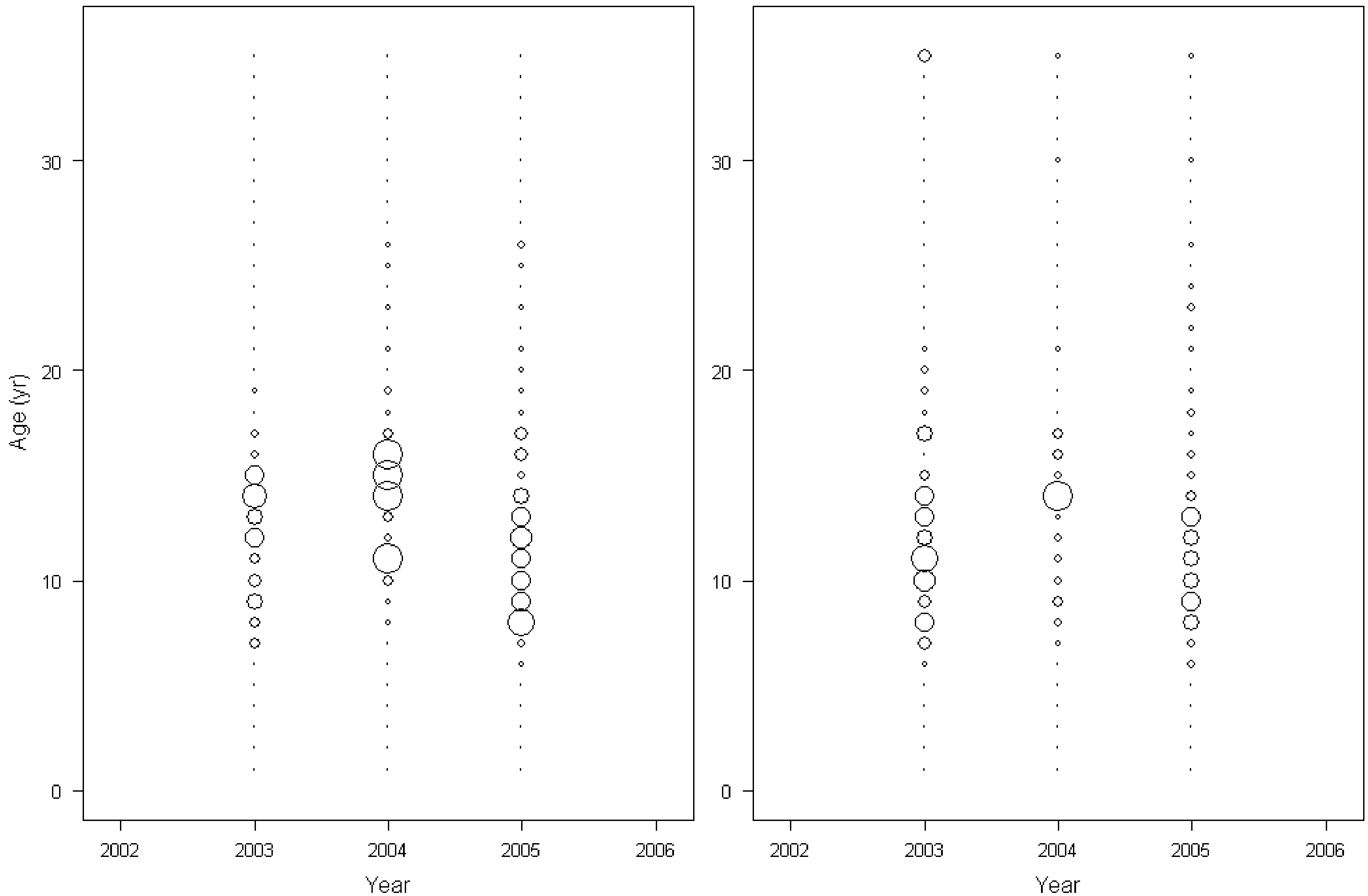


Figure 53. Age-frequency data for bycatch of female (left panel) and male (right panel) canary rockfish from the at-sea whiting fleet. The largest female bubble represents a proportion of 0.15, males represents 0.14.

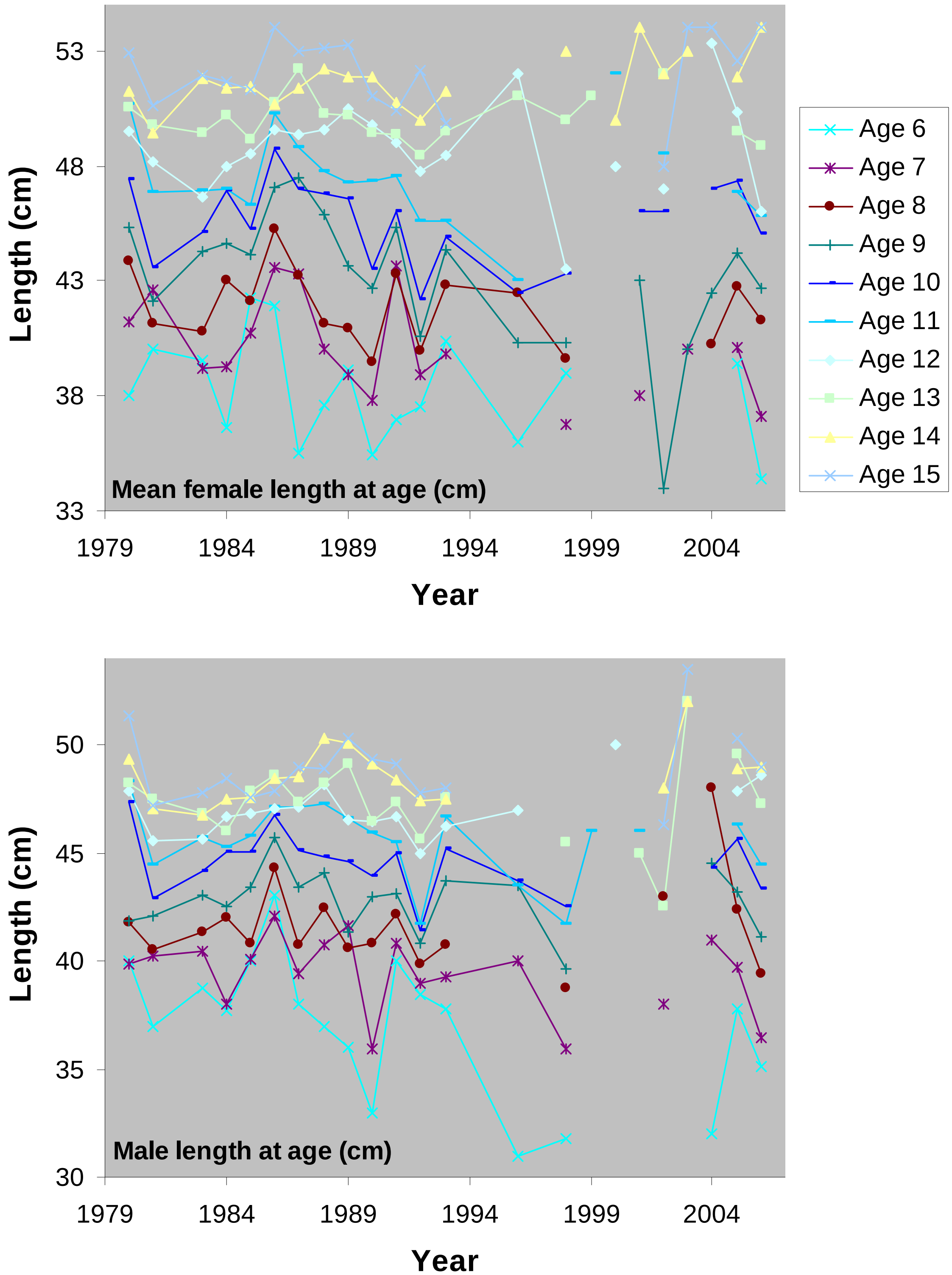
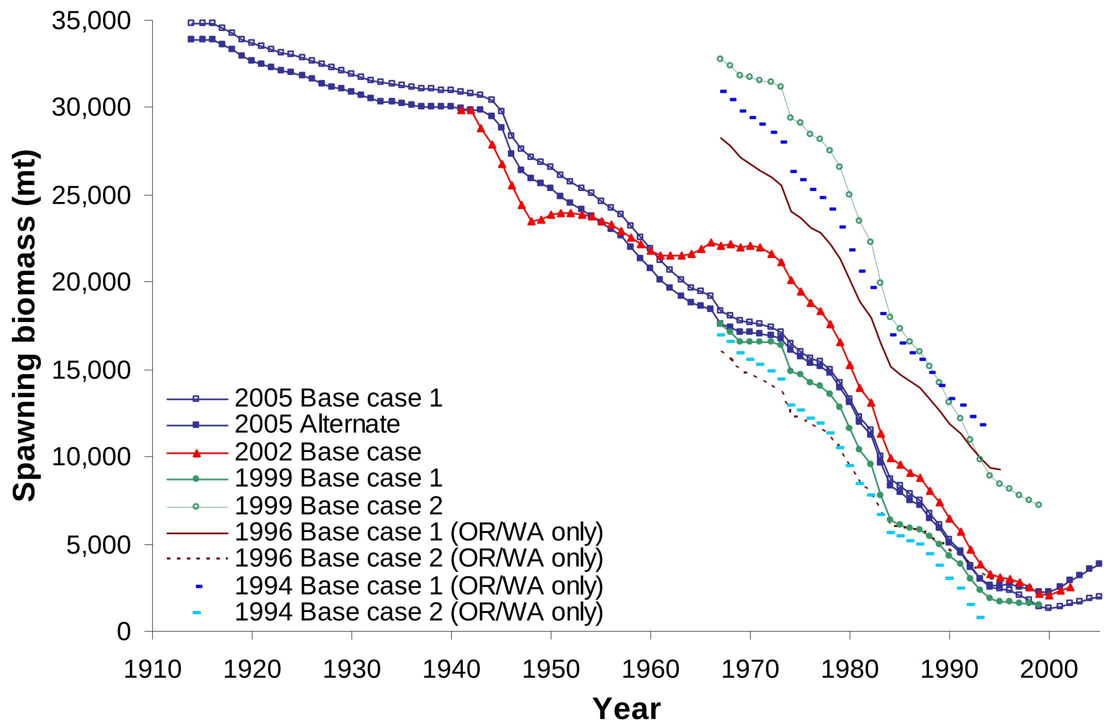


Figure 54. Mean length at observed age for the Washington trawl fleet, based only on recent WDFW age-reading.



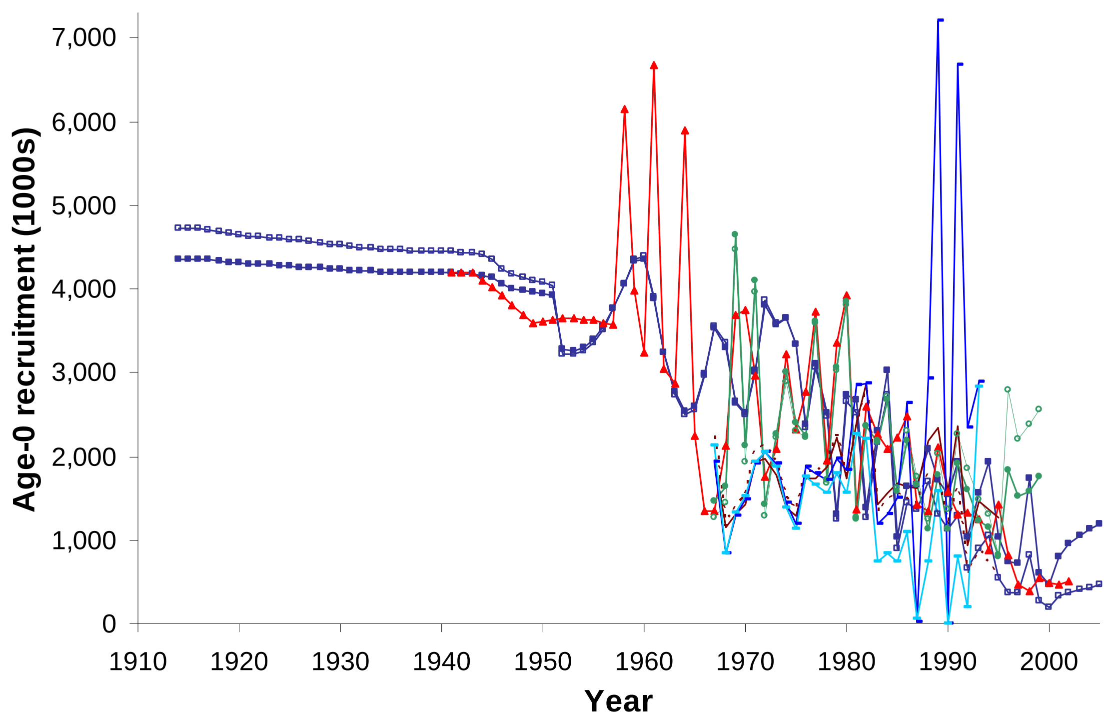


Figure 55. Retrospective analysis across stock assessments for canary rockfish, 1994-2005. Note that in most years two competing models were reported that often differed considerably in absolute scale.

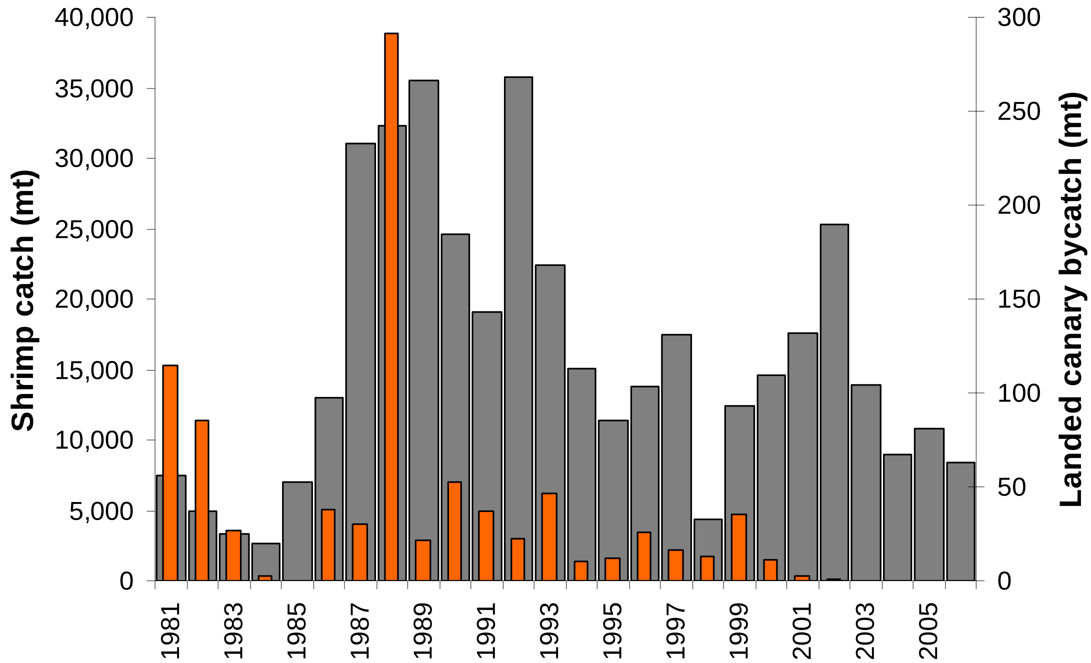


Figure 56. Landings of pink shrimp (primary axis) and canary rockfish from the pink shrimp fishery during the period 1981-2006. Bycatch excluder devices were used in 2001-2002 and required in 2003.

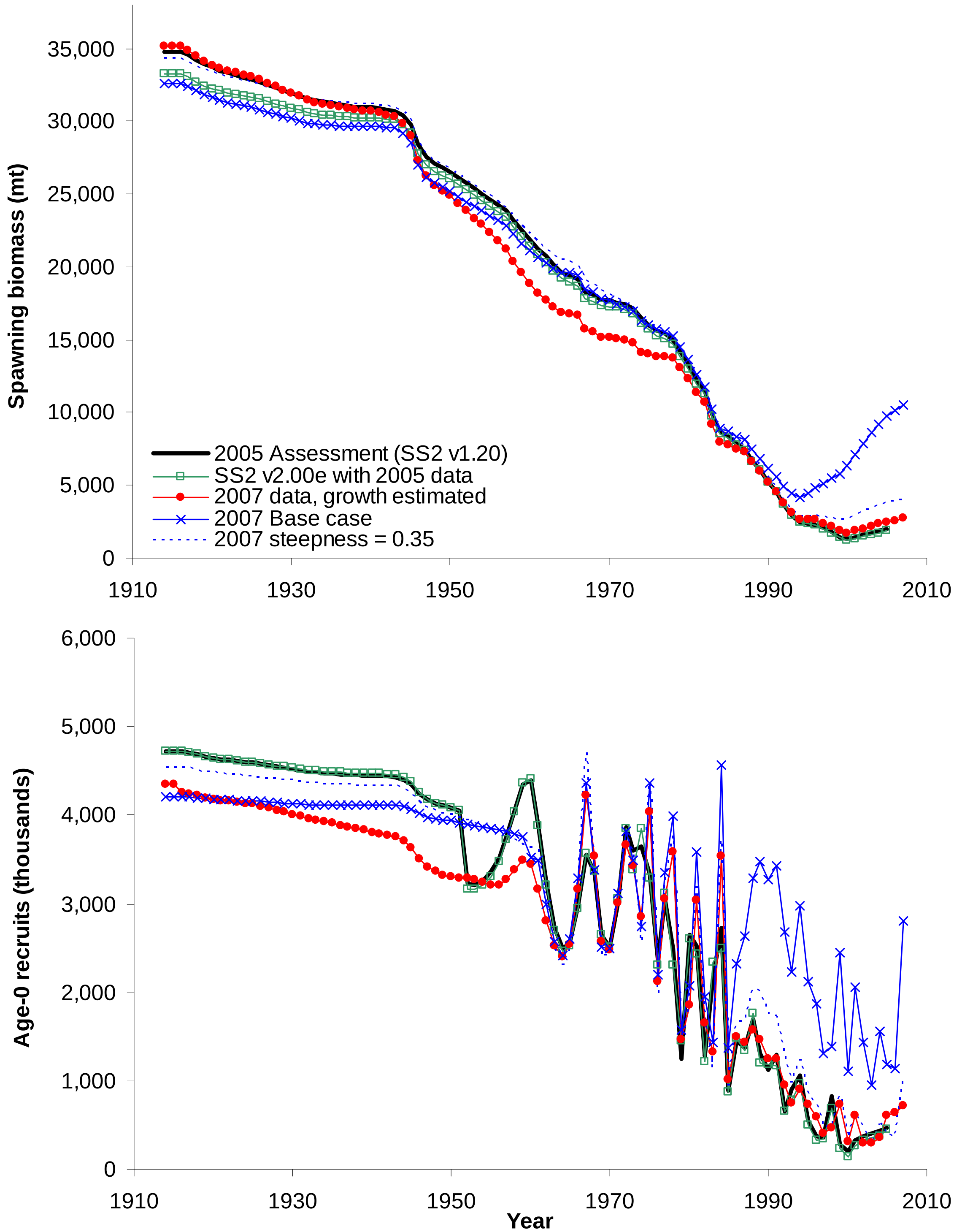


Figure 57. Link from 2005 base case assessment results through SS2 version update, data update to 2007 base case.

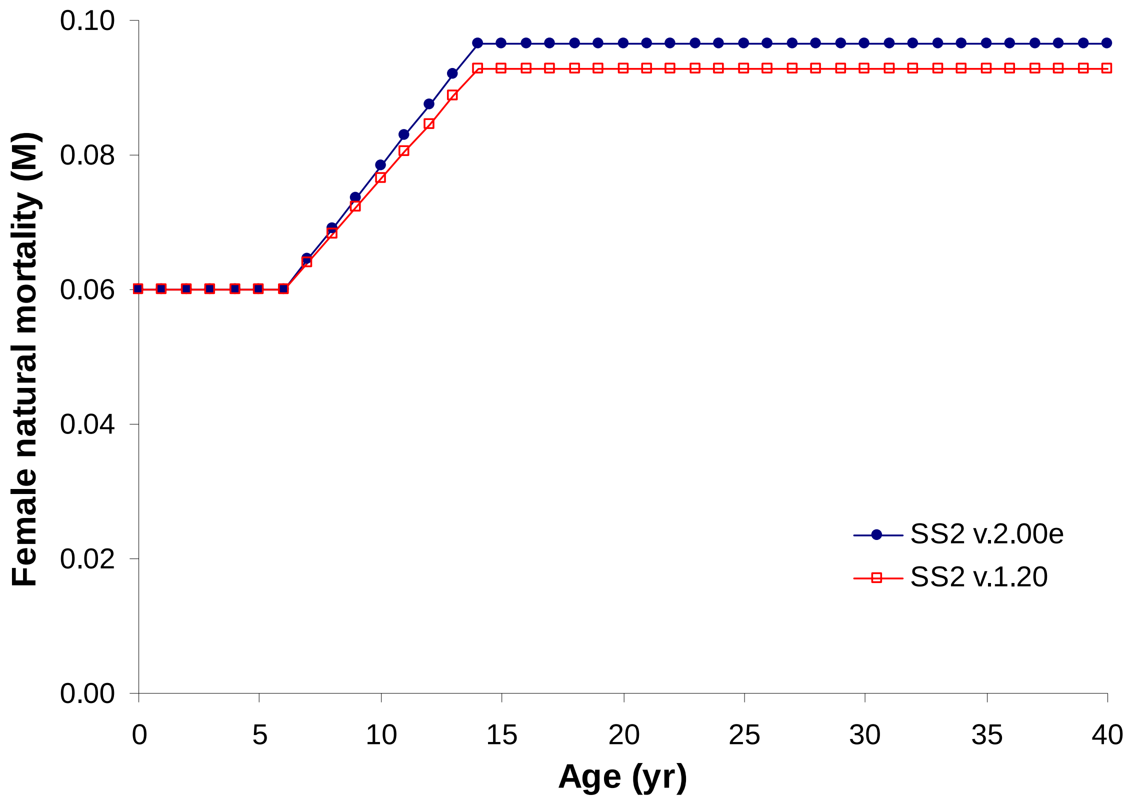


Figure 58. Difference in natural mortality estimate due to SS2 version change.

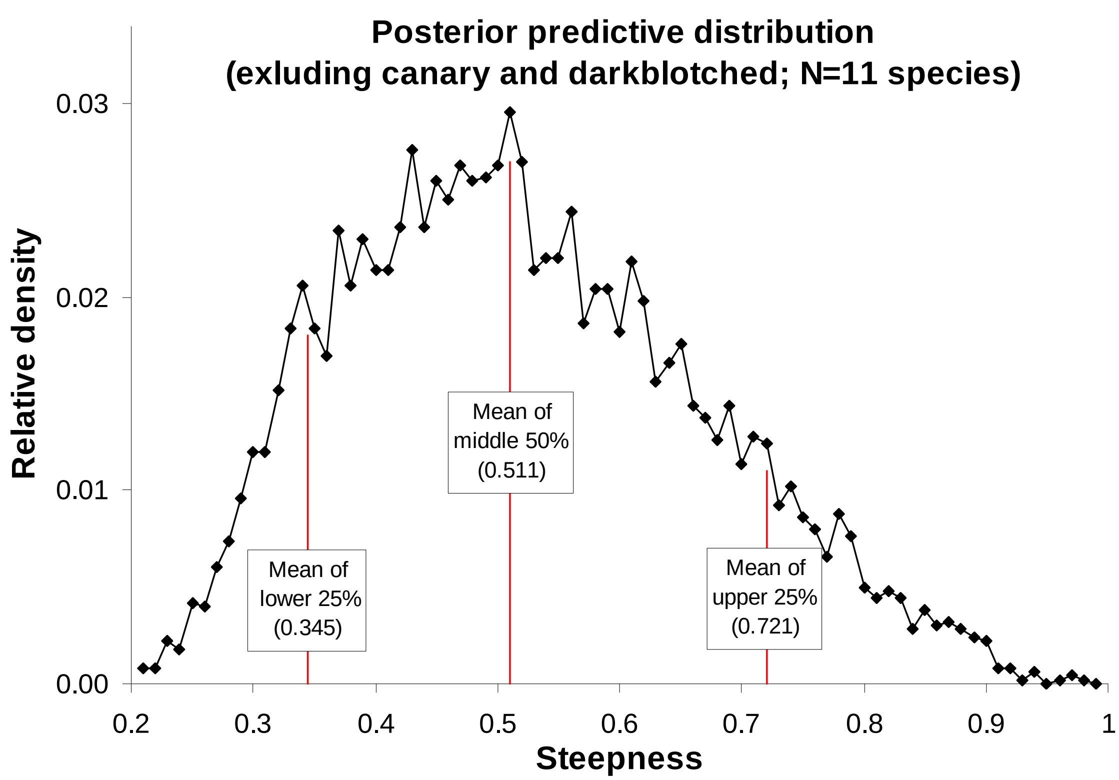


Figure 59. Revised 2007 prior for stock-recruit steepness for canary rockfish (M. Dorn, AFSC, personal communication).

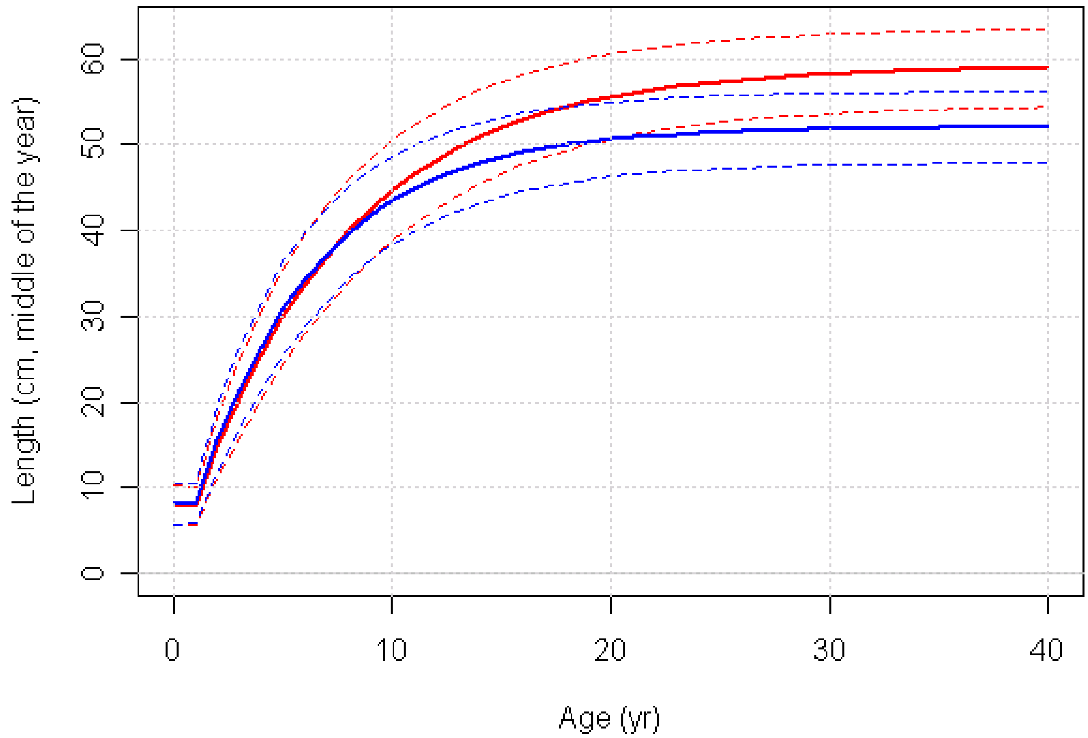


Figure 60. Growth curve for females (upper solid line) and males (lower solid line) with ~95% interval (dashed lines) indicating the expectation and individual variability of length-at-age for the base case model.

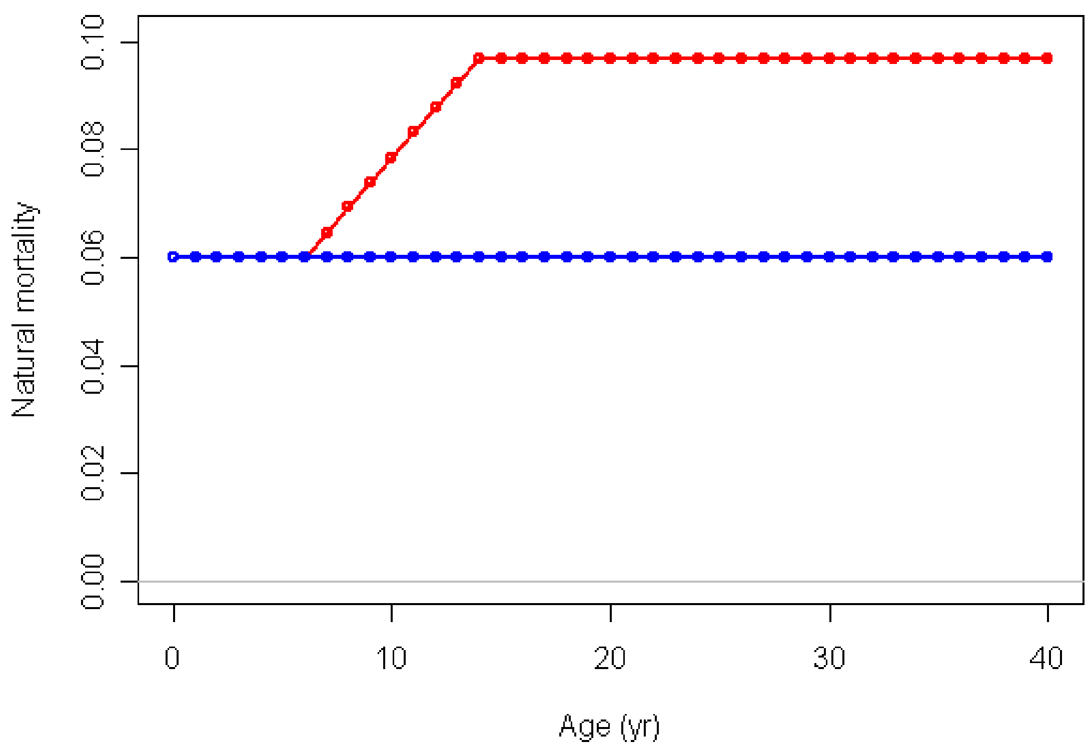


Figure 61. Natural mortality at age for males (horizontal line at 0.06) and females (linear ramp from 0.06 at age 6 to estimated value at age 14).

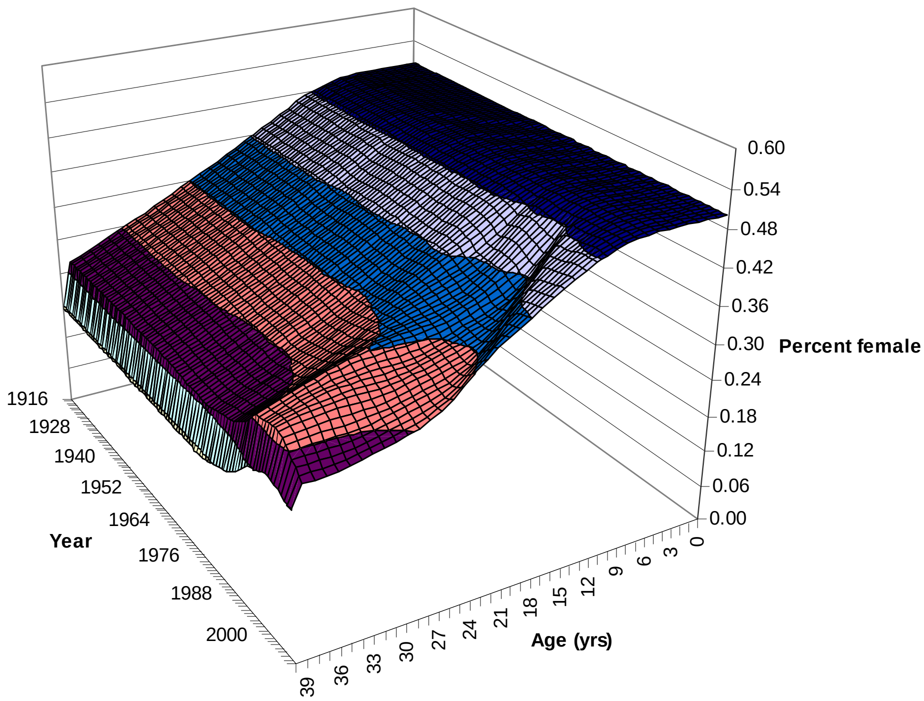


Figure 62. Change in sex-ratio over time, illustrating the effect of increasing natural mortality for females in reducing the percent female at older ages, and the effect of exploitation increasing the percent female in recent years.

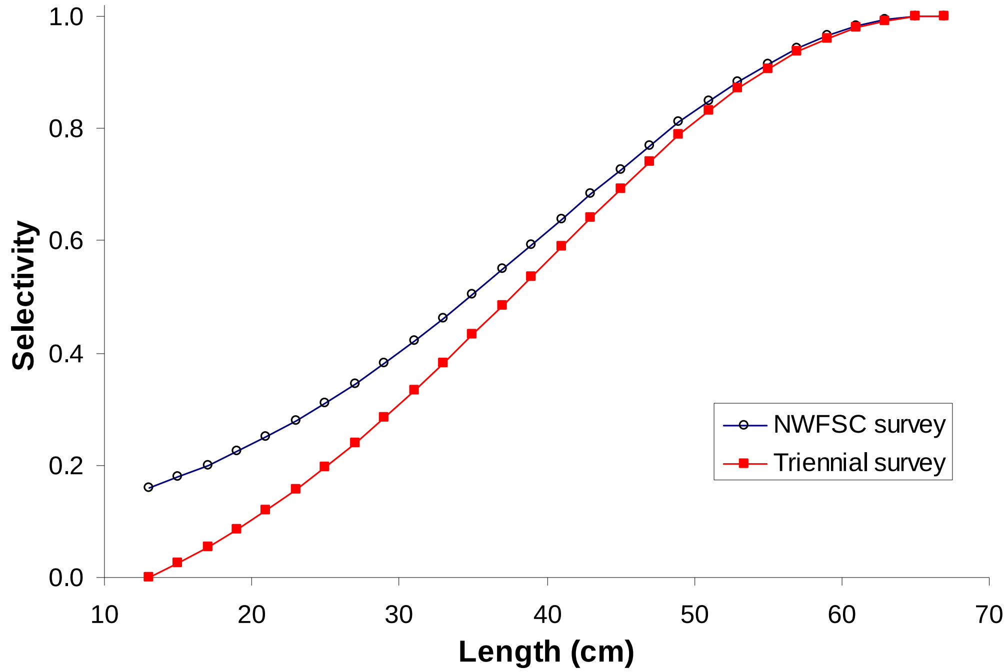


Figure 63. Estimated length-based selectivity curves for the NWFSC and triennial surveys.

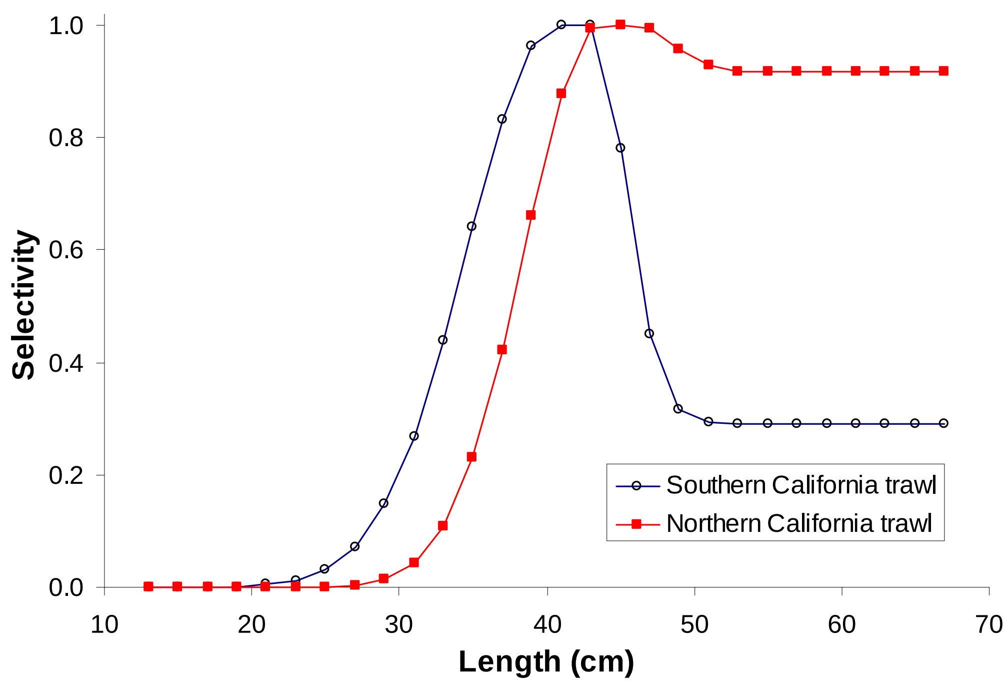


Figure 64. Length-based selectivity in the base model for the southern and northern California trawl fisheries.

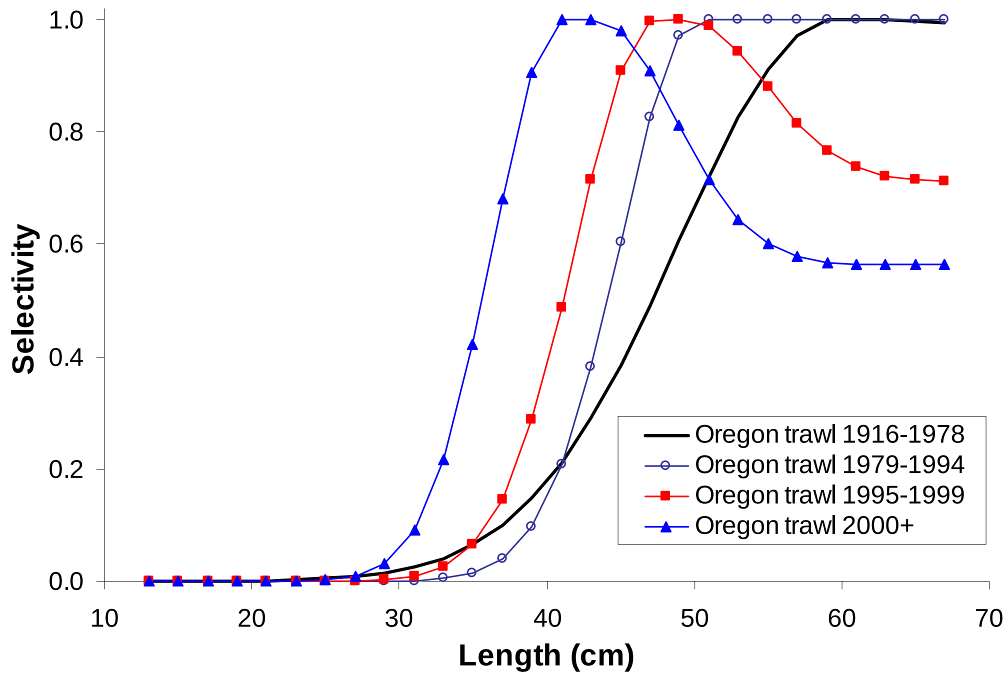


Figure 65. Length-based selectivity in the base model for the Oregon trawl fishery.

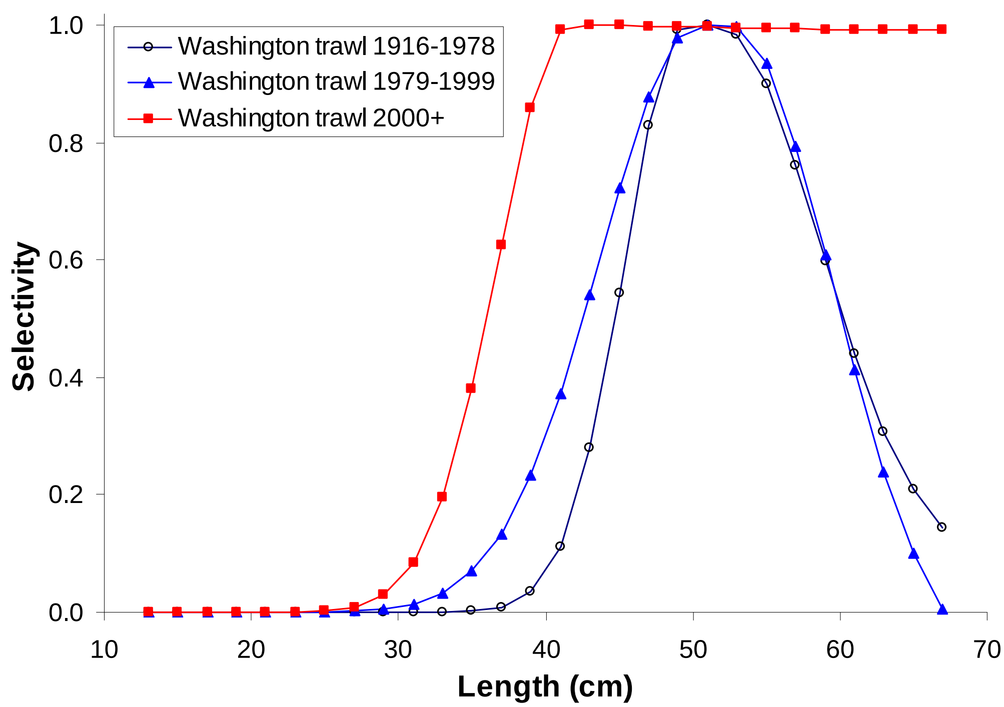


Figure 66. Length-based selectivity in the base model for the Washington trawl fishery.

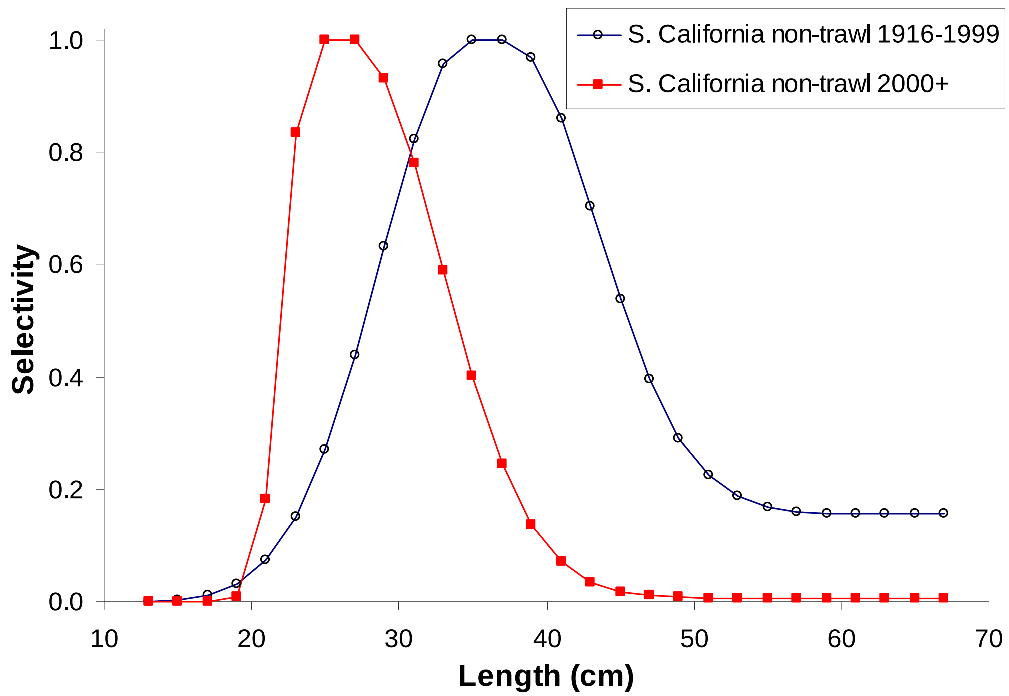


Figure 67. Length-based selectivity estimated for the southern California non-trawl fishery in the base model.

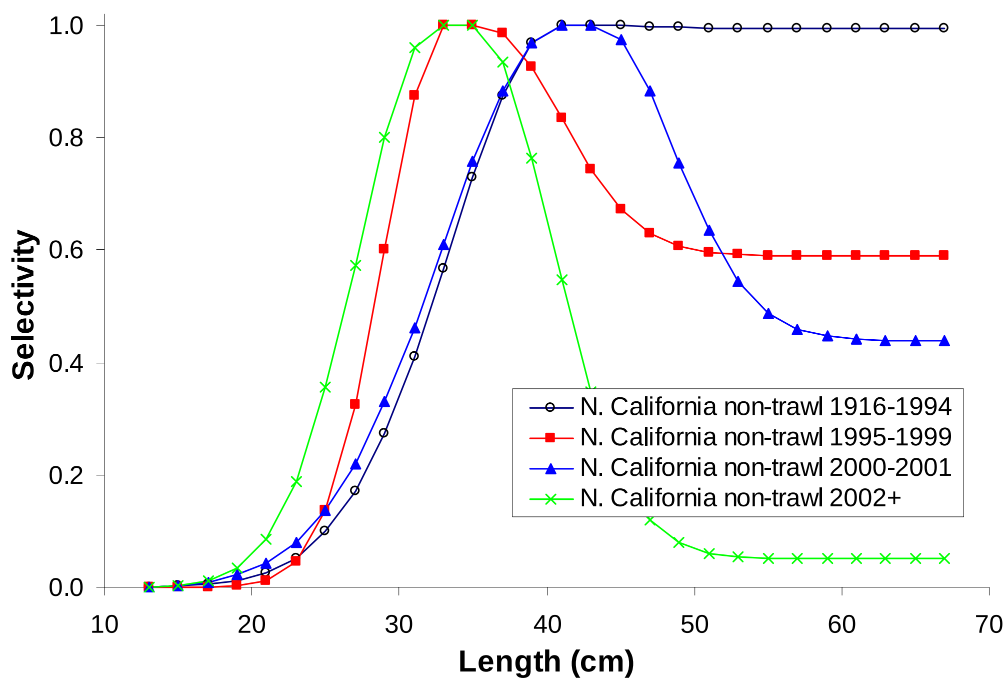


Figure 68. Length-based selectivity estimated for the Northern California non-trawl fishery in the base model.

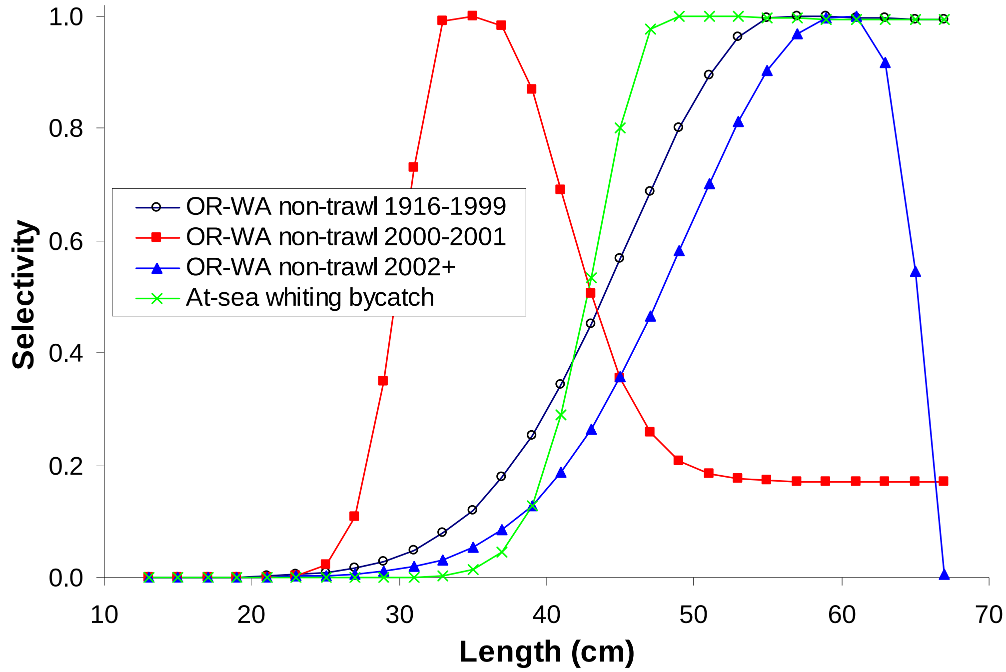


Figure 69. Length-based selectivity estimated for the Oregon-Washington non-trawl fishery and the at-sea whiting fleet in the base model.

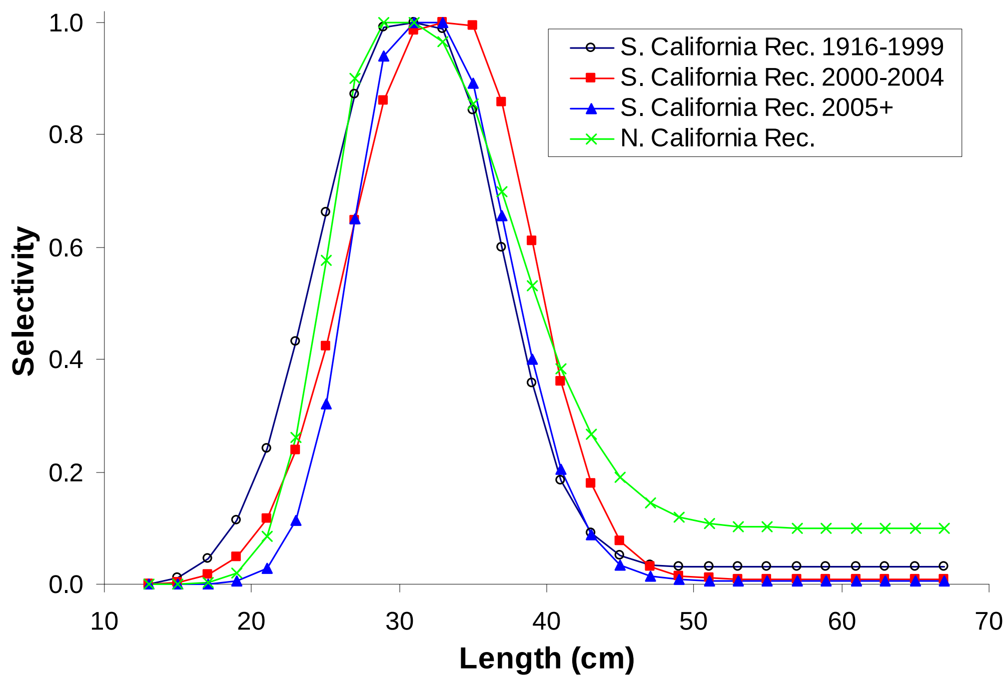


Figure 70. Length-based selectivity estimated for the Southern and Northern California recreational fisheries in the base model.

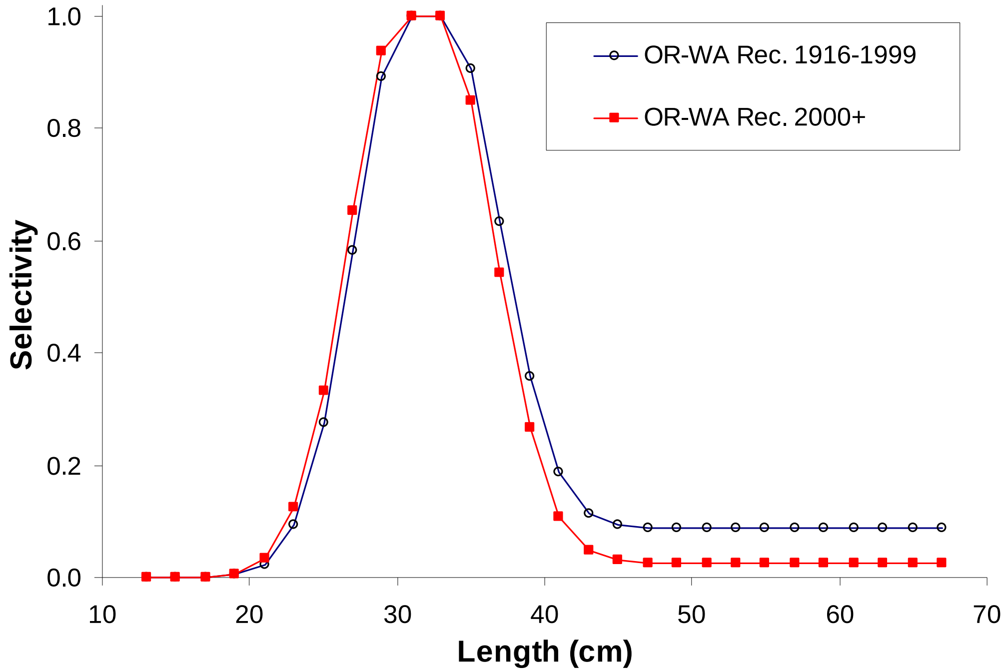


Figure 71. Length-based selectivity estimated for the Oregon-Washington recreational fishery in the base model.

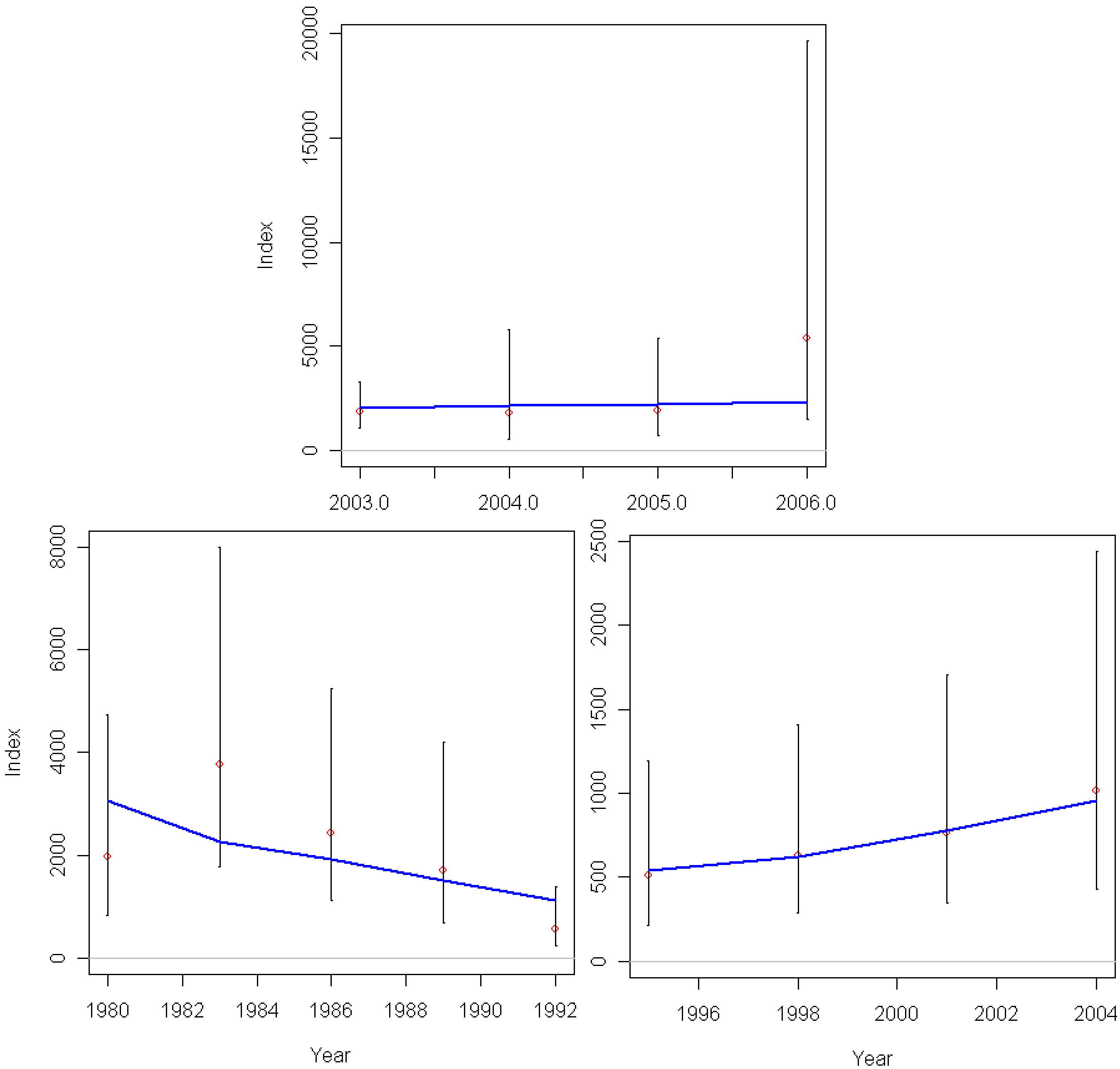


Figure 72. Fit to the NWFSC (upper panel) and triennial (lower panels) survey GLMM-based time series of relative biomass in the base case model.

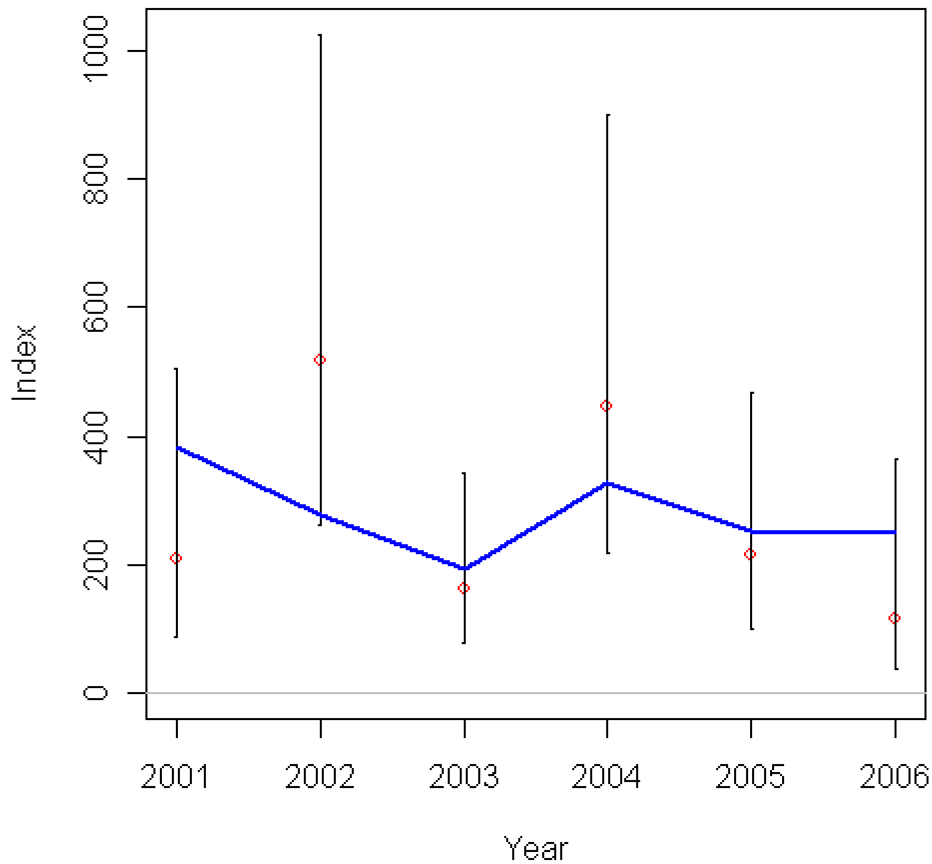


Figure 73. Fit to the coast-wide pre-recruit index.

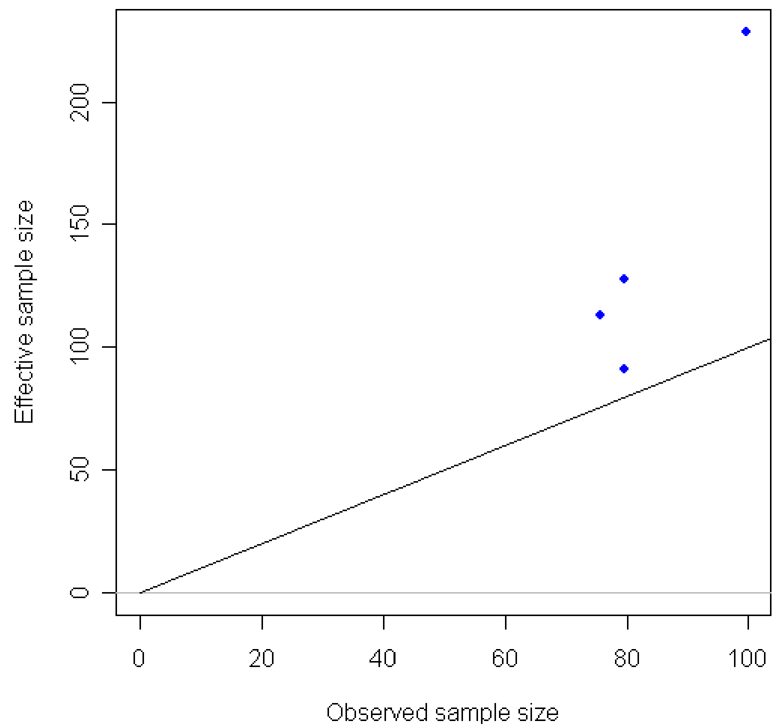


Figure 74. Observed and effective sample sizes for the sex-specific NWFSC length-frequency observations.

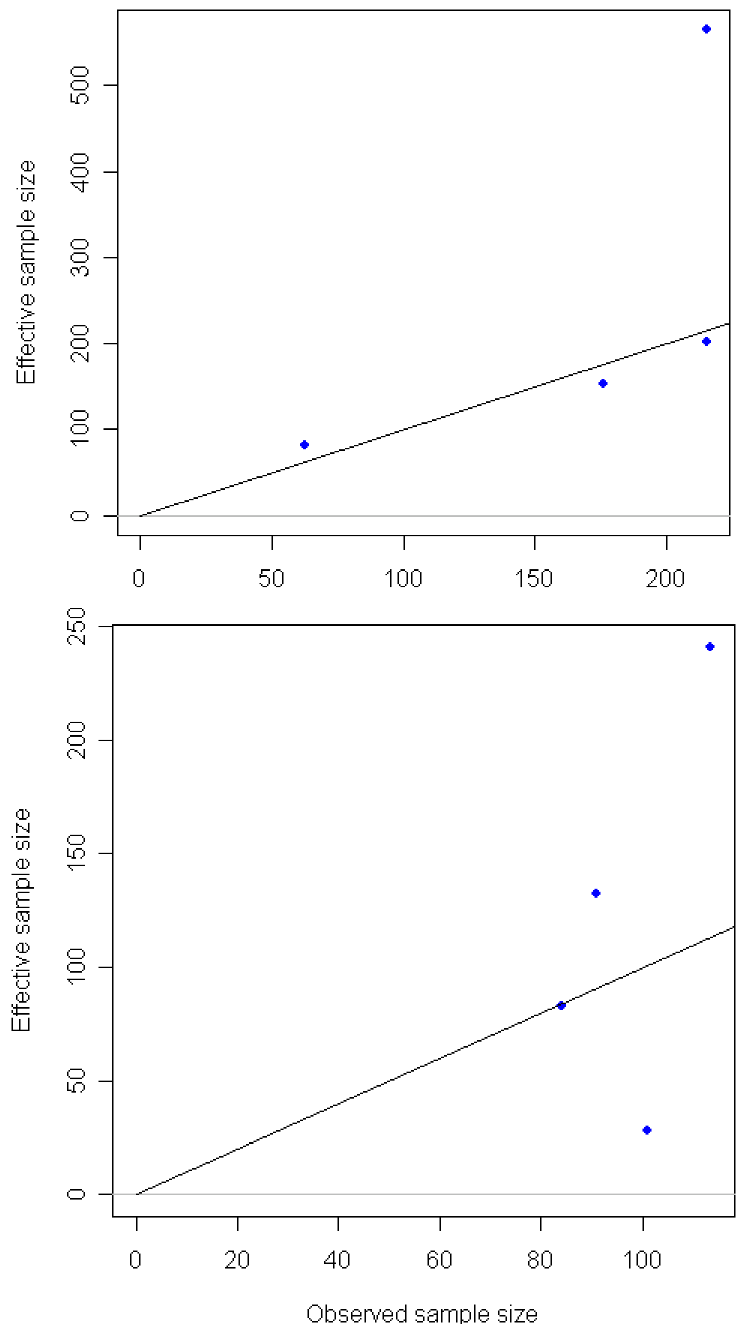


Figure 75. Observed and effective sample sizes for the sex-specific triennial length-frequency observations for 1980-1992 (upper panel) and 1995-2004 (lower panel).

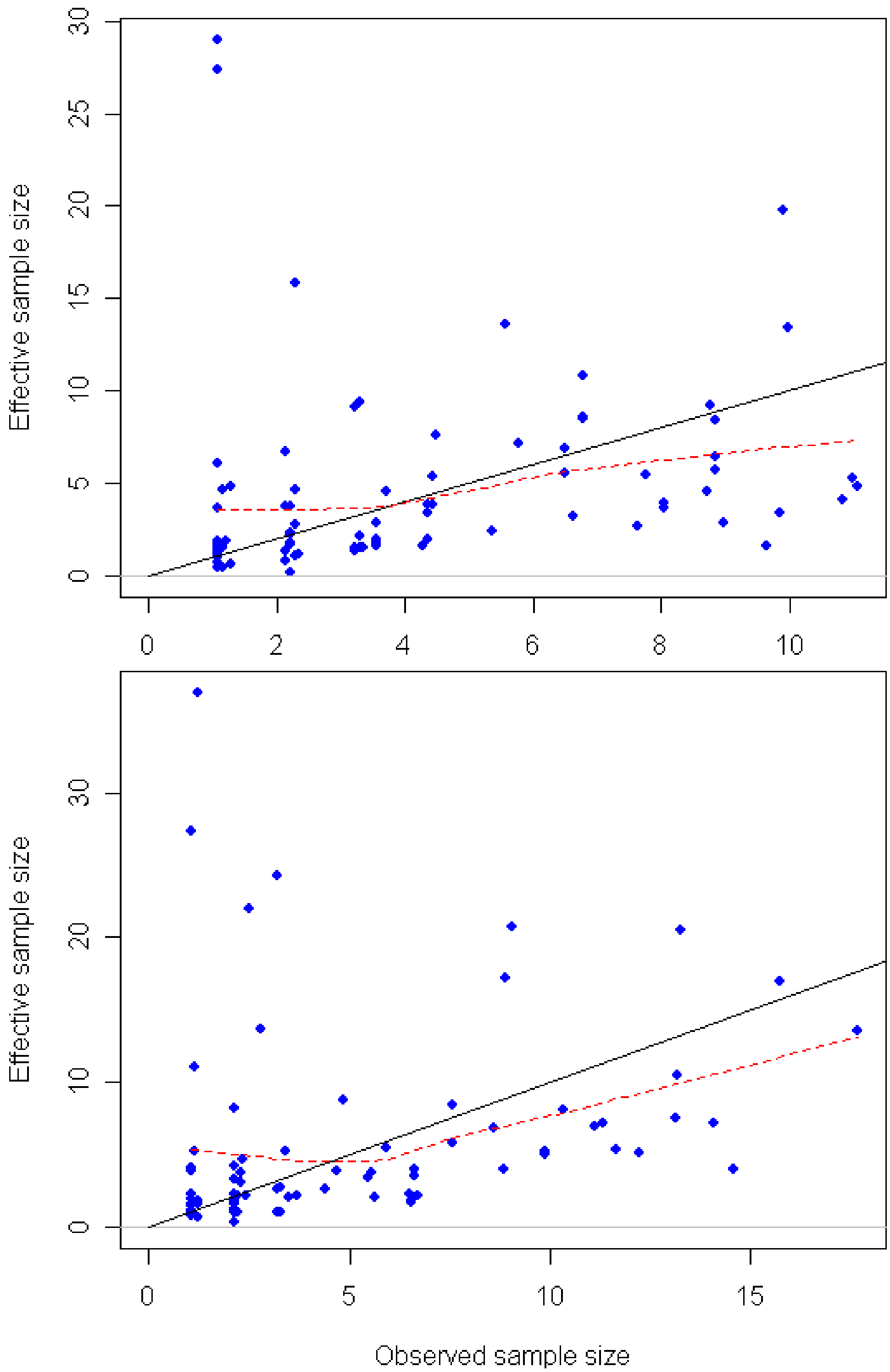


Figure 76. Observed and effective sample sizes for the female (upper panel) and male (lower panel) NWFSC survey conditional age-at-length frequency observations (sexes entered separately for conditional age data).

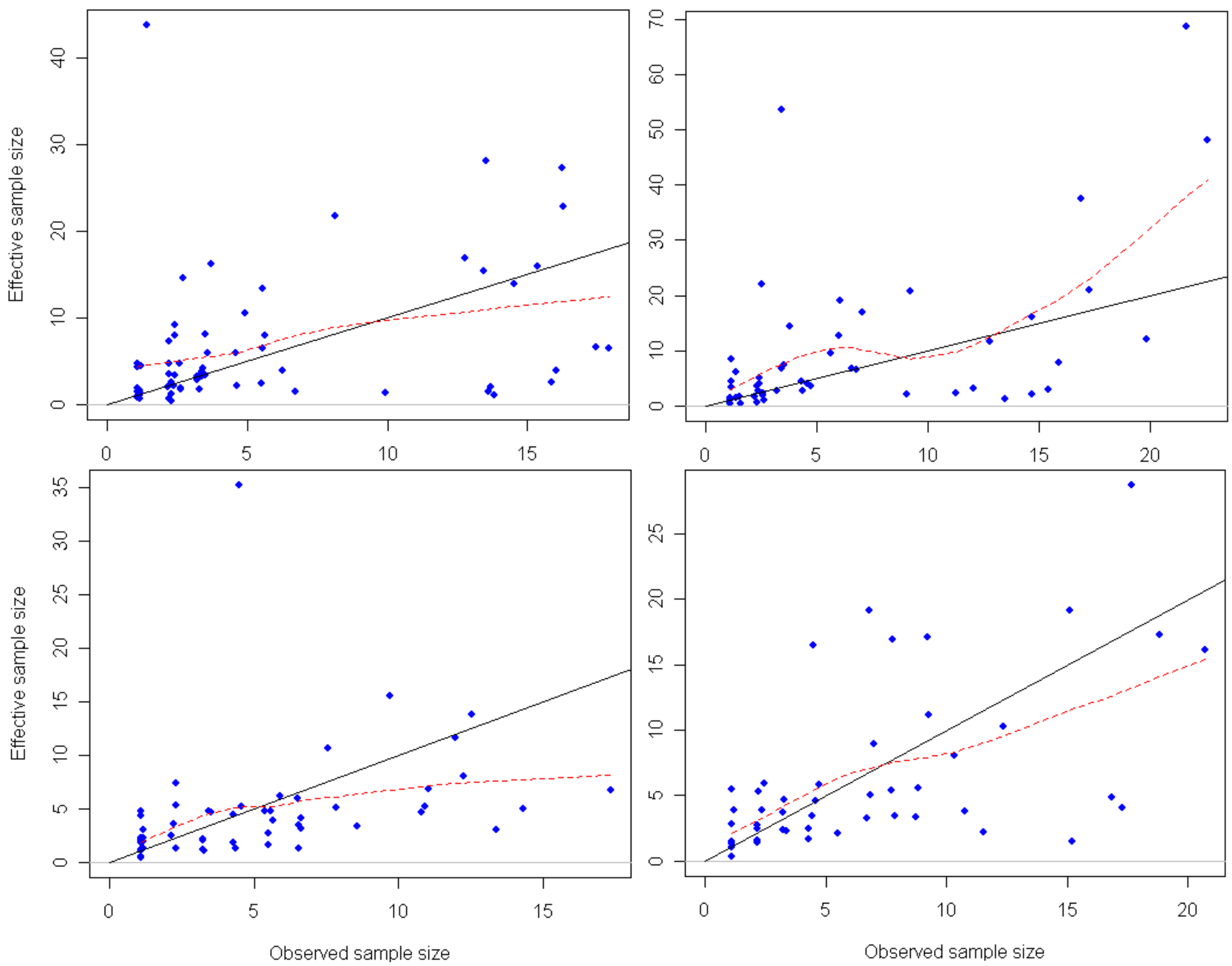


Figure 77. Observed and effective sample sizes for the female (upper panels) and male (lower panels) triennial survey conditional age-at-length frequency observations (sexes entered separately for conditional age data); 1980-1992 (left panels) and 1995-2004 (right panels).

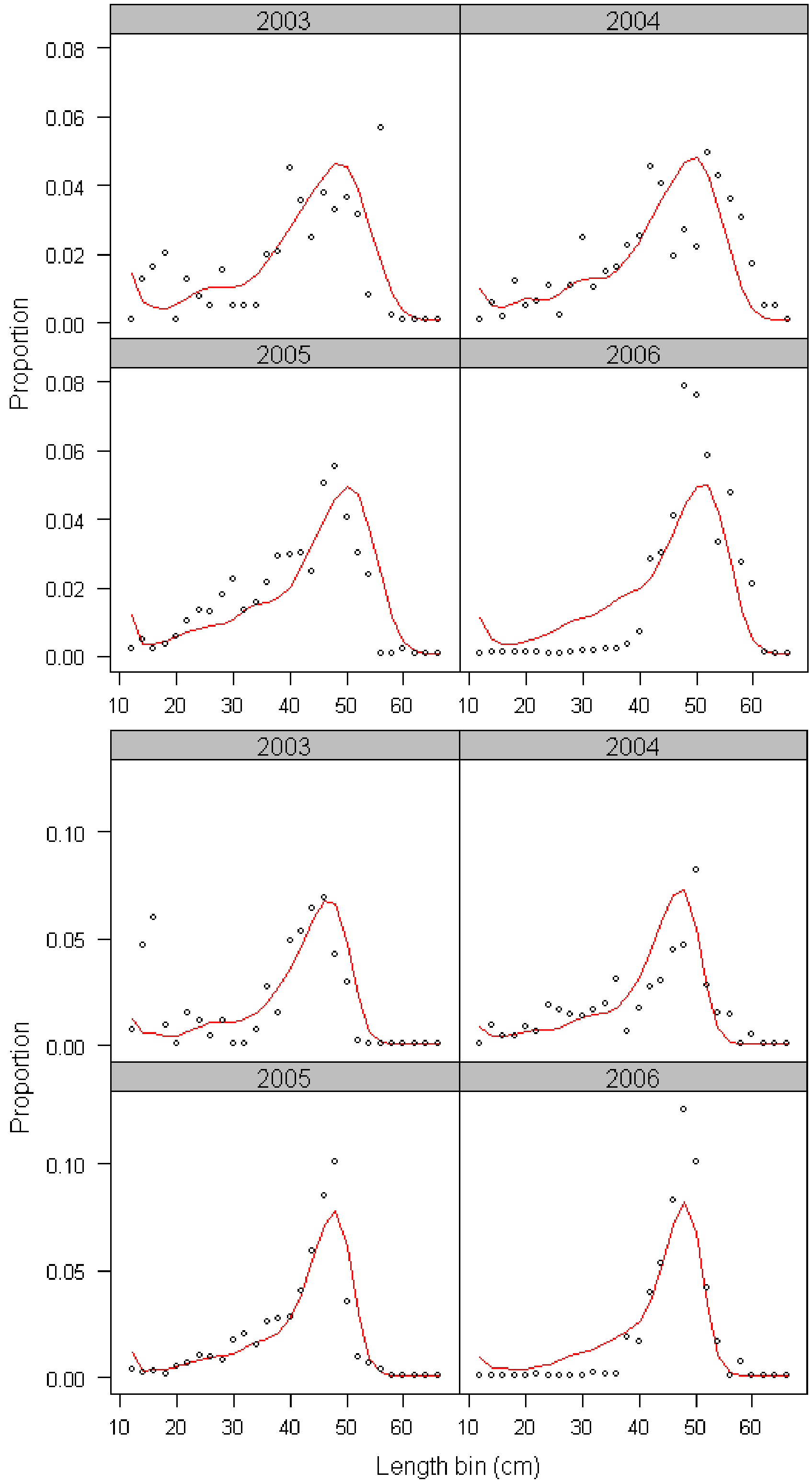


Figure 78. Fit to the NWFSC survey female (upper panel) and male (lower panel) length-frequencies.

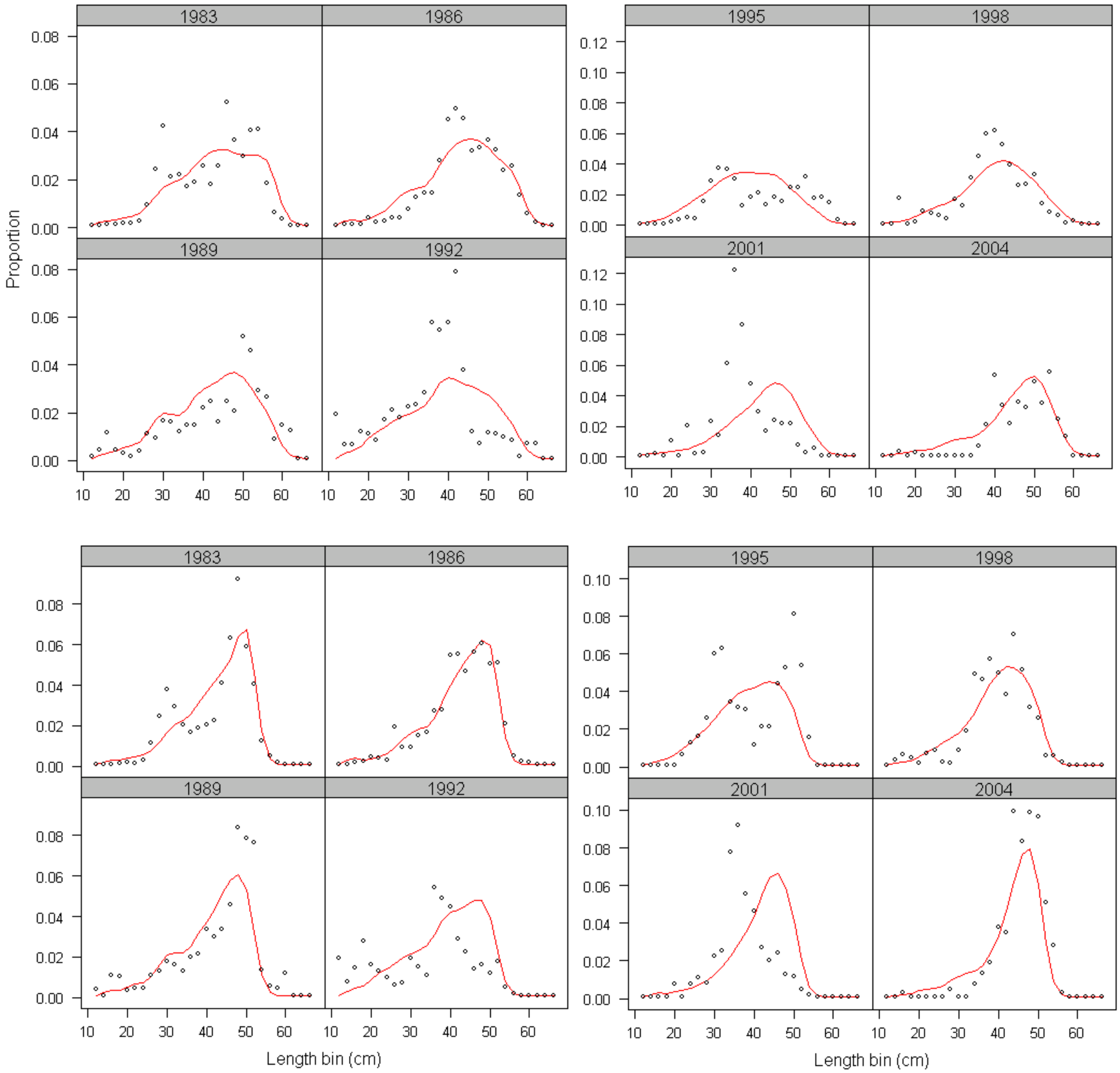


Figure 79. Fit to the triennial survey female (upper panels) and male (lower panels) length-frequencies; 1980-1992 (left panels) and 1995-2004 (right panels).

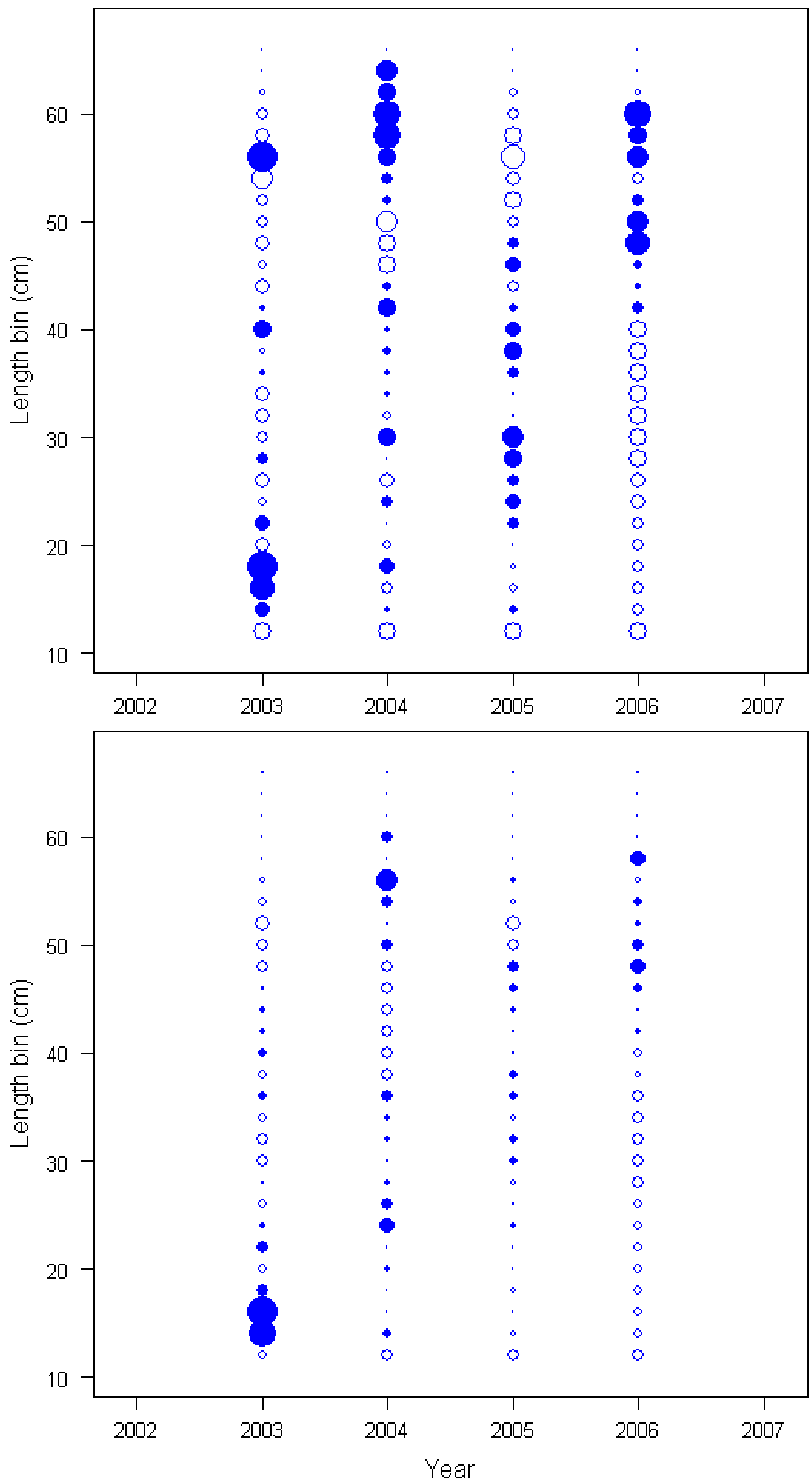


Figure 80. Pearson residuals for the fit to NWFSC survey female (upper panel, maximum = 2.66) and male (lower panel, maximum = 6.32) length-frequencies.

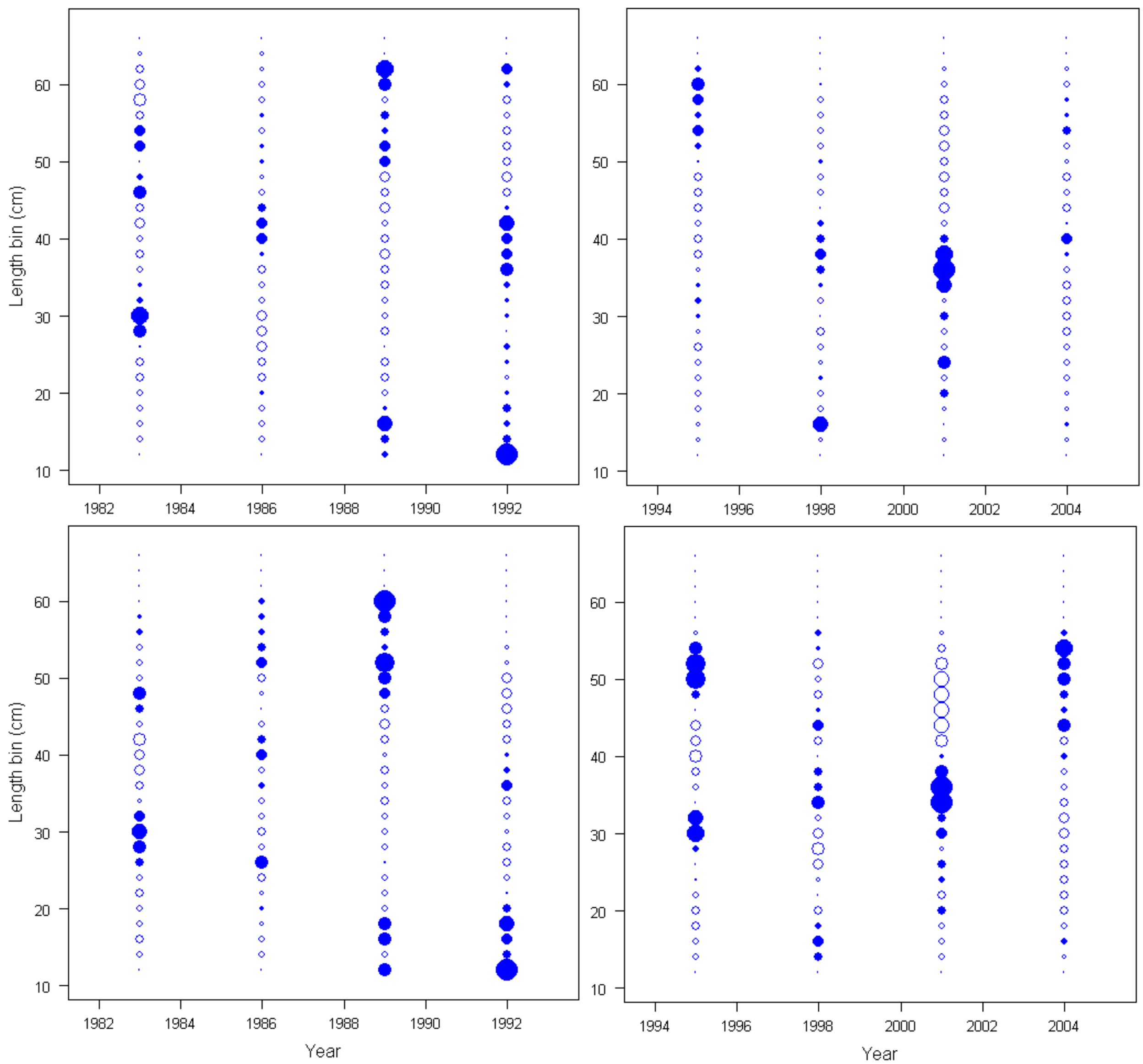


Figure 81. Pearson residuals for the fit to triennial survey female (upper panels, maximum = 4.66, 6.23) and male (lower panels, maximum = 4.78, 3.82) length-frequencies; 1980-1992 (left panels) and 1995-2004 (right panels).

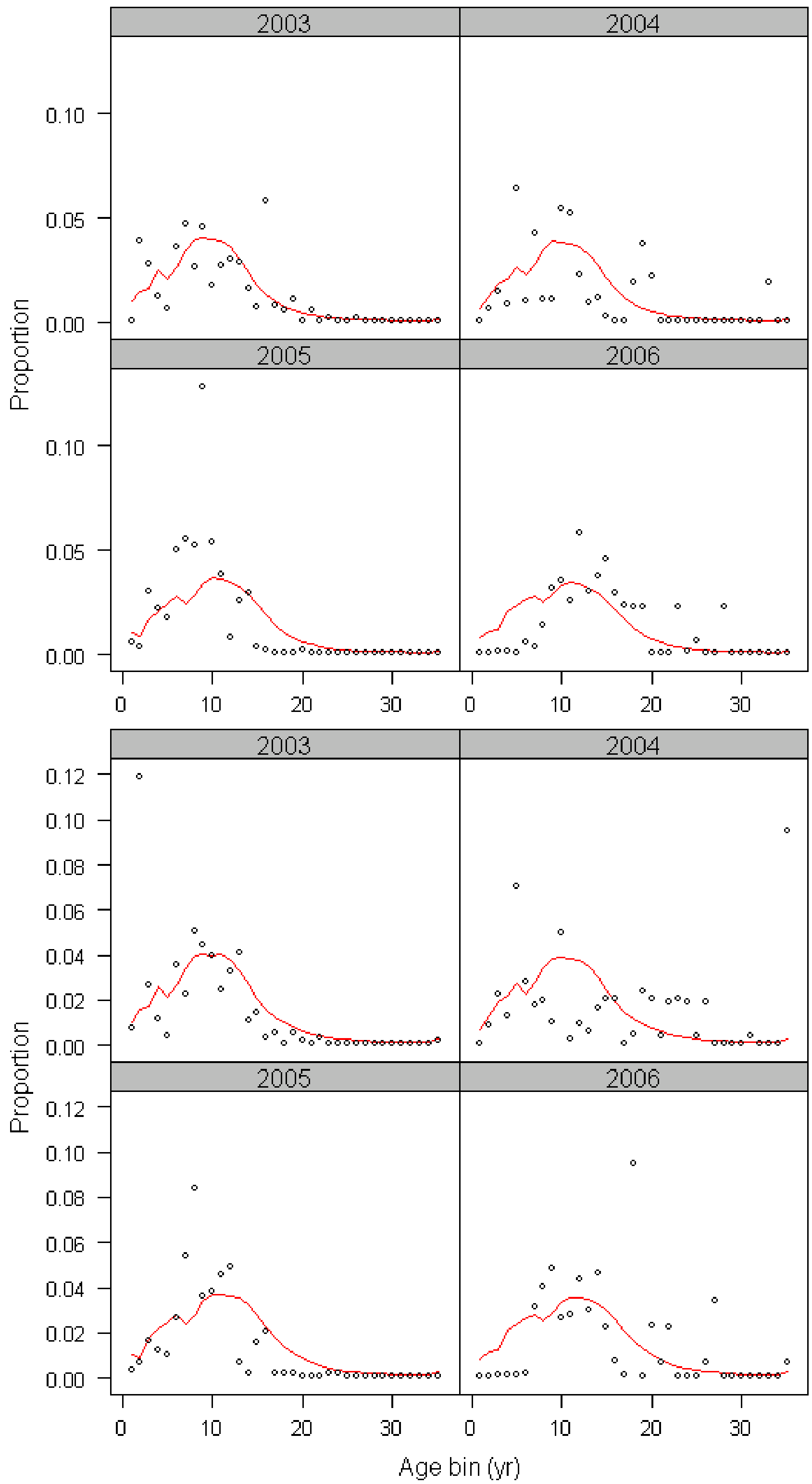


Figure 82. Implied fit to the NWFSC survey female (upper panel) and male (lower panel) marginal age-frequencies. Fits are provided for evaluation only, but not included in the model likelihood.

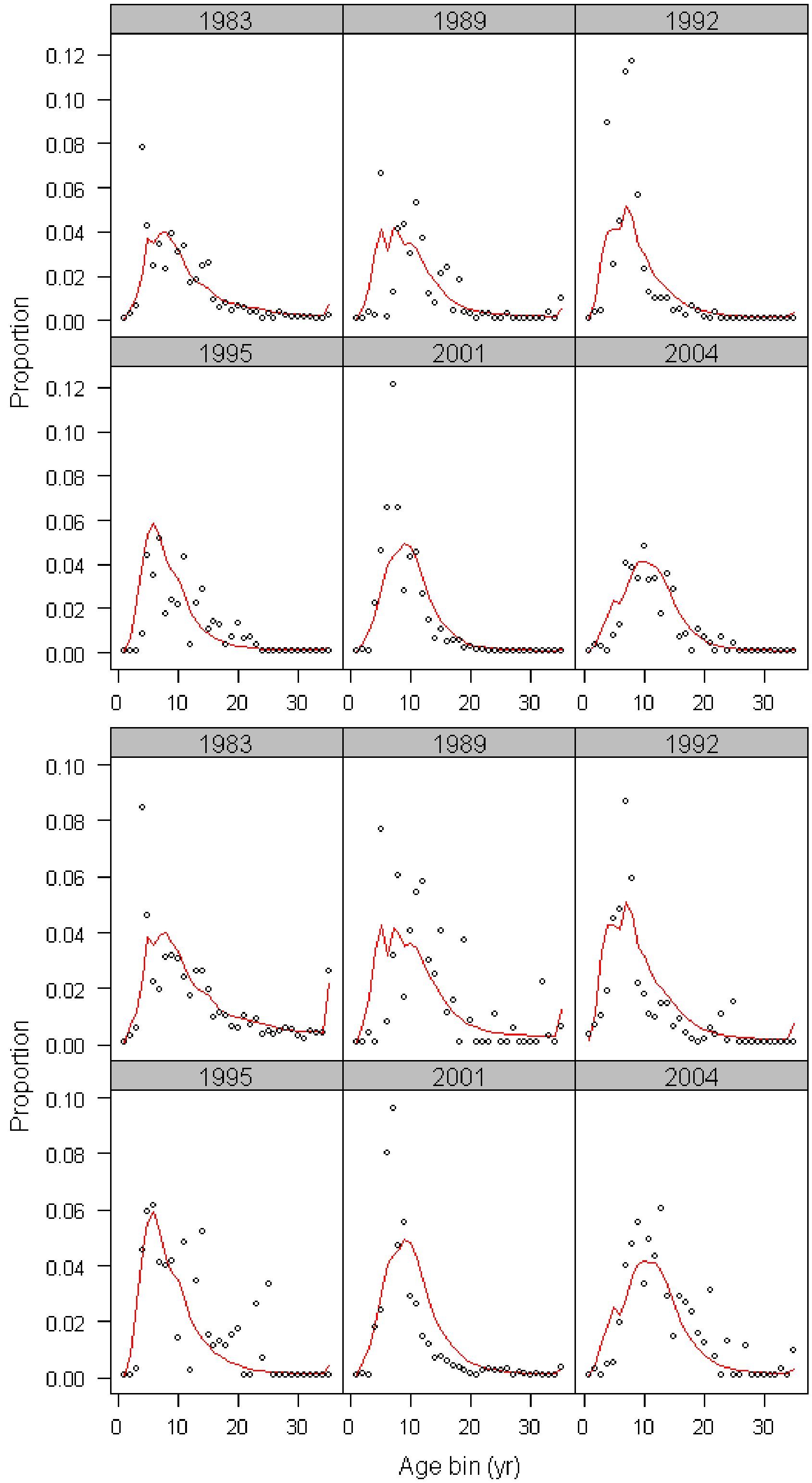


Figure 83. Implied fit to the triennial survey female (upper panel) and male (lower panel) marginal age-frequencies. Fits are provided for evaluation only, but not included in the model likelihood.

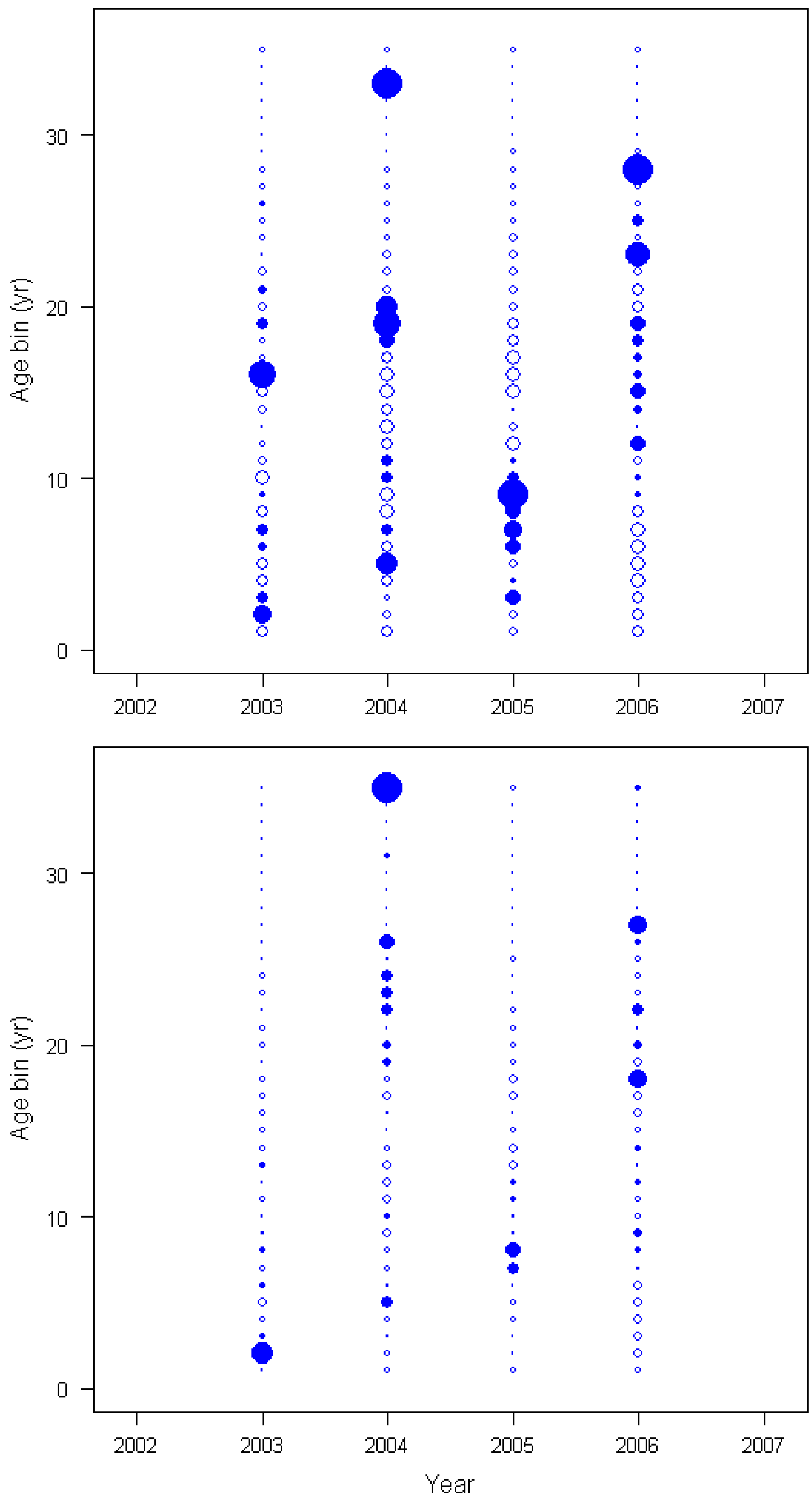


Figure 84. Pearson residuals for the implied fit to the NWFSC survey female (upper panel) and male (lower panel) marginal age-frequencies (for evaluation only, not included in the model fit).

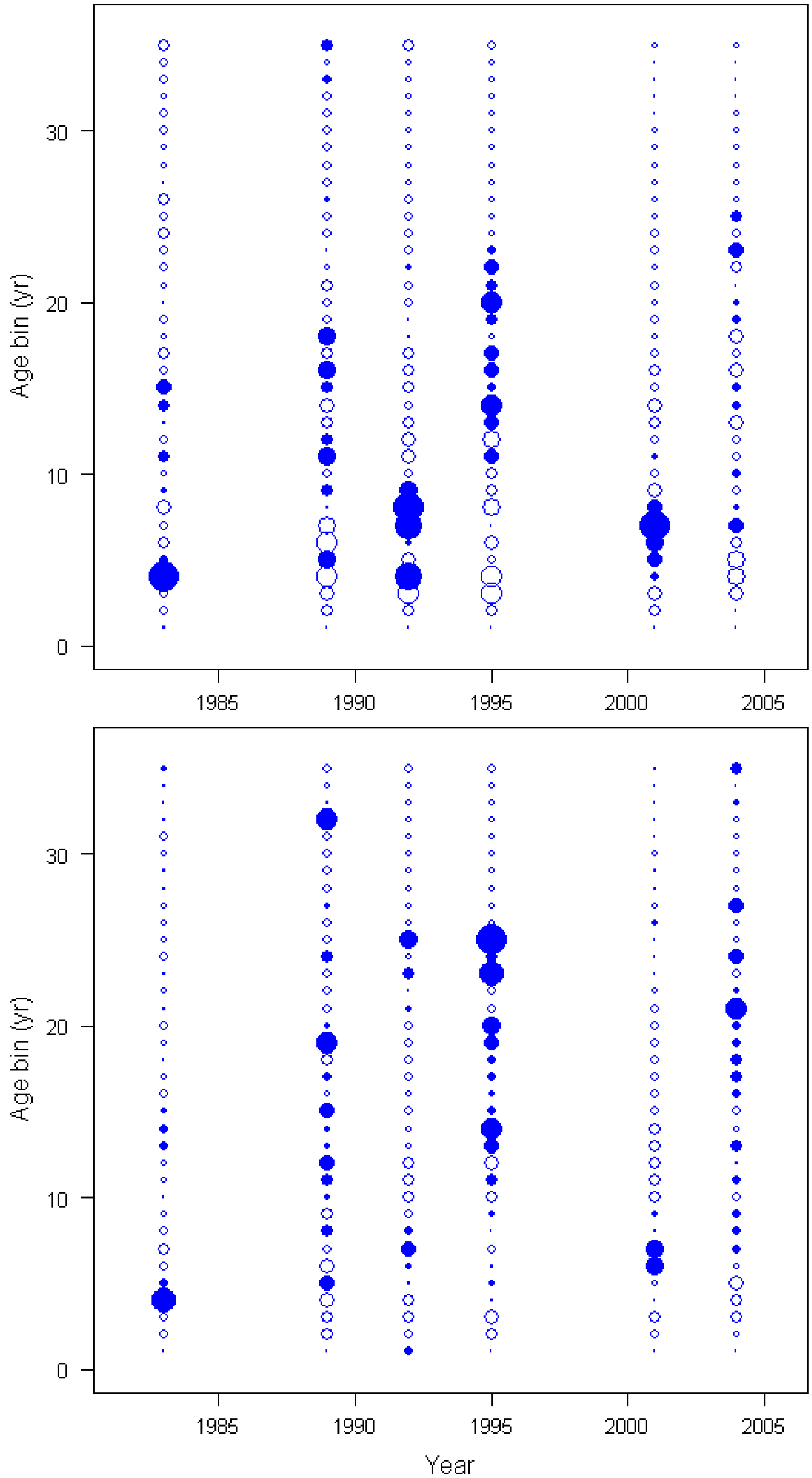


Figure 85. Pearson residuals for the implied fit to the triennial survey female (upper panel) and male (lower panel) marginal age-frequencies (for evaluation only, not included in the model fit).

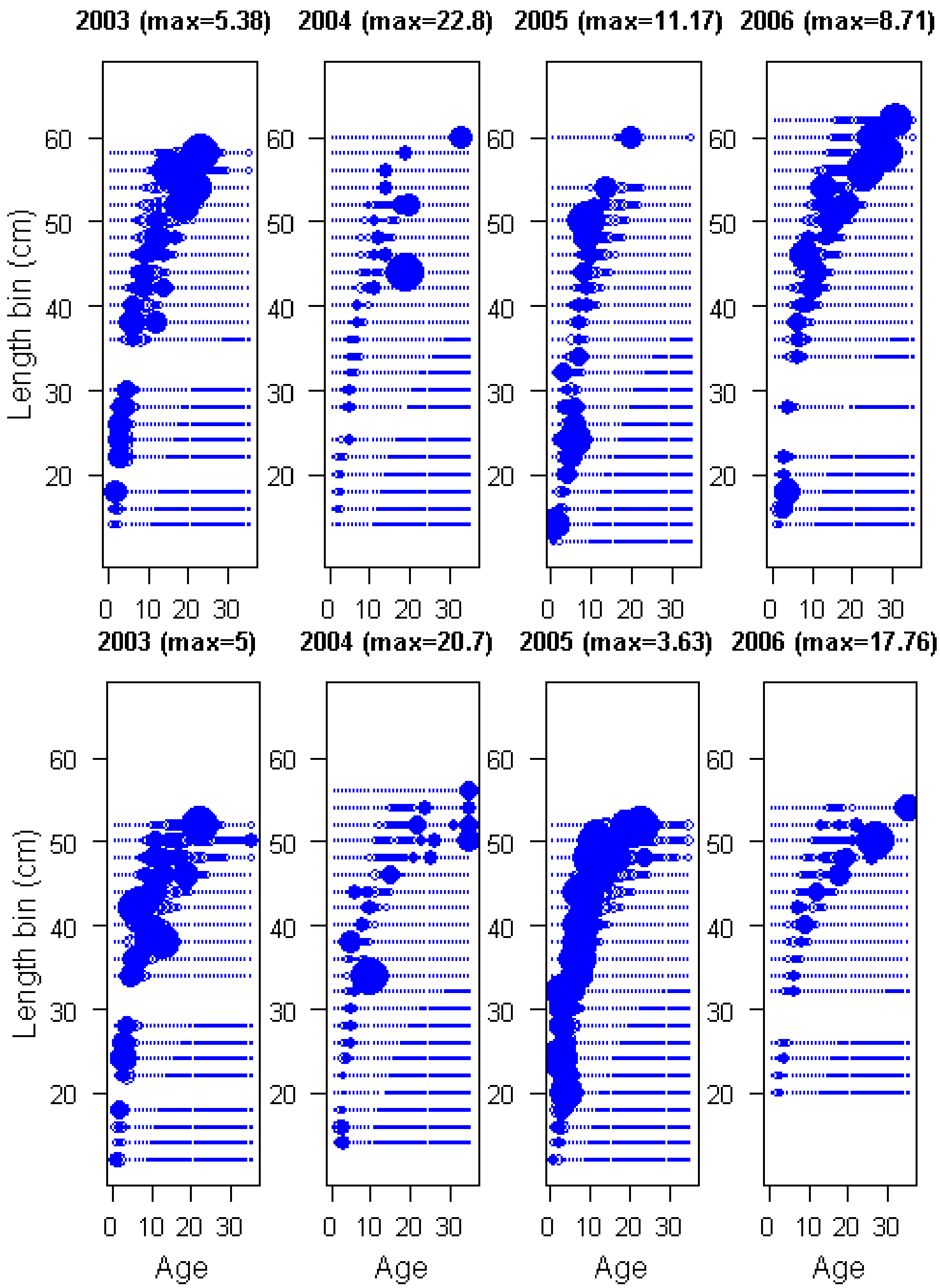


Figure 86. Pearson residuals for the fit to the NWFSC survey female (upper panels) and male (lower panels) conditional age-at-length frequencies. Each panel is scaled independently.

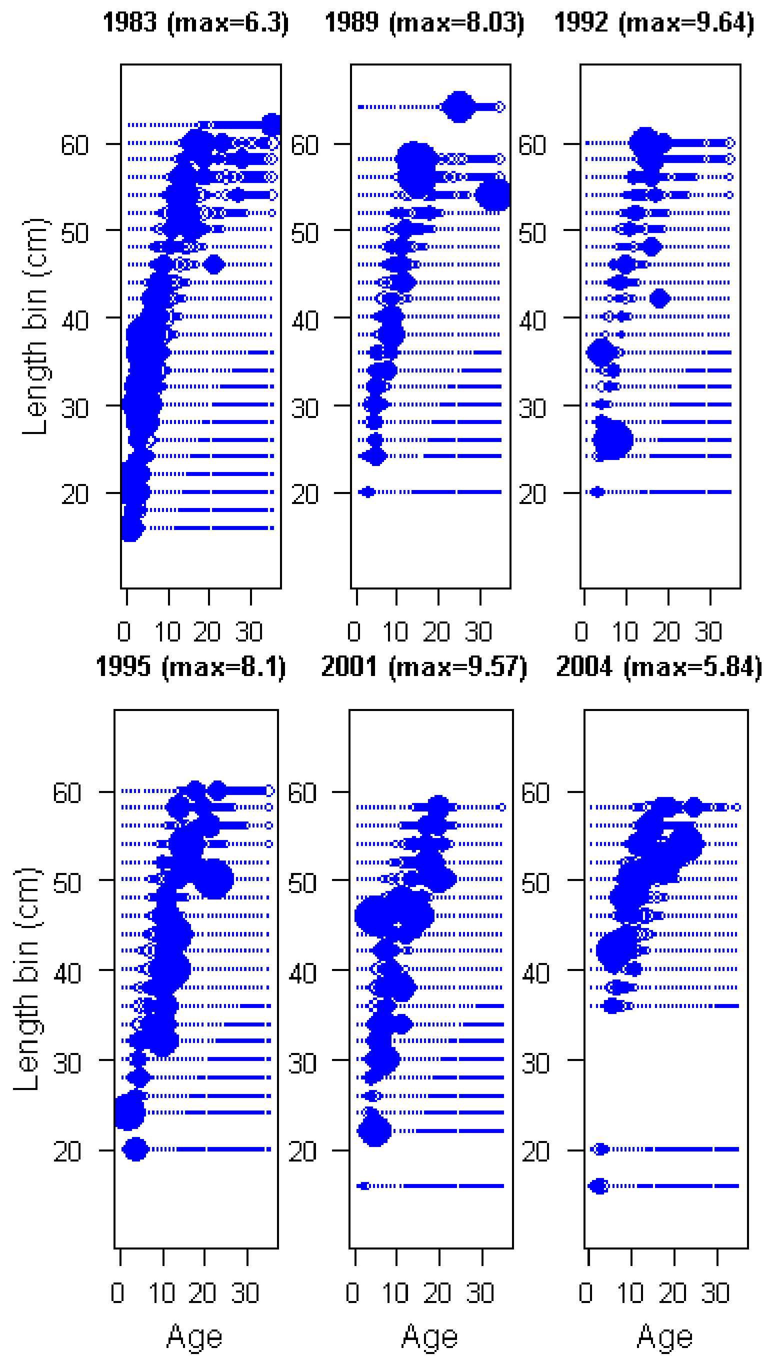


Figure 87. Pearson residuals for the fit to the triennial survey female conditional age-at-length frequencies. Each panel is scaled independently.

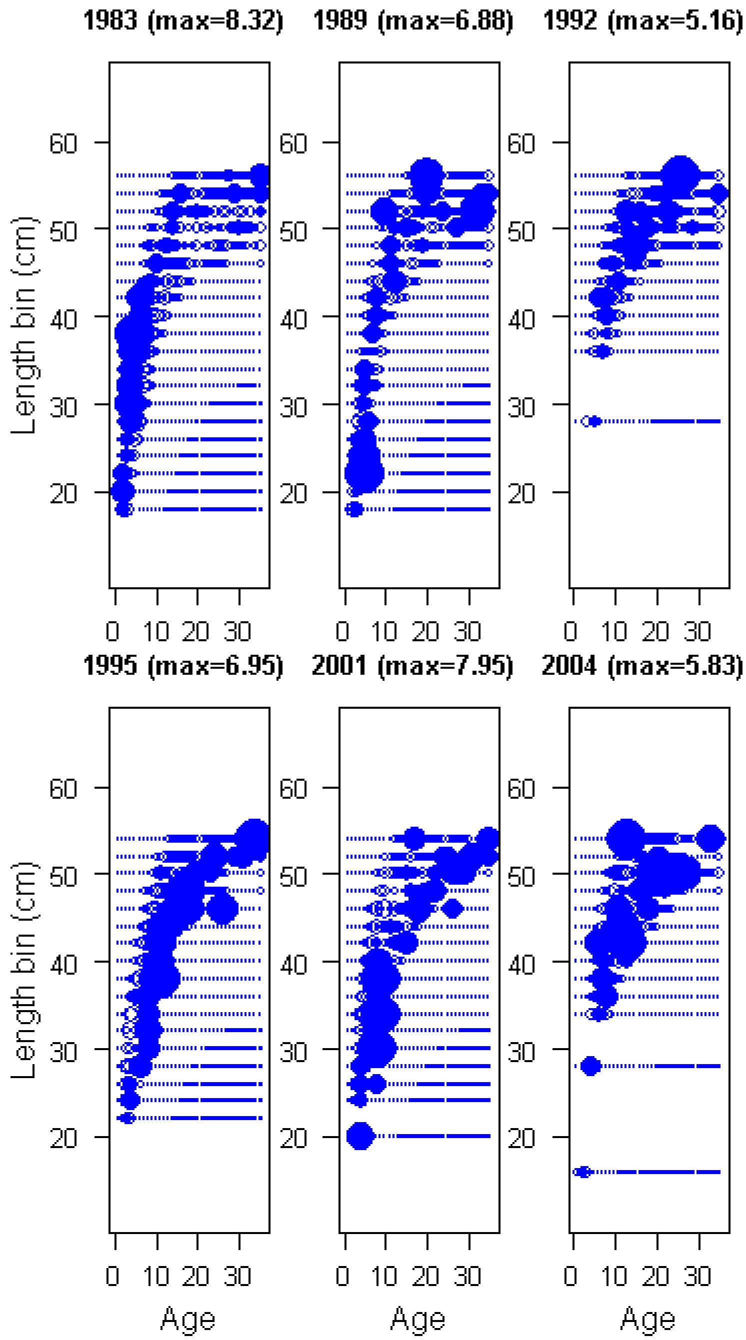


Figure 88. Pearson residuals for the fit to the triennial survey female conditional age-at-length frequencies. Each panel is scaled independently.

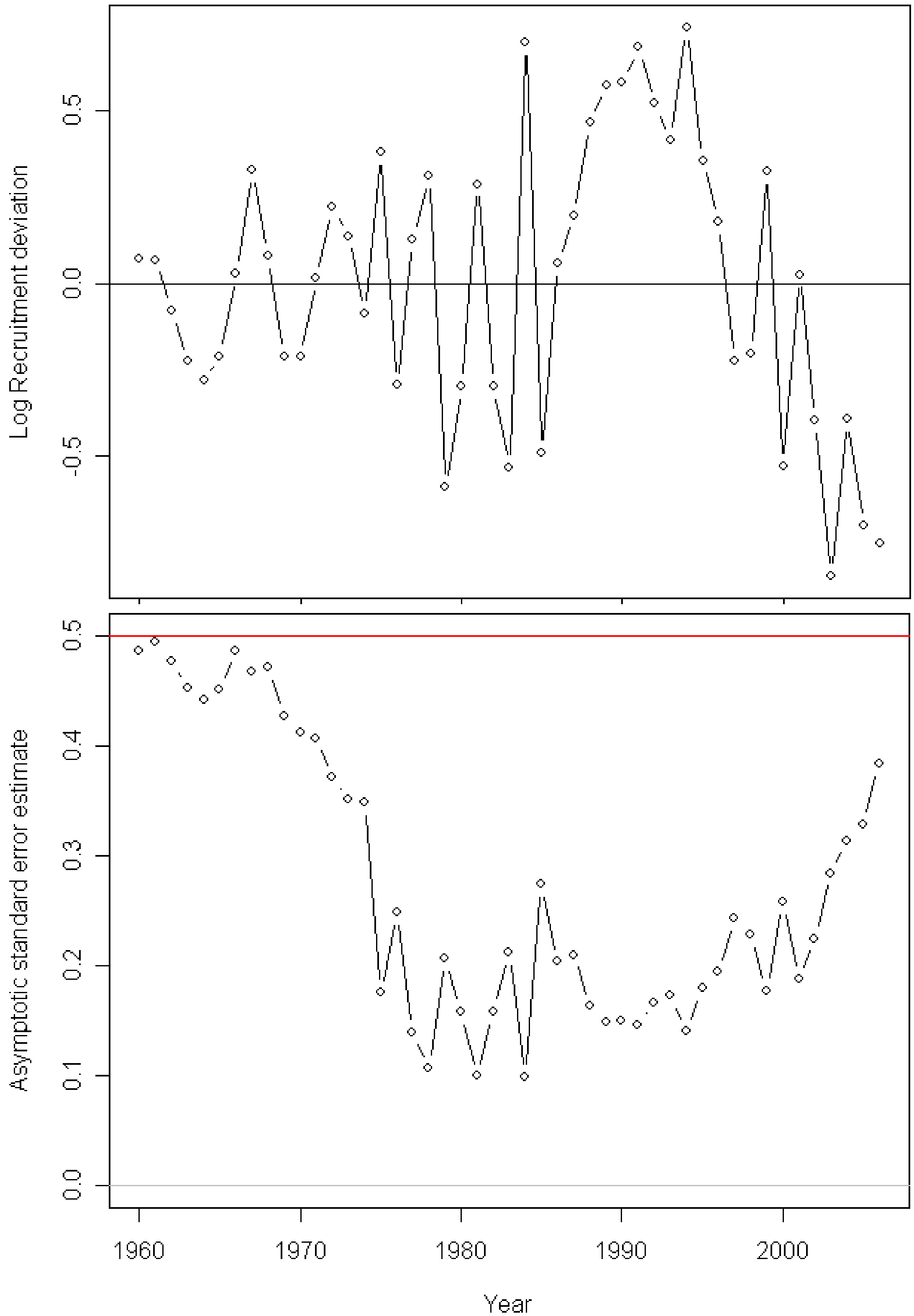


Figure 89. Log recruitment deviations (upper panel) and standard deviations of the recruitment deviations (lower panel) from the base case model run.

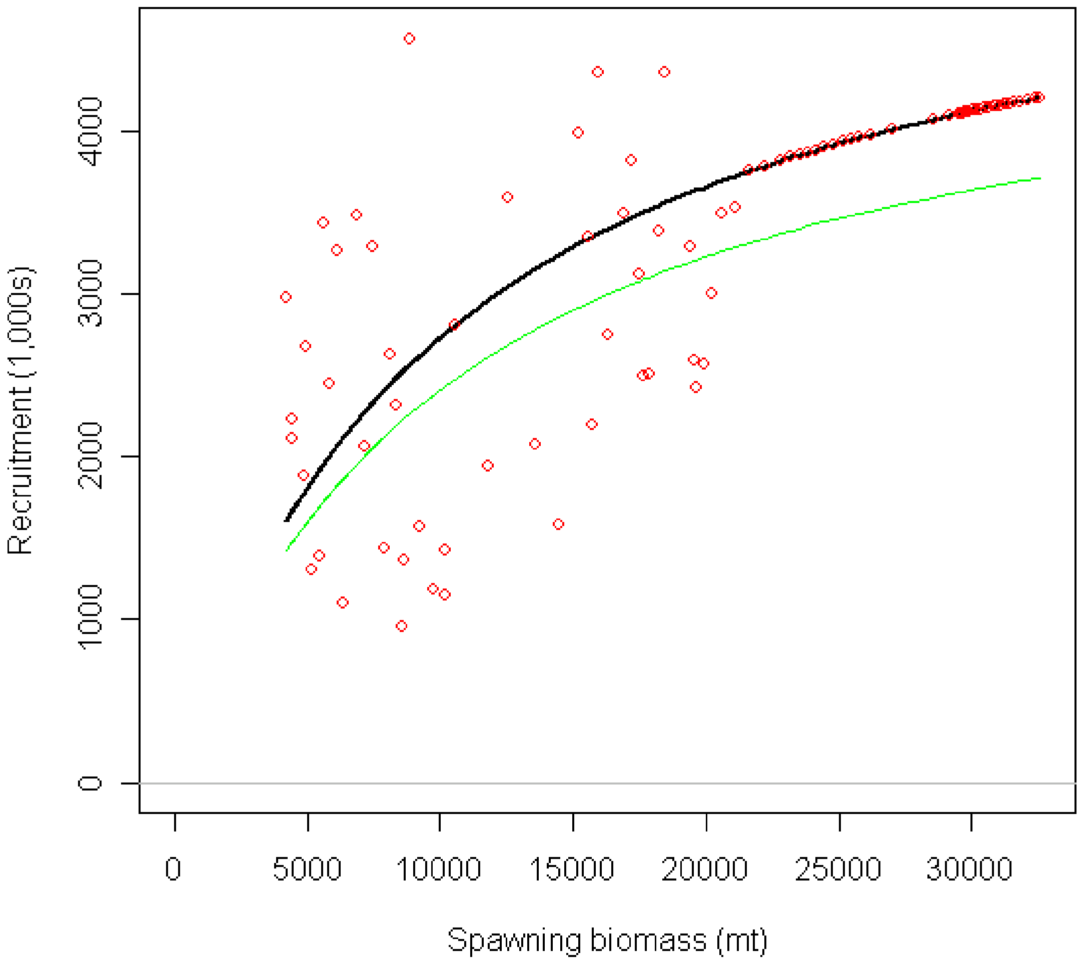


Figure 90. Stock-recruit function with predicted recruitments (points) and bias-corrected expectation (light line).

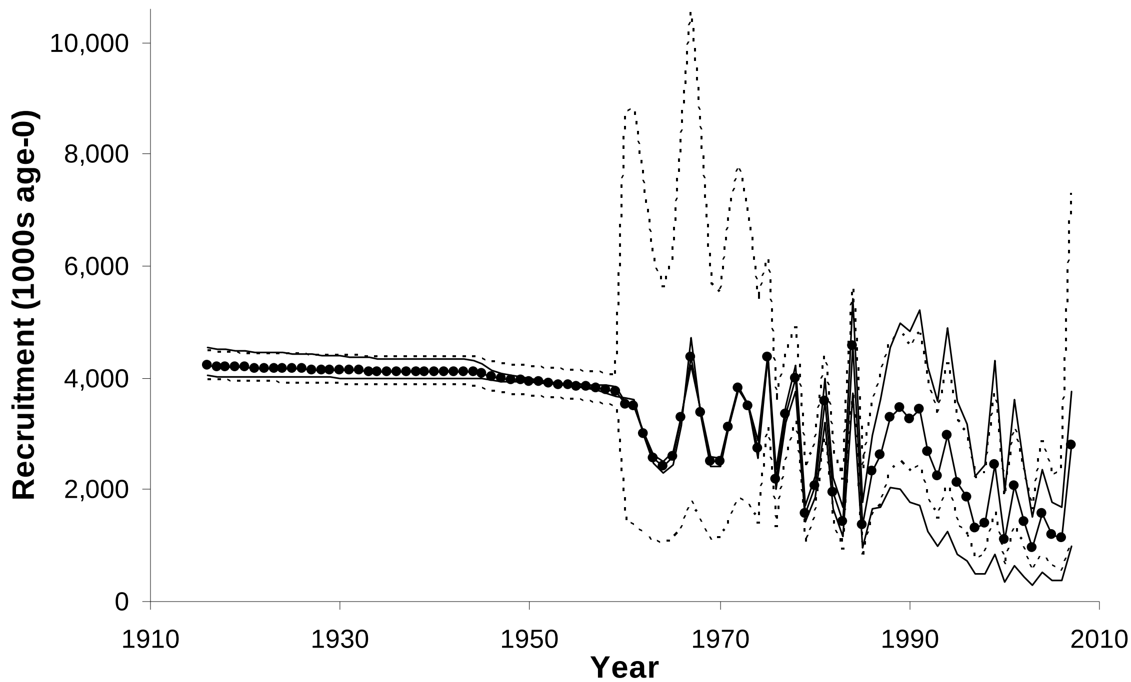


Figure 91. Time series of estimated canary rockfish recruitments for the base case model (round points) with approximate asymptotic 95% confidence interval (dashed lines) and alternate states of nature (light lines).

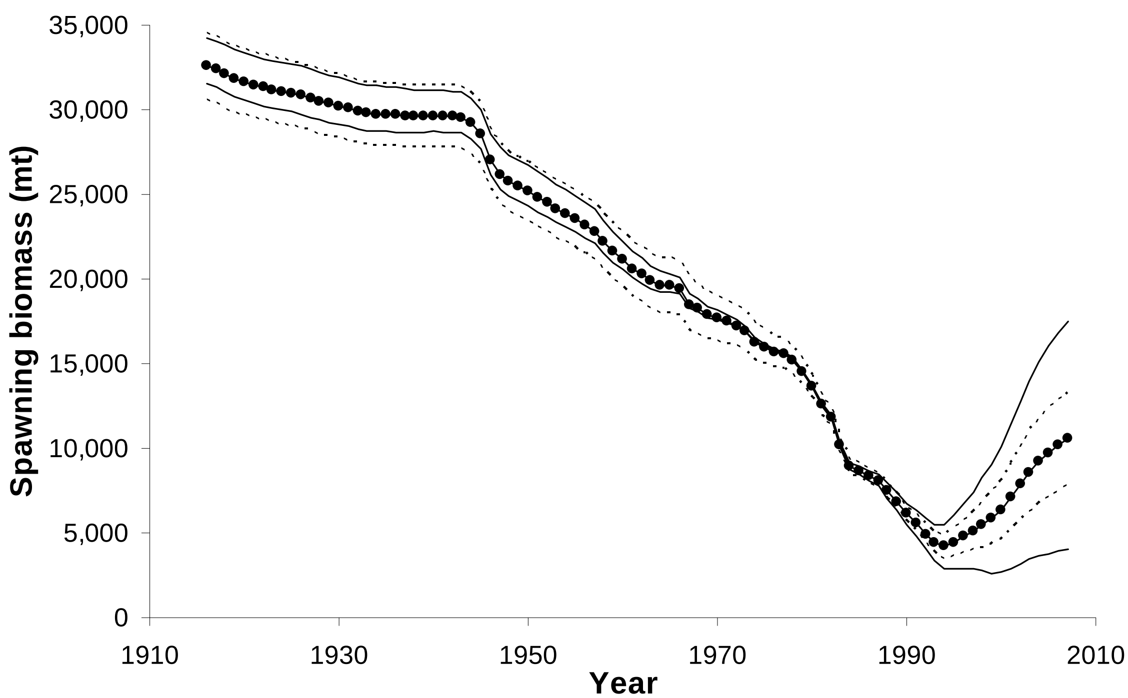


Figure 92. Estimated spawning biomass time-series (1916-2007) for the base case model (round points) with approximate asymptotic 95% confidence interval (dashed lines) and alternate states of nature (light lines).

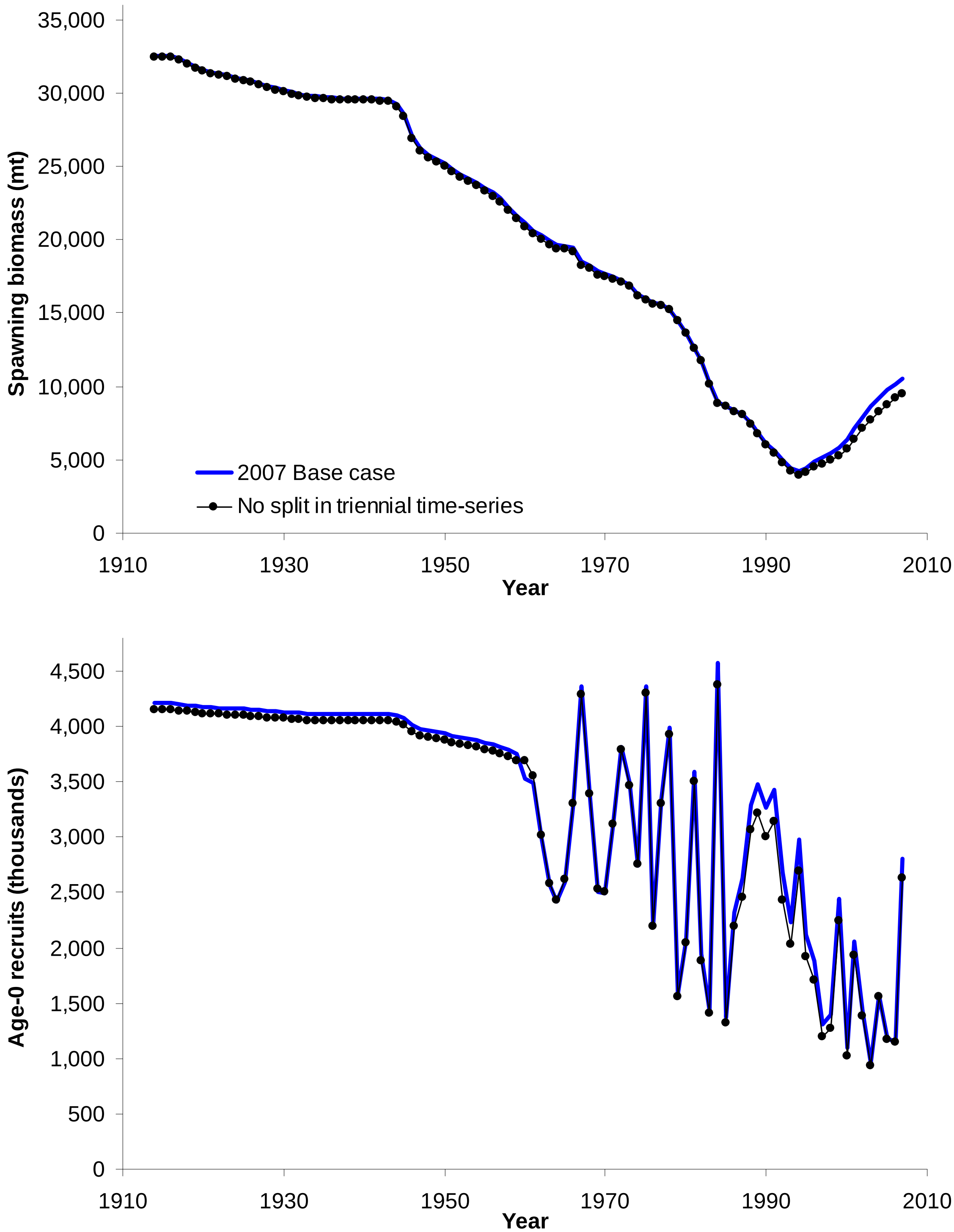


Figure 93. Analysis of sensitivity to splitting the triennial survey time-series.

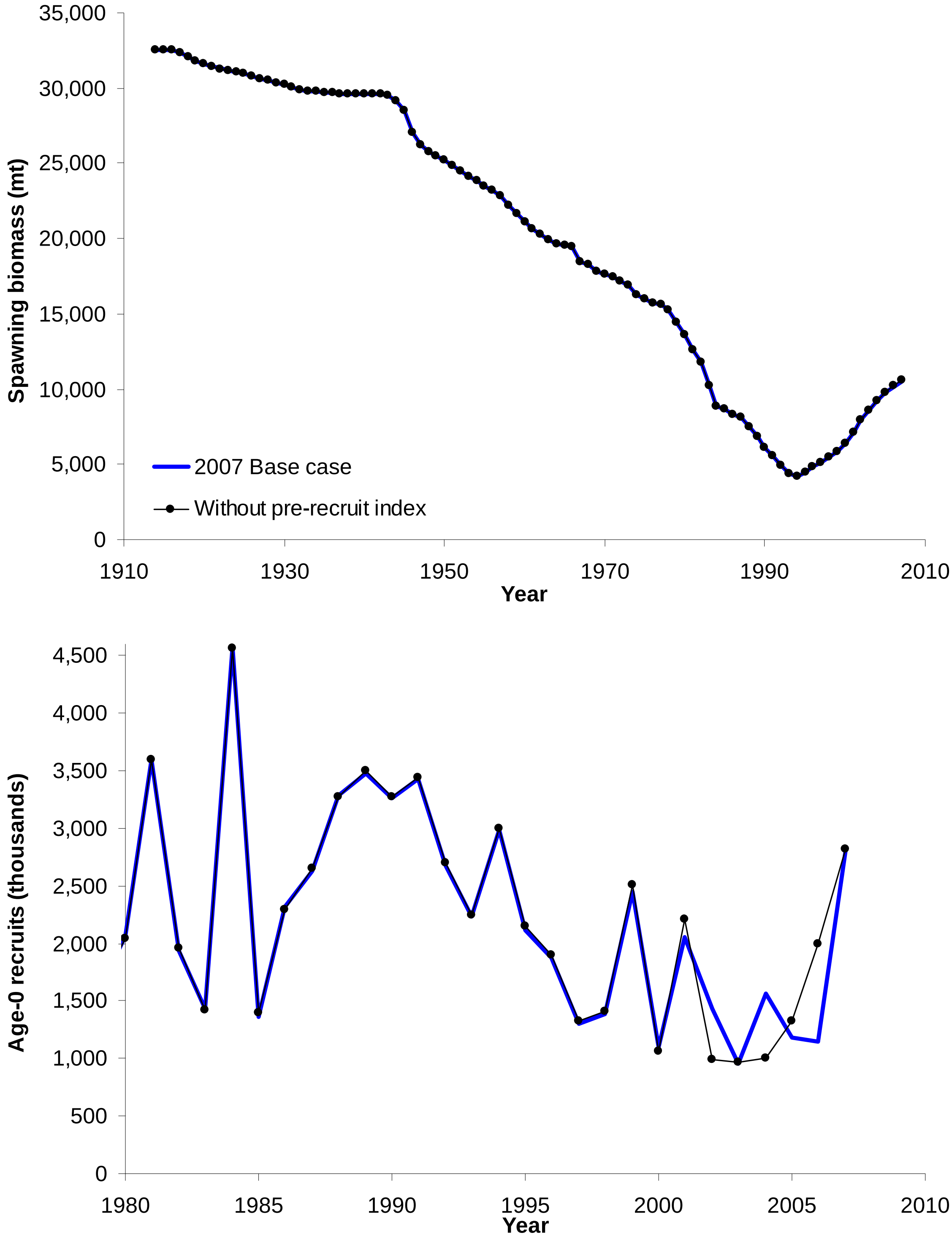


Figure 94. Analysis of sensitivity to exclusion of the pre-recruit index.

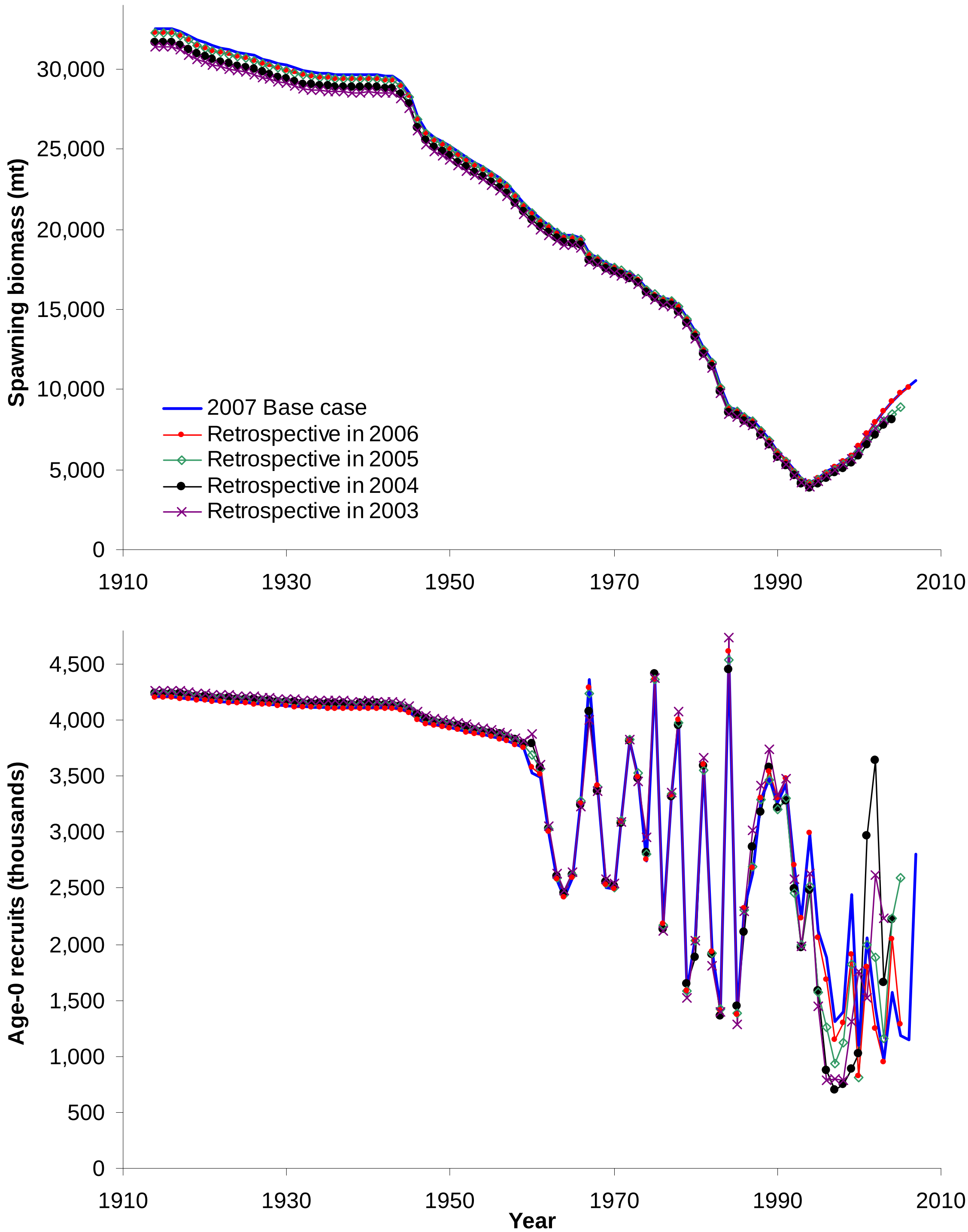


Figure 95. Results from a 4-year retrospective analysis. Each year of retrospective is performed as if the assessment were conducted in that year (i.e., retrospective in 2006 includes data through 2005).

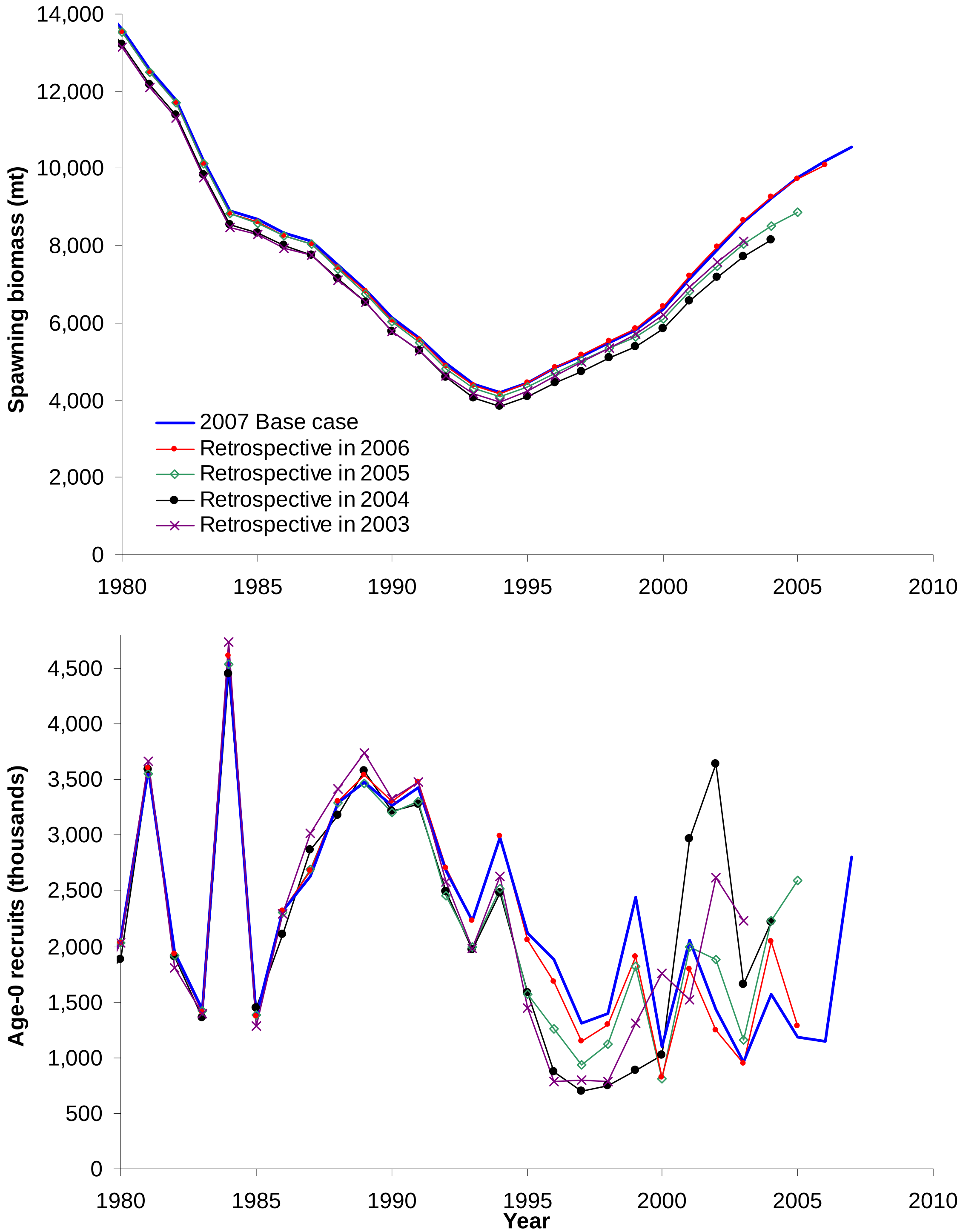


Figure 96. Focus on recent trend from a 4-year retrospective analysis. Each year of retrospective is performed as if the assessment were conducted in that year (i.e., retrospective in 2006 includes data through 2005).

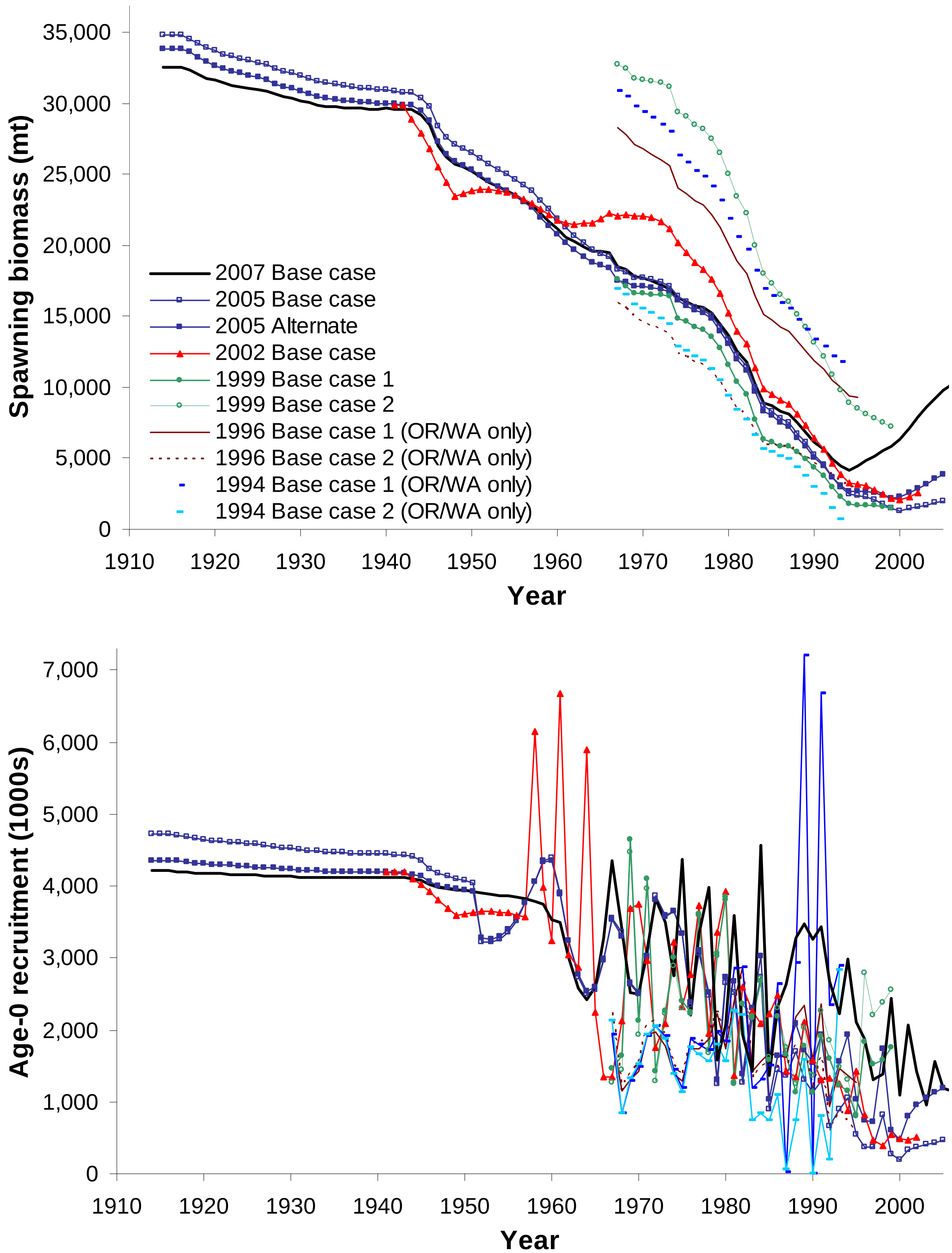


Figure 97. Retrospective analysis across stock assessments for canary rockfish, 1994-2007.

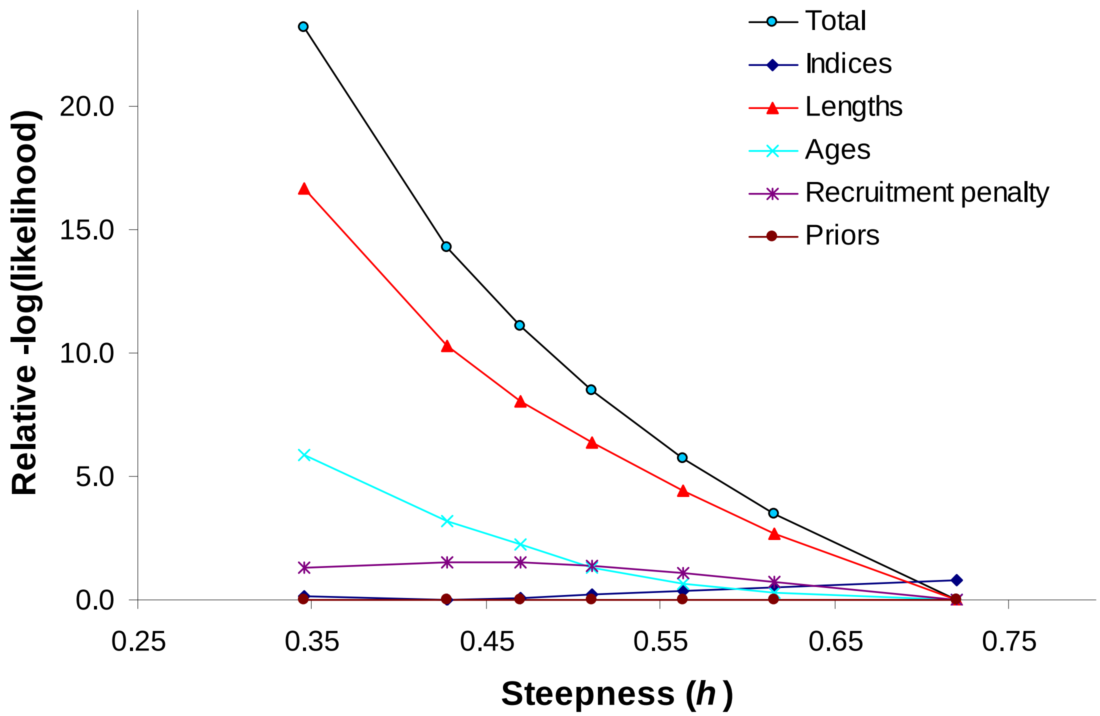


Figure 98. Relative contribution of each likelihood component to the likelihood profile for steepness of the stock-recruitment function.

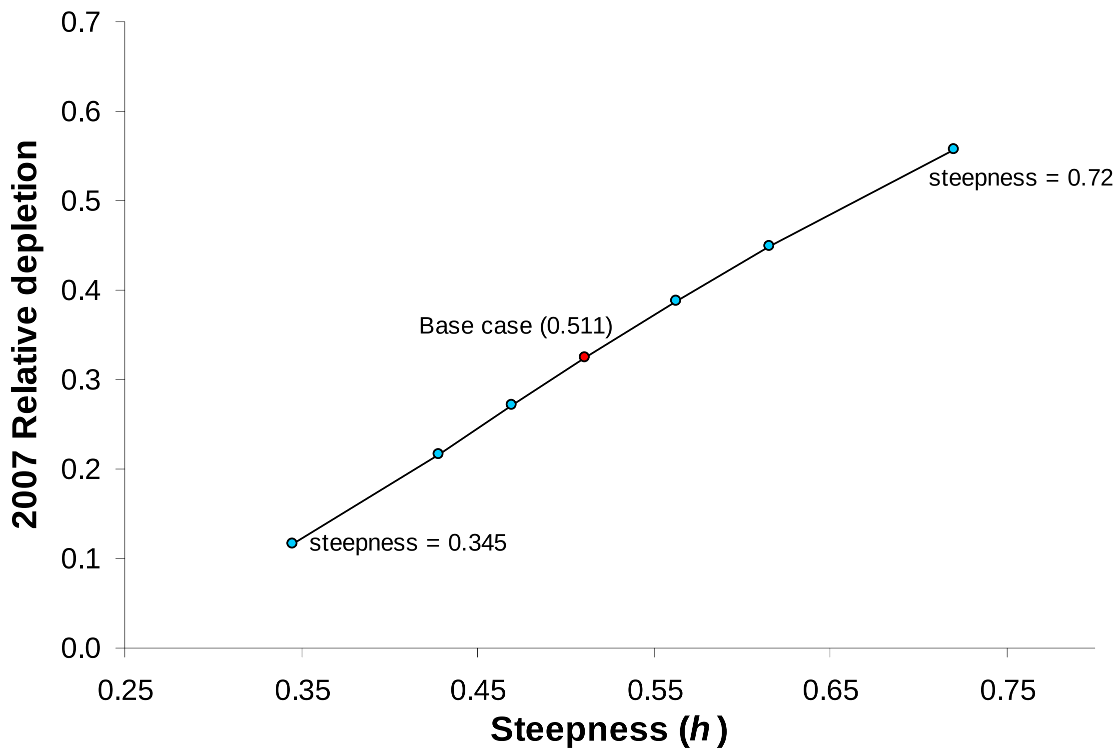


Figure 99. Relationship between 2007 relative depletion and steepness of the stock-recruitment function based on a likelihood profile.

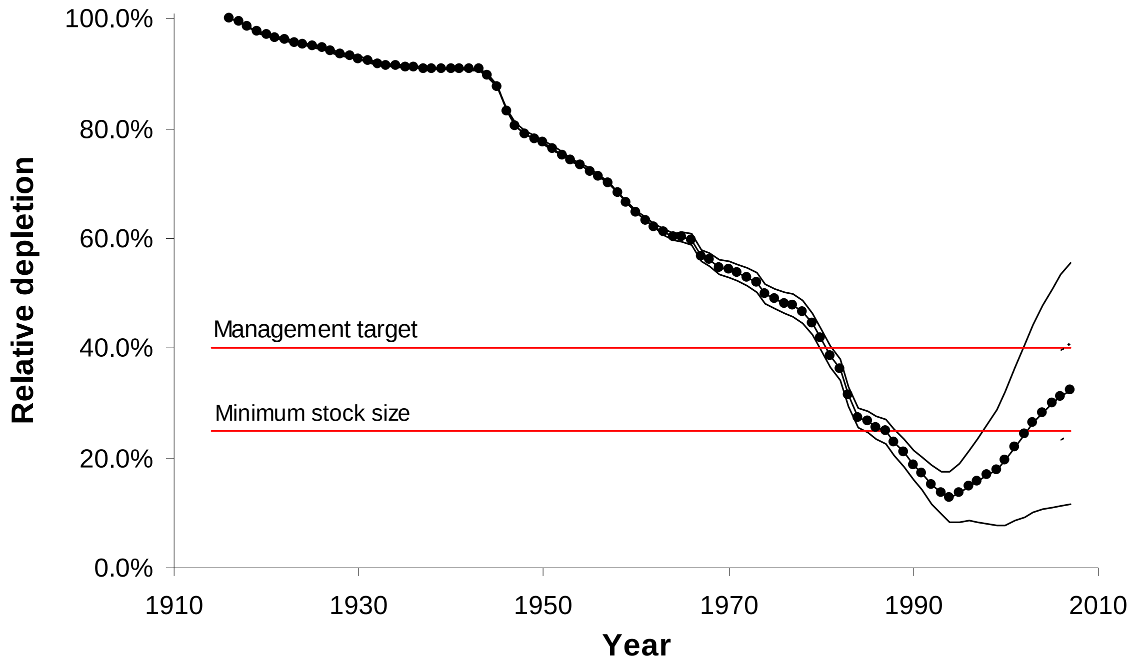


Figure 100. Time series of depletion level as estimated in the base case model (round points) with approximate asymptotic 95% confidence interval (2006-2007 only, dashed lines) and alternate states of nature (light lines).

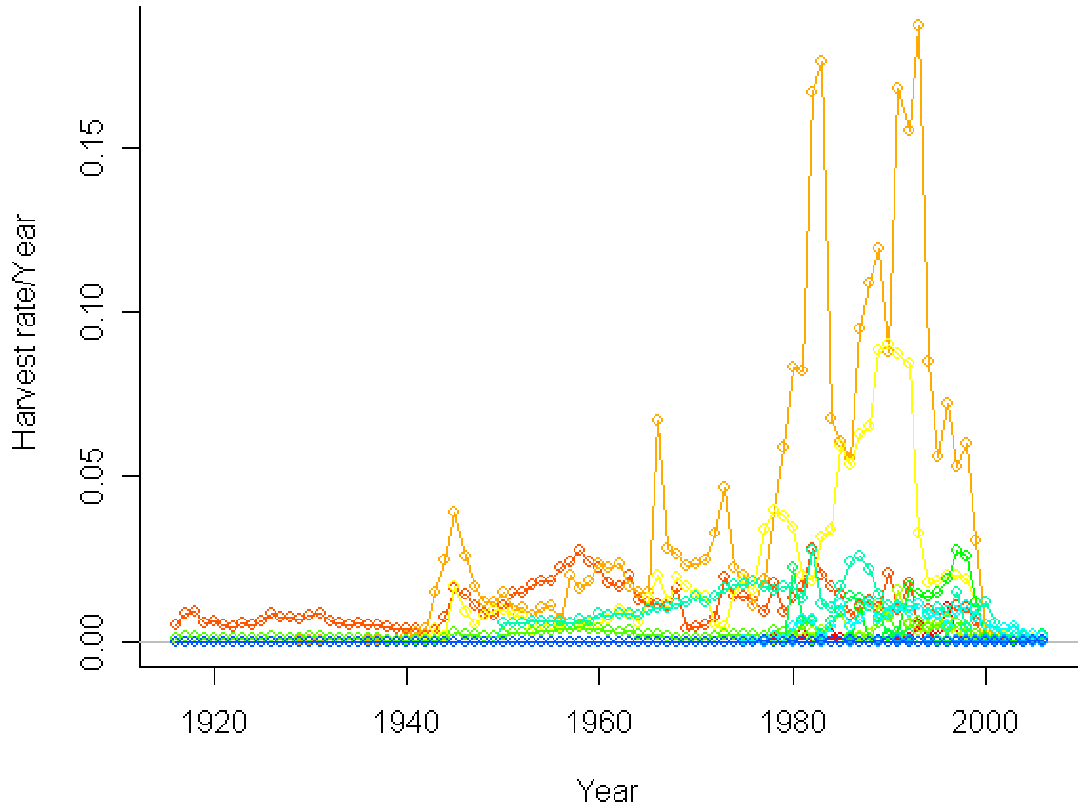


Figure 101. Time-series of harvest rate per year (F) for the fishing fleets. The Oregon trawl fleet is the upper line from 1979-1999 and the Washington trawl fleet is the second highest line 1983-1996.

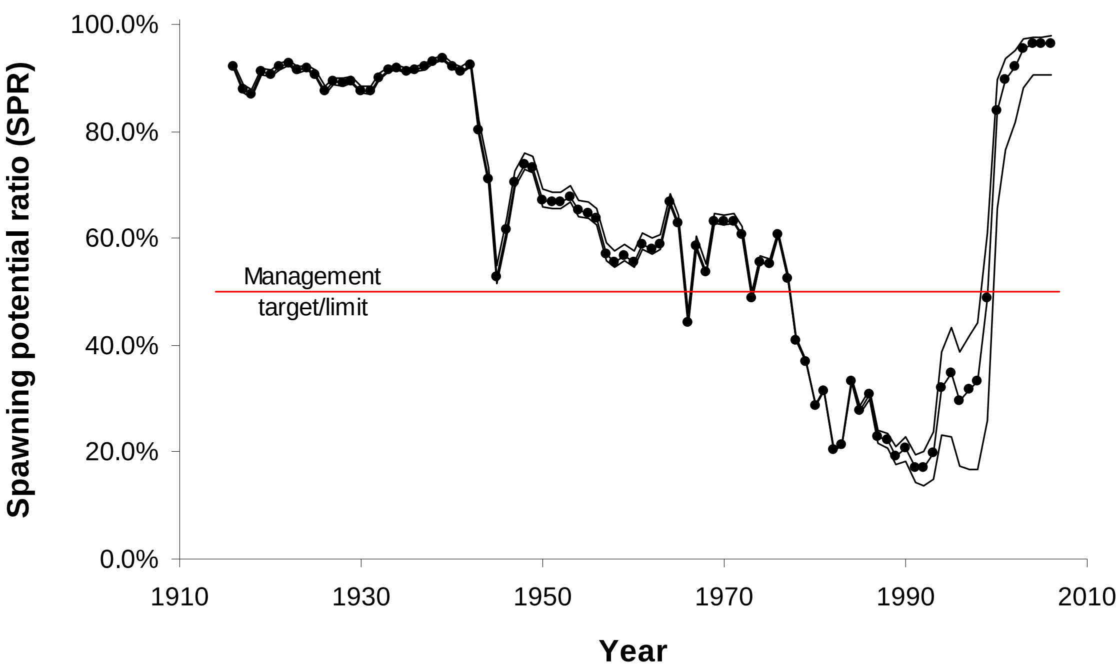


Figure 102. Time series of estimated spawning potential ratio (SPR) for the base case model (round points) and alternate states of nature (light lines). Values of SPR below 0.5 reflect harvests in excess of the current overfishing proxy.

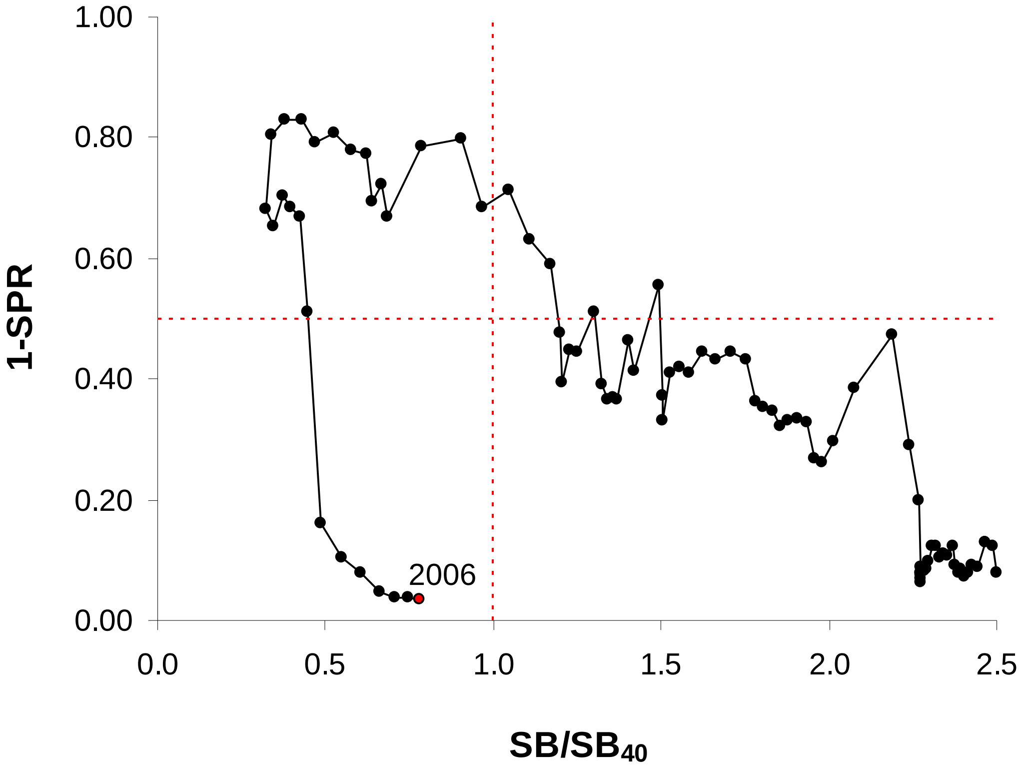


Figure 103. Estimated spawning potential ratio relative to the proxy target of 50% vs. estimated spawning biomass relative to the proxy 40% level from the base case model. Higher biomass occurs on the right side of the x-axis, higher exploitation rates occur on the upper side of the y-axis.

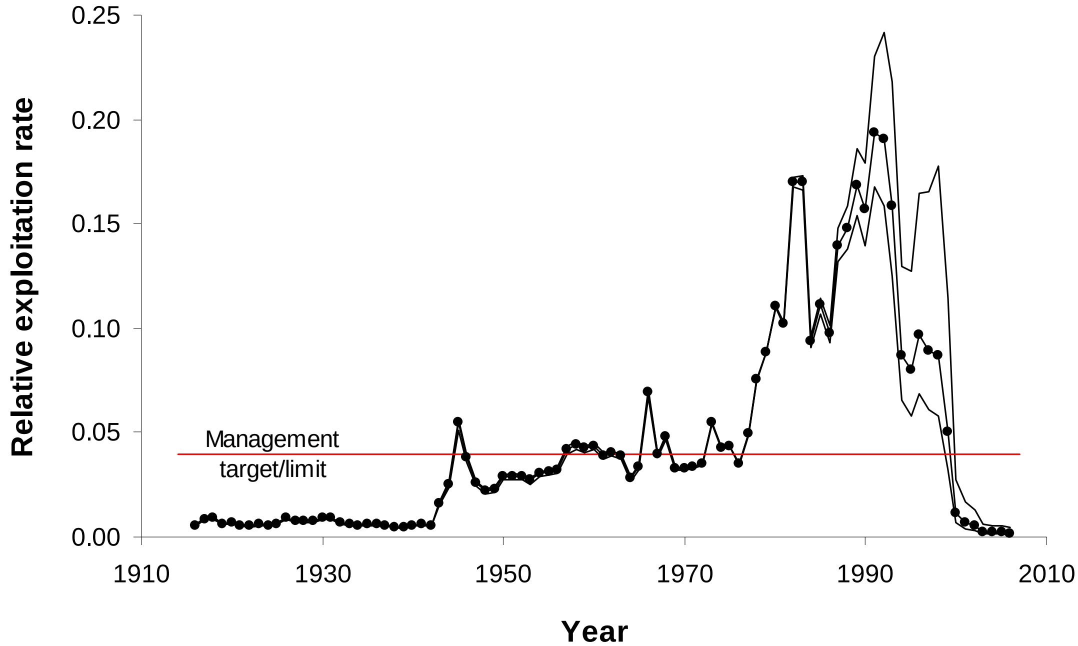


Figure 104. Time series of estimated relative exploitation rate (catch/age 5 and older biomass, lower panel) for the base case model (round points) and alternate states of nature (light lines). Values of relative exploitation rate in excess of horizontal line are above the rate corresponding to the overfishing proxy from the base case.

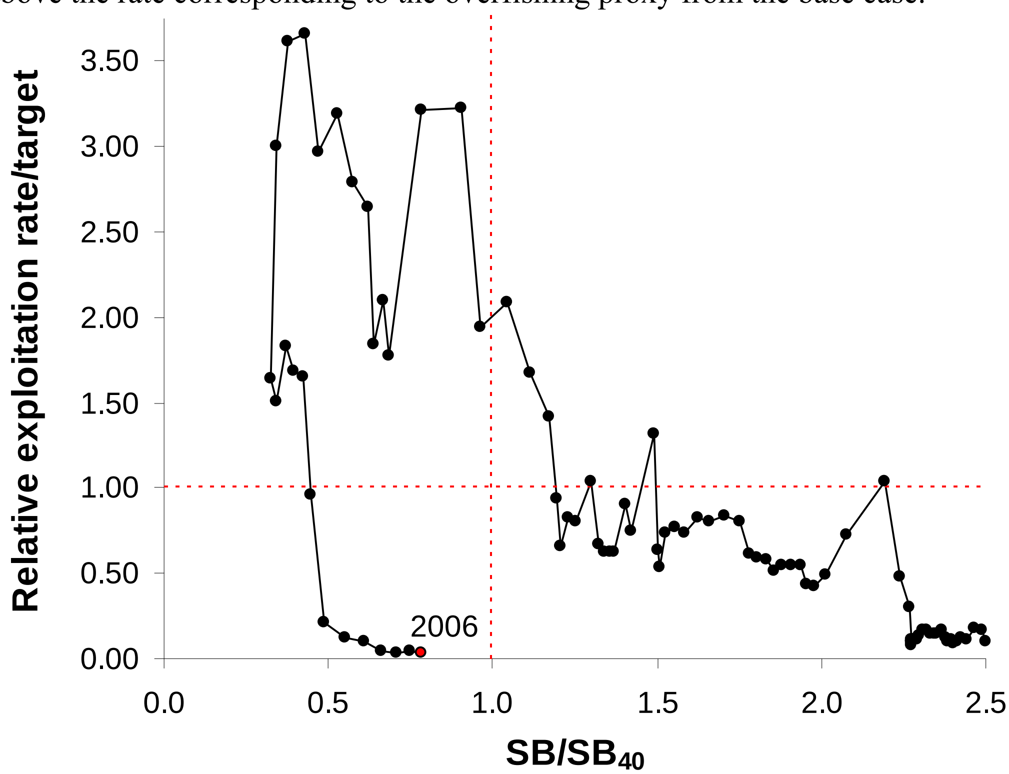


Figure 105. Phase plot of estimated fishing intensity vs. relative spawning biomass for the base case model. Fishing intensity is the relative exploitation rate divided by the level corresponding to the overfishing proxy (0.040). Relative spawning biomass is annual spawner abundance divided by the 40% rebuilding target.

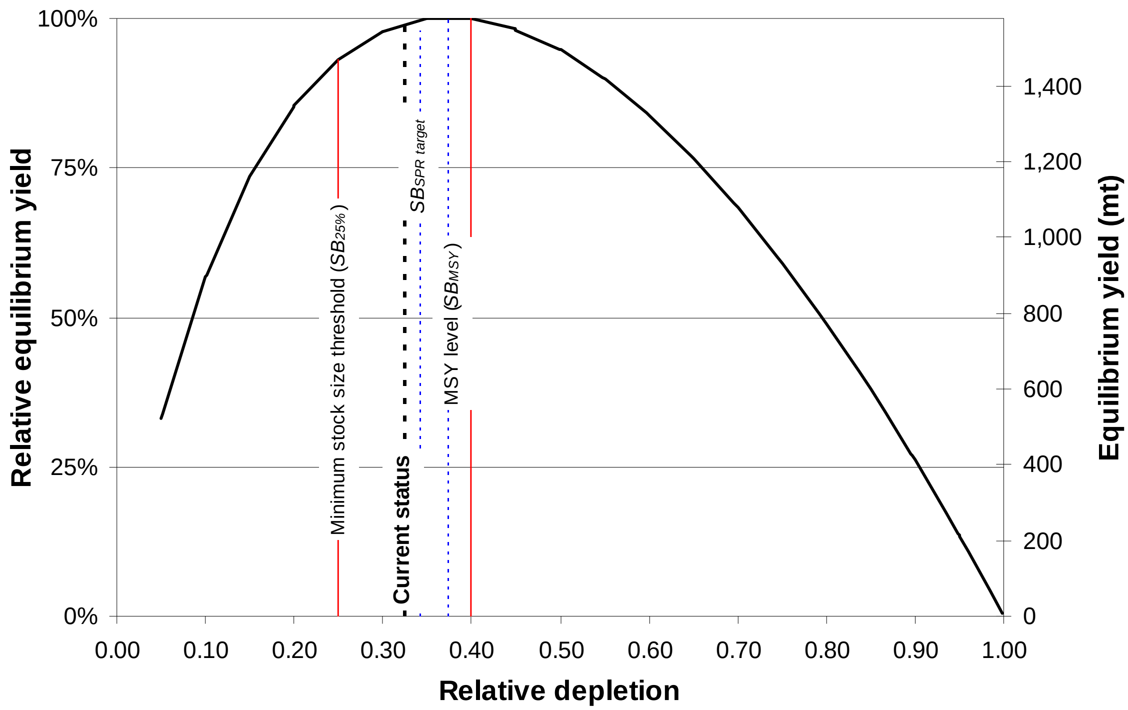


Figure 106. Equilibrium yield curve for the base case model. Values are based on 1994-1998 fishery selectivity and allocation to better approximate the performance of a targeted fishery rather than a bycatch-only scenario.

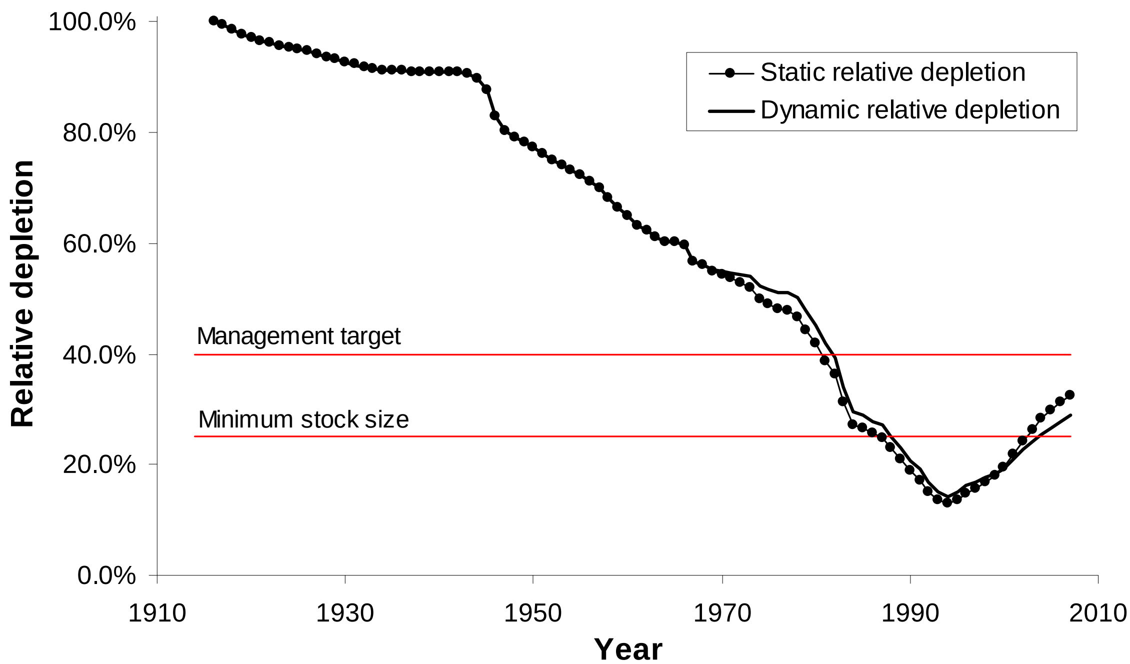


Figure 107. Comparison of the standard ‘static’ estimate of relative depletion (spawning biomass over unexploited spawning biomass) and the ‘dynamic’ estimate of spawning biomass over spawning biomass predicted for that year in the absence of any fishing.

12. Appendix A: Fits to fishery length and age data with diagnostics

In this appendix a series of three types of plots are presented for each kind of data and fishing fleet in the canary assessment model. The first plot shows the relationship between input and effective sample size, the second the fit to the compositional data and the third the Pearson residuals for the preceding fit. Length data are presented first, followed by age data.

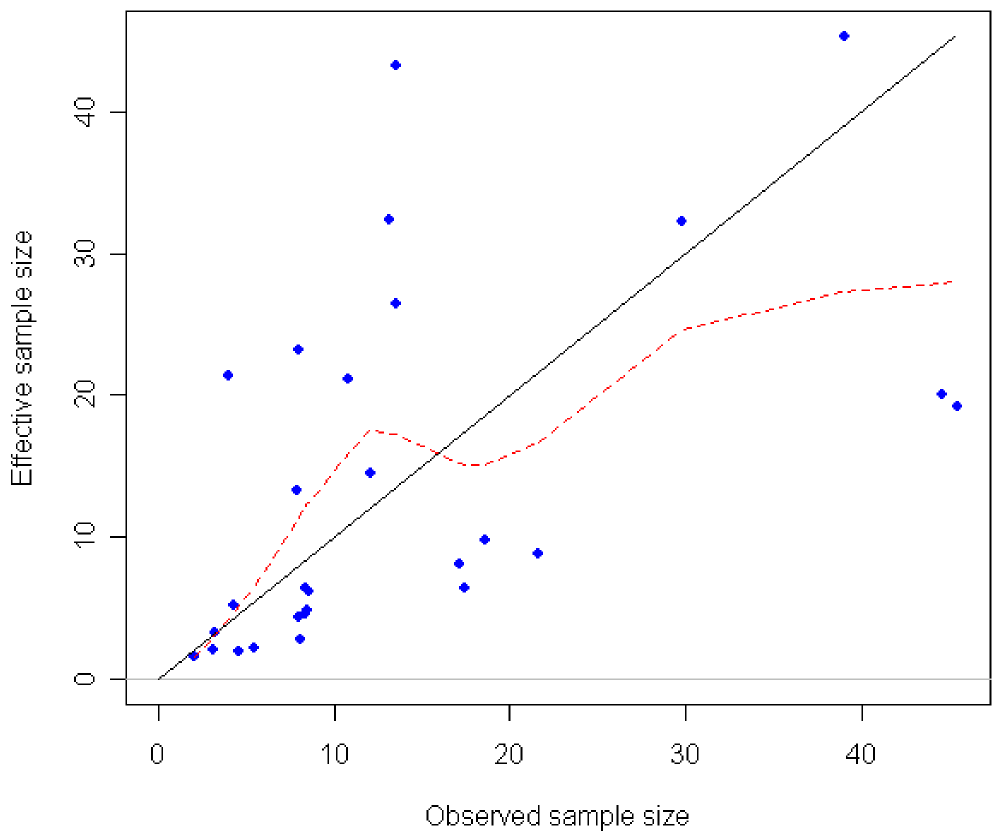


Figure 108. Observed and effective sample sizes for the Southern California trawl fleet length-frequency observations (sexes combined).

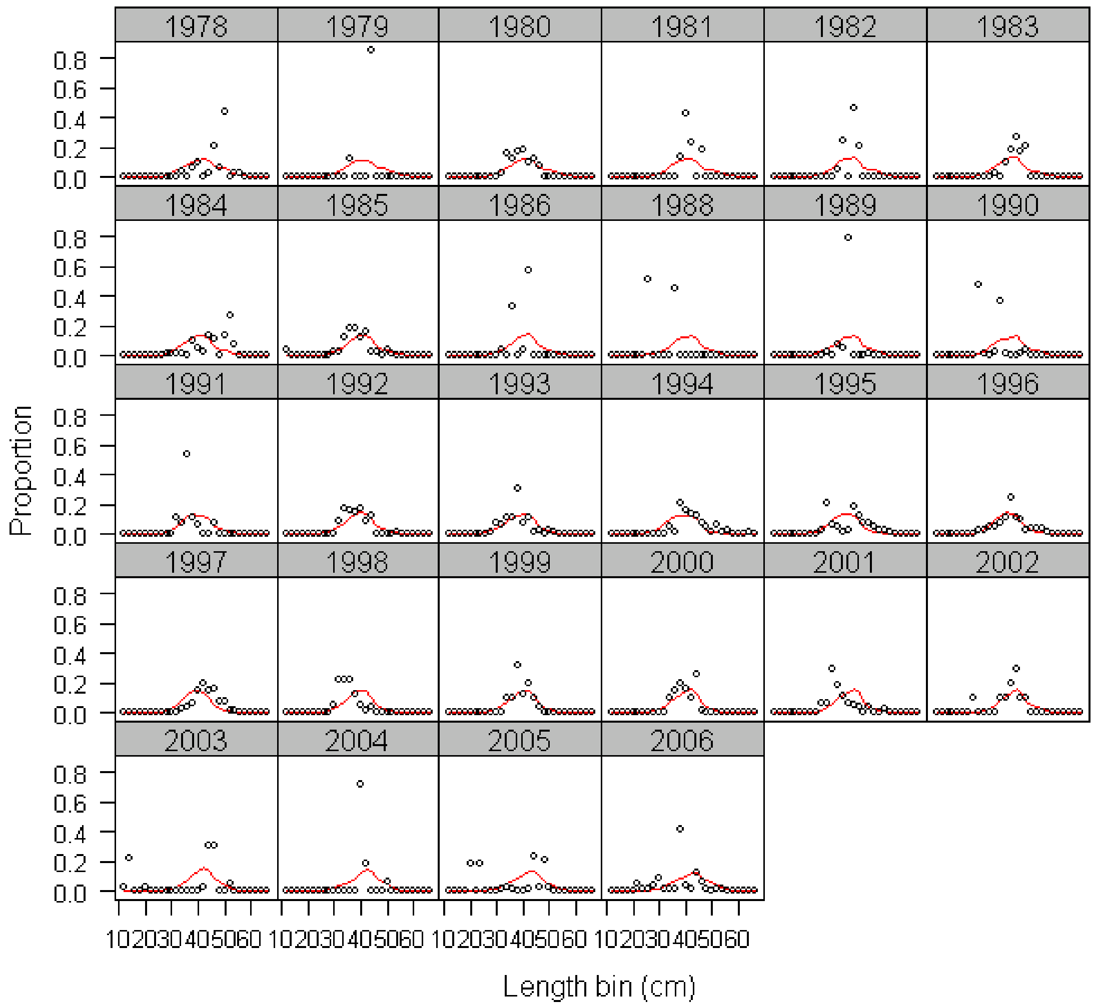


Figure 109. Fit to length-frequency observations (sexes combined) for the Southern California trawl fleet.

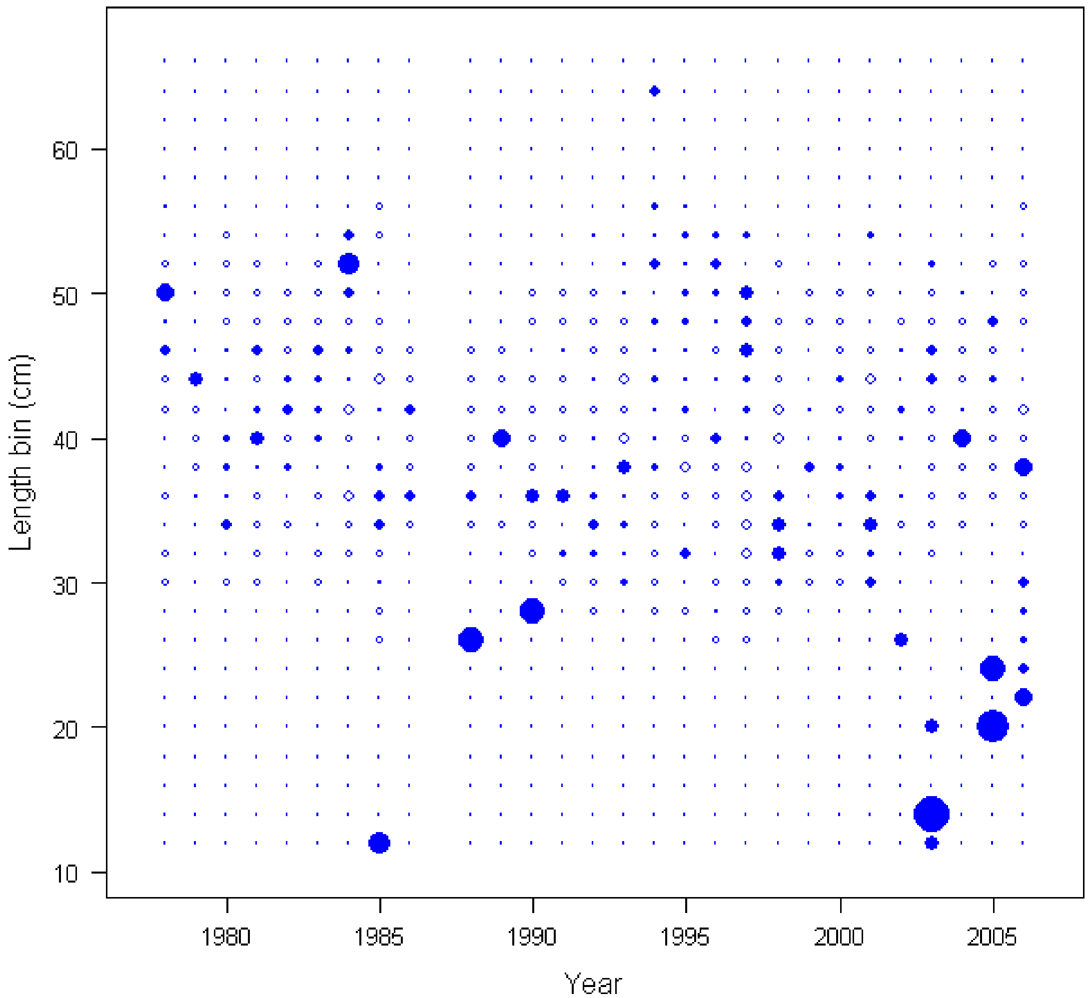


Figure 110. Pearson residuals for the fit to length-frequency observations (sexes combined) for the Southern California trawl fleet. The largest circle represents a value of 21.03; filled circles show observation greater than estimate; solid circles show observation less than estimate.

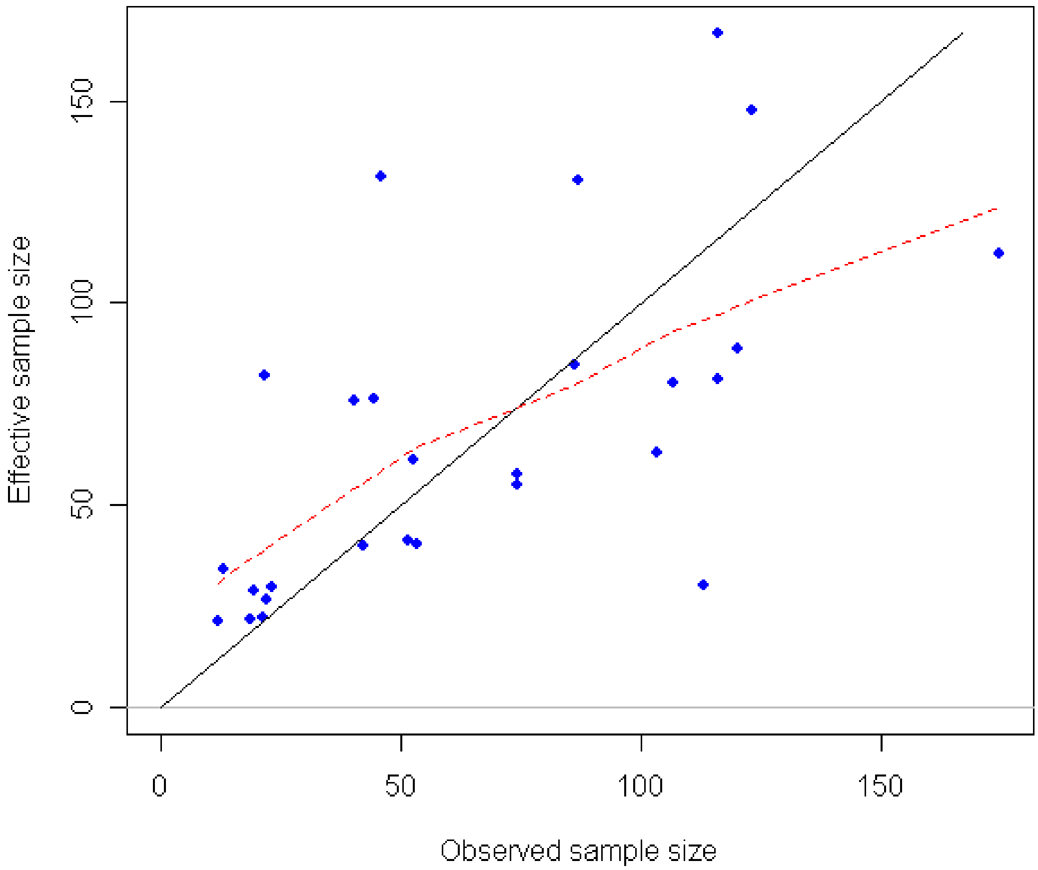
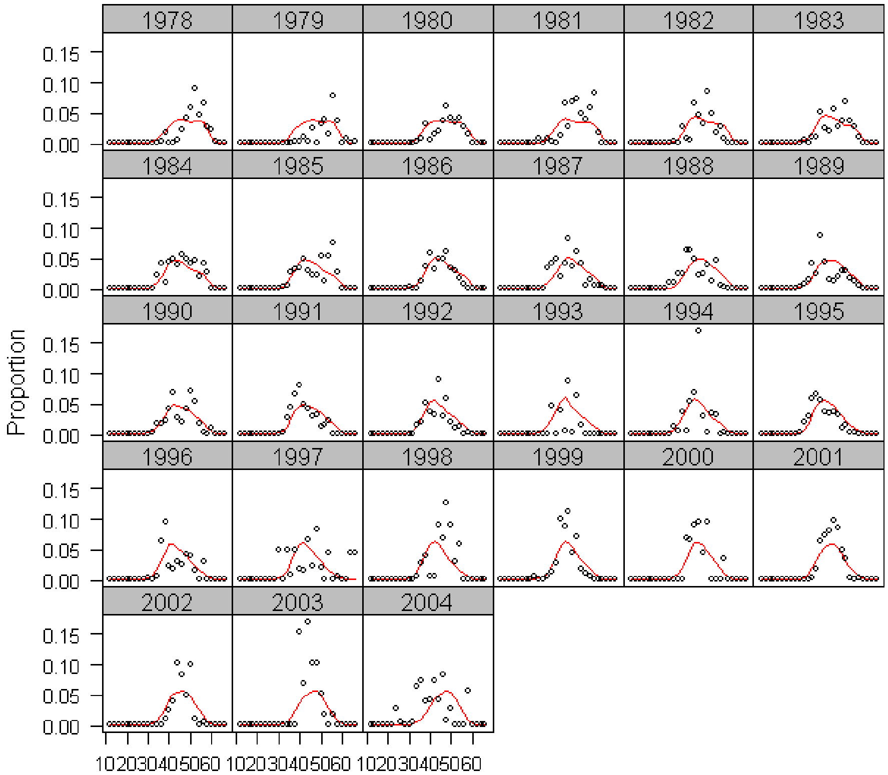


Figure 111. Observed and effective sample sizes for the Northern California trawl fleet length-frequency observations.



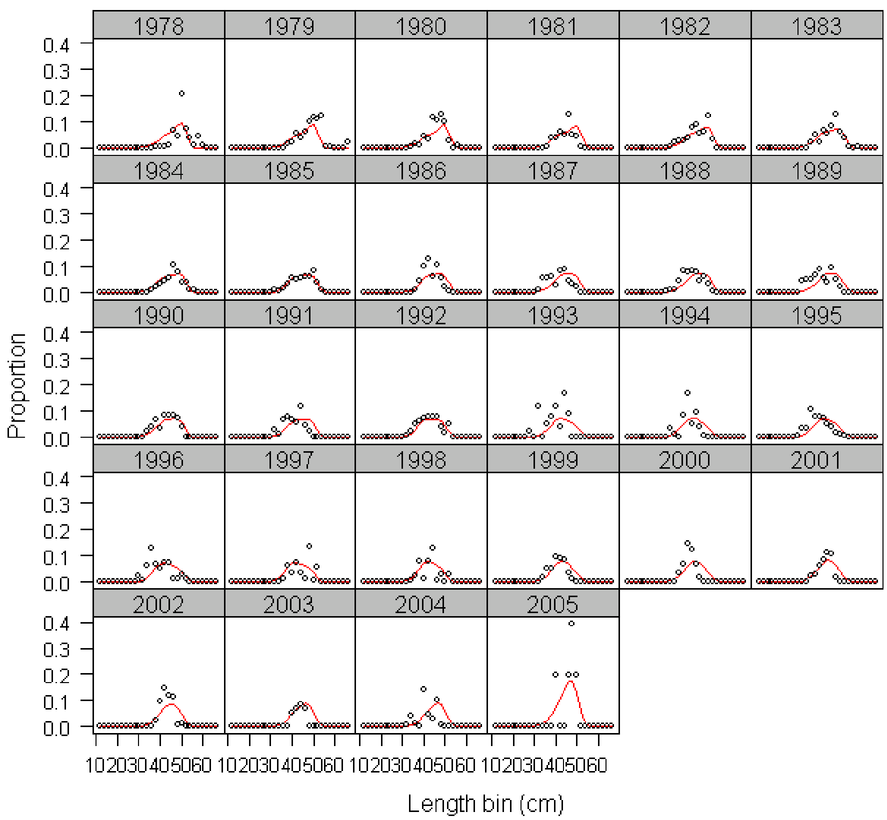


Figure 112. Fit to female (upper panel) and male (lower panel) length-frequency observations for the Northern California trawl fleet.

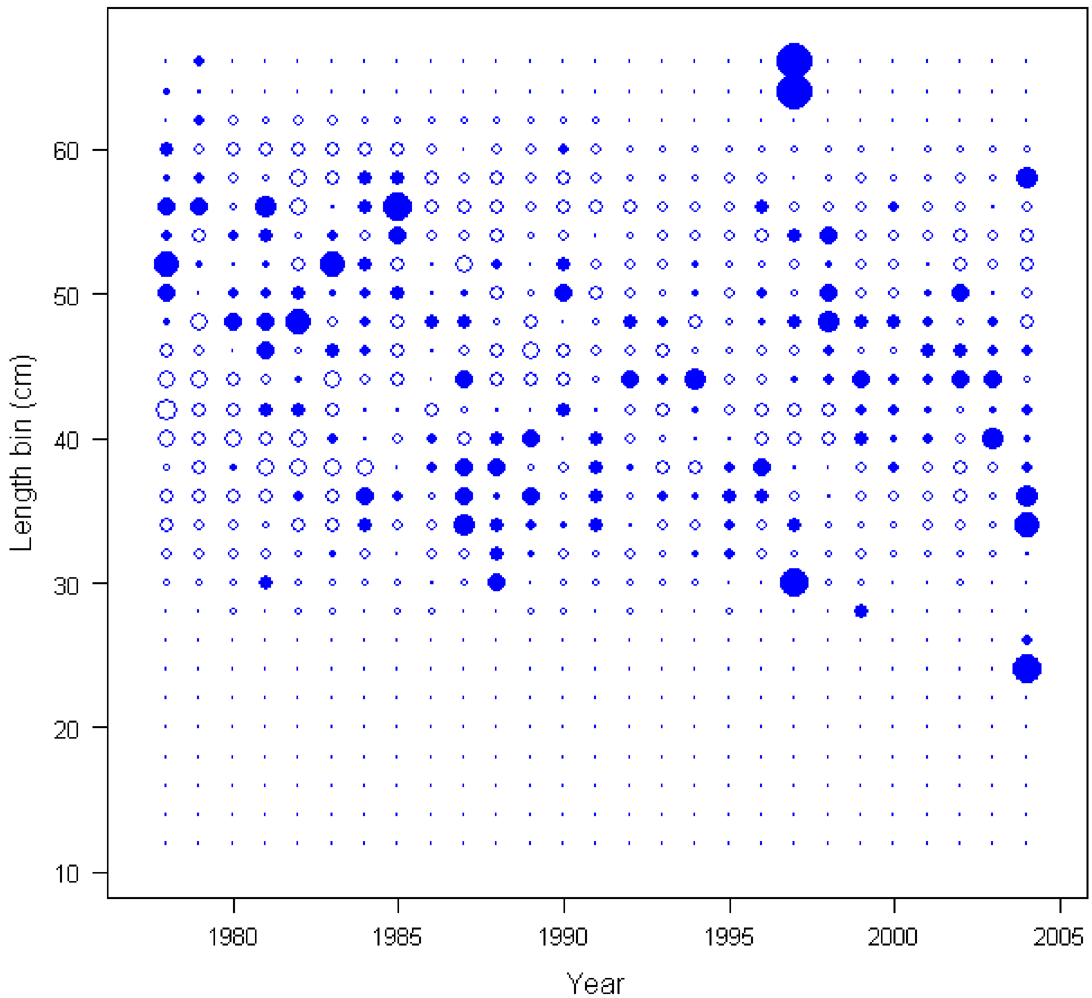


Figure 113. Pearson residuals for the fit to female length-frequency observations for the Northern California trawl fleet. The largest circle represents a value of 6.80; filled circles show observation greater than estimate; solid circles show observation less than estimate.

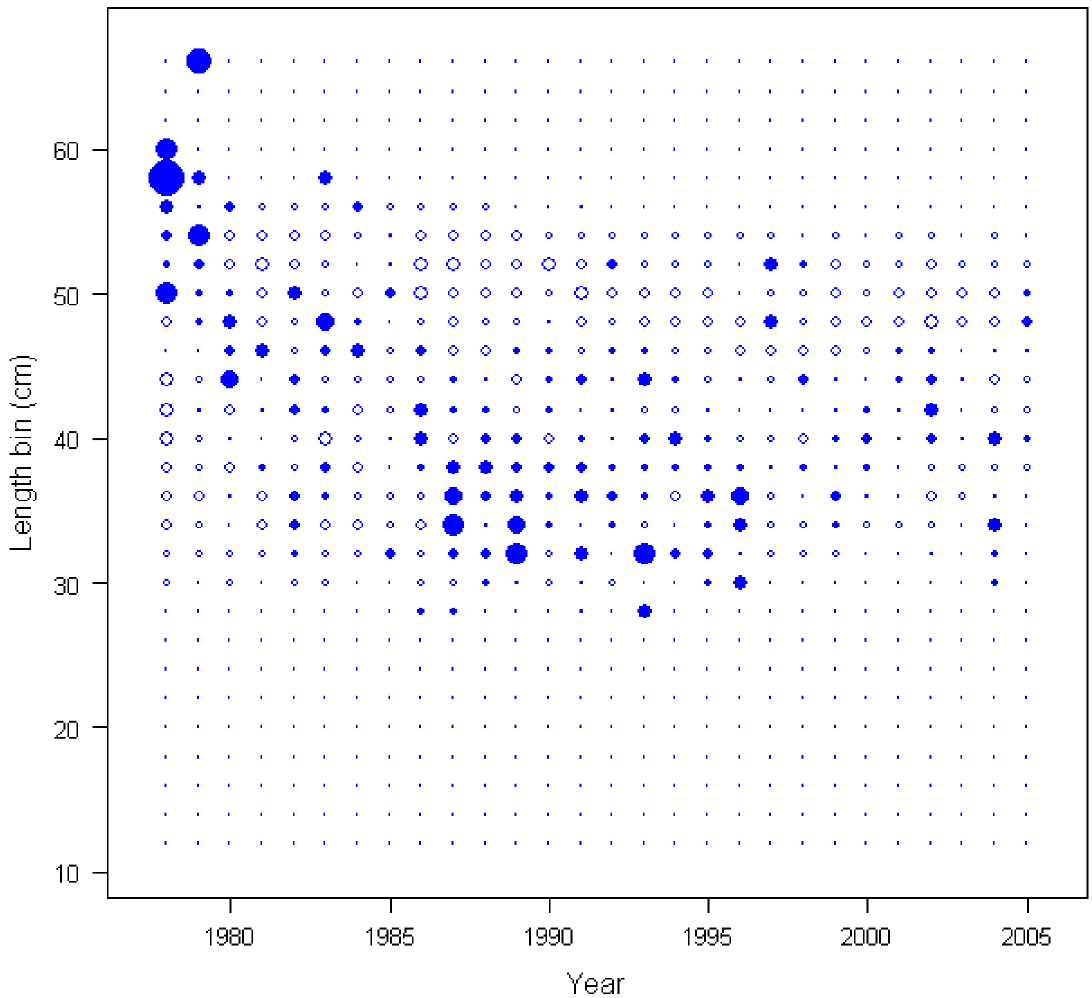


Figure 114. Pearson residuals for the fit to male length-frequency observations for the Northern California trawl fleet. The largest circle represents a value of 13.58; filled circles show observation greater than estimate; solid circles show observation less than estimate.

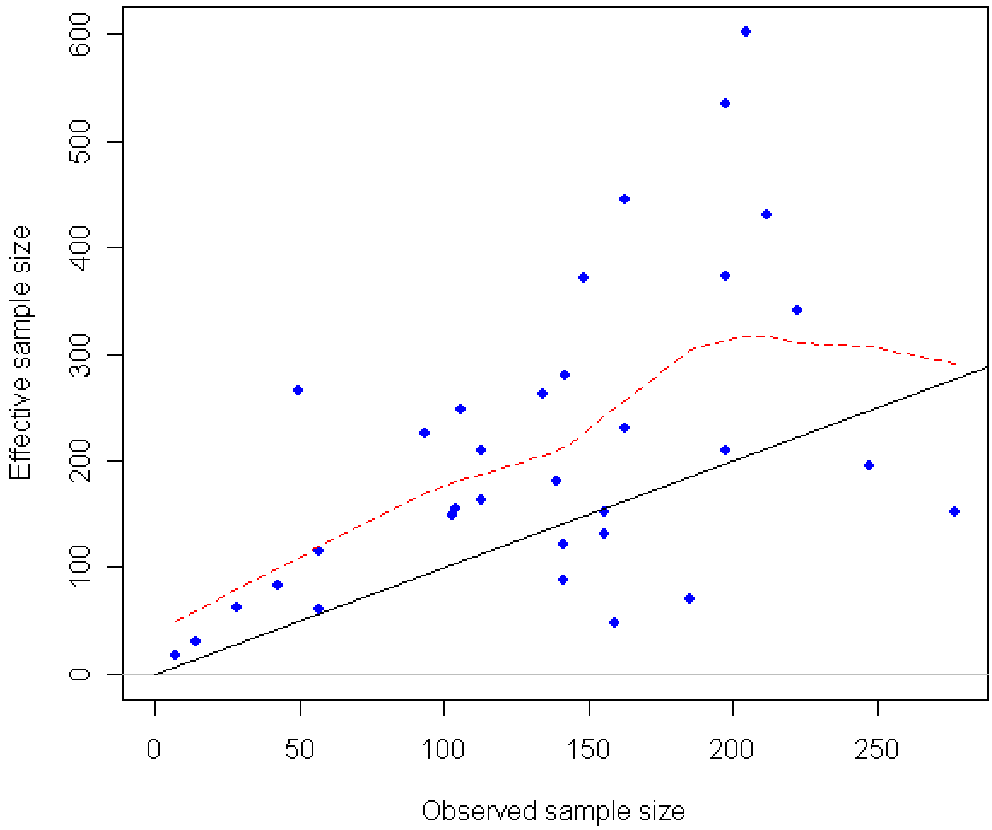
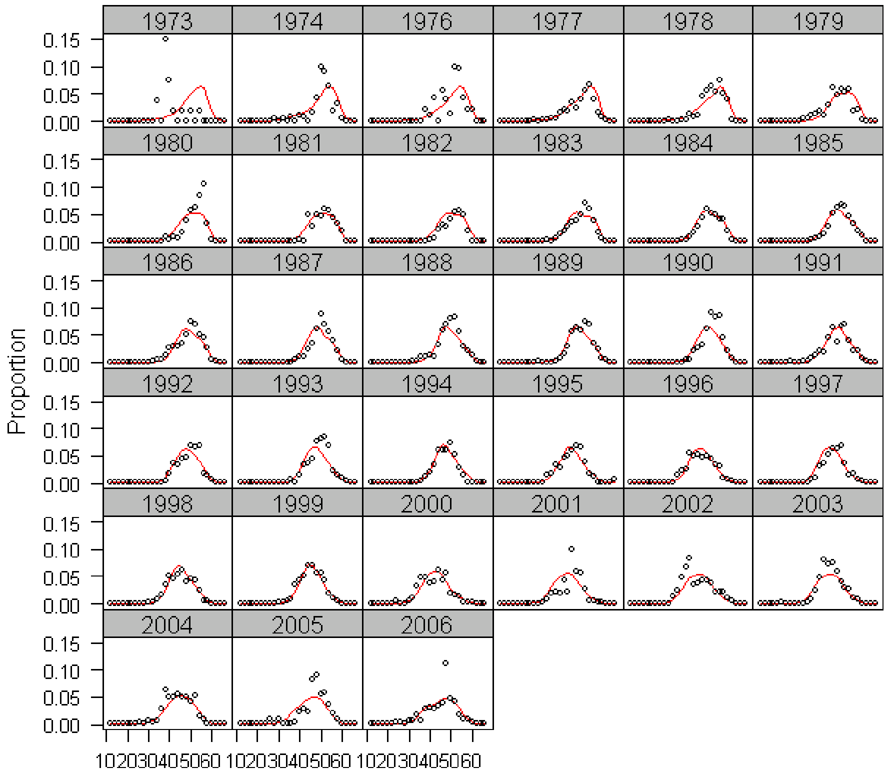


Figure 115. Observed and effective sample sizes for the Oregon trawl fleet length-frequency observations.



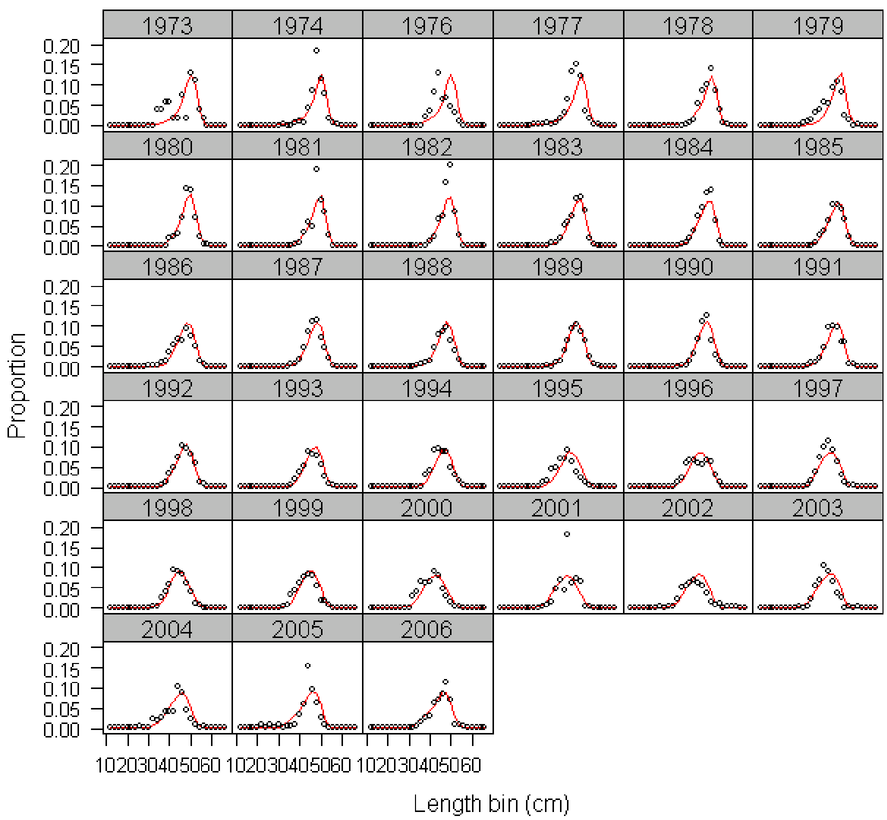


Figure 116. Fit to female (upper panel) and male (lower panel) length-frequency observations for the Oregon trawl fleet.

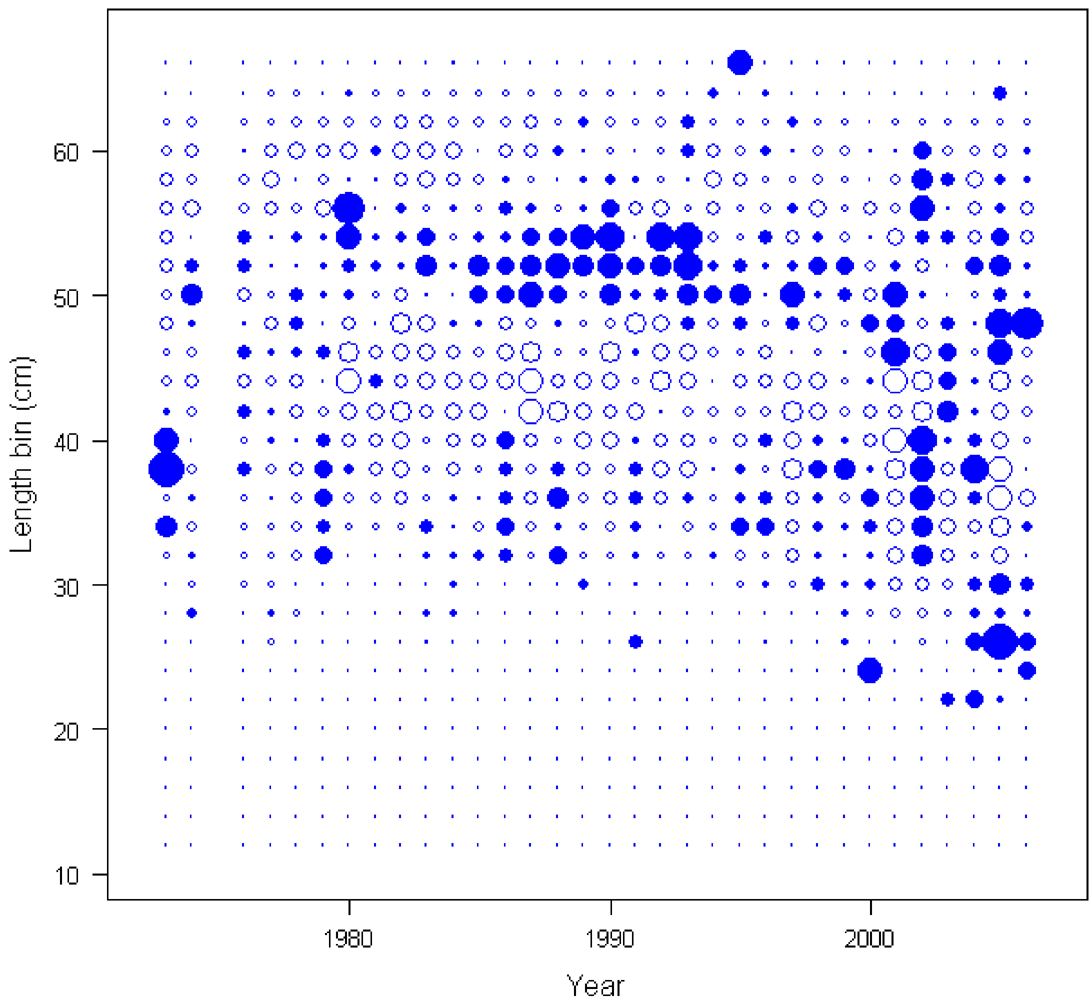


Figure 117. Pearson residuals for the fit to female length-frequency observations for the Oregon trawl fleet. The largest circle represents a value of 4.18; filled circles show observation greater than estimate; solid circles show observation less than estimate.

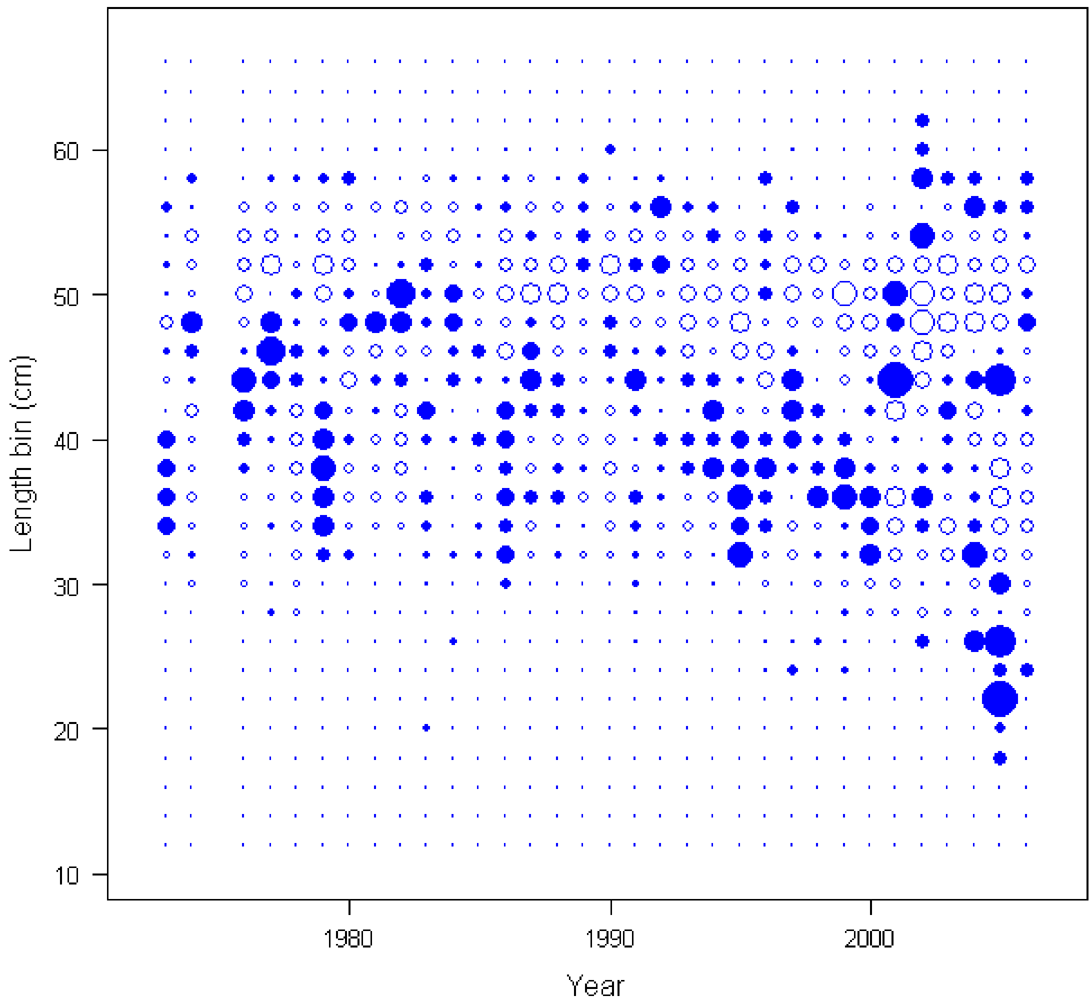


Figure 118. Pearson residuals for the fit to male length-frequency observations for the Oregon trawl fleet. The largest circle represents a value of 4.66; filled circles show observation greater than estimate; solid circles show observation less than estimate.

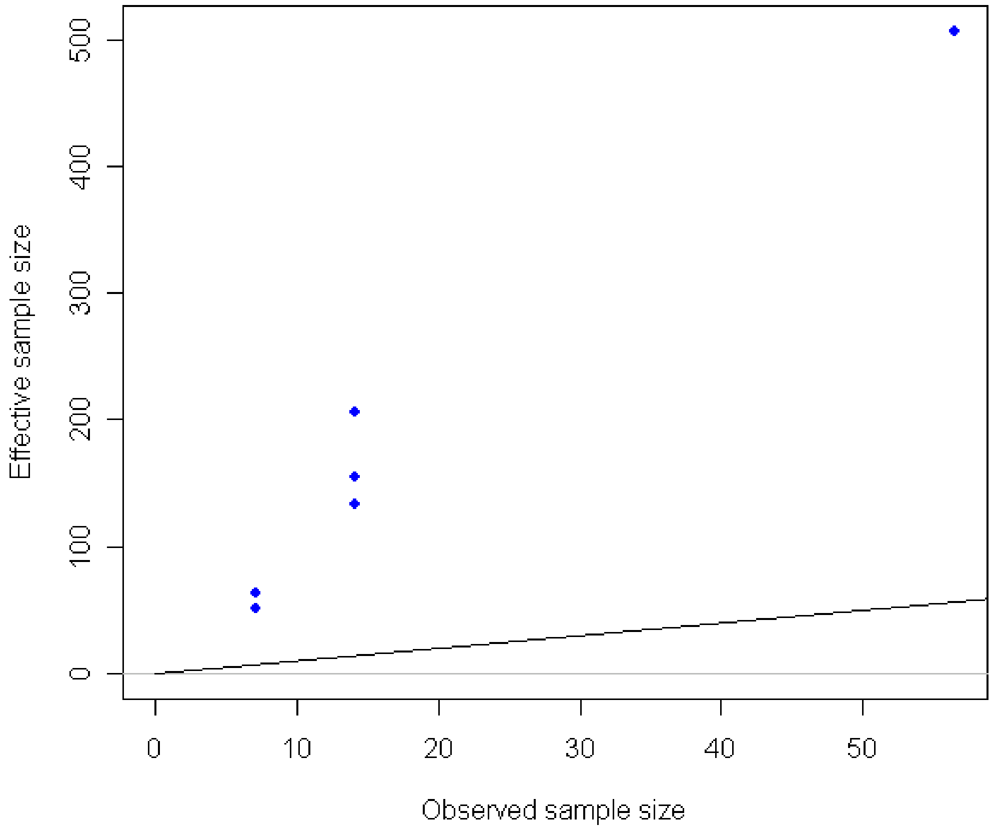


Figure 119. Observed and effective sample sizes for the Washington trawl fleet length-frequency observations (sexes combined in historical sampling).

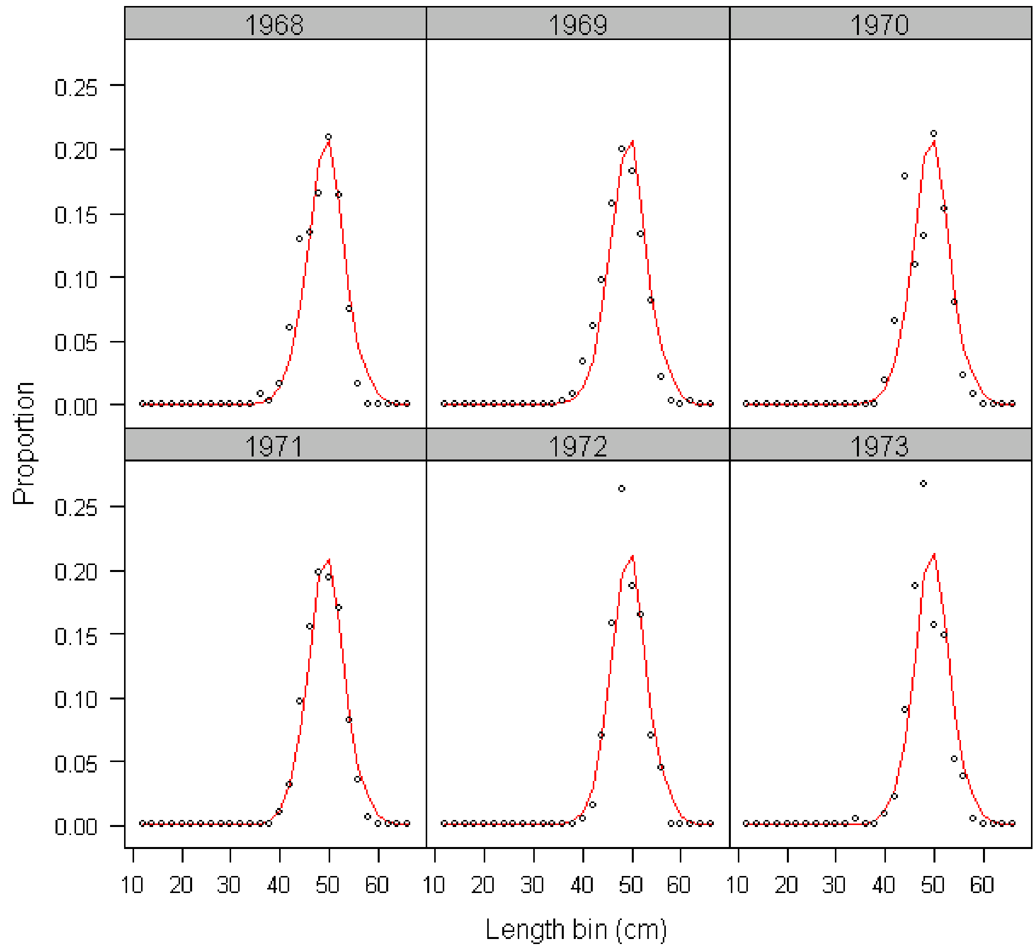


Figure 120. Fit to combined sex length-frequency observations for the Washington trawl fleet.

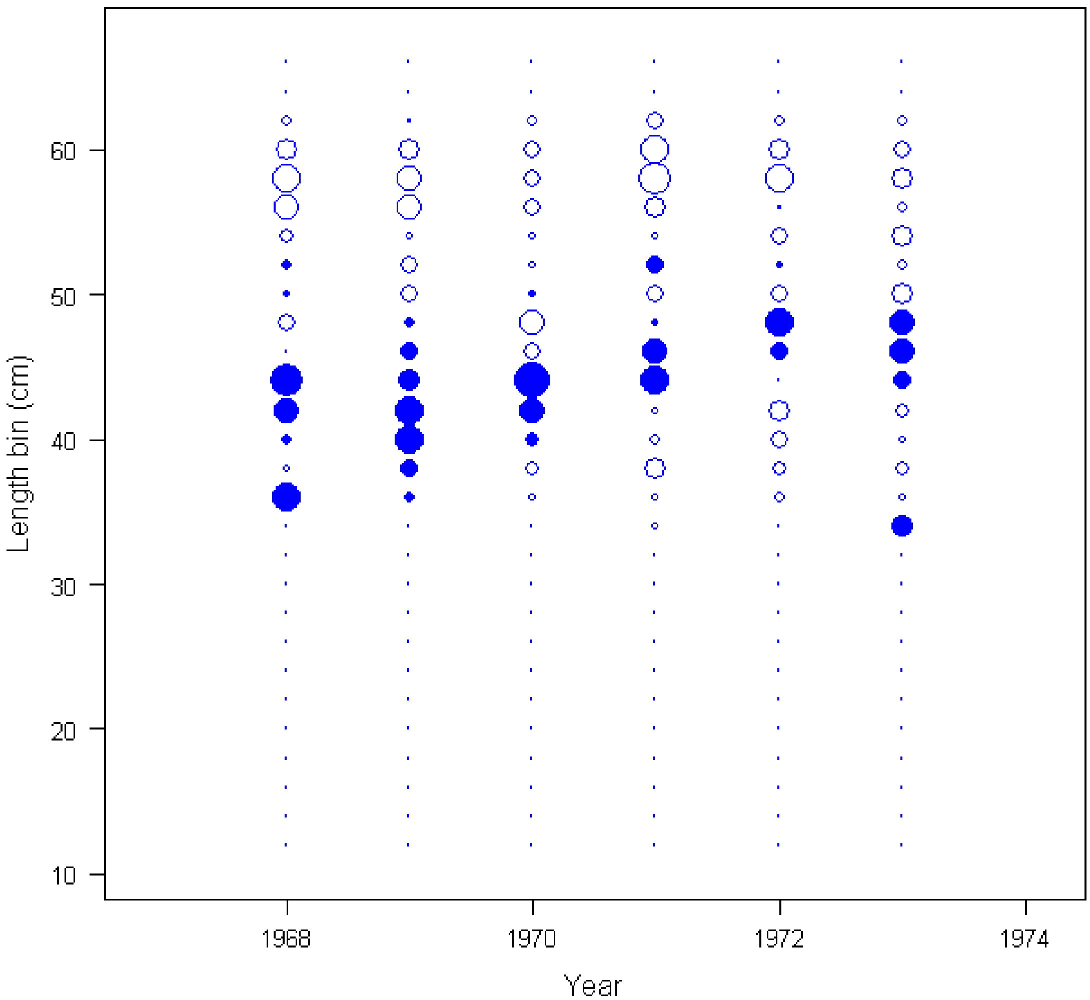


Figure 121. Pearson residuals for the fit to combined sex length-frequency observations for the Washington trawl fleet. The largest circle represents a value of 1.02; filled circles show observation greater than estimate; solid circles show observation less than estimate.

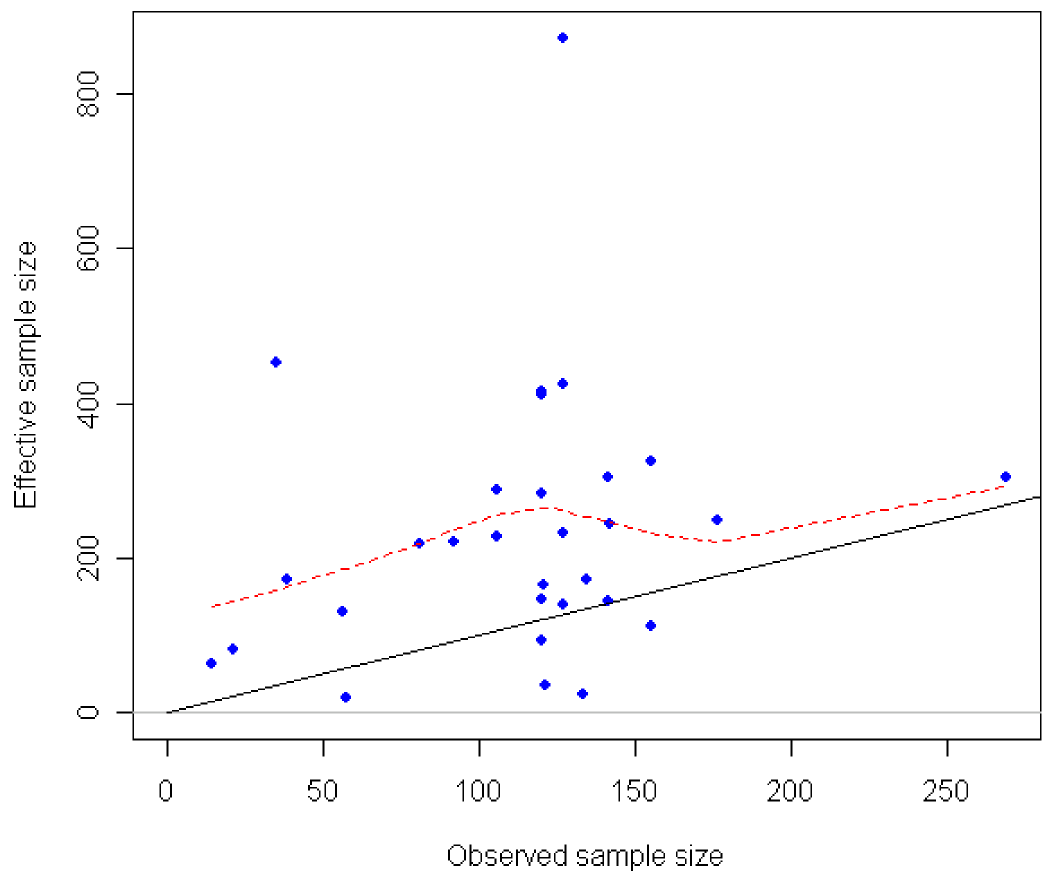


Figure 122. Observed and effective sample sizes for the sex-specific Washington trawl fleet length-frequency observations.

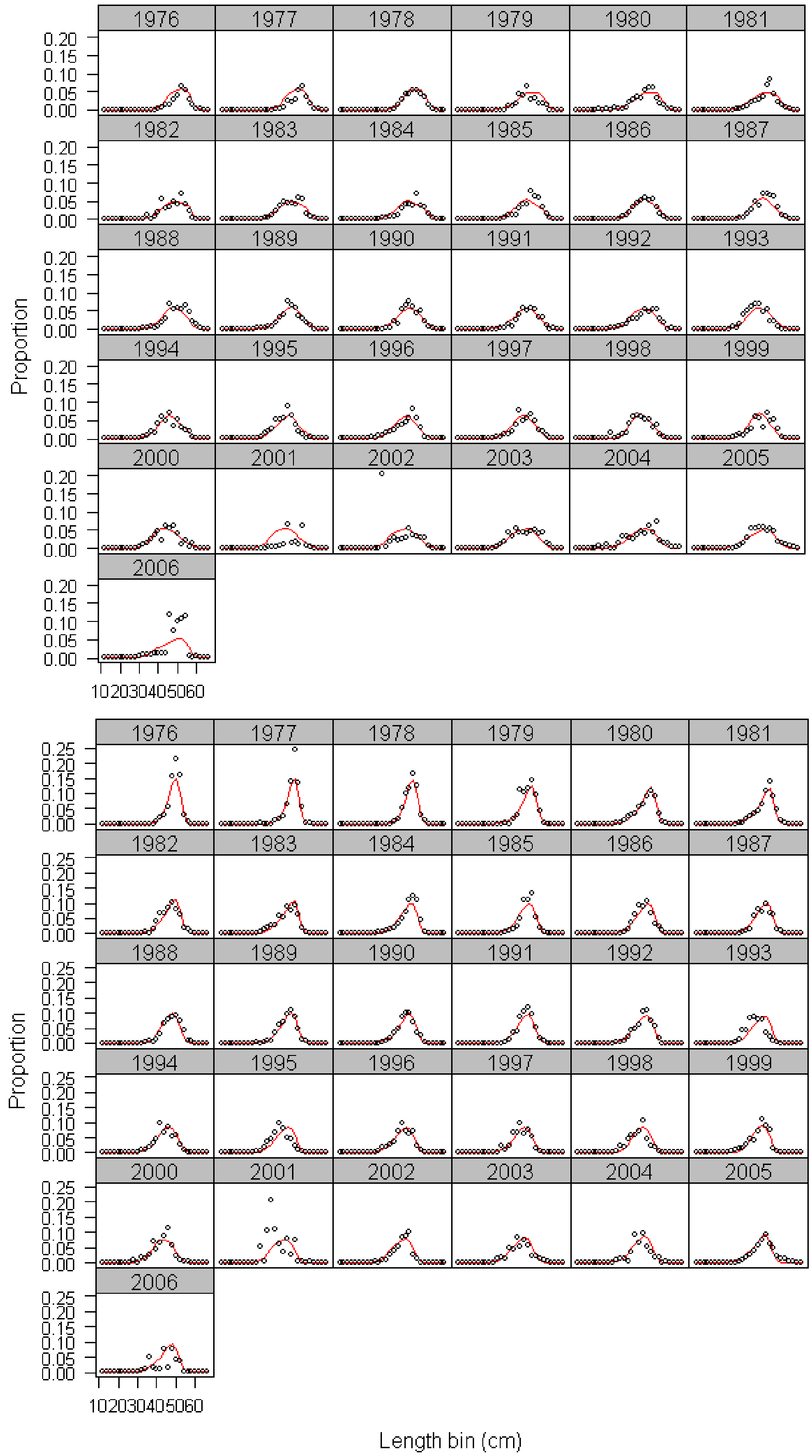


Figure 123. Fit to female (upper panel) and male (lower panel) length-frequency observations for the Washington trawl fleet.

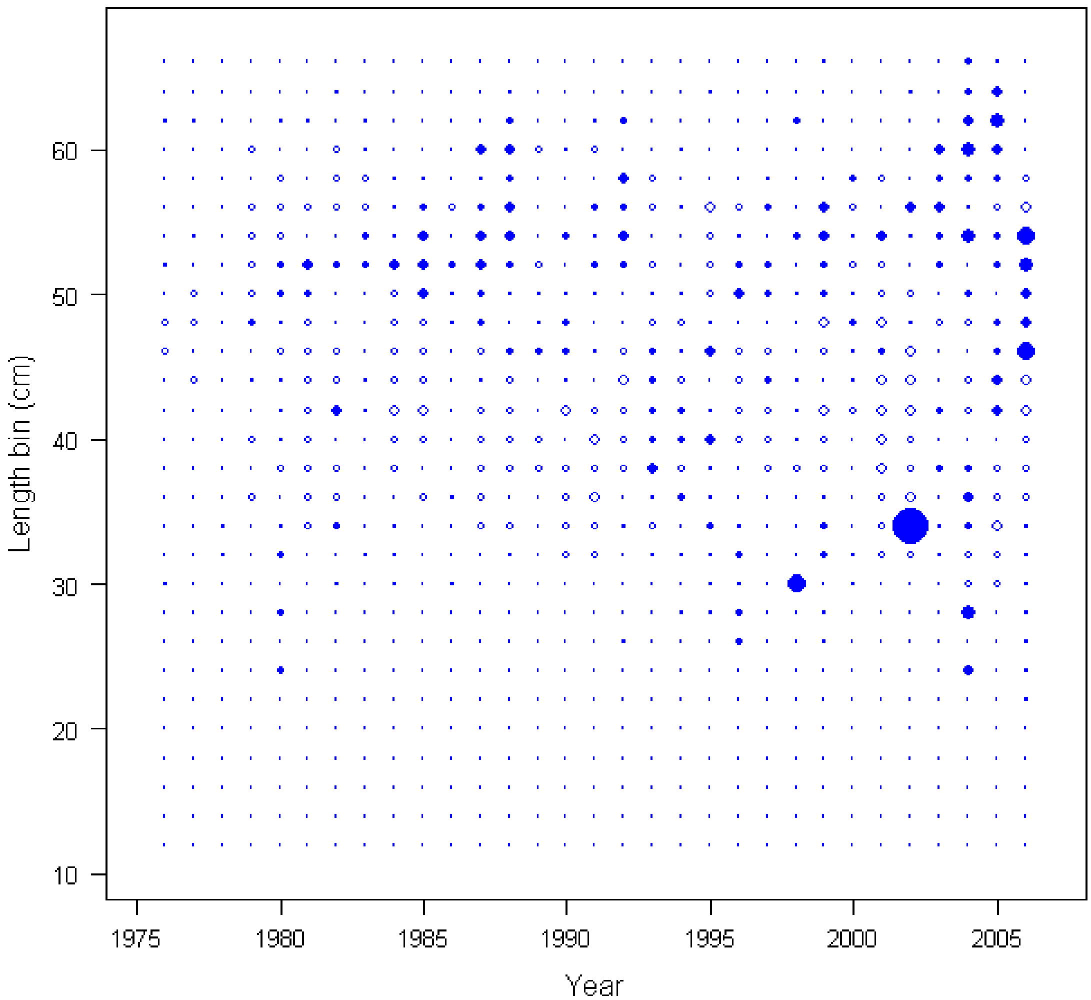


Figure 124. Pearson residuals for the fit to female length-frequency observations for the Washington trawl fleet. The largest circle represents a value of 19.73; filled circles show observation greater than estimate; solid circles show observation less than estimate.

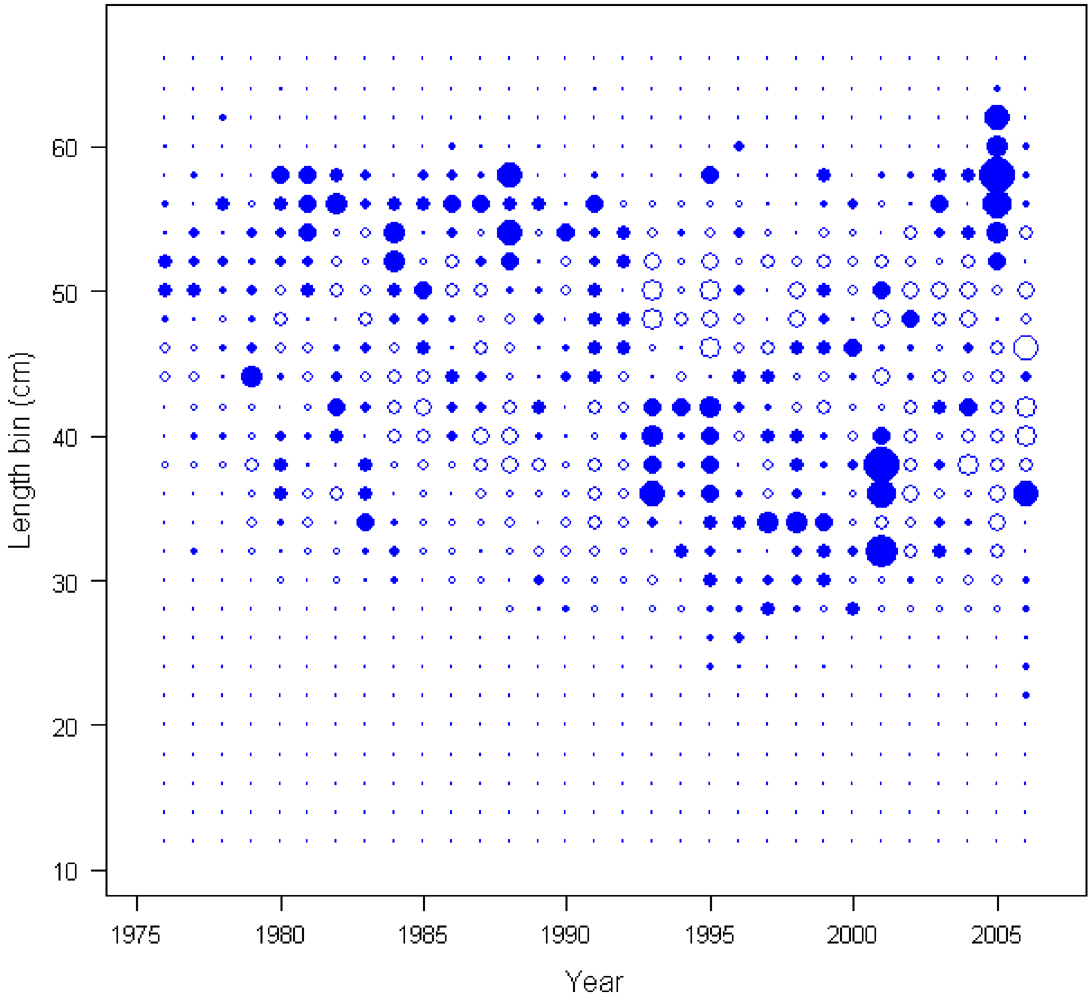


Figure 125. Pearson residuals for the fit to male length-frequency observations for the Washington trawl fleet. The largest circle represents a value of 5.81; filled circles show observation greater than estimate; solid circles show observation less than estimate.

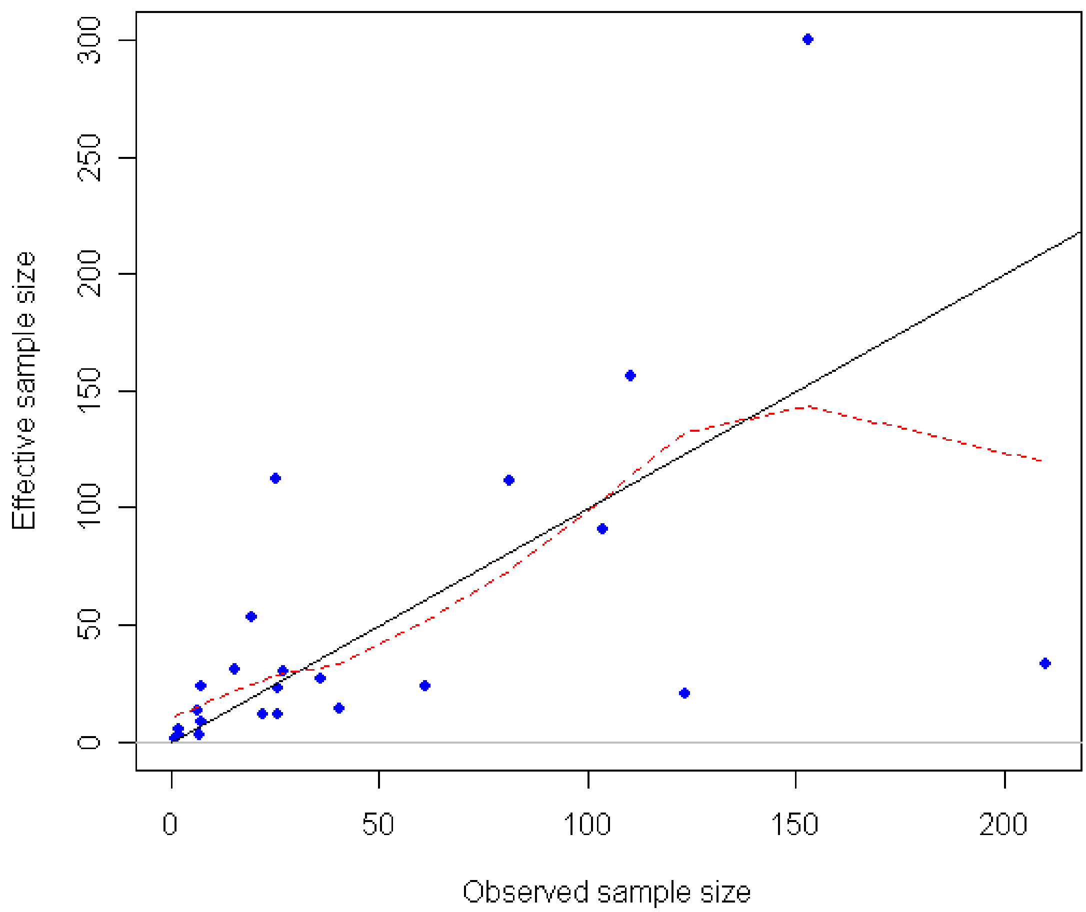


Figure 126. Observed and effective sample sizes for the southern California non-trawl fleet length-frequency observations (sexes combined).

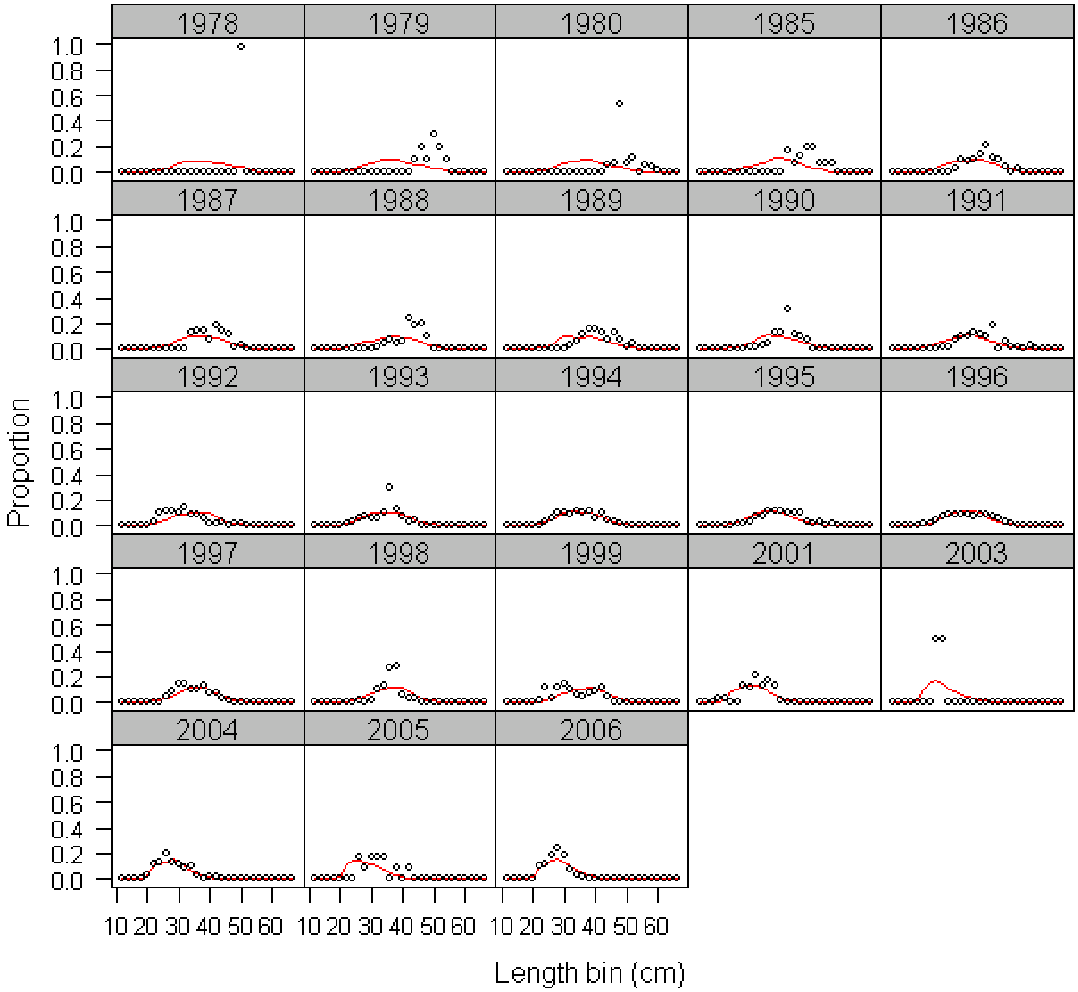


Figure 127. Fit to sexes combined length-frequency observations for the southern California non-trawl fleet.

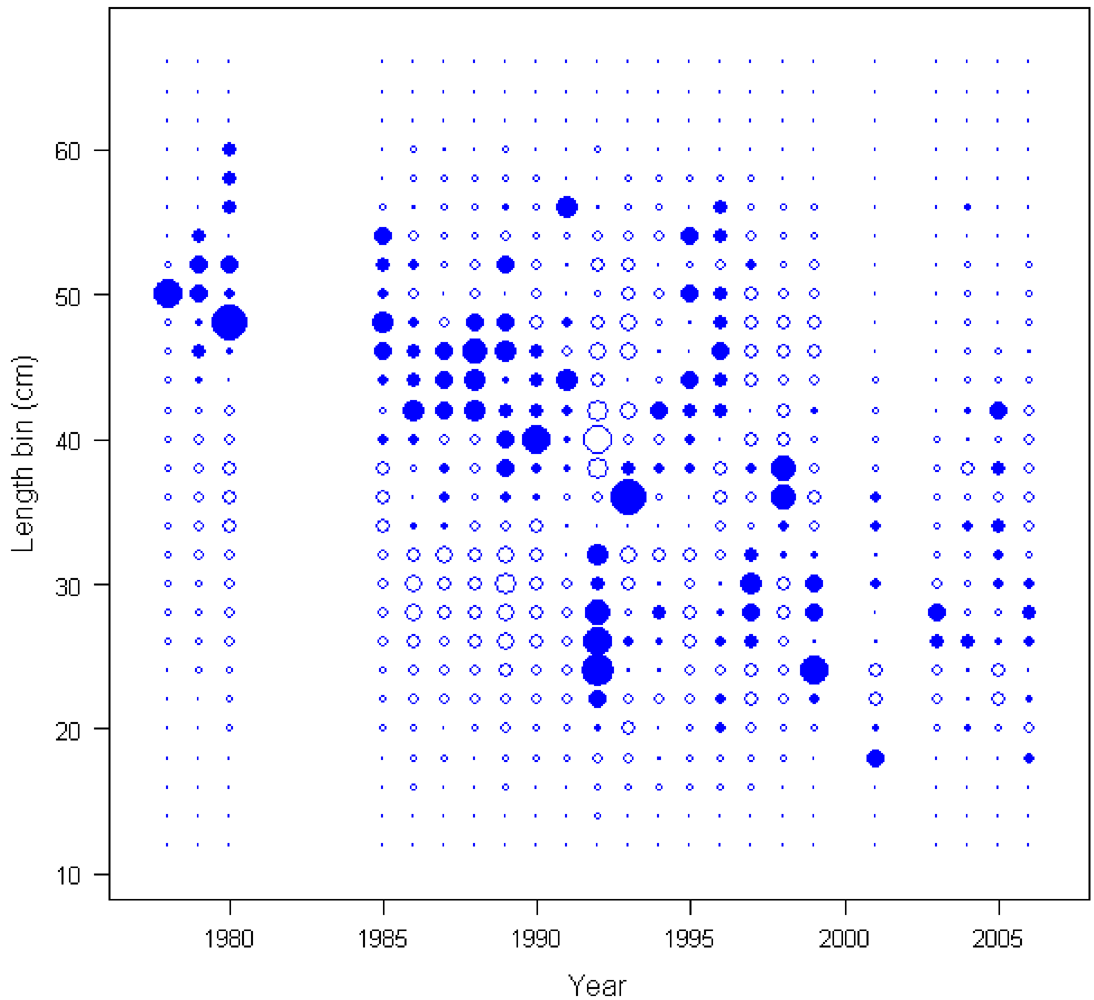


Figure 128. Pearson residuals for the fit to sexes combined length-frequency observations for the southern California non-trawl fleet. The largest circle represents a value of 7.24; filled circles show observation greater than estimate; solid circles show observation less than estimate.

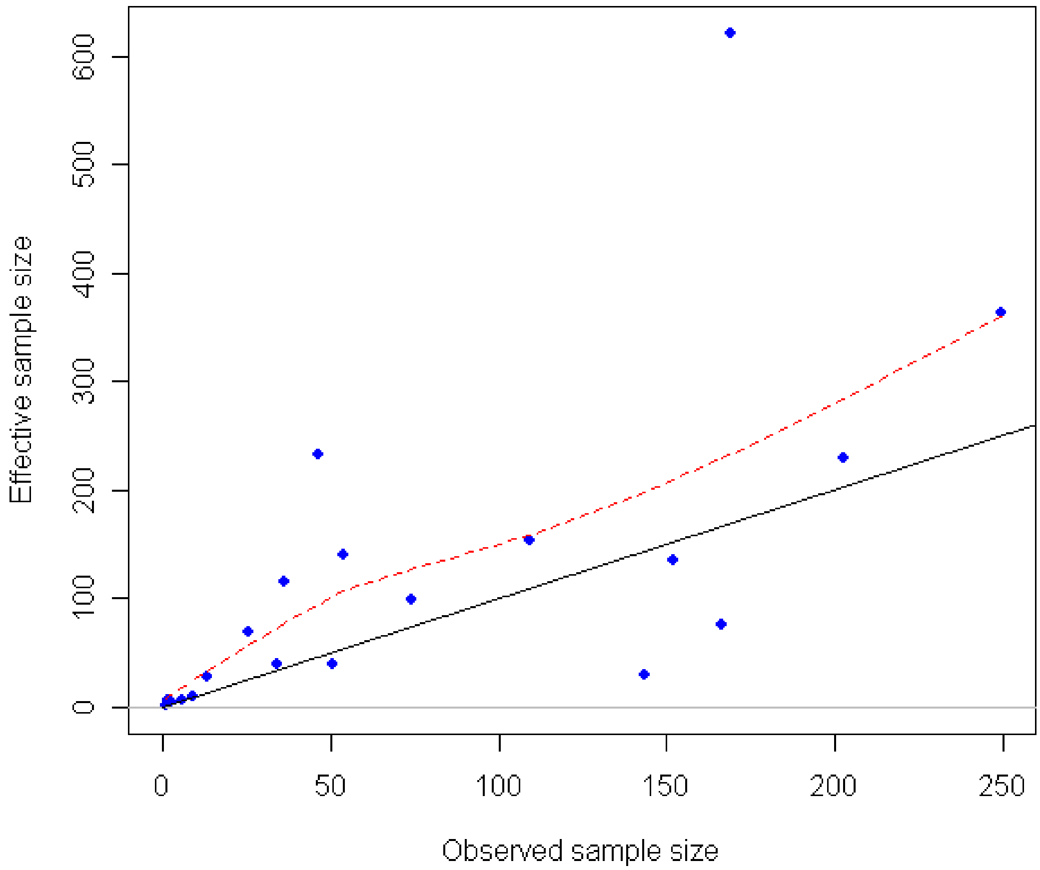


Figure 129. Observed and effective sample sizes for the northern California non-trawl fleet length-frequency observations (sexes combined).

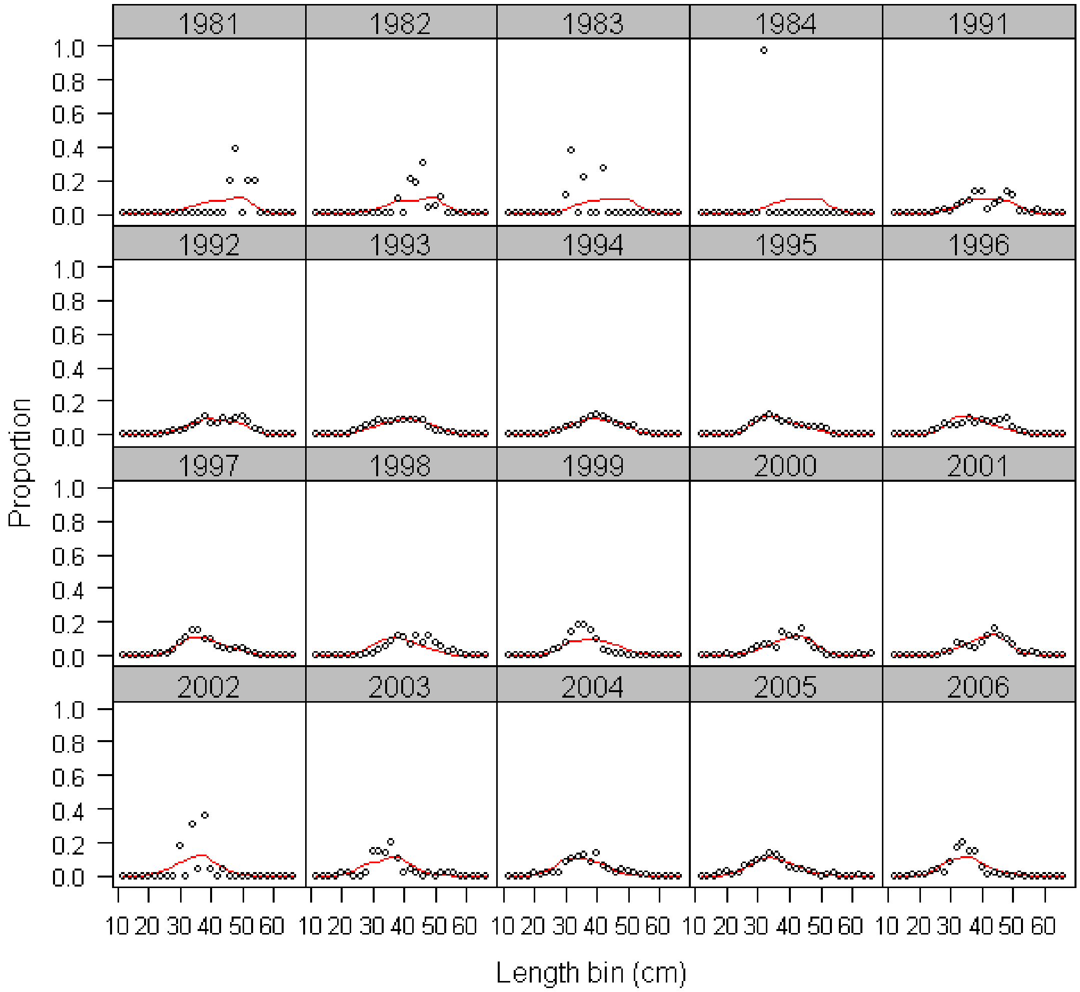


Figure 130. Fit to sexes combined length-frequency observations for the northern California non-trawl fleet.

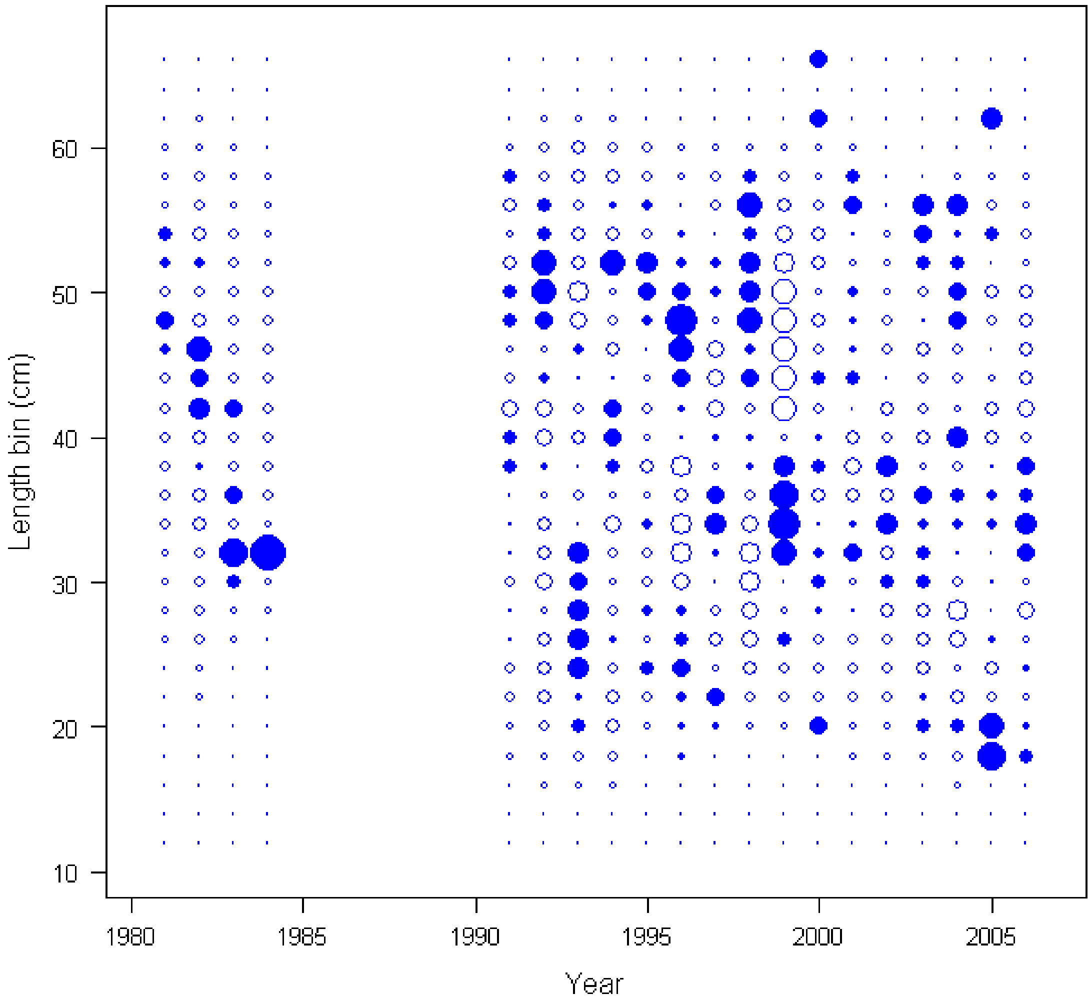


Figure 131. Pearson residuals for the fit to sexes combined length-frequency observations for the northern California non-trawl fleet. The largest circle represents a value of 5.02; filled circles show observation greater than estimate; solid circles show observation less than estimate.

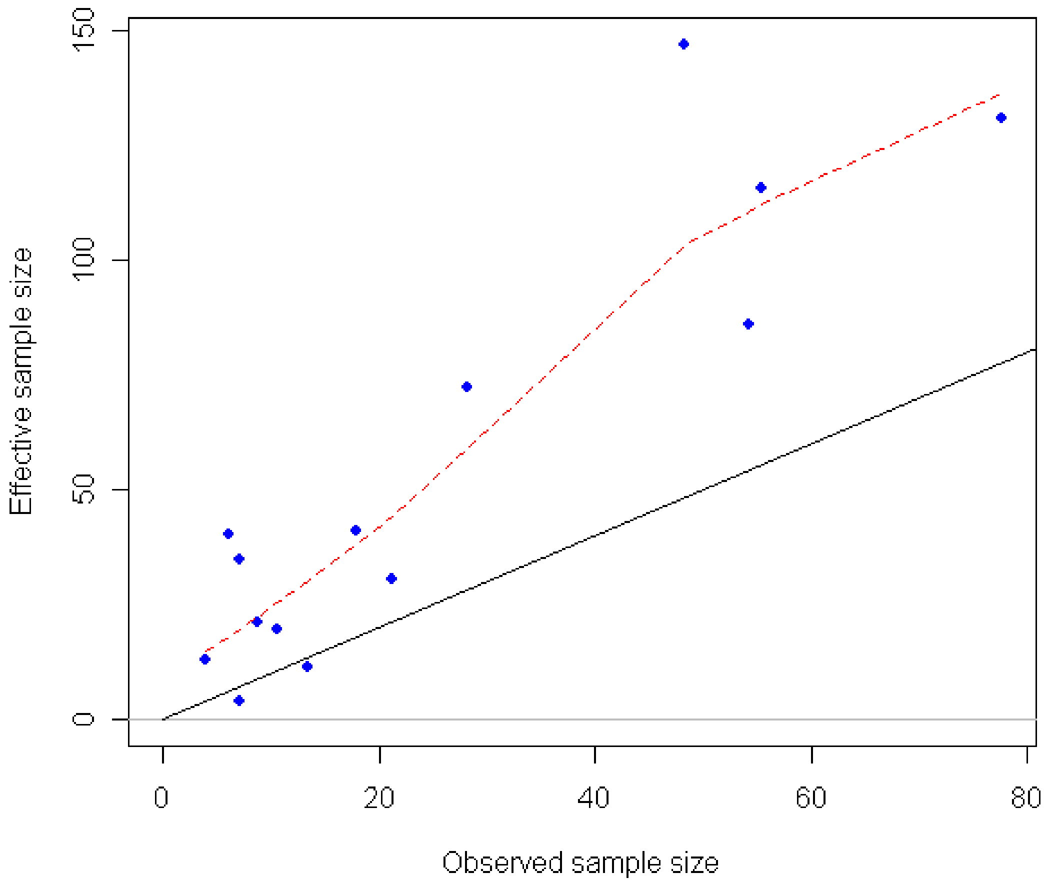
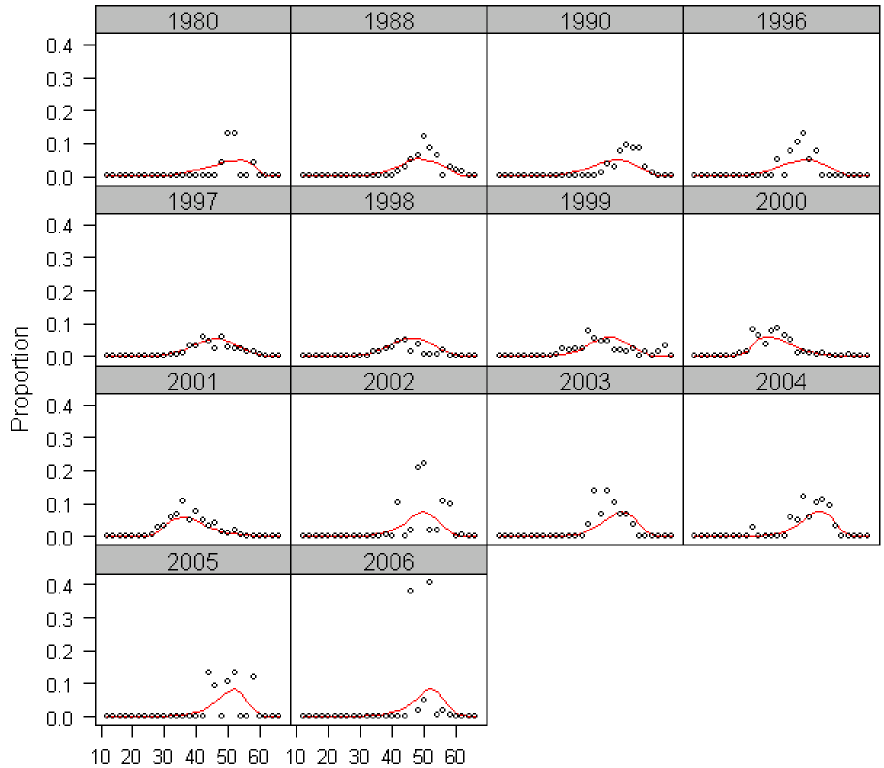


Figure 132. Observed and effective sample sizes for the sex-specific Oregon-Washington non-trawl fleet length-frequency observations.



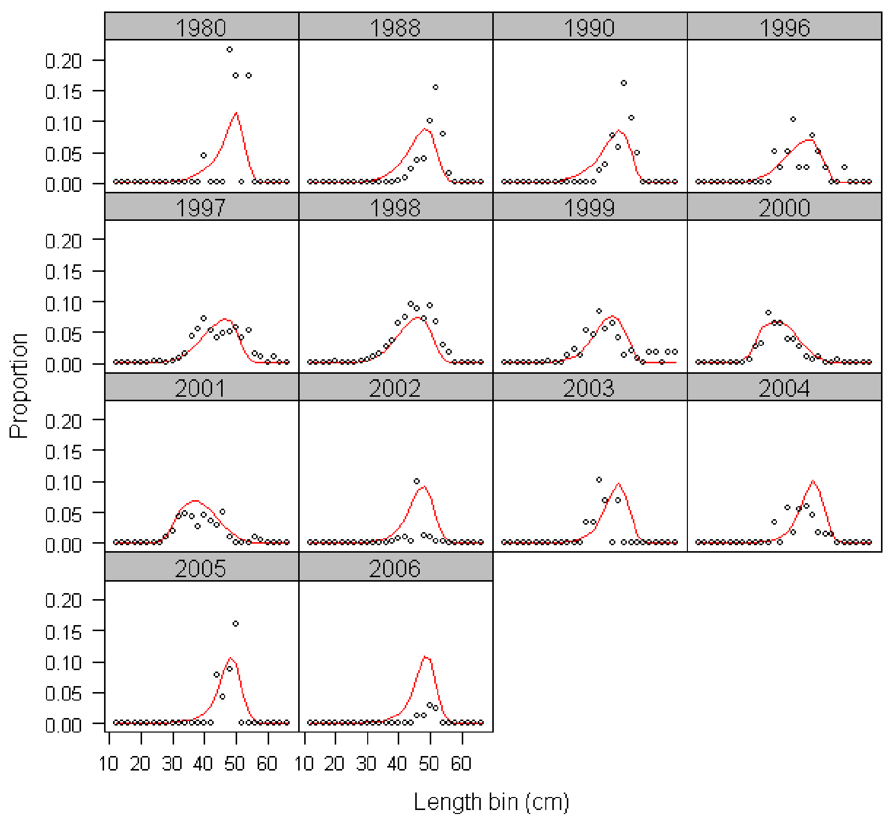


Figure 133. Fit to female (upper panel) and male (lower panel) length-frequency observations for the Oregon-Washington non-trawl fleet.

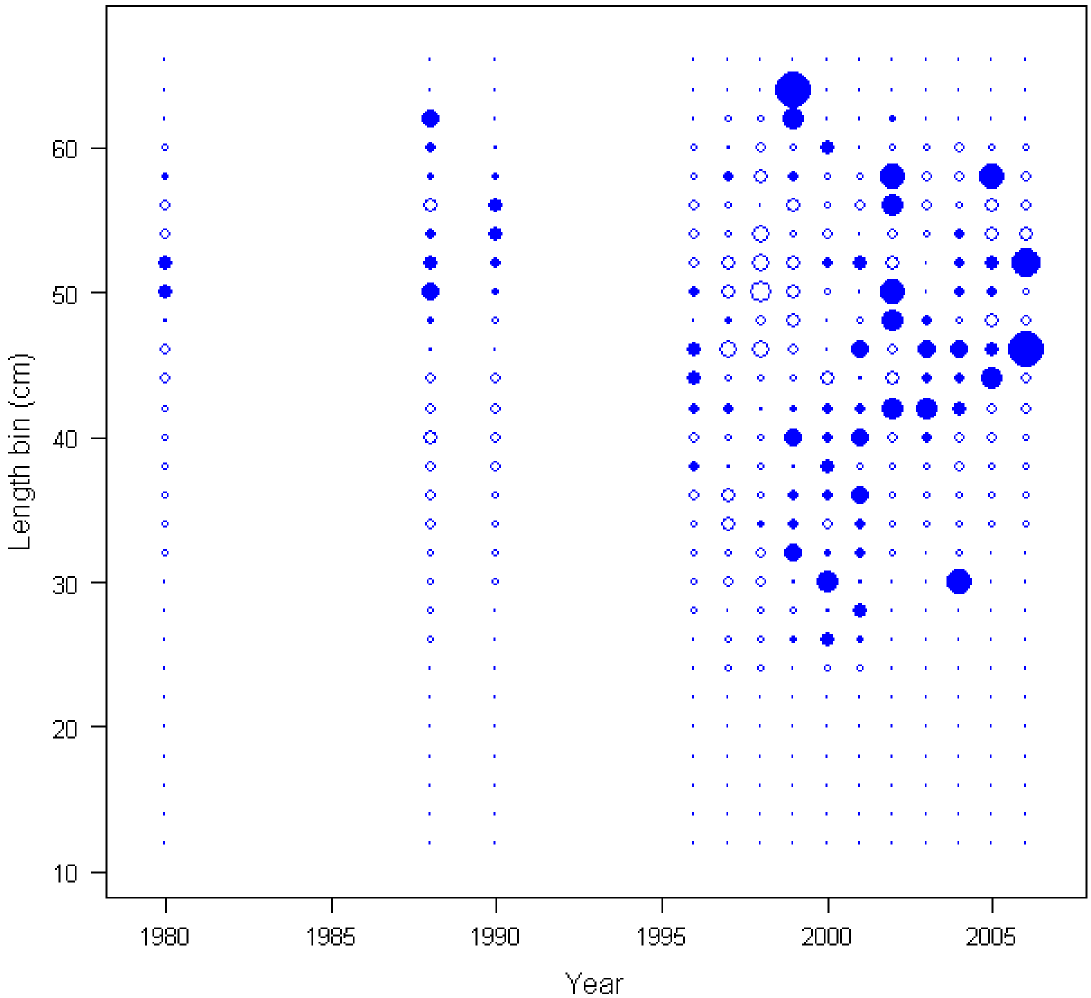


Figure 134. Pearson residuals for the fit to female length-frequency observations for the Oregon-Washington non-trawl fleet. The largest circle represents a value of 5.25; filled circles show observation greater than estimate; solid circles show observation less than estimate.

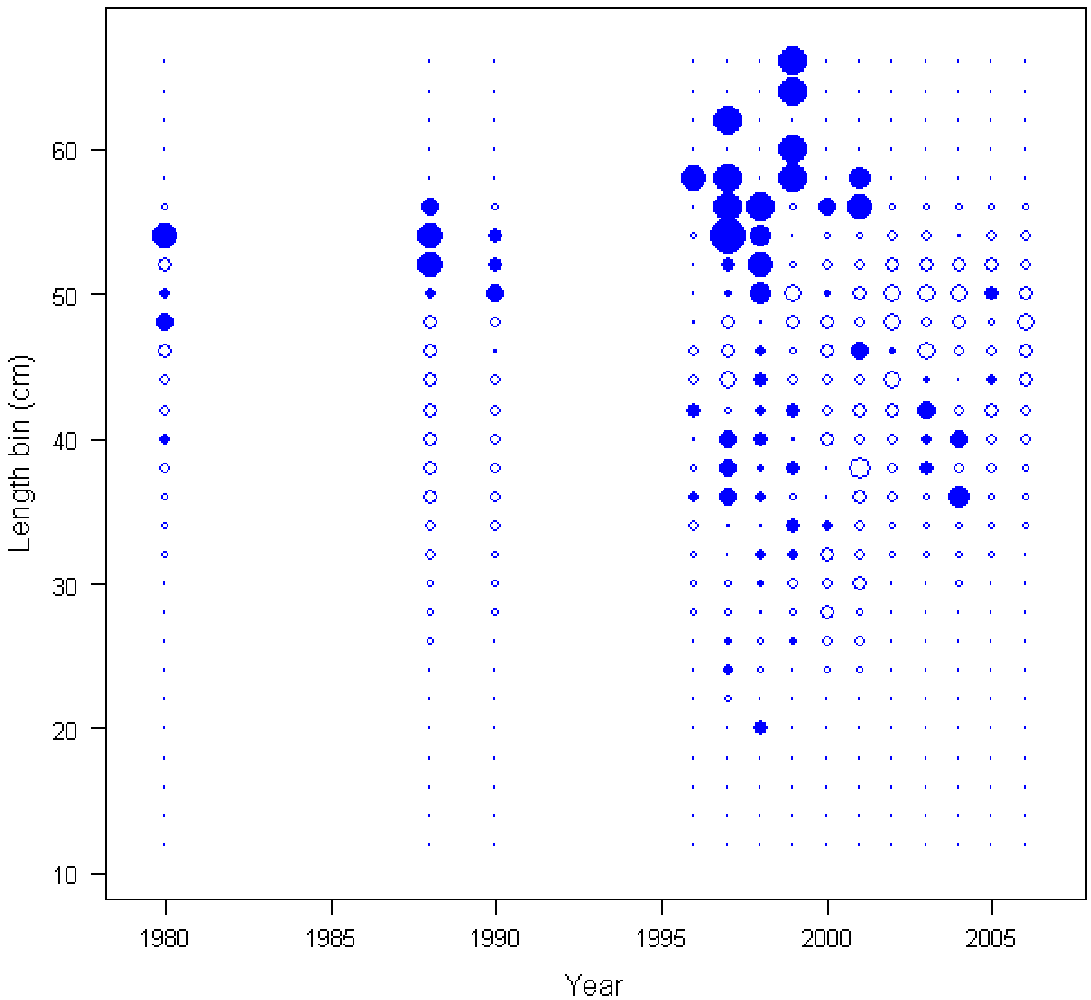


Figure 135. Pearson residuals for the fit to male length-frequency observations for the Oregon-Washington non-trawl fleet. The largest circle represents a value of 4.22; filled circles show observation greater than estimate; solid circles show observation less than estimate.

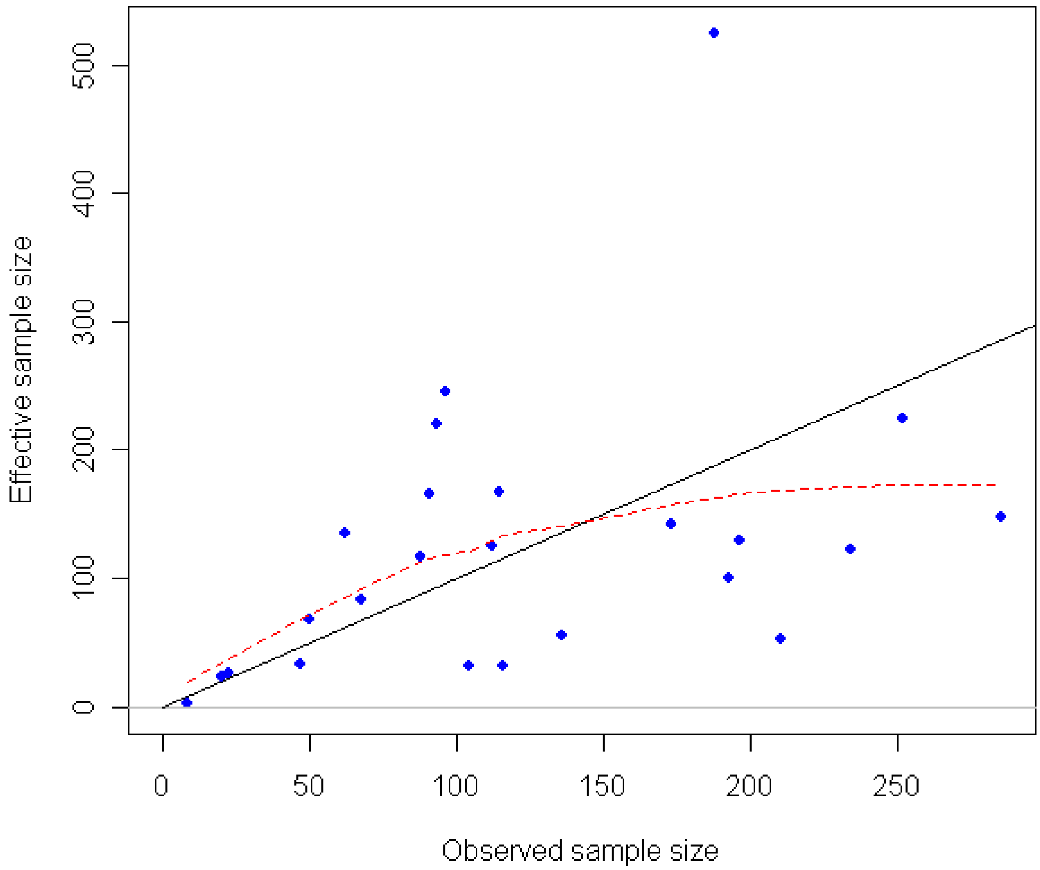


Figure 136. Observed and effective sample sizes for the combined sex southern California recreational fleet length-frequency observations.

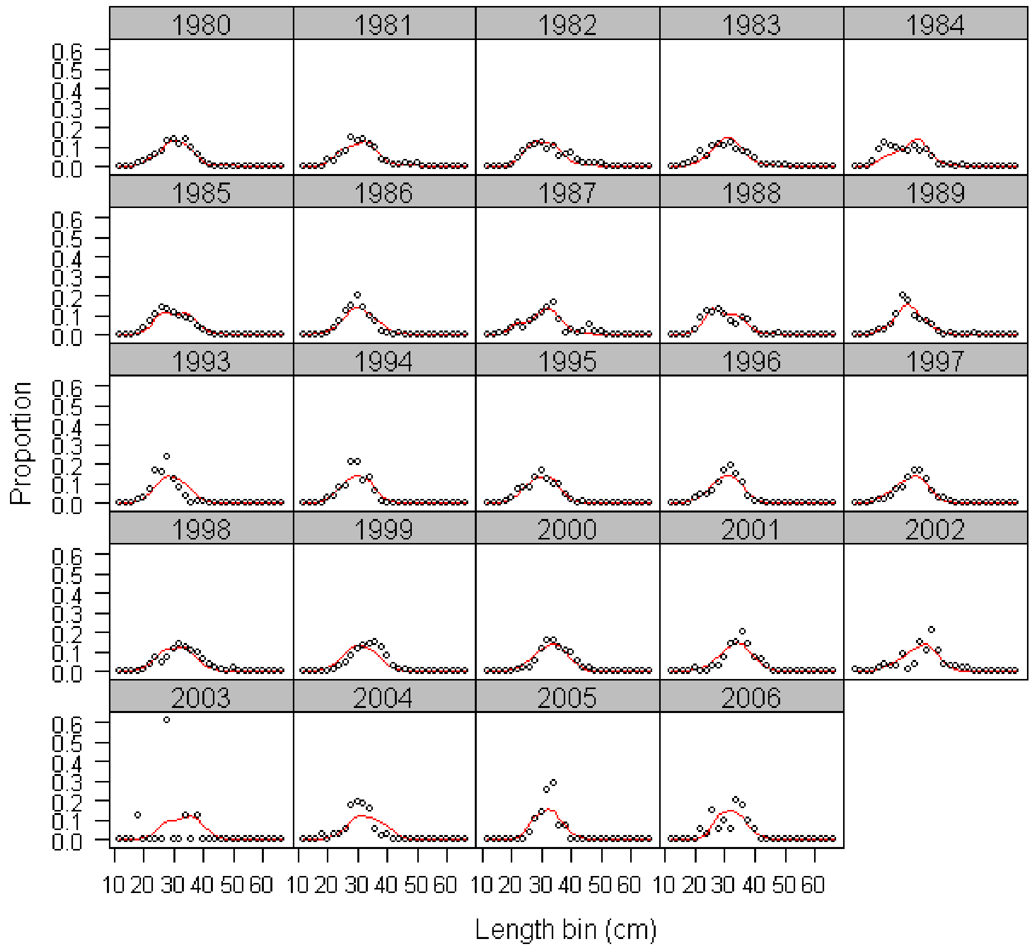


Figure 137. Fit to combined sex length-frequency observations for the southern California recreational fleet.

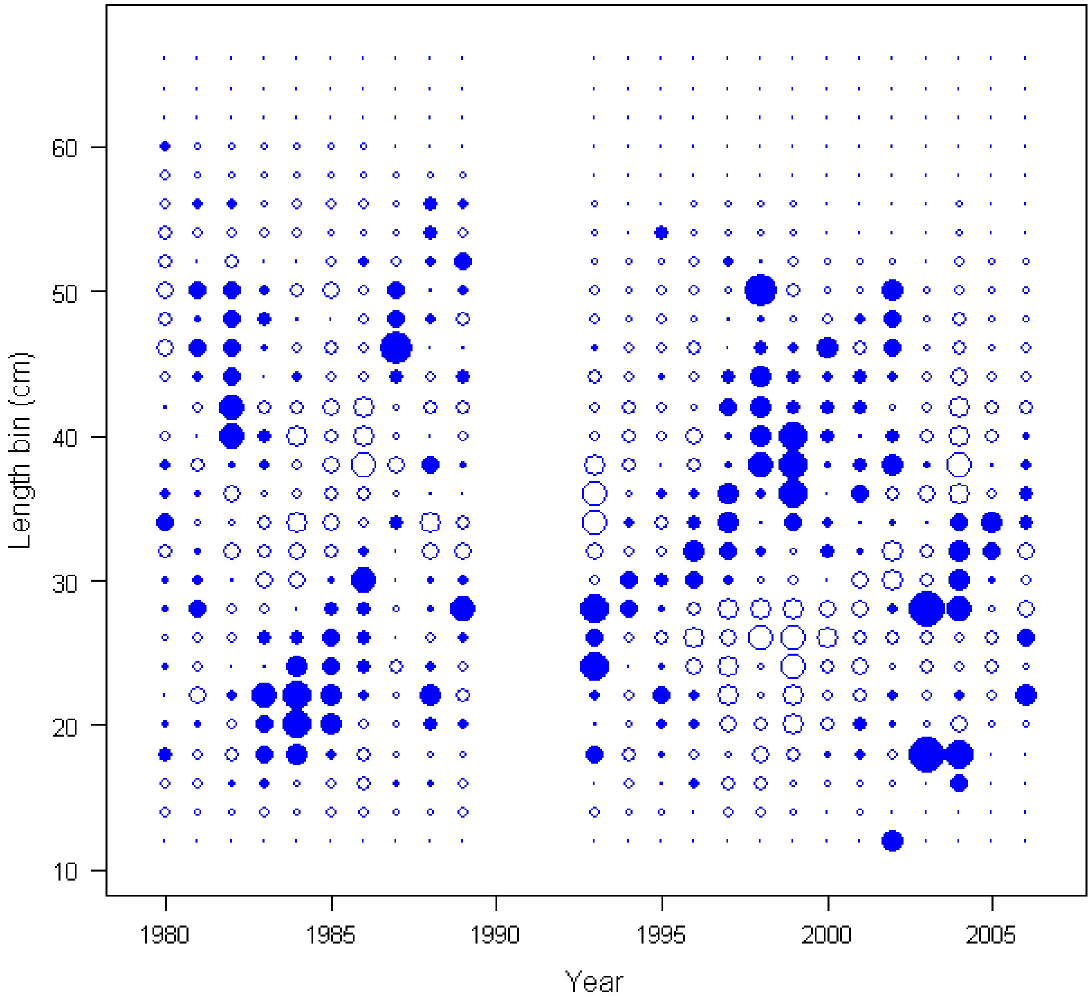


Figure 138. Pearson residuals for the fit to combined sex length-frequency observations for the southern California recreational fleet. The largest circle represents a value of 5.52; filled circles show observation greater than estimate; solid circles show observation less than estimate.

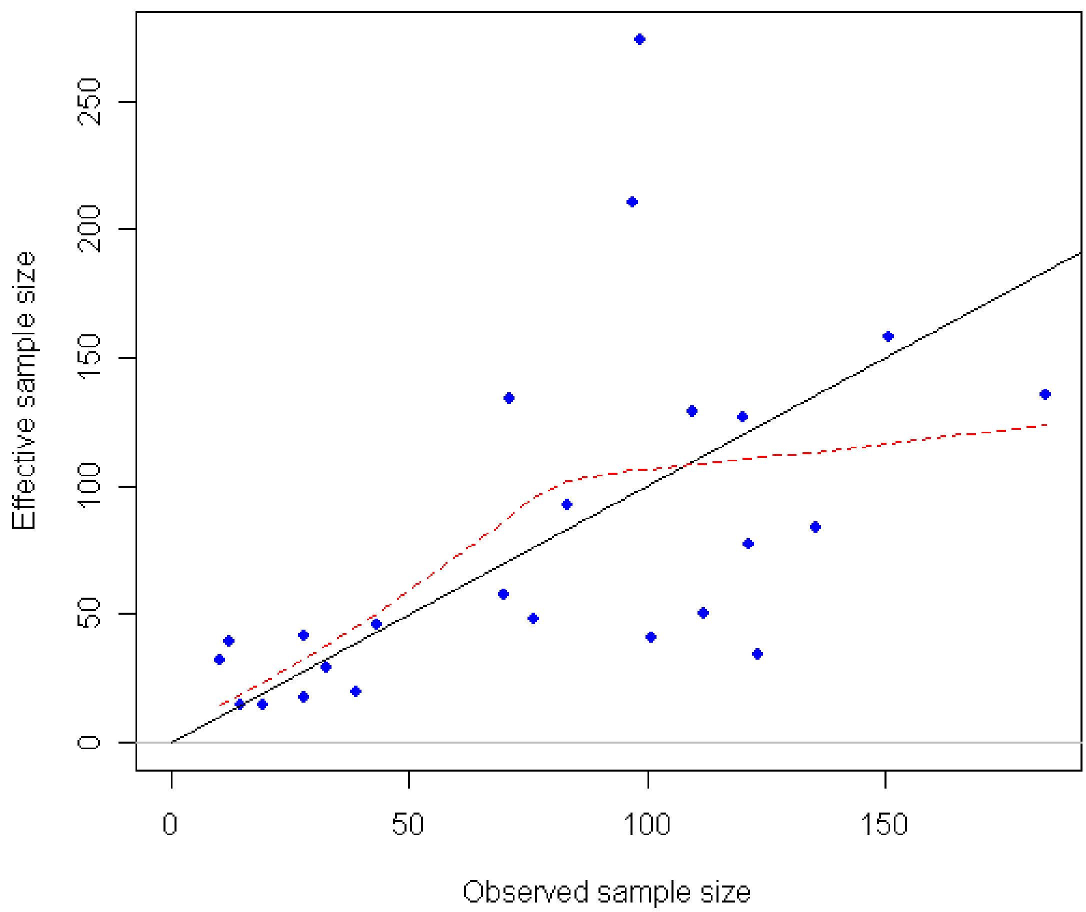


Figure 139. Observed and effective sample sizes for the combined sex northern California recreational fleet length-frequency observations.

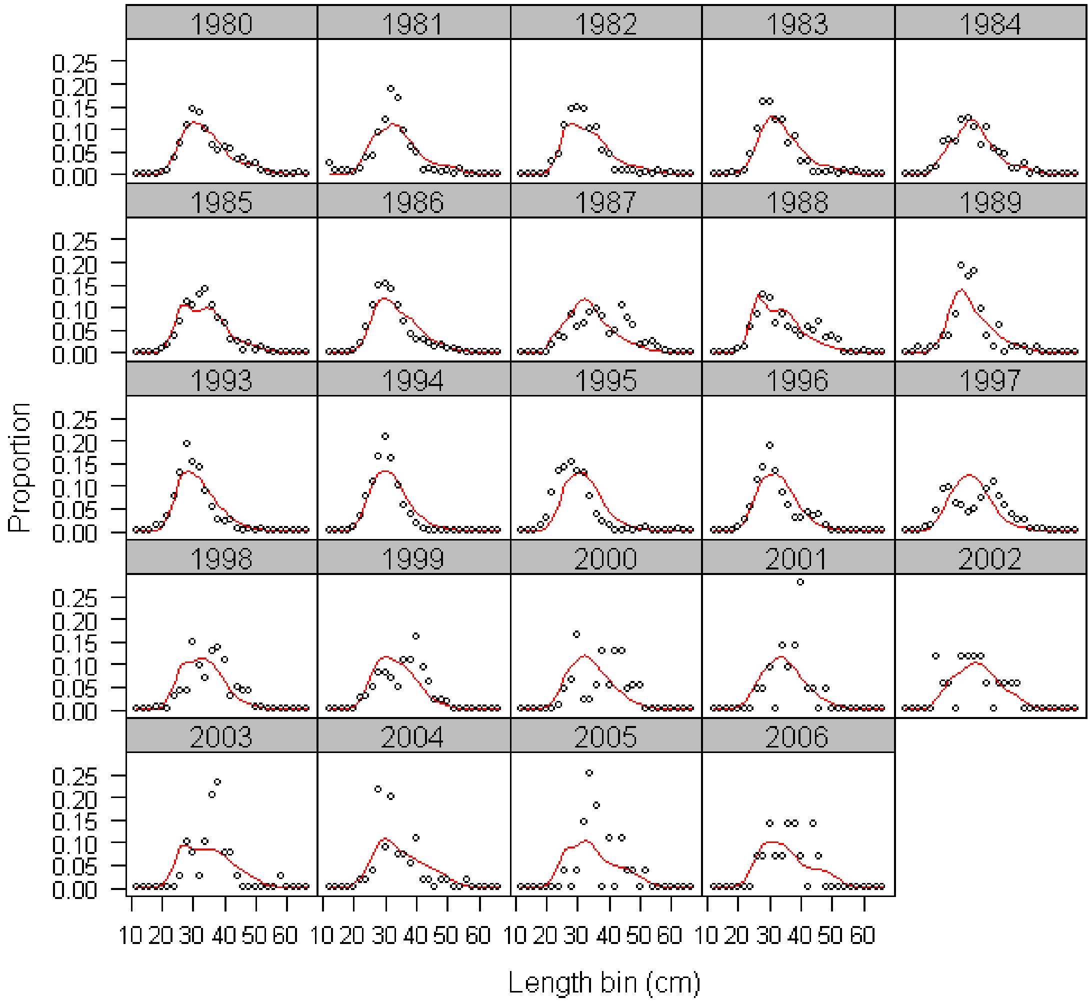


Figure 140. Fit to combined sex length-frequency observations for the northern California recreational fleet.

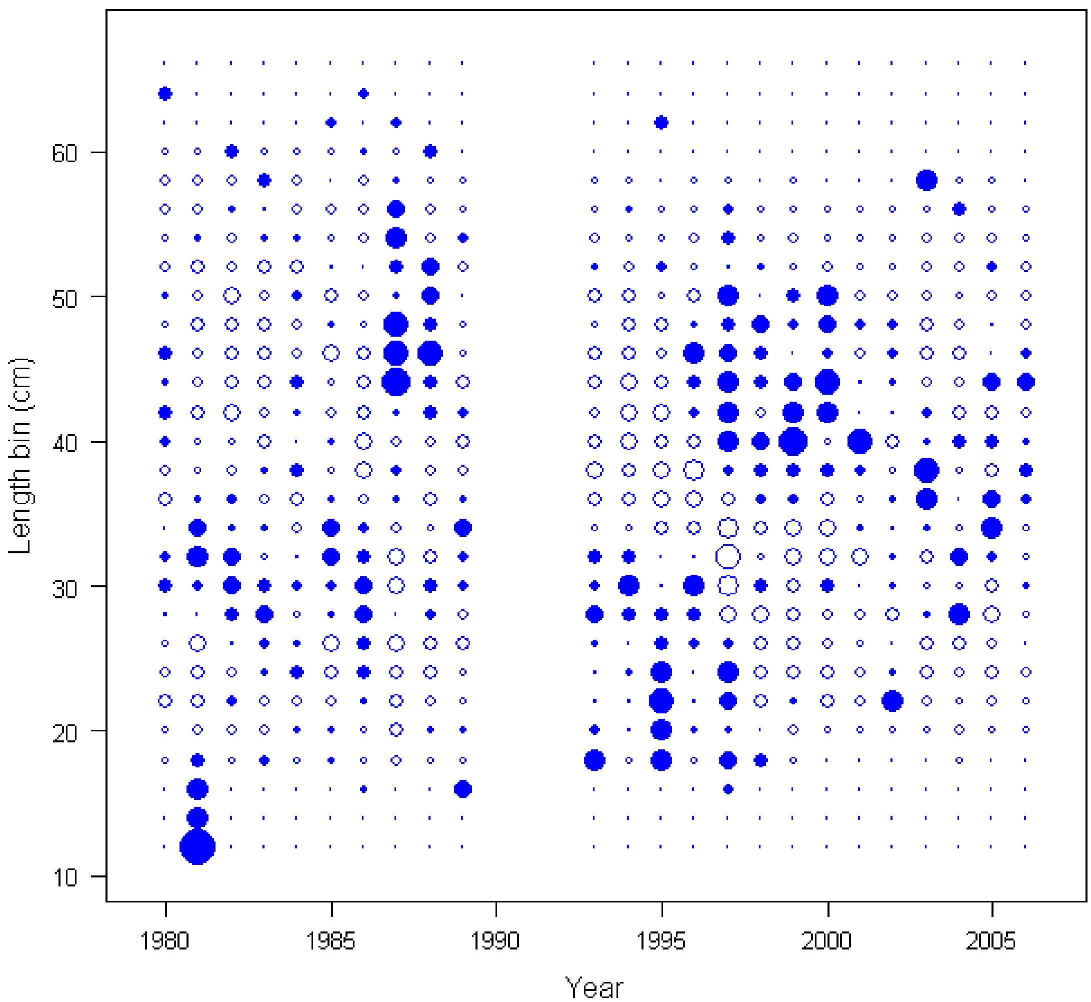


Figure 141. Pearson residuals for the fit to combined sex length-frequency observations for the northern California recreational fleet. The largest circle represents a value of 6.88; filled circles show observation greater than estimate; solid circles show observation less than estimate.

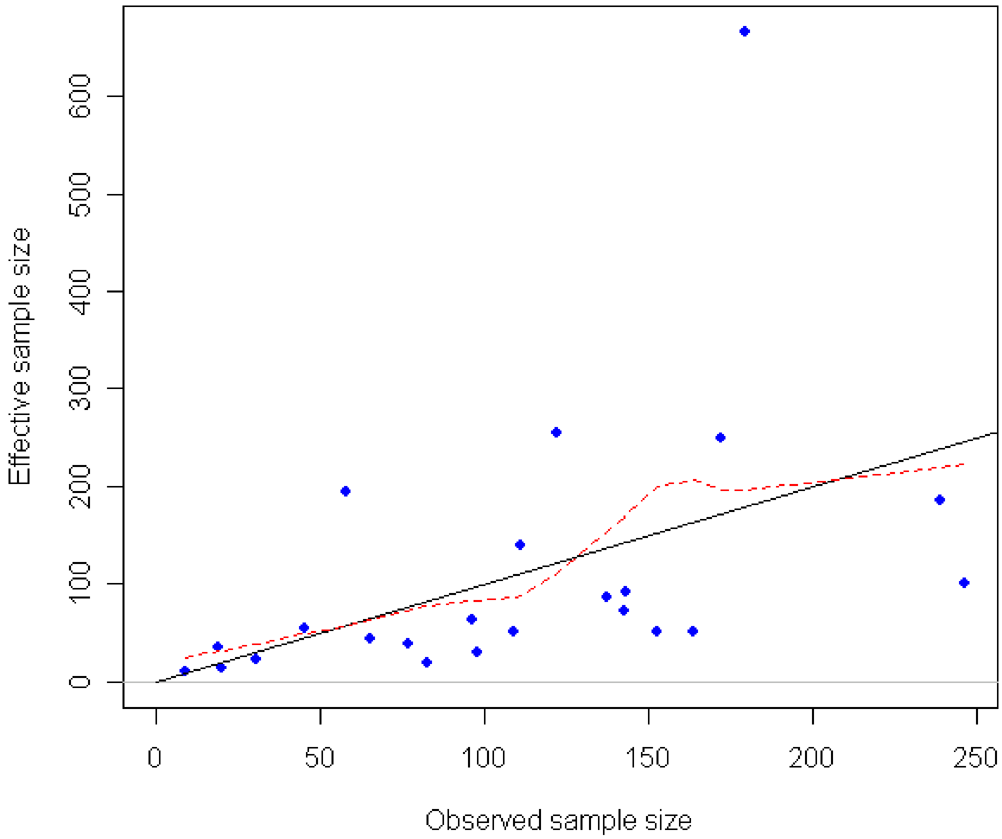


Figure 142. Observed and effective sample sizes for the combined sex Oregon-Washington recreational fleet length-frequency observations.

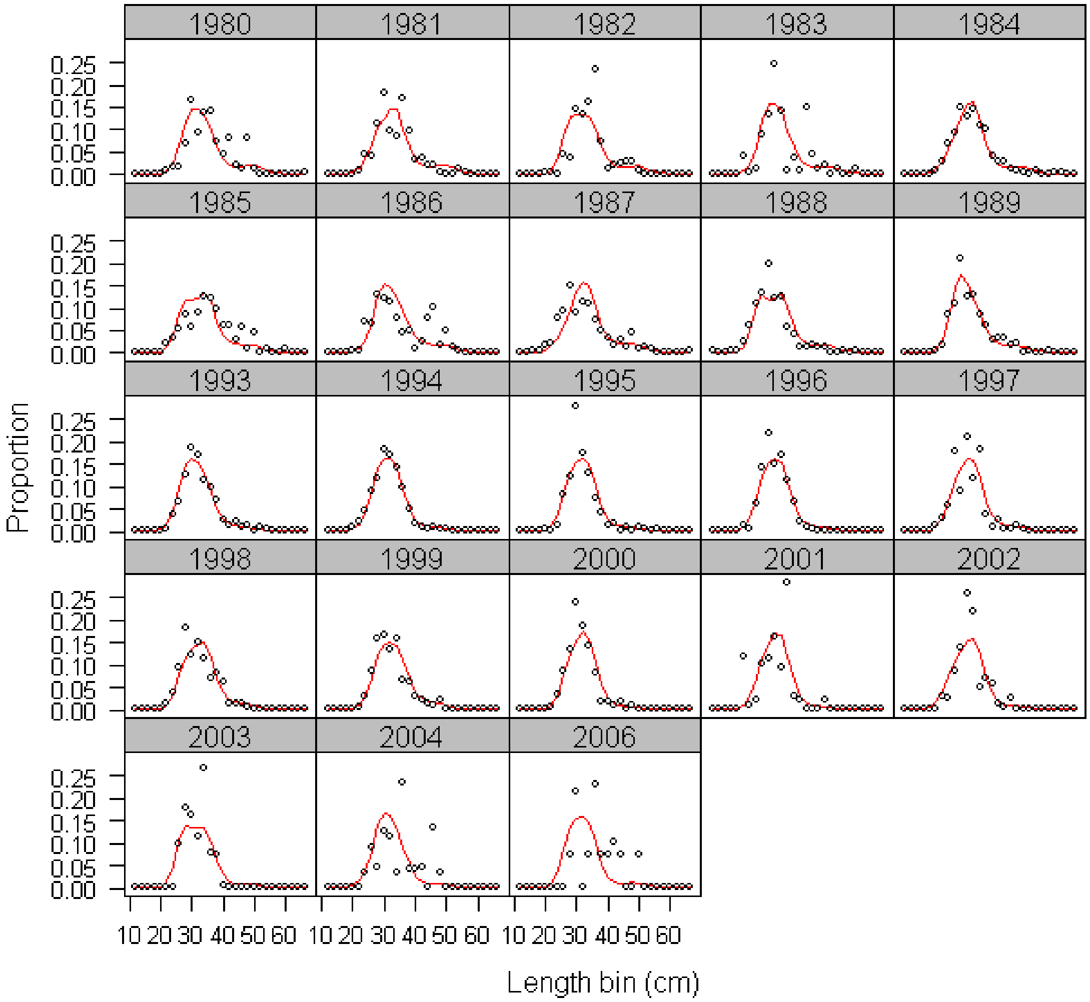


Figure 143. Fit to combined sex length-frequency observations for the Oregon-Washington recreational fleet.

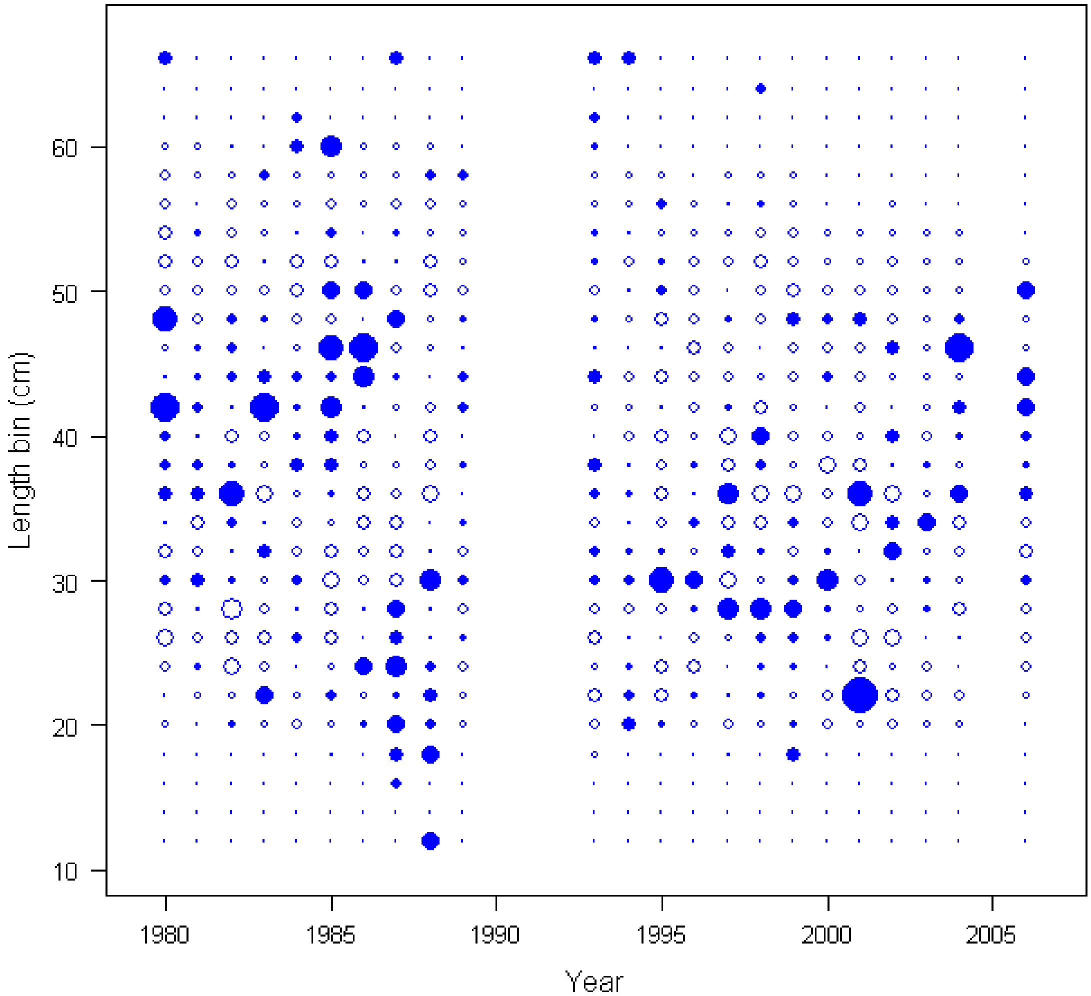


Figure 144. Pearson residuals for the fit to combined sex length-frequency observations for the Oregon-Washington recreational fleet. The largest circle represents a value of 8.81; filled circles show observation greater than estimate; solid circles show observation less than estimate.

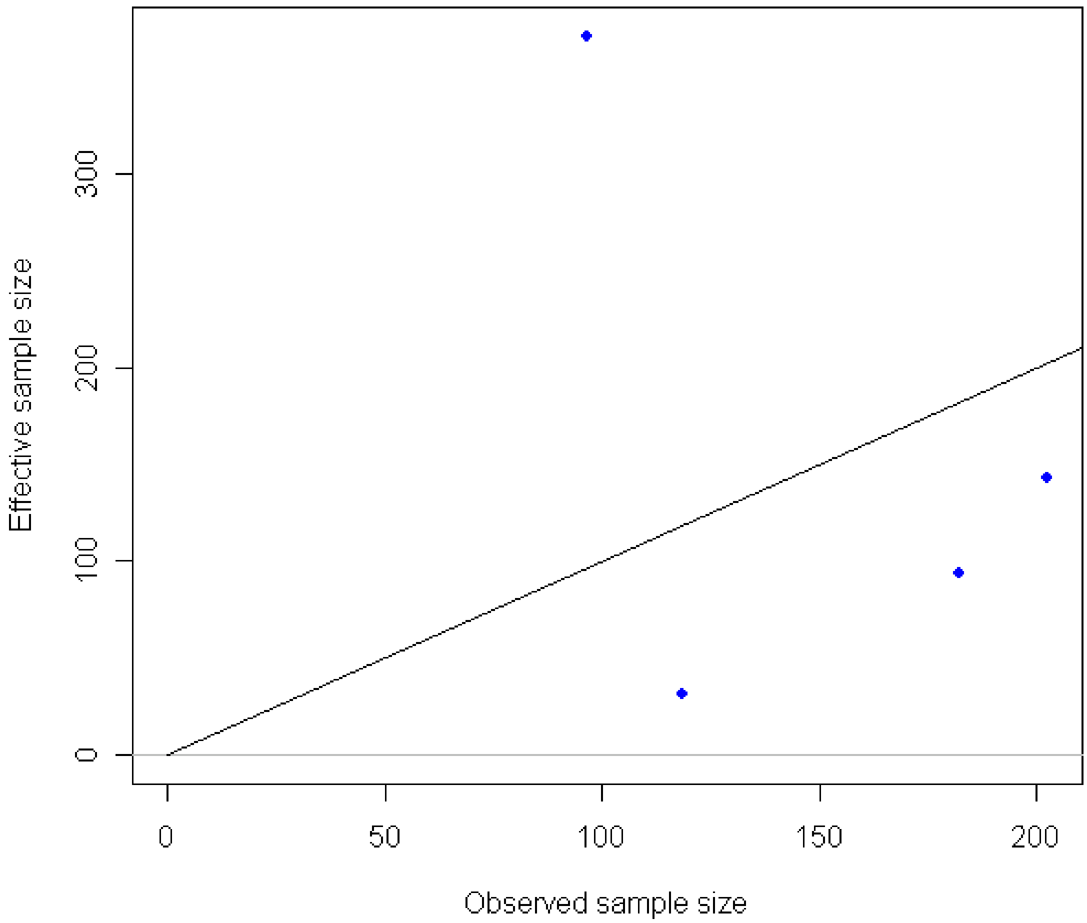


Figure 145. Observed and effective sample sizes for the sex specific at-sea whiting fleet length-frequency observations.

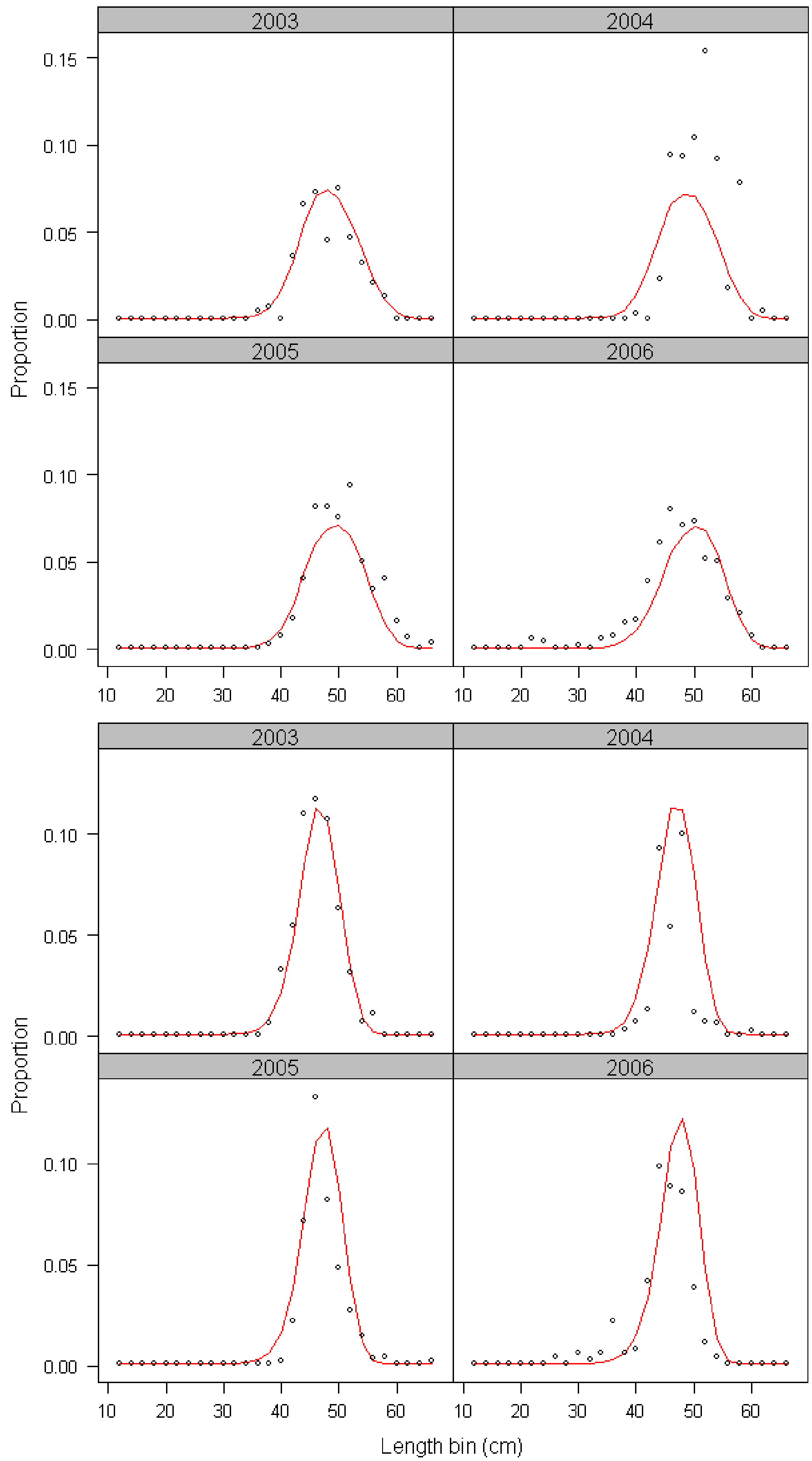


Figure 146. Fit to female (upper panel) and male (lower panel) length-frequency observations for the at-sea whiting fleet.

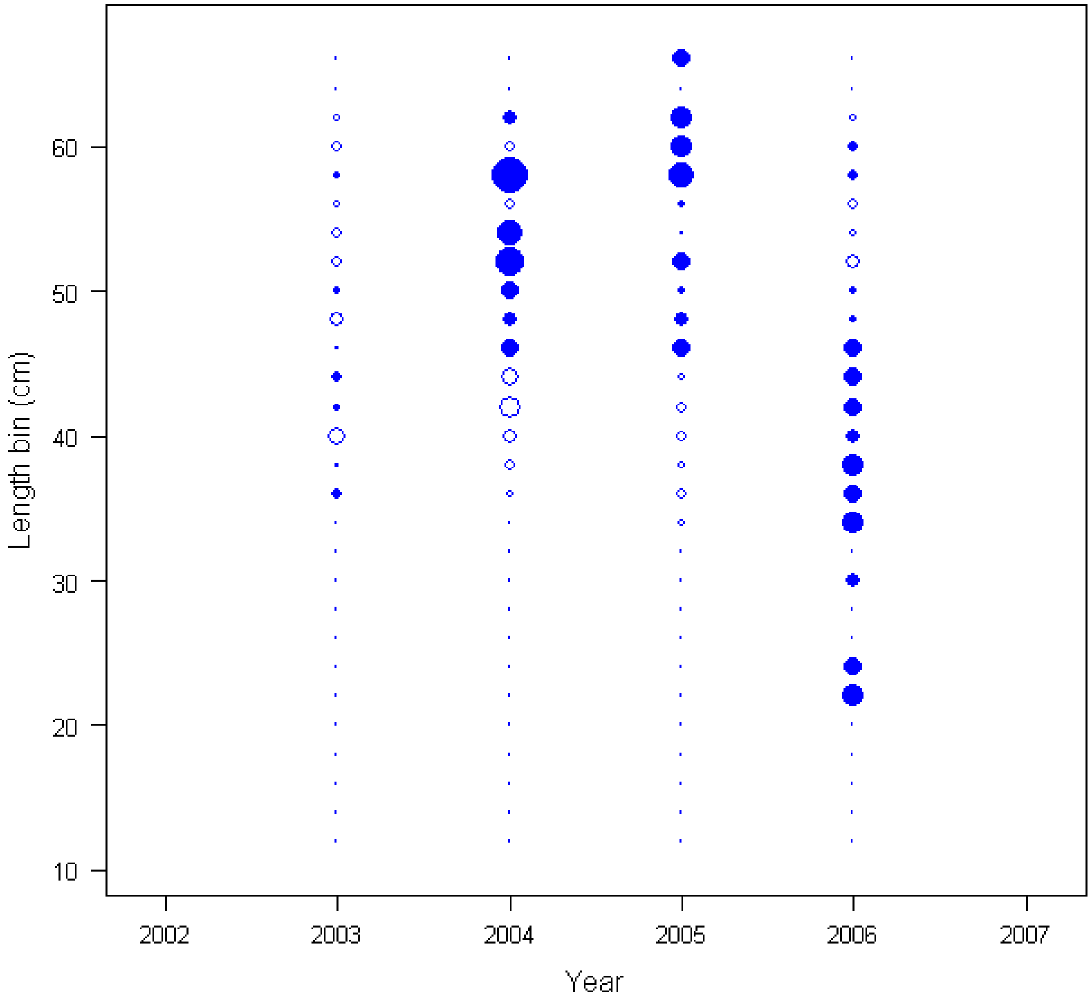


Figure 147. Pearson residuals for the fit to female length-frequency observations for the at-sea whiting fleet. The largest circle represents a value of 6.32; filled circles show observation greater than estimate; solid circles show observation less than estimate.

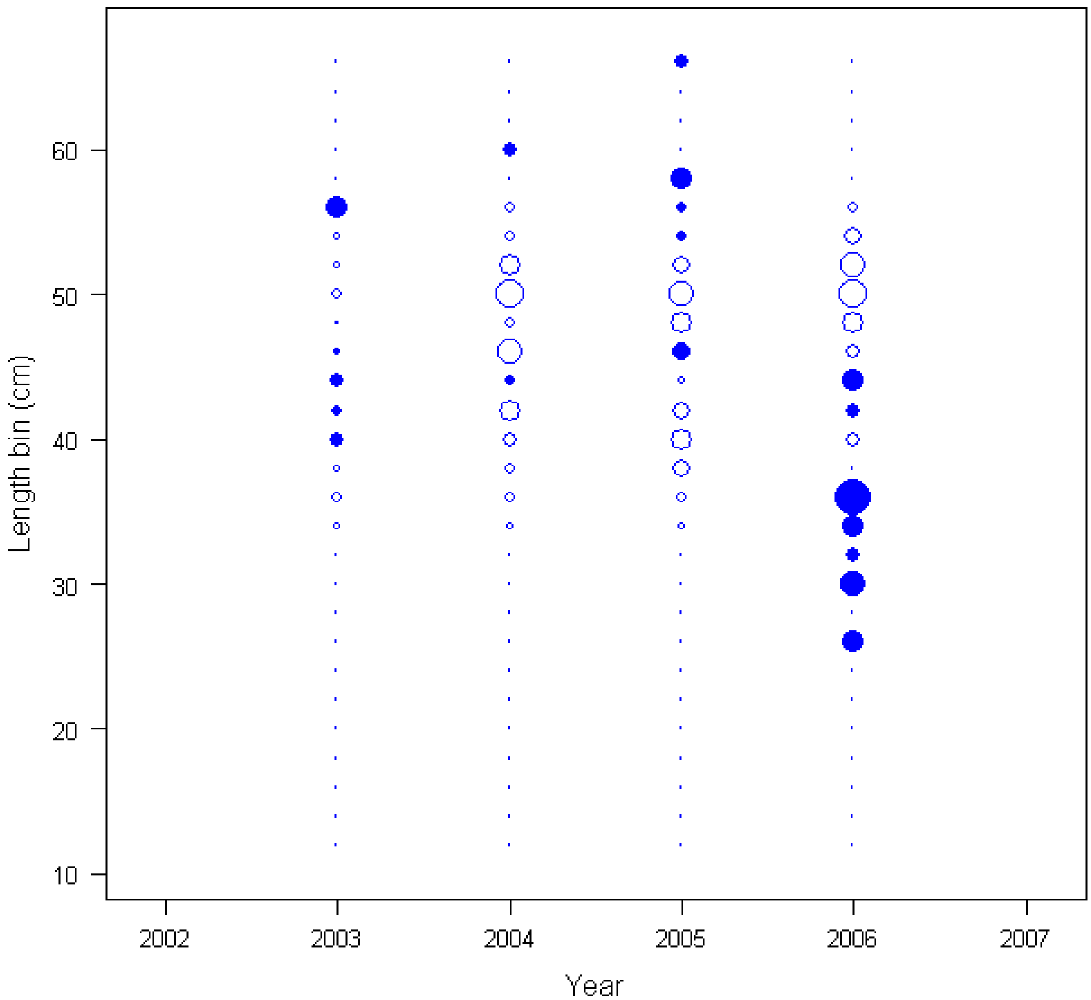


Figure 148. Pearson residuals for the fit to female length-frequency observations for the at-sea whiting fleet. The largest circle represents a value of 5.02; filled circles show observation greater than estimate; solid circles show observation less than estimate.

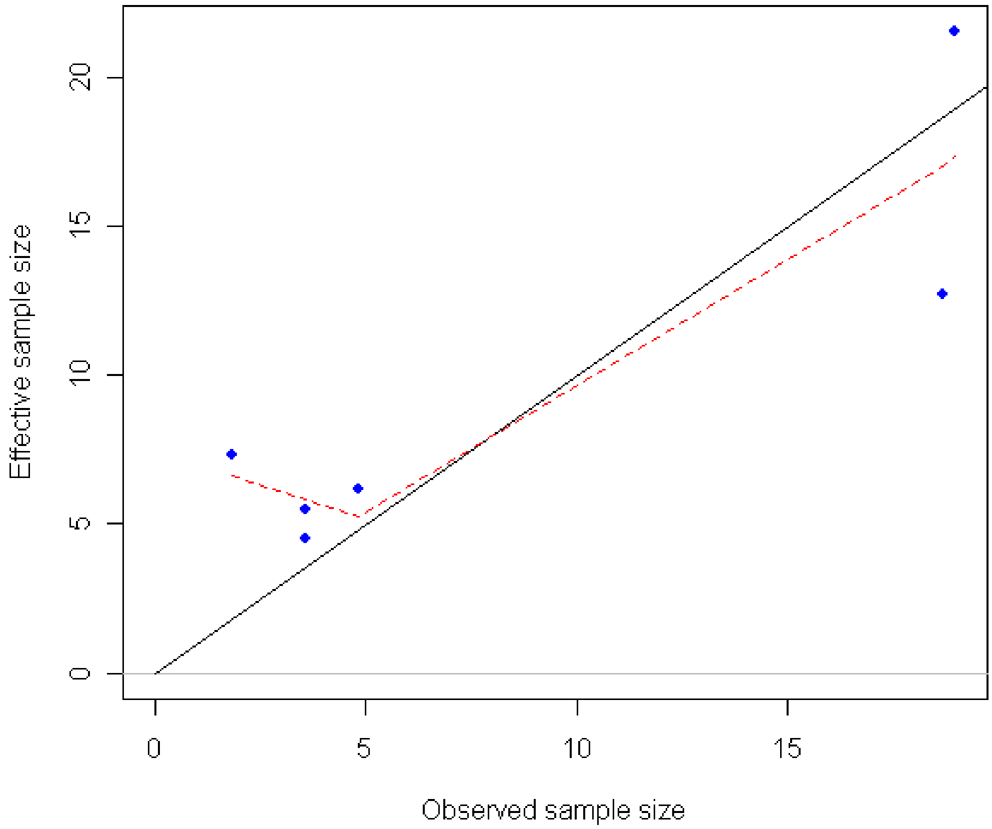


Figure 149. Observed and effective sample sizes for the sex specific southern California trawl fleet age-frequency observations.

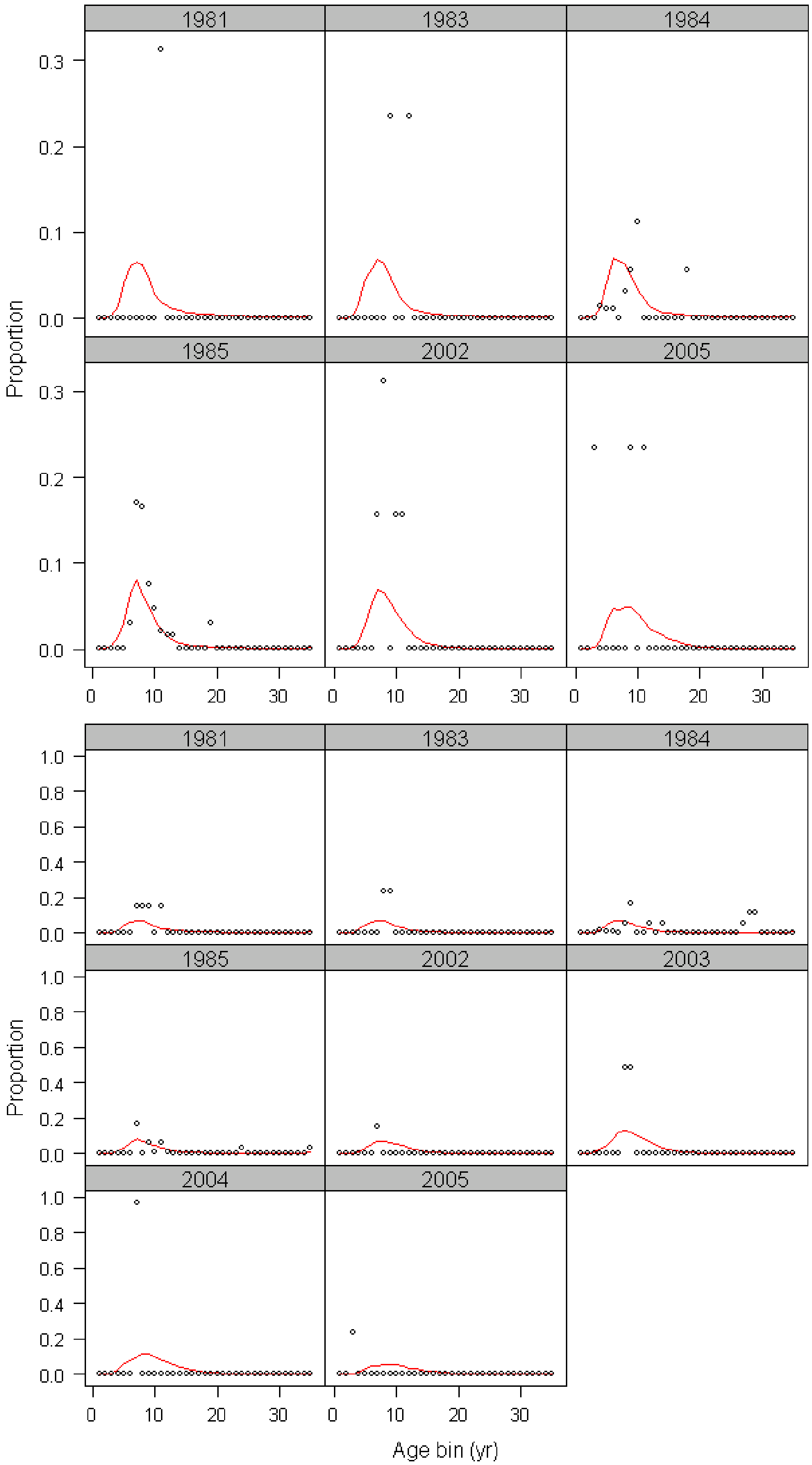


Figure 150. Fit to the southern California fishery female (upper panel) and male (lower panel) age-frequencies.

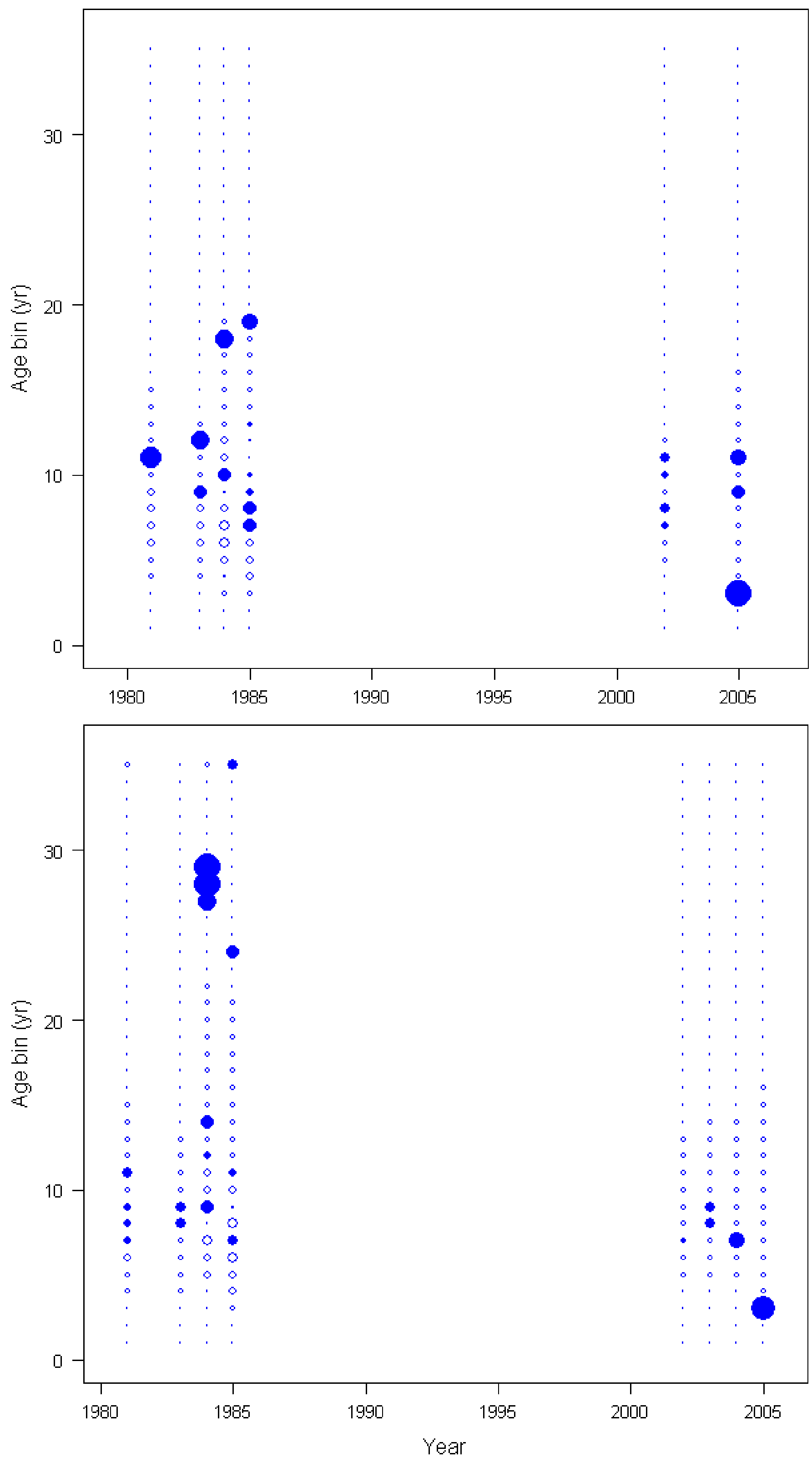


Figure 151. Pearson residuals for the fit to southern California fishery female (upper panel, maximum = 7.64) and male (lower panel, maximum = 9.56) length-frequencies.

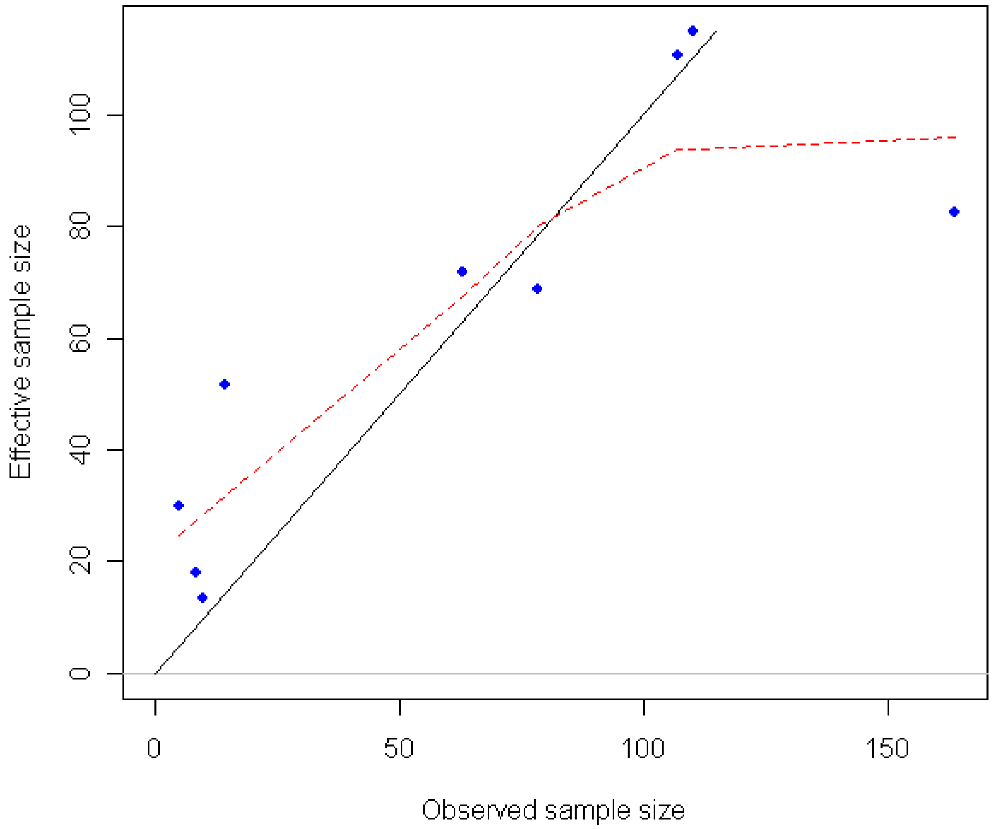


Figure 152. Observed and effective sample sizes for the sex specific northern California trawl fleet age-frequency observations.

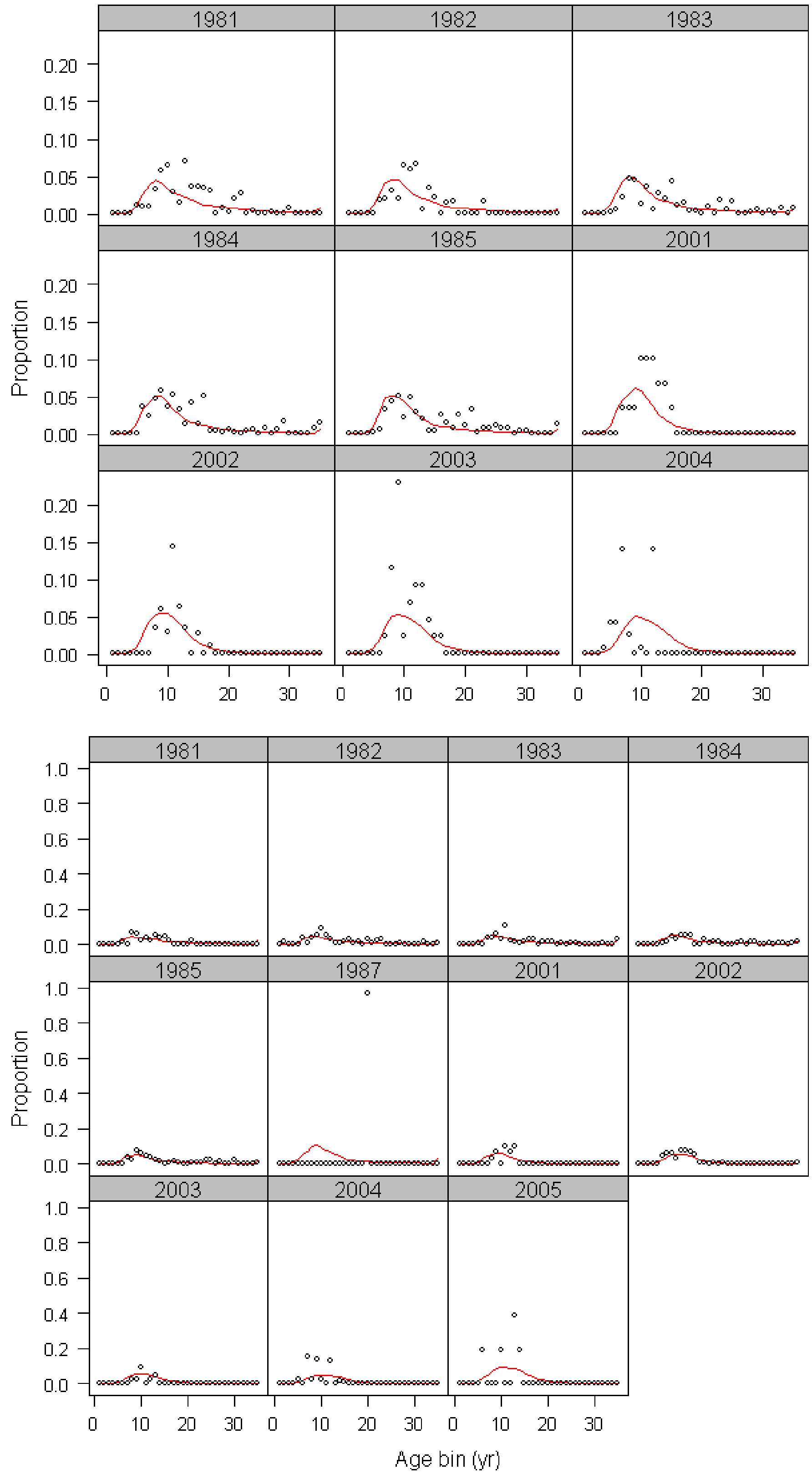


Figure 153. Fit to the northern California trawl fishery female (upper panel) and male (lower panel) age-frequencies.

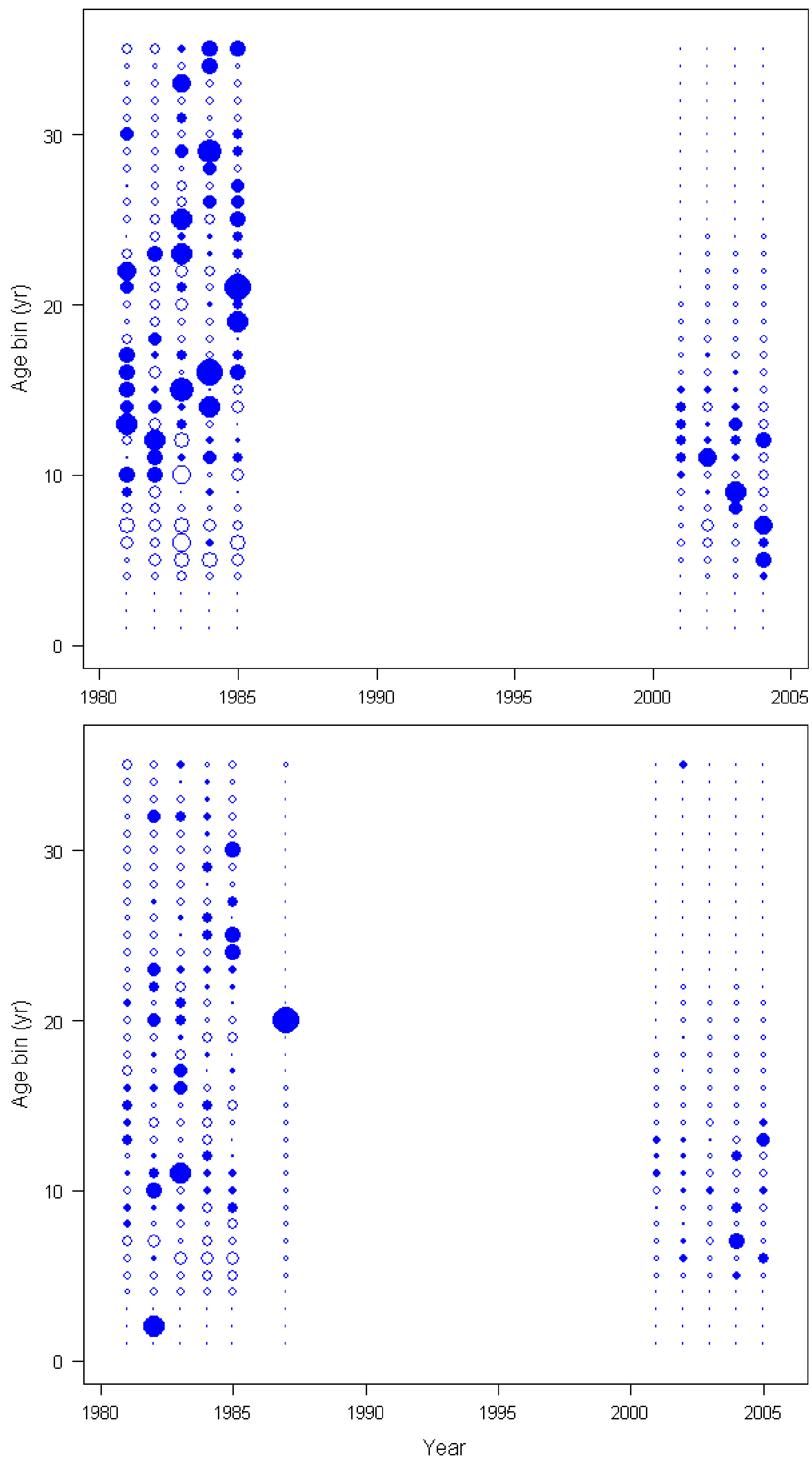


Figure 154. Pearson residuals for the fit to northern California trawl fishery female (upper panel, maximum = 4.19) and male (lower panel, maximum = 8.14) length-frequencies.

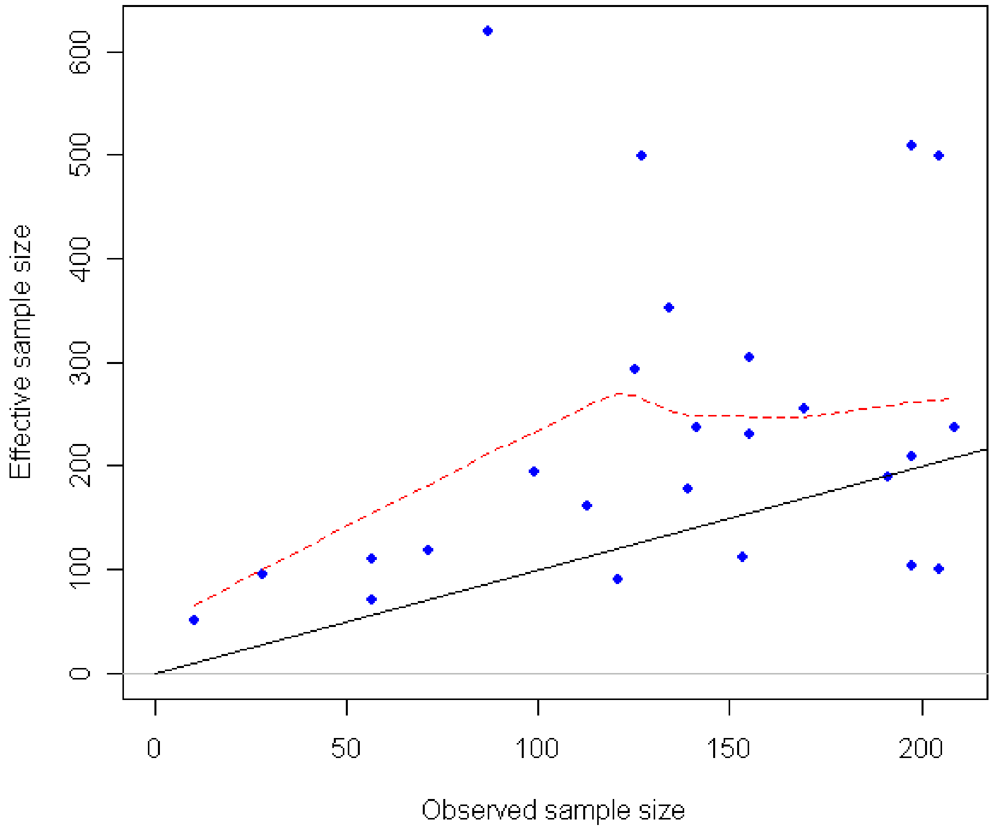


Figure 155. Observed and effective sample sizes for the sex specific Oregon trawl fleet age-frequency observations.

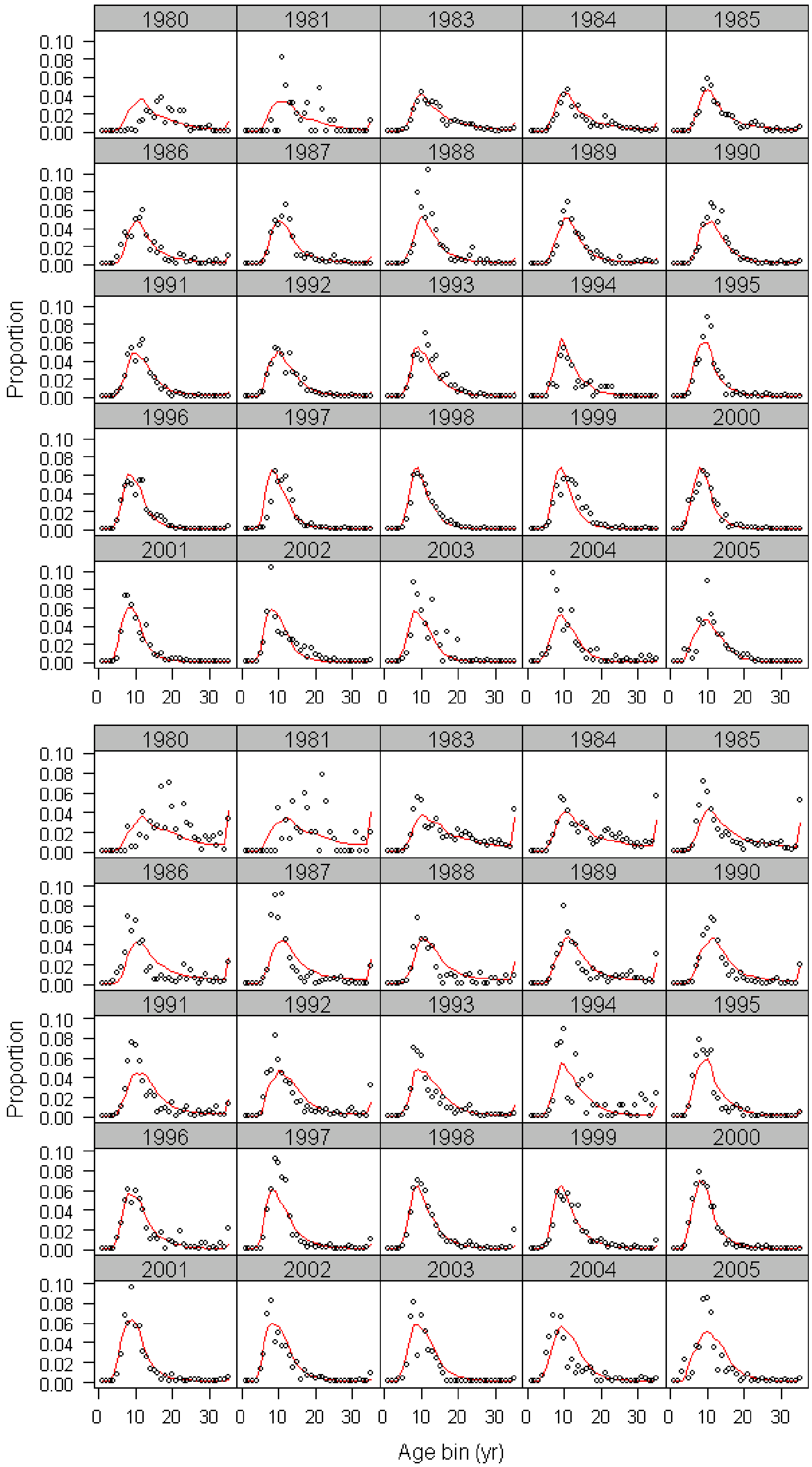


Figure 156. Fit to the Oregon trawl fishery female (upper panel) and male (lower panel) age-frequencies.

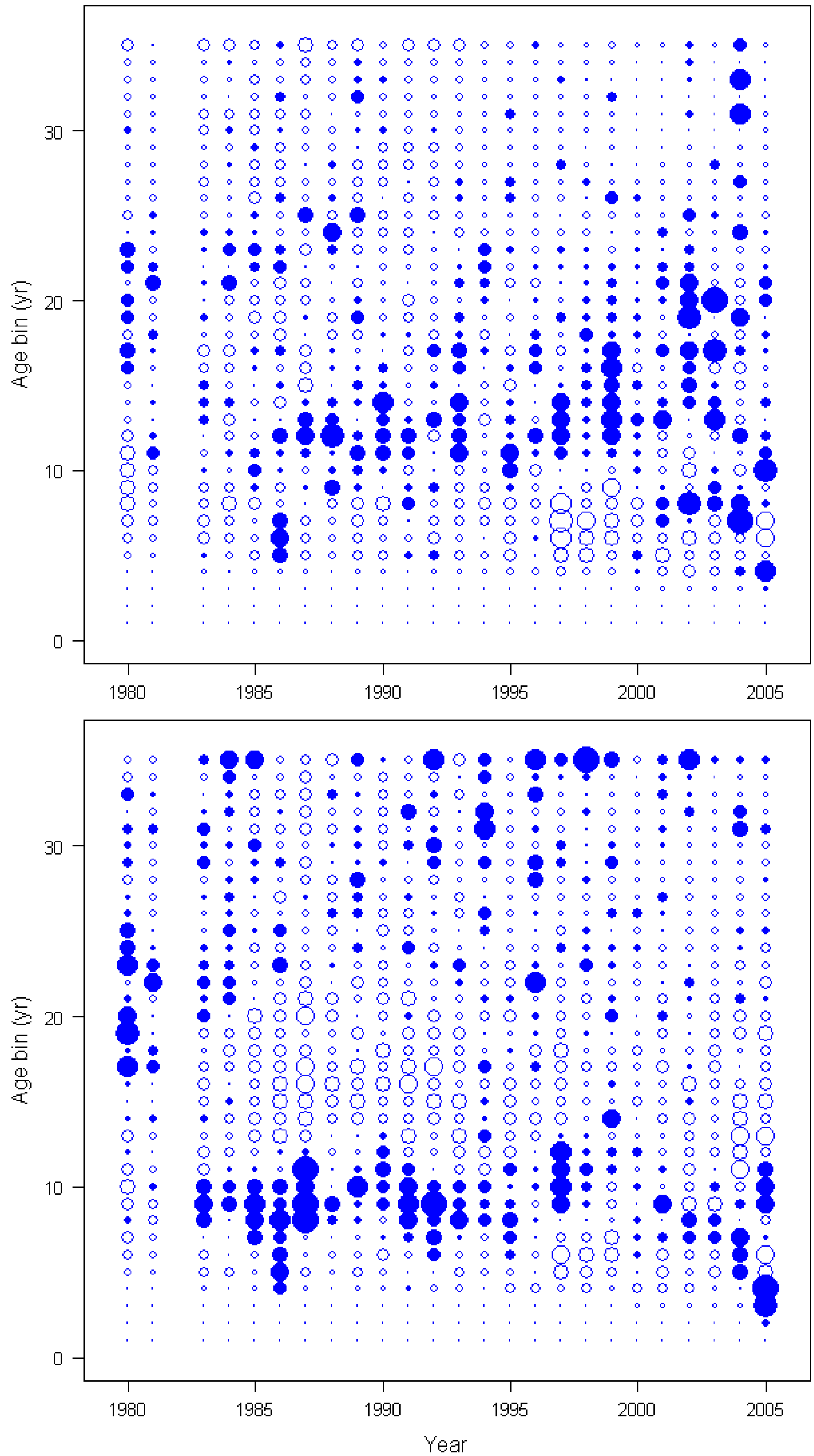


Figure 157. Pearson residuals for the fit to Oregon trawl fishery female (upper panel, maximum = 3.40) and male (lower panel, maximum = 3.64) age-frequencies.

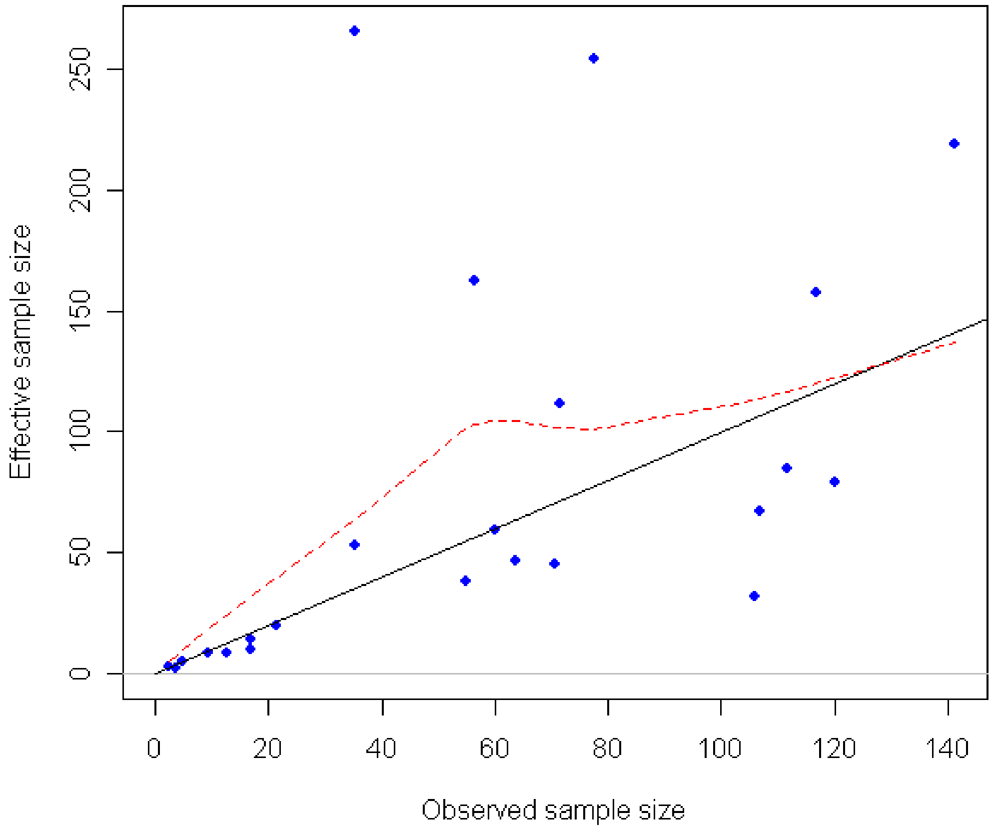


Figure 158. Observed and effective sample sizes for the sex specific Washington trawl fleet age-frequency observations based on WDFW ageing-error.

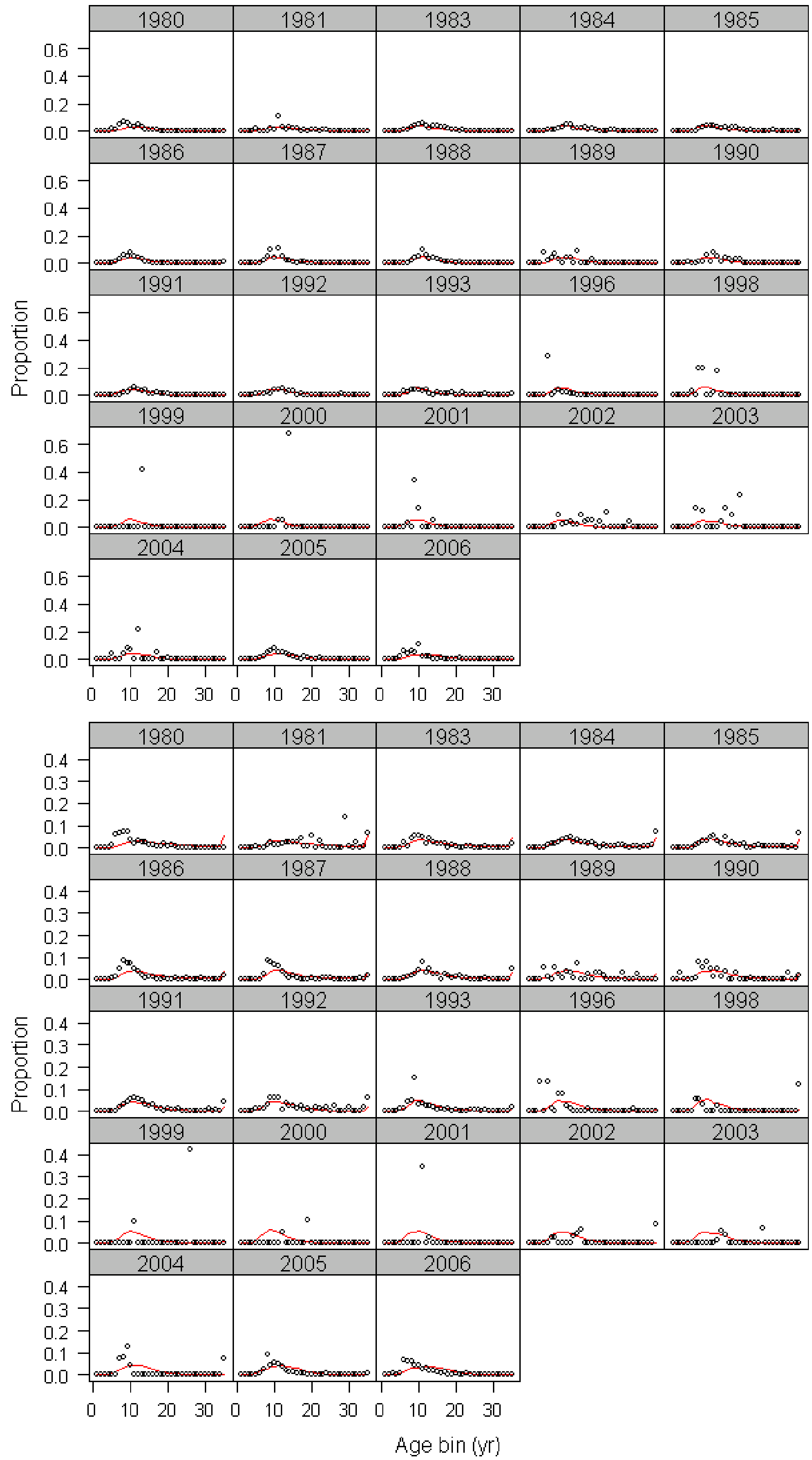


Figure 159. Fit to the Washington trawl fishery female (upper panel) and male (lower panel) age-frequencies based on WDFW ageing-error.

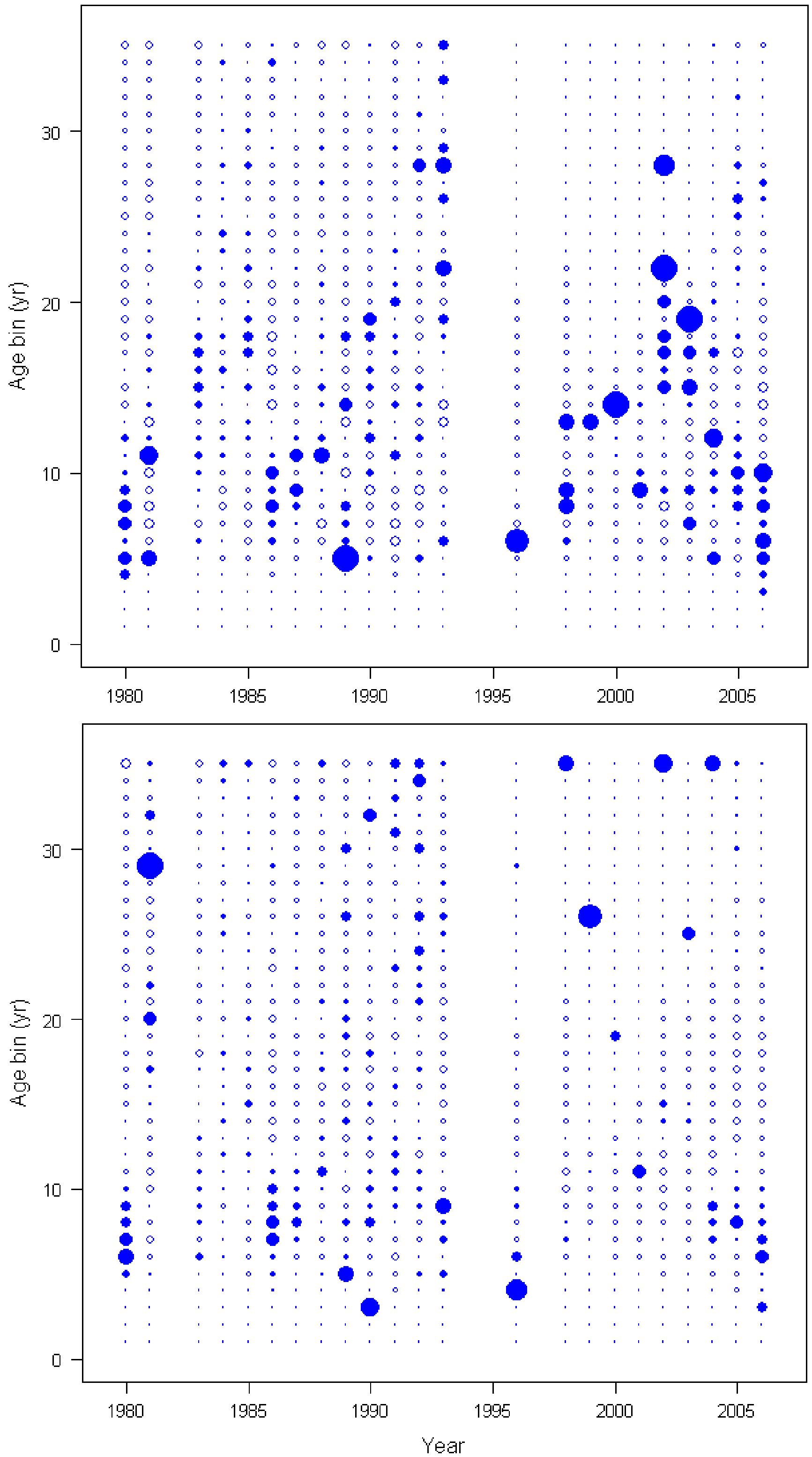


Figure 160. Pearson residuals for the fit to Washington trawl fishery female (upper panel, maximum = 8.79) and male (lower panel, maximum = 14.79) age-frequencies based on WDFW ageing-error.

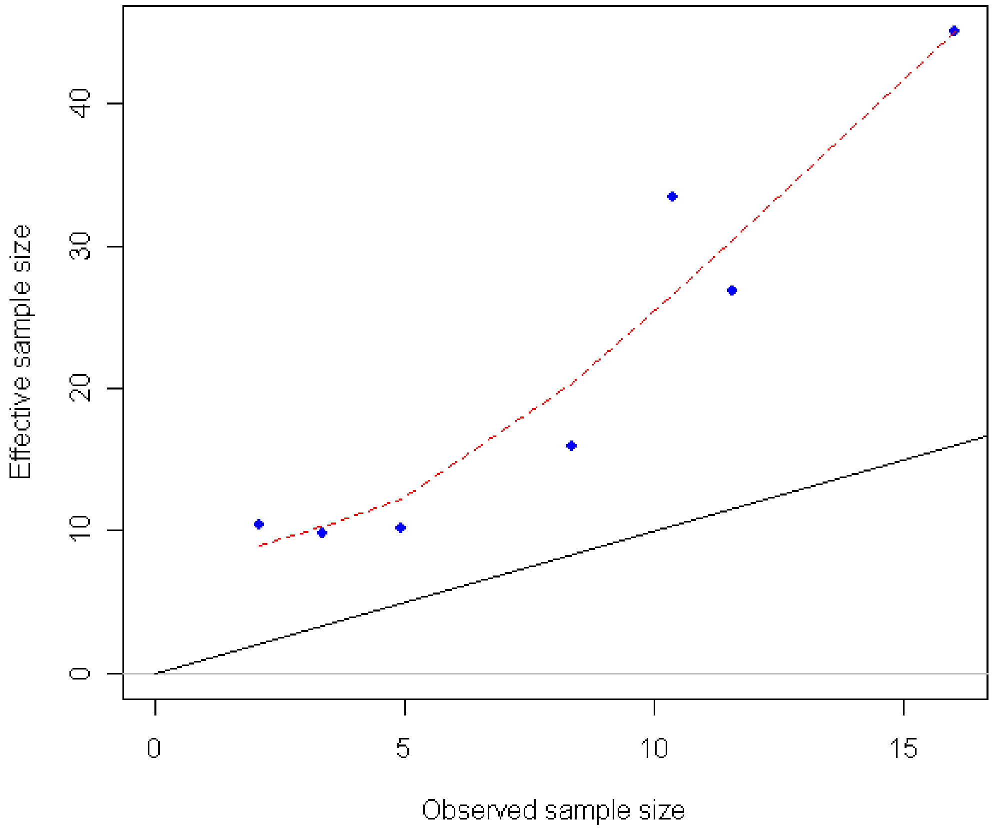


Figure 161. Observed and effective sample sizes for the sex specific Washington-Oregon non-trawl fleet age-frequency observations.

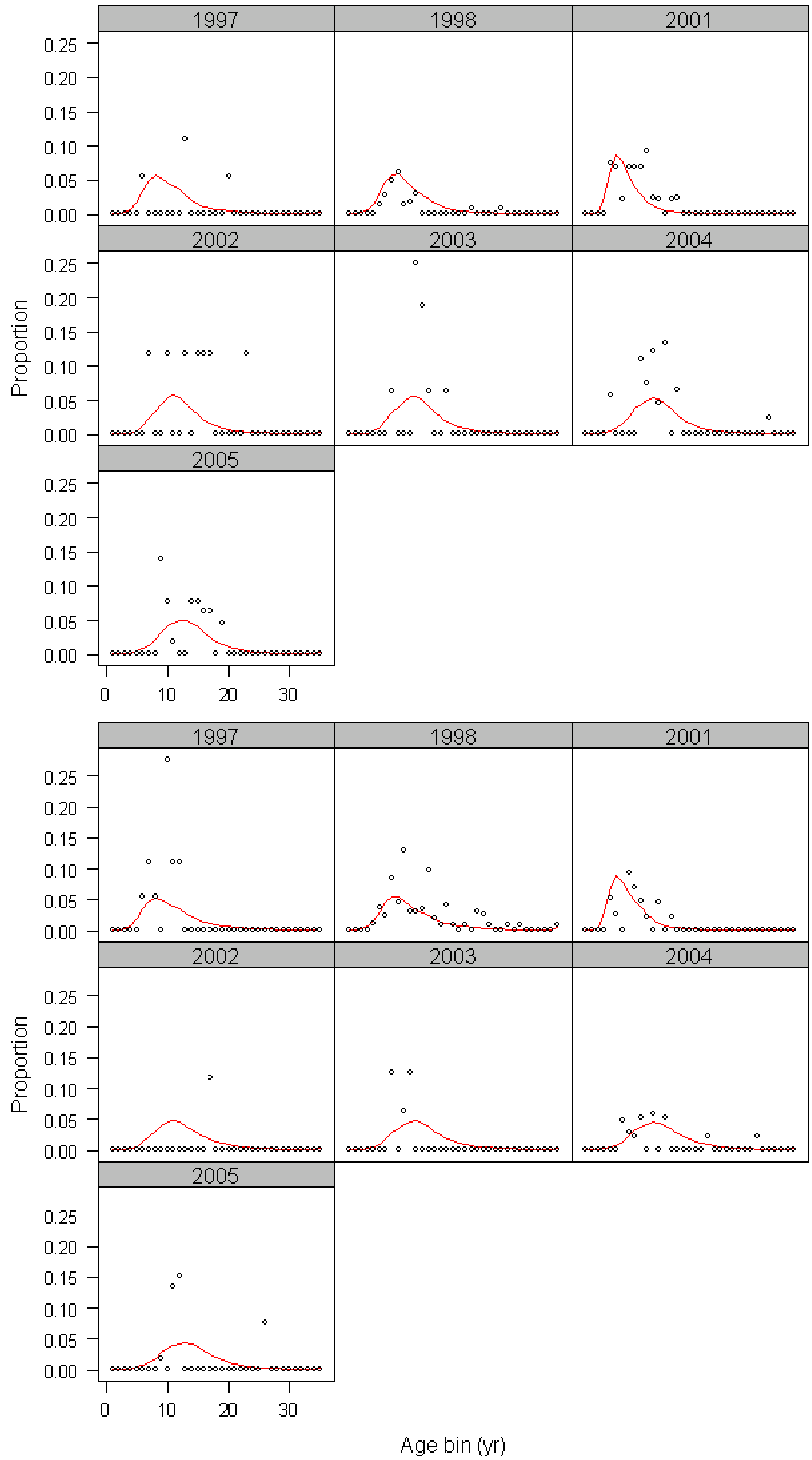


Figure 162. Fit to the Washington-Oregon non-trawl fishery female (upper panel) and male (lower panel) age-frequencies.

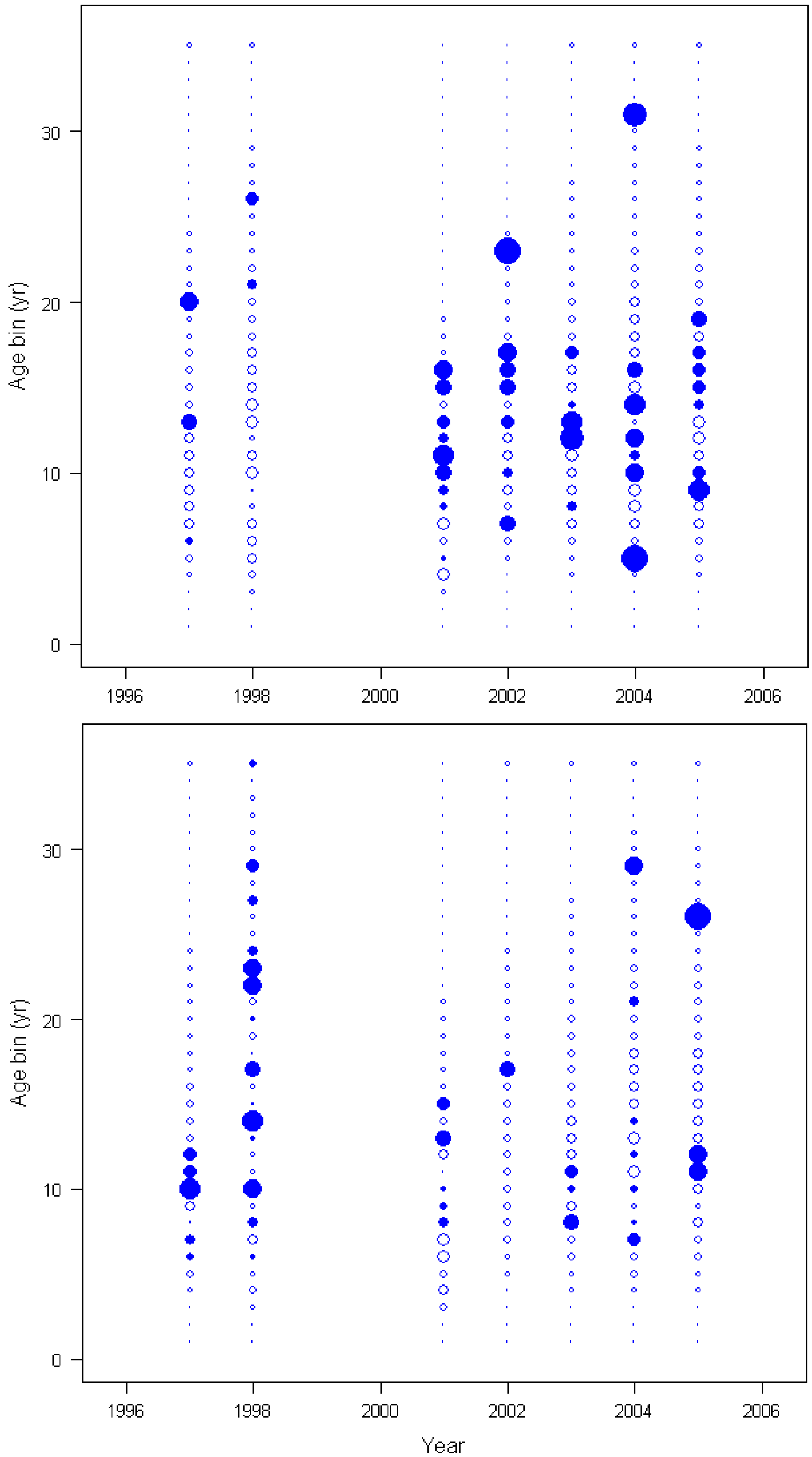


Figure 163. Pearson residuals for the fit to Washington-Oregon non-trawl fishery female (upper panel, maximum = 2.67) and male (lower panel, maximum = 3.44) age-frequencies.

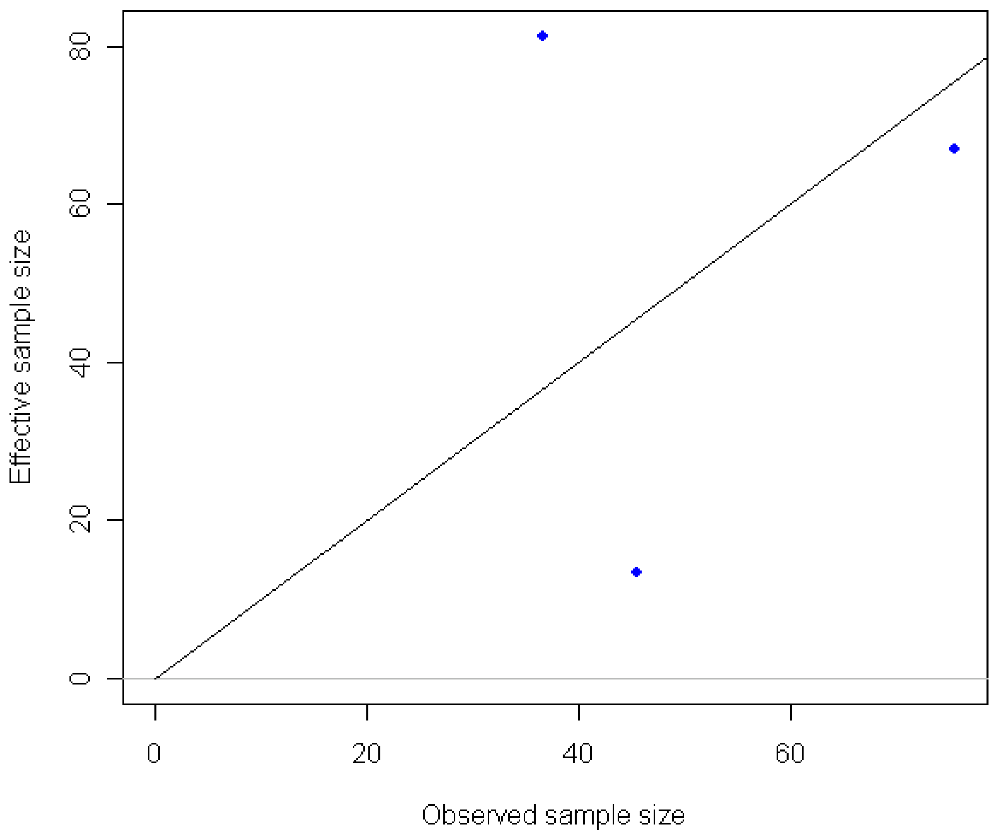


Figure 164. Observed and effective sample sizes for the sex specific the at-sea whiting bycatch fishery age-frequency observations.

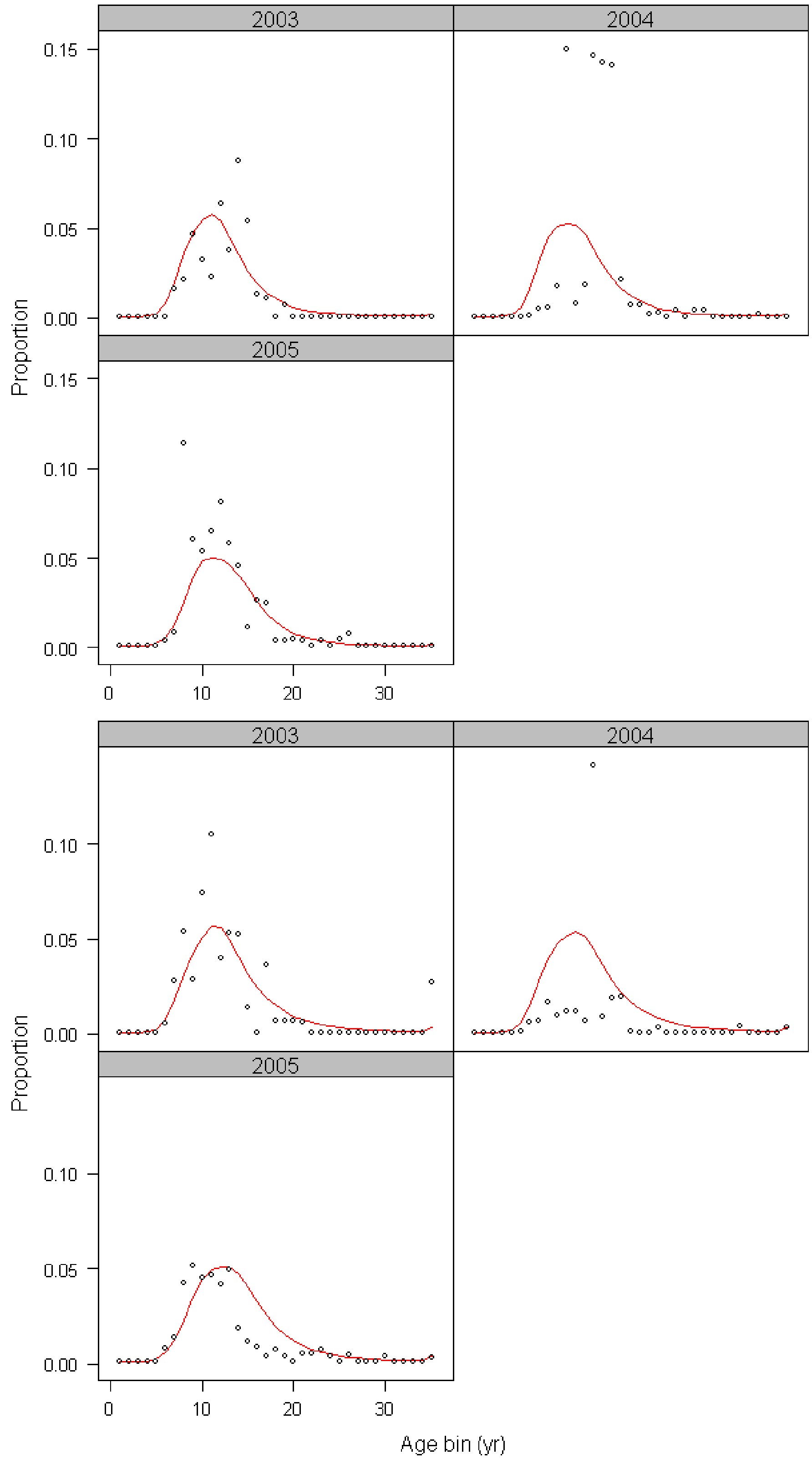


Figure 165. Fit to the at-sea whiting bycatch fishery female (upper panel) and male (lower panel) age-frequencies.

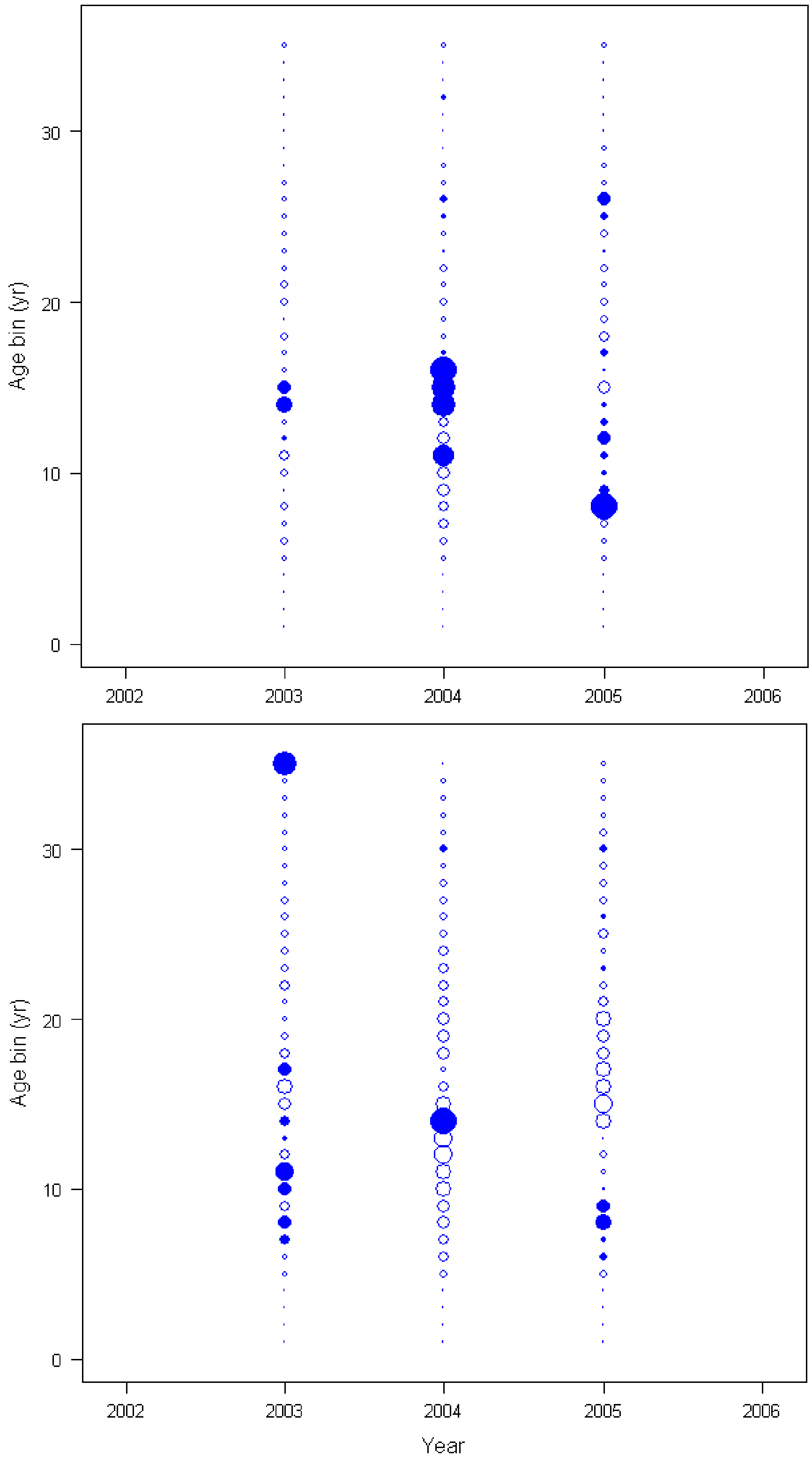


Figure 166. Pearson residuals for the fit to the at-sea whiting bycatch fishery female (upper panel, maximum = 5.43) and male (lower panel, maximum = 3.16) age-frequencies.

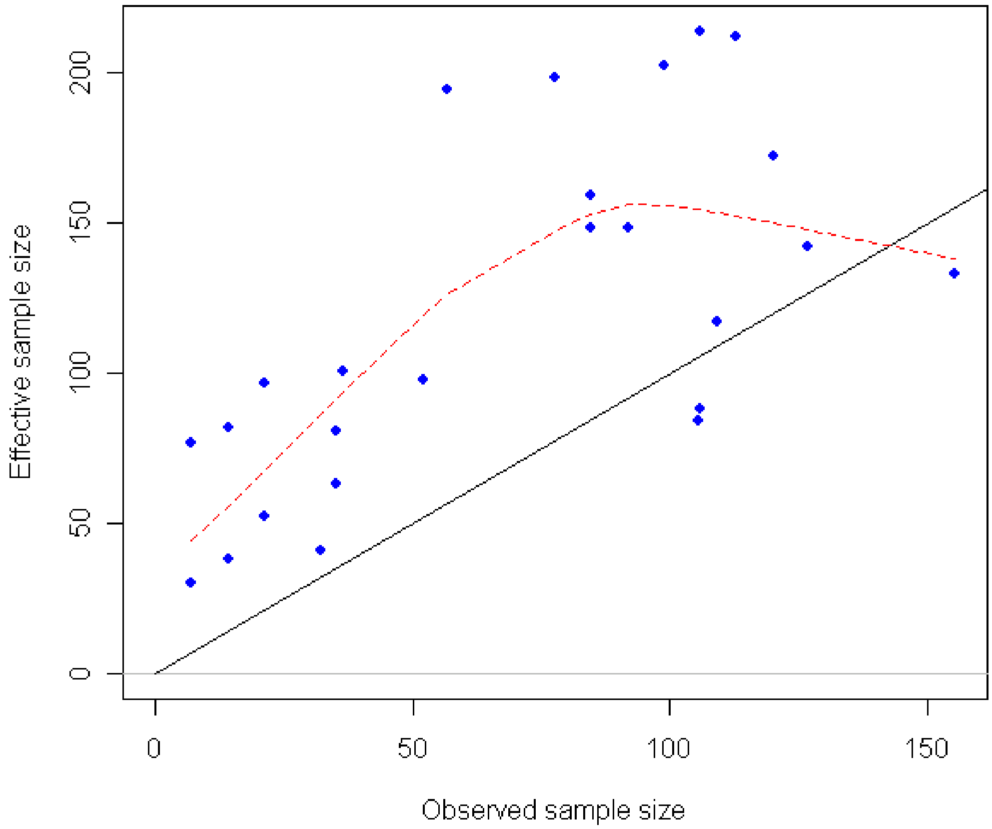


Figure 167. Observed and effective sample sizes for the sex specific Washington trawl fleet age-frequency observations based on CAP ageing-error.

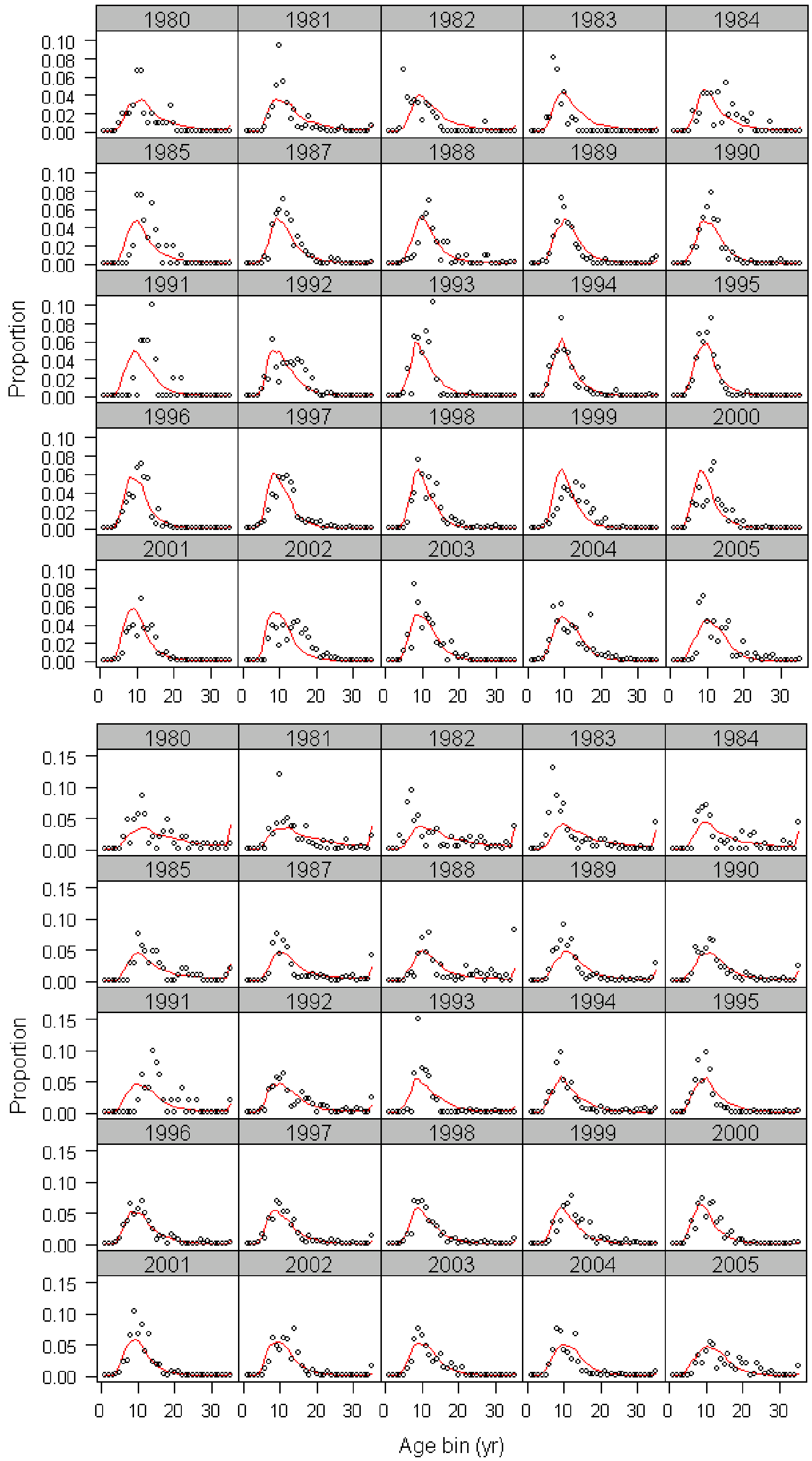


Figure 168. Fit to the Washington trawl fishery female (upper panel) and male (lower panel) age-frequencies based on CAP ageing-error.

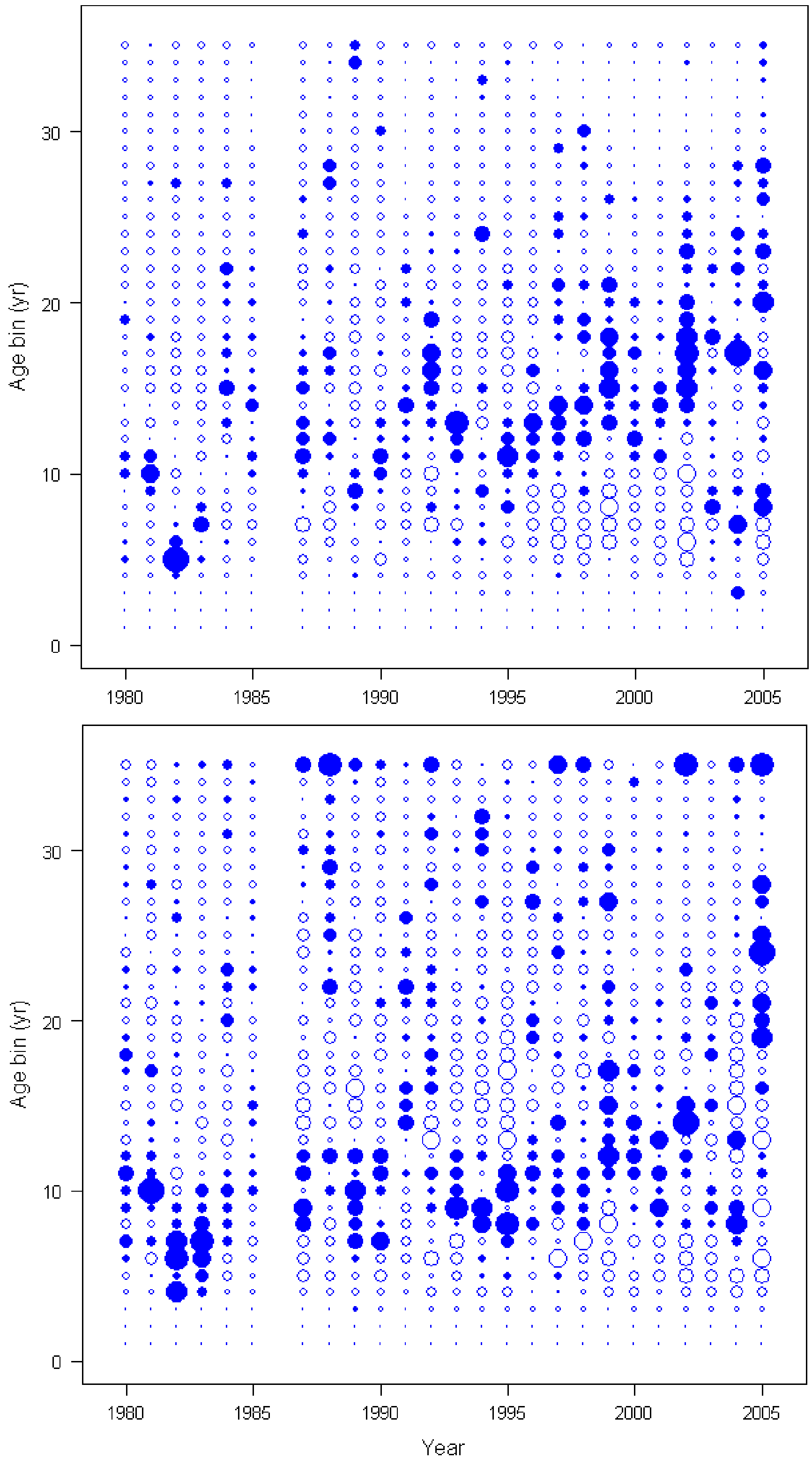


Figure 169. Pearson residuals for the fit to the Washington trawl fishery female (upper panel, maximum = 3.91) and male (lower panel, maximum = 3.15) age-frequencies based on CAP ageing-error.

13. Appendix B: SS2 Data file

.dat file for Canary rockfish assessment 2007 post-STAR review
Ian Stewart, NWFSC 206-302-2447

Global model specifications
1916 # Start year
2006 # End year
1 # Number of seasons/year
12 # Number of months/season (vector, by season)
1 # Spawning occurs at beginning of season
12 # Number of fishing fleets
5 # Number of survey fleets

Fleet names (separated by "%")
1CA_S_trwl%2CA_N_trwl%3OR_trwl%4WA_trwl%5CA_S_nontrwl%6CA_N_nontrwl%7WAOR_nontrwl%8CA_S_rec%9CA_N_rec%10WAOR_rec%11_atseahake%12_NWFSC%13_triennial%14_pre_recruit%15_WAtrl_mirror%16_NWFSC_mirror%17_tri_mirror
Fleet timing (proportion of season)
0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5

2 # Number of genders (1/2)
40 # Accumulator age

Catch section
Initial equilibrium catch (landings + discard in mt) by fishing fleet
0 0 0 0 0 0 0 0 0 0 0 0
Catch series (mt)

0.00	397.05	0.00	0.00	0.00	76.81	0.00	0.00	0.00	0.00	0.00	0.00	# 1916
0.00	627.50	0.00	0.00	0.00	121.39	0.00	0.00	0.00	0.00	0.00	0.00	# 1917
0.00	665.34	0.00	0.00	0.00	128.70	0.00	0.00	0.00	0.00	0.00	0.00	# 1918
0.00	435.72	0.00	0.00	0.00	84.29	0.00	0.00	0.00	0.00	0.00	0.00	# 1919
0.00	454.69	0.00	0.00	0.00	87.96	0.00	0.00	0.00	0.00	0.00	0.00	# 1920
0.00	384.35	0.00	0.00	0.00	74.35	0.00	0.00	0.00	0.00	0.00	0.00	# 1921
0.00	348.06	0.00	0.00	0.00	67.33	0.00	0.00	0.00	0.00	0.00	0.00	# 1922
0.00	411.39	0.00	0.00	0.00	79.58	0.00	0.00	0.00	0.00	0.00	0.00	# 1923
0.00	382.84	0.00	0.00	0.00	74.06	0.00	0.00	0.00	0.00	0.00	0.00	# 1924
0.00	443.03	0.00	0.00	0.00	85.70	0.00	0.00	0.00	0.00	0.00	0.00	# 1925
0.00	608.69	0.00	0.00	0.00	117.75	0.00	0.00	0.00	0.00	0.00	0.00	# 1926
0.00	515.84	0.00	0.00	0.00	99.78	0.00	0.00	0.00	0.00	0.00	0.00	# 1927
0.00	518.20	8.16	0.00	0.00	100.24	0.00	0.00	0.00	0.00	0.00	0.00	# 1928
0.00	487.25	14.19	0.00	0.00	94.25	0.00	0.00	0.00	0.00	0.00	0.00	# 1929
0.00	583.22	13.14	0.00	0.00	112.82	0.00	0.00	0.00	0.00	0.00	0.00	# 1930
0.00	587.44	10.06	0.00	0.00	113.64	0.00	0.00	0.00	0.00	0.00	0.00	# 1931
0.00	454.95	3.69	0.04	0.00	88.01	0.00	0.00	0.00	0.00	0.00	0.00	# 1932
0.00	386.46	5.39	0.00	0.00	74.76	0.00	0.00	0.00	0.00	0.00	0.00	# 1933
0.00	371.63	5.86	0.30	0.00	71.89	0.00	0.00	0.00	0.00	0.00	0.00	# 1934
0.00	389.96	5.40	2.30	0.00	75.43	0.00	0.00	0.00	0.00	0.00	0.00	# 1935
0.00	371.62	13.41	2.96	0.00	71.89	0.00	0.00	0.00	0.00	0.00	0.00	# 1936

0.00	346.38	17.03	2.64	0.00	67.00	0.00	0.00	0.00	0.00	0.00	0.00
	#	1937									
0.00	293.58	15.47	3.90	0.00	56.79	0.00	0.00	0.00	0.00	0.00	0.00
	#	1938									
0.00	269.04	11.49	4.09	0.00	52.04	0.00	0.00	0.00	0.00	0.00	0.00
	#	1939									
0.00	288.21	68.56	9.05	0.00	55.75	0.00	0.00	0.00	0.00	0.00	0.00
	#	1940									
0.00	274.89	144.08	3.39	0.00	53.18	0.00	0.00	0.00	0.00	0.00	0.00
	#	1941									
0.00	114.41	210.19	65.81	0.00	22.27	0.00	0.00	0.00	0.00	0.00	0.00
	#	1942									
0.00	222.74	766.49	212.71	0.00	42.52	0.00	0.00	0.00	0.00	0.00	0.00
	#	1943									
0.00	518.38	1258.48	88.40	0.00	99.22	0.00	0.00	0.00	0.00	0.00	0.00
	#	1944									
0.00	1071.18	1937.94	926.43	0.00	205.53	0.00	0.00	0.00	0.00	0.00	0.00
	#	1945									
0.00	900.07	1215.83	467.02	0.00	172.12	0.00	0.00	0.00	0.00	0.00	0.00
	#	1946									
0.00	685.43	755.22	243.97	0.00	131.62	0.00	0.00	0.00	0.00	0.00	0.00
	#	1947									
0.00	524.45	519.74	396.17	0.00	100.23	0.00	0.00	0.00	0.00	0.00	0.00
	#	1948									
0.00	480.92	528.54	481.83	0.00	92.13	0.00	0.00	0.00	0.00	0.00	0.00
	#	1949									
0.00	654.04	633.70	463.03	0.00	125.54	0.00	0.00	82.80	0.00	0.00	0.00
	#	1950									
0.00	886.91	409.14	387.38	0.00	170.09	0.00	0.00	82.80	0.00	0.00	0.00
	#	1951									
0.00	864.64	418.88	369.45	0.00	166.04	0.00	0.00	82.80	0.00	0.00	0.00
	#	1952									
0.00	986.13	334.79	160.20	0.00	189.33	0.00	0.00	82.80	0.00	0.00	0.00
	#	1953									
0.00	1019.54	421.04	229.79	0.00	195.40	0.00	0.00	82.80	0.00	0.00	0.00
	#	1954									
0.00	1022.58	442.74	216.84	0.00	196.42	0.00	0.00	82.80	0.00	0.00	0.00
	#	1955									
0.00	1204.82	271.93	207.15	0.00	230.84	0.00	0.00	82.80	0.00	0.00	0.00
	#	1956									
0.00	1297.96	779.74	171.37	0.00	249.06	0.00	0.00	77.70	0.00	0.00	0.00
	#	1957									
0.00	1438.70	599.62	216.94	0.00	275.39	0.00	0.00	88.30	0.00	0.00	0.00
	#	1958									
0.00	1232.16	658.62	242.52	0.00	235.90	0.00	0.00	82.40	0.00	0.00	0.00
	#	1959									
0.00	1105.60	834.55	219.31	0.00	211.60	0.00	0.00	108.40	0.00	0.00	0.00
	#	1960									
0.00	873.75	760.81	260.34	0.00	167.05	0.00	0.00	98.30	0.00	0.00	0.00
	#	1961									
0.00	792.75	795.34	362.74	0.00	151.87	0.00	0.00	104.00	0.00	0.00	0.00
	#	1962									
0.00	947.66	544.63	292.02	0.00	181.23	0.00	0.00	105.30	0.00	0.00	0.00
	#	1963									
0.00	571.02	489.43	215.56	0.00	114.41	0.00	0.00	94.20	0.00	0.00	0.00
	#	1964									
0.00	561.91	483.87	480.38	0.00	116.43	0.00	0.00	113.80	0.00	0.00	0.00
	#	1965									
0.00	534.58	2127.32	729.91	0.00	106.31	0.00	0.00	117.90	0.00	0.00	0.00
	#	1966									
0.00	483.95	854.51	414.09	0.00	84.03	0.00	0.00	117.10	0.00	0.00	0.00
	#	1967									
0.00	686.44	788.70	671.26	0.00	60.75	0.00	0.00	120.20	0.00	0.00	0.00
	#	1968									
0.00	167.05	671.26	558.87	0.00	38.47	0.00	0.00	123.50	0.00	0.00	0.00
	#	1969									
0.00	188.32	679.36	472.82	0.00	44.55	0.00	0.00	139.10	0.00	0.00	0.00
	#	1970									
0.00	196.42	702.64	454.59	0.00	46.57	0.00	0.00	120.50	0.00	0.00	0.00
	#	1971									

0.00	301.71	927.41	163.00	0.00	68.85	0.00	0.00	142.90	0.00	0.00	0.00
	#	1972									
0.00	771.49	1306.06	146.81	0.00	92.13	0.00	0.00	165.40	0.00	0.00	0.00
	#	1973									
0.00	523.44	602.41	480.92	0.00	85.05	0.00	0.00	171.20	0.00	0.00	0.00
	#	1974									
0.00	504.20	525.46	575.07	0.00	87.07	0.00	0.00	166.00	4.01	0.00	0.00
	#	1975									
0.00	454.59	283.49	454.59	0.00	85.05	0.00	0.00	180.00	2.11	0.00	0.00
	#	1976									
0.00	331.07	489.01	991.19	0.00	67.83	0.00	0.00	164.90	4.47	0.00	11.66
	#	1977									
22.10	639.95	990.18	1126.86	3.25	130.62	0.00	0.00	150.50	10.30	0.00	0.00
	#	1978									
9.87	308.50	1750.53	1118.76	3.09	106.03	0.00	0.00	159.20	4.86	0.00	0.00
	#	1979									
30.38	413.40	2309.41	945.63	14.20	75.66	0.00	136.90	159.01	34.98	0.00	5.31
	#	1980									
34.18	494.02	2082.84	514.45	39.24	165.68	0.00	35.05	118.04	48.89	0.00	0.00
	#	1981									
0.90	797.72	3941.26	435.11	36.91	11.58	0.00	34.33	241.28	44.47	0.00	0.00
	#	1982									
7.39	499.24	3580.68	650.80	46.55	10.90	0.00	11.63	93.99	6.82	0.00	10.49
	#	1983									
29.61	358.07	1188.43	612.87	56.90	3.05	0.00	31.77	75.66	26.65	0.00	0.00
	#	1984									
15.03	305.93	1029.50	1037.98	107.44	3.42	0.00	43.47	120.33	63.37	0.00	0.00
	#	1985									
0.79	167.71	902.13	899.06	12.40	42.16	15.64	61.40	165.45	24.21	0.00	11.78
	#	1986									
0.00	211.00	1491.39	1016.63	20.61	24.36	160.00	57.02	168.13	34.34	0.00	0.00
	#	1987									
0.50	226.58	1576.42	979.31	24.35	26.44	0.00	46.59	137.65	56.59	0.00	0.00
	#	1988									
6.80	175.77	1573.63	1208.85	111.27	104.31	0.00	29.71	85.89	31.56	0.00	5.10
	#	1989									
15.72	310.17	1029.44	1099.96	69.10	139.26	17.35	10.02	61.34	38.43	0.00	0.00
	#	1990									
7.84	138.10	1776.39	971.64	136.87	24.05	27.91	10.02	61.34	43.75	5.06	0.00
	#	1991									
6.97	218.13	1423.29	825.03	49.38	77.80	152.43	10.02	61.34	38.43	1.81	1.17
	#	1992									
42.03	48.02	1513.80	289.81	26.70	81.32	116.69	0.00	64.82	51.07	0.72	0.00
	#	1993									
13.89	106.05	644.15	149.54	41.37	52.81	104.87	0.00	53.46	38.78	4.83	0.00
	#	1994									
30.10	101.84	548.61	161.15	53.89	60.59	118.68	1.23	68.33	43.53	0.31	1.07
	#	1995									
101.06	116.26	758.21	189.85	72.11	52.88	166.36	2.49	60.59	25.24	1.35	0.00
	#	1996									
31.96	142.66	589.85	203.44	29.78	73.80	254.42	1.75	100.85	46.68	3.63	0.00
	#	1997									
8.41	149.45	716.05	203.01	23.33	57.25	250.13	1.14	25.46	53.49	5.47	0.97
	#	1998									
7.36	96.25	387.85	139.97	8.53	28.59	123.97	2.81	62.05	35.02	5.63	0.00
	#	1999									
1.71	11.24	46.62	32.66	2.52	5.50	10.25	0.41	76.64	18.46	2.35	0.00
	#	2000									
1.44	9.43	33.13	19.65	1.60	4.96	11.00	0.00	33.37	13.34	4.05	1.61
	#	2001									
0.36	14.62	32.60	33.29	0.02	0.08	3.15	0.21	6.00	11.13	5.24	0.13
	#	2002									
0.23	0.31	5.02	6.24	0.00	0.08	6.89	0.06	18.05	12.10	0.93	1.08
	#	2003									
0.61	1.95	7.67	7.73	0.02	0.06	4.68	1.48	9.11	5.76	5.22	2.24
	#	2004									
0.72	2.84	4.91	25.90	0.06	0.09	1.79	1.49	0.83	6.82	1.44	4.54
	#	2005									
3.57	2.28	2.91	15.64	0.00	0.00	3.11	5.73	1.03	3.98	1.09	7.78
	#	2006									

Abundance indices
19 # Total number of observations (all fleets)

Year Seas Type Value s(log space)
NWFSC survey - GLMM based (n=4)
2003 1 12 1845.45 0.292
2004 1 12 1768.00 0.605
2005 1 12 1912.75 0.524
2006 1 12 5387.40 0.660
Triennial survey - GLMM based (n=9)
1980 1 13 1969.39 0.413
1983 1 13 3768.39 0.349
1986 1 13 2419.72 0.361
1989 1 13 1691.33 0.431
1992 1 13 558.28 0.422
1995 1 17 505.81 0.439
1998 1 17 631.39 0.408
2001 1 17 764.26 0.409
2004 1 17 1016.73 0.446
Pre-recruit index ANOVA w/ GLM CVs converted to s(log-space) (n=6)
2001 1 14 207.70 0.3414 #
2002 1 14 516.06 0.2401 #
2003 1 14 162.16 0.2688 #
2004 1 14 444.13 0.2513 #
2005 1 14 213.80 0.2888 #
2006 1 14 115.00 0.4797 #

Discard section
Discard observation setup
2 # Type: 1 = biomass (mt),2 = fraction (D/(D+R)) by weight
0 # Total number of discard observations all fleets and years
Year Season Type Value CV

Mean body weight observations
0 # Total number of mean body weight observations
Partition: 1=discarded catch, 2=retained catch, 0=whole catch (R+D)
Year Seas Type Partition Value (kg) CV

-1 # Minimum proportion for compressing tails of observed compositional data
0.001 # Constant added to expected frequencies

28 # Number of length bins
Lower edge of length bins by bin
12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66

length composition data
270 # Total number of length observations all fleets and years
Gender: 0=sexes combined into length bins, 1=females only (0s male bins), 2=males only (0s for female bins), 3=both males and females, total should sum to 1.0
Year Seas Type Gender Partition Nsamp Data: females then males
2007 Southern California trawl fleet (n=28)
1978 1 1 0 0 9.21 0 0 0 0 0 0
0 0 0 0 0 36.75325 0 67.19697 103.95022 0 21.73913
208.18626 61.38711 451.37755 0 21.73913 21.73913 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
1979 1 1 0 0 2.28 0 0 0 0 0 0
0 0 0 0 0 0 51.6129 0 0 0 354.32692
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
1980 1 1 0 0 14.45 0 0 0 0 0 0
0 0 0 0 121.76471 669.15126 506.66666 716.5967 768.92033 430.43613 510.92888
285.94 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0

1981 1 1 0 0 9.38 0 0 0 0 0 0
0 0 0 0 0 0 0 271.7884615 879.5896885
493.7285367 0 374.5306122 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1982 1 1 0 0 4.69 0 0 0 0 0 0
0 0 0 0 0 0 54.6 257.6422018 0 500
228.8 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1983 1 1 0 0 8.66 0 0 0 0 0 0
0 0 0 0 0 37.0408163 0 115.4166667
212.0171166 309.7270766 192.0171166 238.8372093 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
1984 1 1 0 0 18.83 0 0 0 0 0 0
0 29.877551 59.755102 119.510204 109.5510204 93.5941915 24.4749711
603.1632653 324.2826087 137.0093458 810.6796117 702.5882353 0
824.2826087 1658.048033 500 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0

1985 1 1 0 0 32.73 171.3207547 0 0 0 0
0 0 0 0 119.9185635 90.0094961 527.6007593
787.6976493 795.7559878 515.3457244 664.0846327 102.4770777
111.295098 0 154.3269231 77.1634615 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0
1986 1 1 0 0 3.55 0 0 0 0 0 0
0 0 0 0 12.9591837 0 105.3 0 12.9591837
183.3 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1988 1 1 0 0 3.41 0 0 0 0 0 0
0 81.81 0 0 0 0 71.9958879 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1989 1 1 0 0 5.07 0 0 0 0 0 0
0 0 0 0 21.4615384 0 53.6538462 36.9038462
532.1923077 0 0 0 10.7307692 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1990 1 1 0 0 8.90 0 0 0 0 0 0
0 0 222.7990654 7.5 3.75 11.86 171.36125 9.55 0 3.75
8.11 17.9313725 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1991 1 1 0 0 8.76 0 0 0 0 0 0
0 0 0 0.7088608 83.0546762 63.4044164 414.9436735
85.4511112 45.5111111 0.7088608 0 62.6955556 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
1992 1 1 0 0 14.93 0 0 0 0 0 0
0 0 0 0 49.7728571 99.9788093 93.5015247
85.1026188 102.1530612 48.4931973 70.1564626 4.4859813 5.1666667 0
5.1666667 10.8703704 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1993 1 1 0 0 49.98 0 0 0 0 0 0
0 15.6185158 59.5259383 253.1475428 229.9486807 368.4702333
371.8077533 1050.393493 253.6125338 370.1500121 64.4630154
84.8043099 17.8424547 81.4494418 49.3918036 15.6442308 3.2178218
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1994 1 1 0 0 14.83 0 0 0 0 0 0
0 0 0 0 0 40.286247 9.9955207 148.3938414 117.2055354
94.3406186 91.555442 50.2483862 36.6737708 12.0103093 45.8963124
12.0103093 16.9430016 0 0 0 12.0103093 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1995 1 1 0 0 13.28 0 0 0 0 0 0
0 0 0 30.48 196.9303226 63.7545833 53.5945833 12.16
27.1145833 183.3514493 116.0076993 71.7785326 78.2133152
49.6639493 22.1145833 22.1145833 10.16 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1996 1 1 0 0 42.91 0 0 0 0 0 0
0 2.5714286 58.7589286 53.643617 137.0168259 131.3431123 178.4191272
278.562743 600.0516522 269.2882356 253.1958774 59.0065554
85.5728155 99.9766617 85.5728155 42.7864078 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0
1997 1 1 0 0 48.98 0 0 0 0 0 0
0 0 3.0851064 7.0851064 23.228554 85.3796648 125.6838593 183.3232179
436.7562792 574.8167819 439.4557894 483.3556633 208.3741298
210.5980128 29.19 58.38 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1998 1 1 0 0 23.73 0 0 0 0 0 0
0 0 0 60.7042553 240.0974468 236.3539362 242.1889361
135.5595745 61.1304492 11.2348936 37.0948936 0 4.6 8.4148936
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1999 1 1 0 0 11.90 0 0 0 0 0 0
0 0 0 0 0 30.9288889 31.3177778 95.8288889
36.8577778 61.6288889 28.8777778 11.08 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0
2000 1 1 0 0 8.73 0 0 0 0 0 0
0 0 0 0 0 7.5 11.9444444 15 12.5 7.5
20.0979097 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2001 1 1 0 0 20.45 0 0 0 0 0 0
0 0 0 7.6905747 7.0411494 32.1920487 20.3857471 12.6034483
6.9730237 6.2495109 3.9730237 1 4.9730237 0 1 3.622449 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0
2002 1 1 0 0 4.38 0 0 0 0 0 0
0 1 0 0 0 0 1 1 2 3 1
1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0

2003 1 1 0 0 9.35 6.128650448 49.02920359 0 0
6.128650448 0 0 0 0 0 0 0 0 0
0 6.128650448 65.41403854 65.41403854 0 0 12.2573009
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
2004 1 1 0 0 5.97 0 0 0 0 0 0
0 0 0 0 0 0 0 0 351.2282658
90.00222804 0 0 0 30.00074268 0 0 0 0
0 0 0 0 0 0 0 0 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 1 0 0 9.21 0 0 0 0 130.3278392
0 130.3278392 0 0 0 11.21425302 22.42850603
11.21425302 0 0 14.00919035 158.3462199 23.29114125
142.4047275 23.29114125 0 0 0 0 0 0 0
0 0 0 0 0 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 1 0 0 19.14 0 0 0 0 0
167.0507328 55.68357759 55.68357759 111.3671552 278.4178879
55.68357759 55.68357759 55.68357759 1358.679293 111.3671552
55.68357759 389.7850431 222.7343103 55.68357759 0 55.68357759
55.68357759 0 0 0 0 0 0 0 0 0
0 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 Northern California trawl fleet (n=28)
1978 1 2 3 0 113.09 0 0 0 0 0 0
0 0 0 0 0 0 118.620576 640.855595 0
37.87037 172.292127 816.027507 1487.747031 2096.798161 3191.75492
1603.777512 2335.164309 932.833843 756.792783 82.006941 53.48563 0
0 0 0 0 0 0 0 0 0 0 6.7
0 0 280.532271 159.785714 142.948124 493.097262
2354.266288 1684.743894 7371.176821 2611.463314 1502.707674
528.929746 1582.674231 469.962406 0 0 0
1979 1 2 3 0 53.18 0 0 0 0 0 0
0 0 0 0 0 0 0 31.37931 31.37931 114.583333
31.37931 281.930233 1.865385 380.830711 454.21914 181.704828 912.439928
441.447048 10.223279 96.257377 4.178947 23.751938 0 0 0 0 0
0 0 0 0 0 0 0 0 239.010207
268.647158 652.729227 501.387821 729.824654 1183.067607
1351.687493 1302.679503 1476.261677 54.505555 89.7 0 0 0
280.733333
1980 1 2 3 0 116.02 0 0 0 0 0 0
0 0 0 0 0 67.963434 131.315789 587.133664 88.713516
288.939401 368.491804 685.828172 1171.152206 809.393528
667.799892 800.639099 495.422916 304.898459 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 138.240703 375.199351 203.075686 879.121821 620.87789
2227.287931 2024.224985 2501.730777 1888.276231 593.223662 0
233.910714 0 0 0 0 0
1981 1 2 3 0 74.29 0 0 0 0 0 0
0 0 0 124.75 0 124.75 53.4448244 8.1489362 255.4818868
1234.751363 518.8917677 1280.517625 1410.581854 919.6851325
770.2782992 1116.949268 1567.728721 350.1341303 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 93.0024225 759.482274 794.3314014 1180.161028
1033.105838 2523.177679 1033.681141 912.8045213 128.3242762 0
0 0 0 0 0 0
1982 1 2 3 0 120.16 0 0 0 0 0 0
0 0 0 0 88.4693878 32.8371428 1007.440033
323.488755 176.7080594 2458.002137 1772.1635 1246.304479 3264.786854
1813.534221 683.7733475 1058.516111 263.7513975 10.8461538 4.2884615
0 0 0 0 0 0 0 0 0 0 0
0 0 303.2238449 818.0348666 1167.88308 1113.406082
1606.889284 2910.729196 3384.928817 2145.195514 2343.928141
4794.319474 1312.38659 4.2884615 0 0 0 0 0 0

1983 1 2 3 0 174.44 0 0 0 0 0 0
0 0 0 53.6363636 291.6075229 77.6906558 441.218364
538.544462 2402.817271 1221.64721 973.0557754 2650.612503
1256.343337 1705.737494 3263.409513 1726.524794 1231.428868
464.482247 0 0 0 0 0 0 0 0 0
0 0 0 0 0 145.1014394 182.2048485 1202.329627
2517.8163 1167.65492 3270.181734 2635.771907 3990.073468 6261.49987
2948.148886 2004.594796 361.1772969 54.0395349 206.961165 0
0 0 0
1984 1 2 3 0 116.06 0 0 0 0 0 0
0 0 6.6438356 0 47.634434 749.7551379 1402.351341 315.1686367
1483.620261 1688.484195 1307.060526 1880.950895 1684.637748
1396.472342 1584.174496 656.5174063 1398.353281 893.0375056 10.9
0 0 0 0 0 0 0 0 0 0
0 13.2876712 63.0530261 97.9116912 433.7604463 796.8425966
1270.532623 1522.899657 1935.217138 3576.827901 2702.52329
1339.322596 1371.599481 340.3931452 356.1529412 0 0 0
0 0
1985 1 2 3 0 122.96 0 0 0 0 0 0
0 0 0 0 131.6391403 205.236851 1174.287597
1379.988011 1489.251662 2077.991069 1318.103597 1006.907644
959.1333095 2290.333141 569.7772609 2268.699416 3271.737375
1128.889796 0 0 0 0 0 0 0 0 0
0 0 0 0 24.7327273 451.5098311 292.9054633
658.188647 1564.19122 2381.488066 2210.192169 2546.026142
2715.40301 2788.996369 3620.307485 1820.516493 583.6080116 2.7111111
0 0 0 0 0
1986 1 2 3 0 106.68 0 0 0 0 0 0
0 0 0 45.7142857 0 27.1262136 272.4644907
799.8412897 1213.732792 699.954717 1006.509521 1038.55708
1274.744999 749.7632428 637.2293199 381.5464686 162.8707338
34.4039216 0 0 0 0 0 0 0 0 0
0 0 0 45.7142857 0 8.5882353 13.1346154 313.2680762
959.9147094 2200.004668 2727.001576 1335.099892 2259.124011
1221.029807 487.6268166 139.2749821 29.2079208 0 0 0
0 0 0
1987 1 2 3 0 103.23 0 0 0 0 0 0
0 0 0 0 0 1078.018227 1268.571344 1506.259631
606.7591491 1277.376256 2535.875084 1104.191711 1834.800406
1257.061249 175.6027272 429.1086868 192.239724 184.5454545
148.9393939 0 0 0 0 0 0 0 0 0
0 0 88.2040816 0 363.5950495 1806.253371 1735.420442
1914.220942 971.7152224 2642.324304 2682.562774 1416.198514
1010.69907 771.3737156 49.2353952 0 0 0 0 0
0 0
1988 1 2 3 0 86.12 0 0 0 0 0 0
0 0 0 218.4825371 205.7661583 497.7446001 516.6489736
1310.129926 1303.178279 1009.176446 475.697781 538.3533831
841.1609838 288.9236938 954.0637786 124.5436938 75.95 0 3.6
0 0 0 0 0 0 0 0 0 0 0
0 99.5876289 254.6893213 263.4307196 908.9894449 1770.909898
1654.45194 1787.748824 1665.893625 958.8669768 1287.201241
777.6895077 120.0891089 0 0 0 0 0 0 0
1989 1 2 3 0 74.02 0 0 0 0 0 0
0 0 0 48.1568627 142.5841176 313.0685106 881.2309814
538.9568289 1831.72314 946.6937907 342.2584096 251.5827463 417.69
617.8785149 610.7258886 380.9460606 262.9985149 97.6060606 0
0 0 0 0 0 0 0 0 0 0 0
0 57.5 988.6802263 1089.307809 1150.039032 1489.473443
1961.042627 1203.075266 845.1249546 2063.035095 1054.603658
483.9469997 82.4373738 0 21.8686869 0 0 0 0
0
1990 1 2 3 0 86.75 0 0 0 0 0 0
0 0 0 0 95.46 587.393573 614.022586 828.204582
1464.47111 2419.169212 960.1408962 699.9427342 1481.635347
2505.191785 1910.185249 618.1985544 101.9702971 26.8834951
330.340484 0 0 0 0 0 0 0 0 0
0 0 0 0 105.5843434 791.8729063 1402.144381
2518.281471 1210.52657 3112.644551 3081.663932 3096.058823

2732.753312 1367.064497 0 46.3366337 0 0 0 0
0 0
1991 1 2 3 0 52.46 0 0 0 0 0 0
0 0 0 0 50.73 369.5609804 588.0744457 869.8504854
1089.170336 670.5044593 569.519125 387.5290365 417.6859088
175.5224345 202.2009804 302.1280877 0 0 0 0
0 0 0 0 0 0 0 0 0 21.79 50.73
424.9880392 186.5823077 937.7912774 1088.95382 933.3932039
800.9637274 1592.862786 603.0278269 343.2073364 21.49 0
25.3431373 25.3431373 0 0 0 0 0
1992 1 2 3 0 45.67 0 0 0 0 0 0
0 0 0 0 17.37 264.79 369.25 928.76 656.9 591.15 1660.83
544.2716832 1093.5 368.34 167.27 253.45 0 74.95 0 0 0
0 0 0 0 0 0 0 0 0 0 0
95.32 430.5412621 961.67 1155.453316 1402.64 1482.16 1419.53 1462.87 788.88
367.96 961.35 0 0 0 0 0 0 0
1993 1 2 3 0 18.80 0 0 0 0 0 0
0 0 0 0 0 0 217.36 0 189.0016667 25.8
414.4983673 12.9 292.9183674 66.1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
108.68 0 555.4454545 0 240.7916667 384.35 548.9983673 194.14
802.8467346 419.4638219 0 0 0 0 0 0 0
0 0 0
1994 1 2 3 0 22.01 0 0 0 0 0 0
0 0 0 0 128.24 64.12 408.7536634 64.12 584.8036634
726.0320326 1823.865376 314.246092 21.5 363.0160163 344.6336634
16.25 21.08 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 368.6836634 128.24 0
929.4373267 1842.435376 528.9974024 1055.40099 435.0097554
71.0084449 15.8613861 0 0 0 0 0 0 0
0
1995 1 2 3 0 40.39 0 0 0 0 0 0
0 0 0 7.5940594 69.4740594 109.3568276 221.0267124
242.2950414 210.8799839 132.8174257 126.64059 139.0845464 117.3491089
35.0716832 57.1665306 8.8316832 8.8316832 0 0 0 0 0
0 0 0 0 0 0 0 0 0 30.94
121.3165804 130.3287088 404.4361722 292.7457264 297.6579996
282.1150414 192.9302889 150.2449464 62.1057426 39.63 34.18 0
0 0 0 0 0 0
1996 1 2 3 0 42.08 0 0 0 0 0 0
0 0 0 14.5098039 8.9432943 40.7151125 458.6494869
692.3374081 156.2938614 123.6075065 222.3702174 178.9734653 314.7
294.7634653 104.55 0 209.1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 188.4280303
64.9654545 453.0789762 967.8485779 506.204717 396.9058595
531.189829 539.4227272 94.36 106.1863636 209.1 104.55 0 0
0 0 0 0 0
1997 1 2 3 0 23.01 0 0 0 0 0 0
0 0 0 137.7021277 4.32 140.0621277 23.4774257
141.2421277 48.7380838 45.1980838 185.8617381 63.4071227
231.7656285 56.0955096 1.18 123.6346154 0 13.2574257 0
0 123.6346154 123.6346154 0 0 0 0 0 0
0 0 0 0 0 3.54 35.4806581 177.7985058
100.0677807 212.3765896 91.9587821 29.5806581 387.2270785
13.2574257 166.4726992 0 0 0 0 0 0 0
1998 1 2 3 0 19.25 0 0 0 0 0 0
0 0 0 0 3.32 13.7 58.5848936 80.2027451 13.7
10.17 186.4382353 143.3854902 259.7909804 186.2282353 63.1827451
123.0454902 0 3.32 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 10.17 44.42
161.4438144 30.51 161.8617528 269.7509804 10.17 63.1827451 6.85
59.8627451 0 0 0 0 0 0 0
1999 1 2 3 0 44.19 0 0 0 0 0 0
0 0 55.4455446 0 0 44.8796703 113.6955446
228.2996703 823.4934991 717.881124 923.302707 368.7658416
580.8982842 155.0258089 86.1755446 41.3296703 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 169.8866337 441.7534991 436.3076575 799.9000348
754.0714536 708.8616505 302.0421782 105.5888782 19.2430693 0
0 0 0 0 0 0 0

2000	1	2	3	0	13.14	0	0	0	0	0	0
	0	0	0	0	0	0	0	6.490909	6.3363636	8.6472727	9.190909
	4.3054545	9.1258505	0	0	0	3.2454545	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3.2454545	6.4909091	14.2181818	12.1872727	6.3363636	1.7	0	0		
	0	0	0	0	0	0	0	0			
2001	1	2	3	0	21.77	0	0	0	0	0	0
	0	0	0	0	0	0	0.8148148	4.471243	17.3156253		
	19.8741457	21.8619864	26.492062	23.0518864	13.1845185	9.3810445	0.8148148				
	0	0.8148148	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	5.7446809	8.0647124	16.849699	23.48374
	30.3116208	29.0723276	4.2781818	0	0	0	0	0	0		
	0	0	0								
2002	1	2	3	0	51.29	0	0	0	0	0	0
	0	0	0	0	0	0	0	96.75982177	236.4404013		
	379.4742659	979.6157276	804.1685392	471.2873252	953.9885014						
	96.75982177	0	62.93016997	0	0	0	0	0	0		
	0	0	0	0	0	0	0	0	0	33.12114209	
	23.3280157	17.94462746	242.4045566	933.4975571	1388.375703						
	1136.599202	1093.179496	69.49057881	117.8172912	24.7196395	0					
	0	0	0	0	0	0					
2003	1	2	3	0	11.90	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	32.29653767		
	14.43719483	35.71868569	21.65579224	21.65579224	10.82789612						
	3.609298707	0	3.609298707	0	0	0	0	0	0		
	0	0	0	0	0	0	0	0	0	0	0
	0	0	10.82789612	14.25004414	17.85934284	14.25004414	0				
	0	0	0	0	0	0	0	0	0		
2004	1	2	3	0	21.14	0	0	0	0	0	0
	36.40809209	6.068015348	0	0	6.068015348	86.59420292					
	100.3722217	54.61213813	56.25412618	100.7290548	56.25412618						
	112.8650855	12.1360307	38.05008014	0	0	0	76.10016028				
	0	0	0	0	0	0	0	0	0	0	0
	0	0	6.068015348	12.1360307	56.25412618	18.20404604					
	6.068015348	195.3900942	60.68015348	42.47610743	138.7791349						
	12.1360307	0	6.068015348	0	0	0	0	0	0		
	0										
2005	1	2	2	0	2.69	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	302.1413017	0	0	302.1413017	604.2826035			
	302.1413017	0	0	0	0	0	0	0	0		

2007 Oregon trawl fleet (n=33)

1973	1	3	3	0	7.06	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	2.767	0.000	11.067	5.534	1.383	0.000
	1.383	0.000	1.383	0.000	1.383	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2.767	2.767	4.150	4.150	1.383	1.383	5.534	1.383	9.684	8.301	2.767
	1.383	0.000	0.000	0.000	0.000	0.000					
1974	1	3	3	0	28.24	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	24.747	0.000	24.747	0.000	52.608	0.000	68.672	49.493	3.501
	112.604	297.103	682.084	622.474	443.902	127.509	210.032	27.861	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	24.747
	3.501	3.501	47.040	62.724	31.356	297.103	589.811	1267.139	787.810	545.257	117.393
	52.608	24.747	0.000	0.000	0.000	0.000					
1976	1	3	3	0	14.12	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.878	7.734	35.757	0.000
	48.312	33.346	10.144	84.571	81.658	35.757	17.878	17.878	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	17.878	30.433	71.513	109.680	56.046	58.456	38.167	28.023	7.734
	0.000	0.000	0.000	0.000	0.000	0.000					
1977	1	3	3	0	56.48	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	10.035	0.000	7.015	8.817	25.867	22.360	75.969	108.127	101.339
	186.671	130.426	216.905	302.398	353.411	205.652	87.728	34.806	12.703	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.035	10.035	10.523
	27.196	22.360	41.604	101.474	171.606	340.748	721.575	818.309	660.887	182.312	98.129
	6.175	9.195	0.000	0.000	0.000	0.000					
1978	1	3	3	0	49.42	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	4.576	0.000	0.000	5.077	2.538	52.257	33.175	41.638

	192.485	248.087	275.452	237.034	327.842	222.822	177.763	12.783	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	7.884	24.169	55.158	237.074	386.665	443.795	619.595	386.876	170.014
	20.024	7.115	0.000	0.000	0.000	0.000					
1979	1	3	3	0	42.36	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	139.595	139.595	285.251	430.908	570.503	309.497	887.753
	1863.734	1502.698	1782.579	1668.419	1812.213	595.119	674.996	87.807	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	139.595
	285.251	449.092	1007.472	1239.908	1738.589	1643.333	2917.632	3310.562	2570.775	792.297	466.007
	16.571	87.807	0.000	0.000	0.000	0.000					
1980	1	3	3	0	141.20	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	529.666	324.938	548.544	355.317
	1116.778	2677.047	4085.327	4420.780	6007.093	7404.078	2318.382	245.628	98.561	67.431	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	106.540
	0.000	12.166	186.011	1276.679	1658.574	2122.953	5007.381	10026.331	9962.347	4938.313	1549.075
	234.513	205.102	0.000	0.000	0.000	0.000					
1981	1	3	3	0	56.48	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.810	93.949	28.655	1550.905
	867.224	1582.421	1454.409	1924.873	1815.211	1391.160	1041.089	647.915	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	130.002	319.001	1033.063	1884.398	1516.291	6138.146	3655.290	2679.977	871.421
	28.655	0.000	5.805	0.000	0.000	0.000					
1982	1	3	3	0	141.20	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	9.017	0.000	0.000	0.000	400.058	548.729	2418.367
	3251.310	2956.585	4184.768	5553.225	5847.335	5019.142	1981.069	190.392	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	108.261	161.793	1054.331	2172.285	6673.095	7521.086	16415.656	20898.089	8702.756	2538.404
	0.000	25.281	0.000	0.000	0.000	0.000					
1983	1	3	3	0	211.80	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	3.850	29.134	2.194	69.169	232.232	143.434	520.891	1140.820	1700.040	2511.753
	3139.140	3302.596	4494.634	6201.973	5332.770	3416.903	1505.128	416.233	95.706	0.000	0.000
	0.000	0.000	0.000	0.000	32.894	0.000	0.000	0.000	0.000	12.089	72.013
	192.001	577.067	657.338	1839.690	4466.876	5169.244	6583.045	10375.226	10827.528	8021.602	1756.419
	244.261	0.000	0.000	0.000	0.000	0.000					
1984	1	3	3	0	148.26	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	17.522	20.731	63.507	86.288	221.446	178.029	510.951	1066.040	1818.113
	2801.550	3923.414	3349.916	3230.294	2638.690	2692.555	1212.545	136.994	54.783	0.000	5.842
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.522	0.000	0.000	42.681
	55.972	188.489	576.803	1358.854	2399.715	4744.397	6376.978	8683.630	9059.273	4197.339	866.269
	59.674	61.902	0.000	0.000	0.000	0.000					
1985	1	3	3	0	204.74	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	70.482	0.000	213.051	438.151	680.199	973.023	1883.103
	3472.248	4269.249	4698.941	4536.364	3194.266	2273.431	1420.308	742.949	57.052	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	54.159
	111.787	147.877	483.305	1726.332	2558.299	4418.456	7120.686	7123.870	6392.525	4627.339	1575.495
	296.211	29.210	0.000	0.000	0.000	0.000					
1986	1	3	3	0	112.96	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	62.230	147.967	174.093	412.692	875.275	983.481	979.619
	1159.100	1707.175	2557.653	2403.195	1702.999	1603.104	915.202	176.236	36.180	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	47.130	110.931
	116.014	310.297	500.720	1203.755	1899.580	2400.882	2256.635	3258.785	2590.162	1680.375	421.265
	222.148	23.984	5.493	0.000	0.000	0.000					
1987	1	3	3	0	247.10	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	9.872	292.634	781.952	760.217	1769.957
	2780.376	4721.009	6882.012	5433.266	4336.392	3042.508	1566.308	444.154	29.222	4.297	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	468.935	423.696	1362.027	3648.631	6887.822	8807.806	9129.378	5730.582	3641.156	1724.807
	76.928	0.000	0.000	0.000	0.000	0.000					
1988	1	3	3	0	162.38	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	142.237	68.896	431.438	443.590	543.976	491.472	1401.241
	2524.938	2982.357	3480.504	3572.088	2451.055	1265.547	884.575	513.358	71.306	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	38.894
	51.954	250.707	445.338	659.524	2089.245	3433.124	3759.669	4211.985	2760.504	1640.899	736.894
	42.444	13.060	0.000	0.000	0.000	0.000					
1989	1	3	3	0	162.38	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	52.444	0.000	4.272	18.637	86.693	265.565	652.639	1163.761
	2254.093	2510.662	2341.395	2967.213	2763.622	1366.293	898.639	348.098	155.498	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	45.843	20.627	394.937	590.997	1597.005	2541.268	3744.838	4205.683	3400.449	2642.521	920.867
	194.054	38.402	0.000	0.000	0.000	0.000					

1990	1	3	3	0	155.32	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	10.681	19.659	143.849	176.767	706.872	870.104
	1084.757	2037.653	3122.297	2773.690	2905.506	1521.265	745.985	211.299	17.102	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	8.978	49.944	114.918	487.226	1119.973	2372.451	3800.779	4329.034	2226.857	933.485	447.579
	55.334	0.000	28.807	0.000	0.000	0.000					
1991	1	3	3	0	141.92	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	86.511	0.000	14.428	38.336	145.081	396.569	756.014	1108.295	926.465	2404.667
	3494.247	2011.002	3593.851	3714.005	2195.521	1136.582	1078.195	400.973	47.827	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.428	14.428	43.284	43.284
	148.462	477.587	539.362	1231.479	2539.539	5231.619	5423.404	5299.238	3396.074	3284.686	422.550
	251.542	12.110	0.000	0.000	0.000	0.000					
1992	1	3	3	0	222.23	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	115.721	84.226	338.482	1564.111	3372.224	2960.916
	4114.962	4372.073	6306.535	6120.810	6331.147	1628.552	1381.475	548.907	7.947	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	61.661	538.151	1243.056	3063.813	4374.532	6927.215	9621.340	8857.575	7501.344	5368.191	961.550
	654.096	38.932	0.000	0.000	0.000	0.000					
1993	1	3	3	0	155.32	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	12.065	467.221	42.059	987.307	2210.612	2425.457
	3012.190	5169.135	5495.870	5607.836	4603.483	1537.435	1012.900	605.948	243.725	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	8.885	271.891	1205.304	2497.950	3536.264	6026.149	5401.431	5071.262	3800.353	1886.889	607.080
	203.017	0.000	0.000	0.000	0.000	0.000					
1994	1	3	3	0	105.90	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	32.208	27.112	81.736	285.624	499.882	835.149	1463.266
	1517.552	1461.971	1800.963	1293.953	688.914	339.352	17.912	0.000	9.668	34.382	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.895	17.912
	37.921	55.605	724.931	984.675	2249.048	2385.906	2226.832	2199.997	1209.730	726.068	410.231
	74.401	0.000	0.000	0.000	0.000	0.000					
1995	1	3	3	0	112.96	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	173.919	210.237	371.597	318.813	538.281	555.071
	690.314	775.748	768.604	459.198	203.750	135.526	17.509	2.442	0.000	0.000	66.512
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.883	7.187	154.642
	183.923	502.315	546.710	829.713	790.391	1079.112	726.910	441.560	282.438	135.866	44.253
	10.020	0.000	0.000	0.000	0.000	0.000					
1996	1	3	3	0	134.14	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	3.360	0.000	22.509	21.514	226.132	366.721	439.109	943.300	832.196	895.728
	801.951	850.336	735.966	580.049	512.687	158.433	87.282	61.812	0.000	7.498	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	2.284	2.284	0.000	5.643	33.966
	207.001	407.200	1009.203	1166.363	1147.551	1033.274	954.265	1132.426	1088.164	506.036	197.169
	9.781	33.345	0.000	0.000	0.000	0.000					
1997	1	3	3	0	197.68	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	45.981	202.905	251.392	823.556	981.736	1422.651
	1689.262	1685.030	1854.608	965.222	388.379	425.215	131.957	59.311	42.118	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	22.783	6.139	0.000	13.770	28.752
	102.378	407.209	1023.103	2020.949	2698.830	3085.063	2538.051	1716.999	792.469	307.146	106.658
	80.142	1.252	4.238	0.000	0.000	0.000					
1998	1	3	3	0	197.68	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	52.626	58.361	178.399	453.731	1011.004	1413.360	1296.899	1511.663
	1754.953	1165.058	1272.065	1202.941	644.173	146.375	113.829	13.165	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.186	0.000	0.000	72.852
	118.176	745.610	1159.350	1657.024	2610.224	2505.880	2395.278	1739.195	1161.664	333.896	191.658
	16.105	0.000	0.000	0.000	0.000	0.000					
1999	1	3	3	0	197.68	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	13.190	11.742	24.209	44.948	128.620	197.192	885.817	1049.915	1276.502	1713.185
	1723.515	1352.987	1406.514	1058.130	439.894	269.870	115.495	12.073	1.526	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	3.914	7.828	3.914	14.834	0.000	59.341
	132.177	764.762	1073.316	1490.506	1847.700	2069.803	1965.025	1370.473	450.852	438.714	142.545
	14.952	0.000	0.000	0.000	0.000	0.000					
2000	1	3	3	0	93.21	0.000	0.000	0.000	0.000	0.000	0.000
	4.673	0.000	0.000	4.673	9.346	24.697	39.210	38.617	29.244	32.287	49.268
	33.846	45.633	14.350	11.543	9.760	1.112	2.512	1.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	21.804
	31.379	51.861	50.307	51.936	71.330	65.346	36.608	22.285	10.717	2.440	1.512
	0.000	0.000	0.000	0.000	0.000	0.000					
2001	1	3	3	0	159.30	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	6.879	42.735	157.739	428.298	467.502	379.021	950.854	476.394
	2166.331	1308.553	1223.460	592.477	105.563	113.457	48.874	27.167	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.757	41.253

	166.149	315.970	1052.224	1524.417	908.815	4022.688	1367.975	1583.057	1420.601	91.604	39.941
	5.785	0.000	0.000	0.000	0.000	0.000					
2002	1	3	3	0	276.65	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	333.258	550.507	1132.806	1569.568	1995.150	805.997	885.701
	1000.919	1009.508	905.409	480.577	513.292	490.168	227.671	111.950	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	33.606	0.000	60.367	97.114
	493.995	1179.529	1245.875	1465.947	1607.969	1459.614	1288.562	810.740	355.572	139.379	264.561
	10.865	67.211	33.606	33.606	0.000	0.000					
2003	1	3	3	0	103.93	0.000	0.000	0.000	0.000	0.000	4.807
	0.000	0.000	0.000	0.000	0.000	5.144	23.214	78.323	150.584	261.278	234.888
	244.483	191.351	126.404	93.086	86.946	35.885	27.811	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.871	0.000
	5.144	72.387	168.593	215.589	334.387	291.310	208.217	110.898	84.999	0.000	4.833
	0.000	7.871	0.000	0.000	0.000	0.000					
2004	1	3	3	0	138.75	0.000	0.000	0.000	0.000	0.000	10.667
	0.000	14.223	10.667	27.829	24.171	28.864	134.152	304.713	237.593	243.806	267.041
	237.512	243.065	197.682	251.820	74.933	37.774	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	21.334	0.000	3.247	105.185
	95.677	136.858	194.950	207.240	198.434	507.344	430.473	220.999	105.724	47.409	10.661
	27.698	10.667	0.000	0.000	0.000	0.000					
2005	1	3	3	0	184.91	0.000	0.000	0.000	0.000	0.000	0.772
	0.772	31.917	6.178	28.828	2.317	6.371	6.950	15.399	69.813	89.189	69.066
	255.265	285.847	170.106	182.332	117.239	58.419	31.100	0.000	0.000	4.334	0.000
	0.000	0.000	0.000	4.633	2.317	29.601	5.405	29.601	3.089	28.828	9.282
	11.599	14.688	31.663	108.230	190.517	487.127	302.749	200.294	84.082	28.613	3.089
	8.022	0.000	0.000	0.000	0.000	0.000					
2006	1	3	3	0	102.99	0.000	0.000	0.000	0.000	0.000	0.000
	4.349	6.249	3.125	10.239	9.645	28.339	10.377	49.044	51.394	46.119	57.771
	64.085	191.158	80.055	71.653	30.535	14.906	15.467	6.187	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	3.458	0.000	0.000	3.437	3.458
	6.628	27.650	47.096	53.292	106.857	119.770	145.896	195.673	116.909	16.329	14.963
	6.788	3.486	0.000	0.000	0.000	0.000					

2007 Washington trawl fleet (n=38)

1968	1	4	0	0	14.12	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	104.085	38.004	226.321	832.678	1805.744
	1873.525	2314.542	2929.124	2288.164	1030.921	226.321	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1969	1	4	0	0	14.12	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	18.083	90.417	386.539	735.425	1168.734
	1878.545	2396.969	2178.432	1588.417	969.766	244.894	18.083	0.000	18.083	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1970	1	4	0	0	7.06	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	204.703	736.932	2006.092
	1228.219	1473.863	2374.558	1719.507	900.694	245.644	81.881	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1971	1	4	0	0	56.48	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	25.493	15.118	698.672	2224.221	6999.636
	11321.446	14441.291	14121.699	12357.950	5995.173	2521.231	373.407	6.235	0.000	6.235	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1972	1	4	0	0	14.12	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	108.600	434.400	1954.115
	4396.130	7330.157	5212.799	4564.854	1956.170	1250.156	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1973	1	4	0	0	7.06	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	18.303	0.000	0.000	36.606	91.516	384.366
	805.339	1153.099	677.217	640.611	219.638	164.728	18.303	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					

1976	1	4	3	0	21.18	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	1.008	0.000	3.023	0.000	6.046	86.268	343.811	931.058
	796.239	1838.937	2309.179	4016.321	3367.749	1844.658	887.294	126.756	204.962	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1.008	3.023	9.070	344.819	1162.651	1691.521	3574.652	9669.922	13300.935	9859.485	1941.759
	459.482	0.000	1.008	0.000	0.000	0.000					
1977	1	4	3	0	14.12	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	33.108	33.108	108.279
	357.943	333.791	410.319	811.682	975.864	568.259	243.423	42.063	42.063	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.554
	0.000	0.000	0.000	207.602	233.111	377.211	975.864	2103.970	3727.878	2050.781	832.307
	42.063	42.063	0.000	0.000	0.000	0.000					
1978	1	4	3	0	35.3	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	4.419	4.419	8.837	13.256	37.109	354.250	812.191
	1227.754	1256.701	1529.120	1585.175	1283.201	1008.062	363.237	115.907	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	8.837	17.675	259.606	442.456	1463.045	2897.746	3446.808	4816.816	3652.448	917.330
	378.096	0.000	0.000	25.650	0.000	0.000					
1979	1	4	3	0	56.48	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	34.895	0.000	515.372	496.375	998.847	2518.755
	2409.665	3833.332	1742.858	1843.348	1145.716	1036.302	825.716	20.444	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	246.780	17.447	958.533	1675.576	6724.120	6135.442	7048.722	8759.053	5719.057	2486.972
	129.184	0.000	0.000	0.000	0.000	0.000					
1980	1	4	3	0	127.08	0.000	0.000	0.000	0.000	0.000	0.000
	197.856	0.000	197.856	31.514	625.082	427.226	521.769	903.344	2597.881	3704.160	4290.218
	3738.236	6563.053	7713.342	7701.902	4094.748	2073.082	1580.696	327.456	159.428	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	260.885
	625.082	1708.905	2877.867	3689.800	4346.649	6969.248	7760.286	11343.321	13596.222	11141.158	4157.758
	1112.224	436.195	0.000	0.000	38.941	0.000					
1981	1	4	3	0	127.08	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	5.299	10.599	14.541	42.782	108.724	154.700	312.742	358.338
	450.688	545.602	1060.315	1241.733	637.714	302.818	215.344	78.870	28.205	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.299	10.061
	24.613	39.835	236.931	412.858	503.982	636.692	971.332	1650.396	2094.412	1390.323	685.355
	190.354	75.473	0.000	0.000	0.000	0.000					
1982	1	4	3	0	91.78	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	24.886	0.000	328.546	43.122	202.863	557.287	1585.350	869.278
	926.152	1345.255	1221.470	2008.117	1128.658	641.997	136.741	44.692	17.475	5.032	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.209	0.000	29.096
	102.623	39.920	442.944	1193.196	1940.341	1971.903	2377.540	2918.537	2252.714	1828.661	566.036
	419.091	110.787	0.000	0.000	0.000	0.000					
1983	1	4	3	0	120.02	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	43.912	165.137	247.407	367.088	1020.018	1715.425	2842.822	3647.473
	3476.488	3301.649	3060.912	4643.066	4229.710	1137.740	735.821	449.790	64.881	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	20.393	84.769	269.560
	1061.569	1350.783	2080.169	2201.005	4388.296	4022.645	6836.583	5901.799	7087.699	4676.106	1300.412
	396.186	142.642	0.000	0.000	0.000	0.000					
1984	1	4	3	0	120.02	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	32.631	97.892	229.178	236.408	325.627	369.959	569.673	1328.340
	1775.337	1740.033	1547.440	3062.303	1635.041	1404.509	627.224	176.806	25.298	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	66.685	168.482
	293.714	400.137	596.430	760.519	1374.774	2116.568	2997.191	4677.699	5316.577	4694.119	1861.550
	301.851	0.000	0.000	0.000	0.000	0.000					
1985	1	4	3	0	127.08	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	2.989	15.839	103.330	238.384	559.357	531.192	605.844	1490.291
	2030.809	2058.868	3694.619	3111.035	2832.487	1655.595	681.362	176.185	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.989	16.735	8.966
	134.994	327.628	574.765	745.689	1028.635	2307.471	5325.174	5336.196	6305.292	2654.871	896.536
	331.726	66.706	0.000	0.000	0.000	0.000					
1986	1	4	3	0	120.02	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	35.285	32.496	56.564	317.902	494.064	810.430	1425.069	1827.439
	2162.542	2469.396	2173.539	2203.401	1389.945	628.182	387.079	85.347	12.121	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	17.642
	114.467	298.140	595.463	1519.995	2483.161	3714.314	3509.131	4297.254	2672.789	1361.153	936.321
	394.696	71.085	19.863	0.000	0.000	0.000					
1987	1	4	3	0	176.5	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	28.077	32.720	75.542	238.493	321.462	833.518	1530.834	2950.135
	2330.603	4218.695	4258.030	3938.331	3673.934	2095.398	811.689	591.427	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	140.982

	177.379	249.819	557.568	758.980	3345.156	4763.938	4288.003	5709.554	3956.157	3728.052	843.278
	493.721	37.343	5.002	0.000	0.000	0.000					
1988	1	4	3	0	134.14	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	3.460	17.731	80.829	45.926	243.570	96.744	304.190	714.261	999.777
	2523.393	2094.367	2206.616	2014.405	2461.060	1696.944	822.223	473.125	125.072	21.110	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.770	22.969
	65.405	253.439	130.450	383.261	1050.815	2459.113	2934.398	3182.969	3479.590	2729.951	1551.980
	237.927	323.413	0.000	0.000	0.000	0.000					
1989	1	4	3	0	127.08	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	53.174	88.492	116.308	289.100	372.638	881.412	1513.833	1878.578
	3642.322	3246.403	2851.711	1747.321	1451.045	930.003	524.341	24.538	8.420	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	22.857	140.874	16.190
	198.857	343.503	438.646	1720.645	2983.983	3468.546	4565.652	5343.947	4305.480	2391.239	601.283
	310.756	0.000	6.230	0.000	0.000	0.000					
1990	1	4	3	0	120.02	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	8.864	4.432	26.592	112.955	197.503	1124.477	762.708	2733.743
	3408.024	3979.719	3121.514	2249.299	2550.504	988.332	390.145	176.454	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	39.716	13.296	22.160
	130.526	476.762	865.413	1659.118	2518.488	4321.956	5053.284	5045.810	3552.408	1720.371	1363.853
	100.939	0.000	0.000	0.000	0.000	0.000					
1991	1	4	3	0	155.32	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	132.032	113.271	954.080	602.738	1829.870	3195.848
	4568.224	3884.806	4384.573	4207.931	2604.531	2467.894	706.180	9.774	74.582	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.538
	75.092	336.273	1085.855	2486.687	2889.712	6601.191	8277.912	9176.603	7461.456	4147.401	1276.834
	502.043	74.582	0.000	0.000	3.321	0.000					
1992	1	4	3	0	141.2	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	19.331	0.000	65.605	167.228	413.396	593.861	898.962	1686.336	1954.679	1933.381
	2827.834	3725.351	3291.025	3724.332	3757.101	2063.323	1296.034	55.827	134.573	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.040	15.226	108.965
	225.978	604.399	1410.847	3039.418	3430.809	4193.906	7117.286	7542.803	4968.539	3774.365	1218.769
	5.845	0.000	0.000	0.000	0.000	0.000					
1993	1	4	3	0	120.02	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	1.174	0.000	0.000	145.991	55.140	339.713	1015.904	1258.626	1583.087	1731.309
	1730.824	1129.471	1365.677	554.052	565.490	200.104	1.184	1.184	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.998	1.998	86.438
	280.548	1017.158	1047.291	2009.383	2190.674	1956.893	1933.797	893.195	471.622	185.563	91.737
	0.000	0.000	0.000	0.000	0.000	0.000					
1994	1	4	3	0	105.9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	25.065	25.065	119.353	173.235	498.026	347.428	999.240	1403.804	1148.810
	1693.197	784.059	1287.478	714.886	581.939	480.321	90.763	59.231	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.759	37.138	290.499
	209.174	450.722	769.290	1102.292	2358.564	1672.643	2080.482	1350.925	1409.134	622.703	255.417
	3.862	0.000	0.000	0.000	0.000	0.000					
1995	1	4	3	0	155.32	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	13.626	21.888	42.826	155.416	184.139	260.684	505.212	510.585	547.770
	837.511	612.709	348.875	195.276	120.347	19.413	41.192	2.565	0.000	1.809	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	6.813	6.813	11.023	45.444	60.663
	166.635	330.332	438.269	642.684	938.887	754.765	465.388	432.425	216.576	77.676	34.031
	0.000	31.708	0.000	0.000	0.000	0.000					
1996	1	4	3	0	105.9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	11.263	23.895	17.558	46.323	69.688	100.866	143.980	152.860	246.662	253.588
	316.023	382.446	576.702	381.673	210.927	40.580	18.140	3.449	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	1.969	16.569	9.477	20.321	31.888
	122.682	138.799	201.275	244.161	512.928	684.214	513.045	443.938	500.053	168.263	80.697
	0.000	0.000	8.188	0.000	0.000	0.000					
1997	1	4	3	0	120.02	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	1.161	43.012	86.023	161.666	168.856	281.573	561.911	1121.116
	704.254	806.316	955.923	710.574	304.057	252.957	95.198	14.749	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	40.691	40.691	47.718
	333.713	172.561	310.326	929.052	955.761	1403.580	911.236	1101.395	766.225	214.752	62.384
	14.749	0.000	0.000	0.000	0.000	0.000					
1998	1	4	3	0	141.61	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	201.351	9.389	71.792	158.772	203.049	523.069	761.094	831.782
	778.245	685.331	676.433	411.148	463.548	137.832	45.995	0.000	36.865	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.560	35.388	76.959
	296.725	256.734	553.538	764.909	722.775	934.879	1380.343	585.381	312.343	222.569	78.751
	8.665	0.000	0.000	0.000	0.000	0.000					
1999	1	4	3	0	120.534	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	4.915	12.006	1.779	33.232	58.200	87.069	59.032	125.859	179.031	415.199

	386.455	212.276	507.216	343.535	361.064	201.140	24.138	0.000	0.000	0.000	1.821
	0.000	0.000	0.000	0.000	0.000	0.000	1.088	0.000	0.000	34.497	55.505
	113.264	92.731	198.116	330.745	295.913	500.312	775.089	638.619	523.905	108.118	24.862
	11.499	17.417	0.000	0.000	0.000	0.000					
2000	1	4	3	0	38.602	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	1.481	4.205	4.690	8.643	12.707	16.409	8.126	22.247
	18.609	21.784	14.554	4.205	7.264	1.012	5.065	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.158	0.000	6.556
	3.871	8.643	24.919	15.925	23.617	30.244	40.264	19.303	7.055	2.082	0.593
	1.012	0.000	0.000	0.000	0.000	0.000					
2001	1	4	3	0	57.16	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	4.606	26.627	28.342	44.598	86.517	154.969
	1085.183	213.889	264.800	153.320	976.554	118.618	20.205	0.000	5.386	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	845.704
	23.467	1722.602	3349.163	1767.405	1014.791	569.248	1275.507	379.867	1175.550	50.445	66.011
	0.000	22.930	0.000	0.000	0.000	0.000					
2002	1	4	3	0	133.22	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	4760.725	76.678	382.587	698.354	529.567	610.813
	647.100	1288.210	815.705	714.979	658.795	633.708	139.060	23.450	7.235	7.235	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	64.821	8.564
	202.171	138.602	627.150	901.287	1177.039	1888.291	2010.841	2381.146	546.612	294.483	6.186
	17.677	17.712	0.000	0.000	0.000	0.000					
2003	1	4	3	0	80.888	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	17.774	42.147	67.792	166.407	122.911	210.273	163.433
	171.293	147.393	175.810	189.061	154.536	160.934	55.358	40.396	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	43.628
	63.018	51.325	175.251	172.118	315.236	201.423	279.570	207.985	80.832	79.032	41.444
	27.617	10.878	0.000	0.000	0.000	0.000					
2004	1	4	3	0	141.212	0.000	0.000	0.000	0.000	0.000	0.000
	22.549	0.000	45.255	0.000	4.001	71.317	153.904	149.813	133.328	120.944	163.076
	211.818	187.100	284.776	197.177	329.619	96.333	66.136	71.288	20.118	10.735	7.761
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	34.251
	57.292	66.020	23.867	153.645	418.862	291.695	448.754	243.589	152.704	80.884	67.623
	4.054	11.274	0.000	0.000	0.000	0.000					
2005	1	4	3	0	268.854	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	5.380	18.488	101.538	173.767	390.485	759.734	776.820
	806.680	823.271	680.170	784.293	673.466	222.238	218.663	132.812	92.461	34.972	5.380
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.380
	28.808	108.232	252.587	375.149	545.531	794.508	1020.845	1269.697	848.480	677.878	275.131
	159.960	160.463	53.264	63.990	3.459	0.000					
2006	1	4	3	0	120.974	0.000	0.000	0.000	0.000	0.000	3.720
	8.249	7.845	7.441	28.904	61.633	83.406	82.380	93.861	94.780	93.470	90.799
	1028.732	657.924	869.465	922.558	1007.959	27.059	8.676	29.906	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	8.249	4.125	4.125	14.828	30.286	41.306
	82.516	444.543	140.506	74.676	96.793	671.425	119.801	675.463	339.552	300.103	24.521
	16.786	5.462	5.293	0.000	0.000	0.000					

2007 California South non-trawl fleet (n=23)

1978	1	5	0	0	1.138	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	155.769231		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1979	1	5	0	0	2.38	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	5.102041
	10.204082	5.102041	15.306123	10.204082	5.102041	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1980	1	5	0	0	8.14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	14.423077
	19.23077	128.344231		17.528667	28.547539	1.552795	12.720975	9.615385	4.807692	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1985	1	5	0	0	8.416	0	0	0	0	0	0
	0	0	0	0	2.172185	0	4.344371	0	99.14279	39.355556	79.893617
	118.391963		117.853901		39.787234	39.893617	39.355556	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1986	1	5	0	0	42.8	0	0	0	0	0	0
	0	0	0	0	35.122195	88.536521	85.652273	88.53637	140.140043		202.02677
	102.894765		90.543284	48.272934	8.788462	28.683644	0	4.267677	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1987	1	5	0	0	30.56	0	0	0	0	14.103093	0
	0	0	0	0	0	242.091683		268.485149		266.77394	
	135.711547		361.897354		292.364077		238.470094		24.000978	50.449512	13.910795
	8.816178	0	0	3.113208	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1988	1	5	0	0	25.972	0	0	0	0	0	0
	0	3.707071	0	3.707071	20.750373	46.277146	86.763573	55.235479	69.175557	259.0428	
	204.725494		217.969255		105.381908		9.610526	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1989	1	5	0	0	72.54	0	0	0	0	0	0
	0	0	12.27	7.326733	74.27697	175.021397		329.4444	479.535344		
	466.563555		359.872034		208.215837		365.635163		197.286374		58.407283
	112.627327		0	18.63531	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1990	1	5	0	0	30.592	0	0	0	0	0	0
	2.691589	0	8.737345	13.932535	22.158915	35.070509	97.287122	97.475343	247.187963		93.303613
	83.571667	61.660194	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1991	1	5	0	0	17.97	0	0	0	0	0	0
	0	0	5.769231	9.202021	33.750067	46.010101	43.32427	58.124328	48.307573	43.980063	79.789828
	0	27.306593	5.731481	5.731481	0	15.673469	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1992	1	5	0	0	249.868	0	0	0	0	57.448721	
	176.465379		555.044924		679.8155	682.496865		596.829185		780.714735	
	529.549599		503.663751		295.236615		99.649403	129.227127		177.299372	
	58.866318	62.069737	70.536481	15.020164	6.961538	14.461538	6.961538	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1993	1	5	0	0	146.61	0	0	0	0	0	13.477234
	36.736276	73.577552	79.192808	70.005012	66.162799	111.929037		327.779904		139.084215	
	86.512829	31.826094	52.113691	5.616162	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0		
1994	1	5	0	0	182.286	0	0	0	11.141304	27.84619	29.099068
	103.777175		197.041855		346.007909		360.516803		314.157782		
	398.863659		364.078038		408.474339		236.289254		359.785115		
	159.917557		115.168451		58.564862	21.801111	20.111111	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		
1995	1	5	0	0	96.78	0	0	0	0	7.68	13.88
	56.041667	60.323333	112.081667		281.668744		279.797857		421.692824		
	404.148721		428.122229		377.791066		348.366747		339.113769		
	112.732995		74.809516	126.780701		12.884211	52.669828	2.346939	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1996	1	5	0	0	131.204	0	0	0	0	45.857143	84.062857
	68.574929	251.630323		379.173798		477.618965		459.06708	501.780647		
	478.718823		388.259279		496.245166		494.646526		361.967866		

	323.868918		190.728976		117.457801		10.52381	55.449222	28.252336	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0		
1997	1	5	0	0	123.516	0	0	0	0	0	1
	10	131	221	358	359	268	267	345	185	199	70
	49	18	2	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					
1998	1	5	0	0	47.836	0	0	0	0.000	0.000	0.000
	6.909	20.000	10.000	23.855	138.492	190.691	385.066	397.390	82.753	53.969	49.218
	2.360	0.000	0.000	5.520	0.000	0.000	0.000	0.000	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1999	1	5	0	0	32.042	0	0	0	0.000	0.000	3.983
	27.440	8.208	27.496	33.131	22.251	14.329	11.247	18.270	19.652	26.005	9.478
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2001	1	5	0	0	8.45	0	0	0	1.387	1.387	0.000
	0.000	5.754	5.037	8.974	5.733	7.326	5.733	0.754	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2003	1	5	0	0	2.276	0	0	0	0.000	0.000	0.000
	0.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0
	0	0	0	0	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	5	0	0	29.834	0	0	0	0.000	10.250	37.350
	39.733	61.267	39.850	34.583	26.850	30.750	10.167	0.000	6.100	6.100	0.000
	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0	0	0
	0	0	0	0	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	5	0	0	7.518	0	0	0	0.000	0.000	0.000
	0.000	2.000	1.000	2.000	2.000	2.000	0.000	1.000	0.000	1.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0
	0	0	0	0	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	5	0	0	23.178	0	0	0	1.000	0.000	19.324
	19.993	34.238	42.565	33.484	13.909	6.414	3.748	0.000	0.000	0.000	0.000
	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0
	0	0	0	0	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 California North non-trawl fleet (n=20)											
1981	1	6	0	0	1.69	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	70.080	140.160	0.000	70.080	70.080	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1982	1	6	0	0	9.24	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	417.046	15.846	987.064	882.483
	1452.501	151.569	235.277	464.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1983	1	6	0	0	2.83	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	7.079	24.845	0.000	14.158	0.000	0.000	17.765	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1984	1	6	0	0	1.14	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	18.535	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1991	1	6	0	0	25.60	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	15.605	25.102	16.096	50.694	74.278	88.011	141.983	138.892	27.645	67.149
	85.826	143.667	120.960	13.909	21.712	0.000	27.818	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1992	1	6	0	0	152.19	0.000	0.000	0.000	0.000	0.000	0.000
	14.640	54.689	140.879	129.079	218.686	305.756	449.891	622.561	419.241	396.772	573.629
	457.581	608.464	625.995	487.455	180.227	121.049	21.797	5.366	1.838	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1993	1	6	0	0	202.66	0.000	0.000	0.000	0.000	39.252	42.253
	143.422	245.319	351.505	385.579	544.492	448.920	460.477	561.082	537.158	553.973	551.546
	538.886	281.341	143.749	162.796	70.734	52.494	7.908	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1994	1	6	0	0	249.58	0.000	0.000	0.000	0.000	0.000	10.455
	58.932	157.765	198.098	343.086	465.128	471.821	681.149	812.397	904.115	863.386	692.537
	494.980	443.115	359.383	444.154	90.914	82.388	2.920	2.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1995	1	6	0	0	168.79	0.000	0.000	0.000	0.000	0.000	4.967
	68.671	115.859	272.873	326.421	393.972	481.528	392.515	303.636	295.934	216.465	203.654
	185.228	181.730	178.553	127.320	25.850	28.690	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1996	1	6	0	0	166.62	0.000	0.000	0.000	3.060	8.074	33.708
	123.337	211.515	370.010	341.345	359.481	406.174	563.921	391.582	519.850	436.825	472.194
	532.126	585.326	267.354	135.712	63.777	28.693	9.564	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1997	1	6	0	0	109.25	0.000	0.000	0.000	0.000	3.961	19.800
	13.860	26.849	77.854	160.787	226.902	320.700	322.333	208.149	207.819	103.785	83.153
	60.349	81.996	84.766	50.031	19.091	2.191	1.600	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1998	1	6	0	0	50.57	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	4.000	9.800	20.560	36.053	62.527	81.003	77.903	44.640	84.160
	53.343	83.170	54.587	35.520	15.110	20.663	5.870	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
1999	1	6	0	0	143.70	0.000	0.000	0.000	0.000	0.000	0.000
	4.708	26.667	36.282	57.677	116.000	144.400	144.248	121.300	77.040	28.400	15.760
	9.540	7.340	3.000	1.200	1.000	1.000	1.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2000	1	6	0	0	36.42	0.000	0.000	0.000	0.000	2.387	0.000
	0.000	1.194	5.194	10.000	12.000	12.922	7.961	26.358	22.613	19.515	31.403
	15.608	8.777	7.010	1.000	0.000	0.000	0.000	0.000	1.194	0.000	1.194
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2001	1	6	0	0	54.08	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	1.000	5.260	7.520	23.560	20.891	16.111	14.800	23.847	35.369	48.937

	36.639	28.111	20.240	6.714	4.160	5.610	2.900	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2002	1	6	0	0	6.04	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	4.000	0.000	7.000	1.000	8.000	1.000	0.000	1.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2003	1	6	0	0	13.55	0.000	0.000	0.000	0.000	1.983	1.983
	0.000	0.000	1.983	12.387	12.387	11.898	17.821	8.983	1.983	3.966	1.983
	0.000	1.983	0.000	1.983	1.983	1.983	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2004	1	6	0	0	74.05	0.000	0.000	0.000	0.000	3.000	1.000
	4.026	4.000	3.000	15.044	18.000	19.000	21.044	15.000	24.000	11.000	7.026
	4.000	7.000	5.000	3.000	1.000	2.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2005	1	6	0	0	46.39	0.000	0.000	0.000	3.000	4.000	1.000
	2.000	8.000	9.000	12.000	14.000	18.000	16.000	12.000	7.000	5.000	5.000
	4.000	2.000	0.000	1.000	2.000	0.000	0.000	0.000	1.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2006	1	6	0	0	33.97	0.000	0.000	0.000	1.000	1.000	1.000
	4.000	5.000	2.000	11.000	21.000	25.000	19.000	19.000	7.000	1.000	3.000
	1.000	1.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
# 2007 OR-WA non-trawl fleet (n=14)											
1980	1	7	3	0	4.04	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.898	2.694	2.694	0.000	0.000	0.898	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.898	0.000	0.000	0.000	4.491	3.592	0.000	3.592
	0.000	0.000	0.000	0.000	0.000	0.000					
1988	1	7	3	0	21.18	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	89.134	177.891
	344.952	433.709	808.346	573.733	425.603	26.127	198.110	128.361	103.144	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	15.752	57.631	145.933	249.909	266.571	670.514	1027.201	526.473
	103.144	0.000	0.000	0.000	0.000	0.000					
1990	1	7	3	0	7.06	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	25.435
	101.742	76.306	203.483	254.354	228.918	228.918	76.306	25.435	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	50.871	76.306	203.483	152.612	432.401	279.789	127.177
	0.000	0.000	0.000	0.000	0.000	0.000					
1996	1	7	3	0	6.11	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.029	0.000	3.044	4.059
	5.073	2.029	3.044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	2.029	1.015	2.029	4.059	1.015	1.015	3.044	2.029	1.015	0.000
	0.000	1.015	0.000	0.000	0.000	0.000					
1997	1	7	3	0	77.66	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	2.632	0.000	8.257	6.637	12.054	44.234	48.590	83.747	63.589
	32.941	81.483	41.605	33.193	36.578	20.011	19.371	5.436	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	2.752	2.752	2.264	4.352	11.633
	22.462	62.896	78.738	102.397	75.465	59.806	69.282	73.443	82.031	59.036	75.930
	21.177	13.467	0.000	13.467	0.000	0.000					
1998	1	7	3	0	54.23	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	20.783	21.124	32.702	43.625	69.784	73.268
	20.062	55.367	7.348	9.580	6.086	25.679	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	4.394	0.000	0.000	0.000	3.846	7.692	16.181

	20.177	38.828	52.952	94.156	107.508	139.738	128.532	105.051	137.777	96.859	41.116
	26.227	0.000	0.000	0.000	0.000	0.000					
1999	1	7	3	0	28.18	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.973	0.000	1.259	7.824	6.785	7.870	7.981	25.272	17.279	15.002
	14.587	5.398	5.464	4.140	7.336	0.000	5.234	0.000	5.234	10.467	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.973	0.000	0.000	4.048
	7.140	4.268	17.289	15.186	27.351	17.902	21.329	13.621	4.314	6.252	2.277
	0.000	5.234	5.234	0.000	5.234	5.234					
2000	1	7	3	0	48.29	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	2.000	3.018	14.935	11.623	7.067	14.001	16.039	12.023	9.145	2.091
	3.041	1.996	1.067	2.015	0.000	0.000	0.000	1.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.022	4.861	5.962
	14.923	12.090	12.086	7.100	7.243	5.097	2.067	1.091	1.996	0.000	0.000
	1.067	0.000	0.000	0.000	0.000	0.000					
2001	1	7	3	0	55.36	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	1.000	6.073	7.251	12.512	14.331	22.977	10.404	16.677	11.022	6.537
	8.662	2.448	2.102	3.568	1.075	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.250	4.253	9.126
	10.417	9.221	5.840	9.948	7.481	5.997	10.801	2.232	0.000	0.000	0.000
	2.157	1.157	0.000	0.000	0.000	0.000					
2002	1	7	3	0	13.45	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.867	0.000	155.510	0.000
	29.200	315.887	335.354	29.200	24.333	160.377	150.643	0.000	4.867	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	4.867	9.733	14.600	4.867	150.643	19.467	14.600	4.867	4.867
	0.000	0.000	0.000	0.000	0.000	0.000					
2003	1	7	3	0	8.73	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	127.509	510.037	255.019
	510.037	382.528	254.764	255.019	127.509	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	127.509	127.509	382.528	255.019	0.000	255.019	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2004	1	7	3	0	17.87	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	68.062	0.000	0.000	0.000	0.000	0.000	145.602	128.770
	315.757	151.569	263.139	286.665	238.217	80.723	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	87.304	0.000	145.602	43.508	141.063	153.324	119.694	41.753	34.031	38.970
	0.000	0.000	0.000	0.000	0.000	0.000					
2005	1	7	3	0	10.62	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	66.273
	44.969	0.000	51.359	66.273	0.000	0.000	59.647	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	38.345	21.302	42.603	79.051	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					
2006	1	7	3	0	7.11	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	583.655	25.560	76.681	626.256	8.520	25.560	8.520	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	17.040	17.040	42.601	34.081	0.000
	0.000	0.000	0.000	0.000	0.000	0.000					

2007 California South recreational fleet (n=24)

1980	1	8	0	0	204.35	0	0	1	9	16	23
	35	47	72	80	64	80	56	36	14	8	3
	0	1	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1981	1	8	0	0	101.60	0	0	0	1	8	7
	15	19	35	31	33	26	22	8	7	2	3
	4	2	4	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1982	1	8	0	0	124.43	0	0	1	0	3	13
	21	28	31	34	24	29	15	17	19	11	5
	4	4	4	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					

1983	1	8	0	0	121.95	0	0	2	5	9	20
	13	27	28	26	32	23	21	17	11	2	2
	2	3	2	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1984	1	8	0	0	147.92	0	0	1	9	28	39
	33	30	29	26	34	26	27	17	2	2	4
	1	2	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1985	1	8	0	0	273.81	0	0	1	7	27	53
	75	99	96	79	66	65	55	31	17	5	4
	1	4	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1986	1	8	0	0	254.81	0	1	1	2	10	28
	55	88	110	150	104	73	51	14	9	2	5
	3	3	2	4	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1987	1	8	0	0	67.56	0	0	1	2	6	9
	6	11	13	18	21	25	12	2	4	2	3
	8	3	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1988	1	8	0	0	95.25	0	0	1	1	6	17
	23	22	25	20	13	10	16	15	5	1	1
	1	2	1	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1989	1	8	0	0	188.17	0	0	1	4	15	13
	26	56	104	88	49	42	37	27	10	3	7
	3	0	3	5	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1993	1	8	0	0	126.12	0	0	1	5	7	15
	37	34	51	27	18	8	1	2	3	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1994	1	8	0	0	54.35	0	0	0	0	2	3
	6	7	16	16	9	10	5	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1995	1	8	0	0	104.91	0	0	1	3	8	18
	21	21	35	43	32	25	26	12	4	1	2
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1996	1	8	0	0	213.91	0	1	4	3	16	30
	30	40	70	111	127	97	67	26	6	6	2
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1997	1	8	0	0	310.43	0	0	0	10	19	25
	43	82	98	165	203	205	154	77	39	30	13
	5	4	2	3	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1998	1	8	0	0	209.70	0	0	0	0	9	24
	42	27	42	68	84	77	66	62	36	21	12
	6	3	12	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1999	1	8	0	0	228.91	0	0	1	1	3	9
	17	28	53	78	85	95	101	82	51	17	9
	5	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2000	1	8	0	0	99.12	0	0	0	1	0	3
	6	6	17	36	49	48	39	33	29	17	7
	7	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2001	1	8	0	0	73.39	0	0	0	1	3	1
	1	4	5	11	22	24	32	23	12	10	5
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2002	1	8	0	0	50.80	1	0	0	0	2	4
	3	3	9	1	4	15	11	22	11	4	3
	3	2	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2003	1	8	0	0	9.10	0	0	0	1	0	0
	0	0	5	0	0	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2004	1	8	0	0	113.42	0	0	1	4	0	5
	4	8	27	30	28	24	9	3	4	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2005	1	8	0	0	21.73	0	0	0	0	0	0
	0	1	3	4	7	8	2	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2006	1	8	0	0	24.24	0	0	0	0	0	2
	1	6	2	4	2	8	7	4	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					

2007 California North recreational fleet (n=24)

1980	1	9	0	0	107.09	0	0	0	0	2	3
	12	24	37	49	46	34	22	18	21	20	11
	13	7	9	3	2	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1981	1	9	0	0	75.91	6	2	2	2	1	3
	8	9	21	28	43	39	22	14	11	2	3
	2	1	2	0	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					

1982	1	9	0	0	118.85	0	0	0	0	0	12
	18	42	56	58	56	40	41	21	18	4	3
	3	3	0	2	1	3	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1983	1	9	0	0	77.19	0	0	0	1	0	2
	9	20	32	32	24	24	14	17	6	6	1
	1	1	2	0	2	1	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1984	1	9	0	0	105.40	0	0	0	0	3	4
	18	19	18	30	31	26	16	26	14	12	11
	3	3	6	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1985	1	9	0	0	163.62	0	0	0	1	4	8
	17	31	49	46	57	62	46	34	29	13	11
	2	10	3	5	2	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1986	1	9	0	0	199.60	0	0	1	0	2	14
	39	73	103	106	96	73	46	28	20	19	13
	9	11	6	7	2	1	0	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1987	1	9	0	0	121.72	0	0	0	0	1	8
	17	16	40	27	32	43	47	38	19	24	51
	36	30	9	10	11	7	2	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1988	1	9	0	0	90.26	0	0	0	0	2	3
	12	18	28	26	14	18	12	11	8	12	11
	15	7	8	6	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1989	1	9	0	0	30.32	0	0	1	0	1	1
	3	3	7	16	14	15	8	3	1	5	0
	1	1	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1993	1	9	0	0	130.51	0	0	0	4	5	12
	26	44	66	52	49	31	18	9	7	8	2
	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	0	0	0	0
	0	0	0	0	0	0					
1994	1	9	0	0	131.96	0	0	0	0	4	13
	30	44	66	84	65	40	22	14	6	2	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1995	1	9	0	0	82.88	0	0	0	3	7	20
	31	33	36	31	30	18	9	5	3	0	0
	1	0	1	2	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1996	1	9	0	0	147.20	0	0	0	0	4	11
	24	53	65	88	62	40	26	13	13	19	16
	17	6	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1997	1	9	0	0	133.73	0	0	1	5	7	28
	56	59	37	35	24	30	44	55	64	47	34
	22	14	14	3	4	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1998	1	9	0	0	46.87	0	0	0	1	1	0
	4	6	6	22	14	10	19	20	16	4	7
	6	6	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1999	1	9	0	0	109.75	0	0	0	0	0	9
	10	18	29	28	24	18	38	39	57	33	21
	7	8	6	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2000	1	9	0	0	42.42	0	0	0	0	0	0
	1	4	6	15	2	2	5	12	5	12	12
	4	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	0	0					
2001	1	9	0	0	15.90	0	0	0	0	0	0
	0	1	1	2	0	3	2	3	6	1	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2002	1	9	0	0	13.35	0	0	0	0	0	2
	1	1	0	2	2	2	2	1	0	1	1
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2003	1	9	0	0	30.24	0	0	0	0	0	0
	0	1	4	3	1	4	8	9	3	3	1
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2004	1	9	0	0	35.45	0	0	0	0	0	1
	1	2	12	5	11	4	4	3	6	1	1
	0	1	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2005	1	9	0	0	20.73	0	0	0	0	0	0
	0	1	0	1	4	7	5	0	3	0	3
	1	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
2006	1	9	0	0	10.93	0	0	0	0	0	0
	0	1	1	2	1	1	2	2	1	0	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					

2007 OR-WA recreational fleet (n=23)

1980	1	10	0	0	121.29	0	0	0	0	0	
	328.1504039		597.558782		610.9514286		2446.10622		5875.197787		
	3329.646289		4948.273167		5074.900676		2575.317914		1678.769783		
	2955.907527		678.7236824		423.1214634		2844.455689		405.4968427		
	80.20816668		0	0	0	0	0	0	147.526307		0
	0	0	0	0	0	0	0	0	0	0	0

0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1981 1 10 0 0 50.18 0 0 0 0 117.688549
502.0131582 3246.792632 2913.272582 7860.725817 12725.31912
6841.862819 5997.682378 11807.63698 6697.027958 2374.003556
2673.012194 1491.300157 1523.818687 395.638978 0 0
863.2171846 285.775485 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1982 1 10 0 0 108.91 0 0 0 0 268.8578971
483.1520862 140.2072405 3227.974591 2769.262849 10440.54535
9676.874221 11703.18003 16723.34727 5210.354968 968.2587613
1540.789364 1874.444309 2115.221868 2034.744482 555.4109315 0
0 0 0 159.0036463 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1983 1 10 0 0 33.90 0 0 0 0 0
491.9399744 61.16551383 184.9833146 1093.964074 1647.0908 3063.398714
1774.051388 97.20366352 481.5662471 97.20366352 1843.711988
563.0921404 161.1066088 273.0703669 0 181.2546591 0 0
147.6990731 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0
1984 1 10 0 0 135.64 0 0 0 0 0
330.0311227 946.7096557 2297.646294 3118.932907 5070.596924
4398.525037 4898.987254 3640.055948 3353.701119 1370.554404
933.2577533 971.1793092 489.3916029 353.8373804 113.8037779
59.58932295 242.1124781 55.86245116 0 205.8088908 96.66275609
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1985 1 10 0 0 158.58 0 0 0 57.55740042 0
1511.465 2510.830168 3886.974888 6413.075946 4199.75511 6760.287804
9401.850897 9104.653402 7237.968902 4528.731591 4402.164047
2246.93545 4318.812895 729.6205539 3217.808582 172.1165241
790.1322552 0 57.27956183 790.1322552 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1986 1 10 0 0 72.80 0 0 0 0 103.9245679
83.78531081 1437.027683 1403.790492 2786.59202 2553.757802
2375.591234 1621.556015 975.3961914 1020.097361 215.3114401
534.8829631 1646.401544 2167.891184 374.5262149 1035.646385
249.6841433 124.8420716 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1987 1 10 0 0 107.22 0 0 155.3185786 275.7672429
881.9218557 979.2894241 3648.684814 4311.403816 6982.337735
4142.742686 5207.436876 5143.446031 3330.618299 2351.544679
1590.567368 812.3628633 1320.389338 522.9872745 2146.580981
401.5495515 591.1991079 423.5670199 0 0 0 0 0
193.0309131 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1988 1 10 0 0 159.30 525.4874774 0 0 525.4874774
628.878096 2549.582464 5715.182392 10165.7027 12568.5278
18666.61916 11592.98716 12013.27647 5447.11468 3994.65682
1217.579904 1352.908384 1592.307818 1343.349553 1252.193533 0
0 346.0892737 45.47167898 525.4874774 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
1989 1 10 0 0 64.22 0 0 0 0 0
224.8409015 559.8862432 3162.727769 4042.15625 7705.794454
4534.859759 4739.198854 3071.283091 2210.015262 1062.980897
1214.839177 1191.964293 664.324081 696.5701124 0 180.0175462

0 0 226.8885012 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1993 1 10 0 0 191.14 0 0 0 0 0
120.1353979 1162.336046 1917.343549 3770.378049 5501.966416
5011.854073 3395.374822 2905.163547 2094.907843 757.1194508
420.1350939 668.706784 313.6119453 367.6771169 65.29254079
216.2842397 113.1286841 0 0 42.48484849 70.64383562 0
84.96969697 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1994 1 10 0 0 199.35 0 0 0 0 219.4170364
502.4533629 1032.281777 2088.753175 2700.567627 4214.363902
3900.723771 3303.10353 2236.233557 1129.112827 400.6278448
242.9557915 91.58742416 201.8486487 120.7648625 140.1587755 0
49.32608696 0 0 0 0 0 68.72 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1995 1 10 0 0 182.25 0 0 0 0 107.6539967
0 314.604067 1806.634837 2623.209114 6054.456402 3757.736478
2825.896799 1604.337605 893.6302461 245.0181818 337.3379585 0
229.3571429 0 229.3571429 114.6785714 0 72.74545455 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1996 1 10 0 0 123.37 0 0 0 0 0
234.4230769 89.06896552 1100.421007 2577.523115 3980.377491
2690.014383 3089.308829 2042.286319 1215.629973 410.0770227
143.8076923 78.5 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
1997 1 10 0 0 169.75 0 0 0 37.20731707 0
540.5059404 1301.359253 2648.154468 8423.818614 4203.338204
9861.106653 5482.117362 8688.368134 1837.362763 432.7869333
1197.102695 323.7003024 282.8418736 549.5563123 288.7704914
36.73651079 0 75.53398058 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1998 1 10 0 0 273.84 0 0 0 0 76.4742268
793.1413517 2192.276041 5589.897997 10847.03833 7279.171033
9017.44332 6803.331773 4163.132868 4798.719129 3622.272345
731.5554842 837.9041674 791.3908218 353.0204082 162.4148148 0
0 162.4148148 0 0 0 76.4742268 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1999 1 10 0 0 265.57 0 0 0 112.25 112.25
274.1303007 1216.471888 3410.908391 6191.820316 6512.580884
5236.148204 6262.321993 2574.479191 2466.977664 1176.985111
838.6272096 469.9515756 389.2498761 912.2392344 70.17460318
64.55980861 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2000 1 10 0 0 152.75 0 0 0 0 0
140.2708333 786.3815096 2054.777043 3141.604031 5630.211053
4404.114665 3311.408439 1924.169271 372.2356034 417.3475916
259.1285714 367.3780791 0 212.4439778 18.3 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2001 1 10 0 0 92.12 0 0 0 0 0 1360.4
115.4545455 230.5143745 1198.937507 1332.449208 1893.878029
1069.397232 3261.154747 316.995856 236.7781848 16.61538462
16.61538462 23 235.997965 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0

2002 1 10 0 0 85.25 0 0 0 0 0 0
291.9333333 220.4146794 796.8984632 1281.164623 2417.186895
2047.446112 464.5377886 653.8317965 545.1921569 126.4391892 66
225.9333333 22.5945946 0 0 0 0 0 0 0
0 0 0 0 0 0 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 10 0 0 20.97 0 0 0 0 0 0
0 79.675 146.8161765 135.1965686 93.39313726 219.3544118
64.02990196 60.55980392 3.666666667 1.833333333 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 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 10 0 0 22.31 0 0 0 0 0 0
67.2667547 182.5883164 91.29415822 257.0294712 233.0020677
67.2667547 476.4080241 82.86765651 82.86765651 91.29415822 0
273.8824746 67.2667547 0 0 0 0 0 0 0
0 0 0 0 0 0 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 10 0 0 10.21 0 0 0 0 0 0
0 0 70.90614982 212.7184495 0 70.90614982 226.8181548
70.90614982 70.90614982 99.24143487 70.90614982 0 0
70.90614982 0 0 0 0 0 0 0 0 0
0 0 0 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 At-sea hake fishery (n=4)
2003 1 11 3 0 96.55 0 0 0 0 0 0
0 0 0 0 0 0 2 3 0 16.111111 29.51634
32.738562 20.26634 33.710784 20.873483 14.301587 9.151261 5.722222 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 2.6 14.643791 24.322222 49.410458 52.599673 48.207143 28.317927 13.857143 3
4.634921 0 0 0 0 0
2004 1 11 3 0 118.47 0 0 0 0 0 0
0 0 0 0 0 0 0 0 3.5 0 32.728571
136.17437 135.745798 150.712465 223.222549 133.012465 24.95
112.702941 0 6.25 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 3.5 9.571429 17.828571
133.931513 77.771429 144.62437 15.85 9.25 8.6 0 0 3 0
0 0
2005 1 11 3 0 202.40 0 0 0 0 0 0
0 0 0 0 0 0 0 1.75 5 11.5 27.277778
55.72 55.8 51.67 63.882222 33.888889 22.97 27.498889 10.826667 4.333333 0 2
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 14.5 48.586667 90.476667 55.525556 32.386667 18.36 9.493333
2 2.333333 0 0 0 1
2006 1 11 3 0 182.29 0 0 0 0 0 3
2 0 0 1 0 3 4 8 9 21 33.095238
43.5 38.833333 40.095238 28.333333 27.3 15.428571 11 4 0 0 0
0 0 0 0 0 0 0 2 0 3 1
3 11.8 3 4 22.633333 53.8 48.345238 46.761905 20.8 5.833333 2
0 0 0 0 0 0
2007 NWFSC survey (n=4)
2003 1 12 3 0 79.61 0 43306 57741 72897 0 43190
25363 14357 54765 14357 15747 15786 71294 74632 166245 130017 88970
138216 120031 133437 114197 27694 208718 4550 0 0 0 0
25153 173224 220680 33019 0 54771 39761 14357 39802 0 0
24636 100687 54051 180177 197325 239272 256082 155510 108064 4660 0
0 0 0 0 0 4
2004 1 12 3 0 79.5 0 46225 9781 101655 39123 51157
92780 13115 90261 220272 85706 128292 141709 199472 223960 409937 367860
168530 240944 195117 447365 385664 323417 274293 148496 37124 37124 1
0 78842 33500 32061 75751 51385 168135 142813 127954 120285 143337
170795 278281 55167 152484 243127 269669 405235 429197 755614 253451 133642
122796 0 37124 0 0 5

2005	1	12	3	0	99.54	9312	25526	8973	16237	32473	62804
	81477	80227	112847	140374	82628	96844	135024	186567	189341	190581	156303
	322646	354907	258389	192365	150472	0	0	8702	0	0	2
	18624	9312	12393	6197	27978	34827	58313	55054	47607	110161	128571
	91365	166210	171969	180936	258143	383581	550201	653532	226432	57416	36276
	18138	0	0	0	0	6					
2006	1	12	3	0	75.61	0	9256	9256	9256	8621	7697
	0	0	10606	47258	47258	63974	56121	132406	290410	1273628	1358876
	1865188	3615270	3503977	2670924	1502499	2171131	1233554	936980	8888	0	3
	0	0	0	0	8224	26068	7697	7697	0	0	76282
	42775	37284	846074	740597	1822163	2427673	3815830	5786048	4642550	1894456	742727
	0	296574	0	0	0	7					
# 2007 triennnial survey (n=10)											
1983	1	13	3	0	215.16	0	0	3578	3578	13121	14688
	22563	113129	317694	562889	275905	287613	220792	246952	334313	233752	335422
	699948	484401	391119	537382	545882	236888	73064	37180	1813	0	0
	0	0	0	8946	14313	9641	27423	143716	326252	499398	389346
	261883	212402	244898	267583	293468	542581	850132	1241293	789315	540169	155779
	55125	11196	0	0	0	0					
1986	1	13	3	0	215.16	0	3015	1386	2202	20059	7538
	10696	19221	19347	40982	71310	84335	84117	166954	274047	301968	277293
	192250	201573	219700	195734	141261	154333	78156	30502	8970	0	0
	0	0	7148	10128	22063	19363	14420	112850	51652	52758	87857
	96422	164530	167154	335559	336212	284279	344089	370193	307445	312377	125384
	24739	8430	5836	0	0	0					
1989	1	13	3	0	175.77	5678	22712	73814	23116	15040	5678
	20314	69517	56203	107797	103159	75084	94889	94610	142711	162765	102671
	161590	133711	343786	305478	190954	173833	54169	94060	77410	0	0
	22712	0	68136	63175	19125	25160	22807	68265	81616	114142	104050
	81889	127530	137864	221340	196940	221243	304104	560162	523668	512477	86396
	31795	26226	75161	0	0	0					
1992	1	13	3	0	62.49	34885	10902	10966	20773	19820	14781
	30338	38288	31921	40398	42616	51985	106892	101108	107399	146992	69708
	21254	11877	20135	19809	17140	14090	1234	12073	11881	0	0
	34885	13301	25589	50418	28793	22995	16755	9768	11997	34329	26400
	18422	100552	90942	82939	52979	41260	25057	28979	21189	31815	7830
	1479	0	0	0	0	0					
1995	1	17	3	0	84.12	0	0	0	0	2425	6219
	9051	7444	34124	65169	84732	83277	68180	27715	41353	47699	28838
	40874	34870	54909	56214	71852	39778	40100	32907	6853	0	0
	0	0	0	0	0	13408	28080	35758	58054	137785	144116
	78322	72250	69039	25359	47640	47653	100883	120910	187447	124051	34202
	0	0	0	0	0	0					
1998	1	17	3	0	113.54	0	196	22571	196	1570	11689
	9864	7606	4191	21373	16103	40348	59768	79399	82635	70273	52250
	34294	35430	43633	18110	10390	7156	701	2824	0	0	0
	0	3982	7963	4963	1177	8729	11097	2159	1766	10547	24342
	65749	61566	76257	65988	50491	93704	68243	41814	33539	7181	6747
	2105	0	0	0	0	0					
2001	1	17	3	0	100.86	0	0	3606	0	32110	0
	67475	3520	7040	77336	44391	205336	414378	293143	161288	96909	54077
	79501	72585	72892	23599	7090	16502	0	0	0	0	0
	0	0	0	0	22492	0	22492	35200	26012	74040	83963
	262245	311511	186368	156321	90186	65787	79815	40142	36151	13856	3684
	0	0	0	0	0	0					
2004	1	17	3	0	90.84	0	0	4597	0	4040	0
	0	0	0	0	0	0	10782	35686	91136	56932	36869
	60475	55129	84106	59555	94921	41846	22135	0	0	0	0
	0	0	4040	0	0	0	0	0	6603	0	0
	11675	21407	32063	64495	59598	171145	144096	170212	166250	86653	47887
	4230	0	0	0	0	0					

Age data
35 # Number of age bins for data inputs
Lower edge of age bins (first is a minus group, last is a plus group)
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

3 # Number of ageing error types
Vectors of: Average age at true age (to accumulator age)
SD of ageing precision at true age

```
# definition 1 CAP/NWFSC/ODFW
0.5	1.418732	2.33746	3.2562	4.17493	5.09366	6.01239	6.93113	7.84986	8.76859	9.68732	10.6061
	11.5248	12.4435	13.3623	14.281	15.1997	16.1184	17.0372	17.9559	18.8746	19.7933	20.712
	21.6307	22.5494	23.4681	24.3868	25.3055	26.2242	27.1429	28.0616	28.9803	29.899	30.8177
	31.7364	32.6551	33.5738	34.4925	35.4112	36.3299	37.2486
0.0976918	0.0976918	0.195384	0.293075	0.390767	0.488459	0.586151	0.683843	0.781535	0.879226	0.976918	1.07461
	1.1723	1.26999	1.36769	1.46538	1.56307	1.66076	1.75845	1.85614	1.95384	2.0515278	2.1492196
	2.2469114	2.3446032	2.442295	2.5399868	2.6376786	2.7353704	2.8330622	2.930754	3.0284458	3.1261376	3.2238294
	3.3215212	3.419213	3.5169048	3.6145966	3.7122884	3.8099802	3.907672
# definition 2 WDFW
0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5
	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5
	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5
	34.5	35.5	36.5	37.5	38.5	39.5	40.5
0.112926	0.112926	0.225851	0.338777	0.451702	0.564628	0.677553	0.790479	0.903404	1.01633	1.12926	1.24218
	1.35511	1.46803	1.58096	1.69388	1.80681	1.91973	2.03266	2.14559	2.25851	2.371446	2.484372
	2.597298	2.710224	2.82315	2.936076	3.049002	3.161928	3.274854	3.38778	3.500706	3.613632	3.726558
	3.839484	3.95241	4.065336	4.178262	4.291188	4.404114	4.51704
# definition 3 Surface
0.5	1.418732	2.33746	3.33	4.6	5.81	6.95	8.04	9.08	10.07	11.01	11.91
	12.76	13.57	14.34	15.07	15.77	16.43	17.06	17.66	18.24	18.78
	19.1656896	19.64283015	20.0954992	20.52500625	20.9326368
	21.31965835	21.6873264	22.03689045	22.3696	22.68671055	22.9894896
	23.27922265	23.5572192	23.82481875	24.02481875	24.22481875
	24.42481875	24.62481875	24.82481875
0.166883	0.166883	0.333765	0.500648	0.667531	0.834414	1.0013	1.16818	1.33506	1.50194	1.66883	1.83571
	2.00259	2.16948	2.33636	2.50324	2.67012	2.83701	3.00389	3.17077	3.33765	3.504543	3.671426
	3.838309	4.005192	4.172075	4.338958	4.505841	4.672724	4.839607	5.00649	5.173373	5.340256	5.507139
	5.674022	5.840905	6.007788	6.174671	6.341554	6.508437	6.67532

### Age composition data ###
487 # Total number of age observations
# Conditional ages for surveys, marginal for fishing fleets
# Year	Season	Type	Gender	Partition	ageerr	Lbin_lo	Lbin_hi	Nsamps	Data: females then males
# 2007 Southern California trawl fleet age error key 1 (n=8)
1981	1	1	3	0	1	-1	-1	4.83	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1000.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	500.000	500.000	500.000	0.000	500.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000 #
1983	1	1	3	0	1	-1	-1	3.55	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	500.000	0.000	0.000	500.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	500.000	500.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000 #
1984	1	1	3	0	1	-1	-1	18.69	0.000	0.000	0.000
	123.718	96.225	94.482	0.000	280.996	500.000	1000.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	13.746	123.718	68.732	96.225	0.000	513.746	1500.000	0.000	0.000	500.000
	0.000	500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	500.000	1000.000	1000.000	0.000	0.000	0.000	0.000	0.000
	0.000 #
1985	1	1	3	0	1	-1	-1	18.97	0.000	0.000	0.000
	0.000	0.000	364.773	2026.000	1982.173	890.773	559.273	242.250	182.800	182.800	0.000
	0.000	0.000	0.000	0.000	364.773	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	2000.000	26.000	742.250	91.400	716.667	91.400
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	364.773	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	364.773 #
2002	1	1	3	0	1	-1	-1	1.83	0.000	0.000	0.000
	0.000	0.000	0.000	1.000	2.000	0.000	1.000	1.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
```

	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000 #										
2003	1	1	2	0	1	-1	-1	1.28	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000 #										
2004	1	1	2	0	1	-1	-1	1.14	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000 #										
2005	1	1	3	0	1	-1	-1	3.55	0.000	0.000	1.000
	0.000	0.000	0.000	0.000	0.000	1.000	0.000	1.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000 #										

2007 Northern California trawl fleet age key 1 (n=11)

1981	1	2	3	0	1	-1	-1	64.39	0.000	0.000	0.000
	0.000	171.871	155.052	143.855	552.491	960.329	1078.854	476.593	252.977	1164.645	612.456
	614.869	571.300	520.123	14.040	124.939	44.745	329.820	465.292	0.000	71.300	0.000
	11.489	49.480	0.000	0.000	135.129	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	37.002	252.396	64.149	1172.284	1017.173	370.414	604.302	357.478
	930.652	604.664	724.354	427.770	0.000	12.170	0.000	60.526	404.792	0.000	71.300
	0.000	0.000	37.489	0.000	0.000	0.000	0.000	0.000	15.023	0.000	0.000
	26.776										
1982	1	2	3	0	1	-1	-1	79.98	0.000	0.000	0.000
	0.000	0.000	455.671	505.739	809.562	534.882	1664.928	1515.326	1705.311	157.233	895.207
	551.145	0.000	381.290	441.215	11.588	0.000	15.135	0.000	429.253	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	439.254	0.000	0.000	30.154	974.703	137.143	1009.961	1363.132	2457.232	1390.602	821.069
	257.505	147.106	380.196	762.581	221.857	468.665	49.057	887.256	167.180	572.830	721.857
	0.000	0.000	0.000	221.857	0.000	0.000	0.000	0.000	500.000	0.000	0.000
	221.857										
1983	1	2	3	0	1	-1	-1	167.10	0.000	0.000	0.000
	5.747	93.377	219.512	952.225	2093.845	2071.412	562.523	1666.687	225.840	1206.857	921.750
	1972.970	464.367	655.391	211.598	193.744	8.840	457.666	0.000	859.848	283.133	769.938
	0.000	0.000	54.392	250.705	0.000	205.045	0.000	359.848	0.000	364.923	0.000
	0.000	0.000	0.000	303.942	103.889	1867.813	1936.779	2824.357	1371.667	4971.029	1015.804
	905.464	531.908	749.270	1574.260	1477.369	37.216	596.812	902.296	820.007	27.843	564.893
	127.532	323.870	359.848	0.000	52.019	62.040	0.000	0.000	500.000	0.000	205.045
	1400.464										
1984	1	2	3	0	1	-1	-1	109.40	0.000	0.000	0.000
	0.000	0.000	1163.744	740.745	1490.822	1832.411	1163.223	1672.036	1004.852	398.358	1296.562
	399.151	1603.336	137.387	106.831	80.773	201.809	68.850	0.000	147.961	154.250	0.000
	235.778	0.000	199.282	525.262	0.000	24.386	0.000	0.000	229.966	476.896	0.000
	0.000	0.000	0.000	56.725	169.882	567.390	1413.331	878.886	1800.631	1602.013	1773.945
	77.472	0.000	972.600	305.052	414.354	426.362	10.900	143.350	0.000	334.353	432.588
	0.000	500.510	504.399	0.000	142.608	376.596	10.900	166.157	293.260	146.630	158.861
	540.507										
1985	1	2	3	0	1	-1	-1	112.37	0.000	0.000	0.000
	0.000	78.393	208.954	1380.992	1828.328	2118.386	888.288	2023.116	1224.364	815.748	139.485
	190.525	1057.559	633.697	302.630	1089.635	434.647	1384.695	108.774	325.874	293.774	434.647
	347.121	288.030	0.000	190.525	186.804	0.000	0.000	0.000	2.386	576.061	0.000
	0.000	0.000	0.000	24.733	117.263	1527.011	918.644	3339.029	2520.794	2081.283	1501.902
	1062.287	599.978	139.485	415.724	769.725	453.161	0.000	16.760	340.399	347.121	470.495
	1107.642	951.585	190.525	614.351	105.980	0.000	884.767	0.000	0.000	0.000	44.225
	299.298										

1987	1	2	2	0	1	-1	-1	1.14	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	159.100	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2001	1	2	3	0	1	-1	-1	4.86	0.000	0.000	0.000
	0.000	0.000	0.000	1.818	1.818	1.818	5.455	5.455	5.455	3.636	3.636
	1.818	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	1.818	3.636	0.000	5.455	3.636
	5.455	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2002	1	2	3	0	1	-1	-1	14.52	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	4.495	7.773	3.795	18.610	8.061	4.495	0.000
	3.495	0.000	1.378	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	6.448	7.606	7.931	4.031	10.479	10.463	8.984
	7.485	1.000	1.300	0.000	1.000	0.000	1.300	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1.378										
2003	1	2	3	0	1	-1	-1	8.66	0.000	0.000	0.000
	0.000	0.000	0.000	1.000	5.000	10.000	1.000	3.000	4.000	4.000	2.000
	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	4.000	0.000	1.000
	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2004	1	2	3	0	1	-1	-1	9.93	0.000	0.000	0.000
	1.000	5.000	5.000	16.600	3.000	0.000	1.000	0.000	16.600	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	3.000	0.000	18.600	3.000	16.600	3.000	0.000	15.600
	0.000	2.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2005	1	2	2	0	1	-1	-1	2.69	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000
	2.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										

2007 Oregon trawl fleet with age error key 1 (n=25)

1980	1	3	3	0	1	-1	-1	56.48	0	0	0
	0	0	0	19.0528035	35.5249684	32.9443299	16.4721649				
	246.1499061	295.5244271	515.2433836	496.7916307	351.496883						
	783.8522156	869.629893	199.1663697	604.65023	544.888627	222.542324					
	521.9129669	517.5869465	163.8310552	0	83.9031889	63.4557014					
	65.8886598	63.4557014	130.8867253	0	0	0	0	0			
	0	0	0	0	0	9.5264017	16.4721649	576.1265258			
	101.5613084	108.5070716	379.0301913	929.2802435	317.9759687						
	717.0801581	549.3682202	620.605899	1542.466393	567.0034413						
	1651.308888	1082.508127	537.6195004	326.8049087	1143.928296						
	678.935447	621.8495312	318.0441385	273.2619326	32.9443299						
	351.5545607	256.7897677	348.55551	145.5848983	415.0102621	25.8089127					
	795.7829656										
1981	1	3	3	0	1	-1	-1	10.28	0	0	0
	0	0	0	0	230.5996252	0	0	1588.750271			
	982.3003055	606.4499654	606.4499654	375.8503401	230.5996252						
	375.8503401	606.4499654	0	0	922.3985009	461.1992505	0				
	230.5996252	230.5996252	0	0	0	0	0	0	0		
	0	0	230.5996252	0	0	0	0	0	0		
	0	0	837.0495906	230.5996252	606.4499654	230.5996252					
	982.3003055	461.1992505	375.8503401	1127.55102	837.0495906						

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     375.8503401 375.8503401 0 1503.401361 982.3003055 375.8503401
     230.5996252 0 0 0 0 0 375.8503401 0
     230.5996252 0 375.8503401
1983 1 3 3 0 1 -1 -1 204.74 0 0 0
     0 213.8485138 243.3152148 1067.225709 2195.062394 2894.850549
     3879.902626 3054.129672 2751.510518 3001.940922 2812.473906
     2441.258285 1118.251376 575.6970148 963.6910956 1087.080701
     899.3282739 856.2166328 698.733863 708.5262368 758.7308939
     356.8416573 246.4921771 188.0094288 229.8681228 208.7198424
     40.5922665 8.6557997 151.4842609 110.2132549 137.3070859 313.6422511
     0 0 0 0 58.2135426 412.7847706 1536.550408
     3802.597439 4895.683267 4690.510442 2230.23026 2085.696307
     2325.31177 2980.209294 1874.596455 1216.729336 1364.158886
     1401.055736 1057.6148 1990.862128 1478.435065 1755.857516 1479.073616
     1160.917924 826.6326401 755.4156068 839.7073738 536.1764609
     1019.778152 705.6840087 949.3653908 605.5321124 501.4256925
     355.4971152 3867.991233
1984 1 3 3 0 1 -1 -1 134.14 0 0 0
     21.3407134 44.6710663 297.879374 678.2147005 1051.86582
     1813.324588 2405.419972 2707.951316 1561.479072 989.4581132
     1656.514619 1000.457785 680.9618642 312.6764773 509.4572293
     396.1088628 273.3952643 934.2673031 404.8884521 651.0191832
     449.5250621 245.6952335 196.4645576 186.6826387 228.5168816
     94.4607117 211.9598583 0 115.7910122 58.3669848 132.0779164
     108.4583508 0 0 0 13.5833577 32.3413314 487.3091286
     970.32225 1686.674987 3250.016379 3101.088826 2451.236796 1624.476519
     1503.431012 1119.418988 1687.900129 1367.793919 737.5427611
     395.1882769 588.8533625 807.4840597 1235.678244 1265.381861
     992.9196773 799.7553354 1025.538012 621.0376308 756.8987954
     528.9571231 266.941841 512.3300475 270.6103239 586.6184587
     459.0543646 607.237466 3300.092477
1985 1 3 3 0 1 -1 -1 169.44 0 0 0
     0 0 347.3992369 892.9021116 1054.640438 2274.971563
     2811.714979 2492.573396 1614.090392 1467.353169 962.3198751
     886.8325001 871.7970466 773.1980963 457.9719349 189.7426232
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9.027
2007 Washington trawl fleet with age error key 2 (n=23)
1980 1 4 3 0 2 -1 -1 63.54 0.000 0.000 0.000
197.856 593.568 396.629 1782.537 2489.546 2108.809 1338.983 1203.147 1742.406 979.166 523.004
349.047 550.754 313.489 140.015 158.685 1.833 19.765 40.447 93.676 93.676 0.000
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0.000 0.000 0.000 407.868 2179.166 2375.189 2605.640 2680.213 1307.968 680.679 1099.193
923.254 969.905 424.226 461.088 208.162 339.534 672.852 262.307 529.635 263.600 23.080
138.003 24.312 45.244 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
21.852
1981 1 4 3 0 2 -1 -1 105.90 0.000 0.000 0.000
0.000 128.193 9.959 10.724 12.287 122.478 74.761 594.275 195.686 45.926 170.838
119.875 134.728 18.468 86.509 5.229 42.607 45.413 3.074 42.659 41.096 0.000
1.512 0.000 1.211 0.000 0.000 0.000 2.506 0.000 0.000 0.000 0.000
0.000 0.000 0.000 25.279 6.387 14.254 61.684 155.147 78.437 71.992 121.150

	131.121	127.297	157.244	139.759	235.427	52.422	47.504	323.773	6.140	190.745	46.190
	2.506	2.423	2.723	4.017	5.363	812.664	50.744	0.000	140.832	4.824	45.920
	375.698										
1983	1	4	3	0	2	-1	-1	56.48	0.000	0.000	0.000
	0.000	47.393	204.351	116.651	376.633	543.503	647.165	786.236	513.667	313.955	571.866
	612.908	372.350	456.148	305.658	144.816	98.026	13.324	114.722	51.957	0.000	60.237
	0.000	3.242	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	47.357	348.393	116.006	602.288	716.108	737.761	708.251	301.112
	626.935	366.265	263.968	243.317	297.650	34.542	193.193	58.379	11.017	13.485	110.841
	76.964	9.635	6.484	53.907	63.479	7.062	56.995	6.423	3.242	53.248	8.791
	250.507										
1984	1	4	3	0	2	-1	-1	35.30	0.000	0.000	0.000
	0.000	0.000	1.763	2.545	2.818	4.640	6.184	10.739	10.565	3.864	4.321
	5.228	6.569	2.269	4.346	1.860	0.626	0.723	1.096	1.860	2.955	0.764
	1.096	1.096	1.428	0.332	0.764	0.332	0.000	0.000	0.764	1.290	0.000
	0.000	0.000	0.000	0.295	2.738	3.719	4.725	5.817	9.012	9.617	10.829
	6.161	8.972	5.959	5.091	4.767	5.779	3.150	0.589	2.449	1.253	1.450
	1.979	3.629	3.407	1.338	0.000	1.860	1.510	0.764	1.018	1.096	2.586
	16.689										
1985	1	4	3	0	2	-1	-1	77.66	0.000	0.000	0.000
	0.000	24.966	77.114	160.980	525.730	876.991	1055.242	1039.556	1143.940	971.531	679.445
	808.435	415.751	872.222	841.102	443.115	255.738	34.561	286.070	30.222	181.618	95.630
	0.000	27.688	190.570	23.349	93.582	13.594	3.407	3.407	23.349	108.796	0.000
	0.000	0.000	0.000	13.746	31.687	298.628	568.105	874.201	911.162	1282.770	1454.375
	914.483	478.458	1288.801	346.835	694.629	319.681	341.640	582.884	97.176	74.795	237.387
	282.908	273.950	119.666	167.058	225.247	128.492	162.235	155.680	76.885	148.458	51.446
	1783.508										
1986	1	4	3	0	2	-1	-1	120.02	0.000	0.000	0.000
	0.000	18.529	408.778	806.492	1723.598	1383.059	2148.497	1304.307	1014.918	822.288	325.707
	449.712	90.307	74.703	18.400	17.600	0.000	26.342	120.097	39.983	0.000	13.617
	32.008	0.000	0.000	74.703	25.212	0.000	0.000	0.000	98.591	215.059	0.000
	0.000	0.000	36.800	183.963	399.326	1417.868	2273.825	1973.574	2032.468	1279.494	1012.664
	517.203	231.766	387.022	330.388	56.983	85.667	214.376	85.947	98.591	236.679	15.508
	29.126	135.406	0.000	30.599	39.983	236.995	112.240	0.000	0.000	98.591	39.983
	528.395										
1987	1	4	3	0	2	-1	-1	35.30	0.000	0.000	0.000
	0.000	9.514	14.482	232.047	591.465	1198.636	464.937	1283.877	566.967	258.992	248.608
	132.230	4.968	117.748	87.805	8.700	31.070	14.482	82.837	0.000	4.968	0.000
	0.000	0.000	0.000	0.000	4.968	8.700	0.000	0.000	0.000	4.968	0.000
	0.000	0.000	0.000	9.514	28.543	330.994	1014.186	928.203	835.810	766.291	422.688
	207.915	107.677	227.922	96.506	8.700	8.700	9.514	121.481	0.000	0.000	121.481
	82.837	92.773	4.968	0.000	0.000	0.000	0.000	0.000	4.968	112.780	0.000
	241.169										
1988	1	4	3	0	2	-1	-1	116.84	0.000	0.000	0.000
	3.460	54.692	144.477	114.149	628.071	1233.436	1497.347	3014.890	1784.404	1085.264	1188.129
	1026.811	643.289	495.689	405.392	297.493	143.862	226.799	0.000	155.249	0.000	7.193
	9.395	125.072	0.000	125.072	0.000	0.000	0.000	18.149	0.000	0.000	0.000
	0.000	0.000	0.000	112.942	180.530	392.496	666.557	769.119	1432.410	2562.971	909.355
	1497.354	816.099	754.660	130.905	858.614	601.765	174.833	335.490	550.310	200.236	167.640
	7.193	101.727	24.992	116.112	162.441	0.918	27.544	9.395	71.329	12.392	0.000
	1575.847										
1989	1	4	3	0	2	-1	-1	55.05	0.000	0.000	0.000
	6.230	1244.059	293.912	594.113	1103.508	552.055	68.305	645.017	651.910	106.366	1413.011
	68.305	50.847	44.284	523.088	38.363	0.000	15.275	31.508	8.420	0.000	0.000
	0.000	4.671	0.000	0.000	0.000	0.000	14.668	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	949.548	222.815	65.124	891.130	391.225	165.293	619.173	474.863
	90.786	1231.735	27.759	29.943	462.358	4.671	500.000	514.668	284.773	0.000	4.671
	0.000	10.603	499.729	0.000	13.091	25.271	437.087	14.668	0.000	0.000	0.000
	25.254										
1990	1	4	3	0	2	-1	-1	59.99	0.000	0.000	0.000
	0.000	144.113	37.798	44.916	231.478	154.412	938.048	233.747	1191.783	728.206	190.805
	586.219	526.559	128.421	512.798	531.691	21.448	12.798	20.486	0.000	0.000	11.206
	0.000	0.000	0.000	0.000	0.000	0.000	10.243	0.000	0.000	98.687	0.000
	0.000	500.000	0.000	17.728	22.160	156.157	1265.852	835.947	1222.395	742.329	166.946
	778.705	203.822	621.793	45.518	21.763	515.419	0.000	0.000	1.343	80.598	1.343
	59.149	0.000	10.243	0.000	0.000	11.520	20.486	10.243	500.000	10.243	10.243
	262.278										
1991	1	4	3	0	2	-1	-1	141.20	0.000	0.000	0.000
	0.000	0.000	108.733	427.936	1266.002	1556.286	2991.128	4253.078	2618.288	2117.950	2867.729
	992.425	750.620	1218.003	1015.890	525.707	1002.853	488.385	324.756	376.611	139.321	95.622

	3.321	45.588	4.992	142.128	0.000	0.000	0.000	0.000	0.000	3.321	0.000
	0.000	0.000	0.000	0.000	61.924	1472.776	1957.819	3038.192	3808.162	4293.543	3812.485
	3256.649	2156.356	1559.364	2307.786	741.689	1013.608	109.686	710.021	423.870	364.805	895.027
	260.072	230.590	0.000	184.908	100.503	184.908	45.588	796.244	274.587	517.603	189.141
	2787.822										
1992	1	4	3	0	2	-1	-1	71.62	0.000	0.000	0.000
	19.331	222.050	230.699	271.872	523.226	304.573	868.709	845.847	1132.027	409.754	745.978
	710.722	119.446	264.023	50.240	35.236	50.240	50.240	4.371	50.240	0.000	0.000
	0.000	0.000	240.214	0.000	0.000	50.240	0.000	0.000	0.000	50.240	0.000
	0.000	0.000	24.121	261.448	258.702	371.445	725.460	1340.597	1389.456	1428.147	231.265
	908.499	615.515	613.302	248.579	603.836	173.861	240.214	4.371	468.045	328.311	227.831
	500.000	55.827	554.611	12.383	50.240	29.649	378.551	0.000	50.240	0.000	505.902
	1358.979										
1993	1	4	3	0	2	-1	-1	106.84	0.000	0.000	0.000
	30.452	79.111	458.197	306.947	674.386	637.764	652.093	546.905	554.960	197.263	64.930
	274.840	211.131	216.108	218.352	262.574	0.000	23.146	307.598	0.000	0.000	12.594
	94.817	23.146	189.635	94.817	0.000	0.000	0.000	94.817	0.000	202.921	0.000
	0.000	0.000	33.759	236.664	221.391	659.123	777.382	2306.465	476.400	564.540	421.125
	350.784	320.239	84.014	182.213	84.285	160.702	24.320	94.817	0.000	11.419	23.146
	94.817	94.817	133.274	0.000	94.817	0.000	0.000	0.000	0.000	0.000	23.146
	288.293										
1996	1	4	3	0	2	-1	-1	9.45	0.000	0.000	0.000
	0.000	0.000	78.838	0.000	7.353	11.029	7.353	7.353	3.676	3.676	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	37.581	0.000	37.581	3.676	0.000	22.059	22.059	7.353	3.676
	0.000	0.000	0.000	0.000	3.676	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	3.676	0.000	0.000	0.000	0.000	0.000
	0.000										
1998	1	4	3	0	2	-1	-1	16.83	0.000	0.000	0.000
	0.000	0.000	89.681	8.740	543.005	555.416	6.555	0.000	48.861	502.185	2.185
	0.000	0.000	0.000	0.000	2.185	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	2.185	2.185	10.925	160.503	149.578	89.681	4.370	6.555	0.000
	72.440	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	344.046										
1999	1	4	3	0	2	-1	-1	2.41	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	500.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	112.960	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	500.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2000	1	4	3	0	2	-1	-1	3.69	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.992	7.992	0.000	103.473
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.992
	0.000	0.000	0.000	0.000	0.000	0.000	15.755	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2001	1	4	3	0	2	-1	-1	4.97	0.000	0.000	0.000
	0.000	0.000	0.000	12.403	0.000	153.281	62.996	0.000	0.000	0.000	22.657
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	153.281	0.000
	12.403	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2002	1	4	3	0	2	-1	-1	21.55	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	82.917	24.553	31.157	37.535	22.820	24.553
	82.917	38.171	51.169	44.858	0.000	40.420	0.000	100.692	0.000	0.000	0.000
	0.000	0.000	38.929	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	22.634	22.634	0.000	0.000	0.000	0.000
	29.787	42.327	60.168	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	82.917										

2003	1	4	3	0	2	-1	-1	12.79	0.000	0.000	0.000
	0.000	0.000	0.000	25.889	0.000	20.796	0.000	0.000	0.000	0.000	7.824
	25.362	0.000	15.598	0.000	42.394	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2.288	10.184	7.323	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	12.238	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2004	1	4	3	0	2	-1	-1	16.86	0.000	0.000	0.000
	0.000	20.645	0.000	0.000	18.285	36.549	31.851	0.000	96.720	0.000	0.000
	0.773	0.000	25.230	0.000	0.000	7.273	0.000	1.800	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.773	0.000
	0.000	0.000	0.000	0.000	0.769	33.758	35.780	58.815	18.787	0.000	0.000
	0.000	0.000	0.000	0.000	0.773	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	34.531										
2005	1	4	3	0	2	-1	-1	111.69	0.000	0.000	0.000
	0.000	0.000	8.754	15.213	35.013	42.591	52.945	37.835	35.070	25.698	18.751
	16.920	6.730	3.471	12.262	6.775	5.295	4.681	5.422	0.000	1.013	3.331
	4.370	1.043	2.374	0.000	0.000	0.000	0.935	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	1.360	6.366	18.740	62.162	30.532	38.227	32.048	26.756
	14.622	8.440	8.168	4.910	4.943	3.351	2.105	1.013	1.043	2.196	2.037
	3.366	0.000	1.024	0.000	0.777	0.777	2.748	0.000	1.132	1.132	0.000
	5.811										
2006	1	4	3	0	2	-1	-1	70.61	0.000	0.000	1.071
	2.142	9.126	25.193	17.856	24.456	19.332	42.465	8.191	7.241	7.396	1.845
	1.007	4.469	2.309	2.567	2.043	0.920	3.343	0.933	0.000	0.000	0.922
	1.386	2.516	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	3.213	1.071	3.094	26.761	25.072	24.026	17.170	18.265	10.095	11.597
	8.210	6.899	4.870	3.393	4.910	1.391	0.000	2.359	0.920	0.259	3.149
	0.000	0.471	0.922	0.000	0.259	0.000	0.000	0.000	0.000	0.000	0.000
	1.867										

2007 OR-WA non-trawl fleet (n=7)

1997	1	7	3	0	1	-1	-1	3.35	0.000	0.000	0.000
	0.000	0.000	1.004	0.000	0.000	0.000	0.000	0.000	0.000	2.008	0.000
	0.000	0.000	0.000	0.000	0.000	1.004	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	1.004	2.008	1.004	0.000	5.021	2.008	2.008
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
1998	1	7	3	0	1	-1	-1	16.01	0.000	0.000	0.000
	0.000	0.000	4.245	8.489	15.880	19.375	4.245	5.941	9.088	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	2.795	0.000	0.000	0.000	0.000
	2.795	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	3.846	11.538	7.391	27.020	14.678	41.304	9.436	9.440
	11.237	30.813	6.293	2.795	13.333	2.795	0.000	2.795	0.000	9.788	8.384
	2.795	0.000	0.000	2.795	0.000	2.795	0.000	0.000	0.000	0.000	0.000
	2.795										
2001	1	7	3	0	1	-1	-1	10.38	0.000	0.000	0.000
	0.000	3.355	3.084	1.028	3.139	3.084	3.139	4.167	1.084	1.028	0.000
	1.028	1.084	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	2.393	1.143	0.000	4.223	3.139	2.111	1.028	0.000
	2.056	0.000	1.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2002	1	7	3	0	1	-1	-1	2.10	0.000	0.000	0.000
	0.000	0.000	0.000	1.034	0.000	0.000	1.034	0.000	0.000	1.034	0.000
	1.034	1.034	1.034	0.000	0.000	0.000	0.000	0.000	1.034	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	1.034	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2003	1	7	3	0	1	-1	-1	4.93	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	4.000	2.998	1.000
	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	2.000	0.000	1.000	2.000	0.000

	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2004	1	7	3	0	1	-1	-1	11.55	0.000	0.000	0.000
	0.000	109.346	0.000	0.000	0.000	0.000	207.528	141.690	231.099	87.017	251.058
	0.000	121.753	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	43.530	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	91.842	54.673	43.530	98.182	0.000	110.610
	0.000	98.182	0.000	0.000	0.000	0.000	0.000	0.000	43.530	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	43.530	0.000	0.000	0.000	0.000	0.000
	0.000										
2005	1	7	3	0	1	-1	-1	8.35	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	7.778	4.278	1.000	0.000	0.000	4.278
	4.278	3.500	3.500	0.000	2.500	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	7.500	8.500
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	4.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
# 2007 At-sea hake fishery (n=3)											
2003	1	11	3	0	1	-1	-1	101.73	0.000	0.000	0.000
	0.000	0.000	0.000	7.500	10.167	22.278	15.333	10.833	30.668	18.159	42.359
	25.835	5.857	5.000	0.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	2.333	13.205	26.055	13.433	35.741	50.988	18.961
	25.557	25.356	6.556	0.000	17.500	2.833	3.000	3.000	2.500	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	12.992										
2004	1	11	3	0	1	-1	-1	126.15	0.000	0.000	0.000
	0.000	0.000	0.000	2.000	10.893	12.300	39.943	358.260	17.900	42.643	350.700
	341.067	337.400	48.717	15.700	15.800	3.000	5.500	0.000	7.800	0.000	7.800
	7.800	0.000	0.000	0.000	0.000	0.000	3.600	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	1.000	13.250	15.293	37.443	20.500	26.743	26.800
	13.750	338.400	19.200	42.700	45.800	1.000	0.000	0.000	6.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	7.800	0.000	0.000	0.000	0.000
	6.000										
2005	1	11	3	0	1	-1	-1	209.57	0.000	0.000	0.000
	0.000	0.000	2.000	5.417	80.600	42.217	37.750	45.333	56.967	41.033	31.617
	7.250	18.267	17.200	2.000	2.000	2.667	2.000	0.000	2.000	0.000	2.800
	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	5.333	9.000	29.633	35.967	31.783	32.550	29.167
	34.650	12.333	7.500	5.667	2.000	4.500	2.000	0.000	3.000	3.000	4.800
	2.000	0.000	2.500	0.000	0.000	0.000	2.000	0.000	0.000	0.000	0.000
	1.500										
# 2007 NWFSC survey conditionals (n=164)											
2003	1	12	1	0	1	2	2	1.07	0	33683	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	3	3	1.14	0	67365	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	4	4	1.28	0	44026	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	6	6	3.21	0	0	62865
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	7	7	2.14	0	0	25576
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	8	8	1.07	0	0	14570
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	9	9	2.21	0	0	0
	43795	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	10	10	1.07	0	0	0
	0	14570	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	13	13	2.14	0	0	0
	0	0	28349	26320	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	14	14	3.28	0	0	0
	0	6219	52640	0	0	0	0	0	3972	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	15	15	6.77	0	0	0
	0	0	52640	88029	60888	9860	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	16	16	6.49	0	0	0
	0	0	0	32539	5576	56698	18014	0	0	0	5209
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	17	17	5.56	0	0	0
	0	0	0	28349	28349	66982	28349	7040	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	18	18	9.91	0	0	0
	0	0	0	0	0	37940	18368	36737	10769	12149	12869
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	19	19	8.84	0	0	0
	0	0	0	0	3972	0	0	4367	42163	40748	12438
	0	0	5209	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	20	20	9.98	0	0	0
	0	0	0	0	0	0	0	35189	48381	30457	22254
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	21	21	6.77	0	0	0
	0	0	0	0	0	0	0	18319	6219	23771	0
	24538	5525	18319	0	37662	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	22	22	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	5525
	0	0	5525	0	0	0	18319	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	23	23	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	212769	0	18319	0	0	0	0	0	0	0
	6219	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	24	24	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4550	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	2	0	1	1	1	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	25366

	0	0	0	0	0	0	0	0	0	0	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	12	2	0	1	2	2	1.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	101048	0	0	0	0	0	0	0	0	0	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	12	2	0	1	3	3	2.77	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	302480	0	0	0	0	0	0	0	0	0	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	12	2	0	1	4	4	1.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	33019	0	0	0	0	0	0	0	0	0	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	12	2	0	1	6	6	2.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	11577	43837	0	0	0	0	0	0	0	0	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	12	2	0	1	7	7	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	40189	0	0	0	0	0	0	0	0	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	12	2	0	1	8	8	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	14570	0	0	0	0	0	0	0	0	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	12	2	0	1	9	9	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	40231	0	0	0	0	0	0	0	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	12	2	0	1	12	12	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	12193	0	0	0	0	0	0	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	12	2	0	1	13	13	5.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	80157	3972	28349	3972	0	0	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	12	2	0	1	14	14	7.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	7944	31326	4550	28349	5016	0	0
	6219	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2003	1	12	2	0	1	15	15	9.91	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	11074	113307	7040	32510	26320	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	12	2	0	1	16	16	14.12	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	44388	28239	15384	54887	0	6219	12149
	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	12	2	0	1	17	17	17.68	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	5006	26802	32106	68005	0	40197
	23893	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2003	1	12	2	0	1	18	18	15.75	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	4034	0	29079	21518	18468	45384
	70434	0	22869	5576	0	0	18319	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2003	1	12	2	0	1	19	19	13.26	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	10191	19719	21738	4550
	34351	15592	5576	5525	18319	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2003	1	12	2	0	1	20	20	8.91	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	17674	18319
	17436	23895	22052	0	0	0	0	6238	0	5525	0
	0	0	0	0	0	0	0	0	0	0	0
	5209										
2003	1	12	2	0	1	21	21	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	5209	0
	0	0	0	0	0	0	0	0	0	0	0
	0										

2004	1	12	1	0	1	2	2	2.28	0	46225	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	3	3	1.07	0	9781	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	4	4	2.21	0	0	54185
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	5	5	1.28	0	0	39123
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	6	6	2.28	0	0	38477
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	7	7	1.21	0	0	0
	25222	50444	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	9	9	3.28	0	0	0
	9781	94469	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	10	10	3.56	0	0	0
	0	219774	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	11	11	3.28	0	0	0
	20120	54743	9683	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	12	12	5.77	0	0	0
	20120	103851	20120	61161	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	13	13	3.7	0	0	0
	0	56658	0	123990	34623	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	14	14	4.42	0	0	0
	0	9135	29803	78930	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	15	15	4.49	0	0	0
	0	0	8220	67541	29230	19671	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	16	16	6.63	0	0	0
	0	0	20120	37767	0	19671	201041	172255	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	17	17	7.77	0	0	0
	0	0	0	19671	28519	32595	210014	172255	0	0	0
	0	0	0	0	172255	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	18	18	4.35	0	0	0
	0	0	0	0	0	6505	6077	33978	0	0	28200
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	19	19	10.84	0	0	0
	0	0	0	0	0	15636	18174	28200	180782	34198	11424
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	20	20	8.77	0	0	0
	0	0	0	0	0	0	9559	77186	28200	37949	26544
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	21	21	7.63	0	0	0
	0	0	0	0	0	0	56400	0	0	8615	12516
	17202	0	0	172255	0	186680	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	22	22	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	14425
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	23	23	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	6505
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	24	24	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	172255	14425	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	25	25	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	172255	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	2	0	1	2	2	3.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	68155	25222	0	0	0	0	0	0	0	0	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	12	2	0	1	3	3	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	37348	0	0	0	0	0	0	0	0	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	12	2	0	1	4	4	1.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	75665	0	0	0	0	0	0	0	0	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	12	2	0	1	5	5	2.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	8080	56984	0	0	0	0	0	0	0	0	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	12	2	0	1	6	6	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	8637	0	0	0	0	0	0	0	0	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	12	2	0	1	7	7	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	44404	0	0	0	0	0	0	0	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	12	2	0	1	8	8	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	50443	0	0	0	0	0	0	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	12	2	0	1	9	9	3.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	29342	185952	0	0	0	0	0	0	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	12	2	0	1	10	10	2.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	9534	173117	0	0	0	0	0	0	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	12	2	0	1	11	11	5.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	25222	44137	109487	0	0	0	0	0	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	12	2	0	1	12	12	6.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	9135	72746	39791	9559	0	0	172255	0	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	12	2	0	1	13	13	9.05	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	72745	78179	70482	14425	0	0	0	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	12	2	0	1	14	14	3.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	52893	0	6505	0	0	0	0	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	12	2	0	1	15	15	6.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	8848	22962	78683	6505	0	0	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	12	2	0	1	16	16	9.91	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	7809	29594	67542	19671	194098	13425	0
	19671	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	12	2	0	1	17	17	8.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	9067	20120	8848	34705	38373	0	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	12	2	0	1	18	18	8.84	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	9421	19671	49043	0	14425
	19671	42625	179915	0	0	11424	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	12	2	0	1	19	19	4.84	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	6505	0	0	65015
	0	67688	6505	0	0	28200	28200	0	28200	0	0
	0	28200	0	0	0	0	0	0	0	0	0
	0										
2004	1	12	2	0	1	20	20	5.91	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	6924	6505	0
	6924	0	0	178760	0	0	186680	172255	0	0	172255
	0	0	172255	0	0	0	0	0	0	0	0
	364630										
2004	1	12	2	0	1	21	21	4.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	6505	6851	0	6505	0	0	0	0	0	172255	0
	0	0	0	0	0	0	0	28200	0	0	0
	172255										
2004	1	12	2	0	1	22	22	3.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	28200	0	0	0	0	0	0	0	0	11424

	172255	0	0	0	0	0	0	0	0	0	0
	172255										
2004	1	12	2	0	1	23	23	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	11424	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	172255										
2005	1	12	1	0	1	1	1	1.07	9312	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	2	2	2.21	25526	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	3	3	1.07	0	8973	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	4	4	2.14	0	0	48601
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	5	5	1.14	0	0	0
	18220	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	6	6	3.56	0	0	9388
	54660	39491	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	7	7	3.35	0	12193	24386
	9110	0	39491	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	8	8	2.35	0	0	24386
	0	39491	78982	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	9	9	3.56	0	0	60965
	0	9110	78982	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	10	10	3.56	0	0	12193
	60965	0	48601	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	11	11	3.21	0	0	12193
	0	22573	39491	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	12	12	2.28	0	0	0
	0	0	18220	165088	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	13	13	2.28	0	0	0
	0	0	22573	32409	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	14	14	1.07	0	0	0
	0	0	0	10803	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	15	15	6.49	0	0	0
	0	0	0	105117	25213	97249	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	16	16	4.42	0	0	0
	0	0	0	22573	113019	173957	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	17	17	8.7	0	0	0
	0	0	0	22573	109663	115632	7322	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	18	18	10.98	0	0	0
	0	0	0	0	91413	91413	301492	31822	7322	10333	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	19	19	9.84	0	0	0
	0	0	0	0	0	188887	27255	106739	6134	14716	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	20	20	9.63	0	0	0
	0	0	0	0	0	173957	0	14677	8694	25154	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	21	21	8.84	0	0	0
	0	0	0	0	0	0	11843	91413	14840	106467	98735
	17568	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	22	22	5.35	0	0	0
	0	0	0	0	0	0	0	5406	11328	7767	91413
	0	9121	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	25	25	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	8702	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	2	0	1	1	1	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	18624
	0	0	0	0	0	0	0	0	0	0	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	12	2	0	1	2	2	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	9312	0	0	0	0	0	0	0	0	0	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	12	2	0	1	3	3	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	18220	0	0	0	0	0	0	0	0	0	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	12	2	0	1	4	4	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	9110	0	0	0	0	0	0	0	0	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	12	2	0	1	5	5	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	9388	18220	0	0	0	0	0	0	0	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	12	2	0	1	6	6	1.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	27330	0	0	0	0	0	0	0	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	12	2	0	1	7	7	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	12193	0	10706	0	0	0	0	0	0	0	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	12	2	0	1	8	8	2.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	24386	9110	9110	0	0	0	0	0	0	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	12	2	0	1	9	9	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	12193	9110	0	0	0	0	0	0	0	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	12	2	0	1	10	10	2.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	36579	0	39491	39491	0	0	0	0	0	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	12	2	0	1	11	11	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	12193	0	0	39491	0	0	0	0	0	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	12	2	0	1	12	12	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	9762	39491	82544	0	0	0	0	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	12	2	0	1	13	13	6.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	4889	28099	122630	0	0	0	0	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	12	2	0	1	14	14	6.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	115373	183510	0	0	0	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	12	2	0	1	15	15	5.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	22573	8320	157866	0	0	0	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	12	2	0	1	16	16	13.19	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	24932	70471	26891	91121	7322	7322
	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	12	2	0	1	17	17	14.61	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	124486	169417	26232	30648	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	12	2	0	1	18	18	11.68	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	13336	31799	39777	205940	281562
	14674	7322	0	7127	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2005	1	12	2	0	1	19	19	11.12	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	8577	91413	39185	8577
	15899	0	98735	124675	0	0	0	0	0	0	0
	10333	0	0	0	0	0	0	0	0	0	0
	0										
2005	1	12	2	0	1	20	20	7.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	13983	22159
	8702	0	0	0	8320	7394	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2005	1	12	2	0	1	21	21	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	8702	0	0	0	8577
	0	0	0	0	0	0	0	0	0	0	0
	0										
2006	1	12	1	0	1	2	2	1.07	0	9256	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	3	3	1.07	0	0	9256
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	4	4	1.07	0	0	0
	9256	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	5	5	1.07	0	0	8621
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	6	6	1.07	0	0	7697
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	9	9	1.07	0	0	0
	10606	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	12	12	1.14	0	0	0
	0	0	41456	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	13	13	2.21	0	0	0
	0	8553	45249	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	14	14	2.21	0	0	0
	0	0	157567	17106	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	15	15	4.35	0	0	0
	0	0	0	39729	0	28289	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	16	16	8.05	0	0	0
	0	0	0	74529	208337	166455	1060633	199023	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	17	17	8.84	0	0	0
	0	0	0	0	69980	157567	181156	427885	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	18	18	8.98	0	0	0
	0	0	0	0	332672	44115	188374	0	0	14701	14701
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	19	19	6.77	0	0	0
	0	0	0	0	0	1038009	209471	540636	1308327	0	1060633
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	20	20	8.05	0	0	0
	0	0	0	0	0	0	0	0	332962	286676	286623
	2076018	1052710	8888	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	21	21	11.05	0	0	0
	0	0	0	0	0	0	0	0	1065319	31058	31401
	14701	8115	1046939	1038009	1038009	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	22	22	4.35	0	0	0
	0	0	0	0	0	0	0	0	0	1038009	329835
	0	0	0	9418	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	23	23	4.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	279736	0	0	0	0	0	0	1038009	14701	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	24	24	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1038009	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	25	25	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	270318
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	1	0	1	26	26	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	8888	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12	2	0	1	5	5	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	8224	0	0	0	0	0	0	0	0	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	12	2	0	1	6	6	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	18371	7697	0	0	0	0	0	0	0	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	12	2	0	1	7	7	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	7697	0	0	0	0	0	0	0	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	12	2	0	1	8	8	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	7697	0	0	0	0	0	0	0	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	12	2	0	1	11	11	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	12308	41456	0	0	0	0	0	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	12	2	0	1	12	12	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	7417	0	0	0	0	0	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	12	2	0	1	13	13	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	22624	20728	0	0	0	0	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	12	2	0	1	14	14	4.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1122817	1351679	20728	0	0	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	12	2	0	1	15	15	6.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	43352	189609	1465894	0	0	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	12	2	0	1	16	16	10.33	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	225440	293572	111553	175061	0	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	12	2	0	1	17	17	12.26	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	22624	29616	504688	585451	0	1075964
	0	7167	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2006	1	12	2	0	1	18	18	13.17	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	8553	157567	444990	1256154	351957
	53258	1066089	1038009	23254	0	2076018	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2006	1	12	2	0	1	19	19	11.33	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	15917	17106	577949
	292371	1045361	0	10466	14701	1038009	0	1038009	0	0	0
	0	0	270318	0	0	0	0	0	0	0	0
	0										
2006	1	12	2	0	1	20	20	6.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	7130	0	0	0	270318	0	0	293960	0	0
	0	8930	0	1308327	0	0	0	0	0	0	0
	0										
2006	1	12	2	0	1	21	21	3.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1038009	22624	0	270318	0	1038009	0	0	0	1038009	0
	0	0	0	270318	0	0	0	0	0	0	0
	0										
2006	1	12	2	0	1	22	22	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	7804	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	270318										

2007 Triennial survey conditionals (n=217)

1983	1	13	1	0	1	3	3	1.14	68.35	68.35	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	4	4	1.14	0	136.7	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	5	5	2.28	0	1071.566	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	6	6	2.21	0	934.8661	68.35
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	7	7	3.35	0	0	137.2792
	1003.216	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										

1983	1	13	1	0	1	8	8	6.26	0	0	1938.661
	3215.278	68.35	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	9	9	9.92	0	0	205.05
	10639.04	119.23	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	10	10	13.81	0	0	119.23
	25256.28	853.0851	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	11	11	13.69	0	0	0
	8851.196	3270.325	274.4051	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	12	12	15.85	0	0	0
	3267.589	9369.206	477.7368	54.4775	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	13	13	13.59	0	0	0
	68.35	5273.543	618.1973	316.8574	0	54.4775	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	14	14	16.01	0	0	0
	0	1383.82	654.8543	828.5237	70.01429	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	15	15	17.45	0	0	0
	0	68.35	550.0615	929.3401	196.795	0	140.3946	12.32	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	16	16	17.89	0	0	0
	0	0	81.0598	1671.057	333.7599	998.1472	266.9624	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	17	17	14.52	0	0	0
	0	0	0	343.8408	1242.1	806.5965	457.311	128.4152	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	18	18	16.22	0	0	0
	0	0	68.35	90.16302	324.1718	1710.85	1391.807	1020.459	343.8105	0	0
	0	0	0	0	0	0	68.92924	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	19	19	13.52	0	0	0
	0	0	0	128.4152	112.1718	443.0446	1089.583	1217.146	469.8548	581.7685	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	20	20	13.45	0	0	0
	0	0	0	0	0	183.7386	367.176	1227.444	264.4086	395.431	432.1307
	243.4962	994.9313	0	280.35	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	21	21	15.36	0	0	0
	0	0	0	0	0	0	0	671.5023	1241.905	756.8156	1724.974
	1074.298	126.0443	12.32	256.8303	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	22	22	16.29	0	0	0
	0	0	0	0	0	0	0	216.24	687.621	302.9686	318.8861
	1037.639	271.051	254.4594	12.32	151.7807	274.6082	175.1462	111.9137	128.4152	0	68.35
	0	198.6124	0	70.1973	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	23	23	12.75	0	0	0
	0	0	0	0	0	0	0	0	0	68.35	555.8105
	278.1823	57.69429	68.35	376.3055	323.9137	338.0443	54.4775	68.35	91.71552	0	128.4152
	0	68.35	0	0	0	0	0	0	0	68.35	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	24	24	8.12	0	0	0
	0	0	0	0	0	0	0	0	0	0	68.35
	57.69429	0	68.35	0	212	68.35	68.35	151.7807	68.35	0	111.9137
	0	0	160.0655	0	68.35	68.35	0	0	0	68.35	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	25	25	5.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	68.35	212	0	216.24	0	111.9137	0	212	0	0
	0	68.35	0	68.35	0	0	68.35	68.35	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	1	0	1	26	26	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	68.35	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	4	4	1.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	341.75	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										
1983	1	13	2	0	1	5	5	1.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	546.8	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	6	6	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	119.23	68.35	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	7	7	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	866.5161	137.2792	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	8	8	6.54	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2599.548	4424.702	68.35	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	9	9	9.01	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1783.912	12160.72	136.7	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	10	10	13.46	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	21146.27	666.6092	54.4775	68.35	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	11	11	15.39	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	50.88	12016.17	6404.001	80.67	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	12	12	12.01	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	3910.154	6571.06	328.8826	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	13	13	11.24	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	54.4775	2676.789	643.4669	262.5429	12.32	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	14	14	14.66	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2528.666	752.7975	425.3714	57.69429	101.76	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	15	15	15.87	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	208.0558	1549.219	859.4029	1584.102	122.8275	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	16	16	19.8	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1142.769	1002.724	1528.884	519.3132	506.8623	212	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	17	17	17.22	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	128.4152	280.35	1431.522	2042.251	1088.317	1126.82	216.24
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	18	18	14.69	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	248.6137	996.5949	2889.601	2068.12	956.2608
	1268.925	194.3943	196.7652	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1983	1	13	2	0	1	19	19	22.54	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	494.1973	0	601.4855	767.8779	2585.586
	3146.363	2109.39	2240.413	1280.573	1209.2	692.3563	867.8847	23.36552	503.876	710.9865	277.4352
	0	0	0	0	0	0	0	0	0	180.2637	23.36552
	138.5473										

1983	1	13	2	0	1	20	20	21.61	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	128.4152	428.24	320.5743
	1025.795	2080.831	1261.96	472.9337	805.596	684.1397	925.579	265.1152	385.3137	210.9455	925.579
	647.526	687.621	194.3943	323.9137	816.3572	608.9256	1072.866	186.1094	563.9412	628.4005	198.6124
	906.11772										
1983	1	13	2	0	1	21	21	16.9	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	485.9343	1031.431	57.69429	0	624.1605	844.6405	0	967.971	819.7265	813.6653	327.3886
	128.4152	380.5037	91.71552	115.3886	254.4594	111.9137	0	0	269.6943	0	305.5628
	2021.1464										
1983	1	13	2	0	1	22	22	12.75	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	0	0	0	0
	0	0	57.69429	343.8105	212	0	0	57.69429	0	0	269.6943
	0	0	0	23.36552	343.8105	396.5037	0	0	186.1094	0	0
	1264.83428										
1983	1	13	2	0	1	23	23	4.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	57.69429	57.69429	0	0	0	0	0	0
	463.0405										
1989	1	13	1	0	1	5	5	1.07	0	0	17.19367
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	7	7	1.07	0	0	0
	0	17.19367	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	8	8	2.56	0	0	17.19367
	35.3694	103.162	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	9	9	2.63	0	0	0
	0	228.428	17.19367	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	10	10	4.63	0	0	0
	0	257.4364	0	17.19367	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	11	11	2.63	0	0	0
	0	300.1489	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	12	12	2.28	0	0	0
	0	52.56307	0	0	34.38735	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	13	13	4.56	0	0	0
	0	70.7388	0	62.41367	34.38735	35.3694	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	14	14	2.28	0	0	0
	0	0	0	7.59	0	41.97735	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	15	15	3.28	0	0	0
	0	0	0	0	35.3694	120.3148	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	16	16	3.49	0	0	0
	0	0	0	0	179.3333	164.1313	126.1813	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	17	17	3.35	0	0	0
	0	0	0	0	65.48333	0	0	191.6647	126.1813	37.63	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	18	18	3.21	0	0	0
	0	0	0	0	0	44.41478	0	65.48333	1.39	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	19	19	3.49	0	0	0
	0	0	0	0	0	163.8113	40.76583	333.8944	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	20	20	5.56	0	0	0
	0	0	0	0	0	0	85.18062	166.9472	252.3627	0	0
	1.39	65.48333	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	21	21	2.42	0	0	0
	0	0	0	0	0	0	126.1813	126.1813	126.1813	39.29	0
	0	126.1813	0	126.1813	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	22	22	3.56	0	0	0
	0	0	0	0	0	0	0	0	1.39	0	126.1813
	40.76583	126.1813	0	0	126.1813	0	0	0	0	0	0
	0	0	0	0	0	0	0	126.1813	0	252.3626	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	23	23	6.7	0	0	0
	0	0	0	0	0	0	0	108.0475	0	0	126.1813
	5807.062	40.76583	65.48333	126.1813	0	0	0	0	126.1813	0	0
	126.1813	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	24	24	5.49	0	0	0
	0	0	0	0	0	0	0	0	1.39	0	2883.886
	1.39	2883.886	0	126.1813	0	108.0475	0	108.0475	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	1	0	1	27	27	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2883.886
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	4	4	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	17.19367	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	5	5	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	34.38735	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	6	6	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	35.3694	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	7	7	2.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	86.95042	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	8	8	2.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	192.0766	17.19367	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	9	9	2.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	120.3557	35.3694	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	10	10	1.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	247.5858	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	11	11	2.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	229.4101	0	0	17.19367	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	12	12	2.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	123.3019	0	35.3694	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	13	13	3.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	35.3694	35.3694	54.82367	34.38735	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	14	14	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	37.63	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										

1989	1	13	2	0	1	15	15	2.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	44.41478	106.0232	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	16	16	5.63	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	65.48333	252.9609	170.5961	85.18062	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	17	17	6.77	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	44.41478	0	150.6639	170.5961	378.544
	95.735	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	18	18	9.19	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	44.41478	126.1813	189.6893	373.6975	80.05583
	80.05583	126.1813	65.48333	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	19	19	7.05	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	44.41478	0	298.1675	271.7205
	165.4713	126.1813	39.29	126.1813	0	0	126.1813	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	20	20	5.98	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	39.29	191.6647
	0	165.4713	252.3627	39.29	170.5961	0	83.70478	37.63	0	0	0
	0	0	0	126.1813	0	0	0	0	0	0	0
	0										
1989	1	13	2	0	1	21	21	4.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	65.48333	0	1.39
	0	0	39.29	0	0	0	78.58	0	0	0	0
	65.48333	0	0	0	0	0	0	0	191.6647	0	0
	0										
1989	1	13	2	0	1	22	22	4.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	108.0475	0	0	0
	0	0	0	0	0	0	0	0	0	65.48333	0
	170.59608										
1989	1	13	2	0	1	23	23	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	126.1813	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	5	5	1.07	0	0	6.72
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	7	7	1.07	0	0	0
	46.93345	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	8	8	1.14	0	0	0
	0	46.93345	0	46.93345	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	9	9	1.14	0	0	0
	93.8669	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	10	10	1.21	0	0	0
	93.8669	46.93345	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	11	11	2.21	0	0	0
	0	46.93345	53.65345	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	12	12	2.21	0	0	0
	0	0	46.93345	51.62182	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	13	13	2.35	0	0	0
	93.8669	0	0	93.8669	4.688372	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	14	14	1.42	0	0	0
	0	0	46.93345	93.8669	93.8669	46.93345	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	15	15	2.7	0	0	0
	0	0	0	98.55527	103.2436	93.8669	4.688372	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	16	16	3.7	0	0	0
	0	0	0	98.55527	140.8003	98.55527	0	0	0	0	0
	0	0	0	12.78	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	17	17	3.42	0	0	0
	0	0	0	0	51.62182	56.31019	0	5.12	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	18	18	3.35	0	0	0
	0	0	0	8.96	4.688372	4.688372	46.93345	4.688372	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	19	19	2.42	0	0	0
	0	0	0	0	0	12.78	14.06512	12.78	0	0	0
	0	12.78	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	20	20	5.56	0	0	0
	0	0	0	0	0	0	12.78	22.7	17.55867	4.688372	12.78
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	21	21	2.21	0	0	0
	0	0	0	0	0	0	0	0	12.78	12.78	4.778667
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	22	22	4.91	0	0	0
	0	0	0	0	0	0	4.778667	0	17.46837	22.26837	22.24704
	0	0	25.56	4.8	0	4.778667	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	23	23	2.42	0	0	0
	0	0	0	0	0	0	0	0	12.78	0	12.78

	0	38.34	0	0	0	0	4.8	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	24	24	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	4.688372	12.78	4.8	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	1	0	1	25	25	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	12.78	0	0	0	8.96	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	9	9	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	46.93345	46.93345	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	13	13	1.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	46.93345	140.8003	46.93345	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	14	14	2.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	46.93345	103.2436	93.8669	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	15	15	2.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	51.62182	98.55527	4.688372	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	16	16	2.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	51.62182	0	140.8003	46.93345	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	17	17	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4.688372	4.688372	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										

1992	1	13	2	0	1	18	18	3.77	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	4.688372	4.688372	17.46837	22.15674	4.688372	0
	12.78	4.778667	12.78	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	19	19	4.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	4.778667	0	12.78	14.24571
	0	0	39.84837	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	20	20	6.05	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4.8	4.8	0
	17.55867	12.78	0	9.808372	9.376744	17.58	0	0	4.688372	4.8	0
	4.688372	0	0	0	0	4.8	0	0	0	0	0
	0										
1992	1	13	2	0	1	21	21	3.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	12.78	5.12	0	12.78	0	0	0	0	4.8	0	12.78
	0	5.12	0	0	0	0	0	0	0	0	0
	0										
1992	1	13	2	0	1	22	22	3.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	4.778667	5.12	4.8	4.778667	0
	0	0	0	0	0	0	0	0	0	0	0
	14.336001										
1992	1	13	2	0	1	23	23	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	5.12	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	5	5	1.07	0	0	0
	10.95	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	7	7	1.07	0	12.702	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	8	8	1.07	0	0	0
	87.7344	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	9	9	2.28	0	0	0
	0	282.4432	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	10	10	4.56	0	0	0
	15.05625	350.9376	106.9744	12.702	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	11	11	7.84	0	0	0
	0	223.197	34.29625	53.31978	0	0	21.37778	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	12	12	5.63	0	0	0
	0	0	49.3525	77.05181	12.702	0	12.702	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	13	13	5.91	0	0	0
	0	0	42.8145	128.1946	46.12478	25.404	0	12.702	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	14	14	5.35	0	0	0
	0	0	15.05625	87.7344	0	40.61778	0	12.702	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	15	15	5.49	0	0	0
	0	0	15.05625	0	19.24	15.05625	12.702	61.27941	60.54941	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	16	16	5.56	0	0	0
	0	0	0	0	21.98778	43.48556	60.54941	72.59441	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	17	17	4.28	0	0	0
	0	0	0	0	0	0	0	70.17	0	60.54941	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	18	18	3.21	0	0	0
	0	0	0	0	0	0	0	132.7694	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	19	19	3.21	0	0	0
	0	0	0	0	0	0	0	75.60566	0	19.24	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	20	20	6.63	0	0	0
	0	0	0	0	0	0	0	0	0	149.3494	111.6202
	0	19.24	19.24	0	0	0	0	60.54941	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	21	21	3.42	0	0	0
	0	0	0	0	0	0	60.54941	50.32	0	0	2.44
	50.32	0	100.64	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	22	22	4.35	0	0	0
	0	0	0	0	0	0	0	0	0	0.732	0.7507692
	0	51.13333	0.8133333	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	23	23	3.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0.732
	0	0	50.32	0	0	110.8694	121.0988	60.54941	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	24	24	1.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	60.54941
	0	0	0	0	0	60.54941	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	1	0	1	25	25	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	60.54941	50.32	0	0	0	60.54941	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	6	6	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	19.24	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	7	7	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	34.29625	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	8	8	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	106.9744	15.05625	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	9	9	7.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	100.4364	164.6944	106.9744	12.702	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	10	10	4.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	30.1125	87.7344	34.07978	12.702	12.702	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	11	11	9.26	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	240.8336	250.1664	36.43403	91.83441	21.37778	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	12	12	6.84	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	166.0177	117.8469	87.7344	24.09	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	13	13	8.84	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	50.525	16.51625	27.10125	53.31978	0	0.73	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	14	14	5.49	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	15.78625	0	43.48556	0	31.942	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										

1995	1	17	2	0	1	15	15	3.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	61.27941	12.775	60.54941	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	16	16	4.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	19.24	0.732	69.56	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	17	17	8.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	19.99077	176.7402	50.32
	0.732	60.54941	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	18	18	6.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	62.03018	0
	0.7507692	1.970769	110.8694	0	0	50.32	0	0	0	0	0
	0	0	19.24	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	19	19	7.84	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1.482769	0
	2.314872	19.99077	0	121.0988	1.22	50.32	60.54941	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	20	20	2.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	60.54941	0
	0	0	50.32	0	50.32	0	0	100.64	0	0	50.32
	0	0	0	0	0	0	0	0	0	0	0
	0										
1995	1	17	2	0	1	21	21	4.7	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1.501538	0	0	0	0	50.32	0	0	0	0
	121.0988	50.32	0	0	0	50.32	0	60.54941	0	0	0
	51.05										
1995	1	17	2	0	1	22	22	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	60.54941
	0										
2001	1	17	1	0	1	3	3	1.07	0	22.94	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	6	6	1.07	0	0	0
	0	22.94	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	7	7	1.14	0	0	0
	555.8538	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	8	8	1.07	0	0	0
	22.94	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	9	9	1.14	0	0	0
	45.88	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	10	10	3.28	0	0	0
	0	68.82	0	277.9269	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	11	11	5.49	0	0	0
	0	22.94	349.4469	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	12	12	6.56	0	0	0
	0	1.64	45.88	601.7338	0	0	0	22.94	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	13	13	12.54	0	0	0
	0	0	627.3738	950.6008	556.9138	7.438095	22.94	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	14	14	13.4	0	0	0
	0	22.94	24	325.9269	1165.026	0	24	285.365	7.81	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	15	15	12.26	0	0	0
	0	0	0	279.5669	647.6138	858.0702	70.46	47.22941	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	16	16	11.05	0	0	0
	0	0	0	286.425	47.22941	323.8069	32.78751	68.82	7.438095	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	17	17	10.91	0	0	0
	0	0	0	0	0	48.86941	1.06	34.3681	24.58	0	0
	1.64	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	18	18	17.33	0	0	0
	0	22.94	0	0	0	1.06	25.92941	93.4	27.56941	38.56	1.06
	45.88	0	1.64	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	19	19	14.33	0	0	0
	0	0	0	0	0	22.94	0	346.7469	24.58	98.86	75.92
	22.94	45.88	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	20	20	11.98	0	0	0
	0	0	0	0	0	0	22.94	0	56.04	70.16941	0
	30.04	22.94	22.94	0	0	22.94	0	7.1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	21	21	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1.64	22.94	0	22.94	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	22	22	4.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	24.28941
	0	0	22.94	0	7.1	0	7.438095	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	23	23	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	8.52	0	0	7.438095	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	1	0	1	24	24	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	7.1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	5	5	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1.06	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	7	7	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	22.94	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	8	8	3.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	24.58	0	0	0	1.06	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	9	9	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	300.8669	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	10	10	4.42	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	308.305	300.8669	0	277.9269	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	11	11	3.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	22.94	45.88	1.06	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	12	12	11.54	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	9.8	48	1436.864	601.7338	856.7208	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										

2001	1	17	2	0	1	13	13	10.33	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1.64	323.8069	891.3608	287.3769	286.7969	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	14	14	15.19	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	50.7	30.3781	24	555.8538	24.36	0	7.438095
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	15	15	17.26	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	311.005	1.06	372.6763	3.28	54.62	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	16	16	17.68	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1.64	0	94.45882	79.61941	58.31941	30.3781	49.16
	1.64	22.94	22.94	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	17	17	15.12	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	22.94	55.33	67.18	38.82751
	24.58	7.81	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	18	18	18.82	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	45.88	0	78.90941	24.58
	65.1181	52.98	45.88	30.04	22.94	45.88	0	0	0	0	0
	0	0	7.438095	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	19	19	6.77	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	22.94	22.94
	22.94	22.94	22.94	45.88	7.1	0	22.94	0	0	22.94	1.64
	0	0	0	0	0	0	0	0	0	0	0
	0										
2001	1	17	2	0	1	20	20	6.98	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	53.3181	0	30.3781	22.94	0	1.64	0	22.94	22.94
	0	0	30.3781	0	22.94	22.94	0	0	0	0	0
	1.06										
2001	1	17	2	0	1	21	21	2.35	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	22.94	22.94	0	0	0	0	0	22.94	0	0	0
	30.378095										
2001	1	17	2	0	1	22	22	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	22.94	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	22.94										
2004	1	17	1	0	1	3	3	1.07	0	3.94	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	5	5	1.07	0	0	14.97
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	13	13	1.14	0	0	0
	0	10.4016	0	10.4016	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	14	14	2.28	0	0	0
	0	0	0	25.3716	10.4016	10.4016	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	15	15	4.49	0	0	0
	0	0	14.97	23.64	20.8032	10.4016	14.97	10.4016	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	16	16	6.63	0	0	0
	0	14.97	55.6884	58.1748	14.97	0	7.03	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	17	17	7.56	0	0	0
	0	0	0	14.97	22	58.7784	29.94	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	18	18	9.7	0	0	0
	0	0	0	3.09	14.97	18.06	28.1	26.97	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	19	19	6.56	0	0	0
	0	0	0	0	0	111.3768	70.6584	0	3.09	10.4016	23.96
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	20	20	10.77	0	0	0
	0	0	0	0	0	0	3.09	43.84	6.18	12.08	8.99
	3.09	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	21	21	8.56	0	0	0
	0	0	0	0	0	0	0	3.09	16.5816	14.97	3.94
	3.94	0	55.6884	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	22	22	6.49	0	0	0
	0	0	0	0	0	0	0	0	74.85	0	55.6884
	3.09	8.99	0	0	26.97	14.97	0	0	55.6884	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	23	23	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	55.6884	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	1	0	1	24	24	2.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	55.6884	0	55.6884	0	26.97	0	0	0	26.97
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	17	2	0	1	3	3	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	14.97	0	0	0	0	0	0	0	0	0	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	17	2	0	1	9	9	1.07	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	3.09	0	0	0	0	0	0	0	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	17	2	0	1	12	12	2.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	14.97	25.3716	0	0	0	0	0	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	17	2	0	1	13	13	2.14	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	10.4016	14.97	0	0	0	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	17	2	0	1	14	14	4.56	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	13.4916	62.7432	18.06	0	0	0	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	17	2	0	1	15	15	7.77	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	20.8032	14.97	69.18	41.3116	10.4016	0	0
	8.99	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	17	2	0	1	16	16	10.77	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	25.3716	33.03	7.03	6.18	14.97	0	0
	55.6884	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	17	2	0	1	17	17	16.82	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	6.18	52.06	48.2	21.15	52.06	211.5684
	3.09	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	17	2	0	1	18	18	20.68	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	3.09	36.12	21.15	109.9084	36.12
	54.02	14.97	14.97	0	0	26.97	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	17	2	0	1	19	19	9.19	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	55.6884	111.3768
	56.91	41.94	26.97	139.5284	97.6284	26.97	0	0	0	26.97	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	17	2	0	1	20	20	12.33	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	29.94	3.09	0
	18.06	33.03	55.6884	0	29.94	14.97	109.6284	0	26.97	0	0
	53.94	0	0	53.94	0	0	0	0	0	0	0
	0										

2004	1	17	2	0	1	21	21	1.21	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	55.6884	0	0	0	55.6884	55.6884	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
2004	1	17	2	0	1	22	22	4.28	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	74.85	0	0	0	0	14.97	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	14.97	0
	14.97										

2007 WA Trawl age error key 1 (n=25)

1980	1	15	3	0	1	-1	-1	14.12	0.000	0.000	0.000
	0.000	1.138	2.276	2.276	2.276	3.414	7.966	7.966	2.276	1.138	2.276
	1.138	1.138	1.138	1.138	3.414	1.138	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	2.276	5.690	1.138	5.690	6.828	10.242	6.828
	1.138	2.276	0.000	2.276	3.414	5.690	3.414	1.138	0.000	2.276	2.276
	0.000	1.138	1.138	0.000	1.138	1.138	0.000	1.138	0.000	1.138	0.000
	1.138										
1981	1	15	3	0	1	-1	-1	35.30	0.000	0.000	0.000
	0.000	0.000	19.166	68.332	110.669	212.922	397.324	229.214	131.123	58.653	99.620
	21.933	10.967	23.170	68.382	10.967	19.166	5.483	10.967	0.000	0.000	0.000
	5.483	19.166	0.000	0.000	0.000	0.000	0.000	0.000	0.000	27.366	0.000
	0.000	0.000	0.000	25.887	5.483	135.102	103.598	176.202	510.172	184.052	208.568
	155.640	154.269	66.987	65.616	152.710	47.578	40.966	23.170	10.967	51.824	5.483
	43.816	0.000	0.000	13.683	65.616	13.683	0.000	13.683	19.166	13.683	0.000
	95.699										
1982	1	15	3	0	1	-1	-1	21.18	0.000	0.000	0.000
	4.269	74.658	41.598	33.650	37.919	33.787	12.807	34.239	30.786	22.474	16.712
	4.495	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	12.443	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	24.886	12.443	83.786	104.403	50.951	58.674	21.433	4.269	29.745
	29.381	35.281	4.269	8.764	4.495	22.474	4.495	4.495	17.979	13.033	21.433
	4.495	12.443	21.433	12.443	0.000	4.495	4.269	4.495	0.000	12.443	4.495
	41.824										
1983	1	15	3	0	1	-1	-1	14.12	0.000	0.000	0.000
	0.000	285.283	285.283	1569.058	1296.316	570.566	815.882	155.183	297.824	232.774	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	142.642	427.925	1141.133	2515.040	1659.190	1153.674	1426.416	570.566	375.416
	297.824	0.000	220.233	285.283	297.824	77.591	77.591	285.283	310.365	142.642	77.591
	155.183	0.000	77.591	0.000	0.000	0.000	0.000	77.591	0.000	0.000	0.000
	840.964										
1984	1	15	3	0	1	-1	-1	21.18	0.000	0.000	0.000
	0.000	0.000	152.652	76.326	129.210	287.883	287.883	287.883	46.863	299.261	58.905
	369.545	123.189	199.515	123.189	0.000	93.726	76.326	129.210	0.000	0.000	0.000
	0.000	76.326	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	311.325	411.735	458.598	493.418	376.251	140.588
	6.021	94.389	64.926	93.726	0.000	105.768	6.021	187.451	6.021	152.652	176.073
	46.863	6.021	58.905	0.000	0.000	0.000	0.000	93.726	0.000	58.905	0.000
	293.219										
1985	1	15	3	0	1	-1	-1	7.06	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	48.931	97.861	391.445	391.445	244.653	146.792	342.514
	195.723	97.861	0.000	97.861	0.000	97.861	0.000	48.931	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	146.792	146.792	391.445	293.584	244.653
	146.792	244.653	244.653	146.792	97.861	0.000	0.000	0.000	48.931	97.861	97.861
	48.931	48.931	48.931	48.931	0.000	0.000	0.000	0.000	0.000	0.000	48.931
	97.861										
1987	1	15	3	0	1	-1	-1	84.72	0.000	0.000	0.000
	0.000	0.000	314.668	181.420	1672.042	2157.026	2323.814	2777.587	2166.543	1851.626	755.256
	1169.988	804.219	505.732	367.263	302.464	72.159	23.770	0.000	37.343	260.564	62.686
	166.382	0.000	0.000	0.000	23.770	0.000	0.000	0.000	0.000	42.346	0.000
	0.000	0.000	0.000	9.874	106.725	427.262	2379.180	2977.990	1680.528	2570.071	2146.587

	1060.484	326.843	199.689	275.267	252.504	257.835	410.780	174.627	336.861	231.434	214.000
	0.000	15.472	30.944	199.689	232.857	198.775	353.972	0.000	132.412	138.105	74.687
	1596.282										
1988	1	15	3	0	1	-1	-1	35.30	0.000	0.000	0.000
	7.962	31.846	39.808	56.960	88.819	214.853	485.450	523.221	664.417	374.519	231.878
	37.671	235.155	227.738	0.000	12.557	73.441	0.000	80.857	0.000	0.000	0.000
	0.000	80.857	80.857	0.000	0.000	0.000	11.556	0.000	11.556	12.557	0.000
	0.000	0.000	0.000	7.962	95.767	129.071	69.517	406.365	667.137	427.669	746.275
	312.735	84.997	246.711	46.225	37.671	73.441	0.000	73.441	24.113	235.155	80.857
	80.857	154.298	103.970	11.556	92.413	161.714	80.857	73.441	12.557	80.857	11.556
	792.499										
1989	1	15	3	0	1	-1	-1	91.78	0.000	0.000	0.000
	125.467	100.465	526.406	1444.355	2215.856	3493.773	2947.182	2161.451	1948.887	978.729	778.550
	362.258	246.616	290.120	0.000	51.073	0.000	214.229	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	218.285	341.862	0.000
	0.000	25.093	54.045	173.713	881.338	2243.636	2521.382	3072.295	4354.315	2677.730	3225.230
	1728.132	953.597	496.604	102.329	384.357	471.094	573.240	92.095	273.182	0.000	92.794
	68.159	0.000	214.229	0.000	107.115	51.073	120.061	102.146	51.073	69.687	206.578
	1359.841										
1990	1	15	3	0	1	-1	-1	77.66	0.000	0.000	0.000
	37.596	0.000	822.504	838.170	1724.910	2403.423	2948.462	3715.324	2325.520	2222.534	750.774
	801.003	198.969	601.608	195.933	135.030	3.035	3.035	127.895	0.000	0.000	0.000
	0.000	0.000	3.035	0.000	211.824	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	5.836	564.907	2546.672	2188.533	2037.928	2493.554	3198.335	3090.009
	1505.896	1066.520	1035.383	561.823	709.498	209.646	212.776	6.071	604.643	344.771	209.741
	0.000	225.316	3.035	6.071	97.434	97.434	3.035	212.776	3.035	30.461	3.035
	1128.254										
1991	1	15	3	0	1	-1	-1	7.06	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	186.491	0.000	559.474	559.474	559.474	932.456
	372.982	0.000	0.000	0.000	0.000	186.491	0.000	186.491	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	186.491	559.474	372.982
	372.982	932.456	745.965	559.474	186.491	0.000	186.491	0.000	186.491	372.982	0.000
	186.491	0.000	186.491	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	186.491										
1992	1	15	3	0	1	-1	-1	84.72	0.000	0.000	0.000
	0.000	385.145	1039.991	892.503	3116.253	1571.725	801.596	1796.922	1846.628	1865.441	1735.802
	2060.908	1863.535	1420.915	402.264	969.284	277.959	0.000	0.000	144.649	144.649	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.574	0.000	0.000
	0.000	0.000	0.000	398.997	110.513	1936.558	2139.602	2865.718	2716.253	3138.851	1752.359
	451.253	570.138	913.504	1644.213	1101.756	1096.679	680.079	21.415	614.964	535.429	478.947
	0.000	0.000	0.000	144.649	334.297	0.000	4.838	340.404	215.706	15.040	0.000
	1211.333										
1993	1	15	3	0	1	-1	-1	32.19	0.000	0.000	0.000
	0.000	41.572	378.135	24.273	813.573	793.459	591.422	893.955	736.212	1284.448	227.523
	0.000	16.138	0.000	0.000	0.000	0.000	0.000	0.000	37.504	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	2.034	6.101	52.613	10.168	772.277	1878.367	881.002	835.084	743.937
	297.304	248.889	0.000	0.000	0.000	0.000	0.000	0.000	37.504	0.000	53.643
	0.000	37.504	0.000	0.000	0.000	0.000	37.504	0.000	16.138	0.000	0.000
	0.000										
1994	1	15	3	0	1	-1	-1	105.90	0.000	0.000	0.000
	11.793	303.052	815.389	1068.324	1207.547	2090.416	1244.078	1171.043	767.828	311.398	222.589
	488.298	204.705	101.889	34.691	49.007	49.007	0.000	18.710	20.141	155.749	0.000
	0.000	1.759	0.000	1.097	0.000	0.000	17.613	54.717	0.000	18.190	0.000
	0.000	0.000	25.065	376.347	785.208	821.024	1975.058	2407.590	1297.573	971.284	1156.390
	524.855	439.259	166.417	139.613	140.949	135.314	38.220	247.029	22.479	139.410	18.710
	0.000	0.000	41.041	139.410	0.000	0.000	139.410	113.371	157.023	6.869	0.000
	191.946										
1995	1	15	3	0	1	-1	-1	155.32	0.000	0.000	0.000
	6.813	89.151	158.557	404.822	651.775	564.748	672.100	820.070	429.091	294.382	144.893
	68.908	23.451	8.749	5.130	12.591	5.977	47.390	0.000	5.130	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.117	0.000	0.000
	0.000	0.000	6.813	157.825	287.799	512.595	824.410	483.796	930.294	671.771	280.718
	110.676	116.835	66.458	71.220	8.632	10.369	12.591	9.948	0.000	0.000	25.387
	4.257	0.000	0.000	0.000	4.058	0.000	0.000	0.000	16.259	0.000	14.929
	32.492										
1996	1	15	3	0	1	-1	-1	98.84	0.000	0.000	0.000
	17.094	56.984	120.955	198.925	254.682	236.982	455.987	492.082	393.291	380.645	79.515
	31.367	140.331	11.698	37.420	8.188	0.000	3.155	3.511	0.000	0.000	0.000

	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	20.650	66.958	207.306	264.271	452.880	328.607	397.931	485.390	339.480
	262.084	171.886	51.180	88.719	85.209	8.188	110.703	85.209	41.870	0.000	0.000
	0.000	0.000	0.000	43.338	0.000	33.682	10.477	0.000	0.000	0.000	8.188
	20.953										
1997	1	15	3	0	1	-1	-1	120.02	0.000	0.000	0.000
	42.501	87.323	114.824	273.283	543.503	496.606	809.017	779.741	824.275	724.531	596.595
	172.991	142.488	101.233	126.945	120.775	84.891	115.048	0.000	22.017	49.347	37.900
	0.000	0.000	0.000	34.598	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	43.661	212.569	119.037	603.479	573.911	990.154	943.757	757.181	740.893
	439.659	581.648	260.589	109.790	45.842	184.521	64.877	66.234	76.954	43.669	14.749
	100.299	0.000	56.615	0.000	14.749	0.000	31.636	0.000	0.000	0.000	0.000
	195.584										
1998	1	15	3	0	1	-1	-1	112.96	0.000	0.000	0.000
	5.595	7.553	83.710	364.494	476.123	935.200	728.423	416.294	699.450	442.869	615.200
	271.347	118.811	52.603	159.584	113.465	33.113	77.443	0.000	11.608	0.000	22.757
	0.000	0.000	23.987	11.608	36.865	0.000	0.000	0.000	0.000	11.608	0.000
	0.000	0.000	17.469	54.187	204.535	190.023	854.959	843.092	861.502	717.876	457.856
	439.627	345.411	180.176	208.889	24.514	84.147	126.786	0.000	46.973	60.852	0.000
	42.687	0.000	23.987	48.831	0.000	36.865	0.000	0.000	0.000	0.000	0.000
	125.337										
1999	1	15	3	0	1	-1	-1	105.90	0.000	0.000	0.000
	9.957	55.355	32.538	100.256	146.397	233.871	320.371	302.713	256.557	357.168	217.040
	330.586	198.855	121.465	151.106	49.122	47.882	74.813	0.000	4.977	6.257	0.000
	17.417	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	1.088	2.176	6.003	33.421	246.614	139.806	263.381	433.396	467.628	557.502
	335.087	243.625	287.164	74.749	249.033	59.834	3.370	73.904	46.671	70.862	0.000
	24.862	0.000	2.450	55.516	0.000	17.417	23.673	0.000	0.000	0.000	0.000
	2.527										
2000	1	15	3	0	1	-1	-1	36.64	0.000	0.000	0.000
	0.000	3.212	10.002	8.895	16.260	8.451	10.653	23.115	25.803	11.313	9.077
	6.821	2.596	6.821	2.596	0.000	2.596	0.000	0.000	0.000	0.000	0.000
	0.617	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	4.344	13.603	8.833	23.590	26.293	15.972	23.526	23.964
	12.841	14.564	3.152	4.841	6.821	0.000	2.596	2.596	0.000	0.000	0.617
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.012
	0.617										
2001	1	15	3	0	1	-1	-1	52.26	0.000	0.000	0.000
	1.248	1.248	5.963	24.416	28.733	30.514	21.519	53.550	27.944	27.583	30.326
	19.766	6.180	5.580	7.513	1.510	3.020	0.910	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	2.497	4.751	17.559	19.195	51.598	82.000	53.592	64.353	30.953
	52.942	17.130	14.945	14.920	1.510	1.117	5.438	4.670	5.438	0.000	1.117
	0.000	0.000	0.000	0.000	0.000	0.000	1.117	0.000	0.000	0.000	0.000
	0.000										
2002	1	15	3	0	1	-1	-1	105.56	0.000	0.000	0.000
	0.000	0.000	0.000	29.532	48.568	45.443	20.673	49.737	28.312	46.294	52.844
	55.333	37.873	43.055	32.171	18.309	14.675	4.186	6.038	9.875	4.079	3.960
	2.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.924	0.000	0.000
	0.000	0.000	0.000	0.000	13.388	29.460	77.625	59.585	52.653	78.294	75.888
	33.767	95.232	46.651	19.005	10.053	1.112	13.045	3.423	1.521	0.000	8.842
	0.000	1.112	0.000	0.000	0.000	0.000	0.000	1.112	0.000	0.000	0.000
	19.907										
2003	1	15	3	0	1	-1	-1	56.60	0.000	0.000	0.000
	0.000	3.134	8.169	4.121	24.110	18.518	10.287	14.354	13.282	11.597	5.459
	4.854	5.342	0.000	6.173	2.399	1.083	1.160	1.930	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	3.181	6.188	16.741	21.946	18.779	13.751	9.685
	6.313	7.843	10.364	3.971	3.561	5.720	3.235	0.000	3.774	0.000	0.367
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000										
2004	1	15	3	0	1	-1	-1	126.79	0.000	0.000	11.803
	11.803	42.788	103.303	266.781	193.116	281.273	152.938	143.441	176.494	158.225	82.358
	78.557	55.982	226.019	55.060	26.307	29.505	18.967	35.721	13.685	22.038	4.805
	0.000	7.283	11.803	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	82.353	190.135	341.613	317.556	183.337	170.260	122.757
	297.883	100.273	35.397	31.418	11.300	13.099	8.975	0.000	32.656	0.000	10.306
	5.035	11.803	10.081	0.000	0.000	0.000	0.000	0.000	4.431	5.153	0.000
	33.975										

2005	1	15	3	0	1	-1	-1	109.14	0.000	0.000	0.000
	0.000	1.000	2.000	9.000	68.769	76.644	46.785	27.986	47.013	22.600	37.750
	38.443	46.950	6.000	5.579	6.279	23.050	8.421	0.000	9.150	4.000	1.000
	5.750	3.400	6.500	0.000	0.000	1.000	0.000	1.000	1.000	2.000	0.000
	0.000	0.000	0.000	1.000	2.000	21.173	35.894	20.691	41.863	57.751	53.608
	13.200	28.171	18.050	37.700	16.050	9.000	31.850	21.350	21.050	0.000	2.000
	22.300	11.950	2.000	5.750	7.500	0.000	1.000	1.000	1.000	0.000	0.000
	16.100										

NWFSC marginals for plotting only (n=4)

2003	1	16	3	0	1	-1	-1	1	0	145074	103011
	43795	20789	133629	175237	98785	171480	64731	101652	111504	107125	58295
	24538	218294	29053	18319	37662	0	18319	0	4550	0	0
	6219	0	0	0	0	0	0	0	0	0	25366
	448124	98596	40231	12193	132489	83651	188392	165624	146768	90419	120599
	152333	39487	50497	11101	18319	0	18319	6238	0	10734	0
	0	0	0	0	0	0	0	0	0	0	0
	5209										
2004	1	16	3	0	1	-1	-1	1	0	56006	131785
	75243	589074	87946	389060	92372	94078	501265	483874	208982	80762	99614
	17202	0	0	172255	344510	201105	0	0	0	0	0
	0	0	0	0	0	0	0	172255	0	0	0
	76235	203856	117637	652033	253181	159222	178919	87057	460693	19930	79440
	52771	145364	186420	185265	0	39624	214880	183679	28200	172255	183679
	172255	28200	172255	0	0	0	0	28200	0	0	0
	881395										
2005	1	16	3	0	1	-1	-1	1	34838	21166	192112
	142955	110665	326340	358563	339308	841095	347912	250057	48318	164437	190148
	17568	9121	0	0	0	8702	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	18624
	39725	103849	74476	63252	169145	353799	549669	236684	248543	297078	319620
	39275	7322	98735	131802	8320	7394	8702	0	0	0	8577
	10333	0	0	0	0	0	0	0	0	0	0
	0										
2006	1	16	3	0	1	-1	-1	1	0	9256	25574
	19862	8553	244272	131364	610989	1434435	1639634	1167544	2706608	1370444	1723193
	2090719	1340561	1055827	1047427	1038009	0	0	0	1038009	14701	270318
	0	0	1038009	0	0	8888	0	0	0	0	0
	0	26595	23091	12308	71497	1434961	1873029	2260430	1221419	1273260	2005870
	1383638	2148371	1038009	304038	14701	4422354	0	1045813	293960	1038009	0
	0	8930	270318	1578645	0	0	0	0	0	0	0
	270318										

Triennial marginals for plotting only (n=6)

#1983	1	17	3	0	1	-1	-1	1	1789	27621	80600
	1059623	578322	328239	455316	310005	528206	407144	449496	221668	239010	325851
	340611	110404	63951	91723	47288	76521	63016	32924	35911	0	25245
	0	34643	17757	12483	5752	5285	5914	1882	0	17236	0
	28974	65062	1151279	623300	291965	254776	414736	421507	411595	318627	229723
	346672	348890	254518	123781	140138	125471	78397	66843	129371	84449	116694
	33654	52942	34438	51080	67770	58411	31775	12439	52663	43691	48611
	351654										
#1989	1	17	3	0	1	-1	-1	1	0	0	14750
	9047	391794	5374	71823	240849	253224	174674	312362	216568	66085	40123
	119000	138201	19245	104940	15765	11239	0	11239	13040	0	0
	13040	0	0	0	0	0	0	15765	0	53141	0
	0	17937	0	456863	42011	186880	358492	97395	237381	321245	344866
	175432	146428	239875	63776	90733	0	219836	47245	0	0	0
	58086	0	0	27941	0	0	0	0	128119	12985	0
	33978										
#1992	1	17	3	0	1	-1	-1	1	0	4220	5728
	151991	42311	76086	192645	200244	96084	38175	20818	15026	15986	14965
	6108	6537	2020	9137	6037	974	237	4300	0	0	0
	0	0	0	0	0	0	0	0	0	0	4220
	10234	16394	31408	75863	81925	147870	100347	36390	29768	16729	15134
	23985	23226	9475	13975	5204	1632	271	2158	8780	4947	16996
	815	24158	0	0	0	0	0	0	0	0	0
	0										
#1995	1	17	3	0	1	-1	-1	1	0	0	0
	16624	98129	77798	115218	37344	52032	47063	95381	5527	48649	62711
	21805	29220	27184	6437	13595	28240	11667	14378	6437	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	4469	101537	132293	137491	90822	87870	91782	29427	107383	3989
	76203	115488	32880	23927	26678	23927	32675	37688	0	0	57027
	13267	73671	0	0	0	0	0	0	0	0	0
	0										
#2001	1	17	3	0	1	-1	-1	1	0	3606	0
	141990	302895	433694	804794	432377	182530	282111	298648	170197	94137	38023
	65388	27718	29857	32156	7562	12413	2206	4390	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3606	0	113833	154619	529211	636973	310154	365015	187195	167463	92678
	71492	41027	42252	31139	20996	17928	8929	4646	0	11013	12465
	9877	9877	16081	0	6098	4646	0	2653	0	0	0
	17319										
#2004	1	17	3	0	1	-1	-1	1	0	4597	4040
	0	12219	20380	69183	64844	57050	81643	55347	56950	29254	60550
	48432	10488	13147	0	16671	10599	6295	0	10376	0	6295
	0	0	0	0	0	0	0	0	0	0	0
	4040	0	6603	7635	32011	68320	81561	95154	56375	83791	74036
	103490	48771	24302	48961	45334	39525	25374	19609	52600	11036	0
	21353	0	0	18025	0	0	0	0	0	3372	0
	14838										

0 # Total number of size-at-age observations
0 # Total number of environmental variables
0 # Total number of environmental observations
999 # End file marker

14. Appendix C: SS2 Control file

```
# control file for 2007 canary assessment
# Morph and area setup
1        # N growth patterns
1        # N sub morphs
1        # N Areas
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 # Area for each fleet
1        # rec dist design
0        # rec interaction
0        # Do migration: 0=no migration, 1=for nareas>1 models
0 0 0    # migration matrix

# Time block setup
13       # Number of time block designs for time varying parameters
1        # Blocks in design 1
1        # Blocks in design 2
1        # Blocks in design 3
1        # Blocks in design 4
2        # Blocks in design 5
2        # Blocks in design 6
2        # Blocks in design 7
2        # Blocks in design 8
3        # Blocks in design 9
3        # Blocks in design 10
3        # Blocks in design 11
3        # Blocks in design 12
2    # Blocks in design 13

1995 2006           # Block Design 1 Trip limits
2000 2006           # Block Design 2 footrope/overfished declaration
2002 2006                   # Block Design 3 RCA
2005 2006                   # Block Design 4 Flatfish trawl

1995 1999 2000 2006         # Block Design 5 trip limits + footrope
1995 2001 2002 2006         # Block Design 6 trip limits + RCA
2000 2001 2002 2006         # Block Design 7 footrope + RCA
2000 2004 2005 2006         # Block Design 8 footrope + flatfish trawl

2000 2001 2002 2004 2005 2006 # Block Design 9 footrope + RCA + flatfish trawl
1995 1999 2000 2001 2002 2006 # Block Design 10 trip limits + footrope + RCA
1995 1999 2000 2004 2005 2006 # Block Design 11 trip limits + footrope + flatfish trawl
1979 1994 1995 1999 2000 2006 # Block Design 12 roller gear + trip limits + footrope
1979 1999 2000 2006      # Block Design 13 roller gear + footrope/overfished declaration

# Mortality and growth specifications
0.5      # Fraction female at birth
1000     # Ratio of between to within growth morph variance
-1       # Vector of submorph distribution (-1=normal approx)
6        # Last age for M young
14       # First age for M old
1        # Age for growth Lmin
80       # Age for growth Lmax
0.0      # SD constant added to LAA (0.1 mimics v1.xx for compatibility only)
0        # Variability about growth: 0=CV~f(LAA) [mimic v1.xx], 1=CV~f(A), 2=SD~f(LAA), 3=SD~f(A)
1        # maturity option: 1=length logistic, 2=age logistic, 3=read maturity at age for each growth pattern
2        # First age allowed to mature
3        # mg parm offset option: 1=direct assignment, 2=each pat. x gender offset from pat. 1 gender 1, 3=offsets as SS2 V1.xx
with M old and CV old offset from young values
1        # mg parm adjust method 1=do V1.23 approach, 2=use new logistic approach
-50      # Mortality and growth parameter dev phase

# Mortality and growth parameters
```

# Lo	Hi	Init	Prior	Prior	Prior	Param	Env	Use	Dev	Dev	Dev	Block	block
# bnd	bnd	value	mean	type	SD	phase	var	dev	minyr	maxyr	SD	design	switch

Females

```
0.04	0.08	0.06	0.06	0	50	-50	0	0	0	0	0.5
	0	0	#M1_natM_young
0	0.9	0.45	0.4	-1	50	3	0	0	0	0	0.5
	0	0	#M1_natM_old_as_exponential_offset(rel_young)
2	9	3.8	4	-1	50	2	0	0	0	0	0.5
	0	0	#M1_Lmin
50	70	59.0	60	-1	50	2	0	0	0	0	0.5
	0	0	#M1_Lmax
0.02	0.21	0.14	0.14	-1	50	2	0	0	0	0	0.5
	0	0	#M1_VBK
0.02	0.21	0.14	0.15	-1	50	2	0	0	0	0	0.5
	0	0	#M1_CV-young
-3	3	-1.3	-1.3	-1	50	2	0	0	0	0	0.5
	0	0	#M1_CV-old_as_exponential_offset(rel_young)
# Males
-3	3	0	0	0	50	-50	0	0	0	0	0.5
	0	0	#M2_natM_young_as_exponential_offset(rel_morph_1)
-3	3	0	0	0	50	-50	0	0	0	0	0.5
	0	0	#M2_natM_old_as_exponential_offset(rel_young)
-3	3	0	0	0	50	-50	0	0	0	0	0.5
	0	0	#M2_Lmin_as_exponential_offset
-3	3	-0.12	0	-1	50	2	0	0	0	0	0.5
	0	0	#M2_Lmax_as_exponential_offset
-3	3	0.24	0	-1	50	2	0	0	0	0	0.5
	0	0	#M2_VBK_as_exponential_offset
-3	3	0.04	0	-1	50	2	0	0	0	0	0.5
	0	0	#M2_CV-young_as_exponential_offset(rel_CV-young_for_morph_1)
-3	3	-1.3	0	-1	50	2	0	0	0	0	0.5
	0	0	#M2_CV-old_as_exponential_offset(rel_CV-young)
# Weight-Length and maturity parameters (L in cm, W in kg)
# Lo	Hi	Init	Prior	Prior	Prior	Param	Env	Use	Dev	Dev	Dev
	Block	block
# bnd	bnd	value	mean	type	SD	phase	var	dev	minyr	maxyr	SD
	design	switch
# Females
0	1	1.55E-05 1.55E-05 0	50	-50	0	0	0	0	0.5	0
	0	#Female wt-len-1
2	4	3.03	3.03	0	50	-50	0	0	0	0	0.5
	0	0	#Female wt-len-2
40	41	40.5	40.5	0	50	-50	0	0	0	0	0.5
	0	0	#Female mat-len-1
-3	3	-0.25	-0.25	0	50	-50	0	0	0	0	0.5
	0	0	#Female mat-len-2
-3	3	1.0	1.0	0	50	-50	0	0	0	0	0.5
	0	0	#Female eggs/gm intercept
-1	1	0.0	0.0	0	50	-50	0	0	0	0	0.5
	0	0	#Female eggs/gm slope
# Males
0	1	1.55E-05 1.55E-05 0	50	-50	0	0	0	0	0.5	0
	0	#Female wt-len-1
2	4	3.03	3.03	0	50	-50	0	0	0	0	0.5
	0	0	#Female wt-len-2

# Distribute recruitment among growth pattern x area x season
0	999	1	1	0	50	-50	0	0	0	0	0.5
	0	0	# GP 1
0	999	1	1	0	50	-50	0	0	0	0	0.5
	0	0	# Area 1
0	999	1	1	0	50	-50	0	0	0	0	0.5
	0	0	# Season 1
# Cohort growth (K) deviation parameter
-1	1	1	1	0	50	-50	0	0	1980	1983	0.5
	0	0

0 # Custom environmental linkage setup for mg parameters: 0=Read one line apply all, 1=read one line each parameter
0 # Custom block setup for mg parameters: 0=Read one line apply all, 1=read one line each parameter

# Spawner-recruit parameters
1	# S-R function: 1=B-H w/flat top, 2=Ricker, 3=standard B-H, 4=no steepness or bias adjustment
# Lo	Hi	Init	Prior	Prior	Prior	Param
```

```
# bnd   bnd     value   mean    type    SD      phase
 7      11      8.5     8.5     -1      50      1       # Ln(R0)
 0.21   0.99    0.511   0.4     0       50      -6      # Steepness
 0      2       0.5     0.4     0       50      -50     # Sigma R
 -5     5       0       0       0       50      -50     # Environmental link coefficient
 -5     5       0       0       0       50      -50     # Initial equilibrium offset to virgin
 0      2       0       1       0       50      -50     # Autocorrelation placeholder (Future implementation)
0 # index of environmental variable to be used
1 # env target parameter: 1=rec devs, 2=R0, 3=steepness
1 # rec dev type: 0=none, 1=devvector (zero-sum), 2=simple deviations (no sum constraint)
# Recruitment residuals
1960    # Start year recruitment residuals
2006    # End year recruitment residuals
-5      # Lower bound
5       # Upper bound
1       # Phase
1900    # first year of full bias correction (linear ramp up from this year minus the plus-age to this year)

# Initial F setup by fishing fleet
# Lo    Hi      Init    Prior   P_type  SD      Phase
0       1       0       0.01    0       50      -50 # 1_CA_S_trwl
0       1       0       0.01    0       50      -50 # 2CA_N_trwl
0       1       0       0.01    0       50      -50 # 3OR_trwl
0       1       0       0.01    0       50      -50 # 4WA_trwl
0       1       0       0.01    0       50      -50 # 5CA_S_nontrwl
0       1       0       0.01    0       50      -50 # 6CA_N_nontrwl
0       1       0       0.01    0       50      -50 # 7WAOR_nontrwl
0       1       0       0.01    0       50      -50 # 8CA_S_rec
0       1       0       0.01    0       50      -50 # 9CA_N_rec
0       1       0       0.01    0       50      -50 # 10WAOR_rec
0       1       0       0.01    0       50      -50 # 11atseahake
0       1       0       0.01    0       50      -50 # 12_NWFSC/research

# Catchability (Q) setup
# A=do power: 0=skip, survey is prop. to abundance, 1= add par for non-linearity
# B=env. link: 0=skip, 1= add par for env. effect on Q
# C=extra SD: 0=skip, 1= add par. for additive constant to input SE (in ln space)
# D=type: <0=mirror lower abs(#) fleet, 0=no par Q is median unbiased, 1=no par Q is mean unbiased, 2=estimate par for ln(Q)
#               3=ln(Q) + set of devs about ln(Q) for all years. 4=ln(Q) + set of devs about Q for indexyr-1
# E=Units: 0=numbers, 1=biomass
# F=err_type 0=lognormal, >0=T-dist. DF=input value
# A B C D E F
 0 0 0    0 1 0 # 1CA_S_trwl
 0 0 0    0 1 0 # 2CA_N_trwl
 0 0 0    0 1 0 # 3OR_trwl
 0 0 0    0 1 0 # 4WA_trwl
 0 0 0    0 1 0 # 5CA_S_nontrwl
 0 0 0    0 1 0 # 6CA_N_nontrwl
 0 0 0    0 1 0 # 7WAOR_nontrwl
 0 0 0    0 1 0 # 8CA_S_rec
 0 0 0    0 1 0 # 9CA_N_rec
 0 0 0    0 1 0 # 10WAOR_rec
 0 0 0    0 1 0 # 11atseahake
 0 0 0    0 1 0 # 12NWFSC/research
 0 0 0    0 1 0 # 13_triennial
 0 0 0    0 0 0 # 14_pre_recruit
 0 0 0    0 1 0 # 15WA_trwl_mirror
 0 0 0    0 1 0 # 16_NWFSC_mirror
 0 0 0    0 1 0 # 17_tri_mirror
# Catchability (Q) parameters

# Selectivity section
# Size-based setup
# A=Selex option: 1-24
# B=Do_retention: 0=no, 1=yes
# C=Male offset to female: 0=no, 1=yes, 2=Female offset to male
# D=Mirror selex (#)
# A   B C D
 24  0 2 0  # 1CA_S_trwl
 24  0 2 0  # 2CA_N_trwl
```

24 0 2 0 # 3OR_trwl
24 0 2 0 # 4WA_trwl
24 0 2 0 # 5CA_S_nontrwl
24 0 2 0 # 6CA_N_nontrwl
24 0 2 0 # 7WAOR_nontrwl
24 0 2 0 # 8CA_S_rec
24 0 2 0 # 9CA_N_rec
24 0 2 0 # 10WAOR_rec
24 0 2 0 # 11atseahake
24 0 2 0 # 12_NWFSC/research
24 0 2 0 # 13_triennial
32 0 0 0 # 14_pre_recruit
5   0 0 4   # 15WA_trwl_mirror
5   0 0 12 # 16_NWFSC_mirror
5   0 0 13 # 17_tri_mirror
Age-based setup
10 0 0 0   # 1CA_S_trwl
10 0 0 0   # 2CA_N_trwl
10 0 0 0   # 3OR_trwl
10 0 0 0   # 4WA_trwl
10 0 0 0   # 5CA_S_nontrwl
10 0 0 0   # 6CA_N_nontrwl
10 0 0 0   # 7WAOR_nontrwl
10 0 0 0   # 8CA_S_rec
10 0 0 0   # 9CA_N_rec
10 0 0 0   # 10WAOR_rec
10 0 0 0   # 11atseahake
10 0 0 0   # 12_NWFSC/research
10 0 0 0   # 13_triennial
10 0 0 0   # 14_pre_recruit
10 0 0 0   # 15WA_trwl_mirror
10 0 0 0   # 16_NWFSC_mirror
10 0 0 0   # 17_tri_mirror
Selectivity and retention parameters

# Lo	Hi	Init	Prior	Prior	Prior	Param	Env	Use	Dev	Dev	Dev
	Block	block									
# bnd	bnd	value	mean	type	SD	phase	var	dev	minyr	maxyr	SD
	design	switch									
# 1CA_S_trwl double normal											
20	60	40	50	-1	50	4	0	0	0	0	0.5
	0	2	# PEAK								
-9.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)								
0.0	9.0	4.3	4.2	-1	50	5	0	0	0	0	0.5
	0	2	# Asc WIDTH exp								
0.0	9.0	2.5	2.6	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp								
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)								
-5.0	5.0	-1.0	5	-1	50	5	0	0	0	0	0.5
	0	2	# FINAL (logistic)								
# Female offsets											
10	60	40	50	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg								
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage								
# 2CA_N_trwl double normal											
20	60	43	50	-1	50	4	0	0	0	0	0.5
	0	0	# PEAK								
-9.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)								
0.0	9.0	3.9	2.0	-1	50	5	0	0	0	0	0.5
	0	0	# Asc WIDTH exp								
0.0	9.0	2.7	2.4	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp								

-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)								
-5.0	5.0	2.0	5	-1	50	5	0	0	0	0	0.5
	0	0	# FINAL (logistic)								
# Female offsets											
10	60	45	50	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg								
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage								
#fishery-3OR_trwl double normal											
20	60	50	50	-1	50	4	0	0	0	0	0.5
	12	2	# PEAK								
-9.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)								
0.0	9.0	4.0	4.0	-1	50	5	0	0	0	0	0.5
	12	2	# Asc WIDTH exp								
0.0	9.0	4.0	4.0	0	50	-7	0	0	0	0	0.5
	0	0	# Desc WIDTH exp								
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)								
-5.0	5.0	4.99	5	-1	50	-4	0	0	0	0	0.5
	12	2	# FINAL (logistic)								
# Female offsets											
10	60	50	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg								
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage								
#fishery-4WA_trwl double normal											
20	60	50	50	-1	50	4	0	0	0	0	0.5
	13	2	# PEAK								
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)								
0.0	9.0	4.5	4.5	-1	50	5	0	0	0	0	0.5
	13	2	# Asc WIDTH exp								
0.0	9.0	4.4	4.4	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp								
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)								
-5.0	5.0	-3.3	5	-1	50	5	0	0	0	0	0.5
	13	2	# FINAL (logistic)								
# Female offsets											
10	60	50	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg								
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg								
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage								
#fishery-5CA_S_nontrwl double normal											
20	60	34	50	-1	50	4	0	0	0	0	0.5
	2	2	# PEAK								
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)								
0.0	9.0	4.3	4.1	-1	50	5	0	0	0	0	0.5
	2	2	# Asc WIDTH exp								
0.0	9.0	4.3	4.3	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp								

```
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)
-5.0	5.0	-1.8	5	-1	50	5	0	0	0	0	0.5
	2	2	# FINAL (logistic)
# Female offsets
10	60	35	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage

#fishery-6CA_N_nontrwl double normal
15	60	40	50	-1	50	4	0	0	0	0	0.5
	10	2	# PEAK
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)
0.0	9.0	4.7	4.2	-1	50	5	0	0	0	0	0.5
	10	2	# Asc WIDTH exp
0.0	9.0	4.0	4.0	0	50	-7	0	0	0	0	0.5
	0	0	# Desc WIDTH exp
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)
-5.0	5.0	4.99	0.9	-1	50	-5	0	0	0	0	0.5
	10	2	# FINAL (logistic)
# Female offsets
10	60	40	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage

#fishery-7WAOR_nontrwl double normal
15	60	49	50	-1	50	4	0	0	0	0	0.5
	7	2	# PEAK
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)
0.0	9.0	4.7	5.8	-1	50	5	0	0	0	0	0.5
	7	2	# Asc WIDTH exp
0.0	9.0	4.0	4.0	0	50	-7	0	0	0	0	0.5
	0	0	# Desc WIDTH exp
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)
-5.0	5.0	4.0	5	-1	50	5	0	0	0	0	0.5
	7	2	# FINAL (logistic)
# Female offsets
10	60	53	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage

#fishery-8CA_S_rec double normal
15	60	30	50	-1	50	4	0	0	0	0	0.5
	8	2	# PEAK
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)
0.0	9.0	3.9	4.0	-1	50	5	0	0	0	0	0.5
	8	2	# Asc WIDTH exp
0.0	9.0	3.7	3.7	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp
```

```
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)
-5.0	5.0	-3.5	5	-1	50	5	0	0	0	0	0.5
	8	2	# FINAL (logistic)
# Female offsets
10	60	30	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage

#fishery-9CA_N_rec double normal
15	60	28	50	-1	50	4	0	0	0	0	0.5
	0	2	# PEAK
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)
0.0	9.0	3.1	3.1	-1	50	5	0	0	0	0	0.5
	0	2	# Asc WIDTH exp
0.0	9.0	4.4	4.4	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)
-5.0	5.0	-2.3	5	-1	50	5	0	0	0	0	0.5
	0	2	# FINAL (logistic)
# Female offsets
10	60	28	44	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage

#fishery-10WAOR_rec double normal
15	60	31	50	-1	50	4	0	0	0	0	0.5
	2	2	# PEAK
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)
0.0	9.0	3.2	3.2	-1	50	5	0	0	0	0	0.5
	2	2	# Asc WIDTH exp
0.0	9.0	3.3	2.3	-1	50	5	0	0	0	0	0.5
	0	0	# Desc WIDTH exp
-9.0	5.0	-9.0	-9.0	0	50	-50	0	0	0	0	0.5
	0	0	# INIT (logistic)
-5.0	5.0	-2.4	5	-1	50	5	0	0	0	0	0.5
	2	2	# FINAL (logistic)
# Female offsets
10	60	31	50	0	50	-50	0	0	0	0	0.5
	0	0	# female dogleg
-4	0	0	0	0	50	-50	0	0	0	0	0.5
	0	0	# female offset at minage
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at dogleg
-4	0	0	0	0	50	-6	0	0	0	0	0.5
	0	0	# female offset at maxage

#fishery-11atseahake double normal
15	60	48	50	-1	50	4	0	0	0	0	0.5
	0	0	# PEAK
-4.0	4.0	-4	-4	0	50	-50	0	0	0	0	0.5
	0	0	# TOP (logistic)
0.0	9.0	3.6	3.7	-1	50	5	0	0	0	0	0.5
	0	0	# Asc WIDTH exp
0.0	9.0	4.0	4.0	0	50	-7	0	0	0	0	0.5
	0	0	# Desc WIDTH exp
```

```
-9.0   5.0   -9.0   -9.0   0    50   -50   0   0   0   0   0.5
       0     0      # INIT (logistic)
-5.0   5.0   4.0    5      -1   50   5     0   0   0   0   0.5
       0     0      # FINAL (logistic)
# Female offsets
10     60    48     50     0    50   -50   0   0   0   0   0.5
       0     0      # female dogleg
-4     0     0      0      0    50   -50   0   0   0   0   0.5
       0     0      # female offset at minage
-4     0     0      0      0    50   -6    0   0   0   0   0.5
       0     0      # female offset at dogleg
-4     0     0      0      0    50   -6    0   0   0   0   0.5
       0     0      # female offset at maxage

#survey-12_NWFSC double normal
20     66    61     50     -1   50   4     0   0   0   0   0.5
       0     0      # PEAK   value
-4.0   4.0   -4.0   -4     -1   50   4     0   0   0   0   0.5
       0     0      # TOP    logistic
0.0    9.0   8.8    4.0    -1   50   4     0   0   0   0   0.5
       0     0      # WIDTH up exp
0.0    9.0   4.0    4.0    0    50   -7    0   0   0   0   0.5
       0     0      # WIDTH dn exp
-9.0   5.0   -8.0   -9.0   -1   50   4     0   0   0   0   0.5
       0     0      # INIT   logistic
-5.0   5.0   4.5    5      -1   50   4     0   0   0   0   0.5
       0     0      # FINAL (logistic)
# Add female offsets
10     60    55     50     0    50   -50   0   0   0   0   0.5
       0     0      # female dogleg
-4     0     0      0      0    50   -50   0   0   0   0   0.5
       0     0      # female offset at minage
-4     0     0      0      0    50   -6    0   0   0   0   0.5
       0     0      # female offset at dogleg
-4     0     0      0      0    50   -6    0   0   0   0   0.5
       0     0      # female offset at maxage

#survey-13_triennial double normal
20     66    64     50     -1   50   4     0   0   0   0   0.5
       0     0      # PEAK   value
-4.0   4.0   -3.6   -4     -1   50   4     0   0   0   0   0.5
       0     0      # TOP    logistic
0.0    9.0   7.4    4.0    -1   50   4     0   0   0   0   0.5
       0     0      # WIDTH  exp
0.0    9.0   4.0    4.0    0    50   -7    0   0   0   0   0.5
       0     0      # WIDTH  exp
-9.0   5.0   -9.0   -9.0   0    50   -50   0   0   0   0   0.5
       0     0      # INIT   logistic
-5.0   5.0   4.5    5      -1   50   4     0   0   0   0   0.5
       0     0      # FINAL (logistic)
# Female offsets
10     60    55     50     0    50   -50   0   0   0   0   0.5
       0     0      # female dogleg
-4     0     0      0      0    50   -50   0   0   0   0   0.5
       0     0      # female offset at minage
-4     0     0      0      0    50   -6    0   0   0   0   0.5
       0     0      # female offset at dogleg
-4     0     0      0      0    50   -6    0   0   0   0   0.5
       0     0      # female offset at maxage
### Mirrors, leave fixed ###
#15_Wa trawl mirror for second age key
-2     0     -1     0      0    50   -50   0   0   0   0   0.5
       0     0      # Min mirror bin
-2     0     -1     0      0    50   -50   0   0   0   0   0.5
       0     0      # Max mirror bin
#16_NWFSC mirror for marginal ages
-2     0     -1     0      0    50   -50   0   0   0   0   0.5
       0     0      # Min mirror bin
-2     0     -1     0      0    50   -50   0   0   0   0   0.5
       0     0      # Max mirror bin
```

#16_triennial mirror for marginal ages

-2	0	-1	0	0	50	-50	0	0	0	0	0.5
	0	0	# Min mirror bin								
-2	0	-1	0	0	50	-50	0	0	0	0	0.5
	0	0	# Max mirror bin								

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

1 # Selex parm adjust method 1=do V1.23 approach, 2=use new logistic approach
0 # Selex environmental setup: 0=Read one line apply all, 1=read one line each parameter
1 # Selex block setup: 0=Read one line apply all, 1=read one line each parameter

# Lo	Hi	Init	Prior	P_type	SD	Phase
20	60	46	50	-1	50	4 # OR trawl peak 1979-1994
20	60	46	50	-1	50	4 # OR trawl peak 1995-1999
20	60	41	50	-1	50	4 # OR trawl peak 2000-2006
0.0	9.0	4.0	4.0	-1	50	5 # OR trawl ascending width 1979-1994
0.0	9.0	4.0	4.0	-1	50	5 # OR trawl ascending width 1995-1999
0.0	9.0	3.7	3.9	-1	50	5 # OR trawl ascending width 2000-2006
-5.0	12.0	0.2	5	-1	50	5 # OR trawl final 1979-1994
-5.0	9.0	0.2	5	-1	50	5 # OR trawl final 1995-1999
-5.0	9.0	0.15	5	-1	50	5 # OR trawl final 2000-2006
20	60	41	50	-1	50	4 # WA trawl peak 1979-1999
20	60	41	50	-1	50	4 # WA trawl peak 2000-2006
0.0	9.0	3.6	4.6	-1	50	5 # WA trawl ascending width 1979-1999
0.0	9.0	3.6	4.6	-1	50	5 # WA trawl ascending width 2000-2006
-5.0	5.0	4.5	5	-1	50	5 # WA trawl final 1979-1999
-5.0	5.0	4.5	5	-1	50	5 # WA trawl final 2000-2006
20	60	24	50	-1	50	4 # S CA nontrawl peak 2000-2006
0.0	9.0	1.6	1.3	-1	50	5 # S CA nontrawl ascending width 2000-2006
-5.0	5.0	-4.5	5	-1	50	5 # S CA nontrawl final 2000-2006
20	60	33	50	-1	50	4 # N CA nontrawl peak 1995-1999
20	60	41	50	-1	50	4 # N CA nontrawl peak 2000-2001
20	60	33	50	-1	50	4 # N CA nontrawl peak 2002-2006
0.0	9.0	3.5	4.2	-1	50	-4 # N CA nontrawl ascending width 1995-1999
0.0	9.0	4.8	4.2	-1	50	5 # N CA nontrawl ascending width 2000-2001
0.0	9.0	3.9	4.2	-1	50	5 # N CA nontrawl ascending width 2002-2006
-5.0	5.0	0.1	5	-1	50	5 # N CA nontrawl final 1995-1999
-5.0	5.0	-0.3	5	-1	50	5 # N CA nontrawl final 2000-2001
-5.0	5.0	-2.9	5	-1	50	5 # N CA nontrawl final 2002-2006
15	60	33	50	-1	50	4 # OR/WA nontrawl peak 2000-2001
15	60	58	50	-1	50	4 # OR/WA nontrawl peak 2002-2006
0.0	9.0	2.9	5.8	-1	50	5 # OR/WA nontrawl ascending width 2000-2001
0.0	9.0	5.2	5.8	-1	50	5 # OR/WA nontrawl ascending width 2002-2006
-5.0	5.0	-1.6	5	-1	50	5 # OR/WA nontrawl final 2000-2001
-5.0	5.0	4.8	5	-1	50	5 # OR/WA nontrawl final 2002-2006
20	60	31	50	-1	50	4 # S CA rec peak 2000-2001
20	60	30	50	-1	50	4 # S CA rec peak 2002-2006
0.0	9.0	4.0	4.0	-1	50	5 # S CA rec ascending width 2000-2001
0.0	9.0	3.1	4.0	-1	50	5 # S CA rec ascending width 2002-2006
-5.0	5.0	-4.5	5	-1	50	5 # S CA rec final 2000-2001
-5.0	5.0	-4.8	5	-1	50	5 # S CA rec final 2002-2006
20	60	30	50	-1	50	4 # OR/WA rec peak 2000-2006
0.0	9.0	3.2	3.2	-1	50	5 # OR/WA rec ascending width 2000-2006
-5.0	5.0	-3.6	5	-1	50	5 # OR/WA rec final 2000-2006

-50 #_phase_for_selex_parm_devs

Likelihood related quantities
variance/sample size adjustment by fleet
#1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 #
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.035 0.11 0.00 0.00 0.00 # constant added to survey CV
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 # constant added to discard SD
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 # constant added to body weight SD
0.91 1.00 1.00 1.00 0.84 1.00 1.00 0.92 0.92 0.90 1.00 1.00 1.00 1.00 1.00 1.00 1.00 # multiplicative scalar for length comps
1.00 0.98 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.36 1.00 1.00 1.00 1.00 1.00 1.00 # multiplicative scalar for agecomps
1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 # multiplicative scalar for length at age obs

30 # DF For discard T-distribution

```
30   #  DF For meanbodywt T-distribution

1             # Max number of lambda phases: read this number of values for each component below
1             # SD offset (CPUE, discard, mean body weight, recruitment devs): 0=omit log(s) term, 1=include
# Lambda values by fleet
0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 1 # CPUE lambdas
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 # Discard lambdas
1             # Mean body weight data lambda
#1   2    3    4    5    6    7    8    9    10   11   12   13   14   15   16  17  #
0.50 0.50 0.50 0.50 1    1    0.50 1              1    1    0.50 1    1    0    0    0   1   # Length frequency lambdas
0.50 0.50 0.50 0.50 0    0    0.50 0              0    0    0.50 1    1    0    0.50 0   1   # Age frequency lambdas
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0   0   # Size at age lamdas
1             # Initial F lambda
1             # Recruitment residual lambda
1             # Parameter prior lambda
1             # Parameter deviation lambda
1000          # crashpen lambda
0.9           # max F threshold
999 # end file marker
```

15. Appendix D: SS2 Starter file

```
Canary_07.dat
Canary_07.ctl
0        # read SS2.PAR: 0=no, 1=yes
1        # output to console: 0=none, 1=most, 2=all
1        # rep file detail: 0=minimum, 1=normal
0        # N bootstrap datafiles to create
25       # last phase to estimate
Canary07_mod          # prefix for output string in rep
1      # burn in for mcmc chain
1      # thinning interval for mcmc chain
0.00     # jitter for initial parameter values
0.00     # push initial parameter values away from bounds
-1       # min year for spbio sd_report (neg val = styr-2, virgin state)
-1       # max year for spbio sd_report (neg val = endyr+1)
0.0001  # ending convergence criteria
0        # retro year relative to endyr
1        # 1=keep catches; 0=set catches to nil
0.2    # F ballpark
1999   # F ballpark year
1      # F method: 1=Pope, 2=continuous
5        # summary age for biomass reporting
1      # Forecast_opt: 0=none, 1=use F(spr), 2=use F(msy), 3=use F(btarget), 4=use endyr
F
2      # MSY opt: 0=none, 1=F(spr), 2=calc F(msy), 3=F(btarget), 4=endyr F
0      # do Punt-style rebuilder file: 0=no, 1=yes
-1     # first year for which catch could have been set to zero (Ydecl)(-1 to set to 1999)
-1     # year for current age structure (Yinit) (-1 to set to endyear+1)
```

16. Appendix E: SS2 Forecast file

0.5 # target SPR
1 # total number of forecast years
1 # number of forecast years with SD
1 # emphasis for sigmaR for recruitments occuring prior to endyr+1
1 # fraction of the bias adjustment to use prior to endyr+1
0 # fraction of the bias-correction to use in purely forecast years
0.40 # topend of 40:10 option; set to 0.0 for no 40:10
0.10 # bottomend of 40:10 option
1.0 # OY scalar relative to ABC
2003 # first yr for average fish selex to use in MSY and forecast
2006 # last yr for average fish selex to use in MSY and forecast
1 # for forecast: 1=set relative F from endyr; 2=use relative F read below
0 1 1 1 0 0 1 0 0 1 0 0 # relative F for forecast when using F; seasons; fleets within season
999 # verification read for end of the correct number of relative F reads
1.486 2.144 4.698 14.943 0.024 0.045 2.905 2.639 3.327 5.022 2.350 4.416 # scaled to 44 mt