Status of the U.S. yelloweye rockfish resource in 2009

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Executive Summary

Stock

This assessment reports the status of the yelloweye rockfish (*Sebastes ruberrimus*) resource off the coast of the United States from southern California to the U.S.-Canadian border using data through 2008. The resource is modeled as a single stock, but with three explicit spatial areas: Washington, Oregon and California. Each area is modeled simultaneously with its own unique catch history and fishing fleets (recreational and commercial) but the dynamics follow the current understanding of yelloweye stock structure: large stocks linked via a common stock-recruit relationship with negligible adult movement among areas.

Catches

Yelloweye rockfish catches were estimated from a variety of sources, but are very uncertain due to the relatively small contribution of yelloweye to rockfish market categories and the relatively large scale of recreational removals. Catches include estimates of discarding after 2001 when management restrictions resulted in nearly all yelloweye caught by recreational and commercial fishermen being discarded at sea. Recent catches were based on current total mortality estimates (2002-2007) and the GMT scorecard (2008). Estimated catches increased gradually throughout the first half of the 20th century, with the exception of a brief period of higher removals around World War II. Catches peaked in 1982 at 421 mt, with removals in excess of 200 mt estimated for all years between 1977 and 1997. Uncertainty in catches is treated explicitly throughout this analysis.

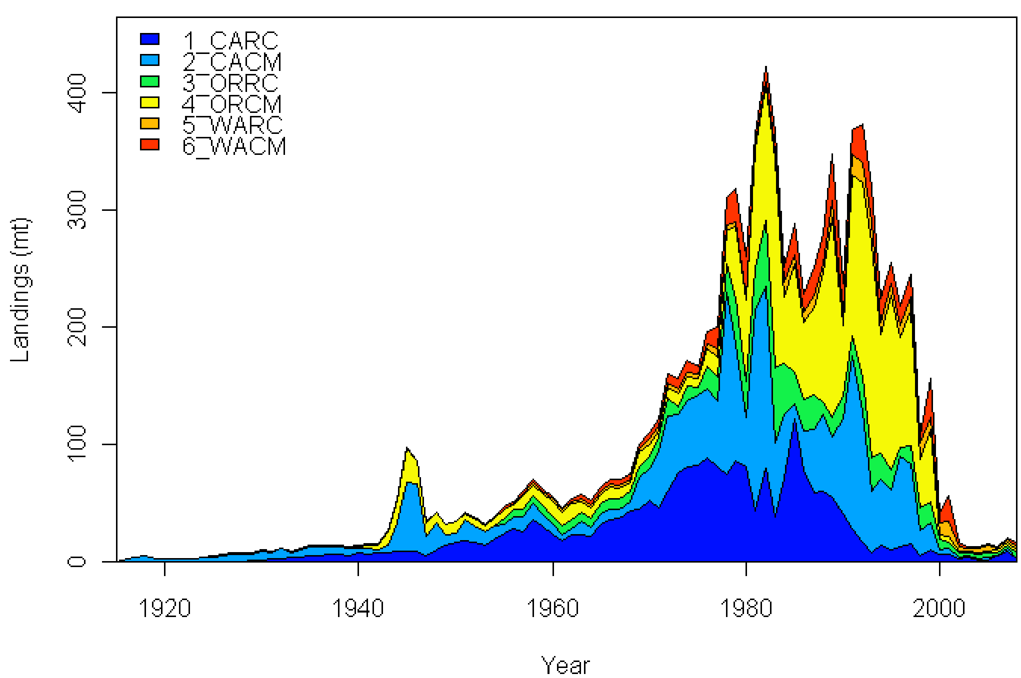

Figure a. Yelloweye rockfish estimated catch history, 1916-2008. Fleet names indicated by state (WA, OR or CA) and sector (recreational = RC, commercial = CM).

Table a. Recent yelloweye rockfish catches (mt) by fleet.

Year	California Recreational	California Commercial[1]	Oregon Recreational	Oregon Commercial[1]	Washington Recreational	Washington Commercial[1]
1999	9.4	23.5	18.1	61.3	10.6	32.9
2000	5.7	4.0	9.5	3.6	10.1	7.9
2001	6.4	4.3	4.8	6.2	12.5	21.8
2002	2.5	1.1	3.1	1.9	3.7	3.5
2003	3.7	0.7	3.0	1.0	2.6	1.3
2004	0.6	1.3	3.7	1.5	3.7	1.5
2005	0.9	1.9	4.3	1.4	5.2	1.4
2006	4.1	0.8	2.9	1.9	1.7	1.0
2007	8.0	2.9	3.1	2.0	2.5	1.1
2008	2.1	0.4	4.1	2.5	2.8	4.7

[1]Includes research catches.

Data and Assessment

This stock assessment used the newest version of Stock Synthesis available (3.03b, released 28 May 2009). The model data sources include catch, length- and age-frequency data from six state-specific recreational and commercial fishing fleets. Biological data is derived from both port and on-board observer sampling programs. Yelloweye catch in the IPHC long-line survey for Pacific halibut is also included via an index of relative abundance for Washington and for Oregon as well as length- and age-frequency data. Oregon recreational charter observer data from discarded yelloweye was used to construct a recent index of relative abundance (2004-2008) and length-frequency observations. The National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC) trawl survey relative biomass indices and information from biological sampling, as well as the triennial trawl survey are included.

Externally estimated model parameters, including those defining weight-length, maturity, and fecundity relationships, are revised from values used in previous assessments. The assessment explicitly accounts for the small degree of dimorphic growth as well as markedly different exploitation histories among geographic areas (Washington, Oregon and California). Due to sparse and poorly informative age- and length-frequency data, recruitment is modeled as a deterministic process. Key parameters including natural mortality, stock-recruitment steepness and all growth parameters are estimated.

Although the base case assessment model captures some uncertainty via asymptotic intervals, uncertainty from two sources is reported through alternate states of nature bracketing the base case results and included explicitly in the decision table. The magnitude of the estimated catch time-series was found to have a large influence on the perception of current stock size and the estimate of steepness of the stock-recruit relationship was closely linked to the projected recovery rates. Alternate values of each were selected to bracket the best estimates with marginal probabilities one-half as likely. For historical catch these values, 75% and 150% of the estimated catch series prior to 2000, were subjective, but reflect both the lack of a comprehensive catch reconstruction in Washington and the change in likelihood of the fit to data sources over a reasonable range of catch levels. For steepness the 12.5th and 87.5th percentiles were calculated from the likelihood profile as a proxy for the probability distribution about this point estimate. The most optimistic and pessimistic of the nine combinations from these two axes (weighted 6.25% each relative to 25% for the best estimate on each dimension) are reported in this document and all combinations used to provide a more realistic degree of uncertainty for future projections, decision tables and rebuilding analyses.

Table b. Relative probabilities for combinations of the two alternate states of nature. Cells in bold denote those reported throughout this document.

		Historical catch		
		Low	Best estimate	High
Steepness	Low	**6.25%**	12.5%	6.25%
	Estimated value	12.5%	**Base case: 25%**	12.5%
	High	6.25%	12.5%	**6.25%**

Stock biomass

A fecundity relationship is used for yelloweye specifying that spawning output per unit weight increases with fish weight; therefore all reference to spawning output is in terms of eggs produced, instead of spawning biomass. Yelloweye rockfish are estimated to have been lightly exploited until the mid-1970's, when catches increased and a rapid decline in biomass and spawning output began. The relative spawning output reached a minimum of 15.8% of unexploited levels (slightly above the estimate of 12.1% from the 2007 assessment) in 2000. Yelloweye rockfish spawning output is estimated to have been gradually increasing since that time in response to large reductions in harvest. Although the relative trend in spawning output is quite robust to uncertainty in the estimated removals, the spawning output trajectory on an absolute scale is very sensitive. The estimated relative depletion level in 2007 is 19.2% (slightly above the estimate of 16.4% from the 2007 assessment) and 20.3% in 2009 (states of nature: 17.3-23.5%), corresponding to 201.5 million eggs. The range over states of nature reflects the very large uncertainty in the absolute scale of the estimated time-series for spawning output: 128.3-353.0 million eggs. The aggregate spawning output estimates mask the spatial heterogeneity included via the area-specific dynamics: relative spawning output has differed markedly among the three states, with California having the largest spawning output at unexploited equilibrium, followed by Oregon and then Washington. Currently, Oregon is estimated to have the largest spawning output, followed by California, then Washington. Relative depletion also varies dramatically by state, with California estimated to be at 16.4% of unexploited conditions, Oregon, 22.5%, and Washington, 27.3%.

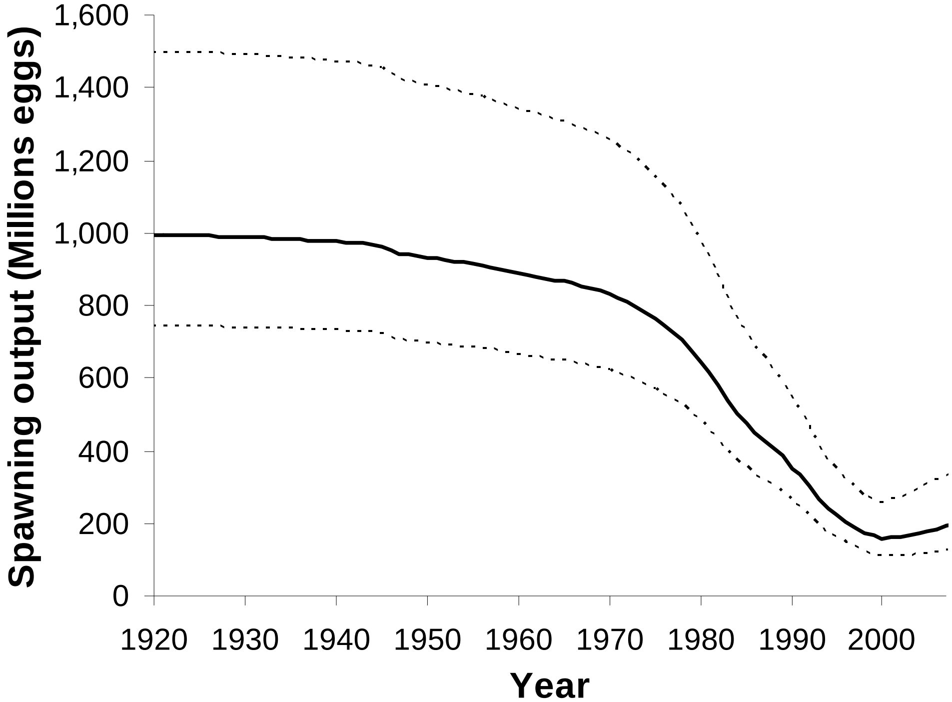

Figure b. Estimated spawning output time-series (1916-2009) for the base case model (solid line) with alternate states of nature (dashed lines).

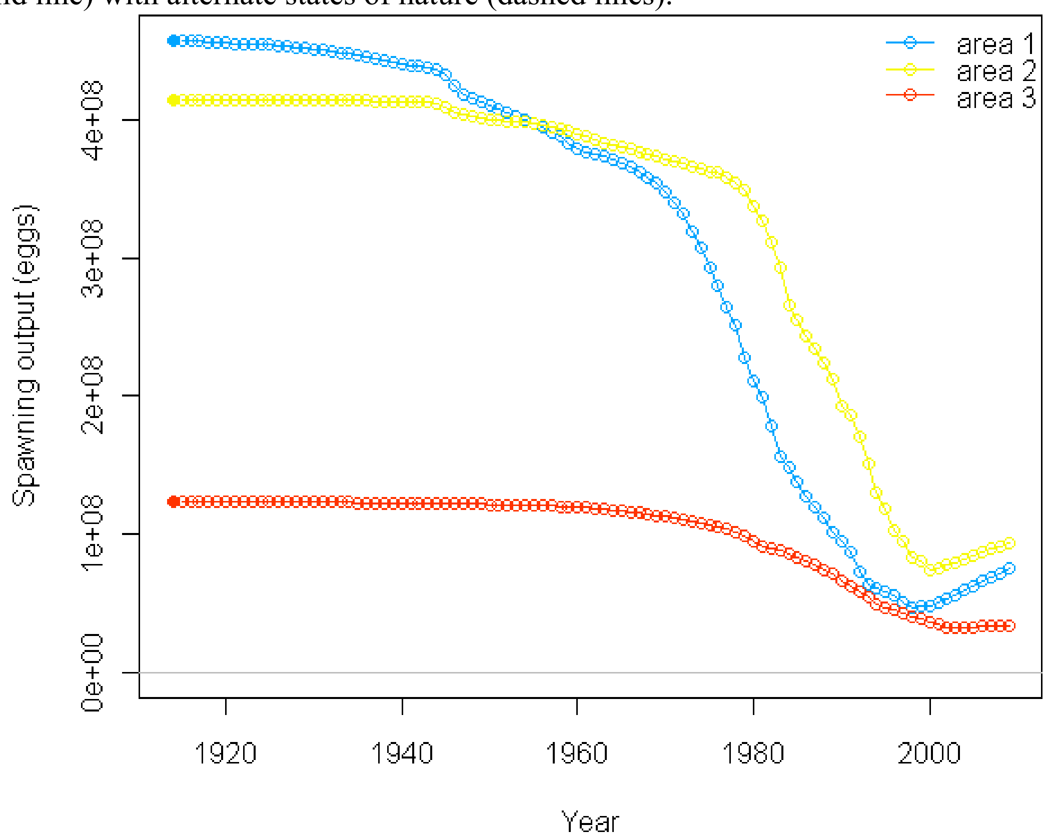

Figure c. Estimated spawning output time-series (1916-2009) by state for the base case model. Area 1, upper line (early years) = California; Area 2, middle line (early years) = Oregon; and Area 3, lower line (early years) = Washington.

Table c. Recent trend in estimated yelloweye rockfish spawning output, recruitment and relative depletion level.

Year	Spawning output (millions eggs)	Range of states of nature	Estimated recruitment (1000s)	Range of states of nature	Estimated depletion	Range of states of nature
2000	157.4	108.8-257.1	79.4	47.1-151.9	15.8%	14.6-17.2%
2001	160.3	109.2-265.1	80.5	47.2-154.9	16.1%	14.7-17.7%
2002	161.6	107.9-271.8	81.0	46.8-157.4	16.3%	14.5-18.1%
2003	167.3	110.9-283.1	83.2	47.9-161.5	16.8%	14.9-18.9%
2004	173.4	114.3-295.0	85.5	49.1-165.7	17.4%	15.4-19.7%
2005	179.5	117.6-307.0	87.7	50.3-169.8	18.1%	15.8-20.5%
2006	185.3	120.5-318.7	89.8	51.4-173.7	18.6%	16.2-21.3%
2007	191.3	123.7-330.7	92.0	52.5-177.6	19.2%	16.6-22.1%
2008	196.4	126.0-341.9	93.8	53.4-181.1	19.8%	16.9-22.8%
2009	201.5	128.3-353.0	95.5	54.2-184.5	20.3%	17.3-23.5%

Recruitment

Because year-class strength is modeled as a deterministic process in this assessment, the decline in estimated recruitment tracks closely that of the spawning output. The decline is especially pronounced given the low (and likely imprecise) estimate for steepness of the stock-recruit relationship in the base case model (0.417), and alternate models (0.344, 0.508). However, the considerable uncertainty in absolute recruitment levels is illustrated by the broad range over the states of nature.

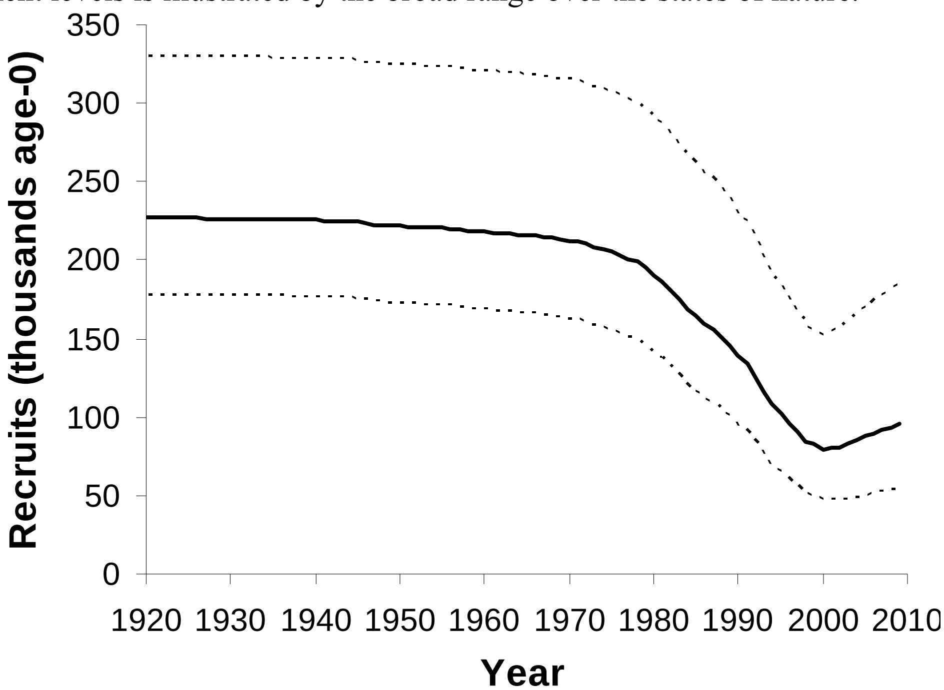

Figure d. Time series of estimated yelloweye rockfish recruitments for the base case model (solid line) and alternate states of nature (dashed lines).

Reference points

Unfished spawning output was estimated to be 994 million eggs. The target stock size (*$SB_{40\%}$*) is therefore 398 million eggs and the overfished threshold (*$SB_{25\%}$*) is 249 million eggs. Maximum sustained yield (MSY), conditioned on current fishery selectivity and allocations, was estimated in the assessment model to occur at a spawning stock biomass of 388 million eggs and produce an MSY catch of 56.4 mt (slightly above the estimate from the 2007 assessment of 43.7 mt). However, the yield at MSY is extremely sensitive to the states of nature resulting in a wide range for this value from 31.5 to 107.9 mt. Maximum sustainable yield is estimated to be achieved at an SPR of 60.4% (range of states of nature: 51.2-69.7%). This is nearly identical to the yield, 56.1 mt, generated by the SPR (61.0%) that stabilizes the stock at the *$SB_{40\%}$* target. The fishing mortality target/overfishing level (SPR = 50.0%) results in a smaller equilibrium yield of 48.9 mt at a spawning output of 230 million eggs (23.1% of the unfished level).

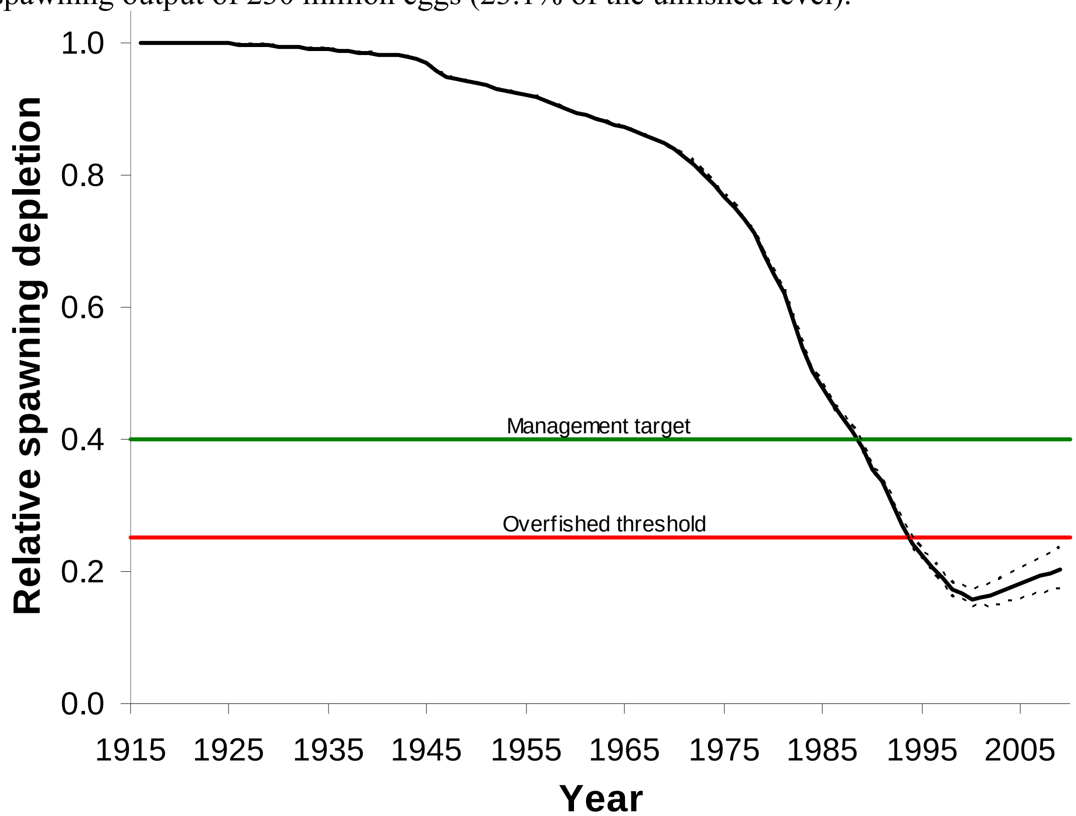

Figure e. Time series of relative spawning depletion as estimated in the base case model (solid line) and alternate states of nature (dashed lines).

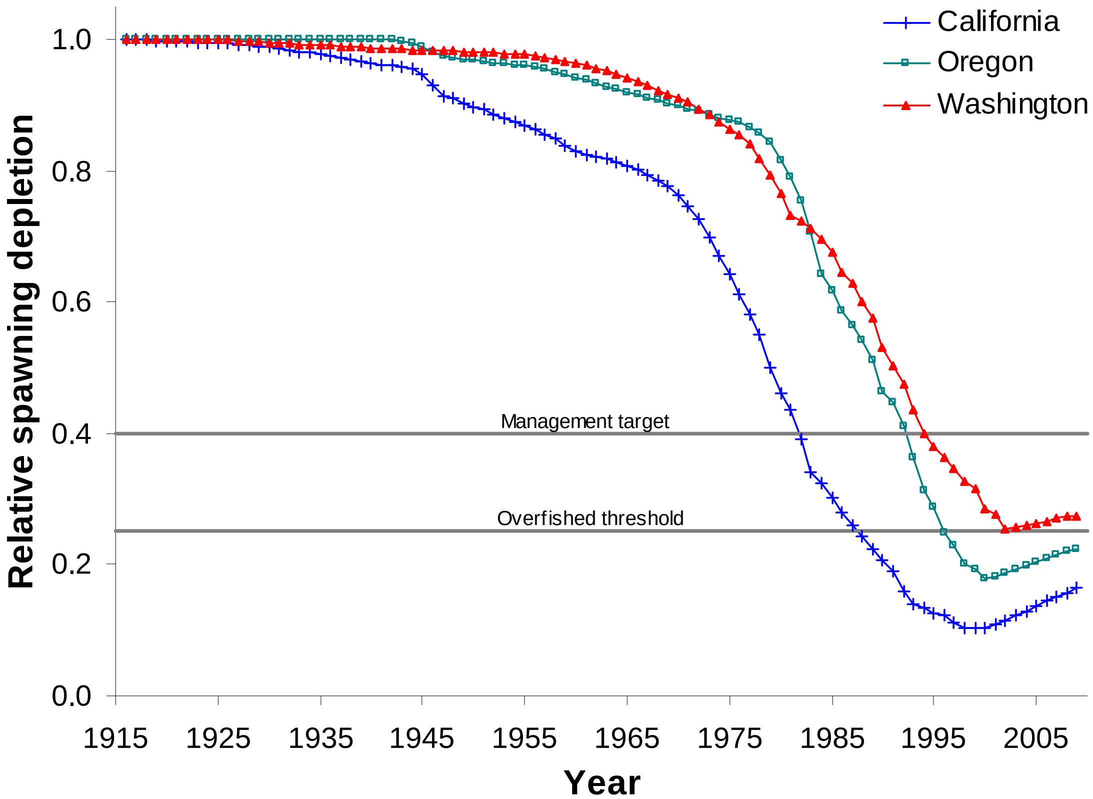

Figure f. Time series of relative spawning depletion by state for the base case model.

Exploitation status

The coast-wide abundance of yelloweye rockfish was estimated to have dropped below the $SB_{40\%}$ management target in 1989 and the overfished threshold in 1994. In hindsight, the spawning output passed through the target and threshold levels with annual catch averaging almost five times the current estimate of the *MSY*. The coast-wide stock remains below the overfished threshold, although the spawning output is estimated to have been increasing since 2000 in response to reductions in harvest. The degree of increase is largely insensitive to the magnitude of historical catch and only moderately sensitive to the value for steepness, but the absolute scale of the population reflects alternate removal series very closely. Fishing mortality rates are estimated to have been in excess of the current *F*-target for rockfish of $SPR_{50\%}$ from 1976 through 1999. Recent management actions have curtailed the rate such that recent SPR values are in excess of 60% over the last eight years. Relative exploitation rates (catch/biomass of age-8 and older fish) are estimated to have been at or less than 1% after 2001. The alternate states of nature result in estimated exploitation rates ranging from less than 1.6% to less than 0.6%.

Table d. Recent trend in spawning potential ratio (SPR) and relative exploitation rate (catch/biomass of age-8 and older fish).

Year	Estimated SPR (%)	Range of states of nature	Relative exploitation rate	Range of states of nature
1999	17.3%	15.9-19.0%	8.9%	8.2-9.6%
2000	53.0%	42.3-65.8%	2.4%	1.5-3.6%
2001	53.0%	42.4-65.3%	3.3%	2.0-4.9%
2002	76.6%	68.6-84.5%	0.9%	0.5-1.4%
2003	78.8%	70.8-86.4%	0.7%	0.4-1.1%
2004	82.0%	75.2-88.4%	0.7%	0.4-1.0%
2005	79.2%	71.5-86.5%	0.8%	0.5-1.2%
2006	79.6%	71.3-87.2%	0.6%	0.4-1.0%
2007	70.6%	60.4-80.9%	1.0%	0.6-1.6%
2008	79.3%	71.4-86.7%	0.8%	0.5-1.3%

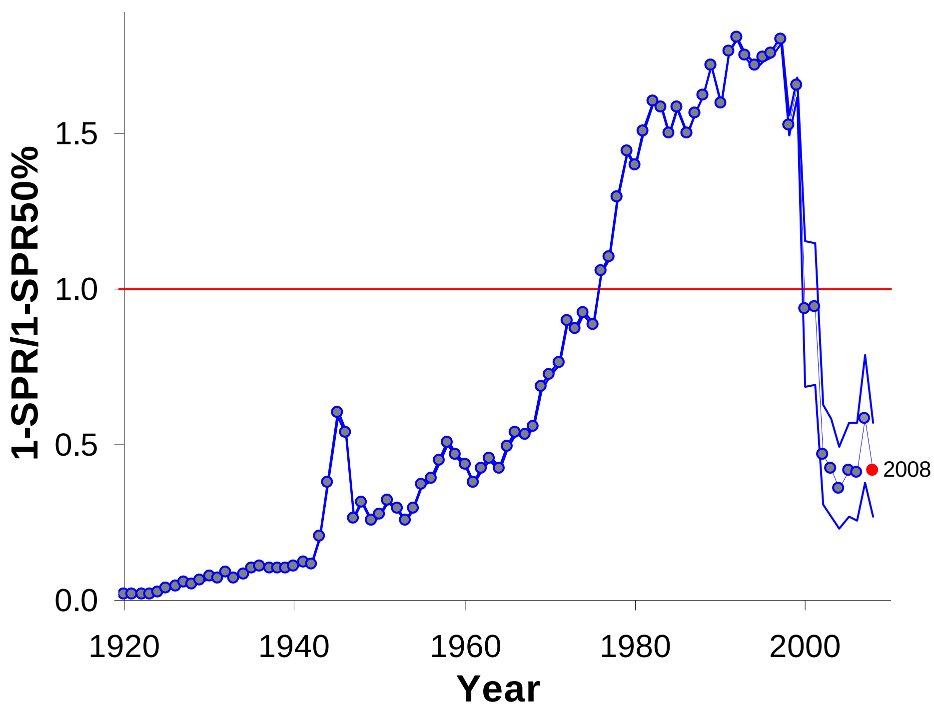

Figure g. Time series of relative spawning potential ratio (1-SPR/1-SPR$_{Target=0.5}$) for the base case model (round points) and alternate states of nature (light lines). Values of relative SPR above 1.0 reflect harvests in excess of the current overfishing proxy.

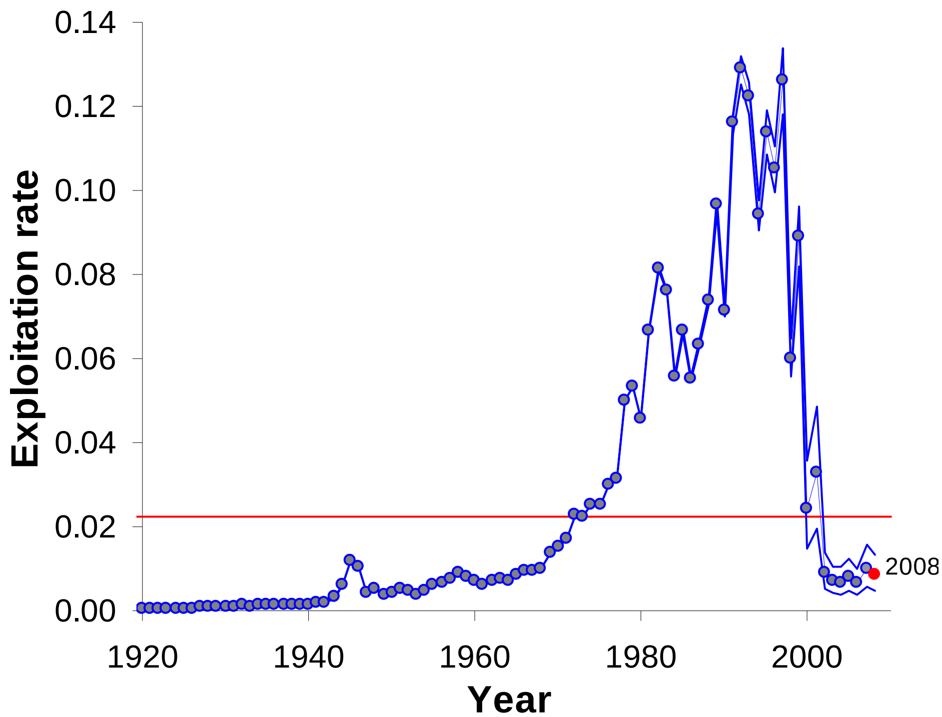

Figure h. Time series of estimated exploitation rate (catch/age 8 and older biomass) for the base case model (circles) and alternate states of nature (light lines). Horizontal line indicates the overfishing limit/target ($F_{50\%}$) from the base case.

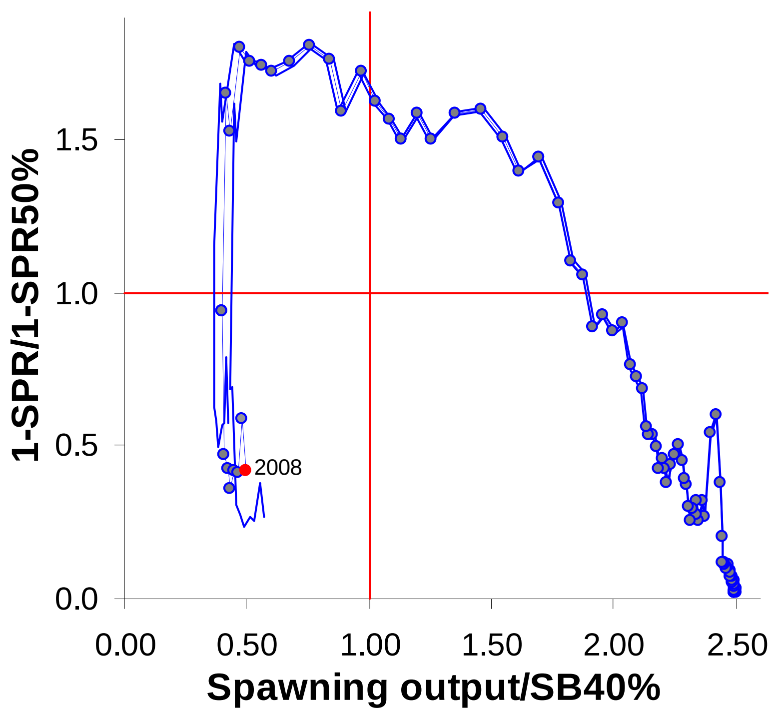

Figure i. Estimated relative spawning potential ratio relative to the proxy target/limit of 50% vs. estimated spawning output relative to the proxy 40% level from the base case model. Higher spawning output occurs on the right side of the x-axis, higher exploitation rates occur on the upper side of the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

Management performance

Before 2000, yelloweye rockfish were managed as part of the *Sebastes* Complex, which included all *Sebastes* species without individual assessments, ABCs and OYs. In 2000, the *Sebastes* Complex was divided into three depth-based groups (north and south of 40° 10' N. latitude), and yelloweye rockfish were managed as part of the minor shelf rockfish group until 2002. Since then, there has been species-specific management, and total catch has been below both the ABC and OY for yelloweye each year. These catch levels represent a 95% reduction from average catches observed in the 1980s and 1990s. Managers have constrained catches by eliminating all retention of yelloweye rockfish in both commercial and recreational fisheries, instituting broad spatial closures (some specifically for moving fixed-gear fleets away from known areas of yelloweye abundance), and creating new gear restrictions intended to reduce trawling in rocky shelf habitats and the coincident catch of rockfish in shelf flatfish trawls. Since 2002, the total 6-year catch (88.5 mt) has been only 63% of the sum of the OYs for 2002-2008 and only 29% of the sum of the ABCs for that period. The total 2008 catch (16.7 mt) is estimated to be just 4% of the peak annual catch that occurred in the early 1980s.

Table e. Recent trend in yelloweye rockfish catch (mt) relative to management guidelines.

Year	ABC (mt)	OY (mt)	Commercial Catch (mt)[1]	Recreational Catch (mt)	Total Catch (mt)
1999	39[2]	NA	117.8	38.1	155.8
2000	39[2]	NA	15.5	25.3	40.9
2001	29[3]	NA	32.4	23.7	56.1
2002	27[3]	13.5[3]	6.4	9.3	15.8
2003	52	22	3.0	9.4	12.4
2004	53	22	4.3	8.0	12.3
2005	54	26	4.7	10.4	15.1
2006	55	27	3.7	8.7	12.4
2007	47	23	6.0	13.6	19.6
2008	47	20	7.7	9.0	16.7

[1]Includes research catches.
[2]Includes the Columbia and Vancouver INPFC areas only.
[3]Includes the Columbia, Vancouver and Eureka INPFC areas only.

Unresolved problems and major uncertainties

Data for yelloweye rockfish are sparse and relatively uninformative, especially regarding current trend. Historical catches are very uncertain, as yelloweye comprise a small percentage of overall rockfish removals and actual species-composition samples are infrequently available for historical analyses. Further, the relative contribution of recreational removals was very large, and there is low certainty in the estimates of the exact magnitude of these removals. The management related quantities were found to be very sensitive to alternate catch time-series and this is presented as one of the primary axes of uncertainty.

The choice to model the yelloweye rockfish stock with explicit areas in the assessment model is based on the sedentary life-history of adult yelloweye, and the markedly different population trends as well as historical and current exploitation rates among the three states. The data do not clearly inform this choice, but it does have substantial ramifications for future projections and management decisions and should be considered a major uncertainty in the assessment.

Parameters that generally contribute significant uncertainty to stock assessments, including those defining steepness, natural mortality and growth are estimated, but may be poorly determined due to the short time-series of data, which are primarily available after the biggest period of removals from the stock. Steepness of the stock-recruitment relationship especially is often poorly estimated from a time series like that of yelloweye (a 'one-way trip'), but its value is very important in determining projected rebuilding. For this reason alternate values (from the likelihood profile) are included as a second axis of uncertainty in this assessment.

Process error in recruitment is not explicitly accounted for in this assessment. This choice is driven by several factors: the lack of substantial reduction in the estimates of uncertainty in recruitment deviations (when estimated) relative to the level of recruitment variability (σ_r), the need to integrate over long time-series of poorly informed recruitment deviations rather than use the maximum likelihood point-estimate in order to achieve unbiased estimates, the computation time required to minimize and integrate a much larger dimensioned model, and the fact that, even when accounted for, recruitment variability did not represent the dominant axis of uncertainty with regard to current management quantities. Previous assessments have struggled with the lack of signal in recruitment deviations; the 2006 and 2007 models estimated deviations over only a short period of the time series (1968-1992). Further research is needed to ensure unbiased estimation is achieved when integrating or estimating large numbers of poorly informed recruitment deviations in stock assessment models.

Currently available fishery-independent indices of abundance are imprecise and not highly informative. It is unclear whether increased rates of recovery (or lack thereof) will be detectable without more precise survey methods applied over broad portions of the coast. Fishery data are also unlikely to produce conclusive information about the stock for the foreseeable future, due to lack of retention and active avoidance of yelloweye among all fleets. For these reasons, it is unlikely that the major uncertainties in this assessment will soon be resolved.

Forecasts

The forecast reported here will be replaced by the rebuilding analysis to be completed in September-October 2009 following SSC review of the stock assessment. In the interim, the total catch in 2009 and 2010 is set equal to the OY (17 mt). The target exploitation rate for 2011 and beyond is based upon an SPR of 71.9%, which approximates the harvest level in the current (2007) rebuilding strategy (the 71.9% SPR rate represents the target after the 'ramp-down' portion of the strategy is completed in 2010). Uncertainty in the rebuilding forecast will be included via integrating over all combinations of the alternate states of nature for catch history and steepness.

Current medium-term forecasts predict increases in coast-wide abundance under the SPR=71.9% rebuilding strategy, however these increases are largely driven by the California and Oregon portions of the stock. In fact, the Washington portion is projected to remain at current levels under recent allocation of catch; however, this result is likely to be sensitive to future revision of the estimated Washington historical catch series. Catch allocation used for the forecast reflects the average distribution of *F*s in 2005-2007 among fleets (recreational, commercial) in: Washington (0.013, 0.005), Oregon (0.004, 0.002) and California (0.006, 0.003). The estimated OY values for 2011 and 2012 are larger (20.9, 21.2) than those predicted from the 2007 rebuilding analysis (13.9, 14.2). The following table shows the projection of expected yelloweye rockfish catch, spawning output (by area) and depletion. It may be desirable to evaluate specific alternative allocation scenarios, if relative removals based on future management actions will be substantially different than recent values by state.

Table f. Projection of potential yelloweye rockfish ABC, OY, spawning output and depletion for the base case model based on the SPR = 71.9% fishing mortality target used for the last rebuilding plan (OY) and $F_{50\%}$ overfishing limit/target (ABC). Assuming the OY of 17 mt is achieved exactly in 2009 and 2010. Catch allocation used for the forecast reflects the average distribution of *F*s in 2005-2007 among fleets (recreational, commercial) in: Washington (0.013, 0.005), Oregon (0.004, 0.002) and California (0.006, 0.003).

Year	ABC[1] (mt)	OY[1] (mt)	Coast-wide Age 8+ biomass (mt)	Coast-wide Depletion	Spawning output (million eggs) Coast-wide	California	Oregon	Washington
2009	*31*	*17*	2,008	20.3%	202	75	93	34
2010	*32*	*17*	2,039	20.8%	206	78	95	34
2011	49.3	20.9	2,068	21.2%	211	80	97	34
2012	49.9	21.2	2,093	21.6%	215	82	98	34
2013	50.5	21.4	2,118	22.0%	219	85	100	34
2014	51.1	21.7	2,141	22.4%	222	87	101	34
2015	51.6	21.9	2,165	22.7%	226	89	103	34
2016	52.1	22.1	2,187	23.0%	229	91	104	34
2017	52.6	22.3	2,210	23.3%	232	93	105	34
2018	53.0	22.5	2,232	23.6%	235	94	107	34
2019	53.5	22.7	2,255	23.9%	237	96	108	34
2020	53.9	22.9	2,277	24.1%	240	98	109	34

[1]ABC/OY values for 2009 and 2010 have already been adopted, and are not based on the results of this assessment.

Decision table

Because yelloweye rockfish are currently managed under a rebuilding plan, this decision table is only intended to better evaluate the management implications of the considerable uncertainty in the base case assessment model. Various alternate management actions, including a range of SPR rates and fixed OYs, will be compared in the rebuilding analysis. Landings in 2009-2010 are 17 mt for all cases. Catch allocation used for the forecast reflects the average distribution of *F*s in 2005-2007 among fleets (recreational, commercial) in: Washington (0.013, 0.005), Oregon (0.004, 0.002) and California (0.006, 0.003).

Table g. Decision table of 12-year projections for alternate states of nature (columns) and management options (rows) beginning in 2011. Relative probabilities are based on the joint distribution of alternate historical catch levels and steepness values.

			State of nature					
			75% of catch < 2000 and steepness = 0.344		Base case 100% of catch < 2000 and steepness = 0.417		150% of catch < 2000 and steepness = 0.508	
Relative probability			0.0625		0.25		0.0625	
Management decision	Year	Catch (mt)	Depletion	Spawning output (millions eggs)	Depletion	Spawning output (millions eggs)	Depletion	Spawning output (millions eggs)
Rebuilding SPR 71.9% catches from low alternative	2011	13.2	17.8%	132	21.2%	211	25.0%	375
	2012	13.4	18.1%	134	21.7%	216	25.7%	385
	2013	13.5	18.3%	136	22.2%	220	26.4%	396
	2014	13.6	18.6%	138	22.6%	225	27.1%	406
	2015	13.7	18.8%	140	23.0%	229	27.8%	416
	2016	13.7	19.0%	141	23.4%	233	28.4%	426
	2017	13.8	19.2%	142	23.8%	237	29.1%	436
	2018	13.9	19.3%	144	24.2%	241	29.7%	445
	2019	13.9	19.5%	145	24.6%	245	30.3%	455
	2020	14.0	19.6%	146	25.0%	248	31.0%	464
Rebuilding SPR 71.9% catches from base case	2011	20.9	17.8%	132	21.2%	211	25.0%	375
	2012	21.2	18.0%	134	21.6%	215	25.7%	385
	2013	21.4	18.1%	135	22.0%	219	26.3%	394
	2014	21.7	18.2%	136	22.4%	222	26.9%	404
	2015	21.9	18.3%	136	22.7%	226	27.5%	413
	2016	22.1	18.4%	137	23.0%	229	28.1%	422
	2017	22.3	18.5%	137	23.3%	232	28.7%	430
	2018	22.5	18.5%	137	23.6%	235	29.3%	439
	2019	22.7	18.5%	138	23.9%	237	29.9%	448
	2020	22.9	18.5%	138	24.1%	240	30.4%	456
Rebuilding SPR 71.9% catches from high alternative	2011	37.0	17.8%	132	21.2%	211	25.0%	375
	2012	37.6	17.7%	132	21.5%	213	25.5%	383
	2013	38.2	17.6%	131	21.7%	215	26.1%	391
	2014	38.7	17.5%	130	21.8%	217	26.6%	398
	2015	39.3	17.4%	129	22.0%	219	27.1%	406
	2016	39.8	17.2%	128	22.1%	220	27.5%	413
	2017	40.3	17.0%	126	22.2%	221	28.0%	419
	2018	40.8	16.7%	124	22.3%	222	28.4%	426
	2019	41.2	16.5%	123	22.4%	222	28.9%	433
	2020	41.7	16.2%	121	22.4%	223	29.3%	439

Research and data needs

The available data for yelloweye rockfish are very sparse and generally weakly informative about current status. The following research topics could improve the ability of this assessment to reliably model the yelloweye rockfish population dynamics in the future and provide better monitoring of progress toward rebuilding:

1. Develop and implement a comprehensive visual survey.
2. Do a scientific review of current efforts to develop and improve stock size indices for yelloweye based on IPHC (including additional stations) and make recommendations on the best approaches to develop such indices.
3. Explore a recalculation of GLMM estimates in the IPHC survey that explores station effects which allows inclusion of stations that differ over time.
4. Continue to refine historical catch estimates using ex-vessel prices, etc., particularly in WA.
5. Investigate the development of a WA recreational yelloweye CPUE based on the recreational halibut fishery. Consider a full time series and one ending in 2002, since the yelloweye RCA in waters off northern WA was implemented in 2003.
6. Encourage the collection of samples to refine the estimate biological parameters, particularly maturity and fecundity.
7. Continue to evaluate the spatial aspects of the assessments, including growth, the number and placement of boundaries between areas, as well as the northern boundary with Canada.
8. More work is needed to better understand the performance of maximum likelihood and Bayesian estimators of stock size and trends when large numbers of poorly informed recruitment deviations are estimated. Although it is logically appealing to include such uncertainty, even when little coherent data informing cohort strengths is available, technical and computational issues need to be solved before this approach can be implemented in a case like yelloweye rockfish.
9. Investigate alternative ways of re-weighting. This issue is relevant for all west coast stock assessments.
10. Investigate how best to account for the variability in dates in trawl surveys through a meta-analysis. This issue is relevant for all west coast stock assessments.
11. Continue to refine coast-wide historical catch estimates. This issue is relevant for all west coast stock assessments.
12. Access and processing of recreational data (catch and biological sampling) currently entails differing locations and formats for data from each of the three states and RecFIN. A single database that holds all raw recreational data in a consistent format would reduce assessment time spent on processing these data and potential introduction of errors or alternate interpretations due to processing.
13. The IPHC data organization should be revisited. Currently biological samples cannot be linked to the station from which they were collected. Age data for 2003-2005 is disconnected from length and sex information and other unknown issues may persist in these data. A thorough evaluation of what data are reliable and a final determination of what information is lost, or can potentially be recovered, is needed.

Rebuilding projections

The rebuilding projections will be presented in a separate document after the assessment has been reviewed by the SSC in September 2009.

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Commercial catch (mt)[1]	15.5	32.5	6.4	3.2	4.4	5.3	3.8	7.9	7.8	NA
Total catch (mt)	40.9	56.1	15.8	12.4	12.3	15.1	12.4	19.6	16.7	NA
ABC (mt)	392[2]	293[3]	273[3]	52	53	54	55	47	47	31[4]
OY	NA	NA	13.53[3]	22	22	26	27	23	20	17[4]
SPR	53.0%	53.0%	76.6%	78.8%	82.0%	79.2%	79.6%	70.6%	79.3%	NA
Exploitation rate (catch/age 8+ biomass)	2.4%	3.3%	0.9%	0.7%	0.7%	0.8%	0.6%	1.0%	0.8%	NA
Age 8+ biomass (mt)	1,674	1,704	1,717	1,767	1,817	1,864	1,904	1,945	1,976	2,008
Spawning output (millions eggs)	157.4	160.3	161.6	167.3	173.4	179.5	185.3	191.3	196.4	201.5
(Range of states of nature)	108.8-257.1	109.2-265.1	107.9-271.8	110.9-283.1	114.3-295.0	117.6-307.0	120.5-318.7	123.7-330.7	126.0-341.9	128.3-353.0
Recruitment (1000s)	79.4	80.5	81	83.2	85.5	87.7	89.8	92	93.8	95.5
(Range of states of nature)	47.1-151.9	47.2-154.9	46.8-157.4	47.9-161.5	49.1-165.7	50.3-169.8	51.4-173.7	52.5-177.6	53.4-181.1	54.2-184.5
Depletion	15.8%	16.1%	16.3%	16.8%	17.4%	18.1%	18.6%	19.2%	19.8%	20.3%
(Range of states of nature)	14.6-17.2%	14.7-17.7%	14.5-18.1%	14.9-18.9%	15.4-19.7%	15.8-20.5%	16.2-21.3%	16.6-22.1%	16.9-22.8%	17.3-23.5%

[1]Includes research catches.
[2]Includes the Columbia and Vancouver INPFC areas only.
[3]Includes the Columbia, Vancouver and Eureka INPFC areas only.
[4]ABC/OY values for 2009 and 2010 have already been adopted, and are not based on the results of this assessment.

Table i. Summary of yelloweye rockfish reference points from the base case model.

Quantity	Estimate	Range of states of nature
Unfished spawning output (SB_0, millions eggs)	994	743-1,499
Unfished 8+ biomass (mt)	8,492	6,399-12,718
Unfished recruitment (R_0, thousands)	227	178-330
Reference points based on $SB_{40\%}$		
MSY Proxy Spawning output ($SB_{40\%}$, millions eggs)	398	297-600
Relative spawning depletion at $SB_{40\%}$	40.0%	NA
SPR resulting in $SB_{40\%}$ ($SPR_{SB40\%}$)	61.0%	54.6-68.6%
Exploitation rate resulting in $SB_{40\%}$	1.5%	1.2-1.9%
Yield with $SPR_{SB40\%}$ at $SB_{40\%}$ (mt)	56	31-107
Reference points based on SPR proxy for MSY		
Spawning output at $SPR_{MSY\text{-}proxy}$ (SB_{SPR}, millions eggs)	230	33-509
Relative spawning depletion at SB_{SPR}	23.1%	4.4-34.0%
$SPR_{MSY\text{-}proxy}$	50.0%	NA
Exploitation rate corresponding to SPR	2.2%	2.2-2.3%
Yield with $SPR_{MSY\text{-}proxy}$ at SB_{SPR} (mt)	49	7-108
Reference points based on estimated MSY values		
Spawning output at *MSY* (SB_{MSY}, millions eggs)	388	314-533
Relative spawning depletion at SB_{MSY}	39.1%	35.6-42.2%
SPR_{MSY}	60.4%	51.2-69.7%
Exploitation Rate corresponding to SPR_{MSY}	1.6%	1.1-2.1%
MSY (mt)	56	32-108

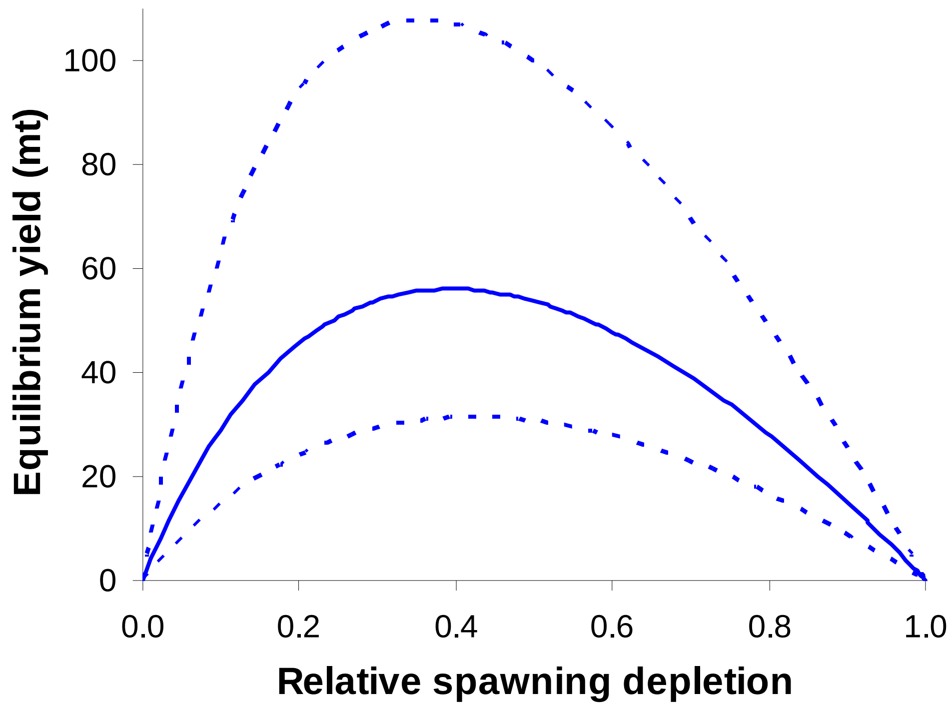

Figure j. Equilibrium yield curve for the base case model (solid line) and alternate states of nature (dashed lines), reflecting the higher and lower values for historical catch prior to 2000 and for steepness.

1. Introduction

1.1 Distribution and Stock Structure

Yelloweye rockfish (*Sebastes ruberrimus*) are distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California (Hart 1973, Eschmeyer and Herald 1983, Love et al. 2002). The species is most abundant from southeast Alaska to central California (Love et al. 2002), with adults found along the continental shelf generally shallower than 400 m. Although smaller yelloweye tend to occur in shallower water, they do not show as pronounced an ontogenetic shift as do many eastern pacific rockfish species. Yelloweye are strongly associated with rocky bottom types, especially areas of high-relief such as caves and large boulders (Love et al. 2002). Mainly solitary, it is widely believed that yelloweye are very sedentary after settlement, with adults moving only short distances during their entire lifetime.

There is relatively little direct information regarding the stock structure of yelloweye rockfish off the U.S. and Canadian coasts. The pelagic larval phase exhibited by all rockfish promotes some mixing of reproductive output, dependent on ocean currents, the duration of the pelagic phase and the timing of annual spawning in relation to annually variable spring transition and upwelling events. However, the sedentary nature of yelloweye rockfish makes adult movement among major rocky habitat areas unlikely. An unpublished genetics study (Yamanaka et al. 2001) of yelloweye rockfish collected from northern Vancouver, B.C. and SE Alaskan waters found little variability among samples and suggested a panmictic stock in the study area. Preliminary results from an analysis of yelloweye collected off Oregon, Washington, Vancouver Island B.C., and the Strait of Georgia B.C. (Lynne Yamanaka, DFO, personal communication, cited in Wallace et al. 2006) suggest that there may be genetic separation between the Strait of Georgia (inside Vancouver Island) and the outer coast (Yamanaka et al. 2006). The yelloweye population residing in the waters of Puget Sound is also thought to be isolated from coastal waters. This Puget Sound stock was proposed for listing under the Endangered Species Act (Federal Register Vol. 73, No. 52, Monday, March 17, 2008, p. 14195-14200) with the result that the stock was considered distinct and proposed to have threatened status (Federal Register / Vol. 74, No. 77, Thursday, April 23, 2009, p. 18516-18542).

An unpublished study of otolith isotope levels (Gao et al. Draft Manuscript) examined ratios of C^{13}/C^{12} and O^{18}/O^{16} in 200 yelloweye rockfish otoliths from the Washington and Oregon coasts. The centroids from these otoliths showed no consistent differences, and suggest there might be a single spawning stock for this portion of the yelloweye rockfish population. Isotopic differences between otolith nuclei and the fifth annual zones may reflect changes in diet from age-1 to age-5. The fifth annual otolith zones differed between Washington and Oregon samples suggesting that the diet compositions of the two areas are slightly different, an unlikely result if appreciable numbers of age 5+ fish were moving between areas

This assessment attempts to mimic the general perception of stock structure for yelloweye rockfish: large stocks linked via a common (but annually variable) stock-recruit relationship with negligible adult movement among areas.

1.2 Life History and Ecosystem Interactions

Yelloweye rockfish spawn in late winter through the summer and possibly into the fall in SE Alaska (Love et al. 2002). Little is known about the pelagic juvenile phase, but recruiting juveniles settle in both shallow and deeper depths, often observed in the same areas as adults. These young juveniles are very conspicuous, and easy to identify, due to having markedly different coloration than adults.

Adult yelloweye rockfish are large-bodied, reaching lengths up to 91 cm (Eschmeyer and Herald 1983, Love et al. 2002). They are long-lived (the oldest observed age is 147 years, from Washington in 2005), late-maturing and slow growing. These life-history characteristics would suggest that yelloweye are relatively unproductive and very sensitive to exploitation. This is compounded by their status as an aggressive top-predator on rocky reefs, making hook-and-line gear highly effective, even gear designed for much larger species such as halibut and lingcod. Adult yelloweye are piscivorous predators eating most small pelagic and groundfish species as available.

The cohabitation of adult and juvenile yelloweye likely results in some cannibalism, and large changes in predator biomass (such as the rebuilding of lingcod, *Ophiodon elongatus,* in recent years) could have a strong feedback to juvenile survival and therefore stock productivity. Many rockfishes have shown decadal changes in productivity linked to ocean conditions, and it would not be surprising if yelloweye exhibited similar trends, although this is uncertain. There is evidence that changes in otolith ring width (and likely growth) is correlated with some of the leading environmental indicators of ocean conditions along the west coast (Black et al. 2008). It is very uncertain how future climate change may potentially influence west coast yelloweye growth, productivity or distribution.

1.3 Historical and Current Fishery

Yelloweye rockfish have historically been a prized catch for both commercial and recreational fleets. They have generally yielded a higher price than other rockfish and have therefore largely been retained when encountered, except in recent years when all retention has been prohibited. Throughout the exploitation history, yelloweye were targeted primarily with line-gear due to their affinity for rocky, and largely untrawlable, habitat.

Rockfish catches are recorded back to the beginning of the 20^{th} century, primarily in California, but appreciable quantities were not landed until an early peak around World War II (Ralston et al. Draft Tech. Memo.). A small fraction of these catches have been yelloweye rockfish, gradually increasing in total removals until around 1970 and then increasing very rapidly as fishing technology, markets and total effort increased (Table 1, Figure 1). The late 1970s to the late 1990s saw the highest yelloweye catches of the time-series. After 2002, when yelloweye were declared overfished, total catches have been maintained at much lower levels. Yelloweye are currently caught only incidentally in commercial hook-and-line and sport fisheries targeting other species that are found in association with yelloweye. The recent fishery encounters a very patchy yelloweye rockfish distribution, and extensive effort is made to avoid all but a small amount of bycatch (Figure 2, Figure 3).

1.4 Management History and Performance

Modern rockfish management began in 1983 when the Pacific Fishery Management Council (PFMC) first imposed trip limits on landings of *Sebastes* species. Yelloweye were managed as part of the *Sebastes* complex until 2000, when the Council moved to species-specific management for overfished species of concern and a few others and minor rockfish groupings: nearshore, shelf or slope for the remaining species. Yelloweye rockfish were managed as part of the minor shelf rockfish group until 2002. In November 2001, the Council adopted a total catch optimum yield (OY) of 13.5 metric tons (mt) for yelloweye for all 2002 commercial, recreational, and tribal fisheries combined for Northern California (Eureka INPFC area), Oregon, and Washington. This was an interim level that allowed for fisheries to take place and potentially catch yelloweye along with other fish, but did not allow prosecution of fisheries that directly targeted yelloweye. Based on the 2002 assessment results (Methot et al. 2002), the Council adopted an OY of 22 mt for 2003. Since 2002, total catch has been below both the annual ABCs and OYs, which were based on rebuilding analyses showing very long time-periods required for stock recovery to target levels (Table 2). These catch levels represent a 95% reduction from average catches observed in the 1980s and 1990s. Managers have constrained catches by eliminating all retention of yelloweye rockfish in recreational fisheries, reducing commercial retention of yelloweye rockfish in the trawl fishery (to 200-300 lb per bimonthly period), instituting broad spatial closures, some specifically intended to move fixed-gear fleets away from known areas of yelloweye abundance, and creating new gear restrictions that have reduced trawling in rocky shelf habitats and the coincident catch of rockfish in shelf flatfish trawls. Since 2002, the total 6-year catch (88.5 mt) has been only 63% of the sum of the OYs for 2002-2008 and only 29% of the sum of the ABCs for that period. The total 2008 catch (16.7 mt) is estimated to be just 4% of the peak annual catch that occurred in the early 1980s.

1.5 Fisheries in Canada and Alaska

Yelloweye are caught by commercial line fisheries and recreational fleets in both British Columbia and Southeast Alaska. Current stock estimates and catches are much larger than those recently observed off the coasts of Washington, Oregon and California. In SE Alaska, total catches were 250 mt in 2007 and 261 mt in 2008 (Brylinsky et al. 2007). The overfishing level in SE Alaska has been 650 and 611 mt over the same period, more than twice the average estimated catches observed from the U.S. west coast over the period 1975-1999. Canadian yelloweye management also adopted conservation measures in 2002, reducing limits and closing 20% of the coastal waters to fishing. Prior to this time, peak catches had reached just over 1,000 mt in the early 1990s (Yamanaka et al. 2006). From 2002 to 2004, catches from Canadian outside waters have averaged 248 mt, but have trended downward from 313 to 200 mt. A large portion of this total (58%) comes from the halibut longline fishery.

2. Assessment

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

1) Fishery independent data: including relative abundance indices, length and age data from the International Pacific Halibut Commission's (IPHC) longline survey 1999-2008, and the NWFSC and Triennial bottom trawl surveys 2003-2008 (NWFSC survey) and 1980-2004 (Triennial survey).
2) Estimates of fecundity, maturity, length-weight relationships and ageing error from various sources.

3) Informative priors on natural mortality and stock recruit steepness derived from other fish and yelloweye stocks.
4) Commercial (targeted and bycatch) and recreational catch estimates from 1916-2008.
5) Commercial and recreational fishery biological data (age and length) from 1968-2008.
6) Fishery dependent catch-per-unit-effort series from recreational and charter observer programs from all three states.

Data availability by source and year is presented in Table 3. A description of each of the specific data sources is presented below.

2.1 Fishery Independent Data

2.1.1 International Pacific Halibut Commission Survey

The International Pacific Halibut Commission (IPHC) has conducted an annual longline survey for Pacific halibut off the coast of Oregon and Washington (IPHC area "2C") since 1997 (no surveys were performed in 1998 or 2000). Beginning in 1999, this has been a fixed station design, with roughly 1,800 hooks deployed at 84 locations each year (Figure 4); station locations differed in 1997 and are therefore not comparable with subsequent surveys. Rockfish bycatch, mainly yelloweye, has been recorded during this survey, although values for 1999 and 2001 are estimates based on subsampling the first 20 hooks of each 100-hook skate. The gear used to conduct this survey, while designed to efficiently sample Pacific halibut, is similar to that used in some targeted line fisheries for yelloweye and should be capable of sampling at least the adult population. Some variability in exact sampling location is practically unavoidable, and leeway is given in the IPHC methods to center the set on the target coordinates but to allow wind and currents to dictate the actual direction in which the gear is deployed. This can result in different habitats accessed at each fixed location among years.

Yelloweye catch has historically occurred at very few of the 84 stations in the design (Table 4). There are 27 stations in Washington waters, but yelloweye have been captured at only 10 of these, and 90% of the 341 yelloweye captured were encountered at just three stations. Further, 98% of the catch is accounted for by seven of the stations, with the most productive yelloweye stations occurring primarily in extreme northern Washington. There are 57 stations in Oregon, of which 12 have produced 1,338 yelloweye from 1999 to 2008. Of the twelve stations with yelloweye catches, five have produced 92% of the total catch and seven have accounted for 98%.

The IPHC longline survey catch data were standardized using a Generalized Linear Model (GLM) with binomial error structure. The choice of catch-per-hook, vs. catch per station was dictated by variability in the number of hooks deployed each year. The binomial error structure was logical, given the binary nature of capturing a yelloweye rockfish on each longline hook or not. The only two independent variables available to predict catch by the 495,600 hooks deployed were year (nine years) and station (84 fixed stations across both states). Treating station as a factor in the model was too computationally intensive to run, so only year was retained in the final analysis. Three models were run; two separate models for Oregon and Washington, as well as one with data from all stations fished for comparison of the method with previous analyses. The variability around the yearly index values was found using a Monte Carlo Markov Chain (MCMC) approach. Specifically, the function 'MCMClogit' that is part of the R package MCMCpack (Pemstein *et al*., 2007) was used. This approach dictated that the 'logit' link be used for the GLM model, because this is the only appropriate link available in MCMCpack (the MCMCprobit in MCMCpack is for ordinal data and is not suitable here). The final standardized index was the median of the posterior density for the back-transformed yearly effects (plus the grand mean). The annual estimates of the standard deviation of the logged MCMC values were used as the starting variance estimates for Stock Synthesis to correspond to the assumption of lognormal error.

The indices for both Oregon and Washington are highly variable and show conflicting if very little overall trend (Figure 5). This is to be expected given the small sample sizes, yet this survey may be the best index of relative abundance available for yelloweye rockfish, sampling the adult population in habitats where it is most abundant. The new method employed for this assessment was tested against the raw average catch per station (states combined) calculated for the 2007 assessment and the differences in point estimates were negligible (Figure 6), indicating that any change in information contribution of this series to the assessment model from 2007 to 2009 is primarily due to the choice to separate the series by state.

The fixed 84 IPHC station locations were supplemented in 2006, 2007 and 2008 by additional stations at the request of the states of Washington and Oregon. The addition of 'extra' stations in each state has followed divergent protocols, with Washington selecting new stations near existing stations that have captured yelloweye, and Oregon instituting a random station allocation to individual reefs based on habitat maps. Since this survey is analyzed as a relative index of abundance, there is no way to analyze these extra stations as part of the existing data set. Each of these data collection efforts could produce an improved time-series in the future, but are too short at present to be used as indices of relative abundance. Further, the divergent sampling designs will preclude analysis of pooled data for both states.

Biological samples were collected from yelloweye during the course of the IPHC survey. Length and sex information was recorded at sea, and age structures were retained for later ageing by Washington Department of Fish and Wildlife (WDFW) staff. Biological samples were augmented with the yelloweye captured at extra locations fished during 2006 to 2008 in Washington and in 2008 in Oregon. Both length and age data are available for IPHC survey yelloweye catches; however, station information for the biological samples has been lost (WDFW, personal communication, 2009). Further, due to a lab mishap, the age data for 2003-2005 cannot be connected with the rest of the biological sampling, and so must be treated as marginal age distributions with the sexes combined.

Thirty-seven length bins from 16 to 88 cm were used to summarize the length frequency of the IPHC survey catches in each year for Oregon and Washington, the first bin including all observations less than 16 cm and the last bin including all fish larger than 88 cm. This choice reflects the need to span the size range observed across all sources of data as well as retain as much information as possible about the growth trajectories (vs. aggregating to wider bins, such as 4 cm). Sampling for length and age was nearly complete for all yelloweye encountered, yet the sample sizes are still relatively small (Table 5), with a minimum of 17 and a maximum of 268 lengths recorded in each state annually, across all years. Broadly, the length frequency distributions for the IPHC survey from 1999-2008 in Washington show few fish smaller than 40 cm captured (Figure 7, Figure 8, Figure 9, Figure 10), consistent with the use of large hooks intended for halibut, the target species. Yelloweye captured in Oregon are slightly smaller, with a greater proportion of both sexes below 50 cm. Over this size range, it would be surprising if evidence of even the strongest cohorts was still visible, and none is in either state.

Age-frequency data from the recent (2006-2008) IPHC survey was compiled as conditional age-at-length distributions by state, 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, 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 and beyond the standard use of marginal age compositions. First, age structures are generally collected as a subset (or the same set) 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 can be present twice in the likelihood, 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 (and orthogonal) information provided by the limited age data (relative to the often 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 ($L_{age\text{-}1}$, $L_{age\text{-}70}$, 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 able to be 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 recent IPHC survey age data, and all other age-frequency series.

Age distributions included 64 bins from age 2 to age 65, with the last bin including all fish of greater age. The choice of these bins reflects the lack of any source for fish younger than age 2, and the need to reduce the computational time by limiting the total number of age bins for each entry. Most data series in the assessment model included very few fish greater than 65 years old; however they were most common in the IPHC survey. Nearly all fish sampled for length were also aged (Table 5). To aid in inspecting the full conditional age-at-length distributions, they are displayed graphically for each data set in this assessment via the entire matrix of age distribution-at-length, as well as summarized to marginal age-frequency distributions. It is often useful for data and model fit evaluation to compute these marginal age-compositions, and include them 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. This approach is used here.

The IPHC age data from 2006-2008 show many fish older than 65 years in both states, with somewhat more older and larger fish present in Washington than in Oregon (Figure 11, Figure 12, Figure 13). A similar pattern can be observed in the sex- and length-aggregated IPHC data available for the earlier period 2003-2005 (Figure 14, Figure 15). In aggregate, these age data appear relatively sparse, provide only a short time-series, show no coherent cohort structure and are unlikely to provide much more than estimates of the growth parameters and the diffuse information that there are more old fish remaining in Washington than in Oregon.

2.1.2 Triennial Bottom Trawl Survey

The longest time-series of fishery-independent data available for yelloweye 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 general, all of the surveys were conducted from 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 surveys in 2001 and 2004 were conducted in May-July (Figure 16). The abrupt shift in survey timing in 1995 led the 2007 canary rockfish (*Sebastes pinniger*) stock assessment to allow for a possibility that this change influenced catchability, and two separate catchability parameters were estimated for the two eras (Stewart 2007).

The initial year of the survey in 1977 was based on a sampling design that spanned depths from 50 to 260 fm (91 to 475 m), and did not come as far inshore (30 fm) as the subsequent surveys conducted on a triennial basis from 1980 to 2001. 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 this assessment. A full description of the water haul issue can be found in Zimmerman et al. (2001).

The bottom trawl survey provides very sparse information on the spatial distribution of yelloweye rockfish, but identifies known areas of abundance off the northern Washington and central Oregon coasts corresponding to major rocky banks (Figure 17, Figure 18). Raw catch rates show a decline from 1980 to 1995, and then an increase in subsequent years, but are highly variable (Figure 19). There are no clear patterns in the catch rate by depth (Figure 20). The proportion of triennial tows that captured yelloweye rockfish shows an increasing trend over the entire early time-series, then an abrupt shift in 1995, coinciding with the shift to earlier sampling (Figure 21).

Triennial survey catch rates were standardized using the zero-inflated Generalized Linear Mixed Model (GLMM) based on the method described by Helser et al. (2004, 2007). The zero-inflated, or delta- approach explicitly models the proportion of positive observations via a binomial GLM (or GLMM) separately from the positive catch rates (e.g., Stefansson 1996). GLMMs were used because sampling vessels could be modeled as a random effect by assuming that vessels were chosen randomly each year from a larger distribution of vessels. Binomial GLMMs were used to predict the proportion of tows containing yelloweye rockfish in each year and gamma GLMMs with a log link were used to predict the catch-rates in each survey year for tows that included yelloweye. The product of the predicted values of the binomial and gamma GLMMs were back-transformed to calculate predicted density of yelloweye rockfish. This density was expanded to an area containing the range of depths within which positive tows were observed, and MCMC was used to estimate the variance about the estimated annual survey catch.

This method requires that all strata (year, area or depth-zone) contain enough positive catch observations to estimate the parameters of the Gamma GLMM. Preliminary exploration revealed that there were too few triennial tows to build a model for either the California or Oregon areas, or to separate the depth range into more than one stratum. Therefore a model was constructed for Washington waters only (46°N to 49°N, not including tows conducted north of the EEZ). The proportion of positive tows in Washington showed a similar pattern to those across the entire coast, with a distinct shift in 1995 (Figure 22). Positive tows ranged from three to 21 among survey years and number of fish from 13 to 114 making this survey index highly uncertain and subject to stochastic sampling variability (Table 6).

The GLMM fit the aggregate proportion positive observations very well (Figure 23). Evaluation of the deviance residuals (using a Gamma distribution with a log-link and ignoring the random effects) also reveals a reasonable fit to the sparse positive catches. The mean of the distribution of the estimated random effects is zero; hence the use of component deviances that ignore the random effects should produce plots that show the distribution of the residuals for each fitted value, but with somewhat more random variation than would be present if accounting for the random effects. However, the omission of random effects from the calculation of deviance components should not result in erroneous bias in the diagnostic figures. The deviance components should (and largely do) follow a gamma distribution with residuals concentrated about a small mean and a few observations with large residuals forming the long tail of the gamma distribution (Figure 24).

The estimated triennial survey time-series for Washington waters shows a relatively flat trend over both the early and later years of the survey, with the lowest values observed around 1995 (Figure 25).

Triennial survey length-frequency distributions are based on subsampling of survey-caught yelloweye rockfish from 1986 to 2004; biological samples of yelloweye were not collected in 1980 or 1983 (Table 7). These distributions are very noisy, and show no obvious trends in mean size or evidence of cohorts (Figure 26, Figure 27). Notably, nearly the entire size range of yelloweye observed from all sources is seen in the triennial data, fish occur across the 18 to 72 cm size categories. There were no age-structures collected for yelloweye during the triennial survey.

2.1.3 NWFSC Bottom Trawl Survey

The NWFSC shelf and slope trawl survey time series available for the depths in which yelloweye rockfish are found extends from 2003 to 2008. The survey identifies the same areas of increased abundance in northern Washington, the Heceta Bank area of Oregon and near Cape Mendocino in California (Figure 28, Figure 29). Positive catch rates show little trend over years or depth for all hauls conducted (Figure 30, Figure 31). The proportion of positive tows also does not show any clear trend over the relatively short time-span of the survey (Figure 32).

A GLMM-based approach identical to that used for the triennial survey was applied to the NWFSC data. Preliminary evaluation revealed that there were insufficient tows to populate models for either Washington or California waters. Even within Oregon, the NWFSC survey encounters yelloweye infrequently, in less than 10 tows for any year of the time series and has never observed more than 100 fish in a single year (although one of the tows conducted in 2003 captured 80 fish; Table 6). The proportion of non-zero tows in Oregon waters did not show a clear trend over time (Figure 33).

As for the triennial survey, the GLMM fit the aggregate proportion positive observations very well (Figure 34). The deviance residuals did not show a clear pattern against the linear-predictor (Figure 35; note again that random vessel effects are not included in this calculation). The biomass index shows a relatively flat trend over the period 2003-2008 with a very large value for 2003, a function of the single very large catch in that year (Figure 36).

The length-frequency distributions for the NWFSC survey from 2003-2008 were constructed using the same size bins as other data sources. These observations are based on very few fish, between 11 and 35 per year (Table 7). Most notably, the NWFSC length-frequency data show a very truncated size range; almost no fish larger than 58 cm were observed in any year of the survey (Figure 37, Figure 38). Fish less than 20 centimeters are rare, perhaps slightly more so than in the triennial survey. As is the case for the yelloweye length- and age-compositions from other fishery independent sources, neither clear trends, nor visible signs of cohorts appear in the biological data. Age structures were collected for nearly all yelloweye encountered by the NWFSC survey, but have not yet been read and are therefore unavailable for this assessment.

2.1.4 Visual Surveys

Yelloweye are a conspicuous member of the *Sebastes* genus, relatively easily identified during underwater visual surveys conducted by scuba-divers, manned or unmanned underwater vehicles. Density estimates for yelloweye rockfish have provided the basis for recent summaries of yelloweye rockfish population trends and abundance in both southeast Alaska and British Columbia waters (Yamanaka et al. 2006, Brylinsky et al. 2007, Brylinsky et al. 2008). An extensive effort was made specifically for this assessment to summarize existing density estimates from published and unpublished visual studies (W. Wakefield and J. Clemens, NWFSC, personal communication). These estimates, although not strictly comparable among all studies (in many cases the survey locations were non-random, or even selected based on predicted abundance of yelloweye and other species of interest), generally show lower but variable yelloweye density off the U.S. west coast compared to British Columbia or southeast Alaska (Table 8). Clear trends over time are not evident, but the observation that at least some locations in California may harbor relatively high densities suggests it is not outside the core range of the species.

2.1.5 Other Fishery Independent Data

A small number of yelloweye are encountered in the NWFSC's cooperative fishery independent hook-and-line survey targeting rockfish in the Southern California Bight (a total of five yelloweye, 2004-2008). These fish were included in the estimation of the weight-length relationship (see below), but no index can be developed from that survey. The authors are unaware of other small-scale projects that could currently provide data for this assessment, although some undoubtedly exist.

2.1.6 Research Removals

Research catches have historically been only a tiny fraction of the total removals from the yelloweye rockfish population. However, as total mortality has been substantially reduced in recent years, the relative contribution of research removals to the total has increased. This was particularly true in 2007, when research catches totaled 1.8 mt, or 9% of the total estimated removals from the stock. Research catches are included in estimates of total commercial catch, ensuring that all known sources of current mortality are accounted for in recent years.

2.2 Biological Data

A number of biological parameters were estimated outside the assessment model. These values are treated as fixed and therefore uncertainty reported for the stock assessment results does not include any uncertainty associated with these quantities. Input values for such parameters are provided in Table 9, and the methods are described below.

2.2.1 Weight-Length Relationship

The weight-length relationship used for this assessment is based on data from 2,012 fish sampled in California, Oregon and Washington between 1978 and 2008. Male and female curves were fit separately using a normal error assumption for the log-linear relationship $W = aL^b$. Parameter estimates derived from this analysis (Table 9) are consistent with other published studies and indicate that female yelloweye are slightly heavier for their length than males at sizes around and above that of maturity (Figure 39).

2.2.2 Maturity Schedule

The maturity-at-length relationship used in this assessment is based on a recent analysis conducted by researchers at ODFW (Hannah and Blume Draft Manuscript). They found that using histological methods produced a slightly lower size at 50% maturity than was previously estimated by visual inspection (Table 9). Their results indicate that 50% of female yelloweye are mature at a size of 38.8 cm; the logistic slope of -0.437 results in near complete maturity by 50 cm (Figure 39). These estimates are based on yelloweye from Oregon, and since no other maturity data are currently available, are used as the basis for the relationship for this stock assessment.

2.2.3 Fecundity

The disproportionate contribution of large female rockfish to reproductive output has been the topic of much research in recent years (e.g., Sogard et al. 2008). Increases in fecundity per unit female body weight have been identified and used in stock assessments for several rockfish species on the west coast. A recent analysis of fecundity data for 40 *Sebastes* species used a Bayesian hierarchical analysis to estimate fecundity per gram as a linear function of weight (Dick 2009). Yelloweye were found to have a relatively moderate increase in weight-specific fecundity with weight, with a posterior median intercept parameter of 137.9 eggs per gram and a slope of 0.0365. These values were quite uncertain, with the ~95% credibility interval ranging from -318.1 to 626.3 for the intercept and -0.0777 to 0.1418 for the slope. The relationship was converted to eggs per kg body weight for Stock Synthesis (Table 9, Figure 40) and results in predicted spawning output increasing slightly faster than the W-L relationship after maturity (Figure 39). Although uncertain, this analysis provides the best available estimates of fecundity for yelloweye rockfish and is used for this assessment.

2.2.4 Natural Mortality

The oldest observed yelloweye is a male, aged 147 years, captured in the Washington trawl fleet in 2005. Although this observation is subject to ageing imprecision, it, along with the large fraction of yelloweye aged 65+ in the IPHC surveys (Figure 11, Figure 12, Figure 13, Figure 14, Figure 15) indicate very low rates of natural mortality.

There are several sources of prior information for natural mortality for fish species and for yelloweye specifically. Two priors were developed based on a hybrid method including both Hoenig's (1983) method using maximum observed age, and Pauly's (1980) meta-analysis of natural mortality for a wide range of fish species. The method calculates prediction intervals based on the two methods, with the only required input information being the maximum observed age (O. Hamel, NWFSC, personal communication). Results for this analysis were relatively insensitive to the choice of maximum age: ln(M) = -2.953, SD = 0.417 for a maximum age of 118 (the value assumed in previous assessments), and ln(M) = -3.05, SD = 0.418 for a maximum age of 147 (Figure 41). Both values of maximum age generated priors with appreciable density over the entire plausible range from 0.02-0.10.

A second yelloweye-specific prior was constructed from age-distribution data collected at the Bowie seamount and at other locations in B.C., Canada. The Bowie seamount was thought to have been only very lightly exploited at the time these samples were collected and therefore the estimate of total mortality (Z) should be very close to that of natural mortality only (M) subject to the unknown effects of fluctuation in year-class strengths and sampling selectivity. The mean value for females based on Ricker's catch curve method was 0.0431 (Yamanaka et al. 2000) and it is this value that was used as the basis for fixing natural mortality (at 0.0431) in the 2007 assessment. Male yelloweye rockfish across five locations in B.C. showed a consistently higher estimate of Z (for the Bowie seamount, as well as other exploited locations) with offsets to female Z ranging from 0.04 to 0.12. To create a sex-specific prior for natural mortality, these offsets were bootstrapped and applied to a distribution for females with an arbitrary SD of 0.03 about the point estimate. The arbitrary SD was selected as the tightest value that still encompassed the range predicted from the Hoenig/Ricker prior developed above (i.e., it should be no more restrictive than that distribution). The prior was constructed for values for M, instead of ln(M), because this was the only form for the prior currently available in Stock Synthesis. The sex-specific priors derived from this method (Figure 41) were used for the pre-STAR base case model, however discussion during the review led to the mutual conclusion that Bowie Seamount data were not representative of the U.S. stock, largely due to the lack of evidence for highly divergent gender-specific mortality in the age-composition data. As a result, the prior derived from the Hoenig/Pauly method was approximated via a normal distribution (a log-normal prior was not available as an option in Stock Synthesis) and used for both males and females in the base case (Figure 42).

2.2.5 Ageing Bias and Imprecision

Observed yelloweye ages are derived from visually counting the rings on otoliths after they have been 'broken-and-burned'. Because they are long-lived, these counts can be large, and the repeatability of individual age estimates is imperfect, especially for older fish. Treatment of ageing imprecision was a topic of specific concern in the 2006 assessment (see section on STAR panel recommendations below). Although not directly applicable for this assessment, an existing study using bomb-radiocarbon methods (Kerr et al. 2004) supports the premise that rings are formed annually on yelloweye otoliths and that enumeration of these rings is imprecise, but not likely to be systematically biased.

What is known about ageing imprecision for the U.S. west coast yelloweye stock is based on comparison of 556 otoliths read independently by two Washington Department of Fish and Wildlife (WDFW) age-readers (Figure 43). Individual reads ranged from 5 years to 123 years with most of the data consisting of reads between 15 and 60 years. Visual inspection reveals a wider degree of difference with increasing age, and generally precise double reads relative to other rockfish species on the U.S. west coast. For the 2009 assessment, these double reads were analyzed with software provided by A.E. Punt (University of Washington, personal communication), which is commonly used to estimate ageing imprecision and bias for west coast rockfish assessments (Punt et al. 2008). Briefly, the software estimates the underlying age distribution of a sample from up to three double- or cross-reads for each age structure, and can do this for multiple samples simultaneously. The most important assumption of the estimation technique is that at least one ageing method must be unbiased, so it is therefore not an age-validation. Functional forms can be explored for each method for both the bias (none, linear, type II) and the imprecision (constant or linear increase in CV, or type II 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.

A step-wise procedure comparing the AIC values for ageing imprecision models fit to the double-read data was employed in order to select the most parsimonious functional form for the relationship. Because we have no external age-validation for comparison, ages are assumed to be unbiased. Estimates of the standard deviation of observed age at true age were very robust to choices of 'minus' and 'plus' groups (for accumulating the tails of the distribution) and a type II functional form improved the fit substantially (delta AIC > 20 units) over a simple linear relationship. The estimated relationship shows a non-linear increase in absolute imprecision with age, from a SD = 1.2 years at true age 10, to SD = 6.2

years at true age 100 (Figure 44), confirming the conclusions from purely visual inspection of raw double reads. This relationship was used in the base case model.

2.3 Fishery Dependent Data

2.3.1 Historical Commercial Catches

The historical commercial catch reconstruction used for this assessment represents an amalgamation of newly available data (unused in previous assessments), updates to 'standard' sources of information (PacFIN, CalCOM, and state databases), and portions of the reconstruction created for the 2006 (or possibly earlier) assessment retained as the best estimate where no additional improvements could be made. The results of this effort, by modeled fishing fleet, are provided in Table 1 and Figure 1. The sources and methods used for this reconstruction are summarized by state below.

For the state of California, commercial landings for the period 1916-1968 relied on estimates from the recent reconstruction efforts by SWFSC and California DFG scientists (Ralston et al. Draft Tech. Memo.). This effort utilized newly available spatial information regarding aggregate rockfish landings back to 1916 as well as intermittent species composition estimates by market category (and period over which that category was used) to apportion the aggregate catches to species, fishing gears and ports. This method is probably quite reliable for the most common species, but is likely much less accurate for species infrequently contributing to the total or making up a very small percentage. This reconstruction added substantial yelloweye catches to the early time period, especially around World War II. From 1969 to 2008, CalCOM (documentation: 2004) estimates of yelloweye catch were used. These estimates were updated in June, 2009 to reflect the changes made during that month. Changes in this database among recent assessments illustrate how sensitive the annual totals for individual species are to application of sparse species-composition sampling of time-varying market categories. A summary of the CalCOM catch estimation concluded that prior to 1992 "many of the landing estimates are not based on actual sampling, which could explain why they are highly erratic" (Pearson et al. 2008); they concluded those earlier landings were unreliable, but later years (from 1992 through 1996) were generally reliable.

In Oregon, there was no comprehensive historical reconstruction that could be used directly for this assessment, although data-entry and analysis efforts are underway. Instead, recently available (since the 2006 assessment) species composition estimates from the 1970s were used to estimate the fraction of aggregate rockfish catches that were likely yelloweye rockfish over the period 1916-1977. Alternate stratifications produced differing results, so simple summation over observed trips was used to derive an estimate of 0.0037%. This estimate reflects the rockfish fishery prior to the development of the mid-water (primarily widow rockfish) fishery in the late 1970s. Previously, in the 2006 and earlier assessments, estimates for this period were assumed to be 1% of aggregate rockfish catches and to have declined linearly before 1969. This fraction was applied to catch estimates from a variety of sources used in other reconstructions (Cleaver 1951, Fish and Wildlife Service, 1950-1955, 1957-1964, Anonymous 1957, Oregon Fish Commission, 1965-1967, and the Pacific Marine Fisheries Commission report 1977). The net result was a modest decrease, relative to the 2006 assessment, in the later portion of this period and an increase over 1925-1955, and 1916-1925, when flat estimates of 2 and 0 mt had been used. For the period 1978-1983 the values from the 2006 assessment were used. Beginning in

1984, best estimates of summary catch from the PacFIN system were extracted and values had changed only slightly from the estimates used in the 2007 update.

For the state of Washington there was also no comprehensive historical reconstruction that could be used directly for this assessment, although efforts are underway there, too. Due to difficulties in apportioning U.S., Canadian and Puget Sound catches, as well as a lack of new species composition estimates (although some hard-copy records exist that could be key-punched and used as a basis for future assessments), no effort was made to reanalyze the series created for the 2006 assessment by WDFW scientists (Wallace et al. 2006). Historical catch estimates from the 2006 assessment consisted of a linear ramp from 1 mt in 1955 to 4 mt in 1975. Catch estimates for the period 1976 to 1982 were referenced from Tagart and Kimura (1982). For 1983-1998 estimates from PacFIN supplemented with apportioned values from the state database for the line-fishery were retained. For the period since 1999, PacFIN summary catch estimates were extracted in late May, 2009.

The net result of the historical catch reconstruction in this yelloweye assessment was only a very small increase in total cumulative removals relative to the 2007 updated assessment, primarily occurring between 1940 and 1955 in California and Oregon (Figure 1,

Figure 45, Table 1). In aggregate, the estimated removals from commercial sources are based on sparse sampling of shifting market categories for a rare contributor to the total. Species compositions have been shared across years, areas and sectors, even in the recent (PacFIN) period since 1981. The degree of uncertainty in commercial catch should be an integral part of the conclusions drawn from this assessment.

2.3.2 Historical Recreational Catches

Estimates of recreational catch must be far more uncertain than those from commercial sources, due to a much less rigorous sampling program until very recently. For many west coast rockfish species, uncertainty in the recreational removals is relatively less important due to the small magnitude of these removals relative to commercial fisheries; however this is not the case for yelloweye rockfish. Yelloweye have been, until as recently at 2002, one of the most sought-after groundfish species captured by recreational fishermen. Release mortality for yelloweye is generally assumed to be very high, although sample sizes for existing studies are extremely small (e.g., 2 fish in Hannah and Matteson 2007). Recreational catch estimates from sources that can account for discarded fish have included all discard estimates for yelloweye as dead catch (e.g., “A+B1” estimates from RecFIN). For this yelloweye assessment some sources have been added or updated to reflect the current best estimates where new information has become available, and some of the values estimated for the 2006 assessment have been retained for lack of a better estimate. Sources and methods for each state are outlined below.

For the state of California, the historical recreational catch reconstruction provided by the SWFSC (Ralston et al. Draft Tech. Memo.) replaced the estimates included in the 2005 and 2007 assessments. This constituted a large increase in the total recreational removals over the period 1929-1980, and an extension of the estimates from 1955 (in the 2007 assessment) to 1929 (Table 1). Recreational catches were assumed to be negligible prior to 1929. Updated RecFIN estimates were extracted for the period 1981-2003 and converted to biomass via observed or extrapolated mean weights. An error was corrected in the recreational catch estimates prior to the STAR panel leading to a small change from the draft document provided for review. No attempt was made as part of this assessment to correct for the large numbers of recently discovered recreationally caught rockfish that have remained unapportioned to the species level in the state of California estimates. This should be revisited as part of the next assessment if species composition estimates become available.

A well-documented reconstruction was provided by the state of Oregon (T. Buell, ODFW, personal communication) for the period 1973-2002. Prior to 1973, recreational catch estimates were extrapolated for the 2006 assessment and those values were retained. The ODFW reconstruction apportioned the small number of unidentified recreationally caught rockfish to species, based on the ratio of species in the retained catch. This method makes several assumptions regarding angler behavior when interviewed, but no alternative approaches have been developed.

For the state of Washington, no revisions have been made to the estimates reported in the 2006 and 2007 assessments, as there have been no revisions to the sources upon which they were originally based (F. Wallace, WDFW, personal communication).

Some revisions were made to the California historical recreational catch reconstruction (1929-1980) after the data had been finalized for this assessment. These changes were small, but should be incorporated into future assessments.

The estimated removals from recreational sources are based on sparse sampling (or phone surveys) of only a very small fraction of anglers, trips and even ports where yelloweye have been caught. The degree of uncertainty in the recreational catch, perhaps even more so than the commercial catch, needs to be an integral part of the conclusions drawn from this assessment.

2.3.3 Foreign Catches

Foreign catches are included in the catch estimates for commercial fleets by state (Table 1), but are insignificant for yelloweye, totaling less than five mt in the peak year (1970) in Oregon.

2.3.4 Recent Removals (2002+)

Catches explicitly include discards beginning in 2002 when management restrictions have resulted in nearly all yelloweye caught by recreational and commercial fishermen being discarded at sea. Recent catches were based on current total mortality estimates (2002-2007) produced by the West Coast Groundfish Observer Program (WCGOP) and the GMT scorecard (2008). Although these sources are relatively comprehensive in covering all sources of mortality, incidental removals occurring in non-groundfish sectors, such as the fixed-gear halibut fishery are not routinely observed, nor included in these estimates.

In aggregate, all sources of removals have been below both the ABC and OY each year. These catch levels represent a 95% reduction from average catches observed in the 1980s and 1990s. Managers have constrained catches by eliminating all retention of yelloweye rockfish in both commercial and recreational fisheries, instituting broad spatial closures, some specifically for moving fixed-gear fleets away from known areas of yelloweye abundance, and new gear restrictions intended to reduce trawling in rocky shelf habitats and the coincident catch of rockfish in shelf flatfish trawls. Since 2002, the total 6-year catch (96 mt) has been only 63% of the sum of the OYs for 2002-2008 and only 29%

of the sum of the ABCs for that period. The total 2008 catch (16.7 mt) is just 4% of the peak annual catch that occurred in the early 1980s.

2.3.5 Fishery Catch-Per-Unit-Effort

There are four indices of recreational fishery catch per unit effort that were developed for previous assessments and are included again in this assessment. Methods used to calculate these time-series are described in the 2006 document. A number of concerns have been raised about these indices during the course of previous assessments, including changes in fishing behavior, target species, the types of trips included, and changes in management, as well as uncertainty in the underlying catch and effort estimates themselves. Upon further investigation of several of these indices, it was concluded that the issues could not be resolved with further analysis, or application of new methods for fitting the raw data, but that the actual data needed to confirm or reject such concerns was missing. For this reason, rather than provide many alternative formulations of the indices themselves, two steps were taken to reduce the potential for these factors to confound the current assessment: 1) years in which regulations had changed dramatically (bag limits, or limitation of co-occurring species) were removed, and 2) the relationship between observed indices and population abundance was allowed to be non-linear via the addition of a second catchability parameter for each index (Methot 2009). The individual indices are described below by state.

The California recreational CPUE series begins in 1980 and ends in 1999 with a gap between 1986 and 1993. The 2007 assessment included values for 2000 and 2001, but these years experienced large reductions in bag-limits and are therefore excluded in this assessment. This series is much higher, on average, in the 1980s than in the 1990s (Figure 46). Also in California, a recreational charter boat index was available for the years 1988 to 1998. This index shows little trend from 1988 to 1991 and then a consistent decline to the end of the series (Figure 47).

The Oregon recreational CPUE series is unchanged from the 2007 assessment. This series begins in 1979 and ends in 1999 with gaps in 1985 and 1997. There is an apparent upward trend from 1979 to 1983 and then a variable but generally declining trend until 1996, with 1998 and 1999 slightly higher than preceding years (Figure 48).

The Washington recreational CPUE series begins in 1990 and extends through 1999. The years 2000 and 2001 are again removed due to changes in bag limits (2001 was added in the 2006 assessment, but was not included in the original 2005 analysis). This series is uncertain and shows little coherent trend (Figure 49).

A new fishery dependent CPUE series was developed for this assessment based on the recreational charter observing program in Oregon. This program sends samplers on charter sport fishing trips where they record the catch rates and size distributions of yelloweye rockfish for as many anglers as they are capable of monitoring. Although this program has been in place since 2001, current non-retention regulations have been in place for yelloweye since 2004 making that the logical start year for a new time-series. Although a large number of drifts (a single-pass over rockfish habitat made by the charter vessel) have been observed in each year, the total number of yelloweye encountered has ranged from only 5 to 52 (Table 10).

A relative index of abundance from these data was fit using the statistical approach that was applied to the IPHC survey (described above). Binary data of whether a yelloweye rockfish was captured on each hook of each drift was analyzed with a binomial GLM. Auxiliary variables considered included: port (with sparse observations included in an aggregate port category), day of the calendar year, and depth at which fishing was conducted. In the final model, year and port group were used as factors with a fourth degree polynomial of depth and a second degree polynomial of the number of days into the calendar year (Figure 50). The final model's fourth degree polynomial of depth was identified via a preliminary fit using a GAM, and improved the model fit by 41.8 AIC units over fitting depth as a categorical variable. Fitting depth with a fourth degree polynomial was around 5 AIC units better than a third degree polynomial, and 10 and 59 units better than second degree and first degree (straight line) polynomials, respectively. The second degree day-of-year polynomial was one AIC unit better than a straight line fit and 0.7 AIC units better than a third degree polynomial. After using MCMClogit, the final back-transformed index was produced via MCMC with covariates standardized to median values of depth = 15 fathoms and the day-of-year = 191 days. This index shows a relatively uncertain increase in abundance from 2004-2008 (Figure 51).

2.3.6 Fishery Biological Data

Length-frequency distributions were developed for each fleet (recreational or commercial) for which observations were available. The same bin structure (2 cm) was used as for fishery independent observations. Due to the sparse sampling (mainly opportunistic, since yelloweye have been landed in very small proportions of mixed species market categories or recreational bag limits) length frequencies are raw, calculated as the count of fish among size bins. This has been the case in previous assessments, and preliminary investigation of alternate weighting procedures revealed little sensitivity to this choice. Sampling statistics (number of samples and number of individual fish) for each fleet and year (Table 11, Table 12) clearly show the different sampling targets employed over different time periods and between state agencies.

The California recreational fishery has yielded a small but relatively consistent number of samples since the early 1990s. Only measured lengths, not length converted from other measurements, are included in the length-frequency observations (this excludes many observations from the earlier years in California). The recreational charter boat sampling program produced over 1,800 lengths during the period 1987-1998. The Oregon has collected much of the length data (both sexed and unsexed) from the recreational fisheries, while Washington provides few samples beginning only in the late 1990s. California provides the majority of the commercial lengths from 1978 to 2007, with sampling in Oregon and Washington beginning only in the early 1990s.

Because most of the length data from California was not sex-specific, sexes-combined observations were summarized for recreational (Figure 52), charter (maintained separately in order to assess potential differences in selectivity; Figure 53) and commercial (Figure 54) fisheries. Although somewhat noisy, the recreational size-distributions contain fish from 16 to 68 cm during the 1990s and after. There are neither clear cohorts, nor obvious trends in average size. The charter vessel size-distributions show a similar range of size and perhaps a weak indication of a cohort moving through during the late 1980s and another in the mid 1990s. The commercial data, starting in 1978 do show a decreasing trend in size through the mid-1990s, after which they are relatively consistent with the recreational observations. As is expected, the commercial fishery observed fewer small (< ~26 cm) yelloweye than the recreational fishery.

Much of the length data from the Oregon recreational fishery was not sex-specific, and was therefore compiled as sexes-combined (Figure 55). Yelloweye from 20 to 82 cm are present in the data, and there is a slightly higher incidence of very large fish (> 66 cm) in the 1980s. The average size of yelloweye observed in the 1990s and thereafter was somewhat smaller, although a clear trend upward in average size is observed in this period. This trend may be due to changes in the population, particularly an above average 1983 year class, however comparison with yelloweye growth curves indicates that the increase is slightly more rapid than predicted via individual growth. It may represent faster growth rates, other factors, such as shifts in the fraction of private vs. charter boats and in target species (and therefore fishing areas and methods) that could be responsible for the trend, or a combination of both; the cause is unknown. Sex-specific observations from the Oregon recreational fishery show essentially the same range and lack of trend seen in the sexes-combined data for the earlier years (Figure 56). Beginning in 2004, length data from the Oregon recreational fishery have been collected by observers riding on charter boats from the major ports. Because these fish cannot be retained, they are measured quickly and released; fish are not routinely sexed. These data show a wide range in the size of yelloweye captured, with fish from 20 to 74 cm (Figure 57). The Oregon commercial fishery length data show fewer small yelloweye (< 30 cm) than observed in the recreational fishery, but generally the same size range (Figure 58). A noisy but slightly increasing trend in size may be present beginning around 2000.

From the Washington recreational fishery there are far fewer small yelloweye (< ~36 cm) than in California or Oregon fisheries (Figure 59). Among sexes-combined observations from the Washington commercial fishery, there are also few small yelloweye, and with perhaps a slight increasing trend in size appearing in the late 1990s (Figure 60). Recent samples from the Washington commercial fishery show no clear trends, but as many large yelloweye as seen in other sectors (Figure 61).

As for fishery independent data, fishery ages, recreational or commercial where available, are compiled as conditional age-at-length observations by two cm size bin. There are very few yelloweye ages available from the recreational fisheries (Table 13). All three states have collected a few ages, but there have been only a total of 83 samples collected from all recreational sources available for this assessment. Commercial age data are not much more numerous than those from recreational sources. Sparse sampling was conducted in the 1980s in California (resulting in only 52 useful ages), and only slightly better samples sizes have been collected in Oregon and Washington beginning in 2001 (Table 14). Age data from California was received late in the process, and although included not all lengths from the age samples were included in length frequency distributions. For the purposes of examination, the age data have been summed across length and plotted as marginal age compositions by fleet. Particularly sparse fleet-specific data (e.g., California recreational ages) have been omitted from plotting.

The Oregon recreational fishery captured yelloweye across a wide range of ages, including many fish of age 65 or greater in the 1980s (Figure 62). There seem to be slightly more females older than age 20, but there are no clear cohorts visible in the data. The Washington recreational fishery has also captured fish to age 65+, but the data is relatively sparse and presents no meaningful patterns (Figure 63). The California commercial fishery observed very few yelloweye older than age 30, despite the preponderance of the samples being collected in the 1980s (Figure 64). The Oregon commercial fishery age data is also very sparse, but does not contain many fish older than age 30 (Figure 65). The Washington commercial fishery ages clearly show many more old yelloweye than in Oregon or California, with many older than age 65 despite the samples primarily occurring after 2000 (Figure 66).

Some revisions were made to the Oregon recreational biological samples (additional ages now available) were made after the data for this assessment had been finalized. These should be included in the next assessment.

2.4 History of Modeling Approaches

2.4.1 Previous Assessments

Yelloweye stock abundance and trend were first analyzed as part of the "remaining rockfish" assessment completed in 1996 (Rogers et al. 1996). This assessment included a number of rockfish species managed as the "Sebastes complex". The estimated yelloweye rockfish Allowable Biological Catch (ABC) was 39 mt (included as a contribution to the 'other rockfish' ABC) for the Northern area (Columbia and Vancouver) based on biomass estimates from the triennial trawl survey and assumptions about natural mortality (M) and catchability (Q). No separate yelloweye ABC was estimated for the Southern area (Monterey and Conception), where yelloweye rockfish were also included in the ABC for the "other rockfish" assemblage.

The first yelloweye-specific stock assessment used the length-based version of Stock Synthesis (Methot 1989, 2000) to model the northern California and Oregon regions with separate models (Wallace 2001). Growth was estimated externally to the model. Recreational CPUE as well as recreational and commercial size-composition data were included in the model. The modeled time period extended from 1970 through 2000 and year-specific recruitments were estimated without constraint by a stock-recruit curve. The assessment examined both increasing natural mortality with age and dome-shaped selectivity with size as alternative factors to improve the fit to the data. Alternative model configurations found that increasing natural mortality with age provided a somewhat better fit to the data, but there were no age data included in the 2001 model.

The length-based version of Stock Synthesis was also employed in the 2002 stock assessment (Methot et al. 2002). There were a number of important differences in model configuration from Wallace (2001) that include: 1) inclusion of Washington catch, CPUE, size and age data, 2) inclusion of age-composition data from all three states, as available, and an update of size-composition data, 3) inclusion of mean length-at-age data from each data source, to aid in the simultaneous estimation of growth parameters and size selectivity, 4) allowing all fishery sectors to have dome-shaped selectivity 5) including a recruitment constraint to the stock-recruit relationship and estimating the curvature (steepness), 6) starting in 1955 rather than 1970, to better allow for potential long-term patterns in recruitment, and 7) use of a constant (and fixed) natural mortality rate of 0.045. The assessment explored area-specific model results including data from only subsets of the coast, and compared these results to a baseline coast-wide model. They concluded that the estimated differences between the areas (states) were neither sufficiently different nor sufficiently precisely estimated to recommend that management be based on area-specific population models. They suggested that area-specific modeling should remain in consideration as new data become available.

The 2005 assessment was a simple update of the 2002 model that included a revised catch time series and additional age- and length-composition information. The assessment used the newly revised version (1.19) of the Stock Synthesis modeling framework (Methot 2005, 2006).

In 2006, a full assessment for yelloweye rockfish was performed (Wallace et al. 2006). That assessment updated the 2005 analysis to the newest version (1.21) of Stock Synthesis available (Methot 2006). The 2006 yelloweye stock assessment included many model specifications carried over from the previous assessments. Separate area-specific models were again evaluated for Washington, Oregon and California, as well as a single coast-wide model assuming instantaneous mixing between areas. The area-specific models included only data from each area, except that the Oregon and Washington models both contained all IPHC length information. Results were presented for each of the area-specific models as well as the coast-wide model and also the aggregate of the area-specific models.

The 2007 assessment was an update, requiring no major changes to the basic model framework, approach and major structural assumptions. Several minor errors in data processing were corrected and the natural mortality rate borrowed from Canadian sources was corrected from the value used in 2006 (0.036) to the value reported by Yamanaka (2000) of 0.0431. The update also moved the assessment forward to the newest version of Stock Synthesis available at the time (Version 2.00c, March 2007).

In aggregate these assessments have largely drawn the same conclusions regarding population abundance and recent trends: that the yelloweye resource was heavily and unsustainably exploited from the early 1970s to around the year 2000 (Figure 67). There is clearly much retrospective uncertainty regarding the absolute scale of the yelloweye population, and there has also been a pattern of each subsequent assessment being slightly more pessimistic than those before since 2002. All of these assessments have estimated that the stock is relatively unproductive and will therefore require many years of low exploitation rates to rebuild to target levels and will never again produce catches as large as peak historical values.

2.4.2 Pre-Assessment Workshop, GAP and GMT Input

There were no 'pre-assessment' workshops held for the 2009 stock assessment and review cycle. However, the authors attempted to respond to all questions and concerns posed by interested parties via e-mail and phone conversations. GAP and GMT members were contacted early in the process and provided valuable background on the discussions regarding previous yelloweye assessments as well as industry points of contact. Discussion with commercial, charter and recreational fishermen were helpful in better understanding the current relationships among the fisheries, management and data collection programs. This has been a valuable part of the assessment process in recent years and should be continued in the future.

2.4.3 Response to STAR Panel Recommendations in 2006

The STAR panel report from the 2006 review (the 2007 assessment was an update, and did not go through the STAR process) identified a number of recommendations for future assessments. Although all these recommendations could not be addressed for 2009, progress on each is summarized below:

1) In the current assessment model, catches are assumed known without error. Because yelloweye rockfish are relatively rare in the fisheries, catches are estimated with considerable error. Ignoring this source of uncertainty will lead to an overestimation of model precision. Future assessments should allow catch to have some error to better propagate this key uncertainty to model estimates. SS2 should be modified to allow error in the catch data. This should not be difficult to code, although it may cause some problems with convergence that may require attention. Allowing for some autocorrelation in F might improve the estimation.

Preliminary investigation into the direct integration of uncertainty in catches via estimated parameters for annual *F*s indicated that it would not be feasible to integrate over the very broad distribution of possible catches in this manner. The method would probably be much more appropriate for assessments where only some portions of the catch has very great uncertainty associated with points estimates, however for yelloweye the entire time-series for all sectors is very uncertain. The choice of representing catch uncertainty via alternate states of nature represents an imperfect solution, but does attempt to provide those evaluating the results of this assessment with insight into the sensitivity of the model scale to historical catches.

2) Formal estimates of uncertainty in catch should be produced by modeling the species composition sampling process. This will require an extended analytical effort, but it should be doable. The analysis may lead to using model-based estimates for missing cells, rather than substitution, which may change the best estimates of catch somewhat. Estimates of uncertainties in the total unclassified rockfish landings and in the species fraction estimates in the earlier years may still have to be assumed.

This topic was not addressed specifically, but it should be noted that model-based catch estimators are an available tool for ongoing state-specific catch reconstructions. It is likely that all three states will have some level of comprehensive catch reconstruction completed for the 2011 assessment cycle; however, the authors are unaware of further exploration of model-based methods for these reconstructions.

3) Obtain data from Canada for a truly stockwide model.

This topic has been raised with Canadian scientists and may be more realistically possible after current (2009, L. Yamanaka, personal communication) assessment efforts for coastal waters of B.C. are completed.

4) Continue efforts on the fishery independent survey programs. The most promising should be expanded stockwide.

Although a number of projects are being evaluated in 'pilot' studies (e.g., open-ended trawls with cameras, AUV surveys, and others) it is likely to be several years (at a minimum) before any of these can produce results that might be directly useful as data in a stock assessment framework.

5) Consider an assessment model incorporating several rockfish species simultaneously.

The use of the meta-analysis for stock-recruit steepness is a step in this direction, but a formal process for developing (and reviewing) multiple-species assessments needs to be created before this will be a realistic option for stock assessment authors. The approach may be best tested in a 'research-mode' analysis before being applied to a 'production' assessment.

6) The panel recommends that aging error be explored again in future assessments. The panel was not completely comfortable with decreasing aging error as age increased as is currently in the base model. The panel discussed that it seemed counterintuitive that fish would become easier to age as they became older, and evidence for this pattern was sparse. However, removing the trend in aging error (to either a constant SD or CV) had small effects on model estimates.

This topic has been resolved using current double-read data and analysis software (see section 2.2.5 above).

7) Data are sparse in the most recent years of the model since the fisheries have been closed. Because of this, there is considerable uncertainty about current age and size structure of the population as well as uncertainty because most of the CPUE time series end in 2001. This uncertainty will become worse for future assessments if no new data streams are added. The best types of data to add would be surveys that estimate absolute abundance such as the submersible survey conducted in 2001. This survey would need to be expanded to include Oregon and California waters. Another option would be to continue and expand the IPHC survey.

As soon as actual data are produced by alternate survey methods it should be incorporated into the yelloweye stock assessment. It may be of little value to perform frequent full stock assessments if no new sources of (higher) quality data become available.

2.5 Model Description

2.5.1 Link from the 2007 to the 2009 Assessment Models

The results of this assessment (see below) provide a very close match to those from previous analyses, despite many changes in data, structural assumptions and modeling approaches. The 2007 depletion estimate is only slightly higher (14.5% in the 2007 assessment version vs. 19.2% in this assessment) despite all the changes made. The change from Stock Synthesis version 2.00c to version 3.0 was, in this author's experience, the easiest upgrade in recent assessment cycles; full back-compatibility of Stock Synthesis version 3 has made this possible when the model was configured in the same manner despite many new features.

Fully described below, a number of key parameters and modeling choices have been changed for this assessment. The most important of these are the use of fixed values in the 2007 assessment for natural mortality (0.043) and stock-recruitment steepness (0.45). Fecundity was previously assumed to be proportional to spawning biomass and recruitment deviations were estimated for the period 1968-1992. Further, there was no tuning of input sample sizes and variance estimates in the 2007 assessment.

2.5.2 Summary of Fleets

Fishery removals were divided among six fleets: 1) California recreational, 2) California commercial, 3) Oregon recreational, 4) Oregon commercial, 5) Washington recreational, and 6) Washington commercial. The California CPFV index of relative abundance and the length frequency distributions from this source are assigned the selectivity from the California recreational fishery. The Oregon charter observer index is treated separately (selectivity estimated independently) from the Oregon recreational fleet. The IPHC data is modeled by state, with each survey utilizing separate selectivity and catchability parameters. There were only sufficient data for a Washington triennial survey index and an Oregon NWFSC survey index, so each had its own fleet. The data available for each fleet are described in Table 3. The choice to structure fleets based on geographic areas allows direct comparison of the dynamics with and without explicit areas in the stock assessment model.

2.5.3 Modeling Software

This assessment used the Stock Synthesis modeling framework written by Dr. Richard Methot at the NWFSC. The most recent version (3.03b) was used, since it included many improvements in the output statistics for producing assessment results and several corrections to older versions used during the 2007 and earlier assessments.

2.5.4 Priors

Uniform (and intended to be noninformative) priors were applied to all estimated parameters in the base case model with only three exceptions where additional information was available (natural mortality, described in section 2.2.4, and steepness, described below). Parameter bounds were selected to be sufficiently wide to avoid truncating the searching procedure during maximum likelihood estimation. A list of all parameter bounds and priors are provided in this document (Table 15).

In addition to the priors for natural mortality, an informative prior for stock-recruitment steepness (h) is used for the base case model. The use of a prior on stock-recruitment steepness based on meta-analysis of rockfish (original basis: Dorn 2002) has become standard practice for U.S. west coast stock assessments. This prior has been updated to reflect current understanding in each of the 2007 and 2009 assessment cycles (M. Dorn, AFSC, personal communication). For 2009, this prior is relatively uninformative (less than two units of negative log-likelihood over most of the acceptable range for h, 0.2-1.0), but favors values approaching 1.0 (Figure 68). Sensitivity for the base case model to the use of these priors is reported below.

2.5.5 Sample Weighting

The approach to sample weighting used here attempts to achieve consistency between the degree of uncertainty in each data set and the model's ability to fit those data. Variances and sample sizes were first derived from the raw data sources. Variances and sample sizes were then iteratively re-weighted to ensure consistency between the input sample sizes (or standard errors) and the effective sample sizes (and root-mean-squared-errors) 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 data, starting from a compromise between the number of fish and the number of samples (a linear function of the number of samples and number of fish, not exceeding 44 fish per sample), and then multiplying the year-specific input sample sizes by a single constant for each data set that made the mean input sample size for compositional data roughly equal to the mean effective sample size based on model fit. The same method was applied to conditional age-at-length data, except that input sample sizes for age distributions, based on the number of fish observed in each sex-length bin combination were not further increased. These input samples sizes can be thought of as a maximum, where each fish is an independent sample from the true multinomial and therefore should not be increased. Similarly, variance estimates for index data were not reduced, even where the model was able to fit the data appreciably better than expected, because these estimates can be considered minimum estimates from the external analyses used to create them. These choices reflect 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 in the base case model. The length data from a few fleets were up-weighted to reflect better than expected fit, except for the fleets where initial sample sizes reflected the number of fish, these were all down-weighted by a factor of 0.62-0.73. Age data fit better than expected (and so no tuning was applied), with the exception of the IPHC data which were down-weighted by a factor of 0.74 (Oregon) or 0.90 (Washington). An additional variance component was added to all of the fishery independent indices of abundance as part of the iterative reweighting process (Table 17). These values ranged from 0.36 to 0.54. Fishery dependent indices received an additional variance component of 0.0 to 0.16.

2.5.6 General Model Specifications

Stock synthesis has a broad suite of structural options available for each application. There are no true 'default' settings for most of these options; each application must be customized to best represent the life-history, dynamics, data-complexity and estimation approach (Bayesian or maximum likelihood) most appropriate.

This assessment is structured to be sex-specific, including separate growth curves for males and females, and therefore tracking the spawning output of only females for use in calculating management quantities. Growth parameters describing the von Bertalanffy growth equation, as well as the spread of lengths for a given age, were estimated for each sex, except that the length at age one year was forced to be identical for males and females. The parameterization used by Stock Synthesis allows the user to specify the age for the two growth parameters (rather than the length at age zero and the implied length at infinite age). Ages one and 70 were selected to be close to the range of observed data. Based on preliminary analyses, this choice had little effect on estimated growth curves. A list of the growth parameters, bounds and priors is given in Table 15. Natural mortality was freely estimated for each sex, based on the *a priori* evidence that it might differ for males and females.

For the internal population dynamics, ages 0-100 are individually tracked, with the accumulator age of 100 determining when the 'plus-group' calculations are applied. This is a relatively large age, and substantially increased the memory and computational requirements of the model, but was necessary to ensure that little growth would be predicted to occur (but not be modeled) at and beyond this age, since the model does not allow growth to continue in the plus-group.

Three explicit areas are included in the base case model, representing the three states: California, Oregon and Washington. Although these are political rather than strictly biological boundaries, the yelloweye population appears to be fragmented enough, and adult movement is likely small enough, that the exact placement of these lines is of little importance. What is known to be important (and related to states rather than biology) is the vastly different exploitation history among the three areas from the historical period to the current fishery. Growth is assumed to be identical among the three areas, largely due to the sparseness of the data. Recruitment dynamics are governed by a global stock-recruit function (using spawning output based on the fecundity relationship, rather than strictly spawning biomass as is common among assessments). This relationship is parameterized to include two estimated quantities: the log of unexploited equilibrium recruitment (R_0) and steepness (h). Recruitment is partitioned via estimation of one additional parameter for each area after the first, which are then renormalized to allocate the total recruits among the areas. The base case does not allow for process error in the stock recruitment relationships (either over time or areas) although this was investigated extensively during preliminary model building and via sensitivity analyses.

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 sex-specific natural mortality, size-based selectivity, and dimorphic growth can result in significant departure from equality due to differential mortality over 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 15.

A two-parameter logistic function was used to represent the selectivity for all fishing fleets and for the IPHC survey. Departure from simple logistic shapes via the use of double-normal selectivity was added for the two trawl surveys in the base case model. For all indices of abundance, catchability parameters were solved for analytically, except for the triennial survey, where allowing for a change (unrestricted) in catchability for the time-series including and after 1995 required the direct estimation of catchability for each period. For the historical fishery dependent time series, where the basic assumptions of CPUE analysis were likely violated, there were four additional parameters estimated to allow for a non-linear relationship between the index and modeled population abundance.

In total, there were nine estimated growth and mortality parameters, four parameters governing the stock recruitment relationship, six catchability related parameters (and seven analytic solutions which could have been treated as estimated parameters), and 23 parameters describing selectivity curves.

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 extensive effort was made to evaluate these choices during model building and the most important of these are presented through sensitivity analysis.

The use of a static (but sex-specific) value for natural mortality over time is also a very important assumption. 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. However this degree of complexity is clearly beyond the information content of the available data. Growth is also assumed to be time- and space-invariant. This is a common assumption that has very important implications for estimation of selectivity and management quantities.

The three most important sources of uncertainty in this assessment are: the catch history, non-estimation of process-error in recruitment dynamics, both over space and time, and the choice to divide the assessment into explicit spatial areas.

Although the base case assessment model captures some uncertainty via asymptotic intervals, uncertainty from two sources is reported through alternate states of nature bracketing the base case results and included explicitly in the decision table. The magnitude of the estimated catch time-series was found to have a large influence on the perception of current stock size and the estimate of steepness of the stock-recruit relationship was closely linked to the projected recovery rates. Alternate values of each were selected to bracket the best estimates with marginal probabilities one-half as likely. For historical catch, these values, 75% and 150% of the estimated catch series prior to 2000, were subjective, but reflect the lack of a comprehensive catch reconstruction in Washington and the change in likelihood of the fit to data sources over a reasonable range of catch levels. For steepness the 12.5^{th} and 87.5^{th} percentiles were calculated from the likelihood profile as a proxy for the probability distribution about this point estimate. The most optimistic and pessimistic of the nine combinations from these two axes (weighted 6.25% each relative to 25% for the best estimate on each dimension) are reported in this document and all combinations used to provide a more realistic degree of uncertainty for future projections, decision tables and rebuilding analyses.

2.6.2 Alternate Models Explored

Hundreds of alternate assessment model formulations were evaluated prior to selecting the base case model. Because not all alternate formulations can be reported here, those that had the largest effects on parameter estimates or management quantities or are obviously of interest are retained and presented as sensitivity analyses (see below).

Prior to settling on the base case model, an extensive evaluation of dome-shaped vs. asymptotic selectivity curves for commercial, recreational and survey fleets was performed. Models very similar to the base case were fit while allowing each fleet to have dome-shaped selectivity. With only one exception, the NWFSC survey, all fleets produced asymptotic curves, requiring the application of informative priors on the descending limbs or fixed parameter values to ensure all parameters remained contributors to the objective function (i.e., when the final selectivity is estimated to be close to 1.0, then the descending width parameter is irrelevant to model fit and if not somehow informed can cause estimation instability). This exercise was repeated across fleets to determine whether additional flexibility was needed beyond a single parameter describing the ascending limb of the selectivity curve. This was found to be the case for the triennial survey, so an additional parameter was estimated, although little change was observed in model results.

This exercise was repeated as part of the STAR panel review, focusing on the IPHC selectivity for Oregon which was found to fit slightly better with dome-shaped selectivity. Although no change was made to the base case, the topic is addressed via sensitivity analyses below.

2.6.3 Convergence Status

To test for convergence prior to the STAR review, 100 trials were performed using a 'jitter' value (Methot 2009) of 0.1 for the base case model. This perturbs the initial values used for minimization with the intention of causing the search to traverse a broader region of the likelihood surface. Ninety-seven of these trials returned to exactly the same objective function value as in the base case, inverting the Hessian and producing small gradients. The remaining three got close to that minimum but failed to completely converge. Due to the high success rate, the exercise was repeated with a 'jitter' of 0.2. Of the second set of 100 trials, 69 returned to the base case minimum and 31 failed to converge. The spread of this search appears to indicate that the jitter was sufficient to search a large portion of the likelihood surface, and that the pre-STAR base case was not stuck in a local minimum. Results of runs that appeared to converge all showed identical levels of ending depletion and spawning biomass.

The exercise was repeated with the base case model after the STAR panel. A jitter value of 0.3 was applied for 100 trials, resulting in 43 models returning to the global minimum, and 57 failing to converge. This exercise appeared to traverse a wider region of the likelihood surface than earlier runs, but still did not discover any new minima. These tests cannot prove convergence of the model, but did not provide any evidence to the contrary. Robust behavior of this model over alternate phasing and initial values further indicated that there was little chance the results reported here are not the global maximum likelihood estimates.

2.7 Response to SSC Recommendations

If the SSC determines that additional analysis beyond completion of a rebuilding plan for the updated 2009 assessment is warranted, this work will be completed subsequent to the September 2009 review.

2.8 Base Case Model Results

The biological (growth and mortality) parameters estimated from the base case and alternate models appear to be quite reasonable (Table 18) and commensurate with inspection of the raw data. These parameters are relatively precisely estimated, both in terms of the asymptotic standard error estimates (Table 19) as well as the alternate states of nature (Table 18). Female and male yelloweye rockfish showed similar growth trajectories, beginning to diverge a approximately age 10; with males growing to a maximum size (66.4

cm) that was about 2.4 cm larger than females (Figure 70). Males are estimated to have a slightly wider spread of lengths at a given age, becoming more pronounced with age. The result that males are estimated to have a slightly larger size at the oldest ages (Figure 70) is somewhat unexpected for a *Sebastes* species. However, Canadian analyses (Yamanaka et al. 2006) also show males reaching a slightly larger (by 2 cm) maximum size, although those fish were slightly larger at 66 and 68 cm for females and males respectively.

The estimated natural mortality for males and females were nearly identical, with females slightly higher than males for both of the alternate states of nature. The estimated female value for the base case, 0.047, is slightly higher than that used in the 2007 assessment, but is still quite consistent with the very protracted age-structure observed in the population.

Estimated selectivity curves for the fishing fleets showed the expected pattern that the recreational sectors in all three states access somewhat smaller yelloweye than the commercial fisheries (Figure 71, Figure 72, Figure 73). This pattern was most pronounced in Oregon, and, also as expected, the recent charter fishing selectivity is shifted further toward smaller fish. Addition of the charter vessel length data did not appreciably change the estimate for the California recreational selectivity pattern and so the selectivity for the two series was not separated. Estimated selectivity curves for the IPHC surveys in both Oregon and Washington appear to access the largest yelloweye available, with Washington especially shifted slightly more than 10 cm larger than Oregon (Figure 74). The NWFSC trawl survey selected far more small yelloweye than did the triennial survey (Figure 75). That the estimated triennial survey selectivity was shifted toward the largest fish but also selecting some very small fish is likely an artifact of the very noisy compositional data. However, the pattern in selectivity makes direct interpretation of base case estimates for survey catchability (1980-1992: 1.43, and 1995-2004: 0.76) difficult, since very little of the population biomass occurs in the fully selected size range (> 85 cm). Forcing the triennial selectivity to conform to a more 'standard' parametric form had little effect on model results, but did degrade the fit to the survey data slightly. Similarly, catchability for the NWFSC survey was estimated to be 0.46 in the base case, however, with the highly dome-shaped selectivity, this does not imply that 46% of the biomass is actually observed.

The base case model predicted a relatively flat trend through both the Washington (Figure 76) and Oregon (Figure 77) IPHC survey indices. The poor residual pattern for the Oregon index (5 positive residuals followed by 4 negative residuals) seems unlikely to occur by chance, however, it also seems unlikely, given the life-history characteristics of yelloweye rockfish that any model could predict the negative offset seen between the 2004 and 2005 survey estimates. Although more investigation could be made, it would seem that there is likely still some unaccounted for process error in the survey methods.

The base case model was able to fit the NWFSC (Figure 78) and triennial (Figure 79) trawl survey indices as well as expected given the small number of positive hauls on which they are based, and the relatively small contribution to the total likelihood value. The fit to these indices, and the contribution of all indices to the objective function was largely unchanged among the three states of nature (Table 20).

Fits to the fishery CPUE series were generally quite good, and estimated power coefficients ranger from positive (0.55, California charter) to mildly negative (-0.27, Washington recreational; Table 18) indicating that observed values were often non-linear in relation to population trends. The predicted California recreational index tracked well the decline in observations through the 1990s (Figure 80), and the California charter series captured the difference between the 1980s observations and the reduced values in the 1990's, but none of the increasing trend in the early portion of the series (Figure 81). For the Oregon recreational index, the model again tracked the decline over the 20 year index, but none of the interannual variability (Figure 82). The Oregon recreational observer index showed a small and very uncertain increasing trend that was not captured by the predicted values but is not at all inconsistent with the results (Figure 83). With relatively large variances on many of the observations, the Washington recreational index provided a flat trend, which was largely matched by the slightly declining predictions (Figure 84).

The base case model fit the length distributions from the IPHC surveys in Oregon (Figure 85, Figure 86) and Washington (Figure 87, Figure 88) reasonably well, although there is some indication of negative residuals for the largest sizes in both series (especially Oregon, see sensitivity analyses below), indicating the model was predicting a greater proportion of the largest fish than was observed. Input sample sizes were tuned down slightly (Table 16), but this was expected, since the initial values were in numbers of fish rather than a compromise between numbers of fish and numbers of samples (it was not clear how correlated observations from a single long-line set would be). Both the NWFSC and triennial survey length-compositions were fit slightly better than expected (Figure 89, Figure 90, Figure 91, Figure 92; and were therefore tuned up, still resulting in relatively small average input sample sizes of 22 and 19). There appeared to be no pattern in the residuals for either series.

The sexes-combined length frequencies for the California recreational fleet fit somewhat better than expected (Figure 93), with no obvious patterns in the residuals (Figure 94). The sexes-combined length-frequency data for the California charter fleet was also fit slightly better than expected (Figure 95), and although there are no clear patterns in the residuals, there may be some indication of an above average cohort in the mid-1980s and another in the mid-1970s (Figure 96). The same was true for the California commercial length frequencies (Figure 97), although there were several large residuals apparent in 2001 (Figure 98). The unsexed Oregon recreational length data were tuned down (by a factor of 0.55, Table 16), however the number of samples was not available for all years, so it was expected that the number of fish would overestimate the appropriate input sample size for these data. Fits showed little residual pattern in the 1980s, but a strong diagonal pattern through the 1990s (Figure 99, Figure 100). This residual pattern from 1993-2003 could be due to a strong cohort (or cohorts) in the mid-1980s, although growth would have to be slightly above predicted rates to achieve the observed increase in mean size of this mode during the 10 year span over which it is observed. It is possible that other factors are also influencing this pattern, such as a shift in the targeting of the recreational fleet; however time-varying selectivity was not included for this fishery in the base case model. Little pattern is observed in the fits (Figure 101) or residuals (Figure 102) to the sex-specific Oregon recreational data from the 1980s. There are also no clear trends in the fit to the Oregon recreational charter observer data from 2004 to 2008 (Figure 103, Figure 104). Unlike the recreational length data from Oregon, the commercial lengths show no clear patterns in the fit or residuals through the 1990s (Figure 105, Figure 106), and fit the data slightly better than expected. In Washington, the recreational length data are quite sparse, but the fit and residuals appear reasonable (Figure 107, Figure 108). The sexes-combined length data for the Washington commercial fleet fit the data quite poorly, although still slightly better than expected (Figure 109). It is not clear whether patterns in the residuals should be investigated, or are just a result of the sparseness of the data (Figure 110). Sex-specific length frequencies from the Washington commercial fleet were also noisy, but showed no obvious patterns in the fits or residuals (Figure 111, Figure 112).

Fits to the age-frequency data are reported via the fit to the margin and residual plot where only marginal age data were available (early IPHC data) or via the full matrix of Pearson residuals for the conditional age-at-length data where these data were used. The early IPHC ages (not linked to length or sex information and so treated as marginal age distributions) fit the data slightly worse than expected, but showed little pattern in the residuals (Figure 113, Figure 114). For the more recent (2006 to 2008) sex-specific age data, the model appeared to underestimate the number of old fish present in the data (Figure 115, Figure 116); the cause of this pattern is unknown, but could perhaps be due to a mild misspecification of the selectivity curve, the growth curve if it tends to differ in Oregon, or some unknown degree of ageing bias in the samples. A similar, but slightly less pronounced pattern is also observed in the Washington IPHC age data (Figure 117, Figure 118). The California recreational fishery age data were very sparse, and little pattern can be discerned from the residuals (Figure 119, Figure 120), which fit about as well as expected. Oregon recreational age data fit slightly better than expected and showed no signs that the growth curve or lack of modeled annual recruitment strengths was inconsistent with the observations (Figure 121). The Oregon commercial age data are too sparse to draw much insight from residual patterns (Figure 122). Washington recreational (Figure 123) and commercial (Figure 124) age data also showed good residual patterns for the few years in which there were enough data to see them.

The estimated stock-recruitment relationship for the base case and alternate states of nature were very consistent in the prediction of little surplus production (steepness values 0.344, 0.417, 0.508; Table 20). These model runs reveal an almost linear relationship between the magnitude of historical removals and the scale of the estimated population size (Table 20, Figure 125). It is very appealing to try to integrate over the process error in recruitment variability via a longer time-series of deviations and more flexibility in the allocation of these deviations among areas, but this exercise is reserved for sensitivity analysis (see below) for this assessment. Because no process error in recruitment is modeled and steepness is relatively low among the states of nature, the time-series' of total recruitment (Figure 126) and spawning output (Figure 127) track one another very tightly. Both show that the aggregate yelloweye population was rapidly reduced from near unexploited conditions to low levels from about 1970 to 2000 (Table 20, Table 21), and this result is quite conserved among the alternate states of nature (Table 20, Table 22, Table 23). The coast-wide trend masks quite different levels of reduction among the three areas in the assessment. California is estimated to have had a much larger population historically, which has been reduced to much lower relative levels than in Oregon or Washington (Figure 128). The Washington stock is estimated to have been the smallest throughout the historical period, but to have been reduced the least. The same patterns are apparent in the estimated time-series of spawning output by area (Figure 129). Although there are not estimated to be extremely divergent values of growth and natural mortality for males and females, there are consistent trends in the predicted sex ratios for each of the three states with males becoming less numerous relative to females as exploitation rates increased (Figure 130). The matrix of predicted numbers at age by sex and area is provided in Appendix A.

A fundamental question that must be posed in light of these differences among areas is: Is the predicted density in the three areas reasonable in light of existing visual observations (and perhaps the common perception that there are more yelloweye rockfish in Washington than anywhere else on the coast)? To make this comparison, an estimate of the magnitude of available habitat, by area, was developed based on the assumption that only the hardest rocky lithology present in existing habitat maps (over depths in which yelloweye have been observed) would support appreciable yelloweye abundance (C. Whitmire, NWFSC, personal communication). This exercise revealed that the largest absolute quantity of yelloweye habitat in 55 to 450 m depths occurs in Oregon, where it comprises 10.5% of the total habitat in these depths and is more than four times as large as the suitable area in Washington (Table 24). California south of Point Conception represents the next largest habitat (although likely supporting a lower biomass of yelloweye given that this is the southernmost portion of their range) with 15.1% of the total habitat estimated to be rocky enough for yelloweye utilization. California north of Point Conception includes less than a third of the total area to the south (the continental shelf is much narrower throughout much of central and northern California than elsewhere on the coast) but still 48% more area than in Washington waters. Since most of the yelloweye observed via visual studies are at least three years old (although some juveniles are seen), the predicted numbers of age-3+ yelloweye in each area were divided by the suitable habitat area to generate a ‘back-of-the-envelope’ density estimate, assuming uniform distribution within areas, and, for lack of direct information, that one-third of the California stock occurs south of Point Conception. This calculation reveals that observed density estimates in the last 30 years should be in the range of 1-10 yelloweye per hectare (Figure 131), declining from 1980 through 2000, and that Washington should have the highest observed current density. This analysis appears consistent with density estimates for available visual studies (Table 8), given the assumption that these studies tended to focus on the rockiest regions and therefore perhaps the best yelloweye habitats.

Yelloweye rockfish are estimated to have been lightly exploited until the mid-1970’s, when catches increased and a rapid decline in biomass and spawning output began. The relative spawning output reached a minimum of 15.8% of unexploited levels (slightly above the estimate of 12.1% from the 2007 assessment) in 2000 (Figure 132). Yelloweye rockfish spawning output is estimated to have been gradually increasing since that time, in response to large reductions in harvest. Although the relative trend in spawning output is quite robust to the uncertainty in the estimated removals and steepness captured in the alternate states of nature (Figure 132), the absolute scale of the spawning output trajectory is very sensitive (Figure 127). The estimated relative depletion level in 2007 is 19.2% (slightly above the estimate of 16.4% from the 2007 assessment) and 20.3% in 2009 (states of nature: 17.3-23.5%), corresponding to 201.5 million eggs. The range over states of nature reflects the very large uncertainty in the scale of the estimated time-series: 128.3-353.0 million eggs. The aggregate spawning output estimates do not convey the spatial heterogeneity included via the area-specific dynamics: relative spawning output has differed markedly among the three states, with California having the largest spawning output at unexploited equilibrium, followed by Oregon and then Washington. Currently, Oregon is estimated to have the largest spawning output, followed by California, then Washington. Relative depletion also varies dramatically by state, with California estimated to be at 16.4% of unexploited conditions, Oregon, 22.5%, and Washington, 27.3% (Figure 133).

2.9 Uncertainty and Sensitivity Analysis

Although the base case assessment model captures some uncertainty via asymptotic intervals, uncertainty from two sources is reported through alternate states of nature bracketing the base case results and included explicitly in the decision table. The magnitude of the estimated catch time-series was found to have a large influence on the perception of current stock size and the estimate of steepness of the stock-recruit relationship was closely linked to the projected recovery rates. Alternate values of each were selected to bracket the best estimates with marginal probabilities one-half as likely. For historical catch, these values, 75% and 150% of the estimated catch series prior to 2000, were subjective, but reflect the lack of a comprehensive catch reconstruction in Washington and the change in likelihood of the fit to data sources over a reasonable range of catch levels (Figure 134). For steepness the $12^{.5th}$ and 87.5^{th} percentiles were calculated from the likelihood profile using the X^2 critical value of 1.127 as a proxy for the probability distribution about this point estimate. This resulted in alternate values for steepness of 0.344 and 0.508 about the maximum likelihood estimate. The most optimistic and pessimistic of the nine combinations from these two axes (weighted 6.25% each relative to 25% for the best estimate on each dimension) are reported in this document and all combinations used to provide a more realistic degree of uncertainty for future projections, decision tables and rebuilding analyses.

2.9.1 Sensitivity Analysis

The results reported in this section are by no means meant to be a comprehensive comparison of all possible aspects of model uncertainty, nor do they reflect even the full range of models considered in developing the base case. These results are intended to provide more information about relatively obvious questions for any stock assessment such as sensitivity to priors, key structural choices and potential conflict in signal among data sources. The order in which they are presented is not intended to reflect their importance; each run included here provided important information for developing or evaluating the base case model and alternate states of nature.

A series of sensitivity analyses were requested during the STAR panel review and are described here in the order in which they were requested. The STAT made the *a priori* decision to truncate all recreational CPUE series in 1999 to avoid the use of points in 2000 and 2001 that were potentially contaminated by changes in aggregate bag limits for rockfish and avoidance of certain species such as canary rockfish. When the CPUE estimates for 2000-2001 (California and Washington) were included in the base case model there was little change in the results for key parameters and derived quantities (Table 25). It is clear that the indices of abundance contribute very little to the overall objective function for this assessment, and that they appear to favor somewhat more pessimistic results. In order to better evaluate this pattern, a sensitivity run was performed where the likelihood contributions for all of the indices were increased by a factor of 10. This had the largest effect on the estimate for steepness, reducing the value to 0.30, but the estimate of depletion changed only to 15.4% and unexploited spawning output remained almost unchanged. Based on discussions with scientists at all three states while reviewing data sources for this assessment, the STAT decided to allow for recreational CPUE indices to be linear or non-linear via estimating an additional catchability exponent parameter for each series. This decision was largely driven by the inability to address major concerns over the behavior of these series via the standardization models (the data to do so not being extant). To test the influence of this decision on model results as sensitivity run was conducted forcing all recreational series to be strictly proportional to population abundance. This had very little effect on model results (Table 25).

During the STAR panel, a request was made to revisit the estimation of dome-shaped selectivity for the IPHC survey in Oregon. This was due to a mild pattern of over-predicting the largest fish for this series. When a very flat-topped dome was permitted (wide bounds on the width of the peak) the very largest fish were not estimated to be fully selected (Figure 135), however the ascending limb was nearly identical to the base case. Inspection of other selectivity curves in Oregon revealed no ‘cascade’ of dome-shaped estimates due to observations of at least a few large fish in each. Parameter estimates and management quantities were largely unchanged (Table 25). Inspection of recent growth data revealed evidence for a small size difference between yelloweye of both sexes in Oregon and Washington (Oregon fish slightly smaller) that could be an alternate explanation to dome-shaped selectivity (Figure 136). It was decided that further exploration of area-specific life-history characteristics (growth, maturity, fecundity) should be addressed before moving to dome-shaped selectivity for the IPHC survey in Oregon but not Washington.

Prior to the STAR panel review a range of sensitivity analyses were performed to investigate several aspects of the assessment. Because there was relatively little change between the pre- and post-STAR base case models (revised California recreational catches, addition of length-frequency data from the Northern California charter fleet, a processing error corrected in the Oregon recreational observer length-frequency data, and revision of the prior on natural mortality) these preliminary sensitivity analyses are retained here. Although the final base case may be slightly more or less sensitive to these factors than the pre-STAR model, they are still informative about the assessment.

The use of alternate states of nature for the level of historical yelloweye catches reflects the high degree of uncertainty in these estimates from both commercial and recreational sources. As is the case with any catch reconstruction, the plausible ‘envelope’ for actual catches probably widens for estimates farther back in time. In the case of catches this seems to be most relevant with the upper estimate rather than the lower as the likelihood of appreciable unaccounted for discarding goes up in the early time-periods. For this reason a series of pre-STAR models with 50% or 200% of the best estimates for historical catch were run using a different year to define the end of the ‘historical’ period. These pre-STAR models indicated a similar degree of sensitivity to alternate catch series for the period before 1996 and 1976 (Table 26).

The second set of pre-STAR sensitivity analyses presented here were intended to evaluate whether there is appreciably conflicting information among various data types and sources. Although this can also be evaluated via the likelihood profiles (see below), the implications for management related quantities are not always obvious without direct comparison of these estimates. To compare the influence of the length and age data (over all sources in the model) the emphasis was sequentially reduced by 50% for each. Very little change was observed from the pre-STAR base case results (Table 27). Given the high probability that the observed fishery dependent CPUE indices for yelloweye rockfish have been influenced by many factors other than population abundance, a model was run omitting these time-series. The results indicated these data were not having an undue influence on quantities of interest or key parameters (Table 27). Similarly, it is quite possible that the fishery independent sources of data have fundamental (and unknown) errors in our interpretation relative to this assessment (trawl surveys may not be adequately reflecting the population dynamics due to sparse sampling or more fundamental process errors like the biomass in trawlable areas not being proportional to the total). To investigate the effects of these data two pre-STAR models were run: 1) omitting all fishery independent data (index and biological) and 2) omitting all fishery independent data and forcing the catchability relationship between fishery dependent indices and population abundance to be linear (removing the Q power coefficients). Only the latter produced appreciable change in key quantities, increasing estimated steepness to 0.369, and therefore MSY to 53 mt, from 42.7 in the base case model (Table 27).

The third set of pre-STAR sensitivity models was intended to evaluate the effects of informative priors on steepness and natural mortality as well as the use of point estimates for the fecundity relationship, since this relationship is quite uncertain. Neither the steepness prior, the natural mortality priors or the fecundity relationship had much effect on the model results (Table 28).

The fourth set of pre-STAR sensitivity analyses was intended to address perhaps the most important choices made in building this assessment: structural choices regarding the explicit use of areas, sex-specific growth and mortality and estimation of recruitment deviations over the full time-series. Removing the explicit areas in the model increased the estimated steepness to 0.42 resulting in a slightly higher estimated MSY and current depletion (19.3%; Table 29). Removing sex-specific growth and mortality parameters (and therefore mimicking a single-sex model as has been used in previous assessments) resulted in very little change to model results, either with or without explicit areas included in the model structure (Table 29). When a full time-series of recruitment deviations was estimated, the modeled estimate of absolute biomass (historical and current) as well as current depletion went down (to 12.0%) but the perceived productivity of the stock went up (steepness to 0.393 and MSY to 49.7). However, in attempting to determine how reliable this model would be as a base case, a number of exploratory analyses were performed. Particularly, if many poorly informed deviations in recruitment strength and area apportionment are estimated in a maximum likelihood context it is important for these deviations to be zero-centered (such that reference point estimates are consistent with the observed time-series) and that the data are sufficiently informative to support their estimation. Given the lack of clear cohorts it is unclear whether there is appreciable evidence for recruitment variability; a reduction in the objective function of ~135 units was achieved, but with an additional 295 parameters. Shorter series of deviations resulted in frequent pathological behavior of the first or terminal deviations over areas, years or both. Perhaps more concerning for maximum likelihood estimation, was the result that although there were appreciable deviations in estimated annual recruitment strengths, the asymptotic variance estimates of these deviations were only slightly reduced below the input value for recruitment variability (σ_r, 0.5 for this sensitivity, but showing a similar pattern over a wide range of input values; Figure 137). In light of this behavior, it would be appealing to integrate over the deviation parameters, rather than trusting the maximum likelihood-based point estimates. Several attempts at summarizing the posterior density of model parameters and derived quantities resulted in poor performance of the jump function (likely due to parameter correlations and ambiguously determined recruitments: large in one of several years, but not in all, causing bimodal posterior distributions). Further, several issues regarding the application of the bias correction to get from the mean to the median during integration were identified, but could not be resolved in time for this assessment. These issues did not appear to have any effect on the base case model, where preliminary MCMC chains revealed little difference with MLE parameter estimates or confidence intervals.

In aggregate, these sensitivity analyses supported the use of historical catch as a primary axis of uncertainty, but suggest (not surprisingly) that this assessment is sensitive to many choices that cannot be clearly informed by the available data.

2.9.2 Retrospective Analysis

A 5-year retrospective analysis was conducted by running the model using data only through 2003 ("retrospective in 2004"), 2004, 2005, 2006 and 2007 (Figure 138). Little retrospective pattern is apparent as the terminal year of data is removed from the model.

The second type of retrospective analysis addresses assessment error, or at least the historical context of the current result given previous analyses. This comparison is framed in terms of relative depletion due to the use of a fecundity relationship this assessment. Because of this, some of the retrospective uncertainty in absolute scale of the yelloweye population is less pronounced. Since 2002, a pattern had emerged in which each new assessment was slightly more pessimistic about current status than those conducted previously, however the current results suggest a slight increase in relative spawning output (Figure 139).

2.9.3 Likelihood Profiles

Likelihood profiles (fully revised after the STAR panel) were completed for three key model parameters: steepness of the stock-recruit relationship (h), unexploited equilibrium recruitment (R_0), and male natural mortality (M_{males}). Likelihood profiles are commonly used to elucidate conflicting information among various data sources, to determine how asymmetric the likelihood surfaces surrounding point estimates may be, and to provide an additional evaluation of how precisely parameters are being estimated.

Steepness appears to be largely informed by the length data (Figure 140), but all likelihood components show a similar signal favoring steepness values below ~0.5. Although male natural mortality is correlated with steepness, it does not span a particularly wide range and is most correlated over the lowest steepness values (Figure 141).

Equilibrium recruitment is informed primarily by the length- and age-composition data (Figure 142); however, given a change of less than one unit of negative log-likelihood for the index data across a wide range of values, there appears (not surprisingly) to be no information in any of the abundance indices for this parameter. The choice to profile over male natural mortality was made easy, due to the nearly perfect correlation between estimated female natural mortality and the value used for males in the likelihood profile (Figure 143). For this reason, the profile can essentially be thought of as a profile over either male or female natural mortality. As was the case with R_0, the length and age data dominate the profile, showing a strong degradation to values much below 0.04 or above 0.052 (Figure 144). Again, the index data were largely uninformative and even the informative prior for female natural mortality was not having a substantial effect on the range of plausible parameter values.

2.9.4 Parametric Bootstrap Using Stock Synthesis

There is a built-in option to create bootstrapped data-sets using Stock Synthesis. This feature performs 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 strictly a variance estimation exercise, but an exploration of the question: If the assessment was true, and the same relative quantity and quality of data were available, how reliably could the parameters and derived quantities be re-estimated?

There was insufficient time to use this powerful diagnostic tool for this assessment, but it should be considered a standard method for full assessments where time permits its application. Its use is particularly important for cases where the asymptotic (or posterior) intervals about model estimates are used as the primary representation of uncertainty.

3. Rebuilding Parameters

Revised rebuilding projections will be presented in a separate document after the assessment has been reviewed in September 2009. Although the base case assessment model captures some uncertainty via asymptotic intervals, uncertainty from two sources is reported through alternate states of nature bracketing the base case results and will be included explicitly in the decision table (Table 30).

4. Reference Points

The spawning output of yelloweye rockfish was estimated to have dropped below the $SB_{40\%}$ management target in 1989 and the overfished threshold in 1994. In hindsight, the spawning output passed through the target and threshold levels with annual catch averaging almost five times the current estimate of the MSY. The coast-wide stock remains below the overfished threshold, although the spawning output is estimated to have been increasing since 2000 in response to reductions in harvest. The degree of increase is largely insensitive to the magnitude of historical catch and only moderately sensitive to the value for steepness, but the absolute scale of the population reflects alternate removal series very closely. Fishing mortality rates are estimated to have been in excess of the current F-target for rockfish of $SPR_{50\%}$ from 1976 through 1999 (Figure 145, Figure 146, Figure 147). Recent management actions have curtailed the rate such that recent SPR values are in excess of 60% over the last eight years (Figure 148). Relative exploitation rates (catch/biomass of age-8 and older fish) are estimated to have been at or less than 1% after 2001. The alternate states of nature result in estimated exploitation rates ranging from less than 1.6% to less than 0.6%.

Unfished spawning output was estimated to be 994 million eggs. The target stock size ($SB_{40\%}$) is therefore 398 million eggs and the overfished threshold ($SB_{25\%}$) is 249 million eggs. Maximum sustained yield (MSY), conditioned on current fishery selectivity and allocations, was estimated in the assessment model to occur at a spawning stock biomass of 388 million eggs and produce an MSY catch of 56.4 mt (slightly above the estimate from the 2007 assessment of 43.7 mt). However, the yield at MSY is extremely sensitive to states of nature resulting in a wide range for this value from 31.5 to 107.9 mt. Maximum sustainable yield is estimated to be achieved at an SPR of 60.4% (range of states of nature: 51.2-69.7%). This is nearly identical to the yield, 56.1 mt, generated by the SPR (61.0%) that stabilizes the stock at the $SB_{40\%}$ target. The fishing mortality target/overfishing level (SPR = 50.0%) results in a much smaller equilibrium yield of 48.9 mt at a spawning output of 230 million eggs (23.1% of the unfished level). In sum, although the estimated MSY spawning output is very close to the proxy level, the harvest rate needed to achieve equilibrium at 40% of the unfished level in substantially lower than the MSY-proxy rate.

5. Harvest Projections and Decision Tables

The forecast reported here will be replaced by the rebuilding analysis to be completed in September-October 2009 following SSC review of the stock assessment. In the interim, the total catch in 2009 and 2010 is set equal to the OY (17 mt). The target exploitation rate for 2011 and beyond is based upon an SPR of 71.9%, which approximates the harvest level in the current (2007) rebuilding strategy (the 71.9% SPR rate represents the target after the 'ramp-down' portion of the strategy is completed in 2010). Uncertainty in the rebuilding forecast will be included via integrating over all combinations of the alternate states of nature for catch history and steepness. Current medium-term forecasts predict increases in coast-wide abundance under the SPR=71.9% rebuilding strategy, however these increases are largely driven by the California and Oregon portions of the stock. In fact, the Washington portion is projected to remain at current levels under recent allocation of catch. Catch allocation used for the forecast reflects the average distribution of Fs in 2005-2007 among fleets (recreational, commercial) in: Washington (0.013, 0.005), Oregon (0.004, 0.002) and California (0.006, 0.003). The estimated OY values for 2011 and 2012 are larger (20.9, 21.2) than those predicted from the 2007 rebuilding analysis (13.9, 14.2).The projection of expected yelloweye rockfish catch, spawning output (by area) and depletion shows very slow recovery (Table 31). It may be desirable to evaluate specific allocation scenarios, if relative removals based on future management actions will be substantially different than recent values by state.

Because yelloweye rockfish are currently managed under a rebuilding plan, the decision table included here (Table 32) is only intended to better evaluate the management implications of the considerable uncertainty in the base case assessment model. Various alternate management actions including SPR rates and fixed OYs will be evaluated in the rebuilding analysis. Landings in 2009-2010 are 17 mt for all cases. Catch allocation used for the forecast reflects the same relative *F*s used in the forecasts.

6. Regional Management Considerations

The choice to model the yelloweye rockfish stock with explicit areas in the assessment model is based on the sedentary life-history of adult yelloweye, and the markedly different population trends as well as historical and current exploitation rates among the three states. Current population status differs by state, with both near term forecasts as well as longer term the rates of recovery under OY catches predicted to be quite different for each area. This information may be valuable for making management and allocation decisions; alternate future projections can easily be added to this assessment, as needed, to better describe the implications of these choices.

The use of area-specific vs. coast-wide assessment models and management tools should be considered a major source of uncertainty. Future efforts, including links to

Canadian waters and alternate approaches to meta-population dynamics could produce differing results.

7. Research Needs

The available data for yelloweye rockfish are very sparse and generally weakly informative about current status. The following research topics could improve the ability of this assessment to reliably model the yelloweye rockfish population dynamics in the future and provide better monitoring of progress toward rebuilding:

1. Develop and implement a comprehensive visual survey.
2. Do a scientific review of current efforts to develop and improve stock size indices for yelloweye based on IPHC (including additional stations) and make recommendations on the best approaches to develop such indices.
3. Explore a recalculation of GLMM estimates in the IPHC survey that explores station effects which allows inclusion of stations that differ over time.
4. Continue to refine historical catch estimates using ex-vessel prices, etc., particularly in WA.
5. Investigate the development of a WA recreational yelloweye CPUE based on the recreational halibut fishery. Consider a full time series and one ending in 2002, since the yelloweye RCA in waters off northern WA was implemented in 2003.
6. Encourage the collection of samples to refine the estimate biological parameters, particularly maturity and fecundity.
7. Continue to evaluate the spatial aspects of the assessments, including growth, the number and placement of boundaries between areas, as well as the northern boundary with Canada.
8. More work is needed to better understand the performance of maximum likelihood and Bayesian estimators of stock size and trends when large numbers of poorly informed recruitment deviations are estimated. Although it is logically appealing to include such uncertainty, even when little coherent data informing cohort strengths is available, technical and computational issues need to be solved before this approach can be implemented in a case like yelloweye rockfish.
9. Investigate alternative ways of re-weighting. This issue is relevant for all west coast stock assessments.
10. Investigate how best to account for the variability in dates in trawl surveys through a meta-analysis. This issue is relevant for all west coast stock assessments.
11. Continue to refine coast-wide historical catch estimates. This issue is relevant for all west coast stock assessments.
12. Access and processing of recreational data (catch and biological sampling) currently entails differing locations and formats for data from each of the three states and RecFIN. A single database that holds all raw recreational data in a consistent format would reduce assessment time spent on processing these data and potential introduction of errors or alternate interpretations due to processing.
13. The IPHC data organization should be revisited. Currently biological samples cannot be linked to the station from which they were collected. Age data for 2003-2005 is disconnected from length and sex information and other unknown issues may persist in

these data. A thorough evaluation of what data are reliable and a final determination of what information is lost, or can potentially be recovered, is needed.

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10. Tables

Table 1. Total catches (mt) of yelloweye rockfish by fleet used in the assessment model. Foreign and research catches are included in commercial totals. See text for description of sources.

Year	California Recreational	California Commercial	Oregon Recreational	Oregon Commercial	Washington Recreational	Washington Commercial
1916	0.00	2.20	0.00	0.00	0.00	0.00
1917	0.00	3.62	0.00	0.00	0.00	0.00
1918	0.00	4.25	0.00	0.00	0.00	0.00
1919	0.00	2.16	0.00	0.00	0.00	0.00
1920	0.00	2.38	0.00	0.00	0.00	0.00
1921	0.00	2.30	0.00	0.00	0.00	0.00
1922	0.00	2.06	0.00	0.00	0.00	0.00
1923	0.00	2.21	0.00	0.00	0.00	0.00
1924	0.00	2.82	0.00	0.00	0.00	0.00
1925	0.00	3.86	0.00	0.00	0.00	1.00
1926	0.00	4.87	0.00	0.00	0.00	1.00
1927	0.00	5.92	0.00	0.00	0.00	1.00
1928	0.00	5.52	0.00	0.12	0.00	1.00
1929	0.73	5.66	0.00	0.21	0.00	1.00
1930	1.18	6.76	0.00	0.20	0.00	1.00
1931	1.76	5.62	0.00	0.15	0.00	1.00
1932	2.35	8.13	0.00	0.06	0.00	1.00
1933	2.94	4.45	0.00	0.08	0.00	1.00
1934	3.53	5.78	0.00	0.09	0.00	1.00
1935	4.12	7.99	0.00	0.08	0.00	1.00
1936	4.70	8.08	0.00	0.20	0.00	1.00
1937	5.61	6.08	0.00	0.26	0.00	1.00
1938	5.50	6.36	0.00	0.23	0.00	1.00
1939	4.81	6.43	0.00	0.17	0.00	1.00
1940	6.85	4.57	0.00	1.04	0.00	1.00
1941	6.25	5.35	0.00	2.18	0.00	1.00
1942	6.78	3.37	0.00	3.18	0.00	1.00
1943	7.30	5.89	0.00	11.61	0.00	1.00
1944	7.83	24.88	0.00	19.06	0.00	1.00
1945	8.36	58.56	0.00	29.27	0.00	1.00
1946	8.88	57.74	0.00	18.22	0.00	1.00
1947	5.02	16.28	0.00	11.40	0.00	1.00
1948	10.12	23.30	0.00	7.81	0.00	1.00
1949	13.09	9.89	0.00	7.94	0.00	1.00
1950	15.95	8.03	0.00	9.60	0.00	1.00
1951	17.91	16.99	0.00	6.20	0.00	1.00
1952	15.95	14.15	0.00	6.34	0.00	1.00
1953	13.97	11.77	0.00	5.07	0.00	1.00
1954	18.74	11.78	0.00	6.38	0.00	1.00
1955	24.06	6.98	6.20	6.70	1.00	2.00
1956	27.15	10.40	6.50	4.12	1.00	2.00
1957	24.78	13.17	6.70	11.81	1.00	2.00
1958	35.91	13.41	7.00	9.08	2.00	2.00
1959	30.41	10.25	7.20	9.97	2.00	2.00
1960	22.05	8.88	7.50	12.64	2.00	2.00

Table 1. Continued. Total catches (mt) of yelloweye rockfish by fleet used in the assessment model.

Year	California Recreational	California Commercial	Oregon Recreational	Oregon Commercial	Washington Recreational	Washington Commercial
1961	17.68	5.25	7.70	11.52	2.00	2.00
1962	22.08	5.43	8.00	13.43	2.00	2.00
1963	23.10	10.86	8.20	8.65	3.00	4.00
1964	20.82	7.52	8.50	8.68	3.00	4.00
1965	31.51	9.38	8.70	7.33	3.00	4.00
1966	35.34	8.97	9.00	10.20	3.00	4.00
1967	36.60	7.85	9.20	8.74	3.00	4.00
1968	42.79	7.66	9.50	7.13	3.00	4.00
1969	44.97	25.70	9.70	12.18	3.00	4.00
1970	51.89	27.70	10.00	10.43	4.00	5.10
1971	46.17	46.50	13.10	4.64	4.00	6.41
1972	59.61	63.66	16.30	8.49	4.00	7.31
1973	75.02	49.51	7.40	10.58	4.00	9.21
1974	80.47	56.38	12.80	6.95	4.00	10.31
1975	81.34	60.24	6.20	7.92	4.00	7.10
1976	88.56	57.96	19.40	15.18	4.30	10.30
1977	79.78	57.45	19.90	16.24	8.80	17.88
1978	74.46	154.20	24.50	28.50	4.50	23.90
1979	85.49	99.33	38.80	62.20	3.50	28.50
1980	80.19	42.07	31.50	68.34	2.40	35.06
1981	43.58	169.44	36.00	102.20	3.40	9.70
1982	79.60	154.33	56.90	114.50	3.40	12.60
1983	38.36	62.69	63.80	177.41	6.70	16.99
1984	71.26	53.66	43.70	57.06	12.20	13.42
1985	121.87	12.22	26.80	91.88	8.80	26.41
1986	77.31	33.51	27.40	65.62	9.00	14.94
1987	57.83	54.31	29.80	73.72	10.50	25.09
1988	60.07	65.44	9.40	110.73	8.30	25.56
1989	54.44	51.25	16.90	170.21	14.60	39.50
1990	40.06	81.32	18.70	61.12	9.90	26.27
1991	27.38	147.30	17.20	137.74	18.00	20.36
1992	16.41	111.10	29.40	165.88	16.20	33.85
1993	7.13	52.92	27.73	183.18	18.00	29.76
1994	13.78	56.02	21.57	102.19	10.30	19.58
1995	10.08	51.40	16.81	148.34	9.90	18.07
1996	12.74	76.54	8.17	92.52	10.80	16.89
1997	14.58	68.68	15.38	115.42	11.40	18.68
1998	4.84	21.89	18.78	41.47	14.40	5.57
1999	9.40	23.49	18.05	61.35	10.60	32.92
2000	5.71	4.02	9.52	3.64	10.10	7.86
2001	6.37	4.35	4.83	6.23	12.50	21.84
2002	2.49	1.07	3.14	1.90	3.70	3.48
2003	3.74	0.71	3.02	1.02	2.60	1.30
2004	0.60	1.34	3.69	1.50	3.70	1.50
2005	0.90	1.86	4.30	1.45	5.20	1.36

Table 1. Continued. Total catches (mt) of yelloweye rockfish by fleet used in the assessment model.

Year	California Recreational	California Commercial	Oregon Recreational	Oregon Commercial	Washington Recreational	Washington Commercial
2006	4.10	0.83	2.85	1.88	1.70	1.01
2007	8.00	2.92	3.14	1.95	2.49	1.14
2008	2.10	0.43	4.10	2.49	2.80	4.74

Table 2. Recent trend in yelloweye rockfish catch (mt) relative to management guidelines.

Year	ABC (mt)	OY (mt)	Commercial Catch (mt)[1]	Recreational Catch (mt)	Total Catch (mt)
1999	39[2]	NA	117.8	38.1	155.8
2000	39[2]	NA	15.5	25.3	40.9
2001	29[3]	NA	32.5	23.7	56.1
2002	27[3]	13.5[3]	6.4	9.3	15.8
2003	52	22	3.2	9.4	12.4
2004	53	22	4.4	8.0	12.3
2005	54	26	5.3	10.4	15.1
2006	55	27	3.8	8.7	12.4
2007	47	23	7.9	13.6	19.6
2008	47	20	7.8	9.0	16.7

[1]Includes research, foreign and discarded catches after 2001.
[2]Includes the Columbia and Vancouver INPFC areas only.
[3]Includes the Columbia, Vancouver and Eureka INPFC areas only.

Table 3. Summary of data sources used in the yelloweye assessment in 2009.

	1916-24	1925-27	1928	1929-54	1955-65	1966-76	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	2007	2008
<u>Catches</u>																																						
CA Recreational				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
CA Commercial	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
OR Recreational					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
OR Commercial			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
WA Recreational					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
WA Commercial		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
Foreign						X																																
Research							X			X			X			X			X			X			X			X			X		X	X	X	X	X	X
WCGOP discards																																X	X	X	X	X	X	X
<u>Fishery Data</u>																																						
<u>CPUE</u>																																						
CA Recreational										X	X	X	X	X	X	X							X	X	X	X	X	X	X									
CA Rec. Charter																		X	X	X	X	X	X	X	X	X	X	X										
OR Recreational									X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X									
WA Recreational																				X	X	X	X	X	X	X	X	X	X									
OR Rec. Charter																																		X	X	X	X	X
<u>Age</u>																																						
CA Recreational													X													X												
CA Commercial								X	X	X	X	X	X		X	X		X													X				X			
OR Recreational									X					X	X	X	X		X												X							
OR Commercial																															X	X	X	X	X	X	X	
WA Recreational																												X	X	X	X			X	X	X		X
WA Commercial																							X								X	X	X	X	X	X	X	X
<u>Length</u>																																						
CA Recreational																							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CA Rec. Charter																	X	X	X	X	X	X	X	X	X	X	X	X										
CA Commercial								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	
OR Recreational								X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X					
OR Rec. Charter																																		X	X	X	X	X
OR Commercial																						X			X	X	X	X	X	X	X	X	X	X	X	X	X	X
WA Recreational																												X	X	X	X			X	X	X		X
WA Commercial										X														X		X	X	X	X	X	X	X	X	X	X	X	X	X

Table 3. Continued. Summary of data sources used in the yelloweye assessment in 2009.

	1916-24	1925-27	1928	1929-54	1955-65	1966-76	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	2007	2008
<u>***Survey data***</u>																																						
<u>*Index*</u>																																						
IPHC (OR)																													X	X	X	X	X	X	X	X	X	X
IPHC (WA)																													X	X	X	X	X	X	X	X	X	X
Triennial (WA)										X			X			X			X			X			X			X			X			X				
NWFSC (OR)																																	X	X	X	X	X	X
<u>*Age*</u>																																						
IPHC (OR)																																	X	X	X	X	X	X
IPHC (WA)																																	X	X	X	X	X	X
<u>*Length*</u>																																						
IPHC (OR)																																	X	X	X	X	X	X
IPHC (WA)																																	X	X	X	X	X	X
Triennial (WA)										X			X			X			X			X			X			X			X			X				
NWFSC (OR)																																	X	X	X	X	X	X

Table 4. Sample information contributing to the index of abundance from the IPHC long-line survey.

	Oregon (57 stations)		Washington (27 stations)	
Year	Positive stations	Number of fish	Positive stations	Number of fish
1999	6	325	2	11
2001	6	149	3	54
2002	7	125	2	16
2003	8	215	6	101
2004	7	151	6	19
2005	7	81	7	75
2006	5	68	5	22
2007	7	102	4	30
2008	9	122	6	13

Table 5. Number of fish contributing biological information caught in association with the IPHC long-line survey (Note that a few fish were ambiguously allocated to state in the available data).

Year	Lengths (sexed)		Ages (sexed > 2005)	
	Oregon	Washington	Oregon	Washington
1999	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
2003	217	99	215	99
2004	155	17	157	17
2005	68	72	62	72
2006	58	34	58	34
2007	103	268	101	268
2008	253	83	251	83

Table 6. Summary of sampling used in the calculation of yelloweye biomass indices for the shelf trawl surveys.

	Triennial (WA only)			NWFSC (OR only)		
Year	Number of tows	Positive tows	Number of fish	Number of tows	Positive tows	Number of fish
1980	101	3	16	NA	NA	NA
1983	176	13	13	NA	NA	NA
1986	263	21	114	NA	NA	NA
1989	113	14	66	NA	NA	NA
1992	107	7	90	NA	NA	NA
1995	83	3	38	NA	NA	NA
1998	87	7	11	NA	NA	NA
2001	87	8	26	NA	NA	NA
2003	NA	NA	NA	62	7	100
2004	75	5	23	83	5	11
2005	NA	NA	NA	118	6	13
2006	NA	NA	NA	123	8	35
2007	NA	NA	NA	118	5	14
2008	NA	NA	NA	105	8	14

Table 7. Summary of data used to produce NWFSC and Triennial trawl survey length-frequency data.

	Triennial (WA only)		NWFSC (OR only)	
Year	Number of Samples	Number of fish	Number of samples	Number of Fish
1980	0	0	NA	NA
1983	0	0	NA	NA
1986	13	51	NA	NA
1989	9	44	NA	NA
1992	4	7	NA	NA
1995	5	7	NA	NA
1998	10	19	NA	NA
2001	10	21	NA	NA
2003	NA	NA	7	24
2004	4	10	5	11
2005	NA	NA	6	12
2006	NA	NA	8	35
2007	NA	NA	5	14
2008	NA	NA	8	14

Table 8. Comparison of density estimates from U.S. and Canadian visual surveys.

Region	Year	Local area	Platform	Method	N fish obs.	Density (N/ha)	Reference
SE AK	1991	CSEO	Delta sub	Line transect	NA	20.3	(Brylinsky et al. 2007)
SE AK	1994	SSEO	Delta sub	Line transect	99	11.7	(Brylinsky et al. 2007)
SE AK	1994	NSEO	Delta sub	Line transect	39	8.4	(Brylinsky et al. 2007)
SE AK	1995	CSEO	Delta sub	Line transect	235	29.3	(Brylinsky et al. 2007)
SE AK	1997	CSEO	Delta sub	Line transect	166	25.3	(Brylinsky et al. 2007)
SE AK	1997	Fairweather	Delta sub	Line transect	256	41.8	(Brylinsky et al. 2007)
SE AK	1999	EYKT	Delta sub	Line transect	206	23.2	(Brylinsky et al. 2007)
SE AK	1999	SSEO	Delta sub	Line transect	288	18.8	(Brylinsky et al. 2007)
SE AK	2001	NSEO	Delta sub	Line transect	30	14.2	(Brylinsky et al. 2007)
SE AK	2003	EYKT	Delta sub	Line transect	323	35.6	(Brylinsky et al. 2007)
SE AK	2003	CSEO	Delta sub	Line transect	706	18.8	(Brylinsky et al. 2007)
SE AK	2005	SSEO	Delta sub	Line transect	283	22.0	(Brylinsky et al. 2007)
SE AK	2007	CSEO	Delta sub	Line transect	301	10.7	(Brylinsky et al. 2007)
BC	2000	Bowie Seamount	Delta sub	Strip transect	NA	154[1]	(Yamanaka Unpublished data)
BC	2000	Queen Charlotte Islands	Delta sub	Strip transect	NA	27[1]	(Yamanaka Unpublished data)
BC	2003	Strait of Georgia	Towed camera	Strip transect	NA	3.4[2]	(Martin and Yamanaka 2004)
BC	2003	Strait of Georgia	Aquarius sub	Line transect	NA	5.6[3]	(Yamanaka Unpublished data)

[1]3rd quartile of distance from center line used as width.
[2]Hardpan substrate only.
[3]Bedrock substrate only.

Table 8. Continued. Comparison of density estimates from U.S. and Canadian visual surveys.

Region	Year	Local area	Platform	Method	N fish obs.	Density (N/ha)	Reference
BC	2005	Strait of Georgia	Aquarius sub	Line transect	NA	79.8	(Yamanaka Unpublished data)
BC	2005	Queen Charlotte Islands	Aquarius sub	Line transect	NA	6.6	(Yamanaka Unpublished data)
WA	1998	Olympic Coast	Delta sub	Strip transect	36	8.7[4]	(Jagielo et al. 2003)
OR	1988	Heceta Bank	Delta sub	Strip transect	NA[5]	5.2	(Tissot et al. 2007)
OR	1989	Heceta Bank	Delta sub	Strip transect	NA[5]	5.8	(Tissot et al. 2007)
OR	1990	Heceta Bank	Delta sub	Strip transect	NA[5]	3.5	(Tissot et al. 2007)
OR	1990	Daisy Bank	Delta sub	Strip transect	11	11.6[6]	(Hixon et al. 1991, Hixon and Tissot 1992)
OR	1990	Coquille Bank (Bandon High Spot)	Delta sub	Strip transect	2	1.0[7]	(Hixon et al. 1991, Hixon and Tissot 1992)
OR	1991	Stonewall Bank	Delta sub	Strip transect	70	5.5[8]	(Hixon et al. 1991, Hixon and Tissot 1992)
OR	2002	Heceta Bank	Delta sub	Strip transect	48	4.5	(York 2005, Wakefield et al. Unpublished data.)
OR	2000	Heceta Bank	ROPOS ROV	Strip transect	66	9.0	(Wakefield et al. Unpublished data.)
OR	2001	Heceta Bank	ROPOS ROV	Strip transect	58	7.5	(Wakefield et al. Unpublished data.)
CA	1992-93	Soquel Canyon	Delta sub	Strip transect	104	30.8[9]	(Yoklavich et al. 2000)

[4]Direct counts from “untrawlable habitat”.
[5]Total of 160 yelloweye RF observed across all three years.
[6]Surveyed 1.0 hours.
[7]Surveyed 2.0 hours.
[8]Surveyed 12.8 hours.
[9]Density estimate based on total number observed relative to total area surveyed.

Table 9. Summary of fixed biological parameters estimated externally and used as input for this stock assessment

Quantity	Value	Source
Female weight-length coefficient (*a*)	0.00000977	All available data pooled from fishery and survey sources.
Female weight-length exponent (*b*)	3.17	
Male weight-length coefficient (*a*)	0.0000170	
Male weight-length exponent (*b*)	3.03	
Female length at 50% maturity	38.78	Hannah and Bloom, 2009
Female maturity logistic slope	-0.437	
Fecundity eggs/kilogram intercept	137,900	Dick, 2009
Fecundity slope	36,500	

Table 10. Summary of sampling used to generate the Oregon charter observer CPUE index.

Year	Number of observed drifts	Number of observed angler-drifts	Number of yelloweye encountered
2004	905	6,538	22
2004	949	6,510	21
2005	1,100	7,163	5
2006	1,396	8,746	37
2007	1,349	7,813	52
2008	905	6,538	22

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

	California		California Charter		Oregon		Oregon Observer		Washington	
Year	N trips	N fish	N trips	N fish	N trips	N fish	N trips	N fish	N hauls	N fish
1978	0	0	0	0	NA	120	0	0	0	0
1979	0	0	0	0	NA	107	0	0	0	0
1980	0	0	0	0	13	25	0	0	0	0
1981	0	0	0	0	8	13	0	0	0	0
1982	0	0	0	0	24	61	0	0	0	0
1983	0	0	0	0	8	17	0	0	0	0
1984	0	0	0	0	53	348	0	0	0	0
1985	0	0	0	0	31	222	0	0	0	0
1986	0	0	0	0	14	175	0	0	0	0
1987	0	0	16	23	22	165	0	0	0	0
1988	0	0	61	276	25	38	0	0	0	0
1989	0	0	84	279	36	112	0	0	0	0
1990	0	0	31	89	0	0	0	0	0	0
1991	0	0	37	112	0	0	0	0	0	0
1992	0	0	81	164	0	0	0	0	0	0
1993	5	33	77	203	88	163	0	0	0	0
1994	5	61	75	189	84	151	0	0	0	0
1995	9	47	72	152	50	110	0	0	0	0
1996	11	75	64	164	38	73	0	0	0	0
1997	3	9	68	144	51	99	0	0	0	0
1998	5	18	31	55	74	147	0	0	1	25
1999	8	88	0	0	109	246	0	0	4	95
2000	5	47	0	0	37	62	0	0	7	189
2001	5	15	0	0	204	368	0	0	10	101
2002	4	13	0	0	278	448	0	0	0	0
2003	4	15	0	0	306	490	2	2	0	0
2004	7	15	0	0	0	0	11	22	5	12
2005	10	57	0	0	0	0	12	26	2	4
2006	13	95	0	0	0	0	24	49	1	1
2007	11	57	0	0	0	0	23	56	0	0
2008	6	27	0	0	0	0	21	64	3	6

Table 12. Summary of sampling effort generating length-frequency distributions used in the assessment model for the commercial fleets.

	California		Oregon		Washington	
Year	N trips	N fish	N trips	N fish	N trips	N fish
1978	2	15	0	0	0	0
1979	15	60	0	0	0	0
1980	18	35	0	0	2	4
1981	17	62	0	0	0	0
1982	10	18	0	0	0	0
1983	20	43	0	0	0	0
1984	19	30	0	0	0	0
1985	20	27	0	0	0	0
1986	20	23	0	0	0	0
1987	18	26	0	0	0	0
1988	14	21	0	0	0	0
1989	20	51	0	0	0	0
1990	15	28	0	0	0	0
1991	27	224	0	0	0	0
1992	75	493	13	1	0	0
1993	97	710	0	0	2	20
1994	82	736	0	0	0	0
1995	37	378	73	5	0	0
1996	80	526	129	7	24	298
1997	53	290	232	7	21	142
1998	18	62	95	3	13	63
1999	58	508	166	11	8	45
2000	14	26	141	34	20	361
2001	26	146	219	46	31	583
2002	9	12	14	8	36	195
2003	3	4	30	2	24	59
2004	25	71	61	14	18	51
2005	12	54	39	22	16	23
2006	6	28	15	6	24	102
2007	20	79	5	3	6	29
2008	0	0	16	3	1	1

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

Year	California		Oregon		Oregon Observer		Washington	
	N trips	N fish	N trips	N fish	N trips	N fish	N trips	N fish
1978	0	0	0	0	0	0	0	0
1979	0	0	1	17	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	1	1	0	0	0	0	0	0
1984	0	0	10	88	0	0	0	0
1985	0	0	8	54	0	0	0	0
1986	0	0	12	68	0	0	0	0
1987	0	0	9	63	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	4	17	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	1	1	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	1	25
1999	0	0	0	0	0	0	4	95
2000	0	0	0	0	0	0	7	189
2001	0	0	4	28	0	0	10	101
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	5	10
2005	0	0	0	0	0	0	2	4
2006	0	0	0	0	0	0	1	1
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	3	6

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

	California		Oregon		Washington	
Year	N trips	N fish	N trips	N fish	N trips	N fish
1978	2	6	0	0	0	0
1979	5	10	0	0	0	0
1980	5	8	0	0	0	0
1981	2	7	0	0	0	0
1982	1	1	0	0	0	0
1983	1	1	0	0	0	0
1984	0	0	0	0	0	0
1985	4	10	0	0	0	0
1986	2	4	0	0	0	0
1987	0	0	0	0	0	0
1988	1	5	0	0	0	0
1989	0	0	0	0	0	0
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	0	0	0	0	2	19
1994	0	0	0	0	0	0
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	1	14	1	9	9	144
2002	0	0	3	4	12	104
2003	0	0	1	29	5	18
2004	0	0	7	16	13	41
2005	2	7	14	29	11	19
2006	0	0	11	12	24	96
2007	0	0	4	4	9	28
2008	0	0	0	0	1	1

Table 15. Description of model parameters in the base case assessment model.

Parameter	Number estimated	Bounds (low, high)	Prior (Mean, SD)
Natural mortality (*M*, female)	1	(0.01,0.15)	Normal (0.0517,0.0226)
Natural mortality (*M*, male)	1	(0.01,0.15)	Normal (0.0517,0.0226)
Stock and recruitment			
Ln(R_0)	1	(3,15)	Uniform
Ln(Mean recruitment offset Oregon, normalized)	1	(-5,5)	Uniform
Ln(Mean recruitment offset Washington, normalized)	1	(-5,5)	Uniform
Steepness (*h*)	1	(0.2,1.0)	Beta (0.73,0.189)
Catchability			
Surveys:			
Ln(*Q*) – IPHC Oregon	-	Analytic solution	
Ln(*Q*) – IPHC Washington	-	Analytic solution	
Ln(*Q*) – NWFSC survey (OR only)	-	Analytic solution	
Ln(*Q*) – Triennial survey (1980-1992, WA only)	1	(-10,0)	Uniform
Ln(*Q*) – Triennial survey offset (1995-2004) to early	1	(-4,4)	Uniform
Fisheries:			
Ln(*Q*) – Fisheries	-	Analytic solution	
Power coefficient for Ln(*Q*) relationship	4	(-6,6)	Uniform
Selectivity			
Fisheries (logistic):			
Length selectivity inflection	7	(10,70)	Uniform
95% width of selectivity logistic	7	(0.001,50)	Uniform
IPHC Surveys (logistic):			
Length selectivity inflection	2	(10,70)	Uniform
95% width of selectivity logistic	2	(0.001,50)	Uniform
Trawl Surveys (double-normal):			
Length at peak selectivity	1	(20,87)	Uniform
Width of top (as logistic)	-	Fixed at -4	
Ascending width (as exp[width])	2	(0,8)	Uniform
Descending width (as exp[width])	1	(0,12)	Uniform
Initial selectivity (as logistic)	1	(-10,10)	
Final selectivity (as logistic)	-	Fixed at 10, or not used	
Individual growth			
Females:			
Length at age 1	1	(10,35)	Uniform
Length at age 70	1	(40,120)	Uniform
von Bertalanffy *K*	1	(0.01,0.2)	Uniform
CV of length at age 1	1	(0.05,0.2)	Uniform
CV of length at age 70	1	(0.05,0.2)	Uniform
Males:			
Length at age 1 offset to females	-	NA	Fixed at 0.0
Length at age 70	1	(40,120)	Uniform
von Bertalanffy *K*	1	(0.01,0.2)	Uniform
CV of length at age 1	1	(0.05,0.2)	Uniform
CV of length at age 70	1	(0.05,0.2)	Uniform
Total: 44 estimated parameters			

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
Fishery independent:				
Length	IPHC (OR)	0.73[1]	103.9	104.5
	IPHC (WA)	0.62[1]	59.2	59.0
	Triennial (WA)	2.08	19.7	20.2
	NWFSC (OR)	2.79	21.8	23.4
Age	IPHC (OR)	0.74	8.4	8.4
	IPHC (WA)	0.90	7.5	7.6
Fishery dependent:				
Length	CA Recreational	3.24	41.3	43.5
	CA Rec. Charter	1.52	120.6	125.3
	CA Commercial	2.25	113.3	113.4
	OR Recreational	0.54[1]	72.5	73.0
	OR Rec. Charter	1.44	34.2	39.6
	OR Commercial	2.16	49.6	51.0
	WA Recreational	5.49	63.6	66.7
	WA Commercial	1.57	54.3	55.0
Age	CA Recreational	1	1.0	1.0
	CA Commercial	1	1.2	1.5
	OR Recreational	1	1.9	2.4
	OR Commercial	1	1.5	1.6
	WA Recreational	1	3.2	4.0
	WA Commercial	1	2.8	3.4

[1]Length data with initial input sample sizes (before tuning) based on number of fish instead of number of samples.

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	SD log(value) adjustment	Mean input SD log(value) after adjustment	RMSE	~95% CI intersection
Fishery independent:				
IPHC (OR)	+0.36	0.45	0.45	9/9
IPHC (WA)	+0.54	0.74	0.74	9/9
Triennial (WA)	+0.41	0.99	0.99	9/9
NWFSC (OR)	+0.42	1.00	1.00	5/6
Fishery dependent:				
CA Recreational	+0.16	0.53	0.53	14/14
CA Rec. Charter	+0.02	0.19	0.19	11/11
OR Recreational	+0.10	0.29	0.28	18/19
OR Rec. Charter	0.00	0.57	0.45	5/5
WA Recreational	0.00	0.92	0.42	10/10

Table 18. Estimated parameter values for the base case model and alternate states of nature.

Parameter	Low	Base case	High
Natural mortality (*M*, female)	0.048	0.047	0.046
Natural mortality (*M*, male)	0.048	0.047	0.046
Ln(R_0)	5.182	5.425	5.799
Ln(Mean recruitment offset Oregon, normalized)	-0.099	-0.099	-0.097
Ln(Mean recruitment offset Washington, normalized)	-1.283	-1.306	-1.324
Steepness (*h*; not estimated in the low or high cases)	0.344	0.417	0.508
CA Rec. power coefficient for Ln(*Q*) relationship	-0.051	0.056	0.179
CA Rec. Obs. power coefficient for Ln(*Q*) relationship	0.347	0.546	0.786
OR Rec. power coefficient for Ln(*Q*) relationship	-0.158	-0.078	0.015
WA Rec. power coefficient for Ln(*Q*) relationship	-0.316	-0.274	-0.224
Ln(*Q*) – Triennial survey (1980-1992, WA only)	0.621	0.355	-0.038
Ln(*Q*) – Triennial survey offset (1995-2004) to early	-0.590	-0.631	-0.676
CA Rec. length selectivity inflection	33.634	33.837	34.038
CA Comm. length selectivity inflection	36.040	36.149	36.248
OR Rec. length selectivity inflection	31.840	32.036	32.236
OR Rec. Obs. length selectivity inflection	22.372	22.727	23.061
OR Comm. length selectivity inflection	38.747	38.864	38.954
WA Rec. length selectivity inflection	42.110	42.643	43.083
WA Comm. length selectivity inflection	43.627	43.863	44.056
CA Rec. 95% width of selectivity logistic	13.846	13.697	13.531
CA Comm. 95% width of selectivity logistic	12.035	11.939	11.823
OR Rec. 95% width of selectivity logistic	7.988	8.021	8.038
OR Rec. Obs. 95% width of selectivity logistic	3.835	4.113	4.356
OR Comm. 95% width of selectivity logistic	12.355	12.189	11.972
WA Rec. 95% width of selectivity logistic	11.842	12.015	12.076
WA Comm. 95% width of selectivity logistic	10.511	10.466	10.392
OR IPHC length selectivity inflection	46.939	47.002	47.056
WA IPHC length selectivity inflection	57.807	57.989	58.117
OR IPHC 95% width of selectivity logistic	5.312	5.318	5.313
WA IPHC 95% width of selectivity logistic	9.831	9.829	9.818
NWFSC Length at peak selectivity	52.065	52.193	52.327
NWFSC ascending width (as exp[width])	6.432	6.346	6.265
Triennial ascending width (as exp[width])	6.655	6.670	6.686
NWFSC descending width (as exp[width])	3.202	3.169	3.132
Triennial initial selectivity (as logistic)	-2.957	-3.093	-3.234
Female length at age 1	18.524	18.393	18.227
Female length at age 70	62.418	62.380	62.346
Female von Bertalanffy *K*	0.049	0.049	0.049
Female CV of length at age 1	0.128	0.128	0.128
Female CV of length at age 70	0.071	0.071	0.072
Male length at age 70	64.783	64.738	64.701
Male von Bertalanffy *K*	0.048	0.048	0.049
Male CV of length at age 1	0.131	0.130	0.129
Male CV of length at age 70	0.061	0.061	0.061

Table 19. Yelloweye rockfish stock-recruitment, mortality and growth parameter estimates (or derived values) and standard errors from the base case model.

Parameter	Value	SD
R_0 – California (1000s Age-0)	104.3	NA
R_0 - Oregon (1000s Age-0)	94.5	NA
R_0 - Washington (1000s Age-0)	28.3	NA
Steepness (*h*)	0.417	0.054
Females:		
Natural mortality (*M*)	0.047	0.002
Length at age 1 (cm)	18.393	0.684
Length at age 70 (cm)	62.380	0.373
von Bertalanffy *K*	0.049	0.002
CV of length at age 1	0.128	0.012
CV of length at age 70	0.071	0.004
Males:		
Natural mortality (*M*)	0.047	0.001
Length at age 1 (cm)	Equal to female	NA
Length at age 70 (cm)	64.738	0.326
von Bertalanffy *K*	0.048	0.002
CV of length at age 1	0.130	0.011
CV of length at age 70	0.061	0.004

Table 20. Comparison of summary quantities among the base case and alternate states of nature.

Model	Low	Base case	High
Convergence			
Maximum gradient component	0.0000023	0.0000018	0.0000063
Negative log-likelihoods			
Total	6,105.1	6,102.5	6,100.4
Indices	-28.9	-28.3	-27.6
Length-frequency data	2,506.0	2,503.8	2,502.9
Age-frequency data	3,627.9	3,626.1	3,625.0
Priors	0.0	0.9	0.1
Select parameters			
Equilibrium recruitment (R_0, 1000s age-0)	178	227	330
Steepness (*h*)	0.344	0.417	0.508
Male *M*	0.048	0.047	0.046
Management quantities			
Equilibrium spawning output (SB_0, millions eggs)	743	994	1,499
2009 Spawning depletion	17.3%	20.3%	23.5%
2009 age-8+ biomass (mt)	1,267	2,008	3,477
2008 *SPR*	71.4%	79.3%	86.7%
MSY (mt)	31.5	56.1	107.9

Table 21. Time-series of population estimates from the base case model.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1916	8,492	994	100.0%	227	2.2	99.1%	0.0%
1917	8,490	994	100.0%	227	3.6	98.5%	0.0%
1918	8,487	994	99.9%	227	4.3	98.3%	0.1%
1919	8,483	993	99.9%	227	2.2	99.1%	0.0%
1920	8,481	993	99.9%	227	2.4	99.0%	0.0%
1921	8,478	993	99.8%	227	2.3	99.0%	0.0%
1922	8,476	992	99.8%	227	2.1	99.1%	0.0%
1923	8,475	992	99.8%	227	2.2	99.1%	0.0%
1924	8,473	992	99.8%	227	2.8	98.8%	0.0%
1925	8,471	992	99.7%	227	4.9	98.0%	0.1%
1926	8,466	991	99.7%	227	5.9	97.6%	0.1%
1927	8,461	990	99.6%	227	6.9	97.2%	0.1%
1928	8,455	990	99.5%	227	6.6	97.3%	0.1%
1929	8,449	989	99.5%	227	7.6	96.9%	0.1%
1930	8,443	988	99.4%	227	9.1	96.3%	0.1%
1931	8,435	987	99.3%	226	8.5	96.5%	0.1%
1932	8,427	986	99.2%	226	11.5	95.4%	0.1%
1933	8,418	985	99.1%	226	8.5	96.5%	0.1%
1934	8,411	984	99.0%	226	10.4	95.8%	0.1%
1935	8,402	983	98.9%	226	13.2	94.7%	0.2%
1936	8,391	982	98.7%	226	14.0	94.4%	0.2%
1937	8,379	980	98.6%	226	13.0	94.8%	0.2%
1938	8,369	979	98.4%	226	13.1	94.7%	0.2%
1939	8,359	977	98.3%	226	12.4	95.0%	0.1%
1940	8,349	976	98.2%	226	13.5	94.5%	0.2%
1941	8,339	975	98.0%	225	14.8	94.0%	0.2%
1942	8,327	973	97.9%	225	14.3	94.1%	0.2%
1943	8,316	972	97.8%	225	25.8	89.9%	0.3%
1944	8,295	969	97.5%	225	52.8	81.1%	0.6%
1945	8,247	963	96.9%	225	97.2	70.0%	1.2%
1946	8,157	952	95.8%	224	85.8	73.0%	1.1%
1947	8,080	943	94.8%	223	33.7	86.7%	0.4%
1948	8,055	939	94.5%	222	42.2	84.1%	0.5%
1949	8,022	935	94.0%	222	31.9	87.2%	0.4%
1950	7,999	932	93.7%	222	34.6	86.2%	0.4%
1951	7,975	929	93.4%	222	42.1	84.1%	0.5%
1952	7,945	925	93.0%	221	37.4	85.4%	0.5%
1953	7,919	921	92.7%	221	31.8	87.2%	0.4%
1954	7,899	919	92.4%	221	37.9	85.1%	0.5%
1955	7,873	915	92.1%	220	46.9	81.5%	0.6%
1956	7,839	911	91.6%	220	51.2	80.3%	0.7%

Table 21. continued. Time-series of population estimates from the base case model.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1957	7,802	906	91.1%	220	59.5	77.4%	0.8%
1958	7,757	901	90.6%	219	69.4	74.7%	0.9%
1959	7,703	894	89.9%	218	61.8	76.5%	0.8%
1960	7,657	888	89.3%	218	55.1	78.3%	0.7%
1961	7,619	883	88.8%	217	46.2	81.2%	0.6%
1962	7,590	880	88.5%	217	52.9	78.8%	0.7%
1963	7,555	875	88.0%	217	57.8	77.2%	0.8%
1964	7,516	870	87.5%	216	52.5	78.8%	0.7%
1965	7,483	866	87.1%	216	63.9	75.2%	0.9%
1966	7,440	860	86.5%	215	70.5	73.1%	0.9%
1967	7,391	854	85.9%	215	69.4	73.3%	0.9%
1968	7,343	848	85.3%	214	74.1	72.0%	1.0%
1969	7,292	842	84.6%	213	99.6	65.7%	1.4%
1970	7,217	832	83.7%	213	109.1	63.7%	1.5%
1971	7,134	822	82.7%	212	120.8	61.8%	1.7%
1972	7,040	810	81.5%	210	159.4	55.1%	2.3%
1973	6,911	795	79.9%	209	155.7	56.4%	2.3%
1974	6,787	779	78.4%	207	170.9	53.7%	2.5%
1975	6,650	762	76.7%	205	166.8	55.6%	2.5%
1976	6,520	746	75.0%	203	195.7	47.1%	3.0%
1977	6,363	727	73.1%	201	200.1	44.8%	3.1%
1978	6,205	707	71.1%	199	310.1	35.3%	5.0%
1979	5,942	675	67.9%	195	317.8	27.8%	5.3%
1980	5,675	643	64.6%	191	259.6	30.1%	4.6%
1981	5,469	617	62.0%	187	364.3	24.6%	6.7%
1982	5,165	580	58.3%	182	421.3	19.9%	8.2%
1983	4,809	537	54.0%	175	366.0	20.6%	7.6%
1984	4,512	499	50.2%	169	251.3	24.9%	5.6%
1985	4,330	477	47.9%	165	288.0	20.8%	6.7%
1986	4,117	450	45.3%	160	227.8	24.9%	5.5%
1987	3,964	431	43.3%	156	251.3	21.6%	6.3%
1988	3,790	409	41.1%	151	279.5	18.8%	7.4%
1989	3,591	385	38.7%	146	346.9	13.9%	9.7%
1990	3,328	353	35.5%	139	237.4	20.2%	7.1%
1991	3,172	334	33.6%	134	368.0	11.7%	11.6%
1992	2,891	301	30.3%	126	372.8	9.5%	12.9%
1993	2,606	268	26.9%	117	318.7	12.3%	12.2%
1994	2,374	240	24.1%	108	223.4	14.0%	9.4%
1995	2,236	223	22.5%	103	254.6	12.7%	11.4%
1996	2,069	203	20.5%	96	217.7	12.2%	10.5%
1997	1,937	188	18.9%	91	244.1	9.8%	12.6%

Table 21. continued. Time-series of population estimates from the base case model.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1998	1,779	170	17.1%	84	107.0	23.6%	6.0%
1999	1,751	166	16.7%	83	155.8	17.3%	8.9%
2000	1,674	157	15.8%	79	40.9	53.0%	2.4%
2001	1,704	160	16.1%	80	56.1	53.0%	3.3%
2002	1,717	162	16.3%	81	15.8	76.6%	0.9%
2003	1,767	167	16.8%	83	12.4	78.8%	0.7%
2004	1,817	173	17.4%	85	12.3	82.0%	0.7%
2005	1,864	180	18.1%	88	15.1	79.2%	0.8%
2006	1,904	185	18.6%	90	12.4	79.6%	0.6%
2007	1,945	191	19.2%	92	19.6	70.6%	1.0%
2008	1,976	196	19.8%	94	16.7	79.3%	0.8%
2009	2,008	202	20.3%	96	NA	NA	NA

Table 22. Time-series of population estimates from the low state of nature.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1916	6,399	743	100.0%	178	1.7	99.1%	0.0%
1917	6,398	743	100.0%	178	2.7	98.5%	0.0%
1918	6,395	743	99.9%	178	3.2	98.3%	0.0%
1919	6,392	742	99.9%	178	1.6	99.1%	0.0%
1920	6,391	742	99.9%	178	1.8	99.0%	0.0%
1921	6,389	742	99.8%	178	1.7	99.1%	0.0%
1922	6,388	742	99.8%	178	1.6	99.2%	0.0%
1923	6,386	742	99.8%	178	1.7	99.1%	0.0%
1924	6,385	742	99.8%	178	2.1	98.8%	0.0%
1925	6,383	741	99.7%	178	3.6	98.1%	0.1%
1926	6,380	741	99.7%	178	4.4	97.7%	0.1%
1927	6,376	740	99.6%	178	5.2	97.3%	0.1%
1928	6,371	740	99.5%	178	5.0	97.4%	0.1%
1929	6,367	739	99.5%	178	5.7	97.0%	0.1%
1930	6,362	739	99.4%	178	6.9	96.4%	0.1%
1931	6,356	738	99.3%	177	6.4	96.6%	0.1%
1932	6,351	737	99.2%	177	8.7	95.5%	0.1%
1933	6,343	736	99.1%	177	6.3	96.6%	0.1%
1934	6,338	736	99.0%	177	7.8	95.9%	0.1%
1935	6,332	735	98.9%	177	9.9	94.8%	0.2%
1936	6,323	734	98.7%	177	10.5	94.5%	0.2%
1937	6,315	733	98.6%	177	9.7	94.9%	0.2%
1938	6,307	732	98.4%	177	9.8	94.8%	0.2%
1939	6,299	731	98.3%	177	9.3	95.1%	0.1%
1940	6,292	730	98.2%	176	10.1	94.6%	0.2%
1941	6,284	729	98.0%	176	11.1	94.1%	0.2%
1942	6,275	728	97.9%	176	10.8	94.2%	0.2%
1943	6,267	727	97.8%	176	19.4	90.0%	0.3%
1944	6,250	725	97.5%	176	39.6	81.4%	0.6%
1945	6,215	720	96.9%	175	72.9	70.4%	1.2%
1946	6,147	712	95.8%	174	64.4	73.4%	1.0%
1947	6,089	705	94.8%	174	25.3	87.0%	0.4%
1948	6,070	702	94.5%	173	31.7	84.4%	0.5%
1949	6,045	699	94.1%	173	24.0	87.5%	0.4%
1950	6,028	697	93.8%	173	25.9	86.5%	0.4%
1951	6,010	694	93.4%	172	31.6	84.3%	0.5%
1952	5,986	691	93.0%	172	28.1	85.6%	0.5%
1953	5,967	689	92.7%	172	23.9	87.4%	0.4%
1954	5,952	687	92.4%	171	28.4	85.4%	0.5%
1955	5,932	684	92.1%	171	35.2	81.9%	0.6%
1956	5,906	681	91.6%	171	38.4	80.6%	0.6%

Table 22. continued. Time-series of population estimates from the low state of nature.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1957	5,877	678	91.2%	170	44.6	77.8%	0.8%
1958	5,842	673	90.6%	170	52.1	75.1%	0.9%
1959	5,801	668	89.9%	169	46.4	76.8%	0.8%
1960	5,766	664	89.3%	168	41.3	78.6%	0.7%
1961	5,737	660	88.8%	168	34.6	81.5%	0.6%
1962	5,714	657	88.4%	168	39.7	79.1%	0.7%
1963	5,687	654	88.0%	167	43.4	77.6%	0.8%
1964	5,657	650	87.5%	167	39.4	79.1%	0.7%
1965	5,631	647	87.0%	166	48.0	75.6%	0.9%
1966	5,597	643	86.5%	166	52.9	73.5%	0.9%
1967	5,559	638	85.8%	165	52.1	73.7%	0.9%
1968	5,522	633	85.2%	164	55.6	72.4%	1.0%
1969	5,482	629	84.6%	164	74.7	66.1%	1.4%
1970	5,424	621	83.6%	163	81.8	64.1%	1.5%
1971	5,360	614	82.5%	162	90.6	62.2%	1.7%
1972	5,288	605	81.4%	161	119.6	55.5%	2.3%
1973	5,189	593	79.8%	159	116.8	56.7%	2.3%
1974	5,095	581	78.2%	157	128.2	54.1%	2.5%
1975	4,990	569	76.5%	155	125.1	56.0%	2.5%
1976	4,891	556	74.9%	153	146.8	47.5%	3.0%
1977	4,771	542	72.9%	151	150.0	45.1%	3.1%
1978	4,650	527	70.9%	149	232.6	35.7%	5.0%
1979	4,451	503	67.7%	145	238.4	28.2%	5.4%
1980	4,249	479	64.4%	141	194.7	30.5%	4.6%
1981	4,092	459	61.8%	137	273.3	24.9%	6.7%
1982	3,862	431	58.0%	132	316.0	20.2%	8.2%
1983	3,593	399	53.7%	126	274.5	20.9%	7.6%
1984	3,367	371	49.9%	120	188.5	25.1%	5.6%
1985	3,228	354	47.6%	117	216.0	21.0%	6.7%
1986	3,065	334	44.9%	112	170.8	25.1%	5.6%
1987	2,947	319	42.9%	109	188.4	21.7%	6.4%
1988	2,812	303	40.7%	105	209.6	19.0%	7.5%
1989	2,658	284	38.2%	101	260.2	13.9%	9.8%
1990	2,456	260	35.0%	94	178.0	20.2%	7.2%
1991	2,334	246	33.0%	91	276.0	11.7%	11.8%
1992	2,118	221	29.7%	84	279.6	9.4%	13.2%
1993	1,898	196	26.3%	76	239.0	12.0%	12.6%
1994	1,718	174	23.4%	70	167.6	13.6%	9.8%
1995	1,607	161	21.7%	65	191.0	12.3%	11.9%
1996	1,475	146	19.6%	60	163.2	11.7%	11.1%
1997	1,369	134	18.0%	56	183.1	9.3%	13.4%

Table 22. continued. Time-series of population estimates from the low state of nature.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1998	1,243	120	16.1%	51	80.2	22.1%	6.5%
1999	1,213	116	15.6%	50	116.9	15.9%	9.6%
2000	1,147	109	14.6%	47	40.9	42.3%	3.6%
2001	1,152	109	14.7%	47	56.1	42.4%	4.9%
2002	1,139	108	14.5%	47	15.8	68.6%	1.4%
2003	1,164	111	14.9%	48	12.4	70.8%	1.1%
2004	1,189	114	15.4%	49	12.3	75.2%	1.0%
2005	1,212	118	15.8%	50	15.1	71.5%	1.2%
2006	1,229	121	16.2%	51	12.4	71.3%	1.0%
2007	1,247	124	16.6%	53	19.6	60.4%	1.6%
2008	1,256	126	16.9%	53	16.7	71.4%	1.3%
2009	1,267	128	17.3%	54	NA	NA	NA

Table 23. Time-series of population estimates from the high state of nature.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1916	12,718	1,499	100.0%	330	3.3	99.1%	0.0%
1917	12,715	1,499	100.0%	330	5.4	98.5%	0.0%
1918	12,710	1,498	99.9%	330	6.4	98.2%	0.1%
1919	12,704	1,497	99.9%	330	3.2	99.1%	0.0%
1920	12,701	1,497	99.9%	330	3.6	99.0%	0.0%
1921	12,698	1,496	99.8%	330	3.5	99.0%	0.0%
1922	12,695	1,496	99.8%	330	3.1	99.1%	0.0%
1923	12,692	1,496	99.8%	330	3.3	99.1%	0.0%
1924	12,690	1,495	99.8%	330	4.2	98.8%	0.0%
1925	12,686	1,495	99.7%	330	7.3	98.0%	0.1%
1926	12,680	1,494	99.7%	330	8.8	97.6%	0.1%
1927	12,672	1,493	99.6%	329	10.4	97.2%	0.1%
1928	12,663	1,492	99.5%	329	10.0	97.3%	0.1%
1929	12,654	1,491	99.5%	329	11.4	96.9%	0.1%
1930	12,644	1,489	99.4%	329	13.7	96.3%	0.1%
1931	12,632	1,488	99.3%	329	12.8	96.5%	0.1%
1932	12,621	1,487	99.2%	329	17.3	95.3%	0.1%
1933	12,607	1,485	99.0%	329	12.7	96.5%	0.1%
1934	12,596	1,483	99.0%	329	15.6	95.7%	0.1%
1935	12,584	1,482	98.9%	329	19.8	94.7%	0.2%
1936	12,567	1,480	98.7%	329	21.0	94.3%	0.2%
1937	12,550	1,477	98.6%	329	19.4	94.7%	0.2%
1938	12,534	1,475	98.4%	329	19.7	94.6%	0.2%
1939	12,519	1,473	98.3%	328	18.6	94.9%	0.1%
1940	12,504	1,472	98.2%	328	20.2	94.4%	0.2%
1941	12,489	1,470	98.0%	328	22.2	93.9%	0.2%
1942	12,472	1,467	97.9%	328	21.5	94.0%	0.2%
1943	12,456	1,465	97.7%	328	38.7	89.7%	0.3%
1944	12,424	1,461	97.5%	328	79.2	80.8%	0.6%
1945	12,353	1,452	96.9%	327	145.8	69.7%	1.2%
1946	12,218	1,435	95.8%	326	128.8	72.7%	1.1%
1947	12,102	1,421	94.8%	325	50.6	86.6%	0.4%
1948	12,064	1,416	94.5%	325	63.4	84.0%	0.5%
1949	12,015	1,409	94.0%	325	47.9	87.1%	0.4%
1950	11,982	1,405	93.7%	325	51.9	86.1%	0.4%
1951	11,946	1,400	93.4%	324	63.2	83.9%	0.5%
1952	11,901	1,394	93.0%	324	56.2	85.2%	0.5%
1953	11,863	1,389	92.7%	324	47.7	87.1%	0.4%
1954	11,833	1,385	92.4%	323	56.8	84.9%	0.5%
1955	11,796	1,380	92.1%	323	70.4	81.3%	0.6%
1956	11,746	1,374	91.6%	323	76.8	80.1%	0.7%

Table 23. continued. Time-series of population estimates from the high state of nature.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1957	11,691	1,366	91.2%	322	89.2	77.2%	0.8%
1958	11,624	1,358	90.6%	322	104.1	74.5%	0.9%
1959	11,545	1,348	89.9%	321	92.8	76.2%	0.8%
1960	11,478	1,339	89.3%	321	82.6	78.1%	0.7%
1961	11,422	1,332	88.9%	320	69.2	81.0%	0.6%
1962	11,380	1,326	88.5%	320	79.4	78.6%	0.7%
1963	11,330	1,320	88.0%	319	86.7	77.0%	0.8%
1964	11,273	1,312	87.5%	319	78.8	78.6%	0.7%
1965	11,226	1,306	87.1%	318	95.9	75.0%	0.9%
1966	11,163	1,298	86.6%	318	105.8	72.8%	0.9%
1967	11,091	1,289	86.0%	317	104.1	73.1%	0.9%
1968	11,022	1,280	85.4%	317	111.1	71.8%	1.0%
1969	10,948	1,270	84.7%	316	149.3	65.5%	1.4%
1970	10,838	1,256	83.8%	315	163.7	63.4%	1.5%
1971	10,716	1,241	82.8%	314	181.2	61.6%	1.7%
1972	10,579	1,224	81.7%	313	239.1	54.8%	2.3%
1973	10,387	1,200	80.1%	311	233.6	56.2%	2.2%
1974	10,205	1,177	78.5%	309	256.4	53.5%	2.5%
1975	10,003	1,152	76.9%	307	250.2	55.4%	2.5%
1976	9,810	1,128	75.3%	305	293.6	46.9%	3.0%
1977	9,578	1,099	73.3%	303	300.1	44.6%	3.1%
1978	9,344	1,070	71.4%	301	465.1	35.2%	5.0%
1979	8,953	1,022	68.2%	296	476.7	27.7%	5.3%
1980	8,557	973	64.9%	292	389.3	30.0%	4.5%
1981	8,251	935	62.3%	288	546.5	24.4%	6.6%
1982	7,799	879	58.6%	282	632.0	19.7%	8.1%
1983	7,270	814	54.3%	274	548.9	20.5%	7.6%
1984	6,829	759	50.6%	267	377.0	24.8%	5.5%
1985	6,562	725	48.3%	262	432.0	20.8%	6.6%
1986	6,247	685	45.7%	256	341.7	24.9%	5.5%
1987	6,024	656	43.8%	251	376.9	21.6%	6.3%
1988	5,770	624	41.6%	246	419.3	18.9%	7.3%
1989	5,480	588	39.2%	240	520.4	14.0%	9.5%
1990	5,095	540	36.0%	231	356.1	20.4%	7.0%
1991	4,871	513	34.2%	225	552.0	11.8%	11.3%
1992	4,461	464	31.0%	214	559.3	9.7%	12.5%
1993	4,046	415	27.7%	202	478.1	12.8%	11.8%
1994	3,710	374	24.9%	191	335.2	14.5%	9.0%
1995	3,517	350	23.3%	184	381.9	13.2%	10.9%
1996	3,281	321	21.4%	174	326.5	12.8%	10.0%
1997	3,099	299	20.0%	167	366.2	10.5%	11.8%

Table 23. continued. Time-series of population estimates from the high state of nature.

Year	Age-8+ biomass (mt)	Spawning output (millions eggs)	Spawning depletion	Age-0 recruits (1000s)	Total catch (mt)	SPR	Relative exploitation rate
1998	2,879	274	18.3%	158	160.4	25.3%	5.6%
1999	2,853	269	18.0%	156	233.7	19.0%	8.2%
2000	2,757	257	17.2%	152	40.9	65.8%	1.5%
2001	2,841	265	17.7%	155	56.1	65.3%	2.0%
2002	2,908	272	18.1%	157	15.8	84.5%	0.5%
2003	3,012	283	18.9%	162	12.4	86.4%	0.4%
2004	3,115	295	19.7%	166	12.3	88.4%	0.4%
2005	3,214	307	20.5%	170	15.1	86.5%	0.5%
2006	3,305	319	21.3%	174	12.4	87.2%	0.4%
2007	3,397	331	22.1%	178	19.6	80.9%	0.6%
2008	3,477	342	22.8%	181	16.7	86.7%	0.5%
2009	3,558	353	23.5%	184	NA	NA	NA

Table 24. Relative distribution of potential yelloweye habitat based on the hardest rocky lithology categories from current habitat maps (C. Whitmire, NWFSC, Personal Communication).

Region	Total area (ha)	Potential yelloweye habitat (ha)	Percent of region
California: South of Pt. Conception	1,239,388	187,602	15.1%
California: North of Pt. Conception	1,826,229	68,704	3.8%
Oregon	1,967,384	206,807	10.5%
Washington	957,596	46,434	4.8%

Table 25. Sensitivity analyses requested during the STAR panel review.

Model	Base case	Include 2000-2001 Rec. CPUE observations	Increase lambdas on indices by 10x	Force catchability for Rec. CPUE indices to be strictly linear	Allow Oregon IPHC survey selectivity to be dome-shaped
Convergence					
Maximum gradient component	0.0000018	0.0000393	0.0000034	0.0002225	0.0000080
Negative log-likelihoods					
Total	6,102.5	*6,101.3*	*5,842.0*	6,103.8	6,090.2
Indices	-28.3	*-29.6*	*-293.9*	-27.3	-28.3
Length-frequency data	2,503.8	2503.8	2,506.9	2,504.1	2,495.8
Age-frequency data	3,626.1	3626.2	3,627.3	3,625.9	3,621.9
Priors	0.9	0.9	1.7	1.0	0.9
Select parameters					
Equilibrium recruitment (R_0, 1000s age-0)	227	227	236	225	224
Steepness (*h*)	0.417	0.412	0.302	0.405	0.424
Male *M*	0.047	0.047	0.048	0.047	0.046
Management quantities					
Equilibrium spawning output (SB_0, millions eggs)	994	994	989	993	1,006
2009 Spawning depletion	20.3%	20.1%	15.4%	19.6%	20.9%
2009 age-8+ biomass (mt)	2,008	1,985	1,480	1,930	2,088
2008 *SPR*	79.3%	79.1%	74.5%	78.6%	79.7%
MSY (mt)	56.1	55.2	31.5	53.6	57.3

Table 26. Comparison among sensitivity analyses to catch history performed prior to the STAR panel review. Note that the base case model differs from that reported in this document.

Model	Pre-STAR base	200% of catch < 1976	50% of catch < 1976	200% of catch < 1996	50% of catch < 1996
Convergence					
Maximum gradient component	0.00000047	0.00003971	0.00000033	0.00000435	0.00000763
Negative log-likelihoods					
Total	5,903.3	5,941.8	5,892.0	5,883.8	5,947.0
Indices	-29.0	-12.3	-29.4	-28.8	-28.4
Length-frequency data	2,331.1	2,350.2	2,321.8	2,314.7	2,366.2
Age-frequency data	3,598.8	3,601.9	3,596.9	3,595.6	3,607.4
Priors	2.3	2.0	2.6	2.3	1.9
Select parameters					
Equilibrium recruitment (R_0, 1000s age-0)	239	238	234	414	162
Steepness (*h*)	0.342	0.437	0.299	0.361	0.392
Male *M*	0.047	0.042	0.049	0.044	0.051
Management quantities					
Equilibrium spawning output (SB_0, millions eggs)	1,050	1,281	942	2,028	582
2009 Spawning depletion	14.8%	13.8%	15.5%	14.8%	21.6%
2009 age-8+ biomass (mt)	1,527	1,764	1,422	2,908	1,284
2008 *SPR*	75.3%	71.8%	74.1%	85.0%	72.3%
MSY (mt)	42.7	68.6	30.0	85.8	33.3

Table 27. Comparison among sensitivity analyses to treatment of data performed prior to the STAR panel review. Note that the base case model differs from that reported in this document. Likelihoods in italics are not comparable across rows.

Model	Pre-STAR base	Reduce emphasis on length data by 50%	Reduce emphasis on age data by 50%	Remove all fishery CPUE data	Remove all fishery independent data	Remove all fishery independent data and *Q* power coefficients
Convergence						
Maximum gradient component	0.00000047	0.00001023	0.00000312	0.00009425	0.00007111	0.00032512
Negative log-likelihoods						
Total	5,903.3	*4,749.8*	*4,573.0*	*5,937.4*	*4,399.5*	*4,387.1*
Indices	-29.0	-29.1	-28.9	*5.3*	*-18.0*	*-30.6*
Length-frequency data	2,331.1	*1,201.3*	2,316.4	2,331.1	*1,971.7*	*1,972.0*
Age-frequency data	3,598.8	3,575.1	*2,283.1*	3,598.8	*2,443.7*	*2,443.9*
Priors	2.3	2.5	2.3	2.3	2.1	1.9
Select parameters						
Equilibrium recruitment (R_0, 1000s age-0)	239	242	246	239	279	279
Steepness (*h*)	0.342	0.325	0.34	0.353	0.342	0.369
Male *M*	0.047	0.047	0.048	0.047	0.056	0.056
Management quantities						
Equilibrium spawning output (SB_0, millions eggs)	1,050	1,043	1,044	1,051	1,096	1,097
2009 Spawning depletion	14.8%	15.0%	14.6%	15.4%	13.6%	15.1%
2009 age-8+ biomass (mt)	1,527	1,537	1,498	1,599	1,374	1,527
2008 *SPR*	75.3%	75.8%	75.0%	76.1%	75.4%	77.1%
MSY (mt)	42.7	39.6	42.5	45.5	46.3	53.0

Table 28. Comparison among sensitivity analyses to externally informed parameters performed prior to the STAR panel review. Note that the base case model differs from that reported in this document. Likelihoods in italics are not comparable across rows.

Model	Pre-STAR base	Remove steepness prior	Remove M priors	No fecundity relationship
Convergence				
Maximum gradient component	0.00000047	0.00000840	0.00000075	0.00000238
Negative log-likelihoods				
Total	5,903.3	*5,901.9*	*5,902.2*	5,902.9
Indices	-29.0	-29.1	-28.9	-28.9
Length-frequency data	2,331.1	2,331.1	2,331.1	2,331.0
Age-frequency data	3,598.8	3,598.8	3,598.8	3,598.7
Priors	2.3	*1.0*	*1.3*	2.2
Select parameters				
Equilibrium recruitment (R_0, 1000s age-0)	239	241	238	239
Steepness (*h*)	0.342	0.328	0.342	0.362
Male *M*	0.047	0.047	0.047	0.047
Management quantities				
Equilibrium spawning output (SB_0, millions eggs)	1,050	1,049	1,050	NA
2009 Spawning depletion	14.8%	14.3%	14.8%	13.0%
2009 age-8+ biomass (mt)	1,527	1,468	1,525	1,533
2008 *SPR*	75.3%	74.7%	75.3%	73.1%
MSY (mt)	42.7	39.7	42.9	43.8

Table 29. Comparison among sensitivity analyses to structural assumptions performed prior to the STAR panel review. Note that the base case model differs from that reported in this document. Likelihoods in italics are not comparable across rows.

Model	Pre-STAR base	No areas	No sex-specific growth or mortality (mimic single-sex model)	No areas or sex-specific growth or mortality	Estimate recruitment and area apportionment
Convergence					
Maximum gradient component	0.00000047	0.00006028	0.00000498	0.00001007	0.00668621
Negative log-likelihoods					
Total	5,903.3	5,899.4	*5,929.2*	*5,927.6*	*5,745.2*
Indices	-29.0	-29.6	-29.0	-29.6	-29.8
Length-frequency data	2,331.1	2,315.5	2,337.9	2,322.7	2,270.5
Age-frequency data	3,598.8	3,611.6	3,619.0	3,633.7	3,503.3
Priors	2.3	1.9	*1.3*	*0.9*	2.2
Select parameters					
Equilibrium recruitment (R_0, 1000s age-0)	239	251	235	248	196
Steepness (*h*)	0.342	0.42	0.346	0.424	0.393
Male *M*	0.047	0.047	0.047	0.047	0.042
Management quantities					
Equilibrium spawning output (SB_0, millions eggs)	1,050	1,060	1,161	1,158	1,076
2009 Spawning depletion	14.8%	19.3%	13.9%	18.4%	12.0%
2009 age-8+ biomass (mt)	1,527	2,066	1,486	2,031	1,239
2008 *SPR*	75.3%	74.9%	74.4%	74.0%	69.5%
MSY (mt)	42.7	64.9	42.7	64.4	49.7

Table 30. Relative probabilities for combinations of the two alternate states of nature to be used in the rebuilding analysis.

		Historical catch		
		Low	Best estimate	High
Steepness	Low	6.25%	12.5%	6.25%
	Estimated value	12.5%	25%	12.5%
	High	6.25%	12.5%	6.25%

Table 31. Projection of potential yelloweye rockfish ABC, OY, spawning output and depletion for the base case model based on the SPR = 71.9% fishing mortality target used for the last rebuilding plan (OY) and $F_{50\%}$ overfishing limit/target (ABC). Assuming the OY of 17 mt is achieved exactly in 2009 and 2010. Catch allocation used for the forecast reflects the average distribution of *F*s in 2005-2007 among fleets (recreational, commercial) in: Washington (0.013, 0.005), Oregon (0.004, 0.002) and California (0.006, 0.003).

Year	ABC[1] (mt)	OY[1] (mt)	Coast-wide Age 8+ biomass (mt)	Coast-wide Depletion	Spawning output (million eggs) Coast-wide	California	Oregon	Washington
2009	*31*	*17*	2,008	20.3%	202	75	93	34
2010	*32*	*17*	2,039	20.8%	206	78	95	34
2011	49.3	20.9	2,068	21.2%	211	80	97	34
2012	49.9	21.2	2,093	21.6%	215	82	98	34
2013	50.5	21.4	2,118	22.0%	219	85	100	34
2014	51.1	21.7	2,141	22.4%	222	87	101	34
2015	51.6	21.9	2,165	22.7%	226	89	103	34
2016	52.1	22.1	2,187	23.0%	229	91	104	34
2017	52.6	22.3	2,210	23.3%	232	93	105	34
2018	53.0	22.5	2,232	23.6%	235	94	107	34
2019	53.5	22.7	2,255	23.9%	237	96	108	34
2020	53.9	22.9	2,277	24.1%	240	98	109	34

[1]ABC/OY values for 2009 and 2010 have already been adopted, and are not based on the results of this assessment.

Table 32. Decision table of 12-year projections for alternate states of nature (columns) and management options (rows) beginning in 2011. Relative probabilities are based on the joint distribution of alternate historical catch levels and steepness values.

			State of nature					
			75% of catch < 2000 and steepness = 0.344		Base case 100% of catch < 2000 and steepness = 0.417		150% of catch < 2000 and steepness = 0.508	
Relative probability			0.0625		0.25		0.0625	
Management decision	Year	Catch (mt)	Depletion	Spawning output (millions eggs)	Depletion	Spawning output (millions eggs)	Depletion	Spawning output (millions eggs)
Rebuilding SPR 71.9% catches from low alternative	2011	13.2	17.8%	132	21.2%	211	25.0%	375
	2012	13.4	18.1%	134	21.7%	216	25.7%	385
	2013	13.5	18.3%	136	22.2%	220	26.4%	396
	2014	13.6	18.6%	138	22.6%	225	27.1%	406
	2015	13.7	18.8%	140	23.0%	229	27.8%	416
	2016	13.7	19.0%	141	23.4%	233	28.4%	426
	2017	13.8	19.2%	142	23.8%	237	29.1%	436
	2018	13.9	19.3%	144	24.2%	241	29.7%	445
	2019	13.9	19.5%	145	24.6%	245	30.3%	455
	2020	14.0	19.6%	146	25.0%	248	31.0%	464
Rebuilding SPR 71.9% catches from base case	2011	20.9	17.8%	132	21.2%	211	25.0%	375
	2012	21.2	18.0%	134	21.6%	215	25.7%	385
	2013	21.4	18.1%	135	22.0%	219	26.3%	394
	2014	21.7	18.2%	136	22.4%	222	26.9%	404
	2015	21.9	18.3%	136	22.7%	226	27.5%	413
	2016	22.1	18.4%	137	23.0%	229	28.1%	422
	2017	22.3	18.5%	137	23.3%	232	28.7%	430
	2018	22.5	18.5%	137	23.6%	235	29.3%	439
	2019	22.7	18.5%	138	23.9%	237	29.9%	448
	2020	22.9	18.5%	138	24.1%	240	30.4%	456
Rebuilding SPR 71.9% catches from high alternative	2011	37.0	17.8%	132	21.2%	211	25.0%	375
	2012	37.6	17.7%	132	21.5%	213	25.5%	383
	2013	38.2	17.6%	131	21.7%	215	26.1%	391
	2014	38.7	17.5%	130	21.8%	217	26.6%	398
	2015	39.3	17.4%	129	22.0%	219	27.1%	406
	2016	39.8	17.2%	128	22.1%	220	27.5%	413
	2017	40.3	17.0%	126	22.2%	221	28.0%	419
	2018	40.8	16.7%	124	22.3%	222	28.4%	426
	2019	41.2	16.5%	123	22.4%	222	28.9%	433
	2020	41.7	16.2%	121	22.4%	223	29.3%	439

11. Figures

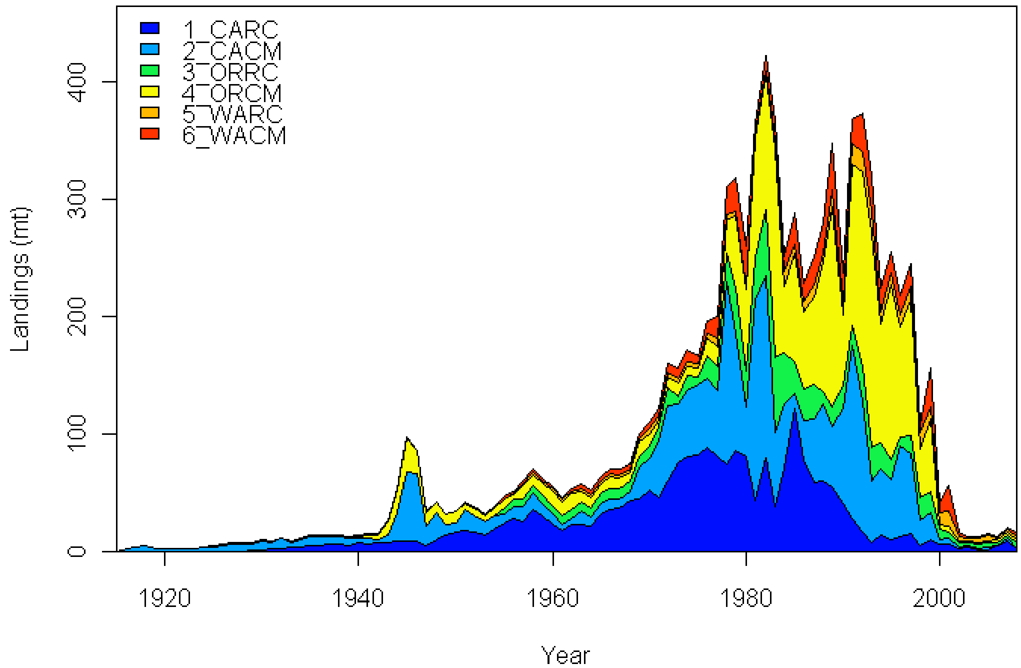

Figure 1. Yelloweye rockfish estimated catch history, 1916-2008. Fleet names indicated by state (WA, OR or CA) and sector (recreational = RC, commercial = CM).

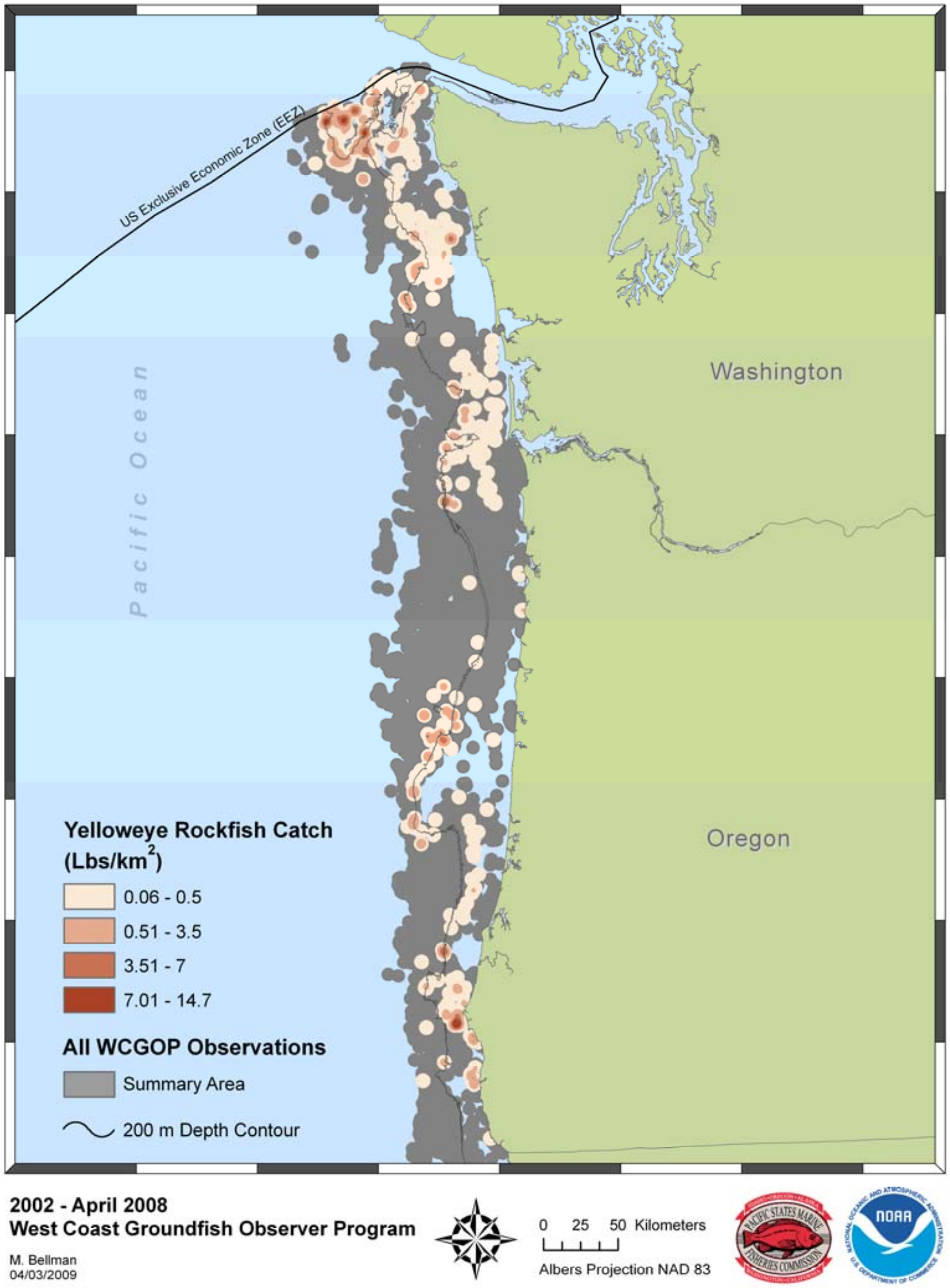

Figure 2. Spatial distribution of yelloweye rockfish catch (lbs/km^2) observed by the West Coast Groundfish Observer Program from 2002 – April 2008 in Oregon and Washington.

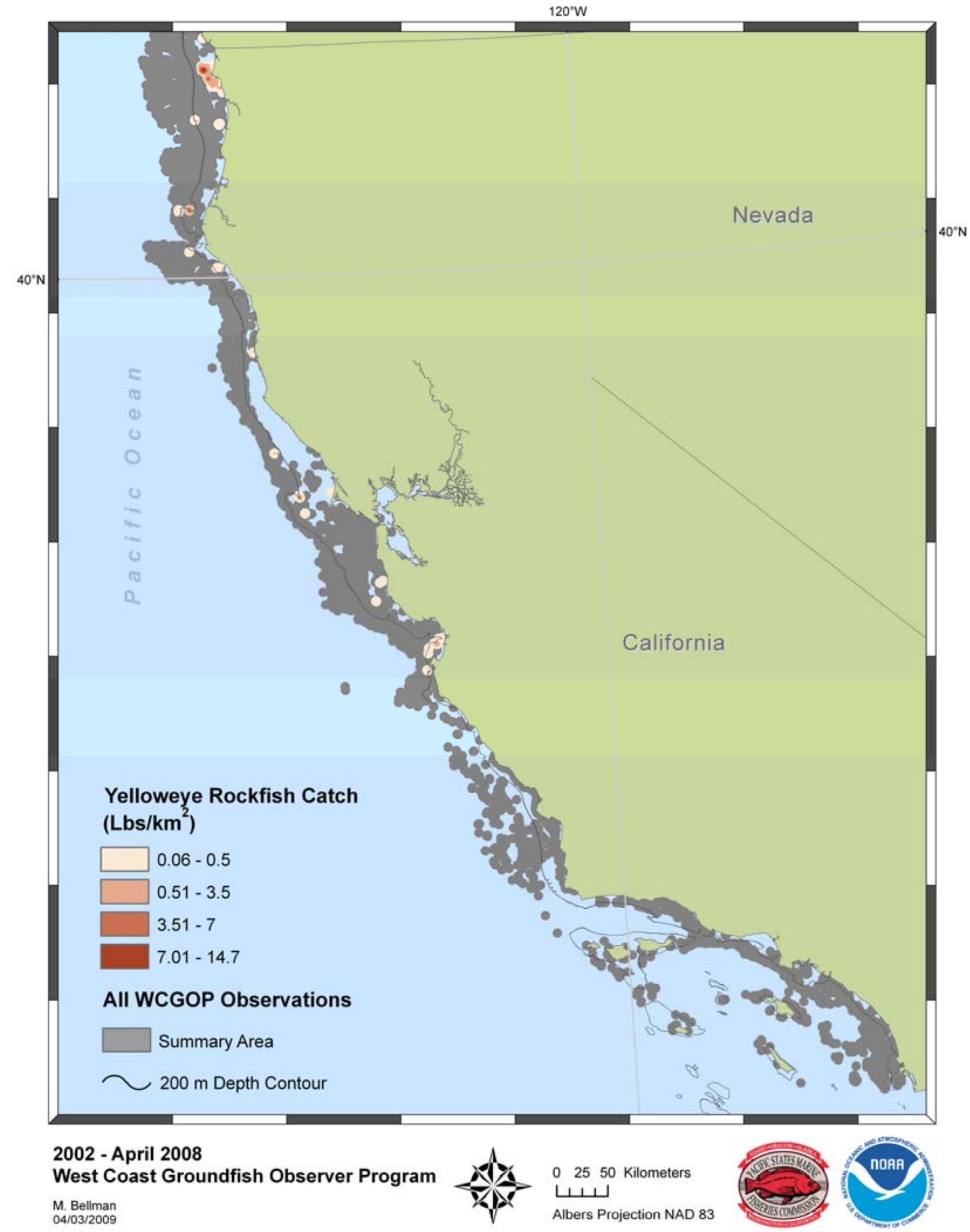

Figure 3. Spatial distribution of yelloweye rockfish catch (lbs/km^2) observed by the West Coast Groundfish Observer Program from 2002 – April 2008 in California.

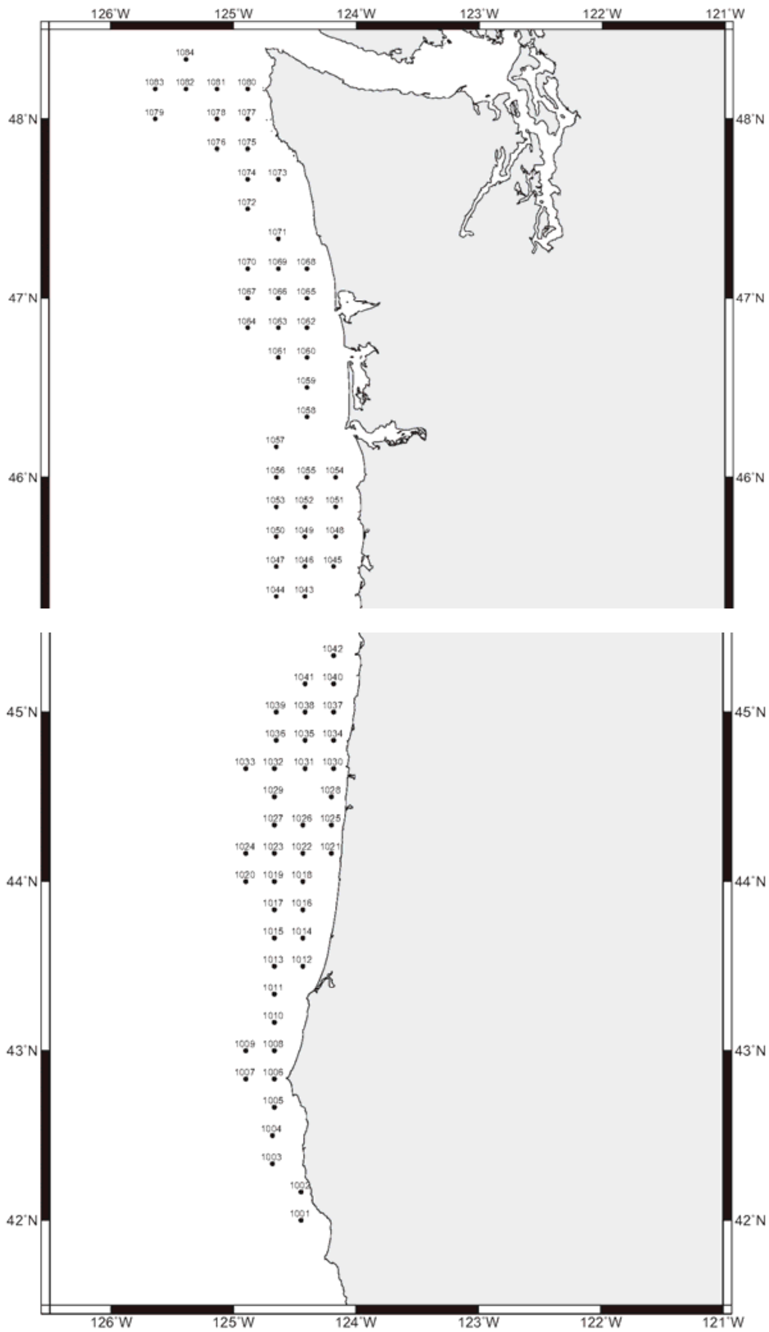

Figure 4. Stations fished by the IPHC long-line survey for Pacific halibut (From IPHC web-site: http://www.iphc.washington.edu/halcom/survey/ssadata/maps/ssa2amaps.pdf). Note that the two maps overlap slightly at the 1042-1044 station line.

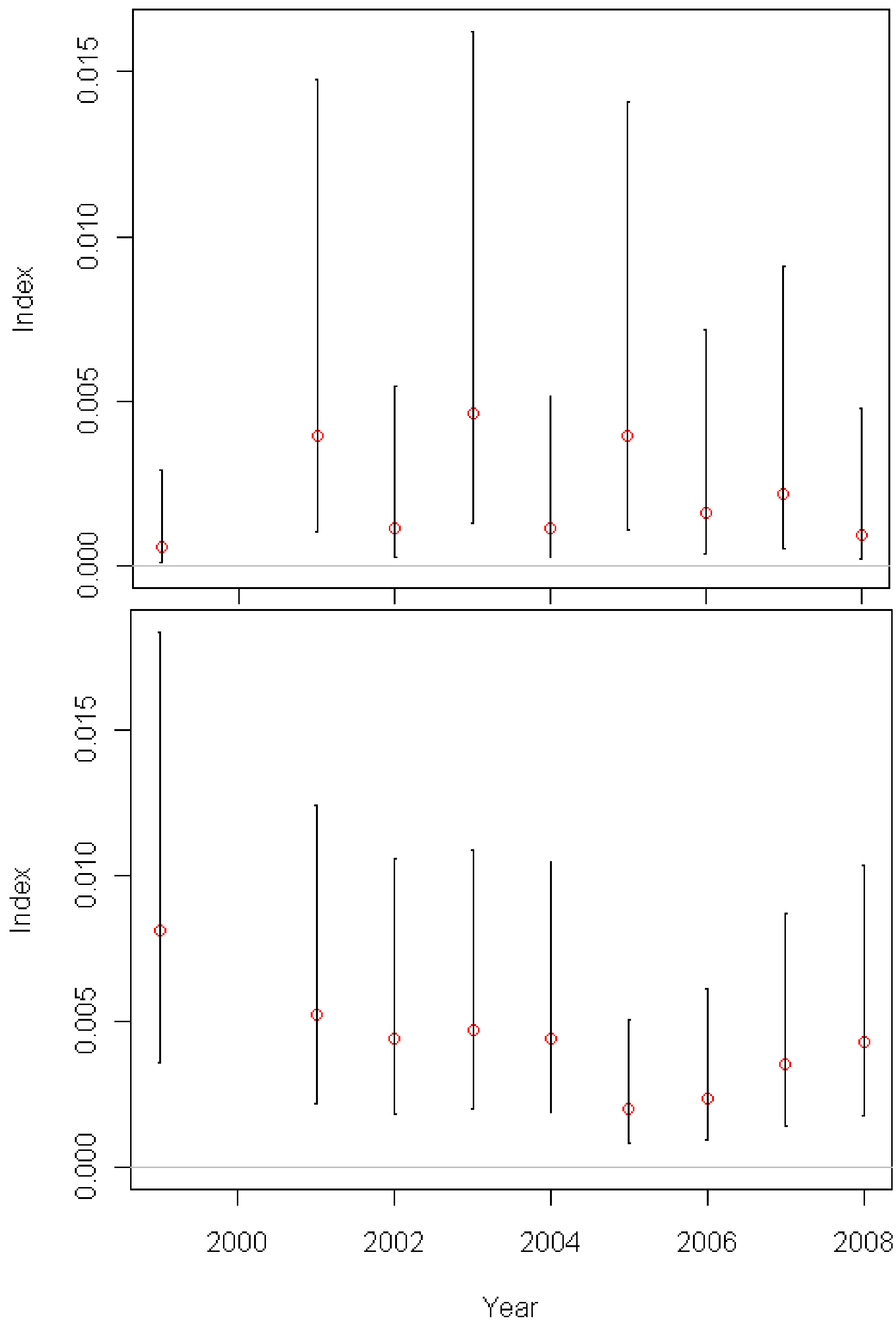

Figure 5. IPHC longline survey indices of relative abundance for Washington (upper panel) and Oregon (lower panel). Vertical lines indicate +/- 95% confidence intervals based on the assumption of lognormal error.

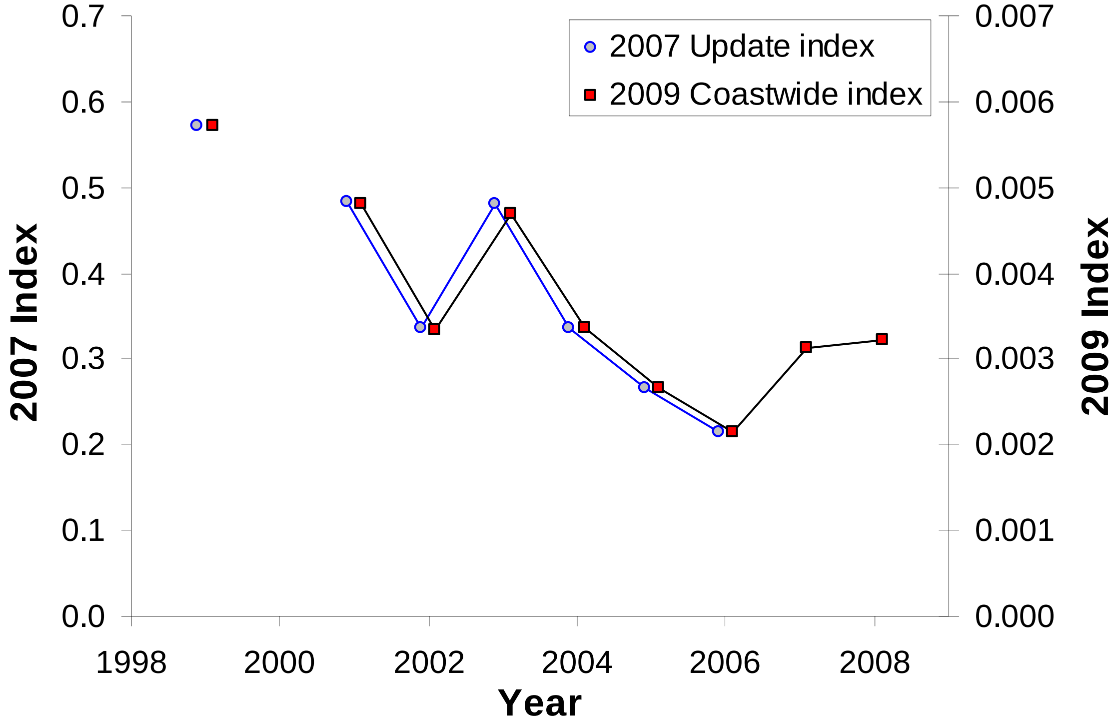

Figure 6. Comparison of a 2009 coast-wide index of abundance from the IPHC data with that calculated with the methods described in the 2007 assessment. Note that the years have been offset slightly to allow each point to be visible.

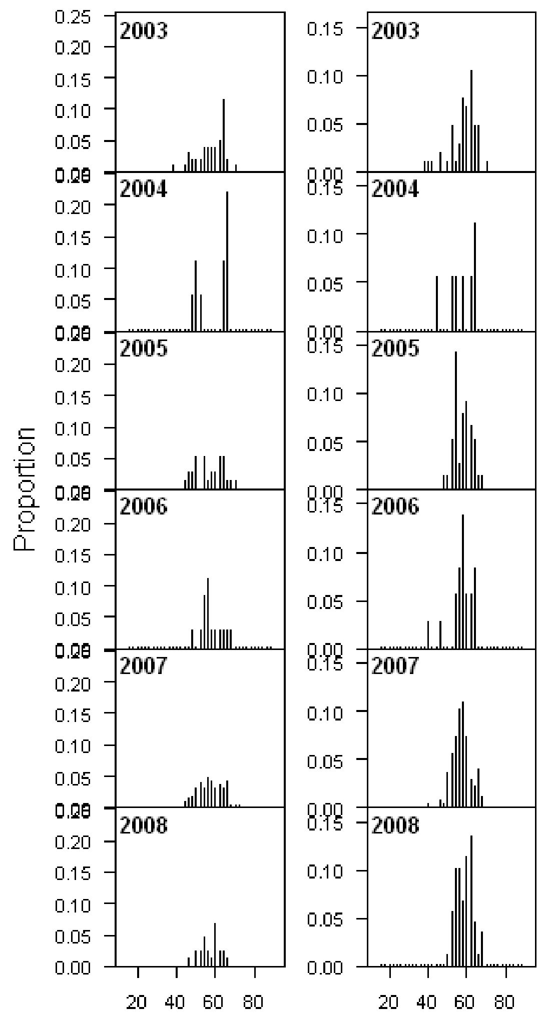

Figure 7. Length-frequency distributions for female (left panel) and male (right panel) yelloweye rockfish from the IPHC survey in Washington.

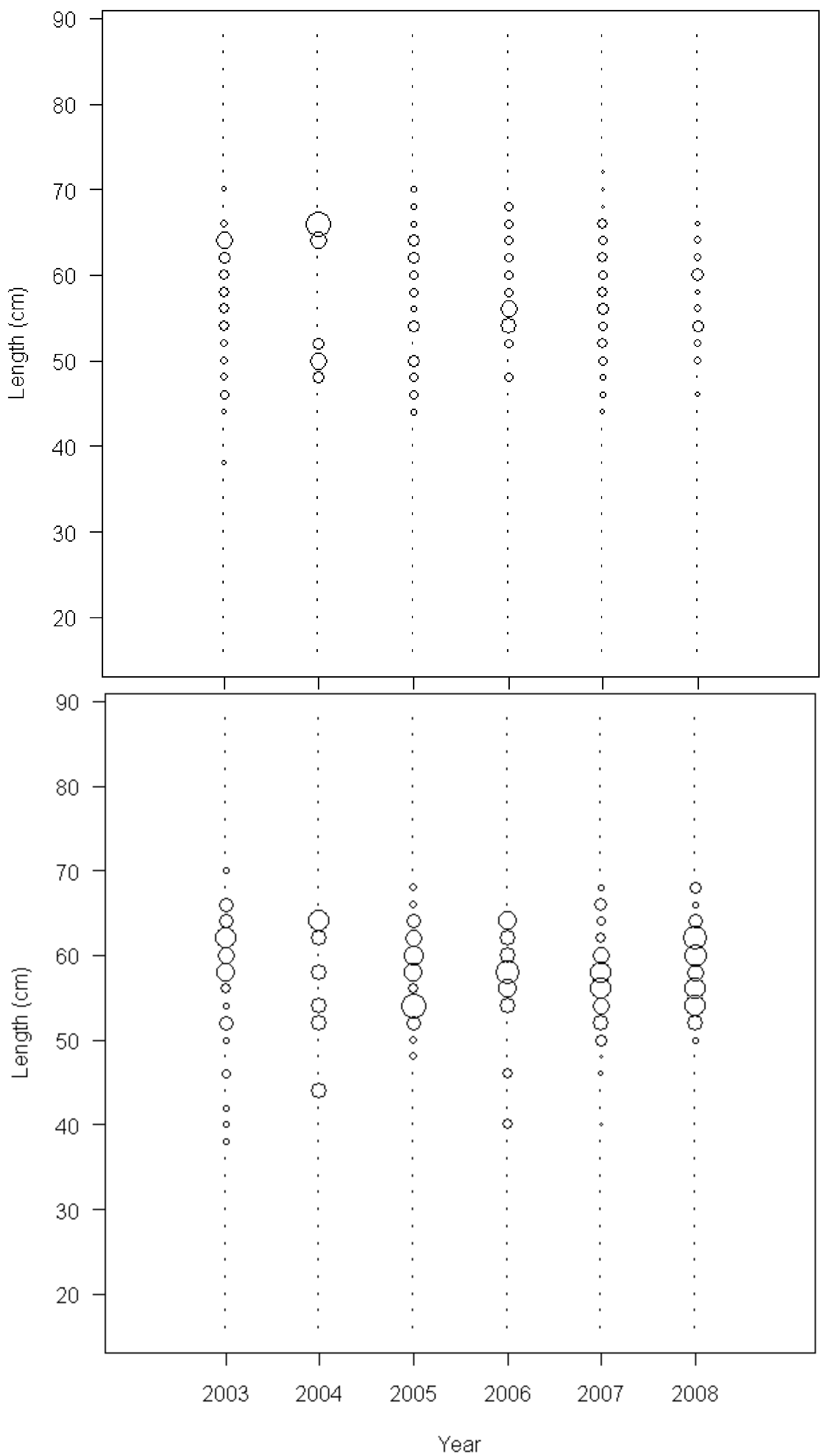

Figure 8. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the IPHC survey in Washington. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.22 (females) and 0.14 (males).

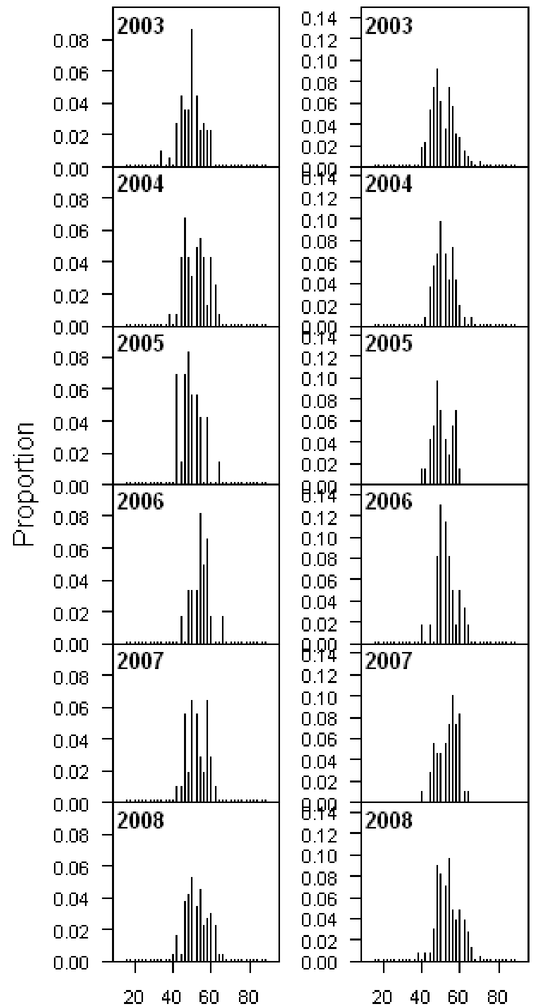

Figure 9. Length-frequency distributions for female (left panel) and male (right panel) yelloweye rockfish from the IPHC survey in Oregon.

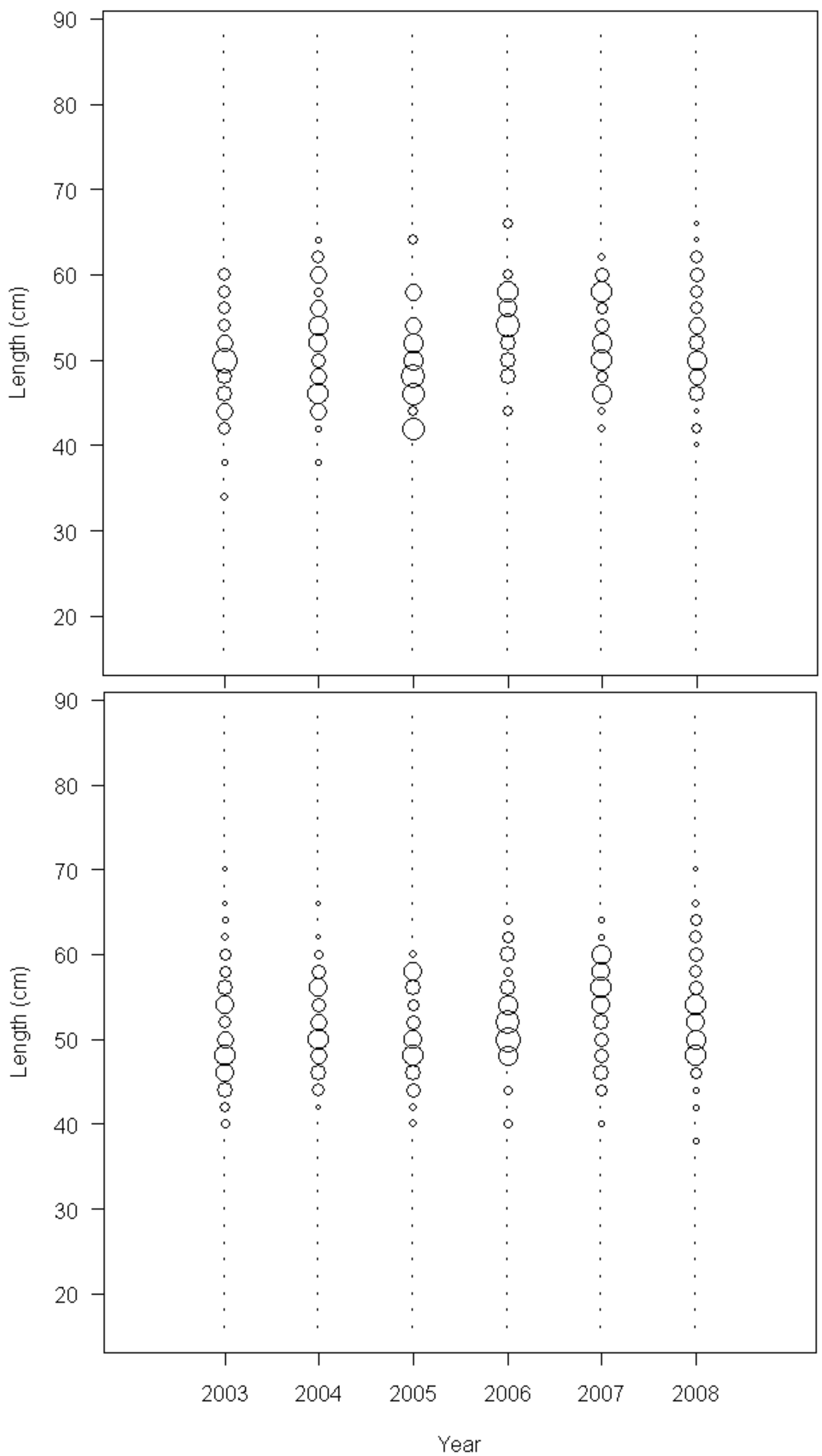

Figure 10. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the IPHC survey in Oregon. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.09 (females) and 0.13 (males).

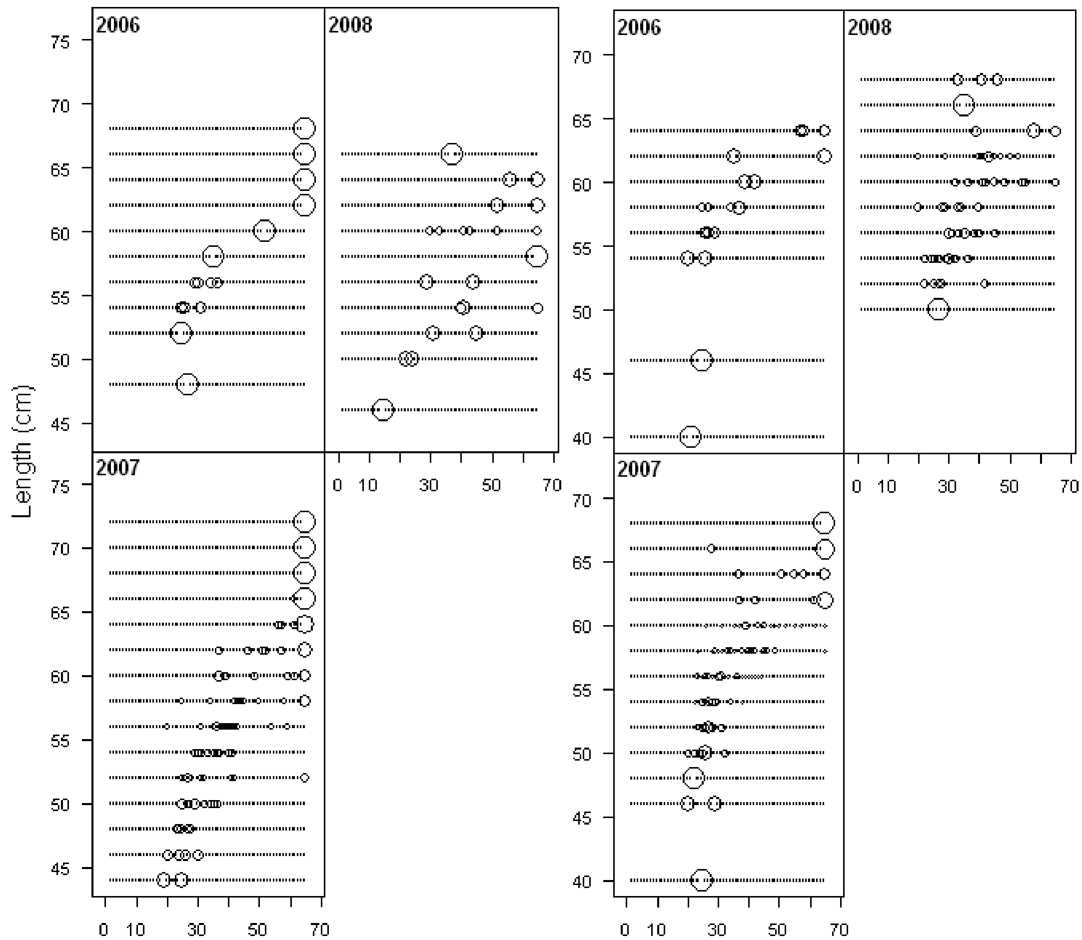

Figure 11. Conditional age-frequency distributions for female (left panels) and male (right panels) yelloweye rockfish from the recent IPHC surveys in Washington (2006-2008). Distributions sum to 1.0 in each age (row); the largest bubble sizes indicate proportions of 0.94 (one fish) for both females and males.

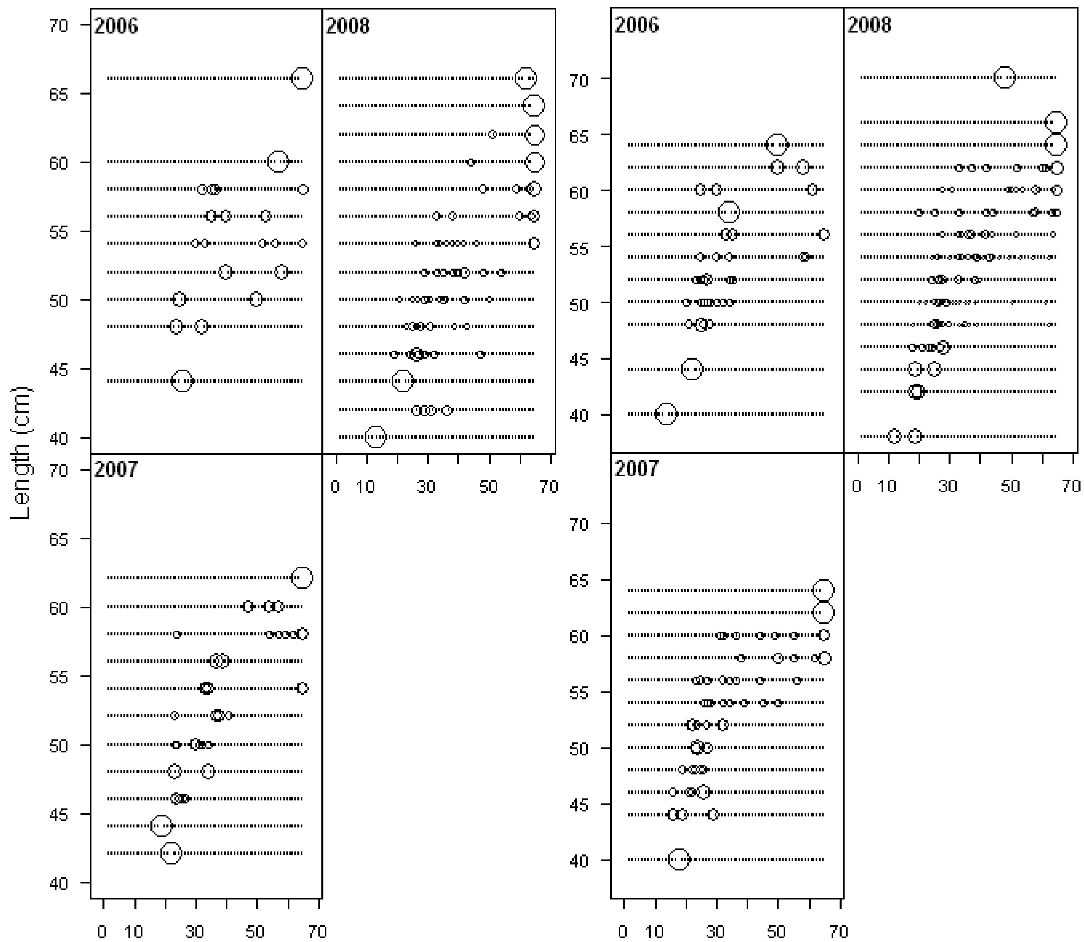

Figure 12. Conditional age-frequency distributions for female (left panels) and male (right panels) yelloweye rockfish from the recent IPHC surveys in Oregon (2006-2008). Distributions sum to 1.0 in each age (row); the largest bubble sizes indicate proportions of 0.94 (one fish) for both females and males.

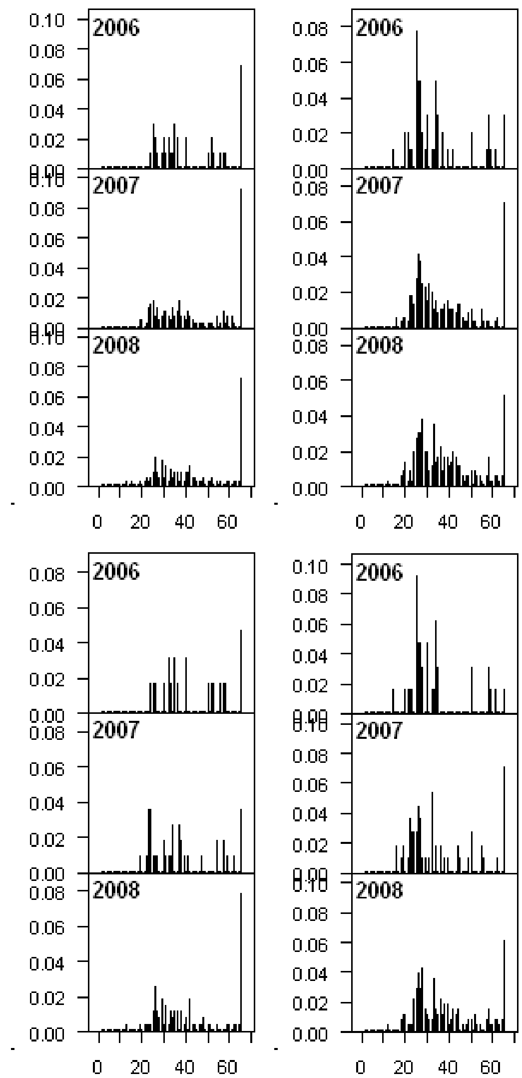

Figure 13. Marginal age-frequency distributions for female (left panels) and male (right panels) yelloweye rockfish from the recent IPHC surveys in Washington (upper panels) and Oregon (lower panels). These summaries are for inspection of the data only, they are not fit.

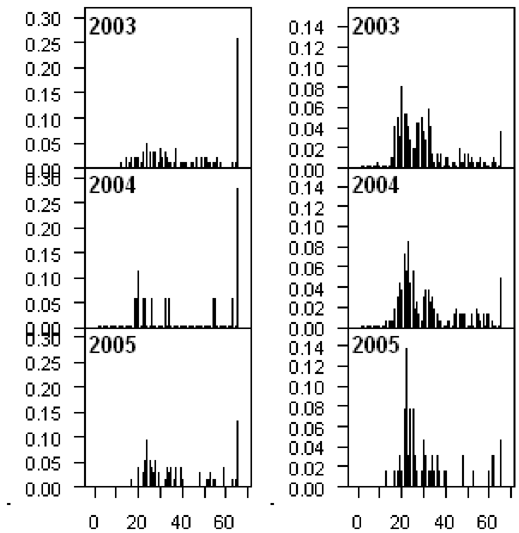

Figure 14. Marginal age-frequency distributions for Washington (left panels) and Oregon (right panels) yelloweye rockfish from the earlier IPHC surveys.

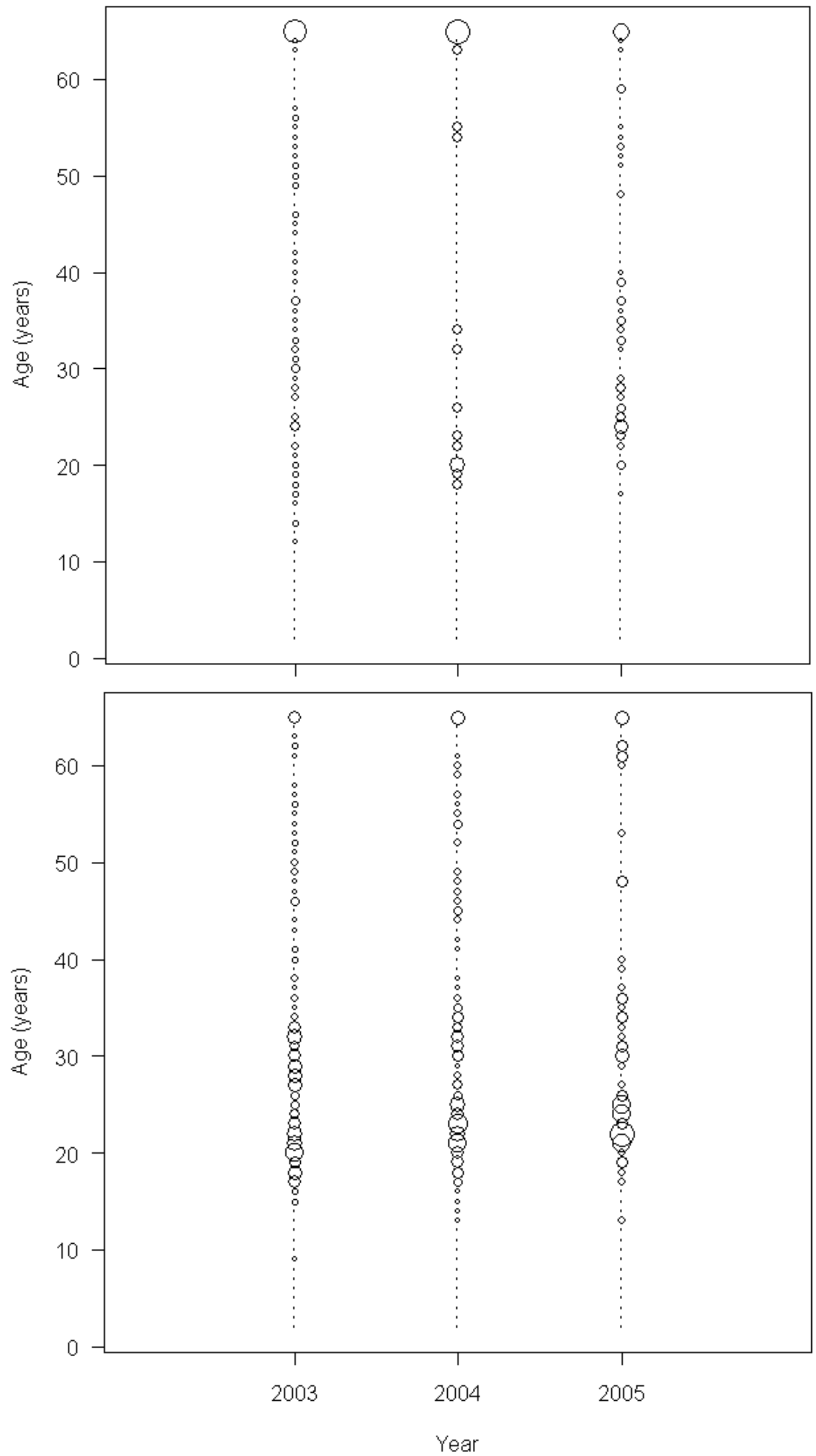

Figure 15. Marginal age-frequency distributions for Washington (upper panel) and Oregon (lower panel) yelloweye rockfish from the earlier IPHC surveys. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.28 (Washington) and 0.14 (Oregon).

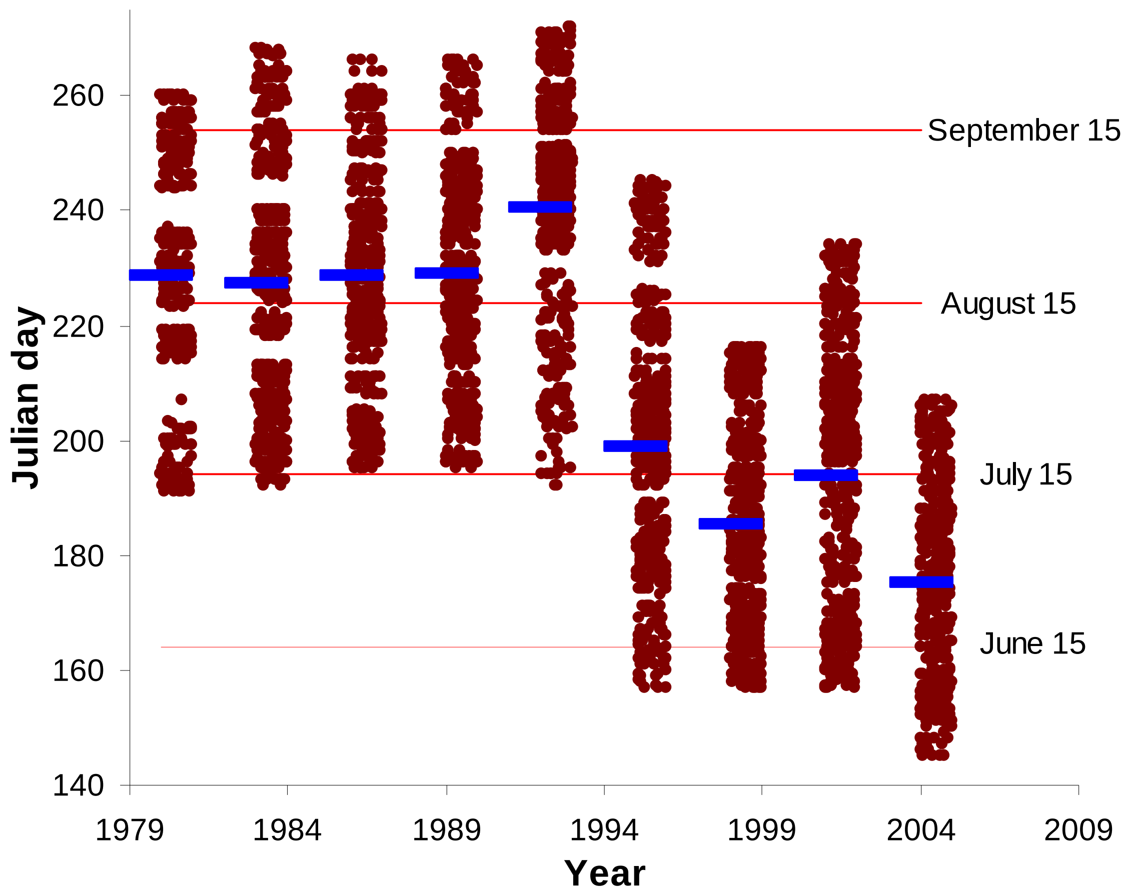

Figure 16. Distribution of dates of operation for the triennial survey (1980-2004). Solid bars show the mean date for each survey year, points represent individual hauls dates, but are jittered to allow better delineation of the distribution of individual points.

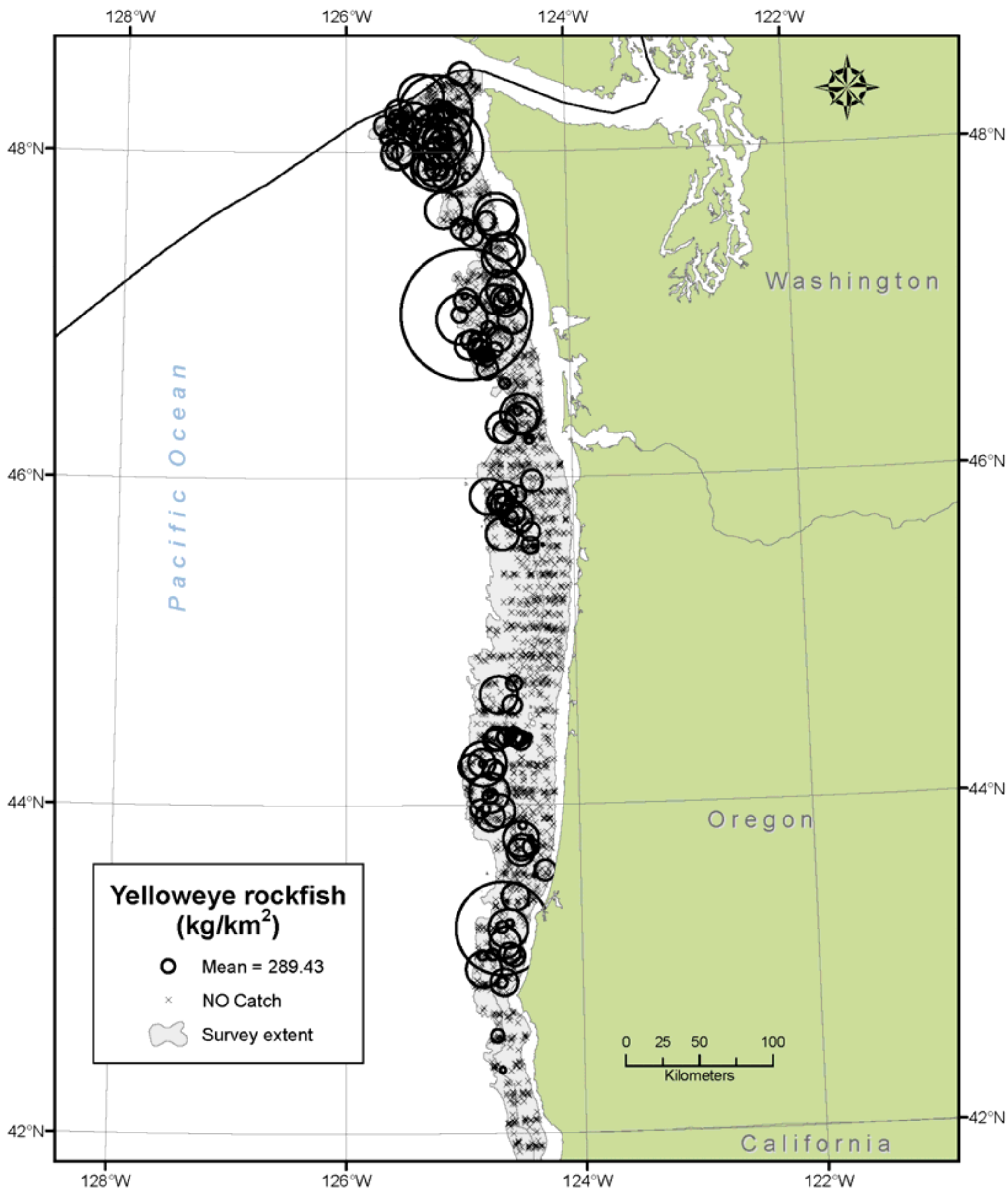

Figure 17. Distribution of yelloweye rockfish (*Sebastes ruberrimus*) catches for the Triennial trawl survey (1977-2004) in Washington and Oregon. Bubble area is proportional to CPUE (kg/km^2). Survey extent is 55-549 m (30-300 fm).

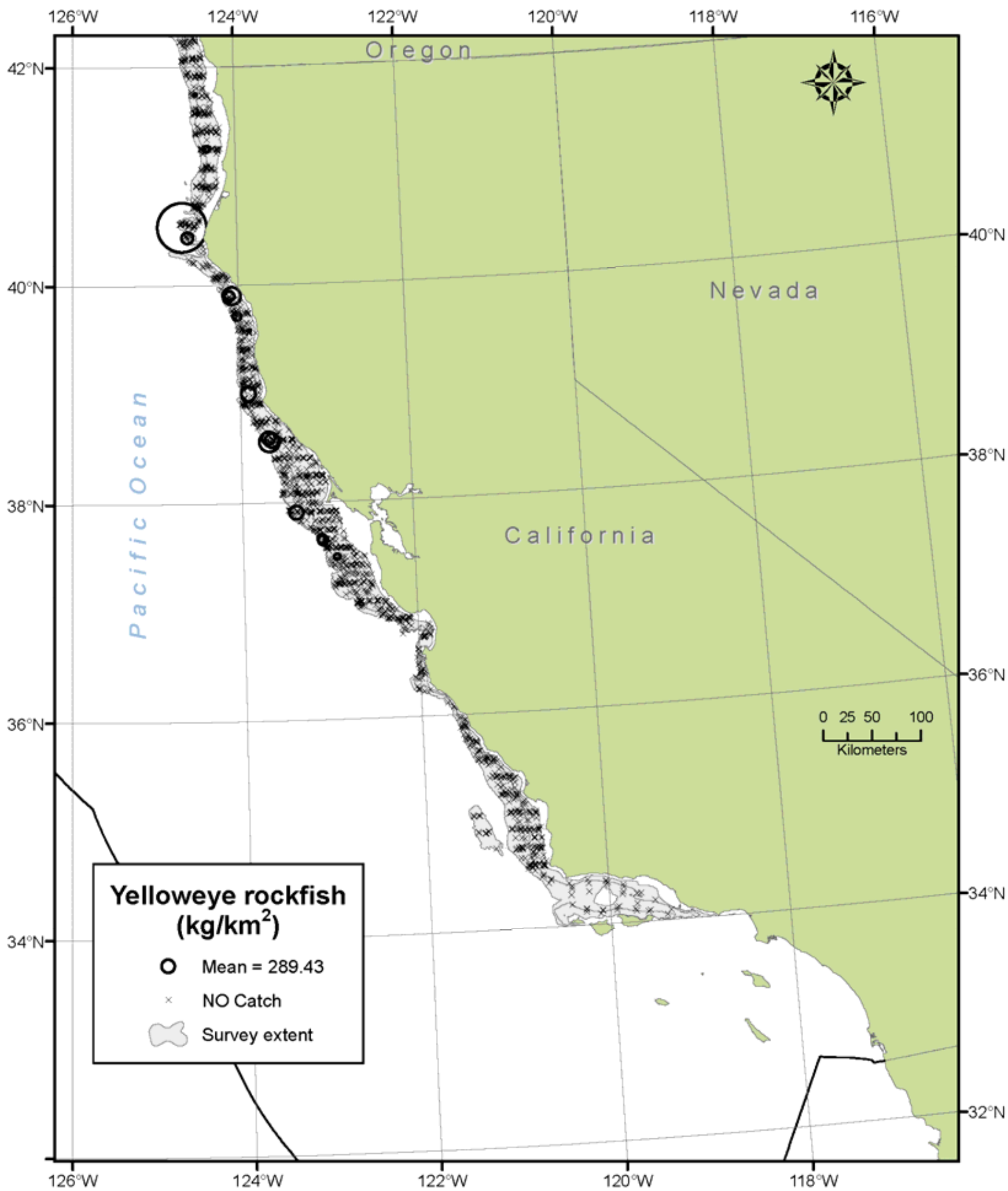

Figure 18. Distribution of yelloweye rockfish (*Sebastes ruberrimus*) catches for the Triennial trawl survey (1977-2004) in California. Bubble area is proportional to CPUE (kg/km^2). Survey extent is 55-549 m (30-300 fm).

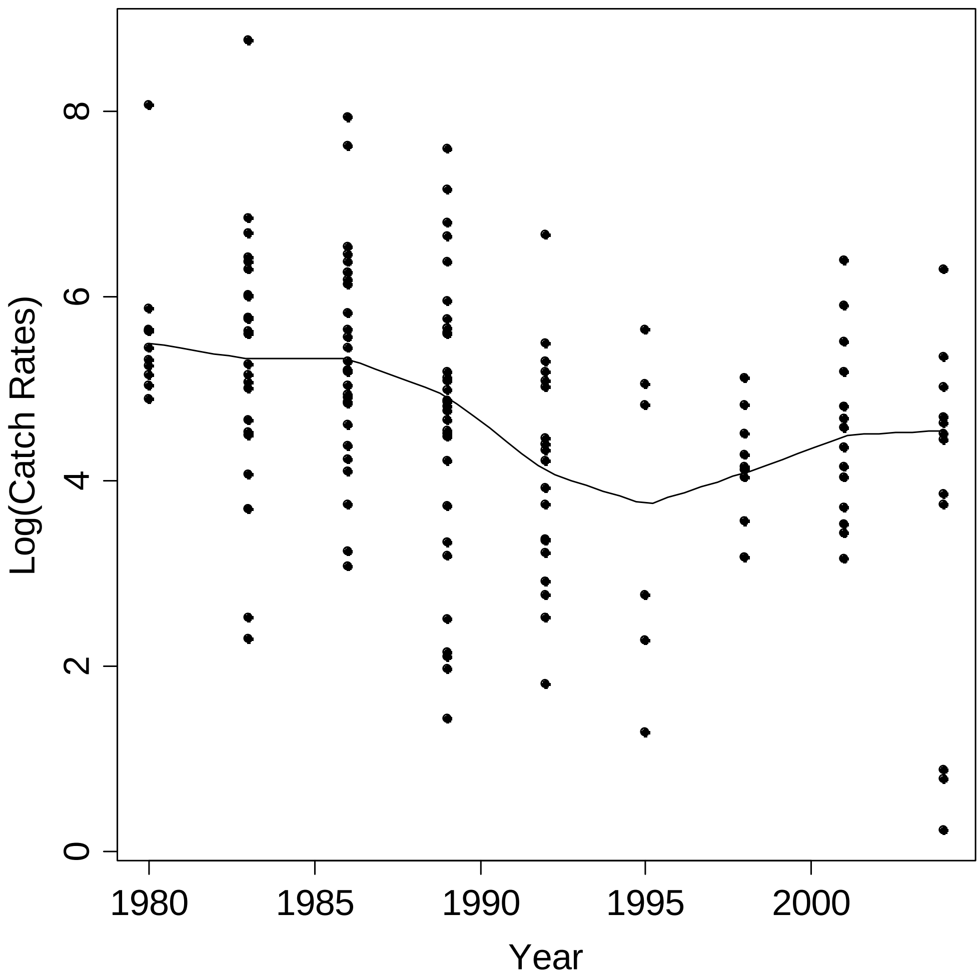

Figure 19. The log of the non-zero catch rates (in kg per km^2) by year for all positive hauls in the triennial survey, 1980-2004. The black line is a lowess smoother to aid evaluation only.

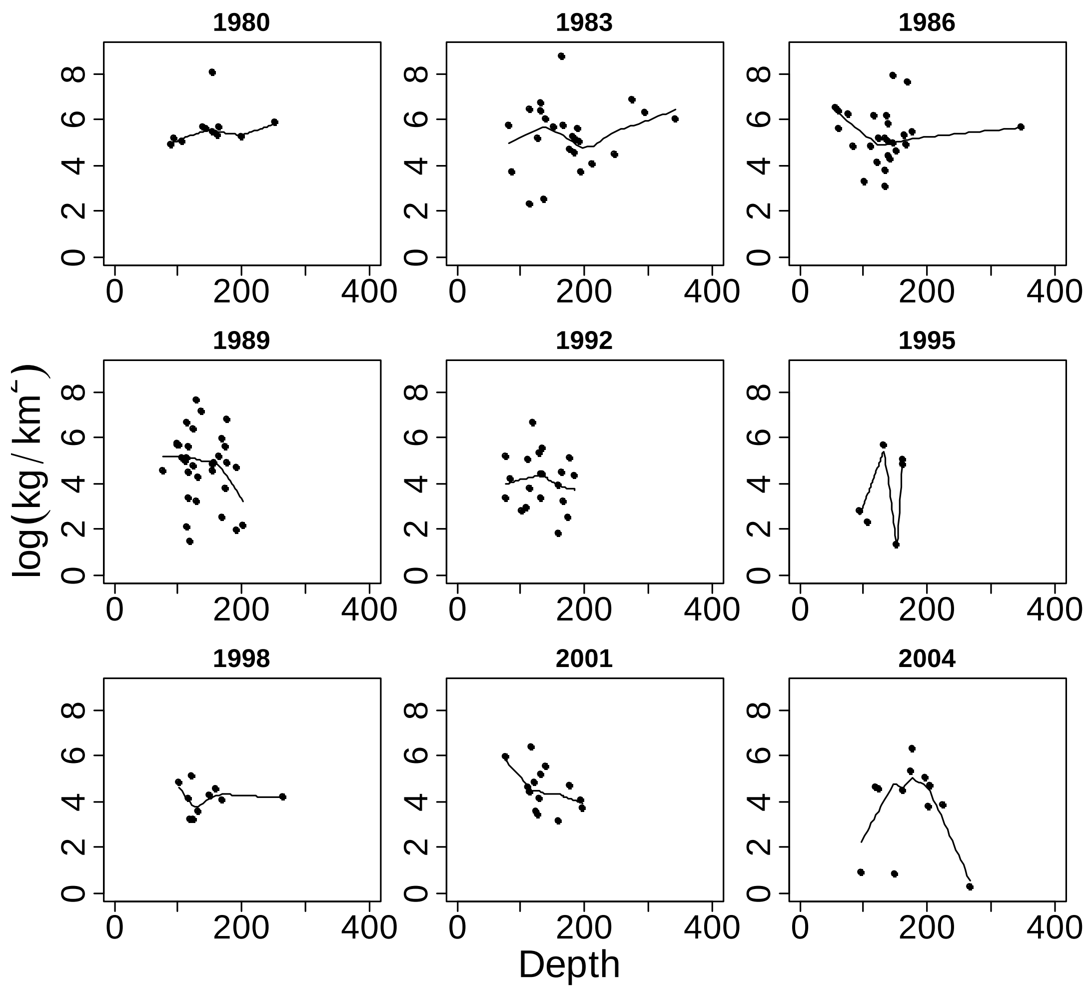

Figure 20. Non-zero catch rates, in log(kg/km^2), by depth and year for the triennial survey. The black line is a lowess smoother to aid evaluation only.

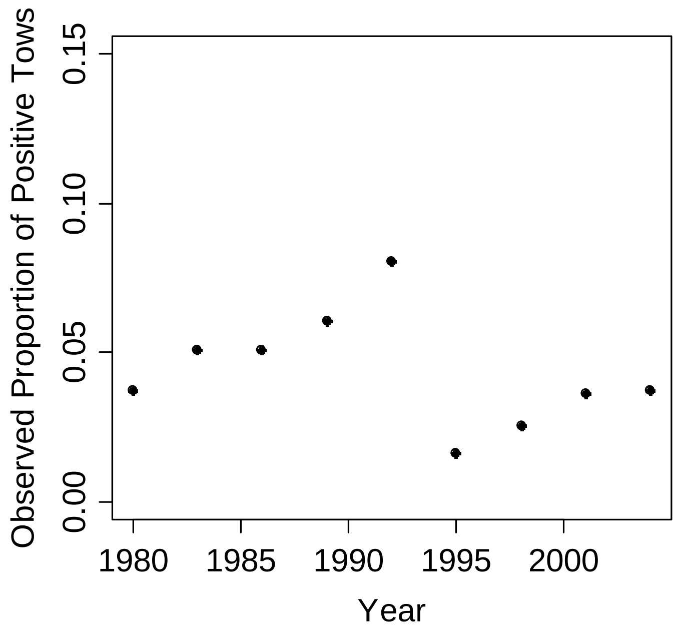

Figure 21. Observed proportion of non-zero tows by year in the triennial survey.

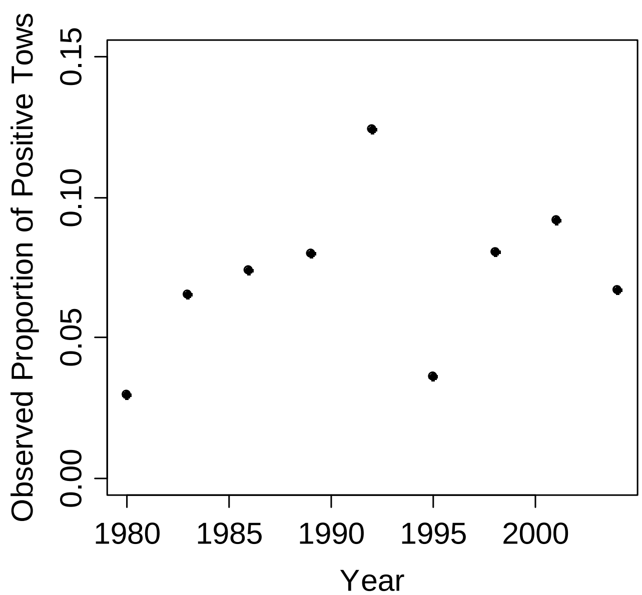

Figure 22. Observed proportion of non-zero tows by year in the triennial survey in Washington waters.

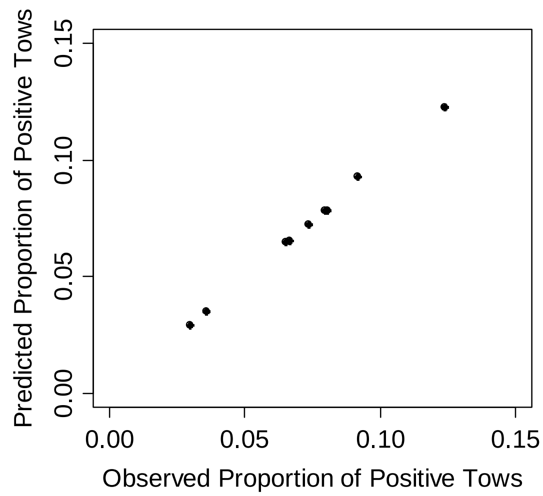

Figure 23. Observed vs. predicted proportion of positive tows for the triennial survey in Washington.

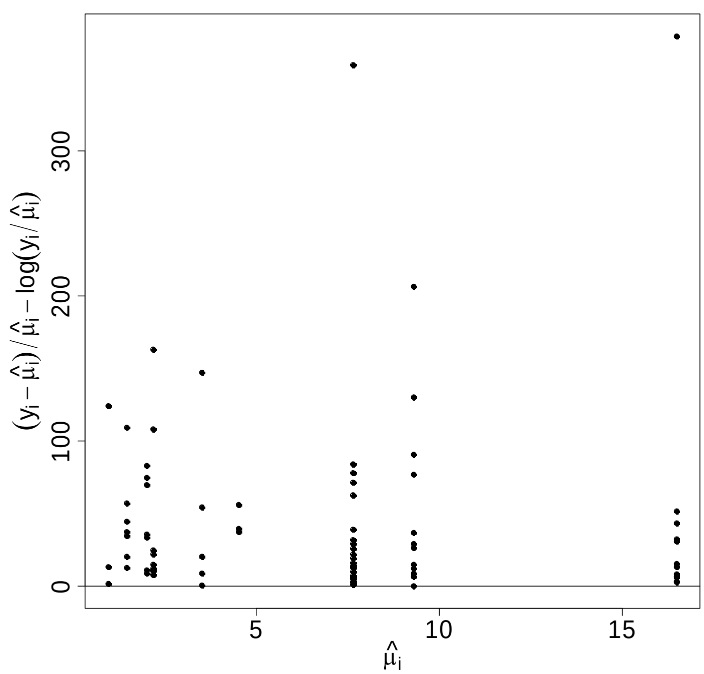

Figure 24. Deviance components (should be Gamma-distributed) vs. predicted values for all positive catch observations in the triennial GLMM for Washington. Note that variation from the random vessel-effects is not included.

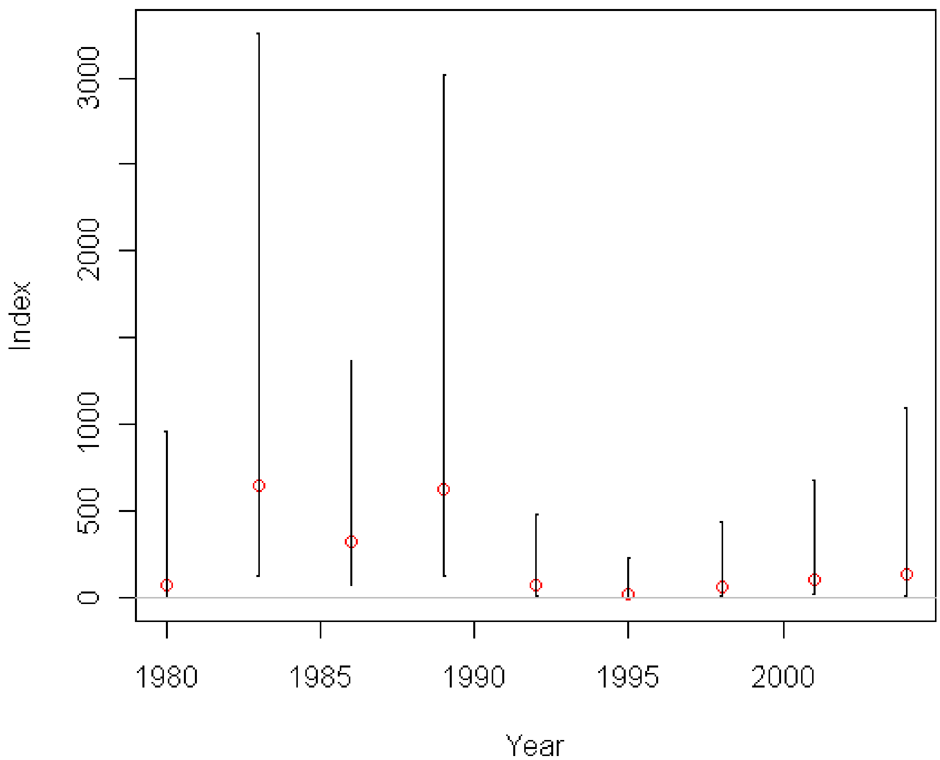

Figure 25. Index of relative abundance for the triennial survey in Washington.

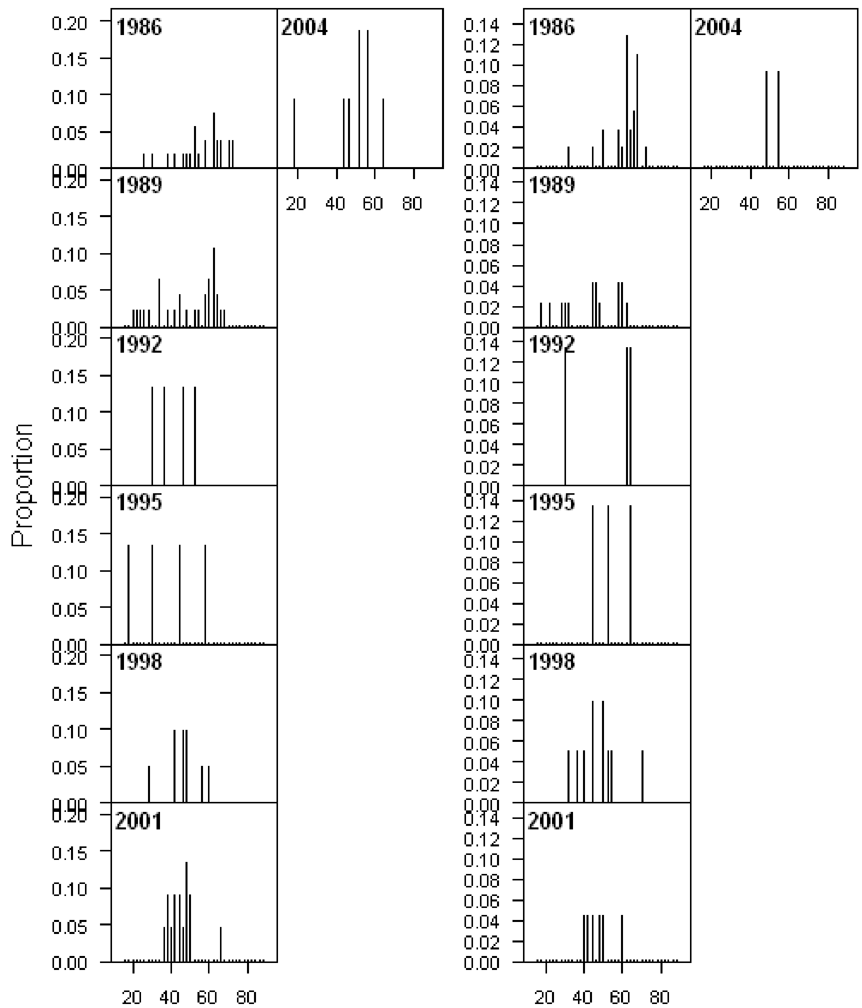

Figure 26. Length-frequency distributions for female (left panel) and male (right panel) yelloweye rockfish from the triennial bottom trawl survey in Washington. The x-axis represents the 2-cm size bin.

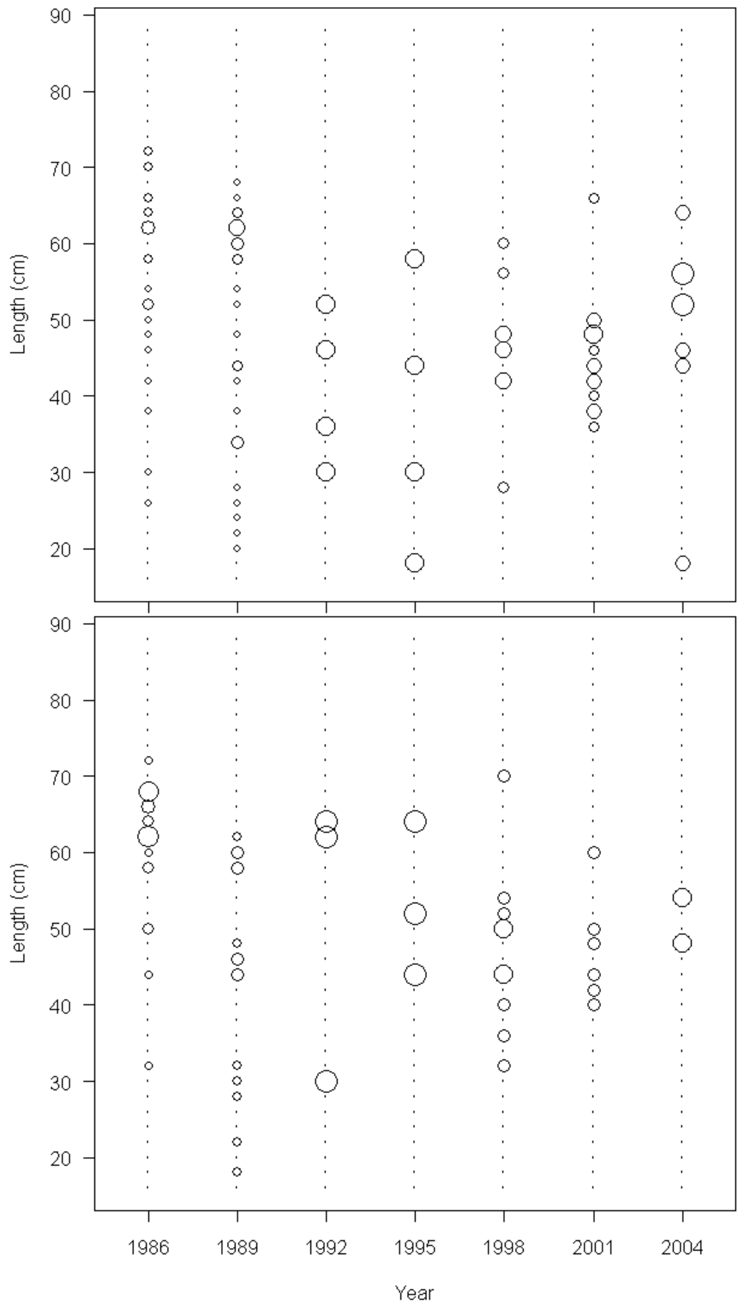

Figure 27. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the triennial bottom trawl survey in Washington. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.19 (females) and 0.13 (males).

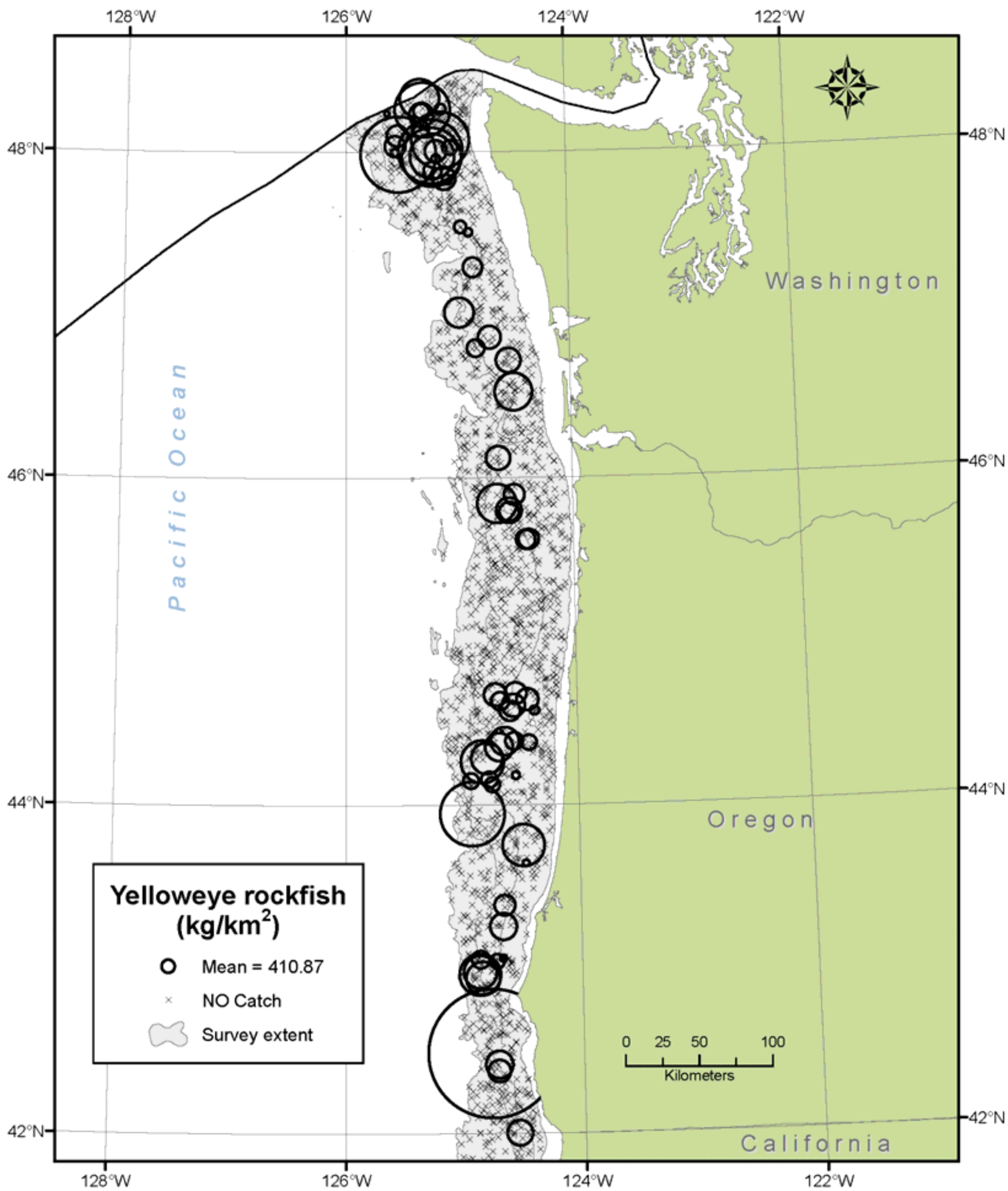

Figure 28. Distribution of yelloweye rockfish (*Sebastes ruberrimus*) catches for the NWFSC trawl survey (2003-2008) in Washington and Oregon. Bubble area is proportional to CPUE (kg/km^2). Survey extent is 55-1280 m (30-700 fm).

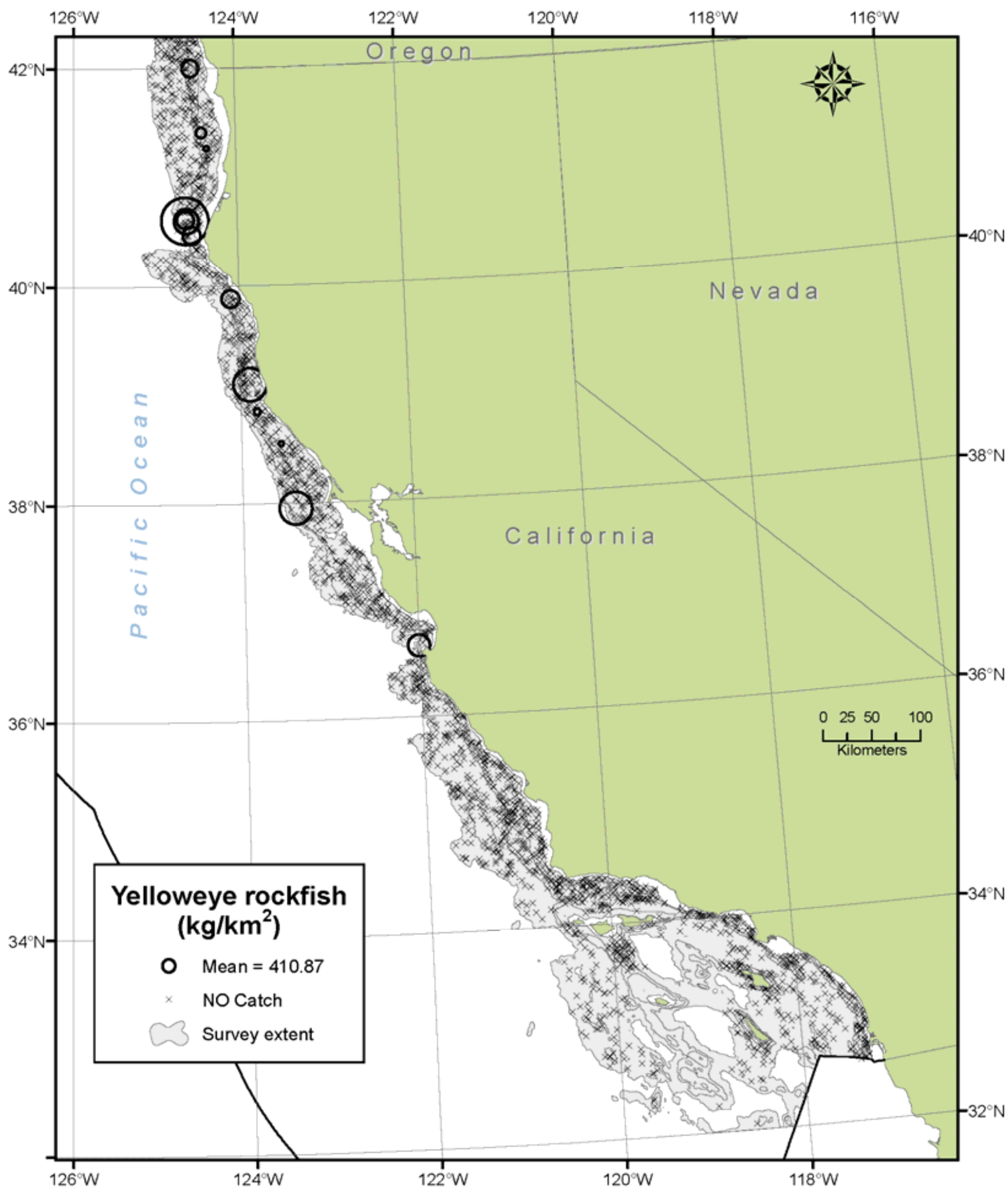

Figure 29. Distribution of yelloweye rockfish (*Sebastes ruberrimus*) catches for the NWFSC trawl survey (2003-2008) in California. Bubble area is proportional to CPUE (kg/km^2). Survey extent is 55-1280 m (30-700 fm).

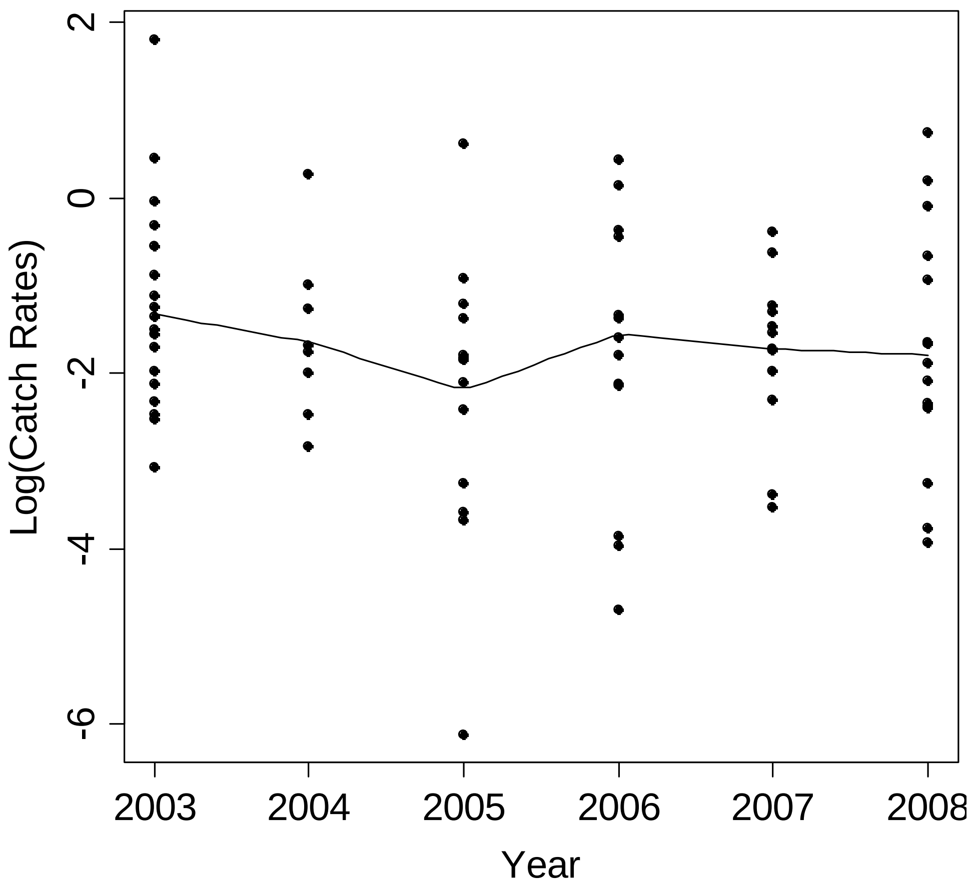

Figure 30. The log of the non-zero catch rates (in kg per km^2) by year for all positive hauls in the NWFSC survey 2003-2008. The black line is a lowess smoother to aid evaluation only.

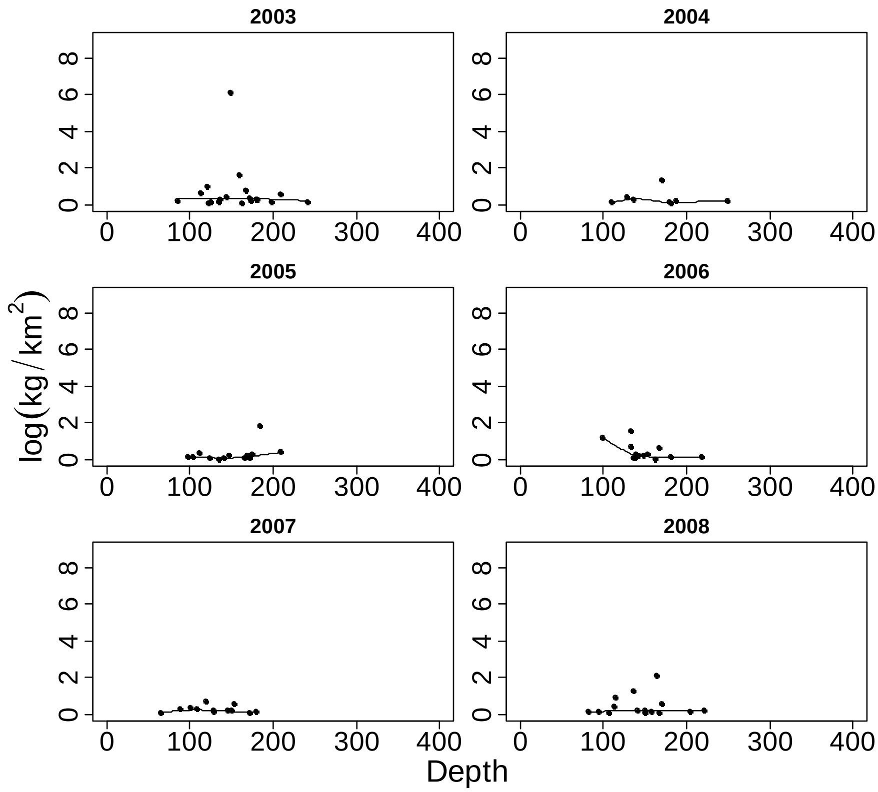

Figure 31. Coast-wide non-zero catch rates over depth for each year in log(kg/km^2); the black line is a lowess smoothing line (NWFSC survey).

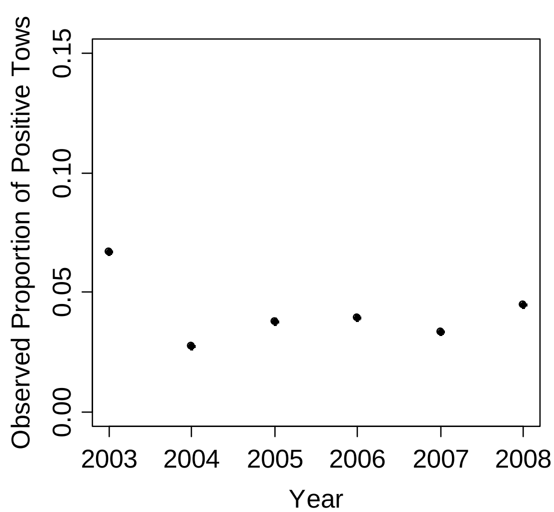

Figure 32. Observed proportion of non-zero tows by year in the NWFSC survey.

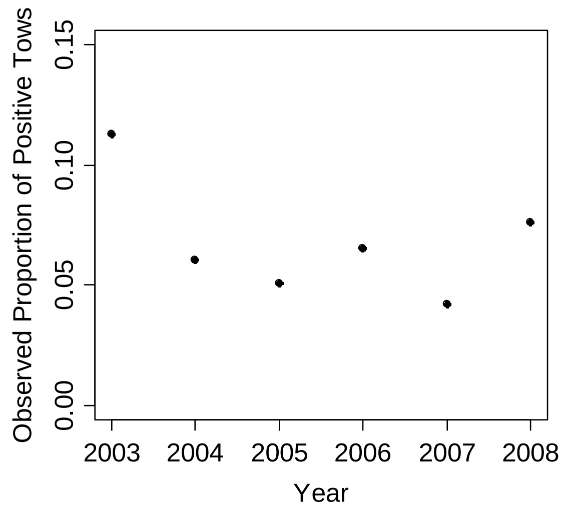

Figure 33. Proportion of non-zero tows in the NWFSC survey in Oregon.

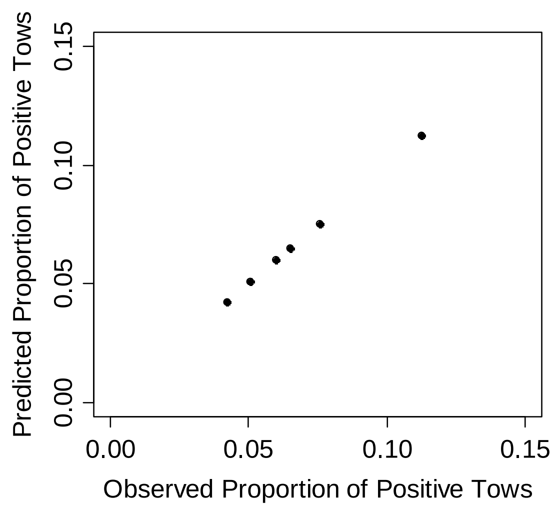

Figure 34. Observed vs. predicted proportion of positive tows for the NWFSC survey in Oregon.

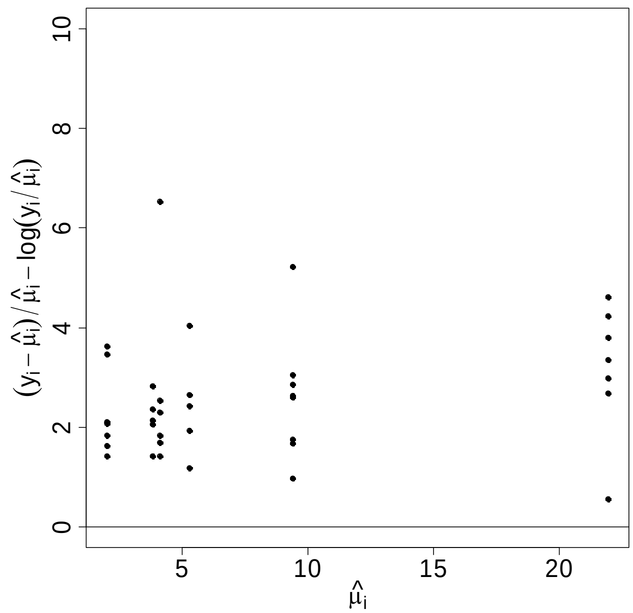

Figure 35. Deviance components (should be Gamma-distributed) vs. predicted values for all positive catch observations in the NWFSC GLMM for Oregon. Note that variation from the random vessel-effects is not included.

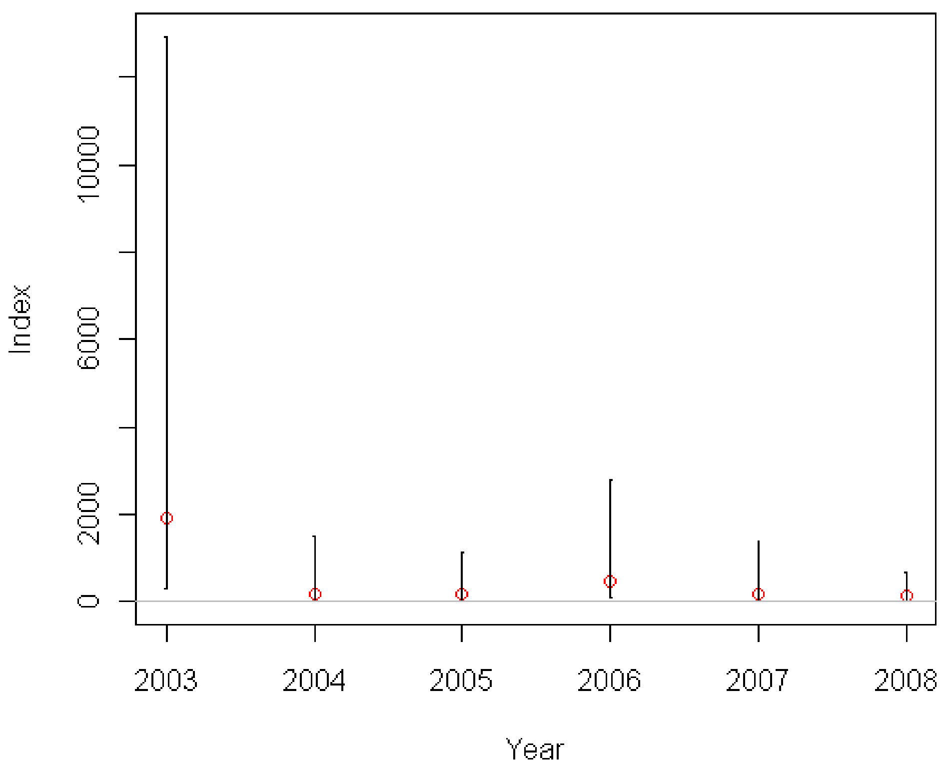

Figure 36. Index of relative abundance for the NWFSC survey in Oregon.

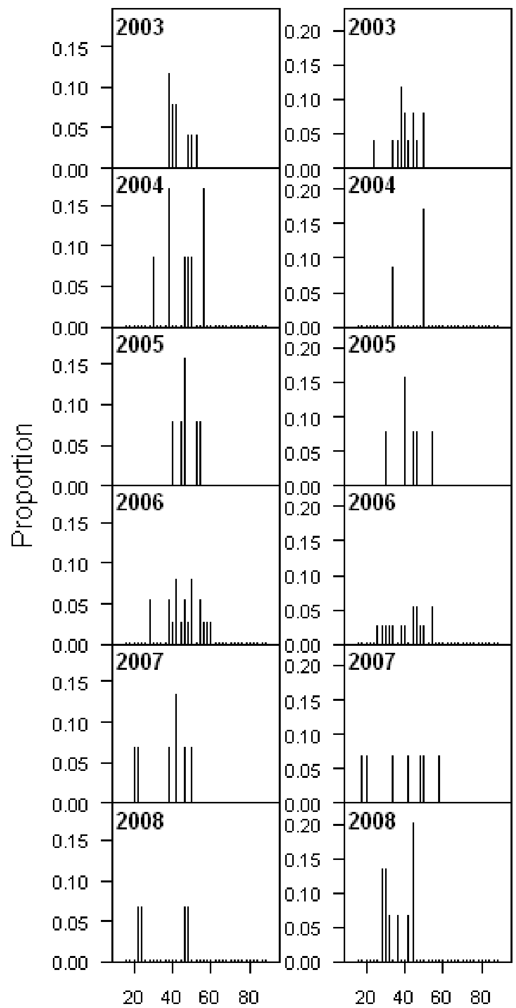

Figure 37. Length-frequency distributions for female (left panel) and male (right panel) yelloweye rockfish from the NWFSC bottom trawl survey in Oregon. The x-axis represents the 2-cm size bin.

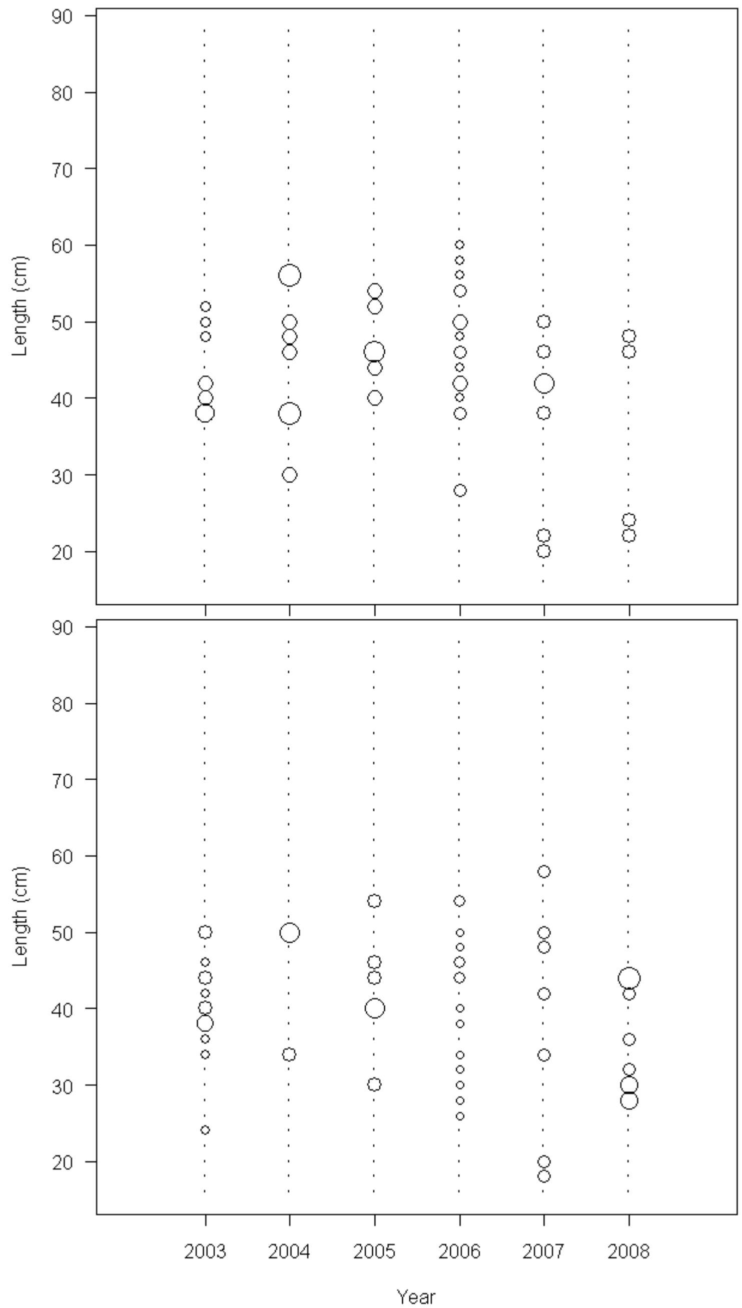

Figure 38. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the NWFSC bottom trawl survey in Washington. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.17 (females) and 0.12 (males).

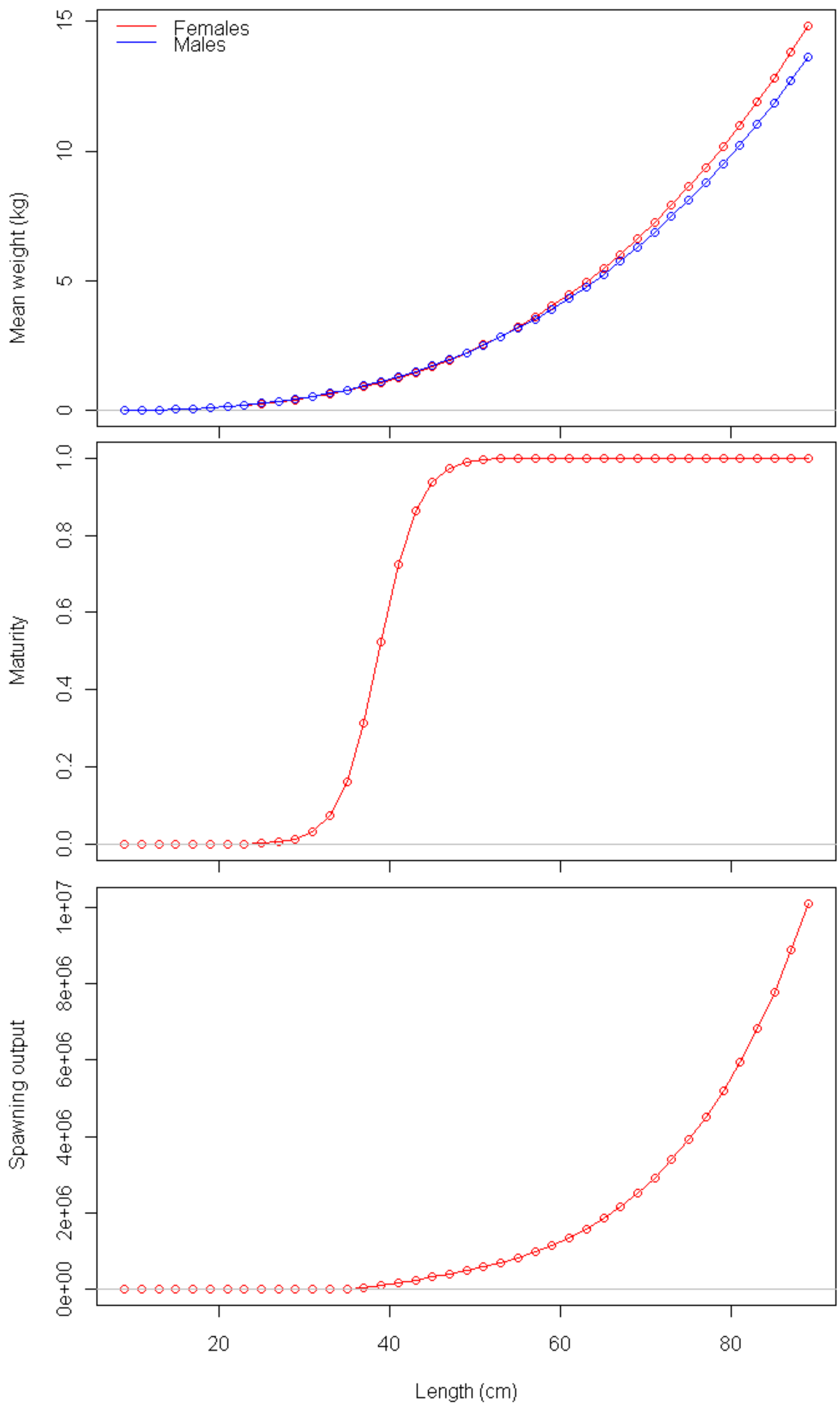

Figure 39. W-L relationship for male and female yelloweye (upper panel), female maturity curve (middle panel), and female spawning output at length (lower panel) illustrating the product of the female W-L, fecundity and maturity relationships.

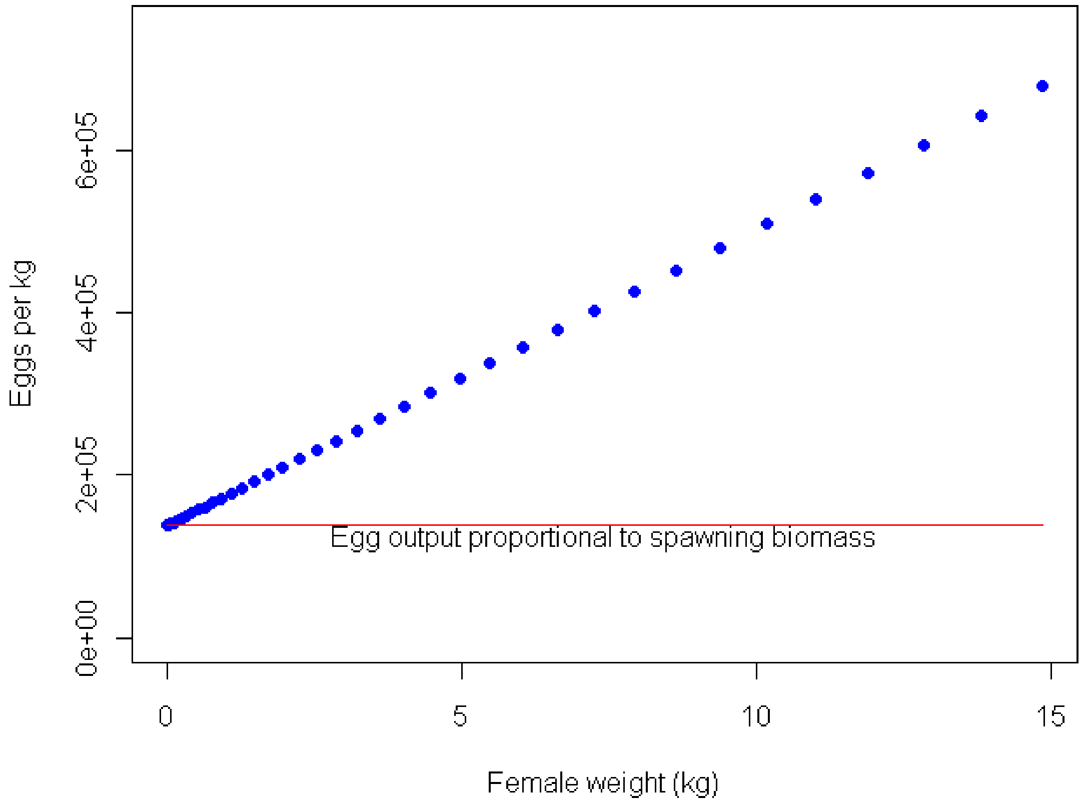

Figure 40. Female yelloweye fecundity relationship (Filled circles, From Dick, 2009). Horizontal line indicates no fecundity relationship (for comparison).

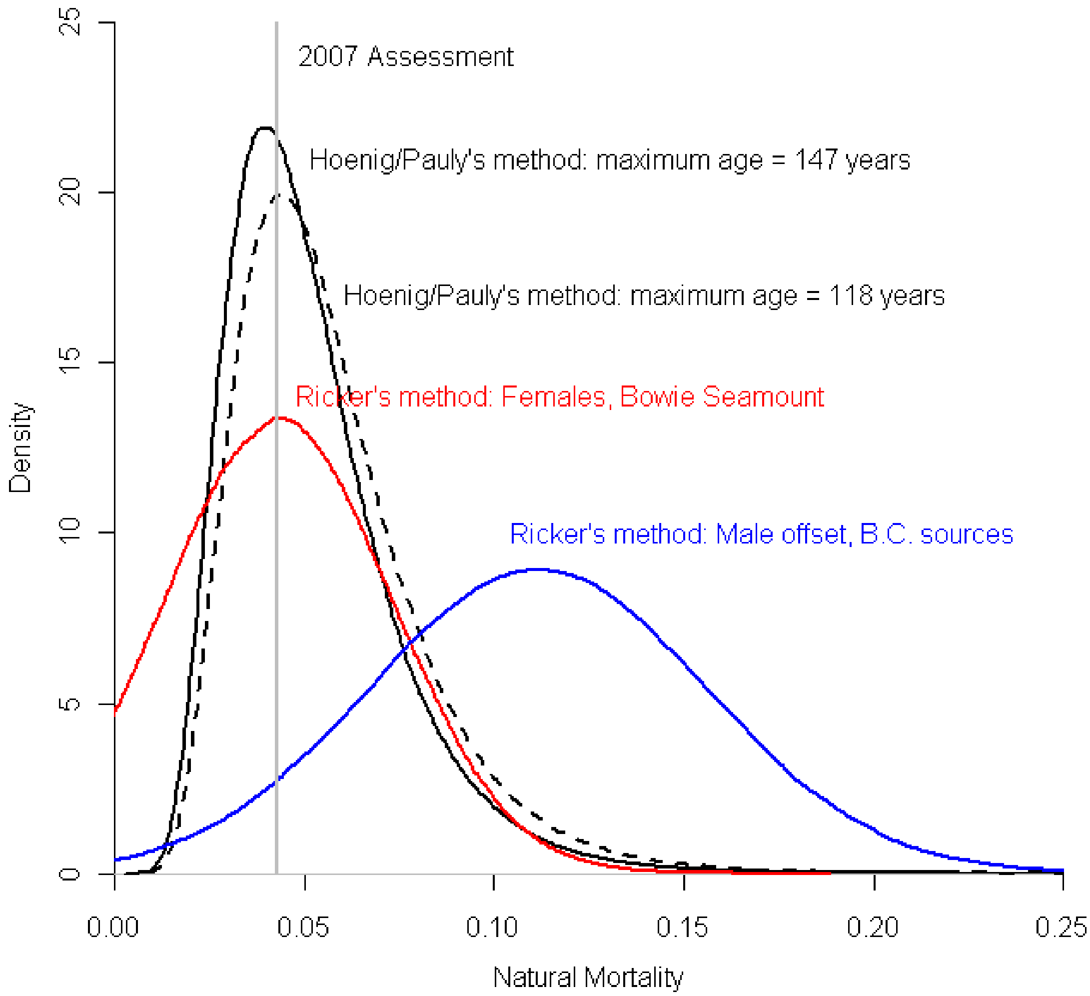

Figure 41. Priors for natural mortality from various sources.

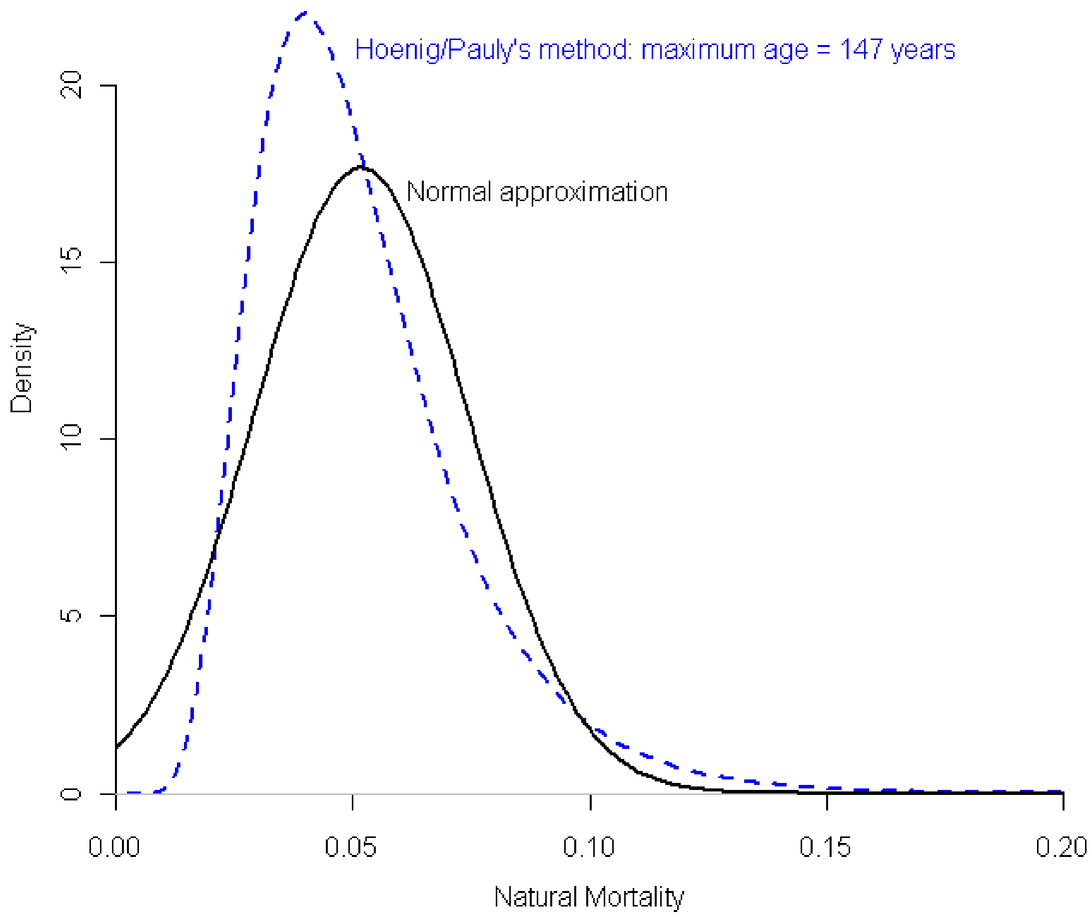

Figure 42**.** Prior for natural mortality (normal approximation) used in the base case model, with original log-normal distribution for comparison.

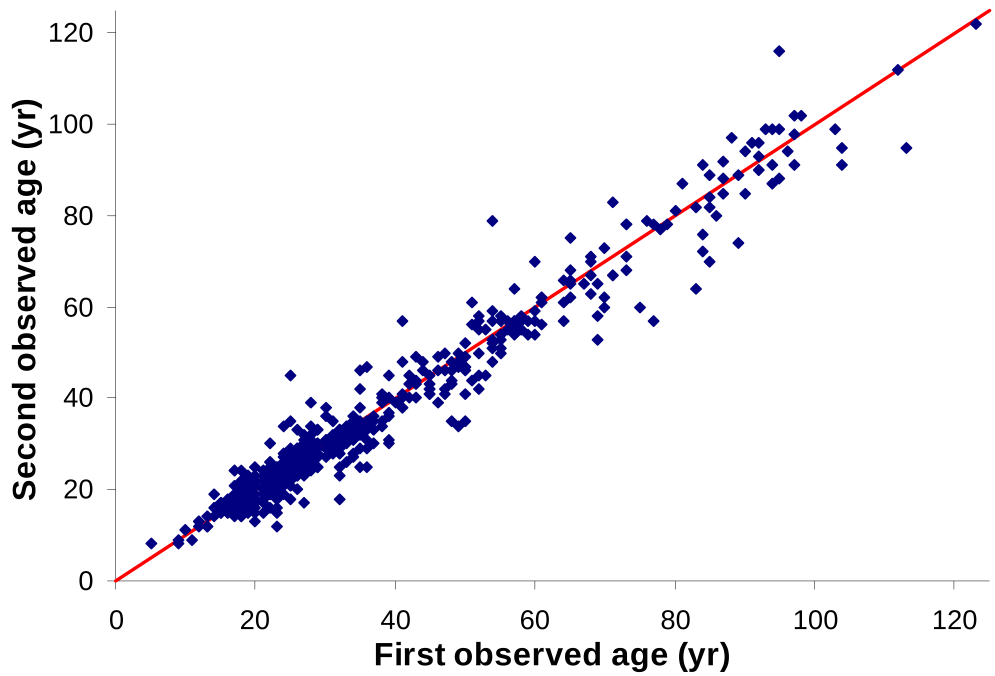

Figure 43. Comparison of first and second age reads (by WDFW age readers) for 556 yelloweye rockfish. Diagonal line indicates the 1:1 relationship.

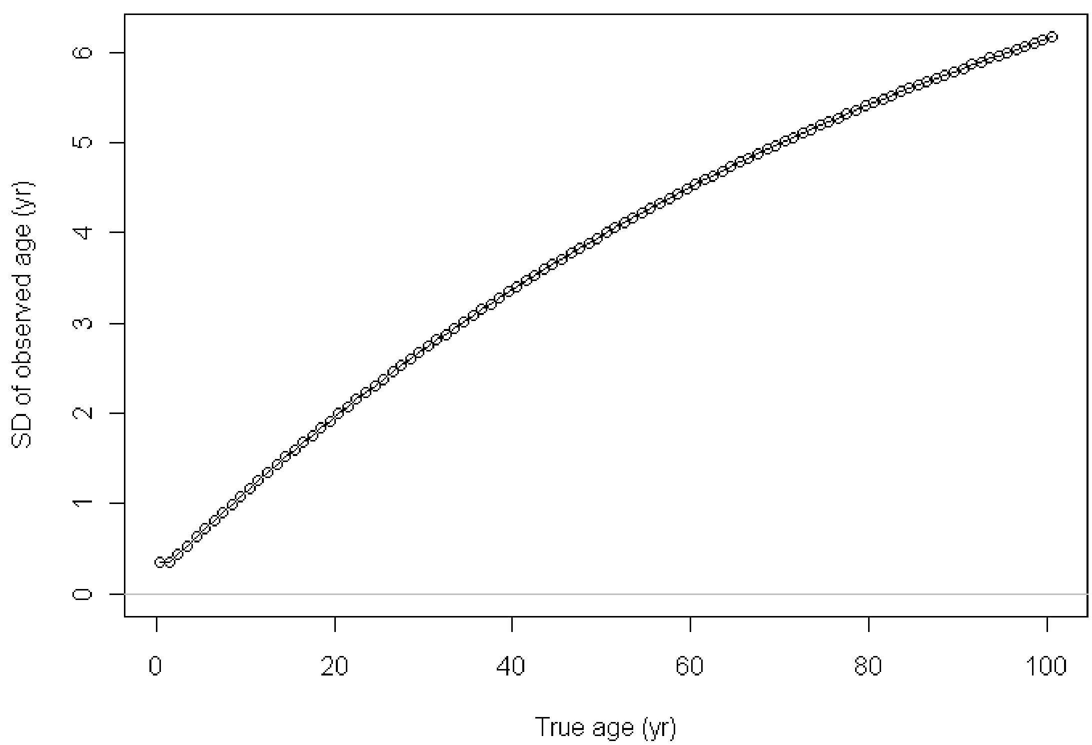

Figure 44. Externally estimated relationship between variability of observed age and true age in years.

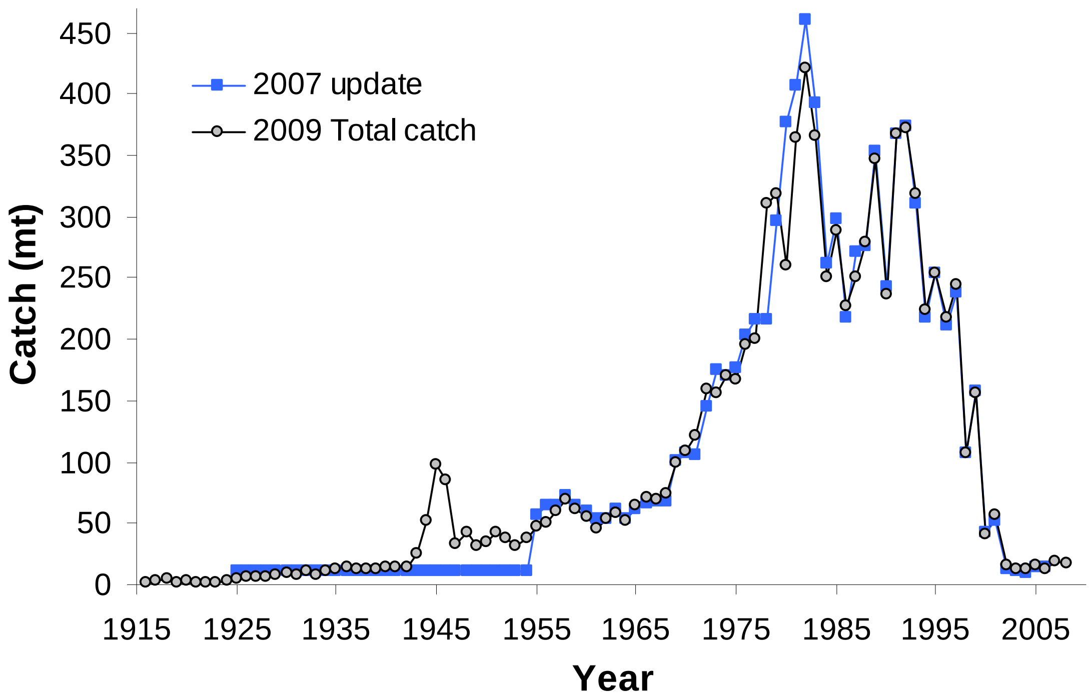

Figure 45. Comparison of the 2007 and recently revised yelloweye rockfish catch history, 1916-2008.

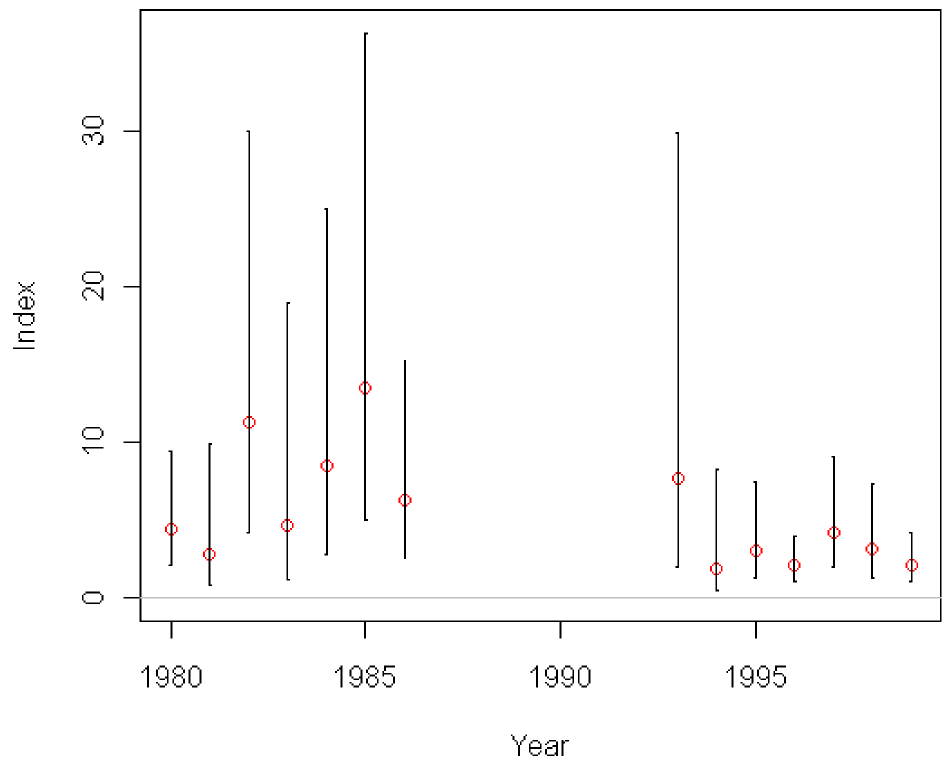

Figure 46. Index of relative abundance for the California recreational CPUE series.

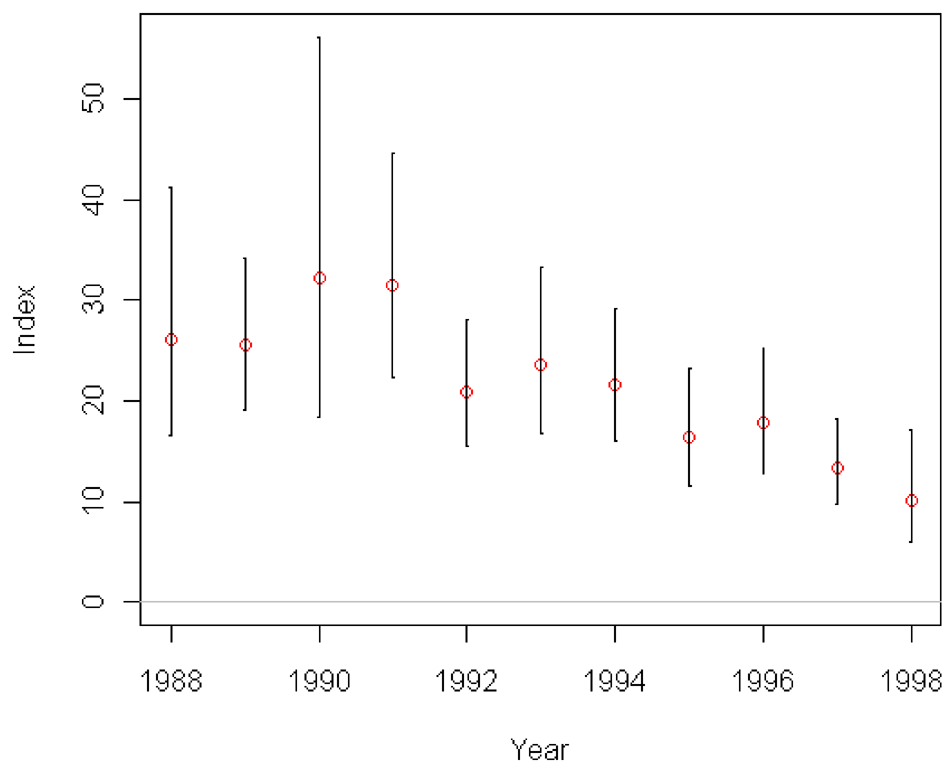

Figure 47. Index of relative abundance for the California recreational observer CPUE series.

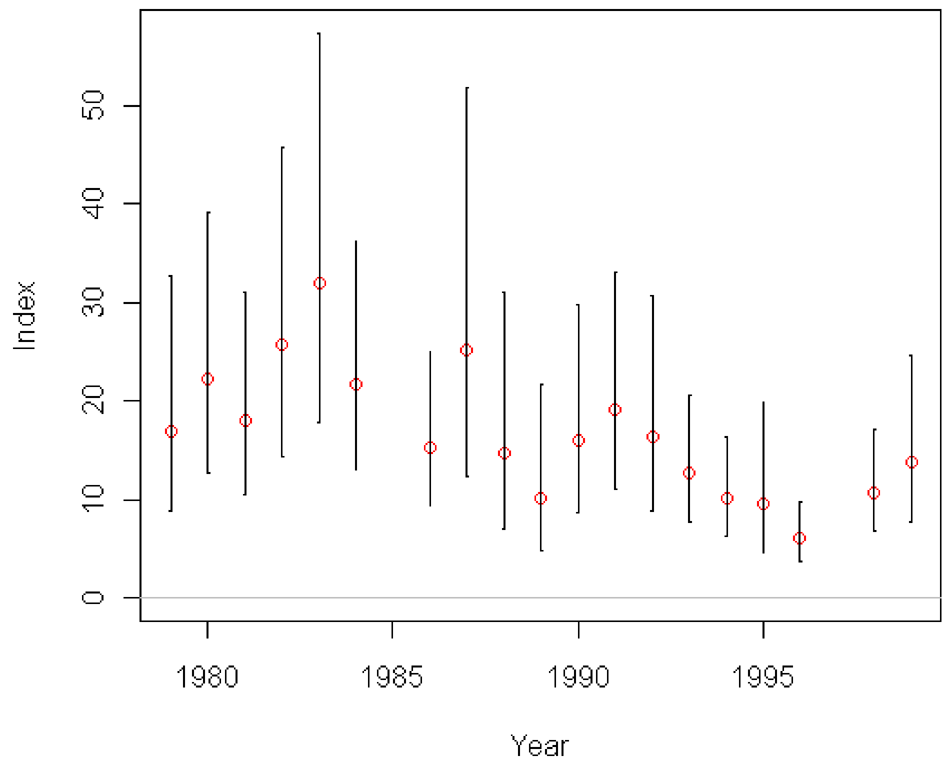

Figure 48. Index of relative abundance for the Oregon recreational CPUE series.

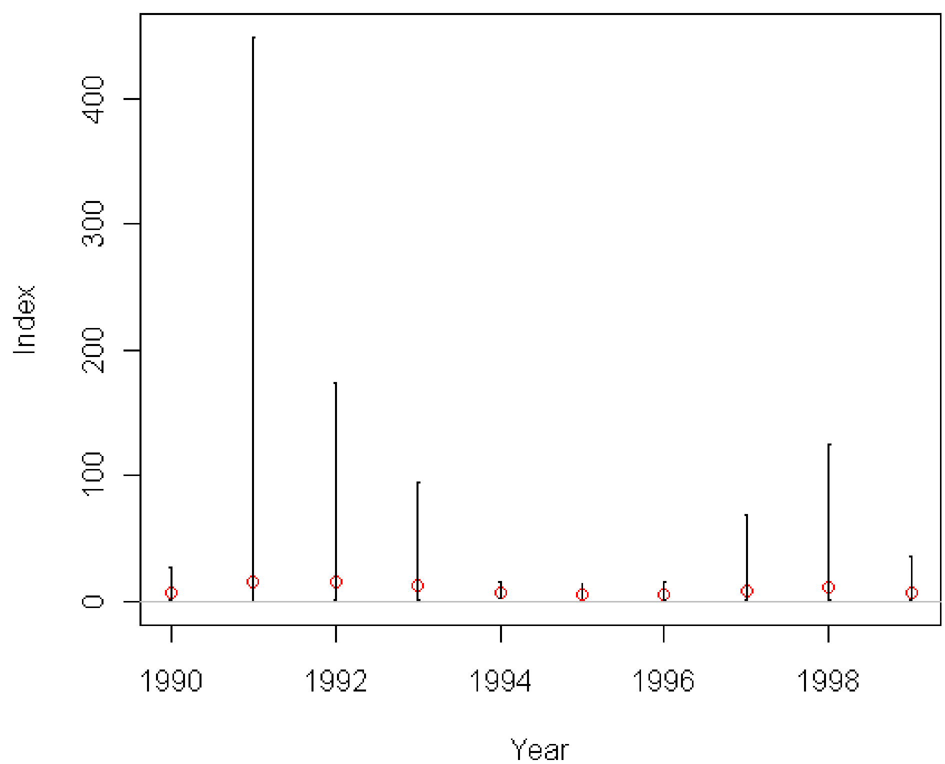

Figure 49.Index of relative abundance for the Washington recreational CPUE series.

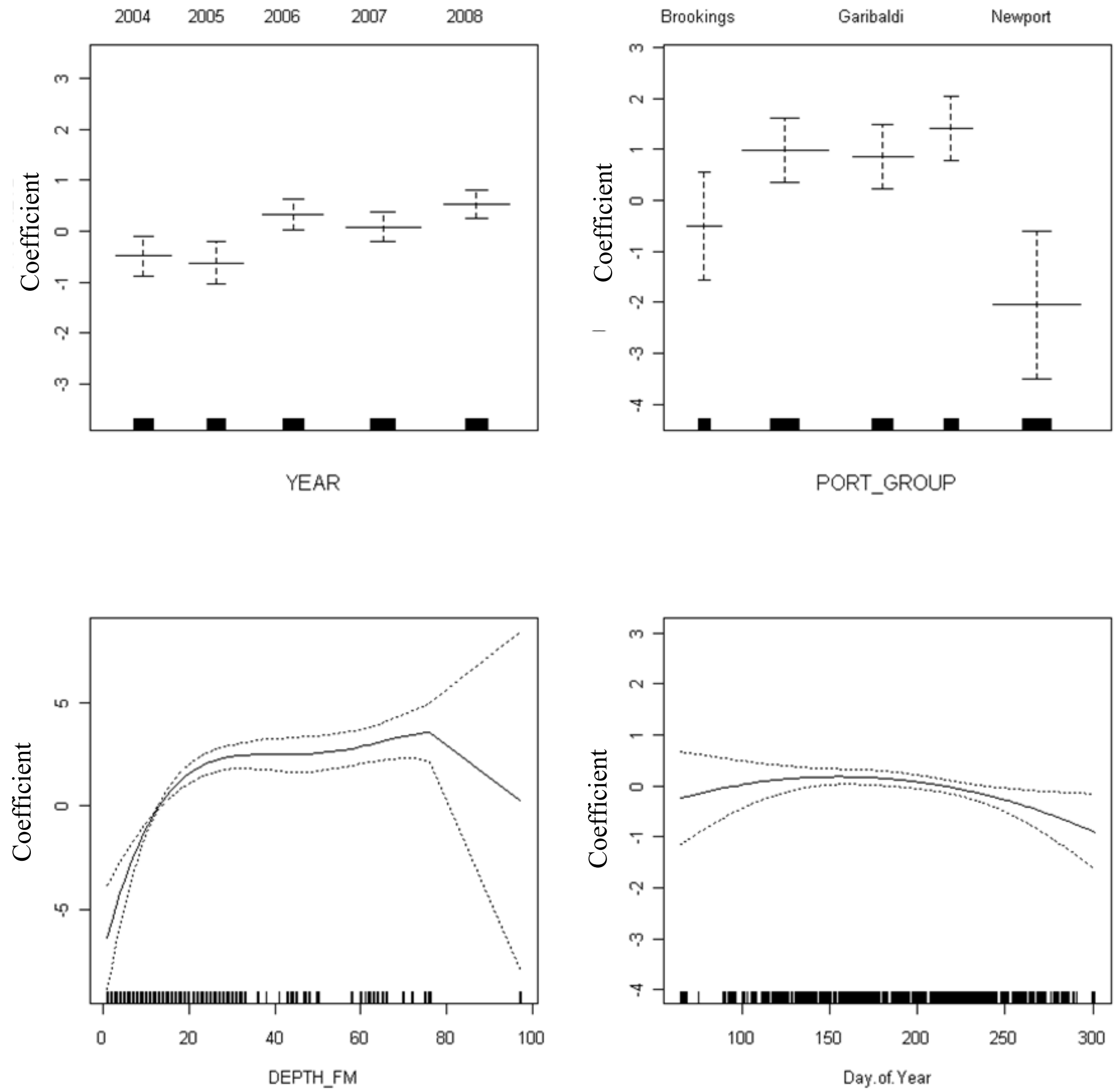

Figure 50.Estimated relationships of covariates included in the analysis of recreational charter observer CPUE data from Oregon. Error bars represent +/- 2 SEs about maximum likelihood estimates.

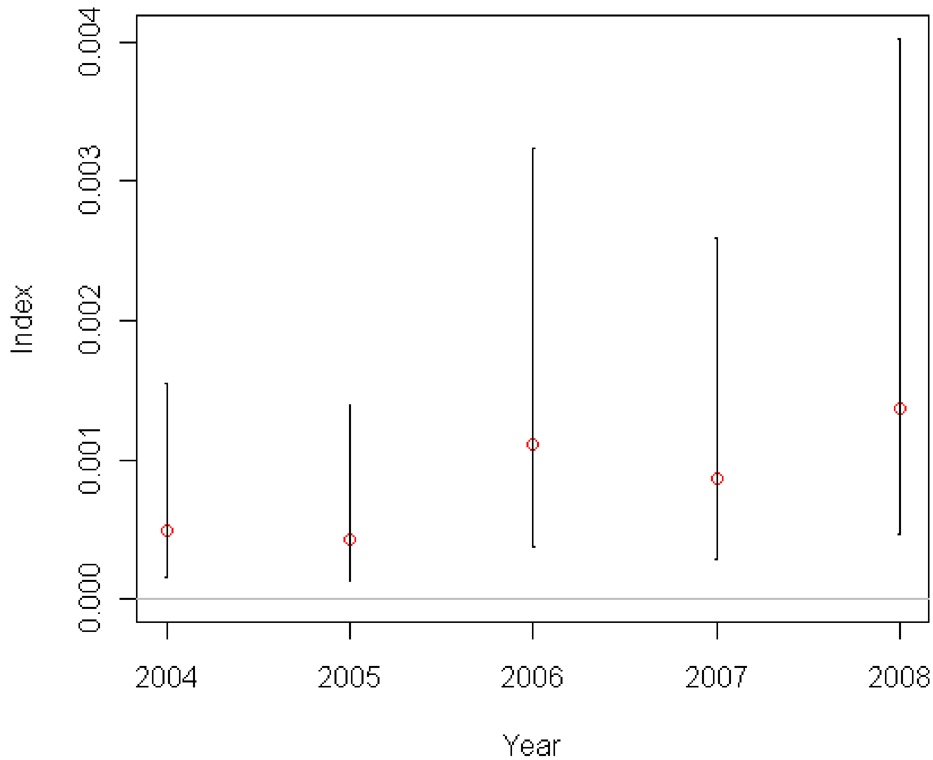

Figure 51. Index of relative abundance for the Oregon recreational observer CPUE series.

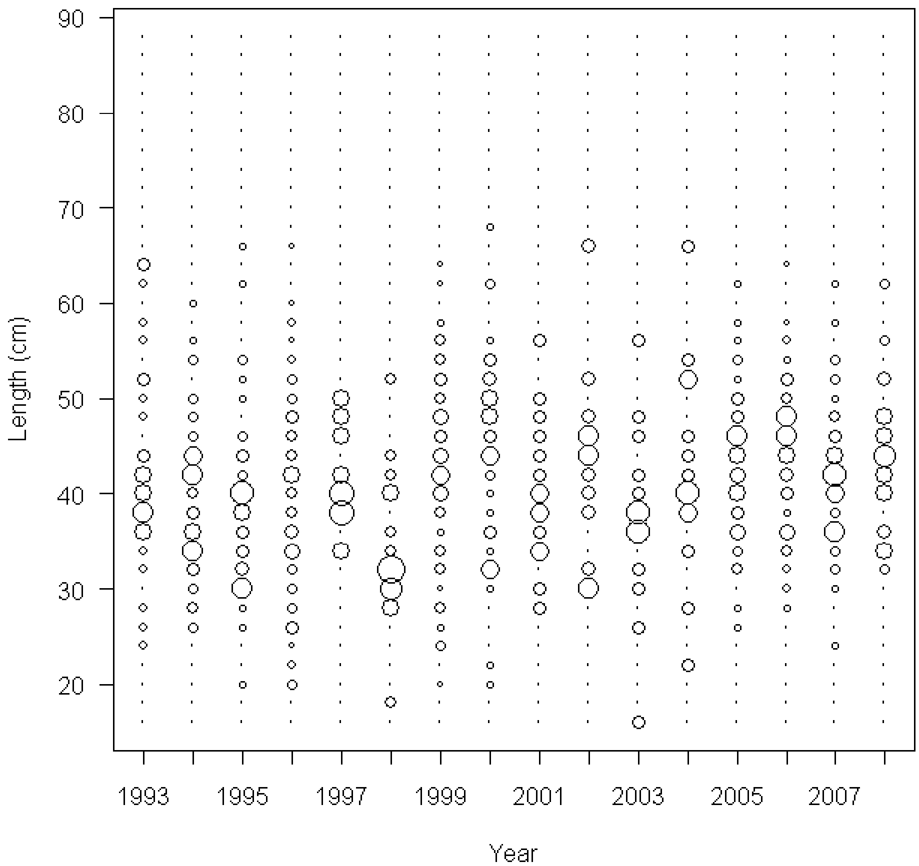

Figure 52. Length-frequency distributions for sexes-combined yelloweye rockfish from the California recreational fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate a proportion of 0.27.

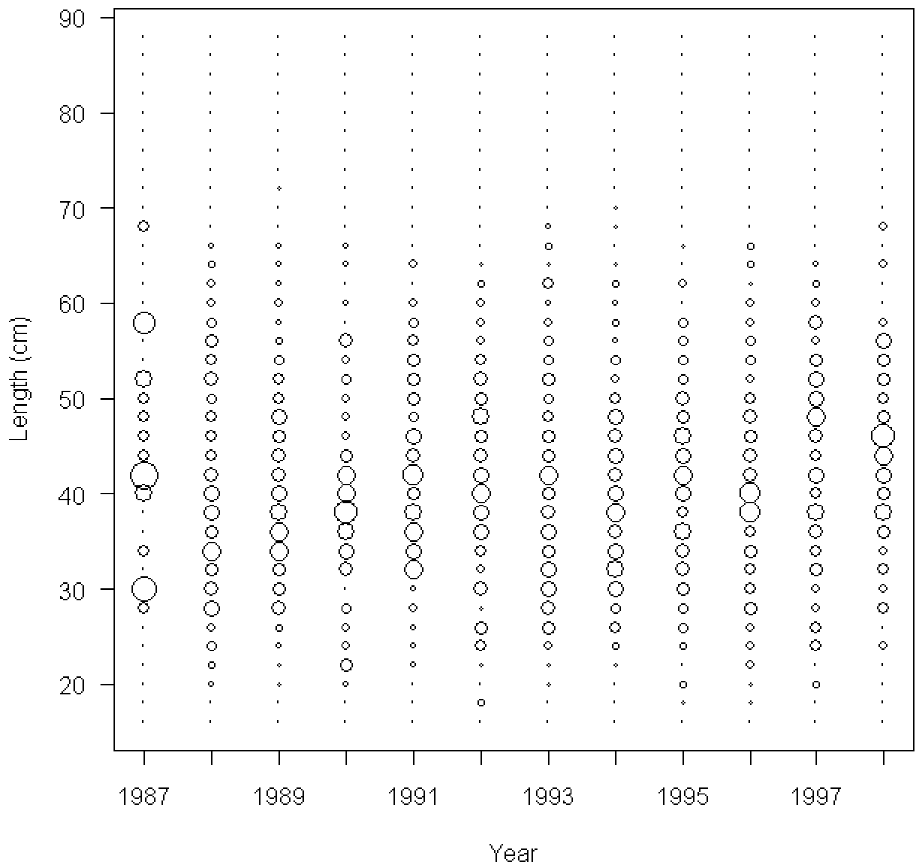

Figure 53. Length-frequency distributions for sexes-combined yelloweye rockfish from the California recreational charter fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate a proportion of 0.21.

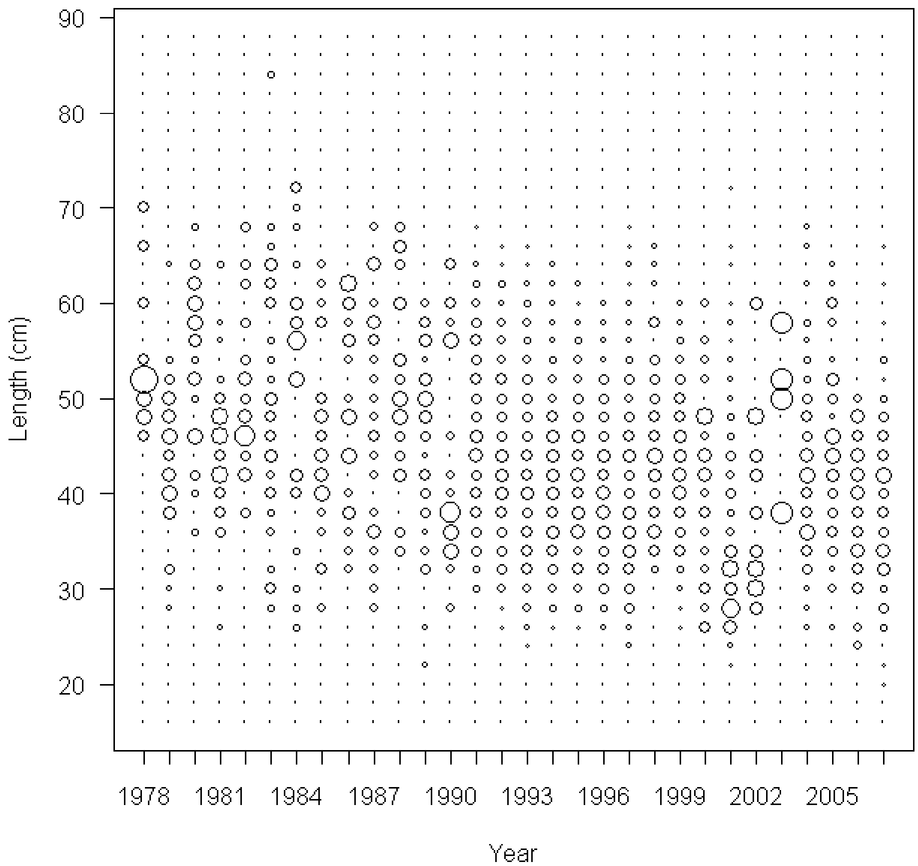

Figure 54. Length-frequency distributions for sexes-combined yelloweye rockfish from the California commercial fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate a proportion of 0.39.

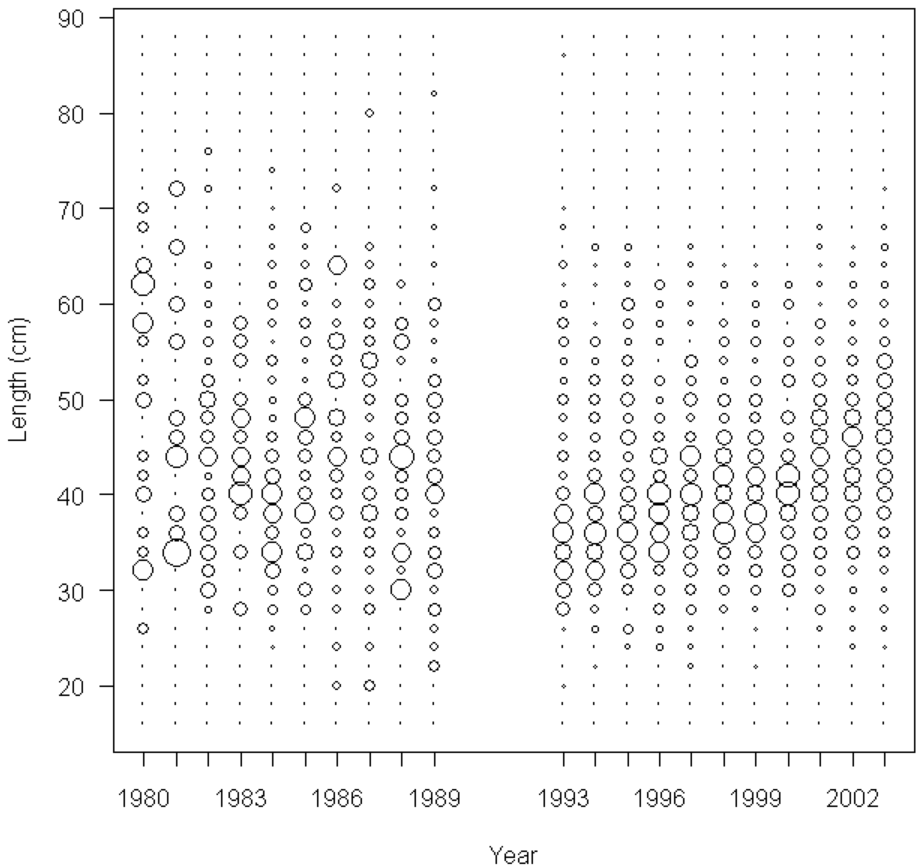

Figure 55.Length-frequency distributions for sexes-combined yelloweye rockfish from the Oregon recreational fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate a proportion of 0.22.

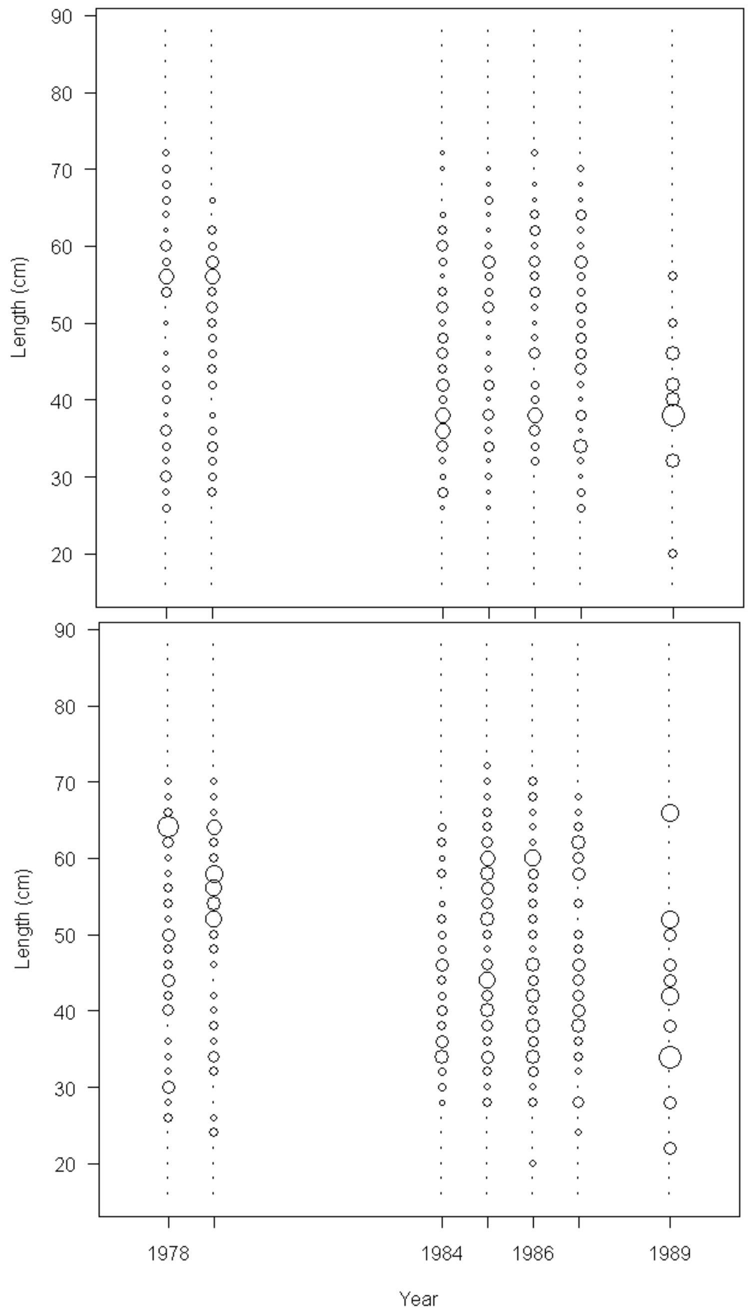

Figure 56. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Oregon recreational fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.15 (females) and 0.09 (males).

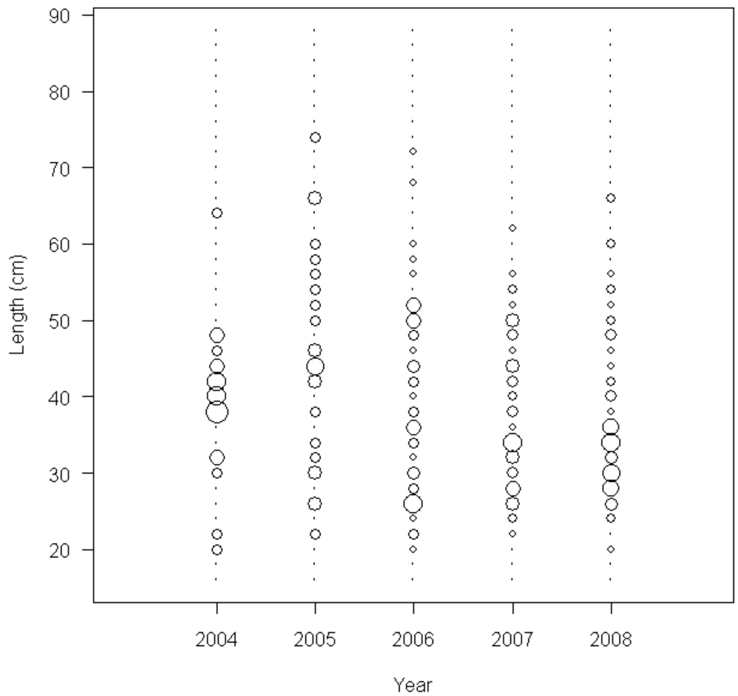

Figure 57. Length-frequency distributions for sexes-combined yelloweye rockfish from the Oregon recreational observer program. Distributions sum to 1.0 in each year; the largest bubble sizes indicate a proportion of 0.18.

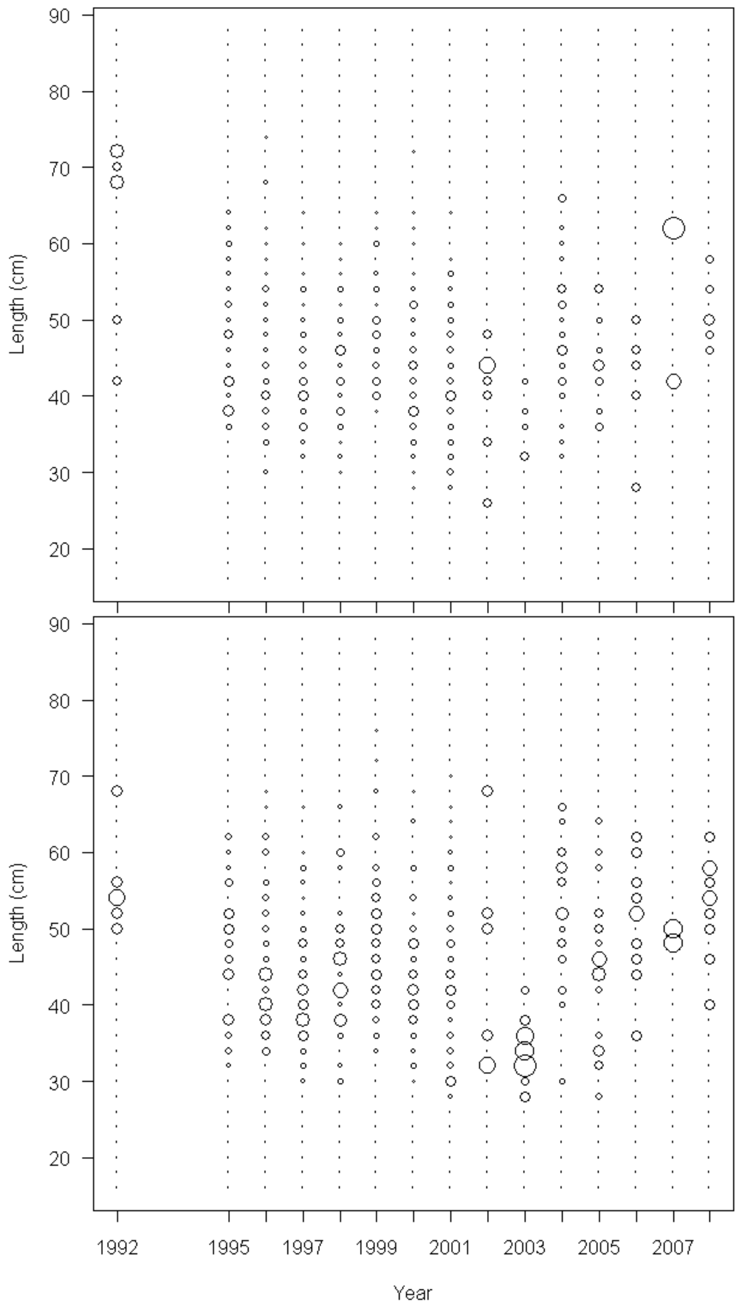

Figure 58. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Oregon commercial fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.37 (females) and 0.25 (males).

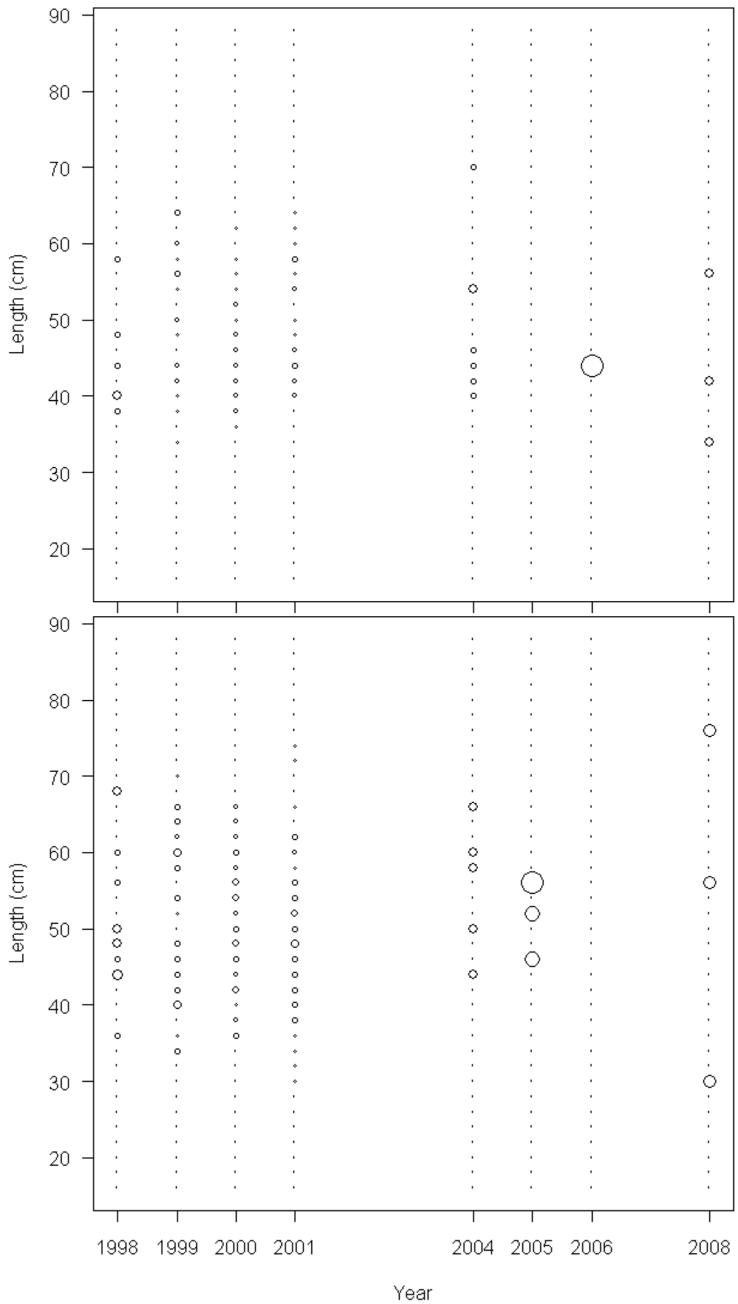

Figure 59. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Washington recreational fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.93 (females) and 0.47 (males).

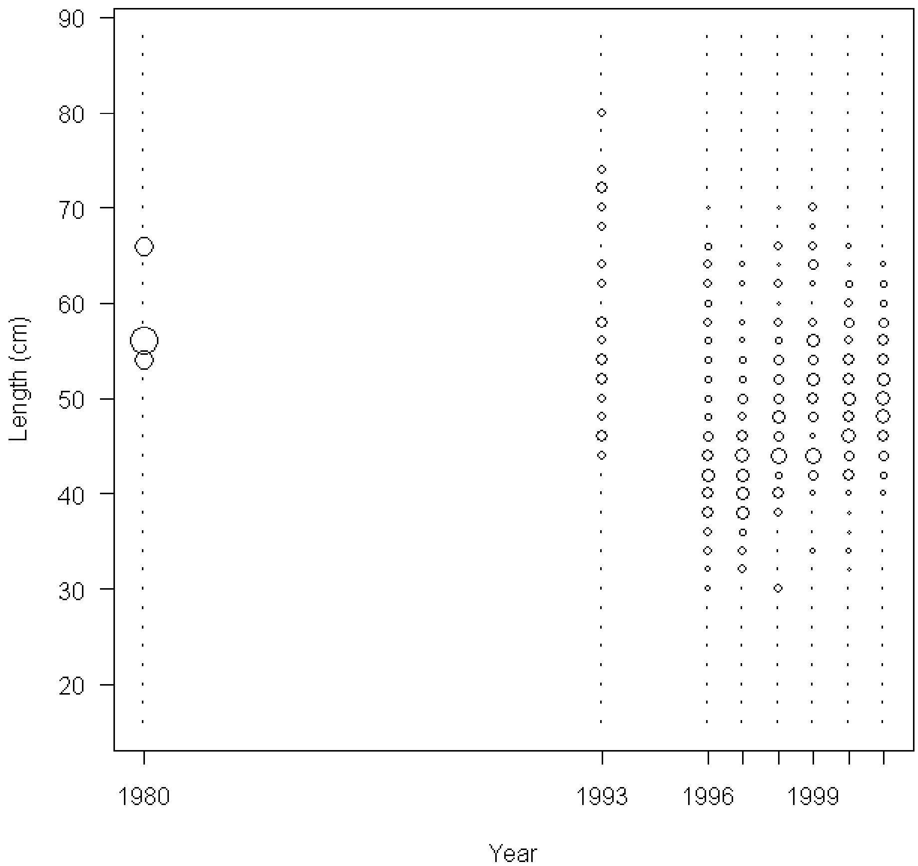

Figure 60. Length-frequency distributions for sexes-combined yelloweye rockfish from the Washington commercial fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate a proportion of 0.48.

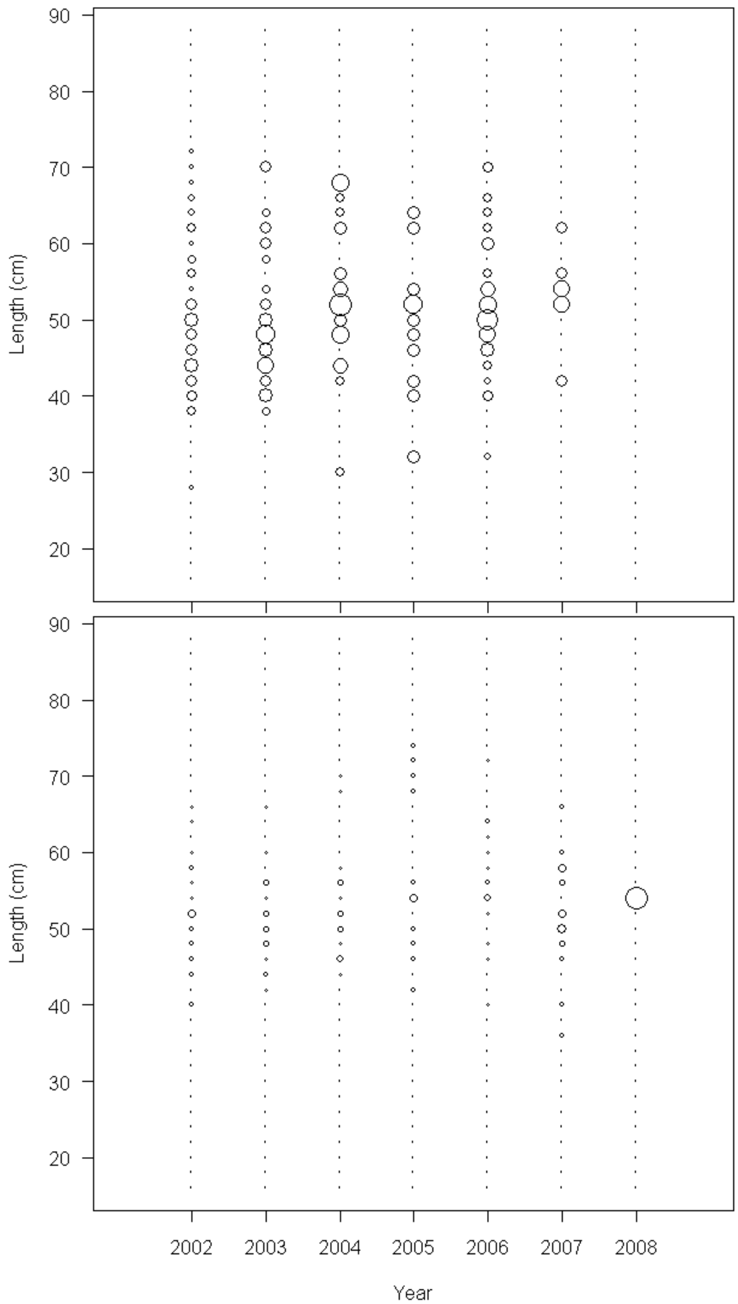

Figure 61. Length-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Washington commercial fishery. Distributions sum to 1.0 in each year; the largest bubble sizes indicate proportions of 0.11 (females) and 0.93 (males).

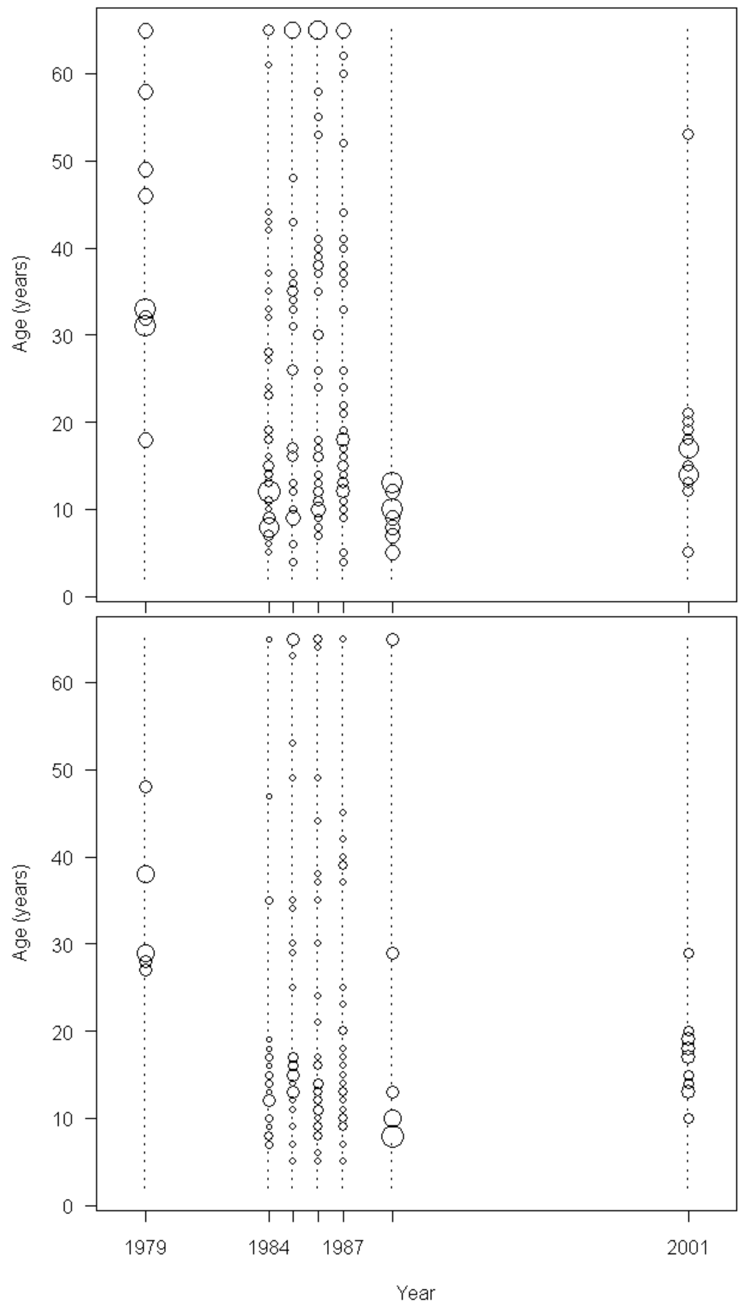

Figure 62. Marginal age-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Oregon recreational fishery. Note that these plots are intended for comparison and visual inspection; only the conditional age-frequency distributions are contributing to the total likelihood.

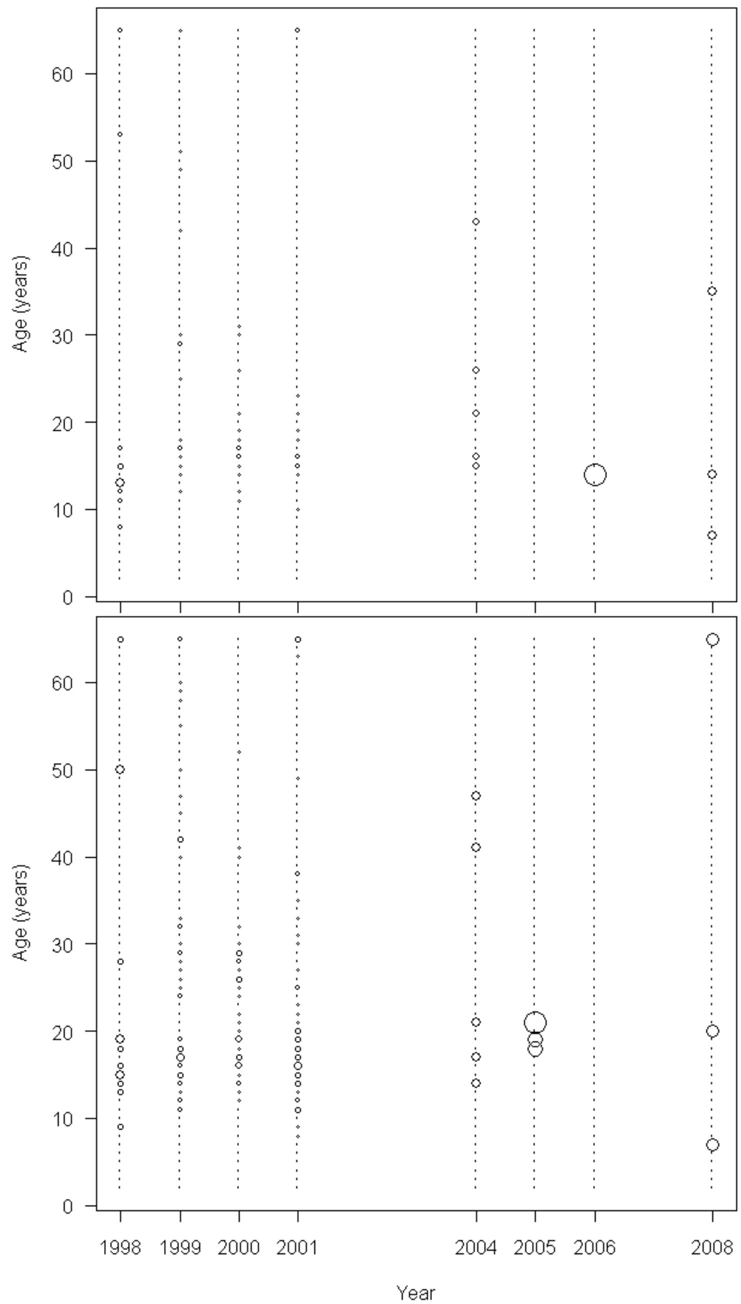

Figure 63. Marginal age-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Washington recreational fishery. Note that these plots are intended for comparison and visual inspection; only the conditional age-frequency distributions are contributing to the total likelihood.

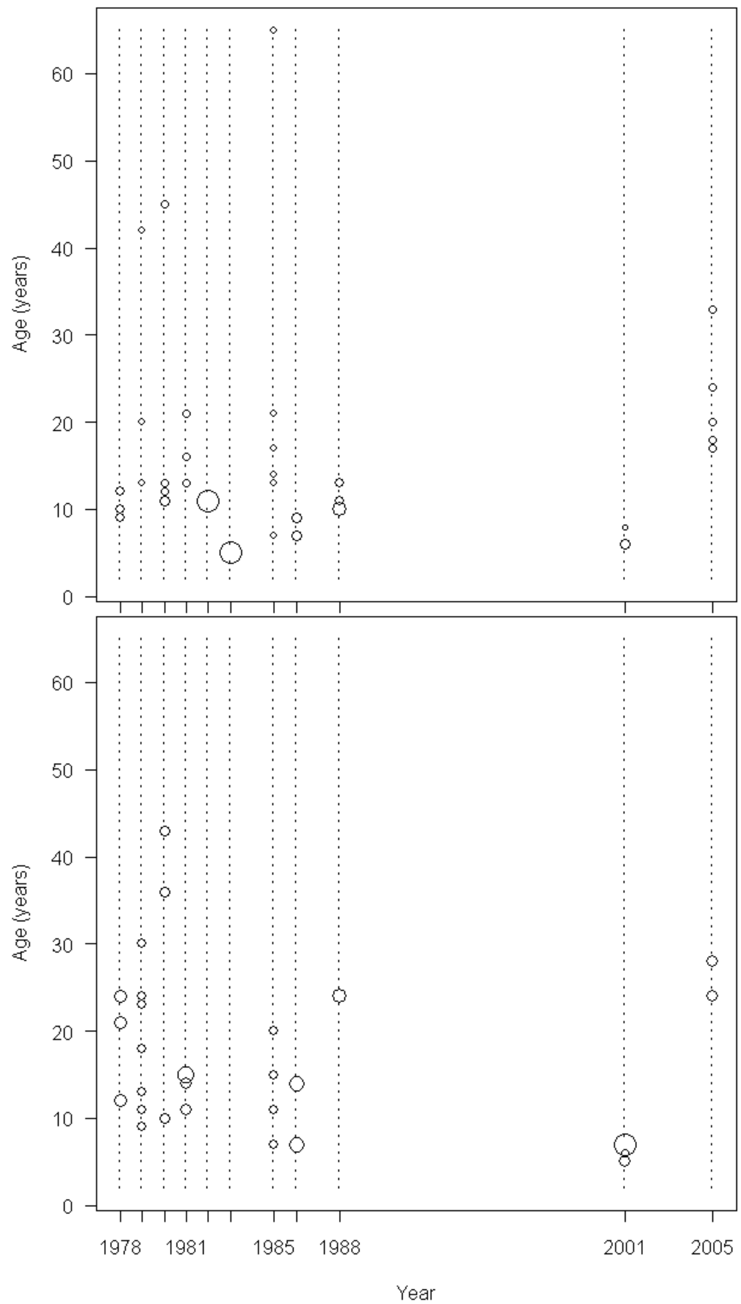

Figure 64. Marginal age-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the California commercial fishery. Note that these plots are intended for comparison and visual inspection; only the conditional age-frequency distributions are contributing to the total likelihood.

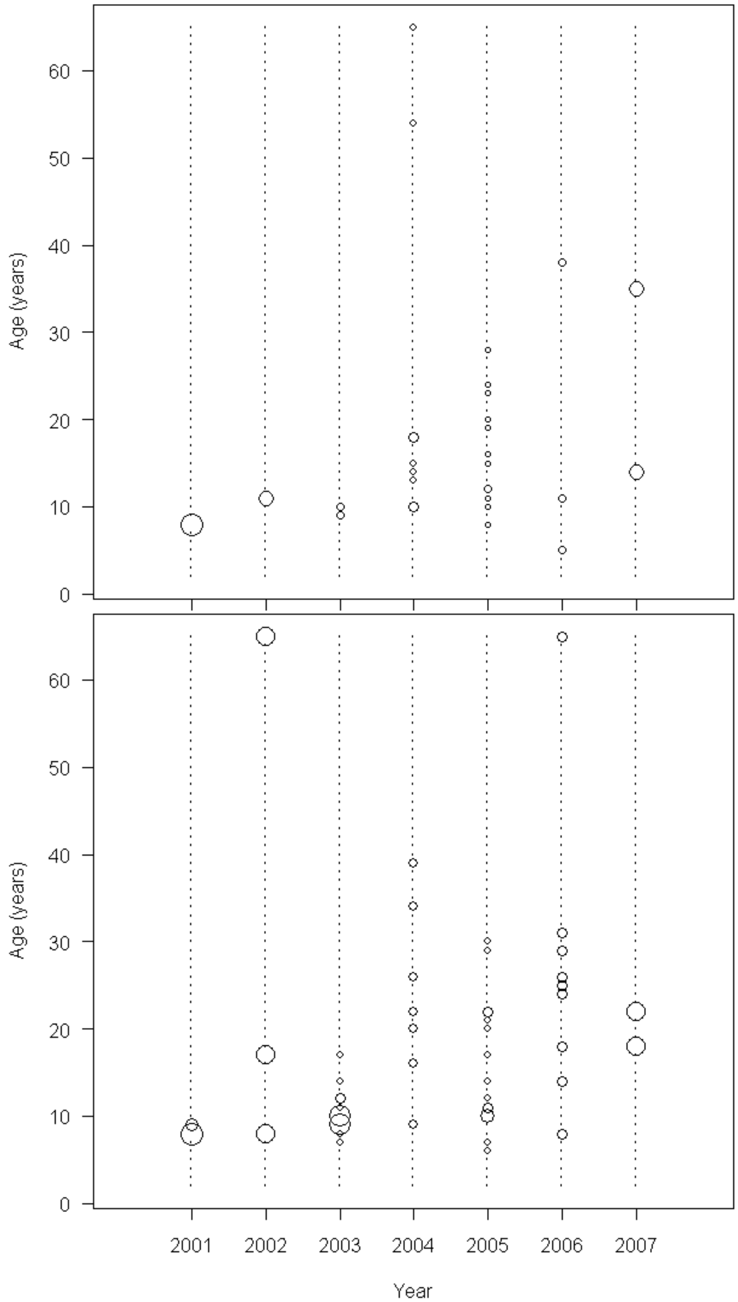

Figure 65. Marginal age-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Oregon commercial fishery. Note that these plots are intended for comparison and visual inspection; only the conditional age-frequency distributions are contributing to the total likelihood.

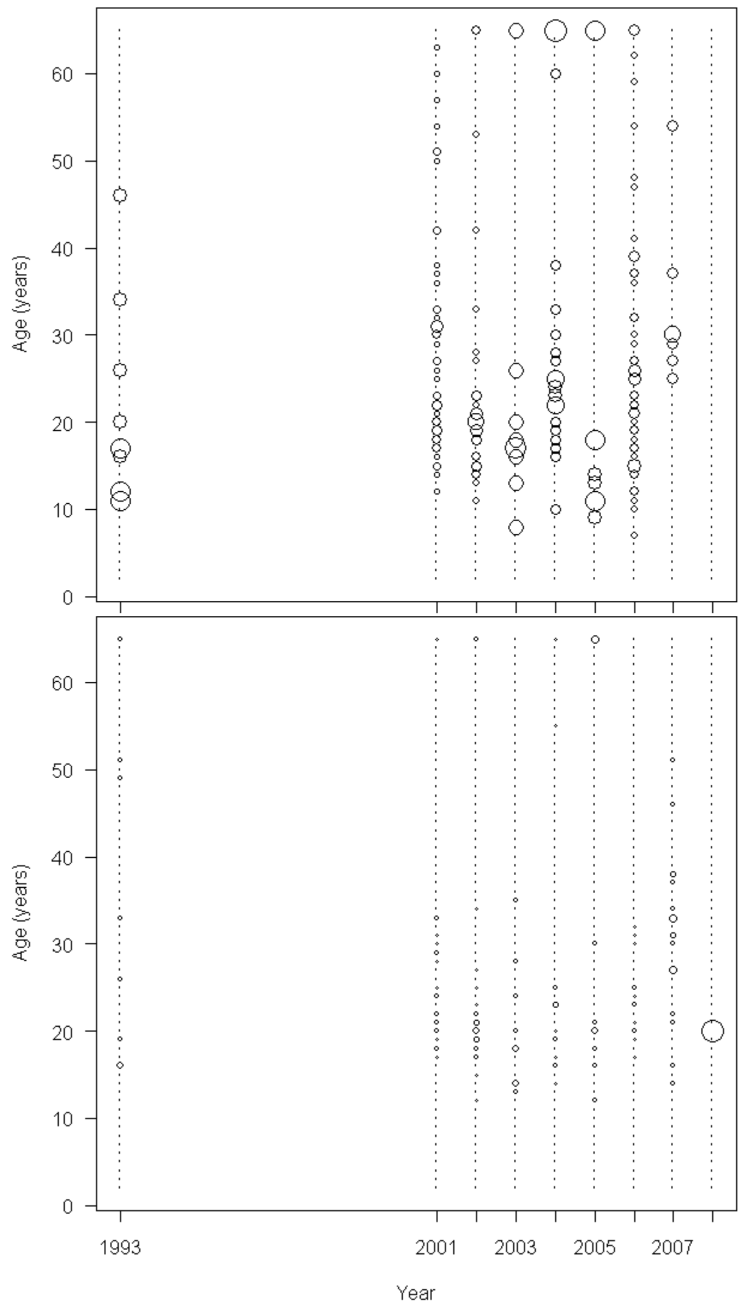

Figure 66. Marginal age-frequency distributions for female (upper panel) and male (lower panel) yelloweye rockfish from the Washington commercial fishery. Note that these plots are intended for comparison and visual inspection; only the conditional age-frequency distributions are contributing to the total likelihood.

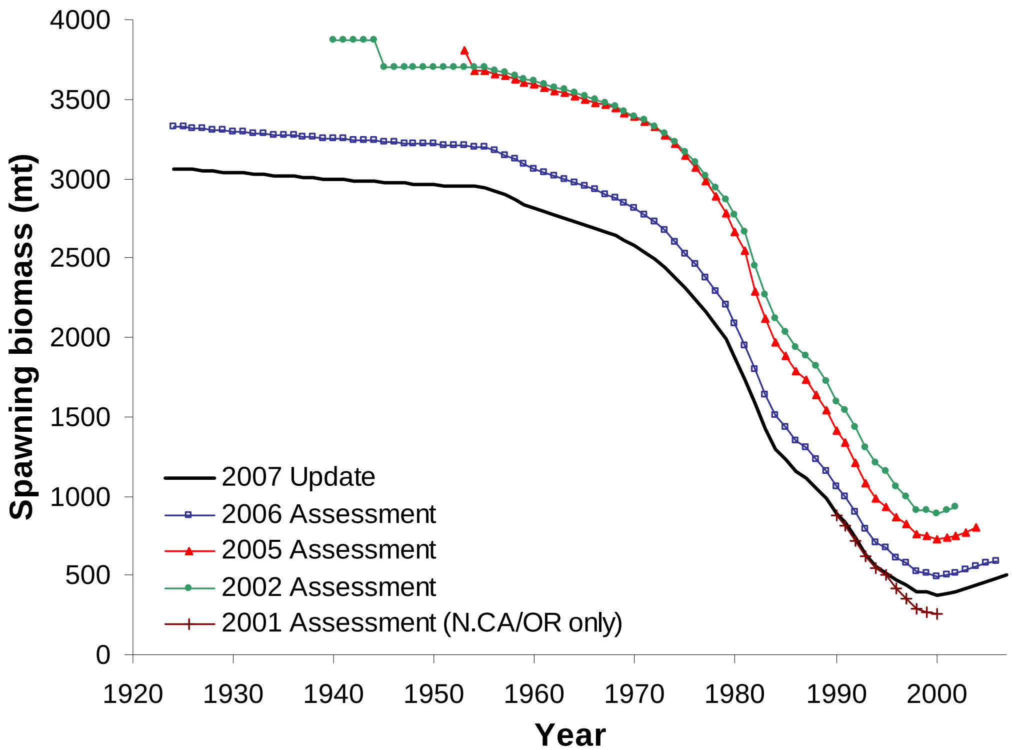

Figure 67. Retrospective analysis across stock assessments for yelloweye rockfish, 2001-2007.

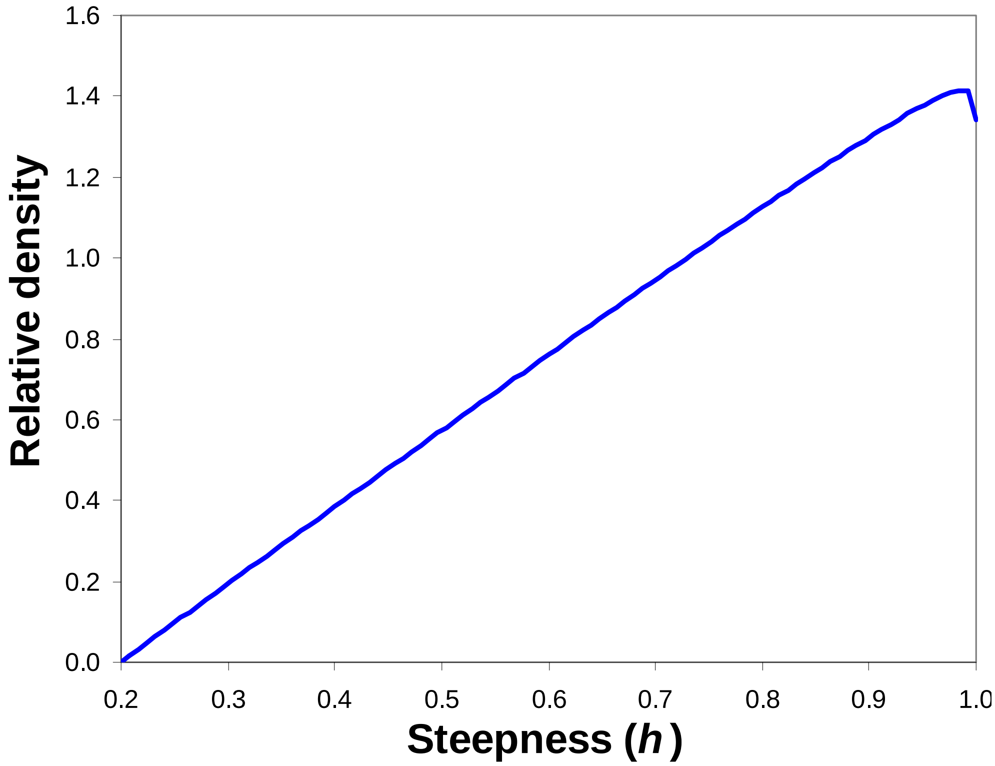

Figure 68. Prior distribution (*Beta*) for stock-recruitment steepness based on a 2009 meta-analysis for west coast rockfish (Martin Dorn, AFSC, personal communication).

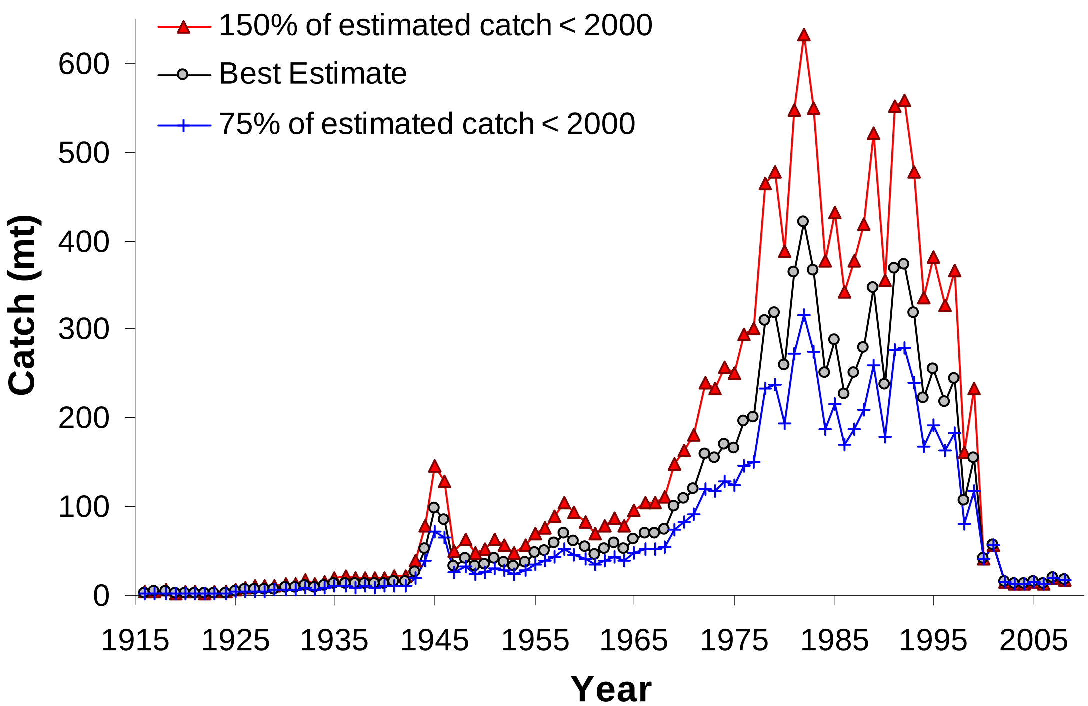

Figure 69. Catch series for the alternate states of nature.

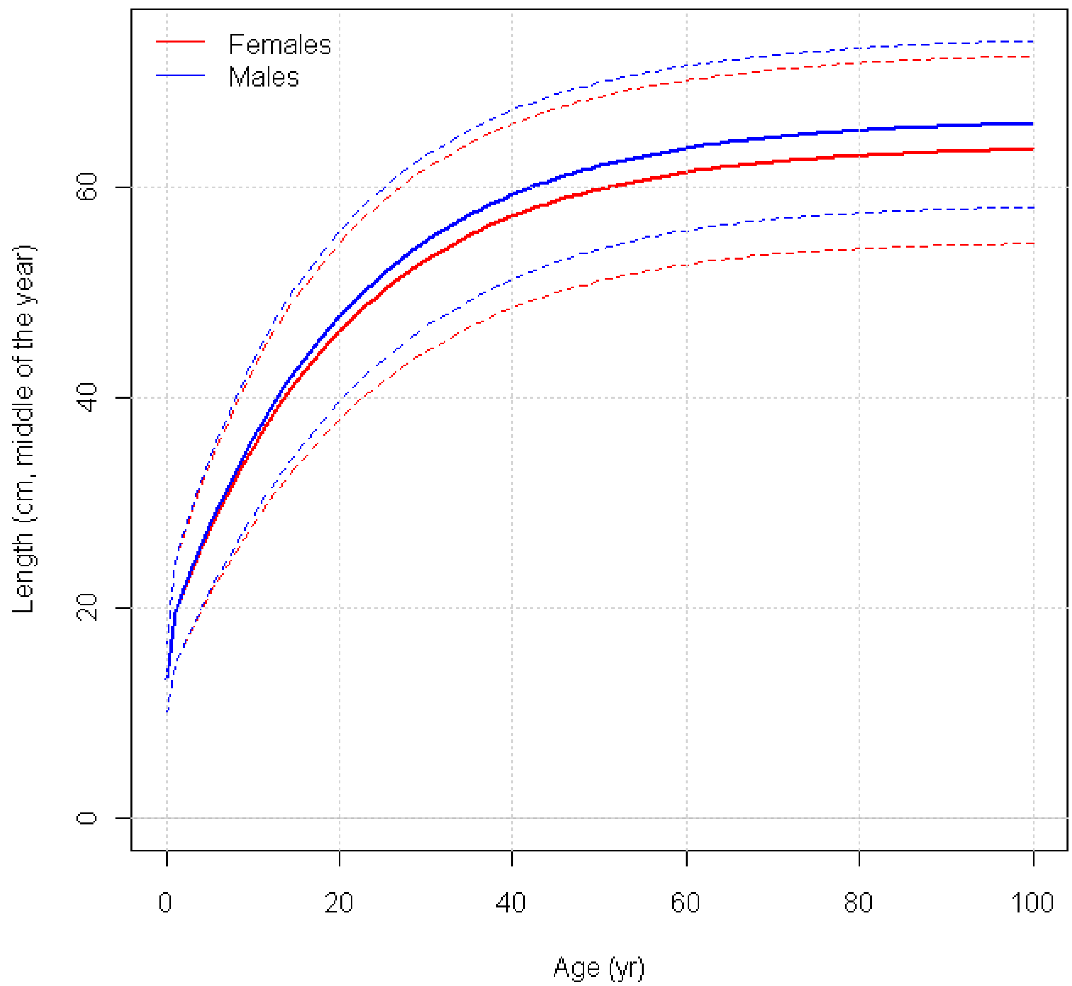

Figure 70. Growth curve for males (upper solid line) and females (lower solid line) with ~95% interval (dashed lines) indicating the expectation and individual variability of length-at-age for the base case model.

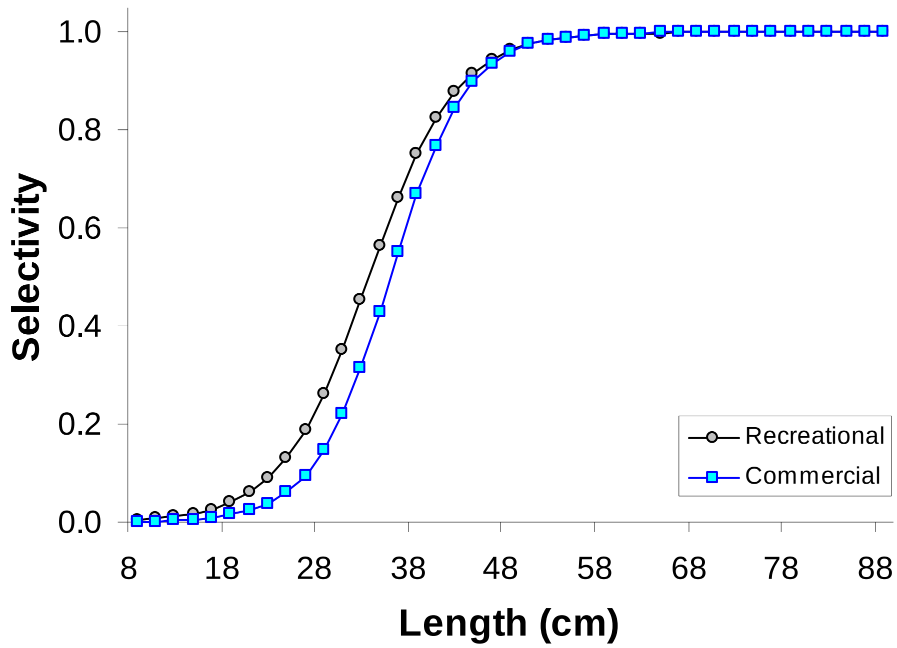

Figure 71. Estimated selectivity for the California fisheries.

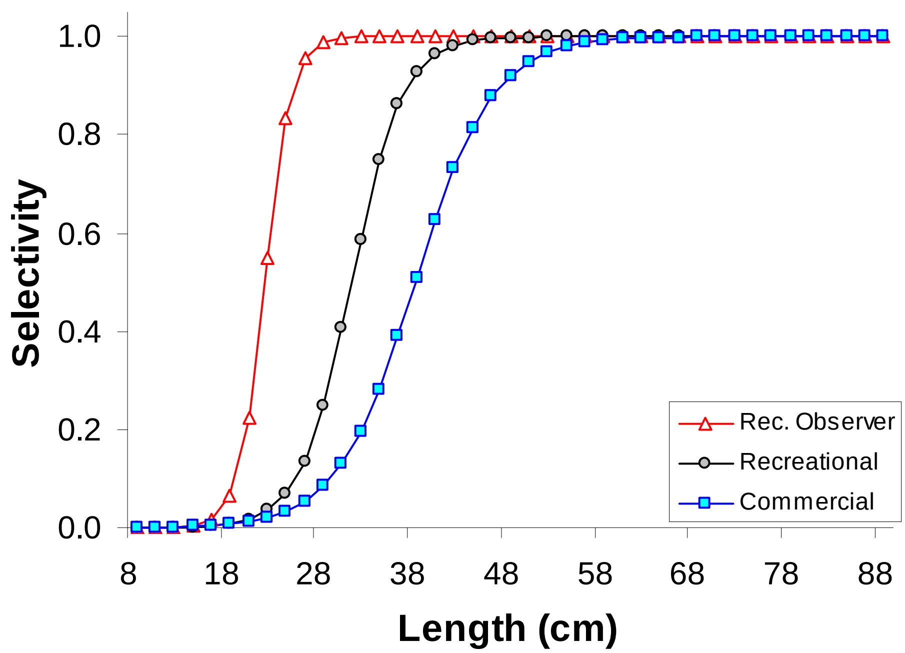

Figure 72. Estimated selectivity for Oregon fisheries.

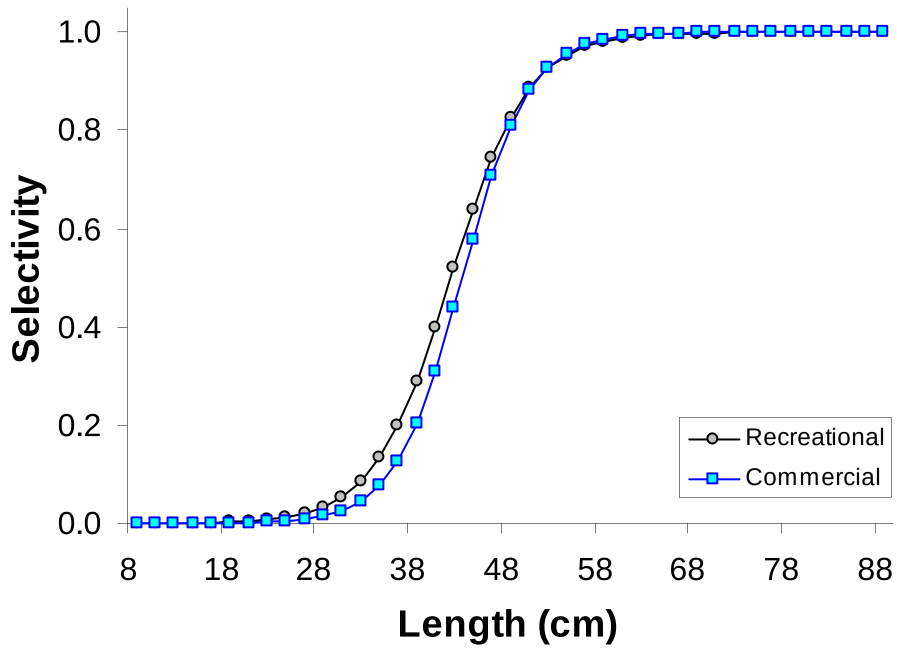

Figure 73. Estimated selectivity for Washington fisheries.

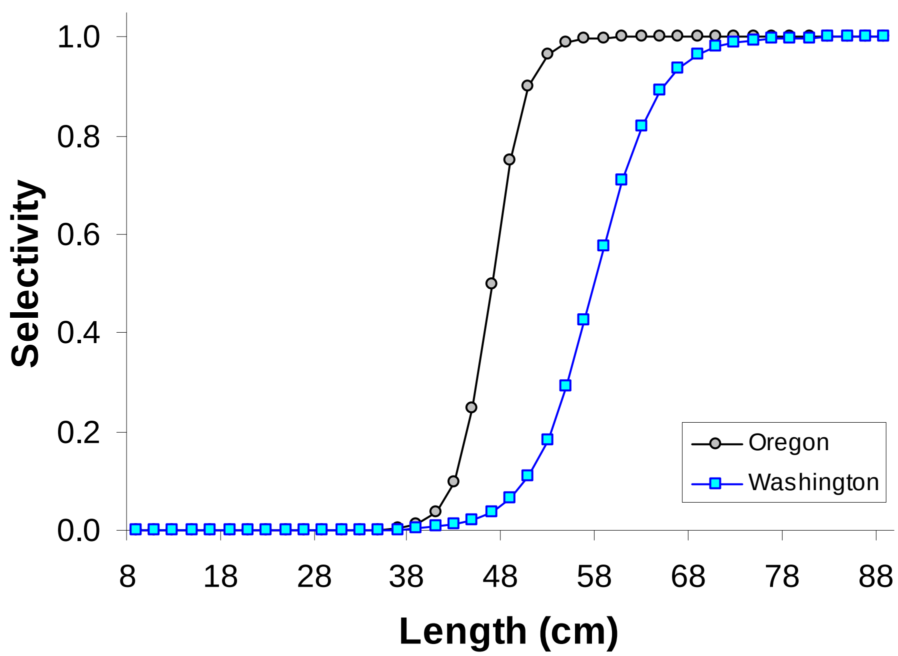

Figure 74. Estimated selectivity for IPHC surveys.

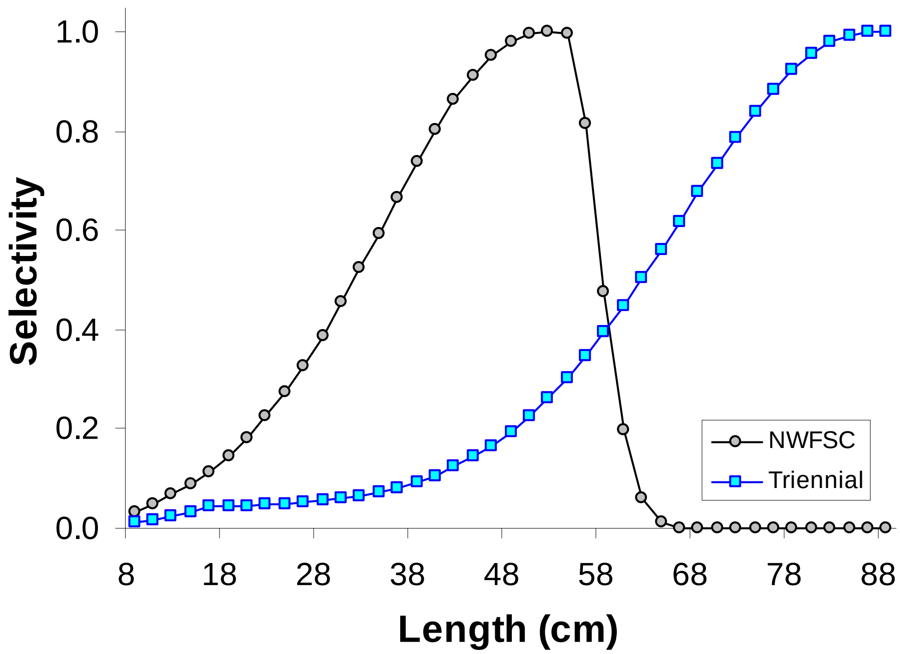

Figure 75. Estimated selectivity for trawl surveys.

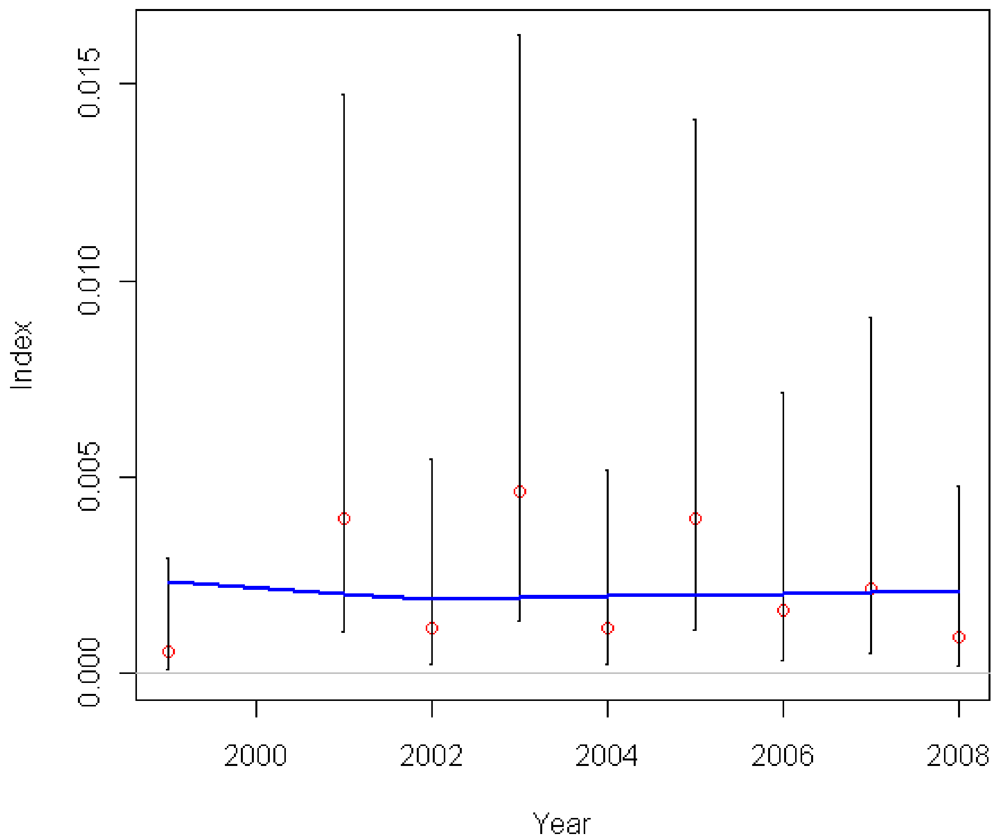

Figure 76. Fit to the IPHC survey index for Washington in the base case model.

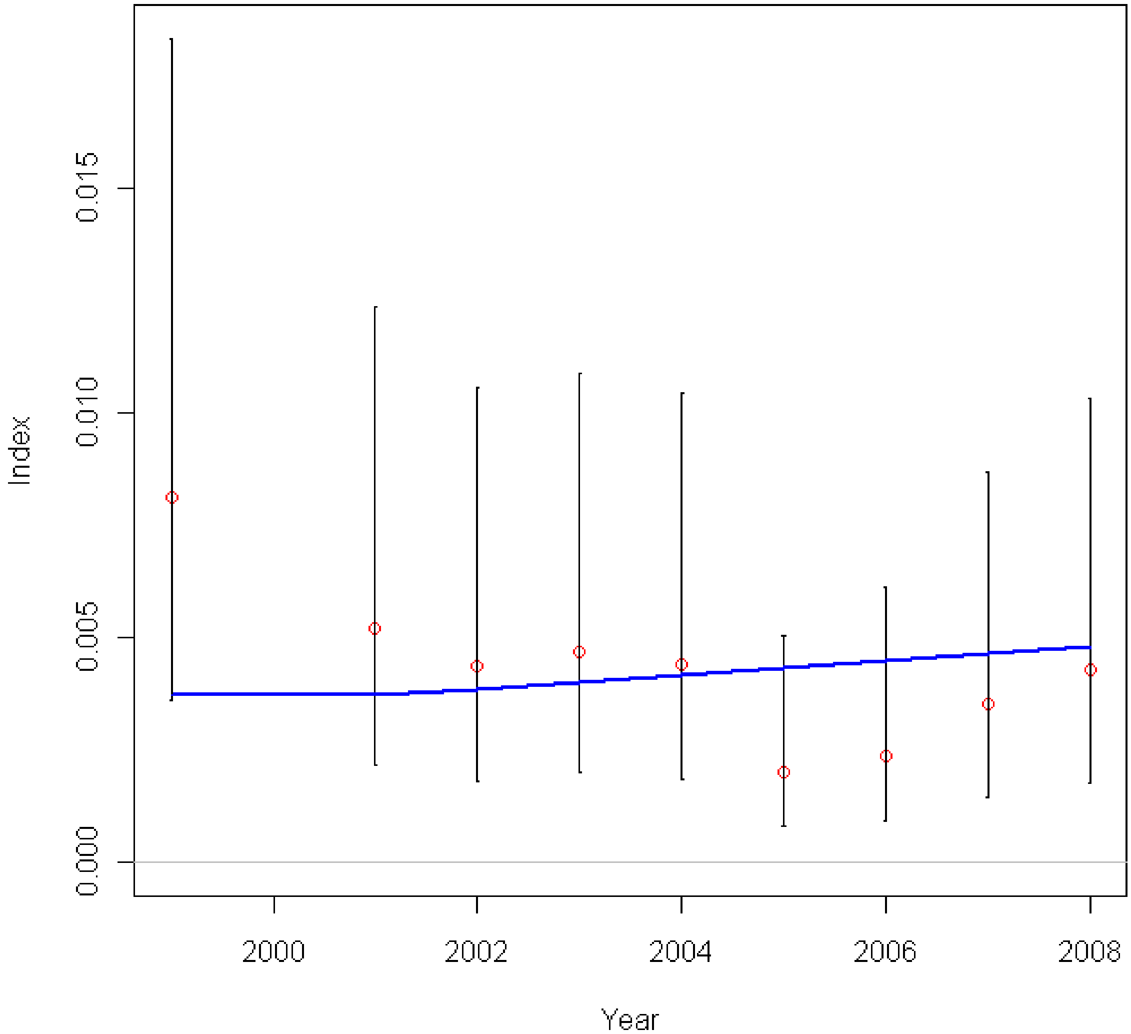

Figure 77. Fit to the IPHC survey index for Oregon in the base case model.

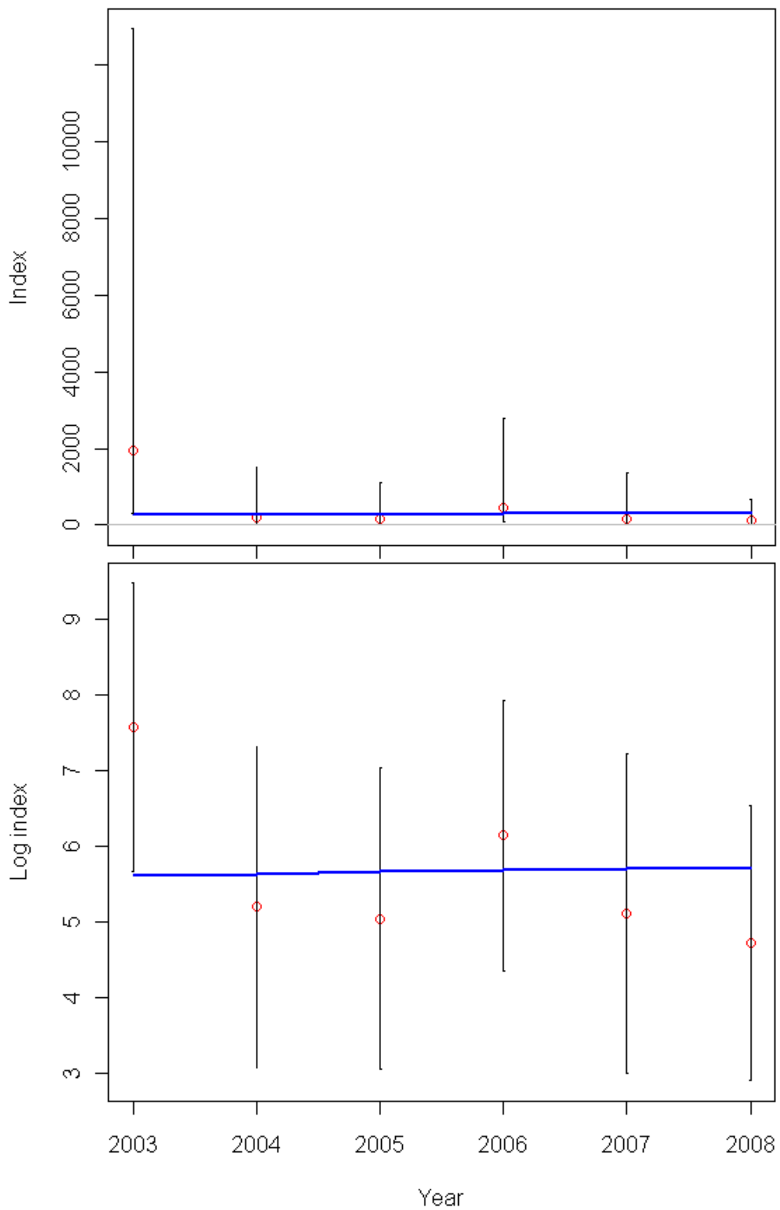

Figure 78. Fit to the NWFSC survey index for Oregon of relative biomass (upper panel) and log(index) for easier evaluation (lower panel) in the base case model.

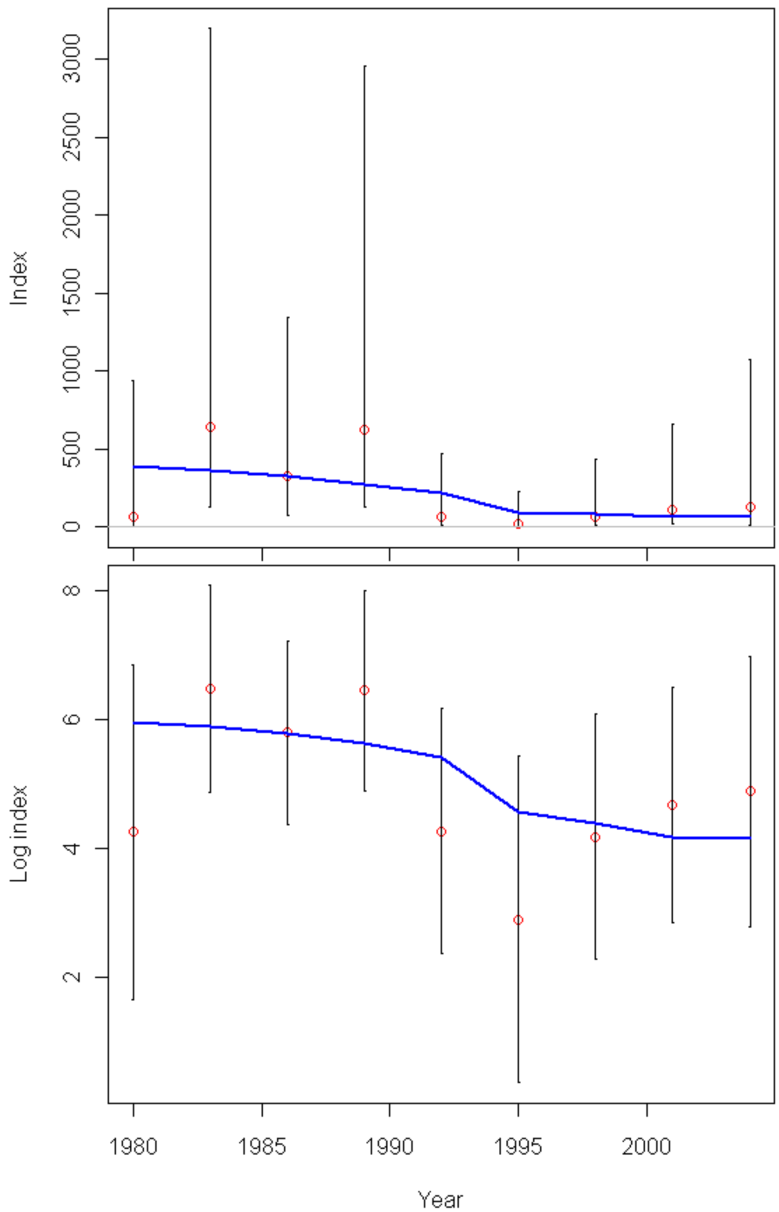

Figure 79. Fit to the triennial survey index for Washington of relative biomass (upper panel) and log(index) for easier evaluation (lower panel) in the base case model.

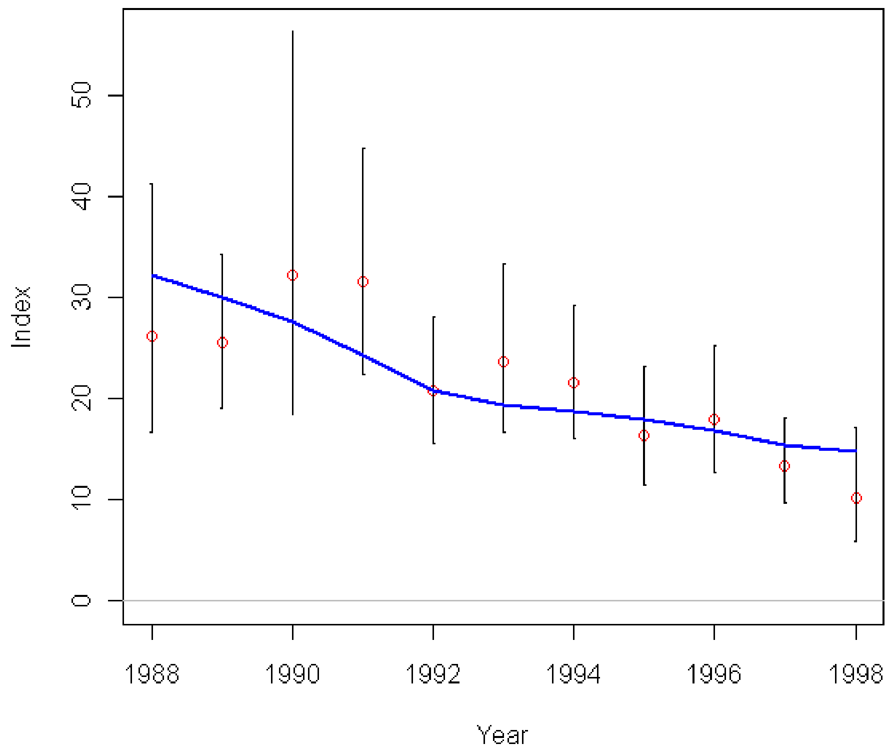

Figure 80. Fit to the recreational observer CPUE index for California in the base case model.

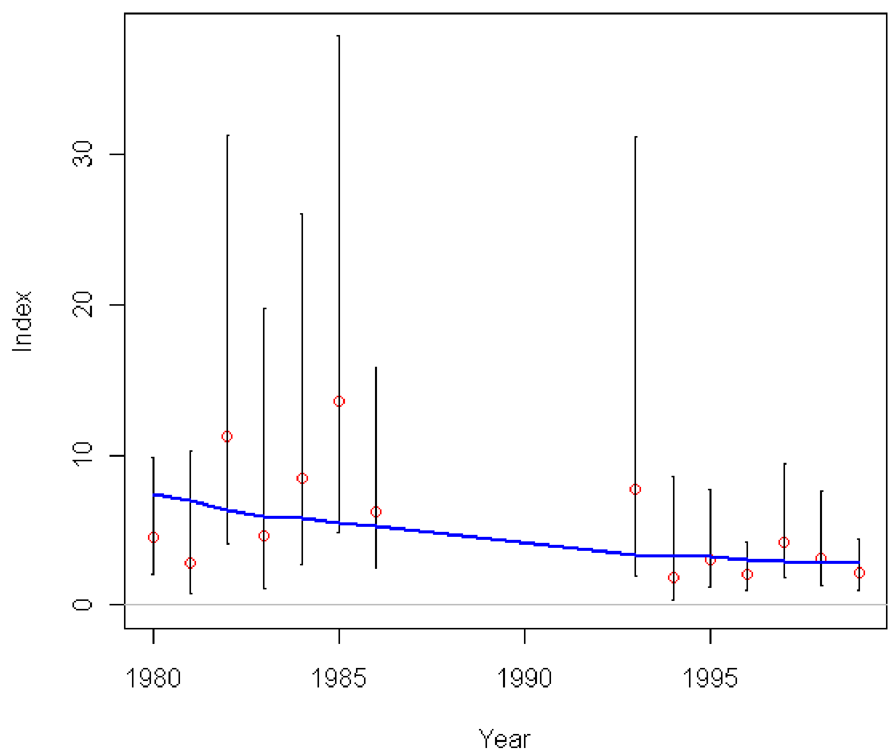

Figure 81. Fit to the recreational CPUE index for California in the base case model.

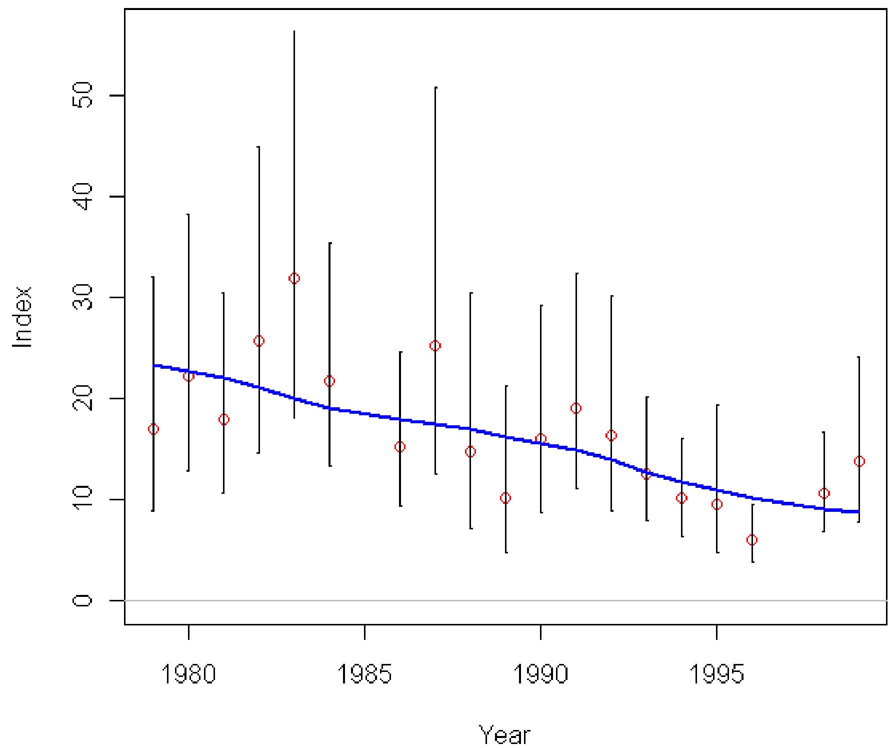

Figure 82. Fit to the recreational CPUE index for Oregon in the base case model.

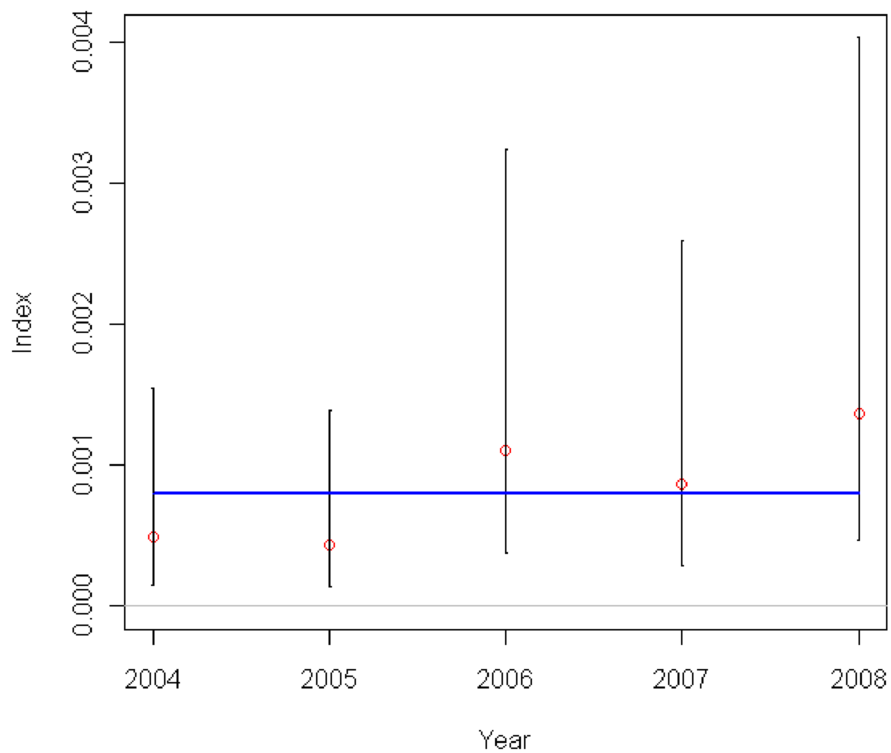

Figure 83. Fit to the recreational observer CPUE index for Oregon in the base case model.

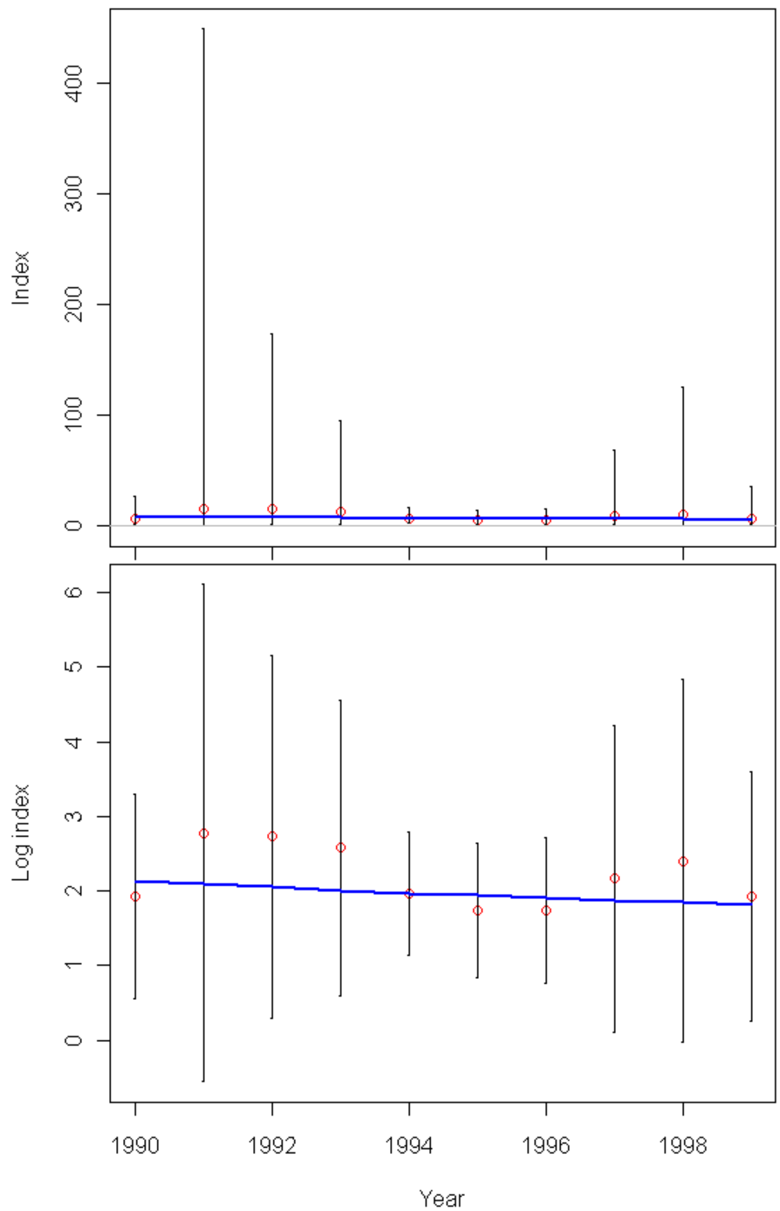

Figure 84. Fit to the recreational CPUE index for Washington (upper panel) and log(index) for easier evaluation (lower panel) in the base case model.

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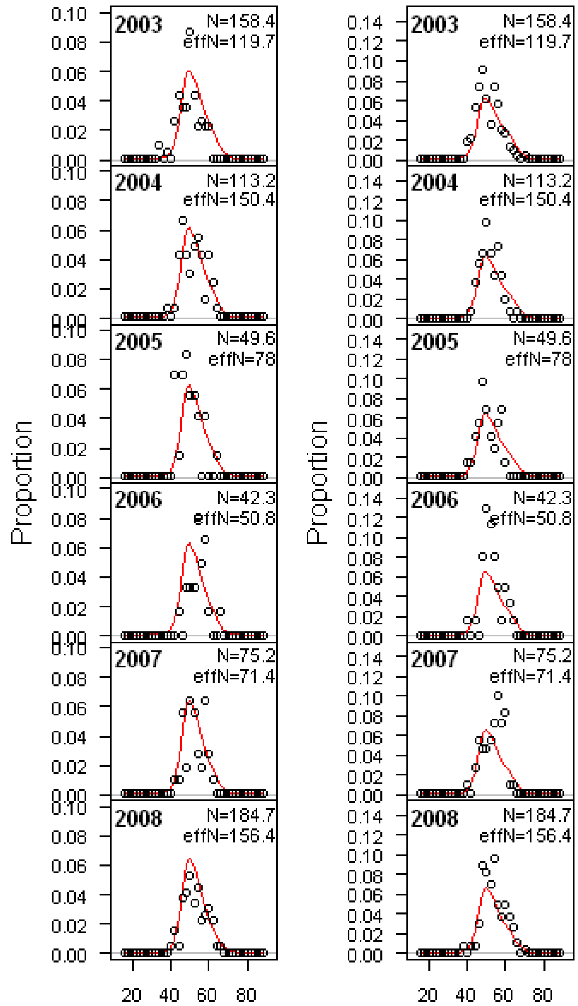

Figure 85. Fit to the Oregon IPHC female (left panels) and male (right panels) length-frequencies.

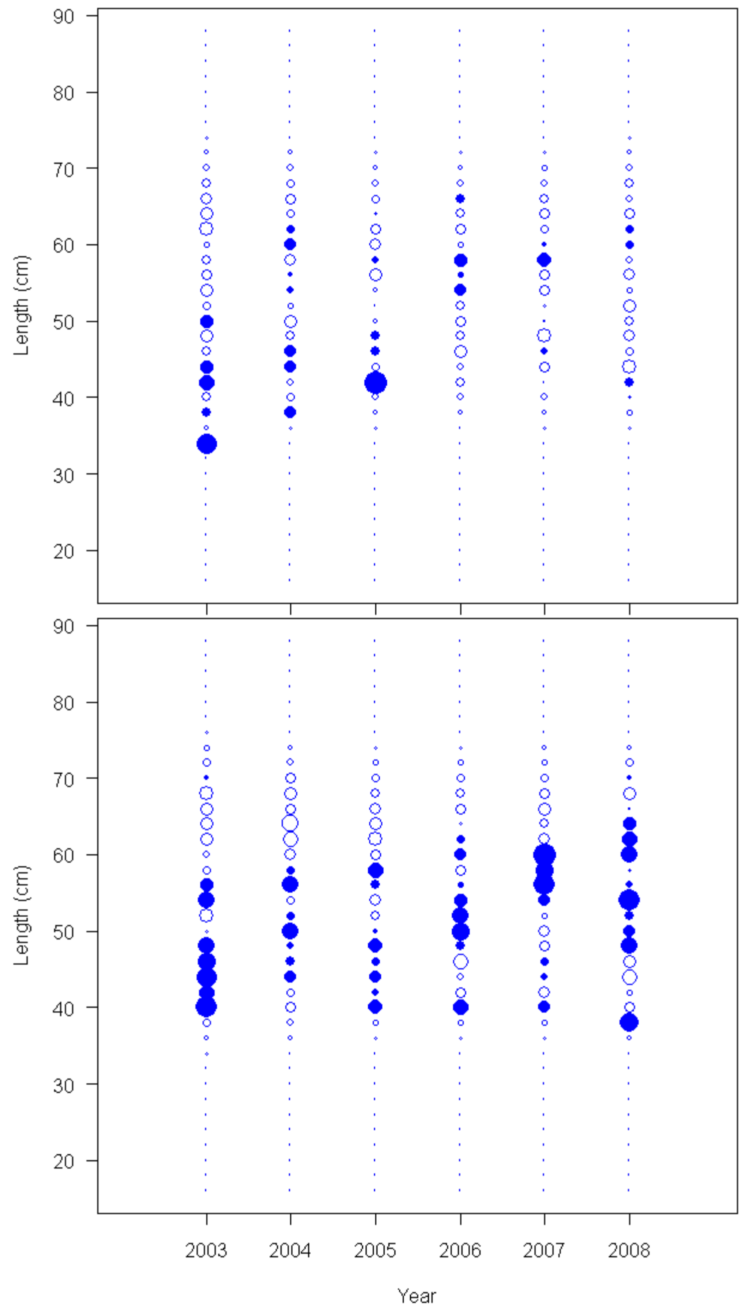

Figure 86. Pearson residuals for the fit to Oregon IPHC female (upper panel, maximum = 3.88) and male (lower panel, maximum = 2.69) length-frequencies. Filled circles represent positive residuals (observed – expected).

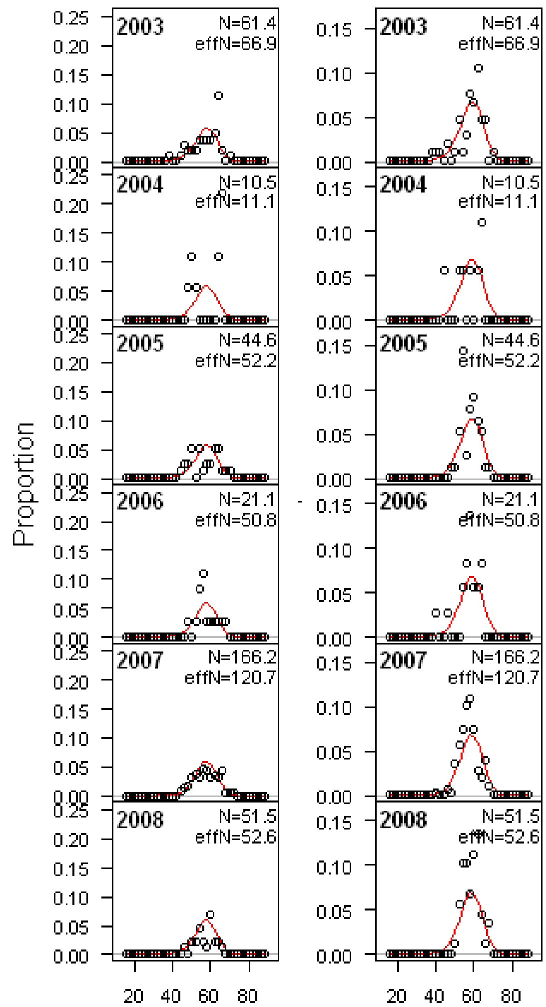

Figure 87. Fit to the Washington IPHC female (left panels) and male (right panels) length-frequencies.

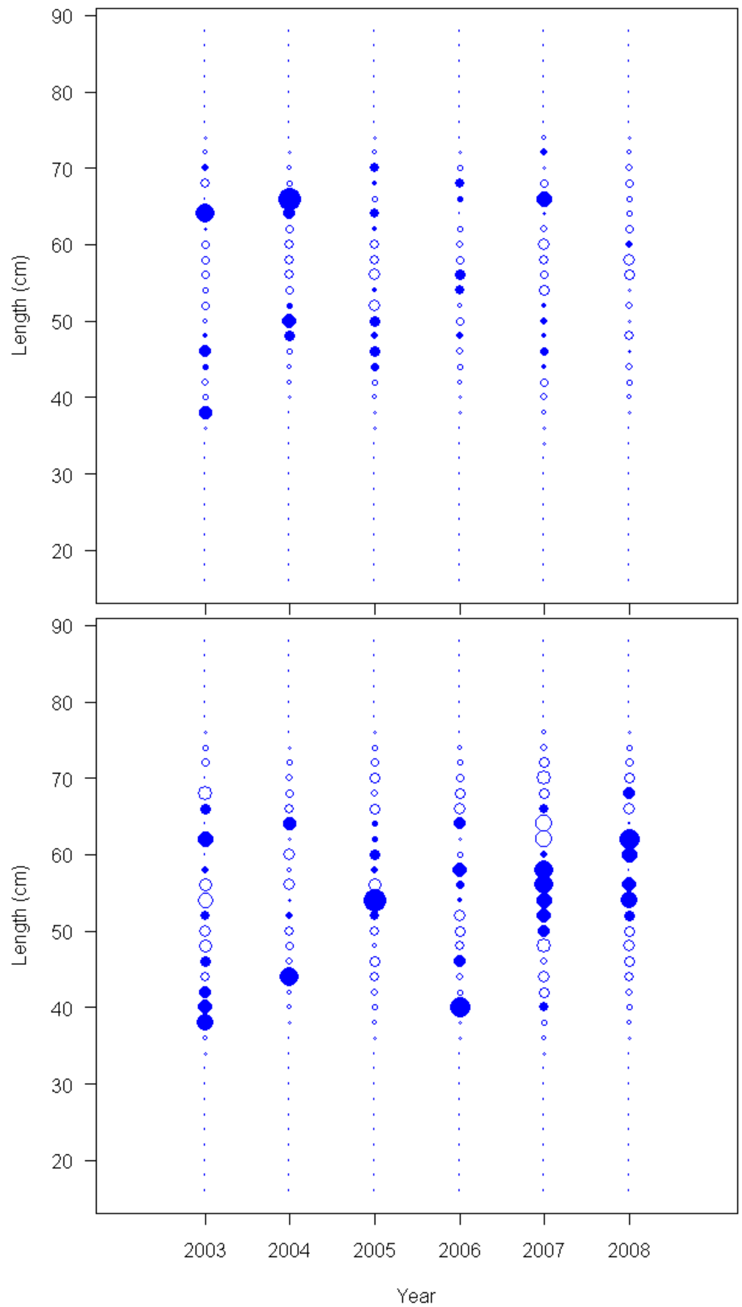

Figure 88. Pearson residuals for the fit to Washington IPHC female (upper panel, maximum = 4.65) and male (lower panel, maximum = 2.85) length-frequencies. Filled circles represent positive residuals (observed – expected).

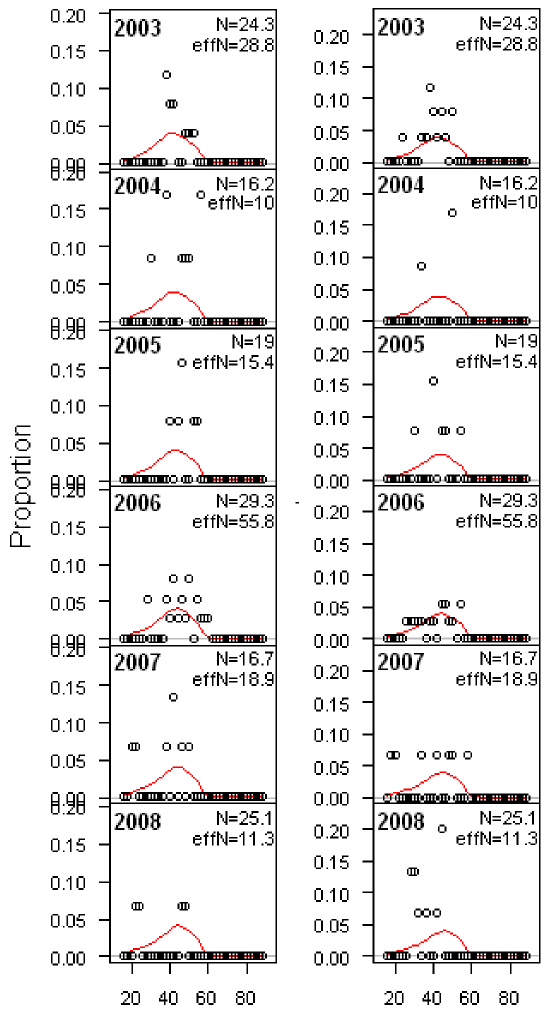

Figure 89. Fit to the Oregon NWFSC female (left panels) and male (right panels) length-frequencies.

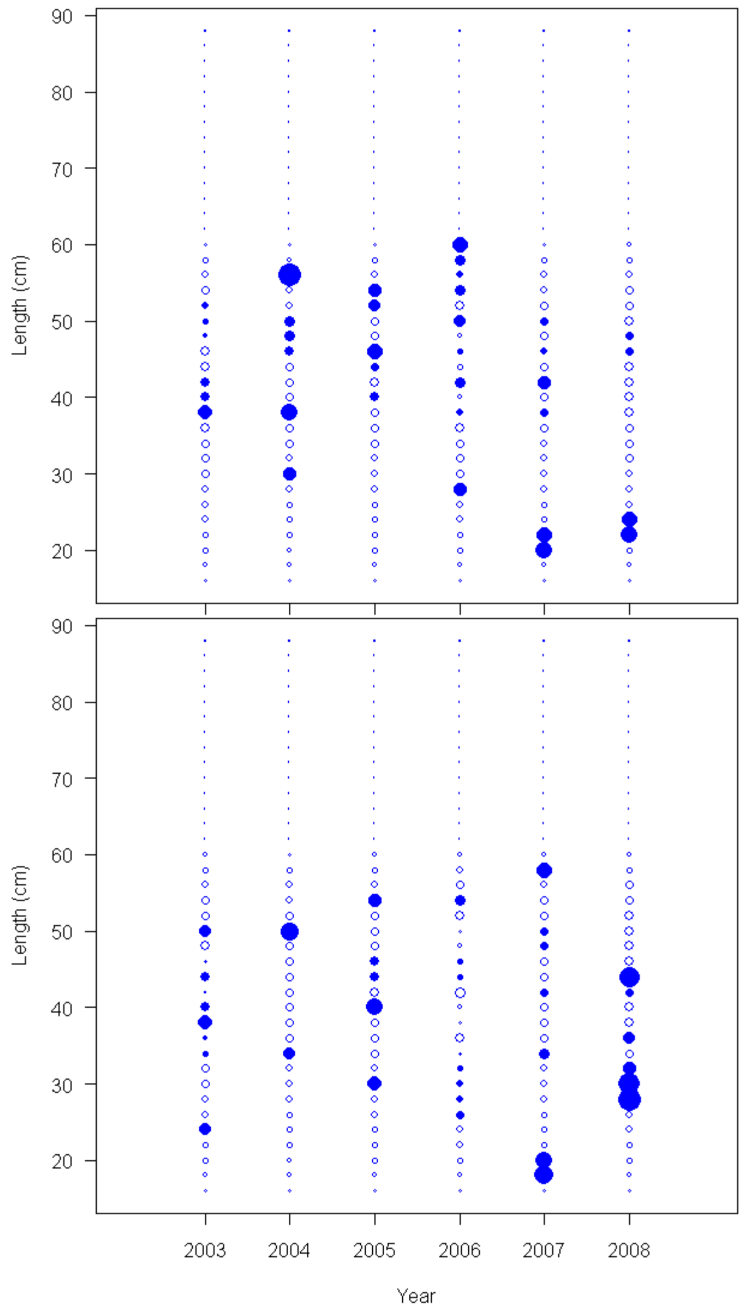

Figure 90. Pearson residuals for the fit to Oregon NWFSC female (upper panel, maximum = 5.31) and male (lower panel, maximum = 5.12) length-frequencies. Filled circles represent positive residuals (observed – expected).

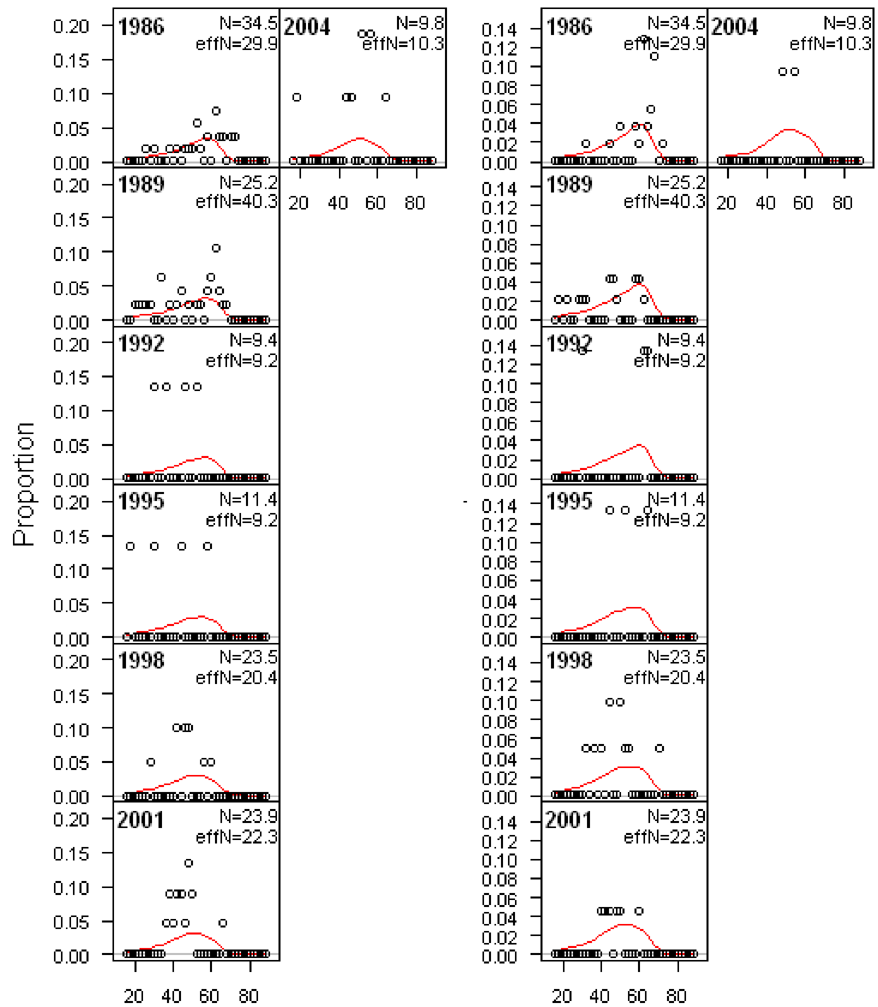

Figure 91. Fit to the Washington triennial female (left panels) and male (right panels) length-frequencies.

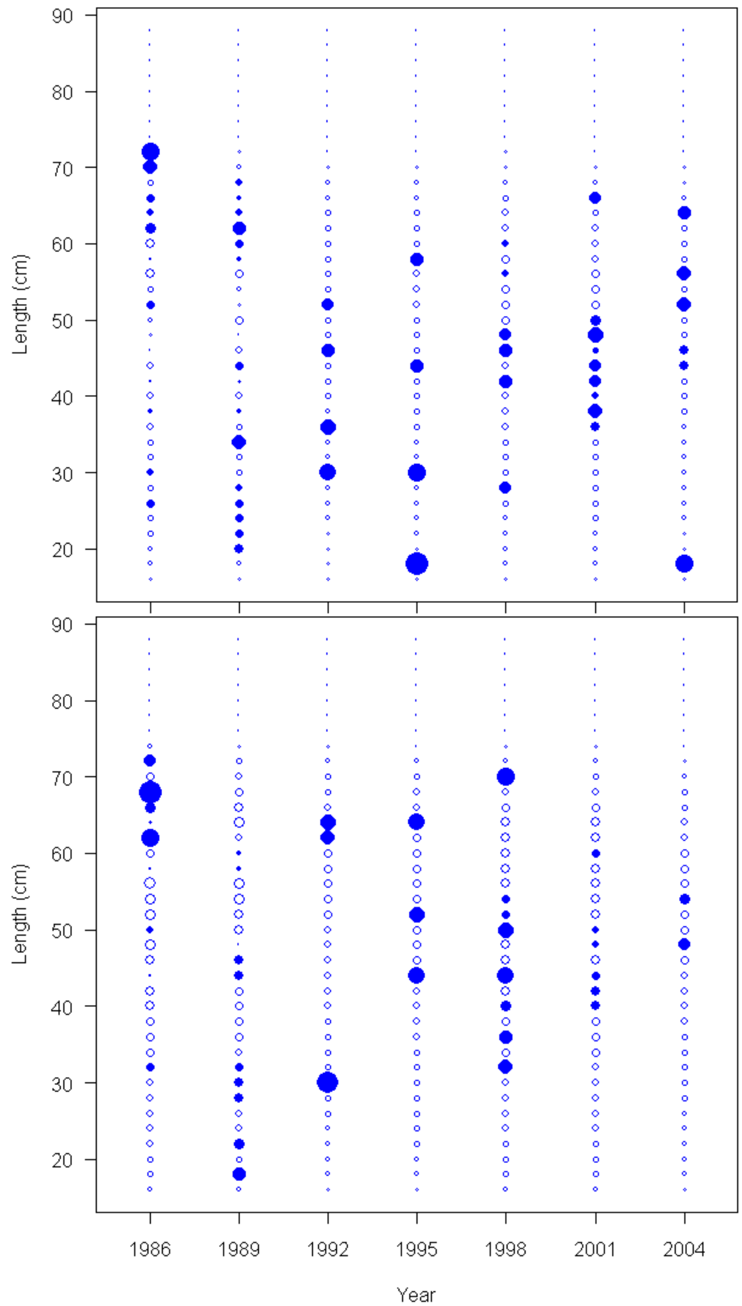

Figure 92. Pearson residuals for the fit to Washington triennial female (upper panel, maximum = 6.53) and male (lower panel, maximum = 4.17) length-frequencies. Filled circles represent positive residuals (observed – expected).

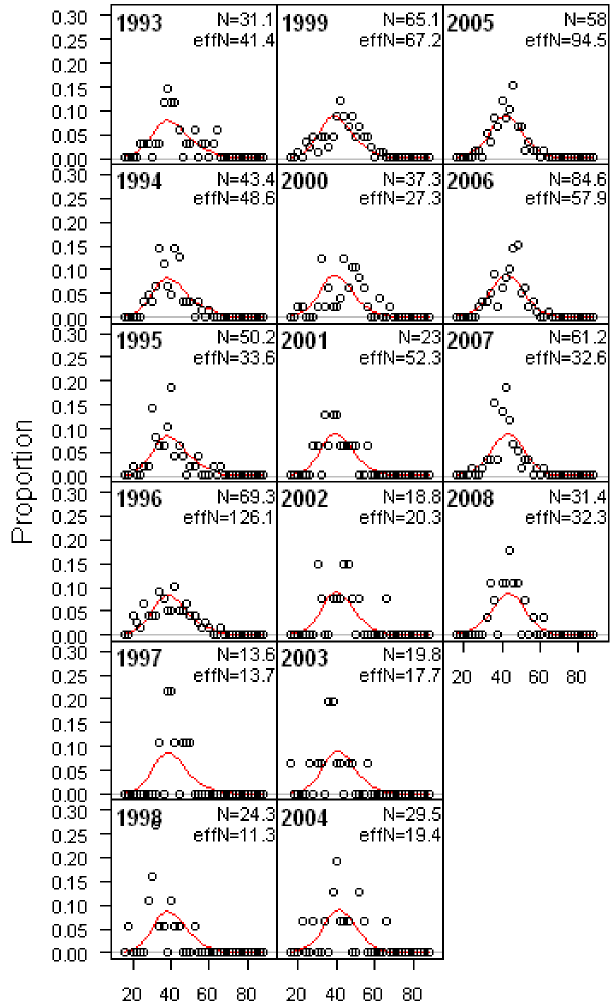

Figure 93. Fit to the California recreational sexes-combined length-frequencies.

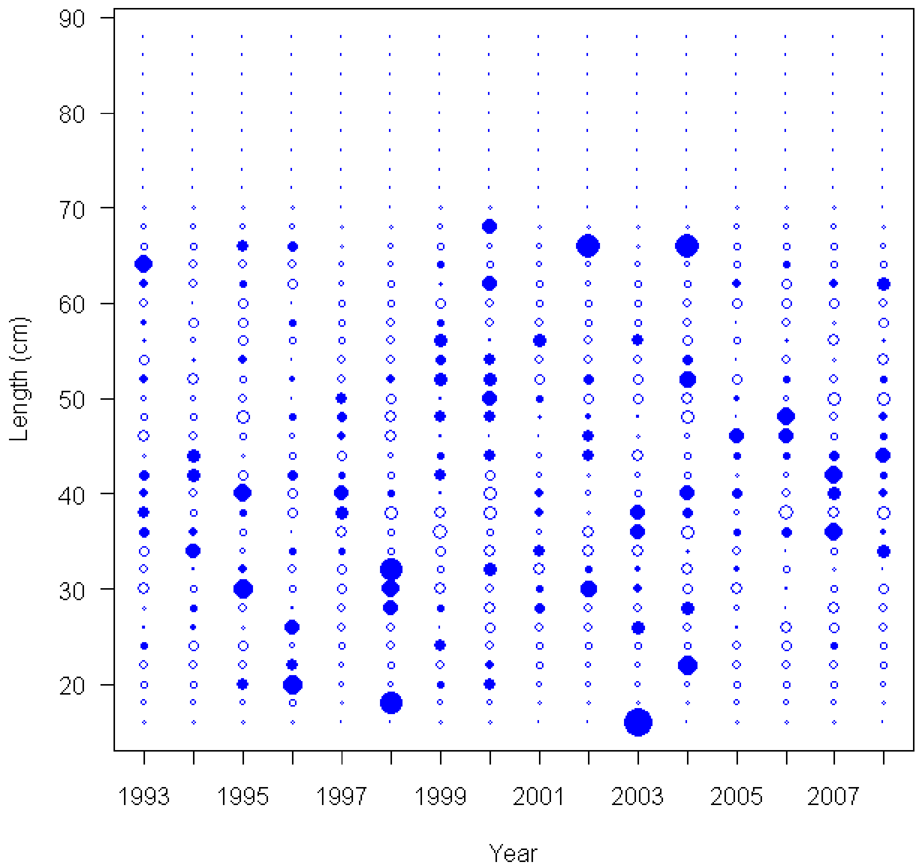

Figure 94. Pearson residuals for the fit to California recreational length-frequencies (maximum = 6.63). Filled circles represent positive residuals (observed – expected).

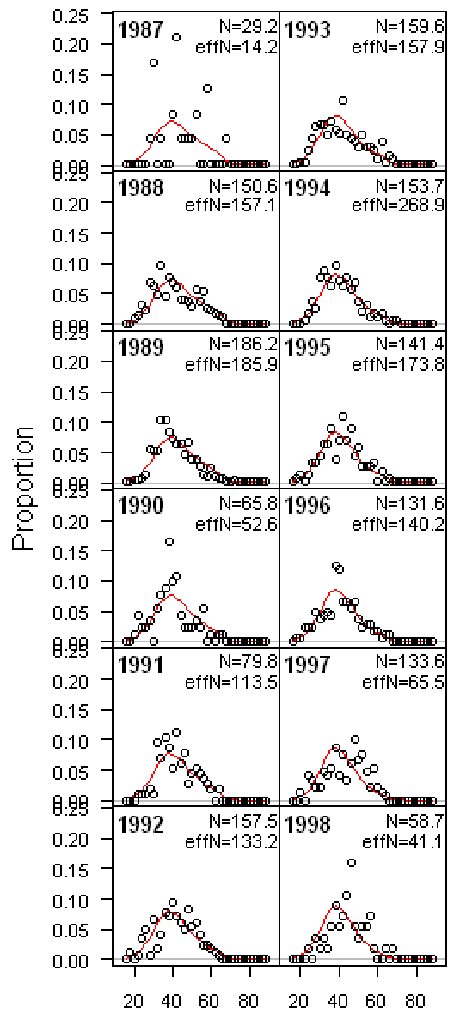

Figure 95. Fit to the California recreational charter vessel sexes-combined length-frequencies.

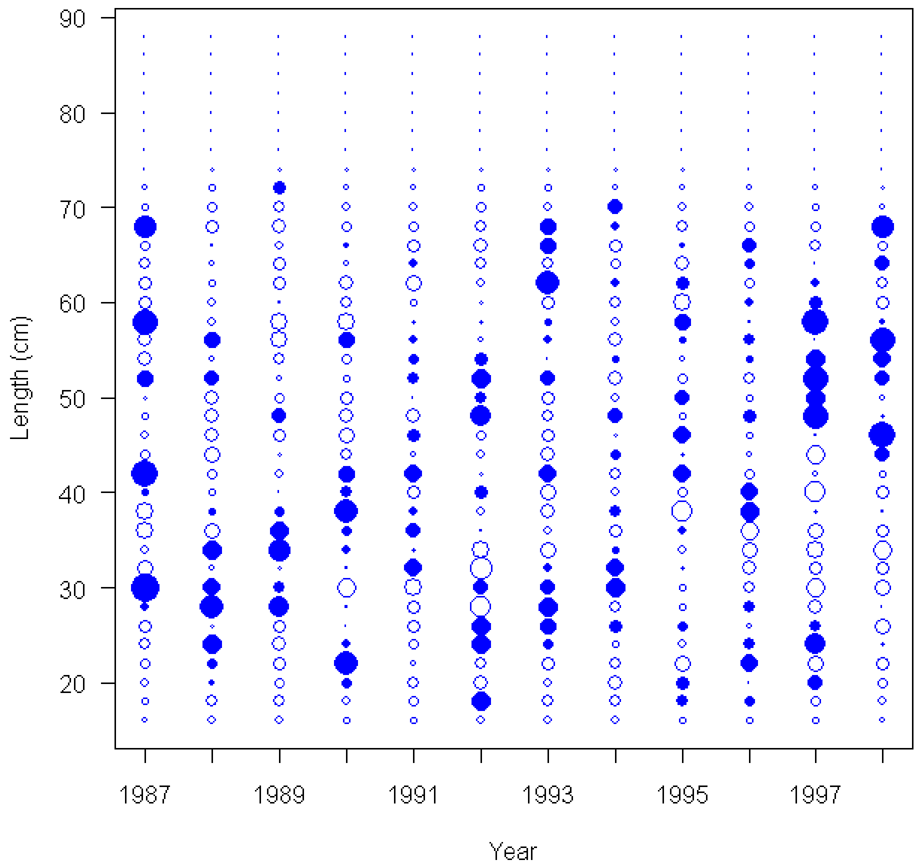

Figure 96. Pearson residuals for the fit to California recreational length-frequencies (maximum = 3.45). Filled circles represent positive residuals (observed – expected).

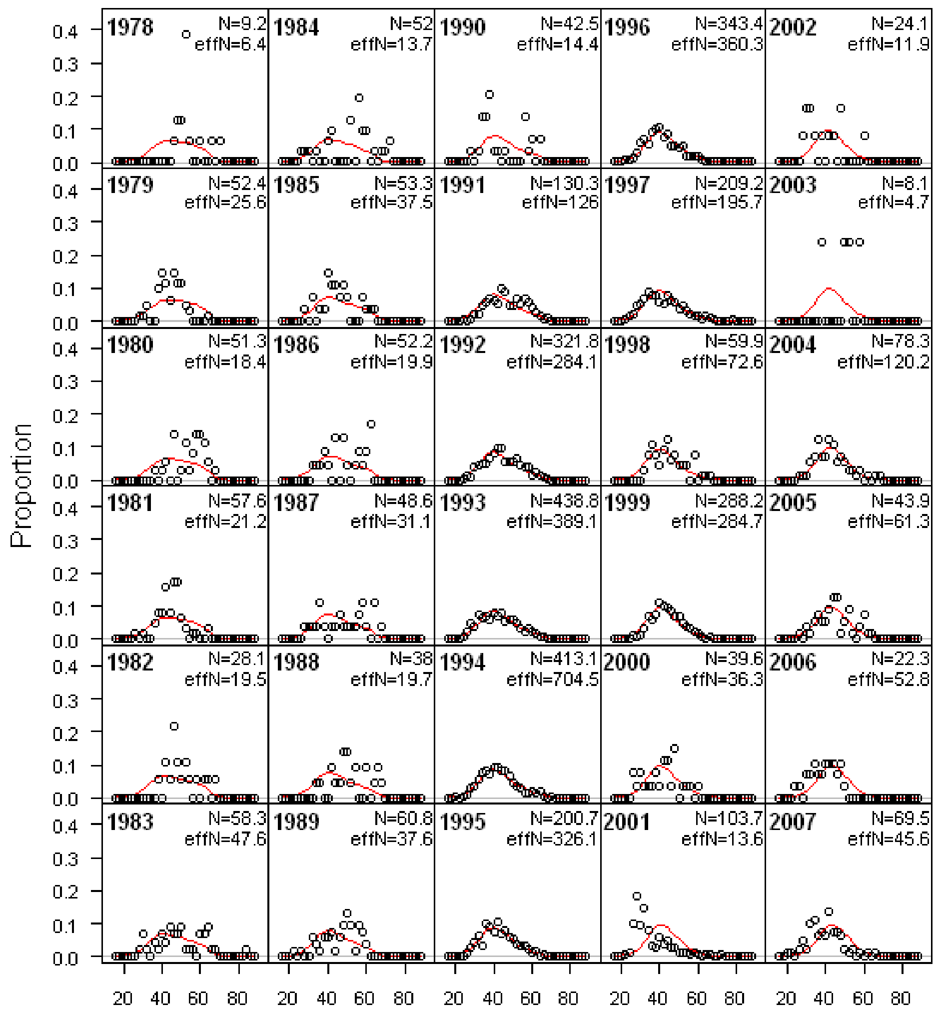

Figure 97. Fit to the California commercial sexes-combined length-frequencies.

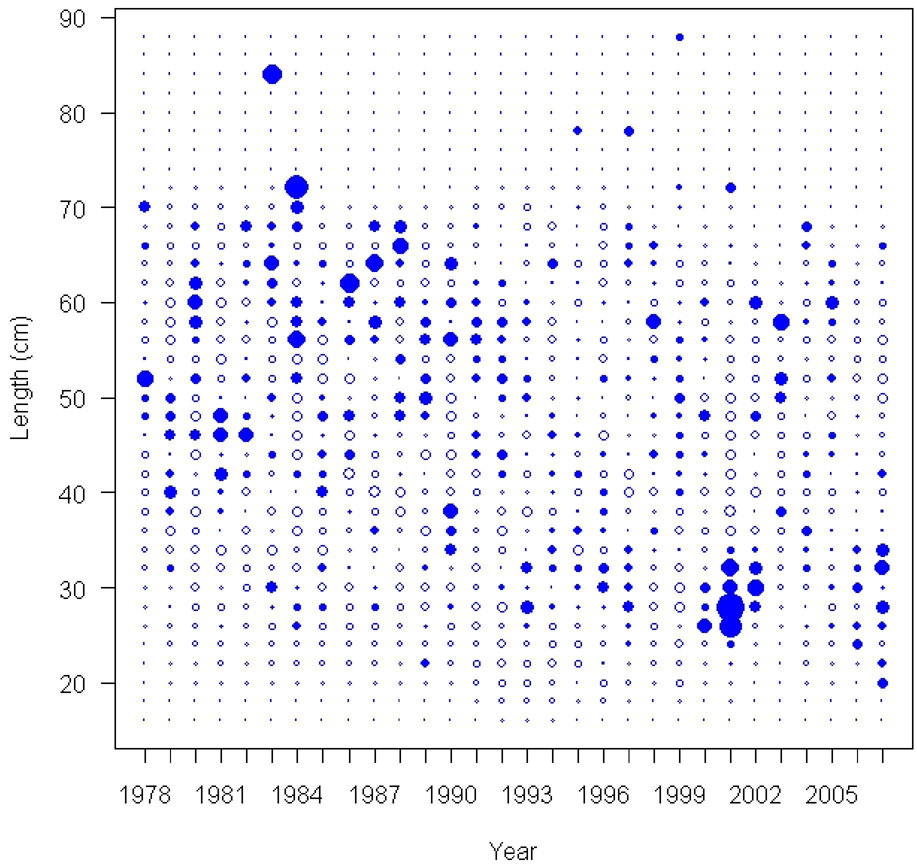

Figure 98. Pearson residuals for the fit to California commercial length-frequencies (maximum = 12.17). Filled circles represent positive residuals (observed – expected).

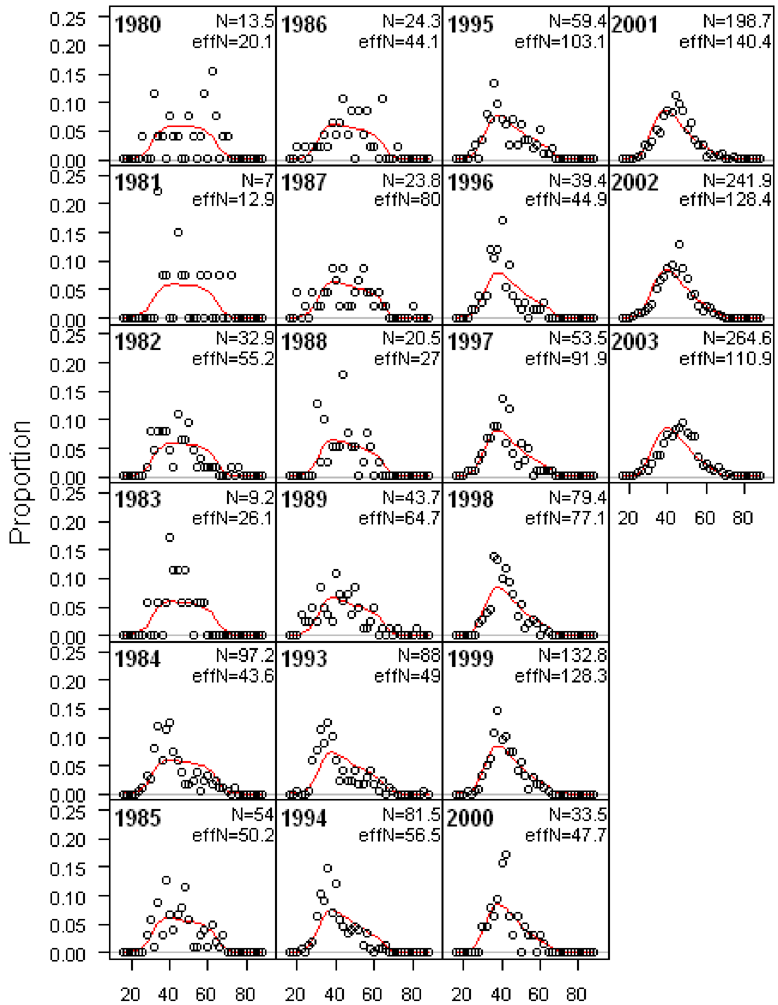

Figure 99. Fit to the Oregon recreational sexes-combined length-frequencies.

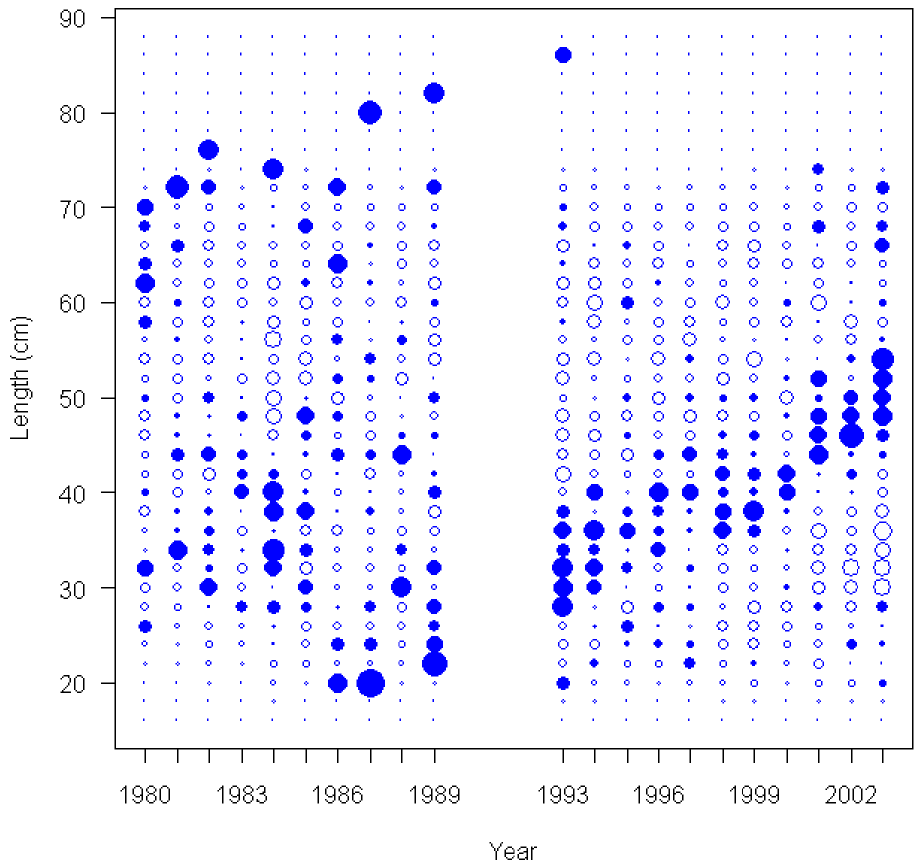

Figure 100. Pearson residuals for the fit to Oregon recreational length-frequencies (maximum = 4.74). Filled circles represent positive residuals (observed – expected).

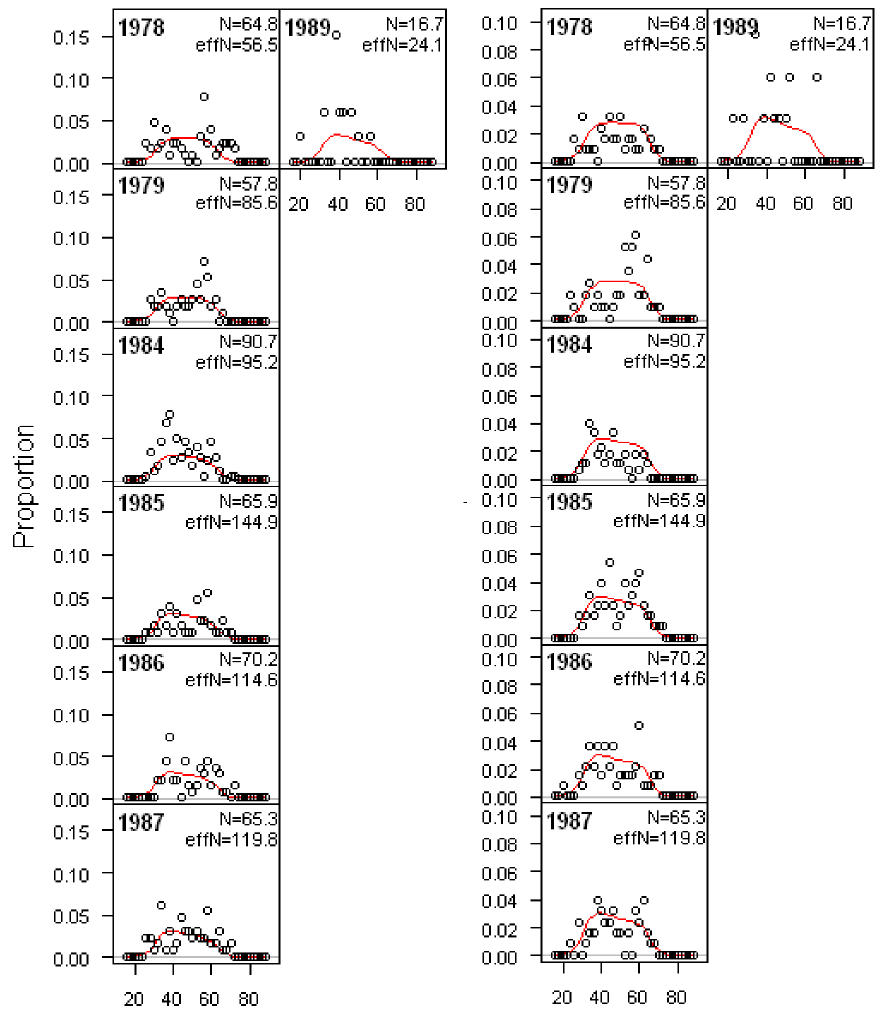

Figure 101. Fit to the Oregon recreational female (left panels) and male (right panels) length-frequencies.

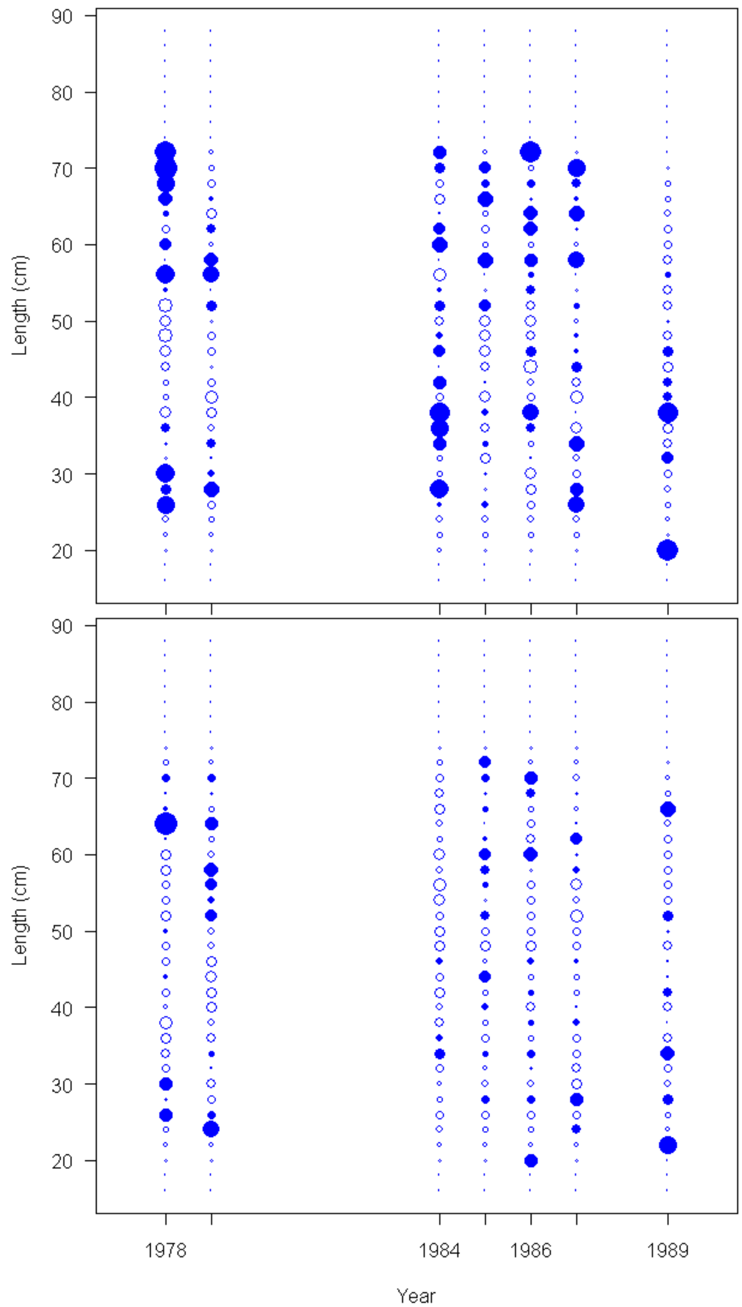

Figure 102. Pearson residuals for the fit to Oregon recreational female (upper panel, maximum = 3.39) and male (lower panel, maximum = 4.00) length-frequencies. Filled circles represent positive residuals (observed – expected).

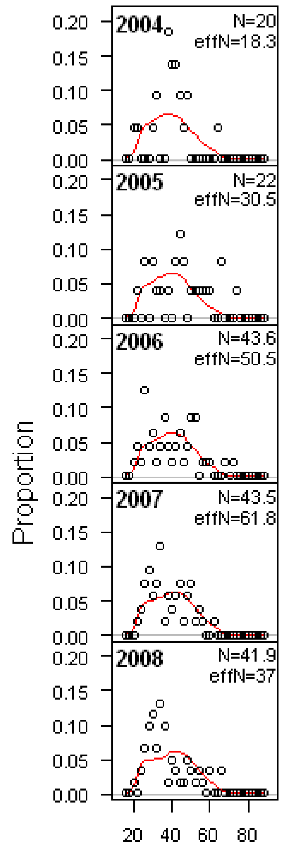

Figure 103. Fit to the Oregon recreational charter observer sexes-combined length-frequencies.

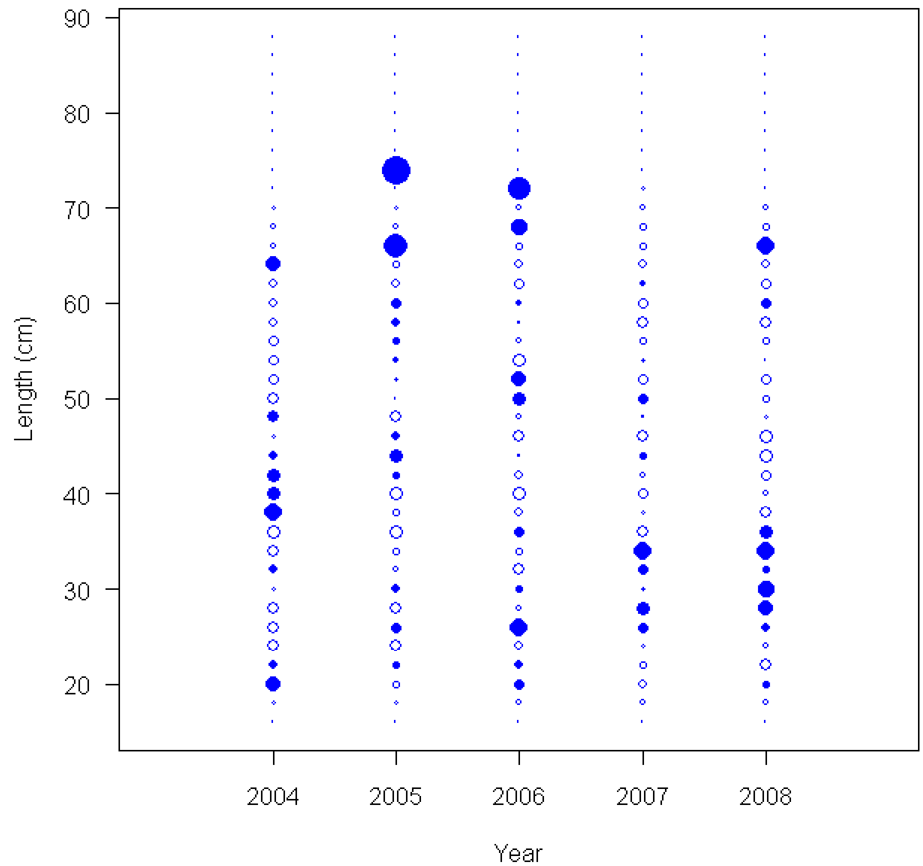

Figure 104. Pearson residuals for the fit to Oregon recreational charter observer length-frequencies (maximum = 5.52). Filled circles represent positive residuals (observed – expected).

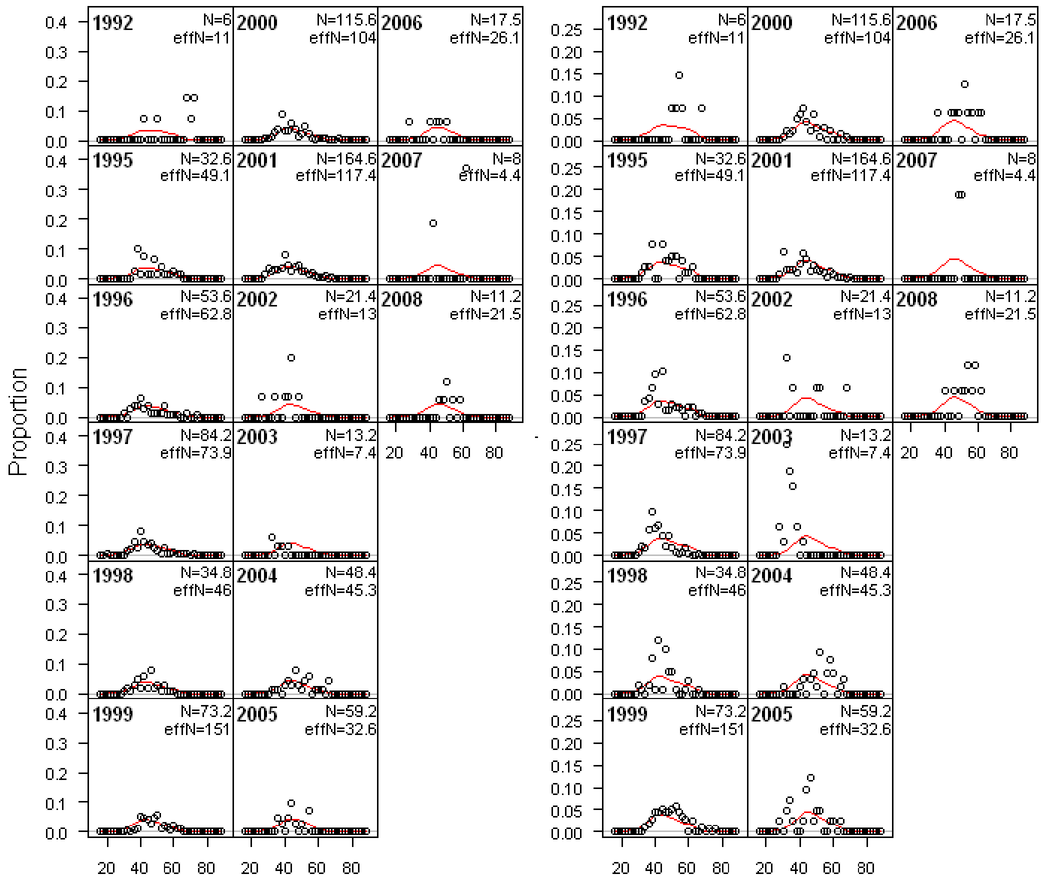

Figure 105. Fit to the Oregon commercial female (left panels) and male (right panels) length-frequencies.

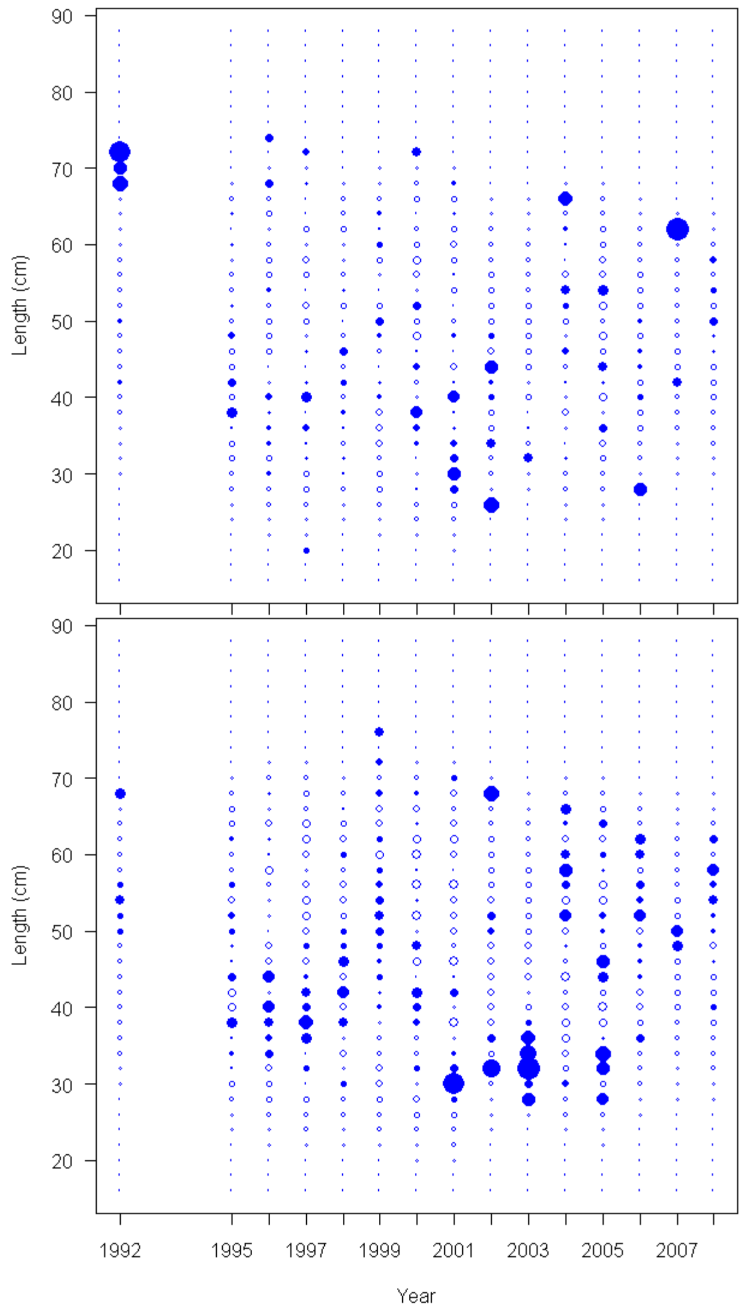

Figure 106. Pearson residuals for the fit to Oregon commercial female (upper panel, maximum = 10.17) and male (lower panel, maximum = 8.12) length-frequencies. Filled circles represent positive residuals (observed – expected).

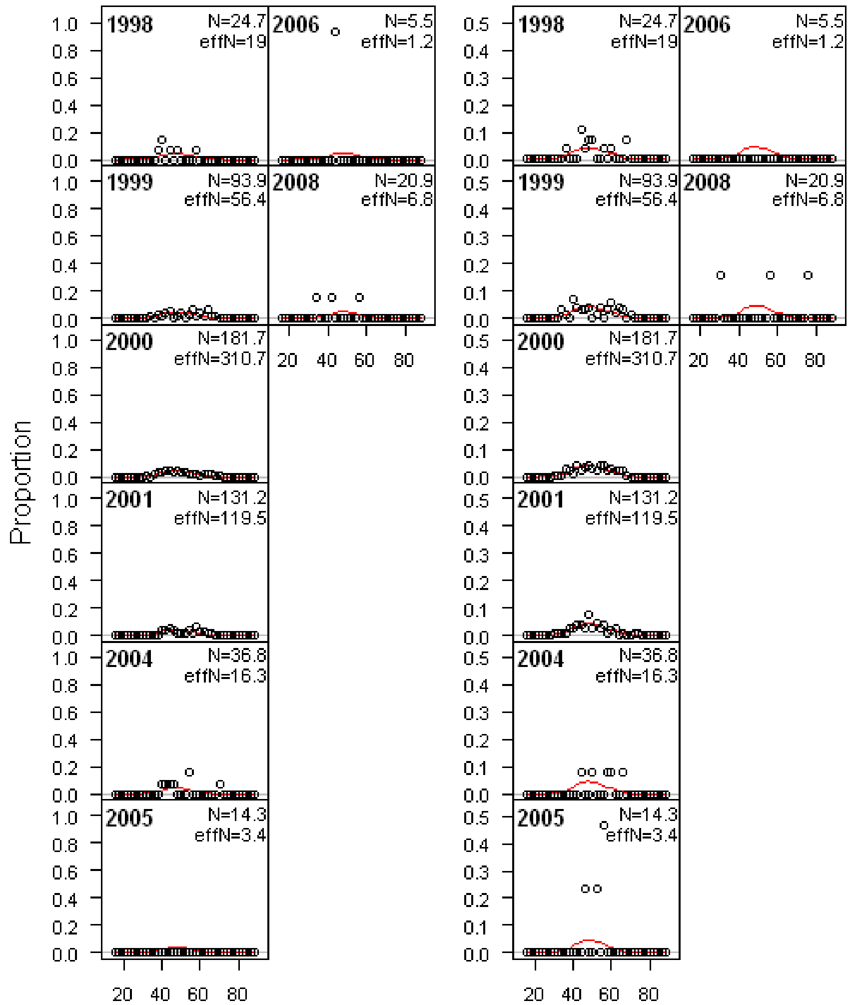

Figure 107. Fit to the Washington recreational female (left panels) and male (right panels) length-frequencies.

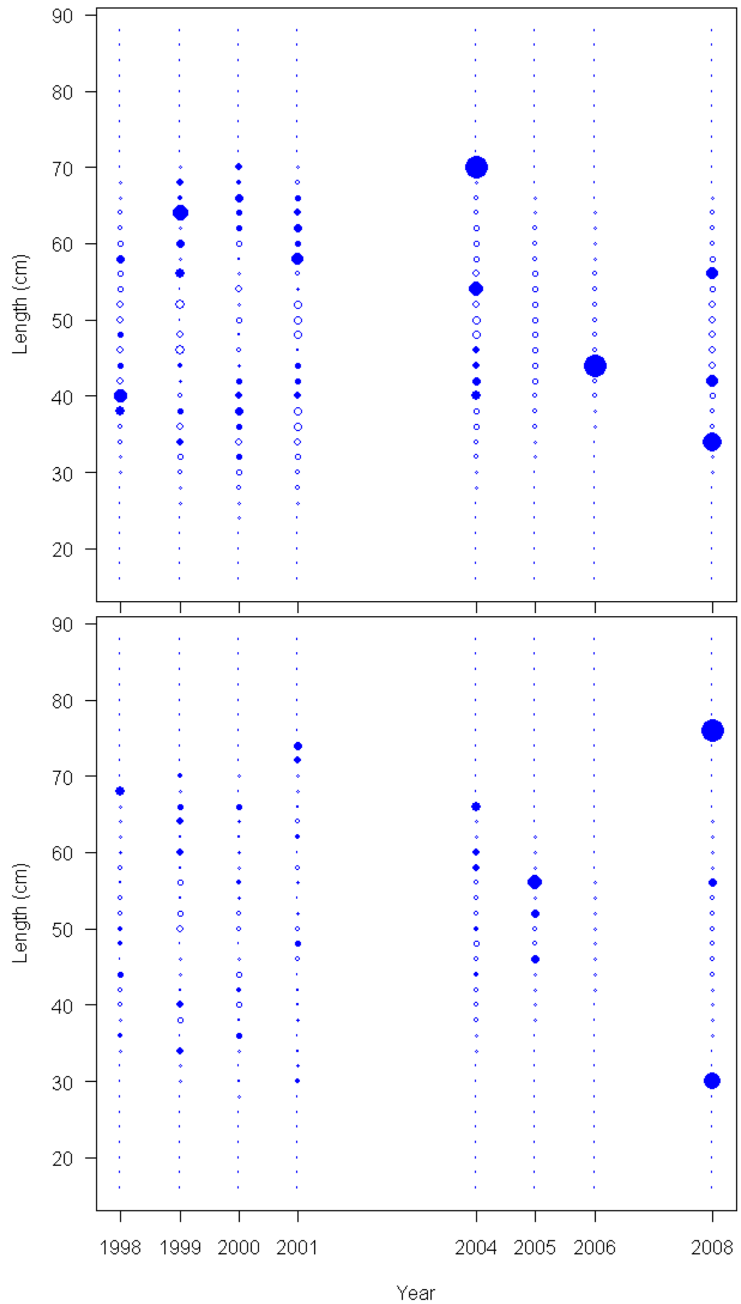

Figure 108. Pearson residuals for the fit to Washington recreational female (upper panel, maximum = 10.55) and male (lower panel, maximum = 22.47) length-frequencies. Filled circles represent positive residuals (observed – expected).

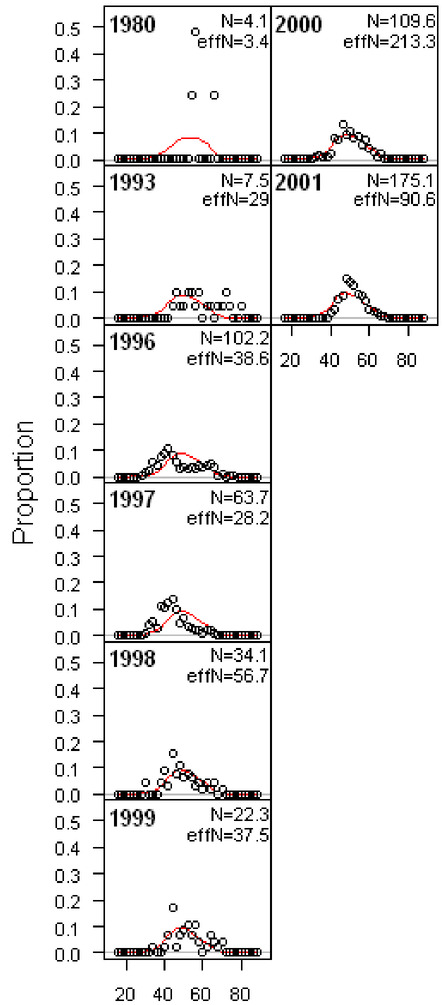

Figure 109. Fit to the Washington commercial sexes-combined length-frequencies.

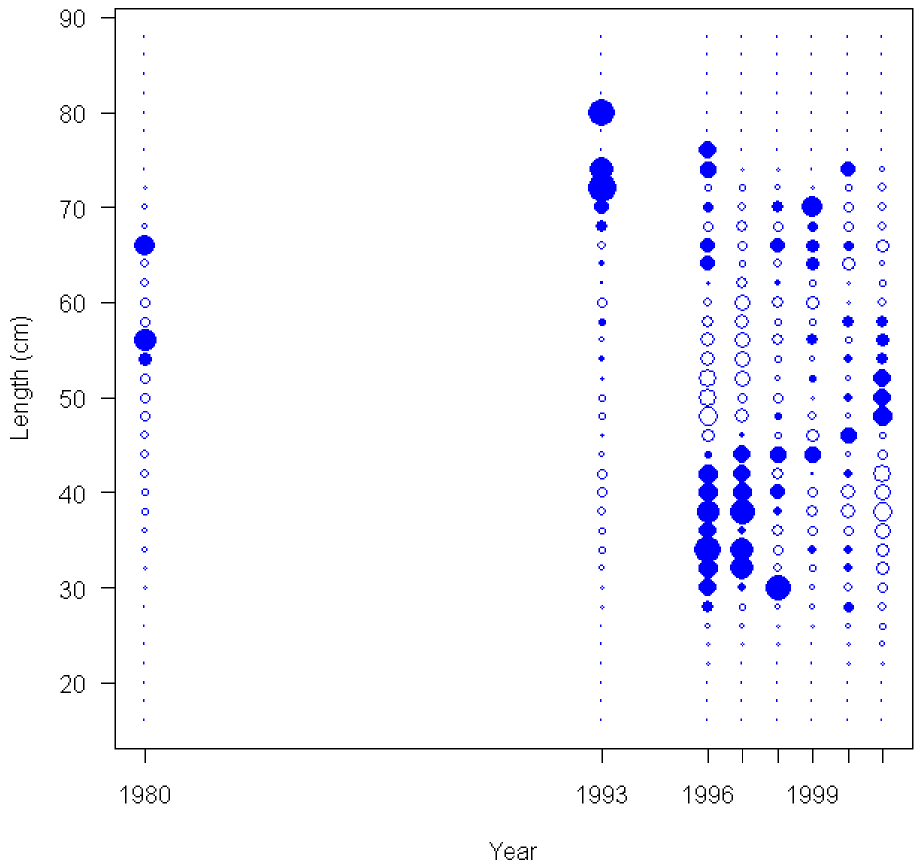

Figure 110. Pearson residuals for the fit to Washington commercial length-frequencies (maximum = 4.54). Filled circles represent positive residuals (observed – expected).

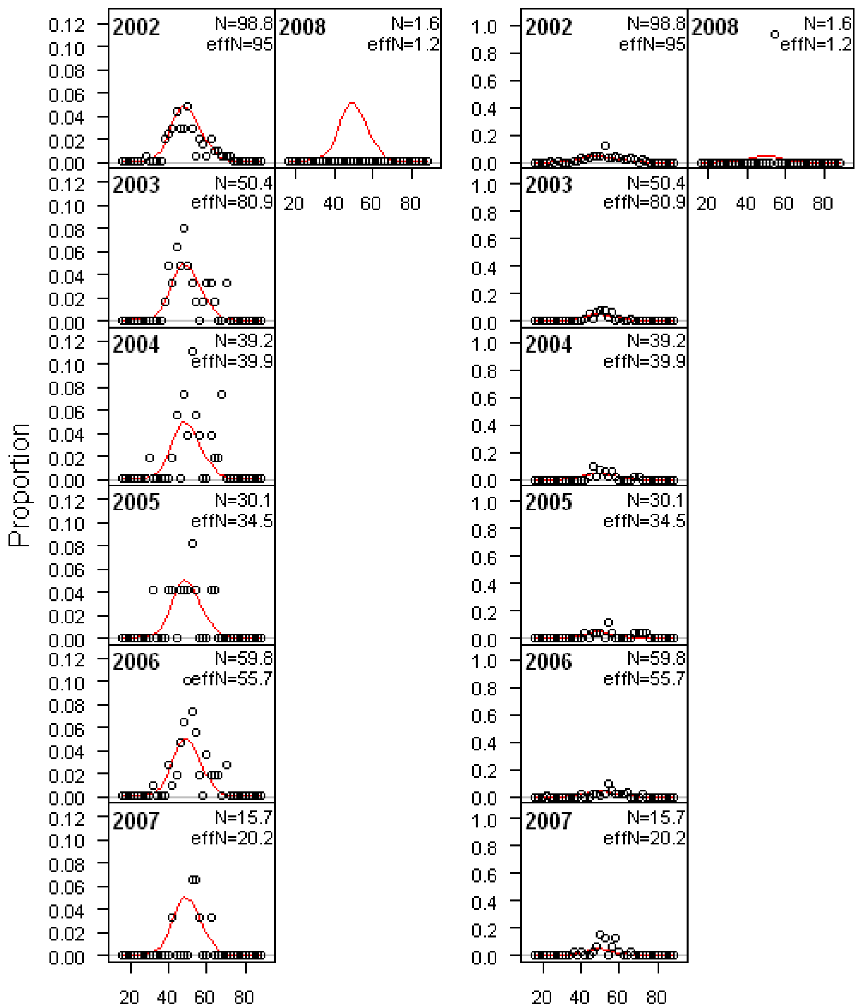

Figure 111. Fit to the Washington commercial female (left panels) and male (right panels) length-frequencies.

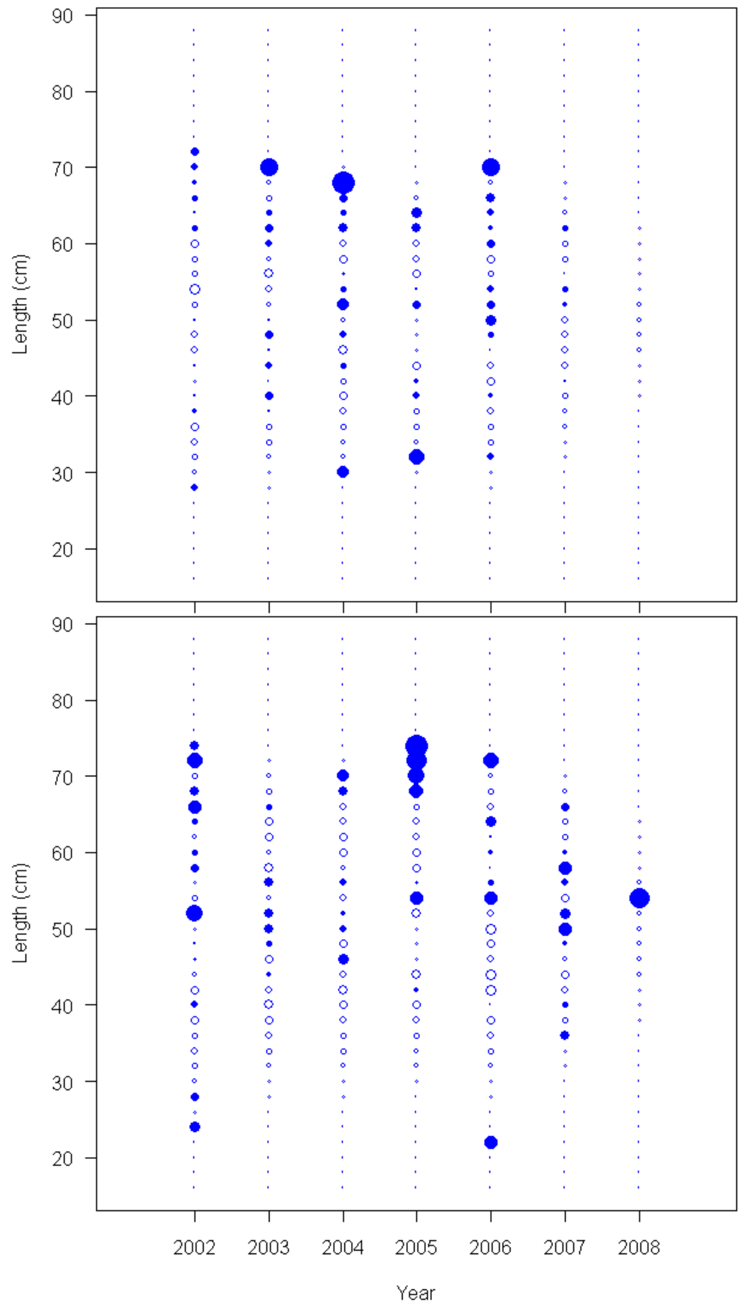

Figure 112. Pearson residuals for the fit to Washington commercial female (upper panel, maximum = 7.56) and male (lower panel, maximum = 6.34) length-frequencies. Filled circles represent positive residuals (observed – expected).

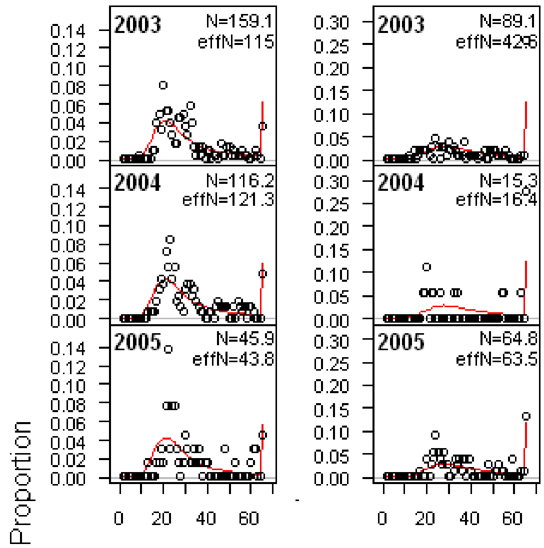

Figure 113. Fit to the Oregon (left panel) and Washington (right panel) IPHC sexes-combined age-frequencies.

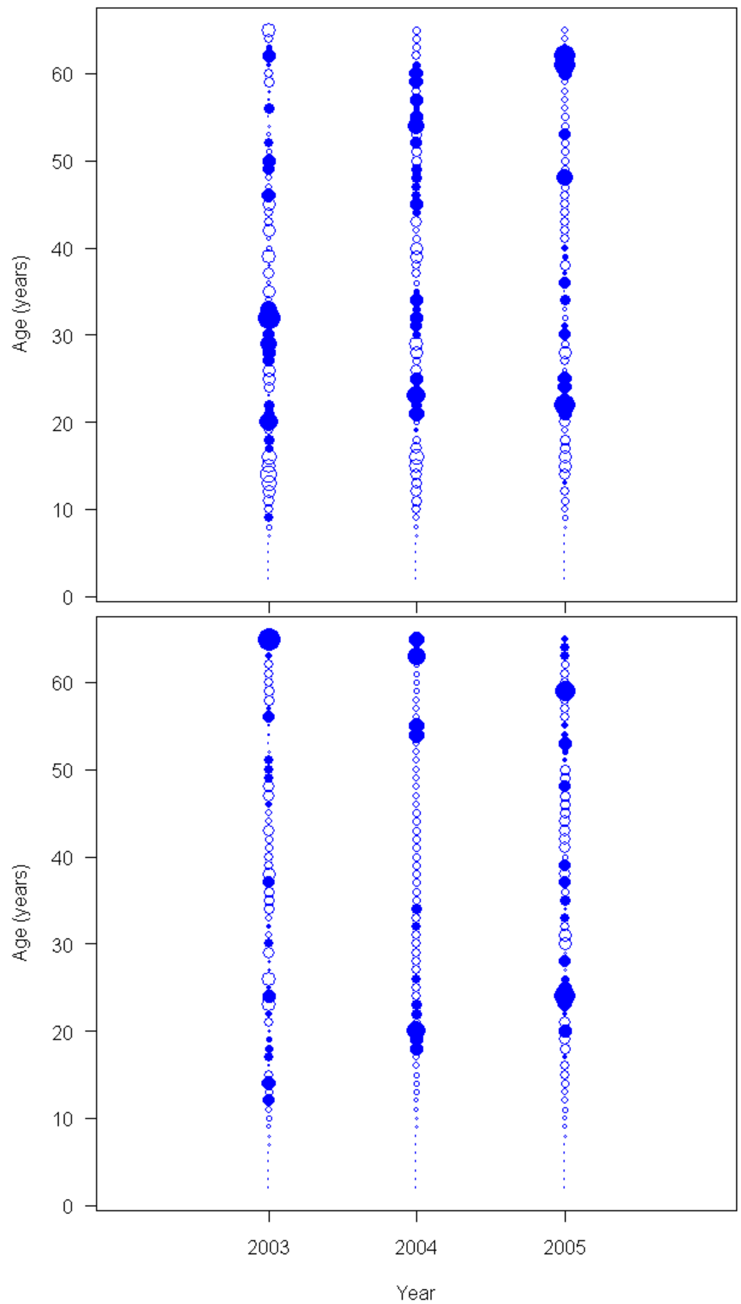

Figure 114. Pearson residuals for the fit to the Oregon (upper panel, maximum = 3.28) and Washington (lower panel, maximum = 3.72) IPHC sexes-combined age-frequencies. Filled circles represent positive residuals (observed – expected).

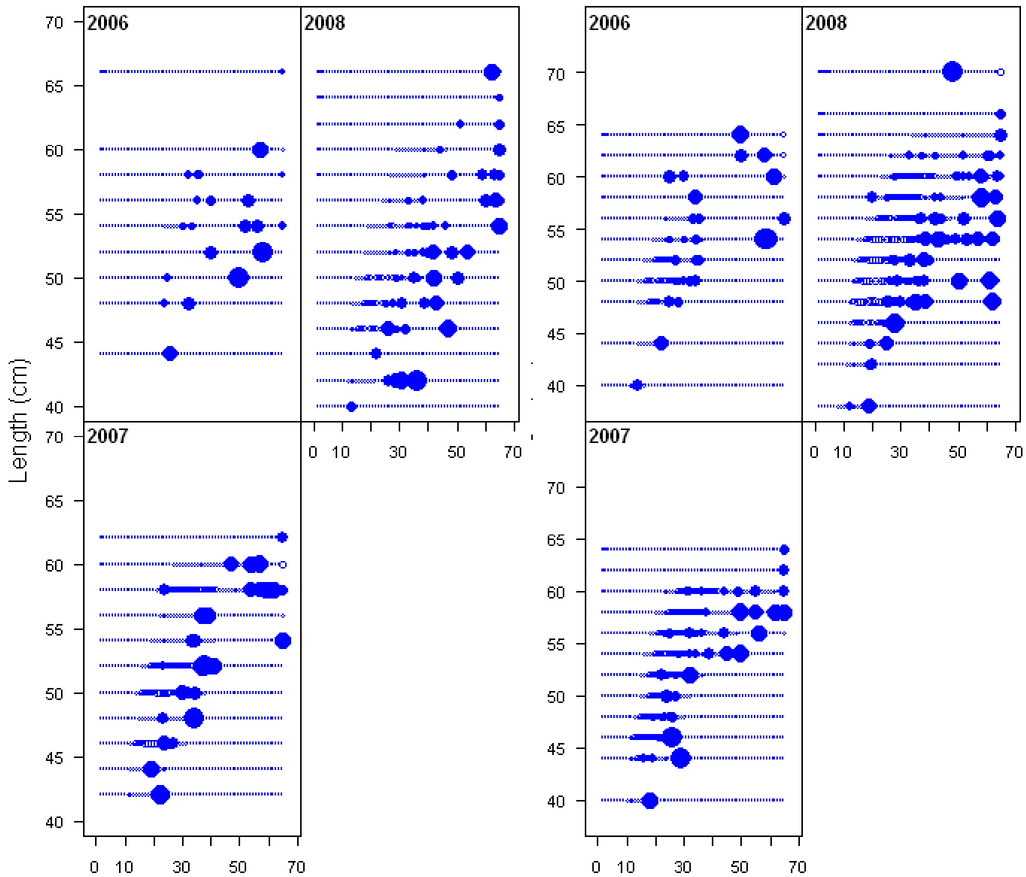

Figure 115. Pearson residuals for the fit to the Oregon female (left panels, maximum = 12.84) and male (right panels, maximum = 8.88) IPHC age-frequencies. Filled circles represent positive residuals (observed – expected).

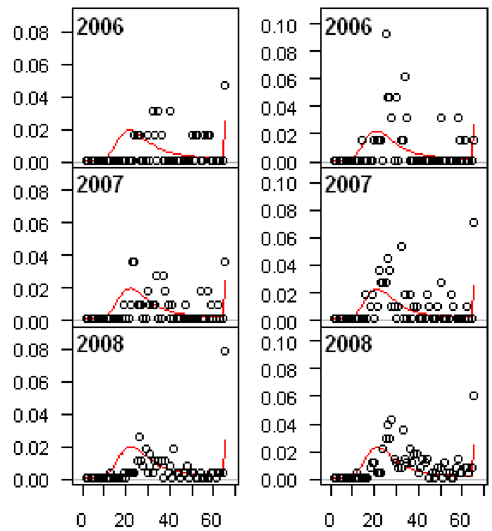

Figure 116. Implied fit to the Oregon female (left panels) and male (right panels) IPHC marginal age-frequencies. Fits are provided for evaluation only, but not included in the model likelihood.

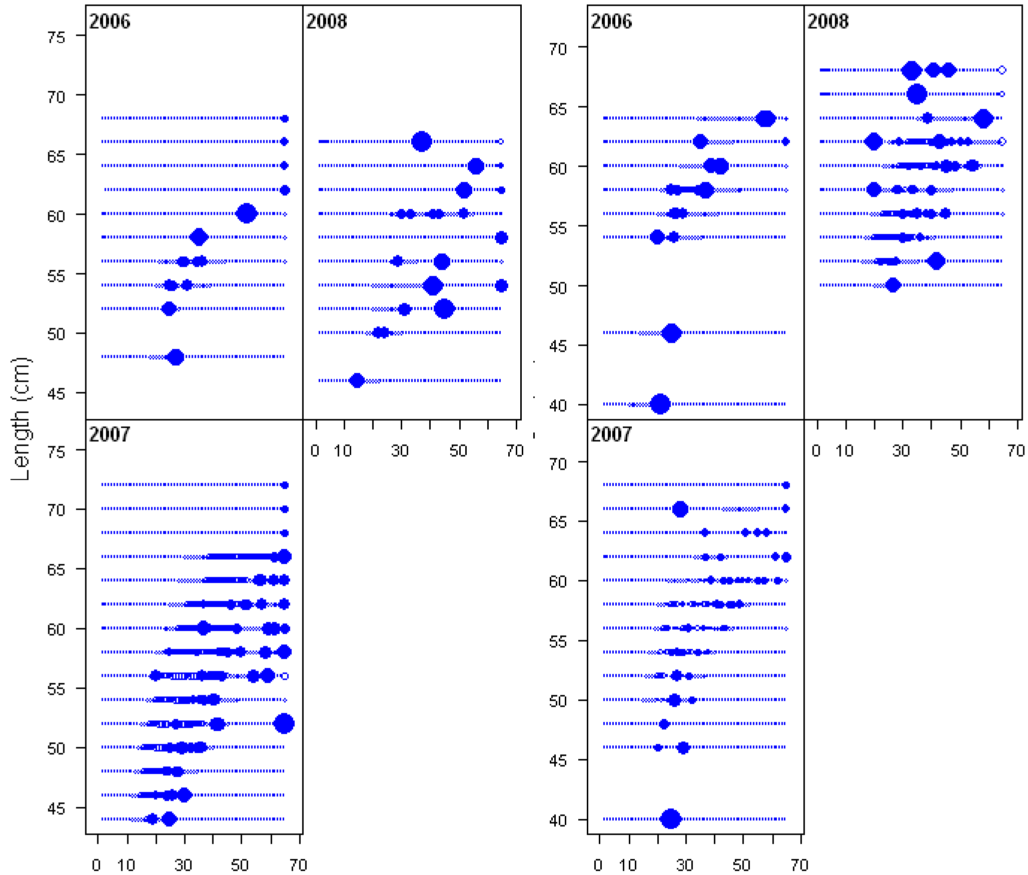

Figure 117. Pearson residuals for the fit to the Washington female (left panels, maximum = 8.10) and male (right panels, maximum = 13.82) IPHC age-frequencies. Filled circles represent positive residuals (observed – expected).

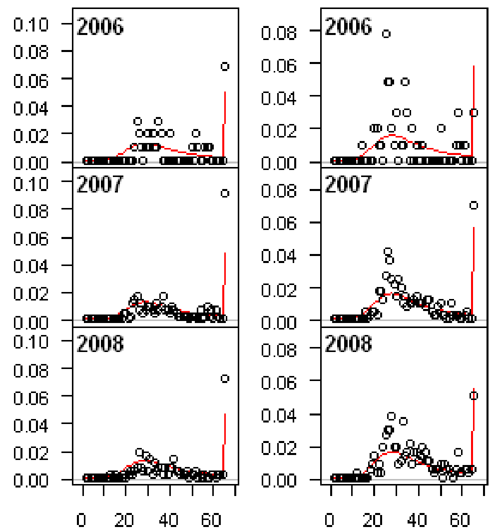

Figure 118. Implied fit to the Washington female (left panels) and male (right panels) IPHC marginal age-frequencies. Fits are provided for evaluation only, but not included in the model likelihood.

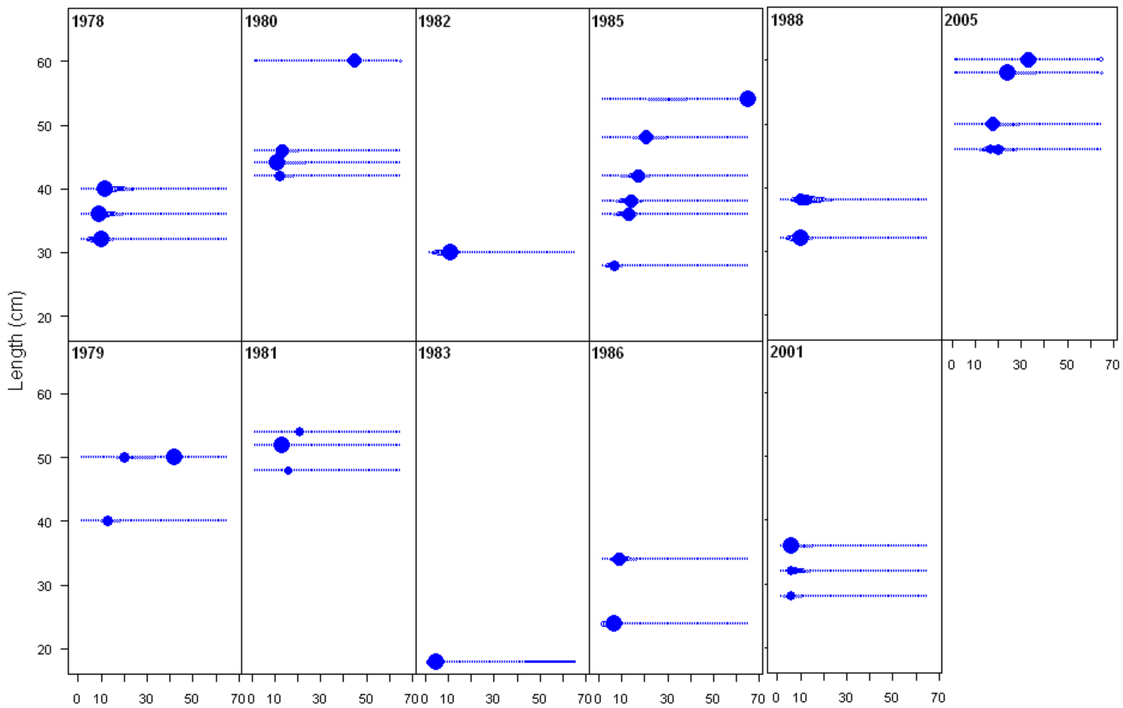

Figure 119. Pearson residuals for the fit to the California commercial female (maximum = 19.51) age-frequencies. Filled circles represent positive residuals (observed – expected).

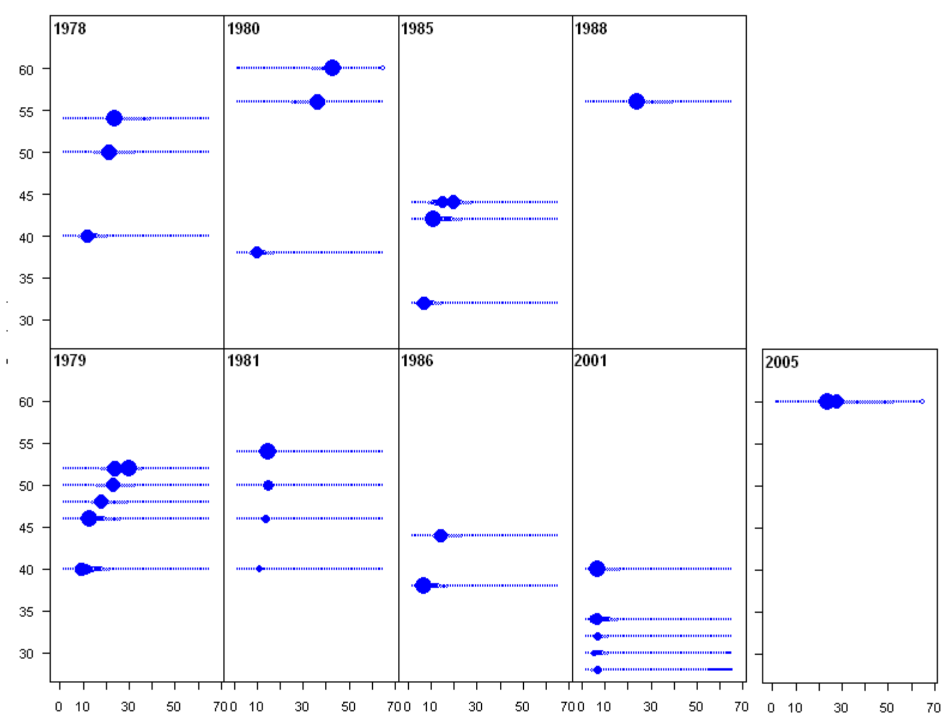

Figure 120. Pearson residuals for the fit to the California commercial male (maximum = 14.77) age-frequencies. Filled circles represent positive residuals (observed – expected).

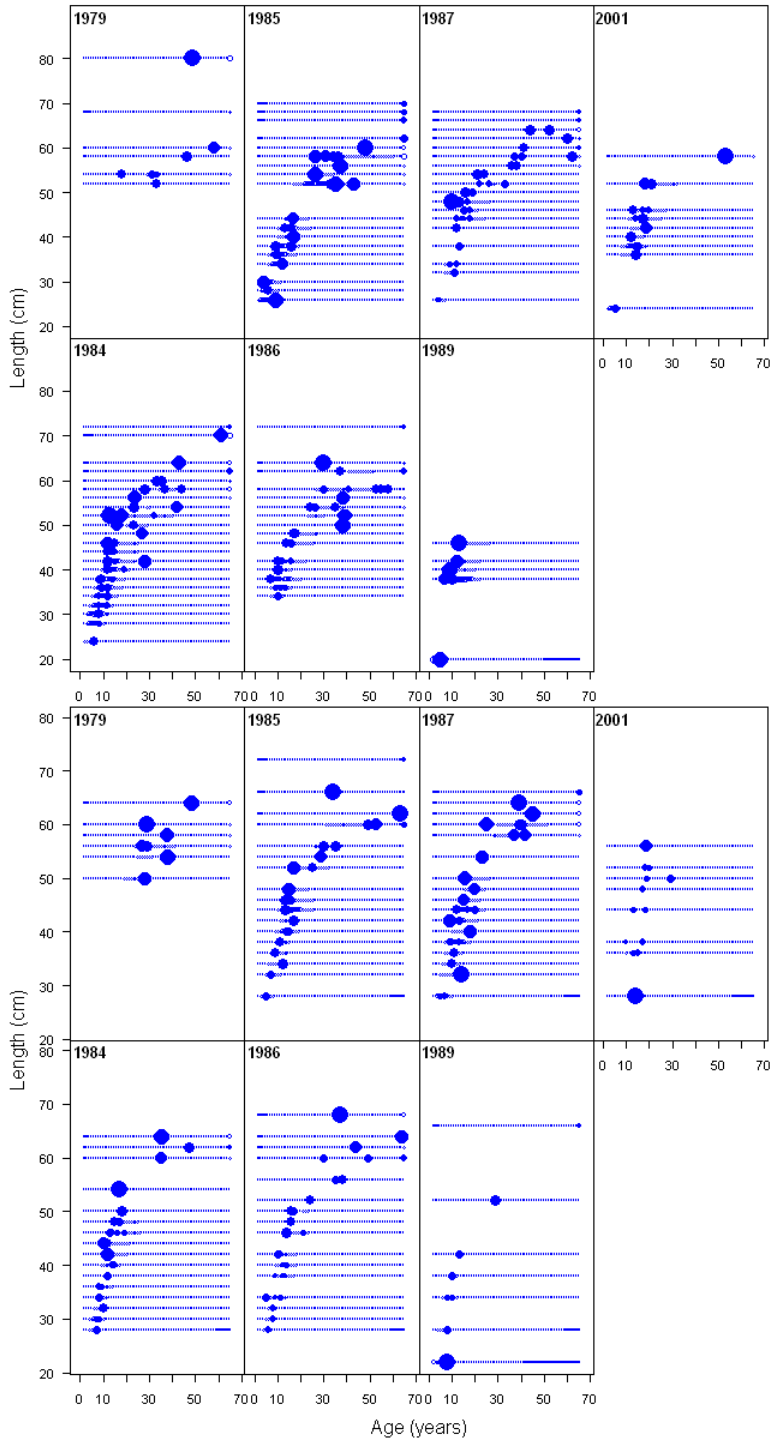

Figure 121. Pearson residuals for the fit to the Oregon recreational female (upper panels, maximum = 14.52) and male (lower panels, maximum = 17.67) age-frequencies. Filled circles represent positive residuals (observed – expected).

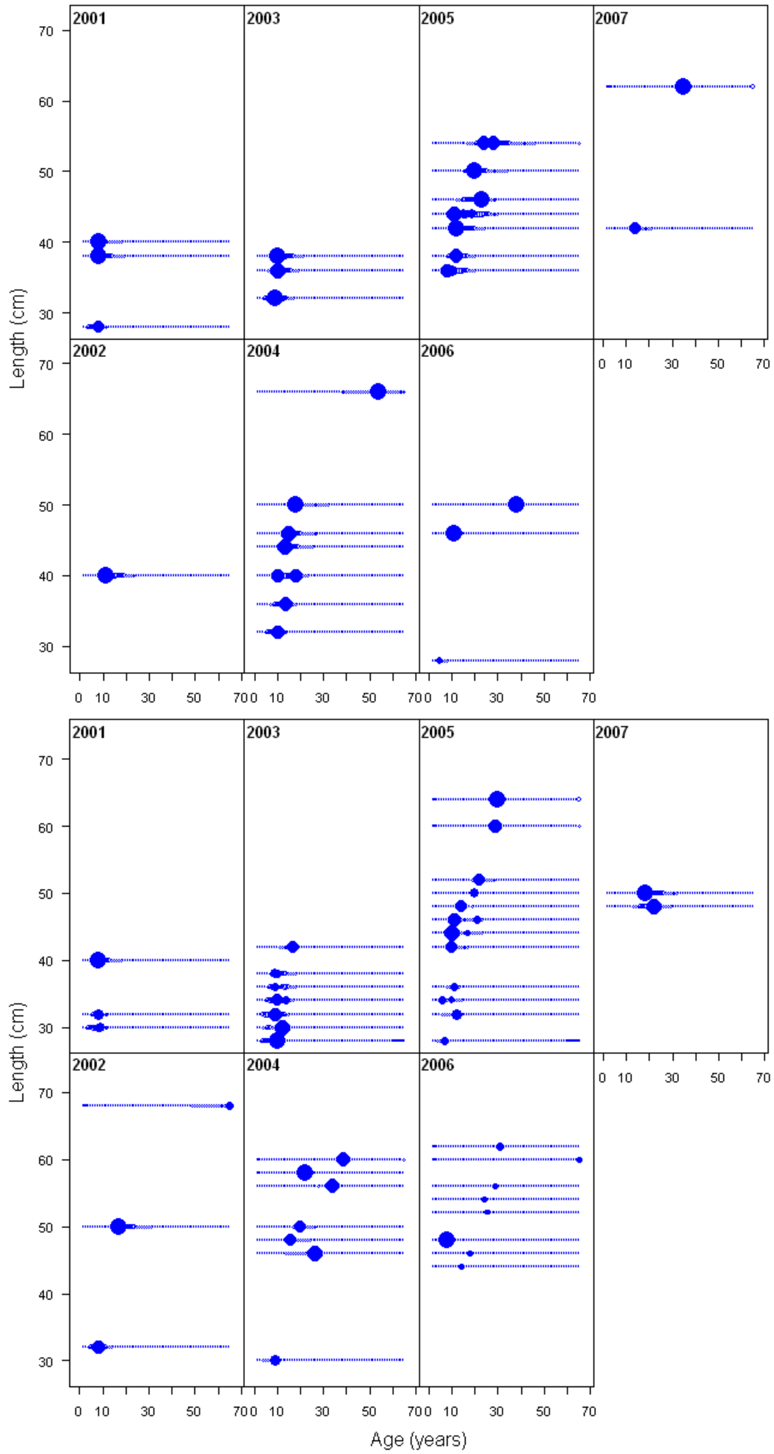

Figure 122. Pearson residuals for the fit to the Oregon commercial female (upper panels, maximum = 10.16) and male (lower panels, maximum = 28.75) age-frequencies. Filled circles represent positive residuals (observed – expected).

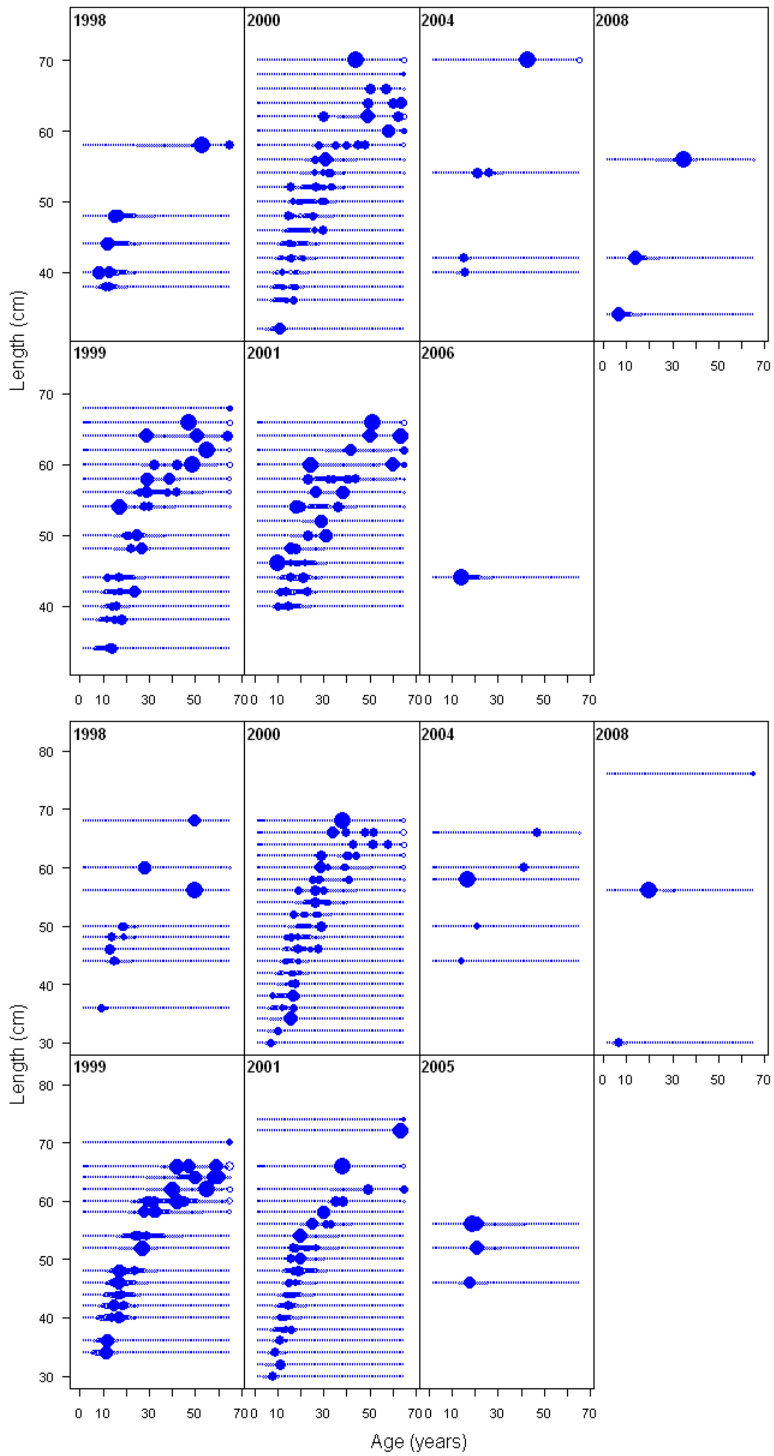

Figure 123. Pearson residuals for the fit to the Washington recreational female (upper panels, maximum = 9.12) and male (lower panels, maximum = 18.23) age-frequencies. Filled circles represent positive residuals (observed – expected).

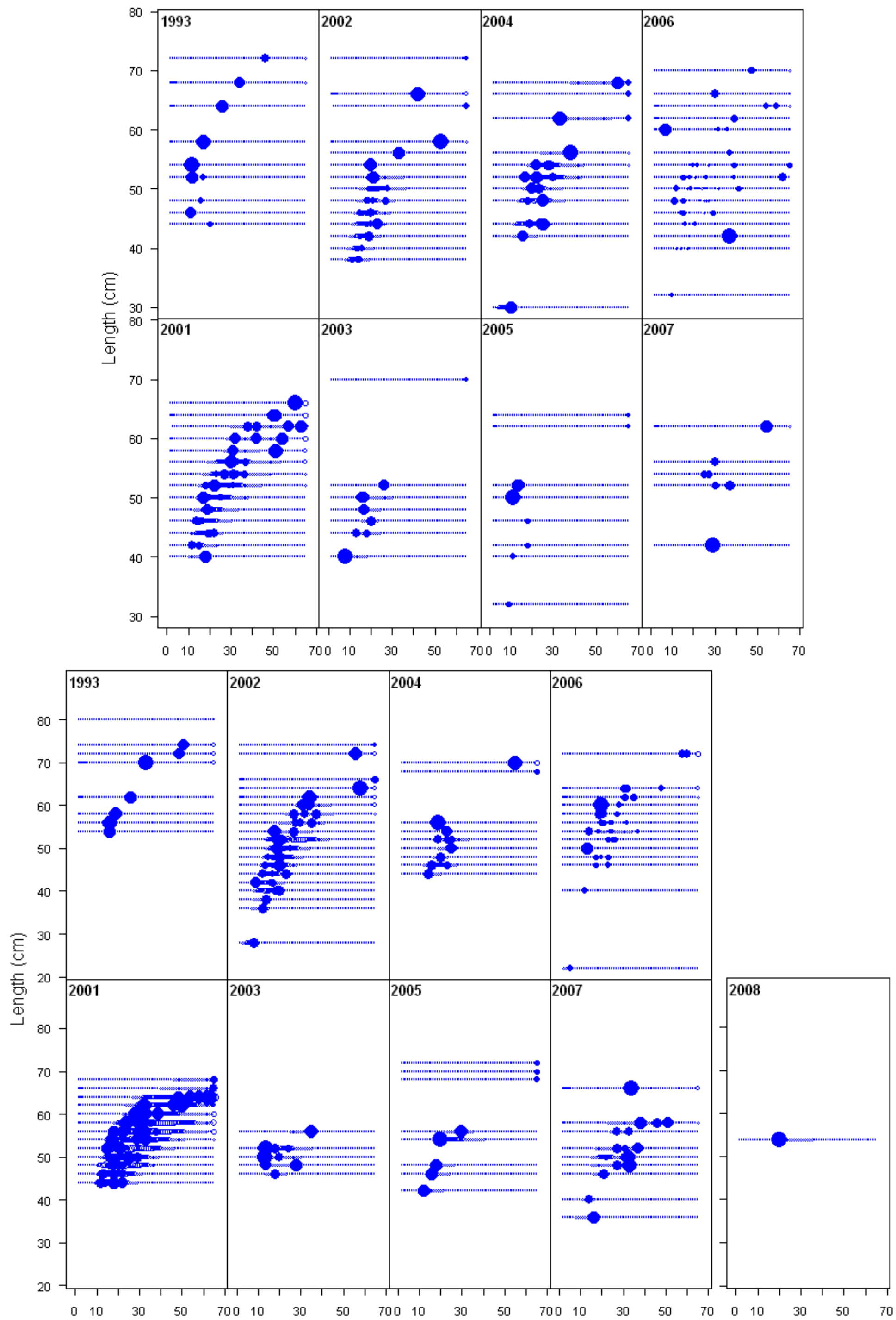

Figure 124. Pearson residuals for the fit to the Washington commercial female (upper panels, maximum =28.44) and male (lower panels, maximum = 19.38) age-frequencies. Filled circles represent positive residuals (observed – expected).

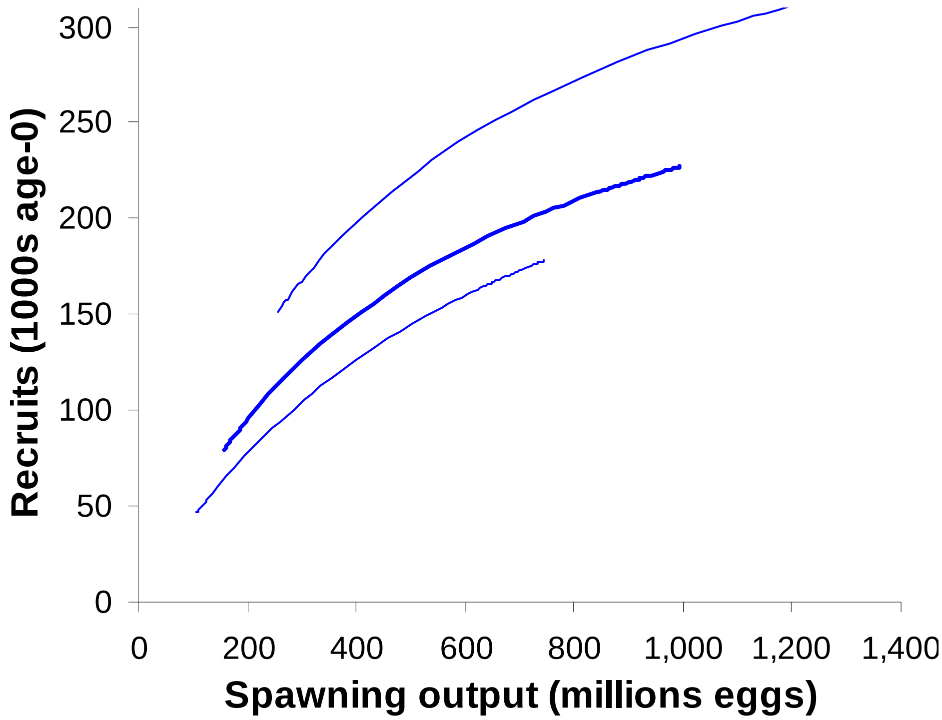

Figure 125. Estimated stock-recruit function for the base case model, and alternate states of nature (light lines).

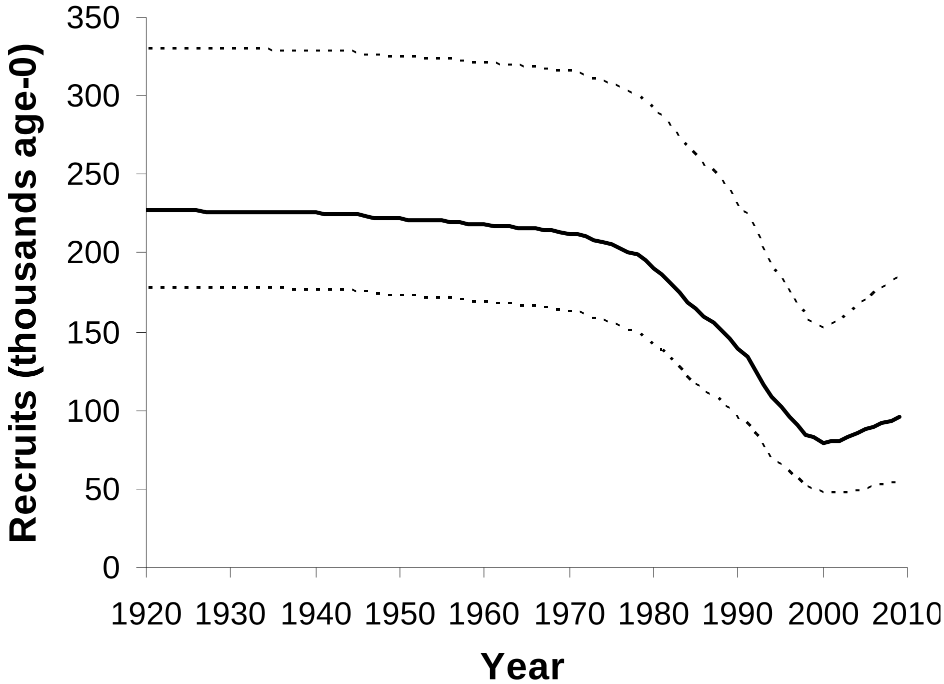

Figure 126. Time series of estimated yelloweye rockfish recruitments for the base case model and alternate states of nature (dashed lines).

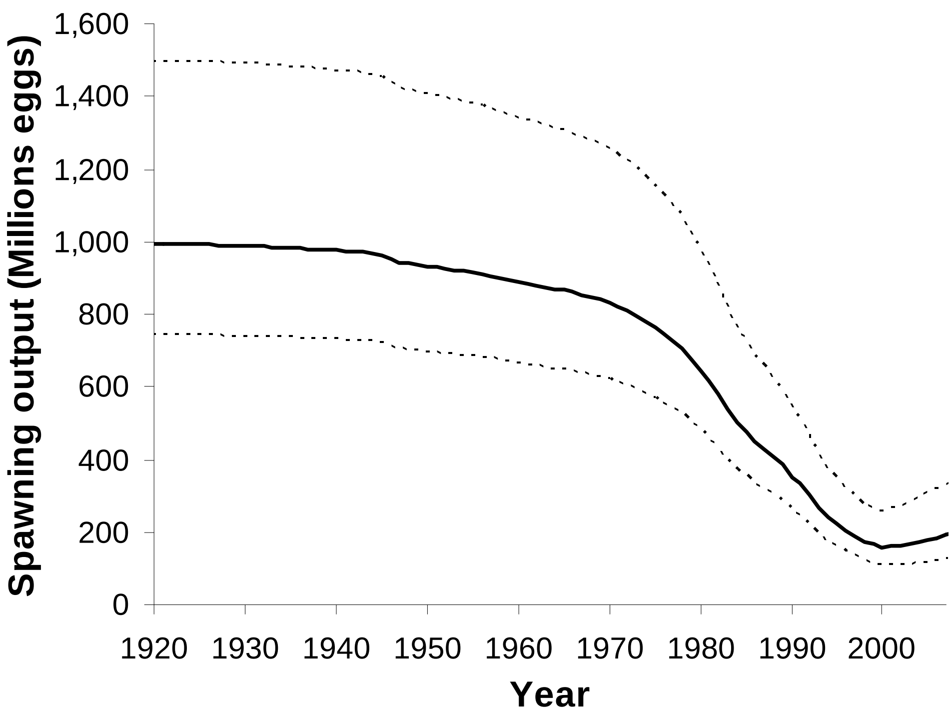

Figure 127. Estimated spawning output time-series (1916-2009) for the base case model (solid line) and alternate states of nature (dashed lines).

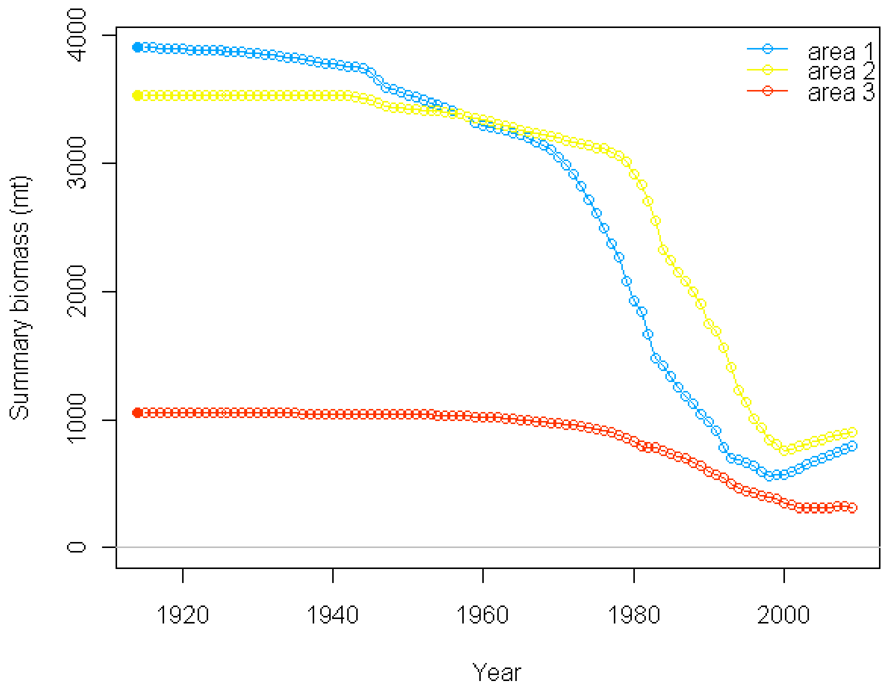

Figure 128. Estimated summary biomass (age-8+) time-series (1916-2009) by state for the base case model. Area 1, upper line (early years) = California; Area 2, middle line (early years) = Oregon; and Area 3, lower line (early years) = Washington.

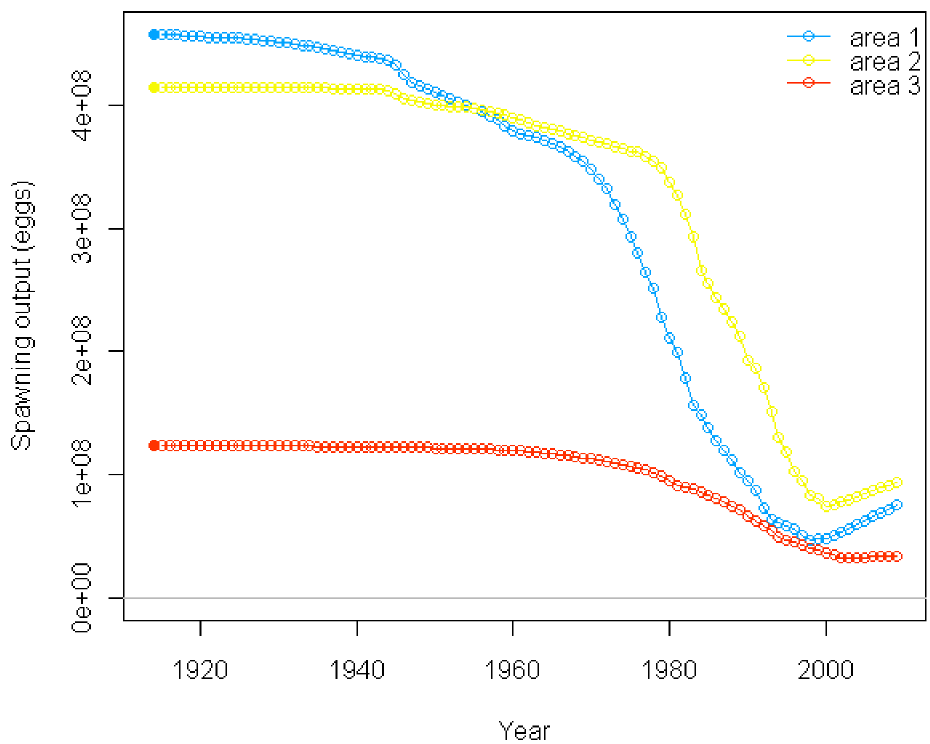

Figure 129. Estimated spawning output time-series (1916-2009) by state for the base case model. Area 1, upper line (early years) = California; Area 2, middle line (early years) = Oregon; and Area 3, lower line (early years) = Washington.

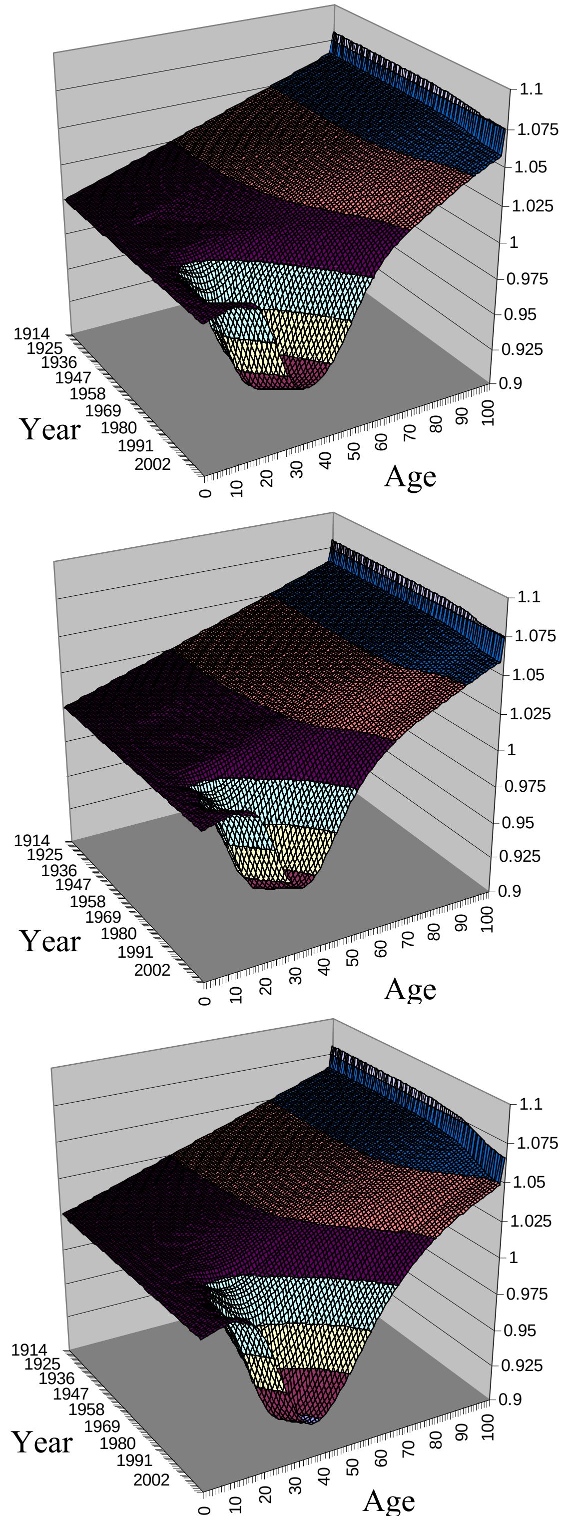

Figure 130. Predicted time-series of male to female ratio (values greater than 1.0 indicate more males than females) at age for California (top panel), Oregon (middle panel) and Washington (bottom panel) for the base case model.

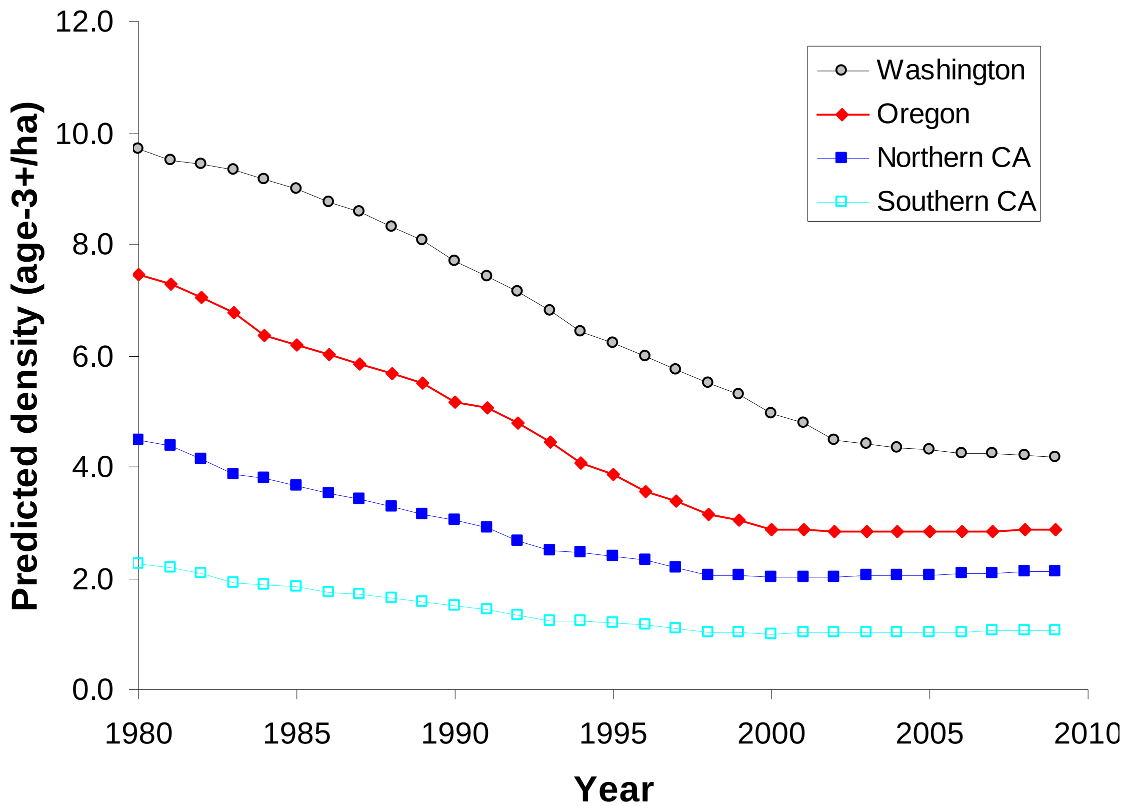

Figure 131. Predicted density of yelloweye rockfish over all ‘suitable’ habitat by state (California divided into southern and northern portions at Point Conception, and 33% of biomass assumed to occur in the south).

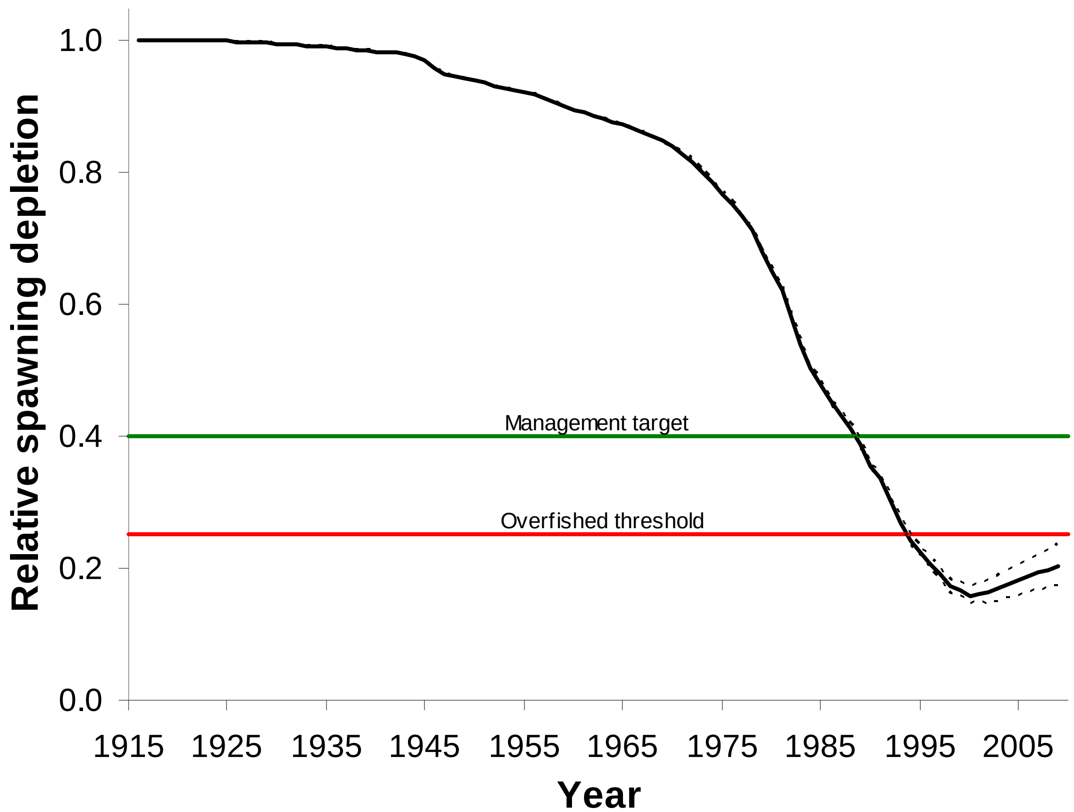

Figure 132. Time-series of relative spawning depletion as estimated in the base case model (round points) with approximate asymptotic 95% confidence interval (dashed lines) and alternate states of nature (light lines).

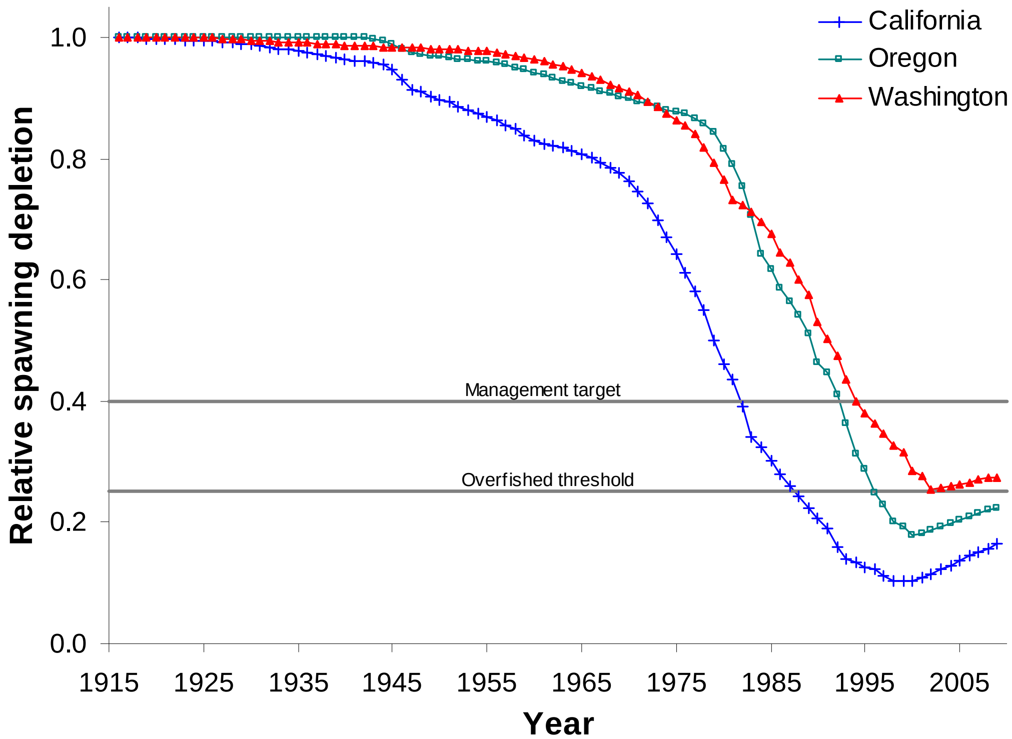

Figure 133. Time-series of relative spawning depletion by state for the base case model.

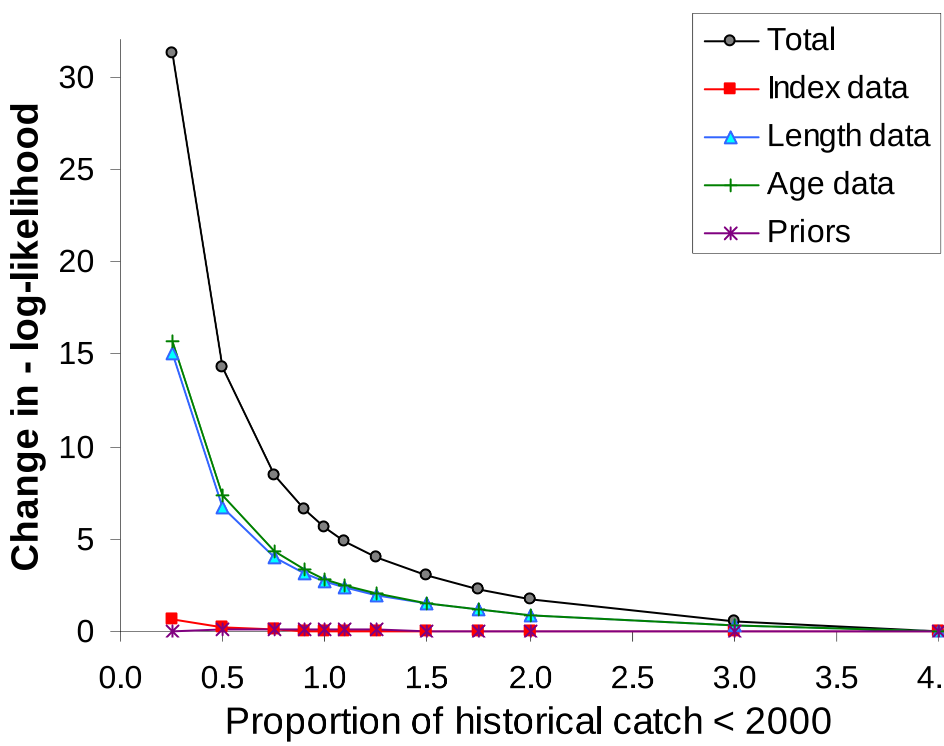

Figure 134. Likelihood profile over the fraction of the best estimate for historical catch.

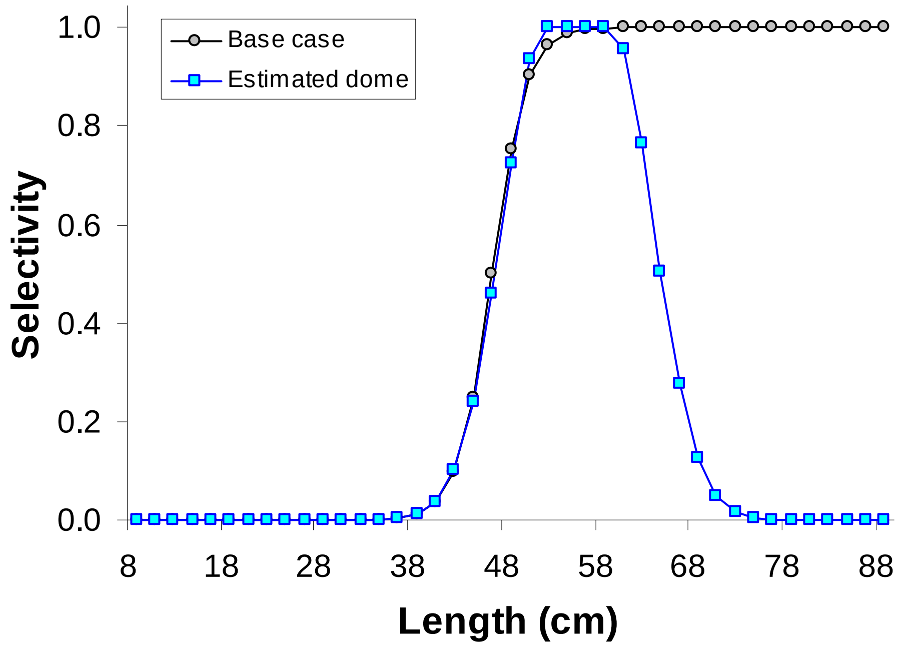

Figure 135. Selectivity curve for the IPHC survey in Oregon for the base case and sensitivity allowing dome-shaped selectivity.

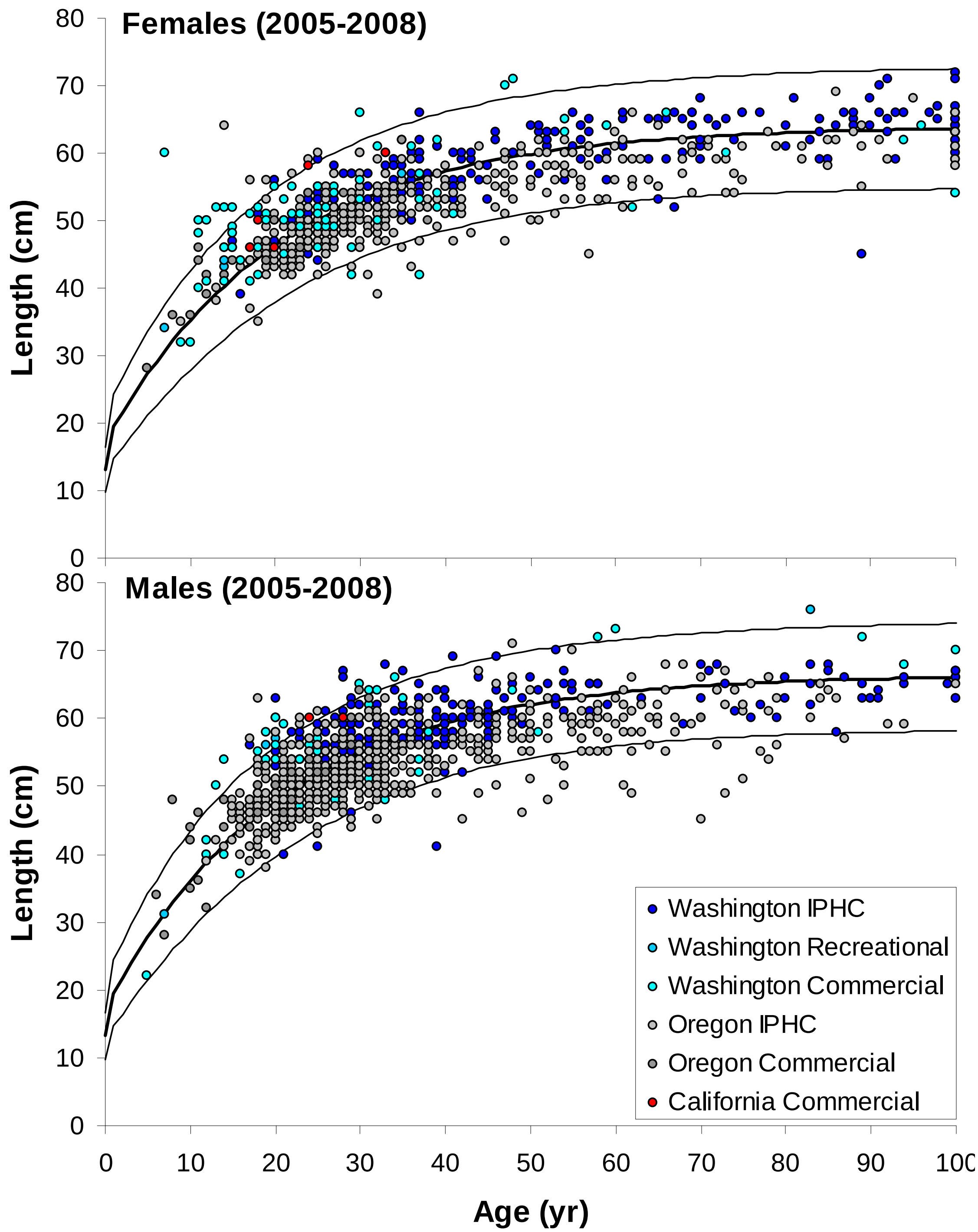

Figure 136. Comparison of recent growth data from California, Oregon and Washington by fleet.

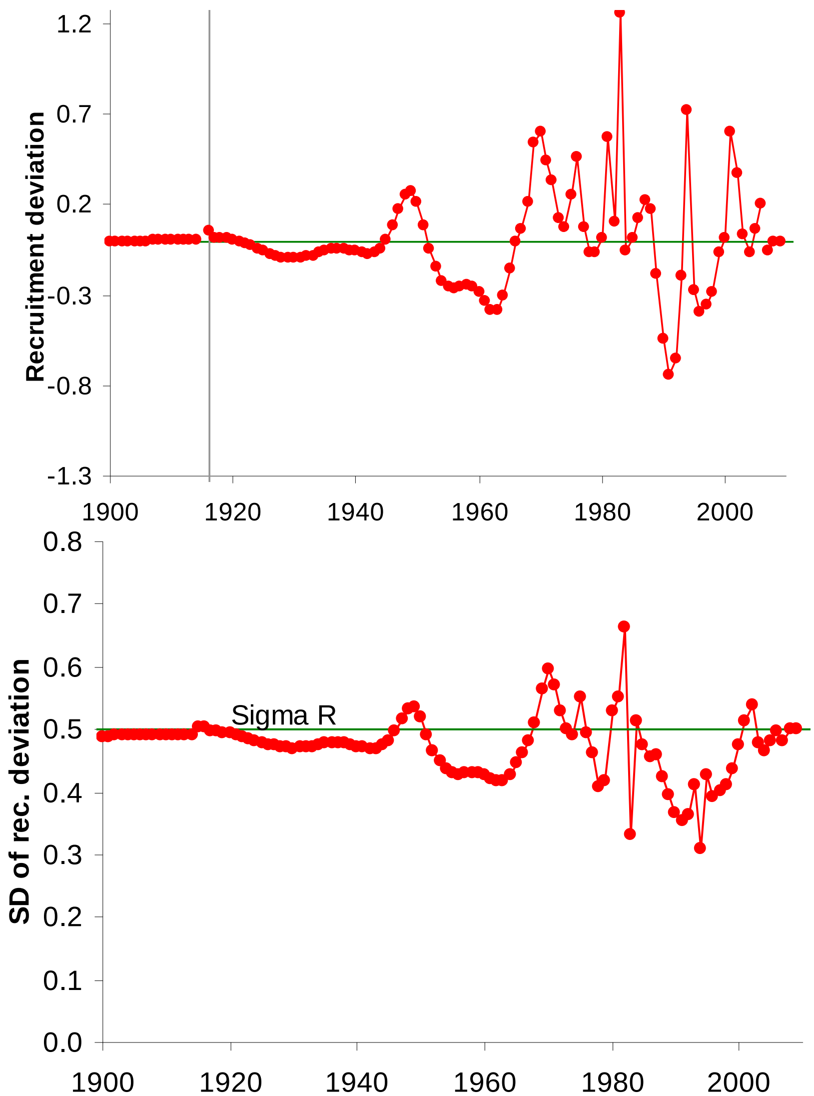

Figure 137. Estimated recruitment time-series (upper panel, horizontal line indicates a value of zero, vertical line indicates the year in which area-specific apportionment of recruitment began) and asymptotic SDs of the estimated deviations (lower panel, horizontal line indicates input σ_r) from pre-STAR sensitivity analysis.

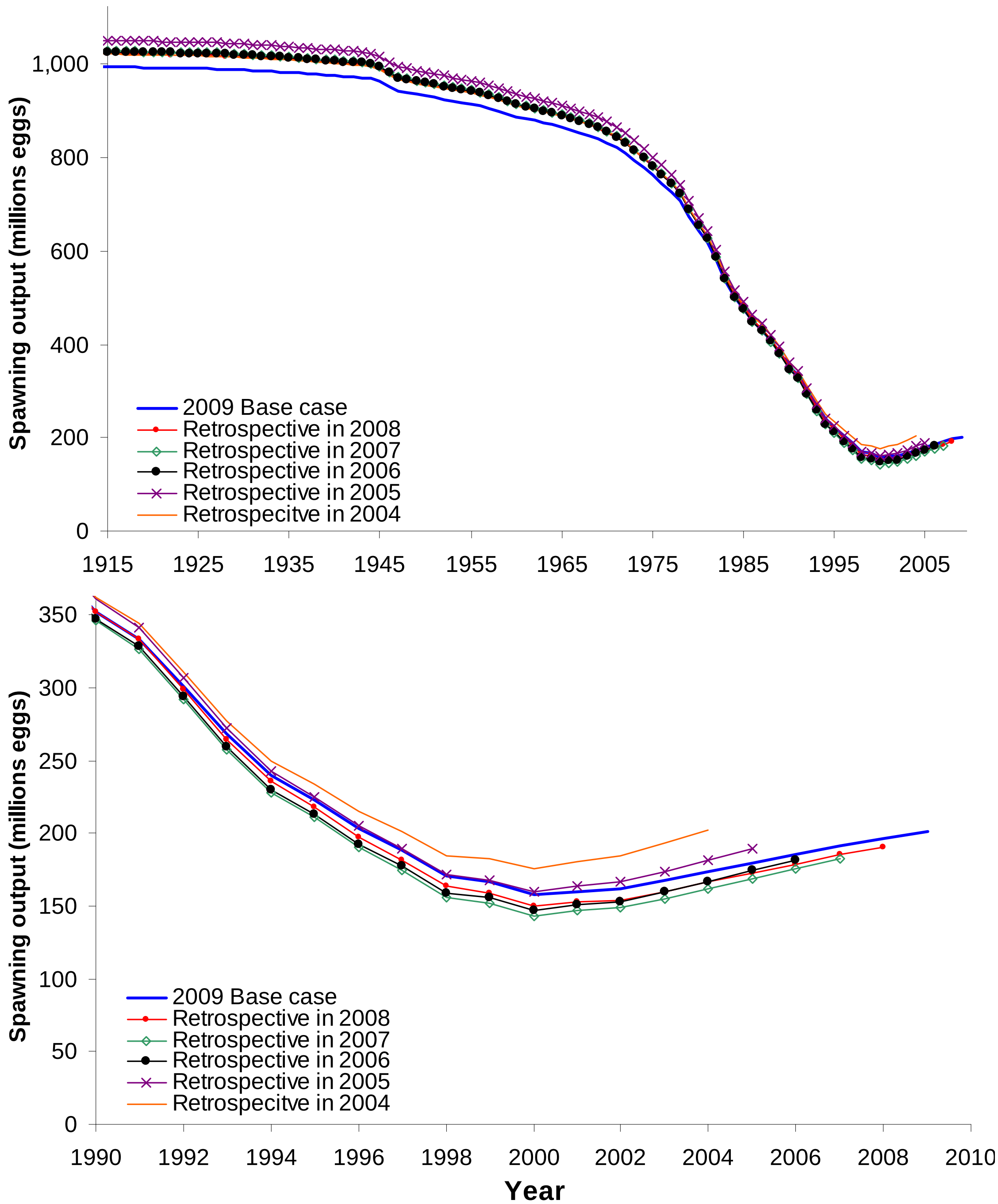

Figure 138. Results from a 5-year retrospective analysis. Each year of retrospective is performed as if the assessment were conducted in that year (i.e., retrospective in 2006 includes data through 2005). Upper panel represents the entire time-series of spawning output, lower panel only the most recent period for easier identification of effects on current status.

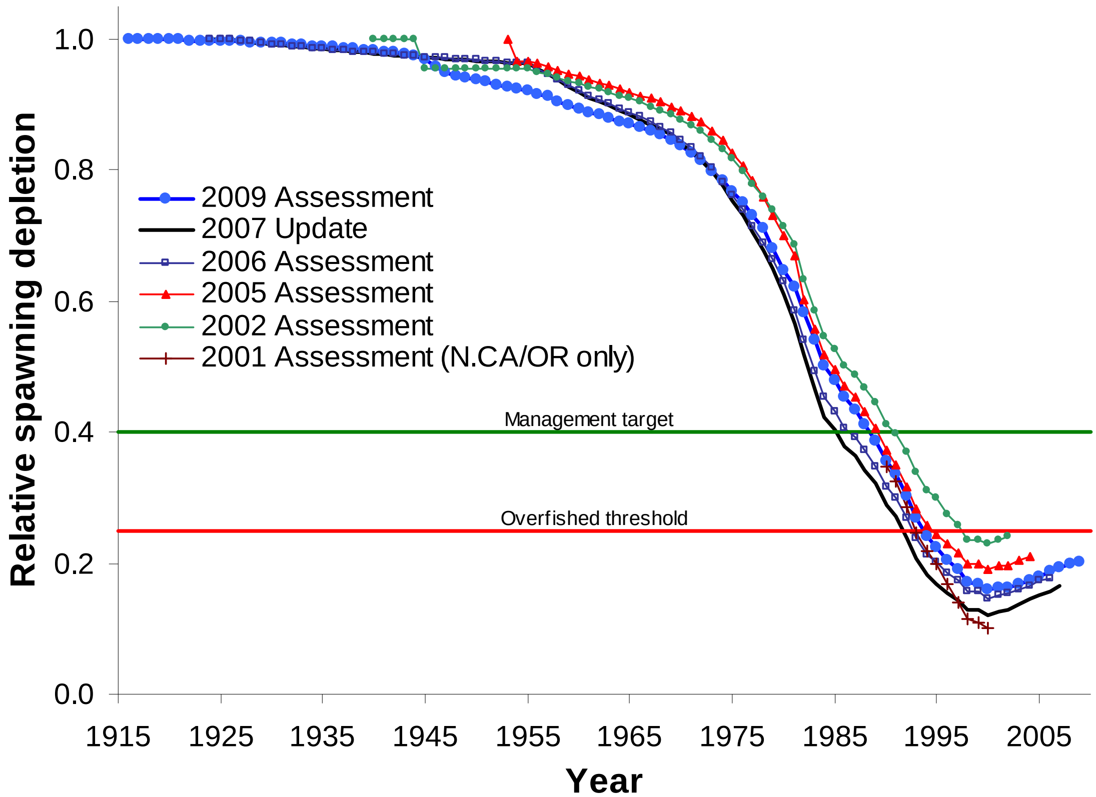

Figure 139. Retrospective pattern in relative depletion among yelloweye rockfish stock assessments.

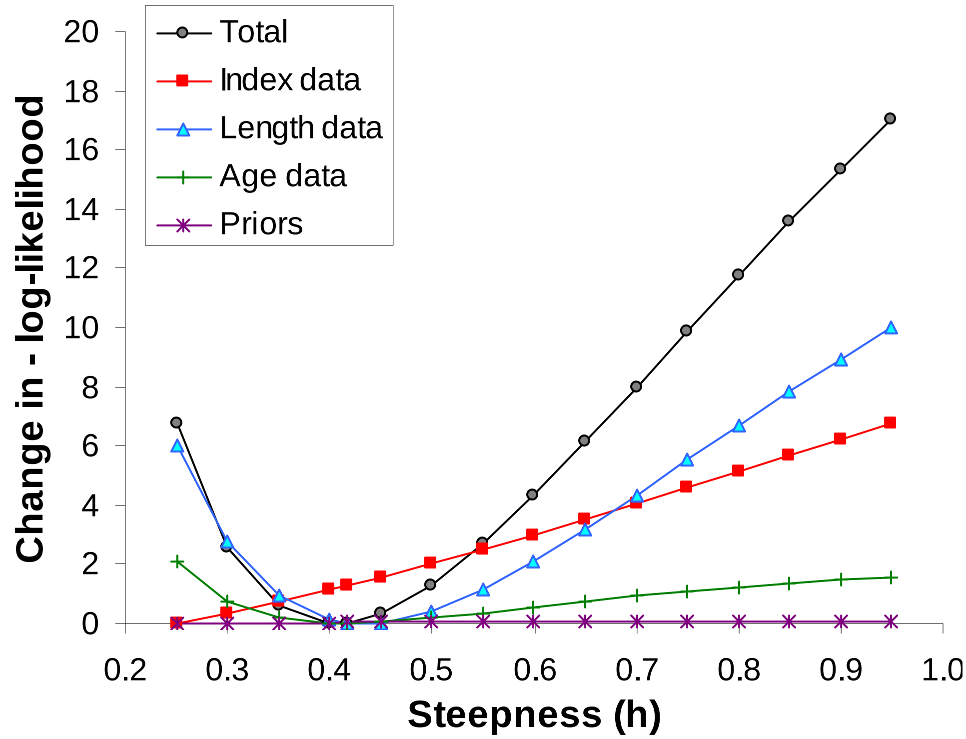

Figure 140. Results of a likelihood profile for steepness of the stock-recruit function, by data type.

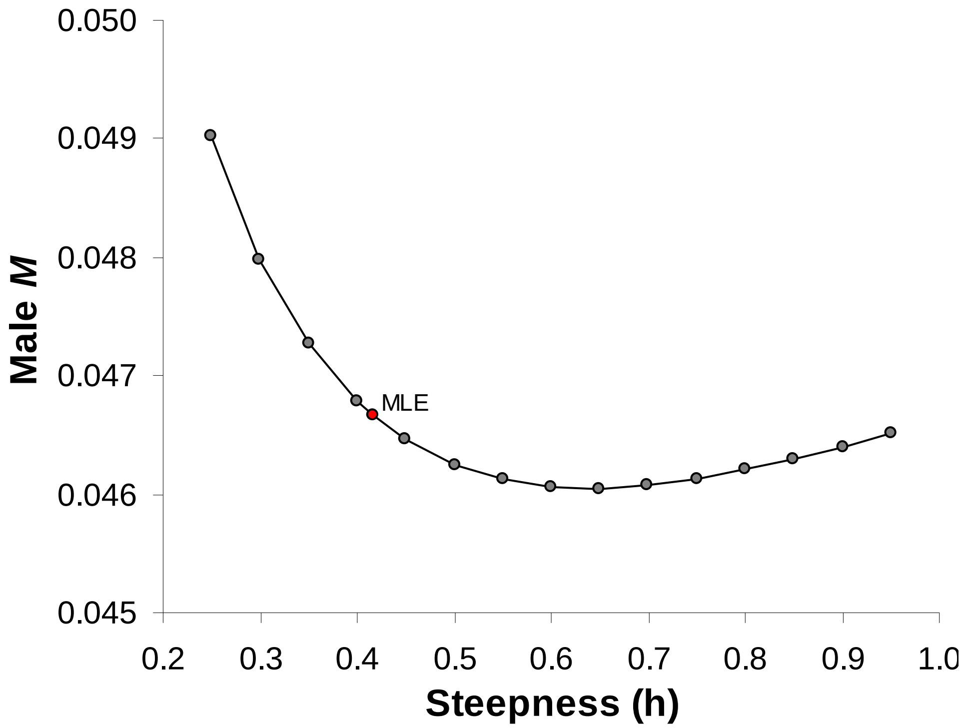

Figure 141. Relationship between steepness and estimated male natural mortality from the likelihood profile on steepness.

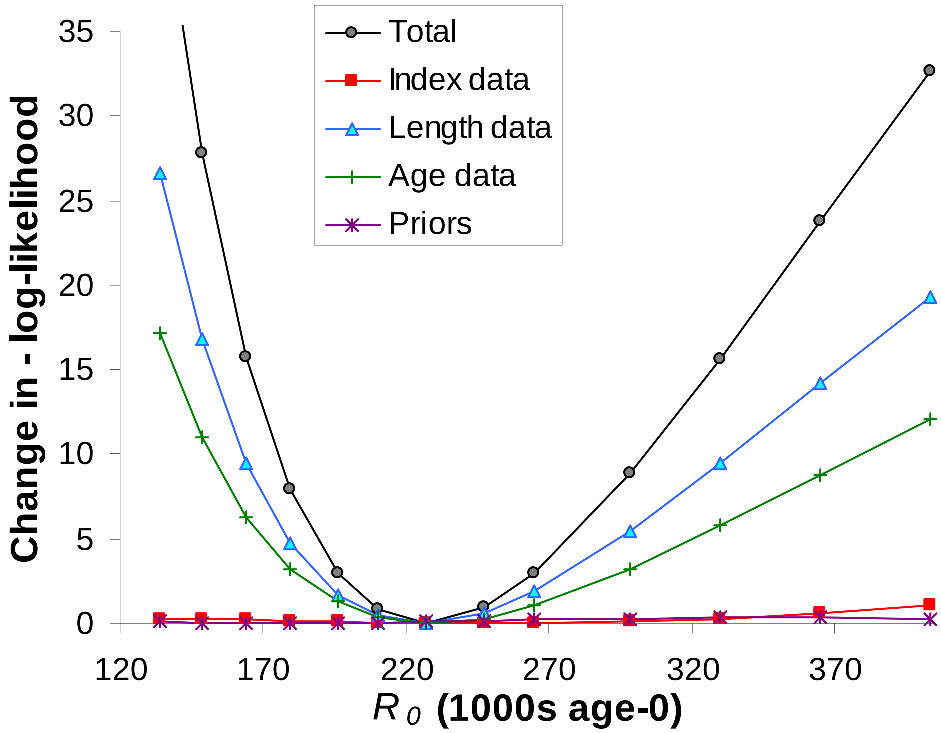

Figure 142. Results of a likelihood profile for unexploited equilibrium recruitment, by data type.

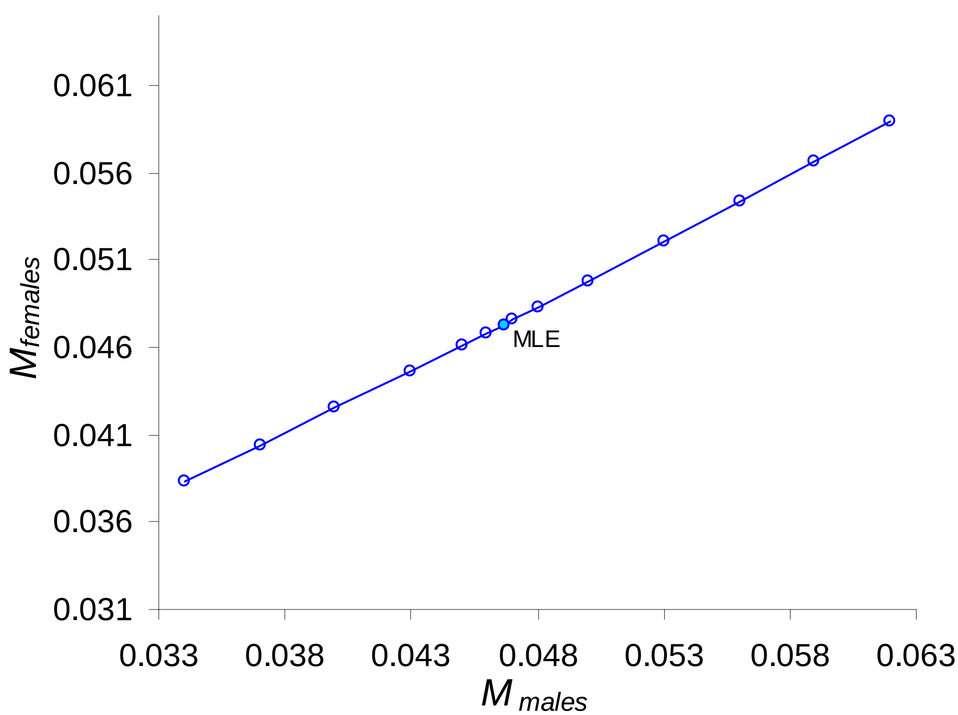

Figure 143. Relationship between estimated male and female natural mortality.

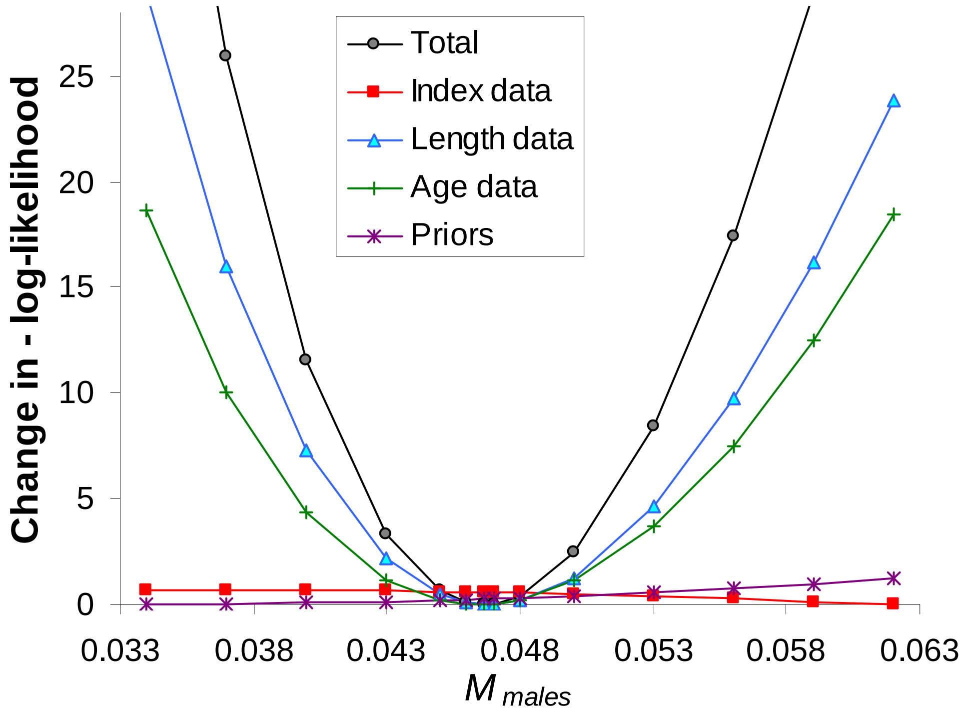

Figure 144. Results of a likelihood profile for male natural mortality (*M*), by data type.

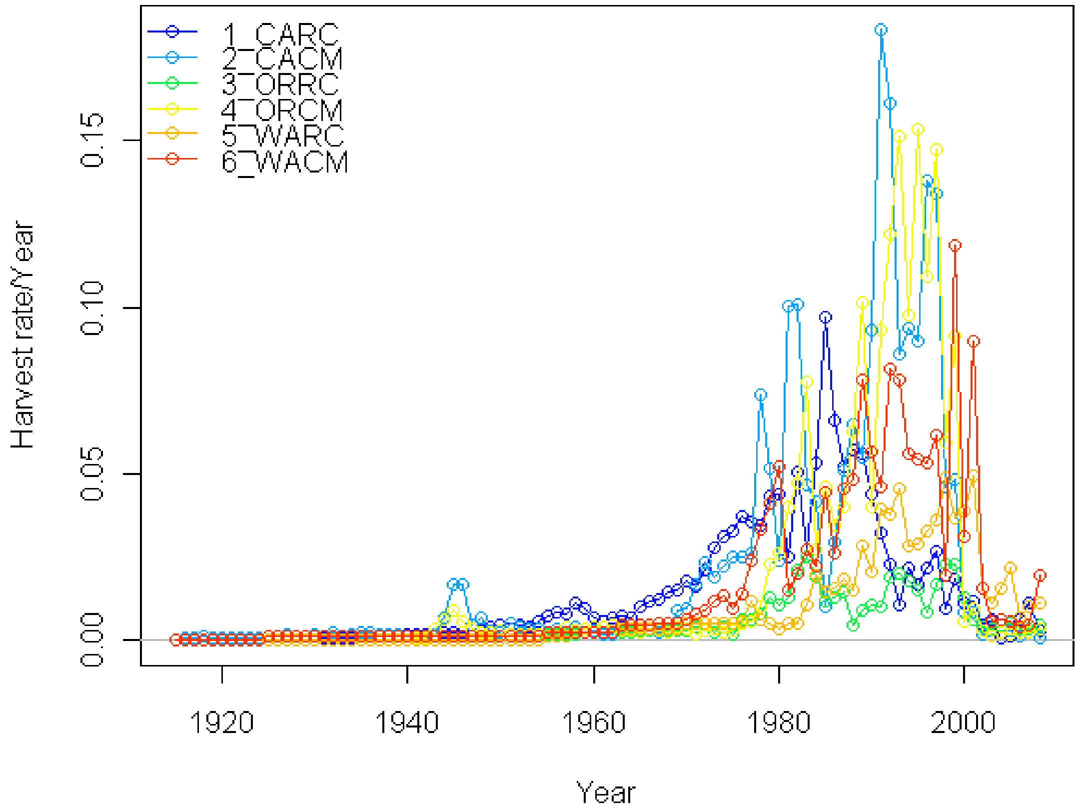

Figure 145. Time-series of harvest rate per year (*F*) for the fishing fleets in the base case model.

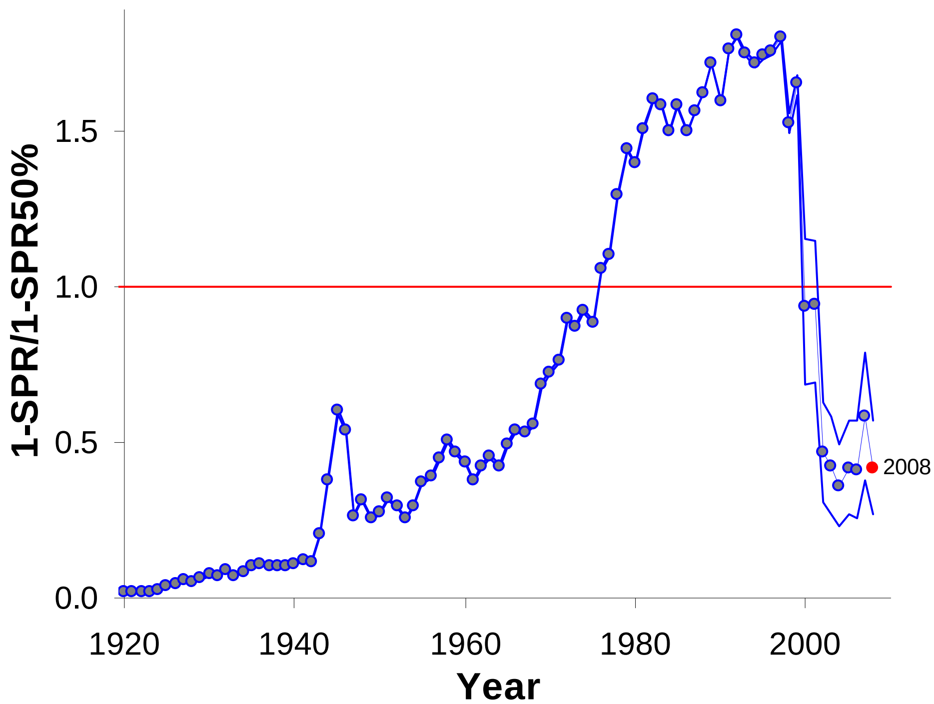

Figure 146. Time series of relative spawning potential ratio (1-SPR/1-$SPR_{Target=0.5}$) for the base case model (round points) and alternate states of nature (light lines). Values of relative SPR above 100% reflect harvests in excess of the current overfishing proxy.

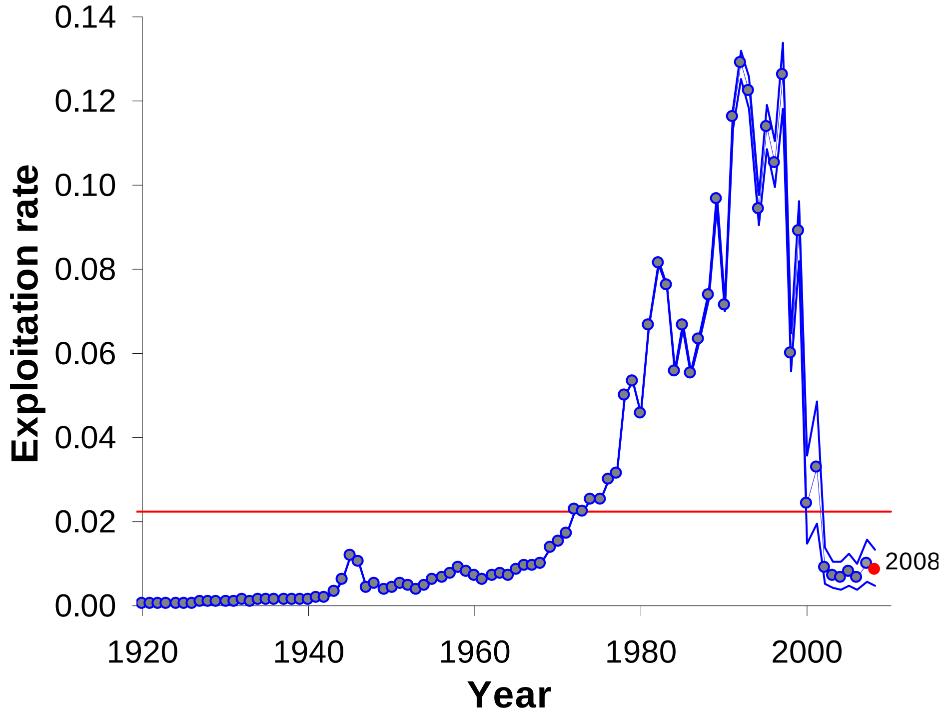

Figure 147. Time series of estimated exploitation rate (catch/age 8 and older biomass) for the base case model (round points) and alternate states of nature (light lines). Horizontal line indicates the overfishing limit/target ($F_{50\%}$) from the base case.

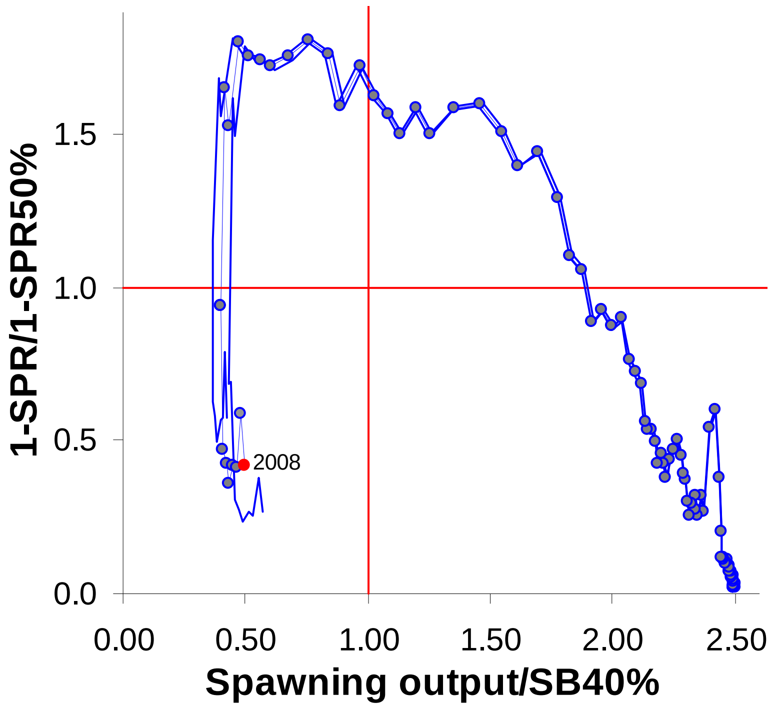

Figure 148. Estimated relative spawning potential ratio relative to the proxy target/limit of 50% vs. estimated spawning biomass relative to the proxy 40% level from the base case model. Higher biomass occurs on the right side of the x-axis, higher exploitation rates occur on the upper side of the y-axis.

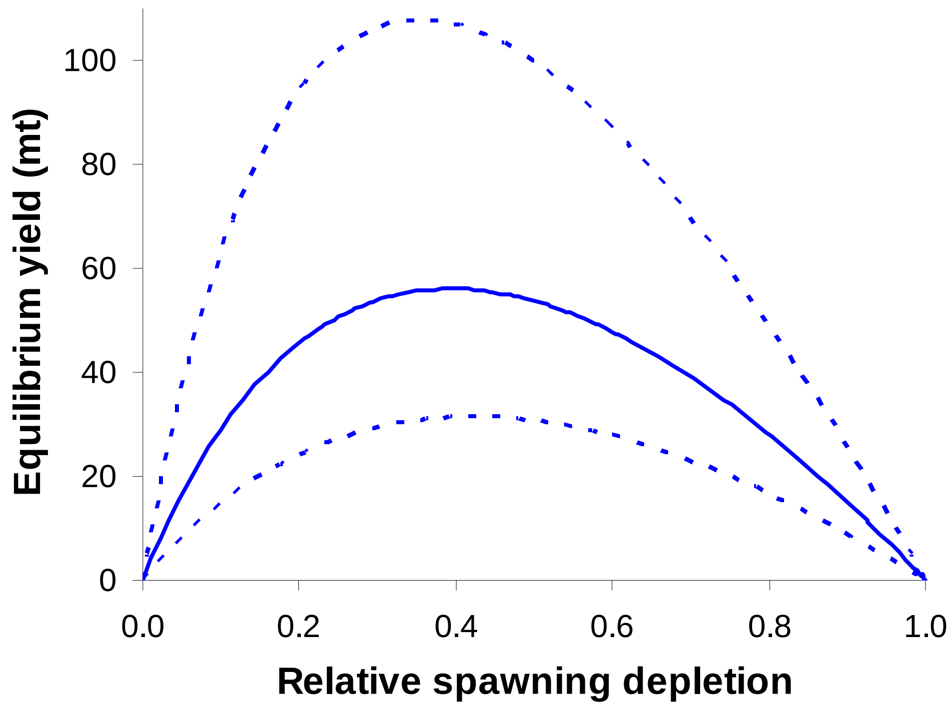

Figure 149. Equilibrium yield curve for the base case model (solid line) and alternate states of nature (dashed lines).

12. Appendix A: Predicted numbers at age by sex and area

Table A.1. Female numbers at age in California (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1916	52.2	49.8	47.5	45.3	43.2	41.2	39.3	37.5	35.7	34.1	265.1	165.2	102.9	64.1	40.0	24.9	15.5	9.7	16.0
1917	52.2	49.8	47.5	45.3	43.2	41.2	39.3	37.5	35.7	34.1	265.0	165.1	102.9	64.1	39.9	24.9	15.5	9.7	16.0
1918	52.1	49.7	47.5	45.3	43.2	41.2	39.3	37.4	35.7	34.1	264.9	164.9	102.8	64.0	39.9	24.9	15.5	9.6	16.0
1919	52.1	49.7	47.4	45.3	43.2	41.2	39.3	37.4	35.7	34.1	264.7	164.8	102.6	64.0	39.8	24.8	15.5	9.6	15.9
1920	52.1	49.7	47.4	45.3	43.2	41.2	39.3	37.4	35.7	34.1	264.6	164.7	102.6	63.9	39.8	24.8	15.5	9.6	15.9
1921	52.1	49.7	47.4	45.2	43.2	41.2	39.3	37.4	35.7	34.1	264.6	164.6	102.5	63.9	39.8	24.8	15.5	9.6	15.9
1922	52.1	49.7	47.4	45.2	43.2	41.2	39.3	37.4	35.7	34.1	264.5	164.5	102.5	63.8	39.8	24.8	15.4	9.6	15.9
1923	52.1	49.7	47.4	45.2	43.1	41.2	39.3	37.4	35.7	34.1	264.5	164.4	102.4	63.8	39.8	24.8	15.4	9.6	15.9
1924	52.1	49.7	47.4	45.2	43.1	41.2	39.3	37.4	35.7	34.1	264.5	164.4	102.3	63.8	39.7	24.8	15.4	9.6	15.9
1925	52.1	49.7	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.1	264.5	164.3	102.3	63.7	39.7	24.7	15.4	9.6	15.9
1926	52.1	49.7	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.0	264.4	164.1	102.2	63.6	39.7	24.7	15.4	9.6	15.9
1927	52.1	49.7	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.0	264.3	164.0	102.0	63.6	39.6	24.7	15.4	9.6	15.8
1928	52.1	49.7	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.0	264.1	163.8	101.9	63.5	39.5	24.6	15.3	9.6	15.8
1929	52.1	49.7	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.0	264.0	163.6	101.7	63.4	39.5	24.6	15.3	9.5	15.8
1930	52.0	49.7	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.0	263.8	163.4	101.6	63.3	39.4	24.6	15.3	9.5	15.8
1931	52.0	49.6	47.4	45.2	43.1	41.1	39.2	37.4	35.7	34.0	263.6	163.1	101.4	63.1	39.3	24.5	15.3	9.5	15.7
1932	52.0	49.6	47.3	45.2	43.1	41.1	39.2	37.4	35.6	34.0	263.4	162.9	101.2	63.0	39.2	24.5	15.2	9.5	15.7
1933	52.0	49.6	47.3	45.2	43.1	41.1	39.2	37.4	35.6	34.0	263.1	162.6	100.9	62.8	39.1	24.4	15.2	9.5	15.6
1934	52.0	49.6	47.3	45.1	43.1	41.1	39.2	37.4	35.6	34.0	263.0	162.4	100.7	62.7	39.1	24.3	15.2	9.4	15.6
1935	52.0	49.6	47.3	45.1	43.0	41.1	39.2	37.3	35.6	33.9	262.8	162.1	100.5	62.5	39.0	24.3	15.1	9.4	15.6
1936	51.9	49.6	47.3	45.1	43.0	41.0	39.1	37.3	35.6	33.9	262.5	161.8	100.2	62.3	38.8	24.2	15.1	9.4	15.5
1937	51.9	49.5	47.3	45.1	43.0	41.0	39.1	37.3	35.6	33.9	262.2	161.4	99.9	62.1	38.7	24.1	15.0	9.4	15.5
1938	51.9	49.5	47.2	45.1	43.0	41.0	39.1	37.3	35.5	33.9	261.9	161.0	99.6	61.9	38.6	24.0	15.0	9.3	15.4
1939	51.8	49.5	47.2	45.0	43.0	41.0	39.1	37.3	35.5	33.9	261.7	160.7	99.3	61.7	38.4	23.9	14.9	9.3	15.4
1940	51.8	49.5	47.2	45.0	42.9	41.0	39.1	37.3	35.5	33.8	261.5	160.4	99.1	61.5	38.3	23.9	14.9	9.3	15.3
1941	51.8	49.4	47.2	45.0	42.9	40.9	39.1	37.2	35.5	33.8	261.3	160.2	98.8	61.3	38.2	23.8	14.8	9.2	15.3
1942	51.8	49.4	47.1	45.0	42.9	40.9	39.0	37.2	35.5	33.8	261.2	159.9	98.6	61.2	38.1	23.7	14.8	9.2	15.2
1943	51.7	49.4	47.1	45.0	42.9	40.9	39.0	37.2	35.5	33.8	261.1	159.7	98.4	61.0	38.0	23.7	14.7	9.2	15.2
1944	51.7	49.4	47.1	44.9	42.9	40.9	39.0	37.2	35.4	33.8	260.8	159.5	98.1	60.8	37.8	23.6	14.7	9.1	15.1
1945	51.6	49.3	47.1	44.9	42.8	40.8	38.9	37.1	35.4	33.7	259.7	158.4	97.3	60.2	37.5	23.3	14.5	9.1	15.0
1946	51.4	49.2	47.0	44.9	42.8	40.8	38.9	37.0	35.2	33.5	257.0	155.8	95.5	59.1	36.8	22.9	14.3	8.9	14.7
1947	51.2	49.0	46.9	44.8	42.7	40.7	38.8	36.9	35.1	33.4	254.6	153.4	93.8	58.0	36.1	22.5	14.0	8.7	14.4
1948	51.1	48.8	46.7	44.7	42.7	40.7	38.8	36.9	35.2	33.4	254.5	152.9	93.4	57.7	35.8	22.3	13.9	8.7	14.3
1949	51.0	48.8	46.5	44.5	42.6	40.7	38.8	36.9	35.1	33.4	254.0	151.9	92.6	57.1	35.5	22.1	13.8	8.6	14.2
1950	51.0	48.7	46.5	44.4	42.5	40.6	38.8	36.9	35.2	33.4	254.0	151.4	92.1	56.8	35.2	21.9	13.7	8.5	14.1
1951	50.9	48.6	46.4	44.3	42.3	40.5	38.7	36.9	35.1	33.4	254.0	150.9	91.6	56.4	35.0	21.8	13.6	8.5	14.0
1952	50.8	48.6	46.4	44.2	42.2	40.3	38.5	36.8	35.1	33.4	253.4	150.0	90.8	55.9	34.6	21.6	13.4	8.4	13.8
1953	50.8	48.5	46.3	44.2	42.2	40.2	38.4	36.7	35.0	33.4	253.2	149.4	90.2	55.4	34.3	21.4	13.3	8.3	13.7
1954	50.7	48.4	46.2	44.1	42.1	40.2	38.3	36.5	34.9	33.3	253.2	148.9	89.7	55.0	34.1	21.2	13.2	8.2	13.6
1955	50.6	48.4	46.2	44.1	42.1	40.1	38.3	36.5	34.7	33.2	252.9	148.4	89.1	54.6	33.8	21.0	13.1	8.2	13.5
1956	50.5	48.3	46.1	44.0	42.0	40.1	38.2	36.4	34.7	33.0	252.4	147.8	88.5	54.1	33.5	20.8	13.0	8.1	13.3
1957	50.4	48.2	46.0	43.9	41.9	40.0	38.1	36.3	34.6	32.9	251.5	147.1	87.7	53.6	33.1	20.6	12.8	8.0	13.2

Table A.1. Continued. Female numbers at age in California (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1958	50.3	48.1	46.0	43.9	41.9	39.9	38.0	36.3	34.5	32.8	250.6	146.3	87.0	53.0	32.7	20.3	12.7	7.9	13.0
1959	50.2	48.0	45.9	43.8	41.8	39.8	38.0	36.1	34.4	32.7	249.1	145.2	85.9	52.3	32.2	20.0	12.5	7.8	12.8
1960	50.1	47.9	45.8	43.7	41.7	39.8	37.9	36.1	34.3	32.6	248.1	144.4	85.2	51.7	31.8	19.8	12.3	7.7	12.7
1961	50.0	47.8	45.6	43.6	41.6	39.7	37.9	36.1	34.3	32.6	247.7	144.2	84.7	51.3	31.5	19.6	12.2	7.6	12.5
1962	49.9	47.7	45.5	43.5	41.6	39.7	37.8	36.1	34.3	32.6	247.7	144.3	84.4	51.0	31.3	19.4	12.1	7.5	12.5
1963	49.8	47.6	45.4	43.4	41.5	39.6	37.8	36.0	34.3	32.6	247.4	144.2	84.1	50.6	31.1	19.3	12.0	7.5	12.3
1964	49.7	47.5	45.4	43.3	41.4	39.5	37.7	35.9	34.2	32.6	246.8	143.8	83.6	50.2	30.8	19.1	11.9	7.4	12.2
1965	49.6	47.4	45.3	43.2	41.3	39.4	37.6	35.9	34.2	32.5	246.5	143.7	83.3	49.9	30.5	18.9	11.7	7.3	12.1
1966	49.5	47.3	45.2	43.1	41.2	39.3	37.5	35.7	34.1	32.4	245.6	143.0	82.6	49.3	30.2	18.6	11.6	7.2	11.9
1967	49.3	47.2	45.1	43.0	41.1	39.2	37.4	35.6	33.9	32.3	244.5	142.1	82.0	48.8	29.8	18.4	11.4	7.1	11.8
1968	49.2	47.0	45.0	43.0	41.0	39.1	37.3	35.5	33.8	32.2	243.5	141.1	81.3	48.2	29.4	18.1	11.3	7.0	11.6
1969	49.0	46.9	44.8	42.8	40.9	39.0	37.2	35.4	33.7	32.0	242.1	139.9	80.5	47.6	28.9	17.8	11.1	6.9	11.4
1970	48.8	46.8	44.7	42.7	40.8	38.9	37.0	35.2	33.5	31.8	239.6	137.8	79.2	46.6	28.3	17.4	10.8	6.7	11.1
1971	48.6	46.6	44.6	42.6	40.6	38.7	36.9	35.1	33.3	31.6	236.7	135.3	77.7	45.5	27.5	16.9	10.5	6.5	10.8
1972	48.3	46.4	44.4	42.4	40.5	38.6	36.7	34.9	33.1	31.4	233.4	132.3	75.8	44.2	26.7	16.4	10.2	6.3	10.5
1973	47.9	46.1	44.1	42.2	40.3	38.4	36.5	34.7	32.9	31.1	228.5	127.8	73.1	42.4	25.6	15.7	9.7	6.0	10.0
1974	47.6	45.7	43.9	42.0	40.1	38.2	36.3	34.4	32.6	30.8	223.8	123.4	70.3	40.7	24.4	15.0	9.3	5.8	9.5
1975	47.1	45.4	43.5	41.7	39.9	38.0	36.1	34.2	32.3	30.5	218.7	118.5	67.2	38.7	23.2	14.2	8.8	5.5	9.0
1976	46.7	45.0	43.2	41.4	39.6	37.7	35.9	34.0	32.0	30.1	213.6	113.4	64.0	36.8	21.9	13.4	8.3	5.1	8.5
1977	46.2	44.6	42.8	41.0	39.2	37.5	35.6	33.7	31.8	29.8	208.5	108.2	60.6	34.7	20.6	12.6	7.8	4.8	8.0
1978	45.7	44.1	42.4	40.7	38.9	37.1	35.3	33.4	31.5	29.6	204.2	103.4	57.4	32.8	19.4	11.8	7.3	4.5	7.5
1979	44.8	43.6	41.9	40.2	38.5	36.7	34.8	32.9	30.9	28.9	194.6	94.5	51.8	29.5	17.4	10.6	6.5	4.0	6.7
1980	43.8	42.7	41.4	39.8	38.1	36.3	34.4	32.5	30.5	28.5	187.9	87.7	47.4	26.9	15.8	9.6	5.9	3.7	6.0
1981	43.0	41.8	40.6	39.3	37.7	36.0	34.2	32.3	30.3	28.4	185.5	83.9	44.7	25.4	14.8	8.9	5.5	3.4	5.6
1982	41.7	41.0	39.7	38.5	37.2	35.5	33.7	31.8	29.8	27.7	177.1	75.9	39.7	22.4	13.0	7.8	4.8	3.0	4.9
1983	40.2	39.8	38.9	37.6	36.3	34.9	33.1	31.1	29.0	26.9	166.6	67.0	34.2	19.2	11.1	6.7	4.1	2.5	4.2
1984	38.7	38.3	37.9	37.0	35.7	34.4	32.9	31.0	29.1	27.0	166.5	64.5	32.1	18.0	10.3	6.2	3.8	2.3	3.9
1985	37.8	36.9	36.4	35.9	35.0	33.6	32.2	30.7	28.7	26.7	164.0	61.0	29.6	16.4	9.4	5.6	3.4	2.1	3.5
1986	36.7	36.1	35.1	34.5	33.9	32.8	31.3	29.8	28.2	26.2	160.0	57.1	26.9	14.8	8.5	5.0	3.1	1.9	3.1
1987	35.8	35.0	34.3	33.2	32.6	31.9	30.7	29.2	27.6	25.9	157.9	54.5	24.8	13.6	7.7	4.6	2.8	1.7	2.8
1988	34.8	34.1	33.2	32.5	31.4	30.7	29.9	28.6	26.9	25.3	155.4	51.8	22.7	12.3	7.0	4.1	2.5	1.5	2.5
1989	33.6	33.2	32.4	31.5	30.7	29.5	28.6	27.7	26.3	24.6	150.9	48.5	20.4	10.9	6.2	3.6	2.2	1.4	2.2
1990	31.9	32.0	31.5	30.7	29.7	28.9	27.6	26.6	25.5	24.0	147.7	46.3	18.7	9.8	5.5	3.2	2.0	1.2	2.0
1991	30.8	30.4	30.4	29.9	29.0	28.0	26.9	25.6	24.4	23.2	142.4	43.2	16.6	8.6	4.8	2.8	1.7	1.0	1.7
1992	28.9	29.4	28.8	28.8	28.1	27.1	25.9	24.6	23.0	21.7	130.3	37.1	13.5	6.8	3.8	2.2	1.3	0.8	1.3
1993	26.8	27.6	27.9	27.3	27.1	26.3	25.2	23.8	22.4	20.7	122.6	33.3	11.4	5.7	3.2	1.8	1.1	0.7	1.1
1994	24.8	25.5	26.2	26.5	25.9	25.6	24.8	23.6	22.1	20.7	122.7	32.9	10.8	5.2	2.9	1.7	1.0	0.6	1.0
1995	23.6	23.7	24.3	24.9	25.1	24.4	24.0	23.1	21.8	20.3	121.3	32.1	10.0	4.7	2.6	1.5	0.9	0.5	0.9
1996	22.1	22.5	22.5	23.1	23.6	23.7	22.9	22.5	21.4	20.1	120.4	31.7	9.4	4.3	2.3	1.3	0.8	0.5	0.8
1997	20.9	21.1	21.4	21.4	21.8	22.2	22.1	21.2	20.5	19.4	115.3	29.7	8.3	3.7	2.0	1.1	0.7	0.4	0.7
1998	19.4	19.9	20.0	20.3	20.2	20.4	20.7	20.4	19.4	18.6	110.4	27.9	7.4	3.1	1.7	0.9	0.6	0.3	0.6
1999	19.0	18.5	19.0	19.1	19.3	19.1	19.3	19.5	19.2	18.2	113.5	29.2	7.5	3.0	1.6	0.9	0.5	0.3	0.5

Table A.1. Continued. Female numbers at age in California (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
2000	18.2	18.2	17.6	18.0	18.1	18.3	18.1	18.2	18.3	17.9	114.7	30.4	7.5	2.9	1.5	0.9	0.5	0.3	0.5
2001	18.5	17.4	17.3	16.8	17.2	17.2	17.4	17.1	17.3	17.3	118.9	33.0	8.0	2.9	1.5	0.8	0.5	0.3	0.5
2002	18.6	17.6	16.6	16.5	16.0	16.3	16.4	16.5	16.3	16.3	121.8	35.9	8.5	3.0	1.5	0.8	0.5	0.3	0.5
2003	19.1	17.8	16.8	15.8	15.7	15.2	15.6	15.6	15.7	15.5	124.2	39.3	9.1	3.1	1.5	0.8	0.5	0.3	0.5
2004	19.6	18.2	16.9	16.0	15.1	15.0	14.5	14.8	14.8	14.9	125.1	42.9	9.9	3.2	1.5	0.8	0.5	0.3	0.5
2005	20.2	18.7	17.4	16.1	15.3	14.4	14.3	13.8	14.1	14.1	125.3	46.9	10.9	3.3	1.5	0.8	0.5	0.3	0.5
2006	20.6	19.2	17.9	16.6	15.4	14.6	13.7	13.6	13.2	13.4	124.0	51.0	11.9	3.4	1.6	0.8	0.5	0.3	0.5
2007	21.1	19.7	18.3	17.0	15.8	14.7	13.9	13.0	12.9	12.5	121.3	55.1	13.0	3.6	1.6	0.9	0.5	0.3	0.5
2008	21.5	20.2	18.8	17.5	16.2	15.0	13.9	13.2	12.4	12.3	116.7	58.7	14.2	3.8	1.6	0.8	0.5	0.3	0.5
2009	21.9	20.5	19.2	17.9	16.7	15.5	14.3	13.3	12.6	11.8	112.9	62.7	15.7	4.0	1.6	0.9	0.5	0.3	0.4
2009	18.2	18.2	17.6	18.0	18.1	18.3	18.1	18.2	18.3	17.9	114.7	30.4	7.5	2.9	1.5	0.9	0.5	0.3	0.5

Table A.2. Male numbers at age in California (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1916	52.2	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.3	267.5	167.8	105.2	66.0	41.4	25.9	16.3	10.2	17.2
1917	52.2	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.3	267.4	167.7	105.1	65.9	41.3	25.9	16.3	10.2	17.1
1918	52.1	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.3	267.3	167.5	105.0	65.9	41.3	25.9	16.2	10.2	17.1
1919	52.1	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	267.1	167.3	104.9	65.8	41.3	25.9	16.2	10.2	17.1
1920	52.1	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	267.0	167.2	104.9	65.8	41.2	25.9	16.2	10.2	17.1
1921	52.1	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	267.0	167.2	104.8	65.7	41.2	25.8	16.2	10.2	17.1
1922	52.1	49.8	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	266.9	167.1	104.7	65.7	41.2	25.8	16.2	10.2	17.1
1923	52.1	49.7	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	266.9	167.0	104.7	65.6	41.2	25.8	16.2	10.1	17.1
1924	52.1	49.7	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	266.9	166.9	104.6	65.6	41.1	25.8	16.2	10.1	17.1
1925	52.1	49.7	47.5	45.3	43.3	41.3	39.4	37.6	35.9	34.2	266.8	166.8	104.5	65.5	41.1	25.8	16.2	10.1	17.0
1926	52.1	49.7	47.5	45.3	43.2	41.3	39.4	37.6	35.9	34.2	266.7	166.7	104.4	65.5	41.1	25.7	16.1	10.1	17.0
1927	52.1	49.7	47.5	45.3	43.2	41.3	39.4	37.6	35.9	34.2	266.6	166.5	104.3	65.4	41.0	25.7	16.1	10.1	17.0
1928	52.1	49.7	47.5	45.3	43.2	41.3	39.4	37.6	35.9	34.2	266.4	166.3	104.1	65.3	40.9	25.7	16.1	10.1	17.0
1929	52.1	49.7	47.4	45.3	43.2	41.3	39.4	37.6	35.9	34.2	266.3	166.1	104.0	65.2	40.9	25.6	16.1	10.1	16.9
1930	52.0	49.7	47.4	45.3	43.2	41.3	39.4	37.6	35.8	34.2	266.1	165.9	103.8	65.1	40.8	25.6	16.0	10.1	16.9
1931	52.0	49.7	47.4	45.3	43.2	41.2	39.4	37.6	35.8	34.2	265.9	165.6	103.6	64.9	40.7	25.5	16.0	10.0	16.9
1932	52.0	49.7	47.4	45.3	43.2	41.2	39.3	37.5	35.8	34.2	265.7	165.4	103.4	64.8	40.6	25.5	16.0	10.0	16.8
1933	52.0	49.6	47.4	45.2	43.2	41.2	39.3	37.5	35.8	34.2	265.4	165.0	103.1	64.6	40.5	25.4	15.9	10.0	16.8
1934	52.0	49.6	47.4	45.2	43.2	41.2	39.3	37.5	35.8	34.1	265.2	164.8	102.9	64.5	40.4	25.4	15.9	10.0	16.8
1935	52.0	49.6	47.4	45.2	43.2	41.2	39.3	37.5	35.8	34.1	265.0	164.5	102.7	64.3	40.3	25.3	15.9	9.9	16.7
1936	51.9	49.6	47.3	45.2	43.1	41.2	39.3	37.5	35.8	34.1	264.7	164.1	102.4	64.1	40.2	25.2	15.8	9.9	16.7
1937	51.9	49.6	47.3	45.2	43.1	41.2	39.3	37.5	35.7	34.1	264.3	163.7	102.0	63.9	40.1	25.1	15.7	9.9	16.6
1938	51.9	49.5	47.3	45.2	43.1	41.1	39.3	37.4	35.7	34.1	264.1	163.4	101.7	63.7	39.9	25.0	15.7	9.8	16.6
1939	51.8	49.5	47.3	45.1	43.1	41.1	39.2	37.4	35.7	34.0	263.8	163.1	101.4	63.5	39.8	25.0	15.6	9.8	16.5
1940	51.8	49.5	47.2	45.1	43.1	41.1	39.2	37.4	35.7	34.0	263.6	162.8	101.2	63.3	39.7	24.9	15.6	9.8	16.4
1941	51.8	49.5	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.0	263.5	162.5	100.9	63.1	39.5	24.8	15.5	9.7	16.4
1942	51.8	49.4	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.0	263.3	162.2	100.6	62.9	39.4	24.7	15.5	9.7	16.3
1943	51.7	49.4	47.2	45.0	43.0	41.0	39.2	37.4	35.6	34.0	263.2	162.0	100.4	62.7	39.3	24.6	15.5	9.7	16.3
1944	51.7	49.4	47.2	45.0	43.0	41.0	39.1	37.3	35.6	34.0	262.9	161.7	100.1	62.5	39.2	24.6	15.4	9.7	16.2
1945	51.6	49.3	47.1	45.0	42.9	41.0	39.1	37.3	35.5	33.9	261.7	160.6	99.3	61.9	38.8	24.3	15.3	9.6	16.1
1946	51.4	49.2	47.1	44.9	42.9	40.9	39.0	37.2	35.4	33.7	258.9	157.9	97.5	60.8	38.1	23.9	15.0	9.4	15.8
1947	51.2	49.0	47.0	44.9	42.8	40.8	38.9	37.1	35.3	33.5	256.2	155.4	95.8	59.6	37.3	23.4	14.7	9.2	15.5
1948	51.1	48.8	46.8	44.8	42.8	40.9	38.9	37.1	35.3	33.6	256.2	154.8	95.3	59.3	37.1	23.2	14.6	9.1	15.4
1949	51.0	48.8	46.6	44.6	42.7	40.8	38.9	37.1	35.3	33.6	255.5	153.8	94.5	58.7	36.7	23.0	14.4	9.1	15.2
1950	51.0	48.7	46.5	44.5	42.6	40.7	38.9	37.1	35.3	33.6	255.6	153.3	94.0	58.3	36.5	22.9	14.3	9.0	15.1
1951	50.9	48.6	46.5	44.4	42.4	40.6	38.8	37.1	35.3	33.6	255.5	152.7	93.4	58.0	36.2	22.7	14.2	8.9	15.0
1952	50.8	48.6	46.4	44.3	42.3	40.4	38.7	37.0	35.3	33.6	255.0	151.8	92.6	57.4	35.8	22.5	14.1	8.8	14.9
1953	50.8	48.5	46.4	44.3	42.3	40.4	38.5	36.8	35.2	33.5	254.8	151.1	92.0	56.9	35.5	22.3	14.0	8.8	14.7
1954	50.7	48.4	46.3	44.2	42.2	40.3	38.5	36.7	35.0	33.5	254.8	150.6	91.4	56.5	35.3	22.1	13.8	8.7	14.6
1955	50.6	48.4	46.2	44.1	42.2	40.2	38.4	36.6	34.9	33.3	254.5	150.0	90.8	56.0	34.9	21.9	13.7	8.6	14.5
1956	50.5	48.3	46.2	44.1	42.1	40.2	38.3	36.5	34.8	33.2	254.0	149.4	90.2	55.6	34.6	21.7	13.6	8.5	14.3
1957	50.4	48.2	46.1	44.0	42.0	40.1	38.3	36.5	34.7	33.1	253.1	148.6	89.4	55.0	34.2	21.4	13.4	8.4	14.2

Table A.2. Continued. Male numbers at age in California (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1958	50.3	48.1	46.0	44.0	42.0	40.0	38.2	36.4	34.7	33.0	252.2	147.8	88.6	54.4	33.8	21.2	13.3	8.3	14.0
1959	50.2	48.0	45.9	43.9	41.9	40.0	38.1	36.3	34.6	32.9	250.6	146.6	87.5	53.6	33.3	20.8	13.1	8.2	13.8
1960	50.1	47.9	45.8	43.8	41.8	39.9	38.0	36.2	34.5	32.8	249.5	145.9	86.7	53.0	32.9	20.6	12.9	8.1	13.6
1961	50.0	47.8	45.7	43.7	41.8	39.9	38.0	36.2	34.4	32.8	249.1	145.6	86.1	52.6	32.6	20.4	12.8	8.0	13.5
1962	49.9	47.7	45.6	43.6	41.7	39.8	38.0	36.2	34.5	32.8	249.1	145.7	85.8	52.3	32.4	20.2	12.7	7.9	13.4
1963	49.8	47.6	45.5	43.5	41.6	39.7	37.9	36.2	34.4	32.8	248.9	145.6	85.5	51.9	32.1	20.1	12.6	7.9	13.2
1964	49.7	47.5	45.4	43.4	41.5	39.6	37.8	36.1	34.4	32.7	248.3	145.2	84.9	51.5	31.8	19.8	12.4	7.8	13.1
1965	49.6	47.4	45.3	43.3	41.4	39.5	37.7	36.0	34.3	32.7	248.0	145.1	84.6	51.1	31.5	19.7	12.3	7.7	13.0
1966	49.5	47.3	45.2	43.2	41.3	39.4	37.6	35.9	34.2	32.6	247.0	144.4	84.0	50.6	31.2	19.4	12.2	7.6	12.8
1967	49.3	47.2	45.1	43.1	41.2	39.3	37.5	35.7	34.1	32.4	245.9	143.4	83.3	50.0	30.7	19.1	12.0	7.5	12.6
1968	49.2	47.1	45.0	43.0	41.1	39.2	37.4	35.6	33.9	32.3	244.8	142.5	82.6	49.4	30.3	18.9	11.8	7.4	12.4
1969	49.0	46.9	44.9	42.9	41.0	39.1	37.3	35.5	33.8	32.1	243.3	141.2	81.8	48.7	29.9	18.5	11.6	7.3	12.2
1970	48.8	46.8	44.8	42.8	40.9	39.0	37.1	35.4	33.6	31.9	240.7	139.1	80.4	47.7	29.2	18.1	11.3	7.1	11.9
1971	48.6	46.6	44.6	42.7	40.7	38.9	37.0	35.2	33.4	31.7	237.7	136.5	78.9	46.6	28.4	17.6	11.0	6.9	11.6
1972	48.3	46.4	44.4	42.5	40.6	38.7	36.9	35.0	33.2	31.5	234.2	133.3	76.9	45.2	27.5	17.1	10.7	6.7	11.2
1973	47.9	46.1	44.2	42.3	40.4	38.5	36.6	34.8	33.0	31.1	229.0	128.8	74.1	43.4	26.4	16.3	10.2	6.4	10.7
1974	47.6	45.8	43.9	42.1	40.2	38.3	36.4	34.5	32.7	30.8	224.0	124.2	71.3	41.6	25.2	15.6	9.7	6.1	10.2
1975	47.1	45.4	43.6	41.8	39.9	38.1	36.2	34.3	32.4	30.5	218.6	119.1	68.1	39.6	23.9	14.7	9.2	5.8	9.7
1976	46.7	45.0	43.2	41.5	39.7	37.8	35.9	34.0	32.1	30.2	213.1	113.8	64.8	37.5	22.6	13.9	8.7	5.4	9.1
1977	46.2	44.6	42.8	41.1	39.3	37.5	35.7	33.7	31.8	29.8	207.7	108.4	61.3	35.4	21.2	13.1	8.1	5.1	8.5
1978	45.7	44.1	42.5	40.7	39.0	37.2	35.4	33.5	31.5	29.6	203.2	103.5	58.1	33.5	20.0	12.3	7.6	4.8	8.0
1979	44.8	43.6	42.0	40.3	38.6	36.8	34.9	32.9	30.9	28.9	193.0	94.3	52.3	30.1	17.9	11.0	6.8	4.3	7.2
1980	43.8	42.7	41.5	39.8	38.2	36.3	34.5	32.5	30.5	28.4	185.9	87.2	47.9	27.5	16.2	9.9	6.2	3.9	6.5
1981	43.0	41.8	40.7	39.4	37.8	36.1	34.2	32.3	30.3	28.3	183.4	83.3	45.1	25.8	15.2	9.3	5.7	3.6	6.0
1982	41.7	41.0	39.7	38.6	37.3	35.6	33.7	31.8	29.7	27.6	174.5	75.1	39.9	22.8	13.4	8.1	5.0	3.1	5.3
1983	40.2	39.8	39.0	37.7	36.4	34.9	33.1	31.1	28.9	26.7	163.5	66.0	34.3	19.5	11.4	6.9	4.3	2.7	4.5
1984	38.7	38.3	37.9	37.0	35.7	34.4	32.9	31.0	29.0	26.8	163.4	63.3	32.2	18.3	10.6	6.4	4.0	2.5	4.1
1985	37.8	37.0	36.5	36.0	35.0	33.7	32.3	30.7	28.7	26.6	160.8	59.6	29.6	16.7	9.7	5.8	3.6	2.2	3.8
1986	36.7	36.1	35.1	34.5	33.9	32.9	31.3	29.8	28.1	26.0	156.8	55.7	26.9	15.1	8.7	5.2	3.2	2.0	3.4
1987	35.8	35.0	34.3	33.3	32.6	31.9	30.7	29.1	27.5	25.7	154.7	53.0	24.7	13.7	7.9	4.7	2.9	1.8	3.0
1988	34.8	34.2	33.3	32.5	31.5	30.7	29.9	28.6	26.9	25.2	152.2	50.2	22.6	12.5	7.1	4.3	2.6	1.6	2.7
1989	33.6	33.2	32.5	31.5	30.7	29.6	28.7	27.7	26.2	24.4	147.6	46.9	20.3	11.0	6.3	3.8	2.3	1.4	2.4
1990	31.9	32.0	31.5	30.8	29.8	28.9	27.6	26.6	25.4	23.9	144.4	44.5	18.4	9.9	5.7	3.3	2.0	1.3	2.1
1991	30.8	30.4	30.4	29.9	29.1	28.0	26.9	25.5	24.3	23.0	138.9	41.4	16.3	8.7	4.9	2.9	1.8	1.1	1.8
1992	28.9	29.4	28.9	28.8	28.1	27.1	25.8	24.5	22.9	21.4	126.3	35.4	13.2	6.9	3.9	2.3	1.4	0.9	1.4
1993	26.8	27.6	28.0	27.4	27.2	26.3	25.2	23.7	22.2	20.4	118.4	31.6	11.2	5.7	3.2	1.9	1.1	0.7	1.2
1994	24.8	25.5	26.3	26.6	25.9	25.7	24.8	23.5	22.0	20.5	118.7	31.2	10.5	5.2	2.9	1.7	1.0	0.6	1.1
1995	23.6	23.7	24.3	24.9	25.2	24.5	24.1	23.1	21.7	20.1	117.3	30.3	9.6	4.7	2.6	1.5	0.9	0.6	0.9
1996	22.1	22.5	22.6	23.1	23.6	23.8	23.0	22.4	21.3	19.9	116.6	29.9	9.0	4.2	2.4	1.4	0.8	0.5	0.8
1997	20.9	21.1	21.4	21.4	21.8	22.2	22.1	21.2	20.5	19.2	111.5	27.9	8.0	3.6	2.0	1.2	0.7	0.4	0.7
1998	19.4	19.9	20.0	20.3	20.2	20.5	20.7	20.4	19.3	18.4	106.7	26.1	7.1	3.1	1.7	1.0	0.6	0.4	0.6
1999	19.0	18.5	19.0	19.1	19.3	19.2	19.4	19.5	19.2	18.0	110.0	27.4	7.1	3.0	1.6	0.9	0.6	0.3	0.6

Table A.2. Continued. Male numbers at age in California (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
2000	18.2	18.2	17.6	18.1	18.1	18.3	18.1	18.2	18.2	17.8	111.5	28.4	7.1	2.9	1.5	0.9	0.5	0.3	0.5
2001	18.5	17.4	17.3	16.8	17.2	17.3	17.4	17.2	17.3	17.3	116.2	31.0	7.5	2.9	1.5	0.9	0.5	0.3	0.5
2002	18.6	17.6	16.6	16.5	16.0	16.4	16.4	16.5	16.3	16.3	119.5	33.7	8.0	2.9	1.5	0.9	0.5	0.3	0.5
2003	19.1	17.8	16.8	15.8	15.8	15.3	15.6	15.6	15.7	15.5	122.5	37.0	8.6	3.0	1.5	0.9	0.5	0.3	0.5
2004	19.6	18.2	16.9	16.1	15.1	15.0	14.5	14.9	14.9	15.0	123.9	40.6	9.3	3.1	1.5	0.9	0.5	0.3	0.5
2005	20.2	18.7	17.4	16.2	15.3	14.4	14.3	13.9	14.2	14.2	124.5	44.6	10.2	3.2	1.5	0.9	0.5	0.3	0.5
2006	20.6	19.2	17.9	16.6	15.4	14.6	13.7	13.7	13.2	13.5	123.6	48.7	11.2	3.3	1.6	0.9	0.5	0.3	0.5
2007	21.1	19.7	18.4	17.1	15.8	14.7	13.9	13.1	13.0	12.6	121.2	52.9	12.3	3.5	1.6	0.9	0.5	0.3	0.5
2008	21.5	20.2	18.8	17.5	16.3	15.1	14.0	13.2	12.4	12.3	116.8	56.6	13.3	3.6	1.6	0.9	0.5	0.3	0.5
2009	21.9	20.6	19.2	17.9	16.7	15.5	14.4	13.3	12.6	11.8	113.2	60.9	14.7	3.8	1.6	0.9	0.5	0.3	0.5
2009	18.2	18.2	17.6	18.1	18.1	18.3	18.1	18.2	18.2	17.8	111.5	28.4	7.1	2.9	1.5	0.9	0.5	0.3	0.5

Table A.3. Female numbers at age in Oregon (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1916	47.2	45.0	43.0	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1917	47.2	45.0	43.0	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1918	47.2	45.0	43.0	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1919	47.2	45.0	43.0	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1920	47.2	45.0	43.0	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1921	47.2	45.0	42.9	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1922	47.2	45.0	42.9	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1923	47.2	45.0	42.9	41.0	39.1	37.3	35.6	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1924	47.2	45.0	42.9	41.0	39.1	37.3	35.5	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1925	47.2	45.0	42.9	40.9	39.1	37.3	35.5	33.9	32.3	30.9	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1926	47.2	45.0	42.9	40.9	39.1	37.3	35.5	33.9	32.3	30.8	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1927	47.2	45.0	42.9	40.9	39.1	37.3	35.5	33.9	32.3	30.8	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1928	47.1	45.0	42.9	40.9	39.1	37.2	35.5	33.9	32.3	30.8	240.0	149.6	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1929	47.1	45.0	42.9	40.9	39.0	37.2	35.5	33.9	32.3	30.8	240.0	149.5	93.2	58.1	36.2	22.5	14.0	8.8	14.5
1930	47.1	45.0	42.9	40.9	39.0	37.2	35.5	33.9	32.3	30.8	240.0	149.5	93.2	58.1	36.2	22.5	14.0	8.7	14.5
1931	47.1	44.9	42.9	40.9	39.0	37.2	35.5	33.9	32.3	30.8	240.0	149.5	93.2	58.1	36.2	22.5	14.0	8.7	14.5
1932	47.1	44.9	42.9	40.9	39.0	37.2	35.5	33.9	32.3	30.8	239.9	149.5	93.2	58.0	36.2	22.5	14.0	8.7	14.5
1933	47.1	44.9	42.9	40.9	39.0	37.2	35.5	33.9	32.3	30.8	239.9	149.5	93.2	58.0	36.2	22.5	14.0	8.7	14.5
1934	47.1	44.9	42.8	40.9	39.0	37.2	35.5	33.9	32.3	30.8	239.9	149.5	93.2	58.0	36.2	22.5	14.0	8.7	14.5
1935	47.0	44.9	42.8	40.9	39.0	37.2	35.5	33.9	32.3	30.8	239.9	149.5	93.2	58.0	36.2	22.5	14.0	8.7	14.5
1936	47.0	44.9	42.8	40.8	39.0	37.2	35.5	33.8	32.3	30.8	239.8	149.5	93.2	58.0	36.2	22.5	14.0	8.7	14.5
1937	47.0	44.8	42.8	40.8	39.0	37.2	35.5	33.8	32.3	30.8	239.8	149.5	93.2	58.0	36.2	22.5	14.0	8.7	14.5
1938	47.0	44.8	42.8	40.8	38.9	37.2	35.5	33.8	32.3	30.8	239.8	149.5	93.1	58.0	36.2	22.5	14.0	8.7	14.5
1939	46.9	44.8	42.7	40.8	38.9	37.1	35.4	33.8	32.3	30.8	239.7	149.5	93.1	58.0	36.2	22.5	14.0	8.7	14.5
1940	46.9	44.8	42.7	40.8	38.9	37.1	35.4	33.8	32.3	30.8	239.7	149.5	93.1	58.0	36.2	22.5	14.0	8.7	14.5
1941	46.9	44.8	42.7	40.7	38.9	37.1	35.4	33.8	32.2	30.8	239.6	149.4	93.1	58.0	36.1	22.5	14.0	8.7	14.5
1942	46.9	44.7	42.7	40.7	38.9	37.1	35.4	33.8	32.2	30.7	239.5	149.3	93.0	58.0	36.1	22.5	14.0	8.7	14.4
1943	46.8	44.7	42.7	40.7	38.8	37.1	35.4	33.8	32.2	30.7	239.3	149.2	93.0	57.9	36.1	22.5	14.0	8.7	14.4
1944	46.8	44.7	42.6	40.7	38.8	37.0	35.3	33.7	32.2	30.7	238.8	148.7	92.6	57.7	36.0	22.4	14.0	8.7	14.4
1945	46.7	44.6	42.6	40.7	38.8	37.0	35.3	33.7	32.1	30.7	238.1	147.9	92.1	57.4	35.7	22.3	13.9	8.6	14.3
1946	46.5	44.5	42.6	40.6	38.8	37.0	35.3	33.7	32.1	30.6	237.1	146.8	91.3	56.8	35.4	22.1	13.7	8.6	14.2
1947	46.3	44.4	42.5	40.6	38.8	37.0	35.3	33.6	32.1	30.6	236.5	146.1	90.8	56.5	35.2	21.9	13.7	8.5	14.1
1948	46.3	44.2	42.3	40.5	38.7	37.0	35.3	33.6	32.1	30.6	236.4	145.7	90.5	56.3	35.1	21.9	13.6	8.5	14.0
1949	46.2	44.1	42.2	40.3	38.6	36.9	35.2	33.6	32.1	30.6	236.4	145.5	90.3	56.2	35.0	21.8	13.6	8.5	14.0
1950	46.1	44.1	42.1	40.2	38.5	36.9	35.2	33.6	32.1	30.6	236.4	145.3	90.1	56.0	34.9	21.7	13.5	8.4	14.0
1951	46.1	44.0	42.0	40.1	38.3	36.7	35.1	33.6	32.0	30.6	236.3	145.0	89.8	55.9	34.8	21.7	13.5	8.4	13.9
1952	46.0	44.0	42.0	40.1	38.3	36.6	35.0	33.5	32.0	30.5	236.4	144.9	89.7	55.8	34.7	21.6	13.5	8.4	13.9
1953	46.0	43.9	41.9	40.0	38.2	36.5	34.9	33.4	32.0	30.5	236.4	144.9	89.5	55.7	34.7	21.6	13.5	8.4	13.9
1954	45.9	43.8	41.9	40.0	38.2	36.5	34.8	33.3	31.8	30.5	236.5	144.9	89.4	55.6	34.6	21.6	13.4	8.4	13.8
1955	45.8	43.8	41.8	39.9	38.1	36.4	34.8	33.2	31.7	30.3	236.5	144.9	89.3	55.5	34.5	21.5	13.4	8.4	13.8
1956	45.8	43.7	41.8	39.9	38.1	36.4	34.7	33.1	31.6	30.2	235.9	144.6	89.0	55.3	34.4	21.4	13.3	8.3	13.7
1957	45.7	43.6	41.7	39.8	38.0	36.3	34.7	33.1	31.6	30.1	235.4	144.4	88.7	55.1	34.3	21.4	13.3	8.3	13.7

Table A.3. Continued. Female numbers at age in Oregon (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1958	45.6	43.6	41.6	39.8	38.0	36.2	34.6	33.0	31.5	30.1	234.5	143.9	88.3	54.8	34.1	21.2	13.2	8.2	13.6
1959	45.4	43.5	41.5	39.7	37.9	36.2	34.5	33.0	31.5	30.0	233.7	143.6	87.9	54.5	33.9	21.1	13.2	8.2	13.6
1960	45.3	43.3	41.5	39.6	37.9	36.2	34.5	32.9	31.4	30.0	232.9	143.1	87.6	54.2	33.7	21.0	13.1	8.2	13.5
1961	45.2	43.2	41.3	39.5	37.8	36.1	34.5	32.9	31.3	29.9	232.0	142.6	87.1	53.9	33.5	20.9	13.0	8.1	13.4
1962	45.2	43.1	41.2	39.4	37.7	36.0	34.4	32.8	31.3	29.8	231.2	142.1	86.7	53.6	33.3	20.7	12.9	8.1	13.3
1963	45.1	43.1	41.1	39.3	37.6	35.9	34.3	32.8	31.3	29.8	230.4	141.6	86.3	53.2	33.1	20.6	12.8	8.0	13.2
1964	45.0	43.0	41.1	39.2	37.5	35.8	34.2	32.7	31.2	29.8	229.8	141.2	86.0	53.0	32.9	20.5	12.8	8.0	13.1
1965	44.9	42.9	41.0	39.2	37.4	35.7	34.2	32.6	31.1	29.7	229.2	140.8	85.6	52.7	32.7	20.4	12.7	7.9	13.1
1966	44.8	42.8	40.9	39.1	37.4	35.7	34.1	32.5	31.1	29.6	228.8	140.3	85.4	52.5	32.6	20.3	12.6	7.9	13.0
1967	44.7	42.7	40.8	39.0	37.3	35.6	34.0	32.5	31.0	29.6	228.2	139.7	85.1	52.2	32.4	20.2	12.6	7.8	12.9
1968	44.5	42.6	40.7	38.9	37.2	35.5	33.9	32.4	30.9	29.5	227.8	139.2	84.8	51.9	32.2	20.0	12.5	7.8	12.8
1969	44.4	42.5	40.6	38.8	37.1	35.5	33.9	32.3	30.8	29.4	227.3	138.7	84.5	51.7	32.0	19.9	12.4	7.7	12.8
1970	44.2	42.4	40.5	38.7	37.0	35.4	33.8	32.3	30.8	29.3	226.7	138.0	84.1	51.4	31.8	19.8	12.3	7.7	12.7
1971	44.0	42.2	40.4	38.6	36.9	35.3	33.7	32.2	30.7	29.3	226.1	137.4	83.8	51.1	31.6	19.7	12.2	7.6	12.6
1972	43.8	42.0	40.2	38.5	36.8	35.2	33.6	32.1	30.6	29.2	225.5	136.9	83.5	50.9	31.4	19.5	12.2	7.6	12.5
1973	43.4	41.7	40.0	38.4	36.7	35.1	33.5	32.0	30.6	29.1	224.7	136.1	83.1	50.6	31.2	19.4	12.1	7.5	12.4
1974	43.1	41.4	39.8	38.2	36.6	35.0	33.5	32.0	30.5	29.1	224.2	135.7	82.8	50.3	31.0	19.3	12.0	7.5	12.3
1975	42.7	41.1	39.5	38.0	36.4	34.9	33.4	31.9	30.4	29.0	223.7	135.2	82.5	50.1	30.8	19.1	11.9	7.4	12.3
1976	42.3	40.7	39.2	37.7	36.2	34.7	33.2	31.8	30.4	29.0	223.4	135.1	82.2	50.0	30.7	19.1	11.9	7.4	12.2
1977	41.8	40.4	38.8	37.4	35.9	34.5	33.0	31.6	30.2	28.8	222.1	134.0	81.4	49.5	30.4	18.8	11.7	7.3	12.1
1978	41.4	39.9	38.5	37.0	35.6	34.2	32.8	31.4	30.0	28.7	220.7	133.0	80.6	49.0	30.0	18.6	11.6	7.2	11.9
1979	40.5	39.4	38.1	36.7	35.3	33.9	32.5	31.2	29.8	28.5	218.6	131.2	79.3	48.2	29.5	18.3	11.4	7.1	11.7
1980	39.6	38.7	37.6	36.3	34.9	33.6	32.2	30.8	29.5	28.1	214.3	127.3	76.7	46.6	28.5	17.6	11.0	6.8	11.3
1981	38.9	37.8	36.9	35.8	34.5	33.2	31.9	30.5	29.2	27.8	210.5	123.6	74.1	45.1	27.5	17.0	10.6	6.6	10.9
1982	37.8	37.1	36.0	35.1	34.1	32.8	31.5	30.1	28.8	27.4	205.2	118.3	70.5	42.8	26.1	16.1	10.0	6.2	10.3
1983	36.4	36.0	35.4	34.3	33.4	32.4	31.1	29.7	28.3	26.9	198.2	111.6	66.0	40.0	24.3	15.0	9.3	5.8	9.6
1984	35.1	34.7	34.3	33.6	32.6	31.6	30.5	29.2	27.7	26.2	188.4	102.0	59.6	36.1	21.9	13.5	8.4	5.2	8.6
1985	34.2	33.4	33.1	32.7	32.0	31.0	30.0	28.9	27.5	26.0	185.8	98.6	57.1	34.5	20.9	12.9	8.0	5.0	8.2
1986	33.2	32.6	31.9	31.5	31.1	30.4	29.4	28.4	27.2	25.8	182.9	94.5	54.2	32.6	19.8	12.1	7.5	4.7	7.7
1987	32.4	31.7	31.1	30.4	30.0	29.6	28.9	27.8	26.8	25.6	181.4	91.7	52.0	31.2	18.9	11.6	7.2	4.5	7.4
1988	31.5	30.9	30.2	29.6	28.9	28.5	28.0	27.3	26.2	25.1	179.2	88.6	49.5	29.6	17.9	10.9	6.8	4.2	7.0
1989	30.4	30.0	29.5	28.7	28.2	27.5	27.0	26.5	25.7	24.6	176.4	84.9	46.6	27.7	16.7	10.2	6.3	3.9	6.5
1990	28.9	29.0	28.6	28.0	27.3	26.7	26.0	25.4	24.8	23.9	169.6	78.2	42.0	24.7	15.0	9.1	5.6	3.5	5.8
1991	27.9	27.5	27.6	27.2	26.7	26.0	25.4	24.6	24.0	23.4	168.5	76.6	40.3	23.6	14.2	8.7	5.3	3.3	5.5
1992	26.2	26.6	26.2	26.3	25.9	25.3	24.5	23.9	23.0	22.3	162.6	71.6	36.6	21.2	12.8	7.8	4.8	3.0	4.9
1993	24.2	25.0	25.3	24.9	24.9	24.5	23.8	23.0	22.2	21.2	153.2	64.8	32.0	18.4	11.1	6.7	4.1	2.6	4.2
1994	22.5	23.1	23.8	24.1	23.6	23.6	23.0	22.2	21.2	20.3	142.2	57.1	27.0	15.3	9.2	5.6	3.4	2.1	3.5
1995	21.4	21.5	22.0	22.6	22.9	22.4	22.2	21.6	20.7	19.7	137.0	53.6	24.4	13.7	8.2	4.9	3.0	1.9	3.1
1996	20.0	20.4	20.4	20.9	21.4	21.6	21.0	20.8	20.0	19.0	128.5	47.9	20.8	11.5	6.8	4.1	2.5	1.6	2.6
1997	18.9	19.1	19.4	19.4	19.9	20.3	20.4	19.8	19.4	18.6	124.8	45.4	18.9	10.2	6.1	3.7	2.2	1.4	2.3
1998	17.5	18.0	18.2	18.5	18.4	18.8	19.1	19.1	18.3	17.8	118.1	41.2	16.3	8.7	5.1	3.1	1.9	1.2	1.9
1999	17.2	16.7	17.2	17.3	17.6	17.5	17.8	18.0	17.9	17.1	116.7	40.7	15.4	8.0	4.7	2.8	1.7	1.1	1.8

Table A.3. Continued. Female numbers at age in Oregon (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
2000	16.5	16.4	15.9	16.3	16.4	16.6	16.5	16.7	16.7	16.5	113.0	39.0	14.1	7.2	4.2	2.5	1.5	0.9	1.6
2001	16.7	15.7	15.7	15.2	15.6	15.6	15.8	15.6	15.8	15.9	115.3	41.1	14.4	7.1	4.1	2.5	1.5	0.9	1.5
2002	16.8	16.0	15.0	14.9	14.5	14.8	14.9	15.0	14.9	15.0	116.8	43.4	14.8	7.1	4.1	2.4	1.5	0.9	1.5
2003	17.3	16.1	15.2	14.3	14.2	13.8	14.1	14.2	14.3	14.1	117.8	46.1	15.3	7.2	4.1	2.4	1.5	0.9	1.5
2004	17.8	16.5	15.3	14.5	13.7	13.6	13.2	13.5	13.5	13.6	117.8	48.9	16.0	7.2	4.1	2.4	1.5	0.9	1.5
2005	18.3	17.0	15.7	14.6	13.8	13.0	12.9	12.5	12.8	12.8	116.7	51.8	16.8	7.3	4.1	2.4	1.5	0.9	1.5
2006	18.7	17.4	16.2	15.0	13.9	13.2	12.4	12.3	11.9	12.2	114.5	54.7	17.7	7.4	4.1	2.4	1.5	0.9	1.5
2007	19.1	17.8	16.6	15.4	14.3	13.3	12.6	11.8	11.7	11.3	111.5	57.7	18.7	7.6	4.1	2.4	1.5	0.9	1.5
2008	19.5	18.2	17.0	15.8	14.7	13.6	12.7	12.0	11.2	11.2	107.6	60.6	19.8	7.7	4.1	2.4	1.4	0.9	1.4
2009	19.9	18.6	17.4	16.2	15.1	14.0	13.0	12.1	11.4	10.7	103.4	63.2	21.0	7.9	4.1	2.4	1.4	0.9	1.4
2009	16.5	16.4	15.9	16.3	16.4	16.6	16.5	16.7	16.7	16.5	113.0	39.0	14.1	7.2	4.2	2.5	1.5	0.9	1.6

Table A.4. Male numbers at age in Oregon (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1916	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1917	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1918	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1919	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1920	47.2	45.1	43.0	41.1	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1921	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1922	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1923	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1924	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1925	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1926	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.1	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1927	47.2	45.0	43.0	41.0	39.2	37.4	35.7	34.0	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1928	47.1	45.0	43.0	41.0	39.2	37.4	35.7	34.0	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1929	47.1	45.0	43.0	41.0	39.1	37.4	35.7	34.0	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1930	47.1	45.0	42.9	41.0	39.1	37.4	35.7	34.0	32.5	31.0	242.2	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1931	47.1	45.0	42.9	41.0	39.1	37.4	35.7	34.0	32.5	31.0	242.1	151.9	95.2	59.7	37.5	23.5	14.7	9.2	15.5
1932	47.1	45.0	42.9	41.0	39.1	37.3	35.7	34.0	32.5	31.0	242.1	151.9	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1933	47.1	44.9	42.9	41.0	39.1	37.3	35.6	34.0	32.5	31.0	242.1	151.9	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1934	47.1	44.9	42.9	41.0	39.1	37.3	35.6	34.0	32.5	31.0	242.1	151.9	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1935	47.0	44.9	42.9	40.9	39.1	37.3	35.6	34.0	32.5	31.0	242.1	151.9	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1936	47.0	44.9	42.9	40.9	39.1	37.3	35.6	34.0	32.5	31.0	242.0	151.9	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1937	47.0	44.9	42.8	40.9	39.1	37.3	35.6	34.0	32.4	31.0	242.0	151.8	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1938	47.0	44.8	42.8	40.9	39.0	37.3	35.6	34.0	32.4	31.0	242.0	151.8	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1939	46.9	44.8	42.8	40.9	39.0	37.3	35.6	34.0	32.4	31.0	241.9	151.8	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1940	46.9	44.8	42.8	40.8	39.0	37.2	35.6	34.0	32.4	30.9	241.9	151.8	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1941	46.9	44.8	42.8	40.8	39.0	37.2	35.5	33.9	32.4	30.9	241.8	151.8	95.2	59.7	37.4	23.5	14.7	9.2	15.5
1942	46.9	44.8	42.7	40.8	39.0	37.2	35.5	33.9	32.4	30.9	241.6	151.7	95.1	59.6	37.4	23.5	14.7	9.2	15.5
1943	46.8	44.7	42.7	40.8	38.9	37.2	35.5	33.9	32.4	30.9	241.5	151.5	95.0	59.6	37.4	23.4	14.7	9.2	15.5
1944	46.8	44.7	42.7	40.8	38.9	37.2	35.5	33.9	32.3	30.9	240.9	151.0	94.7	59.4	37.2	23.3	14.6	9.2	15.4
1945	46.7	44.7	42.7	40.7	38.9	37.1	35.5	33.8	32.3	30.8	240.1	150.2	94.1	59.0	37.0	23.2	14.6	9.1	15.3
1946	46.5	44.6	42.6	40.7	38.9	37.1	35.4	33.8	32.2	30.8	239.0	148.9	93.3	58.5	36.7	23.0	14.4	9.0	15.2
1947	46.3	44.4	42.5	40.7	38.9	37.1	35.4	33.8	32.2	30.7	238.4	148.2	92.8	58.1	36.4	22.9	14.3	9.0	15.1
1948	46.3	44.2	42.4	40.6	38.8	37.1	35.4	33.8	32.2	30.7	238.2	147.8	92.4	57.9	36.3	22.8	14.3	9.0	15.1
1949	46.2	44.2	42.2	40.4	38.7	37.0	35.4	33.8	32.2	30.7	238.2	147.5	92.2	57.8	36.2	22.7	14.2	8.9	15.0
1950	46.1	44.1	42.2	40.3	38.6	37.0	35.3	33.8	32.2	30.7	238.2	147.3	92.0	57.6	36.1	22.7	14.2	8.9	15.0
1951	46.1	44.0	42.1	40.2	38.4	36.8	35.3	33.7	32.2	30.7	238.2	147.0	91.7	57.5	36.0	22.6	14.2	8.9	14.9
1952	46.0	44.0	42.0	40.2	38.4	36.7	35.1	33.7	32.2	30.7	238.3	146.9	91.6	57.4	36.0	22.5	14.1	8.9	14.9
1953	46.0	43.9	42.0	40.1	38.3	36.6	35.0	33.5	32.1	30.7	238.4	146.8	91.4	57.2	35.9	22.5	14.1	8.8	14.9
1954	45.9	43.9	41.9	40.1	38.3	36.6	35.0	33.4	32.0	30.6	238.5	146.8	91.3	57.1	35.8	22.5	14.1	8.8	14.9
1955	45.8	43.8	41.9	40.0	38.2	36.5	34.9	33.4	31.9	30.5	238.4	146.8	91.1	57.0	35.7	22.4	14.1	8.8	14.8
1956	45.8	43.8	41.8	39.9	38.2	36.5	34.8	33.3	31.8	30.4	237.9	146.5	90.8	56.8	35.6	22.3	14.0	8.8	14.8
1957	45.7	43.7	41.8	39.9	38.1	36.4	34.8	33.2	31.7	30.3	237.3	146.3	90.6	56.6	35.5	22.3	14.0	8.7	14.7

Table A.4. Continued. Male numbers at age in Oregon (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1958	45.6	43.6	41.7	39.8	38.1	36.4	34.7	33.2	31.7	30.2	236.4	145.9	90.1	56.3	35.3	22.1	13.9	8.7	14.6
1959	45.4	43.5	41.6	39.8	38.0	36.3	34.7	33.1	31.6	30.2	235.6	145.5	89.7	56.0	35.1	22.0	13.8	8.7	14.6
1960	45.3	43.4	41.5	39.7	38.0	36.3	34.6	33.1	31.6	30.1	234.8	145.1	89.3	55.7	34.9	21.9	13.7	8.6	14.5
1961	45.2	43.3	41.4	39.6	37.9	36.2	34.6	33.0	31.5	30.0	233.8	144.5	88.9	55.4	34.7	21.7	13.6	8.6	14.4
1962	45.2	43.2	41.3	39.5	37.8	36.1	34.5	33.0	31.5	30.0	233.0	144.0	88.4	55.1	34.5	21.6	13.6	8.5	14.3
1963	45.1	43.1	41.2	39.4	37.7	36.0	34.5	32.9	31.4	29.9	232.1	143.4	87.9	54.7	34.2	21.5	13.5	8.4	14.2
1964	45.0	43.0	41.1	39.3	37.6	35.9	34.4	32.8	31.4	29.9	231.5	143.0	87.6	54.4	34.1	21.3	13.4	8.4	14.1
1965	44.9	42.9	41.1	39.3	37.5	35.9	34.3	32.8	31.3	29.9	230.9	142.6	87.3	54.1	33.9	21.2	13.3	8.3	14.0
1966	44.8	42.8	41.0	39.2	37.5	35.8	34.2	32.7	31.2	29.8	230.5	142.2	87.0	53.9	33.7	21.1	13.2	8.3	14.0
1967	44.7	42.7	40.9	39.1	37.4	35.7	34.1	32.6	31.1	29.7	229.9	141.5	86.7	53.6	33.5	21.0	13.2	8.3	13.9
1968	44.5	42.6	40.8	39.0	37.3	35.7	34.1	32.5	31.1	29.6	229.4	140.9	86.4	53.3	33.3	20.9	13.1	8.2	13.8
1969	44.4	42.5	40.7	38.9	37.2	35.6	34.0	32.5	31.0	29.6	229.0	140.4	86.1	53.1	33.1	20.8	13.0	8.2	13.7
1970	44.2	42.4	40.6	38.8	37.1	35.5	33.9	32.4	30.9	29.5	228.3	139.7	85.7	52.7	32.9	20.6	12.9	8.1	13.6
1971	44.0	42.2	40.4	38.7	37.0	35.4	33.9	32.3	30.9	29.4	227.7	139.1	85.4	52.4	32.7	20.5	12.8	8.0	13.5
1972	43.8	42.0	40.3	38.6	36.9	35.3	33.8	32.3	30.8	29.4	227.2	138.6	85.1	52.2	32.5	20.4	12.8	8.0	13.4
1973	43.4	41.8	40.1	38.4	36.8	35.2	33.7	32.2	30.7	29.3	226.3	137.8	84.7	51.9	32.2	20.2	12.7	7.9	13.3
1974	43.1	41.4	39.8	38.2	36.7	35.1	33.6	32.1	30.6	29.2	225.8	137.4	84.4	51.6	32.1	20.1	12.6	7.9	13.3
1975	42.7	41.1	39.5	38.0	36.5	35.0	33.5	32.0	30.6	29.2	225.2	136.9	84.0	51.4	31.9	19.9	12.5	7.8	13.2
1976	42.3	40.7	39.2	37.7	36.3	34.8	33.3	31.9	30.5	29.1	225.0	136.7	83.8	51.3	31.7	19.8	12.4	7.8	13.1
1977	41.8	40.4	38.9	37.4	36.0	34.6	33.2	31.7	30.4	29.0	223.6	135.6	83.0	50.8	31.4	19.6	12.3	7.7	13.0
1978	41.4	39.9	38.5	37.1	35.7	34.3	32.9	31.6	30.2	28.8	222.1	134.5	82.1	50.3	31.0	19.4	12.1	7.6	12.8
1979	40.5	39.5	38.1	36.8	35.4	34.0	32.7	31.3	29.9	28.6	219.9	132.7	80.7	49.5	30.5	19.0	11.9	7.5	12.6
1980	39.6	38.7	37.7	36.3	35.0	33.7	32.3	30.9	29.6	28.2	215.4	128.7	78.0	47.8	29.4	18.3	11.5	7.2	12.1
1981	38.9	37.8	36.9	35.9	34.6	33.3	32.0	30.6	29.3	27.9	211.3	124.8	75.4	46.2	28.4	17.7	11.1	6.9	11.7
1982	37.8	37.1	36.1	35.2	34.2	32.9	31.6	30.2	28.9	27.5	205.5	119.2	71.6	43.9	26.9	16.7	10.5	6.6	11.0
1983	36.4	36.0	35.4	34.4	33.5	32.5	31.1	29.8	28.3	26.9	198.1	112.3	67.0	41.0	25.1	15.6	9.8	6.1	10.3
1984	35.1	34.7	34.4	33.7	32.7	31.7	30.6	29.2	27.7	26.2	187.5	102.3	60.4	36.9	22.6	14.0	8.8	5.5	9.2
1985	34.2	33.5	33.1	32.8	32.1	31.1	30.1	28.9	27.5	26.0	184.8	98.7	57.9	35.3	21.6	13.4	8.4	5.2	8.8
1986	33.2	32.7	31.9	31.6	31.2	30.5	29.4	28.4	27.2	25.8	181.7	94.4	54.8	33.3	20.4	12.6	7.9	4.9	8.3
1987	32.4	31.7	31.2	30.4	30.1	29.7	28.9	27.9	26.8	25.6	180.1	91.4	52.6	31.8	19.4	12.0	7.5	4.7	7.9
1988	31.5	30.9	30.2	29.7	29.0	28.6	28.1	27.4	26.2	25.1	177.9	88.1	50.0	30.2	18.4	11.4	7.1	4.4	7.5
1989	30.4	30.0	29.5	28.8	28.3	27.5	27.1	26.6	25.8	24.6	174.9	84.1	47.0	28.2	17.2	10.6	6.6	4.1	7.0
1990	28.9	29.0	28.6	28.1	27.4	26.8	26.0	25.5	24.8	23.9	167.6	77.2	42.2	25.2	15.4	9.4	5.9	3.7	6.2
1991	27.9	27.5	27.7	27.3	26.7	26.0	25.4	24.6	24.0	23.4	166.6	75.4	40.4	24.0	14.6	9.0	5.6	3.5	5.9
1992	26.2	26.6	26.3	26.3	26.0	25.4	24.6	23.9	23.0	22.3	160.4	70.2	36.6	21.6	13.2	8.1	5.0	3.1	5.3
1993	24.2	25.0	25.4	25.0	25.0	24.5	23.9	23.0	22.2	21.1	150.7	63.1	31.9	18.7	11.4	6.9	4.3	2.7	4.5
1994	22.5	23.1	23.8	24.1	23.7	23.6	23.0	22.2	21.2	20.2	139.2	55.3	26.9	15.6	9.5	5.8	3.6	2.2	3.8
1995	21.4	21.5	22.0	22.6	22.9	22.4	22.3	21.6	20.7	19.6	133.9	51.6	24.2	13.8	8.4	5.1	3.2	2.0	3.3
1996	20.0	20.4	20.4	21.0	21.5	21.7	21.1	20.7	19.9	18.9	125.1	45.9	20.5	11.6	7.0	4.3	2.6	1.6	2.8
1997	18.9	19.1	19.5	19.5	19.9	20.4	20.5	19.8	19.4	18.5	121.4	43.2	18.5	10.3	6.2	3.8	2.3	1.5	2.4
1998	17.5	18.0	18.2	18.5	18.5	18.8	19.1	19.1	18.3	17.7	114.6	39.0	15.9	8.7	5.2	3.2	1.9	1.2	2.0
1999	17.2	16.7	17.2	17.3	17.6	17.5	17.8	18.0	17.8	17.0	113.5	38.5	15.0	8.0	4.8	2.9	1.8	1.1	1.9

Table A.4. Continued. Male numbers at age in Oregon (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
2000	16.5	16.4	16.0	16.4	16.5	16.7	16.5	16.7	16.7	16.4	109.9	36.8	13.7	7.2	4.3	2.6	1.6	1.0	1.7
2001	16.7	15.8	15.7	15.2	15.6	15.7	15.8	15.7	15.8	15.8	112.6	38.8	13.9	7.1	4.2	2.6	1.6	1.0	1.6
2002	16.8	16.0	15.0	15.0	14.5	14.9	14.9	15.1	14.9	15.0	114.7	41.0	14.2	7.1	4.1	2.5	1.5	1.0	1.6
2003	17.3	16.1	15.2	14.3	14.3	13.8	14.2	14.2	14.4	14.2	116.2	43.6	14.7	7.1	4.1	2.5	1.5	1.0	1.6
2004	17.8	16.5	15.3	14.6	13.7	13.6	13.2	13.5	13.5	13.7	116.6	46.4	15.3	7.2	4.1	2.5	1.5	0.9	1.6
2005	18.3	17.0	15.8	14.6	13.9	13.1	13.0	12.6	12.9	12.9	115.9	49.3	16.0	7.2	4.1	2.5	1.5	0.9	1.6
2006	18.7	17.4	16.2	15.0	14.0	13.2	12.4	12.4	12.0	12.2	114.1	52.3	16.8	7.3	4.1	2.5	1.5	0.9	1.6
2007	19.1	17.8	16.6	15.5	14.3	13.3	12.6	11.9	11.8	11.4	111.4	55.4	17.7	7.4	4.1	2.5	1.5	0.9	1.6
2008	19.5	18.3	17.0	15.9	14.7	13.7	12.7	12.0	11.3	11.2	107.7	58.5	18.8	7.5	4.1	2.5	1.5	0.9	1.5
2009	19.9	18.6	17.4	16.2	15.1	14.1	13.0	12.1	11.5	10.7	103.7	61.4	19.9	7.7	4.1	2.5	1.5	0.9	1.5
2009	16.5	16.4	16.0	16.4	16.5	16.7	16.5	16.7	16.7	16.4	109.9	36.8	13.7	7.2	4.3	2.6	1.6	1.0	1.7

Table A.5. Female numbers at age in Washington (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1916	14.1	13.5	12.9	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1917	14.1	13.5	12.9	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1918	14.1	13.5	12.9	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1919	14.1	13.5	12.9	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1920	14.1	13.5	12.8	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1921	14.1	13.5	12.8	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1922	14.1	13.5	12.8	12.3	11.7	11.2	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1923	14.1	13.5	12.8	12.3	11.7	11.1	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1924	14.1	13.5	12.8	12.3	11.7	11.1	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1925	14.1	13.5	12.8	12.3	11.7	11.1	10.6	10.1	9.7	9.2	71.8	44.7	27.9	17.4	10.8	6.7	4.2	2.6	4.3
1926	14.1	13.5	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.8	44.7	27.8	17.4	10.8	6.7	4.2	2.6	4.3
1927	14.1	13.5	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.8	44.7	27.8	17.3	10.8	6.7	4.2	2.6	4.3
1928	14.1	13.5	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.6	27.8	17.3	10.8	6.7	4.2	2.6	4.3
1929	14.1	13.5	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.6	27.8	17.3	10.8	6.7	4.2	2.6	4.3
1930	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.6	27.7	17.3	10.8	6.7	4.2	2.6	4.3
1931	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.5	27.7	17.3	10.7	6.7	4.2	2.6	4.3
1932	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.5	27.7	17.2	10.7	6.7	4.2	2.6	4.3
1933	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.5	27.7	17.2	10.7	6.7	4.2	2.6	4.3
1934	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.5	27.6	17.2	10.7	6.7	4.2	2.6	4.3
1935	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.5	27.6	17.2	10.7	6.7	4.2	2.6	4.3
1936	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.7	44.4	27.6	17.2	10.7	6.7	4.1	2.6	4.3
1937	14.1	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	71.6	44.4	27.6	17.1	10.7	6.7	4.1	2.6	4.3
1938	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.7	9.2	71.6	44.4	27.5	17.1	10.7	6.6	4.1	2.6	4.3
1939	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.7	9.2	71.6	44.4	27.5	17.1	10.7	6.6	4.1	2.6	4.3
1940	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.6	44.4	27.5	17.1	10.6	6.6	4.1	2.6	4.3
1941	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.6	44.4	27.5	17.1	10.6	6.6	4.1	2.6	4.2
1942	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.6	44.4	27.5	17.1	10.6	6.6	4.1	2.6	4.2
1943	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.6	44.4	27.5	17.0	10.6	6.6	4.1	2.6	4.2
1944	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.5	44.4	27.4	17.0	10.6	6.6	4.1	2.6	4.2
1945	14.0	13.4	12.7	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.5	44.4	27.4	17.0	10.6	6.6	4.1	2.6	4.2
1946	13.9	13.3	12.7	12.2	11.6	11.1	10.6	10.1	9.6	9.2	71.5	44.4	27.4	17.0	10.6	6.6	4.1	2.6	4.2
1947	13.9	13.3	12.7	12.1	11.6	11.1	10.6	10.1	9.6	9.2	71.5	44.4	27.4	17.0	10.6	6.6	4.1	2.6	4.2
1948	13.8	13.2	12.7	12.1	11.6	11.1	10.6	10.1	9.6	9.2	71.4	44.4	27.4	17.0	10.6	6.6	4.1	2.6	4.2
1949	13.8	13.2	12.6	12.1	11.6	11.1	10.6	10.1	9.6	9.2	71.4	44.3	27.4	17.0	10.5	6.6	4.1	2.5	4.2
1950	13.8	13.2	12.6	12.0	11.5	11.0	10.5	10.1	9.6	9.2	71.4	44.3	27.4	16.9	10.5	6.6	4.1	2.5	4.2
1951	13.8	13.2	12.6	12.0	11.5	11.0	10.5	10.1	9.6	9.2	71.3	44.3	27.4	16.9	10.5	6.5	4.1	2.5	4.2
1952	13.8	13.2	12.6	12.0	11.5	10.9	10.5	10.0	9.6	9.2	71.3	44.3	27.4	16.9	10.5	6.5	4.1	2.5	4.2
1953	13.7	13.1	12.5	12.0	11.4	10.9	10.4	10.0	9.6	9.1	71.3	44.3	27.4	16.9	10.5	6.5	4.1	2.5	4.2
1954	13.7	13.1	12.5	12.0	11.4	10.9	10.4	10.0	9.5	9.1	71.2	44.3	27.4	16.9	10.5	6.5	4.1	2.5	4.2
1955	13.7	13.1	12.5	11.9	11.4	10.9	10.4	9.9	9.5	9.1	71.2	44.3	27.4	16.9	10.5	6.5	4.1	2.5	4.2
1956	13.7	13.1	12.5	11.9	11.4	10.9	10.4	9.9	9.5	9.1	71.0	44.2	27.3	16.9	10.4	6.5	4.0	2.5	4.2
1957	13.7	13.1	12.5	11.9	11.4	10.9	10.4	9.9	9.5	9.0	70.9	44.1	27.3	16.8	10.4	6.5	4.0	2.5	4.2

Table A.5. Continued. Female numbers at age in Washington (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1958	13.6	13.0	12.5	11.9	11.4	10.9	10.4	9.9	9.5	9.0	70.7	44.0	27.2	16.8	10.4	6.5	4.0	2.5	4.1
1959	13.6	13.0	12.4	11.9	11.3	10.8	10.3	9.9	9.4	9.0	70.6	43.9	27.1	16.7	10.3	6.4	4.0	2.5	4.1
1960	13.6	13.0	12.4	11.9	11.3	10.8	10.3	9.9	9.4	9.0	70.4	43.8	27.0	16.7	10.3	6.4	4.0	2.5	4.1
1961	13.5	12.9	12.4	11.8	11.3	10.8	10.3	9.9	9.4	9.0	70.2	43.7	26.9	16.6	10.3	6.4	4.0	2.5	4.1
1962	13.5	12.9	12.3	11.8	11.3	10.8	10.3	9.8	9.4	9.0	70.1	43.5	26.8	16.5	10.2	6.3	3.9	2.5	4.1
1963	13.5	12.9	12.3	11.8	11.2	10.8	10.3	9.8	9.4	9.0	69.9	43.4	26.7	16.5	10.2	6.3	3.9	2.4	4.0
1964	13.5	12.9	12.3	11.7	11.2	10.7	10.3	9.8	9.4	8.9	69.7	43.2	26.6	16.4	10.1	6.3	3.9	2.4	4.0
1965	13.4	12.8	12.3	11.7	11.2	10.7	10.2	9.8	9.3	8.9	69.5	43.0	26.4	16.3	10.0	6.2	3.9	2.4	4.0
1966	13.4	12.8	12.2	11.7	11.2	10.7	10.2	9.8	9.3	8.9	69.3	42.8	26.2	16.1	10.0	6.2	3.8	2.4	3.9
1967	13.4	12.8	12.2	11.7	11.2	10.7	10.2	9.7	9.3	8.9	69.2	42.6	26.1	16.0	9.9	6.1	3.8	2.4	3.9
1968	13.3	12.7	12.2	11.7	11.1	10.6	10.2	9.7	9.3	8.9	69.0	42.4	25.9	15.9	9.8	6.1	3.8	2.3	3.9
1969	13.3	12.7	12.2	11.6	11.1	10.6	10.1	9.7	9.3	8.8	68.9	42.2	25.7	15.8	9.7	6.0	3.7	2.3	3.8
1970	13.2	12.7	12.1	11.6	11.1	10.6	10.1	9.7	9.2	8.8	68.7	42.0	25.6	15.7	9.7	6.0	3.7	2.3	3.8
1971	13.2	12.6	12.1	11.6	11.1	10.6	10.1	9.7	9.2	8.8	68.5	41.7	25.4	15.5	9.6	5.9	3.7	2.3	3.8
1972	13.1	12.6	12.0	11.5	11.0	10.5	10.1	9.6	9.2	8.8	68.3	41.4	25.1	15.4	9.5	5.8	3.6	2.3	3.7
1973	13.0	12.5	12.0	11.5	11.0	10.5	10.1	9.6	9.2	8.8	68.1	41.1	24.9	15.2	9.3	5.8	3.6	2.2	3.7
1974	12.9	12.4	11.9	11.4	10.9	10.5	10.0	9.6	9.2	8.7	67.8	40.8	24.5	15.0	9.2	5.7	3.5	2.2	3.6
1975	12.8	12.3	11.8	11.4	10.9	10.4	10.0	9.6	9.1	8.7	67.5	40.4	24.2	14.7	9.0	5.6	3.4	2.1	3.5
1976	12.7	12.2	11.7	11.3	10.8	10.4	10.0	9.5	9.1	8.7	67.4	40.1	24.0	14.5	8.9	5.5	3.4	2.1	3.5
1977	12.5	12.1	11.6	11.2	10.7	10.3	9.9	9.5	9.1	8.7	67.1	39.8	23.6	14.3	8.8	5.4	3.3	2.1	3.4
1978	12.4	11.9	11.5	11.1	10.7	10.2	9.8	9.4	9.0	8.6	66.5	39.0	22.9	13.8	8.5	5.2	3.2	2.0	3.3
1979	12.1	11.8	11.4	11.0	10.6	10.2	9.8	9.4	9.0	8.6	66.0	38.1	22.2	13.3	8.1	5.0	3.1	1.9	3.2
1980	11.9	11.6	11.3	10.9	10.5	10.1	9.7	9.3	8.9	8.5	65.4	37.2	21.3	12.8	7.8	4.8	3.0	1.8	3.0
1981	11.6	11.3	11.0	10.7	10.4	10.0	9.6	9.2	8.9	8.5	64.7	36.0	20.4	12.1	7.4	4.5	2.8	1.7	2.9
1982	11.3	11.1	10.8	10.5	10.2	9.9	9.5	9.1	8.8	8.4	64.7	35.9	20.1	11.9	7.2	4.4	2.7	1.7	2.8
1983	10.9	10.8	10.6	10.3	10.0	9.8	9.4	9.1	8.7	8.4	64.6	35.7	19.8	11.7	7.1	4.3	2.7	1.7	2.7
1984	10.5	10.4	10.3	10.1	9.8	9.6	9.3	9.0	8.6	8.3	64.2	35.2	19.3	11.3	6.8	4.2	2.6	1.6	2.6
1985	10.2	10.0	9.9	9.8	9.6	9.4	9.1	8.9	8.5	8.2	63.6	34.7	18.7	10.9	6.6	4.0	2.5	1.5	2.5
1986	9.9	9.8	9.5	9.4	9.3	9.2	8.9	8.7	8.4	8.1	62.8	33.7	17.9	10.3	6.2	3.8	2.3	1.4	2.4
1987	9.7	9.5	9.3	9.1	9.0	8.9	8.7	8.5	8.3	8.0	62.3	33.3	17.4	10.0	6.0	3.6	2.2	1.4	2.3
1988	9.4	9.2	9.0	8.9	8.7	8.6	8.5	8.3	8.1	7.8	61.3	32.4	16.6	9.4	5.6	3.4	2.1	1.3	2.1
1989	9.1	9.0	8.8	8.6	8.5	8.3	8.2	8.1	7.9	7.7	60.4	31.6	15.9	8.9	5.3	3.2	2.0	1.2	2.0
1990	8.6	8.7	8.6	8.4	8.2	8.1	7.9	7.8	7.7	7.5	58.7	29.8	14.6	8.0	4.7	2.9	1.8	1.1	1.8
1991	8.3	8.2	8.3	8.2	8.0	7.8	7.7	7.5	7.4	7.3	57.6	28.9	13.8	7.5	4.4	2.7	1.6	1.0	1.6
1992	7.8	8.0	7.9	7.9	7.8	7.6	7.4	7.3	7.1	7.0	56.2	27.9	13.0	6.9	4.0	2.4	1.5	0.9	1.5
1993	7.3	7.5	7.6	7.5	7.5	7.4	7.3	7.1	6.9	6.7	54.3	26.3	11.9	6.2	3.6	2.2	1.3	0.8	1.3
1994	6.7	6.9	7.1	7.2	7.1	7.2	7.1	6.9	6.7	6.5	52.4	24.7	10.8	5.5	3.2	1.9	1.2	0.7	1.2
1995	6.4	6.4	6.6	6.8	6.9	6.8	6.8	6.7	6.6	6.4	51.2	24.1	10.3	5.1	2.9	1.7	1.1	0.7	1.1
1996	6.0	6.1	6.1	6.3	6.5	6.6	6.5	6.5	6.4	6.2	50.0	23.6	9.8	4.8	2.7	1.6	1.0	0.6	1.0
1997	5.7	5.7	5.8	5.8	6.0	6.2	6.3	6.2	6.2	6.0	48.8	23.1	9.3	4.5	2.5	1.5	0.9	0.6	0.9
1998	5.2	5.4	5.4	5.5	5.6	5.7	5.9	6.0	5.8	5.8	47.3	22.5	8.8	4.1	2.3	1.3	0.8	0.5	0.8
1999	5.2	5.0	5.1	5.2	5.3	5.3	5.4	5.6	5.7	5.5	46.2	22.3	8.6	3.9	2.1	1.3	0.8	0.5	0.8

Table A.5. Continued. Female numbers at age in Washington (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
2000	4.9	4.9	4.8	4.9	4.9	5.0	5.0	5.2	5.3	5.3	43.9	20.7	7.7	3.4	1.8	1.1	0.6	0.4	0.6
2001	5.0	4.7	4.7	4.6	4.7	4.7	4.8	4.8	4.9	5.0	42.8	20.6	7.6	3.3	1.7	1.0	0.6	0.4	0.6
2002	5.0	4.8	4.5	4.5	4.3	4.5	4.5	4.6	4.5	4.6	40.6	19.4	6.9	2.9	1.5	0.9	0.5	0.3	0.5
2003	5.2	4.8	4.6	4.3	4.3	4.1	4.2	4.3	4.3	4.3	39.8	19.9	7.1	2.9	1.5	0.8	0.5	0.3	0.5
2004	5.3	4.9	4.6	4.3	4.1	4.1	3.9	4.0	4.1	4.1	38.9	20.6	7.4	2.9	1.5	0.8	0.5	0.3	0.5
2005	5.5	5.1	4.7	4.4	4.1	3.9	3.9	3.8	3.9	3.9	37.8	21.1	7.6	3.0	1.5	0.8	0.5	0.3	0.5
2006	5.6	5.2	4.8	4.5	4.2	4.0	3.7	3.7	3.6	3.7	36.3	21.4	7.9	3.0	1.4	0.8	0.5	0.3	0.5
2007	5.7	5.3	5.0	4.6	4.3	4.0	3.8	3.5	3.5	3.4	35.0	22.0	8.3	3.1	1.4	0.8	0.5	0.3	0.5
2008	5.8	5.5	5.1	4.7	4.4	4.1	3.8	3.6	3.4	3.4	33.4	22.5	8.7	3.2	1.5	0.8	0.5	0.3	0.5
2009	5.9	5.6	5.2	4.8	4.5	4.2	3.9	3.6	3.4	3.2	31.6	22.5	9.0	3.2	1.4	0.8	0.5	0.3	0.4
2009	4.9	4.9	4.8	4.9	4.9	5.0	5.0	5.2	5.3	5.3	43.9	20.7	7.7	3.4	1.8	1.1	0.6	0.4	0.6

Table A.6. Male numbers at age in Washington (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1916	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1917	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1918	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1919	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1920	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1921	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1922	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1923	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1924	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1925	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.5	45.4	28.5	17.9	11.2	7.0	4.4	2.8	4.6
1926	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.4	45.4	28.5	17.8	11.2	7.0	4.4	2.8	4.6
1927	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.4	45.4	28.4	17.8	11.2	7.0	4.4	2.8	4.6
1928	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.4	45.3	28.4	17.8	11.2	7.0	4.4	2.8	4.6
1929	14.1	13.5	12.9	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.4	45.3	28.4	17.8	11.2	7.0	4.4	2.8	4.6
1930	14.1	13.5	12.8	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.4	45.3	28.3	17.8	11.1	7.0	4.4	2.7	4.6
1931	14.1	13.5	12.8	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.3	45.2	28.3	17.7	11.1	7.0	4.4	2.7	4.6
1932	14.1	13.4	12.8	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.3	45.2	28.3	17.7	11.1	7.0	4.4	2.7	4.6
1933	14.1	13.4	12.8	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.3	45.2	28.3	17.7	11.1	7.0	4.4	2.7	4.6
1934	14.1	13.4	12.8	12.3	11.7	11.2	10.7	10.2	9.7	9.3	72.3	45.1	28.2	17.7	11.1	7.0	4.4	2.7	4.6
1935	14.1	13.4	12.8	12.2	11.7	11.2	10.7	10.2	9.7	9.3	72.3	45.1	28.2	17.7	11.1	6.9	4.4	2.7	4.6
1936	14.1	13.4	12.8	12.2	11.7	11.2	10.7	10.2	9.7	9.3	72.3	45.1	28.2	17.7	11.1	6.9	4.4	2.7	4.6
1937	14.1	13.4	12.8	12.2	11.7	11.2	10.6	10.2	9.7	9.3	72.3	45.1	28.2	17.6	11.1	6.9	4.3	2.7	4.6
1938	14.0	13.4	12.8	12.2	11.7	11.2	10.6	10.2	9.7	9.3	72.3	45.1	28.1	17.6	11.0	6.9	4.3	2.7	4.6
1939	14.0	13.4	12.8	12.2	11.7	11.1	10.6	10.2	9.7	9.3	72.3	45.1	28.1	17.6	11.0	6.9	4.3	2.7	4.6
1940	14.0	13.4	12.8	12.2	11.7	11.1	10.6	10.2	9.7	9.3	72.2	45.1	28.1	17.6	11.0	6.9	4.3	2.7	4.6
1941	14.0	13.4	12.8	12.2	11.7	11.1	10.6	10.2	9.7	9.3	72.2	45.1	28.1	17.6	11.0	6.9	4.3	2.7	4.6
1942	14.0	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	72.2	45.0	28.0	17.5	11.0	6.9	4.3	2.7	4.6
1943	14.0	13.4	12.8	12.2	11.7	11.1	10.6	10.1	9.7	9.2	72.2	45.0	28.0	17.5	11.0	6.9	4.3	2.7	4.6
1944	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.7	9.2	72.2	45.0	28.0	17.5	11.0	6.9	4.3	2.7	4.5
1945	14.0	13.4	12.8	12.2	11.6	11.1	10.6	10.1	9.7	9.2	72.2	45.0	28.0	17.5	11.0	6.9	4.3	2.7	4.5
1946	13.9	13.3	12.8	12.2	11.6	11.1	10.6	10.1	9.7	9.2	72.1	45.0	28.0	17.5	10.9	6.9	4.3	2.7	4.5
1947	13.9	13.3	12.7	12.2	11.6	11.1	10.6	10.1	9.7	9.2	72.1	45.0	28.0	17.5	10.9	6.9	4.3	2.7	4.5
1948	13.8	13.2	12.7	12.1	11.6	11.1	10.6	10.1	9.7	9.2	72.1	45.0	28.0	17.4	10.9	6.8	4.3	2.7	4.5
1949	13.8	13.2	12.6	12.1	11.6	11.1	10.6	10.1	9.7	9.2	72.0	45.0	28.0	17.4	10.9	6.8	4.3	2.7	4.5
1950	13.8	13.2	12.6	12.1	11.5	11.1	10.6	10.1	9.7	9.2	72.0	45.0	28.0	17.4	10.9	6.8	4.3	2.7	4.5
1951	13.8	13.2	12.6	12.0	11.5	11.0	10.6	10.1	9.6	9.2	72.0	45.0	28.0	17.4	10.9	6.8	4.3	2.7	4.5
1952	13.8	13.2	12.6	12.0	11.5	11.0	10.5	10.1	9.6	9.2	71.9	45.0	28.0	17.4	10.9	6.8	4.3	2.7	4.5
1953	13.7	13.1	12.6	12.0	11.5	11.0	10.5	10.0	9.6	9.2	71.9	45.0	27.9	17.4	10.9	6.8	4.3	2.7	4.5
1954	13.7	13.1	12.5	12.0	11.5	10.9	10.5	10.0	9.6	9.2	71.9	44.9	27.9	17.4	10.9	6.8	4.3	2.7	4.5
1955	13.7	13.1	12.5	12.0	11.4	10.9	10.4	10.0	9.5	9.1	71.8	44.9	27.9	17.4	10.8	6.8	4.3	2.7	4.5
1956	13.7	13.1	12.5	12.0	11.4	10.9	10.4	10.0	9.5	9.1	71.7	44.8	27.9	17.3	10.8	6.8	4.2	2.7	4.5
1957	13.7	13.1	12.5	11.9	11.4	10.9	10.4	10.0	9.5	9.1	71.5	44.7	27.8	17.3	10.8	6.7	4.2	2.7	4.5

Table A.6. Continued. Male numbers at age in Washington (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
1958	13.6	13.0	12.5	11.9	11.4	10.9	10.4	9.9	9.5	9.1	71.4	44.6	27.7	17.2	10.7	6.7	4.2	2.6	4.4
1959	13.6	13.0	12.4	11.9	11.4	10.9	10.4	9.9	9.5	9.1	71.2	44.5	27.7	17.2	10.7	6.7	4.2	2.6	4.4
1960	13.6	13.0	12.4	11.9	11.4	10.9	10.4	9.9	9.5	9.1	71.0	44.4	27.6	17.1	10.6	6.7	4.2	2.6	4.4
1961	13.5	12.9	12.4	11.9	11.3	10.8	10.4	9.9	9.5	9.0	70.8	44.2	27.5	17.0	10.6	6.6	4.2	2.6	4.4
1962	13.5	12.9	12.4	11.8	11.3	10.8	10.3	9.9	9.4	9.0	70.7	44.1	27.4	17.0	10.6	6.6	4.1	2.6	4.4
1963	13.5	12.9	12.3	11.8	11.3	10.8	10.3	9.9	9.4	9.0	70.5	44.0	27.3	16.9	10.5	6.6	4.1	2.6	4.3
1964	13.5	12.9	12.3	11.8	11.3	10.8	10.3	9.9	9.4	9.0	70.3	43.8	27.1	16.8	10.4	6.5	4.1	2.6	4.3
1965	13.4	12.8	12.3	11.7	11.2	10.7	10.3	9.8	9.4	9.0	70.0	43.6	26.9	16.7	10.4	6.5	4.0	2.5	4.3
1966	13.4	12.8	12.3	11.7	11.2	10.7	10.2	9.8	9.4	9.0	69.9	43.3	26.7	16.6	10.3	6.4	4.0	2.5	4.2
1967	13.4	12.8	12.2	11.7	11.2	10.7	10.2	9.8	9.3	8.9	69.7	43.1	26.5	16.4	10.2	6.4	4.0	2.5	4.2
1968	13.3	12.8	12.2	11.7	11.2	10.7	10.2	9.8	9.3	8.9	69.5	42.9	26.4	16.3	10.1	6.3	3.9	2.5	4.2
1969	13.3	12.7	12.2	11.6	11.1	10.7	10.2	9.7	9.3	8.9	69.4	42.6	26.2	16.2	10.0	6.3	3.9	2.5	4.1
1970	13.2	12.7	12.1	11.6	11.1	10.6	10.2	9.7	9.3	8.9	69.2	42.4	26.0	16.1	10.0	6.2	3.9	2.4	4.1
1971	13.2	12.6	12.1	11.6	11.1	10.6	10.1	9.7	9.3	8.9	69.0	42.2	25.8	15.9	9.9	6.1	3.8	2.4	4.0
1972	13.1	12.6	12.0	11.5	11.1	10.6	10.1	9.7	9.2	8.8	68.8	41.8	25.5	15.7	9.8	6.1	3.8	2.4	4.0
1973	13.0	12.5	12.0	11.5	11.0	10.5	10.1	9.7	9.2	8.8	68.5	41.5	25.2	15.5	9.6	6.0	3.7	2.3	3.9
1974	12.9	12.4	11.9	11.4	11.0	10.5	10.1	9.6	9.2	8.8	68.2	41.1	24.9	15.3	9.5	5.9	3.7	2.3	3.9
1975	12.8	12.3	11.8	11.4	10.9	10.5	10.0	9.6	9.2	8.8	67.9	40.7	24.5	15.1	9.3	5.8	3.6	2.3	3.8
1976	12.7	12.2	11.7	11.3	10.9	10.4	10.0	9.6	9.2	8.7	67.8	40.4	24.3	14.9	9.2	5.7	3.6	2.2	3.7
1977	12.5	12.1	11.6	11.2	10.8	10.4	9.9	9.5	9.1	8.7	67.5	40.0	23.9	14.6	9.0	5.6	3.5	2.2	3.7
1978	12.4	11.9	11.5	11.1	10.7	10.3	9.9	9.5	9.1	8.7	66.8	39.1	23.2	14.1	8.7	5.4	3.4	2.1	3.5
1979	12.1	11.8	11.4	11.0	10.6	10.2	9.8	9.4	9.0	8.6	66.2	38.2	22.4	13.6	8.4	5.2	3.2	2.0	3.4
1980	11.9	11.6	11.3	10.9	10.5	10.1	9.7	9.3	9.0	8.6	65.6	37.1	21.5	13.0	8.0	5.0	3.1	1.9	3.2
1981	11.6	11.3	11.0	10.8	10.4	10.0	9.6	9.3	8.9	8.5	64.8	35.9	20.5	12.3	7.6	4.7	2.9	1.8	3.1
1982	11.3	11.1	10.8	10.5	10.3	9.9	9.6	9.2	8.8	8.5	64.8	35.7	20.2	12.1	7.4	4.6	2.9	1.8	3.0
1983	10.9	10.8	10.6	10.3	10.1	9.8	9.4	9.1	8.8	8.4	64.7	35.5	19.9	11.9	7.3	4.5	2.8	1.7	2.9
1984	10.5	10.4	10.3	10.1	9.8	9.6	9.3	9.0	8.7	8.3	64.3	35.0	19.3	11.5	7.0	4.3	2.7	1.7	2.8
1985	10.2	10.0	9.9	9.8	9.6	9.4	9.1	8.9	8.6	8.2	63.7	34.4	18.7	11.0	6.7	4.2	2.6	1.6	2.7
1986	9.9	9.8	9.6	9.5	9.4	9.2	8.9	8.7	8.5	8.1	62.8	33.3	17.8	10.4	6.3	3.9	2.4	1.5	2.5
1987	9.7	9.5	9.3	9.1	9.0	8.9	8.8	8.5	8.3	8.1	62.3	32.9	17.3	10.1	6.1	3.8	2.3	1.5	2.4
1988	9.4	9.3	9.0	8.9	8.7	8.6	8.5	8.4	8.1	7.9	61.3	31.9	16.5	9.5	5.7	3.5	2.2	1.4	2.3
1989	9.1	9.0	8.8	8.6	8.5	8.3	8.2	8.1	7.9	7.7	60.3	31.0	15.7	8.9	5.4	3.3	2.0	1.3	2.1
1990	8.6	8.7	8.6	8.4	8.2	8.1	7.9	7.8	7.7	7.5	58.4	29.1	14.4	8.0	4.8	3.0	1.8	1.1	1.9
1991	8.3	8.2	8.3	8.2	8.0	7.8	7.7	7.5	7.4	7.3	57.3	28.2	13.5	7.5	4.5	2.7	1.7	1.1	1.8
1992	7.8	8.0	7.9	7.9	7.8	7.7	7.5	7.3	7.1	7.0	55.9	27.1	12.7	6.9	4.1	2.5	1.6	1.0	1.6
1993	7.3	7.5	7.6	7.5	7.5	7.4	7.3	7.1	7.0	6.7	53.8	25.3	11.5	6.2	3.6	2.2	1.4	0.8	1.4
1994	6.7	6.9	7.1	7.3	7.1	7.2	7.1	6.9	6.7	6.6	51.8	23.7	10.4	5.5	3.2	1.9	1.2	0.7	1.2
1995	6.4	6.4	6.6	6.8	6.9	6.8	6.8	6.7	6.6	6.4	50.6	23.1	9.9	5.1	2.9	1.8	1.1	0.7	1.1
1996	6.0	6.1	6.1	6.3	6.5	6.6	6.5	6.5	6.4	6.2	49.5	22.5	9.4	4.7	2.7	1.6	1.0	0.6	1.0
1997	5.7	5.7	5.8	5.8	6.0	6.2	6.3	6.2	6.2	6.1	48.2	22.0	8.9	4.4	2.5	1.5	0.9	0.6	1.0
1998	5.2	5.4	5.5	5.6	5.6	5.7	5.9	6.0	5.9	5.8	46.8	21.3	8.4	4.0	2.3	1.4	0.8	0.5	0.9
1999	5.2	5.0	5.2	5.2	5.3	5.3	5.5	5.6	5.7	5.6	45.7	21.2	8.1	3.8	2.1	1.3	0.8	0.5	0.8

Table A.6. Continued. Male numbers at age in Washington (1000s) predicted by the base case model.

Age (yr)	0	1	2	3	4	5	6	7	8	9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
2000	4.9	4.9	4.8	4.9	5.0	5.1	5.1	5.2	5.3	5.4	43.3	19.5	7.2	3.3	1.8	1.1	0.7	0.4	0.7
2001	5.0	4.7	4.7	4.6	4.7	4.7	4.8	4.8	4.9	5.0	42.2	19.4	7.1	3.1	1.7	1.0	0.6	0.4	0.6
2002	5.0	4.8	4.5	4.5	4.3	4.5	4.5	4.6	4.6	4.6	40.1	18.2	6.4	2.8	1.5	0.9	0.5	0.3	0.5
2003	5.2	4.8	4.6	4.3	4.3	4.1	4.3	4.3	4.4	4.3	39.4	18.7	6.6	2.8	1.4	0.8	0.5	0.3	0.5
2004	5.3	4.9	4.6	4.4	4.1	4.1	4.0	4.1	4.1	4.1	38.6	19.4	6.8	2.8	1.4	0.8	0.5	0.3	0.5
2005	5.5	5.1	4.7	4.4	4.2	3.9	3.9	3.8	3.9	3.9	37.6	20.0	7.1	2.8	1.4	0.8	0.5	0.3	0.5
2006	5.6	5.2	4.8	4.5	4.2	4.0	3.7	3.7	3.6	3.7	36.2	20.4	7.3	2.8	1.4	0.8	0.5	0.3	0.5
2007	5.7	5.3	5.0	4.6	4.3	4.0	3.8	3.6	3.5	3.4	34.9	21.1	7.7	2.9	1.4	0.8	0.5	0.3	0.5
2008	5.8	5.5	5.1	4.7	4.4	4.1	3.8	3.6	3.4	3.4	33.4	21.6	8.0	3.0	1.4	0.8	0.5	0.3	0.5
2009	5.9	5.6	5.2	4.9	4.5	4.2	3.9	3.6	3.4	3.2	31.7	21.8	8.3	3.0	1.4	0.8	0.5	0.3	0.5
2009	4.9	4.9	4.8	4.9	5.0	5.1	5.1	5.2	5.3	5.4	43.3	19.5	7.2	3.3	1.8	1.1	0.7	0.4	0.7

13. Appendix B: SS Data file

Data file for 2009 Yelloweye rockfish assessment

Global model specifications
1916 # Start year
2008 # End year
1 # Number of seasons/year
12 # Number of months/season (vector, by season)
1 # Spawning occurs at beginning of season
6 # Number of fishing fleets
6 # Number of surveys
3 # Number of areas

Fleet Section
1_CARC%2_CACM%3_ORRC%4_ORCM%5_WARC%6_WACM%7_ORRCOB%8_CACPFV%9_IPHCWA%10_NWFSCOR%1
1_IPHCOR%12_WATRI

0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 # Fleet timing (proportion of season)
1 1 2 2 3 3 2 1 3 2 2 3 # Area of each fleet
1 1 1 1 1 1 # Units for catch by fishing fleet: 1=Biomass(mt),2=Numbers(1000s)
0.1 0.1 0.1 0.1 0.1 0.1 # SE of log(catch) by fishing fleet

More global specs
2 # Number of genders (1=combined,2=females and males)
100 # Accumulator age (plus group for population dynamics)

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

93 # Number of lines catch data

# Catch (by fleet)			Year			Season	
0.00	2.20	0.00	0.00	0.00	0.00	1916	1
0.00	3.62	0.00	0.00	0.00	0.00	1917	1
0.00	4.25	0.00	0.00	0.00	0.00	1918	1
0.00	2.16	0.00	0.00	0.00	0.00	1919	1
0.00	2.38	0.00	0.00	0.00	0.00	1920	1
0.00	2.30	0.00	0.00	0.00	0.00	1921	1
0.00	2.06	0.00	0.00	0.00	0.00	1922	1
0.00	2.21	0.00	0.00	0.00	0.00	1923	1
0.00	2.82	0.00	0.00	0.00	0.00	1924	1
0.00	3.86	0.00	0.00	0.00	1.00	1925	1
0.00	4.87	0.00	0.00	0.00	1.00	1926	1
0.00	5.92	0.00	0.00	0.00	1.00	1927	1
0.00	5.52	0.00	0.12	0.00	1.00	1928	1
0.73	5.66	0.00	0.21	0.00	1.00	1929	1
1.18	6.76	0.00	0.20	0.00	1.00	1930	1
1.76	5.62	0.00	0.15	0.00	1.00	1931	1
2.35	8.13	0.00	0.06	0.00	1.00	1932	1
2.94	4.45	0.00	0.08	0.00	1.00	1933	1
3.53	5.78	0.00	0.09	0.00	1.00	1934	1
4.12	7.99	0.00	0.08	0.00	1.00	1935	1
4.70	8.08	0.00	0.20	0.00	1.00	1936	1
5.61	6.08	0.00	0.26	0.00	1.00	1937	1
5.50	6.36	0.00	0.23	0.00	1.00	1938	1
4.81	6.43	0.00	0.17	0.00	1.00	1939	1
6.85	4.57	0.00	1.04	0.00	1.00	1940	1
6.25	5.35	0.00	2.18	0.00	1.00	1941	1
6.78	3.37	0.00	3.18	0.00	1.00	1942	1
7.30	5.89	0.00	11.61	0.00	1.00	1943	1
7.83	24.88	0.00	19.06	0.00	1.00	1944	1
8.36	58.56	0.00	29.27	0.00	1.00	1945	1
8.88	57.74	0.00	18.22	0.00	1.00	1946	1
5.02	16.28	0.00	11.40	0.00	1.00	1947	1
10.12	23.30	0.00	7.81	0.00	1.00	1948	1
13.09	9.89	0.00	7.94	0.00	1.00	1949	1
15.95	8.03	0.00	9.60	0.00	1.00	1950	1

17.91	16.99	0.00	6.20	0.00	1.00	1951	1
15.95	14.15	0.00	6.34	0.00	1.00	1952	1
13.97	11.77	0.00	5.07	0.00	1.00	1953	1
18.74	11.78	0.00	6.38	0.00	1.00	1954	1
24.06	6.98	6.20	6.70	1.00	2.00	1955	1
27.15	10.40	6.50	4.12	1.00	2.00	1956	1
24.78	13.17	6.70	11.81	1.00	2.00	1957	1
35.91	13.41	7.00	9.08	2.00	2.00	1958	1
30.41	10.25	7.20	9.97	2.00	2.00	1959	1
22.05	8.88	7.50	12.64	2.00	2.00	1960	1
17.68	5.25	7.70	11.52	2.00	2.00	1961	1
22.08	5.43	8.00	13.43	2.00	2.00	1962	1
23.10	10.86	8.20	8.65	3.00	4.00	1963	1
20.82	7.52	8.50	8.68	3.00	4.00	1964	1
31.51	9.38	8.70	7.33	3.00	4.00	1965	1
35.34	8.97	9.00	10.20	3.00	4.00	1966	1
36.60	7.85	9.20	8.74	3.00	4.00	1967	1
42.79	7.66	9.50	7.13	3.00	4.00	1968	1
44.97	25.70	9.70	12.18	3.00	4.00	1969	1
51.89	27.70	10.00	10.43	4.00	5.10	1970	1
46.17	46.50	13.10	4.64	4.00	6.41	1971	1
59.61	63.66	16.30	8.49	4.00	7.31	1972	1
75.02	49.51	7.40	10.58	4.00	9.21	1973	1
80.47	56.38	12.80	6.95	4.00	10.31	1974	1
81.34	60.24	6.20	7.92	4.00	7.10	1975	1
88.56	57.96	19.40	15.18	4.30	10.30	1976	1
79.78	57.45	19.90	16.24	8.80	17.88	1977	1
74.46	154.20	24.50	28.50	4.50	23.90	1978	1
85.49	99.33	38.80	62.20	3.50	28.50	1979	1
80.19	42.07	31.50	68.34	2.40	35.06	1980	1
43.58	169.44	36	102.2	3.4	9.7	1981	1
79.60	154.33	56.9	114.5	3.4	12.6	1982	1
38.36	62.69	63.8	177.41	6.7	16.99	1983	1
71.26	53.66	43.7	57.06	12.2	13.42	1984	1
121.87	12.22	26.8	91.88	8.8	26.41	1985	1
77.31	33.51	27.4	65.62	9	14.94	1986	1
57.83	54.31	29.8	73.72	10.5	25.09	1987	1
60.07	65.44	9.4	110.73	8.3	25.56	1988	1
54.44	51.25	16.9	170.21	14.6	39.5	1989	1
40.06	81.32	18.7	61.12	9.9	26.27	1990	1
27.38	147.3	17.2	137.74	18	20.36	1991	1
16.41	111.1	29.4	165.88	16.2	33.85	1992	1
7.13	52.92	27.73	183.18	18	29.76	1993	1
13.78	56.02	21.57	102.19	10.3	19.58	1994	1
10.08	51.4	16.81	148.34	9.9	18.07	1995	1
12.74	76.54	8.17	92.52	10.8	16.89	1996	1
14.58	68.68	15.38	115.42	11.4	18.68	1997	1
4.84	21.89	18.78	41.47	14.4	5.57	1998	1
9.40	23.49	18.05	61.35	10.6	32.92	1999	1
5.71	4.02	9.52	3.64	10.1	7.86	2000	1
6.37	4.35	4.83	6.23	12.5	21.84	2001	1
2.49	1.07	3.14	1.9	3.7	3.48	2002	1
3.74	0.71	3.02	1.02	2.6	1.3	2003	1
0.60	1.34	3.69	1.50	3.70	1.50	2004	1
0.90	1.86	4.30	1.45	5.20	1.36	2005	1
4.10	0.83	2.85	1.88	1.70	1.01	2006	1
8.00	2.92	3.14	1.95	2.49	1.14	2007	1
2.10	0.43	4.10	2.49	2.80	4.74	2008	1

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

# Year	Seas	Type	Value	s(log space)
# 2007 CA Recreational CPUE from WDFW (2000, 2001 removed for 2009; N=14)				
1980	1	1	4.48	0.240
1981	1	1	2.78	0.506
1982	1	1	11.27	0.361
1983	1	1	4.64	0.579
1984	1	1	8.46	0.413
1985	1	1	13.57	0.363
1986	1	1	6.25	0.314

1993	1	1	7.72	0.552
1994	1	1	1.87	0.616
1995	1	1	3.06	0.314
1996	1	1	2.08	0.193
1997	1	1	4.23	0.249
1998	1	1	3.12	0.295
1999	1	1	2.14	0.211
# 2007 Oregon Recreational CPUE from WDFW (unchanged for 2009; N=19)				
1979	1	3	16.99	0.225
1980	1	3	22.24	0.178
1981	1	3	17.98	0.169
1982	1	3	25.70	0.185
1983	1	3	31.95	0.189
1984	1	3	21.75	0.150
1986	1	3	15.27	0.143
1987	1	3	25.23	0.257
1988	1	3	14.81	0.268
1989	1	3	10.17	0.276
1990	1	3	16.02	0.208
1991	1	3	19.08	0.171
1992	1	3	16.46	0.209
1993	1	3	12.66	0.137
1994	1	3	10.17	0.132
1995	1	3	9.65	0.257
1996	1	3	6.10	0.134
1998	1	3	10.76	0.127
1999	1	3	13.84	0.186
# 2007 WA Recreational CPUE from WDFW (2000, 2001 removed for 2009; N=10)				
1990	1	5	6.90	0.70
1991	1	5	16.03	1.70
1992	1	5	15.29	1.24
1993	1	5	13.19	1.01
1994	1	5	7.15	0.42
1995	1	5	5.70	0.46
1996	1	5	5.72	0.50
1997	1	5	8.75	1.05
1998	1	5	11.06	1.24
1999	1	5	6.88	0.85
# 2009 Oregon Recreational Charter observer CPUE new for 2009; N=5)				
2004	1	7	0.000493	0.585
2005	1	7	0.000433	0.595
2006	1	7	0.001106	0.548
2007	1	7	0.000862	0.561
2008	1	7	0.001368	0.551
# 2007 CA CPFV CPUE from WDFW (unchanged for 2009; N=11)				
1988	1	8	26.19	0.211
1989	1	8	25.52	0.130
1990	1	8	32.16	0.265
1991	1	8	31.59	0.157
1992	1	8	20.88	0.130
1993	1	8	23.63	0.156
1994	1	8	21.67	0.132
1995	1	8	16.33	0.159
1996	1	8	17.90	0.154
1997	1	8	13.31	0.137
1998	1	8	10.13	0.248
# 2009 IPHC Washington-only (N=9)				
1999	1	9	0.000572	0.293
2001	1	9	0.003954	0.131
2002	1	9	0.001154	0.253
2003	1	9	0.004636	0.099
2004	1	9	0.001144	0.229
2005	1	9	0.003927	0.112
2006	1	9	0.001605	0.223
2007	1	9	0.002168	0.190
2008	1	9	0.000951	0.282
# 2009 NWFSC Trawl survey Oregon-only (N=6)				
2003	1	10	1929.89	0.551
2004	1	10	179.08	0.663
2005	1	10	154.13	0.594

2006 1 10 462.93 0.494
2007 1 10 165.86 0.658
2008 1 10 110.93 0.507
2009 IPHC Oregon-only (N=9)
1999 1 11 0.008136 0.055
2001 1 11 0.005207 0.082
2002 1 11 0.004382 0.089
2003 1 11 0.004691 0.069
2004 1 11 0.004420 0.079
2005 1 11 0.002013 0.111
2006 1 11 0.002372 0.125
2007 1 11 0.003533 0.099
2008 1 11 0.004276 0.091
2009 Triennial Trawl survey Washington-only (N=9)
1980 1 12 69.77 0.916
1983 1 12 644.32 0.407
1986 1 12 326.19 0.313
1989 1 12 628.84 0.380
1992 1 12 70.77 0.560
1995 1 12 18.05 0.883
1998 1 12 64.95 0.559
2001 1 12 107.37 0.520
2004 1 12 132.12 0.659

Discard observation section
2 # Type: 1 = biomass (mt),2 = fraction (D/(D+R)) by weight
0 # Number of discard observations all fleets and years

Mean body weight observation section
0 # Number of mean body weight observations

Population size structure
3 # Length bin method: 1=Use data bins,2=generate from min/max/width read below,3=Read count and vector below
41 # N population bins
Lower edge of bins
8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88

-1 # Minimum proportion for compressing tails of observed compositional data
0.001 # Constant added to expected frequencies
0 # Combine males and females at and below this bin number

37 # Number of data length bins

Lower edge of data length bins by bin
16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88

154 # Total number of length observations all fleets and years
Partition: 1=discarded catch, 2=retained catch, 0=whole catch (R+D)
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
Fleet 1: 2009 CA recreational (N=16)
1993 1 1 0 0 9.6 0 0 0 0 1 1
1 0 1 1 4 5 4 4 2 0 1
1 2 0 1 1 0 1 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
1994 1 1 0 0 13.4 0 0 0 0 0 2
3 2 4 9 7 4 3 9 8 2 2
2 0 2 1 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 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	15.5	0	0	1	0	0	1
	1	7	4	3	3	5	9	2	3	2	0
	1	1	2	0	0	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1996	1	1	0	0	21.4	0	0	3	2	1	5
	3	3	3	7	6	4	4	8	4	4	5
	3	3	2	1	2	1	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1997	1	1	0	0	4.2	0	0	0	0	0	0
	0	0	0	1	0	2	2	1	0	1	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	1	0	0	7.5	0	1	0	0	0	0
	2	3	5	1	1	0	2	1	1	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	20.1	0	0	1	0	3	2
	4	1	4	4	2	4	8	11	8	6	8
	4	6	4	4	2	0	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2000	1	1	0	0	11.5	0	0	1	1	0	0
	0	1	6	1	3	1	1	2	6	3	5
	5	4	3	1	0	0	2	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2001	1	1	0	0	7.1	0	0	0	0	0	0
	1	1	0	2	1	2	2	1	1	1	1
	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2002	1	1	0	0	5.8	0	0	0	0	0	0
	0	2	1	0	0	1	1	1	2	2	1
	0	1	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	6.1	1	0	0	0	0	1
	0	1	1	0	3	3	1	1	0	1	1
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	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	9.1	0	0	0	1	0	0
	1	0	0	1	0	2	3	1	1	1	0
	0	2	1	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	1	0	0	17.9	0	0	0	0	0	1
	1	0	3	2	5	4	7	5	6	9	4
	4	1	2	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
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2006	1	1	0	0	26.1	0	0	0	0	0	0
	2	3	3	5	9	2	6	8	10	14	15
	5	6	2	3	1	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	1	0	0	18.9	0	0	0	0	1	0
	0	1	2	2	9	2	8	11	7	4	3
	1	2	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	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	1	0	0	9.7	0	0	0	0	0	0
	0	0	1	3	2	0	3	3	5	3	3
	0	2	0	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

Fleet 2: 2009 CA commercial: Port and observer (N=30)

1978	1	2	0	0	4.1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	2
	2	6	1	0	0	1	0	0	1	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1979	1	2	0	0	23.3	0	0	0	0	0	0
	1	1	3	0	0	6	9	7	4	9	7
	7	3	2	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1980	1	2	0	0	22.8	0	0	0	0	0	0
	0	0	0	0	1	0	1	2	0	5	0
	1	4	1	3	5	5	4	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

1981	1	2	0	0	25.6	0	0	0	0	0	1
	0	1	0	0	3	5	5	10	5	11	11
	4	2	0	1	1	0	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	2	0	0	12.5	0	0	0	0	0	0
	0	0	0	0	0	1	0	2	1	4	2
	1	2	1	0	1	0	1	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1983	1	2	0	0	25.9	0	0	0	0	0	0
	1	3	1	0	2	1	3	2	4	3	3
	4	1	1	1	0	3	3	4	1	1	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1984	1	2	0	0	23.1	0	0	0	0	0	1
	1	1	0	1	0	0	2	3	0	0	0
	0	4	0	6	3	3	0	1	0	1	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	2	0	0	23.7	0	0	0	0	0	0
	1	0	2	0	1	1	4	3	3	2	3
	2	0	0	0	2	1	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1986	1	2	0	0	23.2	0	0	0	0	0	0
	0	0	1	1	1	2	1	0	3	0	3
	1	0	1	2	1	2	4	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1987	1	2	0	0	21.6	0	0	0	0	0	0
	1	1	1	1	3	1	0	1	1	2	1
	1	1	1	2	3	1	0	3	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1988	1	2	0	0	16.9	0	0	0	0	0	0
	0	0	0	1	1	0	0	2	1	1	3
	3	1	2	0	0	2	0	1	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1989	1	2	0	0	27.0	0	0	0	1	0	1
	0	0	3	2	1	3	3	4	1	3	5
	7	5	1	5	4	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1990	1	2	0	0	18.9	0	0	0	0	0	0
	1	0	1	4	4	6	1	1	0	1	0
	0	0	0	4	1	2	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1991	1	2	0	0	57.9	0	0	0	0	1	0
	1	5	5	11	13	16	15	12	23	21	11
	11	16	12	16	13	10	6	3	1	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1992	1	2	0	0	143.0	0	0	0	0	1	6
	5	21	24	26	25	32	41	48	50	29	27
	29	32	23	21	21	8	12	6	4	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1993	1	2	0	0	195.0	0	0	0	2	5	14
	33	28	54	45	52	43	59	52	57	39	42
	43	35	25	17	24	17	11	6	6	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1994	1	2	0	0	183.6	0	0	1	0	4	7
	21	26	44	60	63	54	69	69	62	61	49
	33	25	21	12	11	13	12	15	3	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1995	1	2	0	0	89.2	0	0	1	0	1	4
	11	16	24	13	40	35	29	41	26	31	22
	20	15	13	12	8	4	6	1	2	1	1
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1996	1	2	0	0	152.6	0	0	0	3	3	7
	14	32	37	30	48	56	57	40	47	26	28
	25	26	11	10	11	10	3	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1997	1	2	0	0	93.0	0	0	0	1	4	6
	14	15	21	27	24	24	17	15	24	19	17
	11	14	9	6	4	5	2	5	3	2	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	2	0	0	26.6	0	0	0	0	0	0
	0	0	2	5	7	5	3	6	8	4	5
	3	3	3	0	5	0	1	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1999	1	2	0	0	128.1	0	0	0	1	0	6
	4	7	16	36	31	39	58	53	50	45	36
	36	26	19	16	11	8	2	1	3	1	1
	1	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2000	1	2	0	0	17.6	0	0	0	0	0	2
	1	2	1	1	1	2	1	3	3	1	4
	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	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2001	1	2	0	0	46.1	0	0	0	1	2	15
	28	14	22	12	5	4	9	6	7	4	4
	2	2	2	1	2	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	0	0	0	0	0	0	0	0	0	0
	0	0									
2002	1	2	0	0	10.7	0	0	0	0	0	0
	1	2	2	1	0	1	0	1	1	0	2
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	2	0	0	3.6	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	1	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	2	0	0	34.8	0	0	0	0	0	1
	1	1	4	5	9	5	5	9	8	4	5
	4	2	2	1	2	0	1	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	2	0	0	19.5	0	0	0	0	0	1
	0	2	1	3	4	3	3	5	7	7	1
	3	5	1	0	2	4	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2006	1	2	0	0	9.9	0	0	0	0	1	1
	0	2	2	3	2	2	3	3	3	2	3
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	2	0	0	30.9	0	0	1	1	0	2
	4	2	8	9	5	6	5	11	6	6	5

	2	1	2	0	1	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
# Fleet 3: 2009 OR recreational lengths (N=28)											
# Sexed											
1978	1	3	3	0	120	0	0	0	0	0	3
	2	6	2	3	5	1	3	3	2	1	0
	1	0	4	10	3	5	1	2	3	3	3
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	1	4	1	1	1	0	3
	2	4	2	2	4	1	2	2	1	1	3
	11	2	1	1	0	0	0	0	0	0	0
	0	0									
1979	1	3	3	0	107	0	0	0	0	0	0
	3	2	2	4	2	1	0	2	3	2	2
	3	5	3	8	6	2	3	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	2	1	0	0	2	3	1	2	1
	1	0	1	2	2	6	4	6	7	2	2
	5	1	1	1	0	0	0	0	0	0	0
	0	0									
1984	1	3	3	0	168	0	0	0	0	0	1
	6	2	3	8	12	14	4	9	5	8	6
	3	7	5	1	4	8	5	2	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	2	2	7	6	3	4
	2	3	6	2	2	3	1	0	3	1	3
	2	0	0	0	0	0	0	0	0	0	0
	0	0									
1985	1	3	3	0	122	0	0	0	0	0	1
	1	2	1	4	2	5	1	4	2	1	1
	1	6	3	3	7	2	1	1	3	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	2	4	2	3	5
	3	7	3	1	2	5	3	4	5	6	3
	2	2	1	1	1	0	0	0	0	0	0
	0	0									
1986	1	3	3	0	130	0	0	0	0	0	0
	0	0	3	3	6	10	3	3	0	6	2
	1	2	5	4	6	2	5	4	1	1	0
	2	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	2	1	3	5	3	5	2
	5	3	5	1	2	2	2	2	3	7	1
	1	1	2	2	0	0	0	0	0	0	0
	0	0									
1987	1	3	3	0	121	0	0	0	0	0	3
	3	1	2	8	1	4	1	2	6	4	4
	3	4	3	3	7	2	2	4	1	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	3	0	1	2	2	5	4
	3	3	4	2	2	0	2	0	4	3	5
	2	1	1	0	0	0	0	0	0	0	0
	0	0									
1989	1	3	3	0	31	0	0	1	0	0	0
	0	0	2	0	0	5	2	2	0	2	0
	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	1	0	0	3	0	1	0
	2	1	1	0	1	2	0	0	0	0	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0									
# Unsexed											
1980	1	3	0	0	25	0	0	0	0	0	1
	0	0	3	1	1	0	2	1	1	0	0
	2	1	0	1	3	0	4	2	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1981	1	3	0	0	13	0	0	0	0	0	0
	0	0	0	3	1	1	0	0	2	1	1
	0	0	0	1	0	1	0	0	1	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1982	1	3	0	0	61	0	0	0	0	0	0
	1	5	3	5	5	5	3	1	7	4	4
	6	3	1	2	1	1	1	1	0	0	0
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1983	1	3	0	0	17	0	0	0	0	0	0
	1	0	0	1	0	1	3	2	2	1	2
	1	0	1	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1984	1	3	0	0	180	0	0	0	0	1	2
	6	5	15	22	11	21	23	14	11	7	3
	3	4	7	1	4	6	3	4	2	2	1
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1985	1	3	0	0	100	0	0	0	0	0	0
	3	6	1	9	3	13	7	4	7	8	12
	6	1	1	3	4	1	5	2	1	3	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1986	1	3	0	0	45	0	0	1	0	1	0
	1	1	1	2	1	3	2	3	5	2	4
	0	4	2	4	1	1	0	5	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1987	1	3	0	0	44	0	0	2	0	1	0
	2	1	1	2	2	4	3	1	4	1	1
	2	3	4	2	2	1	2	1	1	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1988	1	3	0	0	38	0	0	0	0	0	0
	0	5	1	4	1	2	2	2	7	3	2
	2	0	1	3	2	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1989	1	3	0	0	81	0	0	0	3	2	2
	4	2	7	4	3	2	9	6	5	6	3
	7	4	1	1	2	4	0	1	0	1	0

	1	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1993	1	3	0	0	163	0	0	1	0	0	1
	10	13	19	15	21	17	10	4	7	4	4
	7	3	3	5	7	3	1	4	0	2	1
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1994	1	3	0	0	151	0	0	0	1	0	2
	3	10	16	14	23	11	19	9	7	5	6
	7	6	2	5	1	0	1	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1995	1	3	0	0	110	0	0	0	0	1	3
	0	4	9	8	15	11	8	7	3	8	3
	7	4	4	2	3	6	1	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1996	1	3	0	0	73	0	0	0	0	1	1
	3	2	3	9	8	9	13	4	7	3	2
	1	2	0	1	1	1	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1997	1	3	0	0	99	0	0	0	1	1	1
	3	4	7	7	9	9	14	6	12	4	2
	6	3	5	0	1	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	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	3	0	0	147	0	0	0	0	0	0
	3	4	6	7	21	20	15	18	14	11	5
	8	2	3	4	3	0	2	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1999	1	3	0	0	246	0	0	0	1	0	1
	2	8	13	16	27	37	24	26	19	19	10
	14	8	2	7	4	4	3	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2000	1	3	0	0	62	0	0	0	0	0	0
	0	3	3	5	4	6	10	11	4	2	4
	0	3	2	2	0	2	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	3	0	0	368	0	0	0	0	1	3
	10	8	12	20	18	29	32	31	43	37	32
	20	24	13	9	10	2	4	2	3	4	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2002	1	3	0	0	448	0	0	0	1	4	4
	5	8	11	24	31	33	40	43	36	60	40
	32	18	19	9	5	10	8	4	2	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2003	1	3	0	0	490	0	0	1	1	3	5
	13	5	11	19	19	30	37	36	42	44	48
	39	36	36	17	10	12	7	5	8	4	0
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

Fleet 4: 2009 OR commercial (N=15)

1992	1	4	3	0	2.8	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	1	0	0	0	0	0	0	0	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	1	1	2	1	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0									
1995	1	4	3	0	15.1	0	0	0	0	0	0
	0	0	0	0	2	8	1	6	1	1	5
	1	3	1	1	1	2	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	2	6	0
	0	6	3	3	4	4	0	3	1	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1996	1	4	3	0	24.8	0	0	0	0	0	0
	0	2	0	4	5	5	9	4	5	2	2
	2	2	5	1	1	1	1	0	0	2	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	5	6	9	13
	4	14	2	2	4	3	3	2	0	3	3
	0	1	1	0	0	0	0	0	0	0	0
	0	0									
1997	1	4	3	0	39.0	0	0	1	0	0	0
	0	0	4	5	11	7	20	11	9	10	7
	4	2	6	2	1	3	1	2	1	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	5	4	14	24	15
	17	11	5	11	4	2	1	2	4	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	4	3	0	16.1	0	0	0	0	0	0
	0	1	2	1	3	5	2	6	2	8	2
	3	1	3	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	1	0	2	8	1
	12	1	10	5	5	1	0	0	1	3	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0									
1999	1	4	3	0	33.9	0	0	0	0	0	0
	0	0	1	0	1	2	9	8	7	5	8
	10	2	4	3	1	4	2	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	3	5	8

	8	9	8	8	9	10	8	6	5	0	4
	0	0	2	0	1	0	1	0	0	0	0
	0	0									
2000	1	4	3	0	53.5	0	0	0	0	0	0
	1	1	2	4	6	13	5	5	9	6	2
	3	7	3	1	0	1	1	1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	3	2	3	7	9
	11	6	3	9	4	1	4	0	3	0	0
	2	0	1	0	0	0	0	0	0	0	0
	0	0									
2001	1	4	3	0	76.2	0	0	0	0	0	0
	3	8	6	7	7	8	19	10	6	9	10
	6	6	3	5	2	1	1	2	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	14	5	5	5	3	8
	13	10	4	7	5	4	3	1	4	2	1
	1	1	0	1	0	0	0	0	0	0	0
	0	0									
2002	1	4	3	0	9.9	0	0	0	0	0	1
	0	0	0	1	0	0	1	1	3	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	1	0	0
	0	0	0	0	1	1	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0									
2003	1	4	3	0	6.1	0	0	0	0	0	0
	0	0	2	0	1	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	8	6	5	2	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2004	1	4	3	0	22.4	0	0	0	0	0	0
	0	0	1	1	1	0	2	3	2	5	2
	1	3	4	0	1	1	1	0	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	1
	2	0	2	3	1	6	0	3	5	3	0
	1	2	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	4	3	0	27.4	0	0	0	0	0	0
	0	0	0	0	2	1	0	2	4	1	0
	1	0	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	2	3	1	0	0
	1	4	5	1	2	2	0	0	1	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0									
2006	1	4	3	0	8.1	0	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	1	1	0	2	1	1	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	4	3	0	3.7	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	4	3	0	5.2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	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	1
	0	0	1	0	1	1	2	1	2	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

Fleet 5: 2009 WA recreational (N=8)

1998	1	5	3	0	4.5	0	0	0	0	0	0
	0	0	0	0	0	2	4	0	2	0	2
	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	3	1	2	2	0	0	1	0	1	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0									
1999	1	5	3	0	17.1	0	0	0	0	0	0
	0	0	0	2	0	3	2	4	5	0	2
	4	0	3	6	2	4	1	6	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	3	1	0	7
	4	3	3	4	0	1	4	0	3	6	2
	4	3	0	1	0	0	0	0	0	0	0
	0	0									
2000	1	5	3	0	33.1	0	0	0	0	0	0
	0	0	2	0	4	7	8	9	9	7	9
	6	7	4	5	5	2	4	3	3	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	1	6	4	2
	9	4	7	8	6	5	8	8	4	6	4
	4	4	1	0	0	0	0	0	0	0	0
	0	0									
2001	1	5	3	0	23.9	0	0	0	0	0	0
	0	0	0	0	0	0	5	5	6	5	2
	2	1	4	2	7	3	3	2	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	1	1	3	3
	4	4	3	8	3	5	3	4	1	2	3
	0	1	0	0	1	1	0	0	0	0	0
	0	0									
2004	1	5	3	0	6.7	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	1	1	0
	0	0	2	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	1	0	0	0	1	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	5	3	0	2.6	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	1	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2006	1	5	3	0	1.0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	5	3	0	3.8	0	0	0	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0									

Fleet 6: 2009 WA commercial (N=15)
unsexed

1980	1	6	0	0	2.6	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1993	1	6	0	0	4.8	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	1
	1	2	2	1	2	0	1	1	0	1	1
	2	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1996	1	6	0	0	65.1	0	0	0	0	0	0
	2	5	8	17	13	24	27	34	26	18	9
	11	9	12	10	13	12	13	16	11	1	3
	0	2	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1997	1	6	0	0	40.6	0	0	0	0	0	0
	0	1	6	8	4	16	15	18	20	14	7
	10	5	4	3	3	1	3	3	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	6	0	0	21.7	0	0	0	0	0	0
	0	3	0	0	0	3	6	2	10	5	7
	4	5	4	2	3	1	3	1	3	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1999	1	6	0	0	14.2	0	0	0	0	0	0
	0	0	0	1	0	0	1	3	8	1	3
	4	5	3	5	2	0	1	3	2	1	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2000	1	6	0	0	69.8	0	0	0	0	0	0
	2	0	4	6	4	3	8	29	28	50	34
	40	30	32	21	27	16	12	3	9	1	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2001	1	6	0	0	111.5	0	0	0	0	0	0
	0	0	0	1	1	2	13	20	42	52	91
	83	74	56	50	40	21	17	13	3	3	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

sexed

2002	1	6	3	0	62.9	0	0	0	0	0	0
	1	0	0	0	0	4	5	6	9	6	6
	10	6	1	4	3	1	4	2	2	1	1

	1	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	0	0	1	1	7
	3	7	10	10	9	25	6	6	9	6	3
	4	6	3	0	3	1	0	0	0	0	0
	0	0									
2003	1	6	3	0	32.1	0	0	0	0	0	0
	0	0	0	0	0	1	3	2	4	3	5
	3	2	1	0	1	2	2	1	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	3	1	4	5	5	2	4	0	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0									
2004	1	6	3	0	25.0	0	0	0	0	0	0
	0	1	0	0	0	0	0	1	3	0	4
	2	6	3	2	0	0	2	1	1	4	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	5	1	4	3	1	3	1	0	0
	0	0	1	1	0	0	0	0	0	0	0
	0	0									
2005	1	6	3	0	19.2	0	0	0	0	0	0
	0	0	1	0	0	0	1	1	0	1	1
	1	2	1	0	0	0	1	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	1	1	1	0	3	1	0	0	0
	0	0	1	1	1	1	0	0	0	0	0
	0	0									
2006	1	6	3	0	38.1	0	0	0	0	0	0
	0	0	1	0	0	0	3	1	2	5	7
	11	8	6	2	0	4	2	2	2	0	3
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	2
	0	0	3	3	1	3	11	5	3	3	2
	4	0	0	0	2	0	0	0	0	0	0
	0	0									
2007	1	6	3	0	10.0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	2	2	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	1	0	1
	0	0	1	2	5	4	0	2	4	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	6	3	0	1.0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

Fleet 7: 2009 Oregon recreational observer (N=5)

2004	1	7	0	0	13.9	0	0	1	1	0	0
	0	1	2	0	0	4	3	3	2	1	2
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	7	0	0	15.3	0	0	0	1	0	2
	0	2	1	1	0	1	0	2	3	2	0
	1	1	1	1	1	1	0	0	2	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

2006	1	7	0	0	30.3	0	0	1	2	1	6
	2	3	1	2	4	2	1	2	3	1	2
	4	4	0	1	1	1	0	0	0	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	7	0	0	30.2	0	0	0	1	2	4
	5	3	4	7	1	3	2	3	4	1	3
	4	1	2	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	7	0	0	29.1	0	0	1	0	2	4
	6	7	4	8	6	1	3	2	1	1	3
	2	1	2	1	0	2	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

Fleet 8: 2009 CA recreational CPFV (N=12)

1987	1	8	0	0	19.2	0	0	0	0	0	0
	1	4	0	1	0	0	2	5	1	1	1
	1	2	0	0	3	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	99.1	0	0	2	4	9	6
	19	18	14	27	13	22	19	17	11	11	10
	8	16	10	15	7	6	5	4	3	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1989	1	8	0	0	122.5	0	0	1	1	2	4
	16	15	15	30	30	24	21	18	18	13	19
	11	11	8	4	3	7	3	2	2	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1990	1	8	0	0	43.3	0	0	1	4	2	2
	3	0	5	7	8	15	9	10	4	2	2
	2	3	2	5	0	1	0	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1991	1	8	0	0	52.5	0	0	0	1	1	1
	2	1	11	8	12	10	6	13	7	9	3
	5	6	5	4	3	2	0	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1992	1	8	0	0	103.6	0	2	0	1	6	8
	1	11	3	7	13	12	16	12	10	8	14
	9	10	7	4	4	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	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1993	1	8	0	0	105.0	0	0	1	1	5	9
	13	14	14	10	15	12	11	22	10	9	8
	6	10	6	6	5	2	8	1	3	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1994	1	8	0	0	101.1	0	0	0	1	3	7
	5	15	17	15	12	19	14	12	15	11	13
	7	4	6	2	3	2	3	1	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1995	1	8	0	0	93.0	0	1	2	0	2	5
	5	7	10	10	14	6	11	17	11	14	7
	9	4	4	4	5	0	3	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1996	1	8	0	0	86.6	0	1	1	4	4	4
	8	6	7	8	7	21	20	11	11	9	11
	6	4	5	5	3	3	1	2	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1997	1	8	0	0	87.9	0	0	2	0	6	5
	3	3	7	6	8	13	6	11	5	9	15
	10	11	7	3	8	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	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	8	0	0	38.6	0	0	0	0	1	0
	2	1	2	1	3	5	3	4	6	9	3
	2	3	3	4	1	0	0	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
#Fleet 10: 2009 WA IPHC (N=6)											
2003	1	9	3	0	99	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	1	3	2
	2	2	4	4	4	4	5	12	2	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	1	0	2	0	1	5	1	3	8	7	11
	5	5	0	1	0	0	0	0	0	0	0
	0	0									
2004	1	9	3	0	17	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	2	1	0	0	0	0	0	2	4	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	1	1	0	1	0	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	9	3	0	72	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	2

	4	0	4	1	2	2	4	4	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	1	1	4	11	2	6	7	5
	4	1	1	0	0	0	0	0	0	0	0
	0	0									
2006	1	9	3	0	34	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	3	4	1	1	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	1
	0	0	1	0	0	0	2	3	5	2	2
	3	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	9	3	0	268	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	4	5
	9	11	9	13	12	9	10	9	12	1	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	2	1	10	16	21	29	31	21	8
	6	11	3	0	0	0	0	0	0	0	0
	0	0									
2008	1	9	3	0	83	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	2	2	4	2	1	6	2	2	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	5	9	9	6	10	12
	4	1	3	0	0	0	0	0	0	0	0
	0	0									

#Fleet 11: 2009 NWFSC OR only (N=6)

2003	1	10	3	0	8.7	0	0	0	0	0	0
	0	0	0	0	0	3	2	2	0	0	1
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	1	1	3	2
	1	2	1	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2004	1	10	3	0	5.8	0	0	0	0	0	0
	0	1	0	0	0	2	0	0	0	1	1
	1	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	10	3	0	6.8	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	2	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	2
	0	1	1	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2006	1	10	3	0	10.5	0	0	0	0	0	0
	2	0	0	0	0	2	1	3	1	2	1
	3	0	2	1	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	1	1	1	1	0	1	1
	0	2	2	1	1	0	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	10	3	0	6.0	0	0	1	1	0	0
	0	0	0	0	0	1	0	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	1
	1	0	0	0	0	0	0	1	0	0	0
	1	0	0	1	1	0	0	0	1	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	10	3	0	9.0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	2	1	0	1	0	0
	1	3	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
#Fleet 12: 2009 OR IPHC (N=6)											
2003	1	11	3	0	217	0	0	0	0	0	0
	0	0	0	2	0	1	0	6	10	8	8
	20	10	5	6	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	4
	5	12	17	21	14	8	17	13	7	6	3
	2	1	0	1	0	0	0	0	0	0	0
	0	0									
2004	1	11	3	0	155	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	7	11	7
	5	8	9	7	2	7	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
	1	6	9	11	16	11	7	12	7	3	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0									
2005	1	11	3	0	68	0	0	0	0	0	0
	0	0	0	0	0	0	0	5	1	5	6
	4	4	3	0	3	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	3	4	7	5	3	2	4	5	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2006	1	11	3	0	58	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	2
	2	2	5	3	4	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	1
	0	1	0	5	8	7	5	3	1	3	2
	1	0	0	0	0	0	0	0	0	0	0
	0	0									
2007	1	11	3	0	103	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	6	2
	7	6	3	2	7	3	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	3	6	5	5	6	8	11	8	9	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0									
2008	1	11	3	0	253	0	0	0	0	0	0
	0	0	0	0	0	0	1	4	1	10	11
	14	9	12	6	7	8	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	2	0
	2	2	8	24	22	19	26	13	10	13	10
	7	3	0	1	0	0	0	0	0	0	0
	0	0									
#Fleet 13: 2009 WA Triennial (N=7)											
1986	1	12	3	0	16.6	0	0	0	0	0	1
	0	1	0	0	0	1	0	1	0	1	1
	1	3	1	0	2	0	4	2	2	0	2
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	1	0	0	2	0	0	0	2	1	7
	2	3	6	0	1	0	0	0	0	0	0
	0	0									
1989	1	12	3	0	12.1	0	0	1	1	1	1
	1	0	0	3	0	1	0	1	2	0	1

	0	1	1	0	2	3	5	2	1	1	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	0	1	1	1	0	0	0	0
	0	2	2	1	0	0	0	0	2	2	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1992	1	12	3	0	4.5	0	0	0	0	0	0
	0	1	0	0	1	0	0	0	0	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0									
1995	1	12	3	0	5.5	0	1	0	0	0	0
	0	1	0	0	0	0	0	0	1	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	1	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0									
1998	1	12	3	0	11.3	0	0	0	0	0	0
	1	0	0	0	0	0	0	2	0	2	2
	0	0	0	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	0	1
	0	2	0	0	2	1	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0									
2001	1	12	3	0	11.5	0	0	0	0	0	0
	0	0	0	0	1	2	1	2	2	1	3
	2	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	1	0	1	1	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
2004	1	12	3	0	4.7	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	0
	0	2	0	2	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									

64 # Number of age bins for data inputs
Lower edge of age bins (first is a minus group, last is a plus group)
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65

1 # Number of ageing error types
Vectors of: Average age at true age (to accumulator age)
SD of ageing precision at true age
Accumulator age = 100

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	41.5	42.5	43.5	44.5
	45.5	46.5	47.5	48.5	49.5	50.5	51.5	52.5	53.5	54.5	55.5
	56.5	57.5	58.5	59.5	60.5	61.5	62.5	63.5	64.5	65.5	66.5
	67.5	68.5	69.5	70.5	71.5	72.5	73.5	74.5	75.5	76.5	77.5
	78.5	79.5	80.5	81.5	82.5	83.5	84.5	85.5	86.5	87.5	88.5
	89.5	90.5	91.5	92.5	93.5	94.5	95.5	96.5	97.5	98.5	99.5
	100.5										
0.343	0.343	0.439	0.534	0.628	0.721	0.812	0.903	0.993	1.082	1.170	1.257
	1.343	1.428	1.512	1.595	1.677	1.758	1.839	1.918	1.997	2.075	2.152
	2.228	2.304	2.378	2.452	2.525	2.597	2.668	2.739	2.808	2.877	2.946
	3.013	3.080	3.146	3.211	3.276	3.340	3.403	3.466	3.527	3.589	3.649

3.709 3.768 3.827 3.885 3.942 3.998 4.055 4.110 4.165 4.219 4.273
4.326 4.378 4.430 4.481 4.532 4.582 4.632 4.681 4.730 4.778 4.825
4.872 4.919 4.965 5.010 5.055 5.100 5.144 5.187 5.230 5.273 5.315
5.357 5.398 5.439 5.479 5.519 5.558 5.597 5.636 5.674 5.712 5.749
5.786 5.822 5.859 5.894 5.930 5.965 5.999 6.033 6.067 6.101 6.134
6.167

806 # Number of age comp observations
2 # Length bin refers to: 1=population length bin indices; 2=data length bin indices; 3= actual lengths
0 #_combine males into females at or below this bin number

Year Season Type Gender Partition ageerr Lbin_lo Lbin_hi Nsamps Data: females then males
Fleet 1: 2009 CA recreational (N=4)
Conditional
1983 1 1 1 0 1 10 10 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 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 1 0 1 21 21 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
Ghost
1983 1 1 3 0 1 1 37 -1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 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 3 0 1 1 37 -1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
Fleet 2: 2009 CA commercial (N=70)
Conditional

1978	1	2	1	0	1	9	9	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1978	1	2	1	0	1	11	11	1	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1978	1	2	1	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1978	1	2	2	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1978	1	2	2	0	1	18	18	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1978	1	2	2	0	1	20	20	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	1	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	2	0	1	13	13	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	2	0	1	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	2	0	1	17	17	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	1	0	1	18	18	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	2	0	1	18	18	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	2	0	1	19	19	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	2	0	1	19	19	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1980	1	2	2	0	1	12	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	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1980	1	2	1	0	1	14	14	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	1	0	1	15	15	2	0	0	0
	0	0	0	0	0	0	2	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	1	0	1	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	2	0	1	21	21	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1980	1	2	1	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	2	1	0	1	9	9	2	0	0	0
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	2	1	0	1	11	11	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	2	2	0	1	7	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
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	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	2	2	0	1	8	8	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	1	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	2	0	1	9	9	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	2	0	1	10	10	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	1	0
	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	2	2	0	1	13	13	1	0	0	0
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	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	2	1	0	1	16	16	2	0	0	0
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	0	1	0	0	1	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	2	1	0	1	18	18	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	2	1	0	1	22	22	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	1	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	2	2	0	1	23	23	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

Ghost

1978	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	1	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	1	0	1	0	1	0	0	0	0
	1	0	0	0	0	1	1	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1980	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	2	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1981	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	1	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1982	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	3	0	1	1	37	-1	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	3	0	1	1	37	-1	0	0	0
	0	0	1	0	0	0	0	0	1	1	0
	0	1	0	0	0	1	0	0	0	0	0
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	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1986	1	2	3	0	1	1	37	-1	0	0	0
	0	0	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1988	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	2	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	3	0	1	1	37	-1	0	0	0
	0	3	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	1
	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							
2005	1	2	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	1	0	0	0	1	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0

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

Fleet 3: 2009 OR recreational (N=187)
Conditional

1979	1	3	1	0	1	19	19	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	3	1	0	1	20	20	5	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	1	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	3	1	0	1	22	22	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1979	1	3	1	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
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1979	1	3	1	0	1	27	27	1	0	0	0
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1984	1	3	1	0	1	12	12	4	0	0	0
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1984	1	3	1	0	1	13	13	4	0	0	0
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1984	1	3	1	0	1	14	14	4	0	0	0
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1984	1	3	1	0	1	15	15	3	0	0	0
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1984	1	3	1	0	1	16	16	2	0	0	0
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1984	1	3	1	0	1	17	17	1	0	0	0
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1984	1	3	1	0	1	18	18	2	0	0	0
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1984	1	3	1	0	1	19	19	5	0	0	0
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1984	1	3	1	0	1	20	20	2	0	0	0
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1984	1	3	1	0	1	21	21	1	0	0	0
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1984	1	3	1	0	1	22	22	3	0	0	0
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1984	1	3	1	0	1	23	23	3	0	0	0
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1984	1	3	1	0	1	24	24	1	0	0	0
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1984	1	3	2	0	1	20	20	1	0	0	0
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1984	1	3	2	0	1	23	23	1	0	0	0
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1985	1	3	1	0	1	7	7	1	0	0	0
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1985	1	3	1	0	1	8	8	1	0	0	1
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1985	1	3	1	0	1	10	10	1	0	0	0
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1985	1	3	1	0	1	12	12	2	0	0	0
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1986	1	3	2	0	1	18	18	2	0	0	0
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1987	1	3	1	0	1	27	27	1	0	0	0
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1987	1	3	2	0	1	12	12	3	0	0	0
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1989	1	3	2	0	1	26	26	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	1	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	1	0	1	14	14	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	1	0	1	15	15	3	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	1	0	1	16	16	3	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	0	0	1	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	1	0	1	19	19	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	1	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	1	0	1	22	22	1	0	0	0
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	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	2	0	1	7	7	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	2	0	1	11	11	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	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	0	0	0	0
	0	0	0	0							
2001	1	3	2	0	1	12	12	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
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	2	0	1	15	15	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
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	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	3	2	0	1	17	17	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	3	2	0	1	18	18	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	3	2	0	1	19	19	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	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	0	0	0							
2001	1	3	2	0	1	21	21	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
# Ghost											
1979	1	3	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	2	1	2	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	1	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	2	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1984	1	3	3	0	1	1	37	-1	0	0	0
	1	1	3	9	4	1	2	11	2	2	3
	1	0	2	2	0	0	0	2	1	0	0
	1	2	0	0	0	1	1	0	1	0	1
	0	0	0	0	1	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	3	0	0	0	0	0
	2	3	1	2	0	5	1	2	2	1	2
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
1985	1	3	3	0	1	1	37	-1	0	0	1
	0	1	0	0	3	1	0	1	1	0	0
	2	2	0	0	0	0	0	0	0	0	2
	0	0	0	0	1	0	1	1	2	1	1

	0	0	0	0	0	1	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	4	0	0	0	1	0
	1	0	1	0	1	1	3	1	3	2	2
	0	0	0	0	0	0	0	1	0	0	0
	1	1	0	0	0	1	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	1	0	0	0	0	0	0	0	0
	0	1	0	3							
1986	1	3	3	0	1	1	37	-1	0	0	0
	0	0	1	1	1	4	2	2	1	1	0
	2	1	1	0	0	0	0	0	1	0	1
	0	0	0	2	0	0	0	0	1	0	1
	2	1	1	1	0	0	0	0	0	0	0
	0	0	0	0	1	0	1	0	0	1	0
	0	0	0	0	0	6	0	0	0	1	1
	0	2	2	1	3	2	2	3	0	2	1
	0	0	0	1	0	0	1	0	0	0	0
	0	1	0	0	0	0	1	0	1	1	0
	0	0	0	0	1	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	2							
1987	1	3	3	0	1	1	37	-1	0	0	1
	1	0	0	0	1	1	1	3	2	1	2
	1	1	3	1	0	1	1	0	1	0	1
	0	0	0	0	0	0	1	0	0	1	1
	1	0	1	1	0	0	1	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	1	0	1	0	0	4	0	0	0	1	0
	1	0	2	2	1	1	2	1	1	1	1
	1	0	2	0	0	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	2
	1	0	1	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
1989	1	3	3	0	1	1	37	-1	0	0	0
	1	0	1	1	1	2	0	1	2	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	0	2	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
2001	1	3	3	0	1	1	37	-1	0	0	0
	1	0	0	0	0	0	0	1	1	3	1
	0	3	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	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	2	1	1	0	2
	2	2	1	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

Fleet 4: 2009 OR commercial (N=75)
Conditional

2001	1	4	1	0	1	7	7	2	0	0	0
	0	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	4	1	0	1	12	12	2	0	0	0
	0	0	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	4	1	0	1	13	13	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	4	2	0	1	8	8	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2001	1	4	2	0	1	9	9	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	4	2	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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2003	1	4	1	0	1	11	11	1	0	0	0
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2003	1	4	2	0	1	8	8	1	0	0	0
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2003	1	4	2	0	1	9	9	8	0	0	0
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2003	1	4	2	0	1	12	12	2	0	0	0
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2004	1	4	1	0	1	9	9	1	0	0	0
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2004	1	4	1	0	1	11	11	1	0	0	0
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2004	1	4	1	0	1	13	13	2	0	0	0
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2004	1	4	1	0	1	16	16	1	0	0	0
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2004	1	4	1	0	1	18	18	1	0	0	0
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2004	1	4	1	0	1	26	26	2	0	0	0
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2004	1	4	2	0	1	8	8	1	0	0	0
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2004	1	4	2	0	1	16	16	1	0	0	0
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2004	1	4	2	0	1	17	17	1	0	0	0
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2004	1	4	2	0	1	18	18	1	0	0	0
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2004	1	4	2	0	1	21	21	1	0	0	0
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2004	1	4	2	0	1	22	22	1	0	0	0
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2004	1	4	2	0	1	23	23	1	0	0	0
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2005	1	4	1	0	1	11	11	2	0	0	0
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2005	1	4	1	0	1	16	16	1	0	0	0
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2005	1	4	2	0	1	7	7	1	0	0	0
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2005	1	4	2	0	1	10	10	2	0	0	0
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2005	1	4	2	0	1	16	16	2	0	0	0
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2005	1	4	2	0	1	17	17	1	0	0	0
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2005	1	4	2	0	1	18	18	1	0	0	0
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2005	1	4	2	0	1	23	23	1	0	0	0
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2005	1	4	2	0	1	25	25	1	0	0	0
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2006	1	4	1	0	1	7	7	1	0	0	0
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2006	1	4	1	0	1	16	16	1	0	0	0
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2006	1	4	1	0	1	18	18	1	0	0	0
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2006	1	4	2	0	1	15	15	1	0	0	0
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2006	1	4	2	0	1	16	16	1	0	0	0
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2006	1	4	2	0	1	17	17	1	0	0	0
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2006	1	4	2	0	1	19	19	2	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	4	2	0	1	20	20	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	4	2	0	1	21	21	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	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	4	2	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	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							
2006	1	4	2	0	1	24	24	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2007	1	4	1	0	1	14	14	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

2007	1	4	1	0	1	24	24	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2007	1	4	2	0	1	17	17	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2007	1	4	2	0	1	18	18	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
# Ghost											
2001	1	4	3	0	1	1	37	-1	0	0	0
	0	0	0	5	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	3	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	4	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	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							
2003	1	4	3	0	1	1	37	-1	0	0	0
	0	0	0	0	2	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	9	9	1	2	0	1	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2004	1	4	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	2	0	0	1	1	1
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	1	0
	0	0	1	0	1	0	0	0	1	0	0
	0	0	0	0	0	1	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	4	3	0	1	1	37	-1	0	0	0
	0	0	0	1	0	1	1	2	0	0	1
	1	0	0	1	1	0	0	1	1	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	4	2	1	0	1	0	0	1
	0	0	1	1	2	0	0	0	0	0	0
	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	4	3	0	1	1	37	-1	0	0	0
	1	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
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	1	0	0	0	0	0	1	1	1	0	0
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
2007	1	4	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
# Fleet 5: 2009 WA rec (N=143)											
# Conditional											
1998	1	5	1	0	1	12	12	2	0	0	0
	0	0	0	0	0	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	0	1	13	13	4	0	0	0
	0	0	0	1	0	0	0	0	2	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	1	0	1	15	15	2	0	0	0
	0	0	0	0	0	0	0	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	1	0	1	17	17	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	1	0	1	22	22	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
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	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	0	1	11	11	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	0	1	15	15	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
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	2	0	1	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	2	0	1	17	17	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
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	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	0	1	18	18	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
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	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	2	0	1	21	21	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	2	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

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	0	0	0	0	0	0	0	0	0	0	1
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1999	1	5	1	0	1	27	27	1	0	0	0
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1999	1	5	2	0	1	10	10	3	0	0	0
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1999	1	5	2	0	1	14	14	4	0	0	0
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1999	1	5	2	0	1	15	15	3	0	0	0
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1999	1	5	2	0	1	16	16	3	0	0	0
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1999	1	5	2	0	1	17	17	4	0	0	0
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1999	1	5	2	0	1	19	19	1	0	0	0
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1999	1	5	2	0	1	20	20	4	0	0	0
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1999	1	5	2	0	1	22	22	3	0	0	0
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1999	1	5	2	0	1	23	23	6	0	0	0
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2000	1	5	1	0	1	17	17	9	0	0	0
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2000	1	5	1	0	1	19	19	7	0	0	0
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2000	1	5	1	0	1	20	20	4	0	0	0
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2000	1	5	1	0	1	21	21	5	0	0	0
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2000	1	5	1	0	1	22	22	5	0	0	0
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2000	1	5	1	0	1	24	24	4	0	0	0
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2000	1	5	1	0	1	25	25	3	0	0	0
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2000	1	5	1	0	1	26	26	3	0	0	0
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2000	1	5	1	0	1	27	27	1	0	0	0
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2000	1	5	1	0	1	28	28	1	0	0	0
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2000	1	5	2	0	1	8	8	1	0	0	0
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2000	1	5	2	0	1	9	9	1	0	0	0
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2000	1	5	2	0	1	10	10	1	0	0	0
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2000	1	5	2	0	1	11	11	6	0	0	0
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2000	1	5	2	0	1	12	12	4	0	0	0
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2000	1	5	2	0	1	13	13	2	0	0	0
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2000	1	5	2	0	1	15	15	4	0	0	0
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2000	1	5	2	0	1	17	17	8	0	0	0
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2000	1	5	2	0	1	20	20	8	0	0	0
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2000	1	5	2	0	1	22	22	4	0	0	0
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2000	1	5	2	0	1	23	23	6	0	0	0
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2000	1	5	2	0	1	26	26	4	0	0	0
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2000	1	5	2	0	1	27	27	1	0	0	0
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2001	1	5	1	0	1	13	13	5	0	0	0
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2001	1	5	1	0	1	14	14	5	0	0	0
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2001	1	5	1	0	1	15	15	6	0	0	0
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2001	1	5	1	0	1	16	16	5	0	0	0
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2001	1	5	1	0	1	17	17	2	0	0	0
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2001	1	5	1	0	1	18	18	2	0	0	0
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2001	1	5	1	0	1	19	19	1	0	0	0
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2001	1	5	1	0	1	20	20	4	0	0	0
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2001	1	5	1	0	1	21	21	2	0	0	0
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2001	1	5	1	0	1	22	22	7	0	0	0
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2001	1	5	1	0	1	23	23	3	0	0	0
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2001	1	5	2	0	1	13	13	3	0	0	0
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2001	1	5	2	0	1	21	21	4	0	0	0
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2001	1	5	2	0	1	23	23	2	0	0	0
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2001	1	5	2	0	1	24	24	3	0	0	0
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2001	1	5	2	0	1	26	26	1	0	0	0
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2001	1	5	2	0	1	29	29	1	0	0	0
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2001	1	5	2	0	1	30	30	1	0	0	0
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2004	1	5	1	0	1	13	13	1	0	0	0
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2004	1	5	1	0	1	14	14	1	0	0	0
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2004	1	5	1	0	1	20	20	2	0	0	0
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2004	1	5	1	0	1	28	28	1	0	0	0
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	0	0	0	0							
2004	1	5	2	0	1	15	15	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2004	1	5	2	0	1	18	18	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	0	1	22	22	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2004	1	5	2	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2004	1	5	2	0	1	26	26	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	5	2	0	1	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	5	2	0	1	19	19	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	2	0	1	21	21	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
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	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	0	0							
2006	1	5	1	0	1	15	15	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	1	0	1	10	10	1	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	1	0	1	14	14	1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	1	0	1	21	21	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	2	0	1	8	8	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	2	0	1	21	21	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	2	0	1	31	31	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	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							
# Ghost											
1998	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	1	0	0	1	1	4	0	2
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	1	0	0	0	1	1	2	1	0
	1	2	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
1999	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	2	1	2	2
	2	4	3	0	1	1	1	0	1	2	1
	1	1	4	2	0	1	0	0	0	0	0
	1	1	0	0	2	0	0	0	0	1	0
	2	1	2	0	0	0	1	0	0	0	0
	0	0	0	0	1	2	0	0	0	0	0
	0	0	0	0	2	2	1	2	3	2	7
	3	2	0	0	0	0	2	1	1	1	1
	2	1	0	2	1	0	0	0	0	0	0
	1	0	3	0	0	1	0	1	0	0	1
	0	0	0	0	1	0	0	1	1	1	0
	0	0	0	2							
2000	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	1	4	5	3	4	6
	8	8	5	4	1	4	1	0	0	2	4
	2	2	1	5	4	1	3	1	1	0	0
	0	0	1	0	0	0	1	1	0	0	1
	3	1	0	0	0	0	0	0	1	1	0
	1	0	1	0	1	3	0	0	0	0	0
	1	1	0	1	1	2	3	4	2	8	6
	3	8	2	2	3	1	3	2	7	2	4
	6	3	1	2	0	1	0	0	0	1	1
	3	2	0	1	1	0	0	0	1	0	0
	1	2	0	0	0	0	0	1	0	0	0
	0	0	0	0							
2001	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	2	1	1	1	2	4
	4	1	3	2	1	2	1	3	1	0	0
	1	0	1	0	1	1	0	1	0	1	0
	1	0	1	1	1	0	1	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	1	0	0	1	0	4	0	0	0	0	0
	0	1	1	0	3	2	1	3	4	6	4
	4	3	4	1	1	1	0	2	0	1	0
	0	1	1	0	1	0	1	0	0	2	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	3							
2004	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	1	0	0	0	0	1	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	1
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	1	0	2	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	5	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	5	3	0	1	1	37	-1	0	0	0
	0	0	1	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	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							

Fleet 6: 2009 WA commercial (N=177)
Conditional

1993	1	6	1	0	1	15	15	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1993	1	6	1	0	1	16	16	2	0	0	0
	0	0	0	0	0	0	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1993	1	6	1	0	1	17	17	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1993	1	6	1	0	1	19	19	2	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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2001	1	6	1	0	1	13	13	1	0	0	0
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2001	1	6	1	0	1	14	14	2	0	0	0
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2001	1	6	1	0	1	15	15	3	0	0	0
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2001	1	6	1	0	1	16	16	4	0	0	0
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2001	1	6	1	0	1	17	17	4	0	0	0
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2001	1	6	1	0	1	18	18	6	0	0	0
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2001	1	6	1	0	1	19	19	8	0	0	0
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2001	1	6	1	0	1	20	20	7	0	0	0
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2001	1	6	1	0	1	21	21	7	0	0	0
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2001	1	6	1	0	1	22	22	2	0	0	0
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2001	1	6	1	0	1	23	23	3	0	0	0
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2001	1	6	1	0	1	24	24	4	0	0	0
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2001	1	6	1	0	1	25	25	2	0	0	0
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2001	1	6	1	0	1	26	26	1	0	0	0
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2002	1	6	1	0	1	19	19	3	0	0	0
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2002	1	6	1	0	1	25	25	1	0	0	0
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2002	1	6	1	0	1	26	26	1	0	0	0
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2002	1	6	1	0	1	29	29	1	0	0	0
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2003	1	6	2	0	1	17	17	2	0	0	0
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2003	1	6	2	0	1	18	18	2	0	0	0
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2003	1	6	2	0	1	19	19	3	0	0	0
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2003	1	6	2	0	1	21	21	1	0	0	0
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2004	1	6	1	0	1	15	15	3	0	0	0
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2004	1	6	1	0	1	17	17	4	0	0	0
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2004	1	6	1	0	1	18	18	2	0	0	0
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2004	1	6	1	0	1	20	20	3	0	0	0
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2004	1	6	1	0	1	21	21	1	0	0	0
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2004	1	6	1	0	1	26	26	1	0	0	0
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2004	1	6	1	0	1	27	27	4	0	0	0
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2004	1	6	2	0	1	15	15	1	0	0	0
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2004	1	6	2	0	1	16	16	4	0	0	0
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2004	1	6	2	0	1	17	17	1	0	0	0
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2004	1	6	2	0	1	18	18	1	0	0	0
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2004	1	6	2	0	1	19	19	3	0	0	0
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2004	1	6	2	0	1	20	20	1	0	0	0
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2004	1	6	2	0	1	21	21	1	0	0	0
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2004	1	6	2	0	1	27	27	1	0	0	0
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2004	1	6	2	0	1	28	28	1	0	0	0
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2005	1	6	1	0	1	9	9	1	0	0	0
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2005	1	6	1	0	1	13	13	1	0	0	0
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2005	1	6	1	0	1	14	14	1	0	0	0
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2005	1	6	1	0	1	16	16	1	0	0	0
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2006	1	6	1	0	1	9	9	1	0	0	0
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2006	1	6	1	0	1	13	13	3	0	0	0
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2006	1	6	1	0	1	14	14	1	0	0	0
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2006	1	6	1	0	1	15	15	2	0	0	0
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2006	1	6	1	0	1	16	16	5	0	0	0
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2006	1	6	1	0	1	17	17	7	0	0	0
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2006	1	6	1	0	1	18	18	11	0	0	0
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2006	1	6	1	0	1	19	19	8	0	0	0
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2006	1	6	1	0	1	20	20	5	0	0	0
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2006	1	6	1	0	1	21	21	1	0	0	0
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2006	1	6	1	0	1	23	23	4	0	0	0
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2006	1	6	1	0	1	24	24	1	0	0	0
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2006	1	6	1	0	1	25	25	2	0	0	0
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2006	1	6	1	0	1	26	26	2	0	0	0
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2006	1	6	1	0	1	28	28	2	0	0	0
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2006	1	6	2	0	1	16	16	2	0	0	0
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2006	1	6	2	0	1	19	19	3	0	0	0
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2006	1	6	2	0	1	20	20	11	0	0	0
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2006	1	6	2	0	1	21	21	5	0	0	0
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2006	1	6	2	0	1	22	22	3	0	0	0
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2006	1	6	2	0	1	23	23	3	0	0	0
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2006	1	6	2	0	1	25	25	4	0	0	0
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2006	1	6	2	0	1	29	29	2	0	0	0
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2007	1	6	1	0	1	14	14	1	0	0	0
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2007	1	6	1	0	1	19	19	2	0	0	0
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2007	1	6	1	0	1	20	20	2	0	0	0
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2007	1	6	1	0	1	21	21	1	0	0	0
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2007	1	6	1	0	1	24	24	1	0	0	0
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2007	1	6	2	0	1	11	11	1	0	0	0
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2007	1	6	2	0	1	13	13	1	0	0	0
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2007	1	6	2	0	1	16	16	1	0	0	0
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2007	1	6	2	0	1	17	17	2	0	0	0
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2007	1	6	2	0	1	18	18	5	0	0	0
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2007	1	6	2	0	1	19	19	4	0	0	0
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2007	1	6	2	0	1	21	21	2	0	0	0
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2007	1	6	2	0	1	22	22	4	0	0	0
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2007	1	6	2	0	1	26	26	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	6	2	0	1	20	20	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
# Ghost											
1993	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	2	2	0	0	0
	1	2	0	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	0	1	0	0	0	0	0	0	1	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0

	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
2001	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	1	0	1	2
	1	3	3	4	3	1	4	2	0	1	1
	2	0	1	3	6	1	2	0	0	1	1
	1	0	0	0	2	0	0	0	0	0	0
	0	1	2	0	0	1	0	0	1	0	0
	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	2	2	2	3
	7	4	5	5	8	2	5	4	1	1	3
	6	3	4	2	5	1	1	0	0	1	1
	0	0	0	0	0	0	1	0	1	0	1
	0	0	0	1	0	0	0	1	0	0	0
	1	1	0	3							
2002	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	1	0	1	2	3
	2	0	3	4	7	4	1	3	0	0	0
	1	1	0	0	0	0	1	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	0	0	0
	0	1	1	0	0	2	1	1	2	1	5
	5	7	9	6	4	2	0	3	0	2	1
	0	1	1	1	0	2	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	0	0	0
	0	0	0	4							
2003	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	1	0	0	0	0	1	0	0
	1	2	1	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	1	2	0	0	0
	2	0	1	0	0	0	1	0	0	0	1
	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2004	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	1	1	1	1	1	0	3	2	2	3	0
	1	1	0	1	0	0	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	5	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	2	1
	0	2	1	0	0	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	1	0	0	0	0	0	0
	0	0	0	1							
2005	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	1	0	2	0	1	1	0
	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	1	0
	1	0	2	1	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	3							
2006	1	6	3	0	1	1	37	-1	0	0	0
	0	0	1	0	0	1	1	2	0	2	5
	1	2	1	2	1	3	2	2	0	4	4

	2	0	1	1	0	2	0	0	0	1	2
	0	3	0	1	0	0	0	0	0	1	1
	0	0	0	0	0	1	0	0	0	0	1
	0	0	1	0	0	3	0	0	0	1	0
	0	0	0	0	0	1	1	1	0	0	2
	1	2	4	3	0	4	3	4	1	1	1
	0	2	2	2	0	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	1	0	1	0
	0	0	0	0							
2007	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	1	0	1	2	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	1	0
	0	0	0	1	1	0	0	0	0	4	0
	0	1	2	0	4	1	0	0	1	2	0
	0	0	0	0	0	0	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	6	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

Fleet 9: 2009 WA IPHC marginal age (N=72)
Marginal

2003	1	9	0	0	1	1	37	99	0	0	0
	0	0	0	0	0	0	0	1	0	2	0
	1	2	2	2	2	1	3	0	5	3	0
	3	3	1	4	2	3	2	1	1	1	4
	0	1	1	1	1	0	1	1	2	0	0
	2	2	2	1	1	1	1	2	1	0	0
	0	0	0	1	1	27	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	1	37	17	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	2	0	1	1	0	0	1
	0	0	0	0	0	1	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	1	0	0	0	0
	0	0	0	1	0	5	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	1	37	72	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	3	0	2	4	7	4	3
	2	4	2	0	0	1	3	2	3	1	3
	0	3	1	0	0	0	0	0	0	0	2
	0	0	1	1	2	1	1	0	0	0	3

	0	0	0	1	1	10	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
# Conditional											
2006	1	9	1	0	1	17	17	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	0	1	19	19	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	0	1	20	20	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	0	1	21	21	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	1	0	0	0	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	0	1	22	22	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	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	1	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1	0	1	24	24	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	1	0	1	25	25	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	1	0	1	26	26	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	1	0	1	27	27	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	2	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	9	2	0	1	16	16	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	9	2	0	1	20	20	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	9	2	0	1	21	21	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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2006	1	9	2	0	1	22	22	5	0	0	0
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2006	1	9	2	0	1	23	23	2	0	0	0
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2006	1	9	2	0	1	24	24	2	0	0	0
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2006	1	9	2	0	1	25	25	3	0	0	0
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2007	1	9	1	0	1	15	15	2	0	0	0
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2007	1	9	1	0	1	16	16	4	0	0	0
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2007	1	9	1	0	1	17	17	5	0	0	0
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2007	1	9	1	0	1	18	18	9	0	0	0
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2007	1	9	1	0	1	19	19	11	0	0	0
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	0	0	0	0							
2007	1	9	1	0	1	20	20	9	0	0	0
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2007	1	9	1	0	1	21	21	13	0	0	0
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2007	1	9	1	0	1	22	22	12	0	0	0
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2007	1	9	1	0	1	23	23	9	0	0	0
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2007	1	9	1	0	1	24	24	10	0	0	0
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2007	1	9	1	0	1	25	25	9	0	0	0
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2007	1	9	1	0	1	26	26	12	0	0	0
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2007	1	9	1	0	1	27	27	1	0	0	0
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2007	1	9	1	0	1	28	28	1	0	0	0
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2007	1	9	1	0	1	29	29	1	0	0	0
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2007	1	9	2	0	1	13	13	1	0	0	0
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2007	1	9	2	0	1	16	16	2	0	0	0
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2007	1	9	2	0	1	17	17	1	0	0	0
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2007	1	9	2	0	1	18	18	10	0	0	0
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2007	1	9	2	0	1	19	19	16	0	0	0
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2007	1	9	2	0	1	20	20	21	0	0	0
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2007	1	9	2	0	1	21	21	29	0	0	0
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2007	1	9	2	0	1	22	22	31	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	1
	3	1	1	0	3	2	1	0	0	2	1
	2	3	2	0	1	2	2	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
2007	1	9	2	0	1	23	23	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
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	0	0	1	0	0	0	1	0	1	0	3
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	0	1	0	0	1	0	1	0	0	0	0
	1	0	0	1							
2007	1	9	2	0	1	24	24	8	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	5							
2007	1	9	2	0	1	25	25	6	0	0	0
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	0	0	0	2							
2007	1	9	2	0	1	26	26	11	0	0	0
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	0	0	0	9							
2007	1	9	2	0	1	27	27	3	0	0	0
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2008	1	9	1	0	1	16	16	1	0	0	0
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	0	0	0	0							
2008	1	9	1	0	1	18	18	2	0	0	0
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2008	1	9	1	0	1	19	19	2	0	0	0
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2008	1	9	1	0	1	20	20	4	0	0	0
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	0	0	0	0							
2008	1	9	1	0	1	21	21	2	0	0	0
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2008	1	9	1	0	1	22	22	1	0	0	0
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	0	0	0	0							
2008	1	9	1	0	1	23	23	6	0	0	0
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	0	0	0	0							
2008	1	9	1	0	1	24	24	2	0	0	0
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2008	1	9	1	0	1	25	25	2	0	0	0
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2008	1	9	1	0	1	26	26	1	0	0	0
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	0	0	0	0							
2008	1	9	2	0	1	18	18	1	0	0	0
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2008	1	9	2	0	1	19	19	5	0	0	0
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	0	0	0	0							
2008	1	9	2	0	1	20	20	9	0	0	0
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2008	1	9	2	0	1	21	21	9	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	9	2	0	1	22	22	6	0	0	0
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	1	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0							
2008	1	9	2	0	1	23	23	10	0	0	0
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2008	1	9	2	0	1	24	24	12	0	0	0
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	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	9	2	0	1	25	25	4	0	0	0
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	0	0	0	1							
2008	1	9	2	0	1	26	26	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	9	2	0	1	27	27	3	0	0	0
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	0	1	0	0	0	0	1	0	0	0	0
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Ghost

2006	1	9	3	0	1	1	37	-1	0	0	0
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	0	1	0	2	1	0	0	1	1	1	0
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	0	0	2	2	1	1	0	8	5	5	2
	1	3	0	1	1	5	3	0	2	0	1
	0	0	1	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	1	3	1	0	1
	0	0	0	3							
2007	1	9	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	2	0	1	5	6	7	3
	5	2	3	4	4	3	2	5	3	4	7
	3	3	2	4	3	2	1	1	1	1	1
	0	1	1	1	0	3	0	1	4	1	3
	0	3	1	0	0	38	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	1	2	2	1	7	7	5	11	17	15	10
	9	6	10	8	4	6	3	4	4	5	6
	4	4	4	3	5	5	2	1	1	3	4
	1	1	0	0	4	1	1	1	0	0	1
	2	0	0	29							
2008	1	9	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	1	0	1
	0	0	0	1	0	1	2	1	2	3	7
	3	2	6	2	5	1	4	2	3	3	1
	3	1	3	3	5	2	2	1	1	1	2
	0	1	1	2	0	1	0	1	0	0	1
	1	0	1	1	1	27	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	2	3	5	1	3	1	7	10	11	11	14
	7	7	3	4	13	5	6	8	3	6	6
	4	5	7	6	4	4	2	1	2	2	3
	0	3	2	2	1	0	2	6	1	1	2
	2	1	2	19							

Fleet 11: 2009 OR IPHC (N=78)
Marginal

2003	1	11	0	0	1	1	37	215	0	0	0
	0	0	0	0	1	0	0	0	0	0	2
	2	9	11	7	18	12	12	9	6	4	4
	10	10	11	8	6	13	9	3	1	3	1
	3	0	2	2	0	1	1	0	4	1	1
	3	3	1	2	1	1	1	2	1	1	0
	0	1	2	1	0	8	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2004	1	11	0	0	1	1	37	157	0	0	0
	0	0	0	0	0	0	0	0	1	1	1
	1	3	5	7	6	12	9	14	7	9	3
	4	2	1	5	6	6	4	5	3	2	1
	1	0	0	1	1	0	2	3	2	2	2
	2	0	0	2	0	3	2	1	2	0	2
	2	1	0	0	0	8	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2005	1	11	0	0	1	1	37	62	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	1	1	2	1	5	9	2	5	5	2
	1	0	1	3	2	1	1	2	1	2	1
	0	1	1	0	0	0	0	0	0	0	2
	0	0	0	0	1	0	0	0	0	0	0
	1	2	2	0	0	3	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
# Conditional											
2006	1	11	1	0	1	15	15	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	17	17	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	18	18	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	19	19	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	20	20	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	1	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	21	21	3	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	22	22	4	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	23	23	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	1	0	1	26	26	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	1	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	2	0	1	13	13	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	2	0	1	15	15	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	2	0	1	17	17	5	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	1	0	0	0	2	1	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2006	1	11	2	0	1	18	18	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
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	1	1	1	1
	0	1	0	1	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

2006	1	11	2	0	1	19	19	7	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	1	1	2	0
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	0	0	0	0							
2006	1	11	2	0	1	20	20	5	0	0	0
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	0	1	0	0	0	1	0	0	0	0	0
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	0	0	0	0	0	0	0	1	1	0	0
	0	0	0	0							
2006	1	11	2	0	1	21	21	3	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1							
2006	1	11	2	0	1	22	22	1	0	0	0
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	0	0	0	0	0	1	0	0	0	0	0
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	0	0	0	0							
2006	1	11	2	0	1	23	23	3	0	0	0
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	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0							
2006	1	11	2	0	1	24	24	2	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0							
2006	1	11	2	0	1	25	25	1	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2007	1	11	1	0	1	14	14	1	0	0	0
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	0	0	0	0	0	0	1	0	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	15	15	1	0	0	0
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	0	0	0	1	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2007	1	11	1	0	1	16	16	6	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	17	17	2	0	0	0
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2007	1	11	1	0	1	18	18	7	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	19	19	6	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	20	20	3	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	21	21	2	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	22	22	7	0	0	0
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	0	0	0	0							
2007	1	11	1	0	1	23	23	3	0	0	0
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2007	1	11	1	0	1	24	24	1	0	0	0
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2007	1	11	2	0	1	13	13	1	0	0	0
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	0	0	0	0							
2007	1	11	2	0	1	15	15	3	0	0	0
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2007	1	11	2	0	1	16	16	6	0	0	0
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2007	1	11	2	0	1	17	17	5	0	0	0
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2007	1	11	2	0	1	18	18	4	0	0	0
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2007	1	11	2	0	1	19	19	6	0	0	0
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2007	1	11	2	0	1	20	20	8	0	0	0
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2007	1	11	2	0	1	21	21	10	0	0	0
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	0	0	0	0							
2007	1	11	2	0	1	22	22	8	0	0	0
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2007	1	11	2	0	1	23	23	9	0	0	0
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2007	1	11	2	0	1	24	24	1	0	0	0
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2007	1	11	2	0	1	25	25	1	0	0	0
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2008	1	11	1	0	1	13	13	1	0	0	0
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2008	1	11	1	0	1	14	14	4	0	0	0
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2008	1	11	1	0	1	15	15	1	0	0	0
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2008	1	11	1	0	1	16	16	10	0	0	0
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2008	1	11	1	0	1	17	17	11	0	0	0
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2008	1	11	1	0	1	18	18	14	0	0	0
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	0	0	0	0							
2008	1	11	1	0	1	19	19	9	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	1	0	1	0	0
	1	0	1	0	2	0	0	0	0	0	1
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	1	0	1	20	20	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	1
	0	0	0	0	0	0	1	1	0	1	0
	1	0	1	0	1	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	4	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	1	0	1	21	21	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	1	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	1	0	1	22	22	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	1	0	3	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	1	0	1	23	23	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	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	7	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	1	0	1	24	24	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	1	0	1	25	25	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

2008	1	11	1	0	1	26	26	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	2	0	1	12	12	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	2	0	1	14	14	2	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	2	0	1	15	15	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
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	0	1	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	2	0	1	16	16	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
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	1	0	1	1	0	0	1	3
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	2	0	1	17	17	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	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	2	4	4	2	2
	0	2	0	0	1	1	2	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
	1	0	0	0							
2008	1	11	2	0	1	18	18	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	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	0	2	3	2	2
	3	0	1	1	1	0	1	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0							
2008	1	11	2	0	1	19	19	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	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	2	3	3
	1	0	0	1	3	0	0	0	0	2	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
2008	1	11	2	0	1	20	20	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	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	2	0	0
	0	1	0	0	2	2	0	2	0	2	3
	0	1	0	3	2	0	1	0	0	1	0
	0	0	1	0	0	0	1	0	0	0	0
	1	0	0	0							
2008	1	11	2	0	1	21	21	13	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	1	1	0	2	2	0	0
	0	1	2	0	1	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0
	0	0	1	0							
2008	1	11	2	0	1	22	22	10	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	1	0	0	0
	0	0	0	0	1	0	0	0	0	0	0

	0	0	1	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	1	2	0	0	0
	0	1	0	1							
2008	1	11	2	0	1	23	23	13	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1
	0	1	0	1	0	0	0	2	1	0	0
	0	0	1	3							
2008	1	11	2	0	1	24	24	10	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	1	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	1	1
	0	0	0	4							
2008	1	11	2	0	1	25	25	6	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	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							
2008	1	11	2	0	1	26	26	3	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	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							
2008	1	11	2	0	1	28	28	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

Ghost

2006	1	11	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	1
	0	0	0	1	0	2	1	0	2	1	0
	0	0	2	0	0	0	0	0	0	0	0
	0	1	0	1	1	0	0	1	1	1	0
	0	0	0	0	0	3	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0
	0	0	1	1	1	1	0	6	3	3	2
	0	3	0	1	1	4	2	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	2	1	0	1
	0	0	0	1							
2007	1	11	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	4	4	1	1
	1	0	0	2	1	1	1	3	0	0	3
	2	1	0	1	0	0	0	0	0	1	0
	0	0	0	0	0	2	0	0	2	0	1
	0	0	1	0	0	4	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0
	1	2	0	1	4	3	3	3	5	4	1
	1	0	1	6	0	2	0	2	0	1	1
	0	0	0	0	2	1	0	0	0	1	3
	0	0	0	0	2	1	0	0	0	0	0
	1	0	0	8							
2008	1	11	3	0	1	1	37	-1	0	0	0
	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	1	0	1	1	1	1	3	7
	3	2	5	1	4	1	3	2	3	3	0
	3	1	2	0	5	1	1	0	1	1	2
	0	1	1	0	0	1	0	0	0	0	1
	1	0	1	1	1	22	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0
	2	3	3	1	1	1	6	8	11	8	12
	4	3	2	2	10	4	3	6	3	5	5
	1	2	4	3	4	0	1	0	1	2	2
	0	3	1	1	0	0	2	4	1	1	2
	2	1	2	17							

0 # No Mean Size-at-Age observations
0 # Total number of environmental variables
0 # Total number of environmental observations
0 # No Weight frequency data
0 # No tagging data
0 # No morph composition data

999 # End data file

14. Appendix C: SS Control file

Control file for 2009 yelloweye assessment

Yelloweye 2009 control file

Morph setup
1 # Number of growth patterns
1 # N sub morphs within GPs

Area setup
3 # Number of recruitment assignments
0 # Recruitment interaction flag
For each recruitment assignment
GP seas area
 1 1 1
 1 1 2
 1 1 3
0 # Number of movement parameters

Time block setup
0 # Number of block designs

Mortality and growth specifications
0.5 # Fraction female at birth
1 # M setup: 0=single Par,1=N_breakpoints,2=Lorenzen,3=agespecific;_4=agespec_withseasinterpolate
1 # Number of M breakpoints
4 # Ages at M breakpoints
1 # Growth model: 1=VB with L1 and L2, 2=VB with A0 and Linf, 3=Richards, 4=Read vector of L@A
1 # Age for growth Lmin
70 # Age for growth Lmax or 999 = Linf
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 age-maturity matrix by growth_pattern
2 # First age allowed to mature
1 # Fecundity option
0 # Hermaphroditic option
1 # 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 logistic transform between bounds

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									
0.01	0.15	0.044	0.0517	0	0.0226	6	0	0	0	0	0
	0	0	#F_natM_young								
10	35	23	30	-1	99	2	0	0	0	0	0
	0	0	#F_Lmin								
40	120	61	66	-1	99	2	0	0	0	0	0
	0	0	#F_Lmax								
0.01	0.2	0.05	0.05	-1	99	2	0	0	0	0	0
	0	0	#F_VBK								
0.05	0.2	0.13	0.19	-1	99	3	0	0	0	0	0
	0	0	#F_CV-young								
0.05	0.2	0.09	0.1	-1	99	3	0	0	0	0	0
	0	0	#F_CV-old								
0.01	0.15	0.056	0.0517	0	0.0226	6	0	0	0	0	0
	0	0	#M_natM_young								
-1	1	0	0	-1	99	-50	0	0	0	0	0
	0	0	#M_Lmin								
40	120	63	66	-1	99	2	0	0	0	0	0
	0	0	#M_Lmax								
0.01	0.2	0.05	0.05	-1	99	2	0	0	0	0	0
	0	0	#M_VBK								
0.05	0.2	0.11	0.14	-1	99	3	0	0	0	0	0
	0	0	#M_CV-young								

0.05 0.2 0.08 0.4 -1 99 3 0 0 0 0 0
0 0 #M_CV-old

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

2009 Female W-L
-3 3 0.0000097659 0.000020873 -1 99 -50 0 0 0 0 0
0 0 #Female wt-len-1
-3 4 3.17125028 2.96956 -1 99 -50 0 0 0 0 0 0
0 #Female wt-len-2
2009 Maturity
38 39 38.78 40 -1 99 -50 0 0 0 0 0
0 0 #Female mat-len-1
-3 3 -0.437 -0.4 -1 99 -50 0 0 0 0 0
0 0 #Female mat-len-2
2009 Fecundity
-3 300000 137900 137900 0 1.0 -6 0 0 0 0 0
0 0 #Female eggs/gm intercept
-3 39000 36500 36500 0 1.0 -6 0 0 0 0 0
0 0 #Female eggs/gm slope
2009 Male W-L
-3 3 0.0000170424 0.000020873 -1 99 -50 0 0 0 0 0
0 0 #male wt-len-1
-3 4 3.02814697 2.96956 -1 99 -50 0 0 0 0 0 0
0 #male wt-len-2

Distribute recruitment (log scale fractions) among growth pattern x area x season
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
0 2 1 1 -1 99 -50 0 0 0 0 0
0 0 # RecrDist_GP_1
0 2 1 1 -1 99 -50 0 0 0 0 0
0 0 # RecrDist_GP_1
0 2 1 1 -1 99 -50 0 0 0 0 0
0 0 # RecrDist_GP_1

-4 4 0 0 -1 99 -50 0 0 0 0 0
0 0 # RecrDist_Area_1
-4 4 -0.1 0 -1 99 1 0 0 1916 2008 0.3
0 0 # RecrDist_Area_2
-4 4 -0.4 0 -1 99 1 0 0 1916 2008 0.3
0 0 # RecrDist_Area_3

0 2 1 1 -1 99 -50 0 0 0 0 0
0 0 # RecrDist_Seas_1

0 2 1 1 -1 99 -50 0 0 0 0 0
0 0 # Cohort growth deviation parameter

Cohort growth deviation
0 0 0 0 0 0 0 0 0 0

#9 # Recruitment split annual deviation phase

Spawner-recruit parameters
3 # 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
3 15 7 5 -1 99 1 # Ln(R0)
Martins 2009 prior
0.2 1 0.5 0.73 2 0.189 7 # Steepness
###
0 5 0.001 1 -1 99 -50 # Sigma R
-5 5 0 0 -1 99 -50 # Environmental link coefficient

```
-5      5       0       0       -1      99      -50     # Initial equilibrium offset to virgin
-1      2       0       1       -1      99      -50     # Autocorrelation in rec devs
0       # Index of environmental variable to be used for S-R parameter
0       # Env. target parameter: 0=none, 1=rec devs, 2=R0, 3=steepness

# Recruitment residuals
1 # Dev type: 0=none, 1=zero-sum, 2=simple deviations (no sum constraint)
1916    # Start year recruitment residuals
1916    # End year recruitment residuals
-8      # Phase
1       # Use advanced recruitment options: 0=no, 1=yes
0       # First year for early rec devs
-8      # Phase for early rec devs
-8      # Phase for forecast recruit deviations
1       # Lambda for forecast recr devs before endyr+1
-1965   # Last year with no bias correction in MPD
-1970   # First year with full bias correction (linear ramp from entry above)
-1990   # Last year for full bias correction in MPD
-1995   # First recent year with no bias correction in MPD
1.0     # max bias adjustment
0       # placeholder
-4      # Lower bound rec devs
4       # Upper bound rec devs
0       # Read N initial values for rec devs

# Fishing mortality setup
0.09    # F ballpark for tuning early phases
1999    # F ballpark year (neg value to disable)
1       # F method:  1=Pope's; 2=Instan. F; 3=Hybrid
0.9     # max F or harvest rate, depends on F_Method
#5      # F method=3: N iterations for tuning

# Initial F by fleet
# Lo    Hi      Init    Prior   P_type  SD      Phase
0       1       0.00    0.01    -1      99      -1
0       1       0.00    0.01    -1      99      -1
0       1       0.00    0.01    -1      99      -1
0       1       0.00    0.01    -1      99      -1
0       1       0.00    0.01    -1      99      -1
0       1       0.00    0.01    -1      99      -1

# 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
 1 0 0 0 0 0            #1_CARC
 0 0 0 0 0 0            #2_CACM
 1 0 0 0 0 0            #3_ORRC
 0 0 0 0 0 0            #4_ORCM
 1 0 0 0 0 0            #5_WARC
 0 0 0 0 0 0            #6_WACM
 0 0 0 0 0 0            #7_ORRCOB
 1 0 0 0 0 0            #8_CACPFV
 0 0 0 0 0 0            #9_IPHCWA
 0 0 0 0 1 0            #10_NWFSCOR
 0 0 0 0 0 0            #11_IPHCOR
 0 0 0 4 1 0            #12_WATRI

# Q parameters
1 # Par setup: 0=read one parm for each fleet with random q; 1=read a parm for each year of index

# Lo    Hi      Init    Prior   Prior   Prior   Param
# bnd   bnd     value   mean    type    SD      phase
# Non-linear parameters
 -6     6       0       0       -1      99      1 #1_CARC
```

```
 -6        6         0         0         -1        99        1 #3_ORRC
 -6        6         0         0         -1        99        8 #5_WARC
 -6        6         0         0         -1        99        1 #8_CACPFV
# Early period
 -10       2         -0.0003   0         -1        99        1   # Triennial (log) base parameter (1980)
 -4        4         0         0         -1        99        -50 # Triennial 1983 deviation
 -4        4         0         0         -1        99        -50 # Triennial 1986 deviation
 -4        4         0         0         -1        99        -50 # Triennial 1989 deviation
 -4        4         0         0         -1        99        -50 # Triennial 1992 deviation
# Late period
 -4        4         -0.6      0         -1        99        1   # Triennial 1995 deviation
 -4        4         0         0         -1        99        -50 # Triennial 1998 deviation
 -4        4         0         0         -1        99        -50 # Triennial 2001 deviation
 -4        4         0         0         -1        99        -50 # Triennial 2004 deviation

# 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
# D=Mirror selex (#)
# A  B C D
 1  0 0 0   #1_CARC
 1  0 0 0   #2_CACM
 1 0 0 0    #3_ORRC
 1  0 0 0   #4_ORCM
 1  0 0 0   #5_WARC
 1  0 0 0   #6_WACM
 1  0 0 0   #7_ORRCOB
 5  0 0 1   #8_CACPFV
 1  0 0 0   #9_IPHCWA
 24 0 0 0   #10_NWFSCOR
 1  0 0 0   #11_IPHCOR
 24  0 0 0  #12_WATRI
#_Age selex
 10 0 0 0   #1_CARC
 10 0 0 0   #2_CACM
 10 0 0 0   #3_ORRC
 10 0 0 0   #4_ORCM
 10 0 0 0   #5_WARC
 10 0 0 0   #6_WACM
 10 0 0 0   #7_ORRCOB
 10 0 0 0   #8_CACPFV
 10 0 0 0   #9_IPHCWA
 10 0 0 0   #10_NWFSCOR
 10 0 0 0   #11_IPHCOR
 10 0 0 0   #12_WATRI

# 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
#1_CARC

 10        70        30        30        -1        99        4         0         0         0         0         0
           0         0         #infl_for_logistic
 0.001     50        11        15        -1        99        5         0         0         0         0         0
           0         0         #95%width_for_logistic
#2_CACM

 10        70        38        30        -1        99        4         0         0         0         0         0
           0         0         #infl_for_logistic
 0.001     50        14        15        -1        99        5         0         0         0         0         0
           0         0         #95%width_for_logistic
#3_ORRC
 10        70        36        30        -1        99        4         0         0         0         0         0
           0         0         #infl_for_logistic
 0.001     50        11        15        -1        99        5         0         0         0         0         0
           0         0         #95%width_for_logistic
```

#4_ORCM

10	70	36	30	-1	99	4	0	0	0	0	0
	0	0	#infl_for_logistic								
0.001	50	11	15	-1	99	5	0	0	0	0	0
	0	0	#95%width_for_logistic								

#5_WARC

10	70	33	30	-1	99	4	0	0	0	0	0
	0	0	#infl_for_logistic								
0.001	50	31	15	-1	99	5	0	0	0	0	0
	0	0	#95%width_for_logistic								

#6_WACM

10	70	52	30	-1	99	4	0	0	0	0	0
	0	0	#infl_for_logistic								
0.001	50	18	15	-1	99	5	0	0	0	0	0
	0	0	#95%width_for_logistic								

#7_ORRCOB

10	70	22.1792	22.1792	-1	5	4	0	0	0	0	0
	0	0	#infl_for_logistic								
0.001	50	3.6938	3.6938	-1	5	5	0	0	0	0	0
	0	0	#95%width_for_logistic								

#8_CACPFV

-2	0	-1	5	-1	99	-50	0	0	0	0	0
	0	0	#minsizeBinCaCPFV_8								
-2	0	-1	6	-1	99	-50	0	0	0	0	0
	0	0	#maxsizeBinCaCPFV_8								

#9_IPHCWA

10	70	62	30	-1	99	4	0	0	0	0	0
	0	0	#infl_for_logistic								
0.001	60	10	15	-1	99	5	0	0	0	0	0
	0	0	#95%width_for_logistic								

#10_NWFSCOR

20	70	46	30	-1	99	4	0	0	0	0	0
	0	0	#Peak								
-4	4	-4	0	-1	99	-50	0	0	0	0	0
	0	0	#Top								
0	8	6	4	-1	99	4	0	0	0	0	0
	0	0	#Asc width								
0	12	4.5	4	-1	99	5	0	0	0	0	0
	0	0	#Desc width								
-1000	-998	-999	0	-1	99	-50	0	0	0	0	0
	0	0	#Init								
-1000	-998	-999	0	-1	99	-50	0	0	0	0	0
	0	0	#Final								

#11_IPHCOR

10	70	47	30	-1	99	4	0	0	0	0	0
	0	0	#infl_for_logistic								
0.001	60	6	15	-1	99	5	0	0	0	0	0
	0	0	#95%width_for_logistic								

#12_WATRI

20	87	87	30	-1	99	-4	0	0	0	0	0
	0	0	#Peak								
-4	4	-4	0	-1	99	-50	0	0	0	0	0
	0	0	#Top								
0	8	6	4	-1	99	4	0	0	0	0	0
	0	0	#Asc width								
0	12	12	4	-1	99	-5	0	0	0	0	0
	0	0	#Desc width								
-10	10	-2.88182	-2.88182	-1	2	4	0	0	0	0	0
	0	0	#Init								
-10	10	10	0	-1	99	-50	0	0	0	0	0
	0	0	#Final								

#1 # selex block setup: 0=read one line for all, 1=read one line for each
Time block parameters
#1 # Selex parameter adjustment method: 1=standard,2=logistic transform

0 # Tagging flag: 0=none,1=read parameters for tagging

Likelihood related quantities
variance/sample size adjustment by fleet
1 # Do variance adjustments
#1   2   3   4   5   6   7   8   9   10   11   12
 0.16 0.0   0.10 0   0.0   0   0.0   0.02 0.54 0.42 0.36 0.41 # constant added to survey CV
 0   0   0   0   0   0   0   0   0   0   0   0   # constant added to discard SD
 0   0   0   0   0   0   0   0   0   0   0   0   # constant added to body weight SD
 3.24 2.25 0.54 2.16 5.49 1.57 1.44 1.52 0.62 2.79 0.73 2.08 # multiplicative scalar for length comps
 1.0 1.0   1.0   1.0 1.0   1.0 1.0   1.0 0.90 1   0.74 1   # multiplicative scalar for age comps
 1   1   1   1   1   1   1   1   1   1   1   1   # multiplicative scalar for length at age obs

1000   # DF discard fraction data t-distribution
1000   # DF mean body weight data t-distribution
1   # Max N lambda phases: read this N values for each item below
1   # SD offset (CPUE, discard, mean body weight, recruitment devs): 0=omit log(s) term, 1=include

0 # N changes to default Lambdas = 1.0
Component codes:
1=survey
2=discard
3=mean body weight
4=length frequency
5=age frequency
6=Weight frequency
7=size at age
8=catch
9=initial equilibrium catch
10=rec devs
11=parameter priors
12=parameter deviations
13=Crash penalty
14=Morph composition
15=Tag composition
16=Tag return
Component fleet/survey phase value wtfreq_method

0 # extra SD reporting placeholder

999 # end of control file

15. Appendix D: SS Starter file

```
# 2009 Yelloweye assessment starter file

yelloweye_data.SS      # Data file
yelloweye_control.SS  # Control file

0       # Read initial values from .par file: 0=no,1=yes
1       # DOS display detail: 0,1,2
2       # Report file detail: 0,1,2
0       # Detailed checkup.sso file (0,1)
0       # Write parameter iteration trace file during minimization
0       # Write cumulative report: 0=skip,1=short,2=full
0       # Include prior likelihood for non-estimated parameters
0       # Use Soft Boundaries to aid convergence (0,1) (recommended)
1       # N bootstrap datafiles to create
25      # Last phase for estimation
1       # MCMC burn-in
1       # MCMC thinning interval
0       # Jitter initial parameter values by this fraction
-1      # Min year for spbio sd_report (-1 for styr, init, virgin)
-2      # Max year for spbio sd_report (-1 for endyr; -2 for endyr+Nforecastyrs)
0       # N individual SD years
0.0001 # Ending convergence criteria
0       # Retrospective year relative to end year
8       # Min age for summary biomass
1       # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B_styr
1       # Fraction (X) for Depletion denominator (e.g. 0.4)
1       # (1-SPR)_reporting:  0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-
SPR_MSY); 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
1       # F_std reporting: 0=skip; 1=exploit(Bio); 2=exploit(Num); 3=sum(frates)
0       # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt

999 # end of file marker
```

16. Appendix E: SS Forecast file

Forecast specifications - 2009 Yelloweye assessment

1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=F(endyr); 5=Ave F (enter yrs); 6=read Fmult
2006 # First year for averaging selex to use in forecast
2008 # Last year for averaging selex to use in forecast
1 # Benchmarks:0=skip, 1=calc Fspr, Fbtgt, Fmsy
2 # MSY: 0=none,1=F(SPR),2=calc F(MSY),3=F(Btgt),4=set to F(endyr)
########
#0.719 is rebuilding SPR from 2007
0.5 # SPR target (e.g. 0.40)
########
0.4 # Biomass target (e.g. 0.40)
1 # Number of forecast years
1 # Read advanced options below: 0=No, 1=Yes
0 # Puntalyzer output: 0=no,1=yes
1999 # Rebuilder: first year catch could have been set to zero (Ydecl)
2002 # Rebuilder: year for current age structure (Yinit)
1 # Control rule method (1=west coast adjust catch; 2=adjust F)
0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40)
0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
1 # Control rule fraction of Flimit (e.g. 0.75)
-1 # maximum annual catch during forecast (not coded yet)
0 # 0= no implementation error; 1=implementation error in forecast (not coded yet)
0.1 # stddev of log(realized F/target F) in forecast (not coded yet)
1 # fleet allocation (in terms of F) (1=use endyr pattern, no read; 2=read below)
0 # Number of manual forecast catches to input
1 # basis for forecatch: 1=retained catch; 2=total dead catch (if line above > 0)
Year Seas Fleet Catch

999 # end of forecast file