Stock Assessment of Aurora Rockfish in 2013

by

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Executive Summary

Stock

Aurora rockfish (*Sebastes aurora*) occur from the Queen Charlotte Islands (British Columbia, Canada) south to mid-Baja California (Mexico), but are most common in US waters from northern Oregon to southern California. They are deep-dwelling, occurring from 200 to 700 meters, with the median depth increasing to the south. They are most abundant from 350 to 550 m in the north and 400 to 600 m in the south. While there are areas of greater abundance, the population appears continuous over the entire coast. There is no clear point for stock delineation. For the purposes of this assessment, the population of Aurora rockfish is treated as a single stock from the U.S.-Mexico border to the U.S.-Canada border.

Catches

The fishery removals in the assessment are divided among two fleets, which include a domestic fishery ("twl" in the figures, since this is dominated by the trawl fleet) and a "full-retention" fishery ("nodisc" in the figures) including the historical foreign Pacific ocean perch (POP) and current at-sea Pacific hake fisheries. The domestic commercial fisheries have historically reported landed catch only, even though a portion of the aurora catch was discarded at sea. The foreign POP fishery, on the other hand, was known not to discard fish based on fish size or species, while the at-sea hake fishery reports total catch, including both retained and discarded fish. In order to account for differences in discarding practices and catch reporting, and most importantly avoid inflating aurora removals in POP and at-sea hake fisheries, landings by the domestic fleet and catch in foreign POP and at-sea hake fisheries were separated.

Landings of aurora rockfish were reconstructed from 1916 forward, and the assessment assumes zero catch and equilibrium unfished biomass in 1915. The reconstructed time series of aurora rockfish landings by the domestic trawl fishery and removals by the full-retention fleet are presented in Table ES-1 and shown in Figure ES-1.

Table ES-1: Recent aurora rockfish landings (mt) by fleets used in the assessment.

Year	Domestic			Full Retention		Total
	CA	OR	WA	Foreign	Hake	
2003	50.357	5.32	0.931	0	0	56.62
2004	61.395	7.775	0.49	0	0.02	69.68
2005	39.654	3.353	0.242	0	0.03	43.28
2006	28.081	5.287	0.017	0	0	33.39
2007	29.737	7.797	0.222	0	0.01	37.76
2008	10.891	7.606	0.212	0	0	18.71
2009	15.494	7.905	0.31	0	0	23.7
2010	19.432	4.237	0.252	0	0.03	23.94
2011	9.823	12.411	2.32	0	0.1	24.66
2012	25.791	9.499	1.566	0	0.02	36.87

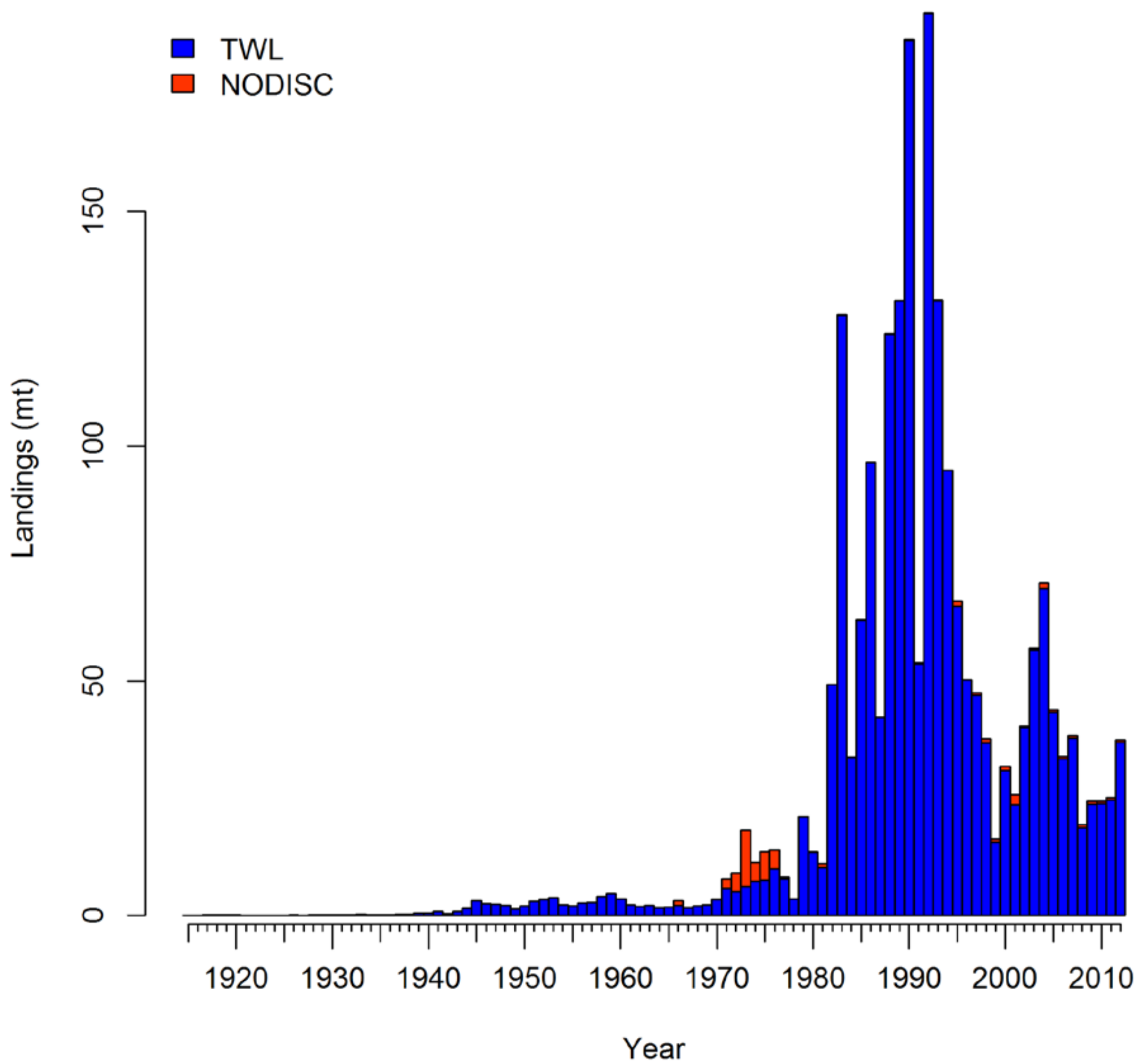

Figure ES-1: Aurora rockfish landings history between 1916 and 2012 by fleet (TWL = domestic fleet, including trawl and non-trawl landings; NODISC=Foreign and at-sea hake and research catch).

Data and assessment

Aurora rockfish has not previously been assessed using category 1 assessment methods. The previous estimate of OFL values came from a category 3 assessment using Depletion-based Stock Reduction Analysis (DB-SRA) conducted by Dick and MacCall (2010).

The current stock assessment uses Stock Synthesis (SS) *(v3.24o*, R. Methot), which is an integrated length-age structured model. Landings have been reconstructed beginning in 1916. The assessment includes fishery length composition data for the domestic fleet starting in 1978. Conditional age-at length data for the domestic fleet are included for 2003, 2008 and 2009. Estimates of discard rates are used from the Pikitch study for the years 1985-87, and from the West Coast Groundfish Observer Program

(WCGOP) from 2002-2011. Associated length compositions and mean weights from the WCGOP are also included in the assessment.

Survey data include abundance indices from the NMFS Triennial shelf survey for 1995, 1998, 2001 and 2004; The AFSC slope survey for 1997, 1999, 2000 and 2001; the NWFSC slope survey for 1999-2002; and the NWFSC shelf-slope survey from 2003-2012. Associated length composition data were available for all but the NWFSC slope survey, and age data were available and included in the model as conditional age-at-length data for the NWFSC shelf-slope survey for 2003, 2005, 2007, and 2009-2012.

A parsimonious model with adequate flexibility to fit the data was selected as the base model. Stock-recruitment steepness and natural mortality rates are fixed at the mean and median of their priors, respectively, while growth parameters are estimated separately for females and males.

Fishery selectivity is modeled as being asymptotic, as exploratory models allowing dome-shaped fishery selectivity estimated it to be asymptotic. Domestic fishery retention is modeled as an asymptotic curve, with the asymptote estimated in time blocks to fit the observed discard rates and length compositions. In particular, a single block is assumed though 1998, with slightly higher discard assumed in a block from 1999-2001. "Blocks" of individual years are used from 2002-2010 to allow for fit to the WCGOP data, and 2011-2012 (and forecast) discard rates are blocked together assuming more stability following the advent of Catch Shares and full observer coverage (and based upon the 2011 data).

The AFSC triennial shelf, AFSC slope and NWFSC shelf- slope surveys are modeled has having dome-shaped selectivity, each of which are estimated individually. The NWFSC slope survey is assumed to have the same selectivity as the NWFSC shelf-slope survey, as aurora do not occur in the depths not included in the earlier slope survey (30-100 fathoms), though they do in the latitudinal expansion south of Point Conception, and no length data were taken for aurora for those early years.

The base model converged and fits the data well given its highly variable nature. Runs with starting parameter values jittered from the base model were run to verify convergence. All of the parameters estimated within the base model are estimated at reasonable values.

Stock biomass

In this assessment, aurora rockfish are assumed to have a proportional egg-to-spawning biomass relationship. Unfished spawning biomass (as a proxy of egg production) is estimated to be 2626 mt (95% CI: 1165-4087; CV = 28.4%; Table ES-5; Figure ES-2), with spawning biomass at the beginning of 2013 estimated to be 1673 mt (95% CI: 348-2998; CV = 40.4%; Table ES-2; Figure ES-2). The stock's status (depletion) is estimated to be at 64% of the unfished level in 2013 (Table ES-2; Figure ES-4).

Spawning biomass was steady until the 1980s, when the rapid increase in trawl catch of aurora caused a significant decline from unfished levels, which continued through the early 2000s. Since the mid-2000s, spawning biomass has remained stable, at levels slightly above 1650 mt (Table ES-2).

Table ES-2: Recent trend in beginning of the year biomass and depletion

Year	Spawning Biomass (mt)	~95% confidence interval	Estimated depletion	~95% confidence interval
2004	1760	(478-3043)	0.67	(0.54-0.8)
2005	1727	(445-3010)	0.66	(0.52-0.79)
2006	1710	(427-2994)	0.65	(0.51-0.79)
2007	1695	(409-2980)	0.65	(0.5-0.79)
2008	1681	(392-2969)	0.64	(0.5-0.78)
2009	1672	(378-2965)	0.64	(0.49-0.78)
2010	1659	(359-2960)	0.63	(0.48-0.78)
2011	1660	(352-2968)	0.63	(0.48-0.79)
2012	1669	(353-2985)	0.64	(0.48-0.79)
2013	1673	(348-2998)	0.64	(0.48-0.79)

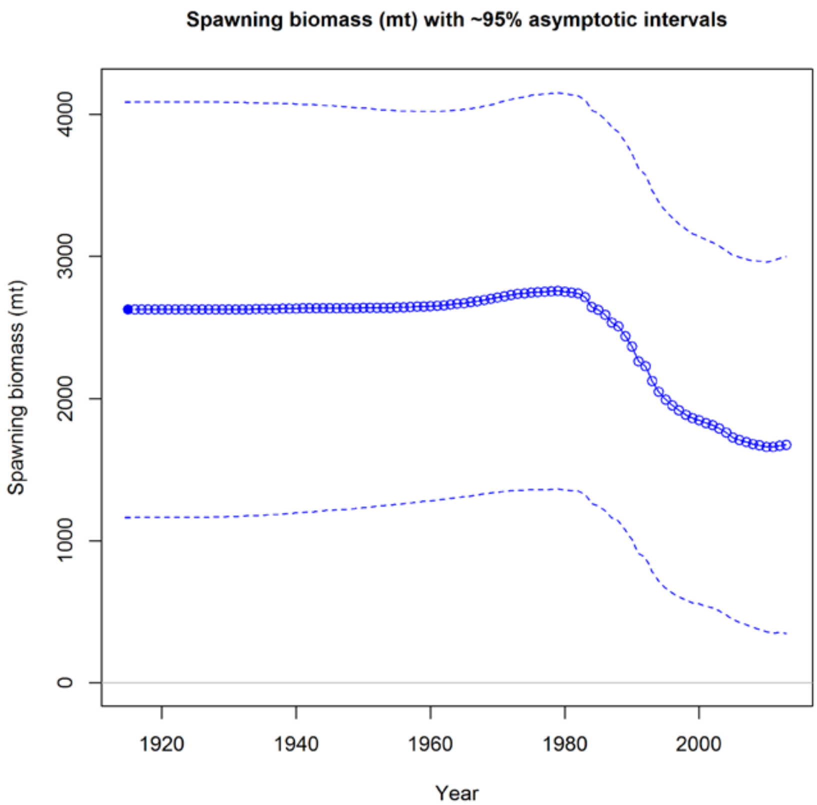

Figure ES-3: Time series of spawning biomass trajectory (circles and line: median; light broken lines: 95% credibility intervals) for aurora rockfish.

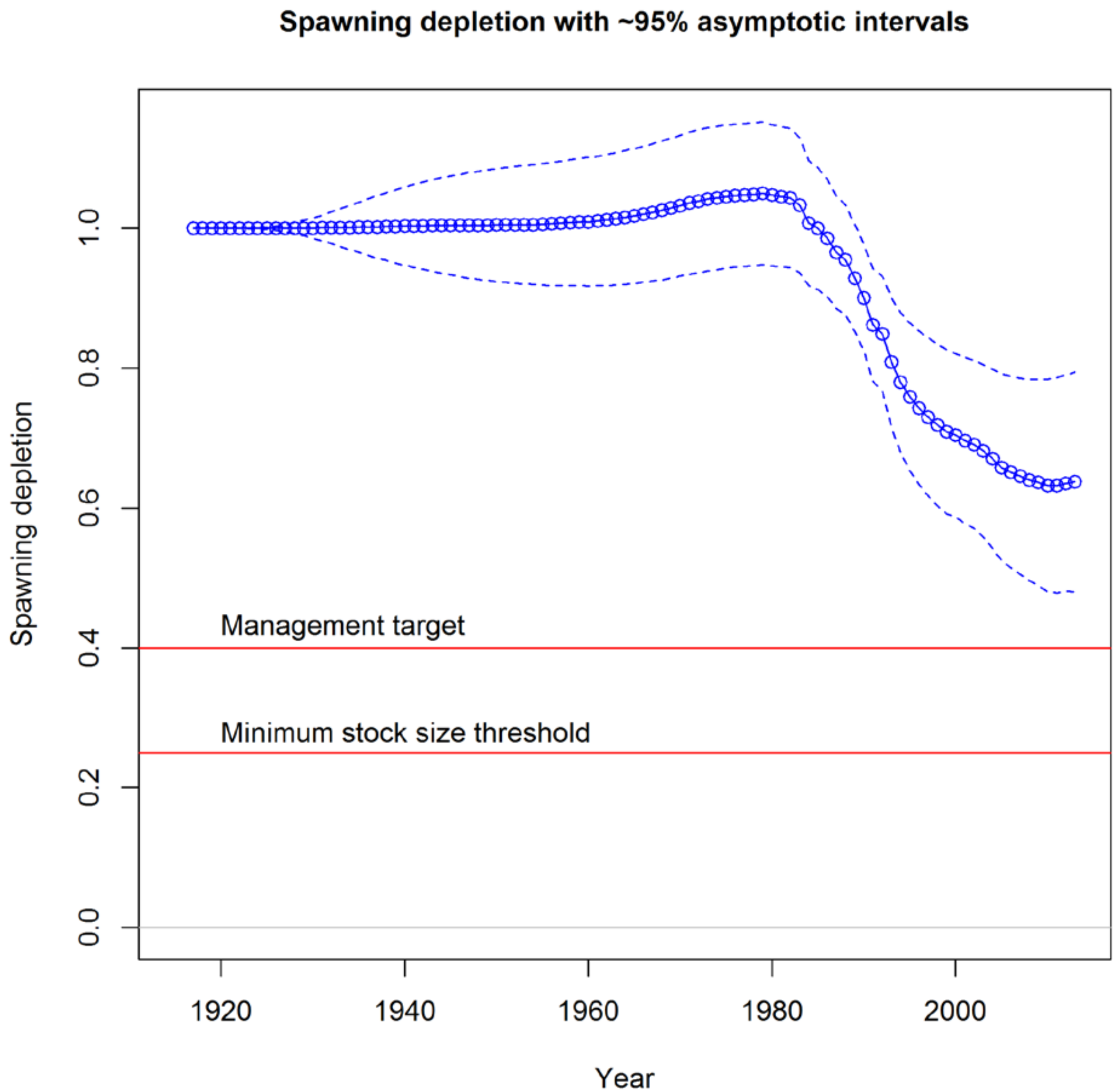

Figure ES-4. Estimated relative depletion with approximate 95% asymptotic confidence intervals (dashed lines) for the aurora rockfish base case assessment model.

Recruitment

The aurora rockfish base case assumed a Beverton-Holt stock recruitment relationship parameterized with the steepness parameter. Steepness was fixed to the mean of the most recent rockfish steepness prior (h = 0.779; Thorson, 2013). The scale of the population is estimated through the log of the initial recruitment parameter (R_0). Recruitment deviations were estimated from 1916 (the beginning of the modeling period), with a ramp towards bias correction beginning in 1962, full-bias adjustment beginning in 1970 and ending in 2008, and a ramping back down to no bias correction in 2012. Two of the largest contemporary recruitment events are found in 1999 and 2007 (Table ES-3; Figure ES-4). Despite the inclusion of estimated ageing error, discerning individual year classes remains difficult and significant correlation exists between the estimated strength of adjacent year classes, which may be primarily due to ageing error rather than actual correlation in recruitment strength.

Table ES-3: Recent recruitment

Year	Estimated recruitment (1,000's)	~95% confidence interval
2004	638	(40-1236)
2005	1093	(100-2085)
2006	1130	(35-2226)
2007	1798	(191-3406)
2008	1328	(32-2624)
2009	1157	(85-2229)
2010	711	(0-1425)
2011	719	(0-1486)
2012	736	(0-1569)
2013	736	(0-1570)

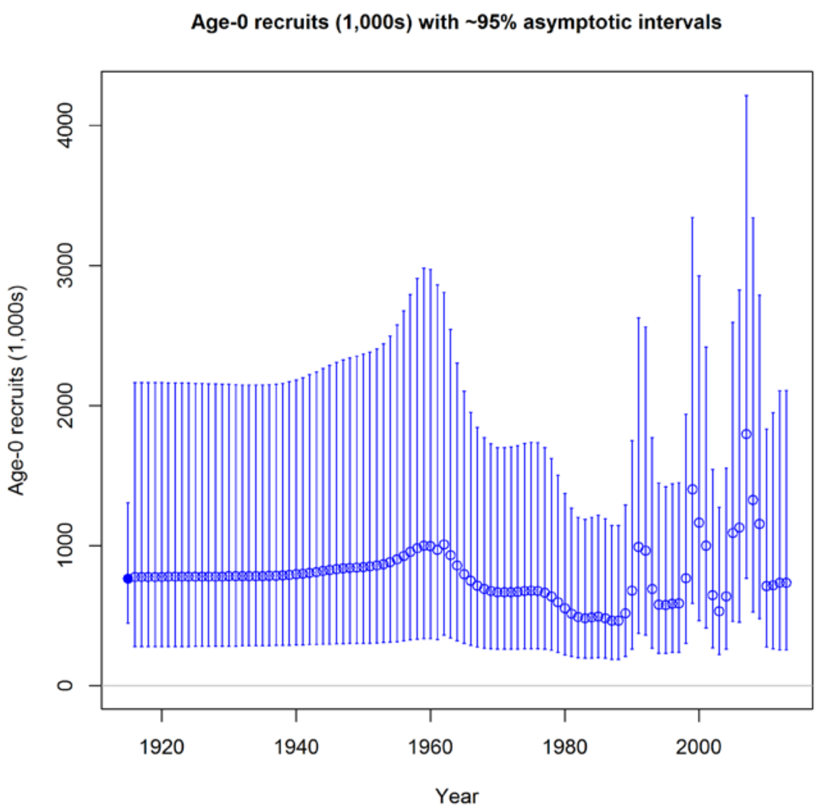

Figure ES-4: Recruitment time series for the base model of aurora rockfish.

Exploitation status

Previous estimates of sustainable aurora rockfish removals (via catch-only methods) compared to actual removals indicated possibly elevated overfishing risks. The aurora base-case model provides an improved basis for evaluating the stock's exploitation history. The current model estimates that exploitation of aurora rockfish has been below the current management harvest-rate limit in almost all years, exceeding the current limit only in 7 years, all during the early peak in trawl catch between 1983 and 1994 (Figure ES-5 and Figure ES-6). Recent levels of removals have generally remained moderate (Table ES-4). In particular, there seems to be very low risk that current removals are causing overfishing.

Biomass status also is estimated to be well above target levels (Figure ES-6). The target reference point for rockfish spawning biomass is 40% of unfished conditions. The current estimate of aurora rockfish depletion is 64%, with the lowest ever estimated depletion from the base case at 63%.

Table ES-4. Recent trend in spawning potential ratio (entered as 1-SPR) and summary exploitation rate (catch divided by total biomass).

Year	Estimated 1-SPR (%)	~95% confidence interval	Exploitation rate	~95% confidence interval
2003	45%	(0-1.32)	0.0205	(0.01-0.0359)
2004	48%	(0-1.43)	0.0235	(0.01-0.0411)
2005	37%	(0-1.08)	0.0151	(0-0.0267)
2006	38%	(0-1.11)	0.0157	(0-0.0287)
2007	38%	(0-1.13)	0.0161	(0-0.0291)
2008	36%	(0-1.06)	0.0146	(0-0.0291)
2009	42%	(0-1.24)	0.0186	(0-0.0375)
2010	30%	(0-0.9)	0.0117	(0-0.0215)
2011	23%	(0-0.67)	0.0079	(0-0.0143)
2012	31%	(0-0.91)	0.0118	(0-0.0212)

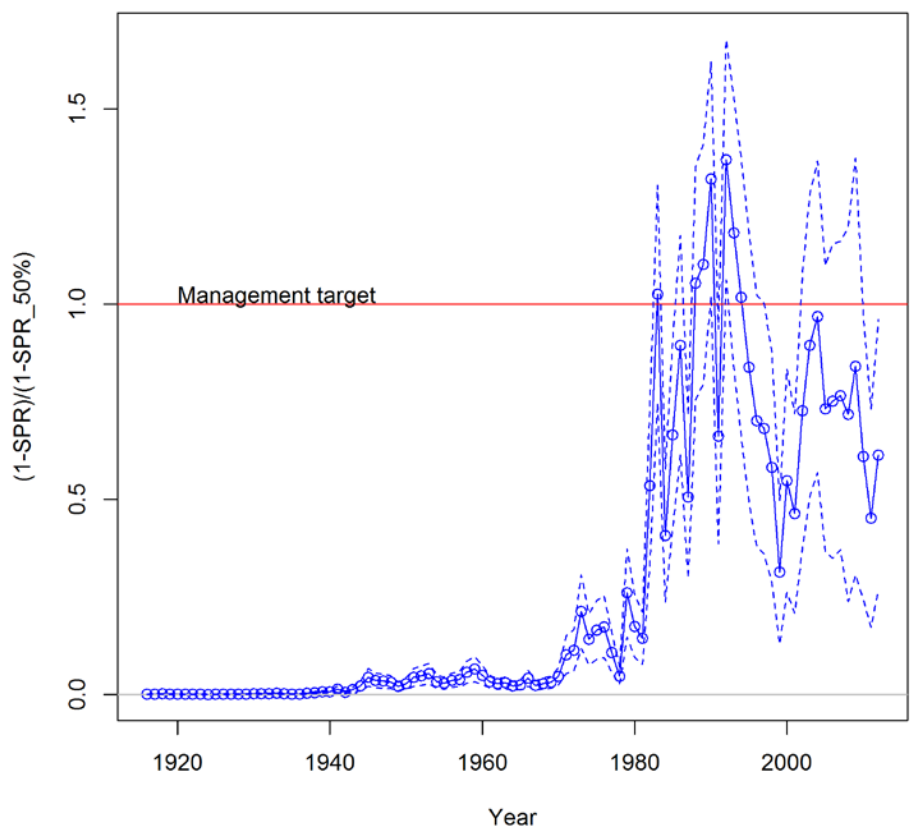

Figure ES-5. Time series of estimated relative spawning potential ratio (1-SPR/1-SPRTarget=0.50) for the aurora rockfish base-case model (round points) with ~95% intervals (dashed lines). Values of relative SPR above 1.0 (100% in the table above) reflect harvests in excess of the current overfishing proxy.

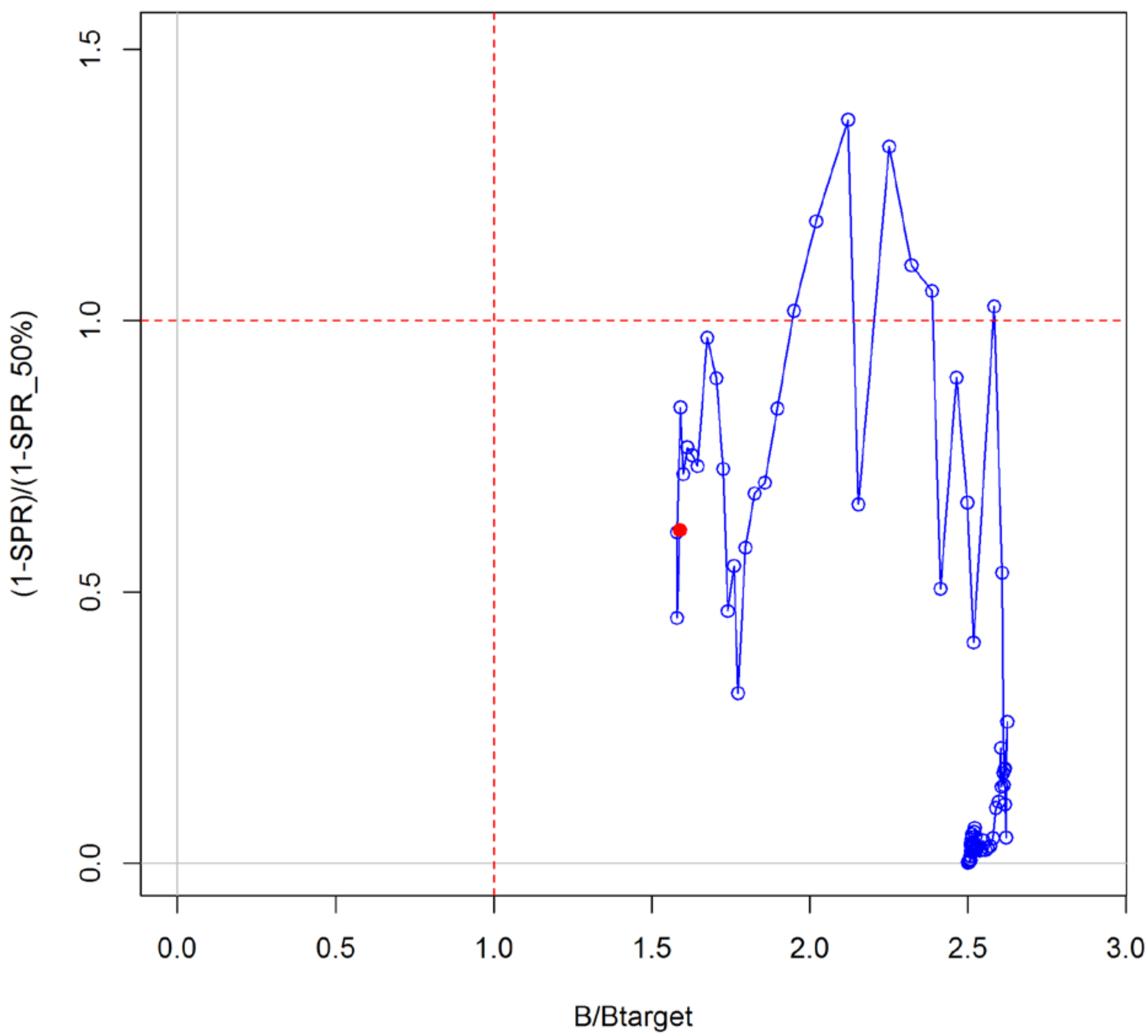

Figure ES-6. Phase plot of estimated relative (1-SPR) vs. relative spawning biomass for the aurora rockfish base case model. The relative (1-SPR) is (1-SPR) divided by 50% (the SPR target). Relative depletion is the annual spawning biomass divided by the spawning biomass corresponding to 40% of the unfished spawning biomass. The red point indicates the year 2012.

Ecosystem considerations

Aurora rockfish co-occurs with many prominent groundfish targets such as Dover sole, sablefish, thornyheads and hake (Figure 2), though it is most often reported with catch of splitnose rockfish. Aurora rockfish contribute to the overall California Current ecosystem as both predators of crustaceans and small fishes, and as prey to larger fishes, marine mammals, and large squid. Juvenile aurora rockfishes are preyed on by salmon, birds, and other fishes (Love 2011).

Several aspects of aurora rockfish population biology are affected by the ecosystem. The recruitment of many species of rockfish appears to have been high in 1999, suggesting that environmental conditions influence the spawning success and survival of larvae and juvenile rockfish, including aurora rockfish. The mechanism behind this observation is not well understood, but zooplankton abundance, changes in water temperature and currents, distribution of prey and predators, and amounts and timing of upwelling are all possible linkages. Changes in the environment may also directly influence age-at-maturity, fecundity, growth, and survival, which can affect stock status determination and its susceptibility to fishing. Thompson and Hannah (2010) found variations in growth corresponding to individual years based upon dendrochronological techniques and otoliths, and found a correlation between observed growth anomalies in otoliths and sea levels in individual years. Such results are intriguing, but insufficient for parameterizing population models. No other studies known to us have quantified any ecosystem level effects in aurora rockfish. Ecosystem considerations therefore were not explicitly included in this assessment.

Reference points

Reference points and quantities for the aurora rockfish base case model are provided in Table ES-5.

Table ES-5. Summary of reference points and management quantities for the base case model.

Quantity	Estimate	~95% Confidence Interval
Unfished Spawning biomass (mt)	2626	(1165-4087)
Unfished age 0+ biomass (mt)	6109	(2737-9481)
Unfished recruitment (R0)	766	(349-1182)
Spawning Biomass (2013)	1673	(348-2998)
SD of log Spawning Biomass (2013)	0.39	---
Depletion (2013)	0.64	(0.48-0.79)
Reference points based on $SB_{40\%}$		
Proxy spawning biomass ($B40_{\%}$)	1050	(466-1635)
SPR resulting in $B40_{\%}$ ($SPR_{B40\%}$)	0.44	(0.44-0.44)
Exploitation rate resulting in $B40_{\%}$	0.0304	(0.0271-0.0337)
Yield with $SPR_{B40\%}$ at $B40_{\%}$ (mt)	72	(33-112)
Reference points based on SPR proxy for MSY		
Spawning biomass	1213	(538-1888)
SPR_{proxy}	50%	
Exploitation rate corresponding to SPR_{proxy}	0.0248	(0.0222-0.0274)
Yield with SPR_{proxy} at SB_{SPR} (mt)	67	(31-104)
Reference points based on estimated MSY values		
Spawning biomass at *MSY* (SB_{MSY})	648	(283-1012)
SPR_{MSY}	0.30	(0.2963-0.3039)
Exploitation rate corresponding to SPR_{MSY}	0.0510	(0.0442-0.0578)
MSY (mt)	79	(36-122)

Management performance

Stock-specific OFLs/ABCs (Table ES-6) were not set historically for aurora rockfish, though the reauthorized Magnuson-Stevens Act of 2006 required OFLs for all species in a management plan. The first of the OFLs were calculated in 2010 for the 2011-2012 management cycle. Aurora rockfish are not managed to their component OFL contributions to the minor slope rockfish complex, but past total removals have exceeded the current OFL component values in several years, suggesting the potential of chronic overfishing of aurora rockfish.

Table ES-6. Recent trend in total catch and commercial landings (mt) relative to the management guidelines. Estimated total catch reflect the commercial landings plus the model estimated discarded biomass.

Year	OFL contribution (mt)	ACL contribution (mt)	Commercial Landings (mt)	Estimated Total Catch (mt)
2003	NA	NA	56.62	76.25
2004	NA	NA	69.68	85.88
2005	NA	NA	43.28	54.65
2006	NA	NA	33.39	56.55
2007	NA	NA	37.76	57.89
2008	NA	NA	18.71	52.46
2009	NA	NA	23.7	66.43
2010	NA	NA	23.94	41.74
2011	47	NA	24.66	28.59
2012	47	NA	36.87	42.71

Unresolved problems and major uncertainties

Natural mortality: The aurora rockfish assessment is very sensitive to the values chosen for the female and male natural mortality coefficients. Natural mortality is always a very problematic parameter for stock assessments, but with very long-lived species such as aurora rockfish, the presence of very old individuals in composition data can provide strong information regarding the implausibility of large values for *M*. Future assessments of this stock would greatly benefit from an increase in the number of conditional age-at-length observations and a validation of the ageing method.

Calculating effective sample size: The pre-STAR panel model calculated effective sample size by iteratively reweighting the different data sources. Although this reweighting approach has become a standard feature of most US West Coast assessments, Francis (2011) provided compelling evidence that this standard approach results in questionable residual patterns. The Francis approach to reweighting, in contrast, greatly reduced these “bad” residual patterns. The STAR Panel endorsed the use of the Francis; however it remains to be determined whether the Francis approach is the “best” general approach for deriving reweighting factors.

Recruitment: The assessment model produced a strange pattern of historical recruitments in which an extended period of positive deviations (roughly for the years 1940-1965) was followed by an extended period of negative deviations (roughly 1966-1987). Possible causes for this unusual pattern are likely related to one or more structural limitations in the model, which created systematic departures from an equilibrium age composition. Attempts were made to uncover the mechanism(s) that might be responsible, but the exact cause(s) remain unknown. These structural limitations in the assessment model remain a source of uncertainty that should be explored more fully the next time this stock is assessed.

Decision table states of nature: How to adequately quantify and balance uncertainty when constructing the decision table was a major topic of discussion during the STAR Panel. This is an ongoing challenge for most assessments, so future stock assessments and STAR Panels would likely benefit if they were provided with more detailed technical guidance on how to construct decision tables, including a summary of lessons learned from a review of approaches applied in past stock assessments.

Harvest projections and decision table

The base model was projected with catches in 2013 and 2014 determined from a recent 5-year average and catches from 2015–2024 based on the predicted allowable biological catch (ABC) using a SPR proxy of 50% ($F_{50\%}$), and P*-based buffer of 0.952 and the 40-10 rule. The buffer is based upon a P* of 0.45 and a σ of 0.39. This is the calculated standard deviation in log space of the 2013 spawning biomass based upon the CV in real space of 0.404, via the equation:

$$SD = \sqrt{\ln\left(1 + CV^2\right)}$$

The value of 0.39 is used as it is larger than the default value of 0.36 for category 1 stocks. While the ABCs nearly double from 2015 onward compared to the average catch, the spawning biomass stays relatively stable (Table ES-7). To observe stock status across important uncertainty considerations, a decision table was developed showing projections from 2015–2024 under ABC catches for three states of nature (defined by natural mortality *M*) and with catches streams based on the ABCs from each state of nature (Table ES-8). The most conservative scenario (low *M*, catch stream based on high *M*) indicates the stock will be at the target biomass in 2024. The least conservative scenario (high *M*, catch stream based on low *M*) indicates the population will climb to around 80% of initial conditions. All scenarios using the base case value of M indicate the population will be above the reference point in all years.

Table ES-7. Projection of potential OFL, landings, and catch, summary biomass (age-5 and older), spawning biomass, and depletion for the base case model projected with status quo catches in 2013 and 2014 (average of the past 5 years (2008-2012), and catches at the ABC from 2013 onward. The OFL in years later than 2014 is the calculated total catch determined by $F_{SPR50\%}$. ABC values are calculated using σ_{SB}=0.39 and P*=0.45.

Year	Predicted OFL/contribution (mt)	ABC/ Catch (mt)	Landings (mt)	Age 0+ biomass (mt)	Spawning Biomass (mt)	Depletion (%)
2013	41	46.38	40.45	4,366	1,673	63.7%
2014	41	46.38	40.29	4,403	1,678	63.9%
2015	91.67	87.33	75.55	4,439	1,685	64.2%
2016	91.77	87.42	75.37	4,434	1,678	63.9%
2017	91.90	87.55	75.34	4,427	1,674	63.7%
2018	92.02	87.67	75.43	4,418	1,672	63.7%
2019	92.08	87.73	75.61	4,406	1,673	63.7%
2020	92.06	87.71	75.80	4,391	1,675	63.8%
2021	91.95	87.60	75.96	4,374	1,676	63.8%
2022	91.74	87.40	76.05	4,354	1,678	63.9%
2023	91.44	87.11	76.04	4,333	1,678	63.9%
2024	91.06	86.75	75.94	4,309	1,676	63.8%

Table ES-8. Summary table of 12-year projections showing results for 2015-2024 for alternate states of nature based on the axis of uncertainty. Columns range over low, mid, and high state of nature, and rows range over different assumptions of catch levels from those states of nature. The average 5-year catch (2008-2012) of 46.4 mt is assumed for 2013 and 2014. ABCs are based upon the assumption that P*=0.45 and a σ of 0.39 which reflects the model uncertainty about the spawning biomass estimate in 2013 (Table ES-9).

			State of nature					
			Low $M_{female} = 0.033$		Base case $M_{female} = 0.035$		High $M_{female} = 0.037$	
Relative probability of ln(SB_2013)			0.25		0.5		0.25	
Management decision	Year	Catch (mt)	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion
ABC catches from "Low" state of nature	2015	54.3	1087	0.541	1685	0.642	2674	0.734
	2016	54.6	1087	0.540	1692	0.644	2691	0.739
	2017	54.9	1089	0.541	1701	0.648	2713	0.745
	2018	55.2	1092	0.543	1713	0.652	2739	0.752
	2019	55.5	1097	0.546	1728	0.658	2768	0.760
	2020	55.7	1103	0.548	1743	0.664	2798	0.768
	2021	55.9	1109	0.551	1758	0.670	2829	0.777
	2022	56.0	1115	0.554	1773	0.675	2857	0.784
	2023	56.1	1120	0.557	1786	0.680	2884	0.792
	2024	56.1	1124	0.559	1798	0.685	2907	0.798
Base Case ABC catches	2015	87.3	1087	0.541	1685	0.642	2674	0.734
	2016	87.4	1073	0.534	1678	0.639	2677	0.735
	2017	87.6	1061	0.528	1674	0.637	2686	0.737
	2018	87.7	1051	0.523	1672	0.637	2698	0.741
	2019	87.7	1043	0.519	1673	0.637	2713	0.745
	2020	87.7	1035	0.515	1675	0.638	2730	0.750
	2021	87.6	1028	0.511	1676	0.638	2747	0.754
	2022	87.4	1020	0.507	1678	0.639	2763	0.759
	2023	87.1	1012	0.503	1678	0.639	2777	0.762
	2024	86.8	1002	0.498	1676	0.638	2787	0.765
ABC catches from "High" state of nature	2015	145.7	1087	0.541	1685	0.642	2674	0.734
	2016	145.3	1049	0.522	1654	0.630	2653	0.728
	2017	145.0	1013	0.504	1625	0.619	2637	0.724
	2018	144.7	980	0.487	1600	0.609	2626	0.721
	2019	144.2	948	0.471	1577	0.600	2618	0.719
	2020	143.7	917	0.456	1555	0.592	2611	0.717
	2021	143.0	886	0.440	1533	0.584	2605	0.715
	2022	142.2	855	0.425	1511	0.575	2598	0.713
	2023	141.2	824	0.409	1488	0.567	2589	0.711
	2024	140.2	792	0.394	1464	0.558	2578	0.708

Table ES-9. Aurora rockfish base case results summary.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Commercial landings (mt)	57	70	43	33	38	19	24	24	25	37	NA
Estimated Total catch (mt)	77	85	54	48	53	48	52	41	29	43	NA
OFL contribution(mt)									47	47	41
ACL contribution(mt)											
1-SPR	0.45	0.48	0.37	0.38	0.38	0.36	0.42	0.30	0.23	0.31	NA
Exploitation rate	0.0205	0.0235	0.0151	0.0157	0.0161	0.0146	0.0186	0.0117	0.0079	0.0118	NA
Age 0+ biomass (mt)	4313	4274	4233	4225	4225	4224	4237	4240	4275	4326	4366
Spawning Biomass	1791	1760	1727	1710	1695	1681	1672	1659	1660	1669	1673
~95% Confidence Interval	(507-3074)	(478-3043)	(445-3010)	(427-2994)	(409-2980)	(392-2969)	(378-2965)	(359-2960)	(352-2968)	(353-2985)	(348-2998)
Recruitment	534	638	1093	1130	1798	1328	1157	711	719	736	736
~95% Confidence Interval	(46-1022)	(40-1236)	(100-2085)	(35-2226)	(191-3406)	(32-2624)	(85-2229)	(0-1425)	(0-1486)	(0-1569)	(0-1570)
Depletion (%)	0.68	0.67	0.66	0.65	0.65	0.64	0.64	0.63	0.63	0.64	0.64
~95% Confidence Interval	(0.56-0.81)	(0.54-0.8)	(0.52-0.79)	(0.51-0.79)	(0.5-0.79)	(0.5-0.78)	(0.49-0.78)	(0.48-0.78)	(0.48-0.79)	(0.48-0.79)	(0.48-0.79)

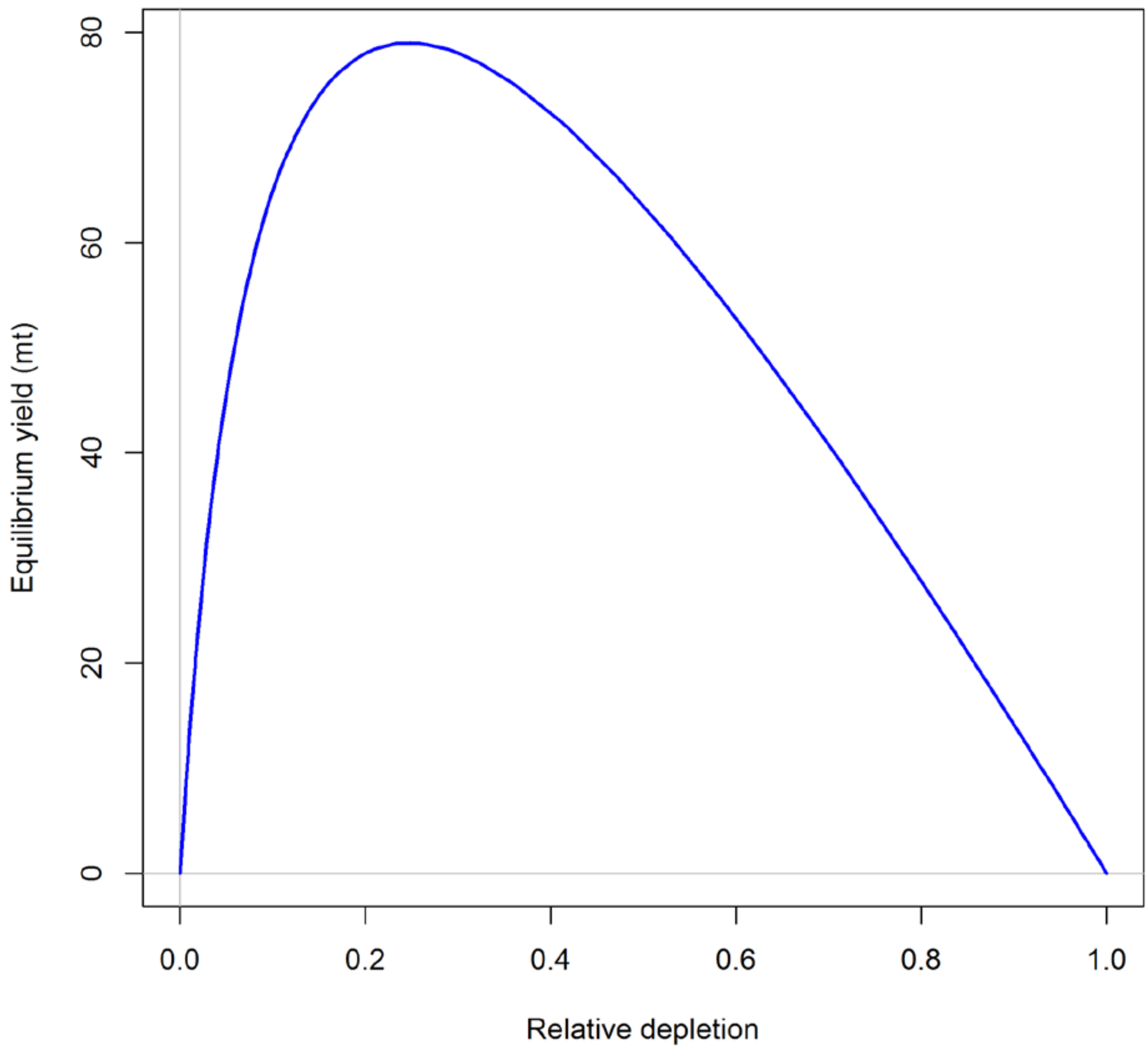

Figure ES-7. Equilibrium yield curve (derived from reference point values reported in Table ES-5) for the aurora rockfish base case model. Values are based on 2010 fishery selectivity and distribution with steepness fixed at 0.779. The depletion is relative to unfished spawning biomass.

Research and data needs

The following research could improve the ability of future stock assessments to determine the current status and productivity of the aurora rockfish population:

1) This was the first year in which aurora rockfish otoliths were read to develop age data. There was insufficient time to read all of the otoliths or even cover all of the years for which aurora rockfish otoliths were collected from the fisheries or surveys. Additional age data could provide additional information for the model to estimate such parameters as natural mortality and recruitment deviations. Additionally, validation methods, such as the bomb radiocarbon chronometer, could be used to validate the ages and ageing method for aurora rockfish.
2) The base model does not use newly available information of female maturity collected within the NWFSC shelf-slope survey in 2012. This new information includes data on mass atresia (a form of skipped spawning), at far greater numbers than that reported in Thompson and Hannah (2010). More data on aurora rockfish maturity will be collected this year on the NWFSC shelf-slope survey, which could confirm the information on mass atresia or indicate variability between years. This information could better inform the maturity curves used in the assessment.
3) The base model assumes spawning output is proportional to spawning biomass. For many rockfish species, fecundity has been shown to have a non-linear relationship with female weight. Determining this relationship for aurora rockfish would improve the estimation of spawning output and depletion.
4) Improve the meta-analysis for steepness. This would include consideration of fixed and estimated parameters, assumptions, and the quality of the information on maturity and fecundity in the component assessments, as well as correlations in recruitments among assessments due to environmental drivers.
5) The application of the GLMM software elicited many unresolved questions. Continued research and articulation of that statistical approach and the options available (e.g. extreme catch events) will greatly benefit both STAT application and STAR Panel understanding of the model and its advantages.
6) Further research on the most appropriate method for data-weighting is greatly needed. Simulation testing and comparison of standard and new (Francis 2011) methods would benefit future assessments of this and other stocks.
7) Development of information on the spatial structure of the stock is needed, including genetic analysis, investigation of differences in and size at maturity, and information on aurora rockfish off of Canada and Mexico.
8) The development of additional indices could provide further information to anchor the assessment. While direct adult biomass indices are unlikely to surface, there may be some possibility to develop a larval abundance index from the CalCOFI data set. This index reflects a measure of spawning biomass.

1 Introduction

1.1 Basic Information

Aurora rockfish (*Sebastes aurora*) are encountered between the Queen Charlotte Islands (British Columbia, Canada) south to mid-Baja California (Mexico). Off of the United States, they are common from northern Oregon to southern California, and are most abundant in the area around Point Conception, California (Figure 1 to Figure 2). They occur at depths from 200 to 700 meters (~100 to 400 fathoms) with the median depth increasing to the south, such that they are most abundant from 350 to 550 m in the north and 400 to 600 m in the south.

While there are areas of greater abundance off of northern Oregon and especially off of Point Conception, California, the population appears continuous over the entire coast, so that there is no clear point for stock delineation. Survey catches exhibit a continuous distribution along the entire coast, though with areas of higher and lower abundances along the coast (Figure 1). For the purposes of this assessment, the population of Aurora rockfish is treated as a single stock from the U.S.-Mexican border to the U.S.-Canada border.

1.2 Life History

Aurora rockfish is a long lived rockfish species, with maximum observed age of 125 years based upon otoliths aged for this assessment. This is slightly greater than the maximum of 118 years seen by Thompson and Hannah (2010) and consistent with a maximum age greater than 75 as reported by Love et al. (2002). As with many rockfish species, aurora rockfish exhibit both spatially varying and sexually dimorphic growth, with females reaching a slightly larger size than males. Off of Oregon, females reached an asymptotic length of 36.9 cm, while males reached only 33.6 cm (Thompson and Hannah 2010). Asymptotic size and size at age decreases with latitude, and since the bulk of the stock is south of Oregon, the average asymptotic lengths are quite a bit lower than those reported above.

Thompson and Hannah (2010) found the age at 50% maturity for female aurora rockfish to be 12.56 years and the length at 50% maturity to be 25.54 cm. Maturity data collected coastwide during the 2012 NWFSC trawl survey found similar values, though with more evidence of atresia in older and larger fish than observed in the Thomson and Hannah study.

Aurora rockfish larvae have been collected off of California in months ranging from November to August, with abundance peaking in May and June, corresponding to the observation of females with developed embryos from March to May off of California and in May in Oregon (Love et al. 2002). Thompson and Hannah (2010) also found that parturition peaked in May off of Oregon. Auroras settle on the bottom when they reach a length of about 3.3 cm (Love et al. 2002).

Aurora rockfish display ontogenetic movement, with smaller fish found in shallower waters (below 400-450 m). They are distributed over both hard and soft substrates (Love et al. 2002)

1.3 Ecosystem Considerations

Aurora rockfish co-occurs with many prominent groundfish targets such as Dover sole, sablefish, thornyheads and hake (Figure 2), though are most reported in the catch of splitnose rockfish. Aurora rockfish contributes to the overall California Current ecosystem as both predator on crustaceans and small fishes, and as prey to larger fishes, marine mammals, and large squid. Juvenile aurora rockfishes are preyed on by salmon, birds, and other fishes (Love 2011).

Several aspects of aurora rockfish population biology are affected by the ecosystem. The recruitment of many species of rockfish appears to be high in 1999, suggesting that environmental conditions influence the spawning success and survival of larvae and juvenile rockfish, including aurora rockfish. The mechanism behind this observation is not well understood, but zooplankton abundance, changes in water temperature and currents, distribution of prey and predators, and amount and timing of upwelling are all possible linkages. Changes in the environment may also directly influence age-at-maturity, fecundity, growth, and survival, which can affect stock status determination and its susceptibility to fishing. Thompson and Hannah (2010) found variations in growth corresponding to individual years based upon dendrochronological techniques and otoliths, and found a correlation between observed growth anomaly in otoliths and sea level in individual years. Such results are intriguing, but insufficient for parameterizing population models. No other studies known to us have quantified any ecosystem level effects in aurora rockfish. Ecosystem considerations therefore were not explicitly included in this assessment.

1.4 Fishery History

Aurora rockfish reside in deep waters below 200 m. The primary gear type that has been used to catch aurora rockfish and other deepwater rockfish has been trawl gear. The use of trawls off the west coast of the United States dates to the late 1800s, though there was little fishery expansion until the availability of the otter trawl and the diesel engine in the mid-1920s (Douglas 1998). Trawl fisheries were mainly conducted on the shelf and became more established during World War II when demand increased for groundfish. Mink farms were also a major destination of groundfish removals in the 1940s and 1950s (Jones and Harry 1960). Foreign fleets began fishing for rockfish, including deeper waters of the slope, in the mid-1960s, with declining participation until the 200-mile EEZ was implemented in 1977 (Rogers 2003). Peaks in the foreign catch have typically been seen in the mid-1960s for rockfishes, but for aurora rockfish, the largest catches were taken in the early 1970s. Foreign fishing was limited in the northern regions by 1970, shifting effort southward and more into aurora rockfish habitat. After 1977, domestic landings of rockfish increased rapidly until about 1990. Subsequent declines in rockfish landings were driven by declining biomass levels and implementation of new, more restrictive management practices, particularly between 1997 and 2002.

Documented and estimated removals of aurora rockfish do not reach consistently large levels until the 1980s (Table 1). Aurora rockfish are and have been historically most commonly taken from central California to Oregon, tightly coupled with the splitnose rockfish. The term “rosefish” was often used to describe either splitnose or aurora rockfish and has been used as a reporting category in California since 1982. Aurora rockfish remains largely a non-targeted member of the slope rockfish complex.

1.5 Management History

Aurora rockfish, being a relatively minor component of groundfish fisheries, has not had the species-specific attention other rockfishes have been afforded over the last 30 years. Most of its management has come in the form of indirect effects from either co-occurring species (such as splitnose) or from effort or catch reductions targeted at species complexes (Appendix 1).

Limits on select rockfishes, which included the co-occurring species splitnose, were established in 1982. The first imposed catch limits on a coastwide *Sebastes* complex (aurora being one of the 50 rockfishes in the complex) were instituted in 1983. This complex was divided into two management areas north and south of 43º00’ N (separating the Eureka and Columbia INPFC areas) in 1994. Ongoing concern that shelf and slope rockfishes may be undergoing overfishing led the attempt by Rogers et al. (1996) to describe the status of most rockfishes contained in the *Sebastes* complex. Aurora rockfish information content was low, so only estimates of exploitation rates were provided, indicating the stock was undergoing very high exploitation rates relative to biomass estimates in both management areas.

The *Sebastes* complex was subsequently divided into nearshore, shelf, and slope complexes effective in the year 2000, and the dividing line between the northern and southern management areas was shifted to 40º10’ N. latitude. Aurora rockfish has since been managed under trip limits for the minor slope rockfish complex in both the north and south management areas.

1.6 Management Performance

While stock-specific OFLs/ABCs were not set historically for aurora rockfish, the reauthorized Magnuson-Stevens Act of 2006 required that all species within a Fishery Management Plan be covered by an OFL. The first of the OFL contributions for minor species that were not calculated using a simple average-catch metric were estimated using DB-SRA in 2010 for the 2011-2012 management cycle. Figure 3 compares the aurora rockfish contribution to the 2012 minor slope rockfish OFLs in each management area to estimated total removals of aurora, over 2003-2011. Several years in both areas indicate removals higher than the 2012 OFL, a strong indicator that aurora rockfish needed further scientific advice on current stock status and other management indicators, hence the recommendation that a full stock assessment be performed.

While the effects of the Rockfish Conservation Areas (RCAs) are often evaluated for their effects on fishery selectivity, aurora rockfish are found almost entirely deeper than the most seaward depth lines used during the history of the RCAs (366 m).

2 Assessment

2.1 Data

The aurora rockfish data used in the assessment are summarized in Figure 4. These data include the following fishery-dependent and fishery-independent sources.

1) Commercial landings from 1916-2012.
2) Fishery length compositions from the domestic fleet (1978-2012).
3) Fishery conditional age-at-length data from the domestic fleet (2003, 2008, 2009).
4) Estimates of discard length frequencies, mean weight, and fraction discarded in the fishery obtained from the West Coast Groundfish Observer Program (WCGOP) and the study by Pikitch et al (1988).
5) Fishery independent data including bottom trawl survey-based indices of abundance and biological data (age and length) from NWFSC shelf /slope survey (2003-2012); NMFS Triennial shelf survey (1995-2004); AFSC slope survey (1997, 1999, 2000, 2001); and NWFSC slope survey (1999-2002). Associated length composition data were available and used for all but the NWFSC slope survey, and age data were available and used for the NWFSC shelf-slope survey for 2003, 2005, 2007, and 2009-2012.
6) Estimates of maturity, length-weight relationships and ageing error from various sources.

A description of each of the specific data sources, including both fishery-dependent and fishery-independent sources is presented below.

2.1.1 Ageing methods

All ages used in this assessment were read by the Cooperative Ageing Project (CAP) in Newport Oregon for the express purpose of being included in this assessment. Due to time limitations only 7 years of survey age data and 3 years of commercial age data were available. Otoliths were read using the break-and-burn (BB) method.

2.1.1.1 Ageing error

Ageing of otoliths is an imperfect measure of the true age of a fish. Incorrect ageing of fish, if ignored, can potentially lead to bias and imprecision in stock assessment derived outputs. Ageing error (both bias and imprecision) is therefore quantified and included in the assessment so as to include such uncertainty in derived assessment quantities. A total of 896 double-read aurora rockfish ages were provided by CAP. Ageing error, for use in interpreting age-composition data, was estimated using the approach of Punt et al. (2008). This approach estimates the underlying true-age distribution of a sample and requires the assumption that at least one age reader is unbiased. Reader 1 is assumed unbiased in explored models. Functional forms of the bias of reader 2 (unbiased, linear or curvilinear) and precision of readers 1 and 2 (constant CV, curvilinear standard deviation, or curvilinear CV) were also considered (Table 8). In all considerations, the form of the precision function was assumed the same for reader 1 and reader 2. Model selection was based on AIC corrected for small sample size (AICc), which converges to AIC when sample sizes are large. The data strongly supported curvilinear bias in reader 2 and curvilinear standard deviation of precision for readers 1 and 2 (Table 8; Figure 5). The choice of minus and plus ages was also explored, but showed very little sensitivity.

2.1.2 Fishery-dependent data

The fishery removals in the assessment are divided among two fleets, which include a domestic fishery ("twl" in figures, as this is dominated by the trawl fishery) and a "full-retention" fishery ("nodisc" in the figures) including the historical foreign Pacific ocean perch (POP), current at-sea Pacific hake fisheries and research catch. The domestic commercial fisheries have historically reported landed catch only, even though a portion of the aurora catch was and is discarded at sea. The foreign POP fishery, on the other hand, was known not to discard fish based on fish size or species, while the at-sea hake fishery reports total catch, including both retained and discarded fish. In order to account for differences in discarding practices and catch reporting, and most importantly avoid inflating aurora removals in POP and at-sea hake fisheries, landings in the domestic trawl fleet and catch in foreign POP and at-sea hake fisheries were treated separately in the model.

Landings of aurora rockfish were reconstructed from 1916 forward, and the assessment assumes a zero catch and equilibrium unfished biomass in 1915. The reconstructed time series of aurora rockfish landings by the domestic fishery and removals by the full-retention fleet are presented in Table 1 and Figure 6.

2.1.2.1 Domestic commercial landings

Estimates of recent commercial landings of aurora rockfish (between 1981 and 2012) were obtained from the Pacific Fisheries Information Network (PacFIN), a regional fisheries database maintained by the Pacific States Marine Fisheries Commission (PSMFC) that serves as a clearinghouse for fishery-dependent information, in cooperation with state agencies on the West Coast and NOAA Fisheries (www.pacfin.com). Landings data were extracted for each gear type on May 17, 2013 and then combined into the fishing fleets used in the assessment. A few records of aurora rockfish recreational catches (for 1984, 1986-1988 and 1994) were reported in the Recreational Fisheries Information Network (RecFIN) (www.recfin.org), another project of PSMFC. Those few records were added to the domestic fishery landings.

Time series of historical (pre-1981) landings were reconstructed by gear group (trawl and non-trawl) for each state separately, and then combined to produce annual coastwide estimates for the domestic fleet. The methods used to reconstruct historical landings for each state are described below.

2.1.2.1.1 Washington

Historically, rockfish landings in Washington were reported on fish tickets in two mixed-species complexes: "Pacific Ocean Perch" and "Other Rockfish" (Tagart and Kimura 1982). In 1966, the Washington Department of Fish and Wildlife (WDFW) initiated a sampling program to estimate landings of each rockfish species within these mixed-species complexes. Tagart and Kimura (1982) described the methodology employed in calculating rockfish landings by species, based on data collected by the WDFW sampling program, and Tagart (1985) provided time series of rockfish landings by year between 1963 and 1980. There were no records of aurora rockfish in these early Washington landings (Tagart, 1985); therefore, no Washington aurora landings were included into time series of domestic landings prior to the PacFIN era (Table 1).

2.1.2.1.2 Oregon

Records of aurora rockfish trawl landings in Oregon go back to the late 1960s, although non-trawl landings were reported earlier (Table 1). Similar to Washington, aurora rockfish were historically landed in Oregon in mixed species market categories, primarily within "Pacific Ocean Perch" and "Unspecified Rockfish". A small portion of rockfish landed in Oregon between 1942 and the early 1980s were also landed in the "Animal Food" category (also called "Mink Food" or "Miscellaneous" by some sources). This portion of catch went to feed mink for the fur trade. Mink food consisted mainly of red meat until World War II, when horsemeat became increasingly difficult and expensive to obtain. During this period, there was an abundance of fillet carcasses, which were used as a protein source for mink. When the demand exceeded the supply, whole fish were specifically targeted to supplement the carcasses (Niska, 1969).

A time series of Oregon historical landings of aurora rockfish through 1986 was provided by the Oregon Department of Fish and Wildlife (ODFW), which in collaboration with the National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC), conducted a reconstruction of historical groundfish landings in Oregon (Karnowski et al., 2012). Karnowski et al. (2012) provide a detailed description of methods used in calculating rockfish landings by species. A variety of data sources were used to reconstruct historical landings of rockfish market categories, including Oregon Department of Fish and Wildlife's Pounds and Value reports derived from the Oregon fish ticket line data (1969-1986), Fisheries Statistics of the United States (1927-1977), Fisheries Statistics of Oregon (Cleaver, 1951; Smith, 1956), Reports of the Technical Sub-Committee of the International Trawl Fishery Committee (now the Canada-U.S. Groundfish Committee) (1942-1975) and many others.

To inform species compositions of rockfish within different market categories, the ODFW has routinely sampled species compositions of multi-species rockfish categories from commercial bottom trawl landings since 1963. Rockfish landings by species, which were estimated based on data collected by the ODFW sampling program, have been summarized in several ODFW reports, including Niska (1976), Barss and Niska (1978) and Douglas (1998). The latter publication by Douglas (1998) was an expansion and improvement on earlier publications (Niska, 1976; Barss and Niska, 1978). These sources were also used by Karnowski et al. (2012) in reconstructing historical landings of aurora rockfish in Oregon. The reconstructed landings of aurora rockfish in Oregon are presented in Table 1.

2.1.2.1.3 California

A time series of California landings of aurora rockfish during the most recent "historical" period (between 1969 and 1980) were available from the California Cooperative Groundfish Survey (CalCOM) database.

Earlier landing records (between 1916 and 1968) were recently reconstructed by the NMFS's Southwest Fisheries Science Center (SWFSC) (Ralston et al., 2010). The reconstructed landings of aurora rockfish in California are presented in Table 1.

2.1.2.2 Discard in the Domestic fisheries

Two sources of information on discard were used for this assessment.

Pikitch et al. (1988) conducted a study from 1985 to 1987, which included the at-sea collection of retained and discard catch data from commercial vessels off of Oregon and Washington. Vessels using bottom, mid-water, or shrimp gear participated in the study on a voluntary basis. John Wallace re-analyzed these data looking at discard rates of aurora rockfish relative to fish assemblages, and applied them to PacFIN data using both Rogers and Pikitch (1992) post-hoc assemblages and area to produce estimates of discard rates (and CVs).

Since 2002, the West Coast Groundfish Observer Program (WCGOP) has collected discard information for limited entry trawl and fixed gear fleets off of the U.S. west coast. Observer coverage averaged about 20% from 2002-2010, expanding to 100% under management of the ITQ (catch share) fishery, which began in 2011. More limited observer coverage exists for the California halibut trawl, the nearshore fixed gear and the pink shrimp trawl fisheries. The Groundfish Mortality Reports (formerly "Total Mortality Reports") produced by the WCGOP incorporates landed and estimates of discarded catch for each year. The WCGOP can also produce estimates of discard rates for each species, but for species caught in stock complexes, such as aurora rockfish, discard estimates of an individual species are relative to total groundfish and not the individual species. For this reason we used the Groundfish Mortality Report estimates of discard for the trawl and non-trawl fleets from 2002-2011 (the 2012 values were not yet available). The values from the Groundfish Mortality Reports do not have associated coefficients of variation or other measures of uncertainty, therefore values consistent with other stocks were assumed.

The WCGOP also has collected length-composition and average-weight data for discarded fish, and these are included to provide information on relative retention at size as well as additional data for estimating discard rates.

2.1.2.3 Catch in the foreign POP fishery

Between 1966 and 1976, foreign trawl fleets from the former Soviet Union, Japan, Poland, Bulgaria and East Germany came to the Northeast Pacific Ocean to target large aggregations of Pacific Ocean perch over high-relief rocky outcrops (Love et al., 2002). Using very large vessels (often called factory trawlers), foreign fleets, particularly the Soviets, had the capacity to operate independently, by processing and freezing their own catch. Support vessels, such as refrigerated transports, oil tankers, and supply ships permitted these large stern trawlers to operate at sea for extended periods of time.

Rogers (2003) estimated removals of POP and other species caught within this foreign POP fishery, including removals of aurora rockfish. In the assessment, we used removals of aurora rockfish catch in the foreign POP fishery between 1966 and 1976 as estimated by Rogers (Rogers, 2003).

2.1.2.4 Catch in the at-sea Pacific hake fishery

A very small amount of aurora rockfish has also been taken as bycatch in the at-sea Pacific hake fishery. The at-sea Pacific hake fishery dates back to the 1960s when foreign vessels participated. In the 1980s, the fishery evolved into a joint venture with U.S. catcher vessels delivering to foreign processing vessels. By 1991, foreign vessels were no longer allowed to fish in U.S. waters, the Pacific hake fishery became completely domesticated, allowing only U.S. vessels to catch and process fish.

The At-Sea Hake Observer Program (A-SHOP) monitors the at-sea hake processing vessels and collects total catch and bycatch data. Since the 1970s, observers were deployed onto foreign fishing vessels that were catching Pacific hake. After 1991, observers continued to be deployed aboard U.S. flagged catcher-processor and mothership vessels.

The annual amounts of aurora rockfish bycatch in the at-sea hake fishery, collected by A-SHOP, were obtained from the North Pacific Database Program (NORPAC). Since 1991, virtually 100% of hauls in the at-sea hake fishery have been sampled for catch and species composition, and the total catch (retained and discarded) has been estimated for both targeted and bycatch species from each haul. To derive the total amount of aurora rockfish bycatch by year, we simply summed the estimated catch in every haul within each year. Prior to 1991 (during the foreign fishery and joint venture), not every haul was sampled. For these years, NORPAC used an expansion factor (one for each year), a ratio of total hauls to sampled hauls. These year-specific expansion factors were used to estimate the total amount of aurora rockfish caught by multiplying the amount of total catch in sampled hauls by the expansion factor. The removals of aurora in the at-sea hake fishery between 1977 and 2012 are presented in Table 1.

2.1.2.5 Fishery biological data

Biological information on domestic commercial landings was obtained from PacFIN (extracted on May 31, 2013). The fishery biological data included sex, length and age of individual fish (amount of data available varied by year and state). These biological data were used to generate length- and age-frequency distributions by sex, which were then used in the assessment to describe selectivity of the domestic trawl and non-trawl fleets. For a portion of length samples, sex information was not available. We used these samples to generate length compositions for unsexed fish and included these compositions in the model, along with those for sexed fish. The summary of sampling efforts, which includes the number of sampled trips and fish by year (for sexed and unsexed fish separately) is provided in Table 4 and Table 5. No biological information was available for aurora removals in foreign POP and at-sea hake fisheries.

2.1.2.5.1 Length composition data

2.1.2.5.1.1 Fishery length compositions

Length-composition data from commercial fisheries were compiled into 16 length bins, ranging from 8 to 38 cm. Most of the length data from PacFIN were reported for females and males separately; therefore length-frequency distributions of aurora rockfish in commercial landings were generated by year and sex. Length compositions for unsexed fish were also included, in addition to the sex-specific compositions.

Overall biological sampling effort has varied among the three states, and the proportion of fish from sampled trips that are measured has been highly variable. To account for non-proportional sampling of aurora rockfish among trips and states, and to generate length frequency distributions that would be more representative of coastwide species landings, the observed length-composition data were expanded using the following algorithm:

1. Length-composition data were acquired at the trip level, along with year, state, and sex information;
2. For each trip, raw length observations were scaled up to represent aurora rockfish landings for the entire trip:
    a. An expansion factor was calculated by dividing the total weight of trip landings by the total weight of aurora rockfish sampled for length within the same trip;
    b. The observed raw length-composition data within each trip were multiplied by the expansion factor and then summed up by state.
3. The expanded and summed lengths in each state were then expanded again to account for differences in species landings among states:
    a. The expansion factor was computed by dividing the total weight of state landings of aurora rockfish by the total weight of aurora rockfish in trips sampled for length within this state;
    b. The length frequency distributions for each state (from step 2 of this algorithm) were multiplied by the expansion factor (from step 3.a) and then summed to determine the coastwide sex-specific, length-frequency distributions by year.

Length-frequencies distributions were developed for the period between 1978 and 2012. We only used randomly collected samples. The initial input sample sizes for length-frequency distributions of aurora landings by year for California and for Oregon and Washington combined were calculated as a function of the number of trips and number of fish sampled, using the method developed by Stewart and Miller (pers. com.):

$$N_{input} = N_{trips} + 0.138 N_{fish} \qquad \text{where} \quad \frac{N_{fish}}{N_{trips}} < 44$$

$$N_{input} = 7.06 N_{trips} \qquad \text{where} \quad \frac{N_{fish}}{N_{trips}} \geq 44$$

The method was developed based on analysis of the input and model-derived effective sample sizes from west coast groundfish stock assessments. A step-wise linear regression was used to estimate the increase in effective sample size per sample, based on fish-per-sample and the maximum effective sample size for large numbers of individual fish.

2.1.2.5.1.2 Discard length compositions

Length compositions of discarded fish were recorded at the tow level by WCGOP observers on board commercial vessels, starting in 2002 for both the trawl and fixed-gear fleets. Length compositions of sampled discarded aurora rockfish were scaled up to the estimated number of discarded aurora in each tow, and then these were summed across observed tows for each year. Sample size was calculated using a modification of Stewart and Miller for survey tows, recognizing that observed discards are less random than surveys.

$$N_{input} = (N_{tows} + 0.0707 N_{fish})^{0.9} \qquad \text{where} \quad \frac{N_{fish}}{N_{tows}} < 55$$

$$N_{input} = (4.89 N_{tows})^{0.9} \qquad \text{where} \quad \frac{N_{fish}}{N_{tows}} \geq 55$$

2.1.2.5.2 Average weight data for discards

The average weight of discarded fish was also provided by the WCGOP and included as another measure of the size of discarded aurora rockfish in the assessment.

2.1.2.5.3 Age-composition data

Fishery age-composition data were available for the trawl fleet only, and only for the years 2003, 2008 and 2009. These age data were compiled into 61 age bins, ranging from age 0 to age 60 fish. Nearly 1,200 ages were available from commercial landings in these three years, as summarized in Table 4.

Age-composition data from the domestic fishery were assembled as conditional distributions of ages at length, by year and sex. The conditional-ages-at-length approach uses an age-length matrix, in which columns correspond to ages and rows to length bins. The distribution of ages in each column then is treated as a separate age composition conditioned on the corresponding length bin (row). The conditional-ages-at-length approach has been used in most recent stock assessments on the West Coast of the United States, since it has several advantages over the use of marginal age-frequency distributions. Age structures are usually collected from individuals that have also been measured for length. If the standard age compositions are used along with length frequency distributions in the assessment, the information on sex ratio and year-class strength are double-counted, since the same fish are contributing to likelihood components that are assumed to be independent. The use of conditional age distributions within each length bin allows avoiding such double-counting without having to downweight both the age and length data. Also, the use of conditional ages-at-length distributions allows the reliable estimation of growth parameters within the assessment model.

Each aged fish was treated as an independent sample of age-at-length. The number of ages within each length bin was used as the initial input sample size for conditional ages–at-length distributions.

2.1.3 Fishery-independent data

2.1.3.1 Surveys

Four fishery-independent groundfish trawl surveys were considered for abundance index development: 1) The Triennial shelf (1977-2004) survey (conducted by the Alaska and Northwest Fisheries Science Centers), the Alaska Fisheries Science Center (AFSC) slope (1997, 1999-2001) survey, and the Northwest Fisheries Science Center (NWFSC) slope survey (1999-2002) and shelf-slope trawl survey (2003-present). Though each survey uses trawl gear to sample groundfishes, the gear specifications, latitudinal and depth distributions, and survey design differs (Cope and Haltuch 2012).

The sampling design of the Triennial groundfish survey employed randomly-selected trawling stations, along each affixed array of latitudinal line transects and was conducted every 3 years from 1977 to 2004. Sampling time, depth, and latitude changed in 1995, with later surveys starting earlier in the year and sampling greater depths (Cope and Haltuch 2012). The deeper sampling is reflected in the fact that aurora rockfish is almost completely absent in this survey before 1995, but present in 17-19% of tows from then on (Table 6; Figure 7). Only years 1995 and onward are considered for survey index development.

The AFSC slope survey has been conducted periodically and without spatial consistency since 1984, but only since 1997 has the survey provided a dependable measure of depths from 183 to 1280 m throughout the area north of 34.5ºN (Table 6). This survey also utilized a fixed-transect design. Frequency of occurrence of aurora rockfish fluctuated from 16% to 21% (Table 6), with an overall occurrence rate of 18% (Figure 8).

The Northwest Fisheries Science Center began conducting a slope trawl survey in 1998, however minimal data were collected for rockfish until 1999. Surveys conducted during 1999-2002 were similar in design to the AFSC slope surveys, in that they continued the line-transect survey design over a slope depth range (183-1,280 m), with no coverage south of Point Conception. However, the new survey differed in the type of vessels and gear used, and trawl duration. The sample coverage was also limited, constraining strata consideration (Figure 9). In 2003, the survey was completely redesigned, switching to a random stratified design and including a wider range of depths (55-1,280m; referred to as the “shelf-slope” survey) and extending to the Mexican border. More samples also allowed for finer stratification options (Figure 10). Relative frequency of occurrence of aurora rockfishes was generally higher in the slope survey (Table 6).

2.1.3.2 Survey abundance indices

Delta-Generalized Linear Mixed Models (delta-GLMMs) were compared to design-based expanded swept-area estimates of abundance. Delta-GLMMs are preferred over the design-based estimates because the approach models both probability of positives and the magnitude of positive tows while allowing for different factors such as vessel and strata effects to be considered in a holistic modeling environment that propagates the uncertainty through all considered processes. The Bayesian implementation of this approach follows that of Thorson and Ward (2013). Lognormal and gamma errors structures were considered for the positive tows, including the option to model extreme catch events (ECEs), defined as hauls with extraordinarily large catches, as a mixture distribution (Thorson et al. 2011). The ECE models were considered exploratory and not considered in model selection. Model convergence was evaluated using the effective sample size of all estimated parameters (typically >500 of more than 1000 kept samples would indicate convergence), while model goodness-of-fit was evaluated using Bayesian Q-Q plots. Deviance was used to choose between the lognormal and gamma error structures.

Stratification for each survey was determined by first considering observations with the design-based strata. Any additional strata within the design strata required at least 5 positive occurrences. Design strata can be broken up into finer strata, but combining strata of differential sampling effort could create bias, thus combining strata was limited to cases where additional samples could be added with small increases in depth beyond a certain strata boundary. Design depth strata considered were 55-183 m,183-366 m, and 366-500m; and 55-183 m, 183-549m, and 549-1280m for the AFCS triennial and NWFSC annual surveys, respectively. There were no specific latitudinal design strata for the AFSC triennial survey, but the NWFSC had one latitudinal effort break at 34.5º N lat. (near Pt. Conception). Final design strata used in the GLMMs for those stocks are shown in Figure 7 to Figure 10. Year-strata effects were assumed fixed with no interactions for both the binomial and positives models. The AFSC surveys assume no vessel effects, while the NWFSC surveys assumed random vessel effects.

Model comparisons and selection are shown in Figure 11 to Figure 14. The gamma error structure was chosen over lognormal based on the deviance criterion in three of the four comparisons, but gamma was used for all surveys for consistency with the design based estimates and lack of reasoning to select lognormal over gamma from just one survey (Figure 15 to Figure 18). All chosen models demonstrated good effective sample sizes and acceptable Q-Q plots (Figure 19). Final index time series used in the base case models are given in Table 7.

2.1.3.3 Survey Length Composition Data

Length-composition data collected by the surveys were used to derive length frequency distributions by survey, year and sex. A summary of sampling efforts in all surveys are summarized in Table 9. Length composition data were compiled into 16 length bins, ranging from under 10 cm to 38 cm and larger, with 2-cm bins intermediate. The observed length compositions were expanded to account for differences in relative sampling among tows as well as biomass indices for each spatial stratum. To generate coast-wide length frequency distributions the following algorithm was used:

1. For a specific year and survey, length data by sex were acquired at the tow level;
2. For each tow, the raw length observations were expanded to represent the entire tow:
   a. An expansion factor was calculated by dividing the total weight of aurora within a tow by the total weight of aurora in a tow measured for length;
   b. The observed length frequencies were multiplied by the corresponding expansion factor and then summed up within a spatial stratum.
3. The expanded and summed length frequencies in each spatial stratum were normalized and then weighted to account for differences in the year-specific indices among the spatial strata:
   a. The weighted and summed length frequencies were divided by their sum so that the resultant frequency vector summed to 1.0;
   b. These normalized length frequency compositions within each stratum multiplied by the proportion of the year specific numerical index within that stratum (i.e. the stratum index divided by the total index).

Spatial strata used to generate annual length frequency distributions were consistent with the strata used to compute survey abundance indices (Table 10; Figure 6 to Figure 10). The coast-wide length frequency distributions of female and male aurora rockfish by survey, year and sex are shown in Figure 35 to Figure 46.

The initial input sample sizes for the survey length frequency distribution data for each stratum were calculated as a function of both the number of fish and number of tows sampled using the method developed by Stewart and Miller (NWFSC, pers.com.):

$$N_{input} = N_{tows} + 0.0707N_{fish} \qquad \text{where } \frac{N_{fish}}{N_{tows}} < 55$$

$$N_{input} = 4.89N_{tows} \qquad \text{where } \frac{N_{fish}}{N_{tows}} \geq 55$$

The total input N was then calculated via the following equation which accounts for the difference in relative index (I) in each stratum and the relative effective sample size in each stratum, under the assumption of a binomial distribution within each cell of the length composition:

$$N_{total} = \frac{1}{\sum_{stratum=1}^{n} \frac{I_{stratum}^2}{N_{stratum}}}$$

2.1.3.4 Age-composition data

Age composition data were available for the NWFSC shelf/slope survey only, and only for the years 2003, 2005, 2007, and 2009-2012. A summary of age data available for the assessment is presented in Table 4 and Table 9. Age composition data from the surveys were compiled as conditional distributions of ages at length by survey, year and sex, as with the fishery data (Section 2.1.2.5.3). Each age was considered an independent observation of age at length, and thus the raw observed age at length data were used as the conditional data and the number of fish in each aged length bin was used as the input sample size. Conditional ages at length compositions generated and used in the assessment are shown in Figure 87 to Figure 90.

2.1.4 Priors for informing parameter values

A prior for natural mortality was developed based upon Hoenig's (1983) method and the method of developing priors from one or more meta-analytical methods developed by Hamel, which has been used in multiple west coast groundfish stock assessments. A prior for steepness (the Thorson-Dorn prior) was calculated using previous stock assessments for the 2013 stock assessment cycle and reviewed at a SSC groundfish subcommittee meeting in March, 2013.

2.2 Model

2.2.1 Modeling Software

This assessment uses the Stock Synthesis modeling framework developed by Dr. Richard Methot (NMFS, NWFSC). The most recent version (SSv3.24o, distributed on April 10, 2013) was used, since it included improvements in the output statistics for producing assessment results and several corrections to older versions.

2.2.2 General Model Specifications

This assessment focuses on the population of aurora rockfish that occurs in coastal waters of the western United States, off Washington, Oregon and California. The population within this area is treated as a single coastwide stock, given the lack of data suggesting the presence of multiple stocks. The modeling period begins in 1916, assuming that in 1915 the stock was in an unfished equilibrium condition.

Fishery removals are divided among two fleets: 1) the domestic fishery (including trawl as well as hook-and-line, pot, setnet and other gears), and 2) the full-retention foreign POP and at-sea Pacific hake fisheries (along with the minimal research catch). As described earlier, the domestic and full-retention fleets are treated separately to account for difference in handling and reporting the discards. The domestic fishery is associated with a particular amount of catch discarded at sea. The foreign POP fishery is known not to discard fish (based on their size or species), while the at-sea hake fishery, which is managed under maximized retention regulations. The time series of discards, therefore, are estimated for the domestic fleet, and no discard is assumed for the full-retention fleet.

Historical landings for the domestic trawl and non-trawl fisheries were reconstructed by state, and then combined into the coastwide fleet. Selectivity and retention parameters are estimated for the domestic fleet, while selectivity of the full retention fleet is mirrored to that of the domestic fishery. The Triennial, AFSC slope and NWFSC surveys are treated as separate fleets with independently estimated selectivity and catchability parameters reflecting differences in depth and latitudinal coverage, design and methods. Since no length or age data are available for the NWFSC slope survey, the selectivity of that survey is mirrored to that of the NWFSC shelf-slope survey which used the same general methodology (except for selection of survey trawls) and also covers the entire depth range of the species. Given the difference in latitudinal range, catchability was estimated independently for the NWFSC slope and NWFSC shelf-slope surveys.

No seasons are used to structure removals or biological predictions; data collection is assumed to be relatively continuous throughout the year. Fishery removals in the model occur instantaneously at the mid-point of each year and recruitment on the 1st of January

The base model is sex-specific and the sex-ratio at birth is assumed to be 1:1. Growth of aurora rockfish is assumed to follow the von Bertalanffy growth model, and separate growth parameters are estimated for females and males, except for the CV of length-at-age (Table 11). Females and males also have separate weight-at-length parameters.

Recruitment dynamics are assumed to be governed by a Beverton-Holt stock-recruit function (Table 11). 'Main' recruitment deviations were estimated for modeled years that had information about recruitment, between 1962 and 2011 (as determined from the bias-correction ramp). We additionally estimated 'early' deviations between 1916 and 1959 so that age-structure for the first year with length composition data (1978) would deviate from the stable age-structure that is consistent with estimated variability in recruitment

The length composition data are summarized into 16 2-cm bins, ranging between 8 cm (representing fish under 10 cm) and 38+ cm (Appendix B). Population length bins are defined at a finer, 1-cm scale. The age data are summarized into 61 bins, ranging being age 0 and age 60+. Age data beyond age 60 comprise less than 15% of all the age data available for the assessment and ageing error is large for fish that old. For the internal population dynamics, ages 0-80 are individually tracked, with the accumulator age of 80 determining when the 'plus-group' calculations are applied. This accumulator age is selected since little growth is predicted to occur at and beyond this and so that, given the ageing error associated with fish in this plus group, the model would not expect fish in the 80+ group to have age estimates below age 60. The model does not allow growth to continue in the plus-group.

One round of iterative re-weighting was used in the assessment to achieve consistency between the input sample sizes and the effective sample sizes for length and age composition samples based on model fit. This reduces the potential for particular data sources to have a disproportionate effect on total model fit. Additional down-weighting of compositional data were undertaken using Francis' method (Francis 2011; Table 10).

2.2.3 Estimated and Fixed Parameters

In the assessment, there are parameters of three types, including life history parameters, stock-recruitment parameters and selectivity and retention parameters. These parameters were either fixed or estimated within the model. Reasonable bounds were specified for all estimated parameters. A full list of all parameters used in the assessment is provided in Table 11 and Table 12.

2.2.3.1 Life History Parameters

Life history parameters that were fixed in the base model included weight-at-length parameters (Figure 20) for females and males, female maturity-at-length (Figure 21) and fecundity-at-length (Figure 22), and natural mortality (*M*) for females and males (Table 11). These parameters were either derived from data or obtained from the literature, as described in Section 1.2.

The von Bertalanffy growth function (von Bertalanffy 1938) was used to model the relationship between length and age in aurora rockfish. This is the most widely applied somatic growth model in fisheries (Haddon 2001), and has been commonly used to model growth in rockfish species (e.g. Love et al. 2002) and several west coast stock assessments).

Female aurora rockfish were reported to reach larger sizes than males; therefore, time-invariant growth was modeled for each sex separately. The Stock Synthesis modeling framework uses the following version of the von Bertalanffy function:

$$L_A = L_\infty + (L_1 - L_\infty) e^{-k(A - A_1)}$$

Where asymptotic length, L_∞, is calculated as:

$$L_\infty = L_1 + (L_2 - L_1)\ /(1 - e^{-k(A_2 - A)})$$

In these equations, L_A is length (cm) at age A, k is the growth coefficient, $L_\propto$ is asymptotic length, and L_1 and L_2 are the sizes associated with a minimum A_1 and maximum A_2 reference ages.
Ages A_1 and A_2 were set to be 1 and 40 years, respectively. Female parameters L_1, L_2, growth coefficient k and CV associated with L_1 and L_2 estimates were estimated in the model. The male L_1, L_2 and growth coefficient k were estimated in the model while the CVs associated with L_1 and L_2 were set to be identical to those estimated for the females.

Natural mortality rates were set at the median of the prior derived from Hoenig's method: 0.0350 for females and 0.0371 for males (Table 11).

2.2.3.2 Stock recruit Parameters

Recruitment dynamics are assumed in the assessment to be governed by a Beverton-Holt stock-recruit function. This relationship is parameterized to include two estimated quantities: the log of unexploited equilibrium recruitment (R_0) and steepness (h) (Table 11).

In this assessment the log of R_0 was estimated, while h was fixed at its prior mean of 0.779. This prior was estimated using a likelihood profile approximation to a maximum marginal likelihood mixed-effect model for steepness from ten Tier-1 rockfish species off the U.S. West Coast (Pacific ocean perch, bocaccio, canary, chilipepper, black, darkblotched, gopher, splitnose, widow and yellowtail rockfish). Both northern and southern assessments of black rockfish were used, although the log-likelihood for each was given a 0.5 weighting, to ensure that together these two assessments had an equal weighting to the other species. This likelihood profile model is intended to synthesize observation-level data from assessed species, while avoiding the use of model output and thus improving upon previous meta-analyses (Dorn, 2002; Forrest et al., 2010). This methodology has been simulation tested, and has been recommended by the PFMC's SSC for use in stock assessments.

We estimate lognormal deviations from the standard Beverton-Holt stock-recruit relationship for the period between 1916 and 2011. Deviations are penalized in the objective function, and the standard deviation of the penalty (σ_R) is specified as 0.5. This is a reasonable, but fairly low value. Methot and Taylor (2011) suggested that σ_R^2 could be tuned to match the sum of the variance of the estimate recruitment deviations and the square of the average standard error of these estimates. Applying this method to the estimated values and their uncertainty for the base model provided a value of 0.518, which was seen as similar enough to the assumed value of $\sigma_R = 0.5$ that no additional tuning was applied. Recruitment deviations are also bias-corrected following Methot and Taylor (2011), by providing a proportion of the total bias correction for year y that varies depending upon how informative the data are about r_y. Specifically, we used R4SS (Taylor et al. 2012) to estimate a five-parameter bias-correction ramp (Figure 23).

2.2.3.3 Selectivity Parameters

Gear selectivity parameters used in this assessment were specified as a function of size with no direct dependence upon age (Table 12). Separate size-based selectivity curves were fit to each fishery fleet and survey for which length composition data were available.

Logistic selectivity curves were used for all three fisheries, with the full retention fleet mirrored to the domestic trawl fleet. The logistic curve has two parameters: 1) The length at 50% selectivity, and 2) the width of the curve.

Separate retention curves were estimated for the domestic trawl fleet and the non-trawl fleet. Retention curves are defined as a logistic function of size. These curves are described by four parameters: 1) inflection, 2) slope, 3) asymptotic retention, and 4) male offset to inflection. Male offset to retention was fixed at 0 (i.e. no male offset was applied). Asymptotic retention was set as a time-varying quantity with blocks from 1999-2001, individual years from 2002-2010, and 2011-2012 as a time block. Discard rates were fit to match the observed amount of discard between 2002 and 2011. The time-varying parameters were set via use of time blocks.

The selectivity curves for all the surveys were estimated to be dome-shaped and modeled with double-normal selectivity. The double-normal selectivity curve has six parameters, including: 1) peak, which is the length at which selectivity is first fully selected, 2) width of the plateau on the top, 3) width of the ascending part of the curve, 4) width of the descending part of the curve, 5) selectivity at the first size bin, and 6) selectivity at the last size bin.

2.2.4 Key assumptions and structural choices

The structure of the base model was selected to balance model realism and parsimony. While the model was able to estimate natural mortality, uncertainty about the historical selectivity of the fishery led to concern about the estimated natural mortality rates. The *a priori* information about natural mortality from Hoenig's (1983) method led to the natural mortality rate being set at 0.0350 for females and 0.0371 for males.

The domestic trawl fishery selectivity curve is estimated to be asymptotic even when given the opportunity to be dome-shaped (i.e. a double-normal form). We have, therefore, chosen to specify that fishery selectivity is asymptotic, which is consistent with the treatment of this fishery in assessments of other rockfish species.

2.2.5 Changes made during STAR panel Review

- The specification for the recruitment deviations was changed from having "simple" recruitment deviations (not forced to sum to zero) in the SS3 control file to having a standard "dev-vector". It is not clear how the "simple" deviations are constrained, nor has this option been tested or reviewed.
- The "Trawl" and "Non-Trawl" fleets were combined into a single Domestic fleet which is dominated by the Trawl fleet, and only Trawl compositional data are used to characterize this fleet. This was done due to the sparse

Non-Trawl compositional data and concerns that the recent Non-Trawl data did not reflect the historical mix of fisheries in that data set.

- The iterative reweighting method was changed from just looking at the differences between the input and estimated effective sample sizes for each set of indices or compositional data to using the Francis (2011) method for compositional data, which considers the deviation between observed and modeled mean length or age within each compositional data set.
- The natural mortality rates *M* were set at the median of the prior distributions (0.035 for females and 0.0371 for males) rather than the mean of those lognormal distributions.

2.2.6 Base Model Results

A converged base model was found with appropriate gradient, covariance and Hessian properties. Additional exploration to conclude the base model was not settling on a local likelihood minimum was conducted by jittering starting values for all parameters at two jitter values (0.1 and 0.5) 100 times each (Figure 24). These jitter runs confirm the base case likelihood minimum over a large exploration of likelihood space.

2.2.6.1 Life history parameters

The list of all the parameters used in the assessment model and their values (either fixed or estimated) is provided in Table 11 and Table 12. The life history parameters estimated within the model are reasonable and consistent with what we know about the species. Both sexes follow the same trajectory in their growth, but with females reaching larger sizes (Figure 25). Figure 20 to Figure 22 show weight-at-length relationships by sex, female maturity-at-length, fecundity-at-length generated based on fixed parameters that were derived outside the model. Female fecundity and spawning output in the assessment are expressed in spawning biomass since no information on the relationship of fecundity and size specific to aurora rockfish was available.

2.2.6.2 Discards

The base model balances the information in the discard fraction or amount data with the length and mean weight data to estimate the shape of the retention curve and, in the case of the trawl fleet, a time-varying asymptote for retention reflecting changes in management measures.

The model does a reasonable job of fitting the length composition data for trawl discard, including balancing those data and the discard ratio data for 2006 and 2007, and matching the decline in average length of discards following the implementation of the catch shares fishery in 2011 (Figure 77 to Figure 82). There is some evidence in these length compositions for incoming year classes.

2.2.6.3 Survey abundance indices

The base model did not indicate contradictions between the survey biomass indices and the estimated trends in selected biomass (Figure 31 to Figure 34). Fits to the all survey indices were generally flat. This is not unexpected for the short time-series of the AFSC (Figure 32) and NWFSC slope (Figure 33) surveys. For the Triennial survey, which covers 10 years (1995-2004, though with only 4 values across that time period) the model does not reflect the small but steady observed increase in the index (Figure 31). The NWFSC survey index is fairly flat, but the model estimates a small increase at the end of the time series (Figure 34). Estimating additional variation for these surveys was attempted, but estimated to be zero for all surveys.

2.2.6.4 Length and age compositions

The model fit to length and age frequency distributions, by year and aggregated across year, and Pearson residuals for the fits by fleet, year and sex are shown in Figure 35 to Figure 90. The quality of fit varies among years and fleets, which reflects the differences in quantity and quality of data. The Pearson residuals, which reflect the noise in the data both within and among years, did not exhibit any strong trends except for the non-trawl fleet for which the small sample size precluded more complex modeling (Figure 47 to Figure 58). Effective samples sizes varied from input sample sizes, but due to the reweighting scheme (primarily the Francis reweighting) the final input sample sizes were generally well below the estimated effective sample sizes (Figure 59 to Figure 70).

Plots of observed and expected length compositions for the domestic landings aggregated across all years (Figure 72, Figure 74, and Figure 76) show acceptably good fits.

The survey length composition generally exhibits smaller average length than the fishery, and hence is more likely to pick out individual cohorts (Figure 83 to Figure 86). However, the variability in the discard rates over the past decade along with the variability of the length compositions makes it difficult to pick these out from Figure 36, Figure 38, and Figure 40.

The fits to conditional ages at length are shown in Figure 87 to Figure 90. These plots show that predicted average age at length is generally within predicted error bars around the observed average age at length, which provides support for the assumption that length at age is adequately approximated by the base model, as is necessary to model size at age internally within Stock Synthesis.

2.2.6.5 Selectivity

2.2.6.5.1 Fisheries

Estimated selectivity and retention curves for the fisheries are shown in Figure 91 to Figure 96. Estimated parameter values are given in Table 12. The selectivity curve for the domestic and full retention fleets (which were assumed identical) is shifted towards larger aurora (Figure 91). The retention curves (Figure 92) fit the discard data reasonably well (Figure 27). The asymptote of the retention curve for the trawl fleet varies to fit the early Pikitch discard data from 1985-1987 and the observer data from 2002-2011, though the fit to the estimated discard fraction is not quite as good for 2006 and 2007 (Figure 27) due to balancing fits to the corresponding length data (Figure 35 and Figure 51) and mean weight data (Figure 26). A single retention curve for the non-trawl fleet was estimated given the relatively small amount of catch and data for that fleet (Figure 91). Since landings and catch are dominated by the trawl fleet, and there is information on catch and discard amounts for the non-trawl fleet, the difficulty in accurately estimating the selectivity and retention functions for the non-trawl fleet has little overall impact on the assessment. A significant portion of the trawl (Figure 95) and full retention (Figure 96) fisheries includes immature individuals.

2.2.6.5.2 Surveys

Estimated selectivity curves for surveys are shown in Figure 91 and parameter values are in Table 12. All surveys cover the core of the depth distribution of aurora (350-500m), with the slope and slope-shelf surveys covering the deeper end of their range as well. It appears that gear and vessel differences are more important than depth differences in selectivity, as the Triennial and the AFSC slope surveys have nearly identical estimates of dome-shaped selectivity, while the NWFSC surveys have peak selectivity at a larger size. Immature individuals are well sampled in all surveys (Figure 97 to Figure 100).

2.2.6.6 Derived outputs

The deviations from the estimated stock-recruitment function have a very large uncertainty which is slightly reduced from the 1960s through the 2000s (Figure 101). Therefore, the relative bias adjustment was ramped to the maximum value during this period. Variable recruitment is evident in the 1990s and 2000s, though the ability to discern recruitment in individual years is still limited (Figure 102). The assumed model value for the recruitment variability parameter (σ_R) is sufficiently matched by the asymptotic error estimate of recruitment variability (Figure 103).

The estimated time series of total and summary biomass (which are the same in this model), spawning biomass, spawning depletion (relative to B_0), recruitment and fishing mortality are presented in Table 13 and Figure 104 to Figure 107. Trends in total and summary biomass, spawning biomass and spawning depletion track one another very closely. The summary and spawning biomass of aurora rockfish started to decline in the 1980s and 1990s. Between 1980 and 2000, the spawning output dropped from over 100% to under 70% of its unfished level. The spawning output continued to decrease, reaching its lowest estimated level of 63% of its unfished level in 2009. Since then, the spawning biomass has been slowly increasing. Currently, the spawning output is estimated to be 64% of its unfished level (Figure 105). Aurora rockfish seems neither to be overfished nor undergoing overfishing (Figure 108). The peak of the yield curve, given the high steepness curve, is well to the left of the assumed biomass target of 40% (Figure 109). Given the history of generally low exploitation rates (Figure 107) and high steepness, surplus production is high (Figure 110).

2.2.7 Profiles, and sensitivity and retrospective analyses

Parameter uncertainty in the assessment is explicitly captured in the asymptotic confidence intervals estimated within the model and reported throughout this assessment for key parameters and management quantities. These intervals reflect the uncertainty in the model fits to the data sources in the assessment, but do not include the uncertainty associated with alternative model configurations and fixed parameters. To explore uncertainty associated with alternative model configurations and evaluate the responsiveness of model outputs to changes in model assumptions, a variety of sensitivity runs were performed.

2.2.7.1 Profiles

Profiles were conducted across values of natural mortality *M* and steepness *h*. These were conducted both with the assumed fixed value of the other of these two parameters or while estimating the other parameter. Thus four profiles were conducted: across *h* with *M* fixed (Table 14, Figure 111 to Figure 113), across *h* with *M* estimated for both males and females (Table 15, Figure 114 to Figure 116), across *M* with *h* fixed at 0.779 (Table 16, Figure 117 to Figure 119), and across *M* while estimating *h* (Table 17, Figure 120 to Figure 122).

The base case model (Table 14 and Figure 111) shows support for steepness values above 0.6, with low sensitivity to any of the derived outputs. All likelihood components converge on higher steepness values with little to no significantly contradictory behavior in any of the likelihood components (Figure 112 and Figure 113).

Allowing natural mortality to be estimated in the base case produces notable differences from the base case (Table 15 and Figure 114). While general sensitivity across steepness values remained low, the lower estimate of natural mortality greatly decreased both the scale (R_0 and biomass) and the status (depletion). Depletion was estimated to be near the target ($B_{40\%}$). It also greatly increased the analytically derived value of the survey catchability coefficients, arguably to values that seem unlikely for rockfishes. This demonstrates significant uncertainty in derived outputs when considering either assumed or data-driven natural mortality values. All likelihood components again converge on higher steepness values with little to no significantly contradictory behavior in any of the likelihood components (Figure 115 and Figure 116).

Shifting focus on holding steepness fixed and profiling across natural female mortality rates shows that a very small range of possible M values are supported by the data (Table 16 and Figure 117). Both scale and status are very sensitive to assumed mortality rates, though all plausible depletion values are around or above the biomass target ($B_{40\%}$). A deeper look at the likelihood components demonstrates contradictory behavior in that the trawl survey length compositions are not well fit and the best fit likelihood values are at the least likely natural mortality values (Figure 118 and Figure 119). Age compositions and survey data were more consistent with the best fit natural mortality values (Figure 119). Estimating steepness profiled across female natural mortality does little to change this overall behavior in derived outputs (Table 17 and Figure 120) and likelihood components (Figure 121 and Figure 122).

2.2.7.2 Sensitivity Analyses

Sensitivity analyses were conducted to explore the sensitivity of the model to various assumptions.
These included alternate runs with:

1) The natural mortality rates (*M*) for females and males either a) estimated or b) set at the mean of the prior.
2) A fecundity relationship with an exponent on weight similar to the average value estimated by Dick (2009).
3) Marginal ages used instead of conditional age-at-length for a) all age data, b) only fishery age data, or c) all age data and with *M* estimated.
4) Ageing error (CV) assumed to be a) half or b) twice of that assumed in the base model.
5) A selectivity block for fishery selectivity starting in 2011 to reflect the effect of catch shares.
6) Maturity curves based upon a) ages instead of lengths (from Thomson and Hannah, 2010) or b) the maturity data from the 2012 NWFSC survey.

Results of these sensitivity runs are summarized in Table 18. The model proved again to be most sensitive to the treatment of natural mortality.

2.2.7.3 *Retrospective analyses*

Retrospective analyses were produced as if the assessment had been conducted in previous years but with only the years of data that would have been available in that terminal year and before. Retrospective runs were conducted every year back to an assessment year of 2008 (Figure 123 to Figure 127). There is a retrospective pattern which begins after removing the last two years of data, with the scale of the population and the uncertainty about the scale increasing. These removals have the greatest effect on the age and discard data and the NWFSC survey data. These patterns generally lead to higher biomass estimates and higher stock status (Figure 127), with lower exploitation rates (Figure 124). While recruitment deviations are little affected (Figure 125), the scale of recruitment changes after two years are removed and again in the last retrospective year (Figure 126). Estimates of initial recruitment become less certain (Figure 127).

2.2.8 Comparison to catch-only methods

Dick and MacCall (2010) applied the depletion-corrected stock reduction analysis (DB-SRA) to aurora rockfish to estimate OFLs in 2011 and 2013. These estimates (47 mt in 2011 and 2012) of OFL are well below the base case estimated yield at an SPR proxy for MSY of 50% (104 mt). Removal comparisons between the 2010 DB-SRA model and the current base case show little difference (Figure 128). A simple Stock Synthesis (SSS; Cope 2013), a catch-only approach similar to DB-SRA, was performed using the current total removals from the base case and same life history parameters. The depletion in year 2000 prior used in the SSS model was assumed a symmetric beta distributed with a mean of 0.3 and standard deviation of 0.2. These values follow the method of Cope et al. (2013) that use the Productivity-Susceptibility Analysis measure of vulnerability to predict depletion. A comparison of the results to the recent base case (Figure 129) illustrate that catch-only methods show a much lower spawning biomass and more highly depleted stock. The additional data (indices of abundance and length and age data) in the full assessment reduce the uncertainty in stock status, but increase the uncertainty in biomass scale.

3 Reference Points

A summary of reference points for the base model is provided in Table 19. Unfished spawning biomass (as a proxy for egg or larva production) is estimated to be 2626 mt (95% CI: 1165-4087; CV = 28.4%) with spawning biomass at the beginning of 2013 estimated to be 1050 mt (95% CI: 466-1635; CV = 40.4%). The stock's status (depletion) is estimated to be at 64% of the unfished level in 2013.

A stock is declared overfished if the current spawning output is estimated to be below 25% of unfished level. The management target for aurora rockfish is defined as 40% of the unfished spawning output ($SB_{40\%}$), which is estimated by the model to be 1050 mt (95% confidence interval: 466-1,635 mt), which corresponds to an exploitation rate of 0.0304. This harvest rate provides an equilibrium yield of 72 mt at $SB_{40\%}$ (95% confidence interval: 33-112 mt). The exploitation rate corresponding to an SPR of 50% (the proxy F_{MSY}) is 0.0248, resulting in an equilibrium yield of 67 mt (95% confidence interval of 31-104 mt) at a biomass of 1213 mt (95% confidence interval of 538-1888 mt).

The assessment shows that the stock of aurora rockfish off the continental U.S. Pacific Coast is currently at 64% of its unexploited level. This is above the overfished threshold of $SB_{25\%}$ and the management target of $SB_{40\%}$ of unfished spawning output.

This assessment estimates that the 2012 SPR is 69%, while the SPR-based management fishing mortality target is 50%. For the last 18 years, the SPR has been above 50%, which means that overfishing of aurora rockfish has not been occurring (Figure 124). Historically, the aurora rockfish had been fished beyond the SPR-based target fishing rate in 1988-1990 and 1992-1994.

4 Harvest projections and decision tables

The base model was projected with catches in 2013 and 2014 determined from a recent 5-year average and catches from 2015–2024 based on the predicted allowable biological catch (ABC) using a SPR proxy of 50% ($F_{50\%}$), and P*-based buffer of 0.956 and the 40-10 rule. While the ABCs nearly double from 2015 onward compared to the average catch, the spawning biomass stays relatively stable (Table 20).

To observe stock status across important uncertainty considerations, a decision table was developed showing projections from 2015–2024 under ABC catches for three states of nature (defined by natural mortality *M*) and with catch streams based on the ABCs from each state of nature (Table 21). The base case demonstrated large sensitivity to the choice of *M*, which is why it was selected to define the decision table states of nature. The base model assumes *M* was fixed, so capturing the uncertainty in *M* was important, and there were two measures of this uncertainty available: 1) a prior on M (Table 11); 2) the post-model estimate of variance in *M*. The latter was available either using the asymptotic variance or through a likelihood profile. The second option was selected in order to not constrain the uncertainty to a normal distribution. The likelihood profile on *M* was used to parameterize a lognormal distribution of uncertainty. To combine uncertainty both in the prior on *M* and in the likelihood based post-model estimate of *M*, the two lognormal distributions were combined into a quasi-posterior distribution. It turns out that the prior contributes little to this combined value, thus the final measure of uncertainty in *M* is very similar to the likelihood profile estimator. This also happens to be very similar to the asymptotic variance estimator. The 12.5% and 87.5% quantiles of *M* were then used to define the lower and upper states of nature, with the median value for the base case value of *M*. The resultant spawning biomass in 2013 from the lower and upper states of nature model runs were very similar to the corresponding quantile values of spawning biomass based on the asymptotic variance. While this characterization of uncertainty in *M* looks to capture measurement and process uncertainty, it does not include model misspecification error.

The most conservative scenario (low *M*, catch stream based on high *M*) indicates the stock will be at the target biomass in 2024. The least conservative scenario (high *M*, catch stream based on low *M*) indicates the population will climb to around 80% of initial conditions. All scenarios using the base case value of M indicate the population will be above the reference point in all years.

5 Regional Management Considerations

This species is currently managed within the slope complexes, north and south of 40°10' latitude. This assessment is not spatially structured. There are indications, however, that life history parameters, particularly growth, might be varying with latitude. Analysis conducted within this assessment did not allow identification of specific areas with different growth parameters, but rather detected a continuous gradient along the coast, which is common for *Sebastes* species on the West Coast of the United States. The relative exploitation rate may be different in the north and south as well, as less than 20% of the NWFSC shelf-slope survey biomass indices are seen in the north, but far more than that percentage of catch has been taken from the north.

6 Future Research Recommendations

The following research could improve the ability of future stock assessments to determine the current status and productivity of the aurora rockfish population:

1) This was the first year in which aurora rockfish otoliths were read to develop age data. There was insufficient time to read all of the otoliths or even cover all of the years for which aurora rockfish otoliths were collected from the fisheries or surveys. Additional age data could provide additional information for the model to estimate such parameters as natural mortality and recruitment deviations. Additionally, validation methods, such as the bomb radiocarbon chronometer, could be used to validate the ages and ageing method for aurora rockfish.
2) The base model does not use newly available information of female maturity collected within the NWFSC shelf-slope survey in 2012. This new information includes data on mass atresia (a form of skipped spawning), at far greater numbers than that reported in Thompson and Hannah (2010). More data on aurora rockfish maturity will be collected this year on the NWFSC shelf-slope survey, which could confirm the information on mass atresia or indicate variability between years. This information could better inform the maturity curves used in the assessment.
3) The base model assumes spawning output is proportional to spawning biomass. For many rockfish species, fecundity has been shown to have a non-linear relationship with female weight. Determining this relationship for aurora rockfish would improve the estimation of spawning output and depletion.
4) Improve the meta-analysis for steepness. This would include consideration of fixed and estimated parameters, assumptions, and the quality of the information on maturity and fecundity in the component assessments, as well as correlations in recruitments among assessments due to environmental drivers.
5) The application of the GLMM software elicited many unresolved questions. Continued research and articulation of that statistical approach and the options available (e.g. extreme catch events) will greatly benefit both STAT application and STAR Panel understanding of the model and its advantages.

6) Further research on the most appropriate method for data-weighting is greatly needed. Simulation testing and comparison of standard and new (Francis 2011) methods would benefit future assessments of this and other stocks.
7) Development of information on the spatial structure of the stock is needed, including genetic analysis, investigation of differences in and size at maturity, and information on aurora rockfish off of Canada and Mexico.
8) The development of additional indices could provide further information to anchor the assessment. While direct adult biomass indices are unlikely to surface, there may be some possibility to develop a larval abundance index from the CalCOFI data set. This index reflects a measure of spawning biomass.

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8 Tables

8.1 Catches

Table 1. Total landings (mt) of aurora rockfish for the domestic trawl and non-trawl fleets (provided here by state) and full-retention fleet (separated here as catch in foreign POP and in at-sea Pacific hake fisheries). The domestic fleet in the assessment model includes both the trawl and non-trawl fisheries.

Year	Trawl			Non-trawl			Catch in foreign POP fishery	Bycatch in at-sea hake fishery + research	Total
	CA	OR	WA	CA	OR	WA			
1915	0	0	0	0	0	0	0	0	0
1916	0.06	0	0	0.020	0.001	0	0	0	0.08
1917	0.09	0	0	0.033	0.001	0	0	0	0.12
1918	0.10	0	0	0.031	0.001	0	0	0	0.14
1919	0.07	0	0	0.018	0.001	0	0	0	0.09
1920	0.07	0	0	0.021	0.001	0	0	0	0.10
1921	0.06	0	0	0.018	0.001	0	0	0	0.08
1922	0.05	0	0	0.018	0.001	0	0	0	0.07
1923	0.05	0	0	0.022	0.001	0	0	0	0.08
1924	0.03	0	0	0.025	0.001	0	0	0	0.05
1925	0.03	0	0	0.028	0.001	0	0	0	0.06
1926	0.06	0	0	0.039	0.001	0	0	0	0.10
1927	0.07	0	0	0.012	0.001	0	0	0	0.08
1928	0.09	0	0	0.015	0.002	0	0	0	0.11
1929	0.11	0	0	0.013	0.003	0	0	0	0.13
1930	0.12	0	0	0.013	0.002	0	0	0	0.14
1931	0.12	0	0	0.025	0.002	0	0	0	0.14
1932	0.16	0	0	0.004	0.001	0	0	0	0.17
1933	0.22	0	0	0.014	0.001	0	0	0	0.23
1934	0.17	0	0	0.003	0.001	0	0	0	0.18
1935	0.13	0	0	0.003	0.001	0	0	0	0.13
1936	0.12	0	0	0.004	0.002	0	0	0	0.13
1937	0.21	0	0	0.004	0.002	0	0	0	0.22
1938	0.32	0	0	0.008	0.002	0	0	0	0.33
1939	0.47	0	0	0.016	0.001	0	0	0	0.48
1940	0.46	0	0	0.023	0.002	0	0	0	0.49
1941	0.90	0	0	0.060	0.004	0	0	0	0.96
1942	0.36	0	0	0.023	0.006	0	0	0	0.39
1943	0.85	0	0	0.010	0.016	0	0	0	0.87
1944	1.57	0	0	0	0.003	0	0	0	1.57
1945	3.11	0	0	0.001	0.001	0	0	0	3.11
1946	2.54	0	0	0.003	0.002	0	0	0	2.55
1947	2.42	0	0	0.011	0.001	0	0	0	2.43
1948	2.18	0	0	0.018	0.002	0	0	0	2.20
1949	1.43	0	0	0.019	0.001	0	0	0	1.45
1950	1.98	0	0	0.014	0.001	0	0	0	1.99

1951	3.08	0	0	0.016	0.001	0	0	0	3.09
1952	3.38	0	0	0.013	0	0	0	0	3.39
1953	3.75	0	0	0.012	0	0	0	0	3.77
1954	2.32	0	0	0.011	0.001	0	0	0	2.33
1955	2.05	0	0	0.007	0	0	0	0	2.06
1956	2.58	0	0	0.011	0	0	0	0	2.59
1957	2.75	0	0	0.009	0.001	0	0	0	2.76
1958	4.07	0	0	0.005	0	0	0	0	4.08
1959	4.62	0	0	0.007	0	0	0	0	4.63
1960	3.51	0	0	0.008	0.004	0	0	0	3.52
1961	2.33	0	0	0.009	0.001	0	0	0	2.33
1962	1.95	0	0	0.006	0.001	0	0	0	1.96
1963	2.13	0	0	0.009	0	0	0	0	2.14
1964	1.31	0.13	0	0.007	0.166	0	0	0	1.61
1965	1.52	0.25	0	0.009	0	0	0	0	1.77
1966	1.45	0.64	0	0.016	0	0	1	0	3.11
1967	1.40	0.28	0	0.013	0.001	0	0	0	1.69
1968	1.19	0.83	0	0.011	0	0	0	0	2.03
1969	2.24	0.04	0	0.002	0.001	0	0	0	2.28
1970	2.64	0.74	0	0.001	0	0	0	0	3.38
1971	2.94	2.90	0	0.001	0	0	2	0	7.84
1972	3.38	1.62	0	0.003	0	0	4	0	9.00
1973	4.75	1.36	0	0.004	0.067	0	12	0	18.17
1974	4.75	2.26	0	0.013	0.224	0	4	0	11.25
1975	4.68	2.78	0	0.005	0.052	0	6	0	13.51
1976	5.80	4.11	0	0.013	0.025	0	4	0	13.95
1977	5.44	0.46	0	0.008	1.850	0	0	0.08	7.83
1978	0.11	3.27	0	0.058	0.047	0	0	0.01	3.49
1979	10.78	10.08	0	0.061	0.077	0	0	0.09	21.08
1980	4.65	8.72	0	0.049	0.040	0	0	0.13	13.59
1981	5.03	5.09	0	0.061	0.047	0	0	0.87	11.10
1982	30.17	18.87	0	0.084	0.040	0	0	0	49.17
1983	107.34	20.46	0	0.057	0.045	0	0	0	127.91
1984	22.94	9.54	0.47	0.685	0.017	0	0	0.04	33.69
1985	51.32	9.72	1.37	0.393	0.028	0	0	0.10	62.93
1986	77.02	15.66	0	2.690	0.119	0	0	0.13	95.62
1987	23.32	11.58	0.47	6.629	0.041	0	0	0.07	42.11
1988	79.04	25.66	2.45	10.351	6.248	0	0	0	123.75
1989	78.84	35.32	0	16.794	0	0	0	0	130.96
1990	112.90	38.28	1.45	33.848	0	0	0	0.01	186.49
1991	13.63	28.86	1.06	10.025	0	0	0	0.05	53.62
1992	93.45	90.39	0.09	8.322	0	0	0	0	192.25
1993	97.57	32.30	0.10	0.928	0.097	0	0	0	131.00
1994	79.16	14.91	0.18	0.238	0.201	0	0	0	94.68
1995	57.83	6.73	0.50	0.838	0	0	0	0	65.90
1996	43.79	5.24	0.30	0.815	0	0	0	0	50.14

1997	36.81	6.77	0.39	2.964	0.026	0	0	0.07	47.03
1998	22.59	11.18	0.44	2.498	0.001	0	0	0	36.71
1999	8.95	6.43	0.15	0.029	0	0	0	0	15.56
2000	18.82	10.07	0.10	1.762	0.041	0.120	0	0.05	30.96
2001	16.95	6.15	0.07	0.341	0.121	0.010	0	0.10	23.74
2002	36.65	1.94	0.12	1.207	0	0.052	0	0.01	39.98
2003	48.12	5.32	0.30	2.237	0	0.631	0	0	56.62
2004	60.55	7.75	0.45	0.845	0.025	0.040	0	0.02	69.68
2005	39.28	3.35	0.04	0.374	0.003	0.202	0	0.03	43.28
2006	27.80	5.27	0.01	0.281	0.017	0.007	0	0	33.39
2007	29.53	7.79	0.18	0.207	0.007	0.042	0	0.01	37.76
2008	10.23	7.56	0.15	0.661	0.046	0.062	0	0	18.71
2009	8.38	7.87	0.28	7.114	0.035	0.030	0	0	23.70
2010	18.60	4.22	0.21	0.832	0.017	0.042	0	0.03	23.94
2011	9.45	12.37	2.27	0.373	0.041	0.050	0	0.10	24.66
2012	25.45	9.43	1.47	0.341	0.069	0.096	0	0.02	36.87

Table 2. Recent trend in commercial landings (mt) relative to the management guidelines.

Year	OFL (mt)	ACL (mt)	Commercial Landings (mt)
2003	NA	NA	56.62
2004	NA	NA	69.68
2005	NA	NA	43.28
2006	NA	NA	33.39
2007	NA	NA	37.76
2008	NA	NA	18.71
2009	NA	NA	23.7
2010	NA	NA	23.94
2011	47	NA	24.66
2012	47	NA	36.87

Table 3. Recreational and research removals (mt) of aurora rockfish. In the model, recreational removals are added to landings of the non-trawl fleet and research removals are added to the catches of the full-retention fleet.

Year	Recreational removals	Research removals
1977	0	0.381386
1978	0	0
1979	0	0
1980	0	0.000907
1981	0	0
1982	0	0
1983	0	0.008754
1984	0.036166936	0.086865
1985	0	0
1986	1.016227165	0.000227
1987	0.162257166	0
1988	0.131557383	0.02844
1989	0	0
1990	0	0.152679
1991	0	0.171413
1992	0	0.012158
1993	0	0.060875
1994	0.227651765	0
1995	0	1.134795
1996	0	0.08863
1997	0	0.405601
1998	0	0.999161
1999	0	0.717655
2000	0	0.806884
2001	0	2.007741
2002	0	0.449
2003	0	0.4039
2004	0	1.20133
2005	0	0.51015
2006	0	0.49506
2007	0	0.53173
2008	0	0.571669
2009	0	0.605653
2010	0	0.462659
2011	0	0.436277
2012	0	0.50182

Table 4. Summary of fishery sampling effort (number of trips fish sampled) used to create length and age compositions of the domestic trawl landings.

Year	Lengths from trawl landings				Ages from trawl landings	
	Sexed fish		Unsexed fish			
	# Trips	# Fish	# Trips	# Fish	# Trips	# Fish
1978	1	17	0	0	0	0
1979	1	7	0	0	0	0
1980	7	34	1	1	0	0
1981	2	19	0	0	0	0
1982	22	90	0	0	0	0
1983	58	542	0	0	0	0
1984	37	415	0	0	0	0
1985	98	788	0	0	0	0
1986	58	573	0	0	0	0
1987	29	178	0	0	0	0
1988	30	212	1	2	0	0
1989	28	219	7	2	0	0
1990	18	184	2	43	0	0
1991	24	113	22	1	0	0
1992	8	94	58	264	0	0
1993	17	157	37	84	0	0
1994	19	343	98	73	0	0
1995	27	441	58	37	0	0
1996	20	421	29	28	0	0
1997	29	330	30	52	0	0
1998	32	246	28	21	0	0
1999	16	237	18	76	0	0
2000	27	248	24	3	0	0
2001	24	378	8	239	0	0
2002	49	1002	17	315	0	0
2003	42	773	19	582	21	481
2004	30	684	27	145	0	0
2005	34	890	20	268	0	0
2006	62	1070	29	583	0	0
2007	83	1524	32	182	0	0
2008	101	1744	16	131	55	382
2009	94	1615	27	189	53	323
2010	98	1376	24	120	0	0
2011	129	2822	49	677	0	0
2012	118	2376	42	501	0	0

Table 5. Summary of fishery sampling effort (number of trips, hauls and fish sampled) used to create length compositions of the domestic non-trawl landings.

Year	Lengths from non-trawl landings			
	Sexed fish		Unsexed fish	
	# Trips	# Fish	# Trips	# Fish
1985	2	3	5	7
1986	1	1	1	1
1987	0	0	1	1
1988	3	3	1	1
1989	5	12	3	32
1990	18	98	18	161
1991	2	2	0	0
1992	3	11	0	0
1993	1	1	2	2
1994	0	0	3	5
1995	0	0	6	11
1996	0	0	40	332
1997	2	2	17	188
1998	0	0	3	43
1999	0	0	2	4
2000	5	33	8	47
2001	4	38	3	5
2002	6	49	5	8
2003	3	31	6	34
2004	8	19	0	0
2005	1	1	4	10
2006	1	1	2	22
2007	6	10	1	3
2008	5	8	8	21
2009	7	11	14	83
2010	12	19	16	44
2011	5	9	9	49
2012	5	33	7	26

8.2 Surveys and indices

Table 6. Relative frequency of occurrence by survey and year for aurora rockfish. Gray cells indicate years used in developing indices of abundance. The NWFSC survey represents two surveys: 1) slope (1998-2002) and 2) shelf-slope (2003-2012).

	AFSC		
Year	Triennial	Slope	NWFSC
1980	0%	-	-
1981	-	-	-
1982	-	-	-
1983	1%	-	-
1984	-	16%	-
1985	-	-	-
1986	0%	-	-
1987	-	-	-
1988	-	21%	-
1989	0%	-	-
1990	-	19%	-
1991	-	18%	-
1992	0%	9%	-
1993	-	18%	-
1994	-	-	-
1995	19%	18%	-
1996	-	15%	-
1997	-	20%	-
1998	19%	-	0%
1999	-	21%	21%
2000	-	16%	17%
2001	17%	16%	24%
2002	-	-	23%
2003	-	-	12%
2004	17%	-	12%
2005	-	-	14%
2006	-	-	14%
2007	-	-	14%
2008	-	-	17%
2009	-	-	13%
2010	-	-	13%
2011	-	-	13%
2012	-	-	14%

Table 7. Final design and model (GLMM)-based survey abundance indices for aurora rockfish.

	Triennial			AFSC slope			NWFSC slope			NWFSC shelf-slope		
Year	Design	Model	Log SD	Design	Model	Log SD	Design	Model	log_SD	Design	Model	Log SD
1995	1838	1866	0.17									
1996												
1997				2919	3009	0.26						
1998	2025	2041	0.16									
1999				2878	2982	0.27	1652	1685	0.22			
2000				3310	3390	0.26	1876	1858	0.23			
2001	2337	2359	0.17	3138	3214	0.26	2390	2399	0.22			
2002							2212	2205	0.19			
2003										4911	4962	0.32
2004	2516	2545	0.19							5715	5947	0.28
2005										4566	4541	0.21
2006										4365	4448	0.21
2007										4860	4888	0.23
2008										4250	4273	0.19
2009										4678	4679	0.20
2010										4008	4078	0.19
2011										4132	4221	0.21
2012										4443	4543	0.33

8.3 Ageing error

Table 8. Ageing error models and resultant model selection (AICc) values for 12 models of bias and precision explored for aurora rockfish.

	Reader 1		Reader 2		Model selection	
Model	Bias	Precision	Bias	Precision	AICc	ΔAICc
1	0	1	0	1	12155	242
2	0	2	0	2	11963	49
3	0	3	0	3	12051	138
4	0	1	1	1	12125	211
5	0	2	1	2	11946	33
6	0	3	1	3	11967	54
7	0	1	2	1	12091	178
8	0	2	2	2	**11913**	0
9	0	3	2	3	11936	23
10	0	1	3	1	55528	43615
11	0	2	3	2	41621	29708
12	0	3	3	3	55532	43619

8.4 Length compositions

Table 9. Summary of survey sampling effort (number of tows and fish sampled) used to create length and age compositions from the surveys.

	Triennial lengths			AFSC slope lengths			NWFSC shelf-slope lengths			NWFSC shelf-slope ages		
Year	#Tows	#Fish	InputN	#Tows	#Fish	InputN	#Tows	#Fish	InputN	#Tows	#Fish	InputN
1995	76	2361	238									
1996												
1997				37	1187	121						
1998	88	3076	281									
1999				42	1131	120						
2000				34	1412	106						
2001	89	3296	277	34	958	102						
2002												
2003							63	1112	128.6	63	404	*
2004	66	2939	214				51	1078	111.6			
2005							84	1671	191.8	82	428	*
2006							86	1715	169.0			
2007							86	1681	170.6	81	395	*
2008							113	1691	215.2			
2009							84	1889	159.9	79	403	*
2010							88	1631	194.2	79	487	*
2011							90	1498	178.0	86	502	*
2012							95	1670	174.8	85	407	*

Table 10. Total multiplicative downweighting factors (when <1) used for length and conditional age compositional data based upon the two step iterative reweighting, with the second step using the Francis (2011) method.

	Domestic Fishery	Triennial Survey	AK Slope Survey	NWFSC Survey
Lengths	0.15	0.33	0.37	0.67
Conditional Ages	0.31	-	-	1

Model results
8.4.1 Base case

Table 11. Biological parameterizations used in the aurora rockfish base case model. Male length CVs were set equal to the estimated female values.

Parameter	Bounds	Fixed value	Prior Type	Prior Mean	Prior SD	Estimated value
Female						
Natural mortality (M)	0.001 to 2	0.035	Log_Norm	-3.35	0.54	
Length at age=1	1 to 11.82		Sym_Beta	6.00	10.00	8.24
Length at age=40	1 to 73.8		No prior			30.77
VBGF K	0.01 to 1		No prior			0.09
Length CV at age=1	0.03 to 0.2		No prior			0.13
Length CV at age=40	0.03 to 0.2		No prior			0.09
Weight-Length a	-3 to 3	0.00001	No prior			
Weight-Length b	-3 to 4	3.14	No prior			
Length at 50% maturity	1 to 1000	25.54	No prior			
Maturity slope	-30 to 3	-0.62	No prior			
Eggs/kg	-3 to 3	1.00	No prior			
Eggs/kg slope	-3 to 3	0.00	No prior			
Male						
Natural mortality (M)	0.001 to 2	0.037	Log_Norm	-3.30	0.54	
Length at age=1	1 to 11.82		Sym_Beta	6.00	10.00	8.35
Length at age=40	1 to 73.8		No prior			30.22
VBGF K	0.01 to 1		No prior			0.09
Length CV at age=1	-1 to 1		No prior			0.13
Length CV at age=40	-1 to 1		No prior			0.09
Weight-Length a	-3 to 3	0.00001	No prior			
Weight-Length b	-3 to 4	3.15	No prior			
Stock-recruit						
$\ln(R_0)$	1 to 31		No prior			6.64
steepness (h)	0.25 to 0.99	0.78	Full_Beta	0.78	0.15	
σ_R	0 to 2	0.50	No prior			

Table 12. Selectivity parameterizations used in the aurora rockfish base case model.

Parameter	Bounds	Fixed value	Prior			Estimated
			Type	Mean	SD	value
Trawl fleet						
logisitic parameter 1	15 to 30		No prior			21.67
logisitic parameter 2	0.001 to 50		No prior			6.90
retention parameter 1	10 to 35		No prior			24.35
retention parameter 2	0.1 to 10		No prior			1.22
retention parameter 3	0.001 to 1		No prior			0.97
retention parameter 1999	0.001 to 1	0.9	Normal	0.9	99	
retention parameter 2002	0.001 to 1		Normal	0.8	99	0.79
retention parameter 2003	0.001 to 1		Normal	0.8	99	0.83
retention parameter 2004	0.001 to 1		Normal	0.9	99	0.91
retention parameter 2005	0.001 to 1		Normal	0.9	99	0.89
retention parameter 2006	0.001 to 1		Normal	0.7	99	0.67
retention parameter 2007	0.001 to 1		Normal	0.7	99	0.74
retention parameter 2008	0.001 to 1		Normal	0.5	99	0.41
retention parameter 2009	0.001 to 1		Normal	0.5	99	0.41
retention parameter 2010	0.001 to 1		Normal	0.7	99	0.66
retention parameter 2011	0.001 to 1		Normal	0.95	99	1.00
Triennial survey						
double-normal parameter 1	10 to 30		No prior			22.92
double-normal parameter 2	-6 to 4		No prior			-2.62
double-normal parameter 3	-1 to 9		No prior			3.56
double-normal parameter 4	-1 to 9		No prior			2.94
double-normal parameter 5	-5 to 9	-4.99	No prior			
double-normal parameter 6	-5 to 9		No prior			-1.00
AFSC slope						
double-normal parameter 1	10 to 30		No prior			23.39
double-normal parameter 2	-6 to 4		No prior			-5.73
double-normal parameter 3	-1 to 9		No prior			3.99
double-normal parameter 4	-1 to 9		No prior			3.17
double-normal parameter 5	-5 to 9	-4.99	No prior			
double-normal parameter 6	-5 to 9		No prior			-1.21
NWFSC slope & shelf-slope						
double-normal parameter 1	10 to 30		No prior			26.94
double-normal parameter 2	-6 to 4		No prior			-5.79
double-normal parameter 3	-1 to 9		No prior			4.30
double-normal parameter 4	-1 to 9		No prior			2.48
double-normal parameter 5	-5 to 9	-4.99	No prior			
double-normal parameter 6	-5 to 9		No prior			-1.08

Table 13. Time series of total biomass, summary biomass, spawning output, stock status (depletion), recruitment, and exploitation rate estimated in the aurora rockfish base model.

Year	Total biomass (mt)	Summary biomass (mt)	Spawning biomass (mt)	Depletion (%)	Recruits (Age-0 in 1000s)	Exploitation rate
1916	6109	6109	2626	100%	777	0.0000
1917	6109	6109	2626	100%	777	0.0000
1918	6109	6109	2626	100%	778	0.0000
1919	6109	6109	2626	100%	778	0.0000
1920	6110	6110	2626	100%	778	0.0000
1921	6110	6110	2626	100%	779	0.0000
1922	6111	6111	2626	100%	779	0.0000
1923	6111	6111	2626	100%	779	0.0000
1924	6112	6112	2626	100%	780	0.0000
1925	6113	6113	2626	100%	780	0.0000
1926	6115	6115	2626	100%	780	0.0000
1927	6116	6116	2626	100%	781	0.0000
1928	6118	6118	2626	100%	781	0.0000
1929	6119	6119	2626	100%	781	0.0000
1930	6121	6121	2627	100%	781	0.0000
1931	6123	6123	2627	100%	782	0.0000
1932	6125	6125	2628	100%	782	0.0000
1933	6127	6127	2628	100%	782	0.0000
1934	6129	6129	2629	100%	783	0.0000
1935	6131	6131	2630	100%	784	0.0000
1936	6134	6134	2630	100%	785	0.0000
1937	6136	6136	2631	100%	787	0.0000
1938	6138	6138	2632	100%	789	0.0001
1939	6141	6141	2633	100%	793	0.0001
1940	6143	6143	2634	100%	797	0.0001
1941	6146	6146	2634	100%	802	0.0002
1942	6148	6148	2635	100%	807	0.0001
1943	6151	6151	2636	100%	814	0.0002
1944	6153	6153	2637	100%	820	0.0003
1945	6156	6156	2637	100%	827	0.0006
1946	6157	6157	2637	100%	833	0.0005
1947	6159	6159	2637	100%	838	0.0004
1948	6162	6162	2637	100%	842	0.0004
1949	6166	6166	2637	100%	845	0.0003
1950	6172	6172	2638	100%	848	0.0004

Year	Total biomass (mt)	Summary biomass (mt)	Spawning biomass (mt)	Depletion (%)	Recruits (Age-0 in 1000s)	Exploitation rate
1951	6177	6177	2639	100%	852	0.0006
1952	6182	6182	2639	100%	858	0.0006
1953	6187	6187	2639	100%	868	0.0007
1954	6193	6193	2640	101%	882	0.0004
1955	6201	6201	2641	101%	902	0.0004
1956	6211	6211	2643	101%	928	0.0005
1957	6221	6221	2645	101%	957	0.0005
1958	6233	6233	2647	101%	984	0.0007
1959	6245	6245	2648	101%	1001	0.0008
1960	6257	6257	2650	101%	998	0.0006
1961	6273	6273	2653	101%	970	0.0004
1962	6292	6292	2657	101%	1010	0.0004
1963	6312	6312	2661	101%	932	0.0004
1964	6334	6334	2666	102%	859	0.0003
1965	6357	6357	2672	102%	797	0.0003
1966	6380	6380	2678	102%	749	0.0005
1967	6401	6401	2685	102%	715	0.0003
1968	6422	6422	2693	103%	691	0.0004
1969	6440	6440	2701	103%	676	0.0004
1970	6456	6456	2711	103%	667	0.0006
1971	6467	6467	2720	104%	667	0.0013
1972	6471	6471	2728	104%	669	0.0015
1973	6470	6470	2736	104%	672	0.0029
1974	6457	6457	2739	104%	676	0.0019
1975	6448	6448	2745	105%	679	0.0023
1976	6433	6433	2749	105%	677	0.0024
1977	6415	6415	2751	105%	666	0.0014
1978	6399	6399	2754	105%	640	0.0006
1979	6386	6386	2757	105%	599	0.0037

Year	Total biomass (mt)	Summary biomass (mt)	Spawning biomass (mt)	Depletion (%)	Recruits (Age-0 in 1000s)	Exploitation rate
1980	6351	6351	2750	105%	553	0.0024
1981	6322	6322	2745	105%	514	0.0020
1982	6293	6293	2740	104%	491	0.0088
1983	6219	6219	2713	103%	484	0.0231
1984	6058	6058	2646	101%	489	0.0063
1985	5998	5998	2625	100%	493	0.0118
1986	5904	5904	2589	99%	483	0.0183
1987	5771	5771	2535	97%	465	0.0082
1988	5698	5698	2508	95%	466	0.0243
1989	5534	5534	2438	93%	520	0.0265
1990	5364	5364	2365	90%	679	0.0389
1991	5138	5138	2263	86%	990	0.0117
1992	5060	5060	2229	85%	965	0.0424
1993	4832	4832	2123	81%	690	0.0303
1994	4678	4678	2049	78%	581	0.0227
1995	4568	4568	1993	76%	576	0.0164
1996	4494	4494	1951	74%	587	0.0125
1997	4440	4440	1918	73%	588	0.0120
1998	4394	4394	1887	72%	767	0.0096
1999	4367	4367	1862	71%	1403	0.0045
2000	4362	4362	1848	70%	1166	0.0088
2001	4345	4345	1828	70%	999	0.0072
2002	4338	4338	1814	69%	648	0.0129
2003	4313	4313	1791	68%	534	0.0177
2004	4274	4274	1760	67%	638	0.0201
2005	4233	4233	1727	66%	1093	0.0129
2006	4225	4225	1710	65%	1130	0.0134
2007	4225	4225	1695	65%	1798	0.0137
2008	4224	4224	1681	64%	1328	0.0124
2009	4237	4237	1672	64%	1157	0.0157
2010	4240	4240	1659	63%	711	0.0098
2011	4275	4275	1660	63%	719	0.0067
2012	4326	4326	1669	64%	736	0.0099
2013	4366	4366	1673	64%	736	NA

8.4.2 Profiles

Table 14. Results from the steepness (highlighted in gray) profile of the base case model for aurora rockfish. The base case steepness value is 0.78.

Metrics	Profile values								
Parameters									
h	0.25	0.35	0.45	0.55	0.65	0.75	0.85	0.95	0.99
M (female)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
M (male)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
$\ln R_0$	6.70	6.67	6.66	6.65	6.64	6.64	6.64	6.64	6.64
Derived outputs									
SB_0	2822	2723	2677	2653	2638	2628	2622	2617	2615
SB_{2013}	1719	1686	1676	1673	1673	1673	1674	1675	1676
Depletion	0.61	0.62	0.63	0.63	0.63	0.64	0.64	0.64	0.64
F_{SPR}	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
$Yield_{SPR}$	0	10	41	54	62	66	69	72	72
SPR_{2012}	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Survey catchability (q)									
AKSHLF_q	0.94	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
AKSLP_q	1.42	1.42	1.42	1.42	1.42	1.41	1.41	1.41	1.41
NWSLP_q	0.72	0.73	0.73	0.73	0.73	0.73	0.73	0.72	0.72
NWFSC_q	1.66	1.66	1.65	1.65	1.64	1.64	1.63	1.63	1.63
Likelihood components									
Total likelihood	2294.87	2281.14	2279.04	2277.78	2276.92	2276.29	2275.81	2275.49	2275.89
survey_like_AKSHLF	-5.90	-5.94	-5.96	-5.97	-5.98	-5.99	-5.99	-6.00	-6.00
survey_like_AKSLP	-5.25	-5.25	-5.25	-5.25	-5.25	-5.25	-5.25	-5.25	-5.25
survey_like_NWSLP	-5.32	-5.33	-5.33	-5.33	-5.33	-5.34	-5.34	-5.34	-5.34
survey_like_NWFSC	-13.79	-13.74	-13.71	-13.69	-13.67	-13.66	-13.65	-13.64	-13.64
Lt_like_TWL	133.38	132.63	132.27	132.05	131.90	131.80	131.72	131.66	131.64
Lt_like_AKSHLF	12.12	12.15	12.17	12.18	12.19	12.19	12.20	12.20	12.20
Lt_like_AKSLP	6.81	6.82	6.82	6.82	6.83	6.83	6.83	6.83	6.83
Lt_like_NWFSC	32.32	31.90	31.69	31.56	31.48	31.42	31.38	31.35	31.33
Age_like_TWL	231.45	231.24	231.14	231.07	231.03	230.99	230.97	230.95	230.94
Age_like_NWFSC	1948.58	1948.34	1948.19	1948.08	1948.01	1947.95	1947.91	1947.87	1947.86
Ct_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recruitment penalty	-3.60	-3.83	-3.98	-4.09	-4.16	-4.21	-4.26	-4.29	-4.30
Parameter penalty	17.28	5.32	4.16	3.49	3.02	2.67	2.41	2.27	2.72
Parameter bounds	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Table 15. Results from the steepness (highlighted in gray) profile of the base case model for aurora rockfish when female and male natural mortality are estimated. The base case steepness value is 0.78.

Metrics	Profile values								
Parameters									
h	0.25	0.35	0.45	0.55	0.65	0.75	0.85	0.95	0.99
M (female)	0.03835	0.03434	0.03333	0.03285	0.03256	0.03237	0.03223	0.03212	0.03208
M (male)	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
lnR_0	11.32	6.50	6.31	6.24	6.21	6.19	6.17	6.16	6.16
Derived outputs									
SB_0	245258	2369	2057	1963	1918	1892	1876	1865	1861
SB_{2013}	225346	1354	1087	1014	983	967	958	953	951
Depletion	0.92	0.57	0.53	0.52	0.51	0.51	0.51	0.51	0.51
F_{SPR}	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
$Yield_{SPR}$	0	9	30	38	42	44	46	47	48
SPR_{2012}	1.00	0.64	0.57	0.55	0.54	0.54	0.54	0.53	0.53
Survey catchability (q)									
AKSHLF_q	0.01	1.14	1.37	1.45	1.49	1.51	1.52	1.52	1.53
AKSLP_q	0.01	1.72	2.06	2.18	2.23	2.26	2.28	2.29	2.29
NWSLP_q	0.01	0.88	1.05	1.11	1.14	1.16	1.17	1.17	1.18
NWFSC_q	0.01	2.03	2.48	2.63	2.70	2.73	2.75	2.76	2.77
Likelihood components									
Total likelihood	2294.49	2281.11	2278.87	2277.49	2276.54	2275.84	2275.31	2274.96	2275.34
survey_like_AKSHLF	-6.30	-5.84	-5.76	-5.75	-5.75	-5.76	-5.76	-5.77	-5.77
survey_like_AKSLP	-5.26	-5.25	-5.24	-5.24	-5.24	-5.24	-5.25	-5.25	-5.25
survey_like_NWSLP	-5.38	-5.32	-5.30	-5.30	-5.30	-5.30	-5.30	-5.31	-5.31
survey_like_NWFSC	-13.42	-13.81	-13.86	-13.86	-13.86	-13.85	-13.84	-13.84	-13.83
Lt_like_TWL	133.63	132.56	132.09	131.81	131.63	131.49	131.39	131.31	131.28
Lt_like_AKSHLF	12.18	12.15	12.15	12.16	12.18	12.18	12.19	12.20	12.20
Lt_like_AKSLP	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79
Lt_like_NWFSC	32.59	31.90	31.58	31.40	31.29	31.21	31.16	31.11	31.10
Age_like_TWL	231.32	231.27	231.22	231.19	231.17	231.16	231.15	231.14	231.13
Age_like_NWFSC	1948.19	1948.31	1948.14	1948.00	1947.90	1947.83	1947.77	1947.72	1947.70
Ct_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recruitment penalty	-3.96	-3.81	-3.98	-4.11	-4.21	-4.28	-4.34	-4.39	-4.40
Parameter penalty	17.27	5.34	4.19	3.53	3.07	2.73	2.47	2.33	2.79
Parameter bounds	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Table 16. Results from the female natural mortality (highlighted in gray) profile for aurora rockfish when male natural mortality is estimated. The base case female natural mortality value is 0.035.

Metrics	Profile values									
Parameters										
M (female)	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
h	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
M (male)	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
$\ln R_0$	3.94	4.97	5.88	8.46	13.35	13.33	13.55	13.79	14.02	14.83
Derived outputs										
SB_0	1011	1155	1579	12884	1086920	740966	650542	592409	547091	853697
SB_{2013}	42	163	577	11270	1011270	763460	690255	630884	574692	826542
Depletion	0.04	0.14	0.37	0.87	0.93	1.03	1.06	1.06	1.05	0.97
F_{SPR}	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.08	0.10	0.18
$Yield_{SPR}$	8	17	35	379	42777	35217	37421	40786	44594	86115
SPR_{2012}	0.01	0.08	0.38	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Survey catchability (q)										
AKSHLF_q	8.49	4.80	2.02	0.15	0.00	0.00	0.00	0.00	0.00	0.00
AKSLP_q	12.60	7.16	3.03	0.22	0.00	0.00	0.00	0.00	0.00	0.00
NWSLP_q	5.30	3.50	1.55	0.12	0.00	0.00	0.00	0.00	0.00	0.00
NWFSC_q	26.25	11.87	4.01	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Likelihood components										
Total likelihood	2387.18	2294.85	2276.86	2278.48	2293.28	2313.46	2329.01	2347.96	2371.20	2393.35
survey_like_AKSHLF	-1.19	-3.67	-5.51	-6.24	-6.14	-5.60	-5.09	-4.53	-3.89	-3.77
survey_like_AKSLP	-5.09	-5.18	-5.24	-5.26	-5.25	-5.22	-5.18	-5.14	-5.09	-5.08
survey_like_NWSLP	-4.81	-5.05	-5.27	-5.37	-5.33	-5.20	-5.08	-4.97	-4.84	-4.81
survey_like_NWFSC	-6.87	-13.33	-14.04	-13.40	-13.30	-13.63	-13.80	-13.93	-14.03	-13.94
Lt_like_TWL	136.80	130.32	132.03	132.18	130.54	130.06	129.67	129.61	130.13	132.56
Lt_like_AKSHLF	12.61	12.08	12.17	12.27	12.77	12.69	12.87	13.12	13.41	14.87
Lt_like_AKSLP	7.96	7.22	6.83	6.73	6.61	6.69	6.72	6.74	7.49	6.73
Lt_like_NWFSC	30.23	29.45	30.47	32.14	32.34	31.72	31.77	32.25	33.04	39.05
Age_like_TWL	242.66	234.68	231.42	230.81	230.18	229.90	229.94	230.59	232.20	230.57
Age_like_NWFSC	1969.72	1953.64	1946.45	1948.16	1952.97	1953.82	1956.06	1961.95	1970.11	1976.58
Ct_like	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
Recruitment penalty	44.90	3.61	-4.44	-3.07	7.25	27.07	39.12	49.24	58.74	64.90
Parameter penalty	7.97	4.05	2.83	2.64	3.58	4.08	4.89	5.85	6.71	8.42
Parameter bounds	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.03

Table 17. Results from the female natural mortality (highlighted in gray) profile for aurora rockfish when male natural mortality and steepness are estimated. The base case female natural mortality value is 0.035.

Metrics	Profile values									
Parameters										
M (female)	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
h	0.99	0.98	0.97	0.96	0.97	0.98	0.98	0.98	0.98	0.98
M (male)	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10
$\ln R_0$	3.97	4.98	5.90	8.30	13.33	13.35	13.59	13.84	13.96	14.82
Derived outputs										
SB_0	1034	1161	1596	10929	1075620	757516	675775	620052	518013	847159
SB_{2013}	50	182	606	9458	996775	761924	693560	635369	541297	792687
Depletion	0.05	0.16	0.38	0.87	0.93	1.01	1.03	1.02	1.04	0.94
F_{SPR}	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.08	0.10	0.17
$Yield_{SPR}$	9	19	38	345	45422	38748	41869	45992	44955	91665
SPR_{2012}	0.01	0.09	0.39	0.94	1.00	1.00	1.00	1.00	1.00	1.00
Survey catchability (q)										
AKSHLF_q	8.08	4.58	1.96	0.18	0.00	0.00	0.00	0.00	0.00	0.00
AKSLP_q	12.01	6.85	2.94	0.26	0.00	0.00	0.00	0.00	0.00	0.00
NWSLP_q	5.12	3.37	1.51	0.14	0.00	0.00	0.00	0.00	0.00	0.00
NWFSC_q	24.03	10.97	3.85	0.29	0.00	0.00	0.00	0.00	0.00	0.00
Likelihood components										
Total likelihood	2382.12	2293.16	2276.17	2277.95	2292.42	2312.16	2327.68	2346.62	2368.44	2390.61
survey_like_AKSHLF	-1.55	-3.92	-5.57	-6.23	-6.14	-5.61	-5.10	-4.54	-3.81	-3.73
survey_like_AKSLP	-5.11	-5.19	-5.24	-5.26	-5.25	-5.22	-5.18	-5.14	-5.09	-5.08
survey_like_NWSLP	-4.84	-5.08	-5.28	-5.37	-5.33	-5.20	-5.09	-4.97	-4.83	-4.80
survey_like_NWFSC	-8.54	-13.66	-14.06	-13.41	-13.30	-13.63	-13.79	-13.92	-14.04	-13.95
Lt_like_TWL	135.70	130.07	131.93	132.07	130.52	130.02	129.63	129.58	129.71	132.22
Lt_like_AKSHLF	12.73	12.13	12.19	12.28	12.76	12.70	12.89	13.14	13.33	14.76
Lt_like_AKSLP	7.98	7.20	6.82	6.73	6.61	6.70	6.72	6.74	6.76	6.74
Lt_like_NWFSC	30.31	29.44	30.46	32.08	32.30	31.70	31.78	32.29	32.86	38.69
Age_like_TWL	243.72	234.57	231.38	230.77	230.15	229.86	229.90	230.55	231.46	230.50
Age_like_NWFSC	1972.84	1953.41	1946.41	1948.13	1952.74	1953.67	1955.97	1961.87	1967.76	1975.25
Ct_like	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02
Recruitment penalty	39.43	3.44	-4.55	-3.07	7.06	26.31	38.23	48.27	60.74	64.63
Parameter penalty	7.66	3.71	2.50	2.32	3.25	3.78	4.59	5.56	6.36	8.09
Parameter bounds	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.03

8.4.3 Sensitivities

Table 18. Results from sensitivity runs on the base case model for aurora rockfish.

		Sensitivity run										
		Natural mortality			Marginal ages			Ageing error			Maturity	
Metrics	BC	Estiamted	Mean	1.25 Fec	All	Fishery ages	All with est. *M*	x0.5	x2	CS sel blks	Age-based	Survey-data
Parameters												
h	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
M (female)	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04
M (male)	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.04
$\ln R_0$	6.64	6.18	10.17	6.64	7.30	6.89	6.49	6.63	6.60	6.72	6.64	6.64
Derived outputs												
SB_0	2626	1887	69590	2195	5082	3359	2530	2619	2506	2862	2883	2411
SB_{2013}	1673	964	64082	1388	4026	2370	1625	1652	1550	1909	1879	1521
Depletion	0.64	0.51	0.92	0.63	0.79	0.71	0.64	0.63	0.62	0.67	0.65	0.63
F_{SPR}	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.02
$Yield_{SPR}$	67	45	2046	66	139	86	65	67	63	72	69	66
SPR_{2012}	0.69	0.54	0.99	0.69	0.85	0.76	0.69	0.69	0.67	0.72	0.70	0.69
Survey catchability (q)												
AKSHLF_q	0.94	1.51	0.03	0.94	0.42	0.70	0.95	0.97	0.97	0.85	0.94	0.94
AKSLP_q	1.41	2.27	0.04	1.41	0.62	1.06	1.42	1.48	1.43	1.27	1.42	1.41
NWSLP_q	0.73	1.16	0.02	0.73	0.29	0.53	0.67	0.75	0.76	0.65	0.73	0.73
NWFSC_q	1.64	2.74	0.04	1.63	0.66	1.19	1.54	1.69	1.72	1.45	1.64	1.63
Likelihood components												
Total likelihood	2276.13	2275.67	2279.06	2276.13	482.37	2088.60	481.64	2269.38	2357.46	2275.43	2276.11	2276.13
survey_like_AKSHLF	-5.99	-5.75677	-6.26195	-5.99	-6.04	-6.02	-5.86	-5.93	-6.01	-6.04	-5.99	-5.99
survey_like_AKSLP	-5.25	-5.24	-5.26	-5.25	-5.25	-5.25	-5.24	-5.25	-5.25	-5.25	-5.25	-5.25
survey_like_NWSLP	-5.34	-5.30	-5.37	-5.34	-5.34	-5.34	-5.32	-5.33	-5.34	-5.35	-5.34	-5.34
survey_like_NWFSC	-13.65	-13.85	-13.37	-13.65	-13.62	-13.62	-13.77	-13.66	-13.72	-13.62	-13.65	-13.65
Lt_like_TWL	131.77	131.46	132.32	131.78	129.15	132.42	128.96	132.01	131.56	130.40	131.76	131.77
Lt_like_AKSHLF	12.19	12.19	12.21	12.19	10.63	12.21	10.57	13.12	11.67	12.18	12.20	12.19
Lt_like_AKSLP	6.83	6.79	6.89	6.83	6.53	6.79	6.40	6.85	6.33	6.83	6.83	6.83
Lt_like_NWFSC	31.41	31.20	31.79	31.41	29.33	31.24	29.50	31.35	30.95	31.70	31.40	31.41
Age_like_TWL	230.99	231.15	230.87	230.99	45.12	44.38	45.33	230.52	235.32	231.07	230.98	230.99
Age_like_NWFSC	1947.94	1947.81	1948.47	1947.94	346.10	1946.90	345.53	1940.26	2029.86	1948.14	1947.93	1947.93
Ct_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recruitment penalty	-4.23	-4.30	-2.77	-4.23	-2.96	-4.26	-3.21	-3.95	-6.52	-4.63	-4.23	-4.23
Parameter penalty	2.59	2.65	2.64	2.59	1.58	2.27	1.64	2.48	1.71	2.55	2.59	2.59
Parameter bounds	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

8.4.4 Reference points

Table 19. Summary of reference points for the base case model.

Quantity	**Estimate**	**~95% Confidence Interval**
Unfished Spawning biomass (mt)	2626	(1165-4087)
Unfished age 0+ biomass (mt)	6109	(2737-9481)
Unfished recruitment (R0)	766	(349-1182)
Depletion (2013)	0.64	(0.48-0.79)
Reference points based on $SB_{40\%}$		
Proxy spawning biomass ($B40_{\%}$)	1050	(466-1635)
SPR resulting in $B40_{\%}$ ($SPR_{B40\%}$)	0.44	(0.44-0.44)
Exploitation rate resulting in $B40_{\%}$	0.0304	(0.0271-0.0337)
Yield with $SPR_{B40\%}$ at $B40_{\%}$ (mt)	72	(33-112)
Reference points based on SPR proxy for MSY		
Spawning biomass	1213	(538-1888)
SPR_{proxy}	50%	
Exploitation rate corresponding to SPR_{proxy}	0.0248	(0.0222-0.0274)
Yield with SPR_{proxy} at SB_{SPR} (mt)	67	(31-104)
Reference points based on estimated MSY values		
Spawning biomass at *MSY* (SB_{MSY})	648	(283-1012)
SPR_{MSY}	0.30	(0.2963-0.3039)
Exploitation rate corresponding to SPR_{MSY}	0.0510	(0.0442-0.0578)
MSY (mt)	79	(36-122)

8.4.5 Harvest projections

Table 20. Projection of potential OFL, landings, and catch, summary biomass (age-5 and older), spawning biomass, and depletion for the base case model projected with status quo catches in 2013 and 2014 (average of the past 5 years (2008-2012), and catches at the ABC from 2013 onward. The OFL in years later than 2014 is the calculated total catch determined by $F_{SPR50\%}$. ABC values are calculated using σ_{SB}=0.39 and P*=0.45.

Year	Predicted OFL/contribution (mt)	ABC Catch (mt)	Landings (mt)	Age 0+ biomass (mt)	Spawning Biomass (mt)	Depletion (%)
2013	41	46.38	40.45	4,366	1,673	63.7%
2014	41	46.38	40.29	4,403	1,678	63.9%
2015	91.67	87.33	75.55	4,439	1,685	64.2%
2016	91.77	87.42	75.37	4,434	1,678	63.9%
2017	91.90	87.55	75.34	4,427	1,674	63.7%
2018	92.02	87.67	75.43	4,418	1,672	63.7%
2019	92.08	87.73	75.61	4,406	1,673	63.7%
2020	92.06	87.71	75.80	4,391	1,675	63.8%
2021	91.95	87.60	75.96	4,374	1,676	63.8%
2022	91.74	87.40	76.05	4,354	1,678	63.9%
2023	91.44	87.11	76.04	4,333	1,678	63.9%
2024	91.06	86.75	75.94	4,309	1,676	63.8%

8.4.6 Decision Table

Table 21. Summary table of 12-year projections showing results for 2015-2024 for alternate states of nature based on the axis of uncertainty. Columns range over low, mid, and high state of nature, and rows range over different assumptions of catch levels from those states of nature. The average 5-year catch (2008-2012) of 46.4 mt is assumed for 2013 and 2014. ABCs are based upon the assumption that P*=0.45 and a σ of 0.39 which reflects the model uncertainty about the spawning biomass estimate in 2013.

			State of nature					
			Low $M_{female} = 0.033$		Base case $M_{female} = 0.035$		High $M_{female} = 0.037$	
Relative probability of ln(SB_2013)			0.25		0.5		0.25	
Management decision	Year	Catch (mt)	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion	Spawning biomass (mt)	Depletion
ABC catches from "Low" state of nature	2015	54.3	1087	0.541	1685	0.642	2674	0.734
	2016	54.6	1087	0.540	1692	0.644	2691	0.739
	2017	54.9	1089	0.541	1701	0.648	2713	0.745
	2018	55.2	1092	0.543	1713	0.652	2739	0.752
	2019	55.5	1097	0.546	1728	0.658	2768	0.760
	2020	55.7	1103	0.548	1743	0.664	2798	0.768
	2021	55.9	1109	0.551	1758	0.670	2829	0.777
	2022	56.0	1115	0.554	1773	0.675	2857	0.784
	2023	56.1	1120	0.557	1786	0.680	2884	0.792
	2024	56.1	1124	0.559	1798	0.685	2907	0.798
Base Case ABC catches	2015	87.3	1087	0.541	1685	0.642	2674	0.734
	2016	87.4	1073	0.534	1678	0.639	2677	0.735
	2017	87.6	1061	0.528	1674	0.637	2686	0.737
	2018	87.7	1051	0.523	1672	0.637	2698	0.741
	2019	87.7	1043	0.519	1673	0.637	2713	0.745
	2020	87.7	1035	0.515	1675	0.638	2730	0.750
	2021	87.6	1028	0.511	1676	0.638	2747	0.754
	2022	87.4	1020	0.507	1678	0.639	2763	0.759
	2023	87.1	1012	0.503	1678	0.639	2777	0.762
	2024	86.8	1002	0.498	1676	0.638	2787	0.765
ABC catches from "High" state of nature	2015	145.7	1087	0.541	1685	0.642	2674	0.734
	2016	145.3	1049	0.522	1654	0.630	2653	0.728
	2017	145.0	1013	0.504	1625	0.619	2637	0.724
	2018	144.7	980	0.487	1600	0.609	2626	0.721
	2019	144.2	948	0.471	1577	0.600	2618	0.719
	2020	143.7	917	0.456	1555	0.592	2611	0.717
	2021	143.0	886	0.440	1533	0.584	2605	0.715
	2022	142.2	855	0.425	1511	0.575	2598	0.713
	2023	141.2	824	0.409	1488	0.567	2589	0.711
	2024	140.2	792	0.394	1464	0.558	2578	0.708

9 Figures

9.1 Ecology

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Figure 1. Occurrence and abundance of aurora rockfish found in the NWFSC annual survey (2003-2012) north of 40º10' N lat.

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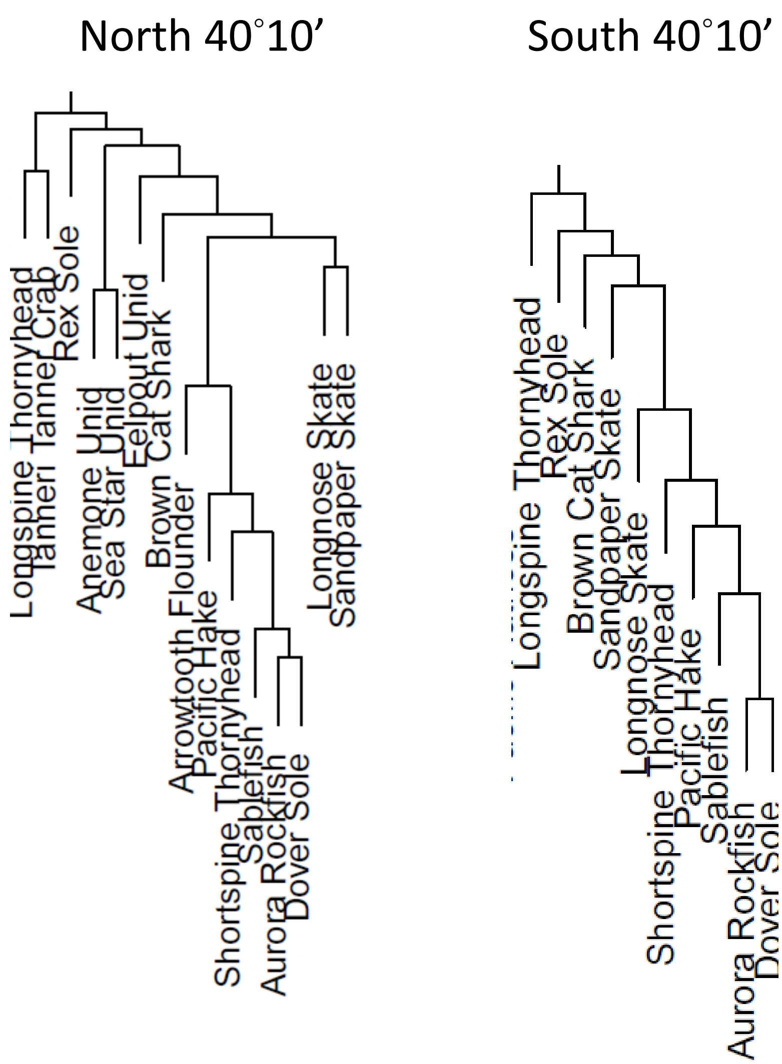


Figure 2. Significant co-occurrence with other shelf-slope groundfishes of aurora rockfish in the NWFSC trawl survey north and south of Cape Mendocino (North-south management unit break).

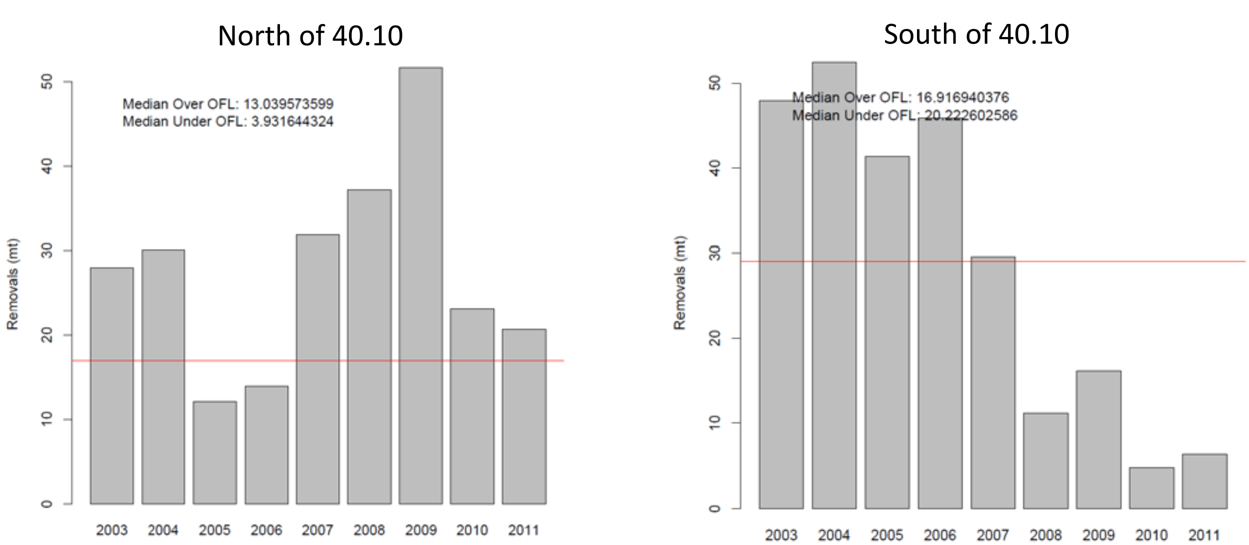


Figure 3. Total removals of aurora rockfish north (left panel) and south (right panel) of 40.10 N. The red horizontal bar indicates the area-specific aurora rockfish 2012 OFL component to the overall minor slope rockfish complex. Median values above and below the OFL across all years are also reported.

9.2 Data

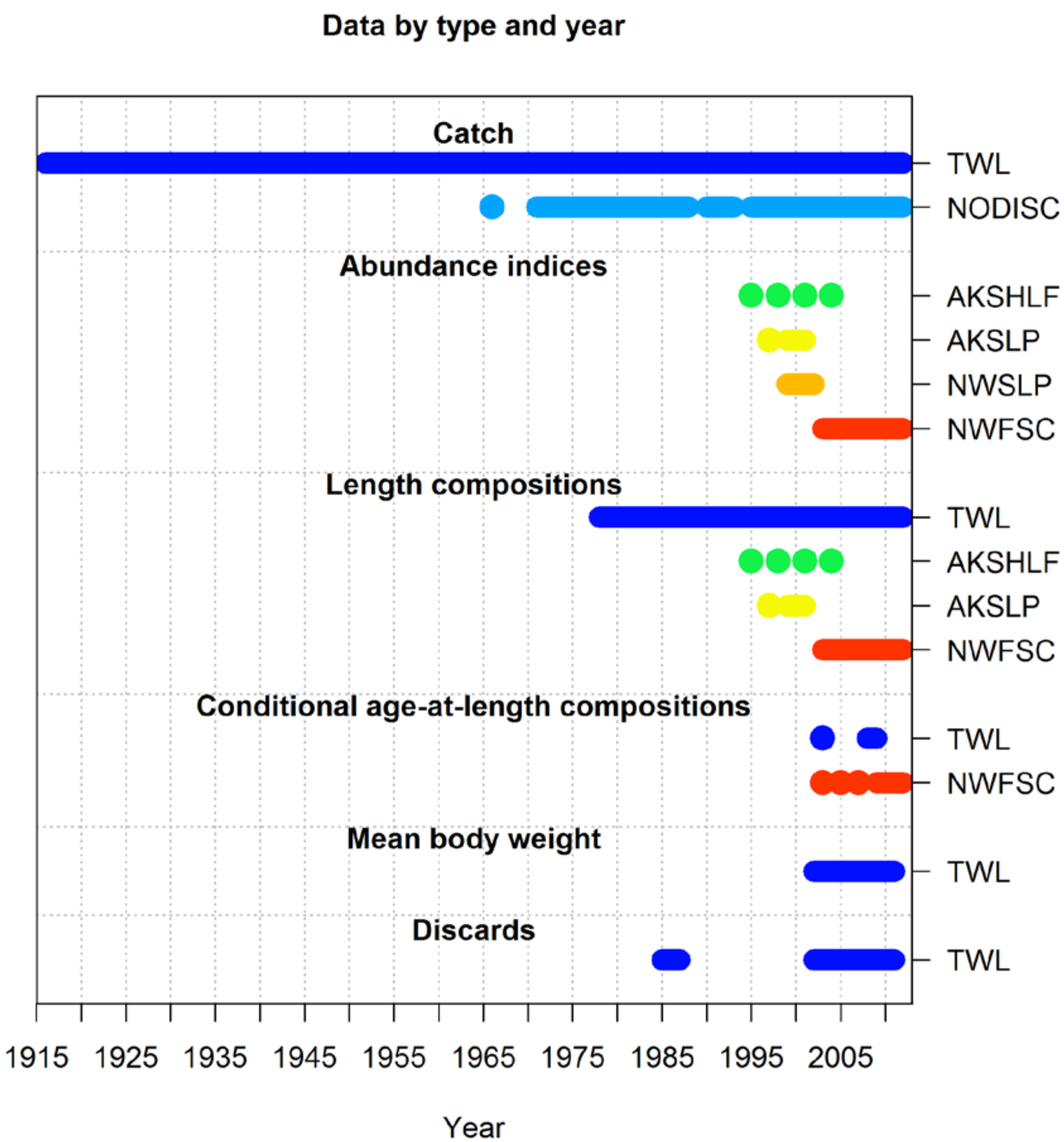


Figure 4. Data types and coverage in the base case aurora rockfish model.

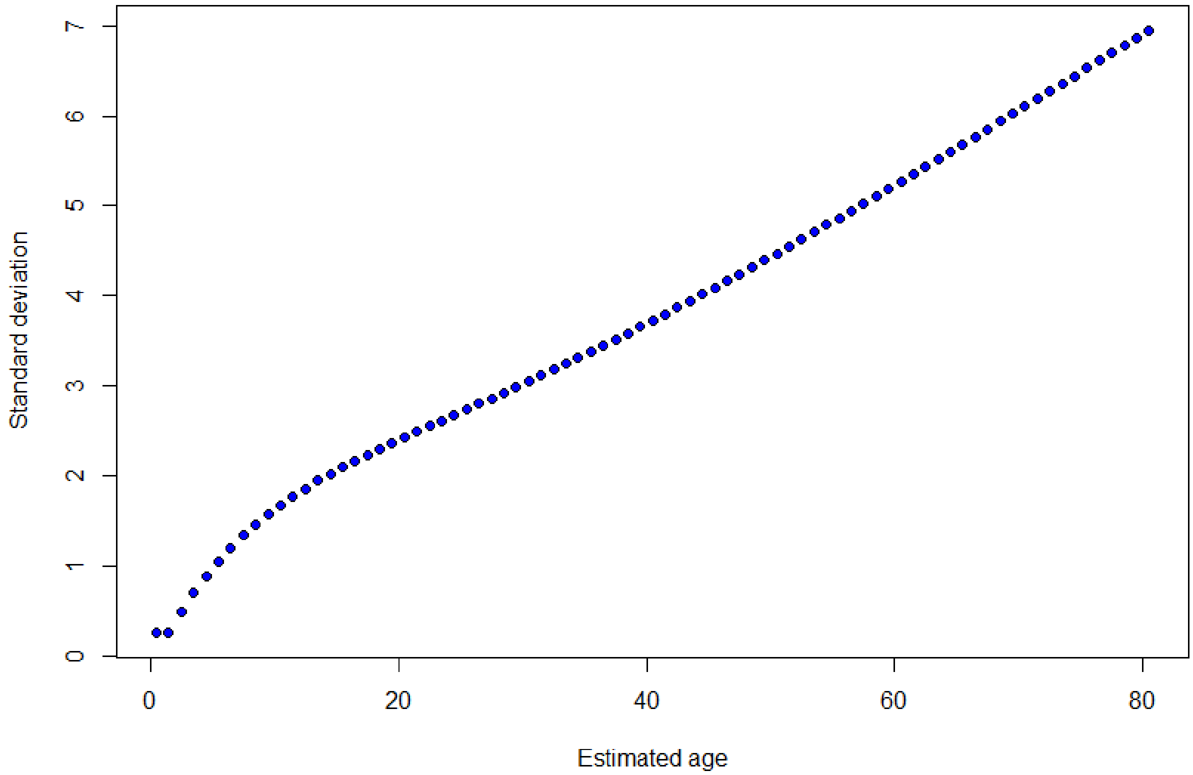


Figure 5. Ageing error relationship used in the aurora rockfish base case assuming curvilinear bias for reader 2 and curvilinear standard deviations for both readers.

9.2.1 Catches

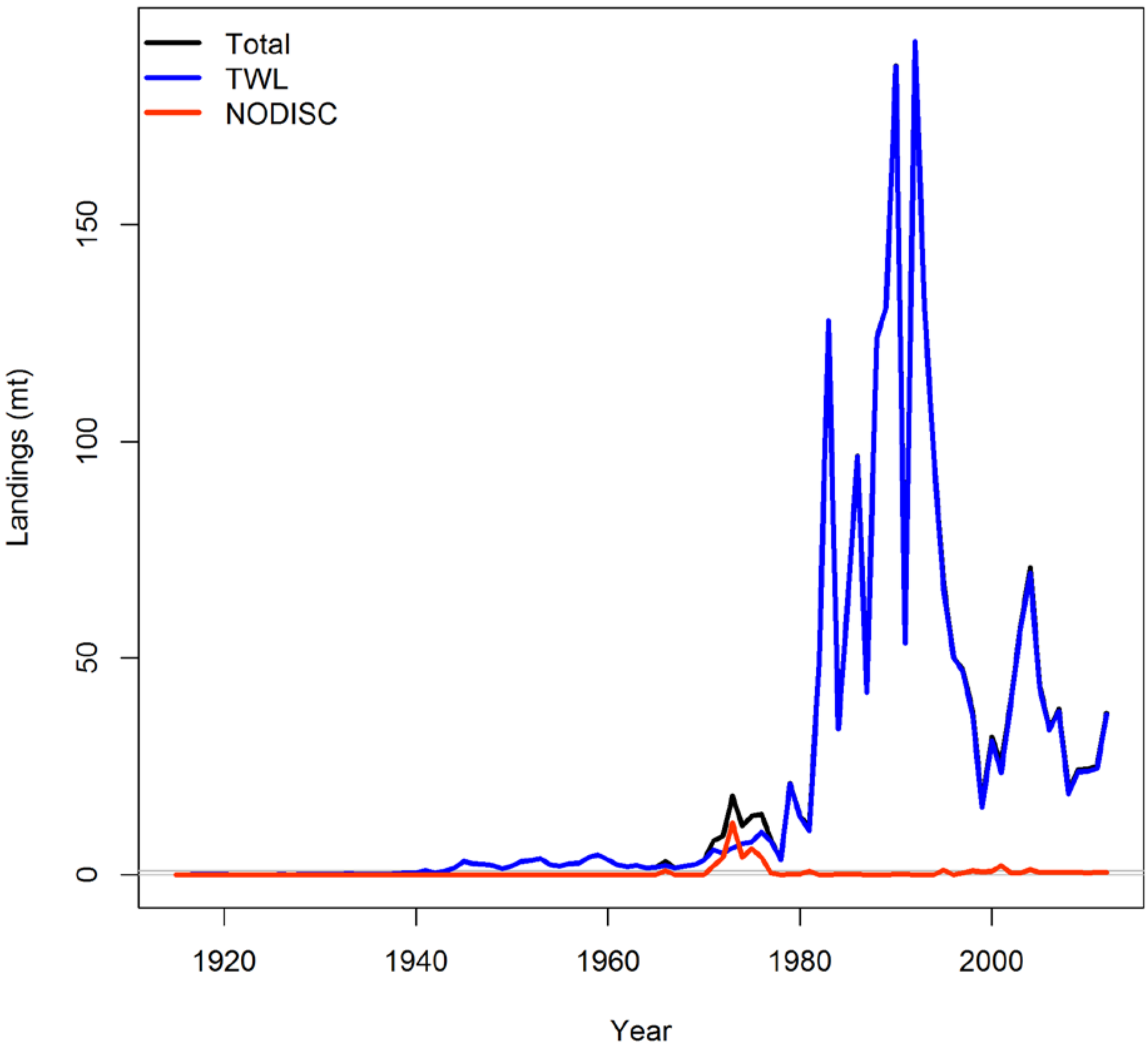


Figure 6. Total and by sector aurora rockfish landings (1916-2012).

9.2.2 Surveys

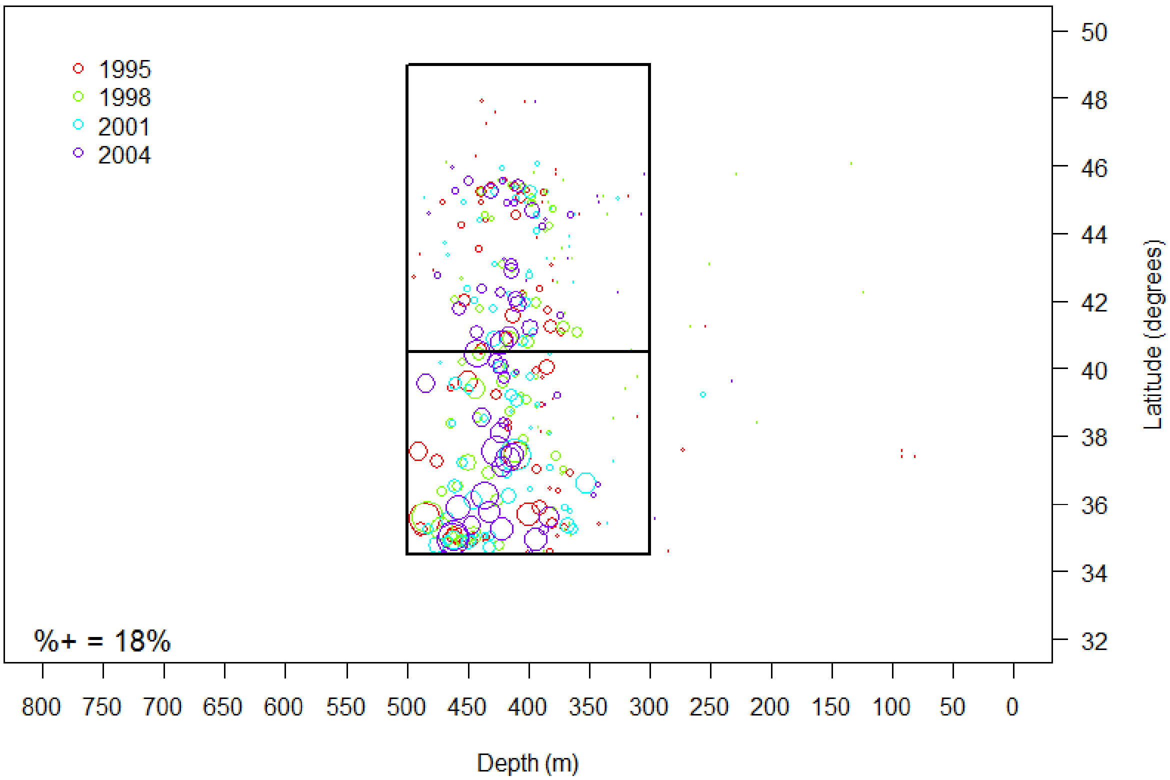


Figure 7. Depth and latitudinal occurrence of aurora rockfish in the AFSC triennial survey by year. Circle size indicates magnitude of catch. Black lines indicate the strata used in the GLMMs. Number in lower right is the percentage of positive tows.

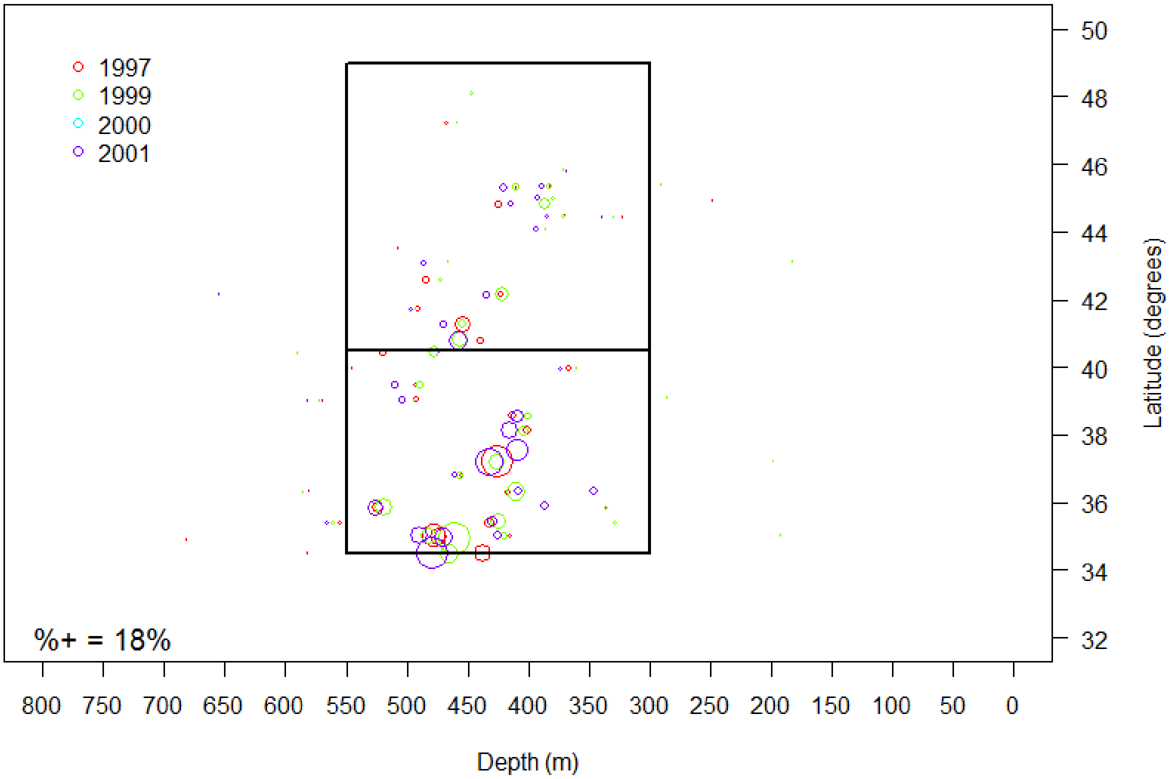


Figure 8. Depth and latitudinal occurrence of aurora rockfish in the AFSC slope survey by year. Circle size indicates magnitude of catch. Black lines indicate the strata used in the GLMMs. Number in lower right is the percentage of positive tows.

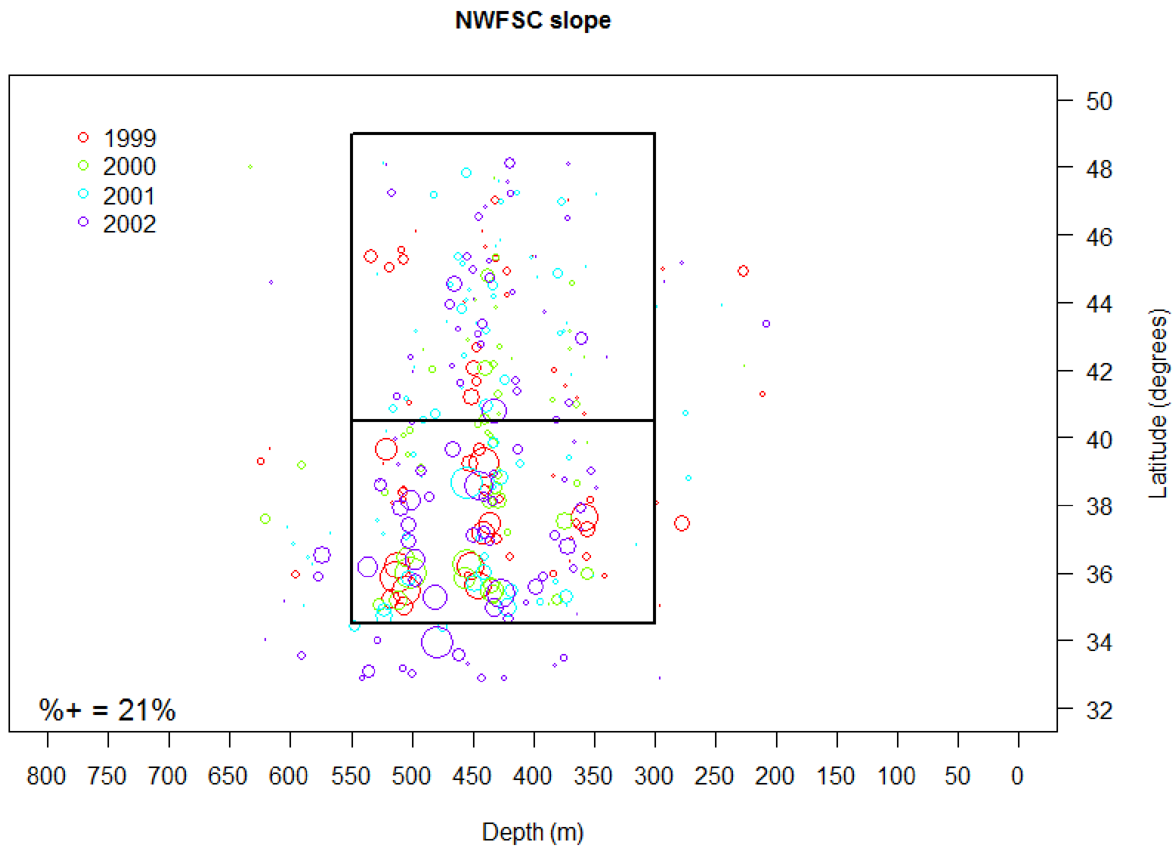


Figure 9. Depth and latitudinal occurrence of aurora rockfish in the NWFSC slope survey by year. Circle size indicates magnitude of catch. Black lines indicate the strata used in the GLMMs. Number in lower right is the percentage of positive tows.

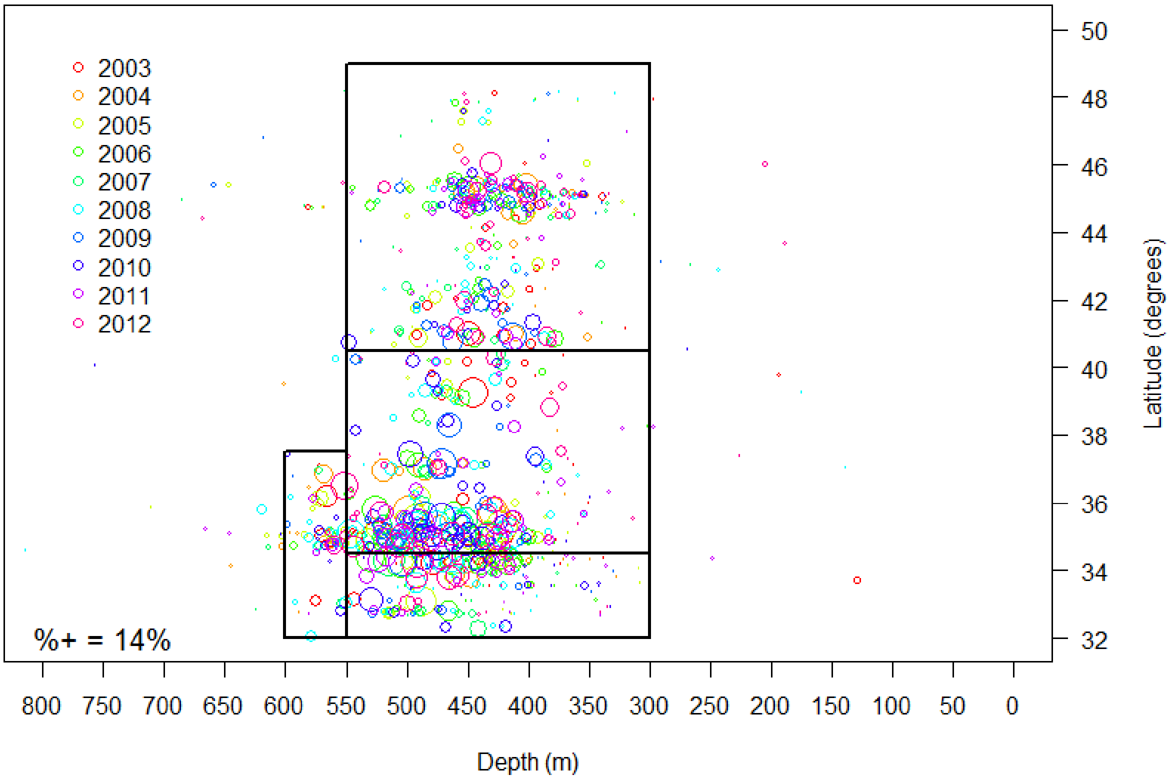


Figure 10. Depth and latitudinal occurrence of aurora rockfish in the NWFSC shelf-slope survey by year. Circle size indicates magnitude of catch. Black lines indicate the strata used in the GLMMs. Number in lower right is the percentage of positive tows.

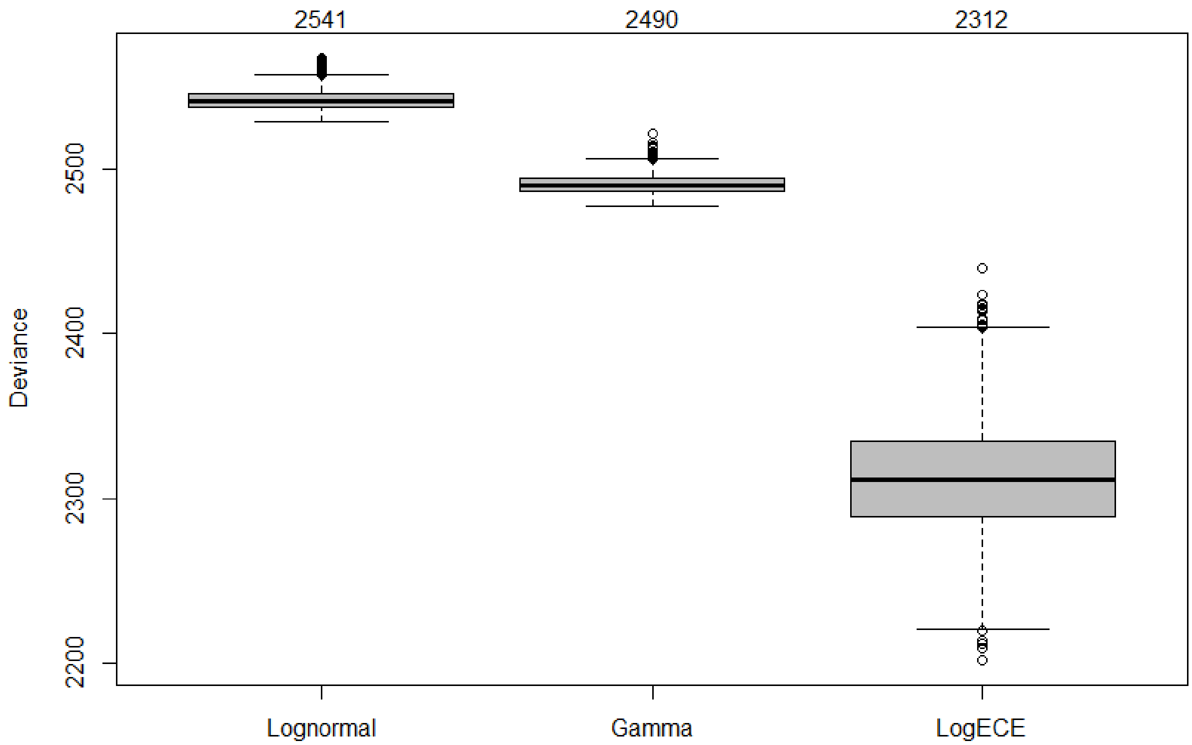


Figure 11. Box plot of deviance for three error structures explored in the GLMM models for the AFSC triennial shelf survey (1995-2004). Black line: median. Box: interquartile range. Whiskers intervals: 95%. Median deviance is given above each box plot.

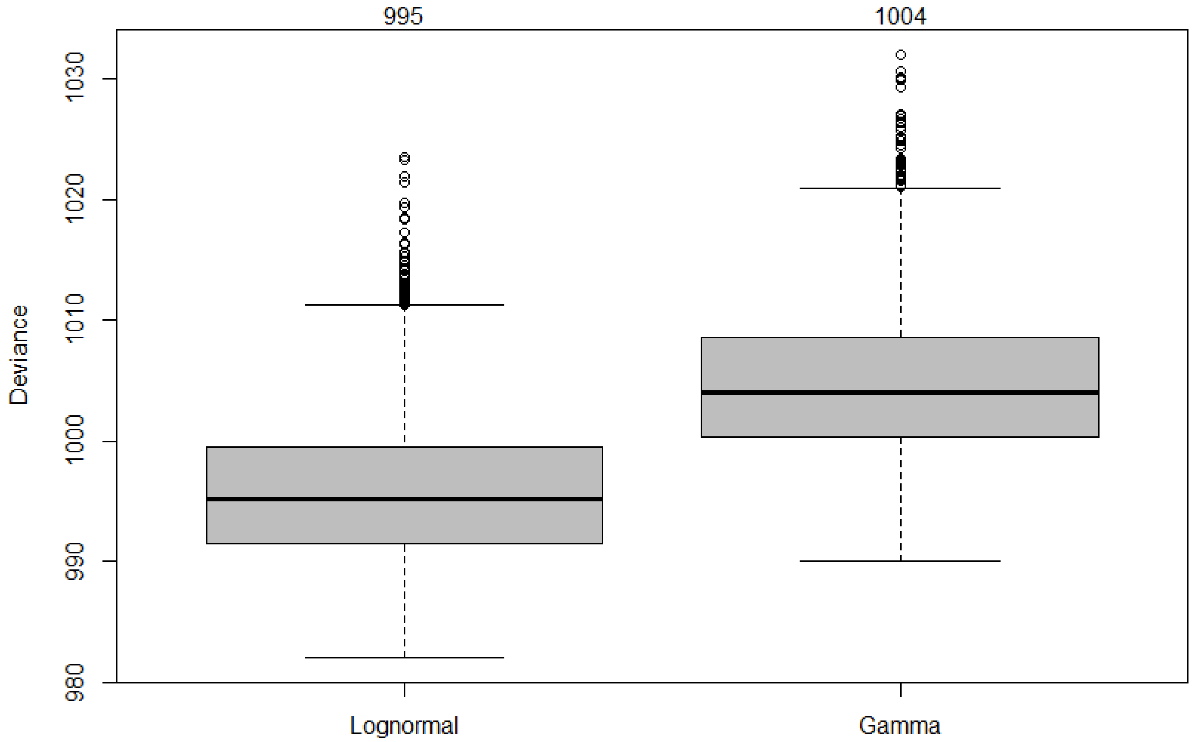


Figure 12. Box plot of deviance for two error structures explored in the GLMM models for the AFSC slope survey (1997, 1999-2001). Black line: median. Box: interquartile range. Whiskers intervals: 95%. Median deviance is given above each box plot.

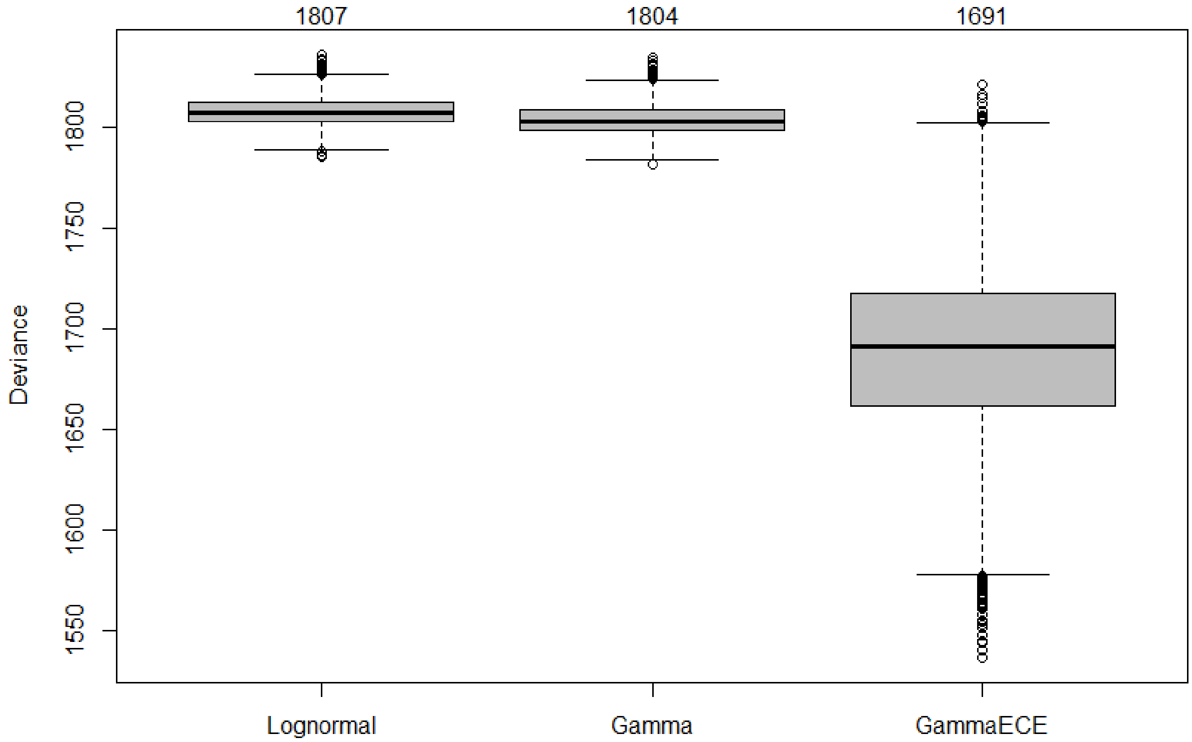


Figure 13. Box plot of deviance for three error structures explored in the GLMM models for the NWFSC slope survey (1999-2002). Black line: median. Box: interquartile range. Whiskers intervals: 95%. Median deviance is given above each box plot.

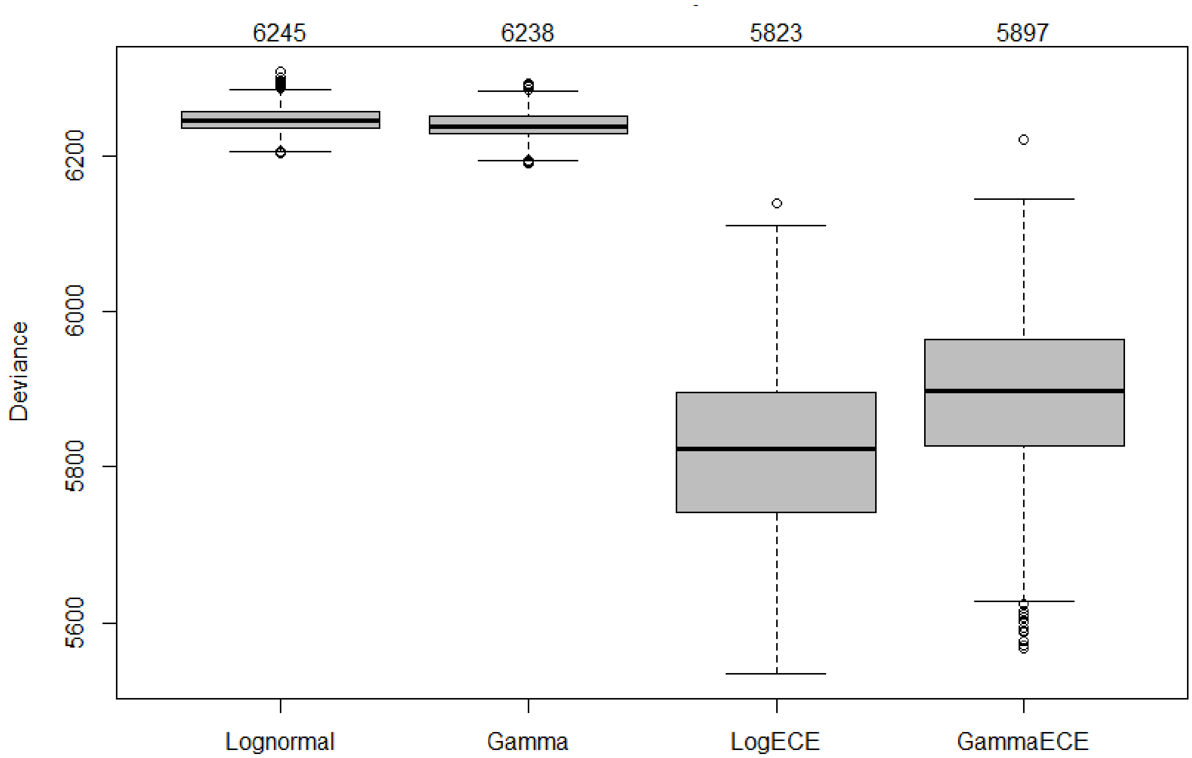


Figure 14. Box plot of deviance for three error structures explored in the GLMM models for the NWFSC shelf-slope survey (2003-2012). Black line: median. Box: interquartile range. Whiskers intervals: 95%. Median deviance is given above each box plot.

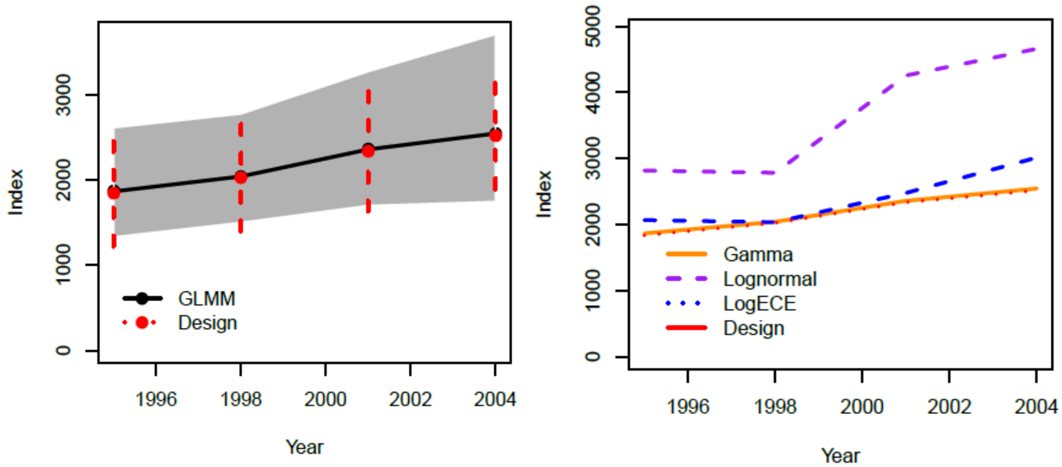


Figure 15. GLMM fits for the AFSC triennial survey assuming the gamma error structure as the base model compared to the designed based estimates (top panel; gray area and red vertical lines are 95% credibility intervals for the GLMM and design, respectively) and the other error structure models (bottom panel).

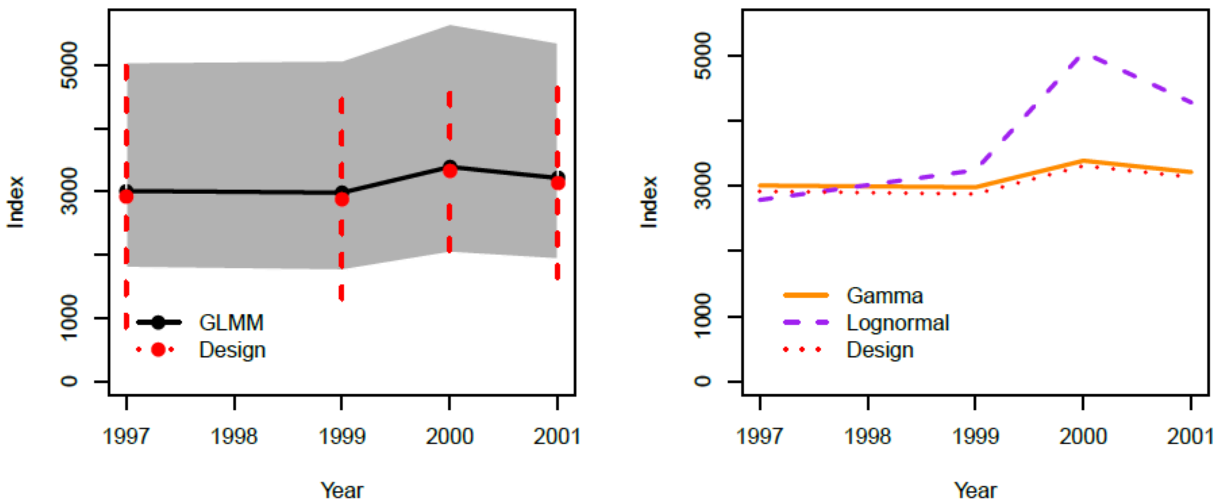


Figure 16. GLMM fits for the AFSC slope survey assuming the gamma error structure as the base model compared to the designed based estimates (top panel; gray area and red vertical lines are 95% credibility intervals for the GLMM and design, respectively) and the other error structure models (bottom panel).

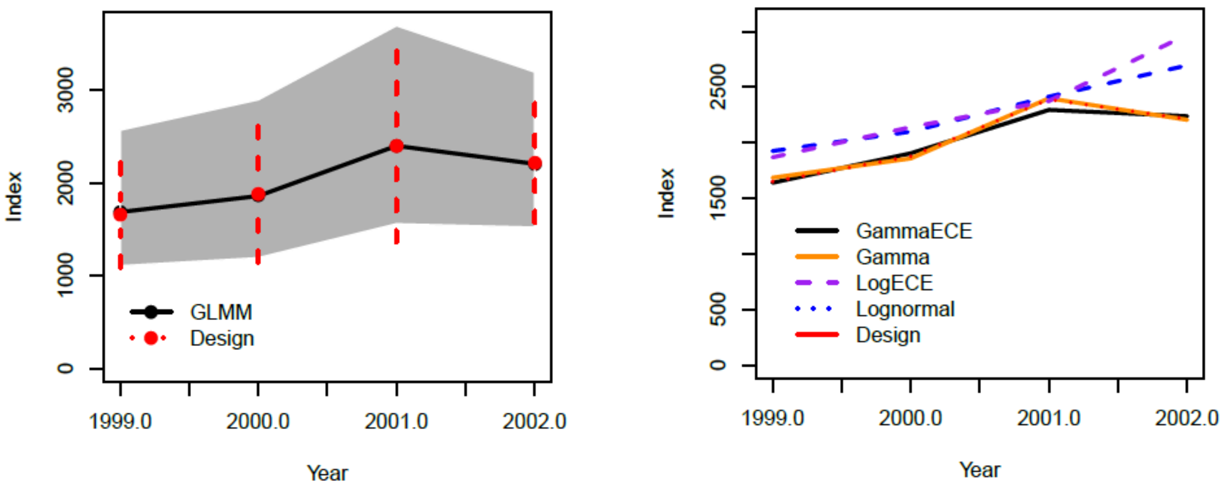


Figure 17. GLMM fits for the NWFSC slope survey assuming the gamma error structure as the base model compared to the designed based estimates (top panel; gray area and red vertical lines are 95% credibility intervals for the GLMM and design, respectively) and the other error structure models (bottom panel).

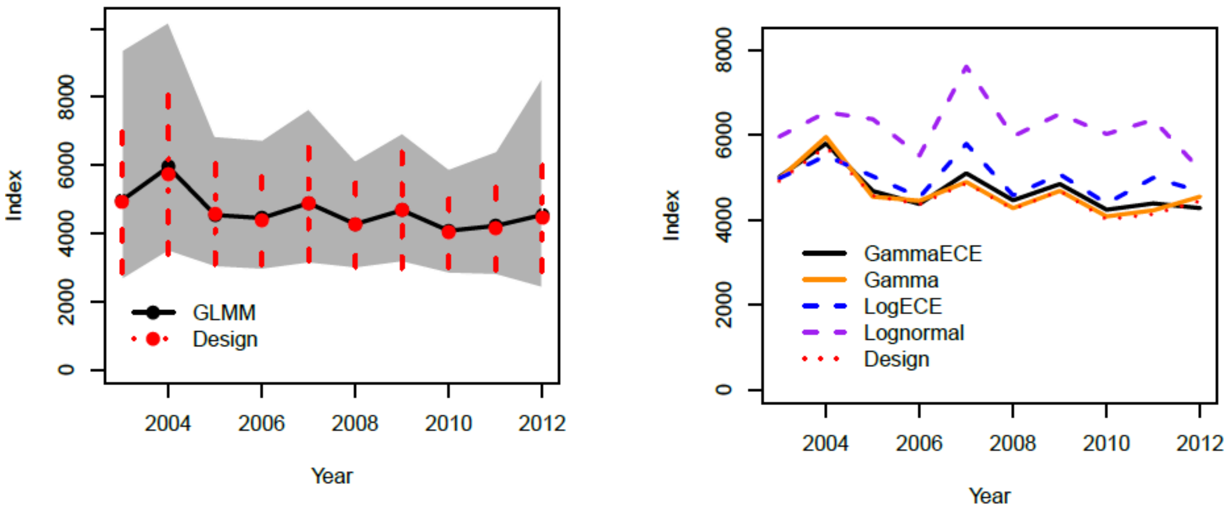


Figure 18. GLMM fits for the NWFSC shelf-slope survey assuming the gamma error structure as the base model compared to the designed based estimates (top panel; gray area and red vertical lines are 95% credibility intervals for the GLMM and design, respectively) and the other error structure models (bottom panel).

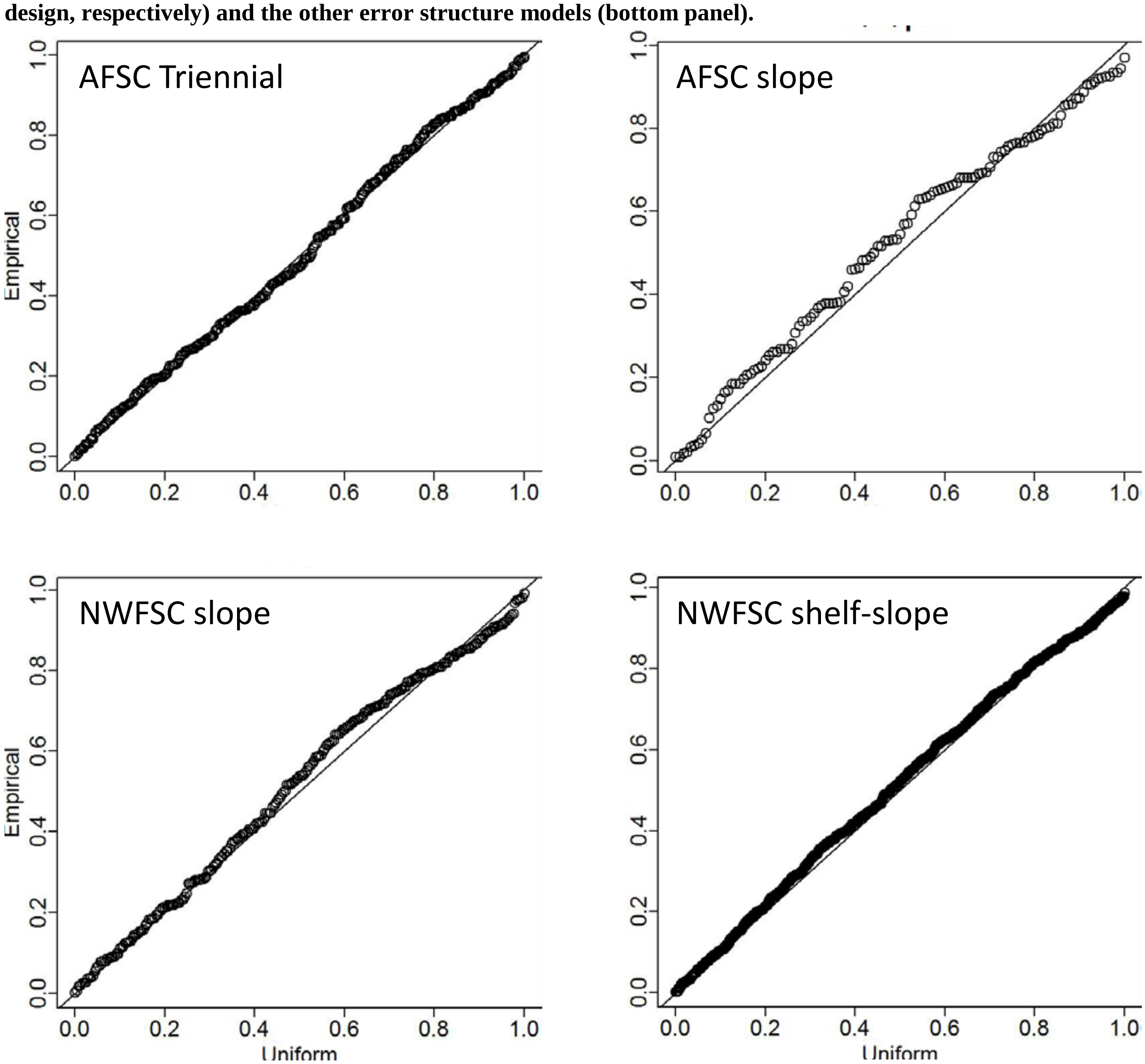


Figure 19. Q-Q plots used to diagnose convergence of the Bayesian GLMM model for the each survey series.

9.2.3 Life history parameters

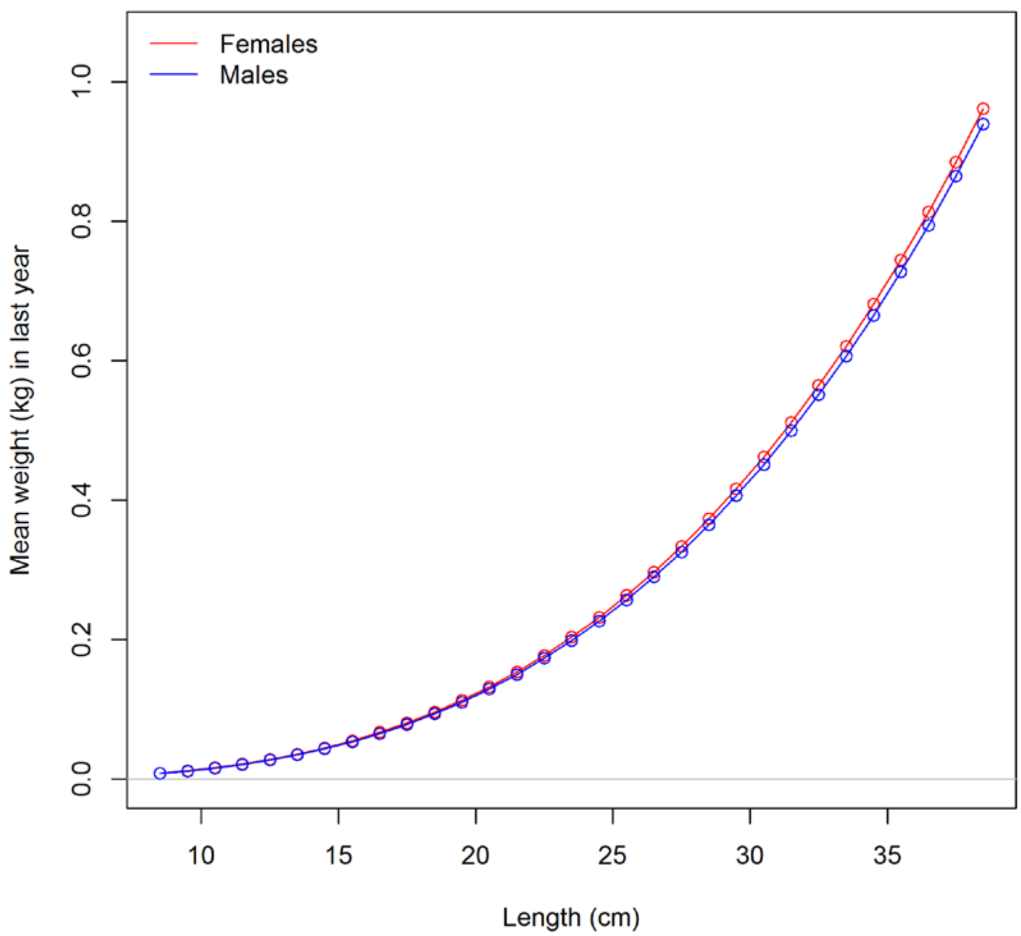


Figure 20. Length-weight relationship for female and male aurora rockfish assumed in the base case model.

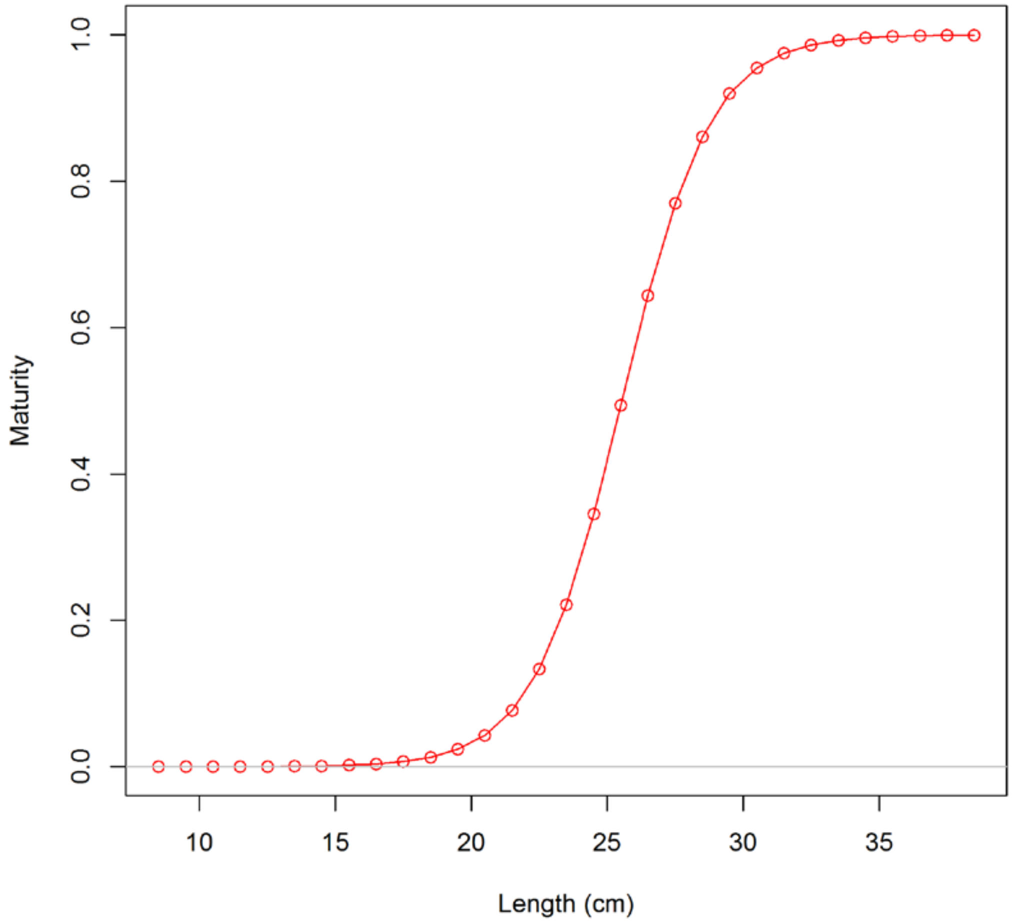


Figure 21. Female maturity ogive used in the aurora rockfish base case model.

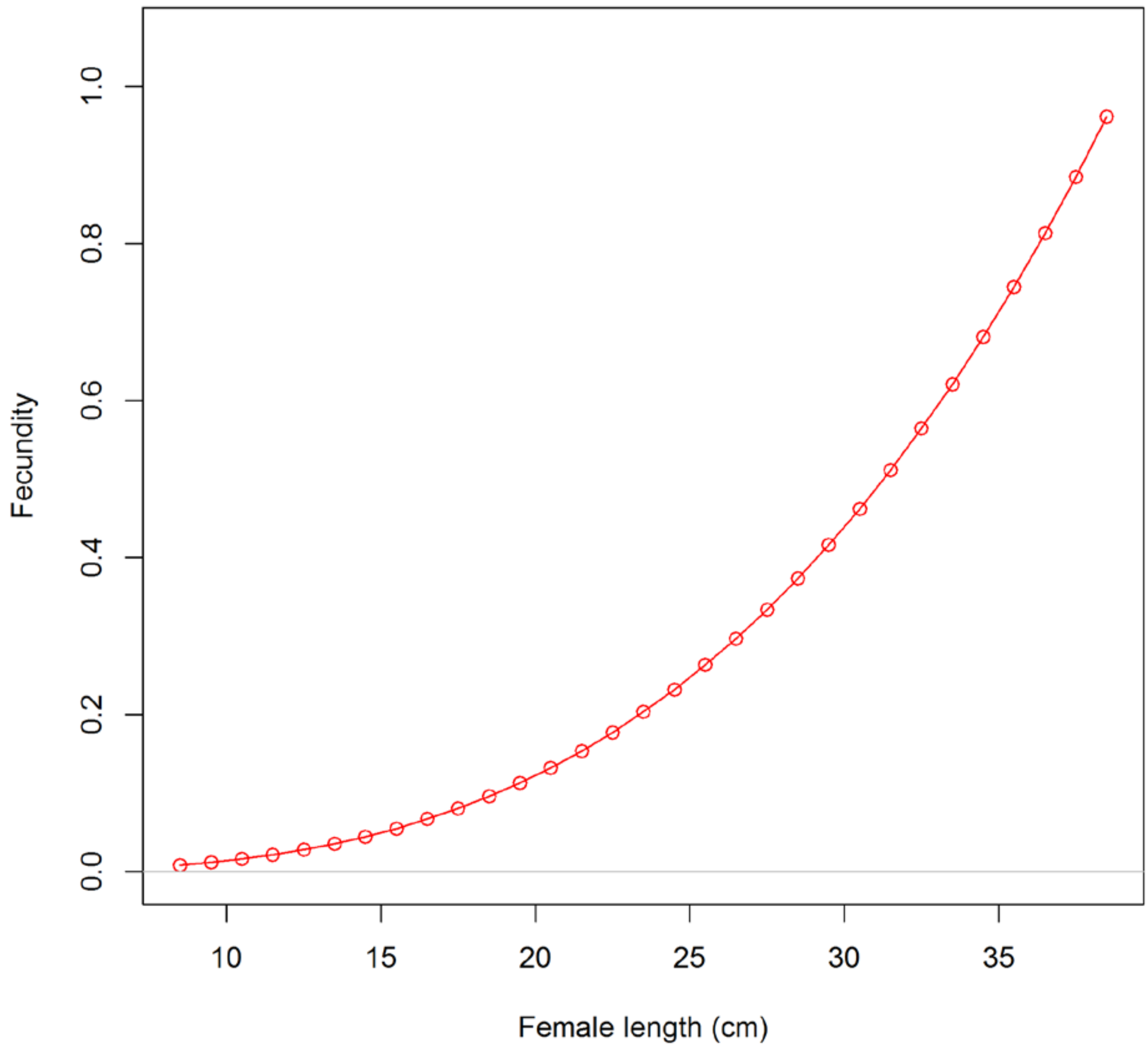


Figure 22. Fecundity at length relationship assumed in the aurora rockfish base case model.

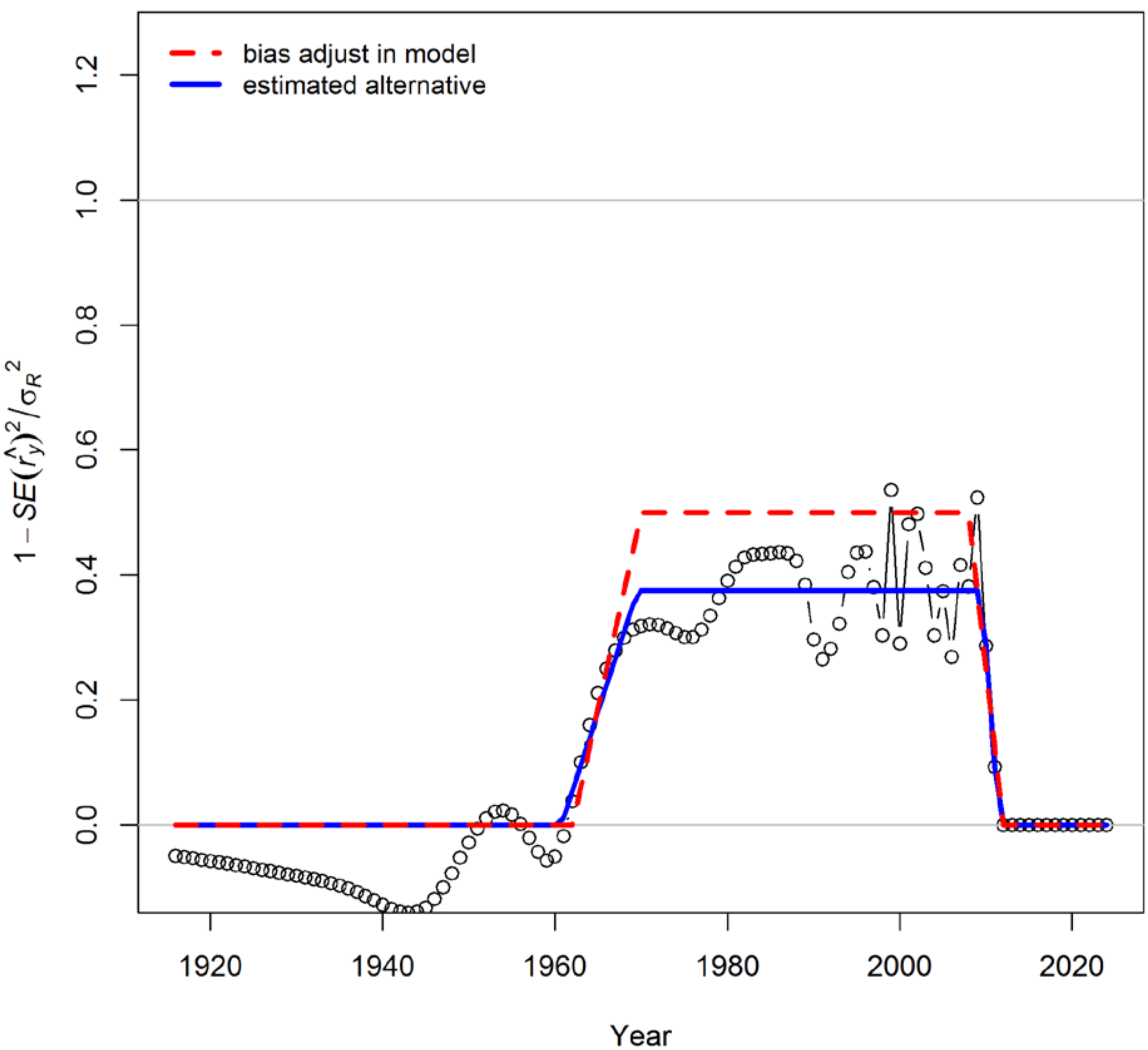


Figure 23. Time series of the applied bias-adjustment in the aurora rockfish base case model.

9.3 Model results

9.3.1 Base model

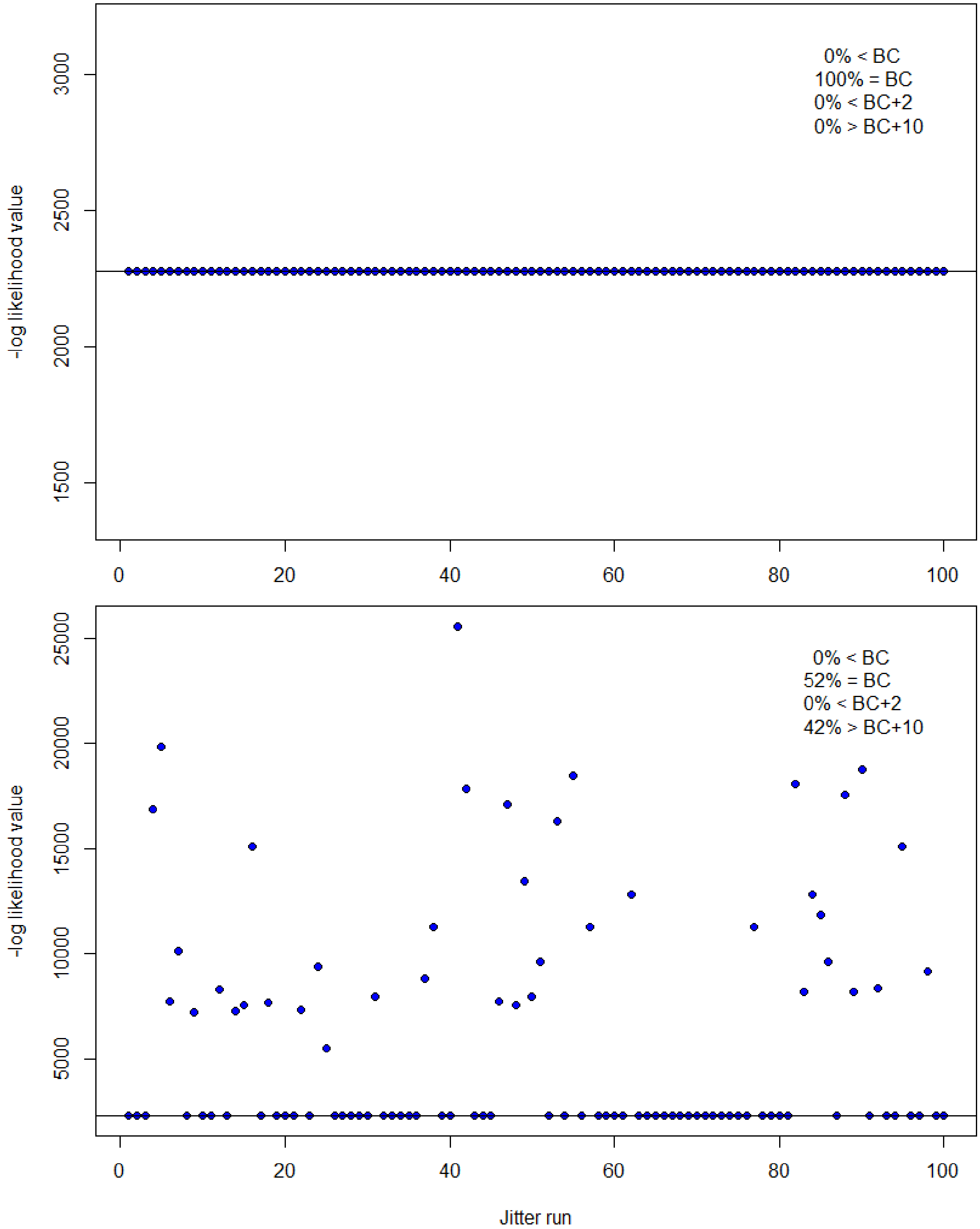


Figure 24. Results from 100 jitter runs using jitter values of either 0.1 (top panel) or 0.5 (bottom panel). Results relative to the assumed base case (BC) model are given with each panel. <2 indicates runs within, but not equal to, the base case likelihood. +10 indicates runs with likelihoods 10 or more units from the base case.

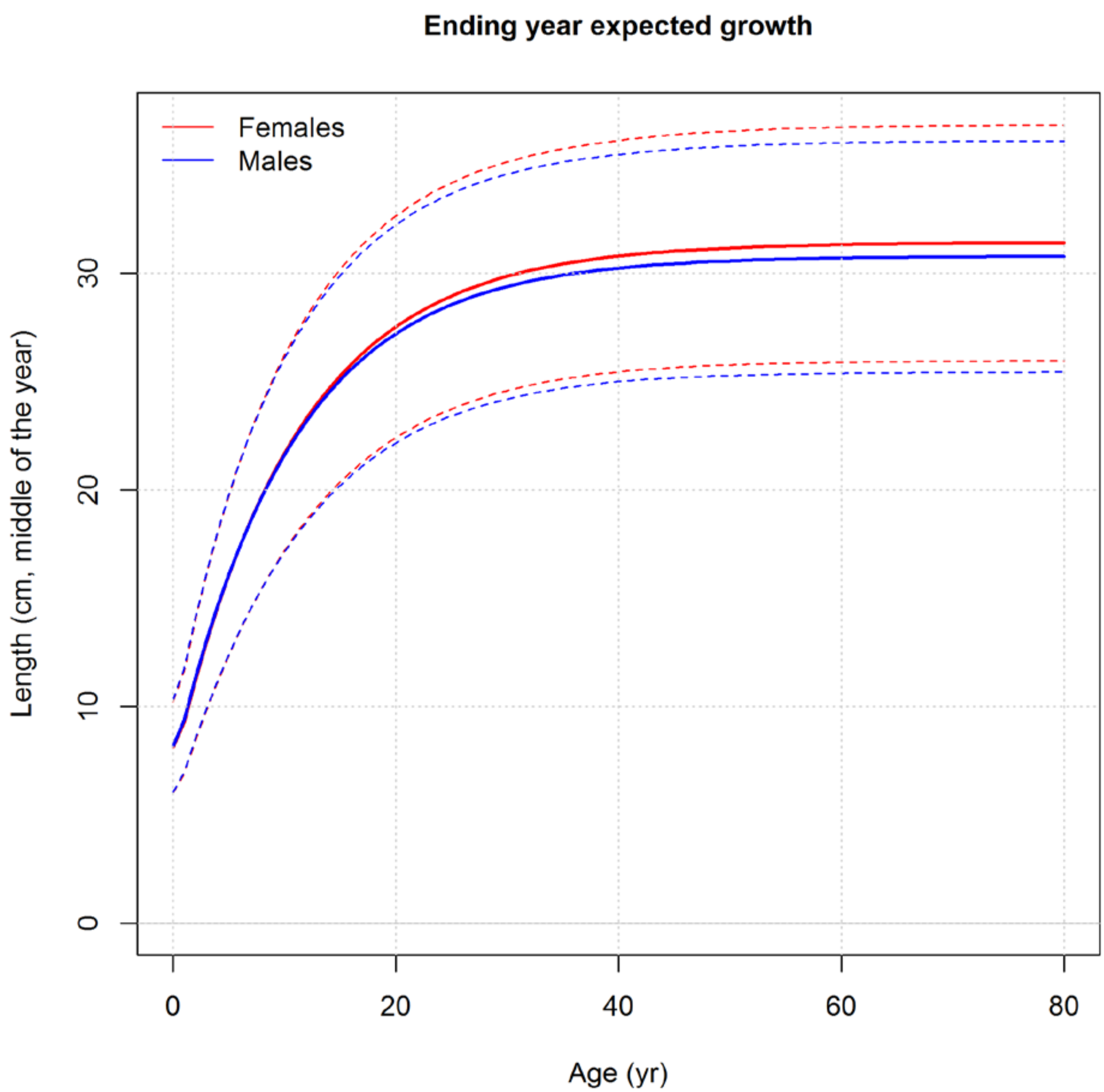


Figure 25. Estimated age and growth relationship for females and males in the aurora rockfish base case model.

9.3.1.1 Removals and discards

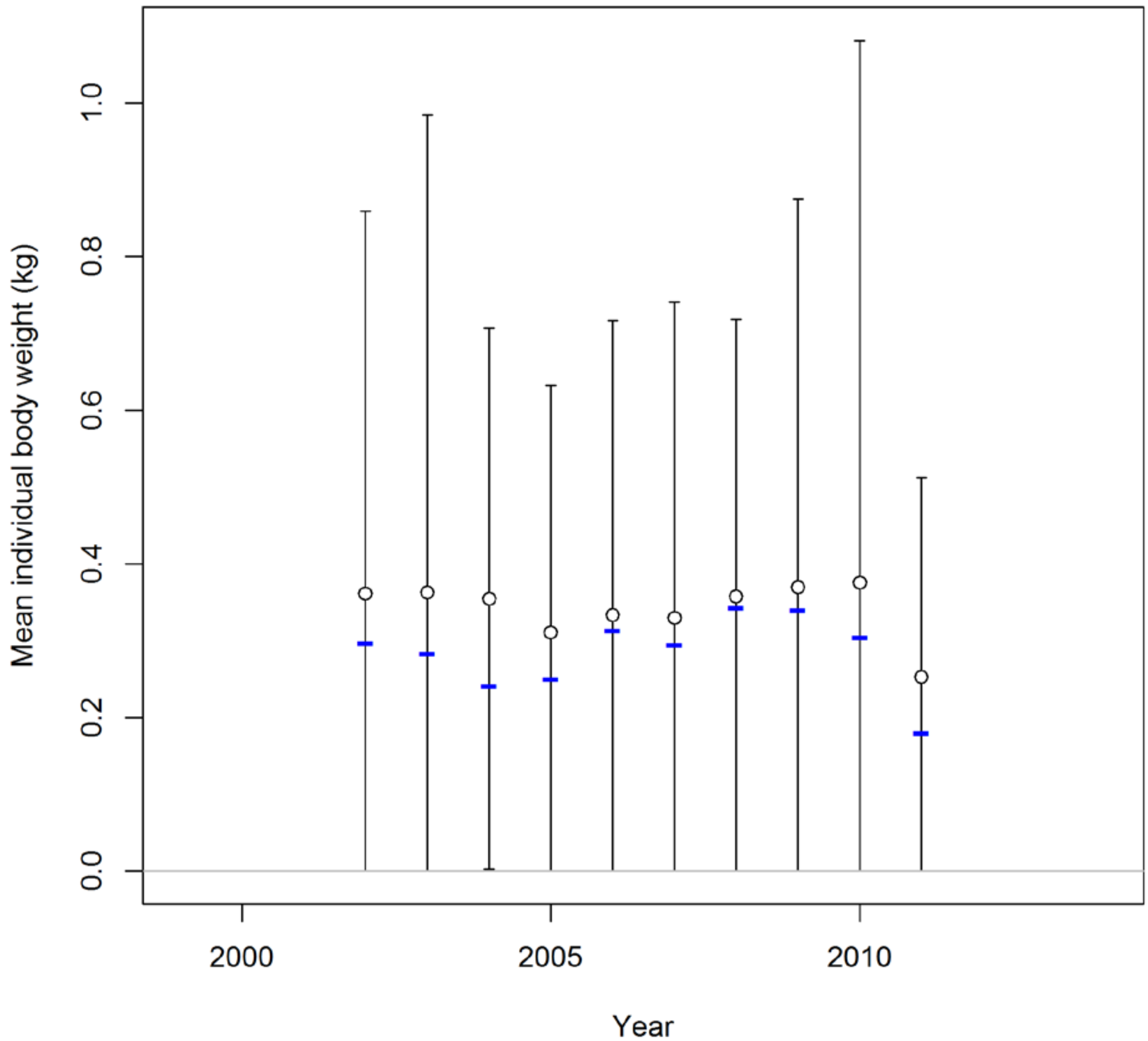


Figure 26. Base case model fit to aurora rockfish mean individual body weight in the trawl fishery.

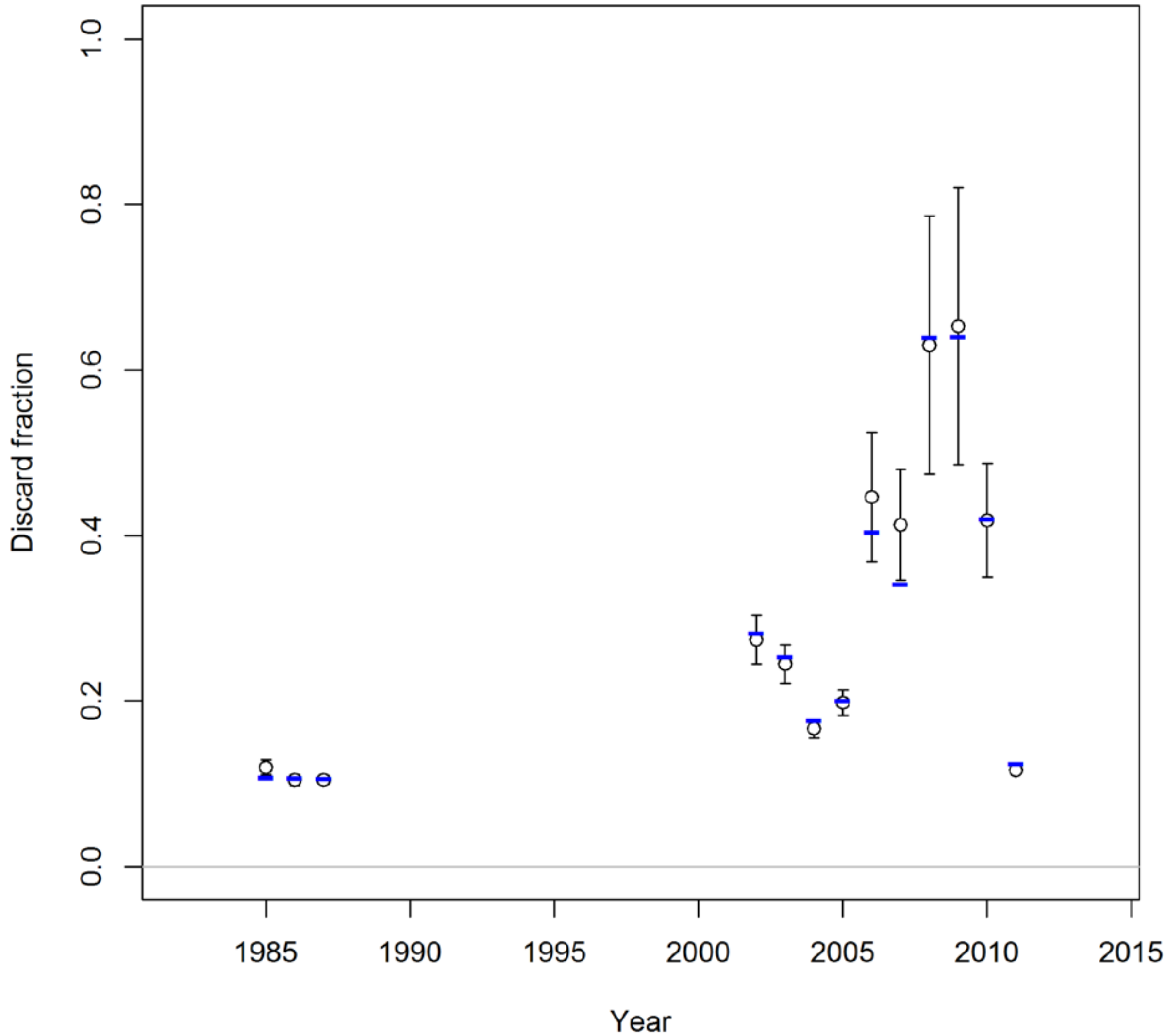


Figure 27. Base case model fits to discard fractions in the domestic fleet.

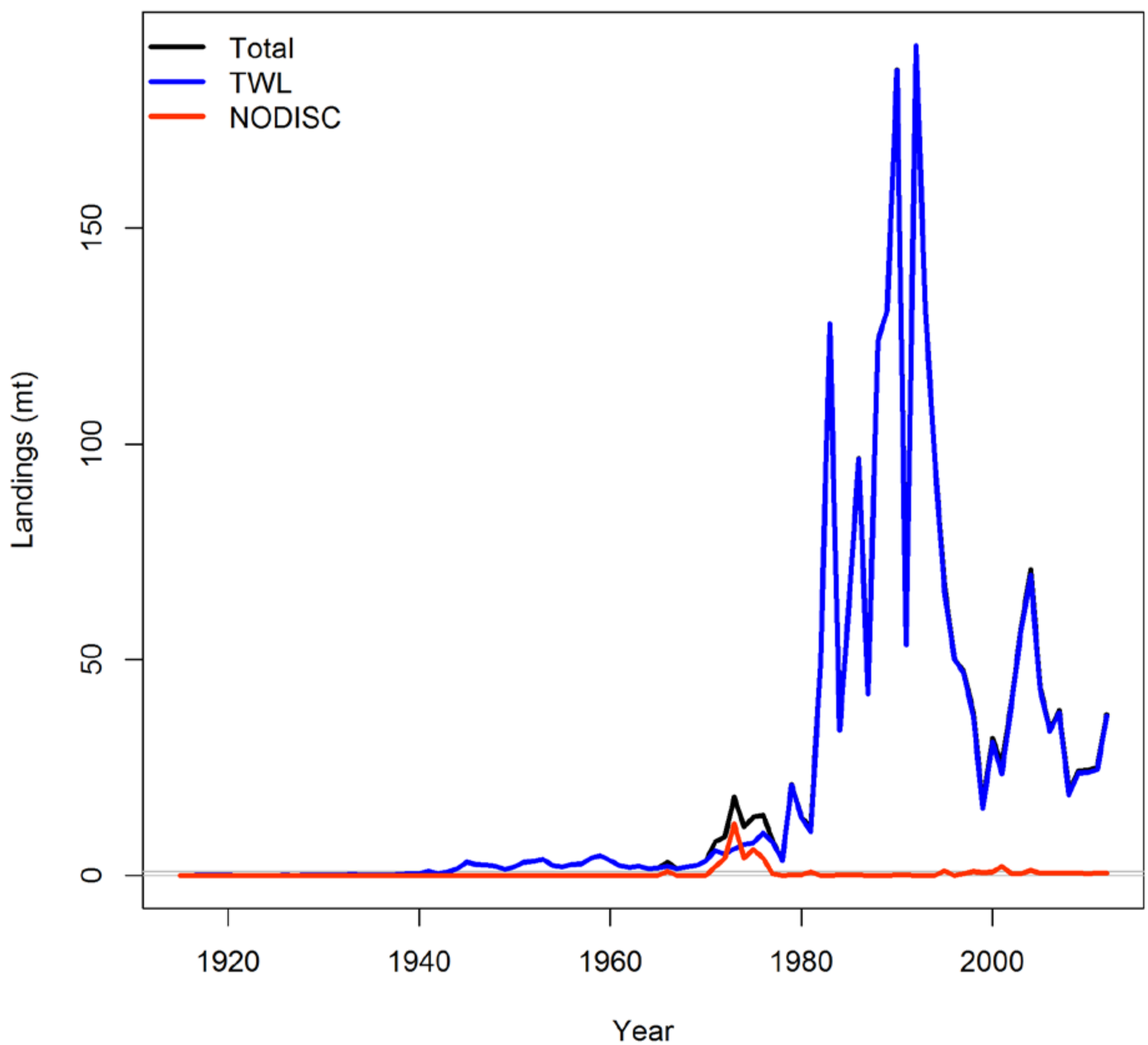


Figure 28. Total and by sector aurora rockfish removals (1916-2012). TWL= trawl fleet. NODISC= catch and full retention fleet and research catch.

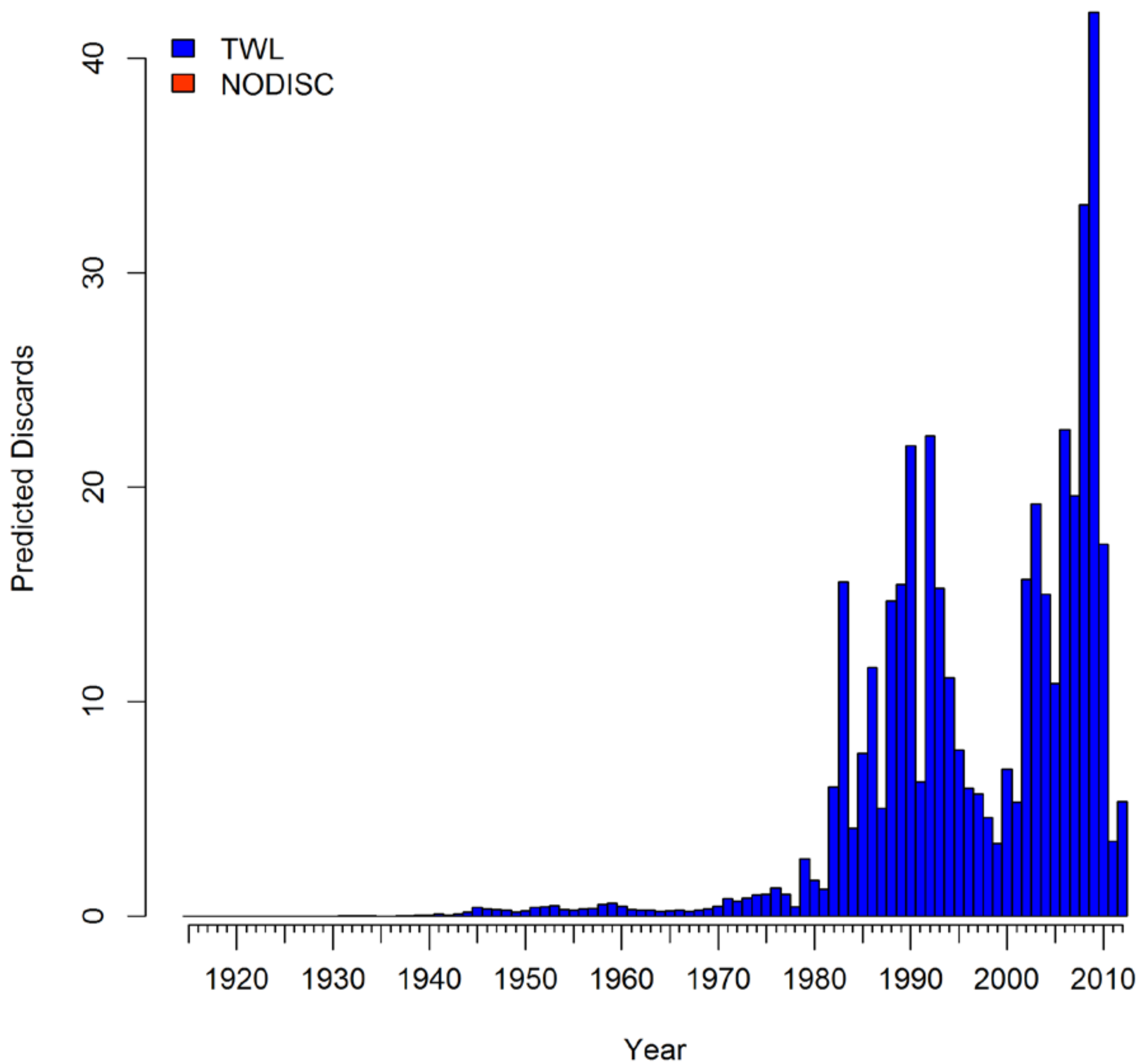


Figure 29. Base case model predicted discards of aurora rockfish by sector. TWL= trawl fleet. NODISC= Bycatch and full retention fleet.

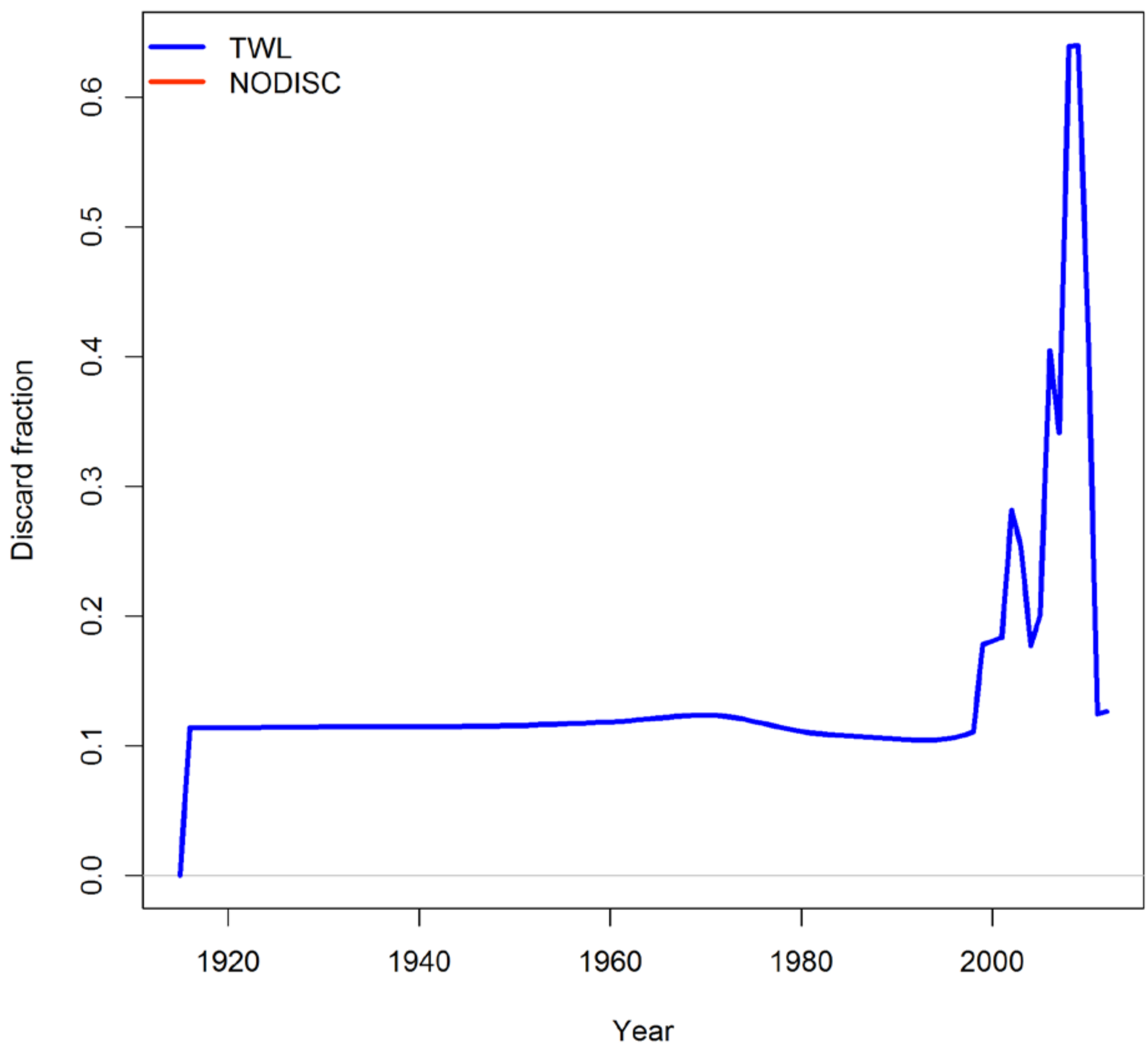
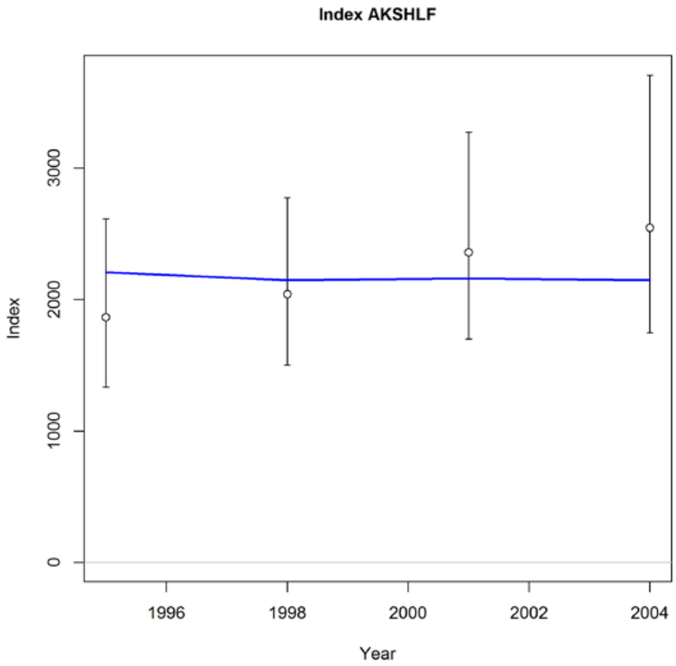


Figure 30. Discards fraction of aurora rockfish by sector used in the base case model. TWL= trawl fleet. NODISC= Bycatch and full retention fleet.

9.3.1.2 Abundance indices



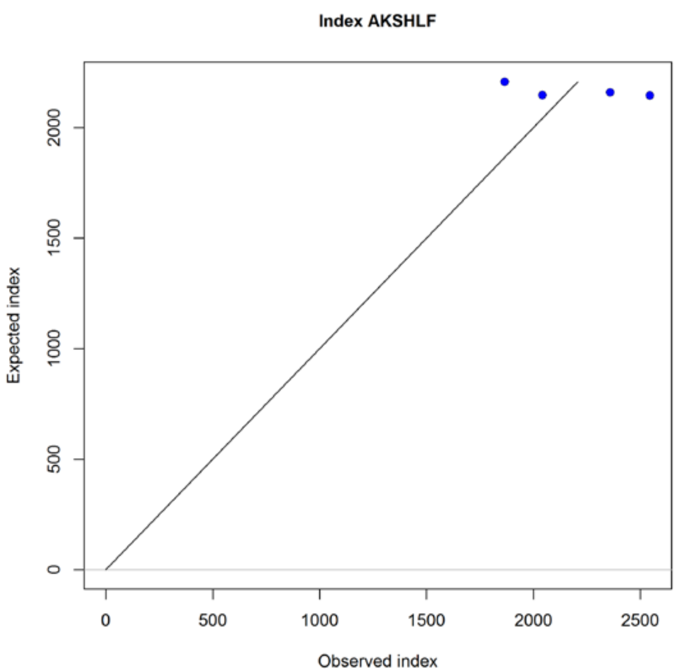


Figure 31. Top panel: Base case model fit (solid blue line) to the AFSC triennial survey data (points with vertical lines indicating 95% CIs). Bottom panel: 1:1 observed to model expectations of said survey values.

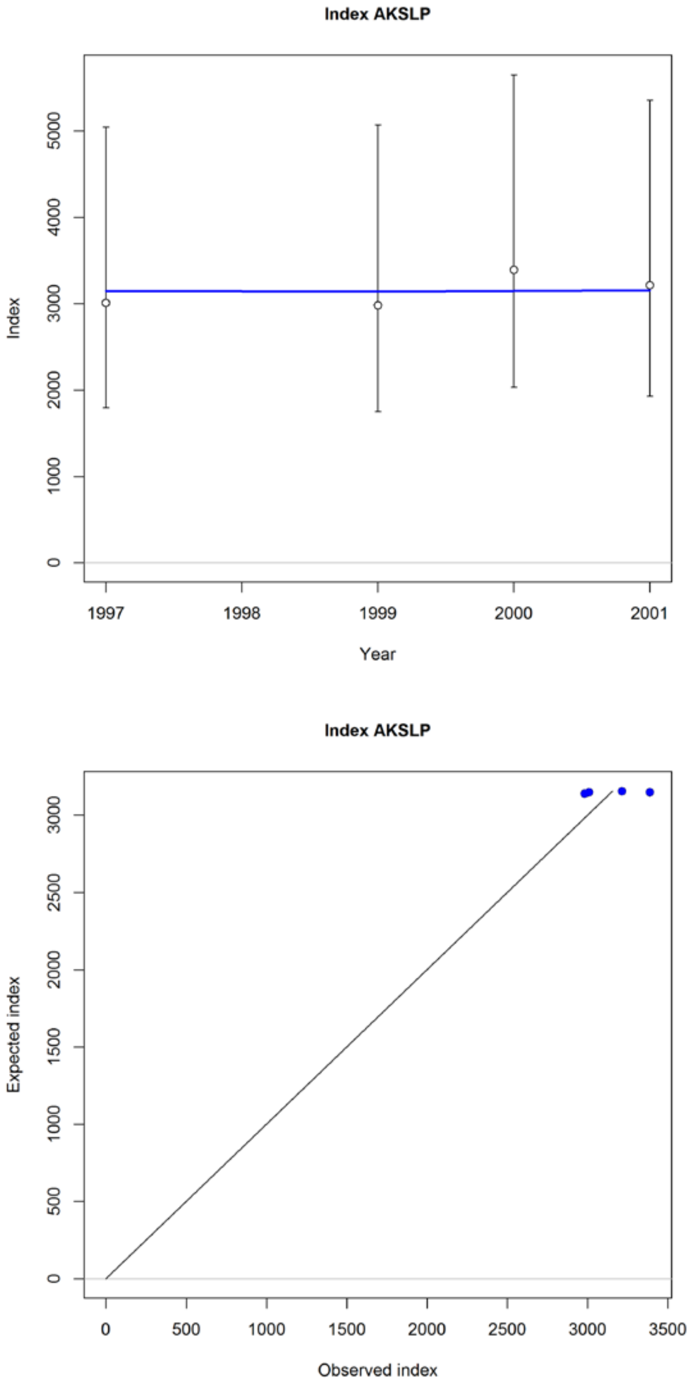
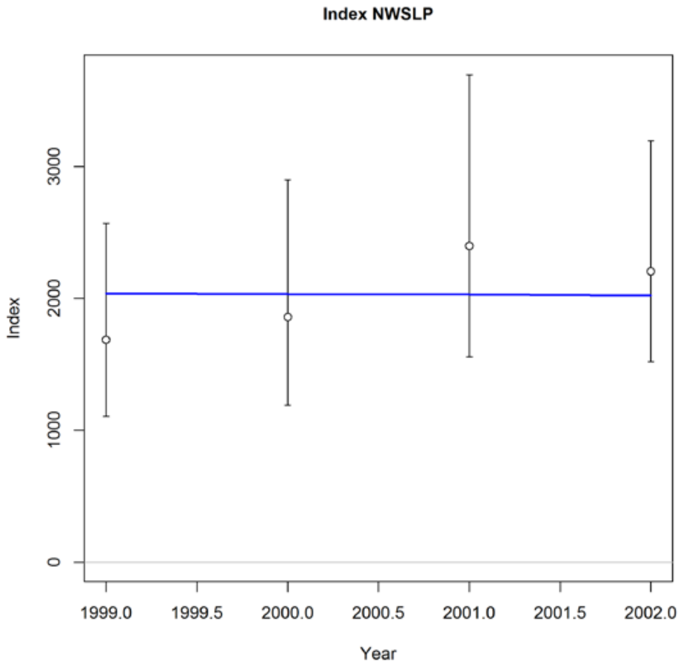


Figure 32. Top panel: Base case model fit (solid blue line) to the AFSC slope survey data (points with vertical lines indicating 95% CIs). Bottom panel: 1:1 observed to model expectations of said survey values.



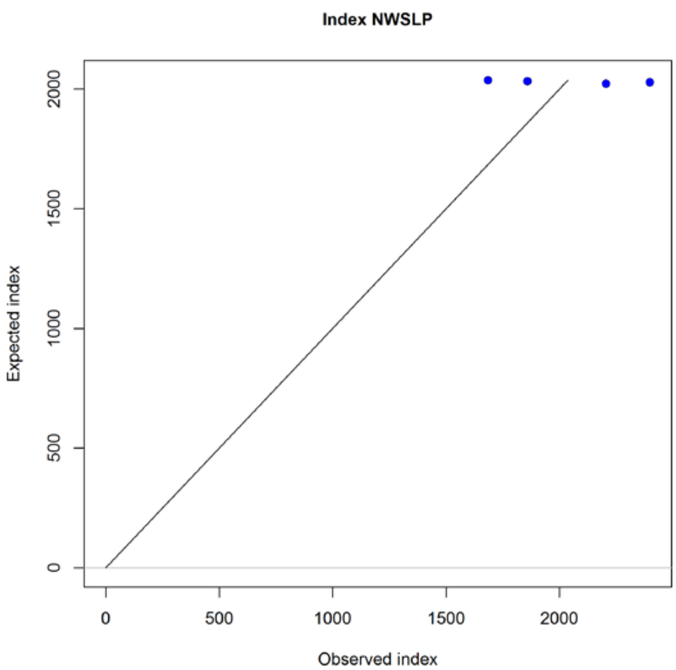


Figure 33. Top panel: Base case model fit (solid blue line) to the NWFSC slope survey data (points with vertical lines indicating 95% CIs). Bottom panel: 1:1 observed to model expectations of said survey values.

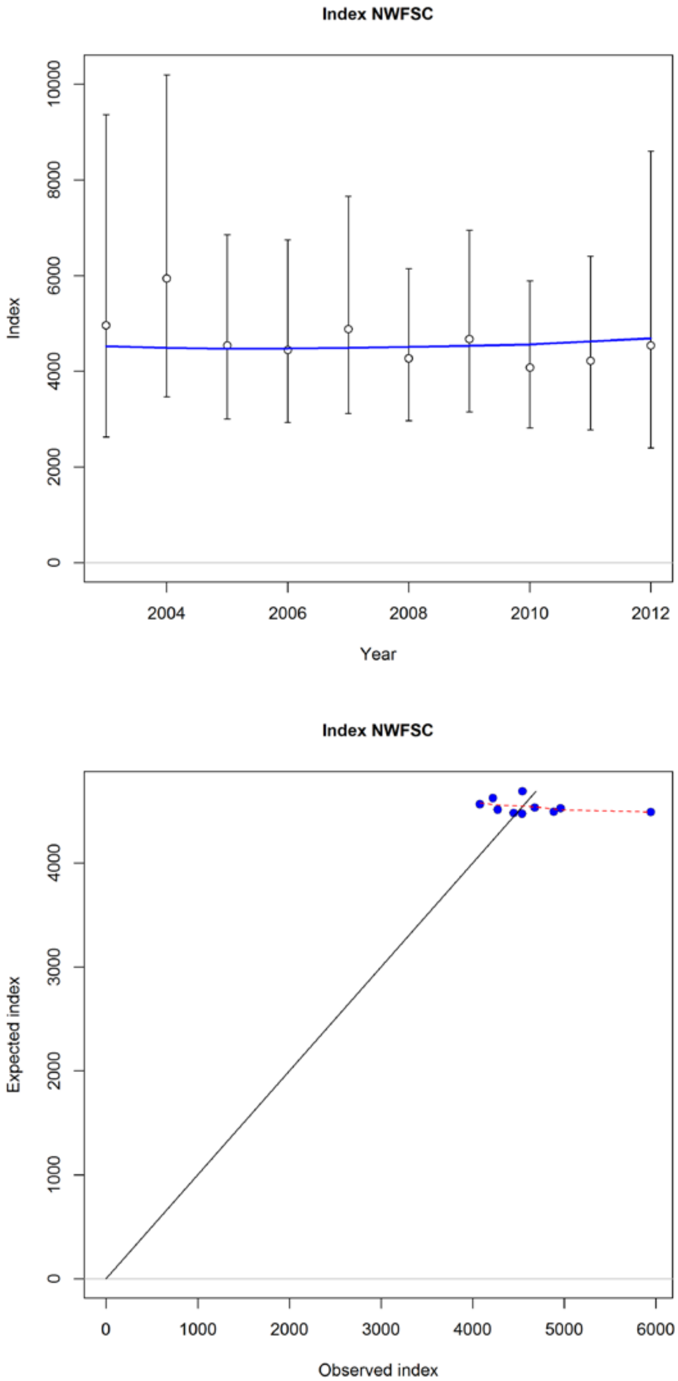


Figure 34. Base case model fit (solid blue line) to the NWFSC shelf-slope survey data (points with vertical lines indicating 95% CIs). Bottom panel: 1:1 observed to model expectations of said survey values.

9.3.1.3 Length compositions

9.3.1.3.1 Fits

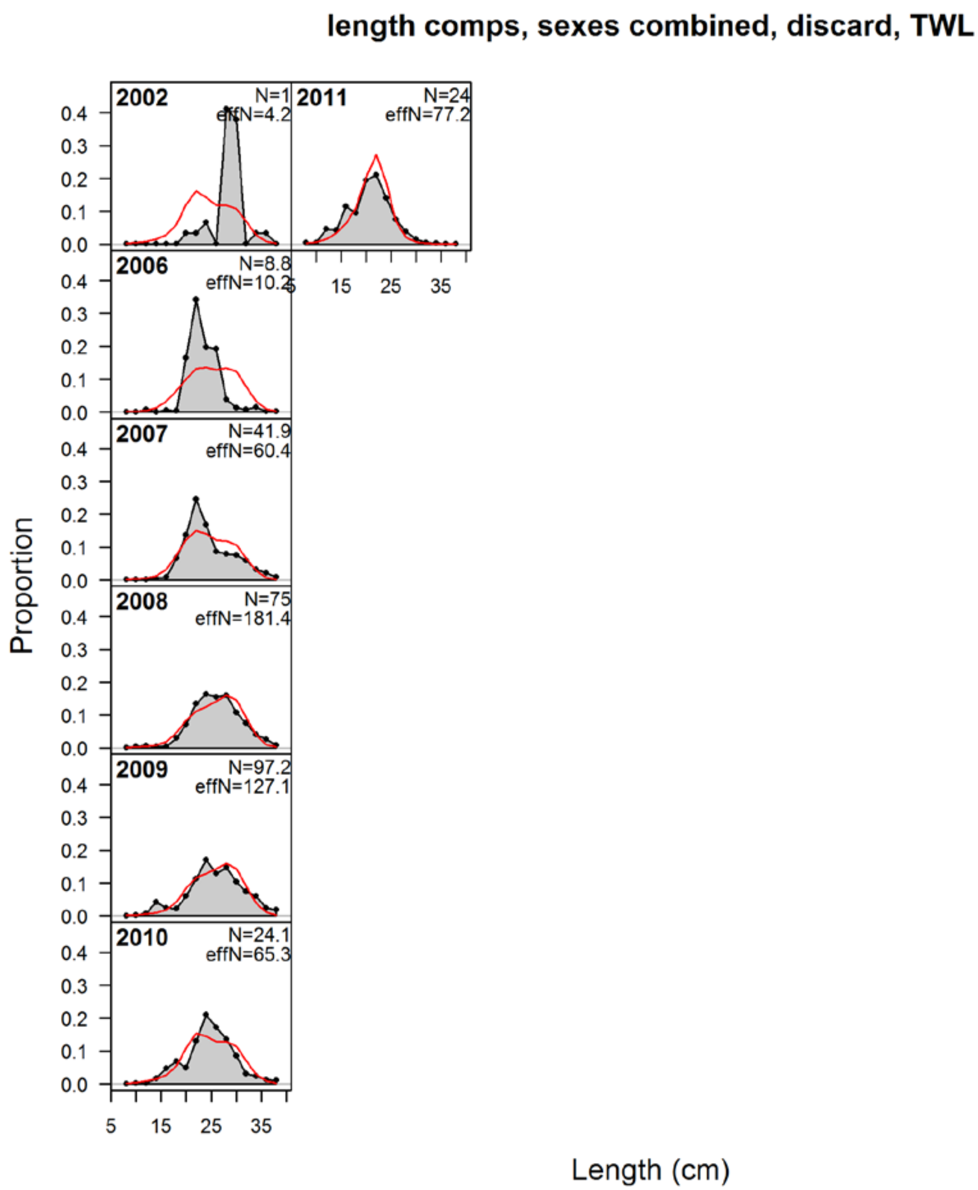


Figure 35. Base case fits to the trawl fleet discard combined-sex length composition data for aurora rockfish.

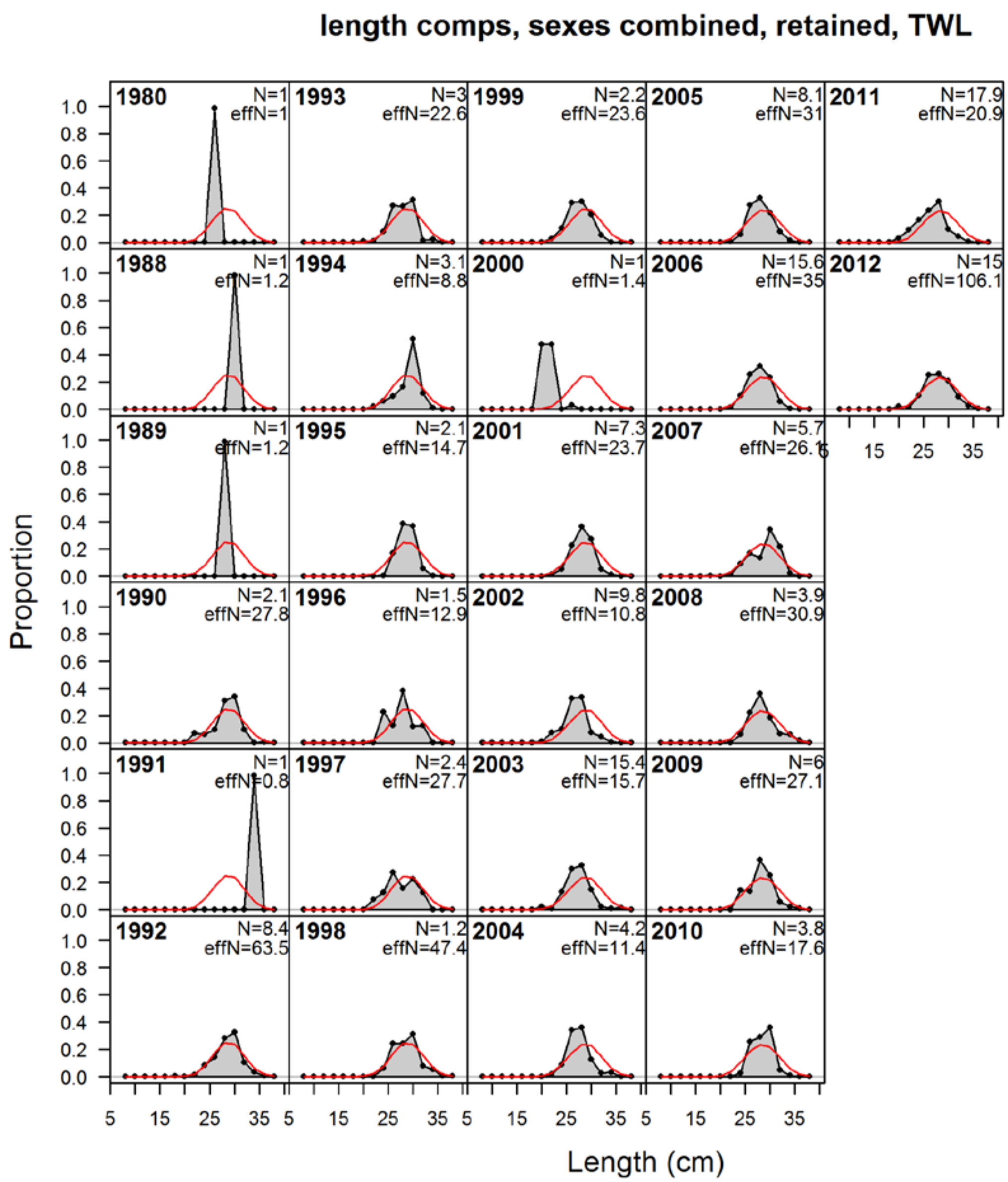


Figure 36. Base case fits to the trawl fleet retained combined-sex length composition data for aurora rockfish.

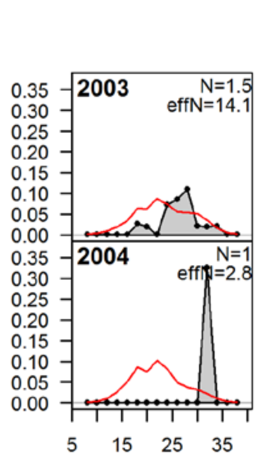


Figure 37 Base case fits to the trawl fleet discard female length composition data for aurora rockfish.

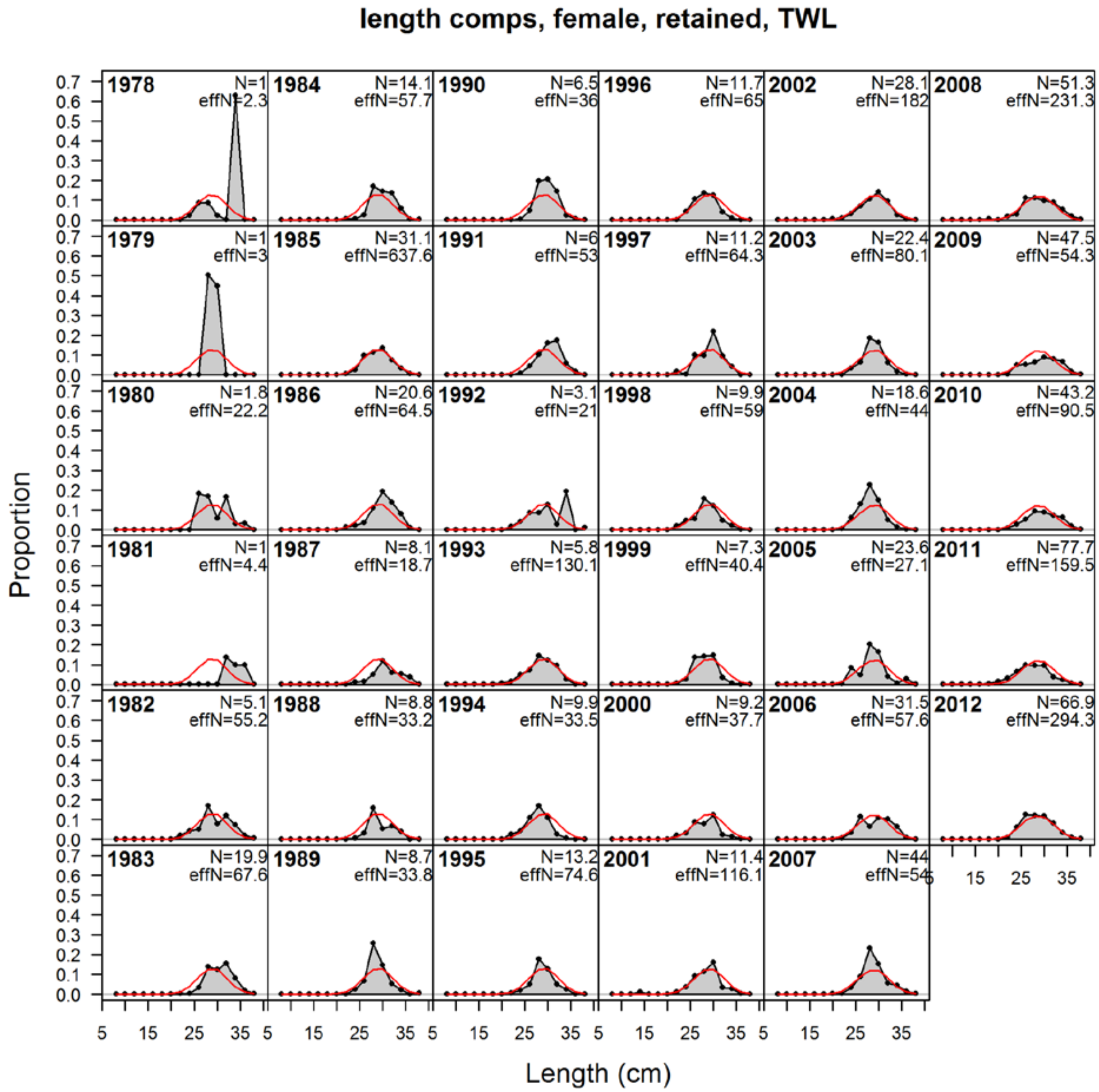


Figure 38. Base case fits to the trawl fleet retained female length composition data for aurora rockfish.

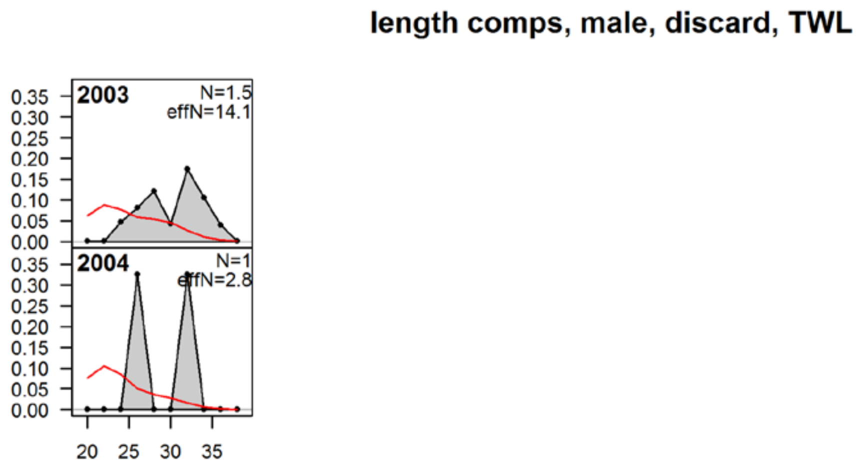


Figure 39. Base case fits to the trawl fleet discard male length composition data for aurora rockfish.

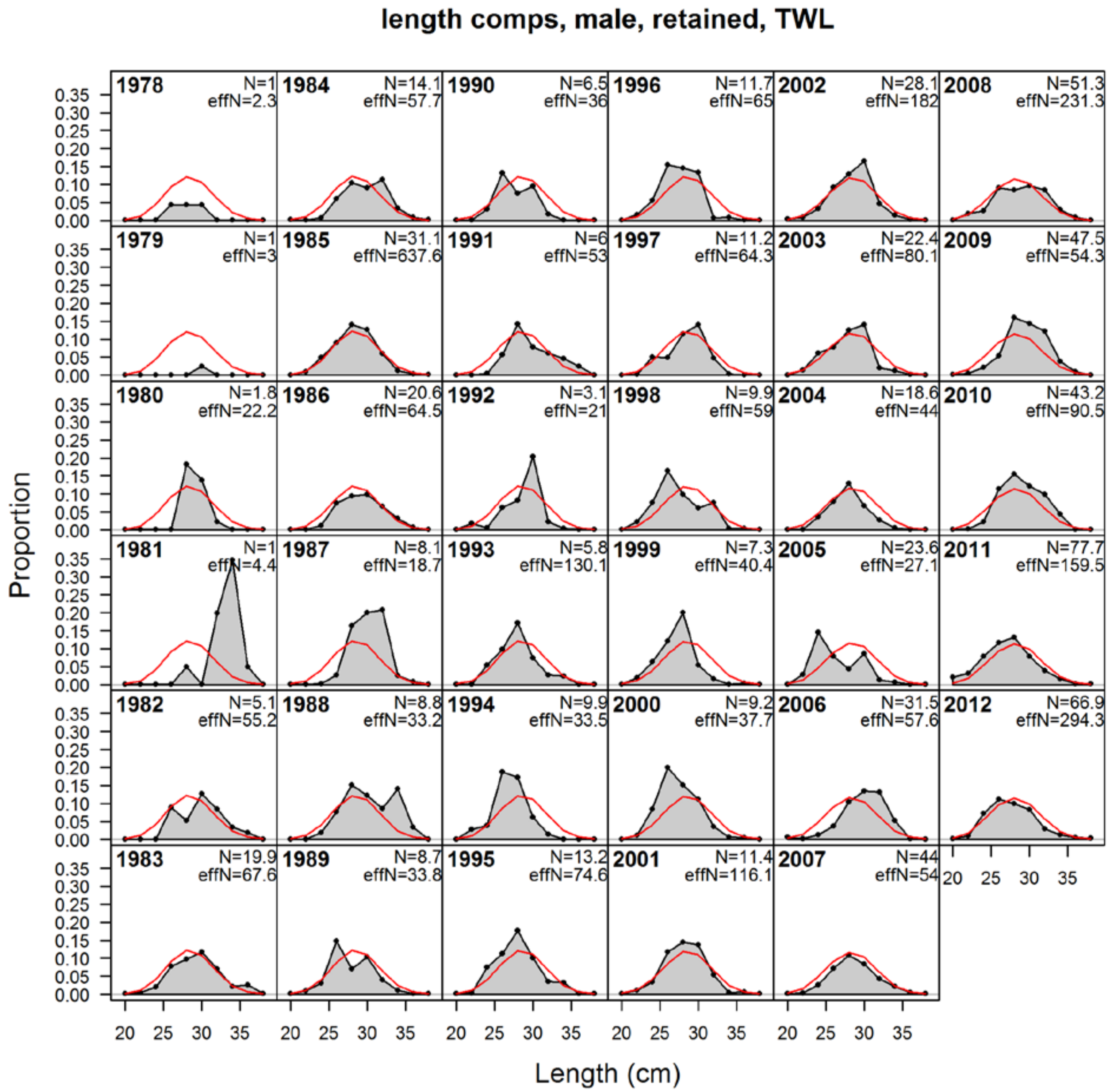


Figure 40. Base case fits to the trawl fleet retained male length composition data for aurora rockfish.

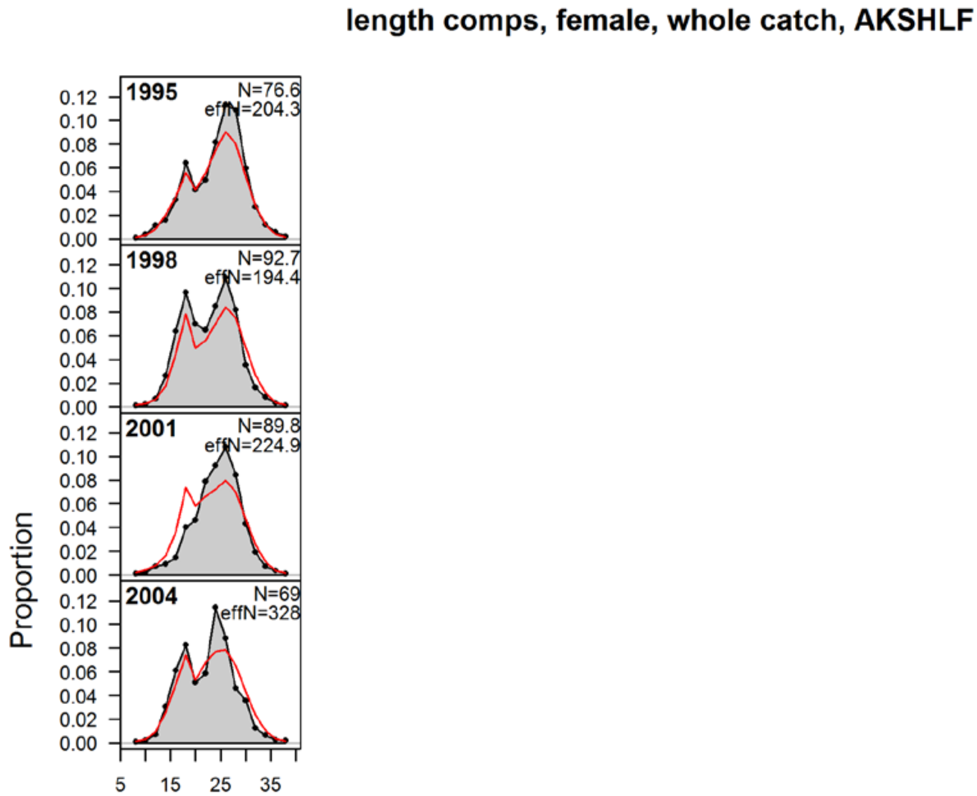


Figure 41. Base case fits to the AFSC triennial survey female length composition data for aurora rockfish.

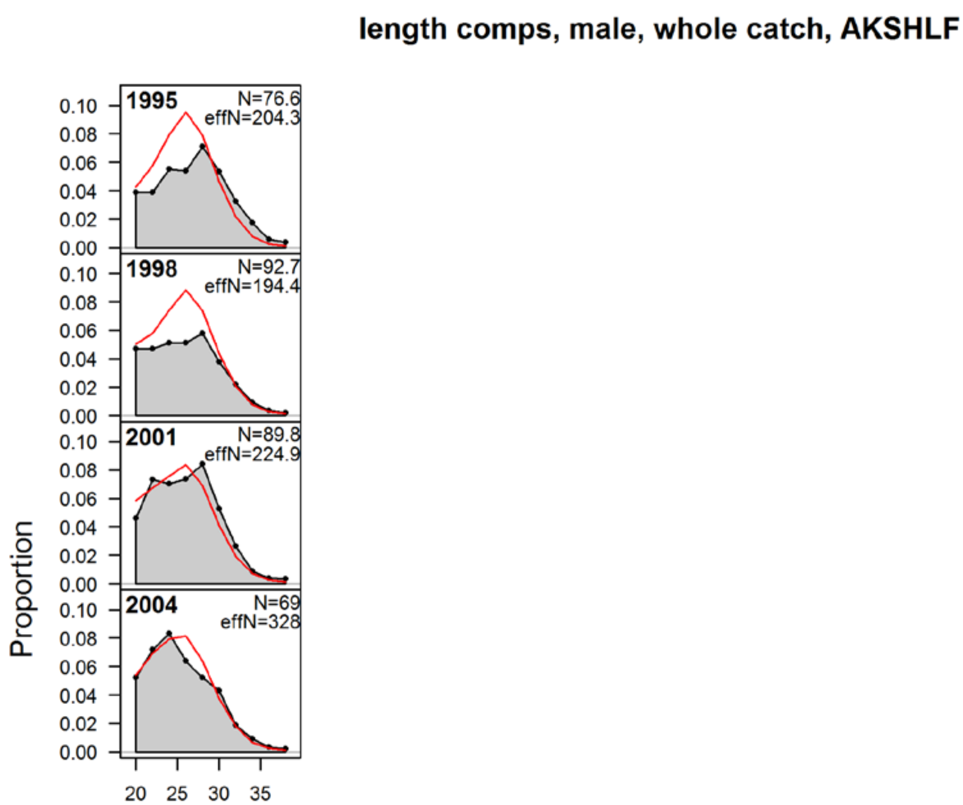


Figure 42. Base case fits to the AFSC triennial survey male length composition data for aurora rockfish.

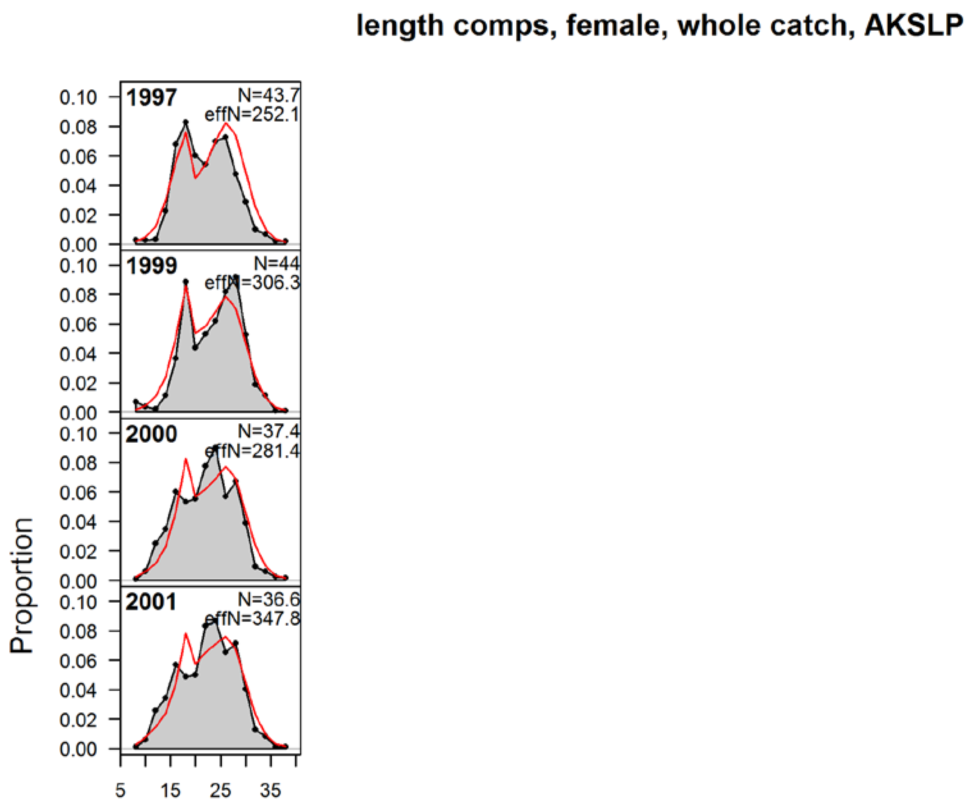


Figure 43. Base case fits to the AFSC slope survey female length composition data for aurora rockfish.

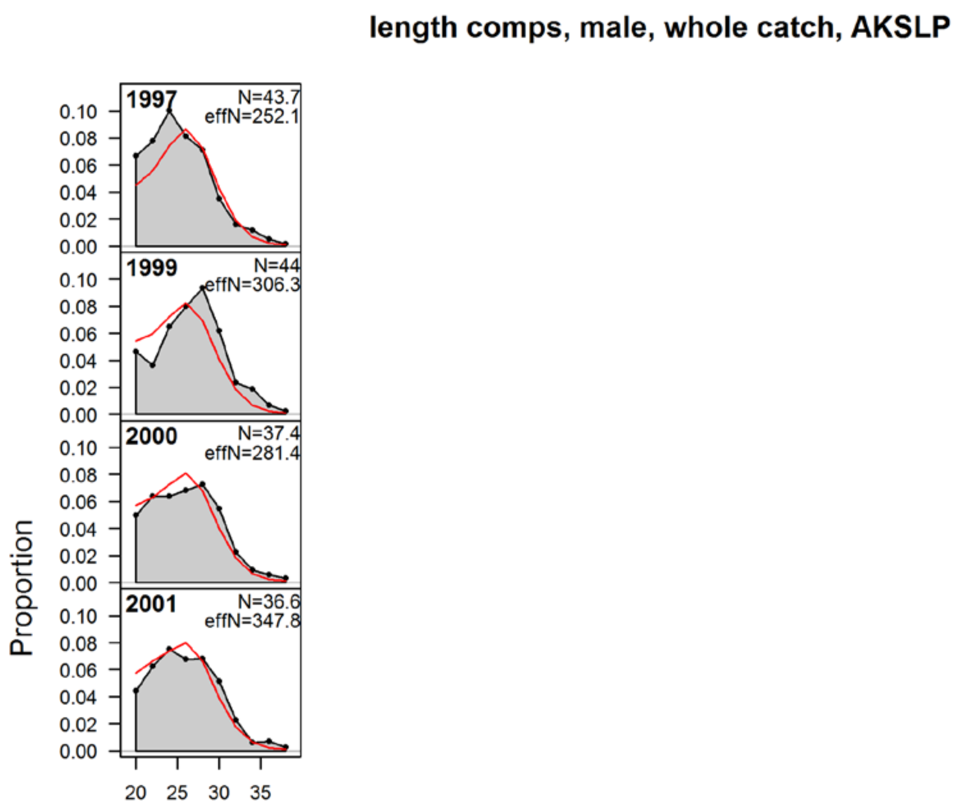


Figure 44. Base case fits to the AFSC slope survey male length composition data for aurora rockfish.

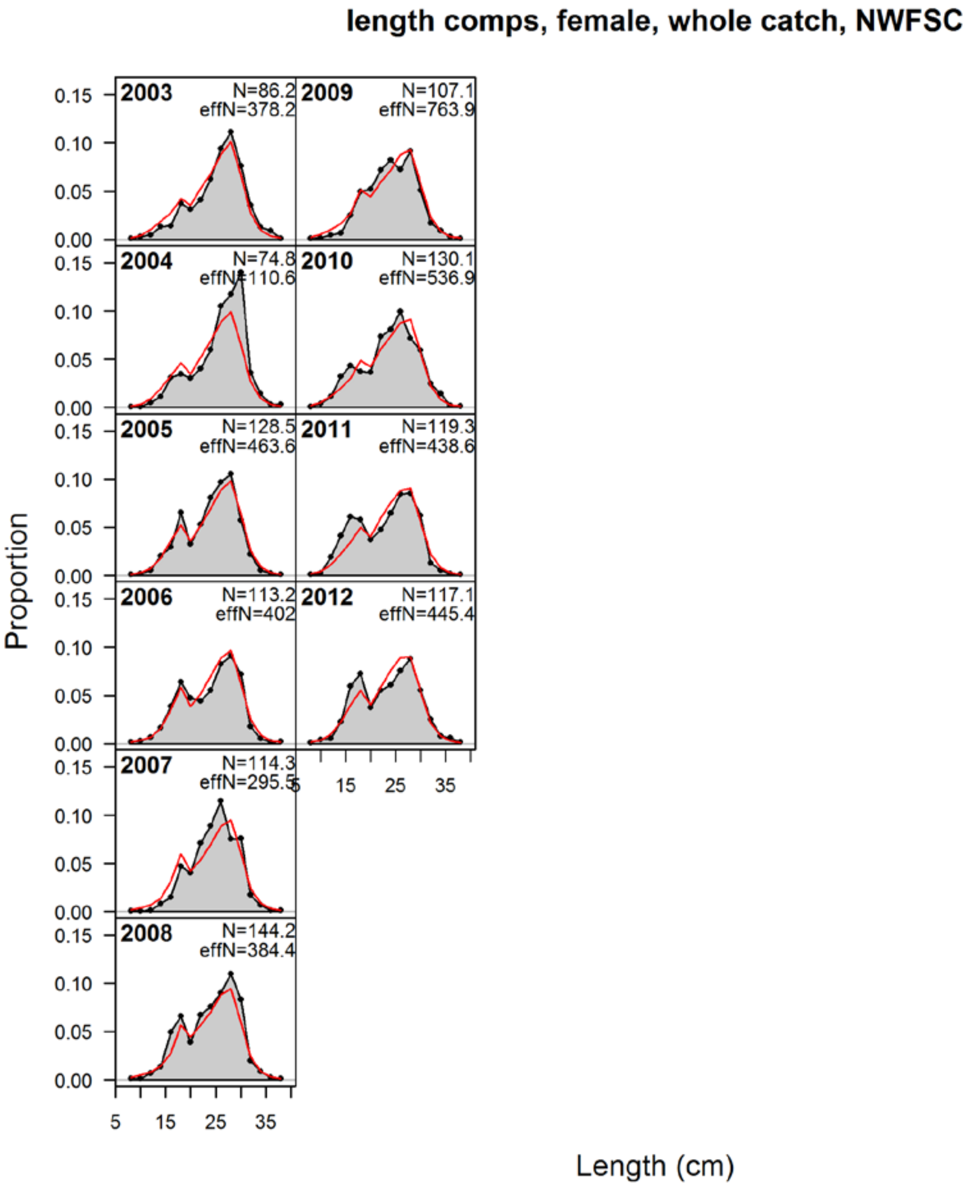


Figure 45. Base case fits to the NWFSC shelf-slope survey female length composition data for aurora rockfish.

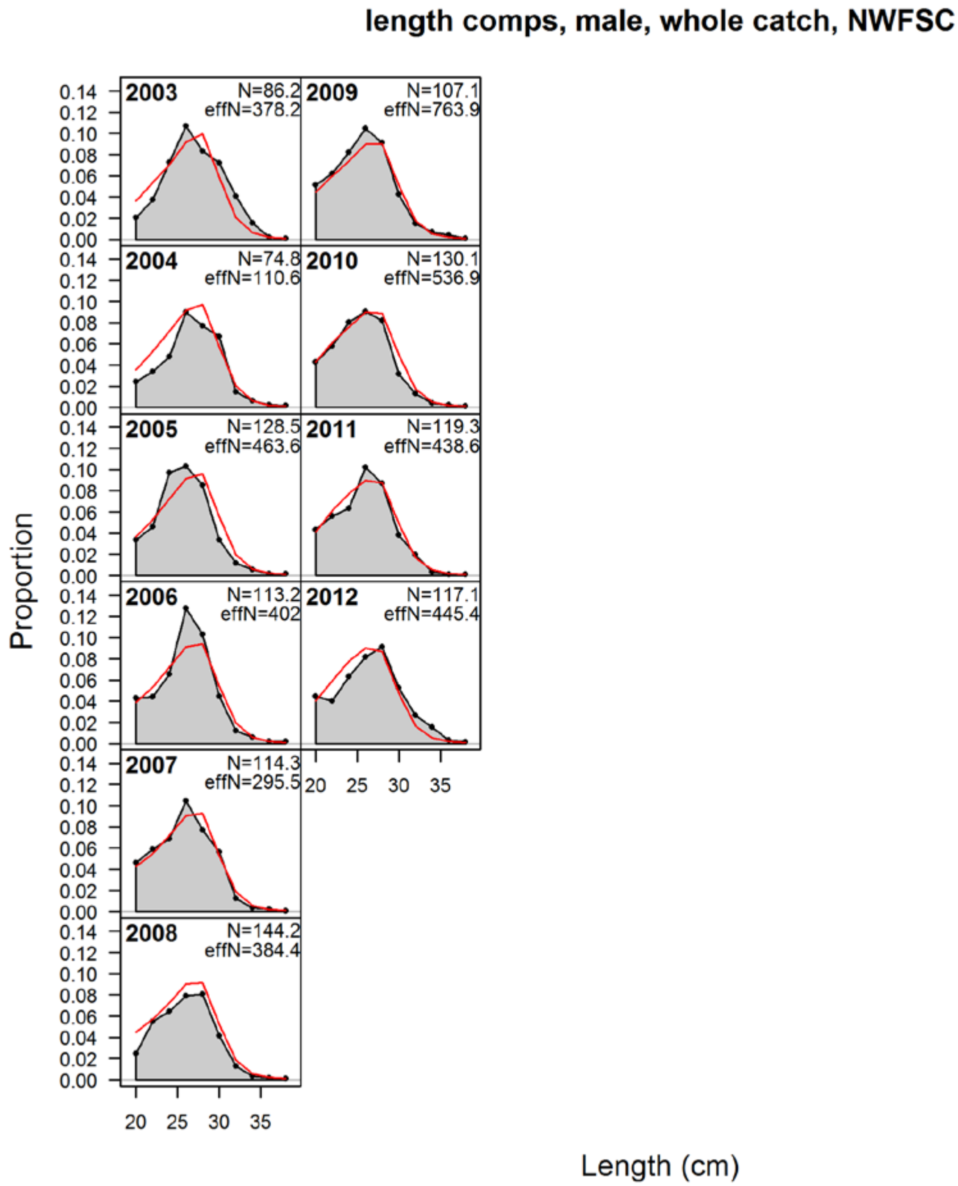


Figure 46. Base case fits to the NWFSC shelf-slope survey male length composition data for aurora rockfish.

9.3.1.3.2 Residuals: Discards

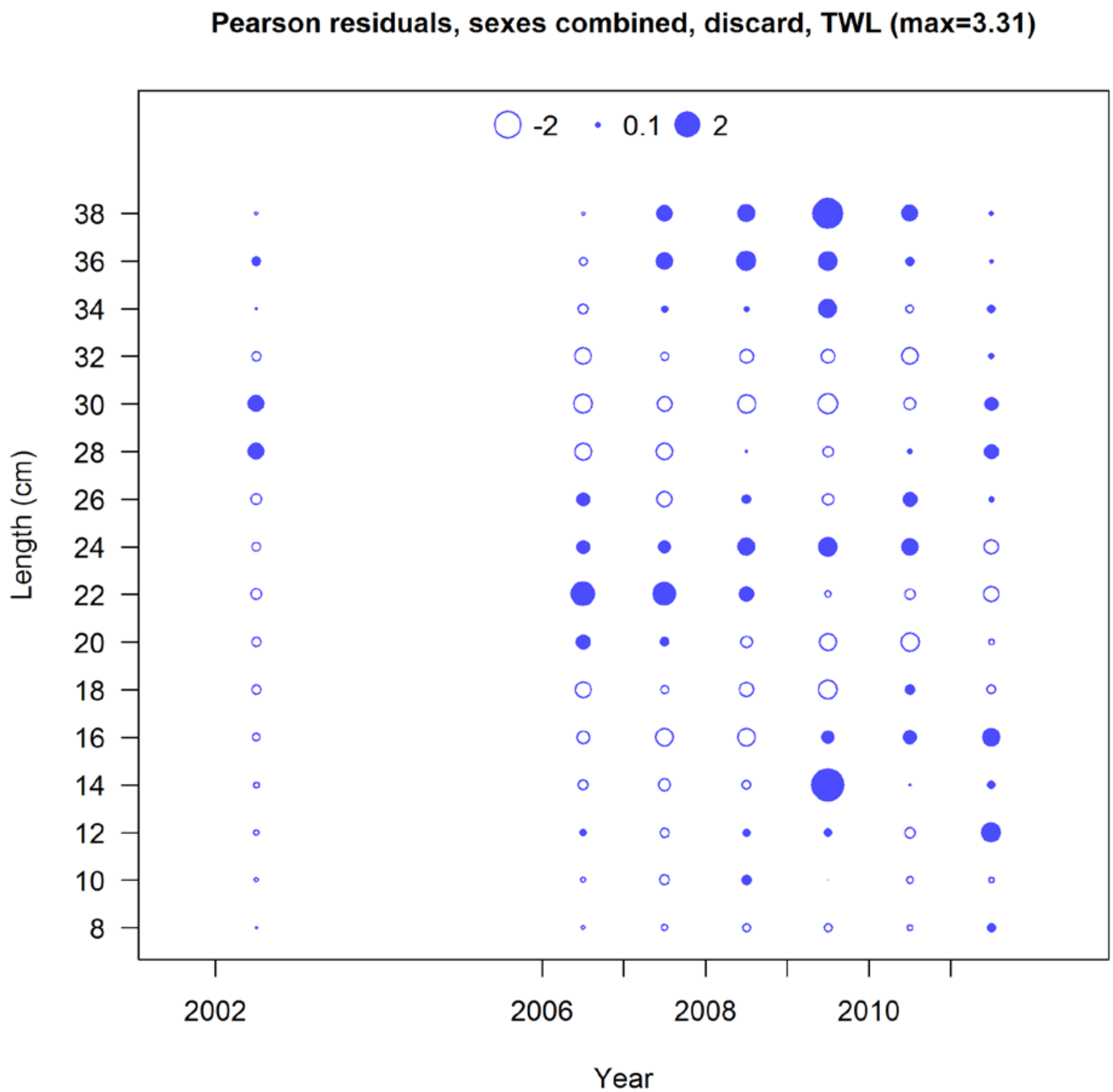


Figure 47. Residual plots to the trawl fleet combined-sex discard length composition fits.

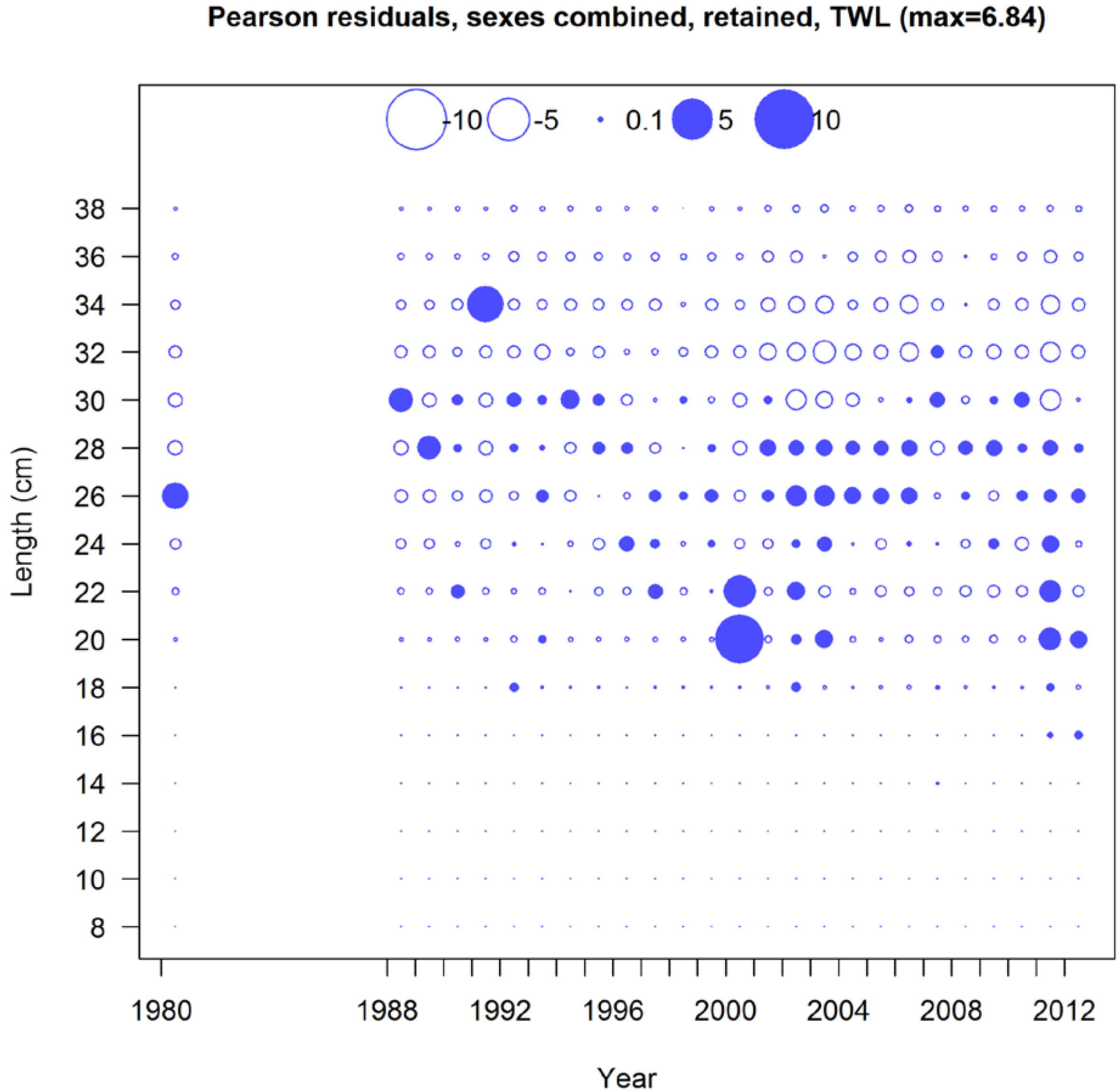


Figure 48. Residual plots to the trawl fleet combined-sex retained length composition fits.

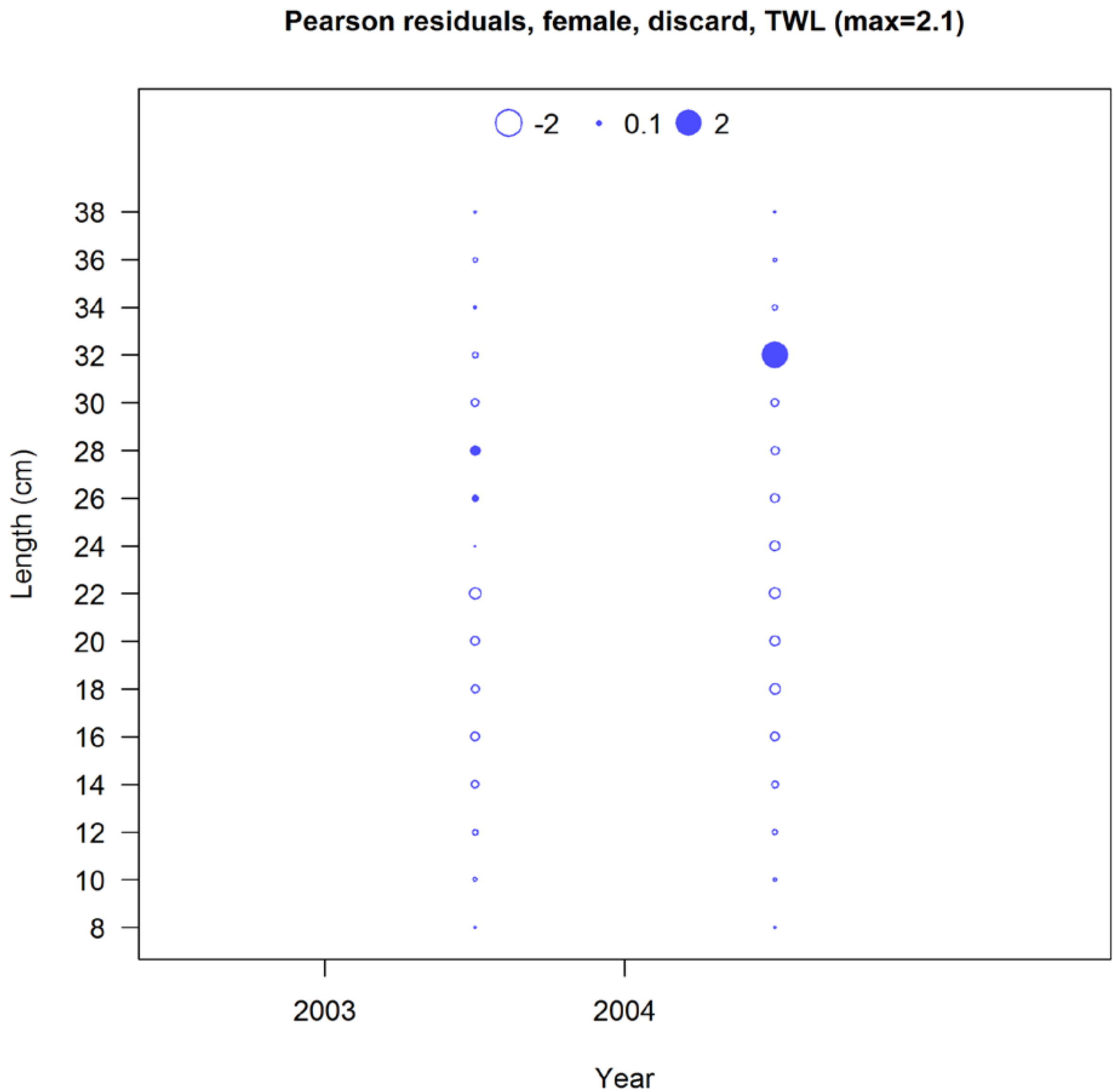


Figure 49. Residual plots to the trawl fleet female discard length composition fits.

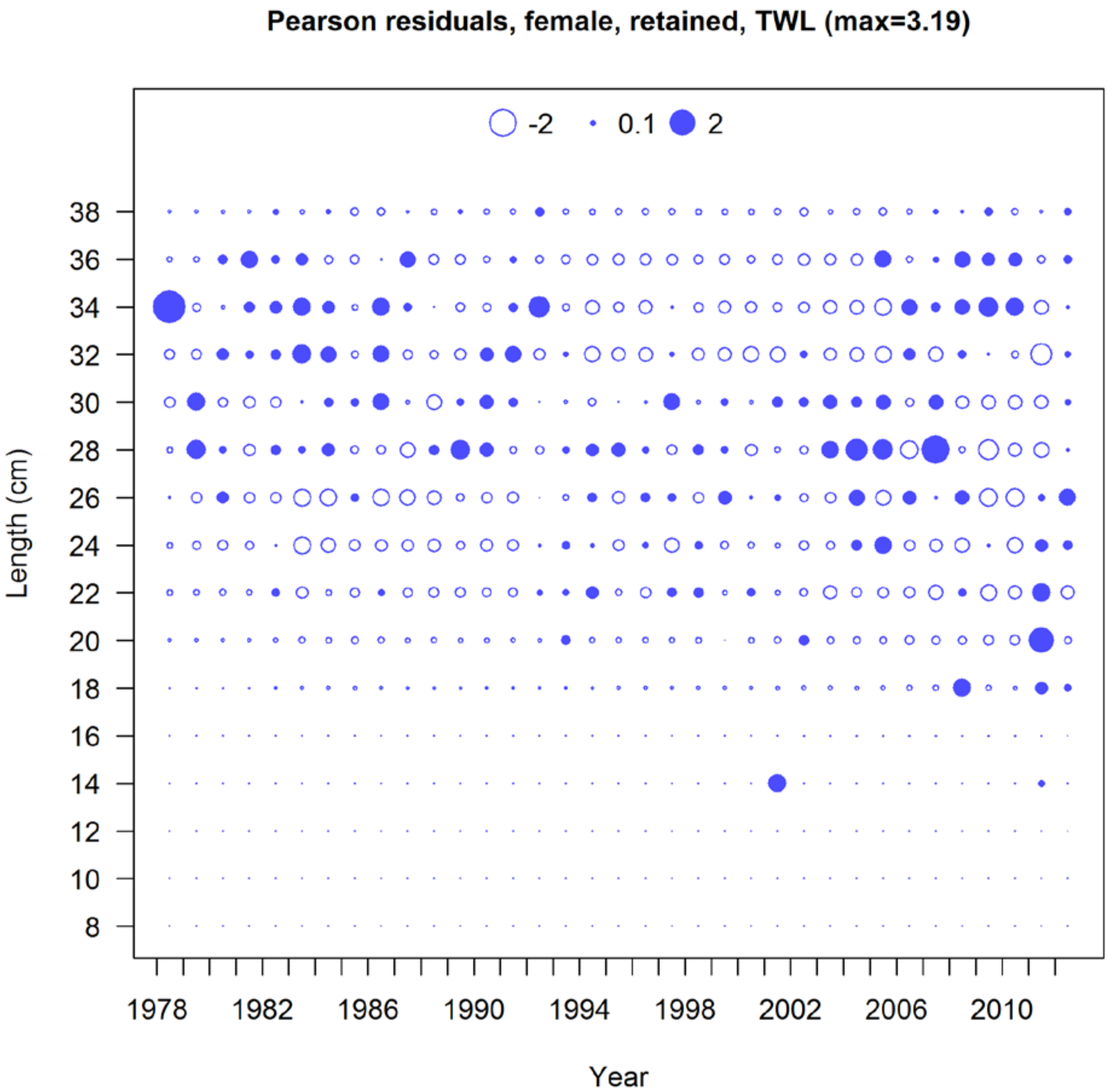


Figure 50. Residual plots to the trawl fleet female retained length composition fits.

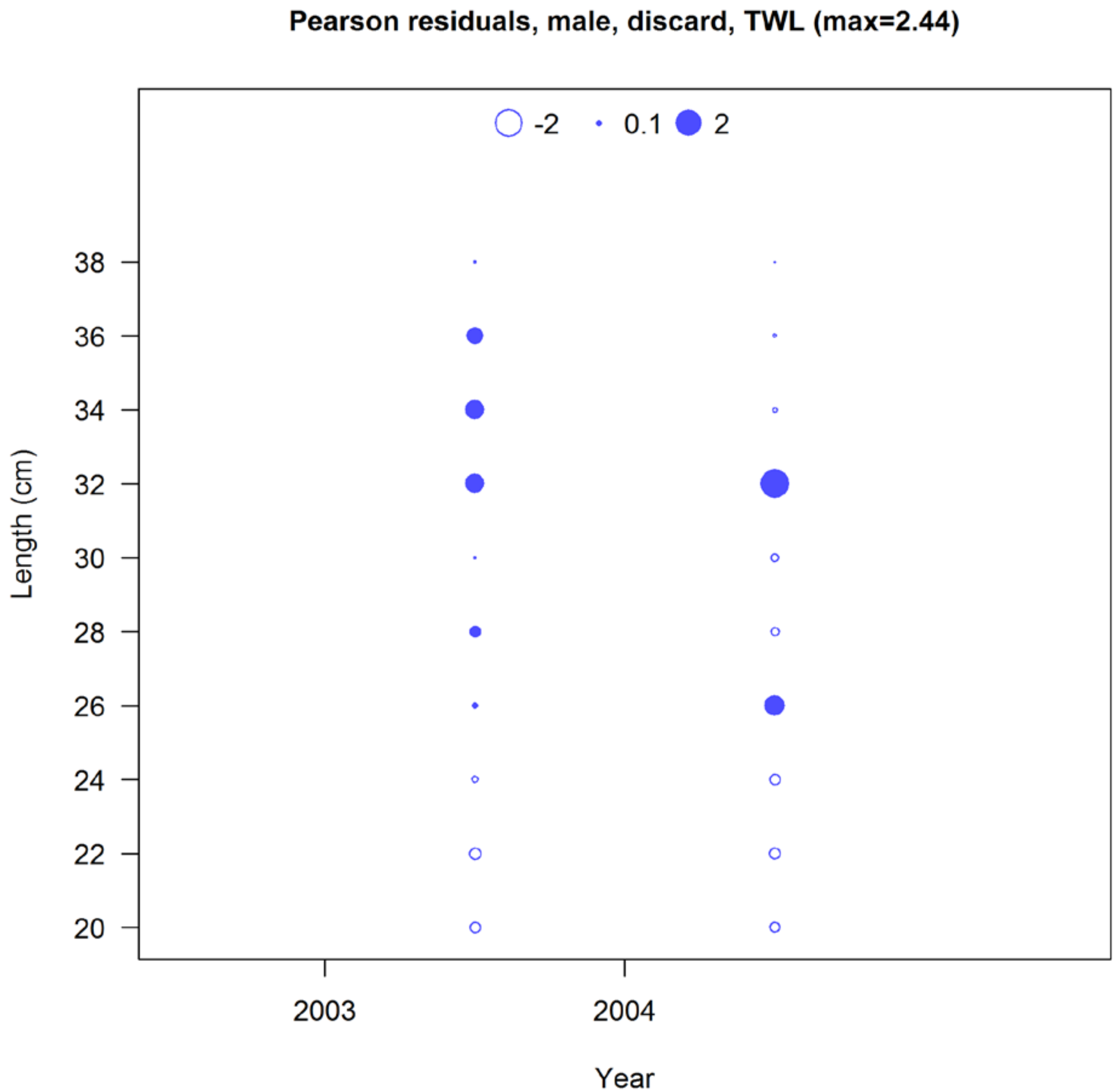


Figure 51. Residual plots to the trawl fleet male discard length composition fits.

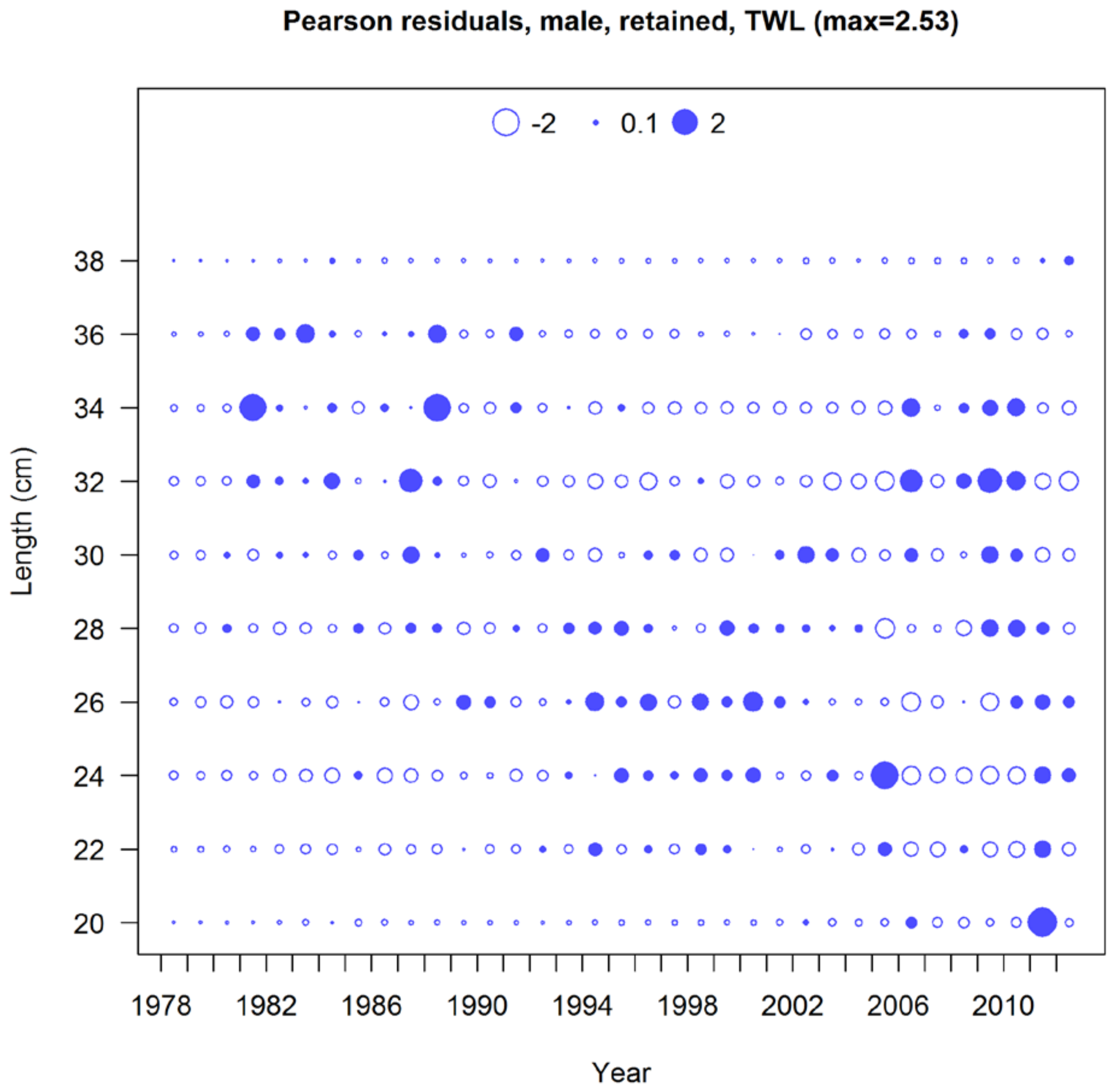


Figure 52. Residual plots to the trawl fleet male retained length composition fits.

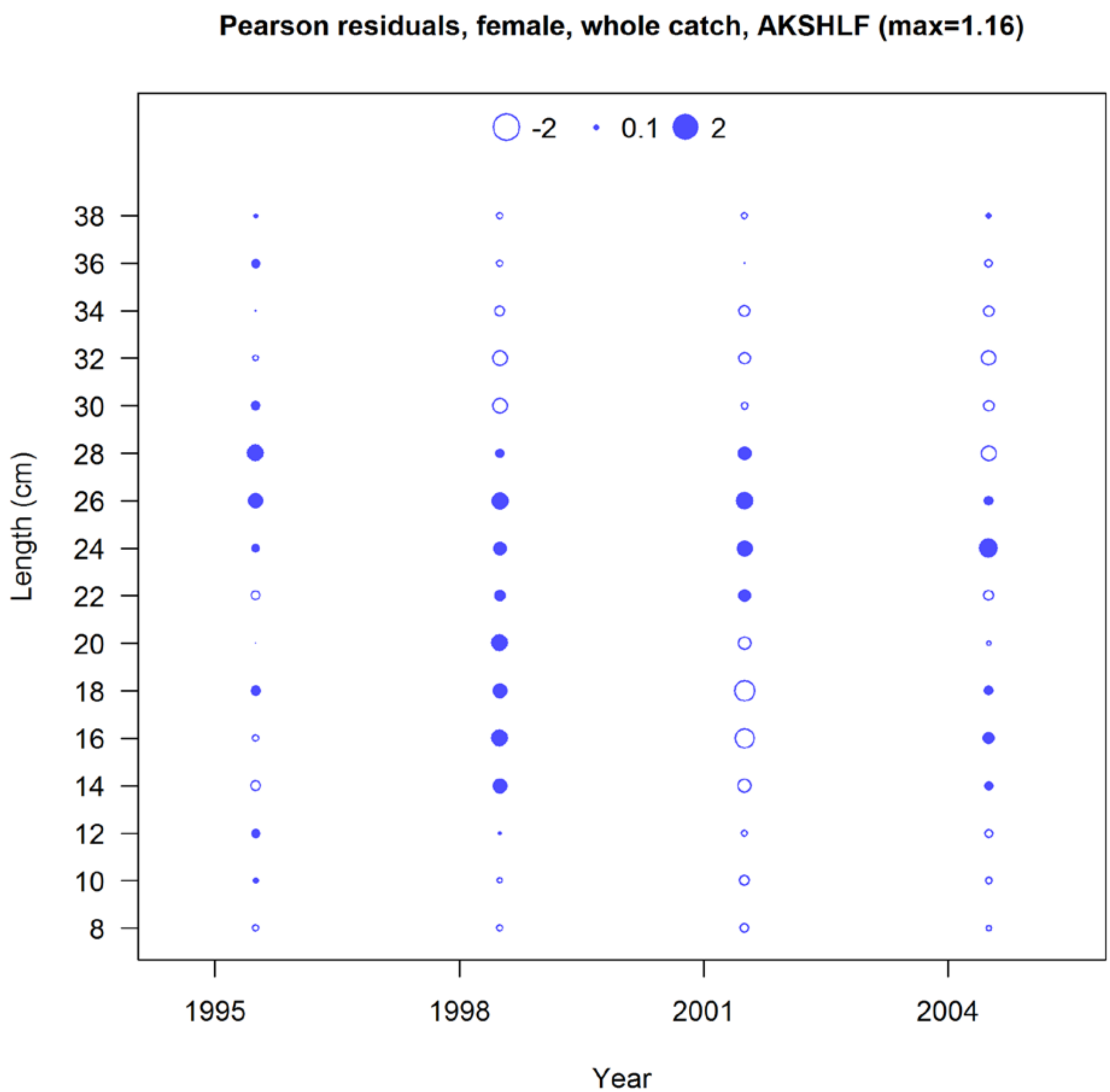


Figure 53. Residual plots to the AFSC triennial survey female length composition fits.

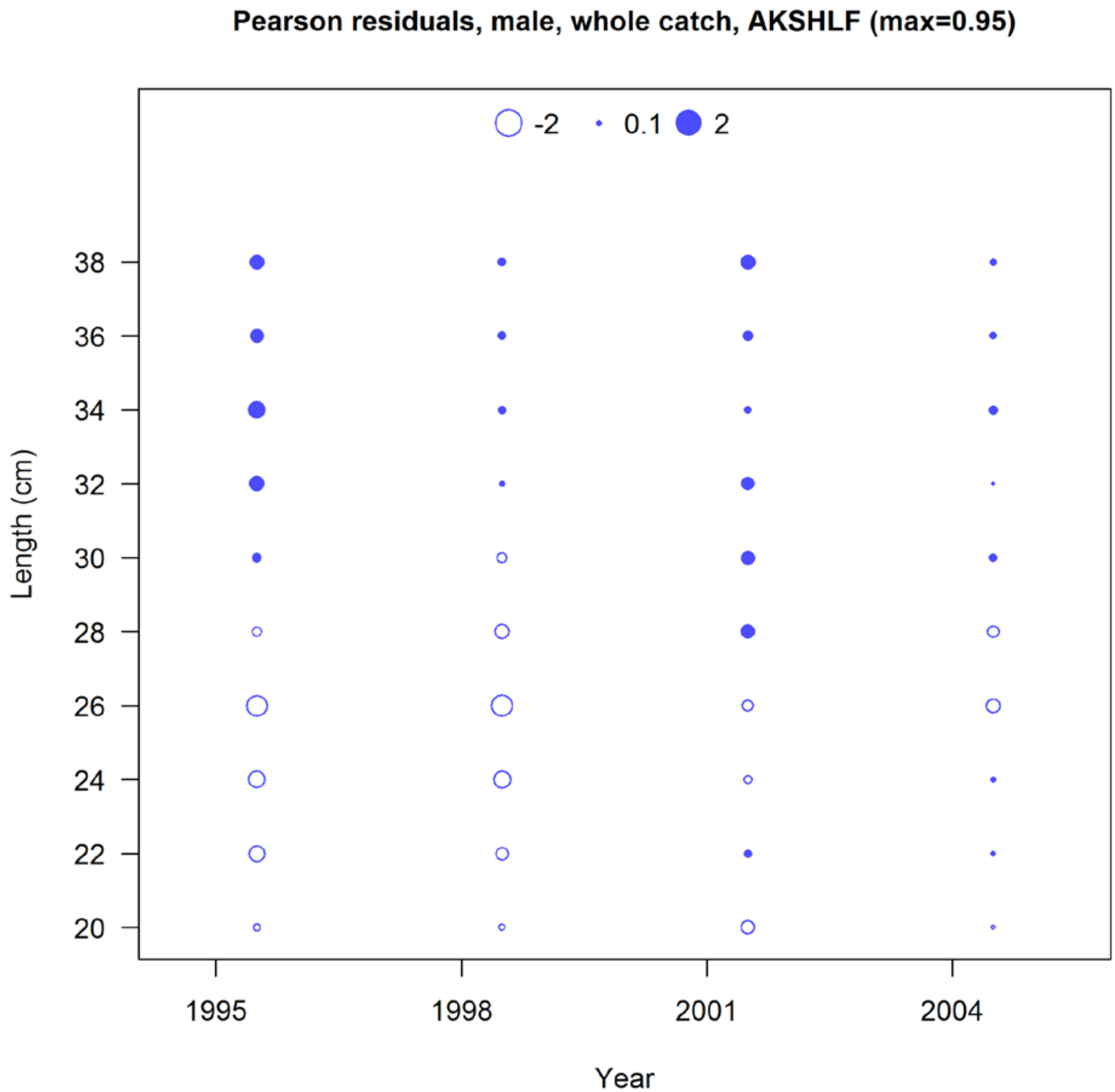


Figure 54. Residual plots to the AFSC triennial survey male length composition fits.

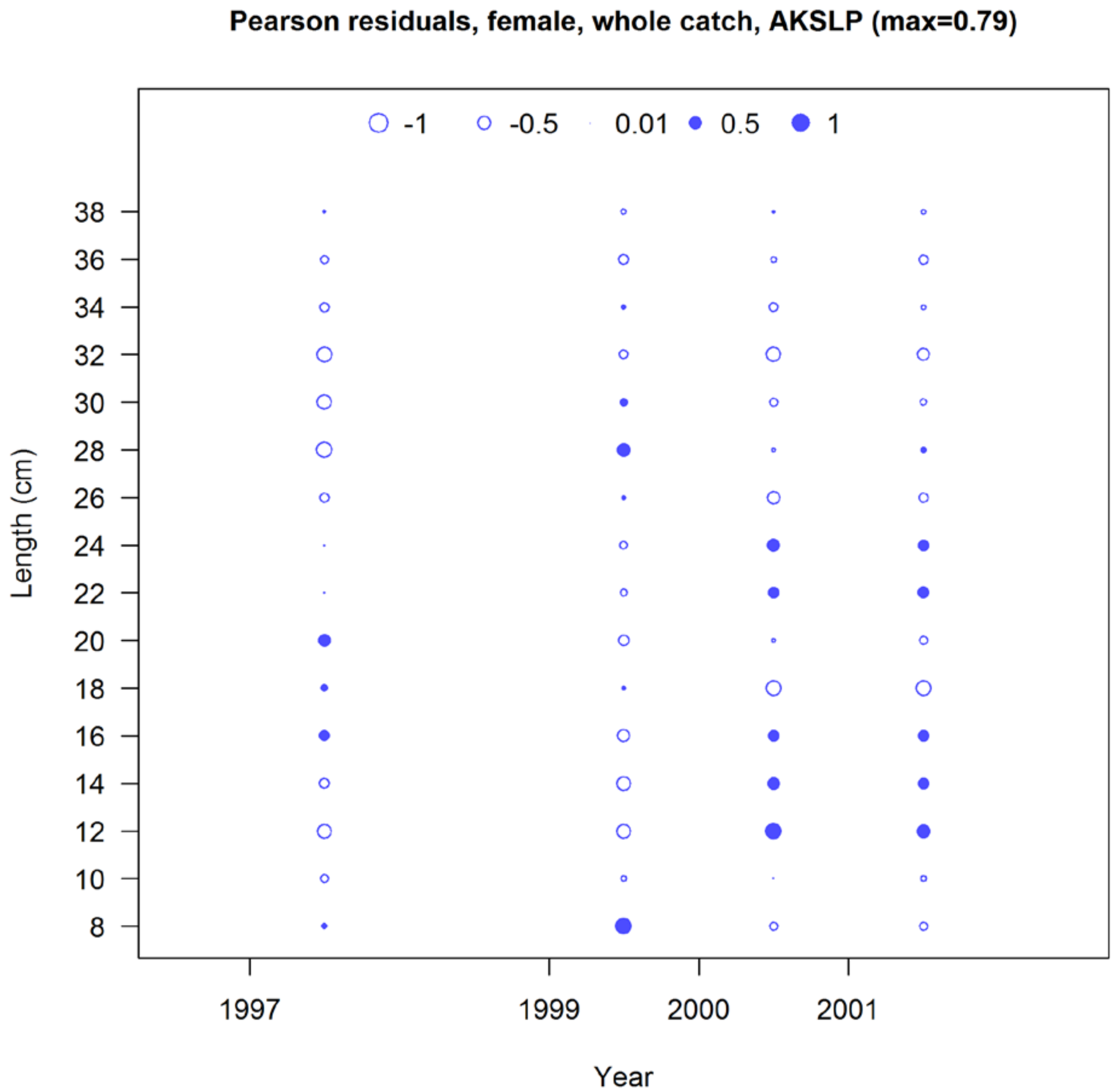


Figure 55. Residual plots to the AFSC slope survey female length composition fits.

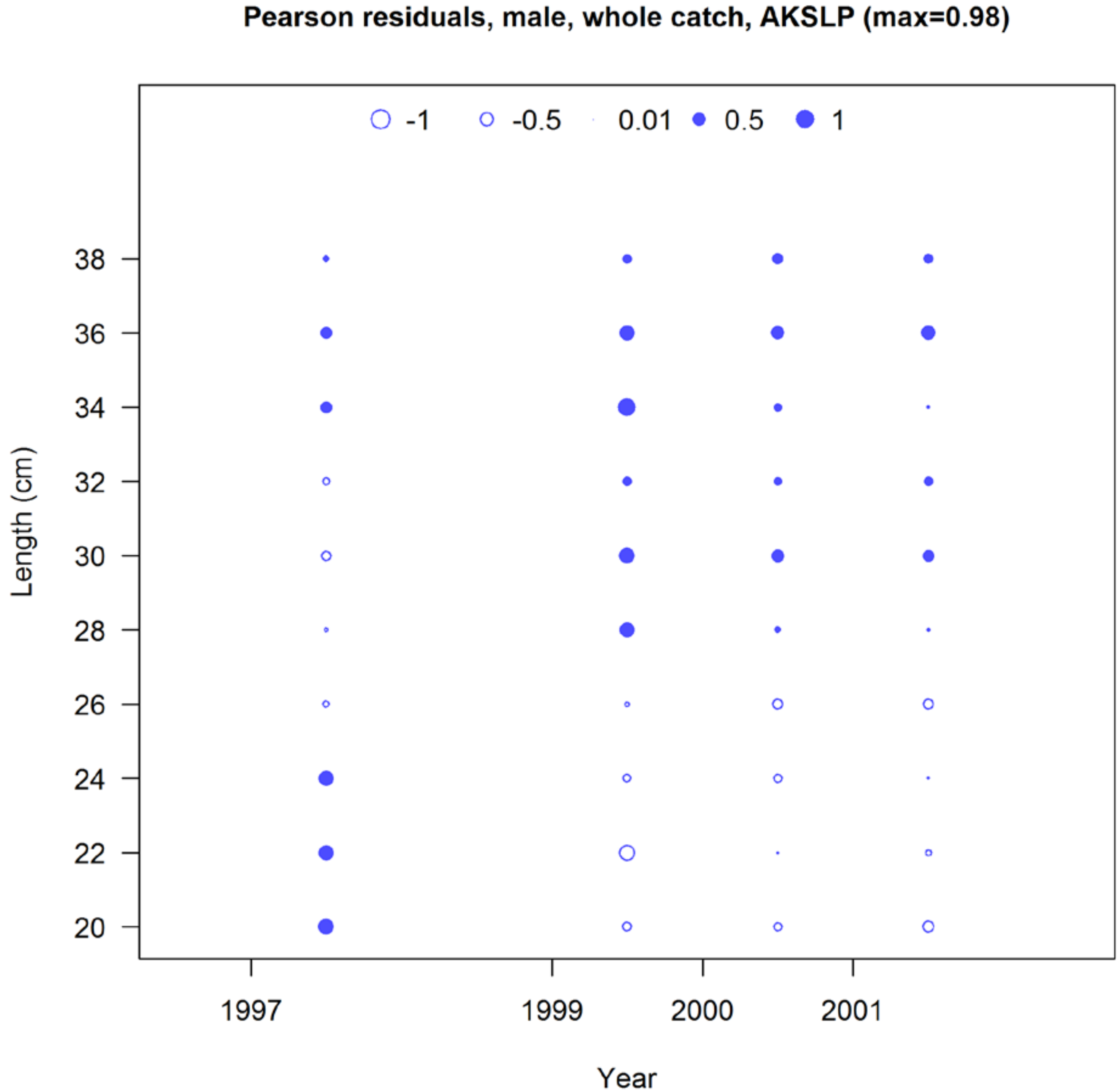


Figure 56. Residual plots to the AFSC slope survey male length composition fits.

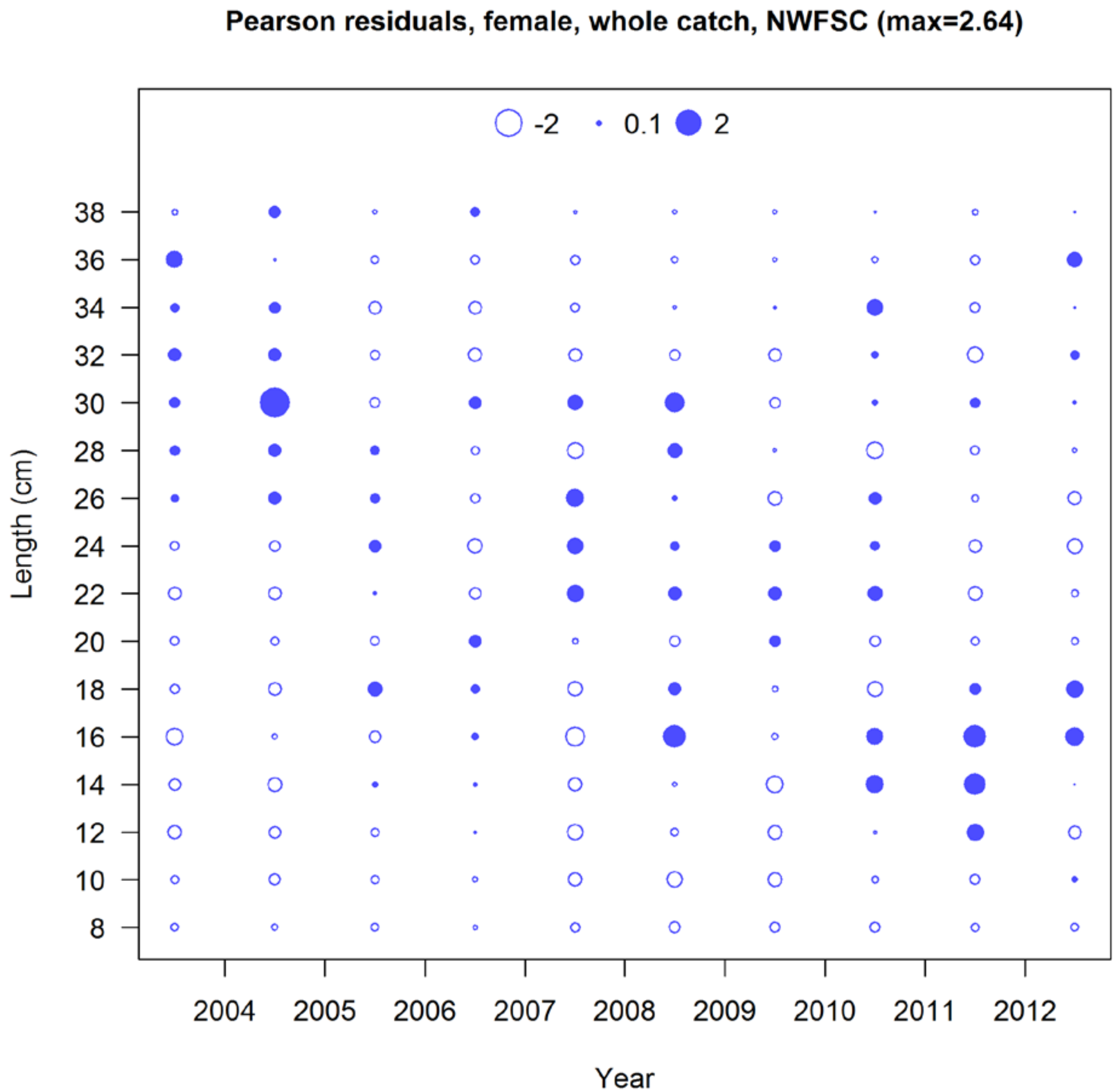


Figure 57. Residual plots to the NWFSC shelf-slope survey female length composition fits.

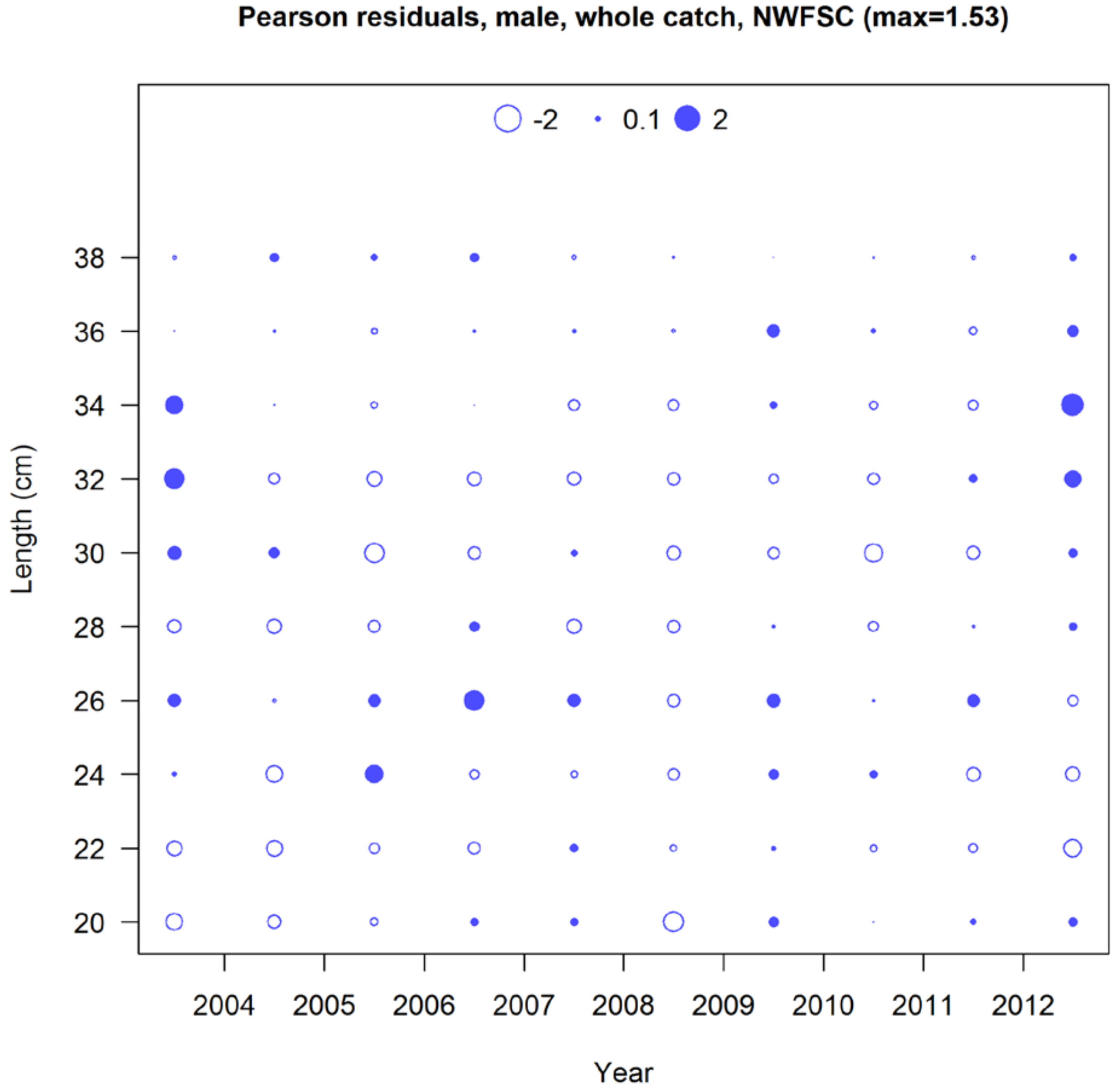


Figure 58. Residual plots to the NWFSC shelf-slope survey male length composition fits.

9.3.1.3.3 Effective sample sizes: Discards

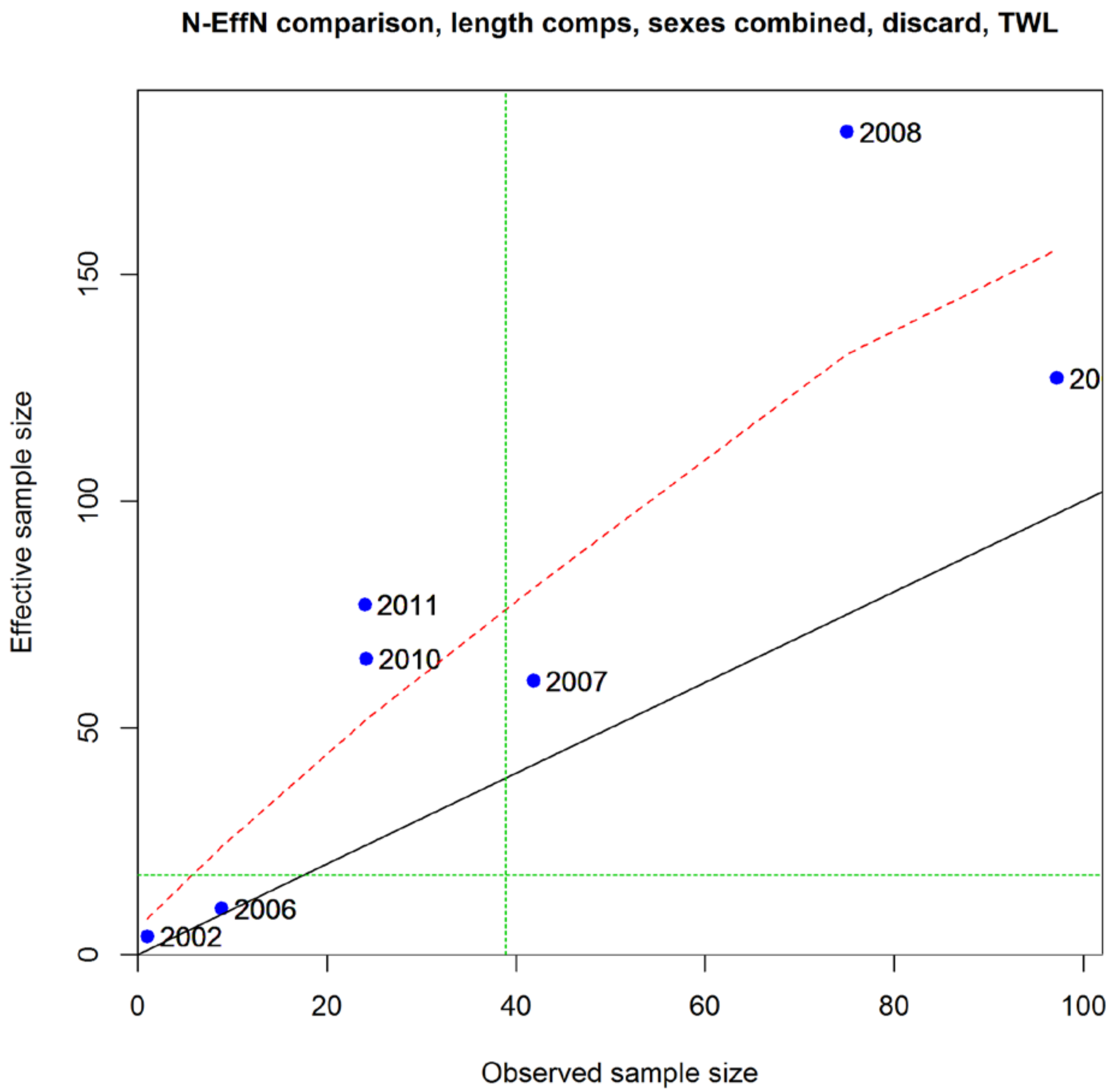


Figure 59. Observed versus effective sample sizes for the trawl fleet combined-sex discard length compositions. Black solid line is the 1:1 line. Red broken line is the lowess fit.

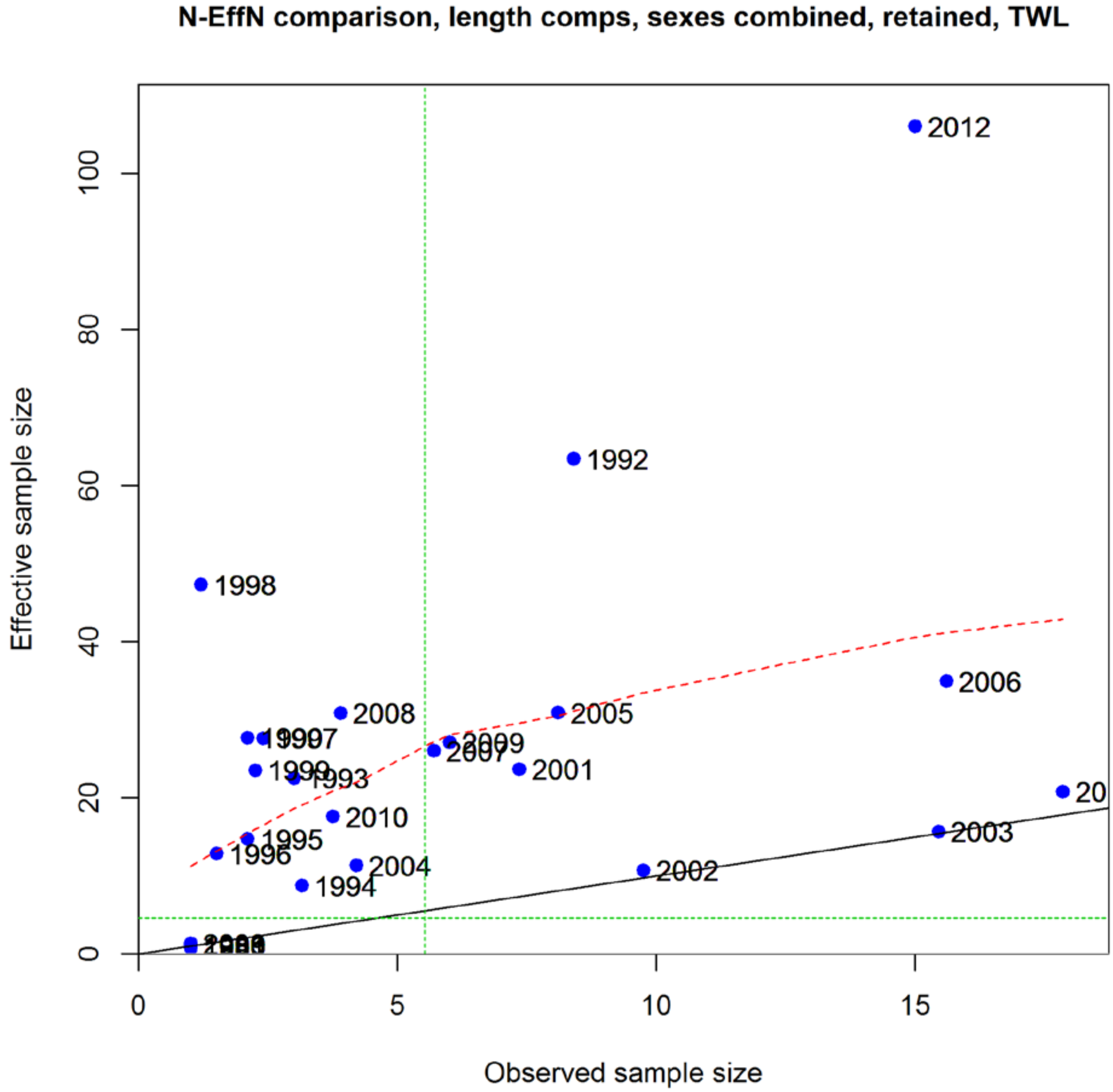


Figure 60. Observed versus effective sample sizes for the trawl fleet combined-sex retained length compositions. Black solid line is the 1:1 line. Red broken line is the lowess fit.

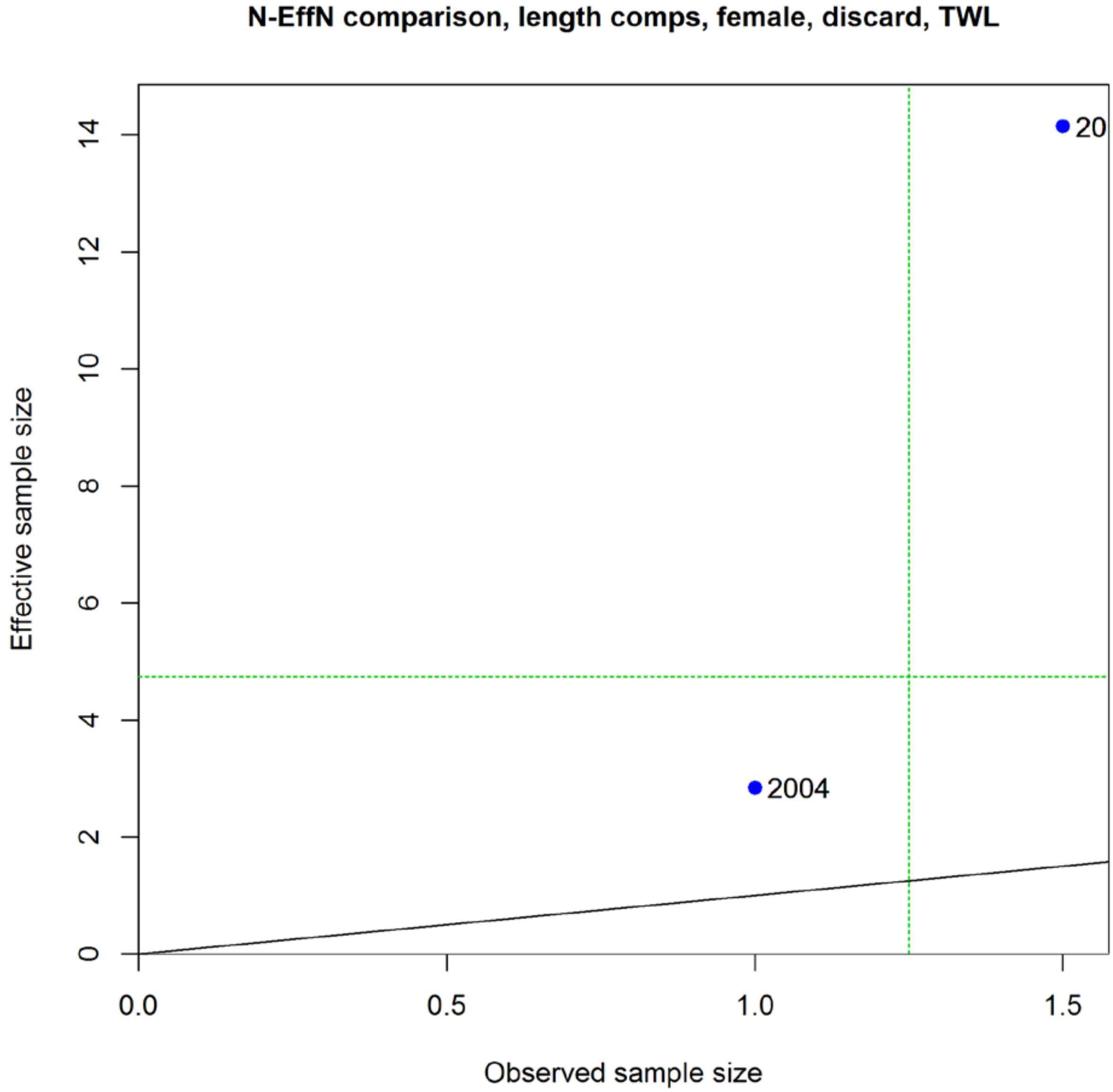


Figure 61. Observed versus effective sample sizes for the trawl fleet female discard length compositions. Black solid line is the 1:1 line. Red broken line is the lowess fit.

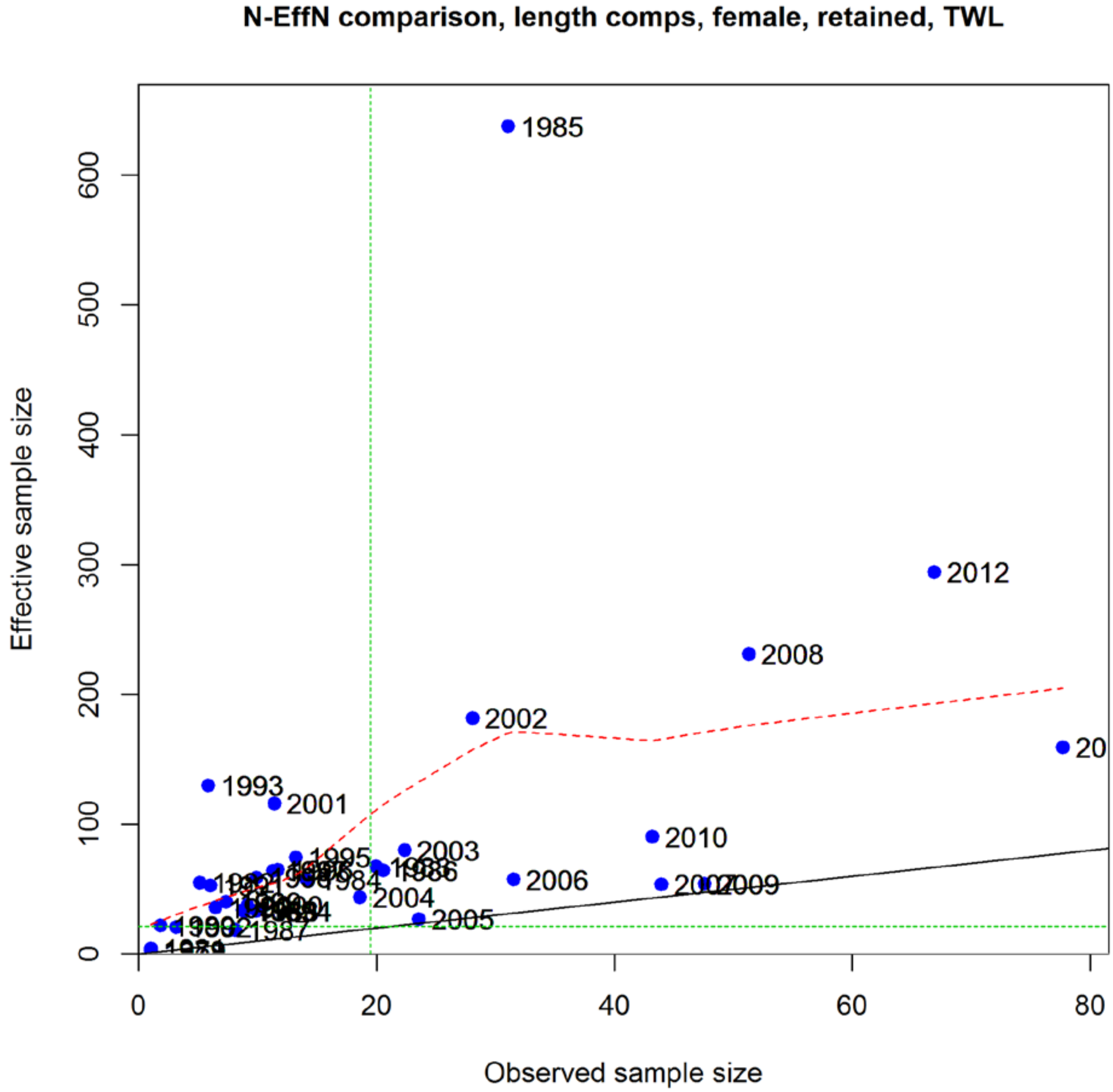


Figure 62. Observed versus effective sample sizes for the trawl fleet female retained length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

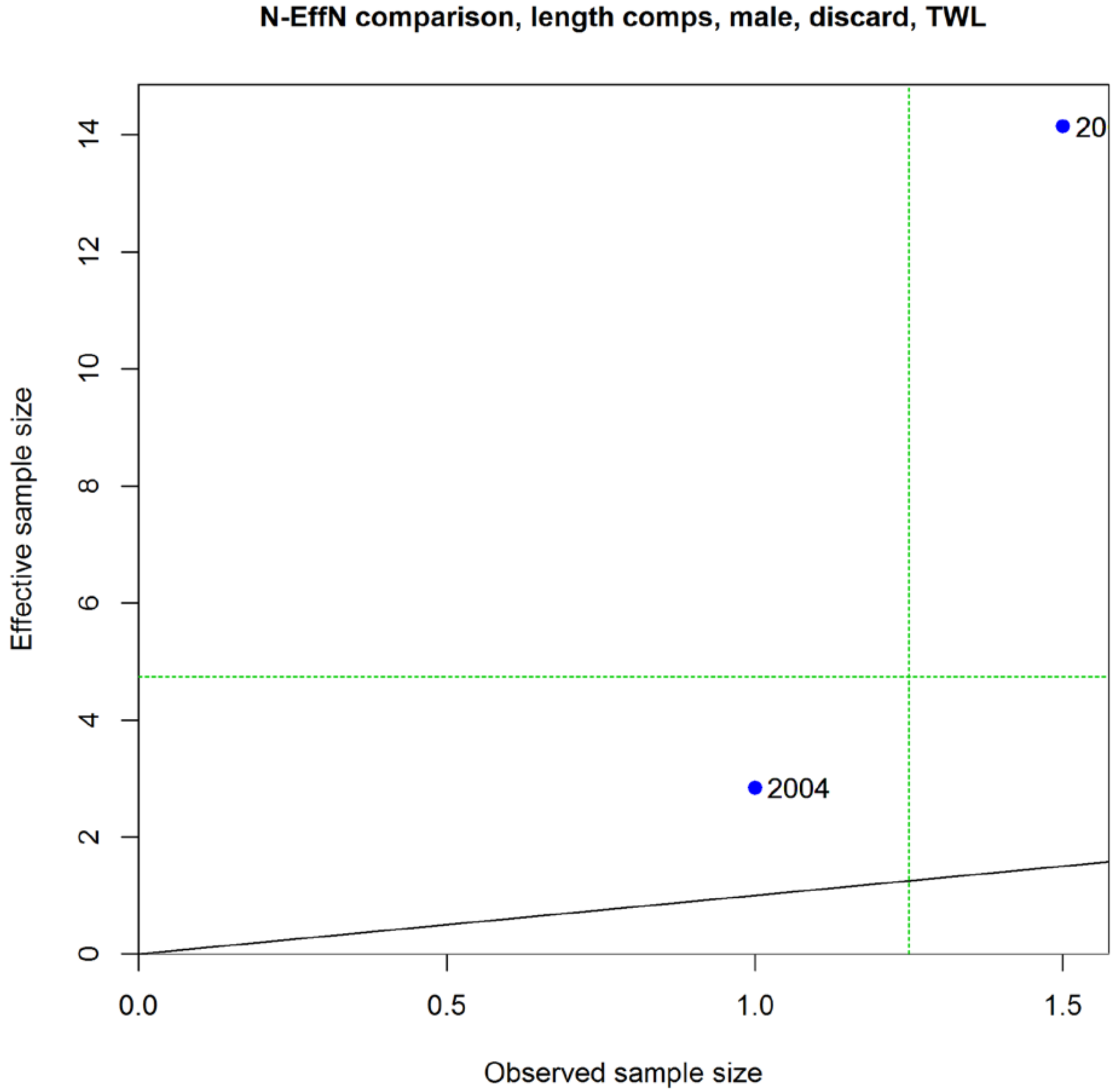


Figure 63. Observed versus effective sample sizes for the trawl fleet male discard length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

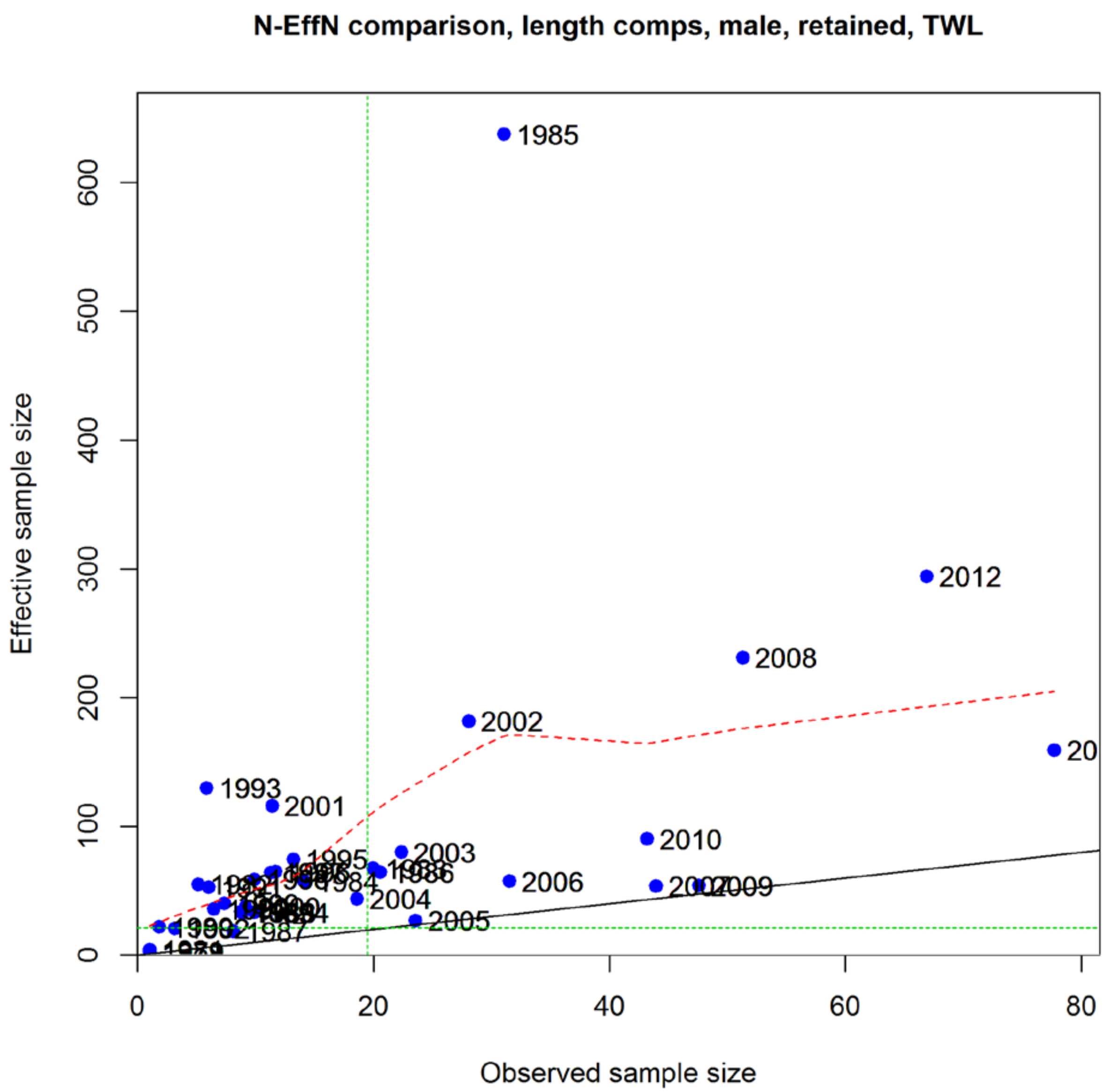


Figure 64. Observed versus effective sample sizes for the trawl fleet male retained length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

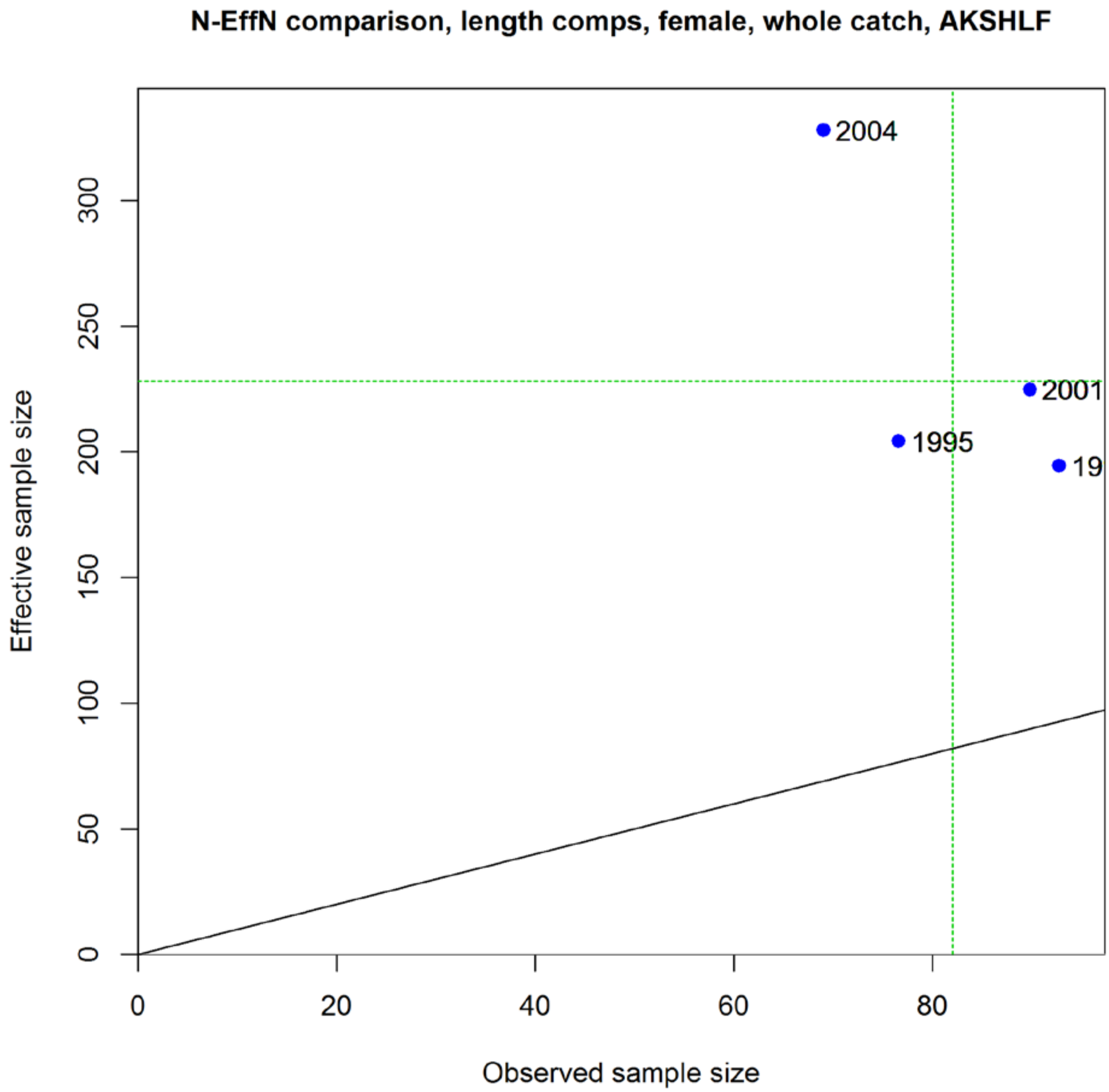


Figure 65. Observed versus effective sample sizes for the AFSC triennial survey female length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

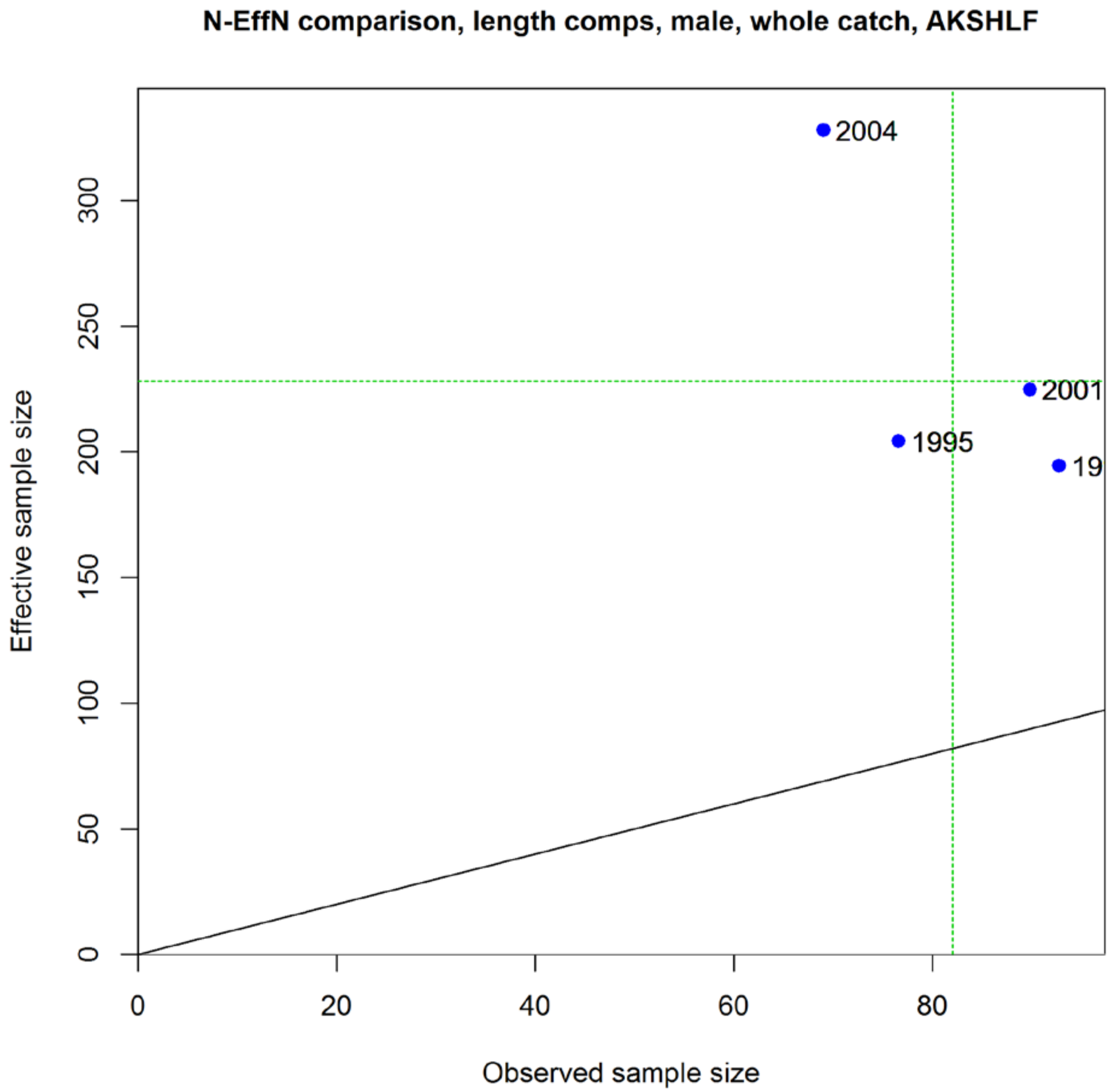


Figure 66. Observed versus effective sample sizes for the AFSC triennial survey male length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

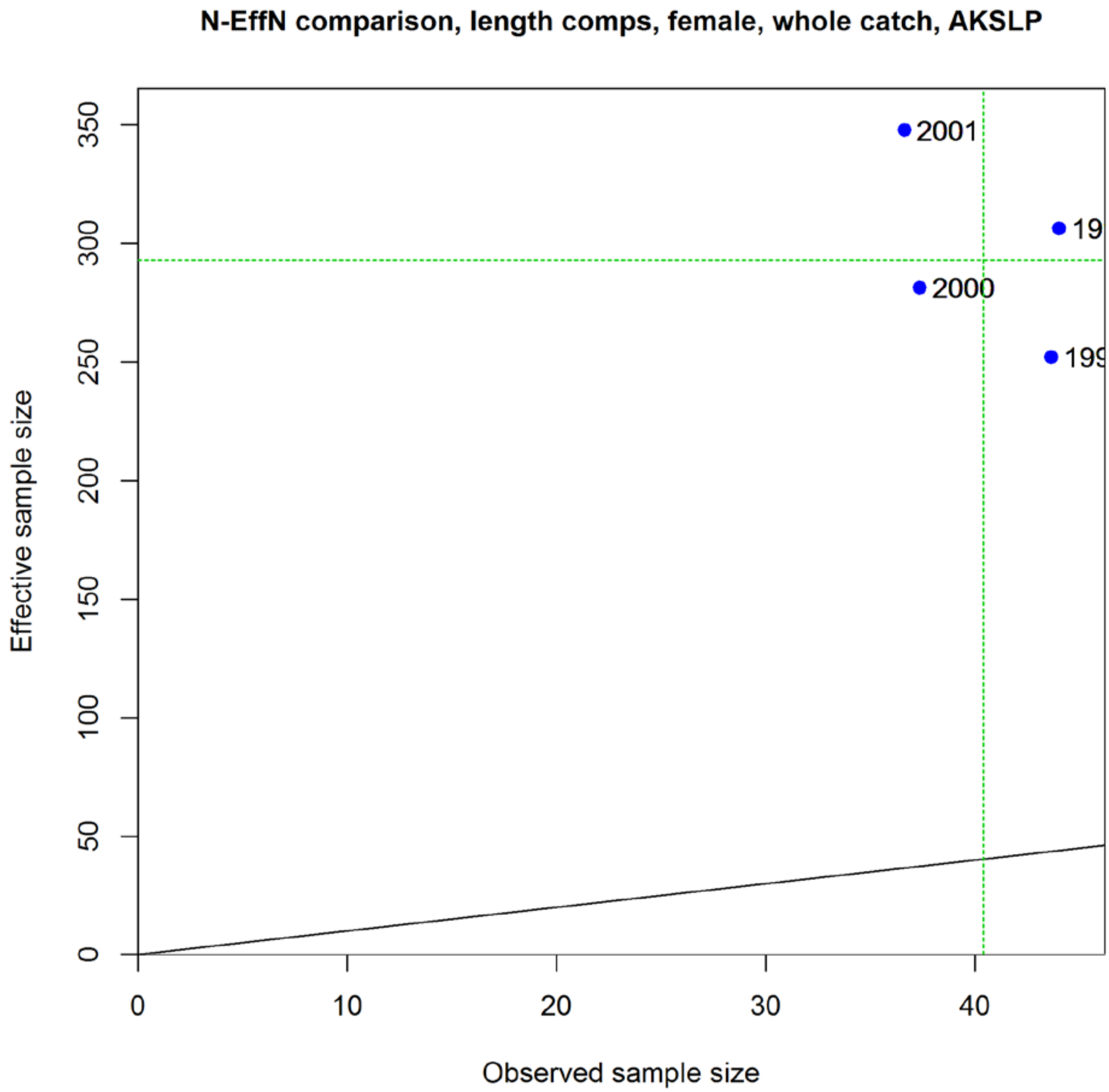


Figure 67. Observed versus effective sample sizes for the AFSC slope survey female length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

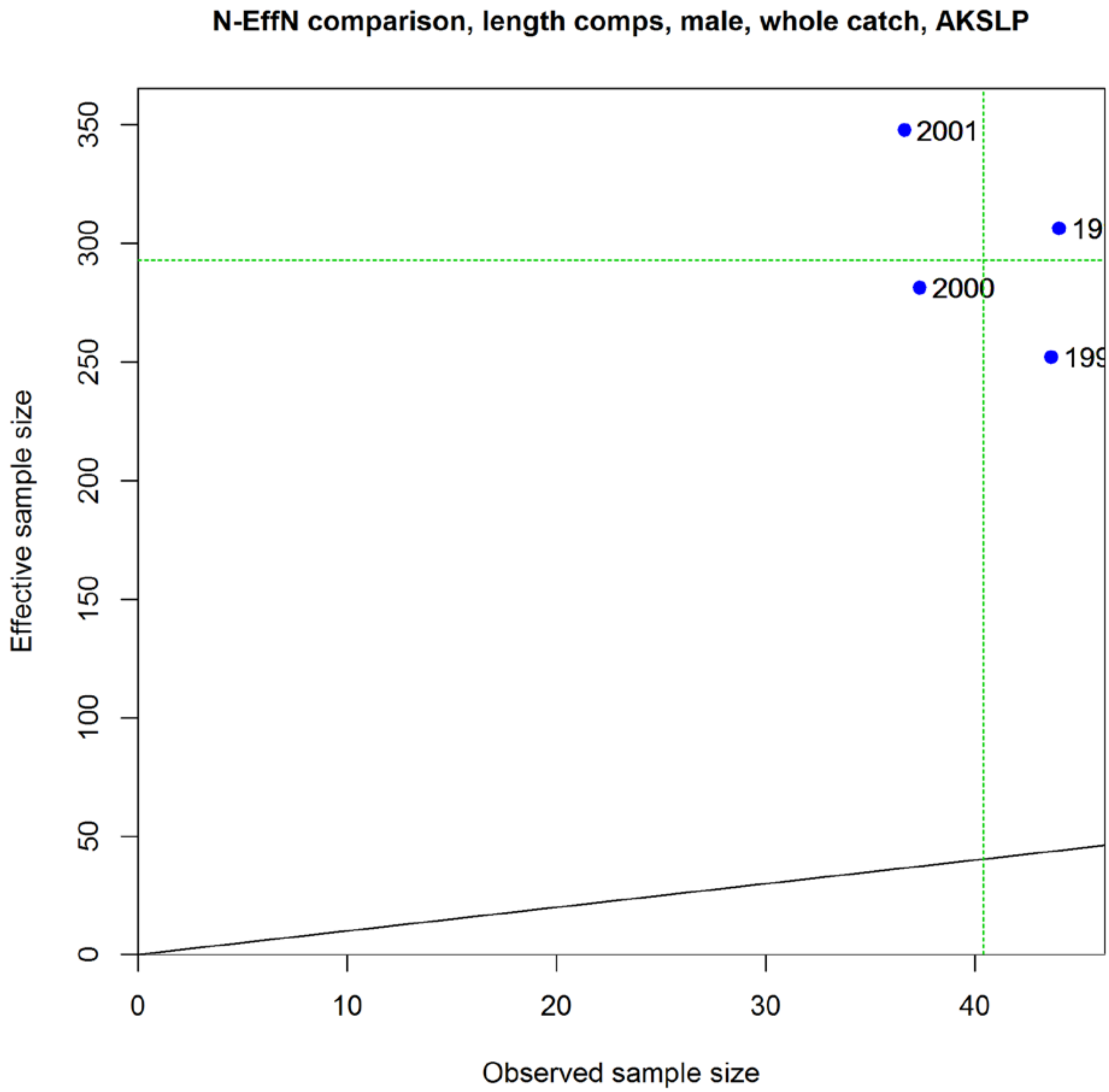


Figure 68. Observed versus effective sample sizes for the AFSC slope survey male length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

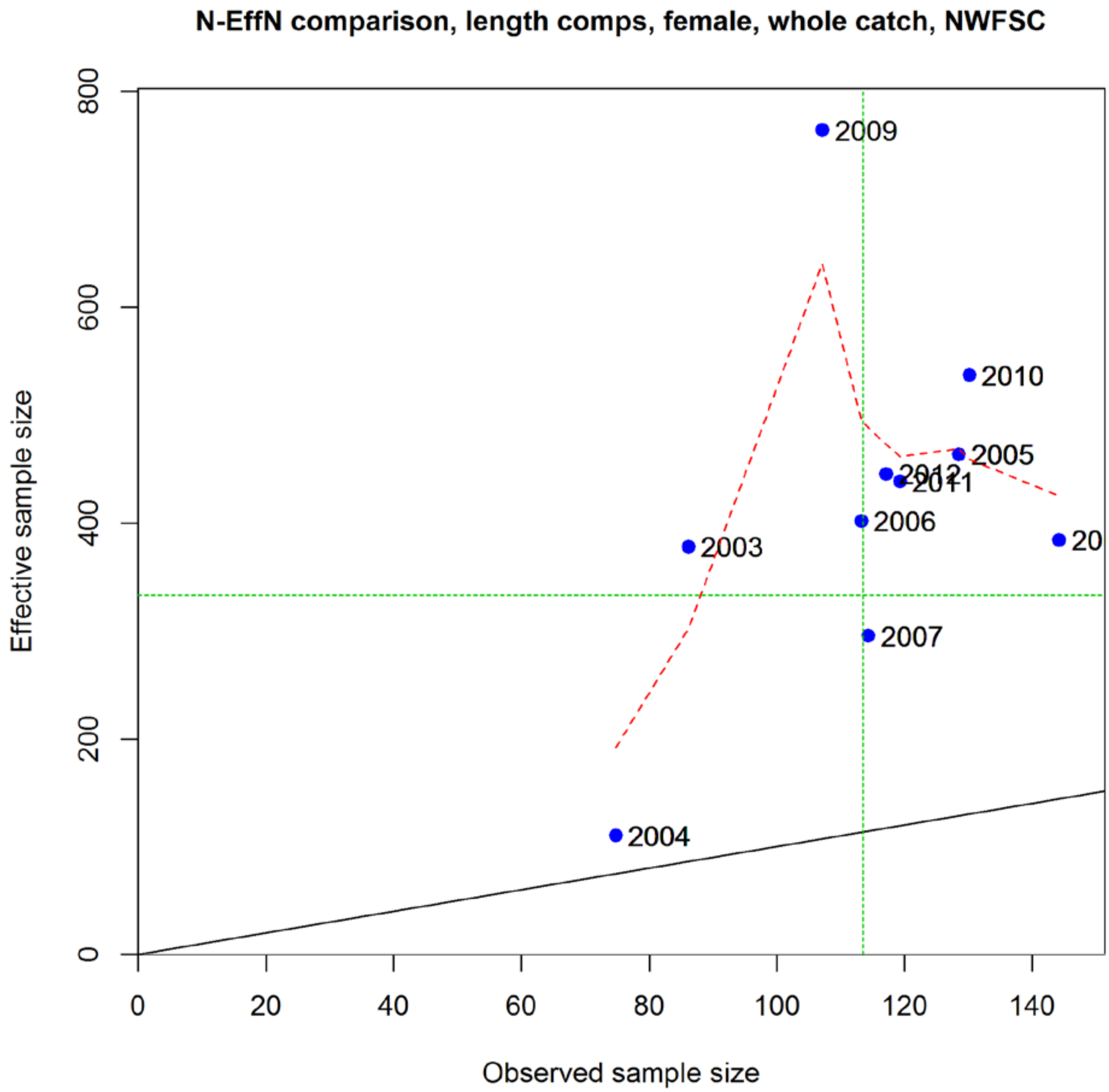


Figure 69. Observed versus effective sample sizes for the NWFSC shelf-slope survey female length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

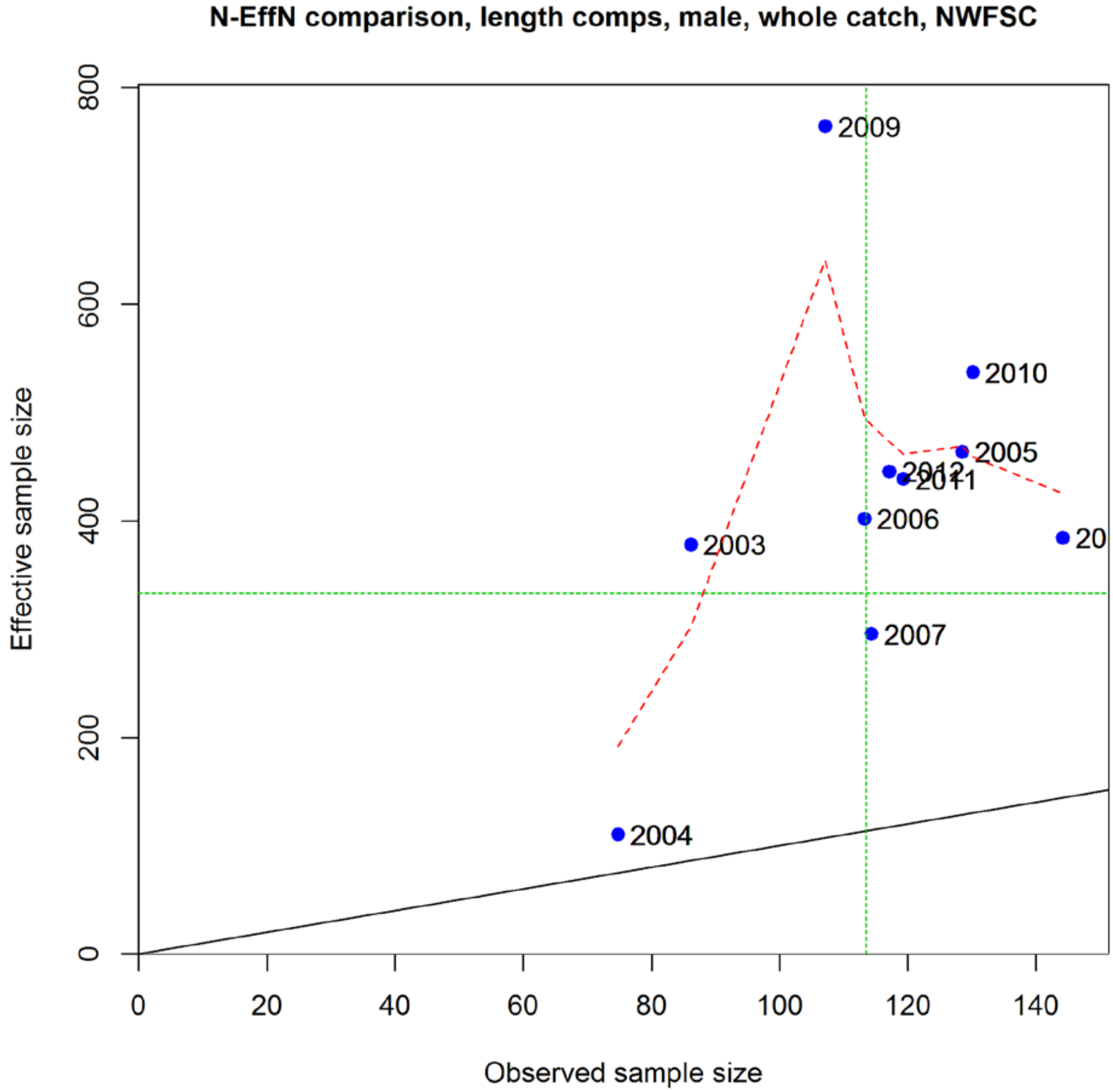


Figure 70. Observed versus effective sample sizes for the NWFSC shelf-slope survey male length compositions. Black solid line is the 1:1 line. Red broken line is the LOWESS fit.

9.3.1.3.4 Aggregated residuals: Fleets, retained catch

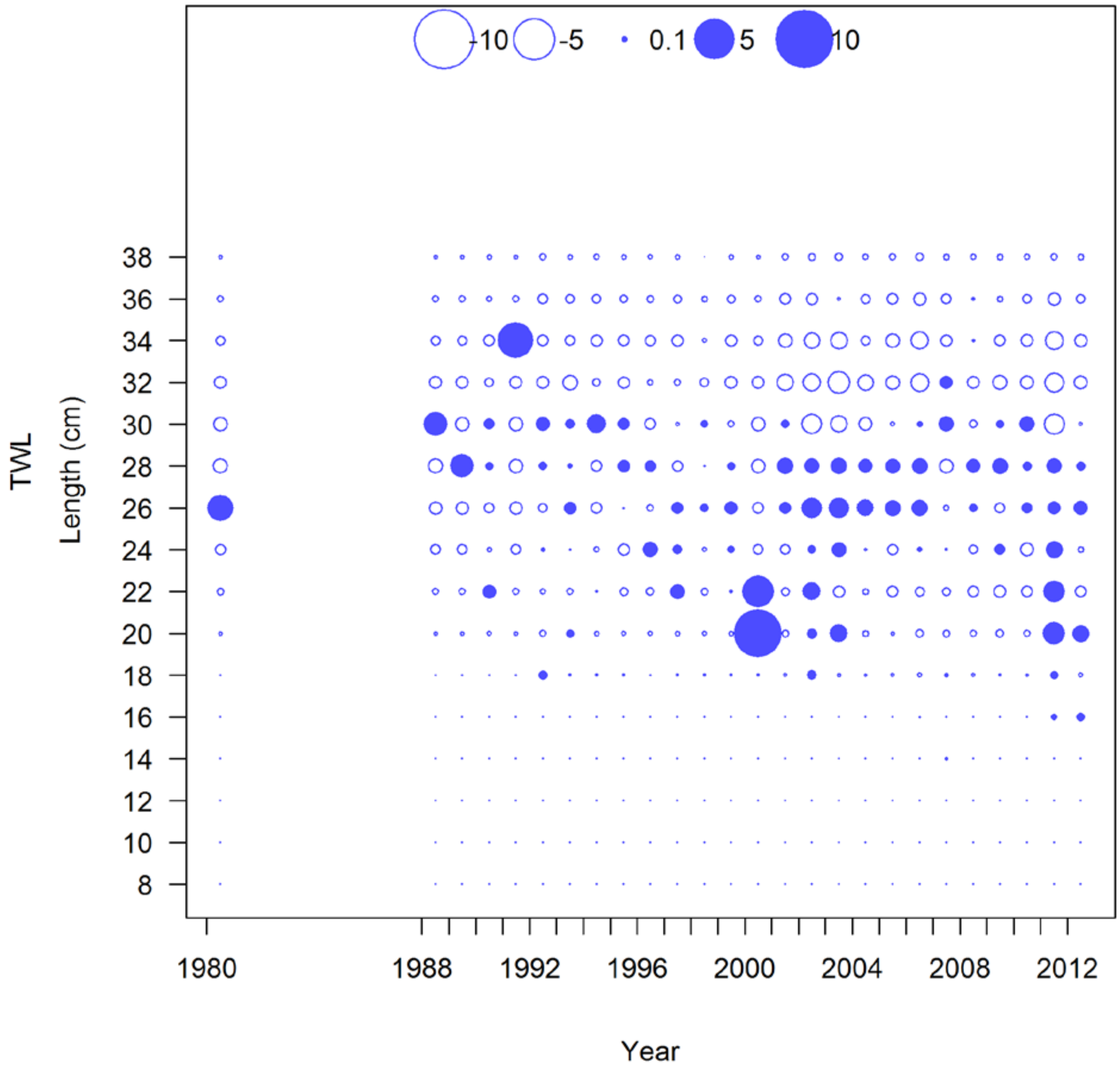


Figure 71. Residuals to combined-sex retained length composition base case fits across years for the trawl fleet.

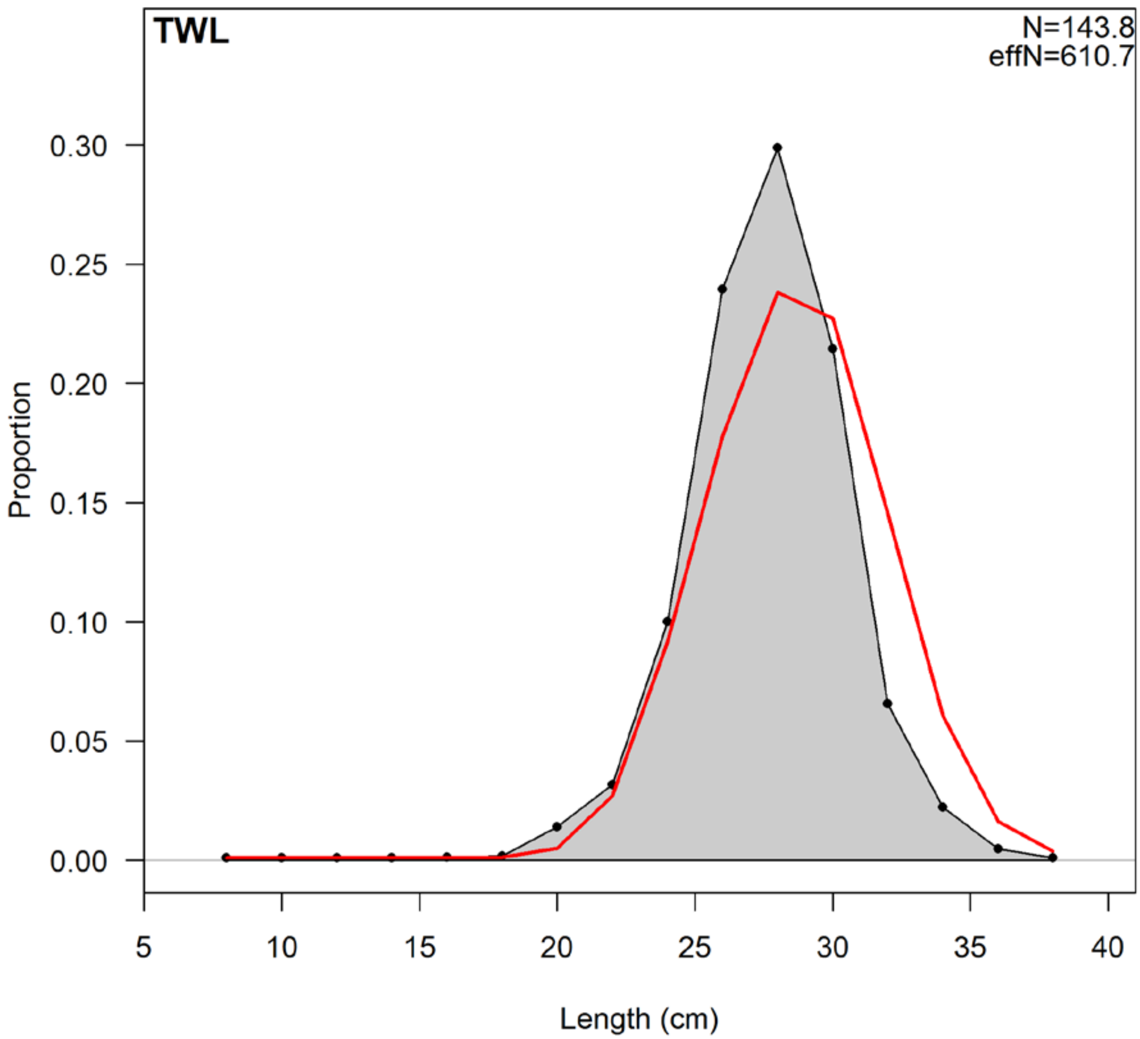


Figure 72. Base case aggregate fit across years to the combined-sex retained length composition for the domestic fleet.

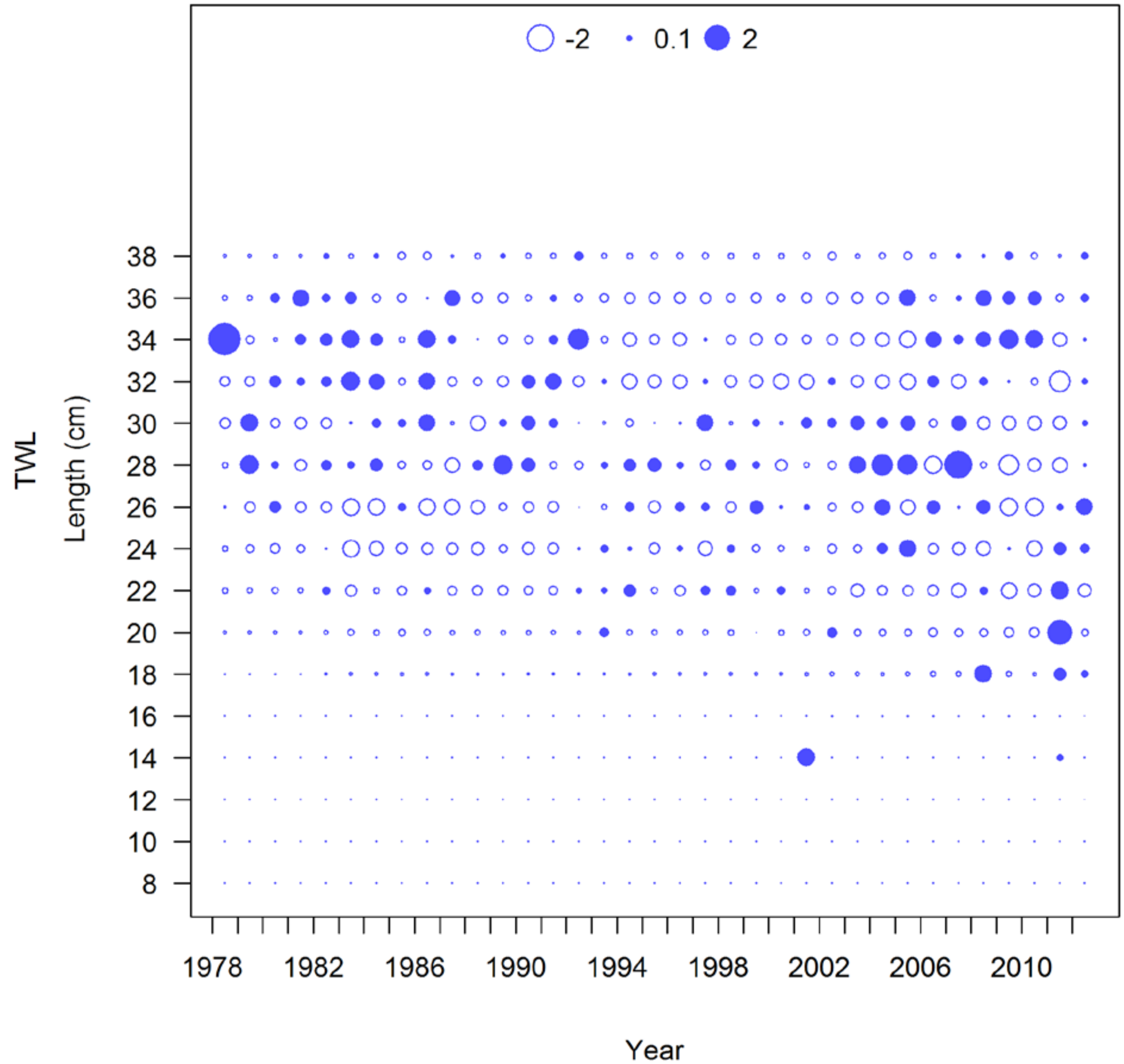


Figure 73. Residuals to female retained length composition base case fits across all fleets and years.

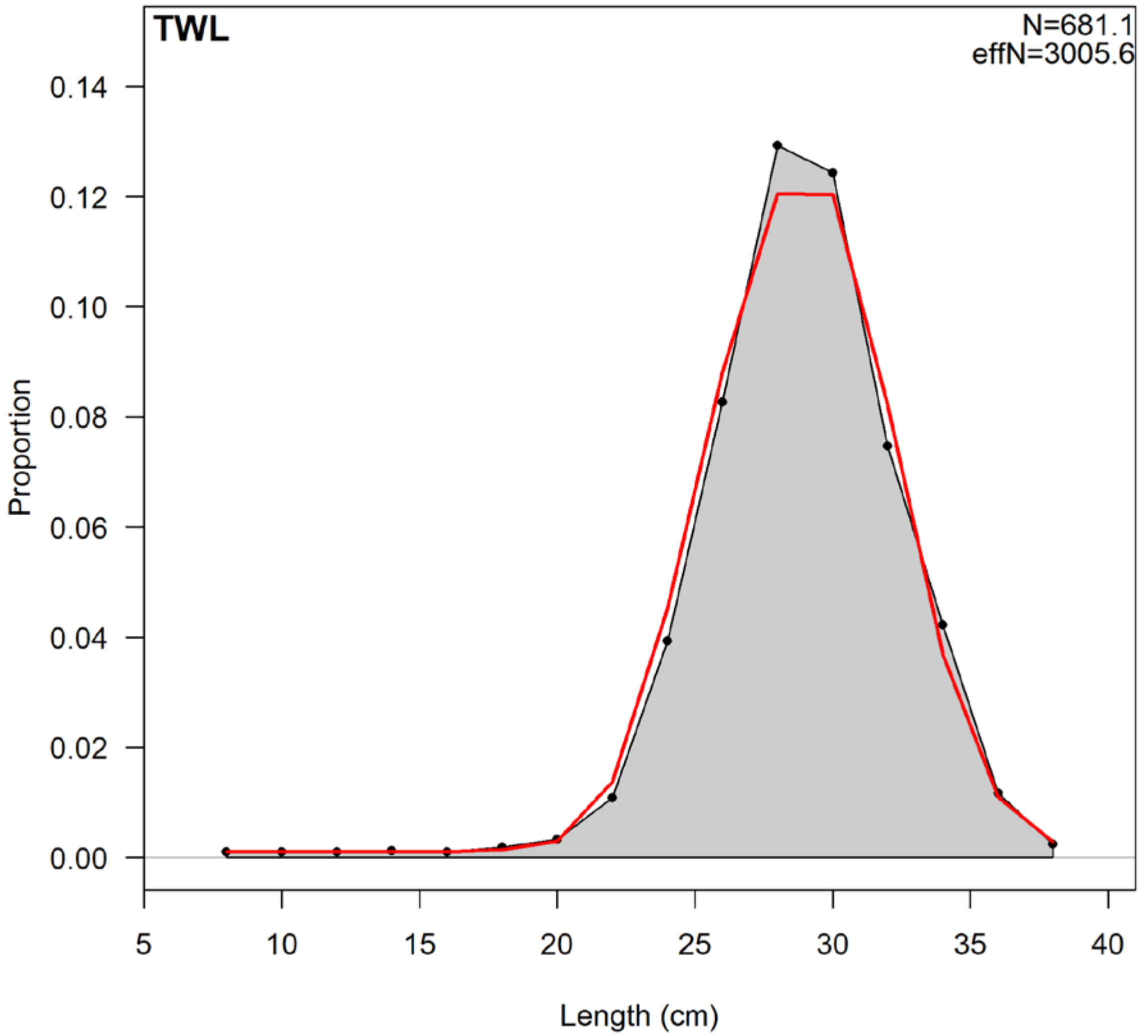


Figure 74. Base case aggregate fit to the female retained length composition domestic fleet.

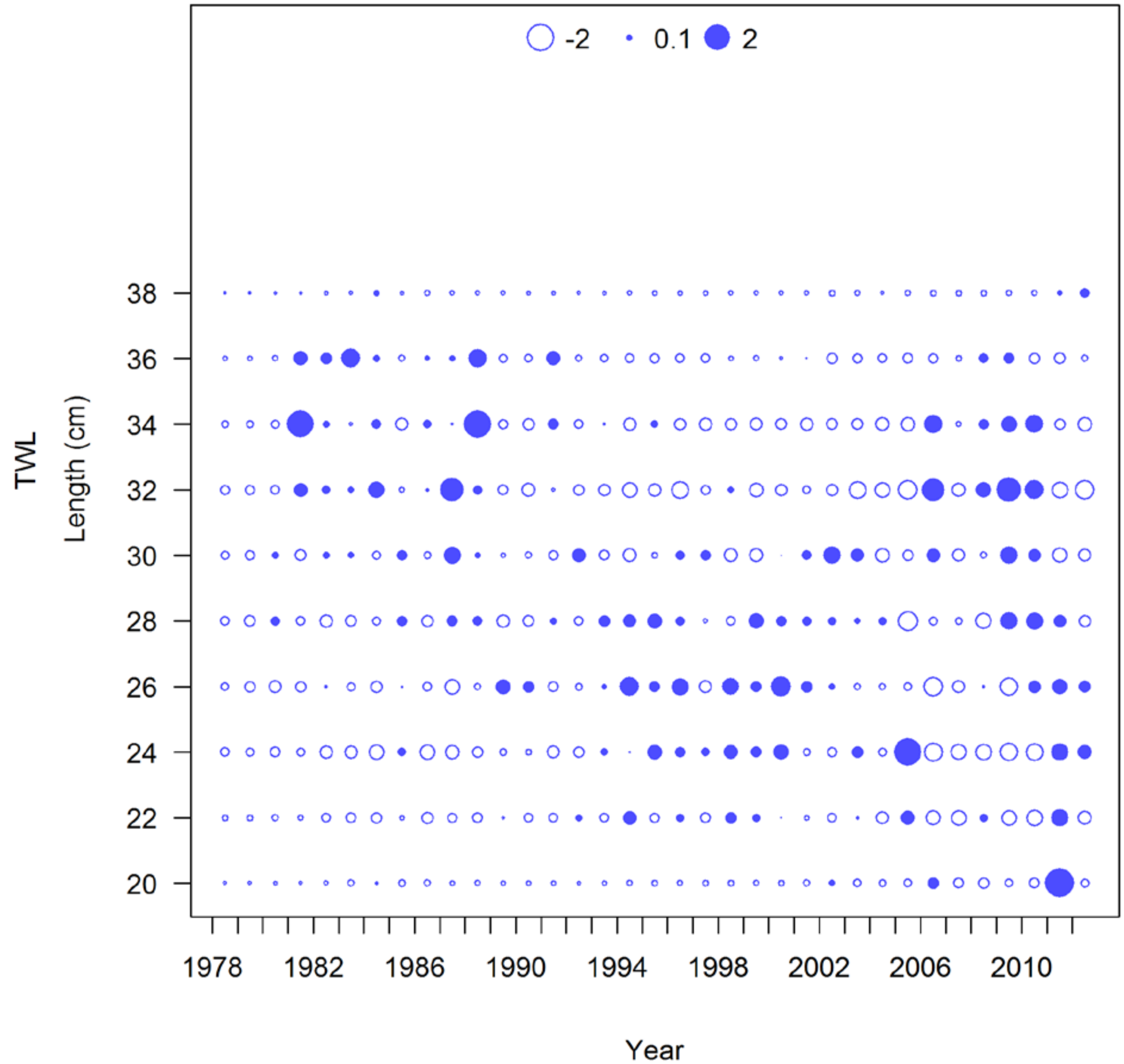


Figure 75. Residuals to male retained length composition base case fits across all fleets and years.

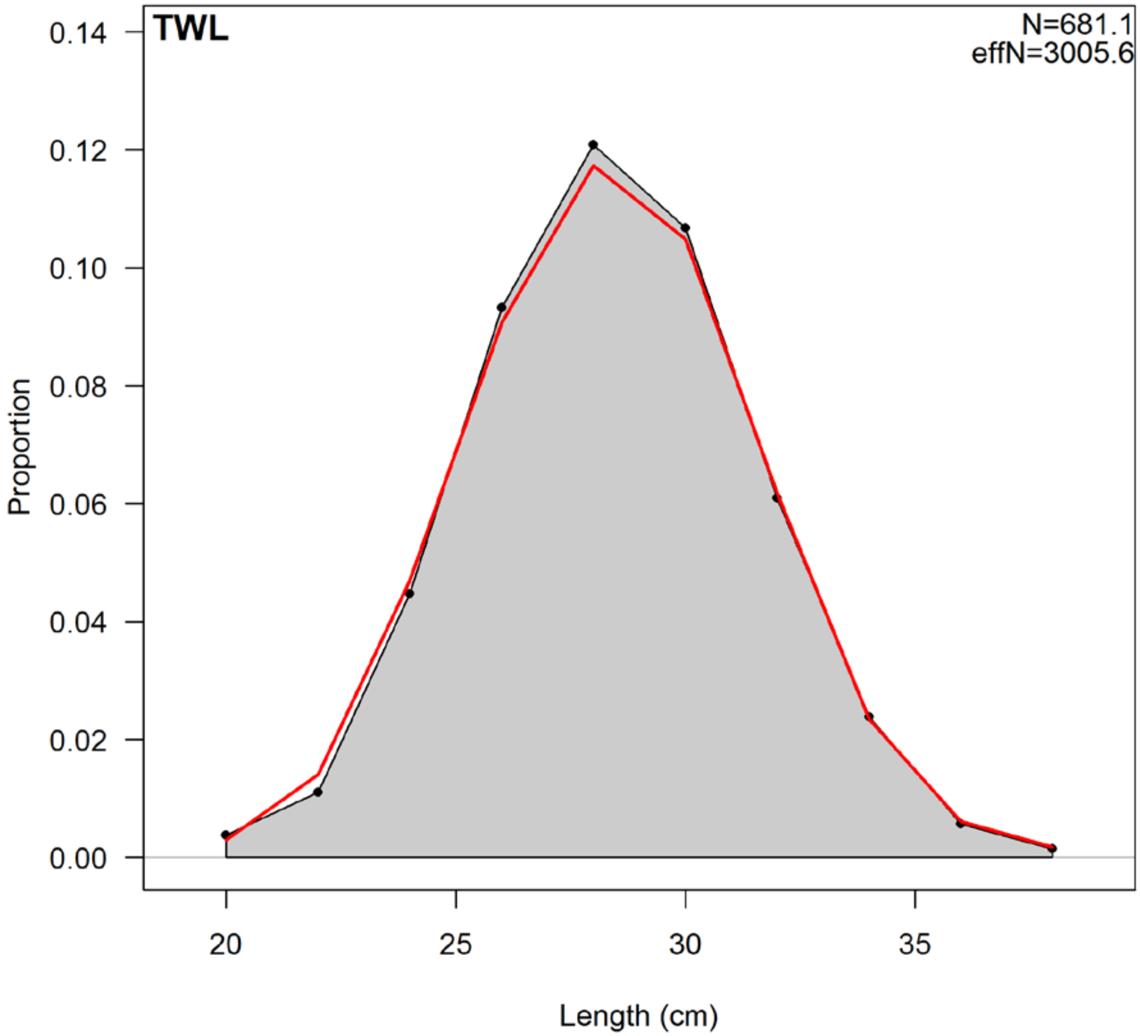


Figure 76. Base case aggregate fit to the male retained length composition the domestic fleet.

9.3.1.3.5 Aggregated residuals: Fleets, discarded catch

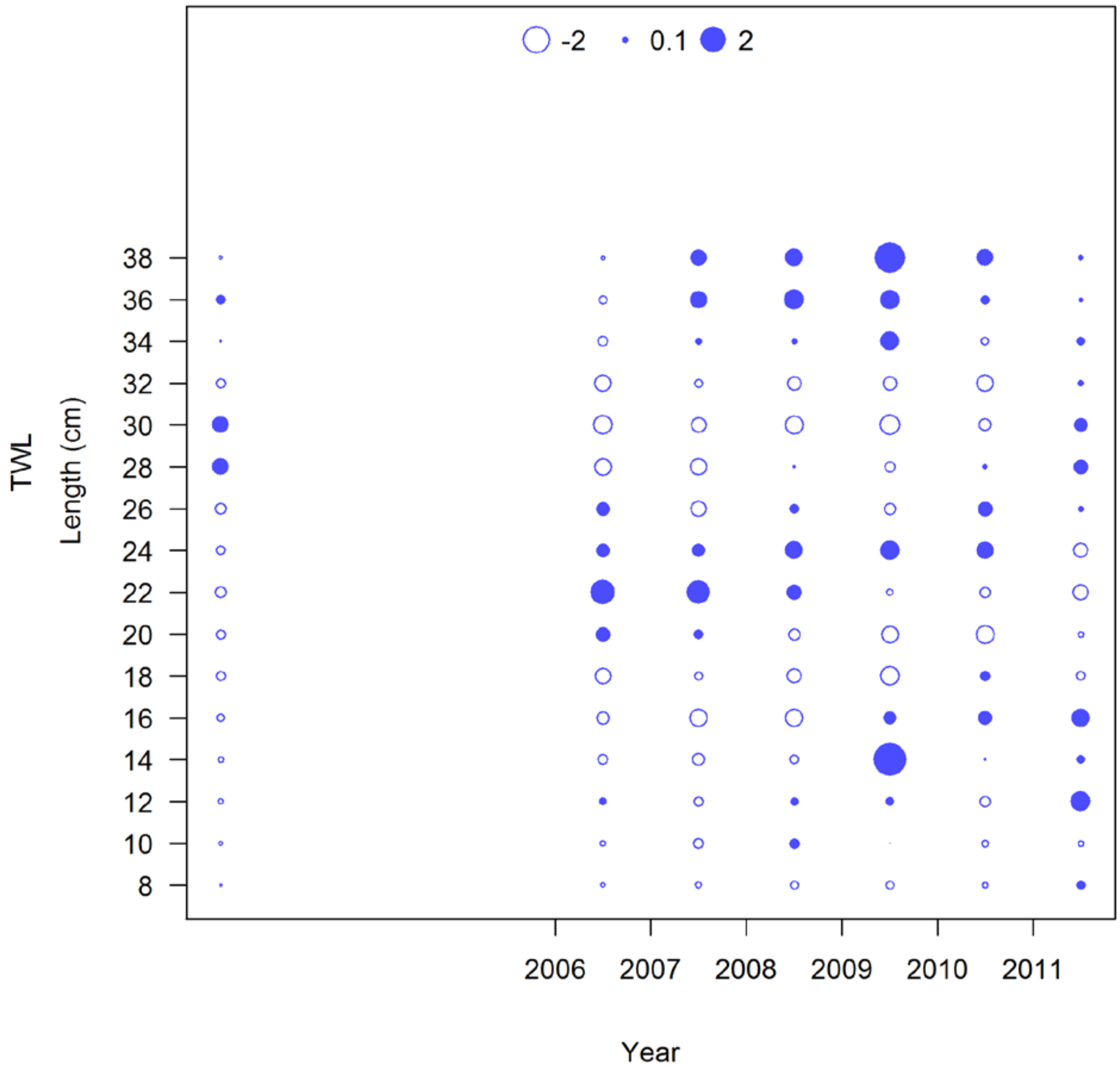


Figure 77. Residuals to combined-sex discard length composition base case fits.

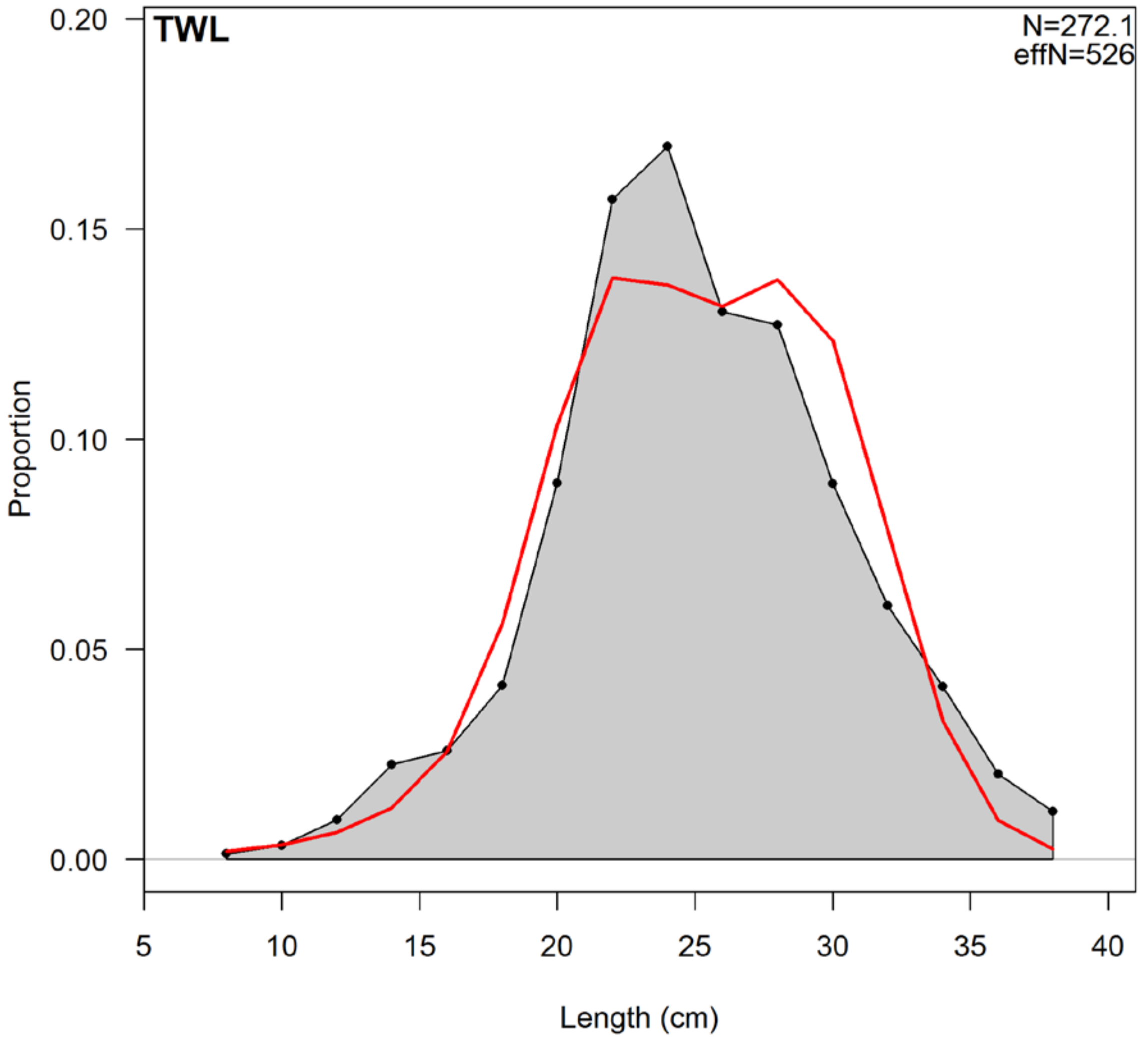


Figure 78. Base case aggregate fit to the combined-sex discard length composition for the domestic fleet.

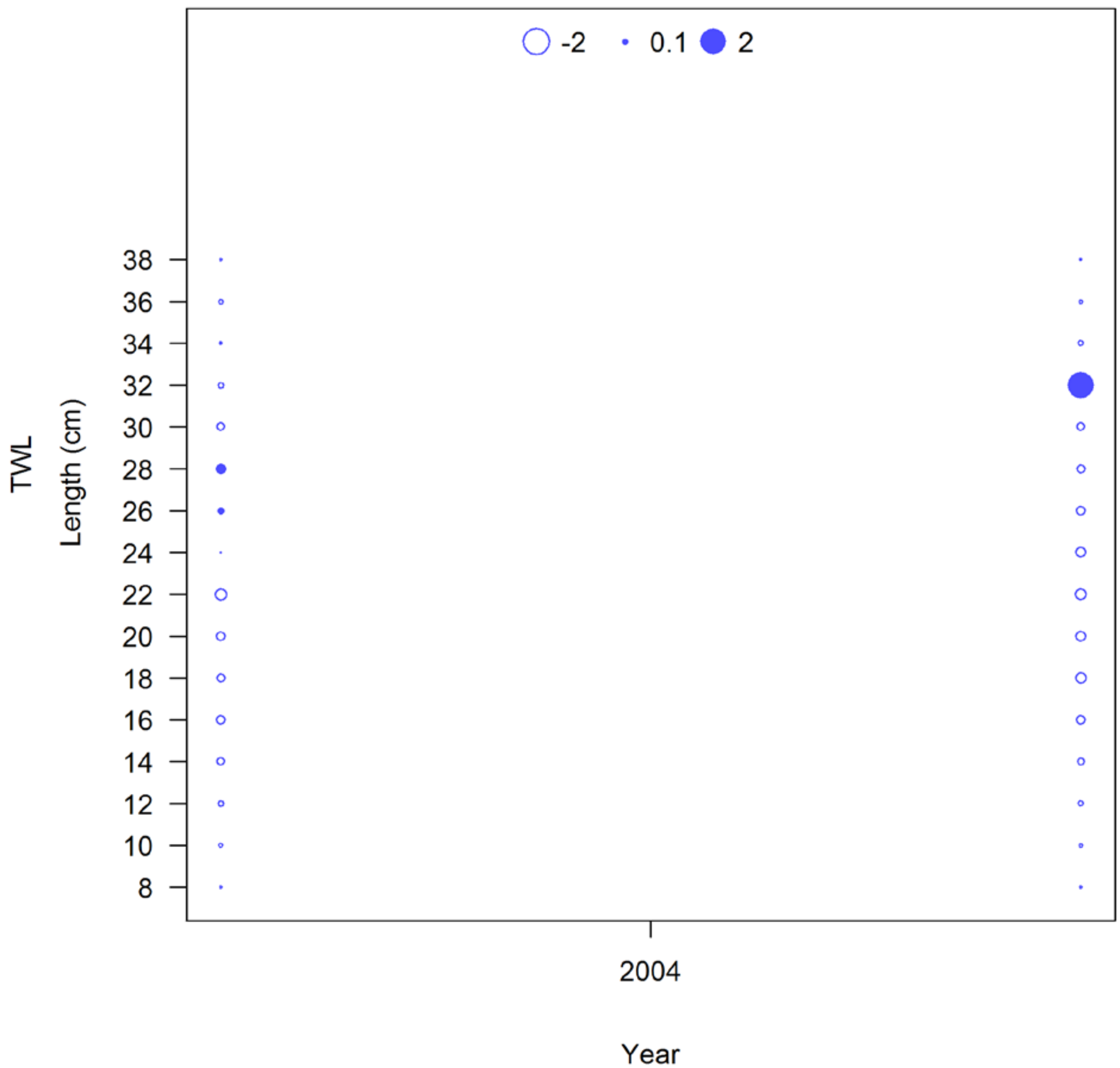


Figure 79. Residuals to female discard length composition base case fits across all fleets and years.

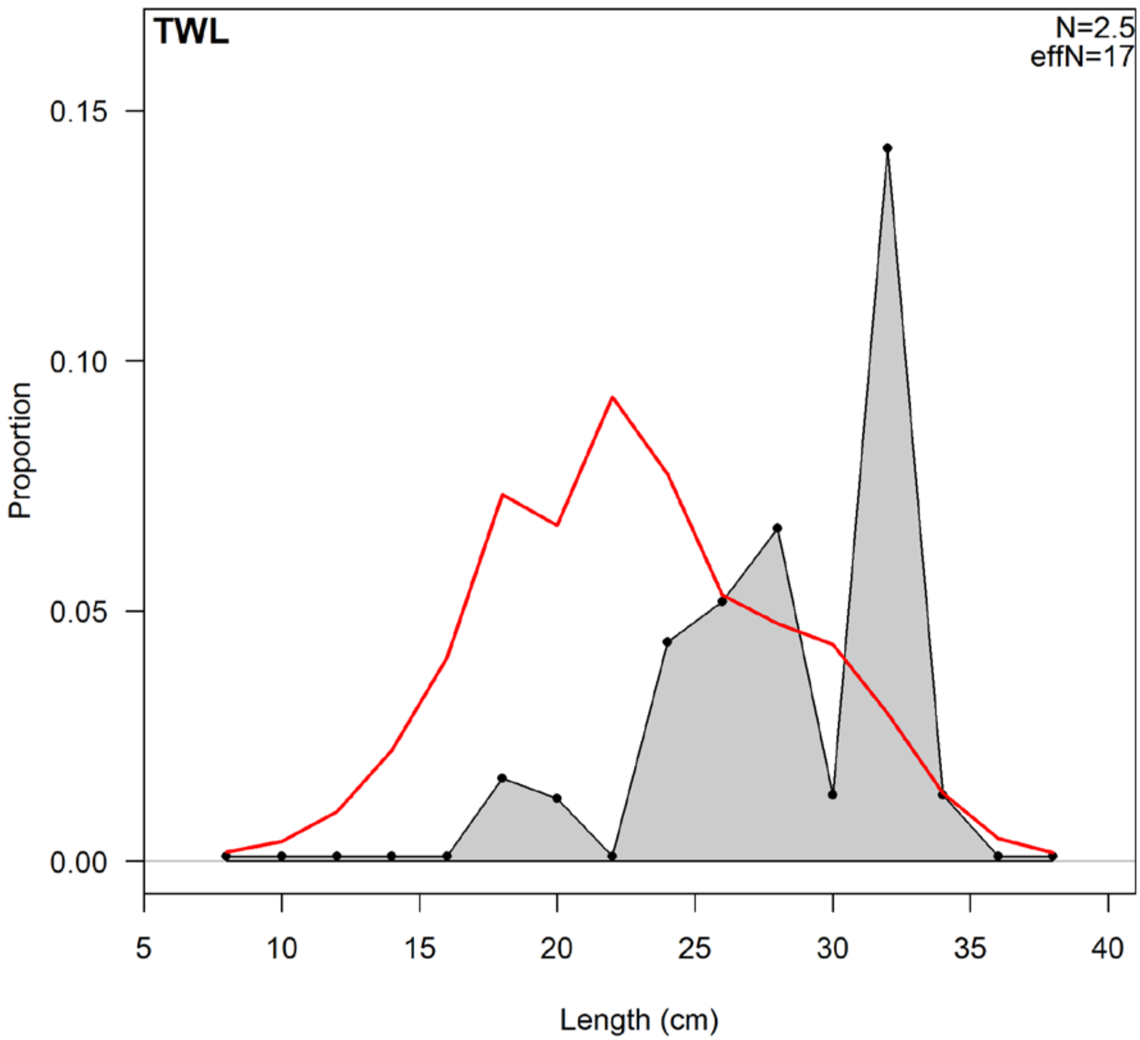


Figure 80. Base case aggregate fit to the female discard length composition the trawl and non-trawl fleets.

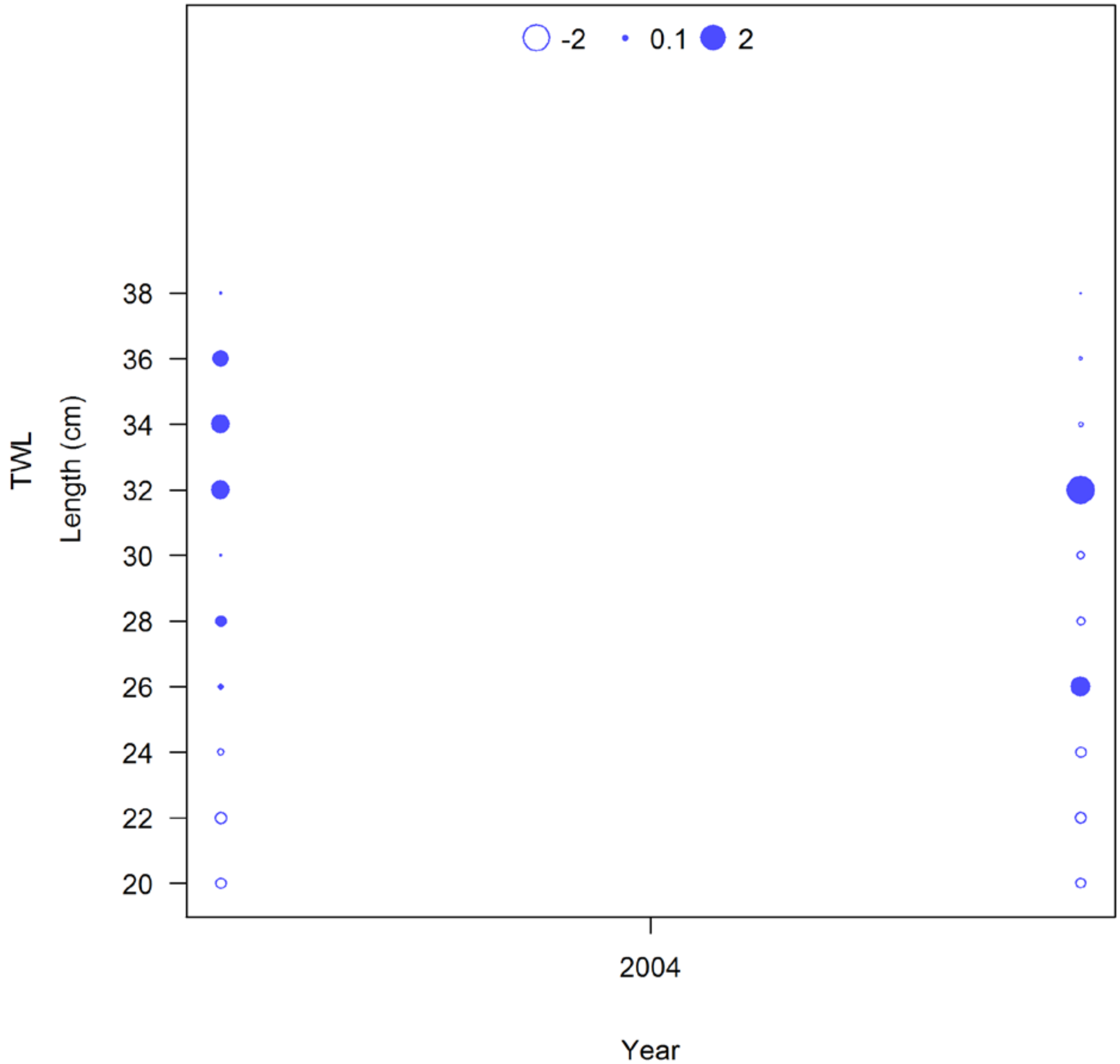


Figure 81. Residuals to male discard length composition base case fits across all fleets and years.

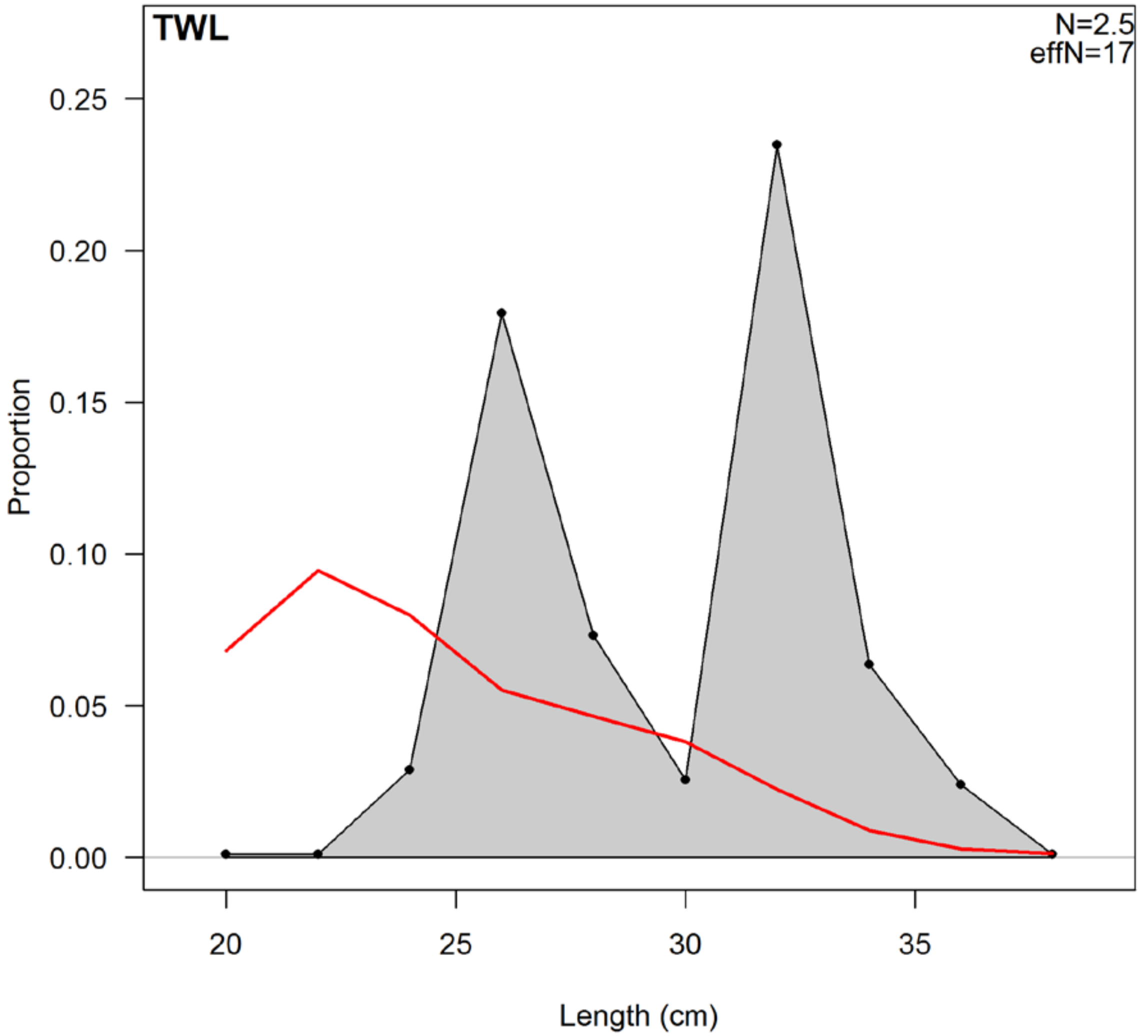


Figure 82. Base case aggregate fit to the male discard length composition the trawl and non-trawl fleets.

9.3.1.3.6 Aggregated residuals: Surveys

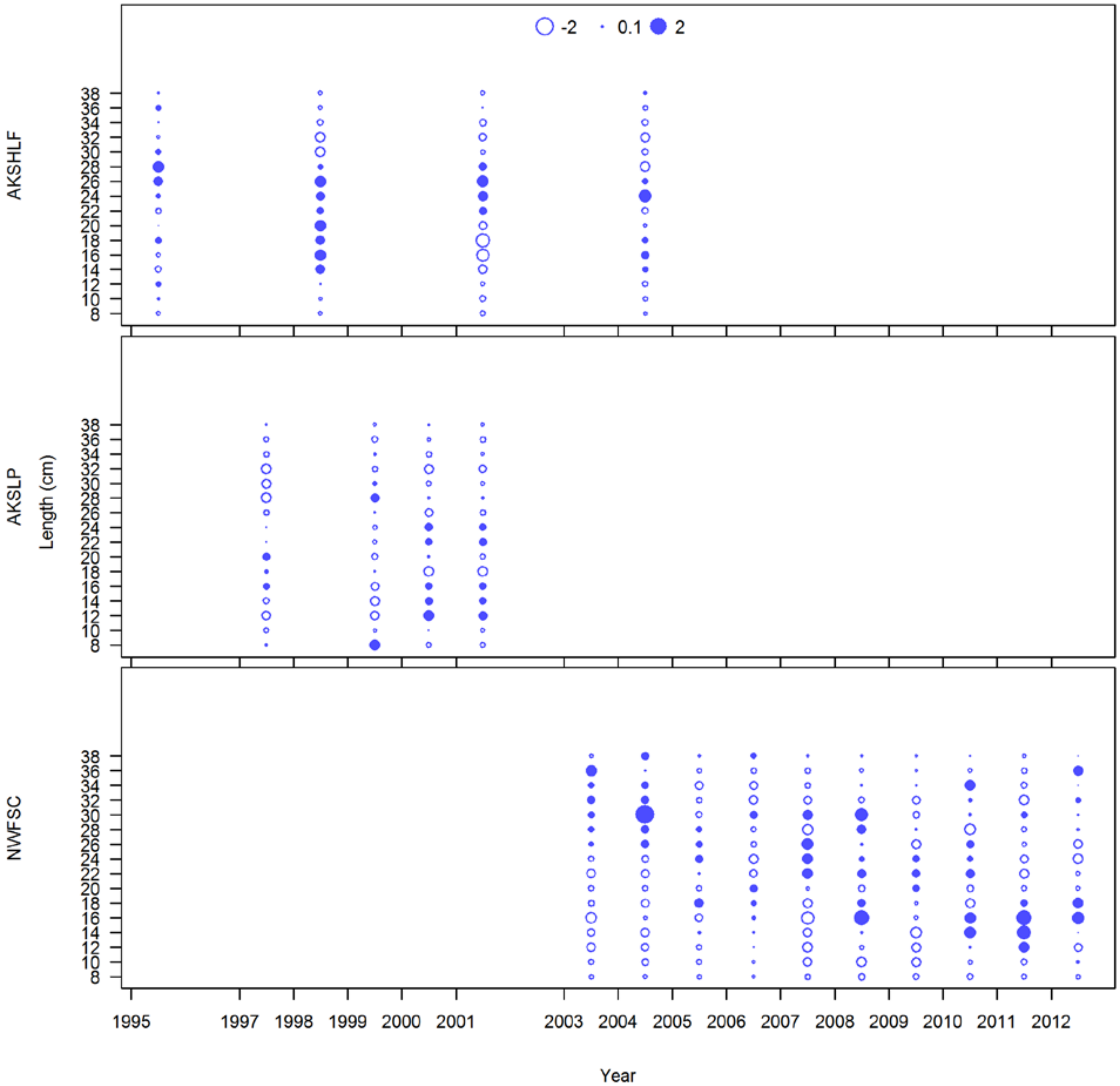


Figure 83. Residuals to female length composition base case fits across all surveys and years.

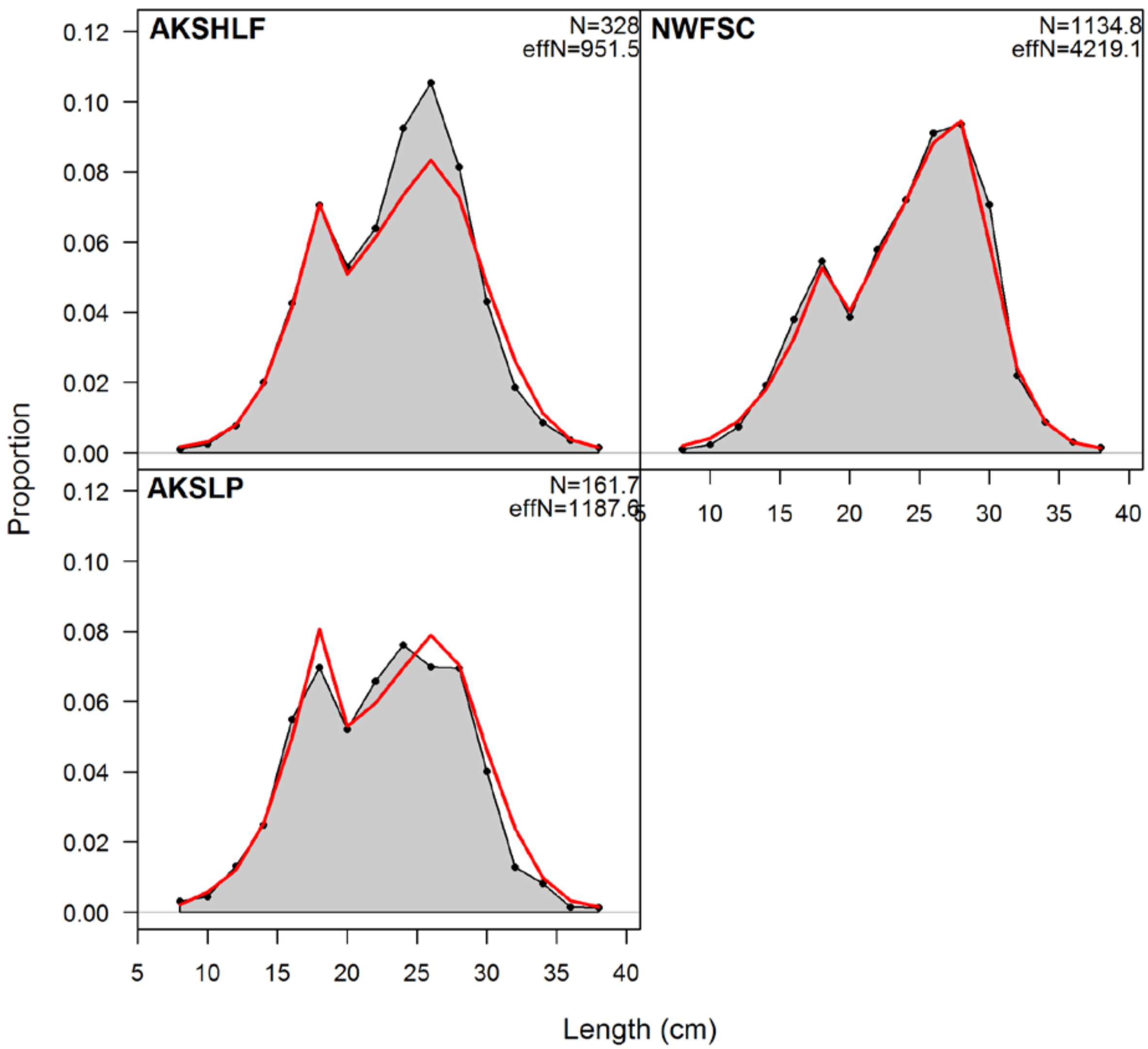


Figure 84. Base case aggregate fit to the female length compositions for each survey.

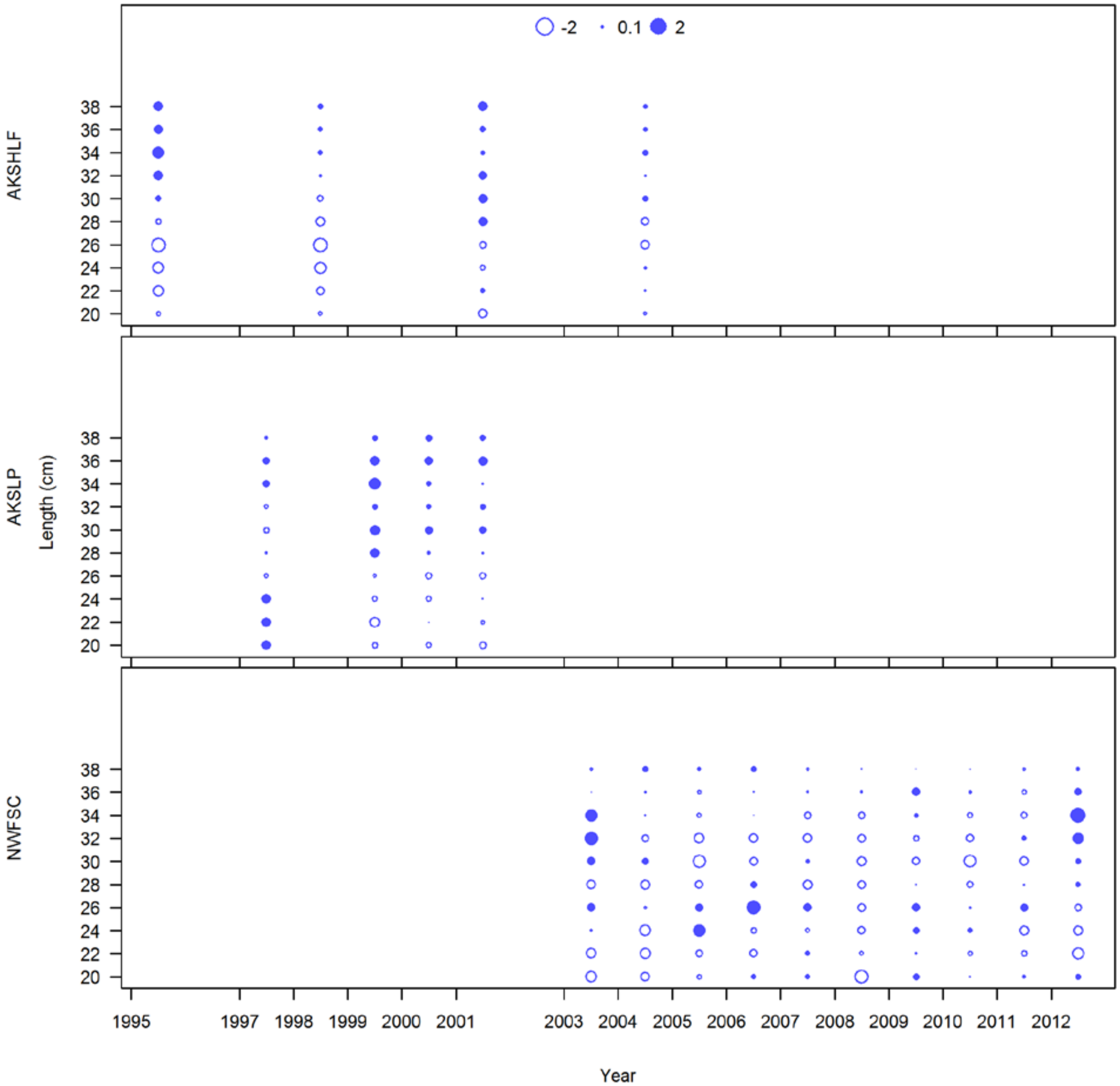


Figure 85. Residuals to male length composition base case fits across all surveys and years.

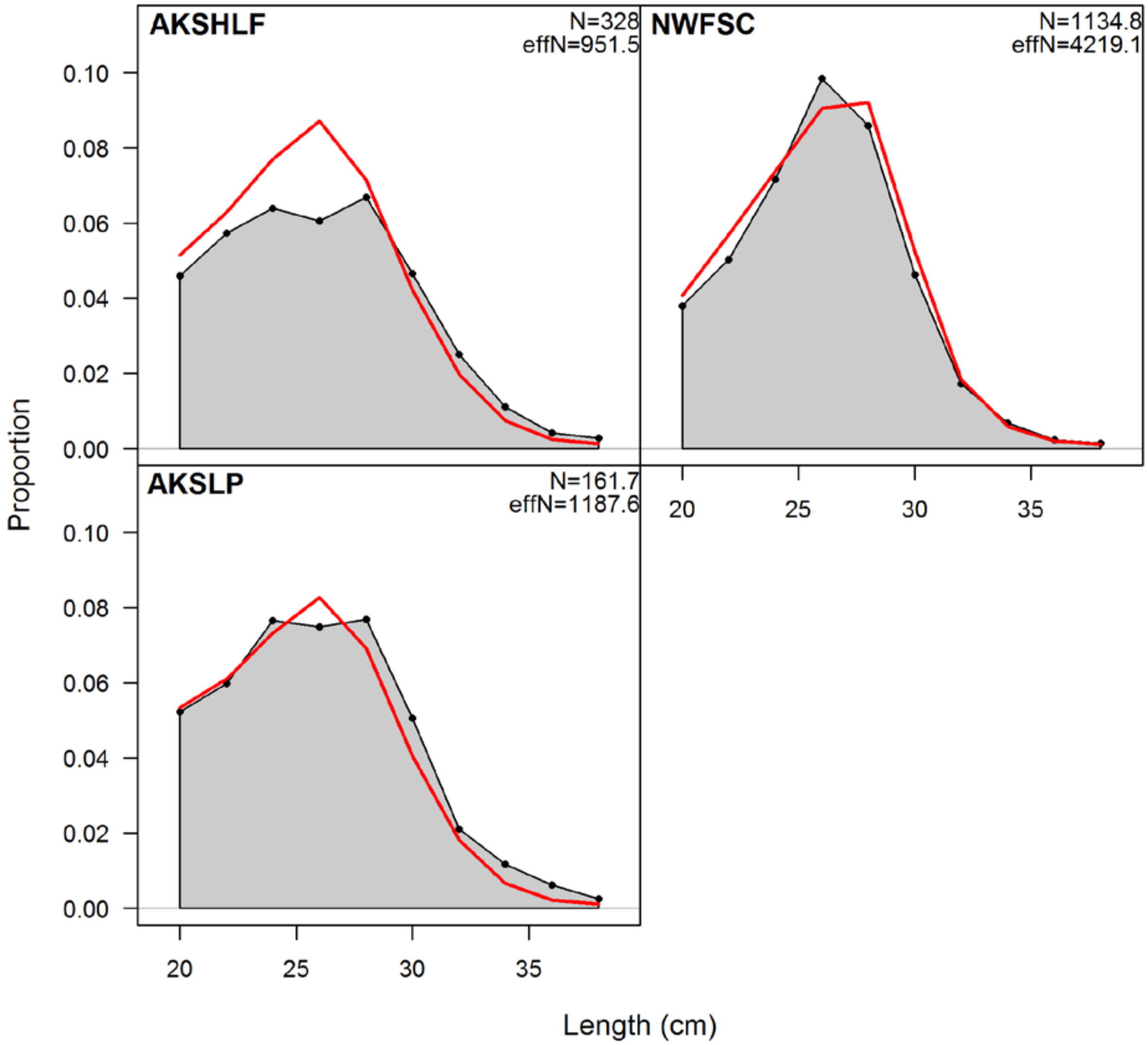


Figure 86. Base case aggregate fit to the male length composition for each survey.

9.3.1.4 Conditional-age-at-length

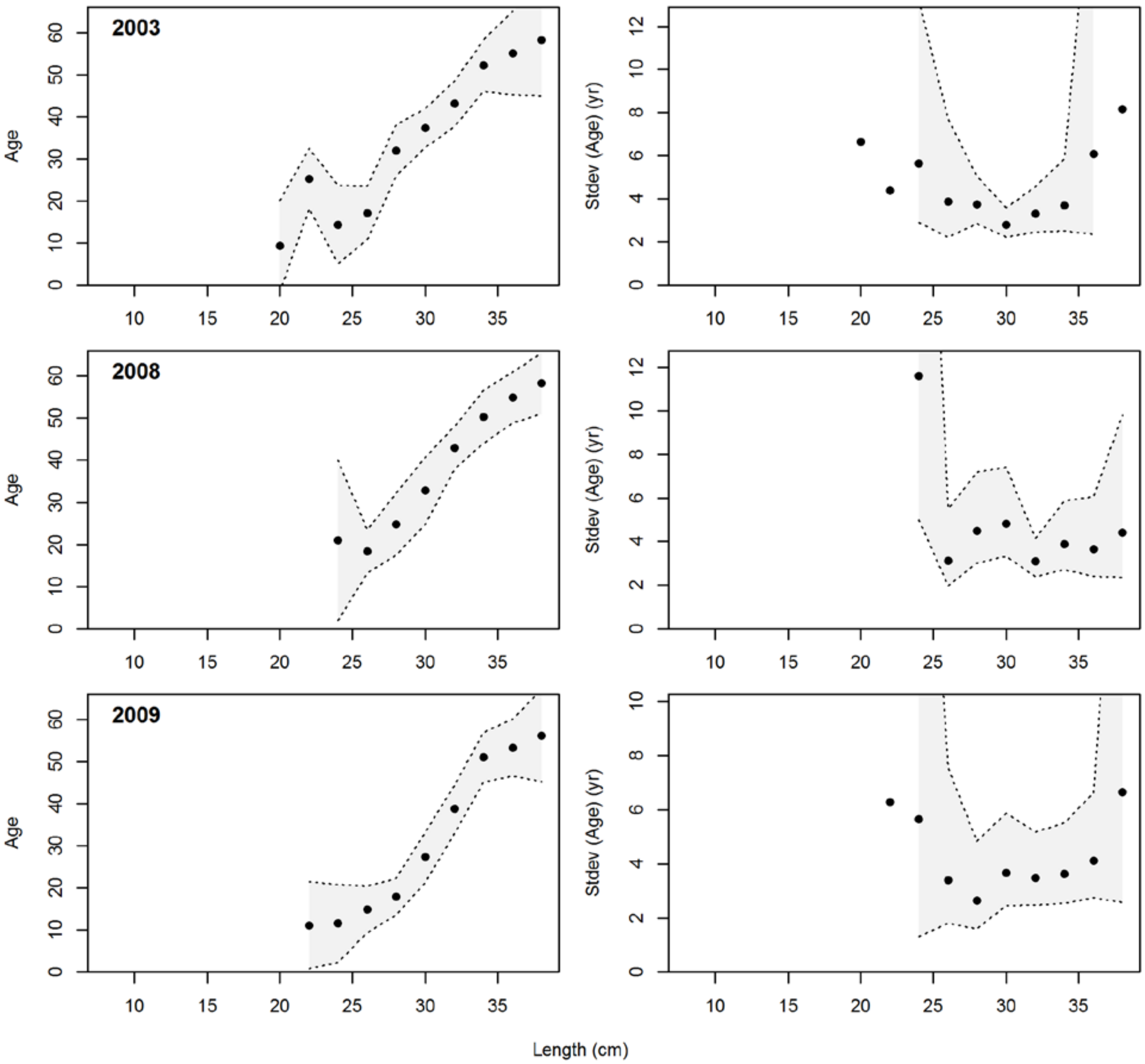


Figure 87. Base case model fits to the conditional age-at-length data (left panels) and precision (right panels) for the trawl fishery for female aurora rockfish.

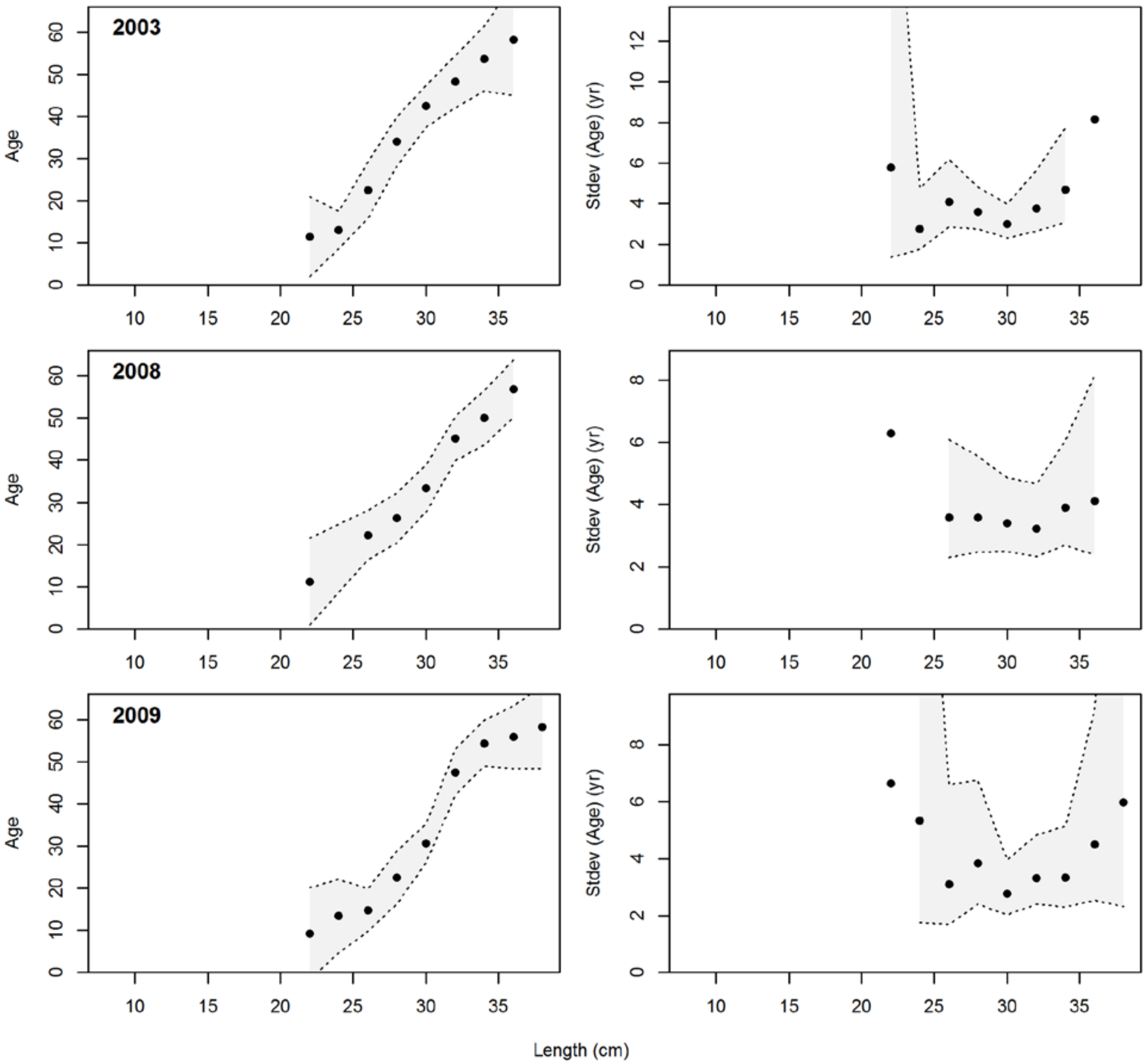


Figure 88. Base case model fits to the conditional age-at-length data (left panels) and precision (right panels) for the trawl fishery for male aurora rockfish.

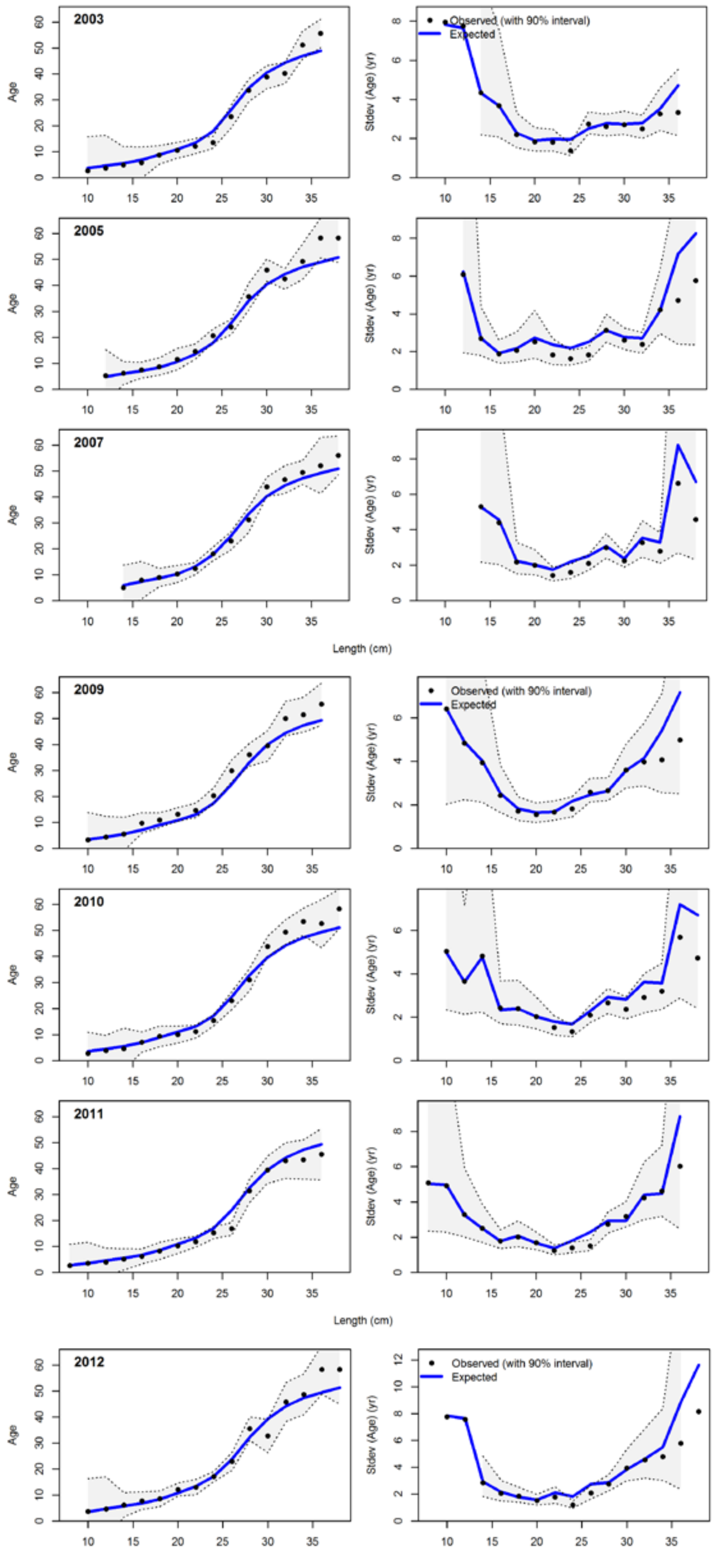


Figure 89. Base case model fits to the conditional age-at-length data (left panels) and precision (right panels) for the NWFSC shelf-slope survey for female aurora rockfish.

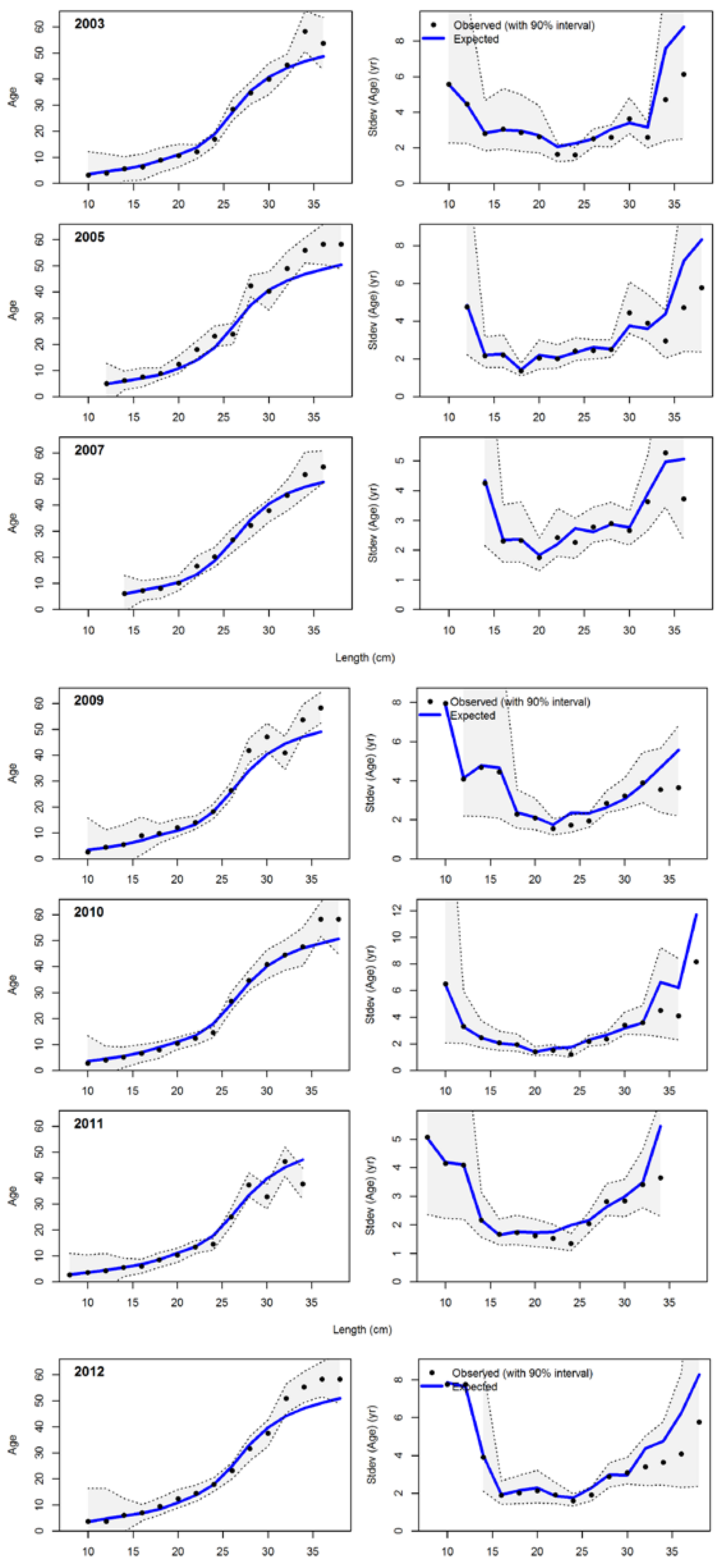


Figure 90. Base case model fits to the conditional age-at-length data (left panels) and precision (right panels) for the NWFSC shelf-slope survey for male aurora rockfish.

9.3.1.5 Selectivity

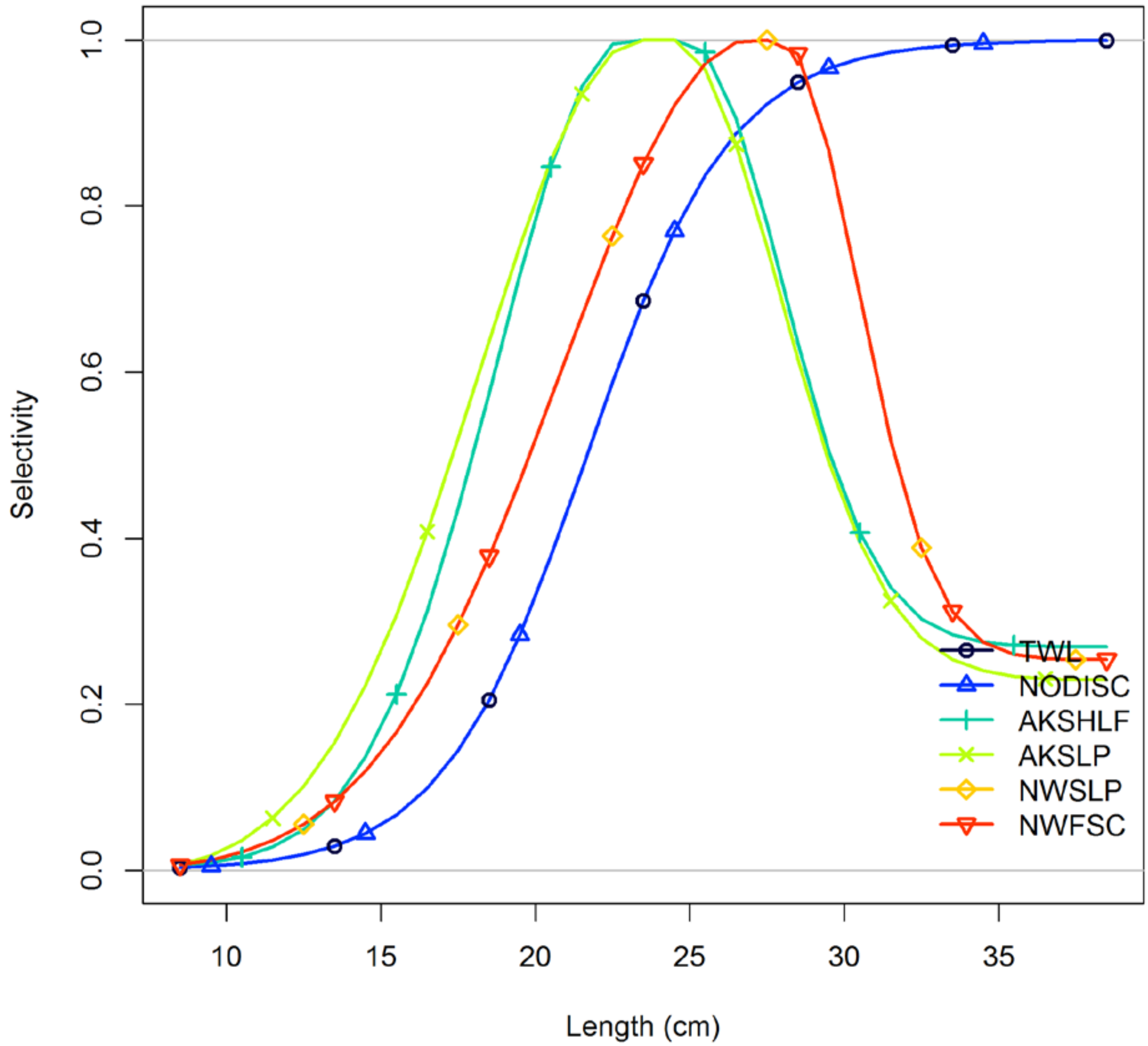
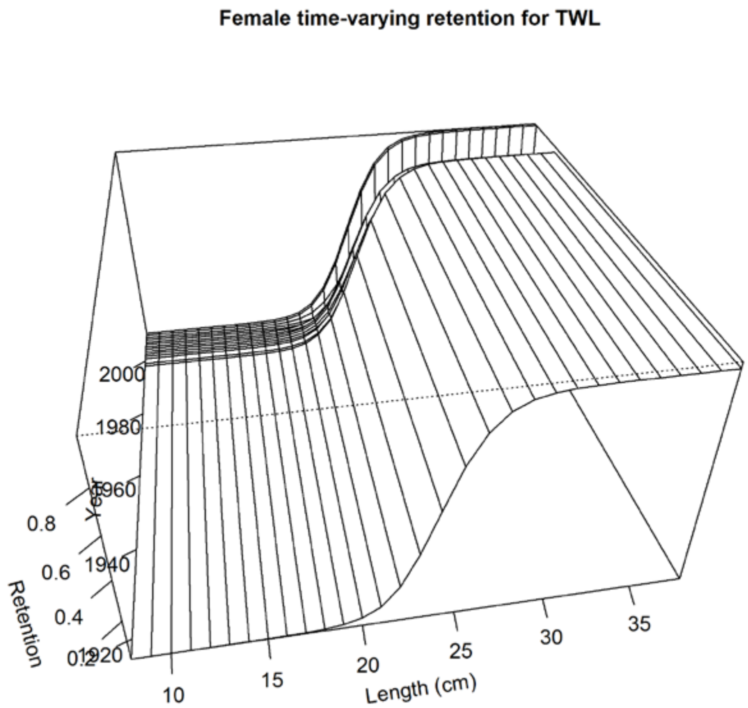


Figure 91. Estimated length-based selectivity in each fleet and survey for the aurora rockfish base case model.



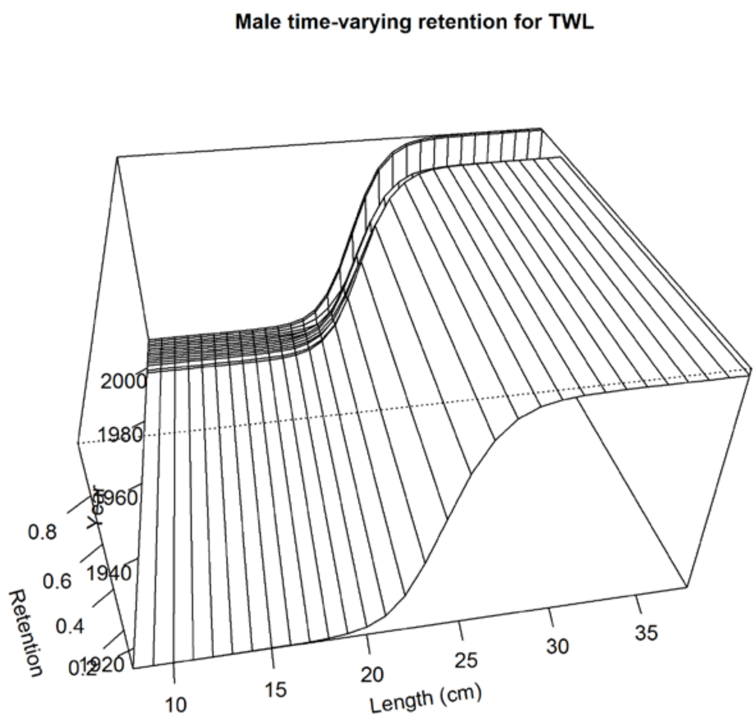


Figure 92. Estimates of the female (top panel) and male (bottom panel) retention curves for each time block in the aurora rockfish base case model.

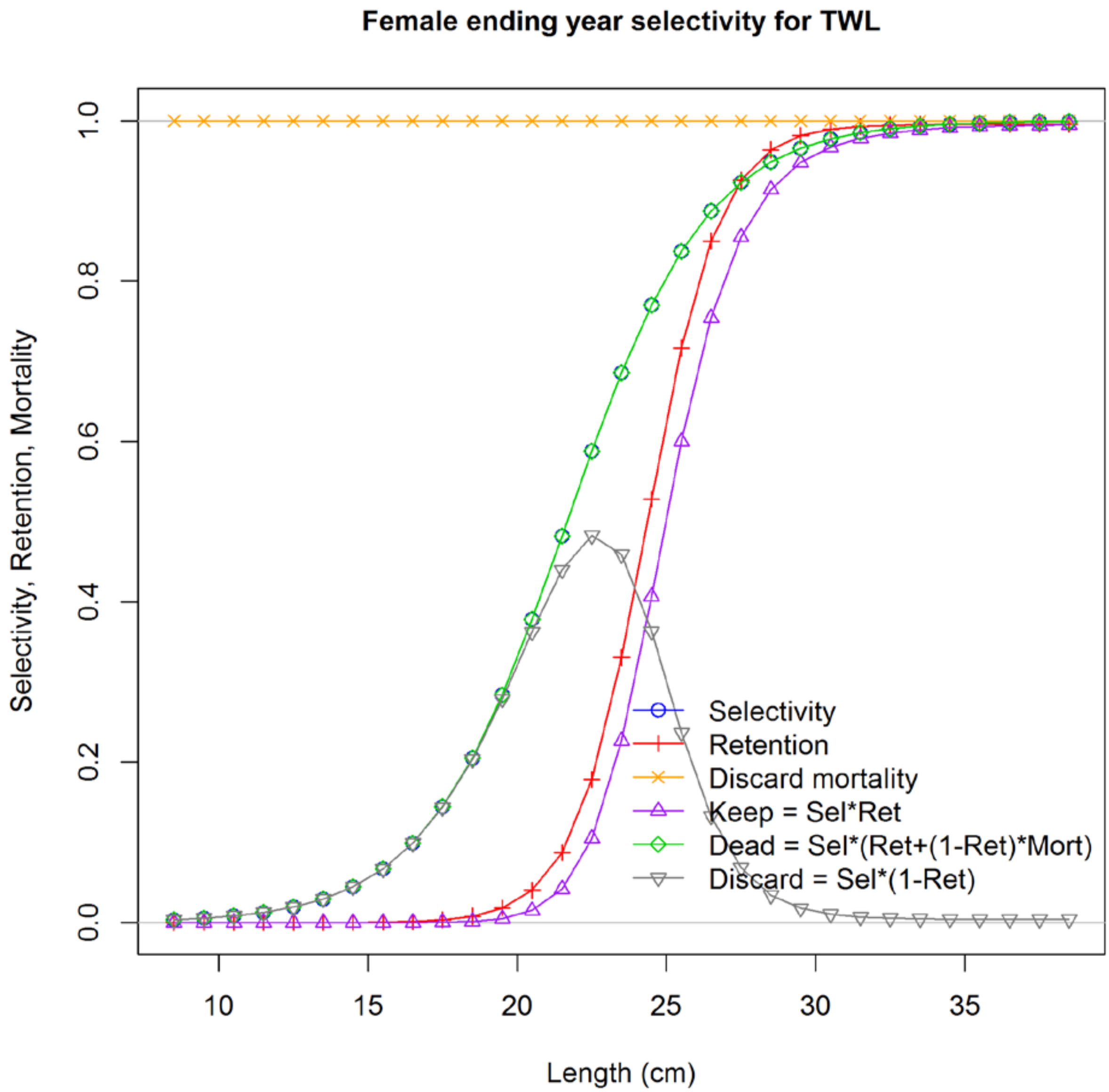


Figure 93. Female selectivity, retention, and mortality curves for the trawl fishery as estimated from the aurora rockfish base case model.

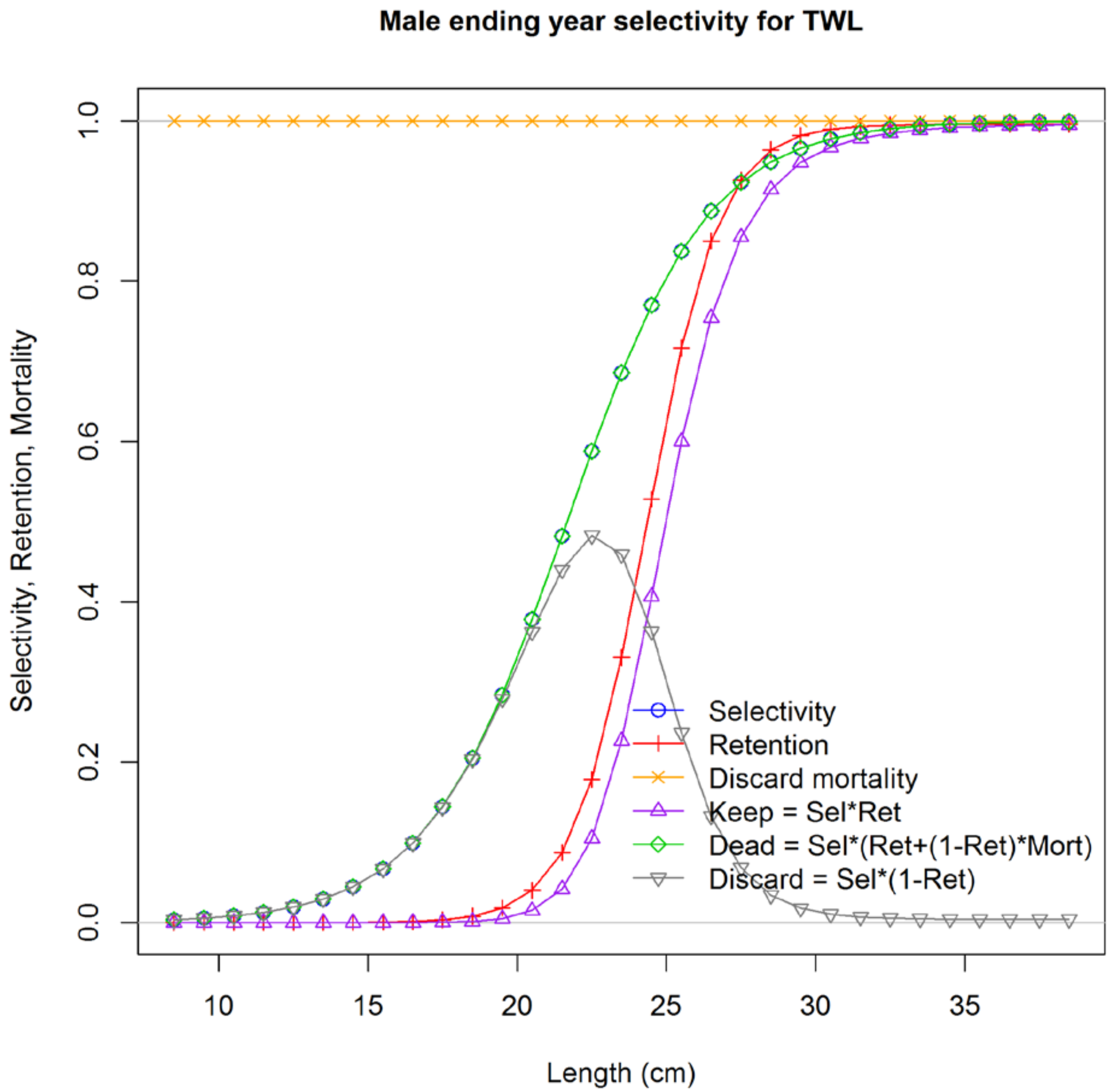


Figure 94. Male selectivity, retention, and mortality curves for the trawl fishery as estimated from the aurora rockfish base case model.

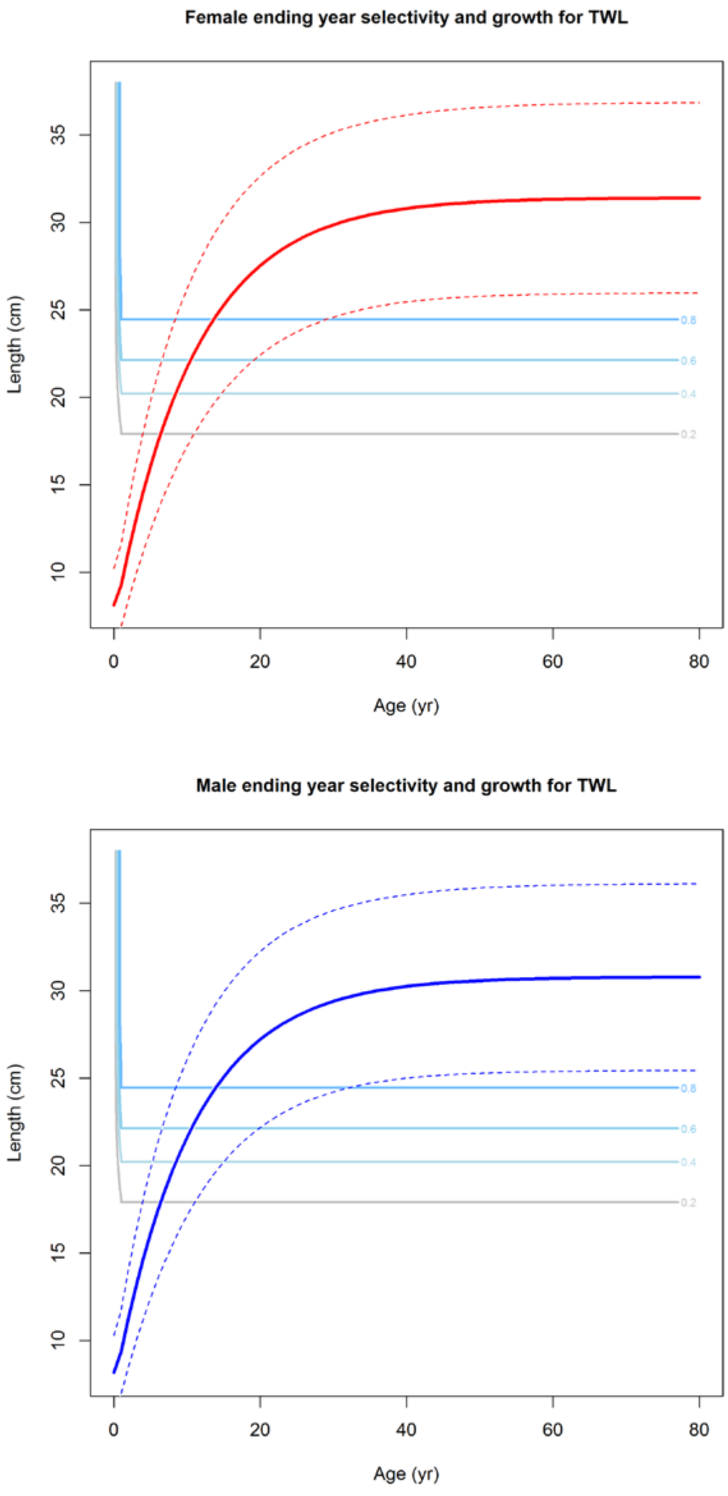


Figure 95. Female (top panel) and male (bottom panel) age and growth (red and blue lines) relative to selectivity curves (lighter colored lines) for the trawl fleet from the aurora rockfish base case model.

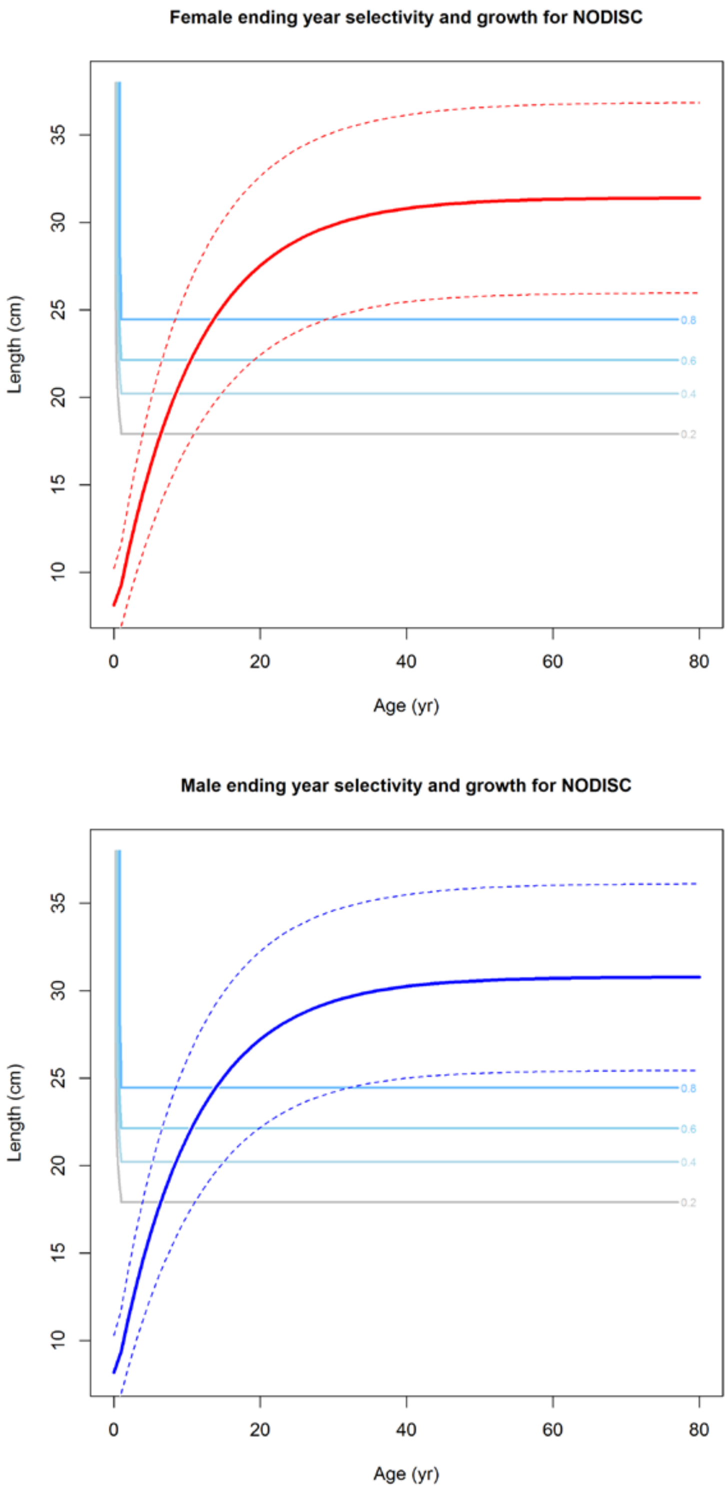
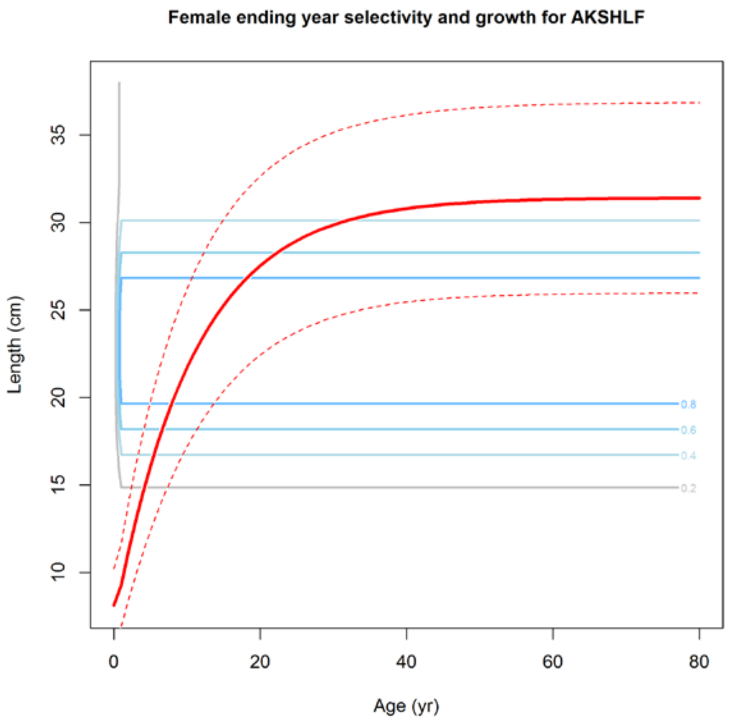


Figure 96. Female (top panel) and male (bottom panel) age and growth (red and blue lines) relative to selectivity curves (lighter colored lines) for the full-retention fleet from the aurora rockfish base case model.



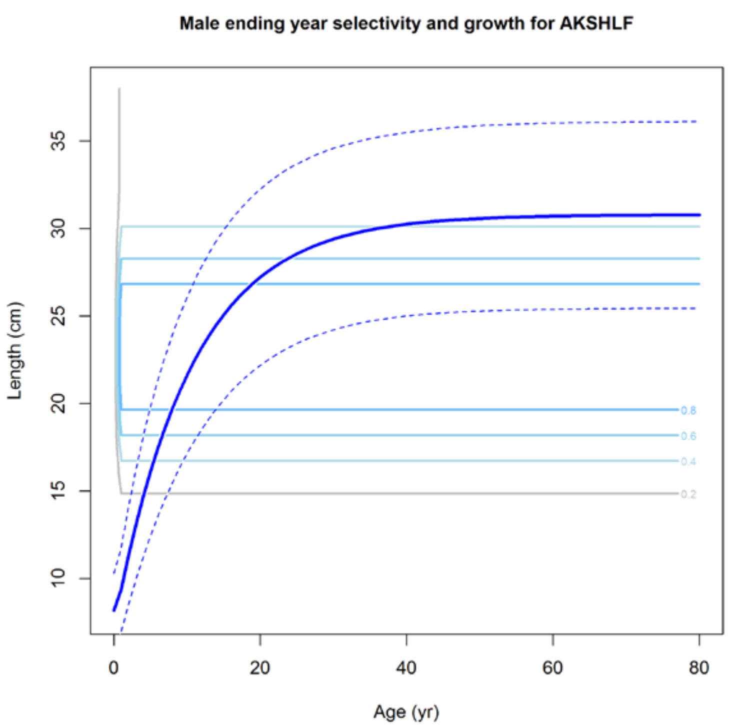


Figure 97. Female (top panel) and male (bottom panel) age and growth (red and blue lines) relative to selectivity curves (lighter colored lines) for the AFSC triennial survey from the aurora rockfish base case model.

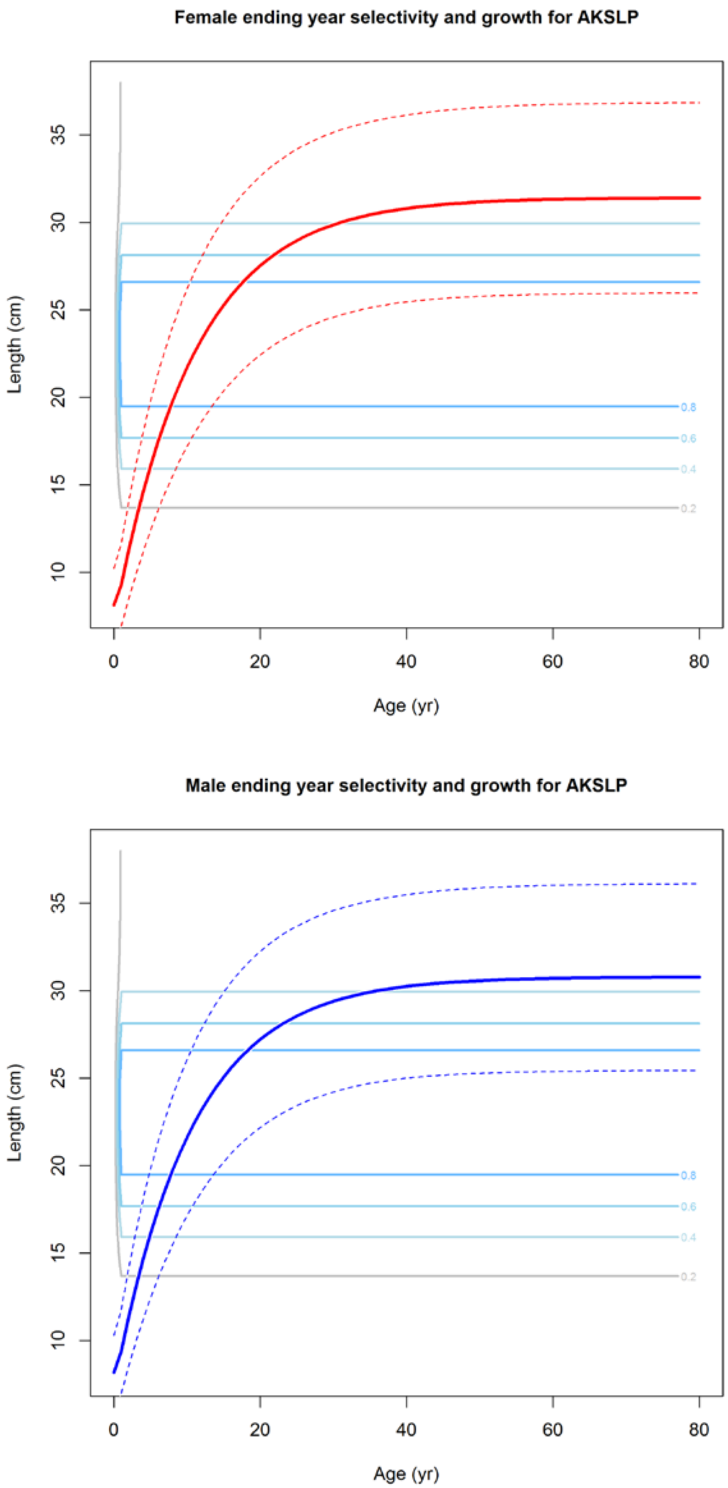


Figure 98. Female (top panel) and male (bottom panel) age and growth (red and blue lines) relative to selectivity curves (lighter colored lines) for the AFSC slope survey from the aurora rockfish base case model.

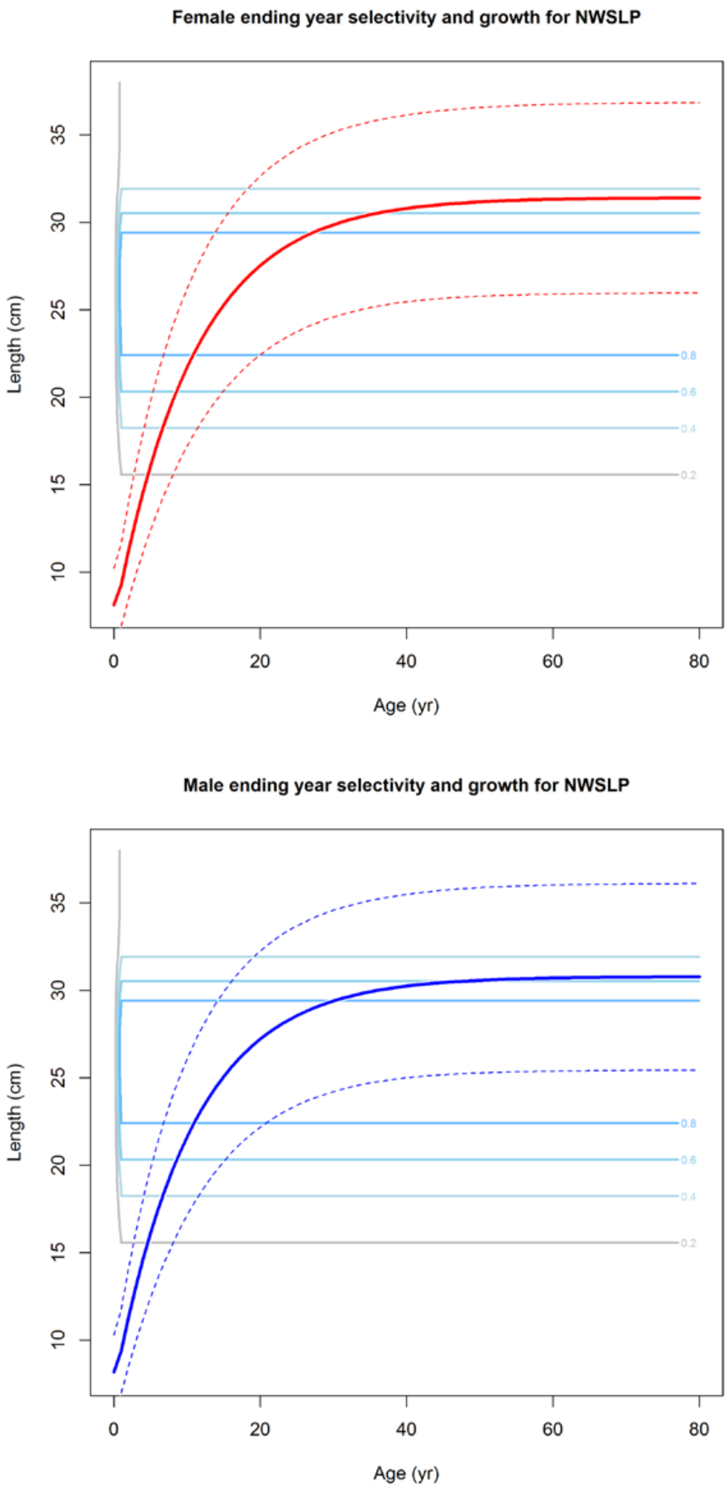
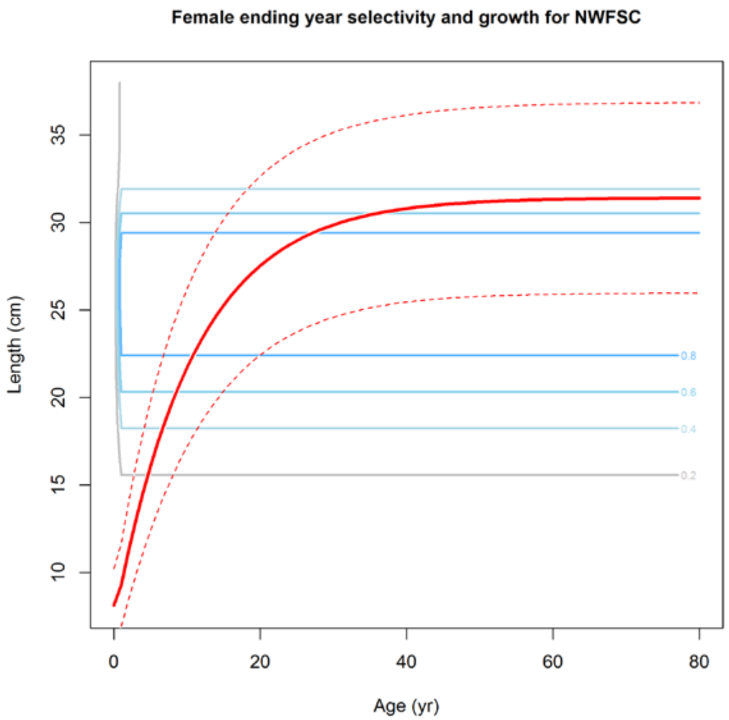


Figure 99. Female (top panel) and male (bottom panel) age and growth (red and blue lines) relative to selectivity curves (lighter colored lines) for the NWFSC slope survey from the aurora rockfish base case model.



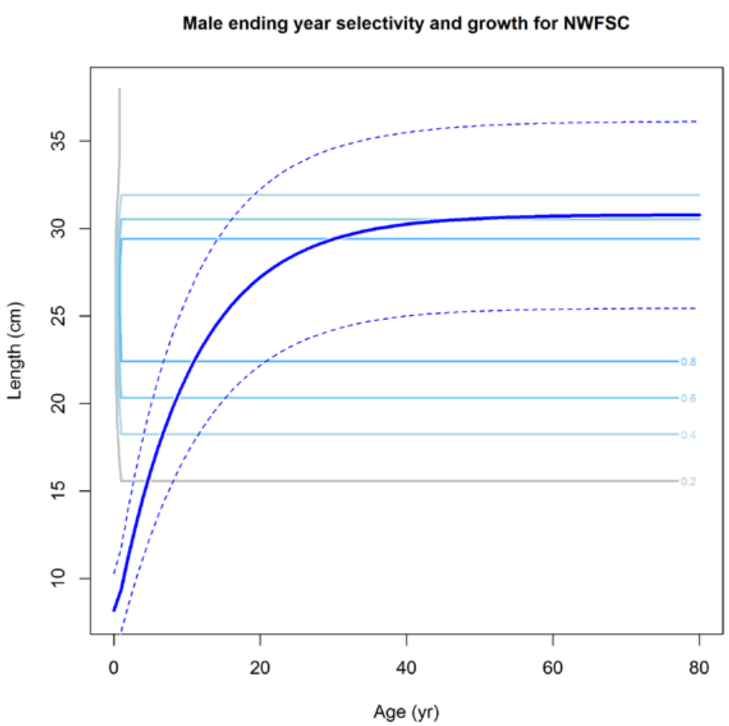


Figure 100. Female (top panel) and male (bottom panel) age and growth (red and blue lines) relative to selectivity curves (lighter colored lines) for the NWFSC shelf-slope survey from the aurora rockfish base case model.

9.3.1.6 Recruitment

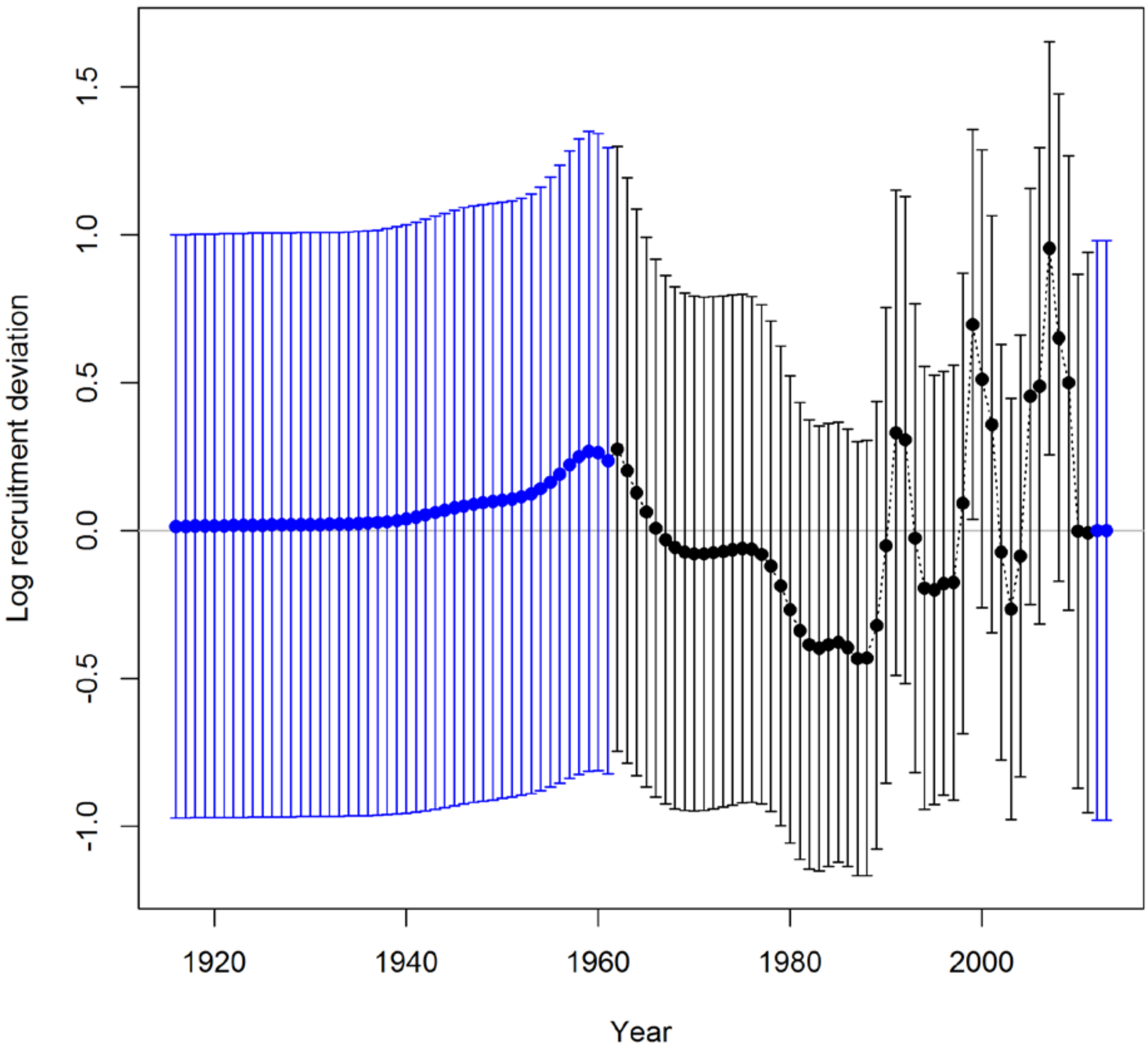


Figure 101. Time series of estimated (black) or deterministic (blue) recruitment deviations from the aurora rockfish base case model. Vertical lines indicate the 95% CIs.

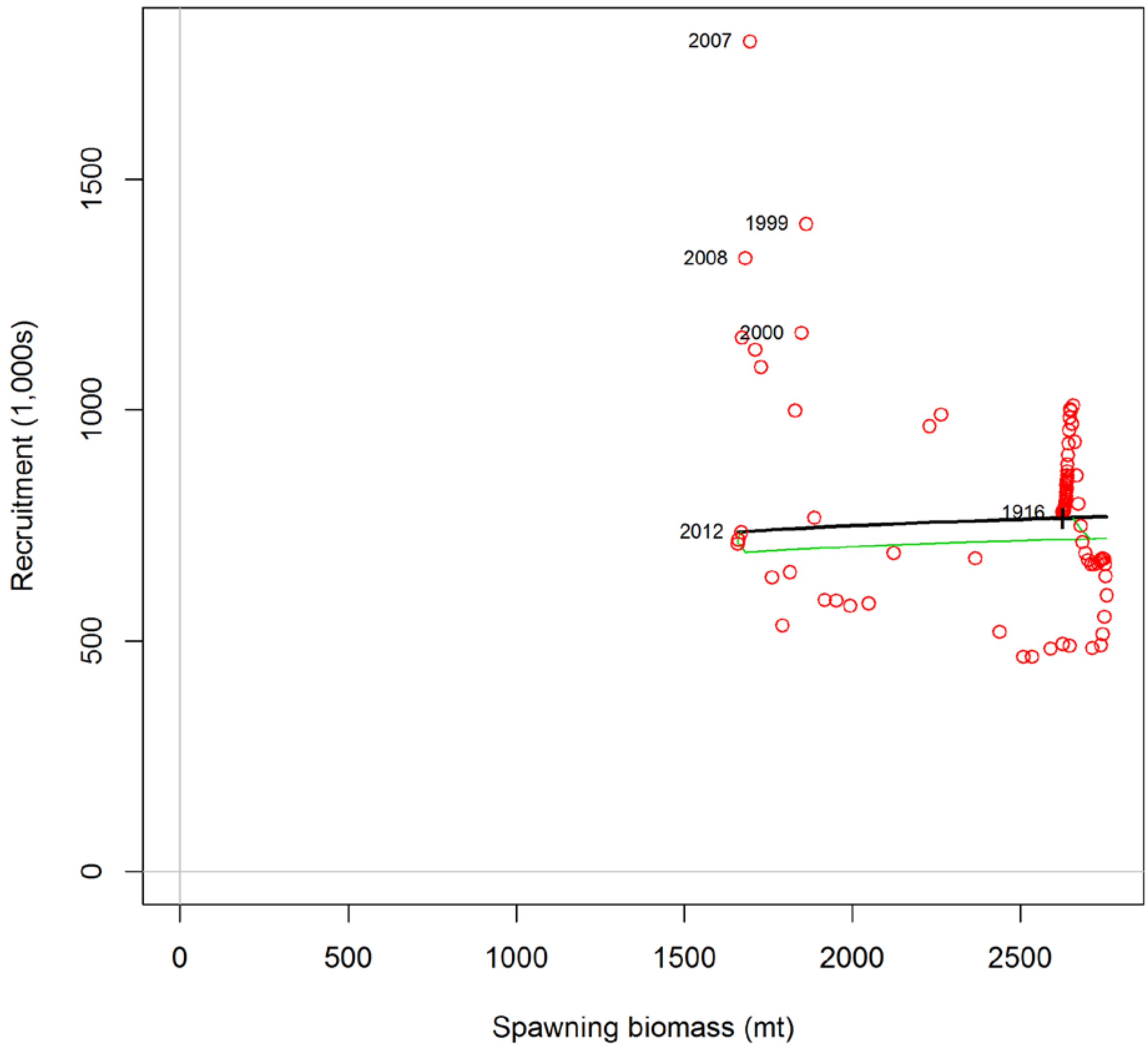


Figure 102. Spawner-recruit time series from the aurora rockfish base case model. Reference years (beginning, ending, and high points) are labeled.

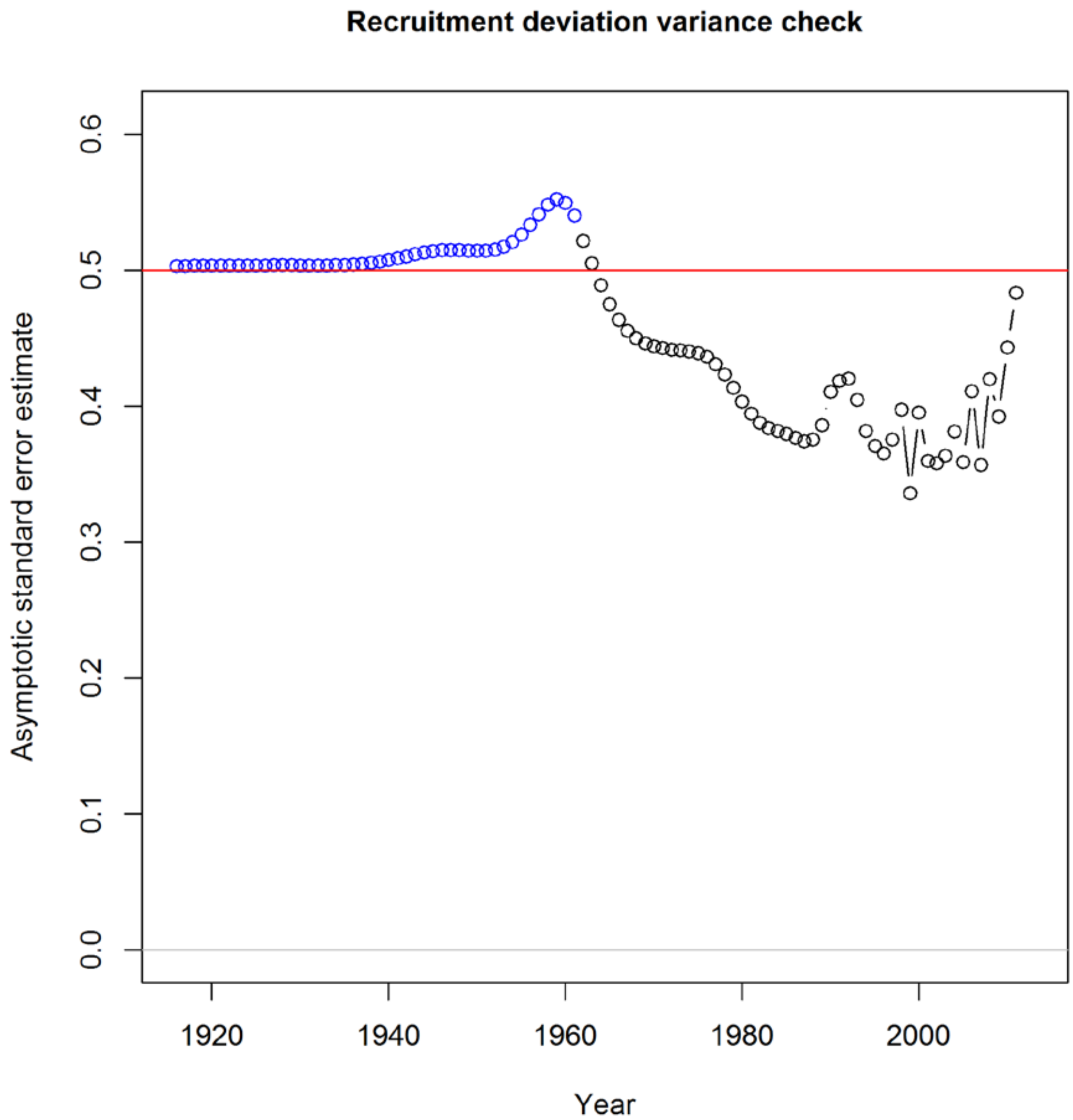


Figure 103. Time series of the estimated asymptotic recruitment error for years with estimated (black) or deterministic (blue) recruitment deviations from the base case aurora rockfish assessment. Assumed model values are indicated by the red line.

9.3.1.7 Biomass and status

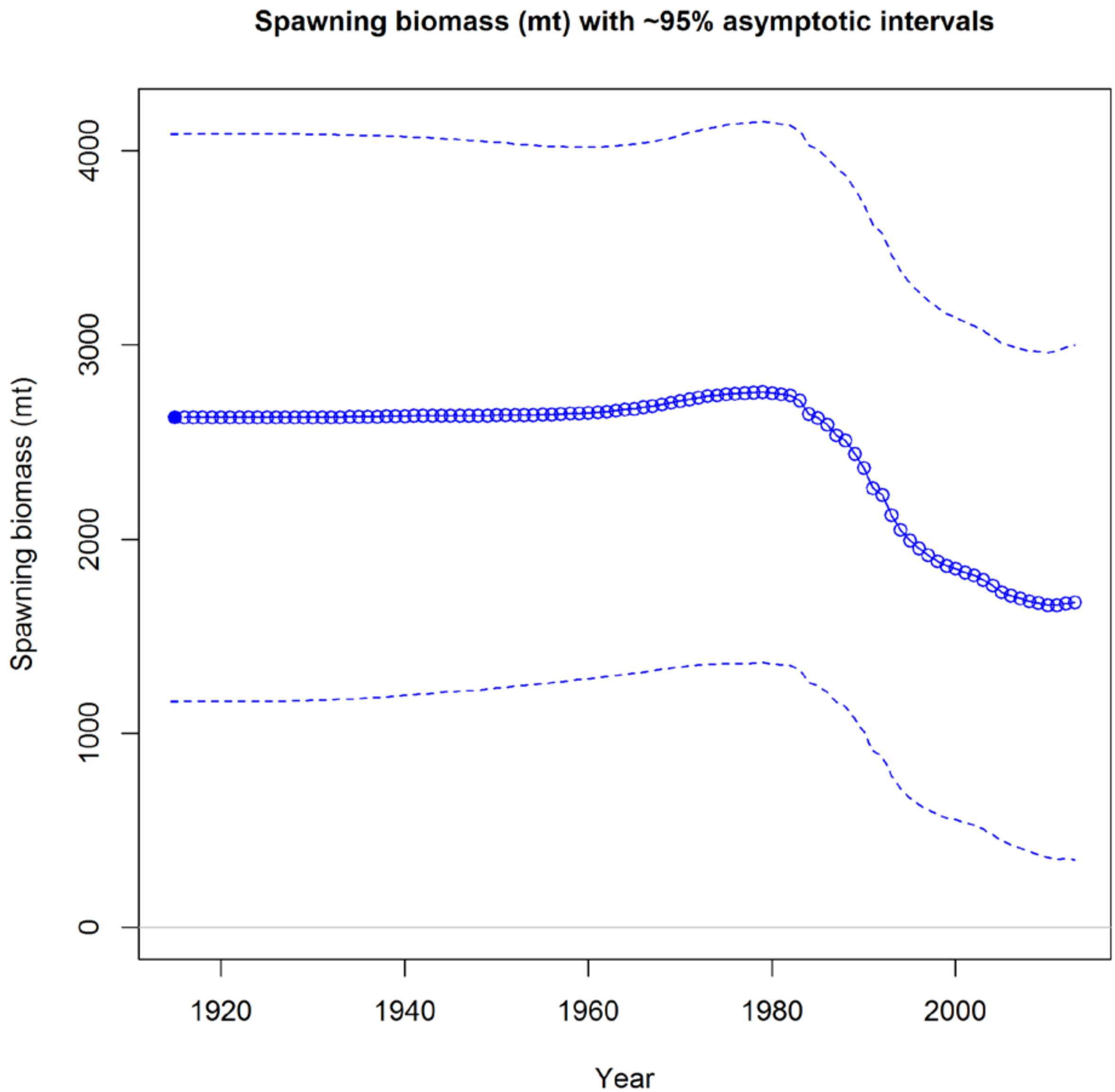


Figure 104. Time series of spawning biomass with asymptotic estimated 95% CIs for the aurora rockfish base case model.

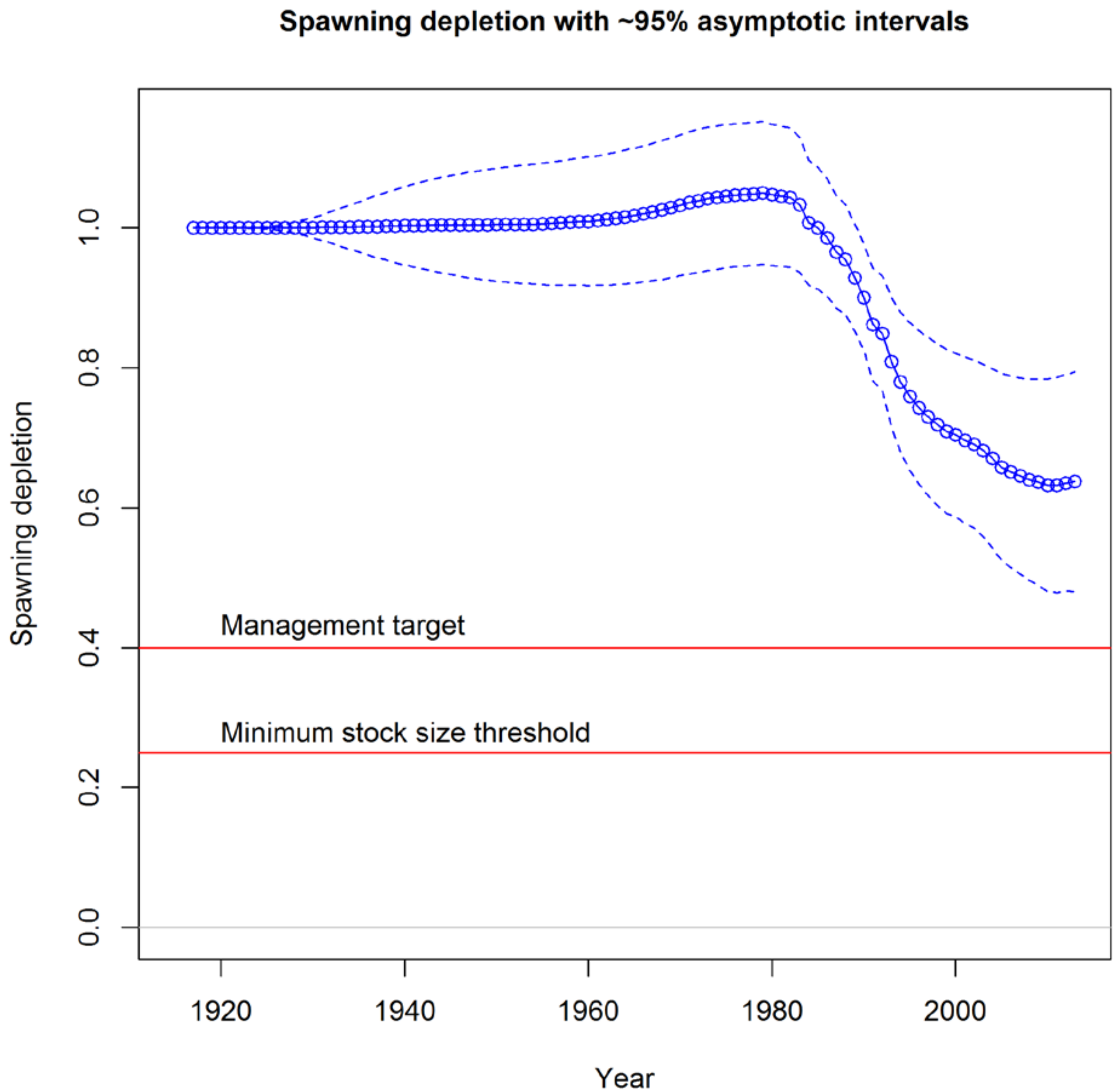


Figure 105. Time series of stock status (depletion) with asymptotic estimated 95% CIs for the aurora rockfish base case model.

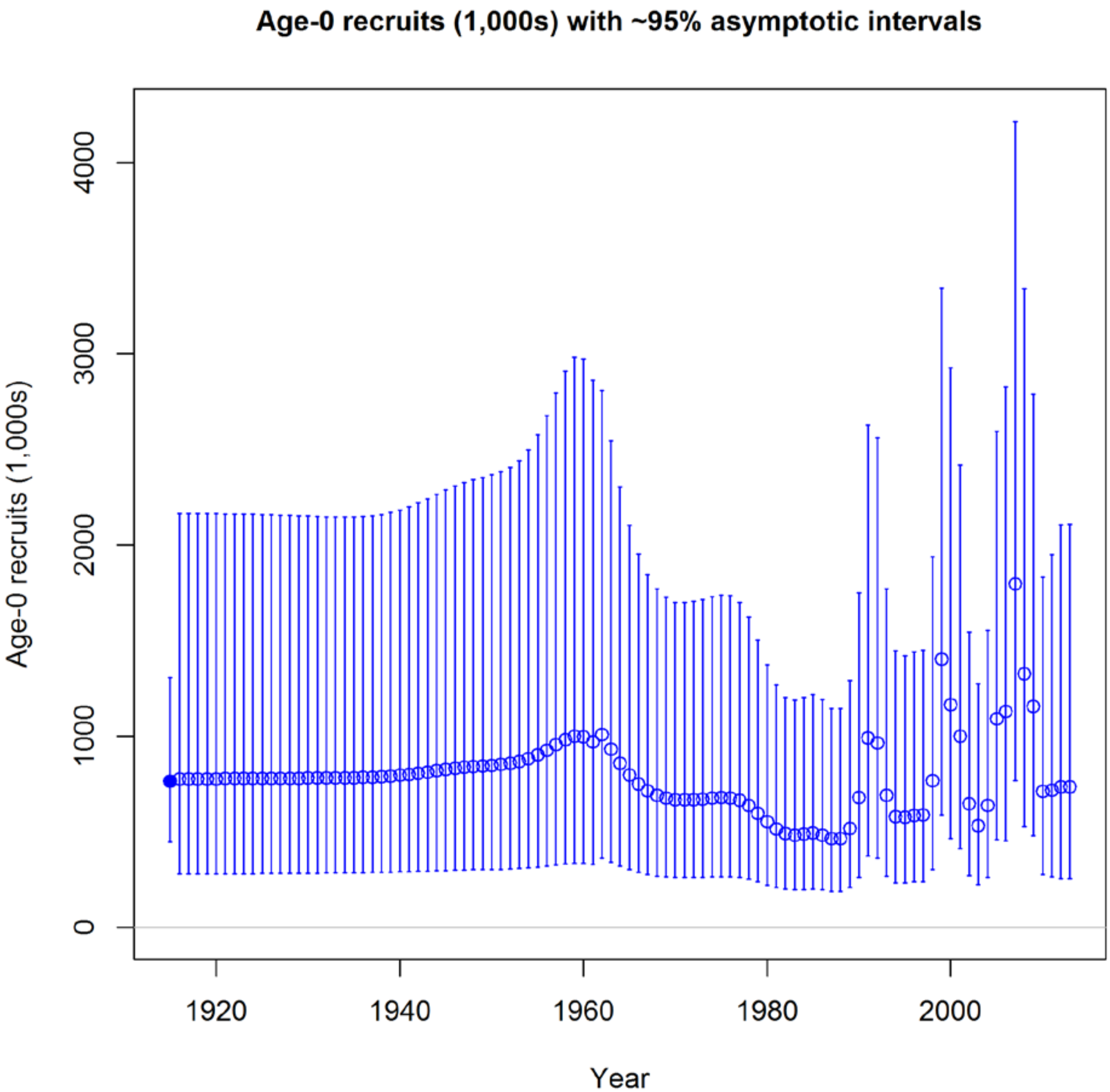


Figure 106. Time series of recruitment with asymptotic estimated 95% CIs for the aurora rockfish base case model.

9.3.1.8 Management outputs

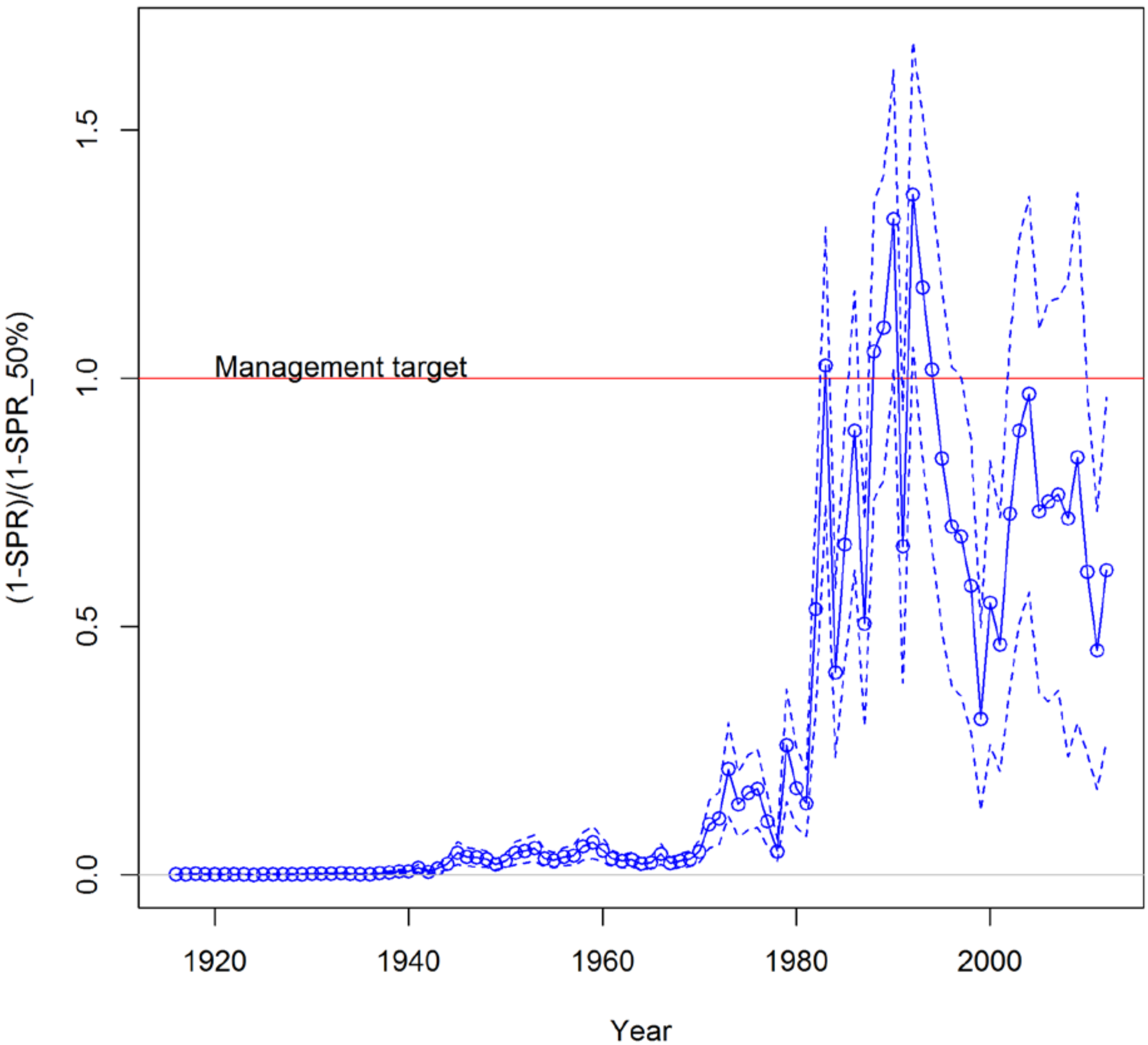


Figure 107. Time series of exploitation relative to the management target from the aurora rockfish base case model. Symbols and line are the mean values. Broken lines indicate asymptotically estimated 95% CIs.

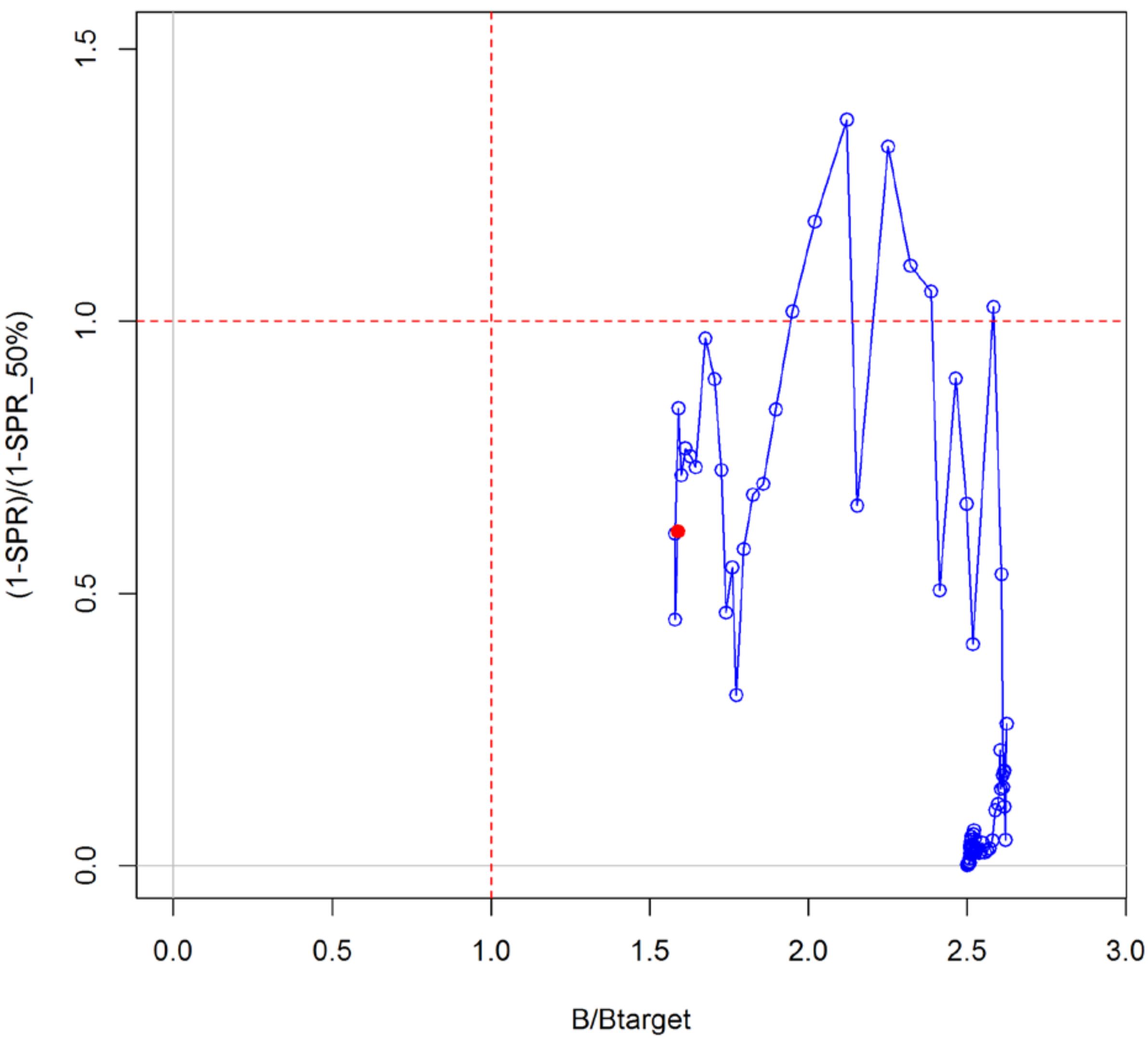


Figure 108. Quadrant plot showing the time series of stock status (x-axis) and exploitation metrics (y-axis) from the aurora rockfish base case model. Red vertical broken line indicated biomass target; red horizontal broken line indicates exploitation target. Red dot is the current year.

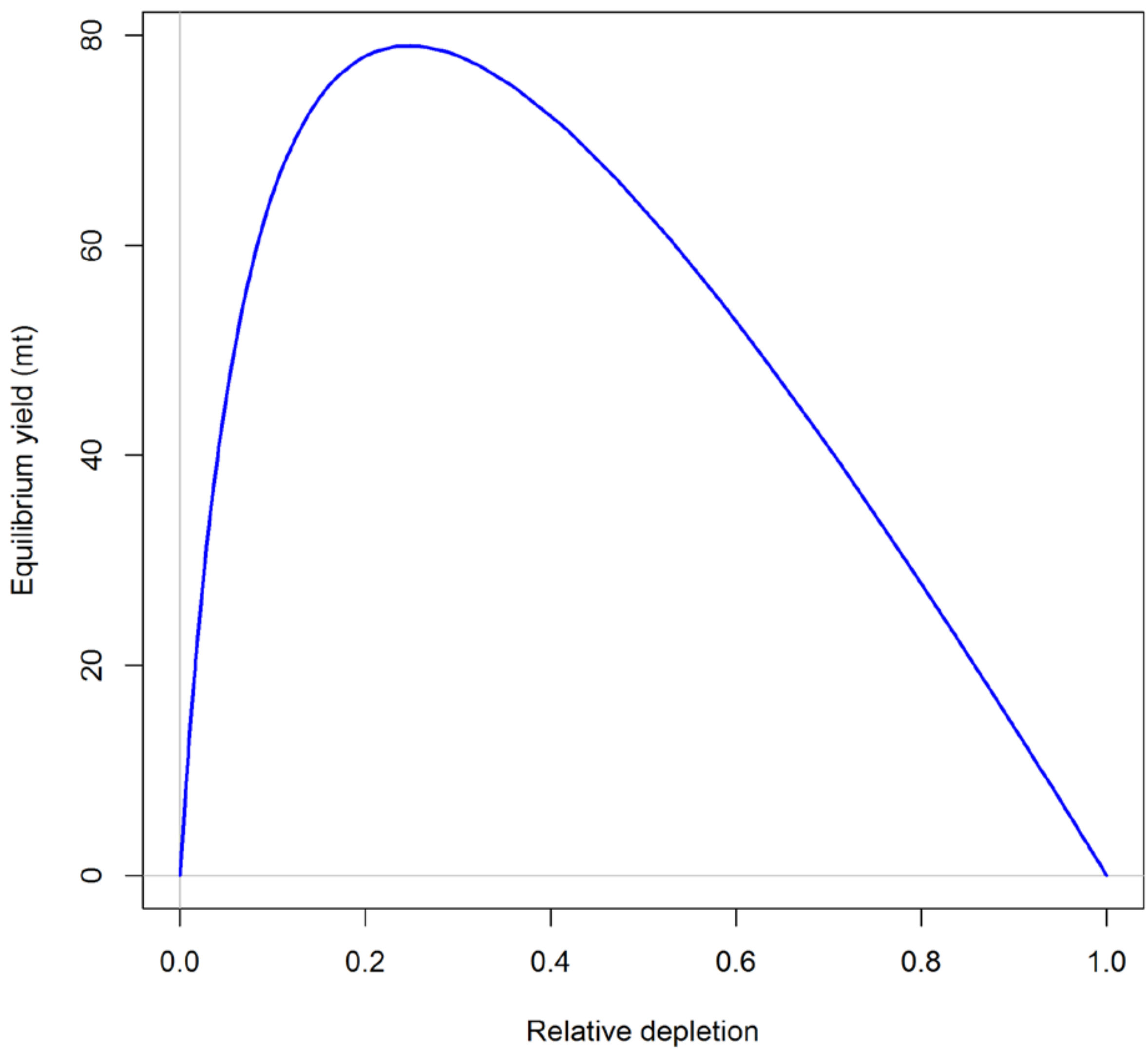


Figure 109. Yield curve for aurora rockfish from the base case model.

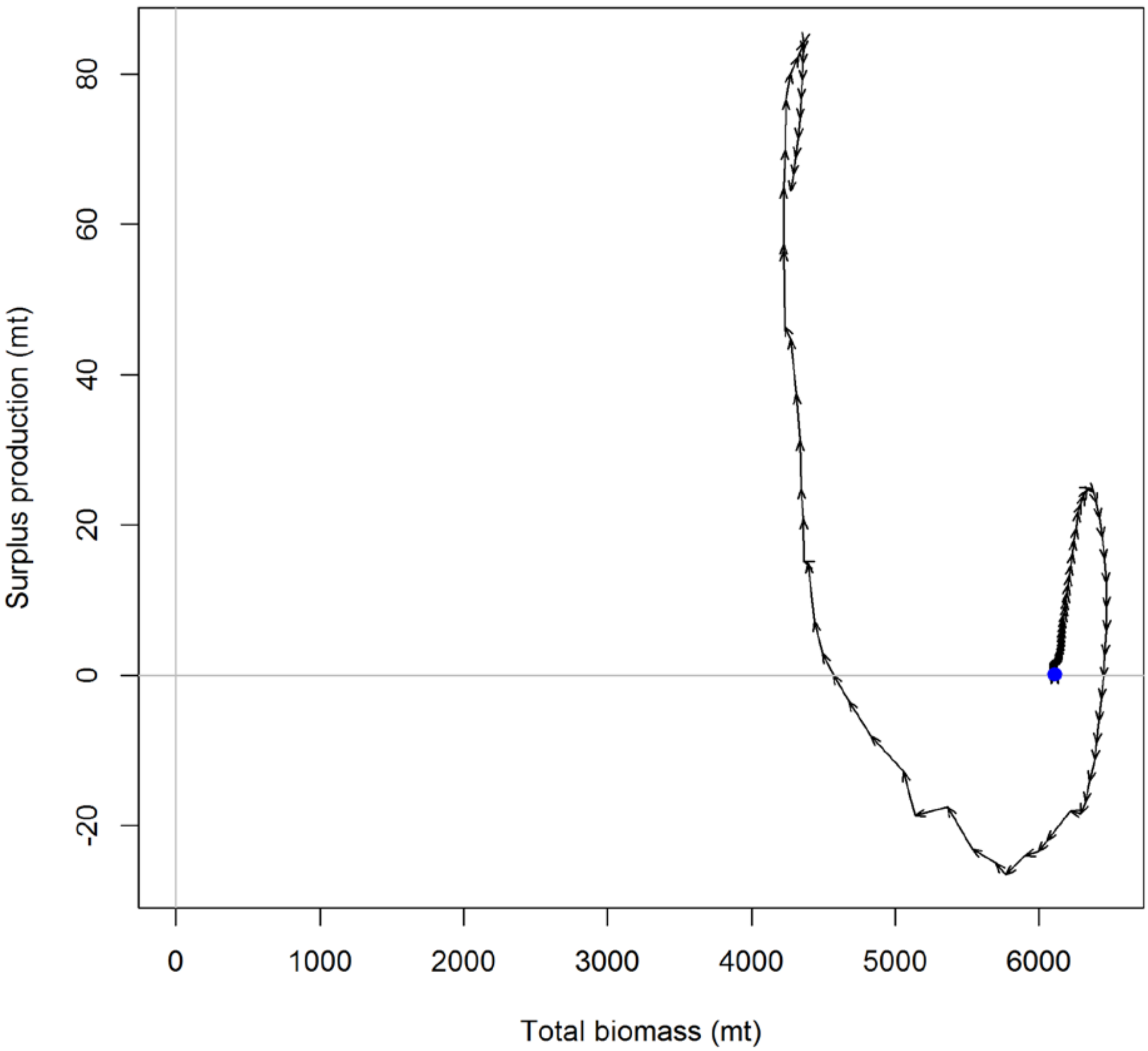


Figure 110. Time series of surplus production from the aurora rockfish base case model.

9.3.2 Profiles

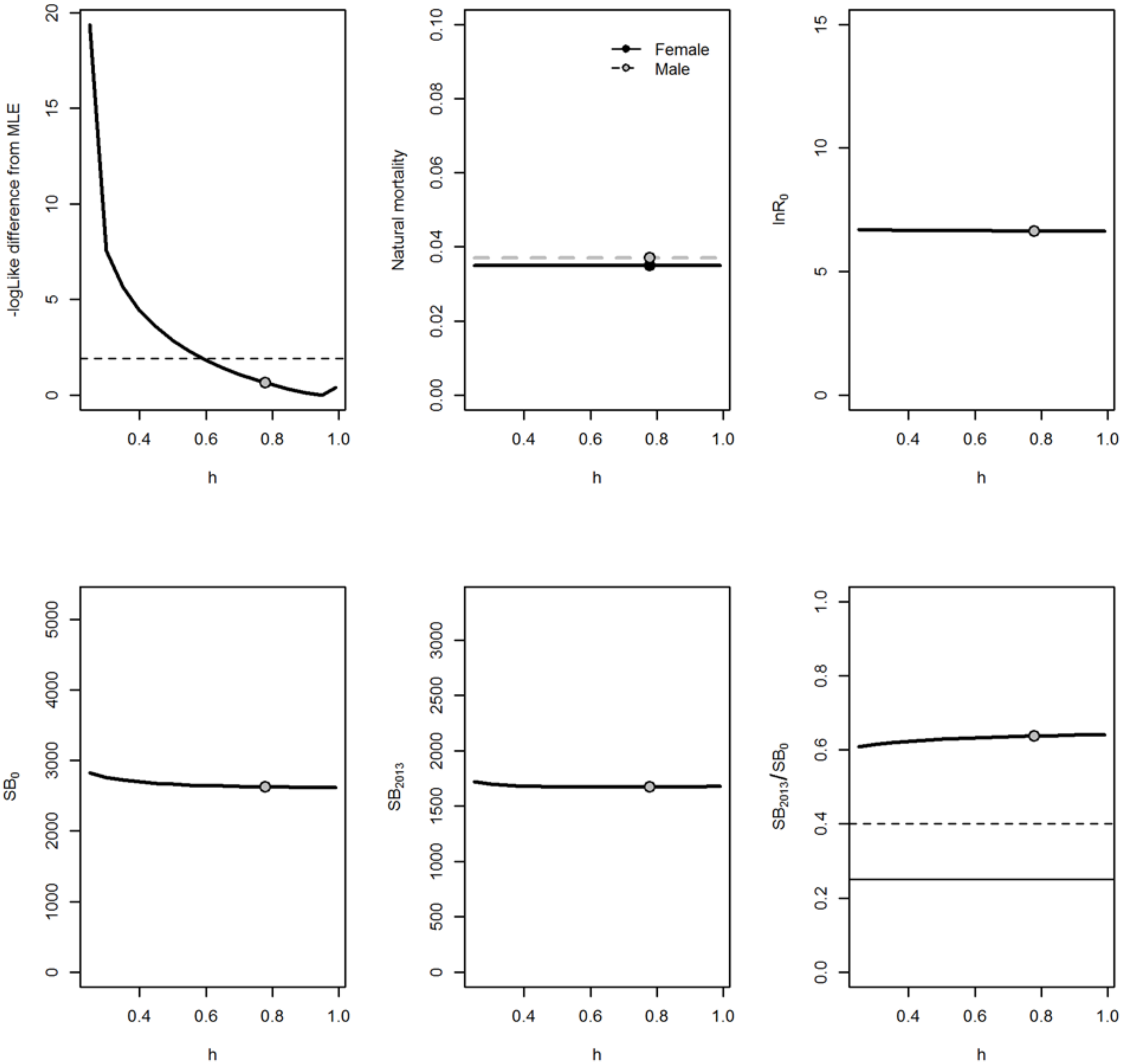


Figure 111. Likelihood profile for steepness (*h*; top left panel) and sensitivity to *h* of estimated (top center and right panels) and derived assessment outputs (bottom panels) for aurora rockfish. The MLE is indicated by the circle. Top left panel: broken line is 95% interval; Top middle panel: solid and broken lines are the female and male *M* values; Bottom right panel: Solid and broken line are the target and limit biomass reference points.

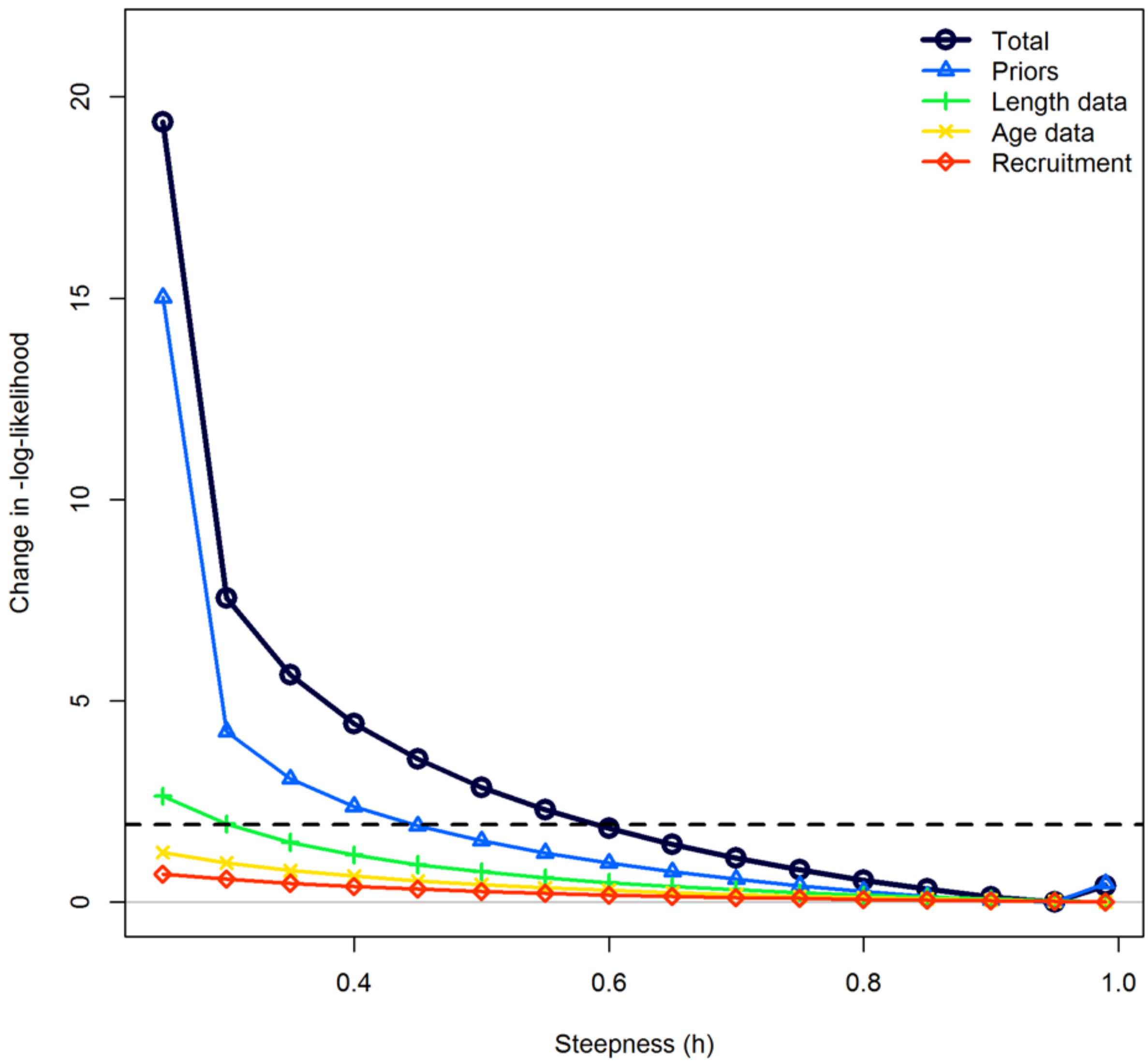


Figure 112. Change in likelihood for the total likelihood and each likelihood component as profiled across steepness (h). Broken horizontal line indicates significant change in likelihood.

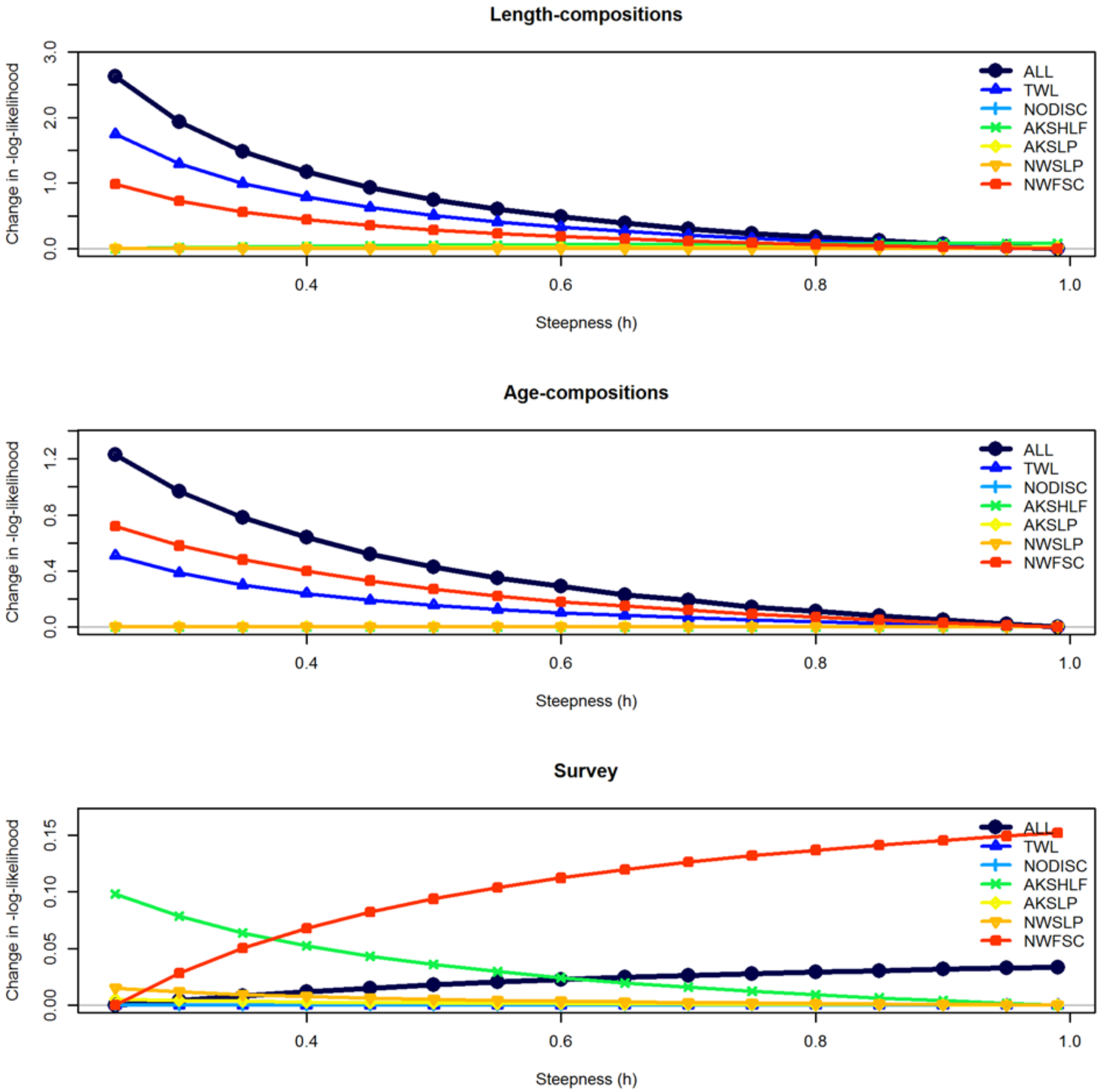


Figure 113. Change in likelihood for each fleet contribution to the likelihood component as profiled across steepness (h).

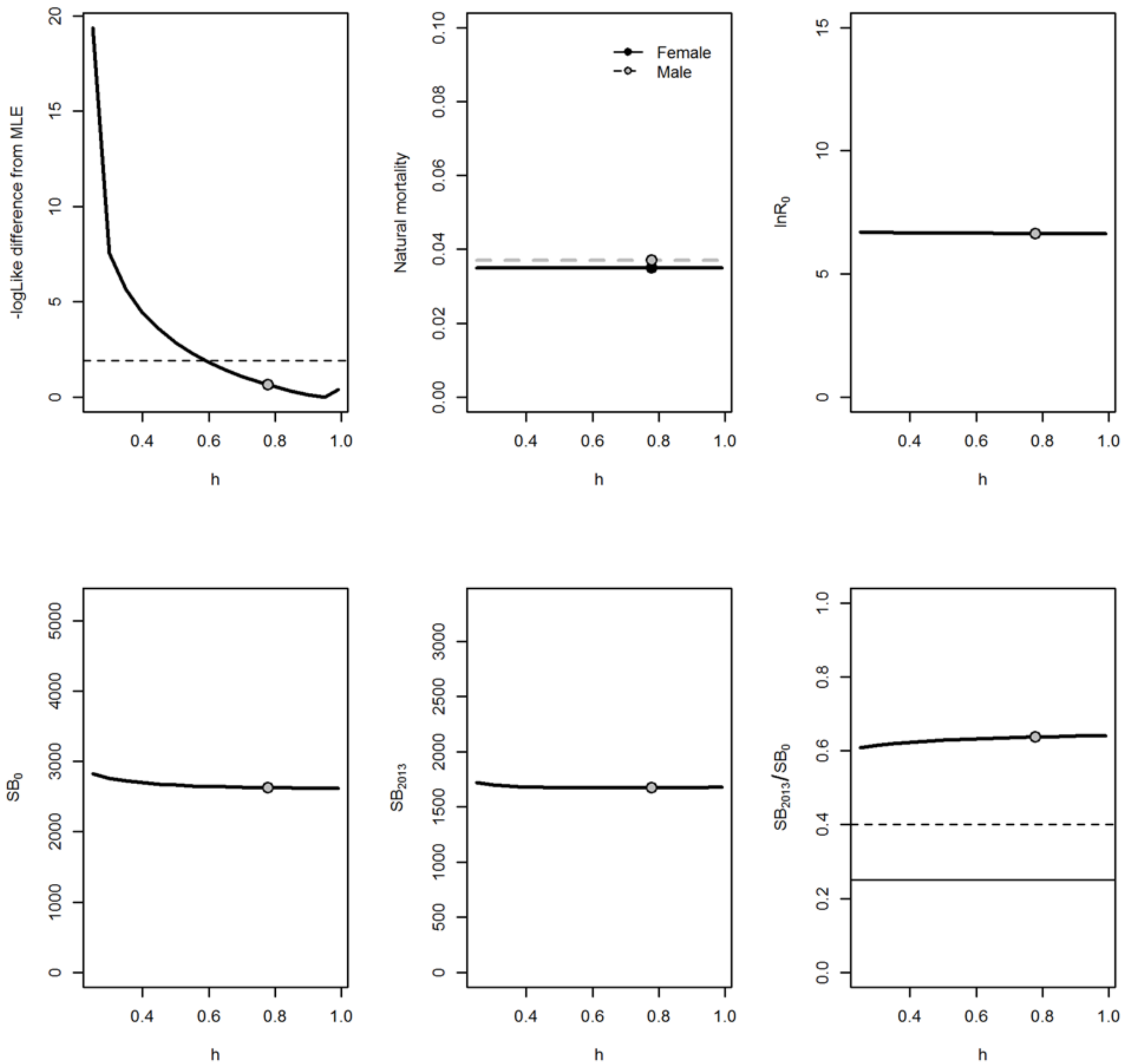


Figure 114. Likelihood profile for steepness (*h*; top left panel) and sensitivity to *h* of estimated (top center and right panels) and derived assessment outputs (bottom panels) for aurora rockfish when both female and male natural mortality (M) is estimated. The base case MLE is indicated by the circle as a reference point. Top left panel: broken line is 95% interval; Top middle panel: solid and broken lines are the female and male *M* values; Bottom right panel: Solid and broken line are the target and limit biomass reference points.

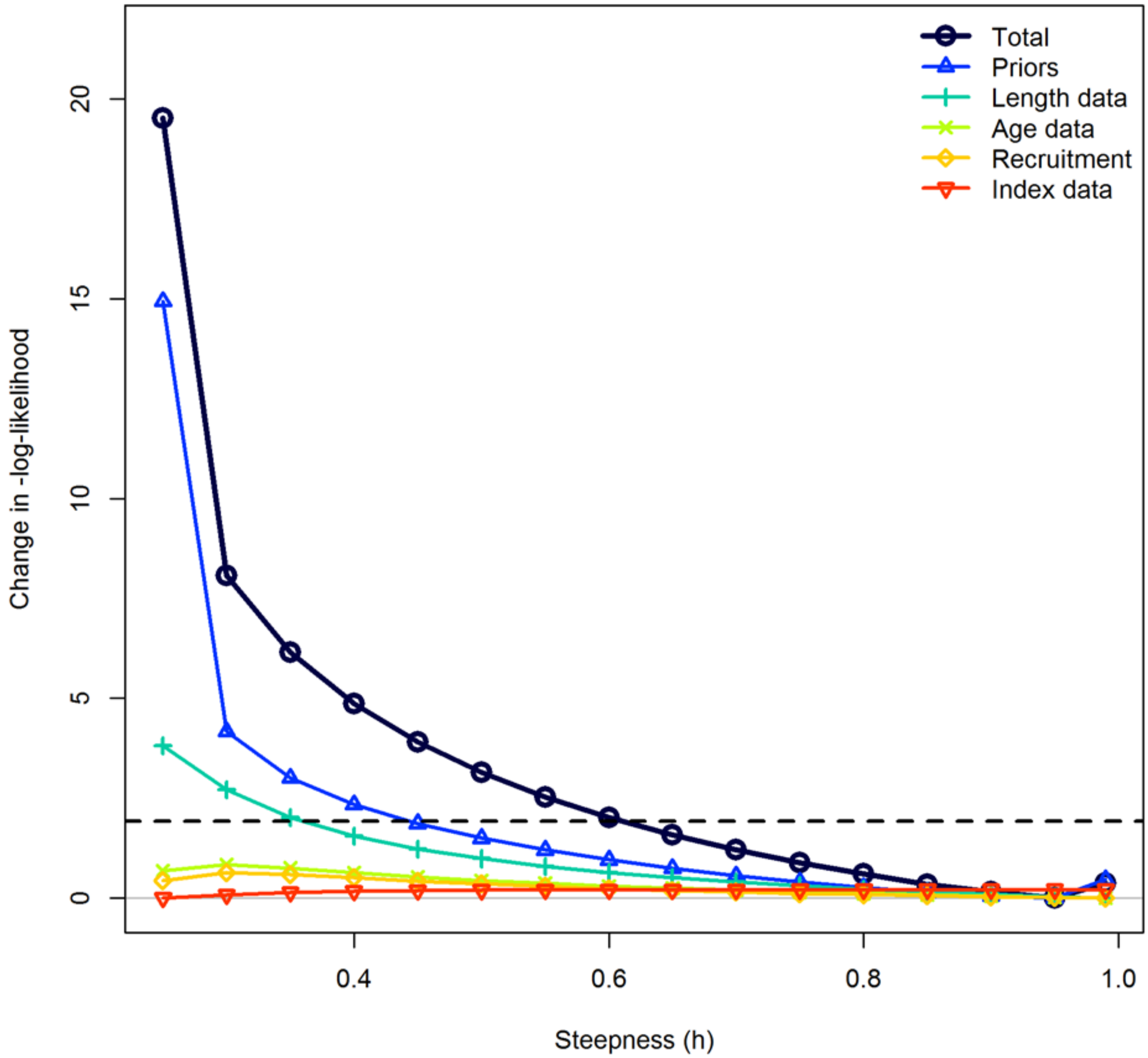


Figure 115. Change in likelihood for the total likelihood and each likelihood component as profiled across steepness (h) when female and male natural mortality are being estimated. Broken horizontal line indicates significant change in likelihood.

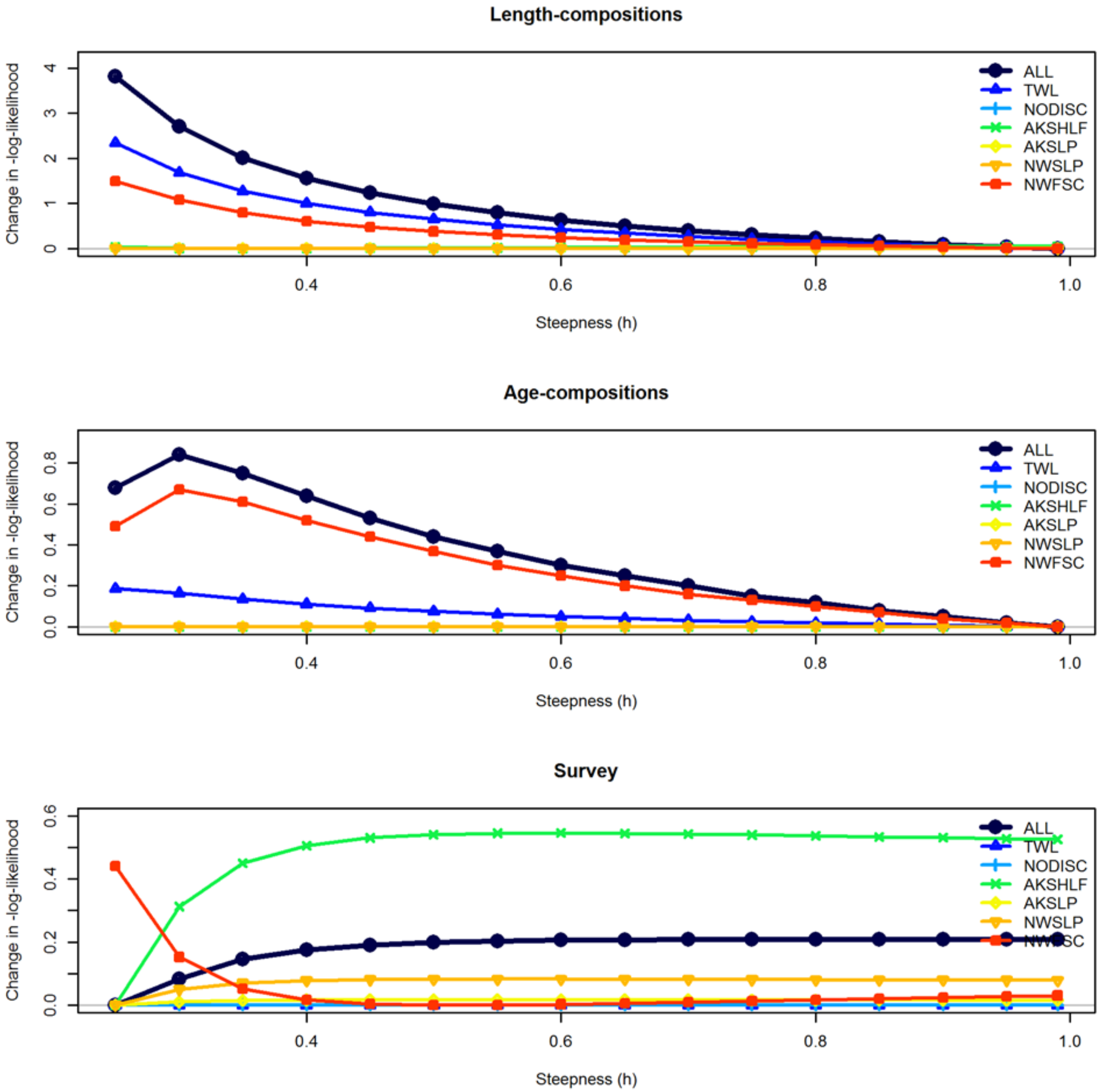


Figure 116. Change in likelihood for each fleet contribution to the likelihood component as profiled across steepness (h) when female and male natural mortality are being estimated.

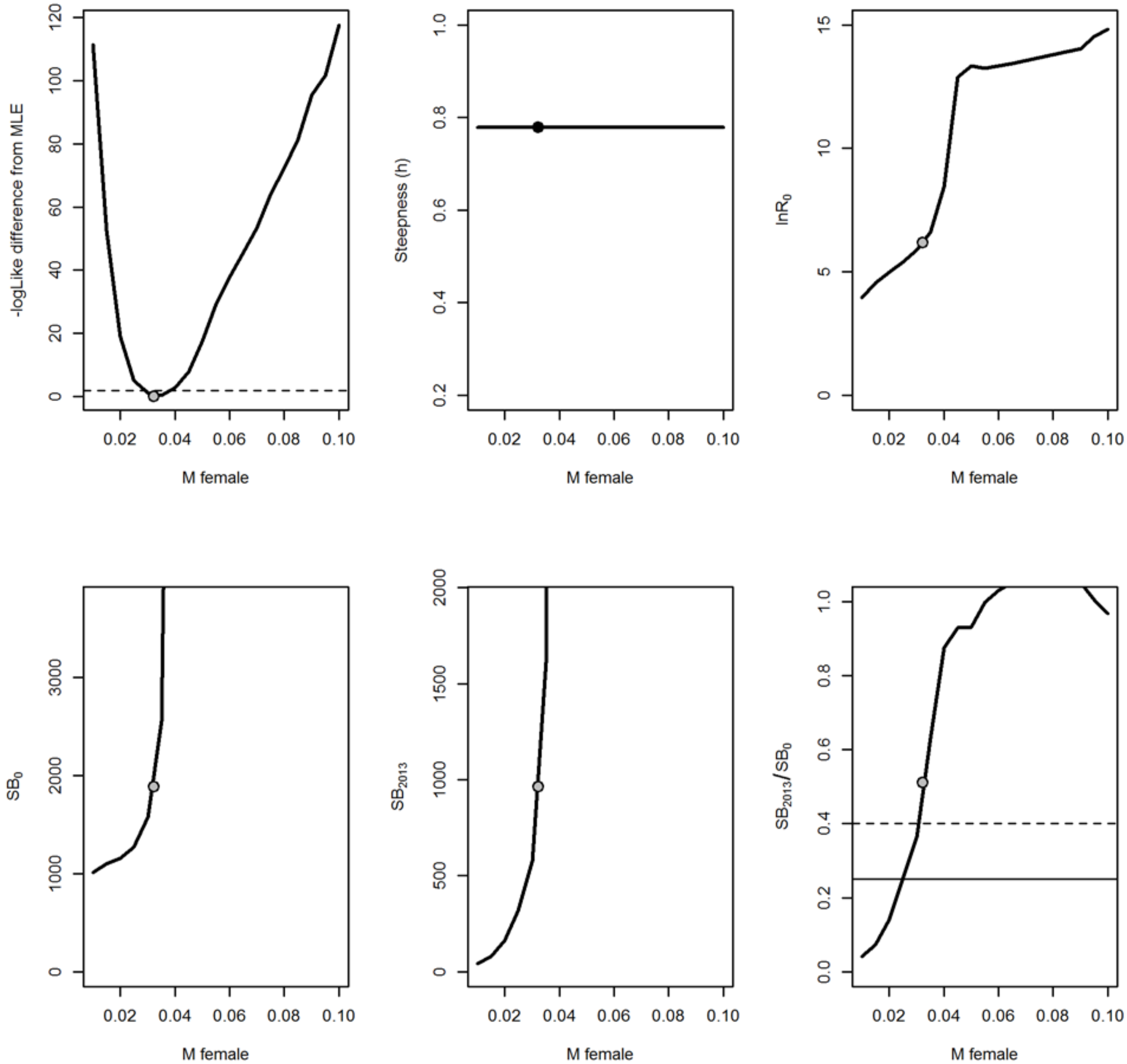


Figure 117. Likelihood profile for female natural mortality (*M*; top left panel) and sensitivity to female *M* of estimated (top center and right panels) and derived assessment outputs (bottom panels) for aurora rockfish when male natural mortality is estimated. The base case MLE is indicated by the circle as a reference point. Top left panel: broken line is 95% interval. Bottom right panel: Solid and broken line are the target and limit biomass reference points.

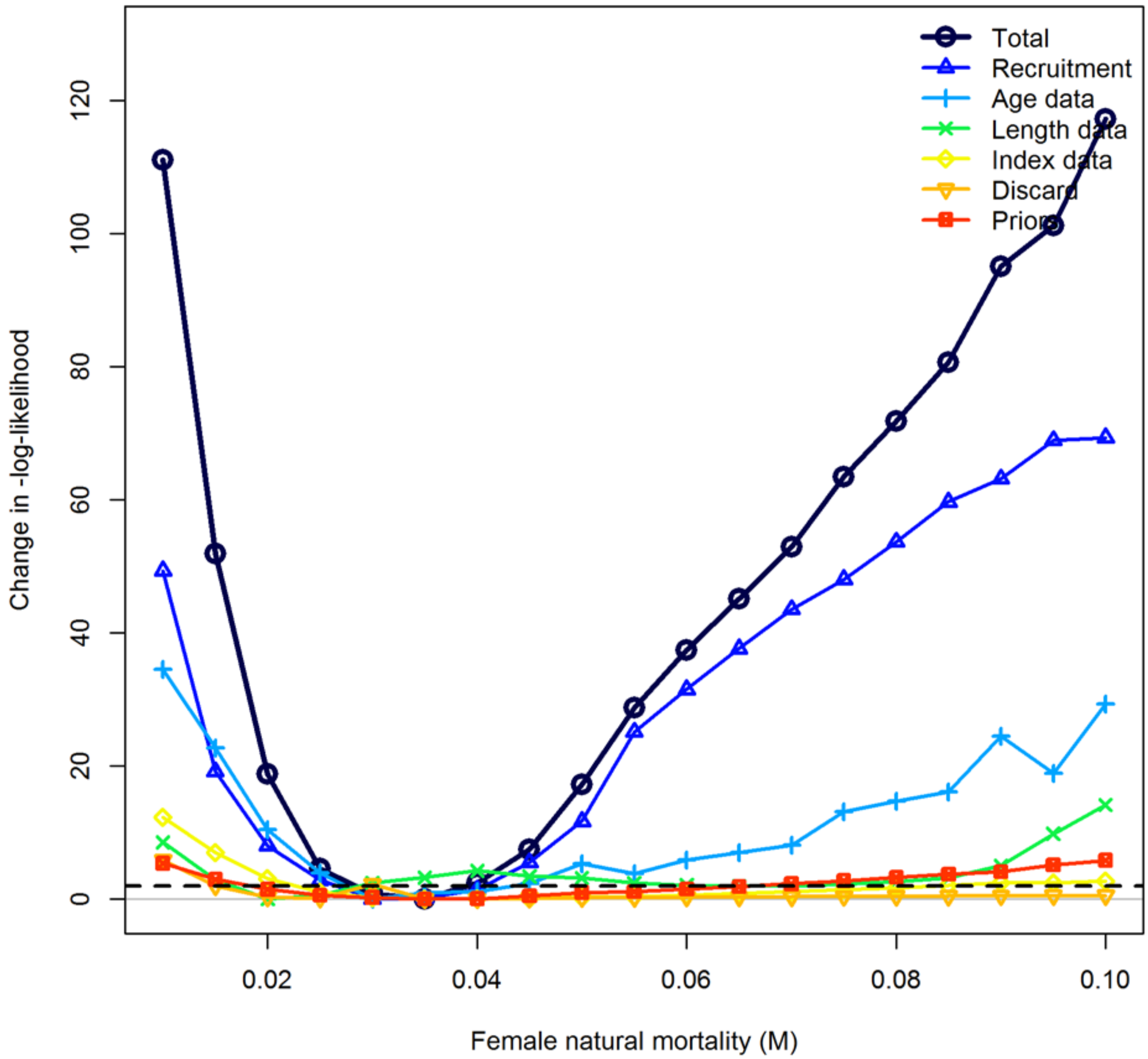


Figure 118. Change in likelihood for the total likelihood and each likelihood component as profiled across female natural mortality (M) when male natural mortality is also being estimated. Broken horizontal line indicates significant change in likelihood.

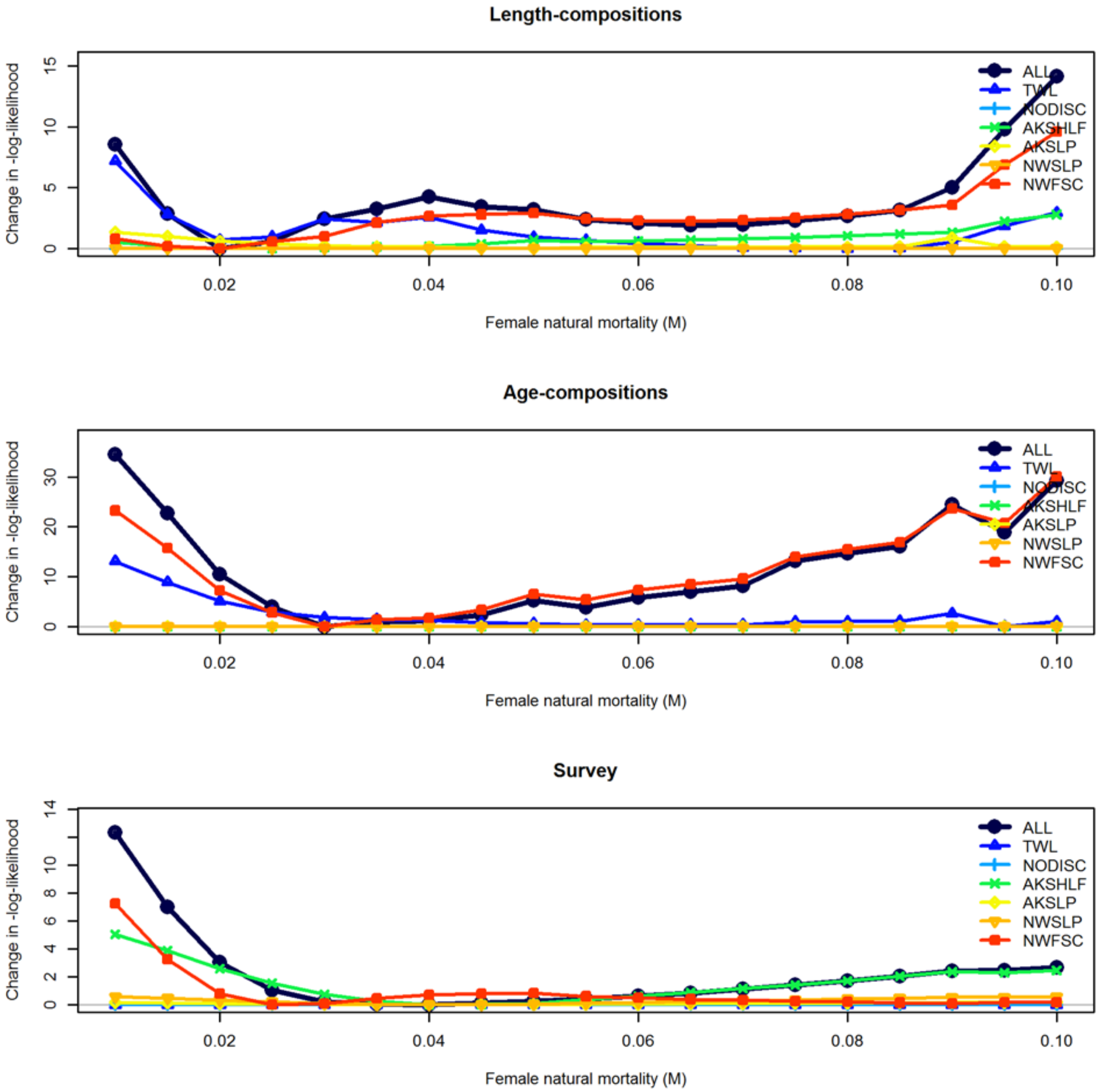


Figure 119. Change in likelihood for each fleet contribution to the likelihood component as profiled across female natural mortality (M) when male natural mortality is also being estimated.

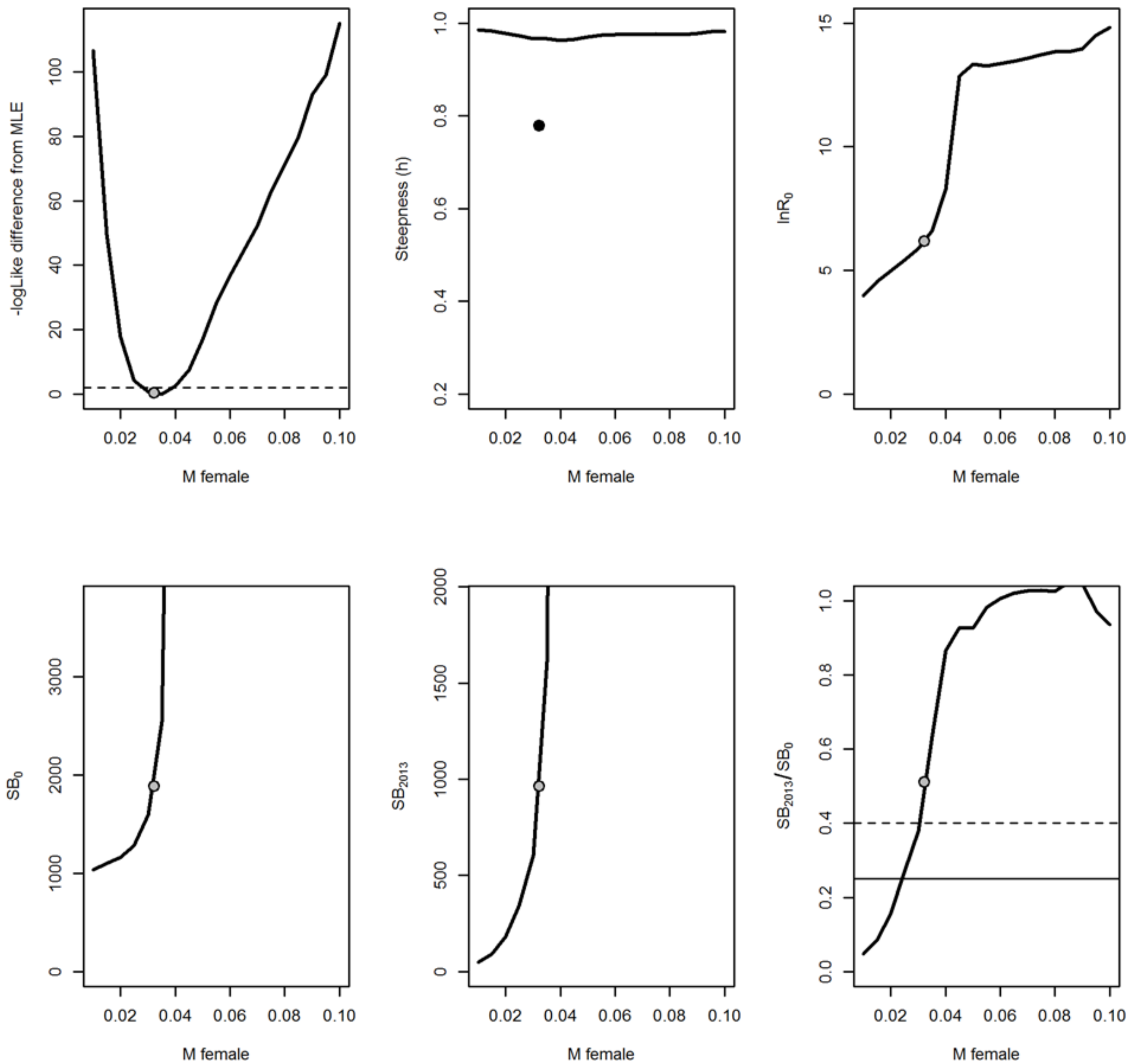


Figure 120. Likelihood profile for female natural mortality (*M*; top left panel) and sensitivity to female *M* of estimated (top center and right panels) and derived assessment outputs (bottom panels) for aurora rockfish when steepness (*h*) male natural mortality is estimated. The base case MLE is indicated by the circle as a reference point. Top left panel: broken line is 95% interval. Bottom right panel: Solid and broken line are the target and limit biomass reference points.

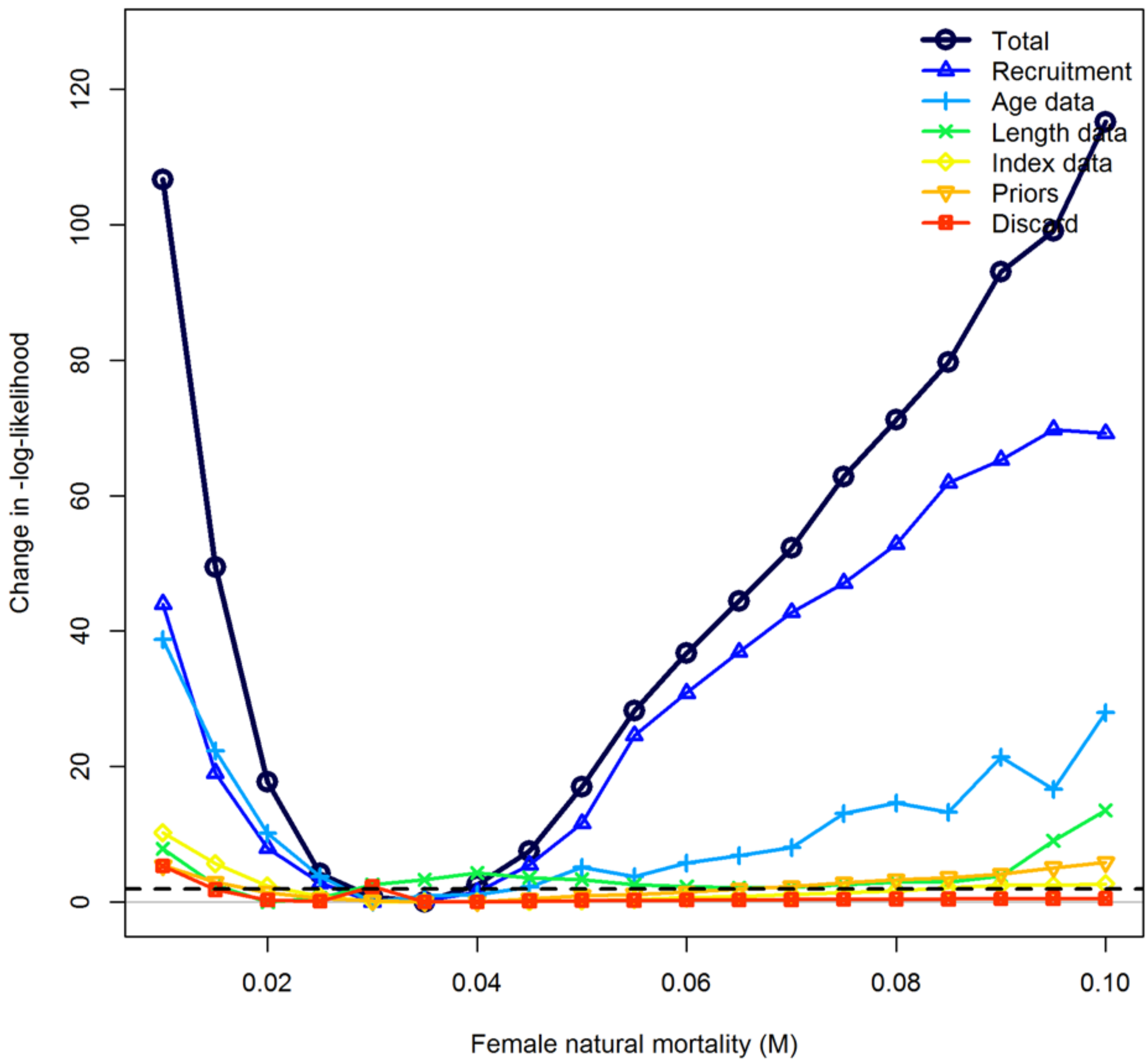


Figure 121. Change in likelihood for the total likelihood and each likelihood component as profiled across female natural mortality (M) when male natural mortality and steepness are also being estimated. Broken horizontal line indicates significant change in likelihood.

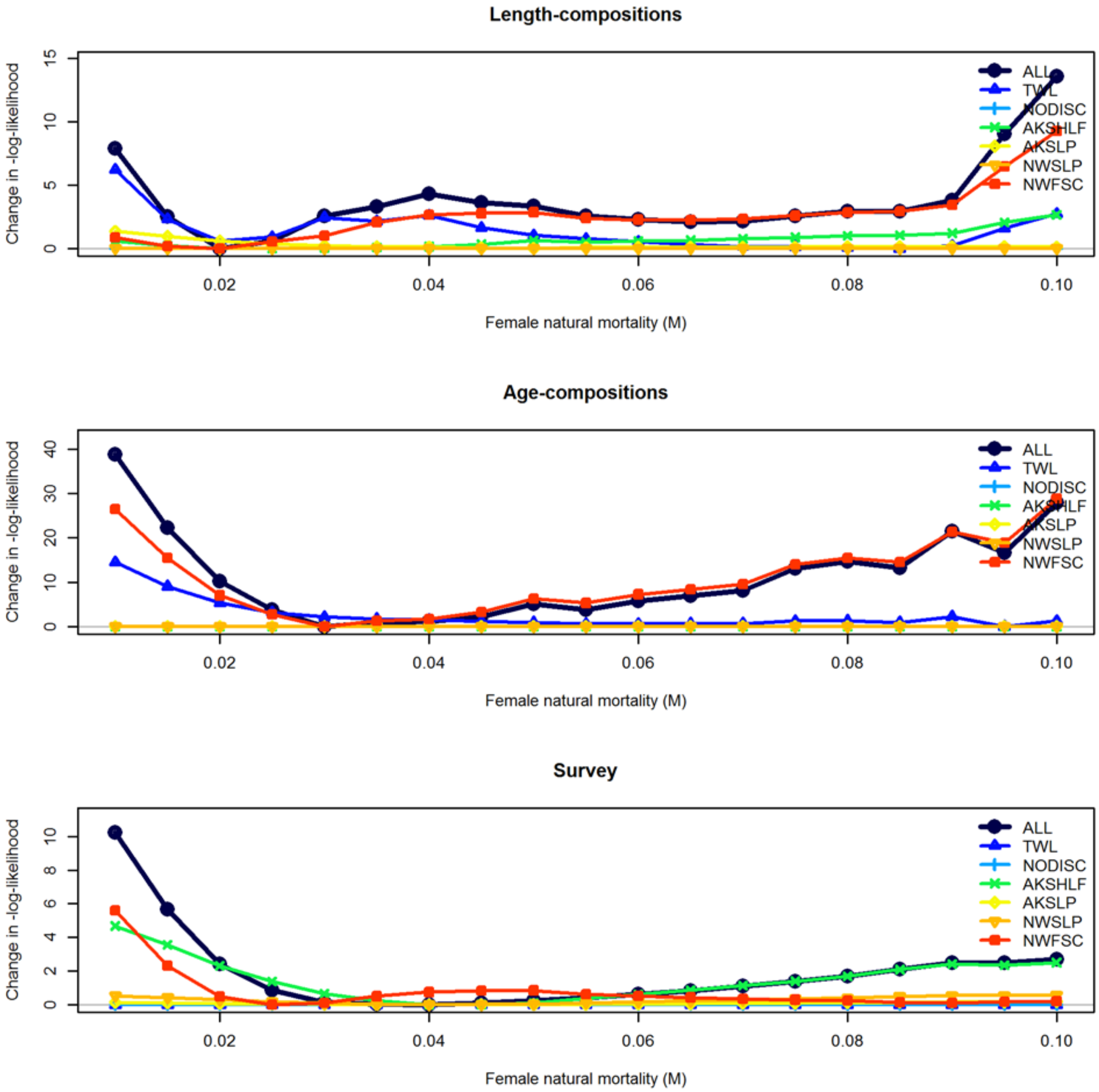


Figure 122. Change in likelihood for each fleet contribution to the likelihood component as profiled across female natural mortality (M) when male natural mortality and steepness are also being estimated.

9.3.3 Retrospective runs

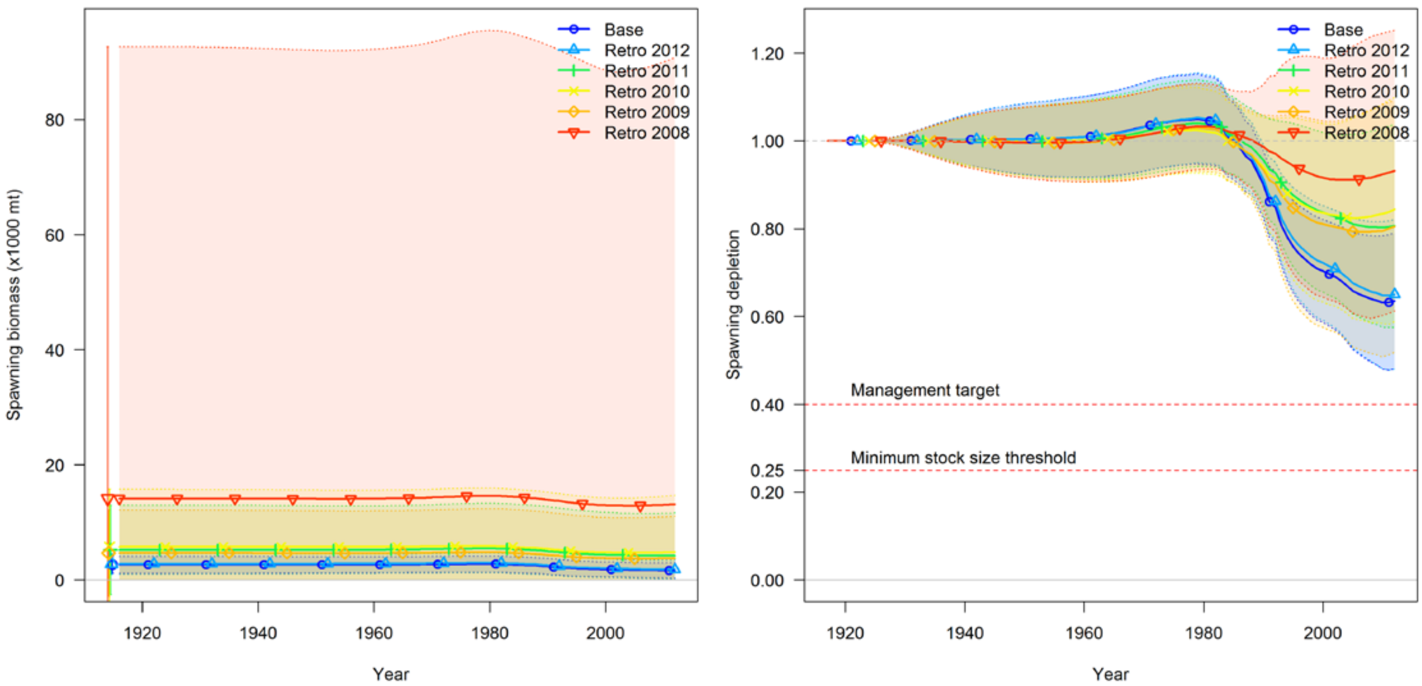


Figure 123. Spawning biomass (top panel) and depletion for the base case and each retrospective run. Solid lines and symbols are median values; polygons are the 85% CI.

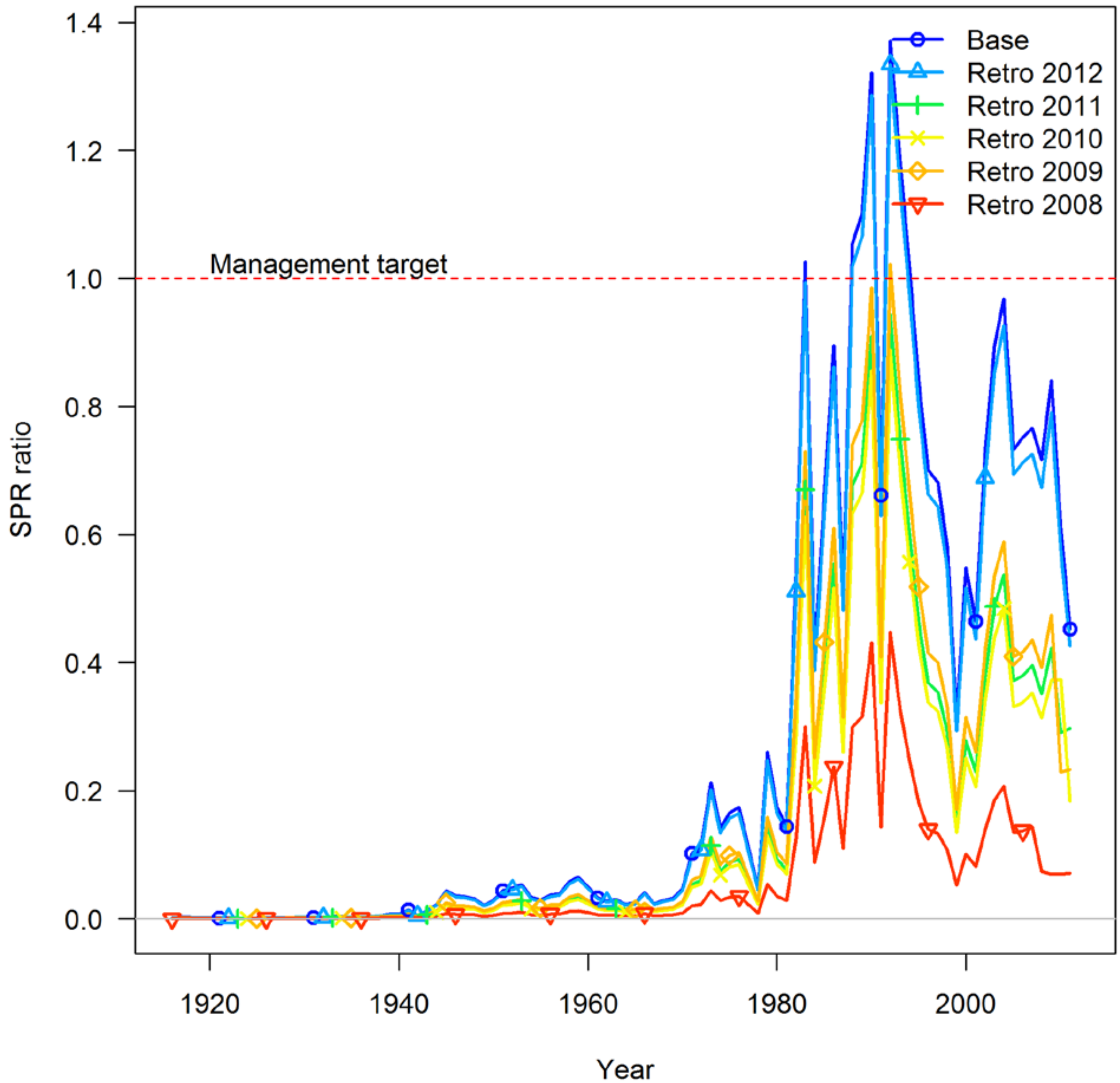


Figure 124. Exploitation history (as measure by the SPR ratio) for the base case and each retrospective run.

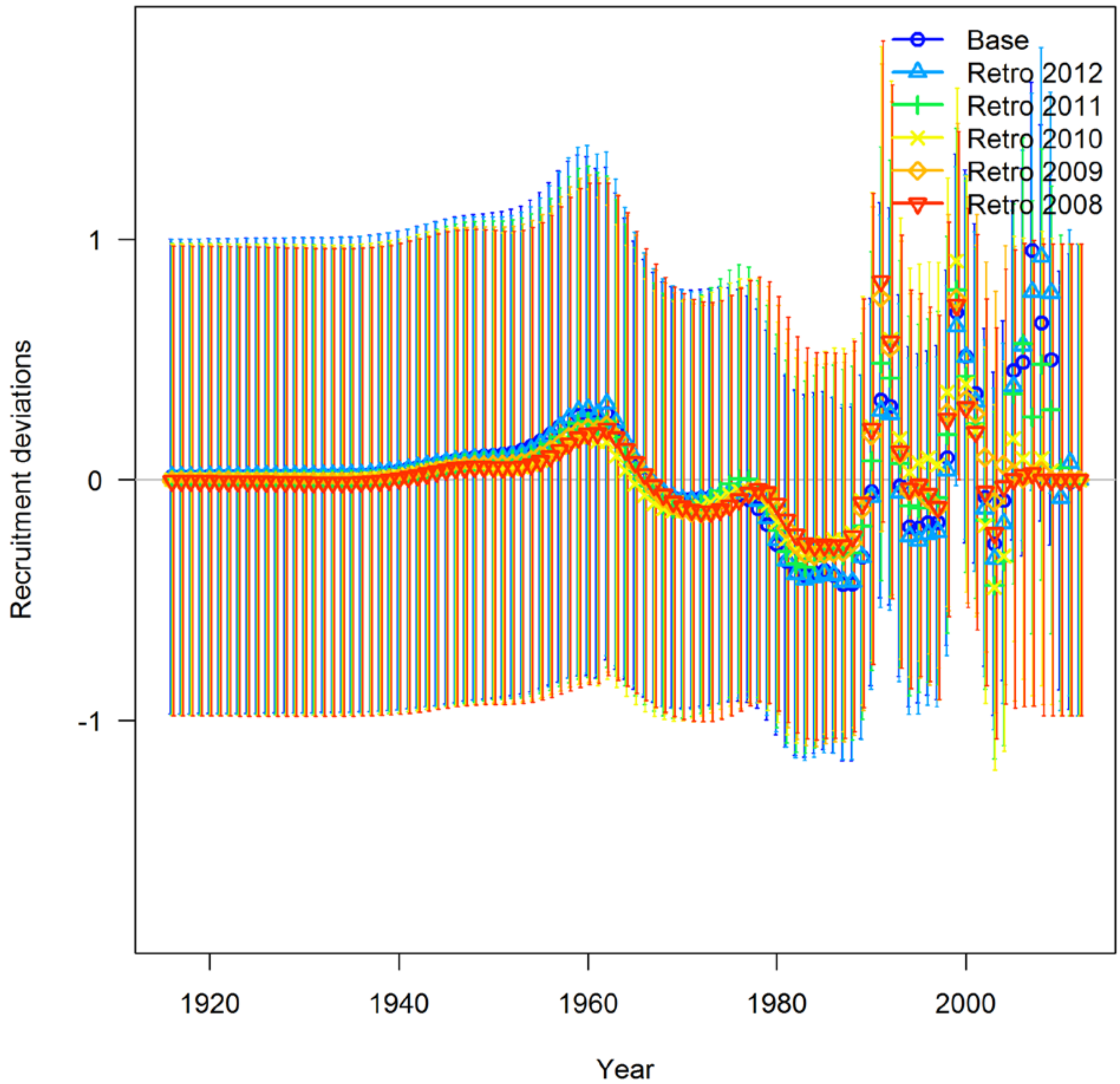


Figure 125. Recruitment deviations across different retrospective runs and the base case. Vertical bars are the 95% CI.

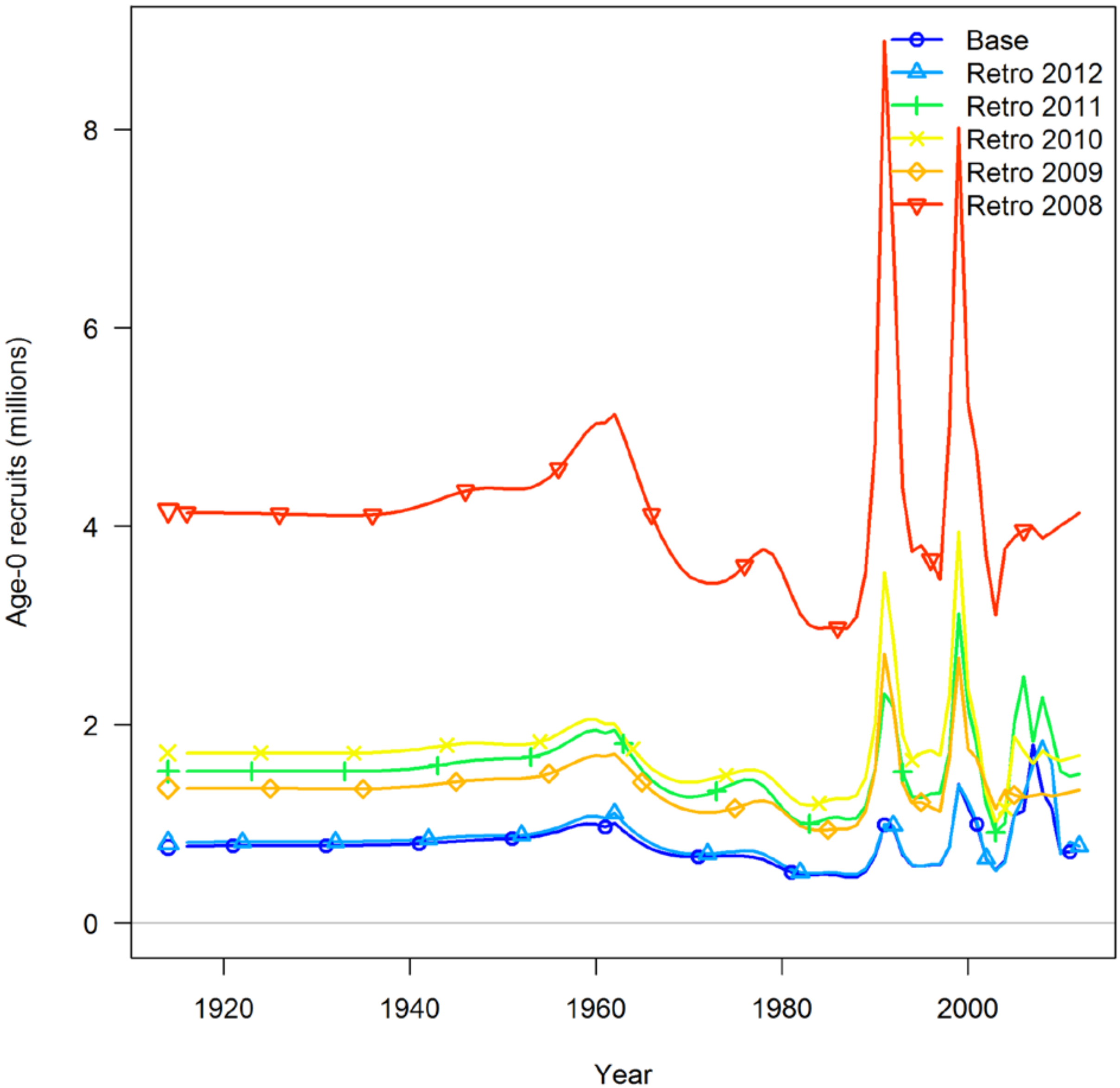


Figure 126. Recruitment (in number of individuals) for the base case and each retrospective run.

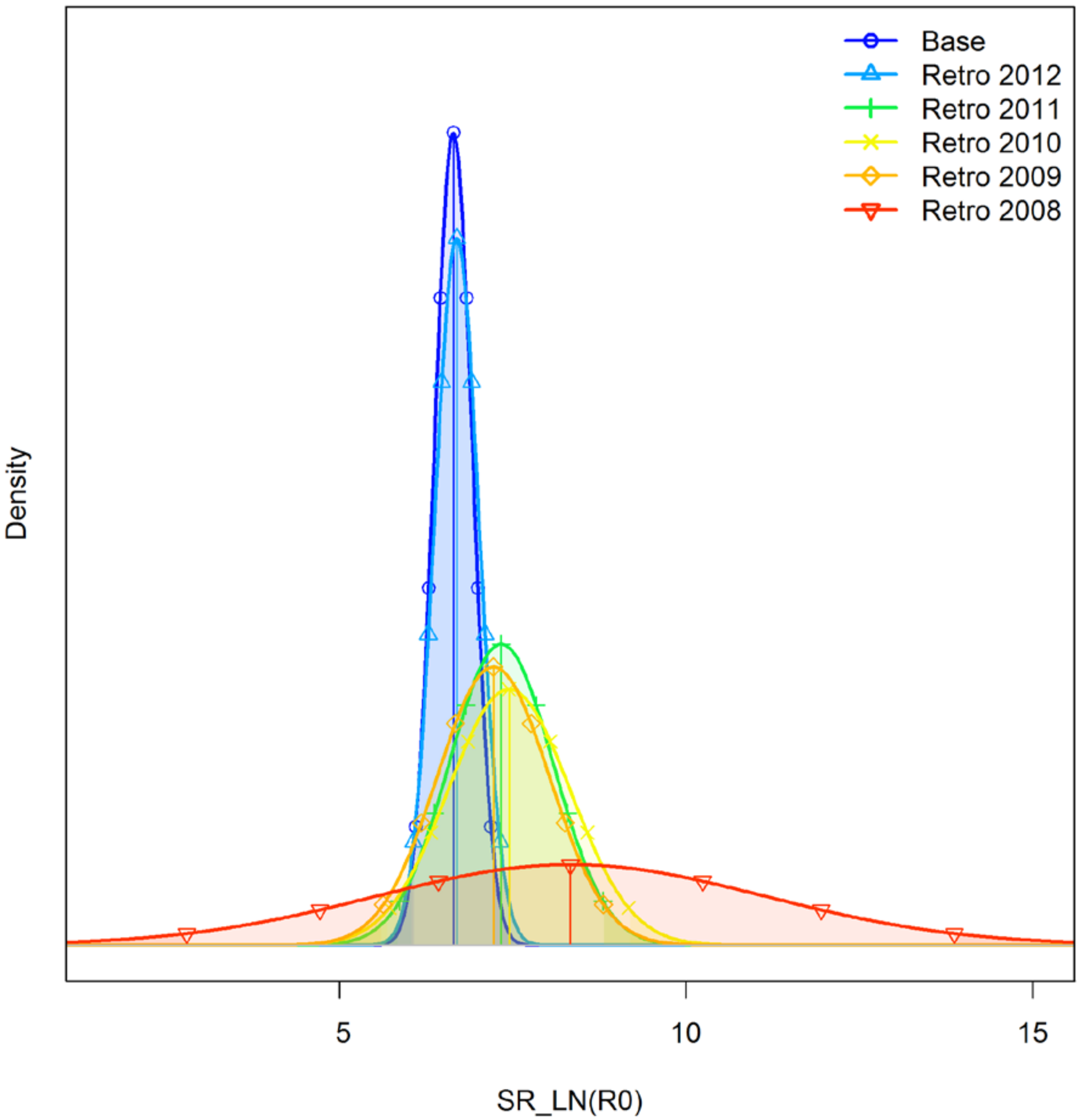


Figure 127. Value of initial recruitment across different retrospective years and the base case.

9.3.4 Alternative assessment methods

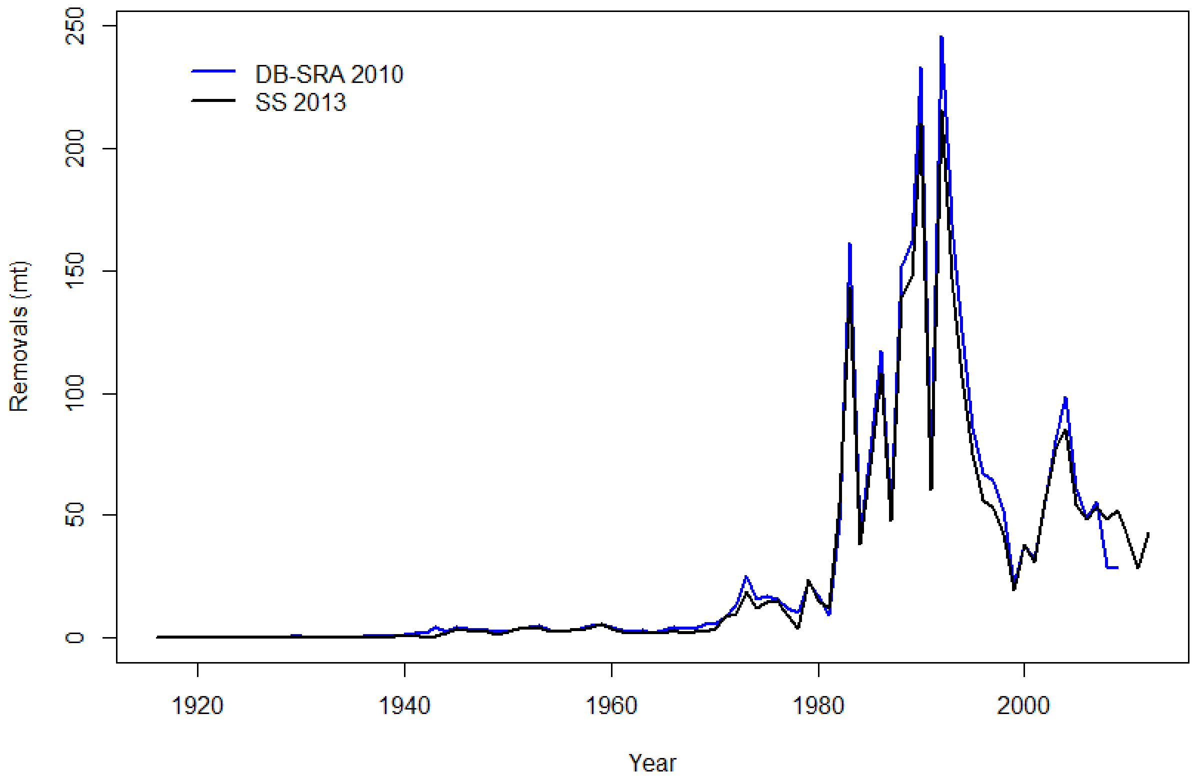


Figure 128. Comparison of aurora rockfish removals in the 2013 base case (black line) to those used in the 2010 DB-SRA estimate of OFLs.

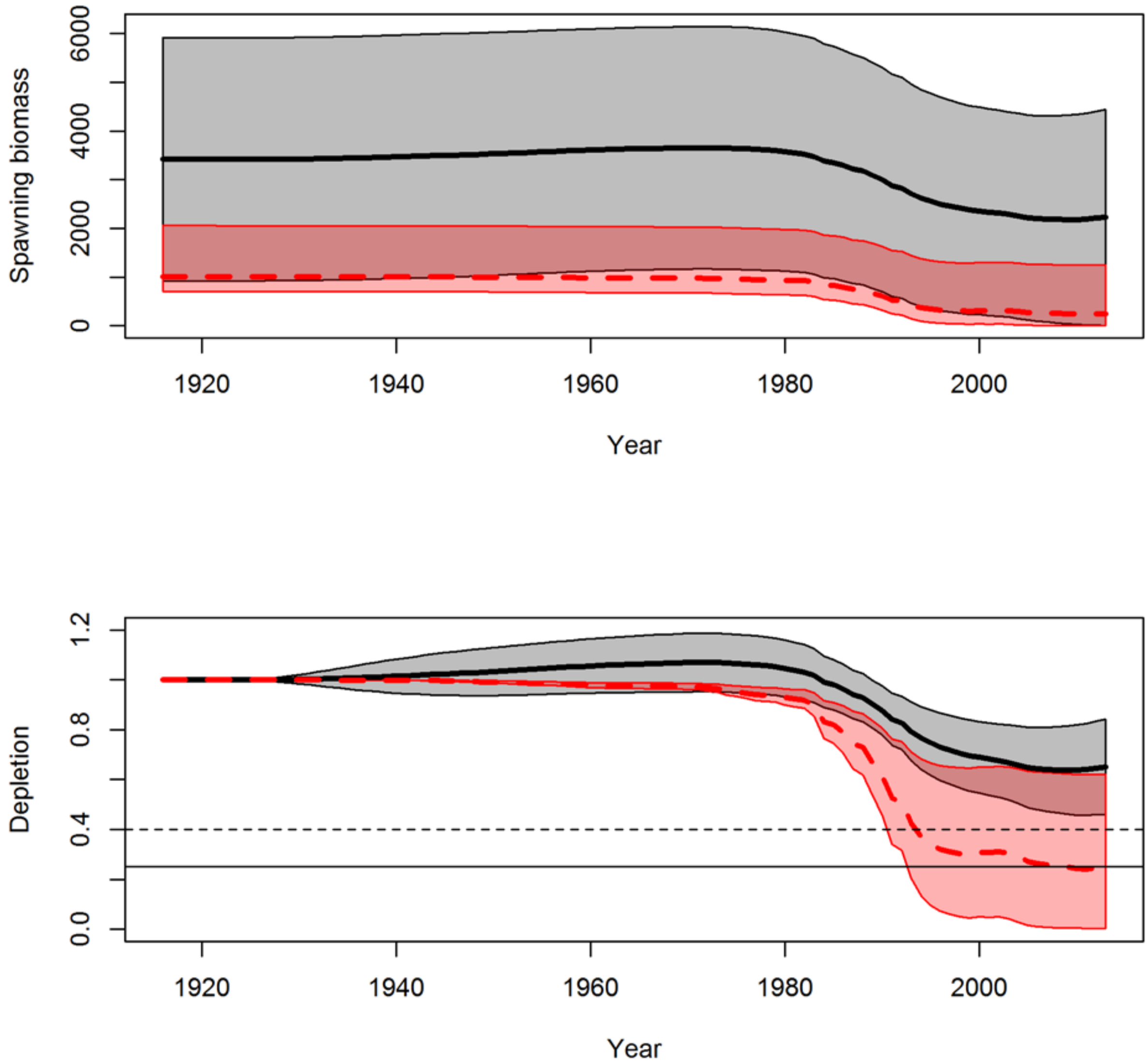


Figure 129. Comparison of the aurora rockfish base case model (median: black line; 95% CI: gray polygon) with the catch-only SSS model (median: broken red line; 95% CI: red polygon).

Appendix A. Management history of minor slope rockfish

Effective 1982:

- *Sebastes* complex
- No limits on rockfish species except for a per/trip limit for the following four species: bocaccio, chilipepper, splitnose and yellowtail rockfish.

Effective 1983:

- *Sebastes* complex
- Per/trip and per/week limits are implemented for the *Sebastes* complex coastwide

Effective 1997:

- PFMC eliminates per/trip limits and moves to monthly or bi-monthly cumulative vessel limits to reduce discards.

Effective 1999:

- Limited Entry and Open Access *Sebastes* complex: north and south of Cape Mendocino, if a vessel takes and retains, possesses, or lands any splitnose or chilipepper rockfish south of Cape Mendocino, then the more restrictive *Sebastes* complex cumulative trip limit applies throughout the same cumulative limit period, no matter where the *Sebastes* complex is taken and retained, possessed, or landed.

Effective during 2000:

- *Sebastes* complex is dissolved
- Three rockfish complexes are implemented, each broken North and South of 40°10 N. lat.: Nearshore rockfish; Shelf rockfish; and Slope rockfish
- Slope rockfish complex includes aurora rockfish and rougheye rockfish both North and South of 40°10 N. lat.
- Slope rockfish complex is subject to bi-monthly vessel limits both North and South of 40°10 N. lat. (for both limited entry and open access commercial fisheries)

Effective during 2001:

- Implementation of the Northwest Fishery Science Center West Coast Groundfish Observer Program (NWFSC WCGOP), improving discard estimates.

Effective 2002:

- RCAs established
- Large footrope gear prohibited from waters inside 275 m (150 fm) following advent of rockfish conservation areas.
- Slope rockfish complex trip limit is revised for the open access fishery North of 40°10 N. lat.: the bi-monthly limit is removed and a new per trip limit is implemented that is a ratio of slope rockfish to sablefish (e.g. the weight of slope rockfish landed may be no more than 25% of the weight of sablefish landed)

Effective 2003:

- Vessel buyback program initiated (December 4, 2003).
- Yelloweye Rockfish Conservation Area established.
- Rockfish Conservation areas for several rockfish species established.

Effective 2007:

- Seasonal changes of trawl RCA boundaries and periodic closures within certain latitude boundaries (e.g., north of Cape Alava at 48°10’ N. latitude to the U.S.- Canada border) starting in 2007.

Effective during 2006:

- Amendment 19 was implemented, which established EFH boundaries and conservation areas.

Effective 2011:

- IFQ fishery begins.

Appendix B. SS data file

```
# For Base 2 reduced Ninput for discard lengths at power of 0.9 which reduces largest by more than half (1330 to 648)
# For data9 - fixed survey to correct scale.
# For dat2 - added research catch to NODISC
#AURORA ROCKFISH
#######################################
### Global model specifications ###
1916 # Start year
2012 # End year
1 # Number of seasons/year
12 # Number of months/season
1 # Spawning occurs at beginning of season
2 # Number of fishing fleets
4 # Number of surveys
1 # Number of areas
TWL%NODISC%AKSHLF%AKSLP%NWSLP%NWFSC
0.5 0.5 0.5 0.5 0.5 0.5 #Timing of each fishery/survey
1 1 1 1 1 1 #Area of each fleet
1 1 #_units of catch: 1=bio; 2=num
0.05 0.05 #_se of log(catch) only used for init_eq_catch and for Fmethod 2 and
3; use -1 for discard only fleets
2 # Number of genders
80 # Number of ages in population dynamics

### Catch section ###
0 0 # Initial equilibrium catch (landings + discard) by fishing fleet
97 # Number of lines catch data
#_catch_biomass(mtons):_columns_are_fisheries,year,season
0.076360523 0 1916 1
0.119483193 0 1917 1
0.135390321 0 1918 1
0.092784047 0 1919 1
0.095990588 0 1920 1
0.079692657 0 1921 1
0.069291427 0 1922 1
0.077033907 0 1923 1
0.052117721 0 1924 1
0.061674556 0 1925 1
0.098446947 0 1926 1
0.078976648 0 1927 1
0.107287016 0 1928 1
0.128630289 0 1929 1
0.138200889 0 1930 1
0.143253663 0 1931 1
0.168920936 0 1932 1
0.231371388 0 1933 1
0.176165588 0 1934 1
0.133467121 0 1935 1
0.126507303 0 1936 1
0.216752647 0 1937 1
0.327272881 0 1938 1
0.48190626 0 1939 1
0.490051881 0 1940 1
0.962035876 0 1941 1
0.391775911 0 1942 1
0.874650878 0 1943 1
1.570407029 0 1944 1
3.109966474 0 1945 1
2.547995793 0 1946 1
2.43008343 0 1947 1
2.198769043 0 1948 1
1.453393464 0 1949 1
1.990710508 0 1950 1
3.093499088 0 1951 1
3.394203199 0 1952 1
3.766552421 0 1953 1
2.332047734 0 1954 1
2.060632506 0 1955 1
2.59353219 0 1956 1
2.756783257 0 1957 1
4.077096202 0 1958 1
4.628820905 0 1959 1
3.520909218 0 1960 1
```

2.334763217	0	1961	1	
1.960652742	0	1962	1	
2.137738654	0	1963	1	
1.611818962	0	1964	1	
1.77202298	0	1965	1	
2.107669278	1	1966	1	
1.691613777	0	1967	1	
2.030084752	0	1968	1	
2.278812926	0	1969	1	
3.375146372	0	1970	1	
5.841780929	2	1971	1	
5.003982366	4	1972	1	
6.174408744	12	1973	1	
7.249700071	4	1974	1	
7.512542875	6	1975	1	
9.948895171	4	1976	1	
7.750856498	0.462287455		1977	1
3.483719999	0.006311736		1978	1
20.99366657	0.090407861		1979	1
13.45932326	0.129418089		1980	1
10.23322689	0.870864396		1981	1
49.16355849	0.002341033		1982	1
127.9051123	0.008754	1983	1	
33.6867196	0.124245657		1984	1
62.82970717	0.104422914		1985	1
96.50751671	0.127899059		1986	1
42.20365717	0.069477668		1987	1
123.8831574	0.028952637		1988	1
130.956	0	1989	1	
186.4822	0.159079	1990	1	
53.574	0.218443	1991	1	
192.2462	0.012158	1992	1	
130.9994	0.062875	1993	1	
94.91195177	0	1994	1	
65.9012	1.134795	1995	1	
50.141	0.08863	1996	1	
46.955	0.478651	1997	1	
36.7129	0.999161	1998	1	
15.564	0.717655	1999	1	
30.9143	0.853514	2000	1	
23.6457	2.103251	2001	1	
39.9778	0.45459	2002	1	
56.6134	0.40623	2003	1	
69.6615	1.22181	2004	1	
43.2527	0.53914	2005	1	
33.3838	0.4964	2006	1	
37.7508	0.53789	2007	1	
18.7094	0.571669	2008	1	
23.702	0.605653	2009	1	
23.9161	0.487889	2010	1	
24.5575	0.539087	2011	1	
36.8526	0.51698	2012	1	

22 #Number of index observations

#Units: 0=numbers,1=biomass,2=F; Errortype: -1=normal,0=lognormal,>0=T

#Fleet	Units	Errortype		
1	1	0	#	fleet
2	1	0	#	fleet
3	1	0	#	fleet
4	1	0	#	fleet
5	1	0	#	fleet
6	1	0	#	fleet

#_year	seas	index	obs	se(log)			
1995	1	3	1865.816371	0.171837138	#Triennial	(N=4)	
1998	1	3	2041.158359	0.156544604			
2001	1	3	2358.5835	0.166949414			
2004	1	3	2545.198395	0.191886201			
1997	1	4	3008.572554	0.263786151	#AFSC	slope	(N=4)
1999	1	4	2981.684721	0.270980378			
2000	1	4	3389.680055	0.260814263			
2001	1	4	3214.149597	0.260413628			
1999	1	5	1685.390011	0.215006357	#NWFSC	slope	(N=4)
2000	1	5	1858.324456	0.226571207			

```
2001	1	5	2399.244372	0.220403969
2002	1	5	2205.016934	0.189393356
2003	1	6	4961.552718	0.324390564	#NWFSC	shelf-slope (N=10)
2004	1	6	5947.491393	0.275404119
2005	1	6	4540.534108	0.210266709
2006	1	6	4448.461087	0.212569
2007	1	6	4887.833126	0.229353875
2008	1	6	4273.365697	0.185446445
2009	1	6	4679.095564	0.20167377
2010	1	6	4077.921184	0.188342857
2011	1	6	4221.237679	0.213207433
2012	1	6	4543.376056	0.326099515
#

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

#Fleet	Disc_units	err_type
1	2	0	#	TWL

13	#N	discard	obs
#_year	seas	index	obs	err
#TWL - first 3 Pikitch years (using six years of species associations) with cv
1985	1	1	0.11992959	0.3210479
1986	1	1	0.10447521	0.2970653
1987	1	1	0.10465784	0.2570422
#TWL continued - here use the calculated discard amounts along with very small cv = .2 throough2010, =0.1 for 2011
2002	1	1	0.274514407	0.2
2003	1	1	0.24475349	0.2
2004	1	1	0.166821589	0.2
2005	1	1	0.198077575	0.2
2006	1	1	0.446793952	0.2
2007	1	1	0.412941503	0.2
2008	1	1	0.630325695	0.2
2009	1	1	0.653249322	0.2
2010	1	1	0.418543881	0.2
2011	1	1	0.116861229	0.1
#

10	#_N_meanbodywt_obs
30	#_DF_for_meanbodywt_T-distribution_like
#Year	Seas	Fleet	Part	Obs	cv
2002	1	1	1	0.361627481	0.673976975
2003	1	1	1	0.362874585	0.838947339
2004	1	1	1	0.354727291	0.485848179
2005	1	1	1	0.310885964	0.505579076
2006	1	1	1	0.333343763	0.563202979
2007	1	1	1	0.329382272	0.611363151
2008	1	1	1	0.357433735	0.493804054
2009	1	1	1	0.36982669	0.669160118
2010	1	1	1	0.375657942	0.919349975
2011	1	1	1	0.253010272	0.501193866

#
#	Population	Length	Structure
2	#	length	bin	method:	1=use	databins;	2=generate from	binwidth,min,max	below;	3=read	vector

1	#	binwidth	for	population size	comp
```

8 # minimum size in the population (lower edge of first bin and size at
age 0.00)
38 # maximum size in the population (lower edge of last bin)
#
-1 #_comp_tail_compression
0.001 #_add_to_comp
#
6 #_combinemales into females at or below this bin number
#
16 #_N_LengthBins
Data length bins
8 10 12 14 16 18 20 22 24 26 28 30 32 34 36
38
#

88 #_N_Length_obs
#TWL (N=35), Females then Males
#Year Seas Fleet Gender Part Nsamp F-8 F-10 F-12 F-14 F-16 F-18 F-20 F-22 F-24
F-26 F-28 F-30 F-32 F-34 F-36 F-38 M-8 M-10 M-12 M-14 M-16 M-18 M-20
M-22 M-24 M-26 M-28 M-30 M-32 M-34 M-36 M-38

1978 1 1 3 2 3 0 0 0 0 0 0 0 0
3.336185488 13.34474195 13.34474195 3.336185488 0 96.81479457 0 0 0
0 0 0 0 0 0 0 0 6.672370977 6.672370977 6.672370977
0 0 0 0
1979 1 1 3 2 2 0 0 0 0 0 0 0 0 0
0 8392.730568 7484.513791 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 399.2418223 0 0 0 0

1980 1 1 3 2 12 0 0 0 0 0 0 0 0 0
2541.815284 2362.096041 817.3393405 2312.318492 401.0735797 433.3581403 0 0
0 0 0 0 0 0 0 0 0 2541.815284 1934.345628
298.3424523 0 0 0
1981 1 1 3 2 5 0 0 0 0 0 0 0 0 0
0 0 0 2903.383075 2108.732166 2108.732166 0 0 0 0 0
0 0 0 0 0 0 1054.366083 0 4217.464333 7380.562582
1054.366083 0
1982 1 1 3 2 34 0 0 0 0 0 0 0 31791.66667
71134.36633 85106.88406 296372.3566 136246.1039 209228.6169 127332.985 34731.91346
7960.784314 0 0 0 0 0 0 0 0 0 154349.7045
89063.54694 220256.7503 146335.8401 56706.27289 31791.66667 0

1983 1 1 3 2 133 0 0 0 0 0 0 0 5541.666667
8869.843924 280967.1849 1193224.777 1067646.302 1336757.022 692971.3828 169170.7913
8541.666667 0 0 0 0 0 0 0 28173.07692 170704.2752
665004.0197 834235.4424 1009907.569 600160.997 184168.7084 215462.7805 4270.833333

1984 1 1 3 2 94 0 0 0 0 0 0 0 17199.83312
20008.82353 69114.03071 456956.9267 395066.7727 369523.0379 158174.4878 11023.90701
8200 0 0 0 0 0 0 4901.960784 1886.792453 17697.87234
159066.8361 281395.1261 245032.7379 303705.5216 91670.93952 22372.93559 5250

1985 1 1 3 2 207 0 0 0 0 0 0 0 25299.53171
137643.5901 514137.092 613719.4606 733255.958 406488.3488 176154.987 31589.44064
1429.579084 0 0 0 0 0 0 0 44632.54451 255523.4894
481485.2422 745672.3162 673177.5378 313049.145 61957.51176 17330.89063 2367.05905

1986 1 1 3 2 137 0 0 0 0 0 0 0 69310.12266
118244.3302 193119.3648 611331.8727 1075356.876 775412.5782 439443.1932 58727.57658
0 0 0 0 0 0 0 0 2723.3252 64776.18582 412359.1583
524742.3869 554195.1462 365501.3973 172667.7386 36802.23866 0

1987 1 1 3 2 54 0 0 0 0 0 0 0 0
6038.978243 8520.037501 28030.33633 66914.18396 32311.1384 29210.60924 20493.89436
857.887218 0 0 0 0 0 0 0 0 511.5053841 14102.38229
89985.38742 110323.1069 115074.4618 13702.50833 4344.31663 0

1988 1 1 3 2 59 0 0 0 0 0 0 0 0
1865.944971 9451.738101 47479.24637 15560.47885 19584.65444 11284.46116 0 0
0 0 0 0 0 0 0 0 5587.993041 22845.03713 45267.3186
36242.538 25557.67741 41765.38514 9907.486033 0

1989 1 1 3 2 58 0 0 0 0 0 0 0 0
4942.236539 13472.38484 51563.84679 29620.99771 10249.20994 4464.832064 0
738.5864142 0 0 0 0 0 0 0 1783.437209 5866.74192

29703.35606 14087.98844 20641.25997 7876.051881 2089.130143 0 0

1990 1 1 3 2 43 0 0 0 0 0 0 0 0
9642.857143 127020 511410.1773 528733.6774 374151.1275 56011.86275 13100 0 0
0 0 0 0 0 0 0 78783.05516 338173.9528 192530.2525
243833.8655 42195.93137 0 0 0
1991 1 1 3 2 40 0 0 0 0 0 0 0 0
902.1238564 4087.806612 9687.234918 15075.05205 16389.90698 5445.447214 1547.602938
0 0 0 0 0 0 0 0 0 326.4419277 5188.383012
13205.64919 7150.22792 5714.775147 4175.799227 2259.014462 0

1992 1 1 3 2 21 0 0 0 0 0 0 0 15558.82353
44174.51575 89714.72371 90915.15746 133989.1506 29394.57071 205081.6538 0 10370
0 0 0 0 0 0 0 18245.69222 5373.737374 65143.94534
86068.85918 216464.7598 23892.15686 4166.666667 0 0

1993 1 1 3 2 39 0 0 0 0 0 0 13870 29201.53846
106606.6745 152413.5687 300927.4423 254870.8181 201343.0692 52610.98361 0 0
0 0 0 0 0 0 0 0 111085.9463 204404.6964 356727.8511
153978.5792 54120.70045 47750 0 0

1994 1 1 3 2 66 0 0 0 0 0 0 0 90851.04042
154796.8771 410772.8572 648558.4725 411367.572 93200.70777 18809.18367 0 0
0 0 0 0 0 0 0 104085.5102 144555.8646 710666.5665
653911.5782 231003.5051 49131.30435 0 0 0

1995 1 1 3 2 88 0 0 0 0 0 0 0 22430
72898.91731 195967.5405 703344.9915 512147.493 193074.1965 91669.91997 0 0
0 0 0 0 0 0 0 8640 293255.6633 449475.8973 706237.3424
403015.8078 137811.5947 125907.9666 0 0

1996 1 1 3 2 78 0 0 0 0 0 0 0 0
211428.4314 515111.5686 668890.5882 606995.098 195253.2353 49069.21569 0 0
0 0 0 0 0 0 0 74620 270223.9507 750790.1961 704521.1765
645962.6106 27720 33730 0 0
1997 1 1 3 2 75 0 0 0 0 0 0 0 56770 11470
335529.5652 319431.3424 729338.7356 312804.2591 136349.3878 1234.693878 0 0
0 0 0 0 0 0 3100 167674.7826 161199.7826 381029.4339
466506.5119 156105.6415 10489.38776 0 1

1998 1 1 3 2 66 0 0 0 0 0 0 0 63870 157780
177969.5148 522244.2857 406527.9962 157620.0586 74611.22523 8695.438796 85.43879592
0 0 0 0 0 0 0 74224.28571 251490 545330.9434 324583.9215
201888.5714 252062.5397 13513.73473 12471.90938 85.43879592

1999 1 1 3 2 49 0 0 0 0 0 0 3070 12990 43830
238857.7778 248940 257994.5422 61928.58586 13195 0 0 0 0 0 0
0 0 0 31450 109380 211268.773 348900 92994.54224 27386.18521 64.54223925
5250 0
2000 1 1 3 2 61 0 0 0 0 0 0 0 25785.34653
40062.69696 116547.452 106028.6252 163387.999 30978.34927 20184.06951 5637.755102
0 0 0 0 0 0 0 0 14832.06883 112129.1291 270182.7606
204312.881 150000.5972 46394.53976 8096.997776 6321.782178 0

2001 1 1 3 2 76 0 0 0 5693.877551 0 0 0
5693.877551 21085.41692 54608.59803 68302.09044 97969.98542 19566.58647 15598.54168
1147.116113 25.62353838 0 0 0 0 0 0 0 5693.877551
19678.00249 71297.85696 87205.80582 83038.0499 32302.01417 2028.840549 3307.452038
26.16900599
2002 1 1 3 2 187 0 0 0 0 0 0 7478.297872
12524.2958 45753.94485 102861.1773 155823.4976 207601.7517 137828.5907 38982.68233
3840 0 0 0 0 0 0 0 4863.265306 10957.95918 46480.42517
133373.8785 187448.0787 240945.2382 67176.06194 19102.26415 1246.848995 0

2003 1 1 3 2 149 0 0 0 0 0 0 638.2978723
737.7641135 71525.3875 132821.0683 386581.3635 343391.6598 124971.5002 34903.34626
5031.578591 2713.843518 0 0 0 0 0 0 99.46624112 28889.46624
126553.9374 163092.6873 261666.7063 294592.6036 41556.83232 24968.32875 2433.398723
198.9324822
2004 1 1 3 2 124 0 0 0 0 0 0 0 7462.083333
90992.88409 198294.2971 345327.5132 225287.3973 72532.52634 20864.00151 1872.486266
631.07852 0 0 0 0 0 0 0 1302.083333 54057.52073 119171.3437
196887.6732 100237.3853 40814.30001 7731.003844 1874.010928 730.4289399

2005 1 1 3 2 157 0 0 0 0 0 0 2454.893617
46233.89491 771305.2046 436068.4934 1839682.717 1486108.664 371553.1001 48317.45359
270576.439 9.45667564 0 0 0 0 0 0 36.3071184 253283.8993
1317120.089 710416.4503 384584.5786 773735.8522 113396.4406 50190.44098 5470.451642
0
2006 1 1 3 2 210 0 0 0 0 0 0 42.09967954
7320.270216 44869.51496 154350.1777 87508.35852 145932.5487 139528.8073 84652.00728
10851.4272 1614.980677 0 0 0 0 0 0 8086.544124 1151.829463
15214.65471 49670.92907 140663.517 181398.2502 177609.1886 70410.63034 2250
21.49871402
2007 1 1 3 2 293 0 0 0 0 0 64.16080048 1031.383996
4862.179832 48013.17747 133059.9588 355994.4082 229984.6021 85361.55035 67458.32677
17914.47011 4057.450416 0 0 0 0 11.37437741 0 8.482161203
2646.973459 37970.08194 109401.6729 165255.9157 127600.7397 64949.08685 31549.32283
6056.882289 120.6845465
2008 1 1 3 2 342 0 0 0 0 0 558.8235294 1030.821816
21986.43185 36391.50935 138911.0717 139589.8016 120242.4018 110075.4376 67391.13648
25895.50533 2905.395851 0 0 0 0 0 7220 48.44699738 22621.23337
32329.56464 111889.709 104272.979 119320.716 103504.8263 35993.79165 9959.480772
145.1347456
2009 1 1 3 2 317 0 0 0 0 0 27.60693957 8.074994844
1217.927384 41857.57261 43141.78722 54049.94728 75218.24627 67319.09469 56990.08635
14535.31202 2999.713278 0 0 0 0 0 0 1008.171126 3179.055866
17754.64255 44491.46341 134199.0367 120293.1014 102729.8865 32041.9194 7543.205268
216.0198049
2010 1 1 3 2 288 0 0 0 0 0 0 13.78786588
3723.223773 16490.69646 31975.21316 56545.61196 54409.05316 43784.607 38220.9698
11084.27613 531.843109 0 0 0 0 0 173.3604107 0 1049.682111
13910.14687 69419.01956 95098.36992 74551.1624 60606.70856 26914.88061 654.922032
108.2125528
2011 1 1 3 2 518 0 0 0 0 6.525587974 1063.963653
29304.99638 60088.36709 120393.0821 182875.5375 178388.8359 179599.042 71333.39731
41703.03552 13831.94365 3078.764716 0 0 0 1006.525588 46.19092664
3824.803466 36391.18754 57017.32121 145908.7634 219529.004 247277.2356 147221.0273
71637.8815 30179.54893 3189.198885 2125.582656

2012 1 1 3 2 446 0 0 8.078104003 0 47.69684447 1924.387884
2081.953801 12066.32462 94921.09274 196670.5897 186988.7039 181421.2516 123662.08
53044.82736 18592.15244 4534.050728 0 0 0 0 70.82353519 335.7307568
1629.194287 12839.98686 110285.1534 172346.8135 154191.8565 127059.0315 44010.43512
17551.04483 5479.420019 3224.343349

#TWL (N=26), Unsexed
#Year Seas Fleet Gender Part Nsamp F-8 F-10 F-12 F-14 F-16 F-18 F-20 F-22 F-24
F-26 F-28 F-30 F-32 F-34 F-36 F-38 M-8 M-10 M-12 M-14 M-16 M-18 M-20
M-22 M-24 M-26 M-28 M-30 M-32 M-34 M-36 M-38

1980 1 1 0 2 1 0 0 0 0 0 0 0 0 0
683.6481473 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

1988 1 1 0 2 1 0 0 0 0 0 0 0 0 0
0 0 3088.397288 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

1989 1 1 0 2 2 0 0 0 0 0 0 0 0 0
0 994.5322013 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

1990 1 1 0 2 14 0 0 0 0 0 0 0 18961.22449
16900 26100 82562.72727 91422.44898 26120.83333 0 2300 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0

1991 1 1 0 2 1 0 0 0 0 0 0 0 0 0
0 0 0 0 902.1238564 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0

1992 1 1 0 2 56 0 0 0 0 0 6127.659574 0
25722.99058 156123.778 269550.0706 525586.5442 608812.6994 190257.4784 62016.98718
6370 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1993 1 1 0 2 20 0 0 0 0 0 0 2941.176471
2941.176471 26381.03067 89467.76374 87981.93027 103034.3352 5154.655831 7688.057334
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0

1994 1 1 0 2 21 0 0 0 0 0 0 0 15204.08163
44835.40373 68555.62521 119598.288 375465.3769 86368.8818 7602.040816 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
1995 1 1 0 2 14 0 0 0 0 0 0 0 0 500
33123.31411 75968.46011 72717.2007 10646.78179 1070.652174 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0

1996 1 1 0 2 10 0 0 0 0 0 0 0 0 67000
37546.70734 112158.9344 35408.8353 36886.8542 3 1 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0

1997 1 1 0 2 16 0 0 0 0 0 0 0 24970.58824
41619.64706 91558.82353 52718.51794 75791.58218 42051.22017 2 2 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
1998 1 1 0 2 8 0 0 0 0 0 0 0 0
1615.384615 6461.538462 6461.538462 8304.708625 2040 1360 85.43879592 85.43879592
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
1999 1 1 0 2 15 0 0 0 0 0 0 0 43877.55102
175510.2041 484544.3539 498533.9717 341187.7551 92597.55102 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2000 1 1 0 2 2 0 0 0 0 0 0 15940 15940 0
1041.666667 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 2 49 0 0 0 0 0 0 0 31031.83673
131723.9717 580503.7326 940173.5224 699718.3485 127016.1538 31180 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2002 1 1 0 2 65 0 0 0 0 0 4659.574468 13347.7551
95572.1821 128567.1815 403539.2297 413878.3164 95831.47923 57251.92677 6734.30762
760 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2003 1 1 0 2 103 0 0 0 0 0 0 121700 51576.9988
741152.1086 1672105.954 1813448.29 834137.532 132332.5857 61447.79948 83800.89327
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0
2004 1 1 0 2 28 0 0 0 0 0 0 0 18940 97220
386475 405836.7172 139000.8586 27165 35600 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0

2005 1 1 0 2 54 0 0 0 0 0 0 9100 18700
176787.7778 826780 985243.8889 660070.5556 241615 45580 500 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0

2006 1 1 0 2 104 0 0 0 0 0 0 11340 182670.7692
1171074.615 3024892.115 3753379.808 2801678.077 693554.6154 56358.46154 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
2007 1 1 0 2 38 0 0 0 1186.868687 0 4318.181818 0
32030 221077.2048 398643.193 320559.9742 818200.6014 519287.8007 48580 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
2008 1 1 0 2 26 0 0 0 0 0 0 0 0
13827.61905 50372.14286 81268.92857 41477.97619 15416.66667 14312.5 4125 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0
2009 1 1 0 2 40 0 0 0 0 0 115.0111386 0
704.6337801 63243.76657 60425.75418 161887.7505 111573.6367 25511.39766 10571.98397
4238.336714 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
2010 1 1 0 2 25 0 0 0 0 0 0 0 0
4838.24704 46979.82655 53808.06938 66728.24284 8411.730769 1319.144755 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
2011 1 1 0 2 119 0 0 0 0 1972.826087 4418.478261
63582.6732 184215.6928 326153.9813 455803.101 587004.3773 188902.7848 87937.76567
7982.630009 2066.666667 1509.803922 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0

2012 1 1 0 2 100 0 0 0 0 1227.406989 0 12882.22097
9233.972646 59637.57137 150121.0737 156293.7945 124264.8641 53575.32718 15719.0149

3990.683761 522.2222222 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0

#TWL DISCARD (N = 9), Unsexed except for 2003 and 2004
#Year Seas Fleet Gender Part Nsamp F-8 F-10 F-12 F-14 F-16 F-18 F-20 F-22 F-24
F-26 F-28 F-30 F-32 F-34 F-36 F-38 M-8 M-10 M-12 M-14 M-16 M-18 M-20
M-22 M-24 M-26 M-28 M-30 M-32 M-34 M-36 M-38

2002 1 1 0 1 3 0 0 0 0 0 0 1 1 2
0 12.58409091 11.58409091 0 1 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2003 1 1 3 1 10 0 0 0 0 0 1.35483871 1 0
3.709677419 4.41733871 5.685 1.0625 1 1.0625 0 0 0 0 0 0
0 0 0 0 2.41733871 4.2 6.25 2.125 8.9975 5.41733871 2 0
2004 1 1 3 1 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 1 0 0 1 0 0 0
2006 1 1 0 1 59 0 0 29 2 17.7 13 637.7262664
1323.946197 763.8824308 739.5963942 142.5544118 50.10882353 29.90746643 56.93887778
7.753054662 2.6 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
2007 1 1 0 1 279 1.2 0 22.6 51.2 95.55 858.1225024 1751.342966
3162.489731 2144.995864 1117.187207 1003.3397 969.3928944 754.9992583 405.7479546 258.4
93.5284585 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2008 1 1 0 1 500 0 74 99.65 92.29854015 62.00881801 577.7176722
1360.494074 2587.091785 3134.090673 2949.711401 3062.539724 2063.124877 1433.191466
781.5560495 481.1699319 151.180529 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2009 1 1 0 1 648 0 60 161.2 1054.076801 616.4654313 537.1294689
1540.2595 2907.248582 4385.764714 3320.45641 3793.802625 2651.640789 1929.284021
1541.848154 579.5777999 443.1017133 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2010 1 1 0 1 161 0 4 5.5 52.87142857 160.4193548 238.1656448
169.1543517 448.103218 729.233768 591.3660329 466.9443264 293.363192 104.8979094
79.97996516 42.4 35 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
2011 1 1 0 1 160 12.2 9.6 143.768254 130.5516484 356.1451282
295.8192918 606.8064713 657.113329 438.1047619 234.7285714 120.7809524 47.64031311
11.43333333 8.326027397 2 2 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0

#
#AKShelf - "Triennial" Survey (N = 4)
#Year Seas Fleet Gender Part Nsamp F-8 F-10 F-12 F-14 F-16 F-18 F-20 F-22 F-24
F-26 F-28 F-30 F-32 F-34 F-36 F-38 M-8 M-10 M-12 M-14 M-16 M-18 M-20
M-22 M-24 M-26 M-28 M-30 M-32 M-34 M-36 M-38

1995 1 3 3 0 232 0.000000 0.001053 0.006618 0.008721 0.015926 0.030750 0.041702 0.049945 0.082645
0.115227 0.110607 0.060298 0.026543 0.011442 0.004888 0.000889 0.000000 0.001789 0.003818 0.006393 0.016827 0.034154 0.038956
0.038609 0.055305 0.054351 0.071685 0.053619 0.032489 0.017037 0.004828 0.002886
1998 1 3 3 0 281 0.000000 0.001075 0.004084 0.014979 0.039570 0.052819 0.070658 0.065774 0.086188
0.111051 0.083033 0.035227 0.015476 0.007642 0.002077 0.000000 0.000000 0.000088 0.001805 0.011117 0.024908 0.045204 0.047343
0.047050 0.051459 0.051294 0.058399 0.037728 0.021679 0.008556 0.002663 0.001055
2001 1 3 3 0 272 0.000000 0.000972 0.003517 0.002757 0.007034 0.017657 0.046465 0.080022 0.093860
0.109776 0.085752 0.043167 0.018739 0.006412 0.002789 0.000000 0.000000 0.000159 0.002456 0.005753 0.006803 0.022313 0.046013
0.073932 0.071073 0.074370 0.085462 0.053107 0.026080 0.007969 0.003048 0.002541
2004 1 3 3 0 209 0.000000 0.000464 0.003759 0.016516 0.025198 0.034002 0.051624 0.059340 0.116198
0.089570 0.046189 0.035220 0.011684 0.005611 0.001412 0.001130 0.000000 0.000464 0.002238 0.013834 0.036705 0.049568 0.052633
0.072474 0.084181 0.064611 0.052428 0.043040 0.018245 0.008431 0.002382 0.000847
#
#AKSlope Survey (N = 4)
#Year Seas Fleet Gender Part Nsamp F-8 F-10 F-12 F-14 F-16 F-18 F-20 F-22 F-24
F-26 F-28 F-30 F-32 F-34 F-36 F-38 M-8 M-10 M-12 M-14 M-16 M-18 M-20
M-22 M-24 M-26 M-28 M-30 M-32 M-34 M-36 M-38

1997	1	4	3	0	118	0.001695	0.001695	0.001444	0.011909	0.033686	0.040922	0.060436	0.054195	0.070641
	0.073488	0.047671	0.028181	0.009167	0.005701	0.000848	0.000848	0.000000	0.000000	0.000867	0.010088	0.034629	0.042950	0.067441
	0.078834	0.101829	0.082623	0.071923	0.035019	0.015358	0.010824	0.004238	0.000848					
1999	1	4	3	0	119	0.003112	0.001729	0.000000	0.004150	0.023565	0.048513	0.043805	0.053478	0.062465
	0.082966	0.093283	0.052796	0.018196	0.010636	0.000000	0.000000	0.003112	0.001037	0.001383	0.006436	0.012661	0.041273	0.046566
	0.036214	0.065759	0.081124	0.094902	0.062353	0.022963	0.017971	0.006063	0.001489					
2000	1	4	3	0	101	0.000000	0.003205	0.016398	0.020101	0.033818	0.030485	0.055957	0.078716	0.091245
	0.057554	0.067802	0.038838	0.008408	0.005317	0.001455	0.000728	0.000000	0.002022	0.008215	0.014666	0.027026	0.023064	0.050265
	0.064636	0.064552	0.069222	0.073615	0.055026	0.021991	0.008395	0.005093	0.002183					
2001	1	4	3	0	99	0.000000	0.003188	0.016747	0.019706	0.030743	0.027576	0.050315	0.084254	0.088138
	0.066163	0.072292	0.040353	0.012237	0.007671	0.000000	0.000000	0.000000	0.002011	0.008608	0.014300	0.026456	0.021493	0.044356
	0.062863	0.076315	0.068297	0.068751	0.051667	0.022382	0.005370	0.006001	0.001745					
#														
#NWFSC Shelf-Slope Survey 2003-2012 (N=10)														
#Year	Seas	Fleet	Gender	Part	Nsamp	F-8	F-10	F-12	F-14	F-16	F-18	F-20	F-22	F-24
	F-26	F-28	F-30	F-32	F-34	F-36	F-38	M-8	M-10	M-12	M-14	M-16	M-18	M-20
	M-22	M-24	M-26	M-28	M-30	M-32	M-34	M-36	M-38					
2003	1	6	3	0	128.6	0.00000	0.00039	0.00153	0.00624	0.00545	0.01722	0.03125	0.04098	0.06312
	0.09563	0.11303	0.07726	0.03576	0.01196	0.00797	0.00000	0.00000	0.00136	0.00230	0.00629	0.00801	0.01984	0.02010
	0.03741	0.07391	0.10846	0.08430	0.07285	0.04091	0.01520	0.00130	0.00000					
2004	1	6	3	0	111.6	0.00000	0.00000	0.00099	0.00364	0.01479	0.01967	0.03044	0.04061	0.06071
	0.10656	0.11951	0.14291	0.03583	0.01345	0.00216	0.00234	0.00000	0.00000	0.00311	0.00710	0.01615	0.01524	0.02399
	0.03391	0.04810	0.09130	0.07805	0.06743	0.01391	0.00550	0.00142	0.00117					
2005	1	6	3	0	191.8	0.00000	0.00080	0.00243	0.00772	0.01797	0.03366	0.03239	0.05311	0.08170
	0.09827	0.10686	0.05782	0.02191	0.00466	0.00139	0.00024	0.00000	0.00025	0.00254	0.01192	0.01151	0.03259	0.03367
	0.04641	0.09881	0.10465	0.08624	0.03336	0.01132	0.00449	0.00074	0.00058					
2006	1	6	3	0	169.0	0.00061	0.00131	0.00202	0.00815	0.01534	0.03933	0.04754	0.04414	0.05575
	0.08327	0.09232	0.07306	0.01714	0.00426	0.00101	0.00150	0.00000	0.00061	0.00377	0.00791	0.02312	0.02540	0.04299
	0.04414	0.06627	0.12998	0.10484	0.04497	0.01170	0.00530	0.00130	0.00098					
2007	1	6	3	0	170.6	0.00000	0.00000	0.00029	0.00407	0.00851	0.03185	0.04047	0.07214	0.09016
	0.11715	0.07632	0.07725	0.01713	0.00598	0.00074	0.00025	0.00000	0.00000	0.00029	0.00353	0.00574	0.01526	0.04668
	0.05974	0.06950	0.10634	0.07804	0.05693	0.01174	0.00251	0.00138	0.00000					
2008	1	6	3	0	215.2	0.00000	0.00000	0.00422	0.00782	0.02631	0.05005	0.03890	0.06805	0.07681
	0.09142	0.11165	0.08412	0.01951	0.00760	0.00151	0.00024	0.00000	0.00000	0.00186	0.00490	0.02330	0.01677	0.02441
	0.05548	0.06498	0.08015	0.08176	0.04187	0.01229	0.00278	0.00096	0.00025					
2009	1	6	3	0	159.9	0.00000	0.00048	0.00176	0.00307	0.01884	0.03269	0.05224	0.07273	0.08324
	0.07329	0.09331	0.05097	0.01627	0.00808	0.00171	0.00021	0.00000	0.00000	0.00224	0.00245	0.00595	0.01710	0.05156
	0.06241	0.08357	0.10663	0.09274	0.04278	0.01411	0.00615	0.00324	0.00017					
2010	1	6	3	0	194.2	0.00000	0.00162	0.00561	0.01576	0.02402	0.02218	0.03675	0.07445	0.08195
	0.10132	0.07255	0.05979	0.02458	0.01402	0.00137	0.00030	0.00000	0.00163	0.00504	0.01621	0.01929	0.01499	0.04281
	0.05858	0.08159	0.09214	0.08299	0.03128	0.01229	0.00333	0.00136	0.00021					
2011	1	6	3	0	178.0	0.00000	0.00035	0.01022	0.01805	0.03473	0.02527	0.03685	0.04790	0.06523
	0.08546	0.08596	0.06293	0.01246	0.00472	0.00070	0.00000	0.00000	0.00133	0.00836	0.02364	0.02669	0.03289	0.04330
	0.05628	0.06406	0.10403	0.08837	0.03830	0.01895	0.00264	0.00031	0.00000					
2012	1	6	3	0	174.8	0.00000	0.00203	0.00275	0.01092	0.02847	0.04380	0.03717	0.05589	0.06166
	0.07654	0.08932	0.05582	0.02467	0.00715	0.00529	0.00043	0.00000	0.00125	0.00184	0.01150	0.03146	0.02984	0.04508
	0.04042	0.06404	0.08267	0.09279	0.05289	0.02631	0.01484	0.00255	0.00059					
#														
#Age	composition		set-up											
61	#_N_age_bins													
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	15	16	17	18	19	20	21	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										
1	#_N_ageerror_definitions													
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				
0.561982	0.561982	0.670791	0.778158	0.884103	0.988645	1.0918	1.19359	1.29404	1.39315	1.49095	1.58746	1.68268	1.77665	1.86937
	1.96086	2.05114	2.14023	2.22814	2.31488	2.40047	2.48493	2.56827	2.65051	2.73166	2.81173	2.89074	2.96871	3.04564
	3.12156	3.19646	3.27038	3.34332	3.41529	3.48631	3.55639	3.62554	3.69377	3.7611	3.82754	3.8931	3.95779	4.02163
	4.08461	4.14677	4.2081	4.26862	4.32834	4.38726	4.44541	4.50278	4.5594	4.61527	4.67039	4.72479	4.77846	4.83143
	4.88369	4.93526	4.98615	5.03637	5.08592	5.13481	5.18305	5.23066	5.27764	5.32399	5.36973	5.41486	5.4594	5.50335
	5.54671	5.5895	5.63172	5.67339	5.7145	5.75507	5.7951	5.8346	5.87358	5.91204				
#														
#														

259	#_N_Agecomp_obs													
3	#_Lbin_method:		1=poplenbins;		2=datalenbins;		3=lengths							
9	#_combinemales		into	females	at	or	below	this	bin	number				
#														
#TWL	(N=51)													
#Conditional		ages	at	length	(N=51),	not	expanded							
#Females														
#Year	Seas	Fleet	Gender	Part	AgeErr	LbinLo	LbinHi	Nsamp	A0	A1	A2	A3	A4	A5
	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19
	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33
	A34	A35	A36	A37	A38	A39	A40	A41	A42	A43	A44	A45	A46	A47
	A48	A49	A50	A51	A52	A53	A54	A55	A56	A57	A58	A59	A60	A0
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28
	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	A41	A42
	A43	A44	A45	A46	A47	A48	A49	A50	A51	A52	A53	A54	A55	A56
	A57	A58	A59	A60										
2003	1	1	1	2	1	20	20	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	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	1	2	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	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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										
2003	1	1	1	2	1	24	24	10	0	0	0	0	0	0
	0	0	0	4	1	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	1	0	0	0	0	0	0	0	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	1	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	1	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	1	2	1	26	26	14	0	0	0	0	0	0
	0	0	0	0	1	2	2	2	1	1	0	0	1	1
	0	0	0	1	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	1	2	2	2	1
	1	0	0	1	1	0	0	0	1	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										
2003	1	1	1	2	1	28	28	56	0	0	0	0	0	0
	0	0	0	0	0	1	3	2	1	1	2	2	3	1
	1	1	2	3	0	1	0	4	0	1	0	1	0	2
	0	3	0	1	2	1	0	1	1	0	1	0	0	1
	2	0	3	1	0	0	0	0	0	1	1	0	5	0
	0	0	0	0	0	0	0	0	0	0	1	3	2	1
	1	2	2	3	1	1	1	2	3	0	1	0	4	0
	1	0	1	0	2	0	3	0	1	2	1	0	1	1
	0	1	0	0	1	2	0	3	1	0	0	0	0	0
	1	1	0	5										
2003	1	1	1	2	1	30	30	81	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	1	0	3
	1	0	1	5	3	2	4	3	3	4	3	2	0	1
	3	1	1	4	2	1	4	1	0	1	0	2	0	2
	2	0	0	1	0	1	3	1	0	0	1	1	12	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	3	1	0	1	5	3	2	4	3	3

	4	3	2	0	1	3	1	1	4	2	1	4	1	0
	1	0	2	0	2	2	0	0	1	0	1	3	1	0
	0	1	1	12										
2003	1	1	1	2	1	32	32	49	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	1	1	0	0	0	2	2	1	2	3	1
	0	0	0	0	1	3	2	1	3	1	2	1	1	0
	0	1	1	1	1	1	0	2	3	1	1	0	8	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	1	1	0	0	0	2
	2	1	2	3	1	0	0	0	0	1	3	2	1	3
	1	2	1	1	0	0	1	1	1	1	1	0	2	3
	1	1	0	8										
2003	1	1	1	2	1	34	34	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	1	0	0
	0	0	0	1	0	1	1	0	0	1	0	0	1	0
	0	0	1	2	0	0	1	2	0	1	2	1	11	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	1	0	1	1	0	0
	1	0	0	1	0	0	0	1	2	0	0	1	2	0
	1	2	1	11										
2003	1	1	1	2	1	36	36	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	1	0	1	0	0	1	0	0	0	3	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	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	1
	0	0	0	3										
2003	1	1	1	2	1	38	38	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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										
2008	1	1	1	2	1	24	24	7	0	0	0	0	0	0
	0	0	0	2	1	0	0	0	1	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	1	0
	0	0	0	0	0	0	0	0	2	1	0	0	0	1
	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	1										
2008	1	1	1	2	1	26	26	19	0	0	0	0	0	0
	0	0	0	1	0	0	1	3	1	2	1	4	0	1
	0	1	0	1	1	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	1	0	0	1	3	1
	2	1	4	0	1	0	1	0	1	1	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										
2008	1	1	1	2	1	28	28	26	0	0	0	0	0	0
	0	0	0	0	0	0	1	3	1	1	0	1	1	3
	3	2	1	1	0	0	1	0	0	0	1	0	1	0
	1	0	1	0	0	0	0	0	0	0	1	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	3	1
	1	0	1	1	3	3	2	1	1	0	0	1	0	0
	0	1	0	1	0	1	0	1	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	1	0										
2008	1	1	1	2	1	30	30	30	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	2	0	1	0	1

	2	0	1	1	1	0	2	1	1	2	0	1	2	1
	1	0	0	0	0	1	0	1	0	0	0	0	0	1
	0	1	0	0	0	0	0	0	1	0	0	0	4	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	2	0	1	0	1	2	0	1	1	1	0	2	1	1
	2	0	1	2	1	1	0	0	0	0	1	0	1	0
	0	0	0	0	1	0	1	0	0	0	0	0	0	1
	0	0	0	4										
2008	1	1	1	2	1	32	32	59	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	1	2	1	2	1	3	2	1	2
	1	2	0	2	3	0	1	1	0	1	2	1	1	1
	1	3	2	1	1	0	2	1	0	0	0	1	14	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	1	2	1	2
	1	3	2	1	2	1	2	0	2	3	0	1	1	0
	1	2	1	1	1	1	3	2	1	1	0	2	1	0
	0	0	1	14										
2008	1	1	1	2	1	34	34	32	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	0
	0	0	1	1	1	1	0	0	0	0	0	1	0	0
	1	0	1	0	2	1	1	2	0	1	2	1	12	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	0	0	0	1	1	1	1	0	0	0
	0	0	1	0	0	1	0	1	0	2	1	1	2	0
	1	2	1	12										
2008	1	1	1	2	1	36	36	23	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	0	0	0	0	1	0	0	0	0
	1	1	1	0	0	0	1	0	0	0	0	2	15	0
	0	0	0	0	0	0	0	0	0	0	0	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	1	1	1	0	0	0	1	0	0
	0	0	2	15										
2008	1	1	1	2	1	38	38	11	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	11	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	11										
2009	1	1	1	2	1	22	22	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	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	1	1	2	1	24	24	4	0	0	0	0	0	0
	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	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	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	1	1	2	1	26	26	11	0	0	0	0	0	0
	0	0	0	1	1	0	2	0	2	1	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	0	0	0	0	1	1	0	2	0	2
	1	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										
2009	1	1	1	2	1	28	28	17	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	3	2	3	0	3	2
	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	1	0	3
	2	3	0	3	2	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										
2009	1	1	1	2	1	30	30	26	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	2	0	1	2	1
	0	2	0	1	1	1	0	2	0	1	0	3	1	3
	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	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	2	0	1	2	1	0	2	0	1	1	1	0	2	0
	1	0	3	1	3	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	0	1										
2009	1	1	1	2	1	32	32	35	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	1	0	0	0	2	3	1	1	3
	0	3	2	1	1	0	0	1	1	0	3	0	1	1
	1	0	1	1	0	1	0	0	0	0	0	1	3	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	0	1	1	0	0	0
	2	3	1	1	3	0	3	2	1	1	0	0	1	1
	0	3	0	1	1	1	0	1	1	0	1	0	0	0
	0	0	1	3										
2009	1	1	1	2	1	34	34	32	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	1	0	0
	1	0	0	1	0	0	0	2	0	1	0	1	0	0
	2	0	0	1	2	1	1	1	0	0	0	0	16	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	0	0	1	0	0	1	0	0	0	2	0
	1	0	1	0	0	2	0	0	1	2	1	1	1	0
	0	0	0	16										
2009	1	1	1	2	1	36	36	25	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	2	1	0	1	0	0	1	0	0	0	0	1	16	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	2	1	0	1	0	0	1	0	0
	0	0	1	16										
2009	1	1	1	2	1	38	38	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	1
	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	1	0	0	0	0	0	0	0	0	0
	0	0	0	5										
#Males														

#Year	Seas	Fleet	Gender	Part	AgeErr	LbinLo	LbinHi	Nsamp	A0	A1	A2	A3	A4	A5
	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19
	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33

	A34	A35	A36	A37	A38	A39	A40	A41	A42	A43	A44	A45	A46	A47
	A48	A49	A50	A51	A52	A53	A54	A55	A56	A57	A58	A59	A60	A0
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28
	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	A41	A42
	A43	A44	A45	A46	A47	A48	A49	A50	A51	A52	A53	A54	A55	A56
	A57	A58	A59	A60										
2003	1	1	2	2	1	22	22	4	0	0	0	0	0	0
	0	0	0	2	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	2	2	1	24	24	20	0	0	0	0	0	0
	0	0	1	4	1	4	5	2	1	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	1	4	1	4	5	2	1
	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										
2003	1	1	2	2	1	26	26	32	0	0	0	0	0	0
	0	0	0	1	1	1	5	2	2	0	2	2	2	2
	0	1	1	0	0	1	0	0	0	1	0	2	0	0
	1	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	1	0
	0	0	0	0	0	0	0	0	1	1	1	5	2	2
	0	2	2	2	2	0	1	1	0	0	1	0	0	0
	1	0	2	0	0	1	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	1										
2003	1	1	2	2	1	28	28	58	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	2	1	0	3	0	2
	6	0	2	4	0	0	1	2	1	1	0	1	0	1
	0	2	3	1	1	0	2	1	1	1	1	3	1	0
	0	1	0	1	0	1	0	0	1	0	1	0	7	0
	0	0	0	0	0	0	0	0	0	0	0	0	2	2
	1	0	3	0	2	6	0	2	4	0	0	1	2	1
	1	0	1	0	1	0	2	3	1	1	0	2	1	1
	1	1	3	1	0	0	1	0	1	0	1	0	0	1
	0	1	0	7										
2003	1	1	2	2	1	30	30	63	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	2	1	2	1	0	1	3	1	0	2	1	0	0
	2	2	0	2	0	1	3	2	3	0	2	1	0	4
	2	2	0	2	2	0	3	2	2	1	0	1	9	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	2	1	2	1	0	1	3	1
	0	2	1	0	0	2	2	0	2	0	1	3	2	3
	0	2	1	0	4	2	2	0	2	2	0	3	2	2
	1	0	1	9										
2003	1	1	2	2	1	32	32	33	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	1	0	0	0	0	0	1	0	0
	0	0	1	0	0	1	0	0	2	3	1	3	0	1
	2	1	0	0	1	0	0	0	0	0	0	2	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	1	0	0	0
	0	0	1	0	0	0	0	1	0	0	1	0	0	2
	3	1	3	0	1	2	1	0	0	1	0	0	0	0
	0	0	2	12										
2003	1	1	2	2	1	34	34	23	0	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	0	0	0	0	1	0	0	0
	0	1	1	0	0	0	0	0	1	1	0	1	15	0
	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	0	0	0

	0	1	0	0	0	0	1	1	0	0	0	0	0	1
	1	0	1	15										
2003	1	1	2	2	1	36	36	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	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	1										
2008	1	1	2	2	1	22	22	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	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	2	2	1	26	26	21	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	0	1	3	1	1	2
	2	1	2	2	0	1	0	0	0	0	0	0	0	0
	0	0	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	2	0
	1	3	1	1	2	2	1	2	2	0	1	0	0	0
	0	0	0	0	0	0	0	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										
2008	1	1	2	2	1	28	28	29	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	0	1	1	2	1	0
	2	2	4	1	0	1	0	1	1	1	1	0	2	0
	1	0	2	0	0	0	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	1	1	2	1	0	2	2	4	1	0	1	0	1	1
	1	1	0	2	0	1	0	2	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1										
2008	1	1	2	2	1	30	30	42	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	1	1	0
	0	1	4	1	2	2	2	2	0	3	2	3	0	1
	1	1	0	0	0	0	0	1	2	1	1	0	0	3
	0	0	0	2	0	1	0	1	0	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	1	1	0	0	1	4	1	2	2	2	2	0
	3	2	3	0	1	1	1	0	0	0	0	0	1	2
	1	1	0	0	3	0	0	0	2	0	1	0	1	0
	1	0	0	1										
2008	1	1	2	2	1	32	32	39	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	1	1	1	0	1	0
	0	3	0	0	0	0	4	1	3	0	1	0	1	3
	2	1	1	1	1	0	1	2	2	1	0	0	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	1	0	1
	1	1	0	1	0	0	3	0	0	0	0	4	1	3
	0	1	0	1	3	2	1	1	1	1	0	1	2	2
	1	0	0	6										
2008	1	1	2	2	1	34	34	29	0	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	2	1
	0	0	0	0	0	0	0	0	0	2	0	0	1	1
	0	2	3	0	1	0	2	0	0	0	1	1	11	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	2	1	0	0	0	0	0	0	0	0	0
	2	0	0	1	1	0	2	3	0	1	0	2	0	0
	0	1	1	11										
2008	1	1	2	2	1	36	36	14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	1	0	0	0	0	0	0	0	0	12	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	12										
2009	1	1	2	2	1	22	22	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	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	1	2	2	1	24	24	5	0	0	0	0	0	0
	0	0	1	0	0	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	0	0	0	1	0	0	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										
2009	1	1	2	2	1	26	26	12	0	0	0	0	0	0
	0	0	0	1	0	0	1	3	2	3	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	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	3	2
	3	0	2	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	1	2	2	1	28	28	19	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	1	2	1	2	1	0
	1	3	0	0	1	2	1	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	1
	2	1	2	1	0	1	3	0	0	1	2	1	0	0
	0	0	0	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	1	2	2	1	30	30	42	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	2	0	0	0
	1	2	0	1	2	1	3	0	3	1	1	2	2	1
	3	0	3	2	1	0	1	1	2	1	1	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
	3	2	0	0	0	1	2	0	1	2	1	3	0	3
	1	1	2	2	1	3	0	3	2	1	0	1	1	2
	1	1	0	0	1	0	0	0	0	0	0	0	0	1
	0	0	0	0										
2009	1	1	2	2	1	32	32	38	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	1	0	0	1	0	0	0
	0	2	1	1	0	0	1	1	1	1	1	0	0	0
	3	3	2	2	2	0	2	0	2	0	1	0	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	1	0	0	1	0
	0	1	0	0	0	0	2	1	1	0	0	1	1	1
	1	1	0	0	0	3	3	2	2	2	0	2	0	2
	0	1	0	9										
2009	1	1	2	2	1	34	34	30	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	1	0	0	0	1	0	1	0	0	0
	0	1	1	0	0	1	0	0	0	3	1	1	18	0
	0	0	0	0	0	0	0	0	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	1

	0	1	0	0	0	0	1	1	0	0	1	0	0	0
	3	1	1	18										
2009	1	1	2	2	1	36	36	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	1	0	0	0	0	0
	0	0	0	0	0	0	1	1	1	0	0	0	9	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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	1	1
	0	0	0	9										
2009	1	1	2	2	1	38	38	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	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	6										

#

#Survey Cond L at age by year, F then M within year (N = 198)

#Year	Seas	Fleet	Gender	Part	AgeErr	LbinLo	LbinHi	Nsamp	A0	A1	A2	A3	A4	A5
	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19
	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33
	A34	A35	A36	A37	A38	A39	A40	A41	A42	A43	A44	A45	A46	A47
	A48	A49	A50	A51	A52	A53	A54	A55	A56	A57	A58	A59	A60	A0
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28
	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	A41	A42
	A43	A44	A45	A46	A47	A48	A49	A50	A51	A52	A53	A54	A55	A56
	A57	A58	A59	A60										
2003	1	6	1	2	1	10	10	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
	0	0	0	0										
2003	1	6	1	2	1	12	12	1	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	0	0
	0	0	0	0	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										
2003	1	6	1	2	1	14	14	3	0	0	0	2	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	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	16	16	4	0	0	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	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	18	18	10	0	0	0	0	0	1
	2	3	2	1	0	1	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
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2003	1	6	1	2	1	20	20	14	0	0	0	0	0	0
	1	3	2	2	3	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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	22	22	16	0	0	0	0	0	0
	1	1	2	4	1	0.5	2	1.5	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
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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										
2003	1	6	1	2	1	24	24	32	0	0	0	0	0	0
	0	0	3	3	4	8	4	3	2	0	2	1	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
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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										
2003	1	6	1	2	1	26	26	34.5	0	0	0	0	0	0
	0	0	0	2	2	4	6	1	1	1	0	2	0	1
	1	1	0	0	1	1	2	0	0	0	0	1	0	0
	1	0	0	0	0	0	1.5	0	0	0	0	0	0	1
	0	0	0	0	0	0	1	0	0	0	0	0	3	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	28	28	32	0	0	0	0	0	0
	0	0	0	0	0	1	1	1	0	0	0	1	3	0
	0	1	0	2	0	0	1	1	2	0	1	1	2	0
	0	0	0	1	0	2	0	0	2	0	1	0	0	0
	0	1	0	1	2	1	0	0	1	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0										
2003	1	6	1	2	1	30	30	30	0	0	0	0	0	0
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	1	0	0	0	1	1	2	0	1	1	1	0	1	1
	1	0	1	1	1	1	1	1	1	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	1	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										
2003	1	6	1	2	1	32	32	25.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	1	0	1	0	2	0	2	1	1
	1	0	1	1	1	0	1	1	0	1	1	0.5	0	1
	1	0	0	0	0	0	0	0	1	1	0	0	4	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										
2003	1	6	1	2	1	34	34	14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	1	0	0	1	0	0	0	0	0	1	0	0	0
	0	1	0	0	0	0	0	0	0	1	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										
2003	1	6	1	2	1	36	36	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	1	0	1	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										
2003	1	6	2	2	1	10	10	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
	1	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										
2003	1	6	2	2	1	12	12	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	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	0	0	0
	0	0	0	0										
2003	1	6	2	2	1	14	14	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	2	3	1	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2003	1	6	2	2	1	16	16	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	1	3	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										
2003	1	6	2	2	1	18	18	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	2	0	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	0										

2003	1	6	2	2	1	20	20	7	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	1	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										
2003	1	6	2	2	1	22	22	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	2	1	3.5	1	2.5	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										
2003	1	6	2	2	1	24	24	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
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	0	0	0	0	0	0	0	0	3	3	4	2	1	1
	1	0	3	1	1	0	1	1	1	0	0	0	2	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										
2003	1	6	2	2	1	26	26	36.5	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	2	1	0	2	3	1
	0	1	2	1	1	1	0	0	1	0	0	1	2	0
	0	4	0	2	0	0	2	1	0	1	0	0.5	0	0
	1	0	0	1	0	0	0	1	0	0	1	0	0	0
	0	0	0	3										
2003	1	6	2	2	1	28	28	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	1	0	0	2	1	0	3	1	2	0	1
	0	0	1	1	2	1	0	1	0	1	1	0	0	1
	0	0	0	0	0	2	0	0	0	0	0	0	0	1
	0	0	1	2										
2003	1	6	2	2	1	30	30	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	1	0	0	0	1	1	0	1	1	0	0	1
	0	1	1	0	0	0	1	0	0	0	0	0	0	0
	2	0	0	1	1	0	0	0	0	0	0	0	0	0
	0	0	0	6										
2003	1	6	2	2	1	32	32	19.5	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	0
	0	0	0	0	0	0	0	0	0	1	0	0	0	1
	0	0	0	0	0	0	1	0	0	1	0	1	0	4
	0	0	1.5	0	0	0	0	0	0	3	0	1	0	0
	2	1	0	2										
2003	1	6	2	2	1	34	34	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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										
2003	1	6	2	2	1	36	36	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	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	1	2	1	12	12	1.5	0	0	0	0.5	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	14	14	7.5	0	0	1	0	2	1.5
	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										
2005	1	6	1	2	1	16	16	14.5	0	0	0	0	2	3.5
	3	5	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	18	18	11	0	0	0	0	0	0
	2	4	4	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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										
2005	1	6	1	2	1	20	20	7	0	0	0	0	0	0
	0	0	3	0	0	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	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	22	22	11	0	0	0	0	0	0
	0	0	0	0	2	0	1	1	3	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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	24	24	24	0	0	0	0	0	0
	0	0	0	0	0	0	4	0	0	1	1	1	4	0
	0	6	0	4	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	26	26	34	0	0	0	0	0	0
	0	0	0	0	0	3	0	3	4	0	1	2	1	1
	0	1	1	2	0	1	2	0	2	0	2	0	1	0
	0	0	2	1	0	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	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	6	1	2	1	28	28	26	0	0	0	0	0	0
	0	0	0	0	0	0	2	0	0	1	0	2	1	2
	0	0	0	0	0	0	1	0	0	0	1	0	0	0
	0	1	0	2	0	0	2	2	0	0	0	0	0	2
	0	0	0	0	2	0	0	2	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	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	30	30	30	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	0	0	1	1	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	1	1	0	1	0	1	0	0
	2	0	3	1	0	1	0	2	0	1	0	0	9	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2005	1	6	1	2	1	32	32	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	1	2	0	0	1	0	1	1	0
	2	1	0	2	0	0	0	0	2	0	0	1	3	1
	1	1	0	0	0	1	0	0	0	0	0	0	6	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	34	34	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	1	1	0	0
	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	1	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										
2005	1	6	1	2	1	36	36	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	38	38	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	2	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	2	2	1	12	12	2.5	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	1.5	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2005	1	6	2	2	1	14	14	11.5	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	1	4	4.5	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2005	1	6	2	2	1	16	16	10.5	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	1	1.5	6	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										
2005	1	6	2	2	1	18	18	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	1	6	9	6	2	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										
2005	1	6	2	2	1	20	20	11	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	2	2	1	2	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										
2005	1	6	2	2	1	22	22	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	0	0	0	0	2
	1	3	2	0	0	1	1	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	0	0	0	0	0	0	0
	0	0	0	0										
2005	1	6	2	2	1	24	24	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	1	0	1	1	0	2	2
	0	0	1	2	0	0	4	0	1	1	2	0	0	1
	2	0	0	0	0	0	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0										

2005	1	6	2	2	1	26	26	33	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	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	3	3	3
	2	0	2	0	0	0	0	1	1	1	2	1	0	0
	0	0	1	3	0	0	1	0	0	0	0	0	1	1
	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	2										
2005	1	6	2	2	1	28	28	40	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	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	1	0	0	0	1	0	0	0	0	3	0
	0	0	2	0	0	1	0	0	0	0	0	0	2	1
	2	1	0	3	0	1	2	2	0	0	1	1	1	0
	1	1	0	9										
2005	1	6	2	2	1	30	30	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	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	0	0	2	0	1	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	6										
2005	1	6	2	2	1	32	32	15	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	1	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	0	0	0	0	0
	0	0	0	9										
2005	1	6	2	2	1	34	34	9	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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	1	0	0
	0	1	0	6										
2005	1	6	2	2	1	36	36	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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										
2005	1	6	2	2	1	38	38	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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										
2007	1	6	1	2	1	14	14	2	0	0	0.5	0	1.5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	16	16	2.5	0	0	0	0	0	0.5
	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										
2007	1	6	1	2	1	18	18	10	0	0	0	0	1	0
	1	2	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
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	20	20	12.5	0	0	0	0	0	0
	2	2	4	1.5	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	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	22	22	20	0	0	0	0	0	0
	0	2	0	2	1	6	4	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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	24	24	23	0	0	0	0	0	0
	0	0	0	1	0	0	3	3	1	1	3	2	3	2
	1	0	0	0	0	0	1	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	26	26	32	0	0	0	0	0	0
	0	0	1	0	2	0	1	5	0	0	2	0	1	0
	3	3	1	1	1	1	2	0	0	1	3	1	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	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	28	28	27	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	2	1	3	3
	0	1	0	0	1	0	0	0	1	1	0	0	0	2
	0	1	0	0	2	0	0	0	0	0	1	0	1	1
	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										

2007	1	6	1	2	1	30	30	42	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	2
	1	0	0	0	0	0	2	0	0	1	2	1	0	0
	1	0	0	0	1	3	2	0	0	0	1	3	1	0
	1	1	0	1	1	0	1	1	1	0	0	0	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										
2007	1	6	1	2	1	32	32	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1	0	1	0
	0	1	1	0	0	0	0	0	1	1	0	0	0	0
	1	0	1	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										
2007	1	6	1	2	1	34	34	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	2	1	0	0	2	1	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	8	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	6	1	2	1	36	36	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2007	1	6	1	2	1	38	38	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	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	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2007	1	6	2	2	1	14	14	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	0.5	0	0.5	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										
2007	1	6	2	2	1	16	16	9.5	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	1	2.5	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	0	0	0										
2007	1	6	2	2	1	18	18	9	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	1	4	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										
2007	1	6	2	2	1	20	20	15.5	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	2	5	0	2.5	1	2	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										
2007	1	6	2	2	1	22	22	14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	0	1	1	1	2	2
	1	0	0	1	0	0	0	0	0	0	1	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										
2007	1	6	2	2	1	24	24	17	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	1	1
	2	1	0	0	2	2	0	0	1	0	0	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
	0	0	0	0										
2007	1	6	2	2	1	26	26	32	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	1	2	0	5
	1	2	0	0	2	3	1	0	0	1	1	1	0	0
	2	0	0	0	0	0	0	2	0	0	1	0	1	0
	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	1	3										
2007	1	6	2	2	1	28	28	31	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	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	4	1	0	1	1	1	0	0	0	0	0	0	1
	1	0	0	0	1	0	0	2	0	1	2	2	0	0
	0	0	0	0	0	0	1	2	0	0	0	1	0	1
	0	1	0	2										
2007	1	6	2	2	1	30	30	30	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	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	1	0	1	2	1	0	2	0	0
	2	0	1	1	0	0	1	0	0	1	1	1	1	1
	0	0	1	0	1	1	1	0	0	0	0	1	0	1
	0	0	0	5										
2007	1	6	2	2	1	32	32	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	1	1	0
	0	1	0	0	0	0	1	0	1	0	0	0	0	0
	0	1	1	0	1	0	1	0	0	0	0	0	0	0
	0	0	1	3										

2007	1	6	2	2	1	34	34	7	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0
	0	0	1	4										
2007	1	6	2	2	1	36	36	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	1	0	0	1	0	0	0	0	0	0
	0	0	0	4										
2009	1	6	1	2	1	10	10	1.5	0	0.5	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	12	12	2.5	0	0	1	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	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	14	14	3.5	0	0	0	0	3.5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	16	16	8.5	0	0	0	0	1	0
	1	2	0	1	2.5	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	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	18	18	15	0	0	0	0	0	0
	1	2	0	4	4	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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	20	20	18	0	0	0	0	0	0
	0	0	2	3	3	0	0	3	5	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	22	22	21	0	0	0	0	0	0
	0	1	1	4	1	3	1	1	1	2	1	0	0	3
	0	0	0	0	0	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	24	24	23	0	0	0	0	0	0
	0	0	0	0	1	0	2	2	1	2	2	2	1	1
	1	0	1	1	1	1	0	1	0	0	0	0	2	0
	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	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										
2009	1	6	1	2	1	26	26	33	0	0	0	0	0	0
	0	0	0	1	0	1	3	1	1	0	0	3	1	1
	0	0	0	0	0	1	1	2	2	0	0	0	2	0
	0	1	0	2	2	0	1	0	0	2	0	0	0	0
	0	1	0	0	1	0	0	0	0	1	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	1	2	1	28	28	37	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	2	0	1	1	0
	0	3	3	2	1	1	0	3	1	0	0	1	1	0
	0	0	1	1	0	0	1	1	0	1	0	0	0	0
	0	0	1	0	0	2	1	0	1	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										
2009	1	6	1	2	1	30	30	19	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	0	1	0	1	1	0	0	0	1	0	0	1	1	0
	0	0	1	1	0	0	1	0	0	0	0	1	1	0
	0	0	0	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										
2009	1	6	1	2	1	32	32	12	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	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	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										
2009	1	6	1	2	1	34	34	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	1	0	0	0	0	0	0	0	0
	0	1	1	0	0	0	0	0	0	0	1	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										

2009	1	6	1	2	1	36	36	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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	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										
2009	1	6	2	2	1	10	10	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
	0.5	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										
2009	1	6	2	2	1	12	12	3.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	2	0.5	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										
2009	1	6	2	2	1	14	14	2.5	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	2.5	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										
2009	1	6	2	2	1	16	16	2.5	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	1	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										
2009	1	6	2	2	1	18	18	9	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	3	0	1	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										
2009	1	6	2	2	1	20	20	11	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	2	0	2	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	0	0	0	0	0
	0	0	0	0										
2009	1	6	2	2	1	22	22	21	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	1	0	1	6	3	1	2	1
	2	0	0	0	2	0	0	1	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	2	2	1	24	24	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	1	4	0	0	3	1
	0	2	0	2	1	1	3	0	0	0	1	0	1	1
	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2009	1	6	2	2	1	26	26	39	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	3	0	5
	0	0	2	0	3	2	1	2	2	1	1	0	1	0
	1	0	0	1	1	2	1	0	1	1	1	1	0	1
	2	0	0	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	1										
2009	1	6	2	2	1	28	28	37	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	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	3	2	0	1	1	0	1	0	0	0	0	0
	0	0	0	0	1	1	0	1	3	0	0	0	0	0
	0	0	0	0	2	1	1	1	0	1	1	0	0	1
	1	1	0	11										
2009	1	6	2	2	1	30	30	25	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	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	1	1	0	0	0	0	0
	0	1	0	0	0	0	1	0	1	1	0	0	0	0
	1	0	0	0	0	0	0	1	0	1	0	0	0	0
	1	0	0	13										
2009	1	6	2	2	1	32	32	14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	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
	1	1	1	0	1	0	1	1	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	4										
2009	1	6	2	2	1	34	34	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	0	0	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	1	0	0	0	1	0	0	0	0
	0	0	0	5										
2009	1	6	2	2	1	36	36	5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	5										

2010	1	6	1	2	1	10	10	2.5	0	2.5	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	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	1	2	1	12	12	4.5	0	0	4	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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	1	2	1	14	14	2.5	0	0	0.5	1.5	0.5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	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										
2010	1	6	1	2	1	16	16	10	0	0	0	1.5	2.5	4
	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
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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										
2010	1	6	1	2	1	18	18	9	0	0	0	0	0	1
	2	1	3	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										
2010	1	6	1	2	1	20	20	12	0	0	0	0	0	2
	1	1	3	0	0	3	1	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	1	2	1	22	22	18	0	0	0	0	0	0
	0	0	4	5	1	6	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										
2010	1	6	1	2	1	24	24	37	0	0	0	0	0	0
	0	0	4	3	3	2	5	3	1	5	5	0	1	0
	0	0	0	1	1	0	1	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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	1	2	1	26	26	38	0	0	0	0	0	0
	0	0	1	4	0	2	0	2	2	3	1	2	1	2
	1	2	1	1	0	0	1	1	1	0	1	0	2	2
	0	1	0	0	0	0	0	0	0	0	0	1	0	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	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0										
2010	1	6	1	2	1	28	28	30	0	0	0	0	0	0
	0	0	0	0	0	2	0	1	1	1	2	2	0	0
	0	1	0	0	1	0	1	2	0	0	1	0	1	1
	2	1	2	0	0	0	0	0	1	0	0	0	2	0
	0	1	0	1	0	1	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										
2010	1	6	1	2	1	30	30	31	0	0	0	0	0	0
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	0	1	1	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	1	1	2	2	1	2	1	0	0	0	1
	2	2	0	1	0	0	0	2	1	0	2	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	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	1	2	1	32	32	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	1	0	1	0	1	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										
2010	1	6	1	2	1	34	34	14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	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	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										
2010	1	6	1	2	1	36	36	3	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	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	0	0
	0	0	0	0										
2010	1	6	1	2	1	38	38	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	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										

2010	1	6	2	2	1	10	10	1.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	1	12	12	5.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	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	1.5	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	1	14	14	9.5	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	1.5	3.5	2.5	2	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	1	16	16	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	2.5	4.5	3	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	0	0										
2010	1	6	2	2	1	18	18	14	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	4	3	0	2	0	4	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	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	4	3	2	2	4	2	4	1	2	1
	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	1	22	22	23	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	2	4	1	3	1	4	3	1
	2	0	0	0	0	0	0	0	0	0	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	1	24	24	39	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	4	7	2	3	3	5	2
	1	1	4	1	1	0	0	0	3	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2010	1	6	2	2	1	26	26	40	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	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	3	2	0
	0	2	0	1	2	3	2	2	1	2	1	2	1	0
	0	1	1	0	0	2	0	1	0	0	0	1	0	0
	1	0	0	1	0	1	0	0	1	0	2	0	0	0
	0	0	0	1										
2010	1	6	2	2	1	28	28	36	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	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	1	3	0	0	0	0	0	1	1	3	0	0
	1	2	0	0	1	2	4	2	1	0	0	1	0	1
	0	0	1	0	0	0	2	0	0	0	0	0	1	0
	0	2	0	3										
2010	1	6	2	2	1	30	30	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	3	1	0	0	1	1	0	0	0	0	0	0	0
	0	0	1	1	0	0	1	1	0	0	0	0	0	0
	1	0	1	0	1	0	0	1	2	0	0	1	0	0
	1	0	1	5										
2010	1	6	2	2	1	32	32	16	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	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	1
	1	0	0	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	1	0	1	0	0	0	1	1	0	1	1
	0	0	0	4										
2010	1	6	2	2	1	34	34	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
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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	1
	0	0	1	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	1										
2010	1	6	2	2	1	36	36	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
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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	4										
2010	1	6	2	2	1	38	38	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	1										

2011	1	6	1	2	1	8	8	2.5	1	0.5	1	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	10	10	2.5	0	0	2.5	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
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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										
2011	1	6	1	2	1	12	12	5.5	0	0	3.5	1.5	0.5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	14	14	9	0	0	0	4.5	3.5	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	16	16	17	0	0	0	4	3	5
	3	1	1	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	18	18	12	0	0	0	0	0	3
	2	2	2	3	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	20	20	18	0	0	0	0	0	2
	3	2	4	0	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	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	22	22	30	0	0	0	0	0	0
	1	4	3	4	6	1	1	3	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	24	24	31	0	0	0	0	0	0
	0	0	0	4	6	2	5	2	0	1	3	1	0	1
	1	0	1	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	26	26	37	0	0	0	0	0	0
	0	0	0	4	8	4	1	3	0	0	3	3	1	1
	1	0	2	0	1	1	0	0	1	1	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	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	28	28	30	0	0	0	0	0	0
	0	0	0	0	0	2	0	1	1	2	0	2	0	0
	0	2	0	2	0	1	1	0	0	1	1	0	1	0
	0	0	1	1	1	0	0	1	0	2	1	0	2	0
	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	30	30	29	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	0	2	3	2
	0	1	0	0	0	0	0	0	0	1	0	0	1	0
	0	1	0	0	1	0	0	0	0	0	1	1	0	0
	0	1	2	0	2	1	0	0	1	1	0	0	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										
2011	1	6	1	2	1	32	32	11	0	0	0	0	0	0
	0	0	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	2
	1	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	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										
2011	1	6	1	2	1	34	34	9	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	1	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	2	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	1	2	1	36	36	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										

2011	1	6	2	2	1	8	8	2.5	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	1
	0.5	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	2	2	1	10	10	3.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	3.5	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										
2011	1	6	2	2	1	12	12	3.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	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	1.5	0.5	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	2	2	1	14	14	12	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	2	3.5	1.5	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	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	2	2	1	16	16	20	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	6	6	4	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	0	0										
2011	1	6	2	2	1	18	18	17	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	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	3	4	1	3	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	2	2	1	20	20	17	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	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	5	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	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2011	1	6	2	2	1	22	22	20	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	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	6	1	1	2	0
	1	1	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										
2011	1	6	2	2	1	24	24	29	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	2	3	4	2	4	3	1
	2	2	1	2	0	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										
2011	1	6	2	2	1	26	26	45	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	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	4	3	1	1	0
	3	1	0	1	1	2	2	2	0	1	1	1	2	2
	1	2	0	0	0	0	2	0	0	0	1	1	0	2
	0	0	1	0	0	1	0	1	0	0	1	0	0	0
	0	0	0	1										
2011	1	6	2	2	1	28	28	37	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	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	1
	0	0	1	0	1	0	1	0	1	2	1	0	0	0
	1	0	1	2	0	1	0	2	0	1	0	0	2	0
	1	0	0	0	1	1	0	0	1	1	0	0	1	0
	0	0	0	9										
2011	1	6	2	2	1	30	30	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	0	0	0	0	0	0	0	0	0	0	0	0
	2	1	0	2	2	1	1	0	1	1	0	1	0	1
	2	0	0	0	1	0	0	0	0	1	0	1	1	0
	0	0	0	1	1	0	1	1	0	1	0	1	0	0
	0	0	0	2										
2011	1	6	2	2	1	32	32	17	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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	0
	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	1	1	1	1	0	0	0	0	1	0	1	0	0	0
	1	1	0	5										
2011	1	6	2	2	1	34	34	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
	2	0	0	0	0	0	0	0	0	0	1	1	1	0
	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	10	10	0.5	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
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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										

2012	1	6	1	2	1	12	12	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										
2012	1	6	1	2	1	14	14	6.5	0	0	0	0	2	4
	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	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	16	16	11.5	0	0	0	0	0.5	2
	4	3	1	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	18	18	16.5	0	0	0	0	1	6
	1	4	0.5	1	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	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	20	20	21	0	0	0	0	0	0
	1	2	4	3	0	2	2	1	1	3	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	22	22	13	0	0	0	0	0	0
	0	0	2	1	0	3	1	3	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	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	24	24	29	0	0	0	0	0	0
	0	0	0	0	1	3	1	4	2	2	1	3	1	4
	4	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	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	26	26	25	0	0	0	0	0	0
	0	0	0	0	0	0	2	4	1	1	1	0	0	3
	1	1	0	1	1	1	3	0	0	1	0	0	1	0
	0	0	0	0	0	0	1	1	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	28	28	31	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0	2	2	1
	0	1	1	0	0	0	1	1	2	1	2	0	2	0
	0	1	0	0	1	0	0	1	0	1	1	1	0	0
	1	0	1	0	0	0	0	0	0	0	0	0	6	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	30	30	17	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	1	1	0	0	1
	1	0	2	2	0	0	0	2	0	0	1	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	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	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	32	32	10	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	1
	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	1	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	0										
2012	1	6	1	2	1	34	34	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	1	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	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										
2012	1	6	1	2	1	36	36	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	1	2	1	38	38	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	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										
2012	1	6	2	2	1	10	10	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	0.5	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										

2012	1	6	2	2	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	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	2	2	1	14	14	3.5	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	1	0.5	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										
2012	1	6	2	2	1	16	16	14.5	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	3.5	5	2	2	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	2	2	1	18	18	11.5	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	3	0	4.5	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										
2012	1	6	2	2	1	20	20	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	1	2	2	3	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										
2012	1	6	2	2	1	22	22	18	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	2	2	2	3	3	0
	2	1	0	0	1	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	2	2	1	24	24	36	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	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	5	4	0	3	0
	3	2	3	4	0	2	2	1	1	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	0	0	0	0										
2012	1	6	2	2	1	26	26	39	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	0	0	0	0	0	0	0	0	0	2	3	1	3	4
	0	2	1	2	2	2	0	2	1	1	1	0	0	0
	3	2	0	0	1	0	1	0	0	0	1	0	2	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	1	0	0	0										
2012	1	6	2	2	1	28	28	29	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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	2
	0	2	0	1	0	1	3	1	1	0	0	0	0	1
	2	0	0	1	0	0	1	1	0	1	0	0	0	1
	1	1	0	0	1	0	1	0	0	0	0	0	0	0
	1	0	0	3										
2012	1	6	2	2	1	30	30	28	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	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	3	2	1	1	0	0	1	1
	0	1	0	0	1	0	1	0	0	0	0	1	1	0
	0	0	0	1	0	0	0	0	1	0	1	0	2	0
	0	0	0	6										
2012	1	6	2	2	1	32	32	11	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	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	1	0	1	0	0	0	0	0	0	0	1	0	0
	1	0	0	5										
2012	1	6	2	2	1	34	34	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	0	0	0	0	0	0	0	0	0	0	0	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
	1	0	1	5										
2012	1	6	2	2	1	36	36	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	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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										
2012	1	6	2	2	1	38	38	2	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	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										
#														
#TWL	ghost	marginal	ages	(N=3),	not	expanded								
#Year	Seas	Fleet	Gender	part	AgeErr	LbinLo	LbinHi	Nsamp						
2003	1	-1	3	2	1	-1	-1	481	0	0	0	0	0	0
	0	0	1	4	2	3	7	6	2	2	3	4	4	5
	2	1	3	10	4	4	5	7	5	7	4	6	4	4
	3	4	1	6	6	6	7	3	4	3	3	3	2	3
	4	1	5	6	1	3	4	5	4	3	5	2	41	0
	0	0	0	0	0	0	0	1	7	3	5	10	7	6

	1	2	6	2	5	6	3	4	6	3	2	2	5	2
	2	2	5	0	1	3	5	4	3	2	3	5	3	6
	5	5	7	1	5	4	5	2	3	3	1	3	2	4
	2	1	4	45										
2008	1	-1	3	2	1	-1	-1	382	0	0	0	0	0	0
	0	0	0	3	1	0	2	6	4	5	1	7	1	5
	5	4	3	4	3	1	5	3	3	3	5	4	4	3
	4	2	3	3	4	2	1	2	0	2	3	2	1	2
	3	5	4	1	3	1	4	3	1	2	2	5	57	0
	0	0	0	0	0	0	0	0	0	1	0	0	4	0
	2	5	4	3	2	4	4	10	4	2	5	3	3	2
	5	4	3	5	2	2	4	3	0	1	0	4	3	6
	3	2	1	2	7	2	4	4	4	2	1	3	3	2
	2	1	1	31										
2009	1	-1	3	2	1	-1	-1	323	0	0	0	0	0	0
	0	0	0	2	3	1	4	1	5	5	4	3	7	3
	0	3	1	1	2	3	1	2	0	3	4	6	2	6
	1	4	2	2	3	0	0	3	1	1	4	1	1	2
	5	1	1	3	2	2	2	1	0	0	0	2	41	0
	0	0	0	0	0	0	0	2	1	0	3	1	3	3
	9	3	5	1	0	2	5	0	1	4	3	4	1	3
	1	2	2	3	3	3	2	4	3	2	0	2	2	5
	2	3	0	0	1	4	4	3	2	2	1	3	1	4
	3	2	1	42										

#

#Survey ghost marginal ages (N=7), not expanded

2003	1	-6	3	2	1	-1	-1	404	0	1	1	3	2	3
	4	7	9	12	10	15.5	13	8.5	4	3	3	4	3	1
	3	3	0	3	2	3	5	2	3	3	2	5	4	2
	3	1	2	3	4	3	3.5	2	3	1	3	1.5	1	2
	1	3	0	2	2	1	1	0	2	2	1	0	29	0
	1	3	4	6	4	3	3	2	10	7	8.5	6	6.5	5
	2	1	6	3	2	1	4	3	2	5	2	3	4	4
	0	5	2	4	2	1	4	2	0	3	1	1.5	0	5
	3	0	1.5	2	1	2	0	2	0	3	1	1	0	1
	2	1	1	17										
2005	1	-6	3	2	1	-1	-1	428	0	0	1	0.5	5	5
	8	9	7	2	2	5	8	4	7	6	2	6	7	3
	1	8	1	6	1	4	6	0	2	1	4	2	2	0
	2	2	3	6	1	1	4	4	2	1	2	2	3	3
	3	1	3	2	2	2	0	5	1	1	0	1	26	0
	0	0	2.5	6	8	14	10	8	7	7	3	6	6	12
	4	4	5	3	2	2	5	2	2	4	4	4	3	2
	4	0	3	4	0	1	2	0	0	0	0	1	4	2
	2	2	0	5	0	2	3	3	1	0	1	2	1	0
	1	2	1	37										
2007	1	-6	3	2	1	-1	-1	395	0	0	0.5	0	2.5	0.5
	4	6	9	6.5	3	7	9	10	5	4	7	4	7	7
	5	4	1	1	2	1	5	0	1	4	6	2	2	3
	1	2	1	0	4	5	3	0	1	3	3	5	2	2
	3	1	1	1	1	0	1	2	1	0	1	0	35	0
	0	0.5	0	1.5	4.5	10	11	3	3.5	3	4	8	4	11
	5	8	2	1	5	7	2	1	3	3	2	6	1	2
	5	1	1	2	1	0	3	4	1	2	4	3	3	1
	0	1	2	1	3	2	3	3	0	0	0	2	0	2
	0	1	3	21										
2009	1	-6	3	2	1	-1	-1	403	0	0.5	2	1	5	0
	2	5	3	13	11.5	5	7	9	9	6	3	7	4	7
	1	4	4	4	3	4	2	6	6	0	0	2	6	0
	0	2	2	4	2	1	3	2	0	3	0	1	1	0
	0	2	2	2	2	2	1	0	1	1	2	1	24	0
	0.5	1	2	3	1	3	3	2	7	11.5	7	6	6	8
	3	4	5	6	6	4	5	4	6	1	3	0	2	1
	2	2	1	1	4	3	3	2	5	2	1	2	0	1
	4	0	0	1	2	2	1	2	0	3	1	0	0	1
	3	1	0	39										
2010	1	-6	3	2	1	-1	-1	487	0	2.5	4.5	3.5	3	7
	3	2	16	13	4	15	7	7	6	10	8	4	2	3
	1	4	2	2	3	1	3	4	1	0	2	0	4	5
	2	3	2	1	2	2	2	3	3	2	1	2	2	1
	3	6	1	3	0	1	0	2	1	0	4	3	26	0
	1.5	5.5	7.5	11	12	4	7	10	19	9	9	11	12	4
	6	6	6	5	4	4	3	3	5	4	3	5	2	1
	2	3	2	1	1	4	6	4	1	0	1	2	0	2

	2	0	3	2	1	3	2	1	3	1	3	1	2	1
	1	2	1	19										
2011	1	-6	3	2	1	-1	-1	502	1	0.5	7	10	7	11
	9	9	10	15	21	11	8	9	3	9	7	10	4	4
	2	4	3	2	2	3	1	2	2	4	1	0	2	5
	1	1	1	2	2	0	2	1	0	3	2	3	2	0
	0	1	2	0	3	2	0	0	3	2	0	0	14	1
	0.5	8	11	10	8	8	7	10	14	20	9	9	8	2
	8	5	3	6	7	3	4	3	3	4	3	3	3	3
	6	2	1	2	1	1	2	2	0	2	2	3	5	2
	2	1	2	2	2	2	1	2	2	3	2	1	1	0
	1	1	0	17										
2012	1	-6	3	2	1	-1	-1	407	0	0	0.5	1	3.5	12
	6.5	9	7.5	6	2	9	6	13	4	8	6	5	5	9
	6	3	3	6	1	1	4	3	2	3	3	0	4	1
	0	1	0	0	2	2	1	2	0	2	1	1	0	1
	1	1	1	1	0	0	1	0	0	1	0	3	16	0
	0	1.5	0	5.5	6	5.5	2	9.5	7	12	13	5	10	6
	5	7	7	8	4	5	8	6	4	3	1	1	1	2
	5	3	0	1	2	0	5	1	1	2	1	2	3	1
	1	2	0	2	1	0	1	1	2	0	1	1	2	0
	4	0	1	25										

#

0 #_N_MeanSize-at-Age_obs
0 #_N_environ_variables
0 #_N_environ_obs
0 #_N sizefreq methods to read
0 # no tag data
0 # no morphcomp data
#
999

Appendix C. SS control file

#Aurora Control File
1 #_N_Growth_Patterns
1 #_N_Morphs_Within_GrowthPattern
1 #_Nblock_Patterns
11 #_blocks_per_pattern
#1916 1998
1999 2001
2002 2002
2003 2003
2004 2004
2005 2005
2006 2006
2007 2007
2008 2008
2009 2009
2010 2010
2011 2012
#
#1916 2001 Block for nontrwl selectivity
#2002 2012
begin and end years of blocks
#
0.5 #_fracfemale
0 #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4=agespec_withseasinterpolate
#_no additional input for selected M option; read 1P per morph
1 # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=not implemented; 4=not implemented
1 #_Growth_Age_for_L1
40 #_Growth_Age_for_L2

```
0 #_SD_add_to_LAA
0 #_CV_Growth_Pattern
1 #_maturity_option
#_placeholder for empirical age-maturity by growth pattern
0 #_First_Mature_Age
1 #_fecundity option:(1)eggs=Wt*(a+b*Wt)
0 #_hermaphroditism option: 0=none; 1=age-specific fxn
1 #_parameter_offset_approach (1=none)
2 #_env/block/dev_adjust_method(2=logistic transform keeps in base parm bounds)
#
#_growth_parms
#_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
0.001 2 0.0350 -3.353 3 0.541 -2 0 0 0 0 0 0 0 # NatM_p_1_Fem_GP_1
1 11.82328614 8.5 6 1 10 2 0 0 0 0 0 0 0 # L_at_Amin_Fem_GP_1
1 73.8 31 31 -1 10 3 0 0 0 0 0 0 0 # L_at_Amax_Fem_GP_1
0.01 1 0.09 0.1 -1 0.8 3 0 0 0 0 0 0 0 # VonBert_K_Fem_GP_1
0.03 0.2 0.1 0.09 -1 0.8 3 0 0 0 0 0 0 0 # CV_young_Fem_GP_1
0.03 0.2 0.07 0.05 -1 0.8 3 0 0 0 0 0 0 0 # CV_old_Fem_GP_1
0.001 2 0.0371 -3.295 3 0.540 -2 0 0 0 0 0 0 0 # NatM_p_1_Mal_GP_1
1 11.82328614 8.5 6 1 10 2 0 0 0 0 0 0 0 # L_at_Amin_Mal_GP_1
1 73.8 30 31 -1 10 4 0 0 0 0 0 0 0 # L_at_Amax_Mal_GP_1
0.01 1 0.092 0.1 -1 0.8 3 0 0 0 0 0 0 0 # VonBert_K_Mal_GP_1
-1 1 0 0 -1 0.8 -3 0 0 0 0 0 0 0 # CV_young_Mal_GP_1
-1 1 0 0 -1 0.8 -3 0 0 0 0 0 0 0 # CV_old_Mal_GP_1
-3 3 0.000009933699 2.44E-06 -1 0.8 -3 0 0 0 0 0 0 0 # Wtlen_1_Fem
-3 4 3.144807 3.34694-1 0.8 -3 0 0 0 0 0 0 0 # Wtlen_2_Fem
1 1000 25.54 55 -1 0.8 -3 0 0 0 0 0 0 0 # Mat50%_Fem
-30 3 -0.616 -0.25 -1 0.8 -3 0 0 0 0 0 0 0 # Mat_slope_Fem
-3 3 1 1 -1 0.8 -3 0 0 0 0 0 0 0 # Eggs/kg_inter_Fem
-3 3 0 0 -1 0.8 -3 0 0 0 0 0 0 0 # Eggs/kg_slope_wt_Fem
-3 3 0.000009618973 2.44E-06 -1 0.8 -3 0 0 0 0 0 0 0 # Wtlen_1_Mal
-3 4 3.147253.34694-1 0.8 -3 0 0 0 0 0 0 0 # Wtlen_2_Mal
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_GP_1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Area_1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Seas_1
0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # CohortGrowDev
#
#_Cond 0 #custom_MG-env_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
```

#
#_Cond 0 #custom_MG-block_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
#_Cond No MG parm trends
#
#_seasonal_effects_on_biology_parms
0 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,malewtlen2,L1,K
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
#
#_Cond -4 #_MGparm_Dev_Phase
#
#_Spawner-Recruitment
3 #_SR_function
#_LO HI INIT PRIOR PR_type SD PHASE
1 31 7.5 7.5 -1 10 1 # SR_R0
0.25 0.99 0.779 0.779 2 0.152 -3 # SR_steep
0 2 0.5 0.8 -1 0.8 -4 # SR_sigmaR
-5 5 0.1 0 -1 1 -3 # SR_envlink
-5 5 0 0 -1 1 -4 # SR_R1_offset
0 0 0 0 -1 0 -99 # SR_autocorr
0 #_SR_env_link
0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
1 #do_recdev: 0=none; 1=devvector; 2=simple deviations
1962 # first year of main recr_devs; early devs can preceed this era
2011 # last year of main recr_devs; forecast devs start in following year
2 #_recdev phase
1 # (0/1) to read 13 advanced options
1916 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
3 #_recdev_early_phase

5 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxphase+1)
1 #_lambda for fore_recr_like occurring before endyr+1
1962 #_last_early_yr_nobias_adj_in_MPD
1970 #_first_yr_fullbias_adj_in_MPD
2008 #_last_yr_fullbias_adj_in_MPD
2012 #_first_recent_yr_nobias_adj_in_MPD
0.5 #_max_bias_adj_in_MPD (-1 to override ramp and set biasadj=1.0 for all estimated recdevs)
0 #_period of cycles in recruitment (N parms read below)
-5 #min rec_dev
5 #max rec_dev
0 #_read_recdevs
#_end of advanced SR options
#
#_placeholder for full parameter lines for recruitment cycles
read specified recr devs
#_Yr Input_value
#
all recruitment deviations
#
#Fishing Mortality info

```
0.3 # F ballpark for tuning early phases
-2001 # F ballpark year (neg value to disable)
3 # F_Method:  1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
0.9 # max F or harvest rate, depends on F_Method
# no additional F input needed for Fmethod 1
# if Fmethod=2; read overall start F value; overall phase; N detailed inputs to read
# if Fmethod=3; read N iterations for tuning for Fmethod 3
5  # N iterations for tuning F in hybrid method (recommend 3 to 7)
#
#_initial_F_parms
#_LO HI INIT PRIOR PR_type SD PHASE
 0 1 0 0.01 0 99 -1 # InitF_1FISHERY1
 0 1 0 0.01 0 99 -1 # InitF_1FISHERY1
#
#_Q_setup
 # Q_type options:  <0=mirror, 0=median_float, 1=mean_float, 2=parameter, 3=parm_w_random_dev,
4=parm_w_randwalk, 5=mean_unbiased_float_assign_to_parm
 #_Den-dep  env-var  extra_se  Q_type
 0 0 0 0 # 1 TRAWL
 0 0 0 0 # 2 BYCATCH
 0 0 0 0 # 3 Tri
 0 0 0 0 # 4 AFSC slope
 0 0 0 0 # 5 NWFSC slope
 0 0 0 0 # 6 NWFSC shelf-slope
#
#_Cond 0 #_If q has random component, then 0=read one parm for each fleet with random q; 1=read a parm for each year
of index
#_Q_parms(if_any)
# LO HI INIT PRIOR PR_type SD PHASE
# 0 5 0.01 0.01 0 99 1 # InitF_1FISHERY1
# 0 5 0.01 0.01 0 99 1 # InitF_1FISHERY1
# 0 5 0.01 0.01 0 99 1 # InitF_1FISHERY1
# 0 5 0.01 0.01 0 99 1 # InitF_1FISHERY1
#_SELEX_&_RETENTION_PARAMETERS
# 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=Extra input (#)
# A B C D
# Size selectivity
1     1     0     0     # TWL
15    0     0     1     # NODISC
24    0     0     0     # Late Triennial
24    0     0     0     # AFSC Slope
24    0     0     0     # NWFSC slope
15    0     0     5     # NWFSC Combo
# Age selectivity
10    0     0     0  # Fishery
10    0     0     0  # NODISC
10    0     0     0   # Late Triennial
10    0     0     0   # AFSC Slope
10    0     0     0   # NWFSC Slope
10    0     0     0   # NWFSC Combo
```

```
# Selectivity 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
# Fishery age-based
 # Selectivity 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
# Block design 1 means that parm' = baseparm + blockparm, 2 means that parm' = blockparm
# TWL Fishery length-based
#18    40    24     24     -1     50     2      0    0    0      0      0    0       0 # Peak
#-6    4     -1     -1     -1     50     -2     0    0    0      0      0    0       0 # Top
#-1    9     2      4      -1     50     3      0    0    0      0      0    0       0 # Asc width
#-1    9     0      4      -1     50     3      0    0    0      0      0    0       0 # Desc width
#-5    9     -4.99  -4     -1     50     -4     0    0    0      0      0    0       0 # Init
#-5    9     1      -2     -1     50     2      0    0    0      0      0    0       0 # Final
15     30    22     22     -1     99     2      0    0    0      0      0    0       0
       #infl_for_logistic
0.001  50    7      9      -1     99     3      0    0    0      0      0    0       0
       #95%width_for_logistic
# TWL Retention
10     35    25     25     -1     99     1      0    0    0      0      0.5  0       0 # Inflection
0.1    10    2      1      -1     99     1      0    0    0      0      0.5  0       0 # Slope
0.001  1     0.95   0.95   -1     99     1      0    0    0      0      0.5  1       2 # Asymptote
0      0     0      0      -1     99     -3     0    0    0      0      0.5  0       0 # Male offset
# Triennial Survey
10     30    25     23     -1     50     2      0    0    0      0      0    0       0 # Peak
-6     4     -2     -2     -1     50     4      0    0    0      0      0    0       0 # Top
-1     9     3      4      -1     50     3      0    0    0      0      0    0       0 # Asc width
-1     9     3      4      -1     50     3      0    0    0      0      0    0       0 # Desc width
-5     9     -4.99  -4     -1     50     -4     0    0    0      0      0    0       0 # Init
-5     9     0      -2     -1     50     2      0    0    0      0      0    0       0 # Final
# AKslope
10     30    23.5   23.5   -1     50     2      0    0    0      0      0    0       0 # Peak
-6     4     -3     -3     -1     50     4      0    0    0      0      0    0       0 # Top
-1     9     3.5    4      -1     50     3      0    0    0      0      0    0       0 # Asc width
-1     9     2      4      -1     50     3      0    0    0      0      0    0       0 # Desc width
-5     9     -4.99  -4     -1     50     -4     0    0    0      0      0    0       0 # Init
-5     9     0      -2     -1     50     2      0    0    0      0      0    0       0 # Final
# NWFSC slope and Combo
10     30    26     26     -1     50     2      0    0    0      0      0    0       0 # Peak
-6     4     -4     -4     -1     50     4      0    0    0      0      0    0       0 # Top
-1     9     4      4      -1     50     3      0    0    0      0      0    0       0 # Asc width
-1     9     2      3      -1     50     3      0    0    0      0      0    0       0 # Desc width
-5     9     -4.99  -4     -1     50     -4     0    0    0      0      0    0       0 # Init
-5     9     0      -2     -1     50     2      0    0    0      0      0    0       0 # Final

#18    40    25     25     -1     99     2      0    0    0      0      0    0       0
       #infl_for_logistic
#0.001 50    11     15     -1     99     3      0    0    0      0      0    0       0
       #95%width_for_logistic
1      # Selex block setup: 0=Read one line apply all, 1=read one line each parameter
# Lo   Hi    Init   Prior  P_type SD     Phase
0.1    1     .9     .9     0      99     -1 #1999-2001
```

0.1	1	.8	.8	0	99	1 #2002
0.1	1	.8	.8	0	99	1
0.1	1	.9	.9	0	99	1
0.1	1	.9	.9	0	99	1
0.1	1	.7	.7	0	99	1
0.1	1	.7	.7	0	99	1
0.1	1	.5	.5	0	99	1
0.1	1	.5	.5	0	99	1
0.1	1	.7	.7	0	99	1
0.1	1	.95	.95	0	99	1
#						
#0.001	1	.75	.75	0	99	1 #
#15	35	20	25	-1	99	1

1 #Selectivity parameters above are applied directly without regard to bounds

\# Tag loss and Tag reporting parameters go next
0 # TG_custom: 0=no read; 1=read if tags exist
#_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0 #_placeholder if no parameters
#
1 #_Variance_adjustments_to_input_values
#_fleet: 1 2 3
#TWL NONTWL DISC TRI AKSL NWSL NWFSC
0 0 0 0 0 0 #_0add_to_survey_CV
0 0 0 0 0 0 #_add_to_discard_stddev
0 0 0 0 0 0 #_add_to_bodywt_CV
.15 1 .33 .37 1 .67 #_mult_by_lencomp_N
.31 1 1 1 1 1 #_mult_by_agecomp_N
1 1 1 1 1 1 #_mult_by_size-at-age_N
#
1 #_maxlambdaphase
1 #_sd_offset
#
0 # number of changes to make to default Lambdas (default value is 1.0)
\# Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=sizeage; 8=catch;
\# 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14=Morphcomp; 15=Tag-comp; 16=Tag-negbin
#like_comp fleet/survey phase value sizefreq_method
#
\# lambdas (for info only; columns are phases)
\# 0 0 0 0 #_CPUE/survey:_1
\# 1 1 1 1 #_CPUE/survey:_2
\# 1 1 1 1 #_CPUE/survey:_3
\# 1 1 1 1 #_lencomp:_1
\# 1 1 1 1 #_lencomp:_2
\# 0 0 0 0 #_lencomp:_3
\# 1 1 1 1 #_agecomp:_1
\# 1 1 1 1 #_agecomp:_2
\# 0 0 0 0 #_agecomp:_3
\# 1 1 1 1 #_size-age:_1
\# 1 1 1 1 #_size-age:_2
\# 0 0 0 0 #_size-age:_3
\# 1 1 1 1 #_init_equ_catch
\# 1 1 1 1 #_recruitments

1 1 1 1 #_parameter-priors
1 1 1 1 #_parameter-dev-vectors
1 1 1 1 #_crashPenLambda
0 # (0/1) read specs for more stddev reporting

999

Appendix D. SS starter file

#C starter comment here
ARRA_dat3.ss
ARRA_ctl5.ss
0 # 0=use init values in control file; 1=use ss3.par
1 # run display detail (0,1,2)
0 # detailed age-structured reports in REPORT.SSO (0,1)
1 # write detailed checkup.sso file (0,1)
4 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms; 4=every,active)
1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
1 # Include prior_like for non-estimated parameters (0,1)
1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
1 # Number of bootstrap datafiles to produce
10 # Turn off estimation for parameters entering after this phase
1 # MCeval burn interval
1 # MCeval thin interval
0.0 # jitter initial parm value by this fraction
-1 # min yr for sdreport outputs (-1 for styr)
-2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs
0 # N individual STD years
#vector of year values
#1960 1970 1980 1990 2000 2010
0.0001 # final convergence criteria (e.g. 1.0e-04)
0 # retrospective year relative to end year (e.g. -4)
0 # min age for calc of summary biomass
1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B_styr
1 # Fraction (X) for Depletion denominator (e.g. 0.4)
1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY); 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
3 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum(Frates)
0 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
999 # check value for end of file

Appendix E. SS forecast file

#V3.21f
#C generic forecast file
for all year entries except rebuilder; enter either: actual year, -999 for styr, 0 for endyr, neg number for rel. endyr
1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endyr)
0.5 # SPR target (e.g. 0.40)
0.4 # Biomass target (e.g. 0.40)
#_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
 0 0 0 0 0 0
2010 2010 2010 2010 2010 2010 # after processing
1 #Bmark_relF_Basis: 1 = use year range; 2 = set relF same as forecast below
#

1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-last relF yrs); 5=input annual F scalar
12 # N forecast years
0.2 # F scalar (only used for Do_Forecast==5)
#_Fcast_years: beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
 0 0 0 0
2010 2010 2010 2010 # after processing
1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB))
0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40); (Must be > the no F level below)
0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
0.95577 # Control rule target as fraction of Flimit (e.g. 0.75)
3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch with allocations applied)
3 #_First forecast loop with stochastic recruitment
0 #_Forecast loop control #3 (reserved for future bells&whistles)
0 #_Forecast loop control #4 (reserved for future bells&whistles)
0 #_Forecast loop control #5 (reserved for future bells&whistles)
2013 #FirstYear for caps and allocations (should be after years with fixed inputs)
0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 to cause active impl_error)
0 # Do West Coast gfish rebuilder output (0/1)
2013 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to set to 1999)
2013 # Rebuilder: year for current age structure (Yinit) (-1 to set to endyear+1)
1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x fleet(col) below
Note that fleet allocation is used directly as average F if Do_Forecast=4
2 # basis for fcast catch tuning and for fcast catch caps and allocation (2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
Conditional input if relative F choice = 2
Fleet relative F: rows are seasons, columns are fleets
#_Fleet: FISHERY
1
max totalcatch by fleet (-1 to have no max) must enter value for each fleet
 -1 -1
max totalcatch by area (-1 to have no max); must enter value for each fleet
 -1
fleet assignment to allocation group (enter group ID# for each fleet, 0 for not included in an alloc group)
0 0
#_Conditional on >1 allocation group
allocation fraction for each of: 0 allocation groups
no allocation groups
0 # Number of forecast catch levels to input (else calc catch from forecast F)
2 # basis for input Fcast catch: 2=dead catch; 3=retained catch; 99=input Hrate(F) (units are from fleetunits; note new codes in SSV3.20)
Input fixed catch values
#Year Seas Fleet Catch(or_F)
 # 2013 1 1 5
 # 2013 1 2 0
 # 2013 1 3 0
 # 2014 1 1 5
 # 2014 1 2 0
 # 2014 1 3 0

999 # verify end of input