Status of the U.S. canary rockfish resource in 2005

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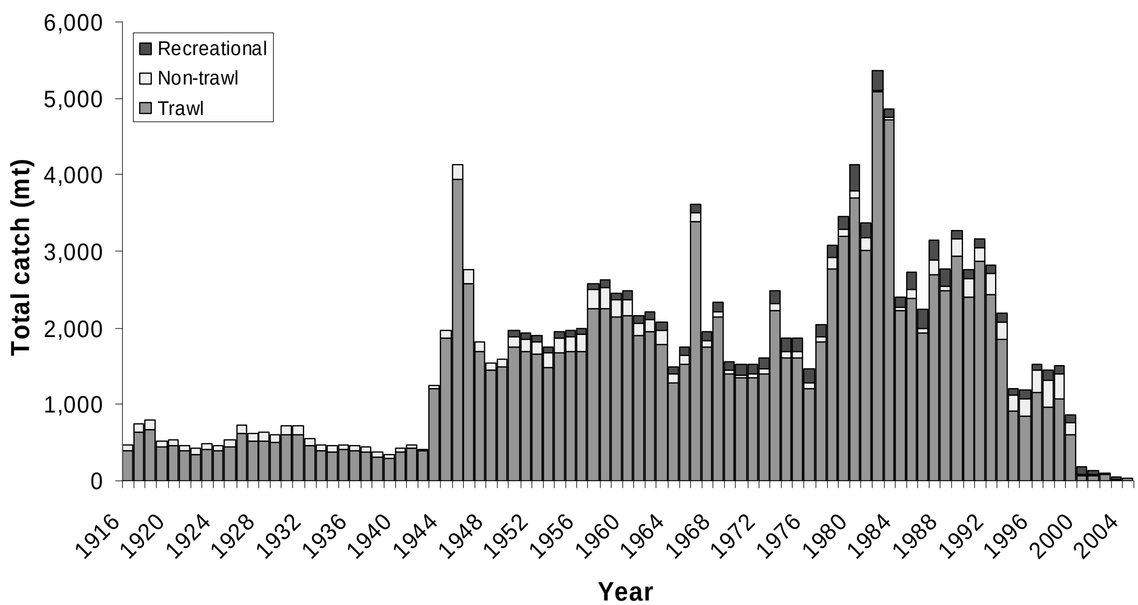
Executive Summary

Stock

This assessment reports the status of the canary rockfish (*Sebastes pinniger*) resource off the coast of the United States from southern California to the U.S.-Canadian border using data through 2004.

Catches

Catch of canary rockfish is first reported in 1916 in California. Since that time, annual catch ranged from 37.5 mt in 2004 to 5,374 in 1982 and totaled almost 150,000 mt over the time-series. Total catches since 1999 have been dramatically reduced relative to previous years in an attempt to rebuild a stock declared overfished in 2000 on the basis of the 1999 assessment. Canary rockfish catches have been primarily from the trawl fleets, on average comprising 85% of the annual catches, with the Oregon fleet removing as much as 3,864 mt in 1982. Historically just 10% of the catches have come from non-trawl commercial fisheries, although this proportion reached 24% and 350 mt in 1997. Recreational removals have averaged just 6% of the catches but have become relatively more important as commercial landings have been substantially reduced in recent years; recreational catches reached 60% of the total with 29 mt caught in 2003.



Catch history by major source, 1916-2004.

Recent commercial fishery catches (mt) by fleet.

Year	Southern California trawl	Northern California trawl	Oregon trawl*	Washington trawl*	Southern California non-trawl	Northern California non-trawl	Oregon-Washington non-trawl
1995	32.54	106.46	544.21	153.76	53.94	60.59	116.36
1996	102.23	116.13	744.34	184.91	84.90	51.48	164.04
1997	32.37	142.41	577.41	204.76	29.83	74.89	248.11
1998	9.52	149.46	712.26	201.23	23.42	56.84	245.13
1999	7.44	97.20	350.41	143.49	8.47	28.29	120.48
2000	1.71	10.92	29.78	28.96	2.52	5.53	7.98
2001	1.32	9.55	29.02	21.80	1.60	4.96	9.62
2002	0.36	14.48	33.51	35.45	0.02	0.08	2.62
2003	0.23	0.40	6.86	6.91	0.00	0.08	4.48
2004	0.80	2.55	13.52	8.04	0.02	0.08	4.89

* Includes at-sea whiting catches.

Data and Assessment

This assessment used the Stock Synthesis 2 model which is an integrated length-age structured model. This assessment includes catch, length- and age-frequency data from 10 fishing fleets, including trawl, non-trawl and recreational sectors. The National Marine Fisheries Service (NMFS) triennial bottom trawl survey biomass index is included to provide direct information on trends in stock abundance.

Several alternative model configurations were investigated in order to best understand the patterns and information in the canary rockfish data. These included specification of age vs. length-based selectivity, incorporating changes in ageing criteria and re-estimating growth parameters to reflect these changes, allowing female selectivity to differ from male selectivity, and other factors. A model configuration with female length-selectivity set equal to male length-selectivity was presented to the STAR panel in August as the proposed base model. This differed from the 2002 assessment that used age-based selectivity and allowed a male-female difference, but was considered a preferred configuration due to the preponderance of length data and the difference in maximum size between males and females. During the STAR panel review, it was found that allowing female length-selectivity to differ from male length-selectivity provided a somewhat better statistical fit to the fishery age and length composition data and this configuration was selected at that time as the base model, documented in the Aug 31, 2005 version of the assessment document, and used for the first draft of the rebuilding analysis in September 2005.

At the SSC review of the canary rockfish assessment (Sept. 27-30, 2005; Seattle, WA) several issues that had not been specifically examined in the assessment (trawl survey catchability, recruitment variability, and juvenile recruitment survey) were considered. The results are summarized in Appendix A to this assessment report. The SSC recommended no major changes to the base model. However, they concluded that the parametric variance around a single base model underestimated the overall uncertainty in the canary rockfish assessment. After re-examining some of the sensitivity analyses included in the assessment, the SSC concluded that the alternative configuration of the male-female selectivity parameters was plausible to include. The two model scenarios are labeled here as Base (Diff configuration – with female length-selectivity allowed to differ from male length-selectivity) and Alternate (NoDiff configuration - with no difference allowed). After considerable deliberation, the SSC concluded that the Base and Alternate models were equally likely and they supported a statistically based blend of the two models as the basis for the rebuilding analysis. This final version of the canary rockfish 2005 assessment has been revised to include the alternate model and to document the results used in the rebuilding analysis. The rebuilding analysis is configured to incorporate 3 sources of uncertainty: two model configurations, probability profile on the spawner-recruitment steepness for each model configuration, and the annual variability in future recruitments.

Unresolved Problems and Major Uncertainties

Parameter uncertainty is explicitly captured in the asymptotic confidence intervals reported throughout this assessment for key parameters and management quantities. These intervals reflect the uncertainty in the model fit to the data sources included in the assessment, but do not include uncertainty associated with alternative model configurations, weighting of data sources (a combination of input sample sizes and relative weighting of likelihood components). Specifically, there appears to be conflicting information between the length- and age-frequency data regarding the degree of stock decline, making the model results sensitive to the relative weighting of each. This issue is explored in the assessment, but cannot be fully resolved at this time. The final model configuration includes a base model and an alternate model that differs only in the degree of flexibility in some selectivity curves, yet results is a difference in the estimated current stock abundance. The relationship between the degree of dome in the selectivity curves and the increase in female natural mortality with age remains a source of uncertainty, as it has been in previous assessments for both canary rockfish and yellowtail rockfish. We have used an approach to this problem similar to recent assessments, but there is little data available to resolve this issue and it will remain an area for further exploration in future assessments.

Regional Management Concerns

This assessment has addressed the spatial aspects of the coast-wide population through separation of data sources/fleets where possible and consideration of residual patterns that may be a result of inherent stock structure. Previous assessments concluded that separate models for northern and southern stocks produce very similar results to coast-wide analyses for canary rockfish (Methot and Piner, 2002), and we find no compelling cause to divide this assessment into separate spatial areas. As noted in the research recommendations, the STAT team does support investigation of spatial patterns in canary rockfish aggregations and movement toward an assessment that includes the portion of the canary rockfish stock that resides in Canadian waters.

Reference Points

Unfished spawning stock biomass was estimated to be 34,798 mt in the Base model and 33,872 mt in the Alternate model configuration. The blended estimate across the steepness probability distributions and the two models is 34,155 mt. The target stock size (SB40%) is therefore 13,662 mt. Maximum sustained yield (MSY) was estimated in the assessment model to occur at a spawning stock biomass of 15,584 mt (base) to 13,418 mt (alternate) and produce a MSY catch of 822 mt (base) and 1,168 mt in the Alternate. The estimate of generation time is 22.8 years, an increase from the 2002 estimate of 19 years due to the decrease in the estimate of the natural mortality rate for old female canary rockfish from 0.12 to 0.09.

Summary of canary rockfish reference points.

Quantity	Model = DIFF Estimate	Model = DIFF ~95% Confidence interval	Model = NODIFF Estimate	Model = NODIFF ~95% Confidence interval
Unfished spawning stock biomass (SB_0, mt)	34,798	32,067-37,529	33,872	30,938-36,806
Unfished summary (age 3+) biomass (mt)	93,315	NA	87,621	NA
Unfished recruitment (R_0, thousands)	4,728	4,326-5,167	4,357	3,982-4,766
Spawning stock biomass at MSY (SB_{msy})	15,584	13,817-17,351	13,418	11,270-15,566
Basis for SB_{msy}	Estimated	NA	Estimated	NA
Recruitment-Spawner steepness	0.329	0.271 – 0.387	0.449	0.349 – 0.550
SPR_{msy}	72.9%	NA	58.1%	NA
Basis for SPR_{msy}	Estimated	NA	Estimated	NA
Exploitation rate corresponding to SPR_{msy}	0.020	NA	0.033	NA
MSY (mt)	822	598-1,046	1,168	905-1,430

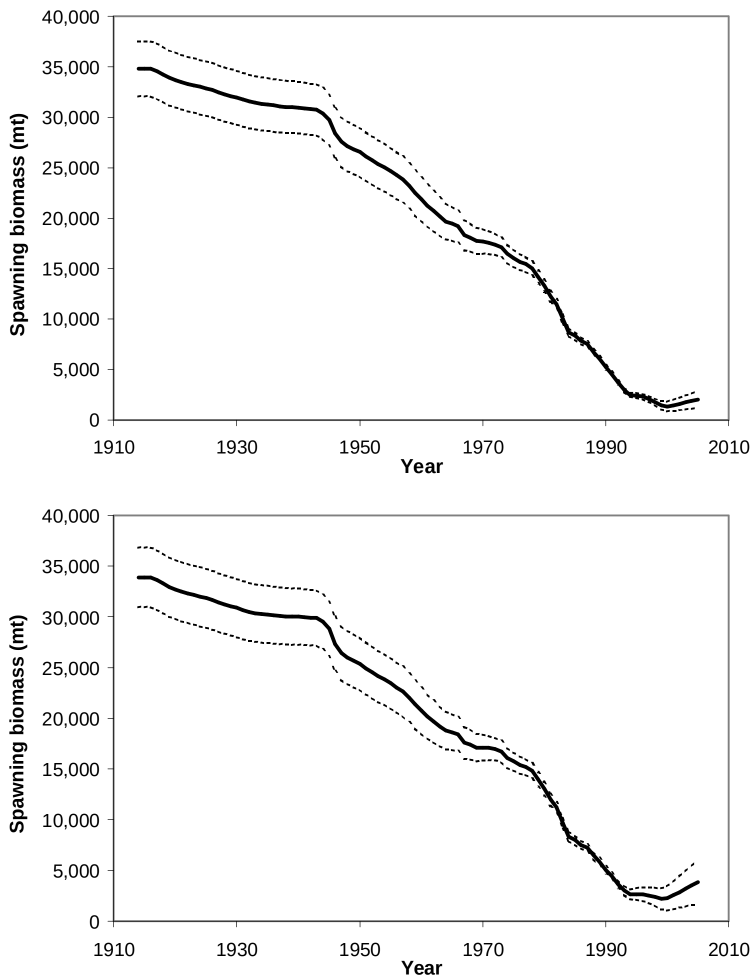
Summary of recent trends in canary rockfish abundance and exploitation levels; all values reported at the beginning of the year

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total catch (mt)	1,190	1,531	1,441	1,513	856	181	123	104	48	38	NA
Landed catch (mt)	1,020	1,298	1,230	1,285	731	141	86	66.5	38.5	22.0	NA
ABC (mt)	1,250*	1,250*	1,220*	1,045*	1,045*	287	228	228	272	256	270
OY	850*	850*	1,000*	1,045*	857*	200	93	93	44	47.3	46.8
Base Model = DIFF											
SPR	0.160	0.114	0.104	0.081	0.130	0.518	0.642	0.705	0.840	0.885	NA
Age 3+ biomass (mt)	7,382	6,933	6,087	5,258	4,287	3,889	4,118	4,368	4,601	4,847	5,066
Spawning biomass (mt)	2,409	2,318	2,060	1,781	1,443	1,319	1,442	1,580	1,717	1,862	1,995
~95% interval	2,177-2,641	2,057-2,579	1,760-2,359	1,433-2,129	1,037-1,850	847-1,791	901-1,983	966-2,195	1,027-2,406	1,100-2,625	1,163-2,827
Recruitment (1000s)	547	374	366	824	276	196	327	380	407	436	466
~95% interval	315-949	204-686	188-710	466-1458	131-585	89-427	138-776	148-978	158-1,051	169-1,127	184-1,182
Depletion	0.069	0.067	0.059	0.051	0.041	0.038	0.041	0.045	0.049	0.054	0.057
~95% interval	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.030-0.077	0.032-0.083
Alternate = NODIFF											
SPR	0.188	0.142	0.144	0.127	0.228	0.687	0.780	0.819	0.913	0.937	NA
Age 3+ biomass (mt)	9,159	9,010	8,510	8,050	7,460	7,439	8,063	8,695	9,289	9,875	10,417
Spawning biomass (mt)	2,658	2,668	2,531	2,395	2,212	2,252	2,544	2,865	3,187	3,518	3,829
~95% interval	2,093-3,222	2,015-3,321	1,772-3,290	1,512-3,278	1,188-3,236	1,069-3,435	1,183-3,905	1,311-4,418	1,435-4,940	1,570-5,467	1,690-5,969
Recruitment (1000s)	1,040	745	728	1,737	605	462	799	966	1,053	1,134	1,182
~95% interval	530-2,039	362-1,531	331-1,601	876-3,448	255-1,439	190-1,125	303-2,106	342-2,728	376-2,949	408-3,152	438-3,190
Depletion	0.078	0.079	0.075	0.071	0.065	0.066	0.075	0.085	0.094	0.104	0.113
~95% interval	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.042-0.165	0.046-0.181

* Covers U.S. Vancouver and Columbia INPFC areas only.

Stock Biomass

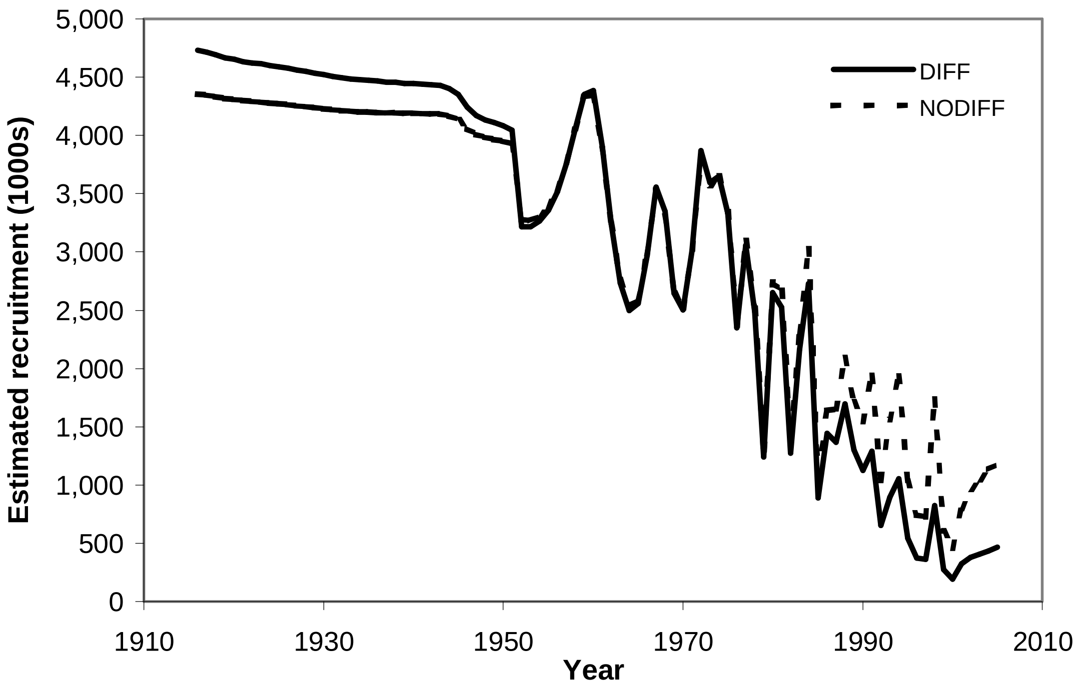
Canary rockfish were relatively lightly exploited until the early 1940's, when catches increased and a decline in biomass began. The rate of decline in spawning biomass accelerated during the late 1970s, and finally stabilized in the late 1990s in response to management measures. The canary rockfish spawning stock biomass reached an estimated low in 2000, but has been increasing since that time. The estimated relative depletion level in 2005 is 5.7% in the base model and 11.4% in the alternate model. The 95% confidence interval is based upon the model's analytical estimate of the variance near the converged solution in the base model configuration. The rebuilding analysis incorporates a fuller range of uncertainty by including both models and the estimated probability distribution of an important parameter, spawner-recruitment steepness, for each model.



Estimated spawning biomass time-series with approximate asymptotic 95% confidence interval for the base-Diff (left) and alternate-NoDiff (right) models.

Recruitment

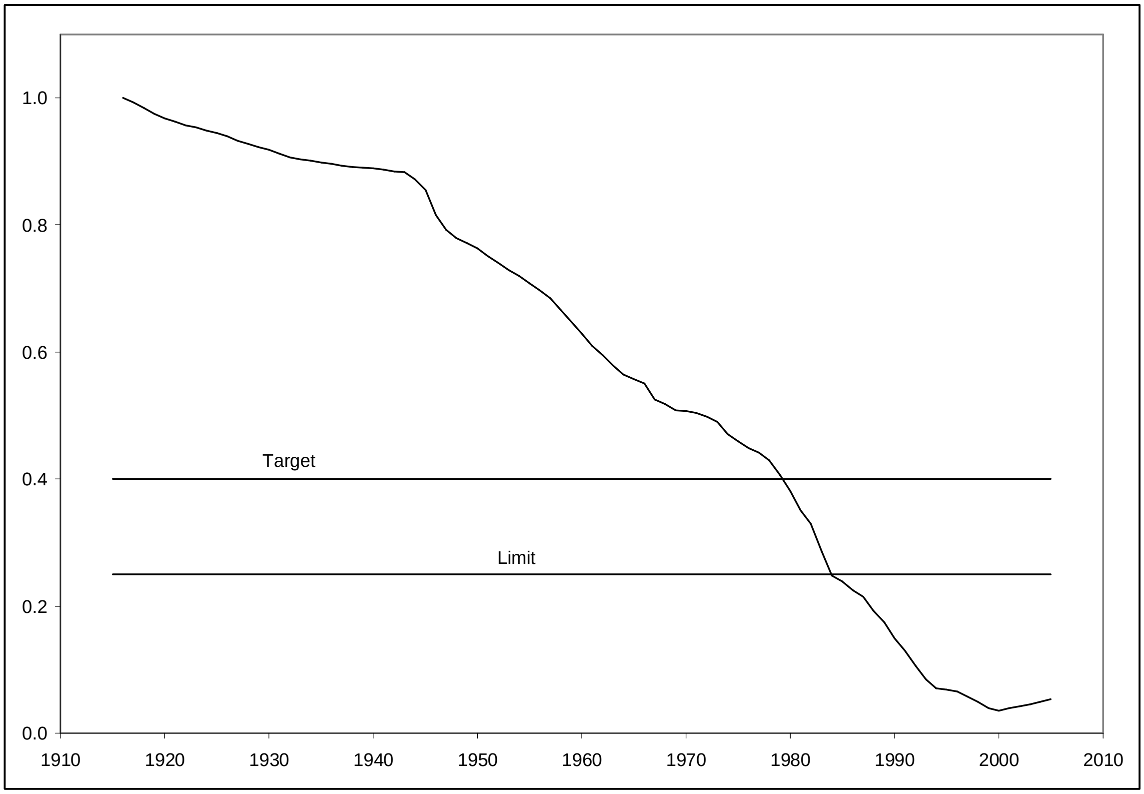
Canary rockfish recruitment has shown a steady decline over the last 50 years, closely tracking the decline in spawning stock biomass. Recent recruitments have generally been low, with 1998 producing the largest estimated recruitment in the last decade. However, there is little information in the available data to inform the assessment model about recruitments subsequent to about 2001, so these estimates largely reflect the stock-recruitment function and will likely be updated in future assessments.



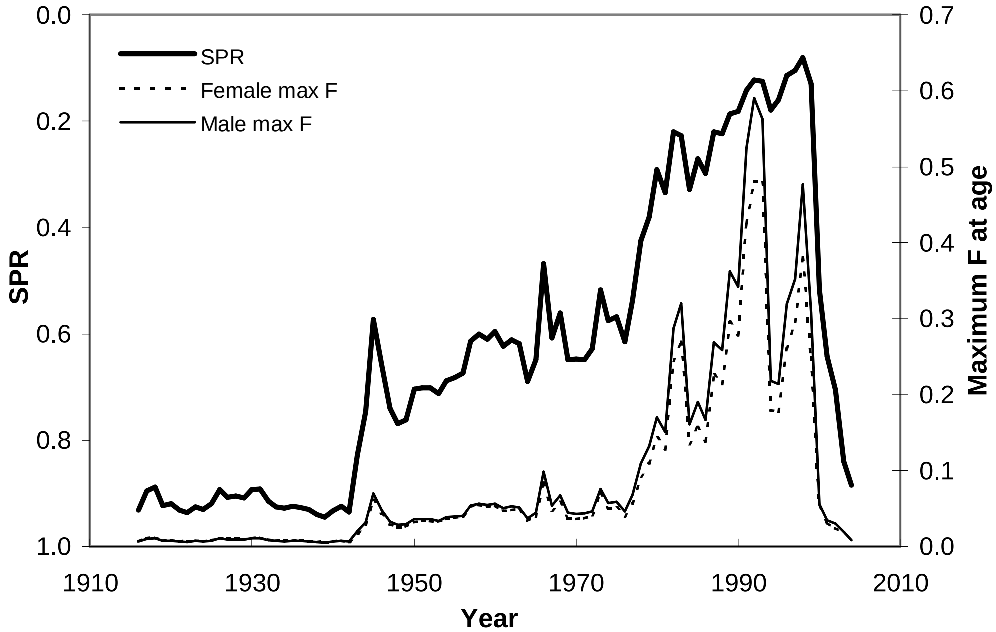
Time series of estimated canary rockfish recruitments.

Exploitation Status

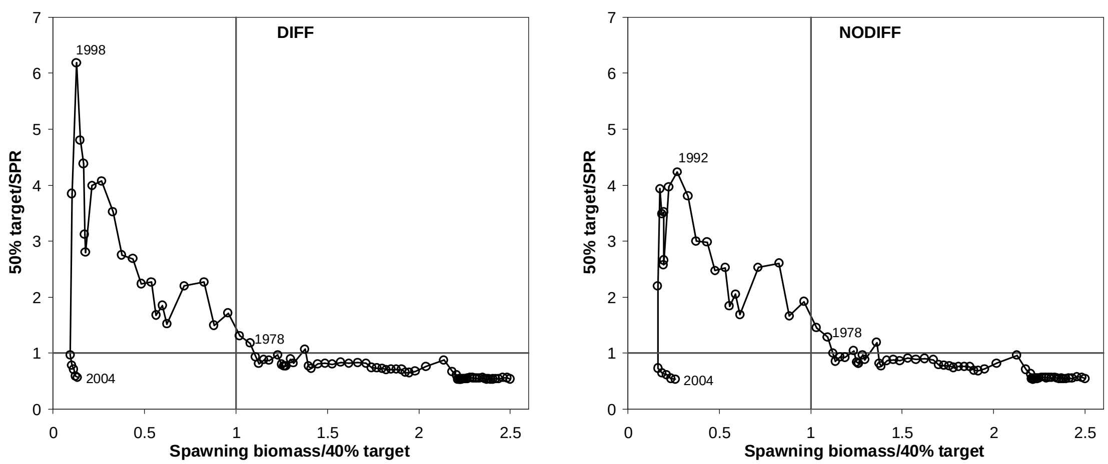
The abundance of the canary rockfish stock was estimated to have dropped below the SB40% management target in the late 1970s and the overfished threshold in the mid-1980s. In hindsight, the spawning stock biomass passed through the B_{msy} level in about 1980, at which time the annual catch was more than double the current estimate of the MSY level. The stock remains depleted, although the spawning stock biomass appears to be increasing. Harvest rates in excess of the current F-target for rockfish of SPR50% is estimated to have begun in the late 1970s and persisted through 1999. Recent management actions appear to have curtailed the rate of removal such that overfishing has not occurred since 1999, and recent SPR values are in excess of 90%.



Time series of depletion level as estimated in the Base model.



Time series of estimated spawning potential ratio (SPR) and maximum age- and sex-specific exploitation rate (labeled F here). Values of SPR below 0.5 reflect harvests in excess of the current F_{MSY} proxy. Only the base model result is shown.



Phase plot of estimated fishing intensity vs. stock abundance. Fishing intensity is the 50% target SPR divided by the annual SPR level. Stock abundance is annual spawner abundance divided by the 40% rebuilding target.

Management Performance

Total catches have decreased dramatically in response to reductions in trip limits and spatial closures driven by the overfished status of canary rockfish declared in 1999 and the corresponding drop in ABC and OY levels. In recent years the total mortality has been near the OY but well below the ABC. Since the overfished determination in 1999, the total 5-year catch (493 mt) has been only 3% above the total OY for 2000-2004. The current annual catch (~45 mt) is only 1% of the peak catch that occurred in the early 1980's.

Forecasts and Rebuilding Projections

The forecast reported here is taken from the rebuilding analysis. The total catch in 2005 and 2006 is set equal to the established OY for these years. The exploitation rate for 2007 and beyond is based upon an SPR of 88.7%, which approximates the harvest level in the current rebuilding plan. Uncertainty in the rebuilding forecast is based upon inclusion of a base and alternate model with 50% probability each, a probability profile of spawner-recruitment steepness for each model, and random variability in recruitment deviations (sigmaR=0.40) for each rebuilding simulation. The final result blends across this uncertainty, so incorporates the probability that the current stock abundance and the future stock probability will differ from the "best" estimates represented by the base model and the alternate model. These forecasts predict slow and steady increases in abundance and catch. The following table shows the projection of expected canary rockfish catch, spawning biomass and depletion. Calculations are based on the blended base and alternate models as estimated in the rebuilding analysis with status quo exploitation rate.

Year	Total catch (mt)	Spawning biomass (mt)	Depletion
2005	46.8	2743	0.081
2006	47.1	2930	0.087
2007	43.2	3091	0.091
2008	44.5	3225	0.095
2009	45.1	3335	0.099
2010	46.4	3432	0.101
2011	48.6	3528	0.104
2012	51.1	3627	0.106
2013	54.1	3706	0.108
2014	56.5	3798	0.111
2015	58.7	3901	0.114
2016	61.0	4014	0.117

Decision table

A decision table approach is not taken here because of the established rebuilding plan for canary rockfish.

Research and Data Needs

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

1. Expanded Assessment Region: Given the high occurrence of canary rockfish close to the US-Canada border, we recommend a joint US-Canada assessment in the future.

2. Pre-recruit surveys: Although the central California midwater trawl juvenile rockfish survey was not included in the current assessment, we recommend further work to evaluate its applicability, especially because of recent efforts to expand the geographic scope of this type of survey.
3. Many assessments are deriving historical catch by applying various ratios to the total rockfish catch prior to the period when most species were delineated. A comprehensive historical catch reconstruction for all rockfish species is needed, to compile a best estimated catch series that accounts for all the catch and makes sense for the entire group.
4. Habitat relationships: The historical and current relationship between canary rockfish distribution and habitat features should be investigated to provide more precise estimates of abundance from the surveys, and to guide survey augmentations that could better track rebuilding. This assessment's description of spatial patterns in occurrence of large and small canary rockfish is a start on this investigation. Such studies could also assist determining the possibility of dome-shaped selectivity.
5. Rarity of old females: Given the premise of this and past assessments regarding the difference between age distributions of male and female canary rockfish, efforts should be undertaken that address this issue, including: (1) habitat-specific studies of the distribution of older male and female canary; (2) laboratory-based programs to rigorously evaluate the physiology of the two sexes. Current field studies to investigate occurrence of larger/older females can contribute information also, but comparison to the occurrence of older males will be difficult due to the reduction in occurrence of older males due to the long history of exploitation.
6. Meta-population model: The spatial patterns show patchiness in the occurrence of large vs. small canary; reduced occurrence of large/old canary south of San Francisco; and concentrations of canary rockfish near the US-Canada border. The feasibility of a meta-population model that has linked regional sub-populations should be explored as a more accurate characterization of the coast-wide population's structure.
7. Enhancements in the assessment model are needed to better address the statistical weighting of data from multiple, spatially distinct fishing fleets and the estimation of time-varying selectivity by these fleets.

Introduction

Distribution and Stock Structure

Canary rockfish (*Sebastes pinniger*) are distributed in the northeastern Pacific Ocean from the western Gulf of Alaska to northern Baja California; however, the species is most abundant from British Columbia to central California (Miller and Lea, 1972; Hart, 1973; Love et al., 2002). Adults, like many other species of rockfish in the genus Sebastes, are primarily found along the continental shelf shallower than 250 fm (457 m). Juvenile canary rockfish are found in intertidal areas (Love et al., 2002).

The bottom trawl survey conducted triennially on the continental shelf from 1977 to 2004 (see section 2.1 below for a description) provides a wealth of detailed information on the spatial distribution of canary rockfish from approximately 34 to 49°N latitude and 55-300+ m bottom depth (Figure 1). The dominant pattern is a strong gradient in mean size with increasing depth over the 55 – 90m depth range and little further change over the remainder of their depth range (Figure 2). The small fish found shallower than 90m occur non-randomly along the coast (Figure 1 and 3). The general pattern is that large fish are found in offshore areas that tend to have rougher terrain and small fish are found in nearshore areas that seem to be near river mouths and bays. A more detailed habitat-specific analysis could elucidate this pattern further.

In this assessment, the canary rockfish population that inhabits waters off California, Oregon and Washington is modeled as a single unit stock. Canary rockfish have a continuous, albeit structured, distribution along the coast. The 2002 assessment integrated what had previously been separate north-south assessments based on the highest density of catch occurring near headlands and INPFC boundaries (Methot and Piner, 2002). They reasoned that splitting stocks or assessments at any INPFC boundaries would divide high-density areas that most likely are biologically linked. There exists little published information regarding the likely stock structure of canary rockfish off the U.S. Pacific coast, but differences observed in the species compositions of mixed-rockfish landings in each state (Boehlert, 1980), and past genetic studies indicate that distinct canary rockfish stocks may exist between the southern and northern portions of its range (Wishard et al., 1980). Although there is ongoing research on population genetics of canary rockfish, we are not aware of any published research indicating separate stocks of canary rockfish within U.S. waters. Given the limited information available on canary rockfish biology (e.g., spatial and temporal migration habits) and no clear information regarding the status of distinct biological populations along the West Coast of the United States, we assess canary rockfish as a single coast-wide stock due to the latitudinal continuity of their occurrence in the fishery and trawl survey.

Although it appears reasonable to treat canary rockfish as a coast-wide population, the analysis of latitudinal distribution patterns indicates substantial spatial pattern within this overall distribution. This spatial pattern influences our compilation and interpretation of age and size composition data from the regional fisheries.

Key Life History

Length distributions by depth developed from NMFS trawl survey data generally support other research that suggests this species is characterized by an increasing trend in mean size of fish with depth. Smaller fish are predominately found shallower than 90 m bottom depth in the summer trawl survey.

Female canary rockfish generally grow faster and reach slightly larger sizes than males, but are much less common at older ages than males, a pattern also found for yellowtail rockfish. In the bottom trawl survey, canary rockfish older than age 24 were caught mostly in 1983 at locations off central Oregon (Hecate Bank) and off NW Washington (Table 1). Although large/old canary rockfish rarely occur in the survey or fishery south of about 38°N, this is not an absolute result because two very old males were caught near 34°N in the 2001 and 2004 surveys. Whenever age 25+ females have been captured, old males have been captured in the same tows (Table 1). Thus, these data show that the distribution of old females at least overlaps with that of old males and suggests that old females may not inhabit a unique specific habitat. Current studies using non-trawl sampling gears will provide further data to investigate these patterns.

The size-at-age data from the trawl survey indicate a small alongshore trend with smaller size-at-age in the south. This phenomenon is not reviewed in this assessment, however it lends support for the modeling approach that allows each regional fishery to have a different size-selectivity pattern relative to the coast-wide modeled population.

Historical and Current Fishery

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

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

A full description of the historical catch reconstruction for canary rockfish is provided under “Fishery data”. Reconstructed historical catches from 1916 to 2004 ranged from 37.5 mt in 2004 to 5,374 in 1982 and totaled almost 150,000 mt over the time-series. Canary rockfish catches have been primarily from the trawl fleets, on average comprising 85% of the annual catches, with the Oregon fleet removing as much as 3,864 mt in 1982. Historically just 10% of the catches have come from non-trawl commercial fisheries, although this proportion reached 24% and 350 mt in 1997. Recreational removals have averaged just 6% of the catches but have become relatively more important as commercial landings have been substantially reduced in recent years, recreational catches reached 60% of the total with 29 mt caught in 2003. Total catches since 1999 have been dramatically reduced in an attempt to rebuild a stock determined to be overfished on the basis of the 1999 assessment.

Management History

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

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

The assessments in 1999 found the stock to be depleted and an overfished determination was made for 2000. Subsequently, commercial and recreational fishing opportunities were severely restricted and removals have been primarily from bycatch.

Canary rockfish have become a limiting species for fisheries that target other commercially important species on the continental shelf. The OY in 2003 was 44 mt; only about 1% of the peak annual catches of the early 1980s. Management regulations were sufficiently strict to keep the catch that year to only 48 mt. Canary rockfish remains one of the most intensively followed species by regulatory agencies, NGO's (conservation) and industry. Table 2 summarizes the coast-wide ABC's and catch in recent years.

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

During 2002 the "Rockfish Conservation Area" (RCA) was implemented to reduce bycatch of overfished rockfish species such as canary in the northern portion of the coast and bocaccio rockfish in the south. The RCA has since been used as a management tool in each year, prohibiting most commercial fishing on the continental shelf. Specific boundaries for the RCA have varied between bimonthly periods in response to changing discard rates and fishery dynamics. In 2003, the shoreward boundary of the RCA ranged from the shoreline to 100 fa (183 m), and the seaward boundary from 200 to 250 fa (366-549 m). Small-footrope gear was required shoreward of the RCA when these areas were open, and retention of canary rockfish was limited to 100 to 300 lbs per month for the limited entry trawl fisheries north and south of 40º10'. Retention of canary rockfish was prohibited in the limited entry fixed gear fishery. In 2004, the shoreward boundary of the RCA ranged from the shoreline to 75 fa (137 m) and the seaward boundary from 150 to 250 fa (274-549 m).

It is possible that the RCA would influence the size range of canary rockfish available to the fishery. The trawl survey occurs during summer months, so does not provide information about possible seasonal changes in the depth distribution of canary rockfish. If the survey does provide a reasonable approximation to the depth distribution in all seasons, then it appears that the great majority of the canary rockfish stock is found shoreward of the seaward boundary of the RCA. On the nearshore side, smaller canary rockfish may be available to the fishery when the shoreward boundary is between 50 and 90m, and a larger size range may be available to the fishery when the nearshore boundary extends deeper than 90 m. However, the size composition of the trawl fishery catch in 2003 and 2004 (to be presented later in this document), did not show a shift towards smaller sizes in 2003 and 2004, so the depth boundaries of the RCA apparently did not have a noticeable effect on the size selectivity of the fishery.

Bimonthly trip limits remained very small during this period. Beginning in 2005, the modified "flatfish" trawl gear has been required shoreward of the RCA. This gear was found to reduce the catch-per-unit-effort of canary rockfish relative to standard commercial gear in pilot experiments (King et al., 2004). Recreational limits have also been substantially reduced over this period, with all three states currently allowing no retention of canary rockfish.

Assessment

The following sources of information were used in this assessment: (1) fishery independent data including research survey abundance and biological data from 1977-2004; (2) commercial and recreational landings (1916-2004); (3) fishery biological data (1968-2004); (4) additional studies providing information on fishery-related discard; and (5) Commercial trawl and recreational fishery logbook data included as auxiliary information in the assessment model. A description of the specific data sources is presented below.

Fishery Independent Data

The primary source of survey data regarding the abundance of canary rockfish is the triennial shelf trawl survey conducted by NMFS starting in 1977 (Dark and Wilkins, 1994). The sampling methods used in the survey over the 21-year period are most recently described in Weinberg et al. (2002). In general, all of the surveys were conducted in the mid summer through early fall: the survey in 1977 was conducted from early July through late September; the surveys from 1980 through 1989 ran from mid July to late September; the survey in 1992 spanned from mid July through early October; the survey in 1995 was conducted from early June to late July; the 1998 survey ran from early June through early August; and the 2001, 2004 surveys were conducted in May-July.

A relative index of stock biomass was derived from the triennial shelf trawl survey (Figure 4 and Table 3). The catch-per-unit-effort (CPUE) index was the swept-area estimates of biomass (Gunderson and Sample, 1980) from samples in the 30-200 fm (55-366 m) depth range. The initial year of the survey in 1977 was based on a sampling design that spanned from 50 to 260 fm (91 to 475 m), i.e., it did not come as far inshore (30 fm) as the subsequent surveys conducted on a triennial basis from 1980 to 2001. The index was constrained in all years to only Monterey-US Vancouver INPFC areas and depths from 55-366m to produce the only consistent time-series available. Surveys that have extended south of Monterey have detected only very small abundances relative to the north, so lack of sampling in this area does not influence the relative index. The index was further constrained to only include tows that caught at least 1kg of “bottom material” to preclude water hauls. This exclusion of water hauls only affected the 1977 survey biomass estimate due to the exclusion of a large canary tow that did not catch 1kg of “bottom material”. A full description of the water haul issue can be found in Zimmerman et al. (2001). Because of the large number of water hauls eliminated in 1977, especially in the US Vancouver INPFC area, and because the sampling depths were not the same as the other years, the 1977 survey year was not used in the assessment. The trend in the relative biomass of canary rockfish appears to have declined rapidly, but has remained stable at low biomass levels in the 1990’s (Figure 4).

Size distributions (fork length in cm) were calculated following the standard estimation methods used throughout the survey series (Dark and Wilkins, 1994). The numbers of fish and number of hauls represented in each year of the survey are presented in Table 4. Twenty-eight bins from 12 to 66 cm were used to summarize the length frequency of the survey catches in each year, the first bin including all observations less than 12 cm and the last bin including all fish larger than 66 cm. Length-frequency distributions by sex for canary rockfish sampled in the survey for the years 1977-2001 are presented in Table 5 and Figure 5. A noticeable shift to smaller fish was evident in the canary rockfish sampled from the research surveys conducted from 1980 to 2004 (Figure 5). The mean size of canary rockfish, both male and female, sampled from the survey has declined from roughly 51 to 39 cm.

Age-frequency distributions were calculated using by use of an age-length key to estimate the proportion of each length that was from a specific age. The age-length key was sex- and year-specific to account for differences in growth between males and females and possibly between years. The numbers of samples (total number of specimens) collected from the shelf trawl surveys are presented in Table 4. Age distributions included 35 bins from age 1 to age 35, with the last bin including all fish of greater age. In general, age distributions (both male and female) from the survey showed a similar declining trend in the proportion of old fish as that observed from the commercial fishery data; however, the survey time series was more variable than the fishery-related data. Note that no otoliths were analyzed from the surveys conducted in 1986. In 1992 all age samples were taken from north of 46°N. This is not representative of the coast-wide population and not used in the model. Age-frequency distributions by sex for canary rockfish sampled in the survey for the years 1977-2004 are presented in Table 6 and Figure 6.

As described in detail in the 2002 assessment, the proportion male increases to above 50% beginning around age 12 (Figure 6 and Table 6) and continues increasing through the remainder of the age-classes. This pattern is observed in all of the canary datasets available and was a topic of much investigation in the 2002 assessment. It was generally concluded in the 2002 assessment that this pattern was due to a combination of reduced availability of larger females to survey and fishery gear as well as increased natural mortality of older females beginning shortly after maturation (approximately 7-8 yrs). Females older than age 24 are found only in trawl samples that also have old males, so a gross difference in habitat preference is not apparent (Table 1).

Canadian Survey Data

The NMFS trawl survey extended into Canadian waters in most years. The trend in biomass for the Canadian area is plotted in Figure 7 and depicts a declining trend similar to that observed in U.S. waters.

Biological Data

Weight-Length

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

$$W_L = a\ (L^b)\ ,$$

where weight is measured in grams and length in centimeters. The parameters used are those from the 2002 assessment and are given in Table 7. Canary rockfish were roughly: 46 g (0.05 kg, 0.10 lb) at 14 cm; 1,109 g (1.1 kg, 2.4 lb) at 40 cm; 2,179 g (2.28 kg, 4.8 lb) at 50 cm, and realized over 4,600 g (4.6 kg, 10.1 lb) at 64 cm.

Maturity

Canary rockfish off the U.S. Pacific coast exhibit a protracted spawning period ranging from September through March, probably peaking in January and February (Love et al., 2002). Female canary rockfish reach sexual maturity at roughly 8 years of age. Like many Sebastes species, canary rockfish are ovoviviparous, whereby eggs are internally fertilized within females and hatched eggs are released as live young (Love et al., 2002). Canary rockfish are a relatively fecund species, with egg production correlated with size, e.g., a 49-cm female can produce roughly 0.8 million eggs and a 60 cm female produces approximately 1.5 million eggs; this relationship does not appear to vary geographically (Gunderson et al., 1980). Very little is known about the early life history strategies of canary rockfish, but limited research indicates larvae are strictly pelagic (near ocean surface) for a short period of time, begin to migrate to demersal waters during the summer of their first year of life, and develop into juveniles around nearshore rocky reefs, where they may congregate for up to three years (Boehlert, 1980; Sampson, 1996).

Logistic response functions have been found to be appropriate and effective statistical tools to describe the proportion of sexually mature fish in a population (Hunter et al. 1990). The following logistic functions were used to estimate the relationship between maturity and age (yr), and maturity and length (cm) for female fish:

$$M_A = \frac{1}{1 + e^{-a - b[\ln(A)]}} \text{ ,and } M_L = \frac{1}{1 + e^{-a - b[\ln(L)]}} ,$$

where M_A and M_L are the estimated probabilities that a fish is mature based on age A and length L, and the estimated regression coefficients are a and b.

Maturity schedules (or maturity-at-age and maturity-at-length relationships) for female canary rockfish were estimated for the various data sources (Table 7). Maturity information was generally sparse within these data sources and for the most part, was not collected in a systematic fashion across time. Additionally, it has been demonstrated that the time of sampling is an important variable in maturity studies (Hunter et al. 1992) and thus, analyses should consider this variation to ensure results do not include additional sources of bias that would hamper statistical interpretation. Given the reasons above, for fishery-dependent data sources (Oregon fishery and Washington fishery), we developed maturity schedules based on specimens sampled during the months of September through February, which generally represent the spawning months for canary rockfish off Oregon and Washington. For survey-related data, the maturity schedules were based on specimens collected from June through September. Additionally, the following modifications to the maturity data sets were conducted to minimize biases likely present in the original sample data: (1) maturity information for ages (and lengths) with extremely low sample sizes (e.g., <10 specimens) was omitted from the maturity-related analysis, e.g., only four, age-4 fish were sampled for purposes of maturity determination from the fishery-dependent data from 1980 to 1998; and (2) as was done in the previous assessments (Sampson and Stewart 1994; Sampson 1996), several old (and large) fish (e.g., >20 years of age and >55 cm in length) that were recorded as immature were removed from the analysis, given the strong likelihood that the maturity of these animals was misidentified, e.g., it is probable that the animals had previously spawned and were in a resting stage. Fecundity was assumed to be proportional to female body weight, i.e., estimates of spawning biomass in the assessment model were in units of mature female body weight.

Estimates based on Oregon fishery data indicating females mature earlier (based both on age and length) than that observed from schedules based on Washington fishery data. Maturity schedules based on fishery-independent data (i.e., research surveys) showed females mature at an earlier age (5.7 years) and size (34 cm) than indicated from either of the fishery-dependent data sources. A maturity schedule for female canary rockfish based on age that included data from the combined fisheries was used in the 2002 assessment model. The 50% maturity was at age 7.6 years. The 2005 assessment model requires maturity parameters in terms of length. To be consistent with the 2002 assessment, the values are taken from the Oregon and Washington combined trawl fishery. The 50% maturity is at 40.5 cm and a logistic slope of –0.25 (note this is transformed from the a and b terms shown in Table 7). The resultant vector of maturity at length is presented below in the assessment results.

Natural Mortality

Beginning with the 1990 canary assessment (Golden and Wood, 1990), this species has been modeled with a single natural mortality rate for males and young females and an increasing rate of natural mortality with age for females. Golden and Wood used an estimate of M = 0.06 for males of all ages and young females and 0.15 for old females. Subsequent assessments conducted in 1994 (Sampson and Stewart, 1994) and 1996 (Sampson, 1996) relied on similar model configurations and used roughly the same estimates of M, with a constant M of 0.06 for males of all ages and young females (less than 9 years of age), and age-dependent M for older females that increased in a linear fashion from 0.06 (age 9) to roughly 0.18 (ages 25). Research applicable to groundfish stocks found off the Pacific coast of Canada also indicated that old female canary rockfish were much less common in the sample data than were males, and supported total mortality estimates (Z) for males in the range of 0.03-0.07 and 0.11-0.24 for females (Archibald et al., 1981). Recent assessments of the canary rockfish stock off British Columbia, Canada have generally used similar rates of natural mortality as those used here (R. Stanley, Canada DFO, Pacific Biological Station, Nanaimo, B.C., Canada, personal communication, 1999). This assessment fixes the rate of natural mortality at 0.06 for males and young females and estimates the degree of increase for older females. In the 2002 assessment, the increasing mortality function was linked to the age-specific increase in maturation of females. This functional relationship was not included in the SS2 code, so a simple linear ramp between ages 6 and 14 was used to approximate the shape of the curve in 2002.

Ageing Precision and Bias

It is known that surface ageing underestimates the age of canary rockfish relative to thin section and break-and-burn methods (Boehlert and Yoklavich, 1984). Because of this bias, all current ageing is done via break-and-burn. Age-validation through the bomb radiocarbon method (Piner et al., 2005) indicated that there was a small negative bias associated with the production aging of canary rockfish. Although based on a small number of individual fish (n=16), the average production age was 2.9 years less than the estimated age via bomb radiocarbon analysis. A linear relationship assuming no bias at age 0 was fit to the observations; this fit resulted in an estimated bias of -2.77 years at age 30 (Figure 8).

The precision of the age determination process was measured by comparing the independent readings of two age readers. It was assumed that each reader has a normal distribution of possible age readings for each fish. The standard deviation of this normal distribution was estimated by computing a normal distribution of possible ages for each age reader, computing the probability that they would agree, be off by 1, 2, 3 or 4 year, then using the Excel Solver routine to search for the value of the standard deviation that would best match the observed frequency distribution of comparisons between the two readers. The results are shown in Figure 9 and Table 8. The observed percentage agreement between readers tended to be underestimated by this approach which indicates the assumed normal distribution of ageing error is not sufficiently fat-tailed to explain both the occurrence of large differences and the high % agreement.

Fishery Dependent Data

Historical Catch Reconstruction

In the last assessment, the California trawl fishery was set to have begun in 1942, Washington trawling in 1966 and Oregon in 1941 with an equilibrium catch of 500 mt at the start of the model. For the current assessment, a reconstruction of historical removals was undertaken to more realistically reflect both the cumulative removals that have occurred from the coast-wide canary rockfish population as well as capture some of the variability during the time series. Documented landings of "rockfishes" were assembled from a variety of sources, this type of aggregated data was all that was available as individual species were not routinely identified until the 1960s. Since most landings were not identified by gear type, the focus of this effort was directed at trawl landings or mixed categories. Results are shown in Figure 10 and Table 9.

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

California: The previous assessment used a ratio of 0.176 trawl-caught canary rockfish to total rockfish catch over the period 1942-1963. Based on landings derived from the California Department of Fish and Game bulletins summarized in a historical review (Bureau of Commercial Fisheries, 1949), this ratio was applied back to the beginning of fully documented landings in California in 1916. Fish and Wildlife Service current fishery statistics series documents were available for nearly all of the period 1942-1964 (1943; 1944; 1945; 1946; 1947; 1948; 1949; 1950; 1951; 1952; 1953; 1954;

1955; 1956; 1958; 1959; 1960; 1961; 1962; 1963; 1964; 1965) and closely matched the total from the source above and the implied total from the ratio. The division of these landings between the northern and southern fleets was unknown, so they were included as aggregate observations, but it seems likely that the removals may be appropriately characterized through the northern selectivity pattern, as the stock would have been quite lightly exploited during this period. A similar approach was used to reconstruct the California non-trawl landings, although these fleets represented a much smaller proportion of the total rockfish category (0.034). Early reports indicate that rockfish comprised only 5% of the total catches of the early trawl fishery in California (Clark, 1935), and that the proportion of nearshore species, such as black rockfish (Sebastes melanops) may have been much higher in the early years (before the mid 1940s) of the non-trawl fishery (Scofield, 1948; Phillips, 1964). However, this landings reconstruction generates a reasonable cumulative total removals prior to that period, and the reconstructed series is quite close to the series used last time (Figure 11), with the exception of a somewhat reduced estimate of removals during the second world war compared to the average catch used in the last assessment.

Oregon: The previous assessment included year-specific landings back to 1967, and then mean landings spread over periods of years: 440 mt for 1948-1965, 3,186 mt for 1942-1947 and a level of historical equilibrium catch set at 500 mt for 1941 and earlier years. This 500 mt level was considered to represent removals from all sources. For this assessment, as time-series of total rockfish landings was derived from the following sources: 1928-1949 from Cleaver (1951), 1950-1953 from Smith (1956), 1954-1955 from Fish and Wildlife Service current fishery statistics series (1955; 1956), 1956 from the Pacific Fisherman Yearbook (1957), 1957-1961 from the Fish and Wildlife series (1958; 1959; 1960; 1961; 1962), 1962-1967 from the Oregon fish commission (Meierjurgen et al., 1966) and 1968-1970 from the Pacific Marine Fisheries commission annual reports (1970; 1971). Additional series were available from the Fish and Wildlife series 1942-1953, 1962-1964, the Pacific Fisherman yearbook series from 1944-1945 (1947), and the National Fisherman 1968-1969 (1970). There was very close agreement between the landings from these additional series and the series used in the reconstruction. For the period 1967-1970, the ratio of canary landings to the total rockfish landings was 0.241 (range = 0.075-0.374). This ratio was applied throughout the time series to approximate the canary landings by year.

Washington: The previous assessment included landings back to 1967 and then assumed zero catch in Washington before that time. Total rockfish catch prior to this period was derived for the current assessment from the following sources: 1930-1941 and 1956 from the Pacific Fisherman yearbook, 1942-1955 and 1957-1964 from the Fish and Wildlife series, 1965-1970 from the Pacific Marine Fisheries Commission reports. These series were quite similar with two exceptions, the catches from 1945, estimated to be 7,300 mt in the Pacific Fisherman Yearbook and 11,552 mt in the Fish and Wildlife series and the landings from 1958-1960. The Fish and Wildlife statistics were used where available, because they specifically excluded Pacific ocean perch (POP) landings, where the Pacific Fisherman yearbook was somewhat unclear on whether POP had been included in the rockfish totals or not. The landings from the Pacific Fisherman in 1963-1966 and the National Fisherman 1967-1968 were much higher than the PMFC reports, also presumably due to the inclusion of POP. For the period 1967-1970, the ratio of U.S.

canary landings to the total rockfish landings was 0.079 (range = 0.050-0.119). This ratio reflects the exclusion of both the portion of the landings caught in Canadian waters, estimated to be 0.149 in 1953 (Alverson, 1956), and the portion of the total rockfish landings that are specifically canary, estimated to be 24% in Oregon by the above ratio. This value, 0.079, was applied throughout the time series to approximate the Washington canary landings by year.

Where landings had been developed in the 2002 or previous assessment for the period 1956-1980 these landings have been retained in the current assessment.

Recent Landings (1981 to present)

Recent landings reflect the most current information from the PacFIN, CalCOM, NORPAC, RECFIN and State recreational databases. Commercial landings estimates of canary rockfish from 1981 to 2004 were generated from the PacFIN database (Extraction: July, 2005, Daspit et al., 1997) for Oregon and Washington. California commercial landings were based on the CalCOM data and species and gear expansions for the period 1978-2004. The at-sea catches occurring incidentally to the whiting fishery were generated from the NORPAC database (B. Renko, personal communication) and included in the trawl totals.

It should be noted that additional data added to the CalCOM system in July 2005, reflecting a reassignment of some of the rockfish landings among species, especially in Southern California, had very little impact on the estimated landings for canary rockfish. The net change was just over 2 mt in a time period when thousands of tons were being removed from the combined fisheries exploiting the coast-wide stock.

Discards

Discard of canary rockfish by commercial trawling vessels was assumed to be minor prior to 1995, when trip limits specific to this species went into effect. Some research (Sampson and Stewart, 1994, from: Pikitch et al., 1988), indicated that market-induced discard (e.g., unacceptable sizes or lack of a market) was insignificant and the small amounts (roughly 1%) of discard in the 1980s and early 1990s were due to management-related causes (e.g., regulations on rockfish species in general). In the 1996 assessment (Sampson, 1996), a discard rate of 1.23% was used for trawl-related catches made from 1983 to 1994, when canary rockfish where regulated as part of the Sebastes complex, and a rate of 16% was used for 1995. The 16% discard rate for the trawl fishery was established by the Groundfish Management Team (GMT) of the Pacific Fishery Management Council (PFMC) following discussions regarding predicted levels of discard (150 mt) associated with the newly adopted harvest guideline in 1995 for canary rockfish in the northern INPFC areas (roughly 1,000 mt). This rate was applied through 2001 in the most recent assessment.

The current assessment uses the discard rates developed in previous assessments up to 1999. These were 0.0123% for all commercial fleets until 1994 and then 16% for all commercial fleets until 1999. Beginning with the year 2001, there were discard observations collected by the West Coast Groundfish Observer Program that were considered applicable to some fleets. The trawl fleets had a discard rate based on at-sea observer data on a year specific basis for 2002-2004 with pooled estimates from all years used to generate estimates for 2000-2001 (2000 was included because regulatory changes in footrope size made this year more similar to the subsequent period than the late 1990s). These estimates ranged from 14.8% (California trawl fleet in 2000) to 75.7% for the Washington trawl fleet in 2000, and are given in Table 27. The non-trawl fleets were assumed to have discarded 4 mt coast-wide in each year, based on the total discard mortality calculated for a portion of the period 2003-2004 associated with nearshore rockfish fisheries and the fixed gear sablefish fishery by the Groundfish Management Team (J. Hastie; personal communication). Recreational discarding was incorporated through the use of the landed and discarded dead (A + B1) categories.

Recreational Fishery

Estimates of recreational catch from 1980-2004 were generated by the RecFIN information system. Estimates have typically been gathered by MRFFS sampling protocols, but in the last few years state-specific estimates have also been implemented. The MRFFS procedure has generally been to estimate effort of recreational fishermen by use of phone surveys and estimates of catch through port sampling of individual trips. The recreational fleet in California was divided into southern and northern components to reflect the tendency for the southern fleet to capture much smaller canary than the northern fleet, with the San Francisco Bay area as the dividing line. Recreational landings were compiled from the following sources by state and time period: Washington, 1975-2000 from state sampling program (F. Wallace, personal communication; July 2005), 2001-2004 from RecFIN. Oregon:1981-2000 from RecFIN, 2001-2004 from State sampling (D. Bodenmiller, personal communication; July 2005), California: Estimates from the previous assessment (Williams, 1999) 1950-1979; 1980-2004 RecFIN split into northern and southern areas through post-stratification of the RecFIN estimates (W. Van Buskirk personal communication; July, 2005). Missing data from 1990-1992 were interpolated based on adjacent years. CPFV landings were added where missing (1993-1995) based on CPFV landings expanded from the logbooks (D. Wilson-Vandenberg personal communication; July, 2005). In Washington and Oregon catches prior to the late 1970s were small enough in comparison to other removals that no reconstruction was attempted.

Recreational length-frequency distributions were compiled from data available through RecFIN. Oregon and Washington were combined and used the length frequencies weighted by the sampled catch via the standard RecFIN method. California length-frequency distributions used the raw length-frequency observations, and were divided into the northern and southern fleets using the county in which the sampling took place. The northern area included all counties north of the San Francisco bay area: Del Norte, Humboltd, Mendocino, and Sonoma counties. Counties which were not coastal were excluded because the location of the fishing activity was unknown.

Foreign Catches

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

Canadian Catches

Although Canadian waters were not formally included in the assessment modeling, we present summary statistics from the Canadian stock. Figure 12 depicts the trend in Canadian catch off Vancouver Island and off the rest of the B.C. coast. The catch has been relatively stable at just under 500 mt for the Vancouver Island area since 1996. U.S. total catch during the late 1990's was approaching 1500 mt. This 3x catch ratio between the U.S. and Canada is similar to the ratio of survey biomass during the 1992-2001 surveys (2,450 mt US / 940 mt Canada = 2.60 ratio). Although other factors such as the extent of trawlable habitat may affect this ratio, it appears that the level of exploitation in Canada during the 1990's was grossly similar to the level of exploitation in the U.S.

Fishery Logbooks

A California trawl fishery CPUE time series was developed in the 2002 assessment through the use of GLM techniques applied to censored logbook data. This CPUE series (Figure 13) has not been updated, but is retained in the current assessment. The California Department of Fish and Game charter boat logbook CPUE series, generated in the 2002 assessment is also retained in the data included in this assessment. Given recent spatial and temporal closures imposed on the recreational fisheries from all three states as well as regulations prohibiting the retention of canary rockfish, it is doubtful that a meaningful extension to 2003 or 2004 could be generated for this series.

Fishery Biological Sampling

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

Commercial length-frequency distributions were developed for each fleet for which observations were available, following the same bin structure as was used for research observations. A variety of methods and stratification schemes for expanding the length-frequency data were explored as a result of both sparse (few trips and/or individual fish) sampling in many years for some fleets and patchy (most trips or individuals coming from one or more portions of the spatial strata) sampling over space within and among years. To retain the approach used in the last assessment, while accommodating recently identified spatial patterns in the length distributions among areas a revised set of fleets, observations from northern and southern California were separated. For each fleet, the raw observations (compiled from the PacFIN and CalCOM databases) were expanded to the sample level, to allow for any fish that were not measured, then to the trip level to account for the relative size of the landing from which the sample was obtained. These expanded length observations were then combined within years for each fleet. Age frequencies were computed in the same manner. Sampling statistics for each fleet and year are given in tables 10-16 and Figure 14. The weighted frequency distributions are given in tables 17-26 and Figures 15-28. Although there were a number of age observations derived from surface aging, these were not included in the current assessment. In some cases, due to a large proportion of unidentified sex observations, both sexes were combined for the length or age distributions and are treated as such in the model.

A substantial improvement was made in the current assessment in the treatment of sparse length or age observations. Where there were fewer than 5 trips sampled for a fleet in a single year, observations were combined across years working backwards in time until greater than 5 trips had been sampled. These observations were then treated as "super-years" in the model matching with appropriate aggregated expected values. In the case of the Oregon-Washington non-trawl fleet, the spatial coverage and sampling intensity was variable enough to warrant combining all length and age observations into a single super-year. Very sparse age samples resulted in a single super-year observation for the southern California trawl fleet as well. This approach has the benefit of allowing the data to inform the model about the relative selectivity for a fishing fleet without erroneously appearing to add information about recruitment deviations that may be due to small noisy samples or spatial changes in sampling effort over time.

The sex ratios of the canary rockfish landings from the trawl fisheries off Oregon and Washington were generally similar over the last two decades, with a mean, annual male to female sex ratio for each fishery estimated to be roughly 1.33 to 1, or 57% males to 43% females. The sex ratios in each of the fisheries have been particularly consistent throughout the 1990's, with slightly higher numbers of males being landed than females. The predominance of male canary rockfish in the sample information has also been observed off British Columbia (Archibald et al., 1981). This discrepancy in the sex ratio of canary rockfish does not appear to be a seasonal phenomenon, but rather a year-round occurrence, as indicated in the relatively consistent sampling conducted throughout a year. Detailed analysis regarding age-specific sex ratios included in the 2002 assessment indicated that the percentage of females in the sample data began to decline at roughly age 12-15, and continued to decline steadily into the older ages. A similar pattern is seen in yellowtail rockfish (Lai et al., 2003).

History of Modeling Approaches

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

The canary rockfish assessment conducted in 1990 (Golden and Wood, 1990) was the first evaluation to incorporate separable catch-at-age analysis and in particular, the first to use the Stock Synthesis Model (Methot, 1989; Methot, 2000). All subsequent stock assessments have used the Stock Synthesis Model to evaluate the status of the canary rockfish population off the U.S. Pacific coast; the model has undergone considerable development since the first program was presented in 1988. The theoretical foundation and parameter estimation techniques utilized in the model are described fully in Methot (Methot, 2000). Data sources included in the assessment model used in 1990 were commercial landings from the fishery (1967-89), age-distribution data from the fishery (1980-88), commercial trawl effort index from the fishery (logbook data from 1980-87), CPUE index from the survey (1977-89), and size-distribution data from the survey (1977-89). The Columbia INPFC area was the only portion of the canary rockfish resource formally modeled in 1990. The 1990 assessment was the first to propose the two, broad assumptions (alternative scenarios or states of nature) regarding the absence of old females in the sample information relative to males: (1) the females are subject to a different rate of natural mortality than males (e.g., age-dependent natural mortality for females or possibly, constant, but elevated natural mortality rates for females); or (2) the females are less vulnerable to the fishing and sampling gears (e.g., dome-shaped selectivity for females and asymptotic selectivity for males). The scenarios above have been generally utilized in all subsequent assessments, including the current assessment presented here. Based on a F35% management model (see Target Fishing Mortality Rates), results from the 1990 assessment indicated the ABC for the canary rockfish resource in the Columbia INPFC area should be decreased by roughly 30% from 2,100 mt to 1,500 mt; no changes were recommended for ABCs for the other INPFC areas (800 mt for the U.S. Vancouver INPFC area and 600 mt for the Eureka INPFC area). Through 1989, the fishery had not achieved the ABCs recommended for canary rockfish.

The assessment conducted in 1994 again utilized the age-based version of the Stock Synthesis Model to evaluate the status of the canary rockfish population in the Columbia, INPFC area, as well as the U.S. Vancouver INPFC area (Sampson and Stewart, 1994). The data sources in the previous assessment (1990) were updated with statistics from the 1990s, with the exception of the commercial trawl effort index from the fishery, which was omitted from the set of data sources due to sample and estimation biases associated with logbook data (see Commercial Fishermen Trawl Logbooks).

Results from the 1994 assessment (for both scenarios described above) clearly indicated that the current level of F exerted on the canary rockfish population exceeded F20% (the overfishing threshold) and thus, the researchers recommended that the ABC be reduced to allow the stock to recover (Sampson and Stewart, 1994). Ultimately, the Pacific Fishery Management Council (PFMC) adopted an ABC for canary rockfish of 1,250 mt for 1995-96, which was a substantial reduction (nearly 60%) from the previous allocation of 2,900 mt (1991-94).

In 1996, the canary rockfish stock was assessed using similar model methods and configurations as were used in the previous assessment conducted in 1994 (Sampson, 1996). Data sources were again updated with newly derived statistics (1995-96) and an age-based version of the Stock Synthesis Model was employed. One difference between the 1994 and 1996 assessments was the manner in which error associated with age-distribution data from the fisheries was accommodated. In the 1996 assessment, a single, percent-agreement error structure was used to describe the variability in the age-related data, whereas in 1994, an error-transition matrix was used to standardize multiple sets of age estimates generated from two age readers (see Major Changes Between Current and Previous Assessment and Age-determination Error). Newly obtained data supported findings from the 1994 analyses and final results further indicated that the canary rockfish stock had suffered fishing in excess of F20%. For both scenarios, annual yields based on F35% were estimated to be roughly 1,200 mt per year for 1997-99.

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

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

The 2002 assessment concluded that the canary stock was still at very low levels, 8% of the estimated unexploited conditions.

Model Description

Overview of Model Changes

The assessment in 2005 largely follows the approach taken in 2002. The largest changes are:

1) Re-configure the spatial separation of fisheries to separate northern and southern California due to the large north-south difference in occurrence of larger fish and the widely varying north-south distribution of fishery sampling. Fishery removals were divided among 10 fleets:
   1) Southern California trawl
   2) Northern California trawl
   3) Oregon trawl
   4) Washington trawl
   5) Southern California non-trawl
   6) Northern California non-trawl
   7) Oregon and Washington non-trawl
   8) Southern California recreational
   9) Northern California recreational
   10) Oregon and Washington recreational

   The selectivity for each of these fleets in quantified relative to the synthetic, coast-wide population. Thus, these selectivities need to have sufficient flexibility to conform to consistent regional patterns in occurrence of large/old vs. small/young canary rockfish. Southern and Northern California were split because of the large difference in occurrence of larger canary rockfish between these two areas. Oregon and Washington non-trawl and recreational landings were combined due to the relatively small total removals by those fisheries and their low level of consistent biological sampling. All California catch prior to 1978 is assigned to the northern California selectivity pattern because there is insufficient information to split southern from northern catch during that era and because the northern California selectivity pattern (larger fish) seems more likely to represent the early fishery.
2) recalculate all the fishery catch, size and age composition data;
3) reexamine the approach to weighting the fishery size- and age-composition samples in the model;
4) introduce the mean size-at-age data from the survey and fishery to provide additional information on growth and to attempt to better differentiate age selectivity from size-selectivity;
5) extend the modeled period back to 1916 when first significant catches occurred;
6) extend maximum age in the data file to 35+ per reques from previous review;
7) switch from age-based selectivity to size-based selectivity. The particular sex-specific age-based selectivity option used in the 2002 assessment was not available in SS2. That pattern assumed asymptotic selectivity for males and allowed dome-shaped selectivity for females. In SS2 a dome-shaped length-based selectivity pattern

is used. In the original model presented to the STAR panel in August 2005, there was no allowance for differential length-selectivity between males and females because of the expectation that an overall dome-shaped selectivity could produce a decline in selectivity for the larger females and nearly full selectivity for most of the older males. The post-STAR base model reintroduces differential selectivity for larger females relative to larger males in order to more closely approximate the pattern used in 2002 and to achieve a better fit to the data. A sensitivity run without male-female selectivity differential and a sensitivity run with age-based selectivity are included.

8) incorporate the new information on age validation and ageing precision;
9) re-estimate growth parameters within the assessment model in order to address the new age validation and to create growth parameter estimates that incorporate effects of size-selectivity and ageing imprecision;
10) change modeling software to the ADMB-based SS2 in order to improve model convergence and to calculate confidence intervals on results. The modeling was done using SS2-V1.20 July 2005. This version differs from V1.19 in 3 ways, none of which affect the population dynamics:
    a) A true "super-year" approach is created so that the model can combine expected values across a specified set of years to compare to an observation based on data from these same years. This is used when sampling was judged to be too sparse to support year-specific data;
    b) A variant of the length-based double-logistic selectivity function was created. In this formulation, the slope parameters enter the model as the natural logarithm of the slope in order to more easily constrain the slope to reasonable values. In addition, the male-female selectivity differential was modified so that female selectivity could be defined relative to a base male selectivity pattern, rather than vice-versa.
    c) Various improvements to model input and output options were made. This includes reading an array from the control file to adjust the survey CVs and composition sample sizes read from the data file. This is strictly an ease of use issue that is equivalent to element – by- element adjustment within the data file.

Sample Weighting

The approach to sample weighting involves setting initial sample size or standard error levels close to those expected from the level of sampling and then to adjust so that the goodness-of-fit fir each data type is consistent with the assigned input sample size or standard error. In addition to these input sample size calculations, it is prudent to adjust for the simultaneous use of size, age and mean size-at-age data because the same samples are used. In the 2002 assessment, which was strictly an age-based population model, the age composition data received a weight of 0.9 and the length composition data received a weight of 0.1, for all data sources. Here we have reconsidered this weighting scheme because it caused fisheries with no age samples to receive a total weight of 0.1 relative to fisheries that also had age data. For the NCal trawl fishery, OR trawl, WA trawl and trawl survey the likelihood weights were set at 0.45 for length composition, 0.45 for age composition and 0.10 for mean size-at-age. The mean size-at-age weight is set lower because its initial sample size is based on number of fish rather than number of samples. For the ORWA-nontrawl fishery, the weights were 0.50 for length composition and 0.50

for age composition (no mean size-at-age used). For all other fisheries, the only data were length compositions and these were given a weight of 1.0. Overall, the 2005 model contains more length composition data than the 2002 model and these data receive more weight than they did in 2002.

The initial sample size calculations for all composition data were calculated on the basis of the number of samples supporting these estimates, rather than the number of fish in these samples. This approach is supported by the high spatial heterogeneity seen in the size composition in the survey. Single samples will come from a limited spatial area so will not encounter the entire size range of the stock. However, the difference in sampling protocols between recreational and commercial fisheries and between states can have an undesirable effect on the relative influence of different fisheries. California and recreational fisheries take multi-species first stage samples, so the number of canary rockfish in a sample is often low (sometimes just 1 fish). In OR and WA trawl sampling, the first stage sample was directed at canary rockfish and over a hundred fish were sometimes measured and aged from a single sample.

In preliminary model runs it was determined that the effective sample size for the fit to the OR and WA samples was about 10x greater than the number of samples, but only about 2X for the CA samples. Multiplicative adjustments were made to each length, age, and size-at-age sample size and an added standard error level was added to the survey se to bring the adjusted input levels to the same level as the output goodness-of-fit. This process was applied 3 times and the sample size adjustments converged. This approach to sample re-weighting is more extensive than the limited adjustments used in the model originally presented to the STAR panel, but it is consistent with levels of reweighting applied in other 2005 west coast groundfish assessments. A sensitivity run with equal sample weights and equal lamdas is included for comparison.

Priors

Intentionally information priors are not used in this assessment except in the case of some selectivity parameters that can be ill-behaved when a selectivity segment becomes asymptotic.

In principle, the double logistic selectivity formulation has been coded so the model can estimate all the parameters, including the parameter that defines where the peak occurs. In practice, the model appears to reliably move the peak parameter in the direction of better fits, but in this application to canary rockfish data it sometimes fails to calculate a good analytical gradient at that point. Consequently, the model fails to achieve final convergence criteria and cannot achieve analytical estimates of asymptotic variance. In order to achieve good and consistent model performance, the peak parameters were estimated in an initial model run and then these parameters were fixed at these values in order to achieve final convergence. Thus the final estimates of model variance will somewhat underestimate the actual variance because these peak parameters are estimated outside of the model's final analytical steps.

Progress Related to the 2002 STAR Panel Recommendations

The STAR panel report from the 2002 review outlined a number of important research and modeling recommendations that should be explored in subsequent assessments (Stock Assessment Review (STAR), 2002). In the current assessment we addressed as many of these recommendations as was possible and made substantial progress on many of them. Progress is outlined as follows by specific recommendation:

1) Incorporation of Canadian data into an international assessment.
   In preparing this assessment, Canadian data were explored and summarized, however completion of a full joint-international assessment was not possible at this time.

2) Identification of benthic juvenile habitat and development of a pre-recruit survey.
   This recommendation is beyond the scope of the STAT team to accomplish. The examination of the trawl survey data did identify nearshore locations where young canary rockfish (ages 2-4) are common.

3) Logbook and CPUE development for historical logbooks not currently available.
   Effort in the current assessment was focused on better understanding the data sources already available and moving to the Stock synthesis 2 model framework. It was not possible to complete a full review of historical logbooks in this assessment cycle. Because of changes in the fishery and establishment of the RCA, there is no way for current fishery logbook data to be informative about trends in canary rockfish abundance. Logbook CPUE were included in initial model runs presented to the STAR panel, but omitted from the final model configuration because the basis for the density-dependent linkage parameter had not been sufficiently explored, nor had the degree CPUE standardization over time been thoroughly investigated. The inclusion or not of the CPUE data had little effect on model results so the final model omitted the CPUE data.

4) Re-examination of otoliths and ageing determination from ODFW collections.
   Exploration of the spatial distribution of younger and older canary rockfish has made it more feasible to identify those time-periods and areas where re-reading of historically collected otoliths would be most effective. Due to the large number of assessments being completed and the ageing requirements of these assessments there was insufficient time to revisit the samples identified. The time series of residuals in the fit to the annual fishery mean size-at-age data was suggestive of patterns that may be due to small shifts in ageing criteria, but there was not sufficient time to explore this further.

5) Application of adequate resources to sampling the recreational and fixed gear fisheries.
   Sampling of recreational and non-trawl catches was been performed and is included for recent years. These sample size are small due to the highly constrained fishery. The use of "super years" improved options for using these data.

6) Alternate survey methods to locate and sample older female canary rockfish.
There are currently multiple projects underway investigating the occurrence of canary rockfish in untrawlable areas via hook-and-line as well as submersible observations. At this time, none of these projects has produced results that can be directly included in this assessment. The spatial pattern of occurrence of older male and female canary rockfish in the survey provides information to help in this investigation. It should be noted that the abundance of older male and female canary rockfish is much reduced from historical estimated levels, so sampling age 25+ fish will be difficult.

7) Continuation of fishery-independent surveys and development of new methods.
The Northwest Fisheries Science Center conducted a 2004 shelf survey using the same methods and equipment used in the triennial survey in past years. The results from this survey will be informative for future assessments.

8) Updating of party-boat logbook data.
Given the drastic reductions in spatial and temporal access to fishing grounds where canary are present, as well as the prohibited status of canary rockfish in all three states recreational fisheries, it no longer appears reasonable to expect that an unbiased CPUE series can be generated from this type of data.

9) Variance estimation for assessment model predictions.
By moving to the Stock Synthesis 2 model framework there are now asymptotic estimates of all estimated parameters and most model predictions available as standard output.

10) Investigation of smoother, less peaked selectivity functions.
Substantial investigation into the spatial and temporal aspects of existing biological sampling from the fishing fleets and the survey have improved our understanding of the causes for unexpected selectivity shapes in the assessment. Generally, additional stratification of the fishing fleets and more continuous application of time-varying selectivity options, combined with the move to Stock Synthesis 2 have resulted in more reasonable estimates of selectivity functions for all fleets.

Model Selection and Evaluation

Pre-STAR Model

The first model "Like2002" simply moved the 2002 data file into the SS2 format and an SS2 control file was created to match the SS1 configuration as closely as possible. Growth and natural mortality parameters were fixed at the estimated values from the 2002 assessment. Selectivity was defined as a function of age and limited time-blocking of the ascending inflection parameter was used as in the 2002 assessment using SS1. Note that an even closer match of SS2 selectivity pattern to SS1 selectivity pattern can be made with the post-STAR model because of the new option for female selectivity to be an offset from the male selectivity, however the “like2002” model was not re-run after the STAR review.

The “Like2002” result was a very close match to the time series of recruitment and an offset to the time-trend in spawning biomass (Figure 29). This offset appears partially due to the different way body weight-at-age is implemented in the two models. In SS1, the body weight-at-age is an input vector. The vector input for the population’s body weight-at-age was the same as the vector used for the survey weight-at-age. In SS2, the body weight-at-age is derived from the weight-at-length and the distribution of size at each age as estimated within the model. The resulting weight-at-age in SS2 was similar to the weight-at-age for the Oregon fishery in SS1, but less than the population weight-at-age input to SS1, particularly for the older ages. Upon examination of the series of input files used for canary rockfish assessments during the 1990s, it appears that this weight-at-age was calculated during the early 1990s and probably heavily influenced by samples from northern Washington. We conclude that SS2 replicates the SS1 result sufficiently closely.

The next sequence of model runs presented to the STAR panel explored the movement from age-selectivity to length-selectivity and from the old ageing criteria to the new ageing criteria. All of these runs were based upon a fixed set of sample size weightings and upon selectivity configurations that did not allow for differences in selectivity between males and females. These model runs were sufficient to support development of the preliminary base model and are not included in this document.

Post-STAR Model

The post-STAR base model differs from the pre-STAR base model in 4 ways:

a) differential male-female selectivity is allowed for the data sources with suitable data (northern California trawl, Oregon trawl, Washington trawl, shelf trawl survey);
b) iterative re-weighting adjusts all input sample sizes and survey standard error;
c) trawl and recreational fishery CPUE are dropped from the model because there has been insufficient work to validate the potential degree of non-linearity in the abundance to CPUE relationship;
d) the parameters defining the variability in size-at-age are fixed at values estimated outside the model from the trawl survey size-age data, rather than allow the model to update these values.

The sensitivity analysis summarized in Table 28 uses the final base model configuration to re-examine the factors considered in the pre-STAR set of investigations. The factor that most influences the model result is the exclusion of a male-female difference in selectivity which causes the ending biomass to be highest among these model runs and the steepness parameter to have the highest value (0.54). The 8 parameters used to implement this selectivity difference for 3 fisheries and the survey cause the base model to fit 24 log(L) units better than the model configuration without these parameters, with most of the improvement coming from 2 parameters for the OR and the WA trawl fisheries. Without allowing for differential male-female selectivity, the lesser decline in abundance during the 1980s-1990s degrades the fit to the trawl survey by 1.2 log(L) units, so is the worst fit to the trawl survey among all these sensitivity runs.

Post-SSC Model

At the SSC review of the canary rockfish assessment (Sept. 27-30, 2005; Seattle, WA) several issues that had not been specifically examined in the assessment (trawl survey catchability, recruitment variability, and juvenile recruitment survey) were evaluated. The results are summarized in Appendix A to this assessment report. The SSC recommended no major changes to the base model. However, they concluded that the parametric variance around a single base model underestimated the overall uncertainty in the canary rockfish assessment. After re-examining some of the sensitivity analyses included in the assessment, the SSC concluded that the alternative configuration of the male-female selectivity parameters was plausible to include. The two model scenarios are labeled here as Base (Diff configuration – with female length-selectivity allowed to differ from male length-selectivity) and Alternate (NoDiff configuration - with no difference allowed). The STAR panel had concluded that the better statistical fit of the Diff model was sufficient to warrant its selection as the sole base model. However, the difference in overall model fit is not great given that 8 additional parameters are estimated in the Diff model. Perhaps more importantly, there is no compelling biological reason for a difference in female and male selectivity.

After considerable deliberation, the SSC concluded that the Base and Alternate models were equally likely and they supported a statistically based blend of the two models as the basis for the rebuilding analysis. The STAT concurs with this recommendation. This final version of the canary rockfish 2005 assessment has been revised to include the alternate model and to document the results used in the rebuilding analysis.

Base-run Results

The "Base" model uses size-selectivity and with time blocks for the fishery selectivity peak, inflection and final selectivity parameters. Each fishery had 1, 2 or 3 time blocks (Table 29) depending on the extent of the time-series of composition data and the appearance of shifts in the composition data pattern (Figures 15-28). The time series of spawning biomass in this Base configuration is compared to the time series from the 2002 assessment in Figure 30. Figure 31 shows the similar result for the time series of recruitment from the base model and the sensitivity run using age selectivity. The time series of recruitment from the Base case and from the configuration using the old ageing criteria are compared in Figure 32. Some shifts in recruitment are due to the different age assignments with the old versus new criteria.

The control files for the Base and Alternate models are in Appendix B. The data file is presented in Appendix C. The estimated parameter values with standard deviations for both models are in Table 30.

The estimated selectivities are shown in Figure 33 and Tables 31 and 32. Although selectivity is directly estimated as a function of length, it is often useful to consider the equivalent age-specific selectivity. The age-specific selectivity is shown in Figure 33 only for the last time period and is calculated as the dot product of selectivity-at-length and the probability distribution of length-at-age.

The estimated growth curves are in Figure 34, and the estimated parameters are in Table 30. The parameters transformed into conventional terms are:

Gender	L at Age 1	L_∞	K	CV_{young}	CV_{old}
Female	6.3 cm	58.1 cm	0.140	0.15	0.056
Male	Same	51.7 cm	0.175	0.15	0.047

The estimate for size at age 1 is much reduced from previous estimates because the new estimate takes into account the phenomenon in which size-selectivity causes the fishery, and even the trawl survey, to select only the larger individuals from younger ages.

The fit to the survey index is in Figure 35. The bottom trawl survey biomass index is estimated in the base model to have an average catchability (*q*) of 0.70 for large canary rockfish relative to the coast-wide stock, but effective catchability for smaller sizes is reduced by the gradually ramp-up in selectivity (Figure 33). The root mean squared error (*rmse*) for the fit to the surveys is 0.55 in log space, which is greater than the average *se* on the input data (0.39). In the alternate model, the *q* is 0.47 and the *rmse* is 0.50.

The input and estimated effective sample size for the composition data is in Figure 36 and Table 33. The input N multipliers range from about 1.7 for the California length comps, where there typically are just one to a few canary rockfish observed in each multi-species sample, to 14 in the WA trawl fishery where large, pure species samples are taken.

The residual plots for the fishery age, size, and size-at-age data are shown in the multi-page Figure 37. The residuals to the mean size-at-age show a particularly distinct pattern. This could be due to either a slowdown in growth during the early 1990s (particularly the 1992-93 el nino period), a subtle shift in the ageing criteria, or both. Further investigation seems warranted, but exploratory model runs not reported here found no substantial change in the estimated biomass trend when using a complex model with time-varying growth.

The spawner-recruitment relationship is shown in Figure 38 with the estimated steepness of 0.329 for the Base model and 0.449 for the Alternate model. The *rmse* of the recruitment deviations is only 0.29 from 1958-1998, which is less than the input level of sigma R (0.40). Apparently there is not enough of a recruitment signal in the composition data to inform the model about any greater level of fluctuation in recruitment.

The biomass, recruitment and exploitation trends are shown in Figures 39-41 and Tables 34 and 35. The confidence intervals on spawning biomass and recruitment behave as expected. In early years and late years the CV on recruitments is near 0.40, which is the value of *sigmaR*, so the data are providing little information about year-to-year fluctuations in recruitment during these time periods. The most precisely estimated recruitments occur during the early 1980s when many CV values are less than 0.15.

Uncertainty and Sensitivity Analysis

Steepness Profile: A critical parameter that must pass from the assessment to the rebuilding analysis is the spawner-recruitment steepness. This parameter is responsive to the degree of decline in recruitment as the stock size has declined, thus it is used to predict the degree to which recruitment will improve as the spawning stock size rebuilds. The base and the alternate model were re-run after fixing the steepness value at a range of values bracketing the freely estimated value. This profile for the Base model (Figure 42 and Table 36) indicates that values ranging from about 0.27 to 0.39 have a likelihood within about 2.0 log-L units of the best estimate. This is comparable to the range and profile estimated in the 2002 assessment and is very similar to the +/- 2se range calculated from the estimated parameter variance when steepness is freely estimated. Figure 43 shows that survey biomass index is fit best at an intermediate steepness of about 0.39 and the length composition data is fit best at a high steepness, and the age data at low steepness. The old female natural mortality co-varies with the steepness level (Figure 44), presumably because as low steepness depletes the production of young fish the natural mortality must be adjusted in a compensatory way to maintain a comparable fit to the percentage of large/old fish in the size and age composition data.

This different response of the survey biomass, age composition and length composition fit to the steepness parameter means that the overall best estimate of steepness and current depletion is sensitive to the relative input weighting on the various components. The logical basis for the composition weighting is certainly improved in 2005 relative to the logic in 2002 and it has resulted in increased weight on the length composition data overall. We have disaggregated the overall fishery into 10 components that differ in average selectivity pattern and in sampling protocol. Because the constancy of fishery-selectivity cannot be confidently asserted, we introduce time-varying fishery selectivity to allow the model to track the pattern in removals over time. But a high level of flexibility is not used, so there remains the possibility that the fishery composition data are influencing the overall model fit to a greater degree than is desirable.

In the future, other options for alternative relative weighting schemes could be evaluated. For example:

One option would be to introduce more time-varying fishery selectivity parameters to soak up the trends so that the population trend would be even more dominated by the survey data. However, moving too far in this direction would certainly become unstable due to the sparseness of the data. It also runs contrary to the logic of separating the fishery into several components in order to achieve greater temporal stability within each fishery.

Another approach would be to down-weight the composition data relative to the survey biomass index. This approach would allow greater residuals in the fit to the composition data (as opposed to the first option which would explain away these residuals with more fishery selectivity parameters). However, this second option would run contrary to an iterative re-weighting approach because the model is already overfitting the composition data and underfitting the survey biomass index relative to their respective initial input levels of variability.

A third approach would bring additional considerations to the relative weighting among the fisheries. The trawl survey covers the entire coast, but each State fishery covers only about a third of the coast, yet all have comparable weighting. The recreational and non-trawl fisheries have very small historical removals relative to the trawl fishery, yet they sometimes have as many samples, and so have comparable likelihood contributions. Weighting by the gross magnitude of the landings would produce a result more similar to what would occur if the various fisheries were combined with weighting based on the magnitude of landings.

However, none of these alternatives present a clearcut improvement over the current approach, which uses a moderate degree of time-varying selectivity and iterative re-weighting so that the model emphasizes a data type to the degree that it can fit that type.

Retrospective Analysis: A retrospective analysis was conducted by running the model using data only through 2001, 2002, 2003 or 2004 (Figure 45). The results do not show changes that would be of concern. The values of some key parameters and output quantities are shown below.

Through:	2004	2003	2002	2001
Steepness	0.329	0.345	0.323	0.311
Virgin SpBio	34798	34684	34094	33210
Spbio in 2001	1442	1278	1585	1942

Reference points and rebuilding parameters

The estimate of generation time changes with the new growth and lower natural mortality of old females. The revised estimate is 22.8 years, as compared to 19 years estimated in 2002.

The estimate of virgin, unfished spawning biomass is 34,798 mt in the Base model and 33,872 mt in the Alternate model. The blended estimate across the steepness probability distributions and the two models is 34,155 mt. These values are somewhat higher that the 2002 assessment result partly because the model now starts at an earlier year (1916 versus 1940) and partly because of the change in basis for estimating body weight. The rebuilding target is 40% of the virgin spawning biomass level.

The degree of spawning biomass depletion is estimated to be 0.038 when the stock reached its minimum level in 2000, then increasing to 0.057 in 2005 in the Base model (Figure 46). In the Alternate model, the minimum was 0.065 in 1999 and the value in 2005 is estimated to be 0.113. The estimate in the 2002 assessment was for a depletion level of 0.069 in 1999.

The estimate of spawner-recruitment steepness in the 2002 assessment was 0.289. The new estimates are 0.329 (se = 0.029) in the Base model and 0.449 (se = 0.050) in the alternate model.

On the basis of these steepness estimates, the following productivity values can be calculated:

Model	Steepness	SPR at MSY	B_{msy}	MSY
Base	0.329	72.9%	15,584 mt	822 mt
Alternate	0.449	58.1%	13,418 mt	1,168 mt

However, these do not necessarily provide accurate estimates of long-term productivity because all of the spawner-recruitment information has come from a monotonic decline in spawning biomass and recruitment. Much better estimates probably will require waiting until the stock has rebuilt most of the way back to B_{msy}.

Harvest projections and decision tables

The exploitation rate for the current rebuilding plan corresponds approximately to a SPR rate of 88.7%. This estimate is based upon interpolation from values in the 2002 rebuilding analysis: at F73%, the 2003 ABC would be 116mt; at F50%, the ABC would be 256 mt; at F100%, the ABC would be 0 mt. So the rebuilding 2003 OY of 41 mt corresponds to a SPR of approximately 88.7%. Alternatively, in the 2002 rebuilding analysis, the F corresponding to F73% is 0.060 and the F corresponding to the rebuilding rate is 0.022. The ratio of these two F's is 0.3663. In terms of the new assessment, F73% corresponds to an exploitation rate (total catch / 3+ biomass) of 0.01765. Applying the 0.03663 ratio to this rate produces an exploitation rate of 0.006464 for the 2005 result. This corresponds to F88.7%.

Decision table – A decision table is not used for canary rockfish because of the existence of the established rebuilding plan. Instead, the rebuilding analysis is configured to incorporate three sources of uncertainty: two models, probability distribution for spawner-recruitment steepness within each model (Figure 47), and annual variability in recruitment.

Research needs

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

1. Expanded Assessment Region: Given the high occurrence of canary rockfish close to the US-Canada border, we recommend a joint US-Canada assessment in the future.
2. Pre-recruit surveys: Although the central California midwater trawl juvenile rockfish survey was not included in the current assessment, we recommend further work to evaluate its applicability, especially because of recent efforts to expand the geographic scope of this type of survey.
3. Many assessments are deriving historical catch by applying various ratios to the total rockfish catch prior to the period when most species were delineated. A comprehensive historical catch reconstruction for all rockfish species is needed, to compile a best estimated catch series that accounts for all the catch and makes sense for the entire group.
4. Habitat relationships: The historical and current relationship between canary rockfish distribution and habitat features should be investigated to provide more precise estimates of abundance from the surveys, and to guide survey augmentations that could better track rebuilding. This assessment's description of spatial patterns in

occurrence of large and small canary rockfish is a start on this investigation. Such studies could also assist determining the possibility of dome-shaped selectivity.

5. Rarity of old females: Given the premise of this and past assessments regarding the difference between age distributions of male and female canary rockfish, efforts should be undertaken that address this issue, including: (1) habitat-specific studies of the distribution of older male and female canary; (2) laboratory-based programs to rigorously evaluate the physiology of the two sexes. Current field studies to investigate occurrence of larger/older females can contribute information also, but comparison to the occurrence of older males will be difficult due to the reduction in occurrence of older males due to the long history of exploitation.
6. Meta-population model: The spatial patterns show patchiness in the occurrence of large vs. small canary; reduced occurrence of large/old canary south of San Francisco; and concentrations of canary rockfish near the US-Canada border. The feasibility of a meta-population model that has linked regional sub-populations should be explored as a more accurate characterization of the coast-wide population's structure.
7. Enhancements in the assessment model are needed to better address the statistical weighting of data from multiple, spatially distinct fishing fleets and the estimation of time-varying selectivity by these fleets.

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Robert Mohn, Center for Independent Experts (CIE)
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Tables

Table 1. Date and location of tows from which fish were aged and fish of at least 25 years of age were found.

Year	Survey	Latitude	Depth	N Male	N Female
1980	AK	43.47	155	1	
		49.19	126	1	
1983	AK	40.35	90	9	1
		44.11	99	17	9
		44.12	161	10	4
		44.30	165	5	1
		44.39	86	5	2
		45.86	154	18	2
		46.62	139	1	
		46.96	80	2	
		48.01	201	14	
		48.35	119	3	
		48.39	154	16	
		48.98	165	3	
		49.10	168	4	
1989	AK	47.98	168	1	
		47.99	163	3	4
		48.21	102	2	
		49.08	146	1	1
1992	AK	48.09	117	2	
		48.25	132	1	
		48.58	188	2	
		49.23	124	3	
		49.24	216	1	
1995	AK	42.58	110	1	
		44.05	116	2	
		44.38	132	3	
		47.25	94	1	
2001	AK	34.68	119	1	
		43.40	103	1	
		44.38	131	6	
		49.05	147	3	
2003	NW	42.94	144		1
		48.29	128	1	
2004	AK	46.57	116	1	
		47.40	107	1	
		48.09	166	2	1
	NW	34.13	108	1	
		43.61	113	2	
		48.20	118	6	1

Table 2. ABC, landings (includes total recreational catch) and total catch (based on assumed commercial discard rates) of canary rockfish from 1995-2004.

Year	ABC (mt)	OY (mt)	Landings (mt)	Total Catch (mt)
1995	1,250*	850*	1,019.6	1,190.4
1996	1,250*	850*	1,298.6	1,531.3
1997	1,220*	1,000*	1,229.6	1,440.8
1998	1,045*	1,045*	1,285.1	1,513.0
1999	1,045*	857*	731.3	856.3
2000	287	200	141.0	180.5
2001	228	93	86.2	123.5
2002	228	93	66.5	103.7
2003	272	44	38.5	48.0
2004	256	47.3	22.0	37.5

* Includes U.S. Vancouver and Columbia INPFC areas only.

Table 3. The estimated shelf survey biomass in each INPFC area and for each survey year from 1977-2004 are reported here. Values are in mt.

	Conception	Monterey	Eureka	Columbia	US Vancouver	Canada
1977	46	1186	36	6528	275	*
1980	*	103	1904	3379	275	9388
1983	*	7772	420	6835	5088	5925
1986	*	0	746	5439	2658	*
1989	4	755	139	3763	3929	5168
1992	0	98	18	1278	448	1315
1995	0	1095	73	1924	61	253
1998	2	670	146	262	458	1822
2001	8	98	164	2294	710	368
2004	*	394	309	1497	899	*

* denotes that the INPFC area was not sampled in those years

Table 4. Summary of sampling in the shelf trawl surveys. Only tows with good performance and in US waters are included.

Source	YEAR	N tows	Positive	haveLen	N_Lengths	HaveAge	N_Ages
AK		4535	952	487	10989	233	3834
	1977	575	94	16	1022	8	621
	1980	314	77	12	693	21	495
	1983	493	185	44	3064	19	1554
	1986	484	169	44	2544	0	0
	1989	452	93	77	1411	18	245
	1992	431	69	34	407	3	137
	1995	450	43	41	616	33	231
	1998	479	86	84	422	0	0
	2001	474	73	73	398	71	340
	2004	383	63	62	412	60	211
NW		1079	92	92	1000	90	575
	2003	574	50	50	423	48	262
	2004	505	42	42	577	42	313
Grand Total		5614	1044	579	11989	323	4409

Table 5. Length frequency distributions from the triennial survey.

Length bin	Females										Males									
(cm)	1977	1980	1983	1986	1989	1992	1995	1998	2001	2004	1977	1980	1983	1986	1989	1992	1995	1998	2001	2004
12-	0.000	0.000	0.000	0.000	0.001	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.020	0.000	0.000	0.000	0.000
14	0.000	0.002	0.000	0.001	0.004	0.006	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.007	0.000	0.003	0.000	0.000
16	0.000	0.002	0.000	0.000	0.012	0.006	0.000	0.018	0.001	0.003	0.000	0.001	0.000	0.001	0.011	0.014	0.000	0.006	0.000	0.002
18	0.000	0.000	0.000	0.000	0.004	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.010	0.028	0.000	0.004	0.000	0.000
20	0.000	0.000	0.001	0.003	0.002	0.011	0.001	0.001	0.010	0.002	0.000	0.002	0.001	0.004	0.003	0.016	0.000	0.001	0.007	0.000
22	0.000	0.000	0.001	0.001	0.001	0.008	0.003	0.009	0.000	0.000	0.000	0.002	0.001	0.003	0.004	0.013	0.006	0.007	0.000	0.000
24	0.000	0.000	0.002	0.002	0.003	0.017	0.004	0.008	0.021	0.000	0.000	0.000	0.002	0.002	0.004	0.009	0.013	0.009	0.007	0.000
26	0.000	0.000	0.009	0.003	0.011	0.021	0.003	0.006	0.001	0.000	0.000	0.000	0.011	0.019	0.011	0.005	0.016	0.002	0.011	0.000
28	0.000	0.000	0.025	0.003	0.009	0.018	0.015	0.003	0.002	0.000	0.000	0.005	0.025	0.009	0.013	0.007	0.026	0.001	0.008	0.004
30	0.000	0.000	0.044	0.007	0.017	0.023	0.029	0.017	0.024	0.000	0.000	0.000	0.039	0.009	0.018	0.019	0.062	0.008	0.023	0.000
32	0.000	0.007	0.021	0.012	0.016	0.024	0.038	0.013	0.014	0.000	0.000	0.000	0.030	0.015	0.016	0.015	0.065	0.019	0.026	0.000
34	0.000	0.001	0.022	0.014	0.012	0.029	0.038	0.031	0.063	0.000	0.000	0.001	0.020	0.016	0.013	0.010	0.035	0.051	0.081	0.007
36	0.000	0.001	0.017	0.014	0.015	0.060	0.031	0.047	0.128	0.007	0.001	0.015	0.016	0.028	0.020	0.056	0.033	0.048	0.096	0.013
38	0.001	0.004	0.019	0.028	0.015	0.057	0.013	0.062	0.090	0.022	0.004	0.004	0.019	0.028	0.022	0.051	0.031	0.059	0.057	0.019
40	0.011	0.015	0.026	0.047	0.022	0.060	0.019	0.064	0.050	0.055	0.033	0.018	0.021	0.057	0.035	0.046	0.011	0.051	0.048	0.039
42	0.031	0.020	0.018	0.051	0.025	0.082	0.022	0.055	0.030	0.035	0.075	0.082	0.023	0.057	0.031	0.030	0.022	0.039	0.028	0.036
44	0.050	0.021	0.026	0.047	0.016	0.039	0.013	0.041	0.017	0.022	0.078	0.112	0.042	0.048	0.035	0.023	0.022	0.073	0.020	0.104
46	0.074	0.022	0.054	0.033	0.025	0.012	0.018	0.027	0.025	0.037	0.077	0.108	0.066	0.059	0.047	0.014	0.046	0.053	0.025	0.087
48	0.050	0.060	0.038	0.034	0.021	0.007	0.016	0.028	0.022	0.033	0.079	0.146	0.096	0.063	0.087	0.016	0.055	0.033	0.012	0.103
50	0.030	0.054	0.030	0.037	0.054	0.011	0.025	0.034	0.022	0.051	0.129	0.103	0.061	0.052	0.082	0.012	0.085	0.026	0.011	0.101
52	0.045	0.045	0.042	0.033	0.048	0.011	0.025	0.014	0.007	0.036	0.062	0.049	0.042	0.053	0.080	0.018	0.056	0.006	0.004	0.053
54	0.065	0.043	0.042	0.024	0.030	0.010	0.033	0.008	0.002	0.058	0.034	0.016	0.012	0.021	0.013	0.004	0.015	0.005	0.001	0.029
56	0.029	0.026	0.018	0.026	0.027	0.008	0.018	0.006	0.005	0.025	0.006	0.006	0.004	0.004	0.005	0.001	0.000	0.002	0.000	0.003
58	0.018	0.005	0.006	0.013	0.008	0.001	0.018	0.001	0.000	0.013	0.002	0.002	0.001	0.001	0.004	0.000	0.000	0.000	0.000	0.000
60	0.002	0.000	0.003	0.005	0.015	0.007	0.015	0.002	0.000	0.000	0.002	0.000	0.000	0.001	0.012	0.000	0.000	0.000	0.000	0.000
62	0.009	0.000	0.000	0.002	0.012	0.007	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 6. Age frequency distributions from the triennial survey. Data from 1992 are not used because of low number of tows providing age data (Table 4).

Age	Females						Males					
(yr)	1983	1989	1992	1995	2001	2004	1983	1989	1992	1995	2001	2004
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
2	0.002	0.000	0.003	0.000	0.001	0.003	0.002	0.000	0.006	0.000	0.001	0.002
3	0.006	0.003	0.004	0.000	0.000	0.002	0.005	0.003	0.010	0.002	0.000	0.000
4	0.082	0.002	0.094	0.008	0.023	0.000	0.089	0.000	0.019	0.048	0.018	0.004
5	0.045	0.070	0.026	0.046	0.048	0.008	0.048	0.081	0.047	0.063	0.025	0.005
6	0.026	0.001	0.047	0.037	0.069	0.013	0.023	0.007	0.051	0.065	0.085	0.020
7	0.035	0.013	0.120	0.054	0.129	0.043	0.020	0.033	0.092	0.043	0.102	0.042
8	0.024	0.043	0.124	0.018	0.069	0.040	0.032	0.064	0.062	0.042	0.050	0.050
9	0.041	0.045	0.060	0.025	0.029	0.035	0.033	0.017	0.023	0.043	0.058	0.059
10	0.032	0.031	0.024	0.022	0.045	0.050	0.032	0.042	0.018	0.014	0.030	0.035
11	0.035	0.056	0.013	0.045	0.048	0.034	0.025	0.057	0.010	0.051	0.027	0.052
12	0.017	0.039	0.009	0.003	0.027	0.035	0.018	0.061	0.009	0.002	0.015	0.046
13	0.019	0.012	0.010	0.023	0.015	0.018	0.027	0.031	0.015	0.036	0.011	0.064
14	0.025	0.007	0.009	0.030	0.006	0.037	0.027	0.026	0.014	0.055	0.007	0.030
15	0.026	0.021	0.004	0.010	0.010	0.030	0.020	0.043	0.006	0.016	0.007	0.015
16	0.009	0.025	0.004	0.014	0.004	0.006	0.010	0.011	0.009	0.011	0.005	0.030
17	0.005	0.003	0.001	0.013	0.005	0.008	0.011	0.016	0.003	0.013	0.003	0.028
18	0.007	0.019	0.006	0.003	0.005	0.000	0.010	0.000	0.001	0.011	0.003	0.024
19	0.004	0.003	0.004	0.006	0.001	0.010	0.006	0.039	0.000	0.015	0.001	0.016
20	0.006	0.002	0.001	0.013	0.002	0.007	0.005	0.008	0.001	0.018	0.001	0.012
21	0.005	0.000	0.000	0.006	0.000	0.004	0.010	0.000	0.005	0.000	0.000	0.032
22	0.003	0.002	0.003	0.007	0.001	0.000	0.007	0.000	0.003	0.000	0.002	0.007
23	0.003	0.002	0.000	0.003	0.000	0.006	0.009	0.000	0.011	0.027	0.002	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	0.001	0.006	0.002	0.013
25	0.002	0.000	0.000	0.000	0.000	0.004	0.004	0.000	0.015	0.035	0.002	0.000
26	0.000	0.002	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.003	0.000
27	0.003	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.000	0.000	0.000	0.011
28	0.001	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.001	0.000
29	0.001	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.001	0.000
30	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
31	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
32	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.023	0.000	0.000	0.000	0.000
33	0.000	0.003	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.002
34	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000
35+	0.001	0.009	0.000	0.000	0.000	0.000	0.027	0.006	0.000	0.000	0.003	0.009

Table 7. Biological parameters for canary rockfish as reported in the 2002 assessment (Oregon fishery - OR fishery, Washington fishery - WA fishery, and NMFS survey). Units are as follows: length is cm; age is yr; weight is g; and maturity is proportion mature.

		Data source				
Biological parameter	Sex[a]	OR fishery	WA fishery	OR and WA fishery	NMFS survey	All
Length-at-age						
L_{∞}	M	**51.9**	**52.8**	52.1	**53.6**	52.3
	F	**58.2**	**61.6**	58.6	**61.4**	58.9
	M and F	53.4	53.9	53.5	55.6	54.0
K	M	**0.167**	**0.162**	0.168	**0.179**	0.189
	F	**0.143**	**0.111**	0.137	**0.130**	0.146
	M and F	0.182	0.168	0.177	0.168	0.183
t_0	M	**-1.84**	**-1.66**	-1.66	**-0.47**	-0.50
	F	**-1.46**	**-2.56**	-1.62	**-1.01**	-0.84
	M and F	-0.71	-1.16	-0.87	-0.49	-0.36
Weight-length						
a	M	0.1259	0.1230	0.1259	0.0123	0.0155
	F	0.0245	0.7943	0.0302	0.0132	0.0151
	M and F	0.2818	0.0550	0.0603	0.0126	**0.0155**
b	M	2.49	2.49	2.49	3.09	3.03
	F	2.91	2.01	2.86	3.07	3.03

Table 7. Cont'd

Biological parameter	Sex[a]	OR fishery	WA fishery	OR and WA fishery	NMFS survey	All
	M and F	2.28	2.70	2.68	3.08	**3.03**
Maximum age						
A_{max}	M	67	60	67	66	67
	F	52	69	69	57	69
$A_{99\%}$	M	45	47	46	44	47
	F	32	30	31	27	31
Maximum length						
L_{max}	M	63	61	63	61	63
	F	66	69	69	65	69
$L_{99\%}$	M	55	56	56	56	55
	F	60	60	60	60	60
Age-at-recruitment						
	M	4-5	4-7	4-7	3	3-7
	F	4-5	4-6	4-6	3-4	3-6
Length-at-recruitment						
	M	20-34	24-36	20-36	14-22	14-36
	F	26-34	26-36	26-36	14-26	14-36

Table 7 cont'd.

Biological parameter	Sex[a]	OR fishery	WA fishery	OR and WA fishery	NMFS survey	All
Maturity-at-age						
a	F	-6.054	-11.580	**-9.249**	-8.230	-8.756
b	F	3.224	5.696	**4.557**	4.757	4.397
$M_{A50\%}$	F	6.6	7.7	**7.6**	5.7	7.3
Maturity-at-length						
a	F	-21.590	-64.236	-37.352	-32.875	-24.777
b	F	6.071	17.041	10.097	9.314	6.834
$M_{L50\%}$	F	35.0	43.4	40.5	34.2	37.6

Table 8. Estimate of ageing bias and ageing precision.

AGE	Biased Age (radiocarbon study)	N	%Agree Observed	Std.dev. Model	Std.Dev. Linear
0	0.50				0.00
1	1.41				0.18
2	2.32				0.18
3	3.22	19	87%	0.26	0.18
4	4.13	21	78%	0.31	0.28
5	5.04	21	67%	0.39	0.38
6	5.95	43	71%	0.48	0.48
7	6.85	83	72%	0.39	0.57
8	7.76	104	70%	0.45	0.67
9	8.67	102	56%	0.79	0.77
10	9.58	85	49%	0.85	0.87
11	10.49	71	38%	1.04	0.97
12	11.39	66	42%	1.17	1.07
13	12.30	54	37%	1.17	1.17
14	13.21	41	44%	1.21	1.27
15	14.12	34	36%	1.69	1.37
16	15.02	22	37%	1.70	1.47
17	15.93	25	45%	1.56	1.57
18	16.84	13	31%	1.38	1.66
19	17.75	17	25%	1.65	1.76
20+	18.66	54	36%	1.89	1.86
21	19.56				1.96
22	20.47				2.06
23	21.38				2.16
24	22.29				2.26
25	23.20				2.36
26	24.10				2.46
27	25.01				2.56
28	25.92				2.66
29	26.83				2.75
30	27.73				2.85
31	28.64				2.95
32	29.55				3.05
33	30.46				3.15
34	31.37				3.25
35	32.27				3.35
36	33.18				3.45
37	34.09				3.55
38	35.00				3.65
39	35.90				3.75
40	36.81				3.84

Table 9. Total catches (mt) of canary rockfish by fishing fleet used in the assessment model. See text for description of sources.

<table>
<tr><th>Year</th><th>Southern CA trawl</th><th>Northern CA trawl</th><th>Oregon trawl</th><th>Washington trawl</th><th>Southern CA non-trawl</th><th>Northern CA non-trawl</th><th>OR-WA non-trawl</th><th>Southern CA recreational</th><th>Northern CA recreational</th><th>OR-WA recreational</th></tr>
<tr><td>1916</td><td colspan="2">397.05</td><td>0.00</td><td>0.00</td><td colspan="2">76.81</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1917</td><td colspan="2">627.50</td><td>0.00</td><td>0.00</td><td colspan="2">121.39</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1918</td><td colspan="2">665.34</td><td>0.00</td><td>0.00</td><td colspan="2">128.70</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1919</td><td colspan="2">435.72</td><td>0.00</td><td>0.00</td><td colspan="2">84.29</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1920</td><td colspan="2">454.69</td><td>0.00</td><td>0.00</td><td colspan="2">87.96</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1921</td><td colspan="2">384.35</td><td>0.00</td><td>0.00</td><td colspan="2">74.35</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1922</td><td colspan="2">348.06</td><td>0.00</td><td>0.00</td><td colspan="2">67.33</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1923</td><td colspan="2">411.39</td><td>0.00</td><td>0.00</td><td colspan="2">79.58</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1924</td><td colspan="2">382.84</td><td>0.00</td><td>0.00</td><td colspan="2">74.06</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1925</td><td colspan="2">443.03</td><td>0.00</td><td>0.00</td><td colspan="2">85.70</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1926</td><td colspan="2">608.69</td><td>0.00</td><td>0.00</td><td colspan="2">117.75</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1927</td><td colspan="2">515.84</td><td>0.00</td><td>0.00</td><td colspan="2">99.78</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1928</td><td colspan="2">518.20</td><td>8.16</td><td>0.00</td><td colspan="2">100.24</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1929</td><td colspan="2">487.25</td><td>14.19</td><td>0.00</td><td colspan="2">94.25</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1930</td><td colspan="2">583.22</td><td>13.14</td><td>0.00</td><td colspan="2">112.82</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1931</td><td colspan="2">587.44</td><td>10.06</td><td>0.00</td><td colspan="2">113.64</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1932</td><td colspan="2">454.95</td><td>3.69</td><td>0.04</td><td colspan="2">88.01</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1933</td><td colspan="2">386.46</td><td>5.39</td><td>0.00</td><td colspan="2">74.76</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1934</td><td colspan="2">371.63</td><td>5.86</td><td>0.30</td><td colspan="2">71.89</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1935</td><td colspan="2">389.96</td><td>5.40</td><td>2.30</td><td colspan="2">75.43</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1936</td><td colspan="2">371.62</td><td>13.41</td><td>2.96</td><td colspan="2">71.89</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1937</td><td colspan="2">346.38</td><td>17.03</td><td>2.64</td><td colspan="2">67.00</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1938</td><td colspan="2">293.58</td><td>15.47</td><td>3.90</td><td colspan="2">56.79</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1939</td><td colspan="2">269.04</td><td>11.49</td><td>4.09</td><td colspan="2">52.04</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1940</td><td colspan="2">288.21</td><td>68.56</td><td>9.05</td><td colspan="2">55.75</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1941</td><td colspan="2">274.89</td><td>144.08</td><td>3.39</td><td colspan="2">53.18</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1942</td><td colspan="2">114.41</td><td>210.19</td><td>65.81</td><td colspan="2">22.27</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1943</td><td colspan="2">222.74</td><td>766.49</td><td>212.71</td><td colspan="2">42.52</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1944</td><td colspan="2">518.38</td><td>1,258.48</td><td>88.40</td><td colspan="2">99.22</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1945</td><td colspan="2">1,071.18</td><td>1,937.94</td><td>926.43</td><td colspan="2">205.53</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1946</td><td colspan="2">900.07</td><td>1,215.83</td><td>467.02</td><td colspan="2">172.12</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1947</td><td colspan="2">685.43</td><td>755.22</td><td>243.97</td><td colspan="2">131.62</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1948</td><td colspan="2">524.45</td><td>519.74</td><td>396.17</td><td colspan="2">100.23</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1949</td><td colspan="2">480.92</td><td>528.54</td><td>481.83</td><td colspan="2">92.13</td><td>0.00</td><td colspan="2">0.00</td><td>0.00</td></tr>
<tr><td>1950</td><td colspan="2">654.04</td><td>633.70</td><td>463.03</td><td colspan="2">125.54</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1951</td><td colspan="2">886.91</td><td>409.14</td><td>387.38</td><td colspan="2">170.09</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1952</td><td colspan="2">864.64</td><td>418.88</td><td>369.45</td><td colspan="2">166.04</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1953</td><td colspan="2">986.13</td><td>334.79</td><td>160.20</td><td colspan="2">189.33</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1954</td><td colspan="2">1,019.54</td><td>421.04</td><td>229.79</td><td colspan="2">195.40</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1955</td><td colspan="2">1,022.58</td><td>442.74</td><td>216.84</td><td colspan="2">196.42</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1956</td><td colspan="2">1,204.82</td><td>271.93</td><td>207.15</td><td colspan="2">230.84</td><td>0.00</td><td colspan="2">82.80</td><td>0.00</td></tr>
<tr><td>1957</td><td colspan="2">1,297.96</td><td>779.74</td><td>171.37</td><td colspan="2">249.06</td><td>0.00</td><td colspan="2">77.70</td><td>0.00</td></tr>
<tr><td>1958</td><td colspan="2">1,438.70</td><td>599.62</td><td>216.94</td><td colspan="2">275.39</td><td>0.00</td><td colspan="2">88.30</td><td>0.00</td></tr>
<tr><td>1959</td><td colspan="2">1,232.16</td><td>658.62</td><td>242.52</td><td colspan="2">235.90</td><td>0.00</td><td colspan="2">82.40</td><td>0.00</td></tr>
<tr><td>1960</td><td colspan="2">1,105.60</td><td>834.55</td><td>219.31</td><td colspan="2">211.60</td><td>0.00</td><td colspan="2">108.40</td><td>0.00</td></tr>
<tr><td>1961</td><td colspan="2">873.75</td><td>760.81</td><td>260.34</td><td colspan="2">167.05</td><td>0.00</td><td colspan="2">98.30</td><td>0.00</td></tr>
<tr><td>1962</td><td colspan="2">792.75</td><td>795.34</td><td>362.74</td><td colspan="2">151.87</td><td>0.00</td><td colspan="2">104.00</td><td>0.00</td></tr>
<tr><td>1963</td><td colspan="2">947.66</td><td>544.63</td><td>292.02</td><td colspan="2">181.23</td><td>0.00</td><td colspan="2">105.30</td><td>0.00</td></tr>
<tr><td>1964</td><td colspan="2">571.02</td><td>489.43</td><td>215.56</td><td colspan="2">114.41</td><td>0.00</td><td colspan="2">94.20</td><td>0.00</td></tr>
<tr><td>1965</td><td colspan="2">561.91</td><td>483.87</td><td>480.38</td><td colspan="2">116.43</td><td>0.00</td><td colspan="2">113.80</td><td>0.00</td></tr>
<tr><td>1966</td><td colspan="2">534.58</td><td>2,127.32</td><td>729.91</td><td colspan="2">106.31</td><td>0.00</td><td colspan="2">117.90</td><td>0.00</td></tr>
<tr><td>1967</td><td colspan="2">483.95</td><td>854.51</td><td>414.09</td><td colspan="2">84.03</td><td>0.00</td><td colspan="2">117.10</td><td>0.00</td></tr>
<tr><td>1968</td><td colspan="2">686.44</td><td>788.70</td><td>671.26</td><td colspan="2">60.75</td><td>0.00</td><td colspan="2">120.20</td><td>0.00</td></tr>
<tr><td>1969</td><td colspan="2">167.05</td><td>671.26</td><td>558.87</td><td colspan="2">38.47</td><td>0.00</td><td colspan="2">123.50</td><td>0.00</td></tr>
<tr><td>1970</td><td colspan="2">188.32</td><td>679.36</td><td>472.82</td><td colspan="2">44.55</td><td>0.00</td><td colspan="2">139.10</td><td>0.00</td></tr>
</table>

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

Year	Southern CA trawl	Northern CA trawl	Oregon trawl	Washington trawl	Southern CA non-trawl	Northern CA non-trawl	OR-WA non-trawl	Southern CA recreational	Northern CA recreational	OR-WA recreational
1971	196.42		702.64	454.59	46.57		0.00	120.50		0.00
1972	301.71		927.41	163.00	68.85		0.00	142.90		0.00
1973	771.49		1,306.06	146.81	92.13		0.00	165.40		0.00
1974	523.44		602.41	480.92	85.05		0.00	171.20		0.00
1975	504.20		525.46	575.07	87.07		0.00	166.00		4.01
1976	454.59		283.49	454.59	85.05		0.00	180.00		2.11
1977	331.07		489.01	991.19	67.83		0.00	164.90		4.47
1978	22.10	639.95	990.18	1,126.86	3.25	130.62	0.00	150.50		10.30
1979	9.87	308.50	1,750.53	1,118.76	3.09	106.03	0.00	159.20		4.86
1980	30.38	413.40	2,309.41	945.63	14.20	75.66	0.00	142.50	165.53	35.02
1981	34.18	494.01	1,966.51	514.45	3.76	164.77	0.00	33.20	111.80	48.92
1982	21.55	777.06	3,863.55	426.09	4.24	10.68	0.00	28.26	198.58	44.45
1983	14.33	492.41	3,553.43	650.80	42.00	5.19	0.00	10.30	83.19	6.84
1984	29.92	386.70	1,191.31	607.42	56.79	1.14	0.00	28.35	67.51	26.66
1985	20.42	302.81	1,029.50	1,037.98	109.36	3.26	0.00	43.58	120.63	63.39
1986	0.81	166.16	864.04	899.01	12.39	43.96	15.64	58.85	158.59	24.24
1987	0.00	209.24	1,464.12	1,016.63	20.51	23.37	160.15	55.41	163.36	34.32
1988	0.50	223.40	1,281.27	979.31	24.34	29.02	0.00	43.61	128.86	56.58
1989	6.59	176.97	1,550.82	1,208.85	112.42	104.57	0.00	20.04	57.94	31.58
1990	15.69	311.97	976.79	1,099.81	76.44	143.44	17.29	10.02	61.34	38.43
1991	7.62	141.81	1,745.27	971.60	137.56	24.01	27.02	10.02	61.34	43.75
1992	6.98	218.98	1,381.93	825.03	49.37	77.70	152.47	10.02	61.34	38.43
1993	42.18	47.98	1,467.26	288.38	26.66	81.63	116.69	0.00	64.74	51.09
1994	13.95	112.51	638.13	150.84	42.13	53.70	104.87	0.00	50.38	38.74
1995	32.54	106.46	544.21	153.76	53.94	60.59	116.36	1.38	76.87	44.34
1996	102.23	116.13	744.34	184.91	84.90	51.48	164.04	2.29	55.68	25.27
1997	32.37	142.41	577.41	204.76	29.83	74.89	248.11	1.44	82.87	46.68
1998	9.52	149.46	712.26	201.23	23.42	56.84	245.13	2.65	58.95	53.52
1999	7.44	97.20	350.41	143.49	8.47	28.29	120.48	2.84	62.72	34.99
2000	1.71	10.92	29.78	28.96	2.52	5.53	7.98	0.40	74.25	18.46
2001	1.32	9.55	29.02	21.80	1.60	4.96	9.62	0.00	32.30	13.30
2002	0.36	14.48	33.51	35.45	0.02	0.08	2.62	0.21	5.84	11.10
2003	0.23	0.40	6.86	6.91	0.00	0.08	4.48	0.06	17.20	11.80
2004	0.80	2.55	13.52	8.04	0.02	0.08	4.89	0.19	2.45	4.96

Table 10. Summary of sampling effort generating length frequency distributions used in the assessment model for the California trawl fleets. Boxes indicate data aggregated into super-years.

<table>
<tr><th></th><th colspan="4">Southern California</th><th colspan="4">Northern California</th></tr>
<tr><th>Year</th><th>Females</th><th>Males</th><th>Combined sex</th><th>Trips sampled</th><th>Females</th><th>Males</th><th>Combined sex</th><th>Trips sampled</th></tr>
<tr><td>1968</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1969</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1970</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1971</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1972</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1973</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1974</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1975</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1976</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1977</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1978</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">18</td><td rowspan="2">9</td><td>153</td><td>210</td><td>0</td><td>63</td></tr>
<tr><td>1979</td><td>51</td><td>117</td><td>0</td><td>30</td></tr>
<tr><td>1980</td><td>0</td><td>0</td><td>25</td><td>11</td><td>96</td><td>165</td><td>0</td><td>80</td></tr>
<tr><td>1981</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">15</td><td rowspan="2">12</td><td>90</td><td>86</td><td>0</td><td>50</td></tr>
<tr><td>1982</td><td>148</td><td>201</td><td>0</td><td>72</td></tr>
<tr><td>1983</td><td>0</td><td>0</td><td>12</td><td>7</td><td>181</td><td>228</td><td>0</td><td>118</td></tr>
<tr><td>1984</td><td>0</td><td>0</td><td>64</td><td>10</td><td>155</td><td>157</td><td>0</td><td>73</td></tr>
<tr><td>1985</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">60</td><td rowspan="2">28</td><td>161</td><td>230</td><td>0</td><td>69</td></tr>
<tr><td>1986</td><td>161</td><td>228</td><td>0</td><td>53</td></tr>
<tr><td>1987</td><td>0</td><td>0</td><td>0</td><td>0</td><td>143</td><td>163</td><td>0</td><td>61</td></tr>
<tr><td>1988</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">18</td><td rowspan="2">6</td><td>117</td><td>152</td><td>0</td><td>49</td></tr>
<tr><td>1989</td><td>90</td><td>142</td><td>0</td><td>42</td></tr>
<tr><td>1990</td><td>0</td><td>0</td><td>21</td><td>6</td><td>133</td><td>184</td><td>0</td><td>43</td></tr>
<tr><td>1991</td><td>0</td><td>0</td><td>20</td><td>6</td><td>81</td><td>89</td><td>0</td><td>29</td></tr>
<tr><td>1992</td><td>0</td><td>0</td><td>43</td><td>9</td><td>75</td><td>111</td><td>0</td><td>20</td></tr>
<tr><td>1993</td><td>0</td><td>0</td><td>210</td><td>21</td><td>14</td><td>28</td><td>0</td><td>13</td></tr>
<tr><td>1994</td><td>0</td><td>0</td><td>64</td><td>6</td><td>40</td><td>47</td><td>0</td><td>10</td></tr>
<tr><td>1995</td><td>0</td><td>0</td><td>60</td><td>5</td><td>92</td><td>121</td><td>0</td><td>11</td></tr>
<tr><td>1996</td><td>0</td><td>0</td><td>224</td><td>12</td><td>91</td><td>127</td><td>0</td><td>12</td></tr>
<tr><td>1997</td><td>0</td><td>0</td><td>239</td><td>16</td><td>56</td><td>60</td><td>0</td><td>7</td></tr>
<tr><td>1998</td><td>0</td><td>0</td><td>114</td><td>8</td><td>45</td><td>51</td><td>0</td><td>6</td></tr>
<tr><td>1999</td><td>0</td><td>0</td><td>50</td><td>5</td><td>118</td><td>137</td><td>0</td><td>9</td></tr>
<tr><td>2000</td><td>0</td><td>0</td><td>27</td><td>5</td><td>30</td><td>29</td><td>0</td><td>5</td></tr>
<tr><td>2001</td><td>0</td><td>0</td><td>83</td><td>9</td><td>58</td><td>49</td><td>0</td><td>7</td></tr>
<tr><td>2002</td><td rowspan="3">0</td><td rowspan="3">0</td><td rowspan="3">17</td><td rowspan="3">7</td><td>86</td><td>140</td><td>0</td><td>9</td></tr>
<tr><td>2003</td><td rowspan="2">42</td><td rowspan="2">12</td><td rowspan="2">0</td><td rowspan="2">7</td></tr>
<tr><td>2004</td></tr>
</table>

Table 11. Summary of sampling effort generating length frequency distributions used in the assessment model for the Oregon and Washington trawl fleets. Boxes indicate data aggregated into super-years.

<table>
<tr><th></th><th colspan="4">Oregon</th><th colspan="4">Washington</th></tr>
<tr><th>Year</th><th>Females</th><th>Males</th><th>Combined sex</th><th>Trips sampled</th><th>Females</th><th>Males</th><th>Combined sex</th><th>Trips sampled</th></tr>
<tr><td>1968</td><td>0</td><td>0</td><td>0</td><td>0</td><td rowspan="8">0</td><td rowspan="8">0</td><td rowspan="8">5,167</td><td rowspan="8">21</td></tr>
<tr><td>1969</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1970</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1971</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1972</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1973</td><td rowspan="4">220</td><td rowspan="4">290</td><td rowspan="4">0</td><td rowspan="4">7</td></tr>
<tr><td>1974</td></tr>
<tr><td>1975</td></tr>
<tr><td>1976</td><td rowspan="2">377</td><td rowspan="2">820</td><td rowspan="2">0</td><td rowspan="2">5</td></tr>
<tr><td>1977</td><td>290</td><td>460</td><td>0</td><td>8</td></tr>
<tr><td>1978</td><td>294</td><td>376</td><td>0</td><td>7</td><td>336</td><td>575</td><td>0</td><td>5</td></tr>
<tr><td>1979</td><td>237</td><td>363</td><td>0</td><td>6</td><td>264</td><td>535</td><td>0</td><td>8</td></tr>
<tr><td>1980</td><td>471</td><td>563</td><td>0</td><td>21</td><td>635</td><td>1,014</td><td>0</td><td>17</td></tr>
<tr><td>1981</td><td>243</td><td>390</td><td>0</td><td>8</td><td>658</td><td>1,107</td><td>0</td><td>18</td></tr>
<tr><td>1982</td><td>579</td><td>839</td><td>0</td><td>20</td><td>482</td><td>818</td><td>0</td><td>13</td></tr>
<tr><td>1983</td><td>1,133</td><td>1,703</td><td>0</td><td>30</td><td>699</td><td>951</td><td>0</td><td>17</td></tr>
<tr><td>1984</td><td>826</td><td>1,238</td><td>0</td><td>21</td><td>577</td><td>973</td><td>0</td><td>17</td></tr>
<tr><td>1985</td><td>828</td><td>1,063</td><td>0</td><td>29</td><td>773</td><td>977</td><td>0</td><td>18</td></tr>
<tr><td>1986</td><td>692</td><td>853</td><td>0</td><td>16</td><td>716</td><td>934</td><td>0</td><td>17</td></tr>
<tr><td>1987</td><td>791</td><td>960</td><td>0</td><td>35</td><td>644</td><td>656</td><td>0</td><td>25</td></tr>
<tr><td>1988</td><td>541</td><td>607</td><td>0</td><td>23</td><td>425</td><td>525</td><td>0</td><td>19</td></tr>
<tr><td>1989</td><td>529</td><td>601</td><td>0</td><td>23</td><td>400</td><td>500</td><td>0</td><td>18</td></tr>
<tr><td>1990</td><td>515</td><td>584</td><td>0</td><td>22</td><td>360</td><td>490</td><td>0</td><td>17</td></tr>
<tr><td>1991</td><td>407</td><td>462</td><td>0</td><td>22</td><td>472</td><td>628</td><td>0</td><td>22</td></tr>
<tr><td>1992</td><td>597</td><td>767</td><td>0</td><td>34</td><td>467</td><td>532</td><td>0</td><td>20</td></tr>
<tr><td>1993</td><td>554</td><td>559</td><td>0</td><td>22</td><td>395</td><td>459</td><td>0</td><td>17</td></tr>
<tr><td>1994</td><td>320</td><td>430</td><td>0</td><td>15</td><td>343</td><td>407</td><td>0</td><td>15</td></tr>
<tr><td>1995</td><td>379</td><td>468</td><td>0</td><td>16</td><td>497</td><td>553</td><td>0</td><td>21</td></tr>
<tr><td>1996</td><td>559</td><td>603</td><td>0</td><td>19</td><td>337</td><td>413</td><td>0</td><td>15</td></tr>
<tr><td>1997</td><td>580</td><td>867</td><td>0</td><td>26</td><td>386</td><td>461</td><td>0</td><td>17</td></tr>
<tr><td>1998</td><td>703</td><td>857</td><td>0</td><td>28</td><td>415</td><td>430</td><td>0</td><td>25</td></tr>
<tr><td>1999</td><td>741</td><td>776</td><td>0</td><td>28</td><td>359</td><td>384</td><td>0</td><td>18</td></tr>
<tr><td>2000</td><td>185</td><td>236</td><td>0</td><td>11</td><td>98</td><td>131</td><td>0</td><td>7</td></tr>
<tr><td>2001</td><td>395</td><td>478</td><td>0</td><td>31</td><td>133</td><td>173</td><td>0</td><td>10</td></tr>
<tr><td>2002</td><td>595</td><td>573</td><td>0</td><td>58</td><td>330</td><td>268</td><td>0</td><td>28</td></tr>
<tr><td>2003</td><td>145</td><td>135</td><td>0</td><td>39</td><td>139</td><td>132</td><td>0</td><td>21</td></tr>
<tr><td>2004</td><td>179</td><td>177</td><td>0</td><td>51</td><td>258</td><td>224</td><td>0</td><td>37</td></tr>
</table>

Table 12. Summary of sampling effort generating length frequency distributions used in the assessment model for the California non-trawl fleets. Boxes indicate data aggregated into super-years.

	Southern California				Northern California			
Year	Females	Males	Combined sex	Trips sampled	Females	Males	Combined sex	Trips sampled
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978					0	0	0	0
1979	0	0	41	6	0	0	0	0
1980					0	0	0	0
1981	0	0	0	0				
1982	0	0	0	0	0	0	50	8
1983	0	0	0	0				
1984	0	0	0	0				
1985	0	0	132	33	0	0	0	0
1986					0	0	0	0
1987	0	0	120	14	0	0	0	0
1988	0	0	94	13	0	0	0	0
1989	0	0	330	27	0	0	0	0
1990	0	0	84	19	0	0	0	0
1991	0	0	65	9	0	0	142	6
1992	0	0	1,086	100	0	0	755	48
1993	0	0	345	99	0	0	1,070	55
1994	0	0	647	93	0	0	1,410	55
1995	0	0	310	54	0	0	1,013	29
1996	0	0	458	68	0	0	932	38
1997	0	0	482	57	0	0	625	23
1998	0	0	122	31	0	0	265	14
1999	0	0	109	17	0	0	679	50
2000	0	0	0	0	0	0	148	16
2001	0	0	25	5				
2002	0	0	0	0	0	0	241	28
2003	0	0	0	0				
2004	0	0	0	0	0	0	0	0

Table 13. Summary of sampling effort generating length frequency distributions used in the assessment model for the California recreational fleets. Boxes indicate data aggregated into super-years.

	Southern California				Northern California			
Year	Females	Males	Combined sex	Trips sampled	Females	Males	Combined sex	Trips sampled
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	0	546	129	0	0	334	61
1981	0	0	229	70	0	0	224	45
1982	0	0	264	88	0	0	383	66
1983	0	0	246	88	0	0	197	50
1984	0	0	311	105	0	0	242	72
1985	0	0	687	179	0	0	432	104
1986	0	0	716	156	0	0	671	107
1987	0	0	149	47	0	0	469	57
1988	0	0	183	70	0	0	212	61
1989	0	0	367	84	0	0	82	19
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	211	97	0	0	337	84
1994	0	0	75	44	0	0	391	78
1995	0	0	253	70	0	0	231	51
1996	0	0	637	126	0	0	458	84
1997	0	0	1,101	145	0	0	585	53
1998	0	0	230	69	0	0	144	27
1999	0	0	637	141	0	0	346	62
2000	0	0	298	58	0	0	90	30
2001	0	0	155	52	0	0	21	13
2002	0	0	100	37	0	0	17	11
2003	0	0	8	8	0	0	38	25
2004	0	0	148	93	0	0	54	28

Table 14. Summary of sampling effort generating length frequency distributions used in the assessment model for the Oregon and Washington non-trawl and recreational fleets. Boxes indicate data aggregated into super-years.

	Oregon and Washington non-trawl				Oregon and Washington recreational			
Year	Females	Males	Combined sex	Trips sampled	Females	Males	Combined sex	Trips sampled
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	0	0	0
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0	0
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	0	0	0
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980					0	0	263	85
1981					0	0	110	35
1982					0	0	224	78
1983					0	0	50	27
1984					0	0	338	89
1985	208	206	0	6	0	0	352	110
1986					0	0	158	51
1987					0	0	248	73
1988					0	0	379	107
1989					0	0	161	42
1990					0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	530	118
1994	0	0	0	0	0	0	604	116
1995	0	0	0	0	0	0	596	100
1996					0	0	336	77
1997					0	0	433	110
1998					0	0	738	172
1999					0	0	765	160
2000	755	949	0	93	0	0	375	101
2001					0	0	182	67
2002					0	0	154	64
2003					0	0	36	16
2004					0	0	0	0

Table 15. Summary of sampling effort generating age frequency distributions used in the assessment model for the California trawl and Oregon-Washington non-trawl fleets. Boxes indicate data aggregated into super-years.

<table>
<tr><th rowspan="2">Year</th><th colspan="3">Southern California trawl</th><th colspan="3">Northern California trawl</th><th colspan="3">Oregon and Washington non-trawl</th></tr>
<tr><th>Females</th><th>Males</th><th>Trips sampled</th><th>Females</th><th>Males</th><th>Trips sampled</th><th>Females</th><th>Males</th><th>Trips sampled</th></tr>
<tr><td>1980</td><td rowspan="24">70</td><td rowspan="24">68</td><td rowspan="24">40</td><td>96</td><td>165</td><td>80</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1981</td><td>81</td><td>74</td><td>43</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1982</td><td>91</td><td>119</td><td>51</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1983</td><td>173</td><td>219</td><td>113</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1984</td><td>150</td><td>150</td><td>68</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1985</td><td rowspan="3">149</td><td rowspan="3">217</td><td rowspan="3">63</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1986</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1987</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1988</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1989</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1990</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1991</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1992</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1993</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1994</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1995</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1996</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1997</td><td>0</td><td>0</td><td>0</td><td rowspan="8">149</td><td rowspan="8">187</td><td rowspan="8">24</td></tr>
<tr><td>1998</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1999</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2000</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>2001</td><td rowspan="3">79</td><td rowspan="3">59</td><td rowspan="3">9</td></tr>
<tr><td>2002</td></tr>
<tr><td>2003</td></tr>
<tr><td>2004</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>

Table 16. Summary of sampling effort generating age frequency distributions used in the assessment model for the Oregon and Washington trawl fleets. Boxes indicate data aggregated into super-years.

	Oregon Trawl			Washington trawl		
Year	Females	Males	Trips sampled	Females	Males	Trips sampled
1980	204	285	11	158	330	5
1981	226	377	7	300	530	11
1982	382	574	14	315	477	12
1983	1,088	1,636	29	142	241	6
1984	731	1125	19	222	373	9
1985	508	696	24	211	239	5
1986	0	0	0	380	470	17
1987 1988	441	489	19	347 124	353 176	14 6
1989	0	0	0	264	373	13
1990	272	277	11	227	323	11
1991	308	353	18	291	409	14
1992	553	702	31	363	386	15
1993 1994	620	690	26	393 342	455 407	17 15
1995	354	440	14	497	553	21
1996	456	487	15	329	400	15
1997	577	862	26	385	458	17
1998	699	855	28	409	418	17
1999	740	776	28	333	355	14
2000	165	206	9	97	130	6
2001	333	395	23	125	157	9
2002	507	496	51	329	266	28
2003	130	118	36	139	132	21
2004	140	153	48	246	220	36

Table 17. Length frequency distributions used in the assessment model for the Southern California trawl fleet.

Length bin (cm)	Combined sexes 1978 - 1979	1980	1981 - 1982	1983	1984	1985 - 1986	1990	1988 - 1989	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
12-	0.000	0.000	0.000	0.000	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.101	0.000	0.532	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.000	0.059
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.488	0.000	0.000	0.018	0.000	0.000	0.025	0.001	0.000	0.000
30	0.000	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.016	0.001	0.000	0.077	0.000	0.033	0.023	0.002	0.059	0.000
32	0.000	0.030	0.000	0.000	0.000	0.023	0.027	0.041	0.000	0.033	0.008	0.110	0.087	0.070	0.000	0.210	0.059	0.008	0.231	0.000
34	0.026	0.167	0.000	0.000	0.034	0.119	0.000	0.000	0.000	0.000	0.026	0.084	0.174	0.112	0.059	0.068	0.056	0.030	0.228	0.000
36	0.037	0.126	0.018	0.052	0.000	0.202	0.155	0.335	0.468	0.082	0.375	0.549	0.163	0.113	0.015	0.057	0.076	0.044	0.233	0.059
38	0.048	0.179	0.173	0.247	0.104	0.180	0.046	0.000	0.000	0.056	0.021	0.113	0.148	0.319	0.216	0.013	0.119	0.064	0.131	0.059
40	0.074	0.192	0.287	0.000	0.192	0.119	0.658	0.041	0.000	0.813	0.000	0.060	0.178	0.077	0.170	0.029	0.257	0.152	0.059	0.176
42	0.000	0.107	0.325	0.480	0.280	0.191	0.000	0.583	0.000	0.000	0.008	0.001	0.084	0.113	0.137	0.196	0.115	0.200	0.011	0.353
44	0.269	0.127	0.075	0.220	0.174	0.023	0.000	0.000	0.000	0.000	0.018	0.000	0.122	0.020	0.133	0.124	0.108	0.153	0.036	0.118
46	0.149	0.071	0.122	0.000	0.216	0.025	0.000	0.000	0.000	0.000	0.039	0.083	0.008	0.026	0.073	0.077	0.025	0.168	0.000	0.118
48	0.044	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.016	0.000	0.000	0.009	0.005	0.053	0.083	0.037	0.073	0.004	0.000
50	0.322	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.017	0.053	0.043	0.073	0.008	0.059
52	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.015	0.067	0.024	0.037	0.010	0.000	0.000
54	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.005	0.017	0.024	0.018	0.020	0.000	0.000
56	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.025	0.011	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 18. Length frequency distributions used in the assessment model for the Northern California trawl fleet.

Length bin (cm)	Females																			
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.000	0.007	0.000	0.001	0.000	0.000	0.002	0.000	0.011	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.051
32	0.000	0.000	0.000	0.000	0.002	0.006	0.001	0.003	0.000	0.000	0.010	0.007	0.003	0.004	0.001	0.000	0.013	0.020	0.001	0.002
34	0.000	0.000	0.004	0.007	0.001	0.002	0.023	0.005	0.001	0.037	0.025	0.016	0.017	0.029	0.015	0.000	0.006	0.031	0.006	0.052
36	0.004	0.000	0.007	0.003	0.028	0.010	0.043	0.029	0.014	0.044	0.026	0.044	0.018	0.046	0.021	0.049	0.040	0.063	0.066	0.009
38	0.019	0.003	0.032	0.000	0.009	0.012	0.010	0.034	0.040	0.052	0.066	0.027	0.024	0.068	0.053	0.000	0.006	0.069	0.099	0.053
40	0.000	0.003	0.005	0.014	0.005	0.053	0.046	0.036	0.060	0.021	0.065	0.091	0.043	0.085	0.037	0.042	0.057	0.060	0.022	0.018
42	0.001	0.010	0.016	0.068	0.068	0.027	0.052	0.051	0.035	0.044	0.051	0.047	0.071	0.053	0.034	0.006	0.071	0.038	0.018	0.017
44	0.005	0.003	0.020	0.029	0.049	0.022	0.040	0.032	0.050	0.087	0.024	0.017	0.028	0.045	0.095	0.093	0.178	0.036	0.032	0.069
46	0.024	0.025	0.038	0.070	0.035	0.059	0.058	0.025	0.052	0.038	0.027	0.012	0.021	0.030	0.031	0.003	0.031	0.039	0.026	0.024
48	0.044	0.000	0.065	0.078	0.090	0.028	0.052	0.023	0.063	0.063	0.042	0.021	0.043	0.033	0.062	0.065	0.002	0.033	0.045	0.086
50	0.063	0.034	0.045	0.051	0.050	0.038	0.043	0.056	0.037	0.043	0.015	0.031	0.073	0.014	0.021	0.015	0.035	0.010	0.042	0.021
52	0.095	0.041	0.037	0.042	0.019	0.072	0.049	0.014	0.032	0.006	0.048	0.030	0.056	0.016	0.010	0.000	0.034	0.016	0.015	0.000
54	0.048	0.016	0.044	0.061	0.029	0.038	0.020	0.055	0.019	0.015	0.006	0.019	0.018	0.024	0.014	0.000	0.002	0.003	0.000	0.046
56	0.070	0.082	0.027	0.086	0.007	0.027	0.043	0.080	0.008	0.007	0.004	0.013	0.003	0.000	0.000	0.000	0.002	0.003	0.030	0.000
58	0.028	0.040	0.017	0.019	0.000	0.010	0.028	0.028	0.002	0.006	0.000	0.005	0.001	0.000	0.004	0.000	0.000	0.000	0.000	0.005
60	0.023	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.002	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046
66+	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046

Table 18. Continued. Length frequency distributions used in the assessment model for the Northern California trawl fleet.

	Females						Males													
Length bin (cm)	1998	1999	2000	2001	2002	2003 - 2004	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.000	0.000	0.002
30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.003	0.000	0.004
32	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.003	0.002	0.011	0.000	0.013	0.013	0.049	0.003	0.033
34	0.007	0.006	0.000	0.000	0.000	0.019	0.000	0.000	0.008	0.000	0.023	0.004	0.003	0.007	0.001	0.062	0.013	0.054	0.023	0.015
36	0.030	0.014	0.000	0.003	0.000	0.037	0.000	0.000	0.021	0.005	0.032	0.027	0.013	0.016	0.016	0.060	0.046	0.057	0.041	0.074
38	0.041	0.029	0.071	0.017	0.009	0.000	0.008	0.021	0.011	0.042	0.031	0.056	0.025	0.038	0.048	0.066	0.089	0.074	0.074	0.085
40	0.007	0.105	0.069	0.068	0.025	0.148	0.005	0.024	0.048	0.044	0.044	0.026	0.039	0.058	0.110	0.033	0.083	0.097	0.035	0.073
42	0.005	0.091	0.094	0.078	0.031	0.074	0.004	0.059	0.034	0.065	0.081	0.072	0.047	0.054	0.136	0.091	0.090	0.060	0.091	0.063
44	0.095	0.117	0.100	0.085	0.105	0.130	0.015	0.045	0.123	0.057	0.094	0.058	0.060	0.062	0.066	0.092	0.084	0.042	0.090	0.125
46	0.073	0.047	0.047	0.104	0.098	0.111	0.070	0.066	0.112	0.139	0.059	0.088	0.111	0.066	0.112	0.049	0.048	0.102	0.091	0.047
48	0.132	0.074	0.100	0.090	0.059	0.111	0.050	0.106	0.138	0.057	0.065	0.138	0.084	0.068	0.061	0.035	0.065	0.052	0.080	0.027
50	0.095	0.020	0.000	0.052	0.067	0.074	0.220	0.121	0.104	0.050	0.133	0.065	0.041	0.088	0.024	0.027	0.039	0.024	0.040	0.002
52	0.032	0.011	0.000	0.037	0.009	0.019	0.078	0.117	0.033	0.007	0.036	0.044	0.042	0.044	0.007	0.002	0.006	0.004	0.000	0.000
54	0.063	0.005	0.000	0.003	0.000	0.000	0.045	0.133	0.000	0.000	0.000	0.008	0.011	0.014	0.001	0.000	0.000	0.000	0.001	0.002
56	0.000	0.000	0.035	0.000	0.000	0.019	0.016	0.005	0.013	0.000	0.000	0.001	0.011	0.000	0.000	0.000	0.000	0.001	0.000	0.002
58	0.002	0.000	0.000	0.003	0.000	0.037	0.047	0.008	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 18. Continued. Length frequency distributions used in the assessment model for the Northern California trawl fleet.

Length bin (cm)	Males 1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003 - 2004
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.000	0.009	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	0.005	0.124	0.036	0.034	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
34	0.025	0.000	0.013	0.037	0.065	0.001	0.005	0.022	0.000	0.000	0.003	0.019
36	0.055	0.054	0.000	0.115	0.139	0.013	0.023	0.056	0.035	0.022	0.003	0.000
38	0.066	0.086	0.091	0.083	0.073	0.066	0.082	0.055	0.071	0.032	0.026	0.000
40	0.080	0.123	0.180	0.084	0.057	0.037	0.016	0.102	0.155	0.066	0.102	0.056
42	0.085	0.043	0.052	0.080	0.076	0.079	0.082	0.096	0.133	0.092	0.181	0.037
44	0.081	0.179	0.103	0.055	0.077	0.034	0.137	0.090	0.069	0.118	0.145	0.056
46	0.084	0.094	0.042	0.043	0.014	0.011	0.005	0.038	0.019	0.114	0.112	0.056
48	0.045	0.000	0.007	0.018	0.015	0.144	0.032	0.013	0.000	0.017	0.010	0.000
50	0.021	0.000	0.002	0.011	0.030	0.005	0.003	0.002	0.000	0.000	0.012	0.000
52	0.055	0.000	0.000	0.010	0.015	0.062	0.030	0.000	0.000	0.000	0.004	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 19. Length frequency distributions used in the assessment model for the Oregon trawl fleet.

Length bin (cm)	Females 1973 - 1974, 1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
28	0.003	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.001	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
32	0.003	0.001	0.000	0.005	0.035	0.000	0.000	0.001	0.001	0.001	0.002	0.000	0.003	0.000	0.000	0.001	0.000	0.000	0.001	0.000
34	0.000	0.002	0.000	0.005	0.021	0.000	0.000	0.003	0.001	0.000	0.004	0.000	0.002	0.000	0.000	0.003	0.001	0.000	0.001	0.016
36	0.007	0.005	0.001	0.010	0.012	0.000	0.000	0.002	0.004	0.003	0.005	0.000	0.010	0.000	0.001	0.008	0.001	0.007	0.003	0.019
38	0.004	0.004	0.001	0.015	0.001	0.000	0.000	0.006	0.003	0.007	0.013	0.004	0.011	0.002	0.004	0.015	0.004	0.001	0.012	0.034
40	0.011	0.015	0.012	0.019	0.003	0.003	0.004	0.013	0.008	0.010	0.027	0.010	0.013	0.007	0.005	0.021	0.018	0.015	0.021	0.029
42	0.012	0.021	0.008	0.011	0.004	0.001	0.006	0.020	0.017	0.015	0.030	0.010	0.012	0.017	0.022	0.018	0.038	0.035	0.035	0.049
44	0.000	0.020	0.010	0.030	0.005	0.051	0.024	0.030	0.029	0.029	0.030	0.024	0.034	0.030	0.027	0.046	0.033	0.038	0.062	0.050
46	0.022	0.036	0.046	0.063	0.017	0.028	0.033	0.037	0.045	0.053	0.035	0.037	0.061	0.059	0.034	0.067	0.047	0.047	0.064	0.063
48	0.044	0.025	0.059	0.051	0.031	0.052	0.030	0.039	0.063	0.065	0.052	0.063	0.072	0.066	0.063	0.039	0.049	0.081	0.062	0.070
50	0.093	0.042	0.066	0.061	0.059	0.047	0.042	0.053	0.053	0.072	0.078	0.092	0.084	0.061	0.097	0.069	0.071	0.086	0.076	0.070
52	0.095	0.059	0.057	0.057	0.064	0.063	0.057	0.073	0.052	0.069	0.073	0.073	0.086	0.078	0.086	0.072	0.069	0.088	0.055	0.042
54	0.070	0.069	0.078	0.062	0.090	0.059	0.060	0.063	0.042	0.049	0.052	0.058	0.059	0.072	0.090	0.042	0.072	0.072	0.029	0.018
56	0.022	0.040	0.053	0.020	0.104	0.045	0.051	0.040	0.043	0.035	0.049	0.041	0.031	0.036	0.047	0.022	0.018	0.024	0.014	0.012
58	0.030	0.017	0.042	0.023	0.033	0.034	0.020	0.018	0.019	0.022	0.028	0.021	0.021	0.024	0.023	0.021	0.016	0.016	0.001	0.002
60	0.006	0.007	0.003	0.003	0.004	0.021	0.002	0.005	0.002	0.011	0.005	0.006	0.012	0.009	0.007	0.008	0.006	0.009	0.000	0.000
62	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.002	0.004	0.001	0.001	0.000	0.004	0.000	0.000
64	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006

Table 19. Continued. Length frequency distributions used in the assessment model for the Oregon trawl fleet.

	Females									Males										
Length bin (cm)	1996	1997	1998	1999	2000	2001	2002	2003	2004	1973 - 1974, 1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.001	0.000	0.002	0.001	0.007	0.001	0.000	0.000	0.003	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
32	0.001	0.000	0.002	0.002	0.015	0.005	0.004	0.000	0.010	0.003	0.002	0.000	0.005	0.002	0.000	0.000	0.001	0.001	0.001	0.003
34	0.014	0.002	0.007	0.005	0.039	0.018	0.016	0.003	0.008	0.001	0.005	0.000	0.010	0.000	0.000	0.000	0.002	0.001	0.002	0.004
36	0.022	0.008	0.017	0.008	0.055	0.048	0.037	0.014	0.016	0.001	0.004	0.000	0.015	0.000	0.000	0.001	0.007	0.003	0.002	0.009
38	0.027	0.010	0.037	0.038	0.054	0.052	0.070	0.029	0.031	0.009	0.008	0.002	0.034	0.001	0.004	0.002	0.008	0.009	0.007	0.015
40	0.057	0.032	0.052	0.045	0.039	0.042	0.084	0.031	0.044	0.013	0.020	0.006	0.042	0.005	0.010	0.011	0.022	0.022	0.026	0.037
42	0.050	0.038	0.048	0.054	0.041	0.059	0.044	0.085	0.066	0.014	0.034	0.013	0.059	0.013	0.034	0.022	0.052	0.038	0.039	0.058
44	0.054	0.055	0.056	0.073	0.057	0.053	0.044	0.091	0.057	0.055	0.067	0.057	0.056	0.032	0.061	0.068	0.061	0.076	0.067	0.073
46	0.049	0.065	0.065	0.073	0.041	0.056	0.038	0.073	0.084	0.087	0.141	0.092	0.099	0.064	0.049	0.076	0.077	0.102	0.109	0.068
48	0.052	0.064	0.043	0.057	0.049	0.053	0.056	0.049	0.033	0.177	0.160	0.106	0.113	0.146	0.200	0.166	0.122	0.138	0.109	0.099
50	0.045	0.071	0.047	0.060	0.020	0.044	0.031	0.056	0.055	0.112	0.129	0.148	0.087	0.138	0.119	0.211	0.127	0.144	0.097	0.079
52	0.035	0.037	0.045	0.045	0.015	0.020	0.020	0.037	0.057	0.078	0.036	0.092	0.027	0.070	0.087	0.088	0.094	0.067	0.071	0.051
54	0.031	0.014	0.024	0.019	0.010	0.012	0.029	0.032	0.028	0.017	0.019	0.041	0.016	0.019	0.028	0.026	0.021	0.014	0.024	0.013
56	0.010	0.016	0.005	0.011	0.002	0.013	0.018	0.017	0.012	0.007	0.001	0.005	0.001	0.004	0.001	0.000	0.003	0.001	0.005	0.007
58	0.005	0.005	0.004	0.005	0.002	0.005	0.013	0.017	0.000	0.003	0.002	0.002	0.003	0.003	0.000	0.000	0.000	0.001	0.000	0.001
60	0.004	0.002	0.000	0.001	0.000	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 19. Continued. Length frequency distributions used in the assessment model for the Oregon trawl fleet.

Length bin (cm)	Males 1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
30	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.002	0.005	0.000	0.001
32	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.014	0.002	0.001	0.003	0.003	0.035	0.005	0.005	0.000	0.004
34	0.000	0.001	0.001	0.000	0.003	0.001	0.000	0.002	0.017	0.013	0.004	0.004	0.006	0.045	0.019	0.018	0.003	0.012
36	0.006	0.006	0.001	0.002	0.009	0.006	0.004	0.002	0.046	0.025	0.016	0.028	0.032	0.077	0.035	0.052	0.026	0.017
38	0.006	0.011	0.010	0.004	0.010	0.014	0.019	0.031	0.050	0.061	0.039	0.043	0.046	0.075	0.071	0.068	0.067	0.057
40	0.018	0.016	0.015	0.015	0.024	0.035	0.039	0.042	0.075	0.071	0.079	0.061	0.063	0.059	0.077	0.065	0.050	0.047
42	0.049	0.050	0.042	0.035	0.049	0.049	0.055	0.095	0.072	0.070	0.104	0.097	0.078	0.082	0.100	0.072	0.093	0.072
44	0.092	0.083	0.067	0.073	0.101	0.078	0.094	0.101	0.098	0.063	0.118	0.093	0.088	0.082	0.078	0.087	0.094	0.073
46	0.118	0.091	0.098	0.118	0.104	0.109	0.084	0.094	0.066	0.058	0.098	0.089	0.083	0.045	0.059	0.050	0.075	0.084
48	0.122	0.102	0.110	0.134	0.102	0.100	0.079	0.093	0.040	0.069	0.067	0.064	0.058	0.026	0.038	0.034	0.042	0.045
50	0.077	0.067	0.089	0.069	0.065	0.085	0.059	0.051	0.026	0.066	0.031	0.043	0.019	0.013	0.020	0.018	0.010	0.046
52	0.049	0.040	0.069	0.029	0.063	0.061	0.030	0.031	0.012	0.031	0.012	0.012	0.019	0.004	0.010	0.003	0.000	0.021
54	0.023	0.018	0.024	0.014	0.008	0.011	0.009	0.017	0.004	0.012	0.004	0.007	0.006	0.002	0.004	0.008	0.003	0.005
56	0.001	0.001	0.005	0.002	0.005	0.007	0.003	0.003	0.001	0.001	0.003	0.001	0.001	0.000	0.001	0.001	0.000	0.012
58	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 20. Length frequency distributions used in the assessment model for the Washington trawl fleet.

Length bin (cm)	Comb sex 1968 - 1973, 1975	Females 1976 - 1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.004	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
30	0.004	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001
32	0.010	0.000	0.000	0.000	0.005	0.001	0.000	0.002	0.002	0.000	0.001	0.001	0.002	0.002	0.000	0.000	0.003	0.006	0.005	0.003
34	0.014	0.000	0.000	0.001	0.004	0.001	0.012	0.003	0.006	0.002	0.001	0.001	0.001	0.003	0.001	0.002	0.006	0.002	0.008	0.014
36	0.041	0.000	0.000	0.000	0.005	0.003	0.002	0.005	0.006	0.005	0.008	0.004	0.007	0.006	0.002	0.002	0.009	0.014	0.022	0.018
38	0.047	0.000	0.000	0.009	0.008	0.007	0.007	0.014	0.008	0.012	0.013	0.006	0.003	0.008	0.004	0.013	0.014	0.043	0.015	0.030
40	0.065	0.002	0.001	0.009	0.018	0.011	0.020	0.024	0.009	0.012	0.021	0.015	0.009	0.019	0.023	0.008	0.025	0.053	0.043	0.055
42	0.065	0.005	0.013	0.017	0.028	0.022	0.058	0.039	0.014	0.013	0.037	0.027	0.020	0.033	0.016	0.025	0.029	0.066	0.061	0.058
44	0.089	0.014	0.029	0.044	0.033	0.025	0.032	0.050	0.033	0.033	0.047	0.052	0.028	0.040	0.056	0.043	0.029	0.073	0.050	0.063
46	0.121	0.016	0.044	0.042	0.032	0.031	0.034	0.048	0.044	0.044	0.056	0.041	0.071	0.078	0.070	0.062	0.043	0.073	0.073	0.096
48	0.161	0.030	0.045	0.067	0.057	0.038	0.049	0.045	0.043	0.045	0.064	0.074	0.059	0.070	0.082	0.052	0.056	0.047	0.034	0.070
50	0.153	0.037	0.055	0.030	0.067	0.073	0.045	0.042	0.038	0.081	0.056	0.075	0.062	0.061	0.064	0.059	0.050	0.057	0.056	0.038
52	0.130	0.066	0.057	0.032	0.067	0.086	0.074	0.064	0.075	0.068	0.058	0.069	0.056	0.038	0.046	0.057	0.056	0.023	0.031	0.022
54	0.062	0.059	0.046	0.020	0.036	0.044	0.041	0.058	0.040	0.062	0.036	0.064	0.069	0.031	0.052	0.035	0.057	0.024	0.025	0.014
56	0.027	0.033	0.036	0.018	0.018	0.021	0.024	0.016	0.034	0.036	0.016	0.037	0.047	0.020	0.020	0.033	0.031	0.008	0.021	0.002
58	0.003	0.015	0.013	0.014	0.014	0.015	0.005	0.010	0.015	0.015	0.010	0.014	0.023	0.011	0.008	0.010	0.020	0.000	0.004	0.005
60	0.000	0.002	0.004	0.000	0.003	0.005	0.002	0.006	0.004	0.004	0.002	0.010	0.013	0.001	0.004	0.000	0.001	0.000	0.003	0.000
62	0.000	0.003	0.000	0.000	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.001	0.002	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 20. Continued. Length frequency distributions used in the assessment model for the Washington trawl fleet.

Length bin (cm)	Females									Males									
	1996	1997	1998	1999	2000	2001	2002	2003	2004	1976 - 1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.004	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.003	0.000	0.016	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000
32	0.007	0.003	0.001	0.005	0.012	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.001	0.001	0.004	0.004	0.000	0.000
34	0.010	0.006	0.006	0.009	0.014	0.001	0.014	0.016	0.008	0.000	0.000	0.000	0.005	0.002	0.004	0.015	0.007	0.003	0.003
36	0.015	0.012	0.013	0.013	0.026	0.007	0.008	0.026	0.007	0.000	0.000	0.004	0.015	0.003	0.001	0.019	0.010	0.007	0.008
38	0.022	0.012	0.017	0.009	0.038	0.008	0.020	0.035	0.013	0.000	0.001	0.000	0.025	0.016	0.016	0.029	0.015	0.013	0.015
40	0.023	0.021	0.043	0.019	0.049	0.012	0.041	0.035	0.027	0.008	0.009	0.017	0.030	0.028	0.044	0.030	0.019	0.016	0.040
42	0.037	0.041	0.062	0.027	0.024	0.023	0.024	0.066	0.026	0.019	0.016	0.029	0.038	0.035	0.071	0.060	0.034	0.022	0.064
44	0.038	0.083	0.068	0.062	0.066	0.041	0.032	0.054	0.042	0.028	0.052	0.117	0.058	0.044	0.072	0.055	0.052	0.050	0.098
46	0.047	0.052	0.064	0.057	0.055	0.067	0.038	0.060	0.068	0.062	0.104	0.107	0.068	0.067	0.087	0.094	0.073	0.116	0.090
48	0.057	0.059	0.056	0.032	0.065	0.057	0.075	0.043	0.055	0.161	0.123	0.123	0.095	0.114	0.107	0.081	0.115	0.116	0.109
50	0.086	0.070	0.055	0.075	0.043	0.070	0.055	0.056	0.087	0.232	0.172	0.153	0.119	0.144	0.083	0.097	0.130	0.138	0.069
52	0.057	0.052	0.034	0.051	0.012	0.041	0.040	0.045	0.066	0.162	0.131	0.100	0.097	0.096	0.067	0.064	0.115	0.058	0.035
54	0.032	0.022	0.038	0.054	0.022	0.038	0.062	0.038	0.042	0.038	0.033	0.043	0.036	0.047	0.021	0.018	0.046	0.020	0.024
56	0.006	0.019	0.011	0.030	0.003	0.031	0.055	0.024	0.034	0.007	0.014	0.002	0.010	0.013	0.015	0.005	0.007	0.007	0.010
58	0.003	0.007	0.004	0.004	0.015	0.005	0.014	0.009	0.015	0.001	0.000	0.000	0.004	0.005	0.004	0.002	0.000	0.001	0.004
60	0.001	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
62	0.000	0.000	0.003	0.000	0.000	0.001	0.001	0.000	0.008	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 20. Continued. Length frequency distributions used in the assessment model for the Washington trawl fleet.

Length bin (cm)	Males 1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.001	0.000	0.006	0.000	0.000	0.000	0.000
30	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.003	0.003	0.003	0.005	0.000	0.000	0.000	0.000	0.000
32	0.002	0.001	0.000	0.000	0.000	0.002	0.004	0.013	0.005	0.005	0.004	0.006	0.008	0.019	0.003	0.001	0.000	0.005
34	0.003	0.002	0.004	0.003	0.001	0.003	0.012	0.009	0.016	0.018	0.025	0.024	0.017	0.011	0.006	0.008	0.000	0.005
36	0.004	0.007	0.007	0.010	0.005	0.009	0.043	0.020	0.035	0.021	0.013	0.021	0.014	0.026	0.014	0.014	0.007	0.008
38	0.010	0.004	0.009	0.018	0.015	0.021	0.044	0.033	0.047	0.030	0.023	0.045	0.029	0.074	0.003	0.045	0.023	0.010
40	0.013	0.011	0.037	0.034	0.034	0.046	0.084	0.048	0.073	0.036	0.068	0.062	0.049	0.047	0.026	0.058	0.044	0.030
42	0.059	0.029	0.064	0.052	0.039	0.052	0.092	0.102	0.107	0.077	0.070	0.059	0.044	0.070	0.048	0.075	0.109	0.064
44	0.084	0.069	0.075	0.089	0.089	0.063	0.082	0.073	0.086	0.102	0.103	0.076	0.074	0.090	0.151	0.092	0.059	0.099
46	0.075	0.082	0.098	0.104	0.112	0.107	0.081	0.090	0.053	0.077	0.067	0.113	0.115	0.119	0.117	0.080	0.093	0.094
48	0.100	0.089	0.115	0.104	0.124	0.114	0.037	0.059	0.049	0.066	0.081	0.048	0.095	0.057	0.101	0.112	0.071	0.072
50	0.069	0.097	0.093	0.073	0.101	0.075	0.020	0.061	0.024	0.075	0.056	0.026	0.078	0.021	0.091	0.009	0.028	0.046
52	0.065	0.076	0.051	0.035	0.056	0.057	0.008	0.027	0.009	0.025	0.016	0.018	0.016	0.006	0.013	0.019	0.027	0.020
54	0.015	0.043	0.013	0.028	0.017	0.018	0.004	0.011	0.003	0.012	0.005	0.006	0.004	0.002	0.018	0.001	0.016	0.016
56	0.009	0.007	0.007	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.000	0.002	0.011	0.002
58	0.001	0.009	0.000	0.000	0.001	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.003	0.000	0.006	0.002	0.004	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 21. Length frequency distributions used in the assessment model for the Southern California non-trawl fleet.

Length bin (cm)	Combined sexes 1978 - 1980	1985 - 1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2001
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.033
20	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.010	0.000	0.008	0.002	0.009	0.000	0.000	0.000	0.033
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.012	0.008	0.004	0.016	0.000	0.000	0.018	0.000
24	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.101	0.034	0.029	0.016	0.013	0.004	0.005	0.124	0.000
26	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.124	0.067	0.056	0.017	0.048	0.052	0.015	0.037	0.137
28	0.000	0.000	0.000	0.000	0.004	0.011	0.014	0.124	0.072	0.098	0.032	0.073	0.088	0.007	0.124	0.120
30	0.000	0.000	0.000	0.003	0.003	0.018	0.022	0.109	0.064	0.102	0.080	0.092	0.143	0.017	0.150	0.213
32	0.000	0.025	0.000	0.019	0.026	0.029	0.080	0.142	0.060	0.089	0.080	0.088	0.143	0.101	0.100	0.136
34	0.000	0.059	0.126	0.043	0.061	0.046	0.109	0.096	0.102	0.113	0.120	0.096	0.107	0.140	0.065	0.174
36	0.000	0.060	0.140	0.080	0.115	0.127	0.102	0.092	0.300	0.103	0.115	0.092	0.106	0.282	0.051	0.136
38	0.000	0.059	0.139	0.051	0.167	0.128	0.138	0.054	0.127	0.116	0.122	0.074	0.137	0.291	0.082	0.018
40	0.000	0.159	0.071	0.064	0.163	0.324	0.114	0.018	0.079	0.067	0.108	0.095	0.074	0.061	0.089	0.000
42	0.000	0.161	0.188	0.239	0.126	0.122	0.104	0.024	0.029	0.102	0.099	0.095	0.079	0.040	0.117	0.000
44	0.044	0.122	0.152	0.189	0.073	0.110	0.189	0.032	0.048	0.045	0.097	0.069	0.028	0.036	0.043	0.000
46	0.066	0.139	0.124	0.201	0.128	0.081	0.000	0.011	0.005	0.033	0.032	0.062	0.020	0.002	0.000	0.000
48	0.301	0.110	0.012	0.097	0.069	0.000	0.065	0.011	0.000	0.017	0.021	0.037	0.007	0.000	0.000	0.000
50	0.425	0.032	0.026	0.009	0.020	0.000	0.014	0.013	0.000	0.006	0.036	0.023	0.001	0.000	0.000	0.000
52	0.087	0.046	0.007	0.000	0.039	0.000	0.014	0.003	0.000	0.006	0.004	0.002	0.010	0.004	0.000	0.000
54	0.015	0.026	0.005	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.015	0.011	0.000	0.000	0.000	0.000
56	0.029	0.003	0.000	0.000	0.007	0.000	0.037	0.003	0.000	0.000	0.001	0.005	0.000	0.000	0.000	0.000
58	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.011	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 22. Length frequency distributions used in the assessment model for the Northern California and Oregon-Washington non-trawl fleets.

	Northern California Combined sexes												Oregon-Washington			
													Females		Males	
Length bin (cm)	1981 - 1984	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 - 2003	1980, 1988, 1990	1996-2004	1980, 1988, 1990	1996-2004
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.006	0.000	0.000	0.001	0.002	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.001
22	0.000	0.000	0.000	0.007	0.001	0.001	0.006	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	0.000	0.000	0.003	0.023	0.008	0.018	0.021	0.007	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.001
26	0.000	0.015	0.009	0.040	0.021	0.030	0.036	0.013	0.000	0.033	0.006	0.003	0.000	0.001	0.000	0.001
28	0.000	0.024	0.024	0.057	0.026	0.072	0.063	0.038	0.006	0.046	0.028	0.016	0.000	0.003	0.000	0.002
30	0.001	0.015	0.022	0.063	0.045	0.086	0.058	0.077	0.014	0.072	0.054	0.035	0.000	0.006	0.000	0.005
32	0.009	0.048	0.037	0.089	0.061	0.104	0.061	0.109	0.030	0.146	0.064	0.073	0.000	0.010	0.000	0.012
34	0.000	0.070	0.052	0.073	0.062	0.127	0.069	0.154	0.052	0.181	0.069	0.086	0.000	0.014	0.000	0.019
36	0.003	0.083	0.077	0.075	0.090	0.103	0.096	0.155	0.091	0.181	0.043	0.053	0.000	0.020	0.000	0.034
38	0.083	0.134	0.107	0.092	0.107	0.080	0.067	0.100	0.118	0.152	0.141	0.073	0.000	0.029	0.000	0.046
40	0.003	0.131	0.072	0.088	0.119	0.078	0.089	0.100	0.113	0.097	0.121	0.077	0.001	0.038	0.002	0.064
42	0.199	0.026	0.068	0.090	0.114	0.057	0.074	0.050	0.065	0.036	0.105	0.109	0.011	0.054	0.012	0.071
44	0.175	0.063	0.098	0.090	0.091	0.054	0.081	0.040	0.122	0.020	0.169	0.154	0.023	0.046	0.025	0.078
46	0.302	0.081	0.078	0.088	0.065	0.049	0.091	0.029	0.077	0.012	0.084	0.113	0.050	0.029	0.051	0.071
48	0.058	0.136	0.104	0.046	0.058	0.048	0.100	0.039	0.121	0.009	0.047	0.087	0.057	0.053	0.048	0.054
50	0.047	0.114	0.107	0.023	0.047	0.047	0.046	0.041	0.079	0.004	0.038	0.062	0.113	0.023	0.123	0.058
52	0.106	0.013	0.084	0.027	0.059	0.033	0.023	0.024	0.052	0.002	0.005	0.021	0.093	0.016	0.146	0.042
54	0.014	0.020	0.031	0.012	0.012	0.007	0.011	0.009	0.022	0.001	0.000	0.013	0.073	0.018	0.073	0.030
56	0.000	0.000	0.021	0.009	0.011	0.008	0.005	0.001	0.030	0.001	0.000	0.017	0.028	0.014	0.012	0.012
58	0.000	0.026	0.004	0.001	0.000	0.000	0.002	0.001	0.009	0.001	0.000	0.009	0.031	0.007	0.000	0.005
60	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.002	0.000	0.001
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.012	0.001	0.000	0.003
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.001
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.001

Table 23. Length frequency distributions used in the assessment model for the recreational fleets.

Length bin (cm)	Southern California combined sexes 1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
14	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
16	0.002	0.000	0.004	0.008	0.003	0.001	0.001	0.007	0.005	0.003	0.005	0.000	0.004	0.006	0.000	0.000	0.002	0.000	0.000	0.000
18	0.016	0.004	0.000	0.020	0.029	0.010	0.003	0.013	0.005	0.005	0.024	0.000	0.012	0.005	0.009	0.000	0.002	0.003	0.006	0.000
20	0.029	0.035	0.011	0.037	0.090	0.039	0.014	0.040	0.033	0.038	0.033	0.027	0.032	0.025	0.017	0.022	0.005	0.000	0.019	0.020
22	0.042	0.031	0.049	0.081	0.125	0.077	0.039	0.060	0.093	0.019	0.071	0.040	0.071	0.047	0.023	0.048	0.014	0.010	0.006	0.040
24	0.064	0.066	0.080	0.053	0.106	0.109	0.077	0.040	0.126	0.046	0.175	0.080	0.083	0.047	0.033	0.039	0.027	0.020	0.006	0.030
26	0.086	0.083	0.106	0.110	0.096	0.144	0.123	0.074	0.120	0.112	0.161	0.093	0.083	0.063	0.070	0.052	0.044	0.020	0.026	0.030
28	0.132	0.153	0.117	0.114	0.093	0.140	0.154	0.087	0.137	0.213	0.242	0.213	0.138	0.110	0.083	0.078	0.083	0.057	0.032	0.090
30	0.147	0.135	0.129	0.106	0.084	0.115	0.209	0.121	0.109	0.202	0.128	0.213	0.170	0.174	0.146	0.104	0.122	0.121	0.071	0.010
32	0.117	0.144	0.091	0.130	0.109	0.096	0.145	0.141	0.071	0.106	0.085	0.120	0.126	0.199	0.183	0.143	0.133	0.164	0.142	0.040
34	0.147	0.114	0.110	0.093	0.084	0.095	0.102	0.168	0.055	0.084	0.038	0.133	0.099	0.152	0.183	0.104	0.149	0.161	0.155	0.150
36	0.103	0.096	0.057	0.085	0.087	0.080	0.071	0.081	0.087	0.079	0.005	0.067	0.103	0.105	0.139	0.143	0.159	0.131	0.206	0.110
38	0.066	0.035	0.064	0.069	0.055	0.045	0.020	0.013	0.082	0.054	0.009	0.013	0.047	0.041	0.064	0.117	0.129	0.111	0.148	0.220
40	0.026	0.031	0.072	0.045	0.006	0.025	0.013	0.027	0.027	0.014	0.014	0.000	0.016	0.009	0.028	0.070	0.080	0.097	0.077	0.110
42	0.015	0.009	0.042	0.008	0.006	0.007	0.003	0.013	0.005	0.005	0.005	0.000	0.004	0.009	0.015	0.057	0.027	0.057	0.065	0.040
44	0.005	0.013	0.019	0.008	0.013	0.006	0.007	0.020	0.005	0.016	0.000	0.000	0.008	0.003	0.004	0.013	0.014	0.023	0.032	0.030
46	0.000	0.017	0.015	0.008	0.003	0.001	0.004	0.054	0.005	0.000	0.005	0.000	0.000	0.000	0.001	0.009	0.008	0.023	0.000	0.030
48	0.002	0.009	0.015	0.012	0.006	0.006	0.004	0.020	0.011	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.003	0.000	0.006	0.020
50	0.000	0.017	0.015	0.008	0.000	0.000	0.003	0.020	0.005	0.003	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.020
52	0.000	0.004	0.000	0.004	0.003	0.001	0.006	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.005	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.000	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 23. Continued. Length frequency distributions used in the assessment model for the recreational fleets.

Length	Southern California		Northern California																
bin	combined sexes		combined sexes																
(cm)	2003	2004	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996	1997	1998	1999
12-	0.000	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.007	0.000	0.009	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.002	0.000	0.000
18	0.125	0.027	0.000	0.009	0.000	0.005	0.000	0.002	0.000	0.000	0.000	0.000	0.012	0.000	0.013	0.000	0.009	0.007	0.000
20	0.000	0.000	0.006	0.004	0.000	0.000	0.012	0.009	0.003	0.002	0.009	0.012	0.015	0.010	0.030	0.009	0.012	0.007	0.000
22	0.000	0.034	0.009	0.013	0.031	0.010	0.017	0.019	0.021	0.017	0.014	0.012	0.036	0.033	0.087	0.024	0.048	0.000	0.026
24	0.000	0.027	0.036	0.036	0.047	0.046	0.074	0.039	0.058	0.036	0.057	0.037	0.077	0.077	0.134	0.052	0.096	0.028	0.029
26	0.000	0.054	0.072	0.040	0.110	0.102	0.079	0.072	0.109	0.034	0.085	0.037	0.131	0.113	0.143	0.116	0.101	0.042	0.052
28	0.625	0.182	0.111	0.094	0.146	0.162	0.074	0.113	0.154	0.085	0.132	0.085	0.196	0.169	0.156	0.142	0.063	0.042	0.084
30	0.000	0.203	0.147	0.125	0.151	0.162	0.124	0.106	0.158	0.058	0.123	0.195	0.154	0.215	0.134	0.192	0.060	0.153	0.081
32	0.000	0.189	0.138	0.192	0.146	0.122	0.128	0.132	0.143	0.068	0.066	0.171	0.145	0.166	0.130	0.135	0.041	0.097	0.069
34	0.125	0.162	0.102	0.174	0.104	0.122	0.107	0.144	0.109	0.092	0.085	0.183	0.092	0.102	0.078	0.087	0.051	0.069	0.052
36	0.000	0.061	0.066	0.098	0.107	0.071	0.066	0.106	0.069	0.100	0.057	0.098	0.053	0.056	0.039	0.057	0.075	0.132	0.110
38	0.125	0.020	0.054	0.063	0.055	0.086	0.107	0.079	0.042	0.081	0.052	0.037	0.027	0.036	0.022	0.028	0.094	0.139	0.113
40	0.000	0.027	0.063	0.049	0.047	0.030	0.058	0.067	0.030	0.041	0.038	0.012	0.021	0.015	0.013	0.028	0.109	0.111	0.165
42	0.000	0.007	0.060	0.009	0.010	0.030	0.050	0.030	0.028	0.051	0.057	0.061	0.024	0.005	0.000	0.041	0.080	0.028	0.095
44	0.000	0.000	0.033	0.013	0.008	0.005	0.045	0.025	0.019	0.109	0.052	0.000	0.006	0.000	0.000	0.035	0.058	0.049	0.061
46	0.000	0.000	0.039	0.009	0.008	0.005	0.012	0.005	0.013	0.077	0.071	0.012	0.000	0.000	0.004	0.037	0.038	0.042	0.020
48	0.000	0.000	0.021	0.004	0.008	0.005	0.012	0.023	0.016	0.064	0.033	0.012	0.006	0.000	0.000	0.013	0.024	0.042	0.023
50	0.000	0.000	0.027	0.009	0.000	0.010	0.025	0.007	0.009	0.019	0.038	0.012	0.000	0.000	0.004	0.000	0.024	0.007	0.017
52	0.000	0.000	0.009	0.000	0.005	0.000	0.000	0.012	0.010	0.021	0.028	0.000	0.006	0.000	0.009	0.002	0.005	0.007	0.003
54	0.000	0.000	0.006	0.013	0.003	0.010	0.008	0.005	0.003	0.023	0.000	0.012	0.000	0.000	0.000	0.000	0.007	0.000	0.000
56	0.000	0.000	0.000	0.000	0.008	0.005	0.000	0.000	0.001	0.015	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.002	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.001	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000
64	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 23. Continued. Length frequency distributions used in the assessment model for the recreational fleets.

Length bin (cm)	Northern California combined sexes 2000	2001	2002	2003	2004	Oregon-Washington combined sexes 1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1993	1994	1995	1996
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.006	0.006	0.000	0.000	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.005	0.019	0.007	0.000	0.000	0.010	0.005	0.000
22	0.000	0.000	0.118	0.000	0.019	0.009	0.007	0.007	0.040	0.010	0.021	0.004	0.022	0.028	0.006	0.004	0.022	0.000	0.013
24	0.011	0.000	0.059	0.000	0.019	0.017	0.048	0.002	0.005	0.029	0.035	0.069	0.080	0.062	0.016	0.040	0.046	0.015	0.005
26	0.044	0.048	0.059	0.026	0.037	0.017	0.043	0.046	0.015	0.070	0.054	0.068	0.095	0.110	0.089	0.066	0.092	0.085	0.062
28	0.067	0.048	0.000	0.105	0.222	0.070	0.115	0.040	0.090	0.095	0.089	0.135	0.154	0.137	0.114	0.130	0.119	0.124	0.146
30	0.167	0.095	0.118	0.079	0.093	0.168	0.186	0.149	0.135	0.154	0.058	0.123	0.091	0.203	0.217	0.190	0.186	0.285	0.225
32	0.022	0.000	0.118	0.026	0.204	0.095	0.100	0.138	0.252	0.134	0.093	0.115	0.115	0.126	0.128	0.173	0.172	0.177	0.152
34	0.022	0.143	0.118	0.105	0.074	0.141	0.088	0.167	0.146	0.149	0.130	0.078	0.113	0.130	0.134	0.117	0.146	0.133	0.175
36	0.056	0.095	0.118	0.211	0.074	0.145	0.173	0.239	0.008	0.110	0.126	0.047	0.073	0.059	0.087	0.100	0.099	0.076	0.116
38	0.133	0.143	0.059	0.237	0.056	0.074	0.098	0.075	0.040	0.102	0.100	0.049	0.052	0.043	0.062	0.072	0.050	0.042	0.069
40	0.056	0.286	0.000	0.079	0.111	0.048	0.035	0.014	0.008	0.042	0.063	0.010	0.035	0.013	0.030	0.026	0.018	0.012	0.023
42	0.133	0.048	0.059	0.079	0.019	0.084	0.039	0.022	0.152	0.028	0.061	0.026	0.018	0.015	0.034	0.014	0.011	0.016	0.008
44	0.133	0.048	0.059	0.026	0.019	0.019	0.022	0.027	0.046	0.029	0.031	0.079	0.029	0.017	0.034	0.023	0.004	0.000	0.004
46	0.044	0.000	0.059	0.000	0.000	0.012	0.022	0.030	0.013	0.015	0.060	0.105	0.012	0.015	0.019	0.011	0.009	0.011	0.000
48	0.056	0.048	0.059	0.000	0.019	0.081	0.006	0.029	0.022	0.011	0.010	0.018	0.047	0.014	0.020	0.013	0.005	0.000	0.000
50	0.056	0.000	0.000	0.000	0.019	0.012	0.000	0.008	0.000	0.003	0.044	0.050	0.009	0.000	0.000	0.002	0.006	0.011	0.000
52	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.015	0.002	0.002	0.012	0.013	0.000	0.005	0.007	0.000	0.005	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.007	0.011	0.006	0.009	0.004	0.000	0.004	0.002	0.000	0.000
56	0.000	0.000	0.000	0.000	0.019	0.000	0.004	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
58	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.012	0.000	0.001	0.000	0.000	0.006	0.006	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.006	0.011	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
64	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.003	0.003	0.000	0.000

Table 23. Length frequency distributions used in the assessment model for the recreational fleets.

Length bin (cm)	Oregon-Washington combined sexes 1997	1998	1999	2000	2001	2002	2003
12-	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	0.001	0.000	0.003	0.000	0.000	0.000	0.000
20	0.000	0.001	0.003	0.000	0.000	0.000	0.000
22	0.012	0.014	0.007	0.006	0.120	0.000	0.000
24	0.028	0.038	0.032	0.034	0.010	0.032	0.000
26	0.057	0.096	0.089	0.089	0.020	0.024	0.099
28	0.182	0.186	0.162	0.136	0.106	0.087	0.182
30	0.091	0.125	0.170	0.244	0.118	0.140	0.168
32	0.213	0.155	0.137	0.191	0.167	0.264	0.116
34	0.119	0.117	0.164	0.144	0.095	0.224	0.273
36	0.188	0.071	0.067	0.084	0.288	0.051	0.080
38	0.040	0.082	0.064	0.016	0.028	0.071	0.075
40	0.009	0.062	0.031	0.018	0.021	0.060	0.005
42	0.026	0.013	0.022	0.011	0.001	0.014	0.002
44	0.007	0.014	0.012	0.016	0.001	0.007	0.000
46	0.006	0.014	0.010	0.000	0.002	0.025	0.000
48	0.012	0.006	0.024	0.009	0.021	0.002	0.000
50	0.006	0.003	0.002	0.001	0.000	0.000	0.000
52	0.001	0.000	0.002	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.002	0.003	0.000	0.000	0.000	0.000	0.000
58	0.000	0.000	0.000	0.000	0.000	0.000	0.000
60	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64	0.000	0.001	0.000	0.000	0.000	0.000	0.000
66+	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 24. Age frequency distributions used in the assessment model for the trawl fleets.

Age (yr)	Southern California combined sexes	Northern California Females							Males						
	1980 - 2003	1980	1981	1982	1983	1984	1985 - 1987	2001 - 2003	1980	1981	1982	1983	1984	1985 - 1987	2001- 2003
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.005	0.000	0.011	0.000	0.002	0.000	0.002	0.000	0.013	0.002	0.001	0.007	0.002	0.001	0.000
6	0.027	0.000	0.010	0.019	0.005	0.039	0.005	0.000	0.010	0.016	0.040	0.002	0.006	0.003	0.030
7	0.101	0.013	0.009	0.021	0.022	0.025	0.035	0.013	0.008	0.004	0.006	0.044	0.019	0.039	0.036
8	0.042	0.038	0.035	0.033	0.049	0.050	0.046	0.053	0.053	0.075	0.042	0.045	0.048	0.023	0.050
9	0.055	0.006	0.061	0.022	0.048	0.062	0.054	0.092	0.071	0.065	0.056	0.066	0.030	0.084	0.041
10	0.064	0.013	0.069	0.069	0.013	0.039	0.022	0.048	0.024	0.024	0.101	0.032	0.061	0.064	0.068
11	0.048	0.038	0.030	0.062	0.039	0.057	0.051	0.127	0.050	0.038	0.057	0.116	0.054	0.053	0.075
12	0.013	0.062	0.016	0.070	0.005	0.034	0.031	0.082	0.078	0.023	0.034	0.024	0.060	0.038	0.064
13	0.003	0.062	0.074	0.006	0.028	0.013	0.021	0.057	0.017	0.059	0.011	0.021	0.003	0.027	0.070
14	0.000	0.031	0.039	0.037	0.022	0.044	0.004	0.026	0.056	0.038	0.006	0.012	0.000	0.015	0.005
15	0.000	0.016	0.039	0.023	0.046	0.013	0.005	0.030	0.031	0.046	0.016	0.018	0.033	0.004	0.006
16	0.000	0.011	0.036	0.000	0.011	0.054	0.027	0.005	0.036	0.027	0.031	0.037	0.010	0.011	0.000
17	0.000	0.011	0.033	0.016	0.015	0.005	0.016	0.006	0.010	0.000	0.009	0.035	0.014	0.019	0.005
18	0.023	0.000	0.001	0.018	0.005	0.004	0.008	0.000	0.058	0.001	0.019	0.001	0.014	0.011	0.000
19	0.005	0.001	0.008	0.000	0.005	0.003	0.028	0.000	0.014	0.000	0.002	0.014	0.000	0.000	0.006
20	0.000	0.003	0.003	0.000	0.000	0.007	0.011	0.000	0.017	0.004	0.037	0.021	0.005	0.004	0.000
21	0.000	0.030	0.021	0.001	0.011	0.002	0.035	0.000	0.035	0.026	0.007	0.019	0.000	0.009	0.000
22	0.000	0.000	0.030	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.024	0.001	0.011	0.009	0.000
23	0.000	0.000	0.000	0.018	0.020	0.005	0.008	0.000	0.000	0.005	0.030	0.013	0.015	0.012	0.000
24	0.000	0.000	0.005	0.000	0.007	0.005	0.007	0.000	0.007	0.000	0.000	0.003	0.000	0.028	0.000
25	0.000	0.004	0.000	0.000	0.018	0.000	0.011	0.000	0.001	0.000	0.000	0.008	0.017	0.024	0.000
26	0.000	0.010	0.001	0.000	0.000	0.008	0.009	0.000	0.007	0.002	0.000	0.008	0.017	0.005	0.000
27	0.000	0.000	0.003	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.009	0.000	0.000	0.016	0.000
28	0.000	0.000	0.000	0.000	0.001	0.007	0.000	0.000	0.014	0.000	0.000	0.001	0.005	0.003	0.000
29	0.000	0.000	0.000	0.000	0.006	0.018	0.005	0.000	0.000	0.000	0.000	0.001	0.013	0.000	0.000
30	0.000	0.000	0.009	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000
31	0.000	0.004	0.000	0.000	0.005	0.001	0.000	0.000	0.009	0.000	0.000	0.000	0.006	0.000	0.000
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.001	0.021	0.012	0.010	0.000	0.000
33	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000
34	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.001	0.000
35+	0.000	0.000	0.000	0.000	0.009	0.016	0.015	0.000	0.009	0.002	0.009	0.033	0.018	0.008	0.006

Table 24. Continued. Age frequency distributions used in the assessment model for the trawl fleets.

Age (yr)	Oregon Females																			
	1980	1981	1982	1983	1984	1985	1987 - 1988	1990	1991	1992	1993 - 1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000
5	0.000	0.000	0.000	0.003	0.001	0.000	0.011	0.000	0.005	0.005	0.001	0.003	0.012	0.002	0.001	0.004	0.042	0.004	0.010	0.003
6	0.000	0.002	0.000	0.003	0.005	0.008	0.012	0.008	0.007	0.006	0.010	0.018	0.038	0.003	0.012	0.008	0.038	0.036	0.022	0.011
7	0.003	0.000	0.000	0.013	0.012	0.019	0.016	0.020	0.022	0.025	0.024	0.037	0.051	0.013	0.029	0.031	0.044	0.078	0.060	0.031
8	0.002	0.011	0.004	0.026	0.019	0.023	0.023	0.022	0.048	0.038	0.044	0.042	0.051	0.032	0.062	0.051	0.056	0.078	0.109	0.092
9	0.002	0.014	0.019	0.034	0.033	0.050	0.086	0.046	0.057	0.057	0.048	0.070	0.048	0.068	0.064	0.039	0.055	0.067	0.053	0.079
10	0.001	0.014	0.022	0.046	0.043	0.061	0.072	0.038	0.042	0.055	0.044	0.092	0.039	0.055	0.062	0.059	0.061	0.050	0.035	0.060
11	0.011	0.060	0.012	0.036	0.049	0.054	0.056	0.084	0.060	0.050	0.071	0.082	0.059	0.058	0.052	0.059	0.046	0.033	0.031	0.044
12	0.020	0.053	0.029	0.032	0.028	0.035	0.075	0.074	0.067	0.027	0.058	0.038	0.057	0.061	0.041	0.056	0.036	0.026	0.033	0.027
13	0.019	0.034	0.048	0.035	0.018	0.032	0.043	0.044	0.043	0.051	0.040	0.030	0.021	0.047	0.032	0.053	0.025	0.043	0.026	0.072
14	0.032	0.040	0.019	0.033	0.030	0.021	0.034	0.063	0.027	0.029	0.046	0.023	0.009	0.034	0.026	0.037	0.010	0.020	0.025	0.034
15	0.021	0.025	0.023	0.029	0.018	0.019	0.017	0.027	0.023	0.026	0.021	0.002	0.014	0.013	0.018	0.025	0.018	0.008	0.021	0.020
16	0.045	0.007	0.013	0.013	0.012	0.019	0.014	0.027	0.016	0.015	0.023	0.013	0.019	0.009	0.014	0.026	0.003	0.007	0.013	0.000
17	0.045	0.019	0.008	0.007	0.006	0.017	0.008	0.015	0.008	0.020	0.024	0.003	0.010	0.003	0.008	0.017	0.004	0.010	0.017	0.034
18	0.014	0.028	0.009	0.011	0.009	0.010	0.005	0.014	0.012	0.006	0.012	0.006	0.012	0.004	0.010	0.006	0.004	0.002	0.005	0.002
19	0.035	0.008	0.012	0.013	0.007	0.004	0.003	0.009	0.004	0.006	0.012	0.003	0.004	0.007	0.006	0.007	0.002	0.002	0.016	0.004
20	0.019	0.010	0.008	0.011	0.005	0.004	0.009	0.009	0.000	0.005	0.006	0.003	0.005	0.002	0.005	0.005	0.003	0.003	0.008	0.026
21	0.013	0.007	0.023	0.010	0.017	0.005	0.003	0.005	0.005	0.004	0.008	0.000	0.000	0.002	0.003	0.005	0.002	0.004	0.007	0.000
22	0.020	0.008	0.018	0.008	0.007	0.010	0.002	0.005	0.004	0.002	0.005	0.000	0.000	0.002	0.002	0.003	0.002	0.003	0.003	0.000
23	0.026	0.002	0.004	0.008	0.012	0.011	0.005	0.002	0.001	0.003	0.004	0.003	0.000	0.003	0.002	0.000	0.000	0.001	0.003	0.000
24	0.007	0.002	0.002	0.009	0.008	0.006	0.010	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000
25	0.002	0.002	0.009	0.004	0.004	0.007	0.008	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.003	0.002
26	0.007	0.002	0.004	0.003	0.004	0.000	0.003	0.003	0.000	0.001	0.003	0.003	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.000
27	0.004	0.001	0.005	0.002	0.003	0.001	0.000	0.000	0.002	0.000	0.002	0.003	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
28	0.003	0.002	0.001	0.003	0.004	0.000	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002
29	0.004	0.000	0.002	0.002	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	0.006	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	0.000	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
32	0.000	0.000	0.000	0.002	0.002	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
33	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000
34	0.002	0.001	0.000	0.002	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
35+	0.000	0.002	0.002	0.004	0.002	0.005	0.000	0.004	0.001	0.001	0.000	0.000	0.004	0.001	0.001	0.000	0.000	0.000	0.001	0.000

Table 24. Continued. Age frequency distributions used in the assessment model for the trawl fleets.

Age (yr)	Oregon Females 2004	Males 1980	1981	1982	1983	1984	1985	1987 - 1988	1990	1991	1992	1993 - 1994	1995	1996	1997	1998	1999	2000	2001	2002
1	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.004	0.001	0.001
5	0.002	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.001	0.001	0.004	0.002	0.010	0.011	0.000	0.003	0.005	0.032	0.008	0.014
6	0.015	0.000	0.000	0.000	0.005	0.009	0.006	0.011	0.003	0.008	0.020	0.009	0.044	0.029	0.012	0.015	0.010	0.062	0.030	0.029
7	0.053	0.001	0.004	0.002	0.018	0.017	0.032	0.031	0.027	0.028	0.046	0.028	0.066	0.057	0.043	0.040	0.026	0.083	0.072	0.074
8	0.049	0.005	0.016	0.010	0.045	0.030	0.050	0.046	0.028	0.060	0.049	0.074	0.083	0.065	0.064	0.066	0.061	0.089	0.063	0.087
9	0.060	0.005	0.032	0.020	0.058	0.059	0.076	0.077	0.047	0.082	0.087	0.071	0.072	0.043	0.098	0.074	0.057	0.056	0.102	0.042
10	0.045	0.005	0.050	0.039	0.055	0.056	0.064	0.057	0.057	0.079	0.061	0.068	0.067	0.060	0.092	0.070	0.052	0.045	0.060	0.052
11	0.015	0.013	0.012	0.024	0.026	0.044	0.045	0.051	0.069	0.061	0.047	0.039	0.071	0.061	0.077	0.062	0.061	0.045	0.058	0.038
12	0.043	0.032	0.040	0.034	0.025	0.029	0.034	0.047	0.070	0.038	0.038	0.027	0.025	0.040	0.074	0.046	0.047	0.049	0.033	0.039
13	0.026	0.010	0.042	0.044	0.027	0.026	0.023	0.037	0.043	0.023	0.035	0.024	0.020	0.026	0.035	0.036	0.030	0.022	0.026	0.028
14	0.039	0.035	0.055	0.043	0.035	0.020	0.016	0.015	0.025	0.027	0.024	0.028	0.008	0.009	0.015	0.025	0.047	0.019	0.012	0.015
15	0.026	0.024	0.014	0.031	0.022	0.030	0.020	0.006	0.010	0.023	0.014	0.016	0.008	0.010	0.015	0.017	0.019	0.005	0.013	0.020
16	0.004	0.027	0.026	0.015	0.014	0.025	0.017	0.003	0.004	0.005	0.016	0.019	0.005	0.012	0.008	0.013	0.018	0.009	0.009	0.002
17	0.027	0.075	0.058	0.016	0.016	0.013	0.011	0.005	0.021	0.007	0.005	0.013	0.009	0.015	0.006	0.008	0.008	0.007	0.002	0.012
18	0.004	0.027	0.033	0.018	0.016	0.007	0.009	0.006	0.004	0.010	0.011	0.009	0.012	0.001	0.002	0.008	0.007	0.002	0.006	0.006
19	0.028	0.082	0.037	0.072	0.012	0.011	0.007	0.005	0.008	0.005	0.007	0.005	0.007	0.008	0.005	0.008	0.007	0.002	0.001	0.006
20	0.000	0.043	0.026	0.041	0.023	0.015	0.002	0.004	0.009	0.015	0.004	0.006	0.000	0.010	0.002	0.004	0.010	0.002	0.007	0.004
21	0.000	0.025	0.006	0.060	0.017	0.022	0.012	0.001	0.005	0.000	0.008	0.007	0.007	0.006	0.003	0.001	0.007	0.002	0.000	0.004
22	0.000	0.016	0.067	0.023	0.021	0.023	0.010	0.006	0.000	0.005	0.005	0.007	0.000	0.020	0.001	0.003	0.002	0.000	0.003	0.005
23	0.000	0.052	0.040	0.012	0.017	0.018	0.007	0.005	0.003	0.006	0.008	0.011	0.000	0.006	0.002	0.008	0.005	0.000	0.000	0.002
24	0.013	0.026	0.020	0.014	0.014	0.014	0.006	0.002	0.003	0.011	0.002	0.004	0.000	0.001	0.005	0.004	0.004	0.004	0.000	0.001
25	0.000	0.029	0.004	0.020	0.010	0.018	0.011	0.038	0.008	0.001	0.004	0.004	0.001	0.000	0.000	0.003	0.002	0.000	0.001	0.001
26	0.000	0.011	0.005	0.007	0.009	0.011	0.006	0.006	0.000	0.000	0.005	0.001	0.001	0.003	0.001	0.001	0.004	0.004	0.002	0.001
27	0.007	0.007	0.002	0.009	0.010	0.014	0.008	0.000	0.003	0.006	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003	0.000
28	0.000	0.001	0.002	0.018	0.006	0.010	0.009	0.000	0.003	0.001	0.001	0.002	0.000	0.006	0.000	0.002	0.000	0.000	0.000	0.000
29	0.000	0.016	0.000	0.005	0.012	0.005	0.008	0.003	0.000	0.004	0.007	0.002	0.000	0.007	0.003	0.001	0.003	0.000	0.000	0.000
30	0.000	0.008	0.005	0.006	0.008	0.009	0.011	0.000	0.001	0.007	0.008	0.001	0.000	0.000	0.002	0.001	0.001	0.000	0.001	0.000
31	0.013	0.008	0.020	0.006	0.011	0.005	0.003	0.000	0.000	0.003	0.004	0.004	0.000	0.003	0.000	0.001	0.000	0.000	0.001	0.000
32	0.000	0.006	0.001	0.005	0.007	0.011	0.003	0.000	0.000	0.010	0.000	0.004	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.002
33	0.013	0.018	0.001	0.019	0.006	0.008	0.002	0.004	0.001	0.002	0.004	0.000	0.000	0.008	0.000	0.001	0.000	0.000	0.002	0.001
34	0.000	0.001	0.001	0.016	0.004	0.011	0.004	0.000	0.000	0.001	0.000	0.003	0.000	0.003	0.001	0.002	0.000	0.000	0.001	0.001
35+	0.000	0.028	0.023	0.070	0.046	0.059	0.056	0.004	0.021	0.014	0.033	0.006	0.005	0.023	0.010	0.021	0.009	0.000	0.005	0.009

Table 24. Continued. Age frequency distributions used in the assessment model for the trawl fleets.

Age (yr)	Oregon Males 2003	2004	Washington Females 1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.004	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.004	0.001	0.000	0.000	0.001	0.001	0.000	0.003
5	0.003	0.009	0.002	0.001	0.014	0.011	0.021	0.014	0.002	0.000	0.003	0.004	0.000	0.000	0.008	0.006	0.013	0.006	0.008
6	0.018	0.043	0.006	0.003	0.024	0.012	0.003	0.056	0.015	0.007	0.005	0.012	0.018	0.002	0.019	0.036	0.035	0.014	0.019
7	0.069	0.045	0.012	0.021	0.017	0.048	0.008	0.035	0.037	0.006	0.009	0.031	0.018	0.009	0.018	0.012	0.046	0.040	0.030
8	0.086	0.039	0.019	0.040	0.069	0.049	0.032	0.036	0.076	0.048	0.011	0.053	0.038	0.023	0.057	0.045	0.052	0.075	0.040
9	0.028	0.086	0.027	0.035	0.054	0.032	0.043	0.052	0.044	0.069	0.031	0.074	0.052	0.031	0.027	0.058	0.091	0.065	0.038
10	0.072	0.058	0.040	0.055	0.036	0.069	0.049	0.024	0.086	0.062	0.049	0.062	0.067	0.038	0.024	0.053	0.054	0.076	0.070
11	0.055	0.023	0.060	0.066	0.052	0.027	0.043	0.025	0.046	0.087	0.065	0.049	0.079	0.066	0.039	0.062	0.051	0.094	0.076
12	0.034	0.031	0.026	0.043	0.062	0.028	0.025	0.055	0.054	0.055	0.070	0.045	0.053	0.050	0.042	0.047	0.033	0.049	0.059
13	0.032	0.019	0.022	0.030	0.025	0.031	0.032	0.012	0.022	0.044	0.042	0.025	0.047	0.033	0.042	0.061	0.014	0.033	0.058
14	0.026	0.022	0.016	0.028	0.021	0.023	0.025	0.032	0.018	0.023	0.024	0.019	0.016	0.044	0.035	0.013	0.010	0.017	0.012
15	0.017	0.018	0.016	0.016	0.006	0.000	0.026	0.027	0.016	0.025	0.005	0.008	0.019	0.017	0.035	0.012	0.021	0.007	0.005
16	0.009	0.027	0.004	0.013	0.003	0.009	0.012	0.003	0.006	0.017	0.025	0.005	0.008	0.006	0.030	0.010	0.009	0.003	0.021
17	0.000	0.028	0.008	0.006	0.009	0.011	0.013	0.005	0.005	0.013	0.026	0.006	0.013	0.009	0.022	0.009	0.004	0.001	0.002
18	0.000	0.018	0.014	0.013	0.016	0.003	0.005	0.005	0.001	0.010	0.000	0.004	0.008	0.014	0.007	0.010	0.002	0.001	0.006
19	0.000	0.000	0.011	0.003	0.012	0.004	0.007	0.002	0.001	0.006	0.001	0.001	0.007	0.007	0.016	0.010	0.002	0.001	0.001
20	0.000	0.000	0.002	0.003	0.002	0.002	0.009	0.000	0.000	0.002	0.007	0.000	0.000	0.012	0.005	0.001	0.002	0.001	0.000
21	0.000	0.018	0.000	0.003	0.000	0.000	0.003	0.000	0.003	0.001	0.000	0.005	0.000	0.007	0.000	0.001	0.000	0.005	0.000
22	0.000	0.006	0.004	0.001	0.001	0.004	0.003	0.000	0.004	0.002	0.008	0.000	0.003	0.009	0.000	0.012	0.001	0.000	0.001
23	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.009	0.000	0.001	0.000	0.000	0.000	0.007	0.002	0.002	0.001	0.001	0.000
24	0.000	0.007	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.002	0.000	0.007	0.000	0.000
25	0.000	0.007	0.002	0.001	0.000	0.004	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
26	0.000	0.000	0.002	0.001	0.000	0.000	0.003	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
27	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.004	0.008	0.000	0.000	0.000
29	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.004	0.000	0.000	0.000
30	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
31	0.000	0.009	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	0.000	0.007	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.004	0.002	0.000	0.000
34	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.000	0.000	0.000	0.000	0.000	0.001	0.000
35+	0.004	0.002	0.016	0.003	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.007	0.000	0.000	0.000	0.009	0.001	0.000	0.000

Table 24. Continued. Age frequency distributions used in the assessment model for the trawl fleets.

Age	Washington																			
(yr)	Females								Males											
	1997	1998	1999	2000	2001	2002	2003	2004	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000
4	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.002	0.001	0.001	0.000	0.000	0.001	0.000	0.000
5	0.006	0.001	0.008	0.009	0.000	0.000	0.012	0.003	0.002	0.005	0.005	0.018	0.009	0.005	0.008	0.000	0.001	0.008	0.000	0.001
6	0.008	0.008	0.005	0.028	0.006	0.000	0.028	0.022	0.004	0.010	0.025	0.037	0.017	0.063	0.018	0.002	0.018	0.019	0.012	0.000
7	0.020	0.031	0.015	0.026	0.031	0.023	0.018	0.027	0.017	0.034	0.055	0.085	0.021	0.047	0.057	0.017	0.019	0.048	0.056	0.026
8	0.040	0.043	0.021	0.048	0.039	0.038	0.085	0.045	0.034	0.046	0.081	0.070	0.029	0.035	0.086	0.073	0.012	0.054	0.050	0.038
9	0.037	0.081	0.034	0.025	0.048	0.042	0.070	0.082	0.027	0.037	0.064	0.049	0.030	0.066	0.063	0.083	0.045	0.064	0.046	0.034
10	0.060	0.061	0.047	0.031	0.029	0.021	0.037	0.051	0.055	0.051	0.043	0.054	0.042	0.062	0.093	0.048	0.071	0.091	0.062	0.077
11	0.057	0.035	0.045	0.071	0.074	0.039	0.050	0.053	0.062	0.040	0.047	0.034	0.034	0.065	0.050	0.068	0.053	0.057	0.069	0.069
12	0.061	0.060	0.038	0.079	0.037	0.025	0.044	0.064	0.052	0.055	0.030	0.045	0.038	0.023	0.028	0.052	0.073	0.069	0.065	0.058
13	0.053	0.039	0.059	0.041	0.038	0.037	0.041	0.045	0.026	0.040	0.021	0.032	0.039	0.019	0.022	0.024	0.030	0.038	0.032	0.050
14	0.044	0.052	0.032	0.026	0.043	0.044	0.023	0.019	0.021	0.023	0.032	0.014	0.048	0.020	0.007	0.013	0.008	0.020	0.022	0.039
15	0.013	0.023	0.048	0.020	0.027	0.050	0.023	0.027	0.022	0.012	0.014	0.014	0.008	0.026	0.016	0.006	0.024	0.011	0.026	0.034
16	0.010	0.010	0.028	0.008	0.008	0.033	0.018	0.020	0.031	0.016	0.005	0.014	0.017	0.035	0.014	0.008	0.007	0.002	0.012	0.034
17	0.007	0.004	0.017	0.020	0.008	0.040	0.004	0.014	0.027	0.015	0.008	0.013	0.011	0.003	0.003	0.005	0.005	0.010	0.015	0.015
18	0.009	0.013	0.022	0.008	0.009	0.026	0.022	0.010	0.033	0.017	0.011	0.004	0.014	0.021	0.003	0.006	0.008	0.010	0.008	0.012
19	0.009	0.010	0.007	0.000	0.002	0.014	0.017	0.010	0.025	0.018	0.006	0.010	0.012	0.014	0.010	0.009	0.000	0.013	0.005	0.005
20	0.006	0.003	0.007	0.008	0.004	0.013	0.004	0.008	0.028	0.018	0.008	0.014	0.018	0.002	0.003	0.006	0.007	0.005	0.000	0.009
21	0.008	0.006	0.010	0.000	0.001	0.005	0.004	0.007	0.016	0.010	0.010	0.018	0.017	0.005	0.000	0.007	0.010	0.006	0.013	0.013
22	0.000	0.000	0.000	0.000	0.000	0.013	0.007	0.008	0.016	0.013	0.011	0.004	0.016	0.020	0.008	0.005	0.024	0.000	0.008	0.015
23	0.002	0.001	0.001	0.000	0.000	0.008	0.000	0.005	0.014	0.009	0.005	0.005	0.027	0.002	0.003	0.007	0.008	0.002	0.005	0.008
24	0.004	0.000	0.000	0.000	0.000	0.003	0.000	0.002	0.006	0.011	0.002	0.009	0.015	0.000	0.002	0.002	0.008	0.001	0.000	0.006
25	0.003	0.002	0.000	0.000	0.000	0.003	0.000	0.002	0.020	0.008	0.003	0.014	0.044	0.009	0.008	0.002	0.015	0.000	0.005	0.002
26	0.000	0.000	0.003	0.002	0.000	0.002	0.000	0.000	0.006	0.016	0.003	0.012	0.011	0.000	0.001	0.001	0.011	0.006	0.000	0.003
27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.010	0.006	0.005	0.000	0.007	0.000	0.001	0.004	0.001	0.000	0.000	0.001
28	0.000	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.008	0.010	0.003	0.000	0.009	0.002	0.001	0.005	0.009	0.002	0.002	0.000
29	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.007	0.000	0.000	0.009	0.000	0.013	0.004	0.016	0.001	0.002	0.001
30	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.008	0.002	0.000	0.006	0.000	0.001	0.008	0.010	0.004	0.000	0.001
31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.006	0.001	0.006	0.011	0.000	0.000	0.000	0.007	0.002	0.005	0.007
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.004	0.001	0.000	0.002	0.002	0.002	0.003	0.001	0.001	0.004	0.002
33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.005	0.002	0.000	0.002	0.002	0.002	0.005	0.008	0.002	0.001	0.007
34	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.006	0.004	0.000	0.000	0.002	0.009	0.007	0.002	0.001	0.004	0.000	0.004
35+	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.066	0.057	0.069	0.053	0.070	0.035	0.030	0.038	0.085	0.029	0.023	0.039

Table 25. Age frequency distributions for the Washington trawl and Oregon-Washington non-trawl fleets.

Age (yr)	Washington Males													OR-WA non-trawl Females	OR-WA non-trawl Males
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	1997 - 2004	1997 - 2004
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.001	0.001	0.000	0.003	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.010	0.013	0.016	0.010	0.010	0.016	0.005	0.001	0.012	0.003	0.000	0.000	0.000	0.004	0.008
6	0.003	0.012	0.034	0.028	0.031	0.009	0.018	0.005	0.038	0.019	0.010	0.012	0.015	0.012	0.019
7	0.035	0.030	0.036	0.056	0.039	0.044	0.018	0.037	0.026	0.025	0.024	0.019	0.034	0.029	0.032
8	0.041	0.062	0.086	0.093	0.069	0.042	0.073	0.021	0.070	0.068	0.061	0.057	0.054	0.038	0.084
9	0.067	0.116	0.104	0.055	0.055	0.073	0.071	0.039	0.077	0.108	0.046	0.078	0.093	0.041	0.051
10	0.061	0.055	0.056	0.105	0.064	0.070	0.073	0.063	0.046	0.072	0.041	0.066	0.063	0.032	0.129
11	0.067	0.059	0.042	0.077	0.074	0.056	0.060	0.068	0.068	0.095	0.061	0.048	0.055	0.042	0.042
12	0.036	0.052	0.050	0.032	0.052	0.055	0.038	0.080	0.071	0.042	0.059	0.034	0.028	0.068	0.060
13	0.015	0.022	0.023	0.013	0.039	0.032	0.037	0.048	0.037	0.072	0.032	0.026	0.041	0.033	0.040
14	0.017	0.024	0.019	0.013	0.026	0.043	0.029	0.035	0.042	0.022	0.075	0.036	0.026	0.006	0.050
15	0.023	0.003	0.007	0.008	0.008	0.019	0.015	0.042	0.009	0.020	0.039	0.041	0.009	0.020	0.011
16	0.031	0.008	0.006	0.008	0.013	0.008	0.017	0.011	0.014	0.020	0.016	0.015	0.008	0.006	0.003
17	0.022	0.003	0.006	0.001	0.014	0.003	0.002	0.036	0.020	0.002	0.008	0.013	0.006	0.014	0.021
18	0.018	0.007	0.006	0.001	0.001	0.014	0.007	0.009	0.000	0.001	0.001	0.020	0.005	0.005	0.003
19	0.015	0.000	0.002	0.001	0.017	0.005	0.011	0.001	0.009	0.008	0.010	0.008	0.003	0.004	0.003
20	0.000	0.005	0.011	0.001	0.013	0.005	0.000	0.011	0.008	0.006	0.003	0.000	0.000	0.003	0.005
21	0.014	0.002	0.001	0.000	0.006	0.006	0.004	0.007	0.000	0.008	0.001	0.014	0.005	0.012	0.001
22	0.020	0.001	0.006	0.000	0.000	0.003	0.005	0.010	0.000	0.000	0.000	0.000	0.000	0.003	0.012
23	0.008	0.006	0.001	0.003	0.000	0.001	0.000	0.000	0.002	0.001	0.007	0.001	0.004	0.003	0.010
24	0.002	0.000	0.000	0.000	0.000	0.007	0.004	0.004	0.000	0.000	0.000	0.000	0.002	0.002	0.003
25	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.000	0.002	0.000
26	0.002	0.006	0.002	0.000	0.000	0.004	0.002	0.008	0.000	0.000	0.000	0.000	0.004	0.005	0.000
27	0.002	0.000	0.006	0.000	0.006	0.000	0.004	0.008	0.000	0.000	0.000	0.000	0.000	0.002	0.003
28	0.005	0.004	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29	0.000	0.000	0.000	0.000	0.006	0.000	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.005
30	0.004	0.002	0.006	0.000	0.002	0.002	0.000	0.004	0.000	0.001	0.000	0.000	0.000	0.000	0.000
31	0.006	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
32	0.003	0.001	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
33	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002
34	0.007	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
35+	0.033	0.012	0.008	0.004	0.003	0.014	0.011	0.000	0.002	0.000	0.022	0.000	0.017	0.003	0.014

Table 26. Mean size-at-age data. (see data file in Appendix A).

Table 27. Canary rockfish discard rates assumed for commercial fishing fleets in the assessment model.

Year	Southern CA trawl	Northern CA trawl	Oregon trawl	Washington trawl	Southern CA non-trawl	Northern CA non-trawl	OR-WA non-trawl
1916-1994	0.0123	0.0123	0.0123	0.0123	0.0123	0.0123	0.0123
1995-1999	0.16	0.16	0.16	0.16	0.16	0.16	0.16
2000	0.148	0.148	0.435	0.757	0.16	0.16	0.16
2001	0.282	0.282	0.600	0.644	0.16	0.16	0.16
2002	0.236	0.236	0.473	0.482	0.16	0.16	0.16
2003	0.190	0.190	0.448	0.285	0.877	0.877	0.877
2004	0.729	0.729	0.578	0.430	0.800	0.800	0.800

Table 28. Selected output quantities from the post-STAR sensitivity runs. The total log(L) is only shown for those runs that have comparable values; other runs have different lambdas for one or more components. The run labeled "no-MF-selex-diff" formed the basis for the alternate configuration (NoDiff) in the final model selection.

	Base model	flatemph	low-sr -emph	no-MF -selex-diff	low-LAA -emph	low-prior -emph	add-CPUE	add-CPUE -bioQ	ageselex	oldagecrit	oldagecrit oldgrowthCV
Total L	2791.73			2815.6					2857.89	2828.11	3069.03
Survey L	-1.10		-1.14	0.11	-1.37	-1.12	-1.03	-1.10	-1.38	-1.24	-1.63
old female M	0.093	0.092	0.093	0.090	0.092	0.093	0.093	0.093	0.094	0.098	0.100
female growth parms											
L at age=1.66	6.3	9.0	6.5	6.6	5.0	6.3	6.3	6.3	11.6	8.2	14.0
L at age 99	58.1	59.2	58.1	59.2	57.5	58.1	58.1	58.1	56.8	58.3	60.2
K	0.140	0.126	0.139	0.132	0.149	0.140	0.140	0.140	0.151	0.150	0.129
Recr-0	4760	4400	4892	4219	4670	4746	4773	4761	4978	3790	4125
Spbio-0	34921	32875	35938	32943	34697	34918	34990	34924	38141	29238	32420
steepness	0.321	0.396	0.286	0.539	0.338	0.323	0.318	0.321	0.300	0.534	0.411
Spbio-2005	1850	3003	1881	6177	2087	1866	1794	1846	2193	4162	2597
depletion	0.053	0.091	0.052	0.187	0.060	0.053	0.051	0.053	0.057	0.142	0.080

Table 29. Time blocks for changes in fishery selectivity.

Fishery	Block 1	Block 2	Block 3
S. Cal.trawl	1916-1996	1997-2004	
N. Cal. Trawl	1916-1979	1980-1997	1998-2004
OR trawl	1916-1979	1980-1993	1994-2004
WA trawl	1916-1979	1980-1992	1993-2004
S. Cal. Non-trawl	1916-1979	1980-1991	1992-2004
N. Cal. Non-trawl	1916-1990	1991-1997	1998-2004
OR-WA non-trawl	1916-1989	1990-2004	
S. Cal. Recr	1916-1995	1996-2002	2003-2004
N. Cal. Recr	1916-1988	1989-1995	1996-2004
OR-WA Recr	1916-1990	1991-2004	

Table 30. Estimated parameter values with standard error from base and alternate model.

		Base (Diff)			Alternate (NoDiff)		
		value	se	Count	value	se	Count
M-G_parms							
morph:1							
	1	0.06			0.06		
	2	0.4368	0.0297	1	0.4076	0.0303	1
	3	6.2543	0.4560	2	6.6318	0.5072	2
	4	58.0770	0.3202	3	59.1320	0.3577	3
	5	0.1400	0.0028	4	0.1323	0.0028	4
	6	0.15			0.15		
	7	-0.98			-0.98		
morph:2							
	8	0			0		
	9	0			0		
	10	0			0		
	11	-0.1169	0.0058	5	-0.1369	0.0063	5
	12	0.2203	0.0192	6	0.2774	0.0197	6
	13	0			0		
	14	-1.16			-1.16		
biology_parms							
	15	1.55E-05			1.55E-05		
	16	3.03			3.03		
	17	40.5			40.5		
	18	-0.25			-0.25		
	19	1			1		
	20	0			0		
	21	1.55E-05			1.55E-05		
	22	3.03			3.03		
morphdist_in_area:1							
	23	0.5			0.5		

	24	0.5			0.5		
dist_between_areas							
	25	1			1		
SR_parms							
	1	8.4612	0.0445	7	8.3794	0.0449	7
	2	0.3294	0.0291	8	0.4495	0.0503	8
	3	0.4			0.4		
	4	0			0		
	5	0			0		
Recr_Devs							
	1952	-0.1396	0.3670	9	-0.0939	0.3693	9
	1953	-0.1318	0.3670	10	-0.0907	0.3686	10
	1954	-0.1099	0.3690	11	-0.0741	0.3698	11
	1955	-0.0714	0.3734	12	-0.0417	0.3733	12
	1956	-0.0148	0.3804	13	0.0080	0.3792	13
	1957	0.0616	0.3904	14	0.0769	0.3876	14
	1958	0.1544	0.4030	15	0.1613	0.3980	15
	1959	0.2425	0.4134	16	0.2394	0.4057	16
	1960	0.2672	0.4105	17	0.2548	0.4013	17
	1961	0.1687	0.3911	18	0.1541	0.3826	18
	1962	-0.0015	0.3657	19	-0.0138	0.3589	19
	1963	-0.1533	0.3457	20	-0.1646	0.3399	20
	1964	-0.2283	0.3350	21	-0.2417	0.3294	21
	1965	-0.1964	0.3340	22	-0.2155	0.3275	22
	1966	-0.0384	0.3422	23	-0.0698	0.3331	23
	1967	0.1737	0.3418	24	0.1195	0.3300	24
	1968	0.1210	0.3341	25	0.0593	0.3224	25
	1969	-0.1030	0.3216	26	-0.1548	0.3112	26
	1970	-0.1547	0.3114	27	-0.2044	0.3021	27
	1971	0.0332	0.3097	28	-0.0203	0.2979	28
	1972	0.2907	0.2873	29	0.2124	0.2774	29
	1973	0.2297	0.2971	30	0.1541	0.2849	30

1974	0.2707	0.2596	31	0.1965	0.2505	31
1975	0.1976	0.2231	32	0.1181	0.2190	32
1976	-0.1367	0.2325	33	-0.2146	0.2304	33
1977	0.1376	0.1639	34	0.0597	0.1634	34
1978	-0.0487	0.1625	35	-0.1354	0.1641	35
1979	-0.7023	0.2250	36	-0.7650	0.2230	36
1980	0.1007	0.1275	37	0.0139	0.1298	37
1981	0.1137	0.1339	38	0.0351	0.1359	38
1982	-0.5240	0.2120	39	-0.5898	0.2114	39
1983	0.1141	0.1635	40	0.0164	0.1664	40
1984	0.4584	0.1368	41	0.3795	0.1395	41
1985	-0.6291	0.2572	42	-0.6722	0.2521	42
1986	-0.0957	0.1972	43	-0.1686	0.1975	43
1987	-0.1116	0.2056	44	-0.1319	0.2044	44
1988	0.1962	0.1526	45	0.1785	0.1568	45
1989	0.0148	0.1617	46	0.0482	0.1676	46
1990	0.0045	0.1615	47	0.0521	0.1710	47
1991	0.2590	0.1368	48	0.3765	0.1476	48
1992	-0.2332	0.2071	49	-0.0914	0.2201	49
1993	0.2803	0.1661	50	0.4663	0.1722	50
1994	0.6132	0.1572	51	0.7990	0.1606	51
1995	-0.0178	0.2214	52	0.1724	0.2271	52
1996	-0.3601	0.2488	53	-0.1642	0.2538	53
1997	-0.2725	0.2733	54	-0.1421	0.2840	54
1998	0.6781	0.1963	55	0.7750	0.1944	55
1999	-0.2133	0.3029	56	-0.2104	0.3031	56
2000	-0.4727	0.3021	57	-0.4970	0.2999	57
2001	-0.0450	0.3497	58	-0.0541	0.3464	58
2002	0.0176	0.3986	59	0.0356	0.3972	59
2003	0.0076	0.3978	60	0.0329	0.3968	60
2004	-0.0014	0.3961	61	0.0265	0.3955	61

sel_parms

#_size_sel:_1							
	1	41			41		
	2	0			0		
	3	0			0		
	4	-2.6692	2.0520	62	-2.7178	2.1221	62
	5	0			0		
	6	-2.8022	0.9219	63	-2.7945	0.9199	63
	7	0.1839	1.5788	64	0.2079	1.6188	64
	8	3			3		
#_male							
#_size_sel:_2							
	9	48.5			48.5		
	10	0			0		
	11	0			0		
	12	-0.9390	0.1479	65	-0.9637	0.1531	65
	13	0			0		
	14	-2.1673	0.9986	66	-1.6039	1.1908	66
	15	-0.4898	1.8456	67	-1.0840	1.3256	67
	16	3			3		
#_male							
	17	44			44		
	18	0			0		
	19	-0.2135	0.0841	68	0		
	20	0.0000	0.0000	69	0		
#_size_sel:_3							
	21	47			47		
	22	0			0		
	23	0			0		
	24	-0.9756	0.0565	70	-1.0013	0.0586	68
	25	0			0		

	26	-0.3014	0.6421	71	-1.9124	0.3302	69
	27	-1.2394	1.7771	72	1.4669	1.4062	70
	28	3			3		
#_male							
	29	44			44		
	30	0			0		
	31	-0.2575	0.0427	73	0		
	32	0.0000	0.0000	74	0		
#_size_sel:_4							
	33	51			51		
	34	0			0		
	35	0			0		
	36	-1.1271	0.0507	75	-1.1469	0.0525	71
	37	0			0		
	38	-1.5065	0.4881	76	-1.4787	0.3740	72
	39	-0.3173	0.8052	77	-0.2322	0.6521	73
	40	3			3		
#_male							
	41	44			44		
	42	0			0		
	43	-0.2685	0.0480	78	0		
	44	0.0000	0.0000	79	0		
#_size_sel:_5							
	45	40.5			40.5		
	46	0			0		
	47	0			0		
	48	-0.5736	0.1438	80	-0.6169	0.1392	74
	49	0			0		
	50	-2.0338	0.2388	81	-1.9534	0.2353	75
	51	-1.3663	0.3432	82	-1.3247	0.3504	76
	52	3			3		
#_male							

#_size_sel:_6							
	53	40.5			40.5		
	54	0			0		
	55	0			0		
	56	-0.6386	0.1057	83	-0.6781	0.1024	77
	57	0			0		
	58	-2.4675	0.1810	84	-2.5052	0.2999	78
	59	2.0662	1.8536	85	1.9516	2.0985	79
	60	3			3		
#_male							
#_size_sel:_7							
	61	60			60		
	62	0			0		
	63	0			0		
	64	-1.1511	0.3172	86	-1.1967	0.2888	80
	65	0			0		
	66	0			0		
	67	-1			-1		
	68	3			3		
#_male							
#_size_sel:_8							
	69	29			29		
	70	0			0		
	71	0			0		
	72	-2.0828	1.2141	87	-2.5693	1.9426	81
	73	0			0		
	74	-1.7829	0.0573	88	-1.7503	0.0554	82
	75	-0.8106	0.0701	89	-0.7977	0.0711	83
	76	3			3		
#_male							
#_size_sel:_9							
	77	31			31		

	78	0			0		
	79	0			0		
	80	-0.5157	0.0896	90	-0.5298	0.0870	84
	81	0			0		
	82	-2.4238	0.1214	91	-2.3745	0.1199	85
	83	-1.0545	0.1147	92	-1.0535	0.1176	86
	84	3			3		
#_male							
#_size_sel:_10							
	85	31			31		
	86	0			0		
	87	0			0		
	88	-1.1862	0.2953	93	-1.2281	0.3167	87
	89	0			0		
	90	-1.9518	0.0646	94	-1.9119	0.0636	88
	91	-0.6966	0.1043	95	-0.6750	0.1073	89
	92	3			3		
#_male							
#_size_sel:_11							
	93	52.6			52.6		
	94	0			0		
	95	0.6162	0.1200	96	0.4313	0.5797	90
	96	-3.2699	0.8713	97	-2.3563	1.6286	91
	97	7.0936	34.9510	98	0.6414	2.9765	92
	98	0.0130	5.0134	99	-0.5792	3.4094	93
	99	-0.9997	2.0002	100	-1.0280	2.0223	94
	100	3			3		
#_male							
	101	44			44		
	102	0			0		
	103	-0.0747	0.1010	101	0		
	104	-0.7692	0.3221	102	0		

sel_parm_blockparms

105	40			40		
106	41.8			41.8		
107	1.1708	0.2634	103	1.2270	0.2479	95
108	1.4588	0.3430	104	1.5185	0.3243	96
109	-1.4418	0.4170	105	-1.4217	0.4172	97
110	-0.3242	0.8426	106	-0.2822	0.8492	98
111	54			54		
112	46			46		
113	45.5			45.5		
114	1.8140	0.2144	107	1.8765	0.2148	99
115	1.1425	0.0899	108	1.1734	0.0942	100
116	1.6171	0.2658	109	1.6305	0.2713	101
117	2.5200	2.1817	110	2.3200	2.2770	102
118	0.8219	0.5435	111	0.5516	0.8347	103
119	-1.8656	1.6153	112	-2.1723	2.0534	104
120	52			52		
121	55.1			55.1		
122	42.5			42.5		
123	1.2722	0.1496	113	1.3210	0.1601	105
124	1.2057	0.0436	114	1.2457	0.0476	106
125	1.7128	0.0503	115	1.7291	0.0525	107
126	1.3044	2.6154	116	2.5996	2.0312	108
127	-2.1229	2.1594	117	-0.6304	0.4550	109
128	1.2325	1.0508	118	2.4418	0.7868	110
129	52			52		
130	53.2			53.2		
131	54			54		
132	1.0762	0.1215	119	1.1343	0.1233	111
133	1.2410	0.0479	120	1.2893	0.0508	112
134	0.8387	0.0460	121	0.8574	0.0513	113
135	-1.4714	1.4778	122	-1.6581	1.3726	114

136	-1.0636	0.8216	123	-1.5006	0.7682	115
137	0.3429	1.0149	124	0.4036	1.0039	116
138	50.1			50.1		
139	41.5			41.5		
140	36.1			36.1		
141	2.7098	0.7958	125	2.7431	0.8010	117
142	1.3136	0.1369	126	1.3444	0.1388	118
143	0.3044	0.0803	127	0.3735	0.0855	119
144	-0.7497	2.6340	128	-0.8080	2.6154	120
145	-2.3153	0.9688	129	-2.2971	0.9779	121
146	-2.5930	0.7875	130	-2.4479	0.7429	122
147	44			44		
148	41.2			41.2		
149	44.4			44.4		
150	2.3663	0.3518	131	2.3775	0.3558	123
151	0.2250	0.0637	132	0.2962	0.0687	124
152	0.2257	0.0632	133	0.2465	0.0649	125
153	-0.9972	0.5881	134	-0.9952	0.5951	126
154	4.3861	1.6756	135	4.5521	1.6694	127
155	0.1026	0.4201	136	0.1689	0.4442	128
156	50			50		
157	48			48		
158	3.0084	1.2341	137	3.1171	1.1518	129
159	1.0271	0.1924	138	1.0995	0.1786	130
160	8			8		
161	8			8		
162	27.6			27.6		
163	32.3			32.3		
164	28.1			28.1		
165	1.0822	0.0943	139	1.1253	0.0736	131
166	1.1336	0.1447	140	1.2342	0.1119	132
167	1.0282	0.2662	141	1.1301	0.2575	133

	168	-3.8530	0.2070	142	-3.7882	0.2070	134
	169	-4.5442	0.7338	143	-4.4759	0.7268	135
	170	-6.2427	1.4697	144	-6.1621	1.4760	136
	171	31.3			31.3		
	172	29.6			29.6		
	173	38.6			38.6		
	174	0.8348	0.0670	145	0.8502	0.0666	137
	175	0.7733	0.1036	146	0.8385	0.1027	138
	176	-0.1999	0.0676	147	-0.1466	0.0659	139
	177	-2.2772	0.1458	148	-2.2384	0.1482	140
	178	-4.3089	0.6460	149	-4.1629	0.6279	141
	179	-1.6064	0.2920	150	-1.5189	0.2984	142
	180	30.6			30.6		
	181	29.7			29.7		
	182	1.3671	0.1127	151	1.3888	0.1140	143
	183	1.7279	0.0901	152	1.7782	0.0908	144
	184	-2.1870	0.1367	153	-2.1315	0.1387	145
	185	-3.1721	0.2049	154	-3.0795	0.2067	146
Forecast_Recr_Devs							
	2005	0.0000	0.4000	155	0.0000	0.4000	147
	2006	0.0000	0.4000	156	0.0000	0.4000	148
	2007	0.0000	0.4000	157	0.0000	0.4000	149
	2008	0.0000	0.4000	158	0.0000	0.4000	150
	2009	0.0000	0.4000	159	0.0000	0.4000	151
	2010	0.0000	0.4000	160	0.0000	0.4000	152
	2011	0.0000	0.4000	161	0.0000	0.4000	153

Table 31. Estimated selectivity at length by model, fleet, time period and gender.

Mid point of length bin (cm)	Model = DIFF Southern CA trawl		Northern CA trawl						Oregon trawl						Washington trawl					
	1916- F/M	1997+ F/M	1916- F	1916- M	1980- F	1980- M	1998+ F	1998+ M	1916- F	1916- M	1980- F	1980- M	1994+ F	1994+ M	1916- F	1916- M	1980- F	1980- M	1993+ F	1993+ M
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19	0.026	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001
21	0.049	0.017	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001
23	0.083	0.032	0.000	0.000	0.002	0.002	0.000	0.000	0.001	0.002	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.002	0.002
25	0.130	0.057	0.000	0.000	0.005	0.005	0.001	0.001	0.003	0.003	0.001	0.001	0.004	0.004	0.003	0.003	0.001	0.001	0.004	0.004
27	0.192	0.094	0.000	0.000	0.011	0.012	0.003	0.003	0.006	0.006	0.002	0.003	0.008	0.009	0.006	0.006	0.002	0.003	0.008	0.009
29	0.270	0.146	0.000	0.000	0.024	0.026	0.006	0.007	0.011	0.013	0.005	0.006	0.015	0.017	0.011	0.013	0.005	0.006	0.015	0.017
31	0.365	0.216	0.000	0.000	0.052	0.058	0.015	0.017	0.021	0.025	0.010	0.011	0.027	0.032	0.021	0.025	0.010	0.011	0.027	0.032
33	0.477	0.307	0.001	0.001	0.108	0.124	0.037	0.042	0.040	0.048	0.019	0.022	0.050	0.060	0.040	0.048	0.019	0.022	0.050	0.060
35	0.607	0.421	0.002	0.003	0.208	0.242	0.084	0.098	0.074	0.090	0.036	0.044	0.091	0.110	0.074	0.090	0.036	0.044	0.091	0.110
37	0.753	0.560	0.006	0.007	0.356	0.421	0.177	0.209	0.132	0.163	0.068	0.084	0.157	0.193	0.132	0.163	0.068	0.084	0.157	0.193
39	0.914	0.726	0.015	0.017	0.523	0.625	0.329	0.393	0.221	0.277	0.123	0.154	0.253	0.317	0.221	0.277	0.123	0.154	0.253	0.317
41	1.000	0.917	0.034	0.041	0.660	0.800	0.513	0.622	0.337	0.430	0.208	0.265	0.371	0.473	0.337	0.430	0.208	0.265	0.371	0.473
43	1.000	1.000	0.077	0.095	0.745	0.916	0.675	0.830	0.462	0.599	0.322	0.417	0.491	0.636	0.462	0.599	0.322	0.417	0.491	0.636
45	0.440	0.947	0.164	0.202	0.800	0.981	0.795	0.975	0.582	0.752	0.457	0.590	0.599	0.775	0.582	0.752	0.457	0.590	0.599	0.775
47	0.222	0.554	0.314	0.378	0.831	1.000	0.831	1.000	0.686	0.867	0.593	0.749	0.692	0.874	0.686	0.867	0.593	0.749	0.692	0.874
49	0.194	0.435	0.508	0.601	0.846	1.000	0.707	0.835	0.763	0.942	0.705	0.870	0.759	0.937	0.763	0.942	0.705	0.870	0.759	0.937
51	0.192	0.421	0.696	0.807	0.723	0.839	0.409	0.475	0.818	0.986	0.788	0.949	0.808	0.973	0.818	0.986	0.788	0.949	0.808	0.973
53	0.191	0.420	0.836	0.952	0.661	0.752	0.232	0.264	0.849	1.000	0.847	0.997	0.844	0.994	0.849	1.000	0.847	0.997	0.844	0.994
55	0.191	0.420	0.895	1.000	0.639	0.714	0.158	0.176	0.869	1.000	0.869	1.000	0.869	1.000	0.869	1.000	0.869	1.000	0.869	1.000
57	0.191	0.420	0.911	1.000	0.638	0.700	0.134	0.147	0.555	0.624	0.734	0.825	0.890	1.000	0.555	0.624	0.734	0.825	0.890	1.000
59	0.191	0.420	0.881	0.949	0.647	0.696	0.128	0.138	0.315	0.346	0.461	0.507	0.707	0.776	0.315	0.346	0.461	0.507	0.707	0.776
61	0.191	0.420	0.883	0.933	0.657	0.695	0.128	0.135	0.214	0.230	0.309	0.332	0.604	0.648	0.214	0.230	0.309	0.332	0.604	0.648
63	0.191	0.420	0.894	0.928	0.669	0.695	0.129	0.134	0.188	0.197	0.262	0.275	0.573	0.601	0.188	0.197	0.262	0.275	0.573	0.601
65	0.191	0.420	0.909	0.926	0.682	0.695	0.132	0.134	0.184	0.189	0.254	0.260	0.574	0.588	0.184	0.189	0.254	0.260	0.574	0.588
67	0.191	0.420	0.926	0.926	0.695	0.695	0.134	0.134	0.187	0.187	0.257	0.257	0.585	0.585	0.187	0.187	0.257	0.257	0.585	0.585

Table 31 Continued. Estimated selectivity at length by model, fleet, time period and gender.

Mid point of length bin (cm)	Model = DIFF													
	Southern CA non-trawl			Northern CA non-trawl			OR/WA non-trawl		Southern CA recreational			Northern CA recreational		
	1916-	1980-	1992+	1916-	1991-	1998+	1916-	1990+	1916-	1996-	2003+	1916-	1989-	1996+
	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.002	0.000	0.000	0.001
15	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.018	0.008	0.020	0.001	0.003	0.004
17	0.000	0.000	0.006	0.000	0.002	0.001	0.000	0.001	0.061	0.026	0.063	0.005	0.012	0.015
19	0.000	0.000	0.020	0.000	0.007	0.003	0.000	0.001	0.139	0.060	0.141	0.018	0.041	0.048
21	0.000	0.000	0.060	0.000	0.021	0.008	0.000	0.003	0.262	0.117	0.258	0.059	0.130	0.144
23	0.000	0.001	0.165	0.000	0.059	0.024	0.000	0.005	0.433	0.202	0.418	0.179	0.342	0.358
25	0.000	0.002	0.379	0.000	0.153	0.066	0.000	0.010	0.653	0.319	0.620	0.429	0.648	0.648
27	0.000	0.008	0.655	0.000	0.342	0.169	0.000	0.020	0.915	0.470	0.858	0.727	0.879	0.859
29	0.000	0.025	0.856	0.000	0.600	0.368	0.000	0.039	1.000	0.651	1.000	0.916	0.984	0.953
31	0.000	0.077	0.950	0.001	0.812	0.627	0.000	0.074	0.972	0.857	0.998	0.994	1.000	0.985
33	0.000	0.212	0.985	0.003	0.926	0.829	0.000	0.136	0.818	1.000	0.855	1.000	0.858	0.996
35	0.000	0.463	0.997	0.011	0.974	0.933	0.000	0.235	0.608	0.999	0.650	0.802	0.553	0.999
37	0.000	0.741	1.000	0.046	0.991	0.976	0.000	0.375	0.382	0.835	0.417	0.542	0.347	1.000
39	0.001	0.915	0.982	0.167	0.998	0.992	0.001	0.542	0.208	0.609	0.224	0.365	0.206	1.000
41	0.005	0.990	0.658	0.452	1.000	0.997	0.004	0.704	0.107	0.376	0.106	0.247	0.118	0.999
43	0.023	1.000	0.482	0.837	1.000	0.999	0.020	0.835	0.058	0.199	0.048	0.175	0.068	0.662
45	0.105	0.805	0.351	1.000	1.000	1.000	0.083	0.925	0.036	0.097	0.021	0.136	0.041	0.461
47	0.357	0.554	0.255	1.000	0.988	1.000	0.275	0.981	0.027	0.048	0.010	0.115	0.027	0.334
49	0.781	0.402	0.188	0.292	0.988	0.701	0.698	1.000	0.023	0.026	0.005	0.104	0.020	0.257
51	1.000	0.294	0.143	0.270	0.988	0.526	1.000	1.000	0.022	0.017	0.003	0.098	0.017	0.214
53	0.971	0.220	0.114	0.270	0.988	0.526	1.000	1.000	0.021	0.013	0.003	0.096	0.015	0.191
55	0.636	0.170	0.096	0.270	0.988	0.526	1.000	1.000	0.021	0.012	0.002	0.094	0.014	0.179
57	0.515	0.138	0.085	0.270	0.988	0.526	1.000	1.000	0.021	0.011	0.002	0.094	0.014	0.173
59	0.438	0.118	0.079	0.270	0.988	0.526	1.000	1.000	0.021	0.011	0.002	0.093	0.013	0.170
61	0.387	0.105	0.074	0.270	0.988	0.526	1.000	1.000	0.021	0.011	0.002	0.093	0.013	0.168
63	0.355	0.097	0.072	0.270	0.988	0.526	1.000	1.000	0.021	0.011	0.002	0.093	0.013	0.168
65	0.334	0.093	0.070	0.270	0.988	0.526	1.000	1.000	0.021	0.011	0.002	0.093	0.013	0.167
67	0.321	0.090	0.070	0.270	0.988	0.526	1.000	1.000	0.021	0.011	0.002	0.093	0.013	0.167

Table 31 Continued. Estimated selectivity at length by model, fleet, time period and gender.

Mid point of length bin (cm)	Model = DIFF				Model = NODIFF										
	OR/WA recreational		Triennial survey		Southern CA trawl		Northern CA trawl			Oregon trawl			Washington trawl		
	1916-	1991+	1916+	1916+	1916-	1997+	1916-	1980-	1998+	1916-	1980-	1994+	1916-	1980-	1993+
	F/M	F/M	F	M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M
13	0.000	0.000	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	0.002	0.000	0.014	0.014	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	0.007	0.002	0.032	0.032	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19	0.023	0.008	0.055	0.056	0.022	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
21	0.061	0.030	0.082	0.084	0.043	0.013	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001
23	0.143	0.091	0.113	0.116	0.074	0.027	0.000	0.002	0.000	0.000	0.000	0.001	0.001	0.001	0.002
25	0.295	0.233	0.149	0.153	0.118	0.049	0.000	0.005	0.001	0.001	0.000	0.002	0.003	0.001	0.005
27	0.523	0.495	0.188	0.194	0.177	0.083	0.000	0.012	0.003	0.002	0.001	0.006	0.006	0.003	0.009
29	0.793	0.861	0.231	0.240	0.253	0.132	0.000	0.026	0.007	0.003	0.002	0.016	0.011	0.005	0.017
31	1.001	1.000	0.277	0.289	0.346	0.199	0.000	0.057	0.018	0.007	0.004	0.039	0.022	0.010	0.032
33	1.000	0.971	0.326	0.342	0.459	0.287	0.001	0.119	0.043	0.016	0.009	0.094	0.043	0.021	0.060
35	0.867	0.768	0.378	0.398	0.591	0.401	0.003	0.232	0.098	0.035	0.018	0.206	0.080	0.040	0.108
37	0.642	0.516	0.432	0.458	0.742	0.542	0.006	0.403	0.208	0.073	0.038	0.394	0.146	0.077	0.189
39	0.409	0.288	0.489	0.520	0.910	0.712	0.015	0.605	0.388	0.145	0.079	0.635	0.250	0.141	0.308
41	0.244	0.149	0.547	0.585	1.000	0.912	0.036	0.784	0.614	0.269	0.154	0.866	0.395	0.244	0.460
43	0.159	0.083	0.607	0.653	1.000	1.000	0.084	0.907	0.824	0.444	0.281	1.000	0.562	0.390	0.621
45	0.123	0.057	0.651	0.723	0.442	0.950	0.181	0.978	0.973	0.638	0.455	1.000	0.721	0.560	0.762
47	0.109	0.046	0.673	0.794	0.223	0.561	0.346	1.000	1.000	0.803	0.644	0.999	0.846	0.724	0.865
49	0.104	0.042	0.692	0.867	0.197	0.444	0.566	1.000	0.868	0.915	0.801	0.923	0.931	0.853	0.931
51	0.102	0.041	0.706	0.940	0.195	0.431	0.783	0.861	0.612	0.980	0.906	0.920	0.983	0.942	0.971
53	0.101	0.041	0.707	1.000	0.194	0.430	0.944	0.780	0.427	1.000	0.967	0.920	1.000	0.996	0.993
55	0.101	0.040	0.666	1.000	0.194	0.430	1.000	0.721	0.293	1.000	0.999	0.920	1.000	1.000	1.000
57	0.101	0.040	0.627	1.000	0.194	0.430	1.000	0.683	0.207	0.939	1.000	0.920	0.623	0.824	1.000
59	0.101	0.040	0.590	1.000	0.194	0.430	0.951	0.660	0.156	0.931	0.834	0.920	0.316	0.456	0.787
61	0.101	0.040	0.555	1.000	0.194	0.430	0.932	0.647	0.129	0.931	0.348	0.920	0.197	0.256	0.656
63	0.101	0.040	0.523	0.999	0.194	0.430	0.921	0.640	0.114	0.931	0.347	0.920	0.168	0.198	0.612
65	0.101	0.040	0.492	0.999	0.194	0.430	0.914	0.636	0.106	0.931	0.347	0.920	0.161	0.185	0.602
67	0.101	0.040	0.463	0.999	0.194	0.430	0.911	0.635	0.102	0.931	0.347	0.920	0.160	0.182	0.600

Table 31 Continued. Estimated selectivity at length by model, fleet, time period and gender.

Mid point of length bin (cm)	Model = NODIFF																
	Southern CA non-trawl			Northern CA non-trawl			OR/WA non-trawl		Southern CA recreational			Northern CA recreational			OR/WA recreational		Triennial survey
	1916-	1980-	1992+	1916-	1991-	1998+	1916-	1990+	1916-	1996-	2003+	1916-	1989-	1996+	1916-	1991+	1916+
	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M	F/M
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.004
15	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.017	0.005	0.015	0.001	0.003	0.003	0.002	0.000	0.018
17	0.000	0.000	0.006	0.000	0.002	0.001	0.000	0.001	0.058	0.021	0.053	0.005	0.010	0.013	0.007	0.002	0.036
19	0.000	0.000	0.019	0.000	0.007	0.003	0.000	0.001	0.135	0.052	0.123	0.018	0.036	0.041	0.023	0.007	0.059
21	0.000	0.000	0.054	0.000	0.019	0.009	0.000	0.002	0.254	0.105	0.233	0.059	0.115	0.123	0.060	0.027	0.088
23	0.000	0.001	0.144	0.000	0.051	0.025	0.000	0.005	0.421	0.184	0.388	0.176	0.310	0.314	0.141	0.083	0.122
25	0.000	0.003	0.333	0.000	0.129	0.067	0.000	0.010	0.640	0.294	0.590	0.420	0.611	0.598	0.290	0.219	0.162
27	0.000	0.009	0.597	0.000	0.291	0.165	0.000	0.019	0.910	0.439	0.841	0.717	0.860	0.829	0.514	0.477	0.207
29	0.000	0.026	0.816	0.000	0.532	0.354	0.000	0.036	1.000	0.620	1.000	0.911	0.981	0.940	0.786	0.853	0.259
31	0.000	0.077	0.932	0.001	0.759	0.602	0.000	0.068	0.975	0.839	0.998	0.994	1.000	0.981	1.001	1.000	0.316
33	0.000	0.205	0.979	0.003	0.898	0.807	0.000	0.123	0.831	1.000	0.866	1.000	0.867	0.994	1.000	0.975	0.379
35	0.000	0.443	0.996	0.012	0.961	0.921	0.000	0.212	0.626	0.999	0.667	0.812	0.569	0.998	0.880	0.787	0.445
37	0.000	0.717	1.000	0.048	0.987	0.970	0.000	0.341	0.397	0.846	0.433	0.557	0.361	1.000	0.663	0.537	0.513
39	0.001	0.902	0.985	0.168	0.996	0.989	0.000	0.500	0.217	0.625	0.234	0.378	0.216	1.000	0.426	0.302	0.584
41	0.004	0.988	0.683	0.448	1.000	0.997	0.002	0.663	0.112	0.389	0.111	0.256	0.125	1.000	0.253	0.156	0.654
43	0.023	1.000	0.505	0.831	1.000	0.999	0.014	0.804	0.061	0.207	0.049	0.182	0.072	0.677	0.165	0.087	0.722
45	0.101	0.822	0.369	1.000	1.000	1.000	0.063	0.908	0.038	0.101	0.022	0.141	0.044	0.478	0.128	0.060	0.788
47	0.344	0.572	0.268	1.000	0.990	1.000	0.236	0.976	0.029	0.050	0.010	0.119	0.030	0.350	0.114	0.050	0.851
49	0.769	0.415	0.198	0.292	0.990	0.679	0.665	1.000	0.025	0.027	0.005	0.108	0.023	0.271	0.109	0.046	0.908
51	1.000	0.301	0.152	0.270	0.990	0.542	1.000	1.000	0.023	0.018	0.003	0.102	0.019	0.227	0.107	0.045	0.961
53	0.973	0.223	0.123	0.270	0.990	0.542	1.000	1.000	0.023	0.014	0.003	0.099	0.017	0.204	0.106	0.044	1.000
55	0.640	0.171	0.105	0.270	0.990	0.542	1.000	1.000	0.022	0.012	0.002	0.098	0.016	0.192	0.106	0.044	1.000
57	0.512	0.138	0.094	0.270	0.990	0.542	1.000	1.000	0.022	0.012	0.002	0.097	0.016	0.186	0.106	0.044	0.937
59	0.430	0.118	0.088	0.270	0.990	0.542	1.000	1.000	0.022	0.011	0.002	0.097	0.016	0.183	0.106	0.044	0.855
61	0.377	0.106	0.084	0.270	0.990	0.542	1.000	1.000	0.022	0.011	0.002	0.097	0.015	0.181	0.106	0.044	0.778
63	0.342	0.098	0.082	0.270	0.990	0.542	1.000	1.000	0.022	0.011	0.002	0.096	0.015	0.180	0.106	0.044	0.718
65	0.321	0.094	0.080	0.270	0.990	0.542	1.000	1.000	0.022	0.011	0.002	0.096	0.015	0.180	0.106	0.044	0.678
67	0.308	0.091	0.080	0.270	0.990	0.542	1.000	1.000	0.022	0.011	0.002	0.096	0.015	0.180	0.106	0.044	0.655

Table 32. Selectivity at age calculated from selectivity at length in 2004 by model, fleet, and gender.

Age	Model = DIFF																	
	S. CA trawl		N. CA trawl		Oregon trawl		WA trawl		S. CA non-trl		N. CA non-trl		OR/WA non-trl		S. CA rec		N. CA rec	
(yr)	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.001	0.001
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.001	0.001
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.005	0.007	0.001	0.002
3	0.008	0.010	0.000	0.000	0.000	0.000	0.001	0.001	0.029	0.040	0.029	0.040	0.001	0.002	0.129	0.160	0.065	0.089
4	0.046	0.055	0.001	0.002	0.002	0.004	0.004	0.005	0.271	0.328	0.271	0.328	0.010	0.012	0.476	0.538	0.431	0.503
5	0.136	0.150	0.010	0.014	0.022	0.030	0.017	0.023	0.667	0.723	0.667	0.723	0.045	0.051	0.801	0.841	0.806	0.852
6	0.282	0.294	0.053	0.063	0.099	0.124	0.056	0.070	0.892	0.918	0.892	0.918	0.139	0.146	0.807	0.813	0.952	0.967
7	0.468	0.468	0.157	0.176	0.253	0.305	0.135	0.160	0.932	0.952	0.932	0.952	0.298	0.294	0.596	0.597	0.977	0.987
8	0.649	0.640	0.312	0.344	0.437	0.523	0.246	0.284	0.846	0.883	0.846	0.883	0.484	0.462	0.367	0.377	0.931	0.959
9	0.764	0.770	0.471	0.524	0.590	0.713	0.367	0.420	0.694	0.754	0.694	0.754	0.651	0.614	0.204	0.221	0.820	0.881
10	0.789	0.833	0.588	0.677	0.689	0.844	0.480	0.544	0.539	0.613	0.539	0.613	0.779	0.734	0.108	0.127	0.677	0.767
11	0.743	0.832	0.644	0.781	0.743	0.919	0.574	0.648	0.413	0.494	0.413	0.494	0.866	0.820	0.058	0.074	0.540	0.646
12	0.669	0.788	0.643	0.837	0.768	0.956	0.647	0.728	0.321	0.404	0.321	0.404	0.921	0.879	0.032	0.046	0.432	0.540
13	0.596	0.727	0.603	0.854	0.780	0.971	0.701	0.788	0.257	0.340	0.257	0.340	0.954	0.918	0.019	0.030	0.353	0.458
14	0.538	0.666	0.544	0.842	0.783	0.975	0.741	0.832	0.212	0.293	0.212	0.293	0.974	0.944	0.012	0.021	0.300	0.397
15	0.497	0.612	0.480	0.814	0.784	0.974	0.770	0.864	0.181	0.260	0.181	0.260	0.985	0.961	0.008	0.015	0.264	0.353
16	0.470	0.570	0.420	0.778	0.782	0.971	0.789	0.888	0.159	0.235	0.159	0.235	0.991	0.972	0.006	0.012	0.240	0.322
17	0.452	0.537	0.368	0.739	0.780	0.966	0.801	0.906	0.143	0.216	0.143	0.216	0.995	0.980	0.005	0.010	0.223	0.298
18	0.441	0.513	0.326	0.702	0.778	0.962	0.809	0.919	0.131	0.201	0.131	0.201	0.997	0.985	0.004	0.008	0.211	0.281
19	0.434	0.495	0.291	0.668	0.775	0.958	0.812	0.929	0.122	0.190	0.122	0.190	0.998	0.988	0.003	0.007	0.203	0.268
20	0.430	0.482	0.264	0.637	0.773	0.955	0.812	0.937	0.115	0.182	0.115	0.182	0.999	0.991	0.003	0.006	0.197	0.259
21	0.427	0.472	0.243	0.611	0.771	0.952	0.810	0.943	0.110	0.175	0.110	0.175	0.999	0.992	0.003	0.006	0.192	0.251
22	0.425	0.465	0.226	0.588	0.769	0.949	0.807	0.947	0.106	0.169	0.106	0.169	0.999	0.994	0.003	0.005	0.189	0.245
23	0.423	0.459	0.213	0.569	0.768	0.947	0.804	0.951	0.103	0.165	0.103	0.165	0.999	0.995	0.003	0.005	0.186	0.240
24	0.423	0.455	0.202	0.552	0.767	0.945	0.800	0.954	0.100	0.161	0.100	0.161	1.000	0.995	0.002	0.005	0.184	0.237
25	0.422	0.452	0.194	0.539	0.766	0.943	0.795	0.956	0.098	0.158	0.098	0.158	1.000	0.996	0.002	0.005	0.183	0.234
26	0.422	0.449	0.187	0.527	0.765	0.941	0.791	0.958	0.096	0.156	0.096	0.156	1.000	0.996	0.002	0.005	0.181	0.231
27	0.421	0.447	0.182	0.517	0.764	0.940	0.787	0.960	0.095	0.154	0.095	0.154	1.000	0.996	0.002	0.004	0.180	0.229
28	0.421	0.445	0.178	0.509	0.763	0.939	0.784	0.961	0.094	0.152	0.094	0.152	1.000	0.997	0.002	0.004	0.180	0.227
29	0.421	0.444	0.174	0.502	0.763	0.938	0.780	0.962	0.093	0.151	0.093	0.151	1.000	0.997	0.002	0.004	0.179	0.226
30	0.421	0.443	0.171	0.497	0.762	0.937	0.777	0.963	0.092	0.150	0.092	0.150	1.000	0.997	0.002	0.004	0.178	0.225
31	0.421	0.442	0.168	0.492	0.762	0.937	0.774	0.963	0.091	0.149	0.091	0.149	1.000	0.997	0.002	0.004	0.178	0.224
32	0.420	0.441	0.166	0.488	0.761	0.936	0.772	0.964	0.090	0.148	0.090	0.148	1.000	0.997	0.002	0.004	0.177	0.223
33	0.420	0.441	0.165	0.484	0.761	0.936	0.770	0.964	0.090	0.147	0.090	0.147	1.000	0.997	0.002	0.004	0.177	0.223
34	0.420	0.440	0.163	0.482	0.761	0.935	0.768	0.965	0.090	0.147	0.090	0.147	1.000	0.997	0.002	0.004	0.177	0.222
35	0.420	0.440	0.162	0.479	0.761	0.935	0.766	0.965	0.089	0.146	0.089	0.146	1.000	0.998	0.002	0.004	0.177	0.222
36	0.420	0.439	0.161	0.477	0.760	0.935	0.764	0.965	0.089	0.146	0.089	0.146	1.000	0.998	0.002	0.004	0.176	0.221
37	0.420	0.439	0.160	0.476	0.760	0.934	0.763	0.966	0.089	0.146	0.089	0.146	1.000	0.998	0.002	0.004	0.176	0.221
38	0.420	0.439	0.159	0.474	0.760	0.934	0.762	0.966	0.088	0.146	0.088	0.146	1.000	0.998	0.002	0.004	0.176	0.221
39	0.420	0.439	0.159	0.473	0.760	0.934	0.761	0.966	0.088	0.145	0.088	0.145	1.000	0.998	0.002	0.004	0.176	0.221
40	0.420	0.439	0.158	0.472	0.760	0.934	0.760	0.966	0.088	0.145	0.088	0.145	1.000	0.998	0.002	0.004	0.176	0.220

Table 32 Continued. Selectivity at age calculated from selectivity at length in 2004 by model, fleet, and gender.

Age	Model = DIFF				Model = NODIFF													
	OR/WA rec		Triennial		S. CA trawl		S. CA trawl		OR trawl		WA trawl		S. CA non-trl		N. CA non-trl		OR/WA non-trl	
(yr)	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
0	0.000	0.000	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.000	0.000	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.005	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
3	0.014	0.021	0.047	0.056	0.006	0.009	0.000	0.000	0.000	0.000	0.001	0.001	0.025	0.042	0.005	0.008	0.001	0.002
4	0.193	0.242	0.122	0.139	0.038	0.051	0.001	0.002	0.003	0.004	0.004	0.006	0.233	0.315	0.062	0.093	0.008	0.012
5	0.597	0.661	0.210	0.231	0.117	0.142	0.011	0.015	0.023	0.032	0.018	0.024	0.609	0.700	0.289	0.363	0.038	0.049
6	0.785	0.815	0.300	0.324	0.252	0.282	0.056	0.066	0.108	0.127	0.062	0.072	0.859	0.905	0.602	0.673	0.118	0.136
7	0.658	0.672	0.387	0.410	0.433	0.456	0.172	0.179	0.288	0.307	0.153	0.160	0.927	0.948	0.824	0.864	0.259	0.274
8	0.437	0.453	0.467	0.489	0.618	0.630	0.353	0.344	0.518	0.522	0.288	0.280	0.863	0.887	0.931	0.948	0.434	0.433
9	0.261	0.282	0.535	0.559	0.746	0.763	0.548	0.522	0.719	0.710	0.441	0.411	0.723	0.764	0.966	0.978	0.604	0.583
10	0.155	0.175	0.589	0.620	0.783	0.829	0.701	0.673	0.850	0.840	0.585	0.533	0.570	0.629	0.958	0.984	0.741	0.704
11	0.099	0.116	0.627	0.673	0.747	0.832	0.784	0.781	0.918	0.915	0.703	0.635	0.440	0.513	0.918	0.973	0.839	0.795
12	0.070	0.084	0.652	0.718	0.677	0.792	0.800	0.843	0.943	0.951	0.791	0.715	0.342	0.423	0.858	0.948	0.904	0.859
13	0.056	0.067	0.668	0.756	0.605	0.734	0.767	0.868	0.947	0.963	0.854	0.776	0.273	0.358	0.790	0.914	0.944	0.903
14	0.049	0.057	0.677	0.789	0.547	0.674	0.708	0.868	0.943	0.965	0.896	0.821	0.225	0.310	0.728	0.874	0.968	0.932
15	0.045	0.052	0.680	0.815	0.505	0.622	0.639	0.852	0.937	0.961	0.923	0.854	0.191	0.276	0.676	0.833	0.981	0.952
16	0.043	0.049	0.679	0.838	0.477	0.581	0.570	0.827	0.932	0.956	0.938	0.878	0.167	0.250	0.636	0.795	0.989	0.965
17	0.042	0.047	0.676	0.856	0.460	0.549	0.508	0.800	0.928	0.951	0.945	0.897	0.150	0.230	0.608	0.761	0.994	0.974
18	0.042	0.045	0.672	0.871	0.449	0.525	0.455	0.772	0.925	0.946	0.945	0.911	0.137	0.215	0.588	0.733	0.996	0.981
19	0.041	0.044	0.667	0.884	0.442	0.507	0.410	0.746	0.924	0.943	0.941	0.922	0.128	0.204	0.574	0.709	0.998	0.985
20	0.041	0.044	0.661	0.894	0.438	0.494	0.373	0.723	0.922	0.939	0.934	0.930	0.121	0.194	0.565	0.689	0.998	0.988
21	0.041	0.043	0.656	0.902	0.435	0.484	0.343	0.702	0.922	0.937	0.925	0.936	0.116	0.187	0.559	0.674	0.999	0.990
22	0.041	0.043	0.650	0.909	0.434	0.476	0.318	0.684	0.921	0.935	0.916	0.941	0.111	0.182	0.554	0.661	0.999	0.992
23	0.041	0.043	0.646	0.915	0.433	0.471	0.297	0.669	0.921	0.933	0.906	0.945	0.108	0.177	0.551	0.651	0.999	0.993
24	0.041	0.042	0.641	0.920	0.432	0.466	0.280	0.655	0.920	0.932	0.896	0.949	0.105	0.173	0.549	0.642	1.000	0.994
25	0.041	0.042	0.637	0.923	0.431	0.463	0.266	0.644	0.920	0.931	0.886	0.951	0.103	0.170	0.548	0.636	1.000	0.994
26	0.040	0.042	0.633	0.926	0.431	0.460	0.255	0.635	0.920	0.930	0.877	0.953	0.101	0.168	0.547	0.630	1.000	0.995
27	0.040	0.042	0.630	0.929	0.431	0.458	0.245	0.627	0.920	0.930	0.869	0.955	0.100	0.166	0.546	0.626	1.000	0.995
28	0.040	0.042	0.627	0.931	0.431	0.456	0.237	0.620	0.920	0.929	0.862	0.956	0.099	0.164	0.545	0.622	1.000	0.996
29	0.040	0.042	0.625	0.933	0.431	0.455	0.230	0.614	0.920	0.929	0.855	0.957	0.098	0.163	0.545	0.619	1.000	0.996
30	0.040	0.042	0.623	0.934	0.430	0.454	0.225	0.609	0.920	0.928	0.849	0.958	0.097	0.161	0.544	0.616	1.000	0.996
31	0.040	0.042	0.621	0.936	0.430	0.453	0.220	0.605	0.920	0.928	0.843	0.959	0.096	0.160	0.544	0.614	1.000	0.996
32	0.040	0.042	0.619	0.937	0.430	0.452	0.216	0.602	0.920	0.928	0.839	0.960	0.096	0.160	0.544	0.613	1.000	0.996
33	0.040	0.042	0.618	0.938	0.430	0.452	0.212	0.599	0.920	0.928	0.834	0.960	0.095	0.159	0.544	0.611	1.000	0.997
34	0.040	0.042	0.616	0.938	0.430	0.451	0.209	0.597	0.920	0.927	0.830	0.961	0.095	0.158	0.544	0.610	1.000	0.997
35	0.040	0.042	0.615	0.939	0.430	0.451	0.206	0.595	0.920	0.927	0.827	0.961	0.094	0.158	0.543	0.609	1.000	0.997
36	0.040	0.042	0.614	0.939	0.430	0.450	0.204	0.593	0.920	0.927	0.824	0.961	0.094	0.158	0.543	0.608	1.000	0.997
37	0.040	0.042	0.613	0.940	0.430	0.450	0.202	0.592	0.920	0.927	0.821	0.962	0.094	0.157	0.543	0.608	1.000	0.997
38	0.040	0.042	0.613	0.940	0.430	0.450	0.201	0.590	0.920	0.927	0.819	0.962	0.094	0.157	0.543	0.607	1.000	0.997
39	0.040	0.042	0.612	0.941	0.430	0.450	0.199	0.589	0.920	0.927	0.817	0.962	0.093	0.157	0.543	0.607	1.000	0.997
40	0.040	0.042	0.611	0.941	0.430	0.449	0.198	0.589	0.920	0.927	0.815	0.962	0.093	0.157	0.543	0.606	1.000	0.997

Table 32 Continued. Selectivity at age calculated from selectivity at length in 2004 by model, fleet, and gender.

Age (yr)	Model = NODIFF S. CA rec F	M	N. CA rec F	M	OR/WA rec F	M	Triennial F	M
0	0.001	0.001	0.001	0.001	0.000	0.000	0.004	0.004
1	0.001	0.001	0.001	0.001	0.000	0.000	0.004	0.004
2	0.004	0.007	0.001	0.002	0.000	0.000	0.007	0.009
3	0.112	0.155	0.055	0.088	0.013	0.022	0.051	0.063
4	0.437	0.532	0.383	0.487	0.173	0.248	0.130	0.151
5	0.775	0.837	0.764	0.838	0.564	0.665	0.229	0.255
6	0.818	0.813	0.935	0.962	0.781	0.817	0.337	0.361
7	0.629	0.602	0.975	0.985	0.685	0.677	0.445	0.460
8	0.399	0.384	0.939	0.959	0.472	0.462	0.546	0.548
9	0.227	0.227	0.838	0.884	0.289	0.291	0.635	0.622
10	0.122	0.131	0.700	0.775	0.173	0.183	0.712	0.685
11	0.065	0.077	0.564	0.658	0.109	0.122	0.776	0.736
12	0.035	0.048	0.453	0.555	0.077	0.089	0.828	0.778
13	0.020	0.031	0.372	0.475	0.061	0.072	0.870	0.811
14	0.012	0.022	0.315	0.415	0.053	0.062	0.900	0.839
15	0.008	0.016	0.277	0.371	0.049	0.056	0.922	0.861
16	0.006	0.012	0.252	0.339	0.047	0.053	0.935	0.879
17	0.005	0.010	0.234	0.316	0.046	0.050	0.942	0.894
18	0.004	0.009	0.222	0.298	0.045	0.049	0.944	0.905
19	0.003	0.007	0.213	0.285	0.045	0.048	0.942	0.915
20	0.003	0.007	0.207	0.275	0.045	0.047	0.938	0.922
21	0.003	0.006	0.202	0.267	0.044	0.047	0.932	0.928
22	0.003	0.006	0.199	0.261	0.044	0.047	0.926	0.933
23	0.003	0.005	0.196	0.256	0.044	0.046	0.919	0.937
24	0.003	0.005	0.194	0.253	0.044	0.046	0.913	0.940
25	0.002	0.005	0.193	0.249	0.044	0.046	0.906	0.943
26	0.002	0.005	0.192	0.247	0.044	0.046	0.900	0.945
27	0.002	0.005	0.191	0.245	0.044	0.046	0.895	0.947
28	0.002	0.005	0.190	0.243	0.044	0.046	0.890	0.948
29	0.002	0.005	0.189	0.242	0.044	0.046	0.885	0.949
30	0.002	0.004	0.189	0.241	0.044	0.046	0.881	0.950
31	0.002	0.004	0.188	0.240	0.044	0.046	0.877	0.951
32	0.002	0.004	0.188	0.239	0.044	0.046	0.874	0.952
33	0.002	0.004	0.187	0.238	0.044	0.045	0.871	0.952
34	0.002	0.004	0.187	0.238	0.044	0.045	0.868	0.953
35	0.002	0.004	0.187	0.237	0.044	0.045	0.866	0.953
36	0.002	0.004	0.187	0.237	0.044	0.045	0.864	0.954
37	0.002	0.004	0.187	0.237	0.044	0.045	0.862	0.954
38	0.002	0.004	0.186	0.236	0.044	0.045	0.861	0.954
39	0.002	0.004	0.186	0.236	0.044	0.045	0.859	0.954
40	0.002	0.004	0.186	0.236	0.044	0.045	0.858	0.955

Table 33. Input and estimated sample sizes for the composition data in the base model. The input adjuster is multiplied by the original input sample sizes to create the Adjusted input N. For age and length comp, the values are averages per sample. For Length at age, the values are averages per age.

Kind	fleet	Input Adjuster	Adjusted input N	Average effN	Average Pearson	Min Pearson	Max Pearson
AGE	1	1.11	44	44	0.268	-1.19	9.38
	2	1.39	89	89	0.050	-2.15	4.68
	3	8.51	200	202	0.019	-3.08	6.58
	4	11.31	159	161	-0.033	-2.71	7.36
	7	3.48	84	84	0.057	-1.06	3.01
	11	3.02	101	101	0.030	-1.93	4.57
LEN	1	1.70	18	18	0.076	-3.10	7.94
	2	1.82	71	70	0.090	-2.22	9.64
	3	12.52	290	288	-0.015	-3.21	5.62
	4	14.40	257	256	0.034	-3.52	4.45
	5	1.68	74	74	0.063	-3.15	7.59
	6	4.48	141	141	0.032	-3.62	4.23
	7	2.69	176	177	0.218	-1.93	4.98
	8	1.67	154	152	0.018	-3.03	4.73
	9	2.40	136	136	0.065	-3.43	8.15
	10	1.62	145	145	0.020	-2.85	8.46
	11	2.76	159	160	0.121	-2.23	7.12
L@A	2	1.01	6	6	-0.286	-7.41	5.82
	3	0.82	15	15	-0.226	-6.41	3.87
	4	0.57	7	7	0.149	-5.63	4.14
	11	0.41	20	20	0.913	-0.57	7.50

Table 34. Time series result for Base model = DIFF.

Year	Total biomass (mt)	Age-3 biomass (mt)	Spawning biomass (mt)	Depletion	Recruits (1000s)	SPR	Max F at age females (approximate)	Max F at age males (approximate)	Total F (approximate)
1916	93,807	93,315	34,798	1.000	4,728	0.931	0.007	0.006	0.005
1917	93,307	92,816	34,574	0.994	4,712	0.895	0.011	0.010	0.008
1918	92,567	92,078	34,246	0.984	4,689	0.889	0.012	0.011	0.009
1919	91,817	91,329	33,909	0.974	4,666	0.923	0.008	0.007	0.006
1920	91,360	90,874	33,695	0.968	4,650	0.920	0.008	0.008	0.006
1921	90,903	90,419	33,482	0.962	4,635	0.931	0.007	0.006	0.005
1922	90,546	90,063	33,312	0.957	4,623	0.937	0.006	0.006	0.005
1923	90,244	89,763	33,170	0.953	4,613	0.926	0.007	0.007	0.005
1924	89,880	89,401	33,006	0.949	4,601	0.931	0.007	0.007	0.005
1925	89,560	89,081	32,864	0.944	4,590	0.920	0.008	0.008	0.006
1926	89,180	88,703	32,701	0.940	4,578	0.893	0.011	0.011	0.008
1927	88,624	88,148	32,466	0.933	4,561	0.907	0.010	0.009	0.007
1928	88,190	87,715	32,284	0.928	4,548	0.905	0.010	0.009	0.007
1929	87,758	87,285	32,105	0.923	4,534	0.909	0.009	0.009	0.007
1930	87,367	86,895	31,945	0.918	4,522	0.893	0.011	0.011	0.008
1931	86,879	86,409	31,745	0.912	4,507	0.892	0.011	0.011	0.008
1932	86,403	85,934	31,551	0.907	4,493	0.915	0.009	0.008	0.006
1933	86,096	85,629	31,429	0.903	4,483	0.926	0.007	0.007	0.005
1934	85,870	85,404	31,343	0.901	4,477	0.928	0.007	0.007	0.005
1935	85,661	85,195	31,265	0.898	4,471	0.925	0.008	0.007	0.006
1936	85,430	84,965	31,179	0.896	4,464	0.927	0.007	0.007	0.005
1937	85,211	84,747	31,099	0.894	4,458	0.930	0.007	0.007	0.005
1938	85,018	84,554	31,029	0.892	4,453	0.940	0.006	0.006	0.004
1939	84,884	84,421	30,984	0.890	4,449	0.945	0.005	0.005	0.004
1940	84,778	84,315	30,950	0.889	4,447	0.932	0.007	0.006	0.005
1941	84,587	84,124	30,882	0.887	4,441	0.925	0.007	0.007	0.006
1942	84,345	83,883	30,793	0.885	4,434	0.936	0.006	0.006	0.005
1943	84,162	83,701	30,737	0.883	4,430	0.828	0.017	0.020	0.015
1944	83,185	82,725	30,382	0.873	4,402	0.747	0.029	0.031	0.024
1945	81,563	81,106	29,762	0.855	4,353	0.572	0.061	0.070	0.051
1946	77,924	77,474	28,396	0.816	4,241	0.659	0.043	0.048	0.035
1947	75,773	75,331	27,571	0.792	4,171	0.740	0.030	0.033	0.024
1948	74,622	74,187	27,127	0.780	4,133	0.769	0.025	0.028	0.021
1949	73,787	73,356	26,828	0.771	4,107	0.762	0.026	0.030	0.021
1950	72,942	72,515	26,541	0.763	4,082	0.704	0.032	0.036	0.027
1951	71,754	71,330	26,134	0.751	4,045	0.701	0.033	0.036	0.027
1952	70,586	70,194	25,738	0.740	3,219	0.701	0.033	0.036	0.027
1953	69,472	69,110	25,367	0.729	3,217	0.712	0.033	0.034	0.025
1954	68,527	68,190	25,041	0.720	3,263	0.688	0.036	0.038	0.028
1955	67,391	67,049	24,648	0.708	3,360	0.683	0.037	0.039	0.029
1956	66,206	65,854	24,251	0.697	3,521	0.674	0.040	0.041	0.030
1957	64,944	64,574	23,833	0.685	3,761	0.614	0.052	0.054	0.040
1958	63,093	62,699	23,192	0.666	4,059	0.601	0.055	0.057	0.042
1959	61,199	60,775	22,522	0.647	4,354	0.610	0.052	0.055	0.040
1960	59,479	59,035	21,903	0.629	4,387	0.596	0.053	0.056	0.042
1961	57,760	57,323	21,254	0.611	3,901	0.623	0.047	0.051	0.037
1962	56,411	56,014	20,715	0.595	3,238	0.612	0.048	0.053	0.039
1963	55,118	54,778	20,160	0.579	2,734	0.619	0.048	0.051	0.038
1964	54,081	53,789	19,663	0.565	2,496	0.690	0.034	0.037	0.027
1965	53,693	53,424	19,438	0.559	2,558	0.649	0.039	0.045	0.033
1966	53,061	52,782	19,178	0.551	2,969	0.468	0.084	0.098	0.068

Table 34 Continued. Time series result for Base model = DIFF.

Year	Total biomass (mt)	Age-3 biomass (mt)	Spawning biomass (mt)	Depletion	Recruits (1000s)	SPR	Max F at age females (approximate)	Max F at age males (approximate)	Total F (approximate)
1967	50,623	50,305	18,296	0.526	3,559	0.607	0.047	0.054	0.039
1968	49,741	49,398	18,081	0.520	3,350	0.560	0.058	0.067	0.047
1969	48,394	48,065	17,741	0.510	2,644	0.649	0.037	0.044	0.032
1970	47,724	47,431	17,686	0.508	2,505	0.647	0.036	0.043	0.032
1971	47,085	46,801	17,577	0.505	3,011	0.649	0.037	0.044	0.032
1972	46,464	46,135	17,394	0.500	3,868	0.628	0.041	0.046	0.035
1973	45,716	45,351	17,110	0.492	3,599	0.517	0.070	0.075	0.054
1974	44,108	43,723	16,445	0.473	3,649	0.575	0.050	0.057	0.042
1975	43,108	42,742	16,047	0.461	3,335	0.568	0.051	0.059	0.043
1976	42,147	41,826	15,658	0.450	2,347	0.616	0.040	0.046	0.035
1977	41,692	41,390	15,426	0.443	3,056	0.537	0.057	0.068	0.049
1978	40,729	40,455	15,001	0.431	2,487	0.425	0.092	0.109	0.075
1979	38,809	38,577	14,200	0.408	1,244	0.380	0.110	0.132	0.089
1980	36,623	36,401	13,320	0.383	2,651	0.292	0.144	0.170	0.113
1981	33,818	33,593	12,255	0.352	2,526	0.335	0.128	0.151	0.100
1982	31,705	31,484	11,504	0.331	1,273	0.220	0.244	0.287	0.170
1983	27,677	27,471	9,993	0.287	2,162	0.228	0.270	0.320	0.176
1984	24,249	24,033	8,673	0.249	2,725	0.329	0.135	0.161	0.099
1985	23,110	22,912	8,336	0.240	890	0.271	0.157	0.190	0.118
1986	21,587	21,414	7,848	0.226	1,444	0.298	0.139	0.167	0.104
1987	20,504	20,374	7,495	0.215	1,368	0.220	0.226	0.269	0.153
1988	18,558	18,401	6,723	0.193	1,699	0.224	0.214	0.259	0.149
1989	16,899	16,747	6,088	0.175	1,303	0.186	0.296	0.362	0.193
1990	14,713	14,571	5,220	0.150	1,129	0.182	0.278	0.342	0.187
1991	12,998	12,869	4,562	0.131	1,293	0.142	0.426	0.525	0.244
1992	10,867	10,761	3,701	0.106	655	0.123	0.481	0.591	0.260
1993	9,065	8,967	2,975	0.085	897	0.125	0.480	0.563	0.241
1994	7,853	7,761	2,482	0.071	1,057	0.179	0.180	0.218	0.153
1995	7,468	7,382	2,409	0.069	547	0.160	0.178	0.214	0.159
1996	7,000	6,933	2,318	0.067	374	0.114	0.261	0.319	0.219
1997	6,132	6,087	2,060	0.059	366	0.104	0.295	0.353	0.235
1998	5,313	5,258	1,781	0.051	824	0.081	0.381	0.477	0.285
1999	4,338	4,287	1,443	0.041	276	0.130	0.249	0.308	0.197
2000	3,933	3,889	1,319	0.038	196	0.518	0.053	0.055	0.046
2001	4,146	4,118	1,442	0.041	327	0.642	0.031	0.034	0.030
2002	4,400	4,368	1,580	0.045	380	0.705	0.024	0.030	0.024
2003	4,640	4,601	1,717	0.049	407	0.840	0.018	0.019	0.010
2004	4,890	4,847	1,862	0.054	436	0.885	0.007	0.009	0.008
2005	5,112	5,066	1,995	0.057	466	NA	NA	NA	NA

Table 35. Time series result for Alternate model = NODIFF.

Year	Total biomass (mt)	Age-3 biomass (mt)	Spawning biomass (mt)	Depletion	Recruits (1000s)	SPR	Max F at age females (approximate)	Max F at age males (approximate)	Total F (approximate)
1916	88,074	87,621	33,872	1.000	4,357	0.920	0.008	0.006	0.005
1917	87,583	87,130	33,634	0.993	4,347	0.878	0.012	0.010	0.009
1918	86,851	86,399	33,279	0.982	4,333	0.871	0.013	0.011	0.009
1919	86,108	85,657	32,917	0.972	4,318	0.911	0.009	0.007	0.006
1920	85,659	85,209	32,690	0.965	4,309	0.907	0.009	0.008	0.006
1921	85,210	84,762	32,463	0.958	4,299	0.919	0.008	0.007	0.005
1922	84,862	84,415	32,285	0.953	4,292	0.926	0.007	0.006	0.005
1923	84,572	84,125	32,136	0.949	4,286	0.913	0.008	0.007	0.006
1924	84,223	83,777	31,963	0.944	4,278	0.919	0.008	0.007	0.005
1925	83,920	83,475	31,816	0.939	4,272	0.907	0.009	0.008	0.006
1926	83,561	83,117	31,645	0.934	4,265	0.875	0.012	0.011	0.009
1927	83,029	82,586	31,396	0.927	4,254	0.892	0.011	0.009	0.007
1928	82,624	82,181	31,207	0.921	4,246	0.889	0.011	0.009	0.008
1929	82,224	81,782	31,023	0.916	4,237	0.894	0.010	0.009	0.007
1930	81,869	81,428	30,862	0.911	4,230	0.875	0.012	0.011	0.009
1931	81,420	80,980	30,659	0.905	4,221	0.874	0.013	0.011	0.009
1932	80,987	80,548	30,464	0.899	4,212	0.900	0.010	0.008	0.007
1933	80,726	80,287	30,350	0.896	4,207	0.913	0.008	0.007	0.006
1934	80,549	80,111	30,277	0.894	4,204	0.916	0.008	0.007	0.006
1935	80,392	79,955	30,214	0.892	4,201	0.912	0.008	0.007	0.006
1936	80,216	79,779	30,144	0.890	4,198	0.914	0.008	0.007	0.006
1937	80,056	79,619	30,082	0.888	4,195	0.918	0.008	0.007	0.005
1938	79,923	79,487	30,034	0.887	4,193	0.929	0.007	0.006	0.005
1939	79,852	79,415	30,013	0.886	4,192	0.935	0.006	0.005	0.004
1940	79,810	79,374	30,005	0.886	4,191	0.921	0.007	0.006	0.005
1941	79,685	79,249	29,961	0.885	4,189	0.911	0.008	0.007	0.006
1942	79,510	79,074	29,895	0.883	4,186	0.924	0.007	0.006	0.005
1943	79,395	78,959	29,863	0.882	4,185	0.798	0.020	0.020	0.016
1944	78,484	78,049	29,495	0.871	4,167	0.708	0.033	0.031	0.025
1945	76,928	76,495	28,828	0.851	4,135	0.520	0.070	0.070	0.054
1946	73,350	72,922	27,327	0.807	4,059	0.611	0.049	0.049	0.038
1947	71,260	70,837	26,431	0.780	4,011	0.700	0.034	0.033	0.025
1948	70,171	69,753	25,960	0.766	3,985	0.732	0.029	0.029	0.022
1949	69,400	68,985	25,649	0.757	3,967	0.724	0.030	0.030	0.023
1950	68,623	68,211	25,352	0.748	3,950	0.663	0.037	0.037	0.029
1951	67,512	67,101	24,925	0.736	3,925	0.661	0.038	0.037	0.029
1952	66,435	66,049	24,516	0.724	3,278	0.661	0.038	0.037	0.029
1953	65,421	65,059	24,137	0.713	3,269	0.674	0.037	0.034	0.027
1954	64,583	64,241	23,816	0.703	3,307	0.647	0.041	0.039	0.030
1955	63,565	63,219	23,427	0.692	3,394	0.642	0.042	0.040	0.031
1956	62,520	62,164	23,041	0.680	3,544	0.633	0.045	0.041	0.032
1957	61,419	61,047	22,640	0.668	3,770	0.568	0.059	0.054	0.042
1958	59,749	59,354	22,001	0.650	4,055	0.555	0.062	0.057	0.044
1959	58,053	57,631	21,346	0.630	4,331	0.565	0.059	0.055	0.042
1960	56,544	56,101	20,760	0.613	4,348	0.551	0.060	0.057	0.044
1961	55,041	54,606	20,155	0.595	3,883	0.579	0.053	0.051	0.039
1962	53,909	53,514	19,679	0.581	3,249	0.567	0.055	0.053	0.041
1963	52,827	52,486	19,191	0.567	2,764	0.577	0.054	0.051	0.039
1964	51,989	51,694	18,767	0.554	2,534	0.653	0.038	0.037	0.029
1965	51,788	51,514	18,629	0.550	2,592	0.610	0.044	0.044	0.034
1966	51,332	51,049	18,442	0.544	2,986	0.420	0.096	0.097	0.070

Table 35 Continued.   Time series result for model = NODIFF.

Year	Total biomass (mt)	Age-3 biomass (mt)	Spawning biomass (mt)	Depletion	Recruits (1000s)	SPR	Max F at age females (approximate)	Max F at age males (approximate)	Total F (approximate)
1967	49,062	48,744	17,558	0.518	3,528	0.566	0.053	0.053	0.040
1968	48,342	48,001	17,395	0.514	3,308	0.517	0.066	0.066	0.048
1969	47,158	46,831	17,094	0.505	2,649	0.612	0.042	0.043	0.033
1970	46,647	46,355	17,105	0.505	2,521	0.612	0.041	0.042	0.033
1971	46,158	45,873	17,065	0.504	3,028	0.614	0.041	0.042	0.033
1972	45,672	45,345	16,952	0.500	3,809	0.594	0.045	0.044	0.035
1973	45,052	44,689	16,730	0.494	3,571	0.480	0.076	0.072	0.055
1974	43,565	43,182	16,092	0.475	3,657	0.541	0.055	0.055	0.043
1975	42,676	42,309	15,737	0.465	3,345	0.535	0.056	0.057	0.044
1976	41,813	41,490	15,385	0.454	2,372	0.587	0.044	0.044	0.035
1977	41,445	41,139	15,200	0.449	3,102	0.502	0.063	0.066	0.049
1978	40,556	40,279	14,797	0.437	2,518	0.389	0.101	0.104	0.076
1979	38,703	38,466	13,980	0.413	1,303	0.344	0.121	0.125	0.089
1980	36,580	36,352	13,065	0.386	2,741	0.260	0.158	0.163	0.113
1981	33,827	33,592	11,972	0.353	2,670	0.301	0.141	0.144	0.100
1982	31,763	31,530	11,212	0.331	1,377	0.192	0.267	0.272	0.169
1983	27,782	27,562	9,655	0.285	2,312	0.198	0.296	0.302	0.175
1984	24,412	24,176	8,310	0.245	3,027	0.297	0.147	0.152	0.098
1985	23,339	23,121	7,992	0.236	1,031	0.244	0.172	0.179	0.117
1986	21,896	21,702	7,529	0.222	1,640	0.272	0.150	0.156	0.102
1987	20,914	20,763	7,210	0.213	1,653	0.198	0.243	0.250	0.150
1988	19,085	18,898	6,471	0.191	2,093	0.202	0.229	0.238	0.145
1989	17,553	17,364	5,876	0.173	1,716	0.168	0.316	0.329	0.186
1990	15,507	15,322	5,055	0.149	1,543	0.167	0.294	0.306	0.177
1991	13,957	13,776	4,460	0.132	1,941	0.131	0.440	0.456	0.227
1992	12,000	11,844	3,675	0.108	1,044	0.118	0.477	0.493	0.235
1993	10,407	10,250	3,041	0.090	1,562	0.126	0.445	0.447	0.210
1994	9,439	9,279	2,646	0.078	1,938	0.194	0.164	0.167	0.128
1995	9,316	9,159	2,658	0.078	1,040	0.188	0.157	0.159	0.128
1996	9,136	9,010	2,668	0.079	745	0.142	0.218	0.223	0.168
1997	8,597	8,510	2,531	0.075	728	0.144	0.224	0.227	0.168
1998	8,164	8,050	2,395	0.071	1,737	0.127	0.259	0.266	0.185
1999	7,566	7,460	2,212	0.065	605	0.228	0.149	0.153	0.113
2000	7,533	7,439	2,252	0.066	462	0.687	0.028	0.028	0.024
2001	8,128	8,063	2,544	0.075	799	0.780	0.016	0.016	0.015
2002	8,773	8,695	2,865	0.085	966	0.819	0.013	0.014	0.012
2003	9,387	9,289	3,187	0.094	1,053	0.913	0.009	0.009	0.005
2004	9,985	9,875	3,518	0.104	1,134	0.937	0.004	0.004	0.004
2005	10,534	10,417	3,829	0.113	1,182	NA	NA	NA	NA

Table 36. Probability distribution for spawner-recruitment steepness as used in the rebuilding analysis.

Steepness	Mfdiff Log(L)	MfDiff Prob	Mfdiff-endbio	NoDiff Log(L)	NoDiff Prob	NODiff-Endbio
0.23	2804.3	0.000	1075		0.000	
0.25	2798.5	0.001	1235		0.000	
0.27	2795.3	0.014	1406		0.000	
0.29	2793.5	0.088	1590		0.000	
0.31	2792.6	0.220	1788	2775.5	0.000	1728
0.33	2792.3	0.279	2001	2772.9	0.001	1975
0.35	2792.8	0.180	2238	2771.1	0.006	2240
0.37	2793.1	0.127	2474	2769.6	0.025	2527
0.39	2793.9	0.058	2734	2768.9	0.053	2826
0.41	2794.8	0.022	3010	2768.1	0.109	3151
0.43	2795.9	0.008	3302	2768.0	0.121	3478
0.45	2797.0	0.003	3610	2767.8	0.159	3839
0.47	2798.1	0.001	3933	2768.0	0.128	4182
0.49		0.000		2768.0	0.122	4582
0.51		0.000		2768.3	0.092	4974
0.53		0.000		2768.6	0.066	5376
0.55		0.000		2769.0	0.044	5786
0.57		0.000		2769.5	0.029	6203
0.59		0.000		2769.9	0.018	6624
0.61		0.000		2770.4	0.012	7046
0.63		0.000		2770.8	0.007	7469
0.65		0.000		2771.3	0.005	7889
0.67		0.000		2771.8	0.003	8306

Figures

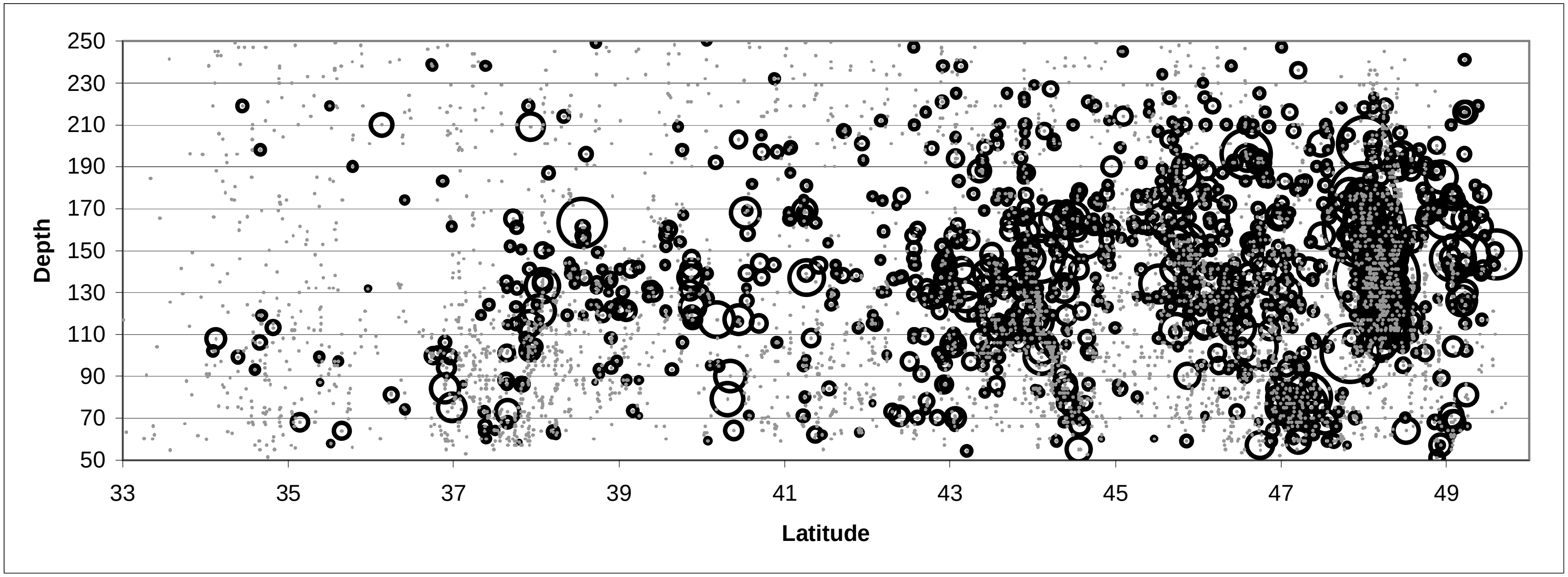


Figure 1. Catch per tow of canary rockfish in the bottom trawl survey. Dots are tows with zero catch. Circle size is proportional to the square root of catch per tow.

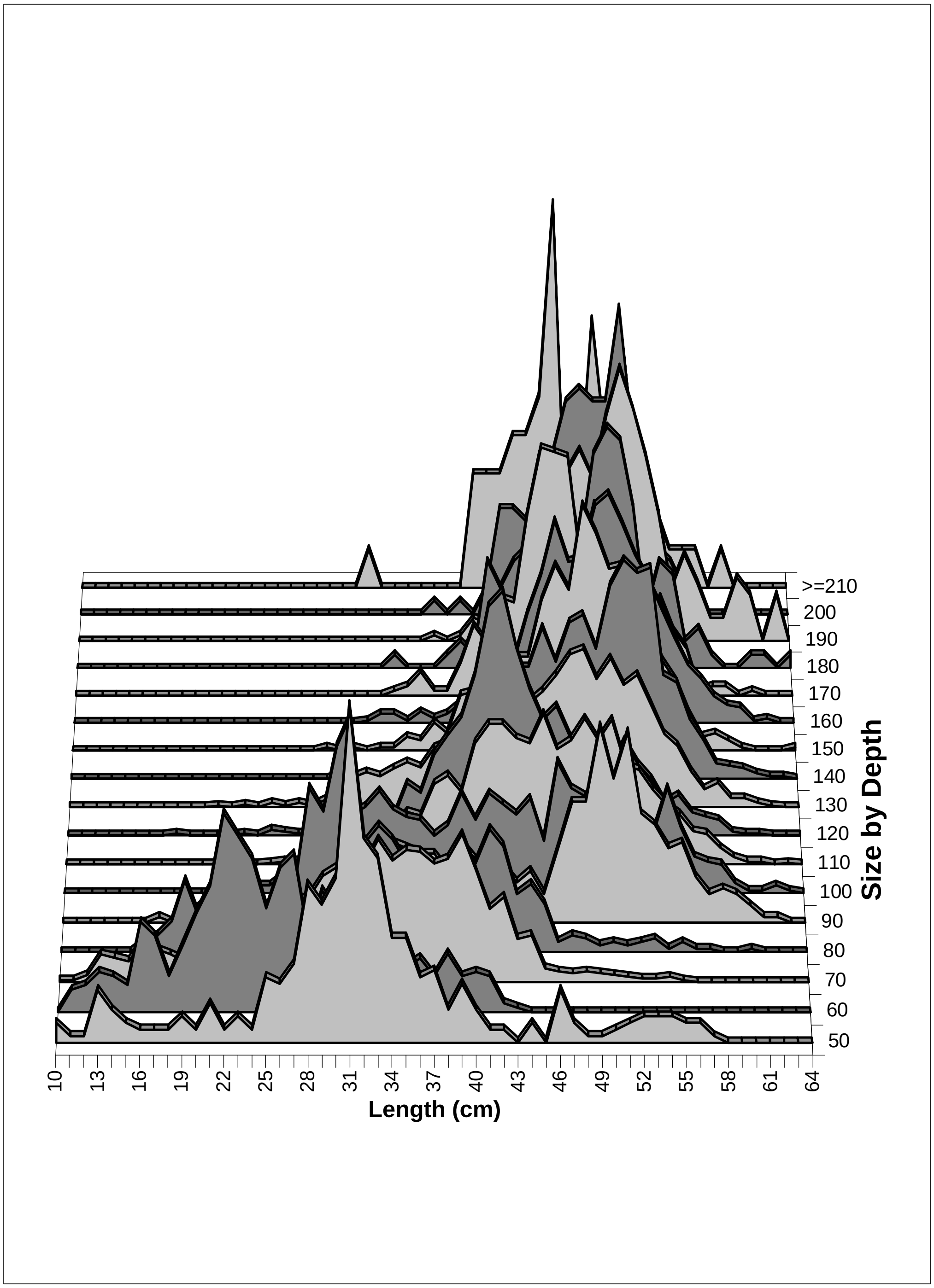


Figure 2. Size composition of canary rockfish in the bottom trawl survey stratified by 10 m depth intervals.

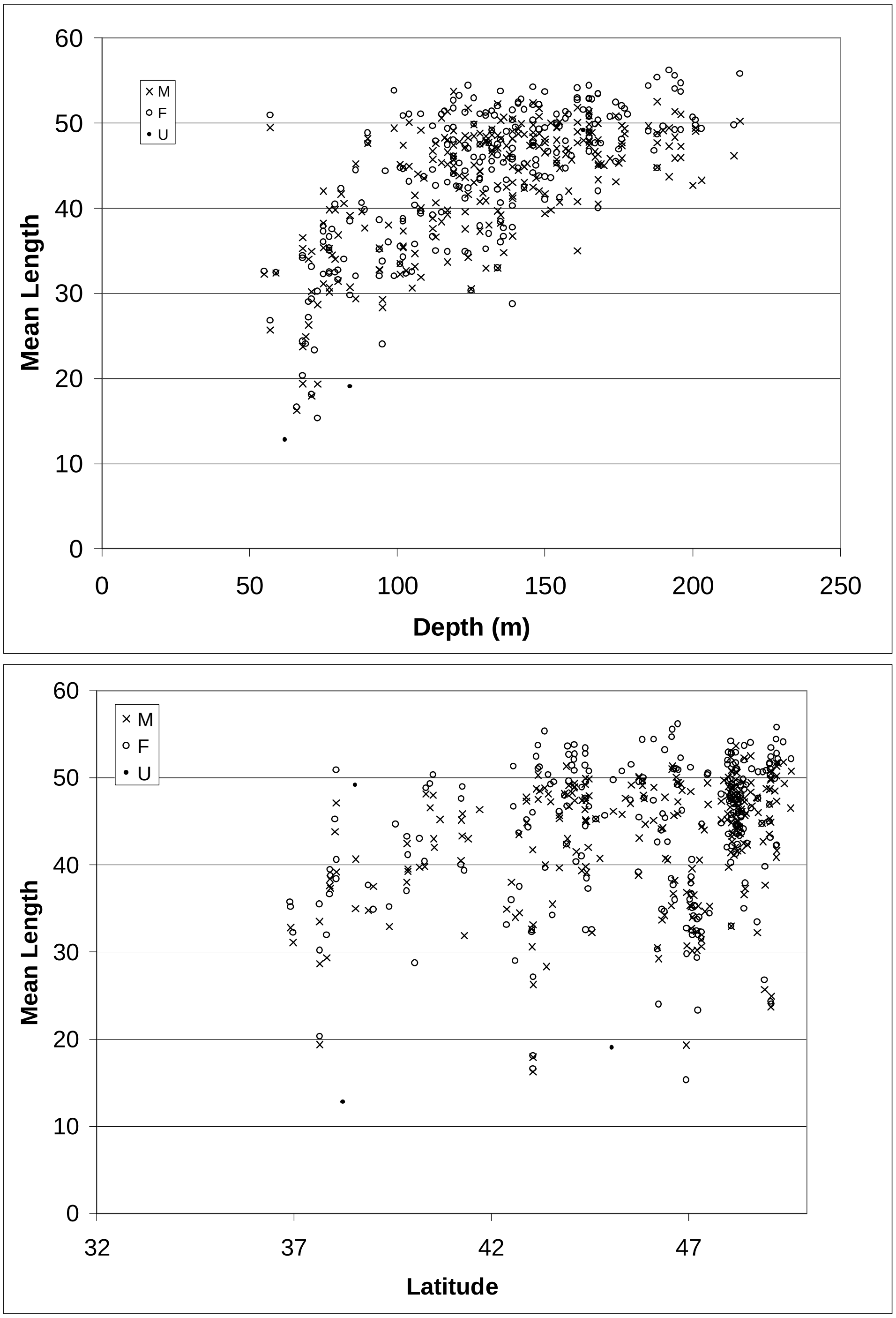


Figure 3. Bathymetric and latitudinal distribution of mean body length for each tow in the bottom trawl survey database, stratified by male (M), female (F), and unsexed (U).

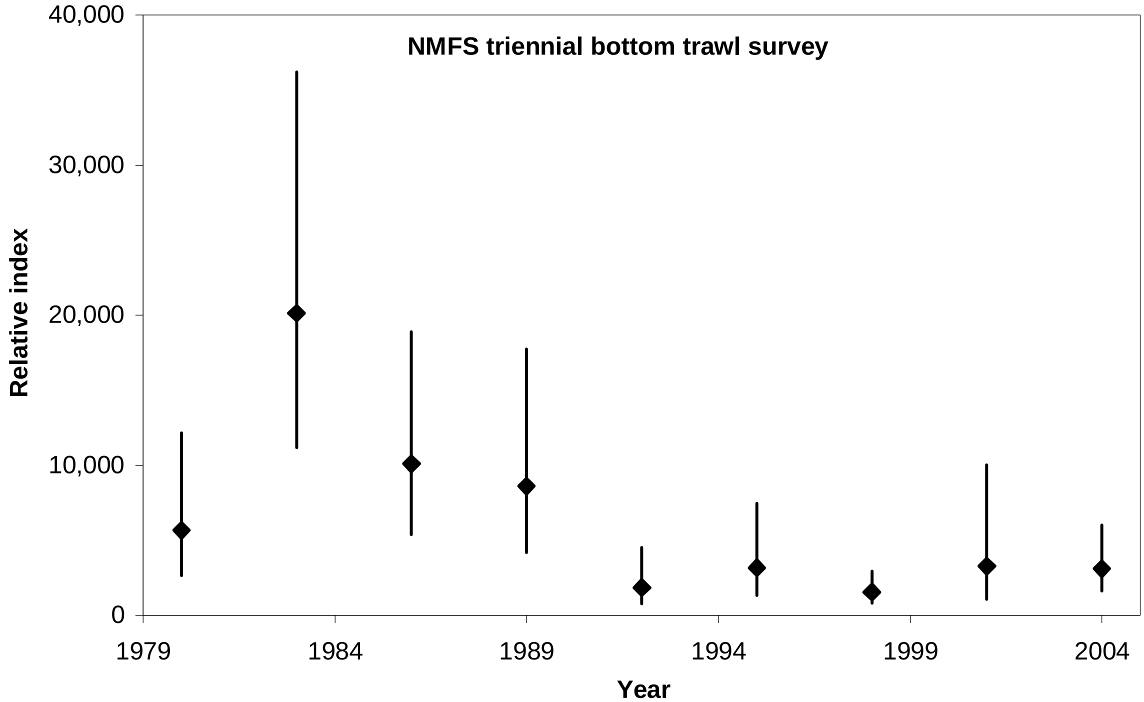
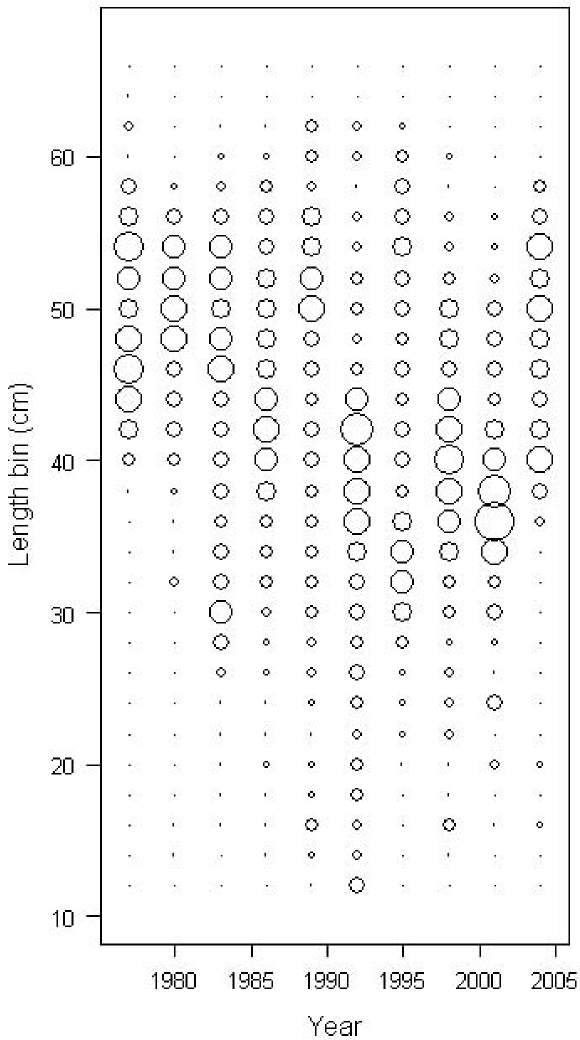


Figure 4. Time series of the bottom trawl biomass index with +/- 2 se (calculated as multiplicative error).



60
50
40
30
20
10
Length bin (cm)
1980
1985
1990
1995
2000
2005
Year

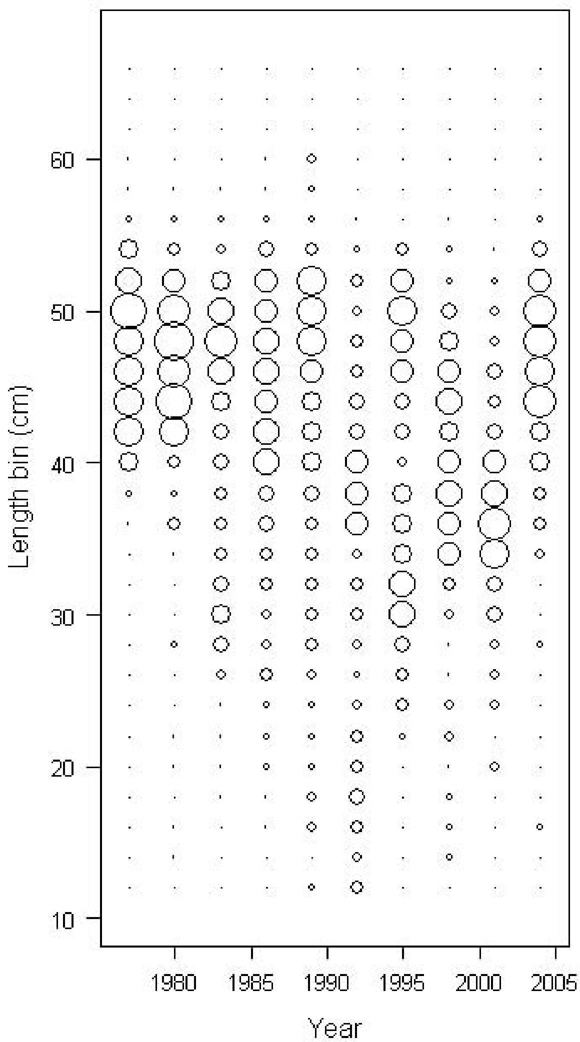
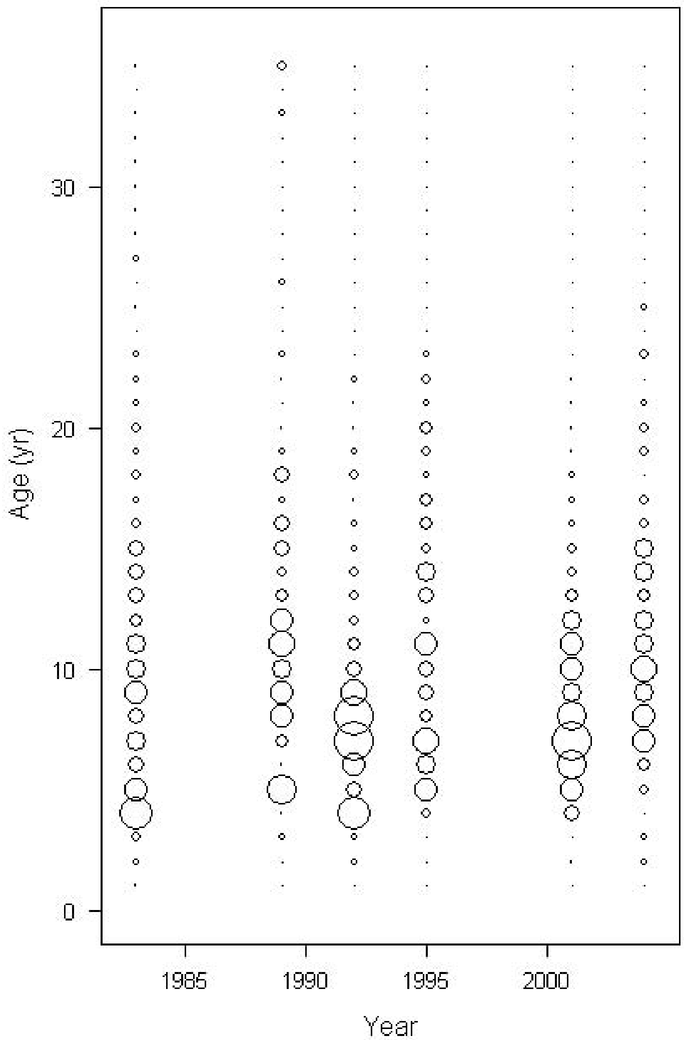


Figure 5. Length frequency distributions for female (left panel) and male (right panel) canary rockfish from the NMFS triennial bottom trawl survey. 1977 was not included in the base case model.



Age (yr)
30
20
10
0
1985
1990
1995
2000
Year

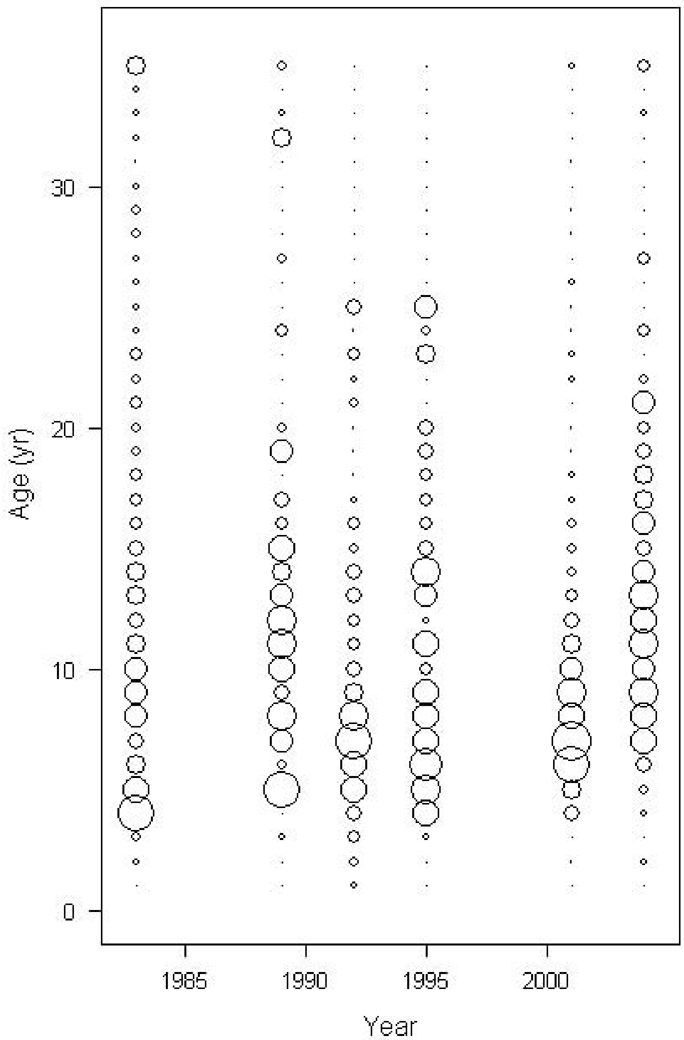


Figure 6. Age frequency distributions for female (left panel) and male (right panel) canary rockfish from the NMFS triennial survey.

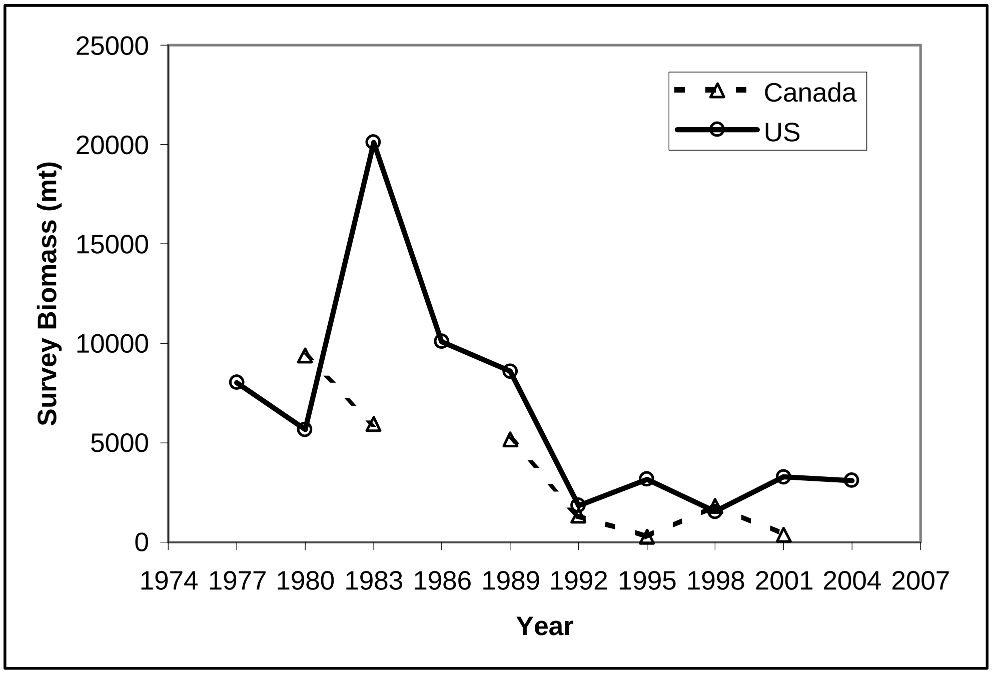


Figure 7. Trend in the bottom trawl survey biomass index in US and Canadian waters.

Figure 8. Ageing bias assumed in the assessment model based on bomb radiocarbon analysis of 16 canary rockfish otoliths (Data from: Piner et al., 2005).

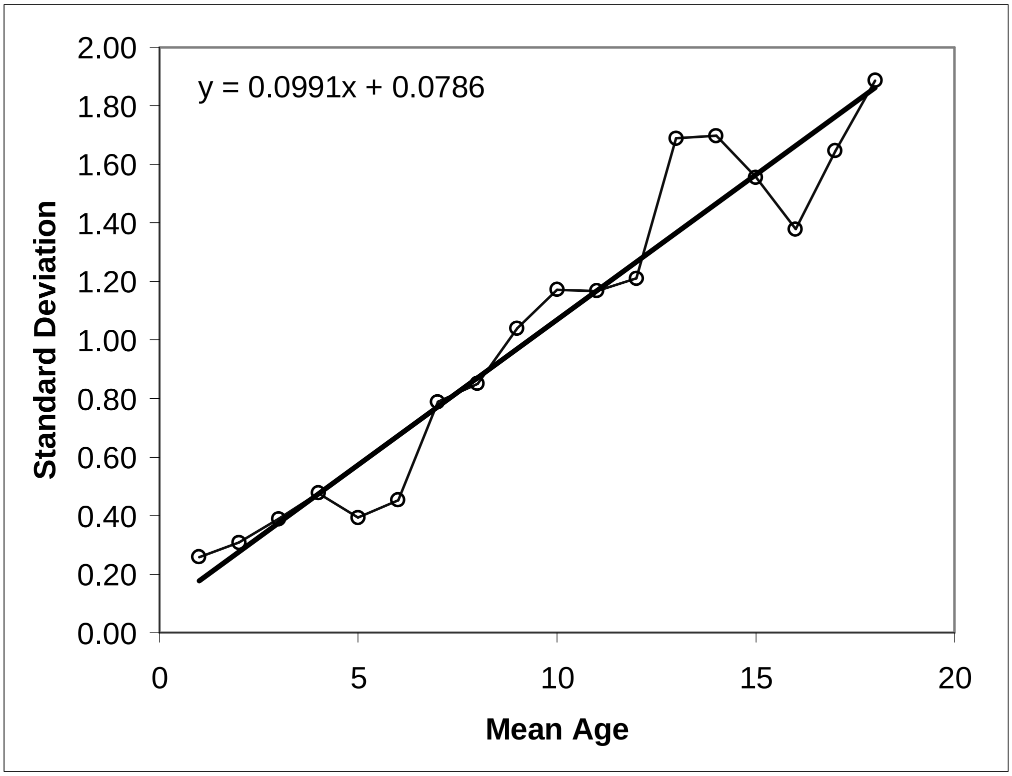


Figure 9. Linear relationship between mean reader age and estimated standard deviation of reader age based on fitting reader agreement data to a normal error model.

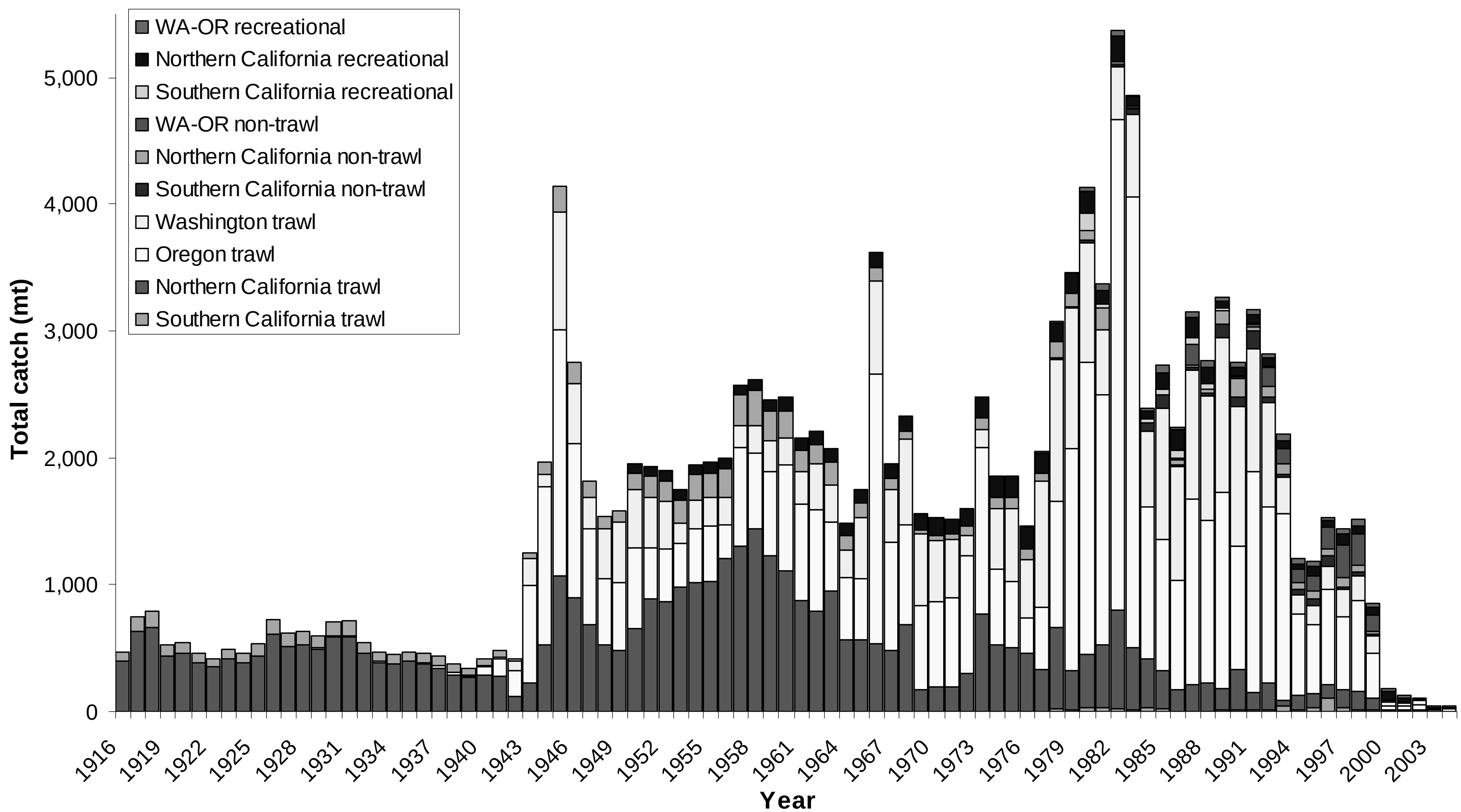


Figure 10. Time series of total catch used in the assessment model.

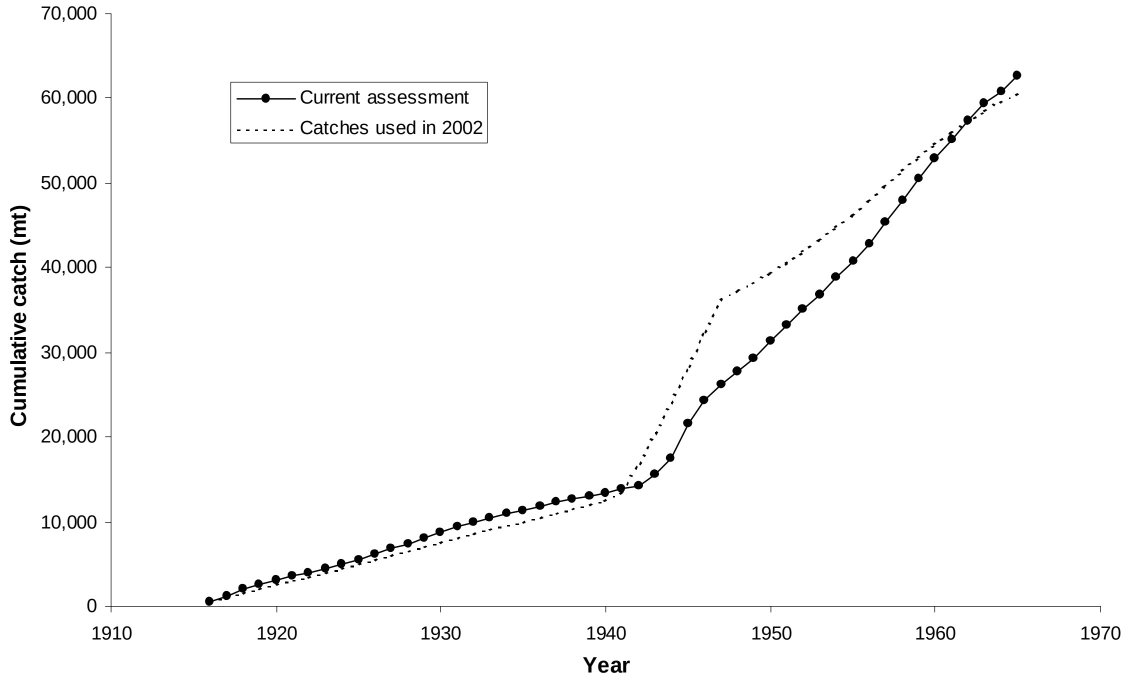


Figure 11. Comparison of cumulative canary rockfish removals prior to 1965 in the current assessment with those used in the 2002 assessment.

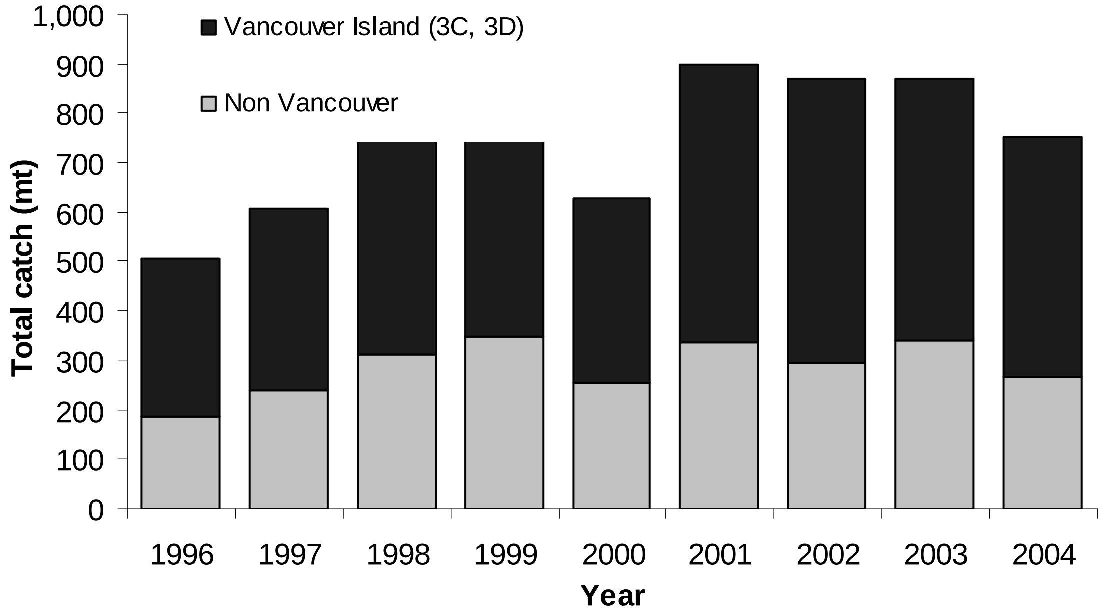


Figure 13. Recent commercial canary catches from Vancouver Island and other B.C. waters (Data courtesy of: R. Stanley, DFO).

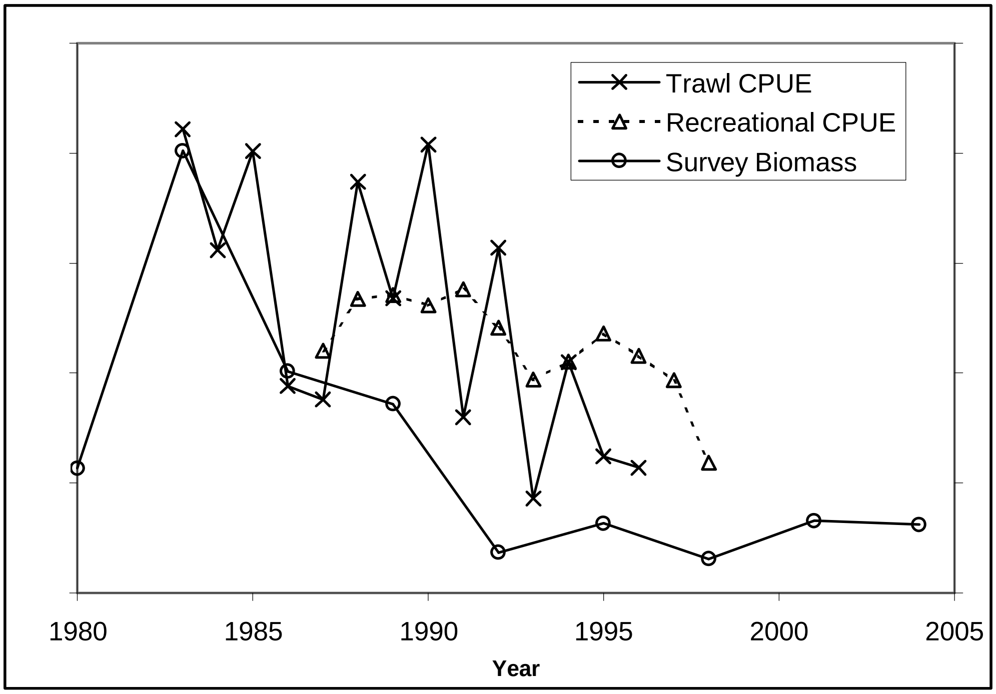


Figure 12. Time series of CPUE index for the northern California trawl fishery and the northern California partyboat CPUE, as compared to the survey biomass trend.

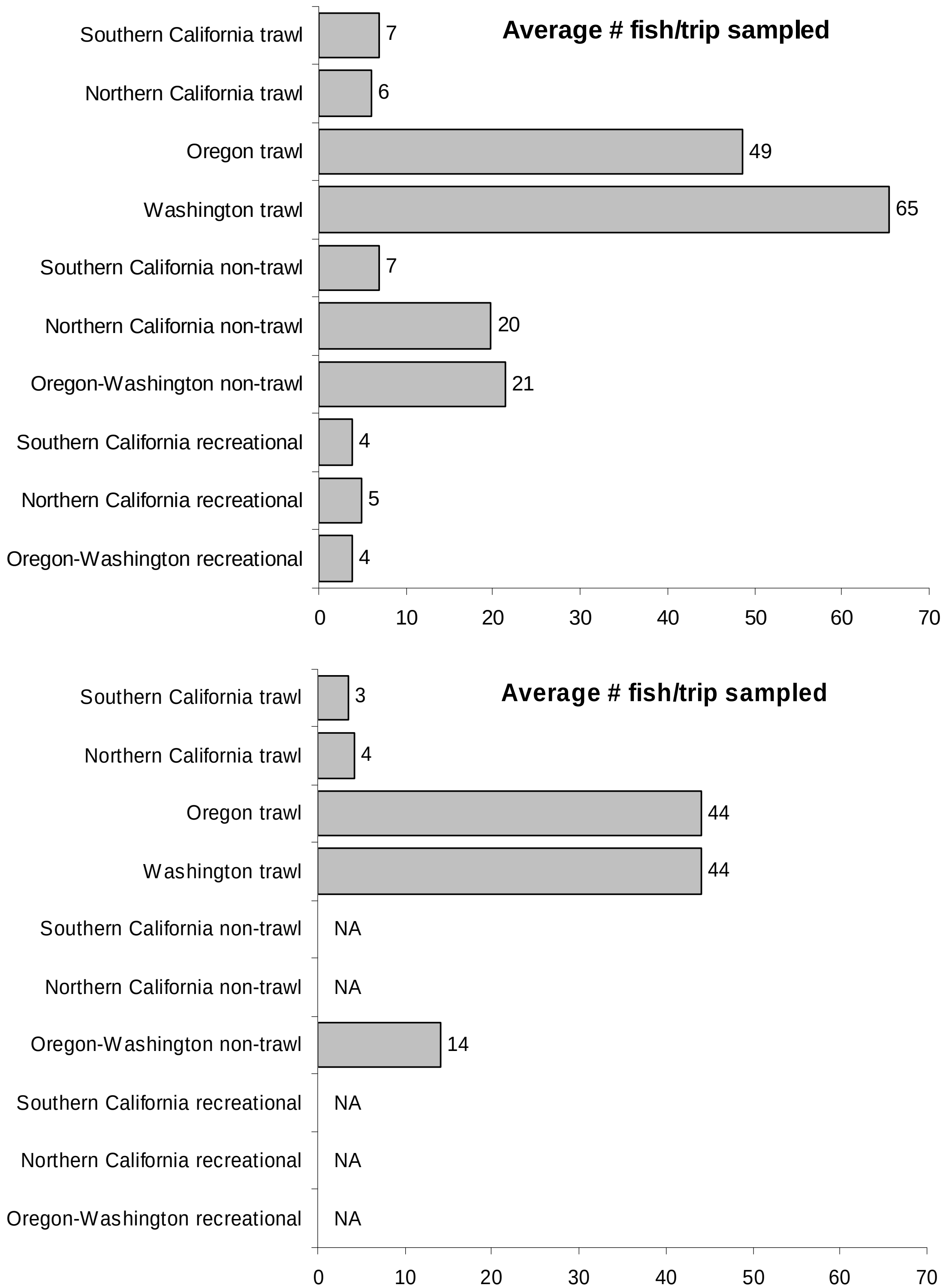


Figure 14. Summary of sampling intensity generating length frequency (Upper panel), and age frequency (lower panel) data used in the assessment model.

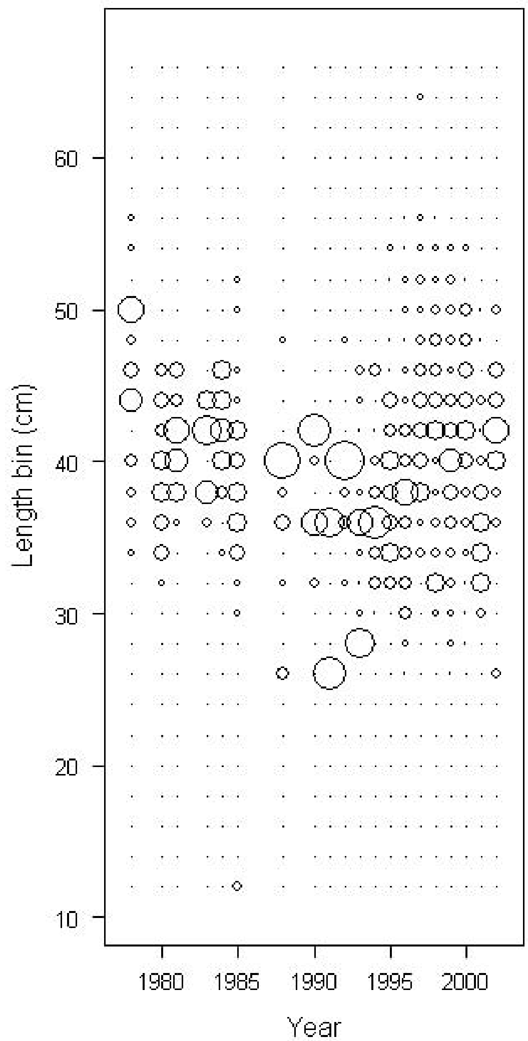


Figure 15. Length frequency data for the southern California trawl fleet, sexes combined. Where more than one year is combined into a super-year, the first year of the period displays the data.

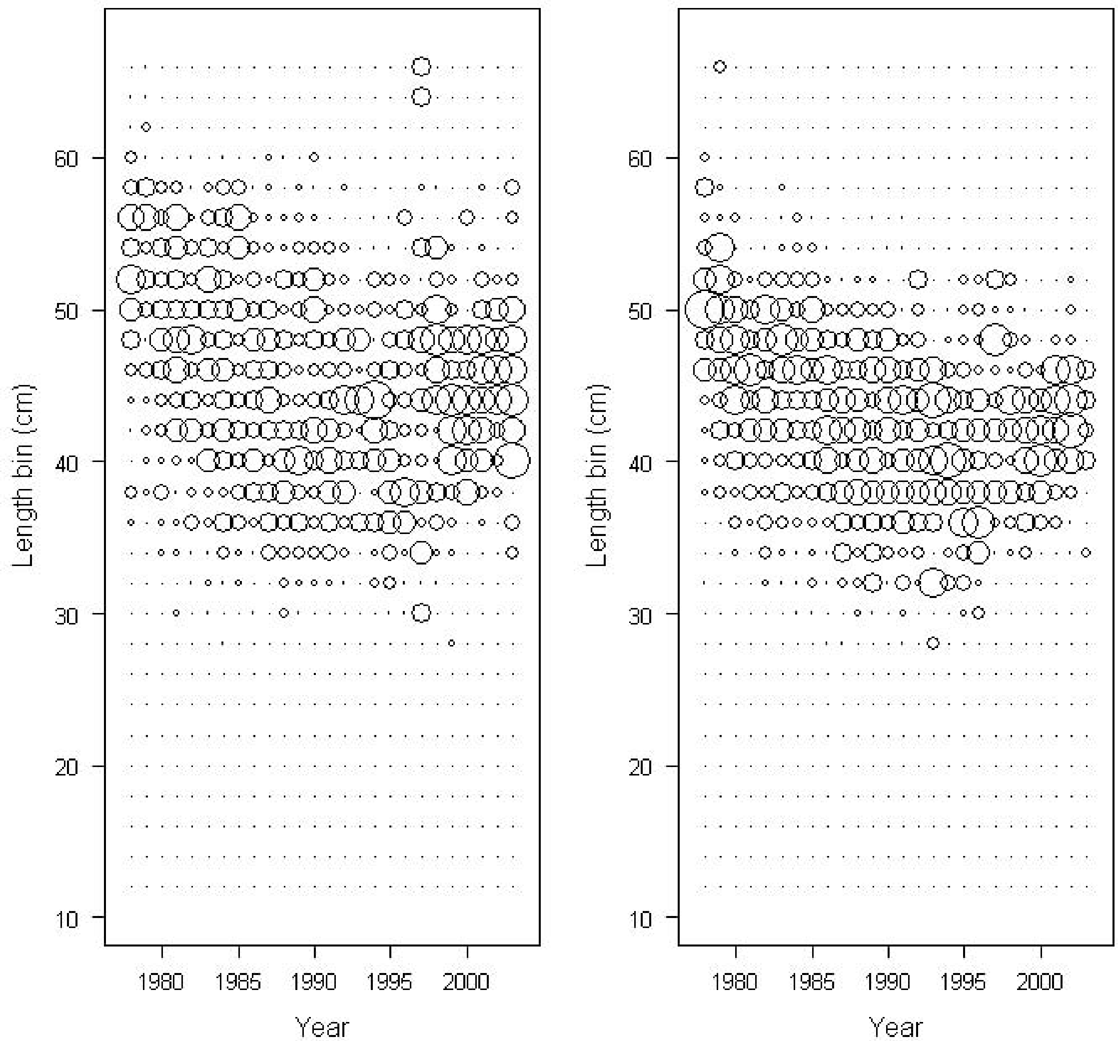


Figure 16. Length frequency data for female (left panel) and male (right panel) canary rockfish from the northern California trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

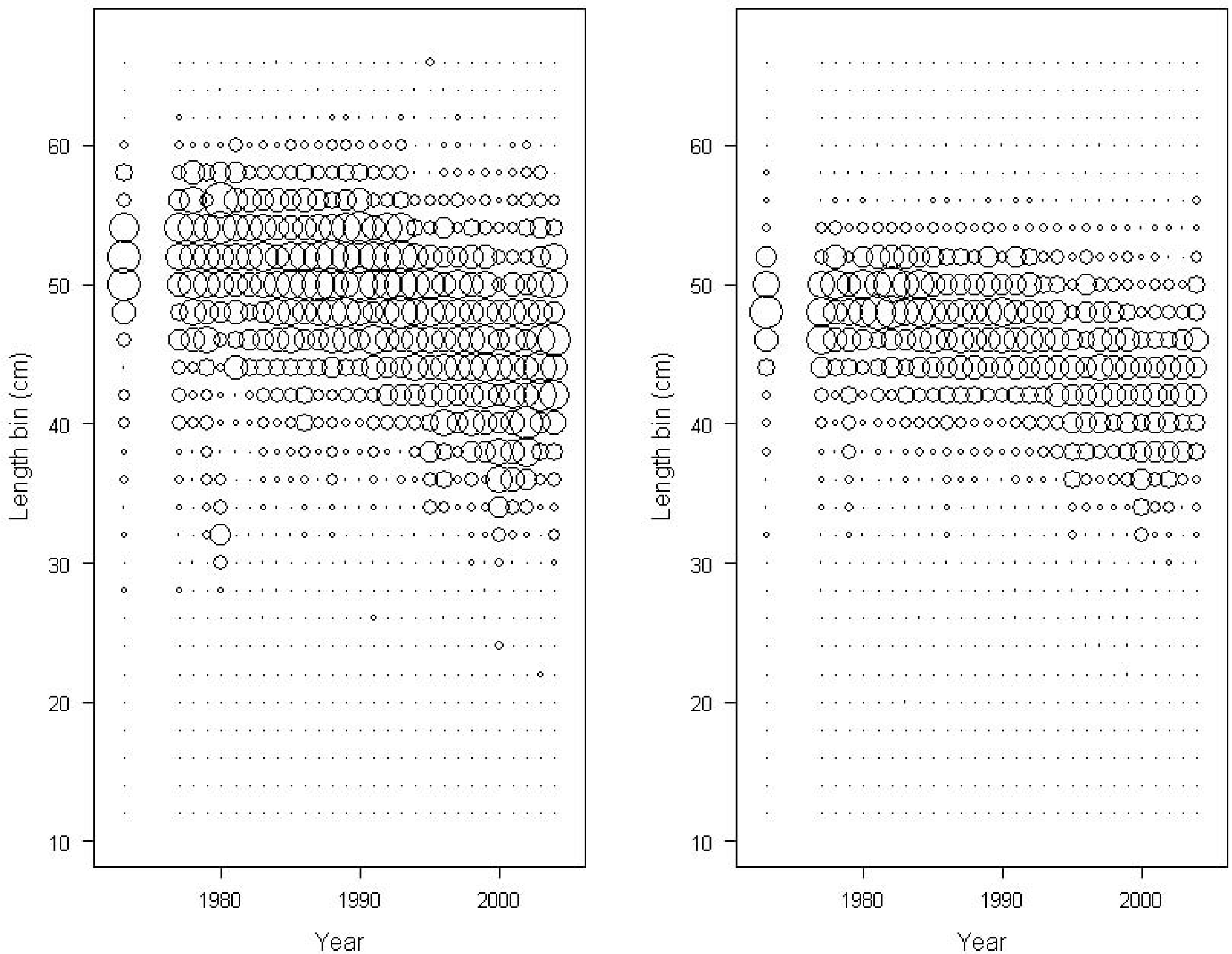


Figure 17. Length frequency data for female (left panel) and male (right panel) canary rockfish from the Oregon trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

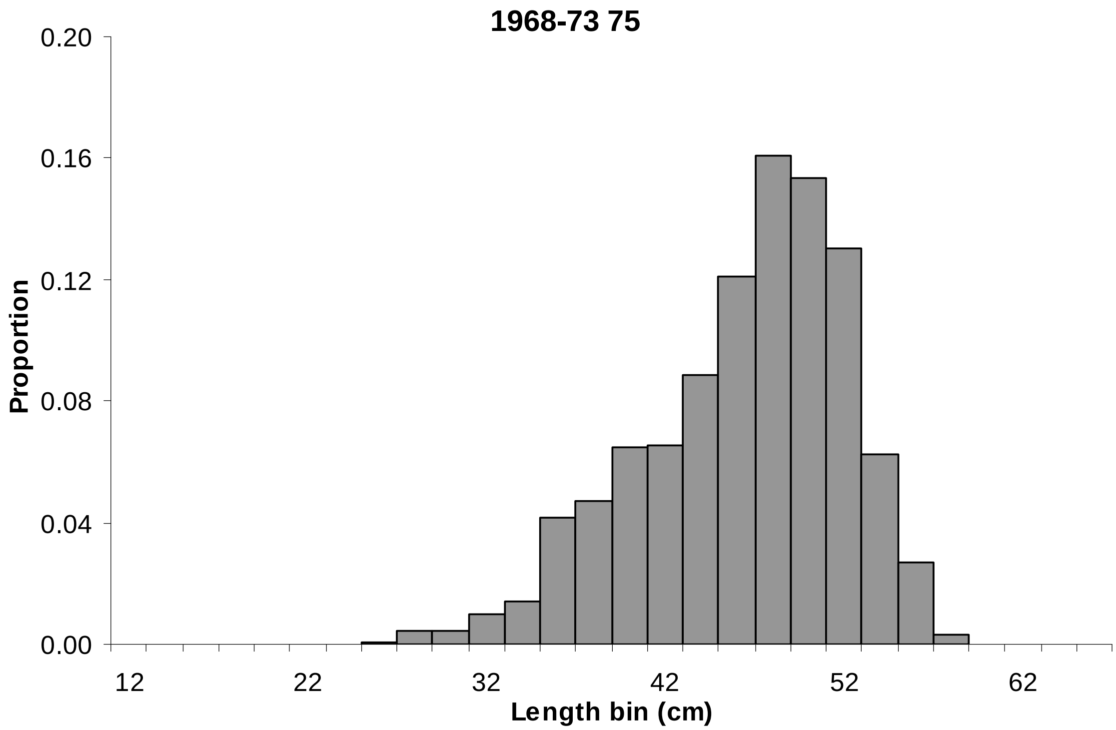


Figure 18. Length frequency data for canary rockfish from the Washington trawl fleet, sexes combined into a super-year.

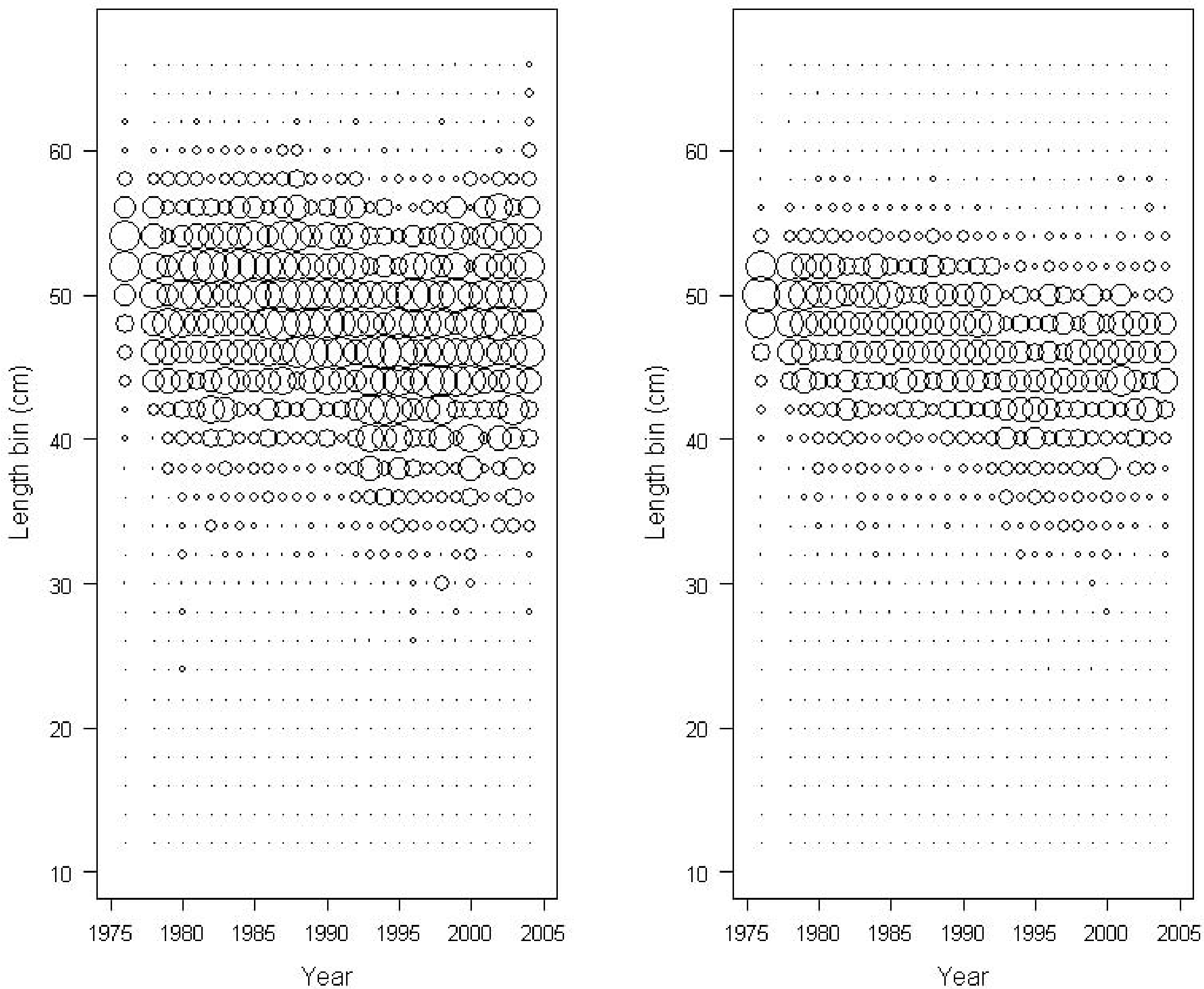


Figure 19. Length frequency data for female (left panel) and male (right panel) canary rockfish from the Washington trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

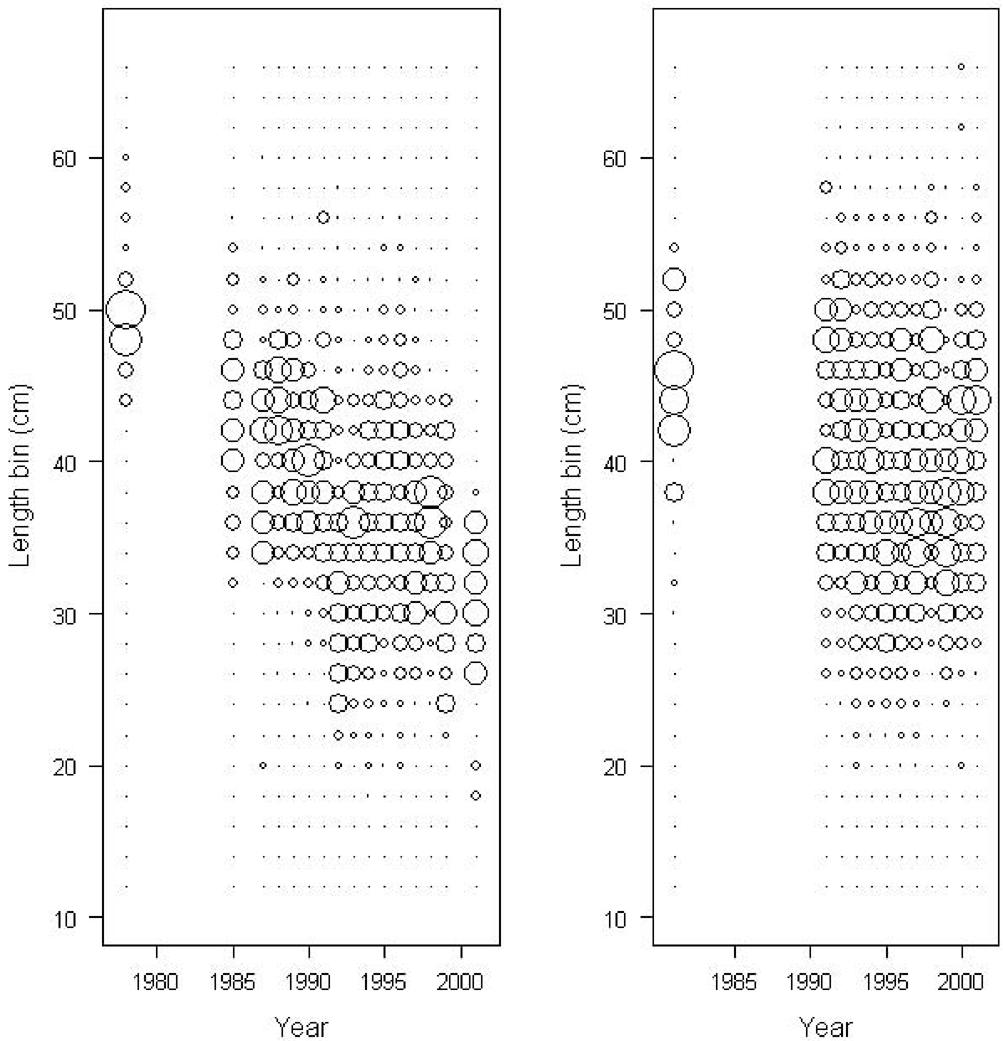


Figure 20. Length frequency data for canary rockfish from the southern (left panel) and northern (right panel) California non-trawl fleets, sexes combined. Where more than one year is combined into a super-year, the first year of the period displays the data.

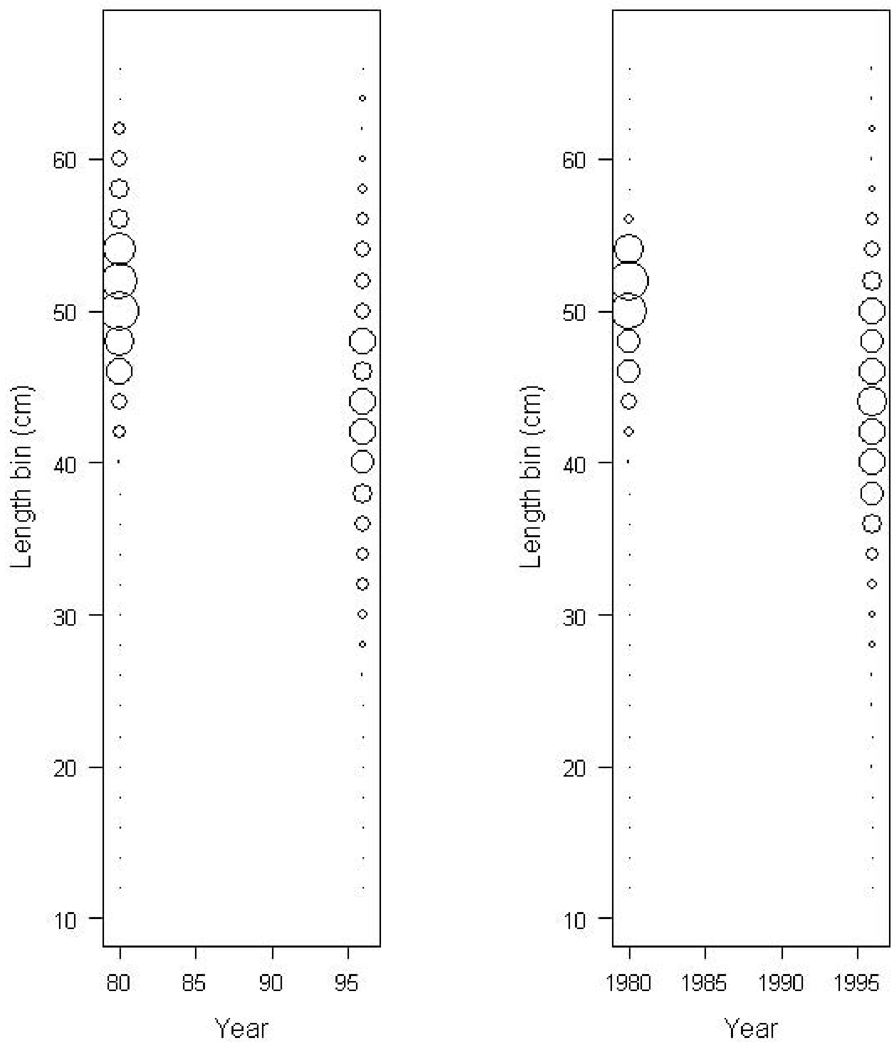


Figure 21. Length frequency data for female (left panel) and male (right panel) canary rockfish from the combined Oregon and Washington non-trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

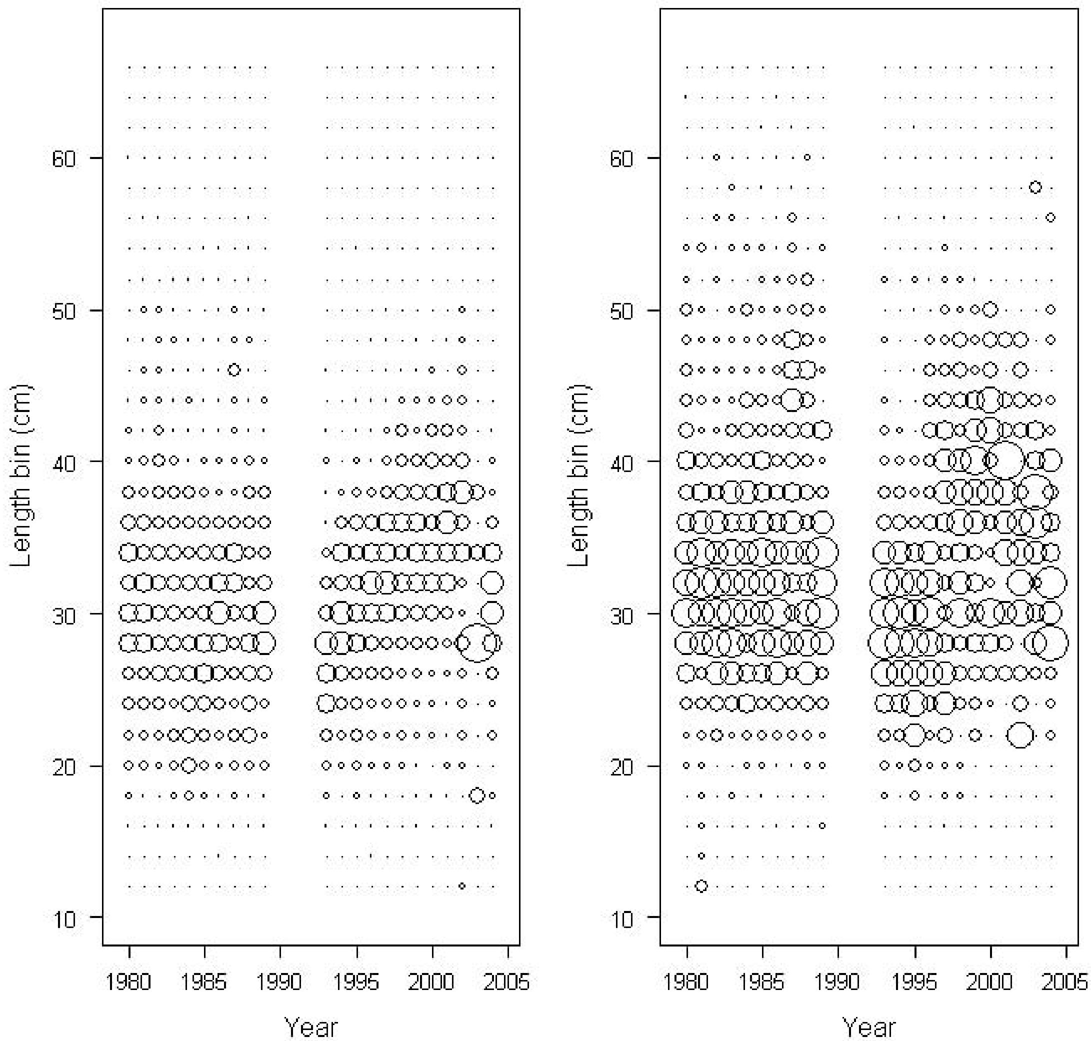


Figure 22. Length frequency data for canary rockfish from the southern (left panel) and northern (right panel) California recreational fleets, sexes combined.

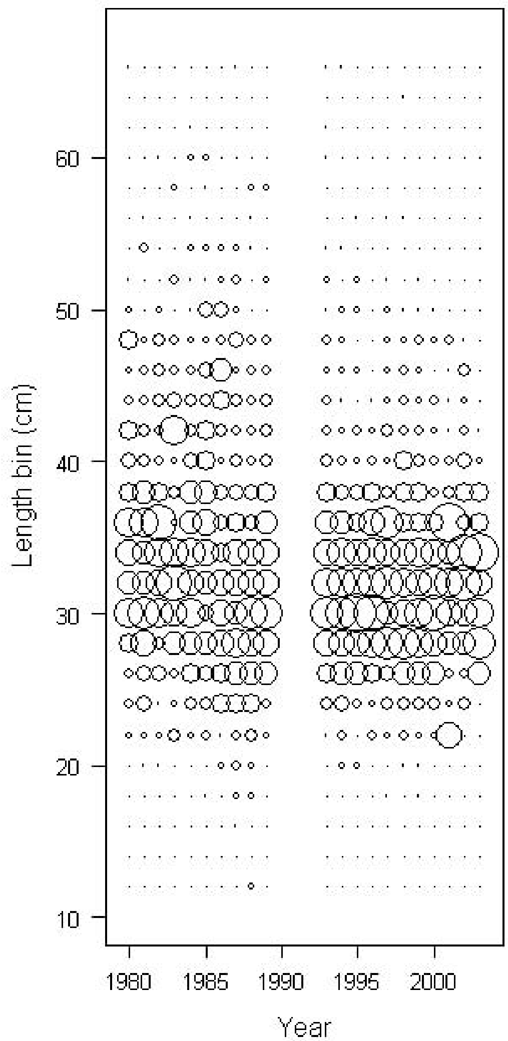


Figure 23. Length frequency data for canary rockfish from the Oregon and Washington recreational fleet, sexes combined.

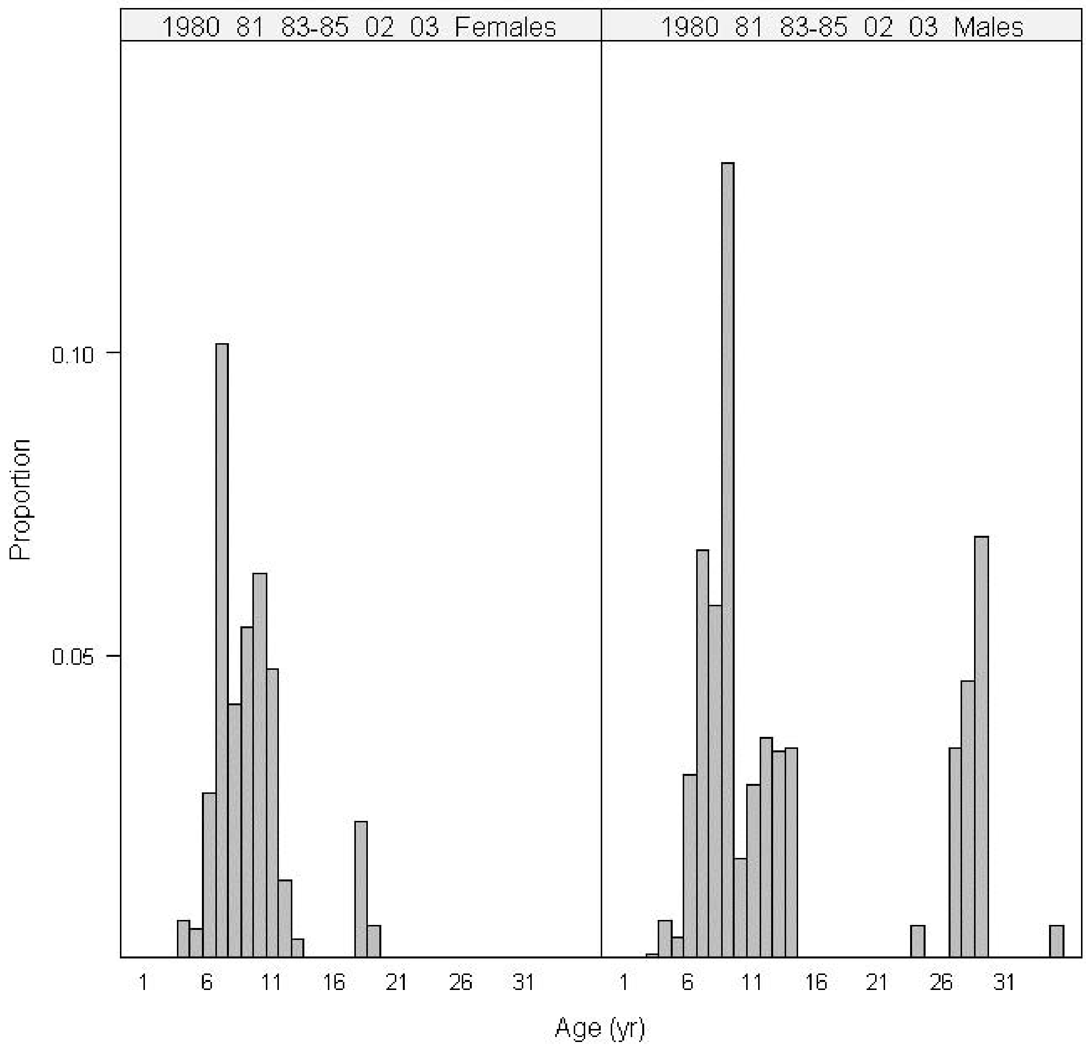


Figure 24. Aggregate age frequency data for canary rockfish from the Southern California trawl fleet. Years included in the super-year are identical for each sex and included in the panel header.

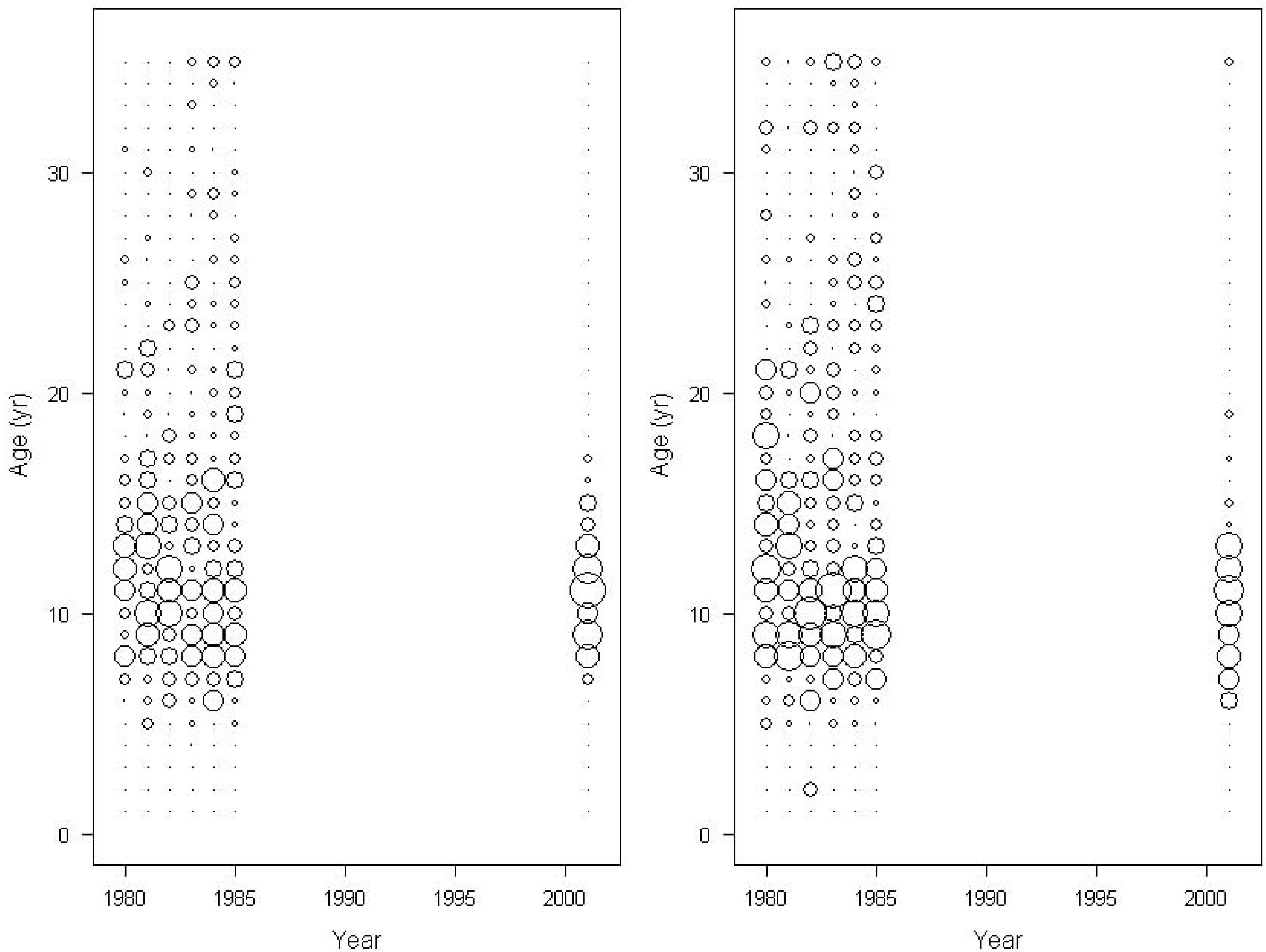


Figure 25. Age frequency data for female (left panel) and male (right panel) canary rockfish from the Northern California trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

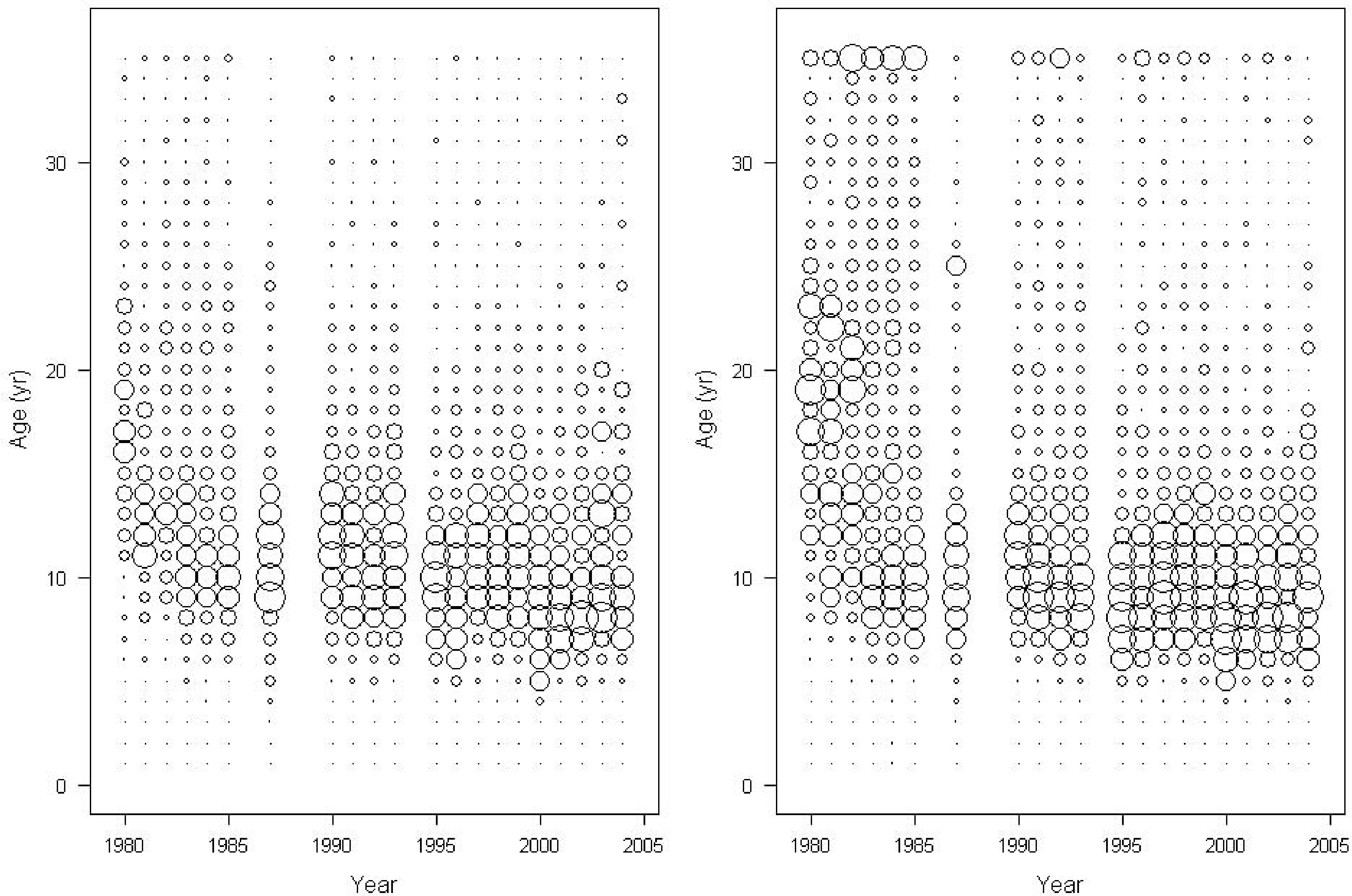


Figure 26. Age frequency data for female (left panel) and male (right panel) canary rockfish from the Oregon trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

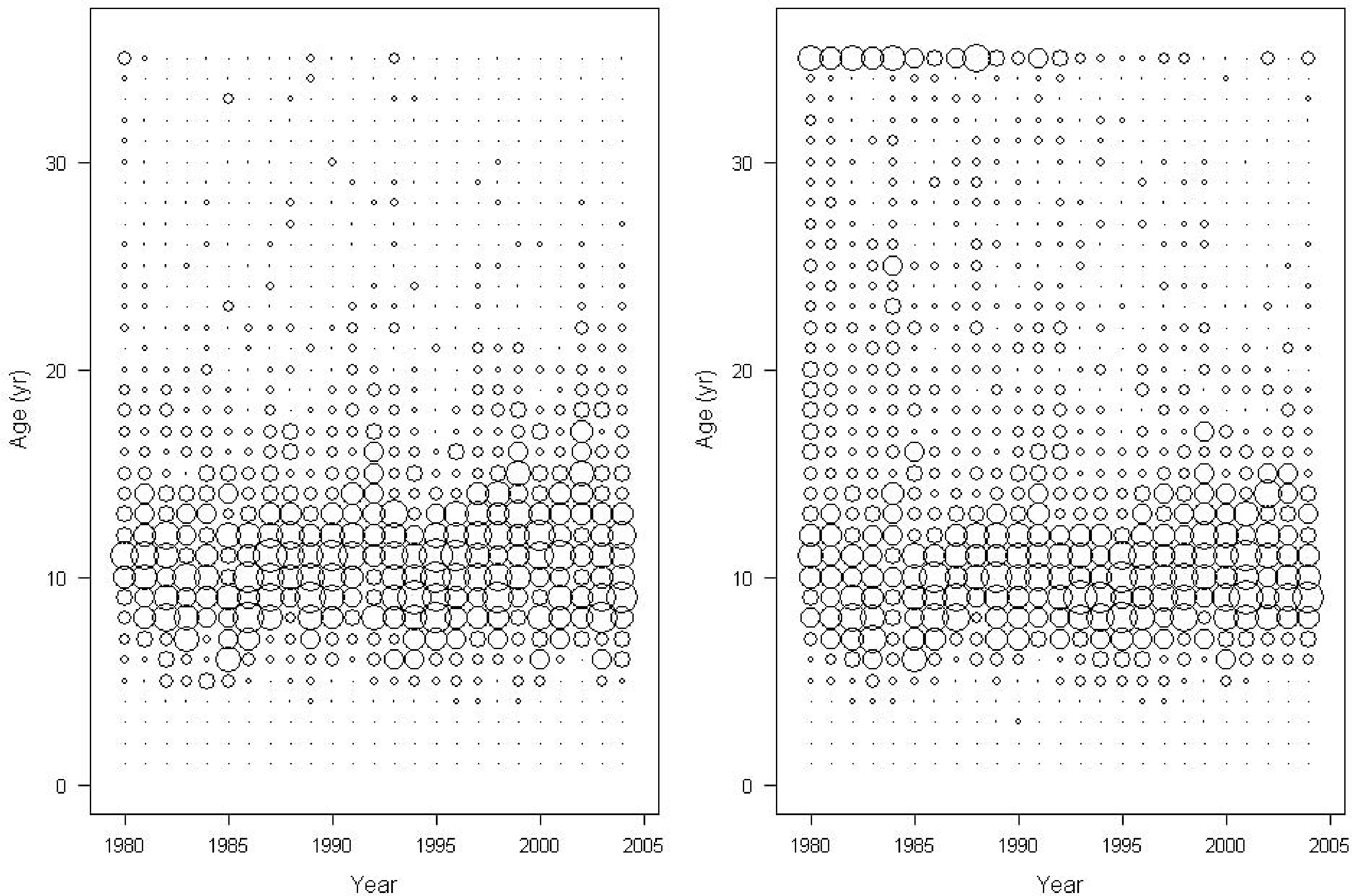


Figure 27. Age frequency data for female (left panel) and male (right panel) canary rockfish from the Washington trawl fleet. Where more than one year is combined into a super-year, the first year of the period displays the data.

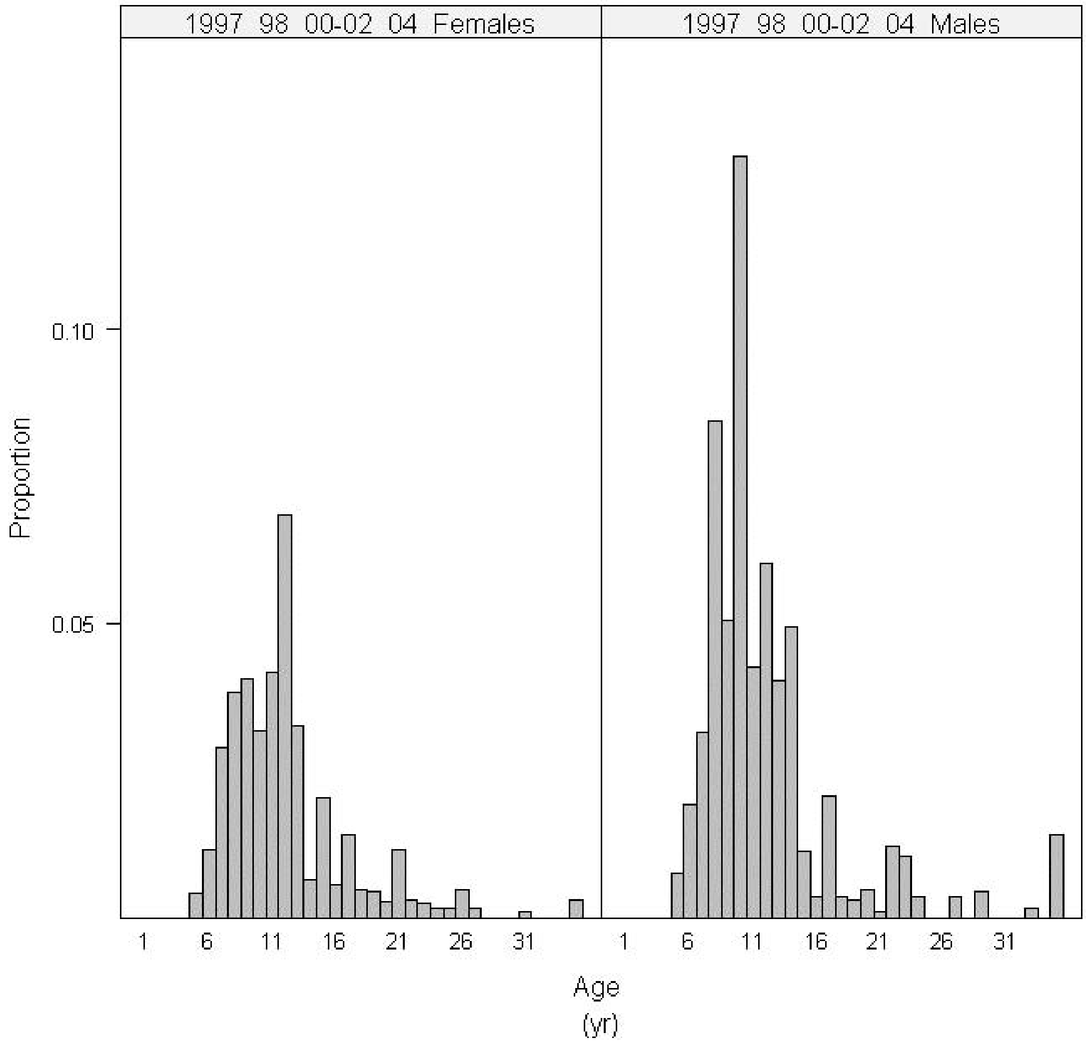


Figure 28. Aggregate age frequency data for canary rockfish from the Oregon and Washington non-trawl fleet. Years included in the super-year are identical for each sex and included in the panel header.

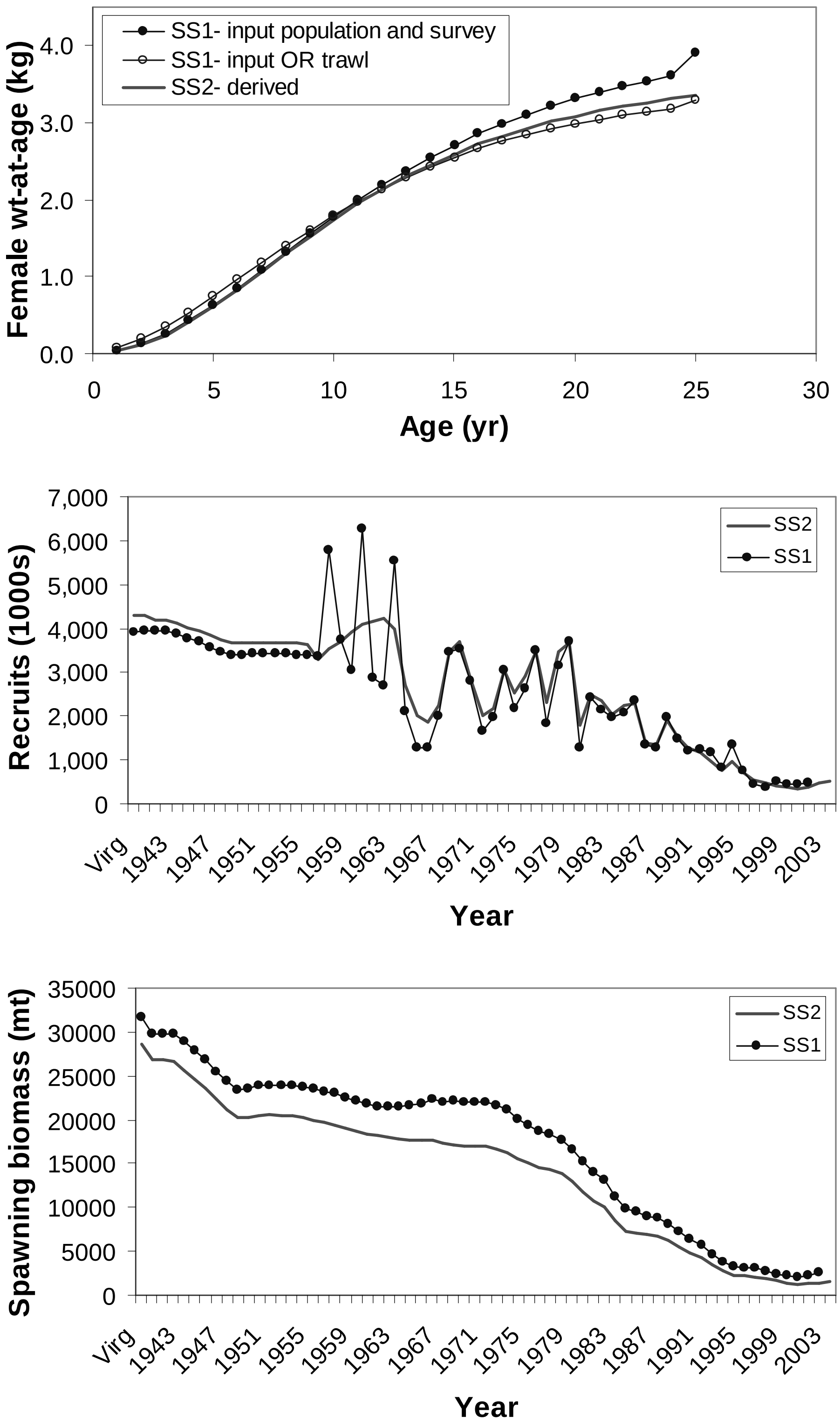


Figure 29. Comparison of results between SS1 and SS2 using the 2002 database and biological parameters and similar scenarios regarding selectivity.

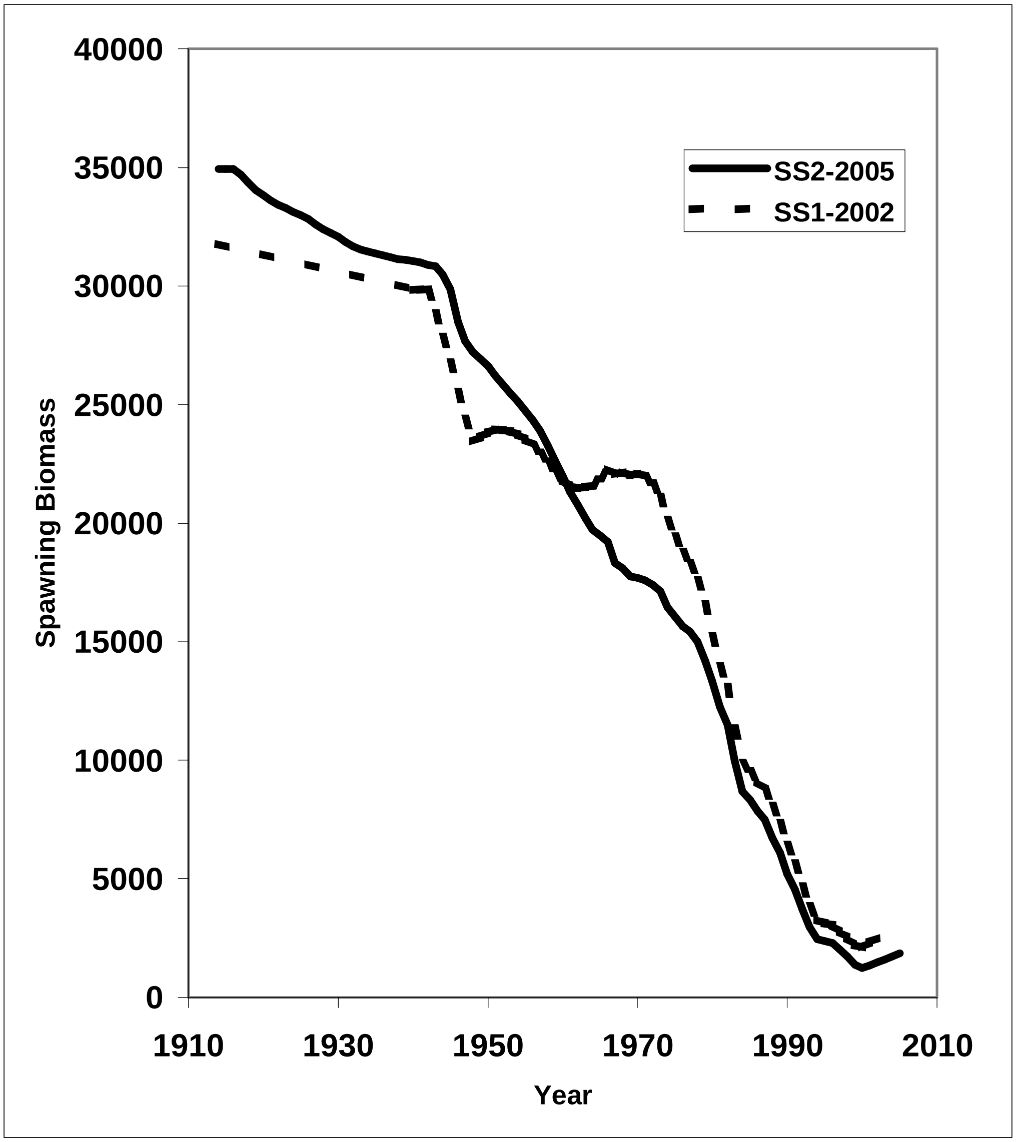


Figure 30. Comparison of spawning biomass from the 2002 assessment result and the 2005 base case.

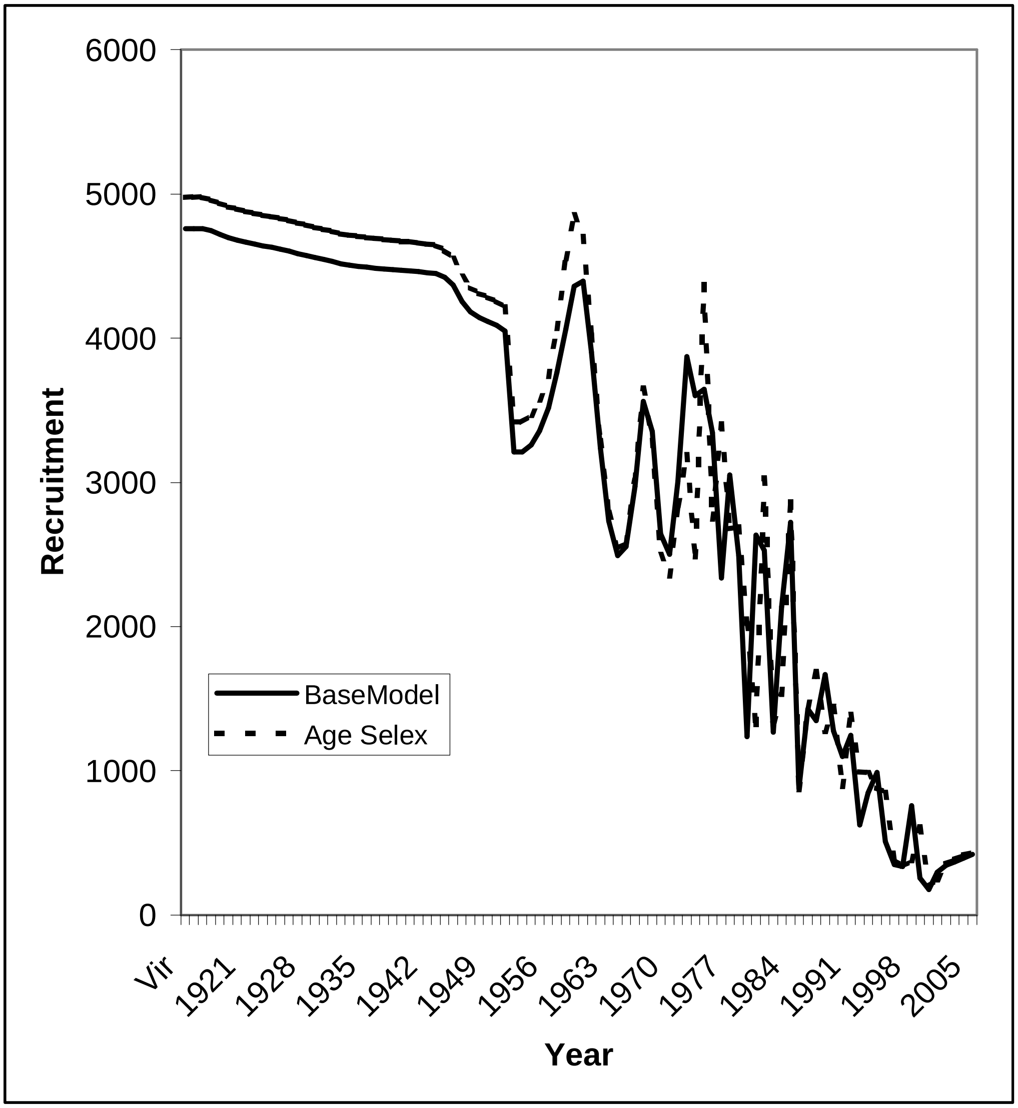


Figure 31. Estimates of recruitment time series with base model and with model using age selectivity.

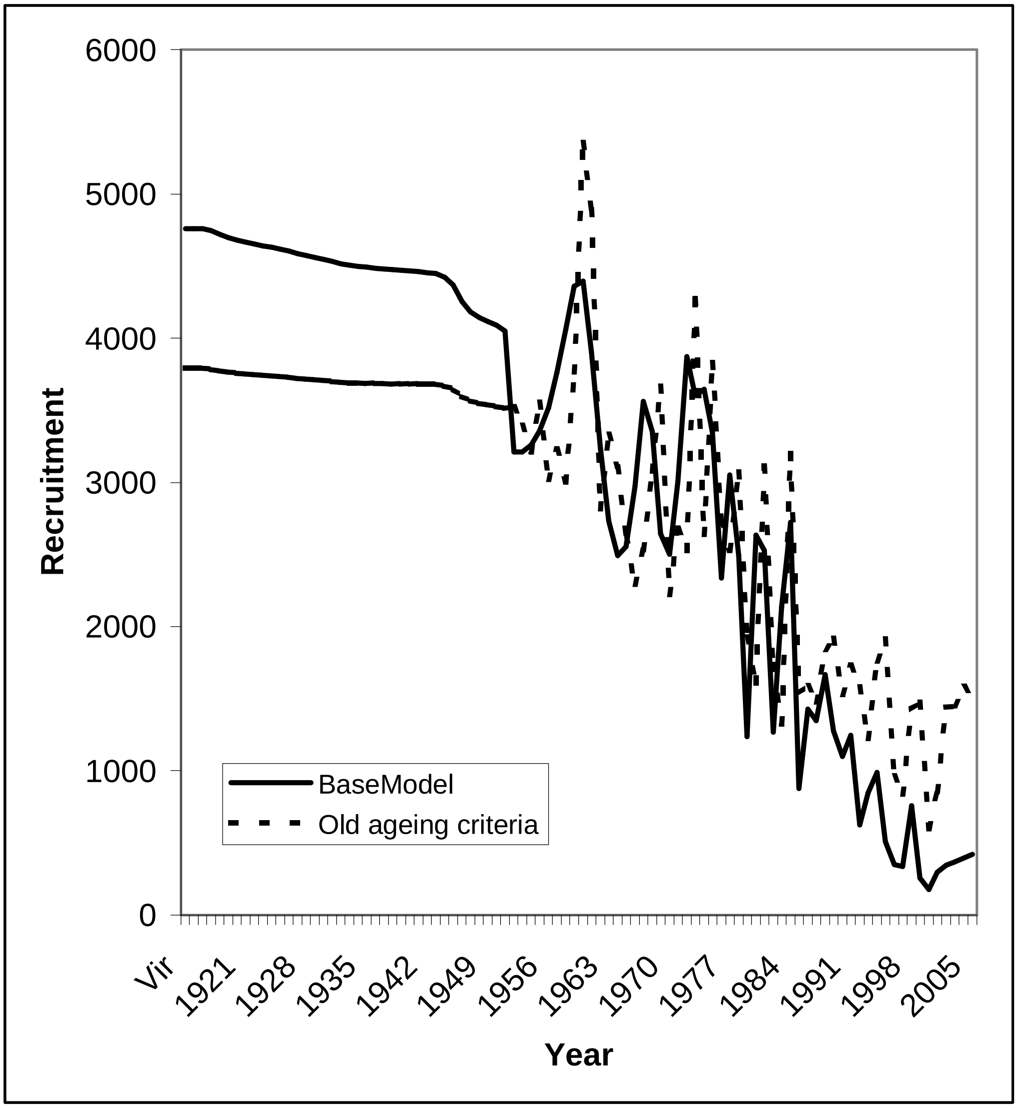


Figure 32. Comparison of the recruitment time-series from the base case model to an alternative that uses the previous age criteria.

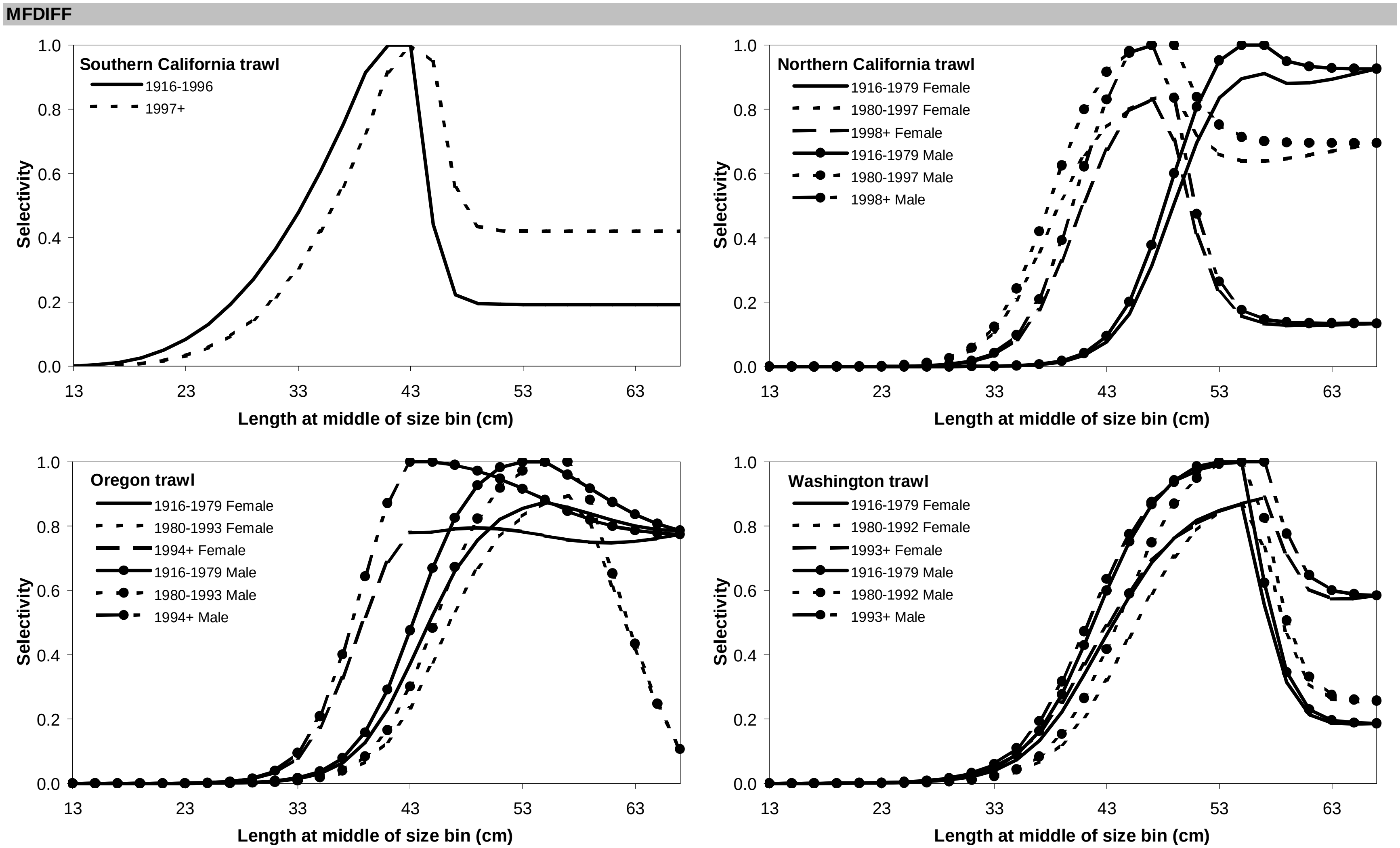


Figure 33. Length-based selectivity in the base (DIFF) model for the four trawl fisheries for each defined time block. The year in the label is the first year of the time block.

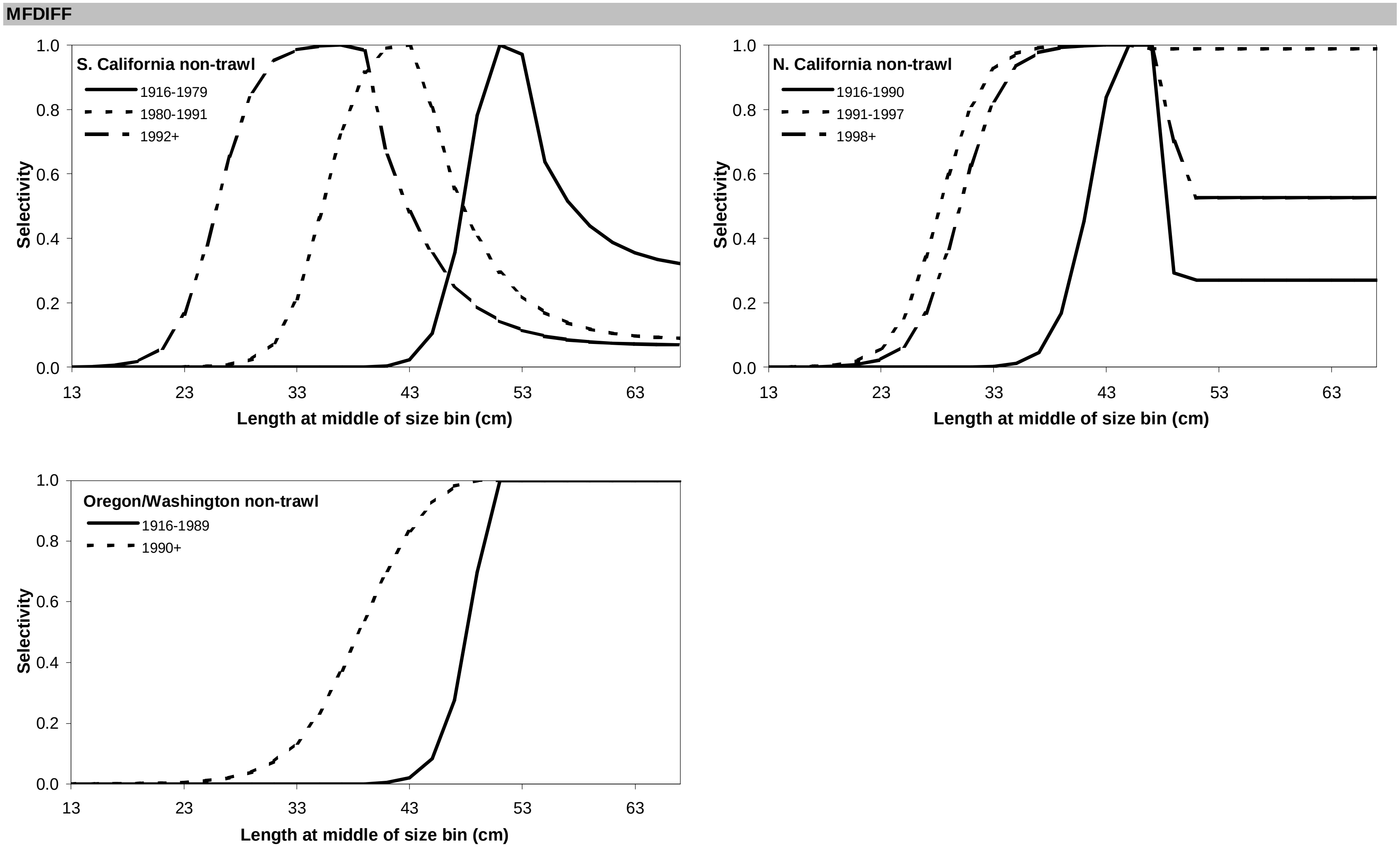


Figure 33. continued. Length-based selectivity estimated for the non-trawl fisheries in the base (DIFF) model.

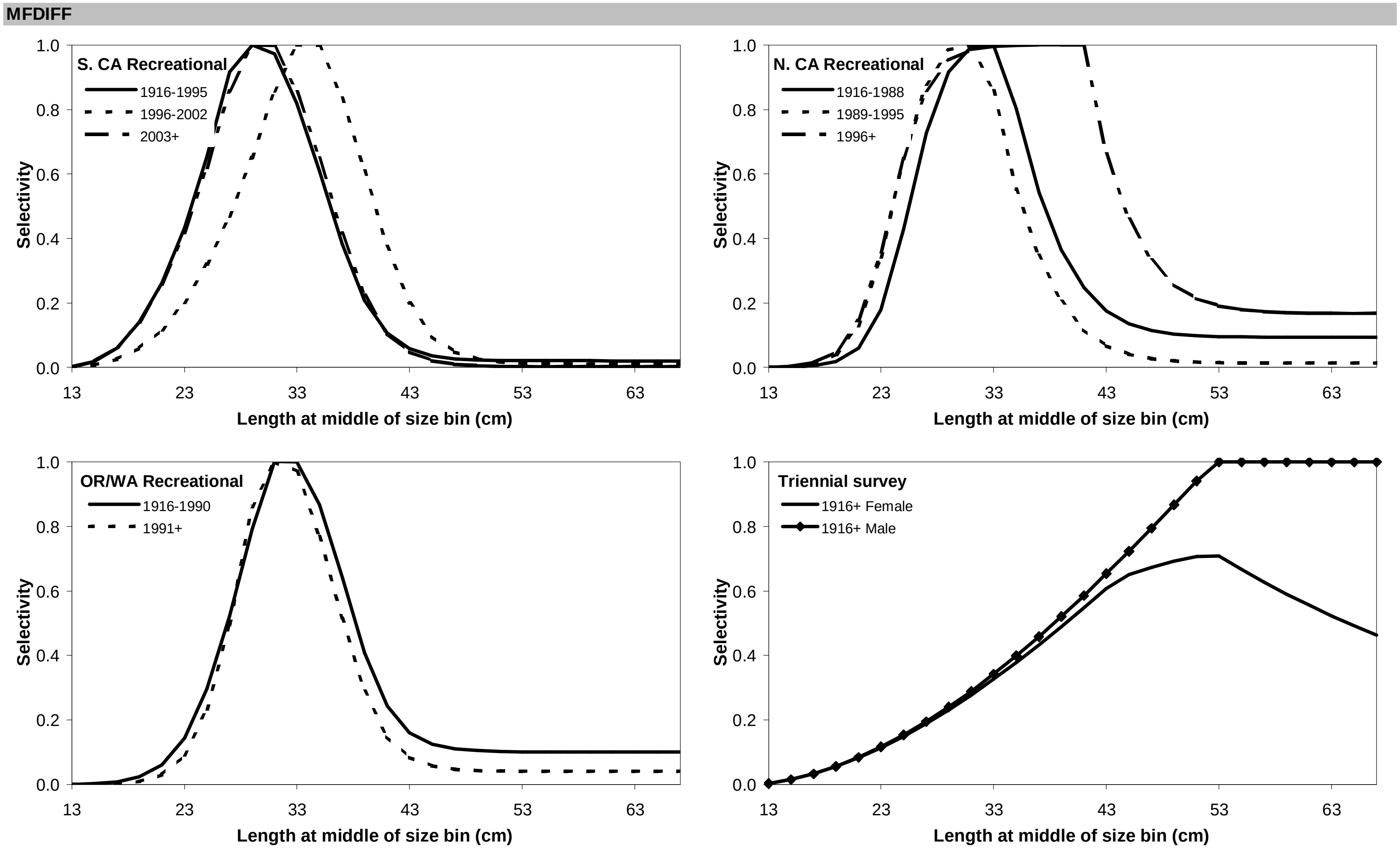


Figure 33. continued. Length-based selectivity estimated for the recreational fisheries and trawl survey in the base (DIFF) model.

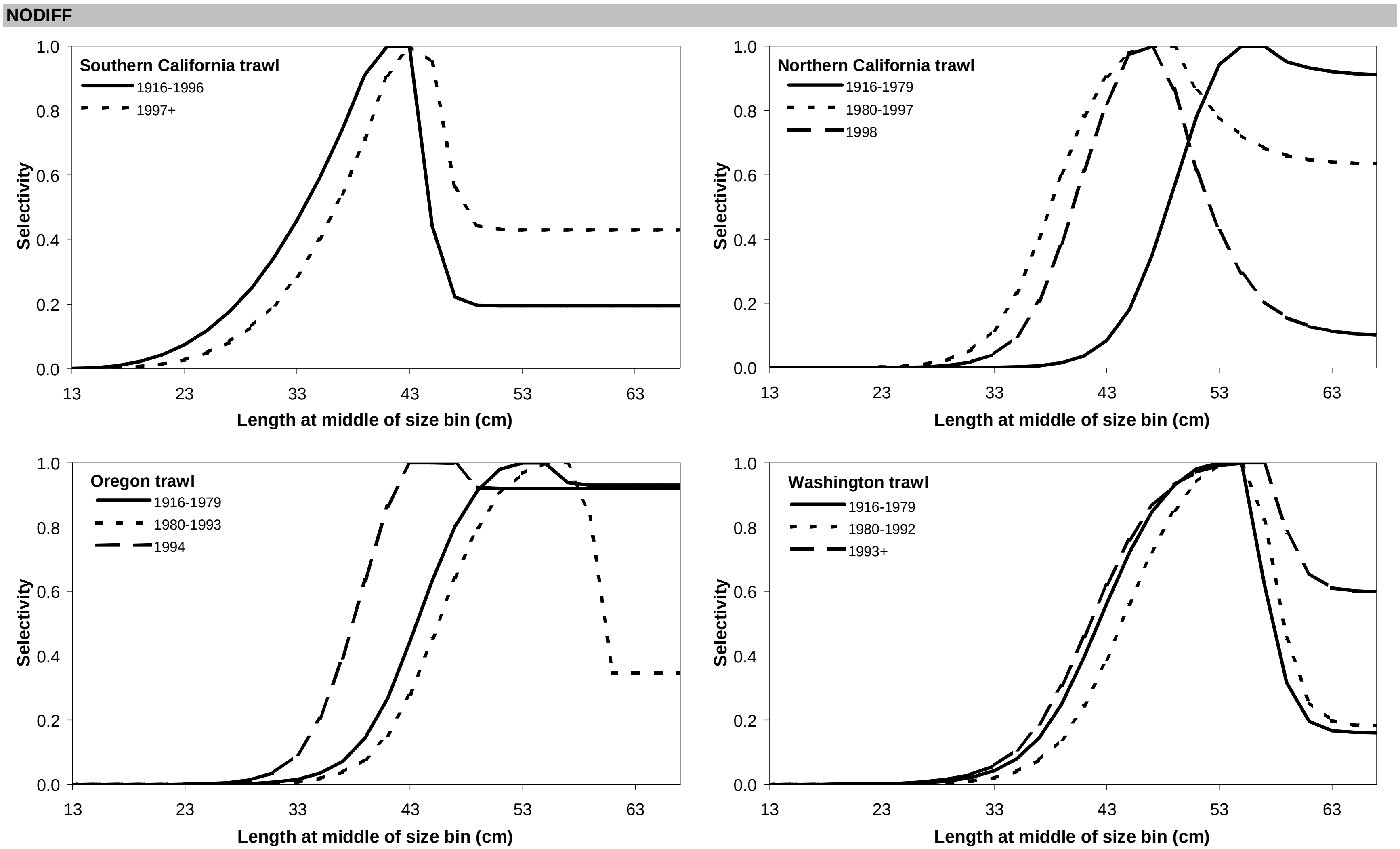


Figure 33. continued. Length-based selectivity estimated for the trawl fisheries in the alternate (NoDIFF) model.

NODIFF

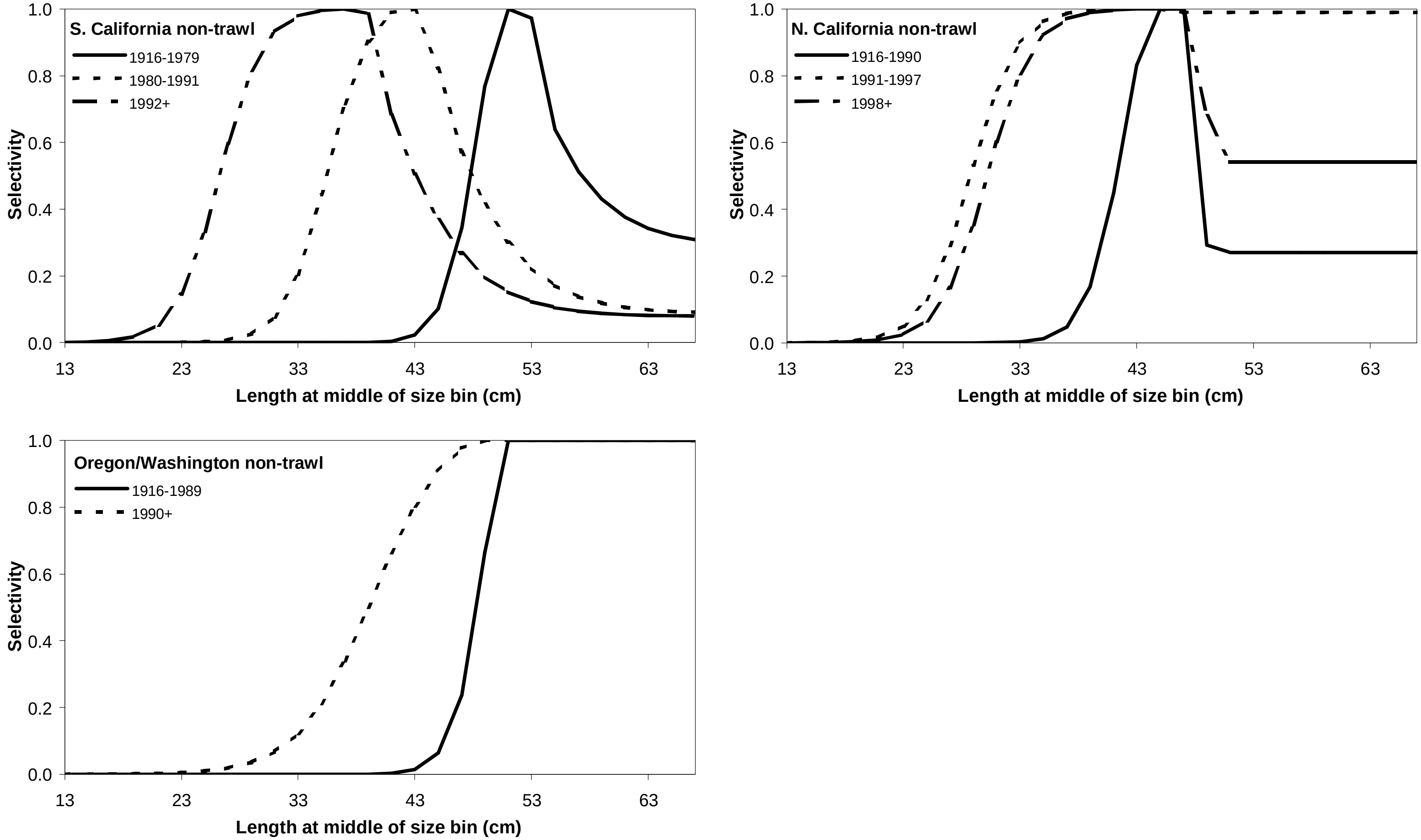


Figure 33. continued. Length-based selectivity estimated for the non-trawl fisheries in the alternate (NoDIFF) model.

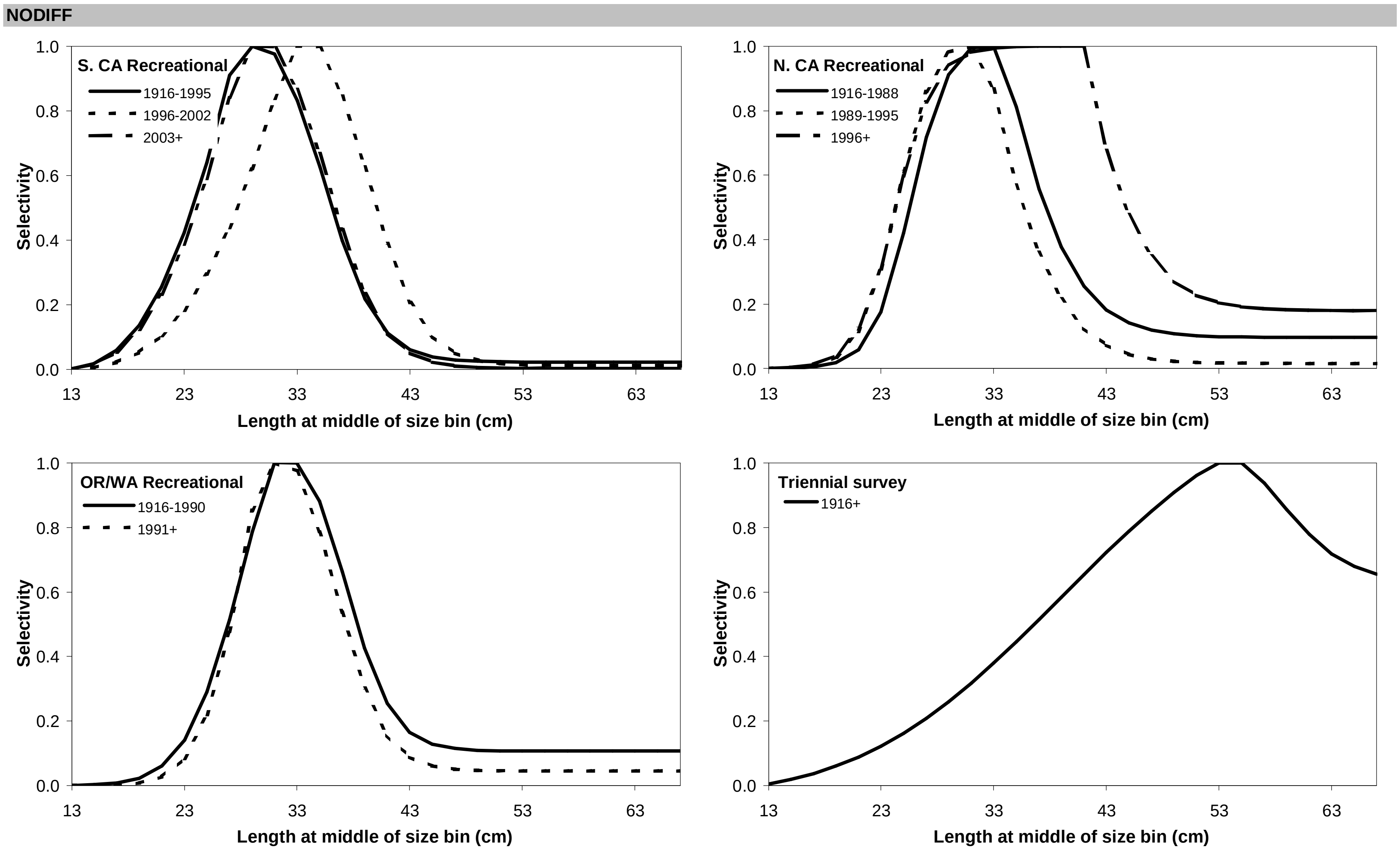


Figure 33. continued. Length-based selectivity estimated for the recreational fisheries and trawl survey in the alternate (NoDIFF) model.

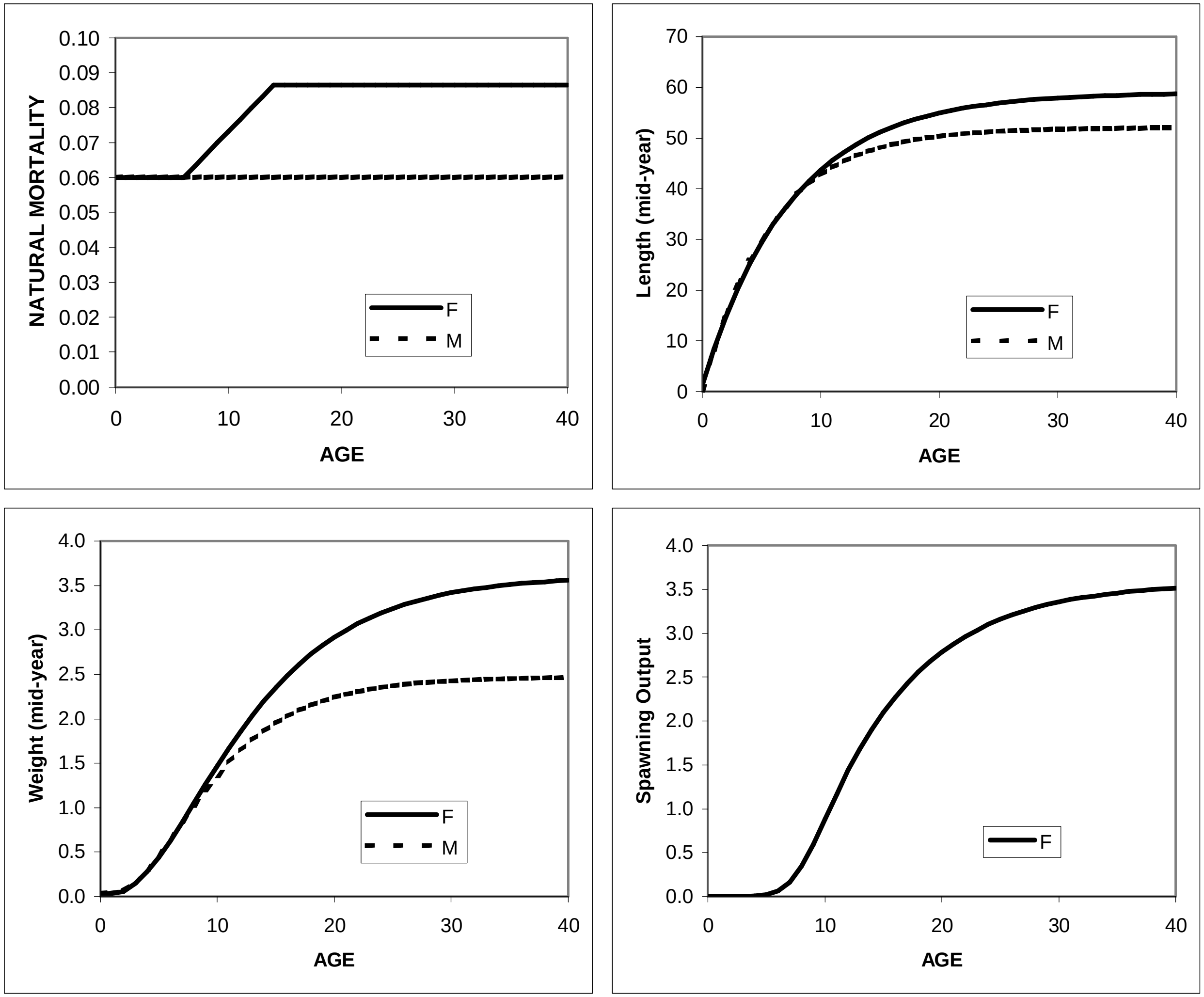


Figure 34. Estimated growth curves and other biological quantities.

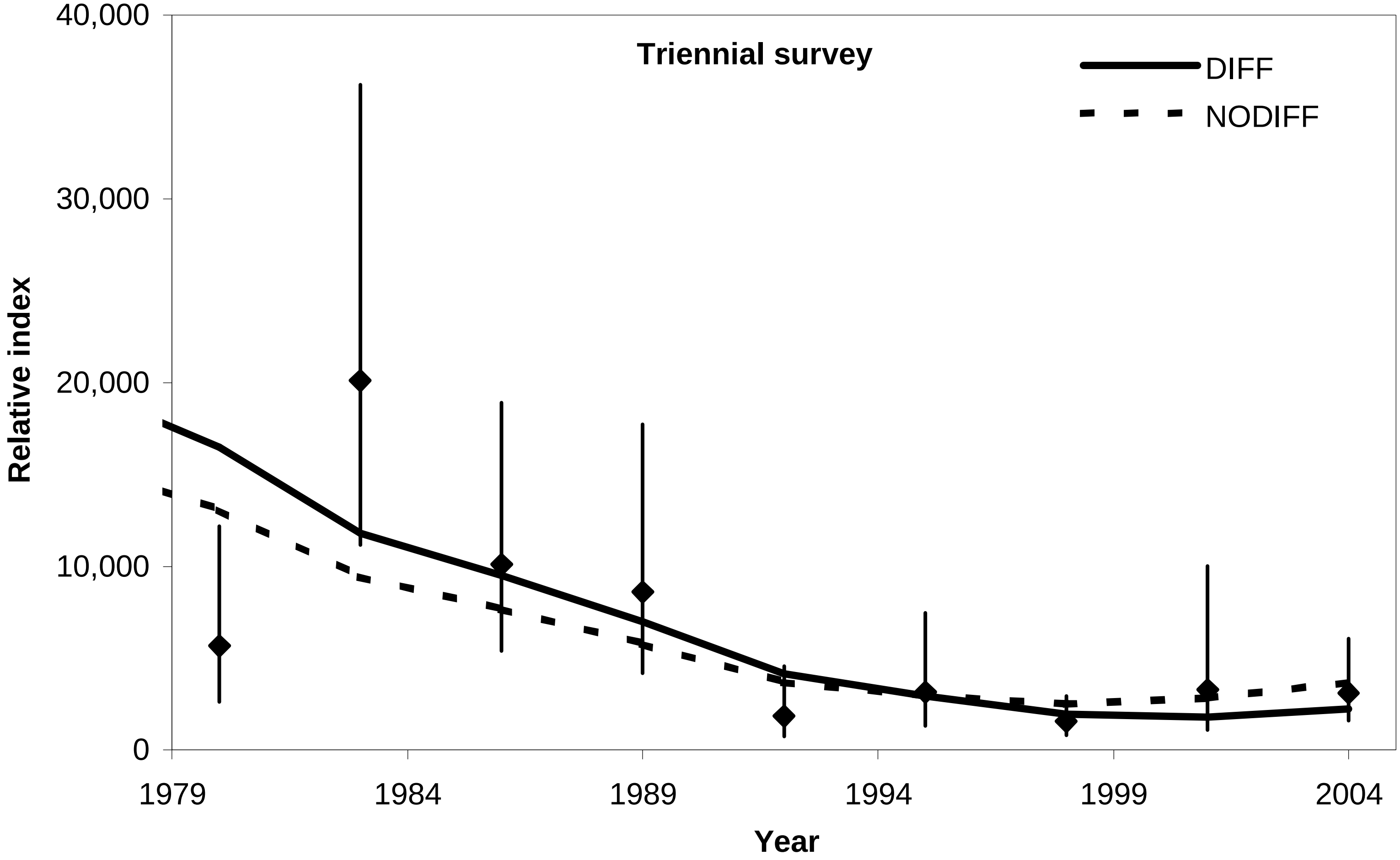


Figure 35. Fit to the time series of survey biomass index in the base (DIFF) and alternate (NoDIFF) models. The DIFF model fits better by 1.2 log(likelihood) units.

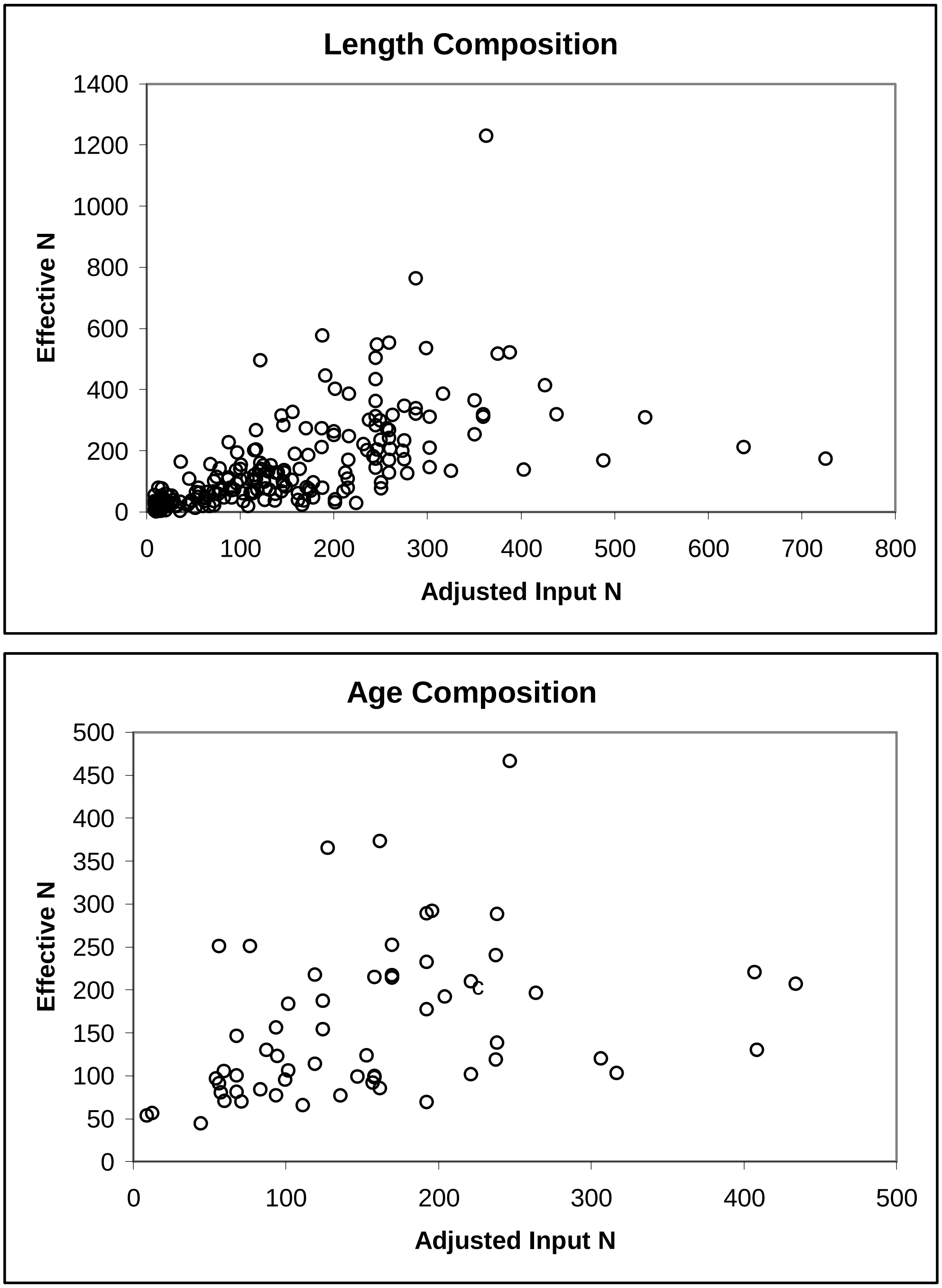
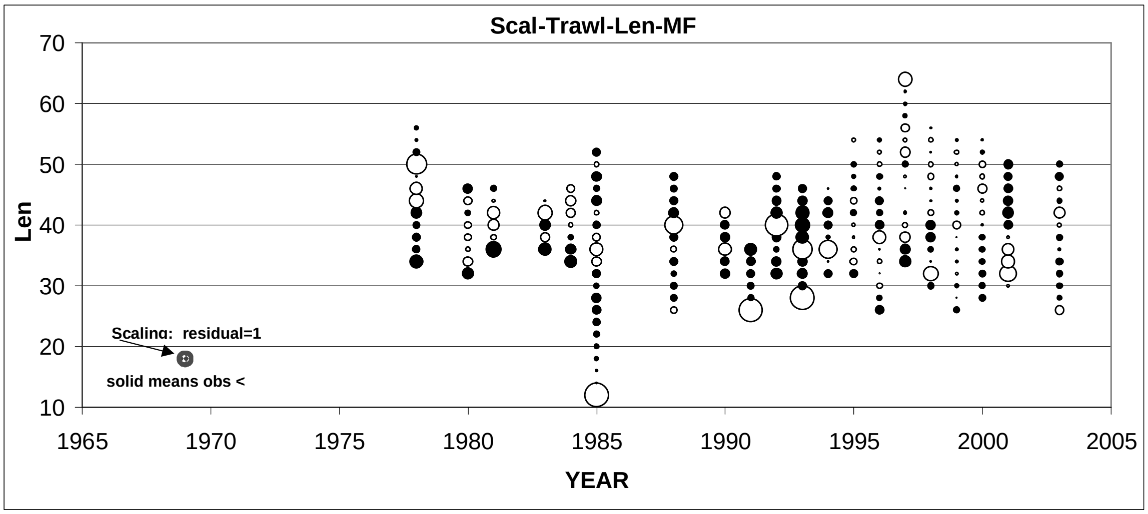
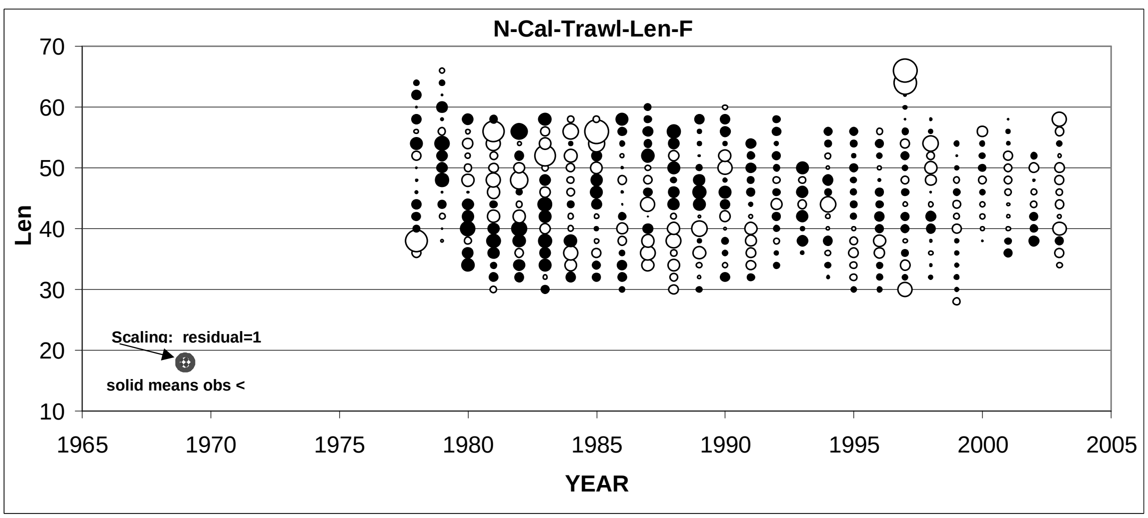
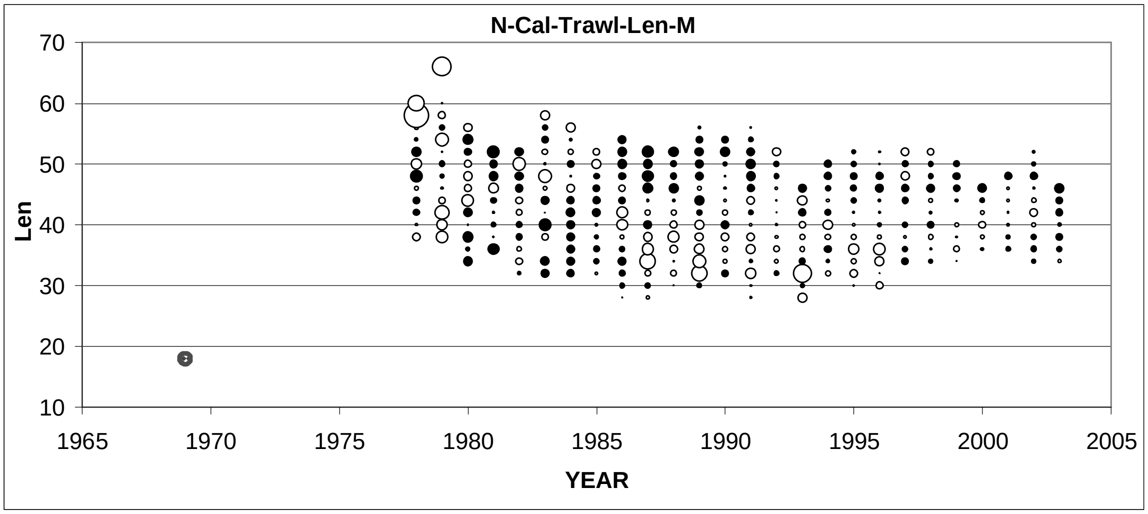


Figure 36. Relationship between adjusted input composition sample size and the estimated effective sample size.

Figure 37 (below and following pages). Pearson residuals for fit to length composition, age composition, and length-at-age data by fleet and gender in the Base model. The circle in lower left corner shows a residual equal to 1.0. Open circles show observation greater than estimate; solid circles show observation less than estimate.



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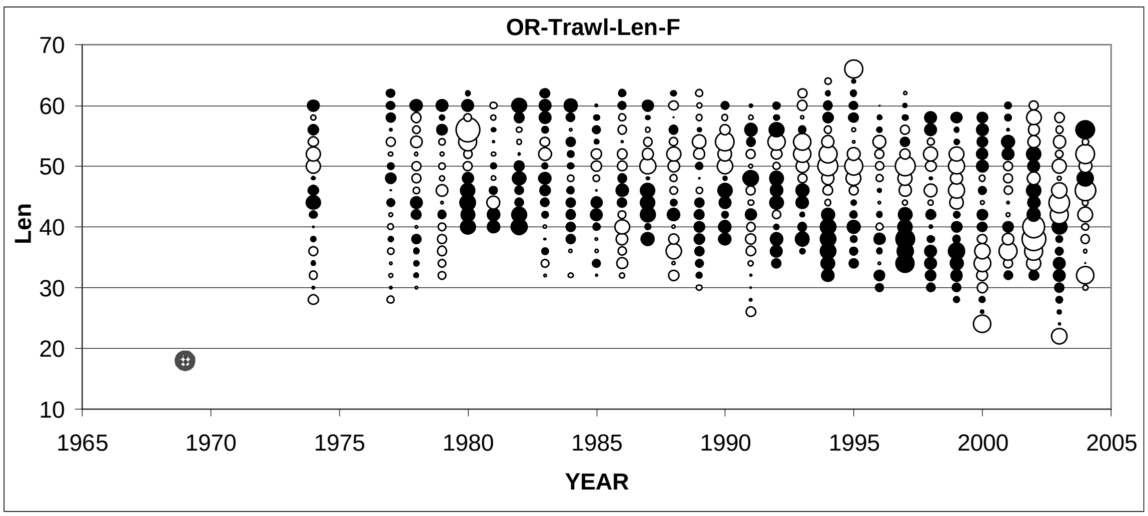
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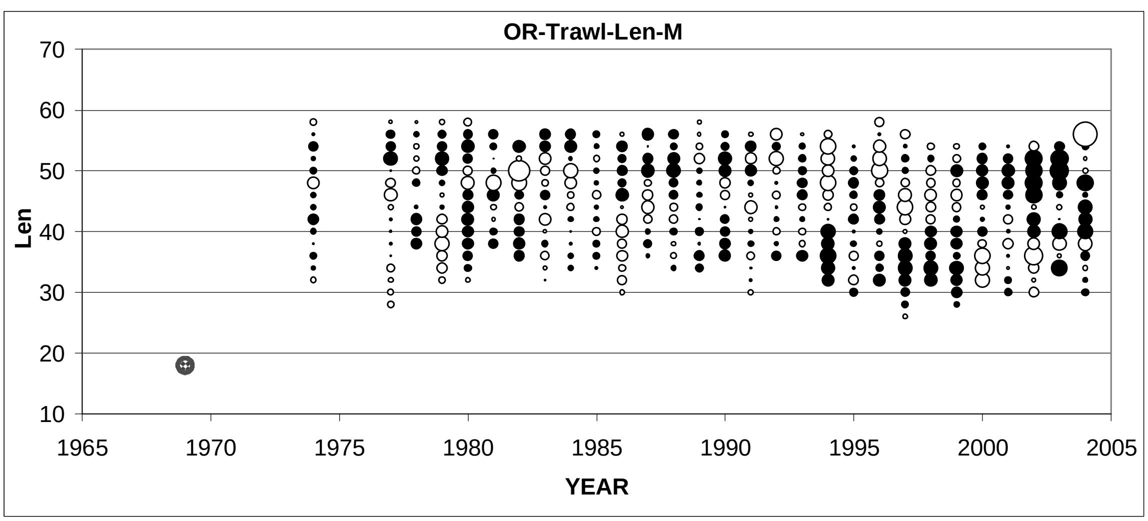
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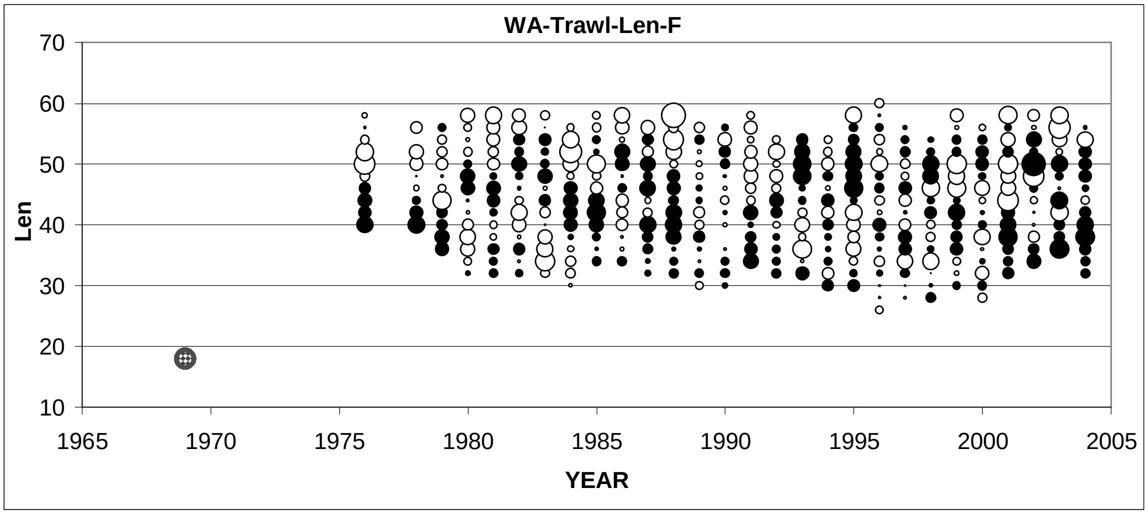
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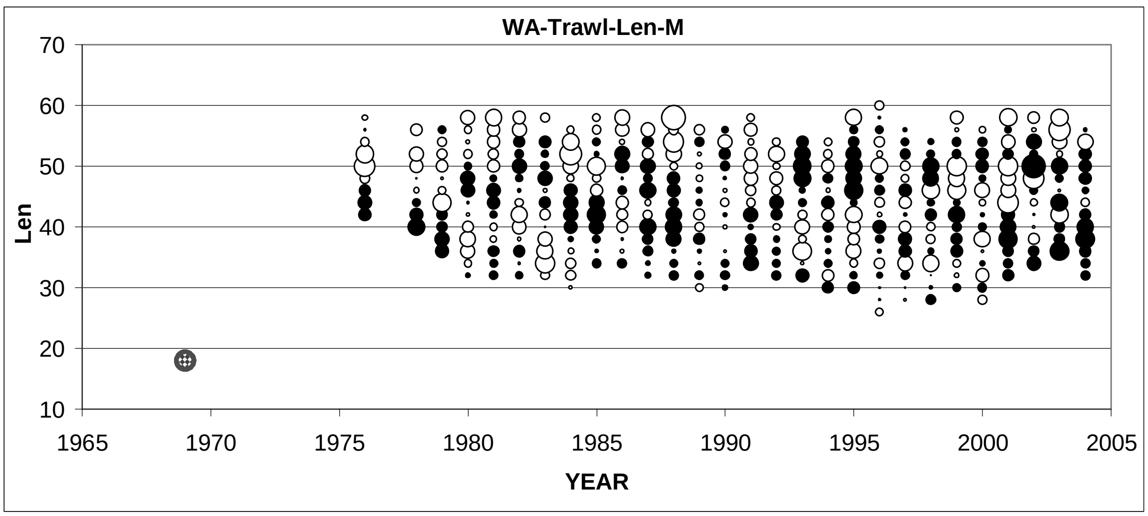
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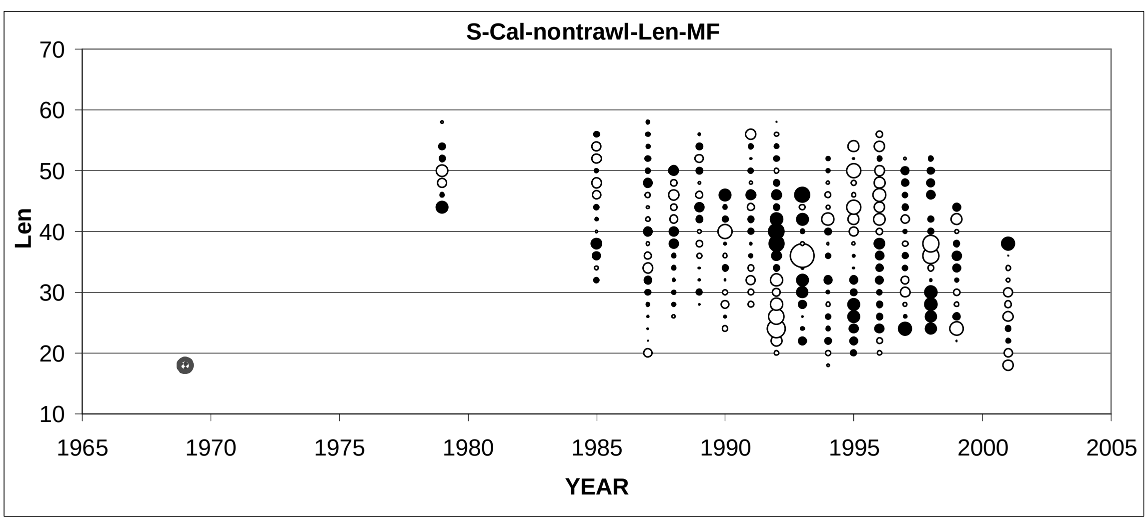
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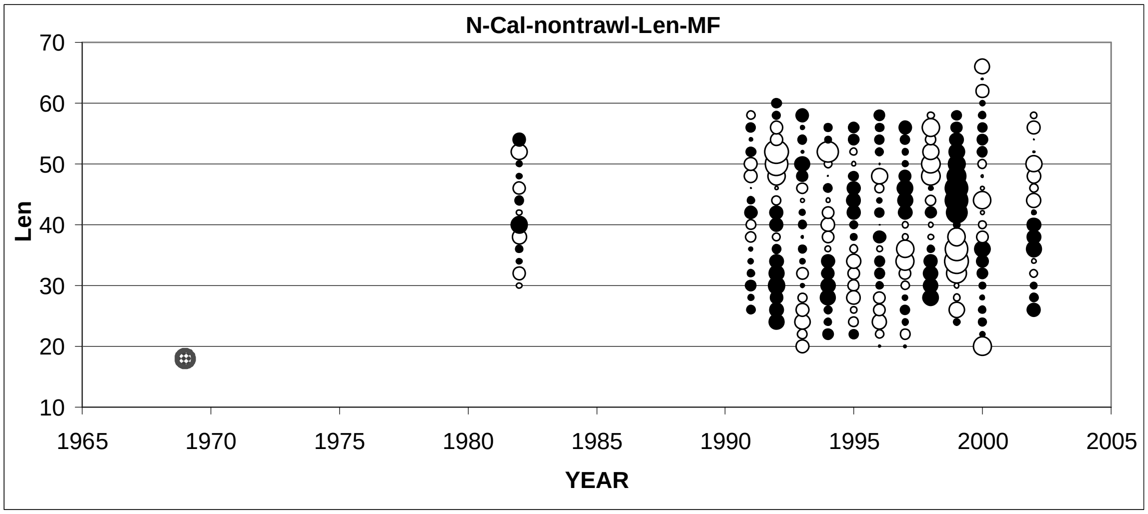
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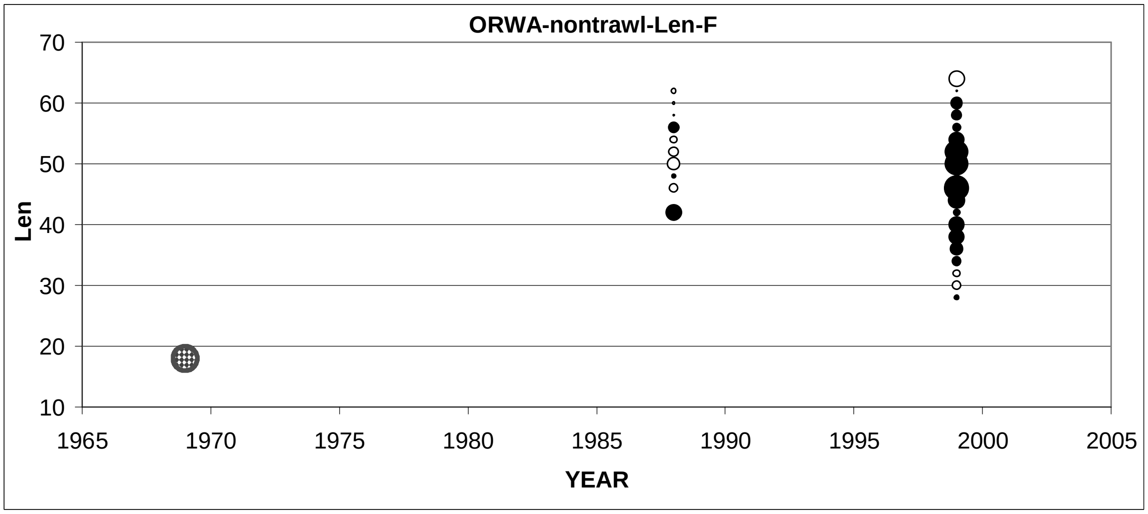
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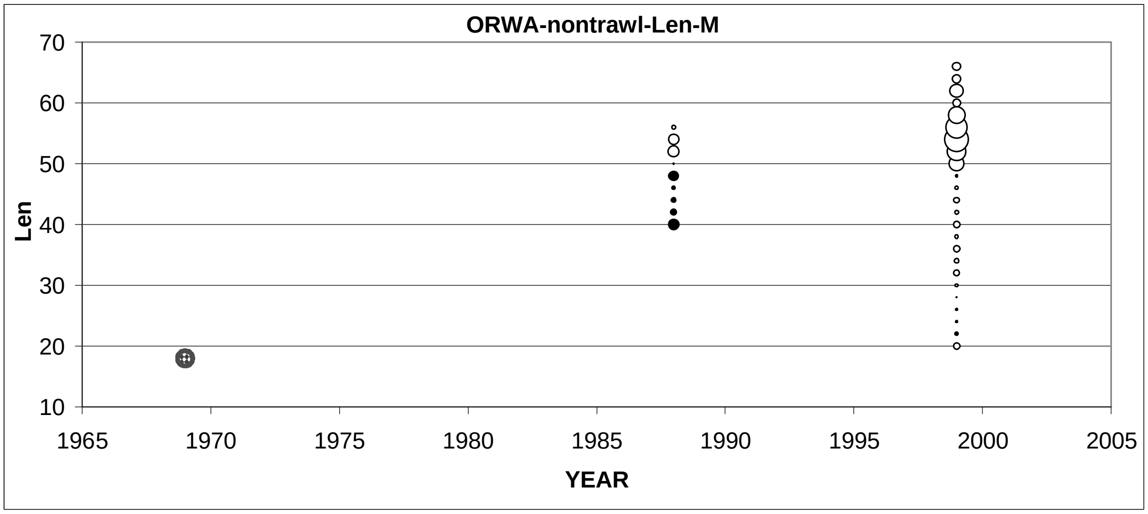
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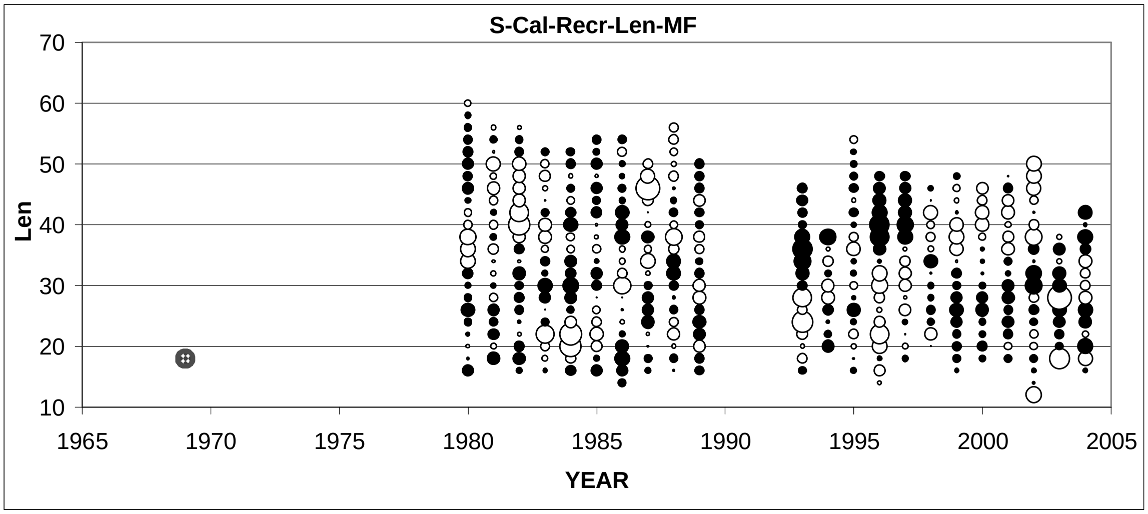
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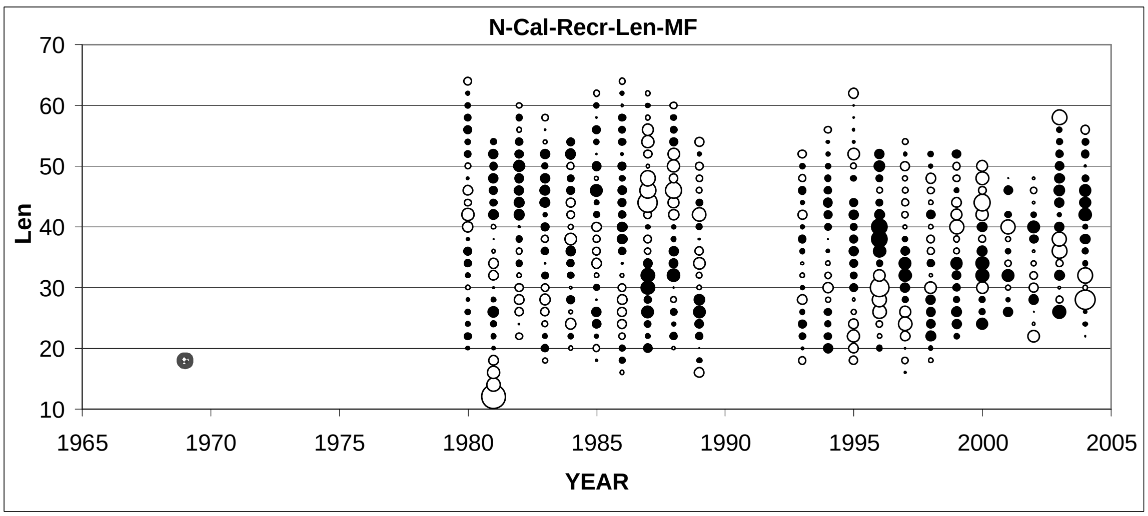
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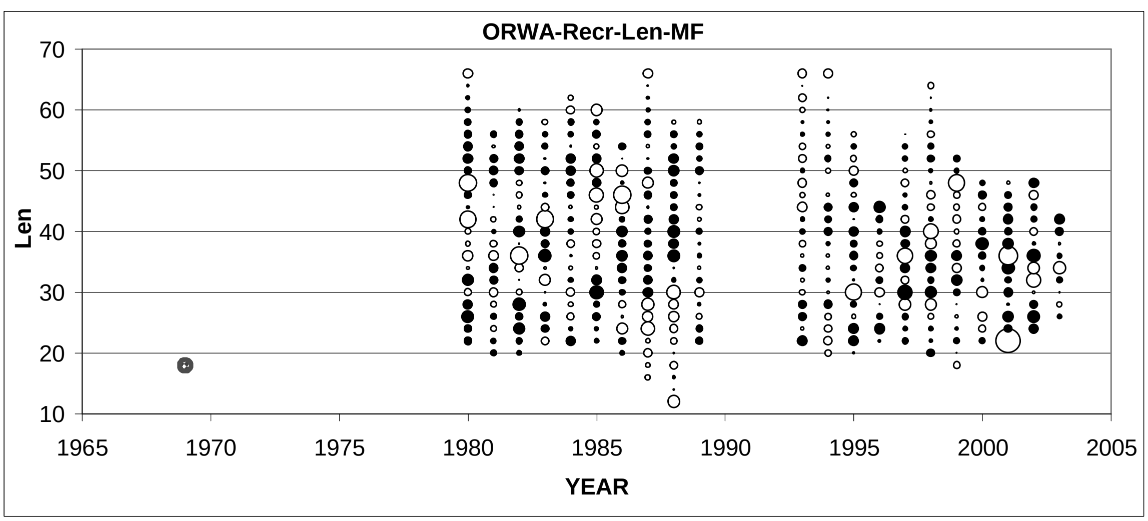
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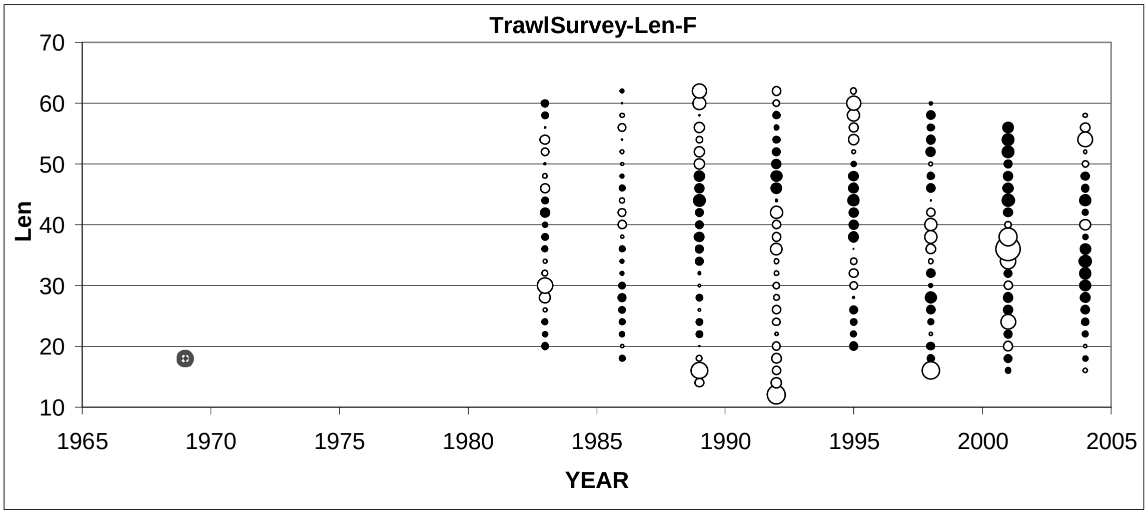
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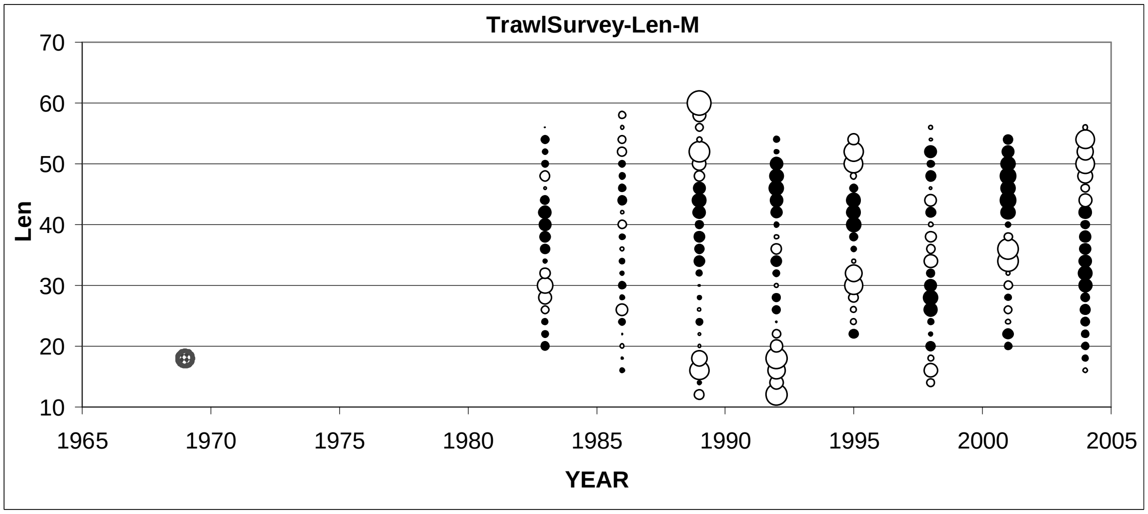
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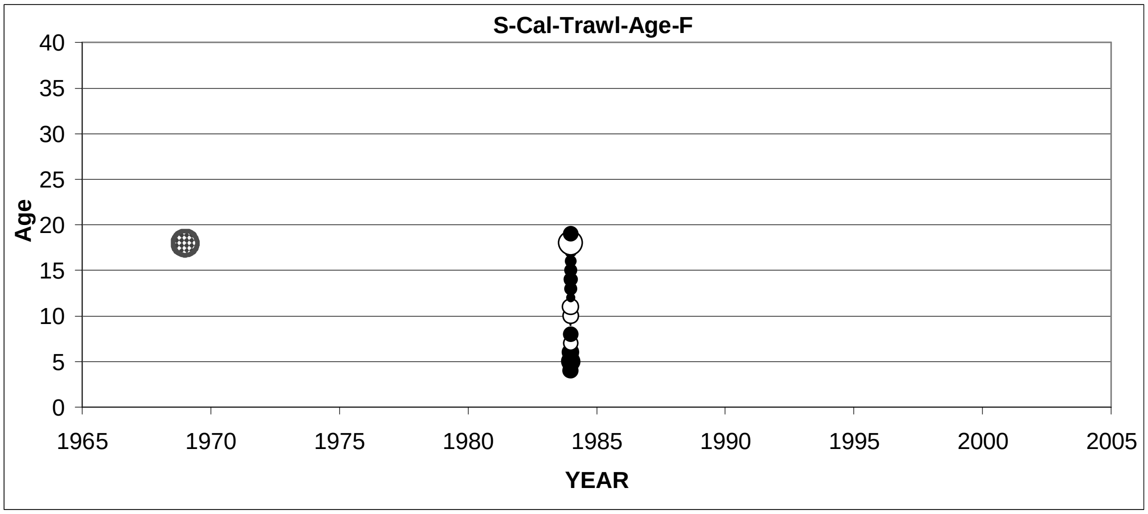
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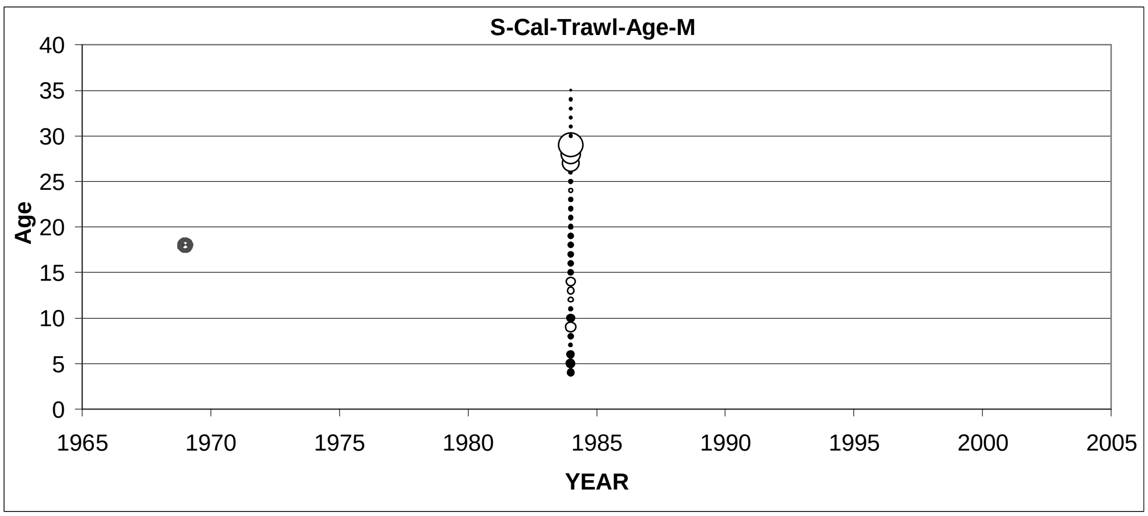
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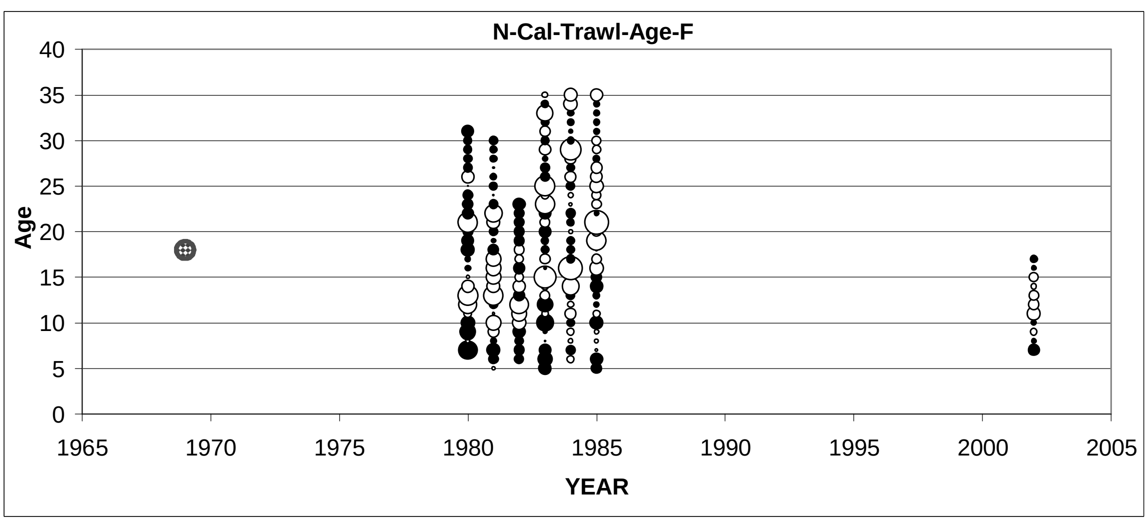
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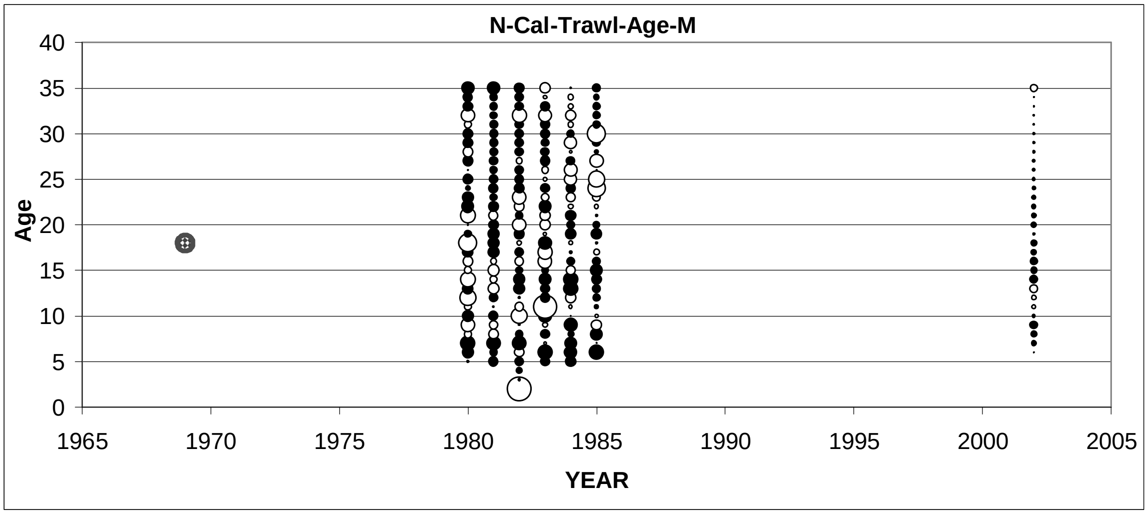
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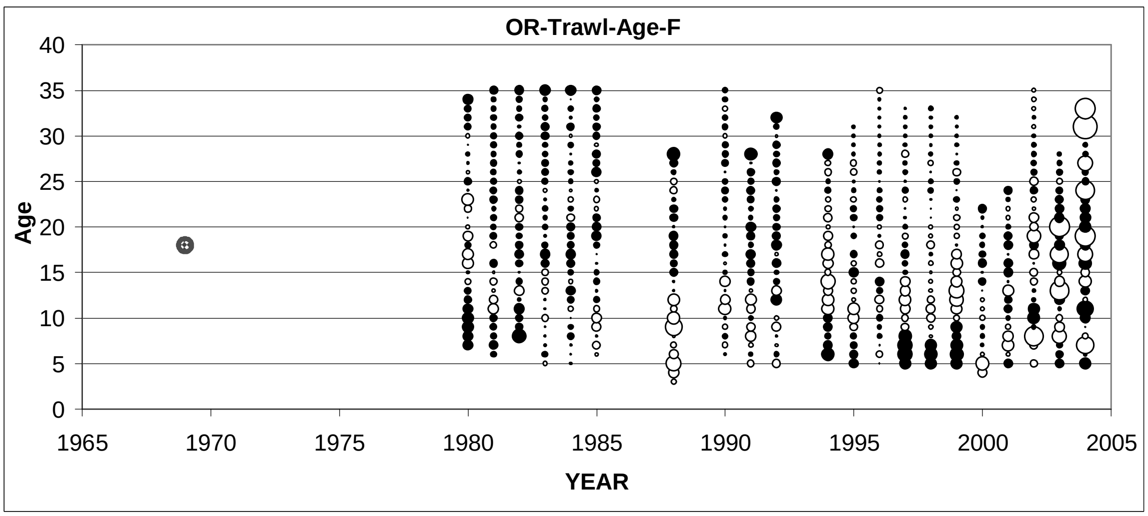
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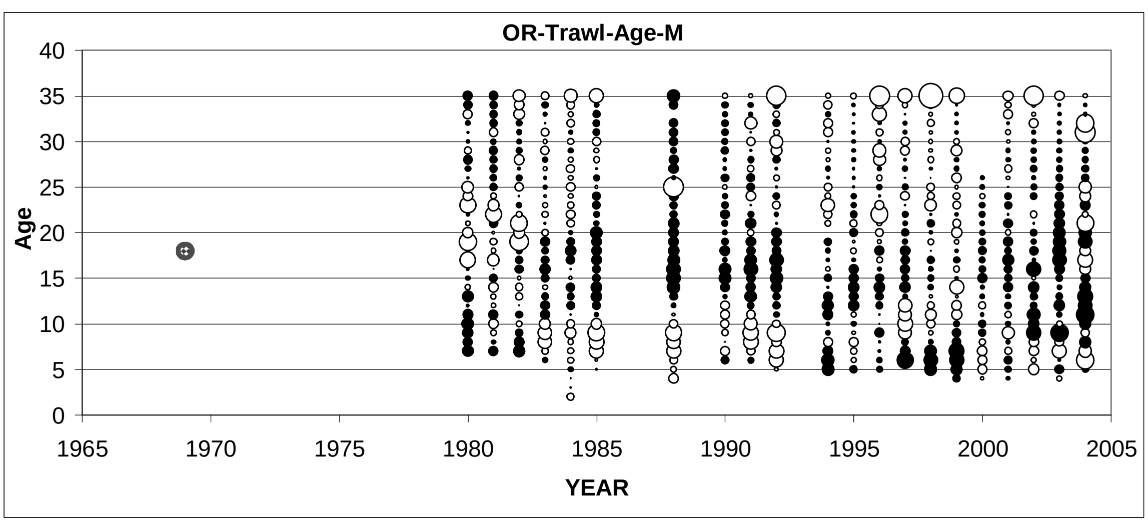
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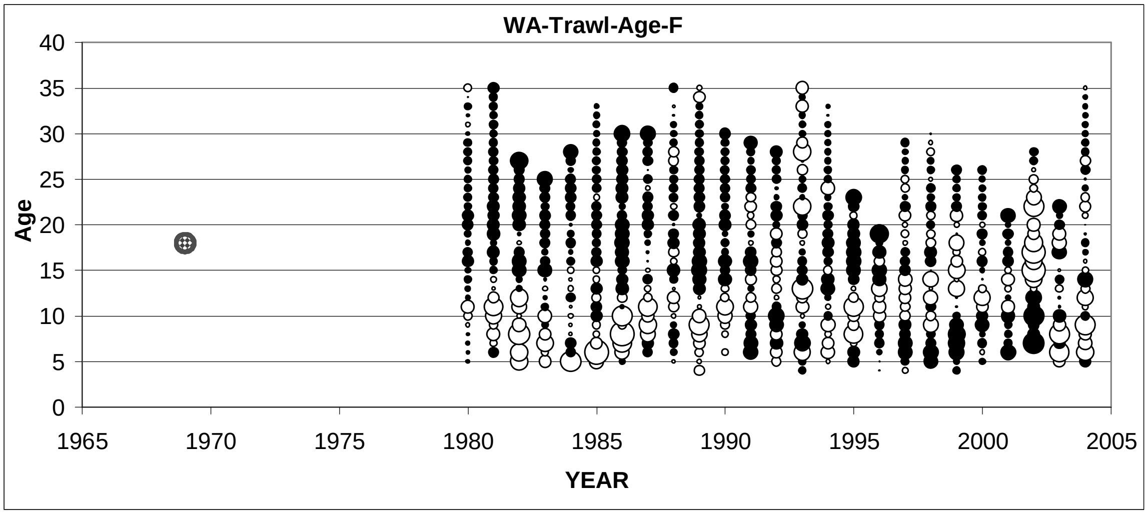

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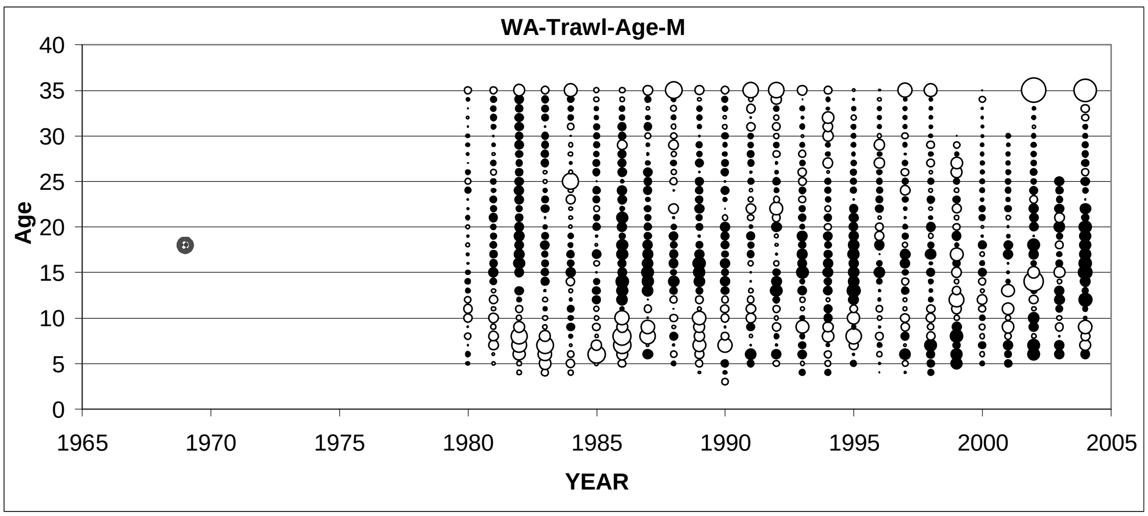

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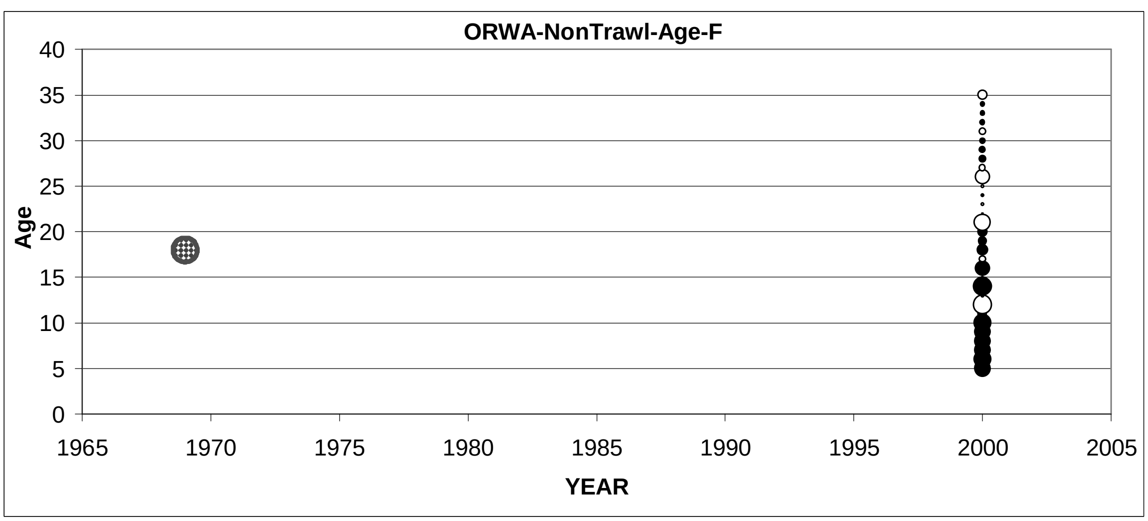

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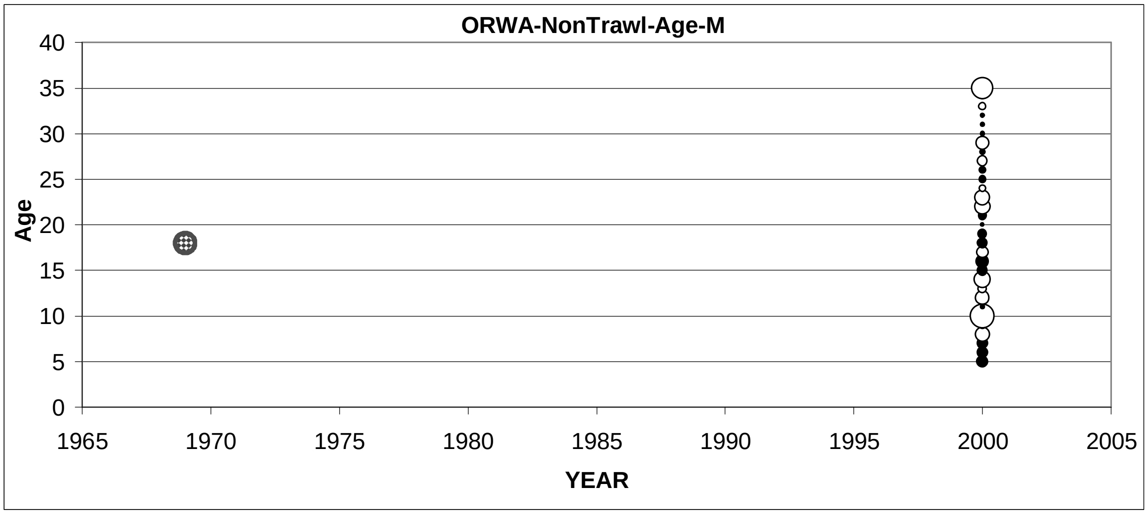
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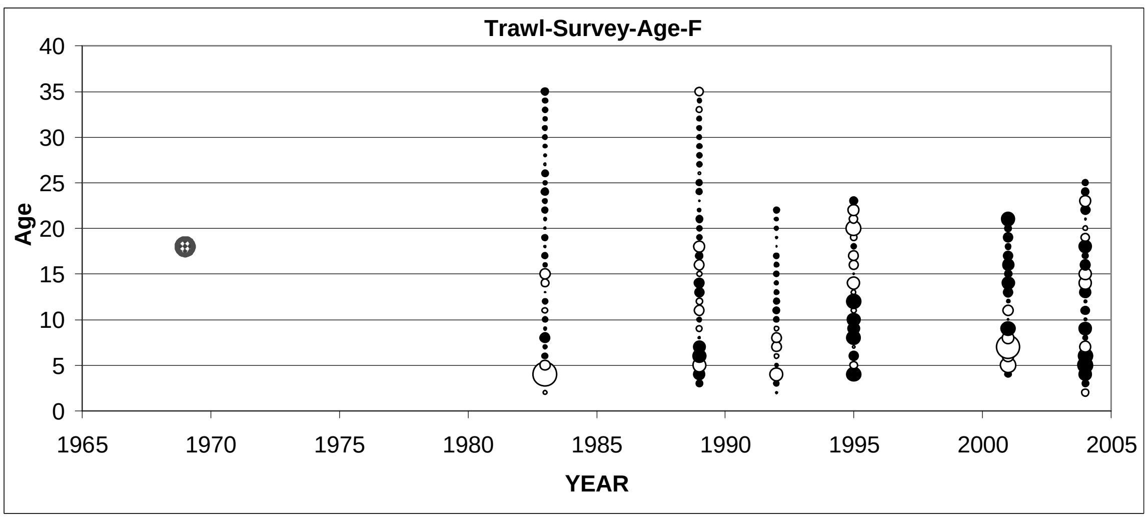
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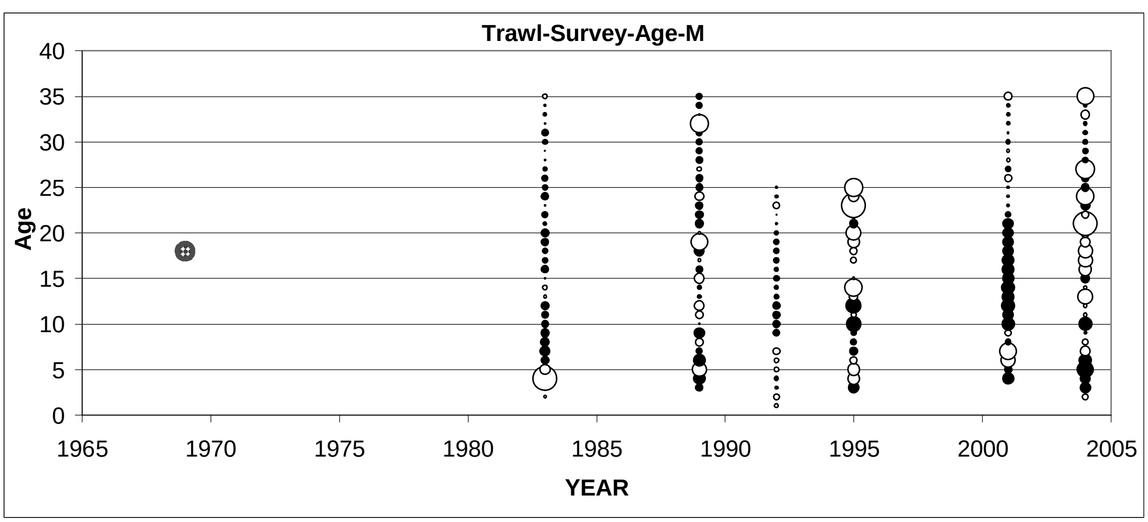
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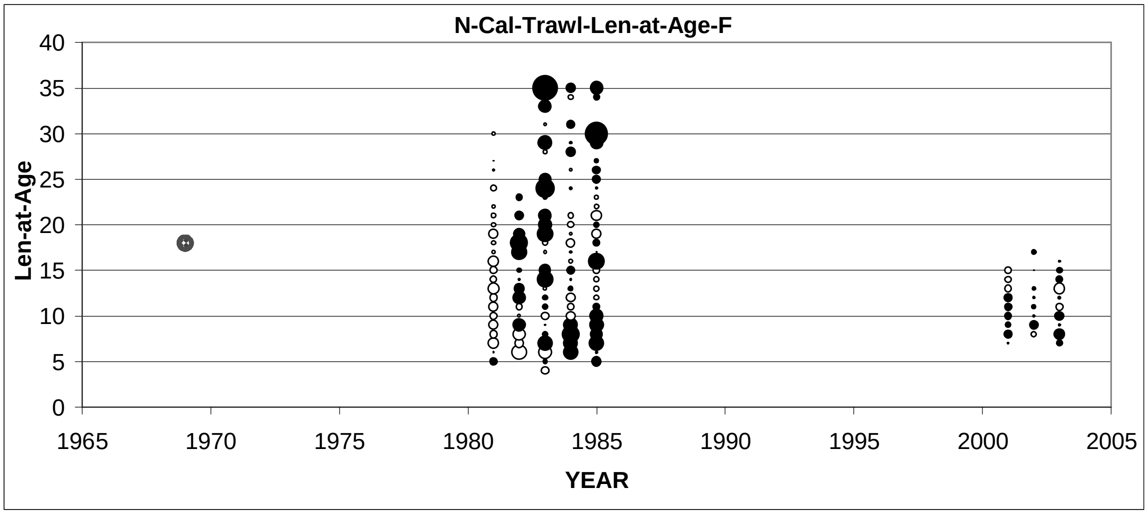
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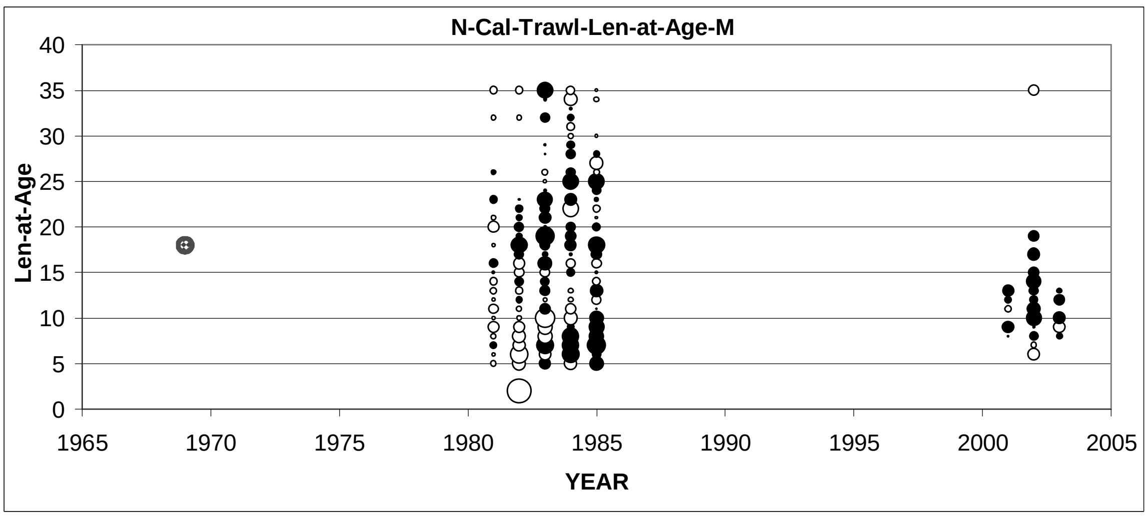
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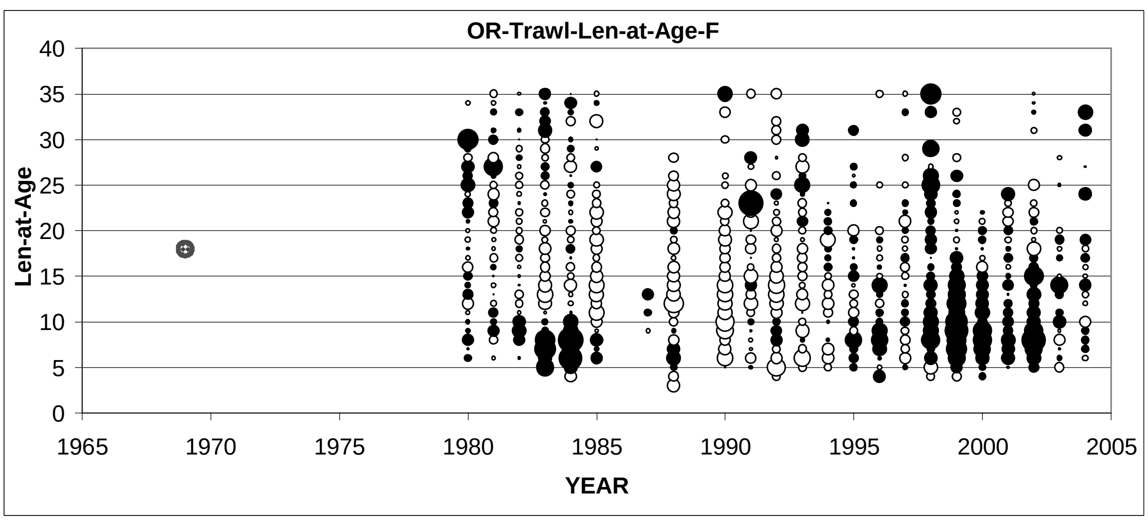
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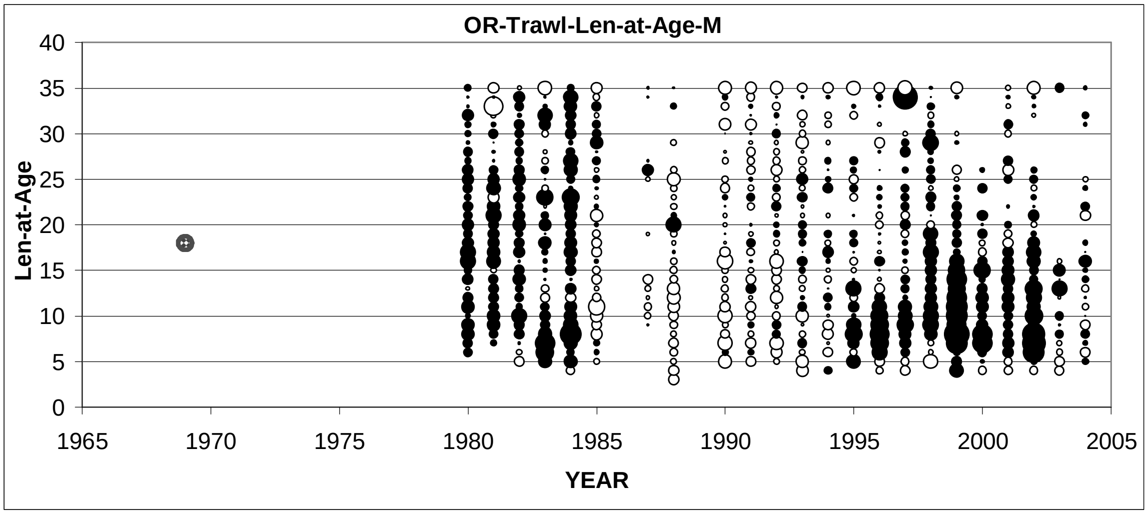
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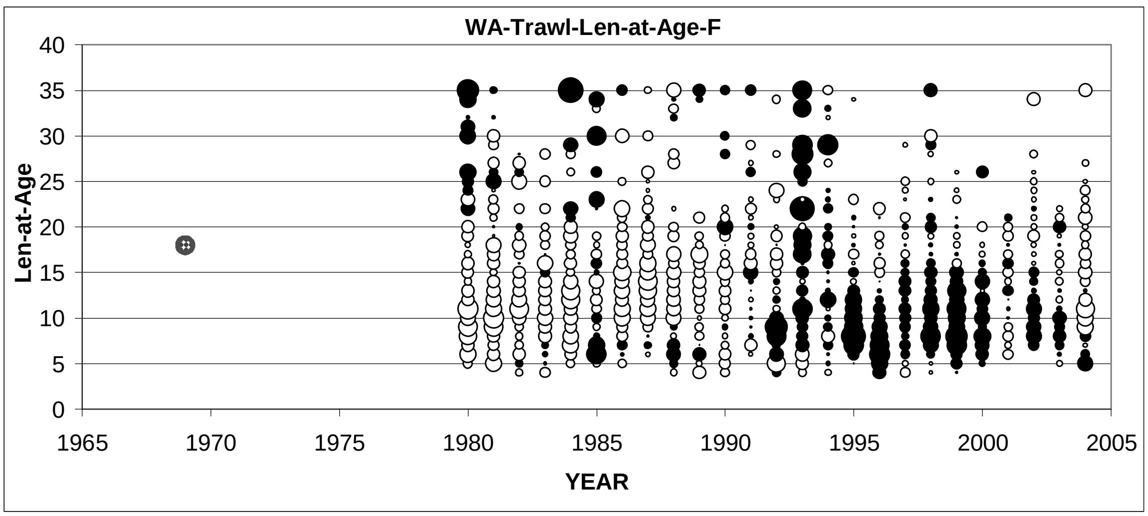
WA-Trawl-Len-at-Age-F
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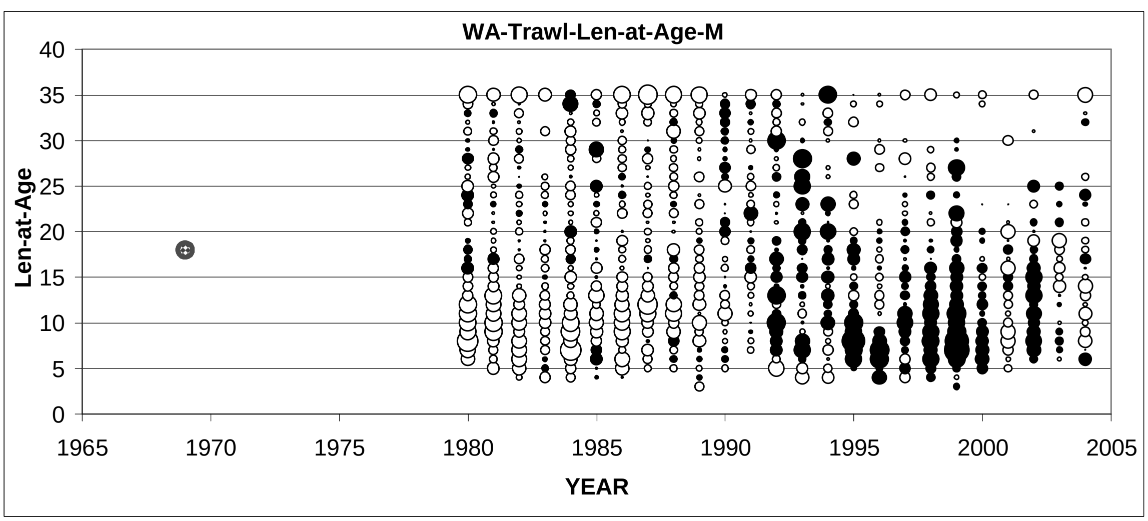
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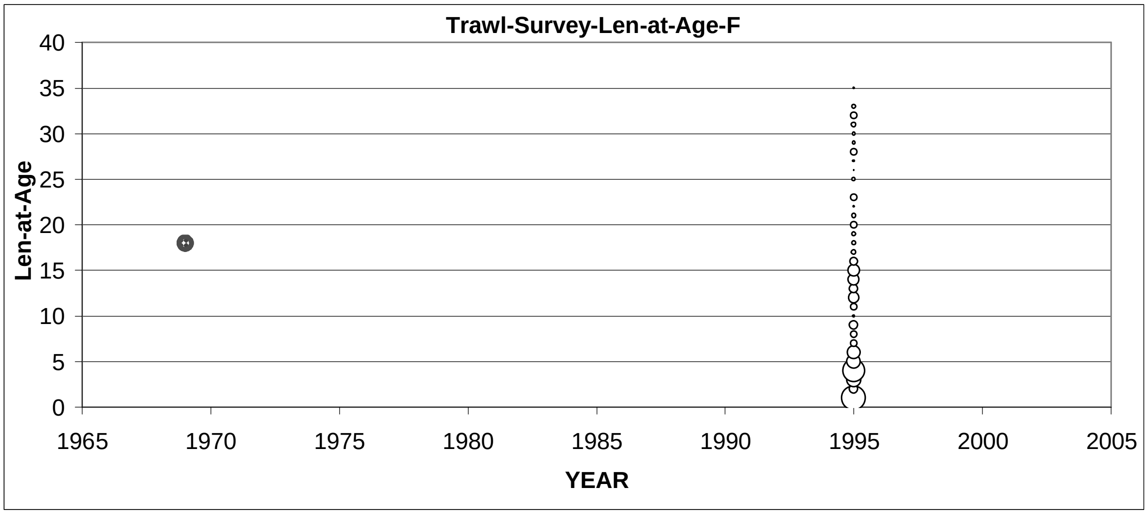

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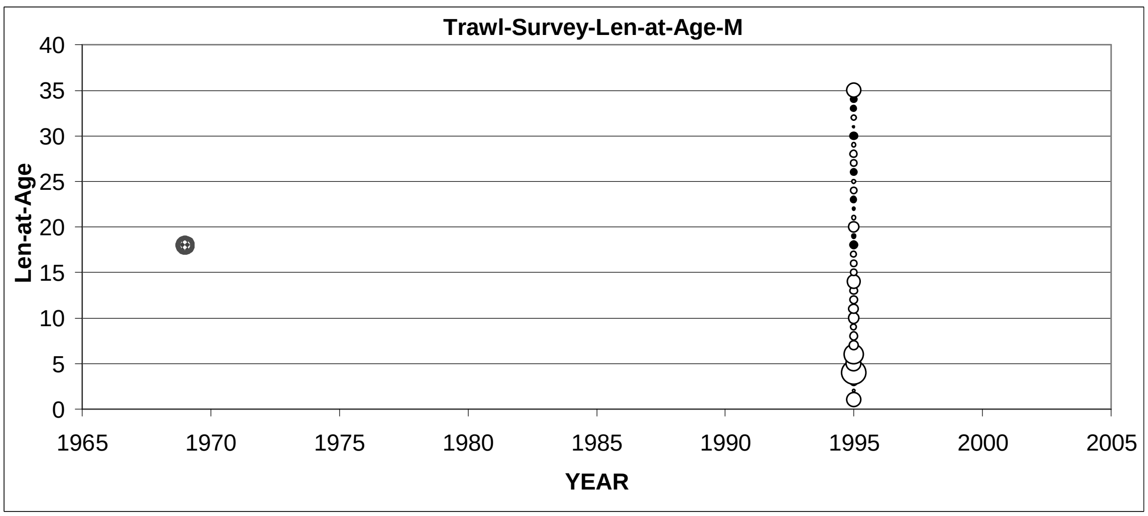

Trawl-Survey-Len-at-Age-M
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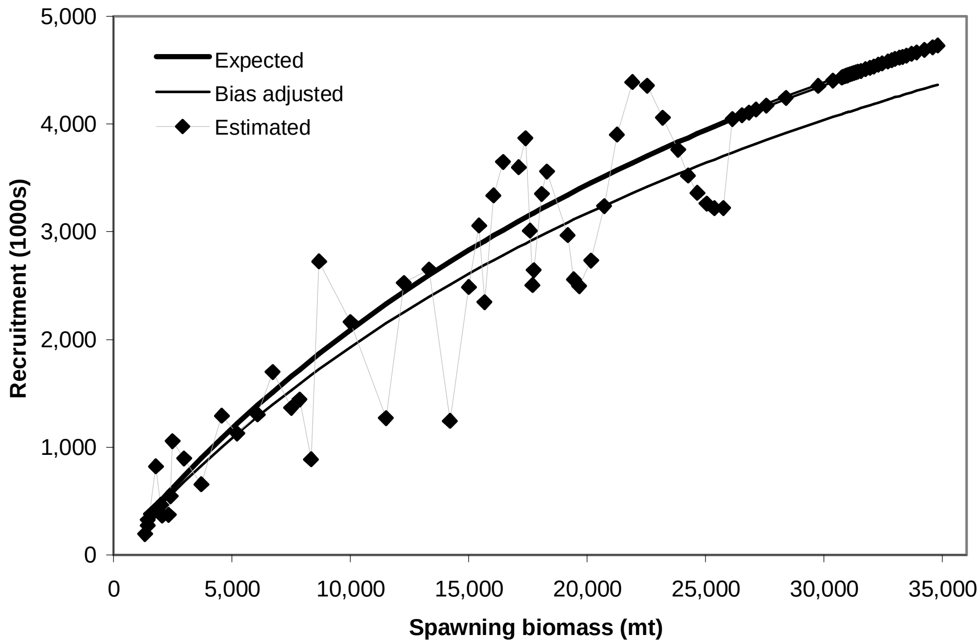


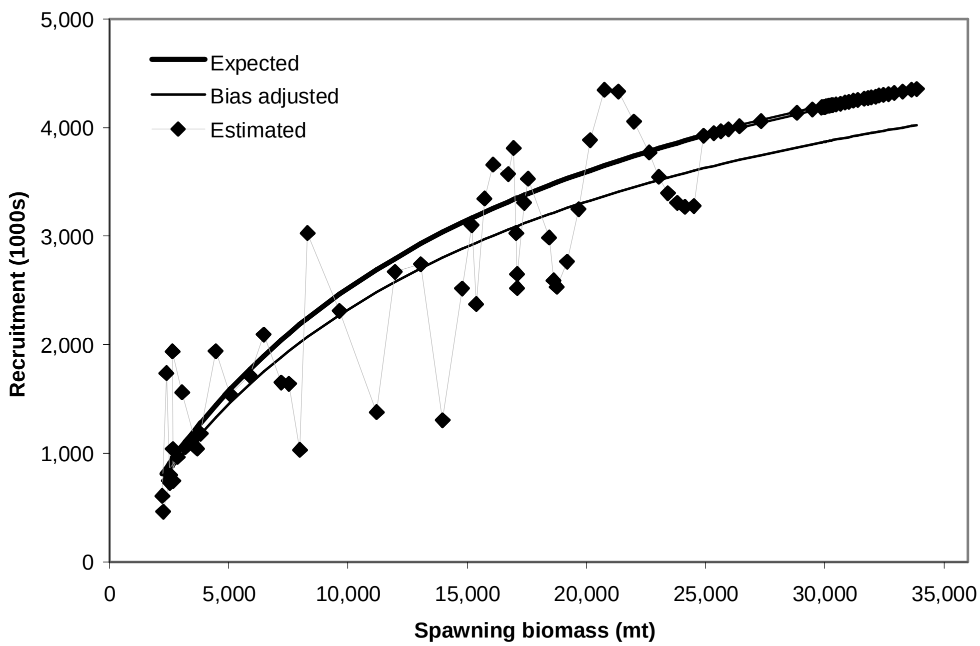


Figure 38. Estimated relationship between recruitment and spawning biomass in the base model (upper) and alternate model (lower). The Expected line shows the mean recruitment level as a function of spawning biomass. The bias adjusted line is the central tendency for the lognormal recruitment deviations.

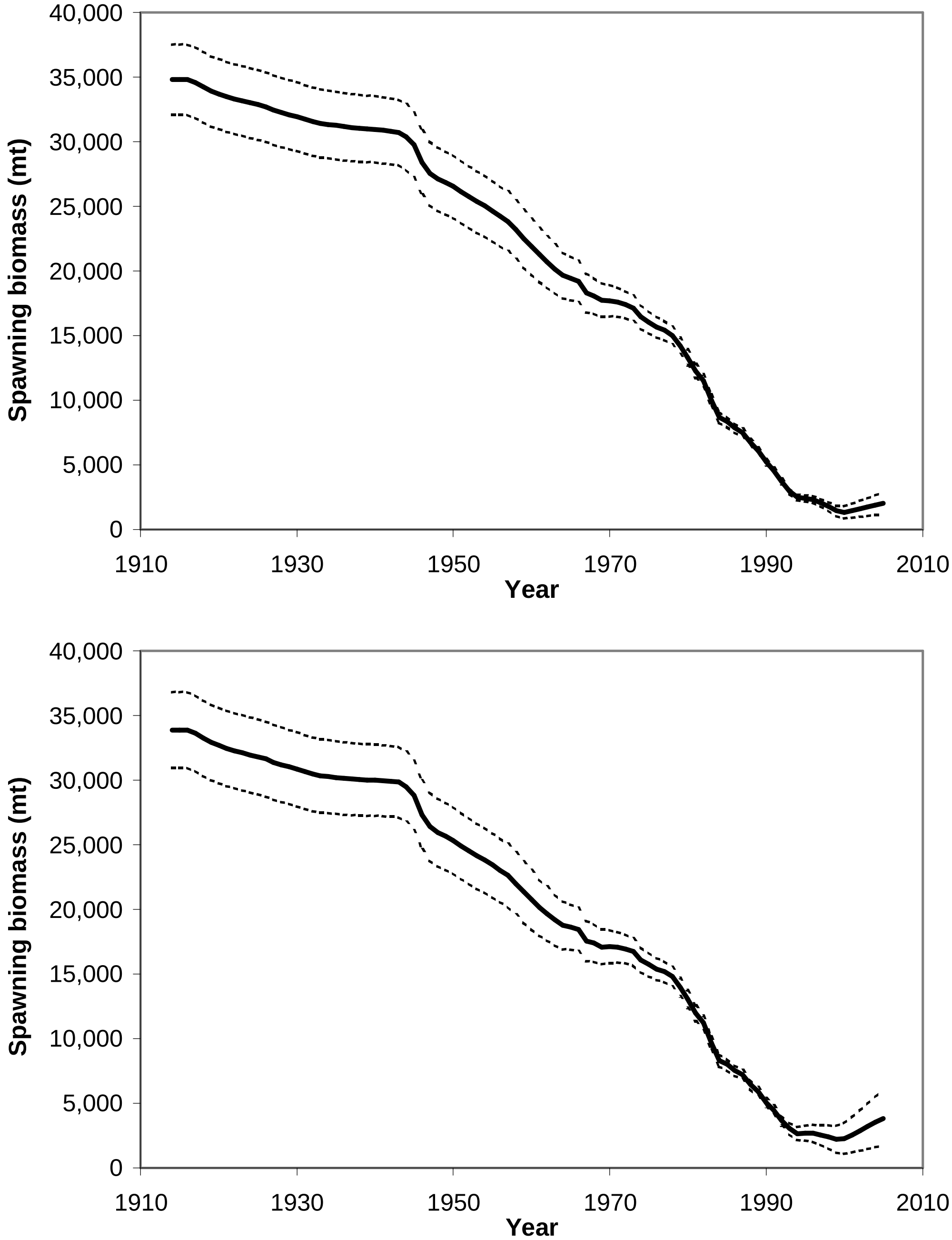


Figure 39. Estimated time series of spawning stock biomass with +/- 2 standard errors of the estimate. Base model is in upper panel and alternate model in lower panel.

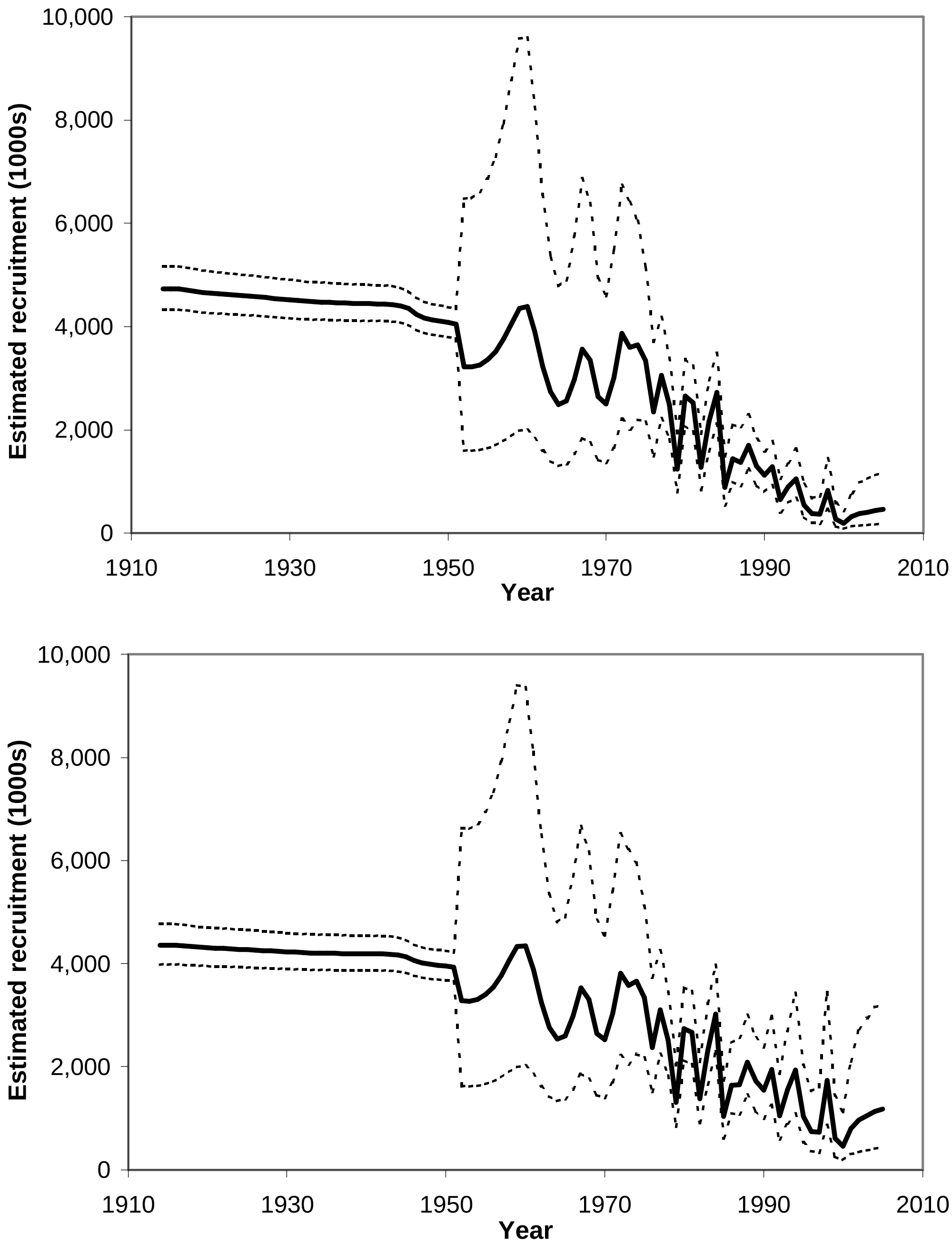


Figure 40. Estimated time series of recruitment with +/- 2 standard errors of the estimate. Base model is in upper panel and alternate model in lower panel.

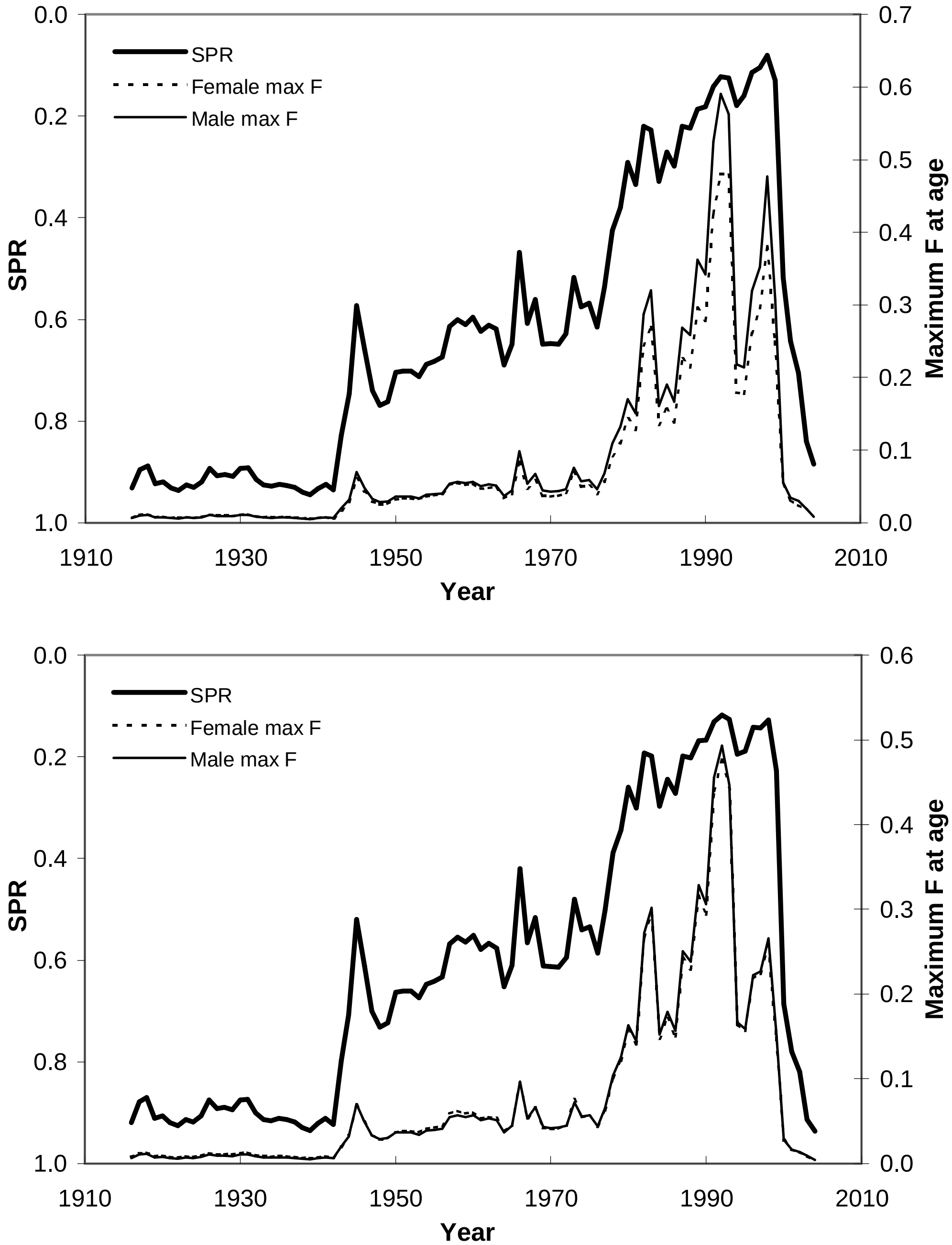


Figure 41. Time series of exploitation intensity as indexed by the spawning potential ratio (SPR) and for the maximum age-specific exploitation rate for females and males. Note the inverted scale for SPR because large values for SPR correspond to low levels of exploitation. Base model is in upper panel and alternate model in lower panel.

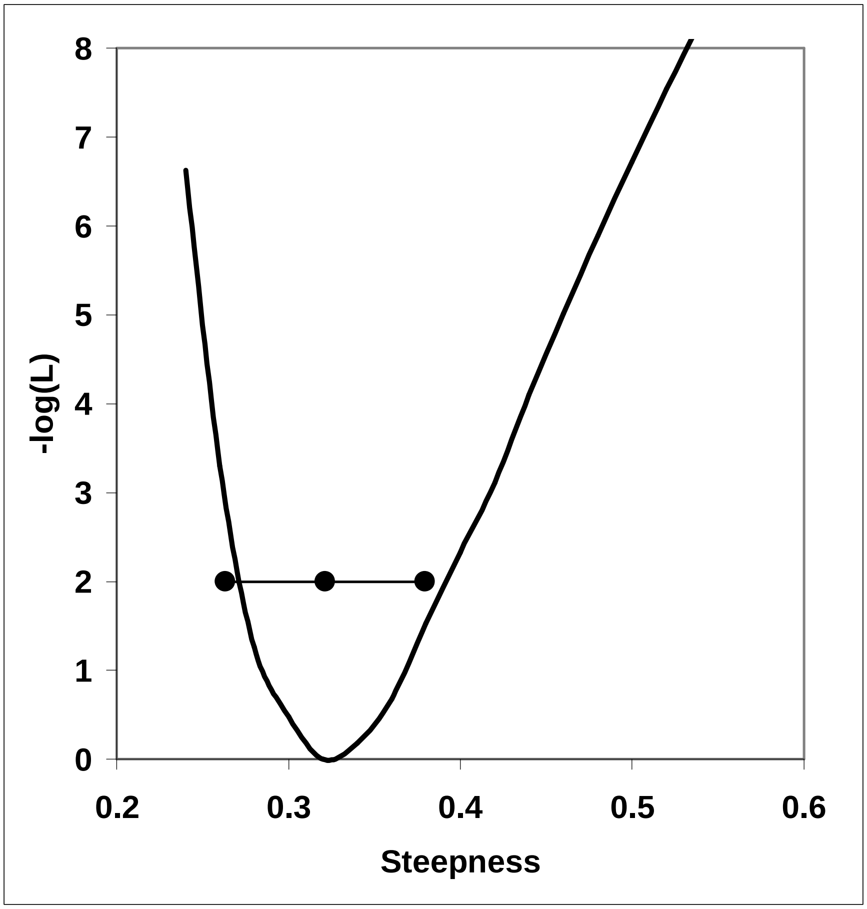


Figure 42. Results of profiling on stock-recruitment steepness (*z*) compared to 95%CI from analytical standard error on parameter.

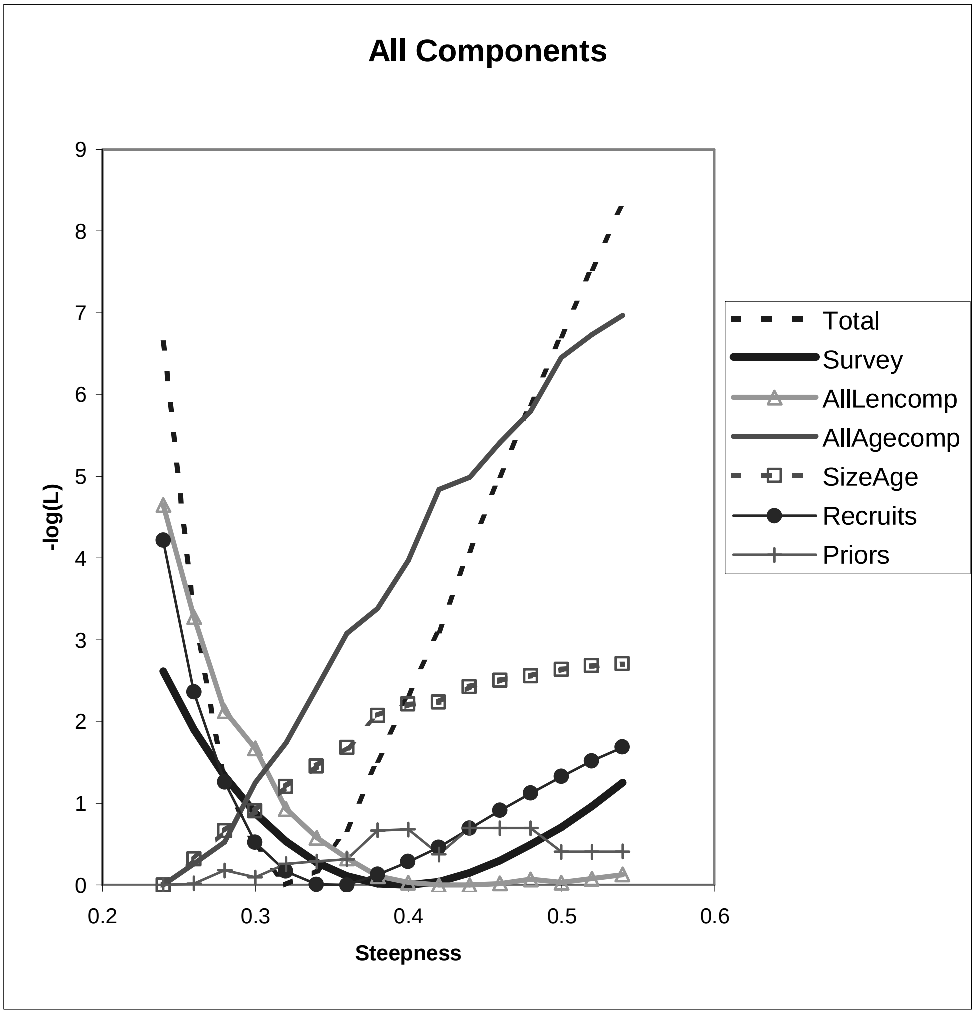


Figure 43. Relative contribution of each data type to the steepness profile.

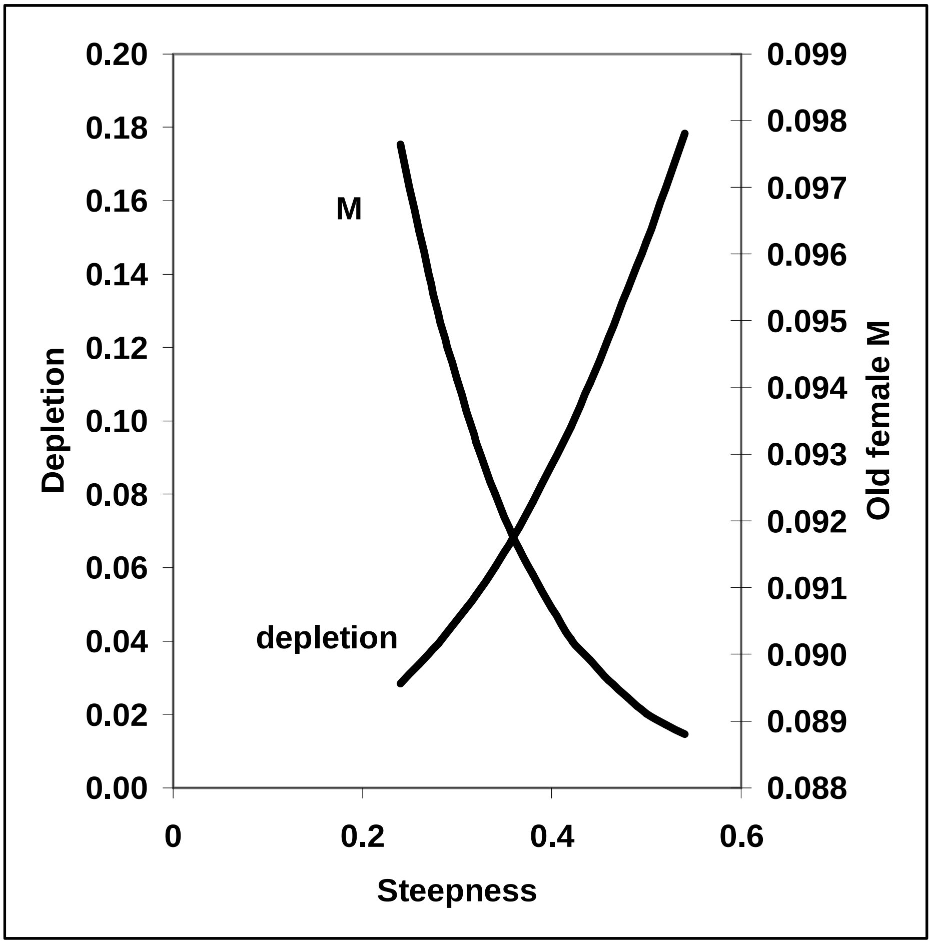


Figure 44. Relationship between the profiled steepness parameter, the estimated natural mortality for old females, and the 2005 relative depletion level.

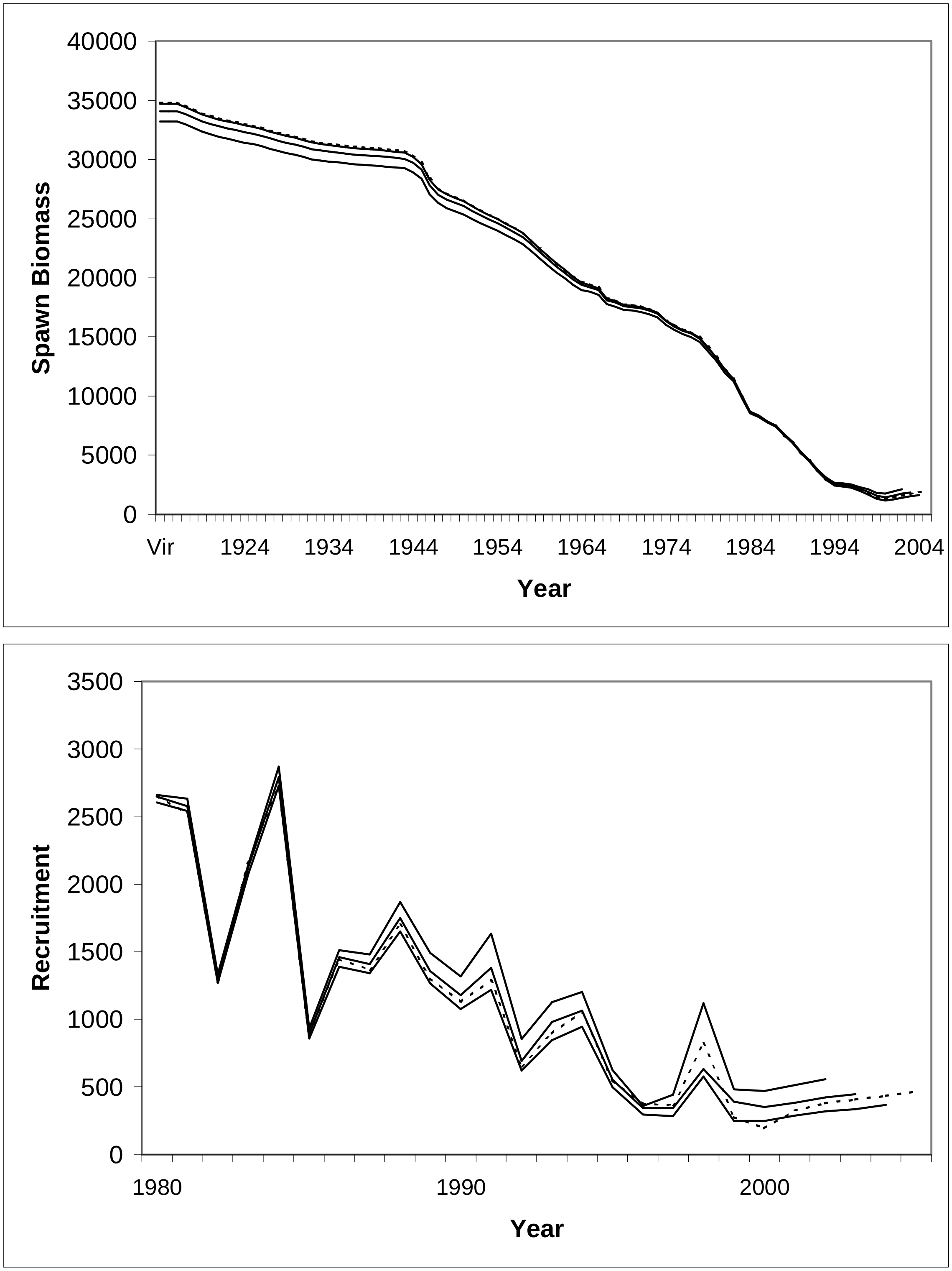
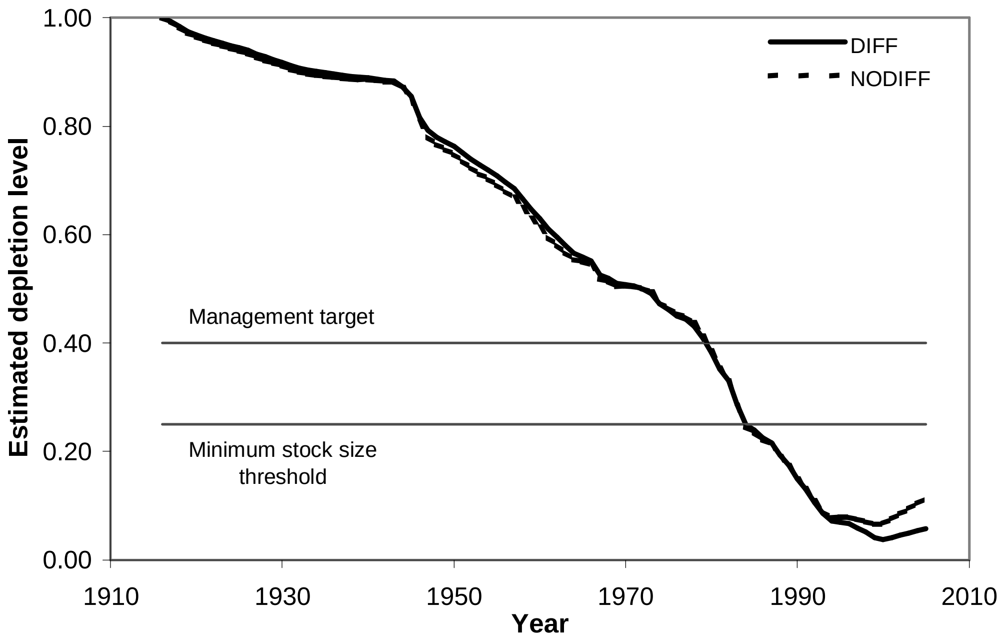


Figure 45. Retrospective analyses using 2001, 2002, 2003, and 2004 as the ending year for the data and assessment. Only the recruitment estimates after 1980 are shown in order to highlight the small differences in the ending years.



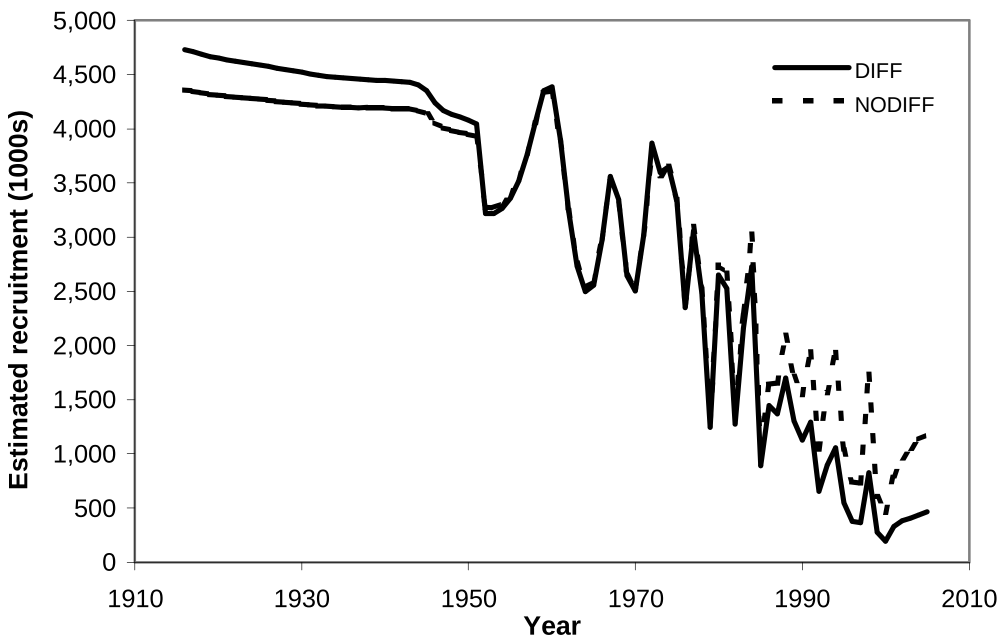
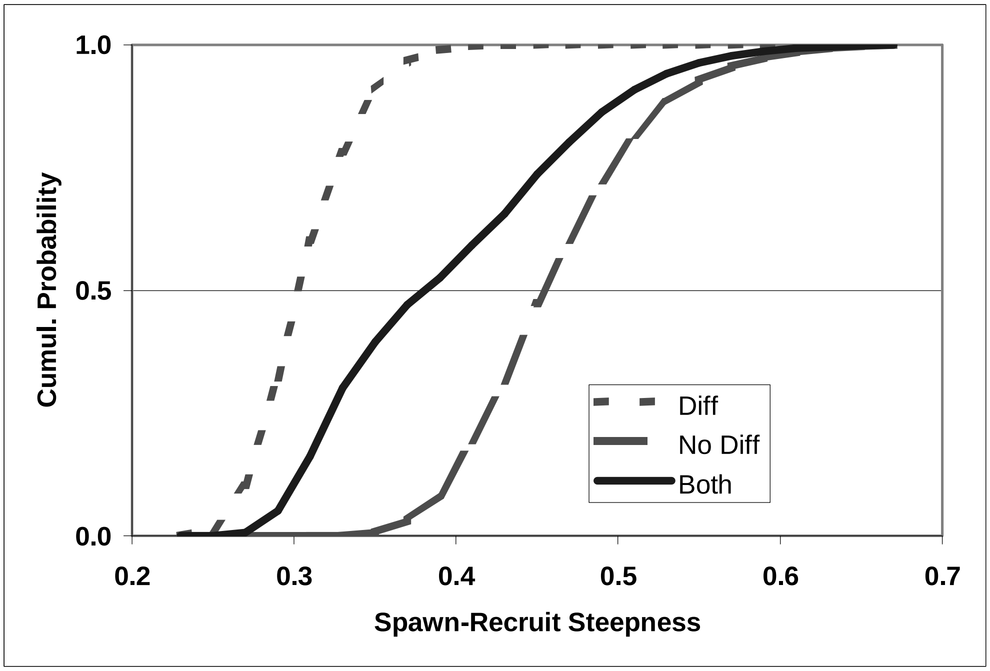


Figure 46. Direct comparison of estimated depletion (annual spawning biomass / virgin spawning biomass) and recruitment between the base (Diff) and alternate (NoDiff) models.



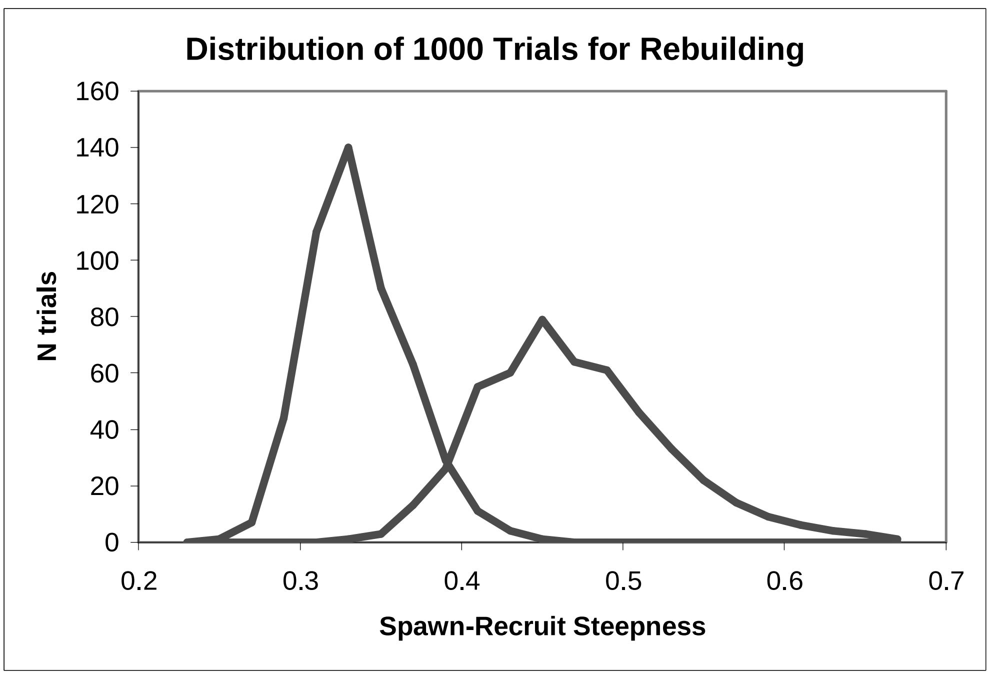


Figure 47. Probability distribution of steepness for the base (Diff) and alternate (NoDiff) models as used in the rebuilding analysis.

Appendix A: Response to SSC Request for Additional Analyses on Canary Rockfish

September 27, 2005

Edited Oct 21, 2005

Summary

This document addresses issues raised by the SSC in their September 20-21 meeting in Portland, Oregon and presented to the STAR panel on Sept 27, 2005. These issues are addressed by briefly categorizing results from other assessments and by conducting sensitivity analyses to better characterize the canary rockfish assessment and its uncertainty. The Base model used for this investigation is the August 2005 version of the Diff model. Subsequent to the investigation reported in this Appendix, the model configuration for canary rockfish in 2005 was modified to include an alternate model that did not include a difference in selectivity between males and females. This alternative was considered equally likely by the SSC and produced higher biomass and recruitment levels for recent years and an associated reduction in the survey catchability coefficient. Several of the issues raised here: meta-analysis for survey q, meta-analysis for recruitment variability, and alternative procedures for inclusion of recruitment indexes are not unique to the canary rockfish assessment. Work on these issues during the 2006 off-cycle year would improve consistency in approach among all the assessments.

SSC Request 1: The survey catchability (q) estimated in the canary assessment appears to be considerably larger than the q estimated for other rockfishes. The validity of the q estimate should be investigated.

RESPONSE:

The absolute value of the survey catchability (q) for rockfish in the triennial shelf trawl surveys was used by Rogers et al (1996) to extend assessment advice to some data-poor, previously unassessed shelf rockfish species, and was more formally examined in a Bayesian meta-analysis by Millar and Methot (2002).

Millar and Methot fit a simplified assessment model simultaneously to several shelf rockfish species and found a probability distribution for q centered on 0.20. The maximum posterior density for canary rockfish (north) was at 0.29, the highest of the 6 rockfish stocks examined.

None of the assessments for shelf species conducted in 2005 used the q prior from the Millar and Methot analysis, and none placed an informative prior on the q. The modeling workshop and the assessment terms of reference did not call for a specific focus on the q in the shelf survey. Thus, all q values are formally valid with respect to the model formulations used in 2005.

The absolute value of q has been a specific assessment issue only for the slope species. This is necessary because the slope trawl survey has a much shorter time series. A short time series provides much less information about trends, but the data can be informative if the factors influencing q are sufficiently well understood.

Although the assessments for shelf species in 2005 did not specifically focus on the shelf survey q values, it is reasonable to review these values in preparation for future investigations and linkages between assessments.

The Millar and Methot results used a much simplified assessment model (such as knife-edge recruitment to the survey), included widow rockfish which clearly has a lower q than more demersal shelf rockfish, and was conducted prior to finding that early surveys needed to be adjusted for occurrence of tows that may not have been on bottom. Thus, the absolute value of their result may not be exactly applicable as a prior for current assessments.

For canary rockfish, the 1999 northern area assessment produced a q value of 0.58. Although this assessment was used as input to the Millar and Methot meta-analysis, this q value is twice the value found in the meta-analysis (0.29). Thus their approach may have a bias towards lower q values.

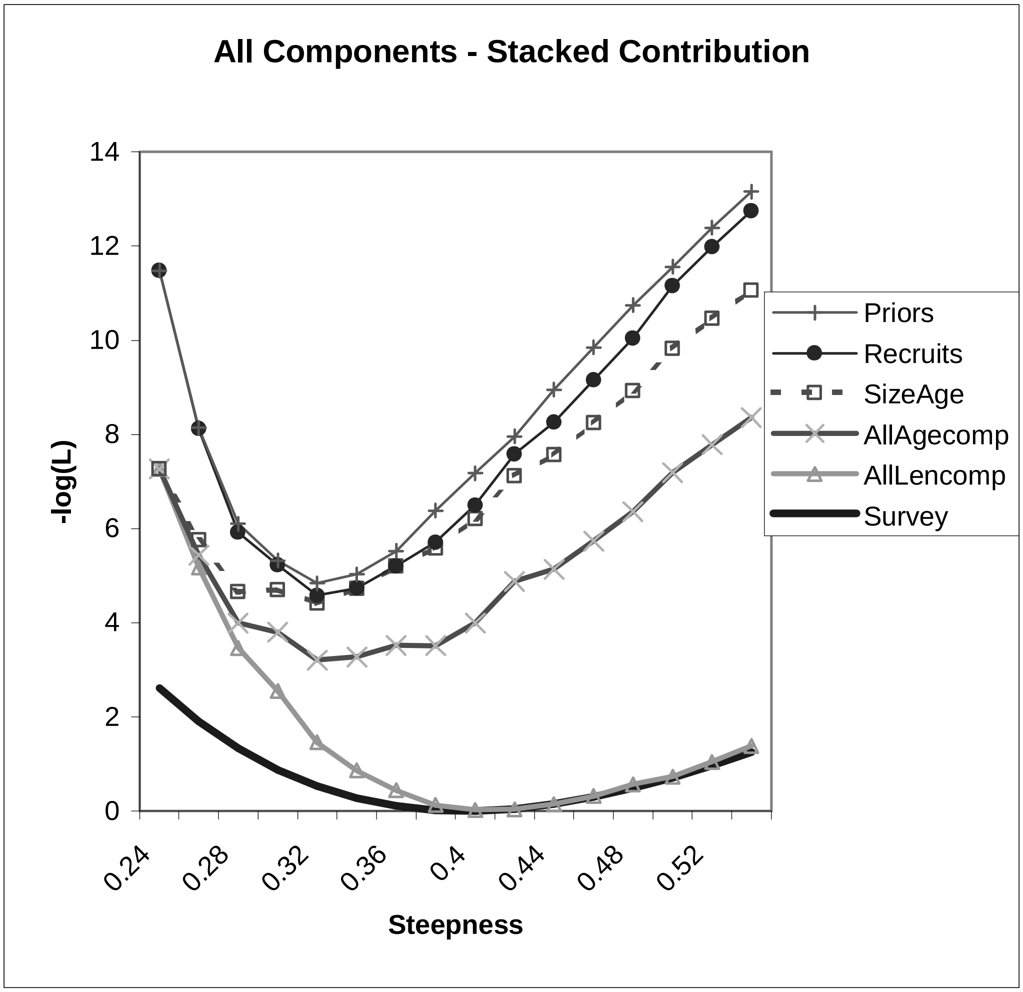
The August 2005 version of the canary assessment reports a q value of 0.705, but it also shows low selectivity at age 5 (0.21) then slowly increasing with age. The average selectivity across ages 5 to 40, weighted by biomass at age in 1992, is 0.617. Thus the effective q is 0.705 x 0.617 = 0.435. This value is not extremely high compared to the value of 0.29 in the meta-analysis.

The table below shows values of q and values of the ratio of survey biomass to population biomass for recent assessments. These values were extracted from assessment documents available on the PFMC website as of September 26, 2005.

Stock	Survey	Ratio	Q
Yelloweye	Shelf	0.07	NA
yellowtail rockfish	Shelf	0.17	0.16 to 0.32 for 3 sub-areas (after adjusting for selectivities > 1.0)
chilipepper (1998)	Shelf	0.43	NA (GLM CPUE values in model)
Canary rockfish	Shelf	0.56	0.705
English sole	Shelf	0.56	0.58 north; 0.19 south relative to total
darkblotched rockfish	Shelf	0.67	1.15
blackgill rockfish	Slope	0.22	0.19
Sablefish	Slope	0.30	0.37
LSTH	Slope	0.49	0.7 (prior); 1.03 (MPD)
Dover sole	Slope	0.59	1.05
POP	Slope	??	0.25; biomass values not available for ratio
SSTH	Slope	??	1.00 (fixed based on Lauth et al); biomass values not available

Ratio is average survey biomass / average population biomass over 1995-2004

Although the canary rockfish survey q does not appear to be unreasonably high, the baseline model does have uncertainty. This uncertainty was quantified primarily by profiling on the steepness parameter. This result from the assessment is presented in the figure below. A steepness of 0.38 represents the upper confidence interval for the overall model fit. For the fit to the survey in particular, this higher steepness fits the survey biomass trend, and the survey size and age composition data better than the baseline model fits these data. It is primarily the fit to the Oregon and Washington trawl fishery age composition data that pull the baseline model to lower biomass levels. At a steepness of 0.38, the ending biomass is higher and the survey q is reduced to 0.63.



All Components - Stacked Contribution
14
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10
8
6
4
2
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-log(L)
0.24
0.28
0.32
0.36
0.4
0.44
0.48
0.52
Steepness
Priors
Recruits
SizeAge
AllAgecomp
AllLencomp
Survey

SSC Request #2: The assumed variability associated with the spawner-recruit relationship (σ_R =0.4) is small relative to that used for other rockfish. The sensitivity of the canary assessment results to larger values of sigmaR (σ_R) should be explored.

RESPONSE:

The value of σ_R used in the assessment of canary rockfish is at the lower edge of the range of values used in other rockfish assessments as documented in the table below.

Stock	SigmaR	Comment
Dover sole	0.35	Fixed
English sole - Eur-Van	0.36	iterate starting from 0.51
Canary rockfish	0.40	fixed from 2002 assessment
Yelloweye	0.40	Fixed
kelp greenling	0.40	value for CA; 1.0 used for OR-WA
Blackgill rockfish	0.50	Fixed
gopher	0.50	Fixed
SSTH	0.50	Fixed
Longspine thornyhead	0.60	fixed; 1.0 used in sensitivity
sablefish	0.68	iterate (value is 0.28 after accounting for environmental data)
Vermillion	0.70	Fixed
Darkblotched rockfish	0.83??	iterate starting from 0.8
Bocaccio	1.00	Fixed
cabezon	1.00	Fixed
Chilipepper (1998)	1.00	Fixed
POP	1.00	Fixed
scorpionfish	1.00	Fixed
StarryFlounder	1.00	Fixed
Widow	???	not reported
Yellowtail rockfish	???	not used in model and not reported

Although several assessments use values as high as 1.0, the justification for these high values was not apparent in a cursory examination of assessment documents.

The resulting variability of recruitments was not reported in most assessments, so it is difficult to ascertain the direct effect of the σ_R value on the results.

Sensitivity of the canary rockfish assessment to the input value of sigmaR is shown below:

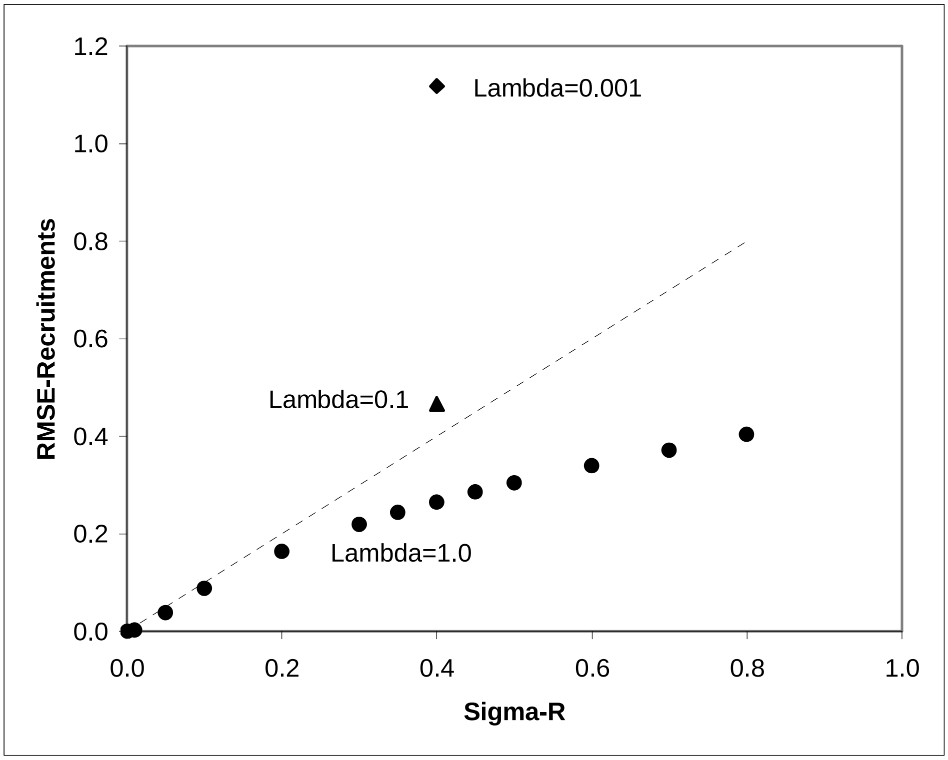


Figure 1. At sigma-R values above 0.1, the resulting standard deviation of recruitments (RMSE) is less than sigma-R, thus any iterative adjustment of sigma-R would cause it to shrink to about 0.1. At a sigma-R of 0.4, reducing the emphasis (lambda) on the recruitment deviations allows for greater variability and the RMSE increases.

NOTE: The earliest and latest years with recruitment deviations tend to have less variability among the deviations. However, the RMSE for the restricted range of years, 1967-2000, is only about 10% higher than the RMSE for all years with recruitment deviations (1952-2004).

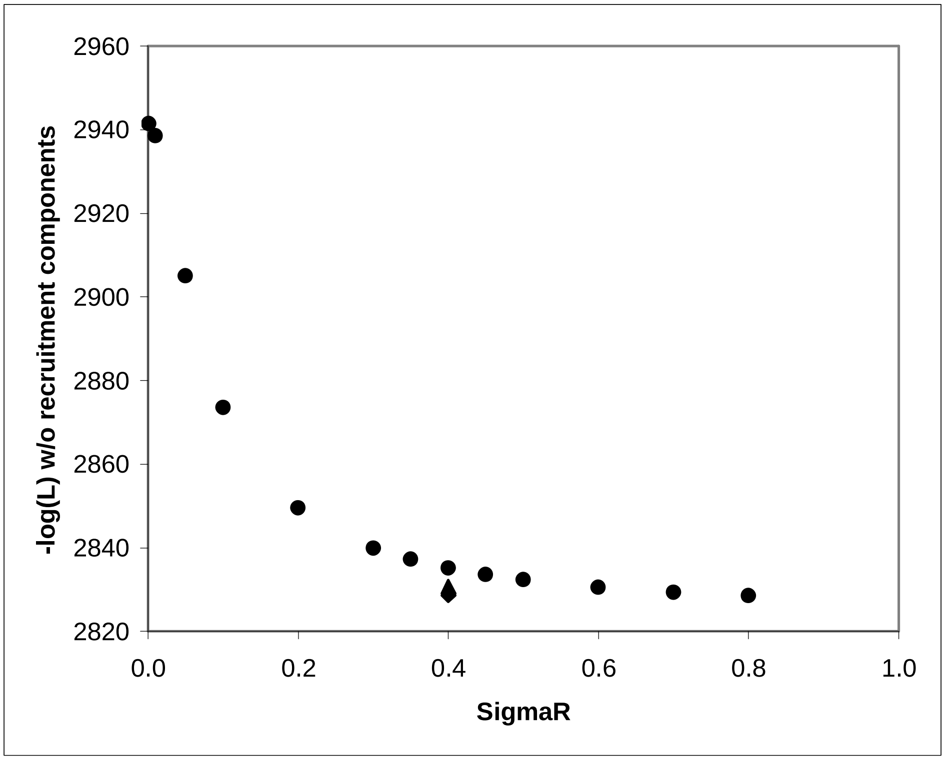


Figure 2. As the sigma-R approaches 0.0, the fit to the non-recruitment likelihood components degrades, but there is only substantial degradation below sigma-R of about 0.2. The fact that the model with maximum allowed variability in 53 recruitment parameters fits only ~90 log(L) units better than the model with no recruitment variability indicates that the size and age composition data do not indicate high recruitment variability.

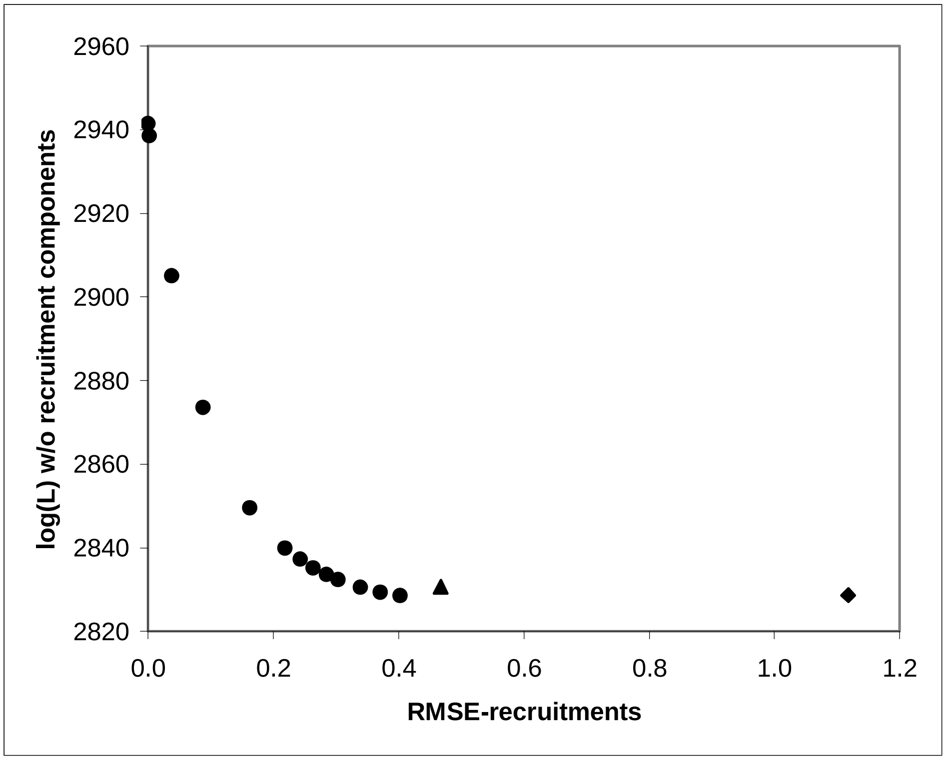


Figure 3. Figure 1 showed high RMSE of the recruitments as the emphasis on recruitment deviations was decreased. This increased variability produces very little improved fit to the canary rockfish data.

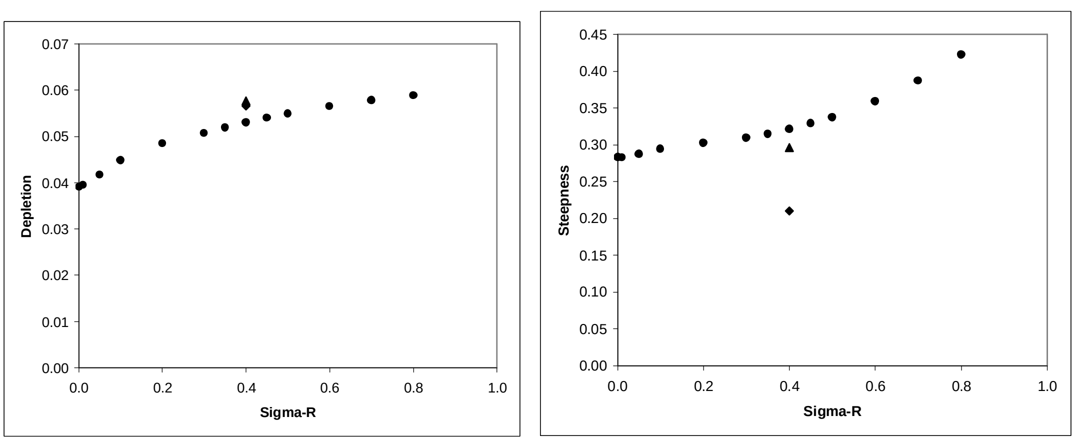


Figure 4. The effect of sigma-R on the estimate of depletion and estimated spawner-recruitment steepness is small.

NOTE: Higher steepness estimates at higher levels of sigma-R are probably a consequence of the following model factors. The geometric mean of estimated recruitments is offset from the spawner-recruitment curve by exp(-0.5*sigmaR^2). Since at high sigma-R the model still does not estimate a high variability in log(recruitment), there are not enough large recruitment events estimated to provide sufficient biomass towards the end of the time series. Consequently, the model compensates by estimating a higher spawner-recruitment steepness in order to maintain the necessary arithmetic mean recruitment level towards the end of the time series.

SSC Request #3: Documentation more complete than that in the draft assessment document should be provided. Minimally, the updated selectivity curves and the SS2 data and control files should be made available.

Response: Work on these will resume following completion of responses to #1, #2, and #4.

SSC Request #4: Inclusion of the Santa Cruz juvenile survey data should be considered.

Response:

The Santa Cruz juvenile survey was not evaluated for use in the 2005 assessment only because of limited time and staff to complete this assessment. The juvenile survey was not used in the 2002 assessment and was not explicitly recommended for use by the 2002 STAR panel, so it was not the highest priority. Future consideration of this survey is included in the research recommendations from the 2002 and 2005 assessments.

There are two primary issues to evaluate before including this survey in the model. These are geographic coverage and non-linearity of the functional relationship. It is important to be as complete as possible in this evaluation because once the juvenile survey is included in the model, the model's estimates of recruitment in recent years will closely follow the survey rather than follow a course based on the spawner-recruitment relationship.

<u>Geographic and Temporal Coverage</u>

The canary rockfish assessment does not include any geographic differentiation. Data from regional fisheries are included in the model, but each is treated as representative of coastwide patterns in recruitment and abundance, albeit with fishery-specific selectivity patterns that could account for some differences that truly are latitudinal in nature. In an investigation of latitudinal patterns in recruitment for some rockfish species, not including canary rockfish, Fields and Ralston (2004) found that the dominant pattern in recruitment variability was coastwide. Thus, the canary rockfish assessment model is already configured to accept a regional recruitment index as an indicator of coastwide recruitment patterns, and the work of Fields and Ralston suggests that it is reasonable to do so. However, this does not mean that the central California juvenile index really is a strong indicator of coastwide recruitment for canary rockfish, especially when one considers that their distribution extends strongly into Canada.

The canary assessment documented some geographic patterns in canary rockfish distribution. One finding was that pockets of nearshore young and offshore old canary rockfish are interspersed along the coast. It is possible, but hard to test, that these represent localized recruitment cells. However, tt would be prudent to examine latitudinal coherence in canary rockfish recruitment more explicitly before concluding that a southern index is a good indicator for northern recruitment.

Very few adult canary rockfish are found south of about San Francisco in the trawl survey and in the fisheries. The locations of canary rockfish in the more extensive juvenile survey conducted as cooperative research by the Pacific Whiting Conservation Cooperative matches this latitudinal pattern with few canary rockfish juveniles detected south of 37.3°N. Thus the Santa Cruz survey occurs at the southern end of the distribution of significant spawning concentrations of adult canary rockfish. Through 2004, there was no juvenile sampling north of about the Columbia River and the occurrence of canary rockfish juveniles seemed to diminish through Oregon. PWCC sampling occurred even further north in 2005, but these results are not yet available and the Santa Cruz juvenile survey detected no canary rockfish in 2005.

The juvenile rockfish survey is timed to occur while rockfish are large enough to capture but before they begin to settle. Some of the perceived latitudinal patterns in canary rockfish pelagic juvenile occurrence could be confounded with latitudinal patterns in the timing of spawning and juvenile settlement. Differences in timing have not been reported, but this issue has not been explicitly investigated.

Non-Linear Relationship

The 1983-2005 juvenile rockfish survey found higher occurrence of canary rockfish during 1984-1991, very low numbers during 1992-2000, then higher numbers during 2001-2004. In six of the surveys, no canary rockfish were detected.

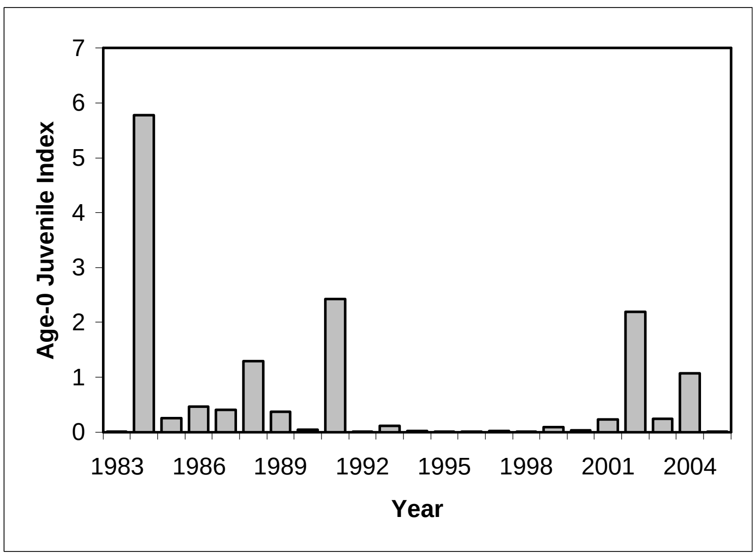


Figure 5. The age-0 juvenile index time series (from Steve Ralston, SWFSC). Five years, including 1983 and 2005, detected too few canary rockfish larvae to calculate the index.

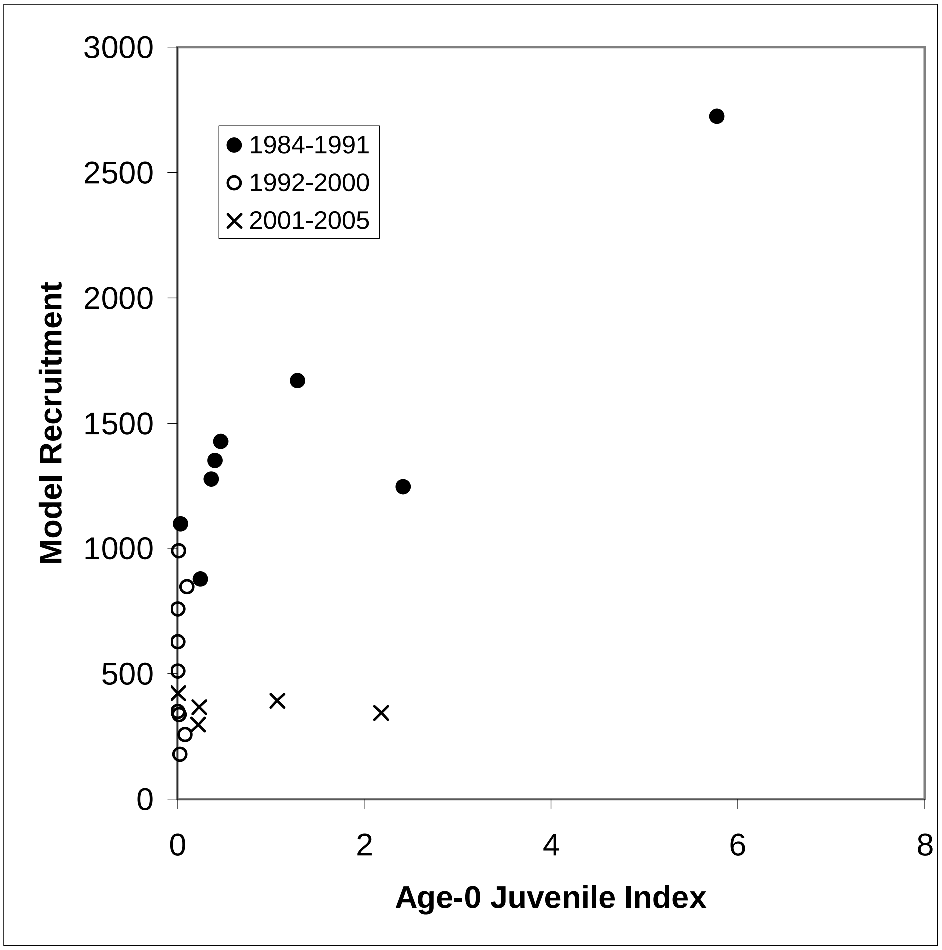


Figure 6. Relationship between juvenile index and the assessment model's estimate of recruitment. During the last era, 2001 to 2005, the model estimates are primarily determined from the spawner-recruitment relationship, so would change if the juvenile index was used as a recruitment predictor.

Conventionally, a survey is specified to have a linear relationship to the model's estimate of abundance. However, other assessments that used the juvenile index as a recruitment predictor (widow rockfish) have found that a non-linear relationship is necessary to reconcile the range of the juvenile index with the range of the model's estimates of recruitment. This non-linearity has been rationalized as a manifestation of compensatory mortality; high initial numbers of juveniles may have a higher mortality rate so their high numbers are reduced more so than occurs in years with lower numbers of juveniles.

This non-linearity has been parameterized as a power function in SS1 and SS2:

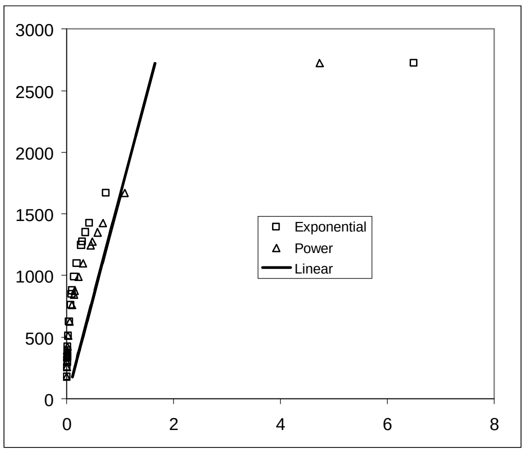
$$\hat{R} = qN_0^{(1+P)}$$

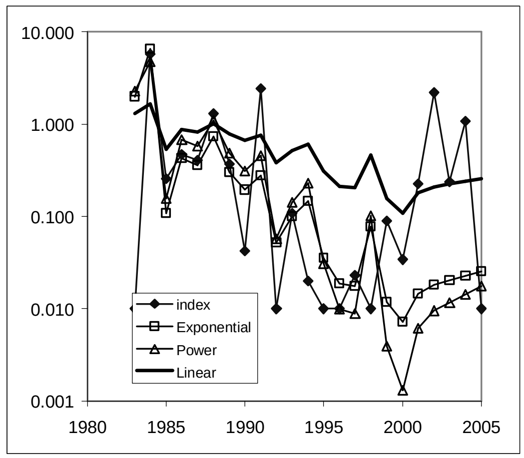
so if the parameter, P, equals zero a linear relationship is obtained. If P is positive, then the dynamic range of the expected recruitment index is expanded.

Because the mechanism is suggested to be compensatory mortality, then it may be better to consider an exponential form for the non-linearity:

$$\hat{R} = qN_0 e^{(-P\frac{N_0}{\max(N_0)})}$$

For canary rockfish, a power function with P=2 and an exponential function with P=4 would provide the following relationships:





Within the 1983-1991 era, years with a higher index value tended to have relatively higher recruitment also, but the 1998 positive recruitment deviation was not detected by the index. Although the highest recruitment in both series occurred in 1984, this recruitment value (2722) is only 57% of R_0. In a rebuilt stock, this recruitment level will be the norm.

Both non-linear relationships seem to match the general decline in the juvenile index from the 1980s to the 1990s, but their predictions for the 2000s have a different scaling.

Note that the years with no larvae detected were assigned an index value of 0.01, which is half the lowest detected index. If these years were assigned an even lower value, then the range of the index would expand further and the magnitude of the required nonlinearity would increase.

Before proceeding to use a non-linear relationship to calibrate the juvenile index as a measure of canary rockfish recruitment, it would be prudent to:

- Evaluate alternative explanations for the decadal pattern, perhaps alongshore currents influence the probability of canary rockfish larvae occurring in the survey area;
- Evaluate the plausibility of compensatory mortality occurring during this life stage for canary rockfish. Because the assessment model currently has little data for fish younger than about age 2 or 3, the compensatory mortality would need to operate after the juvenile survey (about age 4 months) and before age 2-3.

- Construct a life history model for the age 0 to age 3 period and evaluate the maximum possible extent of the compensatory effect;
- Build the exponential option into SS2.

A few preliminary, exploratory SS2 model runs were conducted with the juvenile index included. Not unexpectedly, the basic results are:

- With a linear relationship the model result was not much changed by the index. The model does not match the low index during the 1990s, but does have some increase in recruitment after 1999.
- With a linear relationship and a high emphasis on fitting the juvenile index, the model's estimates of recruitment during the 1990s is greatly reduced, steepness is lower and the ending biomass is lower.
- With a power relationship and a moderate (1.0) emphasis on the juvenile index, the power goes to near 4.0, steepness is higher and the ending biomass is higher than that of the base model.
- As the juvenile index is included, the fit to the size and age composition data degrades, especially for the Oregon and Washington trawl fishery and for the trawl survey. This pattern of degradation may simply be due to the fact that these sources have the longest time series of data, so are more at risk to degradation.

Because of the high sensitivity of the model result to the way in which the juvenile index is included in the model, it is highly advisable to conduct the preparatory studies outlined here before including the juvenile index in the canary rockfish assessment.

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Millar, R.B. and R.D. Methot. 2002. Age-structured meta-analysis of U.S. West Coast rockfish populations and hierarchical modeling of trawl survey catchabilities. Can. J. Fish. Aquat. Sci. 59:383-392.

Rogers, J.B. Wilkins, M.E., Kamikawa, D., Wallace, F., Builder, T., Zimmerman, M., Kander, M., and Culver, B. 1996. Appendix E: Status of the remaining rockfish in the Sebastes complex in 1996 and recommendations for management in 1997. In Appendix Volume II to the Status of the Pacific Coast groundfish fishery through 1996 and recommended acceptable biological catches for 1997. Pac. Fish. Manag. Council, Portland, Oregon.

Appendix B - Control file

```
# Control file for 2005 canary rockfish model:   Base Model (Diff configuration)

# Morph and area setup
2                       # Number of growth morphs
1       2               # Sex of each morph (1 = female, 2 = male)
1                       # Number of areas
# Area for each fleet/survey
1       1       1       1       1       1       1       1       1       1       1
0       # Migration setup (0 = off, 1 = on)

# Time block setup
11      # Number of time-block designs
# Number of blocks per design
2       3       3       3       3       3       2       3       3       2       1
1916    1996    1997    2004                            # Design 1:
1916    1979    1980    1997    1998    2004            # Design 2: NCA trawl
1916    1979    1980    1993    1994    2004            # Design 3: OR trawl
1916    1979    1980    1992    1993    2004            # Design 4: WA trawl
1916    1979    1980    1991    1992    2004            # Design 5:  SCA non-trawl
1916    1990    1991    1997    1998    2004            # Design 6:
1916    1989    1990    2004                            # Design 7:
1916    1995    1996    2002    2003    2004            # Design 8:
1916    1988    1989    1995    1996    2004            # Design 9: NCA rec.
1916    1990    1991    2004                            # Design 10:
1916    2004

# Natural mortality and growth parameter setup
6       # Last age for natural mortality young
14      # First age for natural mortality old
1.66    # Age at Lmin
99      # Age at Lmax
-4      # Phase for time-varying mortality and growth deviations
# Natural mortality and growth parameters
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase Env-variable Use_deviation Dev_minyr Dev_maxyr
Dev_SD
# Female parameters
0.04    0.08    0.06    0.06    0       0.8     -4      0       0       0       0       0.5     0       0       #M1_natM_young
-3      3       0.3     0.693   0       0.8     3       0       0       0       0       0.5     0       0
        #M1_natM_old_as_exponential_offset(rel_young)
5       25      13.26   13.26   0       10      3       0       0       0       0       0.5     0       0       #M1_Lmin
40      90      58.9    58.9    0       10      3       0       0       0       0       0.5     0       0       #M1_Lmax
0.05    0.25    0.146   0.146   0       0.8     3       0       0       0       0       0.5     0       0       #M1_VBK
0.01    0.25    0.15    0.150   0       0.8     -5      0       0       0       0       0.5     0       0       #M1_CV-young
-3      3       -.98    -1.0    0       0.8     -5      0       0       0       0       0.5     0       0       #M1_CV-
old_as_exponential_offset(rel_young)

# Male parameters
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0
        #M2_natM_young_as_exponential_offset(rel_morph_1)
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0
        #M2_natM_old_as_exponential_offset(rel_young)
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0
        #M2_Lmin_as_exponential_offset
-3      3       -0.1188 0       0       0.8     3       0       0       0       0       0.5     0       0
        #M2_Lmax_as_exponential_offset
-3      3       0.2581  0       0       0.8     3       0       0       0       0       0.5     0       0
        #M2_VBK_as_exponential_offset
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0       #M2_CV-
young_as_exponential_offset(rel_CV-young_for_morph_1)
-3      3       -1.16   -1.0    0       0.8     -5      0       0       0       0       0.5     0       0       #M2_CV-
old_as_exponential_offset(rel_CV-young)

# Weight at length, maturity and fecundity parameters
-3      3       1.55E-05        1.55E-05        0       0.8     -3      0       0       0       0       0.5     0       0
        # Female weight-length coefficient
-3      3       3.03    3.03    0       0.8     -3      0       0       0       0       0.5     0       0       # Female weight-
length exponent
```

```
-3	63	40.5	40.5	0	0.8	-3	0	0	0	0	0.5	0	0	# Female maturity
L50%
-3	3	-0.25	-0.25	0	0.8	-3	0	0	0	0	0.5	0	0	# Female maturity at
length slope
-3	3	1.	1.	0	0.8	-3	0	0	0	0	0.5	0	0	# Female eggs/gm
intercept
-3	3	0.	0.	0	0.8	-3	0	0	0	0	0.5	0	0	# Female eggs/gm
slope
-3	3	1.55E-05	1.55E-05	0	0.8	-3	0	0	0	0	0.5	0	0
	# Male weight-length coefficient
-3	3	3.03	3.03	0	0.8	-3	0	0	0	0	0.5	0	0	# Male weight-length
exponent

# Distribution of recruits by morph and area
0	1	0.5000	0.2	0	9.8	-3	0	0	0	0	0.5	0	0	# Fraction of females
to area 1
0	1	0.5000	0.2	0	9.8	-3	0	0	0	0	0.5	0	0	# Fraction of males to
area 1
0	1	1	1	0	0.8	-3	0	0	0	0	0.5	0	0	# Fraction of recruits
to area 1

# Environmental and block setup for mortality and growth parameters
0	# Environmental link setup
0	# Number of time-block setups used

# Stock-recruit setup
1	# Stock-recruit function (1 = BH, 2 = Ricker)
# Stock-recruit parameters
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase
7	11	9.3	9.3	0	10	1	# Ln(R0)
0.21	0.99	0.34	0.4	0	0.5	3	# Steepness
0	2	0.4	0.4	0	0.8	-3	# SD recruitments (Sigma R)
-5	5	0	0	0	1	-3	# Env_link_parameter
-5	5	0	0	0	1	-4	# Initial equilibrium recruit offset

0	# Environmental variable to use
# Recruitment deviations
# Start year End year  Lower bound	Upper bound Phase
1952	2004	-15	15	3

# Initial F setup for each fleet
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase
0	0.2	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1

# Catchability (Q) setup for each fleet
# Float(0/1) Do-power(0/1) Do-env(0/1) Do-dev(0/1) Env-var Num/Bio(0/1)
0	0	0	0	0	1
0	1	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	1	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
# Catchability parameters
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase
-30	30	0	0	0	10	-2	# Fleet 2: exponent
-30	30	0	0	0	10	-2	# Fleet 9: exponent
```

```
# Selectivity setup for each fleet
# Length-based selectivity by fleet
# Type      Do-retention(0/1) Do-male Special
8           0           0           0
8           0           2           0
8           0           2           0
8           0           2           0
8           0           0           0
8           0           0           0
8           0           0           0
8           0           0           0
8           0           0           0
8           0           0           0
8           0           2           0
# Age-based selectivity by fleet
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0
10          0           0           0

# Selectivity parameters by fleet
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase Env-variable Use_deviation Dev_minyr Dev_maxyr
Dev_SD
# Fleet 1: SCA trawl
0    60    41.    41     0    9    -4    0    0    0    0    0.5    1    3 #peak_fleet1
0.0  0.1   0.0    0.001  0    99   -6    0    0    0    0    0.5    0    0 #init
-5   4     0      0      0    99   -2    0    0    0    0    0.5    1    3 #infl
-8   4     -1.    -1     0    5    3     0    0    0    0    0.5    0    0 #slope
-5   9     0      0      0    99   -3    0    0    0    0    0.5    1    3 #final
-5   4     0      0      0    5    4     0    0    0    0    0.5    0    0 #infl2
-8   4     -1.    -1     0    5    5     0    0    0    0    0.5    0    0 #slope
1    4     3      3      0    10   -99   0    0    0    0    0.5    0    0 #binwidth
# Fleet 2: NCA trawl
0    60    48.5   48     0    9    -4    0    0    0    0    0.5    2    3 #peak_fleet1
.0   0.1   0.0    0.001  0    99   -6    0    0    0    0    0.5    0    0 #init
-5   4     0      0      0    99   -2    0    0    0    0    0.5    2    3 #infl
-8   4     -1.    -1     0    5    3     0    0    0    0    0.5    0    0 #slope
-5   9     0      0      0    99   -3    0    0    0    0    0.5    2    3 #final
-5   4     0      0      0    5    4     0    0    0    0    0.5    0    0 #infl2
-8   4     -3.    -1     0    5    5     0    0    0    0    0.5    0    0 #slope
 1   4     3      3      0    10   -99   0    0    0    0    0.5    0    0 #binwidth
10   60    44     44     0    10   -3    0    0    0    0    0.5    0    0 #female dogleg
-4   4     0      0      0    3    -4    0    0    0    0    0.5    0    0 #female offset at minage
-4   4     -.01   -1     0    99   4     0    0    0    0    0.5    0    0 #female offset at dogleg
-4   0     -1     -1     0    99   4     0    0    0    0    0.5    0    0 #female offset at maxage
# Fleet 3: OR trawl
0    60    47     47     0    9    -4    0    0    0    0    0.5    3    3 #peak_fleet1
.0   0.1   0.0    0.001  0    99   -6    0    0    0    0    0.5    0    0 #init
-5   4     0      0      0    99   -2    0    0    0    0    0.5    3    3 #infl
-8   4     -1.    -1     0    5    3     0    0    0    0    0.5    0    0 #slope
-5   9     0      0      0    99   -3    0    0    0    0    0.5    3    3 #final
-5   4     0      0      0    5    4     0    0    0    0    0.5    0    0 #infl2
-8   4     -3.    -1     0    5    5     0    0    0    0    0.5    0    0 #slope
 1   4     3      3      0    10   -99   0    0    0    0    0.5    0    0 #binwidth
10   60    44     44     0    10   -3    0    0    0    0    0.5    0    0 #female dogleg
-4   4     0      0      0    3    -4    0    0    0    0    0.5    0    0 #female offset at minage
-4   4     -.01   -1     0    99   4     0    0    0    0    0.5    0    0 #female offset at dogleg
-4   0     -1     -1     0    99   4     0    0    0    0    0.5    0    0 #female offset at maxage

#fishery-4WA_trwl
0    60    51     51     0    9    -4    0    0    0    0    0.5    4    3 #peak_fleet1
.0   0.1   0.0    0.001  0    99   -6    0    0    0    0    0.5    0    0 #init
```

```
-5   4    0     0     0  99   -2   0  0  0  0  0.5  4   3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  4   3 #final
-5   4    0     0     0   5    4   0  0  0  0  0.5  0   0 #infl2
-8   4   -3.   -1     0   5    5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth
10  60   44    44     0  10   -3   0  0  0  0  0.5  0   0 #female dogleg
-4   4    0     0     0   3   -4   0  0  0  0  0.5  0   0 #female offset at minage
-4   4   -.01  -1     0  99    4   0  0  0  0  0.5  0   0 #female offset at dogleg
-4   0   -1    -1     0  99    4   0  0  0  0  0.5  0   0 #female offset at maxage

# Fleet 5: SCA non-trawl
0   60   40.5  40     0   9   -4   0  0  0  0  0.5  5   3 #peak_fleet1
.0   0.1  0.0   0.001 0  99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99   -2   0  0  0  0  0.5  5   3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  5   3 #final
-5   4    0     0     0   5    4   0  0  0  0  0.5  0   0 #infl2
-8   4   -1.   -1     0   5    5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth
#fishery-6CA_N_nontrwl
0   60   40.5  40     0   9   -4   0  0  0  0  0.5  6   3 #peak_fleet1
.0   0.1  0.0   0.001 0  99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99   -2   0  0  0  0  0.5  6   3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  6   3 #final
-5   4    0     0     0   5    4   0  0  0  0  0.5  0   0 #infl2
-8   4   -1.   -1     0   5    5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth
#fishery-7WAOR_nontrwl
0   60   60    60     0   9   -7   0  0  0  0  0.5  7   3 #peak_fleet1
.0   0.1  0.0   0.001 0  99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99   -2   0  0  0  0  0.5  7   3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  7   3 #final
-5   4    0     0     0   5   -4   0  0  0  0  0.5  0   0 #infl2
-8   4   -1.   -1     0   5   -5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth
#fishery-8CA_S_rec
0   60   29.0  30     0   9   -4   0  0  0  0  0.5  8   3 #peak_fleet1
.0   0.1  0.0   0.001 0  99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99   -2   0  0  0  0  0.5  8   3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  8   3 #final
-5   4    0     0     0   5    4   0  0  0  0  0.5  0   0 #infl2
-8   4   -1.   -1     0   5    5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth
#fishery-9CA_N_rec
0   60   31    32     0   9   -4   0  0  0  0  0.5  9   3 #peak_fleet1
.0   0.1  0.0   0.001 0  99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99   -2   0  0  0  0  0.5  9   3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  9   3 #final
-5   4    0     0     0   5    4   0  0  0  0  0.5  0   0 #infl2
-8   4   -1.   -1     0   5    5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth
#fishery-10WAOR_rec
0   60   31.0  31     0   9   -4   0  0  0  0  0.5  10  3 #peak_fleet1
.0   0.1  0.0   0.001 0  99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99   -2   0  0  0  0  0.5  10  3 #infl
-8   4   -1.   -1     0   5    3   0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0  99   -3   0  0  0  0  0.5  10  3 #final
-5   4    0     0     0   5    4   0  0  0  0  0.5  0   0 #infl2
-8   4   -1.   -1     0   5    5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0  10  -99   0  0  0  0  0.5  0   0 #binwidth

#survey-11_triennial
0   60   52.6  45     0   9   -7   0  0  0  0  0.5  0   0 #peak_fleet1
0.   0.1  0.0   0.001 0  99   -4   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0  99    2   0  0  0  0  0.5  0   0 #infl
```

-8	4	-1.	-1.	0	2	3	0	0	0	0	0.5	0	0	#slope
-5	9	0	0	0	99	3	0	0	0	0	0.5	0	0	#final
-5	4	0	0	0	5	4	0	0	0	0	0.5	0	0	#infl2
-8	4	-3.	-1.	0	2	5	0	0	0	0	0.5	0	0	#slope
1	4	3	3	0	10	-99	0	0	0	0	0.5	0	0	#binwidth
10	60	44	44	0	10	-3	0	0	0	0	0.5	0	0	#female dogleg
-4	4	0	0	0	3	-4	0	0	0	0	0.5	0	0	#female offset at minage
-4	4	0	0	0	3	4	0	0	0	0	0.5	0	0	#female offset at dogleg
-4	0	-1	0	0	-3	4	0	0	0	0	0.5	0	0	#female offset at maxage

Environmental , time-block and time-varying deviation setup for selectivity parameters
0 # Environmental link setup
1 # Select custom time-block setup
Time-block parameters by fleet, parameter and block
Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase

15	62	40.0	40	0	9	-7	#	1-peak-early
15	62	41.8	41	0	9	-7	#	1-peak-late
-8	8	0	0	0	9	3	#	1-infl-early
-8	8	0	0	0	4	3	#	1-infl-late
-8	8	0	0	0	4	3	#	1-final-early
-8	8	0	0	0	4	3	#	1-final-late
15	62	54.0	48	0	9	-7	#	2-peak-early
15	62	46.0	47	0	9	-7	#	2-peak-Mid
15	62	45.5	48	0	9	-7	#	2-peak-late
-8	8	0	0	0	4	3	#	2-infl-early
-8	8	0	0	0	4	2	#	2-infl-Mid
-8	8	0	0	0	4	2	#	2-infl-late
-8	8	0	0	0	4	3	#	2-final-early
-8	8	0	0	0	4	3	#	2-final-Mid
-8	8	8	0	0	4	3	#	2-final-late
15	62	52.0	47	0	9	-7	#	3-peak-early
15	62	55.1	54	0	9	-7	#	3-peak-Mid
15	62	42.5	47	0	9	-7	#	3-peak-late
-8	8	0	0	0	4	3	#	3-infl-early
-8	8	0	0	0	4	2	#	3-infl-Mid
-8	8	0	0	0	4	2	#	3-infl-late
-8	8	0	0	0	4	3	#	3-final-early
-8	8	0	0	0	4	3	#	3-final-Mid
-8	8	8	0	0	4	3	#	3-final-late
15	62	52.0	51	0	9	-7	#	4-peak-early
15	62	53.2	53	0	9	-7	#	4-peak-Mid
15	62	54.0	51	0	9	-7	#	4-peak-late
-8	8	0	0	0	4	3	#	4-infl-early
-8	8	0	0	0	4	2	#	4-infl-Mid
-8	8	0	0	0	4	2	#	4-infl-late
-8	8	0	0	0	4	3	#	4-final-early
-8	8	0	0	0	4	3	#	4-final-Mid
-8	8	8	0	0	4	3	#	4-final-late
15	62	50.1	40	0	9	-7	#	5-peak-early
15	62	41.5	40	0	9	-7	#	5-peak-Mid
15	62	36.1	40	0	9	-7	#	5-peak-late
-8	8	0	0	0	4	3	#	5-infl-early
-8	8	0	0	0	4	2	#	5-infl-Mid
-8	8	0	0	0	4	2	#	5-infl-late
-8	8	0	0	0	4	3	#	5-final-early
-8	8	0	0	0	4	3	#	5-final-Mid
-8	8	0	0	0	4	3	#	5-final-late
15	62	44.0	40	0	9	-7	#	6-peak-early
15	62	41.2	39	0	9	-7	#	6-peak-Mid
15	62	44.4	40	0	9	-7	#	6-peak-late
-8	8	0	0	0	4	3	#	6-infl-early
-8	8	0	0	0	4	2	#	6-infl-Mid
-8	8	0	0	0	4	2	#	6-infl-late
-8	8	0	0	0	4	3	#	6-final-early
-8	8	0	0	0	4	3	#	6-final-Mid
-8	8	0	0	0	4	3	#	6-final-late
15	62	50.0	40	0	9	-7	#	7-peak-early
15	62	48.0	40	0	9	-7	#	7-peak-late
-8	8	0	0	0	4	2	#	7-infl-early
-8	8	0	0	0	4	2	#	7-infl-late

-8	8	8	0	0	4	-3	#	7-final-early
-8	8	8	0	0	4	-3	#	7-final-late
15	62	27.6	30	0	9	-7	#	8-peak-early
15	62	32.3	33	0	9	-7	#	8-peak-Mid
15	62	28.1	30	0	9	-7	#	8-peak-late
-8	8	0	0	0	4	3	#	8-infl-early
-8	8	0	0	0	4	2	#	8-infl-Mid
-8	8	0	0	0	4	2	#	8-infl-late
-8	8	0	0	0	4	3	#	8-final-early
-8	8	0	0	0	4	3	#	8-final-Mid
-8	8	0	0	0	4	3	#	8-final-late
15	62	31.3	30	0	9	-7	#	9-peak-early
15	62	29.6	29	0	9	-7	#	9-peak-Mid
15	62	38.6	30	0	9	-7	#	9-peak-late
-8	8	0	0	0	4	3	#	9-infl-early
-8	8	0	0	0	4	2	#	9-infl-Mid
-8	8	0	0	0	4	2	#	9-infl-late
-8	8	0	0	0	4	3	#	9-final-early
-8	8	0	0	0	4	3	#	9-final-Mid
-8	8	0	0	0	4	3	#	9-final-late
15	62	30.6	30	0	9	-7	#	10-peak-early
15	62	29.7	30	0	9	-7	#	10-peak-late
-8	8	0	0	0	4	3	#	10-infl-early
-8	8	0	0	0	4	2	#	10-infl-late
-8	8	0	0	0	4	3	#	10-final-early
-8	8	0	0	0	4	3	#	10-final-late

-5 # Phase for selectivity parameter deviations

New in Version 1.20: Adjustment of variance and sample sizes
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 # extra stddev For surveys
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 # extra stddev For discard
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 # extra stddev For meanwt
1.70 1.82 12.52 14.40 1.68 4.48 2.69 1.67 2.40 1.62 2.76 # Sample size multiplier length comps
1.11 1.39 8.51 11.31 1.00 1.00 3.48 1.00 1.00 1.00 3.02 # Sample size multiplier age comps
1.00 1.01 0.82 0.57 1.00 1.00 1.00 1.00 1.00 1.00 0.41 # Sample size multiplier size-at-age
Likelihood lambda setup
1 # Maximum number of lambda phases (1 value below for each lambda x phase)
1 # Constant offset for Log(SD) in likelihood calculation (include = 1, not = 0)
Lambdas by data type and phase
#_survey_lambdas
1 0.0001 1 1 1 1 1 1 0.0001 1 1
#_discard_lambdas
0 0 0 0 0 0 0 0 0 0 0
#_meanwtlambda(one_for_all_sources)
1
#_lenfreq_lambdas
.5 .45 .45 .45 1.0 1.0 .5 1.0 1.0 1.0 .45
#_age_freq_lambdas
.5 .45 .45 .45 1.0 1.0 .5 1.0 1.0 1.0 .45
#_size@age_lambdas
.1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1
#_initial_equil_catch
1
#_recruitment_lambda
1
#_parm_prior_lambda
1
#_parm_dev_timeseries_lambda
1
1000 #_crashPenLambda
#max F
0.9
999 #_end-of-file

```
# Control file for 2005 canary rockfish model:   Alternate Model (NoDiff configuration)

# Morph and area setup
2                       # Number of growth morphs
1       2               # Sex of each morph (1 = female, 2 = male)
1                       # Number of areas
# Area for each fleet/survey
1       1       1       1       1       1       1       1       1       1       1
0       # Migration setup (0 = off, 1 = on)

# Time block setup
11      # Number of time-block designs
# Number of blocks per design
2       3       3       3       3       3       2       3       3       2       1
1916    1996    1997    2004                    # Design 1:
1916    1979    1980    1997    1998    2004    # Design 2: NCA trawl
1916    1979    1980    1993    1994    2004    # Design 3: OR trawl
1916    1979    1980    1992    1993    2004    # Design 4: WA trawl
1916    1979    1980    1991    1992    2004    # Design 5:  SCA non-trawl
1916    1990    1991    1997    1998    2004    # Design 6:
1916    1989    1990    2004                    # Design 7:
1916    1995    1996    2002    2003    2004    # Design 8:
1916    1988    1989    1995    1996    2004    # Design 9: NCA rec.
1916    1990    1991    2004                    # Design 10:
1916    2004

# Natural mortality and growth parameter setup
6       # Last age for natural mortality young
14      # First age for natural mortality old
1.66    # Age at Lmin
99      # Age at Lmax
-4      # Phase for time-varying mortality and growth deviations
# Natural mortality and growth parameters
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase Env-variable Use_deviation Dev_minyr Dev_maxyr
Dev_SD
# Female parameters
0.04    0.08    0.06    0.06    0       0.8     -4      0       0       0       0       0.5     0       0       #M1_natM_young
-3      3       0.3     0.693   0       0.8     3       0       0       0       0       0.5     0       0
        #M1_natM_old_as_exponential_offset(rel_young)
5       25      13.26   13.26   0       10      3       0       0       0       0       0.5     0       0       #M1_Lmin
40      90      58.9    58.9    0       10      3       0       0       0       0       0.5     0       0       #M1_Lmax
0.05    0.25    0.146   0.146   0       0.8     3       0       0       0       0       0.5     0       0       #M1_VBK
0.01    0.25    0.15    0.150   0       0.8     -5      0       0       0       0       0.5     0       0       #M1_CV-young
-3      3       -.98    -1.0    0       0.8     -5      0       0       0       0       0.5     0       0       #M1_CV-
old_as_exponential_offset(rel_young)

# Male parameters
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0
        #M2_natM_young_as_exponential_offset(rel_morph_1)
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0
        #M2_natM_old_as_exponential_offset(rel_young)
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0
        #M2_Lmin_as_exponential_offset
-3      3       -0.1188 0       0       0.8     3       0       0       0       0       0.5     0       0
        #M2_Lmax_as_exponential_offset
-3      3       0.2581  0       0       0.8     3       0       0       0       0       0.5     0       0
        #M2_VBK_as_exponential_offset
-3      3       0       0       0       0.8     -3      0       0       0       0       0.5     0       0       #M2_CV-
young_as_exponential_offset(rel_CV-young_for_morph_1)
-3      3       -1.16   -1.0    0       0.8     -5      0       0       0       0       0.5     0       0       #M2_CV-
old_as_exponential_offset(rel_CV-young)

# Weight at length, maturity and fecundity parameters
-3      3       1.55E-05        1.55E-05        0       0.8     -3      0       0       0       0       0.5     0       0
        # Female weight-length coefficient
-3      3       3.03    3.03    0       0.8     -3      0       0       0       0       0.5     0       0       # Female weight-
length exponent
-3      63      40.5    40.5    0       0.8     -3      0       0       0       0       0.5     0       0       # Female maturity
L50%
```

```
-3	3	-0.25	-0.25	0	0.8	-3	0	0	0	0	0.5	0	0	# Female maturity at
length slope
-3	3	1.	1.	0	0.8	-3	0	0	0	0	0.5	0	0	# Female eggs/gm
intercept
-3	3	0.	0.	0	0.8	-3	0	0	0	0	0.5	0	0	# Female eggs/gm
slope
-3	3	1.55E-05	1.55E-05	0	0.8	-3	0	0	0	0	0.5	0	0
	# Male weight-length coefficient
-3	3	3.03	3.03	0	0.8	-3	0	0	0	0	0.5	0	0	# Male weight-length
exponent

# Distribution of recruits by morph and area
0	1	0.5000	0.2	0	9.8	-3	0	0	0	0	0.5	0	0	# Fraction of females
to area 1
0	1	0.5000	0.2	0	9.8	-3	0	0	0	0	0.5	0	0	# Fraction of males to
area 1
0	1	1	1	0	0.8	-3	0	0	0	0	0.5	0	0	# Fraction of recruits
to area 1

# Environmental and block setup for mortality and growth parameters
0	# Environmental link setup
0	# Number of time-block setups used

# Stock-recruit setup
1	# Stock-recruit function (1 = BH, 2 = Ricker)
# Stock-recruit parameters
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase
7	11	9.3	9.3	0	10	1	# Ln(R0)
0.21	0.99	0.45	0.4	0	0.5	3	# Steepness
0	2	0.4	0.4	0	0.8	-3	# SD recruitments (Sigma R)
-5	5	0	0	0	1	-3	# Env_link_parameter
-5	5	0	0	0	1	-4	# Initial equilibrium recruit offset

0	# Environmental variable to use
# Recruitment deviations
# Start year End year  Lower bound	Upper bound Phase
1952	2004	-15	15	3

# Initial F setup for each fleet
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase
0	0.2	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1
0	1	0	0.01	0	1	-1

# Catchability (Q) setup for each fleet
# Float(0/1) Do-power(0/1) Do-env(0/1) Do-dev(0/1) Env-var Num/Bio(0/1)
0	0	0	0	0	1
0	1	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
0	1	0	0	0	1
0	0	0	0	0	1
0	0	0	0	0	1
# Catchability parameters
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase
-30	30	0	0	0	10	-2	# Fleet 2: exponent
-30	30	0	0	0	10	-2	# Fleet 9: exponent

# Selectivity setup for each fleet
```

```
# Length-based selectivity by fleet
# Type     Do-retention(0/1) Do-male Special
8     0     0     0
8     0     2     0
8     0     2     0
8     0     2     0
8     0     0     0
8     0     0     0
8     0     0     0
8     0     0     0
8     0     0     0
8     0     0     0
8     0     2     0
# Age-based selectivity by fleet
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0
10    0     0     0

# Selectivity parameters by fleet
# Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase Env-variable Use_deviation Dev_minyr Dev_maxyr
Dev_SD
# Fleet 1: SCA trawl
0    60   41.   41    0   9   -4   0  0  0  0  0.5  1  3 #peak_fleet1
0.0  0.1  0.0   0.001 0   99  -6   0  0  0  0  0.5  0  0 #init
-5   4    0     0     0   99  -2   0  0  0  0  0.5  1  3 #infl
-8   4    -1.   -1    0   5   3    0  0  0  0  0.5  0  0 #slope
-5   9    0     0     0   99  -3   0  0  0  0  0.5  1  3 #final
-5   4    0     0     0   5   4    0  0  0  0  0.5  0  0 #infl2
-8   4    -1.   -1    0   5   5    0  0  0  0  0.5  0  0 #slope
1    4    3     3     0   10  -99  0  0  0  0  0.5  0  0 #binwidth
# Fleet 2: NCA trawl
0    60   48.5  48    0   9   -4   0  0  0  0  0.5  2  3 #peak_fleet1
.0   0.1  0.0   0.001 0   99  -6   0  0  0  0  0.5  0  0 #init
-5   4    0     0     0   99  -2   0  0  0  0  0.5  2  3 #infl
-8   4    -1.   -1    0   5   3    0  0  0  0  0.5  0  0 #slope
-5   9    0     0     0   99  -3   0  0  0  0  0.5  2  3 #final
-5   4    0     0     0   5   4    0  0  0  0  0.5  0  0 #infl2
-8   4    -3.   -1    0   5   5    0  0  0  0  0.5  0  0 #slope
 1   4    3     3     0   10  -99  0  0  0  0  0.5  0  0 #binwidth
10   60   44    44    0   10  -3   0  0  0  0  0.5  0  0 #female dogleg
-4   4    0     0     0   3   -4   0  0  0  0  0.5  0  0 #female offset at minage
-4   4    0     -1    0   99  -4   0  0  0  0  0.5  0  0 #female offset at dogleg
-4   0    0     -1    0   99  -4   0  0  0  0  0.5  0  0 #female offset at maxage
# Fleet 3: OR trawl
0    60   47    47    0   9   -4   0  0  0  0  0.5  3  3 #peak_fleet1
.0   0.1  0.0   0.001 0   99  -6   0  0  0  0  0.5  0  0 #init
-5   4    0     0     0   99  -2   0  0  0  0  0.5  3  3 #infl
-8   4    -1.   -1    0   5   3    0  0  0  0  0.5  0  0 #slope
-5   9    0     0     0   99  -3   0  0  0  0  0.5  3  3 #final
-5   4    -1    0     0   5   4    0  0  0  0  0.5  0  0 #infl2
-8   4    1.    -1    0   5   5    0  0  0  0  0.5  0  0 #slope
 1   4    3     3     0   10  -99  0  0  0  0  0.5  0  0 #binwidth
10   60   44    44    0   10  -3   0  0  0  0  0.5  0  0 #female dogleg
-4   4    0     0     0   3   -4   0  0  0  0  0.5  0  0 #female offset at minage
-4   4    0     -1    0   99  -4   0  0  0  0  0.5  0  0 #female offset at dogleg
-4   0    0     -1    0   99  -4   0  0  0  0  0.5  0  0 #female offset at maxage

#fishery-4WA_trwl
0    60   51    51    0   9   -4   0  0  0  0  0.5  4  3 #peak_fleet1
.0   0.1  0.0   0.001 0   99  -6   0  0  0  0  0.5  0  0 #init
-5   4    0     0     0   99  -2   0  0  0  0  0.5  4  3 #infl
-8   4    -1.   -1    0   5   3    0  0  0  0  0.5  0  0 #slope
```

```
-5   9    0     0     0   99   -3   0  0  0  0  0.5  4   3 #final
-5   4    0     0     0   5    4    0  0  0  0  0.5  0   0 #infl2
-8   4    -3.   -1    0   5    5    0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth
10   60   44    44    0   10   -3   0  0  0  0  0.5  0   0 #female dogleg
-4   4    0     0     0   3    -4   0  0  0  0  0.5  0   0 #female offset at minage
-4   4    0     -1    0   99   -4   0  0  0  0  0.5  0   0 #female offset at dogleg
-4   0    0     -1    0   99   -4   0  0  0  0  0.5  0   0 #female offset at maxage

# Fleet 5: SCA non-trawl
0    60   40.5  40    0   9    -4   0  0  0  0  0.5  5   3 #peak_fleet1
.0   0.1  0.0   0.001 0   99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   -2   0  0  0  0  0.5  5   3 #infl
-8   4    -1.   -1    0   5    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   -3   0  0  0  0  0.5  5   3 #final
-5   4    0     0     0   5    4    0  0  0  0  0.5  0   0 #infl2
-8   4    -1.   -1    0   5    5    0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth
#fishery-6CA_N_nontrwl
0    60   40.5  40    0   9    -4   0  0  0  0  0.5  6   3 #peak_fleet1
.0   0.1  0.0   0.001 0   99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   -2   0  0  0  0  0.5  6   3 #infl
-8   4    -1.   -1    0   5    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   -3   0  0  0  0  0.5  6   3 #final
-5   4    0     0     0   5    4    0  0  0  0  0.5  0   0 #infl2
-8   4    -1.   -1    0   5    5    0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth
#fishery-7WAOR_nontrwl
0    60   60    60    0   9    -7   0  0  0  0  0.5  7   3 #peak_fleet1
.0   0.1  0.0   0.001 0   99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   -2   0  0  0  0  0.5  7   3 #infl
-8   4    -1.   -1    0   5    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   -3   0  0  0  0  0.5  7   3 #final
-5   4    0     0     0   5    -4   0  0  0  0  0.5  0   0 #infl2
-8   4    -1.   -1    0   5    -5   0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth
#fishery-8CA_S_rec
0    60   29.0  30    0   9    -4   0  0  0  0  0.5  8   3 #peak_fleet1
.0   0.1  0.0   0.001 0   99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   -2   0  0  0  0  0.5  8   3 #infl
-8   4    -1.   -1    0   5    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   -3   0  0  0  0  0.5  8   3 #final
-5   4    0     0     0   5    4    0  0  0  0  0.5  0   0 #infl2
-8   4    -1.   -1    0   5    5    0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth
#fishery-9CA_N_rec
0    60   31    32    0   9    -4   0  0  0  0  0.5  9   3 #peak_fleet1
.0   0.1  0.0   0.001 0   99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   -2   0  0  0  0  0.5  9   3 #infl
-8   4    -1.   -1    0   5    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   -3   0  0  0  0  0.5  9   3 #final
-5   4    0     0     0   5    4    0  0  0  0  0.5  0   0 #infl2
-8   4    -1.   -1    0   5    5    0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth
#fishery-10WAOR_rec
0    60   31.0  31    0   9    -4   0  0  0  0  0.5  10  3 #peak_fleet1
.0   0.1  0.0   0.001 0   99   -6   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   -2   0  0  0  0  0.5  10  3 #infl
-8   4    -1.   -1    0   5    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   -3   0  0  0  0  0.5  10  3 #final
-5   4    0     0     0   5    4    0  0  0  0  0.5  0   0 #infl2
-8   4    -1.   -1    0   5    5    0  0  0  0  0.5  0   0 #slope
 1   4    3     3     0   10   -99  0  0  0  0  0.5  0   0 #binwidth

#survey-11_triennial
0    60   52.6  45    0   9    -7   0  0  0  0  0.5  0   0 #peak_fleet1
0.   0.1  0.0   0.001 0   99   -4   0  0  0  0  0.5  0   0 #init
-5   4    0     0     0   99   2    0  0  0  0  0.5  0   0 #infl
-8   4    -1.   -1.   0   2    3    0  0  0  0  0.5  0   0 #slope
-5   9    0     0     0   99   3    0  0  0  0  0.5  0   0 #final
```

-5	4	0	0	0	5	4	0	0	0	0	0.5	0	0	#infl2
-8	4	-3.	-1.	0	2	5	0	0	0	0	0.5	0	0	#slope
1	4	3	3	0	10	-99	0	0	0	0	0.5	0	0	#binwidth
10	60	44	44	0	10	-3	0	0	0	0	0.5	0	0	#female dogleg
-4	4	0	0	0	3	-4	0	0	0	0	0.5	0	0	#female offset at minage
-4	4	0	0	0	3	-4	0	0	0	0	0.5	0	0	#female offset at dogleg
-4	0	0	0	0	-3	-4	0	0	0	0	0.5	0	0	#female offset at maxage

Environmental , time-block and time-varying deviation setup for selectivity parameters
0 # Environmental link setup
1 # Select custom time-block setup
Time-block parameters by fleet, parameter and block
Lower bound Upper bound Initial value Prior Prior-type Prior-SD Phase

15	62	40.0	40	0	9	-7	#	1-peak-early
15	62	41.8	41	0	9	-7	#	1-peak-late
-8	8	0	0	0	9	3	#	1-infl-early
-8	8	0	0	0	4	3	#	1-infl-late
-8	8	0	0	0	4	3	#	1-final-early
-8	8	0	0	0	4	3	#	1-final-late
15	62	54.0	48	0	9	-7	#	2-peak-early
15	62	46.0	47	0	9	-7	#	2-peak-Mid
15	62	45.5	48	0	9	-7	#	2-peak-late
-8	8	0	0	0	4	3	#	2-infl-early
-8	8	0	0	0	4	2	#	2-infl-Mid
-8	8	0	0	0	4	2	#	2-infl-late
-8	8	0	0	0	4	3	#	2-final-early
-8	8	0	0	0	4	3	#	2-final-Mid
-8	8	8	0	0	4	3	#	2-final-late
15	62	52.0	47	0	9	-7	#	3-peak-early
15	62	55.1	54	0	9	-7	#	3-peak-Mid
15	62	42.5	47	0	9	-7	#	3-peak-late
-8	8	0	0	0	4	3	#	3-infl-early
-8	8	0	0	0	4	2	#	3-infl-Mid
-8	8	0	0	0	4	2	#	3-infl-late
-8	8	0	0	0	4	3	#	3-final-early
-8	8	0	0	0	4	3	#	3-final-Mid
-8	8	8	0	0	4	3	#	3-final-late
15	62	52.0	51	0	9	-7	#	4-peak-early
15	62	53.2	53	0	9	-7	#	4-peak-Mid
15	62	54.0	51	0	9	-7	#	4-peak-late
-8	8	0	0	0	4	3	#	4-infl-early
-8	8	0	0	0	4	2	#	4-infl-Mid
-8	8	0	0	0	4	2	#	4-infl-late
-8	8	0	0	0	4	3	#	4-final-early
-8	8	0	0	0	4	3	#	4-final-Mid
-8	8	8	0	0	4	3	#	4-final-late
15	62	50.1	40	0	9	-7	#	5-peak-early
15	62	41.5	40	0	9	-7	#	5-peak-Mid
15	62	36.1	40	0	9	-7	#	5-peak-late
-8	8	0	0	0	4	3	#	5-infl-early
-8	8	0	0	0	4	2	#	5-infl-Mid
-8	8	0	0	0	4	2	#	5-infl-late
-8	8	0	0	0	4	3	#	5-final-early
-8	8	0	0	0	4	3	#	5-final-Mid
-8	8	0	0	0	4	3	#	5-final-late
15	62	44.0	40	0	9	-7	#	6-peak-early
15	62	41.2	39	0	9	-7	#	6-peak-Mid
15	62	44.4	40	0	9	-7	#	6-peak-late
-8	8	0	0	0	4	3	#	6-infl-early
-8	8	0	0	0	4	2	#	6-infl-Mid
-8	8	0	0	0	4	2	#	6-infl-late
-8	8	0	0	0	4	3	#	6-final-early
-8	8	0	0	0	4	3	#	6-final-Mid
-8	8	0	0	0	4	3	#	6-final-late
15	62	50.0	40	0	9	-7	#	7-peak-early
15	62	48.0	40	0	9	-7	#	7-peak-late
-8	8	0	0	0	4	2	#	7-infl-early
-8	8	0	0	0	4	2	#	7-infl-late
-8	8	8	0	0	4	-3	#	7-final-early
-8	8	8	0	0	4	-3	#	7-final-late

```
15    62    27.6    30    0    9    -7    #    8-peak-early
15    62    32.3    33    0    9    -7    #    8-peak-Mid
15    62    28.1    30    0    9    -7    #    8-peak-late
-8    8     0       0     0    4    3     #    8-infl-early
-8    8     0       0     0    4    2     #    8-infl-Mid
-8    8     0       0     0    4    2     #    8-infl-late
-8    8     0       0     0    4    3     #    8-final-early
-8    8     0       0     0    4    3     #    8-final-Mid
-8    8     0       0     0    4    3     #    8-final-late
15    62    31.3    30    0    9    -7    #    9-peak-early
15    62    29.6    29    0    9    -7    #    9-peak-Mid
15    62    38.6    30    0    9    -7    #    9-peak-late
-8    8     0       0     0    4    3     #    9-infl-early
-8    8     0       0     0    4    2     #    9-infl-Mid
-8    8     0       0     0    4    2     #    9-infl-late
-8    8     0       0     0    4    3     #    9-final-early
-8    8     0       0     0    4    3     #    9-final-Mid
-8    8     0       0     0    4    3     #    9-final-late
15    62    30.6    30    0    9    -7    #    10-peak-early
15    62    29.7    30    0    9    -7    #    10-peak-late
-8    8     0       0     0    4    3     #    10-infl-early
-8    8     0       0     0    4    2     #    10-infl-late
-8    8     0       0     0    4    3     #    10-final-early
-8    8     0       0     0    4    3     #    10-final-late

-5    # Phase for selectivity parameter deviations

# New in Version 1.20: Adjustment of variance and sample sizes
0.00   0.00   0.00    0.00    0.00   0.00   0.00   0.00   0.00   0.00   0.00  # extra stddev For surveys
0.00   0.00   0.00    0.00    0.00   0.00   0.00   0.00   0.00   0.00   0.00  # extra stddev For discard
0.00   0.00   0.00    0.00    0.00   0.00   0.00   0.00   0.00   0.00   0.00  # extra stddev For meanwt
1.707  1.749  11.013  14.070  1.677  4.353  3.624  1.654  2.438  1.617  2.767  76  # Sample size mult length comps
1.156  1.409  8.251   10.947  1.000  1.000  3.858  1.000  1.000  1.000  2.986  # Sample size mult age comps
1.000  0.996  0.829   0.572   1.000  1.000  1.000  1.000  1.000  1.000  0.407  # Sample size mult LAA

# Likelihood lambda setup
1    # Maximum number of lambda phases (1 value below for each lambda x phase)
1    # Constant offset for Log(SD) in likelihood calculation (include  = 1, not = 0)
# Lambdas by data type and phase
#_survey_lambdas
1    0.0001    1    1    1    1    1    1    0.0001    1    1
#_discard_lambdas
0    0    0    0    0    0    0    0    0    0    0
#_meanwtlambda(one_for_all_sources)
1
#_lenfreq_lambdas
.5    .45    .45    .45    1.0    1.0    .5    1.0    1.0    1.0    .45
#_age_freq_lambdas
.5    .45    .45    .45    1.0    1.0    .5    1.0    1.0    1.0    .45
#_size@age_lambdas
.1    .1    .1    .1    .1    .1    .1    .1    .1    .1    .1
#_initial_equil_catch
1
#_recruitment_lambda
1
#_parm_prior_lambda
1
#_parm_dev_timeseries_lambda
1
1000    #_crashPenLambda
#max F
0.9

999    #_end-of-file
```

Appendix C - Data file

Input data file for 2005 canary rockfish assessment

Global Model Dimensions
1916 # Start year
2004 # End year
1 # Number of seasons
12 # Months in each season
1 # Season of spawning
10 # Number of fishing fleets
1 # Number of survey fleets
Fleet names
1_SCA_trawl%2_NCA_trawl%3_OR_trawl%4_WA_trawl%5_SCA_nontrawl%6_NCA_nontrwl%7_WAOR_nontrwl%8_SCA_rec%9_NCA_rec%10_WAOR_rec%11_triennial_survey
Fraction of the year for each fleet
.5 .5 .5 .5 .5 .5 .5 .5 .5 .5
2 # Number of Genders
40 # Accumulator age for population dynamics

Catch series
Initial equilibrium catch by fleet
0 0 0 0 0 0 0 0 0 0
Total catch (mt) by fleet and year

0.00	397.05	0.00	0.00	0.00	76.81	0.00	0.00	0.00	0.00	#	1916
0.00	627.50	0.00	0.00	0.00	121.39	0.00	0.00	0.00	0.00	#	1917
0.00	665.34	0.00	0.00	0.00	128.70	0.00	0.00	0.00	0.00	#	1918
0.00	435.72	0.00	0.00	0.00	84.29	0.00	0.00	0.00	0.00	#	1919
0.00	454.69	0.00	0.00	0.00	87.96	0.00	0.00	0.00	0.00	#	1920
0.00	384.35	0.00	0.00	0.00	74.35	0.00	0.00	0.00	0.00	#	1921
0.00	348.06	0.00	0.00	0.00	67.33	0.00	0.00	0.00	0.00	#	1922
0.00	411.39	0.00	0.00	0.00	79.58	0.00	0.00	0.00	0.00	#	1923
0.00	382.84	0.00	0.00	0.00	74.06	0.00	0.00	0.00	0.00	#	1924
0.00	443.03	0.00	0.00	0.00	85.70	0.00	0.00	0.00	0.00	#	1925
0.00	608.69	0.00	0.00	0.00	117.75	0.00	0.00	0.00	0.00	#	1926
0.00	515.84	0.00	0.00	0.00	99.78	0.00	0.00	0.00	0.00	#	1927
0.00	518.20	8.16	0.00	0.00	100.24	0.00	0.00	0.00	0.00	#	1928
0.00	487.25	14.19	0.00	0.00	94.25	0.00	0.00	0.00	0.00	#	1929
0.00	583.22	13.14	0.00	0.00	112.82	0.00	0.00	0.00	0.00	#	1930
0.00	587.44	10.06	0.00	0.00	113.64	0.00	0.00	0.00	0.00	#	1931
0.00	454.95	3.69	0.04	0.00	88.01	0.00	0.00	0.00	0.00	#	1932
0.00	386.46	5.39	0.00	0.00	74.76	0.00	0.00	0.00	0.00	#	1933
0.00	371.63	5.86	0.30	0.00	71.89	0.00	0.00	0.00	0.00	#	1934
0.00	389.96	5.40	2.30	0.00	75.43	0.00	0.00	0.00	0.00	#	1935
0.00	371.62	13.41	2.96	0.00	71.89	0.00	0.00	0.00	0.00	#	1936
0.00	346.38	17.03	2.64	0.00	67.00	0.00	0.00	0.00	0.00	#	1937
0.00	293.58	15.47	3.90	0.00	56.79	0.00	0.00	0.00	0.00	#	1938
0.00	269.04	11.49	4.09	0.00	52.04	0.00	0.00	0.00	0.00	#	1939
0.00	288.21	68.56	9.05	0.00	55.75	0.00	0.00	0.00	0.00	#	1940
0.00	274.89	144.08	3.39	0.00	53.18	0.00	0.00	0.00	0.00	#	1941
0.00	114.41	210.19	65.81	0.00	22.27	0.00	0.00	0.00	0.00	#	1942
0.00	222.74	766.49	212.71	0.00	42.52	0.00	0.00	0.00	0.00	#	1943
0.00	518.38	1258.48	88.40	0.00	99.22	0.00	0.00	0.00	0.00	#	1944
0.00	1071.18	1937.94	926.43	0.00	205.53	0.00	0.00	0.00	0.00	#	1945
0.00	900.07	1215.83	467.02	0.00	172.12	0.00	0.00	0.00	0.00	#	1946
0.00	685.43	755.22	243.97	0.00	131.62	0.00	0.00	0.00	0.00	#	1947
0.00	524.45	519.74	396.17	0.00	100.23	0.00	0.00	0.00	0.00	#	1948
0.00	480.92	528.54	481.83	0.00	92.13	0.00	0.00	0.00	0.00	#	1949
0.00	654.04	633.70	463.03	0.00	125.54	0.00	0.00	82.80	0.00	#	1950
0.00	886.91	409.14	387.38	0.00	170.09	0.00	0.00	82.80	0.00	#	1951
0.00	864.64	418.88	369.45	0.00	166.04	0.00	0.00	82.80	0.00	#	1952
0.00	986.13	334.79	160.20	0.00	189.33	0.00	0.00	82.80	0.00	#	1953
0.00	1019.54	421.04	229.79	0.00	195.40	0.00	0.00	82.80	0.00	#	1954
0.00	1022.58	442.74	216.84	0.00	196.42	0.00	0.00	82.80	0.00	#	1955
0.00	1204.82	271.93	207.15	0.00	230.84	0.00	0.00	82.80	0.00	#	1956
0.00	1297.96	779.74	171.37	0.00	249.06	0.00	0.00	77.70	0.00	#	1957
0.00	1438.70	599.62	216.94	0.00	275.39	0.00	0.00	88.30	0.00	#	1958
0.00	1232.16	658.62	242.52	0.00	235.90	0.00	0.00	82.40	0.00	#	1959
0.00	1105.60	834.55	219.31	0.00	211.60	0.00	0.00	108.40	0.00	#	1960
0.00	873.75	760.81	260.34	0.00	167.05	0.00	0.00	98.30	0.00	#	1961

0.00	792.75	795.34	362.74	0.00	151.87	0.00	0.00	104.00	0.00	#	1962
0.00	947.66	544.63	292.02	0.00	181.23	0.00	0.00	105.30	0.00	#	1963
0.00	571.02	489.43	215.56	0.00	114.41	0.00	0.00	94.20	0.00	#	1964
0.00	561.91	483.87	480.38	0.00	116.43	0.00	0.00	113.80	0.00	#	1965
0.00	534.58	2127.32	729.91	0.00	106.31	0.00	0.00	117.90	0.00	#	1966
0.00	483.95	854.51	414.09	0.00	84.03	0.00	0.00	117.10	0.00	#	1967
0.00	686.44	788.70	671.26	0.00	60.75	0.00	0.00	120.20	0.00	#	1968
0.00	167.05	671.26	558.87	0.00	38.47	0.00	0.00	123.50	0.00	#	1969
0.00	188.32	679.36	472.82	0.00	44.55	0.00	0.00	139.10	0.00	#	1970
0.00	196.42	702.64	454.59	0.00	46.57	0.00	0.00	120.50	0.00	#	1971
0.00	301.71	927.41	163.00	0.00	68.85	0.00	0.00	142.90	0.00	#	1972
0.00	771.49	1306.06	146.81	0.00	92.13	0.00	0.00	165.40	0.00	#	1973
0.00	523.44	602.41	480.92	0.00	85.05	0.00	0.00	171.20	0.00	#	1974
0.00	504.20	525.46	575.07	0.00	87.07	0.00	0.00	166.00	4.01	#	1975
0.00	454.59	283.49	454.59	0.00	85.05	0.00	0.00	180.00	2.11	#	1976
0.00	331.07	489.01	991.19	0.00	67.83	0.00	0.00	164.90	4.47	#	1977
22.10	639.95	990.18	1126.86	3.25	130.62	0.00	0.00	150.50	10.30	#	1978
9.87	308.50	1750.53	1118.76	3.09	106.03	0.00	0.00	159.20	4.86	#	1979
30.38	413.40	2309.41	945.63	14.20	75.66	0.00	142.50	165.53	35.02	#	1980
34.18	494.01	1966.51	514.45	3.76	164.77	0.00	33.20	111.80	48.92	#	1981
21.55	777.06	3863.55	426.09	4.24	10.68	0.00	28.26	198.58	44.45	#	1982
14.33	492.41	3553.43	650.80	42.00	5.19	0.00	10.30	83.19	6.84	#	1983
29.92	386.70	1191.31	607.42	56.79	1.14	0.00	28.35	67.51	26.66	#	1984
20.42	302.81	1029.50	1037.98	109.36	3.26	0.00	43.58	120.63	63.39	#	1985
0.81	166.16	864.04	899.01	12.39	43.96	15.64	58.85	158.59	24.24	#	1986
0.00	209.24	1464.12	1016.63	20.51	23.37	160.15	55.41	163.36	34.32	#	1987
0.50	223.40	1281.27	979.31	24.34	29.02	0.00	43.61	128.86	56.58	#	1988
6.59	176.97	1550.82	1208.85	112.42	104.57	0.00	20.04	57.94	31.58	#	1989
15.69	311.97	976.79	1099.81	76.44	143.44	17.29	10.02	61.34	38.43	#	1990
7.62	141.81	1745.27	971.60	137.56	24.01	27.02	10.02	61.34	43.75	#	1991
6.98	218.98	1381.93	825.03	49.37	77.70	152.47	10.02	61.34	38.43	#	1992
42.18	47.98	1467.26	288.38	26.66	81.63	116.69	0.00	64.74	51.09	#	1993
13.95	112.51	638.13	150.84	42.13	53.70	104.87	0.00	50.38	38.74	#	1994
32.54	106.46	544.21	153.76	53.94	60.59	116.36	1.38	76.87	44.34	#	1995
102.23	116.13	744.34	184.91	84.90	51.48	164.04	2.29	55.68	25.27	#	1996
32.37	142.41	577.41	204.76	29.83	74.89	248.11	1.44	82.87	46.68	#	1997
9.52	149.46	712.26	201.23	23.42	56.84	245.13	2.65	58.95	53.52	#	1998
7.44	97.20	350.41	143.49	8.47	28.29	120.48	2.84	62.72	34.99	#	1999
1.71	10.92	29.78	28.96	2.52	5.53	7.98	0.40	74.25	18.46	#	2000
1.32	9.55	29.02	21.80	1.60	4.96	9.62	0.00	32.30	13.30	#	2001
0.36	14.48	33.51	35.45	0.02	0.08	2.62	0.21	5.84	11.10	#	2002
0.23	0.40	6.86	6.91	0.00	0.08	4.48	0.06	17.20	11.80	#	2003
0.80	2.55	13.52	8.04	0.02	0.08	4.89	0.19	2.45	4.96	#	2004

Abundance indices
43 # Number of observations

Triennial survey

#Year	Seas	Type	Value	CV
1916	1	11	-8074	.25 # placeholder for output of expected value
1930	1	11	-8074	.25 # placeholder for output of expected value
1940	1	11	-8074	.25 # placeholder for output of expected value
1950	1	11	-8074	.25 # placeholder for output of expected value
1960	1	11	-8074	.25 # placeholder for output of expected value
1970	1	11	-8074	.25 # placeholder for output of expected value
1977	1	11	-8074	.25 # placeholder for output of expected value
1980	1	11	5660	.39 # used in model
1983	1	11	20115	.30
1986	1	11	10082	.32
1989	1	11	8591	.37
1992	1	11	1841	.46
1995	1	11	3153	.44
1998	1	11	1538	.33
2001	1	11	3274	.57
2004	1	11	3099	0.34

NCA trawl CPUE (from last assessment)

1982	1	2	-96.7	0.5
1983	1	2	21.1	0.5
1984	1	2	15.6	0.5

```
1985	1	2	20.1	0.5
1986	1	2	9.4	0.5
1987	1	2	8.8	0.5
1988	1	2	18.7	0.5
1989	1	2	13.4	0.5
1990	1	2	20.4	0.5
1991	1	2	8	0.5
1992	1	2	15.7	0.5
1993	1	2	4.3	0.5
1994	1	2	10.5	0.5
1995	1	2	6.2	0.5
1996	1	2	5.7	0.5

# CA rec. CPUE (from last assessment)
1987	1	9	11.01044498	0.5
1988	1	9	13.36847666	0.5
1989	1	9	13.55968905	0.5
1990	1	9	13.07565467	0.5
1991	1	9	13.82117181	0.5
1992	1	9	12.05167771	0.5
1993	1	9	9.71073689	0.5
1994	1	9	10.51829552	0.5
1995	1	9	11.79259753	0.5
1996	1	9	10.78263322	0.5
1997	1	9	9.672247559	0.5
1998	1	9	5.905972977	0.5

# Discard observations
1	# Measured as: 1 = biomass, 2 = fraction
0	# Number of observations
# Mean body weight observations
0	# Number of observations

# Length and age composition setup
0.001	# Minimum proportion for compressing tails of observed composition
0.001	# Constant added to expected frequencies

# Length frequency observations setup
28	# Number of length bins
# Lower edge of each bin
12	14	16	18	20	22	24	26	28	30	32	34
	36	38	40	42	44	46	48	50	52	54	56
	58	60	62	64	66
# Length composition data
256	# Number of observations
# Southern California trawl fleet (n=34)
#Year	Season	Fleet	Sexes	Market Nsamp Data: females	then males
1978	1	1	0	0	-9999	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1
1978	1	1	0	0	9	0	0	0	0	0	0
	0	0	0	0	0	0.026252161	0.036866131	0.047997542
	0.074249703	0	0.268616963	0.148703561	0.043847667	0.322410562
	0	0.015527855	0.015527855	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0
1979	1	1	0	0	-1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1
1979	1	1	0	0	-9998	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
```

	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1980	1	1	0	0	11	0	0	0	0	0	0
	0	0	0	0	0.0303622	0.1668538	0.126338039		0.178684387		
	0.191731357		0.10732985		0.127400829		0.071299538		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1981	1	1	0	0	-9999	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1981	1	1	0	0	12	0	0	0	0	0	0
	0	0	0	0	0	0	0.017839176		0.172978145		
	0.287383794		0.324675791		0.074754642		0.122368452		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1982	1	1	0	0	-1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1982	1	1	0	0	-9998	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1983	1	1	0	0	7	0	0	0	0	0	0
	0	0	0	0	0	0	0.052447442		0.247484878		0
	0.480287926		0.219779755		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1984	1	1	0	0	10	0	0	0	0	0	0
	0	0	0	0	0	0.033519402		0	0.104444179		
	0.19186097		0.280281792		0.17376234		0.216131317		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1985	1	1	0	0	-9999	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1985	1	1	0	0	28	0.03865964		0	0	0	0
	0	0	0	0	0.027060402		0.023235551		0.119056535		
	0.201510714		0.179567502		0.11921543		0.191217841		0.023124618		
	0.025114461		0	0.034824872		0.017412436		0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0		
1986	1	1	0	0	-1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1986	1	1	0	0	-9998	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1

1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1988 1 1 0 0 -9999 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1988 1 1 0 0 6 0 0 0 0 0 0
0 0.101156331 0 0 0.026536737 0 0.155363233
0.045630824 0.658044507 0 0 0 0.013268369 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
1989 1 1 0 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1989 1 1 0 0 -9998 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1990 1 1 0 0 6 0 0 0 0 0 0
0 0 0 0 0.041203265 0 0.334797617 0
0.041203265 0.582795852 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1991 1 1 0 0 6 0 0 0 0 0 0
0 0.531904215 0 0 0 0 0.468095785 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1992 1 1 0 0 9 0 0 0 0 0 0
0 0 0 0 0.032768594 0 0.081921485 0.056346713
0.812578912 0 0 0 0.016384297 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1993 1 1 0 0 21 0 0 0 0 0 0
0 0 0.487939909 0.016425335 0.008212668 0.02597393
0.375288795 0.020914927 0 0.008212668 0.017761262 0.039270507
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1994 1 1 0 0 6 0 0 0 0 0 0
0 0 0 0.000937054 0.109791226 0.083815252 0.548520285
0.112959109 0.060161822 0.000937054 0 0.082878198 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1995 1 1 0 0 5 0 0 0 0 0 0
0 0 0 0 0.086584346 0.173922101 0.162654283
0.148043634 0.177704407 0.084358264 0.122043455 0.007803767
0.00898788 0 0.00898788 0.018909984 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1996 1 1 0 0 12 0 0 0 0 0 0
0 0.004748008 0.018095808 0.076956523 0.069904099 0.112014471
0.113029073 0.319318254 0.07709788 0.112525121 0.019596673 0.0257804
0.005424083 0.024760524 0.015015044 0.004755826 0.000978214 0

0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1997 1 1 0 0 16 0 0 0 0 0 0
0 0 0 0 0 0.058592245 0.014537467 0.215823737
0.170463521 0.137208827 0.133158071 0.073081163 0.053338267
0.017467772 0.066751515 0.017467772 0.024641871 0 0 0
0.017467772 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0
1998 1 1 0 0 8 0 0 0 0 0 0
0 0 0 0.032514144 0.210072862 0.068009373 0.057171325
0.012971522 0.028924129 0.195587776 0.123749706 0.076568817
0.083433037 0.052978372 0.023590444 0.023590444 0.010838048 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1999 1 1 0 0 5 0 0 0 0 0 0
0 0.001100893 0.025156162 0.02296617 0.058660319 0.056231261
0.076385676 0.119259655 0.256897072 0.115289007 0.108399467
0.025262177 0.036635856 0.042802501 0.036635856 0.018317928 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 1 0 0 5 0 0 0 0 0 0
0 0 0.001075433 0.002469786 0.008097206 0.029762367
0.043811945 0.063904361 0.152248205 0.200374506 0.153189224
0.168492214 0.07263682 0.07341204 0.010175298 0.020350595 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2001 1 1 0 0 9 0 0 0 0 0 0
0 0 0 0.058516934 0.231446156 0.227837533 0.233462284
0.130675036 0.058927772 0.010830073 0.035758275 0 0.004434251
0.008111685 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
2002 1 1 0 0 -9999 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
2003 1 1 0 0 7 0 0 0 0 0 0
0 0.058823529 0 0 0 0 0.058823529 0.058823529
0.176470588 0.352941176 0.117647059 0.117647059 0 0.058823529
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
2004 1 1 0 0 -9998 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1

Northern California trawl fleet (n=29)
1978 1 2 3 0 63 0 0 0 0 0 0
0 0 0 0 0 0 0.003539326 0.019121447 0
0.001129952 0.005140744 0.024348117 0.044390463 0.062562949
0.095233582 0.047852508 0.069675168 0.027833311 0.022580708
0.002446872 0.001595871 0 0 0 0 0 0 0
0 0 0 0 0.00019991 0 0 0.008370346
0.004767586 0.004265196 0.014712727 0.070245121 0.050268332
0.219936551 0.077919205 0.044836849 0.015781874 0.047222841
0.014022444 0 0 0
1979 1 2 3 0 30 0 0 0 0 0 0
0 0 0 0 0 0 0 0.002819901 0.002819901

0.01029703 0.002819901 0.025335657 0.000167633 0.034223347
0.040818398 0.016328902 0.081996403 0.039670634 0.000918715
0.008650168 0.000375541 0.002134468 0 0 0 0 0
0 0 0 0 0 0 0 0 0.021478649
0.024141974 0.058657504 0.04505721 0.065585684 0.106316356
0.12146938 0.117065278 0.132664238 0.004898141 0.008060889 0
0 0 0.025228098
1980 1 2 3 0 80 0 0 0 0 0 0
0 0 0 0 0 0.003743952 0.007233889 0.032343863
0.004887027 0.015917017 0.020299378 0.037780719 0.06451612
0.044587655 0.036787582 0.044105393 0.027291725 0.016796165 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.007615367 0.020668882 0.011186979 0.048428828
0.034202756 0.122696244 0.111509966 0.137814678 0.104020857
0.032679347 0 0.012885611 0 0 0 0 0
1981 1 2 3 0 50 0 0 0 0 0 0
0 0 0 0.006856594 0 0.006856594 0.002937471
0.000447887 0.014041969 0.067865242 0.028519681 0.070380678
0.077529356 0.050548358 0.042336558 0.061390523 0.086166569
0.019244309 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0.005111662 0.04174318
0.043658581 0.064864811 0.056782264 0.138680602 0.056813884
0.050170181 0.007053046 0 0 0 0 0 0 0
1982 1 2 3 0 72 0 0 0 0 0 0
0 0 0 0 0.002449989 0.000909361 0.027899102
0.008958395 0.004893588 0.068069613 0.049076639 0.034513991
0.090411955 0.050222321 0.01893578 0.029313556 0.007304085
0.000300363 0.000118761 0 0 0 0 0 0 0
0 0 0 0 0 0 0.008397198 0.022653893
0.032342262 0.030833627 0.04449969 0.080607013 0.093739054
0.059407039 0.064910555 0.132769402 0.036344007 0.000118761 0
0 0 0 0 0
1983 1 2 3 0 118 0 0 0 0 0 0
0 0 0 0.001185431 0.00644489 0.001717061 0.009751477
0.011902505 0.053105262 0.026999929 0.021505748 0.058581846
0.027766757 0.037698929 0.072125425 0.038158354 0.027216116
0.010265638 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0.003206923 0.004026955 0.026572986
0.055646884 0.025806632 0.0722751 0.058253851 0.088185606 0.138386966
0.065157772 0.044304048 0.007982469 0.001194341 0.0045741 0 0
0 0
1984 1 2 3 0 73 0 0 0 0 0 0
0 0 0.000205526 0 0.00147356 0.023193502 0.043381414
0.009749669 0.04589545 0.052232868 0.040433615 0.058186781
0.052113879 0.043199549 0.049006072 0.020309214 0.043257735
0.027625909 0.000337189 0 0 0 0 0 0 0
0 0 0 0 0 0.000411051 0.001950531 0.003028876
0.013418279 0.024650141 0.039303633 0.047110549 0.059865494
0.110648344 0.083601933 0.041431635 0.042430113 0.010529983
0.011017509 0 0 0 0 0
1985 1 2 3 0 69 0 0 0 0 0 0
0 0 0 0 0.003215986 0.005014001 0.028688215
0.03371354 0.036382886 0.050765974 0.032201685 0.02459907
0.023431928 0.055953558 0.013919837 0.055425039 0.079929571
0.027579132 0 0 0 0 0 0 0 0 0
0 0 0 0 0.000604228 0.011030527 0.007155772
0.016079755 0.038213683 0.058180501 0.053995689 0.062200218
0.066338148 0.068136057 0.088445249 0.04447579 0.014257727 6.62333E-
05 0 0 0 0 0
1986 1 2 3 0 53 0 0 0 0 0 0
0 0 0 0.002276217 0 0.001350675 0.013566619
0.039825894 0.060434481 0.034852317 0.050116369 0.051712089
0.063472415 0.037332395 0.031729079 0.018998055 0.0081097 0.001713048
0 0 0 0 0 0 0 0 0 0 0
0 0.002276217 0 0.000427628 0.000654002 0.015598321
0.047796309 0.109543172 0.135783531 0.066477621 0.112486857
0.060797816 0.024280034 0.006934814 0.001454328 0 0 0
0 0 0
1987 1 2 3 0 61 0 0 0 0 0 0
0 0 0 0 0 0.03710759 0.043666817 0.051848534

	0.02088589	0.0439699	0.087290001	0.038008535	0.063157578	0.043270616					
	0.006044605	0.014770798	0.006617284	0.006352432	0.005126798	0					
	0	0	0	0	0	0	0	0	0	0	
	0.003036165	0	0.012515684	0.062174931	0.059736717	0.065891396					
	0.033448423	0.090954201	0.092339291	0.048748446	0.034790327						
	0.026552259	0.001694783	0	0	0	0	0	0			
1988	1	2	3	0	49	0	0	0	0	0	0
	0	0	0	0.010971872	0.010333274	0.024996002	0.025945352				
	0.065792799	0.065443697	0.050679357	0.023888843	0.027035315						
	0.042241868	0.014509323	0.04791168	0.006254401	0.003814097	0					
	0.000180787	0	0	0	0	0	0	0	0	0	
	0	0	0	0.005001144	0.012790123	0.013229103	0.045648114				
	0.088932491	0.083084144	0.089778118	0.083658729	0.04815289						
	0.064641354	0.039054424	0.006030698	0	0	0	0	0			
	0	0									
1989	1	2	3	0	42	0	0	0	0	0	0
	0	0	0	0.002387048	0.007067634	0.015518234	0.04368101				
	0.026715105	0.090795169	0.046925882	0.016965124	0.012470497						
	0.02070413	0.030627109	0.030272566	0.0188828	0.013036356	0.004838154					
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0.00285017	0.049007072	0.053994998	0.057005334					
	0.073830477	0.0972053	0.059634243	0.0418913	0.10226088	0.052274777					
	0.023988369	0.00408627	0	0.001083991	0	0	0	0			
	0										
1990	1	2	3	0	43	0	0	0	0	0	0
	0	0	0	0	0.002798745	0.017221506	0.018002229				
	0.024281727	0.042936116	0.070926445	0.028149904	0.02052128						
	0.043439346	0.073448499	0.056003792	0.018124663	0.002989618						
	0.000788184	0.009685092	0	0	0	0	0	0	0		
	0	0	0	0	0	0	0.003095576	0.023216536			
	0.041108789	0.073832269	0.03549084	0.091258111	0.090349805						
	0.090771842	0.080120265	0.040080299	0	0.001358521	0	0				
	0	0	0	0							
1991	1	2	3	0	29	0	0	0	0	0	0
	0	0	0	0	0.003979153	0.028987578	0.04612731				
	0.068229224	0.085432208	0.052592946	0.04467187	0.030396954						
	0.032762395	0.013767607	0.015860215	0.023698285	0	0	0				
	0	0	0	0	0	0	0	0	0	0	0
	0.001709161	0.003979153	0.033335159	0.01463512	0.073558356						
	0.085415225	0.07321338	0.062825893	0.124940774	0.047300222						
	0.026920454	0.00168563	0	0.001987862	0.001987862	0	0				
	0	0	0								
1992	1	2	3	0	20	0	0	0	0	0	0
	0	0	0	0	0.000991483	0.015114269	0.021076868				
	0.053013817	0.037495991	0.033742967	0.094800528	0.031067143						
	0.062417211	0.021024925	0.009547807	0.01446698	0	0.004278162					
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.005440886	0.024575386	0.054892327	0.06595352				
	0.080062988	0.084602006	0.081027073	0.083500929	0.045029437						
	0.021003235	0.054874061	0	0	0	0	0	0	0		
1993	1	2	3	0	13	0	0	0	0	0	0
	0	0	0	0	0	0	0.048590586	0	0.042251112		
	0.005767561	0.092660649	0.002883781	0.065481575	0.014776582	0					
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0.024295293	0	0.124169214	0			
	0.053828709	0.085921015	0.122727975	0.043399781	0.179475495						
	0.093770671	0	0	0	0	0	0	0	0	0	
	0										
1994	1	2	3	0	10	0	0	0	0	0	0
	0	0	0	0	0.012504223	0.006252112	0.039856107				
	0.006252112	0.057022112	0.070792785	0.177838585	0.030641012						
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	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0.035949024	0.012504223	0	0.090626107				
	0.179649279	0.051580643	0.102908373	0.042416244	0.006923779						
	0.001546587	0	0	0	0	0	0	0	0		
1995	1	2	3	0	11	0	0	0	0	0	0
	0	0	0	0.002154312	0.019708667	0.031022763	0.062701704				
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2004	1	2	3	0	-9998	1	1	1	1	1	1
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# Oregon trawl fleet (n=31)
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	0.044169025	0.092710574	0.094506071	0.070433149	0.02182268
	0.03046327	0.006113712	0	0	0	0	0	0	0
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	0.087067108	0.177368686	0.111697489	0.077736127	0.017094667
	0.007216666	0.003307722	0	0	0	0
1976	1	3	3	0	-9998	1	1	1	1	1	1
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	1	1	1	1	1	1
1977	1	3	3	0	8	0	0	0	0	0	0
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0.019123366 0.018608527 0.006046217 0.000634221 0 0 0
0 0
2000 1 3 3 0 11 0 0 0 0 0 0
0.007451242 0 0 0.007451242 0.014902483 0.03938175
0.055439108 0.054493559 0.039353758 0.040592568 0.057137657
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0 0 0 0 0 0 0 0.034767409 0.045173717
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0.045047004 0.026027712 0.013463021 0.003891502 0.002411681 0
0 0 0 0 0
2001 1 3 3 0 31 0 0 0 0 0 0
0 0 0 0.00076655 0.004762429 0.017578439 0.0477295
0.052098453 0.04223805 0.058968925 0.053089285 0.056408022
0.052579014 0.043838438 0.019773611 0.011763891 0.01264363
0.005446555 0.003027488 0 0 0 0 0 0 0
0 0 0 0 0 0.0015331 0.004597227 0.018515674
0.035211639 0.071007878 0.076634849 0.09979392 0.07827257
0.059200964 0.037659994 0.019555842 0.010208314 0.004451065
0.00064468 0 0 0 0 0
2002 1 3 3 0 58 0 0 0 0 0 0
0 0 0 0 0.003615077 0.016285031 0.037400513
0.070461982 0.083780396 0.044471218 0.044225123 0.037981497
0.056001492 0.030903683 0.020485668 0.028642721 0.018493388
0.013444272 0.006499367 0 0 0 0 0 0 0

```
        0       0       0       0       0       0.005007953     0.005268597     0.018411703
        0.051969649     0.067996236     0.064876607     0.072327206     0.087244486
        0.049608185     0.034143037     0.018346272     0.003199041     0.008008215
        0.000901385     0       0       0       0       0
2003    1       3       3       0       39      0       0       0       0       0
        0.002967769     0       0       0       0       0       0.00317611      0.014333207
        0.028919989     0.030844778     0.084611309     0.090711991     0.072581935
        0.04949655      0.055999395     0.036731153     0.032419773     0.017297083
        0.017171335     0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0.00317611      0.026038478
        0.066784185     0.050402298     0.092604545     0.093599092     0.075010132
        0.042348761     0.009789741     0       0.002984277     0       0       0       0
        0       0
2004    1       3       3       0       51      0       0       0       0       0       0
        0       0       0       0.002814963     0.010476261     0.007886855     0.015796927
        0.030543561     0.043799394     0.06623644      0.057215575     0.084449342
        0.033280344     0.055491766     0.056729114     0.027854221     0.011748853     0
        0       0       0       0       0       0       0       0       0       0       0
        0       0       0.001407482     0.003979658     0.011879175     0.016970051
        0.056755437     0.047474807     0.07213542      0.073100844     0.084319463
        0.044657292     0.04582302      0.020548092     0.004620852     0.01200479      0
        0       0       0       0

# Washington trawl fleet (n=38)
1968    1       4       0       0       -9999   1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1
1969    1       4       0       0       21      0       0       0       0       0.000195577
        0       0       0.000904638     0.004486608     0.004093739     0.009905967
        0.014007097     0.041464656     0.047194112     0.065069886     0.065490641
        0.088941595     0.12092625      0.16099997      0.153482218     0.130455582
        0.062400551     0.026913014     0.002889496     4.67601E-05     9.78906E-05     3.37531E-
05      0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0       0       0       0       0
        0       0       0       0       0       0       0
1970    1       4       0       0       -1      1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1
1971    1       4       0       0       -1      1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1
1972    1       4       0       0       -1      1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
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        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1
1973    1       4       0       0       -1      1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1
1975    1       4       0       0       -9998   1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1       1       1       1       1       1
        1       1       1       1       1       1
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1 1 1 1 1 1
1978 1 4 3 0 5 0 0 0 0 0 0
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0.044994418 0.054747998 0.056754992 0.045943222 0.036092253
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1980 1 4 3 0 17 0 0 0 0 0 0
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0.045615053 0.007396508 0 0 0 0 0
1985 1 4 3 0 18 0 0 0 0 0 0
0 0 0 6.51822E-05 0.000345438 0.002253517 0.005198929
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0.044901914 0.080576069 0.067848659 0.061773804 0.036106937
0.014859854 0.003842434 0 0 0 0 0 0
0 0 0 0 6.51822E-05 0.000364966 0.000195547
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1986 1 4 3 0 17 0 0 0 0 0 0
0 0 0 0.000914914 0.000844894 0.001466939 0.008237626
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1989 1 4 3 0 18 0 0 0 0 0 0
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1990 1 4 3 0 17 0 0 0 0 0 0
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0.008008009 0.003621837 0 0 0 0 0 0 0

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	0.08871125		0.103722289		0.103568884		0.072915735		0.035311861		
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1991	1	4	3	0	22	0	0	0	0	0	0
	0	0	0	0	0	0.001780953		0.001527889		0.012869348	
	0.00813019		0.024682672		0.043107999		0.061619645		0.052401195		
	0.059142417		0.056759738		0.035131873		0.033288814		0.009525484		
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	0	0	0	0	0	6.12124E-05		0.001012901		0.004535901	
	0.014646836		0.03354231		0.038978608		0.089041837		0.111658708		
	0.123780936		0.100645746		0.055943271		0.017222896		0.006771935		
	0.001006024		0	0	4.48018E-05		0				
1992	1	4	3	0	20	0	0	0	0	0	0
	0	0.00029165		0	0.000989811		0.002523035		0.006237083		
	0.008959833		0.01356302		0.025442458		0.029491064		0.029169742		
	0.042664728		0.056205946		0.04965309		0.056190567		0.056684969		
	0.031130229		0.019553819		0.000842292		0.002030362		0	0	0
	0	0	0	0	0	0	0	0.000226914		0.000229725	
	0.001644003		0.003409427		0.009118816		0.021286043		0.045856986		
	0.051762064		0.063275223		0.10738149		0.113801456		0.074962448		
	0.056945442		0.018388075		8.81885E-05		0	0	0	0	0
1993	1	4	3	0	17	0	0	0	0	0	0
	0	4.92478E-05		0	0	0.006121918		0.002312239		0.014245405	
	0.042600523		0.05277873		0.066384536		0.072600024		0.072579664		
	0.047362767		0.057267739		0.023233388		0.023713039		0.008391091		4.96346E-
05	4.96346E-05		0	0	0	0	0	0	0	0	0
	0	0	8.38037E-05		8.38037E-05		0.003624642		0.011764382		
	0.042653077		0.043916688		0.084260666		0.091862836		0.08205956		
	0.081091089		0.037454876		0.019776825		0.007781314		0.003846857		0
	0	0	0	0	0						
1994	1	4	3	0	15	0	0	0	0	0	0
	0	0	0.001087565		0.001087565		0.005178771		0.007516765		
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1995	1	4	3	0	21	0	0	0	0	0	0
	0	0	0	0.000945263		0.002561181		0.013882619		0.017947804	
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	0.004712342		0.000293434		0	0.000206989		0	0	0	0
	0	0	0	0	0	0.000481697		0.001301856		0.004601711	
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	0.003113745		0	0.003627402		0	0	0	0		
1996	1	4	3	0	15	0	0	0	0	0	0
	0	0.00168222		0.003568972		0.00262248		0.006919009		0.010408862	
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	0.006061147		0.002709441		0.000515121		0	0	0	0	0
	0	0	0	0	0.00029404		0.002474832		0.00141552		
	0.003035201		0.004762832		0.018324239		0.020731509		0.030063077		
	0.036468626		0.076612561		0.102196407		0.076630073		0.066308067		
	0.07468948		0.025132235		0.012053215		0	0	0.001222967		0
	0	0									
1997	1	4	3	0	17	0	0	0	0	0	0
	0	0	0	8.54953E-05		0.003168639		0.006337277		0.011909787	
	0.012439491		0.020743304		0.041395545		0.082591829		0.051881883		
	0.059400736		0.070422148		0.052347441		0.022399656		0.018635128		
	0.007013197		0.001086537		0	0	0	0	0	0	0
	0	0	0	0	0.002997648		0.002997648		0.003515346		
	0.024584378		0.012712439		0.022861492		0.068442621		0.07041026		
	0.103400709		0.067130126		0.081139005		0.056447239		0.015820648		
	0.004595808		0.001086537		0	0	0	0	0		
1998	1	4	3	0	25	0	0	0	0	0	0
	0	0	0	0.016448639		0.000767019		0.005864754		0.012970311	

0.01658729 0.042730117 0.062174756 0.067949308 0.063575785
0.055985515 0.055258659 0.033587224 0.037867809 0.011259647
0.003757394 0 0.003011518 0 0 0 0 0 0
0 0 0 0 0.001271129 0.002890872 0.006286909
0.024239805 0.020972922 0.045219241 0.062486362 0.059044406
0.076371408 0.112761903 0.047820499 0.025515711 0.018181947
0.00643327 0.00070787 0 0 0 0 0
1999 1 4 3 0 18 0 0 0 0 0 0
0 0.000729693 0.001782384 0.000264108 0.004933784 0.00864055
0.012926528 0.008764088 0.018685463 0.026579598 0.061641991
0.057374662 0.031515319 0.075303311 0.051002511 0.053604895
0.029862093 0.003583565 0 0 0 0.000270334 0 0
0 0 0 0 0.000161499 0 0 0.005121616
0.008240527 0.01681555 0.013767209 0.029413061 0.049103746
0.043932337 0.074278283 0.115072675 0.09481179 0.077781017
0.016051592 0.00369114 0.001707254 0.002585829 0 0 0
0
2000 1 4 3 0 7 0 0 0 0 0 0
0 0 0 0.004391259 0.012467397 0.013906754 0.025628276
0.037678237 0.048655327 0.024094894 0.065967536 0.05518134
0.064593496 0.043155668 0.012467397 0.021538795 0.003001919
0.015017673 0 0 0 0 0 0 0 0 0
0 0 0 0.006397918 0 0.019441415 0.011479683
0.025628276 0.073890457 0.047221793 0.070029566 0.089680527
0.119393261 0.057236897 0.0209185 0.006174217 0.001759602 0.003001919
0 0 0 0 0
2001 1 4 3 0 10 0 0 0 0 0 0
0 0 0 0 0 0.001222799 0.007068183 0.007523409
0.011838571 0.022966186 0.041137127 0.066617347 0.056777468
0.070292006 0.040699303 0.037781461 0.031487638 0.005363469 0
0.001429665 0 0 0 0 0 0 0 0 0
0 0 0 0.003046872 0.00622928 0.014374213 0.003254143
0.026267437 0.04793153 0.151108904 0.117139624 0.100836969
0.090605744 0.013390897 0.017522799 0 0.006086958 0 0
0 0
2002 1 4 3 0 28 0 0 0 0 0 0
0 0 0 0 0 0.013532663 0.007980407 0.019579426
0.041109511 0.023542736 0.031998554 0.037934026 0.075244601
0.055481807 0.040411073 0.061818802 0.054620329 0.014472926
0.002440558 0.000753008 0.000753008 0 0 0 0 0
0 0 0 0 0 0 0.000891265 0.007548606
0.014425272 0.045032657 0.057642611 0.07500813 0.092363621
0.080291665 0.112085469 0.009395364 0.019314951 0.000643818
0.001839739 0.001843395 0 0 0 0
2003 1 4 3 0 21 0 0 0 0 0 0
0 0 0 0 0 0.016307189 0.026229448 0.035000777
0.035051743 0.065727376 0.053856116 0.060023386 0.043273703
0.055518933 0.045016172 0.037909865 0.024130278 0.008914781 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0.00672908 0.023417736 0.044087655
0.10946485 0.059177073 0.092538962 0.071093829 0.028148896
0.027452291 0.016035365 0.010685478 0.004209018 0 0 0
0
2004 1 4 3 0 37 0 0 0 0 0 0
0 0 0.003378093 0 0.001611338 0.008289058 0.007495506
0.013037003 0.026741848 0.026005218 0.041619231 0.068278893
0.054918642 0.087445165 0.065787769 0.042449181 0.034255727
0.015283757 0.017358694 0.008102261 0.004323174 0.003125529 0
0 0 0 0 0 0 0 0 0 0.004712875
0.004910965 0.008426061 0.009612162 0.030093929 0.063633507
0.09931276 0.093834164 0.071990576 0.046363726 0.020087935
0.015882752 0.0016325 0 0 0 0 0

California South non-trawl fleet (n=21)
1978 1 5 0 0 -9999 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1

1979	1	5	0	0	6	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
	0.044019037		0.066360359		0.300852285		0.425204466		0.087364852		
	0.015003211		0.028679216		0.021677717		0.010838857		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1980	1	5	0	0	-9998	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1985	1	5	0	0	-9999	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1985	1	5	0	0	33	0	0	0	0	0	0
	0	0	0	0	0.024802473		0.058880846		0.059851895		
	0.058880745		0.159134055		0.160530314		0.121562655		0.138951519		
	0.110481962		0.032305065		0.045607023		0.026173249		0.002838201		0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1986	1	5	0	0	-1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1986	1	5	0	0	-9998	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1					
1987	1	5	0	0	14	0	0	0	0	0.007344643	
	0	0	0	0	0	0	0.126077099		0.139822353		
	0.138931185		0.070676191		0.188469789		0.152258079		0.124191039		
	0.012499288		0.02627322		0.007244498		0.004591311		0	0	
	0.001621304		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
1988	1	5	0	0	13	0	0	0	0	0	0
	0	0.003425032		0	0.003425032		0.019171659		0.042756323		
	0.080162492		0.051033095		0.063912594		0.239334501		0.189149723		
	0.201385882		0.097364321		0.008879345		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0		
1989	1	5	0	0	27	0	0	0	0	0	0
	0	0	0.004282547		0.002557219		0.025924579		0.061086983		
	0.114984594		0.167370206		0.162842717		0.125604624		0.072672699		
	0.127616104		0.068858034		0.020385649		0.039309843		0	0.006504204	
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
1990	1	5	0	0	19	0	0	0	0	0	0
	0.003527285		0	0.011450152		0.018258365		0.029038906		0.045959344	
	0.127493226		0.127739886		0.323935893		0.1222729	0.10951934		0.080804703	
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0						
1991	1	5	0	0	9	0	0	0	0	0	0
	0	0	0.013648507		0.0217696	0.079843924		0.108847991		0.10249401	
	0.137507117		0.114283215		0.104045447		0.188762083		0	0.064600332	
	0.013559201		0.013559201		0	0.037079371		0	0	0	0

	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1992	1	5	0	0	100	0	0	0	0	0.010448416	
	0.032094427		0.100948122		0.123640619		0.124128289		0.108547583		
	0.141991545		0.09631119		0.091603233		0.053695801		0.018123614		
	0.023503027		0.032246108		0.01070624		0.011288858		0.012828737		
	0.002731774		0.001266121		0.002630175		0.001266121		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1993	1	5	0	0	99	0	0	0	0	0	
	0.012319073		0.033579359		0.067254695		0.072387406		0.06398916		
	0.060477126		0.102310461		0.299612272		0.12713207		0.079078384		
	0.029091132		0.047635322		0.005133539		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
1994	1	5	0	0	93	0	0	0	0.003153817		
	0.00788254		0.008237198		0.02937665		0.055777483		0.097945942		
	0.102053037		0.08892999		0.112908046		0.103061131		0.115628583		
	0.066887412		0.101845915		0.045268549		0.032601227		0.016578207		
	0.006171334		0.005692938		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1995	1	5	0	0	54	0	0	0	0	0.002186207	
	0.003951115		0.015952957		0.017171787		0.03190544		0.08018051		
	0.079647939		0.120040105		0.115045958		0.121870315		0.107542924		
	0.099166926		0.09653295		0.032090849		0.021295459		0.036089703		
	0.003667651		0.014993121		0.000668085		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1996	1	5	0	0	68	0	0	0	0	0.008795197	
	0.016122884		0.013152368		0.048261584		0.072723859		0.091605207		
	0.088047037		0.096239311		0.091816155		0.074466414		0.09517763		
	0.094871018		0.069423837		0.062116627		0.036580975		0.022527887		
	0.00201842		0.010634916		0.005418673		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1997	1	5	0	0	57	0	0	0	0	0	
	0.000446639		0.003975505		0.05209872		0.088002503		0.142718219		
	0.143360421		0.107043893		0.106438747		0.13738623		0.073751904		
	0.079459956		0.027739751		0.019731111		0.007161303		0.000638055		
	0.010047044		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1998	1	5	0	0	31	0	0	0	0	0	0
	0.005057073		0.014638897		0.007319448		0.017460262		0.101368442		
	0.139575487		0.281846721		0.290867716		0.06057083		0.039502267		
	0.036024832		0.00172739		0	0	0.004040634		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1999	1	5	0	0	17	0	0	0	0	0	
	0.017983391		0.12388769		0.03705623		0.124142103		0.149579735		
	0.100461594		0.064693764		0.050778404		0.082487472		0.088726766		
	0.117409854		0.042792998		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
2001	1	5	0	0	5	0	0	0	0.032958368		
	0.032958368		0	0	0.136716175		0.119690911		0.213226658		
	0.136227893		0.174068986		0.136227916		0.017924725		0	0	0
	0	0	0	0	0	0	0	0	0	0	0

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

California North non-trawl fleet (n=17)
1981 1 6 0 0 -9999 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1982 1 6 0 0 8 0 0 0 0 0 0
0 0 0 0.001404994 0.008609365 0 0.002809989
0.082770083 0.00314495 0.199426141 0.175144432 0.30218327
0.057898841 0.046694879 0.106004435 0.013908619 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0
1983 1 6 0 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1984 1 6 0 0 -9998 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1991 1 6 0 0 6 0 0 0 0 0 0
0 0.014731027 0.023695523 0.015194389 0.04785441 0.070116989
0.083080813 0.134028694 0.131110944 0.026095867 0.063386809
0.081017899 0.135618073 0.114183541 0.013129877 0.020495391 0
0.026259754 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0
1992 1 6 0 0 48 0 0 0 0 0 0
0.002508741 0.009371655 0.024141272 0.022119283 0.037474545
0.05239496 0.07709423 0.106683369 0.071841982 0.067991656
0.098298261 0.078411986 0.104267644 0.10727187 0.083531312
0.030884162 0.020743286 0.003735171 0.000919587 0.000315029 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1993 1 6 0 0 55 0 0 0 0 0.006410755
0.00690085 0.023423933 0.040065937 0.05740832 0.06297346
0.08892729 0.073318383 0.075205905 0.091636806 0.087729462
0.09047583 0.090079455 0.08801166 0.045949018 0.02347734
0.026588154 0.011552466 0.008573402 0.001291574 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0
1994 1 6 0 0 55 0 0 0 0 0
0.001379562 0.007775969 0.020816823 0.026138755 0.045269635
0.061372886 0.06225598 0.089876442 0.107194422 0.11929653
0.113922323 0.091379109 0.065311735 0.058468304 0.047420043
0.058605395 0.011995959 0.010870945 0.000385289 0.000263897 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1995 1 6 0 0 29 0 0 0 0 0
0.001305814 0.018053052 0.03045831 0.071735537 0.085813034
0.103571537 0.12658913 0.10318827 0.079823074 0.077798196
0.056906643 0.053538638 0.048694602 0.047775052 0.046939884
0.033471191 0.006795714 0.007542322 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0

```
1996	1	6	0	0	38	0	0	0	0.000521861
	0.001376976	0.005748596	0.021034305	0.036072369	0.063102602
	0.058214033	0.061306852	0.069270062	0.096172663	0.066781487
	0.088656729	0.074497353	0.080529391	0.090750272	0.099823209
	0.04559535	0.02314471	0.010876649	0.004893398	0.001631133	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
1997	1	6	0	0	23	0	0	0	0	0.001907914
	0.009537684	0.006676568	0.012933322	0.037502554	0.077451205
	0.109298791	0.154481652	0.155268135	0.100265488	0.100106491
	0.04999313	0.040054696	0.029070156	0.039497364	0.040831864
	0.024100229	0.009196393	0.001055643	0.000770722	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
1998	1	6	0	0	14	0	0	0	0	0	0
	0	0	0.005806266	0.014225352	0.029844208	0.05233386
	0.090761713	0.11758192	0.113082064	0.064798074	0.122163984
	0.077431446	0.120726934	0.079236274	0.051559788	0.021933171
	0.029994251	0.008520696	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0
1999	1	6	0	0	50	0	0	0	0	0	0
	0.00591082	0.033477216	0.045547843	0.072407032	0.145625888
	0.181279123	0.181088721	0.152279485	0.096715676	0.035653235
	0.019785034	0.011976474	0.009214604	0.003766187	0.001506475
	0.001255396	0.001255396	0.001255396	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0
2000	1	6	0	0	16	0	0	0	0	0.012811301
	0	0	0.006405651	0.027873243	0.053668981	0.064402777
	0.069348744	0.042724717	0.141461468	0.121361914	0.104735049
	0.168534345	0.083766465	0.04710586	0.037621285	0.005366898	0
	0	0	0	0.006405651	0	0.006405651	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0
2001	1	6	0	0	-9999	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1
2002	1	6	0	0	28	0	0	0	0	0	0
	0	0.003080043	0.016201028	0.035482099	0.072565821	0.08590583
	0.052702963	0.073305653	0.076530989	0.108938022	0.153809587
	0.11284952	0.08658344	0.062340077	0.020680778	0.01281298
	0.017279043	0.008932126	0	0	0	0	0	0	0
	0	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	0	0	-9998	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1

# OR-WA non-trawl fleet (n=11)
1980	1	7	3	0	-9999	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1
1988	1	7	3	0	6	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0.000687379
```

0.010628375 0.023364014 0.049818912 0.056981198 0.113147803
0.092655457 0.072997554 0.02844474 0.030705248 0.017152654
0.01150345 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0.001856935 0.012100972
0.025473256 0.050565969 0.04793889 0.123406666 0.145766121
0.073300958 0.01150345 0 0 0 0 0
1990 1 7 3 0 -9998 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1996 1 7 3 0 -9999 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1997 1 7 3 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1998 1 7 3 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
1999 1 7 3 0 93 0 0 0 0 0 0
0 0.000980064 0.002892199 0.005784093 0.009921692 0.013717905
0.020345697 0.029070368 0.03762441 0.054306024 0.046050641
0.029234091 0.052704418 0.022796782 0.01594328 0.018170995
0.014322378 0.006572147 0.001834574 0.001291185 0.002582369 0
0 0 0 0 0.001084144 0 0.000679044 0.000918974
0.002314762 0.005220122 0.01158326 0.019284779 0.033778472
0.046277122 0.064065361 0.071496556 0.077767576 0.070523167
0.053865991 0.058083446 0.041798778 0.02996843 0.012490493
0.005458308 0.001291185 0.003322348 0.001291185 0.001291185
2000 1 7 3 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
2001 1 7 3 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
2002 1 7 3 0 -1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
2004 1 7 3 0 -9998 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1

California South recreational fleet (n=22)
1980 1 8 0 0 129 0 0 0.001831502 0.016483516
0.029304029 0.042124542 0.064102564 0.086080586 0.131868132
0.146520147 0.117216117 0.146520147 0.102564103 0.065934066
0.025641026 0.014652015 0.005494505 0 0.001831502 0 0

	0	0	0	0.001831502		0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0								
1981	1	8	0	0	70	0	0	0	0.004366812		
	0.034934498		0.030567686		0.065502183		0.082969432		0.152838428		
	0.135371179		0.144104803		0.113537118		0.096069869		0.034934498		
	0.030567686		0.008733624		0.013100437		0.017467249		0.008733624		
	0.017467249		0.004366812		0	0.004366812		0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0				
1982	1	8	0	0	88	0	0	0.003787879		0	
	0.011363636		0.049242424		0.079545455		0.106060606		0.117424242		
	0.128787879		0.090909091		0.109848485		0.056818182		0.064393939		
	0.071969697		0.041666667		0.018939394		0.015151515		0.015151515		
	0.015151515		0	0	0.003787879		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1983	1	8	0	0	88	0	0	0.008130081		0.020325203	
	0.036585366		0.081300813		0.052845528		0.109756098		0.113821138		
	0.105691057		0.130081301		0.093495935		0.085365854		0.069105691		
	0.044715447		0.008130081		0.008130081		0.008130081		0.012195122		
	0.008130081		0.004065041		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0					
1984	1	8	0	0	105	0	0	0.003215434		0.028938907	
	0.090032154		0.125401929		0.106109325		0.096463023		0.093247588		
	0.083601286		0.109324759		0.083601286		0.08681672		0.054662379		
	0.006430868		0.006430868		0.012861736		0.003215434		0.006430868		0
	0.003215434		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1985	1	8	0	0	179	0	0	0.001455604		0.010189229	
	0.03930131		0.077147016		0.109170306		0.144104803		0.139737991		
	0.114992722		0.096069869		0.094614265		0.080058224		0.045123726		
	0.024745269		0.00727802		0.005822416		0.001455604		0.005822416		0
	0.001455604		0.001455604		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0						
1986	1	8	0	0	156	0	0.001396648		0.001396648		
	0.002793296		0.01396648		0.039106145		0.076815642		0.122905028		
	0.153631285		0.209497207		0.145251397		0.101955307		0.07122905		
	0.019553073		0.012569832		0.002793296		0.00698324		0.004189944		
	0.004189944		0.002793296		0.005586592		0.001396648		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0		
1987	1	8	0	0	47	0	0	0.006711409		0.013422819	
	0.040268456		0.060402685		0.040268456		0.073825503		0.087248322		
	0.120805369		0.140939597		0.167785235		0.080536913		0.013422819		
	0.026845638		0.013422819		0.020134228		0.053691275		0.020134228		
	0.020134228		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0						
1988	1	8	0	0	70	0	0	0.005464481		0.005464481	
	0.032786885		0.092896175		0.12568306		0.120218579		0.136612022		
	0.109289617		0.071038251		0.054644809		0.087431694		0.081967213		
	0.027322404		0.005464481		0.005464481		0.005464481		0.010928962		
	0.005464481		0.005464481		0.005464481		0.005464481		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1989	1	8	0	0	84	0	0	0.002724796		0.005449591	
	0.038147139		0.019073569		0.046321526		0.111716621		0.21253406		

	0.201634877		0.10626703		0.084468665		0.079019074		0.054495913		
	0.013623978		0.005449591		0.016348774		0	0	0.002724796		0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1993	1	8	0	0	97	0	0	0.004739336		0.023696682	
	0.033175355		0.071090047		0.17535545		0.161137441		0.241706161		
	0.127962085		0.085308057		0.037914692		0.004739336		0.009478673		
	0.014218009		0.004739336		0	0.004739336		0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0										
1994	1	8	0	0	44	0	0	0	0	0.026666667	
	0.04	0.08	0.093333333		0.213333333		0.213333333		0.12	0.133333333	
	0.066666667		0.013333333		0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1995	1	8	0	0	70	0	0	0.003952569		0.011857708	
	0.031620553		0.071146245		0.083003953		0.083003953		0.138339921		
	0.169960474		0.126482213		0.098814229		0.102766798		0.04743083		
	0.015810277		0.003952569		0.007905138		0	0	0	0	
	0.003952569		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0								
1996	1	8	0	0	126	0	0.001569859		0.006279435		
	0.004709576		0.025117739		0.047095761		0.047095761		0.062794349		
	0.10989011		0.174254317		0.199372057		0.152276295		0.105180534		
	0.040816327		0.009419152		0.009419152		0.003139717		0	0.001569859	
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1997	1	8	0	0	145	0	0	0	0.009082652		
	0.017257039		0.02270663		0.032697548		0.069936421		0.082652134		
	0.146230699		0.183469573		0.182561308		0.138964578		0.06448683		
	0.028156222		0.015440509		0.003633061		0.000908265		0.000908265		
	0.000908265		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0						
1998	1	8	0	0	69	0	0	0	0	0.02173913	
	0.047826087		0.039130435		0.052173913		0.07826087		0.104347826		
	0.143478261		0.104347826		0.143478261		0.117391304		0.069565217		
	0.056521739		0.013043478		0.008695652		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
1999	1	8	0	0	141	0	0	0.001569859		0.001569859	
	0.004709576		0.014128728		0.026687598		0.043956044		0.083202512		
	0.12244898		0.133437991		0.149136578		0.15855573		0.128728414		
	0.080062794		0.026687598		0.014128728		0.007849294		0.003139717		0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0								
2000	1	8	0	0	58	0	0	0	0.003355705		0
	0.010067114		0.020134228		0.020134228		0.05704698		0.120805369		
	0.16442953		0.161073826		0.130872483		0.110738255		0.097315436		
	0.05704698		0.023489933		0.023489933		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
2001	1	8	0	0	52	0	0	0	0.006451613		
	0.019354839		0.006451613		0.006451613		0.025806452		0.032258065		
	0.070967742		0.141935484		0.15483871		0.206451613		0.148387097		

0.077419355 0.064516129 0.032258065 0 0.006451613 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
2002 1 8 0 0 37 0.01 0 0 0 0.02 0.04
0.03 0.03 0.09 0.01 0.04 0.15 0.11 0.22 0.11 0.04 0.03
0.03 0.02 0.02 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
2003 1 8 0 0 8 0 0 0 0.125 0 0
0 0 0.625 0 0 0.125 0 0.125 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
2004 1 8 0 0 93 0 0 0.006756757 0.027027027
0 0.033783784 0.027027027 0.054054054 0.182432432 0.202702703
0.189189189 0.162162162 0.060810811 0.02027027 0.027027027
0.006756757 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0

California North recreational fleet (n=22)
1980 1 9 0 0 61 0 0 0 0 0.005988024
0.008982036 0.035928144 0.071856287 0.110778443 0.146706587
0.137724551 0.101796407 0.065868263 0.053892216 0.062874251
0.05988024 0.032934132 0.038922156 0.020958084 0.026946108
0.008982036 0.005988024 0 0 0 0 0.002994012 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
1981 1 9 0 0 45 0.026785714 0.008928571 0.008928571
0.008928571 0.004464286 0.013392857 0.035714286 0.040178571 0.09375
0.125 0.191964286 0.174107143 0.098214286 0.0625 0.049107143
0.008928571 0.013392857 0.008928571 0.004464286 0.008928571 0
0.013392857 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1982 1 9 0 0 66 0 0 0 0 0
0.031331593 0.046997389 0.109660574 0.146214099 0.151436031
0.146214099 0.104438642 0.107049608 0.054830287 0.046997389
0.010443864 0.007832898 0.007832898 0.007832898 0 0.005221932
0.002610966 0.007832898 0 0.005221932 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1983 1 9 0 0 50 0 0 0 0.005076142 0
0.010152284 0.045685279 0.101522843 0.162436548 0.162436548
0.121827411 0.121827411 0.07106599 0.086294416 0.030456853
0.030456853 0.005076142 0.005076142 0.005076142 0.010152284 0
0.010152284 0.005076142 0.010152284 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1984 1 9 0 0 72 0 0 0 0 0.012396694
0.016528926 0.074380165 0.078512397 0.074380165 0.123966942
0.128099174 0.107438017 0.066115702 0.107438017 0.05785124
0.049586777 0.045454545 0.012396694 0.012396694 0.024793388 0
0.008264463 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1985 1 9 0 0 104 0 0 0 0.002314815
0.009259259 0.018518519 0.039351852 0.071759259 0.113425926
0.106481481 0.131944444 0.143518519 0.106481481 0.078703704
0.06712963 0.030092593 0.025462963 0.00462963 0.023148148

	0.006944444		0.011574074		0.00462963		0	0.002314815		0	
	0.002314815		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1986	1	9	0	0	107	0	0	0.001490313		0	
	0.002980626		0.020864382		0.058122206		0.108792846		0.153502235		
	0.157973174		0.143070045		0.108792846		0.068554396		0.041728763		
	0.029806259		0.028315946		0.019374069		0.013412817		0.016393443		
	0.008941878		0.010432191		0.002980626		0.001490313		0	0.001490313	
	0	0.001490313		0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1987	1	9	0	0	57	0	0	0	0	0.002132196	
	0.017057569		0.036247335		0.034115139		0.085287846		0.057569296		
	0.068230277		0.091684435		0.10021322		0.081023454		0.040511727		
	0.051172708		0.108742004		0.076759062		0.063965885		0.019189765		
	0.021321962		0.023454158		0.014925373		0.004264392		0	0.002132196	
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0			
1988	1	9	0	0	61	0	0	0	0	0.009433962	
	0.014150943		0.056603774		0.08490566		0.132075472		0.122641509		
	0.066037736		0.08490566		0.056603774		0.051886792		0.037735849		
	0.056603774		0.051886792		0.070754717		0.033018868		0.037735849		
	0.028301887		0	0	0	0.004716981		0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0						
1989	1	9	0	0	19	0	0	0.012195122		0	
	0.012195122		0.012195122		0.036585366		0.036585366		0.085365854		
	0.195121951		0.170731707		0.182926829		0.097560976		0.036585366		
	0.012195122		0.06097561		0	0.012195122		0.012195122		0.012195122	
	0	0.012195122		0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1993	1	9	0	0	84	0	0	0	0.011869436		
	0.014836795		0.035608309		0.077151335		0.130563798		0.195845697		
	0.154302671		0.145400593		0.091988131		0.053412463		0.026706231		
	0.020771513		0.023738872		0.005934718		0	0.005934718		0	
	0.005934718		0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							
1994	1	9	0	0	78	0	0	0	0	0.010230179	
	0.033248082		0.076726343		0.112531969		0.168797954		0.21483376		
	0.166240409		0.10230179		0.056265985		0.035805627		0.015345269		
	0.00511509		0	0	0	0	0	0	0.002557545		0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
1995	1	9	0	0	51	0	0	0	0.012987013		
	0.03030303		0.086580087		0.134199134		0.142857143		0.155844156		
	0.134199134		0.12987013		0.077922078		0.038961039		0.021645022		
	0.012987013		0	0	0.004329004		0	0.004329004		0.008658009	
	0	0	0	0	0.004329004		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0								
1996	1	9	0	0	84	0	0	0	0	0.008733624	
	0.024017467		0.052401747		0.115720524		0.141921397		0.192139738		
	0.135371179		0.087336245		0.056768559		0.028384279		0.028384279		
	0.041484716		0.034934498		0.037117904		0.013100437		0	0.002183406	
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0									
1997	1	9	0	0	53	0	0	0.001709402		0.008547009	
	0.011965812		0.047863248		0.095726496		0.100854701		0.063247863		
	0.05982906		0.041025641		0.051282051		0.075213675		0.094017094		

0.109401709 0.08034188 0.058119658 0.037606838 0.023931624
0.023931624 0.005128205 0.006837607 0.003418803 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1998 1 9 0 0 27 0 0 0 0.006944444
0.006944444 0 0.027777778 0.041666667 0.041666667 0.152777778
0.097222222 0.069444444 0.131944444 0.138888889 0.111111111
0.027777778 0.048611111 0.041666667 0.041666667 0.006944444
0.006944444 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1999 1 9 0 0 62 0 0 0 0 0
0.026011561 0.028901734 0.052023121 0.083815029 0.080924855
0.069364162 0.052023121 0.10982659 0.112716763 0.164739884
0.095375723 0.060693642 0.020231214 0.023121387 0.01734104
0.002890173 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2000 1 9 0 0 30 0 0 0 0 0 0
0.011111111 0.044444444 0.066666667 0.166666667 0.022222222
0.022222222 0.055555556 0.133333333 0.055555556 0.133333333
0.133333333 0.044444444 0.055555556 0.055555556 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2001 1 9 0 0 13 0 0 0 0 0 0
0 0.047619048 0.047619048 0.095238095 0 0.142857143
0.095238095 0.142857143 0.285714286 0.047619048 0.047619048 0
0.047619048 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
2002 1 9 0 0 11 0 0 0 0 0
0.117647059 0.058823529 0.058823529 0 0.117647059 0.117647059
0.117647059 0.117647059 0.058823529 0 0.058823529 0.058823529
0.058823529 0.058823529 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
2003 1 9 0 0 25 0 0 0 0 0 0
0 0.026315789 0.105263158 0.078947368 0.026315789 0.105263158
0.210526316 0.236842105 0.078947368 0.078947368 0.026315789 0
0 0 0 0 0 0.026315789 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
2004 1 9 0 0 28 0 0 0 0 0
0.018518519 0.018518519 0.037037037 0.222222222 0.092592593
0.203703704 0.074074074 0.074074074 0.055555556 0.111111111
0.018518519 0.018518519 0 0.018518519 0.018518519 0 0
0.018518519 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0

OR-WA recreational fleet (n=21)
1980 1 10 0 0 85 0 0 0 0 0
0.009375642 0.017072956 0.017455599 0.069888126 0.167861297
0.095131903 0.141377973 0.144995869 0.073579856 0.047964423
0.084453748 0.019391932 0.012089077 0.081269438 0.011585521
0.002291641 0 0 0 0 0 0 0.004215 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1981 1 10 0 0 35 0 0 0 0 0.001722689
0.007348313 0.047525546 0.042643582 0.115062871 0.186269282
0.10014907 0.087792218 0.172836535 0.098029022 0.034749929

0.039126725 0.02182919 0.022305186 0.005791241 0 0
0.012635506 0.004183093 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1982 1 10 0 0 78 0 0 0 0 0.003846782
0.006912875 0.002006066 0.046185424 0.039622239 0.149381913
0.138455409 0.167447519 0.239275394 0.074549055 0.013853716
0.022045406 0.026819296 0.030264309 0.029112849 0.007946745 0
0 0 0 0.002275003 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1983 1 10 0 0 27 0 0 0 0 0
0.040447267 0.005029024 0.015209314 0.089945642 0.13542368
0.251872408 0.145862369 0.007992078 0.03959434 0.007992078
0.151589859 0.046297393 0.013246173 0.022451825 0 0.014902744
0 0 0.012143806 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0
1984 1 10 0 0 89 0 0 0 0 0
0.010016956 0.028734106 0.069737127 0.094664448 0.153900477
0.133502053 0.148691857 0.110481341 0.101790028 0.041598451
0.028325819 0.029476797 0.014853794 0.010739513 0.003454121
0.001808628 0.007348489 0.001695512 0 0.006246619 0.002933864
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1985 1 10 0 0 110 0 0 0 0.000795671 0
0.020894437 0.034709625 0.0537334 0.088654129 0.058057262 0.093453973
0.129970845 0.125862398 0.100057419 0.062605021 0.060855356
0.031061554 0.059703112 0.010086248 0.044482869 0.002379333
0.01092276 0 0.000791831 0.01092276 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1986 1 10 0 0 51 0 0 0 0 0.005017916
0.004045507 0.069385746 0.067780914 0.134548393 0.123306177
0.114703545 0.07829555 0.047096234 0.049254595 0.010396143
0.025826401 0.079495197 0.104674912 0.018083702 0.050005367
0.012055801 0.006027901 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1987 1 10 0 0 73 0 0 0.003420154 0.006072463
0.019420139 0.021564197 0.080344949 0.094938187 0.153752818
0.091224227 0.114669058 0.113259964 0.073341045 0.0517816 0.03502469
0.017888433 0.029075302 0.01151631 0.047268248 0.008842221
0.013018352 0.009327051 0 0 0 0 0 0.004250589
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0
1988 1 10 0 0 107 0.005707547 0 0 0.005707547
0.006830517 0.027692117 0.062075065 0.11041409 0.136512211
0.202746216 0.125916443 0.130481387 0.059163466 0.043387694
0.013224661 0.014694523 0.017294743 0.0145907 0.013600615 0 0
0.003759025 0.000493888 0.005707547 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0
1989 1 10 0 0 42 0 0 0 0 0
0.006335626 0.015776622 0.089120177 0.113900944 0.217135907
0.127784473 0.133542394 0.086543424 0.062274392 0.029952956
0.034232059 0.033587484 0.018719499 0.019628136 0 0.005072582
0 0 0.006393324 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0

1993 1 10 0 0 118 0 0 0 0 0
0.004142669 0.040081225 0.066116403 0.130015215 0.18972616
0.172825451 0.117083853 0.100179732 0.072239412 0.026108005
0.01448766 0.023059241 0.010814386 0.012678734 0.002251505
0.007458202 0.003901054 0 0 0.001465019 0.002436035 0
0.002930039 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
1994 1 10 0 0 116 0 0 0 0 0.009690281
0.022190229 0.045589444 0.092247192 0.119267218 0.186122153
0.172270625 0.145877469 0.09876048 0.049865867 0.017693232
0.010729841 0.004044845 0.008914395 0.00533343 0.006189938 0
0.002178425 0 0 0 0 0 0.003034934 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1995 1 10 0 0 100 0 0 0 0 0.005074033
0 0.014828166 0.085151732 0.123639152 0.285363394 0.177112587
0.133192387 0.0756169 0.042119283 0.011548389 0.015899678 0
0.010810241 0 0.010810241 0.00540512 0 0.003428696 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1996 1 10 0 0 77 0 0 0 0 0
0.013280679 0.005045989 0.062341721 0.146023408 0.225498768
0.152396332 0.175017404 0.115700847 0.068868609 0.023231933
0.008147081 0.00444723 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
1997 1 10 0 0 110 0 0 0 0.000805172 0
0.011696638 0.028161629 0.057306501 0.182292828 0.090960934
0.213395978 0.118633926 0.188017723 0.039760834 0.009365581 0.0259055
0.007004928 0.006120745 0.011892489 0.006249041 0.000794984 0
0.001634568 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0
1998 1 10 0 0 172 0 0 0 0 0.00131178
0.013604933 0.037604605 0.095884781 0.186061695 0.124861263
0.154678239 0.116699085 0.071411157 0.082313512 0.062133655
0.012548536 0.014372759 0.013574905 0.006055439 0.002785938 0
0 0.002785938 0 0 0 0.00131178 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
1999 1 10 0 0 160 0 0 0 0.002931412
0.002931412 0.007158921 0.031768199 0.089075973 0.161699569
0.170076241 0.136742164 0.163540722 0.0672326 0.064425194 0.030737001
0.021900774 0.012272799 0.010165272 0.023823154 0.001832612
0.001685981 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0
2000 1 10 0 0 101 0 0 0 0 0
0.006088204 0.034131482 0.089183919 0.136355699 0.244369232
0.191152713 0.143725755 0.083515123 0.01615622 0.018114225
0.011247012 0.015945388 0 0.009220751 0.000794279 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0
2001 1 10 0 0 67 0 0 0 0 0
0.120302205 0.010209818 0.020384731 0.106023835 0.117830475
0.167478464 0.094568395 0.288388788 0.028032417 0.020938649
0.001469323 0.001469323 0.002033924 0.020869653 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0

2002	1	10	0	0	64	0	0	0	0	0	0
	0.031871937		0.02406386		0.087001705		0.139871654		0.263897335		
	0.223530739		0.050716097		0.071382345		0.059521569		0.013804048		
	0.007205576		0.024666361		0.002466774		0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	
2003	1	10	0	0	16	0	0	0	0	0	0
	0	0.099033591		0.182488023		0.168045205		0.116084817		0.272650833	
	0.079587212		0.075273986		0.004557555		0.002278777		0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0							

Triennnial survey (N = 10)

1977	1	11	3	0	-16	0	0	0	0	0	0
	0	0	0	0	0	0	0	2147	39699	108963	179509
	263941	179262	108663	162242	233849	102717	65128	6795	31297	6372	0
	0	0	0	0	0	0	0	0	0	0	0
	0	2147	15547	117149	269496	278259	275872	282366	459481	222018	122292
	22384	6746	6746	0	0	0					
1980	1	11	3	0	-12	0	4900	4724	0	0	0
	0	0	0	0	18197	2274	2163	8874	38334	48982	50913
	53857	148441	135152	111963	106173	65032	13312	0	0	0	0
	0	2450	2450	0	4900	4900	0	0	13648	0	0
	2274	36683	9274	44028	203957	277784	268289	361638	255897	122475	39463
	15076	4306	0	0	0	0					
1983	1	11	3	0	44	0	0	3578	3578	13121	14688
	22563	113129	317694	562889	275905	287613	220792	246952	334313	233752	335422
	699948	484401	391119	537382	545882	236888	73064	37180	1813	0	0
	0	0	0	8946	14313	9641	27423	143716	326252	499398	389346
	261883	212402	244898	267583	293468	542581	850132	1241293	789315	540169	155779
	55125	11196	0	0	0	0					
1986	1	11	3	0	44	0	3015	1386	2202	20059	7538
	10696	19221	19347	40982	71310	84335	84117	166954	274047	301968	277293
	192250	201573	219700	195734	141261	154333	78156	30502	8970	0	0
	0	0	7148	10128	22063	19363	14420	112850	51652	52758	87857
	96422	164530	167154	335559	336212	284279	344089	370193	307445	312377	125384
	24739	8430	5836	0	0	0					
1989	1	11	3	0	77	5678	22712	73814	23116	15040	5678
	20314	69517	56203	107797	103159	75084	94889	94610	142711	162765	102671
	161590	133711	343786	305478	190954	173833	54169	94060	77410	0	0
	22712	0	68136	63175	19125	25160	22807	68265	81616	114142	104050
	81889	127530	137864	221340	196940	221243	304104	560162	523668	512477	86396
	31795	26226	75161	0	0	0					
1992	1	11	3	0	34	34885	10902	10966	20773	19820	14781
	30338	38288	31921	40398	42616	51985	106892	101108	107399	146992	69708
	21254	11877	20135	19809	17140	14090	1234	12073	11881	0	0
	34885	13301	25589	50418	28793	22995	16755	9768	11997	34329	26400
	18422	100552	90942	82939	52979	41260	25057	28979	21189	31815	7830
	1479	0	0	0	0	0					
1995	1	11	3	0	41	0	0	0	0	2425	6219
	9051	7444	34124	65169	84732	83277	68180	27715	41353	47699	28838
	40874	34870	54909	56214	71852	39778	40100	32907	6853	0	0
	0	0	0	0	0	13408	28080	35758	58054	137785	144116
	78322	72250	69039	25359	47640	47653	100883	120910	187447	124051	34202
	0	0	0	0	0	0					
1998	1	11	3	0	84	0	196	22571	196	1570	11689
	9864	7606	4191	21373	16103	40348	59768	79399	82635	70273	52250
	34294	35430	43633	18110	10390	7156	701	2824	0	0	0
	0	3982	7963	4963	1177	8729	11097	2159	1766	10547	24342
	65749	61566	76257	65988	50491	93704	68243	41814	33539	7181	6747
	2105	0	0	0	0	0					
2001	1	11	3	0	73	0	0	3606	0	32110	0
	67475	3520	7040	77336	44391	205336	414378	293143	161288	96909	54077
	79501	72585	72892	23599	7090	16502	0	0	0	0	0
	0	0	0	0	22492	0	22492	35200	26012	74040	83963

262245 311511 186368 156321 90186 65787 79815 40142 36151 13856 3684
0 0 0 0 0 0
2004 1 11 3 0 62 0 0 4597 0 4040 0
0 0 0 0 0 0 10782 35686 91136 56932 36869
60475 55129 84106 59555 94921 41846 22135 0 0 0 0
0 0 4040 0 0 0 0 0 6603 0 0
11675 21407 32063 64495 59598 171145 144096 170212 166250 86653 47887
4230 0 0 0 0 0

#Age frequency observations setup
35 # Number of age bins
Lower edge of age bins
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
1 # Number of ageing error types
Vector of mean observed age at true age (derived from radiocarbon analysis)
0.5 1.4078 2.3156 3.2234 4.1312 5.039 5.9468 6.8546 7.7624 8.6702 9.578 10.4858
11.3936 12.3014 13.2092 14.117 15.0248 15.9326 16.8404 17.7482 18.656 19.5638 20.4716
21.3794 22.2872 23.195 24.1028 25.0106 25.9184 26.8262 27.734 28.6418 29.5496 30.4574
31.3652 32.273 33.1808 34.0886 34.9964 35.9042 36.812
SD of observed age at true age (calculated age agreement analysis)
0.000 0.178 0.178 0.178 0.277 0.376 0.475 0.574 0.673 0.772 0.871 0.971
1.070 1.169 1.268 1.367 1.466 1.565 1.664 1.763 1.862 1.962 2.061
2.160 2.259 2.358 2.457 2.556 2.655 2.754 2.853 2.953 3.052 3.151
3.250 3.349 3.448 3.547 3.646 3.745 3.844

Age composition data
83 # Number of age frequency observations

Southern California trawl fleet (n=7)
#Year Season Fleet Sexes Mkt Ageerr Lbin_lo Lbin_hi Nsamp Data: females then males
1980 1 1 3 0 1 1 28 -9999 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1
1981 1 1 3 0 1 1 28 -1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1
1983 1 1 3 0 1 1 28 -1 1 1 1
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1984 1 1 3 0 1 1 28 40 0 0 0
0.006240276 0.004853548 0.027296652 0.101398163 0.041741295
0.054570205 0.063590624 0.047634394 0.012784807 0.00318166 0
0 0 0 0.02257674 0.005372164 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0.000693364 0.006240276 0.00346682 0.030285533
0.067252532 0.058096316 0.131458254 0.016392163 0.028441652
0.036401115 0.034232302 0.034810285 0 0 0 0 0
0 0 0 0 0.005372164 0 0 0.034810285
0.045813679 0.069620569 0 0 0 0 0 0.005372164
1985 1 1 3 0 1 1 28 -1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
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        1 1 1 1 1 1 1 1 1 1 1
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2002    1 1 3 0 1 1 28 -1 1 1 1
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2003    1 1 3 0 1 1 28 -9998 1 1 1
        1 1 1 1 1 1 1 1 1 1 1
        1 1 1 1 1 1 1 1 1 1 1
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# Northern California trawl fleet (n=12)
1980    1 2 3 0 1 1 28 80 0 0 0
        0 0 0.000343776 0.013212726 0.038332185 0.005984033
        0.01260244 0.038354847 0.061587536 0.062026718 0.030777823
        0.016033873 0.011060084 0.010605725 0 0.00098053 0.002880831
        0.029658273 0 0 0 0.003932212 0.009933254 0 0
        0 0 0.004315202 0 0 0 0 0 0 0
        0 0.012764218 0.009570584 0.008327821 0.052785377 0.071371692
        0.023882237 0.049800764 0.07792107 0.016930302 0.056155584
        0.031071054 0.035967883 0.010189551 0.058485557 0.014061161
        0.017062065 0.035428407 0 0 0.007430932 0.00147074
        0.007196033 0 0.013603507 0 0 0.009230983 0.017614222
        0 0 0.009056189
1981    1 2 3 0 1 1 28 43 0 0 0
        0 0.010938602 0.009868145 0.00915554 0.035162807 0.061119304
        0.068662723 0.030332386 0.016100534 0.074122867 0.038979267
        0.039132795 0.036359901 0.033102768 0.000893564 0.007951661
        0.002847764 0.020991088 0.029613091 0 0.004537828 0
        0.000731231 0.003149112 0 0 0.008600172 0 0 0
        0 0 0 0 0 0 0.002354988 0.016063518
        0.004082704 0.074608984 0.064737114 0.023574653 0.038460277
        0.022751397 0.05923057 0.038483333 0.0461009 0.027225082 0
        0.000774563 0 0.003852094 0.025762621 0 0.004537828 0
        0 0.002385978 0 0 0 0 0 0.000956142 0
        0 0.001704105
1982    1 2 3 0 1 1 28 51 0 0 0
        0 0 0.018770025 0.02083243 0.033347492 0.022032883
        0.068581753 0.062419347 0.070245237 0.006476744 0.036875384 0.0227028
        0 0.015706123 0.018174553 0.000477343 0 0.000623426 0
        0.01768179 0 0 0 0 0 0 0 0 0
        0 0 0 0 0.018093753 0 0 0.001242098
        0.040149988 0.005649188 0.041602361 0.056150181 0.101218386
        0.057281739 0.033821483 0.010607153 0.006059599 0.015661049
        0.031412246 0.009138746 0.019305282 0.002020741 0.036547896
        0.006886466 0.023596045 0.029734762 0 0 0 0.009138746
        0 0 0 0 0.020596015 0 0 0.009138746
1983    1 2 3 0 1 1 28 113 0 0 0
        0.000134449 0.002184476 0.0051353 0.022276556 0.048983856 0.048459058
        0.013159772 0.038990823 0.005283342 0.028233462 0.021563605
        0.046156086 0.010863488 0.015332363 0.004950174 0.004532478
        0.000206805 0.010706745 0 0.020115456 0.006623678 0.018012085
        0 0 0.001272462 0.005865052 0 0.004796867 0
        0.008418351 0 0.008537088 0 0 0 0 0.007110486
        0.002430403 0.043696011 0.045309406 0.066073614 0.032089077
        0.116293296 0.023763941 0.021182623 0.012443566 0.017528578
        0.036828564 0.034561886 0.000870632 0.013961943 0.021108499
        0.019183425 0.000651368 0.013215218 0.002983519 0.007576682
```

0.008418351 0 0.001216949 0.001451377 0 0 0.011697105
0 0.004796867 0.032762739
1984 1 2 3 0 1 1 28 68 0 0 0
0 0 0.039349011 0.025046361 0.050408299 0.061958245
0.039331371 0.056535569 0.033976475 0.013469452 0.04383991
0.013496257 0.054212657 0.004645391 0.003612218 0.002731137
0.006823653 0.002327985 0 0.005002924 0.005215549 0
0.007972233 0 0.006738201 0.017760378 0 0.00082454 0
0 0.007775716 0.016125018 0 0 0 0 0.001918026
0.00574412 0.019184842 0.047788138 0.029717267 0.060883684
0.054167943 0.059981382 0.002619512 0 0.03288594 0.010314543
0.014010319 0.014416335 0.000368555 0.004846993 0 0.011305281
0.014626837 0 0.016923446 0.017054933 0 0.004821929
0.01273363 0.000368555 0.005618165 0.009915829 0.004957915
0.00537148 0.018275851
1985 1 2 3 0 1 1 28 -9999 1 1 1
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1
1985 1 2 3 0 1 1 28 63 0 0 0
0 0.001981779 0.005282394 0.034911698 0.046220435 0.053553145
0.022456075 0.05114469 0.030952123 0.020622234 0.0035262 0.004816497
0.026735267 0.016019956 0.007650543 0.027546161 0.010987956
0.03500532 0.002749814 0.008238142 0.007426644 0.010987956
0.008775281 0.007281453 0 0.004816497 0.004722439 0 0
0 6.0322E-05 0.014562906 0 0 0 0 0.000625247
0.002964431 0.038603087 0.023223481 0.084411209 0.063726075
0.052615181 0.037968331 0.026854782 0.01516753 0.0035262 0.010509564
0.019458785 0.011455989 0 0.004445769 0.008605343 0.008775281
0.011894185 0.02800138 0.024056233 0.004816497 0.015530895
0.002679202 0 0.022367058 0 0 0 0.001118028
0.007566311
1987 1 2 3 0 1 1 28 -1 1 1 1
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1987 1 2 3 0 1 1 28 -9998 1 1 1
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2001 1 2 3 0 1 1 28 -9999 1 1 1
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2002 1 2 3 0 1 1 28 9 0 0 0
0 0 0 0.013205242 0.053010284 0.091796663 0.048026368
0.126819088 0.082074175 0.056844065 0.026410483 0.029581631
0.004685731 0.006454833 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0.030213643 0.035640239 0.050365953
0.040611115 0.067842927 0.07458657 0.063819824 0.070001971
0.004685731 0.00609145 0 0.004685731 0 0.00609145 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0.006454833

2003 1 2 3 0 1 1 28 -9998 1 1 1
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Oregon trawl fleet (n=27)
1980 1 3 3 0 1 1 28 11 0 0 0
0 0 4.45311E-05 0.002594763 0.001749126 0.001501411
0.00072844 0.010885355 0.019581365 0.018909506 0.032048857
0.020597064 0.04455676 0.045138319 0.013692037 0.035420595
0.018897367 0.01322276 0.019509463 0.026269308 0.007307572
0.001628137 0.007090743 0.004434304 0.002913759 0.004496863
0.005788133 0 0 0 0.001752201 0 0 0 0
0 0 0.00048384 0.000835529 0.004846935 0.004535822
0.004887512 0.013190835 0.032309375 0.010429361 0.035153948
0.024338947 0.027444722 0.07497234 0.02682649 0.081644914
0.042672226 0.025402996 0.016080255 0.052339529 0.026497915
0.029251919 0.010617946 0.006885365 0.001456879 0.015546609
0.007953658 0.008462832 0.006438123 0.018352776 0.001141334
0.028240332
1981 1 3 3 0 1 1 28 7 0 0 0
0 0 0.002168703 0 0.011189293 0.014274066 0.014439212
0.059560053 0.052867544 0.033845856 0.040285487 0.024532395
0.007494207 0.019299054 0.028436371 0.008494254 0.010130065 0.0072634
0.008343804 0.001660453 0.002142877 0.002156969 0.002156969
0.000579972 0.001617726 0 4.07302E-05 0.001078484 0
0.000539242 0.000539242 0.002284773 0 0 0 0 0
0 0.00354788 0.016465283 0.032196444 0.05039628 0.012093572
0.040386348 0.0423378 0.054663913 0.01374053 0.026343166 0.058243456
0.032949258 0.036859874 0.025738394 0.006449738 0.067033607
0.039869845 0.020418345 0.003517624 0.004555454 0.002494038
0.002270681 0.000162921 0.004978627 0.019644678 0.001078484
0.000742893 0.000620702 0.022778964
1982 1 3 3 0 1 1 28 14 0 0 0
0 0 0.000135303 0 0.004488613 0.019440917 0.022110632
0.0124668 0.028598816 0.048112339 0.019481182 0.022624829 0.01281785
0.008284534 0.009147808 0.011860091 0.008357839 0.022643357
0.018270673 0.003554112 0.002137275 0.008803737 0.004090385
0.005371526 0.001380477 0.002002743 0.000170891 0.002608287 0
0.001282145 0 0.002490348 0 0 0 0 0.000135303
0.000253242 0.002299061 0.009924781 0.020288113 0.038763377
0.024007794 0.033742543 0.044381086 0.04322575 0.031431433
0.015096687 0.015595673 0.017715367 0.071662527 0.041233953
0.05973308 0.022532907 0.011729121 0.013880625 0.020490847
0.006838078 0.008513273 0.018265609 0.004974397 0.005817937
0.005542417 0.004733766 0.018631346 0.016268313 0.069558083
1983 1 3 3 0 1 1 28 29 0 0 0
0 0.002516638 0.002863411 0.012559454 0.025832197 0.034067528
0.045659936 0.035941976 0.032380657 0.035327802 0.033098093
0.028729509 0.01315994 0.006774987 0.011341025 0.012793114
0.010583583 0.010076231 0.008222924 0.008338164 0.008928988
0.004199427 0.002900799 0.002212555 0.002705162 0.002456282
0.000477703 0.000101864 0.001782715 0.001297025 0.001615874
0.003691042 0 0 0 0 0.000685076 0.004857783
0.018082617 0.044750184 0.057613968 0.055199428 0.026246064
0.024545142 0.027365013 0.035072057 0.022060851 0.01431886
0.016053858 0.016488072 0.01244635 0.023429103 0.017398697
0.020663493 0.017406212 0.013662054 0.009728078 0.008889973
0.009881945 0.006309896 0.012001076 0.008304715 0.011172436
0.007126096 0.005900938 0.004183604 0.045519759
1984 1 3 3 0 1 1 28 19 0 0 0
0.000384704 0.000805275 0.005369802 0.012226018 0.01896174
0.032688379 0.043361945 0.048815607 0.028148419 0.017836731
0.029861603 0.018035019 0.012275541 0.005636546 0.009183867
0.007140562 0.004928433 0.016841819 0.00729883 0.011735771
0.008103483 0.004429091 0.003541621 0.003365284 0.004119421

0.001702821 0.003820951 0 0.002087338 0.001052168 0.002380938
0.001955153 0.000783899 0.000783899 0 0.000244864 0.00058301
0.008784608 0.017491773 0.030405297 0.058587287 0.055902605
0.044187874 0.029284059 0.026318102 0.020179505 0.030427382
0.024656902 0.013295511 0.007123967 0.010615122 0.014556327
0.022275284 0.022810744 0.017899131 0.014417003 0.017703236
0.011195301 0.013644438 0.009535387 0.004812098 0.009235654
0.004878229 0.010574834 0.008275266 0.010946528 0.059489997
1985 1 3 3 0 1 1 28 24 0 0 0
0 0 0.007582132 0.019487958 0.023017964 0.049652196
0.061366844 0.054401446 0.035228191 0.03202559 0.02100303
0.019355486 0.019027331 0.016875369 0.009995427 0.004141211
0.004267974 0.004812294 0.010143907 0.010992245 0.006051797
0.007168261 0 0.001479582 0 0.004209855 0.00040886
0.000159995 0.001189239 0 0.001302718 0.004832458 0 0
0 0 0.00150459 0.006190683 0.031660098 0.050056235
0.075863218 0.06419633 0.045200684 0.03416639 0.022989343
0.016242935 0.020167603 0.017059763 0.010733072 0.009197256
0.007083245 0.00227082 0.011518119 0.010073023 0.007272251
0.005890504 0.01068182 0.006335819 0.007886467 0.009265332
0.00798206 0.010590425 0.002874265 0.002622305 0.00236116
0.004184431 0.05570039
1987 1 3 3 0 1 1 28 -9999 1 1 1
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1987 1 3 3 0 1 1 28 -1 1 1 1
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1
1988 1 3 3 0 1 1 28 19 0 0
0.001026757 0.004107027 0.011426844 0.01203871 0.01555487
0.023207935 0.085657218 0.072191436 0.056430806 0.075051706
0.043280421 0.033789542 0.017059339 0.014052546 0.008428108
0.005407598 0.003489551 0.008780424 0.002880359 0.002099021
0.00488334 0.00976668 0.008485804 0.002757994 0 0.002757994
0 0 0 0 0 0 0 0 0 0.000132521
0.00308027 0.003303761 0.010506468 0.030884747 0.046006777
0.077040725 0.057476205 0.051306332 0.046836899 0.036992836
0.015193698 0.006422398 0.002534378 0.004823831 0.005753416
0.005097481 0.003836017 0.001232437 0.005908614 0.00488334
0.001692291 0.037676246 0.005652964 0.000119795 0 0.002757994
0 0 0 0.004250691 2.99488E-05 0.00395489
1988 1 3 3 0 1 1 28 -9998 1 1 1
1 1 1 1 1 1 1 1 1 1 1
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1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
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1
1990 1 3 3 0 1 1 28 11 0 0 0
0 0.000253661 0.007714495 0.019934489 0.021701485 0.045528122
0.037623944 0.083785851 0.073528248 0.043748629 0.062579587
0.027274617 0.027096872 0.015201851 0.013730459 0.008643312
0.009159757 0.004751742 0.004893436 0.002259038 0 0.001469845
0.003115353 0 0 0 0.003749877 0 0 0.003749877
0 0.004397703 0 0 0 0 0.000696942 0.002602472
0.026518987 0.028224121 0.046817118 0.057419498 0.069138444
0.069865631 0.0430555 0.025160805 0.010411858 0.004388272 0.020510238
0.004104243 0.00814758 0.008800089 0.005185551 0.000177183
0.002762507 0.003292536 0.007507022 0 0.003469719 0.003115353

0 0.000788175 0.000256625 0 0.000966376 0.000177183
0.020547722
1991 1 3 3 0 1 1 28 18 0 0 0
0 0.004595935 0.007064168 0.021505375 0.047536704 0.05724562
0.041956265 0.059811176 0.067199169 0.043015656 0.02735327
0.023105127 0.015582805 0.008179919 0.012080184 0.004279283
0.000416908 0.005171756 0.003908588 0.001320127 0 0.000883153
0 0.002472373 9.6109E-05 0 0 0 0 0 0
0.000917811 0 0 0 0 0.000711021 0.007743163
0.027910007 0.060070871 0.081723888 0.078830783 0.060557433
0.038200587 0.022818424 0.027378892 0.023114118 0.00495572
0.007323441 0.010303146 0.004820029 0.015391774 0 0.004747772
0.006248154 0.011374773 0.000883153 0.00017087 0.006373887
0.001400246 0.003505959 0.007015848 0.00297765 0.010473337
0.001571171 0.001229376 0.014477028
1992 1 3 3 0 1 1 28 31 0 0 0
3.19709E-05 0.00518648 0.005809929 0.025498011 0.038039653
0.056529278 0.054954493 0.049860528 0.027075438 0.050511131
0.028578837 0.025591239 0.015059476 0.020183292 0.006278702
0.006446246 0.005077147 0.004109356 0.002252721 0.00274658
0.003211259 0 0.001423696 0 0.000660007 0 0.002101686
0.000591826 0.00099374 0 0 0.000660007 0 0 0
0 0.003540573 0.020355126 0.046000725 0.049392508 0.086932839
0.061115396 0.047039975 0.037843466 0.035371013 0.024334852
0.014268172 0.016348023 0.005049413 0.010975488 0.006864966
0.004234901 0.007593366 0.005135025 0.008119133 0.002131413
0.003928198 0.004702013 0.002461107 0.000611464 0.006760736
0.008477204 0.003733949 0.000200338 0.003651075 0.000142972
0.033221841
1993 1 3 3 0 1 1 28 -9999 1 1 1
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1993 1 3 3 0 1 1 28 -1 1 1 1
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1 1 1 1 1 1 1 1 1 1 1
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1
1994 1 3 3 0 1 1 28 26 0 0 0
0 0.000510761 0.01029963 0.023618918 0.044160993 0.048392466
0.043544388 0.071145838 0.058221598 0.039514759 0.045579159
0.020687354 0.023360212 0.024200428 0.011827394 0.012099156
0.006067502 0.008074392 0.00500175 0.00365427 0.000344451
0.00061093 0.003091868 0.002411893 0.000297863 0 0.000344818
0.000642681 0 0 0 0 0 0 0 0.000111923
0.001644878 0.009265607 0.02807653 0.074069143 0.07087035
0.067690043 0.038900346 0.026857172 0.024070409 0.027515962
0.015851977 0.019429131 0.012559073 0.00893816 0.004649871
0.006280698 0.006623509 0.007465463 0.010679506 0.003813433 0.0043113
0.001199792 0.000373528 0.001851538 0.002100373 0.001145113
0.003591405 0.003566524 0 0.003173269 0.005618505
1994 1 3 3 0 1 1 28 -9998 1 1 1
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1995 1 3 3 0 1 1 28 14 0 0 0
0 0.00349959 0.018194362 0.037318274 0.042412118 0.070093944
0.092315814 0.081778822 0.038218217 0.030242089 0.022705974
0.002451958 0.01253063 0.002519072 0.005697545 0.002519072

0.003220326 0 0 0.003378989 0 0.000519771 0.002807753
0.002519072 0 0 0 0.002519072 0 0 0 0
0 0 0 0 0.009923699 0.043948719 0.066047321
0.082794561 0.071740494 0.067463104 0.070954854 0.024639582
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Washington trawl fleet (n=25)
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0.007221113 0.006058021 0.006116031 0.005871523 0.001658435
0.010718997 0.0009754 0.006049218 0.00081188 0 0 0.001780834
0.006049218 0 0 0.006049218 0.004919351 0.006813492
0.000298054 0 0.008328881
1995 1 4 3 0 1 1 28 21 0 0 0
0 0.005522565 0.014241939 0.040076275 0.074562356 0.064606536
0.076108167 0.093815112 0.049087592 0.032897648 0.016575587
0.007103679 0.002682824 0.001000846 0.000586867 0.001440372
0.000683738 0.00542134 0 0.000586867 0 0 0 0
0 0 0 0 0 0 0.000928531 0 0 0
0 0 0.010261293 0.028247692 0.055522819 0.092752864
0.055345797 0.10486598 0.076849858 0.032113856 0.01266124
0.012586428 0.007602732 0.008147516 0.000987454 0.001186158
0.001440372 0.00113806 0 0 0.002904216 0.000487032 0
0 0 0.000464223 0 0 0 0.001859988 0
0.000928531 0.003717049
1996 1 4 3 0 1 1 28 15 0 0 0
0.002539174 0.008469794 0.019446031 0.029672535 0.039802977
0.038095344 0.06992885 0.076214354 0.058793573 0.057792669
0.011886736 0.004689158 0.020978256 0.001748807 0.005594032
0.001224015 0 0.000471637 0.000524792 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0.003332465 0.009977097 0.031154507 0.039408565 0.068526067
0.055318119 0.063934952 0.074340717 0.051622541 0.039179215
0.025695407 0.007650974 0.013262749 0.013627507 0.001224015
0.016549157 0.012737956 0.006259231 0 0 0 0 0
0.006478725 0 0.005924766 0.001566174 0 0 0
0.001224015 0.003132347
1997 1 4 3 0 1 1 28 17 0 0 0
0.003131405 0.006433822 0.008460072 0.020135043 0.040044486
0.036589123 0.05960711 0.057450122 0.060731269 0.053382297
0.043956189 0.012745737 0.010498322 0.007458681 0.009353114
0.008898539 0.006254636 0.008476527 0 0.001622193 0.003635803
0.002792394 0 0 0 0.002549131 0 0 0 0
0 0 0 0 0 0.003216911 0.015661752 0.008770444
0.044463392 0.04228484 0.072953039 0.069534553 0.05578793
0.054587859 0.032393387 0.042854951 0.019199811 0.008089131
0.003377584 0.013595237 0.004780058 0.004880034 0.005669861

0.00321745 0.001086672 0.007389855 0 0.004171323 0
0.001086672 0 0.002330904 0 0 0 0 0.014410336
1998 1 4 3 0 1 1 28 17 0 0 0
0.000472727 0.000615425 0.008136428 0.031158526 0.043123728
0.081303608 0.061103598 0.03469473 0.059561531 0.038889315
0.051556744 0.022756436 0.009977874 0.004299591 0.013451566
0.009715375 0.002797752 0.00647997 0 0.000948788 0
0.00192282 0 0 0.001963397 0.000948788 0.003114769 0
0 0 0 0.000948788 0 0 0 0.001607431
0.004937556 0.017949022 0.017735802 0.073157395 0.071340428
0.072837737 0.06041564 0.038341855 0.037095167 0.029223774
0.015074994 0.017448605 0.002051974 0.007017701 0.010680382 0
0.003876769 0.005078166 0 0.003587507 0 0.001963397
0.004125814 0 0.003114769 0 0 0 0 0
0.011395839
1999 1 4 3 0 1 1 28 14 0 0 0
0.001497145 0.008323004 0.004892363 0.014793696 0.021341316
0.03449359 0.047389786 0.044563927 0.037624199 0.059258174
0.031853282 0.048145564 0.028448532 0.01703173 0.022439429
0.007105331 0.006638608 0.009736857 0 0.000748337 0.00038 0
0.002618796 0 0 0 0 0 0 0 0 0
0 0 0.000163558 0.000327116 0.000902554 0.005025086
0.037080076 0.021020808 0.038650119 0.063152424 0.068128697
0.080362056 0.047810238 0.035009187 0.042116452 0.010958577
0.036273522 0.00860634 0.000506699 0.010721933 0.007017295
0.010264551 0 0.003738198 0 0.008325492 0.007957154 0
0.002618796 0.003559406 0 0 0 0 0.00038
2000 1 4 3 0 1 1 28 6 0 0 0
0 0.009317479 0.028482428 0.025564065 0.047968988 0.024620282
0.030682689 0.070911067 0.078738474 0.040634397 0.026367308
0.019883848 0.007548567 0.019883848 0.007548567 0 0.007548567
0 0 0 0 0 0.001768912 0 0 0 0
0 0 0 0 0 0 0 0 0 0.011738506
0.037832563 0.026191111 0.069992844 0.077170315 0.046349001
0.06760878 0.070501931 0.036755748 0.041584033 0.009395969
0.014104193 0.019883848 0 0.009317479 0.007548567 0 0
0.001768912 0 0 0 0 0 0 0 0 0
0 0.003017803 0.001768912
2001 1 4 3 0 1 1 28 9 0 0 0
0 0 0.006329992 0.0312268 0.039458577 0.047785292 0.02946532
0.073785065 0.0368938 0.037678626 0.043076571 0.027072981 0.008402034
0.007568145 0.009057425 0.002099911 0.004199823 0.001266023 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0.003057907 0.019136492
0.024612016 0.067554823 0.108387357 0.071612995 0.094605979
0.042403594 0.072439428 0.02228447 0.020399281 0.02017239
0.002099911 0.001480201 0.007562123 0.006302123 0.007562123 0
0.001480201 0 0 0 0 0 0 0.001480201 0
0 0 0 0
2002 1 4 3 0 1 1 28 28 0 0 0
0 0 0 0.022997098 0.038196686 0.041872649 0.021251782
0.039293805 0.024728663 0.037049023 0.044356445 0.050334291
0.032713927 0.039751593 0.026244841 0.014449336 0.012545519
0.004964077 0.013350992 0.007596147 0.003292637 0.003227166
0.001613442 0 0.001613442 0 0 0 0 0
0.000753115 0 0 0 0 0 0 0.010437457
0.023870683 0.061311867 0.046036396 0.040885125 0.060851418
0.059031285 0.031627625 0.075431796 0.039115472 0.015965088
0.007614167 0.000891392 0.010211951 0.002598226 0.001288623 0
0.006767296 0 0.000891392 0 0 0 0 0
0.000891392 0 0 0 0.022084673
2003 1 4 3 0 1 1 28 21 0 0 0
0 0.011733982 0.028328789 0.018428863 0.085303814 0.070102767
0.03697185 0.049566797 0.043721655 0.041410588 0.023179411
0.023045379 0.01765775 0.004070905 0.021943536 0.017050499
0.003724403 0.004127847 0.006590932 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0.011539568 0.019269892 0.057055781 0.078156771
0.066369508 0.048466103 0.034443376 0.026332047 0.035552234
0.041278496 0.014529353 0.013114148 0.020329542 0.007695639 0

0.013807838 0 0.001375534 0 0.003724403 0 0 0
0 0 0 0 0 0 0
2004 1 4 3 0 1 1 28 36 0 0 0
0 0.003456559 0.021869736 0.027457543 0.045139222 0.082085089
0.050579097 0.052753019 0.063654687 0.044684499 0.018856597
0.026664295 0.019599786 0.013601062 0.009832797 0.009814318
0.007857534 0.007177792 0.007543361 0.005016571 0.001704343
0.001889554 0 0.002741178 0 0 0 0 0 0
0 0.00137228 0 0 0 0 0 0.014793678
0.03367762 0.054349573 0.092624988 0.063366688 0.054709333
0.028442263 0.040834208 0.025575578 0.00907939 0.007630615
0.005696196 0.005104609 0.003418405 0 0.004558219 0
0.004052833 0.001938645 0 0.003964073 0 0 0 0
0 0.001695923 0.002026417 0 0.01710983

OR-WA non-trawl fleet (n=6)
1997 1 7 3 0 1 1 28 -9999 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1
1998 1 7 3 0 1 1 28 -1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1
2000 1 7 3 0 1 1 28 24 0 0 0
0 0.004128097 0.011517149 0.028778171 0.0384263 0.04066286
0.031637754 0.041797602 0.068349679 0.032656009 0.006471051
0.020230043 0.005687072 0.014108703 0.004622714 0.004448848
0.002776387 0.011652455 0.003081809 0.002502418 0.001540905
0.001540905 0.004668884 0.001540905 0 0 0 0.001102208
0 0 0 0.003081809 0 0 0 0 0.007676071
0.019323933 0.0315801 0.084355685 0.05051966 0.129499058 0.042479507
0.060364474 0.040331136 0.049530228 0.011163824 0.003438549
0.020757543 0.003438549 0.003081809 0.004805587 0.001102208
0.012042058 0.010315647 0.003438549 0 0 0.003438549 0
0.004540757 0 0 0 0.001540905 0 0.014224881
2001 1 7 3 0 1 1 28 -1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1
2002 1 7 3 0 1 1 28 -1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1
2004 1 7 3 0 1 1 28 -9998 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1
1

Triennial survey (N = 6)

1983	1	11	3	0	1	1	28	19	1789	27621	80600
	1059623	578322	328239	455316	310005	528206	407144	449496	221668	239010	325851
	340611	110404	63951	91723	47288	76521	63016	32924	35911	0	25245
	0	34643	17757	12483	5752	5285	5914	1882	0	17236	0
	28974	65062	1151279	623300	291965	254776	414736	421507	411595	318627	229723
	346672	348890	254518	123781	140138	125471	78397	66843	129371	84449	116694
	33654	52942	34438	51080	67770	58411	31775	12439	52663	43691	48611
	351654										
1989	1	11	3	0	1	1	28	18	0	0	14750
	9047	391794	5374	71823	240849	253224	174674	312362	216568	66085	40123
	119000	138201	19245	104940	15765	11239	0	11239	13040	0	0
	13040	0	0	0	0	0	0	15765	0	53141	0
	0	17937	0	456863	42011	186880	358492	97395	237381	321245	344866
	175432	146428	239875	63776	90733	0	219836	47245	0	0	0
	58086	0	0	27941	0	0	0	0	128119	12985	0
	33978										
1992	1	11	3	0	1	1	28	3	0	4220	5728
	151991	42311	76086	192645	200244	96084	38175	20818	15026	15986	14965
	6108	6537	2020	9137	6037	974	237	4300	0	0	0
	0	0	0	0	0	0	0	0	0	0	4220
	10234	16394	31408	75863	81925	147870	100347	36390	29768	16729	15134
	23985	23226	9475	13975	5204	1632	271	2158	8780	4947	16996
	815	24158	0	0	0	0	0	0	0	0	0
	0										
1995	1	11	3	0	1	1	28	33	0	0	0
	16624	98129	77798	115218	37344	52032	47063	95381	5527	48649	62711
	21805	29220	27184	6437	13595	28240	11667	14378	6437	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	4469	101537	132293	137491	90822	87870	91782	29427	107383	3989
	76203	115488	32880	23927	26678	23927	32675	37688	0	0	57027
	13267	73671	0	0	0	0	0	0	0	0	0
	0										
2001	1	11	3	0	1	1	28	71	0	3606	0
	141990	302895	433694	804794	432377	182530	282111	298648	170197	94137	38023
	65388	27718	29857	32156	7562	12413	2206	4390	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	3606	0	113833	154619	529211	636973	310154	365015	187195	167463	92678
	71492	41027	42252	31139	20996	17928	8929	4646	0	11013	12465
	9877	9877	16081	0	6098	4646	0	2653	0	0	0
	17319										
2004	1	11	3	0	1	1	28	60	0	4597	4040
	0	12219	20380	69183	64844	57050	81643	55347	56950	29254	60550
	48432	10488	13147	0	16671	10599	6295	0	10376	0	6295
	0	0	0	0	0	0	0	0	0	0	0
	4040	0	6603	7635	32011	68320	81561	95154	56375	83791	74036
	103490	48771	24302	48961	45334	39525	25374	19609	52600	11036	0
	21353	0	0	18025	0	0	0	0	0	3372	0
	14838										

Size at age observations setup

62 # Number of size at age observations by fleet

1983	1	11	3	0	1	-9999	17.0	18.1	24.1	30.1	32.9
	36.8	39.1	41.7	44.2	45.4	47.3	49.6	50.4	52.0	53.1	53.4
	53.5	54.1	54.6	55.6	55.5	55.5	57.0	-57	56.8	56.5	56.5
	58.7	57.5	58.0	59.0	61.0	58.0	-58	57.4	13.8	17.7	22.8
	30.1	32.9	37.1	38.8	40.9	42.7	44.6	45.7	46.7	47.6	49.0
	48.9	49.5	49.9	49.5	50.1	51.7	50.9	50.8	50.7	51.7	51.5
	50.8	52.1	52.2	51.9	50.6	51.8	52.1	51.2	51.1	52.8	1
	29	37	207	202	98	153	106	116	92	108	59
	63	61	51	27	21	15	12	16	11	8	8
	0	4	2	4	3	2	1	1	1	3	0
	5	4	50	36	212	198	132	125	134	119	109
	98	70	89	76	61	33	30	25	24	17	20
	18	19	12	10	8	8	10	9	5	5	9
	6	7	61								
1989	1	11	3	0	1	-19	17.0	18.1	24.1	30.1	32.9
	36.8	39.1	41.7	44.2	45.4	47.3	49.6	50.4	52.0	53.1	53.4
	53.5	54.1	54.6	55.6	55.5	55.5	57.0	-57	56.8	56.5	56.5

	58.7	57.5	58.0	59.0	61.0	58.0	-58	57.4	13.8	17.7	22.8
	30.1	32.9	37.1	38.8	40.9	42.7	44.6	45.7	46.7	47.6	49.0
	48.9	49.5	49.9	49.5	50.1	51.7	50.9	50.8	50.7	51.7	51.5
	50.8	52.1	52.2	51.9	50.6	51.8	52.1	51.2	51.1	52.8	1
	29	37	207	202	98	153	106	116	92	108	59
	63	61	51	27	21	15	12	16	11	8	8
	0	4	2	4	3	2	1	1	1	3	0
	5	4	50	36	212	198	132	125	134	119	109
	98	70	89	76	61	33	30	25	24	17	20
	18	19	12	10	8	8	10	9	5	5	9
	6	7	61								
1992	1	11	3	0	1	-19	17.0	18.1	24.1	30.1	32.9
	36.8	39.1	41.7	44.2	45.4	47.3	49.6	50.4	52.0	53.1	53.4
	53.5	54.1	54.6	55.6	55.5	55.5	57.0	-57	56.8	56.5	56.5
	58.7	57.5	58.0	59.0	61.0	58.0	-58	57.4	13.8	17.7	22.8
	30.1	32.9	37.1	38.8	40.9	42.7	44.6	45.7	46.7	47.6	49.0
	48.9	49.5	49.9	49.5	50.1	51.7	50.9	50.8	50.7	51.7	51.5
	50.8	52.1	52.2	51.9	50.6	51.8	52.1	51.2	51.1	52.8	1
	29	37	207	202	98	153	106	116	92	108	59
	63	61	51	27	21	15	12	16	11	8	8
	0	4	2	4	3	2	1	1	1	3	0
	5	4	50	36	212	198	132	125	134	119	109
	98	70	89	76	61	33	30	25	24	17	20
	18	19	12	10	8	8	10	9	5	5	9
	6	7	61								
1995	1	11	3	0	1	19	17.0	18.1	24.1	30.1	32.9
	36.8	39.1	41.7	44.2	45.4	47.3	49.6	50.4	52.0	53.1	53.4
	53.5	54.1	54.6	55.6	55.5	55.5	57.0	-57	56.8	56.5	56.5
	58.7	57.5	58.0	59.0	61.0	58.0	-58	57.4	13.8	17.7	22.8
	30.1	32.9	37.1	38.8	40.9	42.7	44.6	45.7	46.7	47.6	49.0
	48.9	49.5	49.9	49.5	50.1	51.7	50.9	50.8	50.7	51.7	51.5
	50.8	52.1	52.2	51.9	50.6	51.8	52.1	51.2	51.1	52.8	1
	29	37	207	202	98	153	106	116	92	108	59
	63	61	51	27	21	15	12	16	11	8	8
	0	4	2	4	3	2	1	1	1	3	0
	5	4	50	36	212	198	132	125	134	119	109
	98	70	89	76	61	33	30	25	24	17	20
	18	19	12	10	8	8	10	9	5	5	9
	6	7	61								
2001	1	11	3	0	1	-19	17.0	18.1	24.1	30.1	32.9
	36.8	39.1	41.7	44.2	45.4	47.3	49.6	50.4	52.0	53.1	53.4
	53.5	54.1	54.6	55.6	55.5	55.5	57.0	-57	56.8	56.5	56.5
	58.7	57.5	58.0	59.0	61.0	58.0	-58	57.4	13.8	17.7	22.8
	30.1	32.9	37.1	38.8	40.9	42.7	44.6	45.7	46.7	47.6	49.0
	48.9	49.5	49.9	49.5	50.1	51.7	50.9	50.8	50.7	51.7	51.5
	50.8	52.1	52.2	51.9	50.6	51.8	52.1	51.2	51.1	52.8	1
	29	37	207	202	98	153	106	116	92	108	59
	63	61	51	27	21	15	12	16	11	8	8
	0	4	2	4	3	2	1	1	1	3	0
	5	4	50	36	212	198	132	125	134	119	109
	98	70	89	76	61	33	30	25	24	17	20
	18	19	12	10	8	8	10	9	5	5	9
	6	7	61								
2004	1	11	3	0	1	-9998	17.0	18.1	24.1	30.1	32.9
	36.8	39.1	41.7	44.2	45.4	47.3	49.6	50.4	52.0	53.1	53.4
	53.5	54.1	54.6	55.6	55.5	55.5	57.0	-57	56.8	56.5	56.5
	58.7	57.5	58.0	59.0	61.0	58.0	-58	57.4	13.8	17.7	22.8
	30.1	32.9	37.1	38.8	40.9	42.7	44.6	45.7	46.7	47.6	49.0
	48.9	49.5	49.9	49.5	50.1	51.7	50.9	50.8	50.7	51.7	51.5
	50.8	52.1	52.2	51.9	50.6	51.8	52.1	51.2	51.1	52.8	1
	29	37	207	202	98	153	106	116	92	108	59
	63	61	51	27	21	15	12	16	11	8	8
	0	4	2	4	3	2	1	1	1	3	0
	5	4	50	36	212	198	132	125	134	119	109
	98	70	89	76	61	33	30	25	24	17	20
	18	19	12	10	8	8	10	9	5	5	9
	6	7	61								

1981	1	2	3	0	1	10	-45	-45	-45	-45	34
	38	43	43.5	45.125	46.375	49	49.8	51.33333	51.22222	52.8	56.5
	53.66667	55	57	56	56	56	-45	58	-45	57	57
	-45	-45	58	-45	-45	-45	-45	-45	-45	-45	-45
	-45	36	38	38.5	41.5	43.75	44.25	47	46.4	47.33333	48.28571
	48.16667	47.66667	-45	50	-45	52.5	51	-45	49	-45	-45
	50.5	-45	-45	-45	-45	-45	52	-45	-45	53	0
	0	0	0	3	2	3	4	8	8	5	5
	9	9	5	2	3	1	3	1	4	2	0
	1	0	1	1	0	0	1	0	0	0	0
	0	0	0	0	0	2	1	2	8	12	4
	3	5	12	7	6	3	0	1	0	2	1
	0	1	0	0	2	0	0	0	0	0	1
	0	0	1								
1982	1	2	3	0	1	10	-45	-45	-45	-45	-45
	40.5	42.33333	44.71429	41.375	45.38462	47.66667	46.18182	46	50.375	51	-45
	42	44.5	49	-45	53	-45	54.5	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	42	-45
	-45	41	40.5	41.6	42.75	44	44.04	45.41667	45.8	47.8	46.5
	51	51.5	47	45	49	49	49.5	49.66667	50.5	-45	-45
	-45	51	-45	-45	-45	-45	52	-45	-45	53	0
	0	0	0	0	16	3	7	8	13	9	11
	2	8	6	0	1	2	1	0	2	0	2
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	0	1	14	5	12	9	25
	12	10	5	4	1	2	1	2	1	4	2
	3	2	0	0	0	1	0	0	0	0	1
	0	0	1								
1983	1	2	3	0	1	10	-45	-45	-45	34	34.75
	42.33333	38.0625	41.8125	43.78261	46	46.4	47.6	49.66667	46.14286	49.5	52.25
	53.5	55	48	47	50.5	-45	55.5	45.5	53	-45	-45
	58	49	-45	58	-45	51	-45	39.5	-45	-45	-45
	-45	33.7	40.33333	37.91304	42.75	43.89655	46.38095	44.35484	46.25	46.1	46.83333
	49.33333	46.85714	48.85714	47	45	50	48.33333	48	46.5	50.5	51
	52	-45	51	51	-45	-45	49	-45	51	49.25	0
	0	0	2	4	3	16	16	23	20	25	5
	15	7	10	4	2	2	3	1	2	0	2
	2	3	0	0	1	1	0	1	0	1	0
	2	0	0	0	0	10	3	23	20	29	21
	31	12	10	6	6	7	7	1	3	5	3
	1	2	2	4	1	0	1	1	0	0	1
	0	1	8								
1984	1	2	3	0	1	10	-45	-45	-45	-45	-45
	35	38	39.35	41.83333	46.75	47.19048	49.16667	48.75	50.4	49.5	52.57143
	53.2	56.5	55	56.5	57	-45	56	56	-45	57	-45
	54.5	57	-45	55.5	-45	-45	59	55.75	-45	-45	-45
	-45	39	34.375	37.30769	39.73913	42.33333	45.58333	45.72727	46.16667	47.5	-45
	47.57143	50	49	47.66667	47	48	-45	57	48.66667	-45	46.5
	49.5	-45	49	50	52	53	50.5	51	54.5	52.2	0
	0	0	0	0	10	17	20	18	8	21	12
	4	5	2	7	5	2	1	2	1	0	1
	2	0	2	0	2	2	0	2	0	0	1
	3	0	0	0	0	2	8	13	23	12	12
	22	12	2	0	7	4	5	3	1	1	0
	1	3	0	2	2	0	1	2	1	1	2
	1	2	5								
1985	1	2	3	0	1	10	-45	-45	-45	-45	32.66667
	38.5	37.64286	40.5	42.22727	43.58824	46.33333	48.35714	49.83333	52	54	47.5
	53	52	56.5	54	57.8	57	57	56.5	54.5	54	56
	-45	50	36	-45	-45	-45	56	53	-45	-45	-45
	-45	30.5	36.75	37.11765	39.95652	41.72222	43.0625	45.08	46.625	45.57143	48.5
	48	49.83333	47.8	45.33333	-45	49	50.5	52	50.33333	49.75	47.75
	52	53.25	50	-45	51.33333	-45	-45	-45	52	51.5	0
	0	0	0	3	2	14	14	22	17	18	14
	6	1	1	6	5	2	4	2	5	1	1
	2	2	1	1	0	1	1	0	0	0	1
	2	0	0	0	0	2	4	17	23	36	32
	25	16	14	4	1	6	5	3	0	2	2
	1	3	4	4	1	4	1	0	3	0	0
	0	1	2								

2001	1	2	3	0	1	10	-45	-45	-45	-45	-45
	-45	41	40	43	44	45	45.66667	49.5	50	52	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	42	40.5	-45	45.66667	45	44.66667	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	0
	0	0	0	0	0	1	1	1	3	3	3
	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	1	2	0
	3	2	3	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0								
2002	1	2	3	0	1	10	-45	-45	-45	-45	-45
	-45	-45	43.33333	42.8	45.5	46	47	47.66667	-45	49.5	-45
	50	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	41.66667	41	40.8	43	41.6	43.42857	45	45.33333	42
	45	-45	45	-45	46	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	53	0
	0	0	0	0	0	0	3	5	2	10	4
	3	0	2	0	1	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	4	5	2	5
	7	5	3	1	1	0	1	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1								
2003	1	2	3	0	1	10	-45	-45	-45	-45	-45
	-45	40	40.8	43.9	42	47.66667	47	50.5	47.5	48	50
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	41	47	42.25	-45	43	46	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	0
	0	0	0	0	0	1	5	10	1	3	4
	4	2	1	1	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	1	4
	0	1	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0								
1980	1	3	3	0	1	10	-45	-45	-45	-45	-45
	38	42.33333	42.42857	45.66667	47	49.14286	51.41667	49.95652	51.4375	51.9375	54.58333
	54.10526	54.2	55	55.28571	55.2	54.27273	54.66667	56.6	50	55	53
	58	56	47.5	-45	-45	-45	58	-45	-45	-45	-45
	-45	-45	37	39.33333	41.46154	42.33333	45.42857	45.13333	46.7037	48.2	47.66667
	48.76923	47.8	48.26667	49.27273	49.9375	49.76471	50.27273	50	50.8	50.54545	50
	50.28571	51.14286	50	51.5	51.375	51.25	50	51.66667	52	51.47222167	
	0	0	0	0	0	1	3	7	3	1	7
	12	23	16	16	12	19	10	15	7	10	11
	9	5	1	4	2	4	3	2	0	0	0
	1	0	0	0	0	0	0	2	3	13	6
	7	15	27	15	12	13	15	15	11	16	17
	11	7	10	11	8	7	7	2	2	8	4
	4	3	2	12							
1981	1	3	3	0	1	10	-45	-45	-45	-45	-45
	41	-45	45.71429	44.45455	47.15385	48	50.26923	50.81818	51.83333	52.45455	52.90909
	55.25	54.57143	55	55.54545	57	56.75	54.33333	58.2	57.25	56	49
	59	-45	54	56.5	-45	56	58	58.5	-45	-45	-45
	-45	-45	-45	40.66667	42.25	43.28	44.45833	45.72727	46.7	47.5	48.07692
	49.53846	48	48.875	49.45	49.88462	50	49.08333	50	52.26667	49.55556	49.5
	50.71429	51.5	51.5	51.75	50.66667	51.55556	52.5	56.16667	52	52.73015889	
	0	0	0	0	0	1	0	7	11	13	14
	26	22	24	11	11	4	14	11	11	9	8
	3	5	4	4	2	3	0	1	2	0	1
	1	3	0	0	0	0	0	0	3	12	25
	24	11	20	32	26	13	13	16	20	26	16
	12	17	15	9	4	7	4	4	4	6	9
	2	6	3	18							

1982	1	3	3	0	1	10	-45	-45	-45	-45	-45
	40	-45	43.1	44.2	46.44737	48.9	50.36842	51.35556	51.62963	52.47222	53.27586
	54.45455	53.88889	55.57895	55.57143	55.77778	56.23077	56	56.5	57	57.16667	57
	56	58	57	56.66667	-45	56	-45	57.5	-45	-45	-45
	-45	41	40.5	41.375	42.36364	43.72414	44.10811	46.3	47.02564	47.80488	47.88889
	48.51515	49.6875	49.125	49.57143	50.33333	49.80769	50.16667	50.64706	50.42105	50.93333	50.13333
	50.2	51.125	50.90909	51.22222	51	50	51.5	50.85714	50.42857	51.95098	0
	0	0	0	0	1	0	10	15	38	20	38
	45	27	36	29	11	9	19	14	18	13	5
	6	8	6	2	2	2	1	3	0	2	0
	2	0	0	0	0	1	2	8	22	29	37
	30	39	41	36	33	16	16	14	24	26	24
	17	19	15	15	5	8	11	9	9	3	4
	7	7	47								
1983	1	3	3	0	1	10	-45	-45	-45	-45	32.54545
	38.65	40.44898	42.94118	45.91667	47.23404	48.6129	50.56757	51.95455	52.5	52.98361	53.76471
	54.47368	55.45833	55.07692	56	55.54545	56.41176	56.19048	56	57.1	55.57143	55.6
	57.33333	58.5	58.5	51	55.5	56	57	56.02381	-45	-45	-45
	-45	34.08333	37.08824	40.09302	42.55738	44.19108	45.1519	46.14286	47.73134	48.36232	48.65333
	49.04839	49.45714	49.76667	49.61905	50.61538	50.30357	50.75	51.17308	50.2	51.60606	51.40741
	51.2	51.86207	51.82353	51.7	52.09091	50.94737	50.52174	51.7	51.90909	52.37942842	
	0	0	0	0	11	20	49	85	120	141	93
	74	88	86	61	34	19	24	26	23	22	17
	21	13	10	7	5	6	4	2	1	6	5
	3	12	0	0	0	0	12	34	86	122	157
	158	84	67	69	75	62	35	30	42	26	56
	44	52	55	33	27	25	29	17	20	22	19
	23	20	11	124							
1984	1	3	3	0	1	10	-45	-45	-45	39	34
	35.88889	41.14894	41.66667	45.10448	46.49398	48.52874	49.78846	50.90909	52.58333	52.82353	53.71429
	53.72727	53.58824	55.3	56.25	55.34783	55.91667	55.73684	56.83333	55.88889	56.375	58.57143
	57.57143	56	56.66667	-45	58.66667	56.5	55	57.25	-48	-50	-45
	36	32.66667	38.76923	40.64706	41.55682	43.7563	45.07438	45.88462	47.71154	47.41667	48.70968
	48.65957	49.11111	48.91304	49	49.91667	50.05263	50.16	50.23529	49.71429	51.22222	51.04167
	50.29412	50.14286	51.06667	51.42857	50.75	50.9	51	50.70588	50.47059	51.7261785	
	0	0	0	1	5	27	47	60	67	83	87
	52	33	48	34	21	11	17	10	8	23	12
	19	12	9	8	7	7	3	6	0	3	2
	4	5	1	1	0	1	3	26	51	88	119
	121	78	52	36	31	47	36	23	12	12	19
	25	34	28	18	24	17	21	15	7	12	10
	16	17	17	107							
1985	1	3	3	0	1	10	-45	-45	-45	-45	-45
	38.66667	42.42308	43.65714	46.35088	48.19118	49.84127	50.34091	52.02857	53.44	53.85714	54.05263
	54.1875	55.53846	57.8	56.2	57.5	57.72727	56.76923	57.16667	56.7	-45	53
	-45	57	57	57	63	-45	56.66667	57.533334	-45	-45	-45
	-45	37.25	39.27273	41.26667	43.92857	44.98824	46.26316	47.78571	47.69231	48.11111	49.28571
	49.63158	49.4375	50.85714	51.18182	51.25	50.6	52.1875	51	51.44444	51.25	51.05882
	51.85714	50.875	51.6	50.27273	51	51	52.33333	50.33333	52.5	52.31209263	
	0	0	0	0	0	9	26	35	57	68	63
	44	35	25	21	19	16	13	5	5	6	11
	13	6	10	0	1	0	5	1	1	1	0
	3	9	0	0	0	0	4	11	45	56	85
	76	56	39	27	21	19	16	14	11	8	5
	16	14	9	8	17	7	8	10	11	11	7
	3	3	6	73							
1987	1	3	3	0	1	10	-45	-45	-45	-45	-45
	-45	-45	-45	47	-45	47	-45	46	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	44.66667	46.5	47.75	48	48.66667	50.33333
	-45	-45	-45	-45	51	-45	-45	-45	-45	-45	52
	48	51.5	-45	-45	-45	-45	-45	-45	52	51.75	0
	0	0	0	0	0	0	0	1	0	1	0
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	3	4
	4	1	3	3	0	0	0	0	1	0	0
	0	0	0	2	1	4	0	0	0	0	0
	0	1	4								

1988	1	3	3	0	1	10	-45	-45	33	34	36.33333
	38.3125	40.89474	45.65217	46.31081	47.98611	49.47826	51.80702	52.12903	53.16667	54	54.7
	54	56.6	55.5	54.33333	59.5	59.5	58	59.25	58.1	60	-45
	60	-45	-45	-45	-45	-45	-45	-45	-45	-45	32
	34.66667	37.14286	40.25	41.91667	43.4898	44.96154	46.07937	47.3125	48.34146	49.03571	49.06667
	49.83333	51	49.66667	50.6	51.33333	46	50	51.8	52	52.5	52.34211
	52.25	-45	-45	53	-45	-45	-45	51	-45	52	0
	0	1	4	12	16	19	23	74	72	46	57
	31	18	12	10	6	5	4	6	2	2	2
	4	10	1	0	1	0	0	0	0	0	0
	0	0	0	1	3	7	12	36	49	78	63
	48	41	28	15	6	1	3	5	3	2	1
	5	2	2	38	4	0	0	1	0	0	0
	2	0	2								
1990	1	3	3	0	1	10	-45	-45	-45	-45	37
	43	44.33333	45.625	47.85294	50.22222	50.26316	51.26667	52.94737	53.77273	54.125	54.5
	55	56.25	57.75	57.66667	58	59.66667	57.5	-45	57.5	58	-45
	-45	-45	59	-45	-45	61	-45	50	-45	-45	-45
	-45	41	38	43.66667	43.84615	44.6129	46.9375	47.39394	47.71429	48.52941	49
	49.8	53	51	50.33333	50.5	51	51.33333	51	50.66667	53.5	52
	-45	52.33333	52	-45	51.75	56	-45	54	51	53.19444444	
	0	0	0	0	1	12	18	24	34	27	38
	30	19	22	8	8	8	4	4	3	1	3
	2	0	2	1	0	0	0	1	0	0	1
	0	1	0	0	0	0	3	4	21	26	31
	32	33	28	17	10	5	5	9	3	2	5
	3	1	3	2	7	0	3	1	0	4	1
	0	1	1	16							
1991	1	3	3	0	1	10	-45	-45	-45	-45	37
	42	42.35	44.78261	46.23256	47.12821	49.17143	51.14634	51.54839	50.3125	54.25	53.63636
	53.5	56	57	55	61.5	58.5	36	-45	61	-45	58
	52	-45	-45	-45	-45	-45	-45	60	-45	-45	-45
	-45	39.66667	38.875	42.2	43.41463	44.32	45.87037	47.12195	47.54545	47.26667	49.5
	49.5	49.33333	51	49.28571	51	50.57143	-45	52	50	52	51
	54	52.66667	53.5	52	51.66667	54	51.75	51.5	54	53.4	0
	0	0	0	3	7	20	23	43	39	35	41
	31	16	16	11	6	5	2	1	2	2	1
	0	1	0	1	1	0	0	0	0	0	0
	1	0	0	0	0	3	8	20	41	50	54
	41	33	15	14	10	3	3	7	2	7	0
	4	3	4	1	1	3	2	4	3	3	4
	2	1	7								
1992	1	3	3	0	1	10	-45	-45	-45	35	42
	42.35714	43.08333	43.50769	45.58108	47.22727	49.2037	50.9	52.25532	53.66667	53.82143	54.25
	54.18182	55.125	54.75	57.5	56.6	56.2	56.16667	54	-45	59	-45
	57	-45	58.66667	60	60	-45	-45	60	-45	-45	-45
	-45	37.25	40.88462	42.45614	42.59302	44.19048	45.86585	46.45	48.04444	48.2973	49.22222
	49.88889	51.13333	50.11111	50.5	49.85714	50.28571	51	50.125	51.88889	50.33333	51.85714
	53	52.66667	53	52	51	51.75	51	52.66667	52	52.68125	0
	0	0	1	8	14	36	65	74	66	54	40
	47	33	28	16	22	8	8	4	5	5	6
	3	0	1	0	2	0	3	1	1	0	0
	2	0	0	0	0	4	26	57	86	105	82
	60	45	37	27	18	15	9	12	7	7	7
	8	9	3	7	7	3	1	5	7	4	1
	6	1	36								
1993	1	3	3	0	1	10	-45	-45	-45	-45	38.66667
	44	43.53846	44.46835	46.67647	47.68519	48.62687	50.65517	51.38462	51.88571	53.28571	53.8
	54.5625	55.71429	54.7	55.625	53.25	56.75	58	55.5	51	55	60
	59	-45	52.5	54.33333	-45	-45	-45	-45	-45	-45	-45
	39	38.4	39.58824	41.35417	43.35789	44.24359	46.17188	46.06383	47.03704	48.2	49.09524
	48.75	48.83333	49.85714	49.75	49.5	49.83333	51.14286	51.14286	50.3	51.8	49.8
	53	54	52	54.25	52.5	52.33333	54	-45	51.66667	52.72222222	
	0	0	0	0	3	10	39	79	68	54	67
	58	39	35	14	20	16	7	10	8	4	4
	2	2	2	1	3	1	0	2	3	0	0
	0	0	0	0	0	1	10	17	48	95	78
	64	47	27	25	21	12	18	7	12	6	6
	7	7	10	5	5	1	1	1	4	4	3
	2	0	3	12							

1994	1	3	3	0	1	10	-45	-45	-45	-45	38
	40.6	43.66667	42.2	44	45	48.125	50.1	51.33333	54	54	50.5
	52	52	64	52	53	54	56	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	30	-45	39.5	39.75	42.6	43.71429	43.76471	44.2	44.5	46.71429	48.33333
	48.6	48	47.4	51	48	-45	51	-45	-45	48	50
	51	50	-45	52	-45	52.5	52.5	-45	51	53.66666667	
	0	0	0	0	1	5	3	5	11	9	8
	10	3	3	1	2	2	1	1	1	1	1
	1	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	4	12	20	21
	17	5	4	14	6	5	1	5	1	1	0
	1	0	0	1	1	1	1	0	1	0	2
	2	0	1	3							
1995	1	3	3	0	1	10	-45	-45	-45	-45	34.66667
	37.47368	39.7561	40.39474	44.65	45.10526	47.34545	48.64286	50.10714	50.625	49.4	51.77778
	53	54	52	58.5	-45	-45	55	-45	55	57	55
	-45	-45	-45	54	-45	-45	-45	-45	-45	-45	-45
	-45	33.22222	38.18182	38.88	40.03125	41.84314	43.95082	44.25	46.32143	44.88889	47.53846
	48.45455	49.625	49.16667	48.6	49.16667	-45	50.42857	-45	53	49	52.66667
	50	49	-45	-45	-45	-45	53	51	-45	53.625	0
	0	0	0	3	19	41	38	40	57	55	28
	28	16	5	9	1	3	1	2	0	0	3
	0	1	2	1	0	0	0	1	0	0	0
	0	0	0	0	0	9	33	50	64	51	61
	52	28	18	13	11	8	6	5	6	0	7
	0	1	1	3	1	1	0	0	0	0	2
	1	0	8								
1996	1	3	3	0	1	10	-45	-45	-45	27	35.94118
	38.26667	39.37838	40.71642	42.40816	45.36111	46.78846	48.61364	48.9	46.85714	52	52.07692
	53.71429	54.25	53	56.25	-45	-45	-45	-45	58	-45	-45
	-45	-45	-45	-45	-45	-45	-45	60	-45	-45	-45
	35	36.61538	36.75926	38.36842	39.6	41.15517	42.66667	44.08333	45.29032	47.66667	47.75
	48.2	47.42857	49.42857	50	50	51.25	51.33333	50.375	50	50	-45
	51	-45	51	53.33333	-45	52	-45	51.33333	50	52.59523857	
	0	0	0	1	17	45	74	67	49	36	52
	44	20	7	9	13	7	8	1	4	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	1	0	0	0	1	13	54	76	70	58
	48	48	31	15	8	5	7	7	1	4	4
	3	8	2	1	0	1	0	2	3	0	1
	0	3	1	12							
1997	1	3	3	0	1	10	-45	-45	-45	-45	35.33333
	39.63636	40.89286	42.57377	43.92473	45.04054	46.95946	48.21333	49.69231	50.38462	52.05882	53.55556
	51.8	54.28571	55.14286	54	58.25	55	55	-45	58	-45	-45
	58	-45	-45	-45	-45	56	-45	58.5	-45	-45	-45
	35.5	37.5	37.27273	39.26374	40.72358	41.71812	43.27344	44.5567	46.02353	46.42222	46.9
	48.69231	48.5	48.71429	49	50.71429	48.33333	51.28571	49.33333	49.75	50	-45
	50.33333	-45	48	50.33333	52	-45	-45	52	38.5	53.27272727	
	0	0	0	0	3	11	28	61	93	74	74
	75	52	39	17	9	5	7	7	4	4	3
	4	0	1	0	0	3	0	0	0	0	1
	0	2	0	0	0	2	2	33	91	123	149
	128	97	85	45	20	13	10	7	3	7	3
	7	3	4	5	0	3	0	1	3	2	0
	0	1	2	13							
1998	1	3	3	0	1	10	-45	-45	-45	35	38.71429
	37.16	39.91667	40.79167	42.84314	44.30682	46.09859	48.01887	49.2449	49.35135	50.86957	51.83333
	53	52.42857	52.44444	53.625	54.5	52.75	54.6	50	45	51.66667	58
	-45	47	-45	-45	-45	53	-45	47.5	-45	-45	-41
	-45	38.44444	38.12121	39.72464	40.72477	41.7265	42.96262	44.30337	45.5303	46.2439	46.94444
	47.23077	47.79167	46.91667	48.54545	47.8	51	50.4	49.6	49.72727	51.14286	49.75
	49	50.5	50.85714	46	50	50	52.5	50	51.5	51.45	0
	0	0	1	7	25	60	96	102	88	71	53
	49	37	23	18	15	14	9	8	4	4	5
	1	1	3	1	0	1	0	0	0	1	0
	2	0	0	2	0	9	33	69	109	117	107
	89	66	41	36	26	24	12	11	10	6	5
	5	11	7	4	1	2	7	2	4	1	2
	1	2	34								

1999	1	3	3	0	1	10	-45	-45	-45	35	34.43478
	36.42424	38.62025	40.52128	41.5625	43.33333	45.54167	46.46774	48.09434	48.77778	50	51.55172
	51.3125	53.75	54.77778	54.66667	55.66667	56	54	54	-45	53	-45
	60	-45	-45	-45	59	60	-45	-45	-45	-45	-45
	29.66667	34.25	37.53333	38	39.15	41.35	42.01235	43.12644	44.18333	45.38462	45.84615
	46.48148	47	48.5	48.5	49	49.28571	49.28571	49	50.33333	50	51.5
	52.5	-45	-45	51	52	-45	-45	-45	51	53	0
	0	0	2	23	33	79	94	80	93	72	62
	53	36	30	29	16	8	9	6	6	2	1
	1	0	2	0	1	0	0	0	1	1	0
	0	0	0	0	6	16	30	77	120	100	81
	87	60	39	52	27	17	6	8	6	7	7
	3	3	3	2	4	0	0	3	1	0	0
	0	1	10								
2000	1	3	3	0	1	10	-45	-45	-45	31	35.33333
	35.90909	37.8125	39.47826	40.65217	44.57143	44.58824	46.30769	47.55556	48	50.11111	58
	54	53.5	52	52	57	55	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	35	35.44444	36.875	37.03846	39.06061	41.58333	43.15	43.70588	44.75	45.66667	47.33333
	42	47.25	50.66667	51	47	50	47	-45	-45	49	-45
	50.5	-45	-45	-45	-45	-45	-45	-45	-45	-45	0
	0	0	1	9	11	16	23	23	21	17	13
	9	4	9	1	2	2	1	1	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	2	9	16	26	33	24	20
	17	24	9	9	2	4	3	1	1	1	1
	0	0	2	0	2	0	0	0	0	0	0
	0	0	0								
2001	1	3	3	0	1	10	-45	-45	-45	-45	36.5
	37.05	39.21739	40.97872	43.34146	44.57143	46.17241	47.63636	49.51515	49.52941	51.375	53
	52.1	53	55.5	53	57.25	57.75	58	51.5	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	36	37	37.08333	38.89091	40.81818	42.31343	43.42857	44.09756	44.82609	46	45.63636
	46.625	47.5	46.5	52	52	49.33333	-45	50.33333	-45	-45	49
	54	49	-45	-45	53	49	-45	52	51	52	0
	0	0	0	2	20	46	47	41	35	29	22
	33	17	8	5	10	2	2	3	4	4	1
	2	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	1	8	24	55	55	67	49
	41	23	20	11	8	8	2	2	1	3	0
	3	0	0	1	2	2	0	0	1	1	0
	2	1	4								
2002	1	3	3	0	1	10	-45	-45	-45	-45	34.91667
	37.375	39.05357	39.75	41.93617	44.35294	45.70588	47.37931	48	50.2069	48.5	51.72222
	52.70833	56.85714	54.46154	55.27273	54.28571	58	56.8	-45	59.33333	-45	-45
	-45	-45	-45	59	-45	57	58	58	-45	-45	-45
	35	35.44444	35.6875	37.58209	39.15584	42	42.48333	44.04762	44.575	44.96774	47
	47.63158	45.66667	47.1	47.25	49.4	51	48.5	50.66667	50	52	49
	50	-45	-45	-45	-45	-45	52	51	51	53.21428571	
	0	0	0	0	12	24	56	92	47	34	34
	29	32	29	22	18	24	7	13	11	7	3
	5	0	3	0	0	0	0	0	1	0	1
	1	2	0	0	0	1	18	32	67	77	43
	60	42	40	31	17	19	3	10	4	5	2
	4	3	2	1	1	1	0	0	0	0	0
	1	1	1	10							
2003	1	3	3	0	1	10	-45	-45	-45	-45	39
	38	40.88889	43.30769	43.80952	43.71429	46.38462	48.28571	48.71429	46.55556	52	-45
	52.5	55	51	56	-45	-45	-45	-45	56	-45	-45
	58	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	36	39	39	40.44444	40.91667	42.5	43.35	45.07143	46.11111	43.33333	47.5
	46	49.5	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	49	0
	0	0	0	1	3	9	26	21	14	13	7
	14	9	3	0	4	1	1	2	0	0	0
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	1	1	5	18	24	8	20
	14	9	6	4	5	2	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	1								

2004	1	3	3	0	1	10	-45	-45	-45	-45	-54
	38.42857	40.16667	42.0625	43.5	46.66667	47	48.78571	50.18182	48.625	52	53.5
	51.33333	55.5	52.4	-45	-45	-45	-45	50	-45	-45	57
	-45	-45	-45	52	-45	50	-45	-45	-45	-45	-45
	-45	34.66667	38.42105	39.84211	40.92308	43.51724	43.875	45.66667	46	47.8	46.8
	47.75	46.25	49.25	49	-45	-45	53	49	-45	50	52
	-45	-45	-45	-45	-45	51	50	-45	-45	51	0
	0	0	0	1	7	18	16	18	18	8	14
	11	8	5	2	3	2	5	0	0	0	0
	1	0	0	1	0	0	0	1	0	1	0
	0	0	0	0	0	3	19	19	13	29	16
	9	11	5	5	4	4	4	2	0	0	2
	2	0	1	1	0	0	0	0	0	2	1
	0	0	1								
1980	1	4	3	0	1	10	-45	-45	-45	-45	40
	46	44.66667	48	50	49.36842	51.68966	51.30769	52.63636	52.375	54.25	57.5
	54.5	54.28571	56.6	60	-45	50.5	62	52	51	47	-45
	-45	-45	48	52	56	-45	47	51.07142857		-45	-45
	-45	-45	-51	44.5	44.25	46.64706	47.15385	47.48148	48.36667	49.32	48.92308
	49.6	50.27273	48.33333	49.46154	49.5625	50.25	50.64286	51.5	52.5	50.14286	48.66667
	52.7	52	52	49.75	51.33333	51.33333	52.75	52	51	53.66667	
	53.41666667		0	0	0	0	1	3	6	9	13
	19	29	13	11	8	8	2	4	7	5	1
	0	2	1	1	1	1	0	0	0	1	2
	1	0	1	8	0	0	0	0	1	2	8
	17	13	27	30	25	13	10	11	15	13	16
	12	14	8	8	7	3	10	3	5	4	3
	3	4	5	4	3	33					
1981	1	4	3	0	1	10	-45	-45	-45	-45	48
	42.75	42.94737	44.7907	48.23077	49.94872	50.11111	51.17143	52.21053	52.77778	52.85714	54.7
	56.75	56.875	54.5	54.66667	56	60	57.5	56	48	53	61
	-45	60	62	-45	56	-45	-45	55.75	-45	-45	-45
	-45	38.5	39.55556	41.5	43.33333	45.91667	47.11905	47.77143	48.575	49.72414	49.53333
	50	50.72727	48.375	50.6	50.75	50.94737	50.92308	51.06667	50.75	51.63636	51.57143
	52.63636	52.25	53	51.66667	53	52.25	51.6	50.66667	52	52.55560235	
	0	0	0	0	1	4	19	43	26	39	45
	35	19	18	7	10	4	8	2	3	3	1
	2	1	1	1	1	0	1	1	0	1	0
	0	4	0	0	0	0	6	9	28	45	36
	42	35	40	29	15	14	11	8	15	12	19
	13	15	8	11	7	11	8	9	6	6	8
	5	3	4	52							
1982	1	4	3	0	1	10	-45	-45	-45	34	34.75
	41.46154	42.66667	44.18367	45.95238	48.46667	50.78947	51.04167	51.79167	52.86667	54.6	52.66667
	55.25	56.25	55.75	53.5	-45	57.5	-45	-45	64	53	62
	56	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	32.5	40.25	41	42.40541	43.71698	44.66667	46.525	47.66667	48	49.33333	48.61765
	49.18182	50	51.14286	50.33333	50.42857	51.42857	51.1	50.63636	51.57143	52.33333	51
	51.4	51.375	53.5	50	52	52.5	52	53.33333	52	53.06403474	
	0	0	0	1	8	13	15	49	42	30	38
	48	24	15	5	3	4	8	4	2	0	2
	0	0	1	1	1	1	0	0	0	0	0
	0	0	0	0	0	2	4	22	37	53	48
	40	36	32	21	34	11	7	7	9	7	7
	10	11	7	3	3	5	8	2	1	3	2
	1	3	1	40							
1983	1	4	3	0	1	10	-45	-45	-45	37	35.5
	38.875	41.46667	45.82353	47.81818	48.84615	50.75	51.45455	52.46154	53.6	49.5	58
	53.33333	56	57.5	57	-45	59	-45	-45	60	-45	-45
	60	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	36	34.76923	38.3125	41.62963	43.25	44.71429	46.26087	47.42857	48.26667	48.8	49.1
	48.66667	50.33333	51	54	50.66667	50.8	50.75	51.5	50.5	52.5	52.14286
	52	-45	-45	-45	-45	53.5	-45	-45	-45	53.116667	0
	0	0	1	6	8	15	17	11	26	8	11
	13	10	2	3	3	2	2	1	0	1	0
	0	1	0	0	1	0	0	0	0	0	0
	0	0	0	0	2	13	16	27	24	21	23
	14	15	15	10	6	6	3	1	3	5	4
	2	2	2	7	4	0	0	0	0	2	0
	0	0	14								

1984	1	4	3	0	1	10	-45	-45	-45	-45	37.4
	43	46.83333	46.55556	46.90909	48.60714	49.72	52.6875	53.75	53.6875	52.86667	54.5
	54.3	56	57.8	58	53.33333	50.5	-45	-45	-45	57.5	-45
	59	51.5	-45	-45	-45	-45	-45	47.4	-45	-45	-45
	36	38.4	41.1	45.66667	44.61111	47.21053	47.34615	47.64706	48.52381	48.22727	48.78261
	50.85714	49.72727	48.9	51.33333	51.11111	49.5	51.1	51.33333	51.42857	52.33333	52
	51.28571	52	52.25	53.2	53.33333	53.33333	53	52	47	51.27193	0
	0	0	0	10	3	6	18	22	28	25	16
	16	16	15	10	10	3	5	4	3	2	0
	0	0	2	0	1	2	0	0	0	0	0
	5	0	0	0	1	5	10	15	18	19	26
	17	21	22	23	7	11	10	9	9	12	10
	9	14	9	23	7	3	4	5	3	6	1
	1	2	41								
1985	1	4	3	0	1	10	-45	-45	-45	-45	36.5
	37.44444	39.81818	43.55556	46.2	45.66667	49.41667	51.08333	51.6	54.66667	51.6	50.33333
	55.66667	55	57	-45	-45	55	49.5	-45	-45	52	-45
	-45	-45	44	-45	-45	59	49	-45	-45	-45	-45
	30.5	35.25	37.92683	40	43.73684	45.35714	46.95	47.83333	48	51.6	50.66667
	48.9	51	49.66667	49.75	50.5	50	53.5	51.66667	50	52	49
	-45	-45	54	45	-45	-45	54	53	50	52.875	0
	0	0	0	16	54	33	18	25	9	12	12
	5	6	5	3	3	2	1	0	0	1	2
	0	0	1	0	0	0	1	0	0	1	1
	0	0	0	0	2	8	41	34	19	28	20
	18	6	5	3	10	8	3	4	4	1	2
	3	1	1	3	0	0	1	1	0	0	1
	1	1	10								
1986	1	4	3	0	1	10	-45	-45	-45	-45	38
	39.11765	41.5	44.56923	46.45238	48.6	50.13158	50.51282	52.6	53.46154	55.33333	55
	55.33333	58	57.33333	58	56.66667	60.33333	-45	-45	58	-45	-45
	-45	-45	63	-45	-45	-45	-45	53	-45	-45	-45
	32	38.83333	41.17647	41.43396	43.35714	45.65957	46.31765	47.64706	48.59091	49.05556	50
	50.16667	49.63636	50.75	51	52.2	50.75	-45	52.28571	52	50	51.25
	50	54	54	52.4	53.5	52	53	56	53	53.80303091	
	0	0	0	0	2	17	38	65	42	70	38
	39	20	13	12	4	6	1	3	1	3	3
	0	0	1	0	0	0	0	1	0	0	0
	0	1	0	0	0	1	6	17	53	70	47
	85	51	22	18	8	12	11	4	4	5	4
	0	7	3	2	4	1	1	1	5	2	1
	1	1	4	19							
1987	1	4	3	0	1	10	-45	-45	-45	-45	-45
	39.28571	41.11111	44.11905	46.25	48.56098	50	50.80488	52.71429	54.6	54.75	55.69231
	54.625	56	56.25	57.5	54	60	58	56	56	60	-45
	-45	-45	60	-45	-45	-45	-45	58	-45	-45	-45
	-45	37.5	39.5	42.75	42.77358	44.77083	46.18421	47.85714	49.44118	49.4375	49.875
	50.66667	49.4	48.75	51	50.75	51.5	51	52.5	52.16667	52	52.5
	51.5	52	53.66667	51	51.66667	-45	54	54.66667	53	53.90104188	
	0	0	0	0	0	7	9	42	48	41	51
	41	28	15	12	13	8	12	4	4	1	1
	1	2	2	2	0	0	0	1	0	0	0
	0	2	0	0	0	0	2	10	12	53	48
	38	42	34	16	8	3	5	4	6	4	4
	4	4	6	1	2	2	2	3	3	3	0
	1	3	2	28							
1988	1	4	3	0	1	10	-45	-45	-45	33	34
	36	39.25	44.75	45.35714	49.6	50.58824	51.6	52.15385	54.2	56	54.75
	56.8	-45	59	58	-45	56	-45	-45	-45	-45	61
	60	-45	-45	-45	55	60	56	64	-45	-45	-45
	-45	37.5	38.1875	41.23529	41.1	46.05882	46.3	49.08333	49.61538	47	50
	50.75	51.2	48.75	54	-45	51	51	52.5	50	53	54
	52.66667	54	52.5	53	51	58	50	54	53	53.5972225	
	0	0	0	1	4	6	8	4	14	15	17
	15	13	5	4	4	5	0	1	1	0	1
	0	0	0	0	1	1	0	0	0	1	1
	1	1	0	0	0	0	2	16	17	10	17
	20	12	13	5	2	4	5	4	2	0	1
	3	4	1	1	2	3	1	2	2	2	1
	1	1	1	21							

1989	1	4	3	0	1	10	-45	-45	-45	34.42857	35.9
	37.5	41.95	44.25	46.11628	47.4375	49.12	50.54167	52.2	53.30769	53.66667	55.25
	58	56	57	-45	58	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	55.5	53	-45	-45	30
	31	35.5	38.30435	40.78788	43.54545	44.53659	46.52	46.32432	48.11111	48.76471	49.125
	50.83333	51.25	50.75	52	50	51.33333	51.75	-45	53	51.5	-45
	53.33333	-45	52	52	52.25	53.5	53	55	53	53.66666692	
	0	0	0	7	10	20	20	32	43	32	25
	24	15	13	6	4	5	1	1	0	2	0
	0	0	0	0	0	0	0	0	0	0	0
	2	2	0	0	1	3	14	23	33	33	41
	50	37	36	17	16	6	4	4	3	6	3
	4	0	2	2	0	3	0	1	1	4	2
	1	2	2	19							
1990	1	4	3	0	1	10	-45	-45	-45	36	42
	41.125	42.72727	44.28571	45.1	47.4	49.57576	50.25926	51.75	52.55556	55	54.66667
	55	53.5	56.33333	46	58	56	-45	-45	-45	-45	-45
	53	-45	54.5	-45	-45	-45	-45	54	-45	-45	-45
	-45	38	37.5	40.55172	42.84848	43.9697	45.51613	47.65789	47.58537	48.59091	48.33333
	48.94118	50.2	50.25	50	52	48	49.25	51	51	-45	54.33333
	50	49	51	51	50	50.5	50	49.66667	49	52	0
	0	0	1	1	8	11	21	30	35	33	27
	20	9	10	3	3	2	3	1	1	4	0
	0	0	0	0	1	0	2	0	0	0	0
	1	0	0	1	0	1	12	29	33	33	31
	38	41	22	15	17	5	4	3	2	2	4
	3	1	0	3	1	2	1	1	1	2	2
	3	1	9								
1991	1	4	3	0	1	10	-45	-45	-45	-45	-45
	40	43.66667	43.625	45.66667	46.76923	48.31373	49.74359	50.5	51.04348	49.33333	55.6
	54.5	54.16667	54.75	53.875	55.16667	57.2	56	-45	-45	53	57
	-45	58.5	-45	-45	-45	-45	-45	53	-45	-45	-45
	-45	-46	-45	40.91667	42.9	43.92857	45.01754	46.31373	47.2	48.06061	48.78571
	50.05556	48.41176	49.25	50.875	49.8	50.6	51.42857	48.71429	52.25	51.66667	53.33333
	53	51	-45	54	52	52.5	51	52	49	52.64583313	
	0	0	0	0	0	2	9	16	30	39	51
	39	22	23	9	5	10	6	4	8	6	5
	2	0	0	1	1	0	2	0	0	0	0
	0	1	0	0	0	0	1	0	24	30	28
	57	51	40	33	28	18	17	8	8	5	5
	7	7	4	3	3	1	1	0	1	1	2
	2	2	1	21							
1992	1	4	3	0	1	10	-45	-45	-45	27	39.2
	37.86957	41.46341	41.51515	42.08333	45.5	48.48649	48.875	51	50.93333	52.77778	54.38462
	54.90909	53.5	56	54.66667	-45	-45	57	63	-45	-45	-45
	58	-45	-45	-45	-45	-45	59	-45	-45	-45	-45
	-49	38	39.8	40.14	41.46	42.93478	43.21951	45.54839	47.61111	44.75	48.125
	47.63636	48.93333	47.8	49.85714	49.2	50.5	51	50.83333	51.66667	50	-45
	49	53	52	51	45	53.66667	53	55	50.5	52.75925889	
	0	0	0	1	20	23	41	66	36	24	37
	24	18	15	18	13	11	2	7	3	0	0
	1	1	0	0	0	1	0	0	0	0	0
	1	0	0	0	0	1	21	15	50	50	46
	41	31	18	12	8	11	15	10	7	5	2
	5	6	3	1	0	1	1	2	1	2	3
	2	1	2	13							
1993	1	4	3	0	1	10	-45	-45	-45	32.2	36.78571
	39.63889	39.82759	42.40741	43.78333	45.12245	44.81818	48.57143	49.09677	51.625	49.85714	52.57143
	47.8	48.8	48.6	57	57	43.33333	57	-45	54	46	57
	45.5	43	-45	-45	-45	46	-45	50	-45	-45	-45
	34.8	35.92	37.28125	38.625	40.93333	43.20968	44.39623	46.07407	46.61111	46.75	47.95
	46.8	47.85714	49.5	48.4	48	44	49	51	47.66667	-45	45
	46	-45	41	-45	51	-45	53	-45	52	51.78571429	
	0	0	0	5	14	36	29	54	60	49	33
	28	31	8	7	7	5	5	5	1	1	3
	1	0	2	1	1	2	1	0	0	0	1
	0	3	0	0	0	5	25	32	40	60	62
	53	54	36	20	20	5	7	4	5	1	2
	1	2	3	0	2	2	0	1	0	1	0
	1	0	1	10							

1994	1	4	3	0	1	10	-45	-45	-45	33	34.80952
	37.97674	40.13514	44.65625	44.38776	45.75	47.69231	47.09091	49.625	50.75	51.84615	51.14286
	50.2	56	52	53.66667	-45	53	55	55.5	-45	-45	59
	-45	42	-45	-45	58	56	-45	61	-45	-45	-45
	36	35.53333	37.65385	40.8	42.28302	43.88679	43.20513	45.10345	45.96552	45.54545	48.1875
	46.9	49	47	48.75	50	45.66667	50.5	50	46	-45	-45
	52	52	-45	-45	52	53.33333	50.5	55	-45	48.33333333	
	0	0	0	1	21	43	37	32	49	36	26
	33	16	4	13	7	5	2	3	3	0	2
	2	2	0	0	1	0	1	0	0	1	1
	0	1	0	0	0	2	30	52	40	53	53
	39	29	29	11	16	10	6	4	4	4	3
	2	1	2	0	0	1	1	0	0	1	3
	2	1	0	8							
1995	1	4	3	0	1	10	-45	-45	-45	-45	35.21429
	37.33333	38.62857	40.17722	43.18333	44.88406	46.05172	47.125	48.84	51.41667	50.28571	53
	55.75	53.5	55	55	54.5	-45	58.5	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	58	-45	-45	-45	-45
	-45	34.76	36.30508	38.56977	39.67708	42.20339	43.31325	44.98333	46.02703	48.66667	47.27273
	49.5	48.8	46.66667	46	49	52	-45	-45	53	53	-45
	-45	-45	47.5	-45	-45	-45	55	-45	53	51.66666667	
	0	0	0	0	14	36	70	79	60	69	58
	48	25	12	7	4	4	2	2	2	2	0
	2	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	25	59	86	96	59
	83	60	37	9	11	4	5	3	2	2	2
	0	0	2	1	0	0	0	2	0	0	0
	1	0	1	3							
1996	1	4	3	0	1	10	-45	-45	-45	27.8	32
	35.65	38.54348	40.98039	42.83333	45.65625	46.86486	48.30769	49.70588	51	54	54.33333
	53.5	55.33333	58	-45	55	61	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	27.875	34.23529	36.1129	38.15873	40.65517	42.68	44.76744	45.83333	47.23529	48.23077	48.4
	49.75	48.75	50.75	51	49.66667	50	51.5	-45	-45	-45	-45
	-45	54	-45	54	52	-45	-45	-45	53	52	0
	0	0	5	17	40	46	51	30	32	37	26
	17	6	5	9	2	3	1	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	8	17	62	63	58	50	43
	36	17	13	5	4	4	4	1	3	3	2
	0	0	0	0	0	1	0	2	1	0	0
	0	1	2								
1997	1	4	3	0	1	10	-45	-45	-45	34.5	36
	37.09091	39.93103	42.46	43.75	45.58824	47.2	48.8	49.02703	49.73077	50.875	51.57143
	54.6	53.75	55.2	54	57	-45	56	57	58.5	-45	-45
	-45	58	-45	-45	-45	-45	-45	-45	-45	-45	-45
	34.33333	33.25	39.14286	39.74419	41.22222	42.50649	43.37097	44.74074	46.58974	46.63636	47.63333
	47.25	48.5	49.66667	49.125	50	49	50	51.33333	52	50.66667	-45
	51.33333	-45	56	-45	50	52	-45	-45	-45	52.78571429	
	0	0	0	2	6	11	29	50	40	51	50
	40	37	26	8	7	5	4	5	3	4	0
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	0	0	0	0	0	3	8	14	43	45	77
	62	54	39	22	30	12	6	3	8	3	3
	3	3	1	3	0	3	0	1	0	2	0
	0	0	0	10							
1998	1	4	3	0	1	10	-45	-45	-45	31	35.5
	37.84211	38.93103	40.51111	43.62162	45.19608	45.64706	48.09524	49.33333	50.25	50.13333	51.33333
	53	53.5	55	52.25	53.33333	-45	55	-45	58	-45	-45
	58	53	63	-45	-45	-45	-45	51	-45	-45	-45
	28.75	33	35.52381	38.6129	40.27586	41.88889	43.73134	44.14583	45.25806	46.16	47.05263
	47.625	47.44444	49.5	49	50	-45	52	51	-45	49.5	-45
	53	54	-45	53	-45	-45	-45	-45	-45	53.22222167	
	0	0	0	1	2	19	29	45	74	51	34
	42	33	28	15	6	4	6	7	4	3	0
	1	0	1	0	0	1	1	1	0	0	0
	0	1	0	0	0	4	6	21	31	58	63
	67	48	31	25	19	8	9	2	3	5	0
	2	2	0	2	0	1	1	0	1	0	0
	0	0	0	9							

1999	1	4	3	0	1	10	-45	-45	-45	30.8	33.15385
	36.5	37.93103	39.30303	43.06818	44.30952	44.84848	47.43333	47.45833	49.66667	49.75	53.875
	53	54.45455	55.25	54.5	55	-45	57.5	57	-45	57	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	24
	32	32.5	34.6	36	38.40426	41.225	42.73684	43.58333	45.28125	46.36364	46.76471
	47.3125	46.66667	48.5	49.33333	47	48.33333	53	47	-45	50	-45
	49.5	43	-45	51	51	-45	-45	-45	-45	53	0
	0	0	5	13	10	29	33	44	42	33	30
	24	18	12	8	7	11	4	4	2	0	2
	1	0	1	0	0	0	0	0	0	0	0
	0	0	0	1	2	2	15	35	47	40	38
	48	32	22	17	16	9	8	3	2	3	3
	4	0	1	0	2	1	0	1	2	0	0
	0	0	1								
2000	1	4	3	0	1	10	-45	-45	-45	-45	34
	35.42857	37.2	39.1	43.5	42.875	46.44444	46.53333	50.57143	47.85714	50.75	51
	54	55	-45	59	-45	-45	-45	-45	-45	51	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	32.8	35.09091	37.28571	40.33333	41.75	43.6	45.26667	45.41176	46.66667	47.125
	49.66667	47.5	50	-45	49.5	49	-45	-45	51	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	53	54	0
	0	0	0	2	7	5	10	6	8	18	15
	7	7	4	1	4	1	0	1	0	0	0
	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	11	7	15	16	10
	15	17	9	8	3	4	4	0	2	1	0
	0	1	0	0	0	0	0	0	0	0	0
	0	1	1								
2001	1	4	3	0	1	10	-45	-45	-45	-45	-45
	40.75	41.375	44.6	45.6875	46.14286	47.55556	48.90909	48.85714	51.9	53.5	50
	56	53.5	59	57.5	53	-45	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	37.5	38.4	41.44444	44.28571	44.96429	45.16667	45.78947	47.2	48.05556	46.83333
	47.33333	52.75	50	47	50	58	51	-45	51	-45	-45
	-45	-45	-45	-45	55	-45	-45	-45	-45	-45	0
	0	0	0	0	4	8	10	16	14	18	11
	14	10	10	2	2	2	1	2	1	0	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	5	9	14	28	24
	19	15	18	6	6	4	1	1	1	1	1
	0	1	0	0	0	0	0	0	1	0	0
	0	0	0								
2002	1	4	3	0	1	10	-45	-45	-45	-45	-45
	-45	39.4	40.93103	42.85	45.11765	45.47619	47.7	49.875	50.5625	51.30303	52.96296
	53.6	54.13636	56.11111	55.16667	55.8	55	56.5	57	57.33333	57	-45
	59	-45	-45	-45	-45	-45	64	-45	-45	-45	-45
	-45	-45	37	37.81818	39.97297	41.89474	43.69231	44.03333	46.09091	45.33333	47
	46.47368	47.33333	48.6	48	52.5	50.5	49	-45	53	-45	47
	-45	-45	-45	-45	-45	52	-45	-45	-45	53	0
	0	0	0	0	0	10	29	20	17	21	20
	24	32	33	27	30	22	9	12	5	7	2
	3	3	1	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	4	11	37	19	26
	30	33	24	33	19	9	5	1	4	2	1
	0	1	0	1	0	0	0	0	0	1	0
	0	0	5								
2003	1	4	3	0	1	10	-45	-45	-45	-45	35.33333
	38.42857	40	41.66667	43.61905	43.9	47.46154	49.66667	49.91667	52.14286	52.5	54.5
	56	53.8	54.75	49	58	56.5	-45	-45	-45	-45	-45
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
	-45	-45	38.66667	40	41.28571	42.8	44.72222	45.69231	46.3	47.375	50
	49.3	51.5	50.25	51.4	55.5	-45	49.5	-45	50	-45	49
	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	0
	0	0	0	3	7	6	24	21	10	13	12
	12	7	6	4	1	5	4	1	1	2	0
	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	3	6	14	20	18
	13	10	8	9	10	4	4	5	2	0	4
	0	1	0	1	0	0	0	0	0	0	0
	0	0	0								

2004	1	4	3	0	1	10	-45	-45	-45	-45	29
	36.76923	41.53333	42.45833	46.80556	48.73913	51.04762	50.55556	49.95238	52.625	54.16667	54.22222
	55.85714	55	56.75	55.5	59.33333	57.33333	57	60	57	-45	58
	-45	-45	-45	-45	-45	-45	-45	64	-45	-45	-45
	-45	-45	35	40.4375	43.8	44.1	44.76667	47.04167	46.83333	48.25	50.27273
	49.25	49	47.33333	51	52	-45	52	-45	50.5	47	-45
	52.5	-45	-45	-45	-45	-45	50	52	-45	54.11111111	
	0	0	0	0	2	13	15	24	36	23	21
	27	21	8	12	9	7	6	4	4	3	3
	3	1	1	0	2	0	0	0	0	0	0
	0	1	0	0	0	0	0	9	16	25	40
	30	24	12	20	11	4	4	3	3	1	0
	2	0	2	1	0	2	0	0	0	0	0
	1	1	0	9							

Environmental data section
0 # Number of environmental variables
0 # Number of environmental observations

999 # End of file marker