Status of yelloweye rockfish off the U.S. West Coast in 2005 (*Sebastes ruberrimus*)

By

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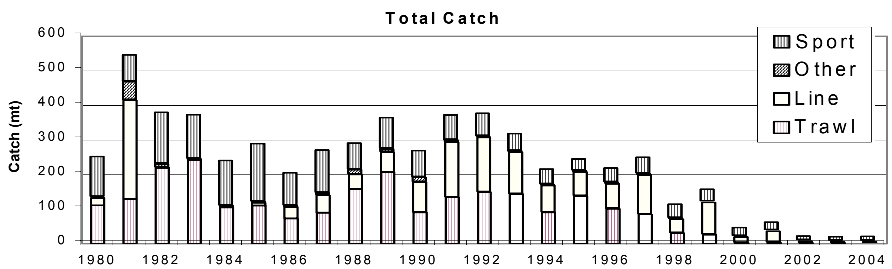
Executive Summary

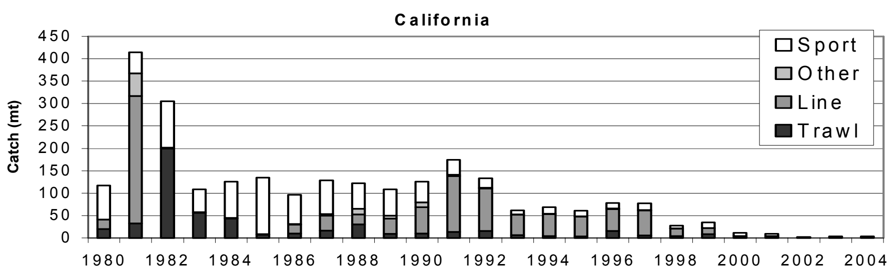
Stock

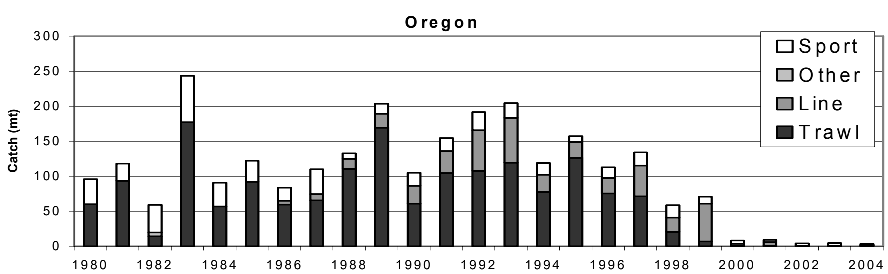
This assessment updates the status of the yelloweye rockfish (*Sebastes ruberrimus*) resource off the west coast of the United States, from the Mexican border to Canadian border. This stock is treated as a single coastwide population as in the previous assessment (Methot et al 2002).

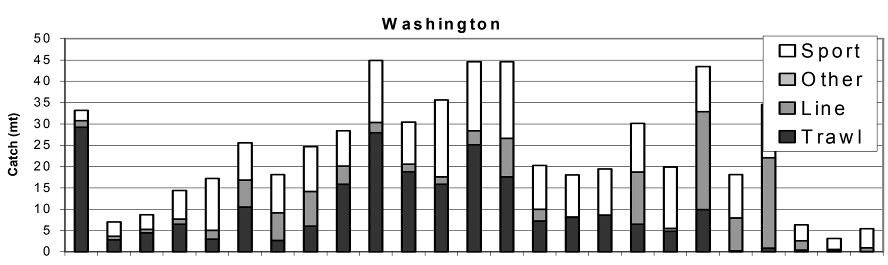
Catches

Total catch of the yelloweye rockfish from California, Oregon, and Washington states has been greatly reduced since 1999 and is below the 26 metric tons OY per year since 2002. Commercial retention was prohibited except for a 300-lb trip limit in the trawl fishery. More than 80% of the total catch was landed in recreational fisheries. Catch rates in Oregon and California recreational fisheries have decreased dramatically prior to significant regulatory restriction. Washington catch rates have also decreased, although not as significantly as in the other states.









Data and assessment

The first and second full assessments for yelloweye rockfish were conducted in 2001 (Wallace 2001) and 2002 (Methot et al 2002). Both assessments were length-based models and used an earlier version of the Stock Synthesis program (Methot 1989). Wallace (2001) conducted two area assessments by using data from California and Oregon. Methot et al (2002) incorporated Washington's recreational CPUE trend, catch and age data and treated the stock as one single assemblage of the California, Oregon, and Washington (W-O-C) coast.

The current assessment uses Stock Synthesis 2 modeling framework to estimate model parameters and management quantities. Same as in the 2002 assessment, the stock was treated as a single stock of the W-O-C coast. Catch time series for each State used in the 2002 assessment are entirely revised; however, none of the abundance indices are revised. Age and length compositions collected since 2001 were appended to the model and ageing error was revised.

Unresolved problems and major uncertainties

As in the previous assessments, the sparseness of the size and age composition data and the lack of a relevant fishery-independent survey have limited model's ability to properly assess the status of the resource. Due to recent restriction in management regulations, catch-per-unit-effort (CPUE) abundance index does not reflect the real changes in population abundance, and discard estimates are highly uncertain.

The differences in trend between the Washington sport CPUE and the California or Oregon sport CPUE indicate a need to consider area-specific model configurations. These differences are supported by the fact that, exploitation in Washington is much lower than exploitation in California or in Oregon over time, and that yelloweye occurrence in the trawl survey is higher off the Washington coast than off the Oregon and California coast, suggesting higher abundance in the north. As in the 2002 assessment, we treated yelloweye as a coastwide stock and the implicit assumption is that recruitment and mortality off each state is the same so that a coastwide model will capture the common recruitment and mortality trends, and/or there is sufficient mixing between areas within the coast such that any regional differences in recruitment or mortality become intermingle so a coastwide model represents the sum of all the processes operating in each area. Because yelloweye appear to be non-migratory, are long lived, and the population is maintained by large infrequent recruitment events there is likely a large degree of dissimilarity between areas such that area-specific patterns may persist for some time. We could build separate area models to better model the true sub-stock dynamics, but are quite far from being able to acquire sufficient data to calibrate these models without additional fishery independent survey information.

Reference points

Yelloweye rockfish was declared "overfished" in 2002, and since has been managed under the 2002 rebuilding plan (Methot and Piner, 2002). Reference points estimated from the base model are presented in the table below.

Reference Point	Value
Recruitment _unfished (thousands)	194
SPB_unfished	3,808
Summary Biomass (B_smry, unfished)	8,644
Steepness for MSYcalculation	0.437
SPR at MSY	0.500
Exploit at MSY (=Y/B_smry)	0.021
Recruits at MSY	102
SPB at MSY	998
SPB_{MSY}/SPB_0(using S_0)	0.262
MSY	52
B_smry at MSY	2,480
Depletion(endyear)	0.21

Note: Summary age is 3

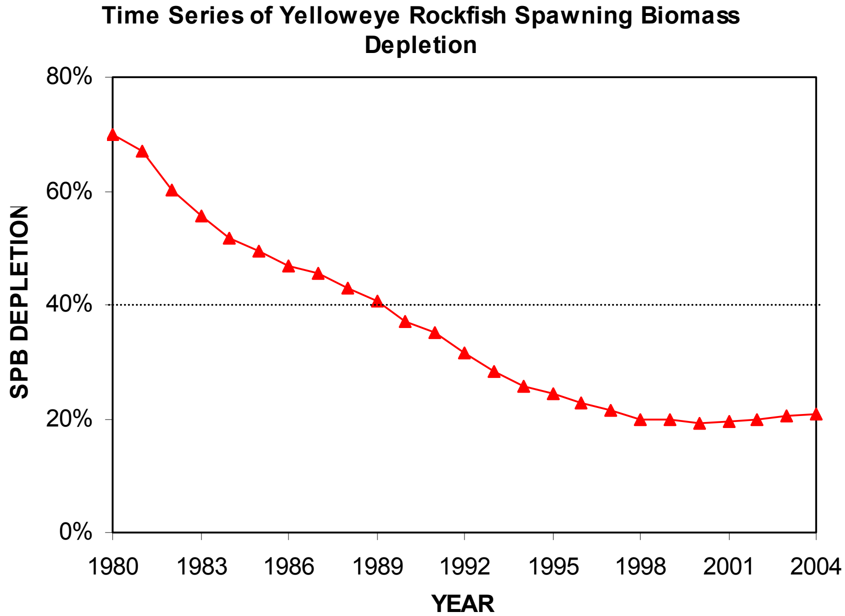
Stock Biomass and Recruitment

Time series of biomass, spawning biomass, and recruitment for the yelloweye rockfish are summarized below.

Year	Total Biomass	Summary biomass	Spawning biomass	Age-0 Recruitment
1980	6394	6299	5333	251
1981	6179	6083	5091	201
1982	5636	5557	4576	180
1983	5288	5214	4244	208
1984	4975	4887	3941	304
1985	4805	4711	3774	243
1986	4580	4494	3575	146
1987	4443	4383	3457	101
1988	4237	4194	3282	97
1989	4018	3980	3089	102
1990	3728	3692	2832	87
1991	3539	3508	2665	61
1992	3242	3217	2412	48
1993	2939	2919	2159	49
1994	2698	2680	1962	49
1995	2561	2542	1859	57
1996	2394	2372	1739	73
1997	2249	2222	1643	82
1998	2065	2035	1520	85
1999	2017	1985	1506	89
2000	1920	1888	1450	86
2001	1934	1901	1484	88
2002	1932	1899	1501	92
2003	1970	1935	1550	96
2004	2008	1972	1596	99
2005	2044	2009	1636	82

Exploitation Status

The coast wide stock declined sharply during the 1980's and early 1990's and the spawning biomass has been under the 40% of SB_0 precautionary threshold since 1990. Depletion has been around 20% of SB_0 in recent years.



Management Performance

Previous assessments indicated over-exploitation during the last two decades, and regulations have most likely been ineffective in constraining yelloweye catch until most recent years. Specifically, there have been no regulations developed to control catch or bycatch of yelloweye rockfish until 2002. Recent management decisions have significantly restricted yelloweye rockfish catch, which are reflected in the recent low level of yelloweye landings. Nevertheless, discard estimates related to recent management measures are highly uncertain and should be considered unknown. This uncertainty had little impact on the current status because historical discard was likely minimal until enactment of recent regulations. However, the current discard rate does have considerable effect on rebuilding projections.

Forecasts

Stock abundance and yield was forecast into future years by using the base case model where catch is fixed at the recommended harvest level determined by the 2002 rebuilding Plan (Methot et al., 2002) of 26 mt coastwide. Final OY's will be based on forecasts from the updated rebuilding analysis to be reviewed in September 2005.

Year	Age 3+ Biomass	Spawning Biomass	Depletion	Catch (mt)	$F_{(SPR\ 0.5)}$
2005	2009	1636	0.215	26	0.017
2006	2032	1659	0.218	26	0.017
2007	2054	1677	0.220	26	0.016
2008	2074	1692	0.222	26	0.016
2009	2096	1706	0.224	26	0.016
2010	2118	1719	0.226	26	0.016
2011	2139	1732	0.227	26	0.016
2012	2161	1746	0.229	26	0.016
2013	2183	1762	0.231	26	0.016
2014	2205	1778	0.233	26	0.016
2015	2227	1795	0.236	26	0.016

Research and Data Needs

Additional effort to collect age and maturity data is essential for improved population assessment. Collection of these data can only be accomplished through research studies and/or by onboard observers because this species is now prohibited. Increased effort toward habitat mapping and in-situ observation of behavior will provide information on the essential habitat and distribution for this species. A study of the role of Marine Protected Areas in harvest management will be beneficial for sedentary species like yelloweye rockfish and genetic study is required as a first step in delimiting stock boundaries for this species.

Alternative survey such as the in-situ 2002 US Vancouver submersible survey in untrawlable habitat is required for future assessment of yelloweye rebuilding status. This study has demonstrated that submersible visual transect surveys can provide a unique alternative method for estimating demersal fish biomass in habitats not accessible to conventional survey tools. For example, because of the low frequency of yelloweye rockfish encountered in the NMFS shelf trawl survey tows, those data were not considered a reliable indicator of abundance and were not used in the 2002 yelloweye stock assessment for PFMC (Methot et al., 2002). Uncertainty in this stock assessment illustrates the need for large-scale surveys to assess bottomfish densities in habitats that are not accessible to trawl survey gear. Further, stratified random sampling designs should be employed with sample sizes sufficient to ensure acceptable levels of statistical power (Jagielo et al. 2003). At present, the in-situ visual transect submersible survey method appears to be a useful tool for this purpose, and the utility of this method will likely improve further with technological advances such as the 3-Beam QMS.

Rebuilding Projections

Rebuilding projections will be conducted in the 2005 yelloweye-rockfish rebuilding plan, which will be reviewed during the week of September 26th 2005.

1.0 Introduction

1.1 Life History

Yelloweye rockfish (*Sebastes ruberrimus*) can be characterized as relatively low in abundance, extremely long-lived (aged up to 120 years), late maturing, and slow growing. They primarily inhabit high-relief rocky areas from northern Baja to the Aleutian Islands in depths 15 to 550 meters (Rosenthal et al. 1982, Eschemeyer, et al. 1983, Love, et al., 2000). Yelloweye are carnivorous feeding primarily on other rockfishes, herring, sand lance, crab and shrimp (Washington et al., 1978, Rosenthal et al.1988, Reilly et al. 1994, Love 1996).

1.2 Stock Structure

Same as in Methot (2002), this assessment treats yelloweye rockfish stock as a single coastwide assemblage. The affinity for hard bottom and age structures of these fishes suggest that they may form stable local populations that, when recognized, could be treated as independent stocks. Evaluation of stock boundaries is reliant upon life history traits associated with a population or sub-population. Data for assessment of stock boundaries for coastal Washington, Oregon and California (W-O-C) yelloweye stock(s) were limited such that comparison of biological parameters among areas was not possible. Currently, there are two independent studies that give some insight into whether or not local aggregations of fishes can be identified as separate stock units.

Gao and Wallace (2003, unpublished) examined yelloweye rockfish stock structure by evaluating ratios of C^{13}/C^{12} and O^{18}/O^{16} in aragonite powder samples of 200 yelloweye rockfish otoliths from the Washington (WA) and Oregon (OR) coast. For each otolith, three samples were taken from otolith surface - one from the nucleus (the starting time of otolith growth) and the other two from the first and fifth annual zone (assumed to be year 1 and 5 in life history). Isotopic signature of the nuclei will provide information on the natal development and spawning stock separation of the fish, whereas signatures of age-1 and age-5 will indicate the behavior of the fish over the sampling period. Isotopic differences were not identified in otolith nuclei samples, suggesting there might be a single spawning stock for yelloweye rockfish along the Washington and Oregon coast. Distinct isotopic differences between samples from otolith nuclei and the fifth annual zones from both sample areas indicate yelloweye rockfish may move to other habitat as they grew from age-1 to age-5. Further, comparison within the fifth annual otolith zones between Washington and Oregon samples show clear differences in $\delta^{13}C$, but not in $\delta^{18}O$ variations, suggesting that the food sources or composition of the two areas are slightly different. In conclusion, the isotopic signatures from otolith nuclei showed there might be a single spawning stock for yelloweye rockfish along the WA and OR coast. From age-1 to age-5, the fish may change their habitat or associated bottom substrates for food.

Yamanaka, et al. (2001) conducted genetic appraisal of yelloweye rockfish collected northern Vancouver, B.C. and SE Alaskan waters. Though authors found little variability among samples and suggested a well-mixed single stock in their study area, specific habitat requirement for yelloweye rockfish support the hypothesis for site fidelity, and little mixing may occur after settlement. It is likely that discrete sub-populations corresponding to high-relief rocky areas form a much larger genetically diverse meta-population.

1.3 Fishery

Yelloweye rockfish are highly prized by sport fishers due to their size, beauty and quality and by commercial fishers due to high market demand and ex-vessel value. Yelloweye rockfish inhabit areas typically inaccessible to trawl gear and catch in the coastal trawl fishery primarily results from incidental harvest associated with other target fisheries fishing at the fringes of this habitat. This species has been a periodic target fishery for both commercial hook-and-line and sport fisheries at least since the 1970's. Yelloweye are also caught incidental in both commercial and sport line fisheries targeting other species found in association with the yelloweye habitat preferences.

1.4 Management history

Management of rockfish has had a long history beginning in 1983 when the Pacific Fisheries Management Council (PFMC) first imposed trip limits on landings from the *Sebastes* complex a group of about 50 species (Figure 1). Rockfish are now managed independently or part of three species-specific minor rockfish groupings: Nearshore, Shelf, and Slope. Yelloweye were managed as part of the *Sebastes* complex until 2000, when the Council abandoned the *Sebastes* complex in favor of a finer scale portioning of rockfish stocks. Yelloweye rockfish are currently managed as part of the Minor Shelf Rockfish group with a separate Optimal Yield (OY). In November 2001, the Council adopted a total catch optimum yield (OY) of 13.5 metric tons (mt) coastwide for yelloweye for all 2002 commercial, recreational, and tribal fisheries combined for California, Oregon, and Washington. This was an interim level that allowed for fisheries to take place and potentially catch yelloweye along with other fish, but did not allow fisheries that target yelloweye. Based on the 2002 assessment and rebuilding plan results (Methot et.al., 2002 and Methot and Piner, 2002), the Council adopted an OY of 22 metric tons and rebuilding measures with consistent harvest levels for the 2003 fisheries.

1.4.1 Commercial Fishery

Prior to 2001 trip limit, regulations on the *Sebastes* complex probably had little or no impact in restricting harvest of yelloweye in the trawl fishery and yelloweye were likely never targeted. Open access and limited entry line gear trip limits for rockfish, which remained at or above 10,000 lbs in all years prior to 1999, did not constrain yelloweye catch because yelloweye landings rarely exceeded 10,000 lbs. Trip and bag limits were significantly reduced following completion of the 2002 yelloweye stock assessment (Figure 1). Commercial retention of yelloweye rockfish was prohibited except for a 300-pound trip limit in the trawl fishery for yelloweye that are caught dead.

In addition to restrictive trip limits for yelloweye, managers instituted Rockfish Conservation Areas (RCA's) in 2002. These areas are large coastal closure areas intended to protect overfished rockfish species. The boundaries of the RCA's and landings limits outside them have varied by year, gear type, and season. The seaward boundary of the trawl RCA has ranged from 150-250 fm, while the shoreward boundary has ranged from 100 fm to the shore. Trawl gear that is used shoreward of the RCA is required to have small footropes (<8" diameter), which increases the risk of gear loss in rocky areas and diminishes incentive to fish close to these areas. Reductions in landings limits for shelf rockfish species have also reduced incentives to fish in rocky areas shoreward of the RCA.

1.4.2 Sport Fishery

Sport CPUE indices used in this assessment indicate that catch rates for yelloweye rockfish are low. Sport rockfish limits for W-O-C have remained at or above ten-fish until 1999 and it is likely that a ten-fish bag limit had little effect on restricting yelloweye harvest. In response to concerns for declining rockfish stocks, management of sport fisheries started becoming much more restrictive beginning in 2000. WDFW first adopted a two-fish bag limit for yelloweye in 2000, and an either/or two fish limit for yelloweye or canary rockfish in 2001 (Figure 1). In 2002, ODFW began a daily bag limit of one yelloweye rockfish, while California imposed a limit of no more than two yelloweye allowed per day per vessel. In addition to reductions in yelloweye retention, California also closed areas and limited recreational fishing seasons. WDFW first prohibited retention of yelloweye rockfish in coastal recreational fisheries in 2002. Both Oregon and California followed suit prohibiting retention beginning in 2004.

1.5 Management performance

Previous assessments indicated over-exploitation during the last two decades, and regulations have most likely been ineffective in constraining yelloweye catch until most recent years. Specifically, there have been no regulations developed to control catch or bycatch of yelloweye rockfish until 2002. Recent management decisions have significantly restricted yelloweye rockfish catch, which are reflected in the recent low level of yelloweye landings. Nevertheless, discard estimates related to recent management measures are highly uncertain and should be considered unknown. This uncertainty had little impact on the current status because historical discard was likely minimal until enactment of recent regulations. However, the current discard rate does have considerable effect on rebuilding projections.

2.0 Assessment

2.1 Fishery Dependent Data

2.1.1 Catch and discard

Catch data are treated as known without error and, due to the high market value for yelloweye rockfish, discarding was assumed to have not occurred prior to enactment of strict harvest policies beginning in 2002. Discard estimates in the sport fishery are provided by MRFSS, ODFW and WDFW and are included in the catch estimates since 2002. There are only a few observations of discard in the commercial fisheries and the overall magnitude cannot be estimated. Discard is likely infrequent and catches are small because of trawl closure areas (Rockfish Conservation Areas) on the shelf since 2001. Discard in the current commercial line fisheries is unknown.

As in the last assessment, data were compiled and analyzed for three independent areas: California, Oregon and Washington (Table 1). California Department of Fish and Game (CDFG) and/or the Marine Recreational Fishery Statistical Survey (MRFSS) intermittently collected length, weight, effort and catch data on recreational fisheries in northern California ports of landing beginning in 1978. CDFG also collected catch and effort data onboard Commercial Passenger Fishing Vessels (CPFV) since 1987. These data provide the most complete and longest time series of information on yelloweye rockfish. Data collection by MRFSS and Oregon Department of Fish and Wildlife (ODFW) in Oregon spans back to the early 1980s, but sampling levels were low and sporadic until most recent years. Washington data (MRFSS and WDFW) is essentially limited to most recent years. Yelloweye commercial catch data prior to 1980 do not exist with the exception of Oregon and Washington trawl catch during the 1970s as estimated by Tagart and Kimura, 1982.

Nearly all data sources including MRFSS, PacFIN, ODFW and WDFW provided updated catch estimates based on revised expansion algorithms intended to more accurately define rockfish catch. Therefore, the catch time series for each State was entirely revised during this assessment to provide most accurate estimates of catch. For some years and fisheries, there were significant differences in catch estimates compared to those provided during the last stock assessment. In general, catch estimates for the 1970s are higher in this assessment but catch estimates for 1980 – 2001 are lower. The total catch for the entire time series decreased 145 mt (Table 2).

California

A revised California commercial catch time series is based on PacFIN expansions of the California commercial landings of yelloweye rockfish. Trawl landings of yelloweye rockfish declined from an average of 43 mt in the 1980s, less than 10 mt in the 1990s and in recent years to less than 1 mt. The commercial line fishery catch reached a historic high of almost 300 mt in 1981. However, catch information indicate that a target fishery did not developed until the late 1980s peaked around 125 mt in

1991 and declined to less than 20 mt's by the late 1990's. Sport catches of yelloweye rockfish averaged 75 mt during the 1980s and precipitously declined to less than 20 mt in the 1990s averaging only 5 mt in 2000 – 2004 (Table 1 and Figure 2).

Oregon
Trawl landings of yelloweye rockfish averaged approximately 90 mt in the 1980's and nearly 80 mt during the 1990's, abruptly declining to less than 1 mt since 2000. A commercial line fishery developed in the early 1990s and has averaged 37 mt annually until management restrictions in 2000 reduced catches to less than 5 mt. Sport catches of yelloweye rockfish averaged 30 mt during the 1980s, declined to 20 mt in the 1990s and have averaged less than 5 mt in 2000 – 2004 (Table 1 and Figure 2).

Washington
Washington trawl landings of yelloweye rockfish have been variable and less than 30 mt annually. Since 2000, trawl landings have declined to less than 1 mt. A small target commercial line fishery developed in the late 1990's and catch peaked at 23 mt in 1999. Insignificant catches are reported since strict regulations went into effect in 2001. Sport yelloweye rockfish landings averaged 8 mt in the 1980's, 13 mt during the 1990's and have declined to less than 7 mt in 2000 – 2004 (Table 1 and Figure 2).

2.1.2 life History

Weight-at-length
An algometric length-weight function (weight=0.000021*length$^{2.9659}$) was computed from over 3,000 observations to estimate weight for a fish of known length for combined sexes. This relationship is used in the current assessment and in the previous (Figure 3).

Growth
Over 1,000 age structures from Oregon and an additional 464 age structures from Washington were recently aged and incorporated into this analysis. The von Bertalanffy growth function ($L_{inf}\cdot(1 - \exp(-k\cdot(age - t_o)))$) was used to estimate the length of a fish of a known age. Estimated parameter values are compared among estimates derived from age data collected from Washington, Oregon, California and other locales (Table 3). Differences in growth among fishes off the Washington, Oregon, and California coast were not apparent (Figure 4). A single growth function for combined sexes was used for W-O-C areas (Table 3).

Same as in Methot (2002), growth parameters are re-estimated within the model to adjust for the effects of size-selectivity and ageing error on the expected value of size-at observed age. Comparison of model results indicates that model estimates are very similar between SS1 and SS2 models (Table 4).

Maturity-at-age
Length and age at 50% maturity for female yelloweye collected from coastal waters off Vancouver Island, B.C., was estimated to be 42.1-42.4 cm and 16.5-17.2 years of age (Yamanaka and Kronlund, 1997). Length at 50% maturity for yelloweye collected off Oregon was estimated to be at 41 cm by Barss (1989) and at 45 cm by McClure (1982); and for fish collected off California, 40 cm by Reilly (et al., 1994). Misspecification of length at 50% maturity at a larger size than actual will tend to lower allowable rates of fishing. As in the previous assessment, model runs were made with 50% maturity occurring at 40 cm (Table 5).

Natural mortality
Several procedures to derive estimates of natural mortality were explored (Wallace 2001). Robson and Chapman (1961) method was investigated, but Chi-square testing indicated that at least one of the critical

assumptions of the data was not met. Catch curve estimates (Ricker, 1975) of total mortality were derived from age data collected from various locales (Table 6). Estimates of mortality from an exploited stock off Neah Bay Washington (0.076) is higher compared to mortality estimates of an unexploited stock (0.025) located at the Bowie Seamount, Queen Charlotte Islands, B.C. (data provided by Yamanaka, DFO). Mortality estimates from Bowie Seamount using five-year age bins (0.086 males and 0.043 females; Yamanaka, 2000) and no age bins were quite different (0.021 males and 0.033 females). Catch curve estimates of natural mortality assume constant recruitment and large variation in recruitment makes it difficult to interpret results derived from catch curve procedures. Differences in yelloweye estimates are related to bin specification of large year class(s) recruited in the late 1960s. An estimated natural mortality rate near 0.045 was used in the 2002 assessment (Methot et al., 2002) and represents a compromise between low (0.02, O'Connell et al., 2000) and high estimates (0.043 for females and 0.086 for males, Yamanaka et al., 2001) and is equivalent to that estimated using Hoenig's (1983) method (Tables 6 and 7). A constant natural mortality rate of 0.045 used in the previous assessment was also employed in this assessment.

2.1.3 Age Validation and Ageing Error

Break-and-burn aging techniques for yelloweye rockfish were corroborated using radiometric aging techniques. Andrews et al. (2001) verified growth zone age estimates between 30 and 100 years, substantiating that longevity likely exceeds 100 years.

Aging error was assessed using data collected from an exchange of 100 otoliths between the Department of Fisheries and Oceans, Canada (DFO) and WDFW. Aging error increased with age and was assumed unbiased, but imprecise and equivalent differences between DFO and WDFW age readings. Comparison of DFO and WDFW age readings indicate that 75% of fish 9-13 years old and 89% of fish older than 70 years of age are mis-aged by at least one year (Wallace, 2001). The SS1 model incorporated ageing error by interpolating error estimates between youngest and oldest aged fish. These data were incorporated in both of the last two assessments. To mimic the error structure used in the previous assessment, an age error vector of standard deviations was developed where standard deviation values were interpolated between the youngest and oldest age groups. This age error vector was incorporated in early model runs to explore differences in model fits to data and final results between SS1 and SS2.

A revised aging error vector was incorporated into the base case model for this assessment. The previous analysis included a single large outlier at the end of the data series that highly influenced the results. The revised ageing error is based on the same dataset, but excludes the outlier and results in an opposite decreasing trend in age error for older aged fish (Figure 5). Age readers (pers. comm.) found older fish easer to age than younger fishes where demarcations between annuli are often difficult to interpret corroborated this result.

2.1.4 Fishery Size and age composition

Northern California data provide the most complete and longest time series of length information for yelloweye rockfish. Data collection in Oregon began in the early 1980s, though sampling levels were low and sporadic until most recent years. Washington data is essentially limited to the last five years (Tables 8-10).

Size frequency distribution data are used to estimate proportion at each size/age for combined sexes and gear for each assessment area. Due to scarcity of data, no weighting is applied in combining samples within State/gear/year strata. As in the last assessment, because of the small sample sizes, some samples are combined across years in order to provide the model with observations that reflect average conditions, although blurring any potential annual signal. The fish within one or a few fishery samples within a year/state/gear cannot represent a good random sample of the entire fishery catch. For example, inspection of the raw data often indicated a cluster of small fish in one year and a cluster of much larger fish in the following year. This occurs because fish within a sample tend to be more similar in size and age than the diversity of size and age that appears when many independent samples are taken. Because the model believes that the fish within a size or age composition observation are from a multinomially distributed random sample, it may attempt to infer recruitment events from what is sampling variability. Since inspection of the data do not reveal any obviously strong recruitment events moving through the population, we felt it was better to blend the small sample size years into multi-year observations. The procedure involved: (1) combining sample data across the range of selected years (see boxed data in Tables 8-10) to create a multi-year observation; (2) assign these proportions at age/size back to each of the source years; (3) assign a multinomial sample size for each of these years so that the sum of these sample sizes equals the sum of the original sample sizes for those years. All blended data time series and proportions are unchanged from the last assessment for years prior to 2000 and have only been revised in most current years.

2.1.5 Fishery CPUE

There have been significant management changes restricting the harvest of yelloweye rockfish since the last assessment. Because of this, it is likely that catch rates are no longer linked to population abundance, but reflect changes in management. None of the abundance indices are revised in this update. An overview of statistical models used in the previous assessment for generating fishery CUPE was provided; details can be found in Methot et.al. (2002).

Abundance indices are assumed to be proportional to population abundance. The catchability coefficient is the factor that relates the units of the index to the abundance of the population. Random variability in the coefficient may occur, but if there is a trend over time or if the coefficient varies with population abundance, then the assessment may be biased. Sport fishery catch rates will be influenced by undocumented search the observed decline in CPUE indices would be underestimated. There is no information to evaluate annual differences in effort for specific individual target species such as yelloweye. It is unlikely that discard or bag limits influenced CPUE historically because yelloweye are a highly valued species and fishers rarely caught their bag limit of yelloweye. To minimize influence of non-bottomfish effort, data were restricted to rockfish or bottomfish-targeted trips. Described below are the statistical models used to explain some of the overall variability in sport CPUE in order to come closer to having indexes that are proportional to the abundance of fish available to the sport fishery.

Northern California CPFV CPUE

The CDFG Central California Marine Sport Fish Project has been collecting catch and effort data onboard recreational Commercial Passenger Fishing Vessels (CPFV) from 1988 to 1998. Data were collected from trips originating out of northern California ports from Port San Luis to Fort Bragg. Observers collected data on catch, number of fishers and time spent fishing at each location fished for the entire day. CPUE was calculated as yelloweye catch per angler minute. A General Linear Model (delta method) was used on log transformed catch rates to estimate annual catch rates. The GLM included a year, area and depth effect which were significant. Area was described as ports group by area as indicated by the California port numbering system (Fort Bragg, 300 ports, 400 ports etc). Depth was discrete groupings of depth by 10fm interval where depths less than 20 and greater than 100fm were excluded from the analysis. A hierarchal approach was used to investigate other factors including season, but adding season into the GLM did not explain much variability and was not significant, thus was not included in the final analysis. Marginal means (for year effect) were back-transformed to the arithmetic scale and applied in the model as a survey index with selectivity equal to that estimated for the northern California sport fishery. Results indicate catch rates have declined significantly over the entire time period (Table 11 and Figure 6).

Oregon CPUE
Annual catch rates of yelloweye rockfish were derived from data assembled by ODFW personnel. The 1998-2000 catch and effort estimates were updated since last year's assessment and incorporated in this analysis. Data include aggregate statistics for estimated number of boats and anglers, and yelloweye rockfish catch by year, month and port. The data series begins in 1979, but information on trip type was not collected after 1987. For this reason, years with significant salmon effort, 1988-1993, 1997 and records from Brookings and Astoria were excluded from the analysis.

A General Linear Model was used on log transformed catch rates to estimate annual catch rates. October through March estimates were excluded from the analysis since these estimates were only available in 1999 and 2000. Year 2000 data were not included because of implementation of a 3-canary rockfish bag limit, which may have shifted effort from offshore to nearshore areas. The final GLM model included year effect $\mathbf{Y}_i$ {i= 1979-1987, 1994-1996,1998-1999}, port effect $\mathbf{P}_j$ (Coos Bay, Depot Bay, Garibaldi, Gold Beach, Newport, Pacific City and Winchester) and month effect $\mathbf{M}_k$ (May-September) with normal error term ε_{ijk} and variance σ^2. There is only one observation in each cell since summary statistics are used for each cell.

The final GLM model $\boldsymbol{ln}(\mathbf{catch/angler})_{ijk} = \mathbf{Y}_i + \mathbf{P}_j + \mathbf{M}_k + \varepsilon_{ijk}$ was based on analysis of 418 records. The overall model was highly significant ($P < 0.0001$) with a total $r^2 = 0.45$. Year, port and month effects were also highly significant ($P < 0.0001$). Marginal means (for year effect) were back-transformed to the arithmetic scale and applied in the model. Annual catch rates were applied in the model as a relative survey index and selectivity set equal to that estimated for the Oregon sport fishery. Results indicate catch rates have declined significantly over the entire time period. Catch rates in earlier years declined sharply from an average of 0.25 yelloweye per angler trip to approximately 0.10 in most recent years (Table 11 and Figure 6).

ODFW personnel as well provided data and analysis of catch and effort information collected in Garibaldi from nearshore and offshore reefs between 1979 and 1987. Data demonstrated greater CPUE in offshore areas compared to nearshore areas. Effort data were noisy and varied widely between years, but indicate a very modest shift of effort from offshore to nearshore areas. There is no information to indicate a shift in effort in other ports. These data did not provide a compelling reason to believe that the declining CPUE trend, developed from coast-wide data, was driven by a shift in effort. Because of this lack of consistent shift in depth distribution of the effort and because the nearshore-offshore information was incompletely available, it was not used as a factor in the GLM.

Washington CPUE
April-September estimates of catch and effort (by trip type) for coastal Washington ports are available from the WDFW Ocean Sampling Program since 1984. Directed halibut trips were pooled with bottomfish trips until 1989. However, the 1989 and 1990 sample data are not currently available and were excluded from the analysis. The directed halibut fishery shows an increasing yelloweye CPUE trend over time. Information from the fishery indicates that this trend was due to increased targeting of yelloweye in a region north of the halibut closure area. For this reason, CPUE trend information from directed halibut trips was biased and could not be used.

A General Linear Model (delta method) was used to estimate the time series of CPUE. The final GLM model included year effect $\mathbf{Y}_i$ {i= 1991-2000}, port effect $\mathbf{P}_j$ (Ilwaco, Westport, LaPush and Neah Bay) and month effect $\mathbf{M}_k$ (May-September).

The final GLM model was based on analysis of 28,786 creel records. The overall model, and the specific factors included in the model were highly significant (P <0. 001). The model explained a significant amount of variability in both the estimation of CPUE from positive tows (r2=0.08) and in the estimation of proportion positive (r^2=0.03). Marginal means (for year effect) were back-transformed to the arithmetic scale and applied in the model. Annual catch rates were applied in the model as a relative survey index and selectivity set equal to that estimated for the Washington sport fishery prior to 2000. Results indicate catch rates have declined over the time period (Table 11 and Figure 6), but not as significantly as in Oregon or California.

2.2 Fishery Independent data

NMFS Trawl Survey

The NMFS triennial trawl survey has covered a wide range of depths off California, Oregon and Washington since 1977. Yelloweye rockfish inhabit areas typically inaccessible to trawl gear and, as a result, were infrequently caught. Most yelloweye rockfish are caught on and near Hecate Bank off central Oregon and off northern Washington (Figure 7). Estimated biomass by statistical area is summarized in Table 12. Given the low frequency of positive tows, NMFS trawl survey probably does not sample yelloweye habitat consistently and may not be a reliable indicator of abundance. NMFS trawl survey data were not incorporated into this or any of the last assessments.

IPHC Setline Halibut Survey

Rockfish caught incidental to the International Pacific Halibut Commission (IPHC) halibut survey were recorded, but not identified to species until 1997. Between 1997 and 2001, rockfish catch was sampled from the first 20 hooks per skate at each station (140 of the potential 700 hooks) and beginning in 2002 all hooks were sampled for rockfish. The time series of IPHC yelloweye catch data has no trend and is not included in this or past assessments (Table 13 and Figure 8). A longer time series will be needed to assess the merit of using the halibut survey as a yelloweye index. Since 2002, 634 yelloweye rockfish have been sampled for age, length and sex. Fishing gear between the Washington line fishery and the IPHC survey is comparable and both fish the Northern Washington waters off shore of Cape Flattery; and length composition between the fishery and survey is similarly comparable (Figure 9).

2002 US Vancouver Submersible Survey

Because there has been only a single survey and did not have inter-annual comparison of biomass estimates we did not believe it was prudent to incorporate the point estimate within the model. Thus, the alternative estimate of yelloweye rockfish biomass from the submersible survey allowed for a useful comparison to corroborate an existing population model estimate. If additional surveys were conducted on a more routine basis, a time series of yelloweye rockfish density data could be used to develop a more reliable estimate of abundance. Further, because this species cannot be sampled using traditional survey techniques, these data will likely provide the only alternative for development of future demographic models of the yelloweye rockfish population abundance.

To our knowledge, submersible survey data have been used in only two other assessments. In Southeast Alaska, O'Connell et al. (2004) have used the submersible visual transect approach to estimate the biomass of yelloweye rockfish for the North Pacific Fishery Management Council (NPFMC); and in California, submersible survey information collected by Yoklavich et al. to quantify the biomass of cowcod (*Sebastes levis*) for PFMC management was used in the most recent assessment.

Fifty submersible dive sites ranging in depth from 102 to 225m were randomly sampled throughout the untrawlable habitat sampling stratum between August 18th-28th, 2002 (Fig 10). In total, an estimated 276,258 m^2 was covered across all sites (Table 14). Overall, transect duration averaged 61 min., width averaged 2.52m, length averaged 2183m, and submersible speed averaged 0.60 m/second.

While yelloweye rockfish occurred in 24 of the 50 nominally untrawlable submersible dive sites in 2002, they occurred in only 2 of the 25 of the 2001 NMFS trawl survey tows within the 55-183m U.S.

Vancouver INPFC Area strata. With the exception of Dover sole, densities of the seven target species were higher in the untrawlable area compared to the trawlable area. Approximately 16% of the US Vancouver INPFC statistical area is considered untrawlable, vs. 84% deemed to be trawlable (Zimmermann, 2003). When the relative size of these survey sampling strata are accounted for, point estimates of population numbers were higher in the untrawlable area by a factor of 9 (canary rockfish), 5 (yelloweye rockfish), 4 (Pacific halibut), and 3 (lingcod), respectively; and higher in the trawlable area by a factor of 11 (Dover sole), 3 (petrale sole), and 2 (yellowtail rockfish), respectively.

Size distributions of fish sampled in the submersible survey were similar to those of fish sampled in the trawl survey, with the exception of Pacific halibut, which tended to be larger than those in the trawl survey. Mean sizes of fish collected in the submersible survey were 47.9 cm (yelloweye rockfish), 44.1 cm (canary rockfish), 44.2 cm (yellowtail rockfish), 58.6 cm (lingcod), 34.8 cm (petrale sole), 33.0 cm (Dover sole), and 65.8 cm (Pacific halibut). Mean sizes from the trawl survey were 45.3 cm (canary rockfish), 46.4 cm (yellowtail rockfish), 58.2 cm (lingcod), 35.2 cm (petrale sole), 36.0 cm (Dover sole), and 86.2 cm (Pacific halibut), respectively (Table 15).

Estimates of yellow biomass compared favorably with estimates reported by Methot et al. (2002) that estimated a total coastal Washington biomass of 542 mt. This compares to a submersible survey estimate of 292 mt in the untrawlable zone; and a NMFS Trawl survey estimate of 101 mt in the trawlable portion of the U.S. Vancouver INPFC statistical area, which represents only the northern portion of the Washington coast (Tables 16 and 17).

2.3 History of modeling approaches

Yelloweye were first addressed as part of the "remaining rockfish" assessment completed in 1996. This assessment included a number of previously un-assessed rockfish species managed as the *"Sebastes* complex". Rogers et al. (1996) estimated a yelloweye rockfish ABC of 39 mt for the Northern area (Columbia and Vancouver) based on biomass estimates from the triennial trawl survey and assumptions about natural mortality (M) and catchability (Q). No separate yelloweye ABC was estimated for the Southern area (Monterey and Conception) but incorporated with the "other rockfish" assemblage ABC.

Model description for the 2001 stock assessment

Wallace (2001) used the length-based version of Stock Synthesis (Methot, 1990) to model the northern California and Oregon regions separately. Growth was estimated externally to the model. Sport CPUE and sport and commercial size composition data were included in the model. The modeled time period extended from 1970 through 2000 and year-specific recruitments were estimated without constraint by a stock-recruitment curve. The assessment examined both increasing natural mortality with age and dome-shaped selectivity with size as alternative factors to improve the fit to the data. Alternative model configurations found that increasing natural mortality with age provided a somewhat better fit to the data, but there were no age data included in the 2001 model, and much of an increase in M would be inconsistent with direct examination of age data through the catch curve analysis documented above.

Model description for the 2002 stock assessment

The length-based version of Stock Synthesis was also employed in the 2002 evaluation (Methot et.al., 2002). There were a number of important differences in model configuration from Wallace (2001) that include: 1) inclusion of Washington catch, CPUE, size and age data, 2) inclusion of age composition data from all three states as available and update of size composition data, 3) inclusion of mean length-at-age data from each data source to aid in the simultaneous estimation of growth parameters and size-selectivity, 4) allowing all fishery sectors to have dome-shaped selectivity 5) including emphasis (0.5) on the stock-recruitment curve and estimating the curvature (steepness) of this curve, 6) starting in 1955 rather than 1970 to better allow for potential long-term patterns in recruitment, 7) use of constant natural mortality of 0.045

2.4 Model description for the current stock assessment

This assessment used the Stock Synthesis 2 V1.19 modeling framework written by Dr. Richard Methot at the NWFSC. The SS2 modeling framework is fully described in documentation available from NWFSC (Methot, 2005). The 2005 yelloweye stock assessment includes a number of model specifications carried over from the last assessment that provide a framework for this assessment, which are described in each of the sub-sections below.

Area Modeling

The previous assessment (Methot et.al., 2002) explored area-specific model configurations by onstructing models that included data from subsets of the coast, and compared these results to the baseline coastwide model. The authors concluded that the estimated differences between the areas (states) are neither sufficiently different nor sufficiently precisely estimated to recommend that management be based on area-specific population models and suggested that area-specific modeling should remain in consideration as new data become available.

In the current assessment, we did not revisit separate area model because no sufficient data available to calibrate such model and little new information is available concerning stock separation. All models presented in this assessment treat yelloweye as a single coastwide stock. The implicit assumption is that either: (1) similar recruitment and mortality occur off each state, or (2) there is sufficient mixing between areas within the coast so that any differences in recruitment or mortality among area are obscured in the coastwide mixing. Meaning that, a coastwide model will either capture the common recruitment and mortality trends or represents the sum of all the processes operating in each area.

Data elements

Data were compiled and analyzed for three independent areas: California, Oregon and Washington. Each area included a sport CPUE index and combined catch, age and length composition information for separate commercial and sport fisheries. In addition, Washington included a commercial line fishery that began targeting yelloweye rockfish in 2000. CPUE time series are assumed to occur instantaneously at the middle of the year.

As in the last assessment, the model combines male and female data into a single morph. Growth is modeled by using the von Bertalanffy growth equation and is assumed to be the same between female and male. A constant (but estimated) CV is used over time. Maturity is externally estimated and is assumed to be logistic in shape and a function of length. Size data were condensed into 2-cm length bins started from 18 cm to 76 cm. Only 0.1% of the observed fish are greater than 76 cm, thus 76 cm was considered to be a reasonable accumulator bin. Age data were condensed into 1-age bins for ages 3 to 29, and into 5-age bins for ages 30-70. All fish above age 70 were accumulated in the 70+ age bin. In addition to providing the model with size and age composition vectors, we calculated the mean length at each age-bin for each gear/state strata (and the number of fish in each age-bin used for the calculation) and assigned this vector to a year that supplied much of the age data. SS2 mean size at-age-bin is used to compare to the expected value for this quantity that takes into account the effects of ageing error and size-selectivity of the fishery. Sample sizes used in this assessment are the number of individual fish sampled for all length and age frequencies with a maximum sample size set at 200.

Information on landings prior to 1980 is rare, thus historical landings, by fishery, were assumed to decrease linearly from the earliest estimates of catch to a relatively small constant catch prior to 1970 (Table 1). Initial population conditions were assumed to at equilibrium at the first year of the model

(1955) and initial fishing mortality was estimated in the model. No discard is assumed for years prior to 2002 and thereafter discard estimates for the sport fishery are included in the catch time series. No discard is included for the commercial fisheries.

Natural Mortality and Recruitment

Natural mortality is consistent with the last assessment and is assumed to be constant throughout age, time independent and equal to 0.045. The stock-recruitment function was a Beverton-Holt parameterization, with the log of mean unexploited recruitment estimated, along with the steepness (h) of the stock recruit function. Year-specific recruitment deviations are estimated from 1955 to 2004 with the start year set equal to that used in the previous assessment.

The standard deviation of the recruitment (σ_R) is treated as a fixed input quantity where the initial value was set at the 2002 model (Methot, 2002) derived value of 0.4.

Selectivity

Natural mortality is confounded with selectivity in age-structured models. The trade-off between natural mortality and selectivity was explored during the last assessment and since we assume the same constant natural mortality rate (0.045) we did not revisit this issue here. Under these presumed natural mortality conditions, dome-shaped selectivity was necessary to account for the low occurrence of older (larger) fish in the age and length composition data. There are several plausible explanations for dome-shaped selectivity: 1) the trawl fishery can only catch fish at the “fringe” of rough non-trawlable habitat; 2) hook size(s) in both the sport and commercial line fisheries do not “select” largest individuals; 3) yelloweye rockfish inhabit high relief (canyons) and rocky bottom habitats and at least some of this habitat may form natural refugee from fishing; and 4) older fishes could be bathymetrically isolated in a portion of their range. There has been ongoing debate in some rockfish assessment discussions over whether natural mortality increases with age or deficit of older age fish in the catch is related to fishery selectivity.

Selectivity is assumed to be length based for all fleets, and to have a double logistic shape (SS2 Type 7). Selectivity for the CPUE indices was mirrored from the respective State Sport fishery. Fishery selectivity was allowed to be time varying with selectivity time periods equal to that STAR panel endorsed in the last assessment. Changes in apparent fishery selectivity are expected due to changes in fishery regulations or other factors that shift the primary fishing grounds or otherwise change the fishing patterns. We evaluated the time series of size and age composition data for significant changes in the occurrence of small/young or large/old yelloweye and find there is little evidence to modify the selectivity time periods used in the previous assessment.

The 2002 STAR Panel endorsed the following changes in selectivity to give the model flexibility to track major changes in selectivity over time and we continue with these changes in this assessment:
CA sport, ascending inflection size, 1983-2004;
CA sport, selectivity at max-size; 1987-2004;
OR comm., ascending inflection size, 2000-2004;
WA sport, ascending inflection size, 1998-2004;
WA sport, ascending slope, 1998-2004;
WA sport, selectivity at max-size, 1998-2004.

Lambdas

Model runs during the last assessment indicated that the model’s ability to fit the age and size composition data implied an effective sample size that was approximately 60% of the observed sample size values. Because sample size and emphasis factor are algebraically equivalent, this reduction in each observation’s sample size was subsequently implemented by reducing all the size and age composition emphasis factors from 1.0 to 0.6. Emphasis factors (lambdas) for size, age, and mean size likelihood components were set similarly for all base model runs. We also set CPUE likelihood components to 1.0 and the baseline model was set to have an emphasis level of 0.5 on deviations from the S/R curve and 0.001 for S/R time series as was done in the previous assessment. Lastly, lambda for the initial equilibrium catch was set to 1.0 and parameter prior lambda to 1.0.

Model estimated parameters
All estimated and assumed model parameters are listed in Table 18 and the likelihood components for the base case are listed in Table 19.

Model time period
Same as in the 2002 assessment (Methot et.al., 2002), the modeling time period begins in 1955 and is assumed to be at equilibrium.

2.5 Priors

No informative priors were set for model parameters, except for recruitment steepness and natural mortality, and parameter bounds were set to be sufficiently wide to avoid truncating the searching procedure during maximum likelihood estimation. Informative priors were set for both steepness and natural mortality and were based on values derived in the 2002 stock assessment (Table 18).

2.6 Model selection and evaluation

Little new information is available since the last assessment to give justification for a revision of model structure, so we provide an "update" in this document and did not explore alternative model configurations. Because the last assessment used the previous length-based version of Stock Synthesis (SS1), every attempt was made to mirror the previous model structure and explore differences between SS1 and the Stock Synthesis 2 modeling framework (SS2). The final base model represents a close approximation to the SS1 model while re-estimating all parameters estimated in the last assessment with data time series appended since 2001. Steepness was fixed at the SS1 value of 0.437 in all model runs with the exception of the sensitivity analysis.

Comparison to SS1
We used a number of alternate models to compare and contrast SS1 and SS2 results (models A1.0 – A1.4 in Tables 20a and 20b). Initial SS2 model runs use identical data as those used in the SS1 and selectivity and all other parameter estimates were fixed to SS1 values (Model A1.0). This model produced similar fits to the data and comparable results (Tables 20a, 20b, and 21). Model 1.0 results indicate that SPB_0 is slightly lower (3,632 vs. 3,839) and depletion was greater (0.233 vs. 0.216) than that reported in the last assessment. In Model A1.1 we re-estimated selectivity, size at min-age, min-age CV, max-age, and max-age CV. Model fit improved significantly (total likelihood value improved by 92), and results remained similar to model 1.0 with SPB_0 slightly lower (3,659) and depletion slightly less (0.225). These results would likely represent model outcome if SS2 were used as the modeling framework during the last assessment in 2002.

Sensitivity
We explored model sensitivity to the addition of a revised age error and a revised catch time series in Models A1.2 and A1.3, respectively. Selectivity, growth, and steepness were fixed at Model A1.1 parameter values. Results from Model A1.2 show that both SPB_0 (3,638) and depletion (0.229) would be slightly lower. Model A1.3 results show that both SPB_0 (3,566) and depletion (0.213) would be slightly higher compared to Model A1.1. In Model A1.4 we incorporated both the revised catch and age error into the data file and re-estimated selectivity, size at min-age, size at min-age CV, max-age, and max-age

CV. Model results indicate that SPB_0 (3,686) and depletion (0.233) are slightly higher than SS1 estimates and total likelihood was improved by 52 (Tables 20a, 20b, and 21).

In the base run model, we extended the time series to 2004 with revised catch, revised age error, appended recent catch and composition data and. We again re-estimated selectivity, size at min-age, size at min-age CV, max-age, max-age CV (Table 22).

Convergence

We struggled with convergence while assembling the Base Model. The model had difficulty creating a positive definite Hessian when estimating all selectivity parameters simultaneously. Consequently, we derived the final Base Model by estimating selectivity for each fishery one at a time. After all selectivity parameters were estimated, we conducted the convergence tests by first jittering all the non-selectivity parameters by 0.5% of the range of the bounds from the maximum likelihood values for a set of 24 convergence runs. Starting values in some runs were outside the range of the model's ability to successfully complete and the run was either terminated early or Hessian matrix was not positive definite. Results for all successful runs show little variability in the objective function and current depletion for all completed runs (Table 23a).

At STAR Panel request we evaluated model convergence further by estimating all parameters simultaneously and setting parameter jitter by 0.5% of the range of the bounds from the maximum likelihood values for a set of another 20 convergence runs (Table 23b). Two of the model runs verified Base Model results while 5 resulted in depletion values ranging from 0.34 - 5.38, 12 resulted in significant F penalties, and one ended prematurely. Based on this set of runs, the STAR Panel and the STAT Team concluded that the results indicated that the base case model estimates are unlikely to represent local minima and, thus, are adequate for use in management.

2.7 Base-run(s) results selection and evaluation

The base case model population trajectory is similar to that predicted during the last stock assessment using SS1. Model fit to all of the three indices was very similar between models (Figures 11-13) as was the estimated fishery selectivity (Figures 14 and 15). Model results indicate that SPB_0 (3,808) and depletion SPB 2001 (0.209 vs. 0.233) is slightly lower than SS1 estimates (Table 22 and Figures 16-17). Decline in biomass is significant and uninterrupted beginning in the 1970's reaching lowest levels in 2000 (Table 24). Population numbers at age indicate a substantial loss of the oldest age classes (Table 25) related to overexploitation across the time series (Table 26). Comparison of SS1 and SS2 Fishery selectivity estimates are dome-shaped for most fisheries (Table 27 and Figure 15) and comparable to that estimated in the previous stock assessment.

2.8 Uncertainty and sensitivity analyses.

We used a number of alternate models under the SS2 modeling framework (version 1.19) to assess the sensitivity of the assessment results to the specific model configuration used in the base case. Profiles of model outputs and likelihood were conducted over a range of initial recruitment and emphasis (lambda) of stock-recruitment steepness and composition data. Initial recruitment sets both the initial population abundance level and the scale of the stock-recruitment curve. The profile of the initial recruitment level (virgin recruitment) is presented in Table 28 and Figure 18. This profile provides information regarding which data components fit better at higher versus lower biomass levels. Likelihood results show a very flat profile for all components with the exception for fit to the recruitment time series where fit was best for the Base case model run.

The profile on the stock-recruitment steepness is presented in Table 29 and Figure 19. Here we range steepness values from 0.15 to 0.75. Results show little model sensitivity for values between 0.2 and 0.5

indicating that a fixed steepness value of 0.437 (based on the 2002 assessment) is rather imprecise; authors came to the same conclusion in the 2002 assessment. This was not unexpected because there was little new information to influence the estimated level of recruitment and model precision in these estimates.

To assess the of importance of the emphasis on stock-recruitment (SR) curve in model fit, we profiled across decreasing lambda values on the SR curve and display the results in Table 30 and Figure 20. In the first run, lambda for the SR curve and for the composition data was set at 100 and 0, respectively. This implied that recruitments were strictly taken from the SR curve and there was no emphasis on any of the size or age composition data. The model crashed and no results were attained. In the remaining runs, constrain from the size and age composition data returned (lambda = 0.6) and the emphasis on SR curve was reduced to lambda at 10, 1, 0.5, 0.1, and 0.001. Each year's recruitment was estimated as a separate parameter, but was bounded by the standard error of recruitment (0.4, same value used in 2002 assessment). Decreasing the lambda on the SR deviations allowed the individual year recruitment estimates to vary more widely, but with diminishing improvement in the fit to data, most of which came from the improvement of fit to the age and length composition data. Based upon the diminishing model improvements for emphasis levels below 0.1, the baseline model was set to have an emphasis level of 0.5 on deviations from the SR curve, same as the 2002 Base case model.

Profiles were also conducted to assess the effect on model fit to increasing the lambda value on length, age and size compositions (Table 31 and Figure 21). As expected, the relative change in likelihood improved for length and age comps and had little influence or degraded the fit for other components. We found no compelling evidence to revise our original composition lambda from 0.6 as it was set in the 2002 assessment.

3.0 Rebuilding parameters

The Base case model outputs will be used to revise the current rebuilding plan for yelloweye rockfish. This work will be reviewed during the week of September 26th, 2005.

4.0 Reference Points

Yelloweye rockfish was declared "overfished" in 2002, and since has been managed under the 2002 rebuilding plan (Methot and Piner, 2002). Reference points estimated from the base model are presented in the Table 32.

5.0 Harvest projections and decision Table

Stock abundance and yield was forecast into future years using the base case model where catch is fixed at the recommended harvest level determined by the 2002 rebuilding Plan (Methot et. al., 2002) of 26 metric tons coast-wide (Table 33). Final OY's will be based on forecasts from the updated rebuilding analysis to be reviewed in September 2005.

6.0 Research Needs

Additional effort to collect age and maturity data is essential for improved yelloweye rockfish stock assessment. Collection of these data can only be accomplished through research studies and/or by onboard observers because this species is now prohibited from retention. Increased effort toward habitat mapping and in-situ observation of behavior will provide information on the essential habitat and distribution for this species. A study of the role of Marine Protected Areas in harvest management will be beneficial for sedentary species like yelloweye rockfish. Genetic study is required as a first step in delimiting stock boundaries for this species.

Alternative survey such as the in-situ 2002 US Vancouver submersible survey in untrawlable habitat is required for future assessment of yelloweye rebuilding status. This study has demonstrated that submersible visual transect surveys can provide a unique alternative method for estimating demersal fish biomass in habitats not accessible to conventional survey tools. For example, because of the low frequency of yelloweye rockfish encountered in the NMFS shelf trawl survey tows, those data were not considered a reliable indicator of abundance and were not used in the 2002 yelloweye stock assessment for PFMC (Methot et al., 2002). Results from this study support this conclusion and illustrate the need for large-scale surveys to assess bottomfish densities in habitats that are not accessible to trawl survey gear. Further, stratified random sampling designs should be employed with sample sizes sufficient to ensure acceptable levels of statistical power (Jagielo et al. 2003). At present, the in-situ visual transect submersible survey method appears to be a useful tool for this purpose, and the utility of this method will likely improve further with technological advances such as the 3-Beam QMS.

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9.0 Tables and Figures

Table 1. Estimated yelloweye rockfish catch by State and fishery since 1955. Italic catch data indicate years where there are no data to estimate catch, but presumed by authors. Grey areas indicate an interpolated catch time series form the earliest to latest years catch values.

Coastal Washington, Oregon and California Yelloweye Rockfish Landings

Source	PacFIN and MRFSS				Tagart, PacFIN, and ODFW				Tagart, PacFIN and WDFW								
	California				Oregon				Washington				Totals				
Year	Trawl	Line	Other	Sport	Trawl	Line	Other	Sport	Trawl	Line	Other	Sport	Trawl	Line	Other	Sport	Total
1955	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1956	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1957	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1958	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1959	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1960	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1961	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1962	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1963	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1964	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1965	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1966	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1967	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1968	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1969	*0.5*	*0.5*	*0*	*20*	*0.5*	*0.5*	*0.0*	*20.0*	*1*	*0*	*0*	5	2.0	1.0	0.0	45.0	48.0
1970	*0.6*	*0.6*	*0*	25.1	*0.3*	*0.3*	*0.0*	23.5	*1*	*0*	*0*	5	1.9	0.9	0.0	53.6	56.3
1971	*2.6*	*2.6*	*0*	30.2	*0.3*	*0.3*	*0.0*	27.0	*1*	*0*	*0*	5	3.9	2.9	0.0	62.2	68.9
1972	*4.6*	*4.6*	*0*	35.3	*1.8*	*1.8*	*0.0*	30.5	1.7	*0*	*0*	5	8.1	6.4	0.0	70.8	85.2
1973	*6.6*	*6.6*	*0*	40.3	*3.3*	*3.3*	*0.0*	34.0	*1*	*0*	*0*	5	10.9	9.9	0.0	79.3	100.0
1974	*8.6*	*8.6*	*0*	45.4	*4.8*	*4.8*	*0.0*	37.5	*1*	*0*	*0*	5	14.4	13.4	0.0	87.9	115.6
1975	*10.6*	*10.6*	*0*	50.5	*6.3*	*6.3*	*0.0*	41.0	2.8	*0*	*0*	4.0	19.7	16.9	0.0	95.5	132.0
1976	*12.6*	*12.6*	*0*	55.6	*7.8*	*7.8*	*0.0*	44.5	3.3	*0*	*0*	4.3	23.7	20.4	0.0	104.4	148.4
1977	*14.6*	*14.6*	*0*	60.7	*9.3*	*9.3*	*0.0*	48.0	0	0.9	0	8.8	23.9	24.8	0.0	117.5	166.1
1978	*16.6*	*16.6*	*0*	65.7	21.5	0.0	0.0	51.6	0	1.2	0	4.5	38.1	17.8	0.0	121.8	177.7
1979	*18.6*	*18.6*	*0*	70.8	54.7	0.0	0.0	55.1	2	4.0	0	2.3	75.3	22.6	0.0	128.1	226.0
1980	*20.6*	*20.6*	*0.0*	75.9	60.2	0.0	0.0	35.5	29.2	1.5	0	2.4	110.0	22.1	0.0	113.8	246.0
1981	32.3	284.8	50.7	46.9	93.7	0.0	0.0	24.2	2.8	0.8	0	3.4	128.8	285.6	50.7	74.5	539.6
1982	199.8	0.2	1.8	103.8	14.4	0.0	5.6	39.1	4.4	0.9	0	3.4	218.6	1.1	7.4	146.2	373.3
1983	56.5	0.3	0.8	51.0	177.3	0.0	0.0	66.3	6.5	1.2	0	6.7	240.3	1.5	0.8	124.0	366.5
1984	43.5	0.5	0.9	80.8	57.1	0.0	0.0	33.8	3.0	2.0	0	12.2	103.6	2.5	0.9	126.8	233.8
1985	7.3	0.9	0.6	125.8	91.9	0.0	0.0	30.4	10.5	6.3	0	8.8	109.7	7.2	0.6	165.0	282.5
1986	9.8	20.0	1.2	65.5	59.8	5.7	0.0	18.1	2.7	6.4	0	9.0	72.3	32.1	1.2	92.6	198.3
1987	16.9	33.1	3.7	75.2	65.7	8.7	0.0	35.7	6.0	8.1	0	10.5	88.6	49.9	3.7	121.5	263.7
1988	30.6	22.5	11.8	57.5	110.7	14.35	0.0	7.9	15.8	4.3	0	8.3	157.1	41.2	11.8	73.7	283.8
1989	9.4	34.0	6.7	58.7	169.4	20	0.0	14.5	27.9	2.5	0	14.6	206.7	56.5	6.7	87.7	357.6
1990	10.1	58.8	10.9	46.12	61.1	25.65	0.0	18.6	18.8	1.7	0	9.9	90.0	86.2	10.9	74.6	261.7
1991	13.9	124.0	3.2	33.57	104.6	31.3	0.0	18.8	15.8	1.8	0	18.0	134.3	157.1	3.2	70.4	365.0
1992	15.8	95.1	1.3	21.02	107.8	58	0.0	26.0	25.1	3.3	0	16.2	148.7	156.4	1.3	63.3	369.7
1993	6.2	46.1	0.6	8.5	119.3	63.9	0.0	21.6	17.6	9.0	0	18.0	143.1	119.0	0.6	48.0	310.7
1994	4.7	48.7	1.0	14	77.6	24.6	0.0	16.8	7.2	2.8	0	10.3	89.5	76.1	1.0	41.5	208.1
1995	3.6	44.2	0.7	12.6	126.3	22.8	0.0	8.2	8.1	0.1	0	9.9	138.0	67.1	0.7	30.6	236.4
1996	16.2	48.0	1.6	12.5	75.5	22.2	0.0	15.4	8.6	0.0	0	10.8	100.3	70.2	1.6	38.7	210.8
1997	6.0	55.3	0.9	15.1	71.4	44.1	0.0	18.8	6.5	12.2	0	11.4	83.9	111.6	0.9	45.3	241.7
1998	4.0	16.7	0.9	5.8	20.8	20.6	0.0	17.3	4.8	0.7	0	14.4	29.6	38.0	0.9	37.5	106.0
1999	8.7	13.4	0.1	12.6	7.1	54.2	0.0	9.5	9.9	23.0	0	10.6	25.7	90.6	0.1	32.7	149.1
2000	0.7	3.3	0.0	7.5	0.3	3.3	0.0	4.8	0.2	7.7	0	10.1	1.2	14.3	0.0	22.5	38.0
2001	0.6	3.9	0.0	4.6	0.7	5.5	0.0	3.1	0.8	21.2	0	12.5	2.1	30.6	0.0	20.3	53.0
2002	0.2	0.0	0.0	2.1	0.4	0.3	0.0	3.6	0.4	2.2	0	3.7	1.0	2.5	0.0	9.4	12.9
2003	0.0	0.0	0.0	3.7	0.8	0.2	0.0	3.8	0.2	0.3	0	2.6	1.0	0.5	0.0	10.1	11.6
2004	0.0	0.0	0.0	3.5	0.2	0.5	0.0	2.4	0.1	0.8	0	4.5	0.3	1.3	0.0	10.4	12.0
	Mean Annual Catch				Mean Annual Catch				Mean Annual Catch				Mean Annual Catch				
1980's	42.7	41.7	7.8	74.1	90.0	4.9	0.6	30.6	10.9	3.4	0.0	7.9	143.6	50.0	8.4	112.6	259.5
1990's	8.9	55.0	2.1	18.2	77.2	36.7	0.0	17.1	12.2	5.5	0.0	13.0	98.3	97.2	2.1	48.3	107.2
2000-2004	0.3	1.4	0.0	4.3	0.5	2.0	0.0	3.6	0.3	6.5	0.0	6.7	1.1	9.9	0.0	14.5	25.5

Table 2. Differences between 2005 catch estimates and those used in the 2001assessment. Italic indicates years where data were not collected to estimate catch, but presumed by authors. Bracketed () catch indicates a reduction in catch estimate, otherwise an increase in catch estimate.

	California		Oregon		Washington			Total		Grand
Year	**Rec**	**Comm**	**Rec**	**Comm**	**Rec**	**Comm**	**Line**	**Rec**	**Comm**	**Total**
1955	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1956	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1957	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1958	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1959	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1960	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1961	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1962	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1963	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1964	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1965	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1966	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1967	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1968	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1969	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	0.0	0.0	0.0
1970	*10.1*	*0.1*	*1.4*	*0.0*	*0.0*	*0.0*	*0.0*	11.5	0.1	11.6
1971	*11.2*	*0.1*	*1.9*	*0.0*	*0.0*	*0.0*	*0.0*	13.1	0.1	13.2
1972	*12.3*	*0.1*	*2.4*	*0.0*	*0.0*	0.7	*0.0*	14.7	0.8	15.5
1973	*13.3*	*0.1*	*2.9*	*0.0*	*0.0*	0.0	*0.0*	16.2	0.1	16.3
1974	*14.4*	*0.1*	*3.4*	*0.0*	*0.0*	0.0	*0.0*	17.8	0.1	17.9
1975	*15.5*	*0.1*	*3.9*	*0.0*	(0.7)	0.0	*0.0*	18.7	0.1	18.8
1976	*16.6*	*0.1*	*4.4*	*0.0*	(0.8)	0.0	*0.0*	20.2	0.1	20.3
1977	*17.7*	*0.1*	*4.9*	*0.0*	(1.6)	0.0	*0.0*	21.0	0.1	21.1
1978	*18.7*	*0.1*	5.5	*0.0*	(0.9)	0.0	*0.0*	23.3	0.1	23.4
1979	*19.8*	*0.1*	6.0	*0.0*	2.3	0.0	*0.0*	28.1	0.1	28.2
1980	5.7	*0.1*	3.8	*0.0*	(0.5)	0.0	*0.0*	9.0	0.1	9.1
1981	(0.1)	68.3	(12.5)	0.0	0.3	0.0	*0.0*	(12.3)	68.3	56.0
1982	(43.1)	3.8	(16.9)	0.0	0.8	0.0	*0.0*	(59.2)	3.8	(55.4)
1983	1.7	0.6	2.5	(0.1)	2.3	(26.7)	0.0	6.5	(26.2)	(19.7)
1984	9.2	0.7	(12.8)	0.1	3.8	(16.5)	0.0	0.2	(15.7)	(15.5)
1985	3.4	0.4	7.1	0.0	2.5	(20.9)	0.0	13.0	(20.5)	(7.5)
1986	0.9	9.1	(11.0)	0.1	0.7	(6.7)	0.0	(9.4)	2.5	(6.9)
1987	0.8	20.7	4.2	0.3	1.1	(16.9)	0.0	6.1	4.1	10.2
1988	(7.6)	13.8	(1.6)	15.0	3.3	(20.9)	0.0	(5.9)	7.9	2.0
1989	2.0	8.7	(3.1)	19.9	5.1	(71.1)	0.0	4.0	(42.5)	(38.5)
1990	2.4	11.6	(3.9)	37.1	3.4	(13.2)	0.0	1.9	35.5	37.4
1991	2.9	15.1	(4.0)	21.5	6.2	(21.9)	0.0	5.1	14.7	19.8
1992	3.3	0.3	(5.6)	0.0	5.6	(19.1)	0.0	3.3	(18.8)	(15.5)
1993	(5.6)	(6.2)	(3.4)	(0.1)	8.8	(27.1)	0.0	(0.2)	(33.4)	(33.6)
1994	(2.0)	(17.4)	(2.6)	(0.1)	5.6	(14.1)	0.0	1.0	(31.6)	(30.6)
1995	(3.0)	(11.5)	(9.8)	(79.8)	4.2	(8.6)	0.0	(8.6)	(99.9)	(108.5)
1996	0.7	(9.3)	7.2	(52.9)	5.9	(15.8)	0.0	13.8	(78.0)	(64.2)
1997	0.8	(4.6)	2.7	(76.0)	5.8	(2.5)	0.0	9.3	(83.1)	(73.8)
1998	0.4	(0.2)	0.0	(4.1)	7.5	0.1	0.0	7.9	(4.2)	3.7
1999	(0.4)	9.9	(7.0)	(14.7)	5.2	0.1	(0.0)	(2.2)	(4.7)	(6.9)
2000	(0.5)	2.0	(3.4)	(0.7)	4.0	0.1	0.0	0.1	1.4	1.5
2001	(0.5)	2.2	(0.9)	(0.1)	4.6	0.0	0.0	3.2	2.1	5.3
Total	121.0	119.1	(34.3)	(134.6)	84.5	(301.0)	0.0	171.2	(316.5)	(145.3)

1/ Revised Recfin estimates and corrected mistake in the catch interpolated between 1979-1970 in last stock assessment
2/ Revised PacFIn catch
3/ Revised Or catch numbers from 1970 - 1993 and then RecFIN?

Table 3. Yelloweye rockfish von Bertalanffy growth function parameters by area and sex. Sizes are in cm fork length.

von Bertalanffy Growth Parameters

	Males						Females						Combined Sexes					
Area	**Linf**	**K**	**t 0**	**t 20**	**t 40**	**N**	**Linf**	**K**	**t 0**	**t 20**	**t 40**	**N**	**Linf**	**K**	**t 0**	**t 20**	**t 40**	**N**
California	67.3	0.054	-5.0	49.9	61.4	50	66.3	0.048	-7.8	49.0	59.7	79	65.4	0.052	-7.1	49.2	59.6	160
Oregon	67.3	0.054	-5.5	50.5	61.6	424	64.1	0.055	-6.0	48.6	58.9	531	65.4	0.055	-5.5	49.2	60.0	1060
Washington	68.5	0.050	-5.6	49.6	61.6	355	67.3	0.043	-9.3	48.1	59.1	286	67.5	0.047	-7.4	49.1	60.3	759
W-O-C	68.0	0.051	-6.0	50.0	61.5	779	64.9	0.051	-6.6	48.4	59.0	817	65.9	0.053	-5.9	49.2	60.1	1979
[1] **Vancouver Is.**	69.1	0.052	-3.7	49.2	62.1	684	66.4	0.052	-4.3	47.8	59.9	642	67.2	0.055	-3.5	48.6	60.9	1326
[2] **Queen Charlotte Islands**	68.3	0.053	-6.2	51.2	62.4	749	65.4	0.051	-6.6	48.7	59.4	997	65.8	0.056	-5.6	49.9	60.5	1746
[3] **Bowie Seamount**	79.3	0.043	-6.0	53.8	68.6	240	82.4	0.035	-7.8	50.9	66.6	228	81.0	0.038	-7.1	52.3	67.7	468
[4] **SE Alaska**	64.4	0.051	-5.4	46.9	58.1	1112	65.9	0.037	-11.6	45.6	56.3	1091	64.4	0.046	-7.6	46.2	57.1	2203

Table 4. Comparison of mean length estimates and standard deviations.

Source	L at Age 6	L at Age 60	K	CV @ Age 6	CV @ Age 60
External	30.8	63.9	0.053	0.180	0.098
SS1 Model estimates	26.9	65.7	0.049	0.128	0.095
SS2 (SS1 age error and catch)	23.1	64.1	0.059	0.141	0.134
SS2 Base Model (revised age error and catch)	22.6	64.6	0.063	0.082	0.051

Table 5. Length and age at 50% maturity for yelloweye rockfish by area and source.

		Male		Female	
Source	**Area**	**A_{50}**	**L_{50}**	**A_{50}**	**L_{50}**
O' Connell et.al. 2000	SE Alaska	23	50	21	45
Rosenthal et.al., 1982	SE Alaska	-	52-60	-	50-52
Kronlund and Yamanaka, 2000	Queen Charolotte Is.	-	-	18.9-20.3	48.5-49.1
Kronlund and Yamanaka, 2000	Vancouver Is.	-	-	16.5-17.2	42.1-42.4
Barss, 1989	Oregon	-	45	-	41
McClure, 1982 [1]	Oregon	12	56	11	45
Reilly et al. 1994 [2]	California		40		40
Watters, 1992 [1]	California	7	40	7	40

[1] Surface age reading of otoliths

[2] Sex unspecified

Table 6. Catch curve estimates of natural mortality.

Ricker Catch Curve Analyses

Area	Year	Age Range	Combined Sexes	Males	Females
Neah Bay, Washington	2000	16-34	0.076	0.060	0.083
		17-34	0.065	0.049	0.074
		18-34	0.048	0.036	0.056
		19-34	0.048	0.049	0.049
Bowie Seamount [1]	1999	19-46	0.025	0.021	0.033
		20-46	0.011	0.008	0.020
		21-46	-0.003	-0.007	0.009
Bowie Seamount-bright [2]	1999	>=20, 5yr Bins	-	0.086	0.043
SE Alaska [3]	1988	36-96,2yr Bins	0.02	-	-

[1] Data provide by Yamanaka, DFO Canada

[2] Yamanaka ,2000

[3] O'Connel et.al., 2000

Table 7. Natural mortality estimates derived from maximum age (Hoenig, 1983).

Empiracle use of longevity data to estimate natural mortality (Hoenig,1983)

			Sexes Combined				Males				Females			
Area	Year	Gear	Mean	Max	Mortality	N	Mean	Max	Mortality	N	Mean	Max	Mortality	N
California	77-85	Sport	25.8	122	0.038	163								
Neah Bay, Washington	98-00	Sport	25.8	87	0.053	296	25.2	79	0.058	152	26.6	87	0.053	144
N. Vancouver Island	97-98	Set Line	23.8	95	0.048	1129	23.8	109	0.042	577	24.9	94	0.049	552
Queen Charelotte	97-98	Set Line	24.3	115	0.040	1407	22.6	95	0.048	716	25.2	89	0.051	684
Bowie Seamount	99	Set Line	28.6	99	0.046	851	26.9	92	0.050	427	30.4	99	0.046	424
SE Alaska														

Note: Natural mortality was estimated using Hoenig's "all groups" a and b parameters.

Table 8. Sample sizes of size and age composition samples from California Fisheries. X in the size@age column indicates the year to which mean size-at-age observation was assigned for data source and negative values indicate sample data not used due to small sample size.

	Size		Age				
Year	N	N [1/]	N	N [1/]	Size@Age	Catch (mt)	N/Catch
SPORT							
1978	81					66	1.2
1979	119					71	1.7
1980	124		17	23		76	1.9
1981	83		33	23	X	47	2.5
1982	106		18	22		104	1.2
1983	105					51	2.1
1984	169					81	2.1
1985	300					126	2.4
1986	206					65	3.1
1987	98					75	1.3
1988	317					58	5.5
1989	385					59	6.6
1990	89					46	1.9
1991	112					34	3.3
1992	164					21	7.8
1993	236					8	27.9
1994	250					14	17.4
1995	199					13	15.8
1996	239					12	19.2
1997	250					15	16.5
1998	125					6	21.5
1999	88	66				13	7.0
2000	47	67				8	6.2
2001	15	15				5	3.3
2002	13	13				2	6.3
2003	15	15				4	4.1
2004	15	15				3	4.3
COMMERCIAL							
1978	50	15				33	1.5
1979	5	15				37	0.1
1980	11	15	12	6		41	0.6
1981	3	15		6		368	0.0
1982	8	15	8	6		202	0.1
1983	22	15	5	7		58	0.5
1984	18	15	17	20		45	0.8
1985	11	15	39	20		9	5.7
1986	14	15	5	21	X	31	0.6
1987	22	15				54	0.4
1988	14	15				65	0.2
1989	8	15				50	0.2
1990	10	15				80	0.1
1991	224					141	1.6
1992	493					112	4.4
1993	709					53	13.4
1994	748					54	13.8
1995	383					49	7.9
1996	534					66	8.1
1997	299					62	4.8
1998	54					22	2.5
1999	507	268				22	22.8
2000	28	267				4	7.0
2001						5	0.0
2002						0	0.0
2003						0	0.0
2004						0	0.0

Table 9. Sample sizes of size and age composition data from Oregon Fisheries. X in the size@age column indicates the year to which mean size-at-age observation was assigned for data source and negative values indicate sample data not used due to small sample size.

	Size		Age				
Year	**N**	**N** [1/]	**N**	**N** [1/]	**Size@Age**	**Catch (mt)**	**N/Catch**
SPORT							
1978	120		120			52	4.7
1979	106		169			55	5.0
1980	25	29				36	0.7
1981	13	29				24	0.5
1982	61	29				39	1.6
1983	17	29				66	0.3
1984	373					34	11.0
1985	222		244			30	15.3
1986	177		124		X	18	16.6
1987	163		140			36	8.5
1988	38		123			8	20.3
1989	112					14	7.7
1993	163		32			22	9.0
1994	151					17	9.0
1995	110					8	13.5
1996	73					15	4.7
1997	99					19	5.3
1998	147					17	8.5
1999	246					10	25.8
2000	62					5	12.8
2001	368		86			3	144.6
2002	448		73			4	144.3
2003	490					4	128.6
2004	-2					2	-0.8
COMMERCIAL							
1992	-13					165.8	-0.1
1995	98					149.1	0.7
1996	161					97.7	1.6
1997	256					115.5	2.2
1998	118					41.4	2.9
1999	166		-24			61.3	2.3
2000	141					3.6	39.2
2001	248		-38			6.2	33.9
2002	-4					0.7	-5.7
2003	-1					1	-1.0
2004	-7					0.7	-10.0

Table 10. Sample sizes of size and age composition from Washington Fisheries. X in the size@age column indicates the year to which mean size-at-age observation was assigned for data source and negative values indicate sample data not used due to small sample size.

	Size		Age				
Year	N	N [1/]	N	N [1/]	Size@Age	Catch (mt)	N/Catch
SPORT							
1980	111	29				2.4	45.7
1981	45	29				3.4	13.3
1982	15	29				3.4	4.5
1983	7	29				6.7	1.0
1984	19	29				12.2	1.6
1985	15	29				8.8	1.7
1986	9	29				9.0	1.0
1987	34	28				10.5	3.2
1988	4	28				8.3	0.5
1995	9	11				9.9	0.9
1996	14	12				10.8	1.3
1998	48		25	60		14.4	3.3
1999	96		95	60		10.6	9.0
2000	189		189		X	10.1	18.6
2001	101		96			12.5	8.1
2002	-2					3.7	-0.5
2003	-7		-7			2.6	-2.7
2004	0					4.5	0.0
COMMERCIAL							
1980	-4					30.7	-0.1
1982	-14					5.3	-2.6
1996	266					8.6	30.9
1997	118					18.7	6.3
1998	40	34				5.5	7.3
1999	45	34				32.9	1.4
2000	17	34				0.2	85.0
2001	-1					0.8	-1.3
2002	48	23	48	23		0.4	120.0
2003	5	23	2	23		0.2	25.0
2004	16	23	14	23		0.1	160.0
LINE							
2000	344				X	7.7	44.4
2001	582		186			21.2	27.4
2002	91	43	91	38		2.2	41.4
2003	14	43	8	38		0.3	46.7
2004	24	43	14	37		0.8	30.0

Table 11. CPUE indices of abundance used in the 2002 and 2005 yelloweye stock assessment.

Year	California CPFV	Oregon Sport	Washington Sport
1979		23.3	
1980		27.2	
1981		24.5	
1982		22.8	
1983		29.4	
1984		20.8	
1985		13.4	
1986		18.1	
1987		22.2	
1988	39.7		
1989	45.9		
1990	37.7		
1991	57.1		20.9
1992	38.9		22.4
1993	35.1		21.1
1994	33.5	12.2	17.2
1995	32.9	8.3	15.4
1996	30.4	5.6	15.6
1997	20.5		19.6
1998	16.8	10.4	20.6
1999		11.8	16.3
2000			16.7

Table 12. Yelloweye rockfish biomass as estimated from swept-area densities observed in bottom trawl surveys.

	California			Oregon			Washington			Canada		
YEAR	Biomass	CV	Tows	Biomass	CV	Tows	Biomass	CV	Tows	Biomass	CV	Tows
Depth Zone 55-183m												
1977	0		0	68	0.78	2	232	0.29	14	0		0
1980	59	0.72	2	234	0.65	11	82	0.72	8	7	0.44	7
1983	4	1.00	1	180	0.43	11	510	0.58	14	4	0.50	4
1986	299	0.70	2	136	0.47	6	181	0.31	29	0		0
1989	83	0.54	8	187	0.52	11	463	0.36	8	17	0.62	17
1992	11	0.65	4	213	0.58	11	108	0.30	11	12	0.41	12
1995	18	1.00	1	44	0.96	3	22	0.60	3	6	0.58	6
1998	4	1.00	1	24	0.75	3	61	0.36	5	10	0.49	10
2001	0		1	172	0.52	8	111	0.49	9	3	0.75	3
Depth Zone 184-366m												
1977[a]	0		0	0		0	23	0.61	3	0		0
1980	34	1.00	1	0		0	6	1.00	1	2	0.67	2
1983	4	1.00	1	126	0.58	4	49	0.75	5	0		0
1986	0		0	0		0	27	1.00	1	0		0
1989	1	1.00	1	12	1.00	1	2	0.79	1	1	1.00	1
1992	0		0	0		0	10	0.72	1	1	0.96	1
1995	0		0	0		0	0		0	0		0
1998	4	1.00	1	0		0	1	1.00	0	1	1.00	1
2001	0		1	0		0	8	0.53	3	1		1
Depth zone 367-475												
1977[a]							52	0.60	3			

Table 13. Yelloweye rockfish catch observed in the International Pacific Halibut Commission's US water 2A set-line survey since 1997.

Number of Fish Observed in IPHC 2A Halibut Survey

Species	1997 [1]	1999 [1]	2001 [1]	2002	2003	2004
Blackgill Rockfish					2	1
Bocaccio		5	5			1
Canary Rockfish	16	5	5	18	11	43
Darkblotched Rkfish			10			
Greenstriped Rockfish		5	5	1	19	2
Quillback Rockfish					1	3
Redbanded Rockfish	21	30	10	9	70	16
Rosethorn Rockfish				1	4	1
Rougheye Rockfish	113	125	30	16	45	11
Shortraker Rockfish	20			1	1	
Shrtspine Thornyhead	32	20	25	9	47	35
Unident. Rockfish	8					
Yelloweye Rockfish	204	336	203	142	317	175
Yellowtail Rockfish	12	25		1	1	20
				634		

[1/] Expanded from sub-sample of the 1st 20 hooks from each set.

Table 14. Yelloweye submersible study area statistics.

Area Description	Area (ha)
Vancouver (U.S. only) shallow strata 55-183 meters	351,800
Study Area	55,680
Total Sampled Area	28
Study Area/U.S. Vancouver Area Ratio	15.8%

[1/] *Vancouver US includes U.S. territorial coastal waters from 47 30' - U.S. Canadian Border.*

Table 15. Results from the 2002 yelloweye submersible survey in untrawlable habitat found in the US Vancouver INPFC area.

Study results for yelloweye rockfish

	All Fish	Age 3+ Fish [1/]
Mean Length (cm)	50.0	51.7
Length Estimates (#'s of Fish)	38	36
Weight (kg) [2/]	2.73	2.69
Number of Fish Observed	59	57
Mean Density (#'s per ha)	2.02	1.95
Estimated Numbers of Fish in Stu	112,586	108,746
Biomass in Study Area (mt)	307	292

[1/] *Fish greater than 30 cm*

[2/] *Weighted biomass*

Table 16. Adjusted NMFS trawl survey area swept estimates in the US Vancouver INPFC area.

	Washington State			U.S. Vancouver 55-183 meter			[2/] Adjusted Biomass (mt)	
Year	Total	CV	[1/] Tows	Total	CV	[1/] Tows	U.S. Vancouver	Total Washington
1977	232	0.29	14	56	0.50	4	47	223.6
1980	82	0.72	8	57	1.00	2	48	73.0
1983	510	0.58	14	140	0.48	7	118	487.9
1986	181	0.31	29	120	0.44	18	101	162.1
1989	463	0.36	8	422	0.38	4	355	396.0
1992	108	0.30	11	82	0.33	8	69	95.2
1995	22	0.60	3	8	0.55	1	7	21.1
1998	61	0.36	5	52	0.39	4	44	53.0
2001	111	0.49	9	64	0.61	7	54	101.2
Mean	197	0.45	11	111	1	6	94	179
Median	111	0.36	9	64	0	4	54	101

[1/] *Tows with yelloweye rockfish.*

[2/] *WDFW adjustment to NMFS trawl survey biomass reflecting trawlable habitat in US Vancouver Area onl*

Table 17. Comparison of biomass estimates between the 2002 yelloweye assessment and the 2002 submersible survey in the US Vancouver INPFC area.

Area Model	Biomass (mt) [1/]	Ratio W-O-C	Biomass (mt) [5/]
Methot etal., 2002 Yelloweye Stock Assessment			
W-O-C [2/]	2310		
California [3/]	988	40.3%	931
Oregon [3/]	921	37.6%	868
Washington [3/]	542	22.1%	511
Survey Biomass Estimates			
Adjusted 2001 NMF	101		
Study Survey	292		
Total Survey Based	393		

[1/] *Age 3+ Biomass*

[2/] *Final STAR Panel endorsed model 2002 beginning biomass (Methot, etal., 20*

[3/] *Independent Area Model Results for 2001 ending biomass*

[4/] *WDFW adjusted NMFS trawl survey biomass*

[5/] *2002 W-O-C biomass apportioned by independent area model results*

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

Base model description of all paramters

Parameter	# estimated	Bounds Low	Bounds High	Prior Mean	Prior STD	Phase
Stock Recruitment						
Ln(R0)	1	3	31	5	50	1
Steepness	-	NA		Fixed @ 0.437		
Sigma R	-	NA		Fixed @ 0.4		
Env_link	0	NA		none		
Iinit_eq	1	-5	5	0	SigmaR	3
Natural Mortality	-	NA		Fixed @ 0.045		
Selectivity (Double Logistic for 7 fisheries and mirror 3 surveys)						
Peak	7	40	70	50.0	10	3
Initial	-	NA		Fixed @ 0.001		
Asc. Inflection	7	-10	5	0.5	3	3
Asc. Slope	7	0.001	5	0.3	99	3
Final	7	-5	10	5.0	99	3
Desc. Inflect	7	-10	5	0.3	3	3
Desc. Slope	7	0.001	5	0.3	99	4
Width of Top	7	0.1	10	5.0	99	4
Block off sets for time varying selectivity						
CaRec_asc_infl_84-04	1	-10	5	0.5	3	5
CARec_final_87-04	1	-5	10	0.3	99	5
OrCom_asc_infl_00-04	1	-5	5	0.5	3	5
WaRec_asc_infl_98-04	1	-5	5	0.5	3	5
WaRec_asc_slope_98-04	1	-5	5	0.3	3	5
WaRec_final_98-04	1	-10	10	5.0	99	5
Growth (Single morph)						
Length at age 6	1	10	35	23.1	10	2
Length at age 60	1	40	120	64.1	10	2
von Bertalanffy k	1	0.01	0.2	0.059	0.8	3
CV of length at age 2	1	0.05	0.2	0.141	0.8	3
CV of length at age 60 (offset)	1	-1	1	-0.049	0.8	3
TOTAL	62 + 49 (Recruitment Devs) =111					

Table 19. List of likelihood components in the base model.

Base Model	
Likelihood Component	**Likelihood**
indices	23.0
length_comps	717.0
age_comps	355.5
size-at-age	76.0
Equil_catch	0.0
Recruitment	11.5
Parm_priors	0.4
Parm_devs	0.0
penalties	0.0
Forecast_Recruitment	0.0

Table 20a. Comparison of model results between SS1 and two SS2 model configurations with identical data files. In model A1.0 selectivity's, body length at min-age and max-age, k, and steepness are set to SS1 values, and in model A1.1 these parameters are re-estimated.

Model	**SS1**	**SS2 A1.0**	**SS2 A1.1**
Start Year	1955	1955	1955
End Year	2001	2001	2001
Data	2002 assessment	Same as SS1	Same as SS1
Selectivity			
Double Logistic	Estimated	Fixed SS1	**Estimated**
Time Varying	Estimated	Fixed SS1	**Estimated**
Number of parameters	100.0	55.0	up to 76
Age Error			
% Agree @1	0.31	Same as SS1	Same as SS1
% Agree @70	0.11	Same as SS1	Same as SS1
Discard	None	None	None
M-G Parameters			
Natural Mortality (Young)	0.045	0.045	0.045
Old Offset	0	0	0
age_for_growth_Lmin	6	6	6
age_for_growth_Lmax	60	60	60
Body length @Agemin	26.9	26.9	**23.1**
Body length @Agemax	65.7	65.7	**64.1**
VonBert	0.049	0.049	**0.059**
CV@Age 6	0.128	0.128	**0.141**
CV@Age 60	0.095	0.095	0.134
Biology			
W-length-1	2.9696	2.9696	2.9696
W-length-2	0.0000	0.0000	0.0000
Mat-length-1	42.1	42.1	42.1
Mat-length-2	-0.415	-0.415	-0.415
S-R Parameters			
Ln(R0) (Lambda 0.5)	**5.037**	**5.226**	**5.407**
S-R Steepness (model est)	0.437	0.437	0.437
SD Recruitments	0.4	0.4	0.4
Enviro Link	0	0	0
Initial Equil	**0.004**	**0.005**	**0.0006216**
Bio-all $_{\text{Ending Year}}$	2248	2055	2142
SPB 0	3859	3632	3659
SPB $_{\text{Ending Year}}$	898	784	825
Depletion	0.233	0.216	0.225

	SS1		
LIKELIHOOD	**-1057**	**1304**	**1212**
indices	31.0	23.1	26.5
discard	0.0	0.0	0.0
length_comps	-711.6	829.9	791.3
age_comps	-251.8	271.6	284.7
size-at-age	-127.0	165.0	92.5
mean_body_wt	0.0	0.0	0.0
Equil_catch	0.0	0.0	0.0
Recruitment	7.8	14.7	16.2
Parm_priors	0.0	0.0	0.5
Parm_devs	0.0	0.0	0.0
penalties	-5.4	0.0	0.0
Forecast_Recruitment	0.0	0.0	0.0

Table 20b. Comparison of model results when a revised age error is added to the data file (A1.2), a revised catch time series (A1.3) is included and a model (A1.4) where both are revised and selectivity's are re-estimated.

Bold = Estimated

Model	**A1.2**	**A1.3**	**A1.4**
Start Year	1955	1955	1955
End Year	2001	2001	2001
Data	Revised Age Error	Revised Catch	Revised Both
Selectivity			
Double Logistic	Fixed As A1.1	Fixed As A1.1	**Estimated**
Time Varying	Fixed As A1.1	Fixed As A1.1	**Estimated**
Number of parameters	55.0	55.0	up to 76
Age Error			
% Agree @1	Revised Age Error	Same as SS1	Revised Age Error
% Agree @70	Revised Age Error	Same as SS1	Revised Age Error
Discard	None	Included in catch	Included in catch
M-G Parameters			
Natural Mortality (Young)	0.045	0.045	0.045
Old Offset	0	0	0
age_for_growth_Lmin	6	6	6
age_for_growth_Lmax	60	60	60
Body length @Agemin	23.1	23.1	**22.5**
Body length @Agemax	64.1	64.1	**64.0**
VonBert	0.059	0.059	**0.063**
CV@Age 6	0.141	0.141	**0.092**
CV@Age 60	0.134	0.134	0.144
Biology			
W-length-1	2.9696	2.9696	2.9696
W-length-2	0.0000	0.0000	0.0000
Mat-length-1	42.1	42.1	42.1
Mat-length-2	-0.415	-0.415	-0.415
S-R Parameters			
Ln(R0) (Lambda 0.5)	**5.26629**	**5.24609**	**5.26366**
S-R Steepness (model est)	0.437	0.437	0.437
SD Recruitments	0.4	0.4	0.4
Enviro Link	0	0	0
Initial Equil	**-0.00235264**	**0.00998278**	**0.0067889**
Bio-all $_{\text{Ending Year}}$	2200	1968	1818
SPB 0	3638	3566	3686
SPB $_{\text{Ending Year}}$	834	758	693
Depletion	0.229	0.213	0.188

LIKELIHOOD	**1215**	**1209**	**1157**
indices	26.7	24.9	22.6
discard	0.0	0.0	0.0
length_comps	790.1	790.4	766.3
age_comps	290.5	285.8	279.3
size-at-age	90.3	93.1	75.9
mean_body_wt	0.0	0.0	0.0
Equil_catch	0.0	0.0	0.0
Recruitment	17.3	14.6	12.3
Parm_priors	0.0	0.0	0.3
Parm_devs	0.0	0.0	0.0
penalties	0.0	0.0	0.0
Forecast_Recruitment	0.0	0.0	0.0

Table 21. Comparison of model likelihood component fit to explore basis of model differences between SS1 and SS2.

Model A1.0

Fleet	surv_lambda	surv_like	disc_lambda	disc_like	length_lambda	length_like	age_lambda	age_like	sizeage_lambda	sizeage_like
CaRec		0.0	0.0	0.0	0.6	442.4	0.6	25.9	0.6	23.3
CaCom		0.0	0.0	0.0	0.6	277.7	0.6	40.0	0.6	23.0
OrRec		0.0	0.0	0.0	0.6	329.5	0.6	271.1	0.6	17.2
OrCom		0.0	0.0	0.0	0.6	131.6	0.6	0.0	0.6	0.0
WaRec		0.0	0.0	0.0	0.6	107.1	0.6	74.3	0.6	33.2
WaCom		0.0	0.0	0.0	0.6	58.1	0.6	0.0	0.6	0.0
WaLine		0.0	0.0	0.0	0.6	36.9	0.6	41.3	0.6	178.2
CaCPFV	1	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CaMRFSS	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrRec	1	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrCom	1	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Likelihood		23.1				829.9		271.6		165.0

Model A1.1

Fleet	surv_lambda	surv_like	disc_lambda	disc_like	length_lambda	length_like	age_lambda	age_like	sizeage_lambda	sizeage_like
CaRec	1	0.0	0.0	0.0	0.6	407.3	0.6	29.4	0.6	11.7
CaCom	1	0.0	0.0	0.0	0.6	249.3	0.6	41.3	0.6	17.5
OrRec	1	0.0	0.0	0.0	0.6	317.1	0.6	277.6	0.6	93.9
OrCom	1	0.0	0.0	0.0	0.6	130.1	0.6	0.0	0.6	0.0
WaRec	1	0.0	0.0	0.0	0.6	128.4	0.6	93.8	0.6	6.6
WaCom	1	0.0	0.0	0.0	0.6	60.7	0.6	0.0	0.6	0.0
WaLine	1	0.0	0.0	0.0	0.6	25.8	0.6	32.3	0.6	24.5
CaCPFV	1	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CaMRFSS	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrRec	1	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrCom	1	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Likelihood		26.5				791.3		284.7		92.5

Model A1.2

Fleet	surv_lambda	surv_like	disc_lambda	disc_like	length_lambda	length_like	age_lambda	age_like	sizeage_lambda	sizeage_like
CaRec	1	0.0	0.0	0.0	0.6	406.3	0.6	28.5	0.6	8.5
CaCom	1	0.0	0.0	0.0	0.6	249.0	0.6	40.3	0.6	17.0
OrRec	1	0.0	0.0	0.0	0.6	316.5	0.6	285.3	0.6	94.3
OrCom	1	0.0	0.0	0.0	0.6	129.7	0.6	0.0	0.6	0.0
WaRec	1	0.0	0.0	0.0	0.6	128.9	0.6	98.0	0.6	6.2
WaCom	1	0.0	0.0	0.0	0.6	60.8	0.6	0.0	0.6	0.0
WaLine	1	0.0	0.0	0.0	0.6	25.6	0.6	32.1	0.6	24.6
CaCPFV	1	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CaMRFSS	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrRec	1	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrCom	1	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Likelihood		26.7				790.1		290.5		90.3

Model A1.3

Fleet	surv_lambda	surv_like	disc_lambda	disc_like	length_lambda	length_like	age_lambda	age_like	sizeage_lambda	sizeage_like
CaRec	1	0.0	0.0	0.0	0.6	405.6	0.6	29.3	0.6	11.5
CaCom	1	0.0	0.0	0.0	0.6	249.4	0.6	41.3	0.6	17.3
OrRec	1	0.0	0.0	0.0	0.6	317.6	0.6	278.1	0.6	95.0
OrCom	1	0.0	0.0	0.0	0.6	130.0	0.6	0.0	0.6	0.0
WaRec	1	0.0	0.0	0.0	0.6	128.3	0.6	94.9	0.6	6.3
WaCom	1	0.0	0.0	0.0	0.6	60.8	0.6	0.0	0.6	0.0
WaLine	1	0.0	0.0	0.0	0.6	25.7	0.6	32.7	0.6	25.1
CaCPFV	1	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CaMRFSS	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrRec	1	15.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OrCom	1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Likelihood		24.9				790.4		285.8		93.1

Model A1.4

Fleet	surv_lambda	surv_like	disc_lambda	disc_like	length_lambda	length_like	age_lambda	age_like	sizeage_lambda	sizeage_like
CaRec	1	0	0	0	0.6	403.147	0.6	29.2424	0.6	11.2405
CaCom	1	0	0	0	0.6	249.866	0.6	40.2969	0.6	19.3424
OrRec	1	0	0	0	0.6	322.716	0.6	283.227	0.6	64.5309
OrCom	1	0	0	0	0.6	124.589	0.6	0	0.6	0
WaRec	1	0	0	0	0.6	89.6708	0.6	77.2716	0.6	9.03259
WaCom	1	0	0	0	0.6	59.9148	0.6	0	0.6	0
WaLine	1	0	0	0	0.6	27.2788	0.6	35.5292	0.6	22.3045
CaCPFV	1	5.28917	0	0	0	0	0	0	0	0
CaMRFSS	0	0	0	0	0	0	0	0	0	0
OrRec	1	13.796	0	0	0	0	0	0	0	0

Table 22. Parameter estimates and results of the base model.

Bold = Estimated

Model	**Final Base**
Start Year	1955
End Year	2004
Data	2001-2004
Selectivity	data appended
Double Logistic	**Estimated**
Time Varying	**Estimated**
Number of parameters	up to 76
Age Error	
% Agree @1	Same as 1.4
% Agree @70	Same as 1.4
Discard	Included in catch
M-G Parameters	
Natural Mortality (Young)	0.045
Old Offset	0
age_for_growth_Lmin	6
age_for_growth_Lmax	60
Body length @Agemin	**22.6**
Body length @Agemax	**64.6**
VonBert	**0.063**
CV@Age 6	**0.082**
CV@Age 60	0.146
Biology	
W-length-1	2.9696
W-length-2	0.0000
Mat-length-1	42.1
Mat-length-2	-0.415
S-R Parameters	
Ln(R0) (Lambda 0.5)	**5.2694**
S-R Steepness (model est)	0.437
SD Recruitments	0.4
Enviro Link	0
Initial Equil	**0.0110434**
Bio-all $_{\text{Ending Year}}$	2008
SPB 0	3808
SPB $_{\text{Ending Year}}$	798
Depletion	0.210
LIKELIHOOD	**1183**
indices	23.0
discard	0.0
length_comps	717.0
age_comps	355.5
size-at-age	76.0
mean_body_wt	0.0
Equil_catch	0.0
Recruitment	11.5
Parm_priors	0.0
Parm_devs	0.0
penalties	0.0
Forecast_Recruitment	0.0

Table 23a. Convergence runs for the base model with selectivity fixed.

Convergence test of the yelloweye 2005 base model using SS2 V1.19

Run	Objective Function Value	Maximum gradient component	Hessian	Depletion
1	6.48E+14	2.73E+17		
2	1183.02	0.00547562	306.556	0.209
3	1183.02	0.000978704	306.556	0.209
4	8.20E+12	4.36E+15		
5	1183.02	0.00570571	306.556	0.209
6	1.95E+12	1.04E+15		
7	1.76E+13	1.07E+16		
8	1183.02	5.51E-05	306.556	0.209
9	1183.02	4.86E-05	306.556	0.209
10	1183.02	0.00135636	306.556	0.209
11	1183.02	0.0068804	306.556	0.209
12	1183.02	0.00475568	306.556	0.209
13	4.67E+13	2.25E+16		
14	1183.02	0.000298845	306.556	0.209
15	1183.02	0.000338521	306.556	0.209
16	584597	2.99E+06		
17	1183.02	0.00252771	306.556	0.209
18	66043	516359	306.556	0.209
19	1183.02	0.00259236	306.556	0.209
20	1183.02	0.00239585	306.556	0.209
21	4.15E+12	1.69E+15		
22	1183.02	6.50E-05	306.556	0.209
23	1183.02	0.00145004	306.556	0.209
24	1183.02	0.000449229	306.556	0.209

Note; Blank cells indicate Hessian matrix not positive definite

Table 23b. Convergence runs for the base model with all parameters freely estimated.

Sum of Mean	Data2					
Run	Depletion	Fpenality	Last Phase	Like	SPB0	SPB05
1	0.00	2.25141E+19	5	2.251E+19	2,581.02	0.00
2	0.49	0	5	1,473.79	7,766.86	3,823.95
3	0.00	8.04112E+13	5	8.041E+13	2,869.13	0.00
4	0.00	7.86173E+11	3	7.862E+11	3,350.49	0.00
5	0.00	1.0648E+13	5	1.065E+13	2,553.85	0.00
6	1.26	0	5	2,402.39	1,187.60	1,502.12
7	0.00	9.74311E+14	5	9.743E+14	17.33	0.00
8	0.00	4.16014E+16	5	4.160E+16	2,831.53	0.00
9	0.46	0	5	1,595.55	7,340.96	3,357.11
10	1,240.46	377.0379442	5	2.544E+04	49.32	63,103.03
11	0.00	5.36374E+12	5	5.364E+12	2,649.70	0.00
12	0.21	0	5	1,219.64	7,172.03	1,505.29
13	0.00	1.34428E+26	5	1.344E+26	2,179.58	0.00
14	0.00	3.02022E+28	5	3.020E+28	2,178.44	0.00
15	0.34	0	5	1,516.73	6,911.37	2,380.09
16	0.21	0	5	1,246.40	6,907.16	1,456.16
17	0.00	1.60878E+14	5	1.609E+14	3,176.25	0.00
18	4.38	0	5	3,542.70	228.25	1,004.57
19	0.00	1.65422E+15	5	1.654E+15	3,221.76	0.00
20	0.00	5.21205E+24	5	5.212E+24	2,546.36	0.00

Table 24. Biomass results from base model.

Base Model Configuration

year	bio-all	bio-smry	SpawnBio	recruit-0
1953	8,719	8,646	3,808	194
1954	8,471	8,397	3,682	196
1955	8,466	8,397	3,682	155
1956	8,418	8,357	3,663	141
1957	8,371	8,316	3,645	141
1958	8,326	8,272	3,626	149
1959	8,282	8,226	3,608	158
1960	8,238	8,180	3,589	155
1961	8,191	8,134	3,571	141
1962	8,139	8,086	3,553	126
1963	8,083	8,035	3,535	115
1964	8,024	7,981	3,517	110
1965	7,965	7,923	3,499	112
1966	7,904	7,861	3,481	123
1967	7,845	7,797	3,461	148
1968	7,789	7,729	3,440	200
1969	7,745	7,660	3,417	326
1970	7,701	7,589	3,392	360
1971	7,628	7,513	3,361	239
1972	7,535	7,434	3,322	215
1973	7,427	7,341	3,273	235
1974	7,317	7,222	3,215	309
1975	7,192	7,093	3,146	242
1976	7,048	6,960	3,068	152
1977	6,893	6,826	2,981	137
1978	6,733	6,674	2,885	185
1979	6,589	6,508	2,785	319
1980	6,394	6,299	2,666	251
1981	6,179	6,083	2,546	201
1982	5,636	5,557	2,288	180
1983	5,288	5,214	2,122	208
1984	4,975	4,887	1,970	304
1985	4,805	4,711	1,887	243
1986	4,580	4,494	1,787	146
1987	4,443	4,383	1,728	101
1988	4,237	4,194	1,641	97
1989	4,018	3,980	1,544	102
1990	3,728	3,692	1,416	87
1991	3,539	3,508	1,332	61
1992	3,242	3,217	1,206	48
1993	2,939	2,919	1,080	49
1994	2,698	2,680	981	49
1995	2,561	2,542	930	57
1996	2,394	2,372	869	73
1997	2,249	2,222	821	82
1998	2,065	2,035	760	85
1999	2,017	1,985	753	89
2000	1,920	1,888	725	86
2001	1,934	1,901	742	88
2002	1,932	1,899	751	92
2003	1,970	1,935	775	96
2004	2,008	1,972	798	99

Table 25. Numbers-at-age by year from base model run.

NUMBERS_AT_AGE
Population

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1953	186	178	170	162	155	148	142	136	130	124	118	113	108	103	99	95	90
1954	188	180	172	164	157	150	143	137	131	125	119	114	109	104	99	95	91
1955	188	180	172	164	157	150	143	137	131	125	119	114	109	104	99	95	91
1956	148	180	172	164	157	150	143	137	131	125	119	114	109	104	99	94	90
1957	135	141	172	164	157	150	143	137	131	125	119	113	108	103	98	94	90
1958	135	129	135	164	157	150	143	137	131	124	119	113	108	103	98	93	89
1959	143	129	123	129	157	150	143	137	130	124	118	113	107	102	98	93	89
1960	151	137	123	118	123	150	143	137	130	124	118	113	107	102	97	93	88
1961	148	144	131	118	113	118	143	137	130	124	118	113	107	102	97	92	88
1962	135	142	138	125	112	108	113	137	130	124	118	113	107	102	97	92	88
1963	120	129	135	132	119	107	103	108	130	124	118	113	107	102	97	92	87
1964	110	115	123	129	126	114	103	98	103	124	118	113	107	102	97	92	87
1965	105	105	110	118	124	121	109	98	94	98	118	113	107	102	97	92	87
1966	107	100	100	105	113	118	115	104	93	89	93	113	107	102	97	92	87
1967	118	102	96	96	101	108	113	110	99	89	85	89	107	102	97	92	87
1968	141	112	98	92	92	96	103	108	105	95	85	81	84	102	97	92	87
1969	191	135	107	94	88	88	92	98	103	100	90	81	77	80	97	92	87
1970	312	183	129	103	89	84	84	88	94	98	95	86	77	73	76	92	87
1971	345	298	175	123	98	85	80	80	84	89	93	90	81	73	69	72	87
1972	229	329	285	167	118	94	82	76	76	80	85	88	86	77	69	65	68
1973	206	218	315	272	160	113	90	78	73	72	75	80	84	81	73	65	62
1974	225	197	209	301	260	153	107	85	74	69	69	71	76	79	76	68	61
1975	295	215	188	200	288	249	146	102	81	70	65	65	67	71	74	71	64
1976	232	282	205	180	191	275	238	139	97	77	66	62	61	63	67	69	67
1977	146	222	270	196	172	182	262	226	132	92	73	62	58	57	59	62	64
1978	131	139	212	258	188	164	174	250	215	125	87	68	58	54	53	54	57
1979	176	126	133	202	246	179	157	166	237	202	117	81	63	54	50	49	50
1980	304	169	120	127	193	235	171	149	157	223	189	109	75	58	50	45	44
1981	240	291	161	115	122	185	224	163	141	148	208	176	100	69	53	45	41
1982	192	229	278	154	110	116	176	212	152	130	133	184	153	86	58	45	38
1983	172	183	219	266	147	105	110	166	198	140	119	120	165	135	75	51	39
1984	199	164	175	209	254	140	99	104	156	184	128	107	107	144	118	65	44
1985	290	190	157	167	200	242	134	94	98	145	170	117	97	96	130	105	58
1986	232	277	182	150	160	190	230	126	88	91	133	154	105	86	85	114	93
1987	140	222	265	174	143	152	181	218	119	82	84	122	140	96	78	77	103
1988	96	133	212	253	166	137	145	171	204	110	75	76	109	125	84	69	67
1989	93	92	127	203	242	158	130	137	161	190	101	68	68	96	109	73	59
1990	98	89	88	122	194	231	150	123	128	149	172	90	59	58	82	92	61
1991	83	93	85	84	116	185	220	142	115	119	136	155	80	52	51	71	79
1992	58	79	89	81	80	111	176	207	132	105	107	119	133	67	43	42	58
1993	46	55	76	85	77	76	105	166	193	121	94	93	101	111	55	35	34
1994	47	44	53	72	82	74	73	100	155	178	109	83	80	85	92	45	29
1995	47	45	42	50	69	78	70	69	94	144	162	98	73	70	74	79	39
1996	55	45	43	40	48	66	74	67	65	87	131	145	86	63	59	62	67
1997	69	52	43	41	38	46	63	70	63	60	79	117	127	74	54	51	53
1998	79	66	50	41	39	37	44	59	66	58	54	70	101	108	62	45	42
1999	81	75	63	48	39	37	35	42	56	62	54	50	64	92	97	56	40
2000	85	77	72	61	46	37	36	33	39	53	57	49	45	57	81	86	49
2001	82	81	74	69	58	44	36	34	31	37	50	54	46	42	54	76	80
2002	84	78	77	71	66	55	42	34	32	30	35	47	51	43	40	50	71
2003	88	80	75	74	68	63	53	40	33	31	28	34	45	48	41	38	47
2004	92	84	77	72	71	65	60	50	38	31	29	27	32	42	46	39	36

Table 25. Numbers-at-age by year from base model run (continued).

NUMBERS_AT_AGE
Population

Year	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1953	86	83	79	76	72	69	66	63	60	58	55	53	50	48	46	44	42
1954	86	83	79	75	72	69	65	62	60	57	54	52	50	47	45	43	41
1955	86	83	79	75	72	69	65	62	60	57	54	52	50	47	45	43	41
1956	86	82	78	75	71	68	65	62	59	57	54	52	49	47	45	43	41
1957	85	82	78	74	71	68	65	62	59	56	54	51	49	47	45	43	41
1958	85	81	77	74	71	67	64	61	59	56	53	51	49	46	44	42	40
1959	85	81	77	73	70	67	64	61	58	56	53	51	48	46	44	42	40
1960	84	80	77	73	70	67	63	61	58	55	53	50	48	46	44	42	40
1961	84	80	76	73	69	66	63	60	58	55	52	50	48	46	44	42	40
1962	83	80	76	72	69	66	63	60	57	55	52	50	48	45	43	41	40
1963	83	79	75	72	69	65	62	60	57	54	52	49	47	45	43	41	39
1964	83	79	75	72	68	65	62	59	56	54	51	49	47	45	43	41	39
1965	83	79	75	71	68	65	62	59	56	54	51	49	47	45	43	41	39
1966	83	79	75	71	68	64	61	59	56	53	51	49	46	44	42	40	39
1967	83	78	75	71	67	64	61	58	56	53	51	48	46	44	42	40	38
1968	83	78	74	71	67	64	61	58	55	53	50	48	46	44	42	40	38
1969	83	78	74	71	67	64	61	58	55	52	50	48	45	43	41	40	38
1970	83	78	74	71	67	64	60	57	55	52	50	47	45	43	41	39	38
1971	82	78	74	70	67	63	60	57	54	52	49	47	45	43	41	39	37
1972	82	78	74	70	66	63	60	57	54	51	49	47	44	42	41	39	37
1973	64	77	73	70	66	63	59	56	54	51	48	46	44	42	40	38	36
1974	58	60	73	69	65	62	59	56	53	50	48	46	43	41	39	38	36
1975	57	54	56	68	64	61	58	55	52	50	47	45	43	41	39	37	35
1976	60	53	51	52	63	60	57	54	51	49	46	44	42	40	38	36	35
1977	62	55	49	47	49	59	56	53	50	48	45	43	41	39	37	35	34
1978	59	57	51	46	43	45	54	51	49	46	44	42	40	38	36	34	33
1979	53	55	53	47	42	40	41	50	47	45	43	41	39	37	35	33	32
1980	46	48	50	48	43	38	36	38	45	43	41	39	37	35	34	32	30
1981	40	41	43	45	43	39	34	33	34	41	39	37	35	34	32	30	29
1982	34	33	34	36	37	36	32	29	27	28	34	33	31	30	28	27	26
1983	32	29	29	29	31	32	31	27	25	23	24	30	28	27	26	25	24
1984	33	28	25	25	25	26	27	26	24	21	20	21	26	25	24	23	22
1985	39	30	25	22	22	22	24	24	24	21	19	18	19	23	22	21	20
1986	51	34	26	22	20	19	20	21	22	21	19	17	16	17	20	20	19
1987	83	46	31	23	19	18	17	18	19	19	19	17	15	15	15	19	18
1988	90	73	40	27	20	17	15	15	15	16	17	16	15	13	13	13	16
1989	58	77	62	34	23	17	15	13	13	13	14	15	14	13	12	11	12
1990	49	48	64	52	29	19	15	12	11	11	11	12	13	12	11	10	10
1991	53	42	41	55	45	25	16	13	11	10	9	10	10	11	11	10	9
1992	65	43	34	34	45	36	20	13	10	9	8	8	8	9	9	9	8
1993	47	52	34	28	27	36	29	16	11	8	7	6	6	7	7	7	7
1994	28	38	42	28	22	22	29	24	13	9	7	6	5	5	6	6	6
1995	25	24	32	36	24	19	19	25	20	11	8	6	5	5	5	5	5
1996	33	21	20	27	30	20	16	16	21	17	10	6	5	4	4	4	4
1997	56	27	17	16	23	25	17	14	13	18	15	8	6	4	4	3	3
1998	43	46	22	14	13	19	21	14	11	11	15	12	7	5	4	3	3
1999	37	39	41	20	13	12	17	18	12	10	10	13	11	6	4	3	3
2000	35	32	33	35	17	11	10	14	16	11	9	9	12	9	5	4	3
2001	46	33	30	31	33	16	10	10	13	15	10	8	8	11	9	5	3
2002	74	42	30	28	29	30	15	9	9	12	14	9	7	7	10	8	5
2003	67	71	40	29	26	27	29	14	9	8	12	13	9	7	7	9	8
2004	45	64	67	38	27	25	26	27	13	8	8	11	12	8	7	7	9

Table 25. Numbers-at-age by year from base model run (continued).

NUMBERS_AT_AGE
Population

Year	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1953	38	37	35	34	32	31	29	28	27	26	25	23	22	21	20	20	19
1954	37	36	34	33	31	30	28	27	26	25	24	23	22	21	20	19	18
1955	37	36	34	33	31	30	28	27	26	25	24	23	22	21	20	19	18
1956	37	36	34	32	31	30	28	27	26	25	23	22	21	20	20	19	18
1957	37	35	34	32	31	29	28	27	26	24	23	22	21	20	19	19	18
1958	37	35	34	32	31	29	28	27	26	24	23	22	21	20	19	18	18
1959	37	35	33	32	31	29	28	27	25	24	23	22	21	20	19	18	18
1960	36	35	33	32	30	29	28	26	25	24	23	22	21	20	19	18	17
1961	36	35	33	32	30	29	28	26	25	24	23	22	21	20	19	18	17
1962	36	34	33	31	30	29	27	26	25	24	23	22	21	20	19	18	17
1963	36	34	33	31	30	29	27	26	25	24	23	22	21	20	19	18	17
1964	36	34	33	31	30	28	27	26	25	24	23	22	21	20	19	18	17
1965	35	34	32	31	30	28	27	26	25	23	22	21	20	20	19	18	17
1966	35	34	32	31	29	28	27	26	24	23	22	21	20	19	19	18	17
1967	35	33	32	31	29	28	27	25	24	23	22	21	20	19	18	18	17
1968	35	33	32	30	29	28	26	25	24	23	22	21	20	19	18	18	17
1969	35	33	32	30	29	28	26	25	24	23	22	21	20	19	18	17	17
1970	34	33	31	30	29	27	26	25	24	23	22	21	20	19	18	17	17
1971	34	33	31	30	28	27	26	25	24	23	22	21	20	19	18	17	16
1972	34	32	31	29	28	27	26	25	23	22	21	21	20	19	18	17	16
1973	33	32	30	29	28	27	25	24	23	22	21	20	19	19	18	17	16
1974	33	31	30	29	27	26	25	24	23	22	21	20	19	18	17	17	16
1975	32	31	29	28	27	26	25	24	22	21	21	20	19	18	17	16	16
1976	32	30	29	28	26	25	24	23	22	21	20	19	18	18	17	16	15
1977	31	29	28	27	26	25	24	22	22	21	20	19	18	17	16	16	15
1978	30	29	27	26	25	24	23	22	21	20	19	18	18	17	16	15	15
1979	29	28	26	25	24	23	22	21	20	19	19	18	17	16	16	15	14
1980	28	27	25	24	23	22	21	20	20	19	18	17	16	16	15	14	14
1981	26	25	24	23	22	21	20	19	19	18	17	16	16	15	14	14	13
1982	24	23	22	21	20	19	18	18	17	16	15	15	14	14	13	13	12
1983	22	21	20	19	18	18	17	16	16	15	14	14	13	13	12	12	11
1984	20	19	18	17	17	16	15	15	14	14	13	13	12	12	11	11	10
1985	19	18	17	16	16	15	15	14	14	13	12	12	12	11	11	10	10
1986	17	17	16	15	15	14	14	13	13	12	12	11	11	10	10	10	9
1987	16	16	15	15	14	13	13	12	12	11	11	11	10	10	9	9	9
1988	15	15	14	13	13	12	12	12	11	11	10	10	10	9	9	9	8
1989	14	13	13	12	12	11	11	11	10	10	10	9	9	9	8	8	8
1990	12	12	11	11	11	10	10	10	9	9	9	8	8	8	7	7	7
1991	9	11	10	10	10	9	9	9	8	8	8	8	7	7	7	7	6
1992	7	7	9	9	9	8	8	8	7	7	7	7	7	6	6	6	6
1993	6	6	6	8	7	7	7	7	7	6	6	6	6	6	5	5	5
1994	6	5	5	5	6	6	6	6	6	6	5	5	5	5	5	5	4
1995	5	5	4	4	5	6	6	5	5	5	5	5	5	4	4	4	4
1996	5	5	4	4	4	4	5	5	5	5	4	4	4	4	4	4	4
1997	4	4	4	4	3	3	3	4	4	4	4	4	4	4	4	3	3
1998	3	3	3	3	3	3	3	3	4	4	3	3	3	3	3	3	3
1999	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2000	2	2	2	3	3	3	2	2	2	2	3	3	3	3	3	3	3
2001	2	2	2	2	2	3	3	2	2	2	2	3	3	3	3	2	2
2002	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2
2003	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2004	4	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Table 25. Numbers-at-age by year from base model run (continued).

NUMBERS_AT_AGE
Population

Year	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
1953	17	16	16	15	14	14	13	12	12	11	11	10	10	10	9	9	189
1954	16	16	15	14	14	13	12	12	11	11	10	10	9	9	9	8	173
1955	16	16	15	14	14	13	12	12	11	11	10	10	9	9	9	8	173
1956	16	16	15	14	14	13	12	12	11	11	10	10	9	9	9	8	173
1957	16	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	172
1958	16	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	171
1959	16	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	170
1960	16	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	170
1961	16	15	14	14	13	13	12	12	11	10	10	10	9	9	8	8	169
1962	16	15	14	14	13	13	12	11	11	10	10	10	9	9	8	8	168
1963	16	15	14	14	13	12	12	11	11	10	10	9	9	9	8	8	167
1964	16	15	14	14	13	12	12	11	11	10	10	9	9	9	8	8	167
1965	16	15	14	14	13	12	12	11	11	10	10	9	9	9	8	8	166
1966	15	15	14	13	13	12	12	11	11	10	10	9	9	9	8	8	165
1967	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	8	164
1968	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	8	164
1969	15	15	14	13	13	12	12	11	11	10	10	9	9	8	8	8	163
1970	15	14	14	13	13	12	12	11	11	10	10	9	9	8	8	8	162
1971	15	14	14	13	13	12	11	11	10	10	10	9	9	8	8	8	161
1972	15	14	14	13	12	12	11	11	10	10	9	9	9	8	8	8	160
1973	15	14	13	13	12	12	11	11	10	10	9	9	9	8	8	7	158
1974	15	14	13	13	12	12	11	11	10	10	9	9	8	8	8	7	157
1975	14	14	13	13	12	11	11	10	10	10	9	9	8	8	8	7	154
1976	14	13	13	12	12	11	11	10	10	9	9	9	8	8	7	7	152
1977	14	13	13	12	12	11	11	10	10	9	9	8	8	8	7	7	149
1978	13	13	12	12	11	11	10	10	9	9	9	8	8	7	7	7	146
1979	13	13	12	11	11	10	10	10	9	9	8	8	8	7	7	7	142
1980	13	12	12	11	11	10	10	9	9	8	8	8	7	7	7	6	138
1981	12	12	11	11	10	10	9	9	9	8	8	7	7	7	7	6	133
1982	11	11	10	10	9	9	9	8	8	7	7	7	7	6	6	6	122
1983	10	10	9	9	9	8	8	8	7	7	7	6	6	6	6	5	115
1984	10	9	9	8	8	8	7	7	7	7	6	6	6	5	5	5	107
1985	9	9	8	8	8	7	7	7	6	6	6	6	5	5	5	5	102
1986	8	8	8	8	7	7	7	6	6	6	6	5	5	5	5	5	97
1987	8	8	7	7	7	7	6	6	6	6	5	5	5	5	5	4	93
1988	8	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	88
1989	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4	4	83
1990	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4	3	76
1991	6	6	5	5	5	5	5	5	4	4	4	4	4	4	3	3	71
1992	5	5	5	5	5	4	4	4	4	4	4	3	3	3	3	3	65
1993	5	5	4	4	4	4	4	4	3	3	3	3	3	3	3	3	58
1994	4	4	4	4	4	3	3	3	3	3	3	3	3	3	2	2	52
1995	4	4	4	3	3	3	3	3	3	3	3	3	2	2	2	2	49
1996	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	45
1997	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	41
1998	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	38
1999	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	36
2000	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	33
2001	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	33
2002	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	32
2003	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	32
2004	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	31

Table 26. Fishing mortality results by fishery and year from the base model.

Harvest Rate Using Base Model Configuration

	California		Oregon		Washington		
year	**Recreational**	**Commercial**	**Recreational**	**Commercial**	**Recreational**	**Commercial**	**Line**
1953	--	--	--	--	--	--	--
1954	0.001	0.000	0.001	0.000	0.000	0.000	0.000
1955	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1956	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1957	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1958	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1959	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1960	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1961	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1962	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1963	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1964	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1965	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1966	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1967	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1968	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1969	0.004	0.000	0.003	0.000	0.001	0.000	0.000
1970	0.005	0.000	0.004	0.000	0.001	0.000	0.000
1971	0.006	0.001	0.005	0.000	0.001	0.000	0.000
1972	0.007	0.002	0.005	0.001	0.001	0.000	0.000
1973	0.008	0.003	0.006	0.001	0.001	0.000	0.000
1974	0.009	0.004	0.007	0.002	0.001	0.000	0.000
1975	0.011	0.005	0.008	0.003	0.001	0.001	0.000
1976	0.012	0.006	0.009	0.004	0.001	0.001	0.000
1977	0.013	0.007	0.009	0.004	0.001	0.000	0.000
1978	0.015	0.009	0.010	0.005	0.001	0.000	0.000
1979	0.017	0.010	0.011	0.014	0.000	0.001	0.000
1980	0.019	0.011	0.008	0.016	0.000	0.007	0.000
1981	0.012	0.105	0.005	0.026	0.001	0.001	0.000
1982	0.029	0.063	0.009	0.006	0.001	0.001	0.000
1983	0.014	0.019	0.017	0.057	0.001	0.002	0.000
1984	0.024	0.016	0.009	0.019	0.003	0.001	0.000
1985	0.038	0.003	0.009	0.032	0.002	0.005	0.000
1986	0.021	0.012	0.005	0.024	0.002	0.003	0.000
1987	0.028	0.021	0.011	0.028	0.003	0.005	0.000
1988	0.022	0.026	0.002	0.048	0.002	0.007	0.000
1989	0.024	0.021	0.005	0.077	0.004	0.011	0.000
1990	0.020	0.036	0.007	0.038	0.003	0.008	0.000
1991	0.015	0.066	0.007	0.062	0.005	0.007	0.000
1992	0.010	0.057	0.010	0.083	0.005	0.012	0.000
1993	0.004	0.029	0.009	0.100	0.006	0.013	0.000
1994	0.008	0.032	0.008	0.060	0.004	0.005	0.000
1995	0.007	0.030	0.004	0.091	0.004	0.004	0.000
1996	0.008	0.043	0.008	0.063	0.005	0.005	0.000
1997	0.010	0.042	0.010	0.077	0.005	0.011	0.000
1998	0.004	0.016	0.010	0.030	0.010	0.004	0.000
1999	0.009	0.016	0.006	0.045	0.007	0.007	0.024
2000	0.006	0.003	0.003	0.002	0.007	0.000	0.008
2001	0.003	0.003	0.002	0.004	0.009	0.001	0.021
2002	0.002	0.000	0.002	0.000	0.003	0.000	0.002
2003	0.003	0.000	0.002	0.001	0.002	0.000	0.000
2004	0.002	0.000	0.001	0.000	0.003	0.000	0.001

Table 27. Estimated selectivity by fishery and year from the base model.

Size	CaRec_1955-1	CaRec_1983-1	CaRec_1987-1	CaCom_1955-2	OrRec_1955-3	OrCom_1955-4	OrCom_2000-4	WaRec_1955-5	WaRec_1998-5	WaCom_1955-6	WaLine_1955-7	IndexCPFV_1955-8	IndexCPFV_1983-8	IndexCPFV_1987-8	IndexOrRec_1955-10	IndexWaRec_1955-11
19	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
21	0.01	0.04	0.04	0.01	0.03	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.04	0.04	0.03	0.00
23	0.02	0.09	0.09	0.03	0.07	0.00	0.03	0.00	0.01	0.01	0.00	0.02	0.09	0.09	0.07	0.00
25	0.04	0.15	0.15	0.06	0.14	0.00	0.08	0.02	0.02	0.02	0.00	0.04	0.15	0.15	0.14	0.02
27	0.06	0.23	0.23	0.10	0.26	0.01	0.20	0.13	0.03	0.05	0.00	0.06	0.23	0.23	0.26	0.13
29	0.11	0.34	0.34	0.16	0.42	0.02	0.42	0.54	0.05	0.08	0.00	0.11	0.34	0.34	0.42	0.51
31	0.17	0.46	0.46	0.25	0.60	0.05	0.68	0.90	0.08	0.15	0.00	0.17	0.46	0.46	0.60	0.88
33	0.25	0.59	0.59	0.37	0.76	0.14	0.86	0.99	0.13	0.25	0.01	0.25	0.59	0.59	0.76	0.98
35	0.36	0.70	0.70	0.50	0.87	0.32	0.95	1.00	0.19	0.38	0.01	0.36	0.70	0.70	0.87	1.00
37	0.49	0.79	0.79	0.63	0.93	0.58	0.98	1.00	0.27	0.53	0.03	0.49	0.79	0.79	0.93	1.00
39	0.62	0.87	0.87	0.75	0.97	0.80	0.99	1.00	0.37	0.68	0.06	0.62	0.87	0.87	0.97	1.00
41	0.73	0.92	0.92	0.84	0.98	0.93	1.00	1.00	0.48	0.80	0.13	0.73	0.92	0.92	0.98	1.00
43	0.83	0.95	0.95	0.91	0.99	0.98	1.00	1.00	0.60	0.89	0.26	0.83	0.95	0.95	0.99	1.00
45	0.90	0.97	0.97	0.95	1.00	1.00	1.00	1.00	0.72	0.94	0.46	0.90	0.97	0.97	1.00	1.00
47	0.95	0.99	0.99	0.98	1.00	1.00	1.00	1.00	0.84	0.97	0.69	0.95	0.99	0.99	1.00	1.00
49	0.99	1.00	1.00	0.99	1.00	0.97	0.97	1.00	0.94	0.99	0.87	0.99	1.00	1.00	1.00	1.00
51	1.00	1.00	1.00	1.00	1.00	0.94	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
53	1.00	1.00	1.00	0.98	1.00	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
55	1.00	1.00	1.00	0.96	1.00	0.85	0.85	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00
57	0.95	0.95	0.93	0.93	1.00	0.80	0.80	1.00	1.00	1.00	0.97	0.95	0.95	0.93	1.00	1.00
59	0.89	0.89	0.85	0.87	0.99	0.74	0.74	1.00	1.00	1.00	0.93	0.89	0.89	0.85	0.99	1.00
61	0.82	0.82	0.74	0.78	0.98	0.68	0.68	1.00	1.00	1.00	0.84	0.82	0.82	0.74	0.98	1.00
63	0.73	0.73	0.62	0.66	0.93	0.62	0.62	1.00	1.00	1.00	0.70	0.73	0.73	0.62	0.93	1.00
65	0.64	0.64	0.49	0.53	0.85	0.56	0.56	1.00	1.00	1.00	0.51	0.64	0.64	0.49	0.85	1.00
67	0.55	0.55	0.37	0.39	0.70	0.50	0.50	1.00	0.99	0.96	0.34	0.55	0.55	0.37	0.70	1.00
69	0.48	0.48	0.26	0.27	0.53	0.45	0.45	1.00	0.91	0.75	0.21	0.48	0.48	0.26	0.53	1.00
71	0.41	0.41	0.18	0.18	0.39	0.40	0.40	1.00	0.62	0.33	0.14	0.41	0.41	0.18	0.39	1.00
73	0.37	0.37	0.12	0.12	0.30	0.36	0.36	1.00	0.43	0.17	0.11	0.37	0.37	0.12	0.30	1.00
75	0.34	0.34	0.08	0.09	0.26	0.33	0.33	1.00	0.40	0.15	0.09	0.34	0.34	0.08	0.26	1.00
77	0.32	0.32	0.05	0.06	0.24	0.30	0.30	1.00	0.40	0.15	0.09	0.32	0.32	0.05	0.24	1.00
79	0.31	0.31	0.03	0.05	0.24	0.28	0.28	1.00	0.40	0.15	0.08	0.31	0.31	0.03	0.24	1.00
81	0.30	0.30	0.02	0.04	0.23	0.26	0.26	1.00	0.40	0.15	0.08	0.30	0.30	0.02	0.23	1.00
83	0.29	0.29	0.01	0.04	0.23	0.25	0.25	1.00	0.40	0.15	0.08	0.29	0.29	0.01	0.23	1.00
85	0.29	0.29	0.01	0.04	0.23	0.24	0.24	1.00	0.40	0.15	0.08	0.29	0.29	0.01	0.23	1.00
87	0.29	0.29	0.00	0.04	0.23	0.23	0.23	1.00	0.40	0.15	0.08	0.29	0.29	0.00	0.23	1.00
89	0.29	0.29	0.00	0.04	0.23	0.23	0.23	1.00	0.40	0.15	0.08	0.29	0.29	0.00	0.23	1.00
91	0.29	0.29	0.00	0.04	0.23	0.22	0.22	1.00	0.40	0.15	0.08	0.29	0.29	0.00	0.23	1.00

Table 28. Profile of likelihood and other model outcomes over a range of fixed values for the initial recruitment level (virgin recruitment).

Bold = Estimated							**R_0 Profile**								
Model Initial R_0	**152**	**159**	**166**	**173**	**180**	**187**	**194**	**201**	**208**	**215**	**222**	**229**	**236**	**243**	**250**
RUN FILE	**Run1**	**Run2**	**Run3**	**Run4**	**Run5**	**Run6**	**Base**	**Run8**	**Run9**	**Run10**	**Run11**	**Run12**	**Run13**	**Run14**	**Run15**
S-R Parameters															
Ln(R0)	**5.024**	**5.069**	**5.112**	**5.153**	**5.193**	**5.231**	**5.2694**	**5.303**	**5.338**	**5.371**	**5.403**	**5.434**	**5.464**	**5.493**	**5.521**
S-R Steepness (model est)		**0.453**	**0.435**	**0.418**	**0.403**	**0.390**	**0.378**	**0.369**	**0.3615**	**0.3562**	**0.3531**	**0.3523**	**0.3542**	**0.3594**	**0.3688**
SD Recruitments		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Enviro Link		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Initial Equil		**0.086**	**0.0622**	**0.0385**	**0.0153**	**-0.006**	**-0.028**	**-0.047**	**-0.066**	**-0.084**	**-0.099**	**-0.113**	**-0.125**	**-0.135**	**-0.142**
SPB 0		3,117	3,254	3,390	3,528	3,665	3,807	3,938	4078.7	4215.6	4352.6	4489.7	4626.4	4762.5	4897.8
SPB2004		518	542	568	596	625	656	687	722.88	761.23	803.94	852.06	906.94	970.31	1044.4
Depletion		0.166	0.167	0.168	0.169	0.170	0.172	0.174	0.177	0.181	0.185	0.190	0.196	0.204	0.213
LIKELIHOOD	**Crash**	**1199**	**1192**	**1187**	**1183**	**1181**	**1180**	**1179**	**1180**	**1182**	**1184**	**1187**	**1190**	**1194**	**1198**
indices		23.3	22.8	22.5	22.2	22.1	22.1	22.1	22.3	22.6	23.0	23.6	24.4	25.4	26.7
discard		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mean_body_wt		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
length_comps		718.8	717.8	717.0	716.5	716.1	715.9	715.8	715.9	716.0	716.3	716.7	717.1	717.7	718.3
age_comps		356.2	355.4	354.8	354.4	354.1	354.0	353.9	353.9	354.0	354.2	354.4	354.6	354.8	355.1
size-age		75.5	75.6	75.6	75.7	75.8	75.8	75.8	75.9	75.9	75.9	75.9	75.9	75.9	75.8
Equil_catch		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recruitment		25.4	20.6	17.0	14.4	12.7	11.9	11.8	12.3	13.3	14.8	16.5	18.5	20.5	22.5
Parm_priors		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parm_devs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
penalties		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forecast_Recruitment		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 29. Profile of likelihood and other model outcomes over a range of fixed values for steepness.

Bold = Estimated					**Profile on Steepness**										
Model	**0.05**	**0.1**	**0.15**	**0.2**	**0.25**	**0.3**	**0.35**	**0.4**	**0.45**	**0.5**	**0.55**	**0.6**	**0.65**	**0.7**	**0.75**
RUN FILE	**Run1**	**Run2**	**Run3**	**Run4**	**Run5**	**Run6**	**Run7**	**Run8**	**Run9**	**Run10**	**Run11**	**Run12**	**Run13**	**Run14**	**Run15**
S-R Parameters															
Ln(R0)	**5.141**	**5.191**	**5.225**	**5.239**	**5.243**	**5.241**	**5.236**	**5.231**	**5.227**	**5.222**	**5.219**	**5.21582**	**5.21334**	**5.21135**	**5.20978**
S-R Steepness (model est)	**0.05**	**0.1**	**0.15**	**0.2**	**0.25**	**0.3**	**0.35**	**0.4**	**0.45**	**0.5**	**0.55**	**0.6**	**0.65**	**0.7**	**0.75**
SD Recruitments	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Enviro Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Initial Equil	**0.10391**	**0.05499**	**0.01705**	**7.06E-08**	**-0.00786**	**-0.01022**	**-0.00932**	**-0.00689**	**-0.00381**	**-0.00052**	**0.00275**	**0.00587**	**0.00879**	**0.01149**	**0.01396**
SPB 0	3246	3413	3532	3581	3594	3588	3572	3554	3537	3522	3509	3499	3490	3483	3478
SPB2004	501	497	521	550	580	613	645	675	704	730	755	779	801	823	843
Depletion	0.154	0.146	0.147	0.154	0.161	0.171	0.181	0.190	0.199	0.207	0.215	0.223	0.230	0.236	0.242
LIKELIHOOD	**1248**	**1207**	**1189**	**1182**	**1180**	**1180**	**1180**	**1182**	**1183**	**1185**	**1187**	**1188**	**1190**	**1191**	**1192**
indices	24.8	23.7	22.8	22.3	22.1	22.1	22.4	22.7	23.1	23.6	24.0	24.5	25.0	25.5	25.9
discard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
mean_body_wt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
length_comps	732.1	722.8	719.1	716.8	715.9	715.9	716.2	716.6	717.2	717.7	718.1	718.6	719.0	719.3	719.6
age_comps	353.5	353.6	352.7	353.1	353.6	354.1	354.7	355.1	355.6	356.0	356.4	356.7	356.9	357.2	357.4
size-age	74.8	74.4	75.2	75.5	75.7	75.9	75.9	76.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0
Equil_catch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recruitment	63.0	32.3	19.6	14.6	12.4	11.5	11.3	11.3	11.6	11.9	12.2	12.6	12.9	13.2	13.5
Parm_priors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parm_devs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
penalties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forecast_Recruitment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 30. Effect on model fit with emphasis on SR curve.

old = Estimated	**Rec from SR**	**Rec from SR**	**SR Lamda Profile**				
odel	**Emp 0 for comps**	**Emp 0.6 for comps**	**10**	**1**	**0.5**	**0.01**	**0.001**
UN FILE	**Run1**	**Run2**	**Run3**	**Run4**	**Run5**	**Run6**	**Run7**
-R Parameters							
Ln(R0)		5.33626	5.31775	5.2923	5.29101	5.30095	5.18413
S-R Steepness (model est)		**0.397**	**0.374**	**0.302**	**0.281**	**0.206**	**0.200**
SD Recruitments		0.4	0.4	0.4	0.4	0.4	0.4
Enviro Link		0	0	0	0	0	0
Initial Equil		-0.00047899	-0.00231791	-0.00204254	-0.00114298	0.000433877	0.116359
SPB 0		3264	3690	3821	3808	3936	3938
SPB2004		845	906	835	798	646	605
Depletion		0.259	0.246	0.218	0.209	0.164	0.154
LIKELIHOOD	**Crash**	**1345**	**1267**	**1190**	**1179**	**1164**	**1163**
indices		19.3	20.9	22.0	22.1	22.2	22.2
discard		0.0	0.0	0.0	0.0	0.0	0.0
length_comps		833.4	752.4	717.5	715.8	714.5	714.2
age_comps		395.4	370.4	355.1	353.9	352.2	351.9
size-at-age		79.5	78.7	76.5	75.8	74.5	74.5
mean_body_wt		0.0	0.0	0.0	0.0	0.0	0.0
Equil_catch		0.0	0.0	0.0	0.0	0.0	0.0
Recruitment		17.1	44.7	18.6	11.7	0.8	0.2
Parm_priors		0.0	0.0	0.0	0.0	0.0	0.0
Parm_devs		0.0	0.0	0.0	0.0	0.0	0.0
penalties		0.0	0.0	0.0	0.0	0.0	0.0
Forecast_Recruitment		0.0	0.0	0.0	0.0	0.0	0.0

Table 31. Effect on model fit and emphasis on length, age and size compositions.

Bold = Estimated			**Length, Age and Size Profile**				
Model Lamda	**100**	**10**	**1**	**0.5**	**0.1**	**0.01**	**0.001**
RUN FILE	**Run1**	**Run2**	**Run3**	**Run4**	**Run5**	**Run6**	**Run7**
S-R Parameters							
Ln(R0)		**5.309**	**5.293**	**5.291**	**5.296**	**5.312**	5.31187
S-R Steepness (model est)		**0.239**	**0.270**	**0.281**	**0.333**	**0.401**	0.40148
SD Recruitments		0.4	0.4	0.4	0.4	0.4	0.4
Enviro Link		0	0	0	0	0	0
Initial Equil		**0.00165672**	**-0.000447202**	**-0.00114299**	**-0.00281792**	**-0.00114385**	-0.00114385
SPB 0		3,962	3,900	3,891	3,911	3,974	3,721
SPB2004		728	682	676	668	653	508
Depletion		0.184	0.175	0.174	0.171	0.164	0.136
LIKELIHOOD	**Crash**	**19074**	**1943**	**1179**	**221**	**41**	**20**
indices		22.6	22.2	22.1	21.2	18.8	17.7
discard		0.0	0.0	0.0	0.0	0.0	0.0
mean_body_wt		0.0	0.0	0.0	0.0	0.0	0.0
length_comps		11909	1192	716	122	14	1.6
age_comps		5874	589	354	60	7	0.7
size-age		1244	126	76	13	1	0.1
Equil_catch		0.0	0.0	0.0	0.0	0.0	0.0
Recruitment		25.5	13.6	11.7	5.2	0.3	0.2
Parm_priors		0.0	0.0	0.0	0.0	0.0	0.0
Parm_devs		0.0	0.0	0.0	0.0	0.0	0.0
penalties		0.0	0.0	0.0	0.0	0.0	0.0
Forecast_Recruitment		0.0	0.0	0.0	0.0	0.0	0.0

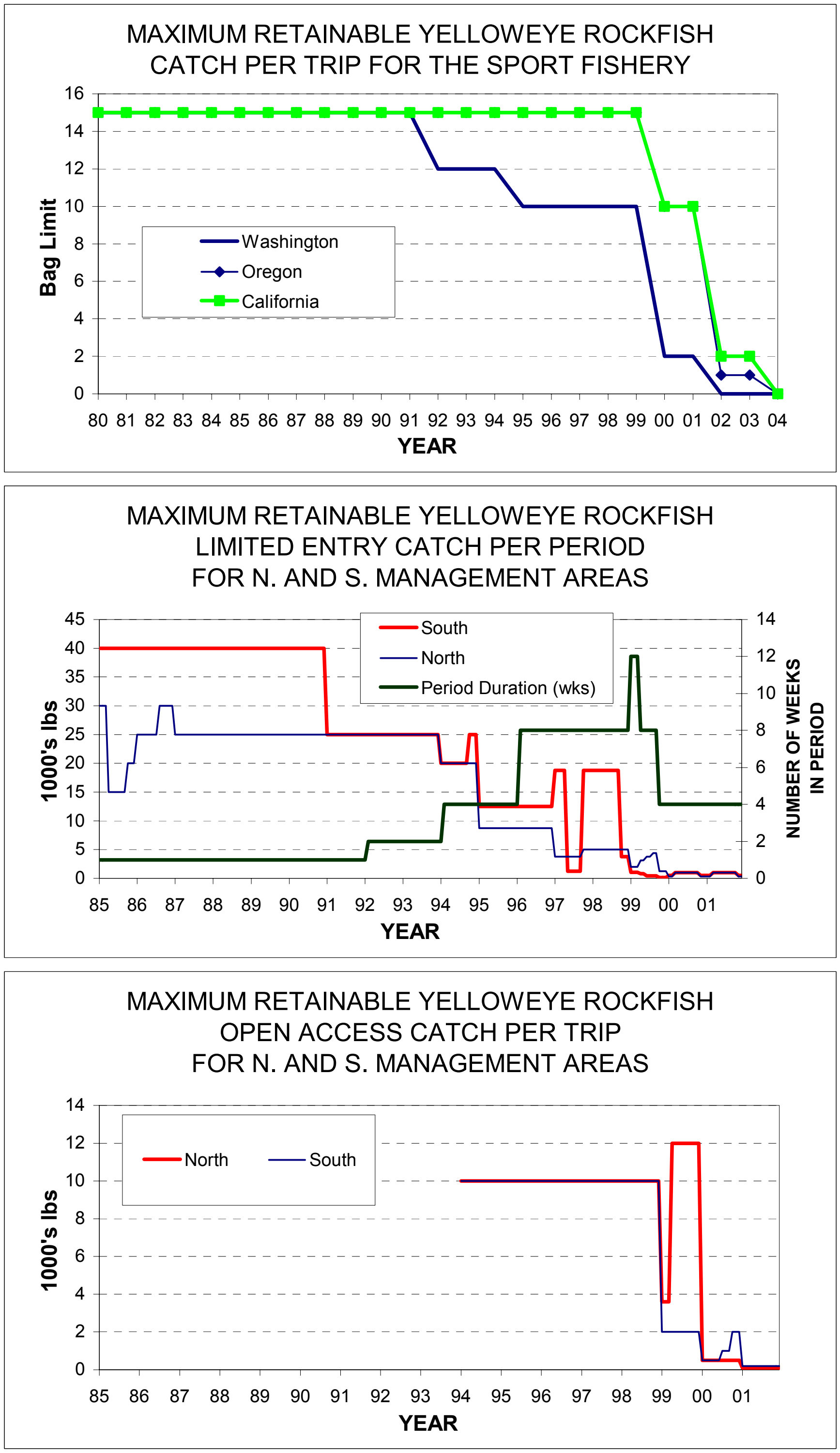
Table 32. Reference points estimated from the base model.

Reference Point	Value
Recruitment _unfished (thousands)	194
SPB_unfished	3,808
Summary Biomass (B_smry, unfished)	8,644
Steepness for MSYcalculation	0.437
SPR at MSY	0.500
Exploit at MSY (=Y/B_smry)	0.021
Recruits at MSY	102
SPB at MSY	998
SPB_{MSY}/SPB_0(using S_0)	0.262
MSY	52
B_smry at MSY	2,480
Depletion(endyear)	0.21

Note: Summary age is 3

Table 33. Biomass forecasting by using the base model. Catch is fixed at 26 metric tons, recommended in the 2002 rebuilding plan.

Year	Age 3+ Biomass	Spawning Biomass	Depletion	Catch (mt)	$F_{(SPR\ 0.5)}$
2005	2009	1636	0.215	26	0.017
2006	2032	1659	0.218	26	0.017
2007	2054	1677	0.220	26	0.016
2008	2074	1692	0.222	26	0.016
2009	2096	1706	0.224	26	0.016
2010	2118	1719	0.226	26	0.016
2011	2139	1732	0.227	26	0.016
2012	2161	1746	0.229	26	0.016
2013	2183	1762	0.231	26	0.016
2014	2205	1778	0.233	26	0.016
2015	2227	1795	0.236	26	0.016



Note: The PFMC N/S Management border shifted North from Cape Mendencio to 40° 10' in 2000. Between Cape Mendocino and N of 36' N, recreational rockfish fishing is closed 3/1 - 4/30; S of 36' N, recreational rockfish fishing is closed 1/1 - 2/29

Figure 1. Yelloweye management history by fishery and area 1985-2004.

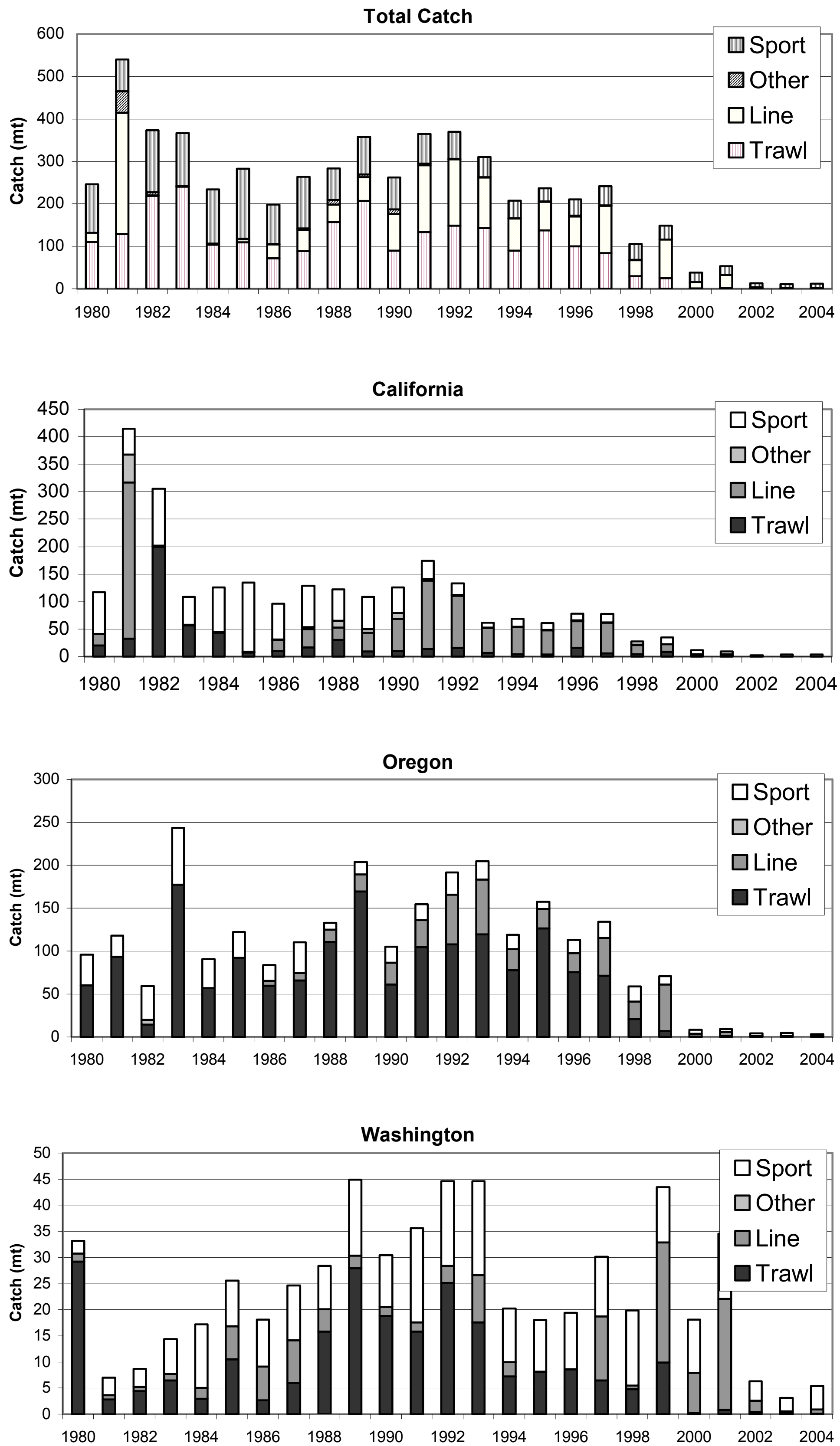


Figure 2. Estimated yelloweye rockfish catch by State and year since 1980.

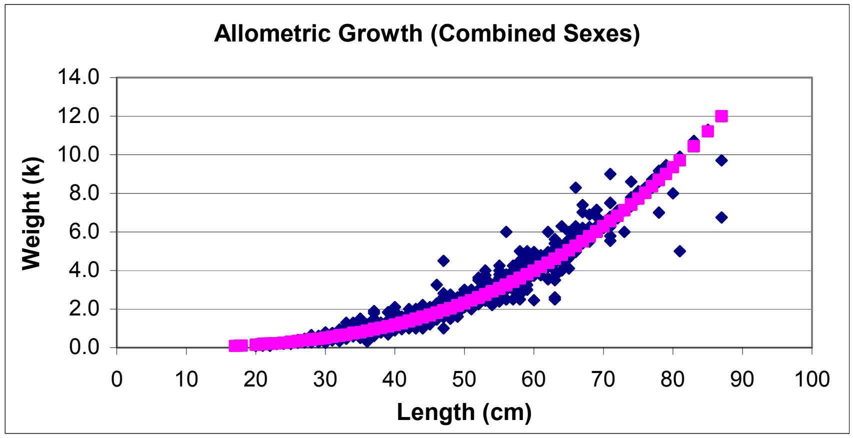


Figure 3. Yelloweye allometric growth for combined sexes (weight= 0.000021*length$^{2.9659}$)

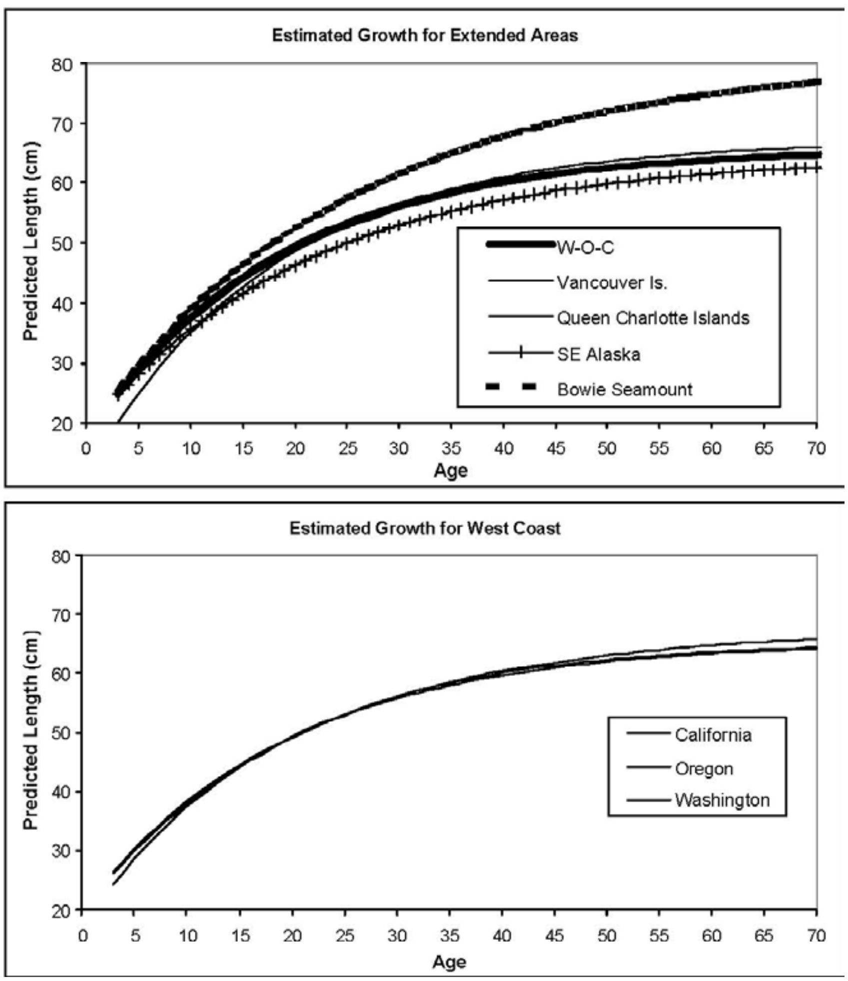


Figure 4. Predicted yelloweye rockfish size-at-age by locale. Need to update for the final model.

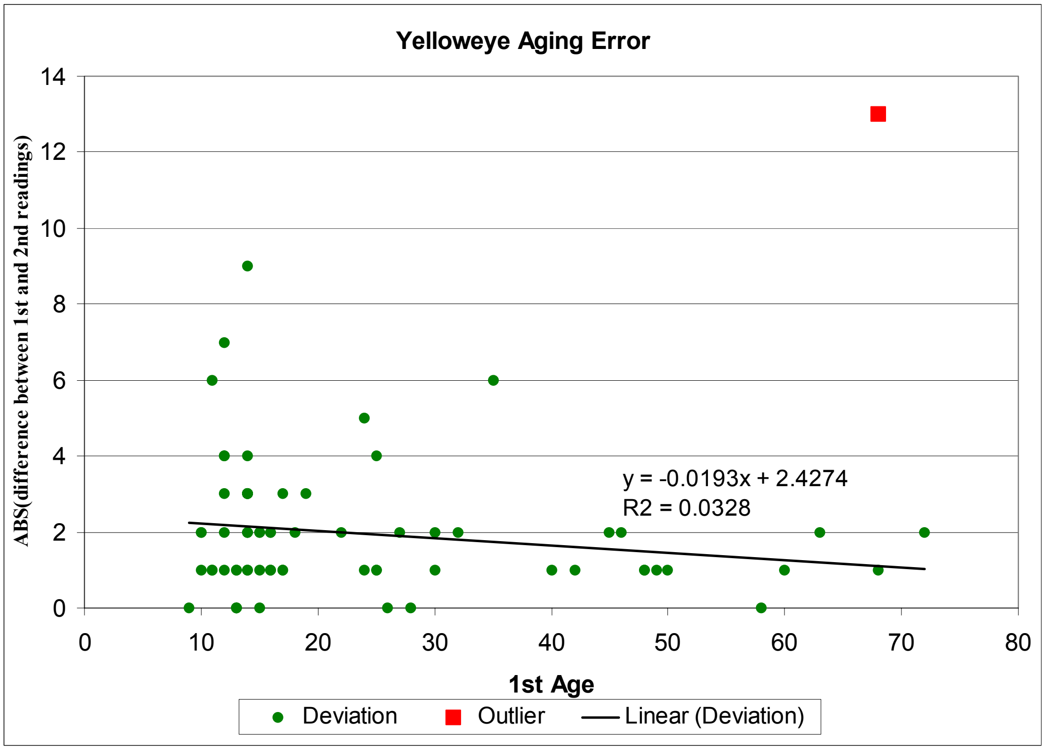


Figure 5. Observed and predicted age error for yelloweye rockfish when omitting the outlier from the dataset.

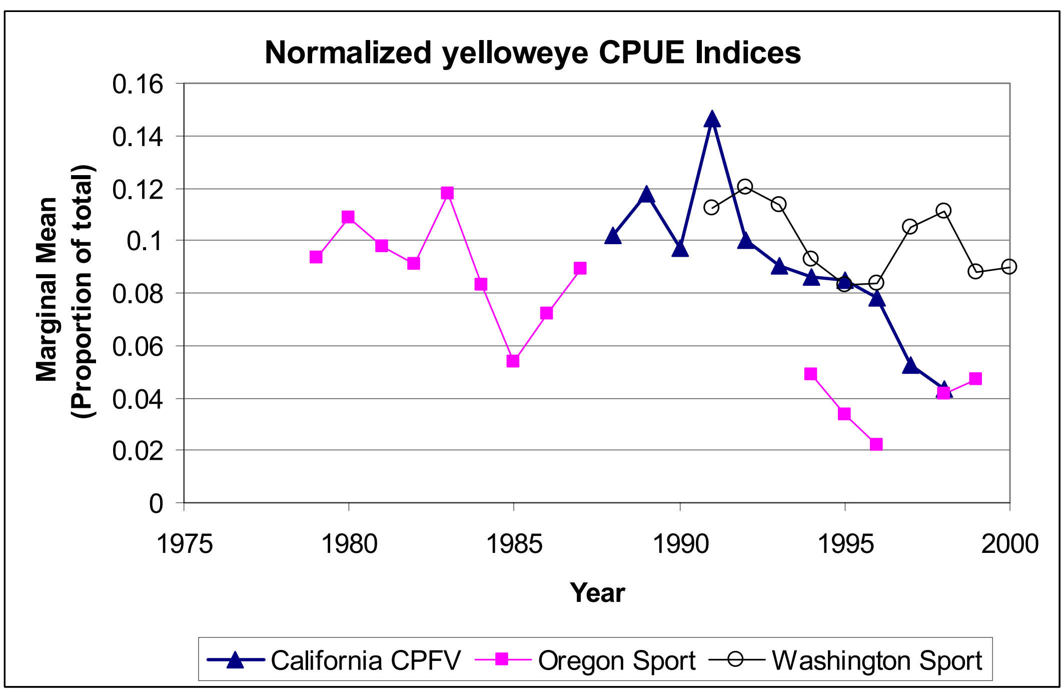


Figure 6. Normalized CPUE indices used in the 2002 and 2005 yelloweye stock assessments.

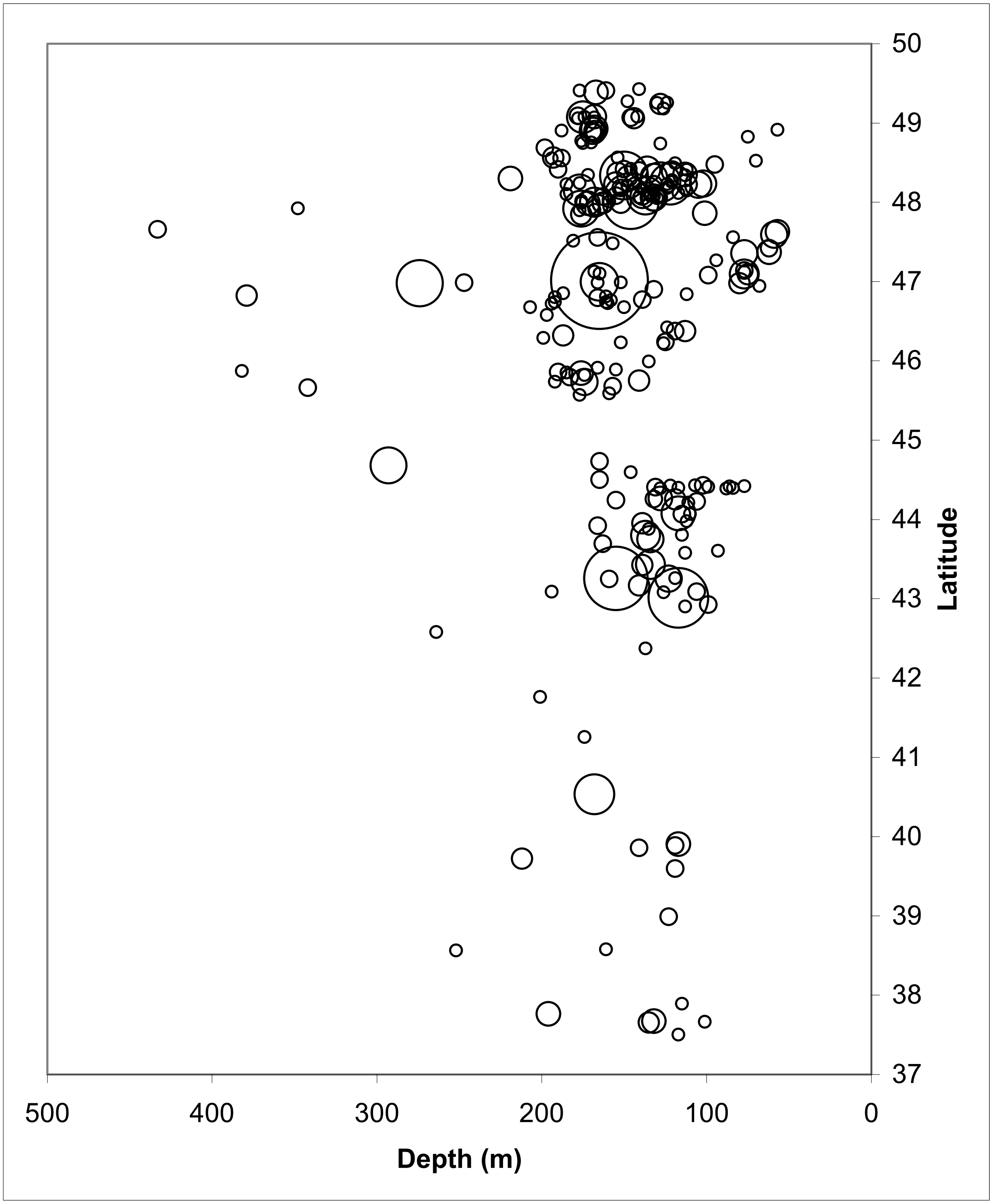


Figure 7. Spatial pattern of yelloweye rockfish occurrence in the NMFS bottom trawl survey; 1977-2001. Size of circle is proportional to yelloweye rockfish density at that location.

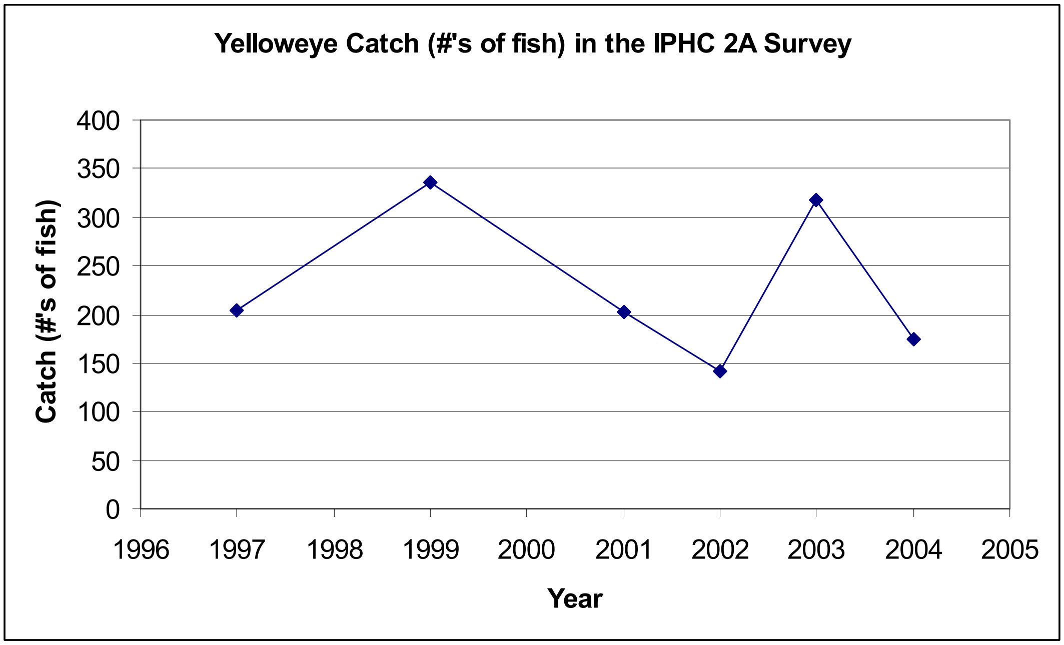


Figure 8. IPHC US water 2A yelloweye catch since 1997. Expanded estimates through 2001.

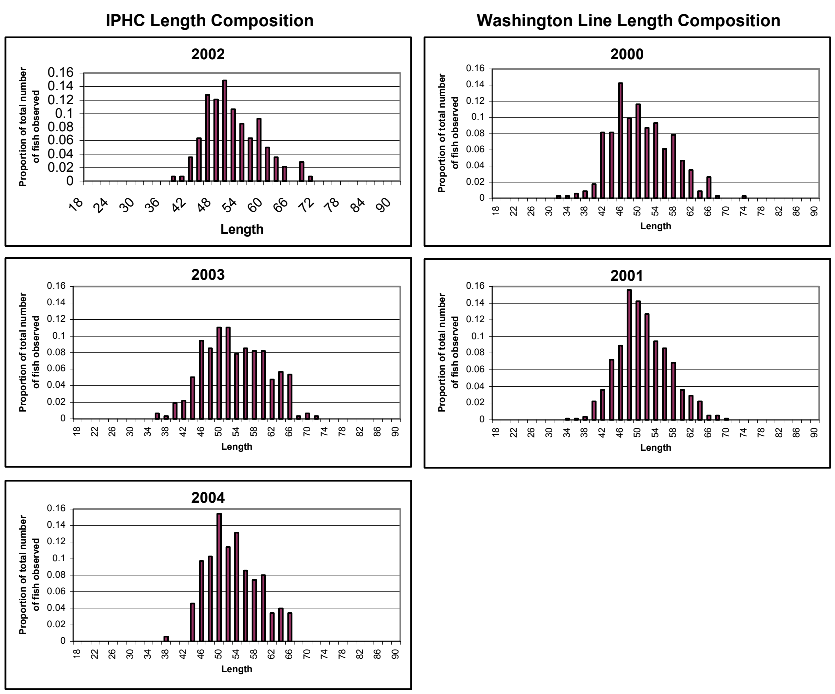


Figure 9. Comparison of length composition between the Washington yelloweye line fishery and the IPHC line survey by year.

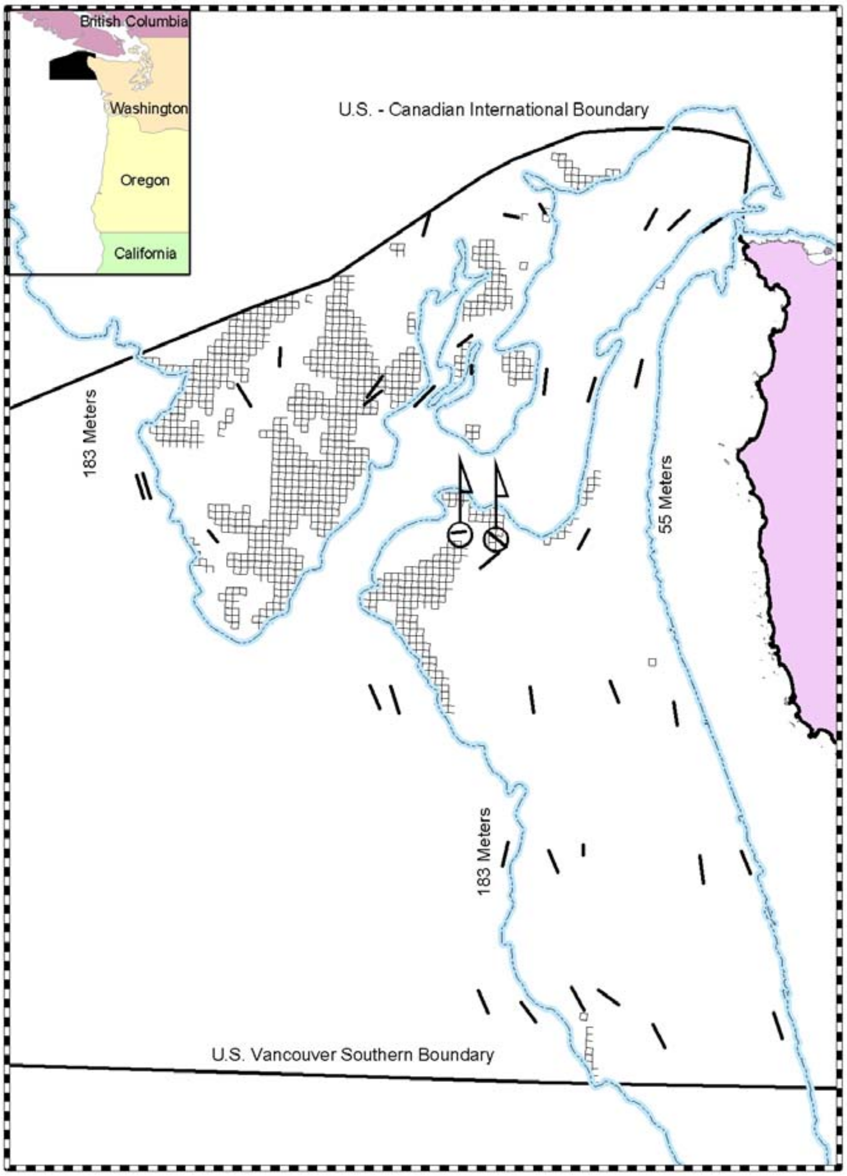


Figure 10. NMFS trawl survey haul location for all successful tows in the U.S. Vancouver Area in 2001. Symbols mark tows with yelloweye rockfish and grey grid represents the untrawlable habitat surveyed in 2002.

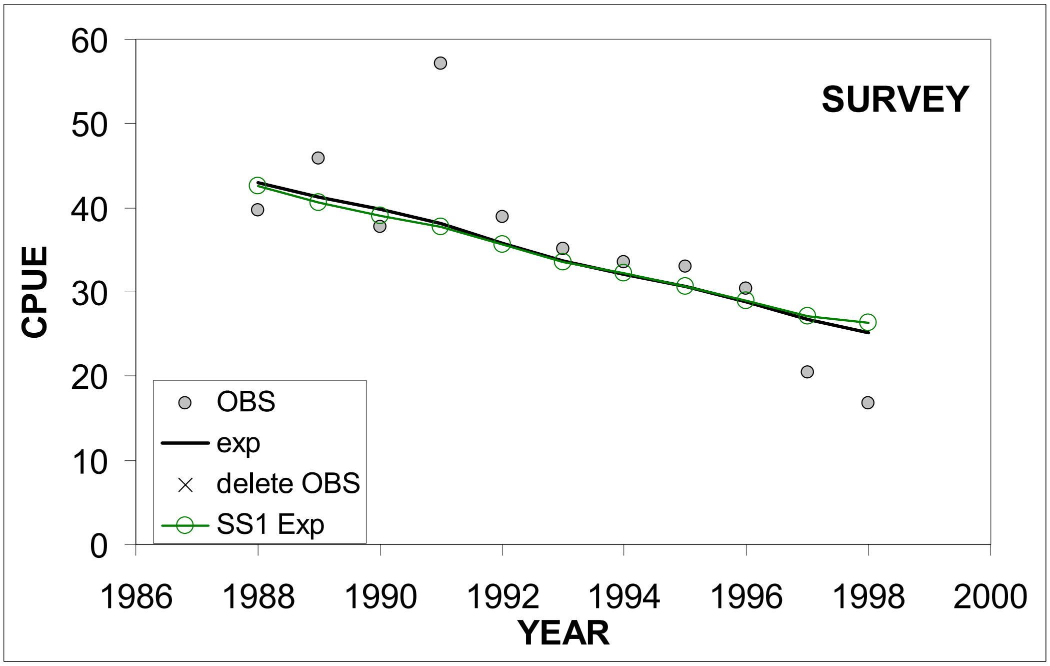


Figure 11. Comparison of 2002 SS1 and 2005 SS2 base model fit to the California CPFV CPUE index.

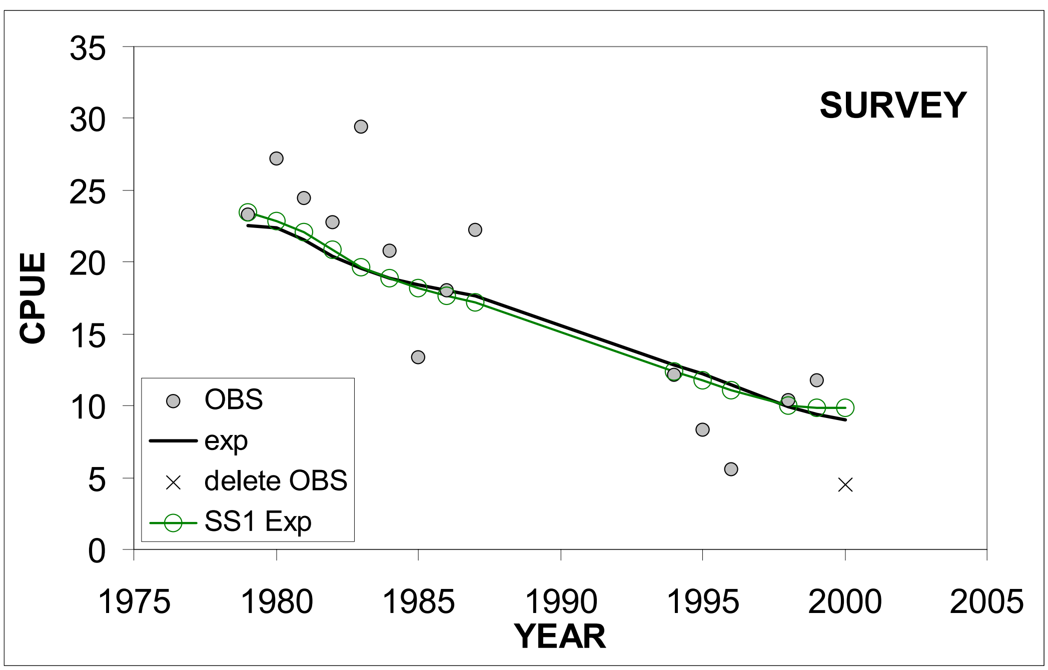


Figure 12. Comparison of 2002 SS1 and 2005 SS2 base model fit to the Oregon Sport CPUE index.

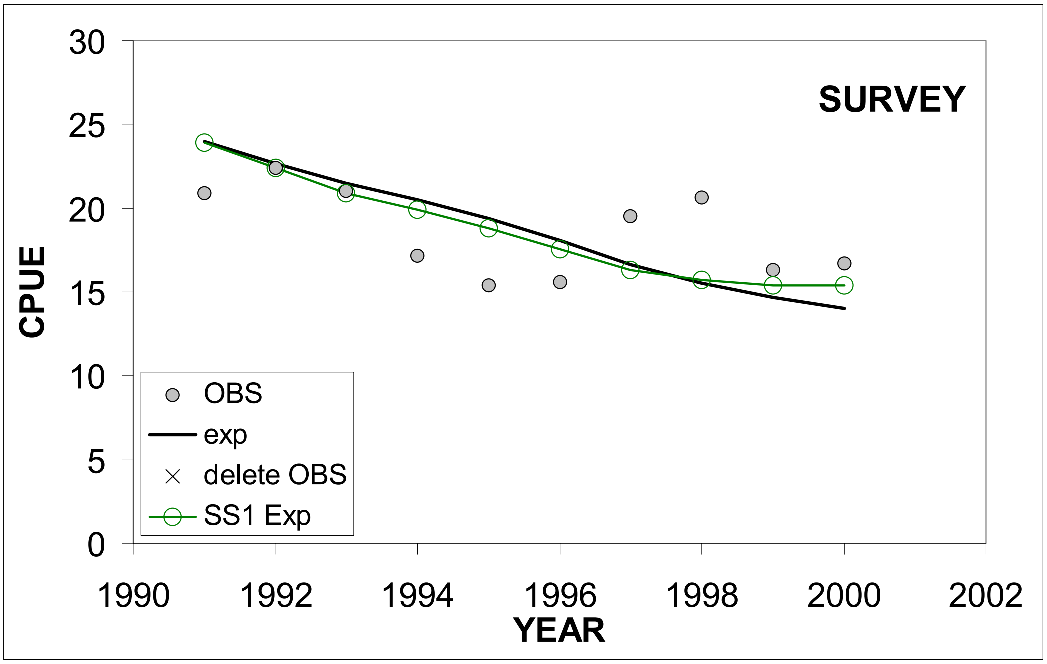


Figure 13. Comparison of 2002 SS1 and 2005 SS2 base model fit to the Washington Sport CPUE Index.

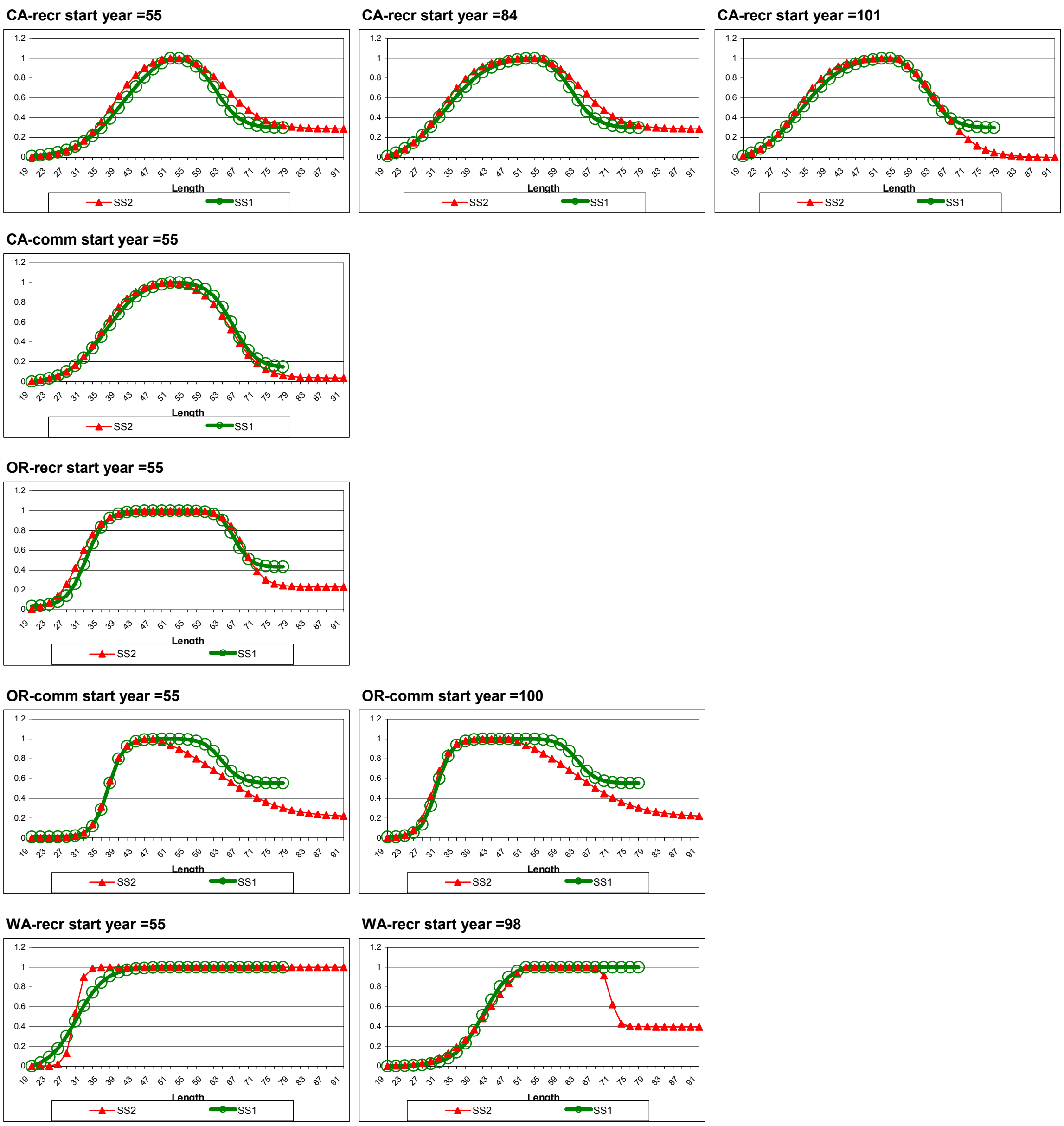


Figure 14. Comparison of estimated selectivity's between SS1 (circles) and SS2 models.

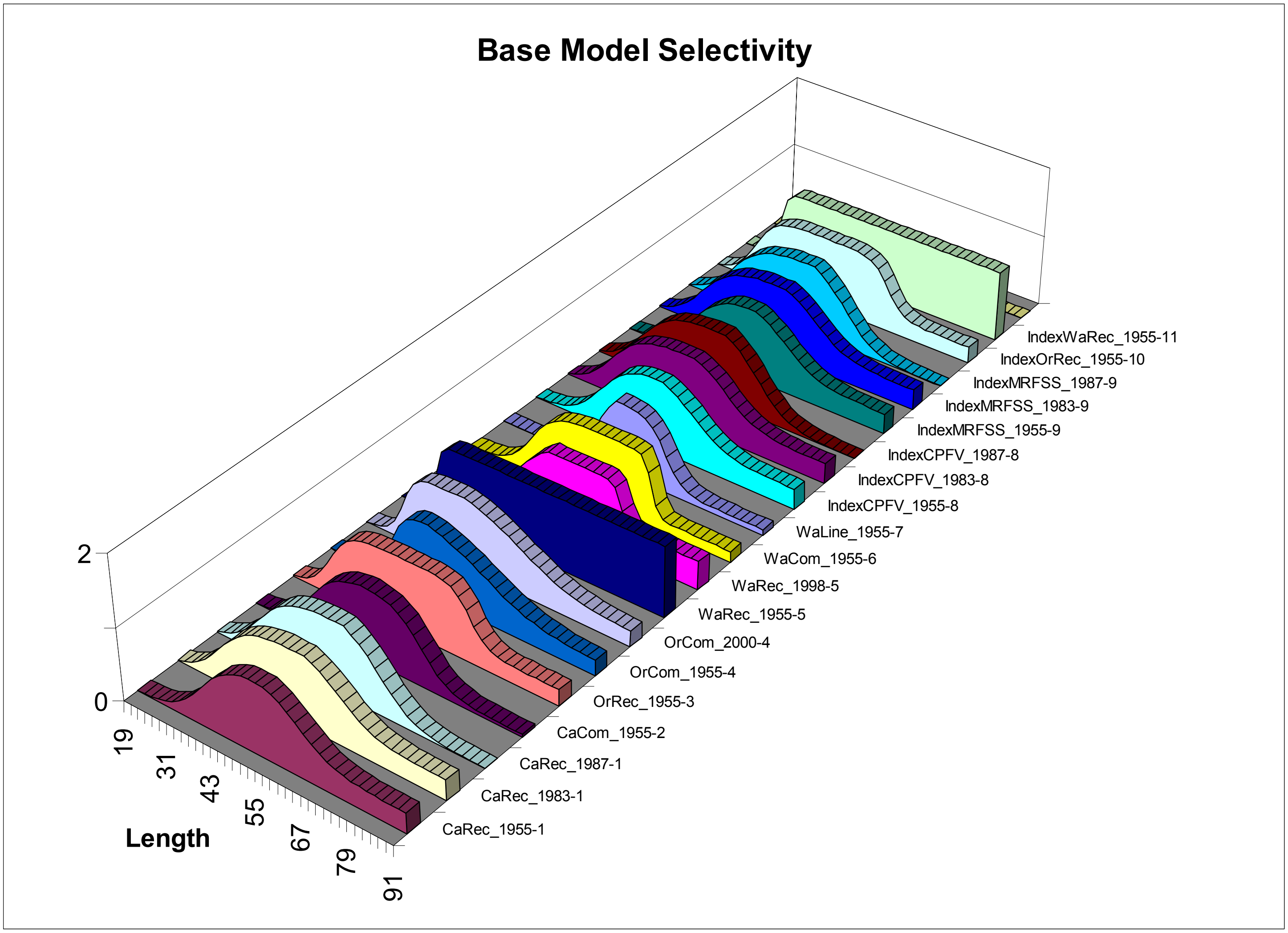


Figure 15. Comparison of base run estimated selectivity's between gears.

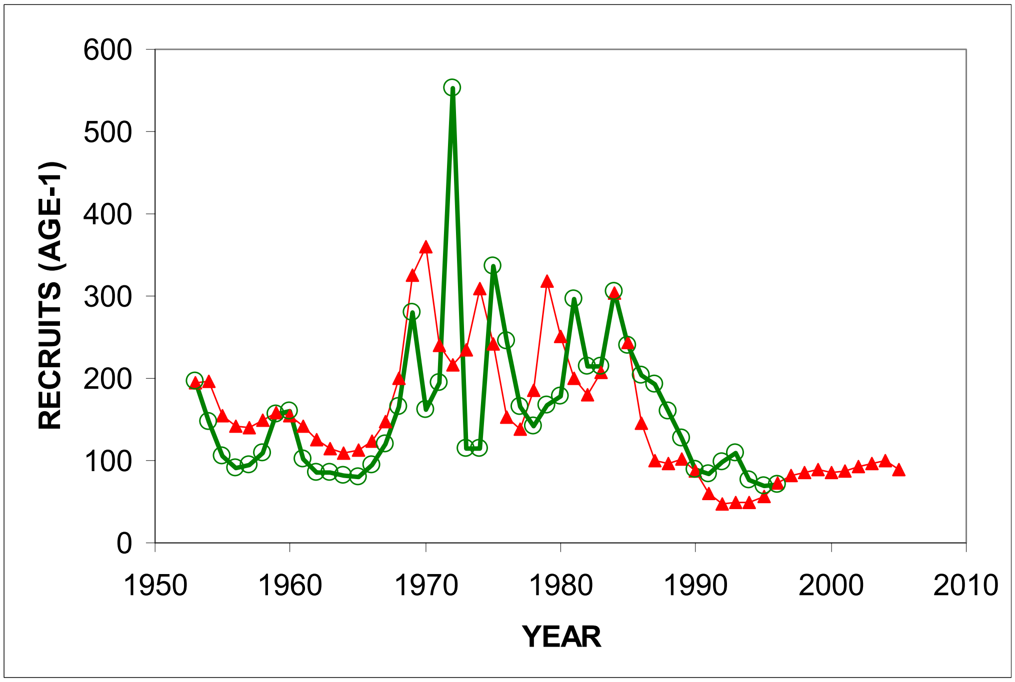


Figure 16. Comparison of the estimated recruitment time series between SS1 (circles) and SS2 base model.

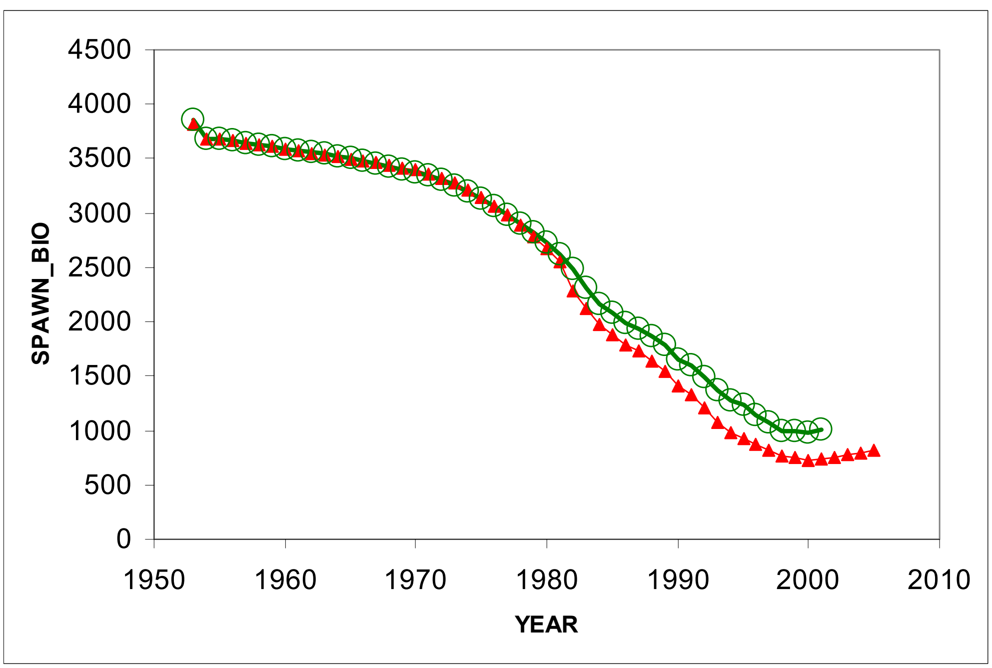


Figure 17. Comparison of the spawning biomass time series between SS1 (circles) and SS2 base model.

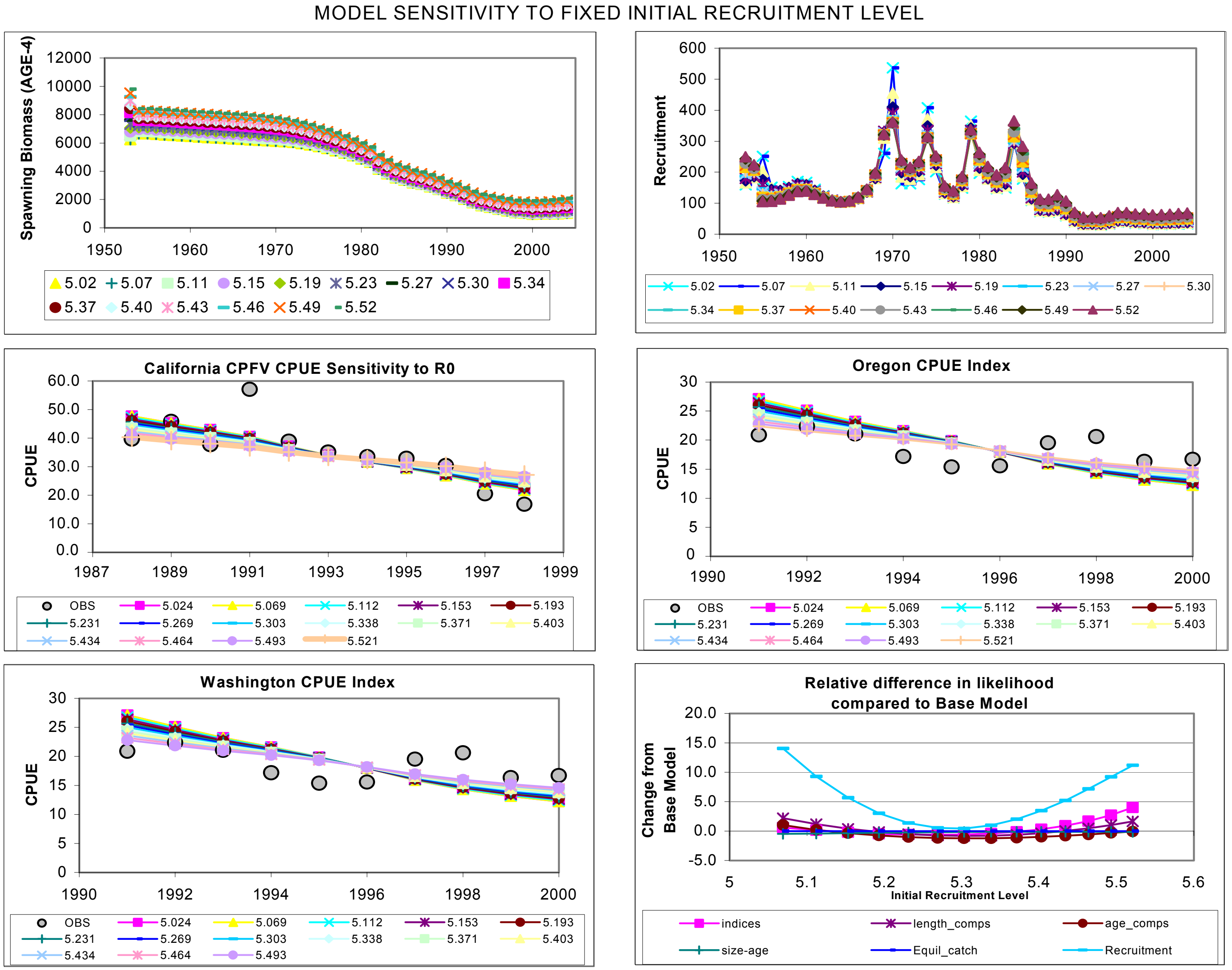


Figure 18. Profile of likelihood and other model outcomes over a range of fixed values for the initial recruitment level (virgin recruitment).

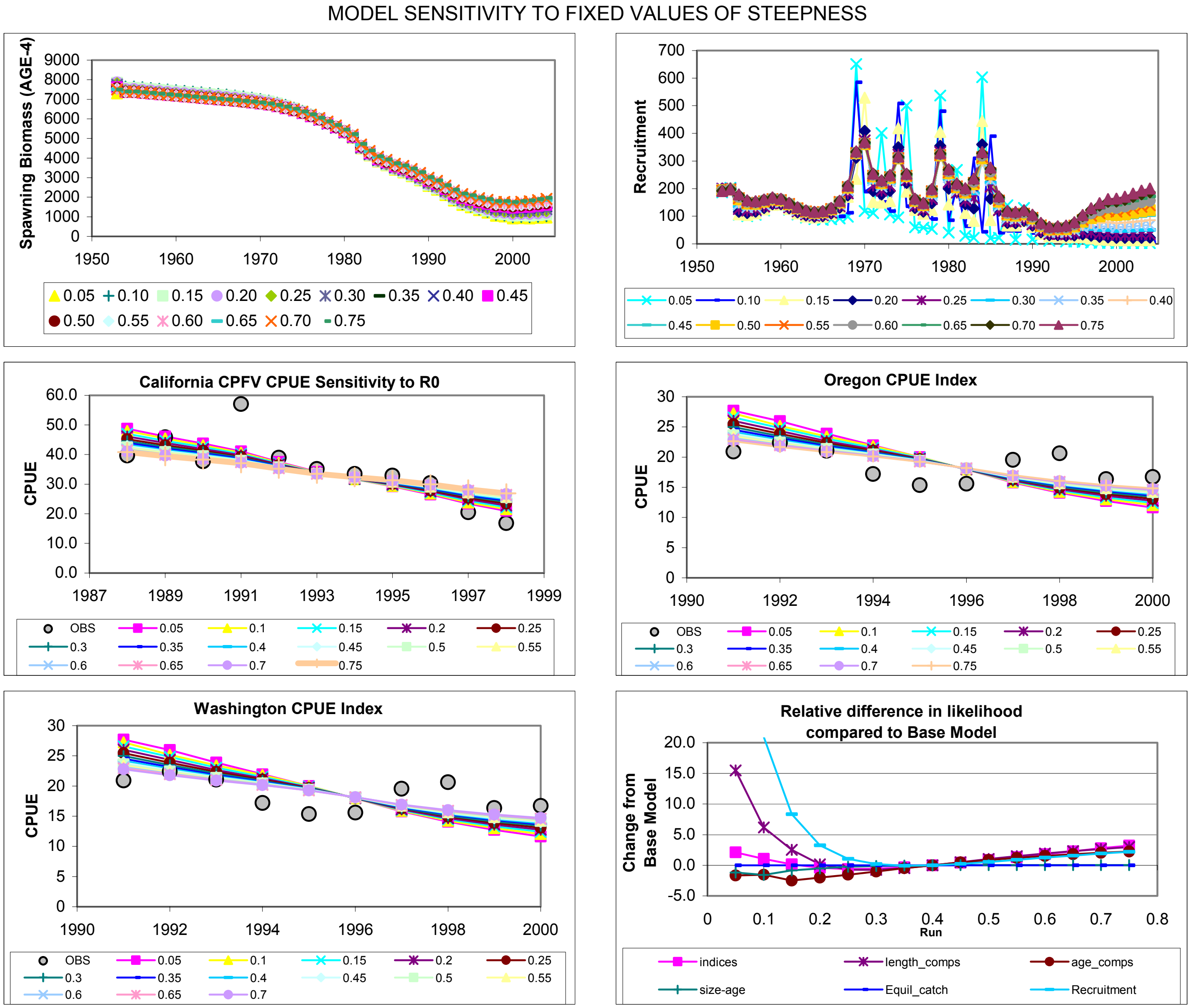


Figure 19. Profile of likelihood and other model outcomes over a range of fixed values for steepness.

MODEL SENSITIVITY TO INCREASING LAMBDA VALUES ON SR CURVE

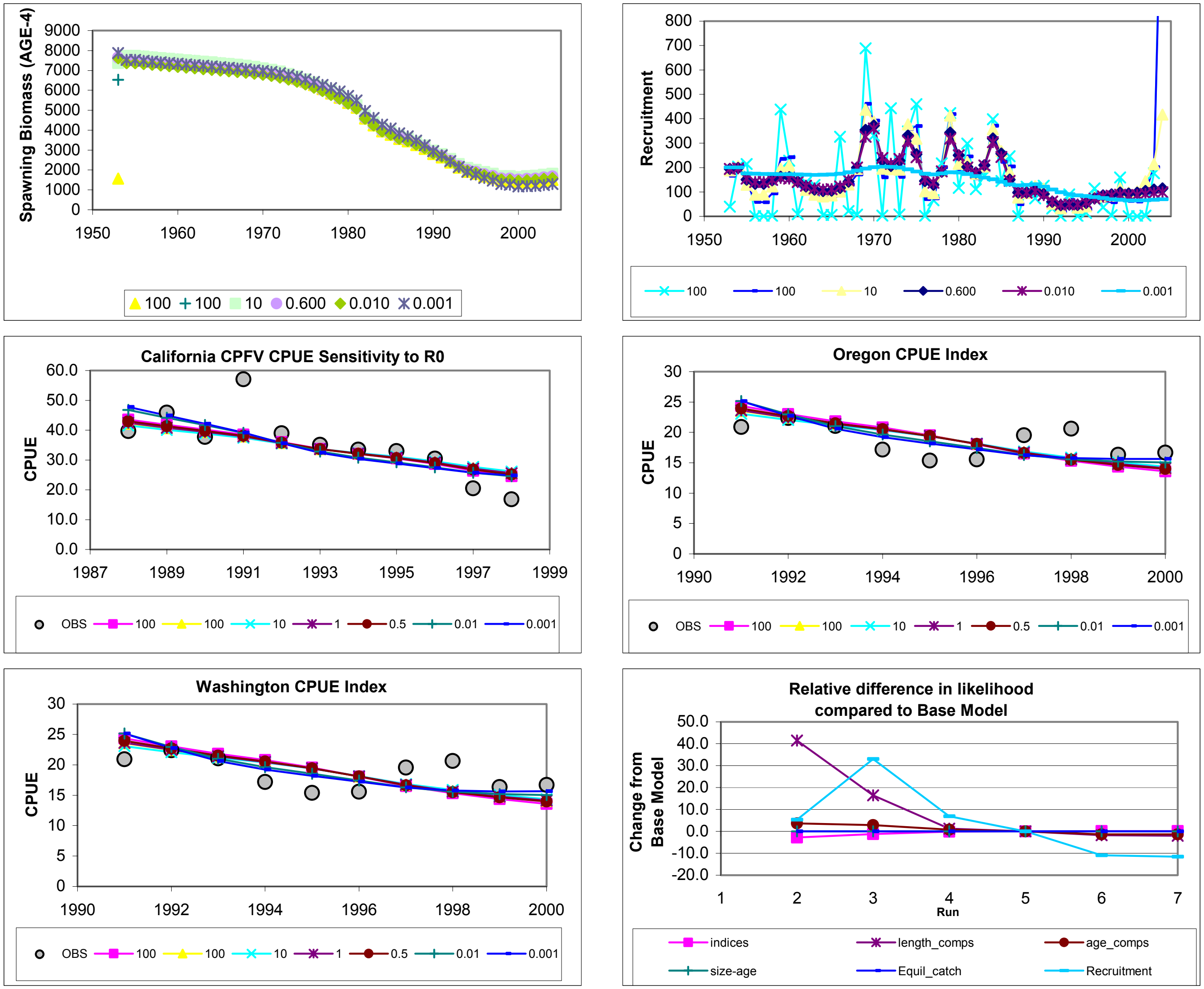


Figure 20. Effect on model fit and emphasis on SR curve.

MODEL SENSITIVITY TO INCREASING LAMBDA VALUES ON COMPOSITION DATA

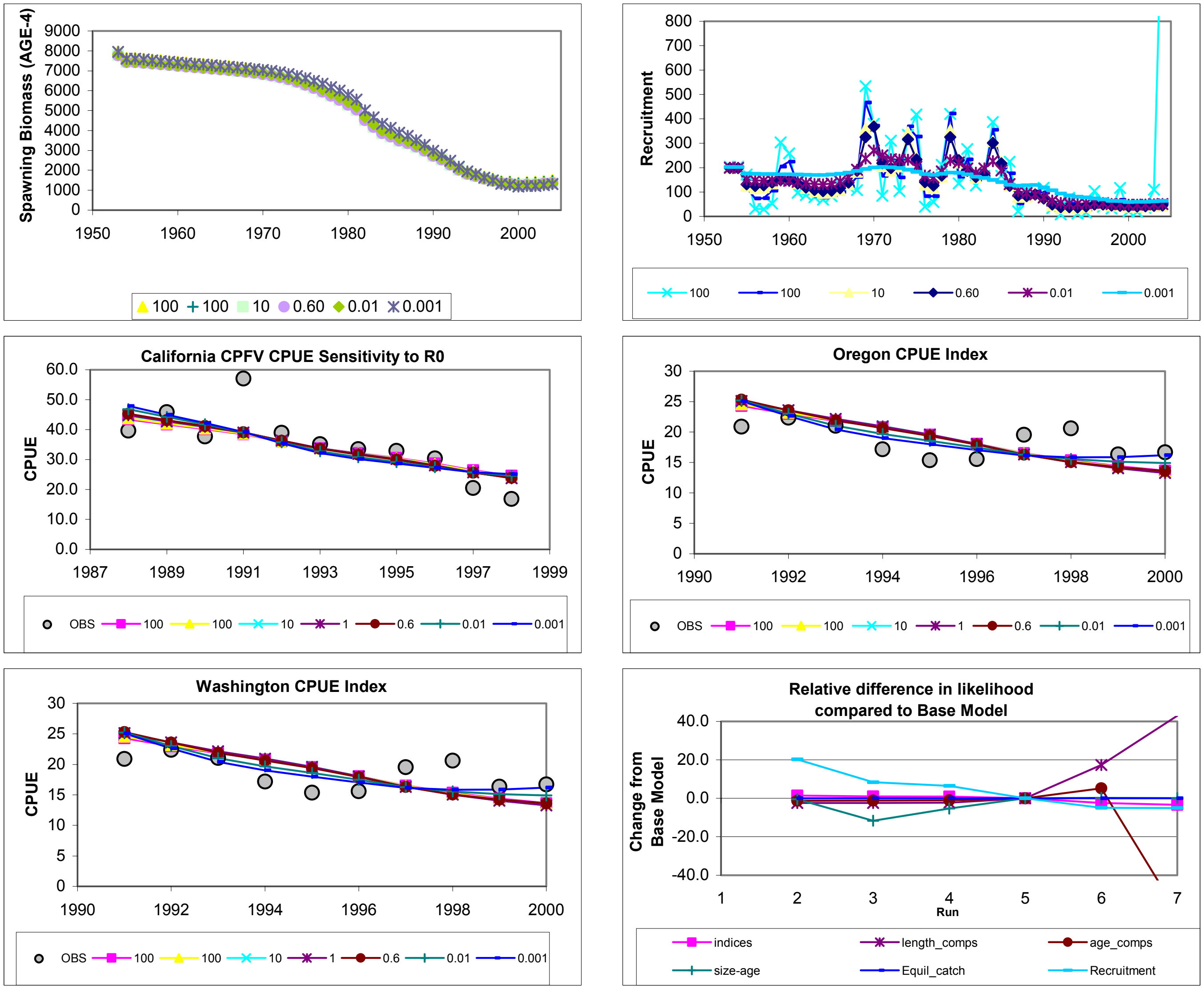


Figure 21. Effect on model fit and emphasis on length, age and size compositions.

Appendix A. Yelloweye final base model control file.

```
#	V1.19	version
#	Yeye05.ctl
#	datafile:Yeye05.dat
1	#_N_growthmorphs

#_assign_sex_to	each_morph_(1=female;_2=male)
1

1	#_N_Areas_(populations)

#_each_fleet/survey_operates_in_just_one_area
#_but_different_fleets/surveys_can	be	assigned_to_share_same_selex(FUTURE_coding)
1	1	1	1	1	1	1	1	1	1	1	#area_for_each_fleet/survey

0	#do_migration_(0/1)

6	#_N_Time_Block_Definitions
1	1	1	1	1	1	#_N_	of	time	blocks	in	each	definition
1983	2004
1987	2004
2000	2004
1998	2004
1998	2004
1998	2004

#Natural_mortality_and_growth_parameters_for_each_morph
4	#_Last_age_for_natmort_young
10	#_First_age_for_natmort_old
6	#_age_for_growth_Lmin
60	#_age_for_growth_Lmax
-4	#_MGparm_dev_phase

#SS1	Values
#Initial_Low_High
#6	60	AGE	AT	WHICH	L1	AND	L2	OCCUR
#1	"1=NORMAL,"	2=LOGNORMAL
#26.913709	10	40	'L@6	'	2	1	0	30.8	0	!	87	OK	-0.002	-546	-1
#65.699442	40	100	'L@60	'	2	1	0	63.9	0	!	88	OK	-0.001	-2003	-1
#0.0491	0.03	0.1	'von	Bert	K	'	2	1	0	0.0529	0	!	89	OK	.000*********	-1
#3.440821	2	6	'L@A	rmse	'	2	1	0	0.18	0	!	90	OK	-0.001	-27	-1
#6.205246	4	8	'L@A	rmse	'	2	1	0	0.098	0	!	91	OK	0	-12	-1
#1	MORTOPT
#0.045	0.01	0.25	'F-NMORT_YNG	'	0	1	0	0	0	!	1	NO	PICK	0	-1	0
#0.045	0.01	0.25	'F-NMORT_OLD	'	0	1	0	0	0	!	2	NO	PICK	0	-1	0
#12	4	25	'F-NMORT_INFL	'	0	1	0	0	0	!	3	NO	PICK	0	-1	0

#LO	HI	INIT	PRIOR	PR_type	SD	PHASE	env-variable	use_dev	dev_minyr dev_maxyr dev_stddev
0.01	0.1	0.045	0.1	0	0.8	-3	0	0	0	0	0.5	0	0	#M1_natM_young
-3	3	0	0	0	0.8	-3	0	0	0	0	0.5	0	0
	#M1_natM_old_as_exponential_offset(rel_young)
10	35	22.618	30	0	10	-2	0	0	0	0	0.5	0	0	#M1_Lmin
40	120	64.6346	66	0	10	-2	0	0	0	0	0.5	0	0	#M1_Lmax

0.01	0.2	0.0626248 0.05	0	0.8	-3	0	0	0	0	0.5	0	0	#M1_VBK

0.05	0.2	0.0819384 0.14	0	0.8	-3	0	0	0	0	0.5	0	0	#M1_CV-
young_3.440821/26.913709=0.127846
-1	1	0.577368 0.4	0	0.8	-3	0	0	0	0	0.5	0	0	#M1_CV-
old_as_exponential_offset(rel_young)	6.21/65.7=	0.095	so	offset	=	ln(0.095/0.127846)=-3.06

#SS1	Values
```

```
#40       -0.415    maturity  (CA)      42.1      -0.415    maturity  (OR)
#0.000020873        2.96956   female    length-weight
#1        0         eggs/kg
#0.000020873        2.96956   male      length-weight

#Add      2+2*gender          lines     to        read      the       wt-Len    and       mat-Len   parameters
-3        3         0.000020873         0.000020873         0         0.8       -2        0         0         0         0         0.5       0         0         #Female   wt-len-1
-3        3         2.96956   2.96956   0         0.8       -2        0         0         0         0         0.5       0         0         #Female   wt-len-2

-3        3         42.1      42.1      0         0.8       -2        0         0         0         0         0.5       0         0         #Female   mat-len-1
-3        3         -0.415    -0.415    0         0.8       -2        0         0         0         0         0.5       0         0         #Female   mat-len-2

-3        3         1         1         0         0.8       -2        0         0         0         0         0.5       0         0         #Female   eggs/gm   intercept
-3        3         0         0         0         0.8       -2        0         0         0         0         0.5       0         0         #Female   eggs/gm   slope

#pop*gmorph         lines     For       the       proportion          of        each      morph     in        each      area
0         1         1         1         0         1         -2        0         0         0         0         0.5       0         0         #frac     to        morph     1
          in        area      1
#pop      lines     For       the       proportion          assigned  to        each      area
0         1         1         1         0         1         -2        0         0         0         0         0.5       0         0         #frac     to        area      1

#_custom-env_read
0         #_        0=read_one_setup_and_apply_to_all_env_fxns;       1=read_a_setup_line_for_each_MGparm_with_Env-var>0

#_custom-block_read
0         #_        0=read_one_setup_and_apply_to_all_MG-blocks;      1=read_a_setup_line_for_each_block      x         MGparm_with_block>0

#         LO        HI        INIT      PRIOR     Pr_type   SD        PHASE
#_Spawner-Recruitment_parameters
1         #         SR_fxn:   1=Beverton-Holt

#SS1      parameter values
#3        "1=B-H,"  "2=RICKER,"         3=new     B-H
#0        0=USE     S-R       "CURVE,"  1=SCALE   CURVE
#0.5      -0.4      '         SPAWN-RECRUIT       indiv'    !         #         =         33        VALUE:    15.72058
#0.00001  -0.3      '         SPAWN-RECRUIT       mean      '         !         #         =         34        VALUE:    -31.29407
#1.557006 0.001     9         'VIRGIN   RECR      MULT'     2         1         0         0         0         !         108       OK        0         -1927     -1
#0.436856 0.2       0.9       'B/H      S/R       PARAM     '         2         1         0         0         0         !         109       OK        0         -84       -1
#0        -0.2      0.2       'BACKG.   RECRUIT   '         0         1         0         0         0         !         110       NO        PICK      0         -1        0
#0.4      0.1       1.5       'S/R      STD.DEV.  '         0         1         0         0         0         !         111       NO        PICK      0         -1        0
#0        -0.2      0.2       'RECR     TREND     '         0         1         0         0         0         !         112       NO        PICK      0         -1        0
#1        0.5       3         'RECR.    MULT.     '         0         1         0         0         0         !         113       NO        PICK      0         -1        0

#LO       HI        INIT      PRIOR     Pr_type   SD        PHASE
3         31        5.172     5         0         50        1         #Ln(R0)
0.2       1         0.437     1         0         50        -6        #steepness
0         5         0.4       1         0         0.8       -3        #SD_recruitments
-5        5         0         0         0         1         -3        #Env_link
```

```
-5        5         0         0         0         1         3         #init_eq

0         #env-var_for_link

#         recruitment_residuals

#         start     end_rec_year        Lower_limit         Upper_limit         phase

1955      2004      -10       10        1

#init_F_setupforeachfleet
#         LO        HI        INIT      PRIOR     PR_type   SD        PHASE
0         1         0.001     0.01      0         99        1         #         need      init      value>0
0         1         0.001     0.01      0         99        1
0         1         0.001     0.01      0         99        1
0         1         0.001     0.01      0         99        1
0         1         0.001     0.01      0         99        1
0         1         0.001     0.01      0         99        1
0         1         0.001     0.01      0         99        1

#_Qsetup
#_add_parm_row_for_each_positive_entry_below(row_then_column)
#-Float(0/1)        #Do-power(0/1)      #Do-env(0/1)        #Do-dev(0/1)        #env-Var  #Num/Bio(0/1)       for       each      fleet     and       survey
0         0         0         0         0         1         #CaRec_1
0         0         0         0         0         1         #CaCom_2
0         0         0         0         0         1         #OrRec_3
0         0         0         0         0         1         #OrCom_4
0         0         0         0         0         1         #WaRec_5
0         0         0         0         0         1         #WaCom_6
0         0         0         0         0         1         #WaLine_7
0         0         0         0         0         0         #CPFV_8
0         0         0         0         0         0         #CaMRFSS_9
0         0         0         0         0         0         #OrRec_10
0         0         0         0         0         0         #WaRec_11

#         LO        HI        INIT      PRIOR     PR_type   SD        PHASE     env-variable

#_SELEX_&_RETENTION_PARAMETERS
#Selex_type         Do_retention(0/1)   Do_male   Mirrored_selex_number(or      Special)

7         0         0         0         #CaRec_1
7         0         0         0         #CaCom_2
7         0         0         0         #OrRec_3
7         0         0         0         #OrCom_4
7         0         0         0         #WaRec_5
7         0         0         0         #WaCom_6
7         0         0         0         #WaLine_7
5         0         0         1         #CaCPFV_8
5         0         0         1         #CaMRFSS_9
5         0         0         3         #OrRecSur_10
7         0         0         0         #WaRec_11

#_Age     selex
10        0         0         0         #CaRec_1
10        0         0         0         #CaCom_2
10        0         0         0         #OrRec_3
10        0         0         0         #OrCom_4
10        0         0         0         #WaRec_5
10        0         0         0         #WaCom_6
10        0         0         0         #WaLine_7
10        0         0         1         #CaCPFV_8
10        0         0         1         #CaMRFSS_9
10        0         0         3         #OrRecSur_10
10        0         0         0         #WaRec_11

#LO       HI        INIT      PRIOR     PR_type   SD        PHASE     env-variable        use_dev   dev_minyr dev_maxyr dev_stddev          Block_Pattern
#cARec_1
40        70        49.9243   50        0         10        -3        0         0         0         0         0         0         0         #peakCARec_1
```

```
0.0001  0.1  0.001     0    0  99  -4  0  0  0  0  0    0  0  #init
-10     5    0.4107    0.5  0  3   -3  0  0  0  0  0    1  2  #infl1
0.001   5    0.24215   0.3  0  99  -3  0  0  0  0  0    0  0  #slope1
-5      10   -0.9115   5    0  99  -3  0  0  0  0  0    2  2  #final
-10     5    -0.9597   0.3  0  3   -3  0  0  0  0  0    0  0  #infl2
0.001   5    0.24284   0.3  0  99  -4  0  0  0  0  0    0  0  #slope2
0.1     10   5         5    0  99  -4  0  0  0  0  0    0  0  #width of top
#Cal_Com2
40      70   50.2353   50   0  10  -3  0  0  0  0  0.5  0  0  #peakCaCom_2
0.0001  0.1  0.001     0    0  99  -4  0  0  0  0  0.5  0  0  #init
-10     5    0.11186   0.5  0  3   -3  0  0  0  0  0.5  0  0  #infl1
0.001   5    0.26276   0.3  0  99  -3  0  0  0  0  0.5  0  0  #slope1
-10     10   -3.3152   5    0  99  -3  0  0  0  0  0.5  0  0  #final
-10     5    -0.5608   0.3  0  3   -4  0  0  0  0  0.5  0  0  #infl2
0.001   5    0.29184   0.3  0  99  -4  0  0  0  0  0.5  0  0  #slope2
0.1     10   0.11      5    0  99  -4  0  0  0  0  0.5  0  0  #width of top
#OrREc_3
40      70   47.9709   50   0  10  -3  0  0  0  0  0.5  0  0  #peakOrRec_3
0.0001  0.1  0.001     0    0  99  -2  0  0  0  0  0.5  0  0  #init
-10     5    -0.4227   0.5  0  3   -3  0  0  0  0  0.5  0  0  #infl1
0.001   5    0.36466   0.3  0  99  -3  0  0  0  0  0.5  0  0  #slope1
-5      10   -1.2055   5    0  99  -3  0  0  0  0  0.5  0  0  #final
-10     5    -0.8301   0.3  0  3   -4  0  0  0  0  0.5  0  0  #infl2
0.001   5    0.45459   0.3  0  99  -4  0  0  0  0  0.5  0  0  #slope2
0.1     10   9.99999   5    0  99  -4  0  0  0  0  0.5  0  0  #width of top
#OrCom_4
40      70   45.7104   50   0  10  -2  0  0  0  0  0.5  0  0  #peakOrCom_4
0.0001  0.1  0.001     0    0  99  -2  0  0  0  0  0.5  0  0  #init
-10     5    0.68342   0.5  0  3   -3  0  0  0  0  0.5  3  2  #infl1
0.001   5    0.53765   0.3  0  99  -3  0  0  0  0  0.5  0  0  #slope1
-5      10   -1.2573   5    0  99  -3  0  0  0  0  0.5  0  0  #final
-10     5    -0.5291   0.3  0  3   -4  0  0  0  0  0.5  0  0  #infl2
0.001   5    0.14581   0.3  0  99  -4  0  0  0  0  0.5  0  0  #slope2
0.1     10   1.3976    5    0  99  -4  0  0  0  0  0.5  0  0  #width of top
#WaRec_5
40      70   50.4943   50   0  10  -3  0  0  0  0  0.5  0  0  #peakWaRec_5
0.0001  0.1  0.001     0    0  99  -3  0  0  0  0  0.5  0  0  #init
-10     5    -0.6888   0.5  0  3   -3  0  0  0  0  0.5  4  2  #infl1
0.001   5    1.03206   0.3  0  99  -3  0  0  0  0  0.5  5  2  #slope1
-5      10   8.00488   5    0  99  -3  0  0  0  0  0.5  6  2  #final
-10     5    -0.5419   0.3  0  3   -4  0  0  0  0  0.5  0  0  #infl2
0.001   5    1.1639    0.3  0  99  -4  0  0  0  0  0.5  0  0  #slope2
0.1     10   8.1618    5    0  99  -4  0  0  0  0  0.5  0  0  #width of top
#WaCom_6
40      70   51        50   0  10  -3  0  0  0  0  0.5  0  0  #peakWaCom_6
0.0001  0.1  0.001     0    0  99  -3  0  0  0  0  0.5  0  0  #init
-10     5    0.25316   0.5  0  3   -3  0  0  0  0  0.5  0  0  #infl1
0.001   5    0.30921   0.3  0  99  -3  0  0  0  0  0.5  0  0  #slope1
-5      10   -1.7379   5    0  99  -3  0  0  0  0  0.5  0  0  #final
-10     5    -0.1271   0.3  0  3   -4  0  0  0  0  0.5  0  0  #infl2
0.001   5    1.09219   0.3  0  99  -4  0  0  0  0  0.5  0  0  #slope2
0.1     10   0.10005   5    0  99  -4  0  0  0  0  0.5  0  0  #width of top
#WaLine_7
40      70   51.1359   50   0  10  -3  0  0  0  0  0.5  0  0  #peakWaLine_7
0.0001  0.1  0.001     0    0  99  -2  0  0  0  0  0.5  0  0  #init
-10     5    1.55066   0.5  0  3   -3  0  0  0  0  0.5  0  0  #infl1
0.001   5    0.38772   0.3  0  99  -3  0  0  0  0  0.5  0  0  #slope1
-5      10   -2.4145   5    0  99  -3  0  0  0  0  0.5  0  0  #final
-10     5    -0.6684   0.3  0  3   -4  0  0  0  0  0.5  0  0  #infl2
0.001   5    0.41952   0.3  0  99  -4  0  0  0  0  0.5  0  0  #slope2
0.1     10   0.10001   5    0  99  -4  0  0  0  0  0.5  0  0  #width of top

#CaCPFV_8
1       37   1         5    0  99  -1  0  0  0  0  0.5  0  0  #minsizeBinCaCPFV_8
1       37   37        6    0  99  -1  0  0  0  0  0.5  0  0  #maxsizeBinCaCPFV_8

#CaMRFSS_9
1       37   1         5    0  99  -1  0  0  0  0  0.5  0  0  #minsizeBinCaMRFSS_9
```

```
1         37        37        6         0         99        -1        0         0         0         0         0.5       0         0         #maxsizeBinCaMRFSS_9

#OrRecSur_10
1         37        1         5         0         99        -1        0         0         0         0         0.5       0         0         #minsizeBinOrRecSur_10
1         37        37        6         0         99        -1        0         0         0         0         0.5       0         0         #maxsizeBinOrRecSur_10

#1        37        1         5         0         99        -1        0         0         0         0         0.5       0         0         #minSizeBinWaRecSur_11
#1        37        37        6         0         99        -1        0         0         0         0         0.5       0         0         #maxSizeBinWaRecSur_11

#         WaRecSur_11         fixed     at        WaRec     SS1       Sel       Values    used_<=1998
40        70        50.4943   50        0         10        -3        0         0         0         0         0.5       0         0         #peakWaRec_5
0.0001    0.1       0.001     0         0         99        -3        0         0         0         0         0.5       0         0         #init
-10       5         -0.6757   0.5       0         3         -3        0         0         0         0         0.5       0         0         #infl1
0.001     5         0.9827    0.3       0         99        -3        0         0         0         0         0.5       0         0         #slope1
-5        10        6.986     5         0         99        -3        0         0         0         0         0.5       0         0         #final
-10       5         -0.5424   0.3       0         3         -4        0         0         0         0         0.5       0         0         #infl2
0.001     5         1.1639    0.3       0         99        -4        0         0         0         0         0.5       0         0         #slope2
0.1       10        8.1618    5         0         99        -4        0         0         0         0         0.5       0         0         #width    of        top


#_custom-env_read
0         #_        0=read_one_setup_and_apply_to_all;_1=Custom_so_read_1_each;


#_custom-block_read
1         #_        0=read_one_setup_and_apply_to_all;_1=Custom_so_see_detailed_instructions_for_N_rows_in_Custom_setup

#_LO      HI        INIT      PRIOR     PR_type   SD        PHASE

#Now      estimate  these
-10       5         -0.293376 0.5       0         3         -5        #CaRec_asc_infl_83-01
-10       10        -9.35824  0.3       0         99        -5        #CARec_final_87-01
-5        5         -0.32666  0.5       0         3         -5        #OrCom_asc_infl_00-01
-5        5         0.930662  0.5       0         3         -5        #WaRec_asc_infl_98-01
-5        5         0.175635  0.3       0         3         -5        #WaRec_asc_slope_98-01
-10       10        -0.414428 0.5       0         99        -5        #WaRec_final_98-01

#         LO        HI        INIT      PRIOR     PR_type   SD        PHASE

-4        #_phase_for_selex_parm_devs

#Max_lambda_phase:  read      this      number    of        lambda    values    for       each      element   below.
#The      last      lambda    value     is        used      for       all       higher    numbered  phases
1         #_max_lambda_phases:_read_this_Number_of_values_for_each_componentxtype_below
0

#_survey_lambda
1         1         1         1         1         1         1         1         0         1         1
#_discard_lambdas
0         0         0         0         0         0         0         0         0         0         0
#_meanbodywt
0
#_lenfreq_lambdas
0.6       0.6       0.6       0.6       0.6       0.6       0.6       0         0         0         0
#_age_freq_lambdas
0.6       0.6       0.6       0.6       0.6       0.6       0.6       0         0         0         0
#_size@age_lambdas
#1        1         1         1         1         1         1         0         0         0         0
0.6       0.6       0.6       0.6       0.6       0.6       0.6       0         0         0         0
#_initial_equil_catch(f)
1
#_recruitment_lambda
0.5
#_parm_prior_lambda
1
#_parm_dev_timeseries_lambda
0.00001
```

```
#SS1      Lambdas
#33       STOCK-RECR
#3        "1=B-H,"  "2=RICKER,"         3=new     B-H
#0        0=USE     S-R       "CURVE,"  1=SCALE   CURVE
#0.5      -0.4      '         SPAWN-RECRUIT       indiv'    !         #         =         33        VALUE:    15.72058
#0.00001  -0.3      '         SPAWN-RECRUIT       mean      '         !         #         =         34        VALUE:    -31.29407
#1.557006 0.001     9         'VIRGIN   RECR      MULT'     2         1         0         0         0         !         108       OK        0         -1927     -1
#0.436856 0.2       0.9       'B/H      S/R       PARAM     '         2         1         0         0         0         !         109       OK        0         -84       -1
#0        -0.2      0.2       'BACKG.   RECRUIT   '         0         1         0         0         0         !         110       NO        PICK      0         -1        0
#0.4      0.1       1.5       'S/R      STD.DEV.  '         0         1         0         0         0         !         111       NO        PICK      0         -1        0
#0        -0.2      0.2       'RECR     TREND     '         0         1         0         0         0         !         112       NO        PICK      0         -1        0
#1        0.5       3         'RECR.    MULT.     '         0         1         0         0         0         !         113       NO        PICK      0         -1        0

#         crashpen  lambda
100
#max      F
0.9

999       #_end-of-file
```

Appendix B. Base Model data file.

```
1955	#	start	year
2004	#	end	year
1	#	N	seasons	per	year
12	#	vector	with	N	months	in	each	season
1	#	spawning		season
7	#	N	fishing	fleets
4	#	N	surveys;		data	type	ID	below	is	sequential	with	the	fisheries
CaRec1%CaCom2%OrRec3%OrCom4%WaRec5%WaCom6%WaLine7%CPFV%CaMRFSS%OrRec%WaRec

0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	#_surveytiming_in_season

1	#	number	of	genders	(1/2);	females	are	gender	1
70	#Accumulator		age
4	0.2	4	0.2	1	0.2	0.1	#_init_equil_catch_for_each_fishery

#_catch_biomass(mtons):_columns_are_fisheries		_rows_are_year*season

20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
20	1	20	1	5	1	0
25.1	1.2	23.5	0.5	5	1	0
30.2	5.2	27	0.5	5	1	0
35.3	9.2	30.5	3.5	5	1.7	0
40.3	13.2	34	6.5	5	1	0
45.4	17.2	37.5	9.5	5	1	0
50.5	21.2	41	12.5	4	2.8	0
55.6	25.2	44.5	15.5	4.3	3.3	0
60.7	29.2	48	18.5	8.8	0.9	0
65.7	33.2	51.6	21.5	4.5	1.2	0
70.8	37.2	55.1	54.7	2.3	6	0
75.9	41.2	35.5	60.2	2.4	30.7	0
46.9	367.8	24.2	93.7	3.4	3.6	0
103.8	201.8	39.1	20	3.4	5.3	0
51	57.6	66.3	177.3	6.7	7.7	0
80.8	44.9	33.8	57.1	12.2	5	0
```

```
125.8   8.8     30.4    91.9    8.8     16.8    0
65.5    31      18.1    65.5    9       9.1     0
75.2    53.7    35.7    74.4    10.5    14.1    0
57.5    64.9    7.9     125.1   8.3     20.1    0
58.7    50.1    14.5    189.4   14.6    30.4    0
46.1    79.8    18.6    86.8    9.9     20.5    0
33.6    141.1   18.8    135.9   18      17.6    0
21      112.2   26      165.8   16.2    28.4    0
8.5     52.9    21.6    183.2   18      26.6    0
14.4    54.4    16.8    102.2   10.3    10      0
12.6    48.5    8.2     149.1   9.9     8.2     0
12.5    65.8    15.4    97.7    10.8    8.6     0
15.1    62.2    18.8    115.5   11.4    18.7    0
5.8     21.6    17.3    41.4    14.4    5.5     0
12.6    22.2    9.5     61.3    10.6    9.9     22.96
7.5     4       4.8     3.6     10.1    0.2     7.74
4.6     4.5     3.1     6.2     12.5    0.8     21.25
2.1     0.2     3.6     0.7     3.7     0.4     2.2
3.7     0       3.8     1       2.6     0.2     0.3
3.5     0       2.4     0.7     4.5     0.1     0.8

54      #_N_cpue_and_surveyabundance_observations
#Note   all     values  for     indexes are     the     same    as      SS1     ye-dat09.dat
#Year   seas    index   obs     selog
#       CA      CPFV    CPUE;   using   GLM     with    delta   lognormal
1988    1       8       39.68590669     0.2
1989    1       8       45.8701541      0.2
1990    1       8       37.71203261     0.2
1991    1       8       57.05530502     0.2
1992    1       8       38.92076328     0.2
1993    1       8       35.12276604     0.2
1994    1       8       33.4927028      0.2
1995    1       8       32.94919085     0.2
1996    1       8       30.43451259     0.2
1997    1       8       20.47190744     0.2
1998    1       8       16.83001077     0.2
#       CA      CPFV    CPUE;   using   GLM     with    delta   lognormal       Includes_4Ports_filtered        for     dapths  19<>100
#1988   1       8       48      0.2
#1989   1       8       51      0.2
#1990   1       8       47      0.2
#1991   1       8       65      0.2
#1992   1       8       43      0.2
#1993   1       8       37      0.2
#1994   1       8       45      0.2
#1995   1       8       45      0.2
#1996   1       8       49      0.2
#1997   1       8       26      0.2
#1998   1       8       26      0.2
#       CA      MRFSS   CPUE
1980    1       9       11.5    0.2
1981    1       9       16.3    0.2
```

1982	1	9	35.9	0.2
1983	1	9	30.3	0.2
1984	1	9	22	0.2
1985	1	9	25	0.2
1986	1	9	16.7	0.2
1987	1	9	17.3	0.2
1988	1	9	6.3	0.2
1989	1	9	10.7	0.2
1993	1	9	2.9	0.2
1994	1	9	6.8	0.2
1995	1	9	5	0.2
1996	1	9	4.4	0.2
1997	1	9	3	0.2
1998	1	9	3.9	0.2
1999	1	9	3.6	0.2
2000	1	9	2.3	0.2
#	Oregon	Sport	CPUE	
1979	1	10	23.33	0.2
1980	1	10	27.19	0.2
1981	1	10	24.46	0.2
1982	1	10	22.81	0.2
1983	1	10	29.39	0.2
1984	1	10	20.82	0.2
1985	1	10	13.39	0.2
1986	1	10	18.07	0.2
1987	1	10	22.24	0.2
1994	1	10	12.16	0.2
1995	1	10	8.34	0.2
1996	1	10	5.56	0.2
1998	1	10	10.42	0.2
1999	1	10	11.8	0.2
2000	1	10	-4.53	0.2
#	WA	sport	CPUE	
1991	1	11	20.9	0.2
1992	1	11	22.38	0.2
1993	1	11	21.05	0.2
1994	1	11	17.18	0.2
1995	1	11	15.37	0.2
1996	1	11	15.58	0.2
1997	1	11	19.55	0.2
1998	1	11	20.62	0.2
1999	1	11	16.34	0.2
2000	1	11	16.7	0.2

2 # Discard in fraction of total catch
0 # Number of Discard observaions (- value causes program to ignore)

0 #_N_meanbodywt_obs

```
0.0001 # compress tails of composition until observed# proportion is greater than this value

0.0001 # constant added to observed and expected proportions at length and age tail
compression occurs first

#_LengthComp

37 # N length bins and Described Below

18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52
54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86
88 90

108 #N Length comp observations

#Year Seas Type Gender Partition(market) Nsamp Detail

1978 1 1 0 0 81 0 0 0 0 0 0 0.01235 0.06173 0.02469 0.02469 0.06173 0.01235
0.03704 0.02469 0.04938 0.09877 0.09877 0.07407 0.04938 0.16049 0.08642 0.04938 0.06173 0 0 0 0 0 0
0 0 0 0 0 0 0 0.01235 # 52.65 81
1979 1 1 0 0 119 0 0 0 0 0 0.0084 0 0.04202 0.0084 0.05042 0.05882 0.01681
0.01681 0.02521 0.03361 0.01681 0.03361 0.10924 0.12605 0.05042 0.10084 0.07563 0.07563 0.06723 0.04202 0.01681 0 0.0084 0.0084
0 0 0 0.0084 0 0 0 0 # 77.35 119
1980 1 1 0 0 124 0 0.00806 0.00806 0 0.00806 0.00806 0.03226 0.03226 0.03226 0.08065 0.06452 0.08871
0.06452 0.04032 0.08871 0.05645 0.04839 0.06452 0.05645 0.04839 0.03226 0.03226 0.03226 0.03226 0.01613 0.00806 0 0.01613 0
0 0 0 0 0 0 0 0 # 80.6 124
1981 1 1 0 0 83 0 0 0 0.0241 0 0 0 0.01205 0.0241 0.06024 0.07229 0.04819
0.08434 0.13253 0.09639 0.06024 0.04819 0.09639 0.07229 0.0241 0.01205 0.04819 0.0241 0.04819 0.01205 0 0 0 0
0 0 0 0 0 0 0 0 # 53.95 83
1982 1 1 0 0 106 0 0 0 0.00943 0.00943 0 0.00943 0.0283 0.0283 0.04717 0.0566 0.03774
0.08491 0.03774 0.0566 0.04717 0.0283 0.08491 0.06604 0.03774 0.04717 0.0566 0.04717 0.08491 0.01887 0.04717 0.00943 0 0
0 0 0 0 0 0 0 0.01887 # 68.9 106
1983 1 1 0 0 105 0 0 0 0 0.00952 0.01905 0.04762 0.0381 0.04762 0.00952 0.0381 0.05714
0.06667 0.05714 0.07619 0.10476 0.0381 0.07619 0.05714 0.04762 0.0381 0.01905 0.0381 0.01905 0.01905 0.01905 0.02857 0.00952 0
0 0 0 0 0 0 0 0.01905 # 68.25 105
1984 1 1 0 0 169 0 0.00592 0.01775 0.00592 0.01183 0.04142 0.05325 0.07101 0.04142 0.05325 0.06509 0.07692
0.07692 0.0355 0.04734 0.04734 0.02367 0.02959 0.07692 0.04734 0.02367 0.04734 0.00592 0.02959 0.02367 0.00592 0.01775 0 0.00592
0.00592 0.00592 0 0 0 0 0 0 # 109.85 169
1985 1 1 0 0 200 0 0 0.00333 0.02333 0.05 0.04 0.05667 0.07667 0.04667 0.07667 0.07667 0.07
0.07667 0.04667 0.04 0.04667 0.04667 0.01667 0.01667 0.02 0.02333 0.02333 0.04667 0.01 0.02 0.01333 0.01667 0.00333 0
0.00667 0.00333 0 0 0.00333 0 0 0 # 195 300
1986 1 1 0 0 200 0 0 0 0.01942 0.01456 0.04369 0.02913 0.04369 0.06311 0.04854 0.10194 0.1165
0.07767 0.0534 0.05825 0.07282 0.01456 0.05825 0.03883 0.04369 0.01942 0.02913 0.01942 0.00485 0.00485 0.00971 0.00485 0 0
0 0.00485 0.00485 0 0 0 0 0 # 133.9 206
```

1987	1	1	0	0	98	0	0	0	0	0.03061	0.02041	0.04082	0.04082	0.04082	0.02041	0.05102	0.05102
	0.05102	0.08163	0.03061	0.05102	0.06122	0.09184	0.05102	0.09184	0.07143	0.03061	0.03061	0.02041	0.02041	0	0.02041	0	0
	0	0	0	0	0	0	0	0	#	63.7	98						
1988	1	1	0	0	200	0	0.00315	0.00315	0.02839	0.02208	0.04101	0.05363	0.05363	0.07886	0.06309	0.06625	0.07571
	0.06625	0.0347	0.05363	0.03155	0.03155	0.06309	0.05047	0.05047	0.0347	0.02839	0.01893	0.02524	0.01262	0.00631	0	0.00315	0
	0	0	0	0	0	0	0	0	#	206.05	317						
1989	1	1	0	0	200	0	0.0026	0	0.00779	0.00779	0.02597	0.05195	0.05455	0.07792	0.1013	0.0987	0.08571
	0.06494	0.07273	0.05974	0.06234	0.04416	0.03896	0.04156	0.01818	0.01558	0.02597	0.01818	0.00779	0.01039	0.0026	0	0.0026	0
	0	0	0	0	0	0	0	0	#	250.25	385						
1990	1	1	0	0	89	0	0.01124	0.02247	0.03371	0.02247	0.02247	0.02247	0.02247	0.08989	0.06742	0.07865	0.16854
	0.11236	0.07865	0.04494	0.02247	0.03371	0.01124	0.03371	0.03371	0.03371	0	0.01124	0.01124	0.01124	0	0	0	0
	0	0	0	0	0	0	0	0	#	57.85	89						
1991	1	1	0	0	112	0	0	0.00893	0	0.00893	0.01786	0.01786	0.07143	0.05357	0.10714	0.05357	0.11607
	0.08929	0.07143	0.08036	0.05357	0.01786	0.0625	0.05357	0.03571	0.04464	0	0.01786	0	0.01786	0	0	0	0
	0	0	0	0	0	0	0	0	#	72.8	112						
1992	1	1	0	0	164	0	0.0061	0.0061	0.03049	0.04878	0.0122	0.02439	0.06098	0.02439	0.06707	0.07317	0.09756
	0.08537	0.07317	0.04268	0.06098	0.07927	0.04878	0.05488	0.03659	0.0061	0.03049	0.02439	0.0061	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	106.6	164						
1993	1	1	0	0	200	0	0	0.00424	0.01695	0.0339	0.05932	0.04237	0.07203	0.05085	0.0678	0.07627	0.07203
	0.08898	0.08051	0.0339	0.04237	0.03814	0.0339	0.04237	0.0339	0.02119	0.01695	0.02542	0.02119	0.01695	0.00424	0.00424	0	0
	0	0	0	0	0	0	0	0	#	153.4	236						
1994	1	1	0	0	200	0	0	0.004	0.004	0.02	0.036	0.064	0.076	0.088	0.092	0.06	0.08
	0.08	0.104	0.056	0.056	0.056	0.032	0.02	0.016	0.012	0.016	0.012	0.008	0	0.004	0.004	0	0
	0	0	0	0	0	0	0	0	#	162.5	250						
1995	1	1	0	0	199	0	0.00503	0.01508	0.01005	0.00503	0.0402	0.04523	0.0804	0.07538	0.06533	0.07035	0.07035
	0.08543	0.09548	0.07538	0.06533	0.0402	0.03518	0.0201	0.03015	0.0201	0.0201	0.0201	0	0.01005	0	0	0	0
	0	0	0	0	0	0	0	0	#	129.35	199						
1996	1	1	0	0	200	0	0.01255	0.01674	0.02092	0.03766	0.05021	0.02092	0.04603	0.05858	0.04603	0.1046	0.10042
	0.08368	0.05858	0.06695	0.06695	0.05021	0.02092	0.03766	0.02929	0.01255	0.02929	0.00837	0.00418	0.01255	0.00418	0	0	0
	0	0	0	0	0	0	0	0	#	155.35	239						
1997	1	1	0	0	200	0	0.004	0.008	0.032	0.04	0.016	0.012	0.044	0.048	0.052	0.076	0.068
	0.04	0.06	0.056	0.084	0.092	0.076	0.064	0.02	0.04	0.04	0.012	0.012	0.004	0	0	0	0
	0	0	0	0	0	0	0	0	#	162.5	250						
1998	1	1	0	0	125	0	0.008	0	0	0.016	0.032	0.056	0.024	0.064	0.024	0.088	0.056
	0.064	0.08	0.152	0.064	0.04	0.048	0.072	0.056	0.016	0.008	0	0.016	0	0.008	0.008	0	0
	0	0	0	0	0	0	0	0	#	81.25	125						
1999	1	1	0	0	67	0	0.01481	0.00741	0.00741	0.02963	0.00741	0.02963	0.03704	0.06667	0.02963	0.03704	0.02222
	0.08148	0.11111	0.1037	0.06667	0.08148	0.06667	0.05926	0.05926	0.02963	0.01481	0.00741	0.01481	0.00741	0.00741	0	0	0
	0	0	0	0	0	0	0	0	#	Super	Years	1999-2000					
2000	1	1	0	0	66	0	0.01481	0.00741	0.00741	0.02963	0.00741	0.02963	0.03704	0.06667	0.02963	0.03704	0.02222
	0.08148	0.11111	0.1037	0.06667	0.08148	0.06667	0.05926	0.05926	0.02963	0.01481	0.00741	0.01481	0.00741	0.00741	0	0	0
	0	0	0	0	0	0	0	0	#	Super	Years	1999-2000					
2001	1	1	0	0	15	0	0.01724	0.01724	0	0	0.03448	0.03448	0.06897	0.03448	0.10345	0.06897	0.13793
	0.08621	0.08621	0.05172	0.10345	0	0.05172	0.01724	0.03448	0.01724	0	0	0	0.01724	0.01724	0	0	0
	0	0	0	0	0	0	0	0	#	Super	Years	2001-2004					
2002	1	1	0	0	13	0	0.01724	0.01724	0	0	0.03448	0.03448	0.06897	0.03448	0.10345	0.06897	0.13793
	0.08621	0.08621	0.05172	0.10345	0	0.05172	0.01724	0.03448	0.01724	0	0	0	0.01724	0.01724	0	0	0
	0	0	0	0	0	0	0	0	#	Super	Years	2001-2004					
2003	1	1	0	0	15	0	0.01724	0.01724	0	0	0.03448	0.03448	0.06897	0.03448	0.10345	0.06897	0.13793
	0.08621	0.08621	0.05172	0.10345	0	0.05172	0.01724	0.03448	0.01724	0	0	0	0.01724	0.01724	0	0	0
	0	0	0	0	0	0	0	0	#	Super	Years	2001-2004					

2004	1	1	0	0	15	0	0.01724	0.01724	0	0	0.03448	0.03448	0.06897	0.03448	0.10345	0.06897	0.13793
	0.08621	0.08621	0.05172	0.10345	0	0.05172	0.01724	0.03448	0.01724	0	0	0	0.01724	0.01724	0	0	0
	0	0	0	0	0	0	0	0	#	Super	Years	2001-2004					
1978	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1979	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1980	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1981	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1982	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1983	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1984	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1985	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1986	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1987	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1988	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1989	1	2	0	0	15	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1990	1	2	0	0	16	0	0	0	0.00634	0.00951	0.03487	0.06022	0.08399	0.03803	0.03803	0.04437	0.03962
	0.03803	0.05071	0.04596	0.01585	0.05705	0.07132	0.05388	0.03803	0.03328	0.04754	0.06022	0.05388	0.03487	0.02219	0.01902	0.00317	0
	0	0	0	0	0	0	0	0	#	combine	78-90						
1991	1	2	0	0	200	0	0	0	0.00446	0	0	0.01786	0.01786	0.03571	0.07143	0.04911	0.08036
	0.05357	0.04911	0.11161	0.07143	0.05804	0.04911	0.06696	0.07143	0.07589	0.03571	0.04911	0.01786	0.00446	0	0.00893	0	0
	0	0	0	0	0	0	0	0	#	145.6	224						
1992	1	2	0	0	200	0	0	0	0	0.00609	0.01217	0.02637	0.03043	0.06694	0.05477	0.05477	0.06897
	0.07911	0.12576	0.07099	0.06694	0.0426	0.07099	0.04868	0.04665	0.04462	0.03245	0.02231	0.01217	0.01014	0.00406	0.00203	0	0
	0	0	0	0	0	0	0	0	#	320.45	493						
1993	1	2	0	0	200	0	0	0	0.00423	0.0141	0.03385	0.04372	0.06065	0.07193	0.05501	0.07475	0.07898
	0.06347	0.07616	0.08463	0.04654	0.06629	0.04513	0.04937	0.03103	0.02116	0.03667	0.01975	0.00987	0.00846	0.00423	0	0	0
	0	0	0	0	0	0	0	0	#	460.85	709						

1994	1	2	0	0	200	0	0.00134	0.00267	0.00134	0.00936	0.01872	0.04011	0.04545	0.07487	0.07487	0.08155	0.08824
	0.08422	0.09492	0.08021	0.07219	0.05348	0.04412	0.03342	0.01471	0.01738	0.01872	0.01604	0.02139	0.00668	0.00267	0.00134	0	0
	0	0	0	0	0	0	0	0	#	486.2	748						
1995	1	2	0	0	200	0	0	0.00261	0	0.00783	0.01828	0.04178	0.05483	0.05222	0.06789	0.09138	0.07572
	0.10444	0.08616	0.08355	0.05483	0.05744	0.047	0.047	0.03916	0.02872	0.01044	0.01567	0.00522	0.00522	0.00261	0	0	0
	0	0	0	0	0	0	0	0	#	248.95	383						
1996	1	2	0	0	200	0	0	0.00375	0.00375	0.00562	0.02434	0.05243	0.05993	0.06929	0.06554	0.11049	0.11236
	0.09176	0.07865	0.06554	0.04682	0.04307	0.05805	0.02622	0.02434	0.02434	0.01685	0.00749	0.00749	0.00187	0	0	0	0
	0	0	0	0	0	0	0	0	#	347.1	534						
1997	1	2	0	0	200	0	0	0.00334	0.00334	0.02341	0.02341	0.0602	0.0602	0.05686	0.08696	0.0903	0.07692
	0.05351	0.08027	0.05017	0.08696	0.03679	0.04682	0.04348	0.02007	0.01672	0.02007	0.01003	0.02007	0.00669	0.01003	0.00669	0	0
	0	0.00669	0	0	0	0	0	0	#	194.35	299						
1998	1	2	0	0	54	0	0	0	0	0	0	0	0.01852	0.05556	0.11111	0.11111	0.03704
	0.07407	0.11111	0.07407	0.07407	0.09259	0.01852	0.05556	0.01852	0.05556	0.03704	0.01852	0	0.01852	0.01852	0	0	0
	0	0	0	0	0	0	0	0	#	35.1	54						
1999	1	2	0	0	200	0	0	0.00187	0	0.00374	0.02056	0.01121	0.02617	0.04486	0.06355	0.07103	0.10093
	0.1028	0.09907	0.10093	0.0729	0.0729	0.05794	0.04673	0.03738	0.01869	0.0243	0.00561	0.00187	0.00561	0.00187	0.00374	0.00187	0
	0	0	0	0	0	0	0	0.00187	#	combines		99-100					
2000	1	2	0	0	200	0	0	0.00187	0	0.00374	0.02056	0.01121	0.02617	0.04486	0.06355	0.07103	0.10093
	0.1028	0.09907	0.10093	0.0729	0.0729	0.05794	0.04673	0.03738	0.01869	0.0243	0.00561	0.00187	0.00561	0.00187	0.00374	0.00187	0
	0	0	0	0	0	0	0	0.00187	#	combines		99-100					
1978	1	3	0	0	120	0	0	0	0	0.04167	0.025	0.08333	0.025	0.03333	0.05	0.00833	0.05
	0.04167	0.05	0.025	0.01667	0.04167	0.00833	0.05	0.1	0.03333	0.05	0.03333	0.10833	0.04167	0.03333	0.03333	0.01667	0
	0	0	0	0	0	0	0	0	#	120							
1979	1	3	0	0	106	0	0	0	0.01887	0.00943	0.0283	0.01887	0.03774	0.06604	0.0283	0.0283	0.00943
	0.0283	0.0283	0.01887	0.03774	0.04717	0.10377	0.06604	0.13208	0.12264	0.03774	0.04717	0.04717	0.01887	0.00943	0.00943	0	0
	0	0	0	0	0	0	0	0	#	106							
1980	1	3	0	0	29	0	0	0	0	0.00862	0.01724	0.0431	0.06034	0.07759	0.06034	0.06034	0.06897
	0.03448	0.11207	0.0431	0.06034	0.07759	0.03448	0.01724	0.0431	0.0431	0.02586	0.03448	0.02586	0.00862	0.00862	0.00862	0.01724	0
	0.00862	0	0	0	0	0	0	0	#	combine	80-83						
1981	1	3	0	0	29	0	0	0	0	0.00862	0.01724	0.0431	0.06034	0.07759	0.06034	0.06034	0.06897
	0.03448	0.11207	0.0431	0.06034	0.07759	0.03448	0.01724	0.0431	0.0431	0.02586	0.03448	0.02586	0.00862	0.00862	0.00862	0.01724	0
	0.00862	0	0	0	0	0	0	0	#	combine	80-83						
1982	1	3	0	0	29	0	0	0	0	0.00862	0.01724	0.0431	0.06034	0.07759	0.06034	0.06034	0.06897
	0.03448	0.11207	0.0431	0.06034	0.07759	0.03448	0.01724	0.0431	0.0431	0.02586	0.03448	0.02586	0.00862	0.00862	0.00862	0.01724	0
	0.00862	0	0	0	0	0	0	0	#	combine	80-83						
1983	1	3	0	0	29	0	0	0	0	0.00862	0.01724	0.0431	0.06034	0.07759	0.06034	0.06034	0.06897
	0.03448	0.11207	0.0431	0.06034	0.07759	0.03448	0.01724	0.0431	0.0431	0.02586	0.03448	0.02586	0.00862	0.00862	0.00862	0.01724	0
	0.00862	0	0	0	0	0	0	0	#	combine	80-83						
1984	1	3	0	0	200	0	0	0	0.00804	0.00804	0.04021	0.03217	0.08043	0.09115	0.08043	0.09651	0.08847
	0.07239	0.05094	0.04826	0.04021	0.01609	0.0429	0.03217	0.00804	0.03217	0.05362	0.03485	0.01877	0.00536	0.00536	0.00536	0.00268	0.00536
	0	0	0	0	0	0	0	0	#	161	373						
1985	1	3	0	0	200	0	0	0	0	0.0045	0.02703	0.04054	0.02252	0.07207	0.03153	0.1036	0.05405
	0.04955	0.08108	0.04505	0.07207	0.03153	0.05405	0.03153	0.04505	0.07207	0.03604	0.04054	0.02252	0.02703	0.02252	0.00901	0.0045	0
	0	0	0	0	0	0	0	0	#	98	222						
1986	1	3	0	0	177	0	0.0113	0.00565	0.00565	0	0.01695	0.0113	0.0452	0.0565	0.0565	0.10169	0.03955
	0.0678	0.03955	0.07345	0.03955	0.01695	0.0452	0.06215	0.0452	0.0565	0.0565	0.0339	0.0565	0.0113	0.01695	0.0113	0.01695	0
	0	0	0	0	0	0	0	0	#	37	177						

1987	1	3	0	0	163	0	0.01227	0	0.00613	0.0184	0.04908	0.01227	0.02454	0.07362	0.03067	0.07975	0.04908
	0.04294	0.07362	0.04908	0.04294	0.04294	0.04294	0.06135	0.02454	0.07975	0.03681	0.05521	0.04294	0.0184	0.01227	0.01227	0	0
	0	0	0.00613	0	0	0	0	0	#	40	163						
1988	1	3	0	0	38	0	0	0	0	0	0	0.13158	0.02632	0.10526	0.02632	0.05263	0.05263
	0.07895	0.18421	0.05263	0.05263	0.05263	0	0.02632	0.07895	0.05263	0	0.02632	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	38	38						
1989	1	3	0	0	112	0	0.00893	0.03571	0.01786	0.01786	0.04464	0.01786	0.08036	0.0625	0.02679	0.08929	0.08036
	0.08929	0.0625	0.07143	0.03571	0.07143	0.05357	0.00893	0.01786	0.01786	0.03571	0	0.00893	0.01786	0.00893	0	0.00893	0
	0	0	0	0.00893	0	0	0	0	#	80	112						
1993	1	3	0	0	163	0	0.00613	0	0	0.00613	0.06135	0.07975	0.11656	0.09202	0.12883	0.10429	0.06135
	0.02454	0.04294	0.02454	0.02454	0.04294	0.0184	0.0184	0.03067	0.04294	0.0184	0.00613	0.02454	0	0.01227	0.00613	0	0
	0	0	0	0	0	0.00613	0	0	#	163	163						
1994	1	3	0	0	151	0	0	0.00662	0	0.01325	0.01987	0.06623	0.10596	0.09272	0.15232	0.07285	0.12583
	0.0596	0.04636	0.03311	0.03974	0.04636	0.03974	0.01325	0.03311	0.00662	0	0.00662	0.00662	0.01325	0	0	0	0
	0	0	0	0	0	0	0	0	#	151	151						
1995	1	3	0	0	110	0	0	0	0.00909	0.02727	0	0.03636	0.08182	0.07273	0.13636	0.1	0.07273
	0.06364	0.02727	0.07273	0.02727	0.06364	0.03636	0.03636	0.01818	0.02727	0.05455	0.00909	0.00909	0.01818	0	0	0	0
	0	0	0	0	0	0	0	0	#	110	110						
1996	1	3	0	0	73	0	0	0	0.0137	0.0137	0.0411	0.0274	0.0411	0.12329	0.10959	0.12329	0.17808
	0.05479	0.09589	0.0411	0.0274	0.0137	0.0274	0	0.0137	0.0137	0.0137	0.0274	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	73	73						
1997	1	3	0	0	99	0	0	0.0101	0.0101	0.0101	0.0303	0.0404	0.07071	0.07071	0.09091	0.09091	0.14141
	0.06061	0.12121	0.0404	0.0202	0.06061	0.0303	0.05051	0	0.0101	0.0101	0.0101	0.0101	0.0101	0	0	0	0
	0	0	0	0	0	0	0	0	#	99	99						
1998	1	3	0	0	147	0	0	0	0	0	0.02041	0.02721	0.04082	0.04762	0.14286	0.13605	0.10204
	0.12245	0.09524	0.07483	0.03401	0.05442	0.01361	0.02041	0.02721	0.02041	0	0.01361	0.0068	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	147	147						
1999	1	3	0	0	200	0	0	0.00407	0	0.00407	0.00813	0.03252	0.05285	0.06504	0.10976	0.15041	0.09756
	0.10569	0.07724	0.07724	0.04065	0.05691	0.03252	0.00813	0.02846	0.01626	0.01626	0.0122	0.00407	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	246	246						
2000	1	3	0	0	62	0	0	0	0	0	0	0.04839	0.04839	0.08065	0.06452	0.09677	0.16129
	0.17742	0.06452	0.03226	0.06452	0	0.04839	0.03226	0.03226	0	0.03226	0.01613	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	62	62						
2001	1	3	0	0	200	0	0	0	0.00272	0.00815	0.01359	0.02174	0.02989	0.04076	0.05163	0.05707	0.09511
	0.08424	0.10326	0.10054	0.09783	0.05707	0.07337	0.04891	0.03533	0.02446	0.0163	0.00272	0.01087	0.00815	0.00543	0.00815	0	0
	0.00272	0	0	0	0	0	0	0	#								
2002	1	3	0	0	200	0	0	0	0.00446	0.00893	0.00893	0.01786	0.02679	0.03348	0.05134	0.08036	0.07589
	0.09152	0.09598	0.11607	0.10045	0.09152	0.04464	0.04464	0.03125	0.01563	0.01339	0.02009	0.01563	0.00446	0.00446	0.00223	0	0
	0	0	0	0	0	0	0	0	#								
2003	1	3	0	0	200	0	0.00204	0	0.00612	0.0102	0.0102	0.02449	0.0102	0.04082	0.03061	0.0551	0.06531
	0.06735	0.07755	0.08571	0.09592	0.10816	0.06327	0.08367	0.05102	0.02857	0.01837	0.02041	0.01429	0.00816	0.01429	0.00408	0.00204	0.00204
	0	0	0	0	0	0	0	0	#								

1995	1	4	0	0	98	0	0	0	0	0	0	0.0102	0.0102	0.04082	0.08163	0.17347	0.03061
	0.06122	0.09184	0.07143	0.08163	0.06122	0.08163	0.02041	0.06122	0.03061	0.05102	0.03061	0.0102	0	0	0	0	0
	0	0	0	0	0	0	0	0	#	98	98						
1996	1	4	0	0	161	0	0	0	0	0	0	0.01242	0	0.07453	0.07453	0.09938	0.15528
	0.04969	0.13043	0.04348	0.03727	0.04348	0.03727	0.0559	0.01863	0.01863	0.03727	0.03106	0.01242	0.01242	0.01863	0.01242	0	0.01242
	0.01242	0	0	0	0	0	0	0	#	161	161						

1997	1	4	0	0	200	0	0.00391	0	0	0	0	0.00781	0.03906	0.03516	0.10156	0.12109	0.14453
	0.13281	0.08203	0.0625	0.07813	0.04688	0.02344	0.03125	0.01953	0.02344	0.01563	0.00781	0.00781	0.00781	0.00391	0	0.00391	0
	0	0	0	0	0	0	0	0	#	256	256						
1998	1	4	0	0	118	0	0	0	0	0	0	0.02542	0.02542	0.00847	0.04237	0.13559	0.02542
	0.15254	0.05085	0.18644	0.0678	0.08475	0.0339	0.04237	0.00847	0.0339	0.0339	0.01695	0	0.01695	0	0.00847	0	0
	0	0	0	0	0	0	0	0	#	118	118						
1999	1	4	0	0	166	0	0	0	0	0	0	0	0.00602	0.01205	0.0241	0.04217	0.10241
	0.09639	0.09639	0.07831	0.09639	0.11446	0.07229	0.07229	0.05422	0.03614	0.0241	0.03614	0.01205	0	0.01205	0	0.00602	0
	0.00602	0	0	0	0	0	0	0	#	166	166						
2000	1	4	0	0	141	0	0	0	0	0	0.00709	0.01418	0.03546	0.04255	0.06383	0.14184	0.09929
	0.11348	0.10638	0.06383	0.07801	0.04965	0.05674	0.04965	0.00709	0.02128	0.00709	0.00709	0.02128	0	0.00709	0	0.00709	0
	0	0	0	0	0	0	0	0	#	141	141						
2001	1	4	0	0	200	0	0	0	0	0	0.02823	0.10081	0.05645	0.07661	0.06855	0.05645	0.125
	0.09274	0.06452	0.05242	0.06855	0.04435	0.04032	0.02419	0.02419	0.02419	0.0121	0.0121	0.0121	0.00806	0.00403	0.00403	0	0
	0	0	0	0	0	0	0	0	#	248	248						

1980	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88	111	111				
1981	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1982	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1983	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1984	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1985	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1986	1	5	0	0	29	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1987	1	5	0	0	28	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1988	1	5	0	0	28	0	0	0	0	0.01138	0.02987	0.06543	0.07539	0.11522	0.0825	0.09388	0.0441
	0.03841	0.02703	0.03129	0.04694	0.0128	0.02418	0.05405	0.02987	0.05974	0.01991	0.01991	0.01422	0.01849	0.00711	0.03129	0.01138	0.00711
	0.00569	0.00569	0.00569	0	0.00569	0.00569	0	0	#	combine	80-88						
1995	1	5	0	0	11	0	0	0	0	0	0	0.30435	0.04348	0.08696	0.08696	0.08696	0.04348
	0.08696	0.04348	0.04348	0	0.04348	0	0	0	0	0	0	0	0	0	0.04348	0	0.04348
	0.04348	0	0	0	0	0	0	0	#	combine	95-96						
1996	1	5	0	0	12	0	0	0	0	0	0	0.30435	0.04348	0.08696	0.08696	0.08696	0.04348
	0.08696	0.04348	0.04348	0	0.04348	0	0	0	0	0	0	0	0	0	0.04348	0	0.04348
	0.04348	0	0	0	0	0	0	0	#	combine	95-96						

1998	1	5	0	0	48	0	0	0	0	0	0	0.02083	0	0	0.04167	0.0625	0.125
	0	0.16667	0.04167	0.08333	0.0625	0	0.04167	0.04167	0.10417	0.02083	0.0625	0.02083	0.02083	0.04167	0.02083	0	0
	0	0	0.02083	0	0	0	0	0	#	48	48						
1999	1	5	0	0	96	0	0	0	0	0	0	0	0	0.05208	0.02083	0.03125	0.09375
	0.08333	0.08333	0.03125	0.0625	0.04167	0.01042	0.07292	0.0625	0.05208	0.10417	0.03125	0.10417	0.04167	0.01042	0.01042	0	0
	0	0	0	0	0	0	0	0	#	96	96						
2000	1	5	0	0	189	0	0	0	0	0	0	0.00529	0.01587	0.02116	0.04762	0.04762	0.06878
	0.08995	0.07407	0.06349	0.09524	0.06349	0.0582	0.06349	0.06349	0.04762	0.04762	0.03704	0.03704	0.03704	0.01058	0.00529	0	0
	0	0	0	0	0	0	0	0	#	189	189						
2001	1	5	0	0	101	0	0	0	0	0	0	0.0099	0.0099	0.0099	0.0099	0.0297	0.07921
	0.08911	0.09901	0.07921	0.09901	0.0495	0.05941	0.06931	0.05941	0.07921	0.0495	0.05941	0.0198	0.0198	0	0	0.0099	0.0099
	0	0	0	0	0	0	0	0	#	101	101						
1996	1	6	0	0	200	0	0	0	0	0	0.00752	0.0188	0.03008	0.05263	0.04511	0.08271	0.09023
	0.12782	0.09023	0.05639	0.02632	0.03759	0.03008	0.04135	0.03759	0.04135	0.03759	0.04511	0.05263	0.03759	0.00376	0.00376	0	0.00376
	0	0	0	0	0	0	0	0	#	266	266						
1997	1	6	0	0	118	0	0	0	0	0	0	0.00847	0.04237	0.0678	0.02542	0.13559	0.11017
	0.10169	0.16102	0.11017	0.04237	0.05085	0.02542	0.02542	0.01695	0.01695	0.00847	0.01695	0.02542	0.00847	0	0	0	0
	0	0	0	0	0	0	0	0	#	118	118						
1998	1	6	0	0	34	0	0	0	0	0	0.01961	0.02941	0.02941	0.05882	0.01961	0	0.08824
	0.05882	0.14706	0.02941	0.08824	0.05882	0.07843	0.04902	0.06863	0.02941	0.0098	0.01961	0.03922	0.03922	0.0098	0.01961	0	0.0098
	0	0	0	0	0	0	0	0	#	combine	98-100						
1999	1	6	0	0	34	0	0	0	0	0	0.01961	0.02941	0.02941	0.05882	0.01961	0	0.08824
	0.05882	0.14706	0.02941	0.08824	0.05882	0.07843	0.04902	0.06863	0.02941	0.0098	0.01961	0.03922	0.03922	0.0098	0.01961	0	0.0098
	0	0	0	0	0	0	0	0	#	combine	98-100						
2000	1	6	0	0	34	0	0	0	0	0	0.01961	0.02941	0.02941	0.05882	0.01961	0	0.08824
	0.05882	0.14706	0.02941	0.08824	0.05882	0.07843	0.04902	0.06863	0.02941	0.0098	0.01961	0.03922	0.03922	0.0098	0.01961	0	0.0098
	0	0	0	0	0	0	0	0	#	combine	98-100						
2002	1	6	0	0	23	0	0	0	0	0.02899	0.01449	0.01449	0.01449	0	0	0	0
	0.02899	0.02899	0.07246	0.04348	0.01449	0.04348	0.02899	0.05797	0.07246	0.01449	0.02899	0.17391	0.14493	0.08696	0.05797	0.01449	0.01449
	0	0	0	0	0	0	0	0	#	combine	04-Feb						
2003	1	6	0	0	23	0	0	0	0	0.02899	0.01449	0.01449	0.01449	0	0	0	0
	0.02899	0.02899	0.07246	0.04348	0.01449	0.04348	0.02899	0.05797	0.07246	0.01449	0.02899	0.17391	0.14493	0.08696	0.05797	0.01449	0.01449
	0	0	0	0	0	0	0	0	#	combine	04-Feb						
2004	1	6	0	0	23	0	0	0	0	0.02899	0.01449	0.01449	0.01449	0	0	0	0
	0.02899	0.02899	0.07246	0.04348	0.01449	0.04348	0.02899	0.05797	0.07246	0.01449	0.02899	0.17391	0.14493	0.08696	0.05797	0.01449	0.01449
	0	0	0	0	0	0	0	0	#	combine	04-Feb						
2000	1	7	0	0	200	0	0	0	0	0	0	0	0.00291	0.00291	0.00581	0.00872	0.01744
	0.0814	0.0814	0.14244	0.09884	0.11628	0.08721	0.09302	0.06105	0.07849	0.04651	0.03488	0.00872	0.02616	0.00291	0	0	0.00291
	0	0	0	0	0	0	0	0	#	344	344						
2001	1	7	0	0	200	0	0	0	0	0	0	0	0	0.00172	0.00172	0.00343	0.0223
	0.03602	0.07204	0.08919	0.15609	0.14237	0.12693	0.09434	0.08576	0.06861	0.03602	0.02916	0.0223	0.00515	0.00515	0.00172	0	0
	0	0	0	0	0	0	0	0	#	583	583						
2002	1	7	0	0	43	0	0	0	0	0	0	0	0	0	0.00775	0.03101	0.03876
	0.06977	0.06202	0.11628	0.10853	0.14729	0.16279	0.12403	0.03876	0.03876	0.0155	0.00775	0	0.00775	0	0	0.00775	0.0155
	0	0	0	0	0	0	0	0	#	combine	04-Feb						
2003	1	7	0	0	43	0	0	0	0	0	0	0	0	0	0.00775	0.03101	0.03876
	0.06977	0.06202	0.11628	0.10853	0.14729	0.16279	0.12403	0.03876	0.03876	0.0155	0.00775	0	0.00775	0	0	0.00775	0.0155
	0	0	0	0	0	0	0	0	#	combine	04-Feb						
2004	1	7	0	0	43	0	0	0	0	0	0	0	0	0	0.00775	0.03101	0.03876
	0.06977	0.06202	0.11628	0.10853	0.14729	0.16279	0.12403	0.03876	0.03876	0.0155	0.00775	0	0.00775	0	0	0.00775	0.0155
	0	0	0	0	0	0	0	0	#	combine	04-Feb						

#2002	1	9	0	0	141	0	0	0	0	0	0	0	0	0	0	0.00709	0.00709
	0.03546	0.06383	0.12766	0.12057	0.14894	0.10638	0.08511	0.06383	0.0922	0.04965	0.03546	0.02128	0	0.02837	0.00709	0	0
	0	0	0	0	0	0	0	0	#IPHC	Survey							
#2003	1	9	0	0	200	0	0	0	0	0	0	0	0	0	0.00631	0.00315	0.01893
	0.02208	0.05047	0.09464	0.08517	0.11041	0.11041	0.07886	0.08517	0.08202	0.08202	0.04732	0.05678	0.05363	0.00315	0.00631	0.00315	0
	0	0	0	0	0	0	0	0	#IPHC	Survey							
#2004	1	9	0	0	175	0	0	0	0	0	0	0	0	0	0	0.00571	0
	0	0.04571	0.09714	0.10286	0.15429	0.11429	0.13143	0.08571	0.07429	0.08	0.03429	0.04	0.03429	0	0	0	0
	0	0	0	0	0	0	0	0	#IPHC	Survey							
36	#	N	age'	bins													
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	35	40	45	50	55	60	65
	70																
1	#	number	of	unique	ageing	error	matrices		to	generate							
0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5
	18.5	19.5	20.5	21.5	22.5	23.5	24.5	25.5	26.5	27.5	28.5	29.5	30.5	31.5	32.5	33.5	34.5
	35.5	36.5	37.5	38.5	39.5	40.5	41.5	42.5	43.5	44.5	45.5	46.5	47.5	48.5	49.5	50.5	51.5
	52.5	53.5	54.5	55.5	56.5	57.5	58.5	59.5	60.5	61.5	62.5	63.5	64.5	65.5	66.5	67.5	68.5
	69.5	70.5	#71.5	72.5	73.5	74.5	75.5	76.5	77.5	78.5	79.5	80.5	81.5	82.5	83.5	84.5	85.5
	86.5	87.5	88.5	89.5	90.5												
#SS1	Age	Error	Vector1.5		1.53	1.57	1.6	1.64	1.67	1.71	1.74	1.78	1.81	1.85	1.88	1.92	1.95
	1.99	2.02	2.06	2.09	2.13	2.16	2.2	2.23	2.27	2.3	2.33	2.37	2.4	2.44	2.47	2.51	2.54
	2.58	2.61	2.65	2.68	2.72	2.75	2.79	2.82	2.86	2.89	2.93	2.96	3	3.03	3.07	3.1	3.13
	3.17	3.2	3.24	3.27	3.31	3.34	3.38	3.41	3.45	3.48	3.52	3.55	3.59	3.62	3.66	3.69	3.73
	3.76	3.8	3.83	3.87	3.9	3.93	#3.97	4	4.04	4.07	4.11	4.14	4.18	4.21	4.25	4.28	4.32
	4.35	4.39	4.42	4.46	4.49	4.53	4.56	4.6	4.63								
#1.01	1.06	1.1	1.14	1.19	1.23	1.27	1.31	1.36	1.4	1.44	1.49	1.53	1.57	1.62	1.66	1.7	1.75
	1.79	1.83	1.87	1.92	1.96	2	2.05	2.09	2.13	2.18	2.22	2.26	2.31	2.35	2.39	2.44	2.48
	2.52	2.56	2.61	2.65	2.69	2.74	2.78	2.82	2.87	2.91	2.95	3	3.04	3.08	3.12	3.17	3.21
	3.25	3.3	3.34	3.38	3.43	3.47	3.51	3.56	3.6	3.64	3.69	3.73	3.77	3.81	3.86	3.9	3.94
	4	3.93	#3.97	4	4.04	4.07	4.11	4.14	4.18	4.21	4.25	4.28	4.32	4.35	4.39	4.42	4.46
	4.49	4.53	4.56	4.6	4.63												
2.41775	2.39845	2.37915	2.35985	2.34055	2.32125	2.30195	2.28265	2.26335	2.24405	2.22475	2.20545	2.18615	2.16685	2.14755	2.12825	2.10895	2.08965
	2.07035	2.05105	2.03175	2.01245	1.99315	1.97385	1.95455	1.93525	1.91595	1.89665	1.87735	1.85805	1.83875	1.81945	1.80015	1.78085	1.76155
	1.74225	1.72295	1.70365	1.68435	1.66505	1.64575	1.62645	1.60715	1.58785	1.56855	1.54925	1.52995	1.51065	1.49135	1.47205	1.45275	1.43345
	1.41415	1.39485	1.37555	1.35625	1.33695	1.31765	1.29835	1.27905	1.25975	1.24045	1.22115	1.20185	1.18255	1.16325	1.14395	1.12465	1.10535
	1.08605	1.06675	#1.04745		1.02815	1.00885	0.98955	0.97025	0.95095	0.93165	0.91235	0.89305	0.87375	0.85445	0.83515	0.81585	0.79655
	0.77725	0.75795	0.73865	0.71935	0.70005	0.68075											

#SS1

```
#3      "1=%CORRECT,"  "2=C.V.,"      "3=%AGREE,"    4=READ  %AGREE  @AGE

#0.31   0.1     0.95    '%AGREE @       1       (MIN)'  0       70      0       0       0       !       82      NO      PICK    0       -1
        0

#0.11   0.1     0.9     '%AGREE @70     (MAX)'  0       70      0       0       0       !       83      NO      PICK    0       -1      0

#1      0.001   4       'POWER  '       0       70      0       0       0       !       84      NO      PICK    0       -1      0

#0.04   0.01    0.3     'OLD    DISCOUNT        '       0       70      0       0       0       !       85      NO      PICK    0       -1
        0

#0      0.001   0.1     '%MIS-SEXED     '       0       70      0       0       0       !       86      NO      PICK    0       -1      0

30      #       N       age     observations    (need   to      count   and     enter   value   here)

#Year   Seas    Type    Gender  Partition       ageerr  LbinLo  LbinHi  Nsamp

1980    1       1       0       0       1       1       -1      23      0.01471 0       0       0.04412 0.04412 0.02941 0.07353 0.01471 0.07353
        0.10294 0.07353 0.02941 0.02941 0       0.01471 0.01471 0       0       0.02941 0.02941 0       0.01471 0       0.02941 0.01471 0
        0       0.04412 0.05882 0.05882 0       0.05882 0.04412 0       0.01471 0.04412 #       combines        80-82   Super   Years
```

1981	1	1	0	0	1	1	-1	23	0.01471	0	0	0.04412	0.04412	0.02941	0.07353	0.01471	0.07353
	0.10294	0.07353	0.02941	0.02941	0	0.01471	0.01471	0	0	0.02941	0.02941	0	0.01471	0	0.02941	0.01471	0
	0	0.04412	0.05882	0.05882	0	0.05882	0.04412	0	0.01471	0.04412	#	combines		80-82	Super	Years	
1982	1	1	0	0	1	1	-1	22	0.01471	0	0	0.04412	0.04412	0.02941	0.07353	0.01471	0.07353
	0.10294	0.07353	0.02941	0.02941	0	0.01471	0.01471	0	0	0.02941	0.02941	0	0.01471	0	0.02941	0.01471	0
	0	0.04412	0.05882	0.05882	0	0.05882	0.04412	0	0.01471	0.04412	#	combines		80-82	Super	Years	
1980	1	2	0	0	1	1	-1	6	0	0	0	0	0	0.04	0	0	0.04
	0.12	0	0	0.04	0.04	0	0	0	0	0.04	0.04	0.08	0.04	0	0.04	0	0.04
	0	0.04	0	0.04	0.12	0.04	0.04	0.04	0	0.12	#	combine	80-82-83		Super	Years	
1981	1	2	0	0	1	1	-1	6	0	0	0	0	0	0.04	0	0	0.04
	0.12	0	0	0.04	0.04	0	0	0	0	0.04	0.04	0.08	0.04	0	0.04	0	0.04
	0	0.04	0	0.04	0.12	0.04	0.04	0.04	0	0.12	#	combine	80-82-83				
1982	1	2	0	0	1	1	-1	6	0	0	0	0	0	0.04	0	0	0.04
	0.12	0	0	0.04	0.04	0	0	0	0	0.04	0.04	0.08	0.04	0	0.04	0	0.04
	0	0.04	0	0.04	0.12	0.04	0.04	0.04	0	0.12	#	combine	80-82-83		Super	Years	
1983	1	2	0	0	1	1	-1	7	0	0	0	0	0	0.04	0	0	0.04
	0.12	0	0	0.04	0.04	0	0	0	0	0.04	0.04	0.08	0.04	0	0.04	0	0.04
	0	0.04	0	0.04	0.12	0.04	0.04	0.04	0	0.12	#	combine	80-82-83		Super	Years	
1984	1	2	0	0	1	1	-1	20	0	0	0.01639	0.01639	0.08197	0.06557	0.04918	0.01639	0.01639
	0.04918	0.03279	0.04918	0.01639	0.01639	0.03279	0.01639	0.04918	0.03279	0.01639	0.03279	0.01639	0.03279	0.03279	0	0.06557	0
	0	0.06557	0.03279	0.04918	0.04918	0	0	0	0.03279	0.01639	#	combine	84-86	Super	Years		
1985	1	2	0	0	1	1	-1	20	0	0	0.01639	0.01639	0.08197	0.06557	0.04918	0.01639	0.01639
	0.04918	0.03279	0.04918	0.01639	0.01639	0.03279	0.01639	0.04918	0.03279	0.01639	0.03279	0.01639	0.03279	0.03279	0	0.06557	0
	0	0.06557	0.03279	0.04918	0.04918	0	0	0	0.03279	0.01639	#	combine	84-86	Super	Years		
1986	1	2	0	0	1	1	-1	21	0	0	0.01639	0.01639	0.08197	0.06557	0.04918	0.01639	0.01639
	0.04918	0.03279	0.04918	0.01639	0.01639	0.03279	0.01639	0.04918	0.03279	0.01639	0.03279	0.01639	0.03279	0.03279	0	0.06557	0
	0	0.06557	0.03279	0.04918	0.04918	0	0	0	0.03279	0.01639	#	combine	84-86	Super	Years		
1978	1	3	0	0	1	1	-1	120	0	0.00833	0.05	0.08333	0.075	0.03333	0.06667	0.03333	0.05
	0.00833	0.00833	0.01667	0.025	0	0.00833	0.01667	0.025	0.00833	0.01667	0	0	0.04167	0.01667	0.03333	0.00833	0
	0.00833	0.08333	0.06667	0.05	0.03333	0.025	0.06667	0.01667	0	0.01667	#	120	120				
1979	1	3	0	0	1	1	-1	169	0	0.00592	0.02367	0.01183	0.08284	0.06509	0.01775	0.04734	0.01775
	0.01775	0.01183	0.00592	0.01183	0.01775	0.01183	0.01775	0.05325	0.04142	0.02367	0.0355	0.01183	0.02959	0.0355	0.0355	0.04734	0.01183
	0.01775	0.10651	0.05325	0.02367	0.02367	0	0.04734	0.00592	0.00592	0.02367	#	169	169				
1984	1	3	0	0	1	1	-1	200	0	0	0.0082	0.0123	0.04918	0.09836	0.13525	0.04098	0.06148
	0.14344	0.04918	0.04918	0.03279	0.03279	0.0123	0.03279	0.0123	0.0082	0.0123	0.0082	0.0123	0.0123	0	0	0.0041	0.0082
	0.0041	0.02459	0.04098	0.02459	0.0082	0.0041	0.0041	0.0041	0.0123	0.03689	#	244	244				
1985	1	3	0	0	1	1	-1	124	0	0.00806	0	0.00806	0.00806	0.01613	0.04839	0.02419	0.02419
	0.02419	0.12903	0.03226	0.06452	0.04839	0.04032	0.02419	0	0	0	0.00806	0.01613	0.00806	0.02419	0.03226	0.00806	0
	0.01613	0.06452	0.12097	0.03226	0.02419	0.00806	0	0.04032	0.01613	0.08065	#	124	124				
1986	1	3	0	0	1	1	-1	140	0	0.00714	0.02857	0.01429	0.01429	0.03571	0.07143	0.06429	0.09286
	0.05	0.05	0.05714	0.01429	0.03571	0.02143	0.02143	0.00714	0	0.01429	0	0	0.02143	0.00714	0.00714	0	0.00714
	0	0.02857	0.07143	0.04286	0.03571	0.01429	0.03571	0.02143	0.01429	0.09286	#	140	140				
1987	1	3	0	0	1	1	-1	123	0	0.02439	0.03252	0	0.04065	0	0.04065	0.06504	0.07317
	0.04878	0.05691	0.03252	0.04065	0.02439	0.03252	0.04065	0.01626	0.01626	0.02439	0.01626	0.00813	0.01626	0.01626	0.00813	0.00813	0.00813
	0	0.01626	0.09756	0.04878	0.01626	0.00813	0.00813	0.04878	0.01626	0.04878	#	123	123				
1989	1	3	0	0	1	1	-1	32	0	0	0.03125	0.03125	0.0625	0.15625	0.03125	0.15625	0.03125
	0.03125	0.125	0.03125	0	0.03125	0.0625	0.03125	0	0.03125	0	0	0	0	0.03125	0.03125	0	0
	0.03125	0	0	0	0	0	0	0	0	0.0625	#	32	32				

```
2001    1       3       0       0       1       1       -1      86      0       0       0.01163 0       0.01163 0.02326 0       0.03488 0.02326
        0.06977 0.15116 0.11628 0.06977 0.0814  0.0814  0.03488 0.05814 0.0814  0.01163 0.01163 0       0       0.01163 0       0       0
        0.01163 0.01163 0.01163 0.01163 0.02326 0.01163 0       0.01163 0.01163 0.01163 #       86      86
2002    1       3       0       0       1       1       -1      73      0       0       0       0       0       0       0.0137  0.0137  0.0274
        0.08219 0.06849 0.0274  0.06849 0.13699 0.0411  0.06849 0.08219 0.10959 0.05479 0.0274  0.0274  0       0       0       0.0137  0
        0       0.0137  0.0411  0       0.0274  0.0137  0       0       0.0137  0.0274  #       73 fish

1998    1       5       0       0       1       1       -1      60      0       0       0       0       0       0       0.00833 0.03333 0.04167
        0.06667 0.05    0.10833 0.05    0.06667 0.06667 0.01667 0.00833 0.00833 0.00833 0.00833 0.01667 0.01667 0.04167 0.01667 0.01667 0.01667
        0.01667 0.04167 0.025   0.05    0.08333 0.05    0.00833 0.01667 0.00833 0.03333 #       combine 98-99   Super   Years
1999    1       5       0       0       1       1       -1      60      0       0       0       0       0       0       0.00833 0.03333 0.04167
        0.06667 0.05    0.10833 0.05    0.06667 0.06667 0.01667 0.00833 0.00833 0.00833 0.00833 0.01667 0.01667 0.04167 0.01667 0.01667 0.01667
        0.01667 0.04167 0.025   0.05    0.08333 0.05    0.00833 0.01667 0.00833 0.03333 #       combine 98-99   Super   Years
2000    1       5       0       0       1       1       -1      189     0       0       0       0       0.00529 0.00529 0       0.01058 0.02646
        0.04233 0.02646 0.04233 0.04233 0.08466 0.08466 0.03175 0.06349 0.01587 0.03704 0.01587 0.01058 0.01058 0.02646 0.04762 0.02646 0.03704
        0.03175 0.11111 0.01587 0.05291 0.03175 0.02116 0.01058 0.01587 0.01058 0.00529 #       189     189
2001    1       5       0       0       1       1       -1      96      0       0       0       0       0       0.01042 0       0.02083 0.03125
        0.03125 0.02083 0.04167 0.08333 0.09375 0.05208 0.07292 0.05208 0.05208 0.03125 0.02083 0.03125 0.01042 0.02083 0       0.02083 0
        0.01042 0.01042 0.0625  0.05208 0.03125 0.02083 0.01042 0.01042 0.02083 0.07292 #       was     101     in      last    assessment
2002    1       6       0       0       1       1       -1      23      0       0       0.015625        0.015625        0.015625        0
        0.03125 0.015625        0       0.015625        0.015625        0       0.03125 0.015625        0.015625        0.078125        0.03125
        0.03125 0.015625        0.03125 0.015625        0.015625        0       0       0       0       0       0       0.0625  0.03125
        0.015625        0       0.0625  0.03125 0.046875        0.34375 #Super  year    2002    -2004
2003    1       6       0       0       1       1       -1      23      0       0       0.015625        0.015625        0.015625        0
        0.03125 0.015625        0       0.015625        0.015625        0       0.03125 0.015625        0.015625        0.078125        0.03125
        0.03125 0.015625        0.03125 0.015625        0.015625        0       0       0       0       0       0       0.0625  0.03125
        0.015625        0       0.0625  0.03125 0.046875        0.34375 #Super  year    2002    -2004
2004    1       6       0       0       1       1       -1      23      0       0       0.015625        0.015625        0.015625        0
        0.03125 0.015625        0       0.015625        0.015625        0       0.03125 0.015625        0.015625        0.078125        0.03125
        0.03125 0.015625        0.03125 0.015625        0.015625        0       0       0       0       0       0       0.0625  0.03125
        0.015625        0       0.0625  0.03125 0.046875        0.34375 #Super  year    2002    -2004
2001    1       7       0       0       1       1       -1      186     0       0       0       0       0       0       0       0       0
        0.01613 0.01075 0.01613 0.03763 0.03763 0.05376 0.06452 0.05914 0.06452 0.06452 0.07527 0.04301 0.04301 0.03226 0.01613 0.02151 0.01613
        0.04301 0.04301 0.13978 0.02151 0       0.03226 0.02151 0.01613 0.01075 0       #       was     262     in      last    assessment
2002    1       7       0       0       1       1       -1      38      0       0       0       0       0       0       0       0       0.01626
        0.00813 0.01626 0.04878 0.04065 0.04878 0.03252 0.0813  0.11382 0.14634 0.06504 0.06504 0.0813  0.01626 0.05691 0       0.03252 0.02439
        0       0.01626 0.04065 0.01626 0       0       0       0.00813 0       0.02439 #Super  Year    04-Feb
2003    1       7       0       0       1       1       -1      38      0       0       0       0       0       0       0       0       0.01626
        0.00813 0.01626 0.04878 0.04065 0.04878 0.03252 0.0813  0.11382 0.14634 0.06504 0.06504 0.0813  0.01626 0.05691 0       0.03252 0.02439
        0       0.01626 0.04065 0.01626 0       0       0       0.00813 0       0.02439 #Super  Year    04-Feb
2004    1       7       0       0       1       1       -1      37      0       0       0       0       0       0       0       0       0.01626
        0.00813 0.01626 0.04878 0.04065 0.04878 0.03252 0.0813  0.11382 0.14634 0.06504 0.06504 0.0813  0.01626 0.05691 0       0.03252 0.02439
        0       0.01626 0.04065 0.01626 0       0       0       0.00813 0       0.02439 #Super  Year    04-Feb

#2004   1       9       0       0       1       1       -1      141     0       0       0       0       0       0       0       0       0
        0       0       0       0.00709 0.01418 0.03546 0.02837 0.04255 0.06383 0.04965 0.05674 0.04255 0.02837 0.02128 0.04965 0.04965 0.02128
        0.05674 0.02128 0.14184 0.04255 0.01418 0.04255 0.05674 0.03546 0.00709 0.07092 #       IPHC


#2004   1       9       0       0       1       1       -1      200     0       0       0       0       0       0       0.00318 0       0
        0.00318 0       0.00637 0.00637 0.00955 0.03185 0.0414  0.03503 0.05414 0.03822 0.05414 0.03185 0.03185 0.02548 0.01274 0.04777 0.03822
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        0.0414  0.03503 0.13057 0.04777 0.02548 0.05732 0.03822 0.02229 0.02229 0.10828 #       IPHC

#2004   1       9       0       0       1       1       -1      175     0       0       0       0       0       0       0       0       0
        0       0.00575 0.01149 0.00575 0       0.03448 0.04598 0.04598 0.03448 0.08046 0.06322 0.07471 0.04023 0.03448 0.02299 0.01724 0.01149
        0.02299 0.00575 0.14368 0.03448 0.02874 0.05747 0.04023 0.05747 0.01149 0.06897 #       IPHC

5       #_N_MeanSize-at-Age_obs

#Yr     Seas    Flt/Svy Gender  Part    Ageerr  Ignore  datavector(female-male)

#       samplesize(female-male)

#Below  were    what    was     used    in      SS1     data    file
        #2000   1       1       0       0       1       2       30      30      30      35.2    32.4    34.8    37.1    37.3    37.4    41.2
        41      43.4    43.6    44.8    43.5    43.9    46.7    48.6    48      51.8    53      53.8    52.9    53.2    54.8    56.7    56.5
        57      56.6    62.2    61.7    64.2    64.1    64.4    63.8    65.7    1       1       1       5       10      9       11      15
        29      29      21      30      21      29      29      14      15      6       13      9       8       9       12      15      13
        10      7       30      15      23      22      16      7       5       6       14
#2000   1       2       0       0       1       2       30      30      30      35.2    32.4    34.8    37.1    37.3    37.4    41.2    41
        43.4    43.6    44.8    43.5    43.9    46.7    48.6    48      51.8    53      53.8    52.9    53.2    54.8    56.7    56.5    57
        56.6    62.2    61.7    64.2    64.1    64.4    63.8    65.7    1       1       1       5       10      9       11      15      29
        29      21      30      21      29      29      14      15      6       13      9       8       9       12      15      13      10
        7       30      15      23      22      16      7       5       6       14
#2000   1       3       0       0       1       2       30      30      30      35.2    32.4    34.8    37.1    37.3    37.4    41.2    41
        43.4    43.6    44.8    43.5    43.9    46.7    48.6    48      51.8    53      53.8    52.9    53.2    54.8    56.7    56.5    57
        56.6    62.2    61.7    64.2    64.1    64.4    63.8    65.7    1       1       1       5       10      9       11      15      29
        29      21      30      21      29      29      14      15      6       13      9       8       9       12      15      13      10
        7       30      15      23      22      16      7       5       6       14
#2000   1       5       0       0       1       2       30      30      30      35.2    32.4    34.8    37.1    37.3    37.4    41.2    41
        43.4    43.6    44.8    43.5    43.9    46.7    48.6    48      51.8    53      53.8    52.9    53.2    54.8    56.7    56.5    57
        56.6    62.2    61.7    64.2    64.1    64.4    63.8    65.7    1       1       1       5       10      9       11      15      29
        29      21      30      21      29      29      14      15      6       13      9       8       9       12      15      13      10
        7       30      15      23      22      16      7       5       6       14
#2000   1       7       0       0       1       2       30      30      30      35.2    32.4    34.8    37.1    37.3    37.4    41.2    41
        43.4    43.6    44.8    43.5    43.9    46.7    48.6    48      51.8    53      53.8    52.9    53.2    54.8    56.7    56.5    57
        56.6    62.2    61.7    64.2    64.1    64.4    63.8    65.7    1       1       1       5       10      9       11      15      29
        29      21      30      21      29      29      14      15      6       13      9       8       9       12      15      13      10
        7       30      15      23      22      16      7       5       6       14

#Year   Season  Fleet   Gender  Partition       ageerr  Nsamp

1981    1       1       0       0       1       74      24      24.8    26      35.3    36.3    33.5    40.2    40      38.6    38.7    43.6
        41.5    45      44      42      44      45      48      50      53      53      53      53      53      64      59      60      61.3
        53.6    61.5    62      62.6    64      63      62      65.3    1       0       0       3       3       2       5       1       5
```

	7	5	2	2	0	1	1	0	0	3	2	0	1	0	2	1	1
	0	3	7	4	0	5	3	0	1	3	#80-82	California		Sport			
1986	1	2	0	0	1	86	24	24.8	26	30	29.8	35.4	32.7	38	38	46.7	40
	43	45.5	52	48	45	45	48	47.5	54.7	53.3	56.7	50.5	53	53.8	60	58	56.2
	57.5	62.3	61.2	66	61	65	64.5	64	0	0	1	1	5	5	3	1	2
	6	2	3	2	2	2	1	3	2	2	3	3	3	2	1	4	1
	0	5	2	4	6	1	1	1	2	4	#80-86	California		Com			
1986	1	3	0	0	1	200	24	24.8	30.2	23.6	27.9	27.7	30.9	37.2	36.7	36.4	39.1
	40.1	40.9	44.4	45.9	45.6	46	38.8	44.5	49.6	52.5	54.1	51.6	53.9	54	51.5	39.8	57.4
	57.9	56.5	59.8	62.4	58.7	60.4	63.2	62.8	0	5	11	7	22	36	55	35	41
	52	46	29	23	23	17	20	6	5	8	5	6	9	7	7	3	4
	4	20	47	22	12	5	7	15	9	40	#84-87	Oregon	Sport				
2000	1	5	0	0	1	200	24	24.8	26	28	30	35	36	38.8	37.9	40.5	40.8
	43.7	43.7	44.6	44.6	46.3	47.8	51	47.7	49.5	52.3	54.2	53.9	54	55.1	55.2	56.7	56.3
	59.8	62	62.2	64.9	65.3	64.4	63	65.9	0	0	0	0	1	2	1	8	13
	19	13	26	23	34	30	15	18	9	12	6	7	5	12	12	9	9
	9	32	11	20	18	12	3	8	5	10	#98	-	4	Washington		Sport	
2000	1	7	0	0	1	200	24	24.8	26	28	30	33	36	38	39.5	42	46.3
	43.4	46.3	47	47.5	48.4	48.6	48.7	50.9	51.1	50.4	52.3	51	54.3	53.4	56	54.1	56.2
	56	64	62.5	62.7	65	65	67	71	0	0	0	0	0	0	0	0	2
	4	4	9	12	13	14	22	25	30	20	22	18	9	13	3	8	6
	8	36	10	1	4	6	3	3	0	3	#00	-	4	Washington		Line	
#2000	1	9	0	0	1	200	0	0	0	0	0	0	35	0	0	39	38
	48.8	48	43.4	46.5	47.2	47.6	46.7	47.8	48.9	49	49.4	49.5	51.8	52.6	52.6	51.5	53.4
	55.2	57.1	57.5	58.9	58.5	61.6	59.9	62	0	0	0	0	0	0	1	0	0
	1	1	4	4	5	21	25	25	32	33	36	29	21	17	15	25	17
	25	91	34	14	28	30	25	12	11	47	#	IPHC					

0 #N environmental variables

0 #_N_environ_obs

999

#ENDDATA