Darkblotched Rockfish (*Sebastes crameri*) 2003 Stock Status and Rebuilding Update

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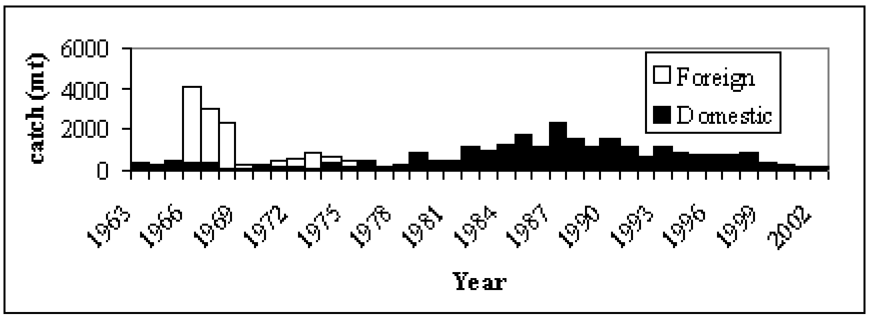
Executive Summary

Stock

The assessment covers the population of darkblotched rockfish (*Sebastes crameri*) off the Pacific west coast United States between Mexico and Canada. The actual stock probably crosses the Canadian border.

Catches

Estimated catch has declined in recent years with increasing management restrictions.



Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Catch (mt)	1188	857	721	730	747	842	359	226	171	129

Data and assessment

The last full assessment used the length-based stock synthesis model to assess the population through 1999 (Rogers et al. 2000, STAR 2000). A 2001 update of that assessment added 2000 AFSC slope survey and available 2000 fishery data (Methot and Rogers 2001). This update further adds 2001 AFSC slope and shelf survey data and fishery data through 2002. Although the 2001 update refit only recruitments, the SSC currently prefers that update models refit all parameters. Results presented in this summary are from a model refitting all parameters estimated in the full assessment.

Unresolved problems and uncertainties

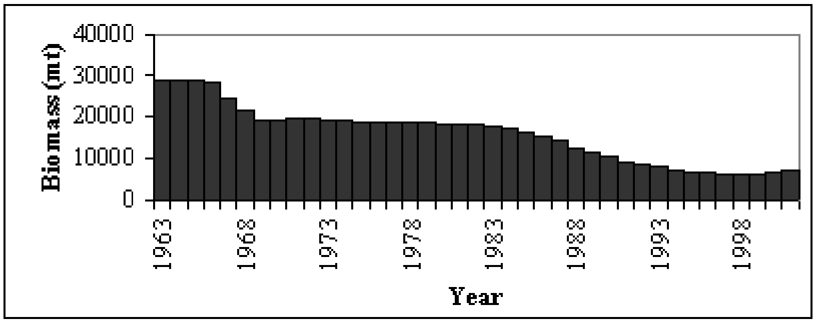
Three sources of uncertainty affected fixed values or model structure and were therefore beyond the scope of an update. Age data produced for this update had different aging error and possibly aging bias than did earlier age data. Also, newly published indirect estimates suggest darkblotched rockfish natural mortality is higher than the value assumed in the model (Gunderson et al. 2003). Finally, NWFSC slope survey data from 1999-2002 were not included in this update. Those data were not combined with AFSC slope survey data because the two sources had different length compositions and trends for years with data from both sources. Exploratory models with either higher natural mortality or the NWFSC survey as a separate index increased spawning biomass relative to unfished levels. In both cases, however, the models fit extremely high 2000 and 2001 recruitments and very low early recruitments.

Reference points

Reference points as of 2003 are: ABC = Fmsy proxy at F50% and OY = 80% probability of rebuilding to Bmsy by 2047 (PFMC 2003).

Stock biomass

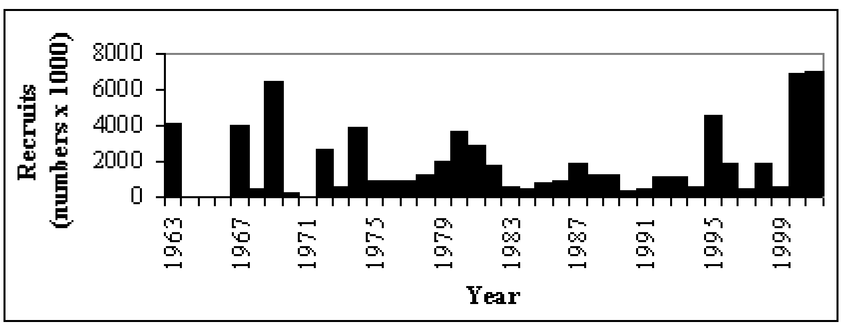
Biomass (mt) of age 1+ fish at the start of the year declined until 1999 and then increased.



Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Biomass (mt)	8210	7861	6986	6542	6339	6200	6110	5940	6404	7266

Recruitment

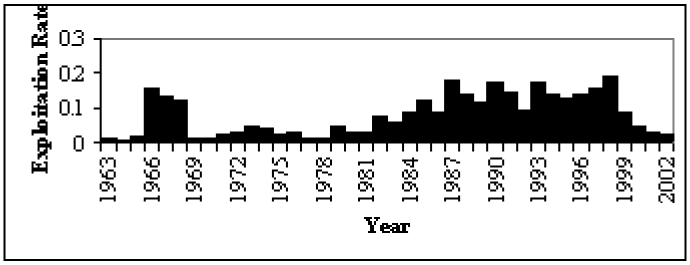
Recent increase in biomass is partly due to estimates of high 2000 and 2001 age 1 recruitments.



Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Recruits (#x 1000)	1099	1138	577	4562	1942	408	1850	572	6898	7041

Exploitation status

The estimated exploitation rate (catch/biomass available to fishermen) has progressively dropped since 1998.



Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Exploitation	0.17	0.14	0.13	0.14	0.16	0.19	0.09	0.05	0.03	0.02

Management performance

Darkblotched rockfish was first assigned an individual species optimum yield (OY) in 2001 based on the 2000 stock assessment. That OY was modified in 2002, following the 2001 update and rebuilding plan. Estimated catch was above the OY in 2001, but below OY in 2002.

	Limits			Actual
	Catch		Landings	Landings
Year	ABC	OY	OY	
2001	302-349	130	109	161
2002	187	168	135	103
2003	205	172		

Forecasts

Updated rebuilding analyses predict OY catch and exploitable biomass will continue to increase over the next three years, given 80% probability of rebuilding the stock in the maximum allowable time. The three values below reflect progressive inclusion of 2000 and 2001 recruitment estimates (2000 includes only the 2000 estimate, 2001 includes both the 2000 and 2001 estimates). Risk increases as ending year increases because recruitment estimates are based on increasingly limited data.

Type	OY (mt)			Exploitable Biomass (mt)		
Ending Year	1999	2000	2001	1999	2000	2001
Year						
2004	172	272	364	6869	7478	7642
2005	180	303	424	7204	8350	8875
2006	187	331	486	7508	9163	10181

Recommendations

1) Information on 2000 and 2001 recruitments should be carefully monitored. High estimates for both the 1995 and 1998 recruits were later reduced when more information was received.

2) A full assessment should be conducted if the SSC decides the assessment should use a higher estimate for natural mortality or include NWFSC slope survey data.

3) Changes in aging criteria should be further explored and resolved.

Additional sources of information

Gunderson, D.R., M. Zimmerman, D.G. Nichol, and K.Pearson. 2003. Indirect estimates of natural mortality rate for arrowtooth flounder (*Atheresthes stomias*) and darkblotched rockfish (*Sebastes crameri*). Fish. Bull. 101:175-182.

Rogers, J.B., R.D. Methot, T.L. Builder, K. Piner, and M. Wilkins. 2000. Status of the Darkblotched Rockfish (*Sebastes crameri*) Resource in 2000. Appendix: Status of the Pacific coast groundfish fishery through 2000 and recommended acceptable biological catches for 2001. Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 200, Portland, OR 97201.

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Introduction

The last full assessment of darkblotched rockfish (*Sebastes crameri*) stock off the coasts of California, Oregon, and Washington was conducted in 2000, using data available through 1999 (Rogers et al. 2000)(Fig.1). The stock assessment model selected by the STAR panel (Model 2) had a single fishery and three Alaska Fisheries Science Center (AFSC) surveys: slope, shelf, and Pacific Ocean Perch (P.o.p.)(STAR 2000, Rogers et al. 2000). Selectivities were fit separately for each data source. The fishery was estimated to catch larger fish at the same rate as medium-sized fish, but the three surveys selected only part of the larger fish. Catchability for each survey (proportion of the stock sampled at fully selected sizes) was freely fit, with no prior assumptions. No stock recruitment relationship was assumed. One-year old recruitments were estimated for 1963-1998, with 1999 recruitment fixed at an assumed level.

A 2001 update of Model 2 is the basis of the current darkblotched rockfish rebuilding plan (Methot and Rogers 2001). The update added 2000 AFSC slope survey data and some fishery data (Fig.1). Selectivities and survey catchabilities were fixed at the values estimated in the full assessment. Only recruitments were re-estimated, with 2000 and 2001 recruitments fixed at an assumed level. The 2001 update model will be referred to in this document as Model 3 (Table 1).

The primary purpose of this document is to update the 2001 model currently used by managers (based on personal communications with Stephen Ralston- Scientific and Statistical Committee(SSC) and Richard Methot- lead author of the 2001 model). This new update includes data through 2002, adding 2001 AFSC slope and shelf survey indices as well as fishery data (Fig.1).

Although the 2001 update refit only recruitments, current SSC update policy requires refitting all parameters estimated in the full assessment (Stephen Ralston, SSC, pers. comm.). Therefore for this update, a model refitting only recruitments (Model 7) was compared to a model refitting all parameters estimated in the full assessment (Model 6) (Table 1).

Exploratory models are also presented for comparison. The Pacific Fishery Management Council requires that an update use the best available scientific data (SSC 2002). Incorporating some new information required changes to Model 2 fixed values or structure, which is beyond the scope of an update. Results from those models were presented to help the SSC determine need for a future full assessment.

Documentation of updated data sources

Catch

Revised 1963-2001 catch estimates were used in the update models (Models 6 and 7)(Table 1). The revised catch had an overall increase of 1246 mt. Domestic landings decreased 342 mt, while foreign catch increased 1579 mt (Table 2). In the revised catch, discard was added to landings in 2001 and 2002, using limited entry rates assumed by the Pacific Fishery Management Council (Table 2).

A report issued in January 2003 presented initial data and summary analyses for the 2001-2002 NWFSC west coast groundfish observer program (NWFSC 2003). That report indicates darkblotched rockfish discard may be higher than the assumed 16%-20%. It did not, however, present percent discard estimates for the fishery as a whole and NWFSC recommends not using the information from that report in assessments. A more complete analysis of the data will be completed in the near future.

Closing the trawl fishery in 100-250 fm north of 40 10' in 2002 (Table 3) did not greatly change the distribution of darkblotched rockfish landings north and south of that boundary (Fig. 2). Based on survey length distributions, the closure should have prevented catch of most fish > 22 cm fl (Fig. 3), the size ordinarily available to commercial gear mesh. The lack of distributional change may be because landings location does not reflect catch location.

AFSC Survey Indices

AFSC conducted both shelf (triennial) and slope surveys in 2001 (Table 4). Date used for biomass indices and associated length frequencies were restricted to the depths and areas covered by earlier years of the surveys (Table 5). The shelf and slope indices overlapped only in 100-200 fm bottom depth and the shelf index extended further south. Both 2001 biomass estimates were higher than in the previous survey years, but also had greater standard deviations (Table 5).

Length Compositions

All length compositions are in Table 6 and 7 and recent length compositions are displayed in Fig. 4-6.

In the update models (Models 6 and 7), fishery length compositions for years with length data from all three states (1996-2002) were derived differently than in the 2000 stock assessment (Model 2) or the 2001 update (Model 3). Previously, length samples were combined without any weighting by landings (Rogers et al. 2000). New fishery length data, however, indicated differences between states. In 1999, California samples had smaller fish than in the previously-available Oregon and Washington samples. In 2001 and 2002, Washington had smaller fish than Oregon and California. Washington landings were a small percentage of the total (Fig. 2), but that state contributed 29% of the length samples in 2001 and 43% in 2002. To prevent bias from unequal sampling rates, state length compositions were weighted by state landings before combining into a single composition.

Some length frequencies previously treated as combined-sex were divided by sex based on available information. Since unsexed Washington fish had a smaller influence on the length compositions, and new data from other states also had some unsexed fish, they were divided into males and females using the sexed proportion for that age or length bin. Previously combined-sex length frequencies for 1985 P.o.p. survey and 1991 slope survey were also divided using that methodology.

Age Compositions

Darkblotched rockfish aging conducted in 2002 (Fig. 1, 4-6; Tables 8-9) indicated a change in age-length relationship and aging error. Plotting newly-aged fish with the age-length relationship used in the assessment (Table 10) indicated larger sizes for the younger ages (Fig. 7). Coefficient of variation (CV) in age between readings was also greatly reduced for those ages (Fig. 8), although most otoliths were read by the same two readers. CV in length at age for females was reduced from 10% to 9% at age 1 and 7% to 2% at age 40. Reasons for this change are currently being explored, but a preliminary investigation suggests an unintended shift in aging criteria between aging time periods. Since the age-length relationship and aging error in the 2000 model did not reflect otoliths aged in 2002, the model could not fit both the new length and age frequencies. New age frequencies were therefore not included in the update models. The old age data were not weighted by state because no years had data from all three states and only 1997 had data from two states (Fig. 1).

Model Description

A comparison of the full assessment model (Model 2) and the 2001 update model (Model 3) is included in Table 11. The model selected by the STAR panel in the last full assessment fit 57 parameters, including 36 yearly recruitments (1963-1998), while the 2001 update fit only background recruitment and 1963-1999 yearly recruitments. Model 2 fixed only the last yearly recruitment, while Model 3 fixed the last two recruitments. Although there was no stock-recruitment relationship in either model, 1964, 1965, and 1971 recruitments in the 2001 update were restricted by the lower bound of 10,000 fish.

This update extended the ending year of the models to 2002 without changing fixed values or model structure. Model 7 updated Model 3 by fitting background recruitment and yearly recruitments in 1963-2000. Model 6 updated Model 2 by re-fitting selectivities, survey catchabilites, background recruitment and yearly recruitments in 1963-2001.

Rebuilding analysis utilized the "environmental hypothesis" alternative (Methot and Rogers 2001), which is the basis of the current OY. In the current rebuilding plan, virgin recruitment was determined from the long-term average (1963-1996), while recruitment during rebuilding was taken from recent (1983-1996) recruitments. The 1998 age composition was supplied to the rebuilding analysis (recruits after 1998 were estimated by re-sampling 1983-1996 recruitments). In this update, those ranges were extended in incremental steps to include more recent recruitments.

Results

A comparison of update model results for Model 6 (full refitting) versus Model 7 (recruitment refitting) are presented in Table 11 and Fig. 9. Model 6 estimated higher recruitments for 1995, 1998, and 2000 (Fig. 9) and higher ending biomass (Table 11). Refitting all parameters improved the fit to fishery lengths, shelf survey index, shelf survey lengths, and slope survey age and lengths, as indicated by relative log-likelilhood values for Model 6 versus Model 7 (Table 11). The SSC committee reviewing this update preferred Model 6 over Model 7, so that model is presented in further detail.

Fits of Model 6 estimates to selected data are in Fig. 10. Estimates of the shelf and slope survey indices reflected the slight upturn in 2001. The model estimated fishery length compositions very well but did not fit the high modes for 33-34 cm females and 32 cm males in the survey compositions. Those sizes roughly correspond to 8-9 year old fish (1993-1994 recruits) given the months when the surveys occur (Table 10). Fishery selectivity for those sizes was high, but survey catchability relatively low (Fig. 11).

The model could not account for the lack of larger fish in the fishery in recent years based solely on catch. As the new fishery data indicated even fewer of those fish, the model explained this by estimating very low recruitments in early years, very high recruitments in the most recent years, and high shelf survey catchability for 3-5 year old fish in the triennial survey (Table 12, Fig. 11). The low and high recruitments as well as selected series of age 3-5 fish in the years of the shelf survey are outlined in Table 13. The very low 1964-1966 recruitments were age 36-39 in 2002. Age 3-5 year old fish in the earliest shelf survey (1977) were ages 27-29 in the 2001 survey. That rather extreme model configuration would likely have been tempered if the model had more adequate age/length data in early and late years and/or constraints on the degree of recruitment variability.

It should be noted that although the STAR panel chose a model which freely fit the data there were bounds on selectivity parameters and yearly recruitments. When those bounds were reached, it affected results. In both the 2001 and this update, the shelf survey descending inflection hit the lower bound, preventing further reduction of selectivity of larger fish. Size at the transition between ascending and descending selectivity was fixed at the approximate length composition mode for each type of survey (Rogers et al. 2000). Setting transition at a smaller size would have resulted in a more rounded curve without hitting the descending inflection bound, but higher catchability at maximum selection. Recruitments were bounded by a minimum of 10,000 fish, but in the 2000 full assessment, that bound was not limiting. In both the 2001 update and this update, recruitments in a few early years were forced to have the minimum value (Tables 11,12).

Uncertainty Analysis

A retrospective analysis for Model 6 shows the effects of first changing and then extending the data (Table 11, 13). Model 4 is the 2001 update model and data (Model 3) with selectivities and survey catchabilities refit (Table 1). Estimated 2001 ending biomass would have been reduced in the 2001 update with full refitting (Table 11). Shelf and Pacific ocean perch survey catchability would have increased and slope survey decreased, and some changes would have been made to survey selectivities (Table 11,13). Model 5 is Model 4 with revised catches and weighted length compositions for years covered by the model (Table 1). Data revisions further reduced the 2001 ending biomass and slightly increased the shelf and slope survey catchabilities (Table 11). All selectivities changed slightly (Table 13). Extending the revised data to 2002 (Model 6) then decreased shelf and slope survey catchabilites, increased P.o.p survey catchability, and slightly changed survey selectivities (Table 11, 13).

The SSC requested two additional model runs which were sensitivity runs for Model 6 (Table 14). One model assumed catch was double the landings in 2000-2002, based on higher discard rates in recent years, as indicated by the preliminary observer report. In order to fit the same survey information and fishery length compositions given higher catch, estimates of ending biomass and

2000 and 2001 recruitments increased slightly. The other run tested the effect of weighting 1996-2002 fishery length compositions by state landings in the revised data. Using unweighted length compositions, as was done in previous assessments, decreased the ending biomass and lower recent recruitment estimates.

Rebuilding Projections

Rebuilding analyses were used to estimate 2004 OY at varying levels of probability of rebuilding within maximum allowed times (Table 15). Rebuilding was based on the SSC review panel preferred model (Model 6). The SSC panel requested progressive inclusion of 1997-1999, 2000, and 2001 recruitment estimates. Risk of error progressively increased from including those recruitment estimates because they were based on increasingly limited data.

Progressive inclusion of recruitment estimates affected three types of input to the rebuilding analyses. Those were: 1) last estimated age composition, 2) recruitments resampled to predict future recruitments and 3) estimates of virgin recruitment. When the last age composition supplied was 1999, then recruits after 1999 were estimated within the rebuilding analyses by resampling recruits during specified earlier time periods (1983-1999) and virgin recruitment was estimated using average recruitment in 1963-1999. When the last year was 2000, then recruits after 2000 were estimated by resampling recruits from 1983-2000 and virgin recruitment was the average of 1963-2000 recruitments. Finally, when the last year was 2001, recruits after 2001 were estimated by resampling recruits from 1983-2001 and virgin recruitment was the average of 1963-2001 recruitments. Comparative age compositions for 1999, 2000, and 2001 are shown in Table 12.

The results were sensitive to the high 2000 and 2001 recruitment estimates (Table 15). Including them allowed much greater 2004 OYs because those recruits enter the fishery and help rebuild the stock before the maximum allowable year (2028). The ABCs, on the other hand, were not as affected because the 2000 and 2001 recruits were too small to have entered the fishery in 2004. This led to 2004 OY estimates which were higher than the ABC, even given 90% probability of rebuilding by 2028. When the ending year was 1999 (2000 and 2001 estimates not included), the ABC was lower than the OY at 80% probability of rebuilding by 2031 (Table 15).

Ten year projections for progressive inclusion of the recruitments are in Table 16. Projections indicated progressive increases in OY and ABC for all comparisons.

Exploratory Models

Incorporating some new information required changes in fixed parameters or model structure. That information is presented so that the SSC may assess need for a full assessment. Results of exploratory models incorporating potential changes are presented if they substantially change results.

Fishery Selectivity

Further information indicates selectivity for the fishery may have changed over time. Recent management changes may have affected selectivity, but this is not clearly shown. Foreign fisheries in 1966-1976 probably selected smaller fish than the domestic fishery during the same time period

(Rogers in press). Foreign catch in 1966-1968 was primarily Soviet Union (100% in 1967, 72% in 1968, 63% in 1969). That country apparently used very small codend mesh. There were reports of 2 inch codend mesh in 1966 and 1967 (Jewell et al. 1966,USBCF 1967). At the end of 1968, they agreed to minimum codend mesh size of 2.4-2.8 in (ITFC 1969).

Natural Mortality

A recent publication provided indirect estimates of natural mortality (M) for darkblotched rockfish (Gunderson et al. 2003) which were higher than the 0.05 estimate used in the assessments (Table 3). They estimated variance associated with two indirect methods of estimating M. One estimate of M was based on a linear relationship with reproductive effort as measured by GSI (ovary weight/somatic body weight). Average size of mature females was estimated at 42.7 cm, resulting in M = 0.107 with a 95% confidence interval of 0.07-0.144. An estimate of M = 0.05 would require an average size of 32.4 cm. The second method was based on correlation between M and K (von Bertalanffy growth parameter). A value of K = 0.1852 (based on both sexes combined) resulted in M = 0.296 (0.27-0.32). Gunderson et al. (2003) acknowledged this result may be an over-estimate. A lower K would reduce M.

Changing M to 0.107 raised the relative spawning stock but degraded model fit to the data (Table 17). In the last full assessment, M fit best between 0.04 and 0.05 (Rogers et al. 2000). Increasing M also further increased recent recruitments and deceased early recruitments (Figure 12).

NWFSC Slope Survey

The update models did not include the Northwest Fisheries Science Center (NWFSC) slope survey information. It was not part of the last full assessment (Rogers et al. 2000) or the 2001 update model (Methot and Rogers 2001). The survey began in 1998, but rockfish catch was not sorted until 1999, and darkblotched rockfish biological samples not taken until 2000. Lengths and otoliths were taken as time permitted (Dan Kamikawa, NWFSC, Newport, OR, pers comm.), with 53% of darkblotched catches sampled in 2000, 83% in 2001, and 100% in 2002. In 2002, lengths were also taken on two catches not utilized in the index because the net belly ripped. The most fish sampled in any tow was 164.

Comparison of the NWFSC and AFSC slope surveys indicates they cannot be simply combined into a single index for darkblotched rockfish. Helser et al. (in review) combined the surveys for sablefish, thornyheads, and Dover sole using a generalized linear mixed model, treating vessel as a random variable. For those species, vessel coefficients were small, separate NWFSC and AFSC biomass estimates and CV were similar, and there was no evidence of pronounced and consistent differences in length compositions between the two surveys. For darkblotched rockfish, a similar model indicated the AFSC survey had lower probability of encountering a positive tow and once encountering fish had lower catch rates (Thomas Helser, NWFSC, Seattle, WA, pers. comm.). In addition, biomass estimates and CV were substantially different for 2000 (Table 5), and NWFSC length compositions for comparable areas and years included larger fish (Fig. 13).

Graphing shows some of the commercial vessels used by the NWFSC consistently had more positive tows, and some commercial vessels had more large catches (adjusted for differences in swept area)(Fig. 14). Four of the largest catches occurred in 2000, resulting in the very high estimated biomass and CV. Large catches were in less than 200 fm and no catches were deeper than 282 fm, although the survey sampled to 700 fm.

Most large fish (> 35 cm fl) caught in the NWFSC survey were from a few large tows (Fig. 15). In 2000, almost all large fish came from the largest tow, in which measured fish averaged 39 cm. In 2002, a large catch (third largest in all years) contained most of the larger fish, but it was excluded from the index because the net belly tore. Larger fish sampled averaged 42.7 ^{0} N latitude with gear depth averaging 173 fm. Only one large fish was caught deeper than 205 fm and none south of 38 ^{0} 66' N.

Possible reasons for differences in the surveys include gear type, vessel effect (including horsepower and experience of captain), or survey design. Both AFSC surveys (shelf and slope) cover the latitude and depth range of the big catches and larger fish.

Differences in gear type may have an effect because the torn net belly on the big catch of large fish implies they were located in rough rocks. Underwater videos demonstrate the NWFSC survey net generally performs well over rocks (Waldo Wakefield, NWFSC, Newport, OR, pers. comm.), but the AFSC slope net was designed to tow on mud bottom.

Vessel effect is difficult to assess, but the smaller fishing vessels utilized by the NWFSC take longer to bring the net off bottom because they have less horsepower. No one is sure how this affects catchability. In addition, the NWFSC uses commercial vessels with captains who ordinarily commercially fish groundfish (including darkblotched rockfish) in some of the areas sampled. The AFSC shelf survey also utilizes commercial vessels, but larger boats whose captains do not ordinarily commercially fish the area.

Survey design also differs between the AFSC and NWFSC surveys. The NWFSC survey has 15 minute tows versus 30 minute tows for the AFSC surveys. This allows the NWFSC survey to sample areas with smaller amounts of trawlable ground. The NWFSC survey design also allows substantial flexibility in finding a trawlable area if the preselected sampling site is unsuitable for trawling. Captains on the NWFSC survey can search for up to two hours within 5 minutes north or south of the designated site within one of two assigned depth categories: 100-300 fm or 400-700 fm (Turk et al. 2001). The AFSC shelf survey has three depth categories (30-100, 100-200, and 200-273 fm, with a set of varying priority search criteria (Weinberg et al. 2002). The AFSC slope survey search is restricted to a similar depth within 18 km radius (Lauth 2001).

Including a NWFSC slope survey index had the greatest effect on the model results (Table 17). Spawning stock was estimated to be at target level, but fit to the other data was overall degraded (Table 17). Recent recruitment estimates were extremely high and early recruitments very low (Fig. 12). Length compositions utilized in the index show a dramatic decline in the proportion of large fish and increase in the proportion of small fish from 2000 to 2002 (Fig. 16). Very high recruitments help the model fit that shift in compositions. Removing the unusual 2000 survey, which was affected by an extremely large catch of large fish, or fixing recent recruitments at levels comparable to those estimated for earlier years substantially reduced current biomass estimates.

Acknowledgments

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Table 1. Comparison of selected models (not including sensitivity runs and exploratory models in this update). This table was developed by the SSC review panel for inclusion in this paper. The first three models (Models 1-3) are prior models and not part of this update. Model 1 was not selected by the STAR panel and is not referred to further in this document. Model 6 is the update of Model 2 and Model 7 is the update of Model 3. Models 4-5 are intermediate steps between Model 2 and Model 6. They are not considered update models and are only part of the uncertainty analyses.

Fitted	Model	Description
all	1	STAT team model in original assessment (Rogers et al. 2000)
all	2	STAR panel model in original assessment (Rogers et al. 2000)
recruitments	3	Updated Model 2 - used in rebuilding analyses (Methot and Rogers 2001)
all	4	Model 3 with all parameters refit
all	5	Model 4 with catch and length compositions revised
all	6	Model 5 extended to 2002
recruitments	7	Model 3 with catch and length compositions revised and extended to 2002

Table 2. Changes in estimated catch (mt) of darkblotched rockfish by year for the Pacific west coast. Catch used in the 2001 updated model (Methot and Rogers 2001) is listed under "2001 model". Catch used in this update is under "2003 model". Domestic landings for 1963-1982 in both models are referenced in Rogers et al. 2000. In 2001 model, domestic landings for 1983-1998 in 2001 model are PacFIN - 4/12/2000 for1983-1998 and 5/2001 for 1999 and 2000, 2001 landings = OY for that year, and foreign catch is 10% of Pacific ocean perch foreign catch in Ianelli et al. (2000). For 2003 model, 1983-2002 landings are from PacFIN - 3/20/03 and foreign catch is from Rogers (in press).

year	2001 model			2003 model				Change
	Domestic	Foreign	Catch	Domestic	Foreign	% discard	Catch	
1963	315		315	315			315	0
1964	246		246	246			246	0
1965	436	38	474	436			436	-38
1966	355	2050	2405	355	3807		4162	1757
1967	338	3320	3659	338	2706		3044	-615
1968	103	1878	1982	103	2288		2391	409
1969	123	436	560	123	153		276	-284
1970	129	444	573	129	149		278	-295
1971	159	479	639	159	278		437	-202
1972	203	400	603	203	374		577	-26
1973	59	315	374	59	768		827	453
1974	363	106	469	363	346		709	240
1975	165	120	285	165	293		458	173
1976	344	115	459	344	118		462	3
1977	194		195	194			194	-1
1978	254		254	254			254	0
1979	851		851	851			851	0
1980	471		471	471			471	0
1981	543		543	543			543	0
1982	1217		1217	1217			1217	0
1983	872		872	925			925	53
1984	1286		1286	1288			1288	2
1985	1787		1787	1757			1757	-30
1986	1277		1277	1172			1172	-105
1987	2375		2375	2347			2347	-28
1988	1692		1692	1540			1540	-152
1989	1295		1295	1184			1184	-111
1990	1427		1427	1550			1550	123
1991	1189		1189	1149			1149	-40
1992	680		680	666			666	-14
1993	1199		1199	1188			1188	-11
1994	860		860	857			857	-3
1995	721		721	721			721	0
1996	707		707	730			730	23
1997	797		797	747			747	-50
1998	890		890	842			842	-48
1999	326		326	359			359	33
2000	239		239	226			226	-13
2001	130		130	161		16%	171	41
2002				103		20%	129	

Table 3. Cumulative two month landings limits for trawl slope rockfish complex (includes darkblotched rockfish). Limits N of 40^{0}10' do not include Pacfic ocean perch, those to the south do not include splitnose rockfish. L.E. = Limited Entry, O.A. = Open Access. Sm. Footrope = bottom trawl net required to have footrope no larger than 8" in diameter. * = two one-month-limits combined.

Year	Area	Period	L.E.	O.A.	No trawling	Sm. Footrope
2000	N of 40^{0}10'	Jan-Dec	3,000	500		for shelf rockfish
		July-Oct	5,000	500		
		Nov.-Dec	3,000	500		
	S of 40^{0}10'	Jan-June	3,000	500		
		July-Aug	7,000	1000		
		Sept-Dec	20000*	3000		
2001	N of 40^{0}10'	Jan-June	1,500	500		for shelf rockfish
		July-Oct 1	2,000	500		for shelf rockfish
		Oct 2-Dec	0	0		for shelf rockfish
	S of 40^{0}10'	Jan-June	14,000	5,000		
		July-Dec	25,000	5,000		
2002	N of 40^{0}10'	Jan-Aug	1,800	25% of sablefish/trip	100-250 fm	
		Sept	600	25% of sablefish/trip	0-250 fm	
		Oct	▼	25% of sablefish/trip	100-250 fm	<100 fm
		Nov.-Dec	1,800	25% of sablefish/trip	100-250 fm	<100 fm
	36^0-40^{0}10'	Jan-April	50,000	10,000		
		May-Aug	5,000	5,000		
		Sept-Oct	600	1,800		
		Nov.-Dec	1,800	1,800		
	S of 36^0	Jan-Aug	50,000	10,000		
		Sept-Oct	25,000	10,000		
		Nov.-Dec	40,000	10,000		

Table 4. Comparison of surveys utilized for information on darkblotched rockfish.

Survey	Year	Vessel	dates	Latitudes	Depths	Gear	knots	min	period	Len	Age
Shelf (Triennial)	77	P.Raider/Tor./Com./D.S. Jordan	7/4-9/27	34°00'-Border	50-250	roller	3	30	day	Y	
	80	Pat San Marie/Mary Lou	7/12-9/28	36°48'-49°15'	30-200	roller	3	30	day	Y	Y
	83	WarriorII/Nordfjord	7/7-10/3	36°48'-49°15'	30-200	roller	3	30	day	Y	Y
	86	Alaska/Pat San Marie	7/9-9/30	36°48'-Border	30-200	roller	3	30	day	Y	Y
	89	Pat San Marie/Alaska	7/7-9/29	34°30'-49°40'	30-200	roller	3	30	day	Y	N
	92	Alaska/Green Hope	7/12-10/7	34°30'-49°40'	30-200	roller	3	30	day	Y	N
	95	Alaska/Vesteraalen	6/8-9/6	34°30'-49°40'	30-275	roller	3	30	day	Y	Y
	98	Dominator/Vesteraalen	6/1-8/9	34°30'-49°40'	30-275	roller	3	30	day	Y	Y
	1	Sea Storm/Frosti	6/1-8/27	34°30'-49°40'	30-275	roller	4	30	day	Y	Y
P,o.p	79	C. Horizon-Wash./New Life-Or.	4/18-5/2	44°37'-Border	90-260	roller	3	30	day	Y	N
	85	Marathon	4/3-5/28	44°37'-Border	90-260	roller	3	30	day	Y	N
Slope	88 (91)	Miller Freeman	11/28-12/14	44°05'-45°30'	100-700	mudsweep	2	30	24 hr	Y	N
	90 (91)	Miller Freeman	10/26-11/15	40°30'-43°00'	100-700	mudsweep	2	30	24 hr	Y	N
	92 (91)	Miller Freeman	10/17-11/12	45°30'-Border	100-700	mudsweep	2	30	24 hr	Y	N
	93 (91)	Miller Freeman	10/14-11/8	43°00'-45°30'	100-700	mudsweep	2	30	24 hr	Y	N
	95 (95)	Miller Freeman	10/30-11/16	40°30'-43°00'	100-700	modmudsw	2.3	30	24 hr	Y	N
	96 (95)	Miller Freeman	10/28-11/13	43°00'-Border	100-700	modmudsw	2.3	30	24 hr	Y	N
	97 (97)	Miller Freeman	10/20-11/25	34°30'-Border	100-700	modmudsw	2.3	30	24 hr	Y	N
	99 (99)	Miller Freeman	10/14-11/19	34°30'-Border	100-700	modmudsw	2.3	30	24 hr	Y	N
	0 (00)	Miller Freeman	10/10-11/9	34°30'-Border	100-700	modmudsw	2.3	30	24 hr	Y	Y
	1 (01)	Miller Freeman		34°30'-Border	100-700	modmudsw	2.3	30	24 hr	Y	Y
NWFSC slope	99	S.Eagle,C.Jack,M.Leona, B.Horizon	7/3-9/24	35°-48°10'	100-700	Aberdeen	2.2	15	day	N	N
	0	S.Eagle,C.Jack,Excalibur,C.Pride	7/3-9/23	35°-48°07'	100-700	Aberdeen	2.2	15	day	Y	Y
	1	S.Eagle,C.Jack,Excalibur,L.Stalker	7/2-9/28	35°-48°08'	100-700	Aberdeen	2.2	15	day	Y	Y
	2	S.Eagle,C.Jack,Excalibur,M.Julie	6/25-9/24	32°51'-48°07'	100-700	Aberdeen	2.2	15	day	Y	Y

Table 5. Biomass index estimates in mt with standard deviations in parentheses. The AFSC indices were used in the 2000 assessment and are included in the update. The 1991 Slope - Super Year summed 1992 U.S. Vancouver and northern Columbia with an average of 1988 and 1993 central Columbia,1993 southern Columbia, and 1990 Eureka. The 1995 Slope - Super Year summed 1996 U.S. Vancouver and central Columbia with 1995 southern Columbia and Eureka. The NWFSC index is included in an exploratory model.

Years	**Surveys**			
	AFSC Shelf	**AFSC P.o.p.**	**AFSC Slope- Super Years**	**NWFSC Slope**
	$36^{0}48'$-US Borde 30-200 fm	**$44^{0}70'$-$47^{0}30'$ 90-260 fm**	**$40^{0}30$-U.S. Border 100-700 fm**	**$34^{0}30$-U.S. Border 100-700 fm**
1977	3835 (739)			
1979		4555 (947)		
1980	3647 (928)			
1983	8970 (2740)			
1985		5595 (1085)		
1986	7350 (2348)			
1989	3081 (533)			
1991			4623 (1933)	
1992	6846 (3012)			
1993				
1995	5218 (3122)		1664 (866)	
1996				
1997			1223 (607)	
1998	2560 (463)			
1999			3064 (1995)	2054 (810)
2000			891 (279)	13359 (8043)
2001	2875 (1329)		2087 (697)	2159 (881)
2002				2485 (677)

Table 6. Fishery length compositions.

Source	Year	sex	Fish	Samp	adj #	Lower Limit of Length Bin (cm)														
						6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
fishery	1978	2	263	26	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1979	2	86	11	64	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1980	2	221	33	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1981	2	198	30	198	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1982	2	759	59	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1983	2	792	115	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1984	2	1995	162	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1985	2	3167	208	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1986	2	2437	145	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1987	2	2704	124	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1988	2	1337	92	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1989	2	1107	92	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1990	2	973	92	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1991	2	964	77	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1
fishery	1992	2	429	49	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1993	2	566	56	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1994	2	796	53	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1995	2	926	60	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1996	2	2097	132	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1997	2	2142	112	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1998	2	2244	121	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	1999	2	1543	79	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery	2000	2	2055	88	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
fishery	2001	2	3082	127	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
fishery		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
fishery	2002	2	2608	111	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
fishery		1				0.0	0.0	0.0	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 6. (Cont.)

Year	sex	21	22	23	24	25	26	27	28	29	30	31	32	33	35	37	39	41	43	45	47	49	51+
1978	2	0.0	0.0	0.0	0.0	0.4	1.0	4.2	1.9	3.4	2.7	3.4	1.1	6.1	7.6	8.0	6.8	6.1	5.3	1.1	0.4	0.0	0.0
	1	0.0	0.0	0.0	0.8	1.1	1.0	0.4	2.3	0.4	0.4	1.1	2.3	5.3	9.9	10.3	4.6	0.8	0.0	0.0	0.0	0.0	0.0
1979	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	2.3	1.2	3.5	8.1	8.1	3.5	5.8	2.3	3.5	2.3	0.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	3.5	0.0	1.2	2.3	11.6	3.5	12.8	11.6	5.8	1.2	2.3	0.0	0.0	0.0
1980	2	0.0	0.0	0.0	0.5	0.5	0.0	0.0	1.8	2.2	1.4	1.4	5.3	7.2	8.7	6.7	6.3	6.8	5.0	2.7	0.9	0.0	0.9
	1	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.5	0.5	0.0	4.7	8.2	14.4	9.1	2.7	0.5	0.0	0.0	0.0	0.0	0.0
1981	2	0.0	0.0	0.0	0.0	0.5	0.0	0.5	1.0	0.0	0.0	1.0	0.5	2.5	5.6	6.1	18.0	16.1	11.1	5.6	1.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.0	1.5	8.1	10.1	8.2	1.0	0.0	0.0	0.0	0.0	0.0
1982	2	0.0	0.1	0.0	0.1	0.4	0.3	1.3	0.5	0.9	1.2	2.5	2.8	4.5	8.0	10.8	11.9	7.8	4.5	2.2	0.3	0.9	0.3
	1	0.0	0.0	0.1	0.4	0.3	0.7	0.1	1.1	0.5	1.2	0.9	1.7	5.3	12.6	8.2	3.6	0.8	0.7	0.3	0.1	0.1	0.1
1983	2	0.0	0.0	0.0	0.1	1.1	1.5	0.9	1.5	1.3	1.0	1.4	1.5	3.0	4.5	8.5	9.3	10.4	6.8	3.2	0.6	0.3	0.1
	1	0.0	0.0	0.1	0.1	0.6	0.5	1.0	0.9	1.4	0.8	2.0	0.9	4.5	8.5	10.0	7.4	2.9	0.6	0.4	0.0	0.0	0.3
1984	2	0.0	0.0	0.0	0.1	0.3	0.4	0.6	1.8	2.2	2.7	2.9	2.5	4.8	5.4	9.0	9.4	7.8	4.9	1.8	0.5	0.1	0.0
	1	0.0	0.0	0.0	0.0	0.2	0.5	0.7	1.1	2.5	1.6	2.2	2.3	7.2	11.3	7.7	4.5	0.7	0.3	0.1	0.0	0.0	0.1
1985	2	0.0	0.0	0.2	0.2	0.3	0.4	1.3	1.1	1.7	2.6	4.0	3.2	6.3	5.5	6.4	7.5	5.6	3.1	1.1	0.2	0.1	0.0
	1	0.0	0.1	0.1	0.3	0.4	0.8	1.0	1.1	2.2	2.4	3.1	4.0	8.2	11.6	8.0	3.5	1.2	0.4	0.3	0.1	0.1	0.0
1986	2	0.0	0.0	0.0	0.0	0.1	0.2	0.7	0.5	1.3	2.0	2.9	4.9	10.3	6.6	6.5	7.5	6.4	2.6	0.9	0.2	0.0	0.0
	1	0.0	0.0	0.1	0.0	0.2	0.4	0.6	1.2	1.3	3.0	4.6	5.0	10.1	9.5	7.1	2.9	0.4	0.0	0.0	0.0	0.0	0.0
1987	2	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.2	0.7	1.2	2.1	3.2	9.3	8.8	9.1	6.2	3.5	1.4	0.5	0.1	0.1	0.0
	1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.4	0.7	2.0	4.2	5.3	14.1	13.3	8.8	2.5	0.6	0.1	0.0	0.0	0.0	0.0
1988	2	0.0	0.0	0.1	0.1	0.1	0.3	0.4	0.4	0.7	0.7	0.9	1.7	8.5	12.2	8.7	8.9	4.9	1.2	0.3	0.2	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.4	0.8	1.2	1.3	3.3	14.1	14.0	9.3	3.7	0.7	0.0	0.1	0.0	0.0	0.0
1989	2	0.0	0.0	0.0	0.1	0.2	0.4	0.5	0.7	1.2	0.8	1.7	2.4	7.0	13.1	8.5	6.8	4.9	2.9	1.1	0.0	0.0	0.0
	1	0.0	0.0	0.1	0.0	0.2	0.2	1.0	0.5	0.7	1.1	1.5	3.3	13.1	13.9	7.8	3.6	0.7	0.0	0.0	0.1	0.0	0.0
1990	2	0.0	0.0	0.0	0.0	0.0	0.8	1.1	1.2	0.7	1.2	1.3	2.6	7.4	8.5	9.1	8.9	3.9	3.5	1.4	0.4	0.2	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.5	1.4	2.1	2.6	2.8	13.0	11.2	8.5	3.7	1.2	0.2	0.0	0.0	0.0	0.0
1991	2	0.0	0.4	0.1	0.5	1.2	0.9	0.7	1.0	2.3	2.0	2.6	2.5	4.1	6.4	6.6	9.6	6.0	6.8	3.0	1.3	0.1	0.0
	1	0.0	0.0	0.1	0.6	0.3	1.1	1.6	1.0	1.3	2.0	1.7	2.1	8.4	10.2	5.8	4.0	0.7	0.3	0.0	0.0	0.0	0.0
1992	2	0.0	0.0	0.0	0.5	0.0	0.7	0.7	0.7	1.9	1.2	2.4	2.3	5.0	5.4	9.2	11.1	8.4	4.6	1.6	0.2	0.0	0.0
	1	0.0	0.0	0.0	0.5	0.0	0.0	0.7	1.6	1.9	3.2	1.3	2.1	5.5	11.0	9.4	5.2	0.9	0.3	0.0	0.5	0.0	0.0
1993	2	0.2	0.0	0.4	0.4	0.4	0.0	1.1	1.2	1.5	2.5	3.5	3.4	3.3	6.5	7.8	6.8	3.7	1.1	0.7	0.4	0.2	0.0
	1	0.2	0.0	0.0	0.0	0.0	0.4	0.0	2.4	1.7	3.5	3.9	3.6	13.0	13.6	8.0	3.3	1.1	0.2	0.0	0.0	0.0	0.0
1994	2	0.0	0.1	0.3	0.4	0.3	0.1	0.1	0.5	1.0	2.2	3.0	4.2	8.0	6.7	7.3	9.0	5.4	4.5	1.3	0.6	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.7	1.4	2.6	3.0	4.9	9.0	11.2	7.4	3.7	0.7	0.0	0.0	0.1	0.0	0.0
1995	2	0.0	0.0	0.1	0.2	0.2	0.7	0.5	0.1	1.0	1.3	2.2	3.6	8.0	7.7	9.3	9.8	8.0	3.8	1.4	0.3	0.0	0.0
	1	0.0	0.1	0.1	0.0	0.3	0.2	0.9	0.3	1.1	1.2	3.4	4.1	9.5	11.2	7.2	2.0	0.0	0.1	0.0	0.0	0.0	0.0
1996	2	0.0	0.0	0.1	0.1	0.6	0.9	1.5	2.4	1.5	1.2	2.1	2.5	6.7	6.3	6.1	6.0	4.9	2.7	1.7	0.7	0.1	0.0
	1	0.0	0.0	0.2	0.5	0.8	1.3	1.0	1.6	2.0	3.1	3.3	5.2	11.7	11.4	6.5	1.7	1.2	0.1	0.1	0.1	0.0	0.0
1997	2	0.0	0.3	0.6	1.4	1.7	1.6	1.7	2.4	2.9	3.0	3.1	6.0	5.8	5.2	5.7	4.8	3.6	2.7	1.8	0.6	0.0	0.0
	1	0.0	0.0	0.2	0.0	1.0	1.7	1.0	1.1	2.7	3.7	3.3	3.5	9.1	7.6	4.9	3.6	1.2	0.5	0.0	0.0	0.0	0.0
1998	2	0.1	0.2	0.2	0.5	0.7	0.9	1.3	1.5	1.7	1.5	2.6	2.4	6.1	7.8	9.5	6.9	6.8	3.4	1.4	0.4	0.0	0.0
	1	0.1	0.3	0.5	0.5	0.7	1.7	2.0	1.3	1.4	1.8	2.4	3.9	10.1	8.8	5.3	2.3	0.8	0.0	0.0	0.2	0.1	0.0
1999	2	0.1	0.5	0.3	0.5	1.8	2.7	4.8	2.8	3.7	4.8	3.7	3.2	5.0	4.7	5.6	4.4	3.9	2.9	1.6	0.8	0.2	0.0
	1	0.1	0.1	0.6	0.5	1.5	3.4	2.7	2.7	2.6	3.6	1.9	2.1	6.5	5.7	5.1	2.3	0.5	0.0	0.0	0.0	0.0	0.0
2000	2	0.0	0.0	0.2	0.3	0.5	1.0	1.6	3.2	3.2	4.1	4.9	4.5	5.3	5.1	4.8	4.7	4.0	2.4	1.4	0.2	0.2	0.0
	1	0.0	0.1	0.1	0.6	0.2	1.0	2.0	3.3	4.1	4.8	3.9	4.8	8.7	6.2	4.6	2.6	0.6	0.2	0.1	0.1	0.0	0.0
2001	2	0.1	0.1	0.0	0.1	0.5	0.7	1.4	2.8	3.7	4.6	6.1	5.9	8.7	5.4	3.9	3.4	2.7	2.1	1.1	0.4	0.0	0.0
	1	0.0	0.1	0.0	0.0	0.3	0.5	1.7	3.2	3.9	5.9	5.3	5.2	7.9	5.7	3.4	1.8	1.0	0.2	0.0	0.0	0.0	0.0
2002	2	0.1	0.3	1.0	1.3	0.8	1.0	0.7	1.7	1.9	2.9	4.3	5.2	11.6	6.5	3.9	4.3	2.8	2.7	0.7	0.2	0.1	0.0
	1	0.2	0.4	0.9	1.1	0.9	1.0	1.2	1.7	2.4	3.6	5.0	5.6	10.2	7.4	3.4	1.0	0.3	0.0	0.0	0.0	0.0	0.0

Table 7. Darkblotched rockfish expanded survey length compositions in percentages (males+females for each year = 100%). For sex, 1 = males; 2 = females; 3 = unsexed. Adj # = # fish * sqrt(# samples)/sqrt(20)) or 200, whichever is less.

Source	Year	sex	Fish	Samp	adj #	Lower Limit of Length Bin (cm)														
						6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
triennial	1977	2	3492	59	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.8	1.1
triennial		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.4	1.0
triennial	1980	2	656	11	200	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.0	0.1	0.2	0.4	0.6	1.5	0.1
triennial		1				0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.2	0.8	0.9	1.5	0.8
triennial	1983	2	4438	43	200	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.4	2.0	3.8	2.2	2.8
triennial		1				0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.2	0.2	0.5	2.0	3.1	3.1	2.5
triennial	1986	2	1834	38	200	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4	1.3	0.9	0.6	0.3	0.8	1.8	1.5
triennial		1				0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.5	1.0	0.8	0.5	0.3	0.3	1.1	1.6
triennial	1989	2	3054	85	200	0.0	0.0	0.0	0.0	0.0	0.1	0.6	4.1	6.9	3.0	0.5	1.6	3.5	6.3	3.2
triennial		1				0.0	0.0	0.0	0.1	0.0	0.2	0.9	4.0	6.8	4.7	0.8	1.4	4.3	5.8	3.3
triennial	1992	2	1452	34	200	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.3	0.3	0.1	0.0	0.2	1.9	4.0
triennial		1				0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.5	0.3	0.1	0.4	1.8	2.9
triennial	1995	2	2407	109	200	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.9	2.5	1.2	0.2	0.1	0.6	1.3	0.9
triennial		1				0.0	0.0	0.0	0.0	0.0	0.1	0.4	1.3	2.5	1.4	0.2	0.2	0.5	1.1	1.9
triennial	1998	2	2943	110	200	0.0	0.0	0.0	0.0	0.0	0.2	0.9	0.8	0.4	0.1	0.7	1.2	0.8	1.6	2.5
triennial		1				0.0	0.0	0.0	0.0	0.0	0.7	1.3	1.1	0.1	0.2	0.6	1.4	1.1	1.1	3.3
triennial	2001	2	2980	184	200	0.0	0.0	0.0	0.0	0.1	0.2	1.5	3.7	2.3	0.6	0.3	1.2	3.9	8.7	8.4
triennial		1				0.0	0.0	0.0	0.0	0.0	0.2	1.1	3.0	2.0	0.8	0.3	1.1	4.2	7.8	7.6
pop	1979	2	1070	16	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
pop		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
pop	1985	2	3603	42	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.2
pop		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3
slope	1991	2	1322	58	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7
slope		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7	1.0
slope	1995	2	725	48	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.4	0.3	0.4	1.3
slope		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.5	0.5	0.4	1.0
slope	1997	2	313	20	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	3.0	3.4
slope		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	2.9	7.5
slope	1999	2	228	26	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0
slope		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.0
slope	2000	2	223	20	200	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.4	0.8
slope		1				0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.4	0.3	0.9	0.3	0.0	0.0	0.0
slope	2001	2	324	14	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8
slope		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0
slopenw	2000	2	325	26	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0
slopenw		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.5	0.2	0.0	0.0	0.1
slopenw	2001	2	499	45	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.6	0.8	2.4	4.3
slopenw		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.2	0.6	0.4	2.2	3.3
slopenw	2002	2	1028	56	200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.5	2.1	1.2	1.1
slopenw		1				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.3	1.0	1.7	0.5

Table 7. Continued.

Year	sex	21	22	23	24	25	26	27	28	29	30	31	32	33	35	37	39	41	43	45	47	49	51+
1977	2	1.0	2.2	4.1	4.7	3.5	1.7	2.7	2.9	1.7	3.4	1.9	2.6	6.4	3.9	1.3	1.0	0.8	0.8	0.9	0.6	0.6	0.5
	1	1.1	1.9	4.3	4.4	2.8	2.8	3.5	2.5	2.5	2.2	2.4	2.5	4.6	2.3	2.3	1.7	0.7	0.2	0.2	0.1	0.0	0.0
1980	2	0.9	1.2	1.3	3.9	4.5	5.2	5.5	5.4	2.5	1.4	3.2	2.9	5.6	2.9	3.4	2.1	0.8	0.9	0.5	0.0	0.0	0.0
	1	0.6	0.7	1.0	0.8	1.7	2.5	2.0	3.9	2.8	3.1	3.8	2.7	3.4	4.7	3.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
1983	2	3.0	4.3	3.9	3.5	3.4	4.1	2.4	1.5	0.5	0.6	0.6	0.4	0.7	0.8	0.9	2.1	2.2	1.2	0.5	0.1	0.0	0.0
	1	3.7	6.5	5.5	4.0	3.8	3.7	2.6	1.1	0.5	0.8	0.4	0.4	0.7	2.3	2.1	0.9	0.2	0.1	0.0	0.0	0.0	0.0
1986	2	0.7	0.6	1.1	1.7	2.0	3.2	3.3	2.5	4.5	4.1	3.7	3.1	4.9	2.4	1.2	0.9	1.0	0.7	0.4	0.2	0.1	0.0
	1	0.7	0.6	1.5	1.5	1.9	4.2	3.7	3.8	6.4	4.1	4.6	3.4	2.8	1.9	0.5	1.0	0.6	0.2	0.0	0.0	0.0	0.0
1989	2	3.6	1.3	2.0	1.9	1.7	1.6	1.3	0.9	0.8	0.8	0.9	0.3	0.9	0.8	0.6	0.5	0.4	0.0	0.1	0.0	0.0	0.0
	1	2.4	1.5	1.7	1.1	1.6	1.1	1.4	1.0	1.1	1.1	0.5	0.6	1.0	0.4	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0
1992	2	2.5	0.6	1.1	1.6	2.9	2.5	4.6	9.6	7.1	4.5	2.6	0.8	0.8	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0
	1	2.9	1.1	0.7	3.1	2.6	1.9	9.3	11.1	7.7	3.1	0.9	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1995	2	0.9	1.0	2.6	4.5	3.8	2.4	2.4	1.7	1.3	1.6	0.9	0.8	2.1	3.2	3.3	2.9	3.7	2.3	0.9	0.4	0.0	0.0
	1	1.2	1.1	2.8	4.7	4.0	2.4	1.6	1.4	1.1	0.9	1.5	1.5	5.2	5.9	3.6	0.6	0.1	0.1	0.0	0.0	0.0	0.0
1998	2	4.7	7.7	8.2	3.6	3.2	2.9	2.7	1.9	1.1	0.6	0.4	0.3	0.6	0.5	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1	5.4	8.2	7.5	5.2	3.4	2.9	2.8	1.8	0.8	0.7	0.8	0.6	0.9	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0
2001	2	2.3	0.2	0.4	0.4	0.8	0.9	0.9	0.5	1.1	0.5	2.5	3.1	10.7	0.7	0.4	0.6	0.2	0.2	0.0	0.1	0.0	0.0
	1	2.8	0.4	0.2	0.4	0.6	0.7	0.8	0.4	0.6	0.7	2.2	1.5	2.3	0.4	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0
1979	2	1.1	2.1	1.4	2.0	5.5	5.1	4.0	4.9	6.1	5.4	2.9	1.7	2.1	2.4	2.5	0.6	0.3	0.2	0.2	0.0	0.1	0.0
	1	0.7	2.4	1.9	3.6	1.7	2.6	4.0	5.8	6.9	5.1	2.6	1.6	4.3	3.6	1.1	0.8	0.4	0.0	0.0	0.0	0.0	0.0
1985	2	1.1	0.8	2.1	4.3	3.4	3.2	4.5	5.8	4.6	4.3	3.0	3.2	2.6	0.4	0.5	0.5	0.5	0.1	0.1	0.1	0.0	0.0
	1	1.7	1.2	2.1	4.0	3.6	3.8	6.4	6.9	5.8	6.4	4.9	1.5	1.9	0.6	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1991	2	0.9	0.8	1.5	2.1	2.2	3.9	5.7	5.8	8.0	2.9	3.8	2.7	1.6	0.8	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	1	1.4	0.6	1.3	2.3	4.2	4.6	9.0	8.1	6.5	4.3	3.8	2.0	2.4	1.4	0.9	0.4	0.1	0.0	0.0	0.0	0.0	0.0
1995	2	1.7	1.3	1.3	1.0	1.5	1.3	1.5	1.5	3.4	2.7	3.9	2.6	7.9	8.6	3.0	0.5	0.6	0.2	0.3	0.0	0.1	0.1
	1	1.6	1.4	2.1	0.6	2.0	1.1	3.2	3.3	5.6	2.9	5.9	5.7	9.5	3.6	0.5	0.6	0.2	0.0	0.0	0.0	0.0	0.0
1997	2	4.9	5.0	3.9	4.7	8.3	5.0	1.9	0.4	0.4	0.2	0.0	0.6	0.7	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0
	1	8.5	4.8	6.8	3.5	5.9	5.3	3.2	0.0	1.4	0.4	0.7	0.7	1.8	0.8	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0
1999	2	0.0	0.1	0.3	0.7	0.0	2.3	5.4	12.8	10.1	5.7	6.7	2.3	1.3	0.1	0.6	0.3	0.3	0.1	0.0	0.0	0.0	0.0
	1	0.0	0.0	0.2	0.3	0.4	3.1	12.6	14.0	10.6	4.2	2.1	1.1	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	2	0.5	3.6	5.4	5.9	4.4	1.2	3.0	4.5	3.8	7.7	3.9	0.9	1.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0
	1	1.5	3.7	6.3	9.3	3.9	2.0	1.0	6.5	3.0	6.6	2.3	0.0	2.0	0.5	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
2001	2	2.5	1.3	1.4	0.2	1.6	0.7	1.6	2.6	3.0	2.1	2.6	8.6	15.2	7.5	0.7	0.0	0.9	0.2	0.2	0.0	0.0	0.0
	1	1.9	0.9	0.8	0.8	1.6	2.2	4.2	2.8	1.5	1.2	7.5	10.7	5.3	0.2	0.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0
2000	2	0.0	0.5	0.6	0.4	0.0	0.2	0.4	1.3	1.0	1.9	0.4	0.2	0.6	0.0	0.0	4.4	8.8	13.2	8.8	7.3	0.0	0.0
	1	0.0	0.0	0.0	0.2	0.2	0.0	0.4	0.8	1.1	0.6	0.4	0.0	0.4	7.3	26.3	5.9	2.9	1.5	1.5	0.0	0.0	0.0
2001	2	1.4	0.5	0.2	0.7	0.6	0.9	1.2	0.6	1.5	1.2	1.9	6.5	8.4	6.9	2.1	3.5	4.9	2.1	0.7	0.0	0.0	0.0
	1	2.8	1.0	0.3	0.3	0.3	2.0	2.1	0.4	1.3	3.1	3.4	6.5	9.9	6.3	9.6	6.8	0.7	0.0	0.1	0.0	0.0	0.0
2002	2	0.4	2.4	6.8	9.3	7.5	5.2	1.1	1.6	2.5	1.9	1.7	1.4	3.2	2.0	0.7	0.7	0.1	0.2	0.1	0.3	0.1	0.0
	1	0.3	2.1	6.1	8.2	6.3	6.3	2.1	2.0	2.5	2.0	1.4	1.5	2.9	2.0	0.9	1.0	0.4	0.2	0.0	0.0	0.0	0.0

Table 8. Fishery age compositions

Source	Year	Fish	Tows	adj #	sex	Age														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
fishery	1977	437	44	200	3	0.0	0.0	0.2	1.2	2.5	5.1	5.5	6.7	6.7	9.9	4.6	7.6	4.1	3.9	2.3
fishery	1978	310	33	200	2	0.0	0.0	0.0	0.7	2.6	3.6	4.6	5.9	3.9	4.6	3.9	3.3	2.0	3.0	2.0
fishery					1	0.0	0.0	0.0	0.3	1.3	3.0	1.0	1.0	2.0	2.6	2.6	3.0	2.0	2.0	0.0
fishery	1980	221	27	200	3	0.0	0.0	0.0	0.0	1.4	5.1	8.3	7.8	10.1	5.1	4.1	5.5	3.7	4.6	3.2
fishery	1982	434	56	200	3	0.0	0.0	0.0	0.9	2.8	5.9	6.1	3.0	6.3	5.6	4.2	5.4	4.9	2.8	4.7
fishery	1987	1066	46	200	2	0.0	0.0	0.0	0.6	1.8	3.0	4.1	4.5	2.3	1.8	1.3	1.8	1.5	1.3	1.6
fishery					1	0.0	0.1	0.1	1.2	0.4	3.3	5.5	4.1	3.2	2.8	2.6	1.8	1.7	2.3	1.7
fishery	1988	375	30	200	2	0.0	0.0	0.3	1.1	1.3	4.5	2.9	5.9	5.1	4.0	1.9	1.3	1.1	1.1	0.8
fishery					1	0.0	0.0	0.3	1.6	0.8	3.5	2.7	6.4	3.7	1.6	2.7	1.9	2.1	2.4	1.6
fishery	1990	241	44	200	2	0.0	0.0	0.4	0.4	2.1	2.5	2.1	2.9	2.9	4.6	4.1	2.5	2.1	2.1	0.8
fishery					1	0.0	0.0	0.0	0.0	0.4	1.7	1.7	0.8	3.3	7.5	5.4	6.6	1.7	2.9	0.8
fishery	1993	233	29	200	2	0.0	0.0	0.0	0.0	0.0	0.9	0.9	3.9	1.3	2.6	3.0	2.1	0.9	1.3	2.1
fishery					1	0.0	0.0	0.0	0.0	0.0	0.4	3.0	0.4	1.3	0.9	2.1	3.4	3.4	2.6	2.6
fishery	1995	169	17	156	2	0.0	0.0	0.0	1.2	2.4	2.4	4.1	2.4	7.1	3.0	2.4	3.6	1.2	1.8	1.8
fishery					1	0.0	0.0	0.0	0.0	0.0	1.8	1.2	3.6	4.1	7.1	3.0	3.6	3.0	1.2	1.2
fishery	1996	244	44	200	2	0.0	0.0	1.2	0.8	0.4	2.0	2.0	3.7	6.1	3.7	2.5	0.8	0.0	1.2	1.6
fishery					1	0.0	0.0	0.0	0.4	2.0	2.9	4.1	5.3	4.1	7.4	2.0	3.7	0.4	3.3	2.0
fishery	1997	278	42	200	2	0.0	0.0	0.0	3.6	6.5	7.2	4.7	2.5	1.8	1.1	1.4	0.7	1.4	1.4	1.1
fishery					1	0.0	0.0	0.4	1.1	3.6	2.5	2.5	2.5	3.3	1.8	1.4	1.1	1.4	1.4	0.4
fishery	1999	171	4	76	2	0.0	0.0	0.0	0.0	2.9	8.2	8.2	7.6	6.4	3.5	1.2	1.2	2.3	0.0	1.8
fishery					1	0.0	0.0	0.0	0.0	0.6	4.7	3.5	3.5	2.9	2.3	0.6	1.8	1.2	0.6	1.2
fishery	2000	1041	44	200	2	0.0	0.0	0.7	6.0	10.8	5.5	4.3	2.7	1.9	1.3	1.8	1.2	1.2	1.2	0.6
fishery					1	0.0	0.1	1.2	5.4	8.6	6.8	4.1	3.0	1.8	1.3	1.2	1.3	1.2	1.3	1.2
fishery	2001	1561	59	200	2	0.0	0.1	0.7	8.1	16.1	10.3	3.2	1.6	0.9	1.0	1.0	0.4	0.6	0.9	0.5
fishery					1	0.0	0.0	0.8	8.1	16.0	8.1	3.0	1.5	0.9	0.6	1.1	0.8	0.9	0.8	0.4
fishery	2002	750	23	200	2	0.0	0.0	0.3	3.3	8.7	14.1	10.5	4.5	1.7	0.9	0.8	0.9	0.3	0.4	0.7
fishery					1	0.0	0.0	0.3	4.3	10.1	14.4	11.2	4.0	1.6	0.3	0.3	0.9	0.4	0.4	0.3

Table 8 (Cont.)

Source	Year	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40+
fishery	1977	2.8	0.9	2.1	2.3	1.4	1.6	1.2	1.4	0.0	2.5	1.8	1.8	0.7	0.9	0.5	0.7	1.2	0.7	0.9	1.2	0.9	1.2	1.6	0.9	8.5
fishery	1978	0.7	1.6	1.6	1.0	2.3	0.7	1.3	0.7	1.3	0.0	0.3	0.3	0.0	0.3	0.0	0.3	0.3	0.3	0.0	0.7	0.3	1.0	1.6	0.3	4.9
fishery		0.3	1.0	0.3	2.0	1.6	0.7	1.0	0.7	0.7	0.3	0.3	0.7	0.3	0.3	0.0	0.7	0.7	0.3	0.0	0.3	1.0	0.7	0.0	0.0	3.6
fishery	1980	0.9	1.8	2.8	1.8	1.4	3.2	3.2	2.3	0.5	0.9	0.9	1.8	0.5	0.9	1.8	0.5	0.5	0.9	0.9	0.9	1.4	1.4	0.0	0.5	9.2
fishery	1982	4.2	3.0	2.6	3.3	2.1	3.3	3.5	2.6	1.6	0.5	1.4	0.5	1.2	1.6	0.9	0.7	0.5	0.9	0.5	0.5	0.9	0.7	0.0	0.5	9.8
fishery	1987	1.6	2.0	1.6	0.8	0.7	0.8	0.8	0.8	0.8	0.3	0.7	0.6	0.6	0.4	0.4	0.1	0.4	0.2	0.3	0.4	0.5	0.4	0.2	0.4	4.1
fishery		2.0	1.9	1.9	1.8	1.2	0.6	0.8	0.5	0.7	0.6	1.4	0.5	0.3	0.8	0.3	0.5	0.2	0.0	1.0	0.7	0.7	0.2	0.9	0.5	4.3
fishery	1988	0.5	1.1	1.3	0.8	1.1	0.8	0.3	0.5	1.1	0.5	0.8	0.8	0.8	1.1	0.8	0.3	0.8	0.0	0.8	0.3	0.8	1.6	0.8	0.3	1.1
fishery		1.6	1.9	1.9	0.8	0.8	1.1	0.8	0.8	0.5	1.6	0.8	0.5	1.3	0.8	0.3	0.3	0.0	0.3	0.8	0.3	0.8	0.0	0.0	0.0	0.8
fishery	1990	0.8	0.0	2.1	1.2	1.2	1.2	1.2	0.8	0.4	0.8	0.8	0.8	0.4	0.0	0.0	0.0	0.4	0.0	0.8	0.0	0.4	0.0	0.0	0.0	5.0
fishery		2.5	2.5	1.7	1.2	0.0	2.1	1.2	0.4	0.4	0.0	0.0	0.0	0.8	0.4	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	4.1
fishery	1993	0.4	0.9	1.3	0.9	1.7	2.1	2.1	2.6	1.3	0.9	0.9	0.9	0.0	0.0	0.9	0.0	0.4	0.9	0.9	0.9	0.4	0.4	0.0	0.9	5.2
fishery		3.0	3.0	4.3	2.1	2.1	2.6	1.3	0.9	0.9	0.0	0.4	1.7	1.7	0.4	0.0	0.0	2.1	0.4	0.4	0.4	0.4	0.9	0.0	0.0	5.2
fishery	1995	1.2	3.6	1.8	2.4	2.4	1.2	0.0	0.0	1.8	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	1.2	0.0	1.2	4.1
fishery		1.2	2.4	0.0	0.0	1.2	1.2	0.0	0.0	0.6	0.6	0.6	3.0	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.0	1.2
fishery	1996	0.8	1.6	0.8	0.8	0.4	0.8	0.4	0.4	1.2	0.4	0.4	0.4	0.0	0.4	0.4	1.2	0.4	0.8	0.0	0.0	0.0	0.4	0.0	0.0	3.7
fishery		0.8	1.6	1.6	1.2	0.8	1.6	0.4	1.6	0.8	0.4	0.4	0.8	0.0	0.8	1.2	0.0	0.4	0.8	0.0	0.0	1.6	0.4	0.4	0.0	2.0
fishery	1997	0.7	2.5	1.1	1.1	1.1	0.7	0.7	0.4	0.0	1.8	0.7	1.4	0.7	0.0	0.4	0.7	0.4	1.1	0.0	0.0	0.0	0.0	0.0	0.0	8.3
fishery		0.4	2.2	1.1	0.0	0.0	0.7	1.8	1.8	0.7	2.5	0.0	1.4	0.4	1.1	0.7	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.7	0.0	2.2
fishery	1999	0.6	1.2	0.6	1.2	2.9	0.6	1.2	0.0	1.8	0.0	0.0	0.0	0.0	1.2	0.0	0.6	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	1.8
fishery		0.6	1.8	0.6	1.8	0.6	2.9	0.6	1.8	0.0	0.0	1.2	0.6	0.6	0.6	1.2	0.0	0.0	0.6	1.2	0.0	0.0	0.6	0.0	0.0	2.9
fishery	2000	1.1	0.5	1.2	1.0	0.7	1.0	0.8	0.9	0.6	0.3	0.2	0.1	0.3	0.0	0.4	0.0	0.2	0.1	0.1	0.2	0.0	0.3	0.2	0.2	1.6
fishery		1.1	0.3	1.0	1.0	0.9	0.7	0.7	0.5	0.5	0.5	0.0	0.3	0.5	0.5	0.2	0.0	0.1	0.2	0.3	0.0	0.1	0.1	0.2	0.1	1.2
fishery	2001	0.7	0.4	0.4	0.3	0.4	0.4	0.2	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	1.0
fishery		0.5	0.4	0.5	0.5	0.5	0.1	0.1	0.0	0.1	0.2	0.1	0.2	0.0	0.0	0.4	0.1	0.1	0.3	0.0	0.1	0.0	0.0	0.1	0.0	0.8
fishery	2002	0.3	0.0	0.1	0.1	0.0	0.4	0.1	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
fishery		0.5	0.0	0.3	0.3	0.3	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0

Table 9. Survey age compositions.

Source	Year	Fish	Tows	adj #	sex	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
						Age														
Triennial	1980	233	4	104	2	0.9	2.8	1.1	12.9	5.0	8.9	5.1	2.5	2.8	3.0	3.2	1.1	1.4	1.5	0.8
Triennial					1	0.6	5.6	0.0	6.0	2.2	7.2	8.0	6.9	4.3	2.6	1.1	0.0	0.5	0.0	0.0
Triennial	1983			0	2	0.0	0.0	8.8	8.2	1.0	4.2	0.8	0.5	0.0	0.2	0.0	0.7	0.0	0.5	0.4
Triennial					1	0.0	15.4	18.5	9.4	2.7	1.9	0.5	0.4	0.7	0.3	0.6	1.0	0.9	1.5	0.5
Triennial	1986	229	9	154	2	3.0	5.8	5.1	7.6	9.6	7.8	4.6	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Triennial					1	3.0	4.4	3.0	9.0	8.8	12.8	7.1	1.3	1.0	1.0	0.0	0.0	0.0	0.0	0.0
Triennial	1995			200	2	4.9	2.8	9.6	7.9	5.2	2.2	2.0	0.1	0.6	2.2	1.0	1.4	0.0	0.6	1.9
Triennial					1	5.4	4.3	9.9	6.1	4.3	3.6	1.1	1.0	0.4	1.4	2.1	1.9	1.3	1.2	0.8
Triennial	1998			200	2	0.0	4.1	4.7	18.6	8.7	4.1	3.3	2.2	0.4	0.4	0.1	0.5	0.1	0.1	0.0
Triennial					1	0.8	5.5	8.0	17.8	8.7	4.7	3.2	1.2	1.1	0.1	0.3	0.2	0.3	0.1	0.1
Triennial	2001	1031	101	200	2	6.2	26.0	2.4	3.0	7.7	7.6	2.7	0.6	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Triennial					1	4.5	25.6	1.8	2.5	3.4	3.0	0.8	0.5	0.1	0.1	0.0	0.0	0.1	0.0	0.0
Slope	2000	114	19	111	2	0.3	0.7	9.1	11.7	12.3	4.5	3.1	3.6	1.6	0.8	0.8	0.0	0.0	0.0	0.0
Slope					1	0.1	1.3	13.9	8.4	17.5	5.1	2.6	0.2	0.5	0.6	0.0	0.0	0.9	0.0	0.0
Slope	2001	155	11	115	2	0.0	7.4	2.7	10.9	10.0	23.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slope					1	0.0	3.9	3.4	11.9	8.5	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slope-nw	2000	320	26	200	2	0.3	0.2	0.8	1.4	2.3	1.6	0.4	1.8	0.0	0.0	0.0	1.5	2.9	1.5	1.5
Slope-nw					1	0.8	0.2	0.2	0.6	1.8	1.2	0.2	1.5	0.0	0.0	0.0	1.5	2.9	4.4	5.8
Slope-nw	2001	358	44	200	2	0.1	14.7	2.2	4.1	7.3	5.1	1.1	0.3	0.2	0.9	0.7	3.0	0.6	0.0	0.7
Slope-nw					1	0.4	15.8	1.9	4.2	4.9	7.5	1.3	2.0	2.9	1.0	0.1	0.0	0.8	2.6	1.7
Slope-nw	2002	828	44	200	2	0.0	4.4	29.6	4.8	5.4	3.0	2.1	0.8	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Slope-nw					1	0.0	3.7	27.4	4.4	6.9	2.9	1.6	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1

Source	Year	sex	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40+
Triennial	1980	2	0.1	0.8	0.1	0.0	0.5	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Triennial		1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Triennial	1983	2	0.0	0.0	0.0	2.3	1.3	4.0	0.6	1.9	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.4
Triennial		1	0.3	0.7	1.0	1.8	0.4	0.6	0.0	0.2	0.8	0.1	0.2	0.2	0.0	0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.5
Triennial	1986	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Triennial		1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Triennial	1995	2	2.4	0.0	0.9	1.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
Triennial		1	1.3	0.8	0.5	0.4	0.3	0.1	0.2	0.3	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Triennial	1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Triennial		1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Triennial	2001	2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Triennial		1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slope	2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slope		1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slope	2001	2	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slope		1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Slope-nw	2000	2	2.9	1.5	2.9	2.9	0.0	2.9	1.5	2.9	2.9	2.9	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	0.0	4.4
Slope-nw		1	2.9	0.1	4.4	1.5	1.5	1.5	4.4	0.0	1.5	1.5	2.9	0.0	1.5	1.5	0.0	1.5	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0
Slope-nw	2001	2	0.1	0.7	0.2	0.0	0.7	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Slope-nw		1	0.6	0.6	0.0	0.0	1.6	0.0	0.0	0.8	1.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	1.3
Slope-nw	2002	2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.5
Slope-nw		1	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0	0.4	0.1	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

Table 10. Life history characteristics at age based on equations in Rogers et al. (2000). Eggs/kg is eggs per kg mature females.

Both Sexes			Female					Male		
Age		M	Length		Weight	Maturity	Eggs/kg	Length		Weight
years	cv(%)		cm	cv (%)	kg	%	x100,000	cm	cv (%)	kg
1	24	0.05	11.7	10	0.0	0	0.2	10.7	8	0.0
2	24	0.05	16.2	10	0.1	0	0.2	15.7	8	0.1
3	23	0.05	20.1	9	0.2	0	0.3	19.9	8	0.1
4	23	0.05	23.4	9	0.2	0	0.5	23.2	8	0.2
5	23	0.05	26.1	9	0.3	0	0.6	25.9	8	0.3
6	22	0.05	28.5	9	0.4	2	0.8	28.1	8	0.4
7	22	0.05	30.5	9	0.5	7	0.9	29.8	8	0.5
8	21	0.05	32.2	9	0.6	19	1.1	31.3	8	0.6
9	21	0.05	33.7	9	0.7	38	1.2	32.4	8	0.7
10	21	0.05	34.9	9	0.8	57	1.3	33.4	7	0.7
11	20	0.05	35.9	9	0.9	73	1.4	34.1	7	0.8
12	20	0.05	36.8	9	1.0	82	1.5	34.7	7	0.8
13	20	0.05	37.6	9	1.0	88	1.6	35.2	7	0.8
14	19	0.05	38.2	9	1.1	92	1.7	35.6	7	0.9
15	19	0.05	38.7	9	1.1	94	1.8	36.0	7	0.9
16	19	0.05	39.2	9	1.2	96	1.8	36.2	7	0.9
17	18	0.05	39.6	9	1.2	97	1.9	36.5	7	0.9
18	18	0.05	39.9	8	1.2	97	1.9	36.6	7	0.9
19	18	0.05	40.2	8	1.3	98	2.0	36.8	6	1.0
20	17	0.05	40.4	8	1.3	98	2.0	36.9	6	1.0
21	17	0.05	40.6	8	1.3	98	2.0	37.0	6	1.0
22	17	0.05	40.8	8	1.3	98	2.1	37.0	6	1.0
23	16	0.05	41.0	8	1.3	99	2.1	37.1	6	1.0
24	16	0.05	41.1	8	1.3	99	2.1	37.2	6	1.0
25	16	0.05	41.2	8	1.3	99	2.1	37.2	6	1.0
26	15	0.05	41.3	8	1.4	99	2.1	37.2	6	1.0
27	15	0.05	41.4	8	1.4	99	2.1	37.2	6	1.0
28	15	0.05	41.4	8	1.4	99	2.1	37.3	5	1.0
29	14	0.05	41.5	8	1.4	99	2.1	37.3	5	1.0
30	14	0.05	41.5	8	1.4	99	2.2	37.3	5	1.0
31	14	0.05	41.6	8	1.4	99	2.2	37.3	5	1.0
32	13	0.05	41.6	8	1.4	99	2.2	37.3	5	1.0
33	13	0.05	41.6	8	1.4	99	2.2	37.3	5	1.0
34	13	0.05	41.6	7	1.4	99	2.2	37.3	5	1.0
35	12	0.05	41.7	7	1.4	99	2.2	37.3	5	1.0
36	12	0.05	41.7	7	1.4	99	2.2	37.3	5	1.0
37	12	0.05	41.7	7	1.4	99	2.2	37.3	4	1.0
38	11	0.05	41.7	7	1.4	99	2.2	37.3	4	1.0
39	11	0.05	41.7	7	1.4	99	2.2	37.4	4	1.0
40	11	0.05	41.7	7	1.4	99	2.2	37.4	4	1.0

Table 11. Effects of revising and updating data with Model 2 versus Model 3 as the basis. Model 2 was the last full assessment (Rogers et al. 2000). Model 3 was the 2001 update (Methot and Rogers 2001) which is the basis of current rebuilding analyses. Models 2 fit selectivities, survey catchabililites, and yearly recruitments, while Model 3 refit only recruitments. Models 6 and 7 are full, revised data updates of Model 2 and 3, respectively. Models 4 and 5 are intermediary between Model 2 and Model 6 and are part of the uncertainty analysis. Models 4 shows effect of fitting all parameters using Model 3 data, while Model 5 shows effects of revising data used in Model 4.

Model Number from Table 1		**3**	**7**	**2**	**4**	**5**	**6**
Ending Year of Model		**2001**	**2002**	**1999**	**2001**	**2001**	**2002**
Data sources available in		**update**	**full**	**full**	**update**	**update**	**full**
Data Type		**original**	**revised**	**original**	**original**	**revised**	**revised**
# Parameters not yearly recruits		1	1	21	21	21	21
Estimated yearly recruitments		37	38	36	38	38	39
Fixed yearly recruitments		2	2	1	1	1	1
Recruitments hitting lower bound		3	4	0	2	4	4
Catchabilities (q)							
Triennial survey		0.88	0.88	0.88	1.13	1.16	1
Slope survey		0.79	0.79	0.79	0.74	0.8	0.55
P.o.p. survey		1.16	1.16	1.16	1.27	1.16	1.28
Ending Year Biomass (mt)		6611	6435	10010	6509	5773	8374
Ending Year f			0.026	0.04	0.027	0.039	0.022
% spawn (unfished versus end year)		11%	10%	17%	10%	8%	11%
total log-likelihood		-1956	-2135	-1750	-1934	-1814	-2062
fishery	Age	-493	-415	-478	-492	-420	-421
fishery	Length	-606	-570	-551	-606	-529	-548
Triennial	index	-0.88	-2.4	1	2.2	1.5	2.1
Triennial	Age	-179	-180	-171	-173	-183	-183
Triennial	Length	-357	-536	-357	-358	-391	-504
slope	index	-3.6	-2	-0.08	-2.7	-3	-2.7
slope	Age	-29	-31	n/a	-29	-21	-27
slope	Length	-276	-383	-182	-264	-253	-363
Pop	Index	2.9	2.9	3	3	3	3
Pop	Length	-15	-18	-15	-15	-19	-19

Table 12. Model 6 estimated population numbers of females (times 100,000) . Dark shaded cells trace recruitments in 1964-1966 which were restricted by the lower bound. Light shaded cells at bottom show strong estimated year classes in very recent years. Cells in borders trace shelf survey high catchability ages forwards (1977 on) and backwards (2001 back).

	Ages																																							
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
63	20	9	9	8	8	8	7	7	6	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	19
64	0	19	9	8	8	8	7	7	6	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	19
65	0	0	18	8	8	8	7	7	6	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	19
66	0	0	0	18	8	8	7	7	6	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	19
67	20	0	0	0	16	7	7	6	6	5	5	5	4	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	16
68	2	19	0	0	0	15	6	6	5	5	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	14
69	32	2	18	0	0	0	13	5	5	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	12
70	1	31	2	17	0	0	0	12	5	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	12
71	0	1	29	2	16	0	0	0	12	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	12
72	13	0	1	28	2	15	0	0	0	11	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	12
73	3	13	0	1	26	2	14	0	0	0	10	4	4	3	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12
74	20	3	12	0	1	24	2	13	0	0	0	9	4	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11
75	4	19	2	11	0	1	23	1	12	0	0	0	8	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11
76	4	4	18	2	11	0	1	21	1	11	0	0	0	8	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11
77	5	4	4	17	2	10	0	1	20	1	10	0	0	0	7	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
78	6	4	4	4	16	2	10	0	1	18	1	10	0	0	0	7	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
79	10	6	4	4	4	15	2	9	0	1	17	1	9	0	0	0	6	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
80	18	10	6	4	4	3	14	2	8	0	1	16	1	8	0	0	0	6	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
81	14	17	9	5	4	3	3	13	2	8	0	1	15	1	8	0	0	0	5	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
82	9	14	16	9	5	3	3	3	12	2	7	0	1	13	1	7	0	0	0	5	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
83	3	8	13	16	8	5	3	3	3	11	1	6	0	0	12	1	6	0	0	0	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
84	2	3	8	12	15	8	4	3	3	2	10	1	6	0	0	11	1	6	0	0	0	4	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	8
85	4	2	2	7	12	14	7	4	3	2	2	8	1	5	0	0	9	1	5	0	0	0	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	8
86	5	3	2	2	7	11	12	6	3	2	2	2	7	1	4	0	0	8	0	4	0	0	0	3	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	7
87	9	4	3	2	2	6	10	11	5	3	2	2	1	6	1	4	0	0	7	0	3	0	0	0	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	6
88	6	9	4	3	2	2	5	8	9	4	2	1	1	1	5	1	3	0	0	5	0	3	0	0	0	2	1	1	1	1	1	0	0	0	0	0	0	0	0	5
89	6	6	9	4	3	2	2	5	7	7	3	2	1	1	1	4	1	2	0	0	4	0	2	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	5
90	2	6	6	8	4	3	2	1	4	6	6	3	2	1	1	1	3	0	2	0	0	4	0	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4
91	2	2	6	5	8	3	2	1	1	3	4	5	2	1	1	1	1	3	0	2	0	0	3	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
92	6	2	2	5	5	7	3	2	1	1	3	4	4	2	1	1	1	1	2	0	1	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3
93	6	5	2	1	5	5	6	3	2	1	1	2	3	3	2	1	1	0	0	2	0	1	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	3
94	3	5	5	2	1	5	4	5	2	1	1	1	2	2	3	1	1	0	0	0	1	0	1	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	2
95	23	3	5	5	2	1	4	3	4	2	1	1	1	1	2	2	1	1	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
96	10	22	3	5	4	2	1	3	3	4	1	1	1	0	1	2	2	1	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
97	2	9	21	2	5	4	2	1	3	2	3	1	1	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
98	9	2	9	20	2	4	3	1	1	2	2	2	1	1	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
99	3	9	2	8	18	2	3	3	1	1	2	2	2	1	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
100	34	3	8	2	8	17	2	3	2	1	1	2	1	2	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
101	35	33	3	8	2	7	15	2	3	2	1	0	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
102	6	33	31	2	8	2	7	14	2	3	2	1	0	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
103	-0	6	32	30	2	7	1	6	13	1	2	2	1	0	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table 13. Retrospective comparison of parameters fit in the fully fitted Model 6. See Table 1 for a more complete description of the models. Fits limited by lower bounds are in bold. Fixed parameters are enclosed in boxes.

Model Number from Table 1		2	4	5	6
Ending Year of Model		1999	2001	2001	2002
Data sources available in		full	update	update	full
Data Type		original	original	revised	revised
Natural mortality		0.05	0.05	0.05	0.05
Fishery Selectivity					
	Transition	36	36	36	36
Ascending curve	minimum selectivity	0.001	0.001	0.001	0.001
	inflection	0.75	0.74	0.737	0.74
	slope	0.67	0.67	0.598	0.59
Descending Curve	infl	0.5	0.5	0.5	0.5
	slope	1	1	1	1
	final	1	1	1	1
Triennial Survey catchability		0.88	1.13	1.16	1.03
Triennial Selectivity					
	Transition	28	28	28	28
Ascending curve	minimum selectivity	0.01	0.01	0.01	0.01
	inflection	0.44	0.43	0.432	0.43
	slope	0.48	0.56	0.59	0.53
Descending Curve	infl	0.1	0.1	0.1	0.1
	slope	1.22	1.24	1.28	1.01
	final	0.12	0.12	0.12	0.13
Slope Survey catchability		0.79	0.74	0.8	0.55
Slope Selectivity	Transition	28	28	28	28
Ascending curve	minimum selectivity	0.001	0.001	0.001	0.001
	inflection	0.76	0.65	0.68	0.67
	slope	0.38	0.74	0.64	0.88
Descending Curve	infl	0.1	0.1	0.11	0.18
	slope	0.74	0.85	0.91	1.00
	final	0.05	0.06	0.06	0.08
P.o.p. Survey catchability		1.16	1.27	1.15	1.28
P.o.p. Selectivity	Transition	28	28	28	28
Ascending curve	minimum selectivity	0.001	0.001	0.001	0.001
	inflection	0.62	0.62	0.61	0.61
	slope	2.49	2.58	2.37	2.44
Descending Curve	infl	0.12	0.12	0.125	0.12
	slope	1.29	1.26	1.32	1.26
	final	0.05	0.05	0.05	0.05
cv age at age 40 (aging error)		0.24	0.24	0.24	0.24
cv age at age 2 (aging error)		0.11	0.11	0.11	0.11
Old discount factor		0.05	0.05	0.05	0.05
Percent mis-sexed		0	0	0	0.00
Female length at age one		10.66	10.66	10.66	10.66
Female Length at age 40		41.78	41.78	41.78	41.78
Female k		0.16	0.16	0.16	0.16
Female cv in length at age 1		0.10	0.10	0.10	0.10
Female cv in length at age 40		0.07	0.07	0.07	0.07
Male length at age one		11.65	11.65	11.65	11.65
Male Length at Age 40		37.36	37.36	37.36	37.36
Male k		0.21	0.21	0.21	0.21
Male cv in length at age 1		0.08	0.08	0.08	0.08
Male cv in length at age 40		0.04	0.04	0.04	0.04
Virgin recruitment multiplier		same as background			
Beverton-Holt Stock-Recruitment shape paramet		1.00	1.00	1.00	1.00
Background recruitment		0.20	0.19	0.20	0.20
Recruitment Standard Deviation		0.50	0.50	0.50	0.50
Recruitment trend		0.00	0.00	0.00	0.00
Recruitment Multiplier		1.00	1.00	1.00	1.00
recruitment years fixed		1999	2000-2001	2001	2002
fixed recruitment values (times 10,000)		0.1246	0.1171	0.1246	0.1246

Table 14. Model 6 results (first column) compared to results from sensitivity runs requested by the SSC review panel. One run assumed catch was double the landings in 2000-2002, which raised the assumed discard rate. The other run used 1996-2002 fishery lengths unweighted by state landings.

Change		**none**	**double landings**	**raw fishery lengths**
Years Affected		**none**	**2000-2002**	**1996-2002**
# Parameters not yearly recruits		21	21	21
Estimated yearly recruitments		39	39	39
Fixed yearly recruitments		1	1	1
Recruitments hitting lower bound		4	4	4
Catchabilities (q)				
Triennial survey		1	0.997	1.21
Slope survey		0.55	0.52	0.74
P.o.p. survey		1.28	1.27	1.36
Ending Year Biomass (mt)		8374	8717	5296
Ending Year F at midage		0.022	0.034	0.035
% spawn (unfished versus end year)		11%	12%	6.5%
total log-likelihood		-2062	-2063	-2066
fishery	Age	-421	-421	-422
fishery	Length	-548	-548	-549
Triennial	Index	2.1	2.1	1.07
Triennial	Age	-183	-183	-185
Triennial	Length	-504	-504	-509
slope	Index	-2.7	-2.9	-1
slope	Age	-27	-27	-26
slope	Length	-363	-364	-360
Pop	Index	3	3.2	3.1
Pop	Length	-19	-19	-19

Table 15 . Comparison of rebuilding analyses based on the 2001 update (Model 3) versus this update with only recruitments refit (Model 7) or all parameters refit (Model 6). In Model 6 and 7, 2003 catch is assumed equal to 2002 catch (129 mt). Effects of progressively including 1997-1999, 2000, and 2001 recruits in estimating virgin recruitment and resampling new recruitments are shown for Model 6. Last age composition year is also increased from 1999 to 2000 and finally 2001. For example, when "Year of last age composition" = 1999, then recruits after 1999 are estimated within the rebuilding analyses by resampling recruits during 1983-1999.

Model Number from Table 1				**6**			
Year of ABC, OY				**2004**			
Year of last age composition		1999		2000		2001	
Years for virgin recruitment average		63-99		63-00		63-01	
Years resampled for future recruitments		83-99		83-00		83-01	
Virgin Recruitment (numbers x 1000)		1530		1671		1808	
Virgin Spawn		28178		30775		33208	
Target (40%) spawn		11271		12310		13319	
Current Spawn /Virgin		12%		11%		11%	
FMSY proxy (F50%)		0.032		0.032		0.032	
ABC (catch at F50%)		217		240		247	
Minimum rebuilding year (Tmin)		2014		2011		2011	
Maximum allowed rebuilding year (Tmax)		2047		2044		2044	
Midpoint rebuilding year (Tmid) = (Tmin+Tmax)/2		2031		2028		2028	
		F	OY	F	OY	F	OY
50% Probability of rebuilding by max. year		0.033	222	0.046	345	0.058	439
60 % Probability of rebuilding by max. year		0.030	205	0.043	321	0.054	417
70% Probability of rebuilding by max. year		0.028	192	0.040	299	0.051	391
80 % Probability of rebuilding by max. year		0.025	172	0.036	272	0.047	364
90 % Probability of rebuilding by max. year		0.022	147	0.032	241	0.041	320
40-10 OY			58		53		44
Rebuild by Tmid year							
PMAX							
	0.78	0.026	176				
	0.71			0.040	296		
	0.65					0.053	404

Table 16. Comparison of 10 year projections at the current management for options presented in Table 15.

1999 = ending year

Year	P= .5	P= .6	P= .7	P= .8	P= .9	Yr=Tmid	40-10 Rule	ABC Rule
2004	222	205	192	172	147	176	58	217
2005	231	214	201	180	154	184	79	226
2006	238	221	208	187	160	191	99	233
2007	245	228	215	193	167	198	120	240
2008	252	235	222	200	173	204	140	247
2009	258	241	228	206	178	211	159	253
2010	265	248	234	212	184	217	178	259
2011	270	253	239	217	189	222	195	265
2012	275	258	245	222	194	227	210	270
2013	280	263	250	227	199	232	224	275
2014	285	268	254	232	203	237	238	279

2000= ending year

Year	P= .5	P= .6	P= .7	P= .8	P= .9	Yr=Tmid	40-10 Rule	ABC Rule
2004	345	321	299	272	241	296	53	240
2005	382	357	333	303	270	329	81	269
2006	414	387	362	331	295	359	117	294
2007	436	410	384	352	315	380	159	314
2008	451	425	399	367	330	395	204	328
2009	464	437	412	380	342	408	248	340
2010	473	447	422	390	352	418	289	351
2011	482	456	431	399	361	427	326	360
2012	490	465	440	408	371	436	358	369
2013	495	470	446	415	378	442	385	376
2014	498	475	451	421	383	448	402	382

2001 = ending year

Year	P= .5	P= .6	P= .7	P= .8	P= .9	Yr=Tmid	40-10 Rule	ABC Rule
2004	439	417	391	364	320	404	44	247
2005	509	484	455	424	375	469	74	291
2006	579	551	519	486	431	535	119	337
2007	632	603	570	534	476	586	179	375
2008	667	638	604	568	508	621	251	403
2009	690	662	628	592	532	645	326	425
2010	713	685	652	616	556	669	400	446
2011	729	701	669	633	573	685	470	463
2012	734	708	676	642	583	692	508	474
2013	736	710	680	647	590	695	515	482
2014	732	708	679	647	591	693	518	486

Table 17. Comparison of Model 6 results (first column) to results from exploratory models changing natural mortality (M) or adding the NWFSC slope survey index (NWFSC). Exploratory models were those requiring change in either fixed parameters (M) or number of parameters (NWFSC).

Type of Change		none	M	NWFSC
Ending Year of Model		2002	2002	2002
Data sources available in		full	full	full
Data Type		revised	revised	revised
# Parameters not yearly recruits		21	21	27
Estimated yearly recruitments		39	39	39
Fixed yearly recruitments		1	1	1
Recruitments hitting lower bound		4	6	4
Catchabilities (q)				
Triennial survey		1	0.23	0.61
Slope survey		0.55	0.1	0.27
P.o.p. survey		1.28	0.37	0.88
NWFSC survey				0.13
Ending Year Biomass (mt)		8374	54966	26877
Ending Year f		0.022	0.004	0.006
% spawn (unfished versus end year)		11%	26%	40%
total log-likelihood		-2062	-2086	-2742
fishery	Age	-421	-456	-427
fishery	Length	-548	-549	-598
Triennial	Index	2.1	-4	-0.26
Triennial	Age	-183	-180	-182
Triennial	Length	-504	-486	-487
slope	Index	-2.7	-5.7	-4
slope	age	-27	-26.8	-34
slope	Length	-363	-362	-398
Pop	Index	3	3.1	3
Pop	Length	-19	-14	-18
nwfsc	Index			-1
nwfsc	age			-174
nwfsc	Length			-421

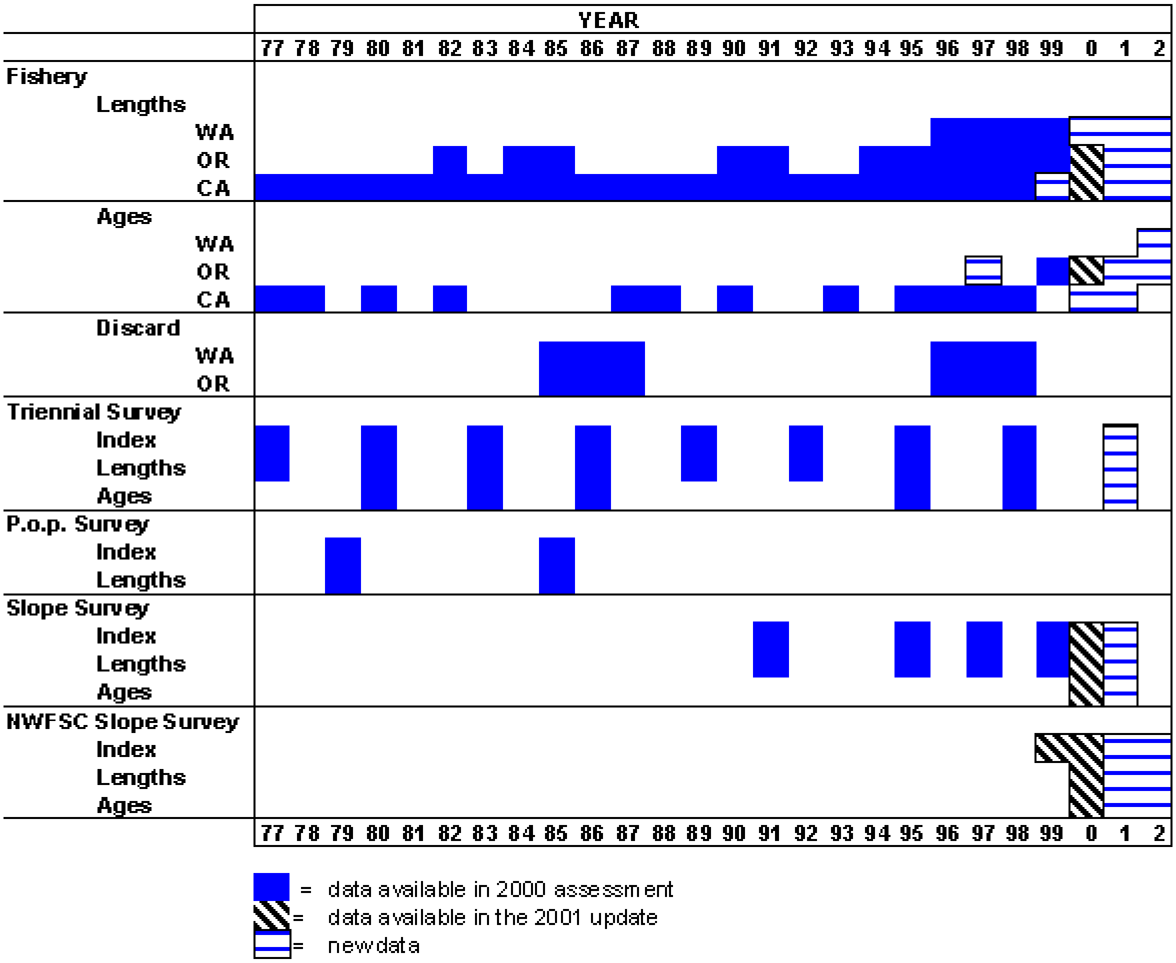
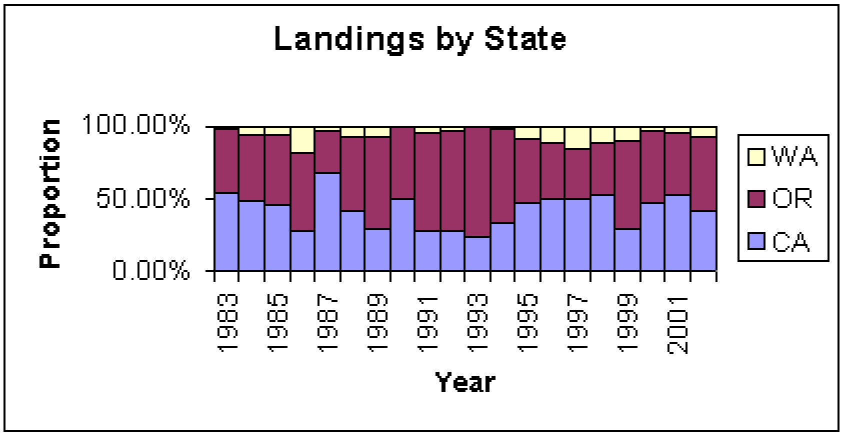


Figure 1. Comparison of data available for use in the last full assessment (Rogers et al. 2000), the 2001 update (Methot and Rogers 2001), and data new to this update. The NWFSC slope survey was not utilized in the 2001 update and only in an exploratory model in this update. Ages designated as "new data" were not utilized in the models.



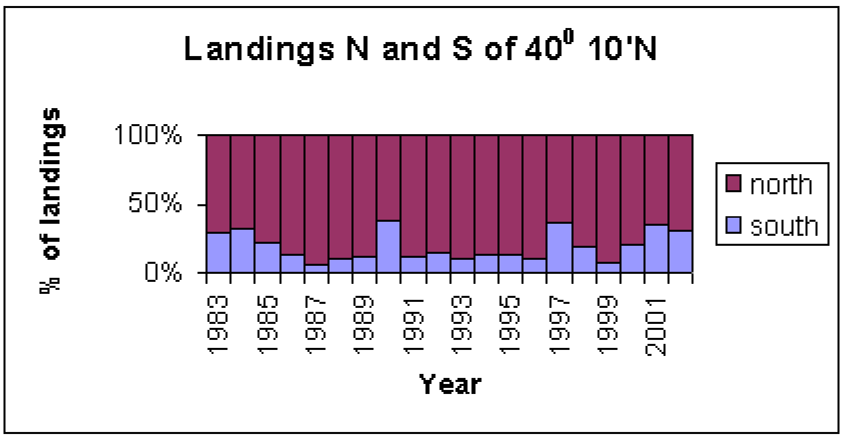


Figure 2. Comparison of darkblotched rockfish landings by state (above) and by ports north and south of 40^0 10' N Latitude (below).

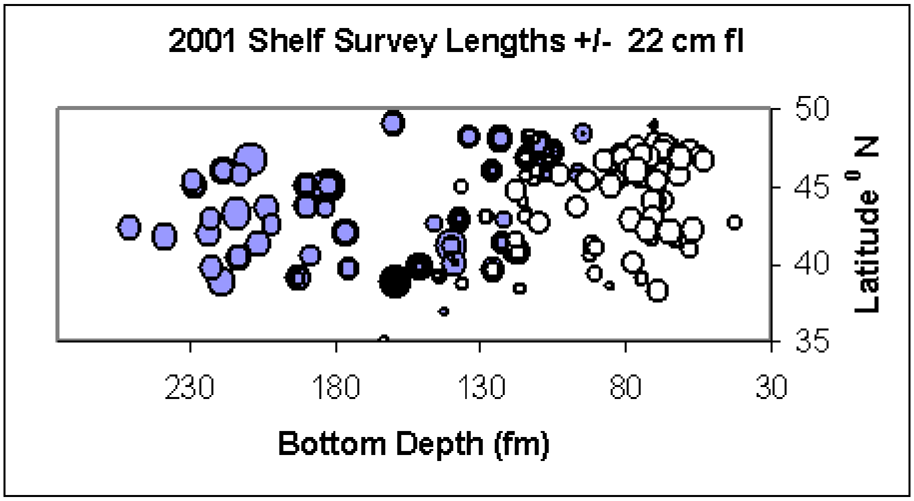


Figure 3 . Comparison of size distribution based on bottom depth and latitude in the 2001 AFSC shelf survey. Each bubble represents a measured fish. Location of bubble is based on the latitude and depth of the catch of the measured fish. Size of the bubble relates to the difference between the length of the fish and 22 cm fl. Shaded bubbles are positive differences (> 22 cm fl), unshaded are negative differences (< 22 cm fl).

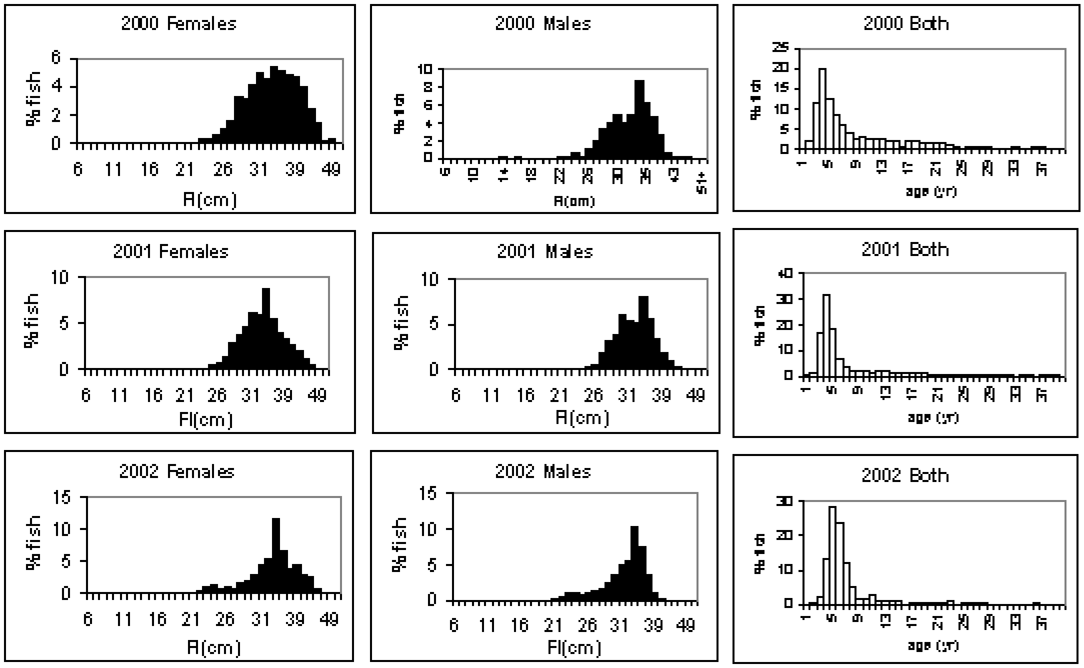


Figure 4. Length and age compositions for latest fishery data. Lengths after 32 cm are in 2-cm bins. Aging for 2001 and 2002 and Oregon in 2000 was done in 2002. Ages for all three years were not used in update models.

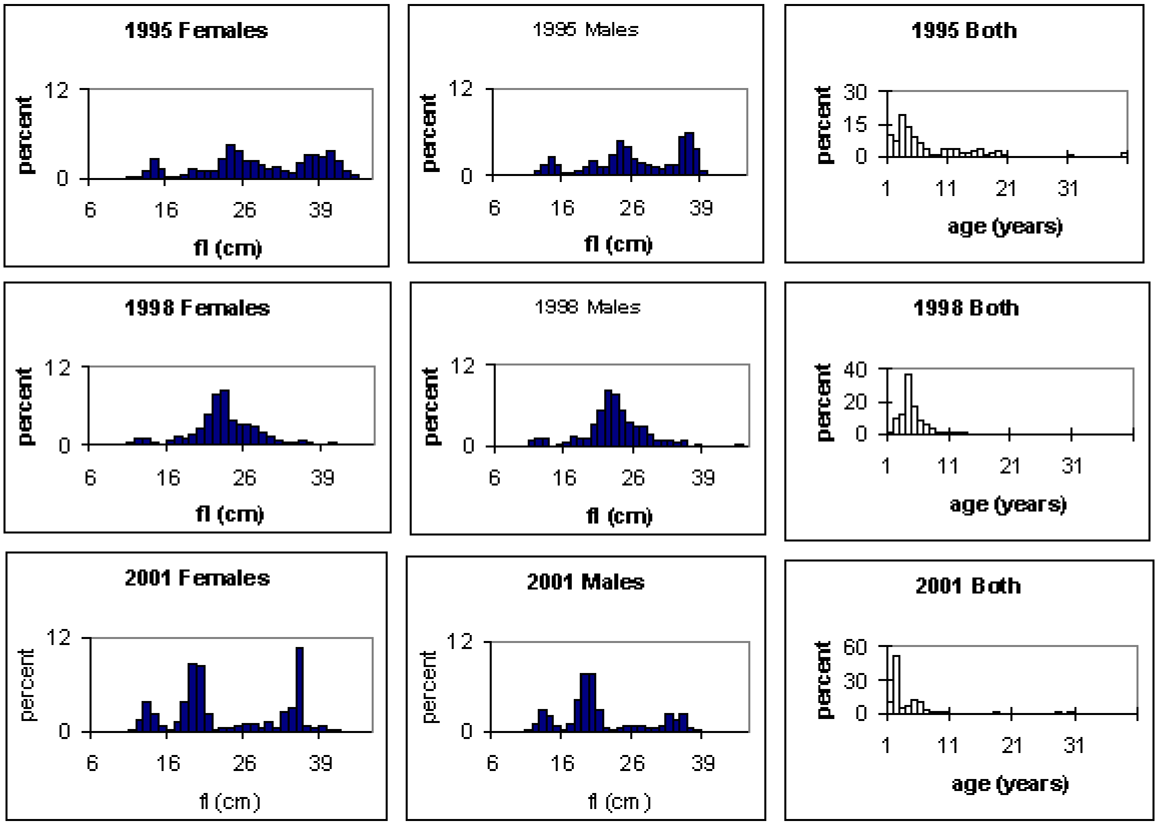


Figure 5. Comparison of recent AFSC shelf survey length and age compositions. Lengths after 32 cm are in 2-cm bins. Aging for 2001 was done in 2002 and not used in update models.

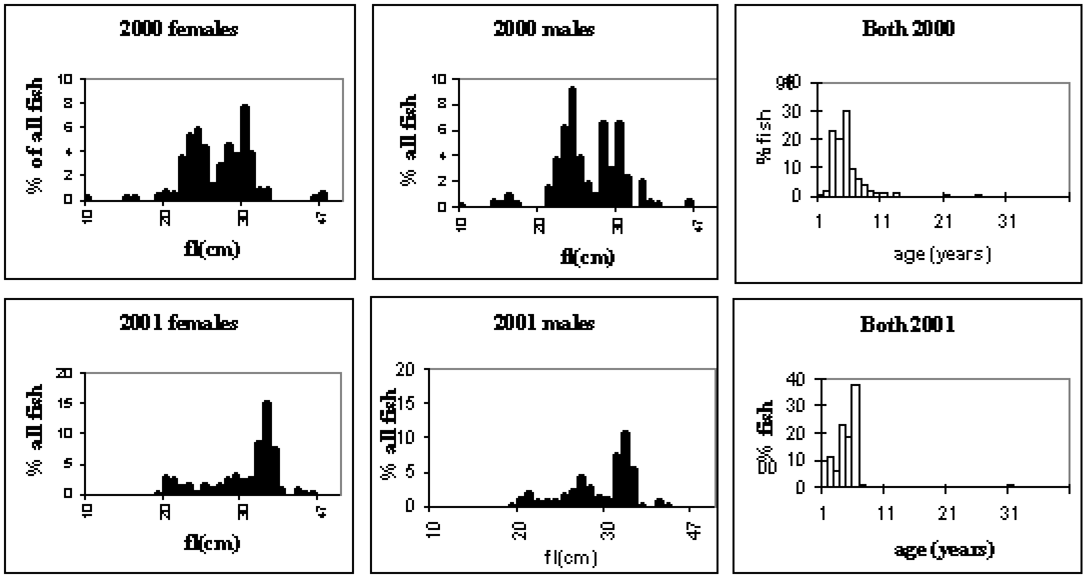


Figure 6. Comparison of recent AFSC slope survey length and age compositions. Lengths after 32 cm are in 2-cm bins. Aging for 2001 was done in 2002 and not used in update models.

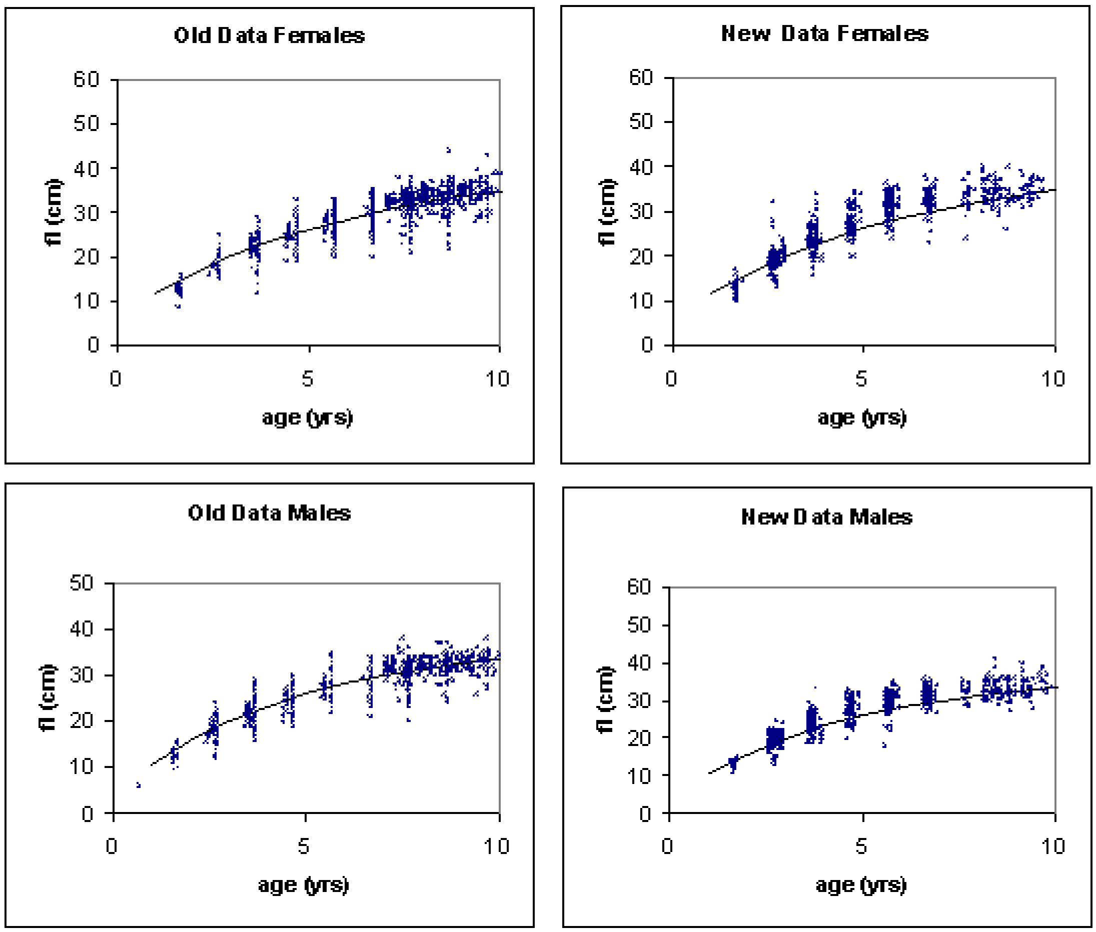


Figure 7. Comparison of the age-length relationship for fish aged previously (old data) versus fish aged in 2002 (new data). Solid line is von Bertanlaffy growth curve based on previous ages.

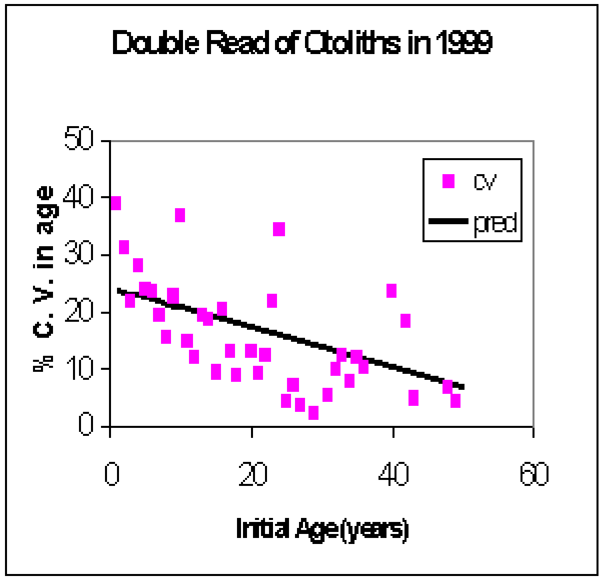


Figure 8. Comparison of darkblotched rockfish survey length compositions for 2000-2002. Northern boundary for all surveys is the U.S.- Canadian border, southern boundary is 34^0 30' N for the AFSC surveys and 35^0 N for the NWFSC survey. Depth ranges are 100-700 fm for slope surveys and 30-275 fm for shelf survey. Heavy solid line is the AFSC slope survey, thin solid line is NWFSC slope survey, and dotted heavy line is the AFSC shelf survey.

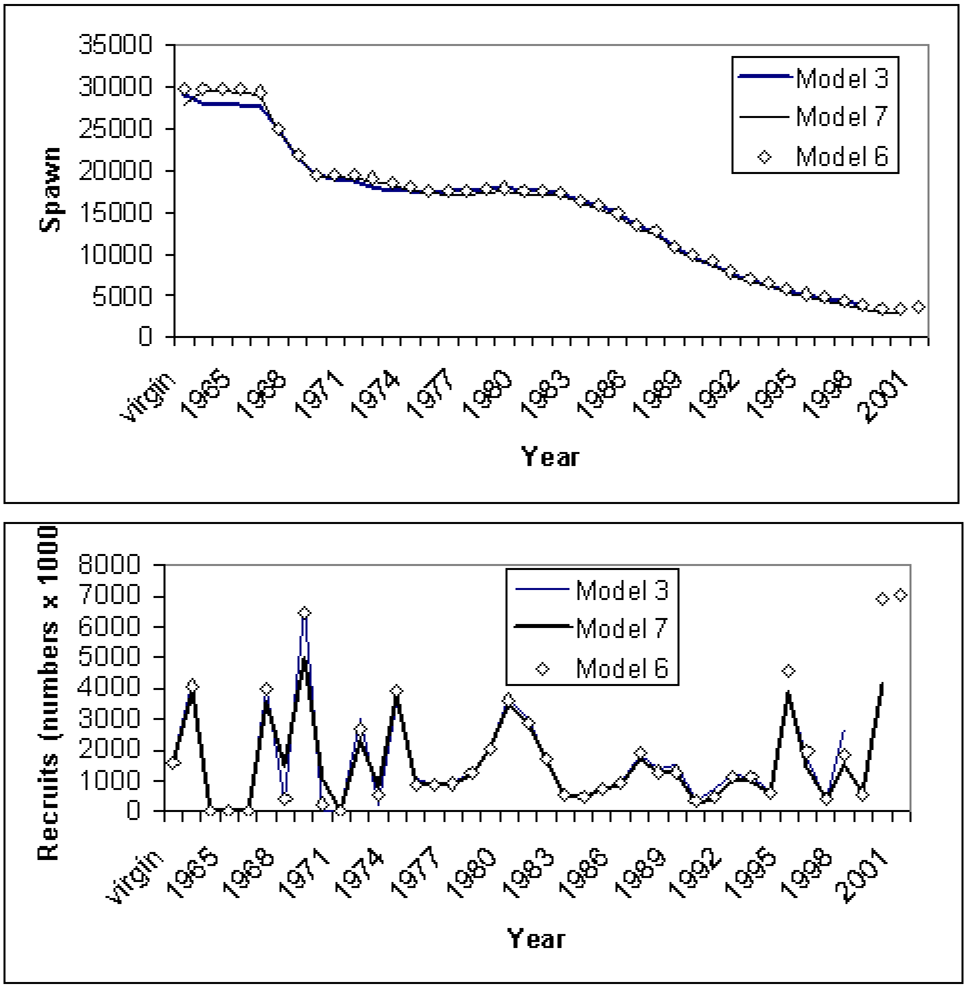


Figure 9. Comparison of Model 3 (2001 update) inputs into the rebuilding analyses versus those from Model 7 (refit only recruitments) and Model 6 (refit all parameters).

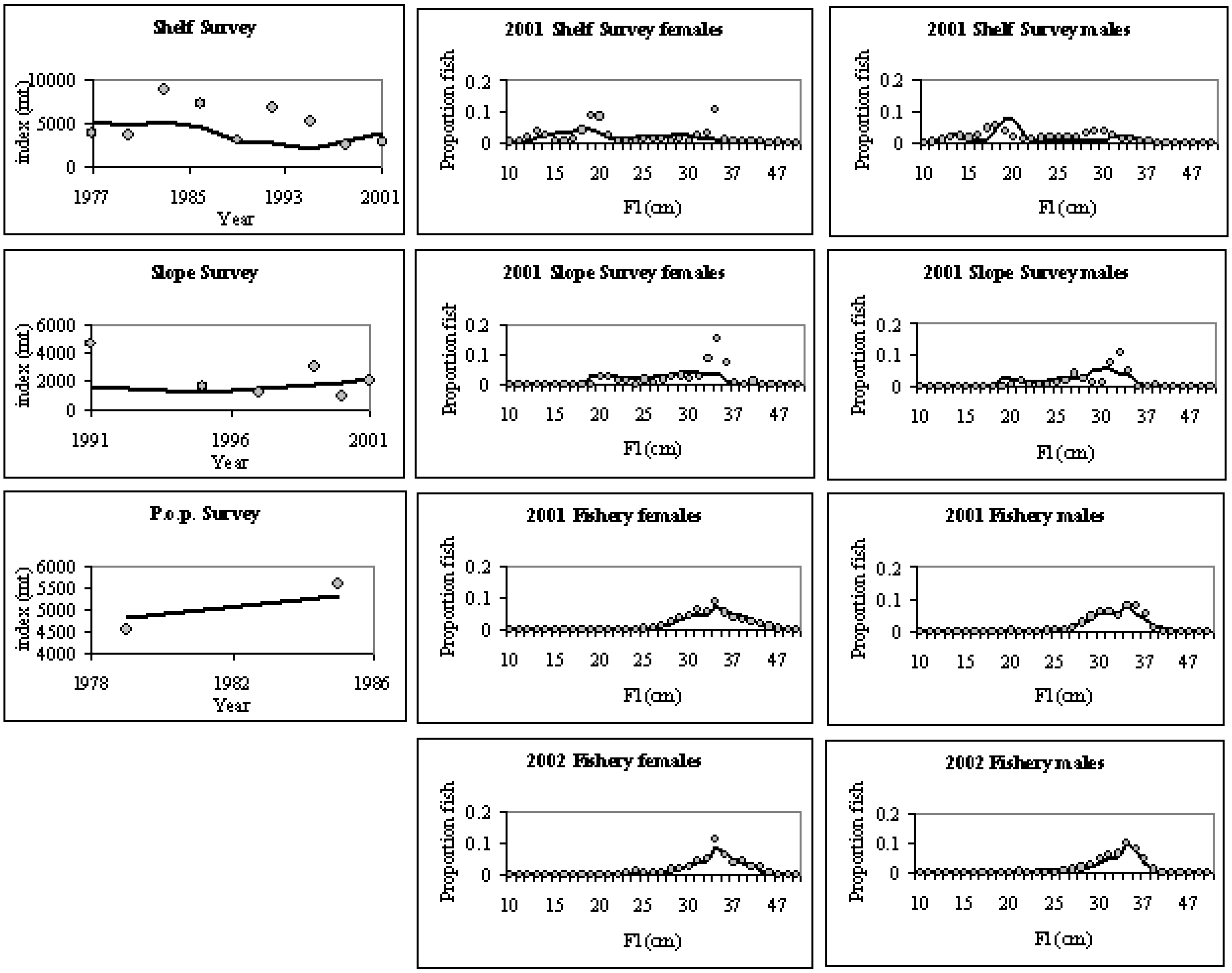


Figure 10. Fit of Model 6 estimates to survey indices and recent length compositions in the surveys and fishery. Lines connect model estimates, circles are data points.

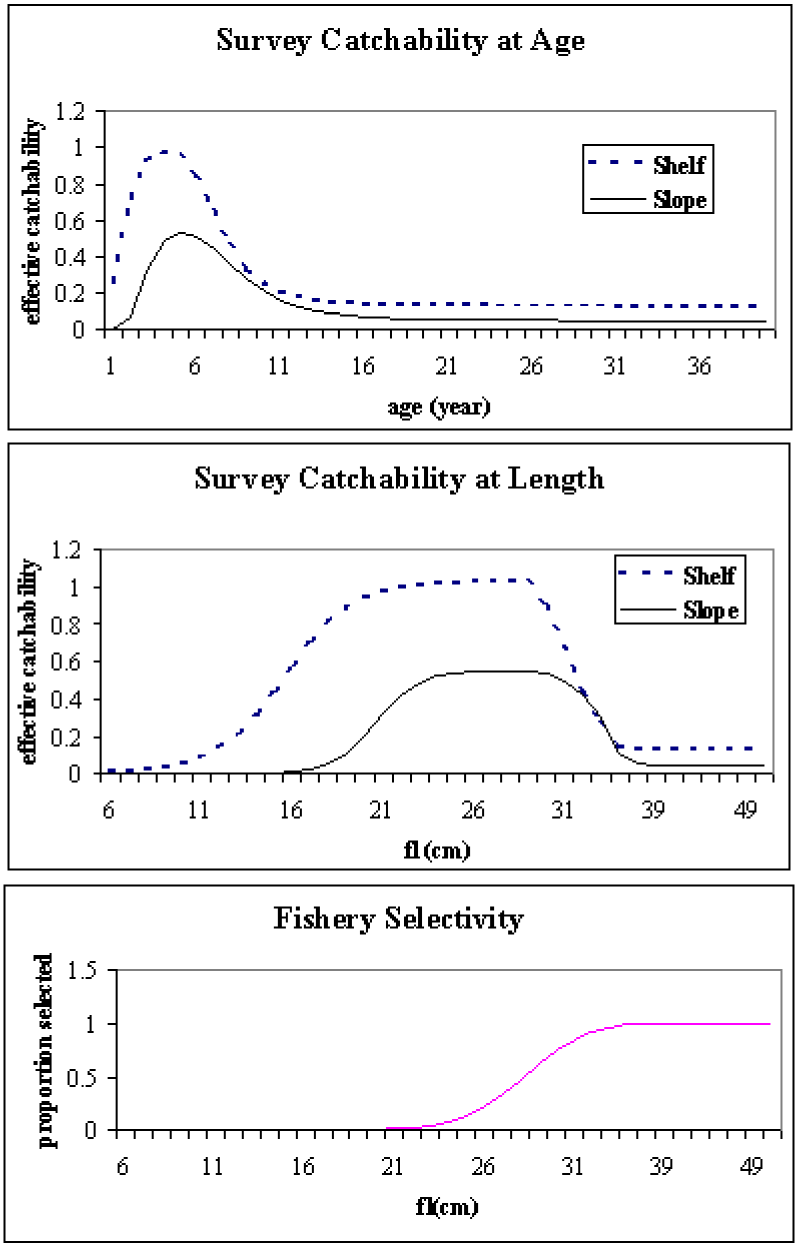


Figure 11. Model 6 estimated catchability at age (catchability at full selectivity times proportion selected) for females in the shelf and slope survey.

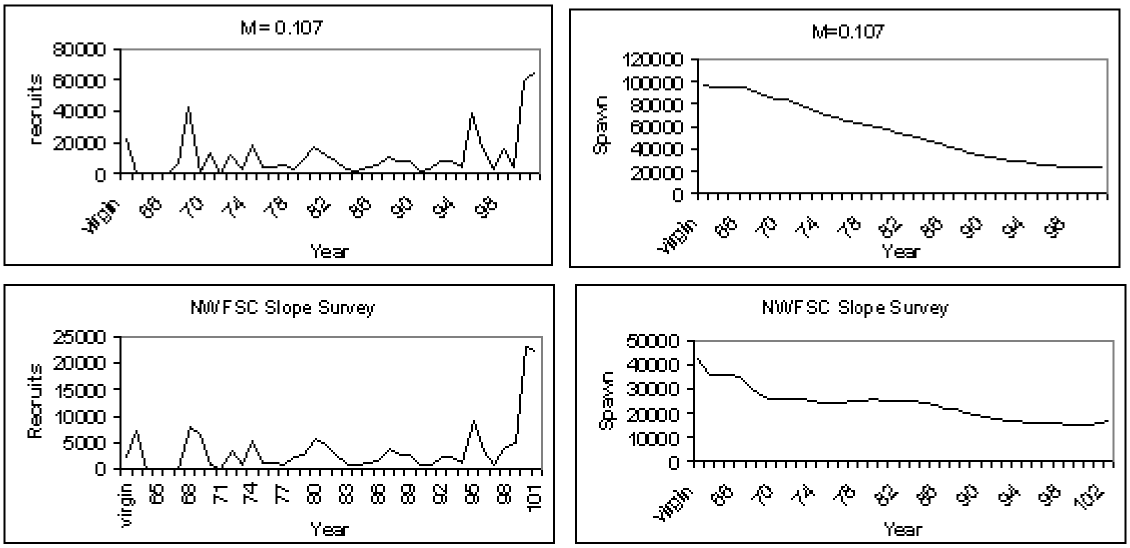


Figure12. Comparison of estimated recruitments and spawn over time in models with higher natural mortality (M) and including the NWFSC slope survey.

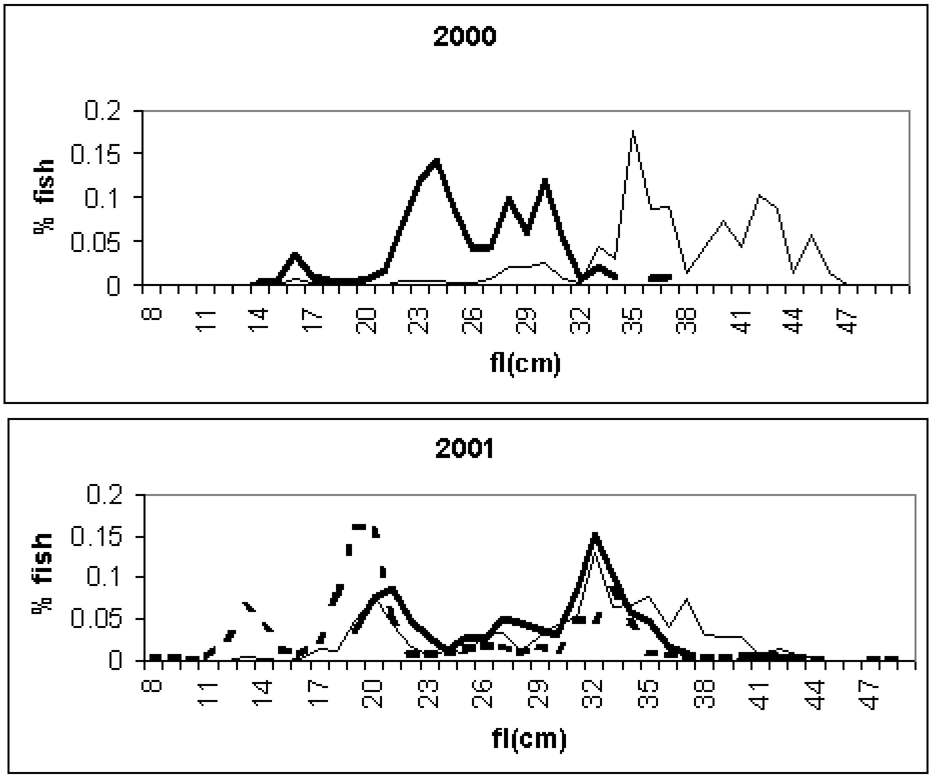


Figure 13. Comparison of length frequencies among recent surveys. Thin solid line is the NWFSC slope survey from 35^0 N latitude to the U.S.-Canadian border in 100-700 fm. Thick solid line is the AFSC slope survey from 34^0 30' N latitude to the U.S.-Canadian border in 100-700 fm. Thick dashed line is the AFSC shelf survey from 34^0 30' N latitude to the U.S.-Canadian border in 30-275 fm.

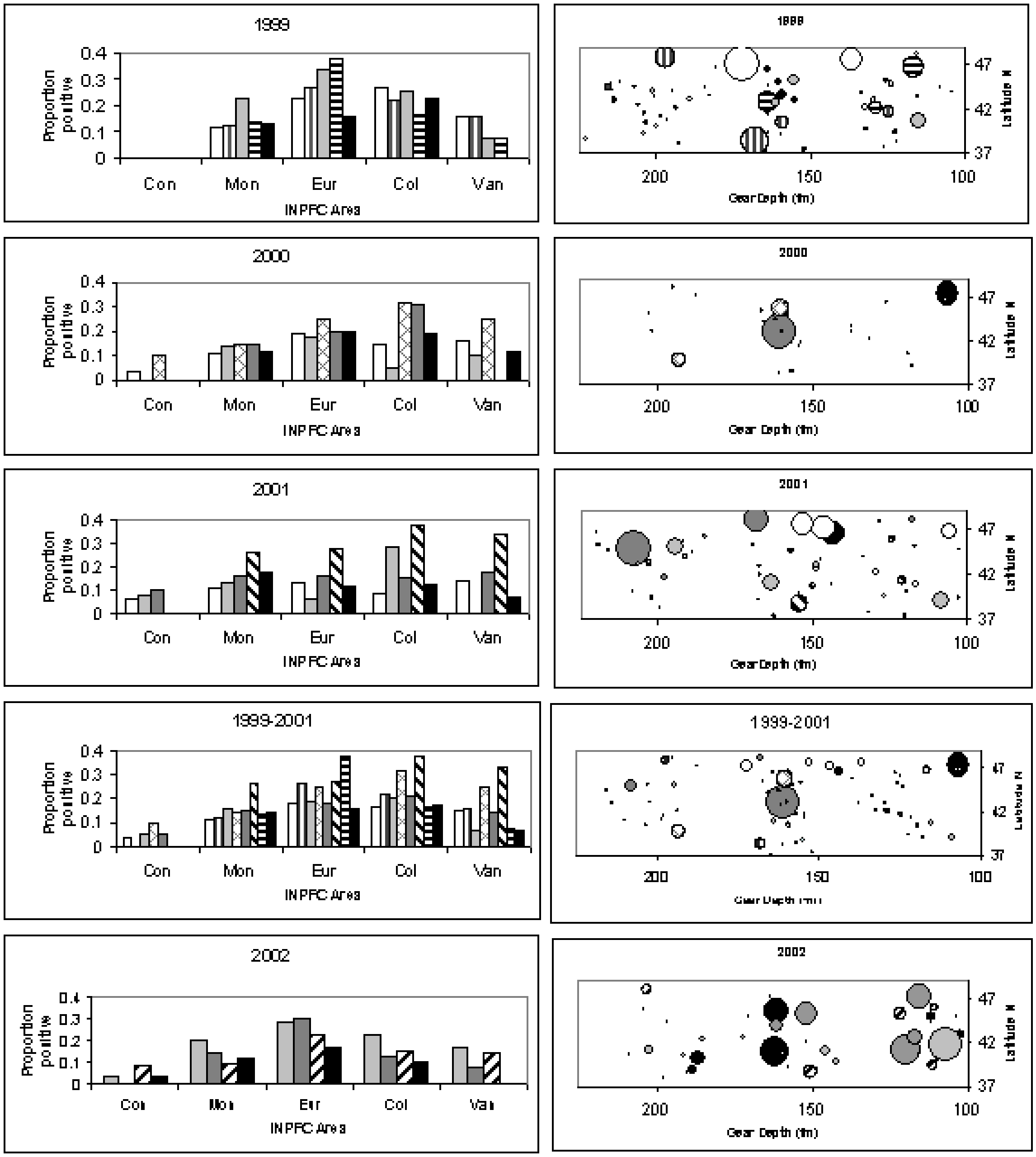


Figure 14 . Comparison of the AFSC and NWFSC darkblotched catches by boat. Empty bars and circles = AFSC Miller Freeman, other shades and patterns refer to specific boats participating in the NWFSC survey. In plots on the right, the location of the bubble indicates depth and latitude of the tow and size of bubble directly relates to maximum catch weight.

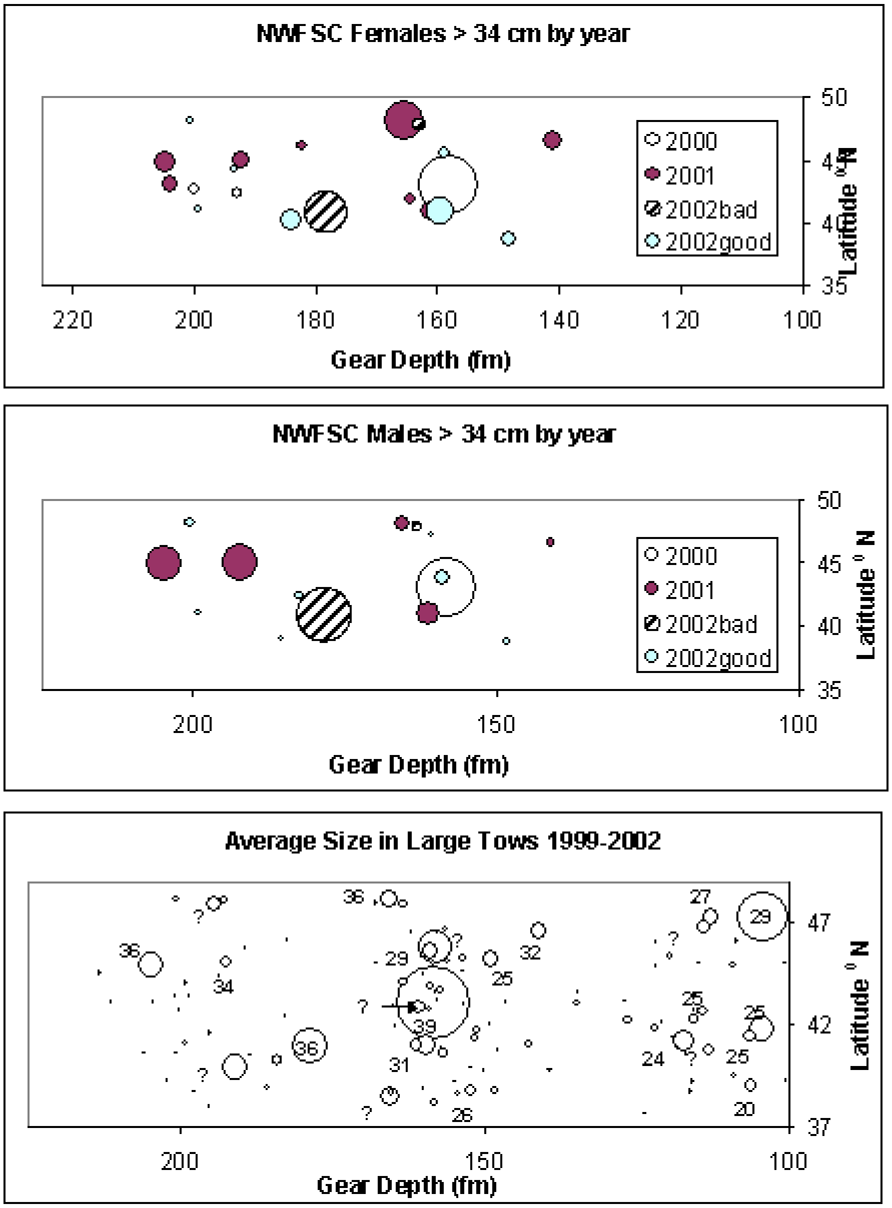


Figure 15 . Plots indicating location of larger darkblotched rockfish. In top two plots, position of bubble indicates tow location, while size of bubble directly relates to the percentage of fish greater than 34 cm for that year (percentages sum to 100 for each year). For 2002, bad versus good indicates use of tow in biomass index (bad = not used). In bottom plot, all tows are plotted by location and size of bubble is directly related to darkblotched catch weight. Larger catches are labeled with average fl (cm). Question marks mean the catch was not sampled for lengths.

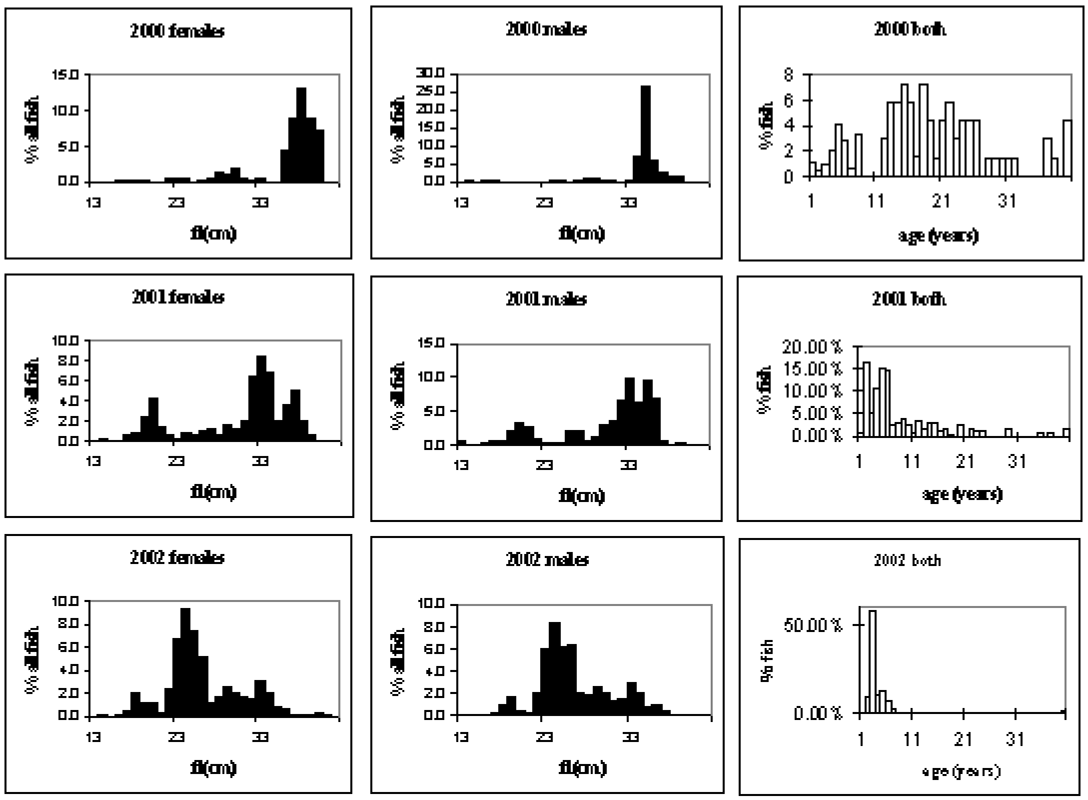


Figure 16. Comparison of recent NWFSC slope survey length and age compositions. Lengths after 32 cm are in 2-cm bins. Aging for 2001 and 2002 was done in 2002 and not used in the exploratory model.

```
revrev.csv       LOOP1:  8  LIKE: -2062.32227  DELTA LIKE:      .00014 ENDBIO:     8374.
newdis.r01
good.p03
```

2003 update stock synthesis input file

```
   1000.000000       .001000     BEGIN AND END DELTA F PER LOOP1
  4   .99              FIRST LOOP1 FOR LAMBDA & VALUE
  1.200                MAX VALUE FOR CROSS DERIVATIVE
  1 READ HESSIAN
newdis.h01
  1 WRITE HESSIAN
newdis.h01
   .000                MIN SAMPLE FRAC. PER AGE
  1  40   1  40        MINAGE, MAXAGE,  SUMMARY AGE RANGE
   63   102            BEGIN YEAR, END YEAR
 1      12  0  0  0    NPER, MON/PER
 1.00                  SPAWNMONTH
 1  3 NFISHERY, NSURVEY
 2 N SEXES
  10000.  REF RECR LEVEL
 0 MORTOPT
    .050000    .010000    1.000000 'Natural Mortalit'   0     1  0     .000000   .0000 !   1 NO PICK     .000      -1.      .0000000
    .050000    .010000    1.000000 'Male same as Fem'   0     1  0     .000000   .0000 !   2 NO PICK     .000      -1.      .0000000
 fishery    TYPE:  1
 7 SELECTIVITY PATTERN
  0   2   0   3   0   0   0  AGE TYPES USED
    1.00000      .02 'fishery Catch      '  ! # =  1 VALUE:         .00000
    1.00000      .30 'fishery Age        '  ! # =  2 VALUE:     -420.86479
    1.00000      .30 'fishery Length     '  ! # =  3 VALUE:     -547.58956
 1  1  0  0  0  0  SEL. COMPONENTS
  36.000000   20.000000   45.000000 'Con-Eur trans   '   0     1  0     .000000   .0000 !   3 NO PICK     .000      -1.      .0000000
    .001000     .000001    1.000000 'Con-Eur min     '   0     1  0     .000000   .0000 !   4 NO PICK     .000      -1.      .0000000
    .738752     .100000     .900000 'Con-Eur AL infl '   2     1  0     .000000   .0000 !   5 OK          .000  -73883.     .0000417
    .590532     .010000    4.000000 'Con-Eur AL slope'   2     1  0     .000000   .0000 !   6 OK          .000   -2312.     .0008258
   1.000000     .010000    1.000000 'Con-Eur final   '  -2     1  0     .000000   .0000 !   7 NO PICK     .000      -1.      .0000000
    .500000     .100000     .900000 'Con-Eur DL infl '  -2     1  0     .000000  2.0000 !   8 NO PICK     .000      -1.      .0000000
   1.000000     .010000    4.000000 'Con-Eur DL slope'  -2     1  0     .000000  2.0000 !   9 NO PICK     .000      -1.      .0000000
 TriSurv    TYPE:  2
 7 SELECTIVITY PATTERN
  0   5   0   6   0   0   0  AGE TYPES USED
   1.030787 -1  1  1 Q, QUANT, LOGERROR=1, BIO=1 or NUM=2
   1.030787     .001000   10.000000 'tri q           '   2     1  0     .000000   .1500 !  10 OK         -.001    -135.     .0099327
    .000000   -1.000000    1.000000 'TriSurv BioQ    '   0   -77  0     .000000   .0000 !  11 NO PICK     .000      -1.      .0000000
    1.00000      .16 'TriSurv biomass    '  ! # =  4 VALUE:        2.10838
    1.00000      .30 'TriSurv Age        '  ! # =  5 VALUE:     -183.19139
    1.00000      .30 'TriSurv Length     '  ! # =  6 VALUE:     -504.37675
 1  1  0  0  0  0  SEL. COMPONENTS
  28.000000   20.000000   45.000000 'TriSurv trans   '   0   -77  0     .000000   .0000 !  12 NO PICK     .000      -1.      .0000000
    .010000     .000001     .990000 'TriSurv min     '   0   -77  0     .000000   .0000 !  13 NO PICK     .000      -1.      .0000000
    .433664     .100000     .900000 'TriSurv AL infl '   2   -77  0     .000000   .0000 !  14 OK          .000   -9862.     .0002340
    .533696     .010000    4.000000 'TriSurv AL slope'   2   -77  0     .000000   .0000 !  15 OK          .000    -508.     .0033646
    .125682     .010000    1.000000 'TriSurv final   '   2   -77  0     .000000   .0000 !  16 OK          .000  -11668.     .0001337
    .100000     .100000     .900000 'TriSurv DL infl '   2   -77  0     .000000  2.0000 !  17 BOUND       .000      -1.      .0000000
   1.014031     .010000    4.000000 'TriSurv DL slope'   2   -77  0     .000000  2.0000 !  18 OK         -.001    -133.     .0103474
 slope su   TYPE:  3
 7 SELECTIVITY PATTERN
  0   8   0   9   0   0   0  AGE TYPES USED
    .551177 -1  1  1 Q, QUANT, LOGERROR=1, BIO=1 or NUM=2
    .551177     .100000    1.500000 'SlopeSurv Q     '   2   -77  0     .000000   .2500 !  19 OK         -.001    -107.     .0134225
    .000000   -1.000000    1.000000 'SlopeSurv BioQ  '   0   -77  0     .000000   .0000 !  20 NO PICK     .000      -1.      .0000000
    1.00000      .16 'slope survey index  '  ! # =  7 VALUE:       -2.70523
    1.00000      .30 'slope Surv Length   '  ! # =  8 VALUE:      -27.41682
    1.00000      .30 'slope surv age      '  ! # =  9 VALUE:     -362.91949
```

```
 1  1  0  0  0  0  SEL. COMPONENTS
  28.000000   20.000000   45.000000 'slopeS  trans   '   0   -91  0     .000000   .0000 !  21 NO PICK    .000      -1.      .0000000
    .001000     .000001     .990000 'slopeS  min     '   0   -91  0     .000000   .0000 !  22 NO PICK    .000      -1.      .0000000
    .665063     .100000     .900000 'slopeS  AL infl '   2   -91  0     .000000   .0000 !  23 OK         .000  -14490.     .0002177
    .877547     .010000    4.000000 'slopeS  AL slope'   2   -91  0     .000000   .0000 !  24 OK         .000    -195.     .0122575
    .079704     .010000    1.000000 'slopeS  final   '   2   -91  0     .000000   .0000 !  25 OK         .000   -3558.     .0004383
    .183048     .100000     .900000 'slopeS  DL infl '   2   -91  0     .000000  2.0000 !  26 OK         .000  -10059.     .0001731
   1.002938     .010000    4.000000 'slopeS  DL slope'   2   -91  0     .000000  2.0000 !  27 OK        -.001     -50.     .0363713
pop Surv   TYPE:  4
 7 SELECTIVITY PATTERN
  0   0   0  11   0   0   0  AGE TYPES USED
   1.281052 -1  1  1 Q, QUANT, LOGERROR=1, BIO=1 or NUM=2
   1.281052     .100000    1.500000 'SlopeSurv Q     '   2   -79  0     .000000   .1500 !  28 OK         .000     -31.     .0404522
    .000000   -1.000000    1.000000 'SlopeSurv BioQ  '   0   -79  0     .000000   .0000 !  29 NO PICK    .000      -1.      .0000000
    1.00000       .16 'pop Surv index      '  ! # = 10 VALUE:        3.15268
    1.00000       .30 'pop Surv Length     '  ! # = 11 VALUE:      -18.51930
 1  1  0  0  0  0  SEL. COMPONENTS
  28.000000   20.000000   45.000000 'Pop Surv trans  '   0   -79  0     .000000   .0000 !  30 NO PICK    .000      -1.      .0000000
    .001000     .000001     .990000 'Pop Surv min    '   0   -79  0     .000000   .0000 !  31 NO PICK    .000      -1.      .0000000
    .613920     .100000     .900000 'Pop Surv AL infl'   2   -79  0     .000000   .0000 !  32 OK         .000   -3244.     .0003429
   2.444989     .010000    4.000000 'Pop Surv AL slop'   2   -79  0     .000000   .0000 !  33 BAD DX2    .000      -1.     2.0000000
    .046910     .010000    1.000000 'Pop Surv final  '   2   -79  0     .000000   .0000 !  34 OK         .000   -7096.     .0002178
    .122024     .100000     .900000 'Pop Surv DL infl'   2   -79  0     .000000  2.0000 !  35 OK         .000   -7606.     .0003552
   1.260752     .010000    4.000000 'Pop Surv DL slop'   2   -79  0     .000000  2.0000 !  36 OK        -.001     -17.     .1769924
 1 AGEERR: 1: MULTINOMIAL,  0: S(LOG(P))=CONSTANT,  -1: S=P*Q/N
200.000 : MAX  N FOR MULTINOMIAL
 2 1=%CORRECT, 2=C.V., 3=%AGREE, 4=READ %AGREE @AGE
    .220000     .300000     .950000 'cv age @ 1 (MIN)'   0   -80  0     .000000   .0000 !  37 NO PICK    .000      -1.      .0000000
    .110000     .100000     .900000 'cv age @ 40(MAX)'   0   -80  0     .000000   .0000 !  38 NO PICK    .000      -1.      .0000000
   1.000000     .001000    4.000000 'POWER           '   0   -80  0     .000000   .0000 !  39 NO PICK    .000      -1.      .0000000
    .050000     .010000     .300000 'OLD DISCOUNT    '   0   -80  0     .000000   .0000 !  40 NO PICK    .000      -1.      .0000000
    .000000     .001000     .100000 '%MIS-SEXED      '   0   -80  0     .000000   .0000 !  41 NO PICK    .000      -1.      .0000000
 0 END OF EFFORT
 0 FIX n FMORTs
 0  MATURITY
 1  GROWTH: 1=CONSTANT, 2=MORT. INFLUENCE
 1.0000 40.0000  AGE AT WHICH L1 AND L2 OCCUR
 1 1=NORMAL, 2=LOGNORMAL
  11.650000   20.000000   40.000000 'FEMALE L1       '   0     1  0     .000000   .0000 !  42 NO PICK    .000      -1.      .0000000
  41.780000   40.000000   70.000000 'FEMALE LINF     '   0     1  0     .000000   .0000 !  43 NO PICK    .000      -1.      .0000000
    .163900     .010000     .300000 'FEMALE K        '   0     1  0     .000000   .0000 !  44 NO PICK    .000      -1.      .0000000
    .096000     .010000     .990000 'FEMALE CV1      '   0     1  0     .000000   .0000 !  45 NO PICK    .000      -1.      .0000000
    .071000     .010000     .990000 'FEMALE CV40     '   0     1  0     .000000   .0000 !  46 NO PICK    .000      -1.      .0000000
  10.660000   10.000000   30.000000 'MALE L1         '   0     1  0     .000000   .0000 !  47 NO PICK    .000      -1.      .0000000
  37.360000   20.000000   50.000000 'MALE LINF       '   0     1  0     .000000   .0000 !  48 NO PICK    .000      -1.      .0000000
    .211200     .100000     .400000 'MALE K          '   0     1  0     .000000   .0000 !  49 NO PICK    .000      -1.      .0000000
    .084000     .010000     .990000 'MALE CV1        '   0     1  0     .000000   .0000 !  50 NO PICK    .000      -1.      .0000000
    .042000     .010000     .299000 'MALE CV40       '   0     1  0     .000000   .0000 !  51 NO PICK    .000      -1.      .0000000
        0  DEFINE MARKET CATEGORIES
 0 ENVIRONMENTAL FXN:    [-INDEX]  [FXN TYPE(1-4)]  [ENVVAR USED]
 0 ESTIMATE N ENVIRON VALUES
 0 PENALTIES
 0 ENVIRONMENT EFFECT ON EXP(RECR)
12  STOCK-RECR
 1 1=B-H, 2=RICKER, 3=new B-H, 4=HOCKEY
 0 disabled option
     .00000      -.50 ' SPAWN-RECRUIT indiv'  ! # = 12 VALUE:     -261.91495
     .00000      -.20 ' SPAWN-RECRUIT mean '  ! # = 13 VALUE:   -21405.65533
    .192485     .001000   10.000000 'vir mult        '   0     1  0     .000000   .0000 !  52 NO PICK    .000      -1.      .0000000
    .999999     .500000     .999000 'B/H  S/R PARAM  '   0     1  0     .000000   .1000 !  53 NO PICK    .000      -1.      .0000000
    .196631     .010000   10.000000 'BACKG. RECRUIT  '   2     1  0     .000000   .0000 !  54 OK         .000 -231595.     .0000202
    .500000     .001000   10.000000 'rec sd          '   0     1  0     .000000   .0000 !  55 NO PICK    .000      -1.      .0000000
```

```
   .000000   -.200000    .200000 'RECR TREND     '  0     1  0     .000000  .0000 !  56 NO PICK    .000      -1.      .0000000
  1.000000    .500000   3.000000 'RECR. MULT.    '  0     1  0     .000000  .0000 !  57 NO PICK    .000      -1.      .0000000
-2 INIT AGE COMP
   .408256    .001000  10.000000 'RECRUIT 63     '  2    63  0     .000000  .0000 !  58 OK        -.001    -455.     .0191631
   .001000    .001000  10.000000 'RECRUIT 64     '  2    64  0     .000000  .0000 !  59 BOUND      .000      -1.     .0000000
   .001000    .001000  10.000000 'RECRUIT 65     '  2    65  0     .000000  .0000 !  60 BOUND      .000      -1.     .0000000
   .001000    .001000  10.000000 'RECRUIT 66     '  2    66  0     .000000  .0000 !  61 BOUND      .000      -1.     .0000000
   .397143    .001000  10.000000 'RECRUIT 67     '  2    67  0     .000000  .0000 !  62 OK         .003    -675.     .0640373
   .044185    .001000  10.000000 'RECRUIT 68     '  2    68  0     .000000  .0000 !  63 OK        -.003    -730.     .0368745
   .643323    .001000  10.000000 'RECRUIT 69     '  2    69  0     .000000  .0000 !  64 OK         .001    -818.     .1391260
   .024554    .001000  10.000000 'RECRUIT 70     '  2    70  0     .000000  .0000 !  65 OK        -.001    -953.     .1119117
   .001000    .001000  10.000000 'RECRUIT 71     '  2    71  0     .000000  .0000 !  66 BOUND      .000      -1.     .0000000
   .265735    .001000  10.000000 'RECRUIT 72     '  2    72  0     .000000  .0000 !  67 OK         .001   -1339.     .0217938
   .055096    .001000  10.000000 'RECRUIT 73     '  2    73  0     .000000  .0000 !  68 OK        -.001   -1461.     .0164369
   .390743    .001000  10.000000 'RECRUIT 74     '  2    74  0     .000000  .0000 !  69 OK         .000   -1535.     .0066685
   .088153    .001000  10.000000 'RECRUIT 75     '  2    75  0     .000000  .0000 !  70 OK         .000   -2123.     .0025559
   .086457    .001000  10.000000 'RECRUIT 76     '  2    76  0     .000000  .0000 !  71 OK         .000   -2834.     .0014828
   .090459    .001000  10.000000 'RECRUIT 77     '  2    77  0     .000000  .0000 !  72 OK         .000   -2519.     .0022425
   .124394    .001000  10.000000 'RECRUIT 78     '  2    78  0     .000000  .0000 !  73 OK         .000   -1735.     .0044479
   .204452    .001000  10.000000 'RECRUIT 79     '  2    79  0     .000000  .0000 !  74 OK         .000   -1658.     .0041986
   .362370    .001000  10.000000 'RECRUIT 80     '  2    80  0     .000000  .0000 !  75 OK         .000   -1452.     .0044705
   .288872    .001000  10.000000 'RECRUIT 81     '  2    81  0     .000000  .0000 !  76 OK         .000   -1672.     .0029140
   .172558    .001000  10.000000 'RECRUIT 82     '  2    82  0     .000000  .0000 !  77 OK         .000   -2817.     .0009226
   .053687    .001000  10.000000 'RECRUIT 83     '  2    83  0     .000000  .0000 !  78 OK         .000   -5795.     .0003402
   .047861    .001000  10.000000 'RECRUIT 84     '  2    84  0     .000000  .0000 !  79 OK         .000   -5932.     .0003957
   .073444    .001000  20.000000 'RECRUIT 85     '  2    85  0     .000000  .0000 !  80 OK         .000   -6092.     .0003415
   .093057    .001000  10.000000 'RECRUIT 86     '  2    86  0     .000000  .0000 !  81 OK         .000   -4504.     .0007325
   .188633    .001000  10.000000 'RECRUIT 87     '  2    87  0     .000000  .0000 !  82 OK         .000   -3112.     .0011654
   .128158    .001000  10.000000 'RECRUIT 88     '  2    88  0     .000000  .0000 !  83 OK         .000   -4122.     .0009172
   .128296    .001000  10.000000 'RECRUIT 89     '  2    89  0     .000000  .0000 !  84 OK         .000   -6046.     .0000717
   .034556    .001000  10.000000 'RECRUIT 90     '  2    90  0     .000000  .0000 !  85 OK         .000  -11299.     .0001583
   .047313    .001000  10.000000 'RECRUIT 91     '  2    91  0     .000000  .0000 !  86 OK         .000   -8816.     .0003133
   .109931    .001000  10.000000 'RECRUIT 92     '  2    92  0     .000000  .0000 !  87 OK         .000   -5937.     .0005297
   .113815    .001000  10.000000 'RECRUIT 93     '  2    93  0     .000000  .0000 !  88 OK         .000   -4932.     .0005442
   .057729    .001000  10.000000 'RECRUIT 94     '  2    94  0     .000000  .0000 !  89 OK         .000   -4962.     .0004019
   .456238    .001000  10.000000 'RECRUIT 95     '  2    95  0     .000000  .0000 !  90 OK         .001   -1311.     .0038819
   .194218    .001000  10.000000 'RECRUIT 96     '  2    96  0     .000000  .0000 !  91 OK         .000   -1726.     .0014605
   .040844    .001000  10.000000 'RECRUIT 97     '  2    97  0     .000000  .0000 !  92 OK         .000   -6114.     .0002510
   .185031    .001000  10.000000 'RECRUIT 98     '  2    98  0     .000000  .0000 !  93 OK         .000   -2475.     .0014476
   .057182    .001000  10.000000 'RECRUIT 99     '  2    99  0     .000000  .0000 !  94 OK         .000   -1476.     .0008786
   .689791    .001000  10.000000 'RECRUIT 98     '  2   100  0     .000000  .0000 !  95 OK         .002    -147.     .0298788
   .704068    .001000  10.000000 'RECRUIT 99     '  2   101  0     .000000  .0000 !  96 OK         .002     -51.     .0467502
   .124646    .001000  10.000000 'RECRUIT 99     '  0   102  0     .000000  .0000 !  97 NO PICK    .000      -1.     .0000000
 CONVERGENCE
LIKE CHANGE:     .0001  MAX PARM CHANGE:  63    RECRUIT 68       .08882
CONVERGENCE PATH (LIKE, BIOMASS)
 -2062.3250     8418.3
 -2062.3250     8418.1
 -2062.3250     8417.9
 -2062.3246     8405.0
 -2062.3242     8394.1
 -2062.3235     8433.0
 -2062.3224     8340.5
 -2062.3223     8374.2
 NUMBER OF ESTIMATED PARAMETERS =          60
 N CATCHES WITH F ESTIMATED     =          40
 N SURV OBS WITH EMPH > 0.001   =          17
 N EFFORT OBS WITH EMPH > 0.001 =           0
 N COMPOSITION OBS WITH NAGES>1 =          60
 N COMPOSITION BINS WITH DATA   =        2943
```

```
PARAMETERS ON BOUNDS
 59   .00100    RECRUIT 64
 60   .00100    RECRUIT 65
 61   .00100    RECRUIT 66
 66   .00100    RECRUIT 71
 17   .10000    TriSurv DL infl
```

```
# Rebuilding input file for ending year 2000
darkblotched rockfish - fitted recruits only
# Number of sexes
2
# Age range to consider (minimum age; maximum age)
1 40
# Number of fleets to consider
1
# First year of the projection
2000
# Year declared overfished
2001
# Is the maximum age a plus-group (1=Yes;2=No)
1
# Generate future recruitments using historical recruitments (1), historical recruits/spawner (2), or a stock-recruitment (3)
1
# Constant fishing mortality (1) or constant Catch (2) projections
1
# Pre-specify the year of recovery (or -1) to ignore
-1
# Fecundity-at-age
#  3  4  5  6  7  8  9 10
0,0,0,0.0005,0.0059,0.0386,0.1386,0.3234,0.5741,0.8582,1.1487,1.4279,1.6874,1.9228,2.1336,2.321,2.4857,2.63,2.7557,2.864
8,2.9591,3.0406,3.111,3.1712,3.2228,3.2669,3.3047,3.3369,3.3644,3.3878,3.4078,3.4248,3.4393,3.4516,3.462,3.4709,3.4785,3
.4849,3.4904,3.5136
# Age specific information (Females then males), M, weight, selectivity and numbers
# Females
0.0518,0.1358,0.2632,0.3774,0.4724,0.5598,0.6453,0.729,0.8095,0.8852,0.955,1.0182,1.0746,1.1246,1.1685,1.2068,1.24,1.268
7,1.2935,1.3148,1.333,1.3487,1.3621,1.3736,1.3833,1.3917,1.3987,1.4048,1.4099,1.4143,1.418,1.4212,1.4239,1.4261,1.4281,1
.4297,1.4311,1.4323,1.4333,1.4375
0.0012  0.0041  0.0291  0.1387  0.3583  0.5937  0.7651  0.8673  0.9238  0.9546  0.9718  0.9817  0.98760.9912
        0.9936  0.9951  0.9961  0.9968  0.9974  0.9977  0.998   0.9982  0.9984  0.9985  0.9986  0.99870.9988
        0.9988  0.9989  0.9989  0.9989  0.999   0.999   0.999   0.999   0.999   0.999   0.999   0.99910.9991
# Males
0.0435,0.1173,0.227,0.3327,0.4232,0.5018,0.5743,0.6419,0.7021,0.754,0.7983,0.8358,0.8674,0.8937,0.9155,0.9335,0.9483,0.9
604,0.9703,0.9784,0.9851,0.9904,0.9948,0.9983,1.0012,1.0035,1.0054,1.0069,1.0081,1.0091,1.0099,1.0106,1.0111,1.0116,1.0
119,1.0122,1.0124,1.0126,1.0128,1.0133
0.0011  0.0032  0.0212  0.1063  0.302   0.5391  0.7246  0.8385  0.9013  0.9357  0.9553  0.9674  0.97520.9804
        0.984   0.9866  0.9884  0.9898  0.9908  0.9916  0.9921  0.9926  0.9929  0.9932  0.9934  0.99360.9937
        0.9938  0.9939  0.994   0.994   0.9941  0.9941  0.9941  0.9942  0.9942  0.9942  0.9942  0 . 9 9 4 2
        0.9943
# Age specific information (Females then males), natural mortality and numbers at age
# Females
0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
3449    272     837     175     781     1672    185     309     248     88      53      161     133
160     65      42      22      20      54      76      81      39      21      13      12      11
44      6       25      0       2       48      3       25      0       0       0       17      7
        97
# Males
0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
3449    272     837     175     785     1692    189     318     257     91      55      169     1   3   9
        168     68      44      24      22      57      80      84      41      22      14      1       2
        11      45      6       26      0       2       49      3       26      0       0       0
```

	18	7	99											

Initial age-structure (for Tmin)

3449	272	837	175	781	1672	185	309	248	88	53	161	1	3	3
	160	65	42	22	20	54	76	81	39	21	13	1		2
	11	44	6	25	0	2	48	3	25	0	0	0		
	17	7	97											
3449	272	837	175	785	1692	189	318	257	91	55	169	1	3	9
	168	68	44	24	22	57	80	84	41	22	14	1		2
	11	45	6	26	0	2	49	3	26	0	0	0		
	18	7	99											

Year for Tmin Age-structure

2000

Number of simulations

1000

Recruitment and Spanwer biomasses

Number of historical assessment years

39

Historical data: Year, Recruitment, Spawner biomass, Used to compute B0, Used to project based
on R, Used to project based on R/S

1950	1671	30780	1	0	0
1963	4083	29881	0	0	0
1964	10	29753	0	0	0
1965	10	29702	0	0	0
1966	10	29439	0	0	0
1967	3971	24999	0	0	0
1968	442	21868	0	0	0
1969	6433	19515	0	0	0
1970	246	19486	0	0	0
1971	10	19413	0	0	0
1972	2657	19104	0	0	0
1973	551	18634	0	0	0
1974	3907	17966	0	0	0
1975	882	17556	0	0	0
1976	865	17509	0	0	0
1977	905	17490	0	0	0
1978	1244	17746	0	0	0
1979	2045	17936	0	0	0
1980	3624	17514	0	0	0
1981	2889	17490	0	0	0
1982	1726	17364	0	0	0
1983	537	16462	0	1	1
1984	479	15824	0	1	1
1985	734	14820	0	1	1
1986	931	13426	0	1	1
1987	1886	12734	0	1	1
1988	1282	10937	0	1	1
1989	1283	9889	0	1	1
1990	346	9111	0	1	1
1991	473	7877	0	1	1
1992	1099	7003	0	1	1
1993	1138	6618	0	1	1
1994	577	5759	0	1	1
1995	4562	5234	0	1	1
1996	1942	4829	0	1	1
1997	408	4398	0	1	1
1998	1850	3946	0	1	1
1999	572	3439	0	1	1
2000	6898	3424	0	1	1

Number of years with pre-specified catches

4

Catches for years with pre-specified catches

2000 226

2001 171

2002 129
2003 129
Number of future recruitments to override
0
Process for overiding (-1 for average otherwise index in data list)
Which probability to product detailed results for (1=0.5,2=0.6,etc.)
1
Steepness and sigma-R and auto-correlations
0.5 0.5 0.0
Target SPR rate (FMSY Proxy)
0.500000
Target SPR information: Use (1=Yes) and power
0 1
Discount rate (for cumulative catch)
0.100000
Truncate the series when 0.4B0 is reached (1=Yes)
0
Set F to FMSY once 0.4B0 is reached (1=Yes; 2=Apply 40:10 rule after recovery)
0
Percentage of FMSY which defines Ftarget
0.900000
Maximum possible F for projection (-1 to set to FMSY)
2
Conduct MacCall transition policy (1=Yes)
0
Definition of recovery (1=now only;2=now or before)
2
Results for rec probs by Tmax (1) or 0.5 prob for various Ttargets (2) or do a sustainability analysis (3)
1
Produce the risk-reward plots (1=Yes)
0
Calculate coefficients of variation (1=Yes)
0
Number of replicates to use
20
First Random number seed
-89102
Conduct projections for multiple starting values (0=No;else yes)
0
File with multiple parameter vectors
mcmc.prj
Number of parameter vectors
100
User-specific projection (1=Yes); Output replaced (1->6)
0 6
Catches and Fs (Year; 1/2 (F or C); value); Final row is -1
2004 2 0
2007 2 0
-1 -1 -1
Split of Fs
2000 1
-1 1
Proportion of target B0
0.400000