Status of the blackgill rockfish, *Sebastes melanostomus*, in the Conception and Monterey INPFC areas for 2011

John C. Field and Don Pearson
Groundfish Analysis Team
Fisheries Ecology Division,
Southwest Fisheries Science Center
110 Shaffer Rd. Santa Cruz CA 95060
John.Field@noaa.gov

October 2011

Table of Contents

B. Executive Summary

B.1 Stock

This assessment reports the status of blackgill rockfish (*Sebastes melanostomus*) for the Conception and Monterey INPFC areas, using data from 1950 through 2010. The resource is modeled as a single stock. Although the distribution of blackgill extends north to at least Canadian waters and south into Mexican waters, the species becomes exceedingly rare north of Cape Mendocino, CA, and data from Mexican waters are unavailable.

B.2 Catches

Catches of blackgill rockfish are largely (approximately 65%) derived from southern California (south of Point Conception), where the species is the target of both directed and incidental catches from fixed gear (hook and line, and historically, gillnet). Landings of this species are estimated to have risen slowly from very low levels (approximately 20-30 tons) in the 1950s, and then climbed rapidly in the 1970s and 1980s as improvements in technology and declines in other target species led fishermen to target blackgill in deeper, and more offshore, waters. Landings peaked in the mid-1980s at just over 1000 tons, but have declined to a value of approximately 100 to 150 tons in recent years. Catch estimates from 1980 through 2010 were extracted from the California Cooperative Groundfish Survey (CalCOM) database, and historical catches from 1950 to 1980 are based on catch reconstruction efforts reported in Ralston et al. (2010). Fleets in this model are represented by southern California fixed gear, central California fixed gear, and central California trawl. Northern California catches are not included in the base model.

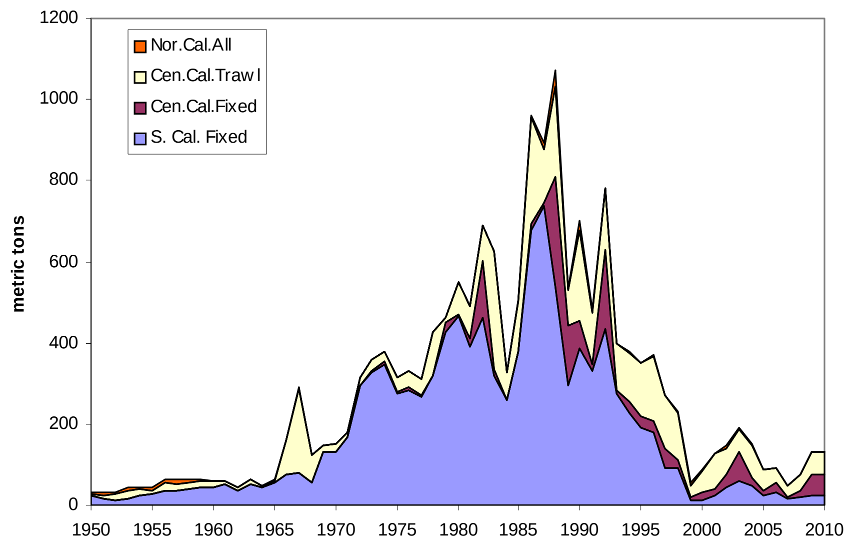


Figure B.1: Estimated catches by fleet from 1950-2010

Table B1: Recent commercial catches (mt, including discards) by fleet

	South fixed	Central fixed	Central trawl
2001	24.0	14.9	89.1
2002	48.2	33.1	82.9
2003	59.1	75.0	55.7
2004	48.8	20.9	81.9
2005	23.8	12.3	77.5
2006	31.0	24.5	74.9
2007	14.6	6.2	34.3
2008	20.2	17.3	41.7
2009	22.9	53.0	60.9
2010	38.0	49.1	64.5

B.3 Data and Assessment

This assessment uses the Stock Synthesis 3 (SS3) integrated length and age structured model, and includes both length frequency and conditional length-at-age data from all three commercial fisheries. The model incorporates the results of new ageing efforts and life history studies (maturity, fecundity), and estimates growth internally based on the use of over 1600 new age data points, which are incorporated as conditional age-at-length data. The model also includes survey indices and length data from the (historical) triennial trawl survey and NWFSC slope (1999-2002) and combined shelf and slope (2003-2010) bottom trawl survey. Triennial survey data are used from 1995-2004 only as the survey did not sample deeper waters, where most blackgill are encountered, prior to 1995. The base case model assumes a steepness of 0.76 and a natural mortality rate of 0.063 (females) and 0.065 (males). Model results are highly sensitive to the assumed value for M. Due to the very slow growth, relative scarcity of age data, and high degree of ageing error, annual recruitments are not estimated for this stock, rather recruitment is assumed to be deterministic.

B.4 Stock biomass

The assessment uses a non-proportional egg-to-weight relationship, and the spawning output is expressed in millions of larvae. The model suggests that the spawning output of blackgill rockfish was at high levels in the mid-1970s; began to decline steeply in the late 1970s through the 1980s, consistent with the rapid development and growth of the targeted fishery; and reached a low of approximately 18% of the unfished level in the mid- 1990s. Since that time, catches have declined and spawning output has increased such that the current estimated larval production is 30% of the unfished level.

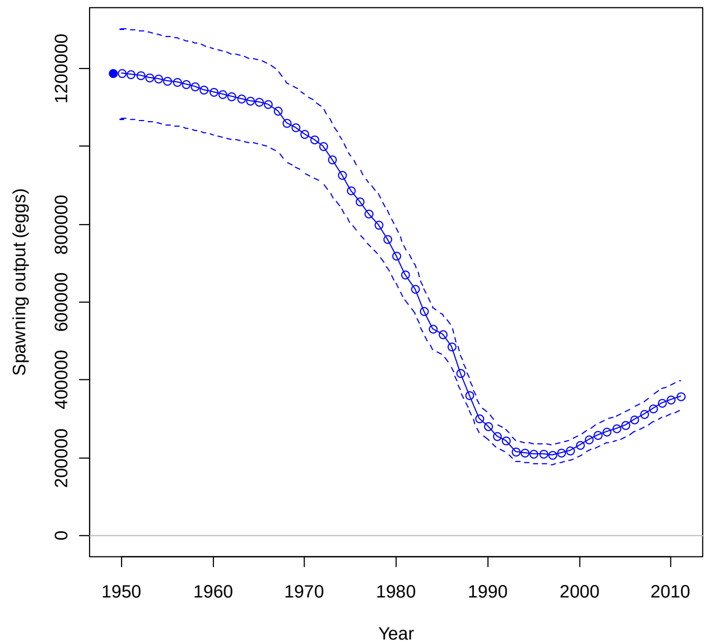


Figure B.2: Estimated spawning output (millions of larvae) from base model

Table B.2: Recent trends in blackgill rockfish spawning output, recruitment and depletion

	Summary Biomass	Spawning output (larvae 10^9)	CV of Spawning output	Depletion	Recruits (x 10^3)
2001	5726	247	0.058	0.208	1748
2002	5832	258	0.057	0.217	1771
2003	5917	268	0.057	0.226	1791
2004	5961	276	0.057	0.233	1805
2005	6028	286	0.056	0.241	1822
2006	6141	299	0.056	0.252	1843
2007	6245	312	0.055	0.263	1863
2008	6381	328	0.054	0.276	1884
2009	6489	341	0.054	0.287	1903
2010	6546	351	0.054	0.295	1915
2011	6585	359	0.054	0.302	1925

B.5 Recruitment

In the assessment, the Beverton-Holt model was used to describe the stock-recruitment relationship. The log of the unexploited recruitment level was treated as an estimated parameter; recruits were taken deterministically from the stock-recruit curve. Recruitment deviations were not estimated, as the lack of obvious cohorts in either age or length data and the high degree of ageing uncertainty make plausible estimates unlikely. The estimated recruitment is projected to be at relatively high levels due to the fixed value of steepness; this trend, however, is consistent with the trends from the survey data.

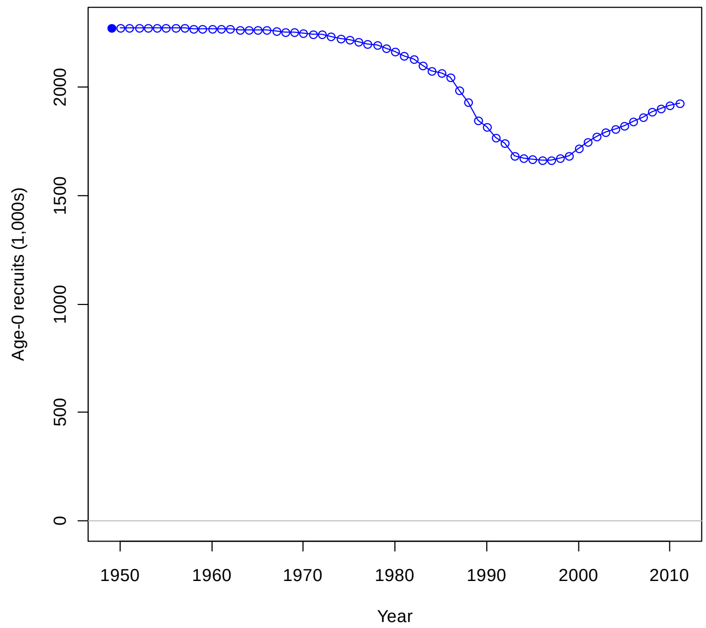


Figure B.3: Estimated number of recruits from base model (deterministic)

B.6 Reference Points

The unfished larval production was estimated to be 1.19 trillion larvae, corresponding to a total (summary) biomass of 12,927 tons (within a model estimated range of 11,836-14,019 tons). The target stock size of 40% of the unfished level is associated with a summary biomass of 7,576 tons and a yield of 192 tons (comparable, but slightly higher than recent catches). Estimated maximum yields vary somewhat under the SPR and MSY estimates, although the summary biomass and relative spawning output associated with MSY level catches are considerably lower than target (and, in fact, overfishing) thresholds.

Table B3: Key reference points for blackgill rockfish

		~95% Confidence Limits	
Unfished Stock	Estimate	Lower	Upper
Summary (1+) Biomass	12927.2	11836	14019
Spawning Output	1.19E+06	1049519	1326081
Equilibrium recruitment	2275.16	2186	2364

	Yield reference Points		
	$SSB_{40\%}$	SPR proxy	MSY est.
SPR	0.447	0.500	0.273
Exploitation rate	0.025	0.022	0.044
Yield	192	177	222
Spawning output	475120	542994	249849
Summary biomass	7576	8201	5063
SSB/SSB_0	0.400	0.457	0.210

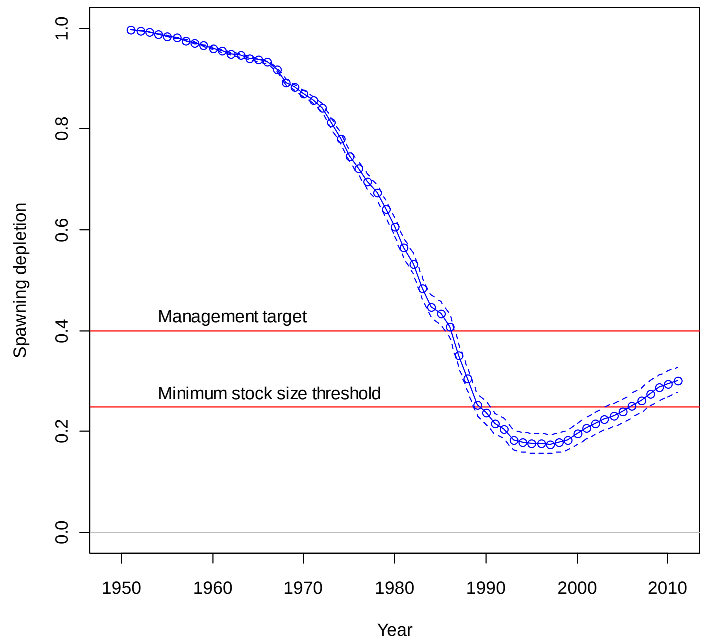


Figure B.4: Estimated relative depletion from base model

B.7 Exploitation Status

The abundance of blackgill rockfish is estimated to have declined below target levels by the late 1980s and below the current minimum stock size threshold (MSST) of 25% of the unfished level in 1990. The model estimated that the stock increased back above this level recently, in 2006, and continues to be headed in an upward trajectory. The base model estimates recent SPR rates variable but very close to the target levels (e.g. 0.62 in 2008, approximately 0.46 in 2009, and 2010). Exploitation rates are estimated to have ranged from 1.2 to 2.3% over recent years.

Table B.4: Recent catches, estimated SPR and relative exploitation rates

	Catch (mt)	SPR	Expl. Rate
2001	128	0.386	0.026
2002	164	0.333	0.033
2003	190	0.303	0.038
2004	152	0.365	0.030
2005	114	0.445	0.022
2006	130	0.415	0.025
2007	55	0.646	0.010
2008	79	0.560	0.015
2009	137	0.424	0.025
2010	152	0.404	0.027

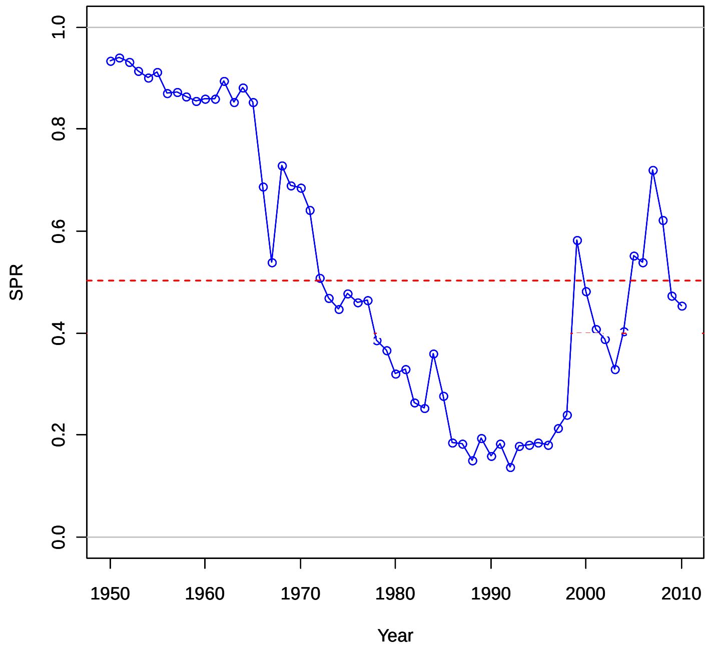


Figure B.5: Time series of estimated SPR rate for the base case model.

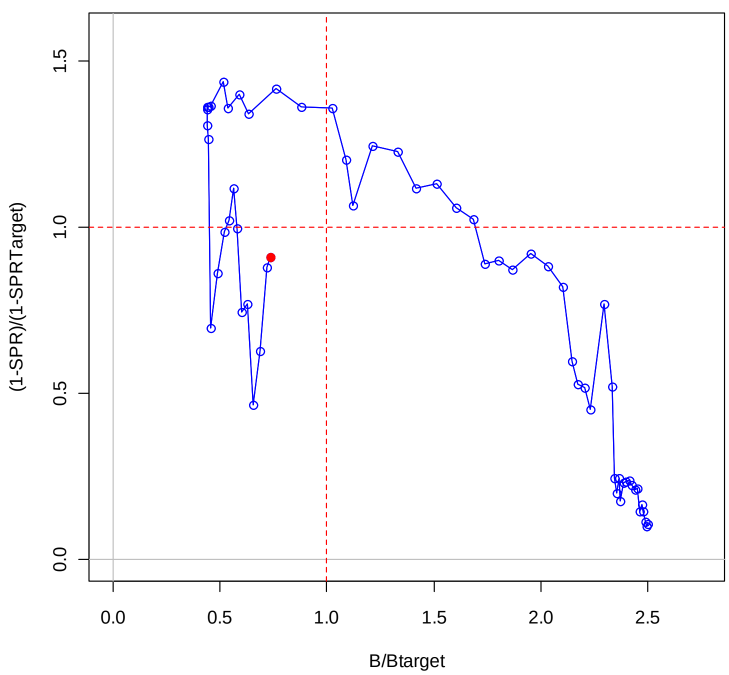


Figure B.6: Phase plot of relative depletion against estimated SPR rate

B.8 Management performance

Estimated total catches (landings plus discards) have been well below ACL and OFL levels for the past decade, typically less than 50% of the adopted levels.

Table B.5: Recent catches relative to OFL (ABC) and ACL (OY) targets for recent years.

	Catch	ACL/OY	ABC/OFL	% of ACL/OY	% of ABC/OFL
2001	128	306	343	0.42	0.37
2002	164	306	343	0.54	0.48
2003	190	306	343	0.62	0.55
2004	152	306	343	0.50	0.44
2005	114	306	343	0.37	0.33
2006	130	306	343	0.43	0.38
2007	55	292	292	0.19	0.19
2008	79	292	292	0.27	0.27
2009	137	282	282	0.48	0.48
2010	152	282	282	0.54	0.54
2011		279	282		
2012		275	282		

B.9 Unresolved problems and major uncertainties

This assessment is not as data rich as an age structure model would ideally be. Catch data are generally reliable for most of the time period, although there is significant uncertainty in catch data prior to the early 1980s. Ageing is very difficult for this species, which appears to have highly variable size at age, as well as apparent regional differences in growth rates and potentially other life history traits. The lack of a reliable, long term, fishery independent survey index that reflects abundance from the entire range of the stock is problematic. Specifically, the implementation of the Cowcod Conservation Areas (CCAs) in the southern California Bight presents current and future challenges to interpretation of both fishery and survey data.

As the uncertainty estimates produced by the model do not capture the true uncertainty associated with derived values, we explored the use of the delta method, which better accounts for the uncertainty associated with fixed (e.g. assumed to be "known") parameters. Details are reported in the assessment, but in general the results showed that natural mortality and growth parameters comprised the greatest contribution to the model uncertainty. The total estimated CV of the ending year larval productivity using the Delta method is approximately 0.28, in contrast to the model mean CV of 0.05 that is based solely on the contributions of the estimated parameters to the overall uncertainty. The former value is a far more appropriate estimate of the actual uncertainty in the model.

B.10 Forecast of model results and decision table

The base model was projected forward 12 years, with catches in the first two years (2011-2012) based on the currently adopted ACLs and subsequent harvests based on the 40:10 harvest rate reduction to the default SPR of 0.50. Under this scenario, the base model suggests that the stock will continue to increase at a relatively constant rate from the current depletion of 0.30 to 0.37 by 2022.

The STAT and STAR Panel agreed that the true natural mortality rate is the greatest source of uncertainty for this stock. Sensitivity to the assumed natural mortality was evaluated based on likelihood profiles, and scenarios designed to bracket uncertainty (alternative states of nature) were based on the (transformed) standard deviations from a prior on natural mortality. Although the scenarios represent plus or minus one standard deviation on the point estimate for M, which should theoretically encompass more than 50% of the uncertainty in the model, it was also recognized that there are additional sources of uncertainty in the model besides M.

Consistent with what intuition might suggest, the low M scenario is considerably more pessimistic (2011 depletion of 0.22), while the high M scenario is considerably more optimistic (2011 depletion of 0.42). The decision table itself is presented as Table B6. The catch streams under the alternative states of nature are substantially different, with the 2013 catch under the pessimistic scenario (low M), slightly over half of the projected (under 40:10) catch under the base model. Spawning biomass is projected to increase under all combinations of catch streams and states of nature.

Table B.6: Projections of base model summary biomass, larval output, depletion, recruitment, the ACL (based on the 40:10 reduction) and the OFL (based on SPR 0.5)

	Summary Biomass	Larval prod ($x10^9$)	Projected depletion	Recruit ($x\ 10^3$)	ACL	OFL
2011	6585	359	0.302	1925	279	279
2012	6510	358	0.302	1924	275	275
2013	6438	357	0.301	1922	87	130
2014	6525	368	0.310	1935	91	134
2015	6606	379	0.319	1947	95	137
2016	6683	390	0.328	1958	98	140
2017	6755	399	0.336	1968	101	143
2018	6823	409	0.344	1978	104	146
2019	6888	418	0.352	1986	106	148
2020	6950	426	0.359	1994	109	150
2021	7010	434	0.365	2001	111	152
2022	7066	441	0.372	2007	113	154

B.11 Research and Data needs

Age estimates are highly uncertain, and this species has proven very difficult to age. Conducting cross reads with other laboratories, as well as consideration of alternative age validation and bias evaluation methods, are important factors for future efforts.

Histology studies are ongoing and will help to refine both the maturity curve and the degree to which maturity may vary as a function of size, age and/or latitude.

Despite considerable investment in catch reconstruction efforts, historical catches remain uncertain for this stock due to the likely spatial patterns of fishery development for this species (a deeply distributed species generally encountered in offshore waters). Efforts to analyze spatially explicit historical catch data are ongoing.

A large fraction of blackgill habitat is currently closed to both fishing and survey effort in the Cowcod Conservation Areas (CCAs), complicating efforts to interpret both catch and survey data. Alternative means of exploring relative or absolute abundance in this region is a key research priority.

Greater investigation into the likely or plausible consequences of a shoaling of the oxygen minimum zone (OMZ) on blackgill habitat will aid in evaluating threats to this species that may be posed by global climate change. A greater appreciation for the impacts of changing abundance of predators (such as sablefish and shortspine thornyheads) will also help interpretation of long term trends for this species.

Table B.7: Decision Table, based on alternative assumptions on natural mortality rates.

		Low M model		Base model		High M model	
Low M catch		Sp.out	depletion	Sp.out	depletion	Sp.out	depletion
2011	*279*	280	0.22	359	0.30	481	0.42
2012	*275*	277	0.22	358	0.30	481	0.42
2013	45	274	0.22	357	0.30	481	0.42
2014	48	286	0.23	371	0.31	498	0.43
2015	51	297	0.24	385	0.32	513	0.45
2016	55	309	0.24	399	0.34	529	0.46
2017	58	320	0.25	412	0.35	543	0.47
2018	60	331	0.26	425	0.36	557	0.48
2019	63	341	0.27	437	0.37	571	0.50
2020	66	351	0.28	449	0.38	584	0.51
2021	68	361	0.29	461	0.39	596	0.52
2022	71	371	0.29	472	0.40	608	0.53
		Low M model		Base model		High M model	
Base model catch		Sp.out	depletion	Sp.out	depletion	Sp.out	depletion
2011	279	280	0.22	359	0.30	481	0.42
2012	275	277	0.22	358	0.30	481	0.42
2013	87	274	0.22	357	0.30	481	0.42
2014	91	283	0.22	368	0.31	494	0.43
2015	95	291	0.23	379	0.32	507	0.44
2016	98	300	0.24	390	0.33	519	0.45
2017	101	307	0.24	399	0.34	530	0.46
2018	104	315	0.25	409	0.34	541	0.47
2019	106	322	0.26	418	0.35	551	0.48
2020	109	328	0.26	426	0.36	560	0.49
2021	111	334	0.27	434	0.37	569	0.50
2022	113	340	0.27	441	0.37	577	0.50
		Low M model		Base model		High M model	
High M catch		Sp.out	depletion	Sp.out	depletion	Sp.out	depletion
2011	279	280	0.22	359	0.30	481	0.42
2012	275	277	0.22	358	0.30	481	0.42
2013	165	274	0.22	357	0.30	481	0.42
2014	167	278	0.22	363	0.31	489	0.42
2015	168	281	0.22	368	0.31	496	0.43
2016	169	283	0.22	373	0.31	502	0.44
2017	170	286	0.23	377	0.32	507	0.44
2018	171	288	0.23	381	0.32	513	0.44
2019	172	289	0.23	385	0.32	517	0.45
2020	173	290	0.23	388	0.33	522	0.45
2021	173	291	0.23	391	0.33	526	0.46
2022	173	292	0.23	393	0.33	529	0.46

C. Introduction

C.1 Range, distribution and stock structure

Blackgill rockfish (*Sebastes melanostomus*), also known at times as blackmouth rockfish or deepsea rockfish, range from at least central Vancouver Island to central Baja California (Love et al. 2002). However, the species is relatively uncommon north of Cape Mendocino and occurs in the greatest densities in the Southern California Bight (SCB). The name very accurately describes the most identifying characteristic of adult blackgill rockfish, in that they have black pigmentation on the rear edge of their gill cover, as well as in the fold above the upper jaw and inside of the mouth. The rest of the fish appears pink with brown and white blotches underwater, or reddish with distinct brown saddles upon capture. It is a medium-sized (to about 62 cm maximum length) and deep bodied species. Additional descriptions and meristics can be found in Love et al. (2002) for adults and Moser (1996) for larvae and juveniles.

Hyde and Vetter (2007) did not find any evidence for close molecular or evolutionary relationships between blackgill and other rockfish species. Blackgill were found to be moderately related with several other slope or deep shelf species (*S. aurora, S. phillipsi, S. gilli and S. diploproa and S. melanosema*) as well to a suite of mostly rare and poorly known species from the Gulf of California (*S. sinensis, S. peduncularis, S. cortezi*) or southern California.

Blackgill are a slope rockfish species, and are generally rare in waters less than 100 meters and most abundant in waters between 300 and 500 meters depth. Love et al. (2002) report a depth distribution of 87 to 768 meters, however, from ten years of data from the NWFSC combined trawl survey, only one haul greater than 600 meters encountered blackgill (that tow was at 647 meters) and the shallowest fish was encountered at 133 meters. Survey data suggest that smaller fish tend to be encountered in shallower water and larger fish in deeper water; survey data also suggest few small fish in waters north of Cape Mendocino. Juveniles are often seen over soft bottom habitats with low relief. Adults are usually associated with high relief rocky outcrops, canyons or deep rock pinnacles, although fishermen often report taking them in midwater (Kronman 1999, Love et al. 2002, J. Butler and K. Stierhoff, SWFSC, unpublished data).

Little is known about the population structure of blackgill rockfish. Like most rockfish, larvae and juveniles circulate in the plankton for 3-4 months. Love et al. 2002 report that some juveniles may be pelagic for up to 7 months, however, this may be atypical. Thus, like most shelf and slope species, blackgill likely disperse over fairly long distances before settling to the bottom. Abundance south of the U.S./Mexico border is uncertain, but there appear to be substantial numbers and catches of blackgill in many areas, and pelagic juveniles have been found as far south as Punta Abreojos, in southern Baja California (Moser and Ahlstrom 1978). The CalCOFI Ichthyoplankton survey has been used to develop or explore indices of relative abundance for several rockfish species for which larvae can be morphologically identified to species (e.g., Moser et al. 2000), and such indices have been used as relative abundance indices for assessments of rockfish (bocaccio and shortbelly rockfish; Field et al. 2009, Field et al. 2007) as well as northern anchovy (Jacobson and Lo 1994), Pacific sardine (Hill et al. 2007), and California sheephead (Alonzo et al. 2008). Unfortunately, blackgill rockfish are not among the species that have been historically sorted to the species level using morphological methods, although recent developments have led to the potential to use genetic methods to identify historical and contemporary *Sebastes* from the ichythyoplankton archives (e.g., Taylor et al. 2004, J. Hyde, FRD/SWFSC, unpublished data). Thus, it is possible that these collections could provide relative abundance information from past and contemporary monitoring programs.

Moser and Ahlstrom also found that blackgill represented approximately 16% of the total number of rockfish specimens encountered in a series of midwater trawls for late larvae and juvenile stage rockfish done in the early 1970s (prior to most historical exploitation). By contrast, from ongoing pelagic juvenile surveys run by the Fisheries Ecology Division used to develop juvenile (pre-recruit) indices for some species (see Sakuma et al. 2006 for methods), we found that blackgill rockfish comprised only about 3% of juveniles collected from the southern California region from 2004 through 2010 (K. Sakuma and J. Field, unpublished data). However, these results are not likely to be comparable unless seasonal and depth of survey efforts are accounted for; the Moser and Ahlstrom study in particular fished depths ranging from 0 to 600 meters using an Isaacs-Kidd midwater trawl, while the FED survey uses a considerably larger (modified Cobb) midwater trawl and typically only fishes at 30 meters headrope depth. There is at least some potential to consider relative abundance indices of age-0 juveniles from the FED/SWFSC survey in the future, although given the very slow growth and difficulty in ageing of blackgill rockfish, it is unlikely that validation of survey indices or improved understandings of high frequency variation in year class strength will be of substantial near term benefit to the model.

In an attempt to explore the possibility of genetic evidence of stock structure, fin clips from ongoing collections were analyzed by SWFSC researchers (L. Gilbert and C. Garza, pers. com) using standard genetic methods. Most of the 98 samples evaluated came from Morro Bay (n=74) and Santa Barbara (n=23), along with 1 fish from Cordell Bank/Bodega Bay. Attempts were made to extract DNA from archived otoliths from more northern waters (Fort Bragg, CA), but unfortunately these samples did not yield usable DNA. The Morro Bay and Santa Barbara populations show no significant genetic differentiation from each other in an F^{st} permutation test, which measures subdivision between populations (F^{st}=0.00165, p=0.226). To put this F^{st} estimate in context, a value of 0.00165 is low and not significantly different from zero; such a value represents roughly an order of magnitude lower than what might be typical for significantly differentiated populations, and roughly two orders of magnitude lower than F^{st} estimates between different species. The single specimen from Cordell Bank was insufficient to assess the potential for population structure between the more southerly fish and more northerly fish, and, clearly, the absence of samples from north of Mendocino represents an important gap in evaluating the potential for population structure at the fringes of the range of this species. We intend to evaluate fish from more northerly waters as samples become available, but the limited analysis done to date provides some assurance to the assumption that there is no genetic break between fish south and north of Point Conception, which is often described as a major biogeographical boundary for many populations.

Nearly 2/3rds of all U.S. landings are from waters south of Point Conception, for which blackgill accounted for as much as 20 to 30% of total *Sebastes* landings in the SCB during the 1980s, when deep water fixed gear fisheries rapidly expanded (more details in catch history section). Nearly all of the remaining landings took place between Conception and Cape Mendocino, such that less than 1.3% of historical California landings have come from waters north of Cape Mendocino. Landings in Oregon waters are even less, and only trace landings of blackgill are reported from Washington waters. Trawl survey abundance data (discussed later in the document) are consistent with these results, although they represent the period following the greatest extent of exploitation: surveys that took place from the 1970s through the late 1990s had virtually no coverage in southern waters where blackgill are the most abundant.

Given that the vast majority of landings and biomass are (or have been) clearly distributed south of Cape Mendocino, this assessment maintains the approach of past assessments by evaluating and reporting the status of the blackgill rockfish resource off the coast of the United States in the Conception and Monterey areas (south of the 40° 10' management line) modeled as a single stock (Figure 1).

C.2 Life history and ecosystem interactions

Physical Habitat

Blackgill rockfish have among the deepest distribution of all of the California Current *Sebastes* (although the three *Sebastolobus* species are common at considerably greater depths), and live at the edge of the low oxygen (hypoxic) conditions that characterize the slope waters of the California Current. Below these depths, species diversity declines to a smaller suite of species that have adapted to cope with low oxygen waters, notably the DTS complex species (Dover sole, Thornyheads and Sablefish), which have evolved a range of adaptive strategies including metabolic suppression, slow growth rates, late ages at maturity, and ambush (rather than active searching) predation methods (Jacobson and Vetter 1996, Vetter and Lynn 1997, Childress and Seibel 1998, Koslow et al. 2000). These low oxygen waters, known as the oxygen minimum zone (OMZ), are a natural feature of the Eastern Pacific Rim and other regions characterized by high surface productivity and/or the upwelling of oxygen-poor source waters (Helly and Levin 2004). The California Current has a relatively deeper OMZ than the Equatorial Eastern Tropical Pacific (ETP) or the Humboldt Current (Helly and Levin 2004), with the zone starting at approximately 500 to 600 meters depth in the waters off of southern and central California. The observation that blackgill are likely the most deeply distributed medium-size *Sebastes* (at least in southern California Current waters) suggests that they have adapted to live on the edge of the OMZ, where oxygen availability is rapidly declining relative to shelf waters, although no *Sebastes* species appears able to tolerate the very low oxygen conditions within the OMZ itself.

Seibel (2011) describes two oxygen thresholds that are temperature dependent (as opposed to species or situation-specific), one in which virtually all species are capable are of physiologically adjusting or adapting to declining oxygen availability, and a second for which no further adjustment or adaptation in aerobic O_2 utilization is possible. Seibel describes this latter threshold as one at which "organisms that are not specifically adapted to low O_2 will suffer physiological stress and eventual death." Importantly, this threshold falls just below the currently observed oxygen levels throughout the slope waters of much of the California Current, inferring that any expansion of the OMZ in this region is likely to have tremendous impacts on the vertical distribution of populations and the species composition of ecosystems. Equally importantly, there is already some evidence of a shoaling (shallowing) of the depth of the OMZ throughout the California Current (Whitney et al. 2007, Bograd et al. 2008), with Bograd et al. (2008) reporting oxygen declines of 20-30% at depths of approximately 300 to 500 meters in the waters of the Southern California Bight, the region in which most of the blackgill biomass resides. A shoaling of the OMZ has been predicted to be a likely or plausible response to global climate change due to the fact that oxygen is less soluble in warmer waters, and warming is also expected to increase stratification in the upper ocean, which will both reduce oxygen supply and increase oxygen demand at depth (Sarmiento et al. 1998, Keeling et al. 2010, Seibel 2011).

For blackgill rockfish, it is the shoaling of the OMZ at depth that is likely to be the greatest long-term threat, as such a shoaling would likely represent a severe compression of the available habitat for this species. McClatchie et al. (2010) evaluated potential scenarios for hypoxia to impact the habitat of cowcod (*Sebastes levis*), a rebuilding shelf species that is a focus of management in the SCB. They found that as much as 37% of deep (240-350 m) cowcod habitat is currently affected by hypoxia, but that if the current trends of a shoaling OMZ continue for 20 years, this could increase to 55% of deep habitat, as well as an additional 18% of habitat in the 180 to 240 m depth range. These numbers would presumably differ substantially for blackgill rockfish, which have a very different (considerably deeper) distribution; due to their proximity to the OMZ, they may be at considerably greater risk to the longer-term impacts of shoaling. Moreover, changes in the characteristics and dynamics of the OMZ could lead to changes in the forage base for blackgill, which are described as foraging primarily on mesopelagic fishes which undergo dial migrations from the edge of the OMZ to surface waters in order to feed.

Trophic interactions

As previously mentioned, blackgill have been described as having a strong affinity for deep water habitat, particularly around offshore banks, canyons and areas of high depth gradients. They have been described as feeding on small mesopelagic fishes, such as myctophids and bathylagids (Love et al. 2002). Isaacs and Schwartzlose (1965), Genin et al. (1988), Koslow (2000) and Genin (2004) describe the mechanisms by which vertical migrants, such as zooplankton and mesopelagic fishes, become trapped by topographic features. High densities of deepwater adapted resident species are consequently found in the relatively small, confined areas where these diurnally-migrating prey become aggregated. Such observations are consistent with the reports by fishermen of isolated deep banks, pinnacles or other habitat features often hosting very large numbers of fish over a relatively small spatial range, such that vertical hook and line gear (which can be more precisely targeted at small habitat features) is the gear of choice for targeting these species (as opposed to horizontal, or set, hook and line gear often used to target species in deeper slope waters, such as sablefish and thornyheads, which tend to be more widely dispersed).

With respect to predators and predation mortality, it is likely that sablefish (*Anoplopoma fimbria*) and shortspine thornyheads (*Sebastolobus alascanus*) are among the most important predators of blackgill rockfish. Both species are large (up to 100 and 75 cm, respectively, although individuals greater than 80 or 65 cm of either species are uncommon) and largely piscivorous ambush predators that are typically (along with the longspine thornyhead, *Sebastomus altivelis*, and Dover sole, *Microstomus pacificus*) the most abundant and commercially important groundfish in the continental slope ecosystem (Lauth 2000). Food habits information for adult sablefish found that *Sebastolobus* and *Sebastes* species, particularly *Sebastolobus altivelis*, are key prey items, representing 15% to 30% of total prey by volume (Laidig et al. 1997, Buckley et al. 1999). Similarly, the shortspine thornyhead (*S. alascanus*) preyed heavily on *S. altivelis*, unidentified *Sebastes* and other fishes (Buckley et al. 1999). Although no *S. melanostomus* were conclusively identified in either study, other slope rockfish species (*S. crameri, S. diploproa and S. alutus*) were. The lack of specimens is likely due to both studies' focused sampling in northern California, Oregon and Washington slope waters, rather than the south-central and southern California waters in which *S. melanostomus* are most abundant.

Length data for both of these predators (sablefish and shortspine thornyheads) and their prey suggest that predation is low on fishes smaller than 5 cm, high on fishes ranging from 5 cm through 20 cm, and drops off notably for larger prey. However, the diet data summarized here were largely of smaller (40-60 cm) predators, and larger predators likely consume (or consumed) a broader range of prey. In the most recent stock assessment for longspine thornyhead (*Sebastolobus altivelis*), the base model suggested a declining or stable population (Fay 2005); however, it was noted that an ecosystem model of the northern California Current indicated that abundance of longspines should be increasing due to declines in predation mortality associated with declines in their primary predators (Field et al. 2006). Survey biomass trends for longspine thornyheads, while limited to a relatively narrow time period and associated with considerable uncertainty, also suggested an increasing biomass trend. These observations led to exploration of both time and age-varying natural mortality rates for *S. altivelis* as informed by changes in predator biomass and estimates of predator consumption (Fay and Field, unpublished data). Results suggest that, for this species, predation-related factors should be taken into account for future single-species stock assessments. Comparable evaluations could, and probably should, be done for blackgill rockfish and other slope species, for which their likely most important sources of predation mortality have themselves undergone significant changes in abundance.

C.3 History of the fishery and summary of management actions

Blackgill rockfish have historically represented a minor part of California rockfish landings north of Point Conception, but a substantial fraction of landings occur south of Conception. Based on consultations with fishery participants, Butler et al. (1998) and Kronman (1999) defined the southern California targeted fishery for blackgill rockfish as being a relatively recent phenomenon. Although longline fishing had long been the primary means of catching rockfish in southern California waters, increased participation and declines in the catches of many highly desired shelf species (such as vermillion and cowcod) contributed to a gradual shift in effort towards deeper and more offshore waters. Moreover, improvements in technology and gear (such as loran, affordable acoustic systems, electric line haulers)[1] helped ease the difficulties of fishing (and relocating good fishing sites) in deeper waters. Additionally, set nets (gillnets) also began to be deployed at a larger scale in southern California in the 1970s and 1980s, often targeting deep reefs for large bocaccio, cowcod, blackgill, bank and other rockfish species.

Such developments seem to have been associated with a geographic expansion of the regions fished, such that fishing locations were sequentially depleted and new fishing locations discovered and developed over time. The first stock assessment for blackgill rockfish (Butler et al., 1998) noted that there was significant evidence for sequential depletion of blackgill rockfish in localized areas. This included reports from fishery participants that many pinnacles or other fishing sites that routinely yielded 20,000 pounds of blackgill per trip in the early days of the fishery were now only yielding 500 or so pounds per trip and were often covered with lost gear. Similarly, in a review of historical southern California fisheries, Kronman (1999) also documented the rapid growth and development of the blackgill fishery specifically as one in which fishermen would often “completely decimate” rockfish spots with deep fishing vertical line gear, based on the accounts of the participants themselves. Consequently, there was an ongoing shift to newer fishing spots, generally further offshore and to greater depths, as well as greater experimentation with alternative gears and target species.

These observations suggest the potential for a situation in which the stock may have undergone the “sequential depletion” of biomass from available habitat patches. If so, this would suggest that a traditional (non-spatial) stock assessment assumption of evenly distributed fishing mortality across space is substantially flawed. In fact, if the fishery were sequentially depleting specific areas, the length frequency information would not be likely to suggest a shift to smaller fish over time as the length frequencies could essentially reflect “unfished” population structure for the duration over which the new habitats were discovered and exploited. The consequences of failing to recognize such patterns can lead to overexploitation and collapse, and such processes have been described for several marine invertebrate populations (Karpov et al. 2000, Orensanz et al. 2000) as well as temperate water reef fishes (Epperly and Dodrill 1995, Rudershausen et al. 2008).

---

1 The development of the LORAN system was particularly important for relocating pinnacles and other habitat features in the southern California Bight, although Kronman (1999) notes that some developments- such as monofilament line- were probably more influential in rapid growth of the shelf fishery, but became less useful when targeting species at greater depths.

Ongoing efforts to analyze historical block summary data have the potential to identify such shifts and consider whether such factors are likely to be important for west coast groundfish species such as blackgill, as well as to determine whether there is sufficient data to estimate spatial effects or develop spatially-explicit models more capable of accounting for such factors.

Management of blackgill rockfish has generally not been to the species level, but rather as part of the "*Sebastes* complex" in the Pacific Fishery Management Council era (prior to which management was under the direction of the California Department of Fish and Game). The PFMC allowable biological catches (ABC) of blackgill have historically been grouped together with eleven other species of minor rockfishes called "remaining rockfish" and all "other" rockfish. The PFMC historically used trip limits, and later cumulative trip limits (over set time periods), to slow the pace of harvest based on allowable biological catch and to promote a year-round fishery. For all commercial gear types, the limits were initiated in 1983 when the PFMC imposed a monthly limit of 40,000 pounds per trip for the entire coastwide *Sebastes* complex, a limit that stayed in place through 1990. After recognizing the differential spatial distribution of the remaining rockfishes and the fisheries that target them, harvest limits on both open access and limited entry fisheries were divided between the northern and southern *Sebastes* complexes, and trip limits began to be implemented at variable levels over both time (month and year) and space (north and south of Mendocino), often with species-specific limits in addition to the overall limit on *Sebastes* catches. Although early limits applied to both trawl and fixed gears, beginning in 1995 fixed gear limits (hook and line and pot, primarily, as gill nets were phased out through the 1990s) were set to 10,000 lbs of *Sebastes* per trip, which persisted through the 1990s.

Consequently, prior to 1999 cumulative trip limits had been historically high relative to landings of blackgill rockfish from individual trips, and unlikely to have impacted fishing for blackgill and catches. Limits were dramatically reduced in 1999 for the southern *Sebastes* complex; 2-month cumulative limit of 3,500 pounds for limited entry and 3,600 pounds per month for open access. Since 2000, blackgill has been managed as part of the Minor Slope Rockfish sub-group, with limits ranging from 3,000-50,000 pounds per 2 months; Tables 1-3 show the trip limits implemented since 2000 for this complex for the limited entry trawl, limited entry fixed gear and open access fixed gear fisheries. Table 4 shows the total estimated catches of blackgill (including discards) south of 40° 10' for the period since 2001, during which time catches have typically ranged well below allowable levels.

In 2001 the Cowcod Conservation area was established outside of 20 fathoms and directly excludes directed groundfish fishing from an expansive area in the Conception and southern Monterey INPFC areas.[2] This regulation has had a tremendous impact on the southern fixed gear fleet that targets blackgill, as the deep offshore banks and features that characterize the CCAs in deep water are optimal habitat for this species. By contrast, the shelf closures (rockfish conservation areas) implemented to protect rebuilding shelf species

2 As the current trawl survey also excludes this region from trawl gear impacts, the area of the CCAs is shown in later maps of survey CPUE for blackgill rockfish, in Figure 13

(such as bocaccio, cowcod, canary and widow rockfish) have presumably had a negligible direct effect, as the depths closed in the RCAs do not encompass the depths at which most blackgill are encountered. Such measures may have had an indirect effect, by virtue of shifting trawl effort to deeper waters, although for much of California the overall effect has been a sharp decline in active participation in the trawl fishery more generally.

D. Assessment

D.1 Life history and data sources

D.1.a Maturity

The previous assessment (Helser 2006) developed a maturity at length curve based on fitting previously published curves in Wyllie-Echeverria (1987) and Love et al. (1990). Based on those results, the previous assessment applied a maturity relationship in which female blackgill rockfish are approximately 50% mature at a length of 34 cm, and approximately 95% mature at just under 38 cm. The corresponding age at 50% maturity was estimated to be approximately 20 years, with the estimated age at full (or virtually full) maturity estimated at approximately 30 years of age. The 2005 assessment, as well as the STAR Panel report, identified data gaps in both maturity and fecundity as important areas for future data collection and research. Consequently, we have sought to both compile and develop as much additional maturity information as possible to reanalyze these relationships.

Wyllie-Echeverria (1987) used data derived from port sampling efforts in the 1980s to estimate maturity of a number of California rockfish. For blackgill, her estimated length at 50% and 95% maturity were based on 17 immature and 109 mature fish from the late 1970s and early 1980s, only three of which (2 females and 1 male) underwent histological examination. She found that the sizes at 1st, 50% and 100% maturity were 30, 35 and 36 cm total length (although the units used in this assessment are fork length, the difference between total length and fork length for blackgill rockfish at these sizes is on the order of 2-3 mm). Similarly, Love et al. (1990) estimated sizes at 1st, 50% and 100% female maturity as 31, 34 and 38 cm total length, respectively, based on over 100 fish sampled from the Southern California Bight in the 1980s. For both of these studies, the original data or data files are unavailable (the Wyllie-Echeverria study presumably utilized the same port sampler databases used for this effort), thus we sought to reevaluate the maturity relationship for female blackgill rockfish using data from the California Cooperative Commercial Survey database (CalCOM) as well as recent and ongoing research efforts.

Altogether, 4350 observations of female maturity were available, with most (3365) from commercial fisheries (trawl, fixed gear), as well as 985 from past and ongoing research efforts. Fish from research efforts included 773 observations from groundfish ecology studies conducted by the Fisheries Ecology Division in central California from 2001-2005 (all seasons) using commercial trawl and fixed gear (but with finer mesh and full retention, such that a wide range of sizes were encountered), another 146 maturity observations collected from the 1998 triennial trawl survey, and 66 observations from ongoing maturity and fecundity studies being conducted by the Fisheries Ecology Division. Importantly, as the original Love et al. data are unavailable, and port sampling has historically been weak in the Southern California Bight, there were only about 40 observations for the Southern California Bight region (all from February 2011, as a result of ongoing research efforts), which has historically accounted for a majority of commercial catches.

Figures 2a and 2b show the proportion of mature fish in each of the maturity stages, based on the CalCOM maturity code system for female rockfish, where stage 1 fish are described as immature, stage 2 as developing ovaries/early yolk, stage 3 as late (fertilized) yolk, stage 4 as with eyed larvae, stage 5 as spent and stage 6 as recovering (unknown or unexamined fish are excluded). These figures show that blackgill appear to have an extended parturition ("spawning" of live larvae) period, with fertilized (late yolk) eggs and eyed larvae being observed throughout a period ranging from November to June, with a clear peak in the frequency of occurrence of eyed larvae in April and May. Interestingly, in Wyllie-Echeverria (1990), and in datasets for other species of *Sebastes* (particularly nearshore and shelf species), most fish are observed to go from stage 2 (unfertilized eggs) to stage 3 or 4 (fertilized eggs or eyed larvae) within the period of peak parturition (typically Jan-March for winter spawning species). By contrast, data on maturity stage by month for blackgill rockfish suggest that a substantial fraction of fish are noted to be stage 2 fish throughout the duration of the peak parturition season, particularly smaller individuals.

As with other species, it is possible to misclassify immature, mature, and resting ovaries, especially outside of the reproductive season (Wyllie-Echeverria 1987, West 1990, Thompson and Hannah 2010). An alternative hypothesis to misclassification is that smaller, younger individuals undergo mass atresia (re-absorbtion) of developing oocytes during periods of "prolonged adolescence." This has been described for both darkblotched rockfish (Nichol and Pikitch 1994) and Pacific Ocean perch (Hannah and Parker 2007), two other commercially important slope *Sebastes*, as well as in other teleost fishes (Bell et al. 1992, Junquera et al. 2003), and is typically only detected in histological sections of ovarian tissue. As a result of the likely difficulties in macroscopic staging and the potential for mass atresia or abortive maturation as seen in other *Sebastes* species, we have initiated a histological study of maturity stage for female blackgill rockfish, which has not previously been performed aside from two female specimens examined and reported in Wyllie-Echeverria (1987). Although this study is still in relatively early stages, there is so far no strong evidence for large scale atresia. A more likely conclusion, based on the initial examination of 75 histology samples from ovaries collected between September 2010 and April 2011, is that macroscopic staging for these specimens is highly difficult and uncertain, as 66% of spent or resting ovaries were assigned a stage 2 macroscopic designation. Thus far, the carefully staged macroscopic and histological sections examined to date are consistent with the size at maturity estimated using both research and commercial specimens. A more detailed account of the methods and results of these ongoing efforts is provided in Appendix A.

We modeled the proportion of individuals that are mature at a given length using a generalized linear models (GLM) with binomial error structures and logit link functions, with a binary response variable (immature=0, mature=1). We explored a suite of models in R using a variety of subsets of these data, including models that excluded months outside of the primary spawning season, models that excluded stage 2 (unfertilized, developing eggs), models based on either inclusion of regional effects or with data only from specific regions, and models focused on solely using either commercially sampled fish or fish sampled in research surveys only. The differences among most models were modest, with the length at 50% maturity ranging from 316 to 337 mm; more substantial differences in the estimated were observed if stage 2 fish were excluded from the analysis, or when only fish from given regions were evaluated independently. Exclusion of stage 2 (developing oocytes) ovaries from the dataset increased the length at 50% maturity to between 364 and 377 mm.

Considering regional models suggested a fairly clear trend of increasing size at maturity with more northerly latitudes, consistent with observations for other species (Haldorson and Love 1991). This, in turn, would suggest that the absence of data in the Southern California Bight, where most of the historical fishery has taken place, is clearly a major shortcoming given that the expected trend would indicate that southern fish should mature at a smaller size. Consequently, for the purposes of this assessment we used the results of a basic model that used both commercial (port-sampled) fish as well as research fish, and only used fish sampled during the extended spawning season (October through May). This model estimated that the size of 50% maturity is 33.0 cm with a corresponding slope parameter of -0.031 (corresponding to a length at 95% maturity of 42.4 cm; Figure 3). Ultimately, this result will be compared to the results of the ongoing histological study, which will include greater representation of samples collected from the southern California Bight, in order to develop a final, definitive maturity curve for this species.

D.1.b Fecundity

Both the 2005 STAT team (recommendation 8) and the 2005 STAR Panel report (recommendation F) suggested that research information to describe the fecundity of blackgill rockfish be conducted research to improve the stock assessment. This effort was undertaken in close concert with the effort to better understand blackgill maturity patterns. Although Love et al. (1990) had previously published data suggesting a strong increase in relative fecundity with size for blackgill rockfish, based on two data points that bracketed the range of observations were reported in that study. However, the original data for the 19 individuals examined for that research effort were lost and unavailable. Despite this, the two data points that were published were used by Dick (2009) and indicated that blackgill rockfish had a relatively strong relationship between size (length or weight) and relative fecundity (eggs per gram of spawning females). Consequently, the development and analysis of new fecundity information was prioritized for this assessment.

Monthly (or nearly monthly) samples of commercially fished blackgill rockfish for maturity and fecundity work have been examined since June of 2010 in collaboration with

S. Reinecke at The Nature Conservancy (TNC) based on cooperative research efforts between the TNC and their Morro Bay fishermen. A small number of samples were also available from archives from SWFSC groundfish ecology cruises conducted in 2003-2005 (Monterey Bay region), several were also provided by a southern California fixed gear fisherman (T. Athens), and a single fecund female from Cordell Bank was included in the analysis. Few samples were available of late stage 3 or stage 4 ovaries, as pressure changes during capture often led to the rupturing and leaking of eggs and larvae from pregnant females. After removing samples that were unreliable due to such rupture or leaking, a total of 31 fecundity samples were analyzed and available for the analysis. The regression between relative fecundity and blackgill total length and total weight are shown in Figures 4a-b. Both relationships were highly significant, with R^2 values of 0.40 and 0.45 ($P<<0.01$ for both) between relative fecundity and length or weight, respectively. The results of the weight relationship were used in the base model, such that the number of eggs per kg of spawning female was set to (eggs/kg) = 124,637 *(weight/kg) + 70,100. The length relationship was estimated to be (eggs/kg) = 1369.4*(weight/kg) - 320517; however, as the relationship between relative fecundity and weight was generally considered to be more robust (Dick 2009) and either parameterization is possible in SS3, the weight relationship was used in this model.

The results from the meta-analysis by Dick (2009) demonstrated that most *Sebastes* do have moderate to very strong changes in relative fecundity with size (the probability of slope parameters greater than zero was over 90% for 14 species and over 50% for all species), with a range of effects that was moderately coherent among subgenera. Blackgill was one of several species exhibiting strong effects, but with very limited data. At that time, only a minority (6 out of 17) of *Sebastes* assessments used size-dependent fecundity relationships, although, since then at least four revised or new *Sebastes* assessments (Pacific Ocean perch, splitnose, greenstriped and yelloweye rockfish) have used either fecundity relationships or the results of the Dick (2009) meta-analysis. The results of this fecundity study have not been run through the hierarchical model of Dick (2009) due to time constraints, although ultimately this is desirable. However, the difference among results from the hierarchical model relative to species-specific regressions tend to be modest for more data-rich species, thus we anticipate that the results are not likely to change substantially when incorporated into a meta-analysis framework. Moreover, we aspire to continue to accumulate additional maturity and fecundity information throughout the 2011-2012 spawning season, at which time a re-analysis of the hierarchical model with additional data may become appropriate.

D.1.c Age estimation

Blackgill rockfish were first aged by the SWFSC for the 1998 stock assessment (Butler et al. 1999) using thin section analysis. Butler et al. (1999) aged otoliths from 224 blackgill rockfish collected from California ports in 1985 and 1997, as well as a small number of juvenile specimens from research cruises. Each specimen was aged independently using either thin sections or break and burn methods (mostly the former), with the results suggesting that, while blackgill were difficult to age, the results were generally consistent among readers. The oldest fish documented in that effort was a 55 cm female estimated to be 87 years old, with the oldest 3% of fish ranging from 69 – 87 years. Stevens et al. (2004) followed up on the Butler effort using the same 1985 samples aged by Butler et al. (1999), as well samples from 1998 and 1999 AFSC research cruises along the California coast. They accumulated over 1200 otoliths for their work and selected a subsample of 5 to 30 age structures from all available size classes (from 10 to 60 cm), from which 260 were aged using thin section analysis. The sections were read by three readers, with one reader determining the final age estimate for each section.

Stevens et al. (2004) reported that growth zones for most blackgill rockfish were difficult to interpret, with inconsistent banding patterns and obscure growth zones in the first 10 to 15 years of growth, followed by a zone of extremely compressed increments and irregular patterns that may have led to false growth zones (checks) as well as the potential for concealed growth zones for older fish. The authors also stated that "ages that could not be confidently resolved were removed from analysis," and the authors reported that final age estimates were ultimately resolved for 197 fish (76% of the number initially analyzed). Even after removing nearly a quarter of the fish from the estimation procedure, the authors reported that agreement among the three readers was low, with 24% of the age estimates within one year, 61% within 5 years and 87% within 10 years.[3] Most importantly, Stevens et al. confirmed their age estimates using radiometric analysis. The authors found a strong correlation with the thin section age estimates and predicted ages based on ^{210}Pb:^{226}Ra ratios (R^2 reported as 0.88). However, their data for radiometric estimates were based on pooled, rather than individual, samples due to poor radium recovery, leading to a relatively small sample size (n=14) that was based on average ages within samples and average radium levels. Moreover, it is noteworthy that there was some evidence of bias towards older ages in the mean predicted (thin section) ages and the estimate of mean radiometric age (see Figures 4 and 5 of Stevens et al. 2004). Although the authors reported no significant difference in slope from their regression of radiometric to thin-section age and a hypothetical agreement line with a slope of 1, the power to detect a difference in slope was relatively low due to the low sample size.

In order to follow through on past assessment and review panel recommendations, and to increase the amount of available data for this assessment, an effort was made to develop production ageing criteria for this species. Criteria were developed by an experienced ager who has aged more than 200,000 otoliths from various species of rockfish during his career (Pearson). To develop the ageing criteria, the ager first determined the method to use. First, the break and burn method was tried on 25 otoliths. This proved to be a difficult approach, as the otoliths did not break well, and this caused the burns to be uneven and frequently unusable. Next, 12 fish were embedded in resin and thin sectioned. This method was also perceived to be unacceptable, as false marks (checks) were too prominent, and the method was considered too time consuming for production ageing. Finally, 25 otoliths were broken or hand cut with a diamond saw (for thicker otoliths) and placed in an oven at 500 °F for 30 minutes. This method produced the most readable

3 Note that the 2005 assessment incorrectly suggests that the Steven's et al. (2004) study found 87% among reader agreement, while the study actually reports 87% agreement within ten years.

otoliths. However, the age reader noted the same severe difficulties in ageing this species as were reported by the age readers in Stevens et al. (2004), with inconsistent banding patterns among specimens, high compression of increments for older individuals, and frequent and difficult to interpret false growth zones (checks) on many otoliths.

After deciding the method to use, 50 otoliths from small fish (<25cm) were used to examine the edge type from different months to see approximately how much growth was occurring in young fish throughout the year. Next, larger (and presumably older) fish were examined. The estimated ages were compared to previous age estimates by other researchers and the results were similar. Finally, a group of 100 fish were arbitrarily selected and aged. Each fish was aged two times, with the second read independent of the first read. The two ages were compared, and the ager resolved the two ages to a best age estimate for each fish. Although the percentage agreement was low, it was consistent with that reported among readers in previous studies and expected, due to the difficulties in ageing this species. Initially, the correlation among reads was strong, with no initial evidence of bias. However, during the course of ageing for this assessment, there was some evidence for bias or drift in ageing methods that may have resulted from the age reader changing which species were being read As a result, all of the initial data were discarded and all ages were based on another read, during which time the age reader focused solely on blackgill rockfish.

Second reads were conducted on 197 age structures during this second round of ageing and revealed no indications of bias. The results of these cross reads (Figure 5) indicate noisy, but generally good agreement between the first and second ages, with approximately 10% agreement to the same year, over 40% agreement within 1 year, and just over 90% agreement within 5 years. Moreover, the results of these ages were consistent with the sizes at age reported by Stevens et al. (2004) and used in the 2005 assessment, with the exception that the maximum age for 1449 fish aged for this revised effort (64 years) was notably less than the oldest of the Stevens study (90 years). Although the Stevens study deliberately sampled fish from a broad size range, while this study aged all fish from within given subsamples (both commercial fisheries and survey years), the pool of fish from which samples were taken for the Stevens study was roughly equivalent to the total number of fish aged for this study. A total of 11 fish in the Stevens study were older than the oldest age (64) estimated for this study, suggesting differences in the ageing criteria among studies. However, as the resulting growth estimates between this study and the Stevens et al. study varied only modestly (described later in the growth section), we have assumed that the age data developed for this assessment represent the best available information and have used these data in the model.

Of the 1449 fish aged for this assessment, the youngest fish aged were estimated to be age 4 (2 fish); the oldest were age 64 (2 fish). The smallest fish aged were 10 cm in length; the largest were 62 cm in length. The results of the 197 cross reads were evaluated using the age-error software of Punt et al. (2008) in order to develop an ageing error matrix that could be used in combination with the age data to estimate quantities such as the coefficient of variation of size at age and other metrics. The resulting ageing error matrix estimated that the youngest fish, for which double-ages were available, had a standard deviation of age of approximately 0.5, while the oldest (64) had a standard deviation of approximately 8, with the error increasing approximately linearly over time (Figure 5). This error matrix was included in the model. The age-error program found no evidence of bias, although the procedure is constrained to assume that at least one of the estimates is unbiased and, thus, this conclusion cannot be reached conclusively at this stage. In order to reconcile the apparent differences among the age range and results between fish aged for this assessment and those aged for past studies, it would be recommended both to explore age validation and comparison among multiple readers, as well as to explore the potential for additional age or age-bias studies using bomb radiocarbon or other methods (e.g., Piner et al. 2006).

Note that although the age data from the Stevens et al. manuscript are available and were evaluated for this assessment, they were not used in this model, as the aged otoliths were not randomly drawn from the size distribution of the sampled fish (due to the study design of the age validation effort) and the among reader error between the age readers for the Stevens et al. study and the reader for this study could not be formally assessed. The lead of the Steven's study (M. Stevens) was contacted to inquire as to whether she would be willing to undergo such a comparison, however, as she had not been ageing fish since the time that study was conducted (~10 years ago) and did not have adequate time available to reacquaint herself with ageing methods, this was not feasible. Future research and assessment efforts should include the utilization of multiple agers and, potentially, alternative age validation efforts to continue to improve on age estimation for this species. The Stevens et al. study also found a strong correlation between otolith weight and estimated age, a result consistent with our results ageing fish for this assessment as well as ongoing efforts to develop more rapid age data for other assessments (J. Cope, unpublished data). However, due to the high variability of age at length and the fact that the age data in this model are used primarily to inform growth (rather than recruitment strength), we explored this relationship but did not attempt to develop age composition data based on these relationships.

D.1.d Growth

Blackgill rockfish have long been known to be amongst the most slowly growing of the *Sebastes* species, with past von-Bertalanffy growth coefficient (K) values ranging from 0.04 to 0.05 for females and 0.06 to 0.08 for males (Butler et al. 1999, Stevens et al. 2004, Helser 2006). For this model, growth parameters were estimated internally, based on the conditional age-at-length data from the 2047 fish aged for this assessment (described above). The growth equation is based on the Schnute formulation for von-Bertalanffy growth, with A_{min} and A_{max} (corresponding to the estimated parameters L_{min} and L_{max}) set to 6 and 60 for this model. The results are discussed more comprehensively in the results section of the assessment, however, the raw size at age data and the resulting growth curve from the base model are shown (Figure 6a and b). Importantly, the fits to the data for this (2011) model demonstrate a considerable variability in size at age, an observation confirmed by the ager for this study, who noted many instances in which fish of very similar or identical lengths (and genders) had very different ages (as well as otoliths weights and thicknesses). This suggests that the variability in size at age for this species is considerable, likely varying both by latitude (as has been shown for numerous other species) and potentially by depth (where oxygen availability may constrain growth for the more deeply distributed specimens relative to those in more shallow habitats). A greater exploration of the plausible or likely factors behind this variation in growth should be among the recommendations for future research and data collection efforts.

The age at length relationship was re-estimated from 2047 fish for which both length and weight were available, ranging from 10 to 62 cm. in length. The difference between male and female age/weight parameters was negligible, so we used the same parameters for each sex, such that weight= 0.00001132*(length)^3.1005904. This was a very minor departure from the relationship used in the 2005 assessment.

D.1.e Natural Mortality

Natural mortality (M) is typically one of the most important, and most difficult to estimate reliably, parameters in any given stock assessment model. The first stock assessment (Butler et al. 1999) based assumptions about M primarily on Hoenig's (1983) linear regression model for relating maximum observed age with natural mortality, and noted that their maximum age of 87 corresponded to a natural mortality rate of 0.047, with a range of 0.037 to 0.057. They also noted that Jensen's (1996) relationship between M and K (M=1.5K, where K is the von Bertalanffy growth parameter) led to an estimate of M=0.057. The 2005 assessment (Helser 2006) evaluated similar information as well as conducted a likelihood profile for M, and arrived at a value of 0.04. The estimated growth parameters in the 2005 model were sensitive to natural mortality, with an increase in K for males and females and a decrease in female asymptotic size with increasing natural mortality. Natural mortality was ultimately chosen as the most critical axis of uncertainty for the 2005 assessment decision table, with lower and upper bounds represented by runs in which natural mortality was fixed at 0.03 and 0.05, respectively (which corresponded with the 5th and 95th percentiles of the distribution of 2005 depletion levels from the base case model).

We explored the potential to develop a prior for M based on an approach developed by Owen Hamel (NWFSC). This approach is based on estimating prediction intervals for natural mortality using several published relationships, including Hoenig's (1983) relationship to maximum age, Gunderson et al.'s (2003) relationship to GSI, and McCoy's and Gillooly's (2008) relationship to maximum weight and environmental temperature. As discussed earlier, the maximum age based on previous (including published and validated) work is 90 years, while the maximum age for fish aged for this assessment is 64. Similarly, temperature varies substantially by both depth (between 300 and 500 meters) and latitude (eastern Southern California Bight through to Cape Mendocino), however a range of 6 to 7° C covered most of the habitat based on CTD data compiled for this effort (unpublished data). The GSI data were obtained from the ongoing maturity and fecundity studies and indicated a mean GSI of 0.037 for mature, pre-spawning females. Depending upon which maximum age and which temperature were used (and the estimate was most sensitive to maximum age), this led to point estimates of 0.057 to 0.065 for the median of the prior distribution (Figure 7), with standard deviations in log space of approximately 0.4, such that the 95% interval ranges from less than 0.03 to just over 0.12 among the four cases. The point estimates for females and males with a maximum age of 64 (rather than 90) were 0.063 and 0.065 respectively and these values were ultimately used in the base model as point estimates.

Both the previously used values for M and the more recent estimates based on the Hamel method are consistent with the estimates that have been used for other north Pacific *Sebastes* (and *Sebastolobus*) species that inhabit deep slope environments, for which natural mortality is typically very low, and associated with slow growth and late age at maturity. Along the west coast slope, the most recent darkblotched rockfish (*Sebastes crameri*) assessment model uses a point estimate of 0.07, based on an earlier version of the previously described approach, while Pacific Ocean perch (*Sebastes alutus*) is modeled using a Bayesian approach, but has a prior (lognormal with median) distribution of 0.05 (with a coefficient of variation of 0.1). Splitnose rockfish (*S. diploproa*) used a point estimate of 0.048 based on the Hoenig relationship, while shortspine thornyhead (*Sebastolobus alascanus*) and longspine thornyhead (*S. altivelis*) have natural mortality rates estimated at 0.05 and 0.06, respectively. Further north, there are a suite of assessments for slope species in the Gulf of Alaska (GOA) for which point estimates of natural mortality have been estimated. Species-specific estimates include 0.061 for Pacific Ocean perch (*Sebastes alutus*), 0.06 for GOA northern rockfish (*S. polyspinis*), 0.034 for the rougheye/blackspotted rockfish complex (*S. aleutianus and S. melanostictus*), 0.03 for shortraker rockfish (*S. borealis*), 0.05 for sharpchin rockfish (S. *zacentrus*), 0.10 for redstripe (*S. proriger*), 0.06 for harlequin rockfish (*S. variegatus*), 0.05 for silvergray rockfish (*S. brevispinis*), 0.06 for redbanded rockfish (*S. babcocki*), and 0.03 for GOA thornyheads (*Sebastolobus spp.*).[4] Thus, the vast majority of slope species have had natural mortality rates estimated or fixed at rates between 0.03 and 0.07, which consequently represents plausible bounds for most slope species.

D.1.f Commercial Landings Data

Although the California Department of Fish and Game has had an effective means of recording commercial landings of fishes since the early 1900s, landings of rockfish (and some other species assemblages) were rarely recorded to the species level prior to the early 1980s. Prior to this period, virtually all rockfish were landed and reported in a small number of market categories. In recognition of the need to comprehensively address historical catch levels, a major effort to develop a single database for historical (pre-1969) catches in California (Ralston et al. 2010) and Oregon (Gertseva et al. in press) were conducted. These references are included in the background materials and should be consulted for the methodologies used to develop the historical catches by gear and region for this assessment.

4 West coast assessments are available online at *http://www.pcouncil.org/groundfish/stock-assessments/archived-stock-assessments/*, Gulf of Alaska assessments are at http://www.fakr.noaa.gov/npfmc/safe/safe.htm.

More recent landings estimates are a product of the California Cooperative Groundfish survey (CCGS, now known as CalCOM). CalCOM was implemented in 1978 by the California Department of Fish and Game, the Pacific States Marine Fisheries Commission and the Southwest Fisheries Science Center of the National Marine Fisheries Service. Species composition (as well as other) data are typically collected by market category, and the composition of a given market category is subsequently applied to fish ticket landings for that market category after stratifying for port, year, season and gear effects. In addition to species composition data, samplers collect biological information and samples (sex, maturity, length, weight, and ageing structures) to help manage commercial fisheries, although sex and maturity data, as well as age structures, are not reliably collected in some regions and for some time periods as some fish processors have not allowed samplers to cut or otherwise fully sample landings. This trend has been particularly apparent for many southern California fisheries, with the result that only limited sex-specific length information is available for blackgill rockfish in southern fisheries.

Species composition data by market category collected in the 1980s were used to estimate catches to the species level for the 1969-1979 period based on the existing expansion routines. Detailed descriptions of the sampling framework and program are provided in Sen (1984), Pearson and Erwin (1997), and Pearson et al. (2008). Catch estimates for California fisheries are reported in Tables 5-8, with Table 5 reporting the catches for the fleets used in the assessment (southern California fixed gear, central California fixed gear, and central California trawl) for the period from 1950 through 2010, as well as catches for the northern California fisheries (all gear types combined) that were not included in the base model. Although blackgill are rarely encountered in recreational fisheries, they are encountered occasionally (almost exclusively in southern California), and recreational estimates from Ralston et al. (1950-1980) and PacFIN (1981-2010, with 1989-1996 set to average of 1985-1988 catches) were compiled. As these catches are minimal, and there are no size data of any significance to accompany them, the catches are folded into the southern California fixed gear catch history. Tables 6, 7 and 8 provide greater spatial and gear-type resolution, with landings reported by gear type (hook and line, setnet and trawl, respectively) and port complex for the period from 1970 through 2010 (note that these are commercial landings only, and do not reflect the trace recreational catches).

To illustrate the relative magnitude of blackgill rockfish catches relative to that of other species, we show total catches of all rockfish (Sebastes) species from 1970 through 2010 for all California waters, as well as for the waters of the Southern California Bight (SCB; Figure 8). In all of California, blackgill represent a small fraction (typically about 5%) of statewide rockfish landings, while in the SCB blackgill have accounted for 20% to 30% of all rockfish landings. However, in recent years, due to shelf closures and other management measures to protect rebuilding shelf (and northern slope) species, blackgill have comprised closer to 20% of statewide rockfish landings and 70% of landings in the SCB.

Figure 9a-c provide a comparison of the catches that were included in the 2005 assessment base model files relative to the estimated catches by gear type resulting from the most recent historical catch reconstruction and the most recent CalCOM database. Note that these estimates, from 1984 to the present, are virtually unchanged (there are some very modest changes) from those used in the 2005. However, all of the catch estimates prior to 1984 have changed substantially. Specifically, the 2005 assessment reported no landings in the setnet fishery between 1978 and 1983, and virtually no landings for the trawl fishery from 1968-1983. Note that the values for conducting these comparisons came from the SS2.dat file provided by the author as the final data file used to run the assessment. However, this was *not* the file included in the Appendix of the 2005 assessment (those files were the original draft versions of the SS2 files, prior to review) nor are they consistent with the values that were reported in Tables 4 and 5 of the 2005 assessment. Thus, it was impossible to entirely understand the rationale for the catches that were ultimately used for the base model in the 2005 assessment; the most likely explanation is that these were the result of an unintended and unchecked error in the final model data files. These and other issues are discussed later in this document, with respect to the comparison with past assessments. Figure 9 is done for comparative purposes with the 2005 landings estimates only, as the fleet structure was altered for this assessment to reflect a southern California fixed gear fleet, a central California fixed gear fleet, and a central California trawl fleet.

Figure 10 shows the landings estimates for the three fisheries used in the model as well as the modest amount of northern California catches. Importantly, the estimated hook and line landings from the 2005 assessment relative to those assumed for this assessment were considerably lower for the period from 1950 through the late 1960s, as the 2005 assessment used an interpolation between 1950 and the year of the first available data (1978) in which the percentage of all California rockfish catch assumed to be blackgill increased from 0 to 2.2%, in order to gradually mimic the movement to offshore (and deeper) waters by the fishery. By contrast, we use the results of Ralston et al. (2010), which is entirely based on species composition data that reflects a period following the expansion to deeper, more offshore waters, and thus may not necessarily be representative of actual historical catches. Specifically, in consultation with GAP representatives, the STAT team found it unlikely that blackgill landings prior to 1950 were significant or even notable. The Ralston et al. (2010) reconstruction assumes that a sizable fraction of the southern California hook and line fishery from 1916 through the early 1930s was represented by blackgill rockfish, which we find unlikely due to the fact that this fishery likely took place almost entirely over shelf, rather than slope, waters. Consequently, we have only used the catch history from the reconstruction from 1950 to the present, consistent with the start of the fishery in the 2005 assessment. We also developed two alternative catch streams for use in sensitivity analysis, one in which pre-1978 catches were reduced by 50% and one in which the same catches were increased by 25% (Figure 10).

The few available pieces of species composition information prior to the 1980s are consistent with these decisions. For example, Phillips (1939) described the species composition of rockfish from the wholesale fish markets of Monterey in 1937-1938, and blackgill were not among the 37 species of *Sebastes* identified in his analysis, for which only 10 of the 332,000 lbs examined were listed as “unknown,” all others were assigned to a species. Moreover, blackgill are not mentioned in Roedel (1953) “Common ocean fishes of the California Coast" nor in Miller et al.'s (year) "A field guide to some common ocean sport fishes of California," reflecting a likely rarity of encounters of blackgill by both commercial and recreational fishermen (and researchers) in the 1950s and 1960s. However, Phillips did include blackgill in a list of "uncommon marketable species" in the list of "proposed standardized group names for reporting commercial rockfish landings" for a 1958 review of California marine fish catches (CDFG 1958). Yet neither quantitative estimate nor rationale for the relative significance of blackgill was provided, and to the best of knowledge of CDFG and NMFS researchers, nowhere are the historical species compositions of southern California hook and line gear reported in even an anecdotal sense.

There are reports of species composition and even discards for some species in Central California trawl fisheries, as well as the hook and line fisheries mentioned earlier. Heimann and Miller (1959) reported that blackgill were present in trace amounts in Morro Bay trawl fisheries in 1957-1958 (5 of 110,000 lbs, none of which was discarded, present in 2 of 64 trawl drags examined). Most of these drags were done in waters shallower than 115 fathoms (approximately 230 meters), for which bocaccio and chilipepper (shelf species) were the primary target. No blackgill were encountered in over 12,000 rockfish examined in party boat (recreational) fisheries for that region, consistent with the observation and assumption that recreational catches of blackgill are minimal. Heimann (1963) later reported on the species composition of Monterey Area trawl catches, separating the analysis into shallow (30-60 fm), intermediate (60-130 fm) and deep (130-200 fm) tows. Blackgill represented a trace amount of the rockfish catch in both intermediate and deep tows (0.2% and 0.1% of the total rockfish catch, respectively), with none of the fish encountered being discarded. Nitsos (1964) reported on the species composition of trawl landings for central and northern California trawl fisheries (Morro Bay to Eureka) and reported blackgill catches only in the San Francisco/Monterey Bay area. Those catches represented 0.03% and 1.37% of the total trawl catch in this region for 1962 and 1963, respectively, resulting in estimated trawl catches of 500 and 31,000 lbs each year; the average of these two values (15,750 lbs, or approximately 7.2 tons) is consistent with the estimated catch from the reconstruction effort of 7.5 and 9.2 tons for the central California trawl fishery, respectively. However, Gunderson et al. (1974) did not include blackgill in the composition of trawl-caught rockfish species from Eureka, Monterey and Conception INPFC areas; it is not clear if the species may have been present in trace but unreported amounts or if the species was simply not encountered in those samples.

Although this assessment includes the blackgill rockfish landings from the population south of Cape Mendocino to the U.S./Mexico boarder only, catch estimates for Oregon and Washington fisheries are included for informative and comparative purposes. These estimates were queried from the PacFIN database for the period from 1988 through 2010, with historical catches for Oregon provided by V. Gertseva (pers. com). These catches are reported in Table 9 by INPFC area and gear type (fixed gear versus other gear types). As discussed earlier, the vast majority of blackgill landings have come from the area south of Cape Mendocino. For the period from 1988 through 2010 (for which PacFIN data are available), blackgill catches north of Cape Mendocino accounted for only 3.35% of the coastwide total (1.75% of which was from northern California ports, 1.60% of which was from Oregon and Washington ports).

Discards

Estimates of discard rates for blackgill rockfish are essentially unavailable for any gear type prior to 2002 and the initiation of the West Coast Groundfish Observer Program (WCGOP), with the exception of the very early, and very limited, studies of several central California trawl fisheries in the 1950s and 1960s (discussed above). From 2002 onward mean discard rates were provided by from WCGOP (J. Jannot, WCGOP) based on bootstrapped samples of discarded and retained catches within area-gear-year combinations. The area and gear types matched those for trawl and fixed gear fisheries, as these fisheries were defined in the model (e.g., south of Conception fixed gear, Conception to Mendocino fixed gear, Conception to Mendocino trawl), with the exception that discard rates for the trawl fishery were estimated independently for the area south and north of 38 N, then applied to the relative catches in those areas and pooled back together for a total trawl fishery catch, as trip limits for slope rockfish are substantially different across this management line. In most years the discarded catch in all fisheries was a very small fraction (typically 1-2% of retained catch) for all fisheries and gear types.

Although the very limited amount of size data from discarded fish does suggest that discards tended to be smaller than the retained catch, the modest magnitude of the discards as well as the small number of length observations from discarded fish (less than 200 for all fisheries and years) led to a decision to account for discards by simply scaling up the estimated landings by the discard rates. Table 10 shows the mean annual discard ratios (discarded/retained catch) for these fisheries and regions by year, as well as the landed catch and the estimated total catch that results from applying the discard ratios. The vast majority of discards are thought to be regulatory in nature for this species, as related to management actions taken to reduce the catch of rebuilding species (and even so, discard rates seem to be very low). Consequently, we assume that discards are negligible before this time period. However, the sensitivity of the model results to this assumption should be evaluated.

D.1.g Length and Age Composition Data

Length and species composition data first began being collected by port-samplers in the early 1980s; prior to this period there are very few species or length composition data available (although there are some data for 1978 and 1979). Since that time, approximately 40,000 length observations have been collected from the three fisheries described for this model. However, sampling density has been variable over both space and time, and the amount of data collected from monitoring efforts can be variable by region. Specifically, only about half of these observations have gender associated with the observation, and in particular, for southern California Bight fisheries, gender information (as well as maturity and age structures) was only collected from 1985 through 1990.[5] Since that time, most southern California processors have not allowed port samplers to cut fish in order to determine gender or to remove age structures, as California law apparently stipulates that such sampling is voluntary, rather than mandatory (as it is in Oregon and Washington). Figure 11 presents a summary of the total number of length observations (for all *Sebastes* species) as well as the fraction which include gender information and the average number of lengths per ton of landing fish, by region, for California sampling efforts. This figure demonstrates the shift from mostly-gender specific length frequencies throughout the state through the 1980s, followed by a steep decline in the percentage of fish sampled for gender in the early 1990s (to 40-60% in central and northern California, and close to 0% in southern California). Of particular concern is the decline in the percentage of fish sampled for gender in central California over the past decade, when the fraction sampled for gender has declined from approximately 50% to 20%. As samplers typically cannot cut fish to remove otoliths when they are not allowed to cut to characterize gender, these trends also reflect a lack or reduction of age information for fish stocks in these regions.

At the request of the STAR Panel, we also developed estimates of the mean, median, 10th and 90th percentiles of lengths by fishery as a diagnostic, to better understand how these qualities have varied over time. These results (as annual values as well as a five year running mean) are shown as Figures 13-15 for the southern fixed gear, central fixed gear, and central trawl fisheries respectively. Mean lengths from the southern fixed gear fishery show a strong decline in the initial years of data collection (the early 1980s), followed by a relatively gradual decline through the late 1980s through 1990s, and a steep drop again in the 2000s (likely due to the implementation of the CCAs). Note that the upper 90th percentile of length observations in the 2000s is variable, but comparable to most of the whole period of the time series, consistent with the observation that while many blackgill landed now may be incidental to other fisheries (e.g., fishermen targeting sablefish or other deep species), there are focused efforts to target blackgill on some offshore habitats where large fish are still abundant. There is very little in the way of an obvious trend in the length compositions for the central California fixed gear fishery (which makes up a small fraction of the total catch, and likely reflects largely incidental catches from a wide range of fishing strategies). However, the central California trawl fishery, for which the data are most abundant and likely to be the most reliable (despite the fact that this fishery also likely reflects a broad range of fishing strategies), also shows strong signs of a declining trend over time, with a suggestion of a leveling or slight increase in the mean size of fish in recent years.

5 We confirmed that these fish represented uncut, rather than unknown sex determination fish by evaluating the frequency of unsexed fish relative to sexed fish by year and port group. We also noted the presence of "large" males in several fisheries that were almost certainly fish that were mistakenly sexed. We therefore decided to classify nearly all of such questionable samples as "unsexed," and pool those samples into length composition data without gender assignmentsTwo specific outliers were re-assigned based on the assumption that they represented mis-sexed fish, a 62 cm "male" caught in central California fixed gear in 1992 and a 58 cm "male" caught by trawl gear in 2003; re-assigning these fish to females did not result in a notable change to model results or parameter estimates, but did improve the likelihood and the readability of residual plots, which scale to the maximum observed value.

The initial effective sample sizes (input N, or N_{eff}) for commercial, recreational and fishery independent length frequency data were calculated using the approach developed by Stewart (2008) in which:

$N_{eff} = N_{hauls} + 0.138 * N_{fish}$ if $N_{fish}/N_{hauls} < 44$
$N_{eff} = 7.06 * N_{hauls}$ if $N_{fish}/N_{hauls} \geq 44$

In this method trips are considered equivalent to unique sampling clusters in port sampling data, or unique hauls in the triennial or NWFSC combined survey, and the maximum input N_{eff} is capped at 400. This approach tended to result in N_{eff} values for most fisheries and surveys that were somewhat greater than the model-estimated effective sample sizes but not to the magnitude at which trips (for CPFV trips) or clusters, which are subsamples of trips for sampling commercial landings, alone tended to result in lower effective sample sizes than those estimated by the model. Francis (in press, see also in Appendix C of He et al. 2009) demonstrates a reasonable approach to tuning effective sample sizes in situation where length frequency data might have an undue influence on model fitting to the point of swamping out the signal from relative abundance indices. Although we wholly agree with the principles of the Francis manuscript and approach, we felt that adopting this approach for this model was likely unnecessary due to the noisiness of the indices and the lack of apparent or obvious major tension between compositional data and those indices.

After careful evaluation of the raw (individual fish) versus expanded (based on fish ticket and port information, as documented in CalCOM protocols cited early) length frequency data, we compiled length frequencies using raw length observations. This was based on the determination that while the differences between raw and expanded length frequencies were typically negligible when sample sizes were relatively large, when sample sizes were smaller, the unevenness in expansions led to an apparent coarsening of the length frequency data. To confirm that this approach was reasonable, we ran the model with a set of both raw and expanded length frequencies using the same years and effective sample sizes. The model with the raw length frequency data had more than a 500 point improvement in the fit to the data, which in turn led to higher values for the model estimated effective sample size. Moreover, both of the resulting parameter estimates as well as biomass trend and other derived values varied only trivially (less than 1%) between the two models.

Currently, the participants of the CalCOM program are engaged in an analysis of expansion methods and criteria, particularly how expansions are conducted in data-limited fisheries and strata. Although the current analysis is related more to how the species compositions of landings by market category are conducted, the results indicate that there are benefits to utilize procedures that maintain as close a relationship as possible to the raw data and minimize unnecessary “borrowing” or expansion of data from poorly sampled strata (Shelton et al. in review). Future work should lead to revisions in expansion methods, as well as greater exploration of how length and age expansions are or could be developed. In the near term, however, we recommend greater exploration of the relative sensitivity of models to alternative (or no) expansion routines, and having done so for this model, we have decided to use the raw length frequency observations in the base model.

This is also consistent with what was done for bocaccio rockfish (*Sebastes paucispinis*) in the most recent (2009) as well as early assessments (Field et al. 2009, MacCall et al. 2003). Tables 11 through 13 show the available number of length observations; fisheries subsamples; and effective sample sizes by fishery, year, and availability of gender information for all of the length data used or available for the model.

Age data were incorporated into the model as conditional age-at-length (AAL) compositional data. This approach has the advantage of treating age data as conditional on length (essentially as entries in an age-length matrix), which avoids issues of "double-counting" age and length data that are derived from the same sampling systems (typically the same individual fish). This also facilitates the estimation of growth parameters internally within an assessment model, including the CV of length at age, information that is typically far more difficult to derive from standard age compositional data (Stewart 2008). Limited data were available for all three of the fisheries as well as most years of the NWFSC combined trawl survey. Table 14 shows the number of ages available by fishery or survey and year, as well as the number of subsamples or hauls from which the samples were drawn. The effective sample size for each subsample (fishery/year/gender/length bin combination; genders were modeled independently as recommended for species with dimorphic growth) was set to the number of samples for that strata. Originally, we explored apportioning the effective N for each strata based on the Stewart approach, however, the effective sample size was consistently much greater than the input with the result that the model was not fitting the age data well, leading to perceived problems in the fit to the growth curve. Consistent with the approach for commercial length frequency data, the AAL compositions were not expanded by strata or trips, but rather each age/length observation was considered independent and weighted equally.

D.1.h Survey Data

Triennial Trawl Survey

A primary source of fishery independent information for most managed and assessed groundfish species in the California Current is the West Coast triennial trawl survey conducted between 1977 and 2004 (e.g., Weinberg et al. 2002). As the general consensus from recent data workshops has been to exclude 1977 data, we have not used these data in the development of a blackgill rockfish index. Moreover, from 1980 through 1992, the survey did not sample depth strata deeper than 366 meters, which is the region of greatest abundance for blackgill rockfish. Consequently, we maintain the approach developed for the 2005 assessment, and explored an index using only the years 1995-2004. During this period, the survey extent ranged from the north to approximately Point Conception (the southern limit varied slightly from year to year), consequently this survey did not sample blackgill in the core region of their habitat. Nevertheless, this is the only fishery-independent survey information currently available for this species prior to the development of the NWFSC combined shelf/slope survey.

The indices were developed from haul datasets from which both bad performance tows and "water hauls" were excluded (hauls in which few benthic organisms were noted; Zimmermann et al. 2001). Figure 16 a-d shows the tow location and catch rates of positive tows for these four years from the Point Conception area to Cape Mendocino. The number of total hauls, number of positive hauls, and number of hauls in which lengths were measured, and total number of lengths measured by year are presented as Table 15.

An index of relative abundance was developed using the Generalized Linear Mixed Model (GLMM) approach described in Helser et al. (2007), and model code for implementing this approach developed by John Wallace (NWFSC, pers. com) in the R programming language and utilizes a Bayesian statistical package called Open BUGS (an offshoot of WinBUGS, *http://www.openbugs.info/*). The model uses depth and latitude strata as fixed effects, with an option to use vessel effects as random effects, to develop stratum-specific estimates of catch rates (kg/ha), which are then expanded to the total area of a given stratum to arrive at an abundance estimate. The model can use either lognormal or gamma distributions for the error estimation of positive tows, although based on an analysis of performance to both gamma and lognormal simulated data and the discovery of some apparent errors in the parameterization of the lognormal distribution, the developer of the program (J. Wallace) has strongly recommended use of the gamma distribution. This advice was followed. As the paucity of positive tows made estimation by fine-scale strata impractical, depth effects were constrained to 150 to 350 meter and 350 to 550 meter depth bins, with latitude effects constrained to the Conception (34.5°N to 36° N) and Monterey (36° N to 40°10' N) INPFC areas. Vessel (mixed) effects were not explicitly modeled for the triennial survey data.

The resulting index is shown in Figure 17 relative to the earlier GLMM estimate from Helser (2005). Both show a substantial increase in relative abundance over this 10 year period for which data are available. The precise reason for the discrepancy is likely a consequence of using the gamma, rather than the lognormal, error distribution but may also relate to changes in the GLMM code developed by J. Wallace (NWFSC). This minor discrepancy is not likely to be consequential given the relatively modest influence of the survey index on the model result.

Northwest Center Combined Trawl Survey

The Northwest Fishery Science Center has conducted combined shelf and slope trawl surveys since 1998 along the U.S. west coast, although in the first year, *Sebastes* were not identified to species. From 1999-2002 only deep water (slope) strata were sampled, no length data were collected, and the waters south of Point Conception were not sampled. The survey design changed in 2003, when a random-grid design was adopted; additional details on this survey and design are available in the abundance and distribution reports by Keller et al. (2008).

Due to the shifts in sampling coverage and the nature of sampling methods, we developed two different indices for this survey. The first utilized the slope survey results from 1999 through 2002 for deep strata in the region north of Point Conception. As no length data were available for estimating selectivity in this survey, we mirrored the selectivity to the triennial trawl survey estimated selectivity, as the latter more closely approximates the geographic boundaries as well as time period of the NWFSC early slope survey data. As there were very few "shallow" water tows, depth effects were not explicitly modeled, and the only stratification was with respect to the INPFC areas (Monterey and Conception) for the region from 350-550 meters. The second index was developed using the 2003-2010 data, for which the survey sampled the entire Conception and Monterey areas and depth strata, collecting length information from nearly all hauls. Selectivity was separately estimated for this survey based on the length frequency data, and the relative abundance index was developed using the same GLMM approach as described for the triennial survey. A suite of depth and area stratifications were explored, although low sample sizes in most years prevented the adoption of high resolution for either variable. The depth strata ultimately chosen were 150-350 meters and 350-550 meters, with area (latitude) strata representing the Monterey and Conception INPFC areas. The resulting indices varied little among the alternative stratifications and are presented as Figures 18 (slope only survey period, 1999-2002) and 19 (combined survey, 2003-2010). Although the resulting indices from both surveys are noisy, reflecting sampling error more than they could possibly reflect actual year-to-year changes in the abundance of this long-lived, slow growing species, they share a common trend towards an increasing biomass since the mid- to late- 1990s.

Figures 21 and 22 show the pooled (all years) CPUE observations for the trawl survey for central and southern California, respectively, with 200 meter isobaths and a background that is based on kriging (spatial variogram estimates) of catch rates over space. Note that all tow data deeper than 600 meters is excluded (as there has been only one positive occurrence of blackgill at these depths throughout the time series), and the tow data are shown, but a density contour based on kriging is masked for the data from 0 to 200 m depth due to the rarity of blackgill in these shallow habitats. The kriging is based only on nearest neighbor, rather than being a habitat model (which might include depth, rugosity or other habitat covariates) and, as such, should be interpreted with caution. However, it does tend to emphasize the regions of greatest abundance of blackgill rockfish, which tend to be offshore banks, particularly the Santa Lucia banks off of Morro Bay, Patton, Cortez and other banks in the southern California Bight, and even the Mendocino escarpment in northern California. Note that there has been no sampling within the cowcod conservation areas (CCAs), a vast region described by fishermen as being very prime habitat for blackgill rockfish and encompassing a large fraction of the offshore habitat between 200 and 600 meters.

Although these figures project the image of high sampling density, which is true over the cumulative period of the survey, this is considerably less true when year-to-year coverage is considered. Appendix B (Figures B1-B9) presents maps of the year-to-year CPUE estimates, including hauls that did not encounter blackgill; note that all hauls deeper than 600 m, where blackgill have only once been encountered, are excluded for clarity. Additionally, Figures B7 and B8 show the same catch rates, pooled over all years, broken apart into catches of "large" (greater than 35 cm) and "small" (less than 35 cm) blackgill. There is some suggestion that catch rates of larger fish are lower close to ports and fishing grounds and greater in more distant (typically offshore) areas. Moreover, there are few areas with high catch rates of large fish east of the Cowcod Conservation Areas (CCAs), where a considerable fraction of the historical fishery has taken place. Although we explored the potential to either model "shallow" or "deep" strata independently, as well as the potential to model "large" relative to "small" blackgill catch rates as separate time series, the resulting indices were not substantially different but were increasingly noisy, due to the relative rarity of the species and paucity of sampling in their optimal habitats, to do any more than generalize the visual observations.

All survey indices were treated as relative abundance indices, we did not attempt to fix or estimate catchability coefficients. This is due to the high variability in the catch data and the resulting time series, the fact that two of the indices did not cover the full extent of the range of blackgill (e.g., the southern California Bight), the fact that the one survey that did cover this area excludes the Cowcod Conservation Areas (which likely represents a substantial fraction of blackgill habitat and abundance), and the fact that adults are thought to have affinities for rocky habitat of high rugosity, which is typically poorly sampled by trawl survey gear.

D.2 History of modeling approaches for blackgill rockfish

The first assessment for blackgill rockfish was done in 1998 (Butler et al. 1998) and was based on stock reduction analysis (assuming constant recruitment) for the Conception INPFC area only. Data were used from 1980 through 1997, and the model was designed to answer the questions of what the then current level of available biomass was relative to historical levels, and whether current catches were sustainable; the model assumed that vulnerable biomass was equal to mature biomass based on comparisons between maturity curves and length frequency data. The model assumed a natural mortality rate of 0.047, and two alternative models (a STAT preferred model and a STAR Panel preferred model) estimated total mortality (Z) values for the 1980-1997 time period to be 0.125 and 0.099, respectively. The results indicated that the then status quo fishing mortality rates (associated with catches in the range of 150 to 250 tons) were approximately equal to $F_{50\%}$-$F_{55\%}$, and thus likely to be "reasonable upper bounds on management targets."

Blackgill rockfish were again assessed in 2005 (Helser 2006) using stock synthesis 2 (version 1.19, April 27th 2005). That assessment expanded both the geographic range, to include both Conception and Monterey INPFC areas, and the temporal scope, from 1950 through 2004, of the assessment. Catch data for the 2005 assessment were interpolated back to 1950 based on a linear increase in the fraction of total California rockfish catches attributed to blackgill that culminated in the observed ratio for the late 1970s, which reflected a gradual movement to deeper and more offshore waters. The 2005 assessment also included more comprehensive exploration of plausible proxies and estimates of natural mortality rates and included the results of an age validation study that used lead 210 to validate longevity and growth estimates (Stevens et al. 2004), although there was relatively little age data available for the model itself. The 2005 assessment also developed several time series of abundance based on the AFSC triennial survey, several

AFSC slope surveys, and the then relatively recent NWFSC slope survey. Although length composition data were the most important source of information for the 2005 assessment, growth parameters were estimated internally using the conditional age-at-length approach and the data published by Stevens et al. (2004; for the triennial survey only; Helser did not use Stevens data for 1980s commercially sampled fish).

Fisheries in the 2005 model were defined as hook and line, setnet and trawl fisheries. Additionally, there were three survey time series (with length composition data), for which catchability coefficient (q) values were estimated. Selectivity was estimated with double-logistic functions for all fisheries and surveys (with strong doming on the largest size classes by all fisheries), although the setnet fishery selectivity was set to mirror the hook and line fishery, and all three surveys had mirrored selectivity as well. The trawl fishery was parameterized to have two time stanzas of selectivity, 1950 to 1990 and 1991 to 2004, based on the observation that this fishery tended to land smaller fish after 1990. Natural mortality was assumed to be equal to 0.04 (based on likelihood profiles), steepness was fixed at 0.65 (based on Dorn 2002), and recruitment deviations were estimated from 1970 through 2004 with sigma-R set at 0.5. The greatest recognized uncertainty in the 2005 model was natural mortality, and the decision table for that model explored the consequences of alternative low (0.03) and high (0.05) values of M as a sensitivity.

The base model results from 2005 suggested that the spawning biomass of blackgill had declined from 9503 metric tons in 1950 (the unfished level) to 4797 in 1999 and increased from then to 4977 tons (52% of the unfished level) in 2004. The model estimated a less than 10% probability that the spawning biomass in 2004 was below the minimum stock size threshold of 25% of the unfished level. The SPR was estimated to be lower than target levels (e.g., exploitation was greater than target levels) during much of the 1980s and 1990s, since 1997 the model estimated that the SPR had been above (less exploitation) the target of 0.5 with the 2004 value estimated at 0.63. The model estimated MSY was 223 tons.

D.2.a Response to previous STAR panel recommendations

This section lists the ranked recommendations for future research (specific to blackgill rockfish) from the 2005 STAR Panel, and how those recommendations were or could be addressed in this or future assessments.

A) A study of contemporary age and growth of blackgill rockfish needs to be conducted. Samples have already been collected but not aged, and differences by sex, area, and perhaps time should be re-investigated to determine if these partitions need to be explicitly accounted for in the assessment model. If results of this study are promising, this species should be considered for inclusion in the production ageing cycle.

A renewed effort to age blackgill was initiated by the FED/SWFSC, for which ageing criteria were developed and alternative approaches explored. These efforts initially resulted in nearly 3000 fish being aged using break and bake methods. However, early efforts uncovered bias problems among some of the early ages and later ages, and as a result of these problems all of the fish initially aged are currently being re-aged with greater quality control and within reader comparisons. A total of 2047 such ages are used in this assessment, over ten times the number of age observations used in the 2005 assessment. Although efforts were made to engage the author of the 2004 age validation study (M. Stevens), this researcher has not been involved in ageing since that study and ultimately was unable to participate in a cross-reader study. There were no other viable near term options for cross reader validation for this species, although we note that the results of the ageing effort have been consistent with those of earlier published studies and yielded growth parameters consistent with published studies and the most recent assessment. Yet, as the maximum ages arrived at between this and earlier ageing studies have varied somewhat, future research should also include efforts to cross validate ages among multiple readers.

B) The bulk of the U.S. population of blackgill is found within the Conception and Monterey Areas. However, an unknown fraction of the population resides in Mexican waters. The next assessment should attempt to document catches in Mexican waters by both U.S. and Mexican fishers and consider the implications of blackgill being a shared stock. Application of genetic techniques for the identification of rockfish larvae taken in CalCOFI-like surveys has the potential to further elucidate the distribution of the resource.

This and other issues related to management of resources that straddle the U.S./Mexico EEZ's were raised at a recent meeting between Mexican officials and SWFSC leadership, and there is a desire on the part of both parties to increase data-sharing and joint research efforts. However, given the complexity of political relationships with Mexican fisheries officials, no substantive action was possible for this assessment.

C) The data from NWFSC Combined Survey are likely to be the foundation of any future assessment. Information contained in the tows made in <100 fathoms needs to be investigated to determine if they contain any useful information with regard to the abundance and distribution of blackgill rockfish.

As noted and discussed in the 2005 assessment, there are very few blackgill rockfish encountered in waters shallower than 100 fathoms. The deeper strata from the NWFSC combined trawl survey are the most informative with respect to blackgill abundance trends. However, the signal from this survey is highly variable due to the patchy distribution of this species, and the likely affinity to rocky or hard substrates.

D) The triennial survey will likely be discontinued in 2006 and so it is desirable to determine whether it is possible to calibrate the triennial survey indices with those from the NWFSC Combined Survey.

This issue is beyond the scope of this assessment, but was discussed in detail in various workshops. The general conclusion is that the triennial survey indices are not compatible with, and should be treated separately from, the data and indices from the NWFSC combined trawl survey.

E) Discard rates for blackgill in the fixed gear sector were not available for this assessment. Sablefish longline catch was highlighted as one of the sectors that may be contributing significantly to discards. The WCGOP is increasing its sampling of the fixed gear sector, and estimates from this program should be included in the next assessment.

Considerable data now exists for estimating discard rates from both fixed gear (longline) and trawl fisheries. These data suggest that discard rates tend to be low in the Conception and Monterey INPFC areas, although they are higher north of Cape Mendocino, likely due to the constraints on slope rockfish trip limits in that region.

F) There is little available information to describe the fecundity of blackgill, either in time or space. This needs to be investigated.

A comprehensive effort to collect adult blackgill for both maturity (using histological methods) and fecundity data was undertaken for this assessment. Preliminary results have been incorporated into the 2011 model, the results of the histological examinations will take more time to develop (see Appendix A for early results), but should be completed within a year at which point they will be published and made available for future assessments.

G) Any work that would help identify the habitat associations of the largest/oldest fish may assist with determining which gear (if any) is most likely to have asymptotic selectivity. Increasing the certainty of the descending limb of the selectivity pattern for one gear type, for instance the trawl survey, may help define this parameter for the remaining gear types.

There has neither been sufficient data nor time to address this recommendation, although we agree that habitat association studies and research should be of a very high priority for future research for this species.

H) An effort should be made to evaluate how port samples are being taken to determine if they are in fact representative of the commercial catch. Although a seemingly effective effort was made within the assessment to post-weight the available lengths, it would be informative to know the sampling protocol used to determine whether any adjustments to this method need to be made. Species identification between darkblotched and blackgill should be addressed in the port samples.

The port sampling protocols and results are discussed in greater detail in several publications cited in the data section (e.g. Pearson and Erwin 1997, Pearson et al. 2008). The FED is also in the process of evaluating and publishing studies that consider how port sampling is conducted and where there might be greater potential for errors or problems in this system (e.g., Sheldon et al. in review- available upon request). With respect to species mis-identification of blackgill and darkblotched rockfish, in the authors opinion, this is possible; however, the very small number of “unrealistically large” blackgill rockfish in port sampler data from central and northern California, the region in which misidentification as the often larger darkblotched is more likely, leads us to conclude that while some misidentification may occur, this should be of a relatively minor magnitude and is likely not a potential source of serious error.

I) Separate Conception and Monterey models for blackgill should be investigated. However, it was recognized that this would be hampered by low sample sizes for most of the available data sources.

Instead of exploring separate models for these two regions, this assessment pools fixed gear fisheries (which were treated with mirrored selectivity) into regional fisheries for the Conception area south of Point Conception and the area north of Point Conception. This structure facilitated comparisons of "separate" models north and south of Conception by turning off data sources, re-estimating survey compositional data, and retaining only catches from the appropriate region. Such models were presented and discussed during the STAR Panel review, at which time both the STAR Panel and the STAT concurred that despite some suggestion of differences in growth and other life history parameters regionally, a single model was likely to be the most appropriate.

Generic recommendation D) Several of the 2005 assessments have conducted historical catch reconstructions. An effort needs to be made to develop a consistent approach to reconstructing catch histories. The ideal outcome would be a single document outlining the best reconstructed catch histories for each species (c.f. Rogers (2003)1 that lists foreign catches). The California landing receipts on microfilm back to 1950 should be incorporated into the landings database.

The initial round of the California catch reconstruction effort was completed prior to this assessment (Ralston et al. 2010), and the results were used for historical catch estimates for this species. However, it was noted that the first reconstruction effort likely did not account for the spatial expansion of fisheries into deeper habitats over time, and future revisions to the initial catch reconstruction effort will likely be appropriate.

D.2.b Report of consultations with GAP and GMT representatives

A short data workshop and discussion was held with Council staff, GAP and GMT representatives to the 2011 blackgill STAR panel at the June 2011 PFMC meeting in Spokane, Washington on the evening of June 9^{th}. The basic sources of information used in the assessment (length frequency, survey data, new age and fecundity data) were discussed, as were changes in the model structure (e.g., pooling fixed gear north and south of Point Conception, rather than having separate but coastwide fleets for hook and line gear as distinct from gillnet gear). There were no glaring or obvious problems raised with the data or the modeling approach discussed at this meeting.

The STAT queried participants with regard to several of the decisions made in developing a base model for the 2011 assessment. First, with respect to the landings history, the question was raised regarding the likelihood that blackgill were caught and landed in any appreciable quantities prior to 1950 (as suggested by the historical catch reconstruction, but as likely to be questionable based on the limitations of the capabilities of gear for fishing deep water at that time, as discussed in the catch history section here). The GAP representative and other participants agreed that the fisheries north and south of Point Conception had different characteristics, qualities, and histories, particularly with regard to the history of targeting versus incidentally encountering blackgill, and that the fleet structure developed for the 2011 model represented a reasonable approach.

The blocking of selectivity for the trawl fishery prior to and post-1990 (as done in the 2005 model) was discussed, as were reasonable blocks for selectivity for other time periods and fisheries. In particular, the fact that the cowcod conservation area (CCA) closures effectively shut fishermen out of some of the most ideal blackgill habitat was noted as being of key concern to participants. It was concluded that blocking selectivity for the southern California fixed gear fleet prior and post CCA implementation was something that should be explored and likely implemented in the base model. The rockfish conservation area (RCA) closures coastwide were not considered to have comparable direct effects on blackgill effort and landings, as most blackgill are found at greater depths than the closed areas, although indirect effects (effort shifts) are likely. Similar concerns were raised with respect to the fact that the combined trawl survey does not sample within the CCAs (although it does within the coastwide RCAs), suggesting that point estimates of biomass from these surveys are not likely to be reliable, as they exclude sampling in some of the regions of greatest blackgill density.

Another topic explored was the geographic range of the assessment. Given the relatively low volume of landings and low biomass of blackgill north of Cape Mendocino (although noting that the region directly off of the Cape seemed to be an area of interest to blackgill), the participants of the data workshop also agreed that maintaining the 2005 model spatial structure (e.g., the Conception and Monterey INPFC areas) was a reasonable approach for the 2011 model.

Finally, estimates of discard rates from the NWFSC groundfish observer program were presented and discussed, particularly with respect to apparently high and very variable rates for the central California trawl fishery. Participants pointed out that trip limits for slope rockfish vary considerably north and south of 38° N, as well as N of 40° 10’, and recommended that data be considered at a greater spatial resolution. A revised data request was made to the West Coast Groundfish Observer Program (WCGOP) shortly after the workshop, and, indeed, bycatch rates vary considerably across the northern latitudes below and above the boundaries for this assessment, with bycatch rates increasing modestly north of 38° and substantially north of 40° 10’.

D.2.c Transformation of 2005 model to SS3 v3.20

The SS2 files from the Helser (2005) model were obtained from Tom Helser to aid in mapping the transition from the 2005 model (developed in stock synthesis 2) to the current (developed in stock synthesis 3). Given the substantial nature of changes to the modeling platform, it was advised to start with a simple model and essentially rebuild the 2005 model in SS3 (v3.20) from scratch (e.g., there was no easily implementable conversion software). Although we were also advised that the estimation of the likelihood functions for the various data should have changed little, we found it difficult to replicate many of the patterns reported in the 2005 model (particularly for recruitment) as well as difficult to arrive at the same final objective function(s) as reported in the 2005 assessment.

In doing this exercise, it was noted that the model documentation files in the appendix of the 2005 assessment do not correspond to the final 2005 model but rather to the draft model developed prior to the 2005 review panel. Moreover, although the documentation states that the growth parameters for female and male blackgill were estimated internally (based on conditional age-at-length data), the resulting estimates are not reported in the documentation; Table 15 (of Helser 2006) reports what appear to be starting values from the traditional (rather than the Schnute) form of the growth model, but these point estimates were not entirely consistent with the final model estimates of the growth equation from the SS2 output files. From these files the growth coefficient (K) was estimated to be 0.0472 and 0.0707 for female and male blackgill, respectively. As we encountered difficulty in replicating these point estimates when growth was estimated internally in the SS3 version of the 2005 model, growth parameters were ultimately fixed at the 2005 final estimated values (based on the summary output spreadsheet from the 2005 model; confirmed by re-running the final model files in SS2).

With the exception of these growth parameters, the model structure in the reconstructed model run in SS3 was essentially identical to that of the SS2 model. All of the data were identical, as were length and age bin structures and life history parameters. Estimated parameters were given the same priors, prior types and standard deviations; these estimated values including R_0, recruitment deviations from 1970 to 2004, catchability coefficients for the survey data, an a suite of parameters estimated (while others were fixed) for double-logistic (dome-shaped) selectivity curves estimated for the hook and line and setnet fisheries (which were mirrored), trawl fishery (blocked pre- and post 1990), and surveys (all three of which were mirrored). Despite this, and despite considerable efforts to tinker and modify the model structure, the exact results from 2005 could not ultimately be replicated in the SS3 version of the 2005 model. When the selectivity parameters that were freely estimated in the 2005 model were estimated in the 2011 model, the result was unreasonable, with an equilibrium spawning biomass of nearly three times the 2005 level, with very little depletion from the unfished level. When the parameters were fixed at the values estimated in the 2005 model, results were more consistent to the 2005 results. However, even with selectivity parameters fixed, the 2011 recruitment deviations were inconsistent with those estimated in 2005, including the tendency for a very large deviation in 1991 that is not well supported by data and has undue influence on abundance. To constrain this, a lambda of 4 was added in the penalty to recruitment for the SS3 version of the 2005 model.

Figures 23-24 show a comparison of key model output from the 2005 model relative to the "best" approximation of that model in SS3 (fixed growth and selectivity at 2005 point estimate values, high lambda on recruitment). The spawning biomass trend is highly similar (although the SS3 spawning biomass is biased high throughout), and the estimated

SPR is almost exactly identical. However, the estimated recruitments vary substantially, likely due to the substantial changes in how recruitment (and bias adjustments) are made in SS3 or potentially for other reasons that are not yet understood. As considerable tinkering with the model code did not lead to any changes in these results and the recruitment estimates themselves have a negligible impact on the primary model outputs (due to the very slow growth and longevity of these animals), we did not consider this shortcoming to be of tremendous concern when moving forward. The objective functions, key reference points and parameter estimates are all reported in Table 17, while Table 18 shows parameter point estimates among these three models.

The likelihood values shown in Table 17 clearly demonstrate that while the "fixed" parameter model more closely approximates the results of the 2005 assessment, there is a tremendous improvement in likelihood by freeing up the parameters in a fashion consistent with the 2005 model setup. Again, there was no obvious reason for these discrepancies; they likely represent changes in the model estimation procedures over time. Also, as noted earlier, the catch histories reflected in the 2005.dat files were not consistent with those reported in the 2005 assessment document. As the catch histories from the 2005.dat files are consistent with the 2005 model output that was reported in the final assessment (including the .dat and .ctl files included as an appendix to the 2005 assessment), all of the comparisons described above were conducted using the catch trajectories from the 2005.dat file. However, due to this confusion, as well as time constraints and poor understanding of the factors that are responsible for these differences, we moved forward with revisions to the SS3 model from a "baseline" 2005 model, which we considered to be the fixed parameter model, as this model more closely approximated the results upon which management decisions were made. We also note that this is not a unique problem when moving between model versions of stock synthesis; for example He et al. (in review, appendix D) found less severe but substantial differences in model results between the 2009 and 2011 versions of stock synthesis for widow rockfish. Consequently, we did not engage in a more systematic exploration of every model change between that model and this one as part of this documentation.

D.3 Model description

This assessment used the Stock Synthesis modeling framework written by Dr. Richard Methot at the NWFSC. The most recent version (3.21fb) was used, since it included many improvements in the output statistics for producing assessment results and several corrections to older versions used during the 2009 and earlier assessments. With respect to structural options, we generally used those that are consistent with the most commonly used approaches for west coast groundfish.

D.3.a Priors

A beta- distribution prior on steepness for *Sebastes* species, as updated from Dorn (2002), was provided with a point estimate of 0.76 and a standard deviation of 0.17. Although we explored the model with and without estimating steepness, we found too much confounding between steepness and other sensitive parameters, particularly natural mortality. Consequently, the final model has steepness fixed at the point estimate of the Dorn prior, with a profile on steepness to evaluate the sensitivity of model results to this value. Similarly, although a prior was developed for natural mortality (M), based on an approach in development by Owen Hamel (NWFSC; discussed in more detail earlier in the document), this model used the point estimate of that prior and fixed natural mortality at that level. All other priors in the model were non-informative uniform priors that were given wide parameter bounds.

D.3.b General model specifications

The basic model structure is moderately changed from the 2005 model, with six primary fisheries (although these, and the surveys, have been redefined, and four "ghost" fisheries have been added to track various composites of size and age information without affecting the likelihood estimation). There are two sexes modeled, and the length and age data are organized into 30 length bins, from 6 to 64 cm, and 29 age bins, from ages 4 through 60. Variations on these bin structures were explored throughout the development of the model and during the review. The modeled time period is from 1950 through 2010. Natural mortality remains almost certainly the greatest axis of uncertainty in this model. The 2005 model fixed natural mortality at 0.04 for both sexes, based largely on likelihood profiling, and explored the consequences of variable mortality rates on the perception of stock abundance and productivity. For this model natural mortality is based on the point estimates for the Hamel prior (discussed earlier), which are 0.063 and 0.065 for females and males, respectively. Similarly, we fixed steepness in the base model at the point estimate of the (updated) Dorn prior, 0.076.

As discussed earlier, we explored both the history of the blackgill rockfish fishery and the length frequency data in assessing how to develop the fleet structure for this model, as well as discussed the history and nature of the fishery with the representative from the Groundfish Advisory Panel. Given the nature of the development of the targeted blackgill fishery by fixed gear (hook and line, setnet) fisheries in the southern California Bight and the greater similarity in length frequency compositional data between the two fixed gear fisheries in that region relative to the same gear types in central California, we revised the fleet structure from Helser (2005) to reflect the geographical nature of the fisheries. For example, in central California, 25% of the samples that were positive for blackgill had only one blackgill present, and 50% of the samples had 5 or less; whereas in southern California, less than 10% of samples had only one fish while 60% had ten or more (there are typically 25 fish per sample). This suggests, and historical documents as well as fisheries participants generally seem to confirm, that the blackgill fishery is more of a targeted fishery in the SC Bight, while more of an incidental catch in a multispecies fishery as one moves around Point Conception and into the Central California region. We also found greater similarities between the length frequency data for central California fixed gears (hook and line, and setnet) than between the same gear types in different regions. Thus, we modeled our fleets based on assumptions of shared behavior, with a southern California fixed gear fishery, a central California fixed gear fishery, and a central

California trawl fishery. As there have been minimal trawl landings from southern California waters at times (trawling has largely been banned in most waters south of Santa Barbara since the 1970s), those landings were folded into the central California trawl fishery. Similarly, the minor recreational landings of blackgill rockfish, nearly all of which have taken place in southern California waters, have been folded into the southern California fixed gear fishery.

D.3.c Estimated and fixed parameters

A total of 23 parameters were estimated in the base model, reflecting primarily growth (8 parameters estimated), selectivity (14 parameters estimated), and unfished recruitment (R0, a single parameter). Growth was estimated internally based on the Schnute parameterization and the available compositional catch-at-age data to inform the growth curve. As the model behaved poorly when trying to estimate L_{min} (the length of fish at the smallest age class defined in the Schnute model), this value was fixed at 12 cm (for age 6 fish), based on the distribution of ages for 12 cm fish observed in the NWFSC combined trawl survey data. Thus, there were a total of eight growth parameters that were freely estimated: L_{max}, K, and the CV of growth at age for both young (A_{min}) and old (A_{max}) fish of each sex. Values for A_{min} and A_{max} (the age at which fish are estimated to be at sizes corresponding to L_{min} and L_{max}) were set to 6 and 60 respectively; there was relatively little sensitivity to varying values on the age for which these parameters were estimated. The log of the unexploited recruitment level is treated as an estimated parameter, however, recruitment deviations were not estimated, as the lack of obvious cohorts in either age or length data, the high degree of ageing uncertainty, and the paucity of age data makes plausible estimates unlikely. In sensitivity tests where recruitment was estimated, the results suggested that the model was trying to compensate to poorer fits from other model elements rather than realistically capture variability in year class strength that were informed from length frequency or other data. This represents a significant departure from the 2005 model.

Selectivity was modeled with only the ascending limb of the double-normal selectivity curve parameterization (three parameters free, three parameters for the descending limb were fixed to represent asymptotic selectivity). As the difference between fit and model results were negligible between this form and the more simple two-parameter logistic selectivity curve, we maintained the use of the double logistic curves for the fisheries, in order to more easily and reliably evaluate the sensitivity of the model results when dome-shaped selectivity was explored. This too was a significant departure from the 2005 model. Generally, the decline in selectivity inferred by double-normal was only of the very largest (and very rarely encountered) size fish, inferring that a descending limb to the selectivity curve was unnecessary. However, in the review we spent considerable effort evaluating the shape of selectivity curves for the two surveys, which generally led to different shapes for the NWFSC combined trawl survey and triennial survey between these two alternative parameterizations. Specifically, the NWFSC combined trawl survey often hit the boundary of the peak value when freely estimated using a double-normal parameterization, but this problem did not persist with a logistic formulation. The problem also became less of an issue following a change in the length bin structure of the model, although the shape of the curves under each parameterization were still dissimilar. As a result, and in consultation with the STAR Panel, the survey selectivity curves were modeled using simple logistic curves. Results with respect to derived quantities such as SSB_0 and depletion varied by much less than 1% when fisheries and/or surveys were allowed to be dome-shaped or when either of the surveys was parameterized as double-normal rather than logistic.

D.3.d Model selection and evaluation

We explored a wide range of model runs with alternative specifications and free parameters, including a wide range of structural assumptions regarding natural mortality (M) and steepness (h), various growth estimation routines, various means of tuning of compositional data and survey indices, estimation of recruitment variability, variable assumptions with regard to the structure of selectivity curves, different levels of emphasis on survey data, and alternative means of time-blocking selectivity. The model was most sensitive to natural mortality (M) and to alternative assumptions regarding the blocking of selectivity for the southern fixed gear and central trawl fisheries, so these factors were explored the most comprehensively in selecting the final model structure. Although the model was sensitive to assumptions regarding steepness (h), this sensitivity was considerably less than the sensitivity to natural mortality. Thus, in the interest of developing the best understanding of the relative model performance and results relative to alternate values of M, steepness was generally fixed at the Dorn prior value for most runs (a profile and sensitivity to this assumption is discussed).

D.3.e Comparison of key model assumption

The blocking of selectivity has a strong effect on the model, with results being considerably more pessimistic and fits being considerably degraded, without block parameters. The two primary blocks explored were a 1990 block on the central trawl fishery (carried over from the 2005 model) and a block on the selectivity of the southern California fixed gear fishery starting in the year 2000 (representing the implementation of the cowcod conservation areas, which were fully established in 2001). The rationale for the 1990 trawl blocking was not fully explained in the 2005 model beyond the fact that there is a slight but notable shift in the size composition data before and after this period. The central California trawl fishery was going through substantial changes during this period, including the ratcheting down of trip limits of *Sebastes* species, first by trip, then over bi-weekly, monthly, and bi-monthly periods. However, given that fisheries were generally expanding to deeper waters over time throughout this period, our expectation would have been that the fishery should have encountered larger, rather than smaller, fish during this period. It is possible that a combined mix of changes in market and regulatory conditions led to an increased acceptance by processors of smaller rockfish, in which case the issue would be more likely to represent a shift in retention rather than selectivity (but note that we assume negligible discards for the trawl fishery prior to the period of WCGOP data availability). More likely, this observation reflects the shifting nature of the target species and fishing strategies for trawl fisheries, few of which are likely to be explicitly targeting blackgill, along a broad,variable stretch of coastline. Given the absence of bycatch information during this period and the dramatic nature of regulatory changes that have taken place since the current observer program has been implemented, there is no way to understand precisely what process is responsible for this shift. Ultimately we did not include the trawl blocking in the base model.

The sensitivity to the southern California fixed gear selectivity blocking was quite different, with a relatively modest change in derived values (initial spawning biomass, ending year depletion), as well as with a considerably improved fit to the data. In this instance, there is a clear management/regulatory rationale for implementing a selectivity block at this time period, the establishment of the cowcod conservation areas (CCAs), which effectively closed a tremendous area of blackgill rockfish habitat to southern California fixed gear fishermen. There is a clear shift evident in the length frequency data of this fishery beginning in 1998 (interestingly, several years before the CCAs were implemented) but particularly evident from 2002 through 2010 length frequency data (no data are available for the 1999-2001 period). This may well reflect a lack of access to good habitat, although it is also noteworthy that landings in southern California fixed gear fisheries declined dramatically immediately before that closure (consistent with the shift in length frequencies in 1998) in southern California ports, particularly San Diego and Los Angeles area ports in 1998 and Santa Barbara area ports in 1999 (landings stayed very low for several years, then increased again in 2002; see Table 6). Thus, other regulatory or market factors could have also contributed to this shift. Most importantly, if the shift was partially or wholly caused by the closure of the CCAs, this infers that most of the blackgill stock residing in habitat outside the CCAs has been heavily exploited, consistent with the sequential depletion of large fractions of stock biomass as the fishery developed over time. Available data do indicate that a substantial fraction of historical landings originated from outside the current CCAs (based Kronman 1999 and unpublished southern California historical catch block summary data). This and other issues related to the spatial structure of the fishery and the past and existing biomass relative to this large closed area remain a key uncertainty in this model.

D.3.f Model diagnostics and convergence

All indications were that convergence was not an issue with the base model or the primary models run to evaluate the sensitivity to substantive changes in assumptions regarding parameter point estimates. Convergence was assessed first by observing that the hessian matrix inverted in virtually all runs when minor changes were made (the log of the determinate of the hessian for the base run was 99.42, with a maximum gradient component of 0.00018039). Similarly, the model arrived at the same likelihood value virtually every time that the model was re-run the model with initial parameter values "jittered" (perturbed) by a substantive degree (0.1). Nearly all of these runs had no substantive differences in parameter estimates or derived values (e.g., unfished recruitment, depletion, current SPR). Model starter, forecast, data, and control files are included as Appendix C.

D.4 Point-by-point response to STAR Panel results

Request 1: Provide plots of lower and upper 10%iles in length composition data by fleet and year. Rationale: To investigate whether lower 10%ile supports blocking of selectivity used in the assessment and whether upper 10%ile indicates the size truncation expected from fishing history.

Response: Although plots of mean length had been developed during the course of the assessment as well as in previous workshops, they were not included in the draft document, and they are now included and discussed in this revised assessment.

Request 2: If possible, plot best estimations of historic proportions of blackgill rockfish catch inside and outside the Cowcod Conservation Areas (CCAs). Rationale: To help evaluate the potential utility of the NWFSC combined shelf-slope trawl survey in the assessment.

Response: This request followed on some presentation and discussion of ongoing analysis of historical California Department of Fish and Game block summary catch statistics, for which the STAT, the CDFG and other researchers are trying to evaluate means to improve historical landings estimates and characterize spatial patterns of fisheries development. As this work is still ongoing, the specific request is difficult to fill with confidence. Complicating factors include the facts that blackgill rockfish are often landed under multiple market categories (with a range of other species; we focused on the blackgill and unspecified rockfish market categories for this analysis, although the blackgill rockfish market category was rarely used prior to the mid-1980s), not all landings included reliable reporting to block, blocks that were reported do not always reflect all of the blocks that may have been fished in a given trip, and, finally, many blocks straddle the CCAs, Despite these challenges, a preliminary estimation was developed, which suggested that between 1950 and 1970 approximately 5% of total catches were likely made in the CCA, increasing to over 40% by mid 1980s, and declining to approximately 20% by 2000. Over the entire period, a preliminary estimate of the total amount of blackgill caught within the boundaries of what is the current CCA is approximately 25%. These estimates are highly preliminary, as this is an active area of ongoing research.

Request 3: Provide plots of catch time series by gear and total used in pre-STAR sensitivity runs and 2005 assessment. Rationale: To evaluate alternative catch scenarios and help formulate sensitivity runs on historical catch time series.

Response: Plots were provided, and provided the rationale for refining the sensitivity to alternative catch histories used in the final analysis.

Request 4: Re-run model with double normal selectivity for surveys, but with length bins added in the model. Compare likelihoods and selectivity patterns with logistic model presented on day 1. Rationale: Determine if problem with double normal selectivity (peak parameter hitting the upper bound) persists with new length binning, in order to decide on likely post-STAR base case.

Response: There were slight but surprisingly non-trivial differences in the form of the selectivity curve under these two parameterizations (double normal set to be asymptotic and logistic) that initially may have contributed to the peak parameter approaching the bounds in the draft model (a problem that resolved following restructuring of length bin structure). In the absence of a clear understanding of just why these differences appeared, but in recognition of the relatively modest influence on overall model results, the Panel and STAT agreed that use of the logistic form for survey selectivities in the base model was reasonable.

Request 5: Provide recruitment series from model run with recruitment deviations estimated. Rationale: To see if there are features suggesting changes in productivity over time.

Response: Recruitment deviations were estimated from 1970 to 2005, with sigma R fixed at 0.5 (consistent with the 2005 model). Results suggested that recruitment deviations were strongly autocorrelated, and did not appear to be explaining clear variations in cohort strength. Although the overall likelihood did improve, the aforementioned constraints as well as magnitude of improvement relative to AIC criteria led to a decision to maintain the base model approach of deterministic recruitment. Results of this and other sensitivities regarding recruitment are presented and discussed in the sensitivity analysis (and in the response to request 7).

Request 6: If time allows, re-run assessment using 60+ plus group. Rationale: To evaluate sensitivity of assessment to plus group, given small numbers of older fish in age data sets.

Response: This change resulted in very minor changes to estimated parameters and derived quantities.

Request 7: Repeat the model run for request (5) (to provide recruitment series from a run with recruitment deviations estimated), but removing the time blocking of selectivity that was introduced to allow a better fit to the trends in length composition and implementation of CCA. Rationale: To see if there are features suggesting changes in productivity over time, without any possible confounding effect of estimating a change in fishery selectivity.

Response: This gave quite different recruitment trends than the run with selectivity block parameter turned on. Although recruitment deviations remain serially correlated, the timing of the peaks and declines differed from the results observed in request 5, such that trends for increased recruitment in 1990s were observed that lead to increased catches of smaller fish in the 2000s. However, the ease at which the autocorrelated anomalies shift is indicative of the recruitment deviations not explaining actual cohorts in length or the very noisy age data.

Request 8: Repeat model run for request (6) (use of 60+ plus group) while: (i) setting length at A_{max} to 55, (ii) setting maximum age in population to 65. Rationale: Determine the effect on estimation of growth parameters of having the maximum population age and the data plus group the same.

Response: As with request 7, these changes resulted in very minor differences in the total likelihood or derived model quantities.

Request 9: Carry out runs of base model with: (i) pre-1978 catch time series increased by 25% and (ii) pre-1978 catch time series reduced by 50%. Rationale: Investigate sensitivity of management variables to uncertainties in historical catches.

Response: Catches of all gears pre-1978 were adjusted +25% and -50% (i.e. foreign catches were adjusted as well). There was discussion that the low catch scenario is likely to be more plausible than the high catch scenario, and potentially more plausible than the base model estimates, due to the fact that the Ralston et al. (2010) catch reconstruction did not explicitly account for the movement by fishing fleets to deeper water with time. However, as the results of the base model changed relatively modestly as a consequence of these explorations, the decision to maintain the current catch estimates was made. The sensitivity runs were redone for the final base model in the section on sensitivity.

Request 10: Profile likelihoods over range of stock-recruit steepness parameter h = 0.6 – 0.95. Rationale: Investigate sensitivity to steepness.

Response: The likelihoods for age decline linearly as steepness is reduced, while the opposite pattern is observed for length, indicating the tension between length and age data in the model. However, the overall sensitivity of model fits and results was relatively modest, and it was determined that steepness should likely remain fixed in the final model.

Request 11: Profile likelihoods over range of natural mortality values 0.04 – 0.10. Rationale: Investigate sensitivity to natural mortality.

Response: The model is the most sensitive to changes in natural mortality (M), with age likelihoods and some length likelihoods improving with high M, and others (notably trawl length frequencies) favoring low M values. These results are discussed in more detail in the uncertainty section.

D.5 Base-case model results

A full list of all estimated parameters and the assumed values for key fixed parameters is provided in Table 19, and a composite of the available catch, survey, length and age frequency data, by fleet and year, used in the base model is shown in Figure 25. The estimated selectivity curves (including the offset for the southern fixed gear fishery) are shown as Figures 26-27, and fits to survey trend data (in both arithmetic and log scale) are presented as Figures 28-30. As discussed earlier, the fits to the survey indices are poor due to the variable nature of the year-by-year estimates. However, all three indices are suggestive of an increasing trend in relative abundance, a trend that is also suggested by the model fit.

We found it difficult to carefully evaluate fits and residuals fits to length data by fishery when mixing gender-specific and gender-neutral length frequency data types. To facilitate diagnostics we took an approach in which all of the fishery length data were pooled into a single "ghost" fishery as mixed gender data, for which selectivity mirrored the modeled fishery. This allowed all of the length data and the cumulative residuals to be viewed in a single image while still enabling the model to inform growth and other fits to gender specific data where it exists and utilize the mixed gender data where gender data is not available. These essentially composite fits and the residuals are shown as Figures 31- 36, and the fits and diagnostics for the actual data types and sources that are being fit to are included as Appendix C. Fits to the survey length frequency data and the corresponding residuals and observed/predicted sample sizes, are shown in Figures 37-40. Finally, composites of the length frequency data across all years are shown as Figures 41-43; note again that the "ghost" fisheries data (with sexes combined) reflect all data, while fits to the original fleets for sexes combined reflect only a subset of the total length data (the rest of which are reported in the female and male composites).

Similarly, we made the decision to present the conditional age-at-length (CAAL) data as composites as well. We pooled the CAAL data into a single year for the two primary fisheries (southern fixed gear and central California trawl; the small number of age observations for the central California fixed gear fishery (2006 and 2008) are included in the central California trawl fishery for this diagnostic), as well as for the NWFSC combined trawl survey data. Thus, data for 1985 and 1986 from the southern California fixed gear fishery are pooled into a 1985 "super-year," data spanning from the early 1980s and the 2000s for the central California trawl fishery are pooled into a year 2005 "super year," and data from the NWFSC combined trawl survey from 2003-2009 are pooled into a 2006 "super year." Figures 44-49 show the CAAL figures for which the age composition by length bin and gender are shown along with residuals, while Figures 50-52 show the relative fits structured differently, with the observed and predicted mean age at length shown as well as the observed and predicted standard deviation (in years) for each length bin. In some sense these figures are simply an "easier" way to evaluate the observed and predicted fits to the CAAL data, as a sort of transposed growth curve. However, note that a key difference from a growth curve is that the figures represent the mean age by length of the entire population; thus, the lack of curvature toward the upper right hand corner of the graph that might be expected in a true transposition of a growth curve is not typically seen as the average age at a given size bin is typically represented by smaller fish (which have not experienced the cumulative mortality of larger fish). Finally, Figure 53 shows composites of the marginal fits to the age composition data when treated as "traditional" age composition data (rather than CAAL), again based on the fits to a "ghost" fishery, in a format inconsistent with that which was used in the actual fitting. The fits to the compositional AAL data by year are also presented in Appendix C (which also includes the fits to the length composition data by the appropriate gender type).

.

Fits to most of the length and age composition data are reasonable, albeit often noisy at times. Although autocorrelation is apparent in many of the residual patterns to the compositional data, most of the residual patterns look reasonable. However, as discussed with respect to the blocking of selectivity parameters, there do appear to be some temporal trends in many of these residuals. There is some suggestion of a smaller asymptotic length inferred from the fits to the gender-specific length composition data from the southern fixed gear fishery in the late 1980s (positive residuals from ~45-50 cm, negative residuals from ~50 cm and larger for females, the same pattern skewed slightly lower for males with the exception of several large fish that most likely represent isolated cases in which sex was mis-identified). This is also suggested in the fits to the mean age-at-length data shown in Figure 50, for which the observed mean age at length is consistently biased low relative to the predicted. This is also consistent with a pattern of smaller size-at-age in southerly latitudes seen in many other *Sebastes*, as well as many other types of marine populations more generally. External fits to the age and length data (based on the Cope et al. model) were also suggestive of differences in size at age with latitude, with southern fish consistently smaller than northern at comparable ages. This may also help explain why the model predictions of catch at age "misses" the older fish for the southern fishery (the model expects larger, and older, fish to be encountered in this fishery) while the model does appear to capture the age structure of the central California trawl fishery reasonably well.

The residuals from the central California fixed gear fleet are also suggestive of shifts in selectivity over time; the model is underestimating the number of large fish caught in the early 1990s and overestimating the number of large fish in the late 2000s. As this fishery may in some sense encompass a suite of trawl target species strategies along a fairly broad range (34° 30' to 40° 10' N), it may be that these residual patterns reflect the tendency for smaller fish to come from strategies in which processors did not allow fish to be cut while larger fish came from trips that were allowed to be sampled for gender identification. Fits to the length compositional data from the surveys were generally noisy, but reasonable, likely reflecting the overall paucity of hauls from which lengths were taken. Similarly, the composite fits to the aggregated length composition data by all fisheries aggregated over all years (Figures 41-43) suggest generally reasonable fits to the data.

The base model results for spawning output, summary (age 1+) biomass, recruitment, SPR, and exploitation rate are reported in Table 20. The base model estimated that the mean unfished larval production of the blackgill population was 1.188×10^{12} larvae, and that the relative depletion in 2011 was 30.2% of the unfished level. The biomass trajectory suggests that the spawning biomass was at high levels in the mid-1970s, began to decline steeply in the late 1970s through the 1980s, consistent with the rapid development and growth of the targeted fishery, and reached a low of approximately 18% of the unfished level in the mid- 1990s (Figures 54-55). The model suggests that spawning biomass has been slowly increasing since that time. As steepness is fixed at a relatively high level, the model suggests that recruitment has been maintained at a fairly high level throughout this period, dipping to no less than approximately 70% of the long-term mean at the low point in spawning abundance (Figure 56). Changes in mean age and length are shown in Figures 57 and 58. With a few exceptions in recent years, the SPR rate has been below the current target rate since the early 1980s, although recent values are quite close to the target of 0.50 (Figures 59 a-b). Surplus production estimates and yield curves are shown as Figures 60 a-b. Note that the uncertainty bounds here are based only on the estimated parameters, and consequently, they substantially underestimate the uncertainty around model-derived quantities such as biomass, depletion and SPR.

D.5.b Uncertainty and Sensitivity Analysis

We evaluated a suite of alternative model scenarios to bracket several key sources of uncertainty in the model, including natural mortality, steepness, historical catches, and whether or not recruitment deviations are estimated. The sensitivity to natural mortality was based on the transformed standard deviations from the Hamel prior, which led to low (0.046 for females, 0.048 for males) and high (0.086 for females, 0.089 for males) scenarios for M. The model results with respect to key derived model outputs and spawning biomass and depletion trajectories are presented in Table 22 and Figure 61. Consistent with what intuition might suggest, the low M scenario is considerably more pessimistic (2011 depletion of 0.22), while the high M scenario is considerably more optimistic (2011 depletion of 0.42). Likelihood profiles across a range of values of M, by data type and by fleet, are also presented in Figures 62-64. Note that, for the purposes of profiling, female and male mortality rates were set equal and profiled across 0.01 intervals. These profiles suggest that the primary source of tension here is with respect to differences between length and age data; the age composition data as a whole had a better fit with higher values of M, while the length composition data had better fits with low values of M.

The length data here were most strongly influenced by the trawl fishery and NWFSC combined trawl survey data, as the profile of the southern fixed gear fishery length data was suggestive of a better fit with higher than base-case values of M. All of the age compositional data had an improved fit at higher values of M. Moreover, natural mortality scales inversely with growth parameters; at high M values, the model estimates a slightly higher L_{max} (55.4, as opposed to 52.3 in the base case and 50.1 in the low M scenario) and a considerably lower von-Bertalanffy growth coefficient (0.019, as opposed to 0.028 in the base model and 0.036 in the low M scenario, Figure 65). This was consistent with the findings of Helser (2005) for this species, who found that model estimates of asymptotic length, as well as growth rate for both sexes, increased with increased values for natural mortality. Most likely, much of this difference relates to differences in growth and perhaps natural mortality by region; in the southern region fish appear to not reach the same asymptotic size as fish in the north, and it is plausible that they also have relatively higher natural mortality rates. However, given the difficulties in ageing and estimation of growth, and the relative paucity of reliable, consistent age data over time, we did not feel that estimating natural mortality internally, or fixing M at the lowest value in the likelihood profile, was the most rational decision.

A comparison of model results and likelihood profiles across alternative values of steepness (h) are also shown (Table 22, Figures 66-70). Assumptions regarding steepness had relatively less influence on the model outcome and total likelihood, with 2011 depletion varying from 27.8% in the low steepness case to 32.4% in the high steepness case (relative to 30.2% in the base model). Despite this, the likelihood profiles did consistently suggest better fits for lower values of steepness, particularly for the length data, while fits to the conditional age-at-length data tended to improve with low values for h. However, the overall differences in likelihoods with any of the values in the range profiled (less than 3 likelihood units) was marginal, and we did not consider the model to be sufficiently data rich to inform steepness.

We also explored the consequences of estimating recruitment deviations in the model. This was done in two scenarios, one with recruitment deviations freed (with a sigma-R of 0.50) from 1970 through 2005 (consistent with the 2005 assessment) and a second run with that same structure but without the blocking of selectivity on the southern fixed gear fishery. The results suggested strong autocorrelation in the estimates of year class strength, generally not suggestive that the recruitments were a consequence of fitting to anomalies in length (or age) frequency data that would reflect cohort strength. With the blocking of southern selectivity on (as it is in the base model), the recruitment(?) result is more optimistic,; without the selectivity blocking, the result is more pessimistic.

Finally, we explored the consequences of various assumptions regarding historical (pre-1978) catches. For the “low” catch scenario, we cut the base model estimates of pre-1978 by 50%; for the “high” catch scenario we increased the same by 25%. Note that in the opinion of the STAT team, these two scenarios are *not* equally plausible; the “high” catch scenario in particular is quite unlikely, while the low catch scenario may well be a more accurate portrayal of the development of the deepwater fixed gear fisheries for this (and other deep slope) species. Interestingly, the range of results with respect to relative depletion with each of these scenarios was relatively narrow (0.291 and 0.323 for high and low catch scenarios, respectively), suggesting that these historical catch estimates, while important, are not of undue influence on the base model result..

As the uncertainty estimates produced by the model do not capture the true uncertainty associated with derived values, we explored the use of the delta method, which is a well-established tool for approximating variances of a function (Seber 1973) and is a logical extension of the sensitivity analyses that are often included in stock assessments (MacCall, In Press). The method is based on Taylor expansion of the variances and covariances of the function’s parameters. It is easily employed and requires a minimal amount of computation beyond that typically performed in standard stock assessments (MacCall, pers. com). For this assessment, we explored several parameters that are treated as fixed values, specifically natural mortality rate (M), the length at Amin (fixed at 12 cm), and steepness (h). The partial derivatives are estimated numerically by making small changes in the parameter of interest, with covariances assumed to be negligible. The variance of the estimated function value is the sum of the individual components, while the relative contribution from each source is given by its variance component divided by the sum of variances.

Figures 92 a-b show the total delta method estimate of variance for the base model SSB time series, as well as the relative contribution from each source. The results showed that natural mortality had the largest contributions to the model variability throughout most of the time series, but there is an unusual dip in which a tremendous fraction of the variance seems to be derived from the (formerly presumed to be negligible) L_{min} (length at A_{min}) growth parameter. Steepness (h) had only a modest contribution and only in the latter part of the time series. Although these patterns are not fully understood, they suggest that there is a strong interaction between the growth parameters and the model behavior under alternative values of natural mortality, which is also suggested by the analyses described earlier. We also note that the total estimated CV of the ending year larval productivity using the Delta method is approximately 0.28, in contrast to the model mean CV of 0.05 based solely on the contributions of the estimated parameters to the overall uncertainty. The latter value is far more consistent with the observations of Ralston et al. (2011), who found that assessment model CVs of ending year biomass were far lower than the inferred uncertainty due to model mis-specification (as indicated by pooled among-assessment variation), with mean coefficients of variation for ending year biomass averaging on the order of 0.37.

D.5.c Retrospective Analysis

Retrospective analyses were done sequentially for the last five years of the model, and the more extreme of the two scenarios are shown (Figure 71). In short the model was surprisingly sensitive to the retrospective analysis, particularly the five year retrospective in which the results were considerably more pessimistic (depletion approximately 17% of unfished). A likely explanation is that the vast majority of the compositional age-at-length data are from the NWFSC combined trawl survey for recent (2003-2010) years; as those data are removed from the model, there are fewer and fewer data from small individuals available to estimate growth, complicating the growth model and the subsequent fits to the length frequency data. A more reasonable approach to doing the retrospective analysis might be to fix growth parameters at those estimated in the base model and sequentially remove the length composition and survey information to assess whether it is the age compositional data or other elements of the model data driving this unusually strong variability in the retrospective simulations.

E. Reference Points

Key biomass reference points (unfished summary biomass, spawning output and equilibrium recruitment) along with approximate 95% confidence limits are reported in Table 25. Also reported are the yield reference points based on the estimation of MSY by the model and MSY proxies used by the PFMC (40% of the unfished spawning biomass and SPR of 0.50). Not surprisingly, given the assumption of a high steepness, the estimated MSY gives the largest estimate for MSY of 222 tons, but does so when the stock is harvested at a considerably higher rate (SPR of 0.273, compared to 0.447 and 0.50 for the SSB and SPR proxies, respectively) and leads to a lower equilibrium biomass level. In fact, the MSY – derived equilibrium spawning biomass is below the overfished threshold adopted for west coast rockfish populations. By contrast, the yield estimates for the SSB and SPR proxies are only slightly lower, at 192 and 177 tons, respectively, and are attained at considerably greater biomass levels (SSB/SSB0 of 0.40 and 0.46, respectively). Interestingly, these values are comparable to those estimated in the 2005 assessment, which reported an MSY (based on the SPR 0.5 proxy) of 223 tons, although the harvest guidelines from that assessment were considerably higher as that assessment suggested that biomass was above target levels.

F. Harvest Projections and Decision Tables

For the decision tables, the STAT and the STAR Panel discussed various alternatives for capturing the major axes of uncertainty for this assessment. There was widespread agreement that natural mortality, which co varied strongly with growth parameters and depletion, was the single greatest source of parameter uncertainty in the model. Consequently, the decision was made to bracket uncertainty with varying values for natural mortality. As the point estimate for M (0.063 for females, 0.065 for males) was based on the Hamel prior, we used the standard deviation for the Hamel prior as the bounds for the uncertainty in M in the decision table, leading to a high (0.086 females, 0.089 males) and low (0.046 for females, 0.048 for males) natural mortality rate alternative states of nature. Although the scenarios with plus or minus one standard deviation should theoretically encompass more than 50% of the uncertainty in the model, it was also recognized that there are additional sources of uncertainty in the model besides M, thus to add or subtract one standard deviation from M is reasonable. Catch streams for the decision table were developed by forecasting the SPR 50% harvest for each state of nature beginning in the year 2013, with catches for the years 2011 and 2012 based on the existing 2011-2012 accumulated catch limits (ACLs).

The decision table itself is presented as Table 25. The catch streams under the alternative states of nature are substantially different, with the 2013 catch under the pessimistic scenario (low M) slightly over half of the projected (under 40:10) catch under the base model (45 versus 87 metric tons). By contrast, the catch stream under the high M model (which is not constrained by the 40:10 rule) is almost twice that of the base model at 165 tons. Under the base model, 2011 depletion is 30% of the unfished level, near the middle of the precautionary zone, but the alternative states of nature (low and high natural mortality rates) encompass both very pessimistic scenarios for the low natural mortality rate (with depletion at 0.22, below the overfished threshold) and very optimistic with high M (depletion at 0.42, just above the target biomass level). Under all of the catch stream scenarios, the projected spawning output continues to increase, but logically the increase is slower with the higher catch streams (base and high M scenarios). However, only under the most pessimistic true state of nature (low M) and most optimistic catch stream (high M) is the stock still projected to be in an overfished condition after ten years.

G. Regional management considerations

The vast majority (approximately 65%) of historical landings have taken place south of Point Conception by fixed gear (hook and line, and historically, setnet) fisheries. In this region, blackgill were, and remain, a targeted fishery although they are encountered incidentally in other fisheries as well. Blackgill appear to be largely incidental north of Point Conception, with some exceptions in targeted fisheries out of Morro Bay and perhaps Monterey. The historical magnitude of catches by region should probably be a consideration in developing management recommendations throughout the area south of 40º10'. North of 40º10' blackgill rockfish are uncommon and may well have different life history characteristics, although it is difficult to imagine that these animals represent a distinct stock. Continued efforts to evaluate potential genetic structure should aid in the consideration of management considerations beyond the range of this assessment.

The large scale closures of the Cowcod Conservation Areas (CCAs) have had apparently notable effects on the size structure of landings in the southern area, consistent with the expectation that the habitat in the CCAs is optimal for this species, but also consistent with the idea that blackgill concentrations outside of this area have been heavily, and perhaps sequentially, impacted by historical fishing effort. This fishery may be an ideal candidate for a more careful and rigorous evaluation of the possible or likely consequences of strong spatial (e.g., sequential) fisheries effects, relative to the common assumption in most models that fishing mortality is applied evenly across the stock over space. Looking into the future however, the ability to monitor this population meaningfully will require that this large area of presumably optimal blackgill habitat is somehow accounted for in models of stock abundance and productivity. Moreover, continued closure of this area to fishing will have the effect of concentrating effort on that fraction of the stock that remains in habitat open to fishing, presumably leading to greater disparity in abundance and size structure between these large fished and unfished regions.

H. Research Recommendations

Age estimates are highly uncertain and this species has proven very difficult to age, which is not uncommon for deepwater species that inhabit environments where seasonal variability is muted. Life history analyses suggest that longevity declines with decreasing latitude while maximum body size and growth rates tend to increase at higher latitudes and/or lower temperatures (Charnov, and Gillooly 2004, Munch and Salinas 2009), thus greater exploration of possible differences in age structure and growth, as well as maturity, throughout the range of this stock are desirable. As this species occupies a wide range of depths, some investigation of the potential effects of depth on growth variability may also be desirable. It is noteworthy that other *Sebastes* species have shown moderate to strong clines in such life history parameters along latitudinal gradients (Haldorson et al. 1991, He 2009, Gertseva et al. 2010), as have other species that are abundant in the Southern California Bight region (e.g., Casselle et al. 2011). Cross reads with other laboratories should be a high priority; evaluation of possible bias using bomb radiocarbon or other age validation methods would be of great assistance in resolving questions regarding ageing error, growth and longevity.

Histology studies are ongoing and will help to refine both the maturity curve and the degree to which maturity may vary as a function of size, age and/or latitude, as well as whether there is any evidence for prolonged adolescence and/or abortive atresia of younger individuals (as seen in other slope species).

Despite considerable effort to comprehensively develop historical catch information for California groundfish, historical catches remain uncertain for this stock, due to anecdotal and historical catch data suggesting that the spatial pattern of development for this fishery, perhaps more so than many others, may have been characterized by sequential depletion of high density habitat for this species. This could bias estimates of stock status and productivity if length composition data do not reflect a constant mortality rate exhibited on the whole of the stock biomass. Although all assessment models are vulnerable to the consequences of spatial fisheries development patterns, this stock could be more vulnerable to bias than others due to the patchiness, longevity and slow growth of the species. Ongoing efforts to analyze historical spatially explicit catch data are ongoing and should be continued; simulation modeling with multiple area models may be one means to evaluate the potential bias of this effect.

Similarly, a tremendous fraction of what is likely among the best blackgill habitat is currently closed to both fishing and survey effort in the Cowcod Conservation Areas (CCAs), complicating any meaningful attempt to interpret survey data beyond those of a purely relative index and ultimately contributing to long-term biases in the interpretation of both catch and survey data. Alternative means of exploring relative or absolute abundance in this region is a key research priority, and greater exploration of the appropriate means to model the southern fishery under these constraints is equally important. Submersible or other survey methods could potentially provide additional habitat and abundance information for this species as they have for others (e.g., Yoklavich et al. 2007). Additionally, further exploration and application of genetic identification of larval *Sebastes* from ichthyoplankton surveys (e.g., Taylor et al. 2005; J. Hyde, pers. com) could lead to improved datasets for monitoring trends and relative (inside/outside) abundance information for this species. Greater investigation into the likely or plausible consequences of a shoaling of the oxygen minimum zone (OMZ) on blackgill habitat would also be helpful in understanding the vulnerability of this and similar species to global change.

As the slope environment is dominated by a relatively small number of species, for which respectable information exists on key predators and prey, food habits, abundance, and size distribution, this environment could be an ideal one for exploring the consequences of fishing on trophic interactions and top-down effects of altering top predator abundance levels.

I. Acknowledgments

We are grateful to a large number of people for their efforts and support of this (and other!) assessments. For this assessment in particular we thank Justine Willeford for her extreme patience and tenacity in working up blackgill rockfish fecundity samples, Lyndsey Lefebvre for her support of ageing efforts and development of the histological study, Rebecca Miller for her wonderful mapmaking skills, Steven Reinecke and the Nature Conservancy for their very substantive support in sampling blackgill for life history studies, Libby Gilbert for her contribution and analysis of blackgill rockfish genetics, and Sabrina Beyer, Neosha Kashef and David Stafford for their assistance in processing blackgill rockfish for those same studies. Additionally, we thank Aimee Keller and Dan Kamikawa for their support in collecting samples from the 2011 NWFSC combined trawl survey for the ongoing histology study. We are also very grateful to Tom Helser for providing data files from the 2005 assessment, Beth Horness for providing NWFSC trawl survey data, Jason Jannot for providing bycatch data, John Wallace for his support and development of the GLMM code for survey indices, John Devore for his support in developing the regulatory history, Ian Taylor and Ian Stewart for generously supporting and sharing their R4SS code with the world and providing answers to silly questions about how to get things to work right, and Rick Methot for his ongoing support and improvements of the Stock Synthesis. We also thank Meisha Key, Xi He, E.J. Dick, Alec MacCall and Steve Ralston for help, support and feedback in developing and exploring the model, and Deb Wilson Vandenberg, Gerry Richter, Dan Platt, Tom Ghio, John Devore and John Budrick for their time and feedback at the data workshop. Finally, we are especially grateful to the STAR Panel, Vladlena Gertseva, Mike Armstrong, Loo Botsford, John Devore, Sean Matson, Gerry Richter and Kevin Stokes, for their thoughtful comments, suggestions and patience in developing and understanding the final base model for this assessment.

J. Sources

Alonzo, S.H., T. Ish, M. Key, A.D. MacCall and M. Mangel. 2008. The importance of incorporating protogynous sex change into stock assessments. Bulletin of Marine Science 83: 163-179.

Bell, J.D., M. Lyle, M. Bulman, J. Graham, M. Newton and D.C. Smith. 1992. Spatial variation in reproduction, and occurrence of nonreproductive adults, in orange roughy, *Hoplostethus atlanticus* Collett (Trachichthyidae), from south-eastern Australia. Journal of Fish Biology 40: 107-122.

Bograd, S.J., C.G. Castro, E. Di Lorenzo, D.M. Palacios, H. Bailey, W. Gilly, and F.P. Chaves. 2008. Oxygen declines and the shoaling of the hypoxic boundary in the California Current. Geophysical Research Letters 35: L12607.

Brodziak, J., J. Ianelli, K. Lorenzen and R.D. Methot. 2011. Estimating natural mortality in stock assessment applications. NOAA Technical Memorandum NMFS0F/SPO-119.

Buckley, T. W., G. E. Tyler, D. M. Smith, and P. A. Livingston. 1999. Food habits of some commercially important groundfish off the coasts of California, Oregon, Washington, and British Columbia. NOAA Technical Memorandum NFMS-AFSC- 102. 173 p.

Butler, J.L., L.D. Jacobson, and J.T. Barnes. 1999. Stock assessment for blackgill rockfish. In Appendix to the status of the Pacific coast groundfish fishery through 1998 and recommended acceptable biological catches for 1999: stock assessment and fishery evaluation, 92 p. Pacific Fishery Management Council, 2130 SW Fifth Avenue, Suite 224, Portland, Oregon.

California Department of Fish and Game (CDFG). 1958. Marine Fish Catch of CA for years 1955-1956 with rockfish review. CDFG Fish Bull 105.

Caselle, J.E., S.L. Hamilton, D.M. Schroeder, M.S. Love, J.D. Standish, J.A. Rosales-Casian and O. Sosa-Nishizaki. 2011. Geographic variation in density, demography, and life history traits of a harvested, sex-changing, temperate reef fish. Canadian Journal of Fisheries and Aquatic Sciences 68: 288-303.

Charnov, E.L. and J.F. Gillooly. 2004. Size and temperature in the evolution of fish life histories. Integrative and Comparative Biology 44:494–497.

Childress, J.J. and B.A. Seibel. 1998. Life at stable low oxygen levels: Adaptations of animals to oceanic oxygen minimum layers. Journal of Experimental Biology 201:1223-1232.

Dick, E. J. 2009. Modeling the reproductive potential of rockfish. Ph.D. dissertation, University of California, Santa Cruz.

Dorn, M.W. 2002. Advice on West coast rockfish harvest rates from Bayesian meta-analysis of stock-recruit relationships. North American Journal of Fisheries Management 22: 280-300.

Epperly, S. P., and J. W. Dodrill. 1995. Catch rates of snowy grouper, *Epinephelus niveatus*, on the deep reefs of Onslow Bay, southeastern U.S.A. Bulletin of Marine Science 56:450–461.

Fay, G. 2006. Stock Assessment and Status of Longspine Thornyhead (*Sebastolobus altivelis*) off California, Oregon and Washington in 2005. In Volume 4: Status of the Pacific Coast Groundfish Fishery Through 2005, Stock Assessment and Fishery Evaluation Portland, OR: Pacific Fishery Management Council.

Field, J.C., E.J. Dick, D. Pearson and A.D. MacCall. 2009. Status of bocaccio, *Sebastes paucispinis*, in the Conception, Monterey and Eureka INPFC areas for 2009. Pacific Fishery Management Council Stock Assessment and Fishery Evaluation

Field, J.C., E.J. Dick, M. Key, M. Lowry, Y. Lucero, A. MacCall, D. Pearson, S. Ralston, W. Sydeman, and J. Thayer. 2007. Population dynamics of an unexploited rockfish, *Sebastes jordani,* in the California Current. pp 451-472 in J. Heifetz, J. Dicosimo, A.J. Gharrett, M.S. Love, V. M. O'connell and R.D. Stanley (editors) Proceedings of the Lowell-Wakefield Symposium on the Biology, Assessment and Management of North Pacific Rockfish. University of Alaska Sea Grant: Anchorage, Alaska.

Field, J.C., R.C. Francis, and K. Aydin. 2006. Top down modeling and bottom up dynamics: linking a fisheries-based ecosystem model with climate hypotheses in the Northern California Current. Progress in Oceanography 68: 238-270.

Francis, R.I.C.C. in press. Data weighting in statitistical fisheries stock assessment models. Canadian Journal of Fisheries and Aquatic Sciences.

Genin, A. 2004. Bio-physical coupling in the formation of zooplankton and fish aggregations over abrupt topographies. Journal of Marine Systems 50: 3– 20.

Genin, A., Haury, L., and Greenblatt, P. 1988. Interactions of migrating zooplankton with shallow topography: predation by rockfishes and intensification of patchiness. Deep Sea Research 35: 151–175.

Gertseva, V.V., J.M. Cope and S.E. Matson. 2010. Growth variability in the splitnose rockfish *Sebastes diploproa* of the northeast Pacific Ocean: pattern revisited. Marine Ecology Progress Series 413: 125-136.

Gunderson, D. R., J. Robinson, and T. Jow. 1974. Importance and species composition of continental shelf rockfish landed by United States trawlers. Int. N. Pac. Fish. Comm. Report.

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

Haldorson, L. and M. Love. 1991. Maturity and fecundity in the rockfishes, *Sebastes* spp., a review. Marine Fisheries Review 53(2): 25-31.

Hannah, R.W. and S.J. Parker. 2007. Age modulated variation in reproductive development of female Pacific Ocean perch (*Sebastes alutus*) in waters off Oregon. pp 1-19 in J. Heifetz, J. Dicosimo, A.J. Gharrett, M.S. Love, V. M. O'connell and R.D. Stanley (editors) Proceedings of the Lowell-Wakefield Symposium on the Biology, Assessment and Management of North Pacific Rockfish. University of Alaska Sea Grant: Anchorage, Alaska.

He, X., D.E. Person, E.J. Dick, J.C. Field, S.V. Ralston, and A.D. MacCall. 2009. Status of the widow rockfish resource in 2009e. Stock Assessment and Fishery Evaluation, Pacific Fisheries Management Council, July 2009.

Helly J.J. and L.A. Levin. 2004 Global distribution of naturally occurring marine hypoxia on continental margins. Deep Sea Research 51:1159-1168.

Heimann, R.F.G. 1963. Trawling in the Monterey Bay Area, with special reference to catch composition. California Department of Fish and Game 49: 152-173.

Heimann, R.F.G. and D.J. Miller. 1960. The Morro Bay otter trawl and party boat fisheries August, 1957 to September, 1958. California Department of Fish and Game 46: 35-67.

Heimann, R.F. and J.G. Carlisle, Jr. 1970. The California marine fish catch for 1968 and historical review 1916-1968. California Department of Fish and Game Fishery Bulletin 149.

Helser, T.E., I.J. Stewart, C. Whitmire, and B. Horness. 2007. Model-Based Estimates of Abundance for 11 species from the NMFS slope surveys. NOAA Technical Memorandum NMFS-NWFSC-82. 145 pp.

Helser, T. 2006. Stock Assessment of the Blackgill Rockfish (*Sebastes melanostomus*) Population off the West Coast of the United States in 2005. In Volume 5: Status of the Pacific Coast Groundfish Fishery Through 2005, Stock Assessment and Fishery Evaluation Portland, OR: Pacific Fishery Management Council.

Hill, K.T., E. Dorval, N.C.H. Lo, B.J. Macewicz, C. Show, and R. Felix-Uraga. 2008. Assessment of the Pacific sardine resource in 2007 for U.S. management in 2008. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-413.

Hoenig, J.M. 1983. Empirical use of longevity data to estimate mortality rates. Fishery Bulletin 81: 898-903.

Hyde, J. R. and R. D. Vetter. 2007. The origin, evolution, and diversification of rockfishes of the genus Sebastes (Cuvier). Molecular Phylogenetics and Evolution 44:490-811.

Isaacs, J. D., and Schwartzlose, R. A. 1965. Migrant sound scatterers: interaction with the sea floor. Science150: 1810–1813.

Jacobson, L.D. and R.D. Vetter. 1996. Bathymetric demography and niche separation of thornyhead rockfish: *Sebastolobus alascanus* and *Sebastolobus altivelis*. Canadian Journal of Fisheries and Aquatic Sciences 53:600-609.

Jacobson, L.D. and N.C.H. Lo. 1994. Spawning biomass of the northern anchovy in 1994. SWFSC Admin. Rep., La Jolla, LJ-94-17, 13p.

Jensen, A. L. 1996. Beverton and Holt life history invariants result from optimal trade-off of reproduction and survival. Canadian Journal of Fisheries and Aquatic Sciences 53:820-822.

Junquera, S., E. Roman, J. Morgan, M. Sainza and G. Ramilo. 2003. Time scale of ovarian maturation in Greenland halibut (*Reinhardtius hippoglossoides*, Walbaum). ICES Journal of Marine Science 60: 767–773.

Karpov, K.A., P.L. Haaker, I.K. Taniguchi and L. Rogers-Bennett. 2000. Serial depletion and the collapse of the California abalone (*Haliotis* spp.) fishery. Canadian Special Publication of Fisheries and Aquatic Sciences 130: 11-24.

Keeling, R. F., A. Körtzinger and N. Gruber. 2010. Ocean deoxygenation in a warming world. Annual Reviews in Marine Science 2:199-229.

Keller, A. A., B. H. Horness, E. L. Fruh, V. H. Simon, V. J. Tuttle, K. L. Bosley, J. C. Buchanan, D. J. Kamikawa, J. R. Wallace. 2008. The 2005 U.S. West Coast bottom trawl survey of groundfish resources off Washington, Oregon, and California: Estimates of distribution, abundance, and length composition. U.S. Dept. of Commerce, NOAA Tech. Memo., NMFS-NWFSC-93, 136 p. Online at http://www.nwfsc.noaa.gov/publications/

Koslow, J.A., G.W. Boehlert, J.D.M. Gordon, R.L. Haedrich, P. Lorance, and N. Parin. 2000. Continental slope and deep-sea fisheries: implications for a fragile ecosystem. ICES Journal of Marine Science 57: 548–557.

Kronman, M. 1999. Santa Barbara's hook-and-line fisheries. Santa Barbara Maritime History Museum.

Laidig, T. E., P. B. Adams and W. M. Samiere. 1997. Feeding habits of Sablefish, *Anoplopoma fimbria*, off the coast of Oregon and California. In Wilkins, M.E. and M.W. Saunders (editors) Biology and management of sablefish, *Anoplopma fimbria*: Papers from the international symposium on the biology and management of Sablefish. NOAA Technical Report NMFS 130.

Lauth R.R. 2000. The 2000 Pacific west coast upper continental slope trawl survey of groundfish resources off Washington, Oregon, and California: estimates of distribution, abundance, and length composition. NOAA Technical Memorandum NMFS-AFSC-120.

Love, M. S., M. Yoklavich, and L. K. Thorsteinson. 2002. The rockfishes of the northeast Pacific. University of California Press, Berkeley.

Love, M., P. Morris, M. McCrae, and R. Collins. 1990. Life history aspects of 19 rockfish species (Scorpaenidae: *Sebastes*) from the Southern California Bight. NOAA Technical Report NMFS 87: 38 p.

MacCall, A. 2003a. Status of bocaccio off California in 2003. In: Status of the Pacific Coast Groundfish Fishery Through 2003, Stock Assessment and Fishery Evaluation: Stock Assessments and Rebuilding Analyses Portland, OR: Pacific Fishery Management Council.

MacCall, A.D. In press. Accounting for the uncertainty associated with fixed M (and other parameters) by means of the delta method. In Brodziak, J., Ianelli, J., Lorenzen, K., Methot, R (eds.). Estimating natural mortality in stock assessment applications. NOAA Technical Memorandum

Mangel, M., J. Brodziak and G. DiNardo. 2010. Reproductive ecology and scientific inference of steepness: a fundamental metric of population dynamics and strategic fisheries management. Fish and Fisheries 11: 89–104.

McClatchie, S., Goericke, R. Rich Cosgrove, R. and Vetter, R. 2010. Oxygen in the Southern California Bight: multidecadal trends and implications for demersal fisheries. Geophysical Research Letters 37: doi: 10.1029/2010GL044497.

McCoy, M.W. and J.F. Gillooly. 2008. Predicting natural mortality rates of plants and animals. Ecology Letters 11:710–716.

Methot, R.D. 2009a. Stock assessment: operational models in support of fisheries management. In R.J. Beamish and B.J. Rothschild (editors) The Future of Fisheries Science in North America, 137 Fish & Fisheries Series. Springer Science and Business Media.

Methot, R.D. 2009b. User manual for Stock Synthesis Model Version 3.03a. May 11, 2009.

Moser, H. G. and E. H. Ahlstrom. 1978. Larvae and pelagic juveniles of blackgill rockfish, *Sebastes melanostomus*, taken in midwater trawls off Southern California and Baja California. Journal of the Fisheries Researc Board of Canada 35: 981-996.

Moser, H. G., R. L. Charter, W. Watson, D. A. Ambrose, J. L. Butler, S. R. Charter, and E. M. Sandknop. 2000. Abundance and distribution of rockfish (*Sebastes*) larvae in the Southern California Bight in relation to environmental conditions and fishery exploitation. CalCOFI Reports 41: 132-147.

Munch, S.B. and S. Salinas. 2009. Latitudinal variation in lifespan within a species is explained by the metabolic theory of ecology. Proceedings of the National Academy of Sciences 106: 13860-13864.

Nichol, D.G. and E.K. Pikitch. 1994. Reproduction of darkblotched rockfish off the Oregon coast. Transactions of the American Fisheries Society 123: 469-481.

Nitsos, R. J. 1965. Species composition of rockfish (family Scorpaenidae) landed by California otter trawl vessels, 1962 1963. Pacific Marine Fisheries Commission.

Orensanz, J.M., J.Armstrong, D. Armstrong and R. Hilborn. 2000. Crustacean resources are vulnerable to serial depletion: The multifaceted decline of crab and shrimp fisheries in the Greater Gulf of Alaska. Reviews in Fish Biology and Fisheries 8: 117-176.

Pearson, D. and B. Erwin. 1997. Documentation of California's commercial market sampling data entry and expansion programs. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-240, 62p.

Pearson, D.E., B. Erwin, M. Key. 2008. Reliability of California's Groundfish Landing Estimates from 1969-2006. NOAA Technical Memorandom NOAA-TM-NMFS-SWFSC-431.

Phillips, J.B. 1939. The rockfish of the Monterey wholesale fish markets. California Fish and Game 25: 214-225.

Phillips, J. B. 1958. Rockfish review˜ In: The marine fish catch of California for the years 1955 and 1956 with rockfish review, State of California Department of Fish and Game, Fish Bulletin 105.

Piner, K.R., J.R. Wallace and O.S. Hamel. 2006. Evaluation of ageing accuracy of bocaccio (*Sebastes paucispinis*) rockfish using bomb radiocarbon. Fisheries Research 77: 200–206.

Punt, A.E., D.C. Smith, K. Krusic-Golub and S. Robertson. 2008. Quantifying age-reading error for use in fisheries stock assessments, with application to species in Australia's southern and eastern scalefish and shark fishery. Canadian Journal of Fisheries and Aquatic Sciences 65: 1991–2005.

Ralston, S., A.E. Punt, O.S. Hamel, J.D. DeVore and R.J. Conser. 2011. A meta-analytic approach to quantifying scientific uncertainty in stock assessments. Fisheries Bulletin 109:217–231.

Ralston, S., D. Pearson, J. Field and M. Key. 2010. Documentation of the California commercial catch reconstruction project. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-461.

Rideout, R.M., M.P.M Burton, and G.A. Rose. 2000. Observations on mass atresia and skipped spawning in northern Atlantic cod, from Smith Sound, Newfoundland. Journal of Fish Biology 57:1429-1440.

Roedel, P.M. 1948. Common Marine Fishes of California. California Department of Fish and Game Fish Bulletin No. 68.

Rogers, J.B. 2003. Species allocation of *Sebastes* and *Sebastolobus* sp. caught by foreign countries from 1965 through 1976 off Washington, Oregon, and California, USA. NOAA Technical Memorandum NMFS-NWFSC-57.

Rudershausen, P.J., E.H. Williams, J.A. Buckel, J.C. Potts and C.S. Manooch. 2009. Comparison of reef fish catch per unit effort and total mortality between the 1970s and 2005-2006 in Onslow Bay, North Carolina. Transactions of the American fisheries Society 137:1389–1405.

Sampson, D.B., R.D. Scott. 2011. An exploration of the shapes and stability of population–selection curves. Fish and Fisheries (early view, currently available online only).

Sarmiento, J. L., T.M. Hughes, R.J. Stouffer and S. Manabe. 1998. Simulated response of the ocean carbon cycle to anthropogenic climate warming. Nature 393: 245-249.

Seber, G. A. F. 1973. The estimation of animal abundance and related parameters. Hafner Press, New York 1973.

Seibel, B.A. 2011. Critical oxygen levels and metabolic suppression in oceanic oxygen minimum zones. The Journal of Experimental Biology 214: 326-336.

Sen, A. R. 1986. Methodological problems in sampling commercial rockfish landings. Fishery Bulletin 84: 409-421.

Shelton, A.O., E.J. Dick, D.E. Pearson, S. Ralston and M. Mangel. In review. Estimating landings and quantifying uncertainty in multi-species fisheries: Hierarchical Bayesian models for stratified sampling protocols with missing data. (draft available upon request).

Stevens, M.M., A.H. Andrews, G.M. Cailliet, K.H. Coale, and C.C. Lundstrom. 2004. Radiometric validation of age, growth, and longevity for the blackgill rockfish (*Sebastes melanostomus*). Fishery Bulletin 102:711-722.

Stewart, I.J. 2008. Status of the U.S. canary rockfish resource in 2007. In: Status of the Pacific Coast Groundfish Fishery Through 2007, Stock Assessment and Fishery Evaluation: Stock Assessments and Rebuilding Analyses Portland, OR: Pacific Fishery Management Council.

Taylor, C.A., W. Watson, T. Chereskin, J. Hyde and R. Vetter. 2004. Retention of larval rockfishes, *Sebastes* near natal habitat in the Southern California Bight, as indicated by molecular identification methods. CalCOFI Reports 45, 152-166.

Thompson, J.E. and R.W. Hannah. 2010. Using cross-dating techniques to validate ages of aurora rockfish (*Sebastes aurora*): estimates of age, growth and female maturity. Environmental Biology of Fishes 88: 377–388.

Vetter, R. D. and E.A. Lynn. 1997. Bathymetric demography, enzyme activity patterns, and bioenergetics of deep-living scorpaenid fishes (genera *Sebastes* and *Sebastolobus*): paradigms revisited. Marine Ecology Progress Series 155: 173-188.

West, G. 1990. Methods of assessing ovarian development in fishes: a review. Australian Journal of Marine and Freshwater Research. 41:199-222.

Wyllie-Echeverria, T. 1987. Thirty-four species of California rockfishes: maturity and seasonality of reproduction. Fishery Bulletin 85: 229-250.

Weinberg, K.L., M.E. Wilkins, F.R. Shaw, and M. Zimmerman, M. 2002. The 2001 Pacific west coast bottom trawl survey of groundfish resources: estimates of distribution, abundance and length and age composition. NOAA Technical Memorandum NMFS-AFSC-128.

Whitney, F.A., H.J. Freeland and M. Robert. 2007. Persistently declining oxygen levels in the interior waters of the eastern subarctic Pacific. Progress in Oceanography 75:179-199.

Yoklavich, M., M. Love, and K. Forney. 2007. A fishery-independent assessment of an overfished rockfish stock, cowcod (*Sebastes levis*), using direct observations from an occupied submersible. Canadian Journal of Fisheries and Aquatic Sciences 64: 1795-1804.

Zimmerman, M., M. E. Wilkins, K. L. Weinberg, R, R, Lauth, and F. R. Shaw. 2001. Retrospective analysis of suspiciously small catches in the National Marine Fisheries Service West Coast Triennial Bottom Trawl Survey. AFSC Proc. Rep. 2001-03: 135p.

TABLES

Table 1: Cumulative landing limits of minor slope rockfish in the limited entry trawl fishery south of 40°10’ N. latitude, 2000-2010.

<table>
<tr><th rowspan="2">Year</th><th rowspan="2">Area</th><th colspan="6">Bimonthly Limits (lbs)</th></tr>
<tr><th>Jan-Feb</th><th>Mar-Apr</th><th>May-Jun</th><th>Jul-Aug</th><th>Sep-Oct</th><th>Nov-Dec</th></tr>
<tr><td>2000</td><td>S 40°10’ N. lat.</td><td colspan="2">3,000</td><td colspan="2">5,000</td><td>5,000</td><td>1,500</td></tr>
<tr><td>2001</td><td>S 40°10’ N. lat.</td><td colspan="3">14,000</td><td colspan="3">25,000</td></tr>
<tr><td rowspan="2">2002</td><td>36° - 40°10’ N. lat.</td><td colspan="2">50,000</td><td colspan="2">5,000</td><td>600</td><td>1,800</td></tr>
<tr><td>S 36° N. lat.</td><td colspan="4">50,000</td><td>25,000</td><td>40,000</td></tr>
<tr><td rowspan="2">2003</td><td>38° - 40°10’ N. lat.</td><td colspan="6">1,800</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="6">30,000</td></tr>
<tr><td rowspan="2">2004</td><td>38° - 40°10’ N. lat.</td><td colspan="2">7,000</td><td colspan="3">50,000</td><td>10,000</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="2">40,000</td><td colspan="4">50,000</td></tr>
<tr><td rowspan="2">2005</td><td>38° - 40°10’ N. lat.</td><td colspan="2">4,000</td><td>8,000</td><td>20,000</td><td>8,000</td><td>6,000 (Nov) Closed (Dec)</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="5">40,000</td><td>40,000 (Nov) Closed (Dec)</td></tr>
<tr><td rowspan="2">2006</td><td>38° - 40°10’ N. lat.</td><td>4,000</td><td colspan="2">8,000</td><td colspan="3">1,000</td></tr>
<tr><td>S 38° N. lat.</td><td>20,000</td><td colspan="5">40,000</td></tr>
<tr><td rowspan="2">2007</td><td>38° - 40°10’ N. lat.</td><td colspan="3">15,000</td><td colspan="2">10,000</td><td>15,000</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="4">40,000</td><td colspan="2">55,000</td></tr>
<tr><td rowspan="2">2008</td><td>38° - 40°10’ N. lat.</td><td colspan="6">15,000</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="6">55,000</td></tr>
<tr><td rowspan="2">2009</td><td>38° - 40°10’ N. lat.</td><td colspan="3">15,000</td><td>10,000</td><td>15,000</td><td>18,000</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="6">55,000</td></tr>
<tr><td rowspan="2">2010</td><td>38° - 40°10’ N. lat.</td><td colspan="6">15,000</td></tr>
<tr><td>S 38° N. lat.</td><td colspan="6">55,000</td></tr>
</table>

Table 2: Cumulative landing limits of minor slope rockfish in the limited entry fixed gear fishery south of 40°10' N. latitude, 2000-2010.

Year	Area	Bimonthly Limits (lbs)					
		Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
2000	S 40°10' N. lat.	3,000		5,000			1,500
2001	S 40°10' N. lat.	14,000			25,000		
2002	36° - 40°10' N. lat.	25,000		5,000		1,800	
	S 36° N. lat.	25,000	25,000	25,000	25,000	25,000	25,000
2003	38° - 40°10' N. lat.	1,800	≤ 25% of landed sablefish poundage/trip				1,800
	S 38° N. lat.	30,000					
2004	38° - 40°10' N. lat.	7,000		50,000			10,000
	S 38° N. lat.	40,000		50,000			
2005	S 40°10' N. lat.	40,000					
2006	S 40°10' N. lat.	40,000					
2007	S 40°10' N. lat.	40,000					
2008	S 40°10' N. lat.	40,000					
2009	S 40°10' N. lat.	40,000					
2010	S 40°10' N. lat.	40,000					

Table 3: Cumulative landing limits of minor slope rockfish in the open access fishery south of 40°10' N. latitude, 2000-2010.

Year	Area	Bimonthly Limits (lbs)					
		Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec
2000	S 40°10' N. lat.	3,000		5,000			1,500
2001	S 40°10' N. lat.	5,000					
2002	36° - 40°10' N. lat.	10,000		5,000		1,800	
	S 36° N. lat.	10,000					
2003	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2004	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2005	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2006	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2007	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2008	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2009	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					
2010	38° - 40°10' N. lat.	≤ 25% of landed sablefish poundage/trip					
	S 38° N. lat.	10,000					

Table 4: Recent and future (2011-2012) OFL and ACL (formerly ABC and OY) limits for blackgill rockfish relative to total catches (landings plus discards) 2001-2012.

	Catch	ACL/OY	ABC/OFL	% of ACL/OY	% of ABC/OFL
2001	128	306	343	0.42	0.37
2002	164	306	343	0.54	0.48
2003	190	306	343	0.62	0.55
2004	152	306	343	0.50	0.44
2005	114	306	343	0.37	0.33
2006	130	306	343	0.43	0.38
2007	55	292	292	0.19	0.19
2008	79	292	292	0.27	0.27
2009	137	282	282	0.48	0.48
2010	152	282	282	0.54	0.54
2011		279	282		
2012		275	282		

Table 5: Estimated California blackgill rockfish landings by gear type, 1950-2010.

year	South CA fixed	Central CA fixed	Central CA trawl	South, Central Rec	North CA (all)	year	South CA fixed	Central CA fixed	Central CA trawl	South, Central Rec	North CA (all)
1950	23.8	0.0	2.8	0.141	4.9	1980	468.1	0.7	79.5	7.791	0.0
1951	17.7	0.0	6.6	0.125	9.5	1981	389.1	20.1	79.3	4.742	0.0
1952	10.4	0.0	17.0	0.143	5.5	1982	464.0	136.3	91.3	4.033	0.0
1953	17.1	0.0	18.7	0.175	6.1	1983	319.9	13.2	294.4	0	0.3
1954	22.4	0.0	18.6	0.392	3.9	1984	257.7	3.4	66.8	0.221	0.5
1955	26.1	0.0	9.5	0.66	6.8	1985	378.1	1.2	124.8	2.98	0.3
1956	35.2	0.0	19.5	0.775	7.5	1986	675.9	18.1	262.5	4.631	2.7
1957	35.8	0.0	18.0	0.459	8.6	1987	737.8	8.4	130.8	0	17.2
1958	38.4	0.0	19.0	0.305	7.1	1988	539.7	270.8	220.6	8.878	40.7
1959	43.5	0.0	18.1	0.187	3.4	1989	294.3	150.0	84.3	3.342	4.8
1960	45.5	0.0	14.3	0.249	0.8	1990	385.0	71.3	220.2	3.342	24.9
1961	51.3	0.0	7.6	0.266	0.6	1991	329.3	18.7	127.7	3.342	8.6
1962	35.3	0.0	7.5	0.229	0.4	1992	435.5	194.4	150.8	3.342	1.2
1963	52.7	0.0	9.2	0.254	1.2	1993	274.8	8.8	114.5	3.342	0.2
1964	42.7	0.0	5.9	0.337	0.5	1994	227.5	28.0	120.6	3.342	1.4
1965	54.5	0.0	6.2	0.799	1.5	1995	190.5	27.7	131.4	3.342	1.6
1966	76.2	0.0	82.0	1.592	0.7	1996	179.1	29.8	156.8	0	6.7
1967	77.9	0.0	209.7	2.314	1.6	1997	93.7	44.1	132.6	0	1.1
1968	56.6	0.0	65.7	2.834	1.8	1998	92.4	20.5	115.7	0	2.7
1969	132.1	0.8	16.6	2.74	0.0	1999	11.2	8.3	28.4	0	8.6
1970	129.8	1.7	18.4	4.179	0.0	2000	12.3	20.2	52.6	0	1.0
1971	167.0	2.2	11.6	4.16	0.0	2001	24.0	14.9	89.1	0	0.7
1972	293.6	2.4	20.3	5.834	0.0	2002	43.0	33.1	62.5	5.257	8.7
1973	327.6	3.1	28.1	7.206	0.0	2003	59.1	73.4	55.3	0	2.2
1974	348.7	5.0	27.1	8.906	0.0	2004	48.8	20.6	79.6	0	0.7
1975	275.7	3.5	36.5	9.117	0.0	2005	23.8	11.6	51.6	0	1.3
1976	284.8	5.0	40.2	7.605	0.0	2006	31.0	24.1	37.7	0	0.3
1977	267.1	3.9	40.7	7.246	0.0	2007	14.6	6.0	26.8	0	2.0
1978	317.8	2.1	107.7	7.094	0.0	2008	20.2	15.1	38.8	0	2.8
1979	427.9	21.9	13.4	10.297	0.0	2009	22.6	52.1	58.0	0	0.7
						2010	38.0	48.4	62.3	0	0.4

Table 6: Estimated California landings for hook and line gear by port complex, 1970-2010.

Year	San Diego	Los Angeles	Santa Barbara	Morro Bay	Monterey	San Francisco	Bodega Bay	Fort Bragg	Eureka	Crescent City
1970	90.5	35.1	0.7	1.5	0.1			0.1		
1971	126.4	35.0	1.7	1.9	0.1			0.1		
1972	230.9	56.7	1.6	1.9	0.2			0.3		
1973	256.7	50.8	2.0	2.4	0.2			0.4		
1974	231.2	34.4	3.6	3.6	0.2			1.1		
1975	150.9	48.2	9.4	2.8	0.2			0.4		
1976	144.7	53.9	12.6	3.6	0.3			1.1		
1977	150.7	35.4	12.5	3.2	0.2			0.4		
1978	177.3	50.6	16.9		1.0			1.1		
1979	223.0	66.3	30.7	21.1				0.8		
1980	320.5	63.2	27.9	0.6	0.0					
1981	91.0	82.9	28.2	9.8	1.6	8.0				
1982	131.6	115.4	38.3	5.0						
1983	119.2	44.8	6.1	0.8	0.2		0.0	0.0		0.0
1984	125.3	4.4	12.6			0.0	0.0	0.0		
1985	143.9	49.7	24.5	0.1	0.0	0.6	0.2	0.0	0.0	0.3
1986	231.1	70.2	32.7	0.0	1.2	0.1	3.2	1.5	0.4	0.2
1987	139.9	56.5	152.8	5.4	1.6	0.0		0.3	0.8	0.2
1988	87.6	10.1	77.2	139.8	2.5	0.0		2.1	0.6	0.3
1989	52.8	20.4	111.2	47.0	3.4	8.7	2.6	0.9	1.2	0.2
1990	110.1	44.5	129.6	51.2	0.4	1.5	0.1	1.6	3.8	0.2
1991	59.2	71.4	152.4	11.2	0.0	0.1				
1992	104.4	52.5	184.4	83.1	8.8	9.3	51.0	0.1	0.4	
1993	54.7	39.9	143.8	4.7	0.5	1.6			0.2	
1994	64.9	92.3	63.9	21.4	0.2	2.2	0.3		1.4	0.1
1995	35.1	72.6	42.7	5.9	7.9	5.8	1.9	3.4	0.0	0.2
1996	17.4	98.8	56.4	3.4	18.1	3.6	1.3	0.8	2.9	
1997	11.7	30.6	46.8	2.7	31.2	4.3	3.6	1.9	0.6	
1998	1.7	9.0	80.9	0.0	7.8	8.3	2.7	0.8	0.3	0.1
1999	0.4	1.7	9.0	3.0	4.4	0.7	0.0	0.0	7.1	0.1
2000	0.7	3.6	8.0	1.1	11.3	3.3	1.1	3.2	0.2	
2001	0.0	9.9	14.1	0.1	11.6	2.8			0.1	0.0
2002	11.4	18.0	13.4	14.1	6.6	3.9	0.5	7.3	7.1	1.3
2003	15.7	16.6	24.7	23.8	36.2	5.0	0.1	0.0	1.6	0.3
2004	17.6	14.8	15.8	9.5	6.2	3.9	0.0		0.0	
2005	5.1	4.7	14.0	4.6	4.6	0.9		1.5	1.1	
2006	7.0	7.4	16.1	11.8	5.5	6.3	0.0	0.0	0.1	
2007	3.5	6.0	5.1	2.5	3.0	0.4		0.0	0.5	0.0
2008	14.2	5.0	0.5	10.2	2.4	0.7	0.1	1.5	2.0	
2009	6.7	1.0	15.2	50.1	0.6	0.7	0.2	0.5	0.1	
2010	24.2	1.6	12.2	44.1	0.2	0.3	0.3	3.4	0.4	0.1

Table 7: Estimated California landings for setnet gear by port complex, 1970-2010 (port complexes not shown had less than 1/10th of a ton for the duration of this period).

year	San Diego	Los Angeles	Santa Barbara	Morro Bay	Monterey	San Francisco
1970	2.6	1.0	0.0		0.0	
1971	3.1	0.7	0.0		0.0	
1972	4.1	0.3	0.0		0.0	
1973	17.6	0.5	0.0		0.1	
1974	79.3	0.2	0.0		0.1	
1975	66.4	0.9	0.0		0.1	
1976	72.1	1.5	0.0		0.0	
1977	64.9	3.6	0.0		0.0	
1978	59.5	13.3	0.3			
1979	76.6	30.4	0.9			
1980	27.7	28.2	0.7		0.0	
1981	150.1	36.1	0.7	0.1	0.2	0.3
1982	149.5	28.9	0.2	128.7	1.9	0.7
1983	142.8	7.1	0.0	12.0	0.0	
1984	105.1	9.7	0.5	0.0	3.4	0.0
1985	136.5	23.2	0.3		0.0	0.1
1986	219.4	120.7	1.7	4.5	7.0	0.6
1987	84.1	61.9	242.7		0.7	0.4
1988	30.2	15.7	318.9	86.6	33.2	6.6
1989	4.3	1.5	104.2	67.0	18.7	1.5
1990	42.6	19.7	38.5	6.4	8.4	1.6
1991	22.0	6.4	17.7	2.0	5.2	0.2
1992	58.7	25.0	10.6	39.3	2.1	0.7
1993	22.7	7.6	6.1		1.8	0.2
1994	0.1		6.3	0.6	3.1	0.3
1995	18.4	4.5	17.2		2.2	0.7
1996	6.2	0.3		0.6	2.0	0.0
1997	2.4	0.3	1.9		0.0	0.4
1998	0.8		0.0	0.8	0.0	0.1
1999		0.0	0.0		0.2	
2000	0.1	0.0			0.1	
2001		0.0		0.2	0.1	0.1
2002		0.2		0.7		
2003	2.1			6.4	1.9	
2004	0.1	0.5		0.1	0.1	0.9
2005	0.0				0.0	
2006	0.5		0.0	0.3	0.2	
2007			0.1			0.1
2008	0.5					0.2
2009						
2010			0.0			

Table 8: Estimated California landings for trawl gear by port complex, 1970-2010 (port complexes not shown had less than 1/10th of a ton for the duration of this period).

year	San Diego	Los Angeles	Santa Barbara	Morro Bay	Monterey	San Francisco	Bodega Bay	Fort Bragg	Eureka	Crescent City
1970			4.2	5.1	6.9			5.3		
1971		0.1	6.1	2.5	4.7			4.5		
1972		0.2	8.9	5.6	7.6			7.1		
1973			10.1	6.7	16.1			5.4		
1974		0.8	9.9	6.2	10.1			10.9		
1975		1.1	6.9	9.4	9.5			17.6		
1976	0.0	0.7	9.6	11.0	9.3			20.0		
1977	0.0		12.7	9.4	9.9			21.4		
1978	0.0		9.8	8.8	94.8	2.2	0.1	1.8		
1979	0.0	0.0	6.3	9.1				4.3		
1980	0.2		1.1	10.7	17.8			51.0		
1981	0.0	0.0	1.8	4.8	2.0	68.4		4.1		
1982	0.1	0.7	3.3	4.2	36.0	3.9	15.0	32.3		
1983	0.0	4.4	2.1	29.5	61.6	14.8	101.9	86.5	0.1	0.2
1984	0.3			9.6	10.7	20.1	19.3	7.1	0.1	0.4
1985			0.9	33.4	38.0	3.8	1.4	48.3		
1986			3.0	139.0	60.8	24.2	27.4	11.1	1.4	0.7
1987	0.2	0.5		86.0	2.9	6.9	24.7	10.2	9.7	6.4
1988			0.1	182.1	24.6	5.8	1.1	6.9	39.8	0.1
1989	0.0		12.4	42.2	13.8	6.5	0.3	21.5	3.3	0.0
1990			0.1	35.3	4.4	127.4	29.1	24.0	20.9	0.0
1991				56.8	21.3	2.6	17.3	29.7	8.4	0.2
1992		1.5		89.8	38.1	11.8	3.7	7.4		0.8
1993	2.6			69.7	15.2	24.5	1.6	3.4		0.1
1994	0.1			85.4	25.7	3.3	0.0	6.2		
1995				79.7	20.8	11.0	14.1	5.8	0.6	0.9
1996		0.0	1.0	84.4	39.4	8.4	3.3	21.3	2.7	1.1
1997				62.5	21.4	11.1	2.1	35.5		0.5
1998	0.0		0.0	61.2	20.1	4.5	3.6	26.3	0.5	1.8
1999			0.0	12.0	14.4	0.6	1.2	0.2		1.4
2000	0.2		0.1	3.4	7.6	1.8	3.9	35.8	0.4	0.4
2001		0.0		24.2	16.4	3.9	2.8	41.7	0.5	0.0
2002	0.2	0.0	0.0	22.8	6.8	8.5	7.2	17.2	0.4	
2003	0.1		0.0	38.0	11.1	3.8	0.1	2.3	0.2	0.1
2004	0.1	0.1	0.0	27.6	7.0	21.3		23.7	0.2	0.5
2005	0.1			21.1	7.0	5.9		17.6	0.0	0.3
2006	0.0		0.0	0.3	14.1	8.3	2.2	12.8	0.1	0.0
2007	0.0		0.0	1.0	3.0	3.2	0.2	19.4	0.3	1.2
2008	0.0		0.0	1.1	4.0	3.9	0.2	29.6	0.3	0.4
2009			1.3	5.8	5.7	5.1	0.0	41.4	0.4	0.1
2010			0.4	0.7	7.6	4.0	0.2	49.8	0.3	0.1

Table 9: Estimated Oregon and Washington landings by INPFC Area (note, Eureka area includes only Oregon landings, pre-1981 Oregon landings are from Gertseva et al. in press, there are no pre-1981 estimates for Washington landings).

		Eureka		Columbia		U.S. Vancouver	
year	OR.all	OTH	TWL	OTH	TWL	OTH	TWL
1970	*0.158*						
1971	*0.05357*						
1972	*0.07121*						
1973	*0.01303*						
1974	*0.01297*						
1975	*0.03669*						
1976	*0.0236*						
1977	*0.00261*						
1978	*0.72162*						
1979	*2.8405*						
1980	*0.846*						
1981	*2.22155*						
1982	*7.24583*						
1983	*7.41673*						
1984	*7.47026*						
1985	*6.4702*						
1986	*21.6052*						
1987							
1988					0.2		0.3
1989					1.1		
1990					0.9		0.4
1991			3.6		6.0		0.7
1992			1.1		1.8		0.0
1993		1.9	8.1	0.0	5.9		0.3
1994			0.8		3.3		0.3
1995			0.4	0.0	7.7		6.4
1996		0.0	1.0		2.9		3.8
1997					4.6		9.3
1998			0.6		1.2		0.9
1999		0.4	0.3		4.4		1.9
2000		0.1	0.3		1.6		1.6
2001			0.9		3.4		0.4
2002			0.0		0.7		0.2
2003			0.3	0.1	2.0		0.9
2004			0.0		1.2		0.4
2005			0.0	0.1	1.1		0.0
2006			0.2	0.5	1.8		0.2
2007			0.4		1.1		0.1
2008		0.2	0.2	0.0	1.4		0.2
2009		0.2	0.5	0.1	1.3		0.5
2010		1.7	0.4	0.6	2.1	0.0	0.5

Table 10: Estimated discard rates from the West Coast Groundfish Observer Program (WCGOP), as applied to estimated landings and converted to total catch.

	Fixed, south Conception			Fixed, Conception-Mendocino		
YEAR	ratio	landed	total	ratio	landed	total
2002	n/a	43.0	43.0	n/a	33.1	33.1
2003	0.026	59.1	60.6	0.022	73.4	75.0
2004	0.043	48.8	50.9	0.013	20.6	20.9
2005	0.002	23.8	23.9	0.066	11.6	12.3
2006	0.029	31.0	31.9	0.017	24.1	24.5
2007	0.008	14.6	14.8	0.032	6.0	6.2
2008	0.000	20.2	20.2	0.147	15.1	17.3
2009	0.018	22.9	23.3	0.016	52.1	53.0
2010	*0.018*	*38.0*	*38.7*	*0.016*	*48.4*	*49.1*

	Trawl, Conception to 38 N			Trawl, 38 N to Mendocino		
YEAR	ratio	landed	total	ratio	landed	total
2002	0.031	45.5	46.9	1.092	17.2	36.0
2003	0.008	53.0	53.4	0.000	2.3	2.3
2004	0.031	56.0	57.8	0.014	23.7	24.1
2005	0.028	34.1	35.0	1.417	17.6	42.4
2006	1.488	24.9	62.0	0.009	12.8	12.9
2007	0.028	7.4	7.6	0.377	19.4	26.7
2008	0.015	9.2	9.3	0.094	29.6	32.4
2009	0.018	17.9	18.2	0.032	41.4	42.7
2010	*0.018*	*12.9*	*13.1*	*0.032*	*49.8*	*51.4*

Table 11: Number of length observations, subsamples, and effective initial sample size for southern California fixed gear.

	# observations		# subsamples		Initial sample size		
year	gender	no gend	gender	no gend	gender	no gend	all
1978							
1979							
1980							
1981							
1982							
1983	1	366	1	12	1.1	62.5	63.6
1984	4	791	4	36	4.6	145.2	149.7
1985	818	1219	59	47	171.9	215.2	387.1
1986	3435	902	151	27	625.0	151.5	776.5
1987	2509	594	106	19	452.2	101.0	553.2
1988	1519	308	51	9	260.6	51.5	312.1
1989	283	550	9	16	48.1	91.9	140.0
1990	500	78	19	3	88.0	13.8	101.8
1991							
1992	3	1252	2	37	2.4	209.8	212.2
1993							
1994	2	393	1	16	1.3	70.2	71.5
1995	1	488	1	17	1.1	84.3	85.5
1996		128		4		21.7	21.7
1997	4	206	4	8	4.6	36.4	41.0
1998	3	160	2	5	2.4	27.1	29.5
1999	2	46	1	4	1.3	10.3	11.6
2000							
2001							
2002	9	201	6	8	7.2	35.7	43.0
2003	5	199	3	7	3.7	34.5	38.2
2004							
2005	8	81	5	7	6.1	18.2	24.3
2006	8	98	6	3	7.1	16.5	23.6
2007	6	107	3	4	3.8	18.8	22.6
2008	5	360	3	10	3.7	59.7	63.4
2009	11	128	8	9	9.5	26.7	36.2
2010	5	273	5	16	5.7	53.7	59.4

Table 12: Number of length observations, subsamples, and effective initial sample size for central California fixed gear.

	# observations		# subsamples		Initial sample size		
year	gender	no gend	gender	no gend	gender	no gend	all
1978							
1979		105		3		17.5	17.5
1980							
1981		149		3		21.0	21.0
1982	12		1		2.7		2.7
1983							
1984							
1985							
1986	5		4		4.7		4.7
1987							
1988	217	3	7	1	36.9	1.4	38.4
1989	167		14		37.0		37.0
1990	83		18		29.5		29.5
1991	18		2		4.5		4.5
1992	202	96	14	6	41.9	19.2	61.1
1993	57	7	7	2	14.9	3.0	17.8
1994	54	107	10	5	17.5	19.8	37.2
1995	69	76	5	9	14.5	19.5	34.0
1996	56	1134	5	60	12.7	216.5	229.2
1997	91	665	4	28	16.6	119.8	136.3
1998	4	9	1	1	1.6	2.2	3.8
1999	53		1		7.0		7.0
2000	47	188	3	8	9.5	33.9	43.4
2001	53	53	4	3	11.3	10.3	21.6
2002	98	116	4	4	17.5	20.0	37.5
2003	22	202	2	9	5.0	36.9	41.9
2004	2	45	1	2	1.3	8.2	9.5
2005		27		2		5.7	5.7
2006	34	104	2	3	6.7	17.4	24.0
2007							
2008	61	409	11	11	19.4	67.4	86.9
2009	94	279	18	10	31.0	48.5	79.5
2010	161	258	22	9	44.2	44.6	88.8

Table 13: Number of length observations, subsamples, and effective initial sample size for central California trawl fisheries.

	# observations		# subsamples		Initial sample size		
year	gender	no gend	gender	no gend	gender	no gend	all
1978	54		7		14.5		14.5
1979	12		6		7.7		7.7
1980	40		8		13.5		13.5
1981	32		6		10.4		10.4
1982	118		14		30.3		30.3
1983	269		45		82.1		82.1
1984	340		43		89.9		89.9
1985	953		89		220.5		220.5
1986	735		78		179.4		179.4
1987	398		46		100.9		100.9
1988	534		51		124.7		124.7
1989	141		41		60.5		60.5
1990	299	13	41	2	82.3	3.8	86.1
1991	895		75		198.5		198.5
1992	562	249	37	15	114.6	49.4	163.9
1993	463	61	34	8	97.9	16.4	114.3
1994	206	89	25	7	53.4	19.3	72.7
1995	581	172	32	14	112.2	37.7	149.9
1996	717	216	47	14	145.9	43.8	189.8
1997	664	157	44	9	135.6	30.7	166.3
1998	687	302	34	12	128.8	53.7	182.5
1999	448	36	21	2	82.8	7.0	89.8
2000	411	44	23	3	79.7	9.1	88.8
2001	251	446	31	23	65.6	84.5	150.2
2002	438	377	44	16	104.4	68.0	172.5
2003	285	392	27	13	66.3	67.1	133.4
2004	119	126	14	6	30.4	23.4	53.8
2005	172	239	15	11	38.7	44.0	82.7
2006	73	368	10	16	20.1	66.8	86.9
2007	84	237	23	11	34.6	43.7	78.3
2008	150	365	21	16	41.7	66.4	108.1
2009	44	748	8	31	14.1	134.2	148.3
2010	17	458	4	16	6.3	79.2	85.6

Table 14: Number of aged fish, of subsamples (hauls or port sample clusters) and effective sample sizes by fishery and year for age compositional data.

	Year	Samples	Fish
Southern California fixed gear	1985	8	196
Southern California fixed gear	1986	12	98
Central California fixed gear	2006	5	33
Central California fixed gear	2008	7	41
Central California trawl	1982	4	17
Central California trawl	1983	13	125
Central California trawl	1984	14	90
Central California trawl	2001	2	20
Central California trawl	2002	1	6
Central California trawl	2003	11	144
Central California trawl	2004	2	19
Central California trawl	2005	6	78
Central California trawl	2006	5	75
Central California trawl	2007	9	51
Central California trawl	2008	8	76
NWFSC Combined trawl survey	2003	8	64
NWFSC Combined trawl survey	2004	5	128
NWFSC Combined trawl survey	2005	10	168
NWFSC Combined trawl survey	2006	7	129
NWFSC Combined trawl survey	2007	6	191
NWFSC Combined trawl survey	2008	7	148
NWFSC Combined trawl survey	2009	5	150

Table 15: Number of hauls, length observations, and effective sample sizes for triennial trawl survey length compositions.

	Monterey			Conception			
	total hauls	pos hauls	lengths	total hauls	pos hauls	lengths	Neff
1995	46	16	93	30	11	101	49.8
1998	53	21	193	33	12	142	75.2
2001	50	27	193	33	18	232	100.7
2004	39	18	154	24	10	114	65

Table 16: Number of hauls, positive hauls, length observations, and effective sample sizes for NWFSC slope (1999-2002) and combined shelf-slope (2003-2010) bottom trawl survey.

	Conception				Monterey				
	total hauls	pos. hauls	hauls w/LF	length s	total hauls	pos hauls	hauls w/LF	length s	Neff
1999	13	1			46	21			
2000	17	7			51	16			
2001	19	9			43	13			
2002	48	15			53	17			
2003	58	15	14	75	33	5	5	59	38.5
2004	52	12	12	394	20	1	1	16	69.6
2005	79	21	21	372	28	2	2	16	76.5
2006	79	24	25	634	32	7	7	127	136.0
2007	92	24	23	281	19	3	3	7	66.7
2008	86	27	27	236	39	7	7	84	78.2
2009	93	24	24	311	29	10	10	230	108.7
2010	100	31	31	464	36	8	8	54	110.5

Table 17: Comparison of 2005 (SS2) model likelihoods and derived qualities with 2011 (SS3) results for models with comparable structure.

	2005	2011.fix	2011.free
SSB0	10231	9503	23274
R0	1486	1378	3127
2004 SPR	0.64	0.63	0.95
2004 depletion	0.53	0.52	0.92
Total likelihood	877.8	1880.1	1106.7
indices	-3.9	-3.9	-3.7
length_comps	552.8	1546.0	702.1
age_comps	354.8	427.0	414.9
Recruitment	-19.8	-90.2	-9.0
Parm_priors	2.2	1.2	2.3
Length by fleet			
Hook-line	77.3	170.4	112.3
Setnet	78.3	137.1	90.5
Trawl	314.0	778.4	407.2
Triennial	53.9	214.0	62.0
AFSC slope	29.4	237.7	30.1
Age by fleet			
Triennial	354.8	426.9	414.9

Table 18: Comparison of 2005 (SS2) model parameter estimates with 2011 (SS3) results for models with comparable structure.

Parameter	2005	2011.fix	2011.free	Rec.devs	2005	2011.fix	2011.free
NatM_p_1_Fem_GP_1	***0.040***	***0.040***	0.040	1970	0.07	0.25	1.32
L_at_Amin_Fem_GP_1	***13.01***	13.01	14.52	1971	-0.44	-0.06	0.18
L_at_Amax_Fem_GP_1	***47.66***	47.66	48.01	1972	-0.45	-0.14	0.16
VonBert_K_Fem_GP_1	***0.047***	0.047	0.049	1973	0.30	0.05	1.12
L_at_Amax_Mal_GP_1	***42.11***	42.11	42.75	1974	0.37	-0.03	0.39
VonBert_K_Mal_GP_1	***0.068***	0.071	0.073	1975	0.03	-0.14	0.21
Mat50%_Fem	***34.00***	***34.00***	***34.00***	1976	0.21	-0.09	0.59
Mat_slope_Fem	***-0.87***	***-0.87***	***-0.87***	1977	0.27	-0.11	0.37
SR_R0	7.23	7.30	8.05	1978	0.10	-0.14	0.40
SR_steep	***0.60***	***0.60***	***0.60***	1979	0.05	-0.17	0.17
SR_sigmaR	***0.50***	***0.50***	***0.50***	1980	0.00	-0.16	0.30
Q_base_4_Triennial	-2.40	-2.55	-4.00	1981	-0.13	-0.17	-0.04
Q_base_5_AFSCslope	-1.43	-1.58	-3.01	1982	0.20	-0.05	0.45
Q_base_6_NWFSCslope	-0.50	-0.50	-0.50	1983	0.37	0.07	0.49
SizeSel_1P_1_hookline	44.08	42.57	48.87	1984	-0.06	0.00	0.09
SizeSel_1P_2_hookline	***0.00***	***0.00***	0.00	1985	-0.54	-0.24	-0.54
SizeSel_1P_3_hookline	2.15	1.71	0.94	1986	-0.50	-0.17	-0.50
SizeSel_1P_4_hookline	***0.30***	***0.30***	0.00	1987	-0.32	0.08	-0.27
SizeSel_1P_5_hookline	-8.67	-2.05	-0.96	1988	-0.25	0.09	-0.47
SizeSel_1P_6_hookline	0.00	0.00	-3.37	1989	-0.30	0.15	-0.61
SizeSel_1P_7_hookline	***0.30***	***0.30***	2.70	1990	-0.13	0.24	-0.57
SizeSel_1P_8_hookline	***4.00***	***4.00***	1.63	1991	0.33	0.51	-0.21
SizeSel_3P_1_trawl	***41.64***	***41.64***	44.64	1992	0.26	0.32	-0.28
SizeSel_3P_2_trawl	***0.00***	***0.00***	0.01	1993	-0.02	0.16	-0.52
SizeSel_3P_3_trawl	***1.97***	***1.97***	1.06	1994	-0.10	0.07	-0.63
SizeSel_3P_4_trawl	***0.30***	***0.30***	0.00	1995	-0.15	0.02	-0.65
SizeSel_3P_5_trawl	***0.00***	***0.00***	-4.13	1996	-0.02	0.00	-0.53
SizeSel_3P_6_trawl	***0.00***	***0.00***	1.60	1997	0.21	-0.02	-0.29
SizeSel_3P_7_trawl	***0.30***	***0.30***	3.02	1998	0.35	-0.03	-0.11
SizeSel_3P_8_trawl	***8.00***	***8.00***	5.48	1999	0.25	-0.04	0.02
SizeSel_4P_1_Triennial	45.00	45.00	38.60	2000	0.12	-0.05	0.05
SizeSel_4P_2_Triennial	0.00	0.00	0.00	2001	-0.03	-0.05	-0.03
SizeSel_4P_3_Triennial	0.49	0.49	-1.04	2002	-0.03	-0.05	-0.04
SizeSel_4P_4_Triennial	0.12	0.12	0.00	2003	-0.02	-0.05	-0.02
SizeSel_4P_5_Triennial	100.00	100.00	-3.18	2004	-0.02	-0.05	-0.01
SizeSel_4P_6_Triennial	0.00	0.00	1.08				
SizeSel_4P_7_Triennial	0.30	0.30	2.84				
SizeSel_4P_8_Triennial	4.00	4.00	5.46				

Table 19: Key fixed and all estimated parameters for the base model.

Parameter	Point estimate	Approx. st.dev	Initial value
Natural Mortality (females)	0.063	fixed	fixed
Natural Mortality (males)	0.065	fixed	fixed
Steepness (h)	0.65	fixed	fixed
L_at_Amin (male and female)	12	fixed	fixed
L_at_Amax (female)	52.3	0.85	52.00
VonBert_K (female)	0.028	0.0017	0.04
CV length at age, young (female)	0.17	0.015	0.15
CV length at age, old (female)	0.13	0.012	0.10
L_at_Amax (male)	45.60	0.45	48.52
VonBert_K (male)	0.047	0.0019	0.05
CV length at age, young (female)	0.21	0.011	0.15
CV length at age, old (female)	0.06	0.006	0.10
Unfished recruitment (log)	7.73	0.018	8.10
Selectivity, southern fixed, peak	46.69	0.39	46.00
Selectivity, southern fixed, asc. width	3.73	0.063	4.00
Selectivity, southern fixed, init	-11.10	1.74	-2.00
Selectivity, southern fixed, block offset	-0.33	0.02	0.00
Selectivity, central fixed, peak	51.39	1.35	45.00
Selectivity, central fixed, asc. width	4.67	0.11	4.00
Selectivity, central fixed, init	-17.75	40.63	-2.00
Selectivity, central trawl, peak	43.88	0.67	45.00
Selectivity, central trawl, asc. width	4.25	0.076	4.00
Selectivity, central trawl, init	-17.62	42.08	-2.00
Selectivity, triennial, inflection	45.26	1.73	45.00
Selectivity, triennial, slope	11.43	0.81	5.00
Selectivity, NWFSC combo, inflection	26.58	1.51	45.00
Selectivity, NWFSC combo, slope	13.19	1.45	5.00

Table 20: Base model results for total biomass, larval production, depletion.

	Summary Biomass	Larval prod ($x10^9$)	CV. Larval prod	Depletion	Recruit (x 103)	Catch (mt)	SPR	Expl. Rate
INIT	12927	1188	0.050	1.00	2275	0	1.000	0.000
1950	12927	1188	0.050	1.00	2275	27	0.935	0.002
1951	12904	1184	0.050	1.00	2275	24	0.940	0.002
1952	12884	1181	0.050	0.99	2274	28	0.932	0.002
1953	12861	1178	0.050	0.99	2274	36	0.913	0.003
1954	12832	1174	0.050	0.99	2273	41	0.901	0.003
1955	12800	1169	0.050	0.98	2272	36	0.912	0.003
1956	12773	1165	0.050	0.98	2272	55	0.871	0.004
1957	12731	1159	0.050	0.98	2271	54	0.873	0.004
1958	12692	1153	0.050	0.97	2270	58	0.865	0.005
1959	12651	1147	0.050	0.97	2269	62	0.856	0.005
1960	12608	1140	0.050	0.96	2268	60	0.859	0.005
1961	12569	1134	0.050	0.95	2267	59	0.860	0.005
1962	12533	1128	0.049	0.95	2266	43	0.894	0.003
1963	12512	1124	0.049	0.95	2265	62	0.853	0.005
1964	12476	1118	0.049	0.94	2264	49	0.880	0.004
1965	12453	1114	0.049	0.94	2263	61	0.854	0.005
1966	12420	1108	0.049	0.93	2262	160	0.687	0.013
1967	12301	1091	0.049	0.92	2259	290	0.539	0.024
1968	12071	1060	0.050	0.89	2254	125	0.729	0.010
1969	11996	1048	0.050	0.88	2252	152	0.690	0.013
1970	11903	1033	0.050	0.87	2249	154	0.684	0.013
1971	11812	1018	0.050	0.86	2246	185	0.642	0.016
1972	11700	1000	0.049	0.84	2242	322	0.508	0.028
1973	11475	966	0.049	0.81	2235	366	0.470	0.032
1974	11223	927	0.049	0.78	2226	390	0.447	0.035
1975	10962	888	0.050	0.75	2216	325	0.477	0.030
1976	10766	857	0.050	0.72	2208	338	0.460	0.031
1977	10568	827	0.050	0.70	2199	319	0.465	0.030
1978	10395	800	0.050	0.67	2191	435	0.386	0.042
1979	10130	762	0.050	0.64	2179	474	0.366	0.047
1980	9847	720	0.050	0.61	2164	556	0.321	0.056
1981	9506	672	0.050	0.57	2145	493	0.330	0.052
1982	9232	633	0.051	0.53	2128	696	0.263	0.075
1983	8803	576	0.052	0.48	2099	627	0.253	0.071
1984	8439	532	0.053	0.45	2073	328	0.361	0.039
1985	8342	517	0.053	0.43	2064	507	0.277	0.061
1986	8103	486	0.053	0.41	2042	961	0.185	0.119
1987	7506	418	0.056	0.35	1987	877	0.184	0.117
1988	7009	362	0.058	0.31	1928	1040	0.150	0.148
1989	6406	301	0.061	0.25	1846	532	0.194	0.083

Table 20 (continued)

	Summary Biomass	Larval prod $(x10^9)$	CV. Larval prod	Depletion	Recruit (x 103)	Catch (mt)	SPR	Expl. Rate
1990	6223	282	0.061	0.24	1815	680	0.161	0.109
1991	5931	256	0.062	0.22	1768	479	0.184	0.081
1992	5806	245	0.062	0.21	1744	784	0.138	0.135
1993	5459	217	0.063	0.18	1682	401	0.180	0.074
1994	5404	213	0.062	0.18	1672	380	0.182	0.070
1995	5365	211	0.062	0.18	1666	353	0.187	0.066
1996	5342	210	0.061	0.18	1664	366	0.182	0.068
1997	5306	209	0.061	0.18	1661	270	0.215	0.051
1998	5335	213	0.061	0.18	1670	229	0.241	0.043
1999	5391	218	0.060	0.18	1685	48	0.582	0.009
2000	5578	233	0.059	0.20	1719	85	0.483	0.015
2001	5726	247	0.058	0.21	1748	128	0.408	0.022
2002	5832	258	0.057	0.22	1771	144	0.388	0.025
2003	5917	268	0.057	0.23	1791	188	0.329	0.032
2004	5961	276	0.057	0.23	1805	149	0.403	0.025
2005	6028	286	0.056	0.24	1822	87	0.552	0.014
2006	6141	299	0.056	0.25	1843	93	0.539	0.015
2007	6245	312	0.055	0.26	1863	47	0.720	0.008
2008	6381	328	0.054	0.28	1884	74	0.622	0.012
2009	6489	341	0.054	0.29	1903	133	0.473	0.020
2010	6546	351	0.054	0.30	1915	149	0.454	0.023
2011	6585	359	0.054	0.30	1925	*n/a*	0.311	*n/a*
2012	*6510*	*358*	*0.054*	*0.30*	*1924*	*n/a*	*0.313*	*n/a*
2013	*6438*	*357*	*0.055*	*0.30*	*1922*	*n/a*	*0.595*	*n/a*
2014	*6525*	*368*	*0.054*	*0.31*	*1935*	*n/a*	*0.591*	*n/a*
2015	*6606*	*379*	*0.053*	*0.32*	*1947*	*n/a*	*0.588*	*n/a*
2016	*6683*	*390*	*0.052*	*0.33*	*1958*	*n/a*	*0.585*	*n/a*
2017	*6755*	*399*	*0.051*	*0.34*	*1968*	*n/a*	*0.582*	*n/a*
2018	*6823*	*409*	*0.050*	*0.34*	*1978*	*n/a*	*0.580*	*n/a*
2019	*6888*	*418*	*0.050*	*0.35*	*1986*	*n/a*	*0.577*	*n/a*
2020	*6950*	*426*	*0.049*	*0.36*	*1994*	*n/a*	*0.575*	*n/a*
2021	*7010*	*434*	*0.049*	*0.37*	*2001*	*n/a*	*0.574*	*n/a*
2022	*7066*	*441*	*0.049*	*0.37*	*2007*	*n/a*	*0.572*	*n/a*

Table 21: Mean input sample sizes, effective sample sizes, and variance adjustments for survey indices, length composition data and age composition data.

Survey data

Fleet	r.m.s.e.	Input	var. adj
Triennial	0.27	0.28	0.06
NWFSC.slope	0.27	0.34	0.00
NWFSC.combo	0.53	0.53	0.25

Length composition data

Fleet	N	model Neff	input Neff	Harm. Mean	model/ input	variance adjust
South.fixed	27	89.2	86.7	38.1	1.03	0.74
Central.fixed	17	68.5	60.0	40.1	1.14	1
Central.trawl	35	113.5	96.6	61.2	1.17	1
Triennial	4	56.4	57.4	53.5	0.98	0.79
NWFSC.combo	8	110.2	86.5	97.8	1.27	1

Age composition data

Fleet	N	model Neff	input Neff	Harm. Mean	model/ input	variance adjust
South.fixed	35	7.4	7.0	3.0	1.06	0.83
Central.fixed	30	2.5	2.5	1.9	1.02	1
Central.trawl	170	4.4	4.1	2.0	1.07	1
NWFSC.combo	233	4.9	4.3	2.3	1.13	1

Table 22: Comparison of negative log-likelihoods and key management quantities under alternative values of natural mortality (M), steepness (h), recruitment and historical catches relative to the base model estimate.

	Base model	Low M	High M	Low h	high h	recruit case1	recruit case2	low hist. catch	high hist. catch
Larval prod (billions)	1188	1261	1153	1226	1143	1294	764	1267	1069
2011 Depletion	0.302	0.222	0.417	0.278	0.324	0.354	0.268	0.324	0.291
2011 SPR	0.454	0.338	0.583	0.441	0.462	0.521	0.373	0.462	0.450
Female Lmax	52.253	50.109	55.388	52.694	51.697	52.740	45.877	51.255	52.875
Female K	0.028	0.036	0.019	0.028	0.028	0.030	0.035	0.031	0.027
TOTAL	3275.3	3336.5	3245.4	3274.1	3276.0	3231.2	3461.7	3297.3	3265.5
Survey	-7.9	-7.1	-8.1	-7.5	-8.2	-7.6	-6.9	-7.7	-8.0
Length_comp	1158.4	1136.6	1177.2	1166.6	1150.0	1151.2	1294.8	1150.6	1162.9
Age_comp	2124.8	2206.9	2076.3	2115.1	2134.2	2087.6	2173.8	2154.3	2110.6
Surveys									
Triennial	-3.4	-2.6	-3.6	-3.2	-3.5	-3.3	-2.0	-3.1	-3.5
NWFSC slope	-3.4	-3.3	-3.3	-3.3	-3.4	-3.3	-3.4	-3.3	-3.4
NWFSC combo	-1.2	-1.2	-1.2	-1.0	-1.3	-0.9	-1.6	-1.2	-1.2
Length data									
South Fixed	376.6	386.5	368.4	377.3	375.6	384.8	582.9	382.4	373.5
Central Fixed	182.2	174.9	181.7	185.0	180.2	172.7	146.9	177.3	184.8
Central Trawl	392.7	370.0	420.3	399.7	387.2	387.7	364.2	383.1	399.0
Triennial	63.1	63.4	63.0	63.8	62.6	67.4	60.6	63.2	63.0
LF.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NWFSC Combo	143.7	141.9	143.8	140.8	144.5	138.6	140.1	144.6	142.6
Age data									
South Fixed	239.9	280.2	215.9	238.4	241.1	244.9	259.2	254.6	232.8
Central Fixed	121.2	121.4	120.5	120.7	121.7	121.0	129.3	121.0	121.2
Central Trawl	820.1	851.3	801.8	816.4	823.7	808.6	841.6	831.0	814.8
NWFSC Combo	943.7	954.0	938.0	939.5	947.8	913.1	943.6	947.7	941.8

Table 23: Reference points for the base blackgill rockfish model

Unfished Stock	Estimate	95% Confidence Limits Lower	Upper
Summary (1+) Biomass	12927.2	11836	14019
Spawning Output	1.19E+06	1049519	1326081
Equilibrium recruitment	2275.16	2186	2364

	Yield reference Points		
	$SSB_{40\%}$	SPR proxy	MSY est.
SPR	0.447	0.500	0.273
Exploitation rate	0.025	0.022	0.044
Yield	192	177	222
Spawning output	475120	542994	249849
Summary biomass	7576	8201	5063
SSB/SSB_0	0.400	0.457	0.210

Table 24: Forecast ACL (OY) and OFL (ABC) values for the base model (under the assumption of achieving 2011-2012 OFLs)

	ACL	OFL
2011	279	279
2012	275	275
2013	87	130
2014	91	134
2015	95	137
2016	98	140
2017	101	143
2018	104	146
2019	106	148
2020	109	150
2021	111	152
2022	113	154

Table 25: Decision Table for blackgill rockfish, based on alternative states of nature that capture uncertainty on the assumed natural mortality rate and associated catch streams.

		Low M model		Base model		High M model	
Low M catch		Sp.out	depletion	Sp.out	depletion	Sp.out	depletion
2011	*279*	280	0.22	359	0.30	481	0.42
2012	*275*	277	0.22	358	0.30	481	0.42
2013	45	274	0.22	357	0.30	481	0.42
2014	48	286	0.23	371	0.31	498	0.43
2015	51	297	0.24	385	0.32	513	0.45
2016	55	309	0.24	399	0.34	529	0.46
2017	58	320	0.25	412	0.35	543	0.47
2018	60	331	0.26	425	0.36	557	0.48
2019	63	341	0.27	437	0.37	571	0.50
2020	66	351	0.28	449	0.38	584	0.51
2021	68	361	0.29	461	0.39	596	0.52
2022	71	371	0.29	472	0.40	608	0.53

		Low M model		Base model		High M model	
Base model catch		Sp.out	depletion	Sp.out	depletion	Sp.out	depletion
2011	279	280	0.22	359	0.30	481	481
2012	275	277	0.22	358	0.30	481	481
2013	87	274	0.22	357	0.30	481	481
2014	91	283	0.22	368	0.31	494	494
2015	95	291	0.23	379	0.32	507	507
2016	98	300	0.24	390	0.33	519	519
2017	101	307	0.24	399	0.34	530	530
2018	104	315	0.25	409	0.34	541	541
2019	106	322	0.26	418	0.35	551	551
2020	109	328	0.26	426	0.36	560	560
2021	111	334	0.27	434	0.37	569	569
2022	113	340	0.27	441	0.37	577	577

		Low M model		Base model		High M model	
High M catch		Sp.out	depletion	Sp.out	depletion	Sp.out	depletion
2011	279	280	0.22	359	0.30	481	0.42
2012	275	277	0.22	358	0.30	481	0.42
2013	165	274	0.22	357	0.30	481	0.42
2014	167	278	0.22	363	0.31	489	0.42
2015	168	281	0.22	368	0.31	496	0.43
2016	169	283	0.22	373	0.31	502	0.44
2017	170	286	0.23	377	0.32	507	0.44
2018	171	288	0.23	381	0.32	513	0.44
2019	172	289	0.23	385	0.32	517	0.45
2020	173	290	0.23	388	0.33	522	0.45
2021	173	291	0.23	391	0.33	526	0.46
2022	173	292	0.23	393	0.33	529	0.46

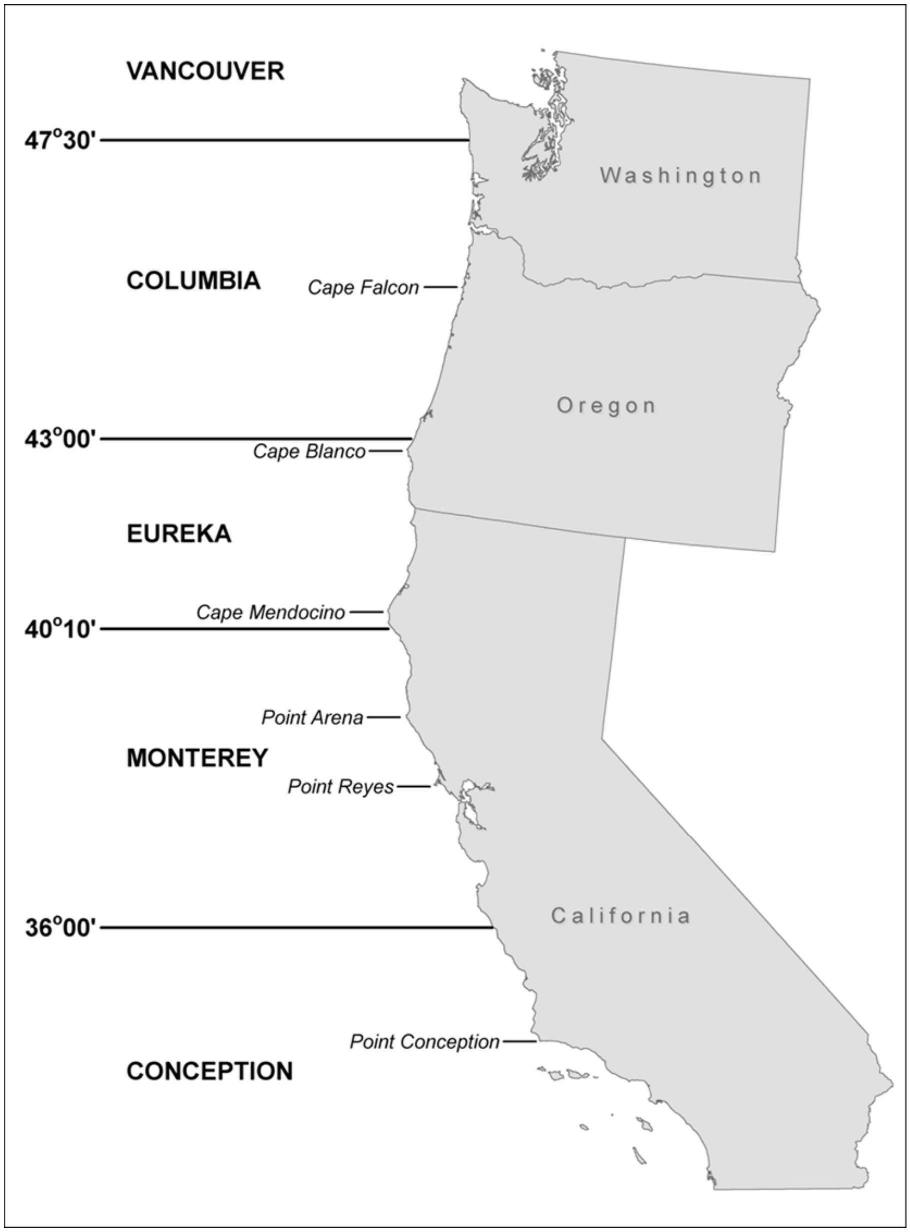


Figure 1: U.S. West coast with International North Pacific Fishery Commission (INPFC) areas and key management lines. This assessment includes only catches and survey data from the Monterey and Conception INPFC areas.

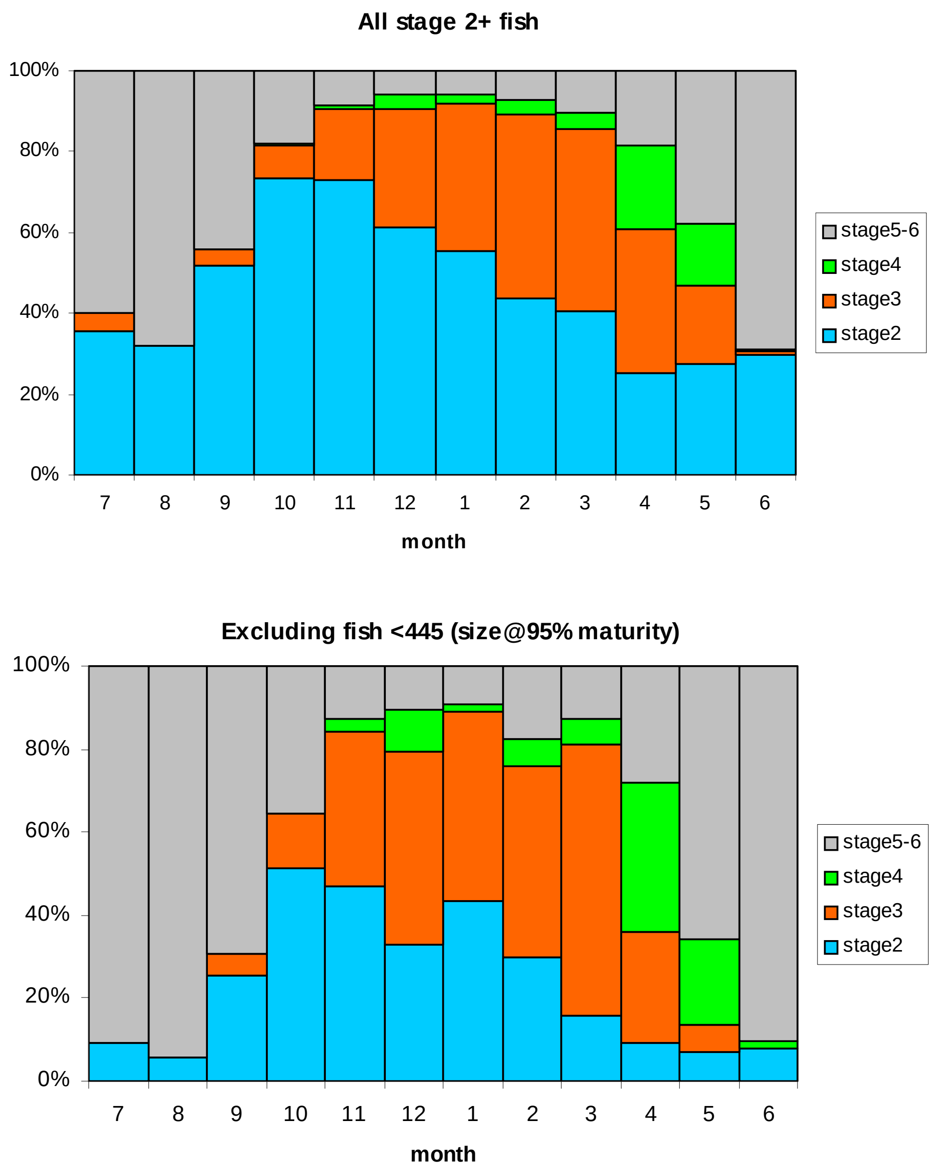


Figure 2a- b: Compilation of relative numbers of maturity stages (for mature, staged fish only) by month for blackgill rockfish (pooled port sample and survey data). See text for definitions of egg and larval stages.

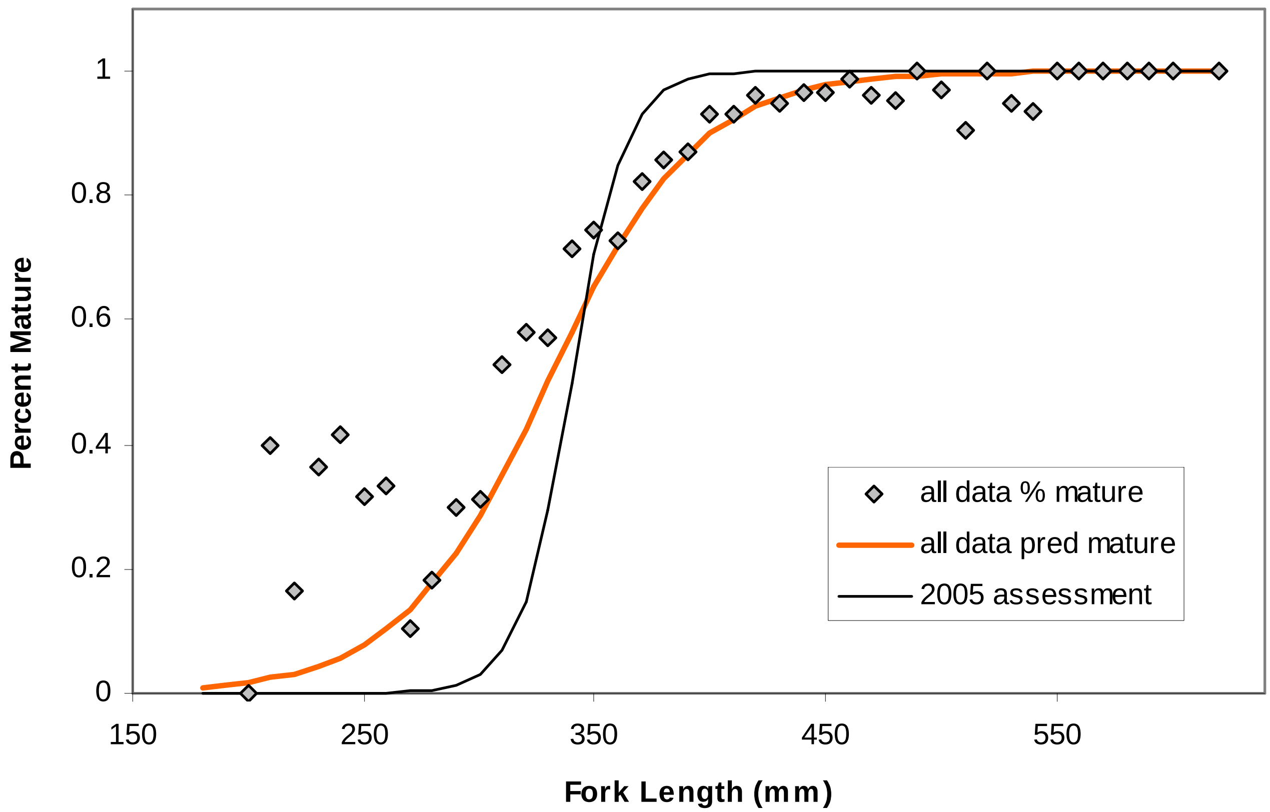
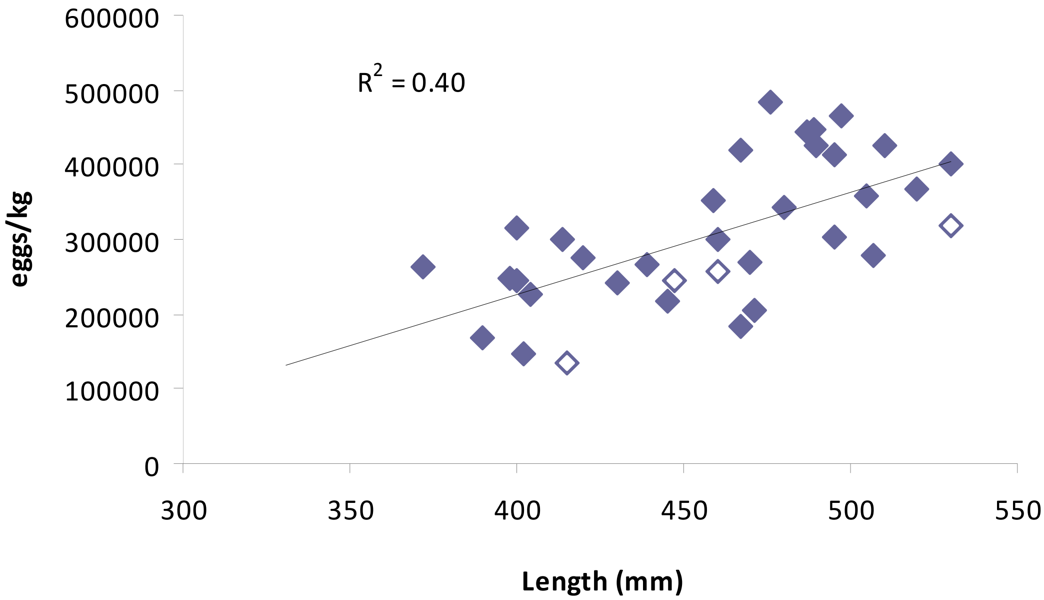


Figure 3: Estimated maturity at length data and fitted curves (female only) including both research and commercial samples from October through May, only.



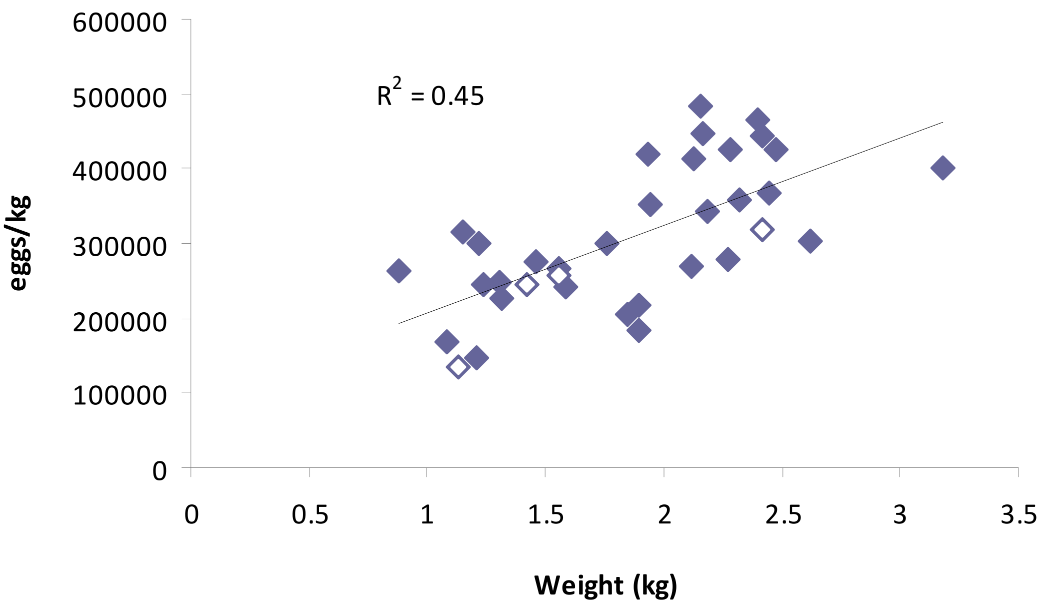


Figure 4: Eggs per kg of total body weight regressed against length (top) and total weight (bottom) for blackgill rockfish. Open data points denote data from Love (1990) and Phillips (1963 for methods, blackgill results are unpublished, recovered from original lab notes).

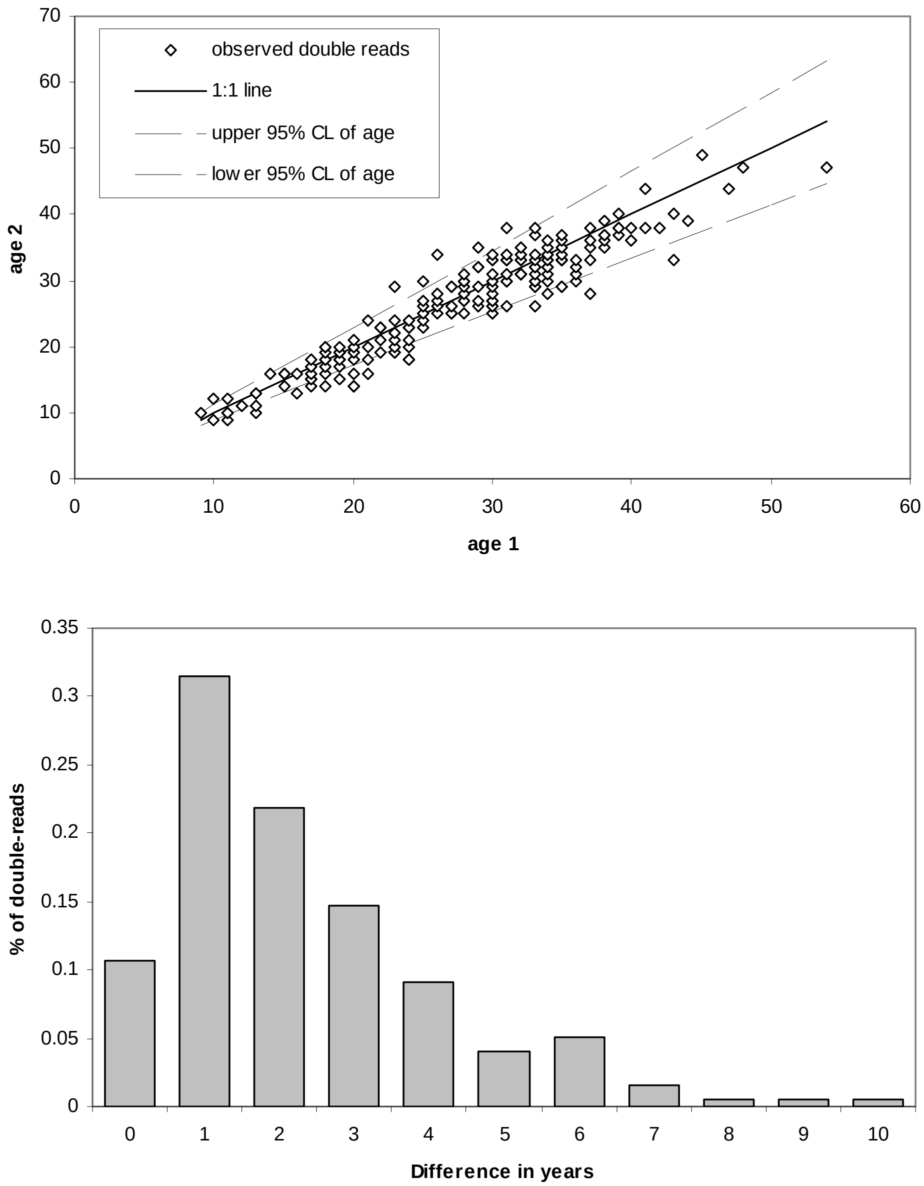
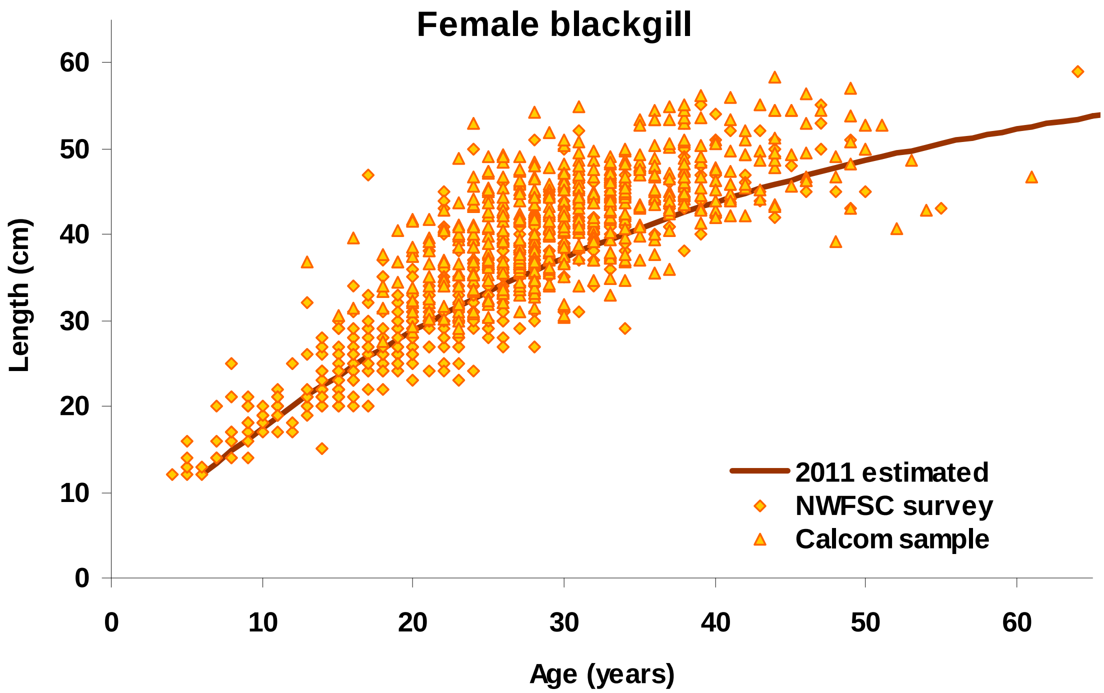


Figure 5: Results of 197 double-read age structures (top panel), with the 1:1 line and the 95% confidence limits in age predicted by the age-error software of Punt et al. (2008) and (bottom panel) the within reader % agreement.



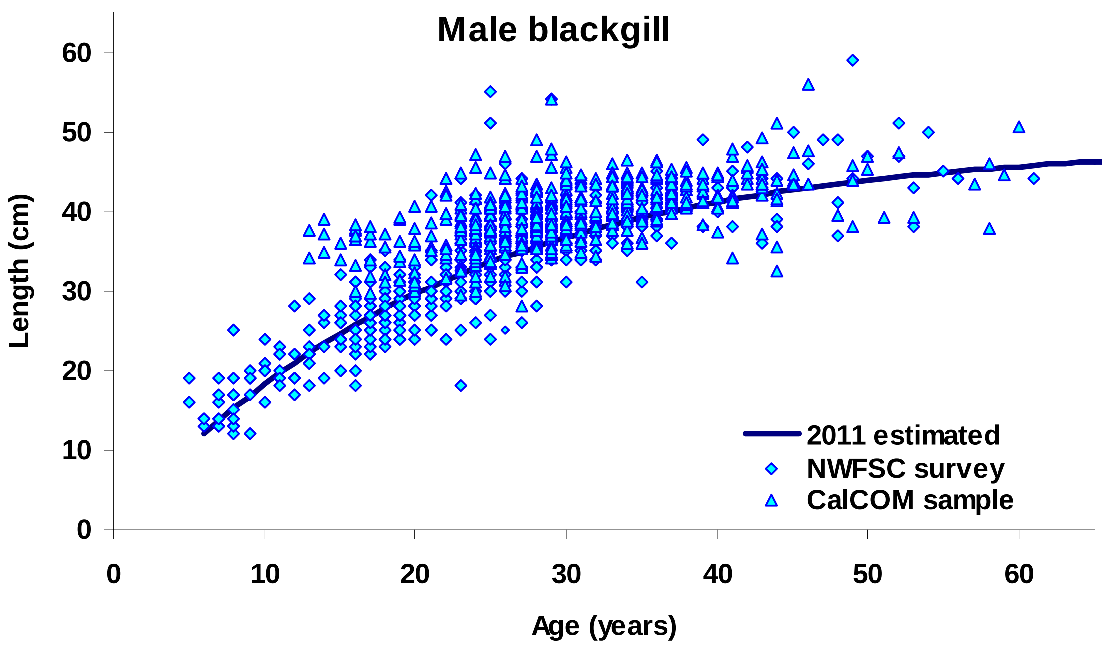


Figure 6: Size at age data by source (fishery or survey) and fitted growth curves based on the base model for this assessment

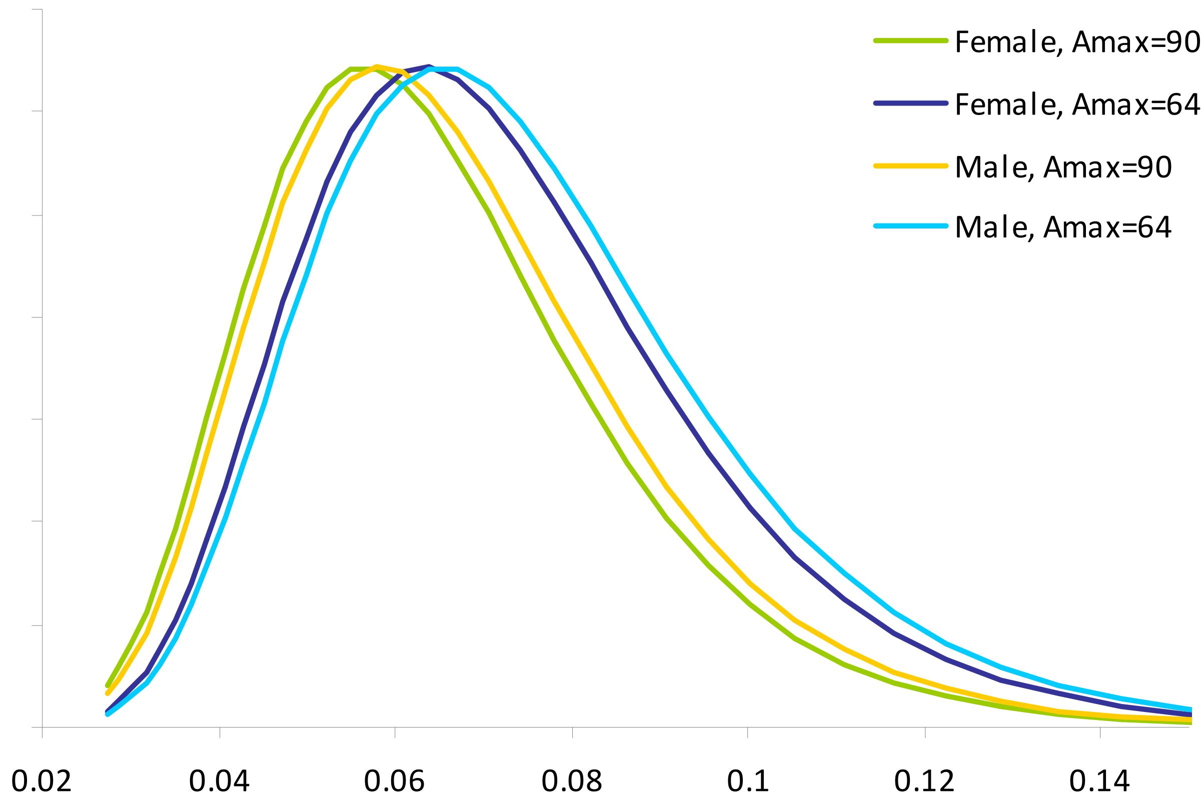


Figure 7: Prior on natural mortality (males and females, with alternative maximum ages) based on the Hamel (pers. com.) approach.

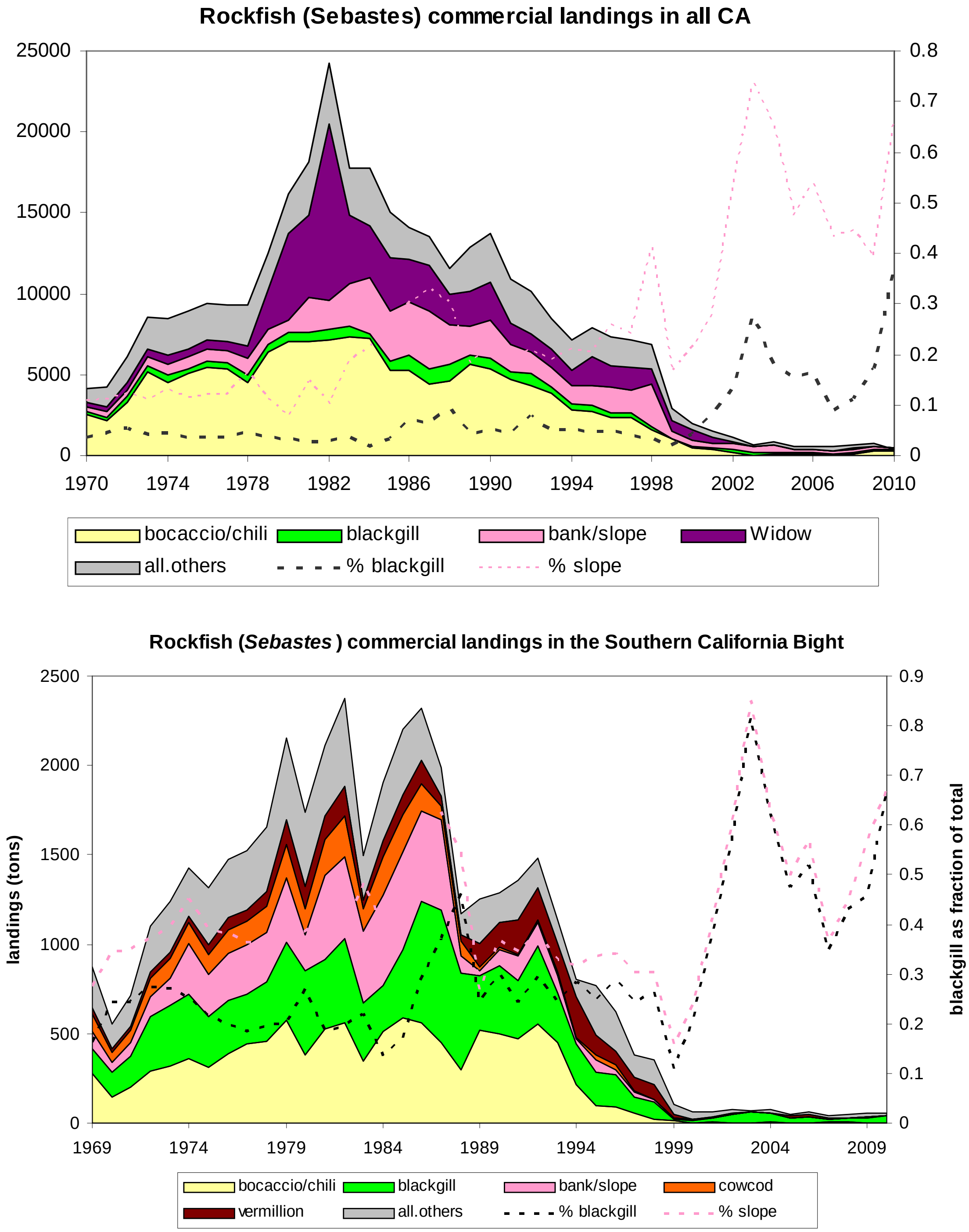


Figure 8a-b: Catches of blackgill (and other slope species) relative to catches of all rockfish (Sebastes spp.) for all of California (top) and the Southern California Bight region south of Point Conception, CA (bottom).

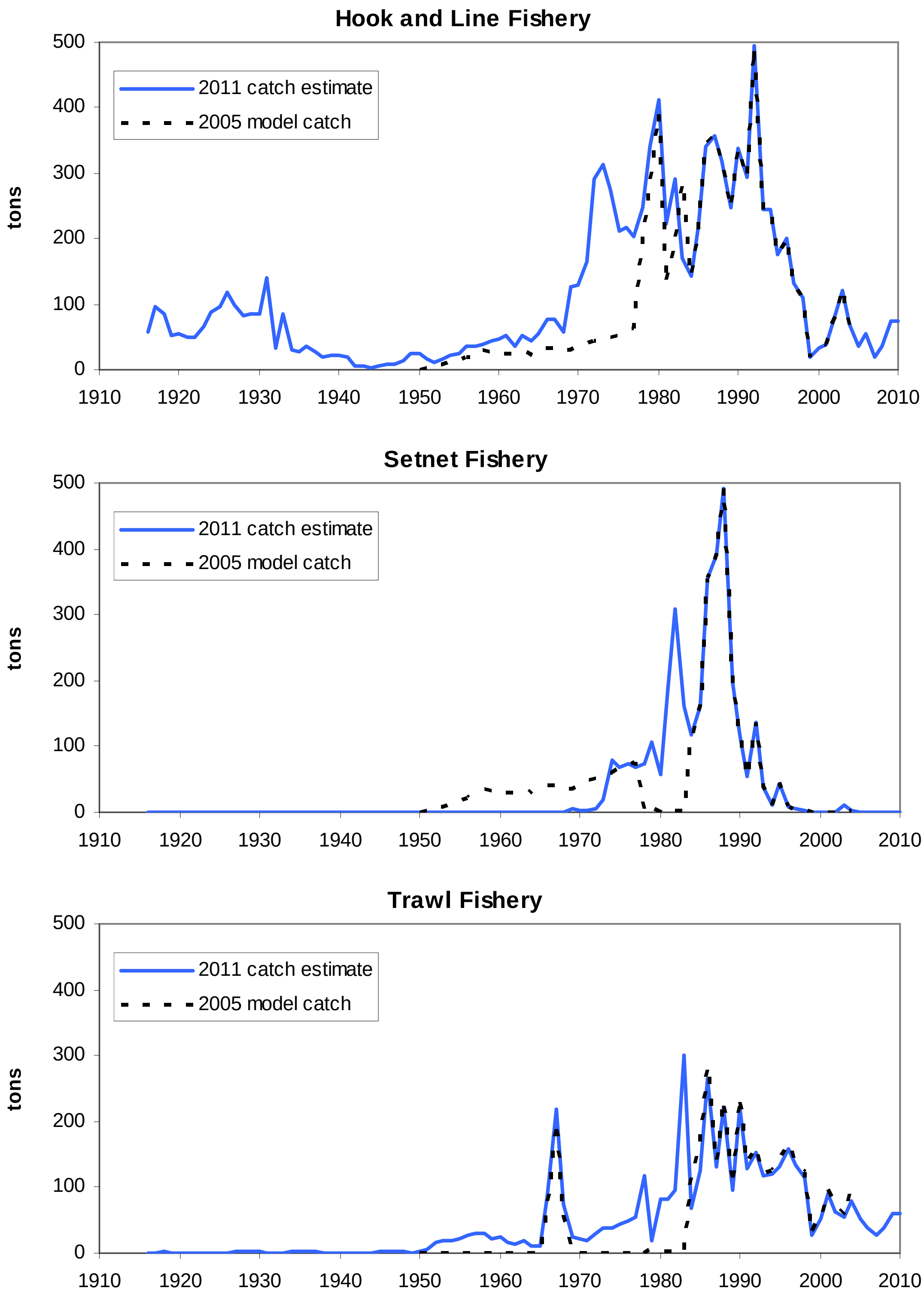


Figure 9: Comparison of catches from the 2005 assessment data file relative to comparable catches for the 2005 fisheries from 2011 catch estimates.

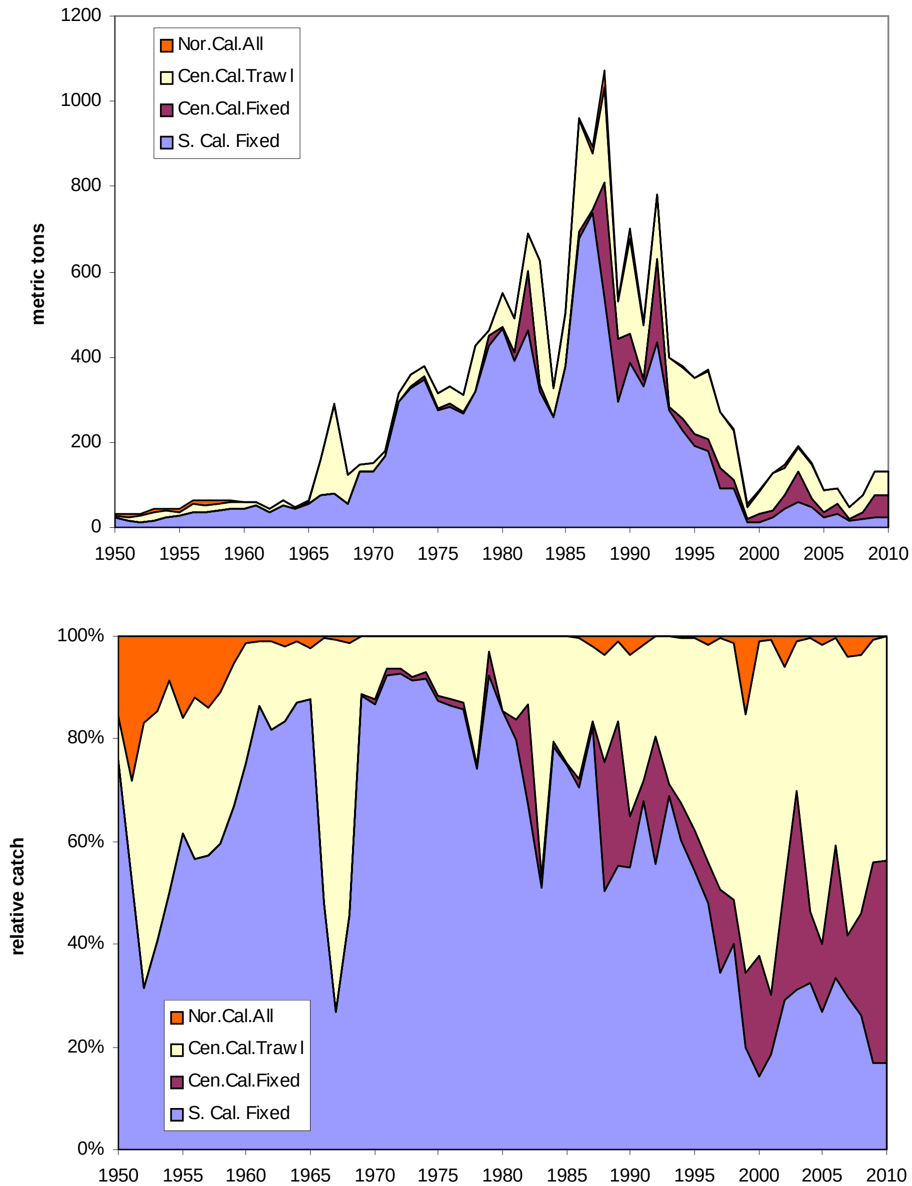


Figure 10: Landings estimates for the three fisheries used in the model, as well as northern California catches (not included), by ton (top) and as a relative fraction of the total catch (bottom).

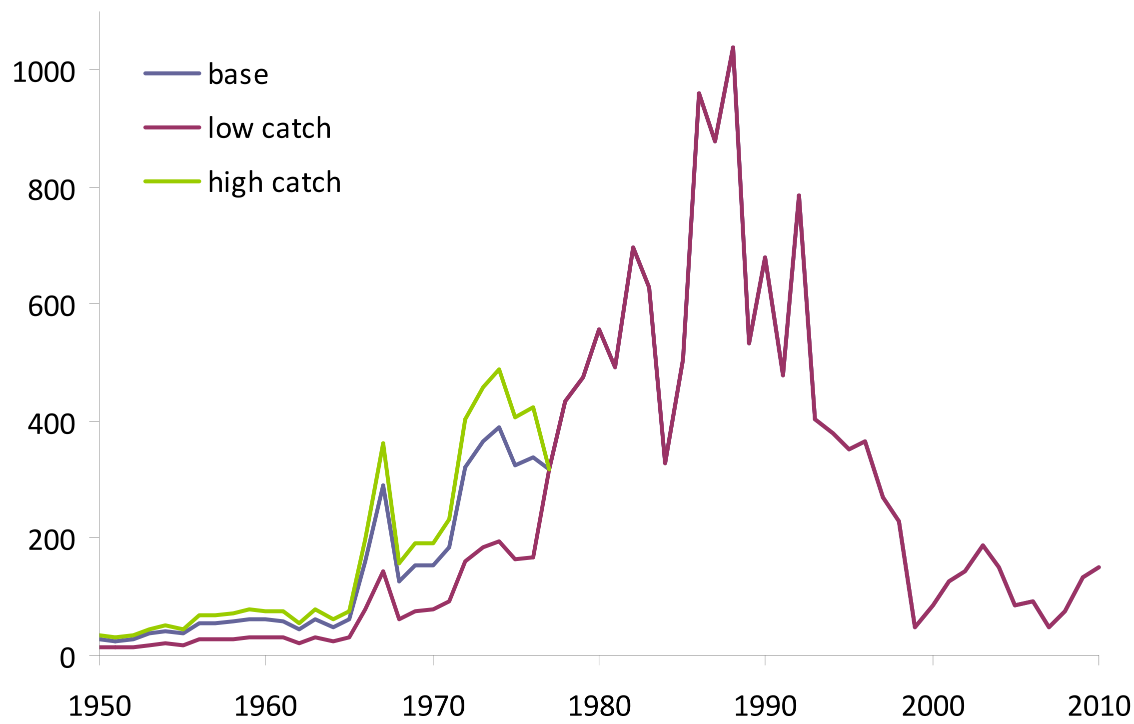


Figure 11: Alternative catch histories for historical catch sensitivity analyses

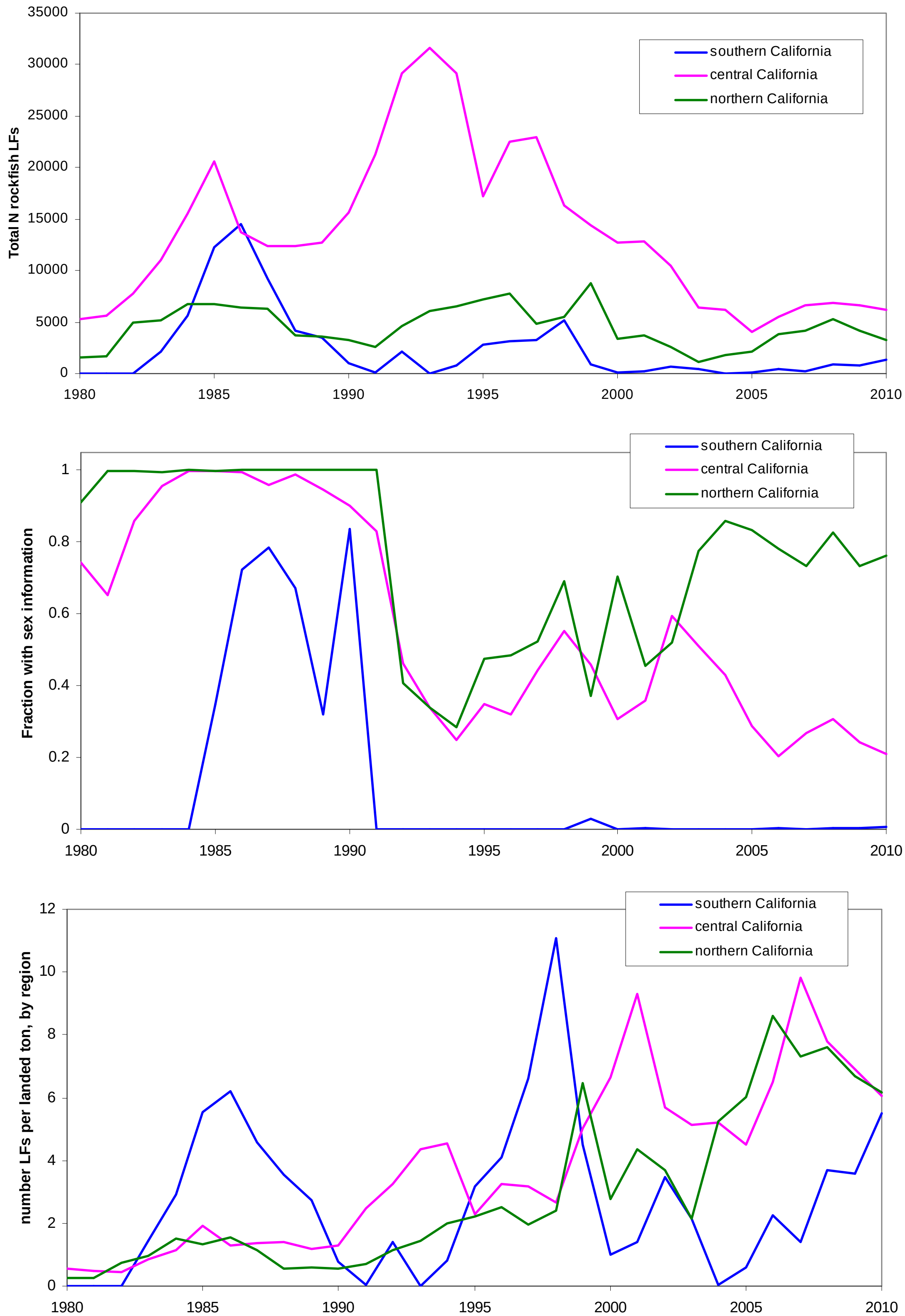


Figure 12: Trends in port sampling data availability; the total number of length observations (top), the fraction of length observations with corresponding sex information (center) and the number of length observations per landed ton (bottom) by region for California waters.

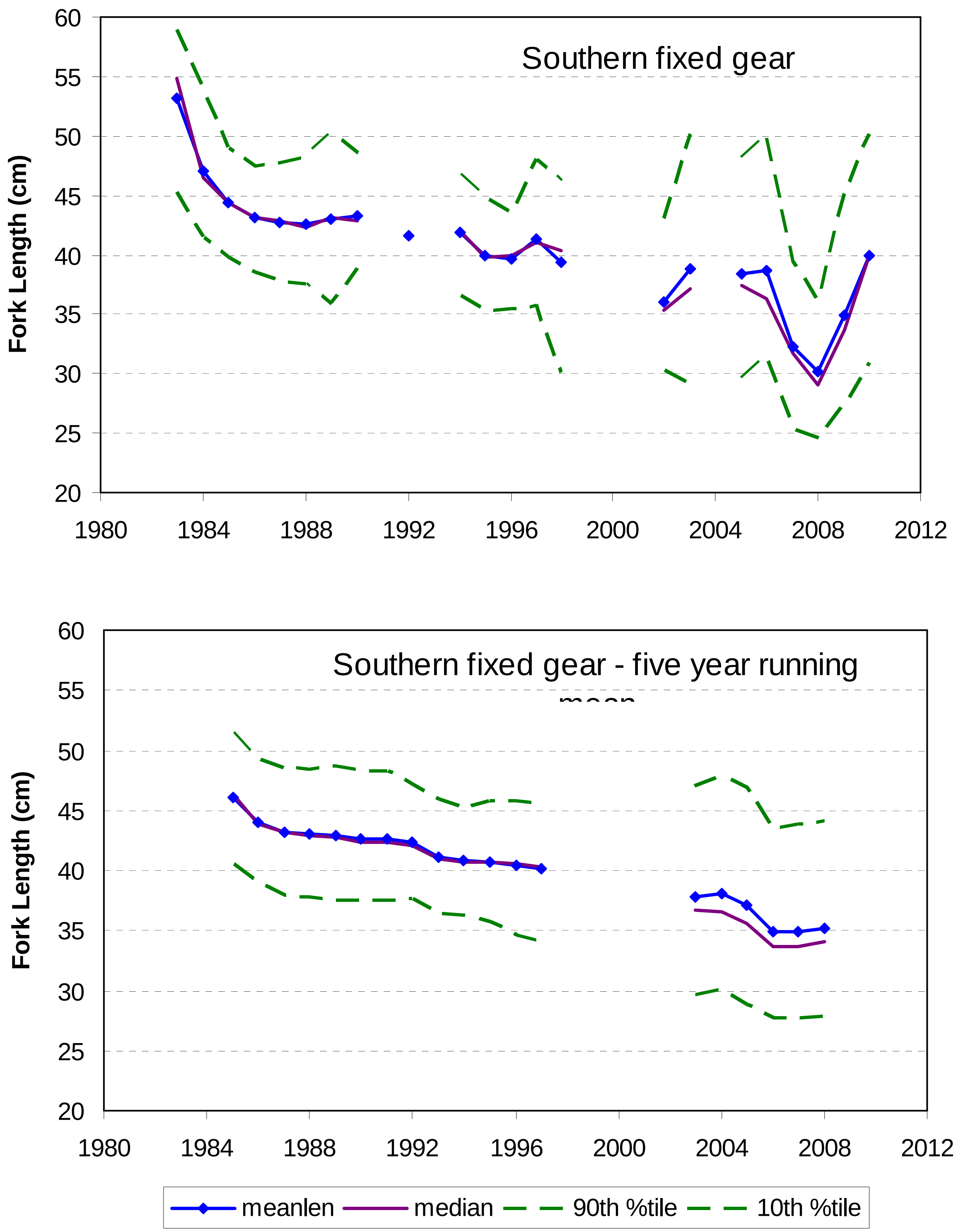
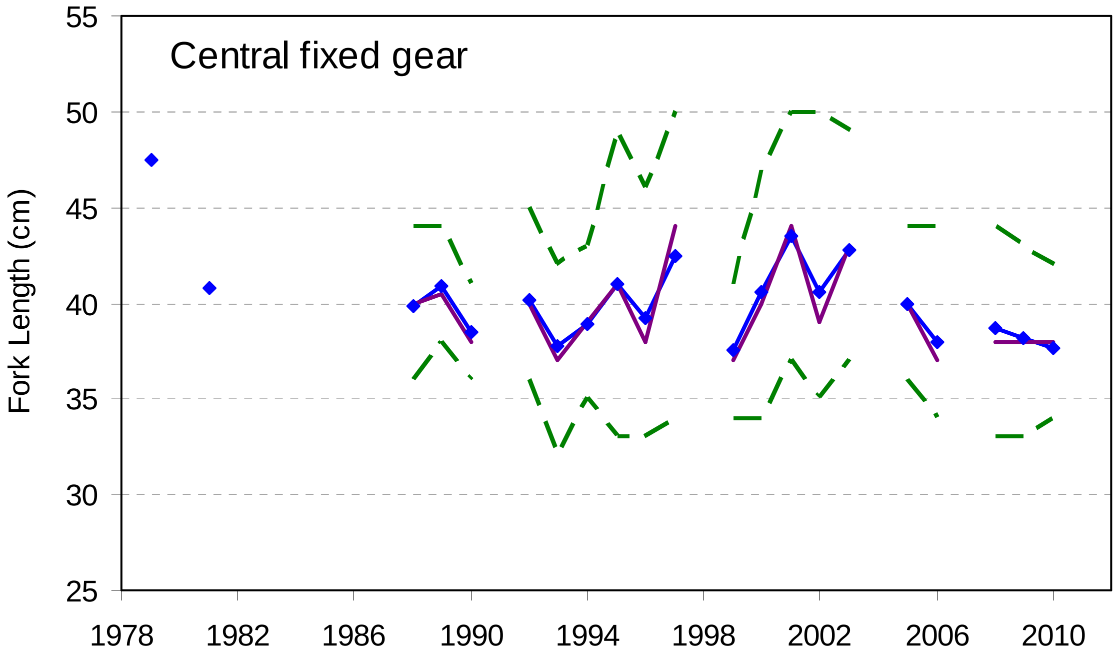


Figure 13: Mean size information for southern California fixed gear



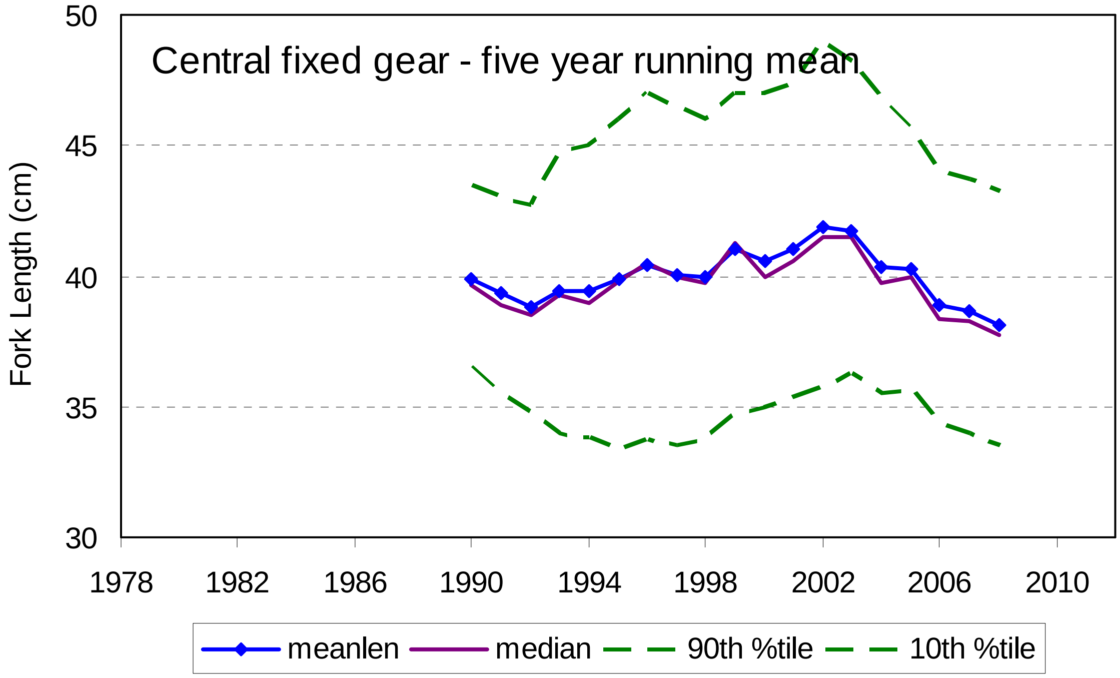


Figure 14: Mean size data for central California fixed gear

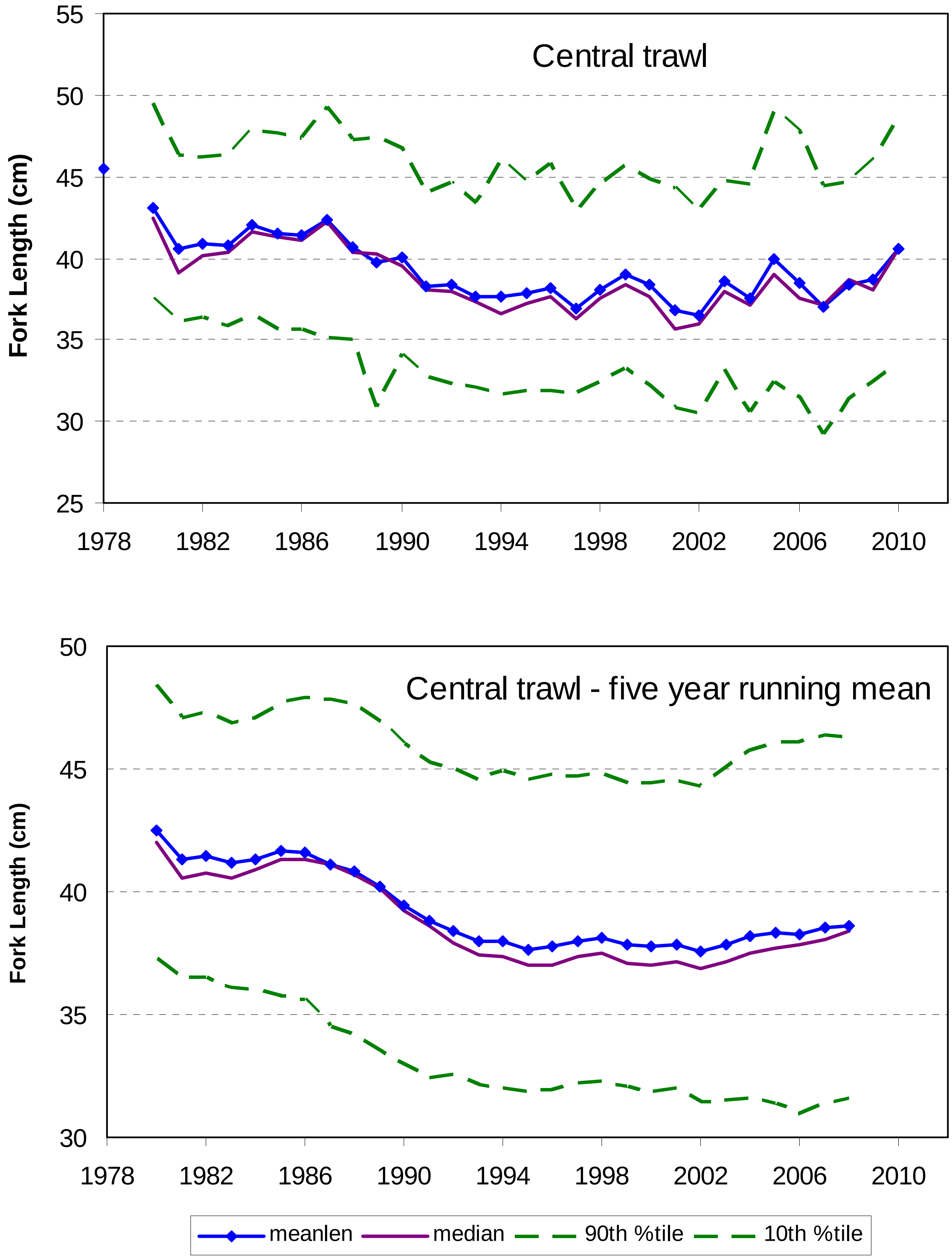


Figure 15: Mean size data for central California trawl

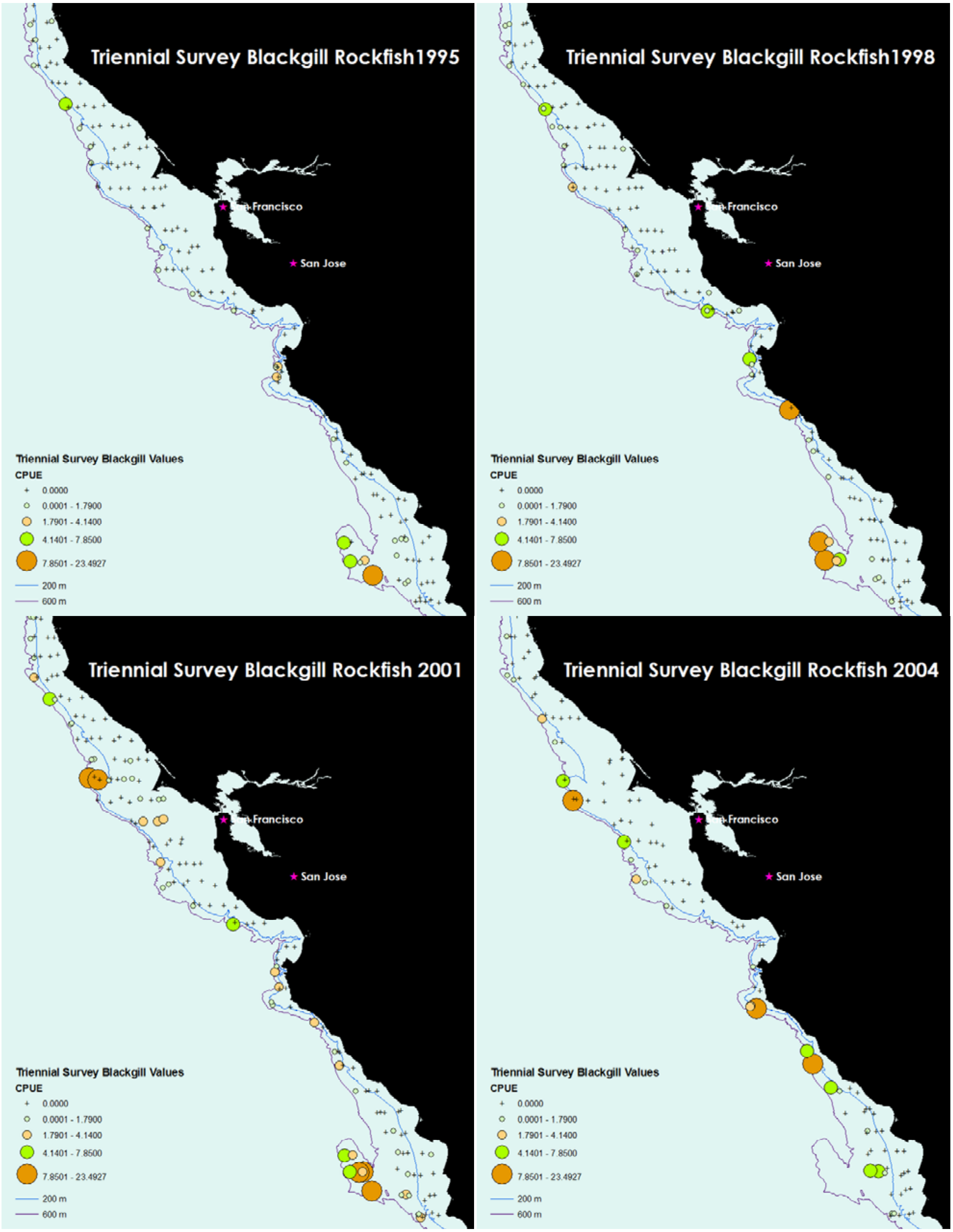


Figure 16: Location and relative CPUE of triennial trawl survey hauls in the Monterey and (northern) Conception INPFC areas

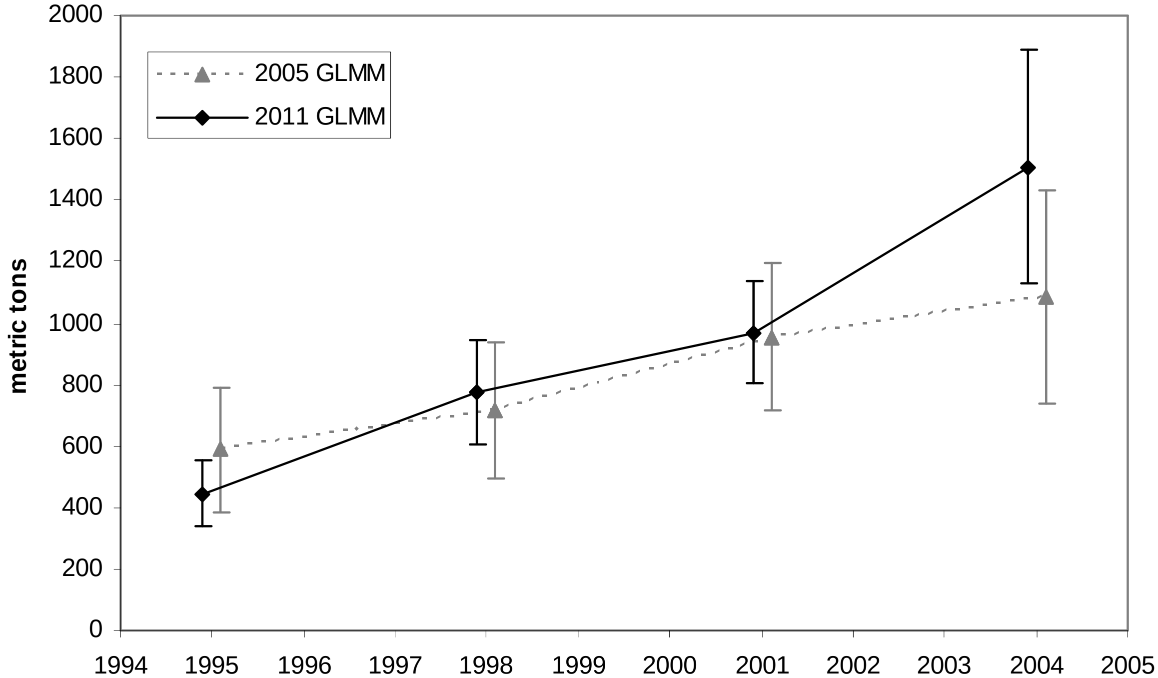


Figure 17: Triennial trawl survey CPUE index for 2011, relative to index from the 2005 assessment.

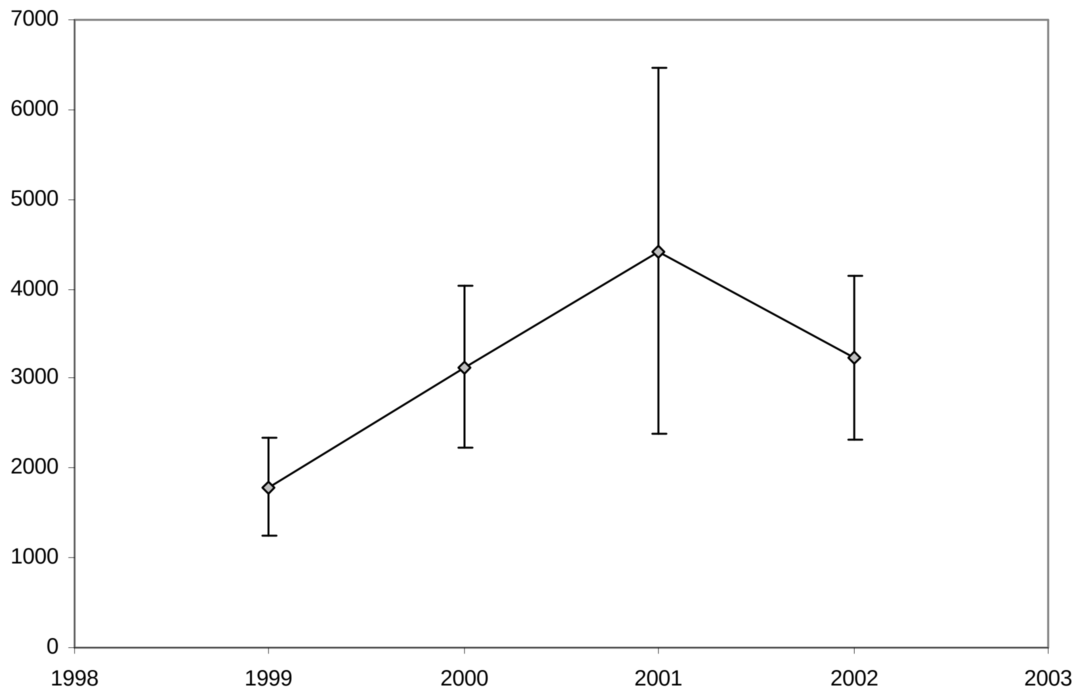


Figure 18: Relative abundance index based on the 1999-2002 NWFSC slope survey (Monterey and north Conception INPFC areas only).

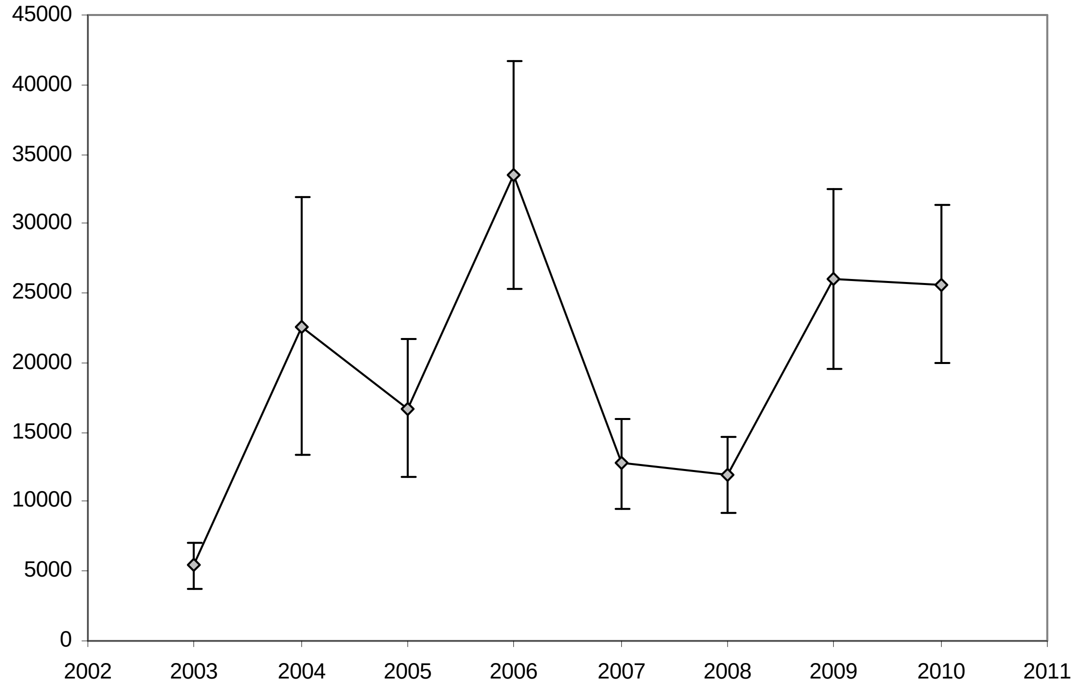


Figure 19: Relative abundance index based on the 2003-2010 NWFSC combined shelf/slope survey

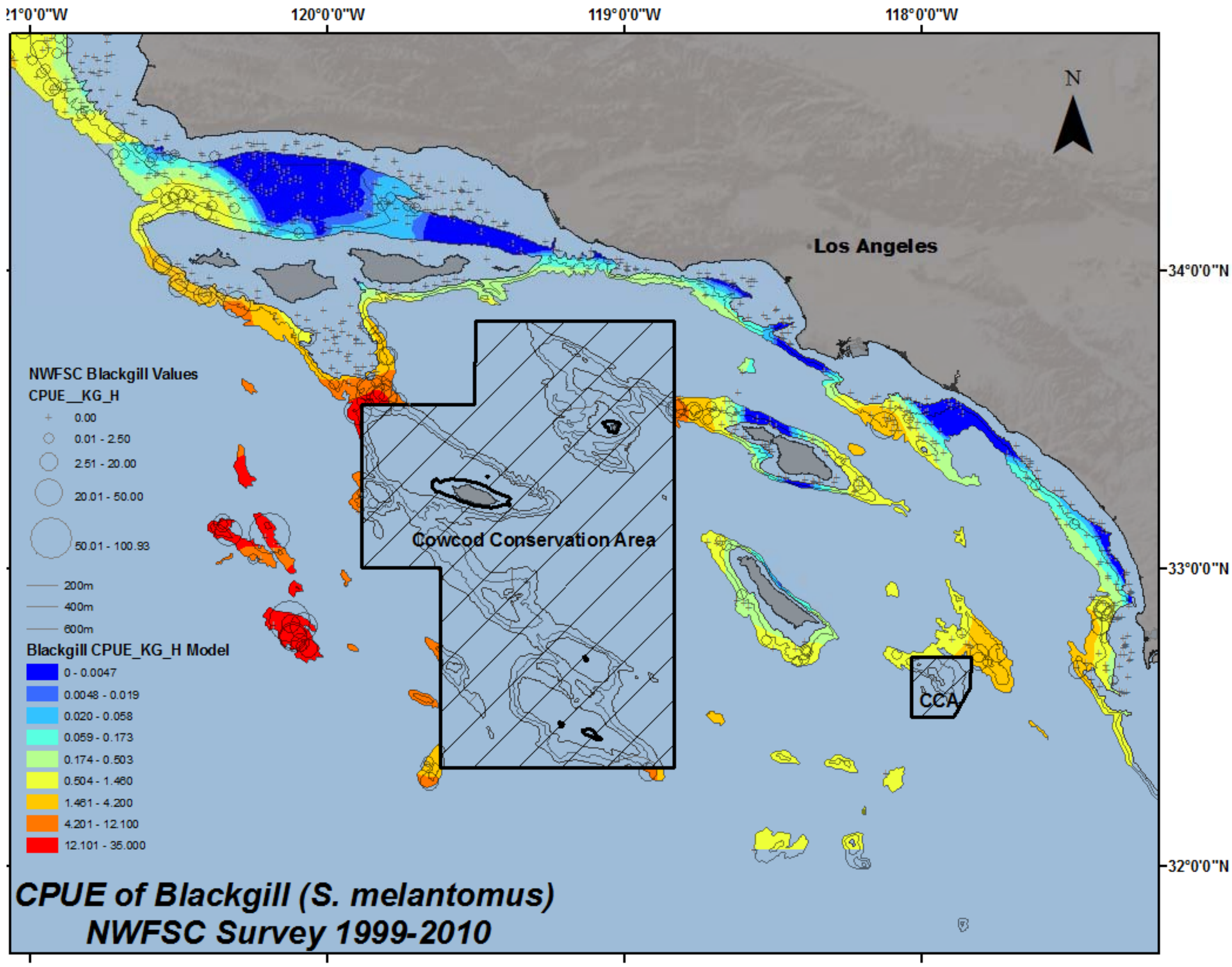


Figure 20: Location and relative CPUE of all NWFSC combined trawl survey hauls in the southern California region (2003-2010), overlaid on an estimate of mean catch rate by area.

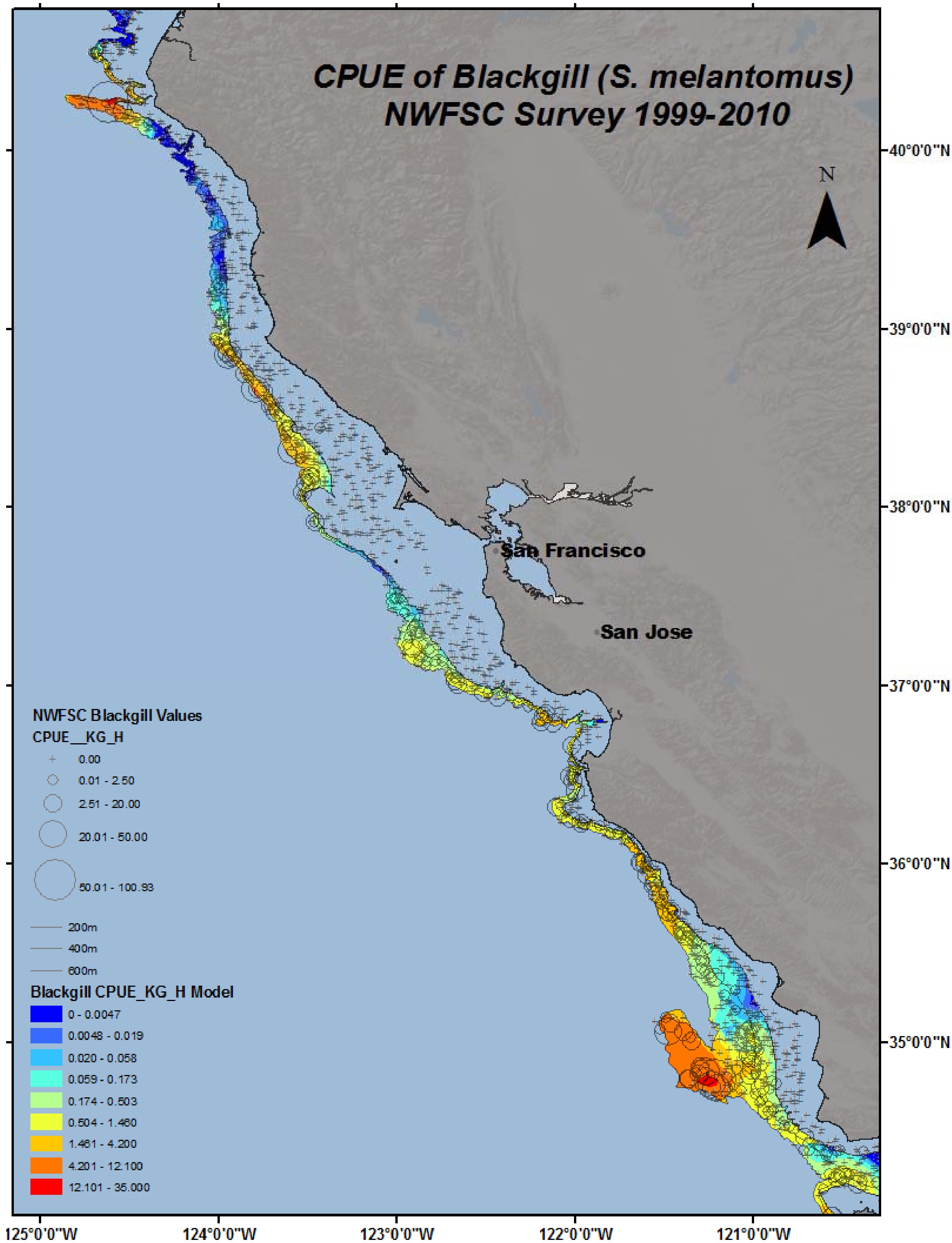


Figure 21: Location and relative CPUE of all NWFSC combined trawl survey hauls in the central California region (1999-2010), overlaid on an estimate of mean catch rate by area.

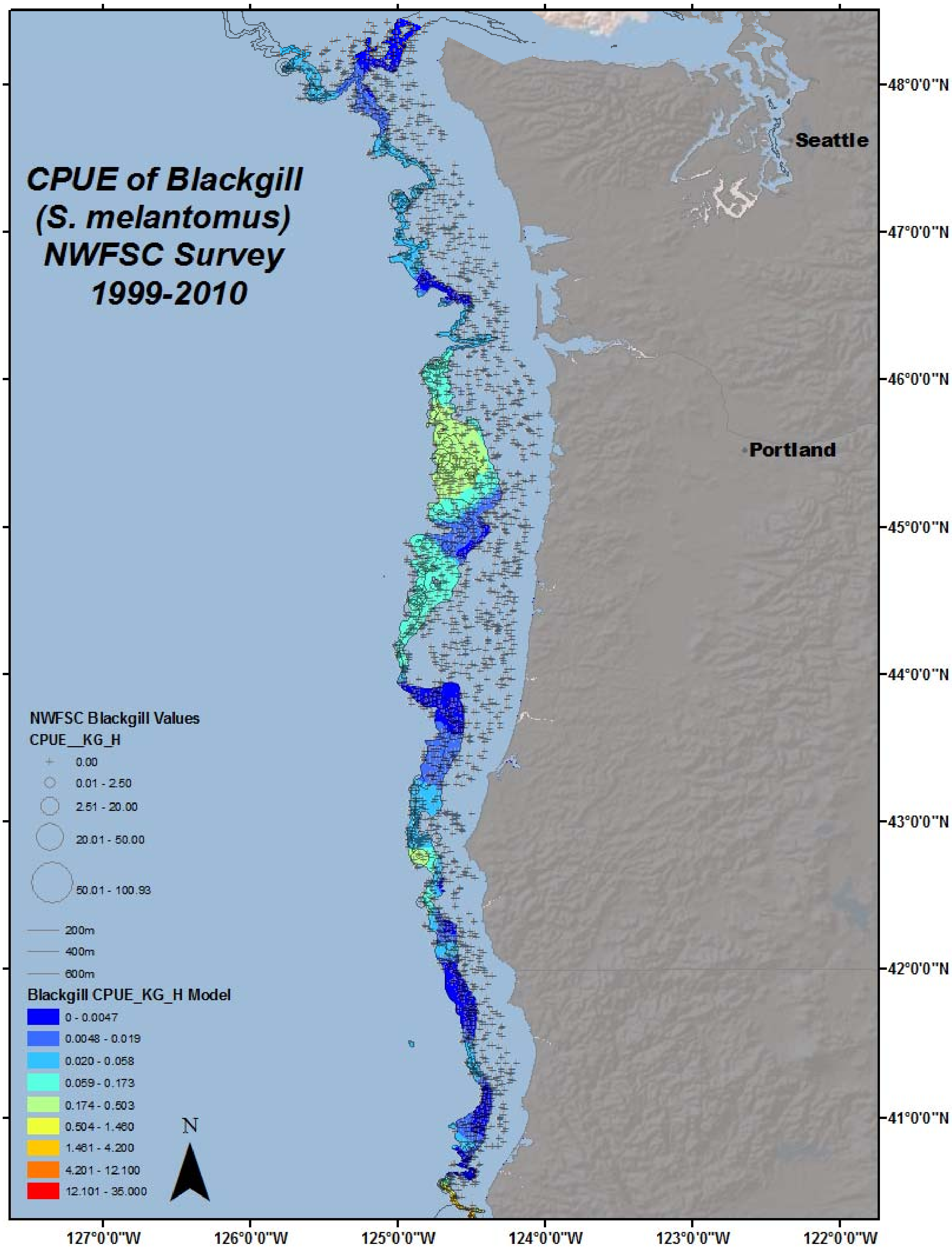
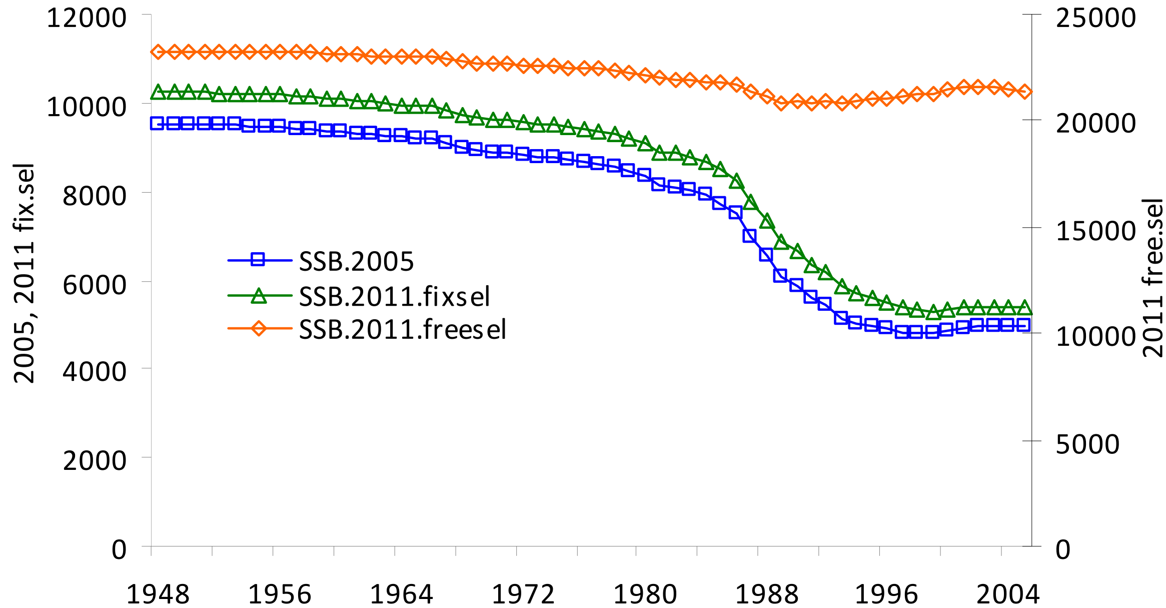
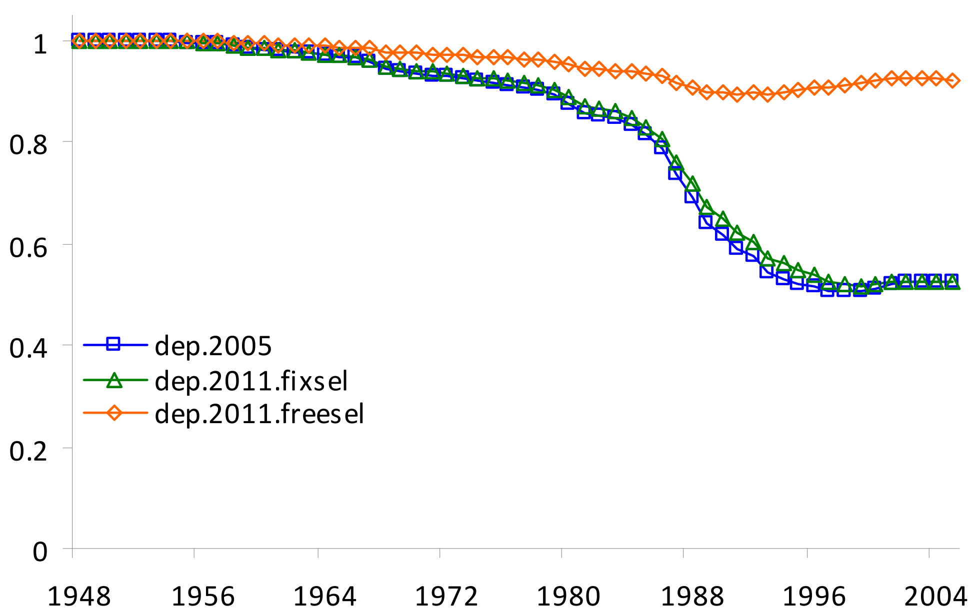


Figure 22: Location and relative CPUE of all NWFSC combined trawl survey hauls in the region north of the assessment area (Cape Mendocino to Cape Flattery, 1999-2010), overlaid on an estimate of mean catch rate by area.





Figures 23a-b: Comparison of 2005 model (SS2) results with two versions of SS3 models that use the same data and structure

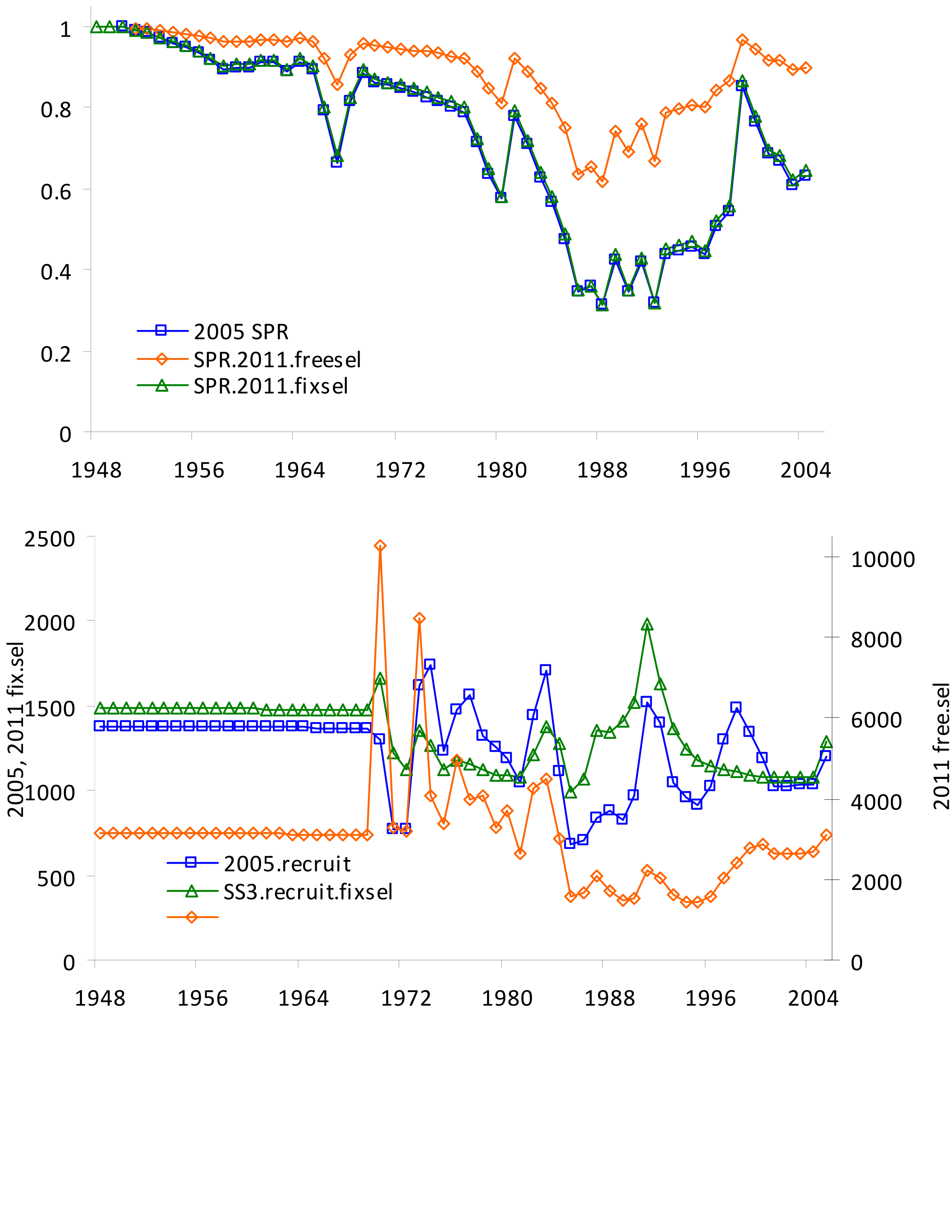


Figure 24: Overview of data sources used in this assessment

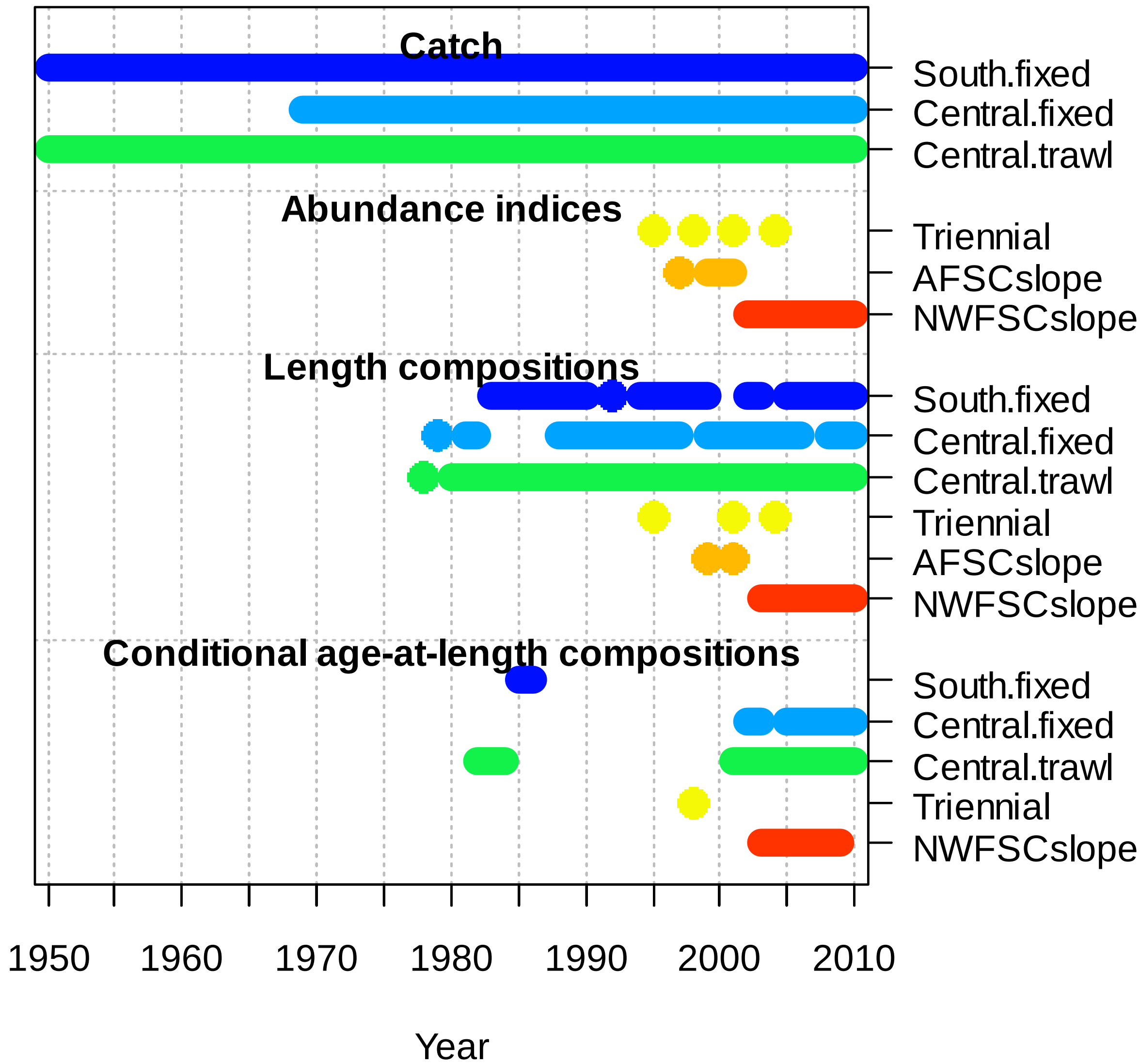


Figure 25: Overview of data sources used in this assessment

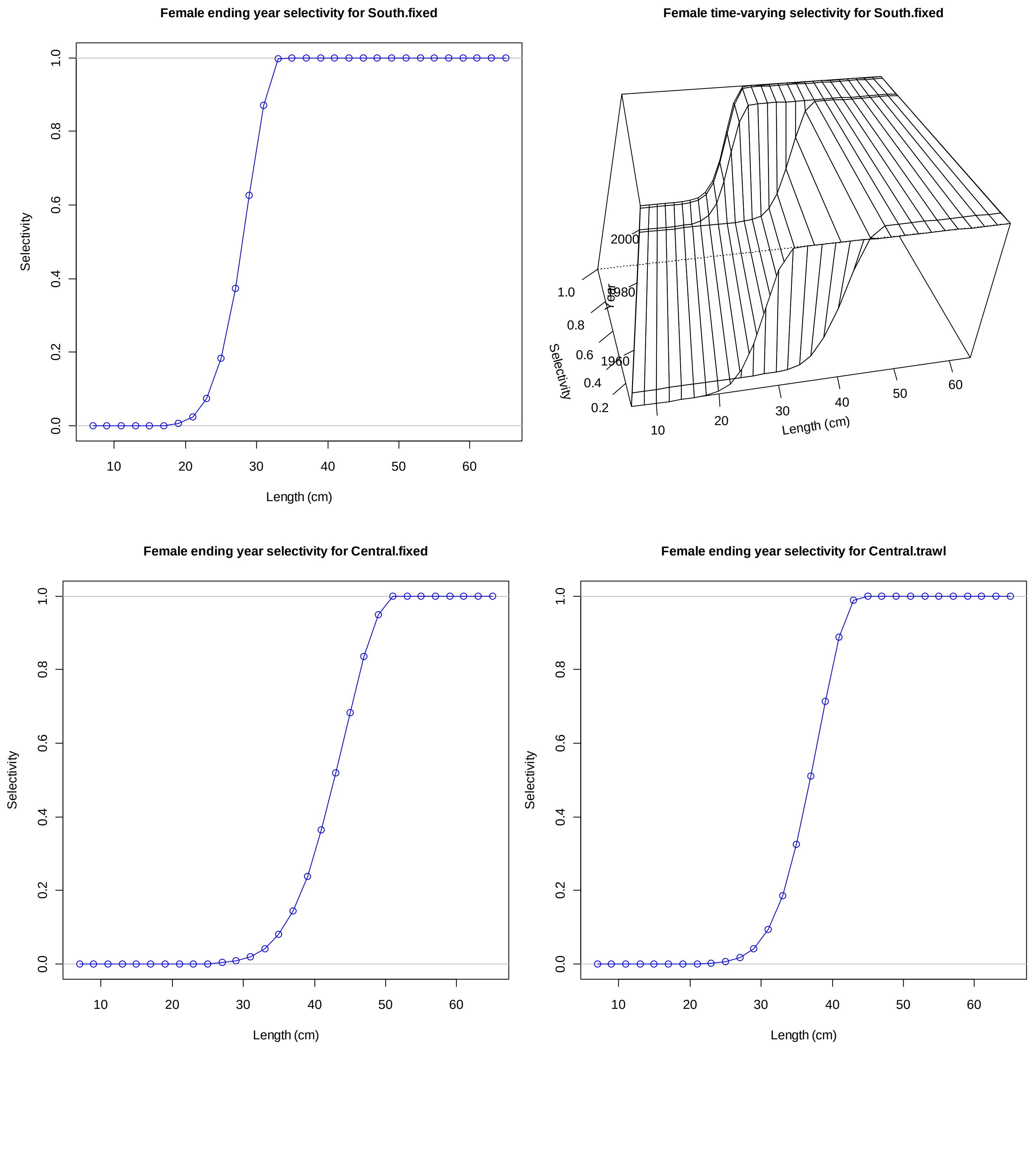


Figure 26a-d: Estimated selectivity curves for the southern fixed gear fishery (upper left), the time-varying selectivity curve for that fishery (upper right), selectivity for central California fixed gear (lower left) and central California trawl (lower right)

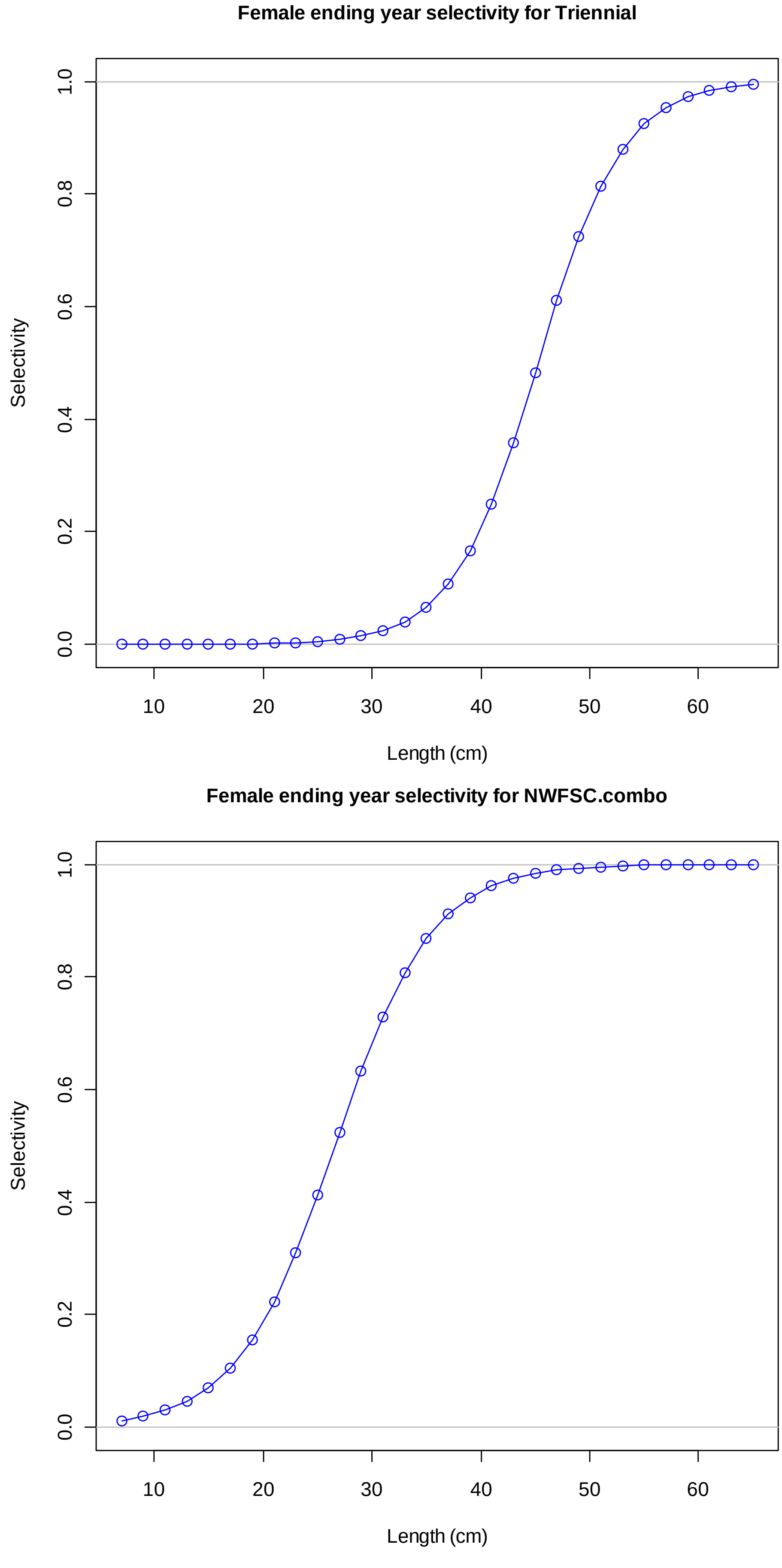


Figure 27 a-b: Estimated selectivity curves for the triennial trawl survey (left) and the NWFSC combined trawl survey (right)

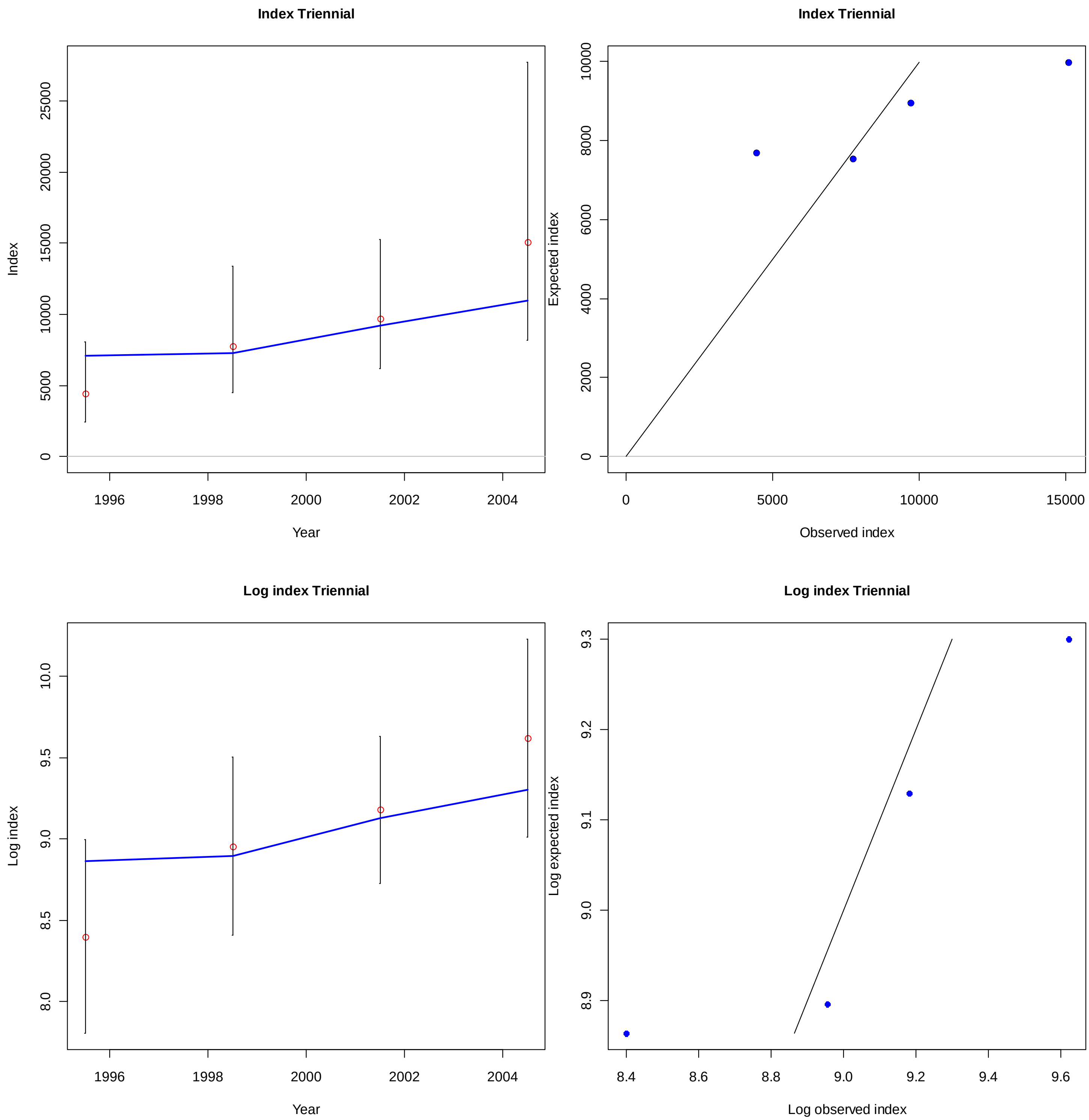


Figure 28a-d: Fits to the triennial trawl survey index (1995-2004) in arithmetic (upper left) and log (lower left) scale, with observed and predicted data (right)

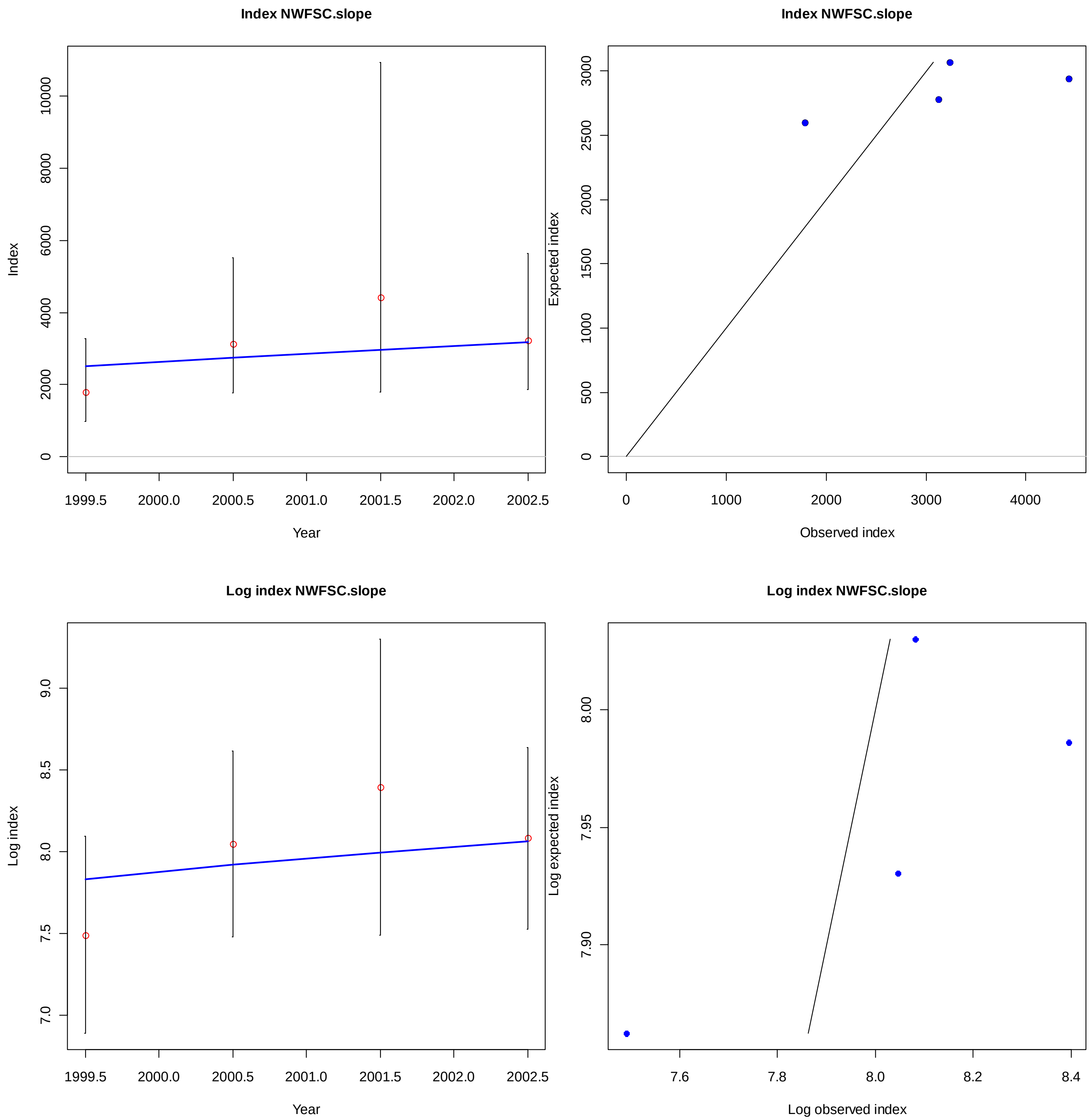


Figure 29a-d: Fits to the NWFSC slope survey index (1999-2002) in arithmetic (upper left) and log (lower left) scale, with observed and predicted data (right)

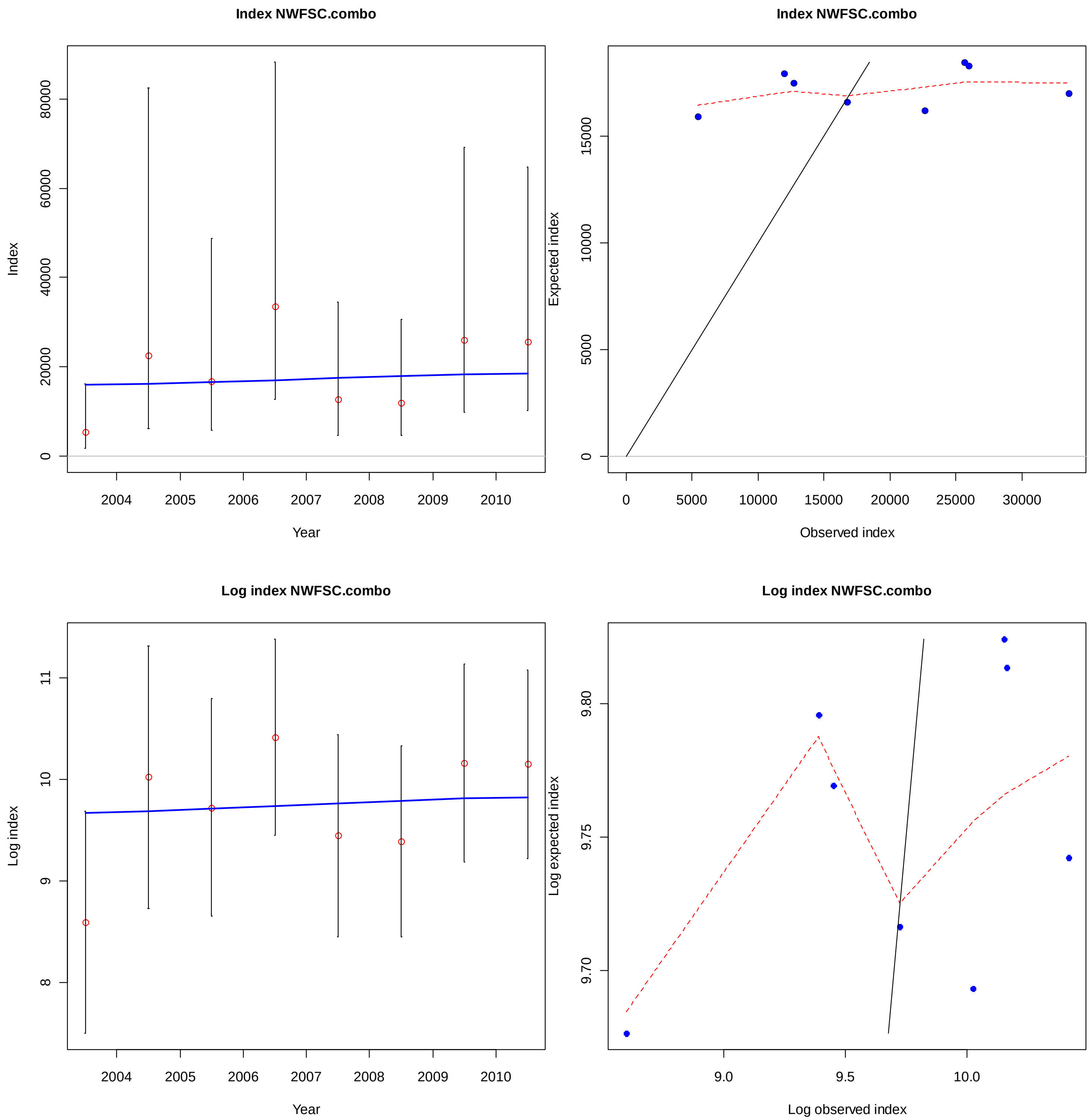


Figure 30: Fits to the NWFSC combined shelf and slope bottom trawl survey index (2003-2010) in arithmetic (upper left) and log (lower left) scale.

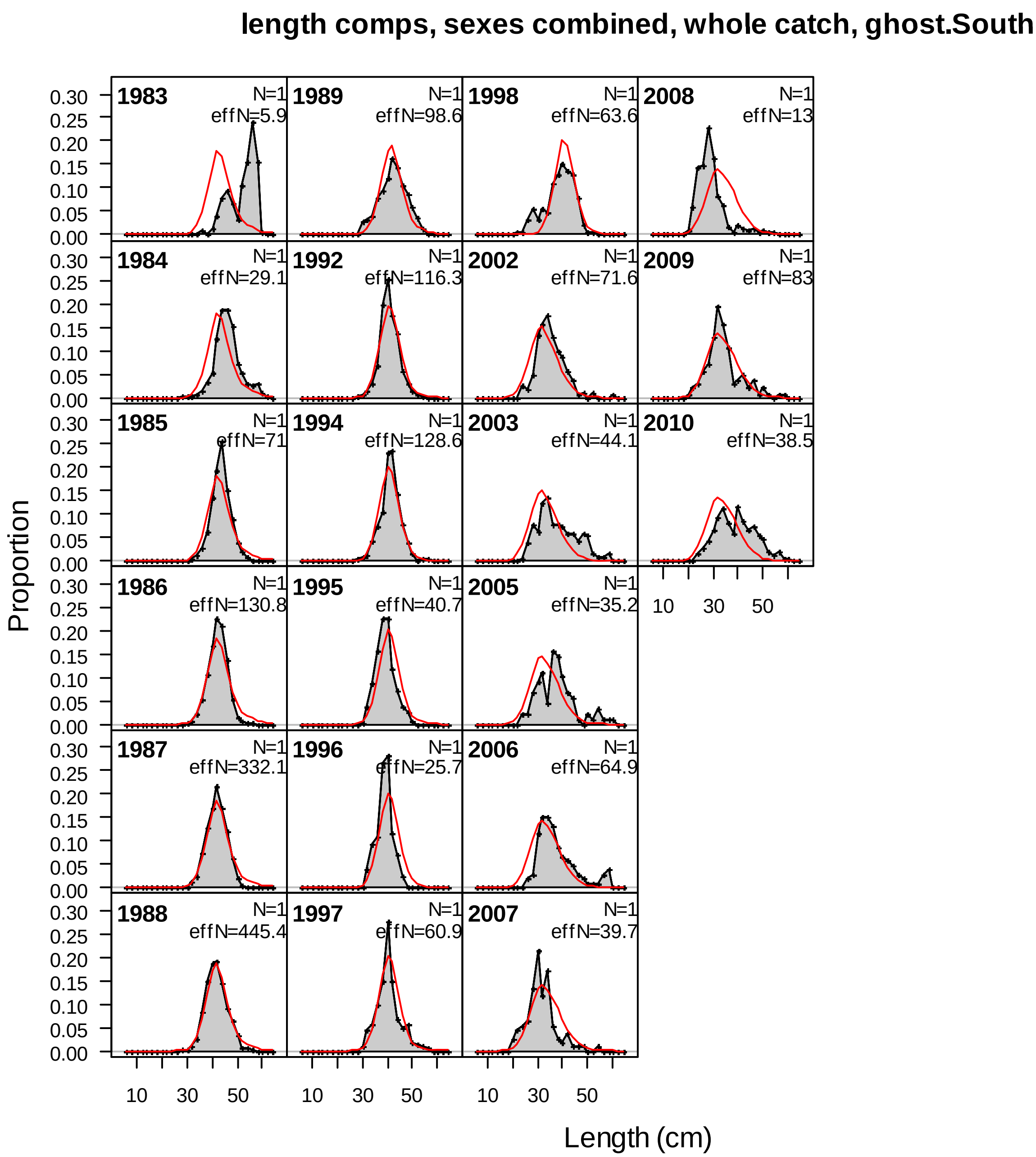


Figure 31: Observed and predicted length composition data (sexes combined) for the southern fixed gear fishery (1983-2010)

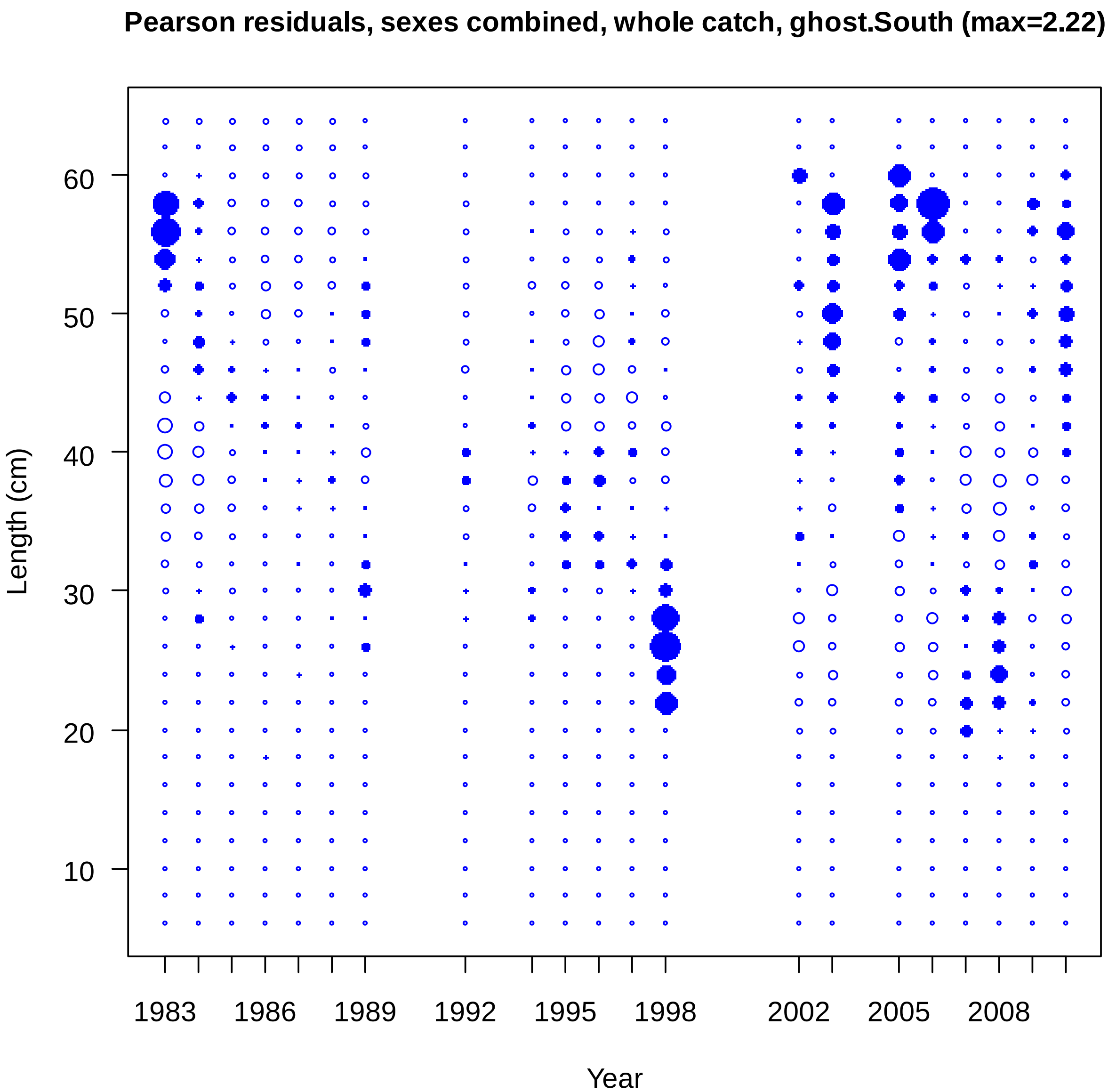


Figure 32 a-b: Residuals for combined sex (ghost fishery, including both gender-specific and gender free length observations). See appendix for observed and predicted effective sample sizes by the appropriate data type.

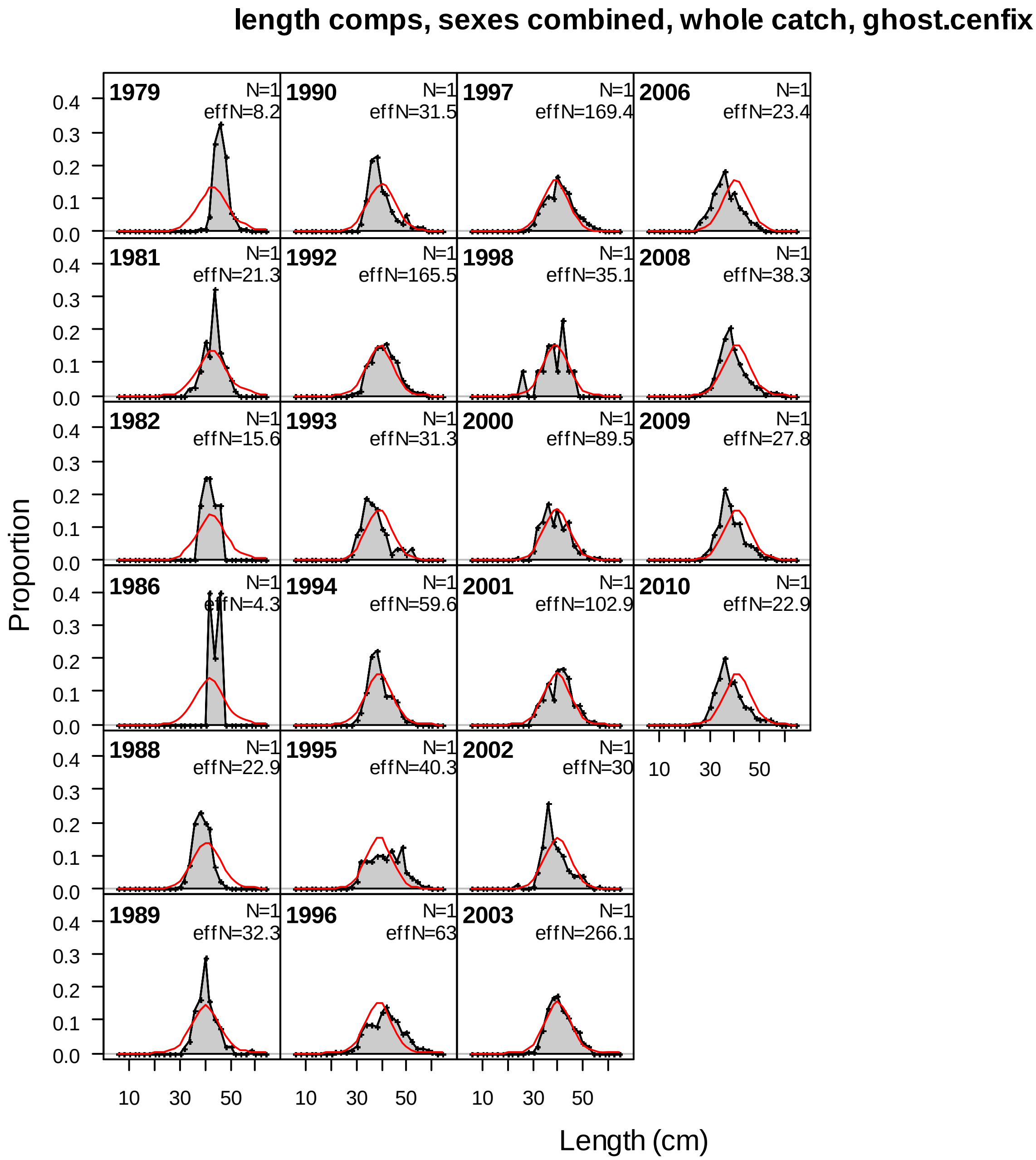


Figure 33: Observed and predicted length composition data (sexes combined) for the central California fixed gear fishery (1983-2010)

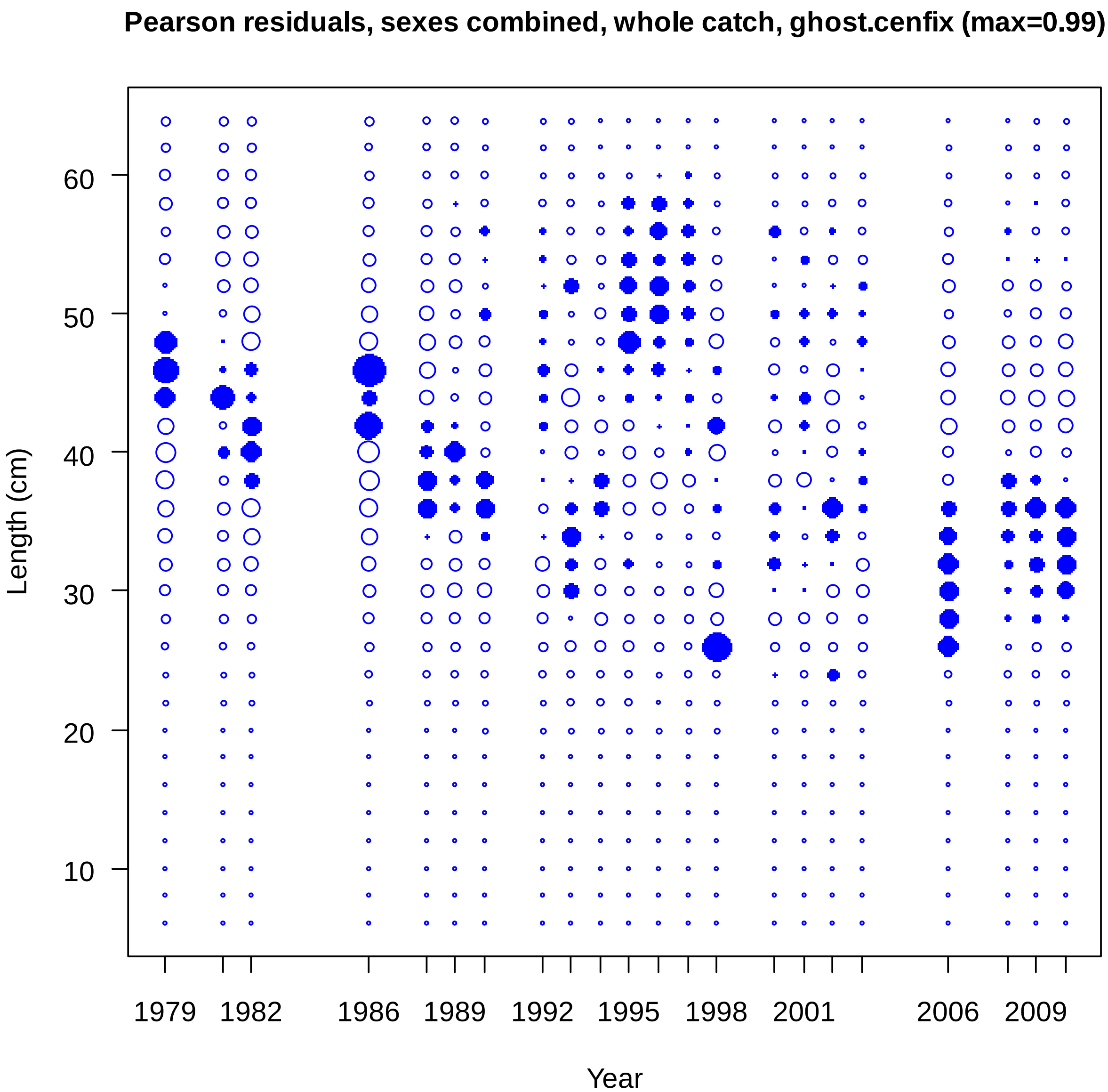


Figure 34 a-b: Residuals (top) and effective sample sizes by year (bottom) for combined sex length frequency data from the central California fixed gear fishery (1994-2010)

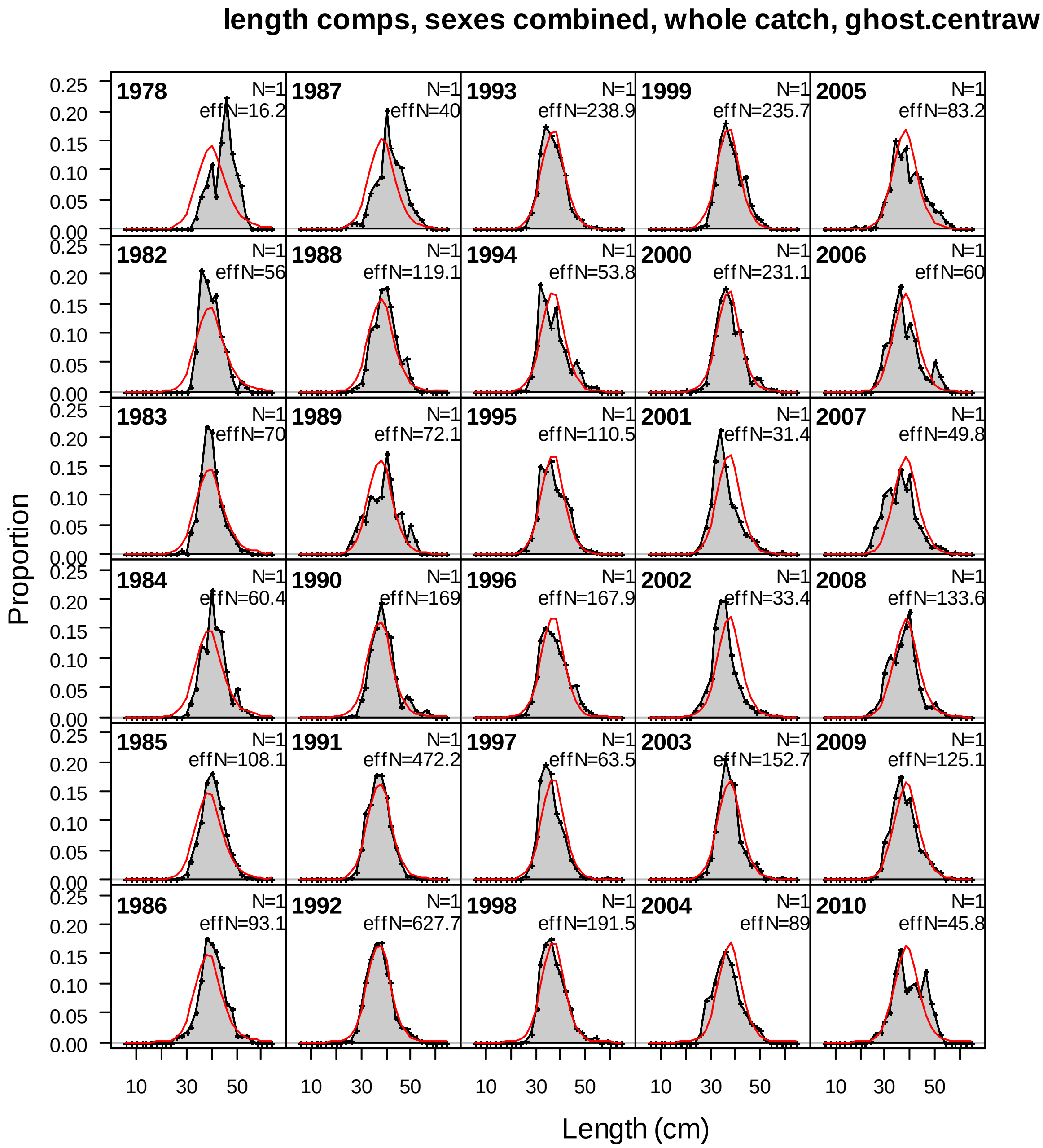


Figure 35: Observed and predicted length composition data (sexes combined) for the central California trawl fishery (1992-2010)

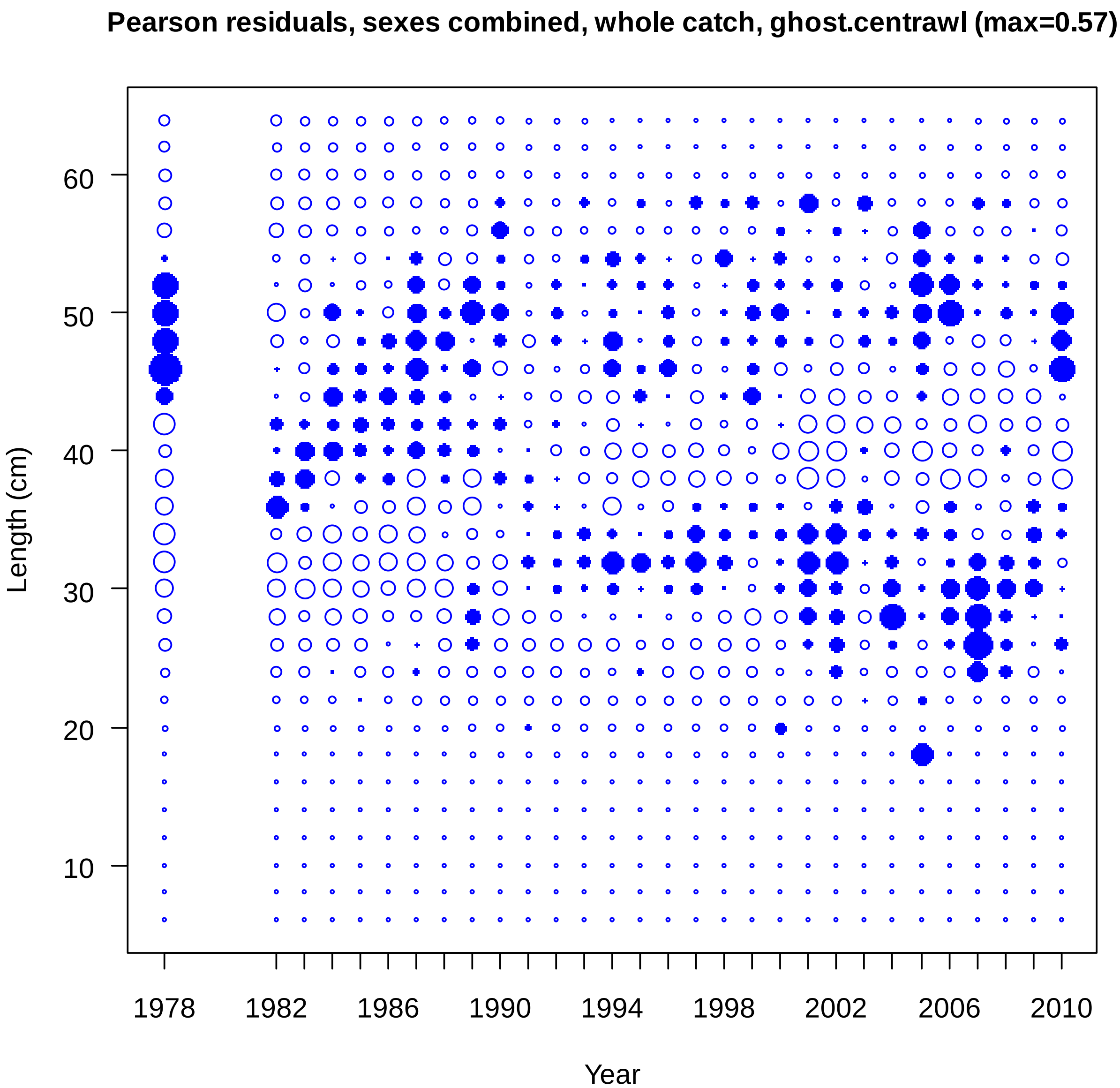


Figure 36: Residuals (top) and effective sample sizes by year (bottom) for female blackgill length frequency data from the central California trawl fishery (1992-2010)

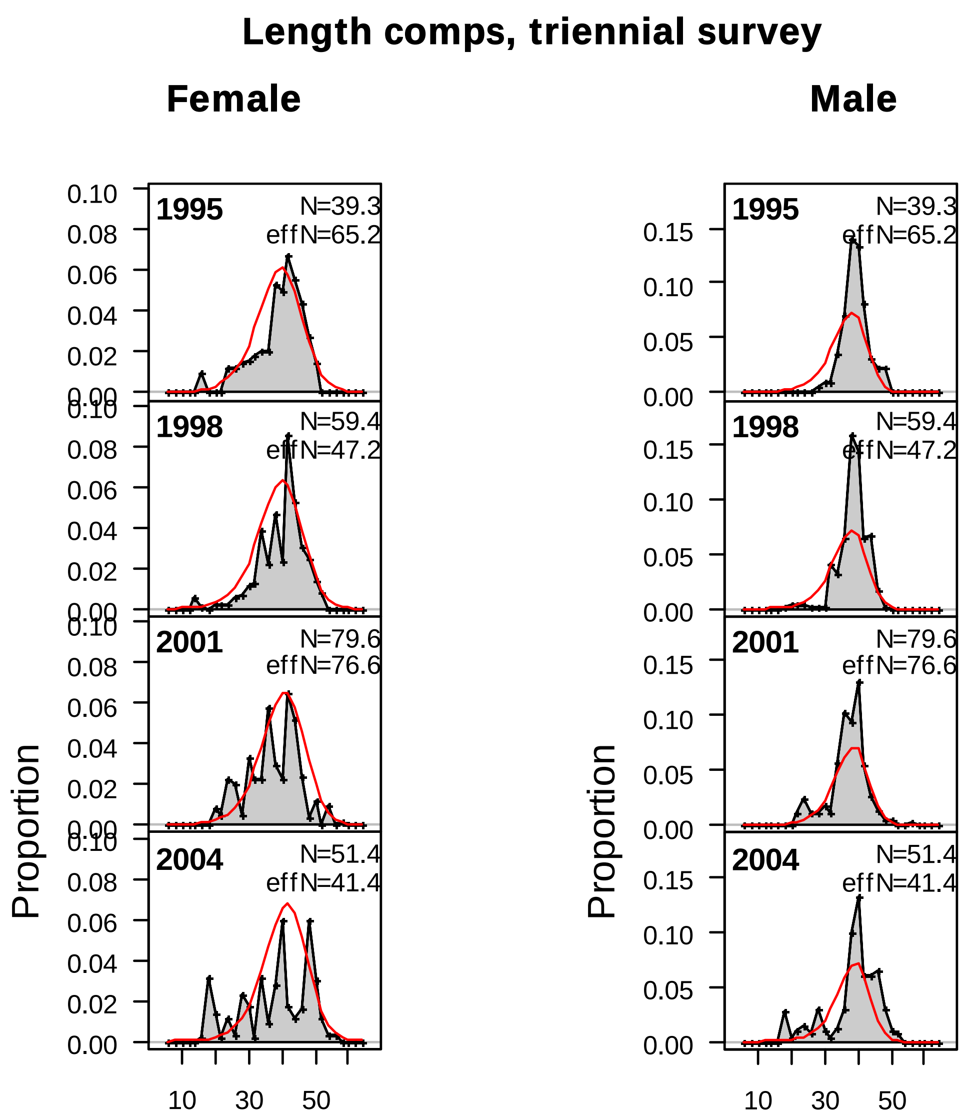


Figure 37: Observed and predicted length composition data for the triennial trawl survey (1995-2004)

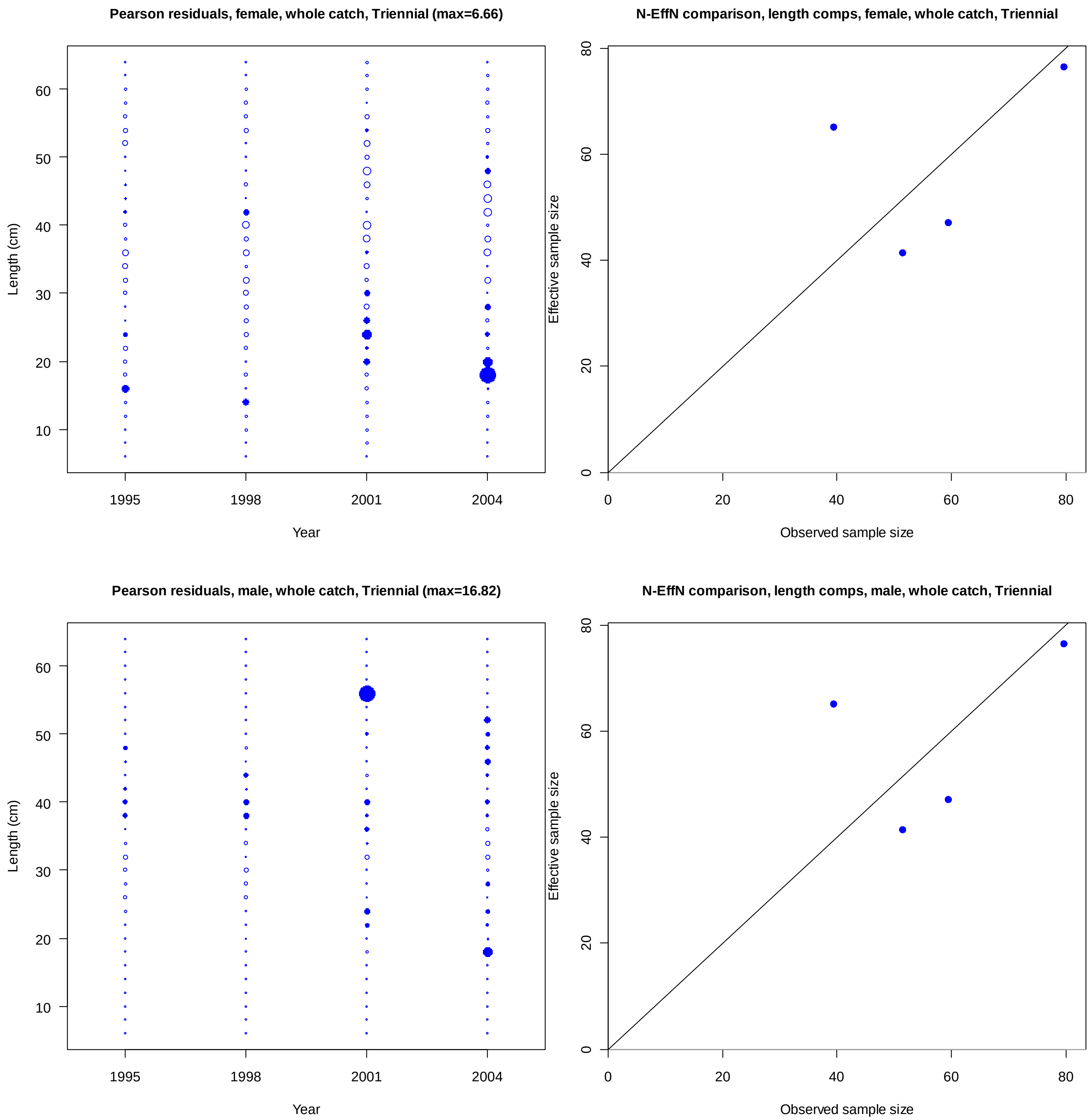


Figure 38 a-d: Residuals and effective sample sizes from gender-specific length frequency data for the triennial trawl survey (1995-2004)

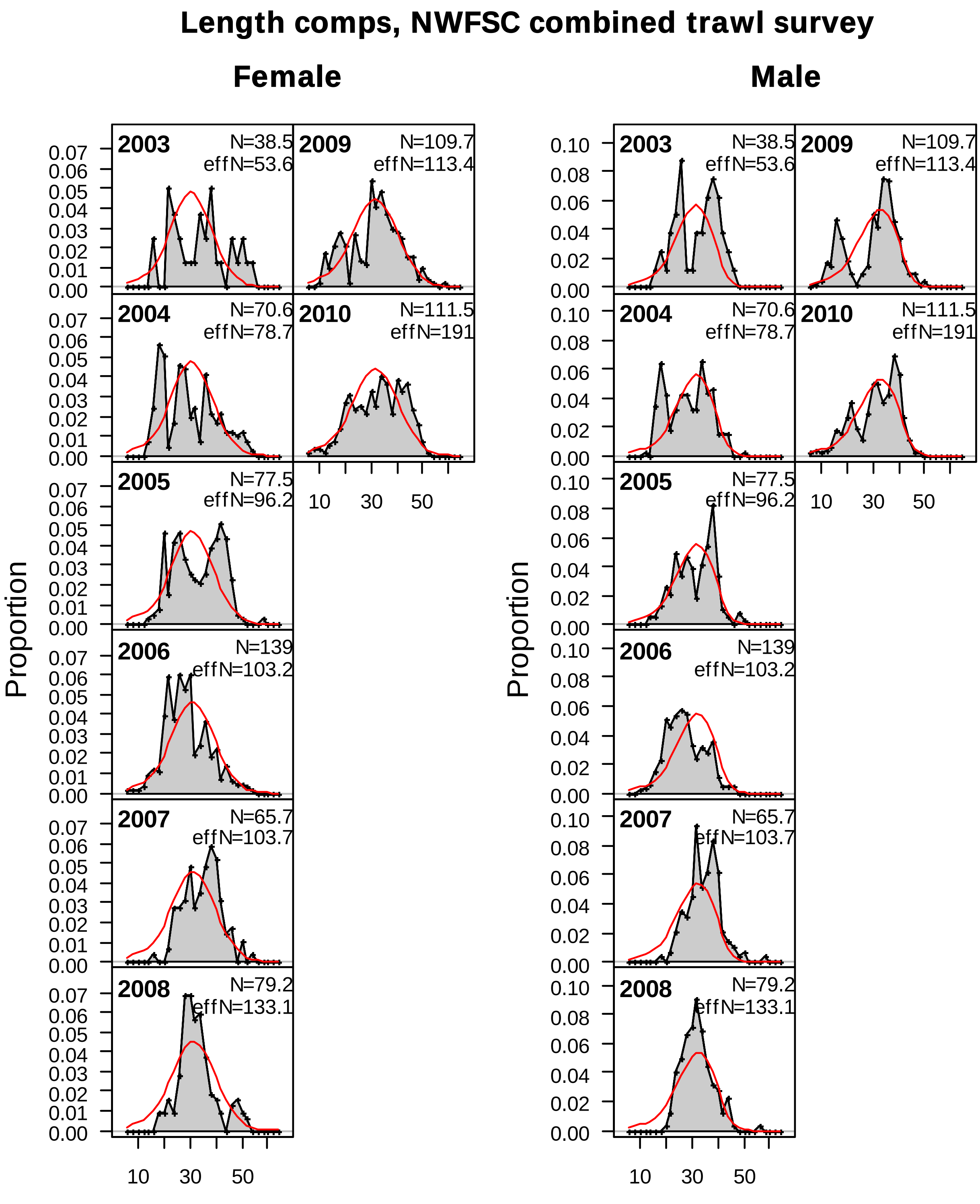


Figure 39: Observed and predicted length composition data for the NWFSC combined shelf and slope trawl survey (2003-2010).

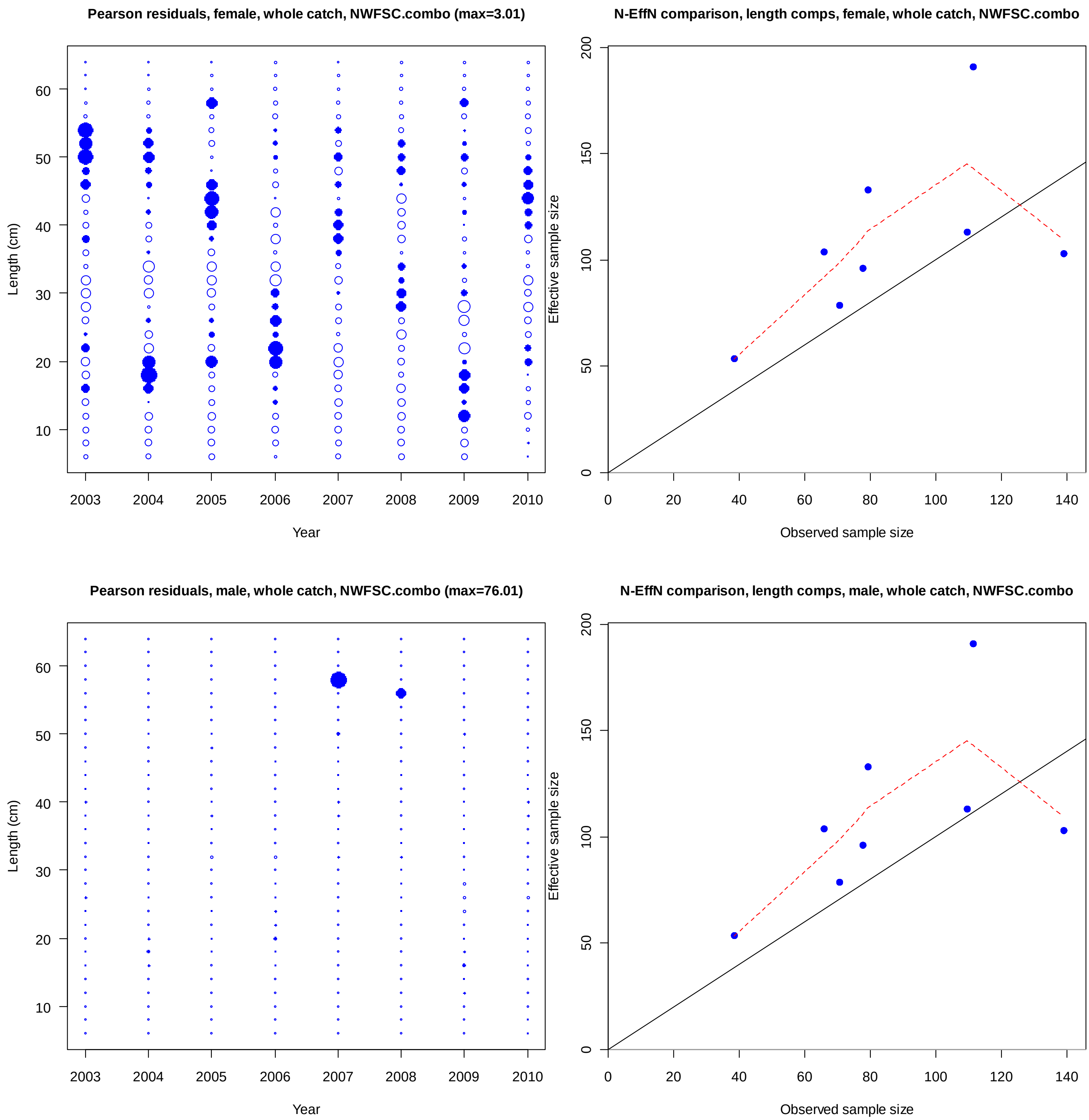


Figure 40 a-d: Residuals and effective sample sizes from gender-specific length frequency data for the NWFSC combined bottom trawl survey (2003-2010)

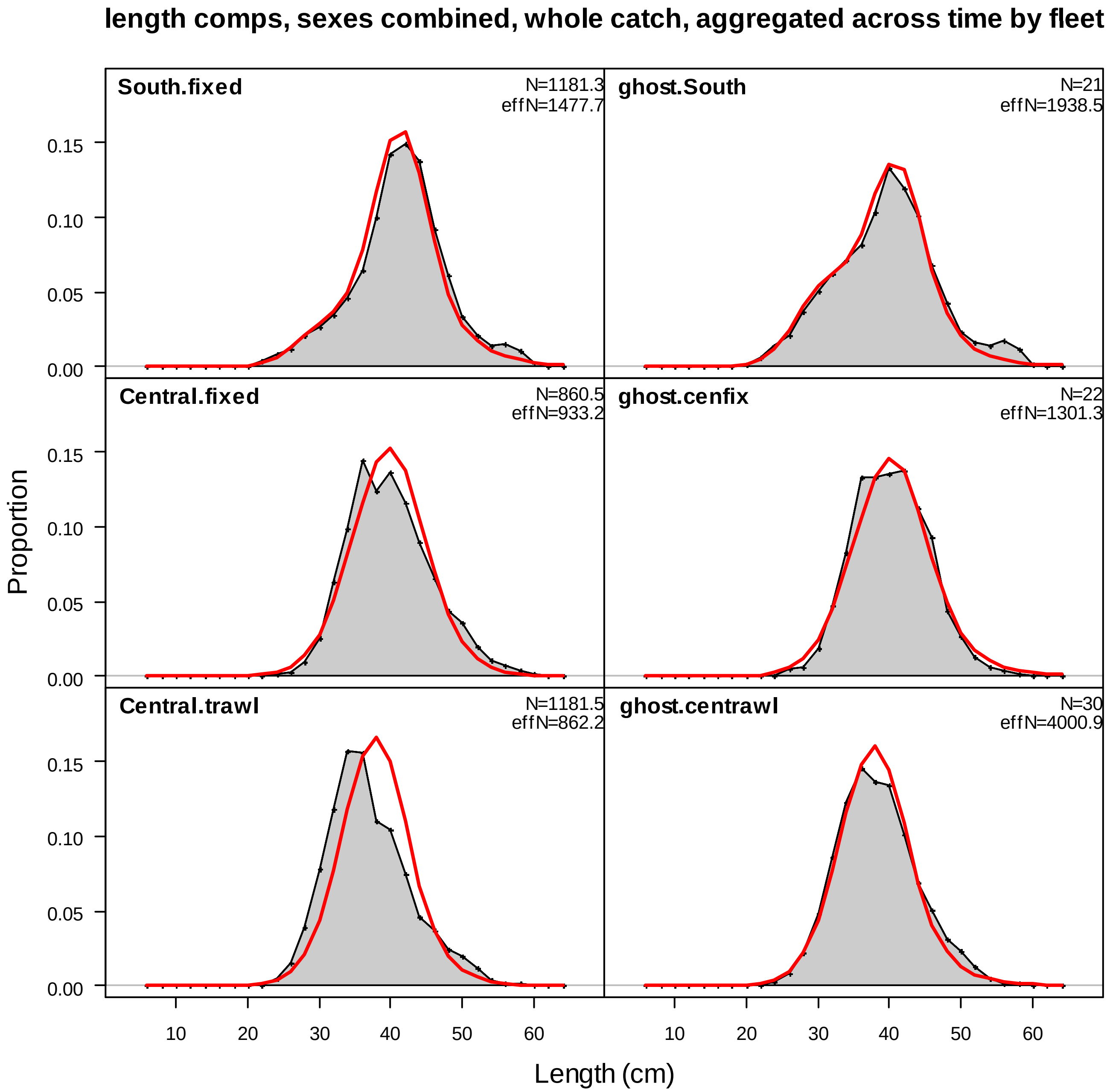


Figure 41: Observed and predicted length composition data (for datasets in which sexes are combined) aggregated across all years for the three commercial fisheries.

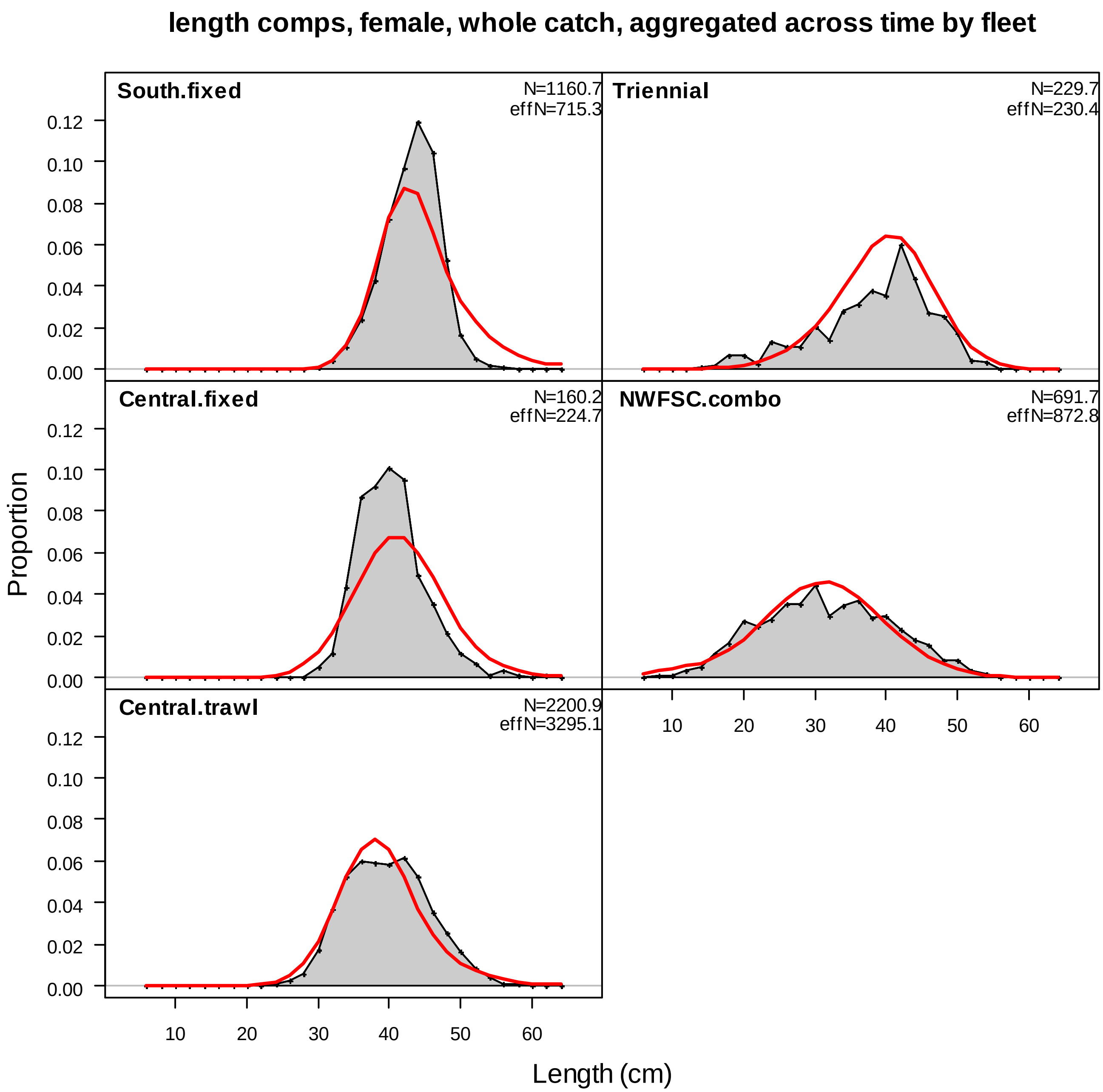


Figure 42: Observed and predicted length composition data for female blackgill rockfsih for all fisheries and surveys aggregated across all years.

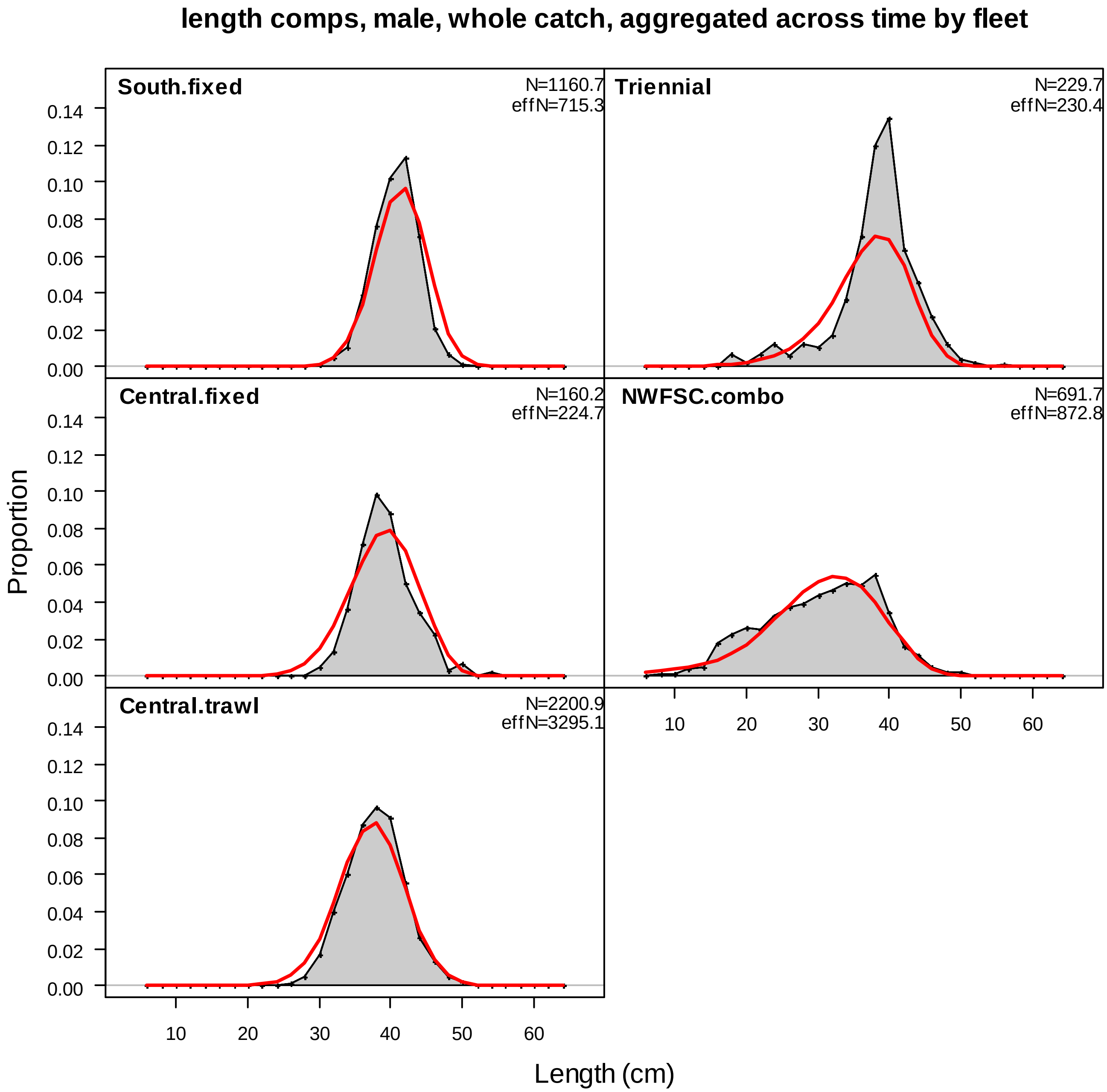


Figure 43: Observed and predicted length composition data for male blackgill rockfsih for all fisheries and surveys aggregated across all years.

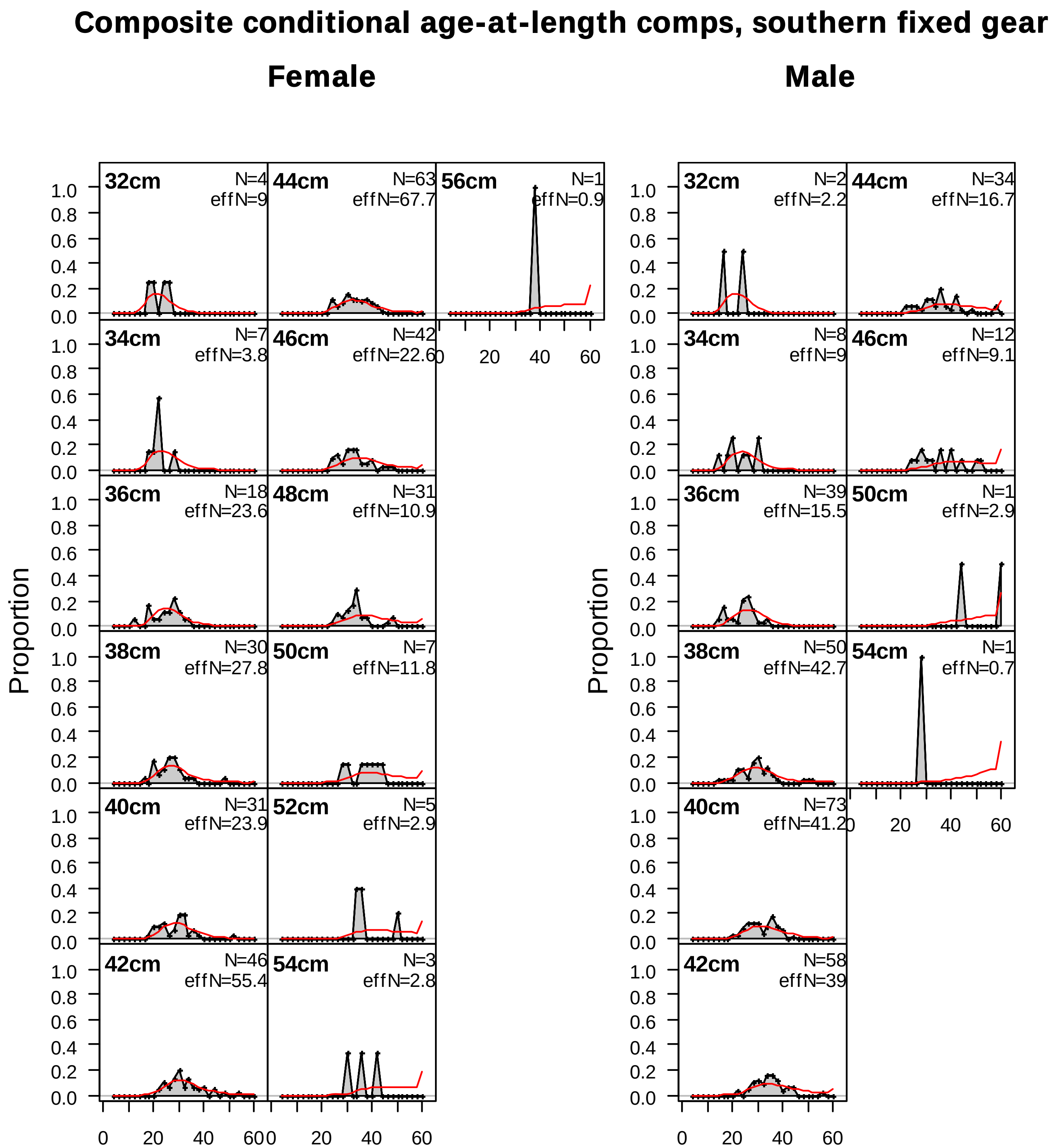
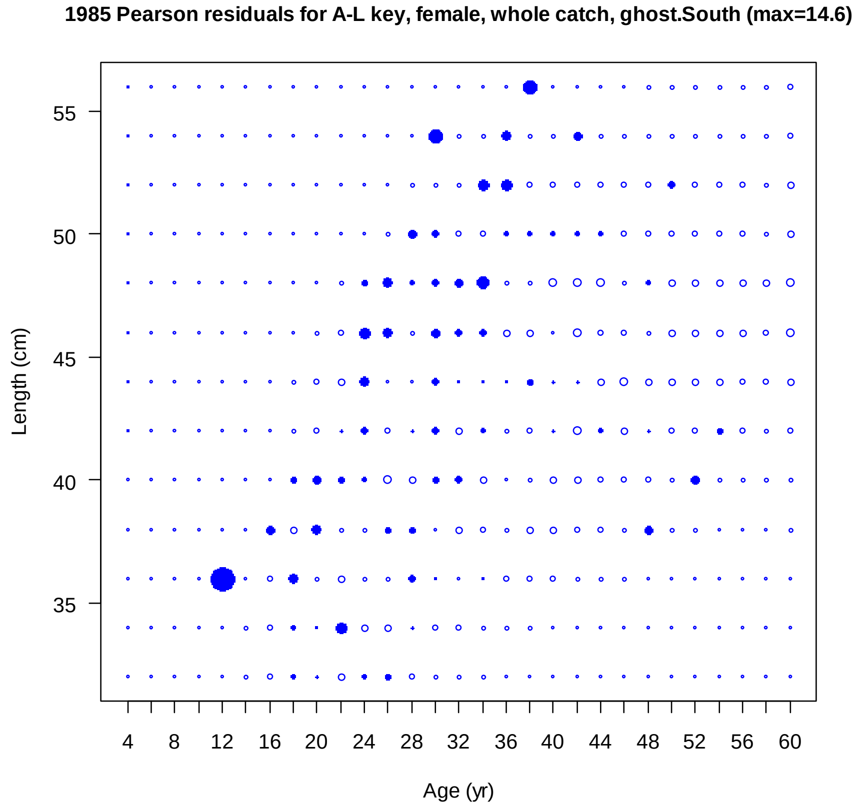


Figure 44: Observed and predictived compositional age-at-length data for all of the southern fixed gear age observations (1985-1986 data are here pooled into a single year in the “ghost” fishery for ease in interpretation; year-specific fits are in appendix).



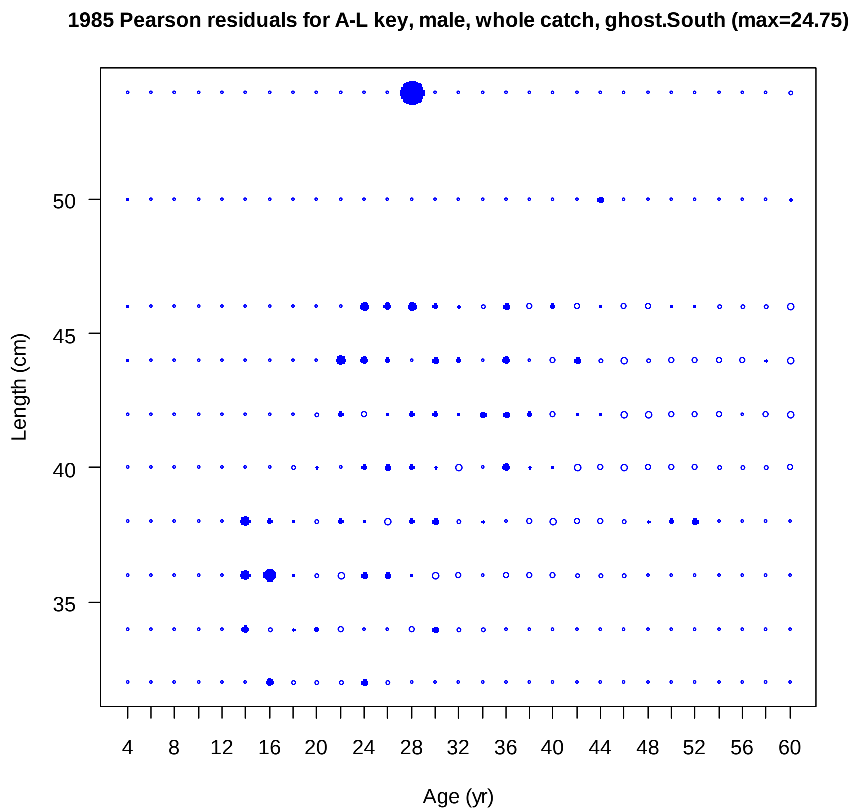


Figure 45: Profiles of total negative log likelihood values by model compoennt under alternative assumptions (fixed values) for natural mortality (M)

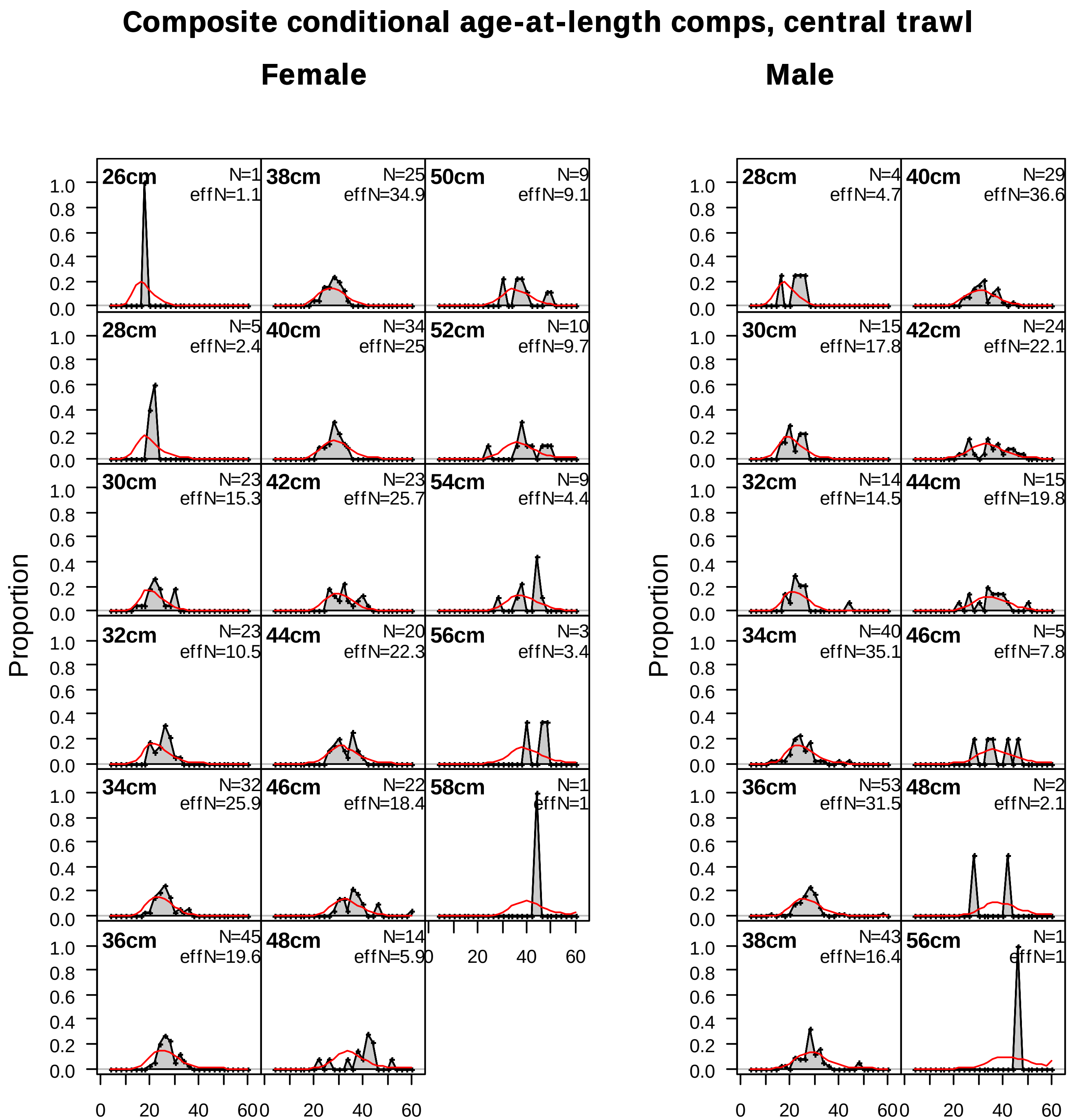
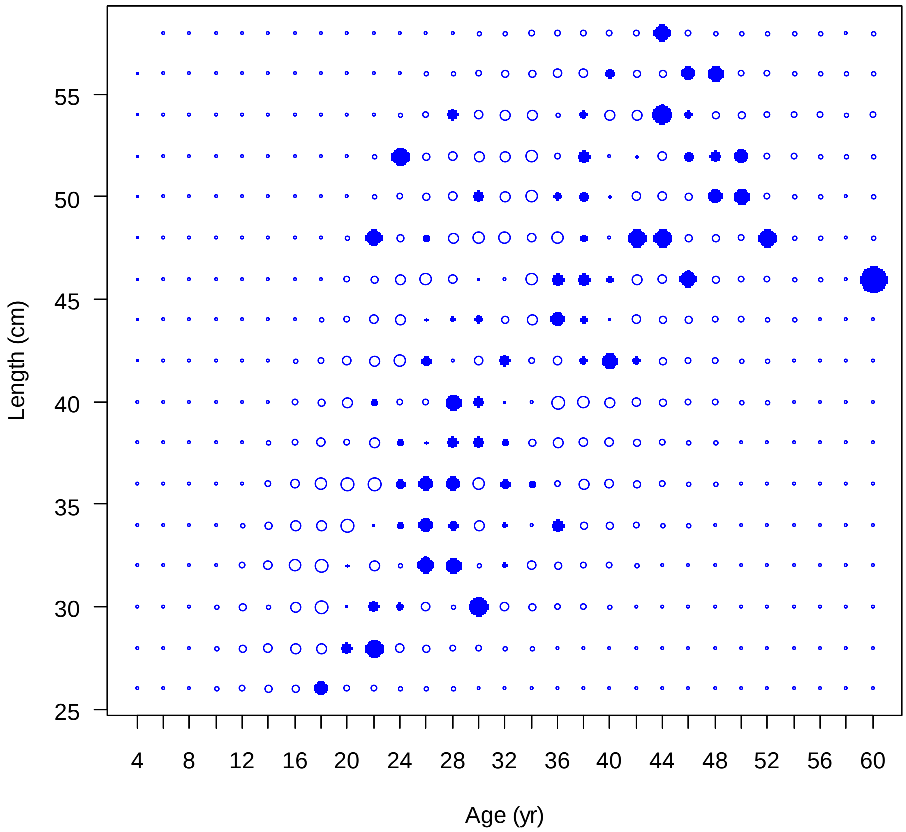


Figure 46: Observed and predictived compositional age-at-length data for all of the southern fixed gear age observations (1985-1986 data are here pooled into a single year in the "ghost" fishery for ease in interpretation; year-specific fits are in appendix).

2005 Pearson residuals for A-L key, female, whole catch, ghost.centrawl (max=7.24)



2005 Pearson residuals for A-L key, male, whole catch, ghost.centrawl (max=25.74)

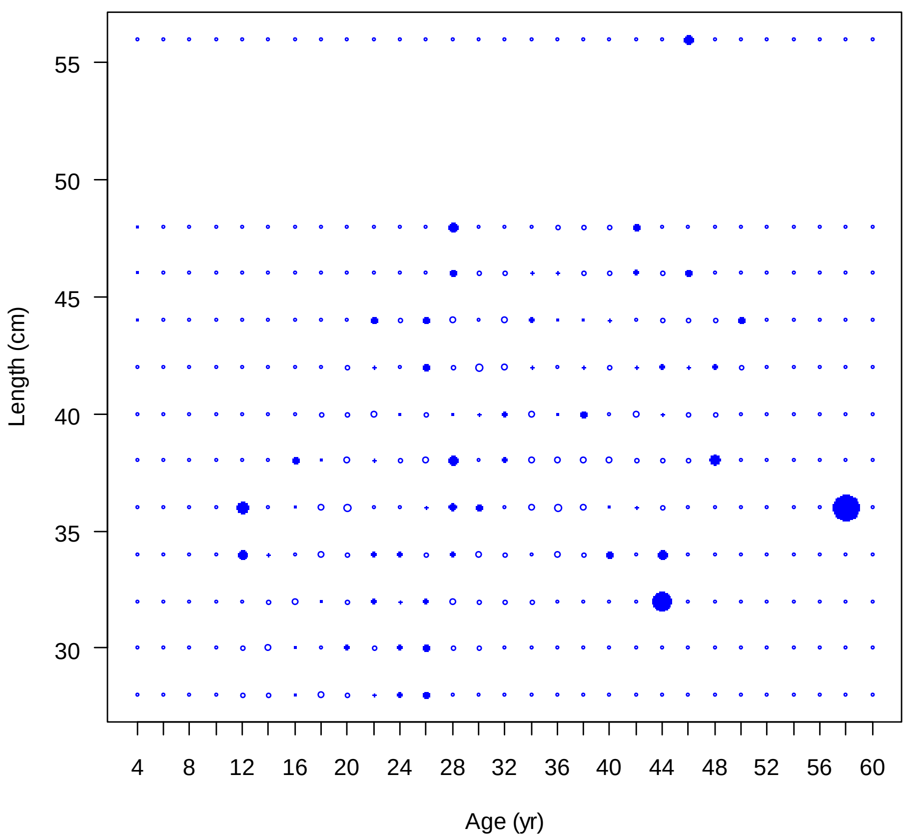


Figure 47: Profiles of total negative log likelihood values by model compoennt under alternative assumptions (fixed values) for natural mortality (M)

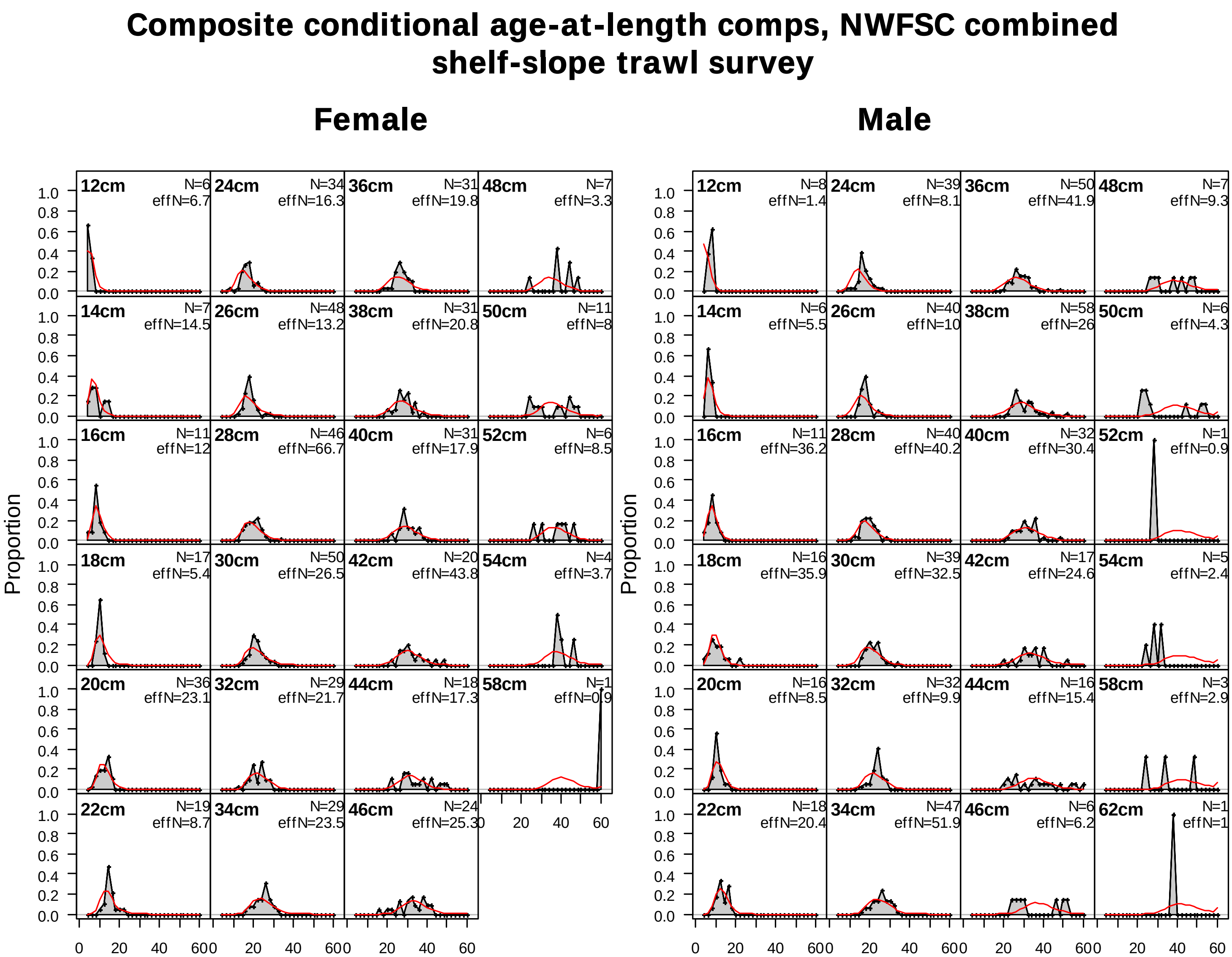


Figure 48: Observed and predictived compositional age-at-length data for all of the NWFSC combined shelf-slope survey age observations (2003-2009 data are here pooled into a single year in the "ghost" fishery for ease in interpretation).

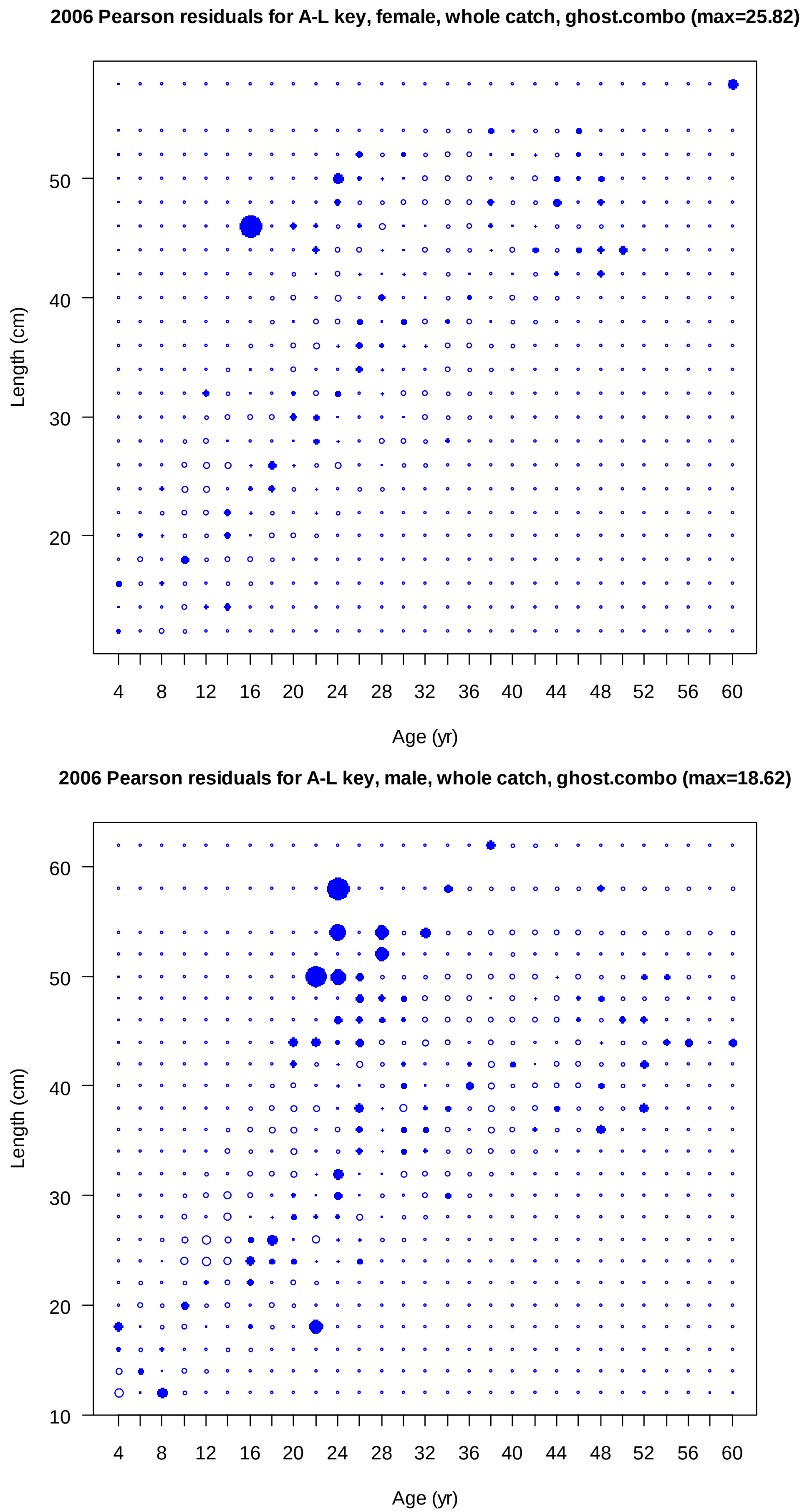


Figure 49 a-b: Residuals from fits to pooled (all years) compositional age-at-length data for NWFSC combined trawl survey data.

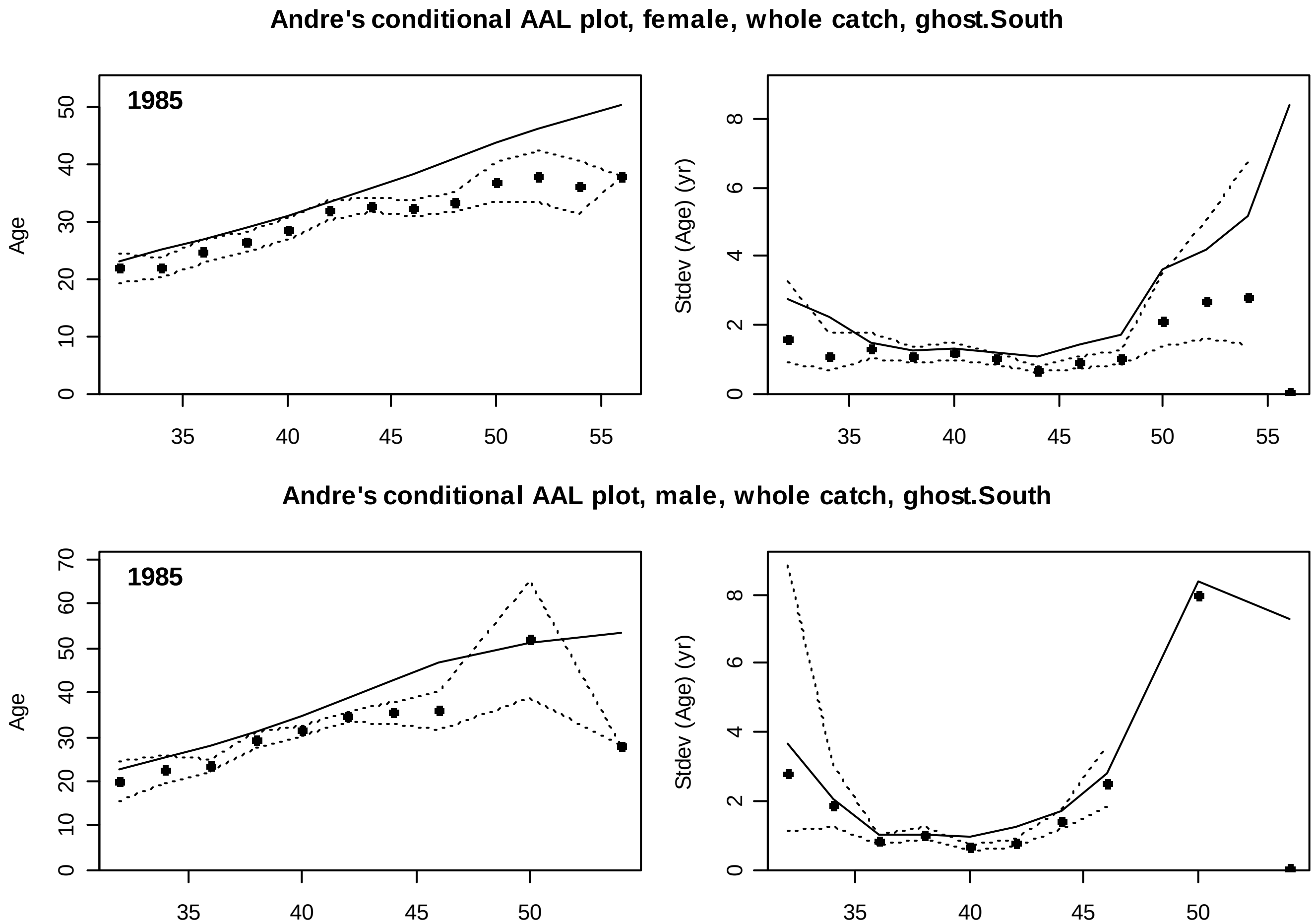


Figure 50 a-b: Fits to pooled (all years) conditional age-at-length data for the southern California fixed gear fishery.

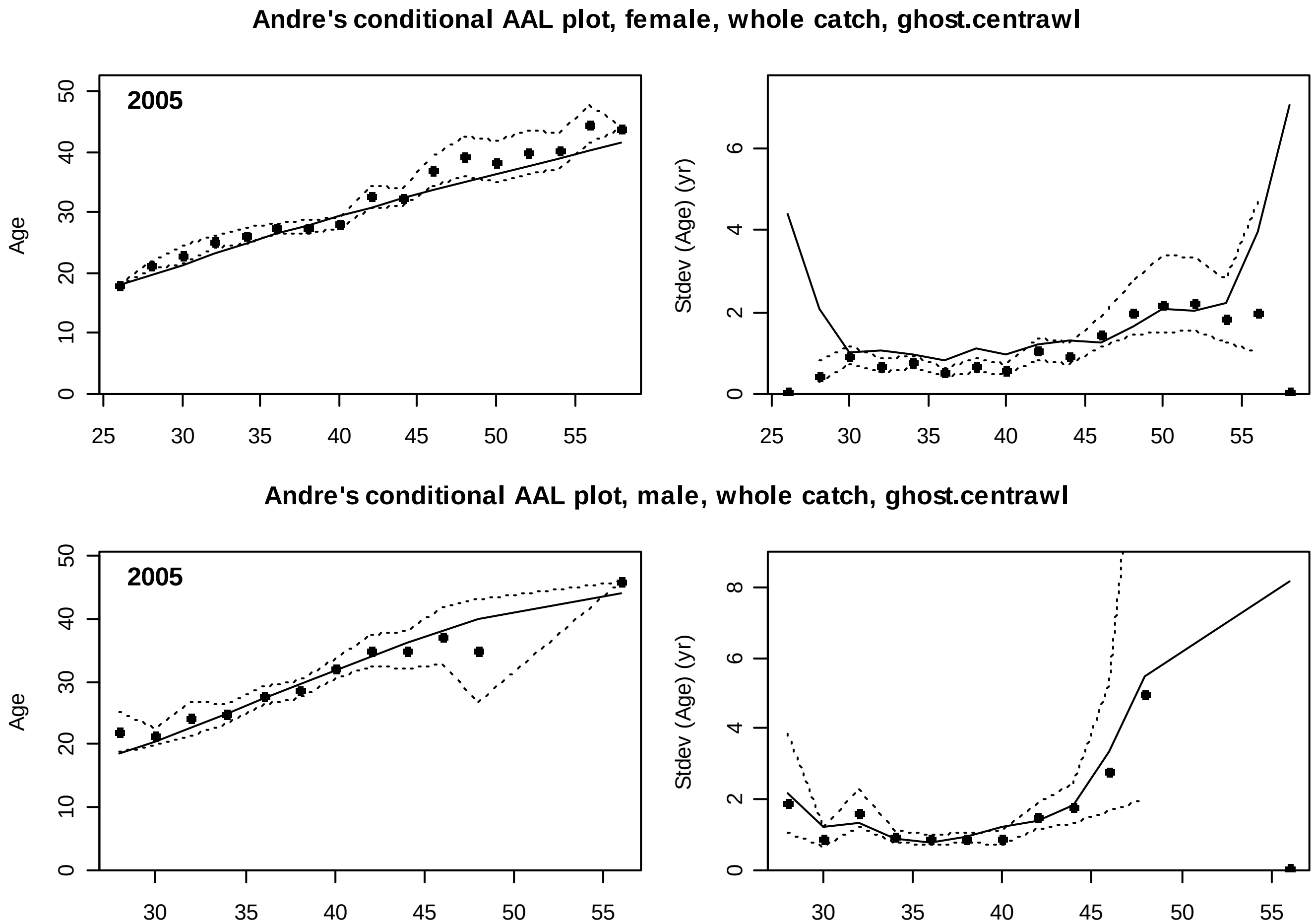


Figure 51 a-b: Fits to pooled (all years) conditional age-at-length data for the central California trawl fishery.

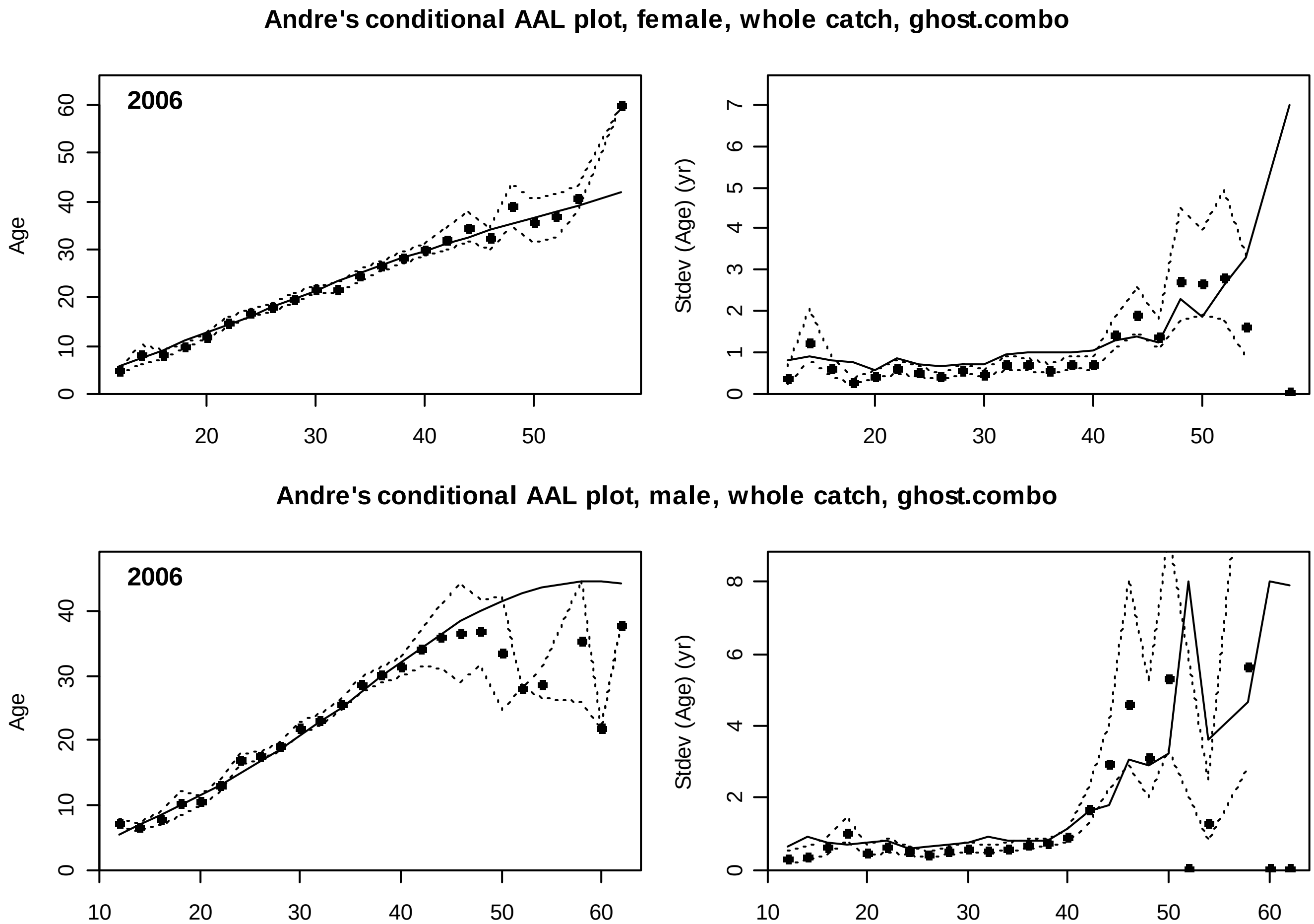
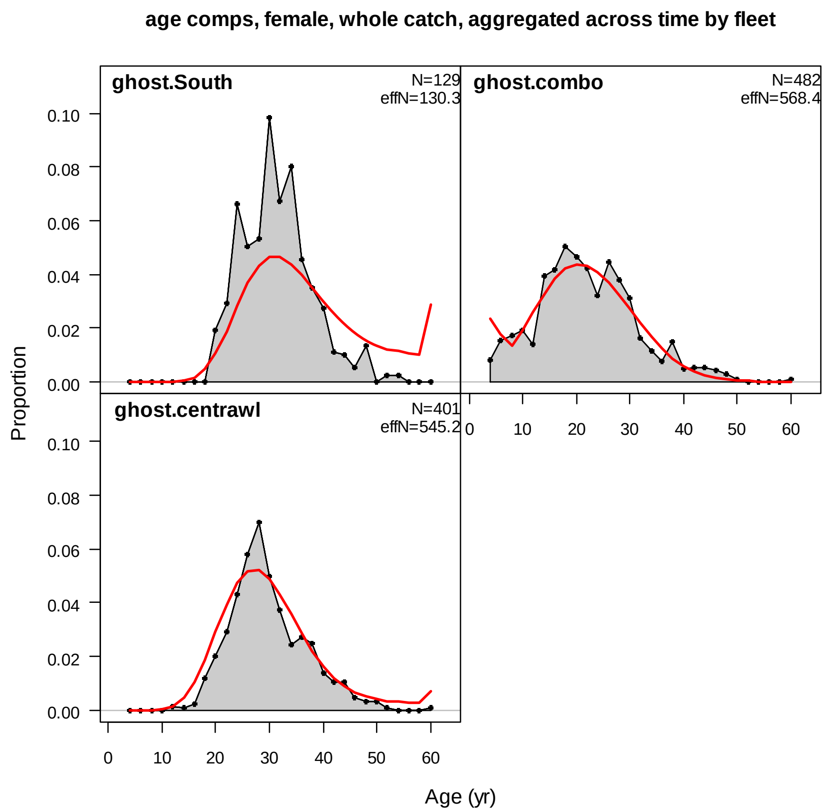


Figure 52 a-b: Fits to pooled (all years) conditional age-at-length data for the NWFSC combined shelf-slope bottom trawl survey.



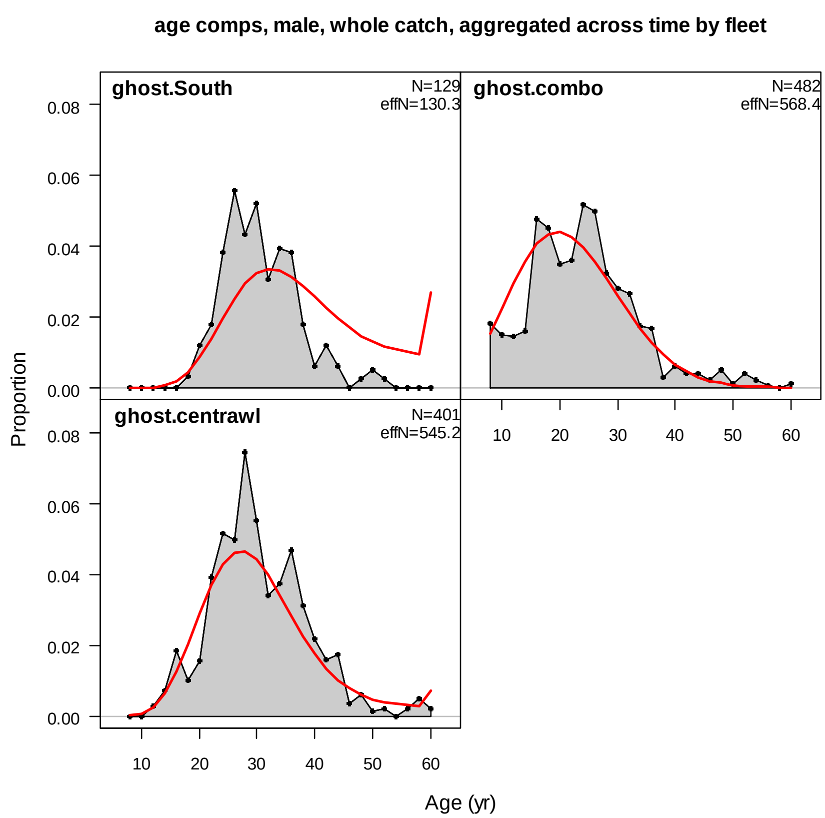


Figure 53 a-b: Marginal fits to age composition data for all commercial fisheries and NWFSC combined trawl survey age data. Note that the age data were not fitted in this format, figures are for diagnostic purposes only.

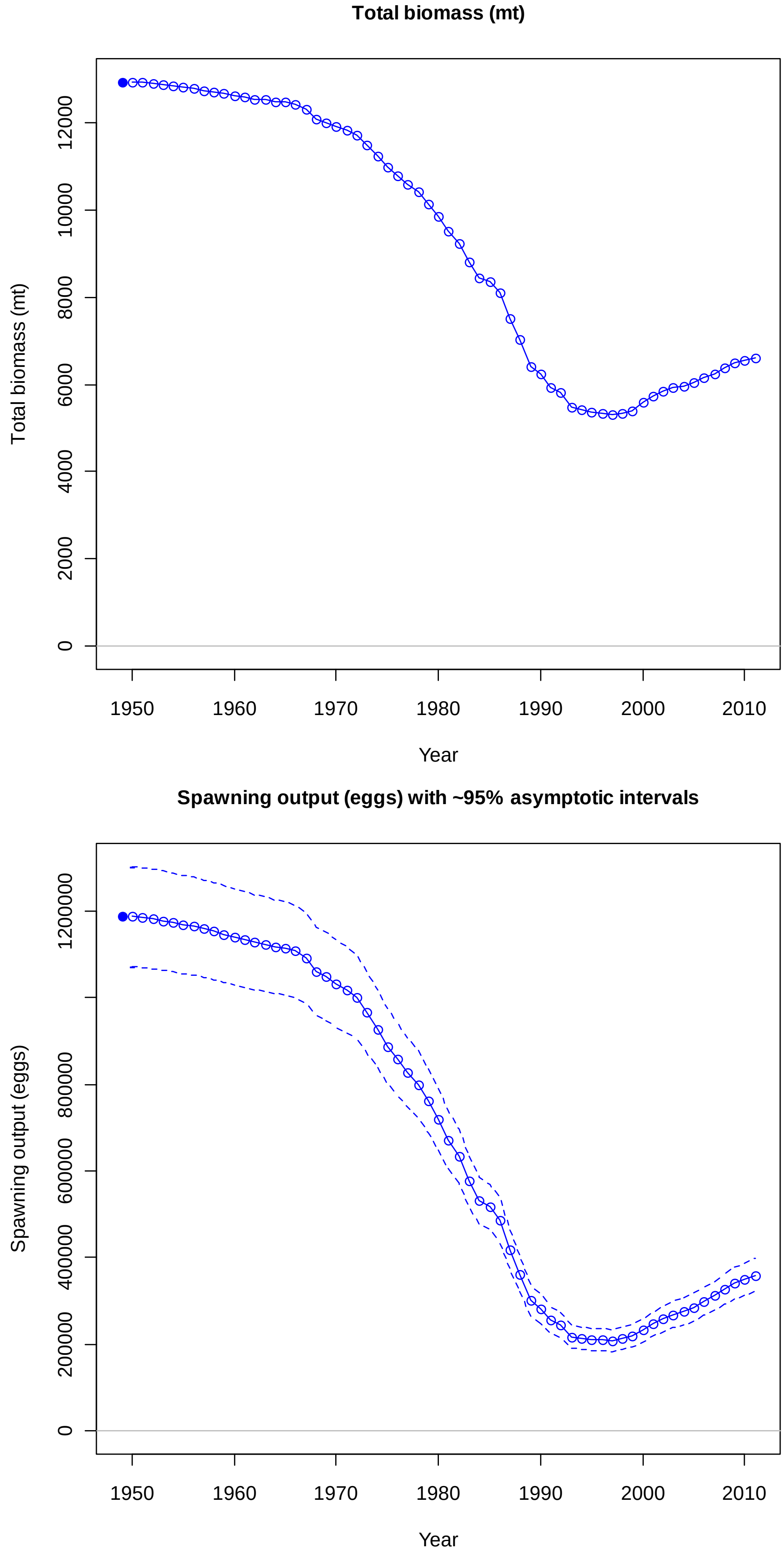


Figure 54 a-b: Base model estimates of total biomass and spawning output (x 10^6).

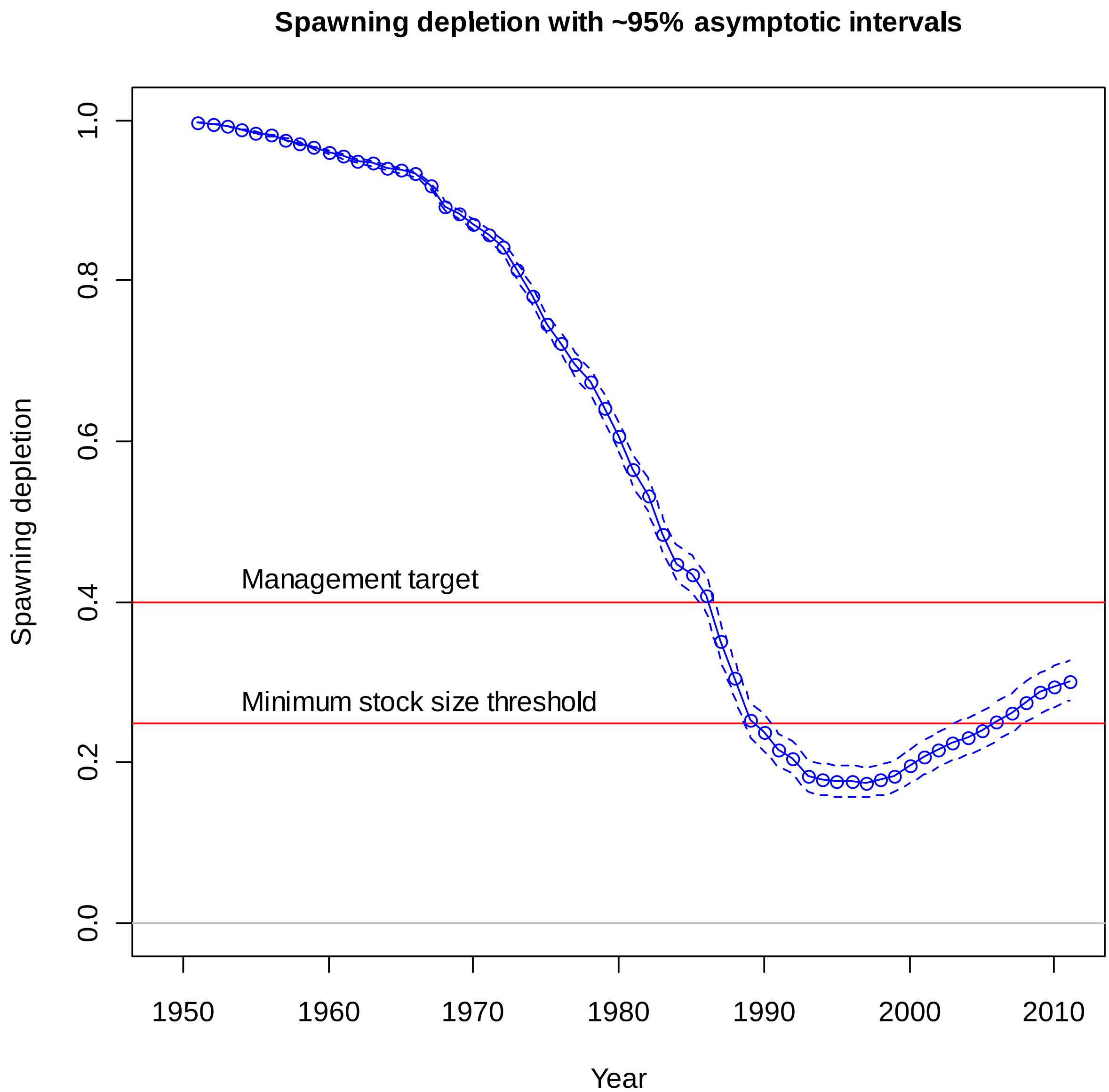


Figure 55: Base model estimates of spawning depletion (with approximate 95% confidence intervals).

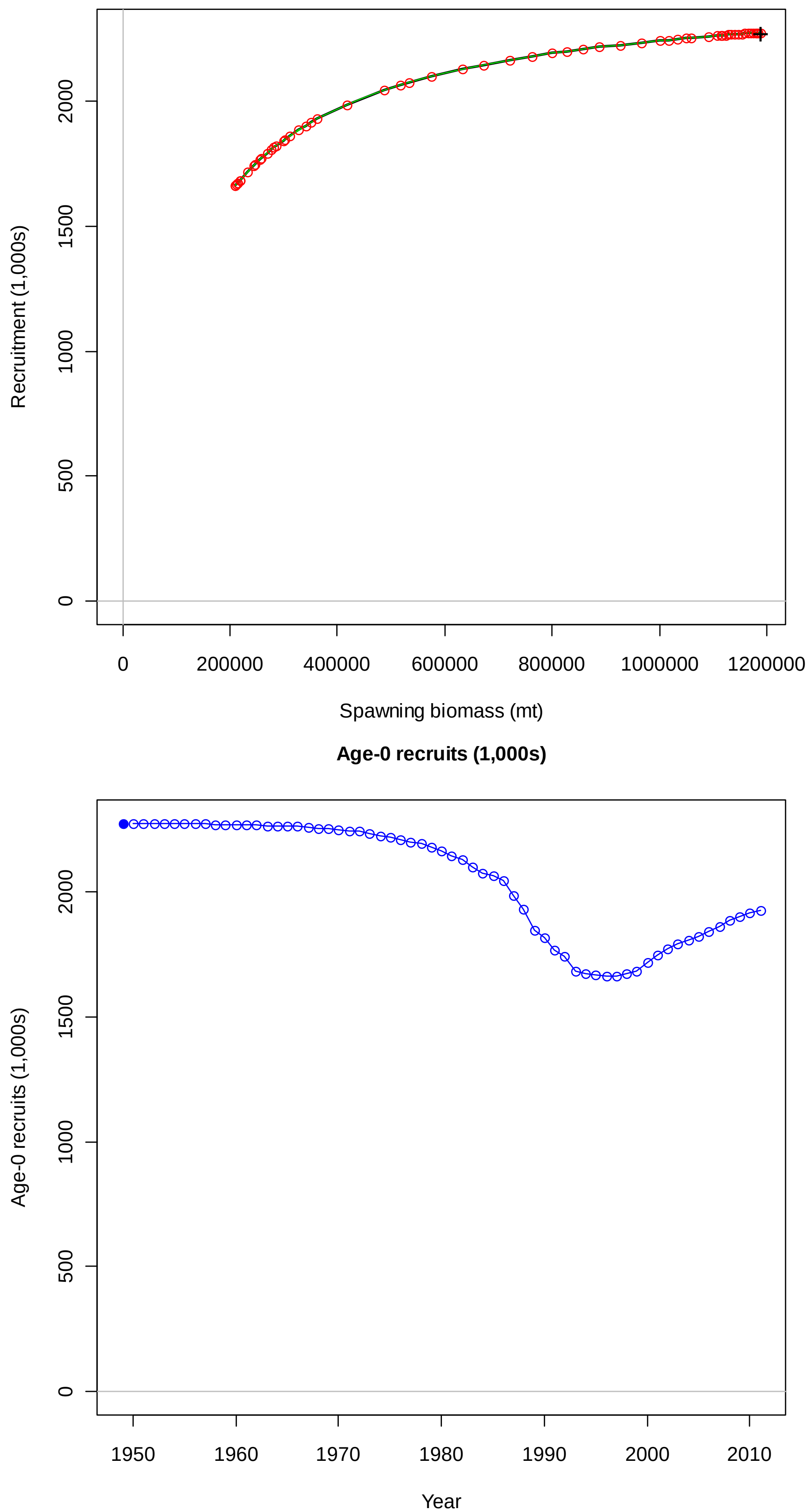


Figure 56: Spawner-recruit curve (based on fixed value for steepness) and time series of estimated age 0 recruits for the base model.

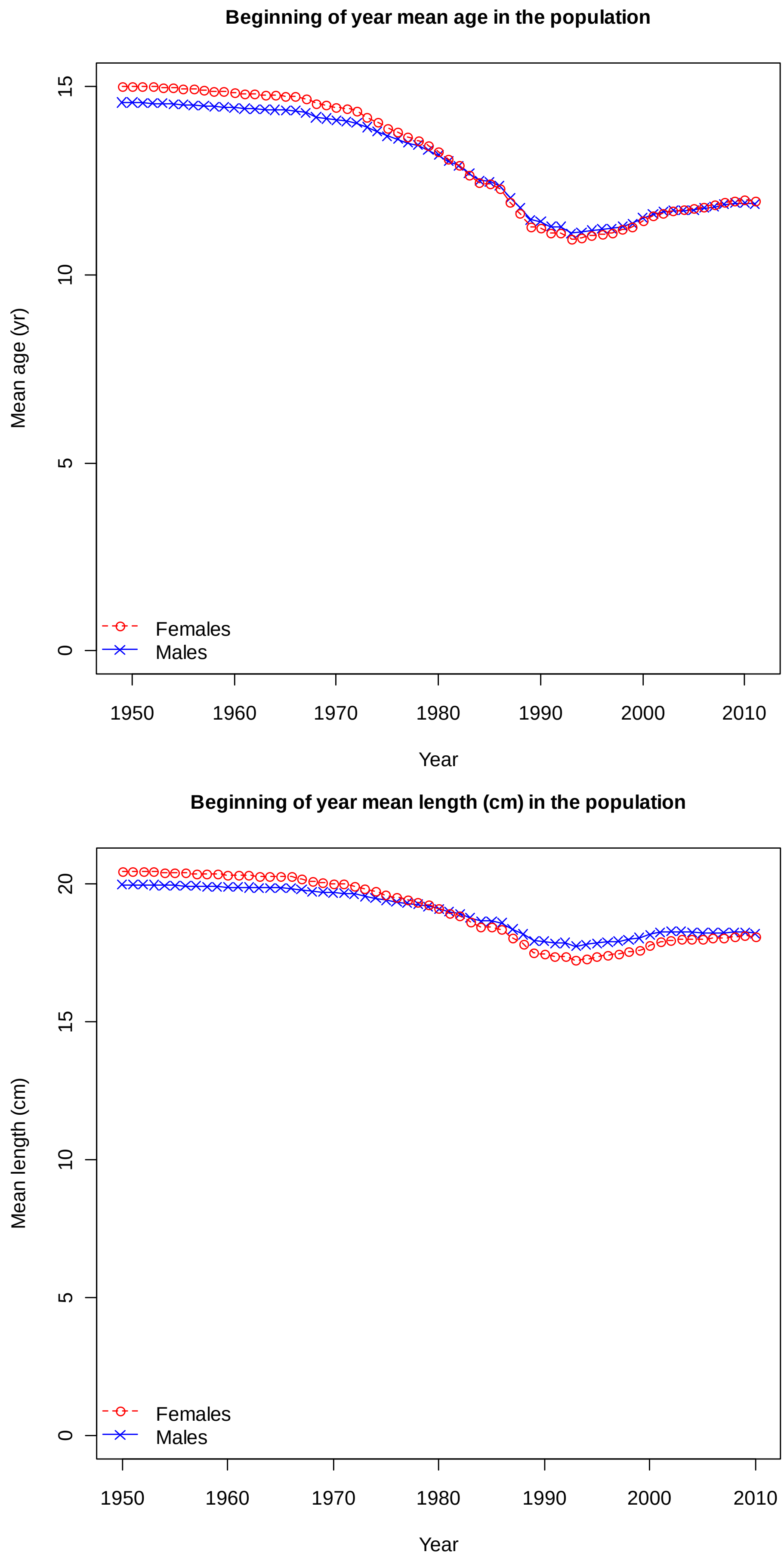


Figure 57 a-b: Estimated mean age and mean length of male and female blackgill rockfish from the base model (entire population).

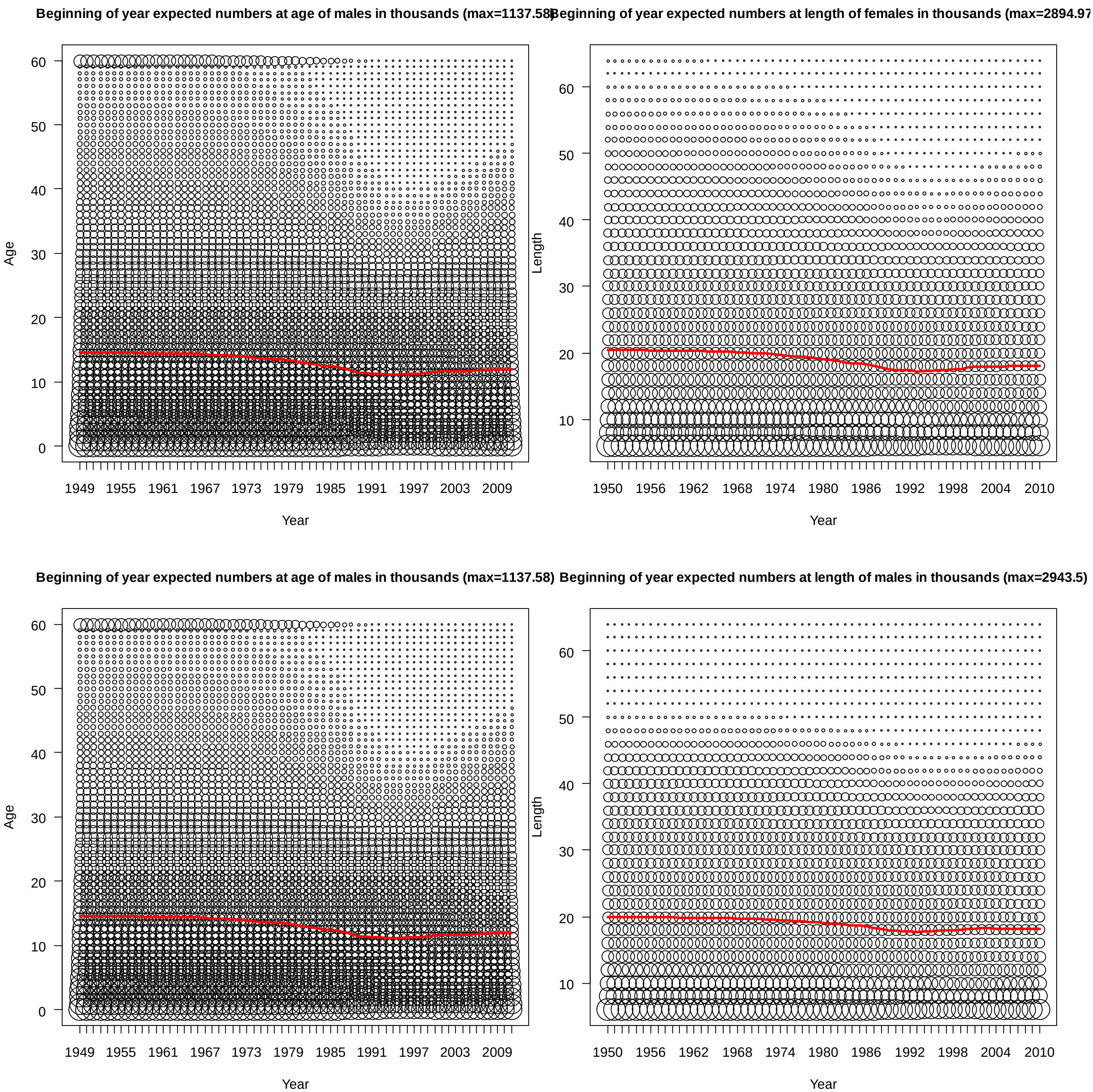


Figure 58 a-d: Bubble plots of numbers at age and numbers at length (female and male) for blackgill rockfish from the base model.

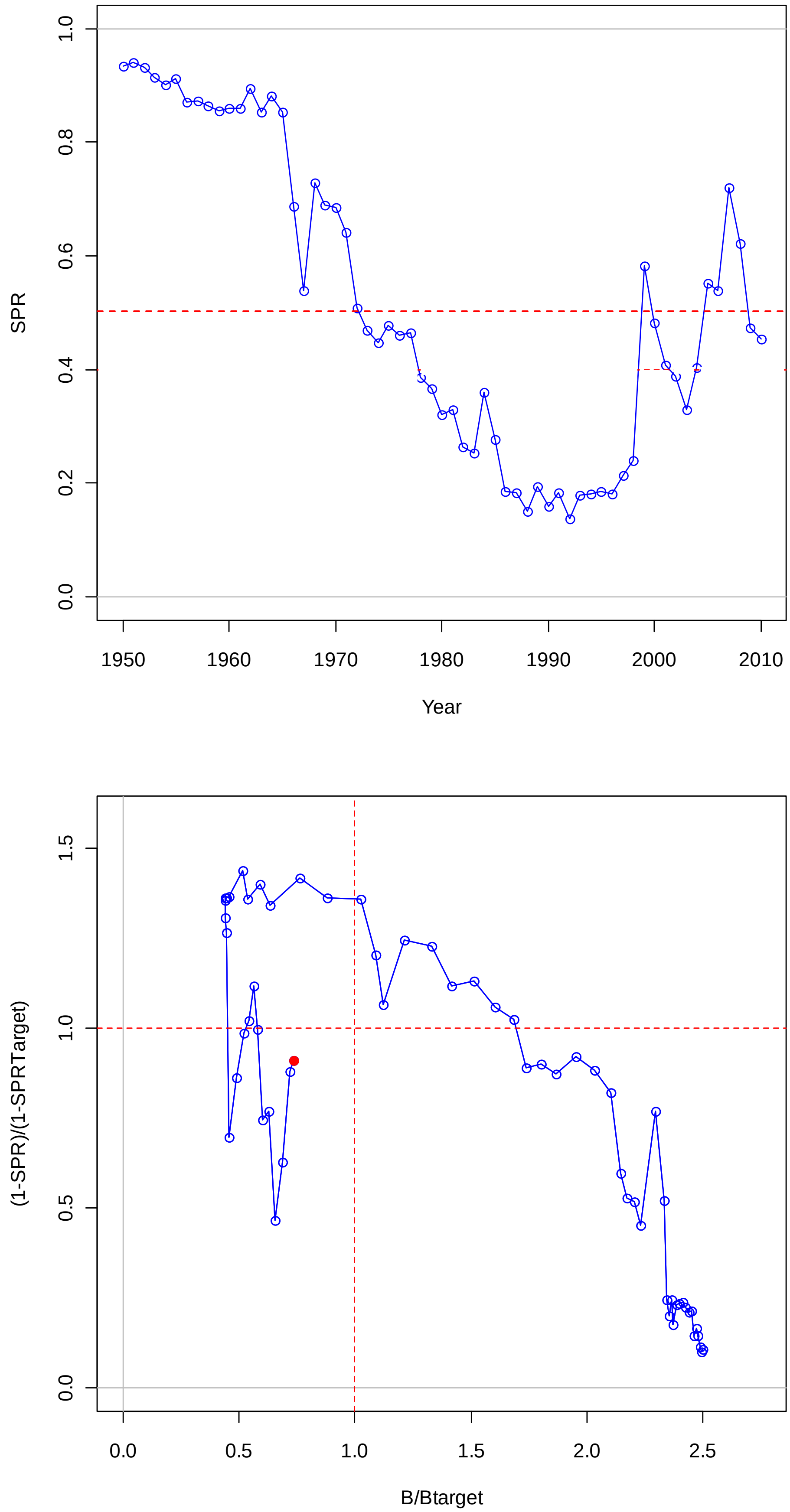
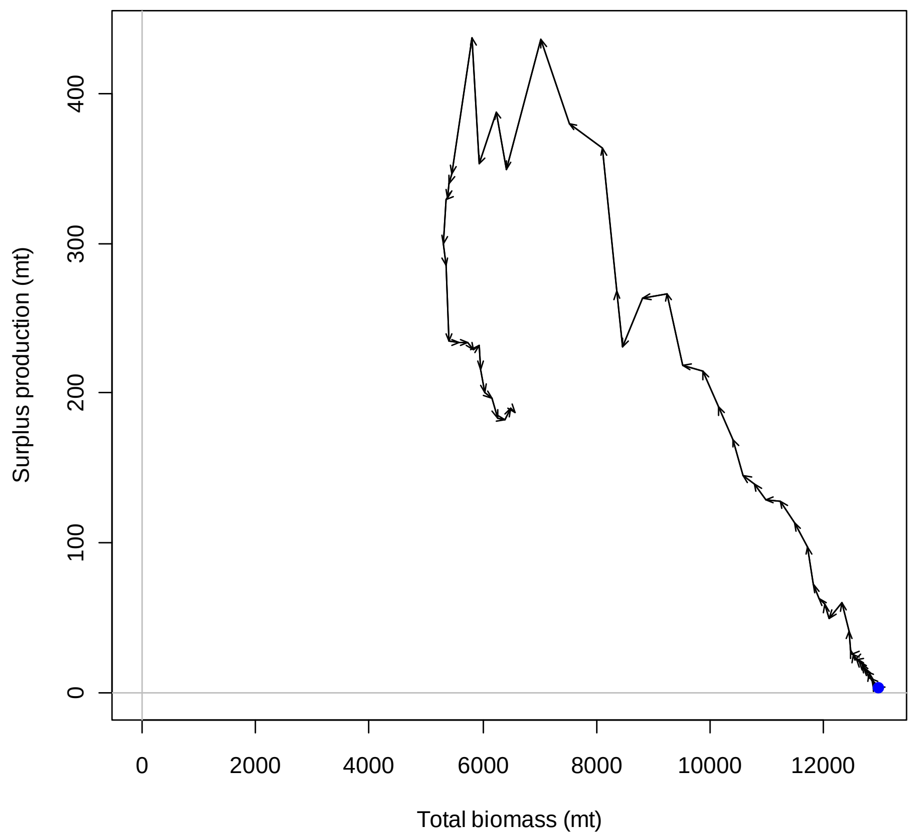


Figure 59: Base model estimates of SPR and relative SPR against biomass (relative to target)- NOTE SPR target incorrectly listed here as 0.4, should be 0.5, some reason R4SS not allowing me to change (??)



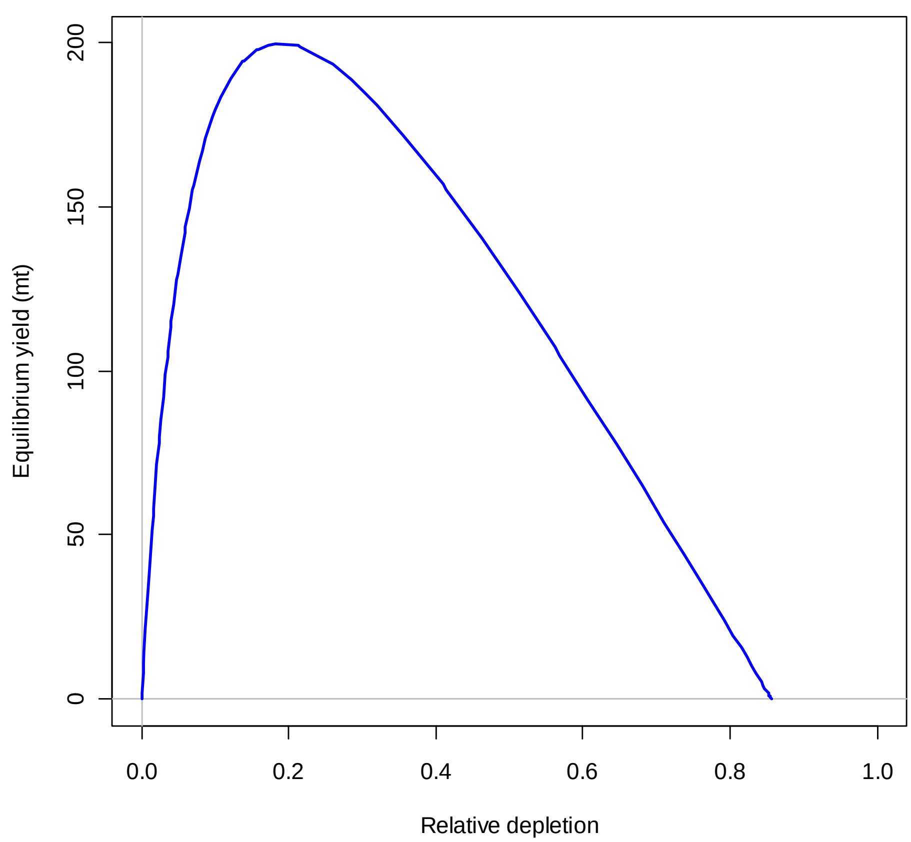
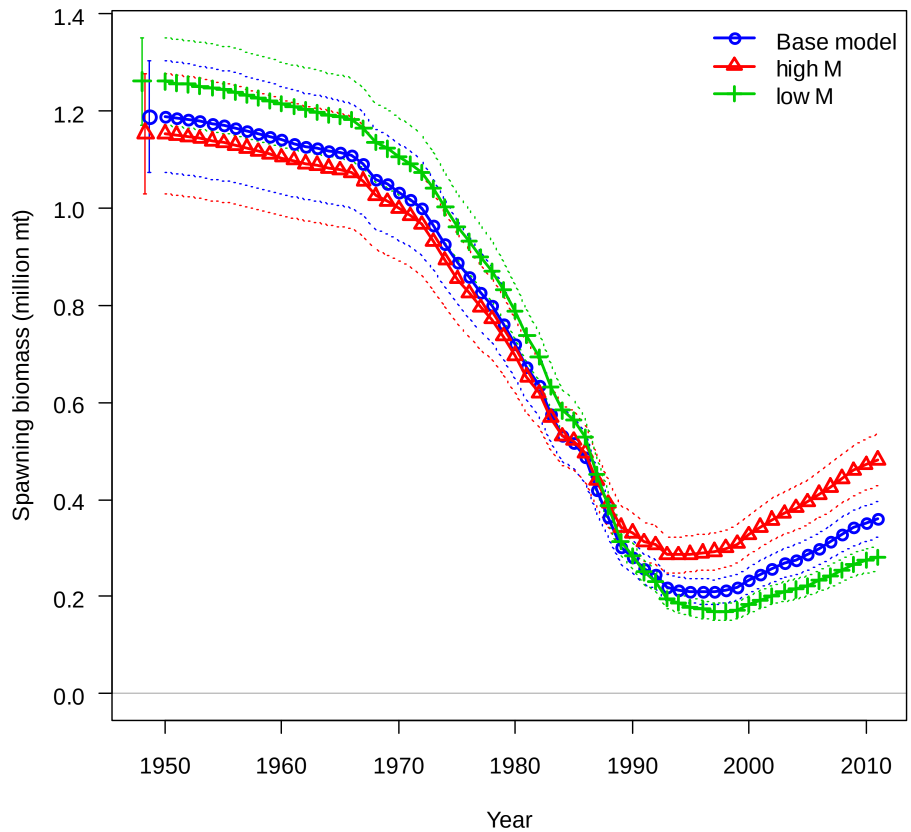


Figure 60: Phase plot of total biomass against surplus production (top) and estimjtaed equilibrium yield curve (bottom) for blackgill rockfish base model.



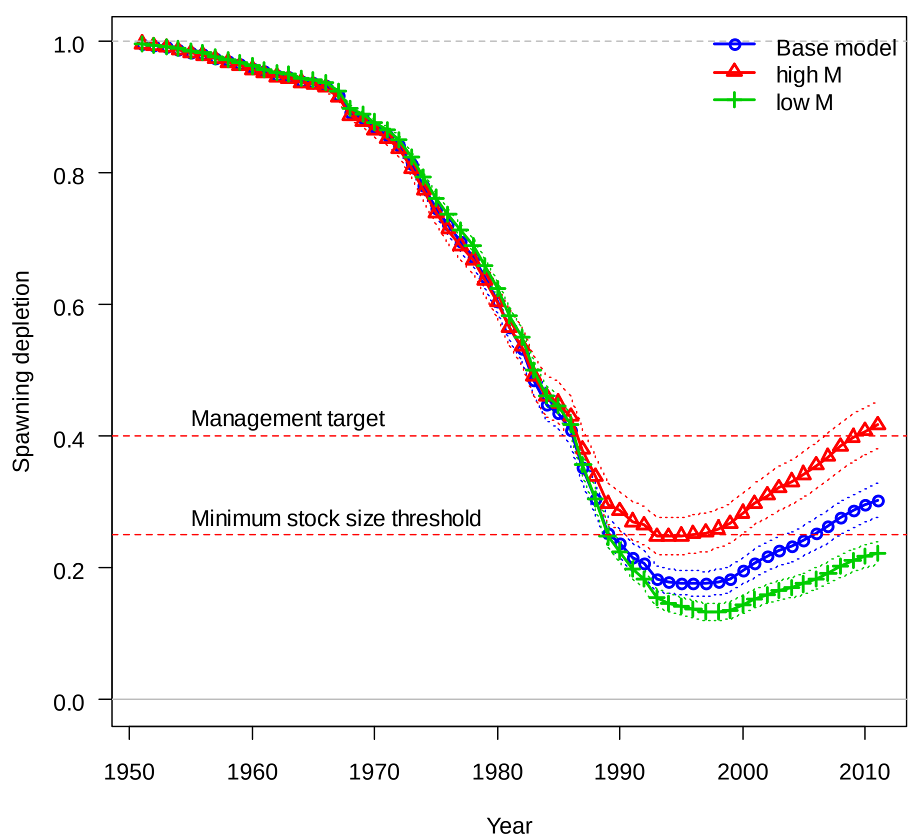


Figure 61: Sensitivity of the model to alternative values of natural mortality (M)

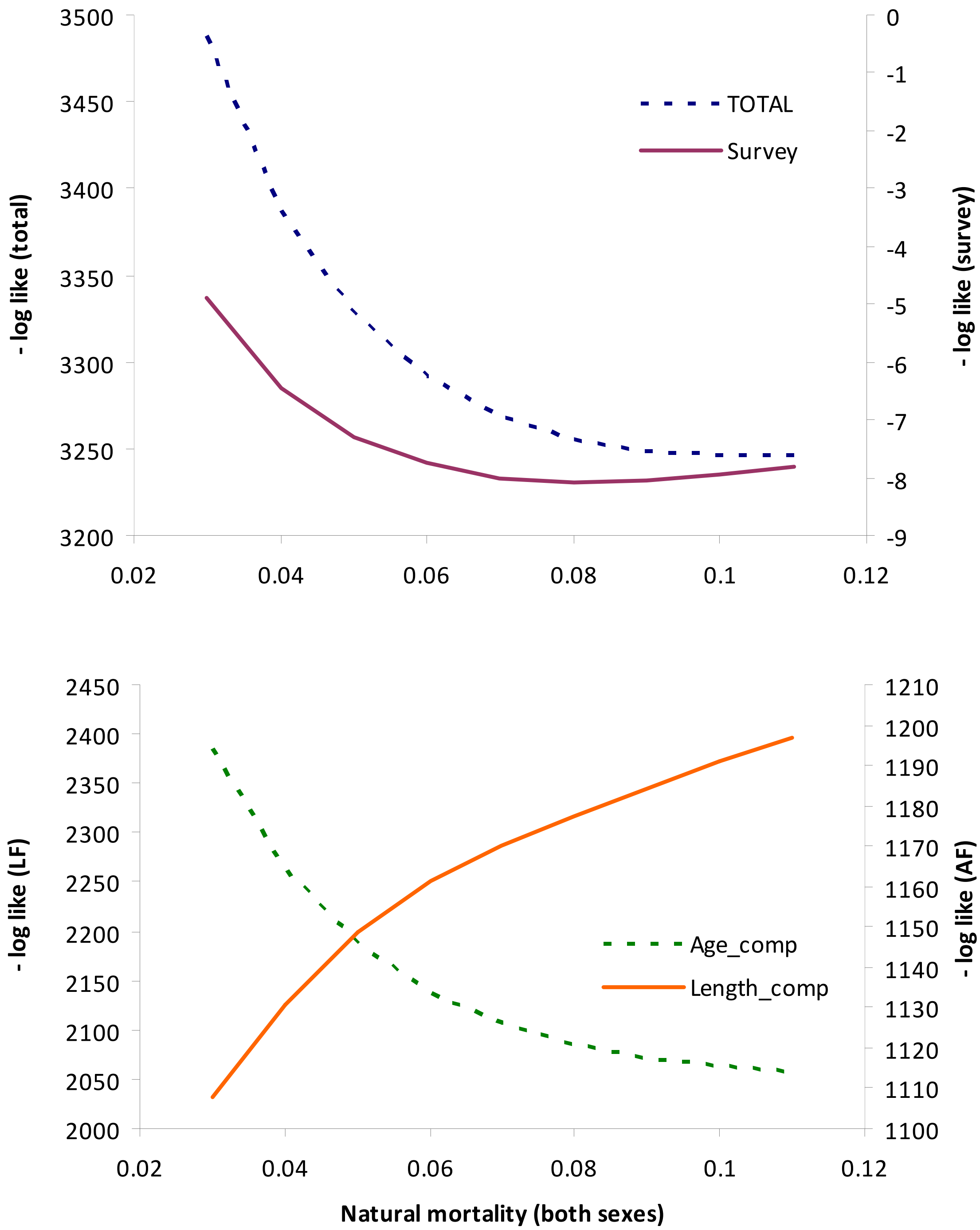


Figure 62: Profiles of total negative log likelihood values by model component under alternative assumptions (fixed values) for natural mortality (M)

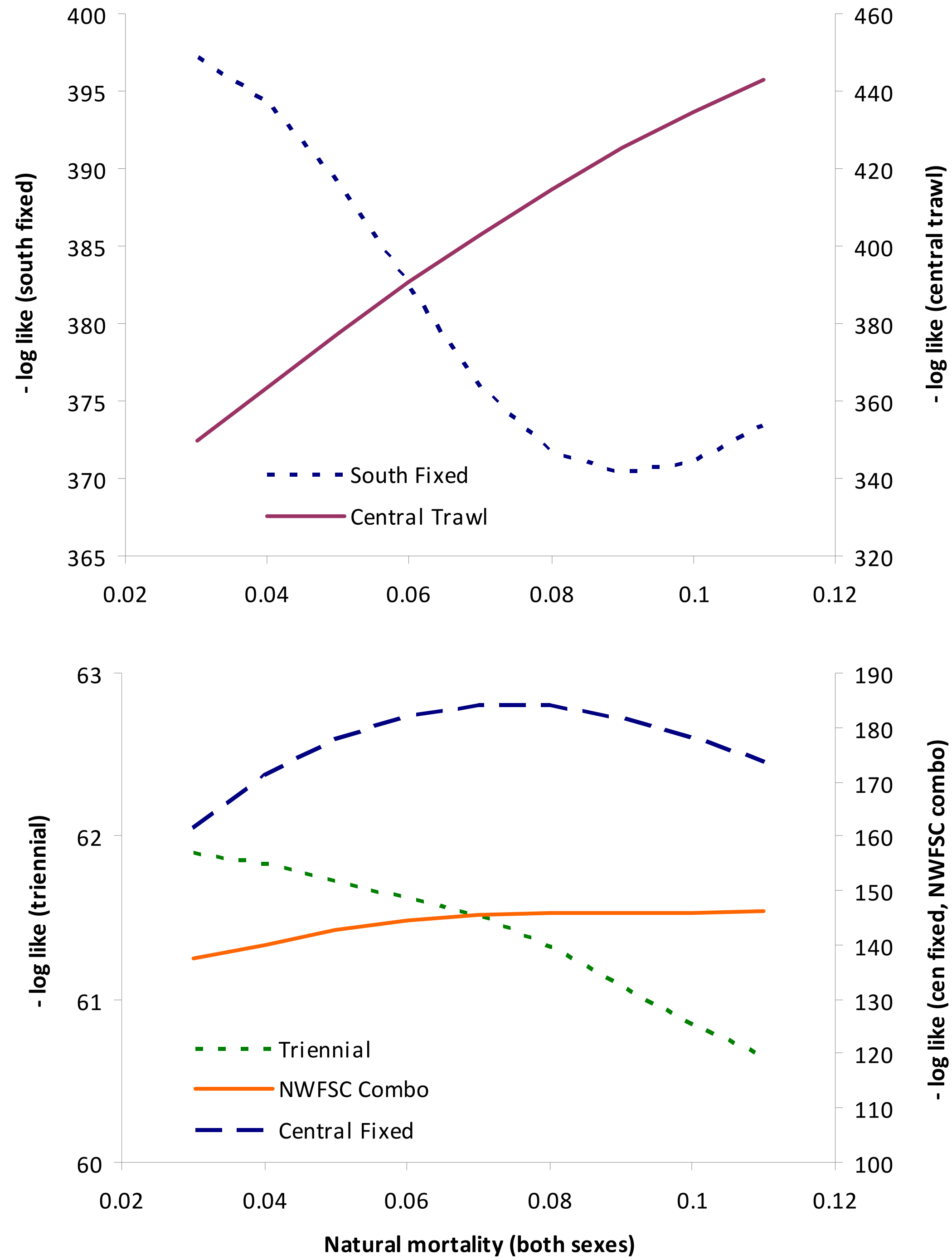


Figure 63: Profiles of total negative log likelihood values for length composition data by fleet under alternative assumptions (fixed values) for natural mortality (M)

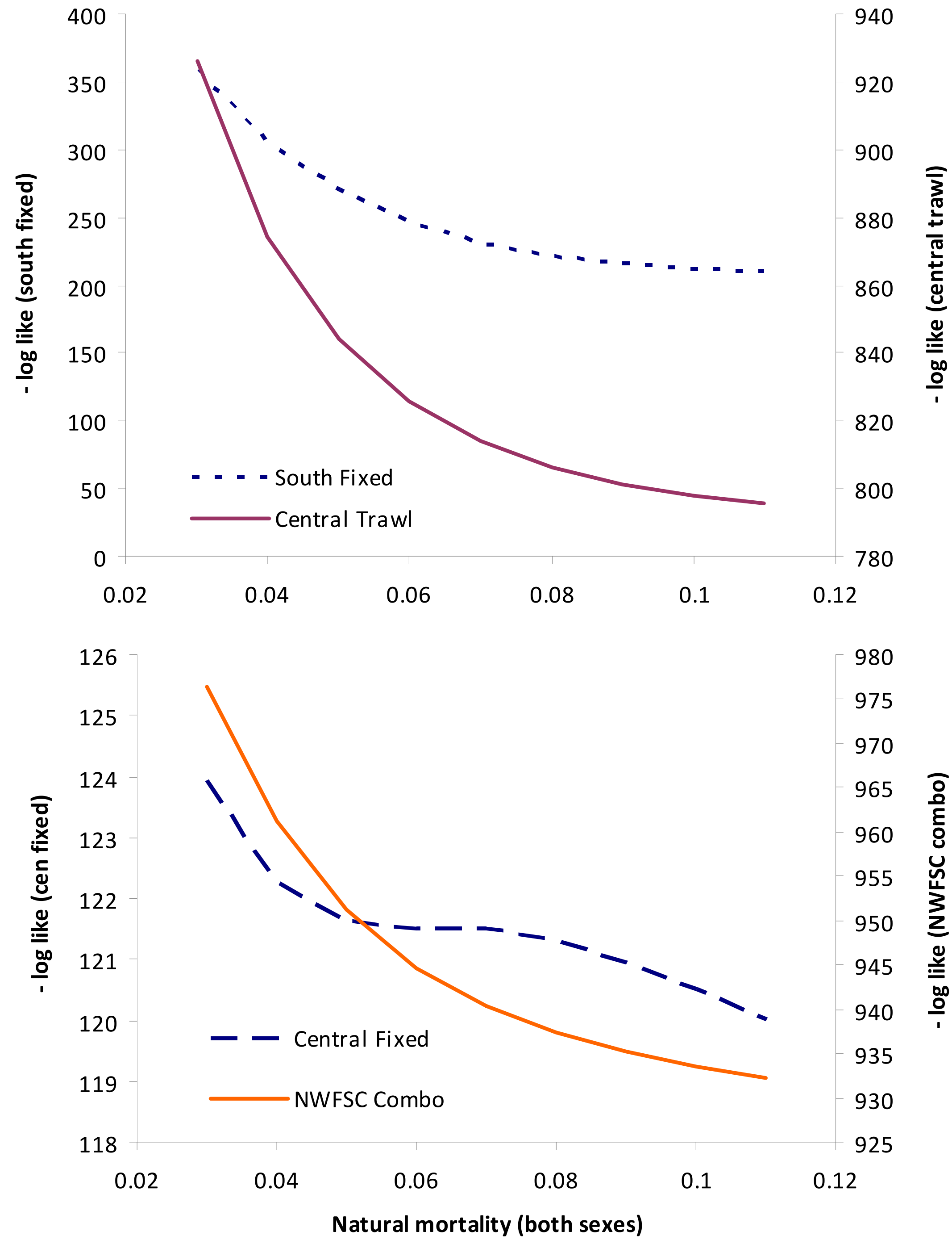


Figure 64: Profiles of total negative log likelihood values by fleet for age composition data (conditional AAL) under alternative assumptions (fixed values) for natural mortality (M).

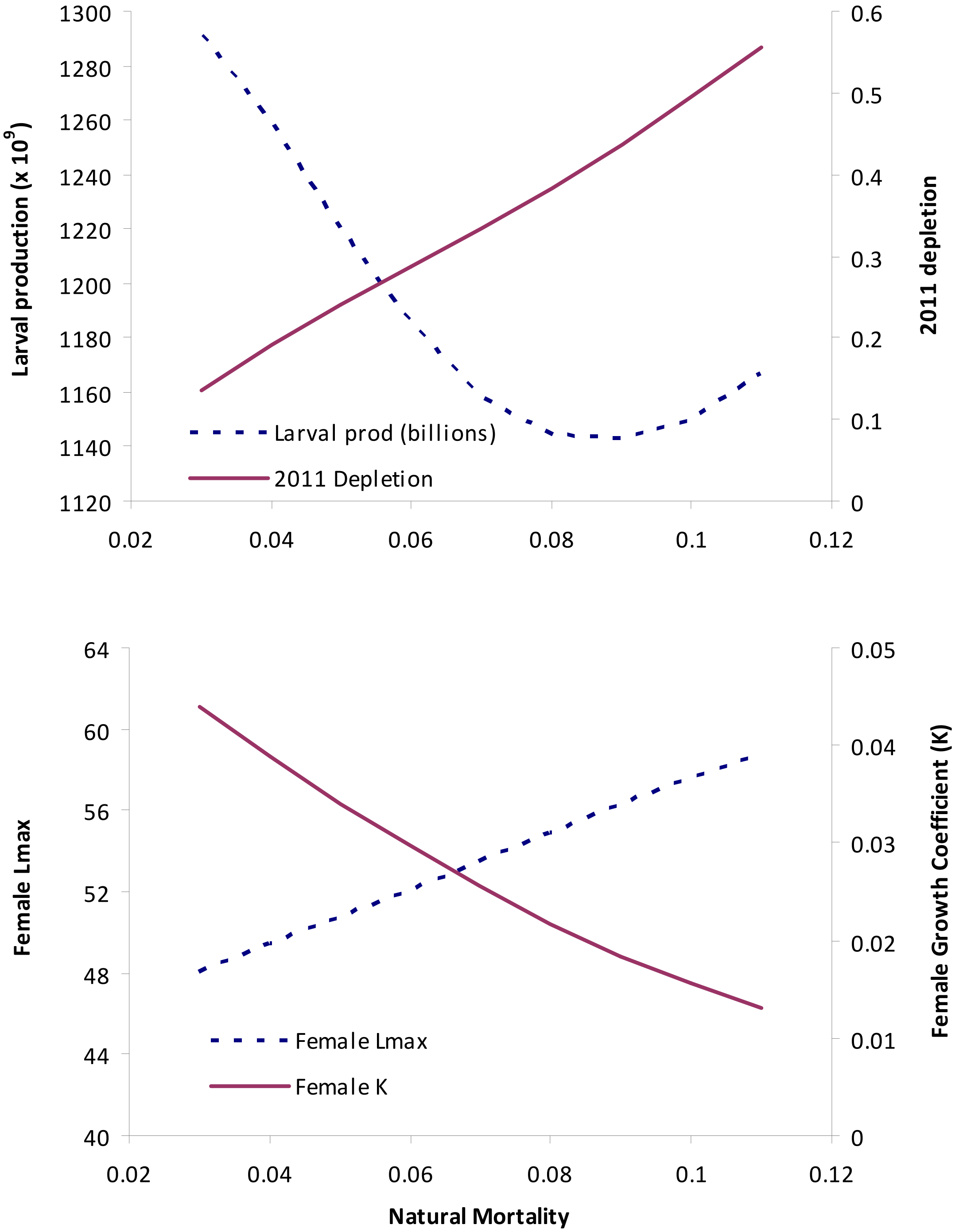


Figure 65: Profiles of estimated quantities (larval production, 2011 depletion) as well as estimated growth parameters (Lmax, K) under alternative assumptions for natural mortality (M).

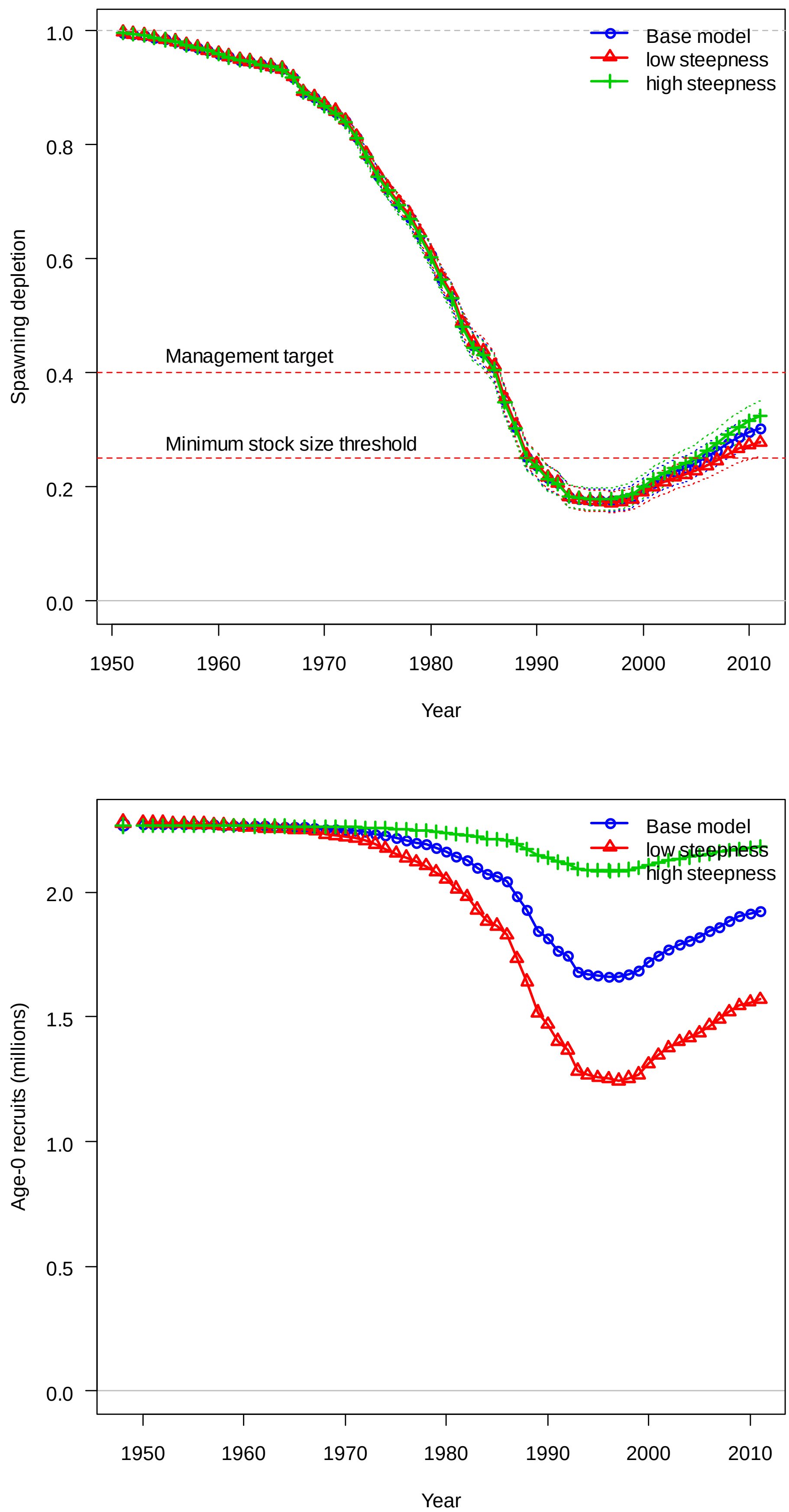


Figure 66: Sensitivity of the base model to alternative fixed values for steepness (h)

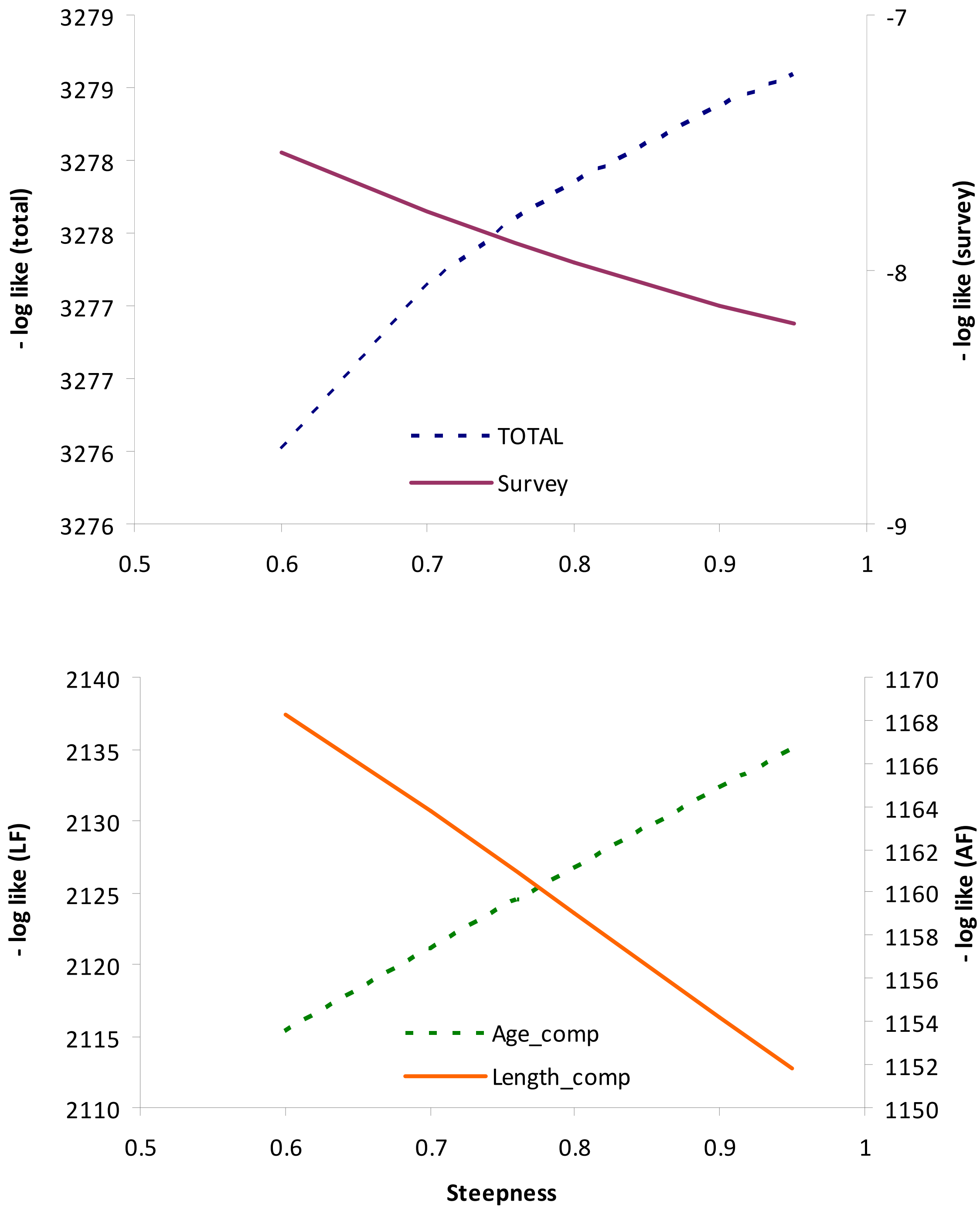
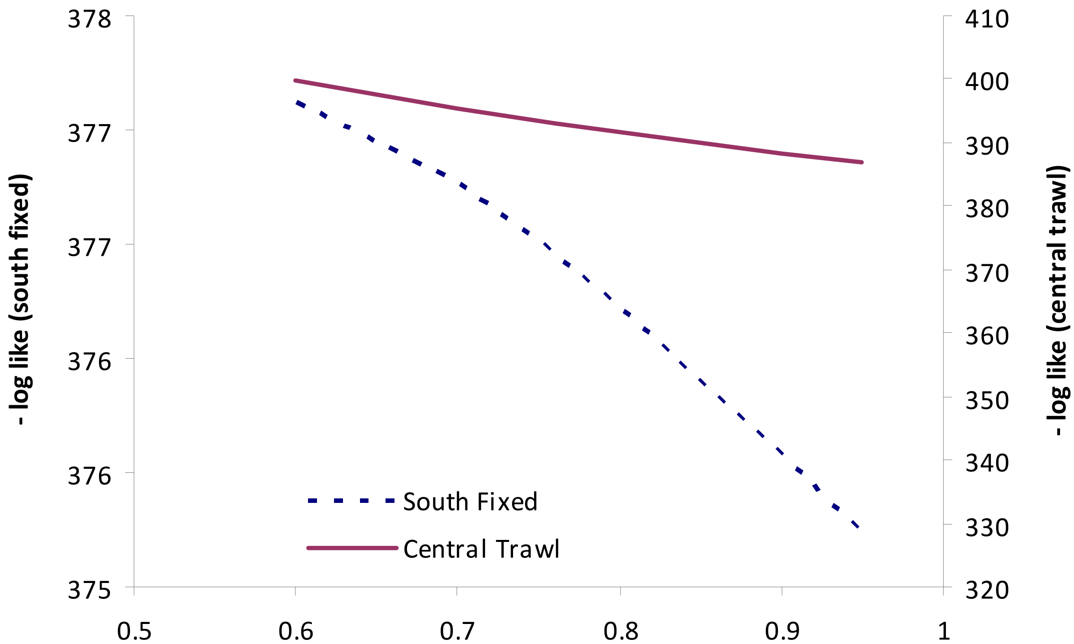


Figure 67: Profiles of total negative log likelihood values by model component under alternative assumptions (fixed values) for steepness (h).



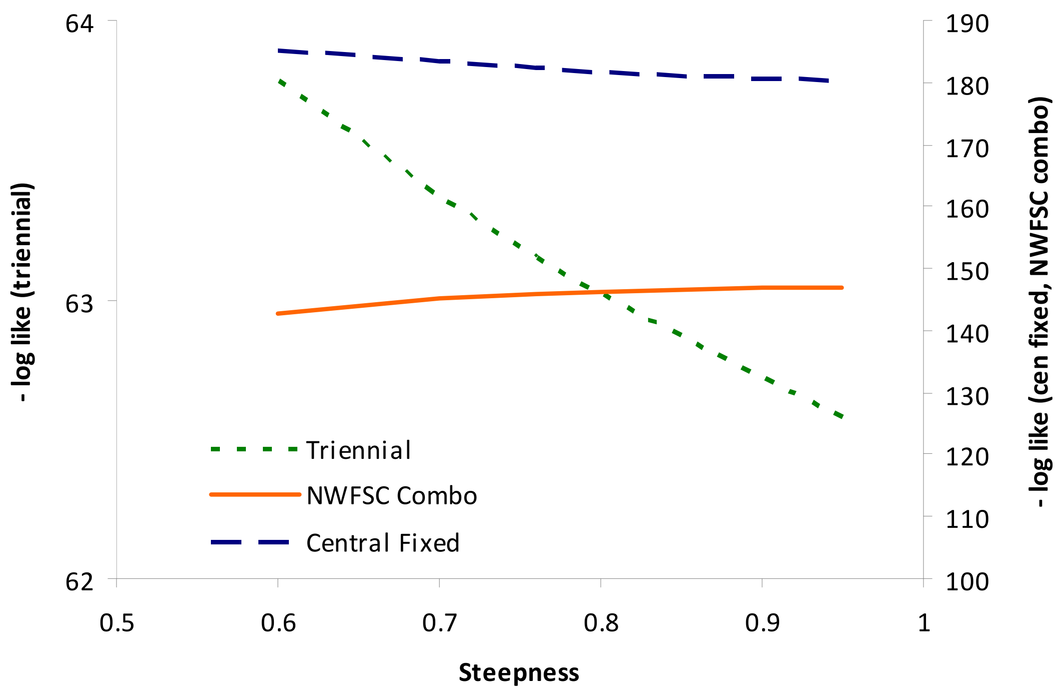


Figure 68: Profiles of total negative log likelihood values for length composition data by fleet under alternative assumptions (fixed values) for steepness (h).

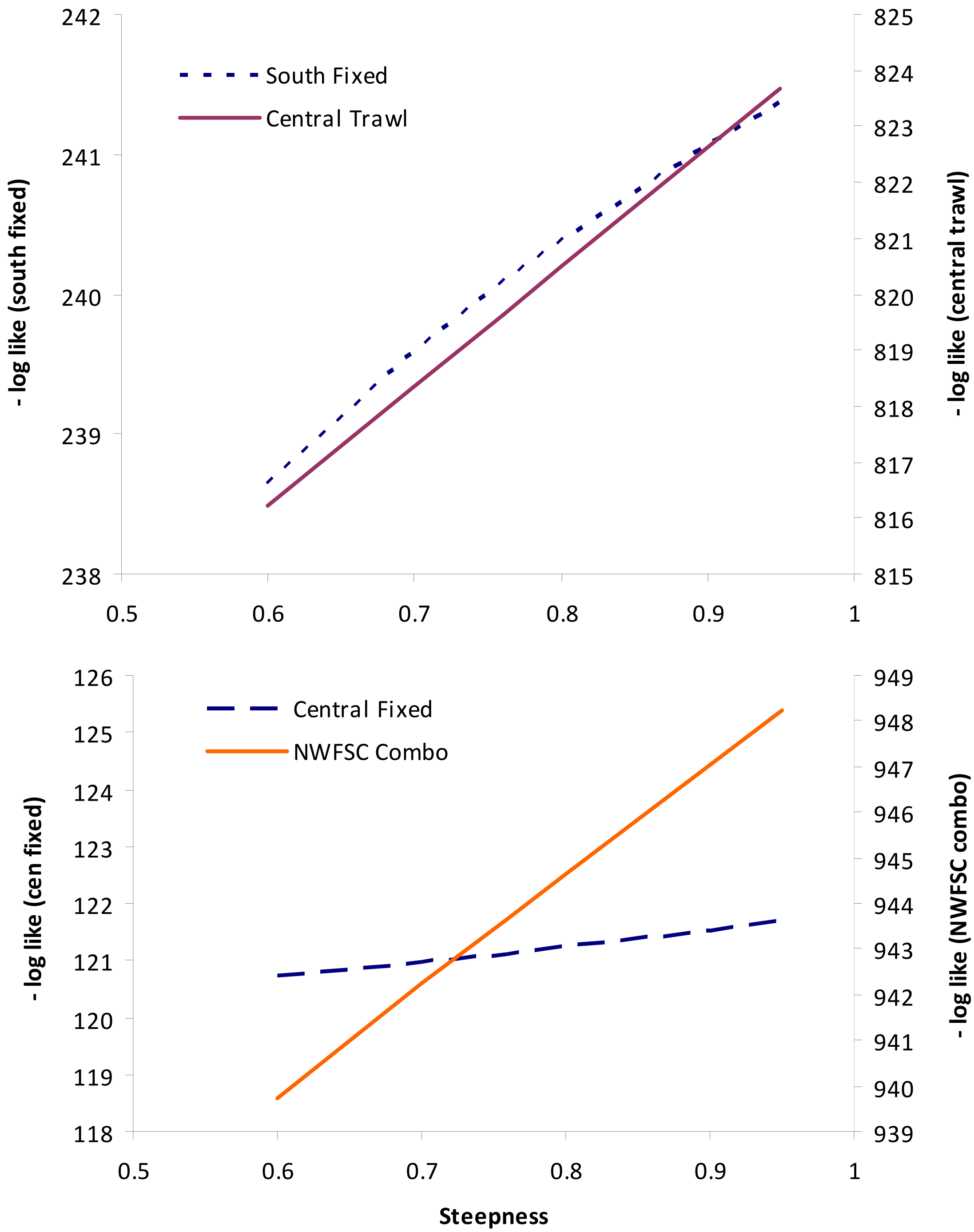


Figure 69: Profiles of total negative log likelihood values for age composition data (conditional age at length) by fleet under alternative assumptions for steepness (h).

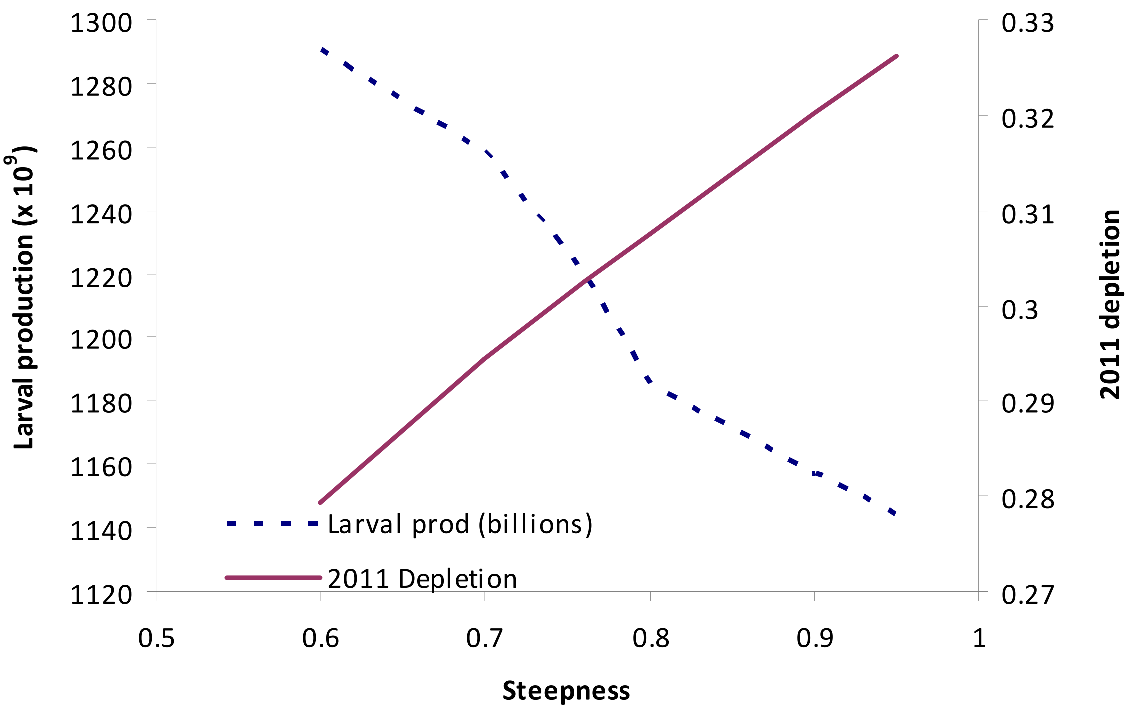


Figure 70: Profiles of estimated quantities (larval production, 2011 depletion) as well as estimated growth parameters (Lmax, K) under alternative assumptions for steepness (h)

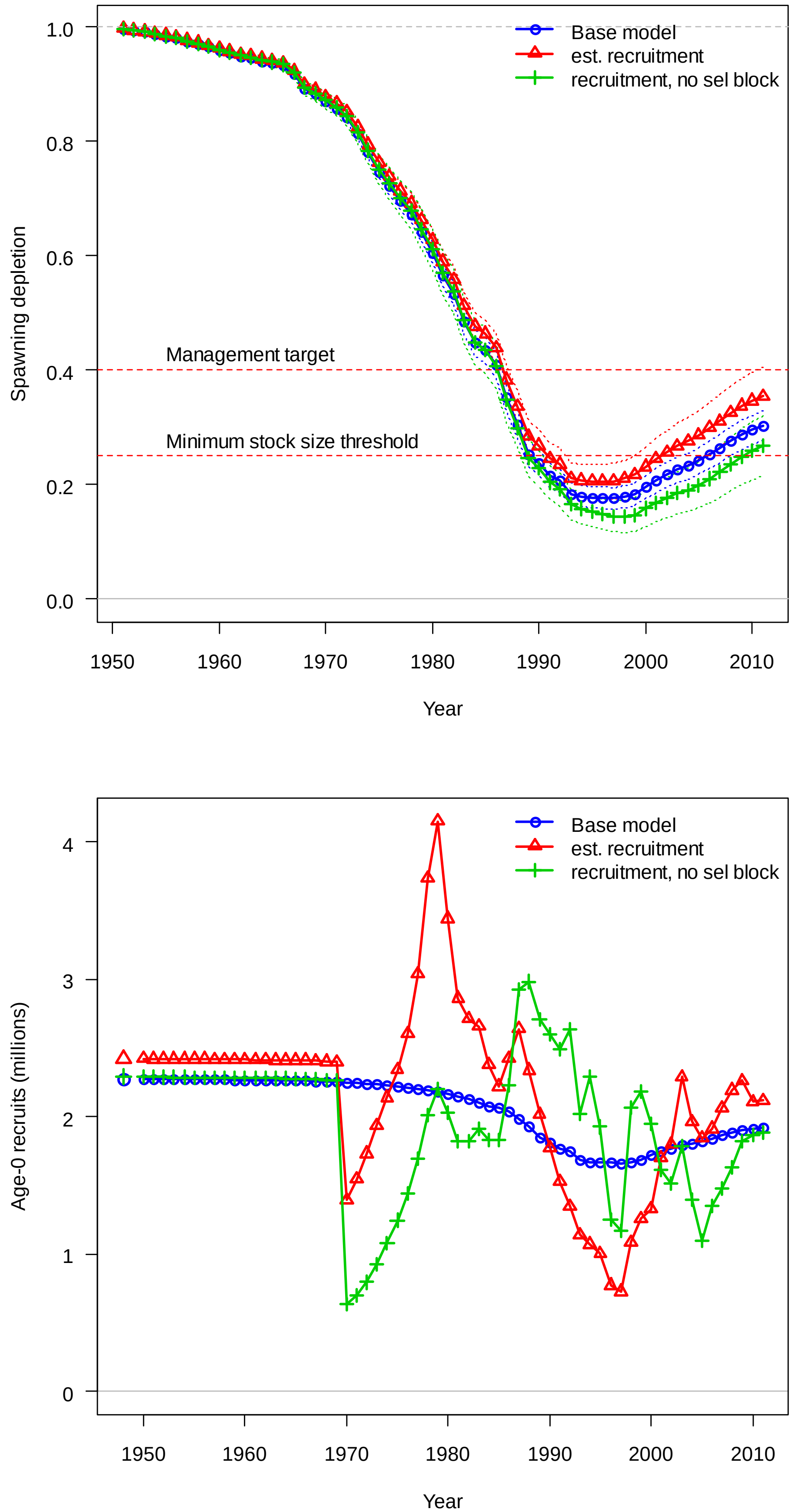


Figure 71: Sensitivity of the base model to alternative model structures; recruitment estimated from 1970 through 2005, and recruitment estimated without a block on selectivity for the southern fixed gear fisheries.

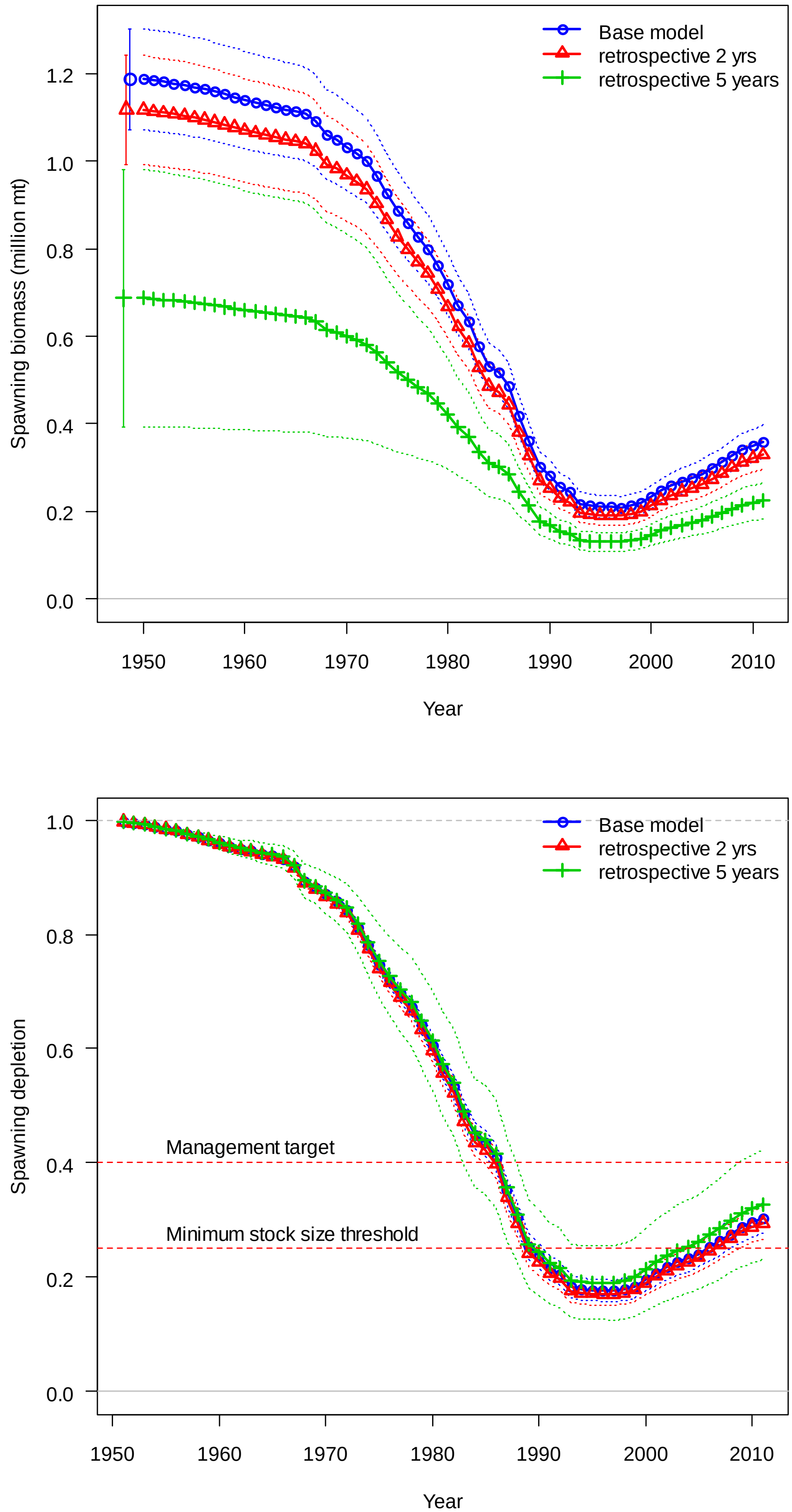


Figure 72: Retrospective model results (remove last two and last five years of data from analysis)

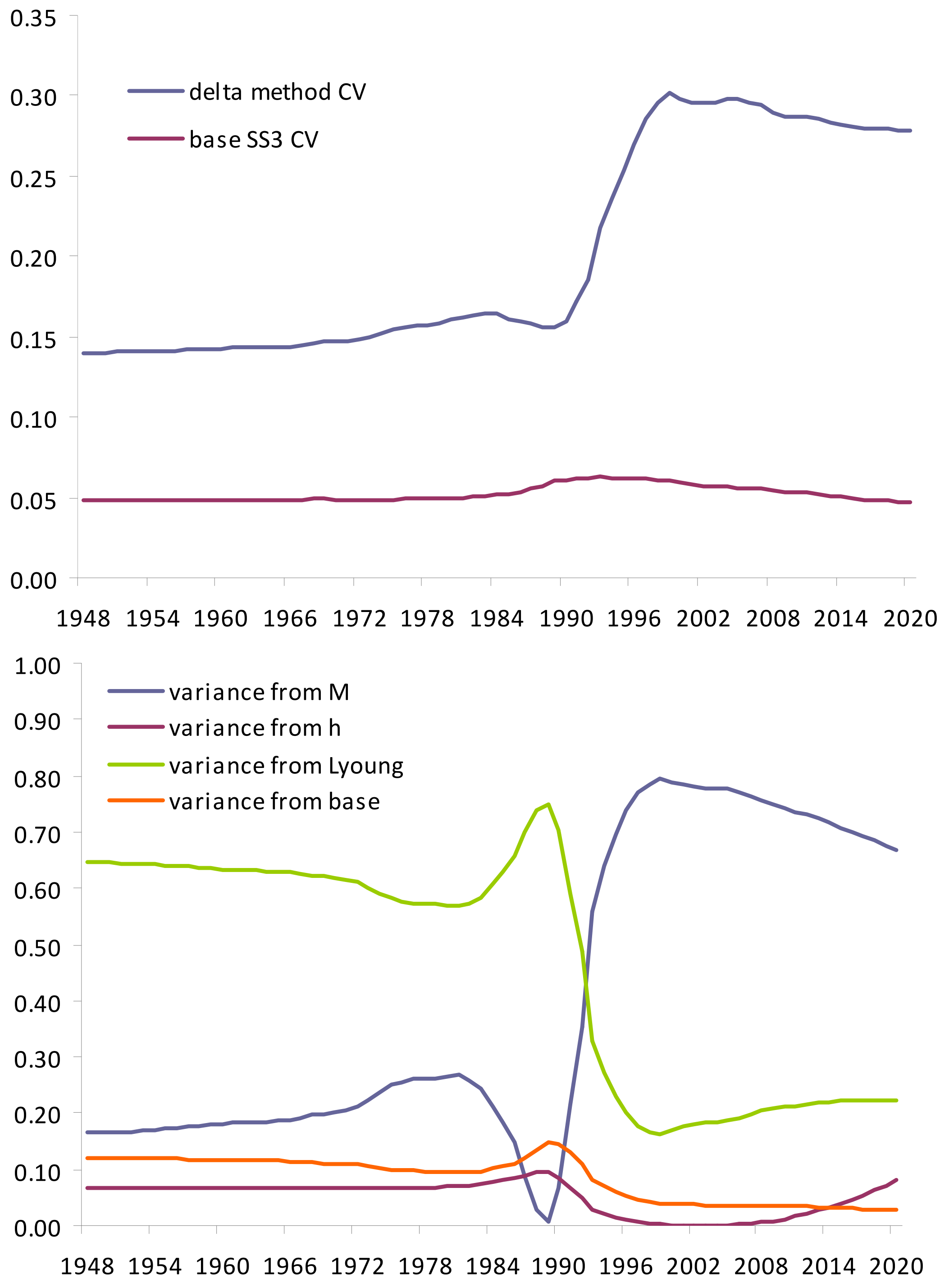


Figure 73 a-b: Delta method estimate of uncertainty relative to model estimate (based only on estimated parameters) for the SSB time series (top) and by source of variance (bottom)

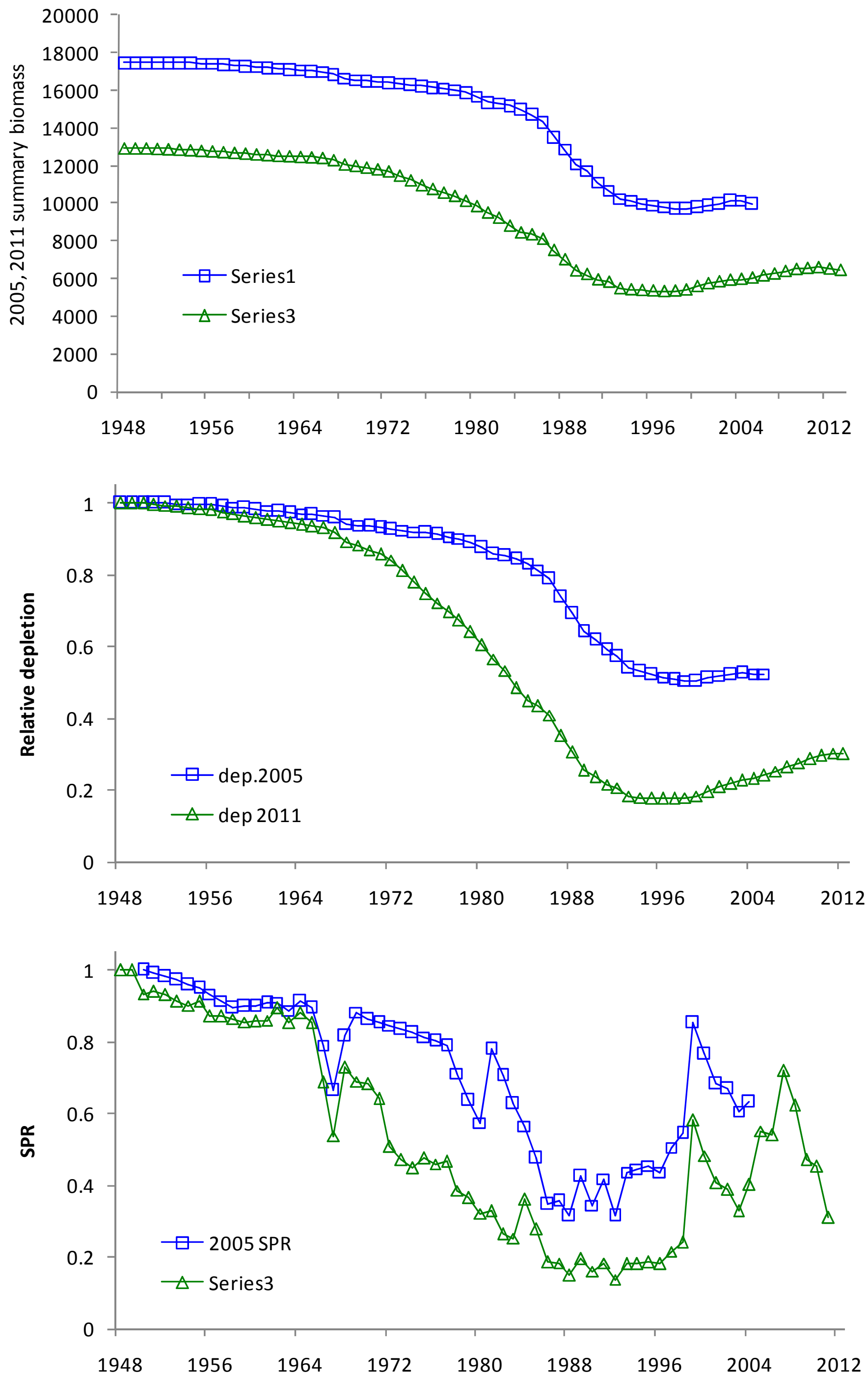


Figure 74: Comparison of 2005 and 2011 model results (summary biomass, spawning depletion, and SPR)

Appendix A: Initial histological analysis of ovarian development in blackgill rockfish

Tissue from seventy-five ovaries of female blackgill rockfish collected by commercial fishing vessels off Morro Bay, CA between September 14, 2010 and April 3, 2011 were processed through standard histological techniques (Humason 1972). The fish were selected from a total of 135 and were chosen to represent the size range and macroscopic maturity stages of fish collected at each time period, with exception of fish that had fertilized eggs or larvae present in the ovary. Fork lengths ranged from 293 to 490 mm. Tissues were blocked in paraffin, sectioned to 6-8 µm using a rotary microtome, mounted on glass slides, and stained with haematoxylin and eosin-y. Slides were viewed under a compound microscope at 100x magnification and assigned a gross ovarian phase based descriptions of teleost oocyte development in Wallace and Selman (1981) with modifications of ovarian phases in Brown-Peterson et al. (2011).

Pending further analysis to describe more subtle changes in seasonal ovarian development, the three gross phases were early developing, developing, and spent/resting. Early developing ovaries contained oogonia, primary growth, cortical alveolar, and/or primary vitellogenic oocytes only, and oocytes were well organized in the ovary. In developing ovaries, the most advanced oocytes were either secondary or tertiary vitellogenic and ovaries thought to have tertiary vitellogenic oocytes were subcategorized as spawning capable to designate them as being closer to ovulation. Spent/resting ovaries were either dominated by postovulatory follicles and/or atretic vitellogenic oocytes or primary oocytes with late stages of atresia. Ovarian phases assigned from histological samples were then compared to the macroscopic stages assigned to the corresponding whole ovaries. Ovaries with developing oocytes (early developing, developing, and spawning capable) were combined into one developing phase, as the subtleties that separate the histologically assigned phases are not readily visible macroscopically.

All female blackgill ovaries processed were mature. Histological analysis shows that development of oocytes starts prior to September and progresses through January (Fig. 1). Ovulation/fertilization (macroscopic only) begins by January and continues through at least April: macroscopic examination of ovaries from fish collected in May and June 2011 indicate that parturition is still occurring beyond April. By April oogenesis has stopped, and fish are either carrying larvae or have ovaries that are regressing or resting. Oogenesis may conclude earlier as all but one of the ovaries examined from February were in the spent/resting phase; however, more samples from February and March are necessary. The ovaries from one fish (490 mm FL) caught in December appeared to be undergoing mass atresia of vitellogenic oocytes without evidence of prior spawning.

Macroscopically assigned stages were accurate in September and November when all ovaries were in developing stages (Table 1). Between December and April, macroscopic stages were less accurate, and 66% of spent/resting ovaries examined from this time period were designated macroscopically as developing (stage 2). The difference was greatest in February when all nine ovaries processed were macroscopically staged as developing while histological examination showed that eight were in fact spent/resting. In both January and April five spent/resting ovaries were misclassified as developing (stage 2). The apparent difficulties of macroscopically identifying spent/resting fish, even within the spawning and parturition season, suggests that many of the stage 2 fish found throughout the year are likely to actually be in the spent/resting phase.

Initial histological analysis suggests that ovaries from smaller fish may develop later than those from larger fish (Fig. 2a and 2b). With the exception of one fish (377 mm FL), in September fish 390 mm FL and less had early developing ovaries while all fish greater than 390 mm FL (to 475 mm FL) had ovaries that were progressed to the developing phase (Fig. 2a). The apparent pattern is most clear in November, when fish between 310-336 mm FL had early developing ovaries and the larger fish (347-475 mm FL) had developing ovaries (Fig. 2b). Additionally, in November, fish larger than 380 mm FL had oocytes that appeared to be more advanced (vitellogenic 3—"spawning capable" fish according to Brown-Peterson et al. 2011), though the distinction between developmental phases for blackgill ovaries is still being refined. In December the only fish with ovaries in the early developing phase were 343 mm FL or smaller. Beyond December there is no pattern as most ovaries are in the spent/resting phase. The pattern of older fish releasing larvae earlier in the season has been seen in other *Sebastes* species (Bobko and Berkeley 2004; Eldridge et al. 1991); however more samples from the fall and winter need to be processed to determine if this pattern persists in blackgill or if it is an artifact of selective sampling.

LITERATURE CITED

Bobko, S.J. and S.A. Berkeley. 2004. Maturity, ovarian cycle, fecundity, and age-specific parturition of black rockfish (*Sebastes melanops*). Fishery Bulletin 102:418-429.

Brown-Peterson, N.J., D.M. Wyanski, F. Saborido-Rey, B.J. Macewicz, and S.K. Lowerre-Barbieri. 2011. A standardized terminology for describing reproductive development in fishes. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 3:52-70.

Humason, G.L. 1972. Animal Tissue Techniques. W.H. Freeman and Co. San Francisco.

Wallace, R.A. and K. Selman. 1981. Cellular and dynamic aspects of oocyte growth in teleosts. American Zoologist 21:325-343.

Table 1. Macroscopically assigned ovarian stage compared to histological phase. All developing histological phases (early developing, developing, and spawning capable) are combined into "developing".

		Macroscopic Stage	Histological Phase
September	Developing	12	12
November	Developing	14	14
December	Developing	12	11
	Spent/Resting	0	1
January	Developing	13	8
	Spent/Resting	0	5
February	Developing	9	1
	Spent/Resting	0	8
April	Developing	5	0
	Spent/Resting	10	15

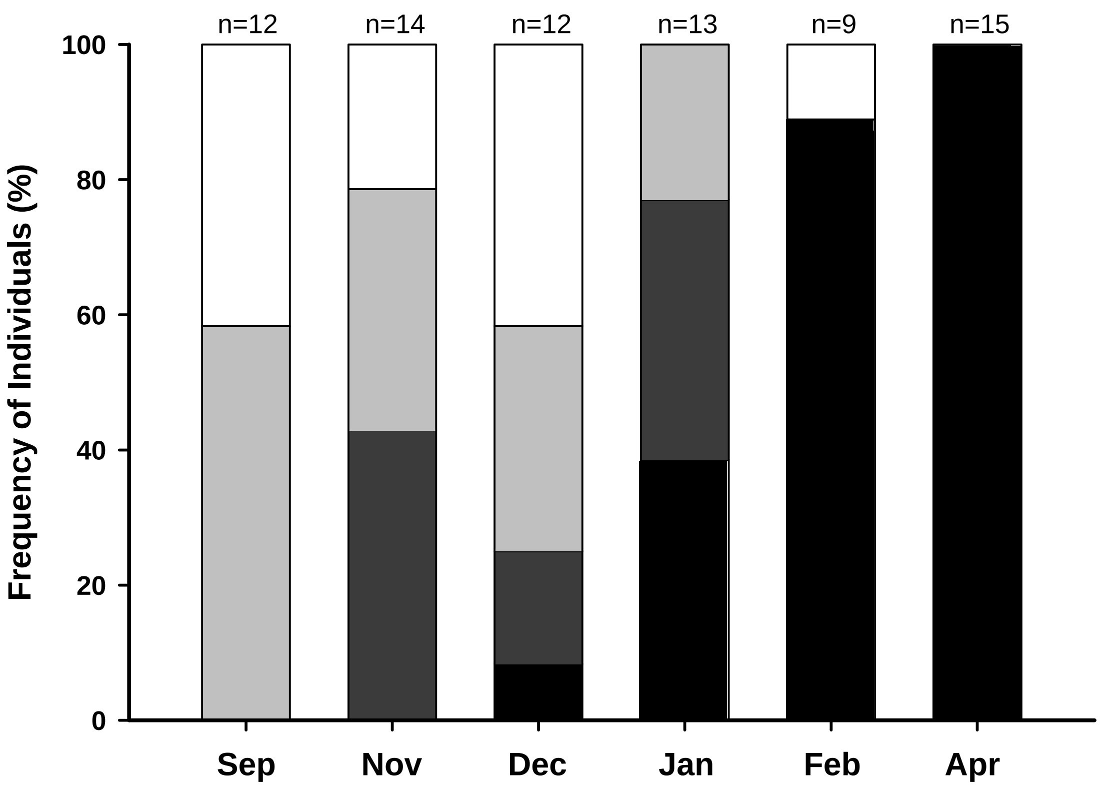


Figure 1. Frequency of individuals with ovaries in each of the gross ovarian development phases found in each month. White = Early Developing; light gray = Developing; dark grey = Spawning Capable; black = Spent/Resting.

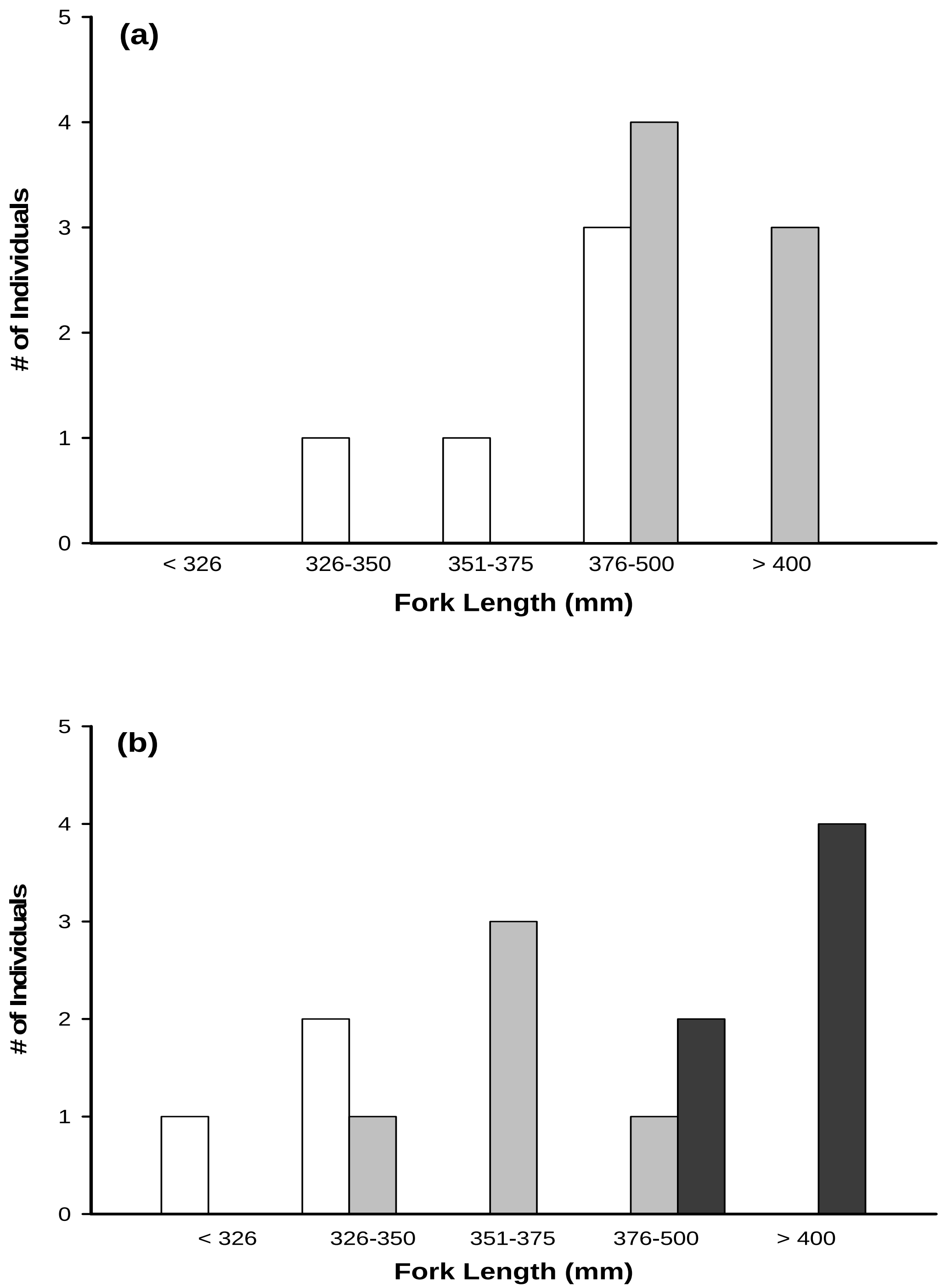


Figure 2. Total number of individuals in size categories with ovaries in the early developing (white), developing (light gray), and spawning capable (dark grey) phases in (a) September and (b) November.

Appendix B: Annual plots of Triennial trawl survey (1995-2004), NWFSC slope (1999-2002) and combined shelf-slope (2003-2010) survey effort and blackgill rockfish CPUE.

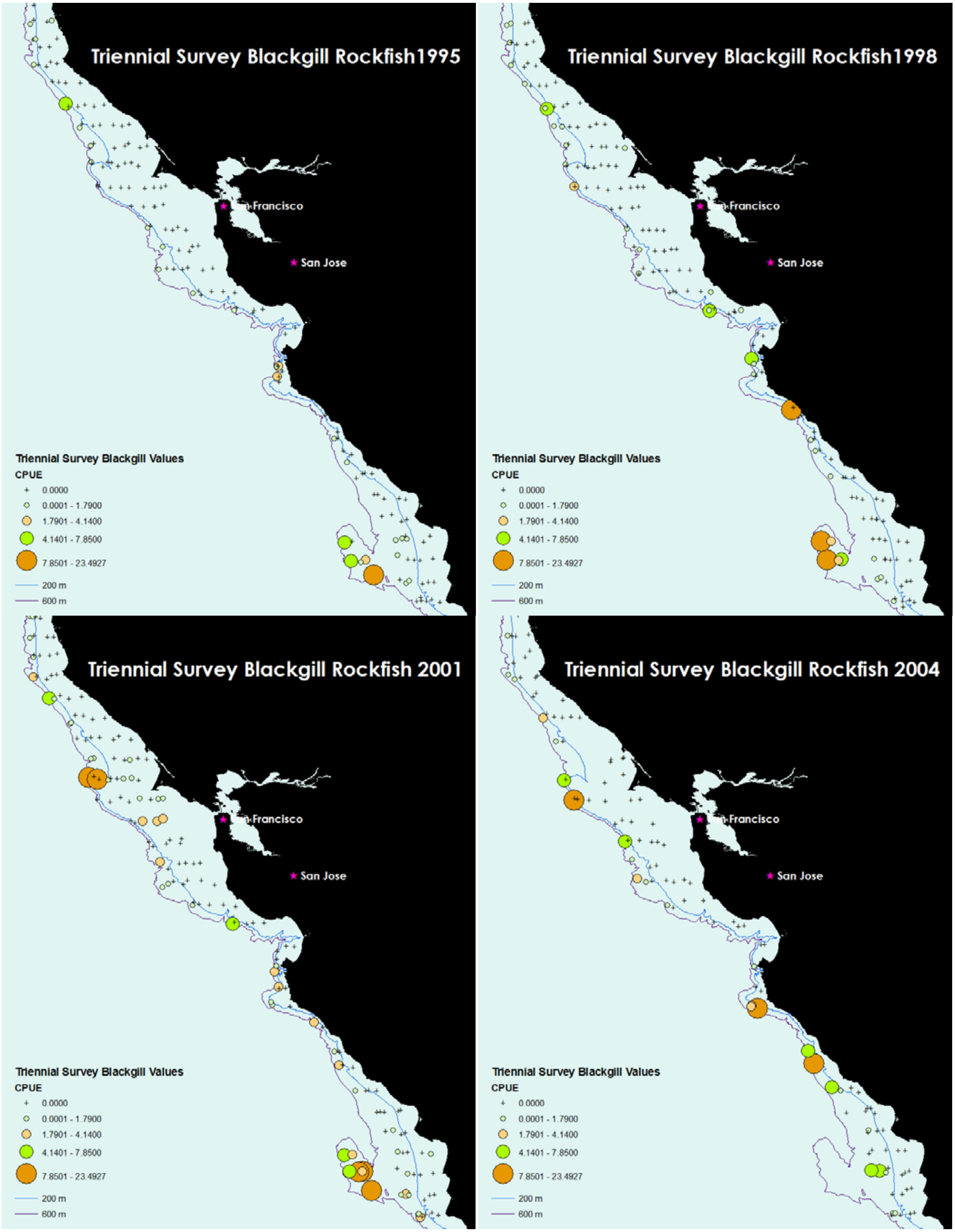


Figure B1: Triennial trawl survey CPUE estimates by year (1995-2004)

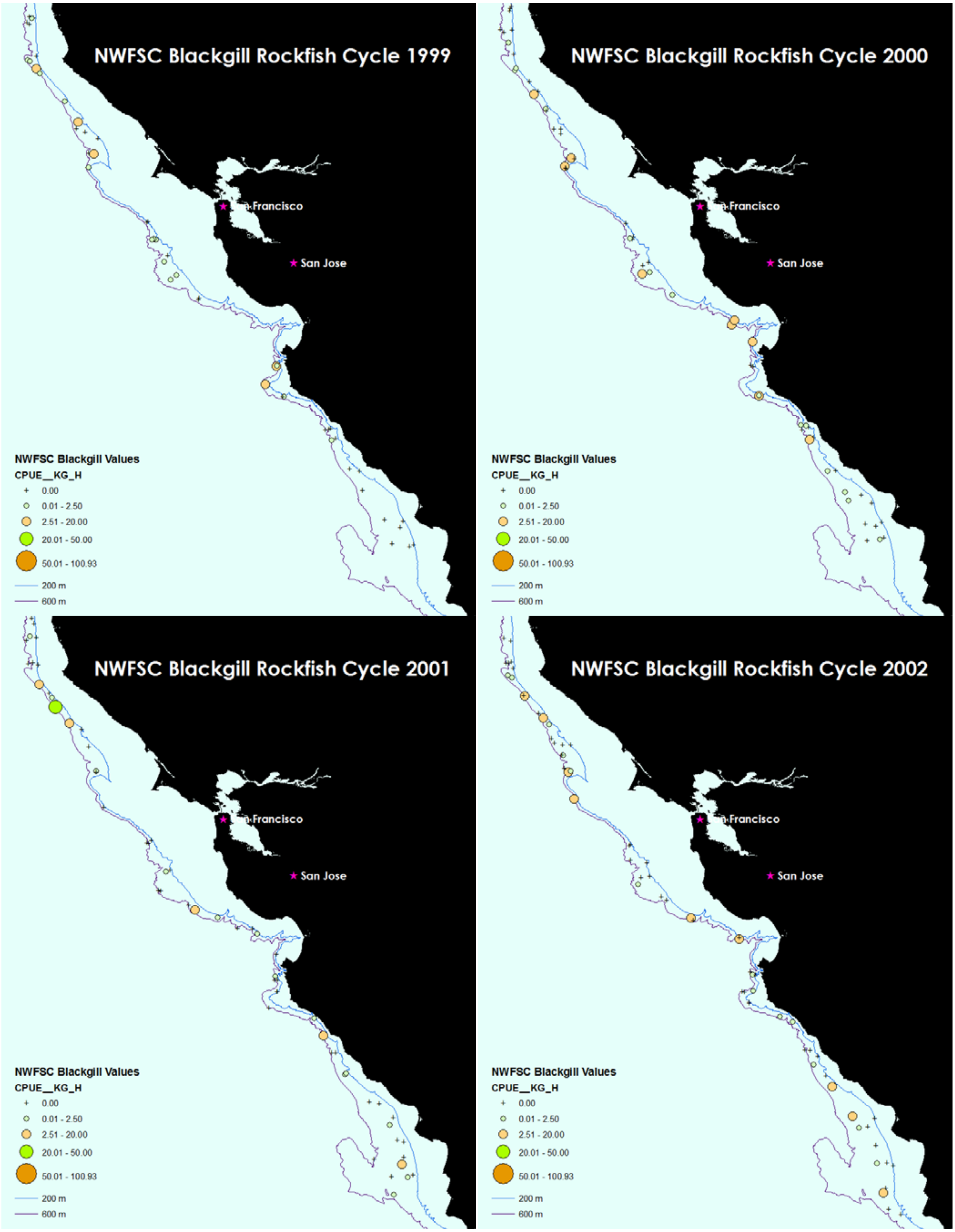


Figure B2: NWFSC slope bottom trawl CPUE estimates by year (1999-2002)

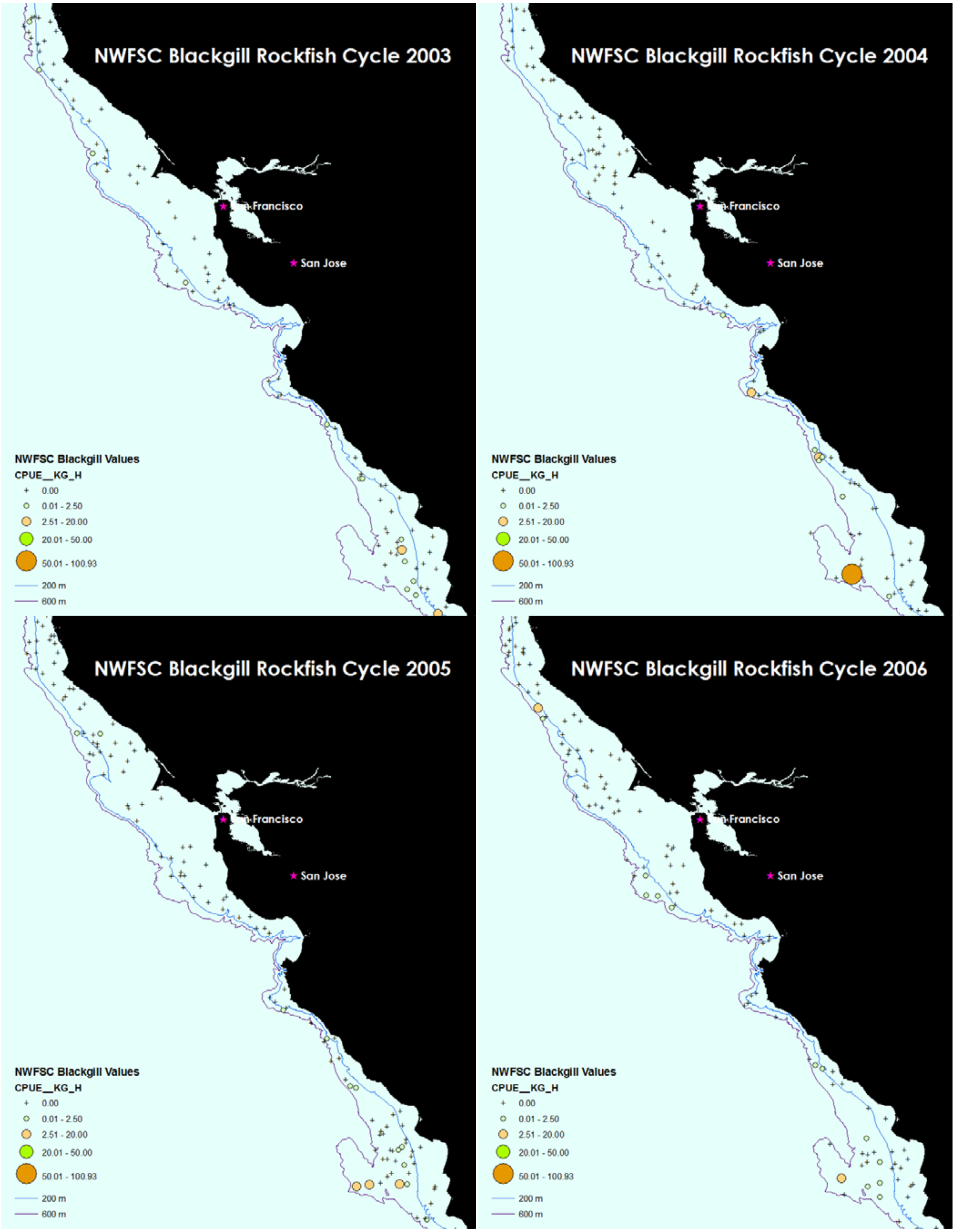


Figure B3: NWFSC combined trawl survey CPUE estimates by year, for central California region (2003-2006)

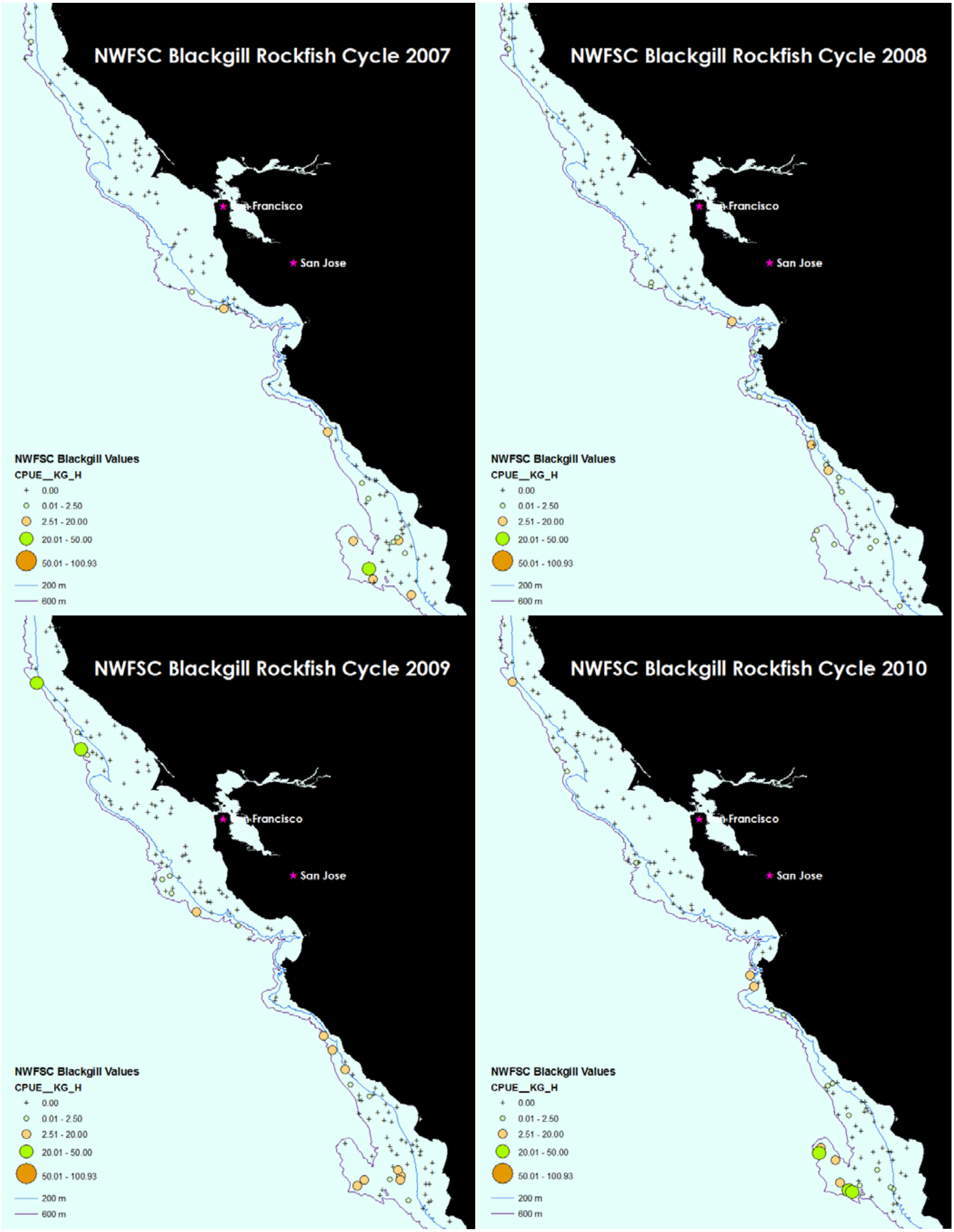


Figure B4: NWFSC combined trawl survey CPUE estimates by year, for central California region (2007-2010)

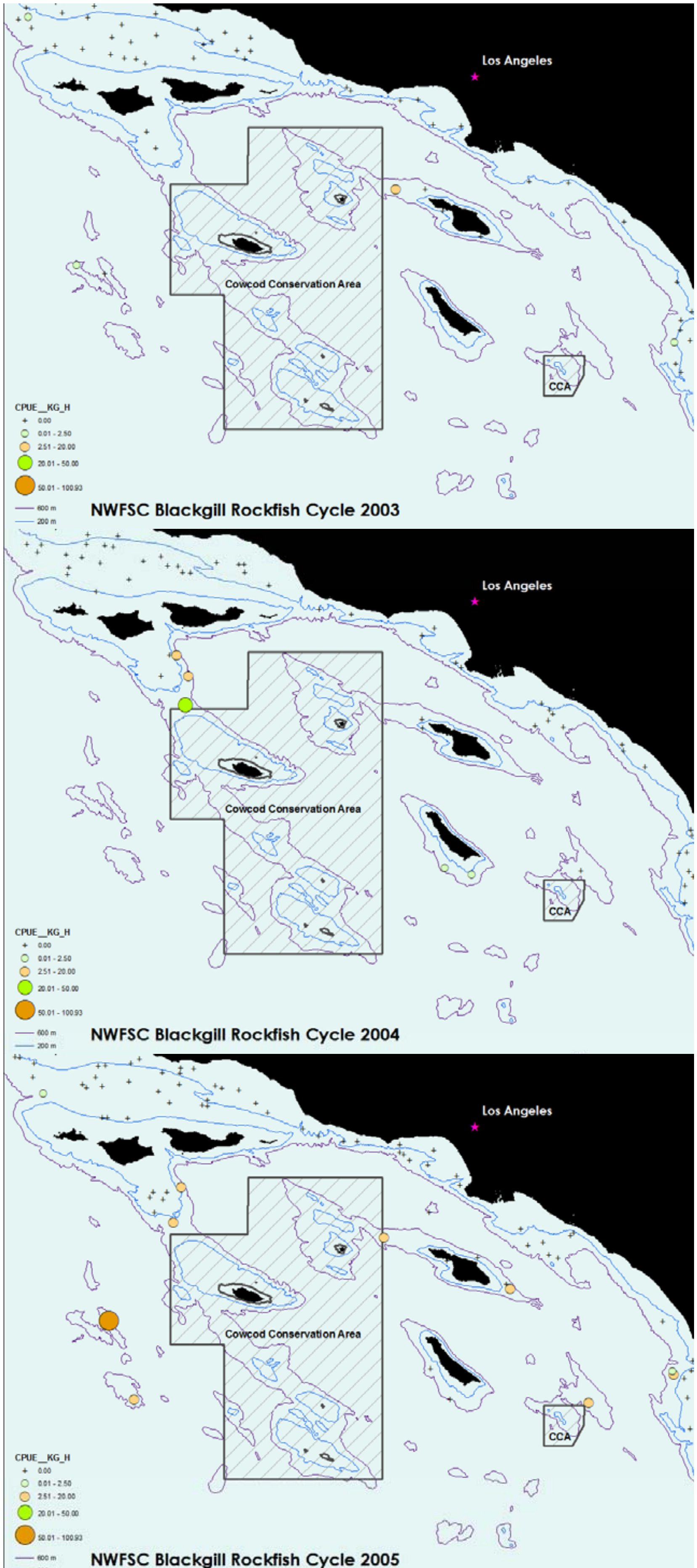


Figure B5: NWFSC combined trawl survey CPUE estimates by year, for southern California Bight region (2003-2005)

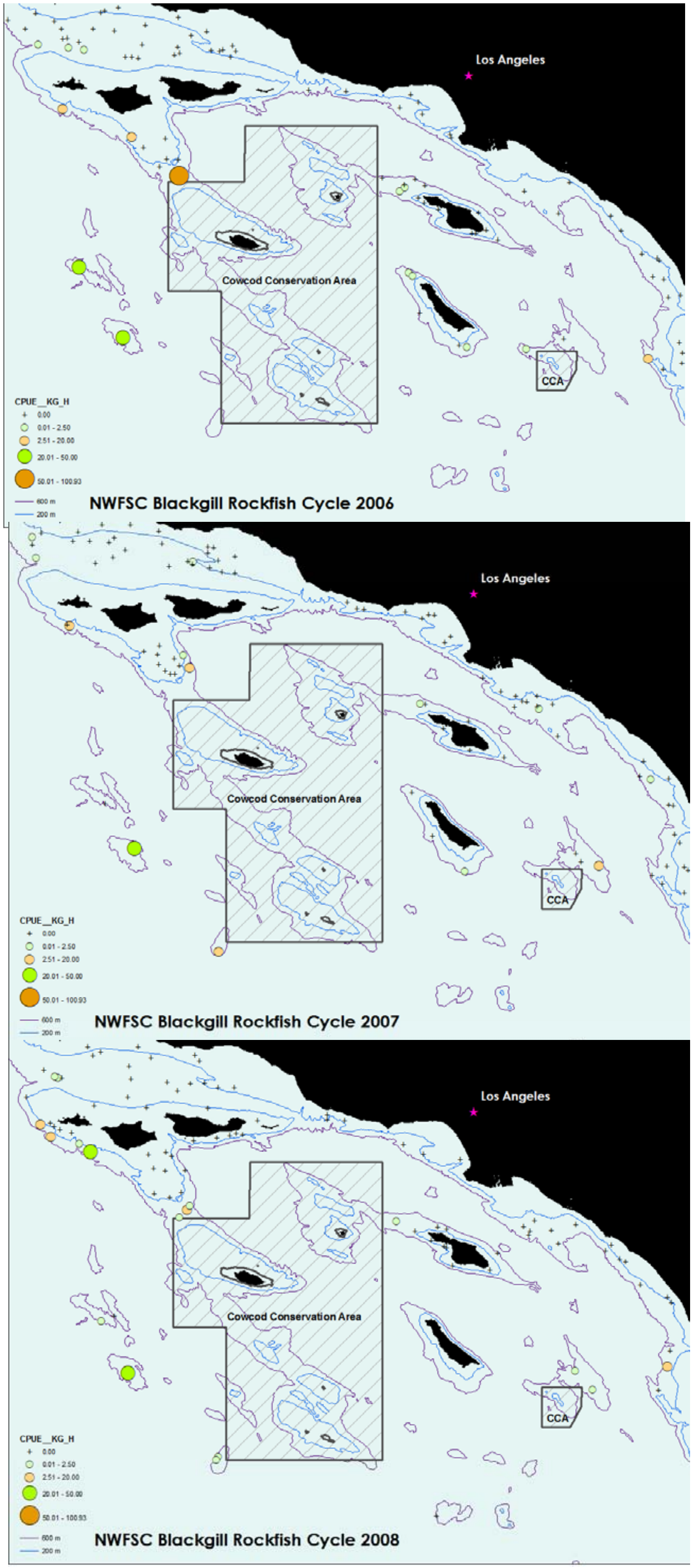


Figure B6: NWFSC combined trawl survey CPUE estimates by year, for southern California Bight region (2006-2008)

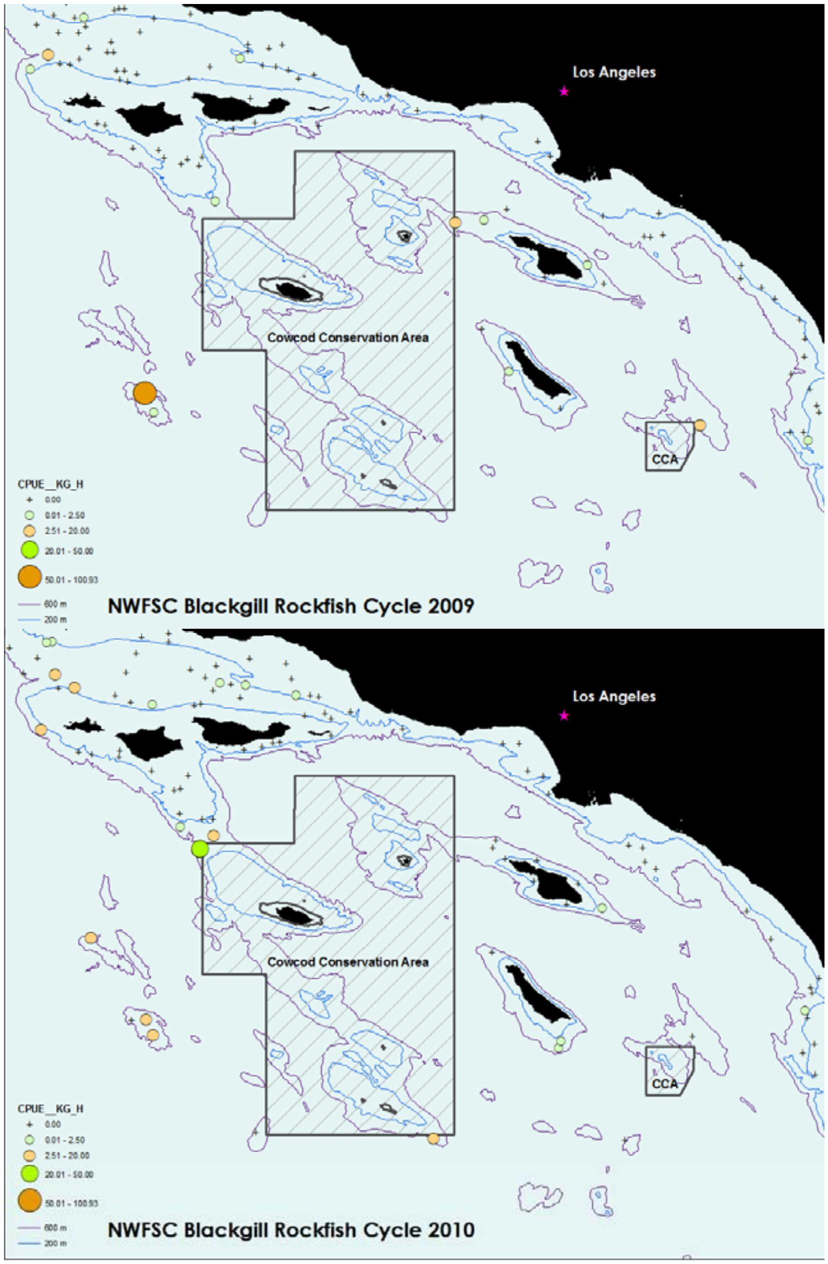


Figure B7: NWFSC combined trawl survey CPUE estimates by year, for southern California Bight region (2009-2010)

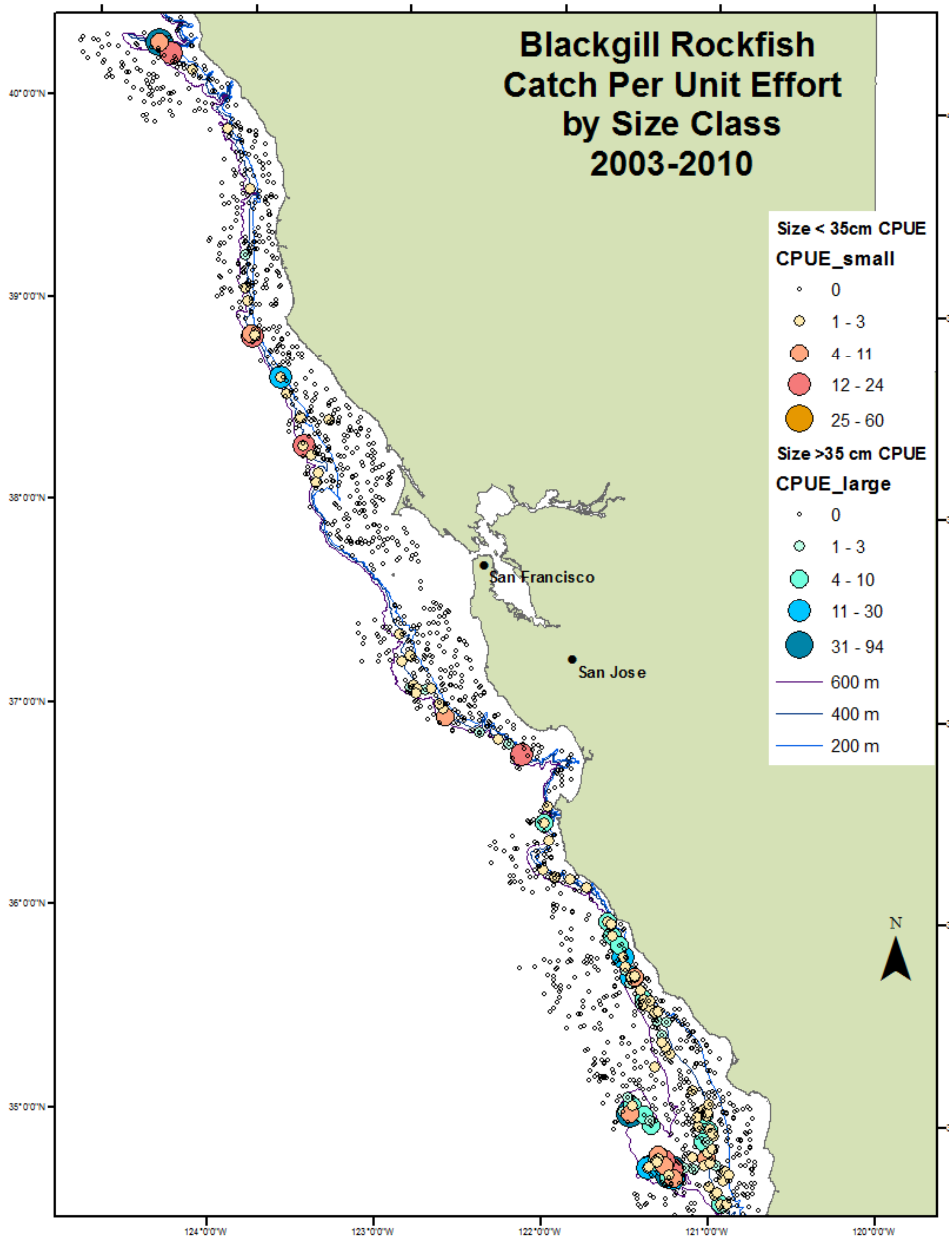


Figure B8: NWFSC combined trawl survey CPUE estimates, divided into "large" (> 35 cm) and "small" (< 35 cm) fish, for central California, all years (2003-2010) combined.

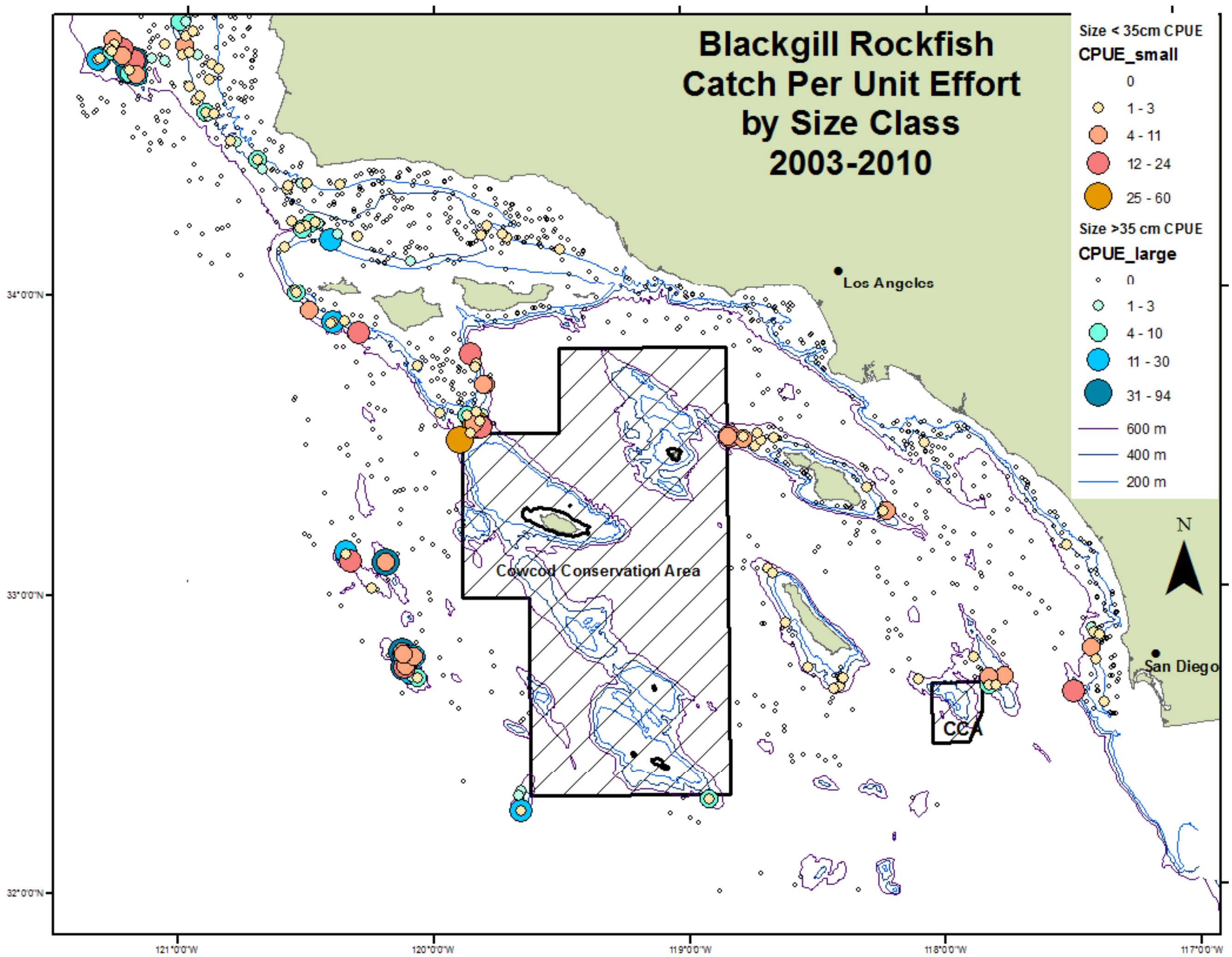


Figure B9: NWFSC combined trawl survey CPUE estimates, divided into "large" (> 35 cm) and "small" (< 35 cm) fish, for southern California Bight, all years (2003-2010) combined.

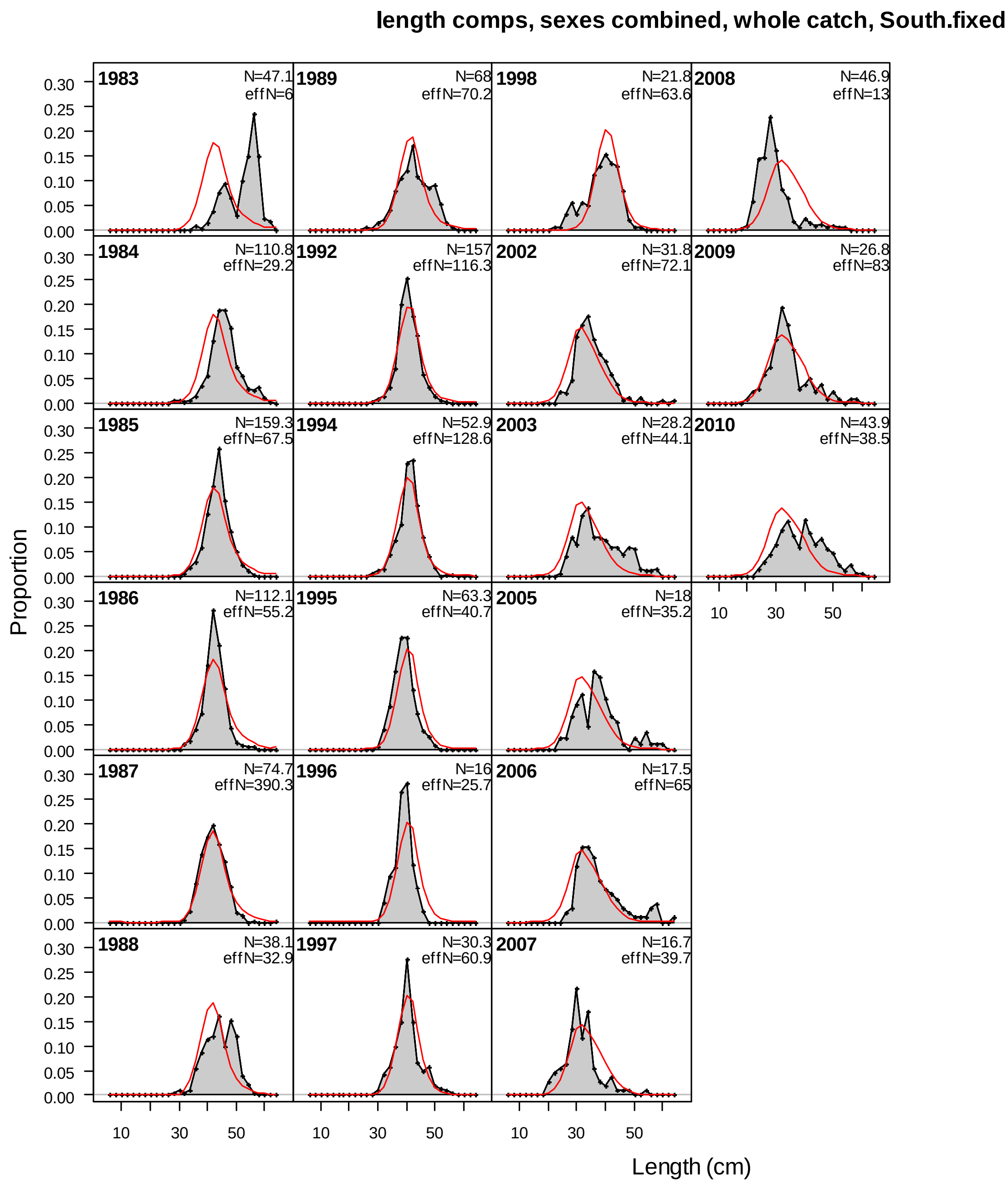


Figure C1: Observed and predicted length composition data (sexes combined) for the southern fixed gear fishery (1983-2010)

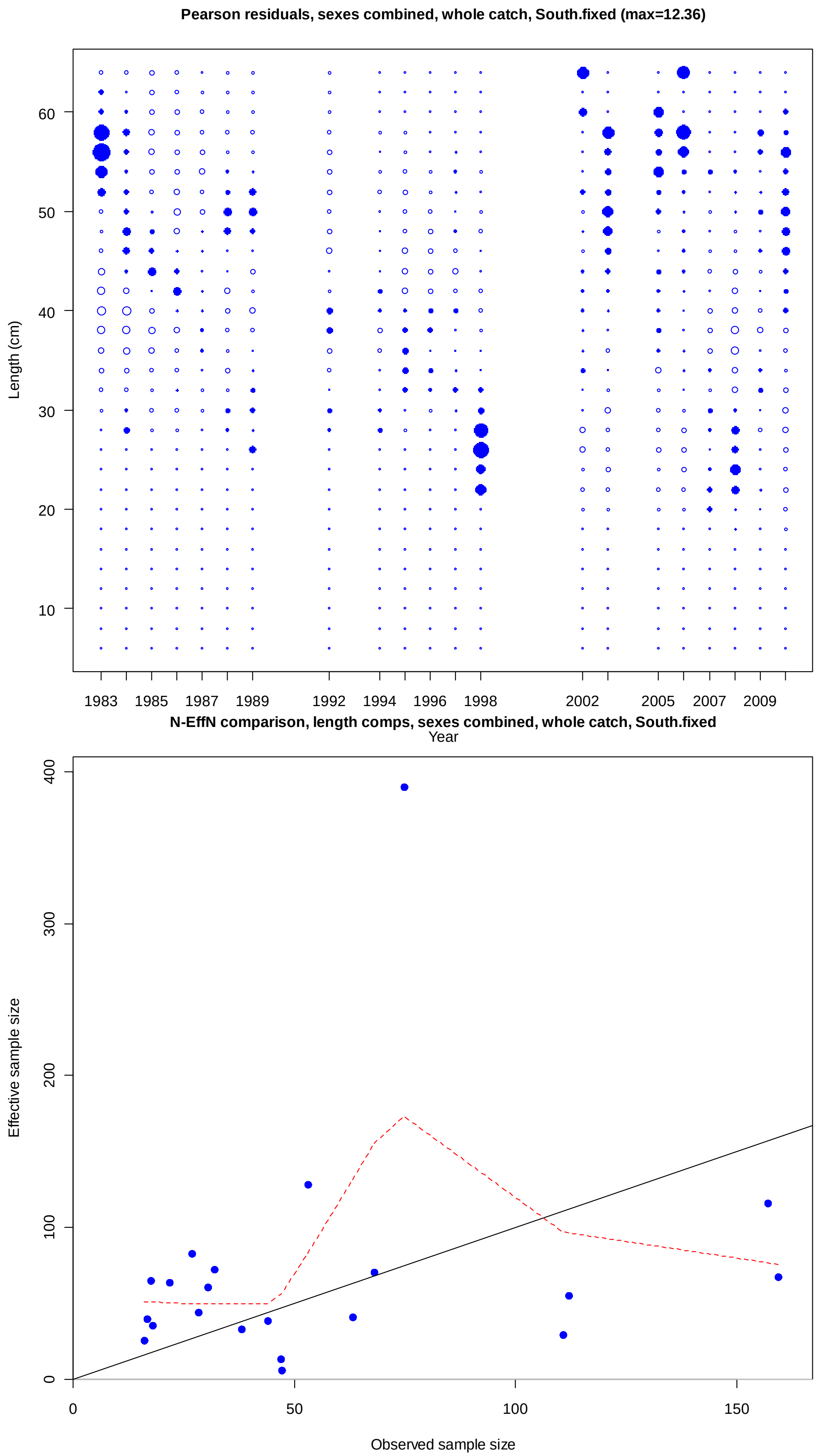


Figure C2 a-b: Residuals and observed versus effective sample sizes for combined sex length composition data for the southern fixed gear fishery.

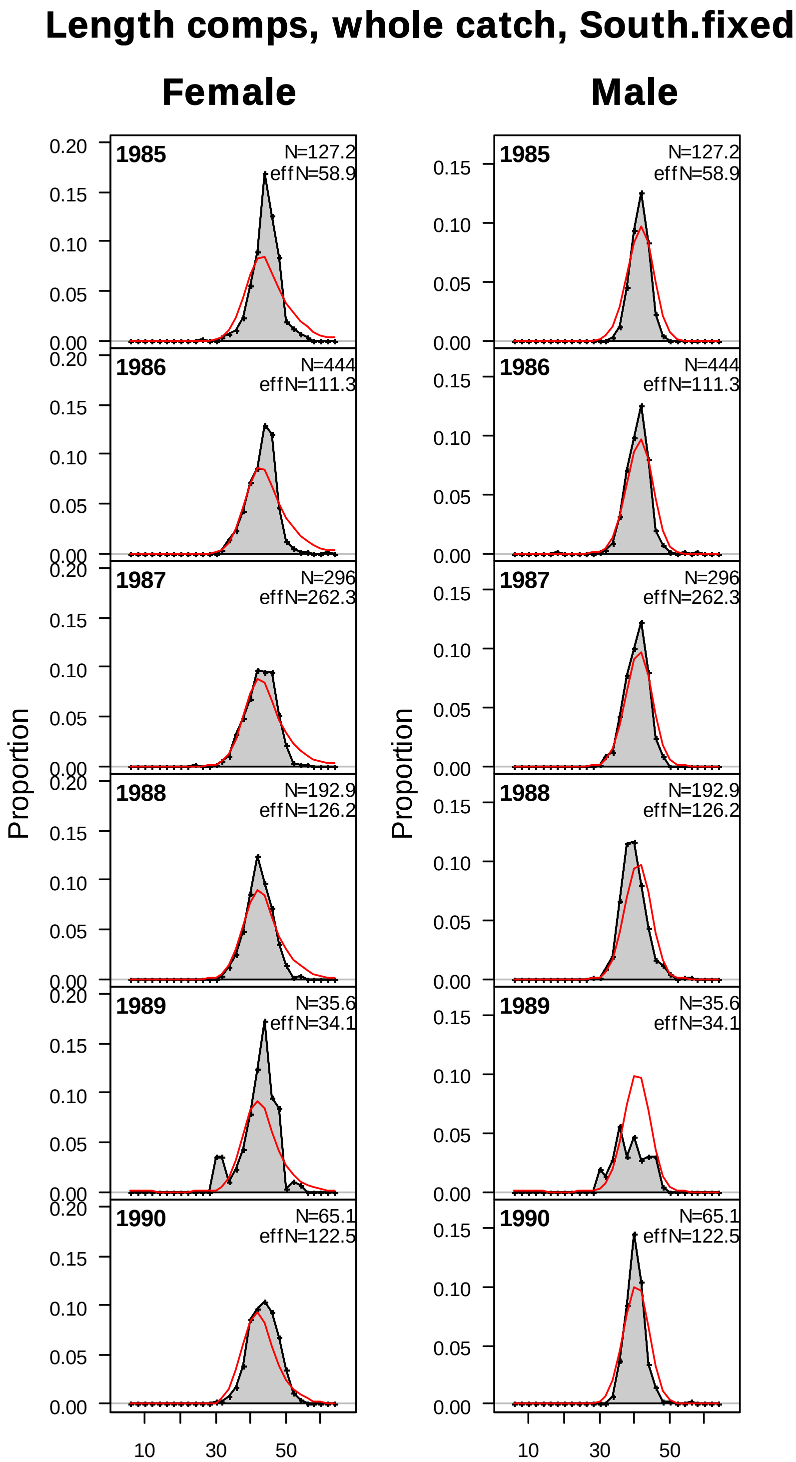


Figure C3: Observed and predicted length composition data (gender-specific) for the southern fixed gear fishery (1985-1990)

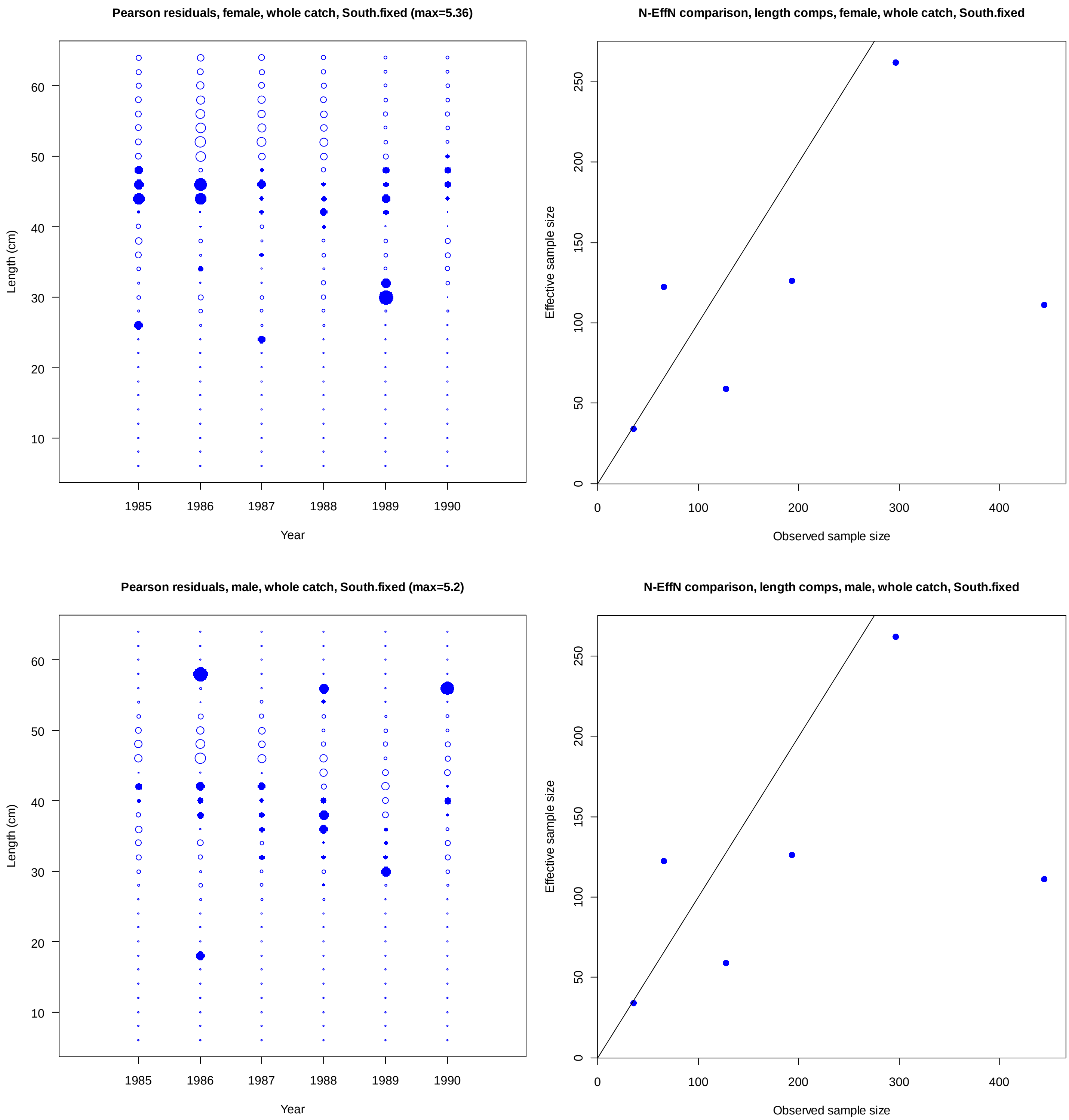


Figure C4 a-d: Residuals (left) and effective sample sizes by year (right) by gender for length frequency data from the southern fixed gear fishery (1983-2010)

length comps, sexes combined, whole catch, Central.fixed

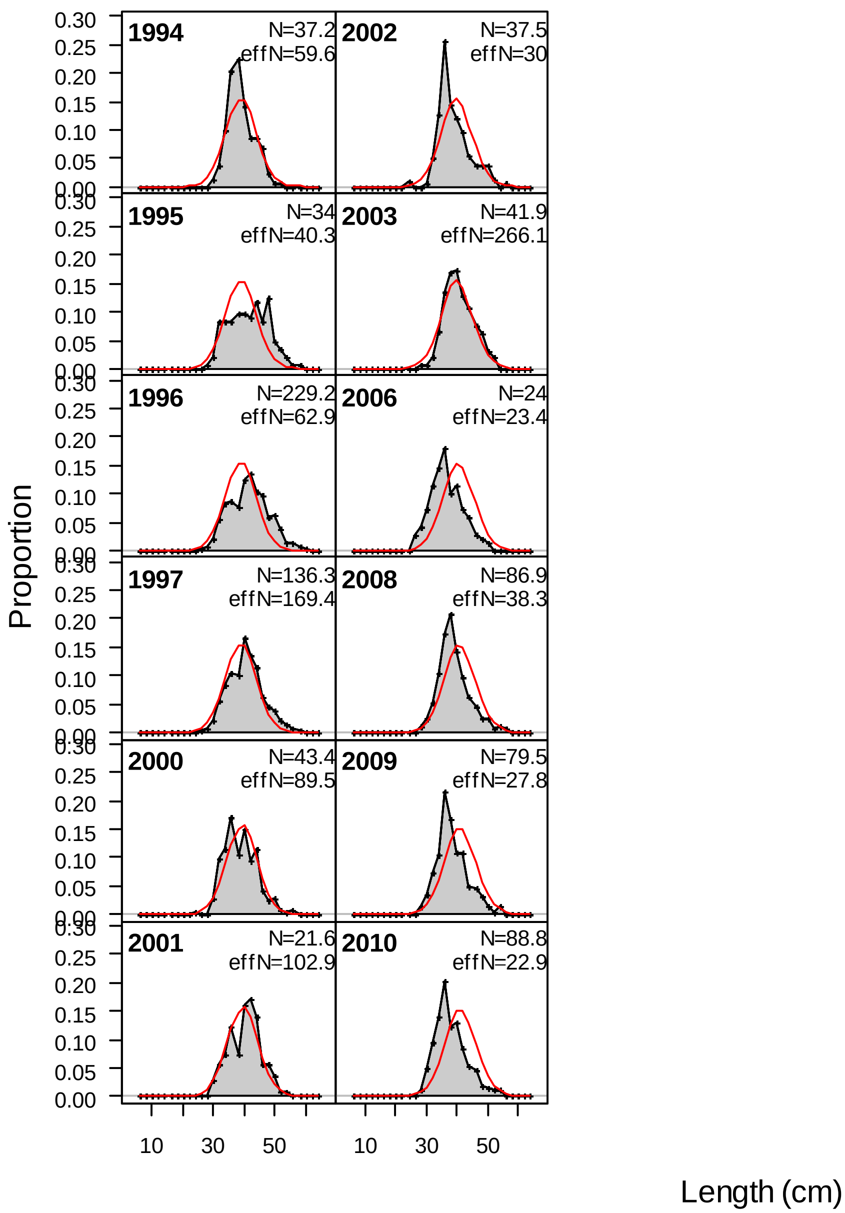


Figure C5: Observed and predicted length composition data (sexes combined) for the central California fixed gear fishery (1994-2010)

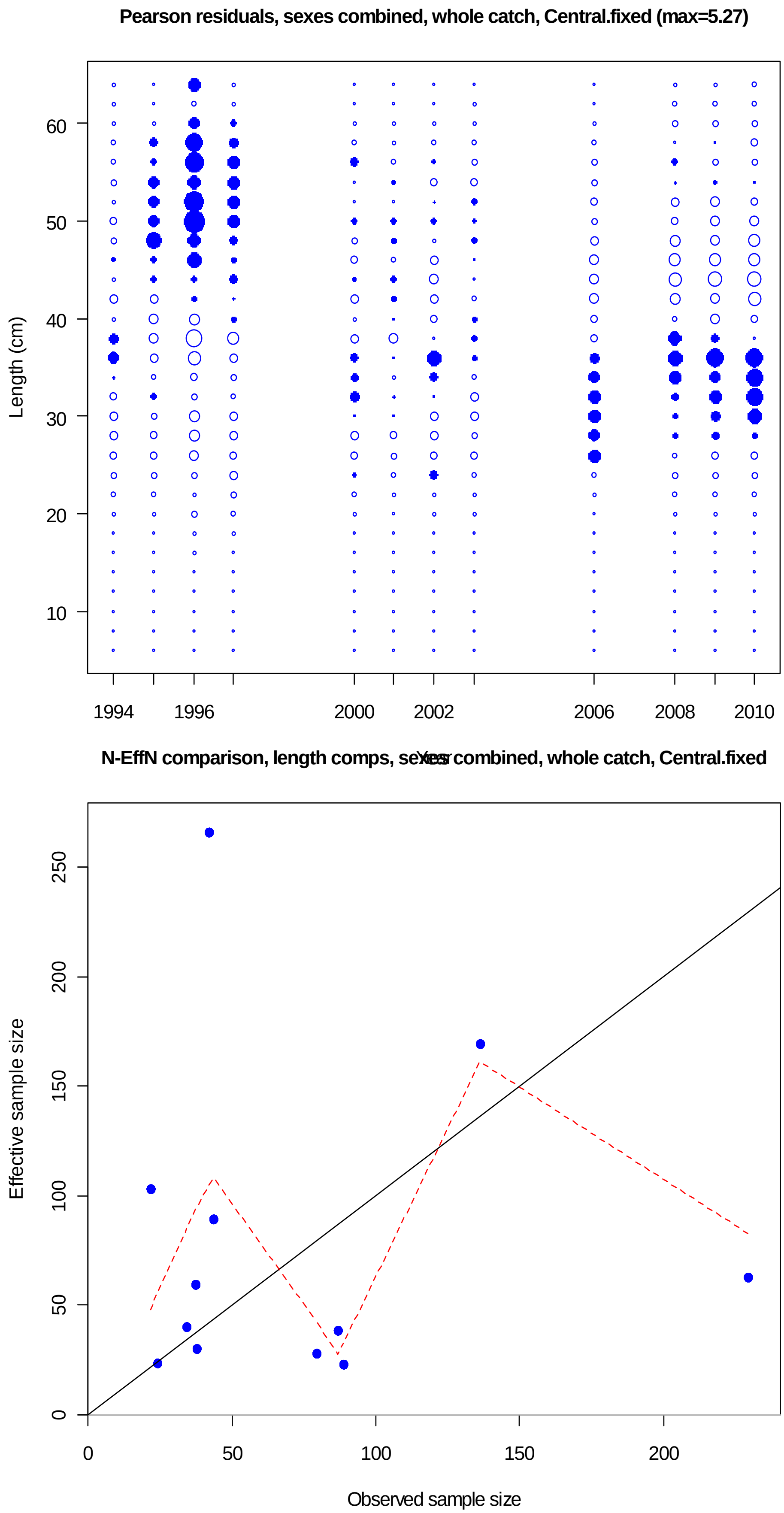


Figure 6 a-b: Residuals (top) and effective sample sizes by year (bottom) for combined sex length frequency data from the central California fixed gear fishery (1994-2010)

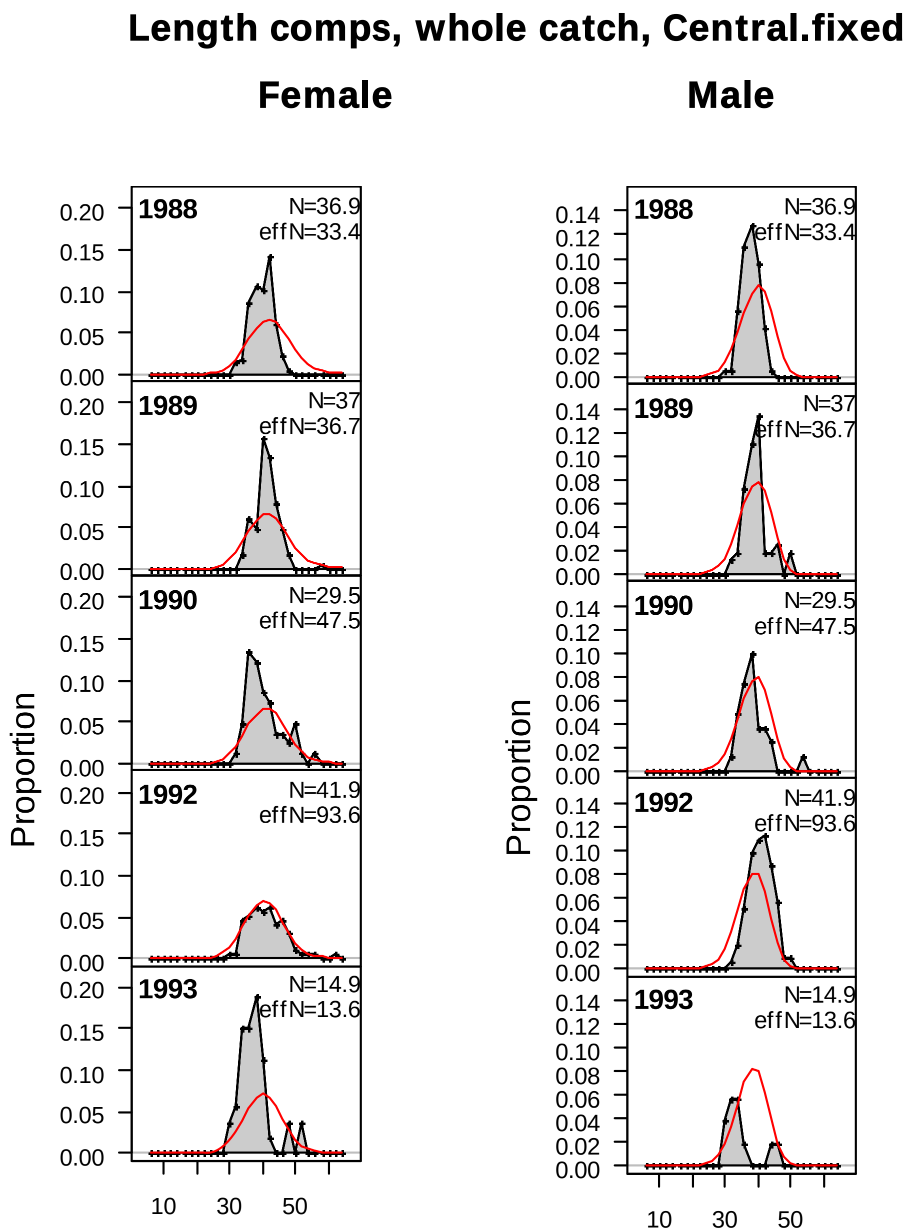


Figure C7: Observed and predicted length composition data (gender-specific) for the central California fixed gear fishery (1988-1993)

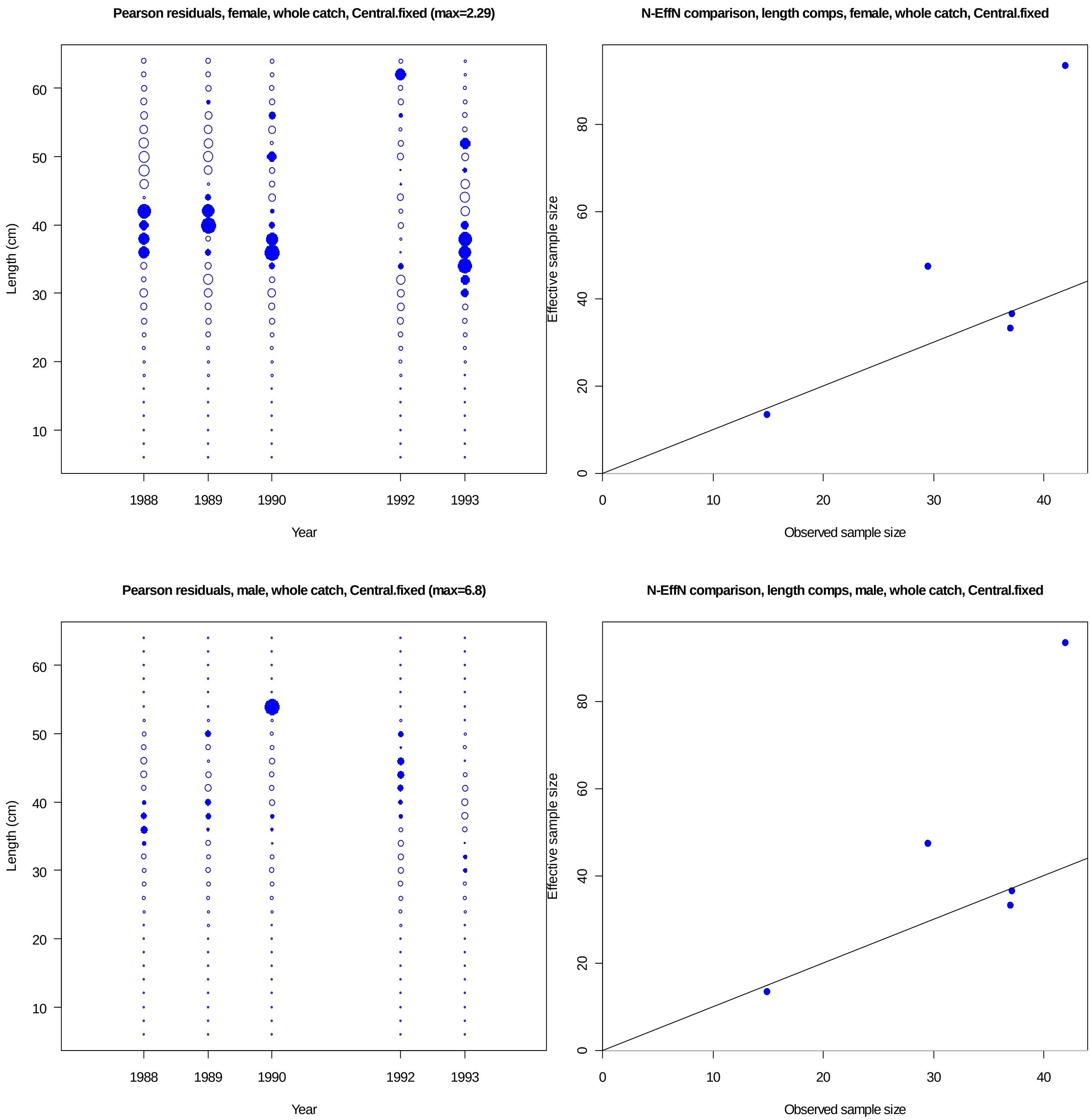


Figure C8 a-d: Residuals (left) and input versus effective sample sizes by year (right) for gender-specific length frequency data from the central California fixed gear fishery (1988-1993)

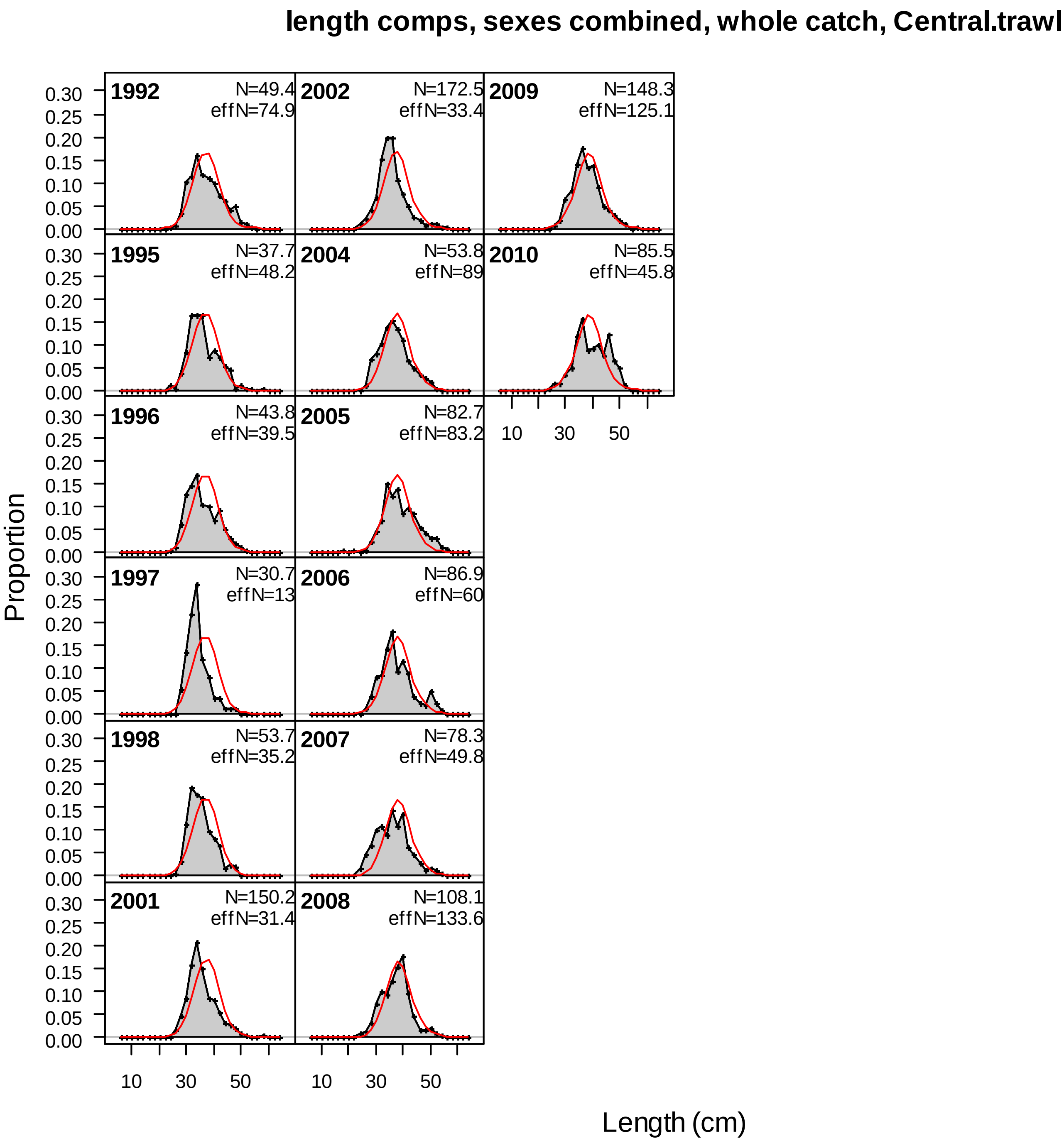
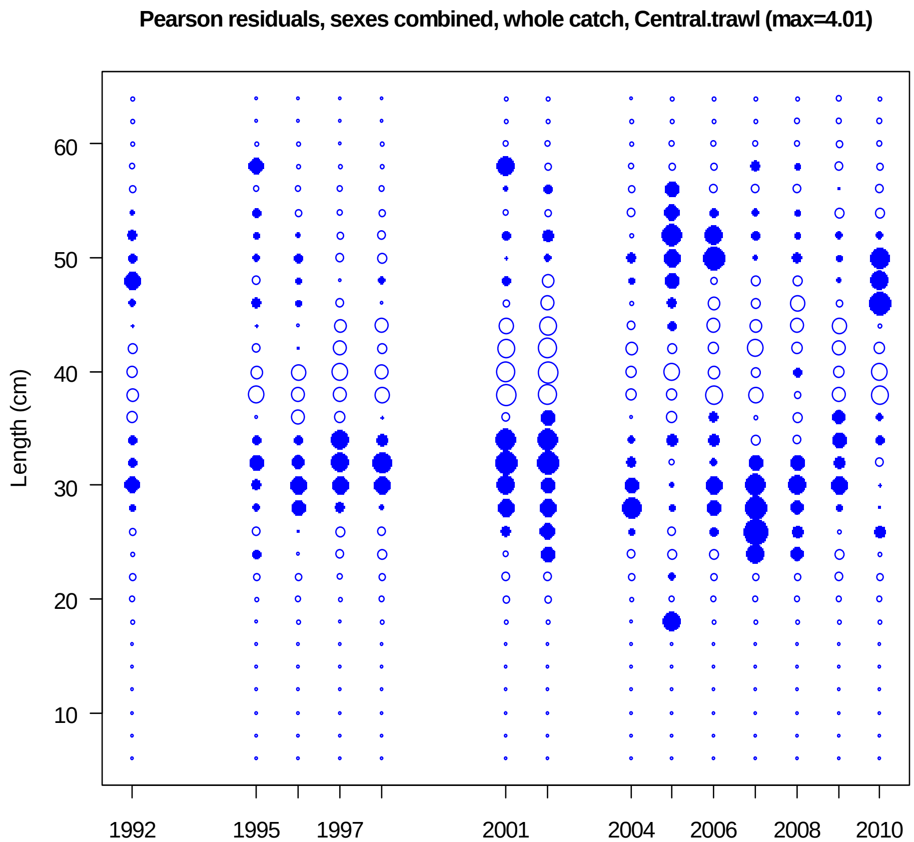


Figure C9: Observed and predicted length composition data (sexes combined) for the central California trawl fishery (1992-2010)



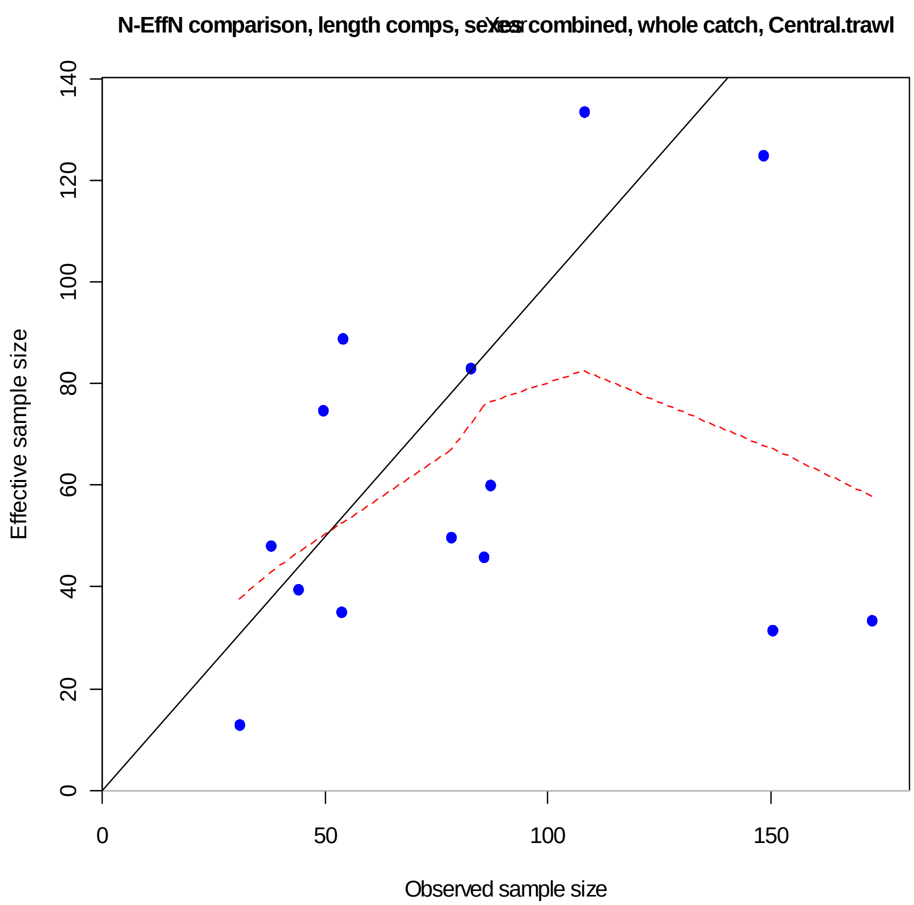


Figure C10 a-b: Residuals (top) and effective sample sizes by year (bottom) for female blackgill length frequency data from the central California trawl fishery (1992-2010)

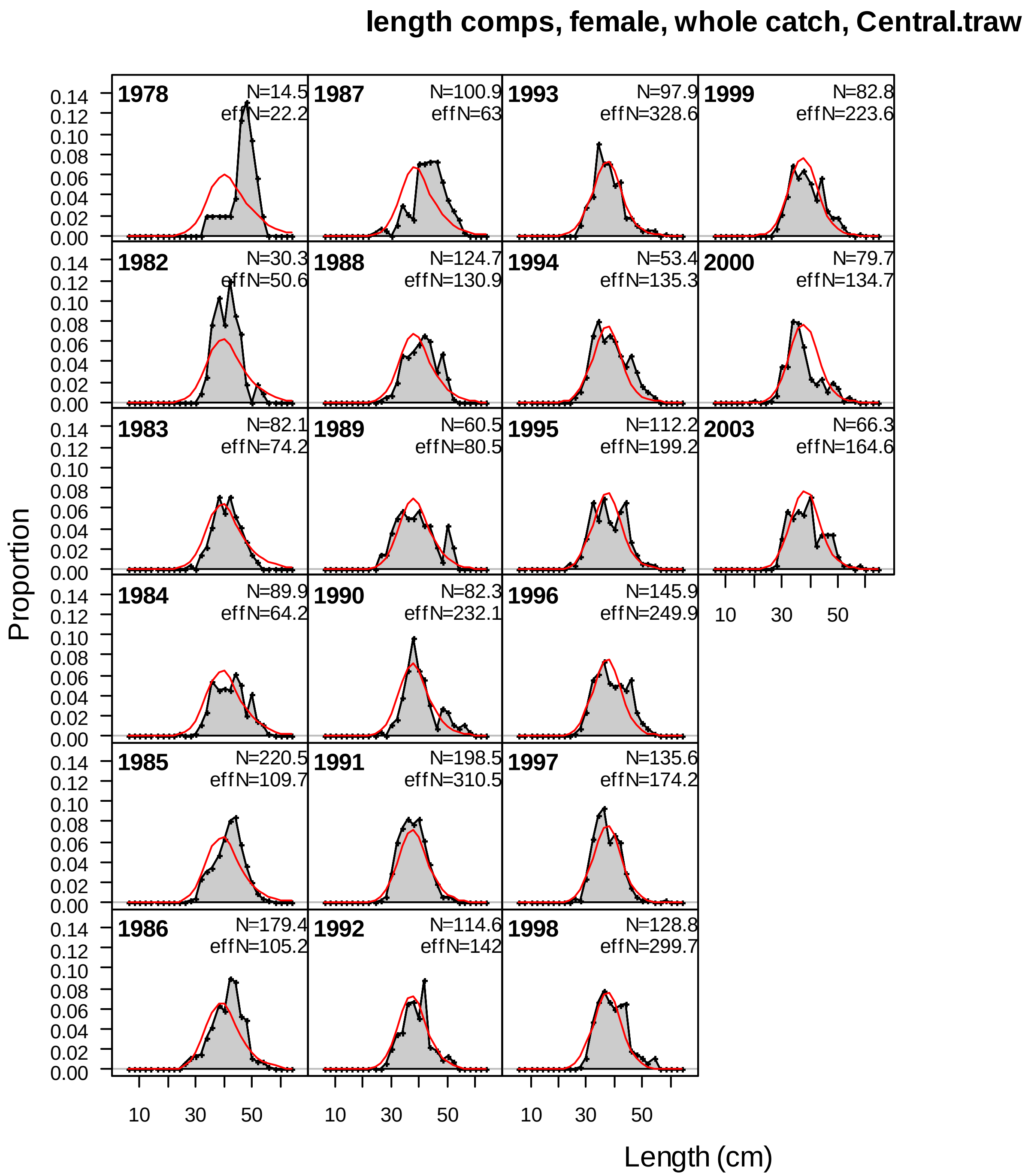


Figure C11: Observed and predicted length composition data for female blackgill for the central fixed gear fishery (1978-2003)

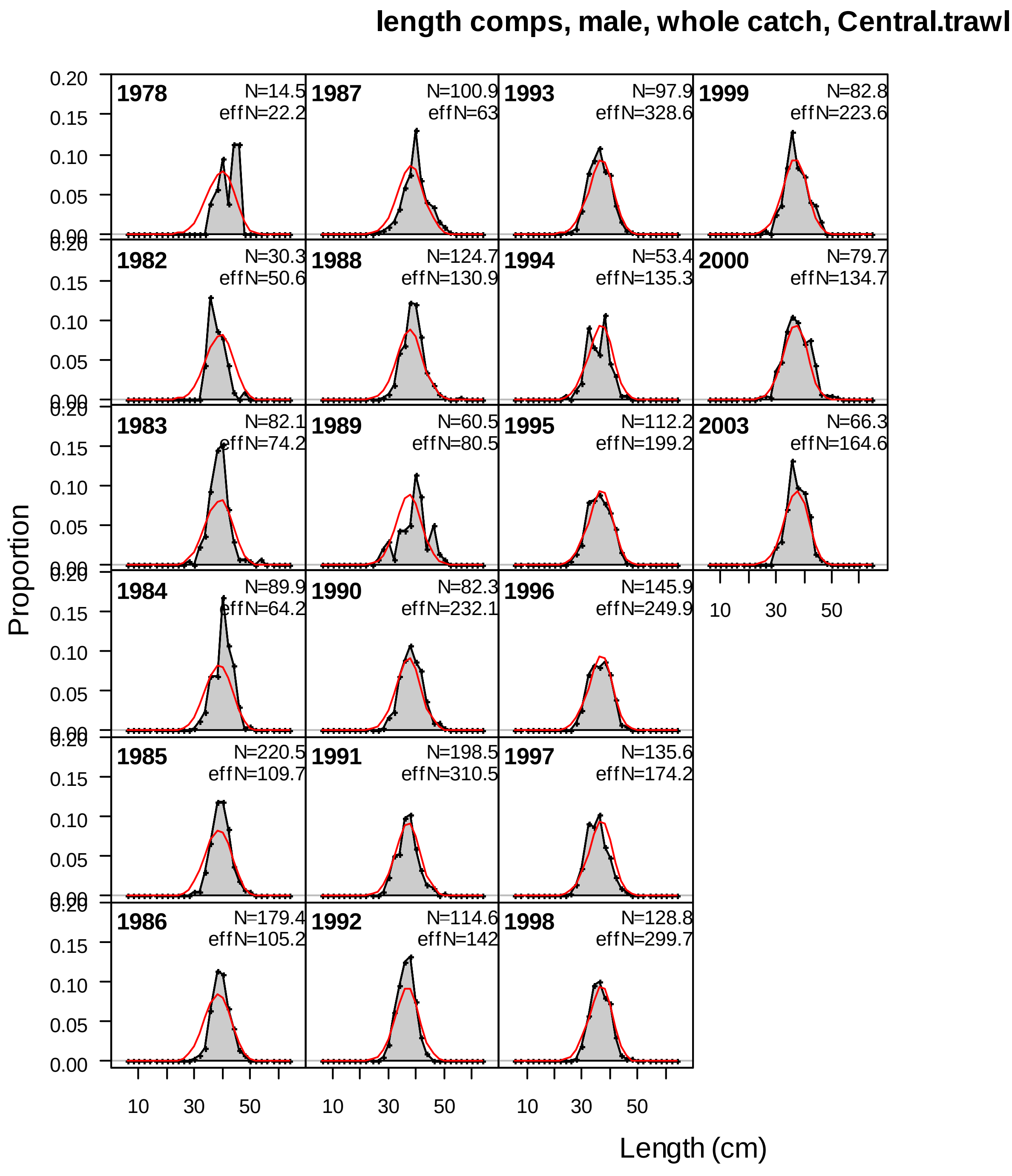


Figure C12: Observed and predicted length composition data for male blackgill from the central California trawl fishery (1978-2003)

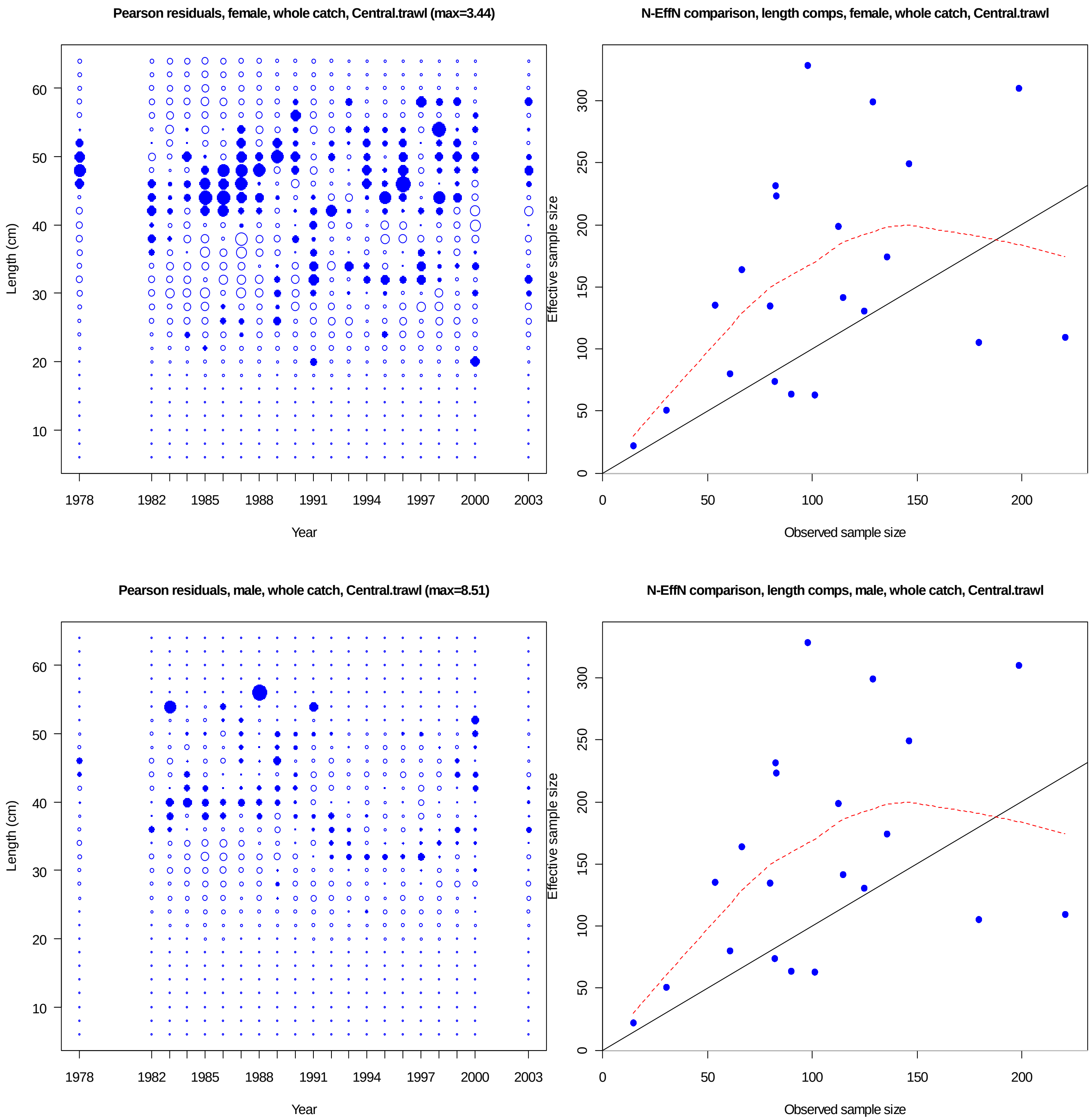


Figure C13 a-d: Residuals and effective sample sizes from gender-specific length frequency data for the central California trawl fishery (1978-2003)

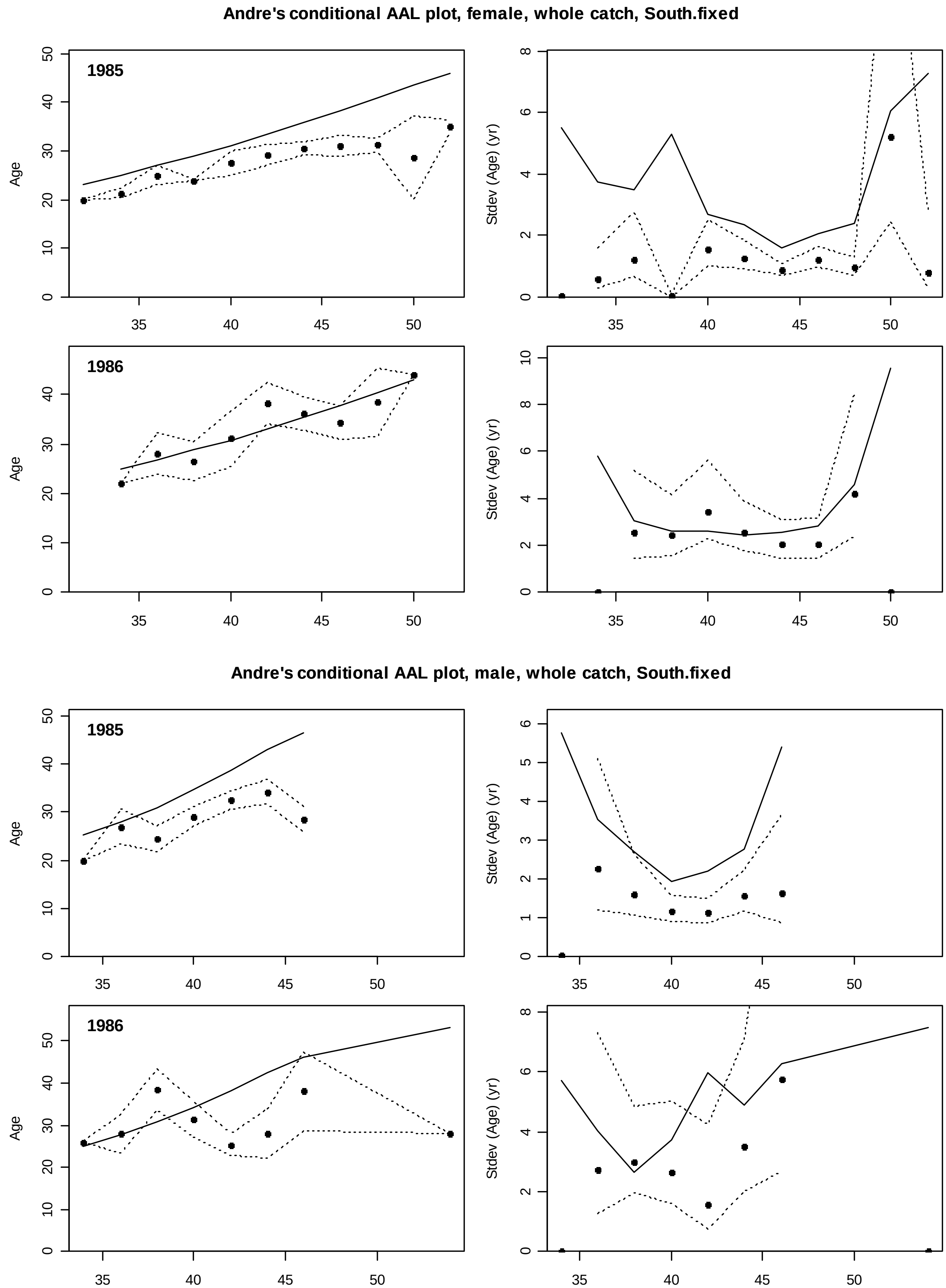


Figure C14: Fits to the conditional age at length data (by gender) for the southern California fixed gear fishery (1985-1986).

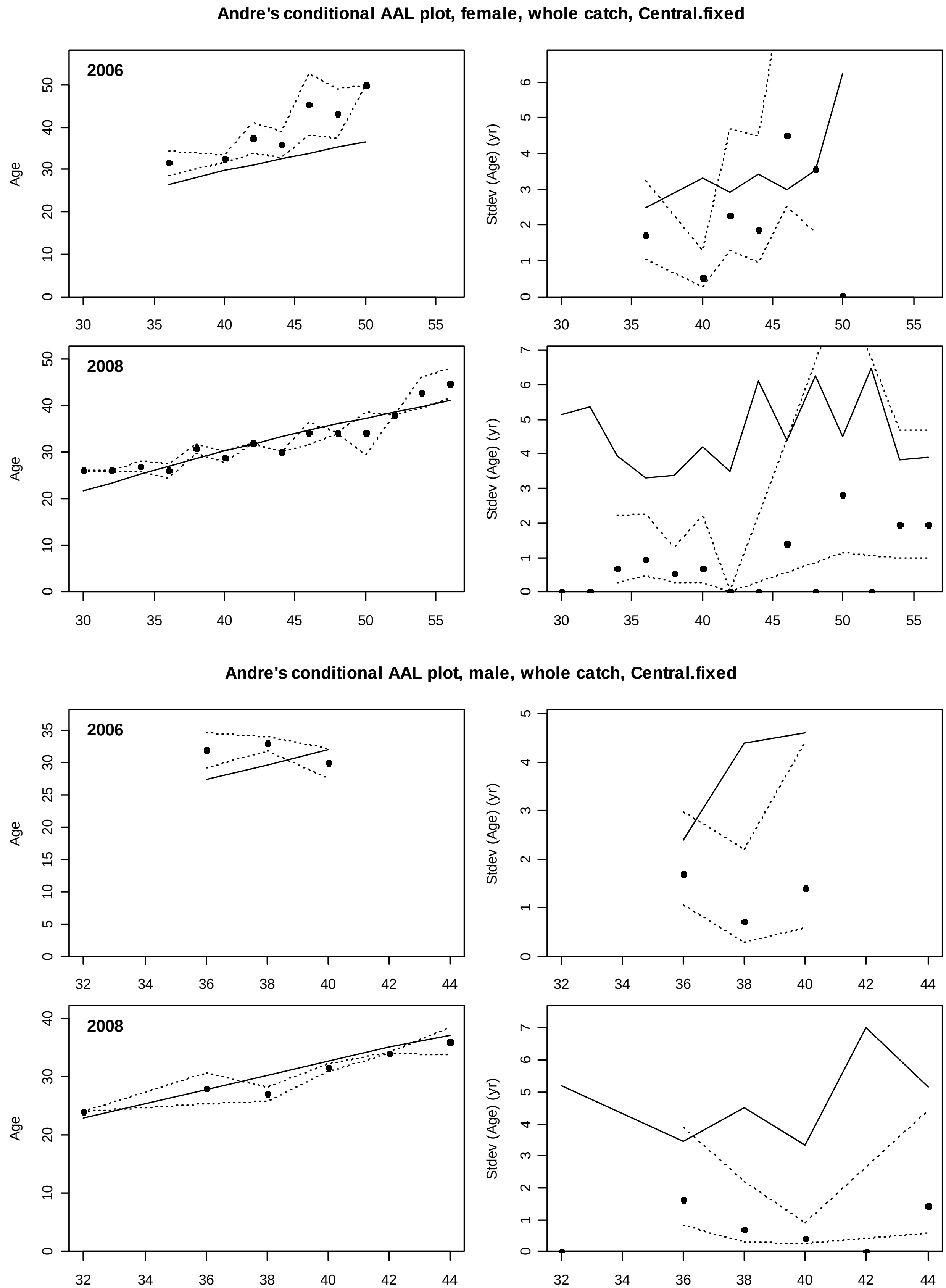


Figure C15: Fits to the conditional age at length data (by gender) for the central California fixed gear fishery (2006-2008).

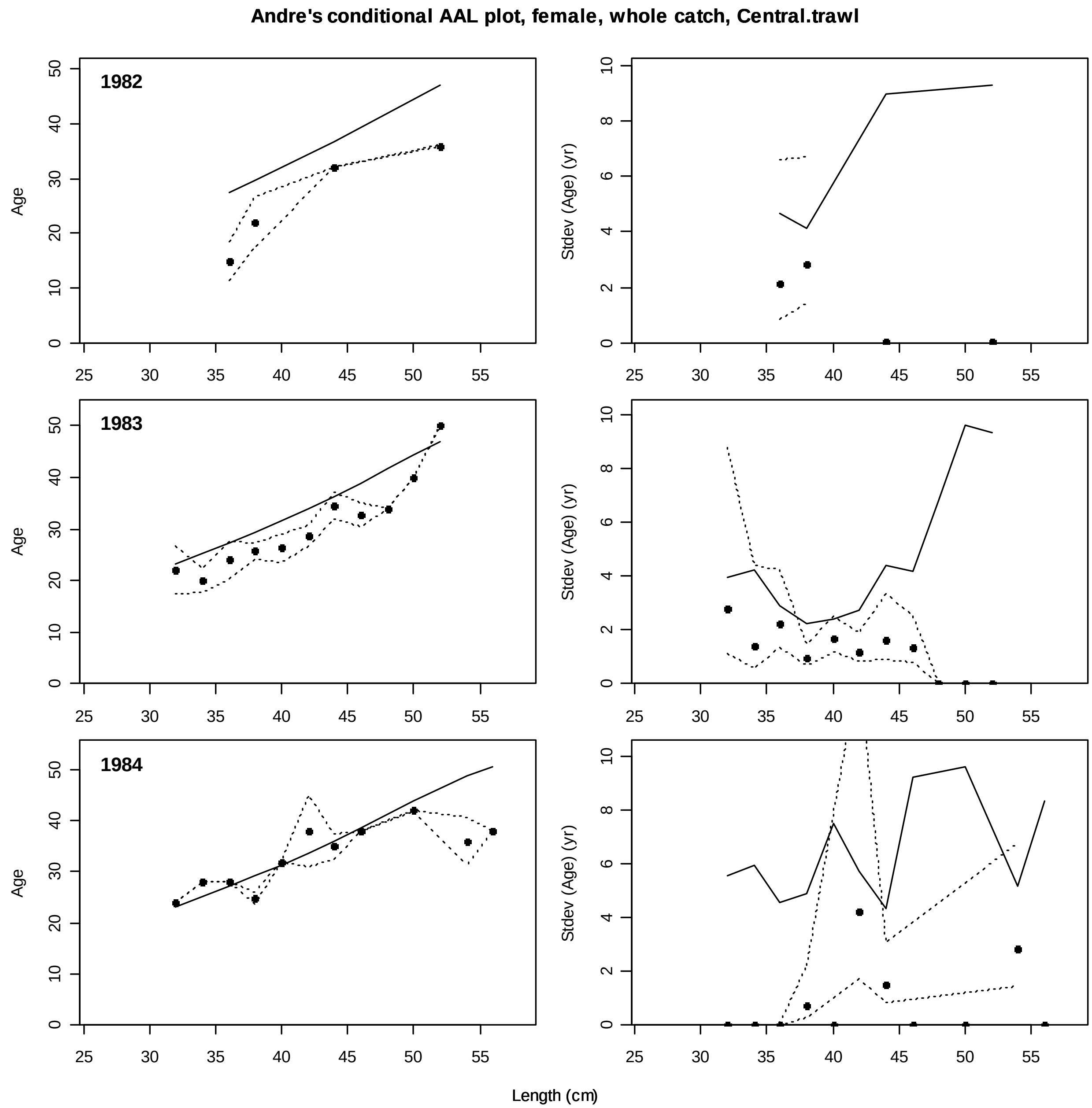


Figure C16: Fits to the conditional age at length data (females only) for the central California trawl fishery (1982-1984).

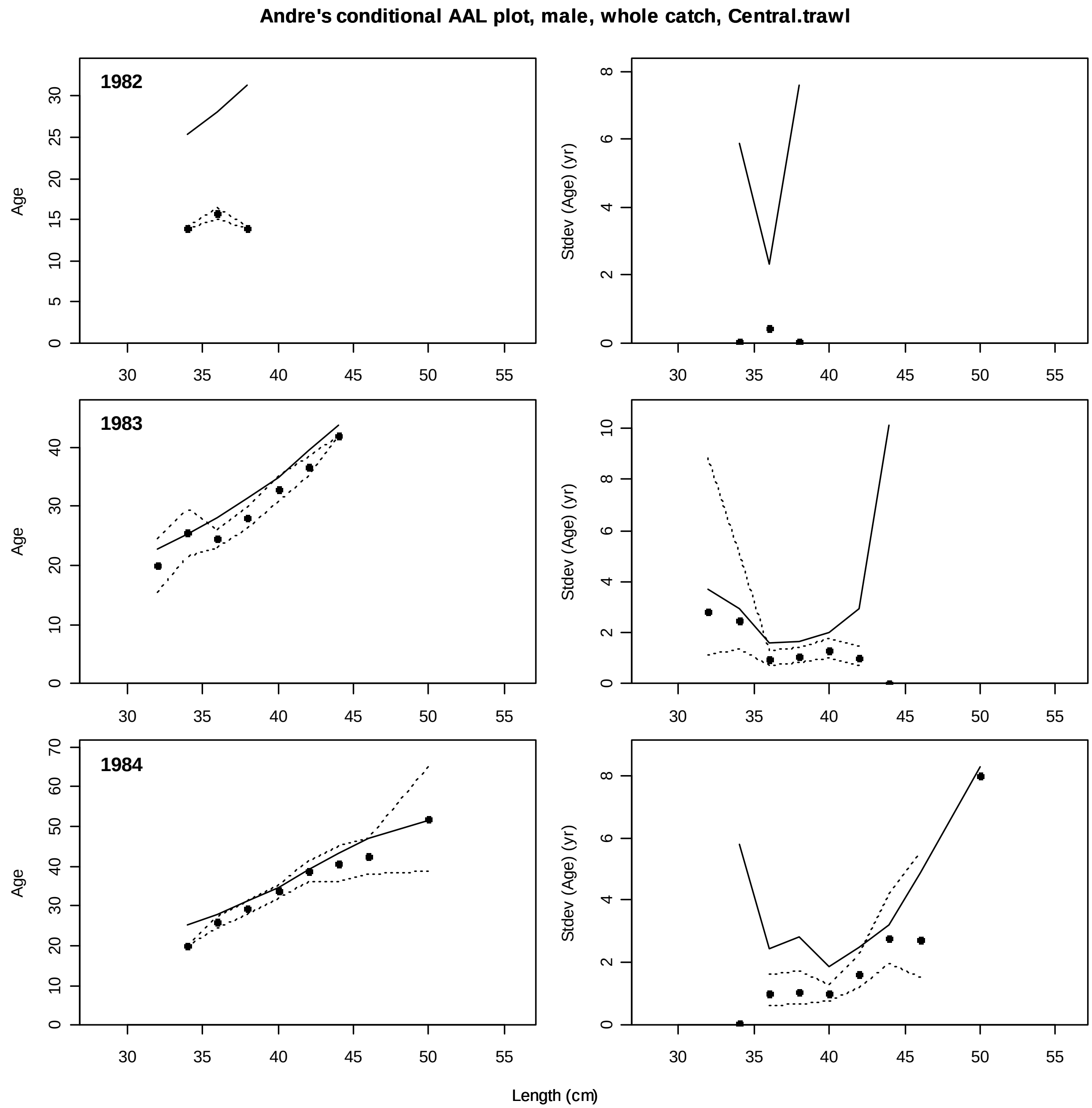


Figure C17: Fits to the conditional age at length data (males only) for the central California trawl fishery (1982-1984).

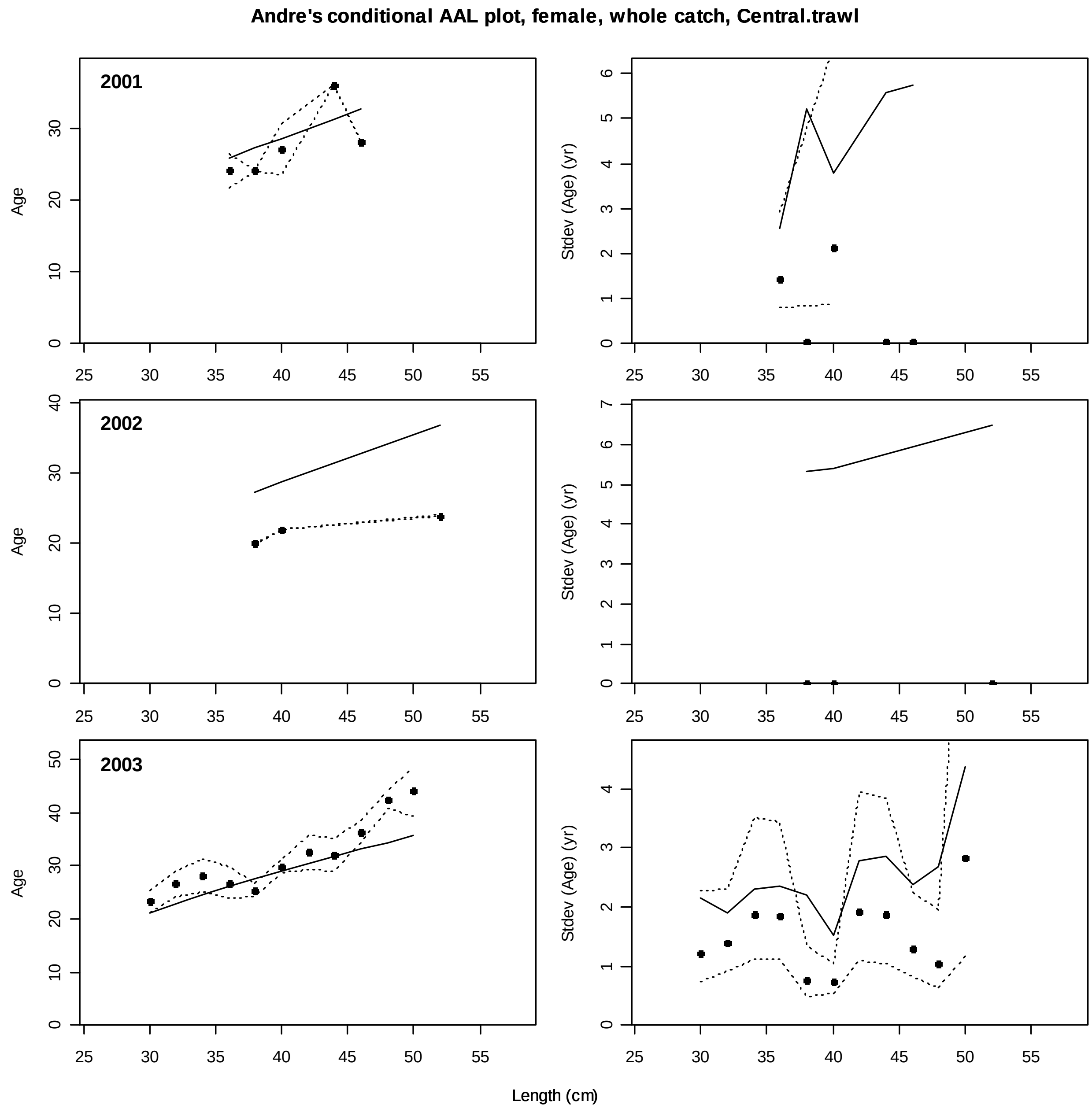


Figure C18: Fits to the conditional age at length data (females only) for the central California trawl fishery (2001-2003).

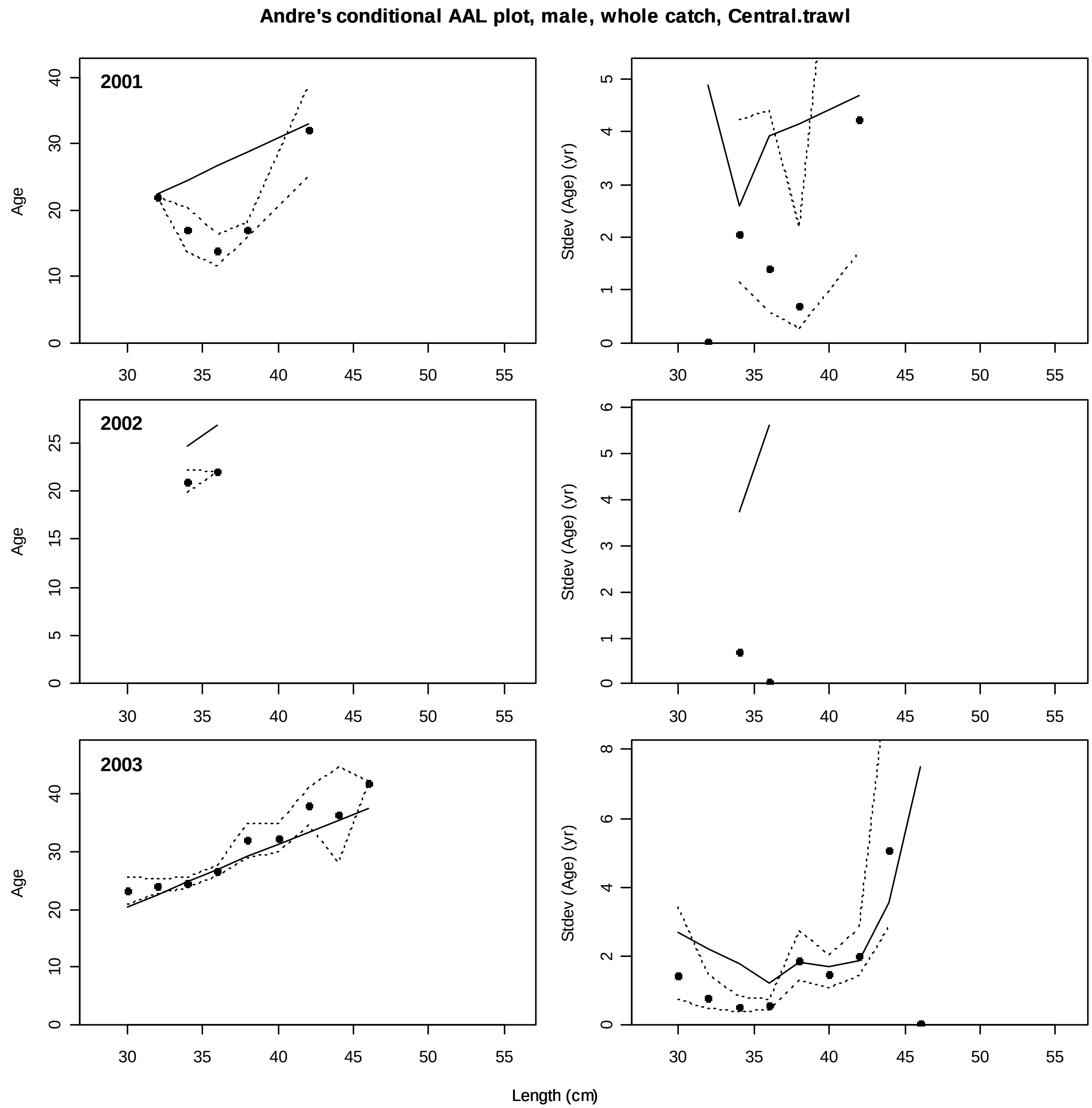


Figure C19: Fits to the conditional age at length data (males only) for the central California trawl fishery (2001-2003).

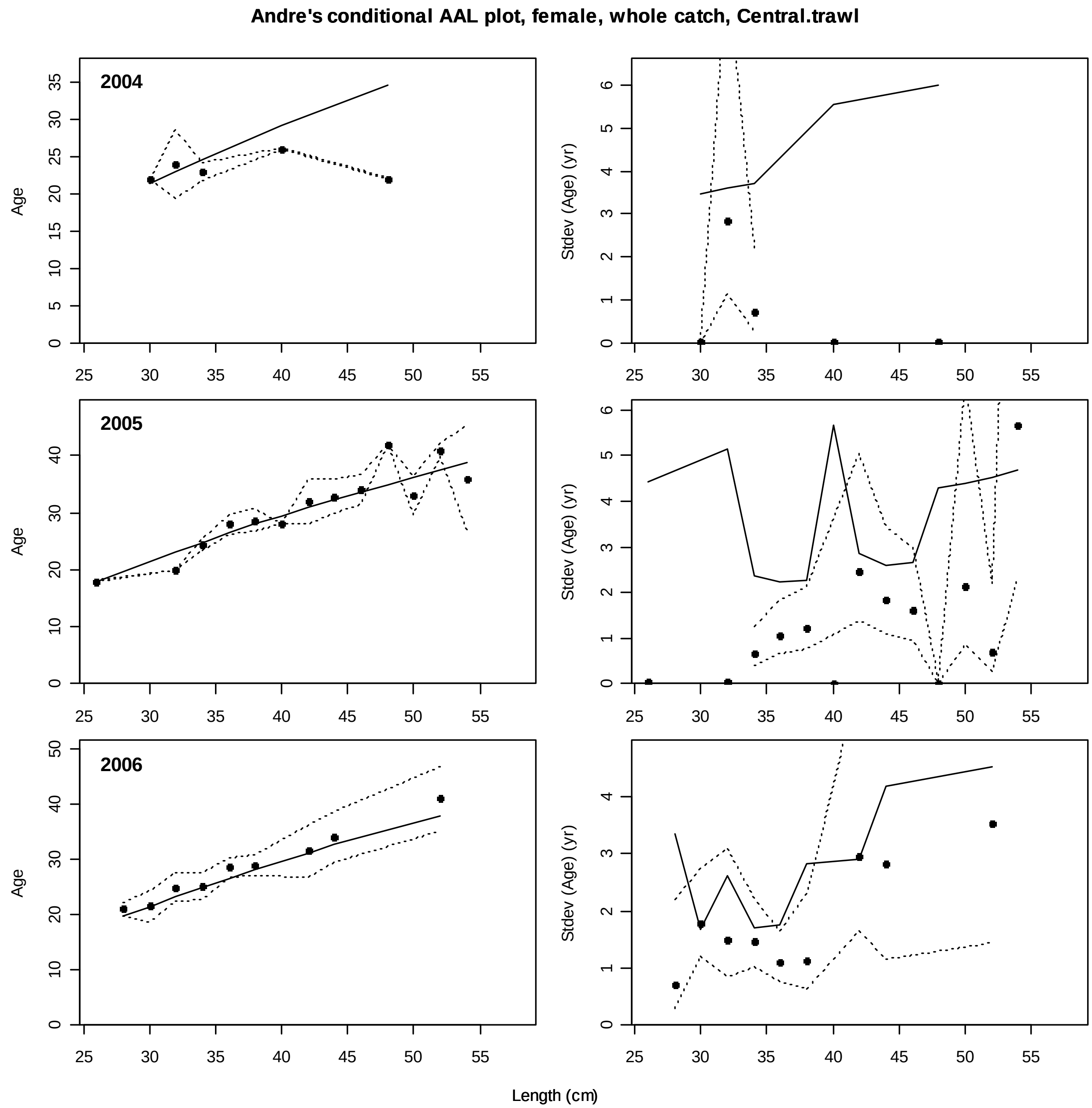


Figure C20: Fits to the conditional age at length data (females only) for the central California trawl fishery (2004-2006).

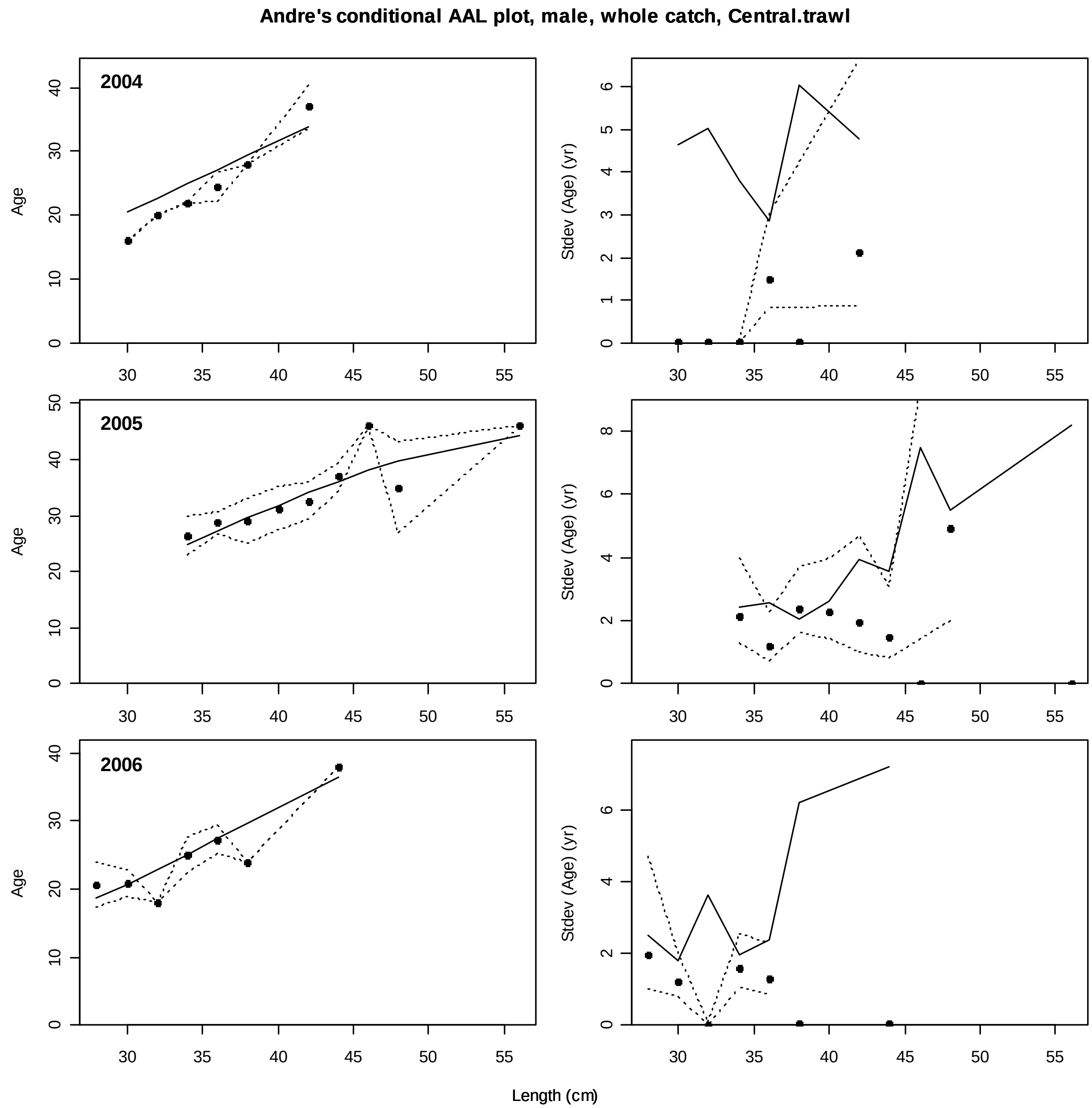


Figure C21: Fits to the conditional age at length data (males only) for the central California trawl fishery (2004-2006).

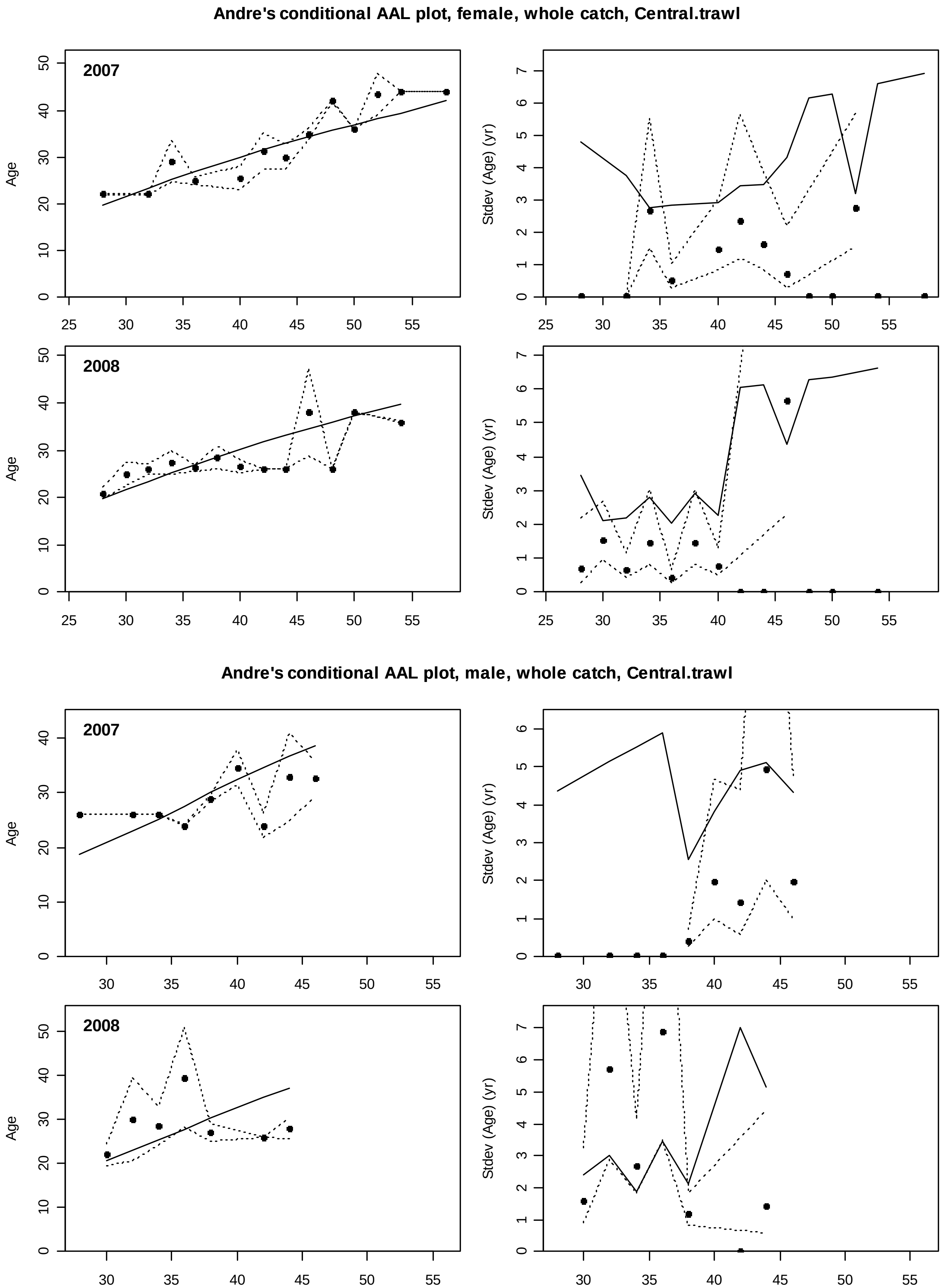


Figure C22: Fits to the conditional age at length data (females and males) for the central California trawl fishery (2007-2008).

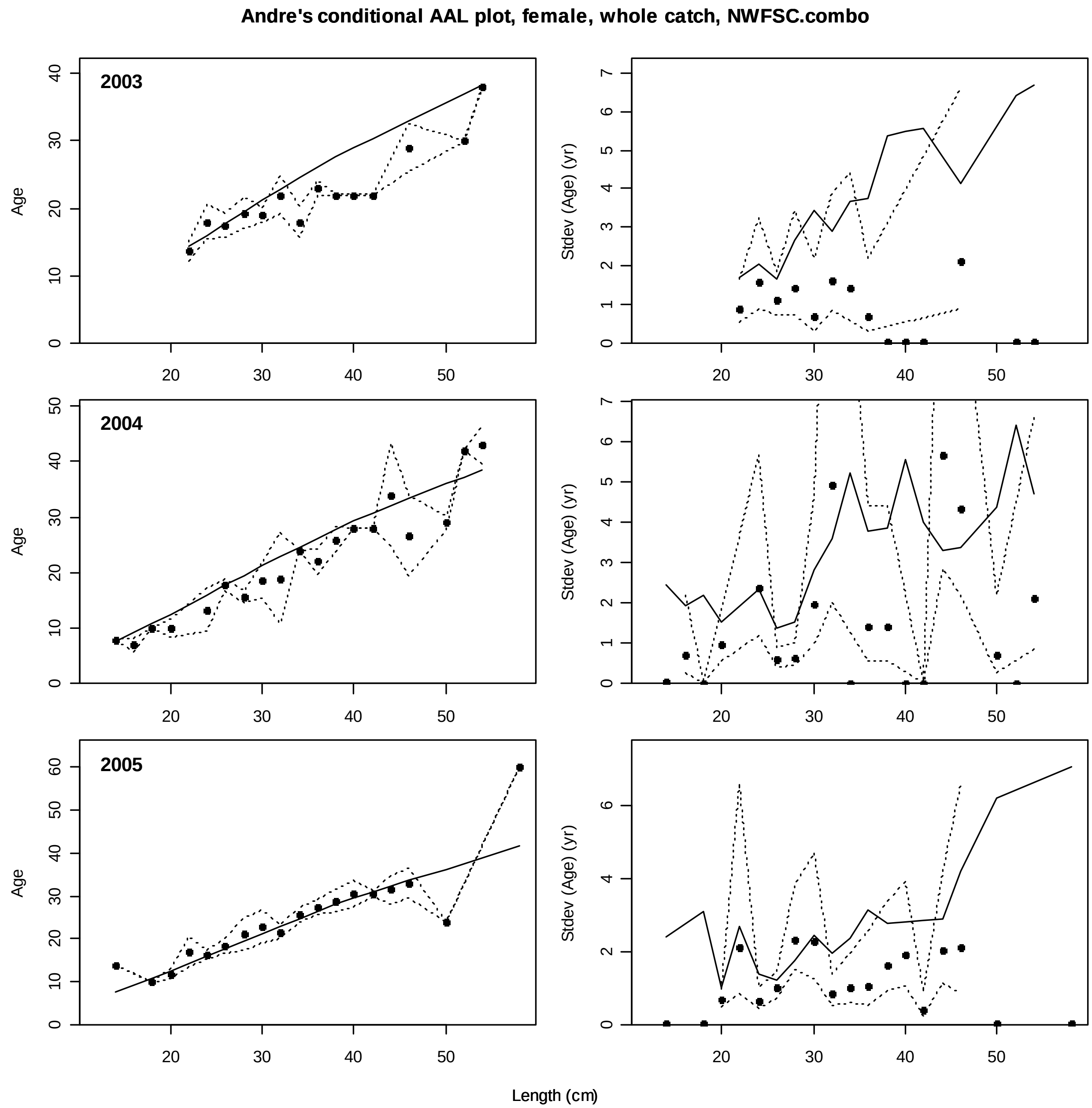


Figure C23: Fits to the conditional age at length data (females only) for the NWFSC combined shelf-slope bottom trawl survey (2003-2005).

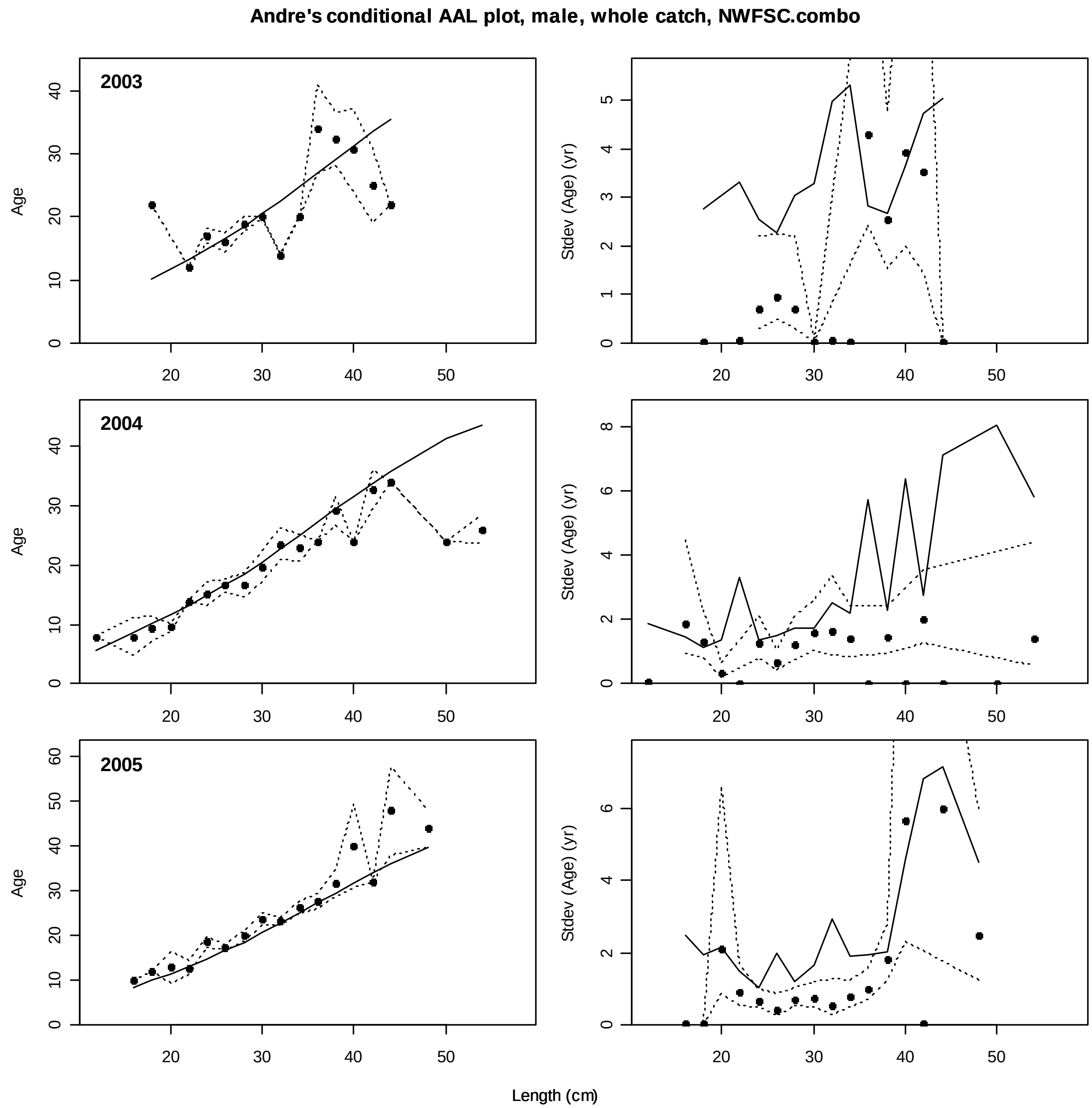


Figure C24: Fits to the conditional age at length data (males only) for the NWFSC combined shelf-slope bottom trawl survey (2003-2005).

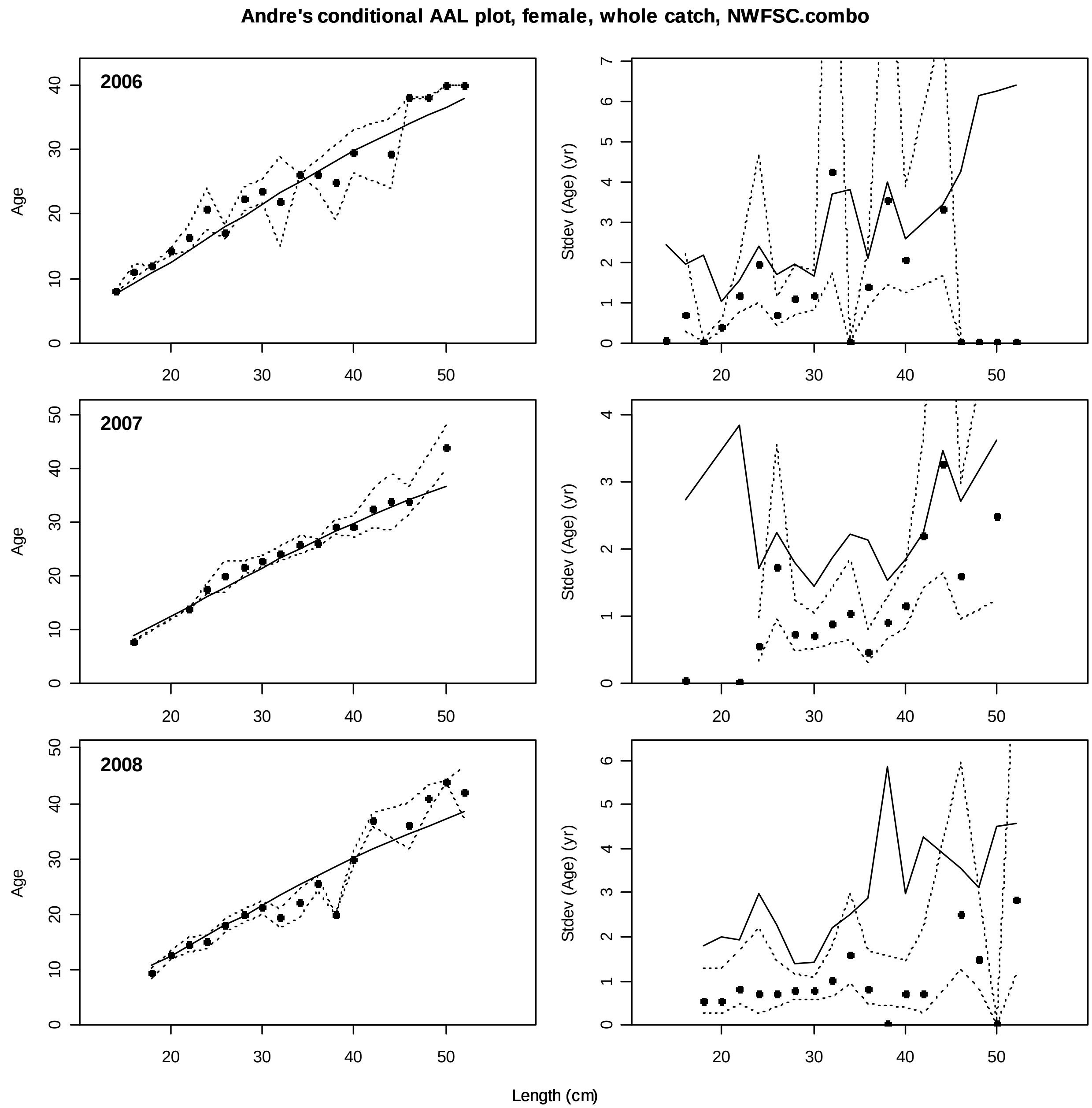


Figure C25: Fits to the conditional age at length data (females only) for the NWFSC combined shelf-slope bottom trawl survey (2006-2008).

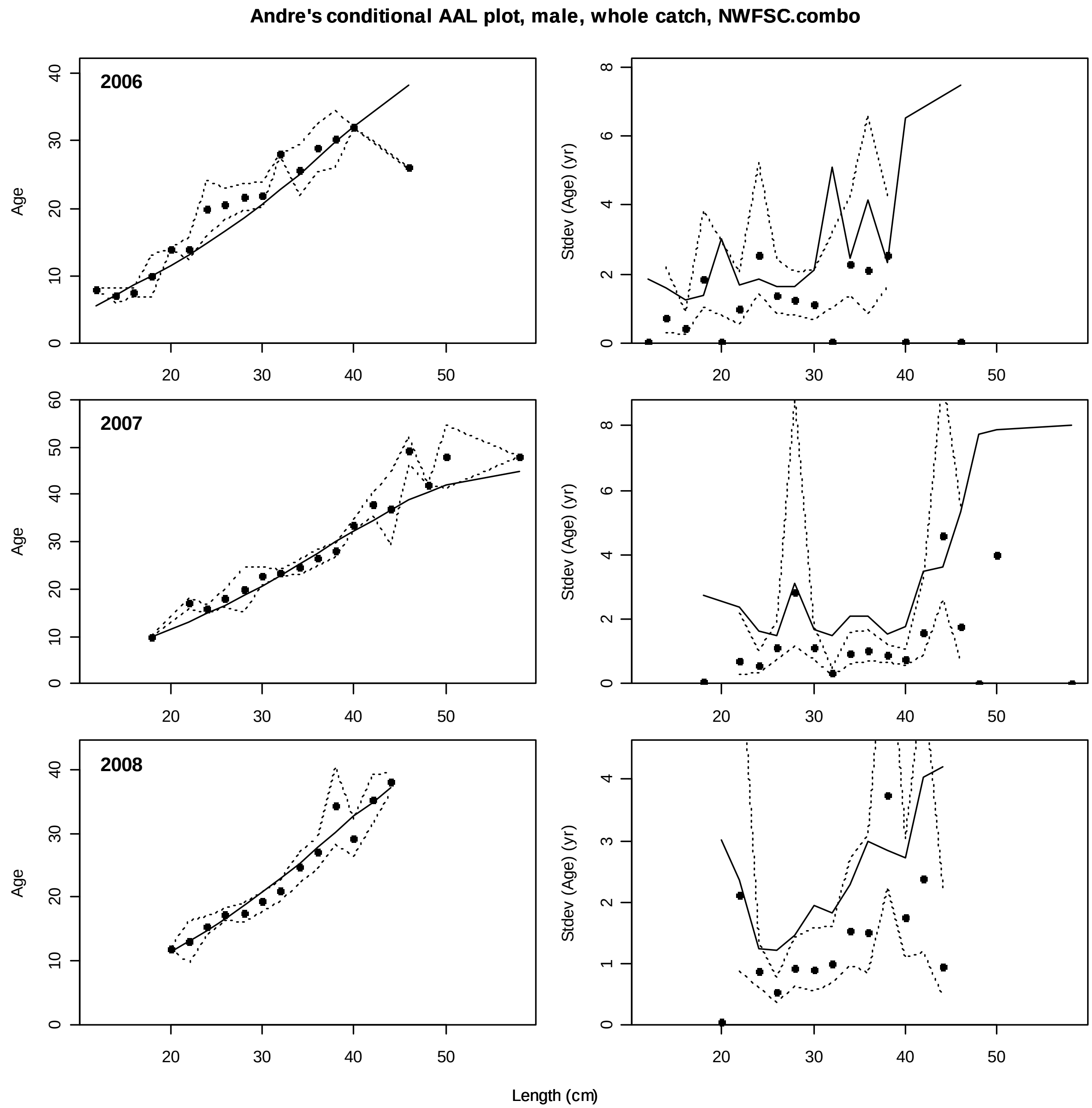


Figure C26: Fits to the conditional age at length data (males only) for the NWFSC combined shelf-slope bottom trawl survey (2006-2008).

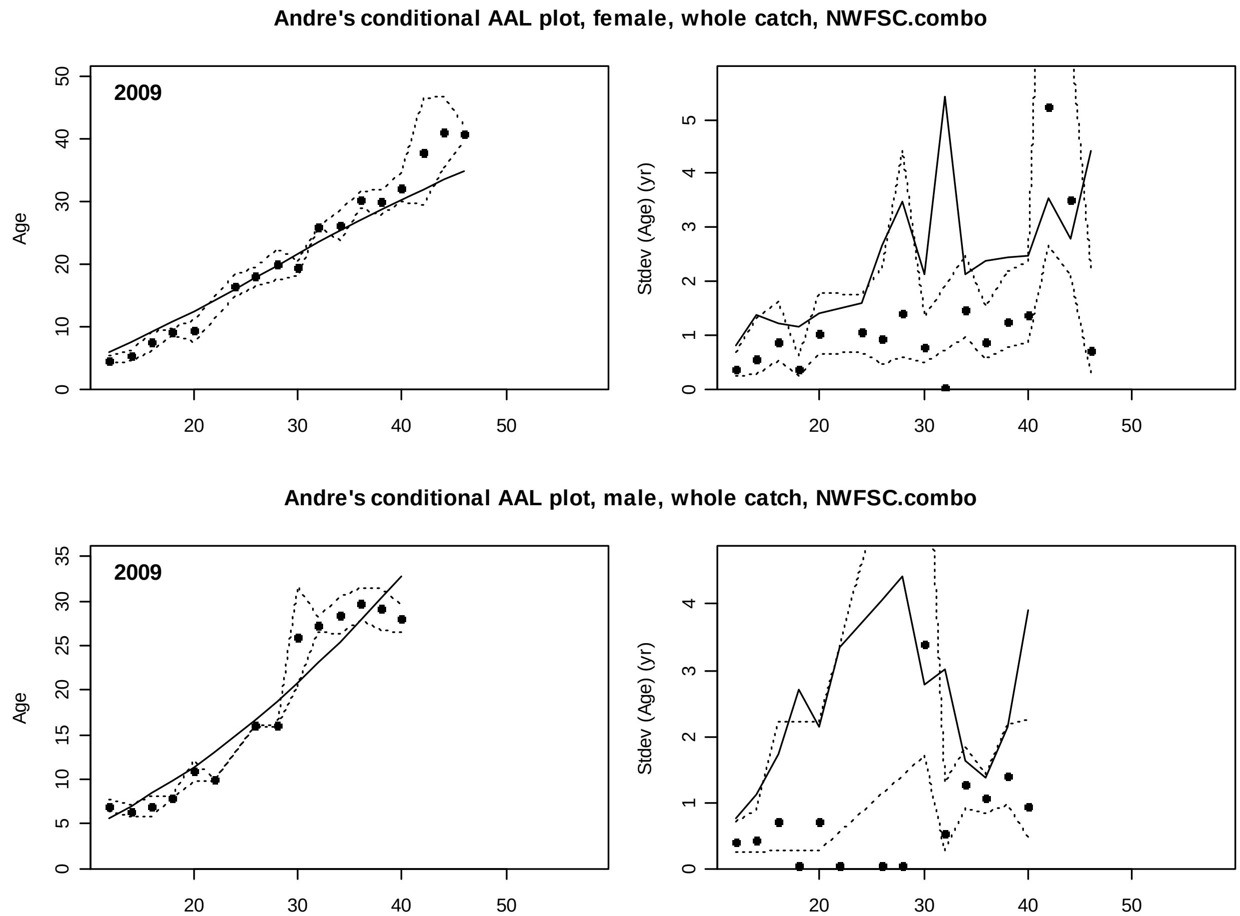


Figure C27: Fits to the conditional age at length data (females and males) for the NWFSC combined shelf-slope bottom trawl survey (2009).

Appendix D: SS3 files

Starter File:

```
#C starter comment here
bgill.star36.dat
bgill.star36.ctl
0	# 0=use init values in control file; 1=use ss3.par
1	# run display detail (0,1,2)
1	# detailed age-structured reports in REPORT.SSO (0,1)
0	# write detailed checkup.sso file (0,1)
0	# write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=every_iter,all_parms;
4=every,active)
1	# write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
1	# Include prior_like for non-estimated parameters (0,1)
1	# Use Soft Boundaries to aid convergence (0,1) (recommended)
3	# Number of bootstrap datafiles to produce
10	# Turn off estimation for parameters entering after this phase
10	# MCeval burn interval
2	# MCeval thin intervalcz
0.05	# jitter initial parm value by this fraction
-1	# min yr for sdreport outputs (-1 for styr)
-2	# max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs
0	# N individual STD years
#vector of year values

0.0001	# final convergence criteria (e.g. 1.0e-04)
0	# retrospective year relative to end year (e.g. -4)
1	# min age for calc of summary biomass
1	# Depletion basis:  denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B_styr
1	# Fraction (X) for Depletion denominator (e.g. 0.4)
1	# SPR_report_basis:  0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY); 3=(1-SPR)/(1-
SPR_Btarget); 4=rawSPR
4	# F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum(Frates)
20 23
1	# F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
999	# check value for end of file
```

Forecast File

```
#V3.20b
#C  generic forecast file
# for all year entries except rebuilder; enter either: actual year, -999 for styr, 0 for endyr, neg number for rel. endyr
1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endyr)
0.5 # SPR target (e.g. 0.40)
0.4 # Biomass target (e.g. 0.40)
#_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (enter actual year, or values of 0 or -integer to be rel. endyr)
 0 0 0 0 0 0
#  2010 2010 2010 2010 2010 2010 # after processing
1 #Bmark_relF_Basis: 1 = use year range; 2 = set relF same as forecast below
1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-last relF yrs); 5=input annual F scalar
1 # N forecast years
0.2 # F scalar (only used for Do_Forecast==5)
#_Fcast_years:  beg_selex, end_selex, beg_relF, end_relF  (enter actual year, or values of 0 or -integer to be rel. endyr)
 0 0 -10 0
#  2010 2010 2000 2010 # after processing
1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.40)
0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
0.75 # Control rule target as fraction of Flimit (e.g. 0.75)
3 #_N forecast loops (1-3) (fixed at 3 for now)
3 #_First forecast loop with stochastic recruitment
0 #_Forecast loop control #3 (reserved for future bells&whistles)
0 #_Forecast loop control #4 (reserved for future bells&whistles)
0 #_Forecast loop control #5 (reserved for future bells&whistles)
2010  #FirstYear for caps and allocations (should be after years with fixed inputs)
0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 to cause active impl_error)
0 # Do West Coast gfish rebuilder output (0/1)
1999 # Rebuilder:  first year catch could have been set to zero (Ydecl)(-1 to set to 1999)
2002 # Rebuilder:  year for current age structure (Yinit) (-1 to set to endyear+1)
1 # fleet relative F:  1=use first-last alloc year; 2=read seas(row) x fleet(col) below
# Note that fleet allocation is used directly as average F if Do_Forecast=4
2 # basis for fcast catch tuning and for fcast catch caps and allocation  (2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
# Conditional input if relative F choice = 2
# Fleet relative F:  rows are seasons, columns are fleets
#_Fleet:  South.fixed Central.fixed Central.trawl
#  0.190524 0.315408 0.494067
# max totalcatch by fleet (-1 to have no max) must enter value for each fleet
 -1 -1 -1
# max totalcatch by area (-1 to have no max); must enter value for each fleet
 -1
# fleet assignment to allocation group (enter group ID# for each fleet, 0 for not included in an alloc group)
 0 0 0
#_Conditional on >1 allocation group
# allocation fraction for each of: 0 allocation groups
# no allocation groups
0 # Number of forecast catch levels to input (else calc catch from forecast F)
2 # basis for input Fcast catch:  2=dead catch; 3=retained catch; 99=input Hrate(F) (units are from fleetunits; note new codes in SSV3.20)
# Input fixed catch values
#
999 # verify end of input
```

Data file

```
#V3.20b
#C  data file comments go here
1950 #_styr
2010 #_endyr
1 #_nseas
 12 #_months/season
1 #_spawn_seas
3 #_Nfleet
7 #_Nsurveys
1 #_N_areas
South.fixed%Central.fixed%Central.trawl%Triennial%NWFSC.slope%NWFSC.combo%ghost.South%ghost.cenfix%g
host.centrawl%ghost.combo
 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 #_surveytiming_in_season
 1 1 1 1 1 1 1 1 1 1 #_area_assignments_for_each_fishery_and_survey
 1 1 1 #_units of catch:  1=bio; 2=num
 0.01 0.01 0.01 #_se of log(catch) only used for init_eq_catch and for Fmethod 2 and 3
2 #_Ngenders
60 #_Nages
 0 0 0  #_init_equil_catch_for_each_fishery
61 #_N_lines_of_catch_to_read
#_catch_biomass(mtons):_columns_are_fisheries,year,season
23.961   0       2.75    1950    1
17.775   0       6.6     1951    1
10.533   0       17      1952    1
17.245   0       18.7    1953    1
22.742   0       18.56   1954    1
26.73    0       9.47    1955    1
35.955   0       19.46   1956    1
36.229   0       18.03   1957    1
38.725   0       18.99   1958    1
43.687   0       18.1    1959    1
45.739   0       14.26   1960    1
51.586   0       7.56    1961    1
35.559   0       7.48    1962    1
52.944   0       9.22    1963    1
43.067   0       5.85    1964    1
55.309   0       6.16    1965    1
77.782   0       81.97   1966    1
80.184   0       209.67  1967    1
59.454   0       65.71   1968    1
134.8    0.76    16.63   1969    1
134.009  1.7     18.35   1970    1
171.11   2.15    11.6    1971    1
299.464  2.43    20.25   1972    1
334.786  3.14    28.13   1973    1
357.556  4.98    27.09   1974    1
284.837  3.48    36.48   1975    1
292.425  5.01    40.19   1976    1
274.356  3.93    40.66   1977    1
324.854  2.11    107.69  1978    1
438.227  21.92   13.41   1979    1
475.931  0.72    79.48   1980    1
393.792  20.08   79.3    1981    1
468.003  136.31  91.32   1982    1
319.9    13.15   294.42  1983    1
257.871  3.44    66.81   1984    1
381.11   1.16    124.78  1985    1
680.551  18.06   262.48  1986    1
737.8    8.36    130.8   1987    1
```

```
548.538	270.78	220.56	1988	1
297.662	149.95	84.29	1989	1
388.292	71.26	220.23	1990	1
332.592	18.72	127.69	1991	1
438.862	194.44	150.77	1992	1
278.092	8.83	114.53	1993	1
230.862	28.02	120.63	1994	1
193.802	27.71	131.42	1995	1
179.09	29.81	156.76	1996	1
93.66	44.11	132.6	1997	1
92.41	20.51	115.74	1998	1
11.19	8.29	28.43	1999	1
12.31	20.19	52.56	2000	1
24.03	14.89	89.09	2001	1
48.247	33.09	62.5	2002	1
59.07	73.35	55.26	2003	1
48.79	20.64	79.61	2004	1
23.81	11.58	51.57	2005	1
31	24.09	37.68	2006	1
14.64	5.97	26.75	2007	1
20.2	15.05	38.78	2008	1
22.59	52.14	57.92	2009	1
38	48.4	62.3	2010	1
#
16 #_N_cpue_and_surveyabundance_observations
#_Units:  0=numbers; 1=biomass; 2=F
#_Errtype:  -1=normal; 0=lognormal; >0=T
#_Fleet Units Errtype
1 1 0 # FISHERY1
2 1 0 # FISHERY2
3 1 0 # FISHERY3
4 1 0 # SURVEY1
5 1 0 # SURVEY2
6 1 0 # SURVEY3
7 1 0 # SURVEY4
8 1 0 # SURVEY5
9 1 0 # SURVEY5
10 1 0 # SURVEY5

#_year	seas	index	obs	err
# triennial trawl survey index
1995	1	4 4442.87774		0.243828917
1998	1	4 7751.36607		0.219202439
2001	1	4 9702.39891		0.170871939
2004	1	4 15077.93083		0.251312047
# NWFSC slope survey index
1999	1	5 1791.215	0.3070336
2000	1	5 3123.582	0.2895296
2001	1	5 4424.138	0.4619825
2002	1	5 3235.895	0.2837498
# NWFSC combo survey index
2003	1	6 5411.558	0.3081556
2004	1	6 22611.744		0.410284
2005	1	6 16745.172		0.2961755
2006	1	6 33517.758		0.2441798
2007	1	6 12725.791		0.2575228
2008	1	6 11977.949		0.2297431
2009	1	6 25981.016		0.2488579
2010	1	6 25661.147		0.2216352

0 #_N_fleets_with_discard
#_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
```

```
#_discard_errtype:  >0 for DF of T-dist(read CV below); 0 for normal with CV; -1 for normal with se; -2 for lognormal
#Fleet Disc_units err_type
0 #N discard obs
#_year seas index obs err
#
0 #_N_meanbodywt_obs
30 #_DF_for_meanbodywt_T-distribution_like

1 # length bin method: 1=use databins; 2=generate from binwidth,min,max below; 3=read vector
#2 # binwidth for population size comp
#6 # minimum size in the population (lower edge of first bin and size at age 0.00)
#64 # maximum size in the population (lower edge of last bin)

-1 #_comp_tail_compression
1e-007 #_add_to_comp
0 #_combine males into females at or below this bin number
30	#	#_N_length_bins
#	#_lower_edge_of_length_bins
6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
36	38	40	42	44	46	48	50	52	54	56	58	60	62	64


164 #_N_Length_obs
#Yr Seas Flt/Svy Gender Part Nsamp datavector(female-male)
#year	season	fleet	Gender	Partit	Nsamp	6	8	10	12 14 16
	18	20 22 24 26 28 30 32 34 36 38
	40	42 44 46 48 50 52 54 56 58 60
	62	64 6	8	10	12 14 16 18 20 22
	24	26 28 30 32 34 36 38 40 42 44
	46	48 50 52 54 56 58 60 62 64
1983	1	1 0 0 63.646	0	0 0 0 0 0
	0	0 0 0 0 0 0 0 0 3 1
	5	14	28 34 24 11 37 55 86 55 8
	6	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 3 1 5 14	28
	34	24 11 37 55 86 55 8	6	0
1984	1	1 0 0 149.71	0	0 0 0 0 0
	0	0 0 0 0 3 3 2 5 12	27
	43	100	150	150	121	58	43 23 21 24 8
	2	0 0 0 0 0 0 0 0 0 0
	0	0 3 3 2 5 12	27	43	100	150
	150	121	58	43 23 21 24 8	2	0
1985	1	1 3 0 171.884	0	0 0 0 0 0
	0	0 0 0 1 0 0 2 5 8 18
	44	72 135	101	68	16 10 6	3	0	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 2 9 36	75	100	67
	18	3	0 0 0 0 0 0 0 0
1986	1	1 3 0 600	0	0 0 0 0 0
	0	0 0 0 0 0 0 12	46	80	146
	245	293 441 412 159 42	14	4	3	0	0
	1	0 0 0 0 0 0 0 1 0 0
	0	0 0 3 8 27	106	245	337	430	276
	66	23	3	0 1 0 1 0 0 0
1987	1	1 3 0 400	0	0 0 0 0 0
	0	0 0 1 0 0 1 10	28	80	123
	175	246 241 244 132 52	7	3	1	0	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 2 20	31	109	195	255	315	203
	61	22	0	0 0 0 0 0 0 0
1988	1	1 3 0 260.622	0	0 0 0 0 0
	0	0 0 0 0 0 0 3 18	37	74
```

130 187 148 108 55 21 2 3 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 1 13 28 101 174 177 122 66
25 17 5 0 1 1 0 0 0 0
1989 1 1 3 0 48.054 0 0 0 0 0 0
0 0 0 0 0 0 11 11 3 7 13
24 38 53 29 26 1 3 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 6 4 8 17 9 14 8 9
9 1 0 0 0 0 0 0 0 0
1990 1 1 3 0 88 0 0 0 0 0 0
0 0 0 0 0 0 1 1 4 9 21
46 52 56 50 36 19 6 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 4 20 45 78 56 18
8 1 1 0 0 1 0 0 0 0
S. Cal. Fixed- no gender LFs for years where gender LFs exist (and N(nogender)>100)

0 0 0

#year season fleet Gender Part Nsamp 6 8 10 12 14 16
18 20 22 24 26 28 30 32 34 36 38
40 42 44 46 48 50 52 54 56 58 60
62 64 0 0 0 12 14 16 18 20 22
24 26 28 30 32 34 36 38 40 42 44
46 48 50 52 54 56 58 60 62 64
1985 1 1 0 0 215.222 0 0 0 0 0 0
0 0 0 0 0 0 0 7 19 36 73
155 224 319 189 112 62 27 13 2 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 7 19 36 73 155 224 319
189 112 62 27 13 2 0 0 0 0
1986 1 1 0 0 151.476 0 0 0 0 0 0
0 0 0 0 0 0 0 10 14 37 67
155 258 192 112 39 12 8 5 3 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 10 14 37 67 155 258 192
112 39 12 8 5 3 0 0 0 0
1987 1 1 0 0 100.972 0 0 0 0 0 0
0 0 0 0 0 0 0 3 12 42 75
95 107 86 67 39 10 8 0 1 0 0
0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 3 12 42 75 95 107 86
67 39 10 8 0 1 0 0 0 1
1988 1 1 0 0 51.504 0 0 0 0 0 0
0 0 0 0 0 1 3 1 3 17 27
35 37 50 31 47 37 12 7 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 3 1 3 17 27 35 37 50
31 47 37 12 7 1 0 0 0 0
1989 1 1 0 0 91.9 0 0 0 0 0 0
0 0 0 0 2 1 7 11 22 41 56
63 90 57 49 44 47 27 8 2 0 0
0 0 0 0 0 0 0 0 0 0 0
0 2 1 7 11 22 41 56 63 90 57
49 44 47 27 8 2 0 0 0 0
these years are only no gender

0 0 0

1992 1 1 0 0 212.19 0 0 0 0 0 0
0 0 0 0 0 3 10 19 38 87 251
316 222 173 71 38 19 6 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 3 10 19 38 87 251 316 222 173
71 38 19 6 2 0 0 0 0 0
1994 1 1 0 0 71.51 0 0 0 0 0 0
0 0 0 0 0 2 4 5 17 29 42
91 93 57 31 16 6 0 1 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 2 4 5 17 29 42 91 93 57
31 16 6 0 1 1 0 0 0 0
1995 1 1 0 0 85.482 0 0 0 0 0 0
0 0 0 0 0 0 2 19 43 77 110
111 58 36 18 12 3 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 2 19 43 77 110 111 58 36
18 12 3 0 0 0 0 0 0 0
1996 1 1 0 0 21.664 0 0 0 0 0 0
0 0 0 0 0 0 0 5 12 14 34
36 15 9 3 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 5 12 14 34 36 15 9
3 0 0 0 0 0 0 0 0 0
1997 1 1 0 0 40.98 0 0 0 0 0 0
0 0 0 0 0 0 2 9 12 21 31
58 31 14 10 12 4 3 2 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 2 9 12 21 31 58 31 14
10 12 4 3 2 1 0 0 0 0
1998 1 1 0 0 29.494 0 0 0 0 0 0
0 0 1 1 5 9 5 9 8 18 21
25 22 21 13 3 1 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1
1 5 9 5 9 8 18 21 25 22 21
13 3 1 1 0 0 0 0 0 0
2002 1 1 0 0 42.98 0 0 0 0 0 0
0 0 0 5 4 10 28 33 37 27 21
18 12 8 1 2 0 2 0 0 0 1
0 1 0 0 0 0 0 0 0 0 0
5 4 10 28 33 37 27 21 18 12 8
1 2 0 2 0 0 0 1 0 1
2003 1 1 0 0 38.152 0 0 0 0 0 0
0 0 0 1 8 16 13 25 28 16 16
15 12 12 9 12 11 3 2 2 3 0
0 0 0 0 0 0 0 0 0 0 0
1 8 16 13 25 28 16 16 15 12 12
9 12 11 3 2 2 3 0 0 0
2005 1 1 0 0 24.282 0 0 0 0 0 0
0 0 0 2 2 6 8 10 4 14 13
9 6 5 1 0 2 1 3 1 1 1
0 0 0 0 0 0 0 0 0 0 0
2 2 6 8 10 4 14 13 9 6 5
1 0 2 1 3 1 1 1 0 0
2006 1 1 0 0 23.628 0 0 0 0 0 0
0 0 0 0 2 3 12 16 16 14 9
7 6 5 3 2 1 1 1 3 4 0
0 1 0 0 0 0 0 0 0 0 0
0 2 3 12 16 16 14 9 7 6 5
3 2 1 1 1 3 4 0 0 1

2007	1	1 0 0 22.594				0	0 0 0 0 0				
	0	3 5 6 7 15					24	13	19	6	3
	2	4 1 1 1 0 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 3 5									
	6	7 15		24	13	19	6	3 2 4 1			
	1	1 0 0 1 0 0 0 0 0									
2008	1	1 0 0 63.37				0	0 0 0 0 0				
	1	3	21	53 54 84 59 30 23 6							2
	8	5 3 4 2 3 2 2 0 0 0									
	0	0 0 0 0 0 0 0 1 3 21									
	53	54 84 59 30 23 6						2	8	5	3
	4	2 3 2 2 0 0 0 0 0									
2009	1	1 0 0 36.182				0	0 0 0 0 0				
	0	1 3 4 8 10					18	27	22	15	4
	5	7 3 5 1 3 1 0 1 1 0									
	0	0 0 0 0 0 0 0 0 1 3									
	4	8	10	18 27 22 15 4					5	7	3
	5	1 3 1 0 1 1 0 0 0									
2010	1	1 0 0 59.364				0	0 0 0 0 0				
	0	0 0 4 8 12					18	26	31	23	16
	32	24 18 21 15 13 6						3	6	1	1
	0	0 0 0 0 0 0 0 0 0 0									
	4	8	12	18 26 31 23 16 32 24 18							
	21	15	13	6	3 6 1 1 0 0						
#		0					0	0			
	0	0	0								
#year	season	fleet	Gender	Part	Nsamp	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 60									
	62	64 0		0	0	12	14 16 18 20 22				
	24	26 28 30 32 34 36 38 40 42 44									
	46	48 50 52 54 56 58 60 62 64									
1988	1	2 3 0 36.946				0	0 0 0 0 0				
	0	0 0 0 0 0 0 3 4 19									23
	22	31	13	5	1 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 1 12					24	28	21	9	1
	0	0 0 0 0 0 0 0 0 0									
1989	1	2 3 0 37.046				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 3 10									8
	26	22	13	8	3 0 0 0 0 1 0						
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 2 3 12						18	22	3	3
	4	0 3 0 0 0 0 0 0 0									
1990	1	2 3 0 29.454				0	0 0 0 0 0				
	0	0 0 0 0 0 0 1 4 11									10
	7	6 3 3 2 4 1 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 4 6 8 3 3 2									
	0	0 0 0 1 0 0 0 0 0									
1992	1	2 3 0 41.876				0	0 0 0 0 0				
	0	0 0 0 0 0 1 1 9 10									12
	11	12	8	9 6 2 1 1 1 0 0							
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 4 10						19	21	22	17
	11	2	2 0 0 0 0 0 0 0								
1993	1	2 3 0 14.866				0	0 0 0 0 0				
	0	0 0 0 0 0 2 3 8 8 10									

```
    6   1 0 0 2 0 2 0 0 0 0
    0   0 0 0 0 0 0 0 0 0 0
    0   0 0 2 3 3 1 0 0 0 1
    1   0 0 0 0 0 0 0 0 0
# no gender LF data for years above commented out

        0   0   0

1994    1   2 0 0 37.218    0   0 0 0 0 0
    0   0 0 0 0 0 2 6 16    33  36
    23  14  14  11  4   1 1 0 0 0 0
    0   0 0 0 0 0 0 0 0 0 0
    0   0 0 2 6 16  33  36  23  14  14
    11  4   1 1 0 0 0 0 0 0
1995    1   2 0 0 34.01 0   0 0 0 0 0
    0   0 0 0 0 1 3 12  12  12  14
    14  13 17 12 18 7   5   3   1   1   0
    0   0 0 0 0 0 0 0 0 0 0
    0   0   1   3   12  12 12 14 14 13 17
    12  18  7   5 3 1 1 0 0 0
1996    1   2 0 0 229.22    0   0 0 0 0 0
    0   0 1 2 3 8 25    66  101 103 93
    149 163 124 117 70  73 45 15 17 10 3
    0   2 0 0 0 0 0 0 0 0 1
    2   3   8   25  66  101 103 93  149 163 124
    117 70  73 45 15 17 10 3    0   2
1997    1   2 0 0 136.328   0   0 0 0 0 0
    0   0 0 0 3 7 16    42  64  80  77
    126 102 87  49 35 29 17 11 7    3   1
    0   0 0 0 0 0 0 0 0 0 0
    0   3   7   16  42 64 80 77 126 102 87
    49  35 29 17 11 7   3   1   0   0
2000    1   2 0 0 43.43 0   0 0 0 0 0
    0   0 0 1 0 0 7 23  27  40  25
    35  22  27  10  6   7 2 1 2 0 0
    0   0 0 0 0 0 0 0 0 0 0
    1   0   0   7   23  27 40 25 35 22 27
    10  6   7 2 1 2 0 0 0 0
2001    1   2 0 0 21.628    0   0 0 0 0 0
    0   0 0 0 0 0 3 6 8 13  8
    17  18  15  6   6 4 1 1 0 0 0
    0   0 0 0 0 0 0 0 0 0 0
    0   0 0 3 6 8 13    8   17  18  15
    6   6 4 1 1 0 0 0 0 0
2002    1   2 0 0 37.532    0   0 0 0 0 0
    0   0 0 2 0 0 1 11  27  55  31
    26  21  12  8   8 8 3 0 1 0 0
    0   0 0 0 0 0 0 0 0 0 0
    2   0   0   1   11  27 55 31 26 21 12
    8   8 8 3 0 1 0 0 0 0
2003    1   2 0 0 41.912    0   0 0 0 0 0
    0   0 0 0 0 1 1 4 13    26  33
    34  25 21 15 12 6   4   0   0   0   0
    0   0 0 0 0 0 0 0 0 0 0
    0   0 1 1 4 13  26  33  34  25  21
    15  12  6   4 0 0 0 0 0 0
2006    1   2 0 0 24.044    0   0 0 0 0 0
    0   0 0 0 4 6 10    16  20  25  14
    16  10  8   4 3 2 0 0 0 0 0
    0   0 0 0 0 0 0 0 0 0 0
```

```
	0	4	6	10	16 20 25 14 16 10 8
	4	3 2 0 0 0 0 0 0 0
2008	1	2 0 0 86.86			0	0 0 0 0 0
	0	0 0 0 1 6 11					24	50	81	98
	67	46 30 21 11 11 3					5	4	1	0
	0	0 0 0 0 0 0 0 0 0 0
	0	1	6	11	24 50 81 98 67 46 30
	21	11	11	3	5 4 1 0 0 0
2009	1	2 0 0 79.474			0	0 0 0 0 0
	0	0 0 0 0 6 13					28	39	80	62
	41	41 19 17 12 6				2	5	1	1	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0	6	13	28 39 80 62 41 41 19
	17	12	6	2 5 1 1 0 0 0
2010	1	2 0 0 88.822			0	0 0 0 0 0
	0	0 0 0 0 5 21					40	59	85	52
	54	36	22	19	8	7 5 5 1 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0	5	21	40 59 85 52 54 36 22
	19	8	7 5 5 1 0 0 0 0
#
										0	0
	0

#year	season	fleet	Gender	Partiti Nsamp	6	8	10	12 14 16
	18	20 22 24 26 28 30 32 34 36 38
	40	42 44 46 48 50 52 54 56 58 60
	62	64 0		0	0	12	14 16 18 20 22
	24	26 28 30 32 34 36 38 40 42 44
	46	48 50 52 54 56 58 60 62 64
1978	1	3 3 0 14.452			0	0 0 0 0 0
	0	0 0 0 0 0 0 0 1 1 1
	1	1 2 6 7 5 3 1 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 2 3 5 2 6
	6	0 0 0 0 0 0 0 0 0
1982	1	3 3 0 30.284			0	0 0 0 0 0
	0	0 0 0 0 0 0 1 3 9 12
	9	14	10	8	2 0 2 1 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 5 15					10	9	5 1
	0	1 0 0 0 0 0 0 0 0
1983	1	3 3 0 82.122			0	0 0 0 0 0
	0	0 0 0 0 1 0 4 6 11								19
	15	19	14	11	7	4 2 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 1 0 6 10				25	39	41	19	8
	2	2 1 0 2 0 0 0 0 0
1984	1	3 3 0 89.92			0	0 0 0 0 0
	0	0 0 1 0 0 1 4 8 18								15
	16	15 21 17 7			14	5	4	1	0	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 1 4 8 23					23	57	36	28
	10	1	2 0 0 0 0 0 0 0
1985	1	3 3 0 220.514			0	0 0 0 0 0
	0	0 1 0 1 2 4 23						30	32	44
	59	76 80 55 35 19 9				4	3	0	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 1 6 5 28				62	113	113	80	35
	18	7	5 0 0 0 0 0 0 0
```

1986 1 3 3 0 179.43 0 0 0 0 0 0
0 0 0 0 5 8 10 11 23 31 46
42 66 63 39 36 9 6 6 2 0 1
0 0 0 0 0 0 0 0 0 0 0
0 0 0 3 6 13 47 83 81 48 30
10 6 0 1 1 0 0 0 0 0
1987 1 3 3 0 100.924 0 0 0 0 0 0
0 0 0 1 3 2 0 4 12 8 6
28 28 29 29 21 14 10 6 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 1 2 3 6 12 23 29 52 27 16
13 6 3 1 0 0 0 0 0 0
1988 1 3 3 0 124.692 0 0 0 0 0 0
0 0 0 0 1 3 4 10 25 24 27
30 35 32 16 26 12 2 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 3 10 31 36 65 64 42 18
10 4 1 0 0 1 0 0 0 0
1989 1 3 3 0 60.458 0 0 0 0 0 0
0 0 0 0 2 2 5 7 8 7 7
8 6 6 3 1 6 3 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 1 3 4 1 6 6 7 16 12 3
7 2 1 0 0 0 0 0 0 0
1990 1 3 3 0 82.262 0 0 0 0 0 0
0 0 0 0 1 0 3 5 11 19 28
19 16 9 2 8 7 3 2 3 1 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 5 7 20 26 31 25 22 11
3 3 1 0 0 0 0 0 0 0
1991 1 3 3 0 198.51 0 0 0 0 0 0
0 1 0 1 2 6 26 53 65 72 68
73 54 34 16 6 5 4 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 5 20 44 47 86 90 52 28 12
8 1 2 0 1 0 0 0 0 0
1992 1 3 3 0 114.556 0 0 0 0 0 0
0 0 0 0 0 3 11 19 20 35 36
27 47 12 10 5 7 4 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 3 12 33 52 67 71 41 16 5
1 1 1 0 0 0 0 0 0 0
1993 1 3 3 0 97.894 0 0 0 0 0 0
0 0 0 0 0 5 13 18 41 32 32
23 24 8 8 5 2 2 2 0 1 0
0 0 0 0 0 0 0 0 0 0 0
1 1 3 13 35 42 49 36 34 16 7
2 1 0 0 0 0 0 0 0 0
1994 1 3 3 0 53.428 0 0 0 0 0 0
0 0 0 0 1 2 5 13 16 12 13
12 9 7 9 6 3 2 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1 0 2 4 18 13 11 21 9 6 1
1 0 0 0 0 0 0 0 0 0
1995 1 3 3 0 112.178 0 0 0 0 0 0
0 0 0 3 2 7 17 38 28 40 27
23 33 38 15 8 3 3 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 3 8 14 46 47 50 44 37 26 9
1 0 0 0 0 0 0 0 0 0
1996 1 3 3 0 145.946 0 0 0 0 0 0
0 0 0 0 1 5 17 40 44 52 37

	35	36 32 40 17 9					5	2	0	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	1	6	18	50 59 57 62 50 28 5						
	3	0 1 0 0 0 0 0 0 0									
1997	1	3 3 0 135.632				0	0 0 0 0 0				
	0	0 0 0 3 1 16						41	56	61	39
	43	39	19	10	4	2 2 0 0 2 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	2	9	22	59 57 67 41 31 15 7						
	3	0 1 0 0 0 0 0 0 0									
1998	1	3 3 0 128.806				0	0 0 0 0 0				
	0	0 0 0 0 2 8 32							45	52	45
	40	43 44 13 10 8					4	8	0	1	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	1	2	13	39 65 68 55 50 21 6						
	2	2 0 0 0 0 0 0 0 0									
1999	1	3 3 0 82.824				0	0 0 0 0 0				
	0	0 0 0 0 3 9 17							31	25	28
	23	16	25	11	8	8 4 1 0 1 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	2	0	11	16 37 57 37 32 18 16						
	7	0 0 0 0 0 0 0 0 0									
2000	1	3 3 0 79.718				0	0 0 0 0 0				
	0	1 0 0 1 3 14						14	32	31	22
	9	7 9 4 8 6 1 2 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	1	2	1	14	19 34 41 39 28 30 17						
	3	2 2 1 0 0 0 0 0 0									
# central CA trawl- no gender LFs for years where gender LFs exist (and N(nogender)>100)											
			0	0	0						
									0	0	0
#year	season	fleet	Gender	Part	Nsamp	0	0 0 12			14	16
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 60									
	62	64 0		0	0	12	14 16 18 20 22				
	24	26 28 30 32 34 36 38 40 42 44									
	46	48 50 52 54 56 58 60 62 64									
1992	1	3 0 0 49.362				0	0 0 0 0 0				
	0	0 0 1 2 9 28						31	44	32	30
	27	20 16 11 13 4					3	1	0	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	1	2	9	28	31 44 32 30 27 20 16						
	11	13	4	3 1 0 0 0 0 0							
1995	1	3 0 0 37.736				0	0 0 0 0 0				
	0	0 0 2 1 7 15						30	30	30	13
	16	13	10	8	1 2 1 1 0 1 0						
	0	0 0 0 0 0 0 0 0 0 0									
	2	1	7	15	30 30 30 13 16 13 10						
	8	1 2 1 1 0 1 0 0 0									
1996	1	3 0 0 43.808				0	0 0 0 0 0				
	0	0 0 1 3 14					28	32	37	23	22
	15	20	11	7	4 3 1 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	1	3	14	28 32 37 23 22 15 20 11							
	7	4 3 1 0 0 0 0 0 0									
1997	1	3 0 0 30.666				0	0 0 0 0 0				
	0	0 0 0 0 9 23						37	48	20	14
	6	6 2 2 2 0 0 0 0 0 0									

0 0 0 0 0 0 0 0 0 0 0
0 0 9 23 37 48 20 14 6 6 2
2 2 0 0 0 0 0 0 0 0 0
1998 1 3 0 0 53.676 0 0 0 0 0 0
0 0 0 0 2 10 35 60 55 53 30
25 21 5 8 6 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 2 10 35 60 55 53 30 25 21 5
8 6 0 0 0 0 0 0 0 0 0
2001 1 3 0 0 150.186 0 0 0 0 0 0
0 0 0 2 11 32 59 110 145 104 60
56 38 23 19 15 6 5 1 1 3 0
0 0 0 0 0 0 0 0 0 0 0
2 11 32 59 110 145 104 60 56 38 23
19 15 6 5 1 1 3 0 0 0
2002 1 3 0 0 172.47 0 0 0 0 0 0
0 0 0 8 17 33 51 116 150 151 81
57 38 21 14 6 9 7 1 2 0 0
0 0 0 0 0 0 0 0 0 0 0
8 17 33 51 116 150 151 81 57 38 21
14 6 9 7 1 2 0 0 0 0
03 included as gender-specific as we have CAAL data for those years, also note that one 58 cm male reassigned to female as it almost certainly outlier 0 0 0

0 0 0

2003 1 3 3 0 66.33 0 0 0 0 0 0
0 0 0 0 0 1 9 17 15 17 16
21 7 10 10 10 4 1 1 0 1 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 7 9 21 39 29 27 18 4
2 1 0 0 0 0 0 0 0 0 0
#2003 1 3 0 0 133.426 0 0 0 0 0 0
0 0 1 1 3 7 22 50 87 124 99
97 38 27 15 17 9 1 2 1 2 0
0 0 0 0 0 0 0 0 0 0 1
1 3 7 22 50 87 124 99 97 38 27
15 17 9 1 2 1 2 0 0 0
2004 1 3 0 0 53.81 0 0 0 0 0 0
0 0 0 0 3 17 19 25 33 37 32
27 16 12 8 6 5 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 3 17 19 25 33 37 32 27 16 12
8 6 5 1 0 0 0 0 0 0 0
2005 1 3 0 0 82.718 0 0 0 0 0 0
1 0 1 0 2 10 19 28 62 50 56
34 39 35 22 18 13 12 5 3 0 0
0 0 0 0 0 0 0 0 1 0 1
0 2 10 19 28 62 50 56 34 39 35
22 18 13 12 5 3 0 0 0 0
2006 1 3 0 0 86.858 0 0 0 0 0 0
0 0 0 0 6 18 35 37 62 79 41
51 39 18 10 8 22 11 3 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 6 18 35 37 62 79 41 51 39 18
10 8 22 11 3 0 0 0 0 0
2007 1 3 0 0 78.298 0 0 0 0 0 0
0 0 0 5 15 21 32 35 29 46 35
43 20 15 9 4 5 4 2 0 1 0
0 0 0 0 0 0 0 0 0 0 0

	5	15	21 32 35 29 46 35 43 20 15								
	9	4 5 4 2 0 1 0 0 0									
2008	1	3 0 0 108.07				0	0 0 0 0 0				
	0	0 0 4 7 15					37	50	46	61	76
	88	48	23	8	8 11		5	3 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0									
	4	7	15	37 50 46 61 76 88 48 23							
	8	8 11		5	3 0 1 0 0 0						
2009	1	3 0 0 148.296				0	0 0 0 0 0				
	0	0 0 0 5 15					50	66	111	138	105
	109	72	38 33 23 14 9					1	2	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	5	15	50	66	111	138 105 109 72				38
	33	23	14	9	1 2 0 0 0 0						
2010	1	3 0 0 85.55				0	0 0 0 0 0				
	0	0 0 1 7 8 17						24	56	74	42
	44	47 37 58 31 23 6						0	0	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	1	7	8	17	24 56 74 42 44 47 37						
	58	31	23	6	0 0 0 0 0 0						
#		0					0	0			
	0	0	0								
# triennial survey			0					0	0		
	0	0	0								
#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	0	0 0 12			14	16
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 60									
	62	64 0		0	0	12	14 16 18 20 22				
	24	26 28 30 32 34 36 38 40 42 44									
	46	48 50 52 54 56 58 60 62 64									
1995	1	4 3 0 49.8				0	0 0 0 0 619				
	0	0	0	772	766 931 996 1092				1289	1254	3346
	3096	4208 3509 2755 1695 865					0	0	0	0	0
	0	0 0 0 0 0 0 0 0 88									88
	82	0	351	550	572	2142	4331 8785 8329 5086 1898				
	1368	1392	82	0	0 0 0 0 0 0						
1998	1	4 3 0 75.2				0	0 0 0 546				77
	0	230	184 271 558 716 1212					1336	4153	2379	5088
	2462	9264 5640 3249 2607 1530 861						0	0	0	0
	0	0 0 0 0 0 0 0 77								461	404
	404	154 231 156 4511				3404	7038	17143	15402	6902	7197
	1786	149	0	0 0 0 0 0 0 0							
2001	1	4 3 0 100.7				0	0 0 0 0 0				
	0	856	557	2362	2078 524		3400	2257 2325 5927 2993			
	2316	6622 5392 2385 403				1269	0	946	0	151	0
	0	0 0 0 0 0 0 0 0 79									1124
	2398	1152 1247 1919 1120 5867 10477						9581	13388	5715	2815
	1438	456	526	0	0 364		0	0 0 0			
2004	1	4 3 0 65				0	0 0 0 0 209				
	4471	2009 189		1551	400	3260	2470 274		4489	1185 3897	
	8387	2421 1603 2279 8381 4312 1595 360							369	0	0
	0	0 0 0 0 0 0 0 4036								598	1314
	2172	1181 4049 1396 372				1744	4297 14075		18738	8379	8612
	9093	4240	1473	1199	0	0 0 0 0 0					

```
#	0	0	0
	0	0	0
#NWFSC combo survey	0	0	0
		0	0	0
#Yr	Seas	Flt/Svy Gender Part	Nsamp	6	8	10	12	14	16
	18	20 22 24 26 28 30 32 34 36 38
	40	42 44 46 48 50 52 54 56 58 60
	62	64 6	8	10	12 14 16 18 20 22
	24	26 28 30 32 34 36 38 40 42 44
	46	48 50 52 54 56 58 60 62 64
2003	1	6 3 0 38.492	0	0 0 0 0 0.025
	0	0 0.05	0.0375	0.025	0.0125	0.0125	0.0125	0.0375	0.025	0.05
	0.0125	0.0125	0	0.025	0.0125	0.025	0.0125	0.0125	0	0	0
	0	0 0 0 0 0 0 0.0125	0.025	0.0125	0.0375
	0.05	0.0875	0.0125	0.0125	0.0375	0.0375	0.0625	0.075	0.0625	0.0375	0.025
	0.0125	0	0 0 0 0 0 0 0 0
2004	1	6 3 0 70.58	0	0 0 0 0.00732	0.02439
	0.0561	0.05122	0.00488	0.01707	0.04634	0.0439	0.01951	0.02439	0.00732	0.04146	0.02195
	0.01707	0.02195	0.0122	0.0122	0.00976	0.0122	0.00732	0.00244	0	0	0
	0	0 0 0 0 0.00244	0	0.03415	0.06341	0.04146	0.01707
	0.03171	0.04146	0.04146	0.03171	0.03171	0.06585	0.0439	0.04634	0.01463	0.01463	0.01463
	0	0 0.00244	0	0 0 0 0 0 0
2005	1	6 3 0 77.544	0	0 0 0 0.00258	0.00517
	0.00775	0.04651	0.0155	0.04134	0.04651	0.03359	0.02584	0.02326	0.02067	0.02584	0.03876
	0.04393	0.05168	0.04393	0.02326	0.00517	0.00258	0	0 0 0.00258	0
	0	0 0 0 0 0 0.00517	0.00517	0.01292	0.02584	0.02067
	0.0491	0.03359	0.04651	0.03876	0.01809	0.04134	0.05426	0.08269	0.03359	0.01034	0.00517
	0	0.00775	0.00258	0	0 0 0 0 0 0
2006	1	6 3 0 139.018	0.00152	0.00152	0.00152	0.00303	0.0091	0.01214
	0.01062	0.03945	0.05918	0.03794	0.0607	0.05311	0.0607	0.01973	0.02428	0.03642	0.01821
	0.02276	0.00759	0.01366	0.00607	0.00455	0.00455	0.00303	0.00152	0	0	0
	0	0 0 0 0.00152	0.00303	0.00607	0.01517	0.02276	0.05159	0.04552
	0.05311	0.05766	0.05463	0.03338	0.02428	0.03187	0.02731	0.0349	0.01062	0.00455	0.00455
	0.00455	0	0 0 0 0 0 0 0 0
2007	1	6 3 0 65.744	0	0 0 0 0 0.00347
	0	0	0.00694	0.02778	0.02778	0.03125	0.04861	0.02778	0.03472	0.04861	0.05903
	0.05208	0.03125	0.01389	0.01736	0	0.01042	0	0.00347	0	0	0
	0	0 0 0 0 0 0 0 0.00347	0	0.00694
	0.02083	0.03472	0.03125	0.04514	0.09375	0.05208	0.0625	0.08333	0.0625	0.02083	0.01389
	0.01042	0.00347	0.00694	0	0 0 0.00347	0	0 0
2008	1	6 3 0 79.16	0	0 0 0 0 0
	0.0094	0.0094	0.01567	0.0094	0.02821	0.06897	0.06897	0.05643	0.05956	0.03762	0.01881
	0.01567	0.0094	0	0.01254	0.01567	0.0094	0.00627	0	0	0	0
	0	0 0 0 0 0 0 0 0 0.00313	0.01254
	0.04075	0.05016	0.06583	0.0721	0.09091	0.06897	0.04389	0.03135	0.02821	0.01254	0.02194
	0.00313	0	0 0 0 0.00313	0	0 0 0
2009	1	6 3 0 109.658	0	0 0.00188	0.01689	0.00938	0.02064
	0.02814	0.02064	0.00188	0.02627	0.01313	0.01126	0.05441	0.04128	0.04878	0.03752	0.03002
	0.02814	0.02439	0.01501	0.01501	0.00375	0.00938	0.00375	0.00188	0	0.00188	0
	0	0 0 0.00188	0.00375	0.01689	0.01501	0.0469	0.03377	0.01876	0.00938
	0.00188	0.00938	0.01501	0.05066	0.04128	0.07505	0.07317	0.04503	0.03377	0.01876	0.00938
	0.00938	0.00188	0.00375	0	0 0 0 0 0 0
2010	1	6 3 0 111.484	0.00193	0.00386	0.00386	0.00193	0.00579	0.00772
	0.01351	0.02703	0.03089	0.02317	0.0251	0.02124	0.03282	0.0251	0.04054	0.03668	0.02124
```

	0.03861	0.03282	0.03668	0.02317	0.01544	0.00772	0.00193	0	0	0	0
	0	0	0.00193	0.00386	0.00193	0.00386	0.00579	0.01737	0.01544	0.02703	0.03668
	0.01931	0.01158	0.02896	0.05019	0.05019	0.03668	0.04247	0.0695	0.05598	0.02703	0.01158
	0.00193	0.00193	0	0 0 0 0 0 0 0							
#		0					0	0			
	0	0	0								
#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	0	0 0 12			14	16
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 60									
	62	64 0		0	0	12	14 16 18 20 22				
	24	26 28 30 32 34 36 38 40 42 44									
	46	48 50 52 54 56 58 60 62 64									
1983	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 3 1									
	5	14	28 34 24 11 37 55 86 55 2								
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 3 1 5 14									28
	34	24 11 37 55 86 55 8							6	0	
1984	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 3 3 2 5 12									27
	43	100	150	150	121	58	43 23 21 24 8				
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 3 3 2 5 12						27	43	100	150
	150	121	58	43 23 21 24 8					2	0	
1985	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 1 0 0 9 26								53	127
	274	396 521 308 183 78					37	19	5	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 0 9 26					53	127	274	396	521
	308	183	78	37	19	5	0 0 0 0				
1986	1	7 0 0 0.1				0	0 0 0 0 0				
	1	0 0 0 0 0 3 30							87	223	458
	737	981 909 590 221 57					22	10	6	1	0
	1	0 0 0 0 0 0 0 1 0 0									
	0	0 0 3 30				87	223	458	737	981	909
	590	221	57	22	10	6	1 0 1 0				
1987	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 1 0 0 3 33							71	231	393
	525	668 530 372 193 62					15	3	2	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	1	0 0 3 33				71	231	393	525	668	530
	372	193	62	15	3	2 0 0 0 1					
1988	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 2 4 17							49	155	275
	342	346 264 164 119 63					14	11	2	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 2 4 17				49	155	275	342	346	264
	164	119	63	14	11	2	0 0 0 0				
1989	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 2 1 24						26	33	65	78
	101	136	119	87	71 48 30 10 2					0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	2	1	24	26 33 65 78 101					136	119
	87	71 48 30 10 2					0	0	0	0	
1992	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 3 10						19	38	87	251
	316	222	173	71	38	19	6	2 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0									

```
	0	0	3	10	19 38 87 251		316	222	173
	71	38	19	6	2 0 0 0 0 0
1994	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 0 0 2 4 5 17					29	42
	91	93 57 31 16 6				0	1	1	0	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 2 4 5 17				29	42	91	93	57
	31	16	6	0 1 1 0 0 0 0
1995	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 0 0 0 2 19				43	77	110
	111	58	36	18	12	3	0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 2 19			43	77	110	111	58	36
	18	12	3	0 0 0 0 0 0 0
1996	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 0 0 0 0 5 12					14	34
	36	15	9	3 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 5 12				14	34	36	15	9
	3	0 0 0 0 0 0 0 0 0
1997	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 0 0 0 2 9 12					21	31
	58	31 14 10 12 4				3	2	1	0	0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 2 9 12				21	31	58	31	14
	10	12	4	3 2 1 0 0 0 0
1998	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 1 1 5 9 5 9 8 18						21
	25	22	21	13	3	1 1 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 1
	1	5 9 5 9 8 18				21	25	22	21
	13	3	1 1 0 0 0 0 0 0
#1999	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 1 3 3 5 8 5 9 1
	7	2 0 2 2 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	1	3 3 5 8 5 9 1 7 2 0
	2	2 0 0 0 0 0 0 0 0
2002	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 5 4 10				28	33	37	27	21
	18	12	8	1 2 0 2 0 0 0 1
	0	0 0 0 0 0 0 0 0 0 0
	5	4	10	28 33 37 27 21 18 12 8
	1	2 0 2 0 0 0 1 0 1
2003	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 1 8 16				13	25	28	16	16
	15	12 12 9		12	11 3		2	2	3	0
	0	0 0 0 0 0 0 0 0 0 0
	1	8	16	13 25 28 16 16 15 12 12
	9	12	11	3	2 2 3 0 0 0
2005	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 2 2 6 8 10				4	14	13
	9	6 5 1 0 2 1 3 1 1 1
	0	0 0 0 0 0 0 0 0 0 0
	2	2 6 8 10			4	14	13	9	6 5
	1	0 2 1 3 1 1 1 0 0
2006	1	7 0 0 0.1			0	0 0 0 0 0
	0	0 0 0 2 3 12				16	16	14	9
	7	6 5 3 2 1 1 1 3 4 0
	0	0 0 0 0 0 0 0 0 0 0
	0	2 3 12		16	16	14	9	7 6 5
	3	2 1 1 1 3 4 0 0 1
```

2007	1	7 0 0 0.1				0	0 0 0 0 0				
	0	3 5 6 7 15					24	13	19	6	3
	2	4 1 1 1 0 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 3 5									
	6	7 15		24	13	19	6	3 2 4 1			
	1	1 0 0 1 0 0 0 0 0									
2008	1	7 0 0 0.1				0	0 0 0 0 0				
	1	3	21	53 54 84 59 30 23 6							2
	8	5 3 4 2 3 2 2 0 0 0									
	0	0 0 0 0 0 0 0 1 3 21									
	53	54 84 59 30 23 6						2	8	5	3
	4	2 3 2 2 0 0 0 0 0									
2009	1	7 0 0 0.1				0	0 0 0 0 0				
	0	1 3 4 8 10					18	27	22	15	4
	5	7 3 5 1 3 1 0 1 1 0									
	0	0 0 0 0 0 0 0 0 1 3									
	4	8	10	18 27 22 15 4					5	7	3
	5	1 3 1 0 1 1 0 0 0									
2010	1	7 0 0 0.1				0	0 0 0 0 0				
	0	0 0 4 8 12					18	26	31	23	16
	32	24 18 21 15 13 6						3	6	1	1
	0	0 0 0 0 0 0 0 0 0 0									
	4	8	12	18 26 31 23 16 32 24 18							
	21	15	13	6	3 6 1 1 0 0						

Dummy LF data for ghost fishery - Central Cal. Fixed

#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	0	0 0 12			14	16
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 60									
	62	64 0		0	0	12	14 16 18 20 22				
	24	26 28 30 32 34 36 38 40 42 44									
	46	48 50 52 54 56 58 60 62 64									
1979	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1									
	1	5 28		34	24	6	4 1 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 1 1 5 28									
	34	24	6	4 1 1 0 0 0 0							
1981	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 3 4 11									
	24	18 48 19 13 7					2	0	0	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 3 4 11							24	18	48
	19	13	7	2 0 0 0 0 0 0							
1982	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 2									
	3	3 2 2 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 2 3 3 2									
	2	0 0 0 0 0 0 0 0 0									
1986	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	2 1 2 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 2 1									
	2	0 0 0 0 0 0 0 0 0									
1988	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 1 5 16								43	51

44 40 14 5 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 5 16 43 51 44 40 14
5 1 0 0 0 0 0 0 0 0
1989 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 0 0 0 2 6 22 27
48 26 17 12 3 3 0 0 0 1 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 2 6 22 27 48 26 17
12 3 3 0 0 0 1 0 0 0
1990 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 0 0 0 2 8 18 19
10 9 5 3 2 4 1 1 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 2 8 18 19 10 9 5
3 2 4 1 1 1 0 0 0 0
1992 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 0 1 2 4 28 30 44
43 46 36 30 14 10 4 3 2 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 2 4 28 30 44 43 46 36
30 14 10 4 3 2 0 0 1 0
1993 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 0 1 5 6 12 11 10
6 5 1 2 2 1 2 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 5 6 12 11 10 6 5 1
2 2 1 2 0 0 0 0 0 0
1994 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 0 0 2 6 16 33 36
23 14 14 11 4 1 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 2 6 16 33 36 23 14 14
11 4 1 1 0 0 0 0 0 0
1995 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 0 1 3 12 12 12 14
14 13 17 12 18 7 5 3 1 1 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 3 12 12 12 14 14 13 17
12 18 7 5 3 1 1 0 0 0
1996 1 8 0 0 0.1 0 0 0 0 0 0
0 0 1 2 3 8 25 66 101 103 93
149 163 124 117 70 73 45 15 17 10 1
0 0 0 0 0 0 0 0 0 0 1
2 3 8 25 66 101 103 93 149 163 124
117 70 73 45 15 17 10 3 0 2
1997 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 3 7 16 42 64 80 77
126 102 87 49 35 29 17 11 7 3 1
0 0 0 0 0 0 0 0 0 0 0
0 3 7 16 42 64 80 77 126 102 87
49 35 29 17 11 7 3 1 0 0
1998 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 0 1 0 0 1 1 2 2
1 3 1 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 1 0 0 1 1 2 2 1 3 1
1 0 0 0 0 0 0 0 0 0
2000 1 8 0 0 0.1 0 0 0 0 0 0
0 0 0 1 0 0 7 23 27 40 25
35 22 27 10 6 7 2 1 2 0 0
0 0 0 0 0 0 0 0 0 0 0

	1	0	0	7	23	27 40 25 35 22 27					
	10	6	7 2 1 2 0 0 0 0								
2001	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 3 6 8 13									8
	17	18	15	6	6 4 1 1 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 3 6 8 13						8	17	18	15
	6	6 4 1 1 0 0 0 0 0									
2002	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 2 0 0 1 11							27	55	31
	26	21	12	8	8 8 3 0 1 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	2	0	0	1	11	27 55 31 26 21 12					
	8	8 8 3 0 1 0 0 0 0									
2003	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 1 1 4 13								26	33
	34	25 21 15 12 6					4	0	0	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 1 4 13					26	33	34	25	21
	15	12	6	4 0 0 0 0 0 0							
2006	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 4 6 10						16	20	25	14
	16	10	8	4 3 2 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0									
	0	4	6	10	16 20 25 14 16 10 8						
	4	3 2 0 0 0 0 0 0 0									
2008	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 1 6 11						24	50	81	98
	67	46 30 21 11 11 3						5	4	1	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	1	6	11	24 50 81 98 67 46 30						
	21	11	11	3	5 4 1 0 0 0						
2009	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 6 13						28	39	80	62
	41	41 19 17 12 6					2	5	1	1	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	0	6	13	28 39 80 62 41 41 19						
	17	12	6	2 5 1 1 0 0 0							
2010	1	8 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 5 21						40	59	85	52
	54	36	22	19	8	7 5 5 1 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	0	5	21	40 59 85 52 54 36 22						
	19	8	7 5 5 1 0 0 0 0								
#		33		0			0	0			
	0	0	0								
# Dummy LF data for ghost fishery - Central Cal. trawl											0
	0	0									
						0	0	0			
#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	0	0 0 12			14	16
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 60									
	62	64 0		0	0	12	14 16 18 20 22				
	24	26 28 30 32 34 36 38 40 42 44									
	46	48 50 52 54 56 58 60 62 64									

1978	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 0 1 3 4									
	6	3 8 12			7	5 4 1 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 3 4 6 3 8									
	12	7	5 4 1 0 0 0 0 0 0								
1982	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 0 0 1 8 24									22
	18	19	11	8	3 0 2 1 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 8 24						22	18	19	11
	8	3 0 2 1 0 0 0 0 0									
1983	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 0 2 0 10							16	36	58
	56	38	22	13	9	5 2 2 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	0	2	0	10	16 36 58 56 38 22					
	13	9	5 2 2 0 0 0 0 0								
1984	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 1 0 0 2 8 16								41	38
	73	51 49 27 8				16	5	4	1	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	1	0 0 2 8 16					41	38	73	51	49
	27	8	16	5	4 1 0 0 0 0						
1985	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 1 0 1 3 10						28	58	94	157
	172	156	115	73	42	24	9	4 3 0 0			
	0	0 0 0 0 0 0 0 0 0 1									
	0	1	3	10	28 58 94 157				172	156	115
	73	42	24	9	4 3 0 0 0 0						
1986	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 5 8 13						18	37	78	129
	123	114	93	49	42	9	7 7 2 0 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	5	8	13	18 37 78 129				123	114	93
	49	42	9	7 7 2 0 0 0 0							
1987	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 2 4 4 3 10							24	31	36
	80	55 45 42 27 17 11 6							1	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	2	4	4	3	10	24 31 36 80 55 45					
	42	27	17	11	6	1 0 0 0 0					
1988	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 1 4 7 20							57	60	92
	94	77 50 26 30 13 2						0	1	0	0
	0	0 0 0 0 0 0 0 0 0 0									
	0	1	4	7	20	57 60 92 94 77 50					
	26	30	13	2	0 1 0 0 0 0						
1989	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 3 6 9 8 14								13	14
	24	18	9	10	3	7 3 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	3 6 9 8 14					13	14	24	18	9
	10	3	7 3 0 0 0 0 0 0								
1990	1	9 0 0 0.1				0	0 0 0 0 0				
	0	0 0 0 1 1 9 16							36	47	61
	44	42	21	5	11	9	3 2 3 1 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	1	1	9	16	36 47 61 44 42 21					
	5	11	9	3 2 3 1 0 0 0							
1991	1	9 0 0 0.1				0	0 0 0 0 0				
	0	1 0 1 2 12					46	102	114	159	158

126 83 48 24 7 7 4 1 0 0 0
0 0 0 0 0 0 0 0 0 1 0
1 2 12 46 102 114 159 158 126 83 48
24 7 7 4 1 0 0 0 0 0
1992 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 1 2 15 51 83 116 134 137
95 83 33 22 19 12 7 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1 2 15 51 83 116 134 137 95 83 33
22 19 12 7 1 0 0 0 0 0
1993 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 1 2 15 32 67 91 84 74
65 48 18 11 8 3 2 2 0 1 0
0 0 0 0 0 0 0 0 0 0 0
1 2 15 32 67 91 84 74 65 48 18
11 8 3 2 2 0 1 0 0 0
1994 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 1 1 8 23 54 46 32 42
26 20 10 15 10 3 2 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1 1 8 23 54 46 32 42 26 20 10
15 10 3 2 2 0 0 0 0 0
1995 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 5 6 22 46 114 105 120 84
76 72 57 24 9 5 4 3 0 1 0
0 0 0 0 0 0 0 0 0 0 0
5 6 22 46 114 105 120 84 76 72 57
24 9 5 4 3 0 1 0 0 0
1996 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 1 5 25 63 122 140 132 121
100 84 48 50 21 13 6 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1 5 25 63 122 140 132 121 100 84 48
50 21 13 6 2 0 0 0 0 0
1997 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 0 5 19 61 137 161 148 94
80 60 28 15 6 3 2 0 0 2 0
0 0 0 0 0 0 0 0 0 0 0
0 5 19 61 137 161 148 94 80 60 28
15 6 3 2 0 0 2 0 0 0
1998 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 0 3 14 56 131 165 173 130
115 85 55 23 18 8 4 8 0 1 0
0 0 0 0 0 0 0 0 0 0 0
0 3 14 56 131 165 173 130 115 85 55
23 18 8 4 8 0 1 0 0 0
1999 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 0 2 3 23 38 73 87 70
63 38 43 20 10 8 4 1 0 1 0
0 0 0 0 0 0 0 0 0 0 0
0 2 3 23 38 73 87 70 63 38 43
20 10 8 4 1 0 1 0 0 0
2000 1 9 0 0 0.1 0 0 0 0 0 0
0 1 0 1 3 6 29 43 70 79 68
45 46 26 7 11 9 3 3 1 0 0
0 0 0 0 0 0 0 0 0 1 0
1 3 6 29 43 70 79 68 45 46 26
7 11 9 3 3 1 0 0 0 0
2001 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 2 11 32 59 110 145 104 60
56 38 23 19 15 6 5 1 1 3 0
0 0 0 0 0 0 0 0 0 0 0

2 11 32 59 110 145 104 60 56 38 23
19 15 6 5 1 1 3 0 0 0
2002 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 8 17 33 51 116 150 151 81
57 38 21 14 6 9 7 1 2 0 0
0 0 0 0 0 0 0 0 0 0 0
8 17 33 51 116 150 151 81 57 38 21
14 6 9 7 1 2 0 0 0 0
2003 1 9 0 0 0.1 0 0 0 0 0 0
0 0 1 1 3 7 22 50 87 124 99
97 38 27 15 17 9 1 2 1 2 0
0 0 0 0 0 0 0 0 0 0 1
1 3 7 22 50 87 124 99 97 38 27
15 17 9 1 2 1 2 0 0 0
2004 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 0 3 17 19 25 33 37 32
27 16 12 8 6 5 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 3 17 19 25 33 37 32 27 16 12
8 6 5 1 0 0 0 0 0 0
2005 1 9 0 0 0.1 0 0 0 0 0 0
1 0 1 0 2 10 19 28 62 50 56
34 39 35 22 18 13 12 5 3 0 0
0 0 0 0 0 0 0 0 1 0 1
0 2 10 19 28 62 50 56 34 39 35
22 18 13 12 5 3 0 0 0 0
2006 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 0 6 18 35 37 62 79 41
51 39 18 10 8 22 11 3 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 6 18 35 37 62 79 41 51 39 18
10 8 22 11 3 0 0 0 0 0
2007 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 5 15 21 32 35 29 46 35
43 20 15 9 4 5 4 2 0 1 0
0 0 0 0 0 0 0 0 0 0 0
5 15 21 32 35 29 46 35 43 20 15
9 4 5 4 2 0 1 0 0 0
2008 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 4 7 15 37 50 46 61 76
88 48 23 8 8 11 5 3 0 1 0
0 0 0 0 0 0 0 0 0 0 0
4 7 15 37 50 46 61 76 88 48 23
8 8 11 5 3 0 1 0 0 0
2009 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 0 5 15 50 66 111 138 105
109 72 38 33 23 14 9 1 2 0 0
0 0 0 0 0 0 0 0 0 0 0
0 5 15 50 66 111 138 105 109 72 38
33 23 14 9 1 2 0 0 0 0
2010 1 9 0 0 0.1 0 0 0 0 0 0
0 0 0 1 7 8 17 24 56 74 42
44 47 37 58 31 23 6 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
1 7 8 17 24 56 74 42 44 47 37
58 31 23 6 0 0 0 0 0 0

29 #_N_age'_bins

```
#_lower_age_of_age'_bins

4       6       8       10      12 14 16 18 20 22 24 26
        28      30 32 34 36 38 40 42 44 46 48
        50      52 54 56 58 60

1       #_number_of_ageerr_types

#_vector_with_stddev_of     ageing_precision_for_each_AGE_and_type

# error for 60 age bins
0.5     1.5     2.5     3.5     4.5     5.5     6.5     7.5     8.5     9.5     10.5    11.5
        12.5    13.5    14.5    15.5    16.5    17.5    18.5    19.5    20.5    21.5    22.5
        23.5    24.5    25.5    26.5    27.5    28.5    29.5    30.5    31.5    32.5    33.5
        34.5    35.5    36.5    37.5    38.5    39.5    40.5    41.5    42.5    43.5    44.5
        45.5    46.5    47.5    48.5    49.5    50.5    51.5    52.5    53.5    54.5    55.5
        56.5    57.5    58.5    59.5    60.5
0.14759 0.14759 0.14759 0.14759 0.22223 0.29744 0.37322 0.44958 0.52652 0.60405 0.68216 0.76087
        0.84018 0.92009 1.0006  1.0817  1.1635  1.2459  1.3289  1.4125  1.4968  1.5817  1.6672
        1.7535  1.8403  1.9278  2.016   2.1049  2.1944  2.2847  2.3756  2.4672  2.5595  2.6525
        2.7462  2.8406  2.9358  3.0316  3.1282  3.2255  3.3236  3.4224  3.522   3.6223  3.7234
        3.8253  3.9279  4.0314  4.1356  4.2406  4.3464  4.453   4.5604  4.6686  4.7777  4.8876
        4.9983  5.1099  5.2223  5.3355  5.449

636 #_N_Agecomp_obs
1 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
2 #_combine males into females at or below this bin number

#Year   Season  Fleet   Gender  Part    ageerr  Lbin_lo Lbin_hi Nsamp   4       6       8
        10      12 14 16 18 20 22 24 26 28 30
        32      34 36 38 40 42 44 46 48 50 52
        54      56 58 60.plus       4       6       8       10      12 14 16
        18      20 22 24 26 28 30 32 34 36 38
        40      42 44 46 48 50 52 54 56 58 60.plus
1985    1       1 1 0 1 14                      14      1       0 0 0
        0       0 0 0 0 1 0 0 0 0 0
        0       0 0 0 0 0 0 0 0 0 0
        0       0 0 0 0 0 0 0 0 0 0
        0       0 0 0 0 0 0 0 0 0 0
        0       0 0 0 0 0 0 0 0 0 0
```

1985	1	1 1 0 1 15	15	3	0 0 0	
	0	0 0 0 0 1 2 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 16	16	4	0 0 0	
	0	0 0 0 0 0 1 1 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 2 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 17	17	2	0 0 0	
	0	0 0 0 0 0 0 2 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	1	1 2 2 0 1 1 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 18	18	9	0 0 0	
	0	0 0 0 0 0 2 2 0 0 2				
	3	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 8 1 3 0 3 2 1				
	1	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 19	19	14	0	0 0
	0	0 0 0 0 0 1 2 0 5 3				
	0	1 1 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 1 3 5 2 5 2 2				
	0	1 1 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 20	20	35	0	0 0
	0	0 0 0 0 0 0 5 3 5 9				
	3	4 2 2 1 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 1 3 3 0 4 0				
	1	2 1 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 21	21	24	0	0 0
	0	0 0 0 0 0 0 3 4 2 3				
	4	4 2 0 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 1 1 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 22	22	19	0	0 0
	0	0 0 0 0 0 0 1 2 2 4				
	3	5 0 2 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 23	23	3	0 0 0	
	0	0 0 0 1 0 0 0 0 0 1				
	0	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 1 0 1 24	24	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1986	1	1 1 0 1 15	15	1	0 0 0	
	0	0 0 0 0 0 1 0 0 0 0				

	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1986	1	1 1 0 1 16					16	5	0 0 0		
	0	0 0 0 0 1 0 1 0 0 1									
	1	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 1 0 0 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1986	1	1 1 0 1 17					17	8	0 0 0		
	0	0 0 0 0 3 1 0 0 0 2									
	0	1 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 1 1 1 2 1									
	0	0 0 0 1 1 1 0 0 0 0									
1986	1	1 1 0 1 18					18	9	0 0 0		
	0	0 0 0 0 1 1 1 1 0 1									
	1	0 1 1 0 0 0 0 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 0 0 1 0 1 1 1 1									
	0	0 0 0 0 0 0 0 0 0 0									
1986	1	1 1 0 1 19					19	12	0	0 0	
	0	0 0 0 0 0 1 0 0 0 1									
	1	1 1 1 3 0 1 0 1 0 0									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 1 0 1 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1986	1	1 1 0 1 20					20	13	0	0 0	
	0	0 0 0 0 0 0 2 1 0 0									
	0	1 1 2 2 3 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 1 2 0 0 0 0 0 0									
	0	1 0 0 0 0 0 0 0 0 0									
1986	1	1 1 0 1 21					21	12	0	0 0	
	0	0 0 0 0 0 0 1 1 0 2									
	2	2 0 0 2 0 1 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 0 0 1 0									
	0	0 0 0 0 1 0 0 0 0 0									
1986	1	1 1 0 1 22					22	5	0 0 0		
	0	0 0 0 0 0 0 0 1 0 0									
	0	1 1 0 0 0 0 0 2 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1986	1	1 1 0 1 23					23	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 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					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi 648		4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		

	18	20 22 24 26 28 30 32 34 36 38				
	40	42 44 46 48 50 52 54 56 58 390				
1985	1	1 2 0 1 15	15	1	0 0 0	
	0	0 0 0 0 1 2 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 2 0 1 16	16	4	0 0 0	
	0	0 0 0 0 0 1 1 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 2 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 2 0 1 17	17	9	0 0 0	
	0	0 0 0 0 0 0 2 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	1	1 2 2 0 1 1 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1985	1	1 2 0 1 18	18	23	0	0 0
	0	0 0 0 0 0 2 2 0 0 2				
	3	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 8 1 3 0 3 2 1				
	1	0 0 0 0 0 0 0 0 0 0				
1985	1	1 2 0 1 19	19	23	0	0 0
	0	0 0 0 0 0 1 2 0 5 3				
	0	1 1 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 1 3 5 2 5 2 2				
	0	1 1 0 0 0 0 0 0 0 0				
1985	1	1 2 0 1 20	20	16	0	0 0
	0	0 0 0 0 0 0 5 3 5 9				
	3	4 2 2 1 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 1 3 3 0 4 0				
	1	2 1 0 0 0 0 0 0 0 0				
1985	1	1 2 0 1 21	21	4	0 0 0	
	0	0 0 0 0 0 0 3 4 2 3				
	4	4 2 0 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 1 1 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1986	1	1 2 0 1 15	15	1	0 0 0	
	0	0 0 0 0 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1986	1	1 2 0 1 16	16	3	0 0 0	
	0	0 0 0 0 1 0 1 0 0 1				
	1	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1986	1	1 2 0 1 17	17	9	0 0 0	
	0	0 0 0 0 3 1 0 0 0 2				
	0	1 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 1 1 1 1 2 1				
	0	0 0 0 1 1 1 0 0 0 0				

1986	1	1 2 0 1 18					18	6	0 0 0	
	0	0 0 0 0 1 1 1 1 0 1								
	1	0 1 1 0 0 0 0 0 0 1								
	0	0 0 0 0 0 0 0 0 0 0								
	0	1 0 0 0 1 0 1 1 1 1								
	0	0 0 0 0 0 0 0 0 0 0								
1986	1	1 2 0 1 19					19	3	0 0 0	
	0	0 0 0 0 0 1 0 0 0 1								
	1	1 1 1 3 0 1 0 1 0 0								
	1	0 0 0 0 0 0 0 0 0 0								
	0	0 1 0 1 1 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
1986	1	1 2 0 1 20					20	5	0 0 0	
	0	0 0 0 0 0 0 2 1 0 0								
	0	1 1 2 2 3 1 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 1 1 2 0 0 0 0 0 0								
	0	1 0 0 0 0 0 0 0 0 0								
1986	1	1 2 0 1 21					21	3	0 0 0	
	0	0 0 0 0 0 0 1 1 0 2								
	2	2 0 0 2 0 1 1 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 1 0 0 0 1 0								
	0	0 0 0 0 1 0 0 0 0 0								
1986	1	1 2 0 1 25					25	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 1 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
# Central CA Fixed gear			3						3	0
			0							
								0		
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30								
	32	34 36 38 40 42 44 46 48 50 52								
	54	56 58 390			4	6	8	10	12 14 16	
	18	20 22 24 26 28 30 32 34 36 38								
	40	42 44 46 48 50 52 54 56 58 390								
2006	1	2 1 0 1 16					16	5	0 0 0	
	0	0 0 0 0 0 0 0 1 1 0								
	0	2 1 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 2 1 1 1 0 0								
	1	0 0 0 0 0 0 0 0 0 0								
2006	1	2 1 0 1 18					18	3	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0								
	2	1 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 1 0 1 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	2 1 0 1 19					19	4	0 0 0	
	0	0 0 0 0 0 0 0 0 0 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 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	2 1 0 1 20					20	3	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0								

	1	0 1 0 1 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2006	1	2 1 0 1 21		21	4	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 1 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2006	1	2 1 0 1 22		22	3	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 1 1 0 0 0 0 0 1						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2006	1	2 1 0 1 23		23	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 1 0						
	0	0 0 0 0 0 0 0 0 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		3	0			
	0							
			0					
2006	1	2 2 0 1 16		16	6	0 0 0		
	0	0 0 0 0 0 0 0 1 1 0						
	0	2 1 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 2 1 1 1 0 0						
	1	0 0 0 0 0 0 0 0 0 0						
2006	1	2 2 0 1 17		17	2	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 1 1 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2006	1	2 2 0 1 18		18	2	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	2	1 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 1 0 1 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
#		3		3	0			
	0							
			0					
#Year	Season	Fleet Gender Part ageerr	Lbin_lo	Lbin_hi 648		4	6	8
	10	12 14 16 18 20 22 24 26 28 30						
	32	34 36 38 40 42 44 46 48 50 52						
	54	56 58 390 4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38						
	40	42 44 46 48 50 52 54 56 58 390						
2008	1	2 1 0 1 13		13	1	0 0 0		
	0	0 0 0 0 0 0 0 1 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 14	14	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 15	15	2	0 0 0
	0	0 0 0 0 0 0 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 16	16	3	0 0 0
	0	0 0 0 0 0 0 1 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 2 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 17	17	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 2			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 18	18	2	0 0 0
	0	0 0 0 0 0 0 0 0 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 3 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 19	19	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	3	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 20	20	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 21	21	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 22	22	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 23	23	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

2008	1	2 1 0 1 24	24	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 25	25	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 1 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 1 0 1 26	26	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 1 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
#		3	3	0	
	0				
			0		
2008	1	2 2 0 1 14	14	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 2 0 1 16	16	3	0 0 0
	0	0 0 0 0 0 0 1 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 2 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 2 0 1 17	17	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 2			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 2 0 1 18	18	4	0 0 0
	0	0 0 0 0 0 0 0 0 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 3 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 2 0 1 19	19	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	3	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	2 2 0 1 20	20	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
# Central CA Trawl		3		3	0

		0						
					0			
#Year	Season	Fleet Gender Part	ageerr	#Lbin_	Lbin_hi	648	4	6 8
	10	12 14 16 18 20 22 24 26 28 30						
	32	34 36 38 40 42 44 46 48 50 52						
	54	56 58 390	4	6	8	10	12 14 16	
	18	20 22 24 26 28 30 32 34 36 38						
	40	42 44 46 48 50 52 54 56 58 390						
1982	1	3 1 0 1 16			16	2	0 0 0	
	0	1 0 0 1 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 2 5						
	1	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1982	1	3 1 0 1 17			17	3	0 0 0	
	0	0 0 1 0 0 1 0 0 1 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 1 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1982	1	3 1 0 1 20			20	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0						
	1	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1982	1	3 1 0 1 24			24	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 1 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1983	1	3 1 0 1 14			14	2	0 0 0	
	0	0 0 0 1 0 0 0 1 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 1						
	0	0 0 1 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1983	1	3 1 0 1 15			15	2	0 0 0	
	0	0 0 0 1 0 1 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	1	0 0 1 0 0 2 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1983	1	3 1 0 1 16			16	5	0 0 0	
	0	0 0 0 2 0 0 0 1 1 1						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 1						
	1	2 1 2 4 5 1 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1983	1	3 1 0 1 17			17	10	0	0 0
	0	0 0 0 0 2 0 0 3 5 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 1						
	0	0 3 2 0 5 3 2 4 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
1983	1	3 1 0 1 18			18	10	0	0 0
	0	0 0 0 1 2 0 1 0 2 2						
	1	1 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						

	0	0 2 1 0 1 3 1 1 7 1			
	1	0 1 0 0 0 0 0 0 0 0			
1983	1	3 1 0 1 19	19	9	0 0 0
	0	0 0 0 0 0 0 2 2 0 3			
	0	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 2 1 4 1			
	1	2 0 0 0 0 0 0 0 0 0			
1983	1	3 1 0 1 20	20	4	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	2	1 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 0 0 0 0 0			
1983	1	3 1 0 1 21	21	5	0 0 0
	0	0 0 0 0 0 0 0 0 0 2			
	1	1 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1983	1	3 1 0 1 22	22	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1983	1	3 1 0 1 23	23	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1983	1	3 1 0 1 24	24	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1984	1	3 1 0 1 14	14	1	0 0 0
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1984	1	3 1 0 1 15	15	1	0 0 0
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1984	1	3 1 0 1 16	16	2	0 0 0
	0	0 0 0 0 0 0 0 0 2 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 3 3 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
1984	1	3 1 0 1 17	17	2	0 0 0
	0	0 0 0 0 0 0 1 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 1 4 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

1984	1	3 1 0 1 18					18	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 4 3 1 2 3 4									
	3	0 0 0 0 0 0 0 0 0 0									
1984	1	3 1 0 1 19					19	2	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	1	0 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 1 2 3 3									
	1	1 3 0 0 0 0 0 1 0 0									
1984	1	3 1 0 1 20					20	4	0 0 0		
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 2 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 0 2 3 2									
	0	1 0 0 1 0 0 0 0 2 0									
1984	1	3 1 0 1 21					21	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 0									
	2	0 1 0 0 0 1 0 0 0 0									
1984	1	3 1 0 1 23					23	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 0 0 0 0 0 0 0 1									
1984	1	3 1 0 1 25					25	3	0 0 0		
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 1 0 0 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1984	1	3 1 0 1 26					26	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
# males		3					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
1982	1	3 2 0 1 15					15	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1982	1	3 2 0 1 16					16	8	0 0 0		
	0	1 0 0 1 0 0 0 0 0 0									

	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 2 5				
	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1982	1	3 2 0 1 17	17	1	0 0 0	
	0	0 0 1 0 0 1 0 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 14	14	2	0 0 0	
	0	0 0 0 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 15	15	4	0 0 0	
	0	0 0 0 1 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	1	0 0 1 0 0 2 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 16	16	17	0	0 0
	0	0 0 0 2 0 0 0 1 1 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	1	2 1 2 4 5 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 17	17	20	0	0 0
	0	0 0 0 0 2 0 0 3 5 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 3 2 0 5 3 2 4 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 18	18	19	0	0 0
	0	0 0 0 1 2 0 1 0 2 2				
	1	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 2 1 0 1 3 1 1 7 1				
	1	0 1 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 19	19	11	0	0 0
	0	0 0 0 0 0 0 2 2 0 3				
	0	2 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 2 1 4 1				
	1	2 0 0 0 0 0 0 0 0 0				
1983	1	3 2 0 1 20	20	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	2	1 0 0 1 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
1984	1	3 2 0 1 15	15	1	0 0 0	
	0	0 0 0 0 0 0 0 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
1984	1	3 2 0 1 16	16	7	0 0 0	
	0	0 0 0 0 0 0 0 0 2 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				

	0	0 0 3 3 0 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1984	1	3 2 0 1 17					17	7	0 0 0		
	0	0 0 0 0 0 0 1 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 1 4 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1984	1	3 2 0 1 18					18	21	0	0 0	
	0	0 0 0 0 0 0 0 0 0 0									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 4 3 1 2 3 4									
	3	0 0 0 0 0 0 0 0 0 0									
1984	1	3 2 0 1 19					19	15	0	0 0	
	0	0 0 0 0 0 0 0 0 0 0									
	1	0 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 1 2 3 3									
	1	1 3 0 0 0 0 0 1 0 0									
1984	1	3 2 0 1 20					20	10	0	0 0	
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 2 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 0 2 3 2									
	0	1 0 0 1 0 0 0 0 2 0									
1984	1	3 2 0 1 21					21	4	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 0									
	2	0 1 0 0 0 1 0 0 0 0									
1984	1	3 2 0 1 23					23	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 0 0 0 0 0 0 0 1									
#		3					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2001	1	3 1 0 1 16					16	4	0 0 0		
	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 0 0 0 0 0 1 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2001	1	3 1 0 1 17					17	1	0 0 0		
	0	0 0 0 0 0 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									

2001	1	3 1 0 1 18		18	2	0 0 0
	0	0 0 0 0 0 0 1 0 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2001	1	3 1 0 1 20		20	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2001	1	3 1 0 1 21		21	1	0 0 0
	0	0 0 0 0 0 0 0 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
#		3		3	0	
	0					
			0			
2001	1	3 2 0 1 14		14	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2001	1	3 2 0 1 15		15	4	0 0 0
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 1 1 0				
	0	1 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2001	1	3 2 0 1 16		16	2	0 0 0
	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 0 0 0 0 0 1 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2001	1	3 2 0 1 17		17	2	0 0 0
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2001	1	3 2 0 1 19		19	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 0 0 0 0 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
#		3		3	0	
	0					
			0			
2002	1	3 1 0 1 17		17	1	0 0 0
	0	0 0 0 0 1 0 0 0 0 0				

	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2002	1	3 1 0 1 18		18	1	0 0 0		
	0	0 0 0 0 0 1 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2002	1	3 1 0 1 24		24	1	0 0 0		
	0	0 0 0 0 0 0 1 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
#		3		3	0			
	0							
			0					
2002	1	3 2 0 1 15		15	2	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	1 1 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2002	1	3 2 0 1 16		16	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 1 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
#		3		3	0			
	0							
			0					
#Year	Season	Fleet Gender Part ageerr	Lbin_lo	Lbin_hi 648		4	6	8
	10	12 14 16 18 20 22 24 26 28 30						
	32	34 36 38 40 42 44 46 48 50 52						
	54	56 58 390 4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38						
	40	42 44 46 48 50 52 54 56 58 390						
2003	1	3 1 0 1 13		13	5	0 0 0		
	0	0 0 0 0 1 2 1 0 1 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	1 0 1 1 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2003	1	3 1 0 1 14		14	7	0 0 0		
	0	0 0 0 0 1 0 1 2 1 1						
	1	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 2 1 2 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2003	1	3 1 0 1 15		15	5	0 0 0		
	0	0 0 0 0 0 0 1 2 1 0						
	0	0 1 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						

	0	0 1 5 2 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2003	1	3 1 0 1 16	16	5	0 0 0	
	0	0 0 0 0 0 1 1 1 1 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 3 3 4 7 5 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2003	1	3 1 0 1 17	17	6	0 0 0	
	0	0 0 0 0 0 1 1 3 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 2 2 3 1 1 0				
	0	0 0 0 1 0 0 0 0 0 0				
2003	1	3 1 0 1 18	18	13	0	0 0
	0	0 0 0 0 0 0 1 0 4 4				
	2	2 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 2 3 2 0 2 1				
	1	0 1 0 0 0 0 0 0 0 0				
2003	1	3 1 0 1 19	19	4	0 0 0	
	0	0 0 0 0 0 0 0 0 1 1				
	0	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 0 0 1 1 1 2				
	0	2 2 1 1 0 0 0 0 0 0				
2003	1	3 1 0 1 20	20	4	0 0 0	
	0	0 0 0 0 0 0 0 0 1 1				
	1	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 0 0 0 1 0 0				
	1	0 0 0 0 1 0 0 0 0 0				
2003	1	3 1 0 1 21	21	6	0 0 0	
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 2 2 1 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
2003	1	3 1 0 1 22	22	5	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 1 3 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2003	1	3 1 0 1 23	23	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				

#

0

0

2003	1	3 2 0 1 13	13	3	0 0 0
	0	0 0 0 0 1 2 1 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

2003	1	3 2 0 1 14	14	5	0 0 0	
	0	0 0 0 0 1 0 1 2 1 1				
	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 2 1 2 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2003	1	3 2 0 1 15	15	9	0 0 0	
	0	0 0 0 0 0 0 1 2 1 0				
	0	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 5 2 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2003	1	3 2 0 1 16	16	22	0	0 0
	0	0 0 0 0 0 1 1 1 1 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 3 3 4 7 5 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2003	1	3 2 0 1 17	17	11	0	0 0
	0	0 0 0 0 0 1 1 3 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 2 2 3 1 1 0				
	0	0 0 0 1 0 0 0 0 0 0				
2003	1	3 2 0 1 18	18	14	0	0 0
	0	0 0 0 0 0 0 1 0 4 4				
	2	2 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 2 3 2 0 2 1				
	1	0 1 0 0 0 0 0 0 0 0				
2003	1	3 2 0 1 19	19	13	0	0 0
	0	0 0 0 0 0 0 0 0 1 1				
	0	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 0 0 1 1 1 2				
	0	2 2 1 1 0 0 0 0 0 0				
2003	1	3 2 0 1 20	20	4	0 0 0	
	0	0 0 0 0 0 0 0 0 1 1				
	1	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 0 0 0 1 0 0				
	1	0 0 0 0 1 0 0 0 0 0				
2003	1	3 2 0 1 21	21	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 2 2 1 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 0 0 0 0				

#

0

0

2004	1	3 1 0 1 13	13	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 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 1 0 1 14	14	2	0 0 0
	0	0 0 0 0 1 0 0 0 1 0			

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 1 0 1 15	15	2	0 0 0
	0	0 0 0 0 0 1 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 2 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 1 0 1 18	18	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 1 0 1 22	22	1	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2004	1	3 2 0 1 13	13	1	0 0 0
	0	0 0 0 0 0 2 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 2 0 1 14	14	1	0 0 0
	0	0 0 0 0 1 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 2 0 1 15	15	2	0 0 0
	0	0 0 0 0 0 1 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 2 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 2 0 1 16	16	4	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 1 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 2 0 1 17	17	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	3 2 0 1 19	19	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

0 0 0 0 0 0 0 0 1 0 0
1 0 0 0 0 0 0 0 0 0 0
#

0

0

2005	1	3 1 0 1 11	11	1	0 0 0
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 14	14	1	0 0 0
	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 15	15	5	0 0 0
	0	0 0 0 0 0 1 2 2 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 2 1 0 0 1 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 16	16	6	0 0 0
	0	0 0 0 0 0 0 1 1 2 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 1 2 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 17	17	6	0 0 0
	0	0 0 0 0 0 0 1 0 3 1			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 1 2 3 0 1 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
2005	1	3 1 0 1 18	18	1	0 0 0
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 1 1 0 0 1 0 2			
	0	0 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 19	19	4	0 0 0
	0	0 0 0 0 0 0 0 0 2 0			
	1	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 20	20	5	0 0 0
	0	0 0 0 0 0 0 0 1 0 1			
	0	0 3 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 2 0			
	0	1 0 0 0 0 0 0 0 0 0			
2005	1	3 1 0 1 21	21	5	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	2	0 1 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			

2005 1 3 1 0 1 22 22 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 2 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 0 0 0 0 0
0 1 0 0 0 0 0 0 0 0 0
2005 1 3 1 0 1 23 23 2 0 0 0
0 0 0 0 0 0 0 0 0 0 1
0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2005 1 3 1 0 1 24 24 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2005 1 3 1 0 1 25 25 2 0 0 0
0 0 0 0 0 0 0 0 0 1 0
0 0 0 0 0 0 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
#

0

0
2005 1 3 2 0 1 15 15 5 0 0 0
0 0 0 0 0 0 1 2 2 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 2 1 0 0 1 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0
2005 1 3 2 0 1 16 16 5 0 0 0
0 0 0 0 0 0 0 1 1 2 1
1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 1 2 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2005 1 3 2 0 1 17 17 9 0 0 0
0 0 0 0 0 0 0 1 0 3 1
0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 1 2 3 0 1 0 0 0
0 0 0 0 1 0 0 0 0 0 0
2005 1 3 2 0 1 18 18 6 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 1 1 1 0 0 1 0 2
0 0 0 0 0 0 0 0 0 0 0
2005 1 3 2 0 1 19 19 3 0 0 0
0 0 0 0 0 0 0 0 0 2 0
1 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 0 0 1 1 0
0 0 0 0 0 0 0 0 0 0 0
2005 1 3 2 0 1 20 20 4 0 0 0
0 0 0 0 0 0 0 0 1 0 1

	0	0 3 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 1 2 0					
	0	1 0 0 0 0 0 0 0 0 0					
2005	1	3 2 0 1 21	21	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 1					
	2	0 1 0 1 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 1 0 0 0 0 0 0 0					
2005	1	3 2 0 1 22	22	2	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 2 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 1 0 0 0 0 0					
	0	1 0 0 0 0 0 0 0 0 0					
2005	1	3 2 0 1 26	26	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 1 0 0 0 0 0 0 0					
#							
							0
		0					
2006	1	3 1 0 1 12	12	2	0 0 0		
	0	0 0 0 0 1 1 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 1					
	0	0 1 1 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2006	1	3 1 0 1 13	13	9	0 0 0		
	0	0 1 1 1 2 1 1 0 0 2					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 1					
	1	2 1 1 1 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2006	1	3 1 0 1 14	14	4	0 0 0		
	0	0 0 0 0 1 0 0 2 1 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	2	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2006	1	3 1 0 1 15	15	10	0	0 0	
	0	0 0 0 1 1 2 1 1 2 1					
	0	1 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	1	1 1 1 0 3 0 1 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2006	1	3 1 0 1 16	16	10	0	0 0	
	0	0 0 0 0 0 1 1 1 2 1					
	4	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 1 0 2 1 1 1 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2006	1	3 1 0 1 17	17	4	0 0 0		
	0	0 0 0 0 0 0 0 1 1 1					
	1	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					

	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 1 0 1 19	19	4	0 0 0
	0	0 0 0 0 0 0 0 2 0 0			
	0	1 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 1 0 1 20	20	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 1 0 1 24	24	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2006	1	3 2 0 1 12	12	3	0 0 0
	0	0 0 0 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 1 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 2 0 1 13	13	7	0 0 0
	0	0 1 1 1 2 1 1 0 0 2			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	1	2 1 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 2 0 1 14	14	2	0 0 0
	0	0 0 0 0 1 0 0 2 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	2	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 2 0 1 15	15	8	0 0 0
	0	0 0 0 1 1 2 1 1 2 1			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 1 1 0 3 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 2 0 1 16	16	6	0 0 0
	0	0 0 0 0 0 1 1 1 2 1			
	4	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 2 1 1 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	3 2 0 1 17	17	1	0 0 0
	0	0 0 0 0 0 0 0 1 1 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

2006	1	3 2 0 1 20	20	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2007	1	3 1 0 1 12	12	1	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 14	14	2	0 0 0
	0	0 0 0 0 0 2 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 15	15	4	0 0 0
	0	0 0 0 0 0 1 0 1 0 0			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 16	16	4	0 0 0
	0	0 0 0 0 0 0 2 2 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 18	18	4	0 0 0
	0	0 0 0 0 0 1 1 1 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 19	19	3	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 20	20	3	0 0 0
	0	0 0 0 0 0 0 0 0 2 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	1	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 21	21	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 22	22	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			

	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 23	23	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 24	24	4	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 2 0 0 0 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 25	25	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 1 0 1 27	27	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2007	1	3 2 0 1 12	12	1	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 14	14	1	0 0 0
	0	0 0 0 0 0 2 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 15	15	1	0 0 0
	0	0 0 0 0 0 1 0 1 0 0			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 16	16	1	0 0 0
	0	0 0 0 0 0 0 2 2 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 17	17	6	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

	0	0 0 0 0 3 3 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 18	18	3	0 0 0
	0	0 0 0 0 0 1 1 1 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 19	19	2	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 20	20	2	0 0 0
	0	0 0 0 0 0 0 0 0 2 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	1	0 0 0 0 0 0 0 0 0 0			
2007	1	3 2 0 1 21	21	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
#					

0

0

2008	1	3 1 0 1 12	12	2	0 0 0
	0	0 0 0 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 13	13	6	0 0 0
	0	0 0 0 0 1 1 2 0 0 2			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 0 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 14	14	6	0 0 0
	0	0 0 0 0 0 0 2 2 2 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 1 0 0 0 0 0 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 15	15	4	0 0 0
	0	0 0 0 0 0 0 1 1 1 0			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 2 1 3 0 0 0 0 0			
	1	0 1 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 16	16	8	0 0 0
	0	0 0 0 0 0 0 1 5 2 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 1 0 0 0 0			
	0	1 0 0 0 0 0 0 0 1 0			

2008	1	3 1 0 1 17	17	4	0 0 0
	0	0 0 0 0 0 0 1 0 1 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 2 1 0 4 0 2 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 18	18	7	0 0 0
	0	0 0 0 0 0 1 0 2 4 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 19	19	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 20	20	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 21	21	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 22	22	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 23	23	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 1 0 1 25	25	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2008	1	3 2 0 1 13	13	4	0 0 0
	0	0 0 0 0 1 1 2 0 0 2			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 0 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	3 2 0 1 14	14	3	0 0 0
	0	0 0 0 0 0 0 2 2 2 0			

0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 1 1 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0 0 0 0
2008 1 3 2 0 1 15 15 9 0 0 0
0 0 0 0 0 0 0 1 1 1 0
1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1
0 0 0 2 1 3 0 0 0 0 0
1 0 1 0 0 0 0 0 0 0 0
2008 1 3 2 0 1 16 16 3 0 0 0
0 0 0 0 0 0 0 1 5 2 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 1 0 0 0 0
0 1 0 0 0 0 0 0 0 1 0
2008 1 3 2 0 1 17 17 9 0 0 0
0 0 0 0 0 0 0 1 0 1 1
1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 2 1 0 4 0 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2008 1 3 2 0 1 19 19 1 0 0 0
0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2008 1 3 2 0 1 20 20 2 0 0 0
0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
#
0
0
#
0
0
Combined trawl survey
0
0
#Year Season Fleet Gender Part ageerr Lbin_lo Lbin_hi 648 4 6 8
10 12 14 16 18 20 22 24 26 28 30
32 34 36 38 40 42 44 46 48 50 52
54 56 58 390 4 6 8 10 12 14 16
18 20 22 24 26 28 30 32 34 36 38
40 42 44 46 48 50 52 54 56 58 390
2003 1 6 1 0 1 9 9 5 0 0 0
1 0 3 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0 0

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 10	10	4	0 0 0
	0	0 1 1 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 11	11	7	0 0 0
	0	0 2 2 0 2 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 12	12	3	0 0 0
	0	0 0 1 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 13	13	2	0 0 0
	0	0 0 0 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 14	14	3	0 0 0
	0	0 0 0 0 2 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 15	15	2	0 0 0
	0	0 0 1 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 16	16	2	0 0 0
	0	0 0 0 0 0 1 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 1 0 0 1 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
2003	1	6 1 0 1 17	17	1	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 1 0 0 1 1 0			
	1	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 18	18	1	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 1 0 0 0 0 0			
	1	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 19	19	1	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

2003	1	6 1 0 1 21	21	2	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 24	24	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 1 0 1 25	25	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2003	1	6 2 0 1 7 7 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 2 0 1 9 9 1 0 0 0			
	1	0 3 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 2 0 1 10	10	2	0 0 0
	0	0 1 1 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 2 0 1 11	11	3	0 0 0
	0	0 2 2 0 2 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 2 0 1 12	12	2	0 0 0
	0	0 0 1 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 2 0 1 13	13	2	0 0 0
	0	0 0 0 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2003	1	6 2 0 1 14	14	1	0 0 0
	0	0 0 0 0 2 0 0 1 0 0			

	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2003	1	6 2 0 1 15					15	1	0 0 0		
	0	0 0 1 0 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2003	1	6 2 0 1 16					16	4	0 0 0		
	0	0 0 0 0 0 1 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 1 0 0 1 0 0									
	0	0 0 0 1 0 0 0 0 0 0									
2003	1	6 2 0 1 17					17	5	0 0 0		
	0	0 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 1 0 0 1 1 0									
	1	0 0 0 0 0 0 0 0 0 0									
2003	1	6 2 0 1 18					18	3	0 0 0		
	0	0 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 1 0 0 0 0 0									
	1	0 0 0 0 0 0 0 0 0 0									
2003	1	6 2 0 1 19					19	2	0 0 0		
	0	0 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 0 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2003	1	6 2 0 1 20					20	2	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 2 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
#		3					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2004	1	6 1 0 1 5 5 1 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2004	1	6 1 0 1 6 6 2 0 1 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 0 1 0 1 0 0									

	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 7 7 2 0 0 0				
	2	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 0 2 1 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 8 8 5 0 0 2				
	2	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 1 4 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 10	10	3	0 0 1	
	0	0 1 0 1 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 1 0 0 1 4				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 11	11	10	0	0 0
	0	0 0 4 4 1 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 2 1				
	4	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 12	12	9	0 0 0	
	0	0 4 3 1 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 1 1 1				
	1	2 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 13	13	3	0 0 0	
	0	0 1 0 0 1 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 2				
	3	0 0 1 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 14	14	2	0 0 0	
	0	1 0 0 0 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	1	0 0 1 2 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 15	15	1	0 0 0	
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	1	1 1 1 1 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 16	16	2	0 0 0	
	0	0 0 0 0 1 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2004	1	6 1 0 1 17	17	2	0 0 0	
	0	0 0 0 0 0 0 1 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 2 1 0 1 2 0 0				
	0	0 0 0 0 0 0 0 0 0 0				

2004	1	6 1 0 1 18	18	1	0 0 0
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 1 0 1 19	19	2	0 0 0
	0	0 0 0 0 0 0 0 0 2 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 1 1 1 1 0			
	1	0 0 0 0 0 0 0 0 0 0			
2004	1	6 1 0 1 20	20	3	0 0 0
	0	0 0 0 0 0 1 0 0 0 0			
	0	1 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 1 0 1 21	21	3	0 0 0
	0	0 0 1 0 0 0 0 0 0 0			
	2	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 1 0 1 23	23	2	0 0 0
	0	0 0 0 0 0 0 0 0 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 1 0 1 24	24	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 1 0 1 25	25	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2004	1	6 2 0 1 4 4 1 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 1 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
2004	1	6 2 0 1 6 6 3 0 1 1
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 1 0 1 0 1 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
2004	1	6 2 0 1 7 7 6 0 0 0
	2	0 0 0 0 0 0 0 0 0 0

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 2 1 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 8 8 5 0 0 2			
	2	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 4 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 9 9 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 10	10	7	0 0 1
	0	0 1 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 1 4			
	0	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 11	11	7	0 0 0
	0	0 0 4 4 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 2 1			
	4	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 12	12	6	0 0 0
	0	0 4 3 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 1 1			
	1	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 13	13	7	0 0 0
	0	0 1 0 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 2			
	3	0 0 1 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 14	14	4	0 0 0
	0	1 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	0 0 1 2 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 15	15	6	0 0 0
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 1 1 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 16	16	1	0 0 0
	0	0 0 0 0 1 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2004	1	6 2 0 1 17	17	7	0 0 0
	0	0 0 0 0 0 0 1 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

0 0 0 1 2 1 0 1 2 0 0
0 0 0 0 0 0 0 0 0 0 0
2004 1 6 2 0 1 18 18 1 0 0 0
0 0 0 0 0 0 0 0 0 1 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2004 1 6 2 0 1 19 19 6 0 0 0
0 0 0 0 0 0 0 0 0 2 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 0 1 1 1 1 0
1 0 0 0 0 0 0 0 0 0 0
2004 1 6 2 0 1 20 20 1 0 0 0
0 0 0 0 0 0 1 0 0 0 0
0 1 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0
2004 1 6 2 0 1 23 23 1 0 0 0
0 0 0 0 0 0 0 0 0 1 1
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2004 1 6 2 0 1 25 25 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
#

0

0
#Year Season Fleet Gender Part ageerr #Lbin_l Lbin_hi 648 4 6 8
10 12 14 16 18 20 22 24 26 28 30
32 34 36 38 40 42 44 46 48 50 52
54 56 58 390 4 6 8 10 12 14 16
18 20 22 24 26 28 30 32 34 36 38
40 42 44 46 48 50 52 54 56 58 390
2005 1 6 1 0 1 5 5 1 0 0 0
0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2005 1 6 1 0 1 7 7 1 0 0 0
1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 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
2005 1 6 1 0 1 8 8 11 0 0 1
3 3 3 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 0 1
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0

2005	1	6 1 0 1 9 9 2 0 0 0				
	0	0 1 0 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 2 1 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 10	10	9	0 0 0	
	0	1 1 3 4 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 1 2				
	3	4 2 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 11	11	13	0	0 0
	0	1 1 1 6 2 1 0 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	3	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 12	12	7	0 0 0	
	0	0 0 2 2 1 0 0 1 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 2				
	3	3 3 2 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 13	13	4	0 0 0	
	0	0 0 0 1 1 0 1 0 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 2 2 3 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 14	14	7	0 0 0	
	0	0 0 0 1 2 1 3 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 2 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 15	15	5	0 0 0	
	0	0 0 0 0 0 1 1 1 2 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 4 2 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 16	16	3	0 0 0	
	0	0 0 0 0 0 0 0 2 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 3 2 1 2 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 17	17	4	0 0 0	
	0	0 0 0 0 0 0 0 2 0 1				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 1 0 3 2 0 0				
	0	0 1 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 18	18	4	0 0 0	
	0	0 0 0 0 0 0 0 1 1 0				
	1	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 1 0 0 0 0 0 0				
2005	1	6 1 0 1 19	19	4	0 0 0	
	0	0 0 0 0 0 0 0 0 0 3				

	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 20	20	4	0 0 0	
	0	0 0 0 0 0 0 0 0 2 0				
	1	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 1 0 0 0				
2005	1	6 1 0 1 21	21	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 1 0 1 23	23	1	0 0 0	
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
2005	1	6 1 0 1 27	27	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
#						
						0
		0				
2005	1	6 2 0 1 6 6 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 7 7 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 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				
2005	1	6 2 0 1 8 8 2 0 0 1				
	3	3 3 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 9 9 5 0 0 0				
	0	0 1 0 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 2 1 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 10	10	12	0	0 0
	0	1 1 3 4 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 1 2				

	3	4 2 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 11	11	4	0 0 0	
	0	1 1 1 6 2 1 0 0 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	3	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 12	12	13	0	0 0
	0	0 0 2 2 1 0 0 1 0 0				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 2				
	3	3 3 2 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 13	13	8	0 0 0	
	0	0 0 0 1 1 0 1 0 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 2 2 3 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 14	14	3	0 0 0	
	0	0 0 0 1 2 1 3 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 2 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 15	15	8	0 0 0	
	0	0 0 0 0 0 1 1 1 2 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 4 2 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 16	16	9	0 0 0	
	0	0 0 0 0 0 0 0 2 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 3 2 1 2 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 17	17	9	0 0 0	
	0	0 0 0 0 0 0 0 2 0 1				
	0	1 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 1 1 0 3 2 0 0				
	0	0 1 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 18	18	2	0 0 0	
	0	0 0 0 0 0 0 0 1 1 0				
	1	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 1 0 0 0 0 0 0				
2005	1	6 2 0 1 19	19	1	0 0 0	
	0	0 0 0 0 0 0 0 0 0 3				
	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2005	1	6 2 0 1 20	20	1	0 0 0	
	0	0 0 0 0 0 0 0 0 2 0				
	1	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 0 0 0 0 1 0 0 0				

2005	1	6 2 0 1 22					22	3	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 0 1 1 0 0 0 0 0 0									
2005	1	6 2 0 1 23					23	0	0 0 0		
	0	0 0 0 0 0 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 1 0 0 0									
#		3					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2006	1	6 1 0 1 5 5 1 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	6 1 0 1 6 6 2 0 0 0									
	1	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 3 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	6 1 0 1 7 7 2 0 0 0									
	0	2 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 1 1 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	6 1 0 1 8 8 11							0	0 0	
	0	2 6 3 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	6 1 0 1 9 9 6 0 0 0									
	0	0 3 1 1 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 2 0 2									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	6 1 0 1 10					10	3	0 0 0		
	0	0 0 1 0 0 1 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 1									
	0	0 0 1 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	6 1 0 1 11					11	7	0 0 0		
	0	0 1 2 3 1 0 0 0 0 0									

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	1	2 0 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 12	12	6	0 0 0
	0	0 0 0 1 1 1 2 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	2	1 2 1 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 13	13	9	0 0 0
	0	0 0 0 0 3 2 1 1 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 0 3 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 14	14	2	0 0 0
	0	0 0 1 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 15	15	2	0 0 0
	0	0 0 0 0 0 0 0 2 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 2 0 2 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 16	16	7	0 0 0
	0	0 0 0 1 0 0 1 1 3 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 17	17	2	0 0 0
	0	0 0 0 0 1 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 2 1 0 1 1 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 18	18	5	0 0 0
	0	0 0 0 0 0 1 0 0 1 1			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 20	20	3	0 0 0
	0	0 0 0 0 0 1 0 0 0 1			
	0	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 0			
2006	1	6 1 0 1 21	21	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 2 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 22	22	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 23	23	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 1 0 1 24	24	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

2006	1	6 2 0 1 4 4 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 5 5 2 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 6 6 4 0 0 0			
	1	1 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 3 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 7 7 4 0 0 0			
	0	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 1 1 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 8 8 1 0 0 0			
	0	2 6 3 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 9 9 4 0 0 0			
	0	0 3 1 1 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 2 0 2			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 10	10	4	0 0 0
	0	0 0 1 0 0 1 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 1			
	0	0 0 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

2006	1	6 2 0 1 11	11	6	0 0 0
	0	0 1 2 3 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	1	2 0 1 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 12	12	7	0 0 0
	0	0 0 0 1 1 1 2 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	2	1 2 1 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 13	13	5	0 0 0
	0	0 0 0 0 3 2 1 1 1 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	1 0 3 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 14	14	1	0 0 0
	0	0 0 1 0 0 0 0 0 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 15	15	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 0 0 0 1			
	0	0 0 0 2 0 2 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 16	16	2	0 0 0
	0	0 0 0 1 0 0 1 1 3 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 17	17	7	0 0 0
	0	0 0 0 0 1 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 2 1 0 1 1 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 18	18	1	0 0 0
	0	0 0 0 0 0 1 0 0 1 1			
	1	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2006	1	6 2 0 1 20	20	0	0 0 0
	0	0 0 0 0 0 1 0 0 0 1			
	0	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 1 0 0			
2006	1	6 2 0 1 21	21	1	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 2 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

											0
				0							
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2007	1	6 1 0 1 6 6 1 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 9 9 1 0 0 0									
	0	0 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 10					10	6	0 0 0		
	0	0 0 2 3 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 3									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 11					11	4	0 0 0		
	0	0 0 0 3 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 1 2									
	2	1 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 12					12	7	0 0 0		
	0	0 0 0 1 1 3 2 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 13					13	12	0	0 0	
	0	0 0 0 0 3 5 1 2 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	3 2 2 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 14					14	8	0 0 0		
	0	0 0 0 0 1 1 4 0 2 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 4 7 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 15					15	6	0 0 0		
	0	0 0 0 0 0 1 1 2 1 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 3 1 1 2 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2007	1	6 1 0 1 16					16	7	0 0 0		
	0	0 0 0 0 0 0 1 4 2 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									

	0	0 1 1 3 1 1 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 1 0 1 17	17	14	0	0 0
	0	0 0 0 0 0 0 0 5 2 4				
	1	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 2 7 2 0 3 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 1 0 1 18	18	10	0	0 0
	0	0 0 0 0 0 0 0 3 4 1				
	0	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 1 3 2 1 7 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 1 0 1 19	19	7	0 0 0	
	0	0 0 0 0 0 0 0 2 0 1				
	1	1 1 0 0 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 1 1 0				
	1	1 0 0 0 0 0 0 0 0 0				
2007	1	6 1 0 1 20	20	3	0 0 0	
	0	0 0 0 0 0 0 0 0 0 2				
	0	0 0 0 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 0 1 0 0 0 0				
	0	0 1 0 1 0 0 0 0 0 0				
2007	1	6 1 0 1 21	21	5	0 0 0	
	0	0 0 0 0 0 0 0 0 0 2				
	0	1 0 2 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 1 1 0 0 0 0				
2007	1	6 1 0 1 23	23	3	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 1 0 0 0 1 1 0 0				
	0	0 0 0 0 0 0 0 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

2007	1	6 2 0 1 7 7 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	6 2 0 1 9 9 2 0 0 0			
	0	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2007	1	6 2 0 1 10	10	5	0 0 0
	0	0 0 2 3 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 3			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

2007	1	6 2 0 1 11	11	7	0 0 0	
	0	0 0 0 3 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 1 2				
	2	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 12	12	2	0 0 0	
	0	0 0 0 1 1 3 2 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 13	13	8	0 0 0	
	0	0 0 0 0 3 5 1 2 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	3 2 2 0 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 14	14	12	0	0 0
	0	0 0 0 0 1 1 4 0 2 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 4 7 1 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 15	15	7	0 0 0	
	0	0 0 0 0 0 1 1 2 1 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 3 1 1 2 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 16	16	8	0 0 0	
	0	0 0 0 0 0 0 1 4 2 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 1 3 1 1 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 17	17	16	0	0 0
	0	0 0 0 0 0 0 0 5 2 4				
	1	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 2 7 2 0 3 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 18	18	14	0	0 0
	0	0 0 0 0 0 0 0 3 4 1				
	0	1 0 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 1 3 2 1 7 0				
	0	0 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 19	19	4	0 0 0	
	0	0 0 0 0 0 0 0 2 0 1				
	1	1 1 0 0 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 1 1 0				
	1	1 0 0 0 0 0 0 0 0 0				
2007	1	6 2 0 1 20	20	4	0 0 0	
	0	0 0 0 0 0 0 0 0 0 2				
	0	0 0 0 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 0 1 0 0 0 0				
	0	0 1 0 1 0 0 0 0 0 0				
2007	1	6 2 0 1 21	21	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 2				

	0	1 0 2 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 1 1 0 0 0 0									
2007	1	6 2 0 1 22					22	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 0 0 0 0 0 0 0 0									
2007	1	6 2 0 1 23					23	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 1 1 0 0									
	0	0 0 0 0 0 0 0 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									
2007	1	6 2 0 1 27					27	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 0 0 0 0 0 0									
#		3					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2008	1	6 1 0 1 7 7 3 0 0 1									
	2	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2008	1	6 1 0 1 8 8 3 0 0 0									
	0	2 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2008	1	6 1 0 1 9 9 4 0 0 0									
	0	1 1 2 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 1 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2008	1	6 1 0 1 10					10	2	0 0 0		
	0	0 1 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 1 1 0 4									
	3	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2008	1	6 1 0 1 11					11	4	0 0 0		
	0	0 0 1 2 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 4									

	4	2 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 12	12	12	0	0 0
	0	0 1 1 2 3 4 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 1 0 3				
	2	2 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 13	13	13	0	0 0
	0	0 0 1 2 3 3 3 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	2	1 2 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 14	14	6	0 0 0	
	0	0 0 1 2 2 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	1	2 1 3 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 15	15	5	0 0 0	
	0	0 0 0 2 0 1 0 2 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 1 2 1 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 16	16	4	0 0 0	
	0	0 0 0 0 0 0 2 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 0 2 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 17	17	1	0 0 0	
	0	0 0 0 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 2 1 1 0 1 0				
	0	0 0 0 0 0 1 0 0 0 0				
2008	1	6 1 0 1 18	18	4	0 0 0	
	0	0 0 0 0 0 0 0 0 1 2				
	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 0 1 0 2 0 2 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 19	19	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 1 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 1 0 0 1 0				
	1	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 21	21	3	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	1	1 0 0 0 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2008	1	6 1 0 1 22	22	4	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 2 0 0 2 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				

2008	1	6 1 0 1 23		23	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 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					
2008	1	6 1 0 1 24		24	2	0 0 0	
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 1 0 0 0 1 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
#		3		3	0		
	0						
			0				
2008	1	6 2 0 1 8 8 1 0 0 0					
	0	2 1 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 1 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 9 9 2 0 0 0					
	0	1 1 2 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 1 0 0 1					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 10		10	9	0 0 0	
	0	0 1 1 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 1 1 0 4					
	3	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 11		11	11	0	0 0
	0	0 0 1 2 1 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 1 4					
	4	2 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 12		12	9	0 0 0	
	0	0 1 1 2 3 4 1 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 1 0 3					
	2	2 1 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 13		13	6	0 0 0	
	0	0 0 1 2 3 3 3 1 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 1					
	2	1 2 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 14		14	8	0 0 0	
	0	0 0 1 2 2 0 1 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 1					
	1	2 1 3 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2008	1	6 2 0 1 15		15	6	0 0 0	
	0	0 0 0 2 0 1 0 2 0 0					

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 1 2 1 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	6 2 0 1 16	16	4	0 0 0
	0	0 0 0 0 0 2 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 0 2 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	6 2 0 1 17	17	5	0 0 0
	0	0 0 0 0 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 2 1 1 0 1 0			
	0	0 0 0 0 0 1 0 0 0 0			
2008	1	6 2 0 1 18	18	6	0 0 0
	0	0 0 0 0 0 0 0 0 1 2			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 0 1 0 2 0 2 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2008	1	6 2 0 1 19	19	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 1 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 1 0			
	1	0 0 0 0 0 0 0 0 0 0			
2008	1	6 2 0 1 20	20	3	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 1 1			
	1	0 0 0 0 0 0 0 0 0 0			

#

0

0

#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi 648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30								
	32	34 36 38 40 42 44 46 48 50 52								
	54	56 58 390		4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38								
	40	42 44 46 48 50 52 54 56 58 390								
2009	1	6 1 0 1 4 4 6 4 2 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 3 3 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2009	1	6 1 0 1 5 5 3 1 2 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 3 1 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2009	1	6 1 0 1 6 6 5 1 0 3								
	1	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 1 1 0 0 0 0								

	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 7 7 7 0 0 3			
	4	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 8 8 6 0 1 2			
	2	0 1 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 1 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 9 9 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 10	10	7	0 0 0
	0	0 3 1 2 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 11	11	3	0 0 0
	0	0 0 1 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 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			
2009	1	6 1 0 1 12	12	2	0 0 0
	0	0 0 0 1 0 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 13	13	6	0 0 0
	0	0 0 1 1 3 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	1 0 1 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 14	14	1	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 2 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 15	15	7	0 0 0
	0	0 0 0 0 1 1 0 2 1 1			
	1	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	1	0 0 2 1 1 3 3 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 16	16	6	0 0 0
	0	0 0 0 0 0 0 0 1 0 2			
	3	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 1 2 3 2 5 3 0 2 0			
	0	1 0 0 0 0 0 0 0 0 0			

2009	1	6 1 0 1 17	17	6	0 0 0
	0	0 0 0 0 0 0 0 1 2 1			
	0	2 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 1 3 1 2 0 1 0 1			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 18	18	6	0 0 0
	0	0 0 0 0 0 0 0 0 2 0			
	1	1 2 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 1 1 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
2009	1	6 1 0 1 19	19	3	0 0 0
	0	0 0 0 0 0 0 0 1 0 0			
	0	0 0 0 1 0 0 0 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 1 0 0 0 0			
2009	1	6 1 0 1 20	20	5	0 0 0
	0	0 0 0 0 0 0 0 0 1 0			
	0	0 0 1 0 1 0 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 1			
2009	1	6 1 0 1 21	21	2	0 0 0
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 1 1 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0			

#

0

0

#

0

0

2009	1	6 2 0 1 4 4 6 4 2 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 3 3 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
2009	1	6 2 0 1 5 5 4 1 2 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 3 1 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
2009	1	6 2 0 1 6 6 2 1 0 3
	1	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 1 1 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
	0	0 0 0 0 0 0 0 0 0 0
2009	1	6 2 0 1 7 7 1 0 0 3
	4	0 0 0 0 0 0 0 0 0 0

	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 8 8 2 0 1 2				
	2	0 1 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 9 9 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 10	10	0	0 0 0	
	0	0 3 1 2 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 11	11	1	0 0 0	
	0	0 0 1 1 1 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 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				
2009	1	6 2 0 1 12	12	1	0 0 0	
	0	0 0 0 1 0 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 1				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 13	13	3	0 0 0	
	0	0 0 1 1 3 1 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	1 0 1 0 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 14	14	3	0 0 0	
	0	0 0 0 0 0 0 0 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 1 2 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 15	15	12	0	0 0
	0	0 0 0 0 1 1 0 2 1 1				
	1	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	1	0 0 2 1 1 3 3 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 16	16	19	0	0 0
	0	0 0 0 0 0 0 0 1 0 2				
	3	0 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				
	0	0 1 2 3 2 5 3 0 2 0				
	0	1 0 0 0 0 0 0 0 0 0				
2009	1	6 2 0 1 17	17	9	0 0 0	
	0	0 0 0 0 0 0 0 1 2 1				
	0	2 0 0 0 0 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0				

	0	0 0 1 3 1 2 0 1 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
2009	1	6 2 0 1 18					18	3	0 0 0		
	0	0 0 0 0 0 0 0 0 2 0									
	1	1 2 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 1 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2009	1	6 2 0 1 19					19	0	0 0 0		
	0	0 0 0 0 0 0 0 1 0 0									
	0	0 0 0 1 0 0 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 0 0 0 0									
2009	1	6 2 0 1 20					20	0	0 0 0		
	0	0 0 0 0 0 0 0 0 1 0									
	0	0 0 1 0 1 0 0 1 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
2009	1	6 2 0 1 21					21	0	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
#											
											0
				0							
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
1985	1	7 1 0 1 14					14	4	0 0 0		
	0	0 0 0 1 1 0 1 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1985	1	7 1 0 1 15					15	7	0 0 0		
	0	0 0 0 1 1 4 0 0 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 0									
	1	2 0 1 1 0 2 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1985	1	7 1 0 1 16					16	18	0	0 0	
	0	1 0 0 3 1 1 2 2 4 2									
	1	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 2 6									
	2	2 1 8 9 5 1 1 2 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1985	1	7 1 0 1 17					17	30	0	0 0	
	0	0 0 1 0 5 2 3 6 6 3									
	1	1 1 0 0 0 0 0 1 0 0									
	0	0 0 0 0 0 0 0 0 1 1									
	1	1 5 5 2 8 10						4	6 3 1		
	0	0 0 0 1 1 1 0 0 0 0									

1985	1	7 1 0 1 18	18	31	0	0 0	
	0	0 0 0 1 3 3 4 1 2 6					
	6	1 2 1 0 0 0 0 0 0 1					
	0	0 0 0 0 0 0 0 0 0 0					
	0	2 2 6 9 9 9 3 7 13					7
	5	0 1 0 0 0 0 0 0 0 0					
1985	1	7 1 0 1 19	19	46	0	0 0	
	0	0 0 0 0 0 2 5 3 6 9					
	3	6 3 2 3 0 2 0 1 0 0					
	1	0 0 0 0 0 0 0 0 0 0					
	0	0 2 0 3 6 7 5 9 9 7					
	2	4 4 0 0 0 0 0 1 0 0					
1985	1	7 1 0 1 20	20	63	0	0 0	
	0	0 0 0 0 0 0 7 4 5 10					
	7	7 6 7 5 4 1 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 2 2 2 1 4 4 2 7 2					
	1	5 1 0 1 0 0 0 0 2 0					
1985	1	7 1 0 1 21	21	42	0	0 0	
	0	0 0 0 0 0 0 4 5 2 7					
	7	7 2 2 3 0 1 1 1 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 1 1 2 1 1 0 2 0					
	2	0 1 0 0 1 1 0 0 0 0					
1985	1	7 1 0 1 22	22	31	0	0 0	
	0	0 0 0 0 0 0 1 3 2 4					
	5	9 2 2 0 0 0 1 2 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
1985	1	7 1 0 1 23	23	7	0 0 0		
	0	0 0 0 0 0 0 0 0 1 1					
	0	0 1 1 1 1 1 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 1 0 0 0 0 0 0 0 1					
1985	1	7 1 0 1 24	24	5	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0					
	0	2 2 0 0 0 0 0 0 1 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
1985	1	7 1 0 1 25	25	3	0 0 0		
	0	0 0 0 0 0 0 0 0 0 1					
	0	0 1 0 0 1 0 0 0 0 0					
	0	0 0 0 0 0 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					
1985	1	7 1 0 1 26	26	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 1 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
#		3	3	0			

0

0

#Year Season Fleet Gender Part ageerr Lbin_lo Lbin_hi 648 4 6 8
10 12 14 16 18 20 22 24 26 28 30

	32	34 36 38 40 42 44 46 48 50 52							
	54	56 58 390	4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38							
	40	42 44 46 48 50 52 54 56 58 390							
1985	1	7 2 0 1 14			14	2	0 0 0		
	0	0 0 0 1 1 0 1 1 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 1							
	0	0 0 1 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
1985	1	7 2 0 1 15			15	8	0 0 0		
	0	0 0 0 1 1 4 0 0 1 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 1 0							
	1	2 0 1 1 0 2 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
1985	1	7 2 0 1 16			16	39	0	0 0	
	0	1 0 0 3 1 1 2 2 4 2							
	1	1 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 2 6							
	2	2 1 8 9 5 1 1 2 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
1985	1	7 2 0 1 17			17	50	0	0 0	
	0	0 0 1 0 5 2 3 6 6 3							
	1	1 1 0 0 0 0 0 1 0 0							
	0	0 0 0 0 0 0 0 0 1 1							
	1	1 5 5 2 8 10				4	6 3 1		
	0	0 0 0 1 1 1 0 0 0 0							
1985	1	7 2 0 1 18			18	73	0	0 0	
	0	0 0 0 1 3 3 4 1 2 6							
	6	1 2 1 0 0 0 0 0 0 1							
	0	0 0 0 0 0 0 0 0 0 0							
	0	2 2 6 9 9 9 3 7 13							7
	5	0 1 0 0 0 0 0 0 0 0							
1985	1	7 2 0 1 19			19	58	0	0 0	
	0	0 0 0 0 0 2 5 3 6 9							
	3	6 3 2 3 0 2 0 1 0 0							
	1	0 0 0 0 0 0 0 0 0 0							
	0	0 2 0 3 6 7 5 9 9 7							
	2	4 4 0 0 0 0 0 1 0 0							
1985	1	7 2 0 1 20			20	34	0	0 0	
	0	0 0 0 0 0 0 7 4 5 10							
	7	7 6 7 5 4 1 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 2 2 2 1 4 4 2 7 2							
	1	5 1 0 1 0 0 0 0 2 0							
1985	1	7 2 0 1 21			21	12	0	0 0	
	0	0 0 0 0 0 0 4 5 2 7							
	7	7 2 2 3 0 1 1 1 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 1 1 2 1 1 0 2 0							
	2	0 1 0 0 1 1 0 0 0 0							
1985	1	7 2 0 1 23			23	1	0 0 0		
	0	0 0 0 0 0 0 0 0 1 1							
	0	0 1 1 1 1 1 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 1 0 0 0 0 0 0 0 1							
1985	1	7 2 0 1 25			25	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 1							
	0	0 1 0 0 1 0 0 0 0 0							
	0	0 0 0 0 0 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									
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi 648		4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2005	1	9 1 0 1 11					11	1	0 0 0		
	0	0 0 0 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2005	1	9 1 0 1 12					12	5	0 0 0		
	0	0 0 0 0 2 3 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	0	0 1 1 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2005	1	9 1 0 1 13					13	23	0	0 0	
	0	0 1 1 1 4 6 4 1 1 4									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 2									
	2	4 1 3 3 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2005	1	9 1 0 1 14					14	23	0	0 0	
	0	0 0 0 0 4 2 3 7 5 1									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	2	1 4 3 3 0 0 0 0 0 0									
	0	0 1 0 0 0 0 0 0 0 0									
2005	1	9 1 0 1 15					15	32	0	0 0	
	0	0 0 0 1 1 5 6 8 5 1									
	2	1 2 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 1 1									
	1	3 8 9 4 7 1 1 1 0 0									
	1	0 1 0 0 0 0 0 0 0 0									
2005	1	9 1 0 1 16					16	45	0	0 0	
	0	0 0 0 0 1 2 9 12								10	2
	5	3 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 0 1									
	0	1 5 6 9 13					10	4	1 0 0		
	1	1 0 0 0 0 0 0 0 1 0									
2005	1	9 1 0 1 17					17	25	0	0 0	
	0	0 0 0 0 1 1 4 4 6 5									
	3	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	1	0 4 3 3 14					5	7 2 1 0			
	0	0 0 0 2 0 0 0 0 0 0									
2005	1	9 1 0 1 18					18	34	0	0 0	
	0	0 0 0 0 0 3 3 4 10									7
	4	3 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 2 2 4 5 6 1 3 4									
	1	0 1 0 0 0 0 0 0 0 0									
2005	1	9 1 0 1 19					19	23	0	0 0	
	0	0 0 0 0 0 0 0 4 3 2									
	5	2 1 2 3 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 1 4 1 0 1 4 2 3									
	1	2 2 1 1 0 0 0 0 0 0									

2005	1	9 1 0 1 20		20	20	0	0 0	
	0	0 0 0 0 0 0 0 2 3 4						
	2	1 5 2 1 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 1 0 2 0 1 0 3 2 2						
	2	1 0 0 0 1 0 0 0 0 0						
2005	1	9 1 0 1 21		21	22	0	0 0	
	0	0 0 0 0 0 0 0 0 1 3						
	3	1 5 4 2 0 0 2 0 0 0						
	0	0 0 1 0 0 0 0 0 0 0						
	0	0 0 0 0 1 0 0 1 1 0						
	0	1 0 1 0 0 0 0 0 0 0						
2005	1	9 1 0 1 22		22	14	0	0 0	
	0	0 0 0 0 0 1 0 1 0 0						
	0	1 0 2 1 4 3 0 0 0 1						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 1 0 0 0 0 0						
	0	1 0 0 0 0 0 0 0 0 0						
2005	1	9 1 0 1 23		23	9	0 0 0		
	0	0 0 0 0 0 0 0 0 0 2						
	0	0 2 2 1 0 0 0 1 1 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2005	1	9 1 0 1 24		24	10	0	0 0	
	0	0 0 0 0 0 0 1 0 0 0						
	0	0 1 3 1 1 0 1 1 1 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2005	1	9 1 0 1 25		25	9	0 0 0		
	0	0 0 0 0 0 0 0 0 1 0						
	0	0 1 2 0 0 4 1 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
2005	1	9 1 0 1 26		26	3	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 1 0 0 1 1 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 1 0 0 0 0 0 0 0						
2005	1	9 1 0 1 27		27	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0						
	0	0 0 0 0 0 1 0 0 0 0						
	0	0 0 0 0 0 0 0 0 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		3	0			
	0							
			0					
#Year	Season	Fleet Gender Part ageerr	Lbin_lo	Lbin_hi	648	4	6	8
	10	12 14 16 18 20 22 24 26 28 30						
	32	34 36 38 40 42 44 46 48 50 52						
	54	56 58 390 4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38						
	40	42 44 46 48 50 52 54 56 58 390						
2005	1	9 2 0 1 12		12	4	0 0 0		
	0	0 0 0 0 2 3 0 0 0 0						

	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 1					
	0	0 1 1 1 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2005	1	9 2 0 1 13	13	15	0	0 0	
	0	0 1 1 1 4 6 4 1 1 4					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 2					
	2	4 1 3 3 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
2005	1	9 2 0 1 14	14	14	0	0 0	
	0	0 0 0 0 4 2 3 7 5 1					
	1	0 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	2	1 4 3 3 0 0 0 0 0 0					
	0	0 1 0 0 0 0 0 0 0 0					
2005	1	9 2 0 1 15	15	40	0	0 0	
	0	0 0 0 1 1 5 6 8 5 1					
	2	1 2 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 1 1 1					
	1	3 8 9 4 7 1 1 1 0 0					
	1	0 1 0 0 0 0 0 0 0 0					
2005	1	9 2 0 1 16	16	53	0	0 0	
	0	0 0 0 0 1 2 9 12				10	2
	5	3 1 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 1 0 1					
	0	1 5 6 9 13	10	4	1 0 0		
	1	1 0 0 0 0 0 0 0 1 0					
2005	1	9 2 0 1 17	17	43	0	0 0	
	0	0 0 0 0 1 1 4 4 6 5					
	3	1 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 1					
	1	0 4 3 3 14	5	7 2 1 0			
	0	0 0 0 2 0 0 0 0 0 0					
2005	1	9 2 0 1 18	18	29	0	0 0	
	0	0 0 0 0 0 3 3 4 10					7
	4	3 0 0 0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 0 2 2 4 5 6 1 3 4					
	1	0 1 0 0 0 0 0 0 0 0					
2005	1	9 2 0 1 19	19	24	0	0 0	
	0	0 0 0 0 0 0 0 4 3 2					
	5	2 1 2 3 1 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 1 1 4 1 0 1 4 2 3					
	1	2 2 1 1 0 0 0 0 0 0					
2005	1	9 2 0 1 20	20	15	0	0 0	
	0	0 0 0 0 0 0 0 2 3 4					
	2	1 5 2 1 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0					
	0	0 1 0 2 0 1 0 3 2 2					
	2	1 0 0 0 1 0 0 0 0 0					
2005	1	9 2 0 1 21	21	5	0 0 0		
	0	0 0 0 0 0 0 0 0 1 3					
	3	1 5 4 2 0 0 2 0 0 0					
	0	0 0 1 0 0 0 0 0 0 0					
	0	0 0 0 0 1 0 0 1 1 0					
	0	1 0 1 0 0 0 0 0 0 0					
2005	1	9 2 0 1 22	22	2	0 0 0		
	0	0 0 0 0 0 1 0 1 0 0					
	0	1 0 2 1 4 3 0 0 0 1					
	0	0 0 0 0 0 0 0 0 0 0					

	0	0 0 0 0 1 0 0 0 0 0									
	0	1 0 0 0 0 0 0 0 0 0									
2005	1	9 2 0 1 26					26	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 0 0 1 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi 648		4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2006	1	10	1	0 1 4 4 6 4 2 0							
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 3 5 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 5 5 7 1 2 2							
	0	1 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 4 2 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 6 6 11					1	1 6	
	2	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 2 5 2 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 7 7 17					0	0 4	
	11	2	0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 2 4 3 3 1 1									
	0	0 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 8 8 36					0	1 5	
	7	7 12		4	0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 2 9 3 1 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 9 9 19					0	0 0	
	1	2 9 4 1 1 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 3 6 2 5									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 10			10	34	0	0 1	
	0	1 7 9 10				2	3 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 1 1 4 15									
	8	5 2 1 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 11			11	48	0	0 0	
	0	1 4 11			19	8	3 0 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 5 11									
	16	5	0 2 1 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0									

2006	1	10	1	0 1 12			12	46	0	0 0	
	0	0 5 7 8 8 10						5	2 0 0		
	0	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 2 1 8									
	9	9 6 4 0 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 13			13	50	0	0 0	
	0	0 1 3 5 15					12	6	4 2 2		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 3									
	6	9 6 9 3 1 1 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 14			14	29	0	0 0	
	0	1 0 2 3 7 2 8 3 3 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 1									
	2	2 6 13			4	3 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 15			15	29	0	0 0	
	0	0 0 1 2 2 4 4 9 4 2									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	3	3 6 6 11				6	6 4 1 0 0				
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 16			16	31	0	0 0	
	0	0 0 0 1 1 1 6 9 6 4									
	3	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 5 4 11				8	8 7 2 2 0				
	0	1 0 0 1 0 0 0 0 0 0									
2006	1	10	1	0 1 17			17	31	0	0 0	
	0	0 0 0 0 2 1 2 8 5 7									
	1	4 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 6 15				9	3 9 8 3 1				
	1	0 2 0 0 0 1 0 0 0 0									
2006	1	10	1	0 1 18			18	31	0	0 0	
	0	0 0 0 0 0 2 0 4 10									4
	4	2 4 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 3 3 3 6 4 3 7 0									
	1	0 0 0 1 0 0 0 0 0 0									
2006	1	10	1	0 1 19			19	20	0	0 0	
	0	0 0 0 0 0 1 0 3 3 4									
	2	1 2 1 1 0 1 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 1 0 1 3 2 2 3 0									
	3	1 0 0 0 0 1 0 0 0 0									
2006	1	10	1	0 1 20			20	18	0	0 0	
	0	0 0 0 0 0 2 0 0 3 3									
	1	1 1 2 0 2 0 1 1 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 2 1 3 0 1 0 1 2 1									
	1	1 1 0 1 0 0 1 1 0 1									
2006	1	10	1	0 1 21			21	24	0	0 0	
	0	0 0 1 0 1 1 0 3 0 3									
	4	2 1 4 2 2 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 1 1 1 0 0 0 0									
	0	0 0 1 0 1 1 0 0 0 0									
2006	1	10	1	0 1 22			22	7	0 0 0		
	0	0 0 0 0 0 0 1 0 0 0									

	0	0 0 3 0 0 2 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 1 1 0 0 0 1									
	0	1 0 1 1 0 0 0 0 0 0									
2006	1	10	1	0 1 23			23	11	0	0 0	
	0	0 0 0 0 0 0 2 1 1 1									
	0	0 0 1 1 0 2 1 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 2 2 1 0 0 0 0 0 0									
	0	0 1 0 0 0 1 1 0 0 0									
2006	1	10	1	0 1 24			24	6	0 0 0		
	0	0 0 0 0 0 0 0 1 0 1									
	0	0 0 1 1 1 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 25			25	4	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 2 1 0 0 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 2 0 2 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	1	0 1 27			27	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 1 0 0									
	0	0 0 0 1 0 0 0 0 0 0									
#		3					3	0			
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	Lbin_lo	Lbin_hi 648		4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
2006	1	10	2	0 1 4 4 8 4 2 0							
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 3 5 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	2	0 1 5 5 6 1 2 2							
	0	1 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 4 2 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	2	0 1 6 6 11					1	1 6	
	2	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 2 5 2 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2006	1	10	2	0 1 7 7 16					0	0 4	
	11	2	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 2 4 3 3 1 1									

	0	0 1 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 8 8 16					0	1 5
	7	7 12		4	0 0 0 0 0 0 0					
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 2 9 3 1 1								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 9 9 18					0	0 0
	1	2 9 4 1 1 1 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 1 3 6 2 5								
	1	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 10			10	39	0	0 1
	0	1 7 9 10				2	3 1 0 0 0			
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 1 1 1 4 15								
	8	5 2 1 1 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 11			11	40	0	0 0
	0	1 4 11			19	8	3 0 1 1 0			
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 5 11								
	16	5	0 2 1 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 12			12	40	0	0 0
	0	0 5 7 8 8 10						5	2 0 0	
	0	1 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 2 1 8								
	9	9 6 4 0 1 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 13			13	39	0	0 0
	0	0 1 3 5 15					12	6	4 2 2	
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 3								
	6	9 6 9 3 1 1 0 1 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 14			14	32	0	0 0
	0	1 0 2 3 7 2 8 3 3 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 1 1								
	2	2 6 13			4	3 0 0 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 15			15	47	0	0 0
	0	0 0 1 2 2 4 4 9 4 2								
	1	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 1								
	3	3 6 6 11				6	6 4 1 0 0			
	0	0 0 0 0 0 0 0 0 0 0								
2006	1	10	2	0 1 16			16	50	0	0 0
	0	0 0 0 1 1 1 6 9 6 4								
	3	0 0 0 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	1 5 4 11				8	8 7 2 2 0			
	0	1 0 0 1 0 0 0 0 0 0								
2006	1	10	2	0 1 17			17	58	0	0 0
	0	0 0 0 0 2 1 2 8 5 7								
	1	4 0 1 0 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0								
	0	0 1 6 15				9	3 9 8 3 1			
	1	0 2 0 0 0 1 0 0 0 0								

2006	1	10	2	0 1 18	18	32	0	0 0	
	0	0 0 0 0 0 2 0 4 10							4
	4	2 4 1 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 1 3 3 3 6 4 3 7 0							
	1	0 0 0 1 0 0 0 0 0 0							
2006	1	10	2	0 1 19	19	17	0	0 0	
	0	0 0 0 0 0 1 0 3 3 4							
	2	1 2 1 1 0 1 0 1 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	1 0 1 0 1 3 2 2 3 0							
	3	1 0 0 0 0 1 0 0 0 0							
2006	1	10	2	0 1 20	20	16	0	0 0	
	0	0 0 0 0 0 2 0 0 3 3							
	1	1 1 2 0 2 0 1 1 1 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	1 2 1 3 0 1 0 1 2 1							
	1	1 1 0 1 0 0 1 1 0 1							
2006	1	10	2	0 1 21	21	6	0 0 0		
	0	0 0 1 0 1 1 0 3 0 3							
	4	2 1 4 2 2 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 1 1 1 1 0 0 0 0							
	0	0 0 1 0 1 1 0 0 0 0							
2006	1	10	2	0 1 22	22	7	0 0 0		
	0	0 0 0 0 0 0 1 0 0 0							
	0	0 0 3 0 0 2 0 1 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 1 1 1 0 0 0 1							
	0	1 0 1 1 0 0 0 0 0 0							
2006	1	10	2	0 1 23	23	6	0 0 0		
	0	0 0 0 0 0 0 2 1 1 1							
	0	0 0 1 1 0 2 1 1 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 2 2 1 0 0 0 0 0 0							
	0	0 1 0 0 0 1 1 0 0 0							
2006	1	10	2	0 1 24	24	1	0 0 0		
	0	0 0 0 0 0 0 0 1 0 1							
	0	0 0 1 1 1 0 1 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 1 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
2006	1	10	2	0 1 25	25	5	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 2 1 0 0 1 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 1 0 2 0 2 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
2006	1	10	2	0 1 27	27	3	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 1 0 0 0 0 0 0 0							
	0	0 0 1 0 0 0 0 1 0 0							
	0	0 0 0 1 0 0 0 0 0 0							
2006	1	10	2	0 1 28	28	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
	0	0 1 0 0 0 0 0 0 0 0							
	0	0 0 0 0 0 0 0 0 0 0							
2006	1	10	2	0 1 29	29	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0							

0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 0 0 0 0 0
3 3 0

0

0
ALL CAAL - all gears, years, including survey

0

0
#Year Season Fleet Gender Part ageerr Lbin_lo Lbin_hi 648 4 6 8
10 12 14 16 18 20 22 24 26 28 30
32 34 36 38 40 42 44 46 48 50 52
54 56 58 390 4 6 8 10 12 14 16
18 20 22 24 26 28 30 32 34 36 38
40 42 44 46 48 50 52 54 56 58 390
2000 1 8 1 0 1 4 4 8 5 3 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 4 6 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 5 5 6 1 2 2
0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 4 2 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 6 6 10 1 1 5
2 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 2 5 1 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 7 7 15 0 0 4
9 2 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 1 4 3 3 1 1
0 0 1 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 8 8 36 0 1 5
7 7 12 4 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 6 2 1 1
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 9 9 18 0 0 0
1 1 9 4 1 1 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 3 5 2 5
1 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 10 10 34 0 0 1
0 1 7 9 10 2 3 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 1 1 4 15

	8	5 2 1 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 1 0 1 11					11	49	0	0 0	
	0	1 4 11			20	8	3 0 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 5 11									
	15	5	0 2 1 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 1 0 1 12					12	51	0	0 0	
	0	0 5 7 8 10					13	5	2 0 0		
	0	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 2 1 9									
	9	9 7 5 1 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 1 0 1 13					13	72	0	0 0	
	0	0 2 3 6 19					18	10	5	3 6	
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 5									
	8	13	7	12	6	1 1 0 1 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 1 0 1 14					14	56	0	0 0	
	0	1 0 2 4 12					4	12	11	8	1
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 2									
	4	3 10		17	7	3 0 0 0 0 0					
	0	0 1 0 0 0 0 0 0 0 0									
2000	1	8 1 0 1 15					15	67	0	0 0	
	0	0 0 1 4 4 13						9	17	10	3
	3	1 2 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 2 2									
	4	8 14		16	15	13	9	5 2 0 0			
	1	0 1 0 0 0 0 0 0 0 0									
2000	1	8 1 0 1 16					16	94	0	0 0	
	0	1 0 0 4 3 4 17							23	20	8
	9	4 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 2 7									
	2	3	10	18 29 26 19 12 4						2	0
	1	2 0 0 1 0 0 0 0 1 0									
2000	1	8 1 0 1 17					17	85	0	0 0	
	0	0 0 1 0 8 4 8 18								17	15
	5	6 1 1 0 0 0 0 1 0 0									
	0	0 0 0 0 0 0 0 0 1 2									
	2	1	10	14 20 31 18 20 16 7							2
	1	0 2 0 3 1 2 0 0 0 0									
2000	1	8 1 0 1 18					18	96	0	0 0	
	0	0 0 0 1 3 8 7 9 22									17
	14	6	6 2 0 0 0 0 0 0 1								
	0	0 0 0 0 0 0 0 0 0 0									
	0	2	3	10	13 16 20 13 11 23 11						
	7	0 2 0 1 0 0 0 0 0 0									
2000	1	8 1 0 1 19					19	88	0	0 0	
	0	0 0 0 0 0 3 5 10								11	15
	10	9	6 5 7 1 3 0 2 0 0								
	1	0 0 0 0 0 0 0 0 0 0									
	0	1 3 2 7 7 10						8	15	14	10
	6	7 6 1 1 0 1 0 1 0 0									
2000	1	8 1 0 1 20					20	101	0	0 0	
	0	0 0 0 0 0 2 7 6 11									17
	10	9	12	11	6	6 1 1 1 1 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 5 2 5 1 6 4 6 10									5
	4	7 2 0 2 1 0 1 1 2 1									

2000 1 8 1 0 1 21 21 83 0 0 0
0 0 0 1 0 0 0 4 6 3 13
14 10 8 10 6 2 1 3 1 0 0
0 0 0 1 0 0 0 0 0 0 0
0 0 0 1 2 3 1 1 1 3 0
2 1 1 2 0 2 2 0 0 0 0
2000 1 8 1 0 1 22 22 50 0 0 0
0 0 0 0 0 0 1 1 4 2 4
5 10 2 7 1 4 5 1 2 0 1
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 1 0 0 0 0 1
0 2 0 1 1 0 0 0 0 0 0
2000 1 8 1 0 1 23 23 25 0 0 0
0 0 0 0 0 0 0 1 0 2 4
0 0 3 4 3 1 3 1 2 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 2 0 0 0 1 1 0 0 1
2000 1 8 1 0 1 24 24 20 0 0 0
0 0 0 0 0 0 0 1 0 0 1
0 2 3 4 2 2 0 2 1 2 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 25 25 15 0 0 0
0 0 0 0 0 0 0 0 0 1 1
0 0 2 3 1 1 4 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 2 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 1 0 1 26 26 4 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 1 0 0 1 1 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 0 0 0 0 0 0
2000 1 8 1 0 1 27 27 2 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 1 0 0 0 0
0 0 0 1 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 0 0 0 0 0
#

0

0
#Year Season Fleet Gender Part ageerr Lbin_lo Lbin_hi 648 4 6 8
10 12 14 16 18 20 22 24 26 28 30
32 34 36 38 40 42 44 46 48 50 52
54 56 58 390 4 6 8 10 12 14 16
18 20 22 24 26 28 30 32 34 36 38
40 42 44 46 48 50 52 54 56 58 390
2000 1 8 2 0 1 4 4 11 5 3 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 4 6 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0
2000 1 8 2 0 1 5 5 6 1 2 2
0 0 1 0 0 0 0 0 0 0 0

	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 4 2 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 6 6 10							1	1 5	
	2	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 2 5 1 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 7 7 15							0	0 4	
	9	2 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 1 4 3 3 1 1									
	0	0 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 8 8 11							0	1 5	
	7	7 12		4	0 0 0 0 0 0 0						
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 6 2 1 1									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 9 9 16							0	0 0	
	1	1 9 4 1 1 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 3 5 2 5									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 10					10	39	0	0 1	
	0	1 7 9 10				2	3 1 0 0 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 1 1 4 15									
	8	5 2 1 1 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 11					11	39	0	0 0	
	0	1 4 11			20	8	3 0 1 1 0				
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 5 11									
	15	5	0 2 1 0 0 0 0 0 0								
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 12					12	44	0	0 0	
	0	0 5 7 8 10					13	5	2 0 0		
	0	1 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 2 1 9									
	9	9 7 5 1 1 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 13					13	54	0	0 0	
	0	0 2 3 6 19					18	10	5	3 6	
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 5									
	8	13	7	12	6	1 1 0 1 0 0					
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 14					14	48	0	0 0	
	0	1 0 2 4 12					4	12	11	8	1
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 1 2									
	4	3 10		17	7	3 0 0 0 0 0					
	0	0 1 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 15					15	93	0	0 0	
	0	0 0 1 4 4 13						9	17	10	3
	3	1 2 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 2 2									

	4	8 14		16	15	13	9	5 2 0 0			
	1	0 1 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 16					16	139	0	0 0	
	0	1 0 0 4 3 4 17							23	20	8
	9	4 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 1 2 7									
	2	3	10	18 29 26 19 12 4						2	0
	1	2 0 0 1 0 0 0 0 1 0									
2000	1	8 2 0 1 17					17	151	0	0 0	
	0	0 0 1 0 8 4 8 18								17	15
	5	6 1 1 0 0 0 0 1 0 0									
	0	0 0 0 0 0 0 0 0 1 2									
	2	1	10	14 20 31 18 20 16 7							2
	1	0 2 0 3 1 2 0 0 0 0									
2000	1	8 2 0 1 18					18	132	0	0 0	
	0	0 0 0 1 3 8 7 9 22									17
	14	6	6 2 0 0 0 0 0 0 0 1								
	0	0 0 0 0 0 0 0 0 0 0									
	0	2	3	10	13 16 20 13 11 23 11						
	7	0 2 0 1 0 0 0 0 0 0									
2000	1	8 2 0 1 19					19	98	0	0 0	
	0	0 0 0 0 0 3 5 10								11	15
	10	9	6 5 7 1 3 0 2 0 0								
	1	0 0 0 0 0 0 0 0 0 0									
	0	1 3 2 7 7 10						8	15	14	10
	6	7 6 1 1 0 1 0 1 0 0									
2000	1	8 2 0 1 20					20	60	0	0 0	
	0	0 0 0 0 0 2 7 6 11									17
	10	9	12	11	6	6 1 1 1 1 0					
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 5 2 5 1 6 4 6 10									5
	4	7 2 0 2 1 0 1 1 2 1									
2000	1	8 2 0 1 21					21	20	0	0 0	
	0	0 0 1 0 0 0 4 6 3 13									
	14	10	8	10	6	2 1 3 1 0 0					
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 1 2 3 1 1 1 3 0									
	2	1 1 2 0 2 2 0 0 0 0									
2000	1	8 2 0 1 22					22	6	0 0 0		
	0	0 0 0 0 0 1 1 4 2 4									
	5	10	2	7 1 4 5 1 2 0 1							
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 1 0 0 0 0 1									
	0	2 0 1 1 0 0 0 0 0 0									
2000	1	8 2 0 1 23					23	3	0 0 0		
	0	0 0 0 0 0 0 1 0 2 4									
	0	0 3 4 3 1 3 1 2 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 2 0 0 0 1 1 0 0 1									
2000	1	8 2 0 1 25					25	3	0 0 0		
	0	0 0 0 0 0 0 0 0 1 1									
	0	0 2 3 1 1 4 2 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 2 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2000	1	8 2 0 1 26					26	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 1 0 0 1 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									

2000	1	8 2 0 1 27					27	1	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 1 0 0 0 0									
	0	0 0 1 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 1 0 0 0 0 0 0									
#	ghost	fisheries		0							
	0										
						0					
#Year	Season	Fleet	Gender	Part	ageerr	l.bin	l.bin	1258	4	6	8
	10	12 14 16 18 20 22 24 26 28 30									
	32	34 36 38 40 42 44 46 48 50 52									
	54	56 58 390			4	6	8	10	12 14 16		
	18	20 22 24 26 28 30 32 34 36 38									
	40	42 44 46 48 50 52 54 56 58 390									
1982	1	9 3 0 1 -1					-1	10	0	0 0	
	0	1 0 1 1 0 1 0 0 1 0									
	1	0 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 4 5									
	1	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
1983	1	9 3 0 1 -1					-1	74	0	0 0	
	0	0 0 0 5 4 1 3 7 8 8									
	4	7 0 1 2 0 0 0 0 1 0									
	0	0 0 0 0 0 0 0 0 0 3									
	2	2 6 7 4 11					9	5 6 11			2
	2	3 1 0 0 0 0 0 0 0 0									
1984	1	9 3 0 1 -1					-1	71	0	0 0	
	0	0 0 0 0 0 0 2 1 3 2									
	2	0 3 3 0 2 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 0 4 4 6 8 3 7 10									9
	6	2 5 0 1 0 1 0 1 2 1									
2001	1	9 3 0 1 -1					-1	11	0	0 0	
	0	0 0 0 0 1 0 4 0 2 1									
	0	0 1 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 2 1 2									
	1	1 2 0 1 0 0 0 0 0 1									
	0	0 0 0 0 0 0 0 0 0 0									
2002	1	9 3 0 1 -1					-1	3	0 0 0		
	0	0 0 0 0 1 1 1 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 2 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
2003	1	9 3 0 1 -1					-1	82	0	0 0	
	0	0 0 0 0 2 4 6 8 11									8
	4	4 3 5 2 1 3 0 1 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	1 8 12			11	12	10	6	3 4 3		
	2	3 3 1 2 1 0 0 0 0 0									
2004	1	9 3 0 1 -1					-1	11	0	0 0	
	0	0 0 0 0 1 4 1 1 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	0	2 2 1 1 2 0 0 1 0 0									
	1	0 0 0 0 0 0 0 0 0 0									
2005	1	9 3 0 1 -1					-1	36	0	0 0	
	0	0 0 0 1 1 1 4 4 9 5									

	4	1 5 0 3 3 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 3 4 3 7 3 2 4 3 2									
	0	2 0 2 1 0 0 0 0 0 0									
2006	1	9 3 0 1 -1					-1	38	0	0 0	
	0	0 1 1 2 5 5 3 8 7 7									
	8	5 3 5 4 1 0 2 0 1 1									
	0	0 0 1 0 0 0 0 0 0 2									
	4	3 4 4 3 7 2 5 2 0 1									
	1	0 0 0 0 0 0 0 0 0 0									
2007	1	9 3 0 1 -1					-1	20	0	0 0	
	0	0 0 0 0 0 5 3 5 2 1									
	2	2 4 2 0 1 2 0 1 1 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 1 1 5 4 4 0 1 2 1									
	1	0 0 0 0 0 0 0 0 0 0									
2008	1	9 3 0 1 -1					-1	45	0	0 0	
	0	0 0 0 0 2 3 8 17								13	9
	7	1 2 4 1 0 1 3 1 0 0									
	0	0 0 0 0 0 0 0 0 0 1									
	1	1 3 6 7 9 3 6 2 0 1									
	1	1 2 0 0 0 0 0 0 1 0									
2009	1	9 3 0 1 -1					-1	0	0 0 0		
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 1 0 0 1 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
	0	0 0 0 0 0 0 0 0 0 0									
#	traditional		AF	data	for	S.	cal.	Fixed	870	4	6
	8	10	12 14 16 18 20 22 24 26 28								
	30	32 34 36 38 40 42 44 46 48 50									
	52	54 56 58 390				4	6	8	10	12 14	
	16	18 20 22 24 26 28 30 32 34 36									
	38	40 42 44 46 48 50 52 54 56 60									
	0										
1985	1	7 3 0 1 -1					-1	87	0	0 0	
	0	0 0 0 0 2 6 16							11	16	23
	14	18	8	7 3 1 0 0 1 0 0							
	0	0 0 0 0 0 0 0 0 0 0									
	1	3 4 8 12				8	14	8	10	8	4
	2	3 2 0 0 0 0 0 0 0 0									
1986	1	7 3 0 1 -1					-1	42	0	0 0	
	0	0 0 0 0 5 4 6 6 1 10									
	9	9 8 5 7 3 4 2 4 0 1									
	1	0 0 0 0 0 0 0 0 0 0									
	0	1 2 5 7 7 3 2 3 5 2									
	0	1 0 0 1 2 1 0 0 0 0									
#											
	0										
						0					
#	traditional		AF	data	for	NWFSC	combinedtrawl		0		
		0									
							0				
2003	1	10	3	0 1 -1			-1	29	0	0 0	
	1	0 6 6 1 8 7 1 2 0 1									
	1	0 0 1 0 0 0 0 0 0 0									

	0	0 0 0 0 0 0 0 1 2 2									
	3	5 3 2 1 3 1 0 2 1 0									
	2	0 0 0 1 0 0 0 0 0 0									
2004	1	10	3	0 1 -1			-1	72	0	1 5	
	4	1 7 8 6 4 3 3 1 5 1									
	2	1 0 0 1 1 0 2 0 0 0									
	0	0 0 0 2 0 6 5 3 6 8									
	10	4	1 9 5 4 1 2 4 1 0								
	1	0 0 0 0 0 0 0 0 0 0									
2005	1	10	3	0 1 -1			-1	85	0	0 1	
	4	5 7 7 14				7	3 6 7 6 7				
	3	2 2 1 0 0 0 0 0 0 0									
	0	0 0 1 0 0 0 3 4 2 7									
	9	8 10		7	11	5	2 7 2 0 1				
	0	1 1 1 2 0 0 2 0 0 0									
2006	1	10	3	0 1 -1			-1	56	0	0 1	
	1	5 10		8	6 6 7 5 5 6 5						
	1	0 2 3 2 0 0 0 0 0 0									
	0	0 0 0 0 3 6 1 2 2 6									
	4	4 3 6 8 3 2 3 1 0 0									
	0	0 1 0 0 0 0 0 1 0 0									
2007	1	10	3	0 1 -1			-1	97	0	0 1	
	0	0 1 2 7 6 10						9	19	12	11
	2	4 1 5 0 1 1 1 1 0 0									
	0	0 0 0 0 0 0 1 0 2 7									
	4	4 10		15	13	6	6 6 3 9 0				
	1	2 2 1 2 1 2 0 0 0 0									
2008	1	10	3	0 1 -1			-1	74	0	0 1	
	2	3 4 7 10				10	8	7 4 2 2			
	2	1 1 4 0 1 4 1 0 0 0									
	0	0 0 0 0 0 0 2 3 1 14									
	12	8	7 5 2 4 5 2 2 3 1								
	2	0 0 0 0 0 1 0 0 0 0									
2009	1	10	3	0 1 -1			-1	69	6	5 8	
	7	0 4 3 5 5 4 0 6 6 4									
	5	3 2 1 2 2 0 0 2 1 0									
	0	0 0 0 0 7 6 2 1 0 2									
	1	1 1 6 9 7 11						6	3 2 1		
	0	1 0 0 0 0 1 0 0 0 1									

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

999

Control File

```
#V3.20b
# star36.ctl, .dat - as star35, but with all junk code, comments, etc deleted ("clean") for the final document

#C spawner-recruitment bias adjustment Not tuned For optimality
1 #_N_Growth_Patterns
1 #_N_Morphs_Within_GrowthPattern
#_Cond 1 #_Morph_between/within_stdev_ratio (no read if N_morphs=1)
#
2 #_Nblock_Patterns
#_Cond
1 2 #_blocks_per_pattern
2000 2010 # begin and end years of blocks
1990 2003 2003 2010 #
#
0.5 #_fracfemale
0 #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4=agespec_withseasinterpolate
  #_no additional input for selected M option; read 1P per morph
1 # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=not implemented; 4=not implemented
6 #_Growth_Age_for_L1
60 #_Growth_Age_for_L2 (999 to use as Linf)
0 #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
0 #_CV_Growth_Pattern:  0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
1 #_maturity_option:  1=length logistic; 2=age logistic; 3=read age-maturity matrix by growth_pattern; 4=read age-
fecundity; 5=read fec and wt from wtatage.ss
#_placeholder for empirical age-maturity by growth pattern
1 #_First_Mature_Age
1 #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
0 #_hermaphroditism option:  0=none; 1=age-specific fxn
1 #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from female-GP1, 3=like SS2 V1.x)
2 #_env/block/dev_adjust_method (1=standard; 2=logistic transform keeps in base parm bounds; 3=standard w/ no
bound check)

#_growth_parms
#_LO      HI         INIT       PRIOR    PR_type SD          PHASE env-var use_dev dev_minyr dev_maxyr
dev_stddev Block Block_Fxn
0.02       0.15       0.063      0.057      0           0.013      -5          0 0 0 0 0 0 0 # NatM_p_1_Fem_GP_1
2      32      12      13      0       99      -2      0 0 0 0 0 0.5 0 0 # F_Lmin
32      70      52      49      0       99     2      0 0 0 0 0 0.5 0 0 # F_Lmax
0.01    0.1     0.04    0.035    0       99      2      0 0 0 0 0 0.5 0 0 # F_VBK
0.02    0.5     0.15     0.1     0       99      2      0 0 0 0 0 0.5 0 0 # F_CV-young
0.02    0.25    0.1      0.1     0       99      2      0 0 0 0 0 0.5 0 0 # F_CV-young
0.02       0.25       0.065      0.058      0           0.013  -5  0 0 0 0 0 0 0 # NatM_p_1_Mal_GP_1
2          45         12         9          0           99         -3          0 0 0 0 0 0 0 # L_at_Amin_Mal_GP_1
30         60         48.52      43         0           99         2           0 0 0 0 0 0 0 # L_at_Amax_Mal_GP_1
0.02       0.25       0.046      0.09       0           99         2           0 0 0 0 0 0 0 # VonBert_K_Mal_GP_1
0.02       0.75       0.15       0.1        0           99         2           0 0 0 0 0 0 0 # CV_young_Mal_GP_1
0.02       0.25       0.1        0.1        0           99         2           0 0 0 0 0 0 0 # CV_old_Mal_GP_1
-3         3  1.132e-005 1.01e-005       -1          0.8        -3          0 0 0 0 0 0 0 # Wtlen_1_Fem
-3         4          3.1006     3.12       -1          0.8        -3          0 0 0 0 0 0 0 # Wtlen_2_Fem
10         60         33.0       32         -1          0.8        -3          0 0 0 0 0 0 0 # Mat50%_Fem
-3         3          -0.031     -0.02      -1          0.8        -3          0 0 0 0 0 0 0 # Mat_slope_Fem
-3         3          74.100     1          -1          0.8        -3          0 0 0 0     0 0 0 # Eggs/kg_inter_Fem
-3         3          124.637    0          -1          0.8        -3          0 0 0 0 0 0 0 # Eggs/kg_slope_wt_Fem
-3         3 1.132e-005 1.01e-005        -1          0.8        -3          0 0 0 0 0 0 0 # Wtlen_1_mal
-3         4          3.1006     3.12       -1          0.8        -3          0 0 0 0 0 0 0 # Wtlen_2_mal

# fecundity relationship 124637x + 74100

 0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_GP_1
 0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Area_1
```

```
 0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # RecrDist_Seas_1
 0 0 0 0 -1 0 -4 0 0 0 0 0 0 0 # CohortGrowDev
#
#
#_seasonal_effects_on_biology_parms
 0 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,malewtlen2,L1,K
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
#
#_Cond -4 #_MGparm_Dev_Phase
#
#_Spawner-Recruitment
3 #_SR_function: 1=B-H_flattop; 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=Shepard_3Parm
#_LO     HI      INIT    PRIOR   PR_type SD      PHASE
6        10      8.1     8.3     -1      10      1  # SR_R0
0.2      1.0     0.76    0.76    2       0.17    -5  #_steepness
# 0.2    1       0.6     0.6     1       0.05    -4 # SR_steep - old command line
0        2       0.5     0.5     -1      0.8     -4 # SR_sigmaR
-5       5       0.1     0       -1      1       -3 # SR_envlink
-5       5       0       0       -1      1       -4 # SR_R1_offset
0        0       0       0       -1      0       -99 # SR_autocorr
0 #_SR_env_link
0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
0 #do_recdev:  0=none; 1=devvector; 2=simple deviations
1970 # first year of main recr_devs; early devs can preceed this era
2010 # last year of main recr_devs; forecast devs start in following year
5 #_recdev phase
1 # (0/1) to read 13 advanced options
 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
 -4 #_recdev_early_phase
 0 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxphase+1)
 1 #_lambda for Fcast_recr_like occurring before endyr+1
 1900 #_last_early_yr_nobias_adj_in_MPD
 1970 #_first_yr_fullbias_adj_in_MPD
 2010 #_last_yr_fullbias_adj_in_MPD
 2010 #_first_recent_yr_nobias_adj_in_MPD
 1 #_max_bias_adj_in_MPD (-1 to override ramp and set biasadj=1.0 for all estimated recdevs)
 0 #_period of cycles in recruitment (N parms read below)
 -2 #min rec_dev
  2 #max rec_dev
  0 #_read_recdevs
#_end of advanced SR options
#
#_placeholder for full parameter lines for recruitment cycles
# read specified recr devs
#_Yr Input_value
#
#Fishing Mortality info
0.3 # F ballpark for tuning early phases
-2001 # F ballpark year (neg value to disable)
3 # F_Method:  1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
2.9 # max F or harvest rate, depends on F_Method
# no additional F input needed for Fmethod 1
# if Fmethod=2; read overall start F value; overall phase; N detailed inputs to read
# if Fmethod=3; read N iterations for tuning for Fmethod 3
4  # N iterations for tuning F in hybrid method (recommend 3 to 7)
#
#_initial_F_parms
#_LO HI INIT PRIOR PR_type SD PHASE
 0 1 0 0.01 0 99 -1 # Impl_err_2002
 0 1 0 0.01 0 99 -1 # Impl_err_2002
 0 1 0 0.01 0 99 -1 # Impl_err_2002
#
```

```
#_Q_setup
 # Q_type options:  <0=mirror, 0/1=float, 2=parameter, 3=parm_w_random_dev, 4=parm_w_randwalk)
 #_Den-dep  env-var  extra_se  Q_type
 0 0 0 0 # 1 FISHERY1
 0 0 0 0 # 1 FISHERY2
 0 0 0 0 # 1 FISHERY3
 0 0 0 0 # 2 SURVEY1
 0 0 0 0 # 3 SURVEY2
 0 0 0 0 # 3 SURVEY3
 0 0 0 0 # 3 SURVEY4
 0 0 0 0 # 3 SURVEY5
 0 0 0 0 # 3 SURVEY6
 0 0 0 0 # 3 SURVEY7

#
#_Cond 0 #_If q has random component, then 0=read one parm for each fleet with random q; 1=read a parm for each
year of index
#_Q_parms(if_any)
# LO HI INIT PRIOR PR_type SD PHASE
#
#_size_selex_types24 is double normal
#_Pattern Discard Male Special
 24 0 0 0 # 1 FISHERY1
 24 0 0 0 # 1 FISHERY2
 24 0 0 0 # 1 FISHERY3
 1 0 0 0 # 2 SURVEY1
 5 0 0 4 # 3 SURVEY2
 1 0 0 0 # 3 SURVEY3
 5 0 0 1 # 3 SURVEY4
 5 0 0 2 # 3 SURVEY5
 5 0 0 3 # 3 SURVEY6
 5 0 0 6 # 3 SURVEY7
#
#_age_selex_types
#_Pattern ___ Male Special
 10 0 0 0 # 1 FISHERY1
 10 0 0 0 # 1 FISHERY
 10 0 0 0 # 1 FISHERY
 10 0 0 0 # 2 SURVEY1
 10 0 0 0 # 3 SURVEY2
 10 0 0 0 # 1 SURVEY3
 10 0 0 0 # 1 SURVEY4
 10 0 0 0 # 1 SURVEY5
 10 0 0 0 # 1 SURVEY6
 10 0 0 0 # 1 SURVEY7
#_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev_stddev Block Block_Fxn
# size sel for south.fixed, double normal- but ascending only (pattern 24)
20      60 46 48 -1              10      3       0       0       0       0       0.5
        1       0 # peak
-15     24      13 13 -1         10      -1      0       0       0       0       0.5
        0       0 # init
-2      9       4 5 -1           10      4       0       0       0       0       0.5
        0       0 # infl
-5      20      11      5       -1      10      -2      0       0       0       0       0.5
        0       0 # slope1
-20     1       -2      -5      -1      10      4       0       0       0       0       0.5
        0       0 # final
-9      19      10 10 -1         10      -2      0       0       0       0       0.5
        0       0 # final

# size sel for Central.fixed, double normal (pattern 24)
```

```
20	60 45 40 -1		10	3	0	0	0	0	0.5
	0	0 # peak
-15	24	10 10 -1		10	-1	0	0	0	0	0.5
	0	0 # init
-2	9	4 5 -1		10	4	0	0	0	0	0.5
	0	0 # infl
-5	20	11	5	-1	10	-2	0	0	0	0	0.5
	0	0 # slope1
-20	1	-2	-5	-1	10	4	0	0	0	0	0.5
	0	0 # final
-9	19	10 10 -1		10	-2	0	0	0	0	0.5
	0	0 # final

# size sel for central trawl- double normal
20	60 45 40 -1		10	3	0	0	0	0	0.5
	2	0 # peak
-15	24	10 10 -1		10	-1	0	0	0	0	0.5
	0	0 # init
-2	9	4 5 -1		10	4	0	0	0	0	0.5
	0	0 # infl
-5	20	11	5	-1	10	-2	0	0	0	0	0.5
	0	0 # slope1
-20	1	-2	-5	-1	10	4	0	0	0	0	0.5
	0	0 # final
-9	19	10 10 -1		10	-2	0	0	0	0	0.5
	0	0 # final

# triennial- logistic
20	60	45	40	0	99	3	0	0	0	0	0.5	0	0	#peak
0.001	20	5.0	6.0	0	99	3	0	0	0	0	0.5	0	0	#init

# mirror sel. for NWFSC slope survey to triennial (same latitude range)
0	20	1	1	0	99	-3	0	0	0	0	0.5	0	0	#peak
20	30	30	30	0	99	-2	0	0	0	0	0.5	0	0	#init

# size sel for NWC combined shelf/slope survey- logistic
16	60	45	40	0	99	3	0	0	0	0	0.5	0	0	#peak
0.001	20	5.0	6.0	0	99	3	0	0	0	0	0.5	0	0	#init

# mirror sel. for ghost1 (south fixed)
0	20	1	1	0	99	-3	0	0	0	0	0.5	0	0	#peak
20	30	30	30	0	99	-2	0	0	0	0	0.5	0	0	#init
# mirror sel. for ghost2 (cen fixed)
0	20	1	1	0	99	-3	0	0	0	0	0.5	0	0	#peak
20	30	30	30	0	99	-2	0	0	0	0	0.5	0	0	#init
# mirror sel. for ghost1 (trawl fishery)
0	20	1	1	0	99	-3	0	0	0	0	0.5	0	0	#peak
20	30	30	30	0	99	-2	0	0	0	0	0.5	0	0	#init
# mirror sel. for ghost1 (combo survey)
0	20	1	1	0	99	-3	0	0	0	0	0.5	0	0	#peak
20	30	30	30	0	99	-2	0	0	0	0	0.5	0	0	#init

#_Cond 0 #_custom_sel-env_setup (0/1)
#_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
#_Cond
1 #_custom_sel-blk_setup (0/1)
-2 0 0 -0.1 0 99 4 #_placeholder when no block usage
-2 2 0 0.1 0 99 -4 #_placeholder when no block usage
-2 2 0 0.1 0 99 -4 #_placeholder when no block usage
#_Cond No selex parm trends
#_Cond
# placeholder for selparm_Dev_Phase
```

```
#_Cond
1 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to keep in base parm bounds; 3=standard w/ no bound check)
#
# Tag loss and Tag reporting parameters go next
0  # TG_custom:  0=no read; 1=read if tags exist
#_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0  #_placeholder if no parameters
#
1 #_Variance_adjustments_to_input_values
#_fleet: 1 2 3
#  0 0 0 0 0 0 0 0 0 0 #
  0 0 0 0.06 0 0.25 0 0 0 0 #_add_to_survey_CV
  0 0 0 0 0 0 0 0 0 0 #_add_to_discard_stddev
  0 0 0 0 0 0 0 0 0 0  #_add_to_bodywt_CV
  0.74 1 1 0.79 1 1 1 1 1 1 #_mult_by_lencomp_N
  0.83 1 1 1 1 1 1 1 1 1 #_mult_by_agecomp_N
  1 1 1 1 1 1 1 1 1 1 #_mult_by_size-at-age_N
#
5 #_maxlambdaphase
1 #_sd_offset
#
10 # number of changes to make to default Lambdas (default value is 1.0)
# Like_comp codes:  1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=sizeage; 8=catch;
# 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14=Morphcomp; 15=Tag-comp; 16=Tag-negbin
#like_comp fleet/survey  phase  value  sizefreq_method
 4 1 1 1 1
 1 5 1 1 1
 1 6 1 1 1
 4 7 1 0 1
 4 8 1 0 1
 4 9 1 0 1
 5 7 1 0 1
 5 8 1 0 1
 5 9 1 0 1
 5 10 1 0 1
# 4 2 3 1 1
#
0 # (0/1) read specs for more stddev reporting
999
```

Appendix E: Numbers at age for female and male blackgill rockfish estimated by base model

Table E1: Numbers at age for female blackgill rockfish (in 1000s)

Time	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1950	1138	1068	1003	942	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1951	1137	1068	1003	942	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1952	1137	1068	1003	942	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1953	1137	1068	1003	942	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1954	1137	1067	1002	941	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1955	1136	1067	1002	941	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1956	1136	1067	1002	941	884	830	780	732	687	645	606	569	534	502	471	442	415	390	366
1957	1135	1066	1002	941	884	830	779	732	687	645	606	569	534	502	471	442	415	390	366
1958	1135	1066	1001	941	883	830	779	732	687	645	606	569	534	502	471	442	415	390	366
1959	1134	1066	1001	940	883	829	779	732	687	645	606	569	534	502	471	442	415	390	366
1960	1134	1065	1001	940	883	829	779	731	687	645	606	569	534	502	471	442	415	390	366
1961	1133	1065	1000	939	882	829	779	731	687	645	606	569	534	502	471	442	415	390	366
1962	1133	1064	1000	939	882	829	778	731	687	645	606	569	534	502	471	442	415	390	366
1963	1132	1064	999	939	882	828	778	731	686	645	605	569	534	502	471	442	415	390	366
1964	1132	1063	999	938	881	828	778	730	686	644	605	569	534	501	471	442	415	390	366
1965	1132	1063	998	938	881	827	777	730	686	644	605	568	534	501	471	442	415	390	366
1966	1131	1063	998	937	880	827	777	730	686	644	605	568	534	501	471	442	415	390	366
1967	1130	1062	998	937	880	827	777	729	685	644	605	568	533	501	471	442	415	390	366
1968	1127	1061	997	937	880	826	776	729	685	643	604	568	533	501	470	442	415	389	365
1969	1126	1058	996	936	880	826	776	729	685	643	604	568	533	501	470	442	415	389	365
1970	1124	1057	993	935	879	826	776	729	684	643	604	567	533	501	470	442	415	389	365
1971	1123	1056	992	933	878	825	775	728	684	643	604	567	533	500	470	441	415	389	365
1972	1121	1054	991	932	876	824	775	728	684	642	603	567	532	500	470	441	414	389	365
1973	1117	1053	990	931	875	822	774	728	684	642	603	566	532	500	470	441	414	389	365
1974	1113	1049	988	929	874	822	772	727	683	642	603	566	532	500	469	441	414	389	365
1975	1108	1045	985	928	873	821	771	725	682	642	603	566	532	499	469	441	414	389	365
1976	1104	1040	981	925	871	819	770	724	681	641	602	566	532	499	469	440	414	389	365
1977	1100	1037	977	921	868	818	769	723	680	639	602	566	531	499	469	440	413	388	365
1978	1096	1033	973	917	865	815	768	722	679	639	600	565	531	499	469	440	413	388	364
1979	1090	1029	969	914	861	812	766	721	678	638	600	563	530	499	468	440	413	388	364
1980	1082	1023	966	910	858	809	763	719	677	637	599	563	529	498	468	440	413	388	364
1981	1073	1016	961	907	855	806	759	716	675	636	598	562	529	497	468	440	413	387	364
1982	1064	1007	954	902	852	803	756	713	672	634	597	561	528	496	466	439	413	387	363
1983	1050	999	946	896	847	800	754	710	669	631	595	561	527	496	466	438	412	387	363
1984	1037	985	938	888	841	795	751	708	667	628	593	559	526	495	465	437	410	386	362
1985	1032	973	925	881	834	790	747	705	664	626	590	557	525	494	465	437	410	385	362
1986	1021	969	914	869	827	783	741	701	662	624	588	554	523	492	464	436	410	385	361
1987	993	959	910	858	816	777	735	696	658	621	586	552	520	490	462	435	409	384	360
1988	964	933	900	854	806	766	729	690	654	618	584	550	518	488	460	434	408	383	359
1989	923	905	876	845	802	757	719	685	648	614	580	548	516	486	458	432	406	382	357
1990	907	867	850	822	794	753	710	675	643	608	576	545	514	485	457	430	405	381	357
1991	884	852	814	798	772	745	707	667	634	604	571	541	511	483	455	428	403	379	355
1992	872	830	800	764	749	725	700	664	626	595	567	536	508	480	453	427	401	377	354
1993	841	819	779	751	718	704	681	657	623	588	559	532	503	477	450	425	400	375	352
1994	836	790	769	732	705	674	661	639	617	585	552	525	500	473	447	423	398	374	351
1995	833	785	742	722	687	662	633	620	600	579	549	518	493	469	444	420	396	373	350
1996	832	782	737	696	678	645	622	594	582	563	544	516	487	463	440	416	393	371	349
1997	830	781	734	692	654	637	606	584	558	547	529	511	484	457	434	413	390	368	346
1998	835	780	733	689	650	614	598	569	548	524	513	497	479	455	429	407	387	365	344
1999	842	784	732	689	647	610	576	561	534	515	492	482	466	450	427	402	382	362	342
2000	860	791	736	687	647	608	573	541	527	501	483	462	453	438	422	401	378	358	340
2001	874	807	743	691	645	607	571	538	508	495	471	454	433	425	411	396	376	354	335
2002	885	821	758	697	649	606	570	536	505	477	464	442	426	407	399	385	371	352	331
2003	895	831	771	712	655	609	569	535	503	474	448	436	415	400	381	373	361	347	328
2004	902	841	781	724	668	615	572	534	503	472	445	421	409	389	375	357	349	337	324
2005	911	847	789	733	679	627	577	537	502	472	443	418	395	384	365	351	334	327	314
2006	922	855	796	741	688	638	589	542	505	471	443	416	392	370	360	342	329	313	306
2007	931	865	803	747	696	646	599	553	509	474	442	416	391	368	348	338	321	308	293
2008	942	874	812	754	701	653	607	562	519	478	445	415	390	367	346	326	317	301	289
2009	951	885	821	763	708	659	614	570	528	488	449	418	390	367	344	324	306	297	282
2010	957	893	831	771	716	665	618	576	535	496	458	421	392	366	344	323	304	287	278
2011	962	899	839	780	724	673	624	581	541	502	465	430	395	368	343	322	303	285	268

Table E1 (continued): Numbers at age for female blackgill rockfish (in 1000s)

Time	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1950	344	323	303	284	267	251	235	221	208	195	183	172	161	152	142	134	125	118	111	104	97
1951	344	323	303	284	267	251	235	221	207	195	183	172	161	151	142	133	125	118	110	104	97
1952	344	323	303	284	267	251	235	221	207	195	183	171	161	151	142	133	125	117	110	103	97
1953	344	323	303	284	267	251	235	221	207	194	183	171	161	151	142	133	125	117	110	103	97
1954	344	323	303	284	267	250	235	221	207	194	182	171	160	151	141	133	124	117	110	103	96
1955	344	323	303	284	267	250	235	220	207	194	182	171	160	150	141	132	124	116	109	102	96
1956	344	323	303	284	267	250	235	220	207	194	182	171	160	150	141	132	124	116	109	102	96
1957	344	322	303	284	267	250	235	220	207	194	182	170	160	150	140	132	123	116	108	102	95
1958	344	322	303	284	267	250	235	220	206	194	181	170	159	149	140	131	123	115	108	101	95
1959	344	322	303	284	267	250	235	220	206	193	181	170	159	149	140	131	123	115	108	101	95
1960	344	322	303	284	267	250	235	220	206	193	181	170	159	149	139	131	122	115	107	101	94
1961	344	322	303	284	267	250	234	220	206	193	181	170	159	149	139	130	122	114	107	100	94
1962	344	322	303	284	267	250	235	220	206	193	181	169	159	149	139	130	122	114	107	100	93
1963	344	323	303	284	267	250	235	220	206	193	181	170	159	149	139	130	122	114	107	100	93
1964	344	323	303	284	267	250	235	220	206	193	181	169	159	149	139	130	122	114	106	100	93
1965	344	323	303	284	267	250	235	220	206	193	181	170	159	149	139	130	122	114	106	99	93
1966	344	323	303	284	267	250	235	220	206	193	181	170	159	148	139	130	121	114	106	99	93
1967	343	322	302	284	266	250	234	219	205	192	180	168	158	147	138	129	120	112	105	98	92
1968	343	322	302	283	265	248	232	217	203	190	178	166	155	145	135	126	118	110	102	96	89
1969	343	322	302	283	265	248	232	217	203	190	177	166	155	144	135	126	117	109	102	95	89
1970	343	322	302	283	265	248	232	217	203	190	177	165	154	144	134	125	116	108	101	94	88
1971	343	322	302	283	265	248	232	217	203	190	177	165	154	143	133	124	116	108	100	93	87
1972	343	322	302	283	265	248	232	217	203	189	177	165	153	143	133	123	115	107	99	92	86
1973	343	322	302	283	265	248	232	217	202	188	175	163	152	141	131	121	113	104	97	90	83
1974	343	322	302	283	265	248	231	216	201	187	174	161	150	139	128	119	110	102	94	87	81
1975	343	321	301	282	264	247	231	215	200	186	172	160	148	137	126	116	107	99	91	84	78
1976	342	321	301	282	264	247	230	215	200	185	172	159	147	135	125	115	106	97	90	82	76
1977	342	321	301	282	264	247	230	214	199	185	171	158	146	134	123	113	104	95	88	80	74
1978	342	321	301	282	264	246	230	214	199	184	170	157	145	133	122	112	103	94	86	79	72
1979	342	320	300	281	263	245	229	213	197	183	169	155	143	131	120	110	100	91	83	76	69
1980	341	320	300	281	262	245	228	212	196	181	167	153	141	128	117	107	97	88	80	73	66
1981	341	320	299	280	261	243	226	210	194	179	164	150	137	125	114	103	93	84	76	69	62
1982	341	319	299	279	261	243	225	208	192	177	162	148	135	122	111	100	90	81	73	66	59
1983	340	319	298	278	259	240	223	205	189	173	158	143	130	117	105	95	85	76	68	60	54
1984	339	317	296	276	256	237	219	202	185	169	153	139	125	112	100	90	80	71	63	56	50
1985	339	318	297	277	257	238	220	202	185	169	154	139	125	112	100	89	80	71	62	55	49
1986	339	317	296	276	256	237	219	201	184	167	151	137	122	109	97	86	76	68	59	52	46
1987	337	315	294	272	252	232	212	194	175	158	142	126	112	99	87	76	66	58	50	44	38
1988	336	314	292	271	249	228	208	188	169	151	133	117	103	89	77	67	57	49	42	36	31
1989	334	311	288	266	243	221	199	178	158	139	121	104	90	76	65	55	46	39	32	27	23
1990	334	311	288	265	243	221	199	178	157	137	119	102	87	73	61	51	43	35	29	24	20
1991	332	309	286	263	240	217	195	173	151	131	112	95	80	67	55	45	37	30	25	20	16
1992	331	309	286	263	240	217	195	172	150	130	111	93	78	64	53	43	35	28	22	18	14
1993	329	306	282	259	235	211	187	164	141	120	101	83	68	55	44	35	27	21	17	13	10
1994	328	305	283	260	236	212	188	165	142	121	101	83	68	54	43	34	26	20	16	12	9
1995	327	305	282	260	237	213	189	166	143	122	102	84	68	54	43	33	26	20	15	11	9
1996	326	304	282	260	237	214	191	168	145	123	104	85	69	55	43	34	26	20	15	11	8
1997	325	303	281	258	236	214	191	168	146	124	104	86	70	56	44	34	26	20	15	11	8
1998	323	302	280	259	237	215	193	171	149	128	108	90	73	59	46	36	28	21	16	12	9
1999	321	301	280	259	238	217	196	174	153	133	113	94	78	63	50	39	30	23	17	13	10
2000	320	301	282	262	242	222	202	182	162	142	123	104	87	72	58	46	36	28	21	16	12
2001	318	299	281	263	244	225	206	187	168	150	131	113	96	80	65	53	42	33	25	19	14
2002	313	297	279	261	243	226	208	190	172	154	136	119	102	87	72	59	48	38	29	22	17
2003	308	291	275	258	241	225	208	190	173	157	140	124	108	93	78	65	53	43	34	26	20
2004	305	286	270	254	238	222	206	190	173	157	142	126	111	97	83	69	57	47	37	30	23
2005	302	284	266	250	235	219	204	189	174	158	143	129	115	101	87	74	62	52	42	34	26
2006	294	282	265	248	233	219	204	189	175	160	146	132	119	105	92	80	68	57	47	38	31
2007	286	275	263	247	231	217	203	189	175	162	148	135	122	109	97	85	73	62	52	43	35
2008	275	268	257	246	231	216	202	189	176	163	150	138	125	113	101	90	79	68	58	48	40
2009	270	257	250	240	230	215	201	188	176	163	151	139	128	116	105	93	83	72	63	53	45
2010	264	253	240	233	223	213	200	186	174	162	150	139	128	117	106	95	85	75	66	57	48
2011	260	246	235	223	217	207	197	184	171	160	149	138	127	117	106	96	86	77	68	59	51

Table E1 (continued): Numbers at age for female blackgill rockfish (in 1000s)

Time	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1950	92	86	81	76	71	67	63	59	55	52	49	46	43	40	38	36	33	31	29	28	425
1951	91	86	80	76	71	67	63	59	55	52	49	46	43	40	38	35	33	31	29	28	424
1952	91	85	80	75	71	66	62	59	55	52	48	45	43	40	38	35	33	31	29	27	422
1953	91	85	80	75	71	66	62	58	55	51	48	45	43	40	37	35	33	31	29	27	420
1954	91	85	80	75	70	66	62	58	55	51	48	45	42	40	37	35	33	31	29	27	418
1955	90	85	79	75	70	66	62	58	54	51	48	45	42	40	37	35	33	31	29	27	416
1956	90	84	79	74	70	65	61	58	54	51	48	45	42	39	37	35	33	31	29	27	414
1957	89	84	79	74	69	65	61	57	54	50	47	44	42	39	37	34	32	30	28	27	411
1958	89	83	78	73	69	65	61	57	53	50	47	44	41	39	36	34	32	30	28	27	407
1959	89	83	78	73	68	64	60	56	53	50	47	44	41	38	36	34	32	30	28	26	404
1960	88	83	77	73	68	64	60	56	53	49	46	43	41	38	36	34	32	30	28	26	400
1961	88	82	77	72	68	63	59	56	52	49	46	43	40	38	36	33	31	29	28	26	397
1962	88	82	77	72	67	63	59	55	52	49	46	43	40	38	35	33	31	29	27	26	393
1963	87	82	77	72	67	63	59	55	52	48	45	43	40	37	35	33	31	29	27	25	390
1964	87	81	76	71	67	62	59	55	51	48	45	42	40	37	35	33	31	29	27	25	387
1965	87	81	76	71	67	62	58	55	51	48	45	42	39	37	35	32	30	29	27	25	384
1966	87	81	76	71	66	62	58	54	51	48	45	42	39	37	34	32	30	28	27	25	380
1967	86	80	75	70	65	61	57	53	50	47	44	41	38	36	34	32	30	28	26	24	372
1968	83	78	73	68	63	59	55	52	48	45	42	39	37	35	32	30	28	27	25	23	357
1969	83	77	72	67	63	58	55	51	48	44	42	39	36	34	32	30	28	26	25	23	350
1970	82	76	71	66	62	57	54	50	47	44	41	38	36	33	31	29	27	26	24	22	341
1971	81	75	70	65	61	57	53	49	46	43	40	37	35	33	31	29	27	25	23	22	333
1972	80	74	69	64	60	56	52	48	45	42	39	36	34	32	30	28	26	24	23	21	322
1973	77	72	67	62	57	53	50	46	43	40	37	35	32	30	28	26	25	23	22	20	304
1974	75	69	64	59	55	51	47	44	41	38	35	33	31	29	27	25	23	22	20	19	284
1975	72	66	61	57	52	48	45	42	39	36	33	31	29	27	25	23	22	20	19	18	263
1976	70	64	59	55	50	47	43	40	37	34	32	29	27	25	24	22	20	19	18	17	247
1977	68	62	57	53	48	45	41	38	35	32	30	28	26	24	22	21	19	18	17	16	230
1978	66	60	55	51	47	43	40	36	34	31	29	26	24	23	21	20	18	17	16	15	215
1979	63	58	53	48	44	41	37	34	31	29	27	25	23	21	19	18	17	16	14	13	196
1980	60	55	50	45	41	38	35	32	29	27	24	22	21	19	18	16	15	14	13	12	175
1981	56	51	46	42	38	35	31	29	26	24	22	20	19	17	16	14	13	12	11	11	152
1982	53	48	43	39	35	32	29	26	24	22	20	18	17	15	14	13	12	11	10	9	134
1983	48	43	39	35	31	28	25	23	21	19	17	15	14	13	12	11	10	9	8	8	109
1984	44	39	35	31	28	25	22	20	18	16	15	13	12	11	10	9	9	8	7	7	91
1985	43	38	34	30	27	24	21	19	17	15	14	13	11	10	9	9	8	7	7	6	82
1986	41	36	31	28	25	22	19	17	15	14	12	11	10	9	8	7	7	6	6	5	69
1987	33	29	25	22	19	17	15	13	12	10	9	8	7	7	6	5	5	4	4	4	48
1988	27	23	20	17	15	13	11	10	8	7	7	6	5	5	4	4	3	3	3	2	32
1989	19	16	14	12	10	8	7	6	5	5	4	4	3	3	2	2	2	2	2	1	17
1990	17	14	12	10	8	7	6	5	4	4	3	3	2	2	2	2	1	1	1	1	12
1991	13	11	9	7	6	5	4	4	3	3	2	2	2	1	1	1	1	1	1	1	7
1992	12	9	8	6	5	4	3	3	2	2	2	1	1	1	1	1	1	1	1	0	5
1993	8	6	5	4	3	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	2
1994	7	6	4	3	3	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	2
1995	7	5	4	3	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1
1996	6	5	4	3	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1
1997	6	5	3	3	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1
1998	6	5	4	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
1999	7	5	4	3	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
2000	9	6	5	3	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
2001	11	8	6	4	3	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0
2002	13	9	7	5	4	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0
2003	15	11	8	6	5	3	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0
2004	17	13	10	7	5	4	3	2	2	1	1	1	0	0	0	0	0	0	0	0	0
2005	20	16	12	9	6	5	3	3	2	1	1	1	1	0	0	0	0	0	0	0	0
2006	24	19	14	11	8	6	4	3	2	2	1	1	1	1	0	0	0	0	0	0	0
2007	28	22	17	13	10	7	5	4	3	2	2	1	1	1	0	0	0	0	0	0	1
2008	32	26	20	16	12	9	7	5	4	3	2	1	1	1	1	0	0	0	0	0	1
2009	37	30	24	19	14	11	8	6	5	3	2	2	1	1	1	1	0	0	0	0	1
2010	40	33	27	21	17	13	10	7	5	4	3	2	2	1	1	1	0	0	0	0	1
2011	43	36	30	24	19	15	12	9	7	5	4	3	2	1	1	1	1	0	0	0	1

Table E2: Numbers at age for male blackgill rockfish (in 1000s)

Time	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1950	1138	1066	999	936	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1951	1137	1066	999	936	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1952	1137	1066	999	936	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1953	1137	1066	999	936	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1954	1137	1065	998	936	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1955	1136	1065	998	936	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1956	1136	1065	998	935	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1957	1135	1064	998	935	877	822	770	722	676	634	594	556	521	489	458	429	402	377	353
1958	1135	1064	997	935	876	821	770	722	676	634	594	556	521	489	458	429	402	377	353
1959	1134	1063	997	935	876	821	770	721	676	634	594	556	521	489	458	429	402	377	353
1960	1134	1063	997	934	876	821	769	721	676	634	594	556	521	489	458	429	402	377	353
1961	1133	1062	996	934	875	821	769	721	676	633	594	556	521	489	458	429	402	377	353
1962	1133	1062	996	933	875	820	769	721	676	633	594	556	521	489	458	429	402	377	353
1963	1132	1062	995	933	875	820	769	721	675	633	593	556	521	489	458	429	402	377	353
1964	1132	1061	995	933	874	820	768	720	675	633	593	556	521	489	458	429	402	377	353
1965	1132	1061	994	932	874	819	768	720	675	633	593	556	521	488	458	429	402	377	353
1966	1131	1060	994	932	873	819	768	720	675	633	593	556	521	488	458	429	402	377	353
1967	1130	1060	994	931	873	818	767	719	674	632	593	556	521	488	458	429	402	377	353
1968	1127	1059	993	931	873	818	767	719	674	632	592	555	521	488	457	429	402	376	352
1969	1126	1056	992	931	873	818	767	719	674	632	592	555	520	488	457	428	402	376	352
1970	1124	1055	989	930	872	818	766	719	673	631	592	555	520	488	457	428	401	376	352
1971	1123	1054	989	927	871	817	766	718	673	631	592	555	520	487	457	428	401	376	352
1972	1121	1052	987	926	869	816	766	718	673	631	591	554	520	487	457	428	401	376	352
1973	1117	1050	986	925	868	814	765	718	673	631	591	554	520	487	457	428	401	376	352
1974	1113	1047	984	924	867	813	763	717	672	630	591	554	519	487	456	428	401	376	352
1975	1108	1043	981	922	866	812	762	715	672	630	591	554	519	487	456	428	401	376	352
1976	1104	1038	977	919	864	811	761	714	670	629	590	554	519	486	456	427	401	375	352
1977	1100	1035	973	916	861	810	760	713	669	628	590	553	519	486	456	427	400	375	352
1978	1096	1030	969	912	858	807	759	712	668	627	588	553	518	486	456	427	400	375	351
1979	1090	1027	966	908	854	804	756	711	668	626	588	551	518	486	455	427	400	375	351
1980	1082	1021	962	905	851	801	753	709	666	626	587	551	517	485	455	427	400	375	351
1981	1073	1014	957	902	848	798	750	706	664	624	586	550	516	484	455	426	400	374	351
1982	1064	1005	950	896	845	795	747	703	662	622	585	549	515	484	453	426	399	374	350
1983	1050	997	942	890	840	792	745	700	659	620	583	548	515	483	453	425	399	374	350
1984	1037	984	934	883	834	787	742	698	656	617	581	547	514	482	452	424	397	372	349
1985	1032	972	922	876	827	782	738	695	654	615	578	544	512	481	452	424	397	372	349
1986	1021	967	910	864	820	775	733	691	651	613	576	542	510	480	451	423	396	371	348
1987	993	957	906	853	809	769	726	687	648	610	574	540	508	478	449	422	395	370	346
1988	964	931	897	849	799	758	720	681	643	607	572	538	506	476	447	421	395	370	346
1989	923	903	872	840	796	749	711	675	638	603	569	536	504	474	445	418	393	368	343
1990	907	865	847	817	787	745	702	666	633	598	565	533	502	472	444	417	391	367	343
1991	884	850	811	793	766	738	699	658	624	593	560	529	499	470	442	415	389	365	341
1992	872	828	797	760	743	718	691	655	616	585	555	525	496	468	440	413	388	363	340
1993	841	817	776	747	712	697	673	648	613	578	548	520	491	464	438	412	386	361	337
1994	836	788	766	727	700	667	653	630	607	575	541	513	488	460	435	409	385	360	337
1995	833	783	739	718	681	656	625	612	591	569	539	507	481	457	431	407	383	359	336
1996	832	780	734	692	673	639	614	586	573	553	533	505	475	450	428	403	380	357	335
1997	830	780	731	688	649	630	598	576	549	537	519	499	473	445	422	400	377	355	333
1998	835	778	730	685	645	608	591	561	539	514	503	486	468	443	417	394	374	352	330
1999	842	783	729	684	642	604	570	553	525	505	482	472	455	438	415	390	369	349	328
2000	860	789	733	683	641	602	566	534	519	492	474	452	442	426	411	388	365	345	327
2001	874	806	740	687	640	601	564	530	500	486	461	444	423	414	399	384	363	341	323
2002	885	819	755	693	644	600	563	528	497	469	455	432	416	396	387	373	359	339	318
2003	895	830	768	707	649	603	562	528	495	466	439	426	405	389	370	362	348	335	316
2004	902	839	778	719	663	609	565	527	495	464	436	411	399	379	364	346	337	324	311
2005	911	846	786	729	674	621	570	530	494	463	435	409	385	374	354	340	323	314	302
2006	922	854	792	737	683	632	582	534	497	463	434	407	383	361	350	331	318	302	294
2007	931	864	800	743	690	640	592	545	501	465	433	407	381	358	337	327	310	297	281
2008	942	873	809	750	696	647	600	555	511	469	436	406	381	357	336	316	306	290	277
2009	951	883	818	758	702	652	606	562	520	479	440	408	380	357	335	314	296	286	271
2010	957	891	827	766	711	658	611	568	526	487	449	412	383	356	334	313	294	276	267
2011	962	897	835	775	718	666	617	573	532	493	456	420	386	358	333	312	292	274	258

Table E2 (continued): Numbers at age for male blackgill rockfish (in 1000s)

Time	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1950	331	310	291	272	255	239	224	210	197	184	173	162	152	142	133	125	117	110	103	96	90
1951	331	310	290	272	255	239	224	210	197	184	173	162	152	142	133	125	117	109	103	96	90
1952	331	310	290	272	255	239	224	210	197	184	172	162	151	142	133	124	117	109	102	96	90
1953	331	310	290	272	255	239	224	210	196	184	172	161	151	142	133	124	116	109	102	96	90
1954	331	310	290	272	255	239	224	209	196	184	172	161	151	141	132	124	116	109	102	95	89
1955	331	310	290	272	255	239	223	209	196	184	172	161	151	141	132	124	116	109	102	95	89
1956	331	310	290	272	255	239	223	209	196	184	172	161	151	141	132	124	116	108	101	95	89
1957	331	310	290	272	255	238	223	209	196	183	172	161	150	141	132	123	115	108	101	95	89
1958	331	310	290	272	255	238	223	209	196	183	171	160	150	141	132	123	115	108	101	94	88
1959	331	310	290	272	255	238	223	209	196	183	171	160	150	140	131	123	115	107	101	94	88
1960	331	310	290	272	254	238	223	209	195	183	171	160	150	140	131	123	115	107	100	94	88
1961	331	310	290	272	254	238	223	209	195	183	171	160	150	140	131	122	114	107	100	94	87
1962	331	310	290	272	255	238	223	209	195	183	171	160	150	140	131	122	114	107	100	93	87
1963	331	310	290	272	255	238	223	209	196	183	171	160	150	140	131	122	114	107	100	93	87
1964	331	310	290	272	255	238	223	209	196	183	171	160	150	140	131	122	114	107	100	93	87
1965	331	310	290	272	255	238	223	209	196	183	171	160	150	140	131	122	114	107	100	93	87
1966	331	310	290	272	255	238	223	209	196	183	171	160	150	140	131	122	114	107	100	93	87
1967	330	310	290	271	254	238	223	208	195	182	170	159	149	139	130	121	113	106	99	92	86
1968	330	309	289	270	253	236	221	207	193	180	168	157	147	137	128	119	111	103	96	90	84
1969	330	309	289	270	253	236	221	206	193	180	168	157	146	136	127	118	110	103	96	89	83
1970	330	309	289	271	253	236	221	206	193	180	168	157	146	136	127	118	110	102	95	89	83
1971	330	309	289	271	253	237	221	206	193	180	168	156	146	136	126	118	110	102	95	88	82
1972	330	309	289	271	253	237	221	207	193	180	168	156	145	135	126	117	109	101	94	88	81
1973	330	309	289	271	253	237	221	206	192	179	167	155	144	134	125	116	108	100	93	86	80
1974	330	309	289	270	253	236	220	206	192	178	166	154	143	133	123	114	106	98	91	84	78
1975	330	309	289	270	253	236	220	205	191	178	165	153	142	132	122	113	104	96	89	82	76
1976	330	309	289	270	252	236	220	205	191	177	164	152	141	131	121	112	103	95	88	81	74
1977	329	308	289	270	252	235	219	204	190	177	164	152	140	130	120	110	102	94	86	79	73
1978	329	308	288	270	252	235	219	204	190	176	163	151	140	129	119	110	101	93	85	78	72
1979	329	308	288	269	251	234	218	203	188	175	162	150	138	127	117	108	99	91	83	76	70
1980	328	307	287	269	251	234	218	202	188	174	161	148	137	126	115	106	97	89	81	74	67
1981	328	307	287	268	250	233	216	201	186	172	159	146	134	123	113	103	94	86	78	71	64
1982	328	306	286	267	249	232	215	200	185	171	157	144	132	121	111	101	92	83	76	68	62
1983	327	306	285	266	247	230	213	197	182	168	154	141	129	117	107	97	87	79	71	64	58
1984	326	304	283	264	245	227	210	194	178	163	150	137	124	113	102	92	83	75	67	60	54
1985	326	304	284	264	245	227	210	194	179	164	150	137	124	113	102	92	83	74	67	60	53
1986	325	304	283	264	245	227	209	193	177	162	148	135	122	110	100	89	80	72	64	57	51
1987	323	302	281	260	241	222	204	187	170	155	140	127	114	102	91	81	72	64	56	50	44
1988	322	300	279	259	238	219	200	183	166	149	134	120	107	95	84	74	65	57	49	43	37
1989	320	297	275	254	233	213	193	174	157	140	124	110	96	84	73	63	55	47	40	35	30
1990	320	297	275	253	232	212	192	173	155	138	122	107	94	81	70	61	52	44	38	32	27
1991	318	295	272	250	229	208	188	169	150	133	116	101	88	75	64	55	46	39	33	27	23
1992	317	295	272	250	229	208	188	168	149	131	115	99	86	73	62	52	44	37	30	25	21
1993	314	291	269	246	224	202	181	161	142	123	106	91	77	65	54	45	37	30	25	20	16
1994	314	291	269	247	225	203	182	161	142	124	106	91	77	64	53	44	36	29	23	19	15
1995	313	290	269	247	225	204	182	162	142	124	107	91	76	64	53	43	35	28	23	18	14
1996	312	290	268	246	225	204	183	163	143	124	107	91	77	64	53	43	35	28	22	18	14
1997	311	288	267	245	224	203	183	163	143	125	107	91	77	64	53	43	34	28	22	17	14
1998	309	288	266	245	225	204	184	164	145	127	110	94	79	66	54	44	36	29	23	18	14
1999	308	287	267	246	226	206	186	167	148	130	113	97	82	69	57	47	38	30	24	19	15
2000	307	288	268	249	229	210	191	173	155	138	121	105	90	76	64	53	43	35	28	22	17
2001	305	286	268	250	231	213	195	177	160	143	127	111	96	82	69	58	48	39	32	25	20
2002	300	283	265	248	231	213	196	179	162	146	130	115	101	87	74	63	52	43	35	28	23
2003	296	279	262	245	229	212	196	179	163	148	133	118	104	91	78	67	56	47	39	32	25
2004	293	274	257	242	225	210	194	179	163	148	134	120	107	94	82	70	60	50	42	34	28
2005	289	271	253	238	223	207	193	178	163	149	135	122	109	97	85	74	63	54	45	37	31
2006	282	269	253	235	221	207	192	178	164	151	137	125	112	100	89	78	68	58	49	41	34
2007	274	262	250	235	219	205	192	178	165	152	139	127	115	103	92	81	71	62	53	45	38
2008	263	256	245	234	219	204	191	178	166	153	141	129	118	106	96	85	75	66	57	49	42
2009	259	245	238	228	218	204	189	177	166	153	142	131	120	109	98	88	79	70	61	53	45
2010	253	241	228	222	212	202	189	175	164	153	141	130	120	109	99	90	80	72	63	55	48
2011	249	235	224	212	205	196	186	174	161	150	140	129	119	109	100	90	82	73	65	57	50

Table E2 (continued): Numbers at age for male blackgill rockfish (in 1000s)

Time	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1950	84	79	74	70	65	61	57	54	50	47	44	41	39	36	34	32	30	28	26	25	366
1951	84	79	74	69	65	61	57	53	50	47	44	41	39	36	34	32	30	28	26	24	365
1952	84	79	74	69	65	61	57	53	50	47	44	41	38	36	34	32	30	28	26	24	363
1953	84	79	74	69	65	61	57	53	50	47	44	41	38	36	34	32	30	28	26	24	362
1954	84	78	73	69	64	60	57	53	50	46	44	41	38	36	34	31	29	28	26	24	360
1955	83	78	73	69	64	60	56	53	49	46	43	41	38	36	33	31	29	27	26	24	358
1956	83	78	73	68	64	60	56	53	49	46	43	40	38	35	33	31	29	27	26	24	357
1957	83	78	73	68	64	60	56	52	49	46	43	40	38	35	33	31	29	27	25	24	354
1958	83	77	72	68	63	59	56	52	49	46	43	40	37	35	33	31	29	27	25	24	351
1959	82	77	72	67	63	59	55	52	48	45	42	40	37	35	33	31	29	27	25	23	349
1960	82	77	72	67	63	59	55	51	48	45	42	39	37	35	32	30	28	27	25	23	346
1961	82	76	71	67	62	58	55	51	48	45	42	39	37	34	32	30	28	26	25	23	343
1962	82	76	71	67	62	58	54	51	48	45	42	39	36	34	32	30	28	26	24	23	340
1963	81	76	71	66	62	58	54	51	47	44	41	39	36	34	32	30	28	26	24	23	338
1964	81	76	71	66	62	58	54	50	47	44	41	39	36	34	32	30	28	26	24	23	335
1965	81	76	71	66	62	58	54	50	47	44	41	38	36	34	31	29	27	26	24	23	333
1966	81	76	71	66	62	57	54	50	47	44	41	38	36	33	31	29	27	26	24	22	330
1967	80	75	70	65	61	57	53	49	46	43	40	38	35	33	31	29	27	25	23	22	323
1968	78	73	68	63	59	55	51	48	45	42	39	36	34	32	30	28	26	24	23	21	310
1969	78	72	67	63	58	54	51	47	44	41	38	36	33	31	29	27	25	24	22	21	305
1970	77	72	67	62	58	54	50	47	43	41	38	35	33	31	29	27	25	23	22	20	298
1971	76	71	66	61	57	53	49	46	43	40	37	35	32	30	28	26	24	23	21	20	291
1972	76	70	65	61	56	52	49	45	42	39	36	34	32	29	27	26	24	22	21	19	282
1973	74	69	64	59	55	51	47	44	41	38	35	33	30	28	26	24	23	21	20	18	268
1974	72	67	62	57	53	49	45	42	39	36	34	31	29	27	25	23	22	20	19	17	251
1975	70	65	60	55	51	47	43	40	37	34	32	30	27	25	24	22	20	19	18	16	235
1976	69	63	58	54	49	46	42	39	36	33	31	28	26	24	22	21	19	18	17	16	221
1977	67	62	57	52	48	44	41	37	34	32	29	27	25	23	21	20	18	17	16	15	207
1978	66	60	55	51	47	43	39	36	33	31	28	26	24	22	20	19	17	16	15	14	195
1979	64	58	53	49	45	41	37	34	32	29	27	24	23	21	19	18	16	15	14	13	179
1980	61	56	51	47	42	39	35	32	30	27	25	23	21	19	18	16	15	14	13	12	162
1981	58	53	48	44	40	36	33	30	27	25	23	21	19	17	16	15	13	12	11	10	142
1982	56	51	46	41	38	34	31	28	25	23	21	19	17	16	15	13	12	11	10	9	126
1983	52	47	42	38	34	31	28	25	23	20	18	17	15	14	13	11	10	10	9	8	105
1984	48	43	39	35	31	28	25	22	20	18	16	15	13	12	11	10	9	8	8	7	89
1985	48	42	38	34	30	27	24	22	19	17	16	14	13	11	10	9	8	8	7	6	81
1986	45	40	36	32	28	25	22	20	18	16	14	13	11	10	9	8	7	7	6	6	70
1987	38	34	30	26	23	20	18	16	14	12	11	10	9	8	7	6	6	5	5	4	50
1988	33	28	25	21	19	16	14	12	11	9	8	7	6	6	5	4	4	4	3	3	34
1989	25	22	18	16	14	12	10	9	7	6	6	5	4	4	3	3	3	2	2	2	20
1990	23	19	16	14	12	10	8	7	6	5	5	4	3	3	3	2	2	2	2	1	14
1991	19	16	13	11	9	8	7	5	5	4	3	3	2	2	2	2	1	1	1	1	9
1992	17	14	12	10	8	7	6	5	4	3	3	2	2	2	1	1	1	1	1	1	7
1993	13	11	9	7	6	5	4	3	2	2	2	1	1	1	1	1	1	1	0	0	3
1994	12	10	8	6	5	4	3	3	2	2	1	1	1	1	1	1	0	0	0	0	2
1995	11	9	7	6	4	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0	2
1996	11	9	7	5	4	3	3	2	2	1	1	1	1	1	0	0	0	0	0	0	1
1997	11	8	6	5	4	3	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1
1998	11	8	7	5	4	3	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1
1999	12	9	7	5	4	3	2	2	1	1	1	1	1	0	0	0	0	0	0	0	1
2000	14	11	8	6	5	4	3	2	2	1	1	1	1	0	0	0	0	0	0	0	1
2001	16	12	10	7	6	4	3	3	2	2	1	1	1	1	0	0	0	0	0	0	1
2002	18	14	11	9	7	5	4	3	2	2	1	1	1	1	0	0	0	0	0	0	1
2003	20	16	13	10	8	6	4	3	3	2	2	1	1	1	1	0	0	0	0	0	1
2004	22	18	14	11	9	7	5	4	3	2	2	1	1	1	1	0	0	0	0	0	1
2005	25	20	16	13	10	8	6	5	3	3	2	2	1	1	1	1	0	0	0	0	1
2006	28	23	18	15	11	9	7	5	4	3	2	2	1	1	1	1	0	0	0	0	1
2007	31	26	21	17	13	10	8	6	5	4	3	2	2	1	1	1	1	0	0	0	1
2008	35	29	24	19	15	12	10	8	6	5	3	3	2	2	1	1	1	1	0	0	1
2009	38	32	27	22	18	14	11	9	7	5	4	3	2	2	1	1	1	1	0	0	1
2010	41	35	29	24	20	16	13	10	8	6	5	4	3	2	2	1	1	1	1	0	2
2011	43	37	31	26	22	18	14	11	9	7	6	4	3	3	2	1	1	1	1	1	2