

1      Status of China rockfish off the U.S. Pacific  
2      Coast in 2015



Photo courtesy Tom Laidig, NOAA

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102 **Executive summary**

103 **Stock**

104 This assessment reports the status of the China rockfish (*Sebastodes nebulosus*) resource in  
105 U.S. waters off the coast of California, Oregon, and Washington using data through 2014.  
106 China rockfish are modelled with three independent stock assessments to account for spatial  
107 variation in exploitation history as well as regional differences in growth and size composition  
108 of the catch. The northern area model is defined as Washington state Marine Catch Areas  
109 (MCAs) 1-4. The central area model spans from the Oregon-Washington border to 40°10'  
110 N. latitude. The southern area model spans 40°10' N. latitude to the U.S.-Mexico border.  
111 However, very little catch of China rockfish occurs south of Point Conception, California  
112 (34°27' N. latitude).

113 **Catches**

114 China rockfish are most often caught by hook-and-line (both recreational and commercial  
115 fisheries) as well as by traps in the commercial live-fish fishery. Although China rockfish  
116 were not a major target species, the commercial rockfish fishery along the U.S. Pacific West  
117 Coast developed in the late 1800s and early 1990s. Available estimates of China rockfish  
118 catch in California begin in the early 1900s, along with small commercial catches in Oregon  
119 until recreational landings began to increase in the early 1970s (Figures a-c). Reconstructed  
120 recreational landings of China rockfish in the northern assessment begin in 1967. As of  
121 1995, Washington has prohibited commercial nearshore fixed gear in state waters and does  
122 not have a historical reconstruction of China rockfish commercial landings. The majority of  
123 commercial removals of China rockfish are now landed by live-fish fisheries in California and  
124 southern Oregon. The magnitude of total removals over the last 10 years peaked in 2009  
125 (35.52 mt) and has been decreasing since then. In recent years, California has the largest  
126 removals of the three states (dominated by the recreational fleet) with smallest removals  
127 coming from the Oregon recreational fleet (Table a).

128 The nearshore live-fish fishery developed in California in the late 1980s and early 1990s and  
129 extended into Oregon by the mid-1990s, driven by the market prices for live fish. Northern  
130 Oregon (north of Florence) does not contribute significantly to the live-fish fishery (maximum  
131 removal of 0.02 mt) as the market for this sector of the fishery is centered in California.  
132 Catches from the live-fish fishery in southern Oregon (south of Florence) has composed the  
133 majority of the catch in that state since 1999, and peaked in 2002. In California, the landings  
134 of live fish begin exceeding the landings of dead fish south of 40°10' N. latitude in 1998 and  
135 north of 40°10' N. latitude in 1999; and the pattern continues through 2014.

136 The historical reconstruction of landings from the recreational fishery for China rockfish in  
137 California goes back to 1928, and the fishery began significantly increasing in the late 1940s.  
138 The recreational catches in California are significantly higher than the commercial catches,

<sup>139</sup> and have decreased in the last five years (Table a). Recreational catches in California peaked  
<sup>140</sup> in 1987 at 53.29 mt and have declined to roughly 10-20 mt per year over the last 10 years.  
<sup>141</sup> The trend is opposite in Oregon, with the magnitude of the commercial landings greater than  
<sup>142</sup> the recreational landings. The historical landings from the recreational fleet in Oregon start  
<sup>143</sup> in 1973 at 0.86 mt, peak in 1983 at 6.07 mt and again in 1993 at 6.04 mt. The recreational  
<sup>144</sup> catches over the last 10 years in Oregon have ranged from 1.67 mt in 2014 to 3.66 mt in 2007.  
<sup>145</sup> Recreational landings in Washington peaked in 1992 (7.98 mt) and have remained between  
<sup>146</sup> 2-4 mt from 2005-2014.

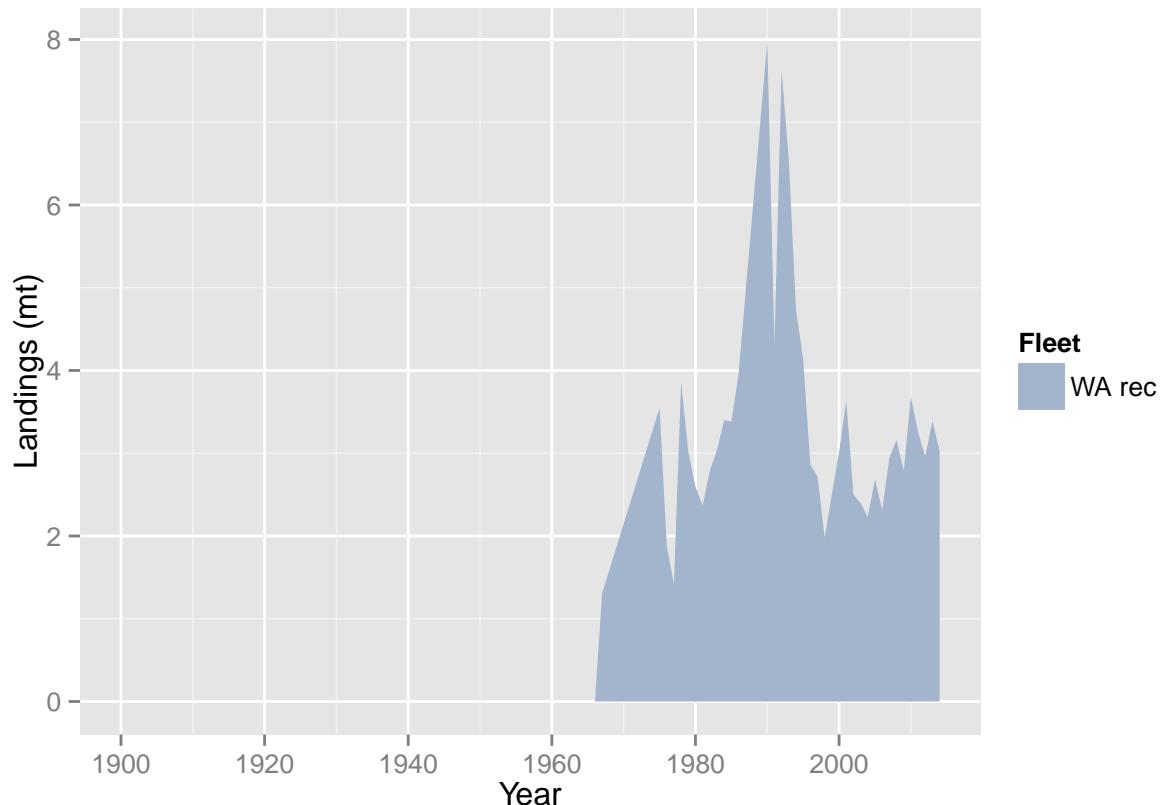


Figure a: China rockfish landings for Washington. Washington has does not have a commercial nearshore fishery.

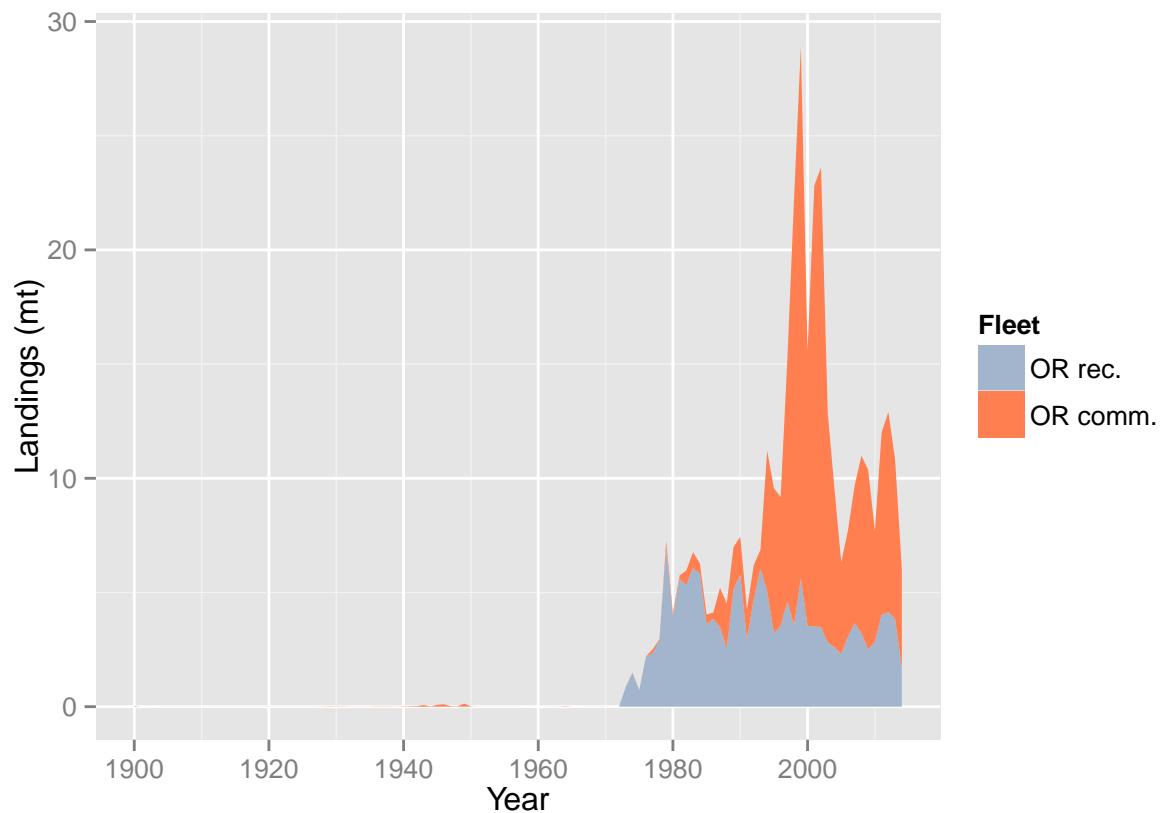


Figure b: Stacked line plot of China rockfish landings history for Oregon by fleet (recreational and commercial).

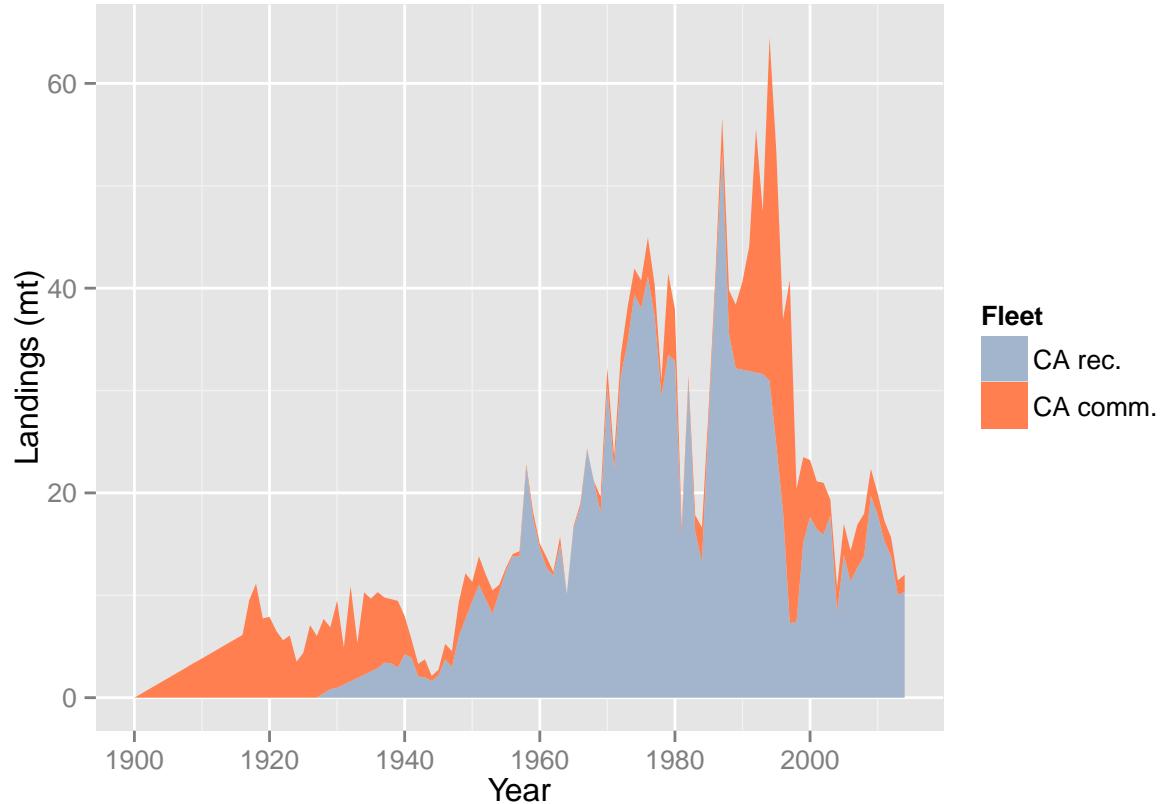


Figure c: Stacked line plot of China rockfish landings history for California by fleet (recreational and commercial).

Table a: Recent China rockfish landings (mt) by fleet.

Year	Washington recreational	Oregon commercial	Oregon recreational	California commercial	California recreational	Total
2005	2.69	4.02	2.31	3.06	13.91	25.98
2006	2.31	4.64	3.07	3.00	11.35	24.37
2007	2.94	6.03	3.66	4.21	12.70	29.54
2008	3.16	7.76	3.22	4.15	13.82	32.12
2009	2.79	7.88	2.50	2.63	19.72	35.52
2010	3.68	4.84	2.85	2.11	17.85	31.34
2011	3.26	7.98	4.02	1.99	15.29	32.54
2012	2.96	8.76	4.14	1.83	13.80	31.49
2013	3.39	6.98	3.85	1.43	10.03	25.68
2014	3.03	4.38	1.67	1.69	10.32	21.08

## 147 Data and assessment

148 China rockfish was assessed as a data moderate stock in 2013 (Cope et al. 2015) using the  
 149 XDB-SRA modeling framework. This assessment uses the newest version of Stock Synthesis  
 150 (3.24u). The model begins in 1900, and assumes the stock was at an unfished equilibrium  
 151 that year.

152 Data within the central and northern models were stratified as follows: central model north  
 153 and south of Florence, OR and the northern model groups MCAs 1-2 (southern WA) and  
 154 MCAs 3-4 (northern WA) (Figure d). Data for the management area south of 40°10' N.  
 155 latitude are aggregated, in part because historical removals from the dominant fisheries  
 156 (recreational charter and private boat modes) prior to 2004 are not available at a finer spatial  
 157 scale. The data used in the assessments includes commercial and recreational landings,  
 158 Catch per Unit Effort (CPUE) indices from recreational and commercial fleets, and length  
 159 and age compositions. Discard data (total discards in mt and size compositions) from the  
 160 commercial live-fish fishery were modelled south of 40°10' N. latitude. Where available,  
 161 age and length compositions for the recreational party/charter (CPFV) and private/rental  
 162 modes were developed separately.

## 163 Stock biomass

164 Estimated spawning output in the northern area (Washington state) declined between the  
 165 1960s and 1990s but has been largely stable during the past two decades (Figure e and Table  
 166 b). The estimated relative depletion level (spawning output relative to unfished spawning  
 167 output) of the northern stock in 2015 is 73.4% (~95% asymptotic interval: ± 63.6% - 83.2%)  
 168 (Figure f).

169 The central area model for China rockfish estimates that spawning output is just above

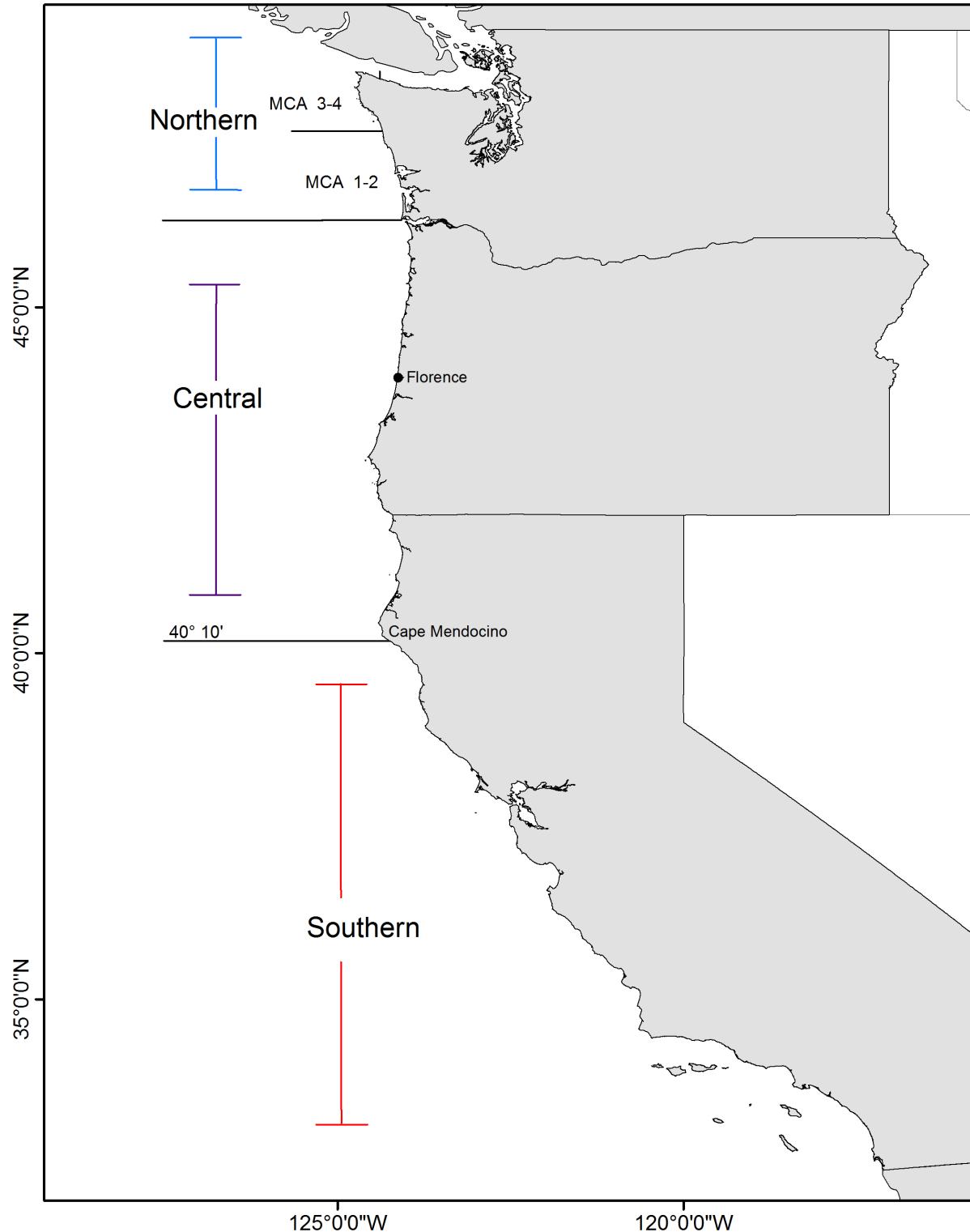


Figure d: Map depicting the boundaries for the three base-case models, Southern model (south of  $40^{\circ}10'$  N. latitude), Central model (south of  $40^{\circ}10'$  N. latitude to the OR-WA border), and the Northern model (WA state MCAs 1-4).

<sup>170</sup> the biomass target in 2015 (Figure [e](#) and Table [c](#)). The rate of spawning output decline is  
<sup>171</sup> estimated to be steepest during the 1980s to 1990s and continued to decline from the early  
<sup>172</sup> 2000s at a slower rate to an estimated minimum of 39.6% in 2014. The estimated relative  
<sup>173</sup> depletion level of the central stock in 2015 is 61.5% (~95% asymptotic interval:  $\pm 53.8\%$  -  
<sup>174</sup> 69.2%) (Figure [f](#)).

<sup>175</sup> The assessment for the southern management area suggests that China rockfish were lightly,  
<sup>176</sup> but steadily exploited since the early 1900s, with more rapid declines in spawning output  
<sup>177</sup> beginning with development of the recreational fishery in the 1950s (Figure [e](#) and Table  
<sup>178</sup> [d](#)). The estimated relative depletion level of the southern stock in 2015 is 29.6% (~95%  
<sup>179</sup> asymptotic interval:  $\pm 25.0\%$  - 34.3%) (Figure [f](#)). Although spawning output in the southern  
<sup>180</sup> area is more depleted than the central and northern areas, it is the only area with an  
<sup>181</sup> increasing trend over the past 15 years.

Table b: Recent trend in beginning of the year biomass and depletion for the northern China rockfish model.

Year	Spawning Output (billion eggs)	~ 95% confidence interval	Estimated depletion	~ 95% confidence interval
2006	17.942	(8.86-27.03)	0.734	(0.638-0.83)
2007	18.030	(8.94-27.12)	0.738	(0.642-0.833)
2008	18.044	(8.95-27.14)	0.738	(0.643-0.833)
2009	18.034	(8.93-27.13)	0.738	(0.642-0.833)
2010	18.062	(8.96-27.17)	0.739	(0.644-0.834)
2011	17.993	(8.89-27.1)	0.736	(0.64-0.833)
2012	17.971	(8.86-27.08)	0.735	(0.638-0.832)
2013	17.981	(8.87-27.09)	0.736	(0.639-0.833)
2014	17.944	(8.83-27.06)	0.734	(0.637-0.832)
2015	17.950	(8.83-27.07)	0.734	(0.637-0.832)

Table c: Recent trend in beginning of the year biomass and depletion for the central (north of  $40^{\circ}10'$  N. latitude to the OR-WA border) China rockfish model.

Year	Spawning Output (billion eggs)	$\sim 95\%$ confidence interval	Estimated depletion	$\sim 95\%$ confidence interval
2006	40.643	(27.6-53.68)	0.624	(0.551-0.697)
2007	40.851	(27.8-53.9)	0.627	(0.555-0.7)
2008	40.630	(27.57-53.69)	0.624	(0.551-0.698)
2009	40.313	(27.25-53.38)	0.619	(0.545-0.694)
2010	40.125	(27.05-53.2)	0.616	(0.541-0.692)
2011	40.380	(27.29-53.47)	0.620	(0.545-0.695)
2012	40.112	(27.01-53.21)	0.616	(0.54-0.692)
2013	39.706	(26.6-52.82)	0.610	(0.533-0.687)
2014	39.573	(26.45-52.7)	0.608	(0.53-0.686)
2015	40.033	(26.88-53.19)	0.615	(0.538-0.692)

Table d: Recent trend in beginning of the year spawning output and depletion for the southern (south of  $40^{\circ}10'$  N. latitude) China rockfish model.

Year	Spawning Output (billion eggs)	$\sim 95\%$ confidence interval	Estimated depletion	$\sim 95\%$ confidence interval
2006	14.430	(9.47-19.39)	0.217	(0.164-0.27)
2007	15.173	(10.01-20.34)	0.228	(0.174-0.283)
2008	15.819	(10.46-21.18)	0.238	(0.182-0.294)
2009	16.289	(10.77-21.81)	0.245	(0.187-0.303)
2010	16.361	(10.75-21.97)	0.246	(0.186-0.306)
2011	16.444	(10.73-22.16)	0.247	(0.186-0.309)
2012	16.758	(10.91-22.6)	0.252	(0.189-0.315)
2013	17.168	(11.18-23.15)	0.258	(0.193-0.323)
2014	17.899	(11.73-24.07)	0.269	(0.203-0.336)
2015	18.565	(12.23-24.9)	0.279	(0.211-0.347)

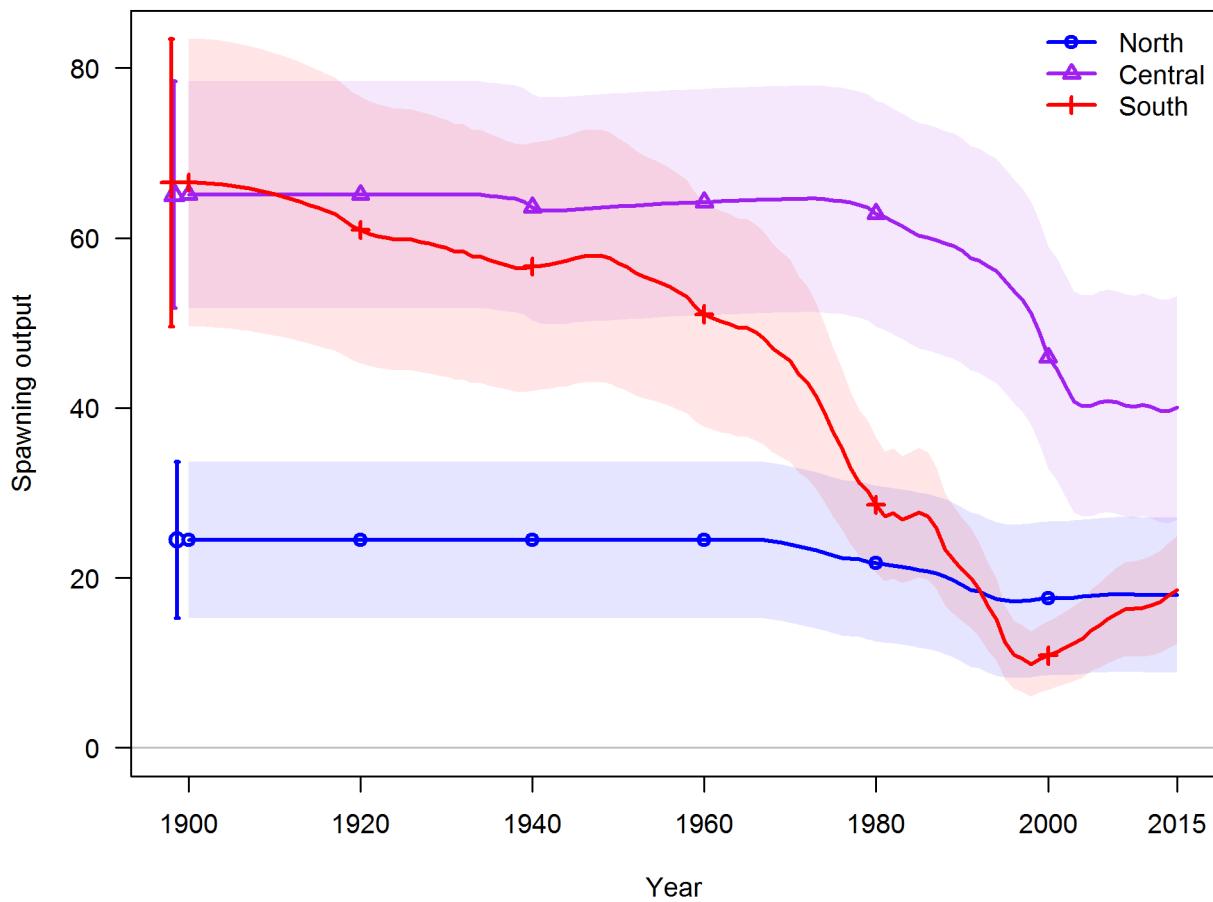


Figure e: Time series of spawning output trajectory (circles and line: median; light broken lines: 95% credibility intervals) for the three models of China rockfish (North=Washington state, Central =  $40^{\circ}10'$  N. lat. to the OR/WA border, and South = south of  $40^{\circ}10'$  N. lat.).

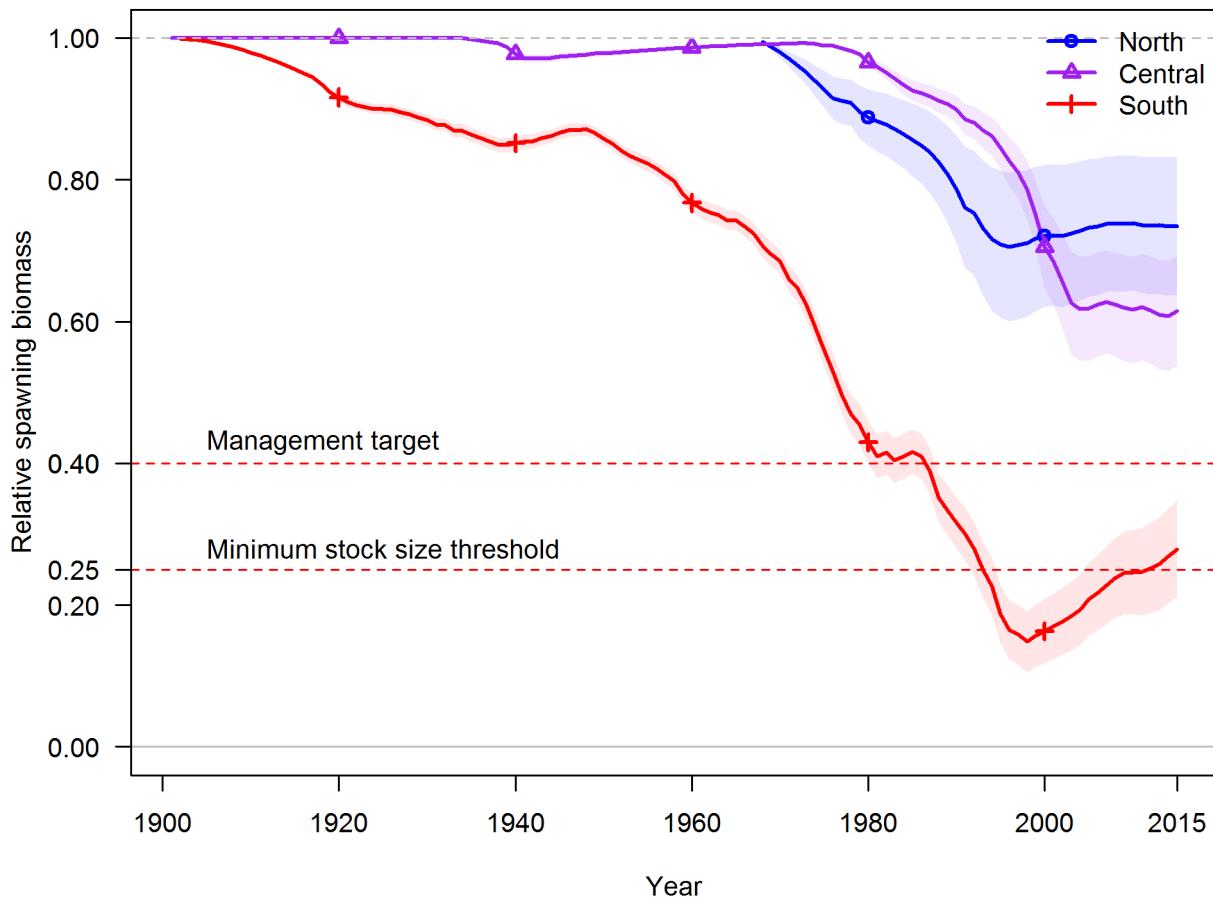


Figure f: Estimated relative depletion with approximate 95% asymptotic confidence intervals (dashed lines) for the three base case assessment models.

<sup>182</sup> **Recruitment**

<sup>183</sup> Length and age composition data for China rockfish contain insufficient information to reli-  
<sup>184</sup> ably resolve year-class strength. Therefore, all three base models assume that recruitment  
<sup>185</sup> follows a deterministic Beverton-Holt stock-recruitment relationship, so trends in recruit-  
<sup>186</sup> ment reflect trends in estimated spawning output. Given the assumed value of steepness and  
<sup>187</sup> estimates of current stock status, estimated recruitment has remained fairly constant in the  
<sup>188</sup> central and northern models, while the estimated biomass in the southern area has declined  
<sup>189</sup> enough to impact spawning output (Figure g, Tables e, f and g).

Table e: Recent recruitment for the northern model (Washington state MCAs 1-4).

Year	Estimated Recruitment (1,000s)	~ 95% confidence interval
2006	33.29	(21.33 - 45.24)
2007	33.30	(21.35 - 45.25)
2008	33.30	(21.35 - 45.26)
2009	33.30	(21.35 - 45.26)
2010	33.31	(21.35 - 45.26)
2011	33.30	(21.34 - 45.25)
2012	33.29	(21.33 - 45.25)
2013	33.29	(21.33 - 45.25)
2014	33.29	(21.33 - 45.25)
2015	33.29	(21.33 - 45.25)

Table f: Recent recruitment for the central model (40°10' N. lat. to the OR/WA border).

Year	Estimated Recruitment (1,000s)	~ 95% confidence interval
2006	68.27	(54.59 - 81.94)
2007	68.31	(54.64 - 81.97)
2008	68.26	(54.59 - 81.94)
2009	68.20	(54.51 - 81.9)
2010	68.17	(54.47 - 81.87)
2011	68.22	(54.52 - 81.91)
2012	68.17	(54.46 - 81.87)
2013	68.09	(54.36 - 81.81)
2014	68.06	(54.32 - 81.8)
2015	68.15	(54.43 - 81.87)

Table g: Recent recruitment for the southern model (south of  $40^{\circ}10'$  N. latitude).

Year	Estimated Recruitment (1,000s)	$\sim 95\%$ confidence interval
2006	122.32	(105.92 - 138.73)
2007	123.93	(107.67 - 140.18)
2008	125.23	(109.07 - 141.39)
2009	126.13	(109.98 - 142.28)
2010	126.27	(109.96 - 142.57)
2011	126.42	(109.97 - 142.87)
2012	126.99	(110.52 - 143.46)
2013	127.71	(111.29 - 144.13)
2014	128.94	(112.72 - 145.15)
2015	129.99	(113.95 - 146.03)

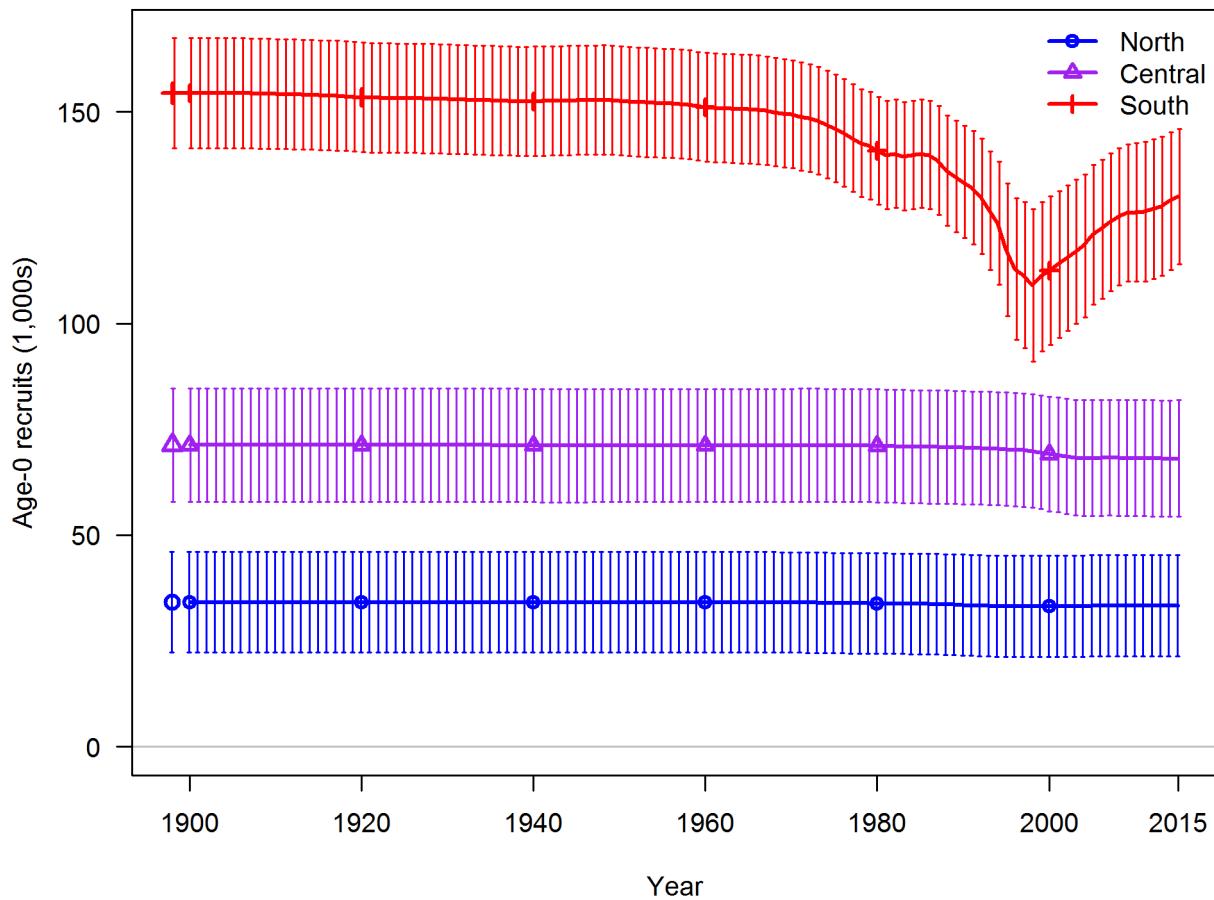


Figure g: Time series of estimated China rockfish recruitments for the three base-case models with 95% confidence or credibility intervals.

190 **Exploitation status**

191 Harvest rates estimated by the northern area model for Washington have never exceeded  
192 management target levels (Table [h](#) and Figure [h](#)). Model results for the central area suggest  
193 that harvest rates have briefly exceeded the current proxy MSY value around 2000, but has  
194 remained below the management target in the last decade (Table [i](#) and Figure [h](#)). Historical  
195 harvest rates for China rockfish rose steadily in the southern management area until the  
196 mid-1990s and exceeded the target SPR harvest rate for several decades, and is just below  
197 the target harvest rate as of 2013 (Table [j](#) and Figure [h](#)). A summary of China rockfish  
198 exploitation histories for the northern, central, and southern areas is provided as Figure [i](#).

Table h: Recent trend in spawning potential ratio and exploitation for the northern China rockfish model (Washington state MCAs 1-4).

Year	Fishing intensity	~ 95% confidence interval	Exploitation rate	~ 95% confidence interval
2005	0.44	(0.27-0.61)	0.32	(0.17-0.47)
2006	0.39	(0.24-0.55)	0.28	(0.15-0.4)
2007	0.47	(0.3-0.65)	0.35	(0.19-0.51)
2008	0.50	(0.32-0.68)	0.38	(0.2-0.55)
2009	0.45	(0.28-0.63)	0.33	(0.18-0.49)
2010	0.56	(0.36-0.76)	0.44	(0.24-0.64)
2011	0.51	(0.32-0.7)	0.39	(0.21-0.57)
2012	0.48	(0.3-0.66)	0.35	(0.19-0.52)
2013	0.53	(0.34-0.72)	0.41	(0.22-0.59)
2014	0.48	(0.3-0.67)	0.36	(0.19-0.53)

Table i: Recent trend in spawning potential ratio and exploitation for the central China rockfish model ( $40^{\circ}10'$  N. lat. to the OR/WA border).

Year	Fishing intensity	$\sim 95\%$ confidence interval	Exploitation rate	$\sim 95\%$ confidence interval
2005	0.55	(0.42-0.68)	0.40	(0.28-0.52)
2006	0.62	(0.49-0.76)	0.48	(0.34-0.62)
2007	0.78	(0.63-0.93)	0.68	(0.48-0.88)
2008	0.82	(0.66-0.97)	0.73	(0.52-0.95)
2009	0.78	(0.63-0.93)	0.68	(0.48-0.88)
2010	0.61	(0.48-0.75)	0.47	(0.33-0.61)
2011	0.80	(0.65-0.96)	0.72	(0.5-0.93)
2012	0.85	(0.69-1.01)	0.79	(0.55-1.02)
2013	0.77	(0.62-0.93)	0.67	(0.47-0.87)
2014	0.53	(0.4-0.66)	0.39	(0.27-0.5)

Table j: Recent trend in spawning potential ratio and exploitation for the southern China rockfish model (south of  $40^{\circ}10'$  N. latitude).

Year	Fishing intensity	$\sim 95\%$ confidence interval	Exploitation rate	$\sim 95\%$ confidence interval
2005	1.30	(1.16-1.45)	1.50	(1.15-1.85)
2006	1.18	(1.03-1.33)	1.19	(0.91-1.47)
2007	1.18	(1.03-1.33)	1.22	(0.93-1.51)
2008	1.23	(1.08-1.37)	1.35	(1.04-1.67)
2009	1.35	(1.21-1.48)	1.76	(1.34-2.17)
2010	1.34	(1.2-1.48)	1.70	(1.29-2.1)
2011	1.25	(1.1-1.4)	1.41	(1.06-1.75)
2012	1.20	(1.05-1.35)	1.27	(0.96-1.58)
2013	1.02	(0.86-1.18)	0.90	(0.68-1.12)
2014	1.04	(0.89-1.2)	0.96	(0.73-1.19)

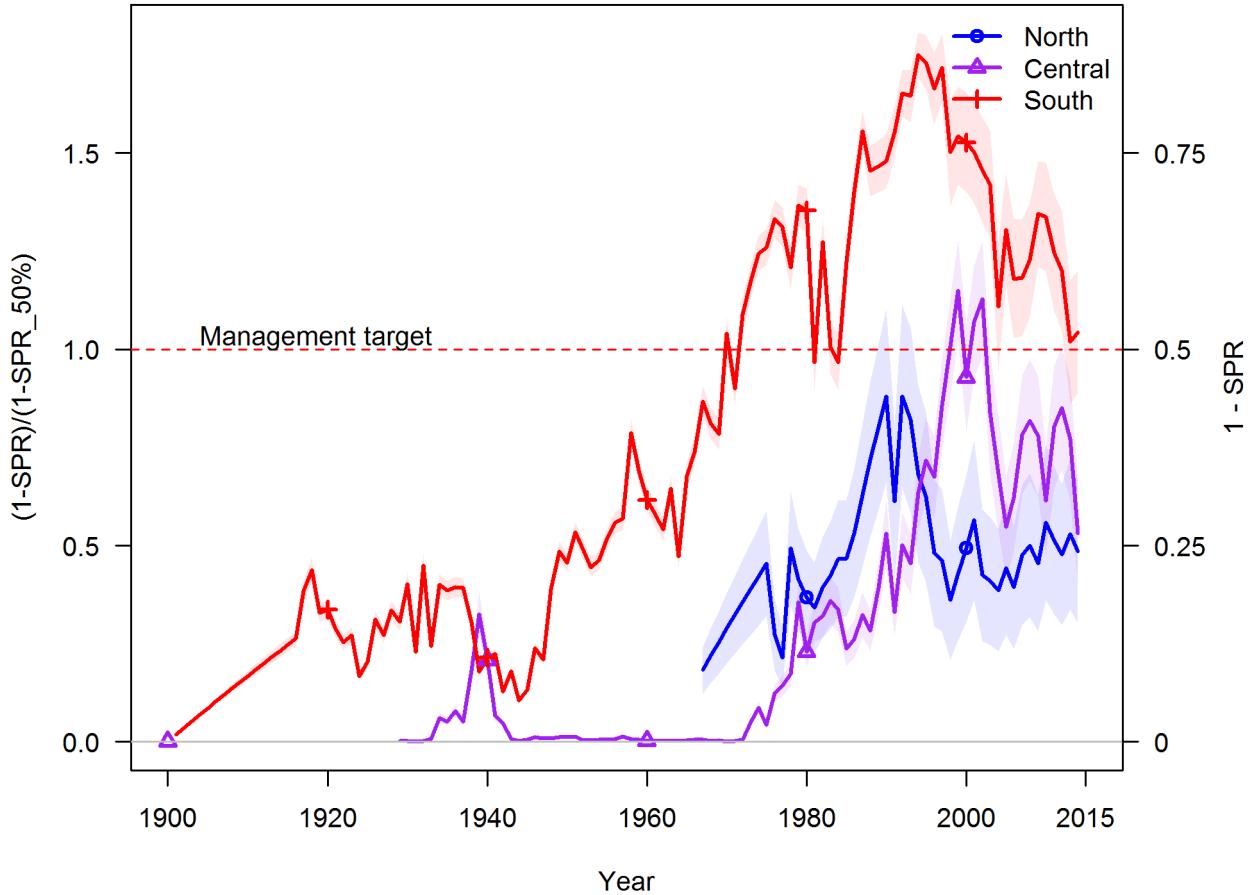


Figure h: Estimated spawning potential ratio (SPR) for the northern, central, and southern base-case models. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis. The management target is plotted as a red horizontal line and values above this reflect harvests in excess of the overfishing proxy based on the SPR<sub>50%</sub> harvest rate. The last year in the time series is 2014.

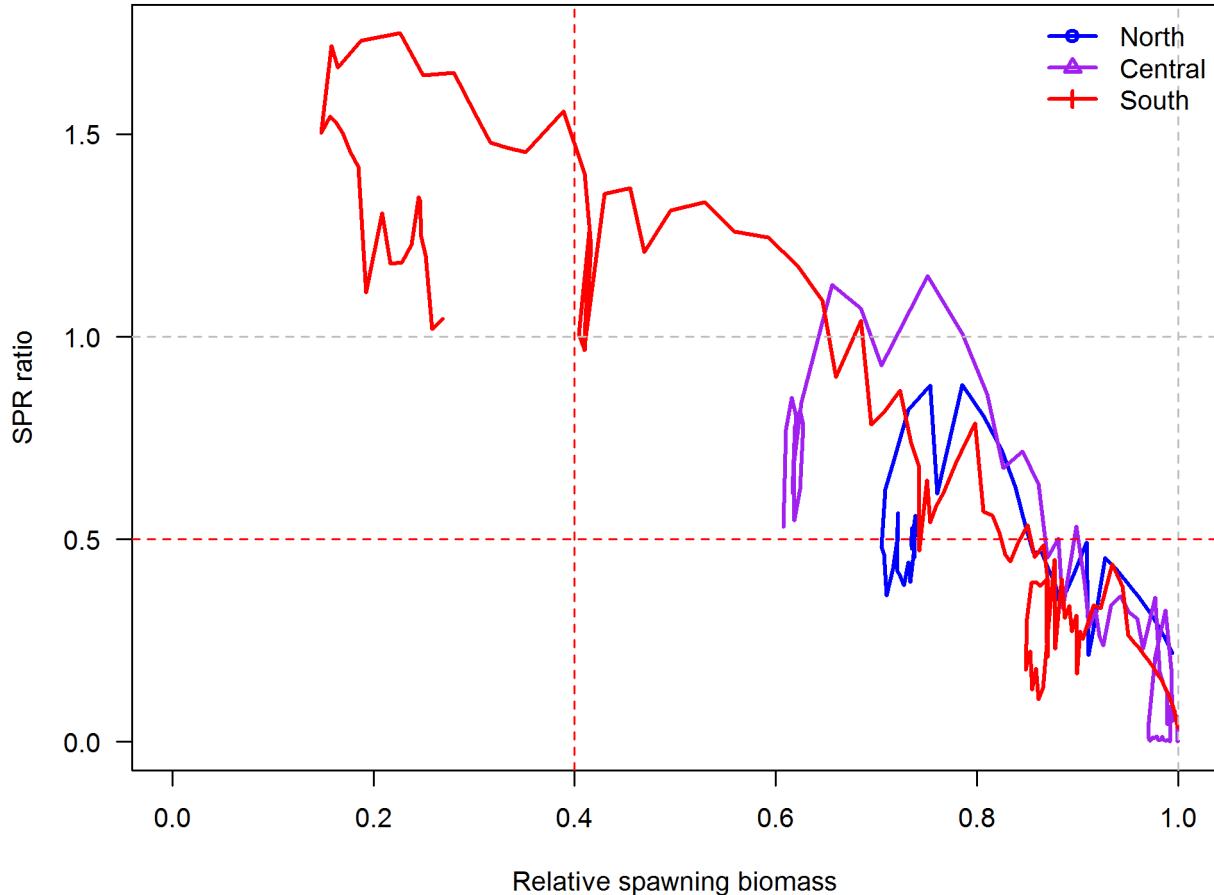


Figure i: Phase plot of estimated relative (1-SPR) vs. relative spawning biomass for the southern, central, and northern base case models. The relative (1-SPR) is (1-SPR) divided by 50% (the SPR target). Relative depletion is the annual spawning biomass divided by the unfished spawning biomass.

<sup>199</sup> **Ecosystem considerations**

<sup>200</sup> In this assessment, ecosystem considerations were not explicitly included in the analysis.  
<sup>201</sup> This is primarily due to a lack of relevant data and results of analyses (conducted elsewhere)  
<sup>202</sup> that could contribute ecosystem-related quantitative information for the assessment.  
<sup>203</sup> Recently available habitat information was used to select the data used in the onboard  
<sup>204</sup> observer indices (see Appendix F, p.[9](#)).

<sup>205</sup> **Reference points**

<sup>206</sup> The management line for China rockfish is at 40°10' N. latitude, with differing management  
<sup>207</sup> guidelines north and south. From 2005-2010, the Nearshore Rockfish Complexes north and  
<sup>208</sup> south of 40°10' N. latitude were managed by a total catch Optimum Yield (OY). As of the  
<sup>209</sup> Pacific Fishery Management Council (PFMC) 2011-12 management cycle, China rockfish  
<sup>210</sup> has a component OFL and ABC within the northern and southern Nearshore Rockfish  
<sup>211</sup> Complexes, based on the work by Dick and MacCall (2010).

<sup>212</sup> This stock assessment estimates that China rockfish in the north are above the biomass  
<sup>213</sup> target. The spawning output of the stock declined between the 1960s and 1990s but has  
<sup>214</sup> largely been stable during the past few decades. The estimated relative depletion level in  
<sup>215</sup> 2015 is 73.4% (~95% asymptotic interval: ± 63.7% - 83.2%, corresponding to an unfished  
<sup>216</sup> spawning output of 24.4 billion eggs (~95% asymptotic interval: 15.2 – 33.7 billion eggs) of  
<sup>217</sup> spawning output in the base model (Table [k](#)). Unfished age 5+ biomass was estimated to be  
<sup>218</sup> 240.8 mt in the base case model. The target spawning output based on the biomass target  
<sup>219</sup> ( $SB_{40\%}$ ) is 9.8 billion eggs, which gives a catch of 6.3 mt. Equilibrium yield at the proxy  
<sup>220</sup>  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 5.8 mt.

<sup>221</sup> This stock assessment estimates that central area China rockfish are just above the biomass  
<sup>222</sup> target. The rate of spawning output decline is estimated to be steepest during the 1980s to  
<sup>223</sup> 1990s and has continued to decline since the 1990s at a slower rate. The estimated relative  
<sup>224</sup> depletion level in 2015 is 61.5% (~95% asymptotic interval: ± 53.8% - 69.2%), corresponding  
<sup>225</sup> to an unfished spawning output of 65.1 billion eggs (~95% asymptotic interval: 51.8 – 78.4  
<sup>226</sup> billion eggs) of spawning output in the base model (Table [l](#)). Unfished age 5+ biomass was  
<sup>227</sup> estimated to be 591.5 mt in the base case model. The target spawning output based on the  
<sup>228</sup> biomass target ( $SB_{40\%}$ ) is 26 billion eggs, which gives a catch of 15.7 mt. Equilibrium yield  
<sup>229</sup> at the proxy  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 14.5 mt.

<sup>230</sup> This stock assessment estimates that China rockfish south of 40°10' N. latitude are below the  
<sup>231</sup> biomass target, but above the minimum stock size threshold, and have been increasing over  
<sup>232</sup> the last 15 years. The estimated relative depletion level in 2015 is 27.9% (~95% asymptotic  
<sup>233</sup> interval: ± 21.2% - 34.7%), corresponding to an unfished spawning output of 66.5 billion eggs  
<sup>234</sup> (~95% asymptotic interval: 49.6 - 83.4 billion eggs) of spawning output in the base model  
<sup>235</sup> (Table [m](#)). Unfished age 5+ biomass was estimated to be 768.6 mt in the base case model.

<sup>236</sup> The target spawning output based on the biomass target ( $SB_{40\%}$ ) is 26.6 billion eggs, which  
<sup>237</sup> gives a catch of 21.1 mt. Equilibrium yield at the proxy  $F_{MSY}$  harvest rate corresponding  
<sup>238</sup> to  $SPR_{50\%}$  is 19.5 mt.

Table k: Summary of reference points and management quantities for the northern (Washington state MCAs 1-4) base case model.

Quantity	Estimate	95% Confidence Interval
Unfished spawning output (billions of eggs)	24.4	(15.2-33.7)
Unfished age 5+ biomass (mt)	240.8	(153-328.7)
Unfished recruitment (R0, thousands)	34.2	(22.3-46)
Spawning output (2015, billions of eggs)	17.9	(8.8-27.1)
Depletion (2015)	0.7344	(0.6369-0.8319)
<b>Reference points based on SB<sub>40%</sub></b>		
Proxy spawning output ( $B_{40\%}$ )	9.8	(6.1-13.5)
SPR resulting in $B_{40\%}$ ( $SPR_{B40\%}$ )	0.444	(0.444-0.444)
Exploitation rate resulting in $B_{40\%}$	0.0551	(0.0522-0.058)
Yield with $SPR_{B40\%}$ at $B_{40\%}$ (mt)	6.3	(4-8.5)
<b>Reference points based on SPR proxy for MSY</b>		
Spawning output	11.3	(7-15.5)
$SPR_{proxy}$	0.5	
Exploitation rate corresponding to $SPR_{proxy}$	0.0458	(0.0435-0.0482)
Yield with $SPR_{proxy}$ at $SB_{SPR}$ (mt)	5.8	(3.7-7.9)
<b>Reference points based on estimated MSY values</b>		
Spawning output at MSY ( $SB_{MSY}$ )	5.6	(3.5-7.8)
$SPR_{MSY}$	0.2875	(0.2823-0.2927)
Exploitation rate at MSY	0.0924	(0.0863-0.0985)
MSY (mt)	7	(4.5-9.4)

Table 1: Summary of reference points and management quantities for the central ( $40^{\circ}10' N.$  lat. to the OR/WA border) base case model.

Quantity	Estimate	95% Confidence Interval
Unfished spawning output (billions of eggs)	65.1	(51.8-78.4)
Unfished age 5+ biomass (mt)	591.5	(473.7-709.3)
Unfished recruitment (R0, thousands)	71.3	(57.9-84.6)
Spawning output (2015, billions of eggs)	40	(26.9-53.2)
Depletion (2015)	0.6149	(0.5381-0.6918)
<b>Reference points based on SB<sub>40%</sub></b>		
Proxy spawning output ( $B_{40\%}$ )	26	(20.7-31.4)
SPR resulting in $B_{40\%}$ ( $SPR_{B40\%}$ )	0.444	(0.444-0.444)
Exploitation rate resulting in $B_{40\%}$	0.0584	(0.0567-0.0602)
Yield with $SPR_{B40\%}$ at $B_{40\%}$ (mt)	15.7	(12.6-18.7)
<b>Reference points based on SPR proxy for MSY</b>		
Spawning output	30	(23.8-36.1)
$SPR_{proxy}$	0.5	
Exploitation rate corresponding to $SPR_{proxy}$	0.0484	(0.0469-0.0498)
Yield with $SPR_{proxy}$ at $SB_{SPR}$ (mt)	14.5	(11.7-17.3)
<b>Reference points based on estimated MSY values</b>		
Spawning output at MSY ( $SB_{MSY}$ )	15.4	(12.2-18.6)
$SPR_{MSY}$	0.2925	(0.29-0.295)
Exploitation rate at MSY	0.098	(0.094-0.1019)
$MSY$ (mt)	17.3	(14-20.7)

Table m: Summary of reference points and management quantities for the southern (south of  $40^{\circ}10'$  N. latitude) base case model.

Quantity	Estimate	95% Confidence Interval
Unfished spawning output (billions of eggs)	66.5	(49.6-83.4)
Unfished age 5+ biomass (mt)	768.6	(660.1-877)
Unfished recruitment ( $R_0$ , thousands)	154.5	(141.5-167.4)
Spawning output (2015, billions of eggs)	18.6	(12.2-24.9)
Depletion (2015)	0.2791	(0.2113-0.3469)
<b>Reference points based on SB<sub>40%</sub></b>		
Proxy spawning output ( $B_{40\%}$ )	26.6	(19.8-33.4)
SPR resulting in $B_{40\%}$ ( $SPR_{B40\%}$ )	0.444	(0.444-0.444)
Exploitation rate resulting in $B_{40\%}$	0.057	(0.0491-0.065)
Yield with $SPR_{B40\%}$ at $B_{40\%}$ (mt)	21.1	(19.9-22.3)
<b>Reference points based on SPR proxy for MSY</b>		
Spawning output	30.6	(22.8-38.4)
$SPR_{proxy}$	0.5	
Exploitation rate corresponding to $SPR_{proxy}$	0.0476	(0.041-0.0541)
Yield with $SPR_{proxy}$ at $SB_{SPR}$ (mt)	19.5	(18.4-20.6)
<b>Reference points based on estimated MSY values</b>		
Spawning output at MSY ( $SB_{MSY}$ )	15.5	(11.2-19.9)
$SPR_{MSY}$	0.2898	(0.2832-0.2965)
Exploitation rate at MSY	0.0938	(0.0784-0.1092)
$MSY$ (mt)	23.4	(22.1-24.8)

## 239 Management performance

240 China rockfish is managed in the northern and southern Nearshore Rockfish Complex (split at  
 241 40°10' N. latitude. Since the 2011-2012 management cycle, China rockfish has a contribution  
 242 OFL and ACL within each the northern and southern Nearshore Rockfish Complexes (Table  
 243 n). The estimated catch of China rockfish north of 40°10' N. latitude of Nearshore Rockfish  
 244 Complex has been above both the China rockfish contribution to the northern Nearshore  
 245 Rockfish Complex OFL and ACL in all years (2011-2014). The estimated catch of China  
 246 rockfish south of 40°10' N. latitude of Nearshore Rockfish Complex has been below the China  
 247 rockfish contribution to the northern Nearshore Rockfish Complex OFL and ACL in all years  
 248 (2011-2014). A summary of these values as well as other base case summary results can be  
 249 found in Table s.

Table n: Recent trend in total catch and commercial landings (mt) relative to the management guidelines. Estimated total catch reflect the commercial landings plus the model estimated discarded biomass. Note: 2015 and 2016 ACLs are proposed and not yet in regulations

Year	Management guideline	Nearshore rockfish north	China contrib. north	Estimated catch north	Nearshore rockfish south	China contrib. south	Estimated catch south
<b>2005</b>	<b>ABC</b>	na	na	10.10	na	na	16.70
	<b>Total Catch OY</b>	122	na		615	na	
<b>2006</b>	<b>ABC</b>	na	na	11.30	na	na	13.60
	<b>Total Catch OY</b>	122	na		615	na	
<b>2007</b>	<b>ABC</b>	na	na	15.80	na	na	14.20
	<b>Total Catch OY</b>	142	na		564	na	
<b>2008</b>	<b>ABC</b>	na	na	16.90	na	na	16.00
	<b>Total Catch OY</b>	142	na		564	na	
<b>2009</b>	<b>ABC</b>	na	na	15.40	na	na	21.00
	<b>Total Catch OY</b>	155	na		650	na	
<b>2010</b>	<b>ABC</b>	na	na	12.40	na	na	19.30
	<b>Total Catch OY</b>	155	na		650	na	
<b>2011</b>	<b>OFL</b>	116	11.7	16.60	1156	19.8	16.20
	<b>ACL</b>	99	9.8		1001	16.5	
<b>2012</b>	<b>OFL</b>	116	11.7	17.50	1145	19.8	14.10
	<b>ACL</b>	99	9.8		990	16.5	
<b>2013</b>	<b>OFL</b>	110	9.8	15.60	1164	16.6	10.40
	<b>ACL</b>	94	8.2		1005	13.8	
<b>2014</b>	<b>OFL</b>	110	9.8	10.10	1160	16.6	11.80
	<b>ACL</b>	94	8.2		1001	13.8	
<b>2015</b>	<b>OFL</b>	88	7.2		1313	55.2	
	<b>ACL</b>	69	6.6		1114	50.4	
<b>2016</b>	<b>OFL</b>	88	7.4		1288	52.7	
	<b>ACL</b>	69	6.8		1006	50.4	

250 **Unresolved problems and major uncertainties**

- 251 As in most/all stock assessments, the appropriate value for stock-recruit steepness remains  
252 a major uncertainty for China rockfish. In this assessment a prior value was available from  
253 a meta-analysis, allowing bracketing of the uncertainty. Exploration of the southern model  
254 during the STAR panel meeting established that the range of uncertainty in current and  
255 projected biomass status provided by this bracketing was very similar to the range due to  
256 natural mortality, and that natural mortality alone would be used to bracket uncertainty in  
257 model results for management advice.
- 258 While the northern and the southern area models are able to estimate a plausible value of  
259 natural mortality with an apparently good level of precision, this was not possible with the  
260 central area model.
- 261 The fishery-dependent abundance indices used in the assessment are relatively noisy. There  
262 is no fishery-independent index. The assessments assume that trends in CPUE indices are  
263 representative of population trends.
- 264 Assessment results for the central and the northern area models are dependent on the method  
265 used for weighting the conditional age-at-length data. This is an area of active research and  
266 there is a lack of consensus on an agreed approach. A workshop is planned for later this year  
267 that might provide guidance. For this assessment, the Panel recommended use of harmonic  
268 mean method, because it is a well-understood and frequently applied method that provided  
269 intermediate results compared to other alternatives.
- 270 The current term of reference for stock assessment require development of a single decision  
271 table with states of nature ranging along the dominant axis of uncertainty. This presumes  
272 that uncertainty is consequential only for a single variable or estimated quantity, such as  
273 natural mortality, steepness, or ending biomass. This approach may fail to capture important  
274 elements of uncertainty that should be communicated to the Council and its advisory bodies.  
275 Additional flexibility in the development of decision tables is needed.
- 276 The forecasts of stock abundance and yield were developed using the final base models. The  
277 total catches in 2015 and 2016 are set to the PFMC adopted China rockfish contribution  
278 ACLs in the northern and central models (Table n). The southern model total catches in  
279 2015 and 2016 are set to the average annual catch from 2012-2014. The exploitation rate  
280 for 2017 and beyond is based upon an SPR harvest rate of 50%. The average of 2010-2014  
281 catch by fleet was used to distribute catches in forecasted years. The forecasted projections  
282 of the OFL for each model are presented in Table o.
- 283 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
284 panel and are based on a low value of M, 0.05, and a high value, 0.09. Current medium-term  
285 forecasts based on the alternative states of nature project that the stock, under the current  
286 control rule as applied to the base model, will decline towards the target stock size Table  
287 p. The current control rule under the low state of nature results in a stock decline into  
288 the precautionary zone, while the high state of nature maintains the stock at near unfished

289 levels. Removing the catches resulting from the low M state of nature, assuming the base  
 290 and high values of M both maintain the stock at well above the current target stock size, as  
 291 does removing the recent average catches under all states of nature. Removing the high M  
 292 catches under the base model M and high M states of nature results in the population going  
 293 to extremely low levels during the projection period, spawning biomass and stock depletion  
 294 values are not reported for years in which the stock goes to these very low levels.  
 295 Current medium-term forecasts based on the alternative states of nature for the central  
 296 model project that the stock, under the current control rule as applied to the base model,  
 297 will decline towards the target stock size Table [q](#). The current control rule under the low  
 298 state of nature results in a stock in the precautionary zone, while the high state of nature  
 299 maintains the stock increasing from 40% to 50% depletion from 2017 - 2026. Removing the  
 300 catches resulting from the low M state of nature, assuming the base and high values of M  
 301 both maintain the stock at well above the current target stock size. Removing the high M  
 302 catches under the base model M and low M states of nature results in the population going  
 303 to extremely low levels during the projection period. Removing average catches under the  
 304 base M and high M states of nature result in the stock remaining above the current target  
 305 stock size, and an ending depletion of 37% in 2026 for the low M state of nature.  
 306 Assuming that catches in 2015 and 2016 equal recent average catch, and that catches be-  
 307 ginning in 2017 follow the default ACL harvest control rule, projections of expected China  
 308 spawning output from the southern base model suggest the stock will be at roughly 30%  
 309 of unfished spawning output in 2017, and increase to 38% by 2026 (Table [r](#)). The stock is  
 310 expected to remain below the target stock size (40% of unfished spawning output) in the  
 311 base model and “low M” states of nature through 2026, and to exceed target size in the  
 312 “high M” scenario, assuming stationarity in the stock-recruitment assumptions.

Table o: Projections of potential OFL (mt) for each model, using the base model forecast.

Year	North	Central	South	Total
2017	9.63	20.52	13.31	43.46
2018	9.29	20.05	13.84	43.18
2019	8.98	19.62	14.34	42.93
2020	8.69	19.21	14.80	42.71
2021	8.43	18.84	15.24	42.51
2022	8.20	18.50	15.63	42.33
2023	7.99	18.19	16.00	42.18
2024	7.80	17.91	16.34	42.05
2025	7.64	17.67	16.65	41.95
2026	7.49	17.45	16.93	41.87

Table p: Summary of 10-year projections beginning in 2017 for alternate states of nature based on an axis of uncertainty for the northern model. Columns range over low, mid, and high states of nature, and rows range over different assumptions of catch levels.

		States of nature						
		Low M 0.05		Base M 0.07		High M 0.09		
	Year	Catch	Spawning Output	Depletion	Spawning Output	Depletion	Spawning Output	
40-10 Rule, Low M	2017	3.39	10.1	0.541	18.2	0.745	59.30	0.93
	2018	3.37	10.1	0.541	18.1	0.741	59.30	0.93
	2019	3.35	10	0.535	18.1	0.741	59.20	0.92
	2020	3.32	9.9	0.53	18.1	0.741	59.20	0.92
	2021	3.30	9.9	0.53	18	0.736	59.20	0.92
	2022	3.29	9.8	0.525	18	0.736	59.10	0.92
	2023	3.27	9.8	0.525	18	0.736	59.10	0.92
	2024	3.25	9.7	0.519	18	0.736	59.10	0.92
	2025	3.23	9.7	0.519	17.9	0.732	59.10	0.92
	2026	3.22	9.6	0.514	17.9	0.732	59.10	0.92
40-10 Rule	2017	8.82	10.1	0.541	18.2	0.745	59.30	0.93
	2018	8.49	9.5	0.509	17.6	0.72	58.70	0.92
	2019	8.22	8.8	0.471	17	0.696	58.10	0.91
	2020	7.96	8.3	0.444	16.5	0.675	57.70	0.90
	2021	7.72	7.7	0.412	16	0.655	57.20	0.89
	2022	7.51	7.2	0.385	15.6	0.638	56.90	0.89
	2023	7.32	6.8	0.364	15.2	0.622	56.50	0.88
	2024	7.14	6.4	0.343	14.9	0.61	56.20	0.88
	2025	6.99	6	0.321	14.6	0.597	56.00	0.88
	2026	6.85	5.6	0.3	14.3	0.585	55.80	0.87
40-10 Rule, High M	2017	38.81	10.1	0.541	18.2	0.745	59.30	0.93
	2018	36.27	6.2	0.332	14.4	0.589	55.50	0.87
	2019	34.02	-	-	11	0.45	52.30	0.82
	2020	32.06	-	-	8	0.327	49.40	0.77
	2021	30.35	-	-	5.4	0.221	46.90	0.73
	2022	28.87	-	-	3.3	0.135	44.80	0.70
	2023	27.59	-	-	-	-	43.00	0.67
	2024	26.51	-	-	-	-	41.40	0.65
	2025	25.57	-	-	-	-	40.10	0.63
	2026	24.79	-	-	-	-	39.00	0.61
Average Catch	2017	2.45	10	0.535	18.1	0.741	59.20	0.92
	2018	2.45	10.1	0.541	18.1	0.741	59.30	0.93
	2019	2.45	10.1	0.541	18.2	0.745	59.30	0.93
	2020	2.45	10.1	0.541	18.3	0.749	59.40	0.93
	2021	2.45	10.2	0.546	18.3	0.749	59.40	0.93
	2022	2.45	10.2	0.546	18.4	0.753	59.50	0.93
	2023	2.45	10.2	0.546	18.4	0.753	59.50	0.93
	2024	2.45	10.3	0.551	18.5	0.757	59.60	0.93
	2025	2.45	10.3	0.551	18.5	0.757	59.60	0.93
	2026	2.45	10.3	0.551	18.6	0.761	59.70	0.93

Table q: Summary of 10-year projections beginning in 2017 for alternate states of nature based on an axis of uncertainty for the central model. Columns range over low, mid, and high states of nature, and rows range over different assumptions of catch levels.

		States of nature						
		Low M 0.05		Base M 0.07		High M 0.09		
	Year	Catch	Spawning Output	Depletion	Spawning Output	Depletion	Spawning Output	
40-10 Rule, Low M	2017	6.70	20.2	0.41	41.40	0.64	109.50	0.85
	2018	6.80	20.5	0.42	41.90	0.64	110.10	0.86
	2019	6.90	20.8	0.42	42.30	0.65	110.50	0.86
	2020	6.90	21	0.43	42.70	0.66	111.00	0.86
	2021	7.00	21.2	0.43	43.00	0.66	111.40	0.87
	2022	7.10	21.4	0.43	43.40	0.67	111.70	0.87
	2023	7.10	21.5	0.44	43.70	0.67	112.10	0.87
	2024	7.20	21.7	0.44	43.90	0.67	112.30	0.87
	2025	7.20	21.8	0.44	44.20	0.68	112.60	0.88
	2026	7.30	22	0.45	44.40	0.68	112.90	0.88
40-10 Rule	2017	18.80	20.2	0.41	41.40	0.64	109.50	0.85
	2018	18.40	19.2	0.39	40.50	0.62	108.70	0.85
	2019	18.00	18.2	0.37	39.70	0.61	107.90	0.84
	2020	17.60	17.2	0.35	38.90	0.6	107.20	0.83
	2021	17.20	16.3	0.33	38.10	0.59	106.60	0.83
	2022	16.90	15.4	0.31	37.50	0.58	106.10	0.83
	2023	16.70	14.6	0.3	36.90	0.57	105.60	0.82
	2024	16.40	13.9	0.28	36.40	0.56	105.20	0.82
	2025	16.20	13.2	0.27	35.90	0.55	104.80	0.82
	2026	16.00	12.6	0.26	35.50	0.55	104.50	0.81
40-10 Rule, High M	2017	64.10	20.2	0.41	41.40	0.64	109.50	0.85
	2018	60.50	14.2	0.29	35.40	0.54	103.60	0.81
	2019	57.30	8.8	0.18	30.00	0.46	98.30	0.76
	2020	54.40	4.1	0.08	25.20	0.39	93.60	0.73
	2021	51.90	0.4	0.01	20.90	0.32	89.60	0.70
	2022	49.80	0	0	17.10	0.26	86.00	0.67
	2023	47.90	0	0	13.80	0.21	83.00	0.65
	2024	46.30	-	-	10.90	0.17	80.40	0.63
	2025	44.92	-	-	8.40	0.13	78.20	0.61
	2026	43.74	-	-	6.30	0.1	76.20	0.59
Average Catch	2017	11.28	20.2	0.41	41.40	63.70%	109.50	0.85
	2018	11.28	20	0.41	41.40	63.50%	109.50	0.85
	2019	11.28	19.8	0.40	41.30	63.40%	109.50	0.85
	2020	11.28	19.5	0.40	41.20	63.30%	109.50	0.85
	2021	11.28	19.3	0.39	41.10	63.10%	109.50	0.85
	2022	11.28	19	0.38	41.00	63.00%	109.50	0.85
	2023	11.28	18.7	0.38	40.90	62.90%	109.40	0.85
	2024	11.28	18.5	0.37	40.80	62.70%	109.40	0.85
	2025	11.28	18.3	0.37	40.80	62.60%	109.40	0.85
	2026	11.28	18	0.37	40.70	62.50%	109.40	0.85

Table r: Summary of 10-year projections beginning in 2017 for alternate states of nature based on an axis of uncertainty for the southern model. Columns range over low, mid, and high states of nature, and rows range over different assumptions of catch levels.

		States of nature						
		Low M 0.05		Base M 0.07		High M 0.09		
	Year	Catch	Spawning Output	Depletion	Spawning Output	Depletion	Spawning Output	
40-10 Rule, Low M	2017	5.08	14.30	0.21	19.82	0.30	23.16	0.40
	2018	5.73	15.25	0.22	21.05	0.32	24.44	0.42
	2019	6.35	16.17	0.23	22.24	0.33	25.66	0.44
	2020	6.96	17.06	0.25	23.37	0.35	26.80	0.46
	2021	7.54	17.91	0.26	24.44	0.37	27.86	0.48
	2022	8.08	18.71	0.27	25.45	0.38	28.84	0.49
	2023	8.60	19.47	0.28	26.39	0.40	29.74	0.51
	2024	9.08	20.18	0.29	27.27	0.41	30.56	0.52
	2025	9.54	20.85	0.30	28.09	0.42	31.31	0.54
	2026	9.97	21.47	0.31	28.84	0.43	31.99	0.55
40-10 Rule	2017	10.81	14.30	0.21	19.82	0.30	23.16	0.40
	2018	11.46	14.87	0.21	20.63	0.31	24.02	0.41
	2019	12.07	15.40	0.22	21.38	0.32	24.81	0.42
	2020	12.64	15.90	0.23	22.09	0.33	25.53	0.44
	2021	13.17	16.35	0.23	22.74	0.34	26.19	0.45
	2022	13.65	16.76	0.24	23.34	0.35	26.79	0.46
	2023	14.10	17.14	0.25	23.90	0.36	27.33	0.47
	2024	14.51	17.48	0.25	24.40	0.37	27.81	0.47
	2025	14.89	17.79	0.26	24.87	0.37	28.24	0.48
	2026	15.23	18.08	0.26	25.30	0.38	28.63	0.49
40-10 Rule, High M	2017	17.86	14.30	0.21	19.82	0.30	23.16	0.40
	2018	18.18	14.40	0.21	20.10	0.30	23.50	0.40
	2019	18.41	14.48	0.21	20.36	0.31	23.80	0.41
	2020	18.62	14.54	0.21	20.59	0.31	24.07	0.41
	2021	18.81	14.59	0.21	20.80	0.31	24.32	0.41
	2022	18.99	14.62	0.21	20.99	0.32	24.55	0.42
	2023	19.15	14.65	0.21	21.17	0.32	24.76	0.42
	2024	19.30	14.67	0.21	21.34	0.32	24.96	0.43
	2025	19.45	14.68	0.21	21.51	0.32	25.14	0.43
	2026	19.58	14.70	0.21	21.67	0.33	25.32	0.43
Average Catch	2017	13.11	14.30	0.21	19.82	0.30	23.16	0.40
	2018	13.11	14.72	0.21	20.45	0.31	23.85	0.41
	2019	13.11	15.14	0.22	21.09	0.32	24.52	0.42
	2020	13.11	15.56	0.22	21.71	0.33	25.17	0.43
	2021	13.11	15.98	0.23	22.33	0.34	25.80	0.44
	2022	13.11	16.39	0.24	22.94	0.34	26.42	0.45
	2023	13.11	16.81	0.24	23.53	0.35	27.01	0.46
	2024	13.11	17.23	0.25	24.12	0.36	27.58	0.47
	2025	13.11	17.64	0.25	24.70	0.37	28.13	0.48
	2026	13.11	18.06	0.26	25.26	0.38	28.67	0.49

Table s: China rockfish base case results summary.

Region	Quantity	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North of 40°10' N	Landings (mt)	11.63	16.14	16.97	15.37	12.58	16.92	17.71	15.67	9.93	
	Total Est. Catch (mt)	11.34	15.79	16.86	15.42	12.44	16.56	17.51	15.65	10.06	
	Nearshore RF ABC/OFL										88
	China contrib. ABC/OFL										
	Nearshore RF OY/ACL	122	142	142	155	155	11.7	11.7	9.8	9.8	7.2
	China contrib. OY/ACL										69
South of 40°10' N	Landings (mt)	12.74	13.39	15.16	20.15	18.75	15.62	13.79	10.01	11.17	
	Total Est. Catch (mt)	13.60	14.22	16.02	20.98	19.32	16.21	14.13	10.44	11.85	
	Nearshore RF ABC/OFL										1,313
	China contrib. ABC/OFL										55.2
	Nearshore RF OY/ACL	615	564	564	650	650	19.8	19.8	16.6	16.6	1,114
	China contrib. OY/ACL										50.4
Northern model	(1-SPR)(1-SPR <sub>50%</sub> )	0.44	0.39	0.47	0.50	0.45	0.56	0.51	0.48	0.53	
	Exploitation rate	0.32	0.28	0.35	0.38	0.33	0.44	0.39	0.35	0.41	
	Age 5+ biomass (mt)	182.55	183.26	183.36	183.25	183.49	182.90	182.72	182.82	182.52	182.58
	Spawning Output	17.9	18.0	18.0	18.0	18.1	18.0	18.0	18.0	17.9	17.9
	95% CI	(8.86-27.03)	(8.94-27.12)	(8.95-27.14)	(8.93-27.13)	(8.96-27.17)	(8.89-27.11)	(8.86-27.08)	(8.87-27.09)	(8.88-27.06)	(8.83-27.07)
	Depletion	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Recruits	95% CI	(0.638-0.83)	(0.642-0.833)	(0.643-0.833)	(0.642-0.833)	(0.644-0.834)	(0.644-0.833)	(0.638-0.832)	(0.639-0.833)	(0.637-0.832)	(0.637-0.832)
	Recruits	33.29	33.30	33.30	33.30	33.31	33.30	33.29	33.29	33.29	33.29
	95% CI	(21.33 - 45.24)	(21.35 - 45.25)	(21.35 - 45.26)	(21.35 - 45.26)	(21.34 - 45.25)	(21.33 - 45.25)	(21.33 - 45.25)	(21.33 - 45.25)	(21.33 - 45.25)	(21.33 - 45.25)
	(1-SPR)(1-SPR <sub>50%</sub> )	0.55	0.62	0.78	0.82	0.78	0.61	0.80	0.85	0.77	
	Exploitation rate	0.40	0.48	0.68	0.73	0.68	0.47	0.72	0.79	0.67	
	Age 5+ biomass (mt)	386.73	388.36	386.42	383.69	382.08	384.10	381.88	378.59	377.54	381.29
Central model	Spawning Output	41	41	41	40	40	40	40	40	40	40
	95% CI	(27.6-53.68)	(27.8-53.9)	(27.5-53.69)	(27.25-53.38)	(27.05-53.2)	(27.29-53.47)	(27.01-53.21)	(26.6-52.82)	(26.45-52.7)	(26.88-53.19)
	Depletion	0.62	0.63	0.62	0.62	0.62	0.62	0.62	0.61	0.61	0.61
	Recruits	68.27	(0.555-0.697)	(0.551-0.698)	(0.545-0.694)	(0.541-0.692)	(0.545-0.695)	(0.540-0.692)	(0.533-0.687)	(0.533-0.686)	(0.533-0.682)
	95% CI	(54.69 - 81.94)	(54.64 - 81.97)	(54.59 - 81.94)	(54.51 - 81.9)	(54.47 - 81.87)	(54.52 - 81.91)	(54.46 - 81.87)	(54.36 - 81.81)	(54.32 - 81.8)	(54.43 - 81.87)
	(1-SPR)(1-SPR <sub>50%</sub> )	1.30	1.18	1.18	1.23	1.35	1.34	1.25	1.20	1.02	
Southern model	Exploitation rate	1.50	1.19	1.22	1.35	1.76	1.70	1.41	1.27	0.90	
	Age 5+ biomass (mt)	234.08	241.35	247.83	252.61	253.37	254.50	258.52	263.64	272.36	280.18
	Spawning Output	14	15	16	16	16	16	17	17	18	19
	95% CI	(9.47-19.39)	(10.01-20.34)	(10.46-21.18)	(10.77-21.81)	(10.75-21.97)	(10.73-22.16)	(10.9-22.6)	(11.18-23.15)	(11.73-24.07)	(12.23-24.9)
	Depletion	0.22	0.23	0.24	0.24	0.25	0.25	0.25	0.26	0.27	0.28
	95% CI	(0.164-0.27)	(0.174-0.283)	(0.182-0.294)	(0.187-0.303)	(0.186-0.306)	(0.186-0.309)	(0.189-0.315)	(0.193-0.323)	(0.203-0.336)	(0.211-0.347)
Recruits	122.32	123.93	125.23	126.13	126.27	126.42	126.99	127.71	128.94	129.99	
	95% CI	(105.92 - 140.18)	(107.67 - 141.39)	(109.07 - 142.28)	(109.98 - 142.57)	(110.97 - 142.87)	(111.29 - 143.46)	(112.72 - 144.13)	(113.95 - 145.15)	(114.03 - 146.03)	

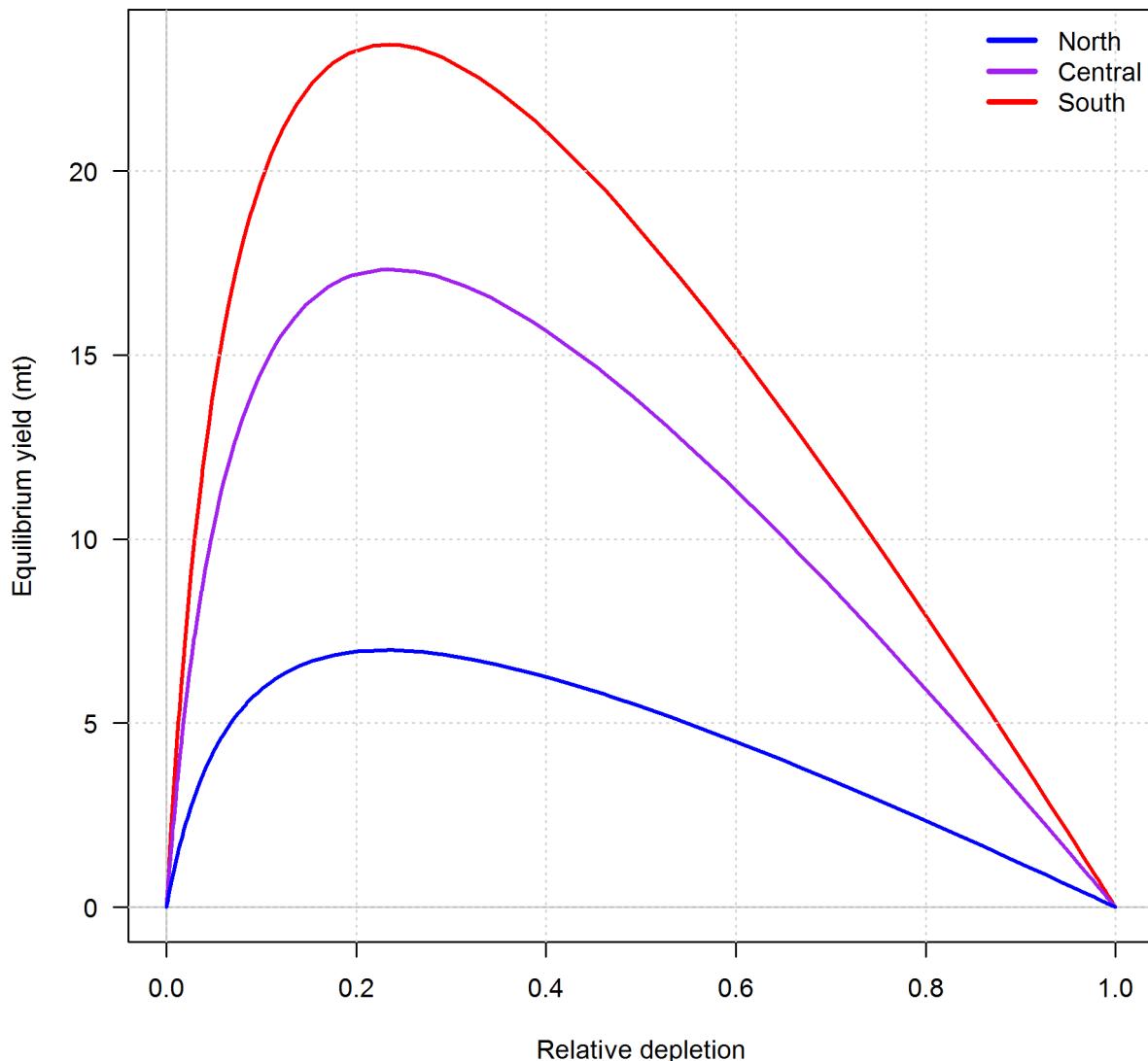


Figure j: Equilibrium yield curve for the base case models. Values are based on the 2014 fishery selectivity and with steepness fixed at 0.773.

313 **Research and data needs**

314 We recommend the following research be conducted before the next assessment:

- 315 1. The number of hours fished in Washington should be recorded for each dockside sample  
316 (vessel) so that future CPUE can be measured as angler hours rather than just number  
317 of anglers per trip. This will allow for a more accurate calculation of effort.
- 318 2. The number of hours fished in Oregon should be recorded for each dockside sample  
319 (vessel), instead of the start and end times of the entire trip. This will allow for a more  
320 accurate calculation of effort.
- 321 3. Compare the habitat-based methods used to subset data for the onboard observer  
322 indices to Stephens-MacCall and other filtering methods.
- 323 4. Explore the sensitivity of Stephens-MacCall when the target species is “rare” or not  
324 common encountered in the data samples.
- 325 5. A standardized fishery independent survey sampling nearshore rockfish in all three  
326 states would provide a more reliable index of abundance than the indices developed  
327 from catch rates in recreational and commercial fisheries. However, information value  
328 of such surveys would depend on the consistency in methods over time and space and  
329 would require many years of sampling before an informative index could be obtained.
- 330 6. A coastwide evaluation of genetic structure of China rockfish is a research priority.  
331 Genetic samples should be collected at sites spaced regularly along the coast throughout  
332 the range of the species to estimate genetic differences at multiple spatial scales (i.e.,  
333 isolation by distance).
- 334 7. Difficulties were encountered when attempting to reconstruct historical recreational  
335 catches at smaller spatial scales, and in distinguishing between landings from the pri-  
336 vate and charter vessels. Improved methods are needed to allocate reconstructed recre-  
337 ational catches to sub-state regions within each fishing mode.
- 338 8. There was insufficient time during the STAR Panel review to fully review the abun-  
339 dance indices used in the China rockfish assessments. Consideration should be given to  
340 scheduling a data workshop prior to STAR Panel review for review of assessment input  
341 data and standardization procedures for indices, potentially for all species scheduled  
342 for assessment. The nearshore data workshop, held earlier this year, was a step in this  
343 direction, but that meeting did not deal with the modeling part of index development.
- 344 9. The Marine Recreational Fisheries Statistics Survey (MRFSS) index in Oregon was  
345 excluded from the assessment model because it was learned that multiple intercept  
346 interviews were done for a single trip. Evaluate whether database manipulations or  
347 some other approach can resolve this issue and allow these data to be used in the  
348 assessment.

- 349 10. Many of the indices used in the China rockfish assessment model used the Stephens-  
350 MacCall (2004) approach to subset the CPUE data. Research is need to evaluate  
351 the performance of the method when there are changes in management restrictions  
352 and in relative abundance of different species. Examination of the characteristics of  
353 trips retained/removed should be a routine part of index standardization, such as an  
354 evaluation of whether there are time trends in the proportion of discarded trips.
- 355 11. Fishery-dependent CPUE indices are likely to be the only trend information for many  
356 nearshore species for the foreseeable future. Indices from a multi-species hook-and-line  
357 fishery may be influenced by regulatory changes, such as bag limits, and by interactions  
358 with other species (e.g., black rockfish) due to hook competition. It may be possible  
359 to address many of these concerns if a multi-species approach is used to develop the  
360 indices, allowing potential interactions and common forcing to be evaluated.
- 361 12. Consider the development of a fishery-independent survey for nearshore stocks. As  
362 the current base model structure has no direct fishery-independent measure of stock  
363 trends, any work to commence collection of such a measure for nearshore rockfish, or  
364 use of existing data to derive such an index would greatly assist with this assessment.
- 365 13. Basic life history research may help to resolve assessment uncertainties regarding ap-  
366 propriate values for natural mortality and steepness.
- 367 14. Examine length composition data of discarded fish from recreational onboard observer  
368 programs in California and Oregon. Consider modeling discarded catch using selec-  
369 tivity and retention functions in Stock Synthesis rather than combining retained and  
370 discarded catch and assuming they have identical size compositions. Another option  
371 would be to model discarded recreational catch as a separate fleet, similar to the way  
372 commercial discards were treated in the southern model.
- 373 15. Ageing data were influential in the China rockfish stock assessments. Collection and  
374 ageing of China rockfish otoliths should continue. Samples from younger fish not  
375 typically selected by the fishery are needed to better define the growth curve.
- 376 16. Consider evaluating depletion estimators of abundance using within season CPUE  
377 indices. This approach would require information on total removals on a reef-by-reef  
378 basis.
- 379 17. The extensive use of habitat information in index development is a strength of the  
380 China rockfish assessment. Consideration should be given to how to further incorporate  
381 habitat data into the assessment of nearshore species. The most immediate need seems  
382 to be to increase the resolution of habitat maps for waters off Oregon and Washington,  
383 and standardization of habitat data format among states.
- 384 18. Although all the current models for China rockfish estimated implausibly large recruit-  
385 ment deviations when allowed to do so, particularly early in the modeled time period,

386 further exploration of available options in stock synthesis could produce acceptable re-  
387 sults. In addition, this work may provide guidance on any additional options that could  
388 be added to stock synthesis to better handle this situation. For example, assuming dif-  
389 ferent levels autocorrelation in the stock-recruit relationship for data-moderate stocks  
390 may help curb the tendency to estimate extreme recruitment with sparse datasets.

391 19. Research is needed on data-weighting methods in stock assessments. In particular,  
392 a standard approach for conditional age-at-length data is needed. The Center for  
393 the Advancement of Population Assessment Methodology (CAPAM) data weighting  
394 workshop, scheduled for later this year, should make important progress on this research  
395 need.

<sup>396</sup> **1 Introduction**

<sup>397</sup> **1.1 Basic Information and Life History**

<sup>398</sup> China rockfish (*Sebastes nebulosus*) is a medium-sized, commercially (mainly in the live-fish  
<sup>399</sup> fishery) and recreationally prized deeper-dwelling nearshore rockfish ranging from southern  
<sup>400</sup> California, north to the Gulf of Alaska (Love et al. 2002). Core abundance is found from  
<sup>401</sup> northern California to southern British Columbia, Canada. China rockfish are rarely encoun-  
<sup>402</sup> tered in the Southern California Bight (Love et al. 1998).

<sup>403</sup> There is limited information available on either stock structure or life history. No genetic  
<sup>404</sup> research has been conducted for China rockfish, and no published research indicates separate  
<sup>405</sup> stocks along the West Coast. China rockfish do not appear to exhibit sexual dimorphism  
<sup>406</sup> (Lenarz and Echeverria 1991), although data are limited. Fits to von Bertalanffy growth  
<sup>407</sup> curves (Bertalanffy 1938) using age-length data from Washington, Oregon, and California  
<sup>408</sup> indicate regional differences in growth and estimates of  $L_{\infty}$ . These data represent fish col-  
<sup>409</sup> lected from the recreational and commercial sectors as well as for research.

<sup>410</sup> China rockfish are among the longer-lived rockfish. Love (2002) reports China rockfish live to  
<sup>411</sup> at least 79 years, which is corroborated by the available age data used in this assessment. The  
<sup>412</sup> oldest aged China rockfish from Alaska was 78 years old (Munk 2001). Recently aged China  
<sup>413</sup> rockfish from the West Coast had a maximum age of 83 years from California (recreational  
<sup>414</sup> or research) in 1973. The oldest aged fish from Oregon was 79 from the commercial dead-fish  
<sup>415</sup> fishery in 2003 and in Washington, 77 years from the recreational fleet in 2000.

<sup>416</sup> Little is known about the maturity schedule and fecundity of China rockfish. Echeverria  
<sup>417</sup> (1987) collected 69 China rockfish, of which the age at first maturity was 3 years for males  
<sup>418</sup> and females (26 cm). Both males and females exhibited 50% maturity at 4 years (27 cm) and  
<sup>419</sup> 100% maturity at 6 years (30 cm). A study by Lea et al. (1999) captured females releasing  
<sup>420</sup> larvae in April and May, and spent females in April, June and October off the coast of  
<sup>421</sup> California. Echeverria (1987) identified January - June as the months of parturition for  
<sup>422</sup> China rockfish in north-central California, with the peak of reproductive activity in January.

<sup>423</sup> One diet study indicated that China rockfish in central California predominantly feed on  
<sup>424</sup> crustaceans and ophiuroids, while the diets of China rockfish in northern California was  
<sup>425</sup> dominated by crustaceans and mollusks (Lea et al. 1999). This is similar to the diet described  
<sup>426</sup> by Love et al. (2002) of benthic organisms, including brittle stars, crabs, and shrimps.

<sup>427</sup> Both juvenile and adult China rockfish tend to be solitary and exhibit high site fidelity  
<sup>428</sup> within rocky habitats. Surveys of rockfishes in *Nereocystis* and *Macrocystis* kelp forests  
<sup>429</sup> observed China rockfish in only the *Macrocystis* kelp forests, and overall sightings within  
<sup>430</sup> the kelp forests were rare (Bodkin 1986). Juvenile China rockfish inhabit shallow, subtidal  
<sup>431</sup> waters (Love et al. 2002), and an experimental study with captive China rockfish found  
<sup>432</sup> that juveniles exhibit both site fidelity and territoriality (Lee and Berejikian 2009). A tag  
<sup>433</sup> and recapture study by Lea et al. (1999) indicated China rockfish have high site fidelity.

434 While Lea et al. (1999) did not report exact distances, all China rockfish from the study  
435 were recaptured in the same “general locality at which they were released.” In other rockfish  
436 movement studies, China rockfish were tagged but never recaptured (Hanan and Curry 2012),  
437 or there was a sample size of one fish (Hannah and Rankin 2011). An ongoing study has used  
438 acoustic telemetry to tag and track seven China rockfish at Redfish Rocks, off the south coast  
439 of Oregon (pers. comm. Tom Calvanese, Oregon State University). The location where each  
440 fish was released after tagging was recorded using GPS. The maximum distance traveled  
441 from release point was calculated using the location of the most distant receiver at which  
442 that fish was detected, plus 250 m (estimated receiver detection range). Preliminary analyses  
443 estimate the maximum distance traveled by China rockfish (n=7) averaged  $1,344 \pm 334$  m  
444 between May 1, 2011, and December 31, 2012.

445 Little is known about dispersal of juvenile China rockfish during the pelagic stage, and they  
446 are not captured in the Southwest Fisheries Science Center’s (SWFSC) juvenile rockfish  
447 cruise. The 2013 assessment model treated the species as two stocks, north and south of  
448 Cape Mendocino, CA ( $40^{\circ}10'$  N. latitude), which is also the management boundary for  
449 China rockfish. For this assessment we explore assessment models north and south of  $40^{\circ}10'$   
450 N. latitude, as well as separate northern California/Oregon and Washington models in the  
451 north.

#### 452 1.1.1 Early Life History

453 China rockfish, like other species in the genus *Sebastodes*, are iteroparous, have internal fertil-  
454 ization, and bear live young. Gestation periods range from 1-2 months among the *Sebastodes*  
455 spp. that have been studied, but no data specific to China rockfish were found in our liter-  
456 ature search. Parturition (release of larvae into the water) by China rockfish was reported  
457 between January and June in Central California (Echeverria 1987), but the duration of the  
458 pelagic larval and juvenile stages is unknown. Closely-related, nearshore rockfish species  
459 (e.g. gopher, black-and-yellow, kelp, and copper) recruit at small sizes (1.5-2 cm), and are  
460 thought to have short pelagic juvenile stages relative to other *Sebastodes* (Anderson 1983, Love  
461 et al. 2002).

#### 462 1.2 Map

463 A map showing the scope of the assessment and depicting boundaries for fisheries or data  
464 collection strata is provided in Figure 1.

#### 465 1.3 Ecosystem Considerations

466 In this assessment, ecosystem considerations were not explicitly included in the analysis.  
467 However, we did use information on the distribution of rocky habitat to inform the onboard

468 observer program indices of relative abundance from California and Oregon. The onboard  
469 observer program collects location-specific encounters of China rockfish. We overlaid the  
470 locations of China rockfish encounters with high-resolution bathymetry data to obtain a  
471 proxy of the extent of China rockfish habitat (see Appendix F for details, p.[F-1](#)).  
472

473 Much research is needed to elucidate the role of China rockfish in the ecosystem, including  
predator/prey interactions.

#### 474 1.4 Fishery Information and Summary of Management History

475 The rockfish fishery off the U.S. Pacific coast first developed off California in the late 19th  
476 century as a hook-and-line fishery (Love et al. 2002). The rockfish trawl fishery was es-  
477 tablished in the early 1940s, when the United States became involved in World War II and  
478 wartime shortage of red meat created an increased demand for other sources of protein (Harry  
479 and Morgan 1961, Alverson et al. 1964). China rockfish are most commonly captured by  
480 hook-and-line or traps. They are rarely encountered in the trawl fishery due to the elusive  
481 behavior and affinity for rocky crevices. Their high site fidelity and territoriality lend to the  
482 evasiveness of the species.

483 Catch reconstructions of China rockfish indicate a developing fishery in California in the  
484 1940s, and not until the 1970s in Oregon. The recreational fishery in Washington developed  
485 in the late 1960s, but the magnitude of catches compared to the other states is relatively  
486 small. China rockfish is not a directed target recreational species in any of the three states.

487 Prior to 2000, the Pacific Fishery Management Council (PFMC; Council) managed the  
488 fishery for China rockfish as part of the *Sebastodes* complex, with no separate Acceptable  
489 Biological Catch (ABC) or Optimum Yield (OY) for China rockfish. In 2000, the Council  
490 established the northern and southern Nearshore Complexes (north and south of 40°10' N.  
491 latitude), of which China rockfish is included.

492 The Council established management guidelines for the northern and southern Nearshore  
493 Rockfish Complexes in the 2005-2006 management cycle (Total Catch OY; 122 mt north of  
494 40°10' N. latitude and 615 mt south of 40°10' N. latitude). The 2011-2012 management cycle  
495 adopted and Overfishing Limit (OFL) and Annual Catch Limit (ACL) for the northern and  
496 southern Nearshore Rockfish Complexes, and the China rockfish contribution to the complex,  
497 which differ north and south of 40°10' N. latitude. In 2003, the Council established Rockfish  
498 Conservation Areas to control catches of overfished rockfish species, and large portions of  
499 the shelf were closed to fishing.

500 In 1995, Washington closed commercial hook-and-line gear in state waters (0-3 miles). Ore-  
501 gon's commercial nearshore fishery developed in the mid 1990s as an open access fishery.  
502 Oregon adopted formal management of the commercial nearshore fishery in 2004. Oregon  
503 adopted a 12 inch size limit in the commercial fishery for China rockfish in 2000, and Cali-  
504 fornia did the same in 2001. California required a nearshore fishery permit as of 1999 and

505 has had area-specific closures since 2000 to minimize interactions with canary and yelloweye  
506 rockfishes.

507 Washington adopted depth closures for the recreational fishery in 2006 for MCAs 2 (closed  
508 seaward of 30 fm), 3 (closed seaward of 20 fm) and 4 (closed seaward of 20 fm).

509 In November 2002, Oregon implemented the first depth closure seaward of 27 fm. In general,  
510 from June 1 - September 30, groundfish are prohibited seaward of 40 fm from 2004-2009.  
511 In July 2010 and 2011, seaward of 20 fm was closed due to yelloweye rockfish interactions.  
512 From 2012-2014, groundfish take seaward of 30 fm from April 1-September 30 is prohibited.  
513 As of 2015, retention of China rockfish is prohibited in the Oregon recreational fishery.

514 California adopted a 3-hook and 1-line regulation in 2000, which changed to 2-hooks and  
515 1-line in 2001. California manages the recreational fishery through management areas, which  
516 have been dynamic through time. In general starting in 2004, north of 40°10' N. latitude to  
517 the CA/OR border, the nearshore rockfish fishery is closed seaward of 30 fm May-December,  
518 (and closed in January-April as of 2005). In 2008, the depths seaward of 20 fm were  
519 closed May-August and the closures from September-December change annually through  
520 2014. Depth closures between Pt. Conception and Cape Mendocino have been much more  
521 dynamic. In general, depth closures began in 2001 at 20 fm and have dynamically varied by  
522 month and depth (20-40 fm) through 2014.

## 523 1.5 Management Performance

524 China rockfish is managed in the northern and southern Nearshore Rockfish Complex, split at  
525 40°10' N. latitude. Since the 2011-2012 management cycle, China rockfish has a contribution  
526 OFL and ACL within each the northern and southern Nearshore Rockfish Complexes (Table  
527 n). The estimated catch of China rockfish north of 40°10' N. latitude of Nearshore Rockfish  
528 Complex has been above both the China rockfish contribution to the northern Nearshore  
529 Rockfish Complex OFL and ACL in all years (2011-2014). The estimated catch of China  
530 rockfish south of 40°10' N. latitude of Nearshore Rockfish Complex has been below the China  
531 rockfish contribution to the northern Nearshore Rockfish Complex OFL and ACL in all years  
532 (2011-2014). A summary of these values as well as other base case summary results can be  
533 found in Table s.

## 534 2 Assessment

### 535 2.1 Data

536 Data used in the China rockfish assessment are summarized in Figures 2 - 4. A description  
537 of each data source is below.

538 **2.1.1 Fishery-Dependent Data: Commercial Landings**

539 **Washington**

540 Washington does not have a nearshore commercial fishery and there are no records of China  
541 rockfish being landed by any commercial gears in Washington. There is no record of tribal  
542 catch of China rockfish in Washington.

543 **Oregon**

544 China rockfish landings from Oregon commercial fisheries were minor until twenty years  
545 ago (Table 1, Figure 5). Prior to the mid-1990s, there were only trace landings of China  
546 rockfish from longline fisheries (i.e., less than one metric ton per year), and no landings  
547 from the trawl fisheries (based on species composition samples obtained since the 1960s)  
548 (Douglas 1998). However, landings of China rockfish rapidly increased from 1995-2000 due  
549 to the emergence of a live-fish market that paid high prices for ornate rockfish, such as  
550 China rockfish (especially in Southern Oregon). Following a peak in catch from 1998-2000,  
551 decreased landings of China rockfish during the early 2000s coincided with new regulations  
552 designed to limit harvests from the live fish fishery, such as landings limits, permit limits,  
553 and minimum size limits (Rodomsky et al. 2014).

554 There is a relatively high degree of confidence in the accuracy of historic China rockfish  
555 landings because comprehensive sampling of commercial landings began before the fishery  
556 for China rockfish developed. Specifically, since 1992, the Oregon Department of Fish and  
557 Wildlife has obtained robust species composition samples from landings categories containing  
558 China rockfish at fine levels of stratification (i.e., year, quarter, gear, disposition, area caught,  
559 and market category). China rockfish landed into improper market categories, has been  
560 practically non-existent, presumably due to the high price differential for China rockfish (as  
561 opposed to other rockfish). China rockfish landings since 1992 were obtained from PacFIN,  
562 which estimates species specific landings of rockfish by the above mentioned strata.

563 However, China rockfish landings could not be obtained from PacFIN prior to 1992 since  
564 China rockfish were not included in species composition samples (of rockfish category land-  
565 ings) from the longline and rod-and-reel fisheries (and thus China rockfish landings incor-  
566 rectly appear as zeros in PacFIN). Accordingly, landings of China rockfish were obtained  
567 from the commercial catch reconstruction developed by Karnowski et al. (2014), whom  
568 borrowed species compositions (from earliest complete years) and applied them to market  
569 category landings from years before species compositions were obtained.

570 All China rockfish landings from the Karnowski et al. (2014) reconstruction were used except  
571 for those occurring from the salmon troll fishery, which were reported as 1-2 metric tons per  
572 year from the mid-1960s to the early 1990s. Since a species composition had never been  
573 obtained from the market categories containing China rockfish for the salmon troll fishery,  
574 Karnowski et al. (2014) borrowed species compositions from the recreational salmon fishery  
575 and applied them to the commercial salmon troll fishery landings. Although China rockfish  
576 appeared in the recreational salmon fishery landings, it was concluded at the Nearshore

577 Stock Assessment Workshop ([Agenda Item D.8 Attachment 10](#), June 2015) that the China  
578 rockfish caught during recreational salmon trips were not caught by troll gear, but rather by  
579 jig gear from anglers who also targeted benthic rockfish species before or after trolling for  
580 salmon. Since China rockfish are associated with rocky reef habitat (Love et al. 1998) and  
581 salmon trollers fish the surface waters for coho salmon and avoid rocky reefs when fishing  
582 for Chinook salmon (to prevent entanglement of expensive downrigger gear on rocks), it was  
583 deemed improbable that China rockfish be caught by salmon troll gear.

## 584 California

585 The [CALCOM](#) database was queried (May 15, 2015) for commercial landing estimates of  
586 China rockfish in California, 1969-2014. Landings were stratified by year, quarter, live/dead,  
587 market category, gear group, port complex, and source of species composition data (actual  
588 port samples, borrowed samples, or assumed nominal market category).

589 The majority of commercial China rockfish landings are made by vessels using hook-and-  
590 line gear ([Figure 6](#)). However, CALCOM landings estimates also include a large fraction of  
591 trawl-caught China rockfish from 1969-1988, which is unlikely given the species' preference  
592 for rocky habitat. The reported trawl catch was mainly from the Monterey port complex  
593 and was landed in the "China rockfish" market category (258).

594 An analysis of species composition data from port samples in market category 258, by  
595 gear type, revealed that the sampled trawl-caught landings contained mainly deeper-water  
596 species, including greenspotted rockfish (*Sebastodes chlorostictus*), sometimes known as "chin-  
597 na fish." Species landed by hook-and-line gears in the China rockfish market category, on  
598 the other hand, consisted of a mixture of nearshore species (e.g., China, quillback, gopher,  
599 black-and-yellow, and brown; [Figure 7](#)). When port samples are not available to estimate  
600 species composition in a stratum, and no samples are available to 'borrow' from an adjacent  
601 stratum, landings in a market category are assigned to the 'nominal' species category, in  
602 this case China rockfish.

603 Given the available species composition data from the trawl catch, and the fact that trawl  
604 gear is unlikely to be fished in China rockfish habitat, estimates of trawl-caught China  
605 rockfish were removed from the landings estimates in the current assessment. A similar  
606 analysis led to the removal of a small amount (about 5 mt) of landings by set-net and  
607 mid-water trawl gear groups.

608 In years prior to 1978, landing receipts are available for California but there are no associated  
609 port sample data. In CALCOM, a ratio estimator (based on the expanded landings estimates  
610 in the earliest sampled years) is used to allocate catch to species in unsampled years. In  
611 the case of China rockfish, this procedure propagated the estimates of trawl-caught China  
612 backward in time to 1969 ([Figure 6](#)). These ratio estimates of trawl-caught China rockfish  
613 were also removed from the final time series of landed catch.

614 The previous assessment of China rockfish (Cope et al. 2015) modeled two China rockfish  
615 populations, north and south of 40°10' N. latitude (roughly Cape Mendocino). The majority

616 of landings occurred south of Cape Mendocino, and the revised estimates are substantially  
617 lower in early years, primarily due to the removal of trawl catch (Figure 8).

618 California's commercial live-fish fishery began targeting nearshore rockfish species in the mid-  
619 1980s in southern California, and condition codes (live or dead) were required on landing  
620 receipts starting in 1993 (CDFG 2002). However, fish landed live are not always recorded  
621 as live landings on the landing receipts, so estimates of live landings should be viewed as a  
622 minimum estimate (CDFG 2002). Live annual landings of China rockfish surpassed landings  
623 of dead fish by the late 1990s, due to the increased value of fish landed live (Table 2, Figure  
624 9).

625 Commercial landings of China rockfish in California from 1916-1968 were obtained from  
626 the historical reconstruction of Ralston et al.(2010), and also available from the CALCOM  
627 website. Their analysis differentiates between trawl-caught landings and “other” gears. In  
628 the case of China rockfish, less than 2 mt of landings from 1916-1968 were attributed to  
629 trawl gears, and these were excluded from the assessment. The remaining “other” gear types  
630 (cumulative removals of 197 mt from 1916-1968) landed China rockfish mainly south of Cape  
631 Mendocino, with a short pulse of landings between Cape Mendocino and the California-  
632 Oregon border in the 1930s and early 1940s (Figure 10). Due to the relatively large landing  
633 estimates south of Cape Mendocino in the early years, catches from 1900 to 1916 were  
634 interpolated with a linear ramp from 0 mt in 1900 to 6.1 mt in 1916 (the first year of  
635 commercial landings estimated by Ralston et al. (2010)).

### 636 2.1.2 Fishery-Dependent Data: Commercial Discards

#### 637 Washington

638 Discards of China rockfish likely occurred before the closure of nearshore commercial fisheries  
639 in 1995 for non-trawl gears and in 1999 for trawl gears. However, there is no information on  
640 historical discards. For this assessment, we assume no retention or discard of China in any  
641 commercial fisheries.

#### 642 Oregon and California

643 Estimates of discarded China rockfish in commercial fisheries were provided by the West  
644 Coast Groundfish Observer Program (WCGOP). These were available for the years 2003-  
645 2013 north of 40°10' N. latitude, and 2004-2013 to the south. WCGOP provided estimates  
646 with and without the depth-specific discard mortality rates applied. These estimates indicate  
647 that the nearshore fixed-gear fishery was the only sector with observed discards of China  
648 rockfish and there were strong differences in rates of discarding north and south of 40°10' N.  
649 latitude, (Figure 11 and Table 3). The mortality of discarded China rockfish is estimated  
650 by WCGOP as a function of the fishing depth which varies by year (Table 3). The average  
651 mortality fraction south of 40°10' across all years was 59%.

652 Discard rates were consistently low north of 40°10' N. latitude, where no year had estimated  
653 mortality from discards greater than either 0.5 mt, or 5% of the landings. A linear regression

654 relating discarded to retained catch (with intercept fixed at the origin) had a slope of 0.0269,  
655 indicating that discards on average represent 2.69% of the landings in this sector (Figure  
656 12). This value is similar to a simple average of the discard fractions, which was 2.75%.

657 South of 40°10' N. latitude, commercial landings were lower and estimated discards higher.  
658 The maximum discard mortality estimate was 1.8 mt for 2012 which was 126% of the 1.4 mt  
659 nearshore fixed gear landings in that area in that year. The total discard amount for that  
660 year, including fish estimated as surviving, was 2.7 mt, almost double the landed amount.  
661 There is also an increasing trend over the observed period (2004-2013) with an average for  
662 the first three years of 30% of all China rockfish catch discarded and an average over the  
663 final three years of 63% discarded.

664 Discard patterns in the area of Northern California between 40°10' N. latitude, and 42° N.  
665 latitude appears to be more similar to Oregon than the rest of California (Table 4). Although  
666 expanded fleet-wide discard estimates were not available on this smaller spatial-scale, only  
667 9% of observed trips between 40°10' N. latitude to 42° N. latitude that were associated with  
668 any catch of China rockfish had any observed discards of China rockfish. South of 40°10',  
669 82%-100% of such trips had observed discards of China rockfish.

670 The patterns of the discards in commercial fisheries suggest that north of 40°10' N. latitude  
671 discard mortality of China rockfish is small enough that it is more parsimonious to account for  
672 this mortality increasing the landed catch estimates by 2.69%. South of 40°10' N. latitude,  
673 total discards are greater than landings in some years and discard mortality represents a  
674 large fraction of the total mortality of China rockfish. The discards are primarily fish below  
675 the minimum legal size of 12 inches (Figure 64). The discard process was modelled using  
676 a retention function in the pre-STAR panel base model, but this approach did not capture  
677 the increasing trend in discard rates, which may be an indication of changes in population  
678 size structure that should be accounted for in the assessment. The final southern base  
679 model treated discarded catch as a separate fleet, exactly matching removals that were dead  
680 discarded catch, and fitting length composition data from WCGOP in the model.

### 681 2.1.3 Fishery-Dependent Data: Recreational Landings and Discards

#### 682 Washington

683 Historically, Washington's coastal recreational anglers have been salmon-orientated and most  
684 groundfish were considered "scrap fish" by anglers (Buckley 1967). Beginning in the mid-  
685 1970s, and particularly in the wake of the 1974 Boldt Decision, salmon fishing opportunities  
686 became increasingly restrictive; seasons were shortened and daily limits were reduced. The  
687 trend continued into the 1980s and 1990s. In 1994, and for the first time in the state's history,  
688 a one year moratorium on all ocean salmon fishing was implemented in response to dwindling  
689 salmon runs. As salmon fishing opportunities waned over time, recreational and commercial  
690 fishers began shifting their interests to other species. Many recreational coastal anglers  
691 shifted their efforts to rockfish. Prior to declines in salmon fishing opportunities, rockfish,

692 though rarely discarded, were generally not targeted. The increased interest in rockfish and  
693 other groundfish can be linked directly to the decline in salmon fishing opportunities.

694 The coastal recreational fleet is composed of two sectors; privately owned vessels and charter  
695 vessels. Throughout the history of coastal charter boat fishing, Westport has remained the  
696 center of charter boat activity; however, as the salmon fishing industry declined, the charter  
697 fleet dispersed in search of more lucrative opportunities. Many of the vessels left the state,  
698 and some moved north where rockfish fishing was perceived as being more reliable. Even so,  
699 there are still more charter vessels operating at Westport than at Neah Bay and La Push.

700 The primary focus of coastal rockfish anglers is black rockfish. Black rockfish occur in  
701 greater abundance and closer to shore than other coastal rockfish species, and while generally  
702 regarded as a “bottom fish,” they tend not to occupy crack and crevice habitat, thus making  
703 them more susceptible to hook-and-line fishing. As rockfish daily limits decreased, the  
704 likelihood of recreational anglers retaining smaller rockfish species, such as China, as part of  
705 their daily bag limit likely also decreased.

706 China rockfish are more common in northern Washington coast (Marine Catch Areas (MCAs)  
707 3 and 4) from south of Tatoosh Island to Pt. Grenville inside of 15 fm and are rarely  
708 encountered south of the Point Grenville. Makah Bay and the Umatilla reef areas seem  
709 to have the largest populations in the area (Tom Burlingame, Excel Fishing Charters, pers  
710 comm). China rockfish are rare off of the central Washington coast (MCA 2) from the  
711 mouth of the Queets River to Leadbetter Point. Some chartered vessels from Westport have  
712 gone multiple seasons without encountering any China rockfish in MCA 2 (Mark Cedergreen,  
713 Westport Charterboat Association, pers comm). Suitable habitat is limited in MCA 1, from  
714 the mouth of the Leadbetter Point to the mouth of Columbia River.

715 Historical estimates of China rockfish catch during 1967 and 1975-1989 were based on his-  
716 torical sport catch report series published by Washington Department of Fisheries (Table  
717 5, Figure 14). Catches for 1968-1974 and 1987-1989 were based on a linear interpolations  
718 between adjacent years. From 1990 to current, catch estimates were produced by the Wash-  
719 ington Department of Fish and Wildlife (WDFW) Ocean Sampling Program based on a  
720 catch expansion procedure that includes a complete count of vessels leaving or entering a  
721 port and dockside angler interviews. The dockside interview program collects information  
722 on number of anglers fished, catch area, and target species. Shorebased fishing, other than  
723 major jetties, is not sampled and is considered negligible. Sampling and effort counts occur  
724 mainly from April to October. Winter fishing is also considered negligible.

725 We assumed an average weight of 0.88 kg/fish ([RecFIN](#)) to convert the estimates from number  
726 of fish to metric tons for all years. The split between charter and private vessels prior to  
727 1990 was based on a ratio estimator using 1990-1994 data.

728 More than 90% of China rockfish were caught off the northern Washington coast on an annual  
729 basis (Table 5) and the catch by private vessels accounted for 70%-95% of the northern  
730 catches. In the southern area, harvest of China has been under 0.5 mt annually; and most  
731 of China rockfish were caught by charter vessels (Table 5, Figure 14).

732 Release information was not available until 2002. Number of released fish by species and the  
733 depth of release were added to OSP dockside questionnaire in 2002 and 2005, respectively.  
734 The number of released fish by depth is estimated using the same catch expansion algorithm  
735 for retained catch. Surface release mortalities adopted by the Groundfish Management Team  
736 (GMT) were then applied to the number of release estimates for a total mortality calculation.  
737 The average weight of 0.88 kg/fish was also used for released fish. For pre-2002 release, we  
738 applied proportions of released fish based on a ratio estimator using 2003-2007 data. For  
739 the split between charter and private vessels, the same algorithm used for splitting retained  
740 catch was applied.

741 Discard rates are higher in northern Washington than in southern Washington. Since 2011,  
742 more than 50% of the China rockfish caught were released by anglers. The release rates are  
743 lower in the southern area between 14% and 26% in recent years. This may be due to the rare  
744 encountering of China off southern Washington coast.

#### 745 Oregon Sport Fishery Removals 1973-2014

746 China rockfish have been a relatively minor contributor to historic Oregon sport groundfish  
747 landings (i.e., typically less than one percent of total catch), and have primarily been from  
748 incidental catches of anglers targeting intermixed schools of midwater rockfish species (e.g.,  
749 black rockfish, blue rockfish, and yellowtail rockfish). China rockfish removals from the  
750 Oregon sport fishery ramped up relatively quickly during the 1970s (Table 6, Figure 15),  
751 and have since ranged between two and seven metric tons every year, with considerable  
752 inter-annual variation.

753 Total removals of China rockfish from the Oregon sport fisheries were obtained from esti-  
754 mates produced by the Oregon Recreational Boat Survey (ORBS). To produce total catch  
755 estimates, ORBS applies catch rates from a subsample of vessels (from dockside interviews)  
756 to total effort counts at fine levels of stratification (i.e., by week, port, fishery, and type of  
757 boat). For estimates of landings, catch rates are verified by biologists; however, estimates of  
758 discard mortality are based on angler-reported discards, and are further stratified by depth-  
759 dependent mortality rates associated with barotrauma. Since nearly all mortality of China  
760 rockfish has been from landed catch (i.e., typically less than 0.1 mt of estimated discard  
761 mortality per year), there is relatively high degree of certainty in sport fishery removals.

762 Since 2001, ORBS has produced comprehensive year-round estimates of catch and effort  
763 for all developed Oregon ports (and are available from RecFIN). However, prior to 2001,  
764 ORBS sampling was typically only conducted at major ports during the peak months of  
765 sport fishing activity, and no estimates of catch were made for unsampled ports and times.  
766 Accordingly, the Oregon Department of Fish and Wildlife (ODFW) reconstructed historic  
767 ORBS estimates of China rockfish to include catches from all ports and times (not yet  
768 available on RecFIN), as is done in recent years.

769 The sport reconstruction addressed four spatial and temporal coverage biases identified dur-  
770 ing an external review of ORBS by the RecFIN Statistical Subcommittee (Van Voorhees et  
771 al. 2000): (1) “major ports” that were sampled each year were not sampled during the win-

ter months; (2) “minor ports” were not sampled at all during some years; (3) effort counts for private boats excluded afternoon and night trips; and (4) undeveloped launch sites were never sampled (e.g., beaches). A fifth coverage bias, shoreline and estuary boat removals, was not relevant to China rockfish since landings were typically non-existent during years when sampling occurred.

The sport reconstruction utilized ratio estimators, based on years with complete sampling, to expand catches from years with partial sampling. For instance, the contribution of winter catch to total catch during years with complete sampling was used to expand catches for years with missing winter catch. Similarly, the contribution of catch from a minor port to that of the major ports during years with complete sampling was used to expand catches of years that the minor port was not sampled.

## California

In California, recreational fishing has accounted for over 70% of cumulative China rockfish removals statewide (1900-2014, landings and discard), and over 84% of statewide removals since 2005 (Table 7 and Figure 16). Almost all the removals are attributed to boat fishing modes (party/charter and private/rental fleets), with only a negligible contribution from shore-based fishing modes (RecFIN, 2015).

Estimates from the California Recreational Fisheries Survey (CRFS) were downloaded from the Recreational Fisheries Information Network (RecFIN). This survey covers the years 2004-2014, and estimates of retained plus discarded catch (catch types A and B1) were downloaded in numbers of fish as well as metric tons by year, boat mode (“PC” = party/charter, “PR”=private/rental), month, and CRFS district. In some strata, estimates of catch in numbers had no corresponding catch in weight due to missing average weight values in RecFIN. For these strata, catch in weight was estimated using the product of catch in numbers and average weight in the same year. Catches in weight (mt) were aggregated by year, boat mode, and CRFS district. As an approximation, removals in CRFS District 6 were assigned to the management area north of Cape Mendocino.

From 1980-2003, sampling of recreational fisheries in California was conducted as part of the Marine Recreational Fisheries Statistics Survey (MRFSS). Estimates of retained and discarded catch (A+B1) in numbers of fish and weight in metric tons were downloaded from the RecFIN website. Strata with estimates of catch in numbers, but no corresponding weight, were imputed using the same approach described above for the CRFS estimates. MRFSS sampling was not conducted from 1990-1992 due to lack of funding. Also, sampling of the PC boat mode north of Point Conception did not resume until 1996. Estimates for these missing years were calculated using linear interpolation, by region and boat mode.

The MRFSS program did not provide estimates of removals stratified north and south of Cape Mendocino. However, the California Department of Fish and Wildlife (CDFW) has maintained logbook records since 1957 of total rockfish catch by CDFW statistical block (Table 7) from the PC mode (a.k.a. the Commercial Passenger Fishing Vessel or “CPFV” fleet). Following the approach used in the last China rockfish assessment (Cope et al. 2015), we calculated the ratio of total rockfish catch (all species combined) for statistical blocks

813 less than 233 (blocks north of Cape Mendocino) to total rockfish catch in the area north  
814 of Point Conception ( $34^{\circ}27'$  N. latitude) by year. The ratios were then scaled such that  
815 the percentage of catch north of Mendocino in 2003 matched the observed ratio of catch in  
816 CRFS District 6 to CRFS Districts 3-6 from 2004-2011. These adjusted ratios were applied  
817 to annual MRFSS estimates for the area north of Point Conception in order to estimate  
818 landings north and south of Cape Mendocino in the years 1980-2003.

819 Estimates of recreational removals (catch and discard) from 1928-1979 were reconstructed  
820 by Ralston et al. (2010) (Table 7). Similar to the MRFSS data, the estimates produced by  
821 Ralston et al. (2010) did not partition catch to areas north and south of Cape Mendocino,  
822 so CPFV logbook data was used to determine the fraction of removals north and south of  
823 Cape Mendocino. Adjusted annual percentages (Table 8) were applied to the reconstructed  
824 recreational catches back to 1957, and the average percentage in 1957-58 (0.74%) was applied  
825 to all previous years and assumed constant back to 1928.

#### 826 2.1.4 Fishery-Dependent Data: Oregon Commercial Logbook

827 The ODFW has required nearshore commercial fishers (both nearshore permitted vessels and  
828 open access vessels) to submit fishing logbooks since 2004. Fisher compliance is generally  
829 high, averaging around 80%, but has varied through time ranging from 65% in 2007 to  
830 95% in recent years. Although required to provide all requested information in the logbook  
831 per fishing gear set, there has been substantial variation in the quantity and quality of  
832 information reported in logbooks. Responses from submitted logbooks were entered into a  
833 central database and span the years 2004 through 2013. At the time of this assessment, 2014  
834 logbook submissions were not fully processed and thus were not available. A map showing  
835 positive reports of China rockfish can be found in Figure 17.

836 Logbook information went through several data quality filters to attain as best as possible a  
837 consistent and representative data set through time to estimate a relative abundance trend.  
838 Results from the filtration algorithm are summarized in Table 9. Of note, only logbook  
839 submissions from black and blue rockfish permitted vessels with a nearshore endorsement  
840 were included in the analysis, because these vessels consistently fish in areas where China  
841 rockfish are encountered. To minimize temporal variation in reporting errors (or nuances),  
842 only vessels that fished all 10 years (2004 to 2013) were deemed the most likely to provide  
843 consistent responses through time. Operators of endorsed vessels may have changed through  
844 time. Individual observations of catch (kg) and effort (hook hour) were at the trip level,  
845 where multi-set trips were aggregated to the trip level. ODFW sets bimonthly trip landing  
846 limits for China rockfish and these have changed through time. However, trip limits have  
847 not generally been breached in the subset of logbook data used for China rockfish, and thus  
848 there was no need to exclude subsequent trips. The final subset of logbook data included  
849 3,575 trips (14% of the full set of logbook data) from 10 vessels (Figure 20).

850 Preliminary data analyses identified levels or limits of filtering variables in order to preserve  
851 adequate sample sizes and representative trips for China rockfish. For example, gear type

852 was restricted to hook-and-line (excluding longline gear) because this method accounted for  
853 85% of all sets. The three main southernmost Oregon ports (Port Orford, Gold Beach, and  
854 Brookings) were the only locations that included a sufficient number of sets throughout the  
855 time series for nearshore endorsed vessels. Thus, this abundance index is most representative  
856 of southern Oregon nearshore waters. Fishing depth at the start of a set was restricted to  
857 within 30 fm (54.9 m), which included more than 99% of all sets by nearshore endorsed  
858 vessels, to ensure only CPUE in areas where China rockfish are commonly encountered was  
859 evaluated.

860 Covariates considered in the full model included *month*, *vessel*, *port*, *depth*, and *people* (Figure 18). All covariates were specified as categorical variables, except depth was a continuous  
861 variable. *Depth* was included to account for general differences in bathymetry and fishing  
862 depth restrictions associated primarily with limiting catch of yelloweye rockfish. *People* were  
863 included in an attempt to control for the potential oversaturation of hooks at a given fishing  
864 location and the interaction that multi-crew trips (# fishers onboard) may have on fishing  
865 efficiency. The selection of covariates included in final models were evaluated using standard  
866 information criterion for relative goodness of fit (AICc and BIC) in a backwards stepwise  
867 fashion, where a covariate remained in the model if model fit was improved relative to an  
868 otherwise identical model without the covariate.

870 CPUE was modeled using a delta-GLM approach, where the catch occurrence (binomial)  
871 component was modeled using a logit link function and the positive catch component was  
872 modeled according to a gamma distribution with a log link function. CPUE was calculated  
873 for each trip, where total catch was defined as the sum total of all reported retained catch  
874 (in weight) and released catch (numbers converted to weight by applying a median catch  
875 weight) and total effort was defined by hook-hours (number of hooks used multiplied by the  
876 number of hours fished). A lognormal distribution for the positive catch component was  
877 also evaluated, but graphical summary diagnostics of model adequacy slightly favored the  
878 gamma distribution. A delta-GLMM was also attempted to specify vessel-year interaction  
879 effects as stemming from a distribution (random effect) and to account for this added source  
880 of variation. However, the estimation procedure was unstable for the delta-GLMM approach,  
881 resulting in overinflated CVs.

882 Model selection procedures identified the covariates *vessel*, *port*, *depth* and *people* as impor-  
883 tant, and along with the categorical *year* factor of interest for the index were the variables  
884 included in both the catch occurrence and positive catch component models. Extracted,  
885 back-transformed and bias corrected estimates of the *year* effect were used for the abundance  
886 index (Table 10, Figure 19). A jackknife resampling routine was conducted to estimate the  
887 standard error (and CV) of the year effects. The relative effects of each covariate are shown  
888 in Figure 21 for the catch occurrence component and Figure 22 for the positive catch com-  
889 ponent. Standard model diagnostics show adequate fit and general consistency with GLM  
890 model assumptions for the positive catch component (Figure 23).

891 **2.1.5 Fishery-Dependent Data: Recreational Dockside Surveys**

892 **Washington**

893 The WDFW provided recreational dockside fisheries data from 1981 to 2014. These data  
894 went through several data quality filters to identify the best subset of the available data that  
895 are likely to be consistent over the time series and provide a representative relative index of  
896 abundance once standardized. Sample sizes from data filtering steps prior to implementing a  
897 delta-GLM CPUE standardization resulted in 10,248 records applying the Stephens-MacCall  
898 data filter (Stephens and MacCall 2004), 16,193 records applying the Stephens-MacCall data  
899 filter to the full data set and then retaining all of the positive records, and 54,285 without  
900 applying the Stephens-MacCall data filter (Table 11). The Stephens-MacCall method is an  
901 objective approach for identifying trip records of catch and effort data when fishing locations  
902 are unknown, based inference regarding the species composition of the catch identifying  
903 habitats where the target species is likely to occur (Stephens and MacCall 2004).

904 Since recreational fishing trips target a wide variety of species, standardization of the catch  
905 rates requires selecting trips that are likely to have fished in habitats containing China  
906 rockfish. The method of Stephens and MacCall (2004) was used to identify trips with a  
907 high probability of catching China rockfish, based on the species composition of the catch  
908 in a given trip. Prior to applying the Stephens-MacCall filter, we identified potentially  
909 informative “predictor” species, i.e., those with sufficient sample sizes and temporal coverage  
910 (at least 30 positive trips total, distributed across at least 10 years of the index) to inform  
911 the binomial model. Coefficients from the Stephens-MacCall analysis (a binomial GLM) are  
912 positive for species which co-occur with China rockfish, and negative for species that are not  
913 caught with China rockfish.

914 Covariates considered in the full model included *year*, *month*, *boat type*, *daily bag limits*,  
915 and *depth restrictions* (Figure 24). All covariates were specified as categorical variables.  
916 The stepwise selection of covariates included in the final model was evaluated using standard  
917 information criterion for relative goodness of fit (AIC). *Depth* was not included in the analysis  
918 because it was not uniformly recorded through time; depth data collection began during 2003.  
919 The covariates for *daily bag limits* and *depth restrictions* represent management changes.  
920 Summer fishing restrictions based on depth limitations were implemented during 2006 in  
921 WDFW areas 2, 3, and 4. The daily rockfish limit was 15 fish from 1961-1991, 12 fish from  
922 1992-1994, and reduced to 10 fish in 1995 (see Appendix H for the history of recreational  
923 regulations, p.H-1).

924 CPUE was modeled using a delta-GLM approach, where the catch occurrence (binomial)  
925 component was modeled using a logit link function and the positive catch component was  
926 modeled after log-transformation of the response variable, according to a normal distribution  
927 with an identity link function. Data are collected at the trip level, with the number of fish  
928 landed and the number of anglers on each vessel being recorded. The amount of time fished  
929 by each angler is not recorded. Therefore, the units for CPUE are fish landed/angler-trip. A  
930 gamma distribution for the positive catch component was also explored, but model selection

931 favored the lognormal model, although both models provided similar results.

932 Model selection procedures selected the covariates *month* and *boat type* as important for  
933 both the catch occurrence and positive catch component models for all data sets, along  
934 with the categorical year factor used for the index of abundance (Tables 12, 13 and 14). A  
935 bootstrap analysis (N=500) was used to estimate the standard errors (and CVs) of the year  
936 effects (Table 15). Standard model diagnostics show adequate fit and general consistency  
937 with GLM model assumptions for the positive catch component Figures 25, 26 and 27).

938 Due to the large number of records filtered out by the Stephens-MacCall method three sets  
939 of models were run: 1) applying the Stephens-MacCall data filter, which eliminates both  
940 zero and positive observations, 2) applying the Stephens-MacCall data filter but retaining  
941 all of the positive records, and 3) without applying the Stephens-MacCall data filter (Table  
942 11). The resulting indices of China rockfish abundance using either data set subject to  
943 the Stephens-MacCall filter are similar (Figure 28). However, the index resulting from the  
944 dataset not subject to the Stephens-MacCall filter produces similar trends compared to the  
945 Stephens-MacCall filter through the mid-2000s then declines compared to the indices using  
946 the Stephens-MacCall filter from the late 2000s to present (Table 15). The model with the  
947 Stephens-MacCall filter that retained all positive encounters was the index selected for use  
948 in the assessment model (Figure 29).

949 Additional model sensitivities that did not impact the standardized index were:

950 1. The use of only area 4 data versus using all of the data with an area covariate. A strong  
951 majority of the positive data are from area 4, only these data are used in the standardized  
952 indices.

953 2. Splitting the time series in 2002 to model CPUE from 2002 to 2014 as total catch (discarded  
954 fish were recorded beginning in 2002) rather than landed catch.

955 Producing a model for just southern areas (1 and 2) was not successful due to a lack of  
956 positive data over the time series.

#### 957 California MRFSS Dockside Charter Boat Index, South of 40°10' N. latitude

958 From 1980 to 2003 the MRFSS program sampled landings at dockside (called an “intercept”)  
959 upon termination of recreational fishing trips. The program was temporarily suspended from  
960 1990-1992 due to lack of funding, and sampling of California charter boats north of San Luis  
961 Obispo County did not resume until 1995. For purposes of this assessment, the MRFSS  
962 time series is truncated at 2003 due to regulatory changes and an increasing fraction of trips  
963 sampled by onboard observers (see “Recreational Onboard Observer Surveys”). Although  
964 the program sampled various fishing modes, only the California party and charter boat (a.k.a.  
965 “PC mode,” commercial passenger fishing vessel, or CPFV) samples are used in the present  
966 analysis due to availability of catch and effort data aggregated at the trip level. Each entry  
967 in the RecFIN Type 3 database corresponds to a single fish examined by a sampler at a  
968 particular survey site. Since only a subset of the catch may be sampled, each record also  
969 identifies the total number of that species possessed by the group of anglers being interviewed.

970 The number of anglers and the hours fished are also recorded. Unfortunately the Type 3  
971 data do not indicate which records belong to the same boating trip. Because our aim is to  
972 obtain a measure of catch per unit effort (fish per angler hour), it is necessary to separate the  
973 records into individual trips. For this reason trips must be inferred from the RecFIN data.  
974 This is a lengthy process, and is outlined in Supplemental Materials (“Identifying Trips in  
975 RecFIN”).

976 Since recreational fishing trips target a wide variety of species, standardization of the catch  
977 rates requires selecting trips that are likely to have fished in habitats containing China  
978 rockfish. The method of Stephens and MacCall (2004) was used to identify trips with a  
979 high probability of catching China rockfish, based on the species composition of the catch  
980 in a given trip. Prior to applying the Stephens-MacCall filter, we identified potentially  
981 informative “predictor” species, i.e., those with sufficient sample sizes and temporal coverage  
982 (at least 30 positive trips total, distributed across at least 10 years of the index) to inform  
983 the binomial model. Coefficients from the Stephens-MacCall analysis (a binomial GLM) are  
984 positive for species which co-occur with China rockfish, and negative for species that are not  
985 caught with China rockfish. As expected, positive indicators of China rockfish trips include  
986 several species of nearshore rockfish, and counter-indicators include several species of flatfish,  
987 salmon, and deep-water rockfish (Figure 30). One species (albacore, *Thunnus alalunga*) that  
988 met the requirement of 30 positive trips over at least 10 years never co-occurred with China  
989 rockfish. All trips catching albacore were excluded from the data set used to model CPUE.  
990 Records from 1993 and 1994 were also dropped from the index, due to poor spatial coverage  
991 (all trips were in San Luis Obispo county).

992 The percentage of trips that caught China rockfish was 13.6% prior to filtering, and 70.8% in  
993 the final, filtered data set (n=431; Table 16). The number of sampler-examined trips varies  
994 by year and county, and counties with small sample sizes were aggregated with adjacent  
995 counties into four *regions*. (Table 17). Samples from Humboldt and Del Norte counties were  
996 included with the Oregon MRFSS index.

997 CPUE (number of fish per angler hour) was modelled using a “delta-GLM” model (Lo  
998 et al. 1992, Stefánsson 1996). Model selection using AIC supported inclusion of *year* and  
999 *region* effects in both the binomial and lognormal components of the index (Table 18). The  
1000 addition of two-month *wave* effects (to allow for seasonal changes in CPUE) did not improve  
1001 model fit. Data in the binomial component also supported inclusion of a distance from  
1002 shore variable (*AREA\_X*). Residual-based model diagnostics for the positive component of  
1003 the index suggest the data generally met the assumptions of the GLM (Figure 31). The  
1004 resulting index is highly variable, but suggests a decline in catch rates after 1995 relative to  
1005 preceding years (Table 19; Figure 32).

1006 **California North of 40°10' and Oregon Dockside Charter Boat Indices (MRFSS  
1007 and ORBS)**

1008 For the Oregon sport fisheries, three indices of abundance were used in the pre-STAR Panel  
1009 base model: (1) catch rates from the onboard observer program, (2) catch rates from the  
1010 dockside survey component of the ORBS, and (3) catch rates from the dockside MRFSS (see

1011 description of California MRFSS index, above). For the onboard observer index, all data  
1012 elements were verified by a biologist, and thus there was a high degree of certainty in the  
1013 catch, effort, and locations fished; however, there was limited spatial-temporal coverage and  
1014 only charter boats were included (not private boats). In contrast, the ORBS dockside survey  
1015 has more comprehensive coverage and much greater samples sizes (i.e., 50-70 times more trips  
1016 than onboard observer program), but there was less confidence in the data elements, as only  
1017 catch and the number of anglers were verified by biologists (all other trip details were angler-  
1018 reported). The two dockside programs (ORBS and MRFSS) differ in terms of the measure  
1019 of fishing effort (details below). A single fishing trip can be sampled in both by the onboard  
1020 observer program and also dockside within ORBS. Because the onboard observer program  
1021 data is at a much finer scale than the trip-based dockside data; we removed trips from the  
1022 ORBS database that were double-sampled and chose to retain all onboard observer trips.

1023 **Index Standardization: MRFSS Dockside Charter Boat CPUE for California**  
1024 **North of 40°10' and Oregon**

1025 An index based on MRFSS data for northern California and Oregon was developed for the  
1026 pre-STAR base model. Prior to the review meeting, it was discovered that the data were not  
1027 trip-level data, and the index was removed from the final base model, with negligible effect  
1028 on model results. The STAT recommends that future China rockfish assessments examine  
1029 trip-level MRFSS catch and effort data as a potential index of abundance.

1030 **Index Standardization: Oregon Recreational Boat Survey (ORBS) Dockside**  
1031 **Charter Boat CPUE**

1032 In order to provide estimates of total catch and effort for the Oregon sport fisheries, ORBS  
1033 obtains catch rates from a portion of vessels via a dockside survey, and applies them to total  
1034 effort counts. During the dockside survey, biologists intercept vessels returning from fishing  
1035 trips and record catch, effort, and other trip-related details (e.g., grid area fished, target  
1036 species, depth, port, etc.). Since catch and effort per sampled trip are both obtained, the  
1037 dockside survey of ORBS was also used to develop an index of abundance for China rockfish.

1038 Modifications had to be made to trip hours from the original ORBS dataset to create a  
1039 standardized unit of effort. Since trip hours in ORBS are not hours fished, as in MRFSS,  
1040 but rather the total duration of the trip (as measured from the time the boat crossed into the  
1041 ocean until the time they were interviewed at the dock), travel times had to be determined  
1042 and subtracted from trip hours in order to get a standardized measure of fishing effort per  
1043 trip. Accordingly, a total distance function was created for each trip based on the river  
1044 miles (distance along the navigable channel from the port to the bar (river mouth)) and  
1045 ocean miles (i.e., straight distance from the river bar to the ocean grid fished, wrapping  
1046 around obstructions if needed). Total distance was then converted to travel time based on  
1047 generalized vessel speeds for private (i.e., 18 mph) and charter boats (i.e., 13 mph) provided  
1048 by Wayne Butler (Oregon charter captain; personal communication). It is important to note  
1049 that the original trips hours minus travel hours still does not equal hours fished because it  
1050 does account for time needed to move from drift to drift; however, since the number of resets  
1051 between drifts would be expected to be related to fish abundance (as with catch rates),

1052 the modified trips hours was deemed a viable effort unit for the assessment. Some trips  
1053 had erroneous trips hours (discrepancies between values entered on paper and then entered  
1054 electronically later). These were the steps taken to correct the issue:

- 1055 1. Trip hours is computed automatically by the data logger based on the time the inter-  
1056 view is entered electronically
- 1057 2. If samplers write their interviews on paper and enter them electronically later when  
1058 they have time (as believed to have happened despite being instructed not to), then  
1059 the trip hours are inflated.
- 1060 3. To potentially remove these errors, we computed time intervals between interviews.  
1061 Pulses of interviews a minute or two apart are very likely to have been from bunches  
1062 of paper interviews entered at electronically in one sitting, as normal interviews are  
1063 somewhat sporadic and take more than a minute to complete.

1064 The ORBS dockside charter boat records (years 2001-2014) include 36,752 trips in the un-  
1065 filtered data set, of which 4,080 caught China rockfish (11%). As with the other trip-based  
1066 CPUE data sets, the Stephens-MacCall method was used to identify trips with a high prob-  
1067 ability of catching China rockfish. Prior to using the Stephens-MacCall approach to select  
1068 relevant trips, a number of other filters were applied to the data to minimize variability in  
1069 CPUE estimates. Criteria for valid trips included vessels with 20+ sampled trips (13% of  
1070 vessels accounted for 89% of trips) and trip hours <12. Trips targeting tuna and dive trips  
1071 were excluded from the analysis (see Table 20 for other filters).

1072 As with the MRFSS indices, potentially informative species for the Stephens-MacCall analy-  
1073 sis were defined as those occurring in at least 30 unique trips, in 10 different years (Figure 33).  
1074 Some of these never occurred with China rockfish (strong ‘counter-indicators’) and records  
1075 with these species were removed from the data prior to estimation of the index. Strong  
1076 counter-indicators for the ORBS data set included blue shark, white sturgeon, steelhead,  
1077 and albacore. Trips in which at least 99% of the catch consisted of pelagic rockfish were also  
1078 excluded, as anglers were likely targeting semi-pelagic rockfish (Table 20).

1079 Coefficients from the Stephens-MacCall analysis identified several rockfish species (black,  
1080 rosy, tiger, bocaccio, vermillion, yelloweye, copper, etc.) as indicators of positive China  
1081 rockfish catch, along with lingcod, kelp greenling, and cabezon. Counter-indicators included  
1082 deep-water rockfish, salmonids, and Pacific Halibut. Brown rockfish, another nearshore  
1083 rockfish species, was among the counter-indicator species, reasons for which are unclear to  
1084 the STAT at this time.

1085 A total of 6232 trips were retained following the Stephens-MacCall filter (Table 21). Model  
1086 selection with AIC proceeded as with the other dockside indices, but the ORBS data sup-  
1087 ported an interaction term in the lognormal component of the delta-GLM (Table 22). The  
1088 interaction was not supported by the binomial model (although AIC retained a region effect),  
1089 but the keeping the year-region interaction term in the positive model reduced the AIC by  
1090 38 points over a model with year and region alone (Table 22).

1091 To account for this interaction, separate delta-GLM models (each with a year and wave  
1092 effect) were fit to the regional data (Southern OR and Northern OR, split at Florence). The  
1093 regional indices show little change in the northern region, but a decline in catch rates in  
1094 the south (Figure 34). Residual diagnostics for the regional models did not show strong  
1095 deviations from model assumptions in either area (Figures 35 and 36). Estimated area of  
1096 rocky reefs off Oregon was generated using GIS (see description of onboard observer indices),  
1097 and we calculated an area-weighted index based on the relative proportion of reef habitat in  
1098 each region (total reef habitat distributed as 35.4% north, 64.6% south).

1099 The final, area-weighted index (Table 23, Figure 37) shows a declining stock (on average,  
1100 statewide), but the STAT emphasizes that this does not capture regional patterns in CPUE,  
1101 and may underestimate the fishing impacts in the southern region, and overestimate impacts  
1102 in the north.

### 1103 2.1.6 Fishery-Dependent Data: Recreational Onboard Observer Surveys

1104 The goal of the Observer Programs in California and Oregon is to collect data including  
1105 charter boat fishing locations, catch and discard of observed fish by species, and lengths of  
1106 discarded fish. Both states sample the commercial passenger fishing vessel (CPFV), i.e., charter  
1107 boat or for-hire fleet. The onboard observer programs collect drift-specific information  
1108 at each fishing stop on an observed trip. At each fishing stop recorded information includes  
1109 start and end times, start and end location (latitude/longitude), start and end depth, num-  
1110 ber of observed anglers (a subset of the total anglers), and the catch (retained and discarded)  
1111 by species of the observed anglers. Data for the onboard observer indices for the recreational  
1112 CPFV fleet are from four sampling programs.

1113 The CDFW conducted an onboard observer program in central California from 1987-1998  
1114 (Reilly et al. 1998). These data were previously used in the 2013 data moderate assessments  
1115 (Cope et al. 2015), at the level of a fishing trip. Since the 2013 assessments, the original  
1116 data sheets were acquired and data were keypunched to the level of fishing stop. One caveat  
1117 of this data is that location data were recorded at a finer scale than the catch data. We  
1118 aggregated the relevant location information (time and number of observed anglers) to match  
1119 the available catch information. Between April 1987 and July 1992 the number of observed  
1120 anglers was not recorded for each fishing stop, but the number of anglers aboard the vessel is  
1121 available. We imputed the number of observed anglers using the number of anglers aboard  
1122 the vessel and the number of observed anglers at each fishing stop from the August 1992-  
1123 December 1998 data (see Appendix E for details, p.E-1). In 1987, trips were only observed  
1124 in Monterey, CA and were therefore excluded from the analysis. CDFW collected lengths of  
1125 both retained and discarded fish during this time period. All China rockfish measured were  
1126 retained and lengths are used as length compositions for this index.

1127 California implemented a statewide sampling program in 1999 (Monk et al. 2014). California  
1128 Polytechnic State University (Cal Poly) has conducted an independent onboard sampling  
1129 program as of 2003 for boats in Port San Luis and Morro Bay (Stephens et al. 2006), but

follows the protocols established in Reilly et al. (1998), and modified to reflect sampling changes that CDFW has also adopted, e.g., observing fish as they are landed instead of at the level of a fisher's bag. Therefore, the Cal Poly data area incorporated in the same index as the CDFW data from 1999-2014. CalPoly collects lengths of both retained and discarded fish.

We generated separate relative indices of abundance in California for the 1987-1999 and 2000-2014 datasets due to the number of regulation changes occurring throughout the time period (see Appendix H, p.[H-1](#)). CDFW implemented a regulation of three hooks in 2000, which was reduced to (and remains at) two hooks in 2001.

The ODFW initiated an onboard observer program in 2001, which became a yearly sampling program in 2003 (Monk et al. 2013). Both California and Oregon provided onboard sampling data through 2014. Both of these programs only collected lengths of discarded fish, and the number of lengths of China rockfish from these studies is small (Figure [38](#)).

All indices were standardized using a delta-GLM modeling approach (Lo et al. 1992). Data were analyzed at the drift level and catch was taken to be the sum of observed retained and discarded fish, i.e., number of fish encountered per angler hour. The onboard observer data from the CDFW 1999-2014 data between north of 40°10' N. latitude and the Oregon border were too sparse to include in the index. Therefore, indices used in the model with a break at 40°10' N. latitude remain the same as the state-specific onboard observer indices.

#### *Data Filtering*

Prior to any analyses, a preliminary data filter was applied.

Trips/drifts from the CDFW 1988-1998 meeting the following criteria were excluded from analyses:

1. Drift associated with a fishing location code that was not assigned to a reef
2. Drifts identified as having possible erroneous location, observed anglers, or time data
3. Trips encountering <50% groundfish species (number of fish)

Trips/drifts from the ODFW, CDFW 1999-2014, and Cal Poly databases meeting the following criteria were excluded from analyses:

1. ODFW halibut-targeted trips were excluded
2. Drifts south of Pt. Conception (only 2 China rockfish observed south of Pt. Conception)
3. Trips encountering <50% groundfish species
4. Drifts within the current Stonewall Bank Yelloweye Rockfish Conservation
5. Drifts within Arcata Bay, Humboldt Bay, South Bay, or San Francisco Bay
6. Drifts missing a starting location (latitude/longitude)
7. Drifts identified as having possible erroneous location or time data
8. Drifts missing both starting and ending depths
9. Drifts within the habitat data occurring farther than 83 m from a reef in Oregon and 34 m in California (see Appendix F (p. [F-1](#)) for details)
10. Drifts outside the habitat data in California occurring farther than 141 m from reef (see Appendix F (p. [F-1](#)) for details)

- 1170 11. Drifts occurring on a reef with <3 positive encounters of China rockfish  
1171 12. Drifts occurring on a reef in which China rockfish was observed in <25% of years the  
1172 reef was visited

1173 **Index standardization: Oregon**

1174 At the March 2015 Nearshore Stock Assessments Workshop the issue of hook saturation by  
1175 black rockfish (*Sebastodes melanops*) in Oregon was raised ([Agenda Item D.8 Attachment 10](#),  
1176 June 2015). The recreational fishery in Oregon specifically targets black rockfish. While black  
1177 rockfish associate with rocky habitat, they are a schooling, midwater species. Fishermen  
1178 specifically targeting black rockfish may not drop their lines to the seafloor, or may encounter  
1179 black rockfish and other midwater species before their lines can reach the seafloor. To address  
1180 this issue in the onboard observer data, we filtered out drifts for which the catch (retained  
1181 plus discarded) consisted of at least 95% black, blue (*Sebastodes mystinus*) and yellowtail  
1182 (*Sebastodes flavidus*) rockfishes, the most commonly occurring midwater rockfish species. This  
1183 resulted in a decrease in the number of drifts by 4,092, only three of which observed China  
1184 rockfish.

1185 The filtered dataset included 6,038 drifts, of which 259 (4%) drifts with positive encounters  
1186 (Table 24). The majority of drifts sampled (75%) were from north of Florence, although  
1187 China rockfish were present in 6% of drifts in southern Oregon and 3% of drifts in the north.  
1188 Covariates considered in the full model included *year*, *depth*, *month* or *2-month wave* and,  
1189 *region* (Figures 39 and 40). To increase sample sizes data from waves 2 and 3 were aggregated  
1190 as well as from 4 and 5 (ODFW does not sample in waves 1 and 6). Depths greater than 20  
1191 m were also binned to 20-59 m.

1192 The final selected dataset contained categorical variables for *year* (13 levels), *wave* (2 levels),  
1193 *region* (2 levels, north and south of Florence), and three depth bins (*depth*: 0-19 m, and  
1194 20-59 m). A lognormal model was selected over a gamma for the positive encounters by a  
1195 deltaAIC of 20.01. Model selection, using AIC, selected a lognormal model with *year*, *wave*,  
1196 *depth*, *region*, and a *wave:depth* interaction, while a binomial with *year*, *region*, and *wave*  
1197 was selected (Table 25). In the lognormal submodel, stepwise BIC retained the *year*. In  
1198 the binomial model, stepwise BIC retained *region* and *wave*. The final *year* effects from the  
1199 delta-GLM with main effects *year*, *region*, and *wave* are shown in Table 26 and Figure 41).  
1200 The final model suggests that relative abundance was slightly higher in southern Oregon,  
1201 and in waves 4 and 5. Standard model diagnostics show adequate fit and general consistency  
1202 with GLM model assumptions for the positive catch component (Figure 42).

1203 **Index standardization: California**

1204 *Central California 1988-1998*

1205 The filtered dataset included 5,557 drifts, of which 852 (15%) drifts with positive encounters  
1206 (Table 24). To increase sample sizes, data from Regions 2 and 3 were aggregated as well as  
1207 Regions 8 and 9. Samples north of Ten Mile River were too sparse to reliably include in the  
1208 index.

1209 Covariates considered in the full model included *year*, *depth*, *month or 2-month wave* and,  
1210 *region* (Figures 43 and 44). The selected data contained categorical variables for *year* (13  
1211 levels), *wave* (6 levels), *region* (5 levels), and four depth bins (*depth*: 0-19 m, 20-39 m, 40-59 m,  
1212 and 60-79 m). A lognormal model was selected over a gamma for the positive encounters by a  
1213 deltaAIC of 125.06. Model selection, using AIC, selected a lognormal model with *year*, *depth*,  
1214 and *region*, while a binomial with *year*, *region*, *depth*, *wave*, and a *year:region* interaction was  
1215 selected. However, the standard errors of the binomial model with interactions were large,  
1216 and suggested data were too sparse to explore the *year:region* interaction. For the lognormal  
1217 submodel, stepwise BIC retained the *depth* and *region* (Table 27). For the binomial submodel,  
1218 stepwise BIC retained *year*, *region*, and *depth*. The final *year* effects from the delta-GLM with  
1219 main effects *year*, *region*, and *depth* are shown in Table 28 and Figure 45). The covariates in  
1220 the final model suggest the relative abundance of China rockfish decreases with depth and  
1221 increases north of Monterey, CA. Standard model diagnostics show adequate fit and general  
1222 consistency with GLM model assumptions for the positive catch component (Figure 46)

1223 *California (north of Pt. Conception) 2000-2014*

1224 The filtered dataset included 13,993 drifts, of which 1,403 (10%) drifts with positive encoun-  
1225 ters (Table 24). CDFW began sampling Region 12 (Trinidad Head to the OR border) in  
1226 2008 and no trips from Region 11 (Cape Mendocino to the Eel River) were sampled from  
1227 2000-2014. From 2008-2014, only 10 drifts encountering China rockfish were observed in  
1228 Region 12. Therefore, the following index only reflects the population south of Cape Mendo-  
1229 cino. Further, to increase sample sizes drifts from Regions 2 and 3 were aggregated as well  
1230 as Regions 7 and 8, and Regions 9 and 10.

1231 Covariates considered in the full model included *year*, *depth*, *month or 2-month wave* and,  
1232 *region* (Figures 47 and 48). The selected data contained categorical variables for *year* (15  
1233 levels), *wave* (6 levels), *region* (6 levels), and four depth bins (*depth*: 0-19 m, 20-39 m, 40-59  
1234 m, and 60-79 m). A lognormal model was selected over a gamma for the positive encounters  
1235 by a deltaAIC of 115.91. Model selection, using AIC, selected a lognormal model with *year*,  
1236 *depth*, and *region*, while a binomial with *year*, *region*, *depth*, and a *year:region* interaction was  
1237 selected. However, the standard errors of the binomial model with interactions were large,  
1238 and suggested data were too sparse to explore the *year:region* interaction. For the lognormal  
1239 submodel, stepwise BIC retained the *year* and *region* (Table 29). For the binomial submodel,  
1240 stepwise BIC retained *region*, and *depth*. The final YEAR effects from the delta-GLM with  
1241 main effects *year*, *region*, and *depth* are shown in Table 30 and Figure 49). The covariates  
1242 in the final model suggest the relative abundance of China rockfish decreases with depth,  
1243 specifically in depths greater than 59 m, and increases south to north. Standard model  
1244 diagnostics show adequate fit and general consistency with GLM model assumptions for the  
1245 positive catch component (Figure 50)

1246 **2.1.7 Fishery-Independent Data: sources considered, but not used in assess-**  
1247 **ment**

1248 *Northwest Fisheries Science Center (NWFSC) slope survey*

1249 The NWFSC slope survey was conducted annually from 1999 to 2002. The depth range of  
1250 this survey (100-700 fm) is outside the depth range of China rockfish, and was therefore not  
1251 used in this assessment.

1252 *Northwest Fisheries Science Center (NWFSC) shelf-slope survey*

1253 This survey is referred to as the “combo,” conducted annually since 2003. The survey  
1254 consistently covered depths between 30 and 700 fm, and has never encountered a China  
1255 rockfish. Therefore, the combo survey was not used in this assessment.

1256 *Alaska Fisheries Science Center (AFSC) shelf survey*

1257 The survey, often referred to as the “triennial” survey was conducted every third year between  
1258 1977 and (and conducted in 2004 by the NWFSC using the same protocols). The triennial  
1259 survey trawls in depths (generally 30 to 275 fm) that are deeper the range and habitats of  
1260 China rockfish, and was therefore not used in this assessment.

1261 *Pikitch study*

1262 The Pikitch study was conducted between 1985 and 1987 (Pikitch et al. 1988). The northern  
1263 and southern boundaries of the study were 48°42' N latitude and 42°60' N. latitude respec-  
1264 tively, which is primarily within the Columbia INPFC area (Pikitch et al. 1988 , Rogers and  
1265 Pikitch 1992). Participation in the study was voluntary and included vessels using bottom,  
1266 midwater, and shrimp trawl gears. Observers of normal fishing operations on commercial  
1267 vessels collected the data, estimated the total weight of the catch by tow and recorded the  
1268 weight of species retained and discarded in the sample. China rockfish are not targeted using  
1269 trawl gear, and therefore we did not use data from this survey in the assessment.

1270 *Enhanced Data Collection Project (EDCP)*

1271 The EDCP was conducted by ODFW to collect information on bycatch and discard ground-  
1272 fish species off the coast of Oregon from late 1995 to early 1999. EDCP had limited spatial  
1273 coverage in Oregon waters only. China rockfish are not targeted using trawl gear, and  
1274 therefore we did not use data from this survey in the assessment.

1275 *Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)*

1276 A total of 59 China rockfish were observed in 17,657 SCUBA transects conducted in the  
1277 southern and central survey regions. Transects were conducted in Northern California and  
1278 Oregon for two years (2010-2011), with a higher occurrence of China rockfish (156 out of  
1279 956 transects).

1280 **2.1.8 Biological Data: Length and age compositions**

1281 Length compositions were provided from the following sources, by region, with brief descrip-  
1282 tions below:

1283 Southern model (*south of 40°10' N. latitude*)

- 1284 • Jeff Abrams' thesis (*research, 2010-2011*)
- 1285 • CALCOM (*commercial dead fish, 1992-2006, excluding 1999*)
- 1286 • CALCOM (*commercial live fish, 1997-2012*)
- 1287 • CDFW onboard observer (*recreational charter, 1987-1998*)
- 1288 • California recreational sources combined (*charter mode, 1960, 1978-2014*)
  - 1289 – Miller and Gotshall survey
  - 1290 – CA rec. sampling (1978-1985)
  - 1291 – MRFSS (1980-2003)
  - 1292 – CRFS (2004-2014)
- 1293 • California recreational sources combined (*private mode, 1959 and 1980-2014*)
  - 1294 – Miller and Gotshall survey
  - 1295 – CA recreational sampling (1978-1985)
  - 1296 – MRFSS (1980-2003)
  - 1297 – CRFS (2004-2014)
- 1298 • CCFRP (*research, Point Buchon to Año Nuevo, 2007-2013*)
- 1299 • WCGOP (*discards, 2004-2013*)

1300 Central model (*California north of 40°10' N. latitude to the OR/WA border*)

- 1301 • ORBS north of Florence (*recreational, charter and private modes, 1980-2014*)
- 1302 • ORBS south of Florence (*recreational, charter mode, 1984-2014*)
- 1303 • ORBS south of Florence (*recreational, private mode, 1980-2014*)
- 1304 • PacFIN Oregon (*commercial live fishery, sexes combined, 1998-2014*)
- 1305 • PacFIN Oregon (*commercial dead fishery, sexes combined, 1995-2014*)
- 1306 • CALCOM (*commercial dead fish, 1992-2002*)
- 1307 • CALCOM (*commercial live fish, 1997-2010*)
- 1308 • California recreational sources combined (*charter and private modes, 1981-2014*)
  - 1309 – MRFSS (1981-2003)
  - 1310 – CRFS (2004-2014)

1311 Northern model (*Washington state MCAs 1-4*)

- 1312 • Washington MCAs 3-4 (*recreational all modes, 1979-2014*)
- 1313 • Washington MCAs 1-2 (*recreational all modes, 1969-2014*)

1314 Recreational: Washington (WDFW)

1315 Recreational length- and age- composition data were provided directly from WDFW dur-  
1316 ing winter 2015. The WDFW routinely collected recreational biological samples for China  
1317 rockfish between 1995 and 2014, with all but one year sampled during 1979 to 1983. These  
1318 composition data lack information on the number of fish sampled out of those landed in  
1319 a given trip, and therefore are used without expansion to the sample level. Unexpanded  
1320 recreational composition data are frequently used in West Coast stock assessments for the  
1321 above reason. Length and age data collected from dockside recreational samples WA are

1322 summarized by the number of fish sampled (Table 31). The WA recreational length- and  
1323 age- compositions are shown in Figures 51, 52, 9, and 53.

1324 *Recreational: California MRFSS and CRFS length composition data*

1325 Individual fish lengths recorded by MRFSS (1980-2003) and CRFS (2004-2011) samplers were  
1326 downloaded from the RecFIN website ([www.recfin.org](http://www.recfin.org)). CRFS data from 2012-2014 were  
1327 obtained directly from CDFW. Fish were assigned to the northern and southern management  
1328 areas based on county and interview site number. To examine finer scale spatial differences  
1329 in size composition data, interview sites in each county were assigned to a CRFS district  
1330 (including years prior to 2004). Distributions of lengths increased from south to north, with  
1331 the largest change in mean length occurring between CRFS districts 5 & 6 (roughly around  
1332 Cape Mendocino; Figure 54). This pattern was consistent across all years of CRFS sampling  
1333 (2004-2014; Figure 55). Sizes of retained fish north of Cape Mendocino were more similar  
1334 to fish caught in Oregon than fish caught south of Cape Mendocino. Since both biological  
1335 (e.g. growth) and fishery-related (e.g. selectivity, retention) factors can influence the size  
1336 compositions, length at age was estimated internal to the assessment models in all three  
1337 areas.

1338 *Recreational: Oregon Recreational Boat Survey (ORBS)*

1339 Biological data from the ORBS program were provided by ODFW. The ORBS is a dockside  
1340 sampling program for the both the recreational CPFV and private modes. Length compo-  
1341 sition samples from north of Florence for the CPFV and private fleets were provided from  
1342 1980-2014. Samples from south of Florence spanned 1984-2014. Distributions of length data  
1343 from these southern and northern parts of Oregon were similar to each other, and across  
1344 years (Figure 56).

1345 *Recreational: Miller and Gotshall (1965)*

1346 The Northern California Marine Sport Fish Survey conducted an assessment survey with  
1347 goals that included estimation of annual fishing effort by all recreational fishing modes,  
1348 catch by weight, CPUE, and collection of data to analyze length compositions. Lengths  
1349 from 101 China rockfish were collected from 1959-1960. Lengths of China rockfish from 1959  
1350 primarily came from private/rental boats, and lengths from 1960 came from charter boats.  
1351 These two years of data were not consistent with length composition data from later years,  
1352 and were influential on model results (see model sensitivities to these data).

1353 *Commercial: PacFIN (Oregon and California)*

1354 Biological data from commercial fisheries for China rockfish were extracted from PacFIN  
1355 (PSMFC) on May 18, 2015. Commercial landings and the biological characteristics of hook-  
1356 and-line landings were sampled from 1995-2014 in Oregon and in 1991-2013 California. There  
1357 is no commercial catch of China rockfish in the state of Washington. Currently, port biol-  
1358 ogists employed by each state fishery agency collect species-composition information and  
1359 biological data from the landed catches. The monitoring programs currently in place vary  
1360 between the states but are generally based on stratified, multistage sampling designs. The  
1361 OR data were available by live fish fishery landings and dead fish fishery landings, but fish

1362 conditions were not available for PacFIN for the CA landings. Due to the lack of fish condition  
1363 data for CA in PacFIN, the CA commercial fishery compositions were downloaded from  
1364 the [CALCOM](#) database.

1365 Annual commercial length- and age-frequency distributions were developed for each state for  
1366 which observations were available, following the same bin structure as was used for research  
1367 observations. For each fleet, the raw observations were expanded to the sample level, to  
1368 allow for any fish that were not measured, then to the trip level to account for the relative  
1369 size of the landing from which the sample was obtained. Length and age data collected from  
1370 commercial landings for OR and CA are summarized by the number of port samples (Tables  
1371 [32](#) and [33](#)). Figures [57](#), [58](#), [59](#), [60](#), [61](#), and [62](#) show plots of the commercial length and age  
1372 composition data for the central model. Figures [63](#), [64](#), and [65](#) show plots of the commercial  
1373 length and age composition data for the southern model.

1374 *Research: NMFS groundfish ecology survey*

1375 From 2001-2005, the SWFSC Fisheries Ecology Division conducted longline surveys aboard  
1376 a chartered commercial longline vessel at various stations between Monterey and Davenport,  
1377 CA (36° N. latitude to 37.5° N. latitude)(pers. comm. Don Pearson, SWFSC). Longline gear  
1378 was set in various depths from 10 meters to 700 meters, parallel to the depth contour. Each  
1379 longline set consisted of 3-5 skates, each with about 250 2/0 circle hooks baited with squid.  
1380 In nearshore habitats, we allowed the gear to soak for roughly 30 minutes. A small number  
1381 of China rockfish length samples were available from this cruise, but were not included in  
1382 the assessments due to sample size and potential differences in selectivity.

1383 *Research: California Collaborative Fisheries Research Program (CCFRP)*

1384 The [California Collaborative Fisheries Research Program](#) (CCFRP), created by Rick Starr  
1385 (Sea Grant and Moss Landing Marine Laboratory) and Dean Wendt (Cal Poly San Luis  
1386 Obispo), monitors marine protected areas (MPAs) and gathers information useful for fisheries  
1387 management (Starr et al. 2015). This program has been running in Central California since  
1388 2007. Length compositions for China rockfish were included in this assessment (Figure [66](#)).

1389 Future research is planned to use CPUE information from this program, comparing relative  
1390 abundance indices derived from fishery-dependent and fishery-independent monitoring pro-  
1391 grams. The CCFRP data provide a time series of fishery-independent catch and effort at  
1392 fixed stations, collecting information at sample sites inside and outside of MPAs spanning  
1393 about 200 miles of the California coast from Point Buchon to Año Nuevo. This fishery-  
1394 independent information, combined with our current fishery-dependent information (i.e.,  
1395 CPFV onboard observer data), provides an opportunity for fine-scale spatial and temporal  
1396 analysis of catch rates and species compositions, specifically addressing the research needs  
1397 identified in nearshore rockfish stock assessments.

1398 *Research: Abrams Thesis*

1399 Jeff Abrams (2014) conducted a research study aboard recreational charter boats from Cres-  
1400 cent City Harbor, Trinidad Bay and the Noyo River Harbor. Rocky habitat was identified

1401 from high resolution bathymetric data and gridded into 500 m by 500 m cells (California  
1402 Seafloor Mapping Project, data available from: <http://seafloor.ottrelabs.org/index.html>).  
1403 During a sampling event, cells were randomly selected to fish. Fish were captured via hook-  
1404 and-line by either researchers, students, or recreational fishers. The charter boat captain  
1405 was not allowed to search and target fish within the cell. Fishing drifts started at the up-  
1406 current/wind side of the cell and drifted to the opposite edge of the cell, then stopped the  
1407 clock and reset for another drift (Jeff Abrams, pers. comm.) If it was certain that fishing  
1408 was occurring over sand, the captain would generally reset. However, because cells were  
1409 selected with a minimum area of rocky habitat, this was rare. This study provided 138  
1410 individual China rockfish, which were used as Conditional Age-at-Length (CAAL) in the  
1411 southern model (Figure 67).

#### 1412 2.1.9 Biological Data: Age structures

1413 Age structure data were available from the following sources:

1414 *Southern model (California south of 40°10' N lat.)*

- 1415 • Jeff Abrams' thesis (*research*, 2010-2011)
- 1416 • CDFW (*recreational and research*, 1972-1985)
- 1417 • CDFW (*recreational CPFV*, 1977-1986)
- 1418 • CDFW (*recreational CPFV*, 1980-1984)
- 1419 • NMFS groundfish ecology (*research*, 2003-2005)

1420 *Central model (California north of 40°10' N lat. to the OR/WA border)*

- 1421
- 1422 • Oregon, majority south of Florence (*commercial dead landings*, 2001-2013)
  - 1423 • Oregon, north of Florence (*recreational, all modes combined*, 2005-2013)
  - 1424 • Oregon, south of Florence (*recreational, all modes combined*, 2005-2013)

1425 *Northern model (Washington state MCAs 1-4)*

- 1426
- 1427 • Washington South (MCAs 1-2, *recreational, all modes combined*, 2014)
  - Washington North (MCAs 3-4, *recreational, all modes combined*, 1998-2014)

1428 The commercial ages from Oregon were extracted from PacFIN, and these data are uploaded  
1429 by the states. The Washington state ages were provided by Tien-Shui Tsou (pers. comm.)  
1430 and aged by WDFW. Otoliths from various CDFW sampling programs (1972-1985) were  
1431 aged for this assessment. It is unclear whether the otoliths were obtained from recreational  
1432 boat modes, research cruises, and diving modes. For this reason, these ages were not included  
1433 in the assessment models, but were used for external estimation of size at age. Commercial  
1434 port samplers in California sampled catch from recreational charter boats in the late 1970s  
1435 and early 1980s.

1436 A total of 3,963 fish were aged/re-aged for this assessment (Table 34), very few of which  
1437 were small or young fish(Figure 68). Prior to this assessment, the only available growth

1438 curve for China rockfish was estimated from Lea et al. (1999). Lea et al. (1999) aged China  
1439 rockfish via the surface aging method. Surface ages are biased towards younger ages; the  
1440 break-and-burn method is preferred and more precise (Beamish 1979, Kimura et al. 1979).  
1441 All ages for this assessment were aged using the break-and-burn method, either by WDFW  
1442 or the NMFS NWFSC Aging Lab.

1443 Length-at-age was initially estimated external to the population dynamics models using the  
1444 von Bertalanffy growth curve (Bertalanffy 1938),  $L_i = L_\infty e^{(-k[t-t_0])}$ , where  $L_i$  is the length  
1445 (cm) at age  $i$ ,  $t$  is age in years,  $k$  is rate of increase in growth,  $t_0$  is the intercept, and  $L_\infty$   
1446 is the asymptotic length. The unavailability of small fish results in unrealistic estimates  
1447 of  $t_0$ , on the order of -9 to -20 depending on the subset of data modeled. For exploratory  
1448 purposes,  $t_0$  was fixed at 0, and for final estimates of growth the length of age-0 fish was  
1449 fixed at 2 cm. The NMFS SWFSC conducts an annual rockfish recruitment and ecosystem  
1450 assessment survey. Pelagic juvenile rockfish are collected at an average age of approximately  
1451 100 days. The mean size of all rockfish species at 1 month of age was roughly 2 cm. At  
1452 this age, length-at-age is fairly consistent among species and therefore differences in growth  
1453 among species are unlikely to introduce considerable bias. We approximated size-at-age zero  
1454 in the assessment with a value of 2 cm.

1455 Differences in growth between sexes, among fleets, and regions were explored. To remove  
1456 biases introduced by region or fleet, we used data from the southern Oregon (south of  
1457 Florence, OR) commercial (dead fish) fleet to look at the growth difference between males  
1458 and females. Few fish were aged older than 37 years (5.8%). For ages in which there were  
1459 fish aged older than 37 years, there was only one fish in each age. Including these fish  
1460 in the model proved to bias the von Bertalanffy growth estimates (large ( $>1.5$ ) standard  
1461 errors in estimates of  $L_\infty$ ). Therefore, the following exploratory analyses exclude fish older  
1462 than 37 years. Fixing  $t_0$  at 0, the other parameters for males and females were similar and  
1463 the differences were not biologically significant, (Males:  $L_\infty = 37.14, k = 0.21$ ; Females:  
1464  $L_\infty = 35.91, k = 0.23$ ). This result, estimating males having a larger asymptotic size of  
1465 approximately 1 cm than females, is anomalous, as females are larger than males in all but  
1466 one rockfish species (Love et al. 2002). This is also inconsistent with the analysis of Lenarz  
1467 and Echeverria (1991), which identified no significant sexually dimorphic characters in China  
1468 rockfish. Quillback rockfish (*Sebastodes maliger*, also in the *Pteropodus* subgenus) are also long-  
1469 lived and don't exhibit dimorphic growth until approximately age 30, with an estimated  $L_\infty$   
1470 of 0.5 cm greater for females than males (Love et al. 2002). Given the sparse data for older  
1471 China rockfish and the unlikelihood of China rockfish being the only rockfish species where  
1472 males are larger than females, growth is assumed the same for males and females in this  
1473 assessment.

1474 Using data from southern Oregon (south of Florence, OR), differences in growth among  
1475 the commercial (dead fish) and the private recreational fleets were explored. There were  
1476 significant differences in growth between the fleets (Commercial:  $L_\infty = 36.23, k = 0.22$ ;  
1477 Recreational:  $L_\infty = 37.93, k = 0.22$ ), suggesting differing selectivity between the fleets.  
1478 The commercial fleet has been restricted to a 12 in minimum size limit since 2000, with a

1479 preference for plate-sized fish. All of the age data from the southern Oregon commercial  
1480 (dead fish) fleet are from 2001-2013. The recreational fleet has no minimum size limit and  
1481 all samples are from 2005-2013.

1482 Regional differences in growth were significant. In general, the asymptotic size of fish were  
1483 smallest in southern California (south of 40°10' N. latitude), increased in northern California  
1484 (north of 40°10' N. latitude) to southern Washington (MCAs 1 & 2) and decreased again in  
1485 northern Washington (Table 35 and Figure 69).

1486 Stock Synthesis models growth as the Schnute parameterization of the von Bertalanffy  
1487 growth model. The size of fish at age-0 was fixed at 2 cm with a CV of 0.1, and all other  
1488 parameters estimated within the model.

### 1489 2.1.10 Biological Data: Aging precision and bias

1490 Ageing imprecision was estimated using a collection of 529 China rockfish otoliths with  
1491 multiple age reads (Figures 70 - 72). We analyzed this data set using the ageing error  
1492 software provided by Andre Punt and Jim Thorson, publicly available at <https://github.com/nwfsc-assess/nwfscAgeingError>. The software estimated a bias in the age readings  
1493 from some early samples read by a former NWFSC age reader and these were excluded from  
1494 the compositions used in the model. The variability in age readings of the remaining readers  
1495 was estimated under an assumption of a linear increase in standard deviation with age. The  
1496 resulting estimate indicated a standard deviation in age readings increasing from 0.1 years  
1497 at age 1 by about 1 year of uncertainty per 10 years of age to a standard deviation of 7.7  
1498 years at age 80.

### 1500 2.1.11 Biological Data: Weight-Length

1501 The weight-length relationship is based on the standard power function:  $W = \alpha(L^\beta)$  where  
1502  $W$  is individual weight (kg),  $L$  is length (cm), and  $\alpha$  and  $\beta$  are coefficients used as constants.

1503 This assessment uses weight-length parameters for females of  $\alpha = 1.17 \times 10^{-5}$  and  $\beta = 3.177$ ,  
1504 derived from Lea et al. (1999). A fit of the length-weight relationship to the Oregon ORBS  
1505 data,  $\alpha = 2.06 \times 10^{-5}$  and  $\beta = 3.02$ , yielded a curve that was very similar to that reported in  
1506 Lea et al. (1999)(Figure 73).

### 1507 2.1.12 Biological Data: Maturity and Fecundity

1508 China rockfish maturity-at-length data were sparse and was gathered from two available  
1509 sources, one from California and one from Oregon. Echeverria (1987) collected 69 China  
1510 rockfish from central and northern California, of which the age at first maturity was 3 years  
1511 for males and females (26 cm). Both males and females exhibited 50% maturity at 4 years  
1512 (27 cm) and 100% maturity at 6 years (30 cm).

1513 In Oregon, Hannah and Blume (2011) determined a length at 50% maturity at 28.5 cm from  
1514 a sample size of 239 China rockfish. Maturity was fit to a logistic curve,  $p_l = \frac{e^{B_0+B_l l}}{1+e^{B_0+B_l l}}$ ,  
1515 where  $p_l$  is the proportion of the natural fish at length  $l$ , and  $B_0$  and  $B_1$  are the regression  
1516 coefficients. Parameter estimates from Hannah and Blume (2011) are  $B_0 = -13.320$  and  
1517  $B_1 = 0.467$ .

1518 The southern base model used the California estimate (50% mature at 27cm) while the  
1519 central and northern draft based models used the Oregon estimate (50% mature at 28.5 cm).  
1520 Fecundity is assumed proportional to female spawning biomass in the draft base models.

### 1521 2.1.13 Biological Data: Natural Mortality

1522 Natural mortality for wild fish populations is extremely difficult to estimate.

1523 Dick and MacCall (2010) estimated natural mortality for 50 data poor stocks using Hoenig's  
1524 (1983) method. The total mortality rate ( $Z$ , the sum of natural and fishing mortality rates),  
1525 is estimated as,  $\log(Z) = 1.710 - 1.084\log(A_{max})$ , where  $A_{max}$  is the maximum observed age.  
1526 The mortality rate was back-transformed to arithmetic space using a bias correction factor,  
1527 log-scale standard deviation of 0.4.

1528 Cope et al. (2015) used the maximum age for China rockfish of 79 years in the 2013 data  
1529 moderate assessment, which produces a natural mortality rate of 0.055. The maximum age  
1530 of China rockfish on the West Coast is now 83 years (age data for this assessment), which  
1531 gives a natural mortality of 0.056 when calculated from Hoenig's method.

### 1532 2.1.14 Biological Data: Sex ratios

1533 The sex ratio from all of the aged China rockfish for this assessment were approximately  
1534 50% each males and females (WA:47%, OR:47%, and CA: 49% female). These fishes came  
1535 from a mixture of recreational, commercial, and research collections.

## 1536 2.2 History of Modeling Approaches Used for this Stock

### 1537 2.2.1 Previous assessments

1538 Dick and MacCall (2010) estimated the overfishing level (OFL) for China, which was adopted  
1539 for the PFMC's 2011-12 and 2013-14 management cycles, as components of the stock complex  
1540 OFLs associated with each species.

1541 China rockfish was assessed as a data moderate species in 2013 (Cope et al. 2015). The  
1542 accepted assessment modelled removal and index data using Extended Depletion-Based Stock  
1543 Reduction Analysis (XDB-SRA) (Dick and MacCall 2011), which is a Bayesian surplus  
1544 production model reparameterized in terms of MacCall's (2009) Depletion-Corrected Average

1545 Catch method. The STAR panel favored regional models for China rockfish, north and south  
1546 of  $40^{\circ}10'$  N. latitude.

1547 The stock north of  $40^{\circ}10'$  N. latitude was found to be below target biomass, as a percentage of  
1548 unfished biomass (a.k.a. “depletion”), but above the minimum stock size threshold (MSST).  
1549 The median of the posterior northern spawning biomass in 2013 was estimated at 37% (84  
1550 mt), and the fishing mortality rate in 2012 was 21.5% of  $F_{MSY}$ .

1551 The stock south of  $40^{\circ}10'$  N. latitude was found to be above target biomass, as a percentage  
1552 of unfished biomass (a.k.a. “depletion”). The median of the posterior southern spawning  
1553 biomass in 2013 was estimated at 66% (264 mt), and the fishing mortality rate in 2012 was  
1554 27% of  $F_{MSY}$ .

## 1555 2.2.2 Spatial stock structure

1556 The waters and biological communities of the California Current System tend to exhibit the  
1557 greatest change at the major promontories along the West Coast, including Point Conception,  
1558 Cape Mendocino, Cape Blanco and the northern tip of Vancouver Island (Checkley and Barth  
1559 (2009); Hickey (1979); Gottscho (2014)). In particular, the waters off Cape Mendocino are  
1560 a known biogeographical boundary along the West Coast of the U.S. and has been shown  
1561 as a geographical boundary across a number of terrestrial and marine taxa (see Gottscho  
1562 (2014) for a review). The waters off Cape Mendocino, CA are characterized by turbulent  
1563 waters and some of the strongest winds and upwelling found within the California Current  
1564 (Botsford and Lawrence 2002, Pacific Fishery Management Council 2013).

1565 The California Current is the equatorward surface flow that extends from the Vancouver  
1566 Island, Canada (approx.  $50^{\circ}$  N. latitude) with equatorward flow to Baja California, Mexico  
1567 (approx.  $15^{\circ} - 25^{\circ}$  N. latitude) (Hickey 1979, Checkley and Barth 2009). Winds associated  
1568 with the North Pacific High, the Aleutian Low, and a thermal low-pressure system drive the  
1569 oceanographic dynamics that stretch from central California to northern Mexico (Checkley  
1570 and Barth 2009). Seasonal winds drive the frequency and intensity of upwelling along the  
1571 coast. Off the coast of Washington south to Cape Blanco, OR the winds and therefore  
1572 upwelling is generally weak. Starting near Cape Blanco, OR the continental shelf narrows  
1573 and winds and upwelling intensity increases (Francis et al. 2009). The winter environment  
1574 south of Cape Mendocino is dominated by upwelling from southerly winds pushing water  
1575 offshore through Ekman transport, whereas northward winds north of Cape Mendocino result  
1576 in downwelling. Summer upwelling is dominant along the entire West Coast of the US from  
1577 the northerly winds pushing the surface waters offshore via Ekman transport. South of  
1578 Cape Mendocino upwelling conditions persist all year, with the northerly winds strongest  
1579 from April-June. North of Cape Mendocino a low pressure system in the Gulf of Alaska  
1580 produces westerly and southwesterly winds that blow surface waters towards shore and result  
1581 in downwelling.

1582 In addition to the oceanic conditions in the California Current, there is also a prominent  
1583 submarine ridge off the coast of Cape Mendocino. The Mendocino Escarpment, a submarine

ridge extending past the 200 nm EEZ boundary, is a dominant physical feature in the California Current (Fisk et al. 1993). Currents from the north and south converge around the Mendocino Escarpment creating an area of offshore transport, which may create a physical barrier to larval dispersal (Magnell et al. 1990, Cope 2004, Sivasundar and Palumbi 2010).

Gottsch (2014) completed a comprehensive review of the zoogeography literature worldwide and identified both Cape Mendocino and Point Conception as phylogeographic breakpoints on the West Coast. Specifically, coastal Oregon does not experience the intense upwelling and offshore transport as off the California coast south of Cape Mendocino, which allows increased larval retention in nearshore waters in Oregon (Gottsch 2014). Drake (2013) used simulation modelling to evaluate dispersal of spring spawning nearshore invertebrates and found that larval dispersal ranged from 175 km to 200 km from the release site (Bodega Bay, CA) when larvae remained below the surface boundary layer, allowing larvae to avoid offshore drifts. Larval retention in nearshore waters in California may be driven by the timing of relaxed upwelling and the ability of larvae to remain below the surface boundary layer (Sivasundar and Palumbi 2010, Drake and Edwards 2013). In simulations, larval dispersal ranged from 175 km to 200 km from the release site (Bodega Bay, CA) when larvae remained below the surface boundary layer, which allows larvae to avoid offshore advection (Drake and Edwards 2013). The majority of drifters released off the coast of Oregon (Newport and Coos Bay) from 1994-1999 remained north of Cape Mendocino within the first 40 days of deployment and none returned to coastal waters south of Point Arena, CA (Sotka et al. 2004). Trajectories of comparative drifters released in off the coast of Santa Barbara, CA never overlapped with the drifters released in Oregon.

Cape Blanco and Cape Mendocino have both been shown as transition zones to juvenile and adult fishes. Field and Ralston (2005) utilized landings and age data to elucidate year-class strength among a number of rockfish species along the West Coast. Spatial patterns in recruitment were heightened in vicinity Cape Mendocino and Cape Blanco versus comparison between regions further from these capes. Characterization of species assemblages in two of the trawl surveys conducted by the NMFS have also shown shifts around Cape Mendocino. Tolimieri (2006) found a shift in the species assemblage captured in the NMFS slope trawl survey near both Point Conception Cape Mendocino, CA and Cape Blanco, OR. The AFSC triennial shelf trawl surveys indicate a change in distribution around the Mendocino Escarpment; with the Mendocino Escarpment acting as a physical barrier to some species, e.g., blackgill rockfish, Pacific ocean perch, chilipepper, shortbelly rockfish, bocaccio, and greenspotted rockfish (Williams and Ralston 2002).

In addition to analyzing fisheries catch and survey trawl data, results from recent genetic studies of rockfish along the West Coast vary from finding genetic divergence along the coast to finding little evidence of genetic divergence along the coast. Genetic studies of blue rockfish, a nearshore midwater species with schooling tendency, show the species to have a genetic break around Cape Mendocino, CA (Cope 2004, Burford and Bernardi 2008). A study by Sivasundar and Palumbi (2010) confirmed a genetic differentiation of blue rockfish between Oregon and Monterey, CA, with yellowtail rockfish exhibiting the same strong genetic differ-

1625 entiation. While Sivasundar and Palumbi (2010) did not specifically look at China rockfish,  
1626 the *Pteropodus* subgenus was represented by copper, gopher and brown rockfishes, all three  
1627 of which exhibited only moderate genetic differentiation along the coast. Additional genetic  
1628 studies of copper, grass and brown rockfishes indicate limited larval dispersal and increasing  
1629 genetic divergence with increasing geographic distance [Buonaccorsi (2002); Buonaccorsi et  
1630 al. (2004); Buonaccorsi unpubl. data]. Much additional work is needed to fully understand  
1631 the genetic differentiation of rockfish species along the west coast. However, these studies  
1632 support the hypotheses that oceanographic and physical barriers are likely to limit larval  
1633 dispersal along the coast.

1634 California has managed the area from Cape Mendocino to the Oregon/Washington border  
1635 as its own management area since 2000 (see Appendices G and H for details). The Pacific  
1636 Fishery Management Council developed a Pacific Coast Fishery Ecosystem Plan in which  
1637 the California Current Large Marine Ecosystem and recognizes the transitional zone between  
1638 Cape Blanco, OR and Cape Mendocino, CA (Francis et al. 2009, Pacific Fishery Management  
1639 Council 2013).

1640 The 2013 stock assessment of China rockfish consisted of two, independent models, north  
1641 and south of 40°10' N. latitude. Following the STAR panel, a request was made to stratify  
1642 the assessment north and south of 42° N. latitude (the CA-OR border), based on concerns  
1643 over spatial differences in exploitation history and insufficient trend data between 40°10' N.  
1644 latitude and 42° N. latitude ([Agenda Item F.5.b Supplemental GMT Report](#), June 2013). In  
1645 November 2013, after examining results from both area stratifications, the SSC concluded  
1646 that there was no evidence in support of either stratification, and recommended that the  
1647 Council retain the model stratified around the existing management boundary ([Agenda Item  
1648 H.5.b Supplemental SSC Report](#), November 2013).

1649 The 2013 China rockfish assessment was a data-moderate assessment and therefore did not  
1650 consider size and age composition data as part of the analysis. For this assessment, the  
1651 STAT made efforts to examine all available data sources that might provide evidence of  
1652 spatial stock structure. Data sets with sufficient sample sizes and spatial coverage included  
1653 length frequency and length at age data.

1654 The largest source of length composition data came from the recreational fleets in each state.  
1655 In California, the California Recreational Fisheries Survey (CRFS) has collected length data  
1656 by CRFS district since 2004. Distributions of length for sampled (retained) catch varied  
1657 by district, with mean length smallest in the southernmost district with adequate samples  
1658 (CRFS District 3), and largest in the northernmost district, CRFS District 6, roughly the  
1659 area between Cape Mendocino and the California-Oregon border (Figure 55). There is some  
1660 indication of a gradient in average length of retained fish, but the largest increase in mean  
1661 length between adjacent CRFS Districts occurs between CRFS Districts 5 & 6 (roughly  
1662 across Cape Mendocino).

1663 Since length compositions of retained fish are affected by numerous processes (e.g., growth,  
1664 recruitment, exploitation, selectivity), the STAT also compared growth curves fit to size at  
1665 age data. External fits indicated differences in growth among regions, and these patterns

1666 were consistent with growth curves estimated within the assessment models (see base model  
1667 results for details).

1668 **2.2.3 2013 Data Moderate Recommendations**

1669 **Recommendation 1:** Continued research on the uncertainty in the catch histories  
1670 of all groundfishes. Reconstructions of historical catches are still needed  
1671 for certain areas, time periods, and fisheries. Currently, reconstructed  
1672 catches are available for California's commercial and recreational fisheries  
1673 extending back to 1916 and 1928, respectively (Ralston et al. 2010).  
1674 Oregon has completed a reconstruction for its commercial catch since 1876  
1675 (V. Gertseva, NMFS; pers. comm.), but recreational catch prior to 1980  
1676 is assumed to be zero in this analysis. Recreational catch in Washington  
1677 was reconstructed to 1975 for these assessments, and interpolated back to  
1678 1960. A thorough reconstruction of historical commercial catches (prior  
1679 to 1981) is urgently needed for Washington. Estimates of uncertainty in  
1680 historical catch reconstructions are needed for all states.

1681  
1682 2015 STAT response: Oregon completed a reconstruction of the recreational catches  
1683 back to 1973. There is currently no reconstruction of the commercial catches in Wash-  
1684 ington, and no estimates of uncertainty are available for any catch reconstruction.

1685 **Recommendation 2:** Single-species stock assessment models are still unable to  
1686 address systematic changes in productivity due to external factors such  
1687 as inter-species relationships and low-frequency aspects of climate change.  
1688 Relatively simple data-moderate models may provide tractable linkages to  
1689 ecosystem models, and are relatively easy to modify to reflect ecosystem  
1690 forces.

1691  
1692 2015 STAT response: No additional ecosystem or environmental data were included in  
1693 the 2015 China rockfish assessment.

1694 **Recommendation 3:** Exploration of trans-boundary assessments with Canada  
1695 should be initiated, and would benefit all parties. This also requires  
1696 development of data inputs including historical catch reconstructions. Due  
1697 to their transparency, data-moderate assessments may play an especially  
1698 useful role in promoting trans-boundary fishery science.

1699  
1700 2015 STAT response: Canada has not conducted a stock assessment for China rockfish.

1701 **Recommendation 4:** The data-moderate assessments assume known catches,  
1702 but there is considerable uncertainty in historical catch reconstructions,

1703 particularly for the recreational fishery. This uncertainty has not been  
1704 measured, and tools for incorporating this uncertainty in assessments are  
1705 not well developed. This is an issue for all assessments.

1706  
1707 2015 STAT response: See response to the first recommendation.

1708 **Recommendation 5:** There are fundamental differences between XDB-SRA and  
1709 exSSS in how stock productivity is modeled. For exSSS, FMSY increases  
1710 as the ratio of BMSY/B0 decreases in a deterministic way, while there  
1711 is no prior relationship between FMSY and the ratio of BMSY/B0 for  
1712 XDB-SRA. It is unclear which of these assumptions is most appropriate.  
1713 This is a broader issue than for just data-moderate assessments, since  
1714 it questions the appropriateness of two-parameter curves such as Bever-  
1715 ton-Holt to model the stock recruit relationship. Research to improve  
1716 understanding of the relationship between the inputs of the XDB-SRA and  
1717 exSSS productivity parameters is encouraged.

1718  
1719 2015 STAT response: The 2015 China rockfish assessment assumes a Beverton-Holt  
1720 stock-recruit relationship, with a fixed value for steepness in all three models. The  
1721 STAT agrees with the recommendation, and considers this a priority for “off-year”  
1722 research.

1723 **Recommendation 6:** Different priors (uniform of q / uniform on log-q) for the  
1724 additional variance term were used in the two assessment models. It is  
1725 unclear which performs best, and, since this term affects the weights given  
1726 to each index in the model fitting, the form of the prior will influence  
1727 model results, particularly when the indices are in conflict.

1728  
1729 2015 STAT response: Additional variance parameters were estimated for all indices in  
1730 the China rockfish models, but no explicit prior was used in Stock Synthesis, apart  
1731 from specifying parameter bounds.

1732 **Recommendation 7:** Compare the standardized (onboard observer) indices from  
1733 the proposed method with indices constructed by applying the Stephens--  
1734 MacCall approach to the data aggregated by trip.

1735  
1736 2015 STAT response: Time constraints have not allowed for this analysis and it is a  
1737 priority research topic for the next off-cycle year.

1738 **Recommendation 8:** The GMT representative also recommended expanding  
1739 the analysis of CPUE data to additional sectors of the recreational fishery,  
1740 such as private and rental boats. CPUE indices from these sectors may be

1741 useful in future assessments of nearshore stocks.

1742

1743 2015 STAT response: Time constraints did not allow a private-mode index for the  
1744 California recreational dockside survey. Oregon and Washington both provided data  
1745 for the private/rental and party/charter recreational fleets from dockside surveys. A  
1746 private boat mode index was considered for Oregon, but rejected due to infrequent  
1747 catches of China. The WA recreational index included boat mode (charter and private)  
1748 as a categorical variable in the delta-GLM analysis.

1749

1750 **Recommendation 9:** The GMT representative noted that for certain nearshore  
1751 species there is potential utility in using post-2003 RecFIN dockside  
1752 data as well as onboard sampling data since depth restrictions have not  
1753 constrained access to the adult population.

1754

1755 2015 STAT response: The 2015 China rockfish assessment utilizes data through 2014  
1756 for the onboard observer programs in California and Oregon. The California post-  
1757 2003 dockside data were not used because a large percentage of the trips north of Pt.  
1758 Conception were also sampled by the onboard observer program.

1759 **Recommendation 10:** The Panel strongly emphasizes the value of conducting  
1760 a data workshop during which catches, indices, biology, and other data  
1761 inputs are reviewed.

1762

1763 2015 STAT response: The China STAT team participated in the Nearshore Stock  
1764 Assessment Workshop held March 31-April 2, 2015 in Portland, OR.

1765 **Recommendation 11:** The historical CPFV drift-specific data should be key-  
1766 punched, which should allow the algorithm for developing CPFV-based  
1767 data indices to be improved.

1768

1769 2015 STAT response: The SWFSC Fisheries Ecology Division key-punched and error-  
1770 checked the CDFW 1987-1998 onboard observer survey data. These data were included  
1771 in an onboard index.

1772 **Recommendation 12:** Recommendation: Habitat maps should be developed so  
1773 that structural rather than true zeros are designated using data which are  
1774 independent from the data used to determine the indices.

1775

1776 2015 STAT response: Habitat maps and 'reefs' were defined by the SWFSC using the  
1777 California Seafloor Mapping Project and the Oregon State waters Mapping Program  
1778 mapping products. These habitat maps were used to select data for the onboard  
1779 observer indices in both California and Oregon.

1780 **2.3 Response to the 2015 STAR Panel Requests**

1781 **Request No. 1: Explore the utility of using California Recreational Fisheries**  
1782 **Survey (CRFS) data from 2004-2007 to partition California catches in the**  
1783 **early years based on the proportion of catch in the private recreational and**  
1784 **charter modes north and south of 40°10' N latitude (concerns the southern**  
1785 **and central models).**

1786

1787 **Rationale:** This may be a better alternative to the current approach of using logbook  
1788 data to partition the recreational catches north and south of 40°10' N latitude.

1789 **STAT Response:** This request was not completed, and was repeated as request no.  
1790 13.

1791 **Request No. 2: Add the current assessment biomass trends for current base**  
1792 **model to the plot in the draft assessment that compares the XDB-SRA**  
1793 **and SS3 runs and plot an additional set of runs for all models where**  
1794 **steepness and natural mortality are estimated with priors (add results**  
1795 **from the northern and central models). This would be two sets of plots**  
1796 **with spawning biomass and depletion (all models).**

1797

1798 **Rationale:** To provide a comparison between the previous assessment results using  
1799 XDB-SRA and the current assessment. XDB-SRA has more flexible productivity as-  
1800 sumptions than SS3, so estimating h and M was regarded as a way to more closely  
1801 mimic XDB-SRA using stock synthesis.

1802 **STAT Response:** The plots were provided (Figures 74 and 75). Since XDB-SRA  
1803 had knife-edge maturity at age 5, summary biomass for ages 5 and older was used  
1804 in the plot to provide a common basis for comparison. For the southern model, the  
1805 SS3 model with estimated h and M and XDB-SRA show similar results in absolute  
1806 summary biomass and depletion. For the north plus central models, it was not possible  
1807 to simultaneously estimate h and M, but again the results were similar.

1808 **Request No. 3: Compare the amount of available habitat for China rockfish in**  
1809 **the area covered by northern and central models with estimates of  $R_0$  for**  
1810 **the northern and central models.**

1811

1812 **Rationale:** Available habitat by region may provide an independent proxy for the  
1813 relative abundance of the stock in each region.

1814 **STAT Response:** Available rocky habitat was examined using two methods, and  
1815 ratios of habitat between areas showed an increase in habitat from the northern area,  
1816 to the central area, and to southern area with the most habitat. The Panel regarded this  
1817 as a useful exercise for ranking assessment areas, but it cannot be used for determining

relative abundance. There were a number of methodological issues that would need to be addressed to do this more rigorously, and ultimately its application to stock assessment would be indirect given the assumptions required. The Panel will consider making a research recommendation to examine the estimated area of reefs at more finely resolved scales.

**Request No. 4: Provide a model run where historical discards for the live-fish fishery are modeled as a separate fleet. For the discard fleet, estimate actual tonnage of catch: apply the discard fraction for the earliest four years to estimate discards back to 2000 with a ramp from 1990 to 2000 (selectivity for this fleet is determined from the discard length comps) (southern model only).**

**Rationale:** Fits to discard amount for the live-fish fishery by the model since 2000 are poor, and the model structure does not allow flexibility to decrease the discards prior to 2000.

**STAT Response:** This was done. Fits generally improved and the estimated selectivity pattern for the discard fleet appeared reasonable. The STAR Panel and the STAT agreed that the base model should incorporate this new approach.

**Request No. 5: Provide the proportion of trips removed using the Stephens--MacCall filter over time as a diagnostic for all area models.**

**Rationale:** To evaluate potential bias in the filtering procedure.

**STAT Response:** This was done for the northern area, and proportion of trips retained showed a temporal pattern of a slight increase followed by a decline in number of trips retained. The STAT asked that this request be considered a low priority for the other areas because it was not clear what the patterns in proportion of trips retained would indicate, and the northern area model was not sensitive to index treatment. The Panel agreed. Further investigation is needed and this will be added to the list of research recommendations. Examination of the characteristics of trips retained/removed using the Stephens-MacCall method should be a routine part of index standardization.

**Request No. 6: For the central model, provide a run where the northern California size composition data are added to the model, estimate two selectivity parameters (i.e., the simpler selectivity function), and estimate M to understand how this affects fits to the length composition data. Provide residual plots.**

**Rationale:** This may produce a selectivity pattern that has a more realistic peak (full selection of a reasonable portion of observed lengths).

1856           **STAT Response:** The selectivity pattern improved but estimates a very high M  
1857           (0.12) and produces an implausible estimate of biomass (>1000 times the base model).  
1858           The model is not supportable as a change to the base model.

1859       **Request No. 7: Exclude the Marine Recreational Fisheries Statistics Survey**  
1860       **(MRFSS) index in Oregon to define a new base case for the central model.**

1861  
1862  
1863           **Rationale:** It was learned that multiple intercept interviews were done for a single  
1864           trip, so the index was not constructed from trip level data, as was intended. This only  
1865           affects MRFSS index for Oregon.

1866           **STAT Response:** Excluding this index had a minor effect on model results. This  
1867           problem should be correctable so the STAR panel will list this as a research recommen-  
1868           dation.

1869       **Request No. 8: Add in the northern California length composition data to**  
1870       **central area model. The selectivity pattern for this fishery should mirror**  
1871       **the southern Oregon selectivity pattern. Retune the length composition**  
1872       **data.**

1873  
1874           **Rationale:** These data were inadvertently left out of the model.

1875           **STAT Response:** This was done. Adding these data had a minor effect on model  
1876           results.

1877       **Request No. 9: For the central area model, attempt to estimate the selectivity**  
1878       **patterns for each fishery and determine which of the selectivity patterns**  
1879       **provides plausible estimates. Take the mean of those estimates (peak**  
1880       **and/or spread parameters) and use the mean as a prior for the poorly**  
1881       **estimated selectivities. Consider using the mode of the observed length**  
1882       **distribution as a prior for the peak parameter.**

1883  
1884           **Rationale:** To provide a more objective means to reflect selectivity parameters for  
1885           those fleets where those parameters cannot be estimated.

1886           **STAT Response:** Alternative procedures resulted in models with small difference  
1887           to the base case depletion, though scale is dependent on the choice of peak value for  
1888           selectivity for parameters that were required to be fixed (highest estimated value that  
1889           didn't hit the bound of 45 cm). The Panel agreed that the original procedure used for  
1890           the base case was simple and more supportable from a methodological viewpoint.

1891       **Request No. 10: For the central area model, repeat Request No. 9 using a two**  
1892       **parameter ascending logistic curve for selectivity.**

1894     **Rationale:** To examine the effect on model results of using a different functional form  
1895     for asymptotic selectivity.

1896     **STAT Response:** Logistic curves did not improve model results, and all the same  
1897     issues remain.

1898     **Request No. 11: Turn on estimation of recruitment deviations for all models,  
1899       and iteratively increase  $\sigma_R$  from a low value until the residual pattern  
1900       stabilizes.**

1902     **Rationale:** To determine whether estimating recruitment deviations can be supported  
1903     by any of the models.

1904     **STAT Response:** All models estimated extremely large recruitments in the 1980s  
1905     and early 1990s that seem implausible and are not obvious in size composition data.  
1906     For the southern area model, the standard error of recruitment deviance is larger than  
1907      $\sigma_R$  for many early estimates, which is a nonsensical result. The likelihood components  
1908     show slightly worse fit to indices, an improved fit for age composition data, and the  
1909     most improvement for size composition data. This suggests that the estimated recruit-  
1910     ment deviations are being driven by relatively subtle signals in the length composition  
1911     data rather than improved ability to fit the trends in the indices. The Panel concluded  
1912     that there was insufficient information to estimate recruitment deviations for all mod-  
1913     els. Therefore no changes were made to the base model. One potential area of research  
1914     for data-moderate stocks would be evaluate the effect of assuming different levels au-  
1915     tocorrelation in the stock-recruit relationship. This might help curb the tendency to  
1916     estimate extreme recruitment with sparse datasets.

1917     **Request No. 12: For all models, explore alternative methods of reweighting the  
1918       conditional age-at-length data, but do not increase the weight on any data  
1919       set. Alternatives to evaluate are: the unmodified sample size (the method  
1920       used for the base case), and Francis weighting method A and B (report the  
1921       values of A and B).**

1923     **Rationale:** Methods for weighting conditional age-at-length data are a current active  
1924     area of research with no generally agreed procedures, so model sensitivity to each  
1925     method requires examination.

1926     **STAT Response:** For the southern area model the weights for both the Francis A and  
1927     B methods were above one, so no reweighting was applied. For both the central and  
1928     the northern area models, Francis method A for the most part strongly downweights  
1929     the conditional age-at-length data. The situation is most extreme for the northern  
1930     area model, where iterative application of Frances method A appeared to be leading  
1931     to a zero weight being given to conditional age-at-length data. Weighting is highly  
1932     influential on both absolute biomass and relative depletion.

1933 The Francis method A appears to produce unrealistically small weights for conditional  
1934 age-at-length data in some cases. Apparently Francis method A is the recommended  
1935 approach in preference to method B (C. Francis, pers. comm.), but the Panel was  
1936 unable to find clear rationale for this recommendation. The harmonic mean method  
1937 has a history of use and theoretical basis in the multinomial distribution, and generally  
1938 provides weightings that are intermediate to no weighting (unmodified initial otolith  
1939 counts) and the Frances method A. The Panel recommended that the harmonic mean  
1940 should be used for now as it provides a compromise between no weighting and Francis A,  
1941 while noting that a workshop with a focus on these methods later this year may result  
1942 in the general recommendation of one of the existing methods or a new procedure.

1943 **Request No. 13:** Explore the utility of using California Recreational Fisheries  
1944 Survey (CRFS) data from 2004-2007 to partition California catches in the  
1945 early years based on the proportion of catch in the private recreational  
1946 and charter modes north and south of 40°10' N latitude (this concerns the  
1947 southern and central models). This is a repeat of Request No. 1.

1948  
1949 **Rationale:** This may be a better alternative to the current approach of using logbook  
1950 data to partition the recreational catches north and south of 40°10' N latitude.

1951 **STAT Response:** This analysis was completed. South of 40°10' N latitude, the  
1952 difference in model results between using CRFS data and logbook for the apportioning  
1953 catches is small. North of 40°10' N latitude there is a greater difference, primarily a  
1954 change in initial stock size. The logbook method was based on data collected over  
1955 a long period of time, while the CRFS method is based only on recent data. The  
1956 logbook method better captures temporal changes in fishery, while CRFS method pro-  
1957 vides better information on relative catches between private and charter boats. In  
1958 Oregon, recreational fishing for nearshore rockfish began around 1970, and this should  
1959 be indicative of northern California. The STAR panel and STAT agreed that the log-  
1960 book method should be used because the reconstructed catches are more consistent  
1961 with what is known about the gradual development of the recreational fishery in north-  
1962 ern California. Nevertheless, the Panel flagged improved methods for reconstructing  
1963 recreational catches as a research recommendation.

1964 **Request No. 14:** A set of revised base models should be brought forward with  
1965 the following recommended changes:

- 1966
- 1967 • Use weight specific fecundity relationships from Dick (2009) for all  
1968 models.
  - 1969 • Update 2011 and 2012 data in the onboard observer CPUE index  
1970 (southern model).
  - 1971 • Change the years in the Abrams dataset to 2010-2011; remove obser-  
1972 vations N of 40°10' N latitude (southern model).

- Model discards as a separate fleet (southern model).
- Remove Oregon MRFSS index (central model).
- Add northern California length composition data (central model).
- Fix any selectivity parameters hitting upper bounds (central model).

**Rationale:** All of these changes have been identified and agreed to as changes that need to be made to the base models.

**STAT Response:** The changes were implemented to establish a new set of base models for China rockfish.

**Request No. 15: Tune all models using the harmonic mean method for the conditional age-at-length composition and marginal age composition data.**

**Rationale:** The Panel recommended that the harmonic mean method be used to re-weight the conditional age-at-length composition data, because it is a well-understood and frequently applied method that provided intermediate results compared to other alternatives.

**STAT Response:** This was done and considered appropriate as a new base model.

**Request No. 16: Estimate M in the revised base models for southern and northern models, and use the average of those estimates as a fixed value for all models.**

**Rationale:** The northern and southern area models (but not the central area model) provide some objective basis for the selection of an appropriate value for M.

**STAT Response:** Although the estimates of M for the northern and southern area models are reasonable, the estimate for the central area M (0.116) is difficult to support. The age composition data are noisy, but fits suggest that more young fish are observed than would be expected for lower values of M, outweighing the effect of older fish on the fits, which results in the preference towards a higher M in this model. There are a good number of observations of older fish that arguably are more important in terms of stock status that should be fitted by the model, and only the lower M values provide a reasonable fit to the oldest age observations. Values of M of 0.09 and above lead to unrealistically high biomass and minimal effect of fishing, results which appear to conflict with the habitat-based relative biomass among models. The median of the prior for M is 0.05 for this stock, and it is unclear why the data are so informative about the value of M. The northern and southern area models have more age data than the central area model, and the abundance indices show contrast, which is not apparent in the central area indices. Consequently the northern and southern area models may provide more supportable values for M. The Panel's proposed approach is to use the average of the estimated M values for the southern and northern area models (0.07) as a fixed value for all assessments.

2012   **Request No. 17:** Provide likelihood profiles for M in all revised base models;  
2013    consider providing a combined likelihood profile in one graphic for all  
2014    models.

2015

2016   **Rationale:** Since the estimated values for M may be used as fixed value in all assessments, the Panel would like the STAT to examine the likelihood profiles as a useful diagnostic.

2017

2018   **STAT Response:** Likelihood profiles for both the southern and northern area models appear quite reasonable, particularly the northern area model where both the index data and the age data support the estimated M value. It should be noted that since these models are not estimating recruitment deviations, they are highly constrained, and may provide misleadingly precise estimates compared to models with greater flexibility.

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2025   **Request No. 18:** Normalize all indices and provide time series plots in which groups of comparable indices are plotted together (southern and central models). Provide time series plots in which groups of comparable index residuals are plotted together.

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2030   **Rationale:** To assess the comparability of indices prior to incorporation in the assessment model.

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2032   **STAT Response:** This was done, see Figures 76 and 77. In the southern area model, overall trends are broadly consistent with the model biomass and show a decline to the late 1990s, followed by an increase. The model has the ability to scale the periods before and after 2000 due a lack of overlap of indices in this period. The observer CPFV index shows a sustained decline after 2005 that the model is unable to match, even when recruitment deviations are turned on. Because China rockfish is a very long-lived species, age-structured population dynamics precludes rapid changes in abundance when fishing is relatively stable, suggesting that there must be some other cause for this recent trend. Indices for the central area show similar pattern from 2000 to 2014 across three indices that are also difficult to account for with China rockfish population dynamics. The Panel discussed potential interactions with other species (e.g., black rockfish) due to hook competition, and regulatory changes as factors that could affect CPUE indices derived from a multi-species recreational fishery. Panel will add a research recommendation that these factors be investigated.

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2046   **Request No. 19:** Provide likelihood profiles on M for all base models, which now are using a fixed value of M of 0.07. Plot predicted spawning output on the M profile plots.

2047   **Rationale:** To evaluate whether the profiles for M for the base models for the northern and southern area are well determined as a justification using a single fixed value across

2052 all models, and to also demonstrate the inadequacy of the central model for estimating  
2053 M

2054 **STAT Response:** This was done. The new base models behaved as expected (except  
2055 for spawning output declining at very high M for southern area model).

2056 **Request No. 20:** Provide bracketing model runs varying M (high and low Ms  
2057 should be equidistant from the base M (high M = 0.09; base M = 0.07; low  
2058 M = 0.05 (set to the median of the prior)) for potential decision tables.  
2059 Assume projected ACL removals for a category 2 stock ( $P^* = 0.45, \dots = 0.72$ , 40-10 adj. as needed) applied to high and low M scenarios. Also  
2060 provide projected ACL removals under base case, and recent year catches  
2061 (if different than base case ACLs).  
2062

2063 **Rationale:** Development of a potential axis of uncertainty based on M.

2064 **STAT Response:** This was done.

2065 **Request No. 21:** Update the figures from Request No. 2 with the new base  
2066 models (show summary biomass).

2067 **Rationale:** To provide a comparison between the previous assessment results using  
2068 XDB-SRA and the current assessment.

2069 **STAT Response:** This was done (Figure 78). The current base models deviate more  
2070 strongly from the results using XDB-SRA than the pre-STAR models, but results  
2071 remain broadly consistent (i.e., biomass estimates differ by no more than a factor of  
2072 two).  
2073

2074 **Request No. 22:** Provide runs of for the central model treating all age com-  
2075 positions as marginal (fix growth parameters, and alternatively fix and  
2076 estimate M).

2077 **Rationale:** This may provide improved fits to composition data, and may also provide  
2078 further evidence that large values for M above 0.1 for the central model are implausible.

2079 **STAT Response:** Results were only very slightly different to the base model, so no  
2080 additional information was provided for the assessment.

2081 **Request No. 23:** Provide two runs from the base for the southern area model  
2082 that bracket uncertainty in steepness. Use values of 0.6 and 0.9 which  
2083 are close to the 12.5 and 87.5 percentiles from the Thorson prior. Pro-  
2084 vide projected biomass to compare with current bracketing models with M.

2085 **Rationale:** To determine whether uncertainty in M sufficiently captures uncertainty  
2086 for decision tables for the southern area model.

2090       **STAT Response:** This was done. The bracketing model runs for steepness and M  
2091       produced remarkably similar results, allowing the Panel to agree to use only M to  
2092       bracket uncertainty for management advice for the southern area model, and to do the  
2093       same for the northern and central area models.

2094       **Request No. 24:** The STAR panel requested a detailed justification be provided  
2095       for the decisions regarding stock structure assumed in the assessment(s)  
2096       (i.e., growth differences, size composition, fishery discard rates, evidence  
2097       of low larval drift, and management history and jurisdiction).

2099       **Rationale:** This information was not provided in detail in the draft assessment doc-  
2100       ument. This is just a bookkeeping request as the Panel had discussed with the STAT  
2101       the importance of providing supporting information on stock structure decisions, but  
2102       no formal request was forwarded to the STAT.

2103       **STAT Response:** This information will be included in the final assessment document.

## 2104       2.4 Model Description

### 2105       2.4.1 Transition from the 2013 to 2015 stock assessment

2106       The first formal assessment of China rockfish was conducted as a data moderate assessment  
2107       in 2013 (Cope et al. 2015). The results of the 2013 assessment were based on catch histories  
2108       and indices of abundance from onboard (OR and CA) and dockside (OR and CA) surveys of  
2109       the recreational fishing fleet. Below, we describe the most important changes made since the  
2110       last full assessment and explain rationale for each change. [Note: descriptions below apply  
2111       to the pre-STAR base model, and were not modified to reflect the final base model in order  
2112       to provide a record of events leading to selection of the final model]:

- 2113       1. Population dynamics model changed from a Bayesian surplus production model (XDB-  
2114       SRA) with two areas (U.S. waters north and south of 40°10' N. latitude) to a length-  
2115       based, age-structured statistical catch at age model (Stock Synthesis) with three areas  
2116       (U.S. waters south of 40°10' N. latitude, 40°10' N. latitude to the OR-WA border, and  
2117       from the OR-WA border to the U.S.-Canadian border). *Rationale:* The assessment  
2118       is moving from a data moderate to a full assessment, incorporating new data sources,  
2119       e.g. individual growth, age and length compositions of landed and discarded catch.
- 2120       2. New point estimate for annual natural mortality rate (0.053). *Rationale:* median of a  
2121       prior distribution derived from a method endorsed by the SSC (O. Hamel, NWFSC;  
2122       pers. comm.).

- 2123 3. Beverton-Holt stock-recruitment relationship with steepness fixed at 0.773. *Rationale*:  
2124 when estimated, steepness in the model approaches implausible values (near 1). Al-  
2125 though uncertainty in model results is greatly underestimated, steepness in each sub-  
2126 model was fixed at the mean of a prior distribution derived from a meta-analysis of  
2127 rockfish steepness parameters (J. Thorson, NWFSC; pers. comm.).
- 2128 4. Revised catch histories for California, Oregon, and Washington. *Rationale*: agency  
2129 representatives for each state either prepared (OR and WA) or reviewed (CA) revised  
2130 catch histories for the commercial and recreational fisheries.
- 2131 5. Updated indices of abundance through 2014. *Rationale*: following research recommen-  
2132 dations from the last assessment, current indices include revised recreational CPUE  
2133 based on spatially-referenced, onboard observer data combined with habitat data, as  
2134 well as catch and effort data by fishing-stop from the 1988-1999 CDFW onboard ob-  
2135 server program.
- 2136 6. Two new recreational dockside CPUE indices for northern Washington (1981-2014)  
2137 and Oregon (2004-2014). *Rationale*: previous assessment had no trend information  
2138 for Washington state, and did not include CPUE from the high-intensity dockside  
2139 sampling program in Oregon (ORBS).
- 2140 7. New commercial logbook CPUE index for the southern Oregon nearshore fishery (2004-  
2141 2013). *Rationale*: previous assessment contained no indices of abundance based on  
2142 commercial fisheries data. This (primarily live-fish) nearshore fishery has expanded  
2143 rapidly over the past two decades.
- 2144 8. Models include new age data representing all three states. *Rationale*: allows growth to  
2145 be estimated in each sub-model based on conditional-age-at-length composition data.
- 2146 9. Discards modeled explicitly with selectivity and retention curves in the southern area  
2147 model. *Rationale*: new length composition data for discarded catch permits explicit  
2148 modeling of retention and selectivity in the southern commercial live-fish fishery.
- 2149 Prior to the STAR Panel review meeting, age-structured production models (i.e., fit only  
2150 to indices of abundance) were developed in Stock Synthesis to mimic the XDB-SRA mod-  
2151 els from the 2013 stock assessment. Trends in stock status and overall scale were similar  
2152 among models for the northern substock (Figures 79 and 80), but the southern substock  
2153 was estimated to have a larger unfished biomass and similar current biomass (i.e. a more  
2154 depleted stock) when the data were fit in Stock Synthesis (Figures 81 and 82). The age-  
2155 structured model makes different assumptions from the last assessment about production  
2156 (Beverton-Holt stock-recruitment relationship, with steepness estimated at 0.88 and 0.89 in  
2157 the northern and southern models, respectively) and growth, which may explain the differ-  
2158 ences between the two population dynamics models. See Request #2 from the 2015 STAR  
2159 Panel for a comparison of final base model results to the 2013 assessment.

2160 **2.4.2 Definition of fleets and areas**

2161 We generated data sources for each of the models. Fleets include:

2162 **Northern Model**

2163 *Recreational*: All catch in the northern model is recreational. The recreational fleets include  
2164 separate landings from the party/charter and private./rental modes in MCAs 3-4 and com-  
2165 bined party/charter and private/rental modes for MCAs 1-2 (where catches and sample sizes  
2166 were lower).

2167 **Central Model**

2168 *Commercial*: The commercial fleets include five separate fleets, one each for the live and dead  
2169 commercial fishers in the following areas, California north of 40°10' N. latitude, southern Ore-  
2170 gon. Live and dead commercial fisheries were combined for northern Oregon as commercial  
2171 landings were low in this area.

2172 *Recreational*: The recreational fleets include six separate fleets, one each for the party/charter  
2173 and private/rental modes in the following areas, California north of 40°10' N. latitude, south-  
2174 ern Oregon, and northern Oregon.

2175 **Southern Model**

2176 *Commercial*: The commercial fleets include separate catches for the live and dead fish fish-  
2177 eries, as well as discards from the live-fish fishery.

2178 *Recreational*: The recreational fleets include landings from the party/charter and pri-  
2179 vate/rental modes. There are three indices of abundance: CDFW 1989-1999 CPFV onboard  
2180 observer, CDFW 2000-2014 CPFV onboard observer, MRFSS 1980-2003 CPFV dockside.

2181 *Research*: Length compositions from Jeff Abrams thesis (Abrams 2014) and the CCFRP  
2182 study.

2183 **2.4.3 Summary of data for fleets and areas**

2184 **2.4.4 Modeling software**

2185 The STAT team used Stock Synthesis 3 version 3.24u by Dr. Richard Methot at the NWFSC.  
2186 This most recent version (SS-V3.24u) was used, since it included improvements and correc-  
2187 tions to older versions.

2188 **2.4.5 Data weighting**

2189 Length composition sample sizes for all models were tuned by the “Francis method” (also  
2190 known as “TA1.8”) (Francis 2011), as implemented in the r4ss package. This approach  
2191 involves comparing the residuals in the model’s expected mean length with respect to the  
2192 observed mean length and associated uncertainty derived from the composition vectors and

their associated input sample sizes. The sample sizes are then tuned so that the observed and expected variability are consistent. After adjustment to the sample sizes, models were not re-tuned as long as the bootstrap uncertainty value around the tuning factor overlapped 1.0.

Age compositions and conditional-age-at-length (CAAL) compositions were re-weighted using the Ianelli-McAllister harmonic mean method (McAllister and Ianelli 1997). Two variations on the Francis method were also considered for the CAAL data, dependent on whether or not the vectors of age at length are considered independent within each year. Data weighting in general, and the Francis method are topics of ongoing research and there is no clear guidance on a preferred method. In the southern model, both approaches indicated that the fit was already better than expected with the input sample sizes left in place. For the central and northern models, Francis method A suggested that the CAAL sample sizes should be greatly reduced to achieve reasonable fit (effectively down weighting the CAAL data out of the northern model) while Francis method B suggested little tuning was needed.

#### 2.4.6 Priors

In the pre-STAR panel base models, the mean of the priors for Beverton-Holt steepness parameter (Dorn, M. and Thorson, J., pers. comm.) and natural mortality (Hamel 2015) were used as fixed values across the three models. The priors were applied in sensitivity analyses where these parameters were estimated.

The final base models also used the mean of the Beverton-Holt steepness prior, but fixed natural mortality at the mean of the estimated values from the northern and southern regions.

#### 2.4.7 General model specifications

Stock synthesis has a broad suite of structural options available. Where possible, the ‘default’ or most commonly used approaches are applied to this stock assessment. The assessment is sex-aggregated, including the estimation of growth curves and selectivity.

This stock assessment is divided into three independent areas, the south (California south of 40°10' N. latitude), the central (north of 40°10' N. latitude to the Oregon-Washington border), and the north (Washington state) based on latitudinal patterns in the length composition data and fits to size at age data. The time-series of landings begins during 1900, and captures the inception of the fishery, so the stock is assumed to be in equilibrium at the beginning of the modeled period.

The internal population dynamics model tracks ages 0-80, where age 80 is the ‘plus-group.’ As there is little growth occurring at age 80, the data use a plus group of age 50; there are relatively few observations in the age compositions that are greater than age 50.

All models used the posterior predictive fecundity relationship from Dick (2009).

2228 The following likelihood components are included: catch, indices, discards (south only),  
2229 discarded catch (south only), length compositions, age compositions, parameter priors, and  
2230 parameter soft bounds. See the SS technical documentation for details (Methot and Wetzel  
2231 2013).

2232 Model data, control, starter, and forecast files can be found in Appendices A-D.

#### 2233 **2.4.8 Estimated and fixed parameters**

2234 A full list of all estimated and fixed parameters is provided in Tables 36, 37, and 38. Time-  
2235 invariant, sex-aggregated growth is estimated for all modeled areas in this assessment. Re-  
2236 cruitment deviations are not estimated due to a lack of visible cohorts in either the length  
2237 or age data. In the pre-STAR models natural mortality was fixed at 0.053, the median  
2238 of the Hamel prior (Hamel 2015), and the stock-recruitment steepness is fixed at the SSC  
2239 approved steepness prior of 0.773. However, post-STAR models fix M at 0.07 for all models,  
2240 the average of the estimated M's from the northern and southern models (the central area  
2241 model was unable to estimate M). Asymptotic selectivity is generally used in the base case  
2242 models.

### 2243 **2.5 Model Selection and Evaluation**

#### 2244 **2.5.1 Key assumptions and structural choices**

2245 All structural choices for stock assessment models are likely to be important under some  
2246 circumstances. In this assessment these choices are generally made to 1) be as objective as  
2247 possible and 2) follow generally accepted methods of approaching similar models and data.  
2248 The relative effect on assessment results of each of these choices is often unknown; however  
2249 an effort is made to explore alternate choices through sensitivity analysis. Major choices in  
2250 the structuring of this stock assessment model include the independent north, central and  
2251 south area models that use disaggregated fleet structuring and mirrored selectivity for fleets  
2252 with little or no length and age composition data. All of these models fix the values for  
2253 natural mortality and stock-recruitment steepness as there is not enough information in the  
2254 data to reliably estimate these important productivity parameters. Recruitment is assumed  
2255 to be deterministic in all models, as the data do not contain sufficient information to resolve  
2256 the strength of individual year classes.

#### 2257 **2.5.2 Alternate models explored**

2258 Sensitivity analyses included a comparison of key model assumptions were based on nested  
2259 models and included asymptotic vs. domed selectivity, alternative values of M, and alter-  
2260 native fleet mirroring structure for estimating selectivity. For the area North of 40°10' N.  
2261 latitude, an alternative model in which both Central and North areas were included in a

2262 single, spatially-explicit model. However, differences in growth found between Oregon and  
2263 Washington supported independent models.

2264 **2.5.3 Convergence**

2265 Convergence testing through use of dispersed starting values often requires extreme values  
2266 to actually explore new areas of the multivariate likelihood surface. Jitter is a SS option  
2267 that generates random starting values from a normal distribution logistically transformed  
2268 into each parameter's range (Methot 2015). Table 39 shows the results of running 100 jitters  
2269 for each pre-STAR base model. The northern model, which has the least amount of data  
2270 and the fewest number of estimating parameters (8), returned to the same base case solution  
2271 every time. The central model, with 14 parameters had 6% of the starting values cause  
2272 errors in the likelihood but the remaining runs returned to the base model. The southern  
2273 model, which had the most estimated parameters (16), had some jitters converge to a local  
2274 minimum with worse likelihood, but the majority returned to the base model.

2275 **2.6 Base-Model(s) Results**

2276 Base models for all three areas (northern, central, and southern) are combined sex models,  
2277 based on lack of evidence for sexually dimorphic growth in the available size-at-age data as  
2278 well as in previous studies. Key productivity parameters are fixed at measures of central ten-  
2279 dency from prior distributions endorsed by the PFMC's SSC due to the models' inability to  
2280 estimate reasonable parameter values. Specifically, steepness of the assumed Beverton-Holt  
2281 stock-recruitment relationship was fixed at 0.773. In the final base models the instantaneous  
2282 rate of annual natural mortality was fixed at  $0.07\text{yr}^{-1}$ , the average between the estimated  
2283 natural mortality from the northern and southern models. Estimated parameters in each  
2284 model vary, and are described in the area-specific results sections, below.

2285 **Northern**

2286 The northern base-case model produces reasonable estimates of growth parameters, with  
2287 China rockfish in northern Washington reaching a maximum length of 35.4 cm (Table 36,  
2288 Figure 83). The northern base-case model was able to fit the northern Washington recre-  
2289 ational index of abundance with an estimated additional standard deviation of 0.13 (Table  
2290 36). However, there are runs of years in which the model consistently either over or under  
2291 fits the data (Figure 84). The model fit to the index estimates a declining trend in the fit  
2292 between the 1980s and 1990s, followed by a flat trend through recent years.

2293 Fits to the time aggregated southern Washington recreational length distributions are poor,  
2294 where data are sparse, with the model expecting more fish sized approximately 27 cm to 34  
2295 cm and fewer fish greater than 40 cm than are present in the data (Figure 85). However, fits  
2296 to the time aggregated northern Washington recreational length distributions, the area with  
2297 most of the data and landings, are good (Figures 85 and 86). The model fits the recreational

2298 conditional age-at-length data reasonably (Figures 87 and 88). There are a few outliers,  
2299 including two 15-year-old fish in the 22 cm bin in 2005 and one 14-year-old fish in the 20 cm  
2300 bin in 2010 but there are no strong patterns in the residuals.

2301 Estimated selectivity curves for the Washington recreational southern and northern fleets  
2302 suggest different ascending width parameters, resulting in the southern fleet selecting smaller  
2303 China rockfish than the northern fleet (Figure 89). The southern fleet asymptote was unable  
2304 to be estimated so it was fixed to the estimate from the northern fleet.

## 2305 Central

2306 The central base-case model produces reasonable estimates of growth parameters, with China  
2307 rockfish in the central area reaching a length of 37.44 cm at age 30 (Table 37, Figure 83). The  
2308 central base-case model fits to the indices of abundance are generally flat to slightly declining,  
2309 with many model fits showing runs of years in which the model consistently either over or  
2310 under fits the data (Figures 90, 91, 92). Each of the central model indices of abundance except  
2311 the Oregon southern commercial live fish fishery were fit estimating additional standard  
2312 deviations of 0.15, 0.50, and 0.08 for the Oregon commercial logbook index, the Oregon  
2313 onboard recreational index, and the Oregon ORBS index, respectively (Table 37).

2314 Fits to the central model length distributions are reasonable given the small samples sizes,  
2315 particularly during the early years, and the constraints applied to selectivity parameters  
2316 (Figures 93, and 94). The model fits the Oregon southern commercial fishery best, shifts the  
2317 peak of the fitted distribution to the left for the Oregon southern recreational private/rental,  
2318 Oregon southern recreational party/charter, and Oregon northern recreational private/rental  
2319 fleets, and under fits the peak of the time aggregated length distributions for the Oregon  
2320 southern commercial live fish and Oregon northern recreational party/charter fleets. The  
2321 model fits the conditional age-at-length data from the southern Oregon commercial dead-  
2322 fish fishery poorly with clusters in the residuals and fewer observations in the age-50+ bin  
2323 than expected by the model (Figure 95). The residual patterns are less notable in the fit to  
2324 conditional age-at-length data from the southern Oregon recreational party/charter (Figure  
2325 96). For both these datasets, the largest residuals are associated with young fish at large  
2326 sizes, including commercial catch of fish aged 10 years and younger in the 35-40cm range in  
2327 2002 through 2004 and a recreational observation in 2011 in the 44 cm length bin estimated  
2328 at 10 years old. In many years the model expects more fish in the plus group (age 50) than are  
2329 actually present in the data, but years where 50+ age fish were observed, this observations  
2330 is typically larger than the expectation. The fit to the marginal age compositions from the  
2331 northern Oregon recreational fishery are reasonable given the low sample sizes of this fleet  
2332 (which is the reason it was not represented as conditioned on length) although generally more  
2333 fish in the 5-10 year old range were observed than expected by the model (Figure 97).

2334 The central model does not explicitly model discards due to low discard rates and the limited  
2335 availability of discard data. However, a discard fraction of 2.69% of the annual commercial  
2336 landings has been added to the commercial landings to account for the total removals by the  
2337 commercial fisheries.

2338 Asymptotic selectivity curves are estimated for all fleets with length compositions (Figure  
2339 98). The exceptions included the northern Oregon commercial fishery which shared the se-  
2340 lectivity curve for the southern Oregon life-fish commercial fishery, and the northern Oregon  
2341 private/rental fleet that was assumed to share the selectivity with the party/charter fleet  
2342 in this same area. Many of the recreational has estimates of peak selectivity that hit the  
2343 upper bound of 45 cm, well above the estimated asymptotic size. These parameters were  
2344 all reduced to (fixed at) the highest peak selectivity parameter among the recreational fleets  
2345 that was not hitting a bound: 39.9 cm. The ascending width parameters showed small dif-  
2346 ferences among all fleets (Table 37). The commercial selectivity parameters generally had  
2347 peak values estimated at a lower point than the recreational selectivities.

## 2348 Southern

2349 The model for the area south of 40°10' N. latitude produces reasonable values of estimated  
2350 growth parameters in the base-case model, with China rockfish in the southern management  
2351 area reaching an asymptotic length (converted from Schnute parameterization) of 31.5 cm,  
2352 with von Bertalanffy growth coefficient,  $k = 0.144$ , and a coefficient of variation of 12%  
2353 for length at age 30 (Figure 83). The southern base-case model best fit the southern area  
2354 recreational dockside index of abundance with an estimated additional standard deviation  
2355 of 0.12, and the two recreational onboard indices (1988-1999 and 2000-2014) with additional  
2356 SDs of 0.15 and 0.18, respectively (Table 38). However, in all three indices there are runs  
2357 of positive or negative residuals. The model is able to capture a decline in catch rates from  
2358 the 1980s to the late 1990s / early 2000s in the dockside recreational CPUE index (Figure  
2359 99), but slightly underestimates a declining trend in the 1988-1999 onboard observer index  
2360 (Figure 100). The model is consistent with an observed increasing trend from 2000-2012 in  
2361 the more recent onboard observer index, but was not able to capture a recent drop in catch  
2362 rates in recent years (Figure 101).

2363 Fits to the time-aggregated southern recreational private and charter boat length distribu-  
2364 tions, the fleets with most of the data and landings, are most consistent with the observed  
2365 data (Figure 102). Length data from the commercial fisheries (live-fish fishery and fish  
2366 landed dead) are fit reasonably well by the model (Figure 102).

2367 Fits to the length compositions from the central California onboard observer and CCFRP  
2368 surveys (fleets observing whole, retained plus discarded, catch) are good for the onboard  
2369 observer data (which mirrors the selectivity of the recreational charter boat fishery), but the  
2370 model a larger variance and smaller mode in time-aggregated lengths relative to the data  
2371 from the CCFRP survey (Figure 103).

2372 The model fits the conditional age-at-length data from Jeff Abrams' thesis (Abrams 2014)  
2373 reasonably well (Figure 104), particularly for years with larger sample sizes.

2374 Length-based selectivity parameters estimated in the southern base model include, for each  
2375 fleet, the size at 100% vulnerability ('peak' parameter), and the 'width' of the ascending  
2376 limb of the selectivity curve (a cumulative normal distribution). Peak values ranged from  
2377 27.6 cm (commercial discards) to 35.5 cm (commercial live-fish fishery). The recreational

2378 catches represent both retained and discarded fish, the composition data in the base model  
2379 represents only retained fish. Recreational length composition data for discarded fish are  
2380 available from the onboard charter boat observer programs, and could potentially be used to  
2381 model retention and selectivity separately. The STAT was not able to attempt this analysis  
2382 for the southern model due to time constraints (see research recommendations).

2383 Discards in the pre-STAR base model were estimated in the southern area model for the  
2384 commercial live-fish fishery. This model did not fit the length composition data for the  
2385 commercial live-fish fishery well, and did not capture the increasing trend in the proportion  
2386 of discarded catch south of Cape Mendocino. During the STAR panel, the STAT adopted a  
2387 recommendation made by the panel to treat discarded commercial catch as a separate “fleet”  
2388 in Stock Synthesis, which greatly improved the fits to the discard length composition data  
2389 and greatly improved the fits to the length composition of retained catch in the commercial  
2390 live-fish fishery.

## 2391 2.7 Uncertainty and Sensitivity Analyses

2392 The base-case assessment model includes parameter uncertainty from a variety of sources,  
2393 but underestimates the considerable uncertainty in recent trend and current stock status. For  
2394 this reason, in addition to asymptotic confidence intervals (based upon the model’s analytical  
2395 estimate of the variance near the converged solution), two alternate states of nature (low  
2396 and high values of M) are presented in a decision table. Much additional exploration of  
2397 uncertainty was performed prior the STAR panel. Some of that exploration of other sources  
2398 of uncertainty is provided below. Specifically, for each pre-STAR area model, the following  
2399 sensitivity runs were performed:

- 2400 1. “Drop-one” analyses: remove single data types from the model – indices, discards,  
2401 length compositions (down-weighted by scaling Francis weights by factor of 0.25), and  
2402 age compositions.
- 2403 2. Alternative data-weighting criterion. The base model length compositions are tuned  
2404 based on the Francis method (Francis2011), as implemented in the r4ss package. An  
2405 alternative method based on the harmonic mean effective sample size (McAllister and  
2406 Ianelli 1997).
- 2407 3. Free up size at age 0 (1 run) and CV at A\_min (1 run)
- 2408 4. Fix growth at external estimate (1 run)

## 2409 Northern Model

2410 Tabular results for the northern area pre-STAR model sensitivity runs can be viewed here:  
2411 [40](#), and associated figures are here: Figures [105](#) and [106](#). The model for the northern management  
2412 area was not sensitive to dropping the index of abundance, data weighting methods,

2413 downweighting length comps (75% reduction in Francis weights, i.e. weights multiplied by  
2414 0.25). The pre-STAR models that attempted to estimate the size at age 0 and CV at Age  
2415 minimum growth parameters resulted parameters going to bounds, producing unrealistic  
2416 estimates for these parameter values. The pre-STAR model was highly sensitive to the  
2417 exclusion of age the com- position data and fixing growth the the externally estimated values.  
2418 Lack of age data and fixing growth to the external estimates produced an approximate  
2419 doubling in the estimates of the stock size and in the status of the population. Removal of  
2420 the age composition data, modeled as conditional age-at-length, impacts the scale of the pre-  
2421 STAR model, in part because the pre-STAR model is no longer able to estimate reasonable  
2422 values of growth parameters. Fixing growth to the externally estimated values is problematic  
2423 because the data lack small/young fish, resulting in high sensitivity to the k estimate.

2424 When estimated with their respective prior distributions, both steepness and natural mor-  
2425 tality are larger than the fixed values in the pre-STAR base model ( $h = 0.95$ , and  $M = 0.07$ ).  
2426 However, the higher estimate of  $M$  contradicts the observed maximum age of 83 and the  
2427 higher  $h$  estimate is inconsistent with the current understanding of rockfish productivity.

2428 Additional sensitivities conducted during the STAR panel are described in the section “Re-  
2429 sponse to the 2015 STAR Panel Requests.”

### 2430 Central Model

2431 Tabular results for the central area pre-STAR model sensitivity runs can be viewed here:  
2432 Table 41, and associated figures are here: Figures 107 and 108. The pre-STAR model for the  
2433 central management area was not sensitive to dropping the index of abundance, data weight-  
2434 ing methods, downweighting length comps (75% reduction in Francis weights, i.e. weights  
2435 multiplied by 0.25). The pre-STAR models that attempted to estimate the size at age 0 and  
2436 CV at Age minimum growth parameters resulted parameters going to bounds, producing  
2437 unrealistic estimates for these parameter values. The pre-STAR model was highly sensitive  
2438 to the exclusion of age the composition data and fixing growth the externally estimated  
2439 values. Lack of age data resulted in an inability to estimate  $R_0$ , leading to unrealistic model  
2440 results. Fixing growth to the external estimates produced an approximate doubling in the  
2441 estimates of the stock size and in the status of the population. Fixing growth to the exten-  
2442 nally estimated values is problematic because the data lack small/young fish, resulting in  
2443 high sensitivity to the k estimate.

2444 The central pre-STAR base model is unable to estimate  $M$  but when  $h$  is estimated it goes  
2445 to a value of 0.75, very close to the fixed value from the pre-STAR base model of 0.773,  
2446 indicating that the data do not contain much information about stock productivity.

2447 Additional sensitivities conducted during the STAR panel are described in the section “Re-  
2448 sponse to the 2015 STAR Panel Requests.”

### 2449 Southern Model

2450 The pre-STAR base model for the southern management area was not very sensitive to drop-  
2451 ping indices or discard data, or to downweighting length comps (75% reduction in Francis

2452 weights, i.e. weights multiplied by 0.25). However, exclusion of age composition data significantly altered estimates of the scale and status of the population (Table 42; Figures 109 and  
2453 110). Removal of marginal age composition data and conditional age-at-length data had a  
2454 dramatic effect on model results, in part because the model is no longer able to estimate  
2455 credible values of growth parameters (e.g. von Bertalanffy  $k = 0.027$ ; Figure 111).

2457 Weighting of data types (e.g. composition data vs. indices) in the pre-STAR base models was  
2458 based on the method of Francis (2011), as implemented in the r4ss package. An alternative  
2459 method based on the harmonic mean effective sample size (McAllister and Ianelli 1997) was  
2460 applied, and results were consistent with the Francis method (Figures 112 and 113).

2461 The pre-STAR base model fixes length at age zero at 2 cm, with a CV of 0.1. Separate  
2462 attempts to estimate these parameters in the model failed, with both going to unrealistic  
2463 boundaries, i.e. size at age 0 years of 10 cm, and a CV of 0.01 (results not shown). If growth  
2464 is estimated external to the model and fixed at those estimates, fits to the model degrade  
2465 (increased negative log likelihoods) and the stock is more depleted, with biomass in 2015 at  
2466 23% of unfished biomass, below the minimum stock size threshold (Figures 114, 115, and  
2467 116).

2468 The southern pre-STAR base model fixed parameters that determine stock productivity  
2469 (steepness and natural mortality) at point estimates derived from prior distributions (see  
2470 prior distributions section for details). When estimated with their respective prior distri-  
2471 butions, both steepness and natural mortality are larger than the fixed values in the base  
2472 model ( $h = 0.92$ , and  $M = 0.1$ ). As noted in the profile likelihood analyses, the length and  
2473 age composition data appear to support higher M values, but this contradicts the observed  
2474 maximum age of 83. The data appear to have little information about steepness, and the  
2475 estimated value is near the mode of the prior distribution (Figure 117). Higher values of  
2476 steepness and natural mortality result in a smaller, less-depleted stock (Figures 118 and 119).  
2477 The estimated growth curve also changes, with a lower value of  $k$  and higher asymptotic size  
2478 (Figure 120).

2479 Additional sensitivities conducted during the STAR panel are described in the section “Re-  
2480 sponse to the 2015 STAR Panel Requests.”

### 2481 2.7.1 Retrospective analysis

2482 Retrospective analyses were conducted for each pre-STAR base model by conducting model  
2483 runs that sequentially remove the last year of data over the last 5 base model years. The  
2484 southern model showed very little change in estimated spawning biomass trajectory as a  
2485 result of this data removal (Figure 121). The central and northern models, however, showed  
2486 that the each additional year of data added to the model has resulted in a higher initial  
2487 spawning biomass (Figures 122 and 123). These results are consistent with the dependence  
2488 of the central and northern models on more recently collected data as compared to the  
2489 southern model where the catch history began earlier.

2490 **2.7.2 Likelihood profiles**

2491 **Pre-STAR base model likelihood profiles**

2492 Likelihood profiles for equilibrium recruitment ( $R_0$ ), natural mortality ( $M$ ), and steepness  
2493 ( $h$ ), were completed to investigate the uncertainty in these parameters and their influence  
2494 on the fit to different data sources. For all models, the age data had the largest influence  
2495 on the scale of the population as indicated by the data type most influenced by  $R_0$  (Figures  
2496 124, 125, and 126). In the southern model, the length and index data also had the best fit at  
2497 a similar scale, showing consistency in these data sources about the population size. In the  
2498 central model, lower  $R_0$  values caused the model to fit the length data less well but higher  
2499 values had little influence. The index data was most influential on the  $R_0$  estimates in the  
2500 northern model, where they were best fit with a higher equilibrium recruitment.

2501 Profiles over natural mortality showed length and age data best fit by high  $M$  values (greater  
2502 than 0.10) in the central and south models (Figures 127 and 128), while the value among  
2503 those in the profile with best likelihood in the northern model was  $M = 0.08$  (Figure 129).  
2504 As in the profile over  $R_0$ , the index data in the northern model showed a larger influence on  
2505  $M$  than the index data in the central and southern models.

2506 Likelihood profiles were conducted over four values for the steepness of the stock-recruit  
2507 curve ( $h = 0.3, 0.6, 0.773$ , and  $0.9$ ), where  $0.773$  is the mean of the prior distribution and  
2508 chosen as a fixed value in the three base models. These profiles indicated that for the  
2509 southern and northern models (Figures 130 and 131), length and age data were best fit by  
2510 high steepness values, with the index in the northern model also showing a better fit at  
2511 higher steepness. The central model, however, showed the best combined fit to all data  
2512 sources at an intermediate value of steepness, with an MLE estimate when the parameter  
2513 was estimated of  $h = 0.753$ , which is close to the prior mean (Figure 132). This estimate  
2514 represents a balance between the age data and steepness prior, which were best fit at higher  
2515 steepness values, and the length data, which was best fit at lower steepness values. The index  
2516 data in the central model showed less change in likelihood as a result of the steepness profile  
2517 than the other data types, but it was the only type that was best fit at an intermediate  
2518 value,  $h = 0.6$ .

2519 **Final base model likelihood profiles**

2520 Likelihood profiles over natural mortality were conducted for all of the final base models,  
2521 and sensitivities to those models (Figures 133, 134, and 135). The northern model had the  
2522 best combined fit at the estimated value of natural mortality. The southern model showed a  
2523 good fit to the estimated value of natural mortality for the index data and the priors. The  
2524 length data in the souther model indicated a better fit at a lower value of natural mortality  
2525 whereas the age data indicated the best fit towards the upper bound of the profile,  $M=0.12$ .  
2526 The central model was not able to estimate a reasonable value for natural mortality, with all  
2527 data sources indicating the best fit to the data towards the upper bound of natural mortality  
2528 in the profile.

## 2529 3 Reference Points

### 2530 Northern Model

2531 This stock assessment estimates that China rockfish in the north are well above the biomass  
2532 target. The spawning biomass of the stock declined between the 1960s and 1990s but has  
2533 largely been stable during the past few decades (Table 43; Figure 136). The estimated relative  
2534 depletion level in 2015 is 73.4% (~95% asymptotic interval:  $\pm 63.6\% - 83.2\%$ ), corresponding  
2535 to an unfished spawning output of 17.9 billion eggs (~95% asymptotic interval: 8.8 – 27.1  
2536 billion eggs) of spawning output in the base model (Table b; Figure 137). Unfished spawning  
2537 output was estimated to be 24.4 billion eggs in the base case model. The target spawning  
2538 output based on the biomass target ( $SB_{40\%}$ ) is 9.8 billion eggs, which gives a catch of 6.2  
2539 mt. Equilibrium yield at the proxy  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 5.8 mt.  
2540 Table k shows the full suite of estimated reference points for the northern area model and  
2541 Figure 138 shows the equilibrium yield curve.

### 2542 Central Model

2543 This stock assessment estimates that central area China rockfish are just above the biomass  
2544 target (Table 44; Figure 139). The rate of spawning output decline is estimated to be  
2545 steepest during the 1980s to 1990s and has continued to decline since the 1990s at a slower  
2546 rate (Figure 140). The estimated relative depletion level in 2015 is 61.5% (~95% asymptotic  
2547 interval:  $\pm 53.8\% - 69.2\%$ ), corresponding to an unfished spawning output of 65.1 billion eggs  
2548 (~95% asymptotic interval: 51.8 – 78.4 billion eggs) of spawning output in the base model  
2549 (Table c). Unfished age 5+ biomass was estimated to be 591.5 mt in the base case model.  
2550 The target spawning output based on the biomass target ( $SB_{40\%}$ ) is 26 billion eggs, which  
2551 gives a catch of 15.7 mt. Equilibrium yield at the proxy  $F_{MSY}$  harvest rate corresponding to  
2552  $SPR_{50\%}$  is 14.5 mt. Table l shows the full suite of estimated reference points for the central  
2553 area model and Figure 141 shows the equilibrium yield curve.

### 2554 Southern Model

2555 This stock assessment estimates that China rockfish south of  $40^{\circ}10' N.$  latitude are below the  
2556 biomass target, but above the minimum stock size threshold, and have been increasing over  
2557 the last 15 years (Table 45; Figure 142). The estimated relative depletion level in 2015 is  
2558 27.9% (~95% asymptotic interval:  $\pm 21.2\% - 34.7\%$ ), corresponding to an unfished spawning  
2559 output of 66.5 billion eggs (~95% asymptotic interval: 49.6 - 83.4 billion eggs) of spawning  
2560 output in the base model (Table d). Unfished age 5+ biomass was estimated to be 768.6  
2561 mt in the base case model (Figure 143). The target spawning output based on the biomass  
2562 target ( $SB_{40\%}$ ) is 26.6 billion eggs, which gives a catch of 21.1 mt. Equilibrium yield at  
2563 the proxy  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 19.5 mt. Table m shows the full  
2564 suite of estimated reference points for the southern area model and Figure 144 shows the  
2565 equilibrium yield curve.

## 2566 4 Harvest Projections and Decision Tables

2567 The forecasts of stock abundance and yield were developed using the final base models. The  
2568 total catches in 2015 and 2016 are set to the PFMC adopted China rockfish contribution  
2569 ACLs in the northern and central models (Table n). The southern model total catches in  
2570 2015 and 2016 are set to the average annual catch from 2012-2014. The exploitation rate for  
2571 2017 and beyond is based upon an SPR harvest rate of 50%, adjusted by the default 40-10  
2572 harvest control rule. The average of 2010-2014 catch by fleet was used to distribute catches  
2573 in forecasted years.

2574 **Northern Model** Current medium-term projections of expected China spawning biomass  
2575 from the northern base model suggests slight declines from the current levels as the stock  
2576 moves towards the current target stock size under the default harvest control rule (Table 46,  
2577 Figures 145 and 146). The stock is expected to remain above the target stock size during  
2578 the projection period, assuming stationarity in the stock-recruitment assumptions.

2579 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
2580 panel and are based on a low value of M, 0.05, and a high value, 0.09. Current medium-term  
2581 forecasts based on the alternative states of nature project that the stock, under the current  
2582 control rule as applied to the base model, will decline towards the target stock size Table  
2583 p. The current control rule under the low state of nature results in a stock decline into  
2584 the precautionary zone, while the high state of nature maintains the stock at near unfished  
2585 levels. Removing the catches resulting from the low M state of nature, assuming the base  
2586 and high values of M both maintain the stock at well above the current target stock size, as  
2587 does removing the recent average catches under all states of nature. Removing the high M  
2588 catches under the base model M and high M states of nature results in the population going  
2589 to extremely low levels during the projection period, spawning biomass and stock depletion  
2590 values are not reported for years in which the stock goes to these very low levels.

### 2591 Central Model

2592 Current medium-term projections of expected China spawning biomass from the central base  
2593 model suggests stable catches near current levels as the stock is just above the current target  
2594 stock size under the default harvest control rule (Table 47, Figures 145 and 146). The stock is  
2595 expected to remain just above the target stock size, increasing slightly, during the projection  
2596 period, assuming stationarity in the stock-recruitment assumptions.

2597 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
2598 panel and are based on a low value of M, 0.05, and a high value, 0.09. Current medium-  
2599 term forecasts based on the alternative states of nature project that the stock, under the  
2600 current control rule as applied to the base model, will decline towards the target stock size  
2601 Table q. The current control rule under the low state of nature results in a stock in the  
2602 precautionary zone, while the high state of nature maintains the stock increasing from 40%  
2603 to 50% depletion from 2017 - 2026. Removing the catches resulting from the low M state of  
2604 nature, assuming the base and high values of M both maintain the stock at well above the

2605 current target stock size. Removing the high M catches under the base model M and low M  
2606 states of nature results in the population going to extremely low levels during the projection  
2607 period. Removing average catches under the base M and high M states of nature result in  
2608 the stock remaining above the current target stock size, and an ending depletion of 37% in  
2609 2026 for the low M state of nature.

## 2610 Southern Model

2611 Assuming that catches in 2015 and 2016 equal recent average catch, and that catches be-  
2612 ginning in 2017 follow the default ACL harvest control rule, projections of expected China  
2613 spawning output from the southern base model suggest the stock will be at roughly 30% of  
2614 unfished spawning output in 2017, and increase to 38% by 2026 (Table 48, Figures 145 and  
2615 146). The stock is expected to remain below the target stock size (40% of unfished spawning  
2616 output) in the base model and “low M” states of nature through 2026, and to exceed target  
2617 size in the “high M” scenario, assuming stationarity in the stock-recruitment assumptions.

2618 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
2619 panel: a low value of M, 0.05, the base model value, M=0.07, and a high value, M=0.09.  
2620 Stock status under the alternative states of nature ranges from an overfished state in 2017  
2621 for the low-M scenario (21% of unfished spawning output) to a stock at target biomass (40%  
2622 of unfished) in the high-M scenario (Table r). Annual catches based on the low-M state of  
2623 nature increase from 5 to 10 mt over the projection period, and result in an increasing stock  
2624 under all three states of nature. Catches derived from the base model increase from 11 mt  
2625 in 2017 to 15 mt in 2026, and also produce increasing trends (at different rates) in spawning  
2626 output under all three states of nature. Catches under the high-M state of nature produce  
2627 very little change in spawning output over the projection period for all three states of nature.

## 2628 5 Regional Management Considerations

2629 China rockfish is currently managed as part of the nearshore rockfish stock complex, and  
2630 as such, does not have a species-specific ACL. The complex is divided into northern and  
2631 southern components around the PFMC management line at 40°10' N. latitude (near Cape  
2632 Mendocino, California). This management boundary is consistent with observed spatial pat-  
2633 terns in the data (e.g. length compositions, size at age, commercial discard rates), and OFL  
2634 estimates for the northern and southern management regions can be calculated directly from  
2635 the base model runs and projections (southern model = OFL for southern nearshore rockfish  
2636 complex, central + northern models = OFL for northern nearshore rockfish complex).

## 2637 6 Research Needs

- 2638 1. The number of hours fished in Washington should be recorded for each dockside sample  
2639 (vessel) so that future CPUE can be measured as angler hours rather than just number

- 2640 of anglers per trip. This will allow for a more accurate calculation of effort.
- 2641 2. The number of hours fished in Oregon should be recorded for each dockside sample  
2642 (vessel), instead of the number of the start and end times of the entire trip. This will  
2643 allow for a more accurate calculation of effort.
- 2644 3. Compare the habitat-based methods used to subset data for the onboard observer  
2645 indices to Stephens-MacCall and other filtering methods.
- 2646 4. Explore the sensitivity of Stephens-MacCall when the target species is “rare” or not  
2647 common encountered in the data samples.
- 2648 5. A standardized fishery independent survey sampling nearshore rockfish in all three  
2649 states would provide a more reliable index of abundance than the indices developed  
2650 from catch rates in recreational and commercial fisheries. However, information value  
2651 of such surveys would depend on the consistency in methods over time and space and  
2652 would require many years of sampling before an informative index could be obtained.
- 2653 6. A coastwide evaluation of genetic structure of China rockfish is a research priority.  
2654 Genetic samples should be collected at sites spaced regularly along the coast throughout  
2655 the range of the species to estimate genetic differences at multiple spatial scales (i.e.,  
2656 isolation by distance).
- 2657 7. Difficulties were encountered when attempting to reconstruct historical recreational  
2658 catches at smaller spatial scales, and in distinguishing between landings from the pri-  
2659 vate and charter vessels. Improved methods are needed to allocate reconstructed recre-  
2660ational catches to sub-state regions within each fishing mode.
- 2661 8. There was insufficient time during the STAR Panel review to fully review the abun-  
2662 dance indices used in the China rockfish assessments. Consideration should be given to  
2663 scheduling a data workshop prior to STAR Panel review for review of assessment input  
2664 data and standardization procedures for indices, potentially for all species scheduled  
2665 for assessment. The nearshore data workshop, held earlier this year, was a step in this  
2666 direction, but that meeting did not deal with the modeling part of index development.
- 2667 9. The Marine Recreational Fisheries Statistics Survey (MRFSS) index in Oregon was  
2668 excluded from the assessment model because it was learned that multiple intercept  
2669 interviews were done for a single trip. Evaluate whether database manipulations or  
2670 some other approach can resolve this issue and allow these data to be used in the  
2671 assessment.
- 2672 10. Many of the indices used in the China rockfish assessment model used the Stephens-  
2673 MacCall (2004) approach to subset the CPUE data. Research is need to evaluate  
2674 the performance of the method when there are changes in management restrictions  
2675 and in relative abundance of different species. Examination of the characteristics of

2676 trips retained/removed should be a routine part of index standardization, such as an  
2677 evaluation of whether there are time trends in the proportion of discarded trips.

- 2678 11. Fishery-dependent CPUE indices are likely to be the only trend information for many  
2679 nearshore species for the foreseeable future. Indices from a multi-species hook-and-line  
2680 fishery may be influenced by regulatory changes, such as bag limits, and by interactions  
2681 with other species (e.g. black rockfish) due to hook competition. It may be possible  
2682 to address many of these concerns if a multi-species approach is used to develop the  
2683 indices, allowing potential interactions and common forcing to be evaluated.
- 2684 12. Consider the development of a fishery-independent survey for nearshore stocks. As  
2685 the current base model structure has no direct fishery-independent measure of stock  
2686 trends, any work to commence collection of such a measure for nearshore rockfish, or  
2687 use of existing data to derive such an index would greatly assist with this assessment.
- 2688 13. Basic life history research may help to resolve assessment uncertainties regarding ap-  
2689 propriate values for natural mortality and steepness.
- 2690 14. Examine length composition data of discarded fish from recreational onboard observer  
2691 programs in California and Oregon. Consider modeling discarded catch using selec-  
2692 tivity and retention functions in Stock Synthesis rather than combining retained and  
2693 discarded catch and assuming they have identical size compositions. Another option  
2694 would be to model discarded recreational catch as a separate fleet, similar to the way  
2695 commercial discards were treated in the southern model.
- 2696 15. Ageing data were influential in the China rockfish stock assessments. Collection and  
2697 ageing of China rockfish otoliths should continue. Samples from younger fish not  
2698 typically selected by the fishery are needed to better define the growth curve.
- 2699 16. Consider evaluating depletion estimators of abundance using within season CPUE  
2700 indices. This approach would require information on total removals on a reef-by-reef  
2701 basis.
- 2702 17. The extensive use of habitat information in index development is a strength of the  
2703 China rockfish assessment. Consideration should be given to how to further incorporate  
2704 habitat data into the assessment of nearshore species. The most immediate need seems  
2705 to be to increase the resolution of habitat maps for waters off Oregon and Washington,  
2706 and standardization of habitat data format among states.
- 2707 18. Although all the current models for China rockfish estimated implausibly large recruit-  
2708 ment deviations when allowed to do so, particularly early in the modeled time period,  
2709 further exploration of available options in stock synthesis could produce acceptable  
2710 results. In addition, this work may provide guidance on any additional options that could  
2711 be added to stock synthesis to better handle this situation. For example, assuming dif-  
2712 ferent levels autocorrelation in the stock-recruit relationship for data-moderate stocks  
2713 may help curb the tendency to estimate extreme recruitment with sparse datasets.

2714      19. Research is needed on data-weighting methods in stock assessments. In particular,  
2715      a standard approach for conditional age-at-length data is needed. The Center for  
2716      the Advancement of Population Assessment Methodology (CAPAM) data weighting  
2717      workshop, scheduled for later this year, should make important progress on this research  
2718      need.

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2739      model the commercial discards as a fleet in the southern model. We thank Don Pearson for  
2740      providing California's commercial catch data and providing advice on growth models. We  
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<sup>2742</sup> **8 Tables**

Table 1: Commercial removals (mt) from the Oregon live and dead commercial fisheries, north and source of Florence, OR.

Year	Southern Dead	Northern Dead	Southern Live	Northern Live	Total Removals	Source
1900	0.01	0.01			0.02	Karnowski et al.
1901	0.00	0.00			0.00	Karnowski et al.
1902	0.00	0.00			0.00	Karnowski et al.
1903	0.00	0.00			0.00	Karnowski et al.
1904	0.00	0.00			0.00	Karnowski et al.
1905	0.00	0.00			0.00	Karnowski et al.
1906	0.00	0.00			0.00	Karnowski et al.
1907	0.00	0.00			0.00	Karnowski et al.
1908	0.00	0.00			0.00	Karnowski et al.
1909	0.00	0.00			0.00	Karnowski et al.
1910	0.00	0.00			0.00	Karnowski et al.
1911	0.00	0.00			0.00	Karnowski et al.
1912	0.00	0.00			0.00	Karnowski et al.
1913	0.00	0.00			0.00	Karnowski et al.
1914	0.00	0.00			0.00	Karnowski et al.
1915	0.00	0.00			0.00	Karnowski et al.
1916	0.00	0.00			0.00	Karnowski et al.
1917	0.00	0.00			0.00	Karnowski et al.
1918	0.00	0.00			0.00	Karnowski et al.
1919	0.00	0.00			0.00	Karnowski et al.
1920	0.00	0.00			0.00	Karnowski et al.
1921	0.00	0.00			0.00	Karnowski et al.
1922	0.00	0.00			0.00	Karnowski et al.
1923	0.00	0.00			0.00	Karnowski et al.
1924	0.00	0.00			0.00	Karnowski et al.
1925	0.00	0.00			0.00	Karnowski et al.
1926	0.00	0.00			0.00	Karnowski et al.
1927	0.00	0.00			0.00	Karnowski et al.
1928	0.00	0.00			0.01	Karnowski et al.
1929	0.01	0.01			0.01	Karnowski et al.
1930	0.00	0.00			0.01	Karnowski et al.
1931	0.00	0.00			0.01	Karnowski et al.
1932	0.00	0.00			0.00	Karnowski et al.
1933	0.00	0.00			0.01	Karnowski et al.
1934	0.00	0.00			0.01	Karnowski et al.
1935	0.00	0.00			0.00	Karnowski et al.

Table 1: Commercial removals (mt) from the Oregon live and dead commercial fisheries, north and source of Florence, OR.

Year	Southern Dead	Northern Dead	Southern Live	Northern Live	Total Removals	Source
1936	0.00	0.00			0.01	Karnowski et al.
1937	0.00	0.00			0.01	Karnowski et al.
1938	0.00	0.00			0.01	Karnowski et al.
1939	0.00	0.00			0.00	Karnowski et al.
1940	0.01	0.01			0.01	Karnowski et al.
1941	0.01	0.01			0.02	Karnowski et al.
1942	0.01	0.01			0.03	Karnowski et al.
1943	0.04	0.04			0.07	Karnowski et al.
1944	0.01	0.01			0.01	Karnowski et al.
1945	0.04	0.04			0.08	Karnowski et al.
1946	0.05	0.05			0.11	Karnowski et al.
1947	0.01	0.01			0.02	Karnowski et al.
1948	0.01	0.01			0.02	Karnowski et al.
1949	0.07	0.07			0.13	Karnowski et al.
1950	0.00	0.00			0.01	Karnowski et al.
1951	0.00	0.00			0.00	Karnowski et al.
1952	0.00	0.00			0.00	Karnowski et al.
1953	0.00	0.00			0.00	Karnowski et al.
1954	0.00	0.00			0.00	Karnowski et al.
1955	0.00	0.00			0.00	Karnowski et al.
1956	0.00	0.00			0.00	Karnowski et al.
1957	0.00	0.00			0.00	Karnowski et al.
1958	0.00	0.00			0.00	Karnowski et al.
1959	0.00	0.00			0.00	Karnowski et al.
1960	0.00	0.00			0.00	Karnowski et al.
1961	0.00	0.00			0.00	Karnowski et al.
1962	0.00	0.00			0.00	Karnowski et al.
1963	0.00	0.00			0.00	Karnowski et al.
1964	0.01	0.01			0.02	Karnowski et al.
1965	0.00	0.00			0.00	Karnowski et al.
1966	0.00	0.00			0.00	Karnowski et al.
1967	0.00	0.00			0.00	Karnowski et al.
1968	0.00	0.00			0.00	Karnowski et al.
1969	0.00	0.00			0.01	Karnowski et al.
1970	0.00	0.00			0.00	Karnowski et al.
1971	0.00	0.00			0.00	Karnowski et al.
1972	0.00	0.00			0.00	Karnowski et al.
1973	0.00	0.00			0.01	Karnowski et al.

Table 1: Commercial removals (mt) from the Oregon live and dead commercial fisheries, north and source of Florence, OR.

Year	Southern Dead	Northern Dead	Southern Live	Northern Live	Total Removals	Source
1974	0.01	0.01			0.02	Karnowski et al.
1975	0.00	0.00			0.01	Karnowski et al.
1976	0.00	0.00			0.00	Karnowski et al.
1977	0.09	0.09			0.17	Karnowski et al.
1978	0.01	0.01			0.03	Karnowski et al.
1979	0.13	0.13			0.26	Karnowski et al.
1980	0.07	0.07			0.13	Karnowski et al.
1981	0.07	0.07			0.14	Karnowski et al.
1982	0.32	0.32			0.64	Karnowski et al.
1983	0.35	0.35			0.69	Karnowski et al.
1984	0.23	0.23			0.45	Karnowski et al.
1985	0.21	0.21			0.41	Karnowski et al.
1986	0.14	0.14			0.28	Karnowski et al.
1987	0.88	0.84			1.72	Karnowski et al.
1988	0.85	1.11			1.97	Karnowski et al.
1989	1.05	0.81			1.86	Karnowski et al.
1990	1.13	0.53			1.66	Karnowski et al.
1991	0.66	0.64			1.30	Karnowski et al.
1992	0.86	0.64			1.50	PacFIN
1993	0.82	0.01			0.82	PacFIN
1994	6.16				6.16	PacFIN
1995	6.35				6.35	PacFIN
1996	5.62				5.62	PacFIN
1997	5.31		5.31		10.63	PacFIN
1998	9.54		9.15		18.69	PacFIN
1999	8.39		14.92		23.31	PacFIN
2000	2.54		9.51		12.05	PacFIN
2001	3.83		15.47		19.31	PacFIN
2002	3.06		17.06		20.12	PacFIN
2003	1.88		8.16		10.04	PacFIN
2004	1.08		5.84		6.92	PacFIN
2005	0.63		3.39		4.02	PacFIN
2006	0.54		4.11		4.64	PacFIN
2007	1.15	0.01	4.88		6.03	PacFIN
2008	1.45	0.04	6.28	0.00	7.76	PacFIN
2009	1.12	0.02	6.70	0.04	7.88	PacFIN
2010	0.52	0.02	4.30	0.00	4.84	PacFIN
2011	1.37	0.02	6.59		7.98	PacFIN

Table 1: Commercial removals (mt) from the Oregon live and dead commercial fisheries, north and source of Florence, OR.

Year	Southern	Northern	Southern	Northern	Total	Source
	Dead	Dead	Live	Live	Removals	
2012	1.29	0.04	7.41	0.02	8.76	PacFIN
2013	1.55	0.02	5.41	0.00	6.98	PacFIN
2014	0.72	0.01	3.62	0.02	4.38	PacFIN

Table 2: Commercial removals (mt) from the California live and dead commercial fisheries.

Year	South of	South of	North of	North of	Total	Source
	40°10'	40°10'	40°10'	40°10'	Removals	
	Dead	Live	Dead	Live		
1900	0.00				0.00	Ralston et al. 2010
1901	0.38				0.38	Ralston et al. 2010
1902	0.77				0.77	Ralston et al. 2010
1903	1.15				1.15	Ralston et al. 2010
1904	1.53				1.53	Ralston et al. 2010
1905	1.92				1.92	Ralston et al. 2010
1906	2.30				2.30	Ralston et al. 2010
1907	2.68				2.68	Ralston et al. 2010
1908	3.06				3.06	Ralston et al. 2010
1909	3.45				3.45	Ralston et al. 2010
1910	3.83				3.83	Ralston et al. 2010
1911	4.21				4.21	Ralston et al. 2010
1912	4.60				4.60	Ralston et al. 2010
1913	4.98				4.98	Ralston et al. 2010
1914	5.36				5.36	Ralston et al. 2010
1915	5.75				5.75	Ralston et al. 2010
1916	6.13	0.00			6.13	Ralston et al. 2010
1917	9.52	0.00			9.52	Ralston et al. 2010
1918	11.13	0.00			11.13	Ralston et al. 2010
1919	7.74	0.00			7.74	Ralston et al. 2010
1920	7.89	0.00			7.90	Ralston et al. 2010
1921	6.52	0.00			6.52	Ralston et al. 2010
1922	5.61	0.00			5.61	Ralston et al. 2010
1923	6.07	0.00			6.07	Ralston et al. 2010
1924	3.51	0.00			3.52	Ralston et al. 2010
1925	4.39	0.00			4.39	Ralston et al. 2010
1926	7.08	0.00			7.09	Ralston et al. 2010
1927	6.02	0.00			6.02	Ralston et al. 2010

Table 2: Commercial removals (mt) from the California live and dead commercial fisheries.

Year	South of 40°10' Dead	South of 40°10' Live	North of 40°10' Dead	North of 40°10' Live	Total Removals	Source
1928	7.27		0.00		7.27	Ralston et al. 2010
1929	6.01		0.01		6.03	Ralston et al. 2010
1930	8.52		0.01		8.53	Ralston et al. 2010
1931	3.63				3.63	Ralston et al. 2010
1932	9.27		0.03		9.30	Ralston et al. 2010
1933	3.33		0.09		3.42	Ralston et al. 2010
1934	7.09		0.96		8.04	Ralston et al. 2010
1935	6.31		0.80		7.11	Ralston et al. 2010
1936	6.22		1.20		7.42	Ralston et al. 2010
1937	5.60		0.76		6.36	Ralston et al. 2010
1938	3.26		3.00		6.26	Ralston et al. 2010
1939	0.72		5.79		6.51	Ralston et al. 2010
1940	0.30		3.43		3.73	Ralston et al. 2010
1941	0.85		0.96		1.81	Ralston et al. 2010
1942	0.52		0.70		1.22	Ralston et al. 2010
1943	1.75		0.01		1.76	Ralston et al. 2010
1944	0.49				0.49	Ralston et al. 2010
1945	0.55		0.00		0.56	Ralston et al. 2010
1946	1.45		0.06		1.51	Ralston et al. 2010
1947	1.48		0.08		1.57	Ralston et al. 2010
1948	3.25		0.09		3.34	Ralston et al. 2010
1949	4.43		0.01		4.44	Ralston et al. 2010
1950	1.81		0.11		1.92	Ralston et al. 2010
1951	2.65		0.14		2.79	Ralston et al. 2010
1952	2.42		0.00		2.42	Ralston et al. 2010
1953	2.29				2.29	Ralston et al. 2010
1954	0.75				0.75	Ralston et al. 2010
1955	0.34				0.34	Ralston et al. 2010
1956	0.19		0.00		0.20	Ralston et al. 2010
1957	0.41		0.09		0.50	Ralston et al. 2010
1958	0.24				0.24	Ralston et al. 2010
1959	0.63		0.01		0.64	Ralston et al. 2010
1960	0.47				0.47	Ralston et al. 2010
1961	1.00		0.00		1.01	Ralston et al. 2010
1962	0.38				0.38	Ralston et al. 2010
1963	0.81		0.00		0.81	Ralston et al. 2010
1964	0.03				0.03	Ralston et al. 2010
1965	0.18		0.02		0.20	Ralston et al. 2010

Table 2: Commercial removals (mt) from the California live and dead commercial fisheries.

Year	South of 40°10' Dead	South of 40°10' Live	North of 40°10' Dead	North of 40°10' Live	Total Removals	Source
1966	0.25		0.08		0.33	Ralston et al. 2010
1967	0.12		0.01		0.13	Ralston et al. 2010
1968	0.01				0.01	Ralston et al. 2010
1969	1.57		0.00		1.57	CALCOM
1970	1.84		0.00		1.84	CALCOM
1971	1.26		0.00		1.26	CALCOM
1972	2.10		0.01		2.11	CALCOM
1973	3.42		0.00		3.42	CALCOM
1974	2.53		0.01		2.54	CALCOM
1975	2.72		0.01		2.73	CALCOM
1976	3.81		0.01		3.82	CALCOM
1977	3.07		0.02		3.10	CALCOM
1978	1.45		0.11		1.56	CALCOM
1979	7.95		0.02		7.97	CALCOM
1980	5.01		0.01		5.02	CALCOM
1981	0.76		0.00		0.77	CALCOM
1982	0.56		0.00		0.56	CALCOM
1983	1.66				1.66	CALCOM
1984	3.34		0.00		3.35	CALCOM
1985	1.09		0.00		1.09	CALCOM
1986	1.06		0.00		1.06	CALCOM
1987	3.36				3.36	CALCOM
1988	4.22		0.01		4.23	CALCOM
1989	6.01		0.22		6.23	CALCOM
1990	6.16		2.46		8.61	CALCOM
1991	11.51		0.70		12.21	CALCOM
1992	20.99		2.80		23.79	CALCOM
1993	14.87	0.17	0.83		15.86	CALCOM
1994	21.46	11.07	0.99		33.52	CALCOM
1995	14.94	9.14	4.62		28.70	CALCOM
1996	8.78	6.16	3.78	0.01	18.73	CALCOM
1997	23.31	6.50	1.97	1.74	33.52	CALCOM
1998	5.31	5.39	1.43	0.83	12.96	CALCOM
1999	2.34	3.80	0.60	1.57	8.31	CALCOM
2000	0.67	2.29	0.59	2.04	5.58	CALCOM
2001	0.77	2.44	0.42	1.05	4.68	CALCOM
2002	0.68	2.11	0.46	1.82	5.06	CALCOM
2003	0.27	0.72	0.09	0.49	1.57	CALCOM

Table 2: Commercial removals (mt) from the California live and dead commercial fisheries.

Year	South of 40°10' Dead	South of 40°10' Live	North of 40°10' Dead	North of 40°10' Live	Total Removals	Source
2004	0.57	1.41	0.21	0.28	2.46	CALCOM
2005	0.71	1.62	0.14	0.58	3.06	CALCOM
2006	0.53	1.49	0.15	0.83	3.00	CALCOM
2007	0.73	1.47	0.40	1.60	4.21	CALCOM
2008	0.77	1.57	0.26	1.56	4.15	CALCOM
2009	0.44	1.54	0.05	0.60	2.63	CALCOM
2010	0.76	1.05	0.04	0.26	2.11	CALCOM
2011	0.43	1.12	0.09	0.35	1.99	CALCOM
2012	0.71	0.67	0.08	0.38	1.83	CALCOM
2013	0.38	0.83	0.05	0.17	1.43	CALCOM
2014	0.25	1.33	0.02	0.09	1.69	CALCOM

Table 5: Recreational removals (mt) from the Washington party/charter (PC) and private (PR) vessels. Northern WA represents MCAs 3 and 4 and southern WA represents MCAs 1 and 2. WDFW provided all data. Note: A discard mortality rate was applied to removals presented in this table.

Year	Southern PC	Southern PR	Northern PC	Northern PR	Total Removals
1967	0.00	0.00	0.27	1.04	1.30
1968	0.02	0.00	0.32	1.25	1.58
1969	0.04	0.00	0.37	1.45	1.87
1970	0.06	0.00	0.43	1.66	2.15
1971	0.07	0.00	0.48	1.87	2.43
1972	0.09	0.00	0.53	2.08	2.71
1973	0.11	0.00	0.59	2.29	2.99
1974	0.13	0.00	0.64	2.49	3.27
1975	0.15	0.00	0.69	2.70	3.55
1976	0.02	0.00	0.38	1.48	1.88
1977	0.01	0.00	0.29	1.12	1.42
1978	0.06	0.00	0.78	3.02	3.86
1979	0.01	0.00	0.62	2.40	3.02
1980	0.02	0.00	0.53	2.04	2.59
1981	0.06	0.00	0.47	1.83	2.37
1982	0.05	0.00	0.56	2.18	2.79
1983	0.00	0.00	0.62	2.42	3.04
1984	0.11	0.00	0.67	2.62	3.40
1985	0.06	0.00	0.68	2.64	3.38

Table 5: Recreational removals (mt) from the Washington party/charter (PC) and private (PR) vessels. Northern WA represents MCAs 3 and 4 and southern WA represents MCAs 1 and 2. WDFW provided all data. Note: A discard mortality rate was applied to removals presented in this table.

Year	Southern PC	Southern PR	Northern PC	Northern PR	Total Removals
1986	0.16	0.00	0.78	3.02	3.96
1987	0.19	0.00	1.03	3.73	4.96
1988	0.23	0.01	1.28	4.45	5.97
1989	0.26	0.01	1.54	5.16	6.97
1990	0.30	0.01	1.79	5.88	7.98
1991	0.23	0.00	0.51	3.58	4.31
1992	0.35	0.01	1.46	5.81	7.63
1993	0.32	0.00	1.13	5.08	6.54
1994	0.31	0.00	1.18	3.24	4.74
1995	0.10	0.01	0.60	3.43	4.13
1996	0.12	0.01	0.45	2.29	2.86
1997	0.18	0.00	0.40	2.13	2.71
1998	0.19	0.07	0.08	1.65	1.99
1999	0.06	0.00	0.09	2.35	2.50
2000	0.10	0.00	0.41	2.51	3.02
2001	0.25	0.00	0.25	3.13	3.63
2002	0.10	0.00	0.23	2.17	2.50
2003	0.08	0.01	0.12	2.18	2.39
2004	0.07	0.04	0.14	1.97	2.23
2005	0.03	0.01	0.19	2.46	2.68
2006	0.02	0.00	0.08	2.20	2.31
2007	0.07	0.00	0.14	2.73	2.94
2008	0.16	0.01	0.31	2.68	3.16
2009	0.07	0.00	0.17	2.55	2.79
2010	0.15	0.04	0.13	3.36	3.68
2011	0.07	0.00	0.16	3.02	3.26
2012	0.07	0.01	0.26	2.63	2.96
2013	0.05	0.02	0.27	3.06	3.39
2014	0.03	0.02	0.30	2.68	3.03

Table 3: Estimated discarded and retained China rockfish in the Nearshore Fixed-gear Fishery provided by the West Coast Groundfish Observer Program (WCGOP). For the area South of  $40^{\circ}10'$ , where discards are higher, bootstrapping was used to estimate a coefficient of variation (CV) of the total discard amount. The mortality of discarded China rockfish is estimated by WCGOP as a function of the fishing depth which varies by year. The average mortality fraction south of  $40^{\circ}10'$  across all years was 59%.

Year	Area	Estimated total discard (mt)	CV of total discard	Estimated dead discard (mt)	Estimated mortality fraction	Estimated landings (mt)	Estimated dead discard + landings	Ratio of dead discard:total dead
2003	N of $40^{\circ}10'$	0.54	-	0.25	47%	10.62	10.87	2%
2004	N of $40^{\circ}10'$	0.54	-	0.24	45%	7.28	7.52	3%
2005	N of $40^{\circ}10'$	0.38	-	0.17	45%	4.56	4.73	4%
2006	N of $40^{\circ}10'$	0.47	-	0.21	44%	5.62	5.83	4%
2007	N of $40^{\circ}10'$	0.20	-	0.08	43%	7.99	8.08	1%
2008	N of $40^{\circ}10'$	1.02	-	0.42	41%	9.40	9.81	4%
2009	N of $40^{\circ}10'$	0.70	-	0.29	41%	8.53	8.82	3%
2010	N of $40^{\circ}10'$	0.34	-	0.13	38%	5.15	5.28	2%
2011	N of $40^{\circ}10'$	0.28	-	0.12	44%	8.42	8.54	1%
2012	N of $40^{\circ}10'$	0.61	-	0.23	38%	9.15	9.39	2%
2013	N of $40^{\circ}10'$	0.26	-	0.12	45%	7.20	7.32	2%
2004	S of $40^{\circ}10'$	0.61	51%	0.35	57%	1.96	2.31	15%
2005	S of $40^{\circ}10'$	1.40	51%	0.65	46%	2.35	3.00	22%
2006	S of $40^{\circ}10'$	0.87	48%	0.48	55%	2.02	2.50	19%
2007	S of $40^{\circ}10'$	1.06	19%	0.61	57%	2.20	2.81	22%
2008	S of $40^{\circ}10'$	1.35	77%	0.81	60%	2.28	3.09	26%
2009	S of $40^{\circ}10'$	1.77	64%	0.96	54%	1.97	2.92	33%
2010	S of $40^{\circ}10'$	2.68	69%	1.68	63%	1.80	3.49	48%
2011	S of $40^{\circ}10'$	2.92	45%	1.38	47%	1.55	2.93	47%
2012	S of $40^{\circ}10'$	2.73	82%	1.81	66%	1.44	3.25	56%
2013	S of $40^{\circ}10'$	1.61	53%	1.28	79%	1.20	2.47	52%

Table 4: Total number of observed trips associated with catch of China rockfish and trips with observed discards of China rockfish aggregated by  $2^\circ$  latitude bins. Range of years is 2003-2013 North of  $40^\circ 10'$  and 2004 2013 to the south. Note: No observed catch of China rockfish occurred between  $40^\circ$  and  $40^\circ 10'$ .

Latitude range	Trips observed	Trips with discards	Percent with discards
$44^\circ - 46^\circ$	46	10	22%
$42^\circ - 44^\circ$	875	324	37%
$40^\circ - 42^\circ$	144	13	9%
$38^\circ - 40^\circ$	55	45	82%
$36^\circ - 38^\circ$	146	133	91%
$34^\circ - 36^\circ$	26	26	100%

Table 6: Recreational removals (mt) from the Oregon party/charter and private vessels.  
North and South refer to north and south of Florence, OR.

Year	Charter North	Charter South	Private North	Private South	Total North	Total South	OR Total	Source
1973	0.44	0.16	0.07	0.19	0.51	0.34	0.86	ODFW Reconstruction
1974	0.75	0.27	0.13	0.32	0.88	0.59	1.47	ODFW Reconstruction
1975	0.37	0.13	0.06	0.16	0.43	0.29	0.72	ODFW Reconstruction
1976	1.08	0.38	0.27	0.47	1.35	0.85	2.20	ODFW Reconstruction
1977	1.15	0.41	0.29	0.49	1.44	0.90	2.34	ODFW Reconstruction
1978	1.50	0.53	0.25	0.64	1.75	1.18	2.93	ODFW Reconstruction
1979	1.52	2.94	0.98	1.53	2.51	4.47	6.98	ODFW Reconstruction
1980	1.63	0.91	0.90	0.53	2.54	1.44	3.98	ODFW Reconstruction
1981	2.18	1.56	0.97	0.89	3.15	2.45	5.60	ODFW Reconstruction
1982	2.14	1.42	0.95	0.82	3.09	2.24	5.33	ODFW Reconstruction
1983	2.69	1.36	1.20	0.81	3.89	2.17	6.07	ODFW Reconstruction
1984	2.71	1.43	1.21	0.48	3.92	1.90	5.82	ODFW Reconstruction
1985	1.38	1.04	0.62	0.59	2.00	1.63	3.62	ODFW Reconstruction
1986	1.58	0.99	0.70	0.57	2.28	1.56	3.84	ODFW Reconstruction
1987	1.03	1.29	0.46	0.69	1.49	1.99	3.48	ODFW Reconstruction
1988	1.44	0.38	0.29	0.45	1.73	0.82	2.55	ODFW Reconstruction
1989	2.21	1.04	0.31	1.57	2.52	2.61	5.13	ODFW Reconstruction
1990	2.19	1.29	0.49	1.81	2.68	3.10	5.78	ODFW Reconstruction
1991	1.44	0.52	0.31	0.68	1.75	1.19	2.94	ODFW Reconstruction
1992	2.41	0.76	0.65	0.88	3.06	1.64	4.70	ODFW Reconstruction
1993	3.03	0.90	0.99	1.12	4.02	2.02	6.04	ODFW Reconstruction
1994	2.13	0.97	0.73	1.21	2.86	2.19	5.05	ODFW Reconstruction
1995	1.09	0.68	0.51	0.94	1.60	1.62	3.22	ODFW Reconstruction
1996	1.74	0.84	0.26	0.71	2.00	1.55	3.55	ODFW Reconstruction
1997	2.04	1.08	0.47	1.00	2.51	2.09	4.60	ODFW Reconstruction
1998	1.56	0.79	0.47	0.76	2.03	1.55	3.58	ODFW Reconstruction
1999	2.11	1.78	0.45	1.26	2.56	3.04	5.60	ODFW Reconstruction
2000	1.71	0.85	0.39	0.59	2.10	1.45	3.54	ODFW Reconstruction
2001	1.41	0.32	1.41	0.36	2.83	0.69	3.51	RecFIN
2002	1.40	0.32	1.40	0.38	2.79	0.70	3.49	RecFIN
2003	1.12	0.26	1.12	0.32	2.23	0.58	2.81	RecFIN
2004	0.99	0.23	0.99	0.40	1.98	0.62	2.60	RecFIN
2005	0.77	0.26	0.77	0.51	1.53	0.77	2.31	RecFIN
2006	1.11	0.35	1.11	0.50	2.22	0.85	3.07	RecFIN
2007	1.40	0.38	1.40	0.48	2.79	0.87	3.66	RecFIN
2008	1.25	0.26	1.25	0.45	2.50	0.72	3.22	RecFIN
2009	0.95	0.12	0.95	0.49	1.89	0.60	2.50	RecFIN
2010	1.02	0.20	1.02	0.61	2.05	0.80	2.85	RecFIN
2011	1.56	0.31	1.56	0.60	3.12	0.91	4.02	RecFIN
2012	1.68	0.37	1.68	0.41	3.36	0.78	4.14	RecFIN
2013	1.48	0.25	1.48	0.64	2.96	0.89	3.85	RecFIN
2014	0.51	0.18	0.51	0.48	1.01	0.66	1.67	RecFIN

Table 7: Recreational removals (mt) from the California party/charter (PC) and private (PR) vessels.

Year	South of 40°10' PC	South of 40°10' PR	North of 40°10' PC	North of 40°10' PR	Total Removals	Source
1928	0.10	0.31	0.00	0.00	0.42	Ralston et al. 2010
1929	0.21	0.62	0.00	0.00	0.84	Ralston et al. 2010
1930	0.24	0.72	0.00	0.00	0.96	Ralston et al. 2010
1931	0.32	0.95	0.00	0.01	1.28	Ralston et al. 2010
1932	0.40	1.19	0.00	0.01	1.60	Ralston et al. 2010
1933	0.48	1.43	0.00	0.01	1.92	Ralston et al. 2010
1934	0.56	1.67	0.00	0.01	2.24	Ralston et al. 2010
1935	0.64	1.91	0.00	0.01	2.56	Ralston et al. 2010
1936	0.72	2.15	0.00	0.02	2.88	Ralston et al. 2010
1937	0.85	2.55	0.01	0.02	3.42	Ralston et al. 2010
1938	0.83	2.50	0.01	0.02	3.36	Ralston et al. 2010
1939	0.73	2.19	0.01	0.02	2.94	Ralston et al. 2010
1940	1.05	3.15	0.01	0.02	4.23	Ralston et al. 2010
1941	0.97	2.91	0.01	0.02	3.91	Ralston et al. 2010
1942	0.52	1.55	0.00	0.01	2.08	Ralston et al. 2010
1943	0.49	1.48	0.00	0.01	1.99	Ralston et al. 2010
1944	0.40	1.21	0.00	0.01	1.63	Ralston et al. 2010
1945	0.54	1.62	0.00	0.01	2.17	Ralston et al. 2010
1946	0.93	2.79	0.01	0.02	3.74	Ralston et al. 2010
1947	0.74	2.21	0.01	0.02	2.98	Ralston et al. 2010
1948	1.48	4.43	0.01	0.03	5.95	Ralston et al. 2010
1949	1.91	5.74	0.01	0.04	7.70	Ralston et al. 2010
1950	2.33	6.99	0.02	0.05	9.39	Ralston et al. 2010
1951	2.73	8.20	0.02	0.06	11.01	Ralston et al. 2010
1952	2.38	7.15	0.02	0.05	9.60	Ralston et al. 2010
1953	2.04	6.11	0.01	0.05	8.20	Ralston et al. 2010
1954	2.55	7.66	0.02	0.06	10.29	Ralston et al. 2010
1955	3.07	9.21	0.02	0.07	12.38	Ralston et al. 2010
1956	3.43	10.30	0.03	0.08	13.84	Ralston et al. 2010
1957	3.42	10.25	0.03	0.10	13.80	Ralston et al. 2010
1958	5.62	16.85	0.03	0.08	22.58	Ralston et al. 2010
1959	4.36	13.07	0.02	0.06	17.50	Ralston et al. 2010
1960	3.63	10.90	0.01	0.04	14.59	Ralston et al. 2010
1961	3.16	9.49	0.01	0.04	12.71	Ralston et al. 2010
1962	2.98	8.93	0.00	0.01	11.92	Ralston et al. 2010
1963	3.72	11.17	0.01	0.02	14.91	Ralston et al. 2010
1964	2.52	7.55	0.01	0.02	10.10	Ralston et al. 2010

Table 7: Recreational removals (mt) from the California party/charter (PC) and private (PR) vessels.

Year	South of 40°10' PC	South of 40°10' PR	North of 40°10' PC	North of 40°10' PR	Total Removals	Source
1965	4.13	12.38	0.01	0.04	16.55	Ralston et al. 2010
1966	4.65	13.96	0.00	0.01	18.63	Ralston et al. 2010
1967	6.03	18.10	0.02	0.05	24.20	Ralston et al. 2010
1968	5.28	15.85	0.01	0.02	21.16	Ralston et al. 2010
1969	4.49	13.48	0.02	0.05	18.05	Ralston et al. 2010
1970	7.59	22.76	0.00	0.01	30.37	Ralston et al. 2010
1971	5.57	16.72	0.01	0.02	22.31	Ralston et al. 2010
1972	7.84	23.52	0.02	0.05	31.43	Ralston et al. 2010
1973	8.67	26.02	0.01	0.03	34.73	Ralston et al. 2010
1974	9.84	29.52	0.00	0.01	39.38	Ralston et al. 2010
1975	9.51	28.52	0.00	0.01	38.04	Ralston et al. 2010
1976	10.28	30.83	0.00	0.01	41.12	Ralston et al. 2010
1977	9.30	27.90	0.00	0.01	37.22	Ralston et al. 2010
1978	7.33	21.99	0.03	0.08	29.44	Ralston et al. 2010
1979	8.34	25.02	0.03	0.10	33.49	Ralston et al. 2010
1980	10.94	21.85	0.04	0.08	32.90	RecFIN
1981	4.75	10.99	0.04	0.10	15.89	RecFIN
1982	5.68	25.00	0.03	0.14	30.84	RecFIN
1983	5.10	10.82	0.08	0.16	16.17	RecFIN
1984	1.05	12.17	0.00	0.06	13.28	RecFIN
1985	3.28	23.87	0.02	0.14	27.31	RecFIN
1986	7.75	31.95	0.12	0.49	40.31	RecFIN
1987	18.35	34.12	0.28	0.53	53.29	RecFIN
1988	8.28	26.83	0.11	0.35	35.56	RecFIN
1989	9.55	22.43	0.06	0.14	32.17	RecFIN
1990	8.46	22.74	0.23	0.61	32.03	RecFIN
1991	7.57	23.49	0.20	0.64	31.89	RecFIN
1992	6.74	24.48	0.12	0.42	31.75	RecFIN
1993	5.78	25.02	0.15	0.66	31.61	RecFIN
1994	4.88	25.25	0.14	0.70	30.97	RecFIN
1995	3.98	20.01	0.12	0.60	24.71	RecFIN
1996	3.12	14.77	0.06	0.28	18.23	RecFIN
1997	3.60	3.54	0.06	0.06	7.26	RecFIN
1998	0.84	6.40	0.02	0.17	7.44	RecFIN
1999	2.97	11.71	0.10	0.40	15.18	RecFIN
2000	5.64	11.24	0.25	0.50	17.63	RecFIN
2001	6.51	9.19	0.31	0.43	16.44	RecFIN

Table 7: Recreational removals (mt) from the California party/charter (PC) and private (PR) vessels.

Year	South of 40°10' PC	South of 40°10' PR	North of 40°10' PC	North of 40°10' PR	Total Removals	Source
2002	5.14	10.00	0.27	0.52	15.92	RecFIN
2003	4.40	12.12	0.33	0.91	17.77	RecFIN
2004	3.72	4.09	0.08	0.44	8.33	RecFIN
2005	8.48	4.90	0.15	0.37	13.91	RecFIN
2006	4.86	5.86	0.14	0.49	11.35	RecFIN
2007	4.40	6.79	0.64	0.87	12.70	RecFIN
2008	5.24	7.58	0.20	0.81	13.82	RecFIN
2009	7.03	11.14	0.66	0.89	19.72	RecFIN
2010	7.81	9.13	0.27	0.64	17.85	RecFIN
2011	7.46	6.61	0.16	1.06	15.29	RecFIN
2012	6.15	6.26	0.37	1.02	13.80	RecFIN
2013	4.53	4.27	0.26	0.97	10.03	RecFIN
2014	4.34	5.25	0.08	0.66	10.32	RecFIN

Table 8: Estimated percentages of California recreational removals north of Point Conception (numbers of total rockfish in CPFV logbooks) taken north of Cape Mendocino, 1957-2003.

Year	Pt Conc. To Cape Mendocino	Cape Mendocino To CA-OR border	% of catch north of Cape Mendocino	% adjusted to match CRFS data
1957	633942	3388	0.5%	1.0%
1958	1043547	2786	0.3%	0.5%
1959	872489	2134	0.2%	0.5%
1960	675870	1379	0.2%	0.4%
1961	510629	1132	0.2%	0.4%
1962	585544	537	0.1%	0.2%
1963	603016	549	0.1%	0.2%
1964	457779	622	0.1%	0.3%
1965	712922	1072	0.2%	0.3%
1966	767130	302	0.0%	0.1%
1967	756345	1092	0.1%	0.3%
1968	796635	589	0.1%	0.1%
1969	838879	1733	0.2%	0.4%
1970	1042951	349	0.0%	0.1%
1971	800620	452	0.1%	0.1%
1972	1091050	1311	0.1%	0.2%
1973	1385090	753	0.1%	0.1%
1974	1461828	401	0.0%	0.1%
1975	1393389	192	0.0%	0.0%
1976	1575447	230	0.0%	0.0%
1977	1379412	315	0.0%	0.0%
1978	1190453	2377	0.2%	0.4%
1979	1315420	2753	0.2%	0.4%
1980	1329375	2494	0.2%	0.3%
1981	1597924	7694	0.5%	0.9%
1982	1621139	4732	0.3%	0.5%
1983	1515401	12197	0.8%	1.5%
1984	1291340	3400	0.3%	0.5%
1985	1197297	3638	0.3%	0.6%
1986	1063522	8705	0.8%	1.5%
1987	1147014	9427	0.8%	1.5%
1988	1216914	8500	0.7%	1.3%
1989	1437152	4853	0.3%	0.6%
1990	1517596	21458	1.4%	2.6%
1991	1286523	18387	1.4%	2.6%
1992	1465874	13385	0.9%	1.7%
1993	1213593	16975	1.4%	2.6%
1994	913140	13439	1.5%	2.7%
1995	769021	12163	1.6%	2.9%
1996	641306	6404	1.0%	1.8%
1997	790977	6976	0.9%	1.6%
1998	783588	11298	1.4%	2.7%
1999	784390	14079	1.8%	3.3%
2000	438816	10175	2.3%	4.2%
2001	390885	9686	2.4%	4.5%
2002	385765	10430	2.6%	4.9%
2003	386823	15064	3.7%	7.0%

Table 9: Commercial logbook filtering criteria and resulting sample sizes used for China rockfish. Bold value indicates the final trip-level sample size used for delta-GLM analysis.

Filter	Criteria	Sample size	Level
Full data set	All data	26592	Set
Gear type	Hook and line only	22735	Set
Port	Port Orford/Gold Beach/Brookings	17100	Set
Depth	Valid set starting depth ( $\leq$ 30 fm; 54.9 m)	15663	Set
Hooks	Valid hook count (1 - 100)	16	Set
Hours	Valid hours fishing (0.1 - 20)	15180	Set
People	Valid number of fishers onboard ( $\geq$ 1)	14976	Set
Nearshore	Nearshore endorsed vessel only	13262	Set
Endorsed			
Vessel	Completed at least one set in all 10 years (2004 - 2013)	3823	Set
Trip	Aggregate multi-set trip to trip level	3575	Trip

Table 10: Abundance indices for China rockfish based on least square means from the delta-GLM model and associated standard errors from the final subset of Oregon commercial nearshore logbook submissions.

Year	Index	Log-scale SE
2004	0.0364	0.2112
2005	0.0281	0.1918
2006	0.0323	0.1997
2007	0.0382	0.2127
2008	0.0429	0.2038
2009	0.0264	0.2066
2010	0.0244	0.2536
2011	0.0395	0.2026
2012	0.0320	0.2063
2013	0.0180	0.2283

Table 11: WDFW recreational dockside data sample sizes at each data filtering step. The bold value indicates the final sample size used for delta-GLM analysis.

Filter	Criteria	Sample size with Stephens- MacCall filter	Sample size with Stephen-MacCall filter, retaining all positive observations	Sample size without Stephens- MacCall filter
Full data set	All data	736271		
Trip type	Retain only bottomfish trips	109619		
Punch Card Areas	Remove non-rockfish areas (0,5,20,42,51,55,99 (1981-1989); 0,5,6,20,41,42,51,53:56, 61 (1990-2014))	107762		
Boat Type	Remove shore-based trips	106063		
Boat Type	Remove records with missing values	106052		
Remove NAs	1980-1989 Anglers	106026		
Stephens-MacCall	Remove trips not in China habitat	12819	20608	-
Months	Remove months with little to no data (3,10)	12755	20518	104615
Sampling Area	Remove area 52, very few records	12738	20499	102267
Area	Retain only area 4	<b>10428</b>	<b>16193</b>	<b>54285</b>

Table 12: AIC values for each model using the data with Stephens-MacCall filtering for the Washington dockside index.

Model	Binomial	Lognormal
Year	14279.1	9990.2
Year+Month	13920.0	9850.0
Year+Month+BoatType	<b>13905.3</b>	<b>9830.2</b>
Year+Month+BoatType+BagLimits	13905.3	9838.2
Year+Month+BoatType+BagLimits+DepthRestrict	13905.3	9840.2

Table 13: AIC values for each model using the data with Stephens-MacCall filtering and retaining all positive observations for the Washington dockside index.

Model	Binomial	Lognormal
Year	20428.0	17741.0
Year+Month	20062.3	17458.3
Year+Month+BoatType	<b>20057.7</b>	<b>17442.5</b>
Year+Month+BoatType+BagLimits	20057.7	17450.5
Year+Month+BoatType+BagLimits+DepthRestrict	20057.7	17452.5

Table 14: AIC values for each model using the data without Stephens-MacCall filtering Washington dockside index.

Model	Binomial	Lognormal
Year	52916.0	17741.0
Year+Month	52081.0	17458.3
Year+Month+BoatType	<b>51847.9</b>	<b>17442.5</b>
Year+Month+BoatType+BagLimits	51847.9	17450.5
Year+Month+BoatType+BagLimits+DepthRestrict	51847.9	17518.6

Table 15: Washington (Area 4 only) recreational dockside CPUE indices for China rockfish.

Year	Area 4 with			Stephens-MacCall, retain all positive records			Area 4 without Stephens-MacCall		
	Area 4 with Stephens MacCall			Index	SE	CV	Index	SE	CV
	Index	SE	CV						
1981	0.4810	0.1580	0.2820	0.6940	0.1230	0.1540	0.3010	0.0570	0.1660
1982	0.3830	0.0600	0.1690	0.5400	0.0600	0.1050	0.2300	0.0260	0.1060
1983	0.4550	0.0600	0.1340	0.6430	0.0650	0.0980	0.2520	0.0300	0.1130
1984	0.4820	0.0480	0.0930	0.5000	0.0400	0.0710	0.1790	0.0150	0.0720
1985	0.6910	0.0690	0.0920	0.7360	0.0490	0.0590	0.2830	0.0210	0.0650
1986	0.5620	0.0590	0.0960	0.6160	0.0530	0.0770	0.3070	0.0290	0.0830
1987	0.4540	0.0360	0.0750	0.4860	0.0310	0.0600	0.2550	0.0170	0.0620
1988	0.5590	0.0500	0.0810	0.5870	0.0410	0.0640	0.3090	0.0220	0.0650
1989	0.7130	0.0480	0.0650	0.6660	0.0360	0.0510	0.4140	0.0230	0.0520
1990	0.7810	0.0570	0.0710	0.8010	0.0490	0.0560	0.4260	0.0260	0.0560
1991	0.5970	0.0630	0.1000	0.6650	0.0470	0.0660	0.3490	0.0270	0.0710
1992	0.7030	0.0470	0.0680	0.7040	0.0880	0.1090	0.3760	0.0510	0.1180
1993	0.6030	0.0490	0.0790	0.6300	0.0380	0.0570	0.3180	0.0210	0.0620
1994	0.5670	0.0470	0.0750	0.6480	0.0380	0.0540	0.3270	0.0200	0.0560
1995	0.5490	0.0360	0.0640	0.5900	0.0310	0.0510	0.2640	0.0150	0.0540
1996	0.3320	0.0260	0.0810	0.3890	0.0230	0.0600	0.1690	0.0110	0.0640
1997	0.3240	0.0270	0.0880	0.3680	0.0240	0.0670	0.1550	0.0100	0.0660
1998	0.3210	0.0280	0.0970	0.4020	0.0290	0.0750	0.1390	0.0110	0.0810
1999	0.3490	0.0420	0.1190	0.4030	0.0340	0.0810	0.1560	0.0150	0.0940
2000	0.4580	0.0450	0.1030	0.5200	0.0370	0.0710	0.2060	0.0170	0.0810
2001	0.5680	0.0580	0.1010	0.5940	0.0430	0.0680	0.2670	0.0210	0.0730
2002	0.4150	0.0560	0.1310	0.5210	0.0420	0.0770	0.1780	0.0160	0.0880
2003	0.3540	0.0620	0.1610	0.4720	0.0430	0.0870	0.1870	0.0180	0.0940
2004	0.2910	0.0480	0.1690	0.4350	0.0390	0.0930	0.1660	0.0150	0.0970
2005	0.2970	0.0300	0.1050	0.4270	0.0280	0.0650	0.1480	0.0110	0.0770
2006	0.3430	0.0500	0.1450	0.4800	0.0390	0.0810	0.1580	0.0140	0.0880
2007	0.4590	0.0880	0.1770	0.6550	0.0850	0.1130	0.2260	0.0310	0.1200
2008	0.5240	0.0740	0.1260	0.6550	0.0530	0.0700	0.2500	0.0220	0.0780
2009	0.5100	0.0600	0.1160	0.6350	0.0580	0.0810	0.2130	0.0220	0.0930
2010	0.6430	0.1230	0.1490	0.7110	0.1060	0.1110	0.1940	0.0300	0.1170
2011	0.6800	0.0770	0.1160	0.7260	0.0590	0.0750	0.2290	0.0230	0.0920
2012	0.5830	0.1070	0.1600	0.6310	0.0770	0.1040	0.1650	0.0240	0.1210
2013	0.7100	0.0890	0.1180	0.7130	0.0610	0.0780	0.1890	0.0190	0.0920
2014	0.6170	0.1200	0.1650	0.6030	0.0710	0.1030	0.1390	0.0190	0.1180

Table 16: CA South recreational MRFSS dockside data sample sizes at each data filtering step. The bold value indicates the final sample size used for delta-GLM analysis.

Filter	Criteria	Sample size (no. of trips)
Full data set	CPFV trips including counties from San Luis Obispo to Sonoma	2297
Stephens-MacCall	Retain all positive China trips, plus False Positives (trips predicted to be in China habitat, but with no China retained)	446
Poor spatial coverage in year	Drop 1993, 1994 (trips in SLO county only)	<b>431</b>

Table 17: Number of trips by year and region in the CA South recreational MRFSS index.

Year	San Luis Obispo	Monterey-Santa Cruz	S.F. Bay Area	Mendocino- Sonoma
1980	8	10	5	4
1981	4	0	2	5
1982	2	2	3	6
1983	4	4	1	3
1984	7	5	1	4
1985	7	15	17	7
1986	13	11	12	4
1987	8	2	11	5
1988	7	3	9	0
1989	6	3	14	3
1995	4	3	4	8
1996	19	12	24	18
1998	3	5	5	0
1999	17	7	10	4
2000	3	0	7	0
2001	2	5	5	2
2002	6	5	2	3
2003	2	6	1	2

Table 18: AIC values for each model in the CA South MRFSS dockside index.

Model	Binomial	Lognormal
Year	518.90	813.90
Year + Area X	520.90	814.70
Year + Area X + Wave	528.70	822.40
Year + Area X + Wave + Region	518.80	808.20
Year + Area X + Region	510.90	800.90
Year + Region	509.10	804.90
Year + Region + Year:Region	537.40	817.20

Table 19: Year effects for the CA South MRFSS dockside index.

Year	Index	Log-scale SE
1980	0.06	0.26
1981	0.05	0.39
1982	0.08	0.32
1983	0.09	0.31
1984	0.05	0.30
1985	0.06	0.25
1986	0.08	0.18
1987	0.13	0.25
1988	0.12	0.28
1989	0.07	0.27
1995	0.09	0.21
1996	0.04	0.14
1998	0.04	0.27
1999	0.02	0.18
2000	0.04	0.35
2001	0.06	0.30
2002	0.06	0.29
2003	0.05	0.40

Table 20: Sample sizes at each data filtering step for the Oregon Recreational Boat Survey data. The bold value indicates the final sample size used for delta-GLM analysis.

Filter	Criteria	Sample size (no. of trips)
Full data set	Charter boat trips from Oregon (statewide)	36752
Highliners	Retain vessels with 20+ trips;(13% of vessels made 89% of trips)	32394
Missing Effort	Delete records with TripHours=NULL	32387
Remove Multi-day	Delete trips with TripHours>12	31247
No tuna or dive trips	Drop TripType=(T or D); no China caught on tuna trips; CPUE not comparable for dive trips	30665
Extreme counter-indicators	Drop trips with common species that never co-occur with China (Blue shark, white sturgeon, steelhead and albacore)	30004
Delete catch = NA	Delete 3 trips with catch=NA	30001
Pelagic Rockfish Target	Delete trips in which >99% of catch is pelagic rockfish (silvergray, widow, yellowtail, black, blue)	28215
Stephens-MacCall	Retain all positive China trips, plus False Positives (trips predicted to be in China habitat, but with no China retained)	<b>6232</b>

Table 21: Number of trips by year and subregion in the Oregon Recreational Boat Survey (ORBS) charter boat index. Southern Oregon is defined as ports south of Florence. Northern Oregon includes the port of Florence and all ports to the OR-WA border.

Year	Southern Oregon	Northern Oregon
2001	210	176
2002	330	206
2003	270	241
2004	251	120
2005	298	181
2006	274	170
2007	291	151
2008	420	157
2009	256	116
2010	271	155
2011	354	137
2012	329	166
2013	300	171
2014	122	109

Table 22: AIC values for each model in the Oregon Recreational Boat Survey (ORBS) charter boat index. (\*) The binomial model with interaction between year and wave did not converge.

Model	Binomial	Lognormal
Year	8184.0	8791.0
Year + Wave	8119.3	8797.6
Year + Region	8184.6	8688.9
Year + Wave + Region	<b>8118.8</b>	8695.1
Year + Wave + Region + Year:Region	8120.8	8659.3
Year + Wave + Region + Year:Wave	*	8736.8
Year + Region + Year:Region	8189.5	<b>8650.9</b>

Table 23: . The Oregon Recreational Boat Survey (ORBS) charter boat index (area-weighted).

Year	Index	Log-scale SE
2001	0.02	0.08
2002	0.02	0.08
2003	0.02	0.08
2004	0.02	0.09
2005	0.01	0.10
2006	0.02	0.08
2007	0.03	0.08
2008	0.02	0.07
2009	0.01	0.09
2010	0.02	0.09
2011	0.02	0.08
2012	0.02	0.09
2013	0.02	0.08
2014	0.01	0.11

Table 24: Onboard observer dataset filtering criteria and resulting sample sizes used for China rockfish.

Dataset	Filter	Criteria	Positive drifts	Total drifts
Oregon (2001, 2003-2014)	Entire dataset		325	14415
	General data filters	Filters 1-9, section 2.1.6	269	11009
	Depth	< 180 ft (<30 fm)	269	10671
	Midwater drifts	<95% midwater species	266	6579
	Reef	Reefs with China rockfish	259	6038
California (1989-1999)	Entire dataset		881	7712
	General data filters	Filters 1-3, section 2.1.6	880	7050
	Depth	< 360 ft (<60 fm)	880	6495
	Reef	Reefs with China rockfish	852	5557
	Entire dataset		1468	62207
California (2000-2014)	General data filters	Filters 1-9, section 2.1.6	1431	15912
	Depth	< 240 ft (< 40 fm)	1427	15381
	Reef	Reefs with China rockfish	1403	13993

Table 25: AIC and BIC values for each model considered for the Oregon onboard observer index.

Model	AIC	BIC
<b>Logormal submodel</b>		
Year + Wave + Depth + Region + Year:Region + Region:Wave + Wave:Depth	461.20	568.03
Year + Wave + Depth + Region + Wave:Region + Wave:Depth	458.93	522.95
Wave + Depth + Region + Wave:Region + Wave:Depth	445.96	467.3
Wave + Depth + Region + Wave:Depth	444.18	461.97
Wave + Depth + Region		458.48
Wave + Region		<b>452.99</b>
Wave		449.85
1		447.43
<b>Binomial submodel</b>		
Year + Depth + Region + Wave + Year:Region	2121.11	2308.88
Year + Depth + Region + Wave	2116.09	2223.39
Year + Region + Wave		2114.25
Depth + Region + Wave		2148.49
Region + Wave		<b>2140.20</b>

Table 26: Year effects for the Oregon onboard observer index

Year	Index	Log-scale SE
2001	0.0503	0.2462
2003	0.0386	0.2096
2004	0.0306	0.2646
2005	0.0290	0.2871
2006	0.0364	0.2538
2007	0.0582	0.1901
2008	0.0295	0.2450
2009	0.0452	0.2361
2010	0.0128	0.4352
2011	0.0506	0.2890
2012	0.0436	0.2591
2013	0.0256	0.2925
2014	0.0170	0.4147

Table 27: AIC and BIC values for each model considered for the California 1988-1999 onboard observer index.

Model	AIC	BIC
<b>Logormal submodel</b>		
Year + Wave + Depth + Region + Year:Region + Region:Wave + Depth:Wave	599.29	1077.61
Year + Wave + Depth + Region + Wave:Region + Wave:Depth	565.35	844.77
Year + Wave + Depth + Region + Wave:Depth	552.56	737.25
Year + Wave + Depth + Region	540.09	653.74
Year + Depth + Region	532.50	
Depth + Region + Wave		611.27
Depth + Region		<b>580.73</b>
<b>Binomial submodel</b>		
Year + Depth + Region + Wave	4059.48	4217.86
Year + Depth + Region		<b>4201.99</b>

Table 28: Year effects for the California 1988-1999 onboard observer index

Year	Index	Log-scale SE
1988	0.0889	0.1264
1989	0.0770	0.1426
1990	0.1394	0.2216
1991	0.0693	0.2013
1992	0.0422	0.1498
1993	0.0406	0.1427
1994	0.0506	0.1351
1995	0.0332	0.1547
1996	0.0378	0.1208
1997	0.0246	0.1293
1998	0.0206	0.1614
1999	0.0446	0.2663

Table 29: AIC and BIC values for each model considered for the California 2000-2014 onboard observer index.

Model	AIC	BIC
<b>Logormal submodel</b>		
Year + Wave + Depth + Region + Year:Region + Region:Wave + Depth:Wave	2348.95	2927.52
Year + Wave + Depth + Region + Wave:Region + Wave:Depth	2316.05	2571.45
Year + Wave + Depth + Region + Wave:Depth	2308.72	2493.08
Year + Wave + Depth + Region	2301.14	2372.95
Year + Depth + Region	<b>2299.87</b>	<b>2273.95</b>
Year + Region		2339.58
<b>Binomial submodel</b>		
Depth + Region + Wave + Year	8025.34	8219.59
Depth + Region + Wave		8165.79
Depth + Region + Year	<b>8023.65</b>	
Depth + Region		8144.34

Table 30: Year effects for the California 2000-2014 onboard observer index

Year	Index	Log-scale SE
2000	0.0199	0.0198
2001	0.0465	0.0465
2002	0.0850	0.0849
2003	0.0691	0.0690
2004	0.0665	0.0665
2005	0.0694	0.0693
2006	0.0669	0.0668
2007	0.0774	0.0773
2008	0.0988	0.0985
2009	0.1266	0.1261
2010	0.0964	0.0961
2011	0.0925	0.0923
2012	0.0653	0.0652
2013	0.0457	0.0457
2014	0.0464	0.0464

Table 31: The annual number of China rockfish sampled by WDFW for ages and lengths.

Year	N fish lengths	N fish ages
1979	40	0
1980	2	0
1981	24	0
1983	2	0
1995	36	0
1996	16	0
1997	9	0
1998	58	50
1999	180	55
2000	55	55
2001	38	26
2002	69	11
2003	60	0
2004	223	171
2005	363	206
2006	277	89
2007	220	119
2008	143	73
2009	118	22
2010	78	22
2011	182	50
2012	76	24
2013	172	11
2014	441	414

Table 32: Number of length and age port samples and fish sampled in Oregon.  
Source: PacFIN.

Year	State	Fish condition	N port samples with lengths	N fish length samples	N port samples with ages	N fish age samples
1998	OR	Alive	23	100	0	0
1999	OR	Alive	74	93	0	0
2000	OR	Alive	196	1095	0	0
2001	OR	Alive	239	1858	13	16
2002	OR	Alive	294	1339	0	0
2003	OR	Alive	196	794	0	0
2004	OR	Alive	170	586	0	0
2005	OR	Alive	93	194	0	0
2006	OR	Alive	121	408	0	0
2007	OR	Alive	156	680	0	0
2008	OR	Alive	117	348	0	0
2009	OR	Alive	144	348	32	1
2010	OR	Alive	174	454	0	0
2011	OR	Alive	260	688	0	0
2012	OR	Alive	161	446	0	0
2013	OR	Alive	194	423	0	0
2014	OR	Alive	175	355	0	0
1995	OR	Dead	33	102	0	0
1996	OR	Dead	45	118	0	0
1998	OR	Dead	23	38	0	0
1999	OR	Dead	74	37	0	0
2000	OR	Dead	196	137	0	0
2001	OR	Dead	239	196	13	47
2002	OR	Dead	294	253	55	121
2003	OR	Dead	196	200	74	181
2004	OR	Dead	170	115	21	55
2005	OR	Dead	93	23	7	14
2006	OR	Dead	121	30	7	29
2007	OR	Dead	156	44	14	40
2008	OR	Dead	117	28	13	26
2009	OR	Dead	144	82	32	79
2010	OR	Dead	174	75	40	65
2011	OR	Dead	260	309	103	307
2012	OR	Dead	161	156	59	152
2013	OR	Dead	194	265	86	260
2014	OR	Dead	175	165	0	0

Table 33: Number of length samples and fish sampled in California, south of  $40^{\circ}10'$ .  
 Source:CALCOM.

	Year	Number of clusters	Number of fish
Dead fish	1992	26	207
	1993	22	158
	1994	54	313
	1995	10	59
	1996	16	63
	1997	19	81
	1998	2	23
	2006	1	-
Live fish	1997	11	47
	1999	24	48
	2000	31	85
	2001	17	72
	2002	8	57
	2003	6	26
	2004	29	85
	2005	28	90
	2006	13	26
	2007	22	95
	2008	9	67
	2009	22	142
	2010	12	84
	2011	13	17
	2012	5	12

Table 34: Sample sizes of available length at age data by region and fleet. California North/South is defined as north/south of  $40^{\circ}10'$ , Oregon North/South is defined as north/south of Florence, OR, and Washington North/South is defined as south=MCAs 1-2 and north=MCAs 3-4.

Region	Comm. dead	Comm. live	Rec. mode unknown	Rec. party/ charter	Rec. private	Research	Rec./ Research
California North	0	0	0	0	0	19	0
California South	0	0	0	83	0	159	113
Oregon North	7	0	0	0	439	0	0
Oregon South	1371	17	0	1	359	0	0
Washington North	0	0	266	27	1088	0	0
Washington South	0	0	0	14	0	0	0

Table 35: von Bertalanffy growth parameters for each region, with age-0 fixed at 2 cm.

Region	$L_\infty$	Standard Error	$k$	Standard Error	$t_0$	Sample size
Califirnia South	33.62	0.23	0.23	0.01	-0.26	339
California North	39.44	1.48	0.14	0.02	-0.36	19
Oregon South	36.58	0.09	0.22	0.00	-0.26	1668
Oregon North	36.94	0.20	0.23	0.01	-0.24	432
Washignton South	41.37	1.63	0.13	0.04	-0.37	11
Washington North	34.77	0.10	0.22	0.01	-0.27	1261

Table 36: Description of model parameters in the northern base-case assessment model.

Parameter	Number esti- mated	Bounds (low,high)	Prior (Mean, SD)	Estimate Type
Natural mortality ( $M$ )	0	-	-	0.070
$L(R_0)$	1	(2,12)	-	3.531
Steepness ( $h$ )	0	-	-	0.773
<b>Growth</b>				
Length at age 0	0	-	-	2.000
Length at age 30	1	(20,50)	(34,10) Normal	35.410
von Bertalanffy k	1	(0.01,0.3)	(0.1,0.8) Normal	0.147
CV of length at age 0	0	-	-	0.100
CV of length at age 30	1	(0.01,0.25)	-	0.080
<b>Indices</b>				
Extra SD - northern WA recreational private	1	(0,2)	-	0.126
<b>Selectivity</b>				
Length at peak selectivity for northern WA recreational CPFV	1		-	34.890
Ascending width - northern WA recreational CPFV	1	(0,9)	-	3.970
Length at peak selectivity for southern WA recreational	1		-	34.860
Ascending width - southern WA recreational	1	(0,9)	-	2.920

Table 37: Description of model parameters in the central base-case assessment model.

Parameter	Number estimated	Bounds (low,high)	Prior (Mean, SD)	Estimate
			Type	
Natural mortality ( $M$ )	0	-	-	0.070
$L(R_0)$	1	(3,12)	-	4.270
Steepness ( $h$ )	0	-	-	0.773
<b>Growth</b>				
Length at age 0	0	-	-	2.000
Length at age 30	1	(20,50)	(34,10) Normal	36.850
von Bertalanffy k	1	(0.01,0.3)	-	0.159
CV of length at age 0	0	-	-	0.100
CV of length at age 30	1	(0,2)	-	0.080
<b>Indices</b>				
Extra SD - southern OR commercial live-fish fishery	1	(0,2)	-	0.020
Extra SD - northern OR recreational private	1	(0,2)	-	0.500
Extra SD - southern OR recreational ORBS	1	(0,2)	-	0.090
<b>Selectivity</b>				
Length at peak selectivity - northern CA commercial dead-fish fishery	1	(19,45)	-	33.340
Ascending width - northern CA commercial live-fish fishery	1	(0,9)	-	2.710
Length at peak selectivity - northern CA commercial live-fish fishery	1	(19,45)	-	32.700
Ascending width - northern CA commercial dead-fish fishery				2.680
Length at peak selectivity - northern CA recreational party/charter	0	-	-	39.900
Ascending width - northern CA recreational party/charter	1	(0,9)	-	3.430
Length at peak selectivity - northern CA recreational private	0	-	-	39.900
Ascending width - northern CA recreational private	1	(0,9)	-	3.840
Length at peak selectivity - Southern OR commercial dead-fish fishery	1	(0,9)	-	33.680
Ascending width - southern OR commercial dead-fish fishery	1	(19,45)	-	2.180
Length at peak selectivity - Southern OR commercial live-fish fishery			-	32.360
Ascending width - southern OR commercial live-fish fishery			-	1.080
Length at peak selectivity - southern OR recreational party/charter	0	-	-	39.900
Ascending width - southern OR recreational party/charter	129	(0,9)	-	3.660
Length at peak selectivity - southern OR recreational private	0	-	-	39.900
Ascending width - southern OR recreational private	1	(0,9)	-	3.590

Table 38: Description of model parameters in the southern base-case assessment model.

Parameter	Number estimated	Bounds (low,high)	Estimate
Natural mortality ( $M$ )	0	-	0.070
$L(R_0)$	1	-	5.040
Steepness ( $h$ )	0	-	0.773
<b>Growth</b>			
Length at age 0	0	-	2.000
Length at age 30	1	(25, 45)	31.500
von Bertalanffy k	1	(0.05, 0.3)	0.144
CV of length at age 0	0	-	0.100
CV of length at age 30	1	(0.03,0.2)	0.120
<b>Indices</b>			
Extra SD - Recreational dockside CPFV 1988-1999	1	(0,2)	0.120
Extra SD - Recreational onboard CPFV 2000-2014	1	(0,2)	0.150
Extra SD - Recreational onboard CPFV 2000-2014	1	(0,2)	0.180
<b>Selectivity</b>			
Length at peak selectivity - Commercial dead-fish fishery	1	(19, 45)	32.660
Ascending width - Commercial dead-fish fishery	1	(0,9)	3.314
Length at peak selectivity - Commercial live-fish fishery	0	(20,40)	35.540
Ascending width - Commercial live-fish fishery	1	(0,9)	2.457
Length at peak selectivity - Recreational dockside CPFV	1	(19,45)	33.190
Ascending width - Recreational dockside CPFV	1	(0,9)	3.519
Length at peak selectivity - Recreational dockside private	1	(19,45)	34.500
Ascending width - Recreational dockside private	1	(0,9)	3.513
Length at peak selectivity - Commercial discard	1	(19,45)	27.640
Ascending width - Commercial discard	1	(0,9)	3.443
Descending width - Commercial discard	1	(0,9)	2.665

Table 39: results from 100 jitters from each of the three models.

Status	North	Central	South
Returned to base case	100	94	67
Found local minimum	0	0	32
Found better solution	0	0	0
Error in likelihood	0	6	1
Total	100	100	100

Table 40: Sensitivity of the northern model to dropping or down-weighting data sources and alternative assumptions about growth.

Label	Base (Francis weights)	Harmonic mean weights)	Drop index	Drop ages	Down- weight lengths	Free size Age0	Free CV Amin	External growth
TOTAL_like	1011.10	1062.10	1043.50	13.20	976.00	991.10	993.40	1214.70
Catch_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equil_catch_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Survey_like	-32.80	-33.30	0.00	-36.90	-32.60	-31.00	-32.20	-36.90
Length_comp_like	45.90	95.60	46.20	44.60	12.30	46.20	45.90	46.70
Age_comp_like	992.50	994.20	991.70	0.00	990.70	969.40	974.30	1199.50
Parm_priors_like	5.60	5.60	5.60	5.60	5.60	6.60	5.60	5.60
SSB_Unfished_thousand_mt	0.06	0.07	0.06	0.13	0.06	0.06	0.06	0.12
TotBio_Unfished	152.30	155.90	146.30	298.50	150.80	155.50	150.00	285.20
SmyrBio_Unfished	149.80	153.50	143.90	289.50	148.30	146.70	147.90	277.50
Recr_Unfished_billions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSB_Btgt_thousand_mt	0.03	0.03	0.02	0.05	0.03	0.02	0.03	0.05
SPR_Btgt	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Fstd_Btgt	0.05	0.05	0.05	0.06	0.05	0.04	0.05	0.06
TotYield_Btgt_thousand_mt	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
SSB_SPRtgt_thousand_mt	0.03	0.03	0.03	0.06	0.03	0.03	0.03	0.06
Fstd_SPRtgt	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.05
TotYield_SPRtgt_thousand_mt	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
SSB_MSY_thousand_mt	0.01	0.02	0.01	0.03	0.01	0.01	0.01	0.03
SPR_MSY	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Fstd_MSY	0.08	0.08	0.08	0.10	0.08	0.08	0.08	0.10
TotYield_MSY_thousand_mt	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
RetYield_MSY	3.70	3.70	3.60	7.90	3.70	3.40	3.50	7.40
Bratio_2015	0.52	0.52	0.50	0.78	0.52	0.47	0.49	0.76
F_2015	1.03	1.03	1.02	1.07	1.04	1.01	1.02	1.06
SPRRatio_2015	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Recr_2015	13.30	13.40	12.80	24.60	13.20	12.40	12.90	22.90
Recr_Virgin_billions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L_at_Amin_Fem_GP_1	2.00	2.00	2.00	2.00	2.00	16.10	2.00	2.00
L_at_Amax_Fem_GP_1	35.10	35.30	35.00	34.30	34.90	35.40	35.70	34.90
VonBert_K_Fem_GP_1	0.15	0.15	0.15	0.24	0.16	0.08	0.13	0.22
CV_young_Fem_GP_1	0.10	0.10	0.10	0.10	0.10	0.10	0.25	0.10
CV_old_Fem_GP_1	0.08	0.08	0.08	0.09	0.08	0.09	0.07	0.10

Table 41: Sensitivity of the central model to dropping or down-weighting data sources and alternative assumptions about growth.

Label	Base (Francis weights)	Harmonic mean weights)	Drop index	Drop ages	Down-weight lengths	Free size	Free CV	External growth
	1840.01	1936.34	1884.28	132.68	1662.40	1837.61	1826.10	2188.79
TOTAL_like								
Catch_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equil_catch_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Survey_like	-44.27	-44.32	0.00	-42.71	-43.88	-44.15	-44.01	-44.05
Length_comp_like	214.50	299.23	214.82	169.79	69.28	224.63	216.25	196.77
Age_comp_like	1664.16	1675.82	1663.83	0.00	1631.38	1651.29	1648.23	2030.47
Parm_priors_like	5.62	5.61	5.62	5.59	5.61	5.83	5.62	5.60
SSB_Unfished_thousand_mt	0.20	0.21	0.20	786.00	0.19	0.20	0.19	0.41
TotBio_Unfished	455.75	468.05	454.45	1813900.00420.14	449.69	428.12	428.12	891.43
SmryBio_Unfished	449.09	460.76	447.81	1793850.00414.36	438.68	422.33	422.33	866.34
Recr_Unfished_billions	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00
SSB_Btgt_thousand_mt	0.08	0.08	0.08	314.40	0.07	0.08	0.08	0.16
SPR_Btgt	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Fstd_Btgt	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.06
TotYield_Btgt_thousand_mt	0.01	0.01	0.01	34.75	0.01	0.01	0.01	0.02
SSB_SPRtgt_thousand_mt	0.09	0.10	0.09	361.86	0.09	0.09	0.09	0.19
Fstd_SPRtgt	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
TotYield_SPRtgt_thousand_mt	0.01	0.01	0.01	32.32	0.01	0.01	0.01	0.02
SSB_MSY_thousand_mt	0.09	0.10	0.09	361.86	0.09	0.09	0.09	0.19
SPR_MSY	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Fstd_MSY	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
TotYield_MSY_thousand_mt	0.01	0.01	0.01	32.32	0.01	0.01	0.01	0.02
RetYield_MSY	8.76	9.05	8.74	32323.80	8.28	8.42	8.15	18.92
Bratio_2015	0.42	0.44	0.42	1.00	0.38	0.40	0.38	0.73
F_2015	0.99	0.99	0.98	1.15	0.95	0.97	0.95	1.04
SPRratio_2015	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00
ForeRecr_2015_billions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recr_2015	31.98	33.31	31.88	162746.00	29.73	30.71	29.97	60.47
Recr_Virgin_billions	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00
L_at_Amin_Fem_GP_1	2.00	2.00	2.00	2.00	2.00	8.46	2.00	2.00
L_at_Amax_Fem_GP_1	37.44	37.18	37.44	36.65	37.32	37.55	37.67	36.57
VonBert_K_Fem_GP_1	0.14	0.15	0.14	0.11	0.14	0.12	0.13	0.23
CV_young_Fem_GP_1	0.10	0.10	0.10	0.10	0.10	0.10	0.25	0.10
CV_old_Fem_GP_1	0.08	0.07	0.08	0.06	0.08	0.08	0.07	0.10

Table 42: Sensitivity of the southern model to dropping or down-weighting data sources and alternative assumptions about growth.

Label	Base (Francis weights)	Drop indices	Drop dis- card	Down- weight lengths	Drop ages	No data weight- ing	Harmonic mean weights	External growth	Estimate h and M
TOTAL_like	616.21	637.67	570.09	341.55	329.65	1409.01	487.91	831.09	590.51
Survey_like	-21.51	-21.48	-21.28	-18.42	-22.01	-21.66	-21.34	-18.99	
Length_comp_like	362.17	362.35	321.64	95.76	339.29	1143.33	290.39	469.57	348.49
Age_comp_like	268.94	268.81	269.92	264.06	277.06	213.54	357.30	253.04	
Parm_priors_like	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
R0_billions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SR_BH_stEEP	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.92
NatM_p_1_Fem_GP_1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10
NatM_p_1_Mal_GP_1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L_at_Amax_Fem_GP_1	31.60	31.57	31.40	32.54	25.10	32.06	32.17	33.62	33.28
L_at_Amax_Mal_GP_1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VonBert_K_Fem_GP_1	0.16	0.16	0.16	0.16	0.03	0.14	0.15	0.23	0.14
VonBert_K_Mal_GP_1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SPB_Virgin_thousand_mt	0.38	0.38	0.35	0.41	0.57	0.37	0.39	0.43	0.30
Bratio_2015	0.30	0.30	0.28	0.29	0.42	0.24	0.28	0.23	0.58
SPRratio_2014	0.99	0.97	1.00	1.00	0.83	1.12	1.02	1.11	0.53

Table 43: Time-series of population estimates from the northern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploita- tion rate	SPR
1900	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1901	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1902	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1903	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1904	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1905	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1906	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1907	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1908	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1909	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1910	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1911	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1912	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1913	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1914	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1915	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1916	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1917	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1918	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1919	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1920	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1921	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1922	240.81	24.44	0.00	71.27	0.00	0.00	1.00
1923	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1924	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1925	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1926	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1927	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1928	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1929	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1930	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1931	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1932	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1933	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1934	240.81	24.45	0.00	71.27	0.00	0.00	1.00
1935	240.81	24.45	0.00	71.26	0.00	0.00	1.00
1936	240.81	24.45	0.00	71.25	0.00	0.00	1.00

Table 43: Time-series of population estimates from the northern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1937	240.81	24.45	0.00	71.24	0.00	0.00	1.00
1938	240.81	24.45	0.00	71.23	0.00	0.00	1.00
1939	240.81	24.45	0.00	71.21	0.00	0.00	1.00
1940	240.81	24.45	0.00	71.15	0.00	0.00	1.00
1941	240.81	24.45	0.00	71.12	0.00	0.00	1.00
1942	240.81	24.45	0.00	71.12	0.00	0.00	1.00
1943	240.81	24.45	0.00	71.12	0.00	0.00	1.00
1944	240.81	24.45	0.00	71.12	0.00	0.00	1.00
1945	240.81	24.45	0.00	71.13	0.00	0.00	1.00
1946	240.81	24.45	0.00	71.14	0.00	0.00	1.00
1947	240.81	24.45	0.00	71.14	0.00	0.00	1.00
1948	240.81	24.45	0.00	71.15	0.00	0.00	1.00
1949	240.81	24.45	0.00	71.15	0.00	0.00	1.00
1950	240.81	24.45	0.00	71.16	0.00	0.00	1.00
1951	240.81	24.45	0.00	71.16	0.00	0.00	1.00
1952	240.81	24.45	0.00	71.17	0.00	0.00	1.00
1953	240.81	24.45	0.00	71.17	0.00	0.00	1.00
1954	240.81	24.45	0.00	71.18	0.00	0.00	1.00
1955	240.81	24.45	0.00	71.18	0.00	0.00	1.00
1956	240.81	24.45	0.00	71.19	0.00	0.00	1.00
1957	240.81	24.45	0.00	71.19	0.00	0.00	1.00
1958	240.81	24.45	0.00	71.19	0.00	0.00	1.00
1959	240.81	24.45	0.00	71.20	0.00	0.00	1.00
1960	240.81	24.45	0.00	71.20	0.00	0.00	1.00
1961	240.81	24.45	0.00	71.20	0.00	0.00	1.00
1962	240.81	24.45	0.00	71.21	0.00	0.00	1.00
1963	240.81	24.45	0.00	71.21	0.00	0.00	1.00
1964	240.81	24.45	0.00	71.21	0.00	0.00	1.00
1965	240.81	24.45	0.00	71.22	0.00	0.00	1.00
1966	240.81	24.45	0.00	71.22	0.00	0.00	1.00
1967	223.10	24.45	0.00	71.22	1.31	0.00	0.91
1968	219.59	24.30	0.99	71.22	1.59	0.00	0.89
1969	216.26	24.14	0.99	71.23	1.86	0.17	0.87
1970	212.77	23.94	0.98	71.23	2.15	0.20	0.86
1971	209.43	23.73	0.97	71.23	2.43	0.23	0.84
1972	206.14	23.49	0.96	71.23	2.71	0.26	0.82
1973	202.90	23.24	0.95	71.23	2.99	0.29	0.80

Table 43: Time-series of population estimates from the northern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1974	199.78	22.97	0.94	71.23	3.26	0.32	0.79
1975	196.57	22.68	0.93	71.22	3.54	0.35	0.77
1976	214.30	22.37	0.92	71.21	1.88	0.19	0.86
1977	220.01	22.26	0.91	71.19	1.42	0.14	0.89
1978	192.86	22.22	0.91	71.17	3.86	0.39	0.75
1979	200.66	21.91	0.90	71.15	3.03	0.31	0.79
1980	205.14	21.70	0.89	71.08	2.59	0.27	0.82
1981	207.54	21.56	0.88	71.05	2.36	0.24	0.83
1982	202.51	21.45	0.88	71.01	2.79	0.29	0.80
1983	199.61	21.30	0.87	70.96	3.04	0.32	0.79
1984	195.44	21.13	0.86	70.90	3.40	0.36	0.77
1985	195.36	20.93	0.86	70.85	3.38	0.36	0.77
1986	189.14	20.74	0.85	70.83	3.96	0.42	0.73
1987	179.59	20.50	0.84	70.81	4.96	0.53	0.69
1988	170.71	20.16	0.82	70.77	5.97	0.65	0.64
1989	162.49	19.73	0.81	70.74	6.97	0.77	0.60
1990	154.63	19.20	0.79	70.69	7.98	0.90	0.56
1991	181.08	18.60	0.76	70.60	4.32	0.50	0.69
1992	154.69	18.41	0.75	70.57	7.62	0.89	0.56
1993	160.67	17.89	0.73	70.50	6.53	0.78	0.59
1994	174.30	17.50	0.72	70.44	4.74	0.58	0.66
1995	179.99	17.33	0.71	70.33	4.13	0.51	0.69
1996	194.01	17.24	0.71	70.19	2.86	0.35	0.76
1997	195.80	17.29	0.71	70.07	2.72	0.33	0.77
1998	205.73	17.37	0.71	69.87	1.99	0.24	0.82
1999	199.21	17.52	0.72	69.58	2.50	0.30	0.79
2000	192.84	17.61	0.72	69.16	3.02	0.37	0.75
2001	185.80	17.64	0.72	68.95	3.63	0.44	0.72
2002	199.49	17.61	0.72	68.64	2.49	0.30	0.79
2003	200.97	17.69	0.72	68.28	2.39	0.29	0.80
2004	203.26	17.79	0.73	68.19	2.23	0.27	0.81
2005	197.68	17.89	0.73	68.19	2.68	0.32	0.78
2006	202.56	17.94	0.73	68.27	2.31	0.28	0.80
2007	194.62	18.03	0.74	68.31	2.95	0.35	0.76
2008	192.08	18.04	0.74	68.26	3.16	0.38	0.75
2009	196.57	18.03	0.74	68.20	2.79	0.33	0.77
2010	186.33	18.06	0.74	68.17	3.68	0.44	0.72

Table 43: Time-series of population estimates from the northern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
2011	190.94	17.99	0.74	68.22	3.26	0.39	0.74
2012	194.38	17.97	0.74	68.17	2.96	0.35	0.76
2013	189.33	17.98	0.74	68.09	3.40	0.41	0.74
2014	193.65	17.94	0.73	68.06	3.02	0.36	0.76
2015	207.26	17.95	0.73	68.15			

Table 44: Time-series of population estimates from the central base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1900	591.21	65.10	0.00	71.27	0.02	0.00	1.00
1901	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1902	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1903	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1904	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1905	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1906	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1907	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1908	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1909	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1910	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1911	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1912	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1913	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1914	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1915	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1916	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1917	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1918	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1919	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1920	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1921	591.52	65.10	1.00	71.27	0.00	0.00	1.00
1922	591.52	65.11	1.00	71.27	0.00	0.00	1.00
1923	591.52	65.11	1.00	71.27	0.00	0.00	1.00

Table 44: Time-series of population estimates from the central base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1924	591.52	65.11	1.00	71.27	0.00	0.00	1.00
1925	591.52	65.11	1.00	71.27	0.00	0.00	1.00
1926	591.52	65.11	1.00	71.27	0.00	0.00	1.00
1927	591.52	65.11	1.00	71.27	0.00	0.00	1.00
1928	591.52	65.11	1.00	71.27	0.00	0.00	1.00
1929	590.91	65.11	1.00	71.27	0.04	0.00	1.00
1930	590.91	65.10	1.00	71.27	0.04	0.00	1.00
1931	591.37	65.10	1.00	71.27	0.01	0.00	1.00
1932	590.90	65.10	1.00	71.27	0.04	0.00	1.00
1933	589.96	65.09	1.00	71.27	0.10	0.00	1.00
1934	576.20	65.08	1.00	71.27	1.00	0.04	0.97
1935	578.59	64.97	1.00	71.26	0.84	0.03	0.97
1936	572.04	64.87	1.00	71.25	1.28	0.05	0.96
1937	578.72	64.73	0.99	71.24	0.83	0.03	0.97
1938	546.27	64.65	0.99	71.23	3.11	0.11	0.91
1939	510.29	64.30	0.99	71.21	5.98	0.22	0.84
1940	539.47	63.62	0.98	71.15	3.57	0.13	0.90
1941	575.21	63.26	0.97	71.12	1.04	0.04	0.97
1942	579.63	63.21	0.97	71.12	0.75	0.03	0.98
1943	589.79	63.21	0.97	71.12	0.11	0.00	1.00
1944	591.05	63.29	0.97	71.12	0.03	0.00	1.00
1945	590.11	63.37	0.97	71.13	0.09	0.00	1.00
1946	588.55	63.45	0.97	71.14	0.19	0.01	0.99
1947	589.48	63.52	0.98	71.14	0.13	0.00	1.00
1948	589.18	63.59	0.98	71.15	0.15	0.01	1.00
1949	588.45	63.66	0.98	71.15	0.20	0.01	0.99
1950	588.43	63.72	0.98	71.16	0.20	0.01	0.99
1951	588.12	63.77	0.98	71.16	0.22	0.01	0.99
1952	590.50	63.82	0.98	71.17	0.07	0.00	1.00
1953	590.50	63.89	0.98	71.17	0.07	0.00	1.00
1954	590.36	63.95	0.98	71.18	0.08	0.00	1.00
1955	590.22	64.00	0.98	71.18	0.09	0.00	1.00
1956	589.93	64.06	0.98	71.19	0.11	0.00	1.00
1957	588.22	64.10	0.98	71.19	0.22	0.01	0.99
1958	589.94	64.13	0.99	71.19	0.11	0.00	1.00
1959	590.21	64.18	0.99	71.20	0.09	0.00	1.00
1960	590.79	64.22	0.99	71.20	0.05	0.00	1.00

Table 44: Time-series of population estimates from the central base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1961	590.80	64.27	0.99	71.20	0.05	0.00	1.00
1962	591.09	64.31	0.99	71.21	0.03	0.00	1.00
1963	591.09	64.35	0.99	71.21	0.03	0.00	1.00
1964	590.78	64.39	0.99	71.21	0.05	0.00	1.00
1965	590.48	64.43	0.99	71.22	0.07	0.00	1.00
1966	590.10	64.46	0.99	71.22	0.09	0.00	1.00
1967	590.36	64.48	0.99	71.22	0.08	0.00	1.00
1968	591.09	64.51	0.99	71.22	0.03	0.00	1.00
1969	590.52	64.54	0.99	71.23	0.07	0.00	1.00
1970	591.23	64.57	0.99	71.23	0.02	0.00	1.00
1971	591.09	64.59	0.99	71.23	0.03	0.00	1.00
1972	590.36	64.62	0.99	71.23	0.08	0.00	1.00
1973	578.63	64.64	0.99	71.23	0.90	0.03	0.97
1974	569.95	64.56	0.99	71.23	1.53	0.06	0.96
1975	580.81	64.42	0.99	71.22	0.74	0.03	0.98
1976	560.72	64.37	0.99	71.21	2.22	0.08	0.94
1977	556.23	64.16	0.99	71.19	2.55	0.09	0.93
1978	548.50	63.91	0.98	71.17	3.16	0.12	0.91
1979	502.84	63.61	0.98	71.15	7.38	0.27	0.82
1980	534.51	62.85	0.97	71.08	4.24	0.16	0.89
1981	515.89	62.48	0.96	71.05	5.88	0.22	0.85
1982	511.82	61.94	0.95	71.01	6.16	0.23	0.84
1983	501.86	61.39	0.94	70.96	7.01	0.26	0.82
1984	507.75	60.78	0.93	70.90	6.37	0.24	0.83
1985	532.57	60.27	0.93	70.85	4.22	0.16	0.88
1986	526.29	60.03	0.92	70.83	4.73	0.18	0.87
1987	510.84	59.75	0.92	70.81	6.02	0.23	0.84
1988	520.90	59.34	0.91	70.77	5.01	0.19	0.86
1989	493.93	59.07	0.91	70.74	7.45	0.29	0.80
1990	458.94	58.53	0.90	70.69	10.84	0.43	0.73
1991	509.33	57.63	0.89	70.60	5.83	0.23	0.83
1992	466.45	57.34	0.88	70.57	9.64	0.39	0.75
1993	478.27	56.63	0.87	70.50	8.55	0.35	0.77
1994	432.68	56.09	0.86	70.44	13.23	0.54	0.68
1995	412.03	55.03	0.85	70.33	15.20	0.63	0.64
1996	422.65	53.78	0.83	70.19	13.55	0.57	0.66
1997	376.65	52.77	0.81	70.07	19.41	0.83	0.57

Table 44: Time-series of population estimates from the central base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1998	338.53	51.13	0.79	69.87	25.30	1.12	0.50
1999	302.11	48.88	0.75	69.58	32.27	1.48	0.42
2000	358.64	45.92	0.71	69.16	19.38	0.94	0.54
2001	322.70	44.59	0.68	68.95	24.75	1.23	0.46
2002	307.76	42.70	0.66	68.64	26.49	1.36	0.44
2003	381.77	40.72	0.63	68.28	14.35	0.77	0.58
2004	420.97	40.23	0.62	68.19	10.19	0.55	0.66
2005	455.05	40.26	0.62	68.19	7.45	0.40	0.73
2006	435.82	40.64	0.62	68.27	9.03	0.48	0.69
2007	395.91	40.85	0.63	68.31	12.84	0.68	0.61
2008	386.54	40.63	0.62	68.26	13.70	0.73	0.59
2009	396.64	40.31	0.62	68.20	12.63	0.68	0.61
2010	438.29	40.12	0.62	68.17	8.76	0.47	0.69
2011	390.59	40.38	0.62	68.22	13.30	0.72	0.60
2012	378.64	40.11	0.62	68.17	14.55	0.79	0.57
2013	398.85	39.71	0.61	68.09	12.25	0.67	0.61
2014	459.21	39.57	0.61	68.06	7.04	0.39	0.73
2015	496.73	40.03	0.61	68.15			

Table 45: Time-series of population estimates from the southern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1900	768.57	66.51	0.00	154.47	0.00	0.00	1.00
1901	763.29	66.51	0.00	154.47	0.38	0.00	0.99
1902	758.09	66.48	1.00	154.46	0.77	0.00	0.98
1903	752.96	66.41	1.00	154.45	1.15	0.03	0.97
1904	747.89	66.32	1.00	154.43	1.53	0.04	0.97
1905	742.88	66.19	1.00	154.41	1.92	0.05	0.96
1906	737.90	66.03	0.99	154.39	2.30	0.06	0.95
1907	732.99	65.85	0.99	154.35	2.68	0.08	0.94
1908	728.10	65.64	0.99	154.32	3.06	0.09	0.93
1909	723.25	65.41	0.98	154.28	3.45	0.10	0.92
1910	718.43	65.15	0.98	154.23	3.83	0.11	0.92

Table 45: Time-series of population estimates from the southern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1911	713.64	64.88	0.98	154.18	4.21	0.12	0.91
1912	708.86	64.58	0.97	154.13	4.60	0.13	0.90
1913	704.10	64.26	0.97	154.07	4.98	0.14	0.89
1914	699.36	63.93	0.96	154.01	5.36	0.16	0.88
1915	694.62	63.57	0.96	153.95	5.75	0.17	0.88
1916	689.90	63.21	0.95	153.88	6.13	0.18	0.87
1917	653.53	62.82	0.94	153.81	9.52	0.28	0.81
1918	636.92	62.16	0.93	153.68	11.13	0.33	0.78
1919	669.92	61.39	0.92	153.53	7.74	0.23	0.84
1920	667.66	60.95	0.92	153.44	7.89	0.24	0.83
1921	682.38	60.51	0.91	153.35	6.52	0.20	0.86
1922	692.68	60.22	0.91	153.30	5.61	0.17	0.87
1923	687.06	60.03	0.90	153.26	6.07	0.18	0.86
1924	718.52	59.82	0.90	153.21	3.51	0.11	0.92
1925	707.29	59.84	0.90	153.22	4.39	0.13	0.90
1926	675.04	59.79	0.90	153.21	7.08	0.22	0.84
1927	687.04	59.51	0.89	153.15	6.02	0.18	0.86
1928	667.94	59.34	0.89	153.11	7.68	0.24	0.83
1929	677.13	59.04	0.89	153.05	6.85	0.21	0.85
1930	648.16	58.82	0.88	153.00	9.47	0.29	0.80
1931	700.01	58.38	0.88	152.91	4.90	0.15	0.89
1932	633.64	58.36	0.88	152.91	10.86	0.34	0.78
1933	695.43	57.83	0.87	152.79	5.24	0.16	0.88
1934	648.67	57.80	0.87	152.78	9.32	0.29	0.80
1935	653.13	57.44	0.86	152.70	8.85	0.28	0.81
1936	650.27	57.12	0.86	152.63	9.08	0.29	0.80
1937	650.94	56.81	0.85	152.56	8.99	0.29	0.80
1938	677.75	56.52	0.85	152.49	6.60	0.21	0.85
1939	715.44	56.44	0.85	152.48	3.64	0.12	0.91
1940	704.74	56.63	0.85	152.52	4.50	0.14	0.89
1941	701.66	56.75	0.85	152.55	4.73	0.15	0.89
1942	730.21	56.85	0.85	152.57	2.58	0.08	0.94
1943	714.57	57.13	0.86	152.63	3.72	0.12	0.91
1944	737.08	57.30	0.86	152.67	2.11	0.07	0.95
1945	728.89	57.60	0.87	152.74	2.71	0.09	0.93
1946	697.21	57.85	0.87	152.79	5.16	0.16	0.88
1947	706.17	57.87	0.87	152.80	4.44	0.14	0.90

Table 45: Time-series of population estimates from the southern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1948	652.17	57.94	0.87	152.81	9.15	0.29	0.81
1949	622.88	57.62	0.87	152.74	12.07	0.38	0.76
1950	631.71	57.04	0.86	152.61	11.13	0.35	0.77
1951	608.04	56.58	0.85	152.51	13.58	0.43	0.73
1952	621.47	55.92	0.84	152.35	11.95	0.39	0.75
1953	635.21	55.42	0.83	152.24	10.43	0.34	0.78
1954	629.98	55.07	0.83	152.16	10.96	0.36	0.77
1955	613.58	54.71	0.82	152.07	12.62	0.41	0.74
1956	600.78	54.22	0.82	151.95	13.92	0.46	0.72
1957	598.01	53.65	0.81	151.80	14.08	0.47	0.72
1958	531.30	53.09	0.80	151.66	22.71	0.76	0.61
1959	560.62	51.84	0.78	151.34	18.05	0.62	0.65
1960	583.40	51.03	0.77	151.11	15.01	0.52	0.69
1961	593.94	50.51	0.76	150.97	13.66	0.48	0.71
1962	606.30	50.14	0.75	150.86	12.28	0.43	0.73
1963	574.33	49.90	0.75	150.79	15.70	0.55	0.68
1964	627.12	49.40	0.74	150.65	10.10	0.36	0.76
1965	564.85	49.39	0.74	150.65	16.68	0.59	0.66
1966	545.95	48.85	0.73	150.49	18.86	0.68	0.63
1967	506.38	48.15	0.72	150.28	24.26	0.88	0.57
1968	523.68	47.03	0.71	149.93	21.14	0.78	0.59
1969	532.14	46.21	0.69	149.66	19.55	0.73	0.61
1970	452.71	45.56	0.68	149.44	32.19	1.22	0.48
1971	496.17	43.90	0.66	148.86	23.55	0.92	0.55
1972	437.26	43.01	0.65	148.53	33.45	1.32	0.46
1973	409.94	41.36	0.62	147.89	38.11	1.55	0.41
1974	387.68	39.39	0.59	147.06	41.88	1.77	0.38
1975	382.96	37.20	0.56	146.06	40.75	1.80	0.37
1976	359.26	35.21	0.53	145.04	44.92	2.07	0.33
1977	365.91	32.97	0.50	143.77	40.27	1.95	0.34
1978	399.26	31.20	0.47	142.67	30.77	1.55	0.40
1979	348.00	30.27	0.46	142.04	41.31	2.12	0.32
1980	352.25	28.58	0.43	140.81	37.79	2.02	0.32
1981	475.79	27.24	0.41	139.75	16.51	0.91	0.52
1982	378.69	27.62	0.42	140.06	31.23	1.71	0.36
1983	463.14	26.90	0.40	139.47	17.59	0.98	0.50
1984	475.80	27.25	0.41	139.76	16.56	0.91	0.52

Table 45: Time-series of population estimates from the southern base case model.

Year	Total biomass (mt)	Spawning biomass (mt)	Depletion	Age-0 recruits	Total catch (mt)	Relative exploitation rate	SPR
1985	395.06	27.70	0.42	140.12	28.24	1.54	0.39
1986	336.55	27.26	0.41	139.77	40.76	2.25	0.30
1987	283.50	25.87	0.39	138.57	55.84	3.21	0.22
1988	318.38	23.36	0.35	136.11	39.32	2.44	0.27
1989	314.51	22.12	0.33	134.74	37.98	2.45	0.27
1990	309.96	21.02	0.32	133.40	37.36	2.50	0.26
1991	284.22	19.99	0.30	132.05	42.75	2.95	0.22
1992	248.89	18.62	0.28	130.07	52.53	3.80	0.17
1993	251.37	16.58	0.25	126.67	46.27	3.62	0.18
1994	211.76	15.07	0.23	123.71	64.20	5.35	0.13
1995	219.17	12.46	0.19	117.43	49.66	4.66	0.13
1996	244.94	10.95	0.16	112.88	34.18	3.46	0.17
1997	223.69	10.52	0.16	111.40	38.67	4.00	0.14
1998	302.93	9.85	0.15	108.98	19.14	2.06	0.25
1999	288.07	10.43	0.16	111.08	22.29	2.32	0.23
2000	293.00	10.85	0.16	112.52	21.75	2.22	0.24
2001	301.58	11.30	0.17	113.98	21.07	2.12	0.25
2002	317.02	11.77	0.18	115.42	19.68	1.95	0.27
2003	329.63	12.28	0.18	116.93	18.75	1.83	0.29
2004	431.25	12.81	0.19	118.36	10.13	0.97	0.45
2005	367.72	13.85	0.21	120.98	16.37	1.50	0.35
2006	408.52	14.43	0.22	122.32	13.22	1.19	0.41
2007	407.40	15.17	0.23	123.93	14.00	1.22	0.41
2008	392.92	15.82	0.24	125.23	15.97	1.35	0.39
2009	354.49	16.29	0.24	126.13	21.10	1.76	0.33
2010	356.28	16.36	0.25	126.27	20.45	1.70	0.33
2011	386.08	16.44	0.25	126.42	17.01	1.41	0.38
2012	400.64	16.76	0.25	126.99	15.60	1.27	0.40
2013	458.34	17.17	0.26	127.71	11.29	0.90	0.49
2014	450.56	17.90	0.27	128.94	12.45	0.96	0.48
2015	446.54	18.57	0.28	129.99			

Table 46: Projection of potential China rockfish OFL, spawning biomass, and depletion for the northern base case model.

Year	OFL contriubtion (mt)	ACL landings (mt)	Age 5+ biomass (mt)	Spawning Biomass (mt)	Depletion
2015	9.51	1.97	182.58	17.95	0.73
2016	9.57	2.03	183.59	18.07	0.74
2017	9.63	8.81	184.50	18.18	0.74
2018	9.29	8.50	179.23	17.55	0.72
2019	8.98	8.22	174.48	16.98	0.69
2020	8.69	7.96	170.21	16.47	0.67
2021	8.43	7.72	166.38	16.00	0.65
2022	8.20	7.51	162.98	15.58	0.64
2023	7.99	7.31	159.93	15.20	0.62
2024	7.80	7.14	157.22	14.86	0.61

Table 47: Projection of potential China rockfish OFL, spawning biomass, and depletion for the central base case model.

Year	OFL contriubtion (mt)	ACL landings (mt)	Age 5+ biomass (mt)	Spawning Biomass (mt)	Depletion
2015	19.80	4.64	381.29	40.03	0.61
2016	20.17	4.78	387.10	40.75	0.63
2017	20.52	18.79	392.54	41.44	0.64
2018	20.05	18.36	384.93	40.52	0.62
2019	19.62	17.96	377.97	39.66	0.61
2020	19.21	17.58	371.64	38.87	0.60
2021	18.84	17.24	365.94	38.15	0.59
2022	18.50	16.93	360.84	37.49	0.58
2023	18.19	16.65	356.26	36.90	0.57
2024	17.91	16.40	352.17	36.38	0.56

Table 48: Projection of potential China rockfish OFL, spawning biomass, and depletion for the southern base case model.

Year	OFL contribution (mt)	ACL landings (mt)	Age 5+ biomass (mt)	Spawning Biomass (mt)	Depletion
2015	12.48	13.11	280.18	18.57	0.28
2016	12.89	13.11	287.26	19.19	0.29
2017	13.31	10.81	294.24	19.82	0.30
2018	13.84	11.46	303.00	20.63	0.31
2019	14.34	12.07	311.12	21.38	0.32
2020	14.80	12.64	318.62	22.09	0.33
2021	15.24	13.17	325.53	22.74	0.34
2022	15.63	13.65	331.90	23.34	0.35
2023	16.00	14.10	337.78	23.90	0.36
2024	16.34	14.51	343.23	24.40	0.37

2743 **9 Figures**

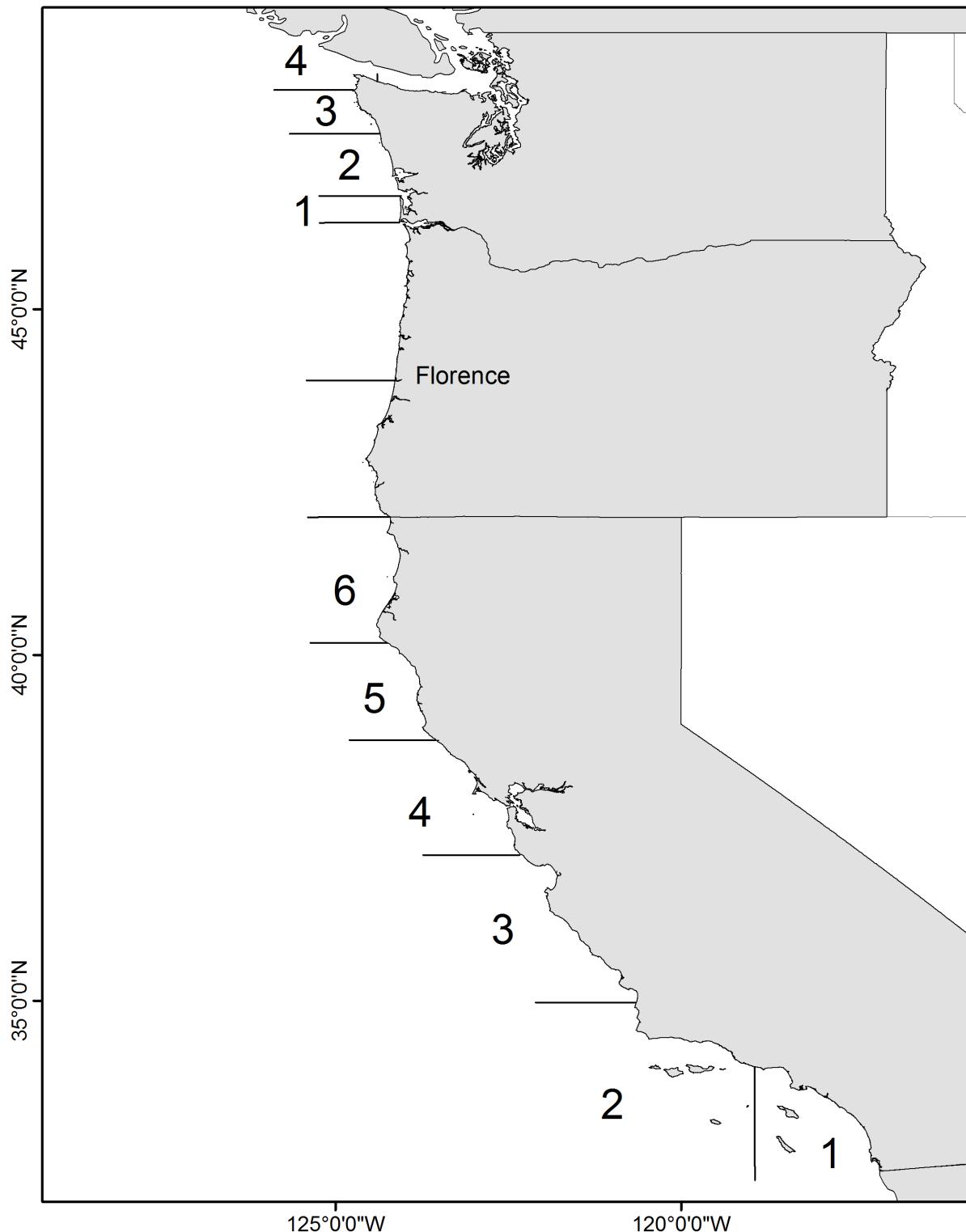


Figure 1: Map showing the state boundary lines for management of the recreational fishing fleets. CRFS Districts 1-6 in California are presented as well as the WDFW Recreational Management Areas in Washington. Florence, OR is shown as a potential location of model stratification.

### Data by type and year

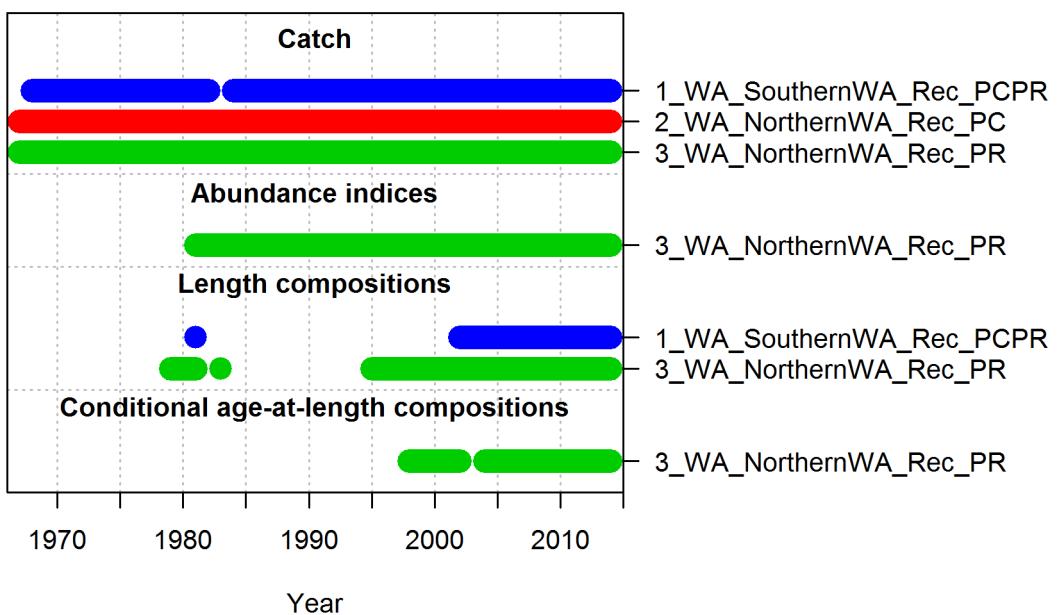


Figure 2: Summary of data sources used in the northern assessment.

### Data by type and year

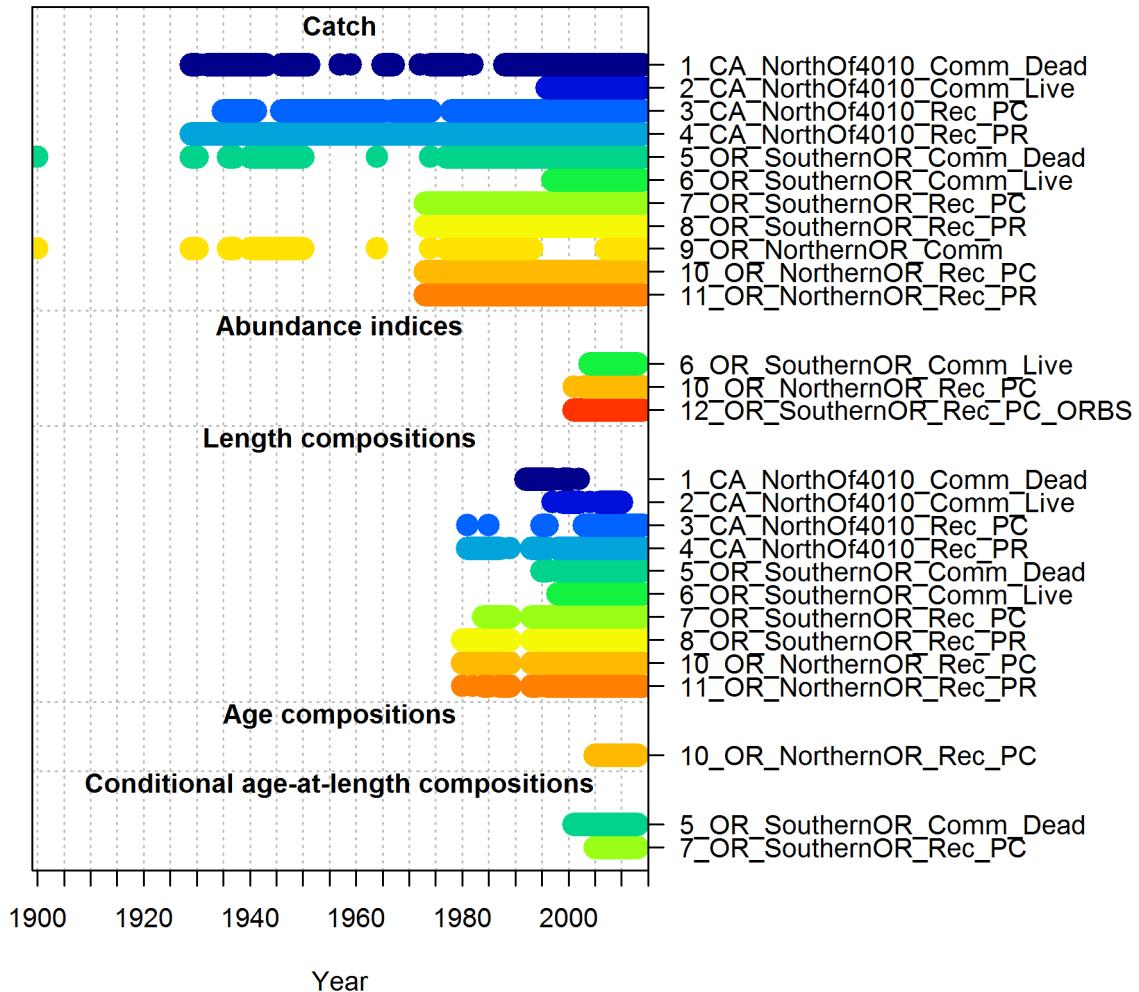


Figure 3: Summary of data sources used in the central assessment.

### Data by type and year

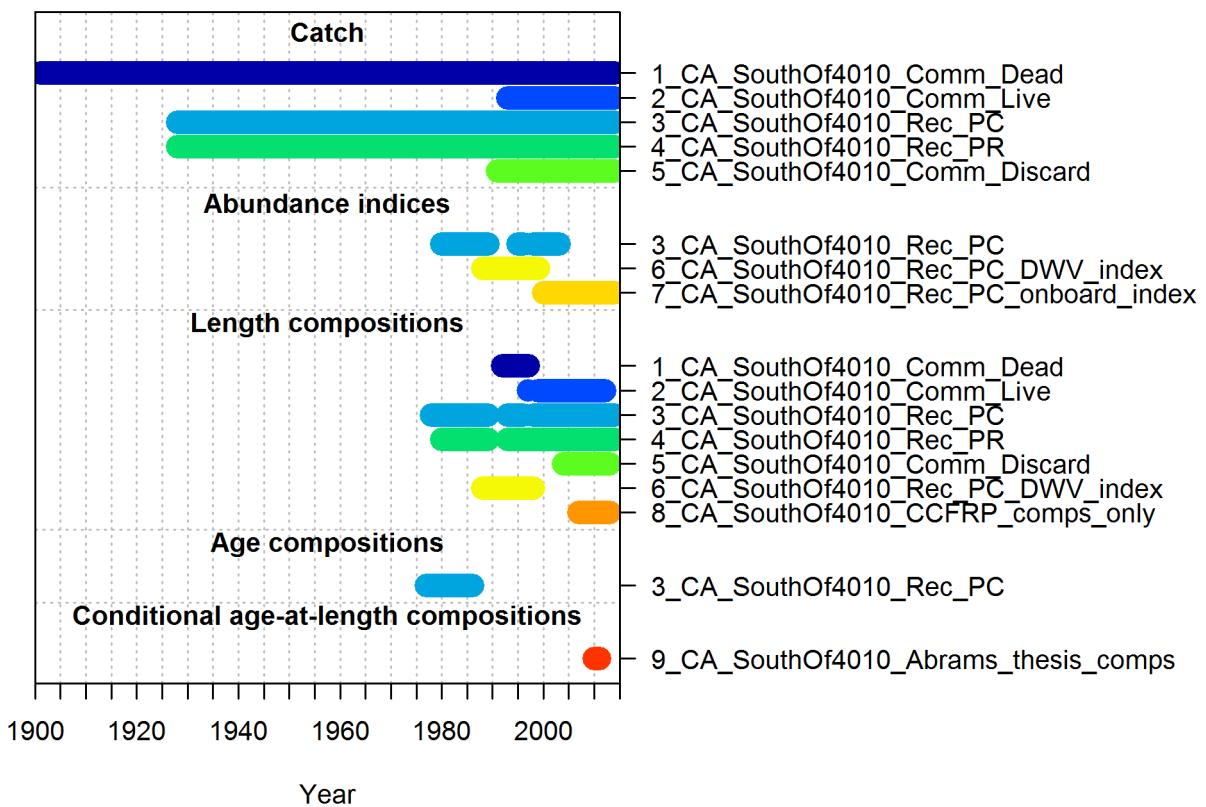


Figure 4: Summary of data sources used in the southern assessment.

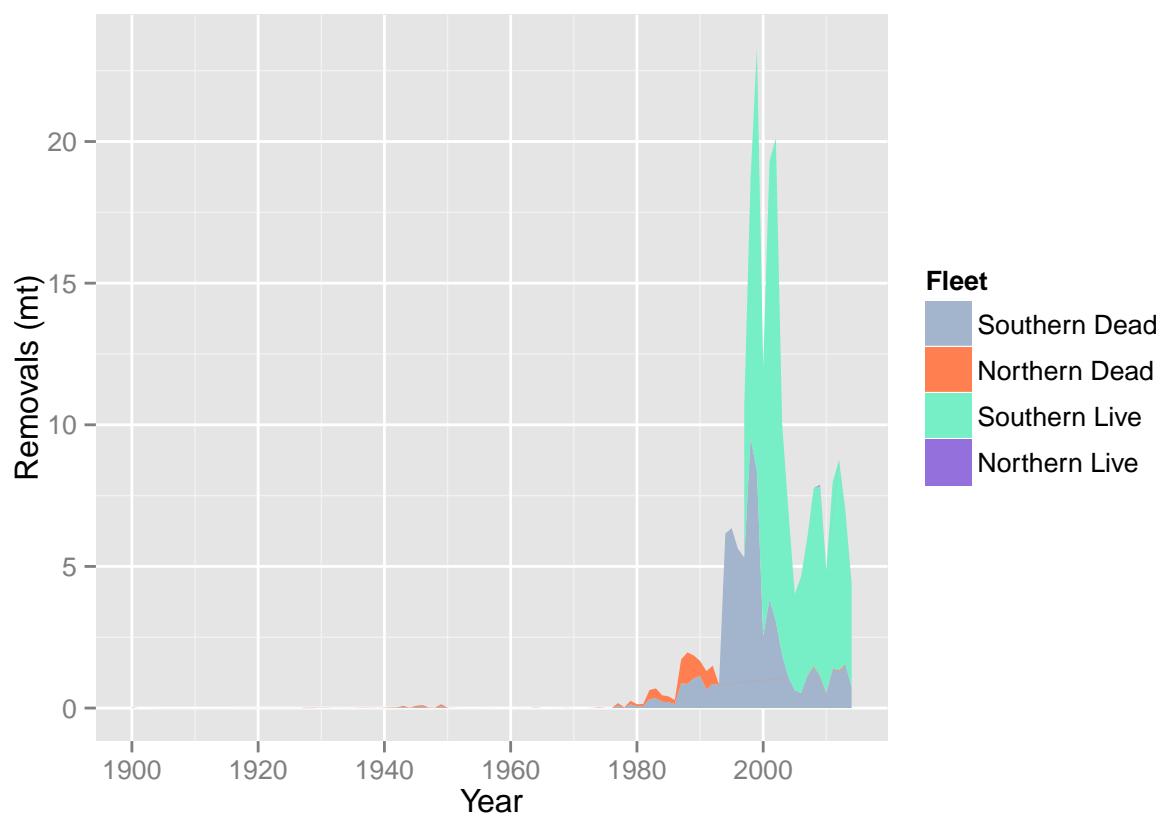


Figure 5: Removals (mt) from the Oregon commercial fleet, north and south of Florence, OR.

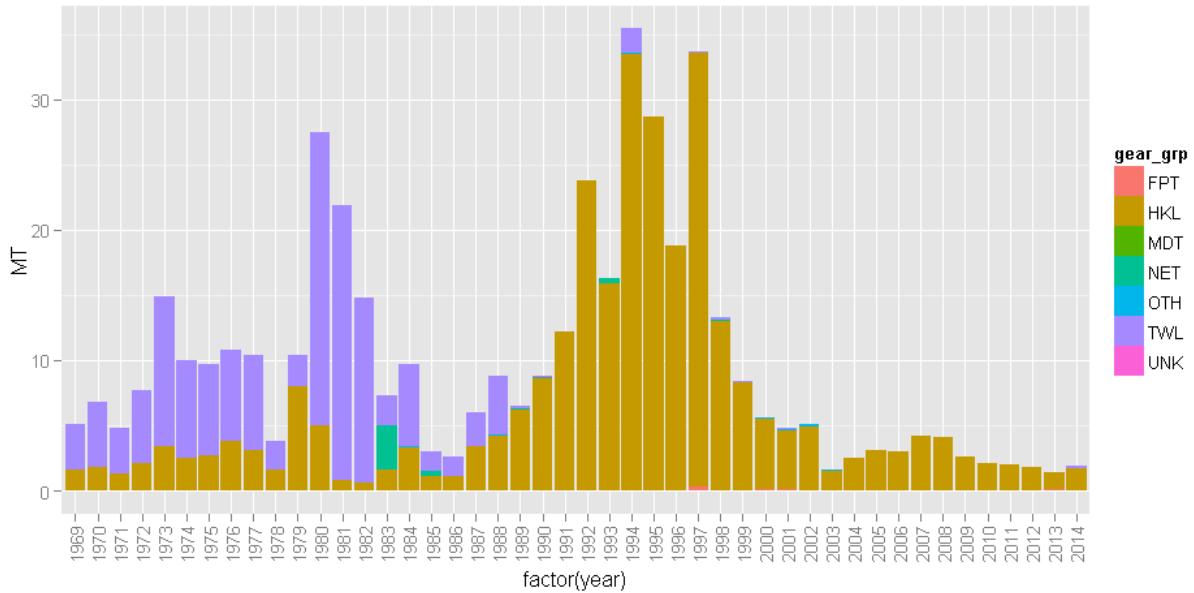


Figure 6: Estimated commercial landings of China rockfish (mt) in California by year and gear group (Source: CALCOM).

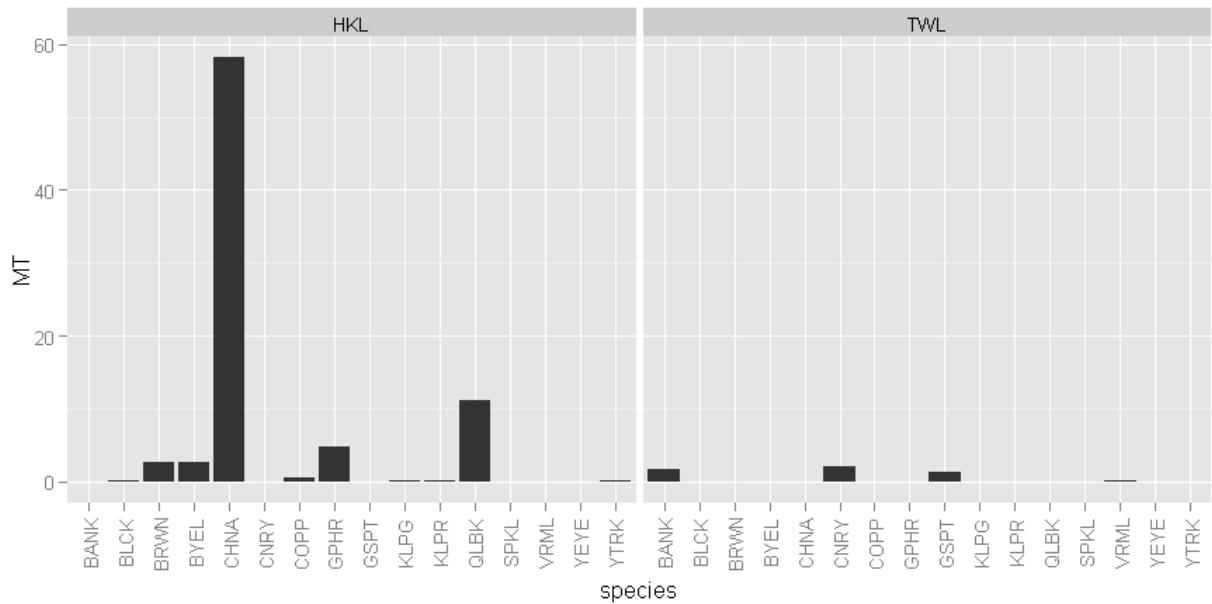


Figure 7: California commercial landings (mt) based on port samples in the China rockfish market category (258) by species and gear group, 1969-2014. hook-and-line (“HKL”) gears are landing nearshore species in this category, mainly China rockfish, whereas trawl (“TWL”) gears landed species with a deeper depth distribution, and no China rockfish.

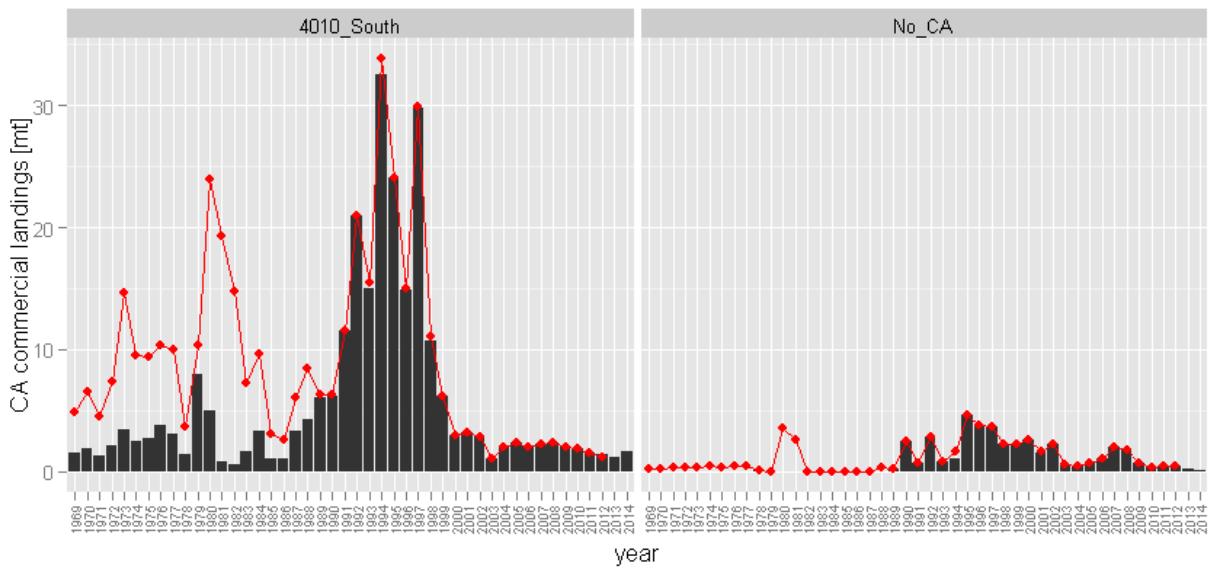


Figure 8: Revised California commercial landing estimates (mt) of China rockfish, north and south of Cape Mendocino, 1969-2014 (black bars). Estimates of California's annual landed commercial catch used in the 2013 stock assessment are plotted for comparison (red line).

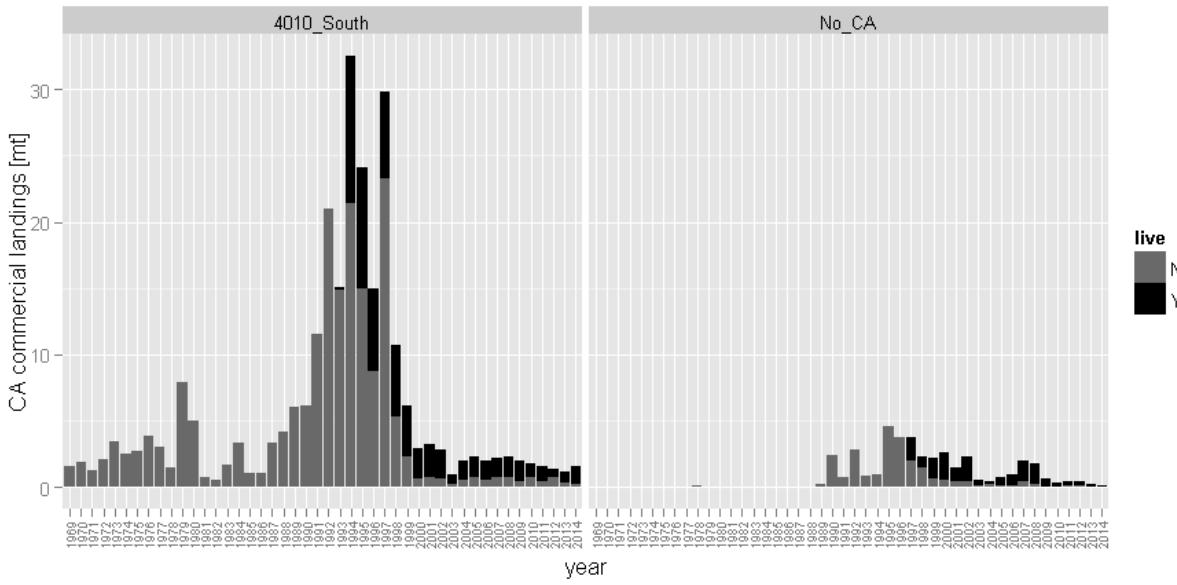


Figure 9: Revised commercial landing estimates (mt) of China rockfish landed live and dead, north and south of Cape Mendocino, 1969-2014.

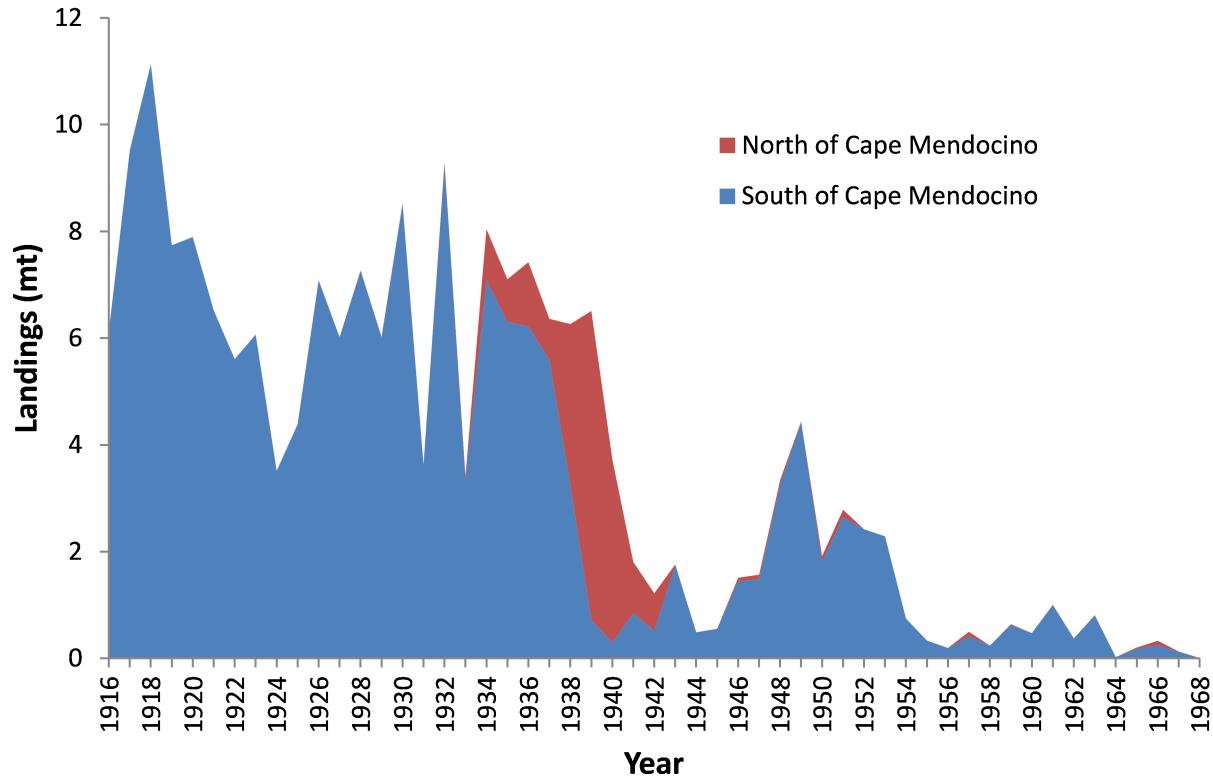
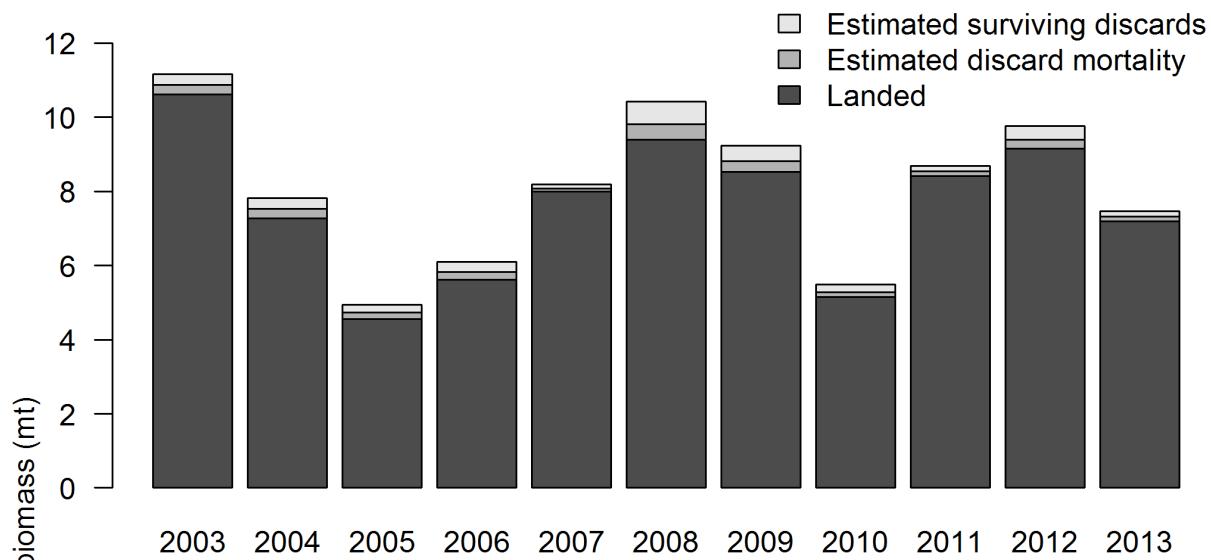


Figure 10: Reconstructed historical commercial landings of China rockfish in California, excluding trawl gear landings, 1916-1968. Source: Ralston et al. 2010

### North of $40^{\circ}10'$



### South of $40^{\circ}10'$

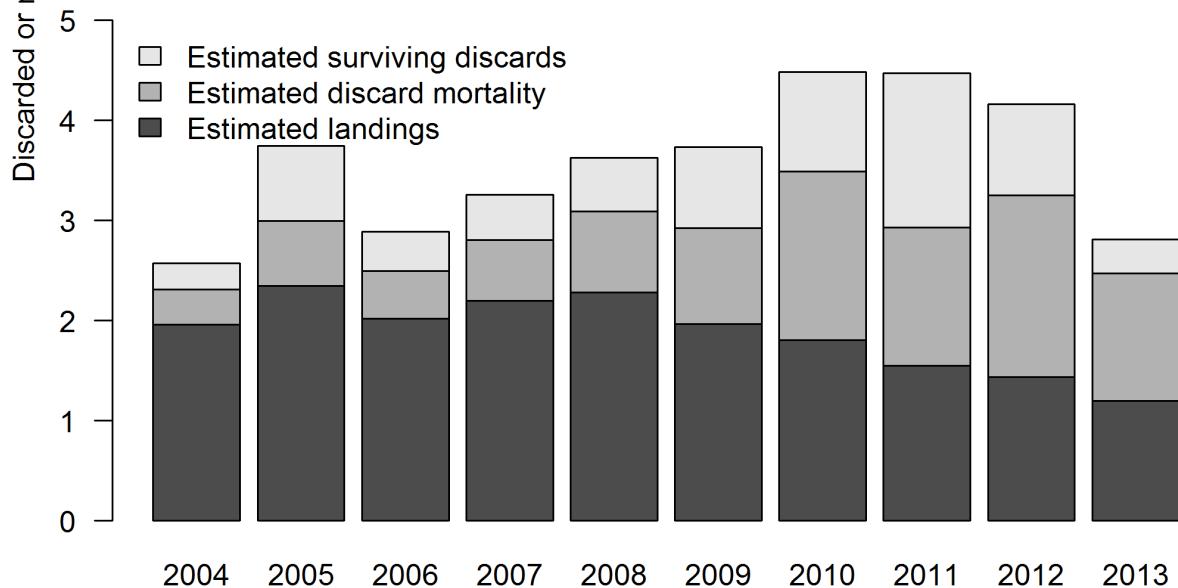


Figure 11: Estimates of discarded and retained China rockfish north and south of  $40^{\circ}10'$  in the commercial Nearshore Fixed-gear fishery. Note that the y-axis limits and range of years differ between panels.

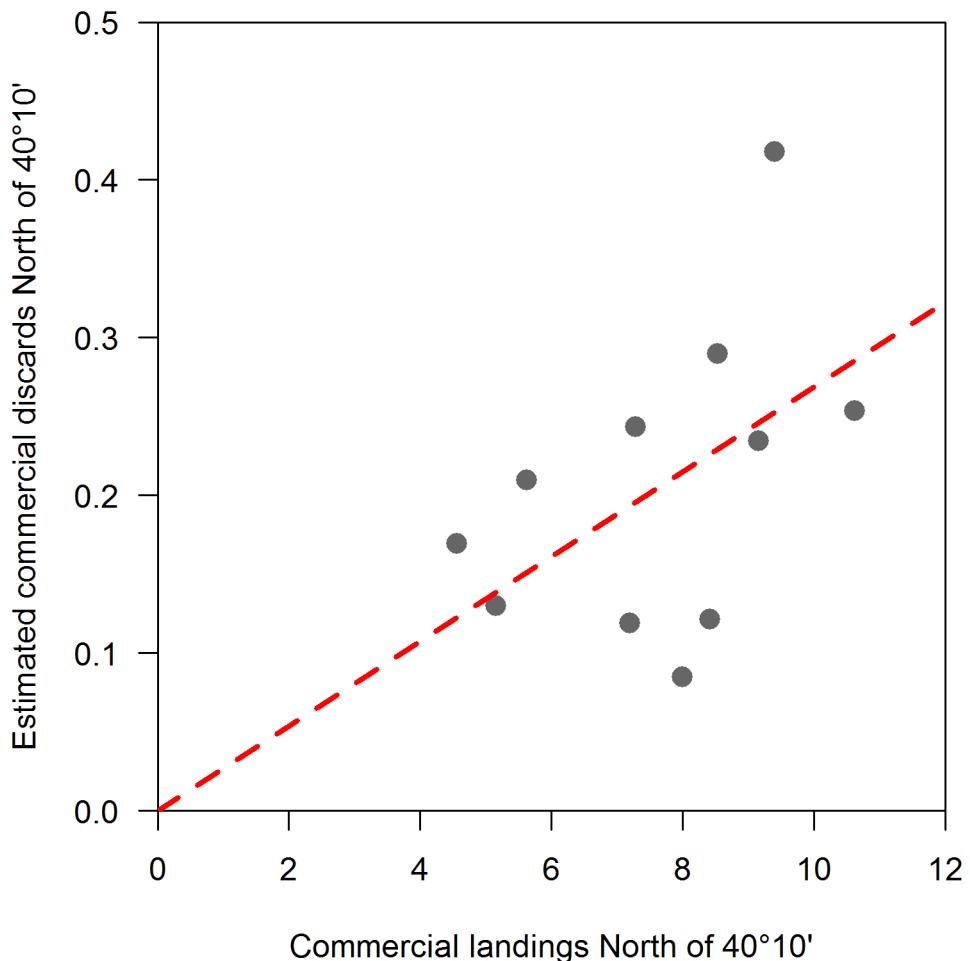


Figure 12: Relationship between estimated discards and landings of China rockfish in the Nearshore Fixed-gear fishery north of  $40^{\circ}10'$ . The gray points indicate estimates from individual years and the red line is a linear regression through those estimates with intercept fixed at 0. The slope of the linear regression is 0.0269, indicating that discards on average represent 2.69% of the landings in this sector.

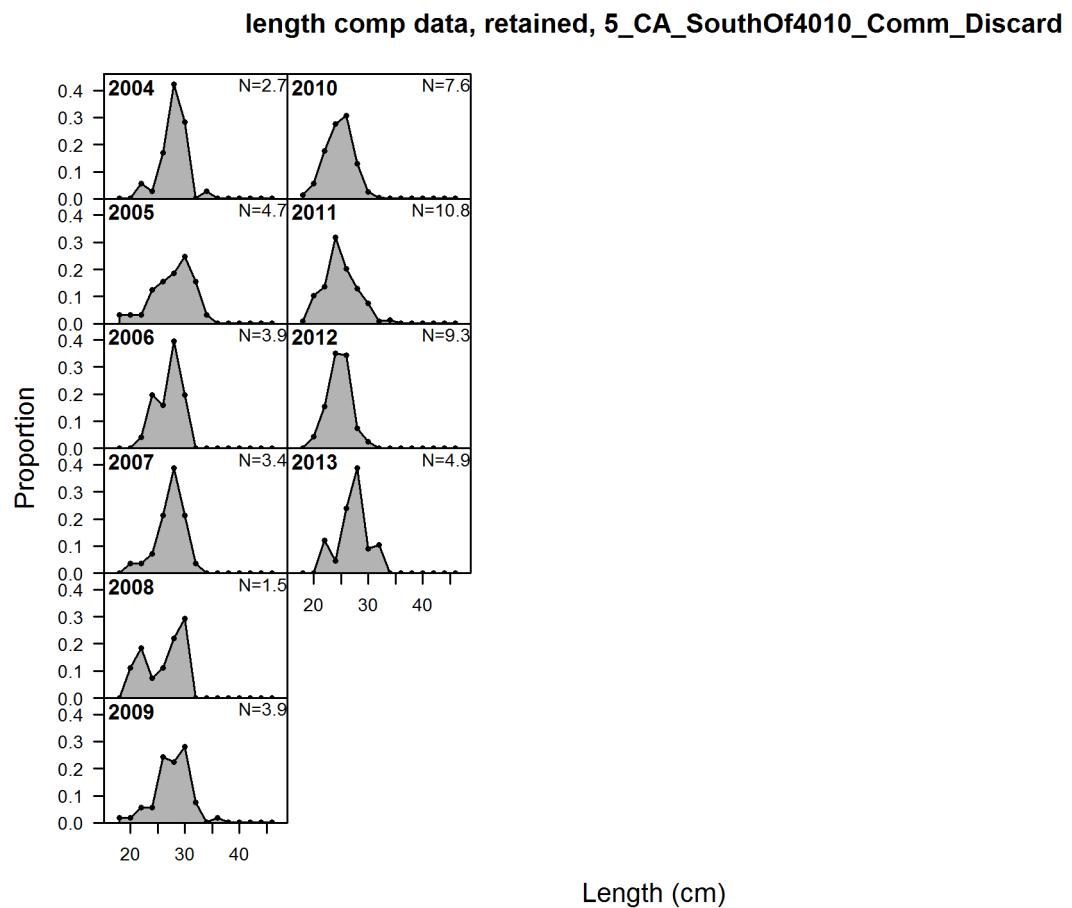


Figure 13: Length compositions by year for discarded fish in the California commercial fishery south of  $40^{\circ}10'$ .

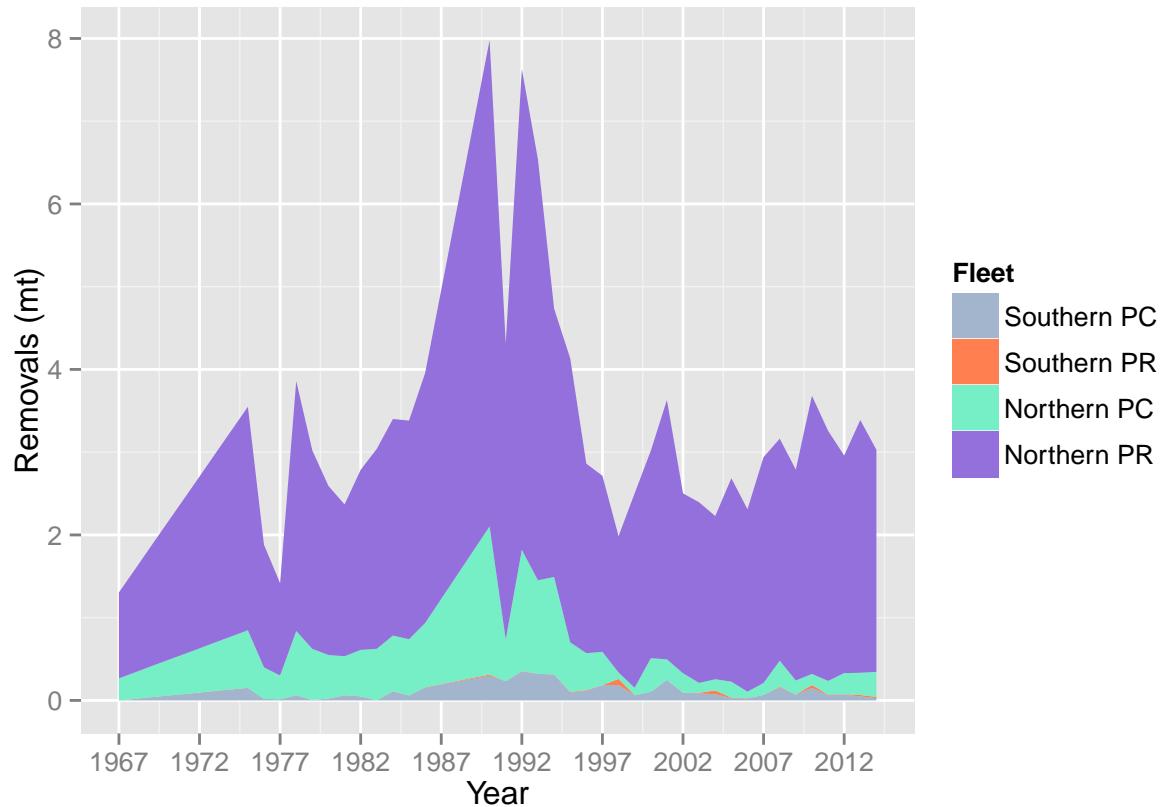


Figure 14: Removals (mt) from the Washington recreational party/charter and private sectors. Northern WA represents MCAs 3 and 4 and southern WA represents MCAs 1 and 2.

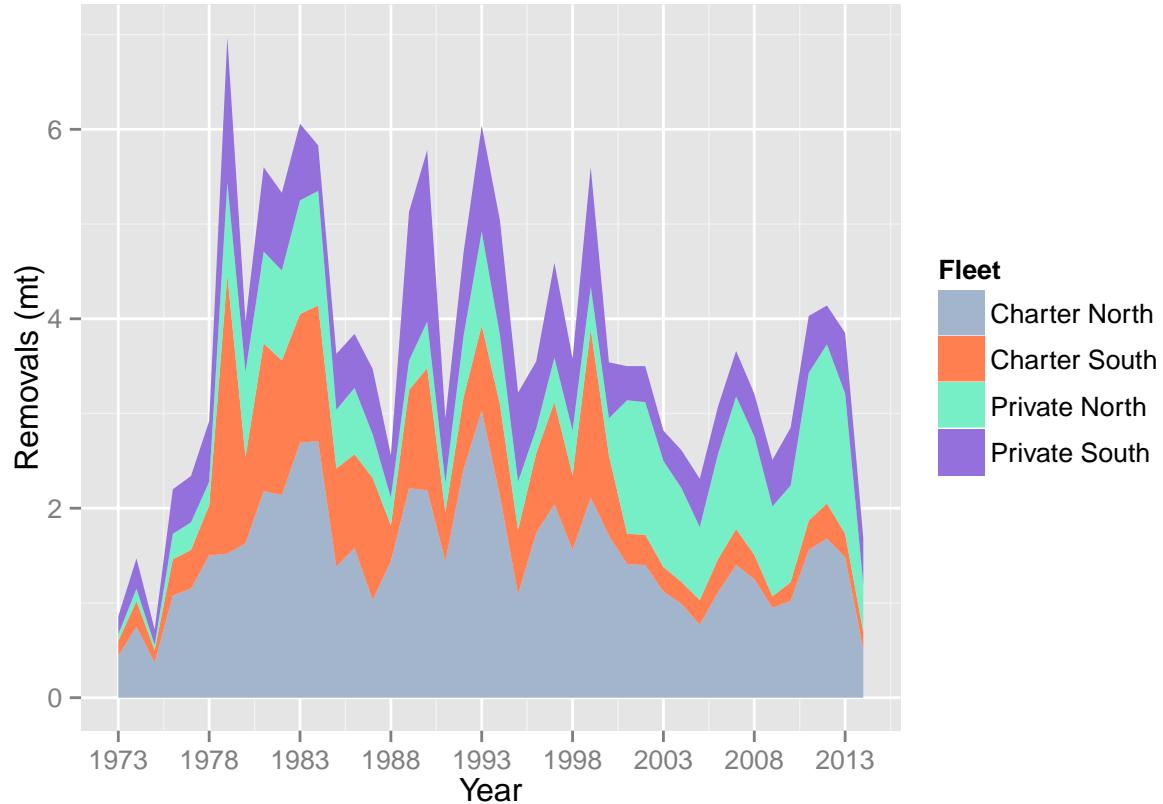


Figure 15: Removals (mt) from the Oregon recreational party/charter and private sectors, north and south of Florence, OR.

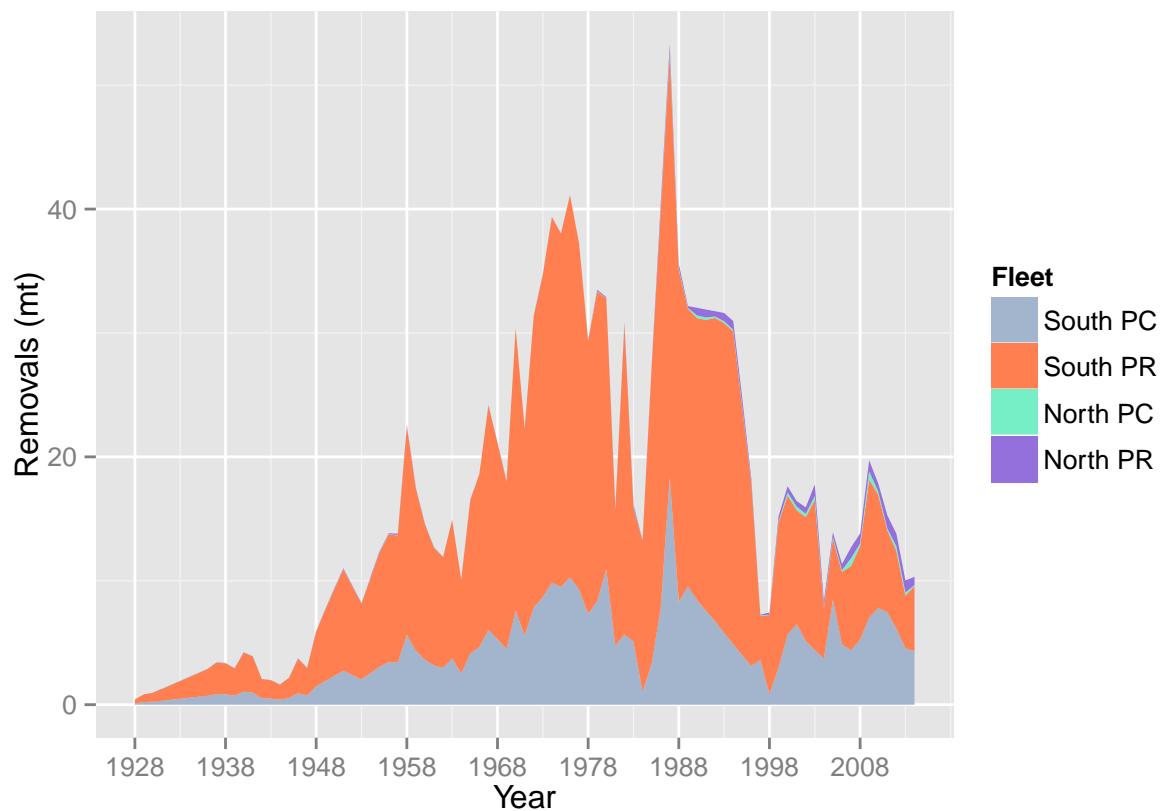


Figure 16: Removals (mt) from the California recreational party/charter and private sectors, north and south of  $40^{\circ}10'$ .

## Oregon Commercial China Rockfish Catch: 2004 - 2013

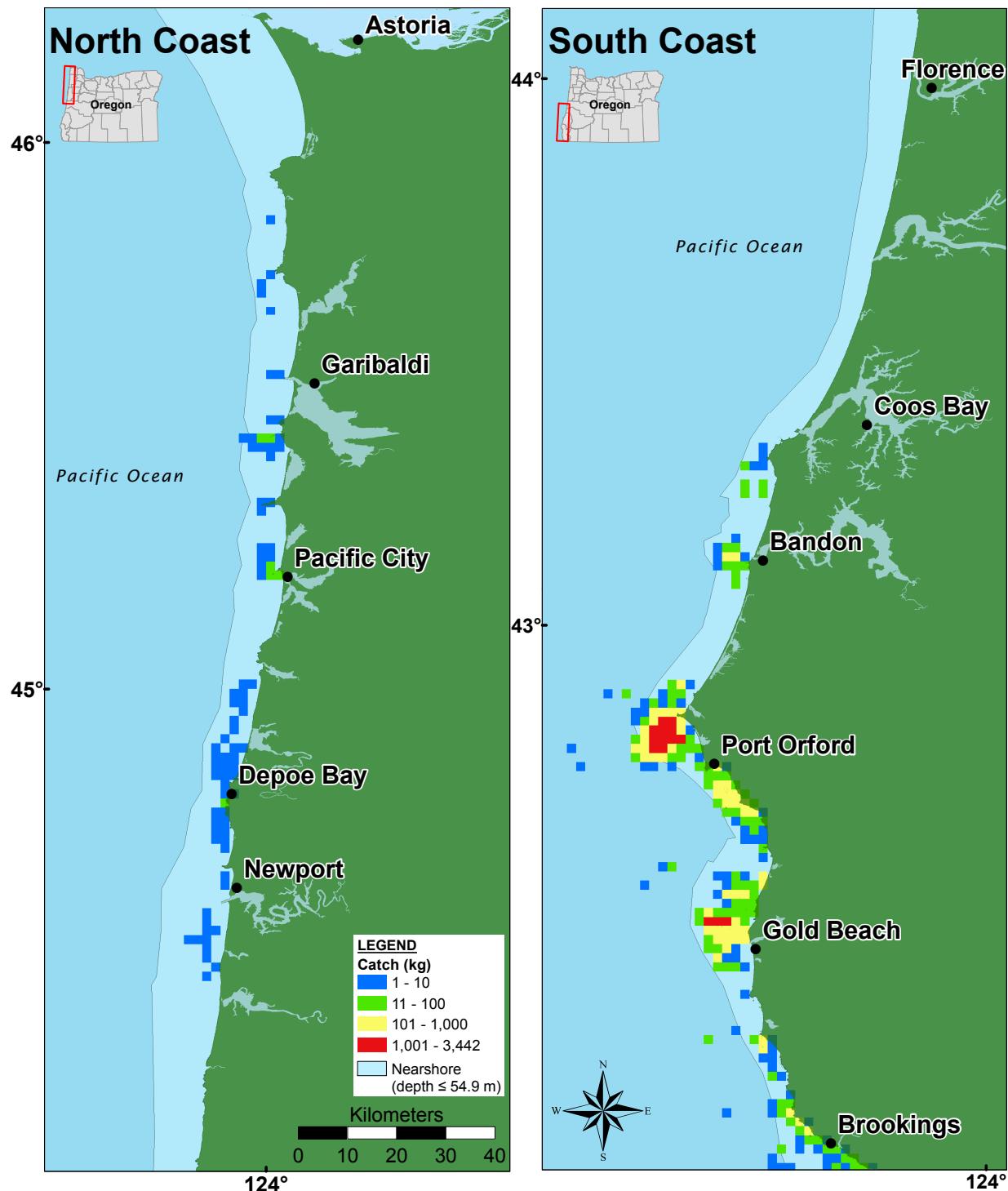


Figure 17: Landings from the commercial fishery logbooks in Oregon. All fishing locations follow the confidentiality guidelines and were fished by at least three vessels during the study.

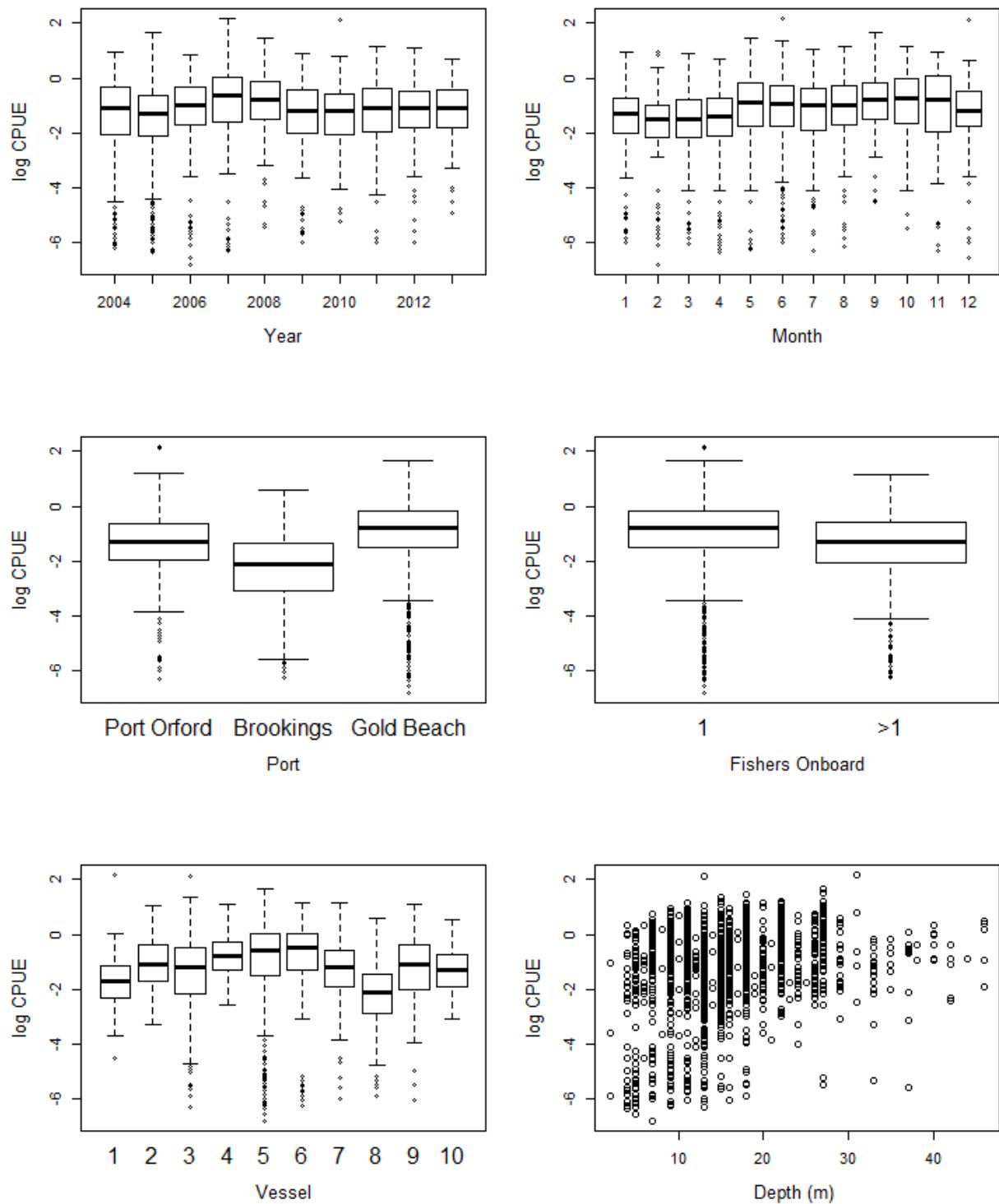


Figure 18: The distribution of set-level raw positive catch CPUE data relative to potential covariates evaluated in the China rockfish Oregon commercial logbook delta-GLM analysis.

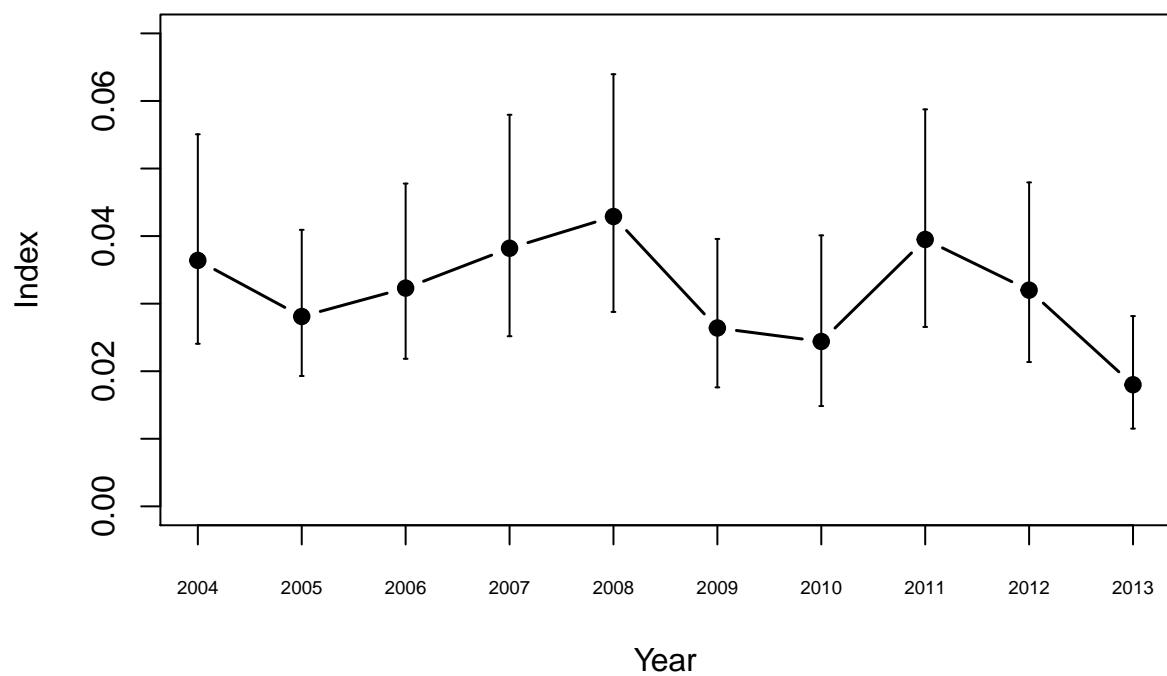


Figure 19: Index for the Oregon commercial logbook, with 95% lognormal confidence intervals.

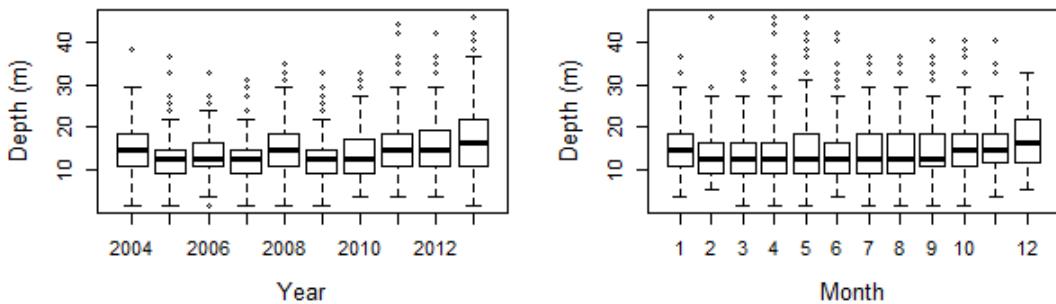
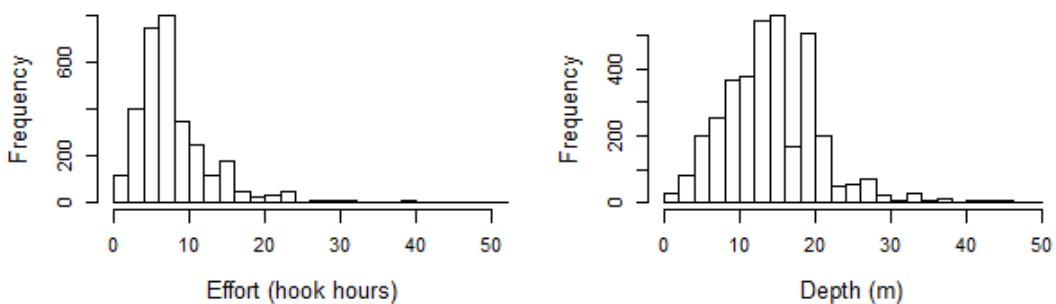
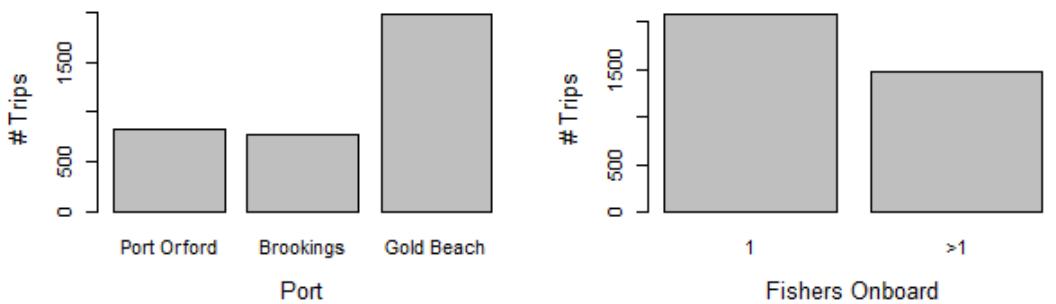
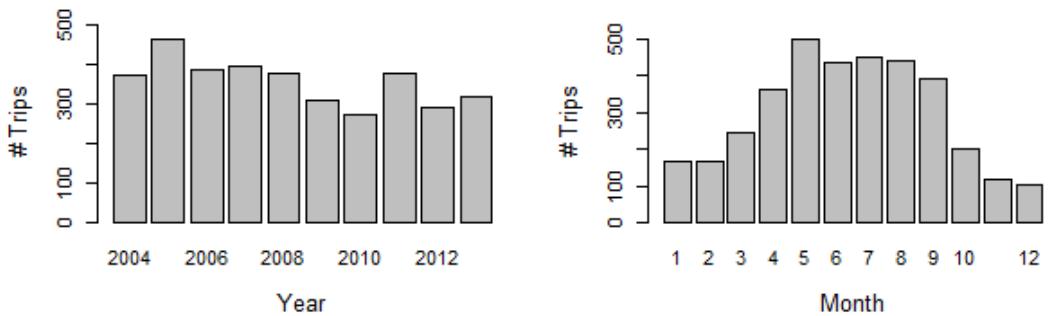


Figure 20: Characterization of the final subset of Oregon commercial logbook data used in delta-GLM analyses for China rockfish. 164

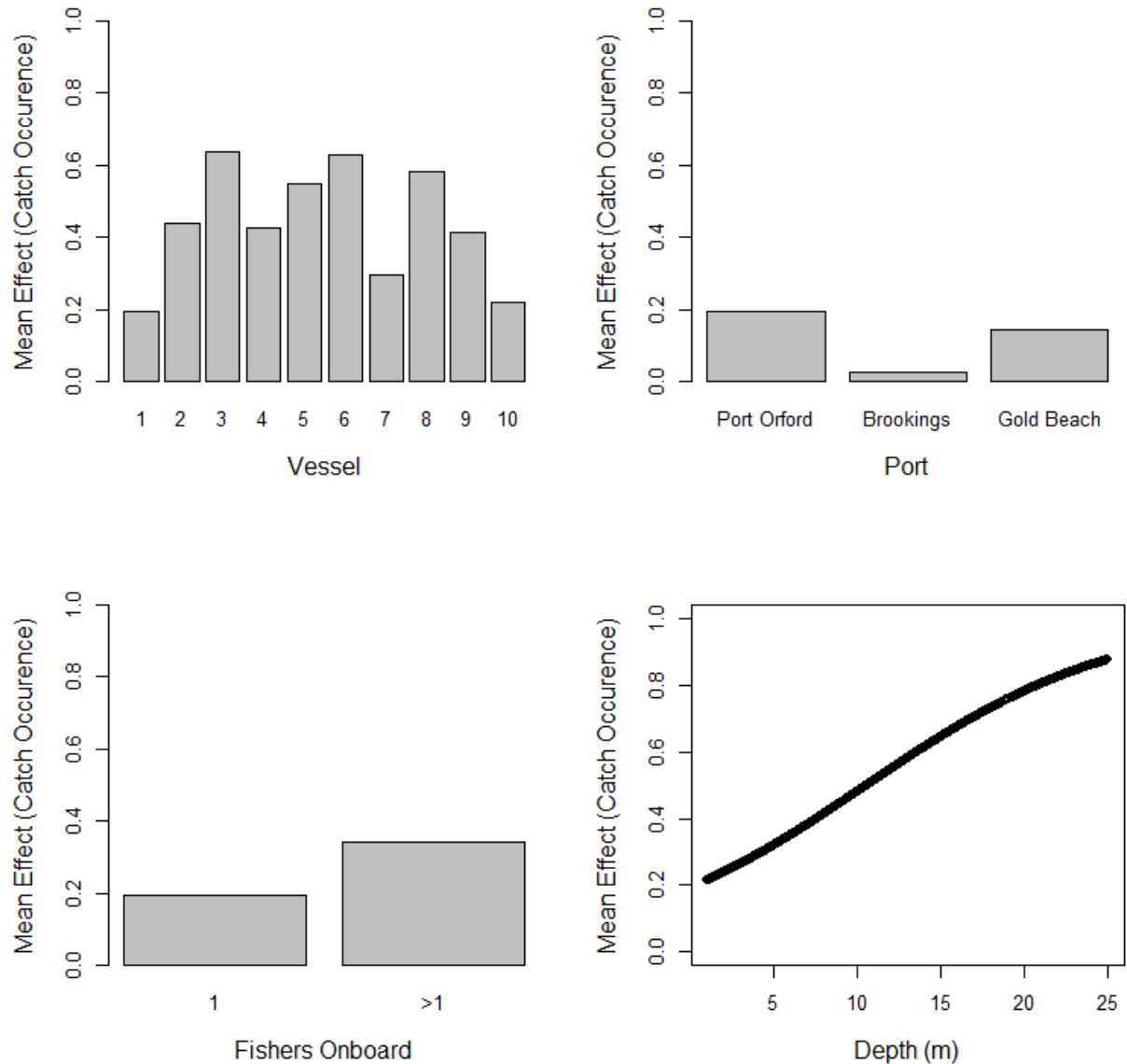


Figure 21: Summary of the relative effects of each covariate in the catch occurrence model component for the Oregon commercial logbook index.

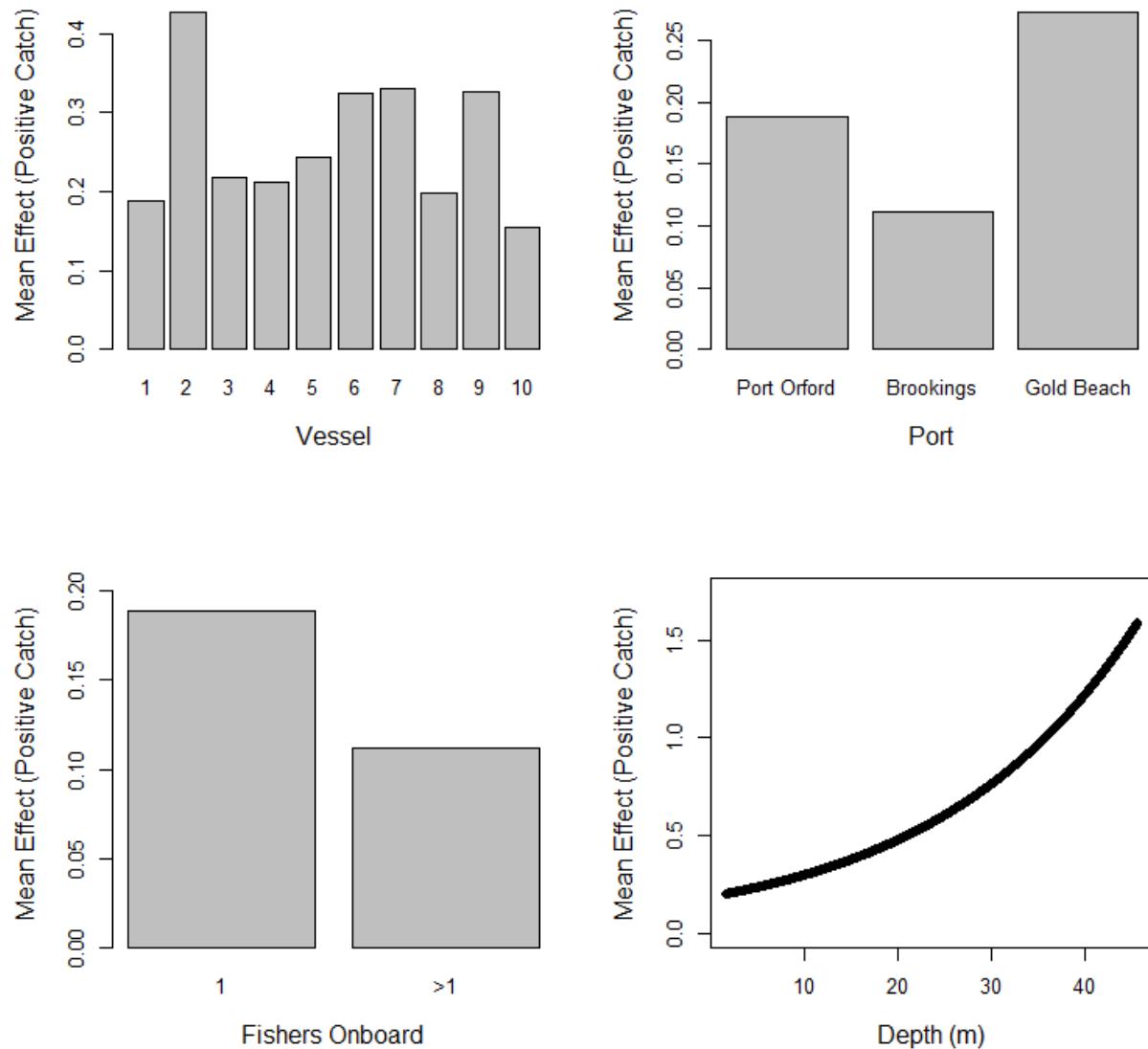


Figure 22: Summary of the relative effects of each covariate in the positive catch model component for China rockfish in the Oregon commercial logbook index.

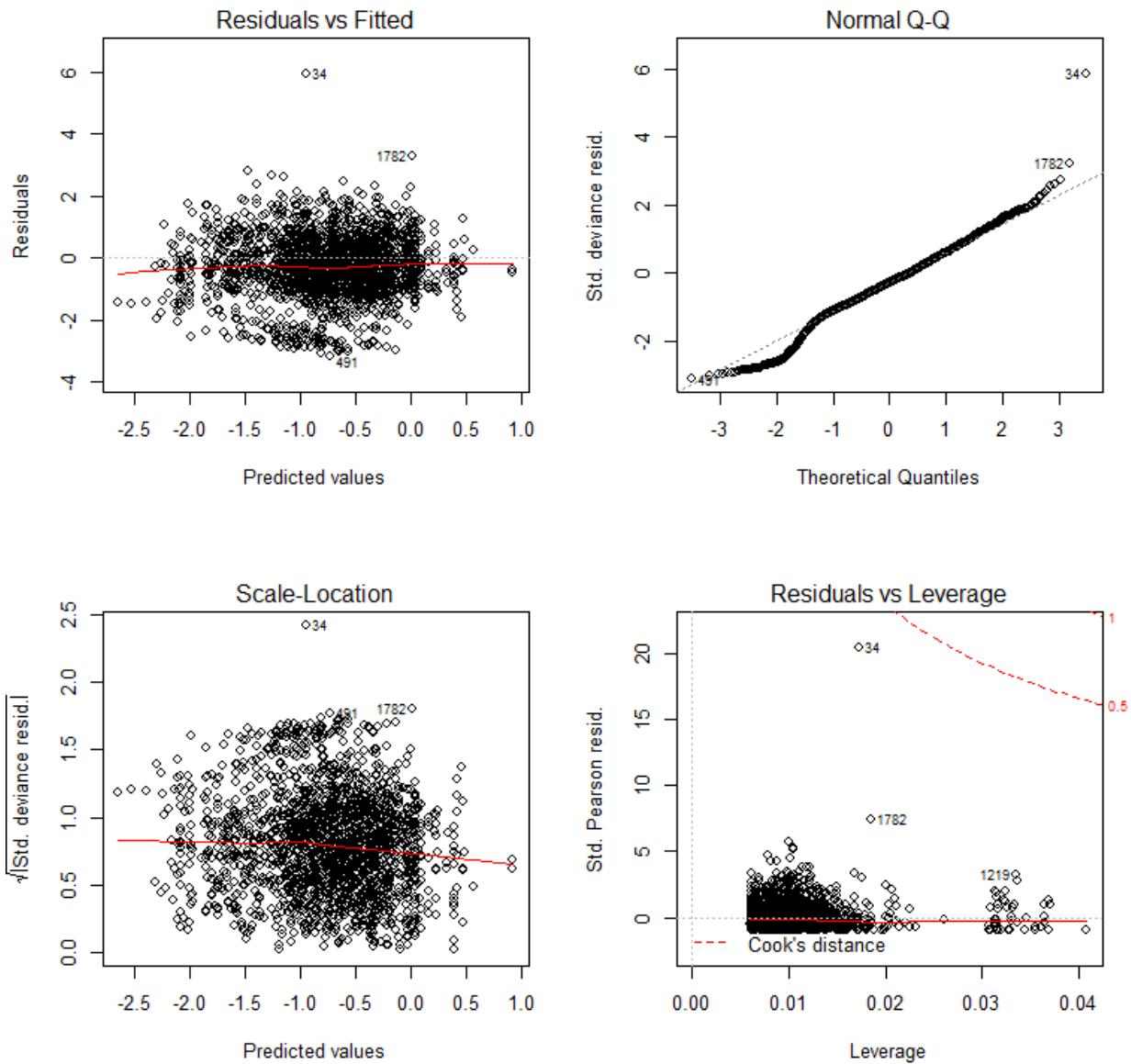


Figure 23: Diagnostic plots for the China rockfish positive catch component delta-GLM model for the Oregon commercial logbook index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

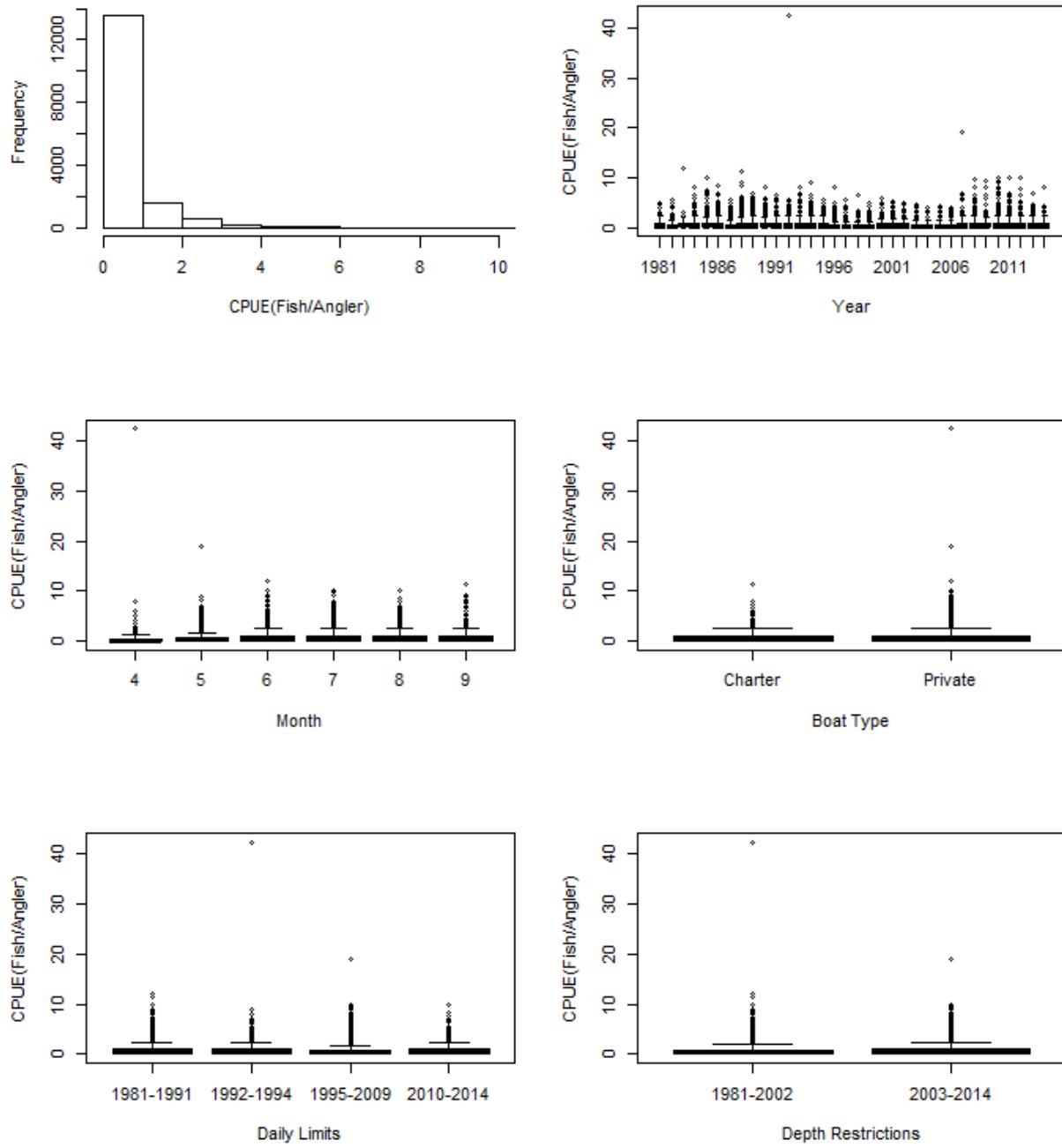


Figure 24: Summary data plots for the data set with Stephens-MacCall filtering for the Washington dockside index.

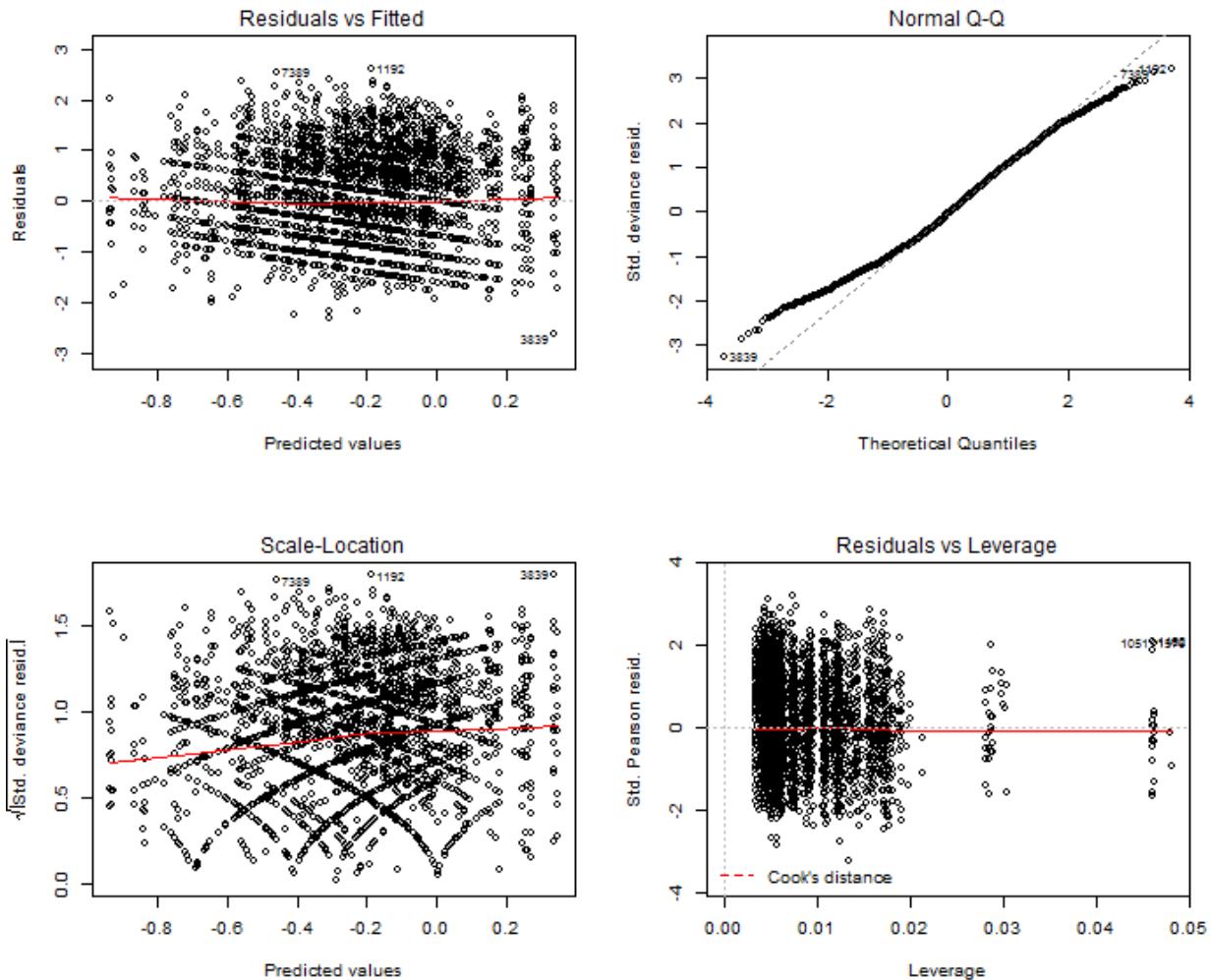


Figure 25: Diagnostic plots for the China rockfish positive catch component longnormal delta-GLM model for the dataset applying the Stephens-MacCall data filter for the Washington dockside index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

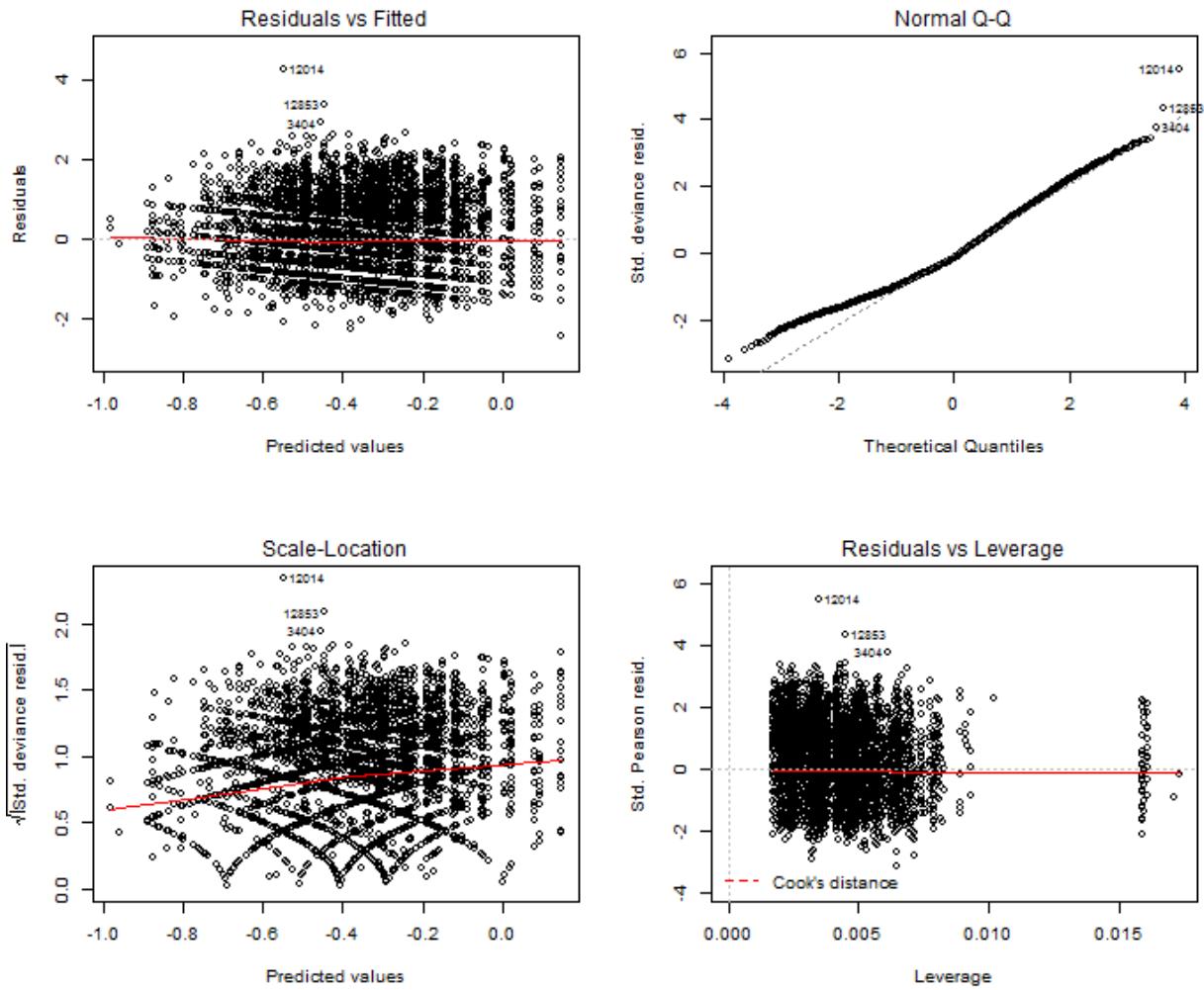


Figure 26: Diagnostic plots for the China rockfish positive catch component longnormal delta-GLM model for the dataset applying the Stephens-MacCall data filter, but retaining all of the positive records for the Washington dockside index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

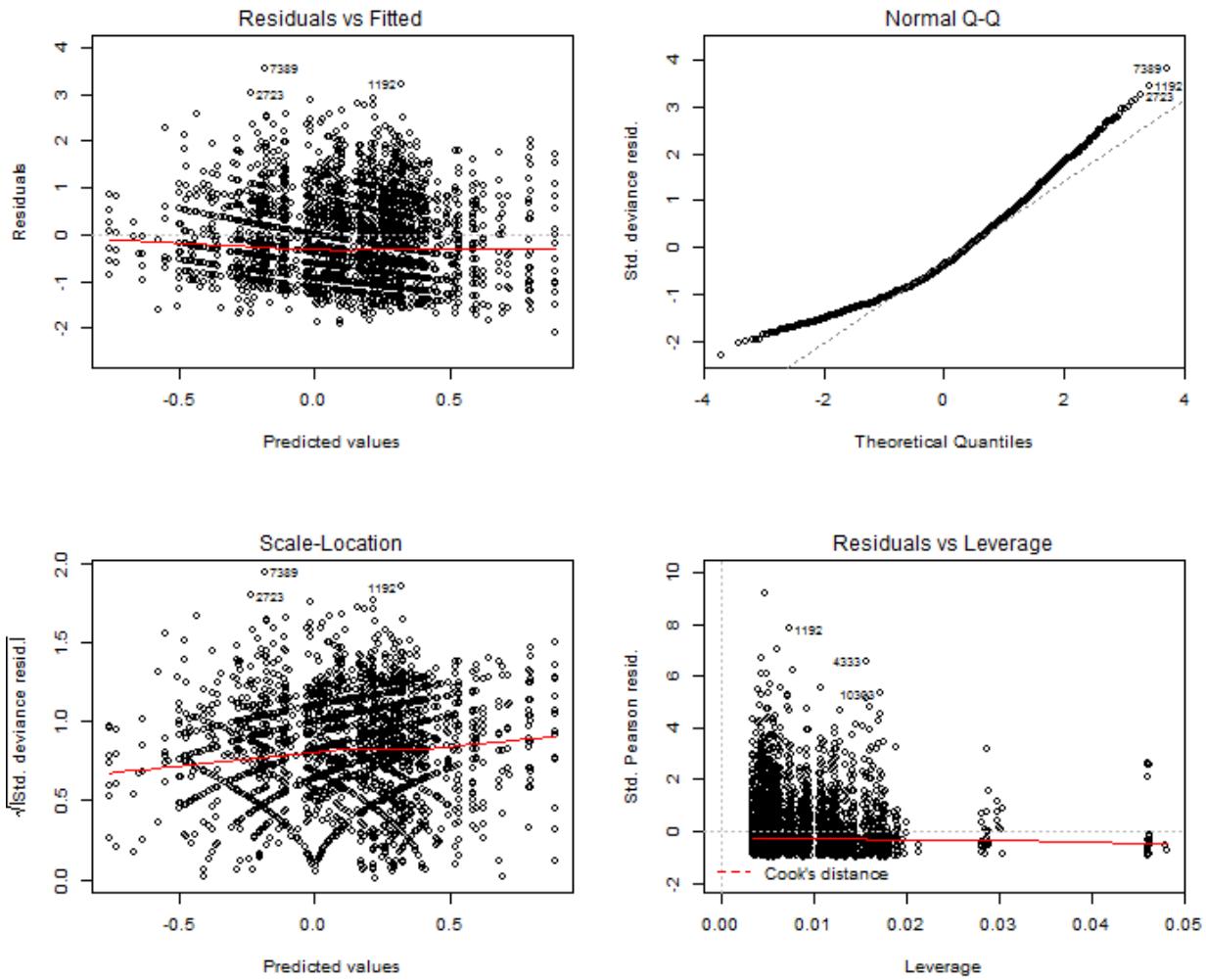


Figure 27: Diagnostic plots for the China rockfish positive catch component gamma delta-GLM model for the dataset without Stephens-MacCall filtering for the Washington dockside index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

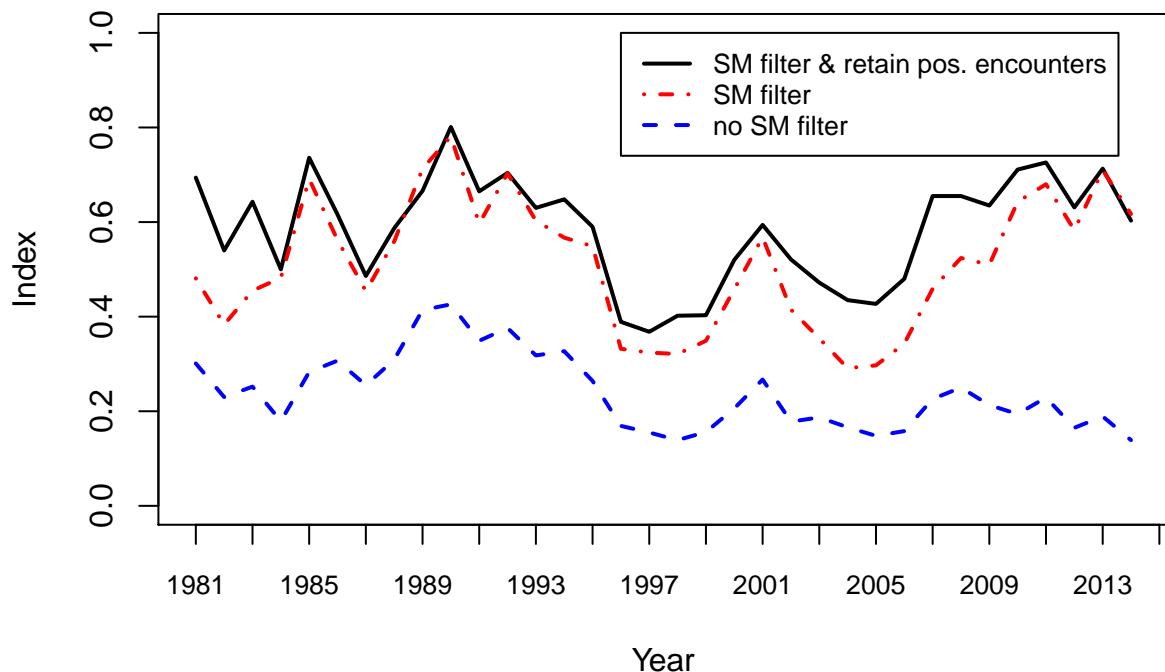


Figure 28: Three indices considered for the Washington dockside program, applying the Stephens-MacCall filters and retaining all positive encounters (black), applying the Stephens-MacCall filter and retaining only those trips above the threshold value (red), and the index with no Stephens-MacCall filter applied.

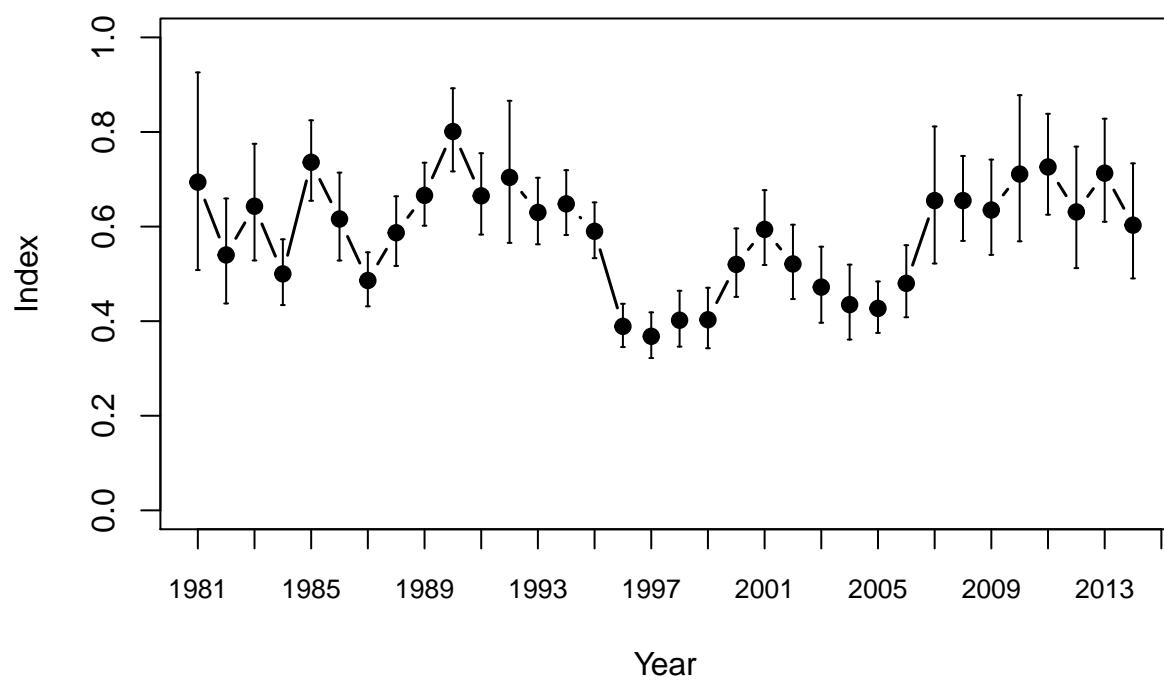


Figure 29: Index for the Washington dockside program, with 95% lognormal confidence intervals, applying the Stephens-MaCall data filter and retaining all positive observations.

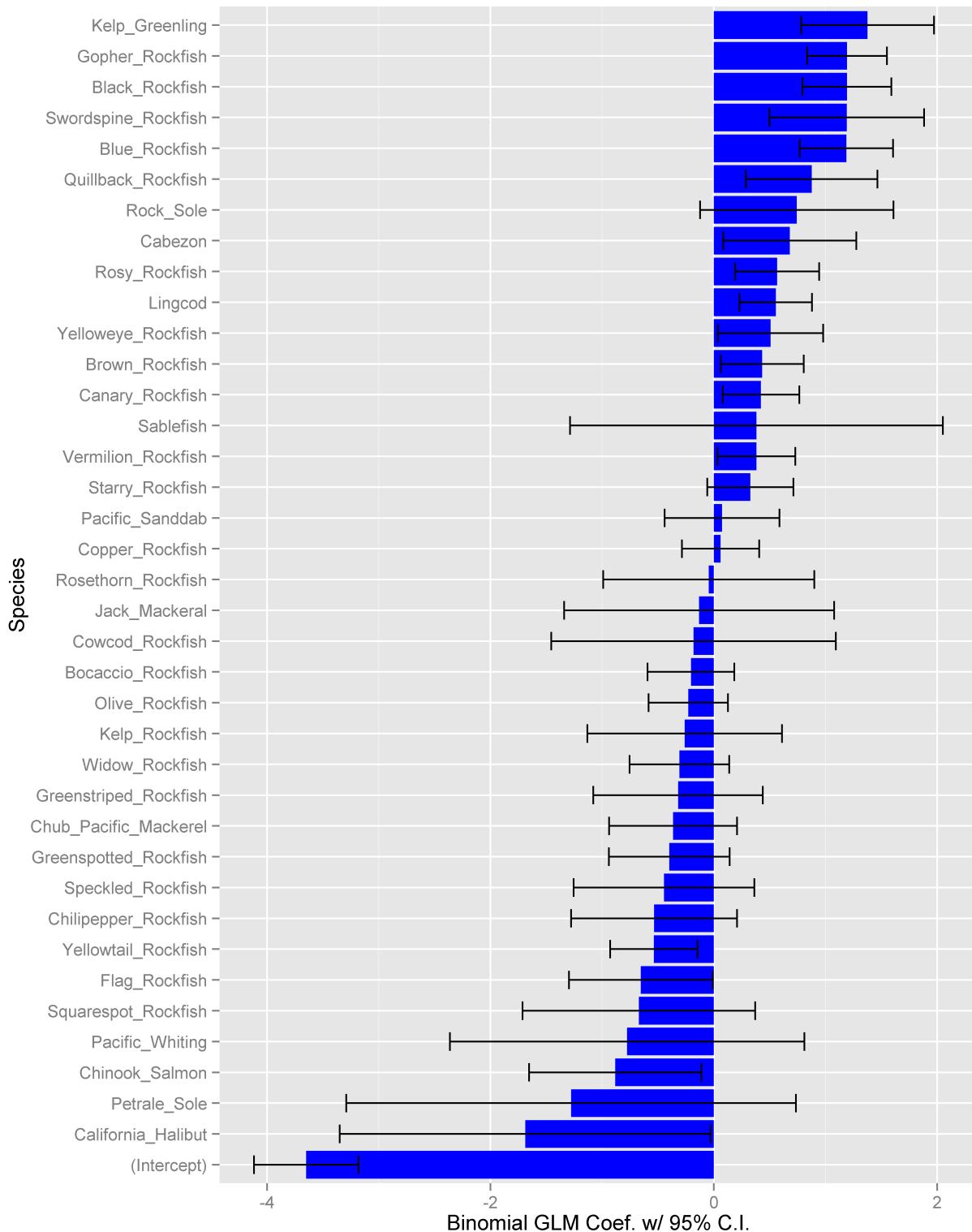


Figure 30: Species coefficients from the binomial GLM for presence/absence of China rockfish in the MRFSS data for California south of  $40^{\circ}10' N.$  latitude. Horizontal bars are 95% confidence intervals. Albacore coefficient ( $<-10$ ) excluded for scale.

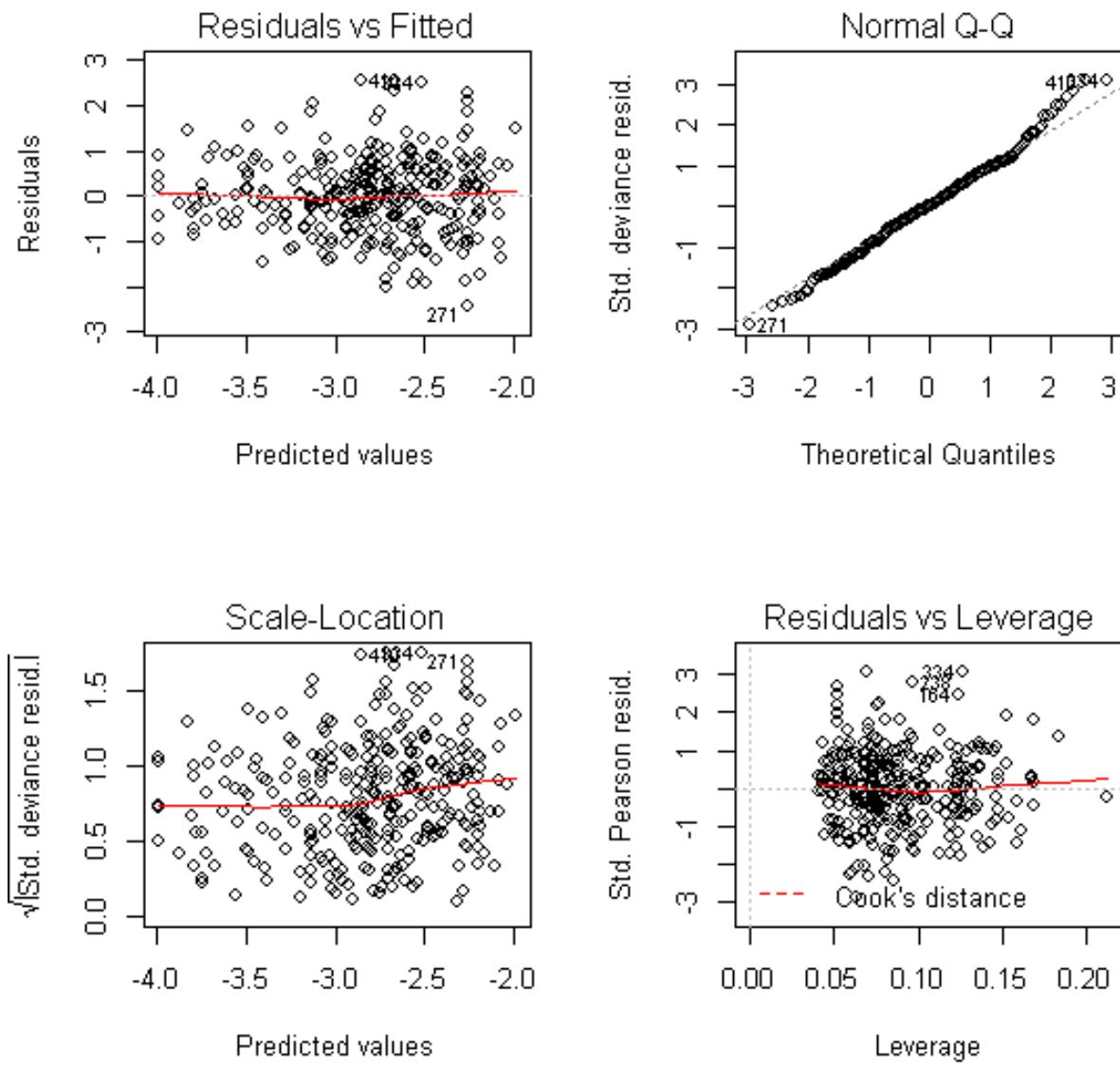


Figure 31: Diagnostic plots for the China rockfish delta-GLM index (lognormal component) for the MRFSS data for California south of  $40^{\circ}10'$  N. latitude. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

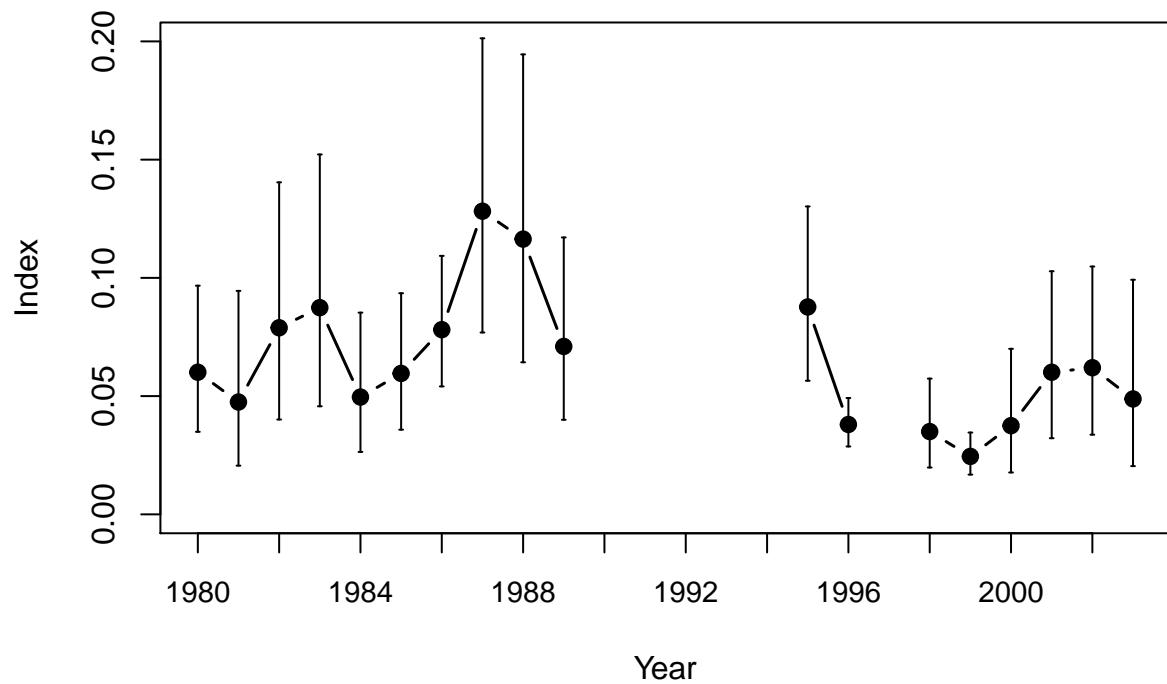


Figure 32: Index for the MRFSS data for California south of  $40^{\circ}10'$  N. latitude, with 95% lognormal confidence intervals.

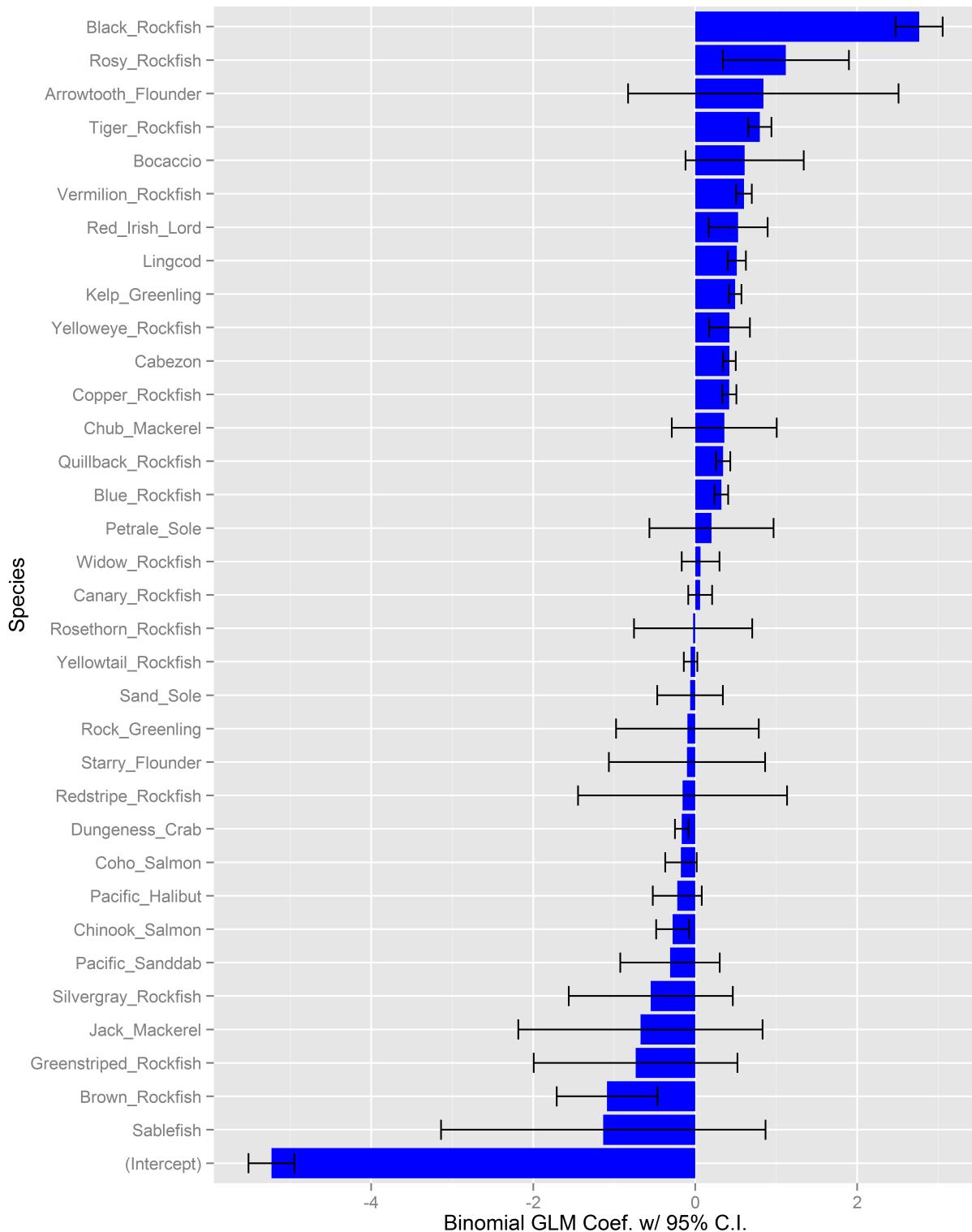


Figure 33: . Species coefficients from the binomial GLM for presence/absence of China rockfish in the Oregon Recreational Boat Survey (ORBS) data set. Horizontal bars are 95% confidence intervals.

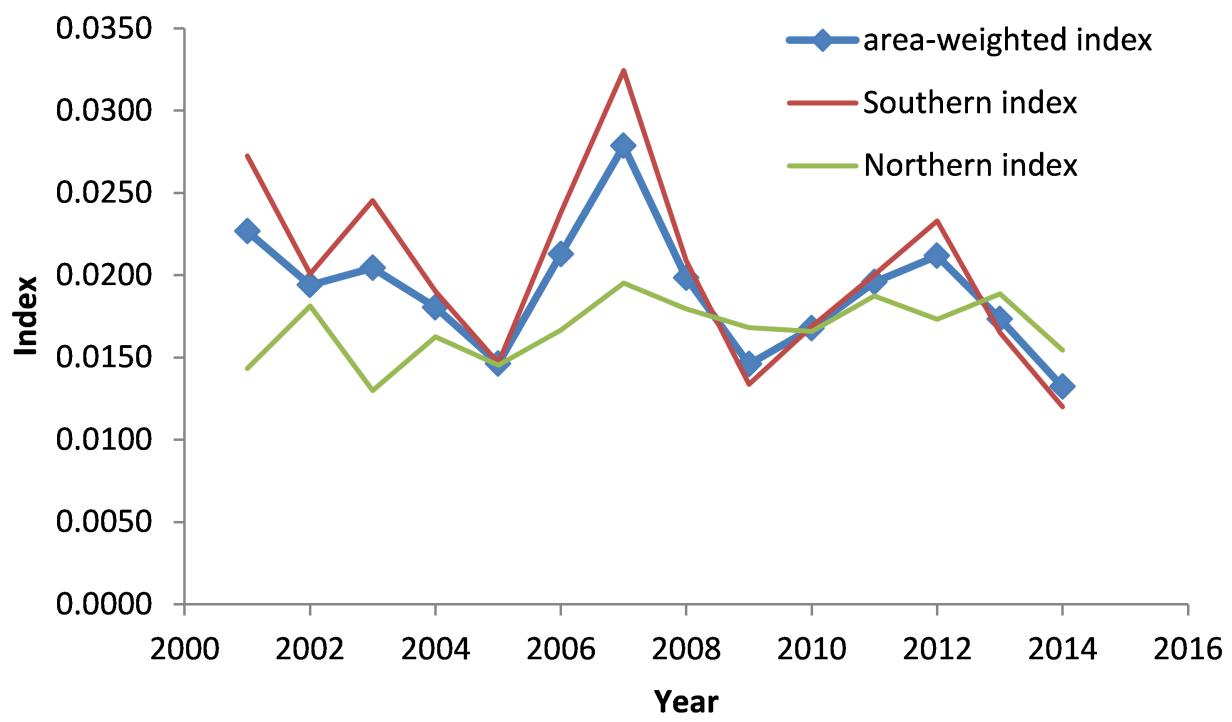


Figure 34: . Comparison of delta-GLM index trends in Southern Oregon, Northern Oregon, and a habitat area-weighted index.

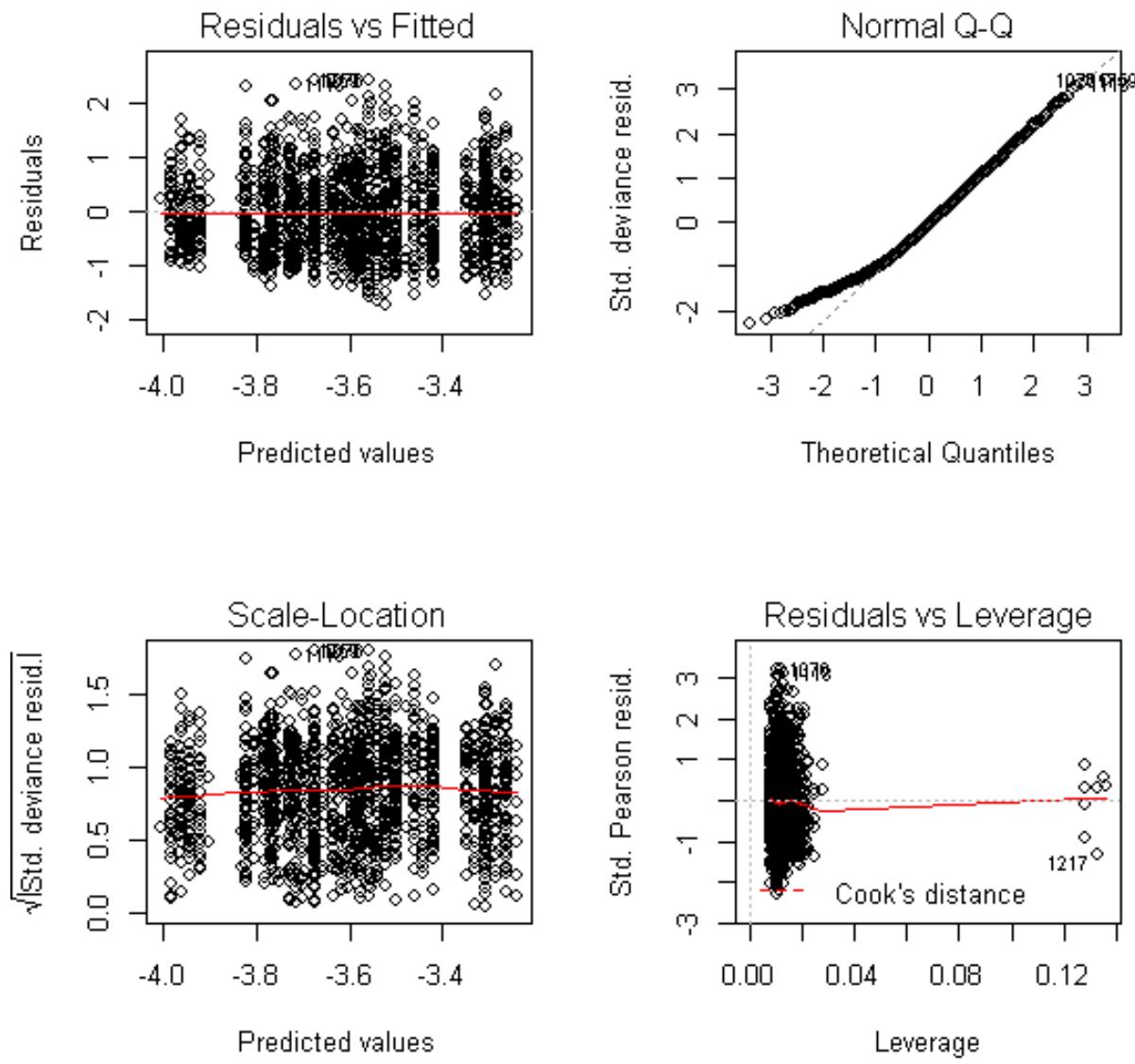


Figure 35: . Diagnostic plots for the China rockfish delta-GLM index (lognormal component) for the Southern Oregon Recreational Boat Survey (ORBS) data set. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

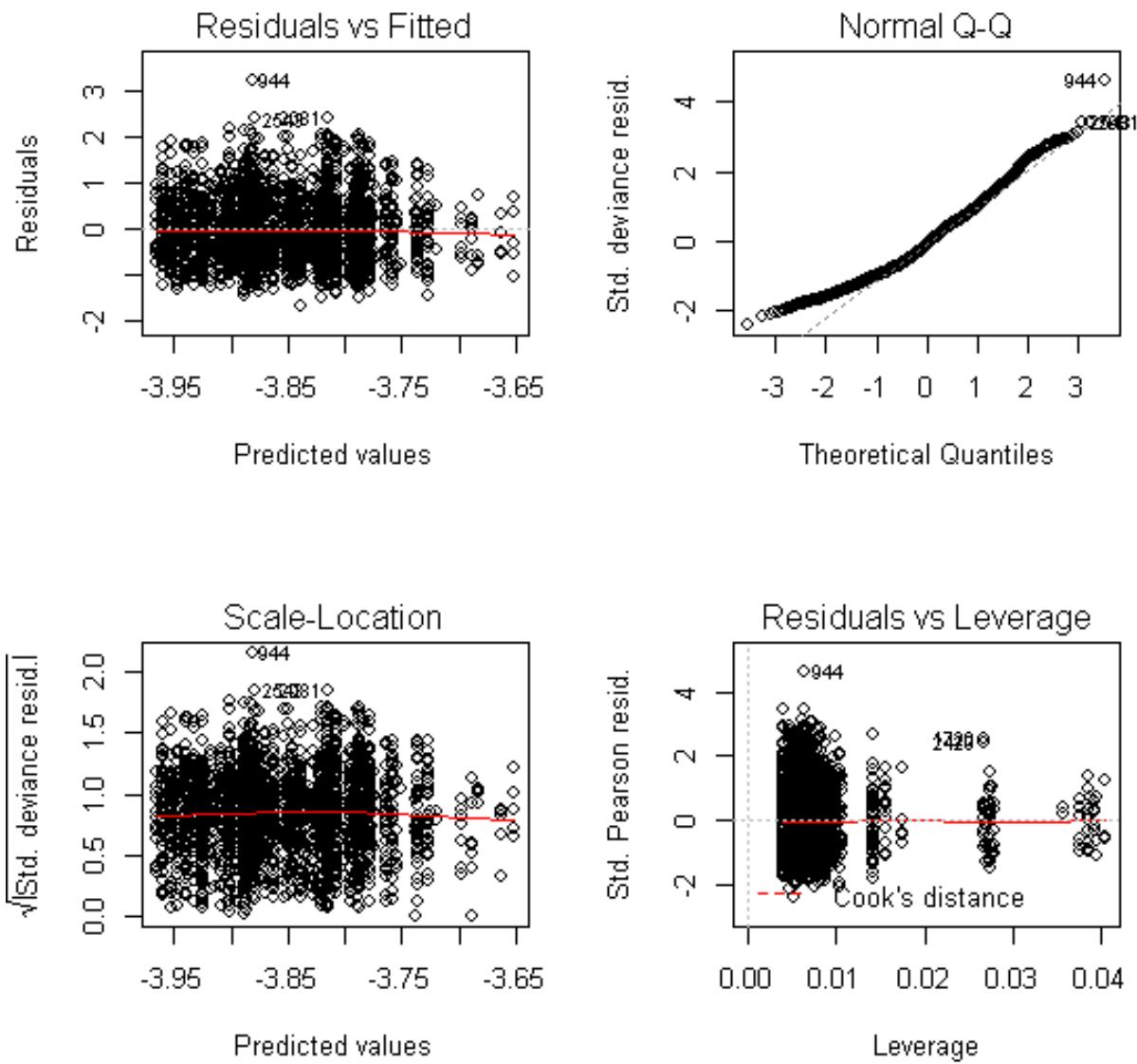


Figure 36: Diagnostic plots for the China rockfish delta-GLM index (gamma component) for the Northern Oregon Recreational Boat Survey (ORBS) data set. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

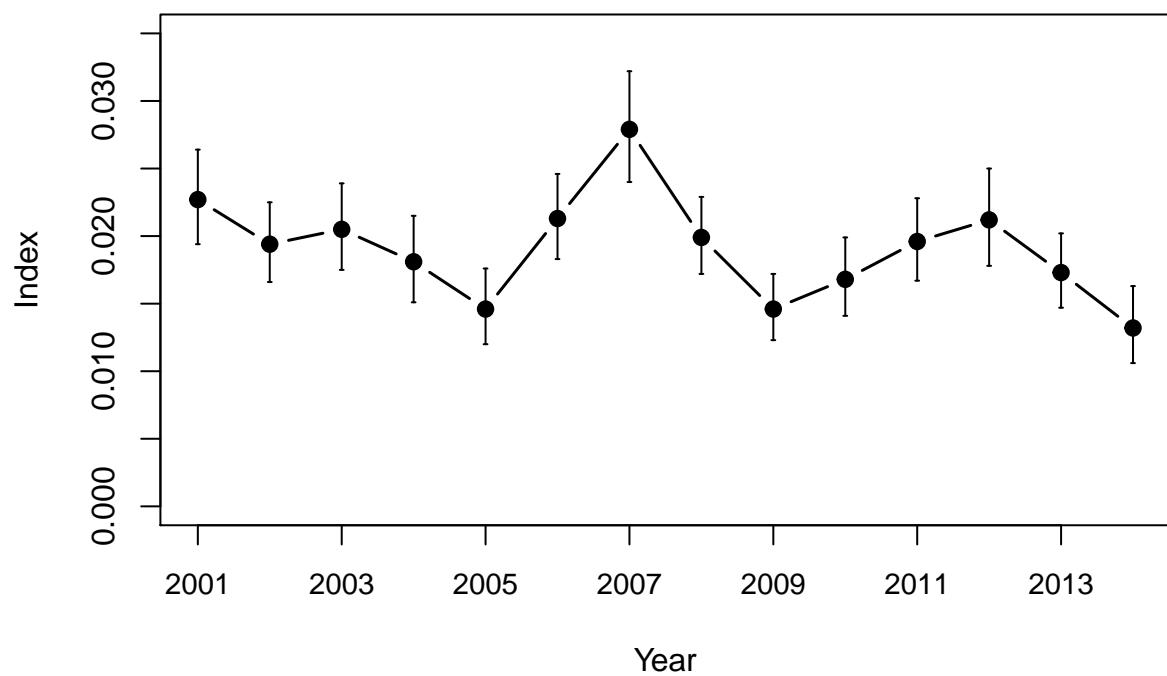


Figure 37: Oregon Recreational Boat Survey (ORBS) charter boat index (area-weighted), with 95% lognormal confidence intervals.

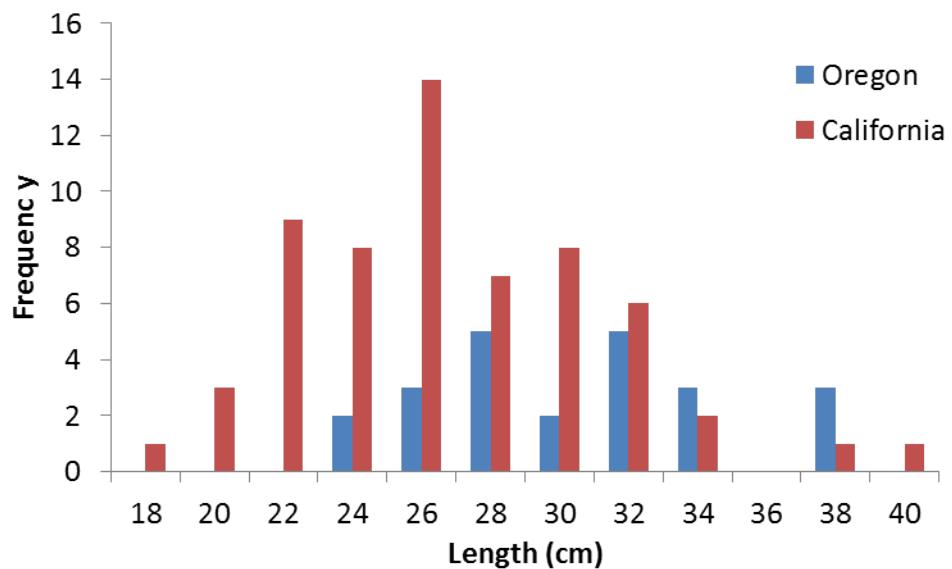


Figure 38: Frequencies of the discard lengths from the Oregon (ODFW 2001,2003-2014) and California (CDFW 1999-2014 and CalPoly 2001-2014) onboard observer programs.

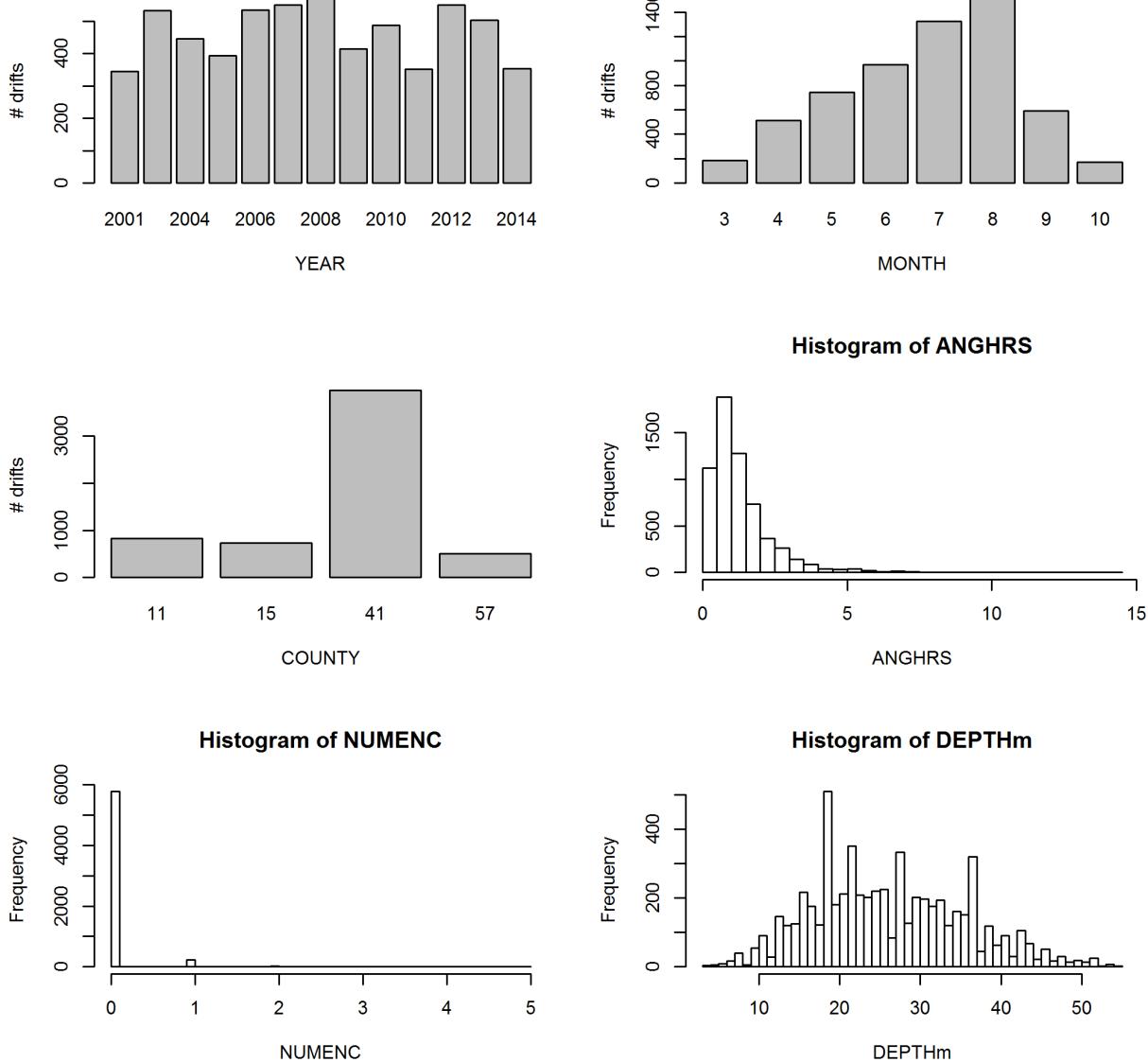


Figure 39: Characterization of the final subset of Oregon onboard observer data used in delta-GLM analyses for China rockfish.

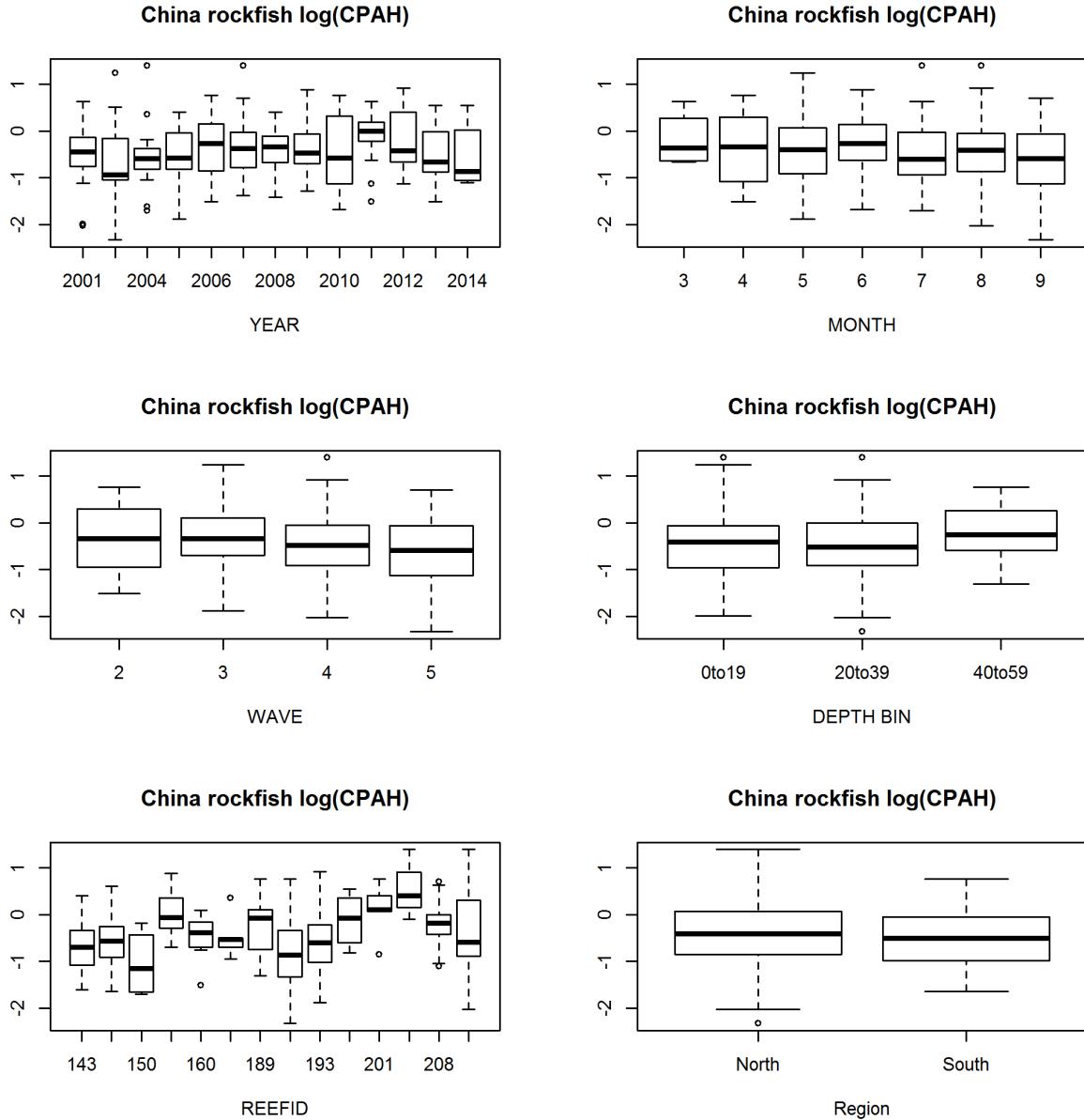


Figure 40: The distribution of drift-level CPUE data relative to potential covariates evaluated in the China rockfish Oregon onboard observer delta-GLM analysis(positive encounters only).

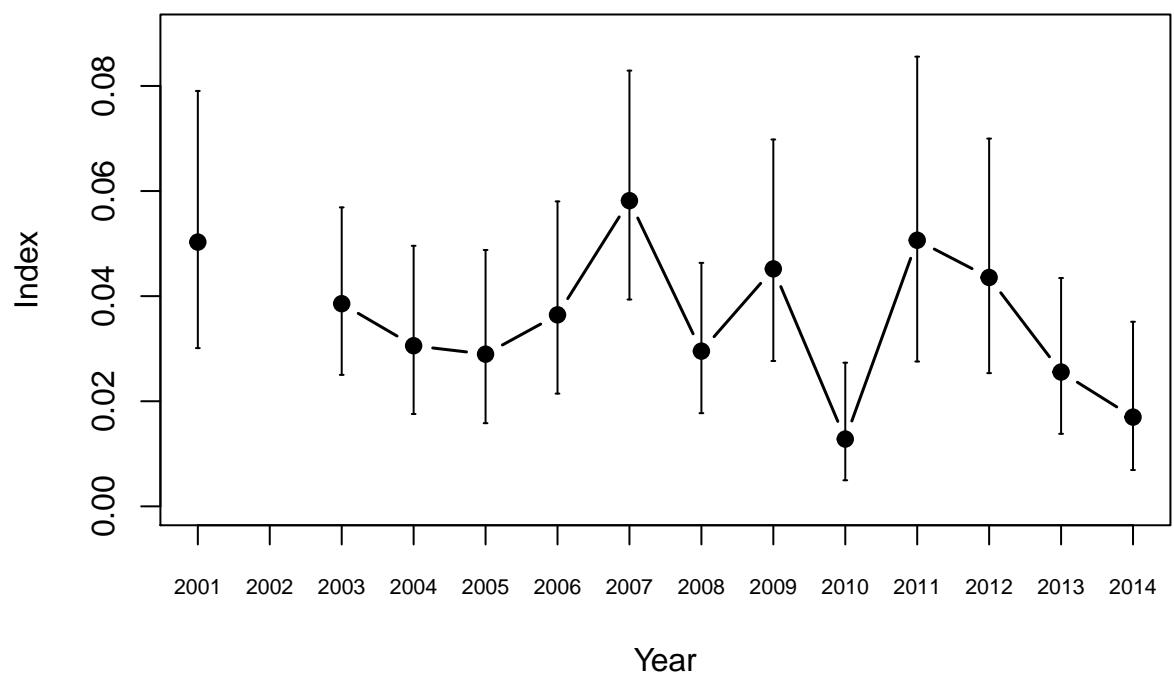


Figure 41: Index for the Oregon onboard observer program, with 95% lognormal confidence intervals.

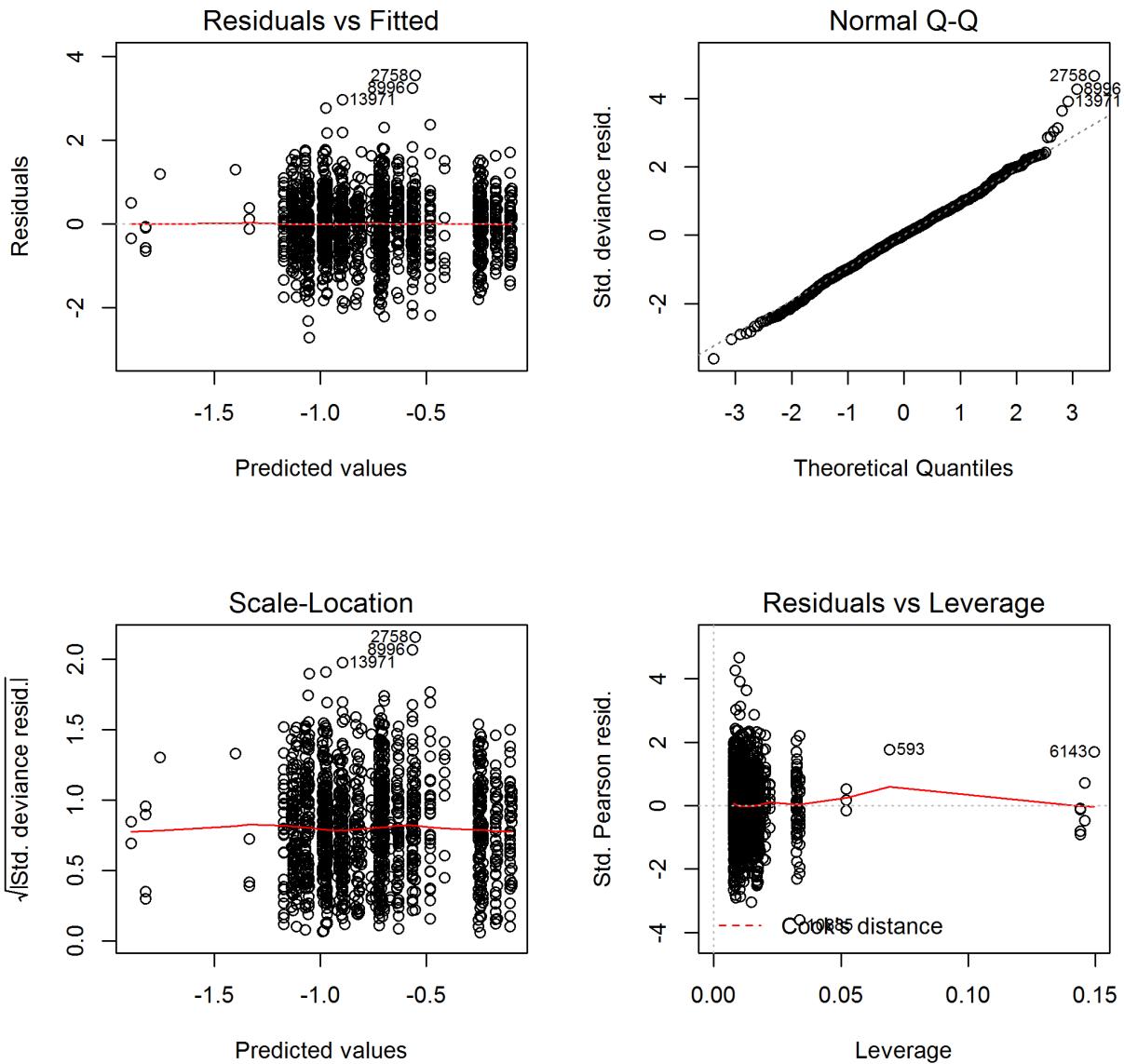


Figure 42: Diagnostic plots for the China rockfish positive catch component lognormal delta-GLM model for the Oregon onboard observer index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

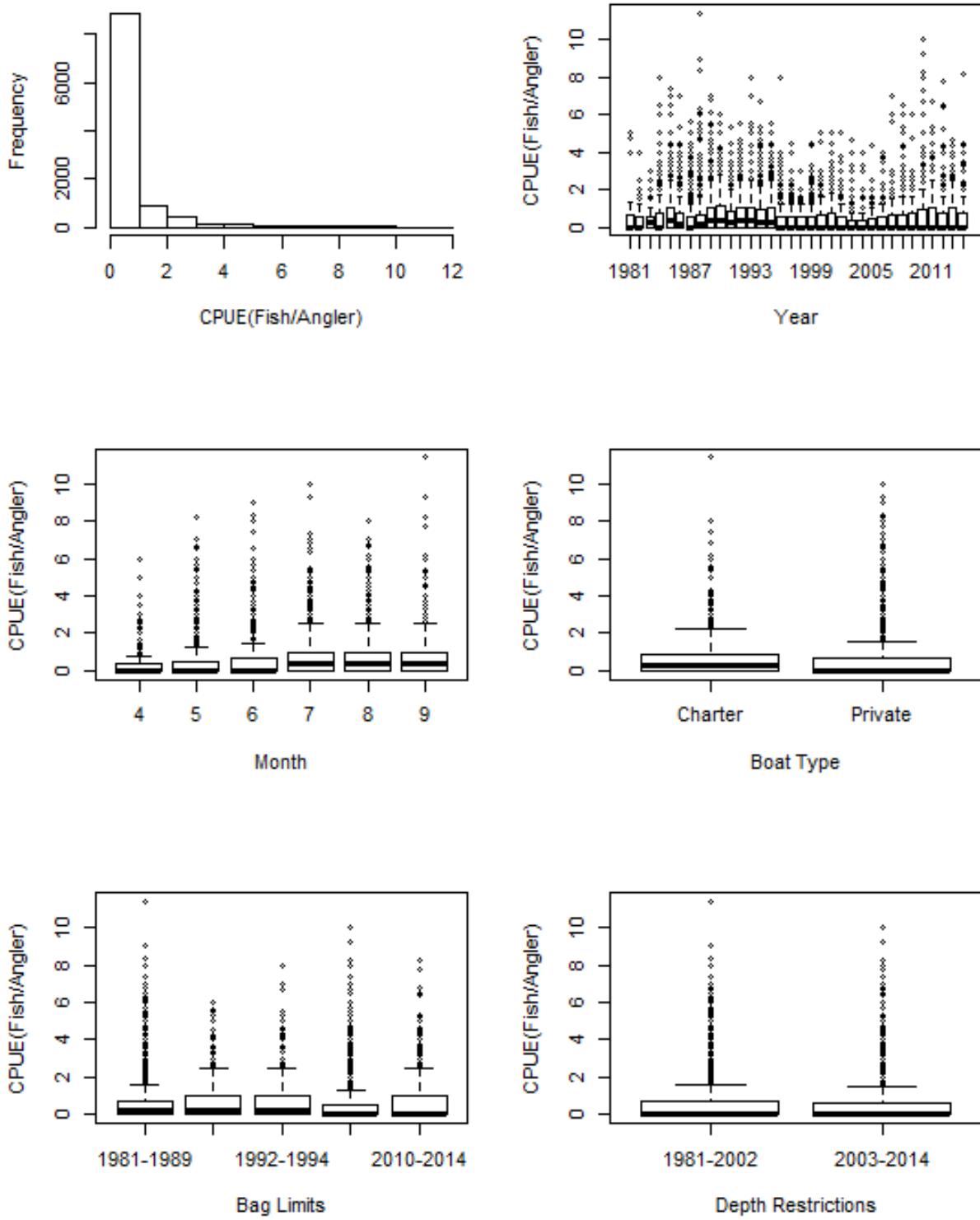


Figure 43: Characterization of the final subset of 1988-1999 California onboard observer data used in delta-GLM analyses for China rockfish.

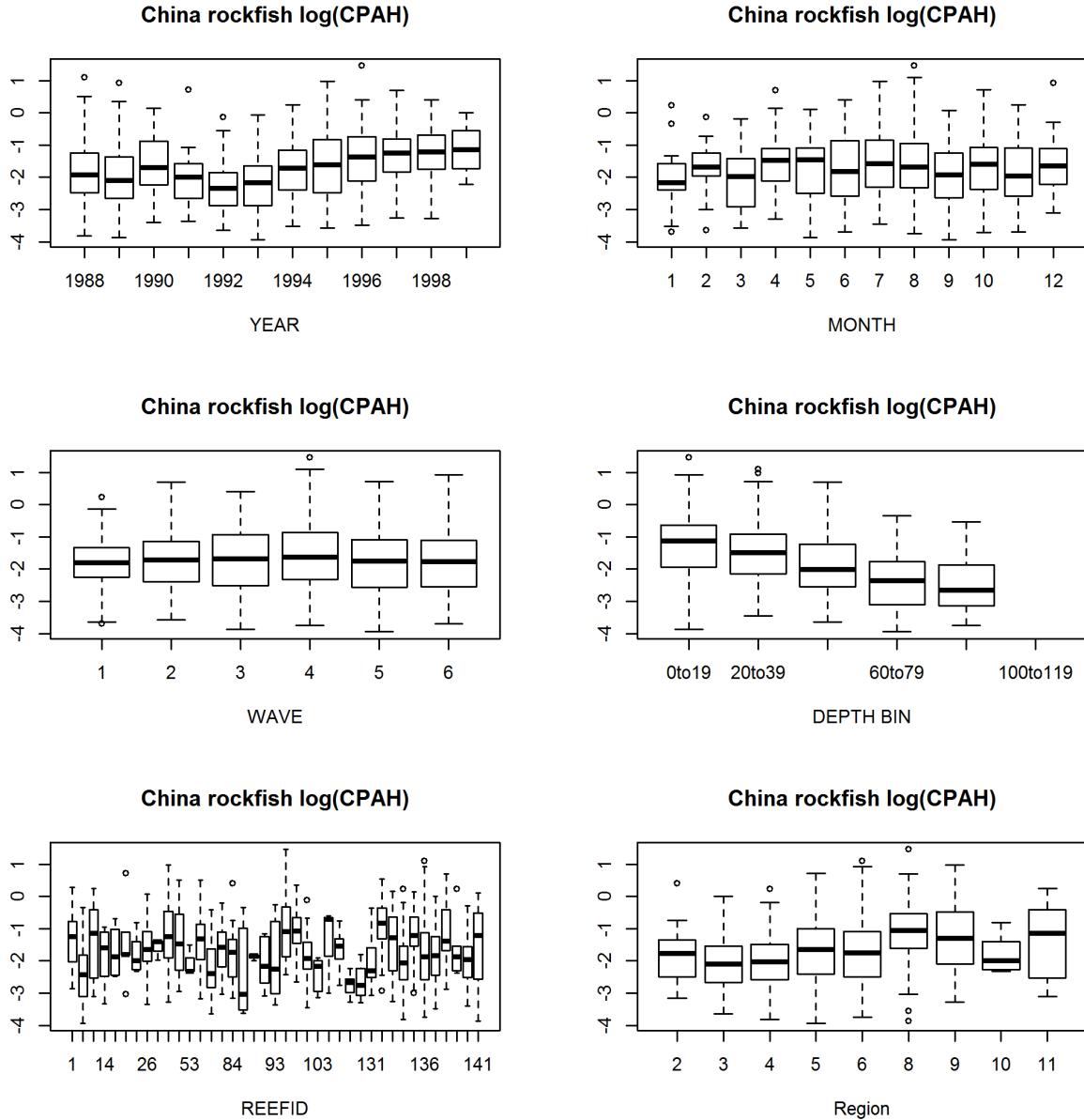


Figure 44: The distribution of drift-level CPUE data relative to potential covariates evaluated in the China rockfish 1988-1999 California onboard observer delta-GLM analysis (positive encounters only).

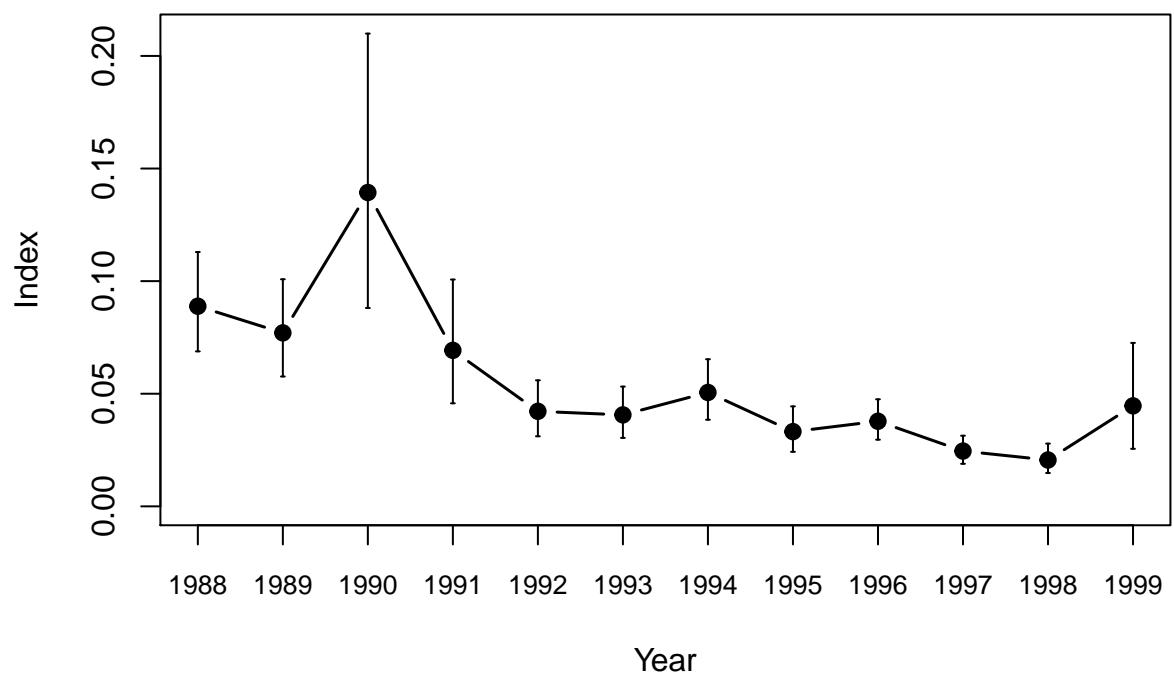


Figure 45: Index for the California 1988-1999 onboard observer program, with 95% lognormal confidence intervals.

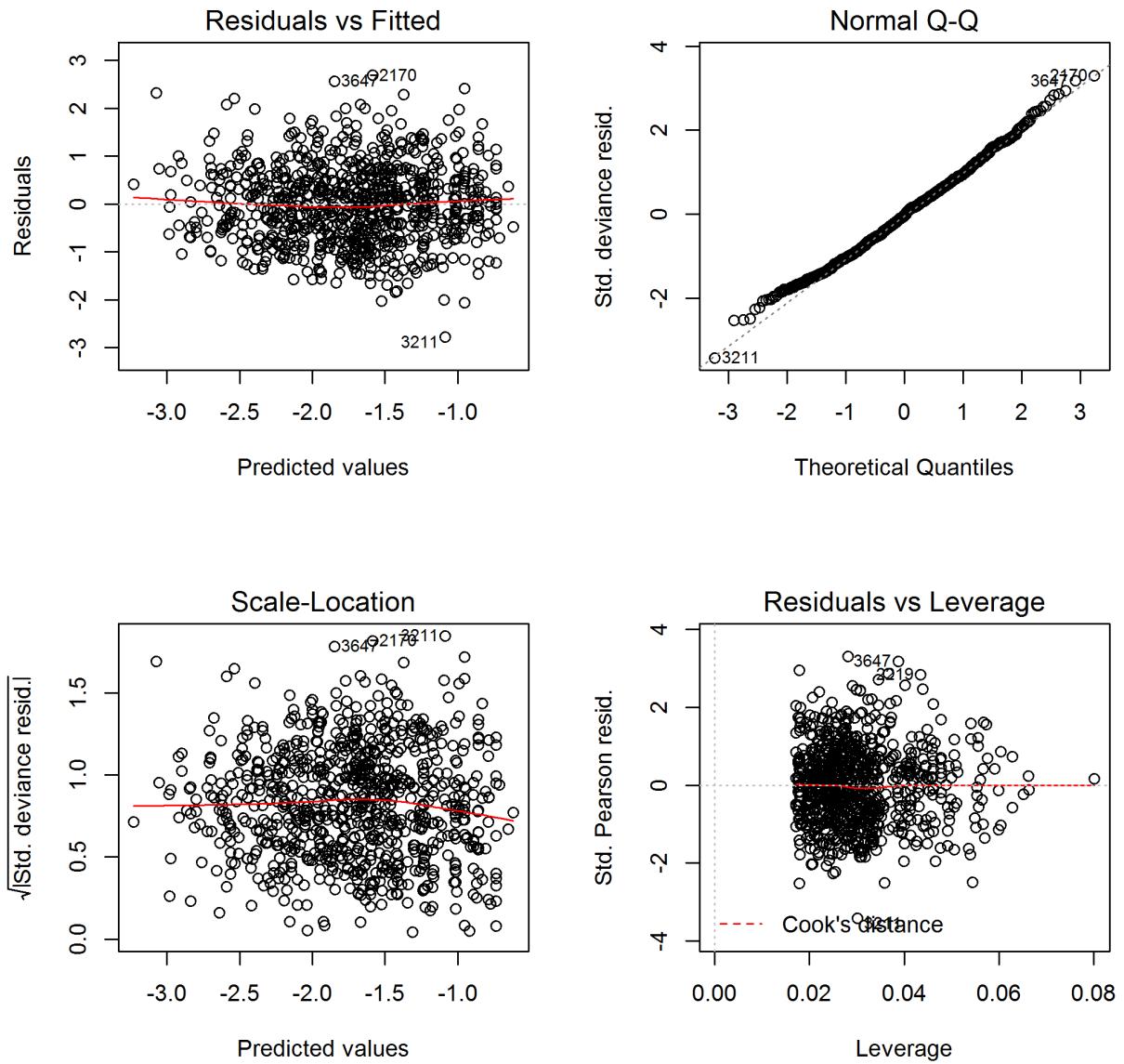


Figure 46: Diagnostic plots for the China rockfish positive catch component lognormal delta-GLM model for the 1988-1999 California onboard observer index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

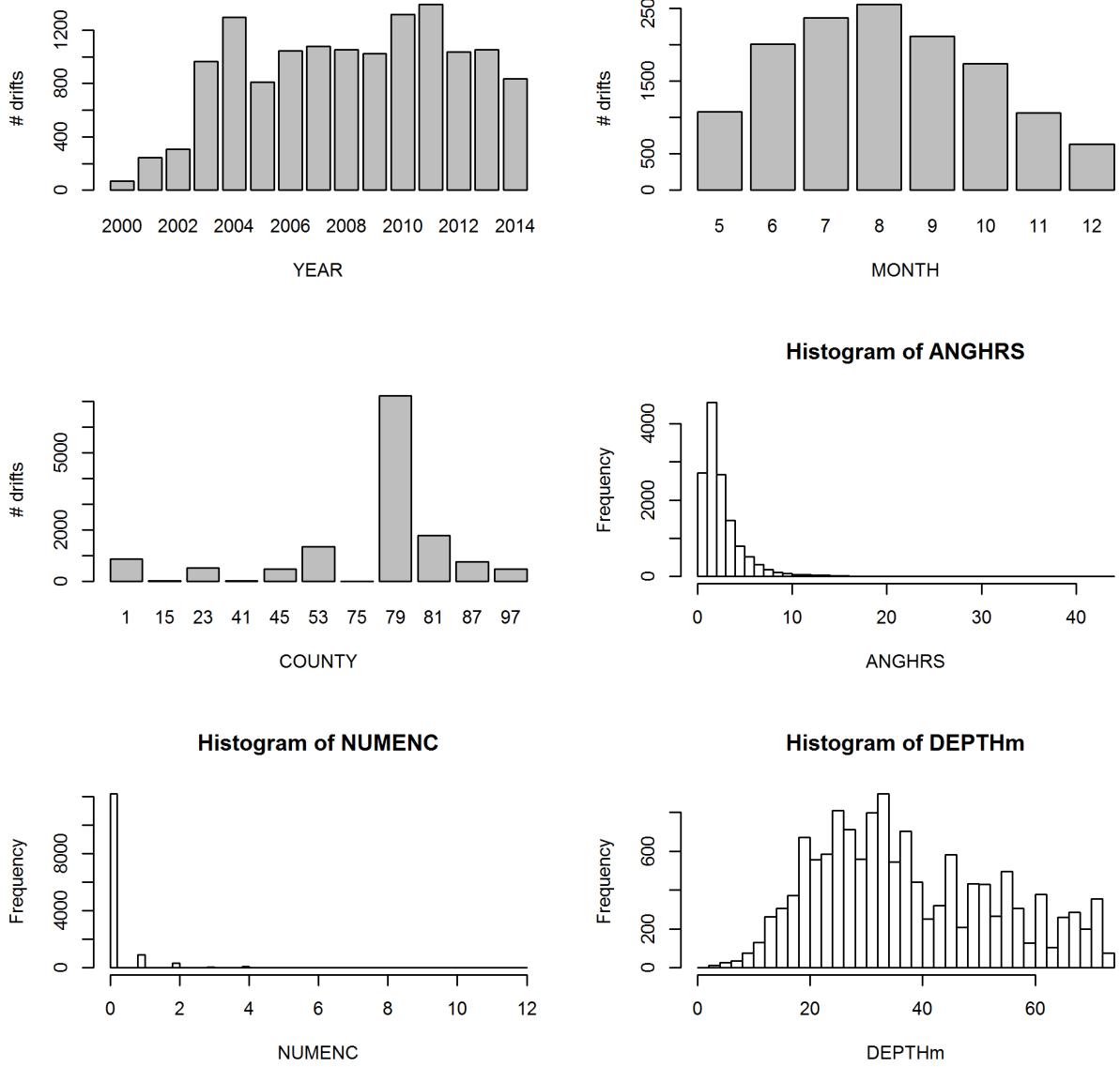


Figure 47: Characterization of the final subset of 2000-2014 California onboard observer data used in delta-GLM analyses for China rockfish.

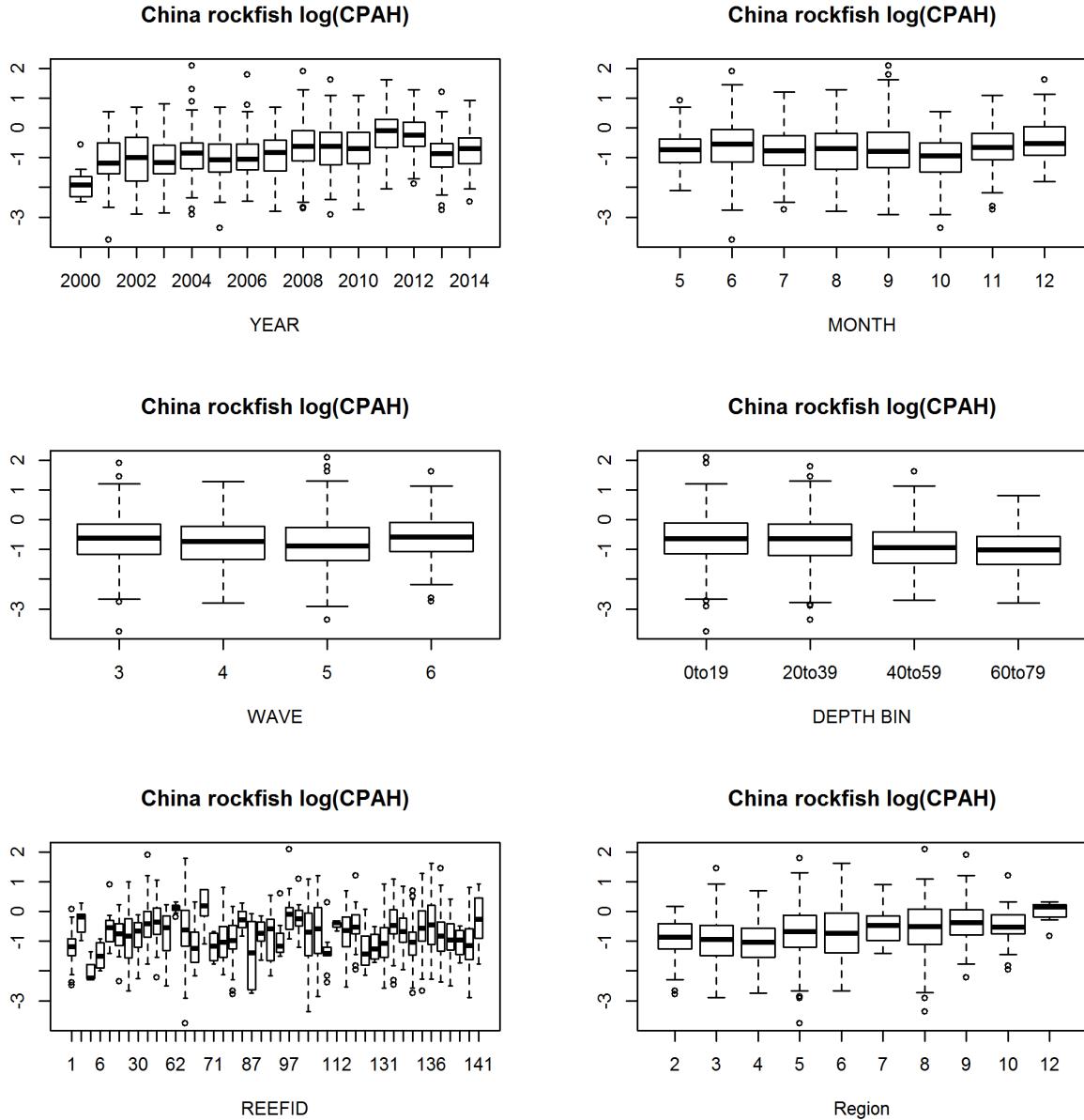


Figure 48: The distribution of drift-level CPUE data relative to potential covariates evaluated in the China rockfish 2000-2014 California onboard observer delta-GLM analysis (positive encounters only).

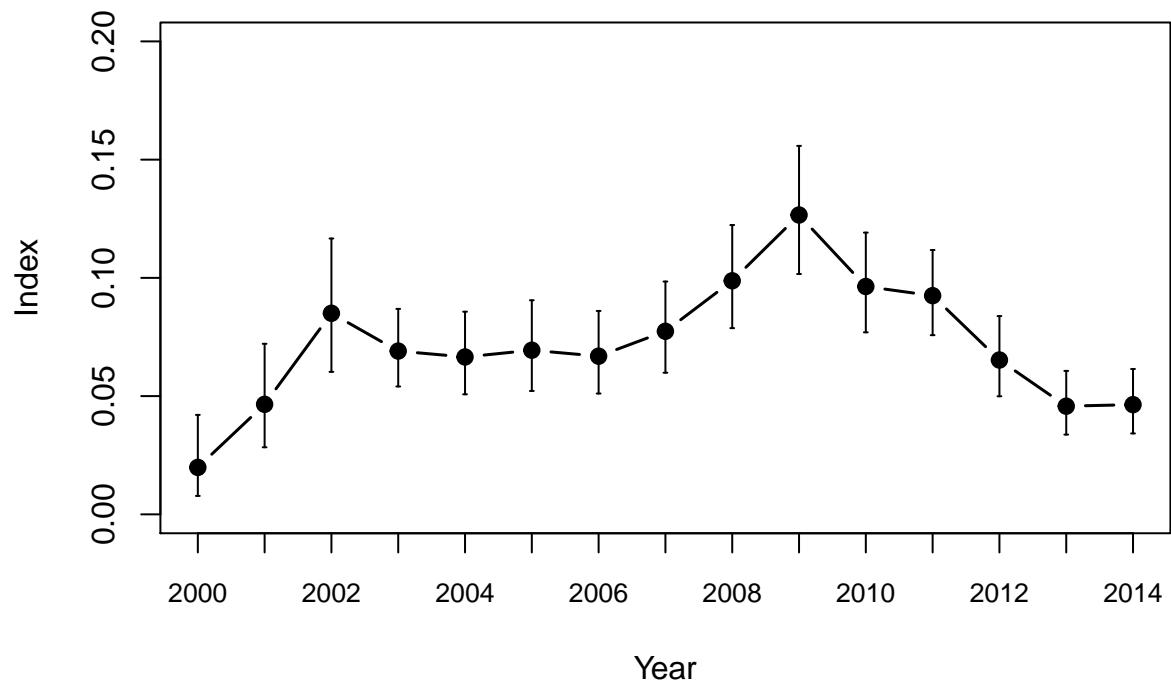


Figure 49: Index for the California 2000-2014 onboard observer program, with 95% lognormal confidence intervals.

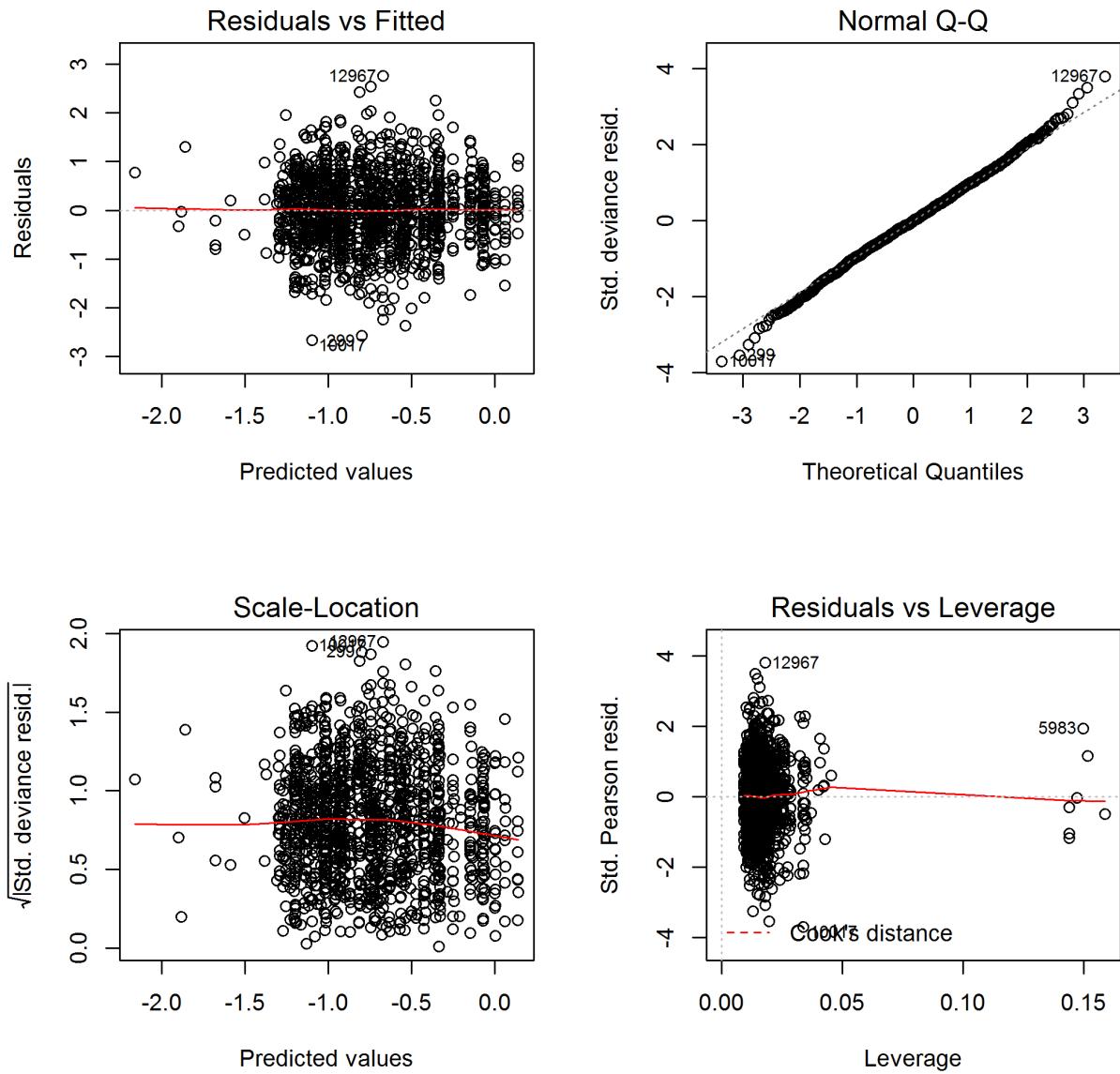


Figure 50: Diagnostic plots for the China rockfish positive catch component lognormal delta-GLM model for the 2000-2014 California onboard observer index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom right).

### length comp data, retained, 1\_WA\_SouthernWA\_Rec\_PCPR

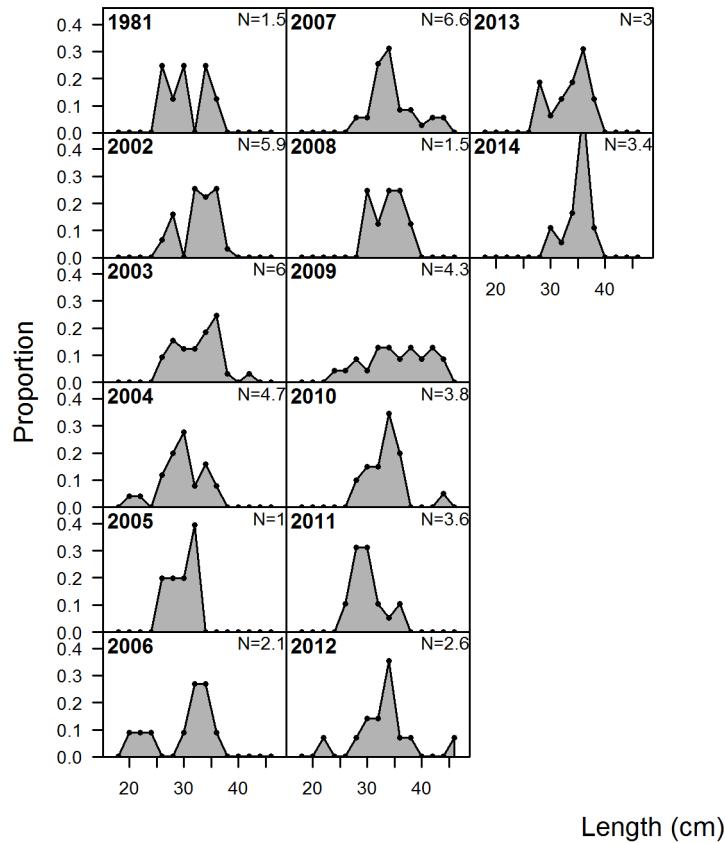


Figure 51: WDFW length compositions for the southern Washington recreational fleet, all modes.

2744 [Length compositions for northern model. ](r4ss/plots\_N/(r4ss/plots\_N/comp\_lendat\_sex1mkt2\_multi-  
 2745 fleet\_comparison.png)

### length comp data, retained, 3\_WA\_NorthernWA\_Rec\_PR

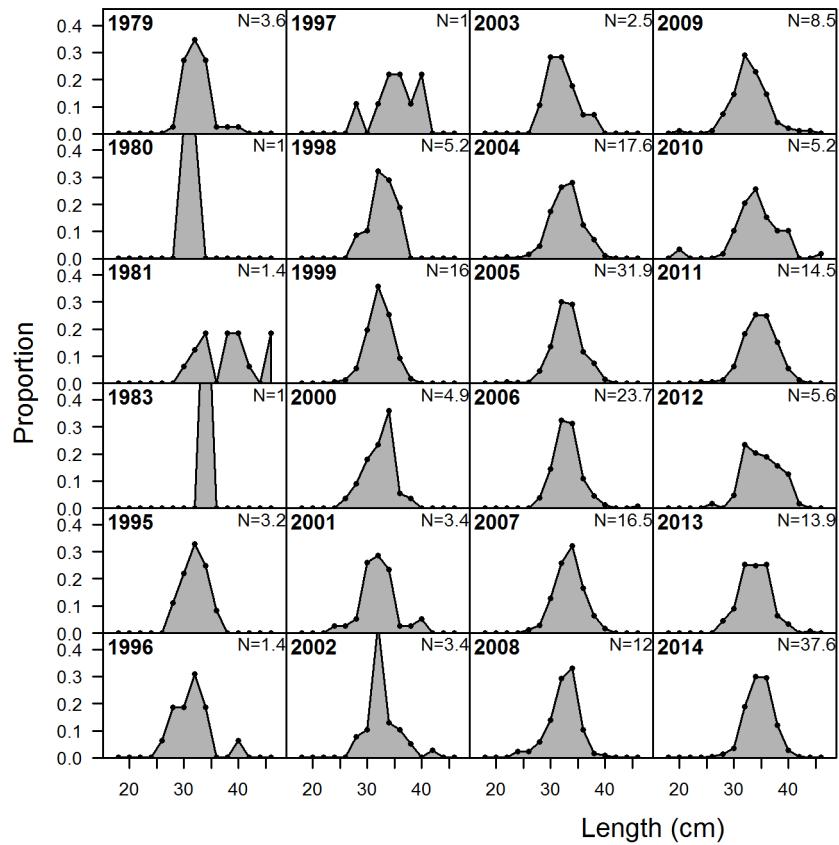


Figure 52: WDFW length compositions for the northern Washington recreational CPFV fleet.

conditional age-at-length data, retained, 3\_WA\_NorthernWA\_Rec\_PR (max=0.96)

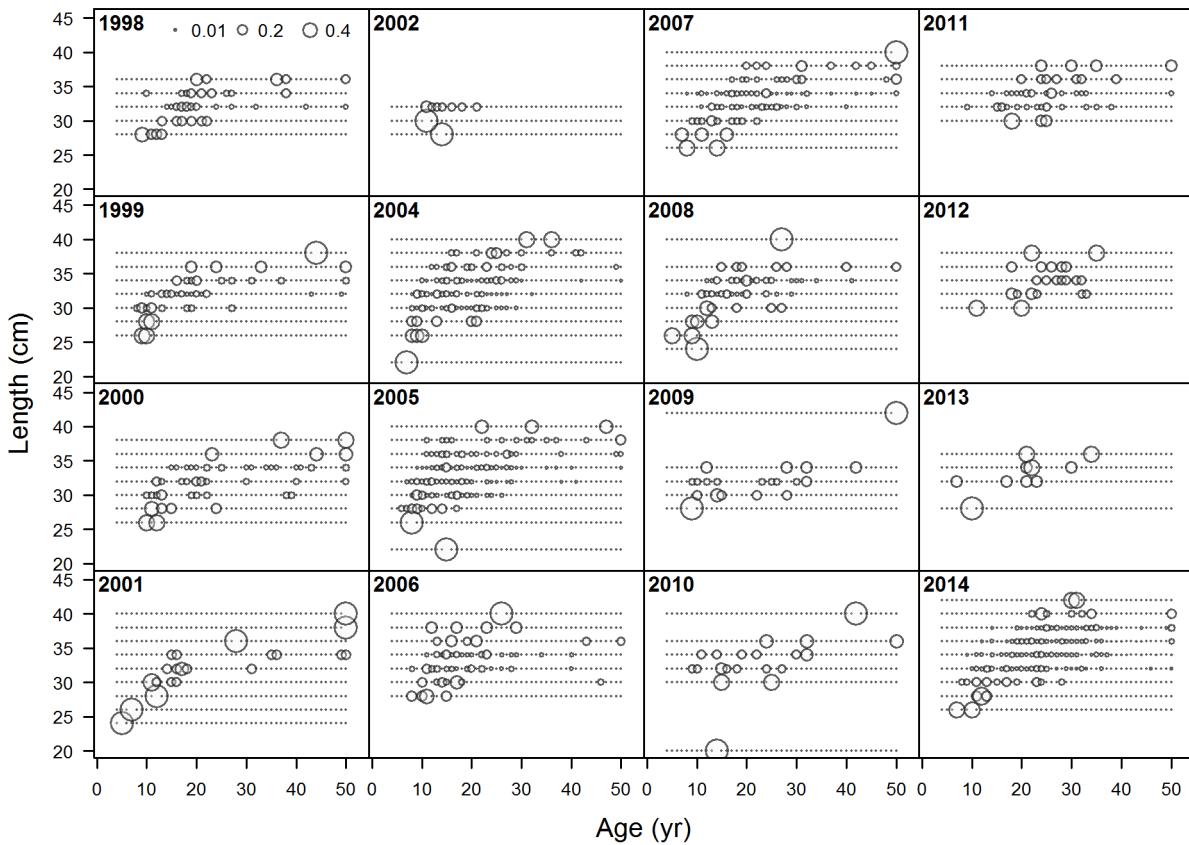


Figure 53: Conditional age-at-length compositions for recreational private/rental catch in northern WA in the northern model.

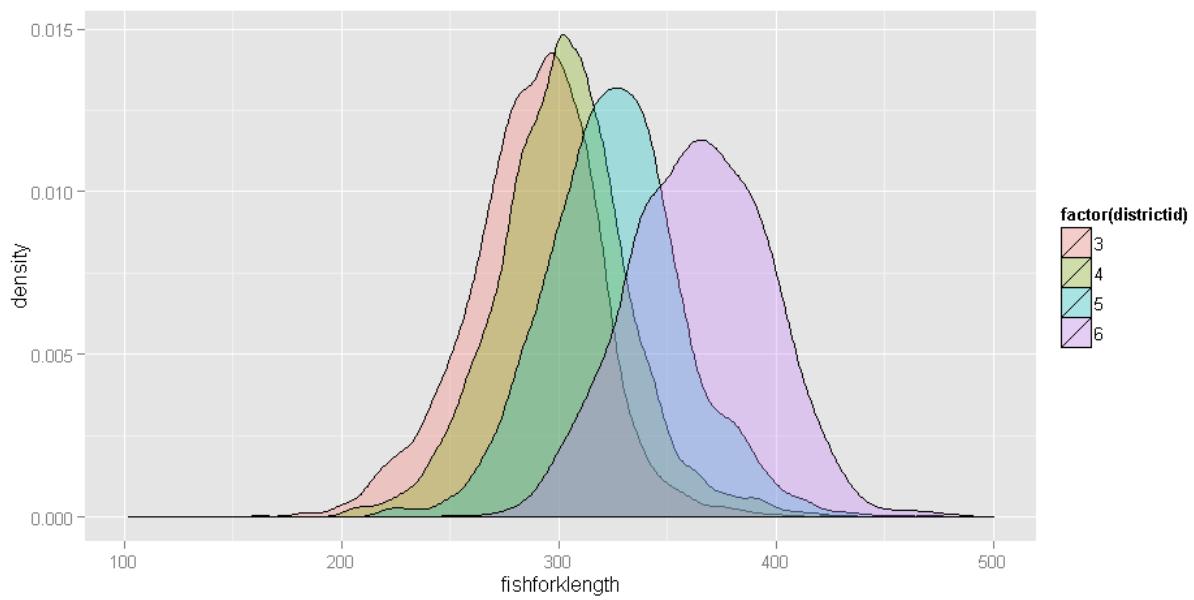


Figure 54: Distribution of lengths by CRFS district from CDFW, south of Cape Mendocino.

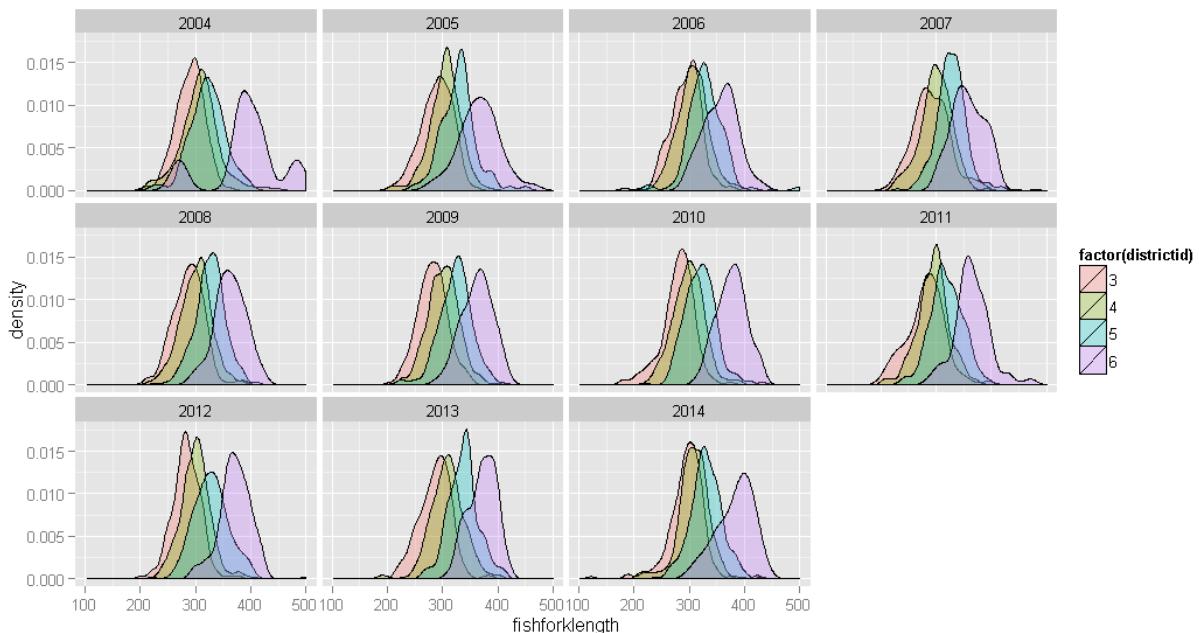


Figure 55: Distribution of lengths from the CDFW CRFS survey south of Cape Mendocino, by year and district.

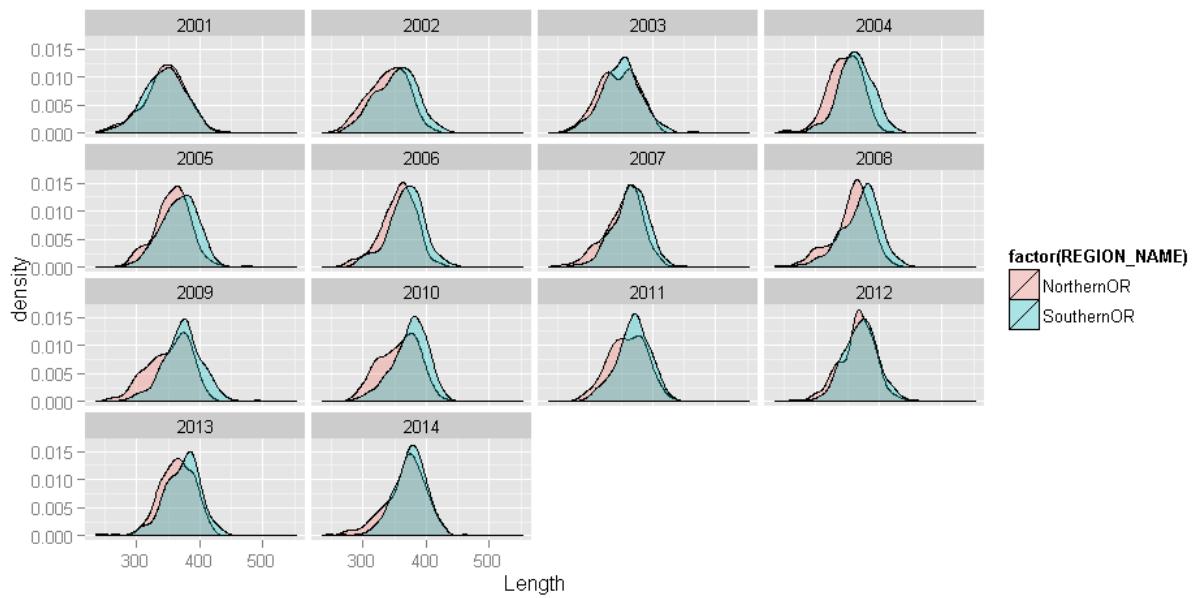


Figure 56: Oregon (ORBS) recreational CPFV fleet length distributions by region and year.

**length comp data, retained, 5\_OR\_SouthernOR\_Comm\_Dead**

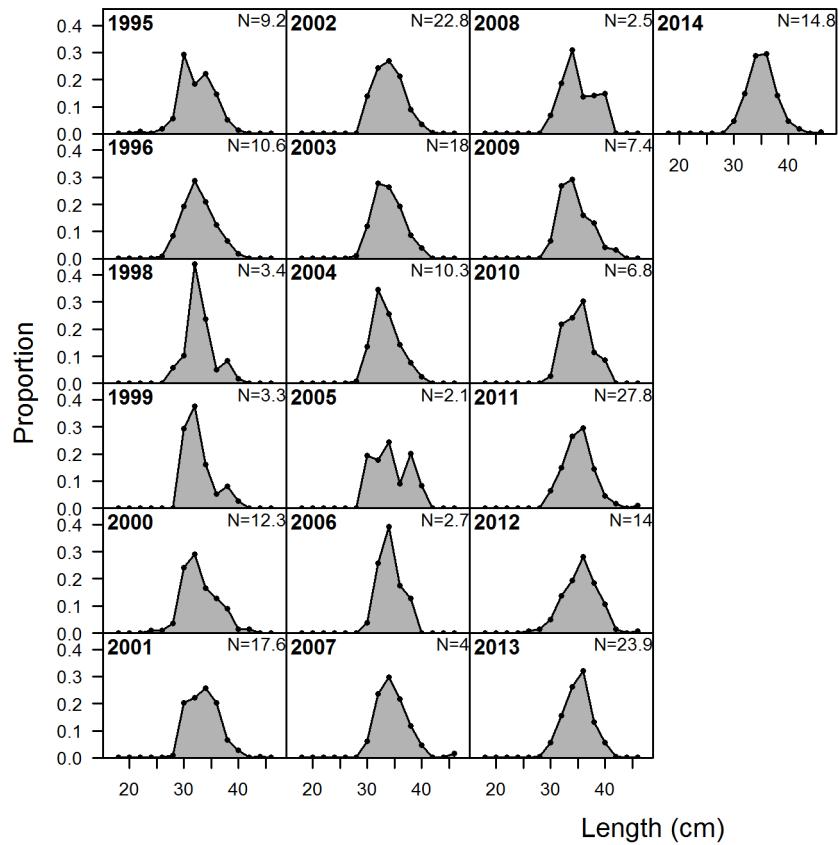


Figure 57: Length compositions for retained fish from the southern Oregon commercial dead-fish fishery.

### length comp data, retained, 6\_OR\_SouthernOR\_Comm\_Live

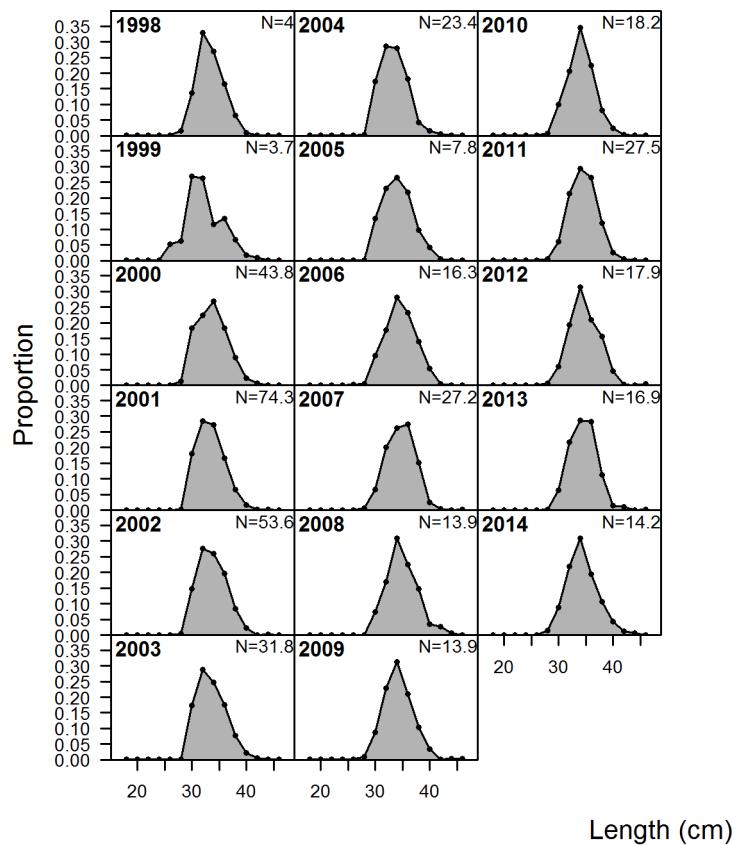


Figure 58: Length compositions for retained fish from the southern Oregon commercial live-fish fishery.

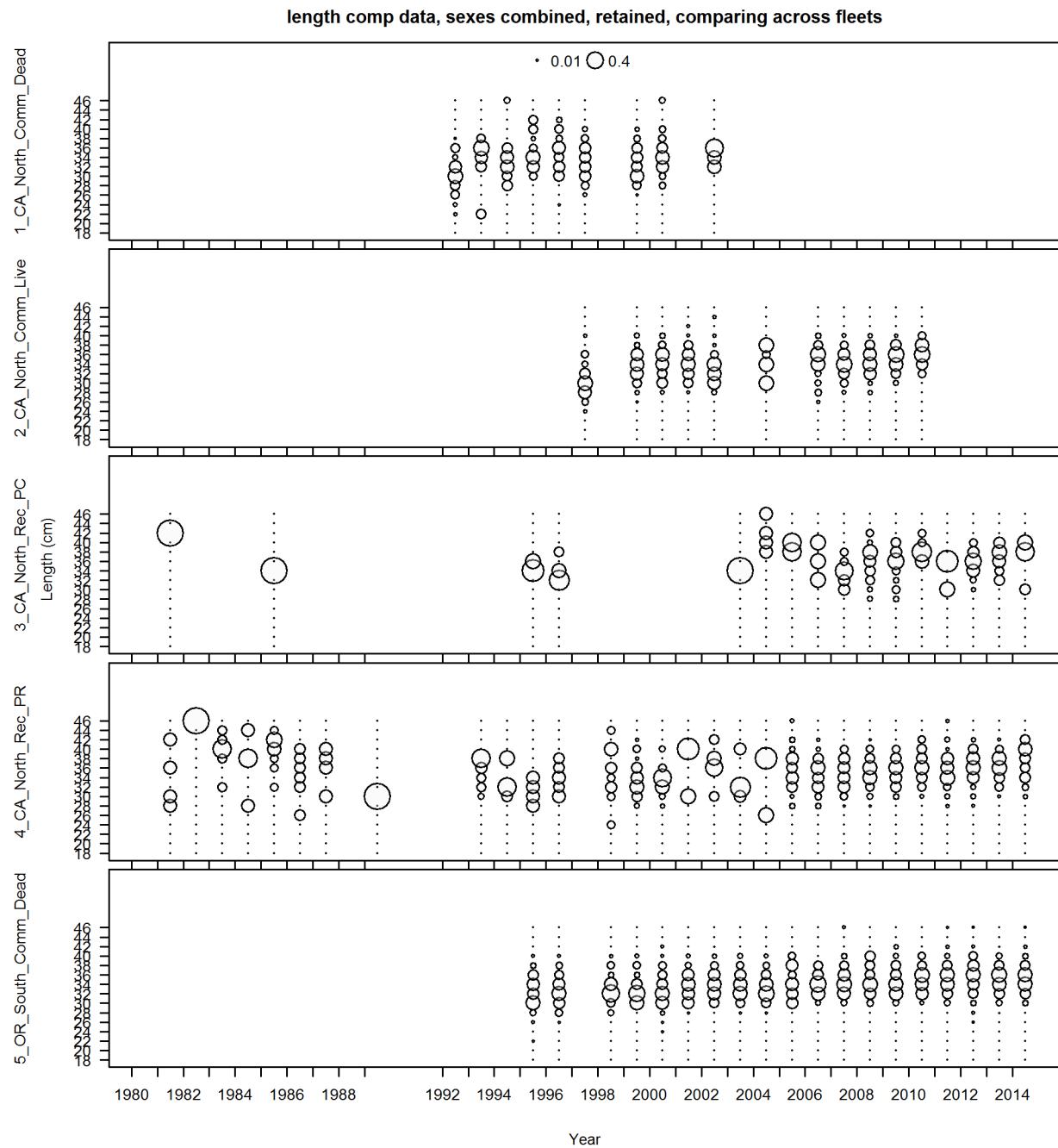


Figure 59: Length compositions for central model, figure 1 of 2.

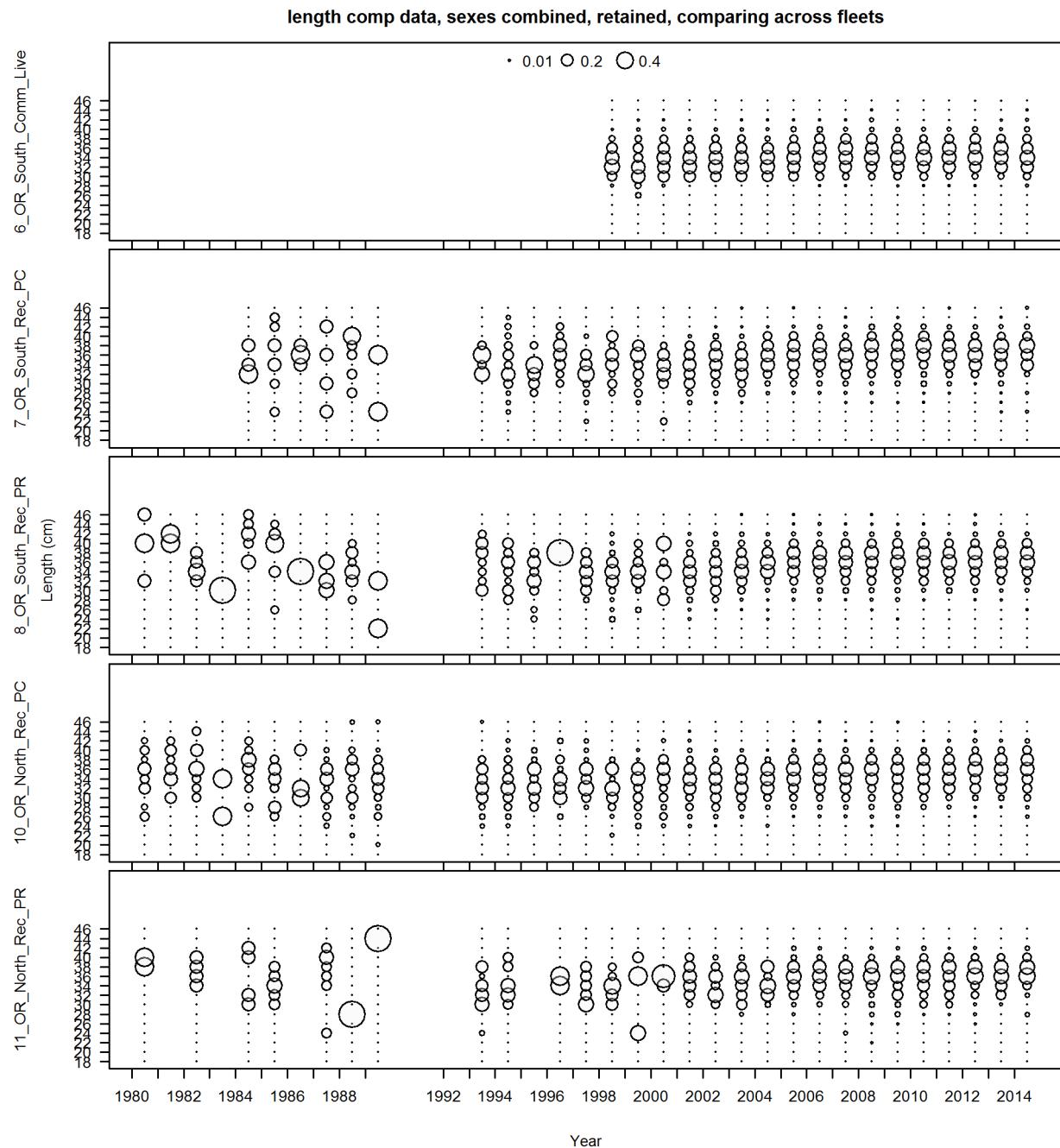


Figure 60: Length compositions for central model continued, figure 2 of 2.

conditional age-at-length data, retained, 5\_OR\_SouthernOR\_Comm\_Dead (max=0.96)

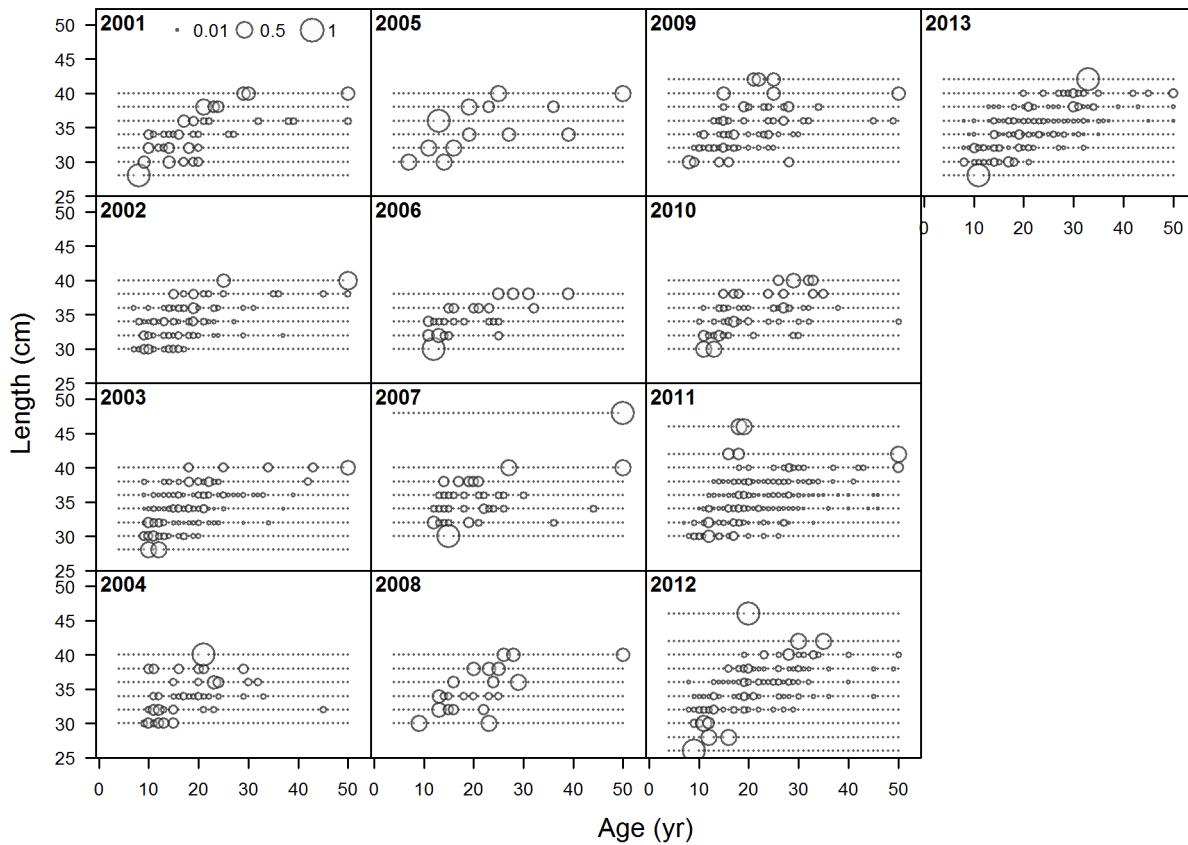


Figure 61: Conditional age-at-length data for retained fish from the southern Oregon commercial dead-fish fishery.

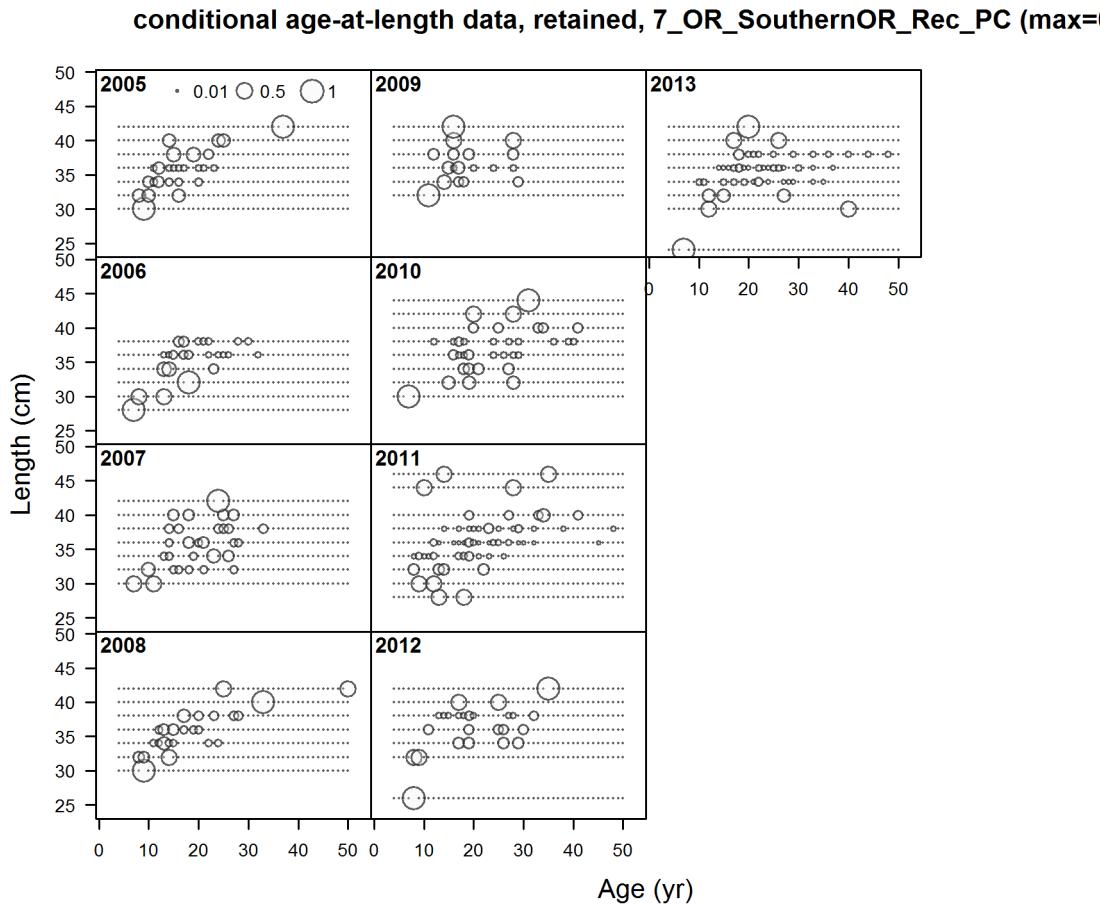


Figure 62: Conditional age-at-length compositions for the commercial dead-fish fishery in southern OR in the central model.

**length comp data, retained, 1\_CA\_SouthOf4010\_Comm\_Dead**

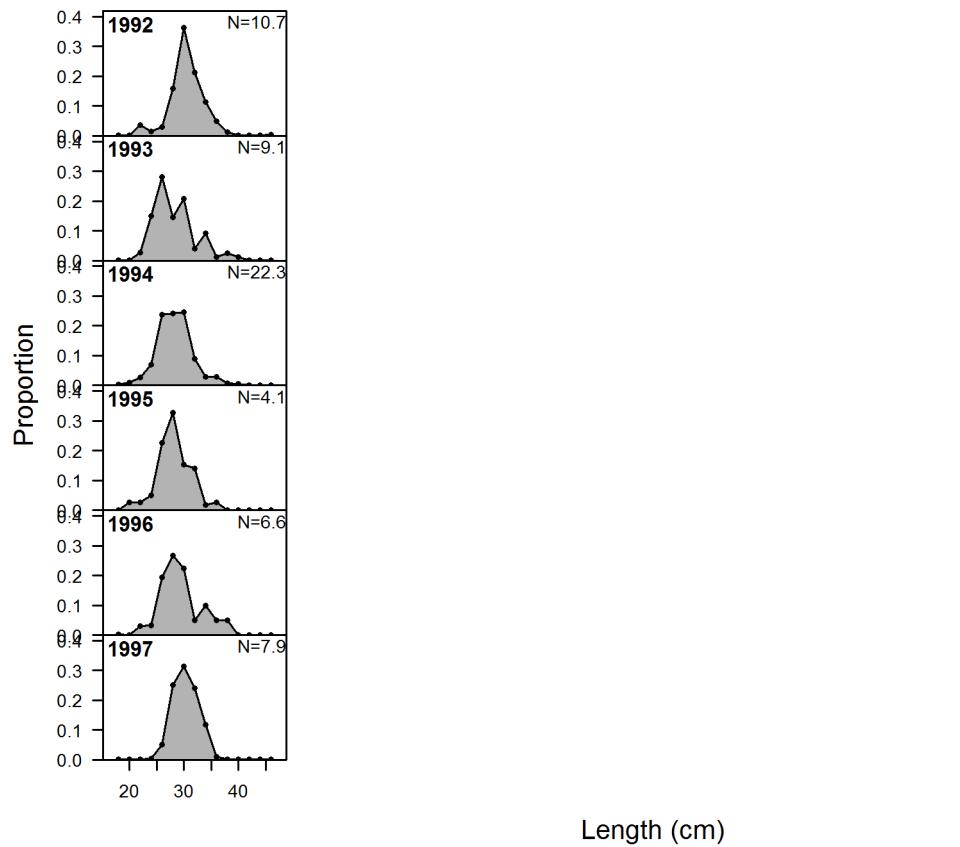


Figure 63: Length compositions by year for the California commercial dead-fish fishery south of  $40^{\circ}10'$ .

**length comp data, retained, 5\_CA\_SouthOf4010\_Comm\_Discard**

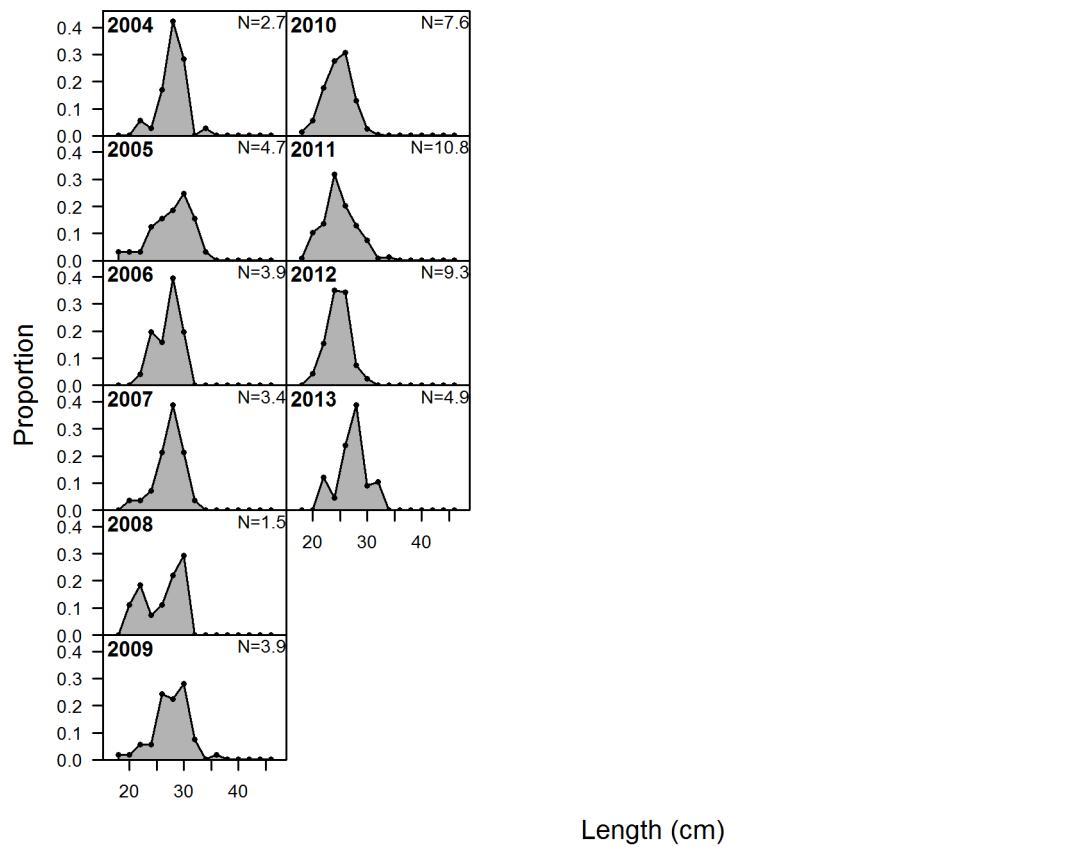


Figure 64: Length compositions by year for discarded fish in the California commercial fishery south of  $40^{\circ}10'$ .

### length comp data, retained, 2\_CA\_SouthOf4010\_Comm\_Live

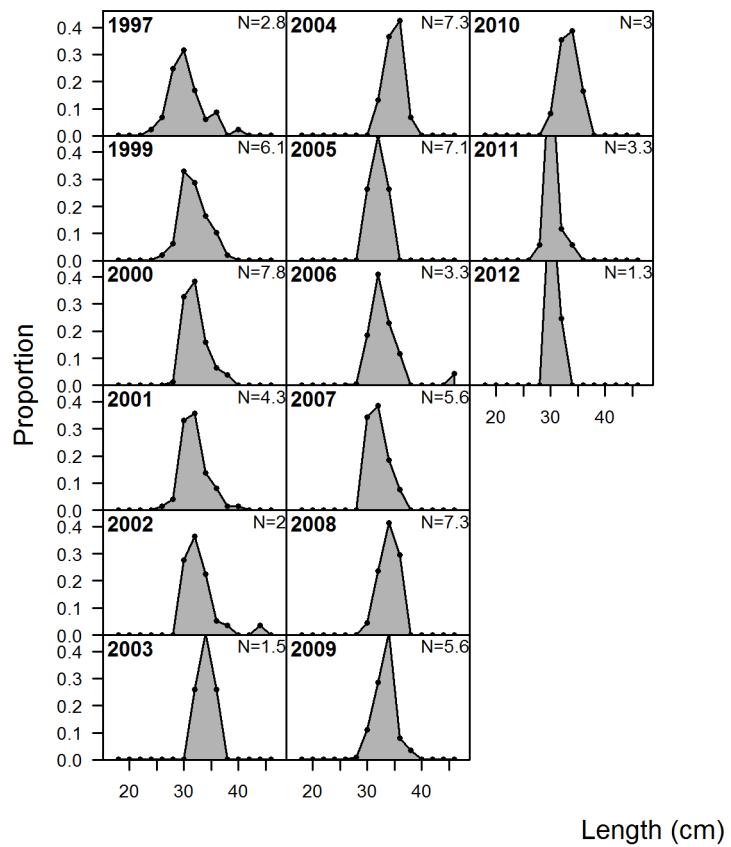


Figure 65: Length compositions by year for retained fish in the California commercial live-fish fishery south of  $40^{\circ}10'$ .

**length comp data, whole catch, 8\_CA\_SouthOf4010\_CCFRP\_comps\_only**

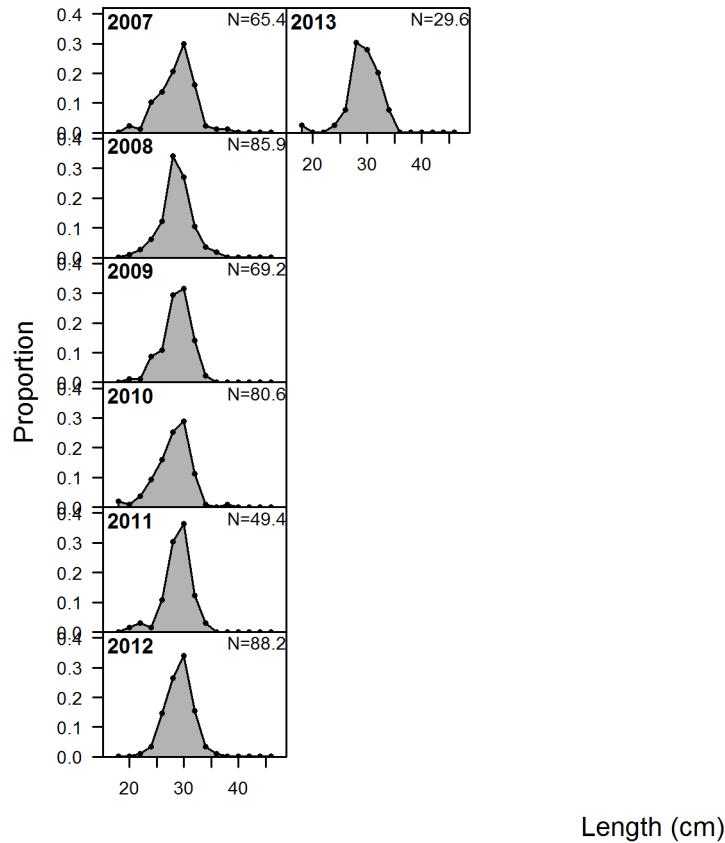


Figure 66: CCFRP research program length compositions for the southern model.

**conditional age-at-length data, whole catch, 9\_CA\_SouthOf4010\_Abrams\_thesis\_comps (max=0.**

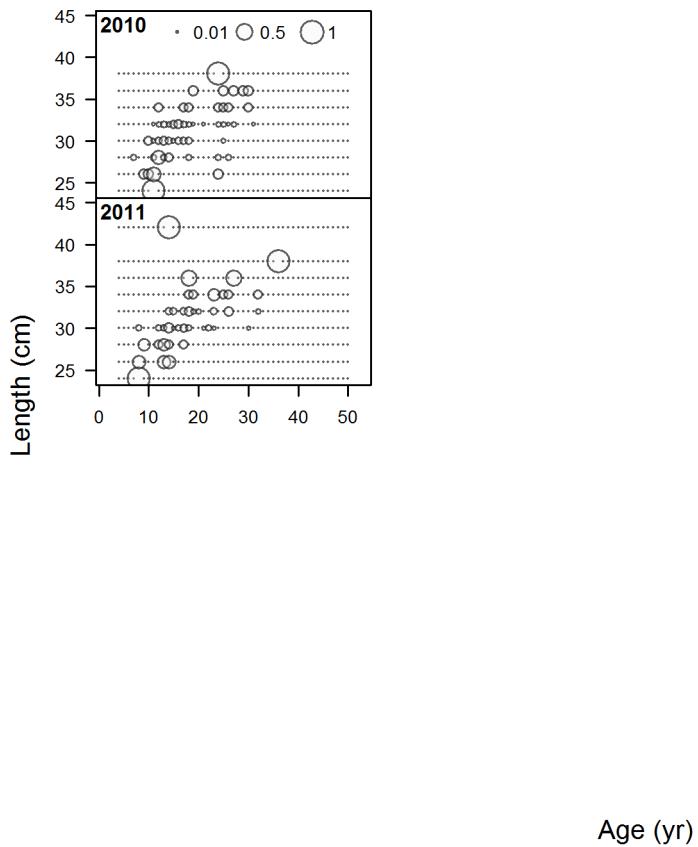
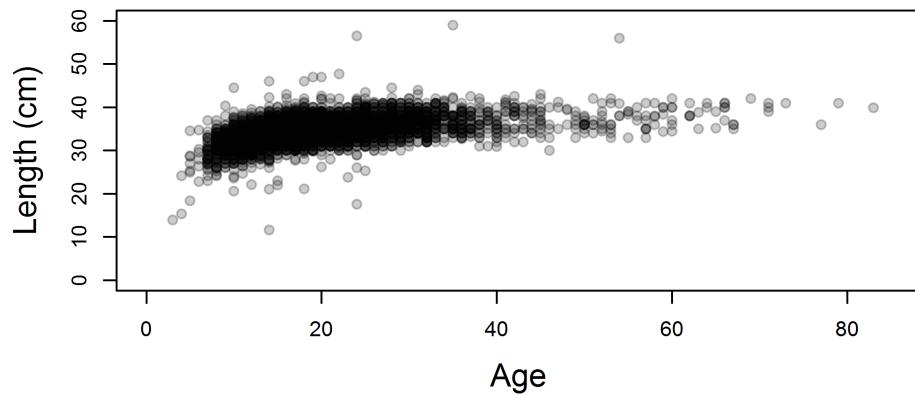
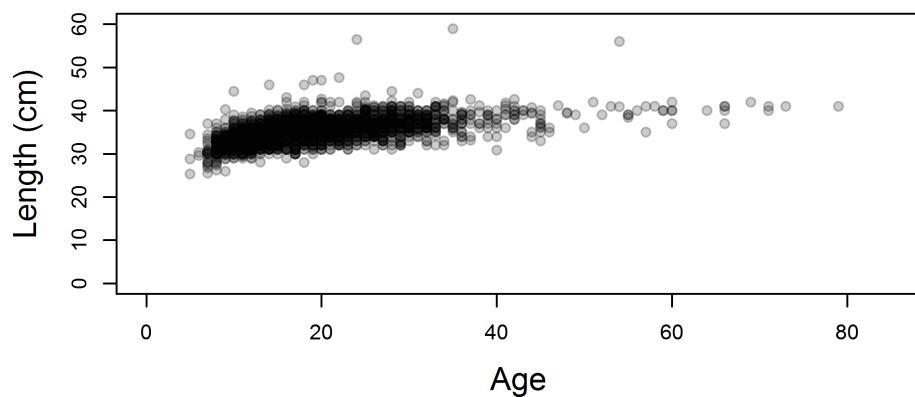


Figure 67: Conditional age-at-length compositions by year from the Abrams thesis study, used in the southern model.

**Washington**



**Oregon**



**California**

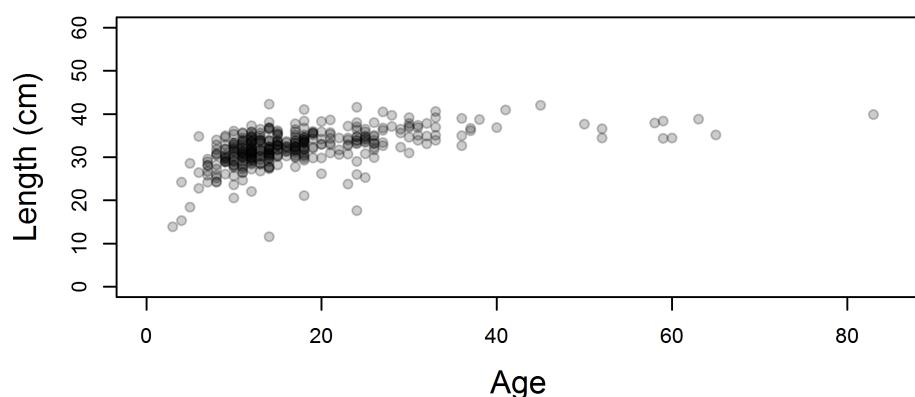


Figure 68: Raw length at age data by state.

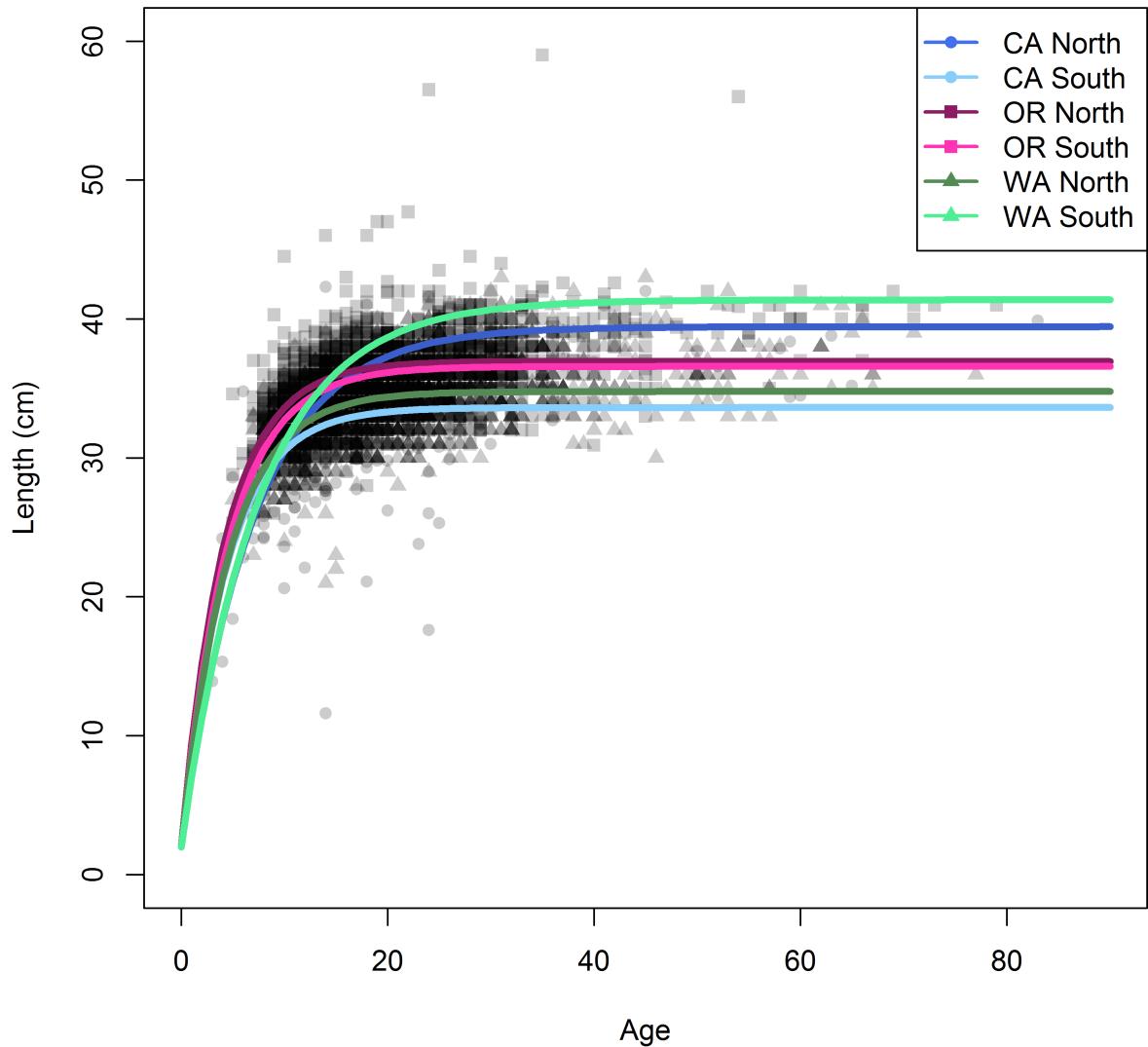


Figure 69: Fits by region to the von Bertalanffy growth curve with age-0 fixed at 2 cm. California is split at  $40^{\circ}106'$ , Oregon at Florence, OR, and Washington between MCAs 2 and 3.

### Comparison of current NWFSC age readers

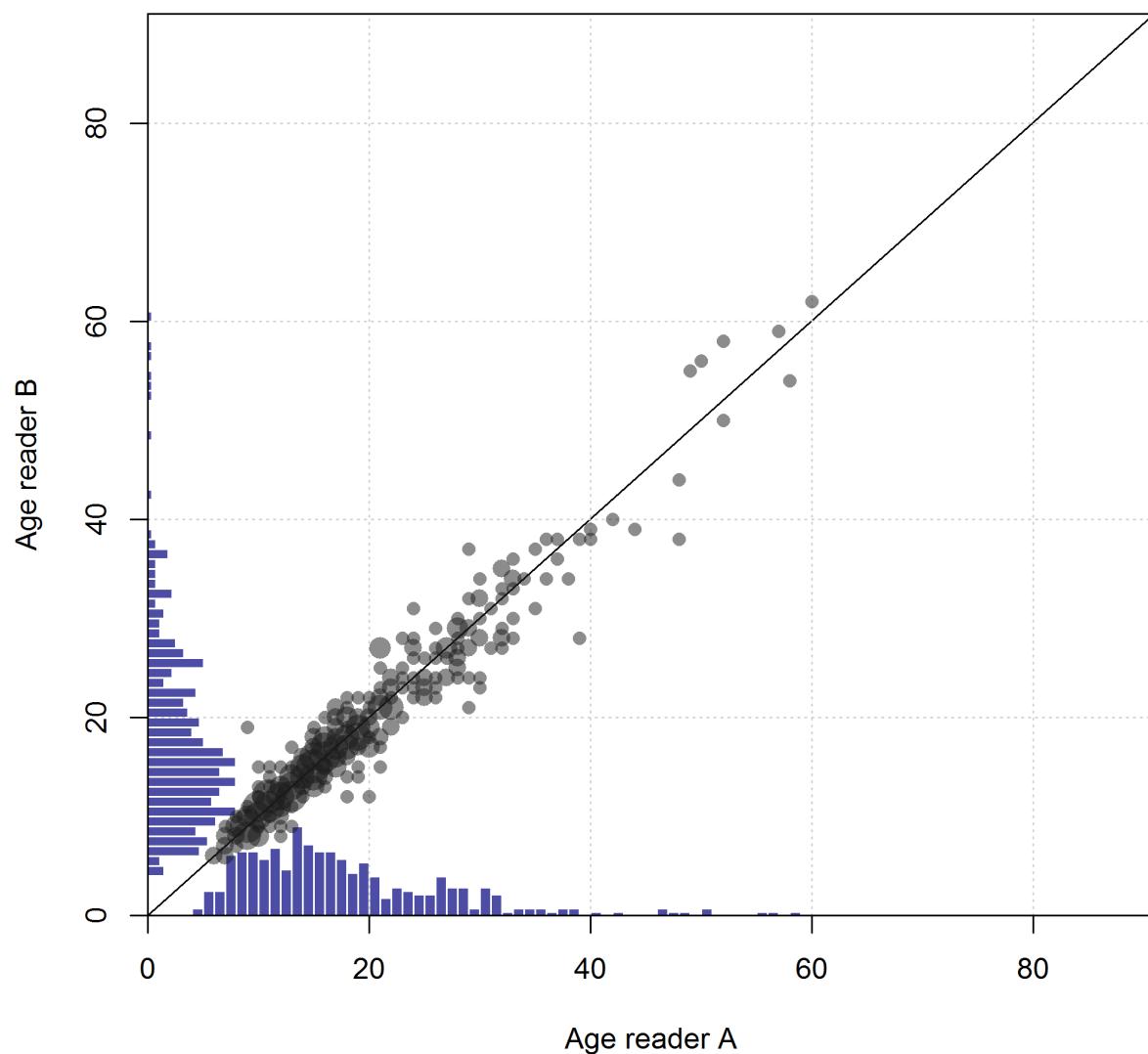


Figure 70: Aging precision between two current age readers at the NWFSC.

### Current vs. former NWFSC age readers

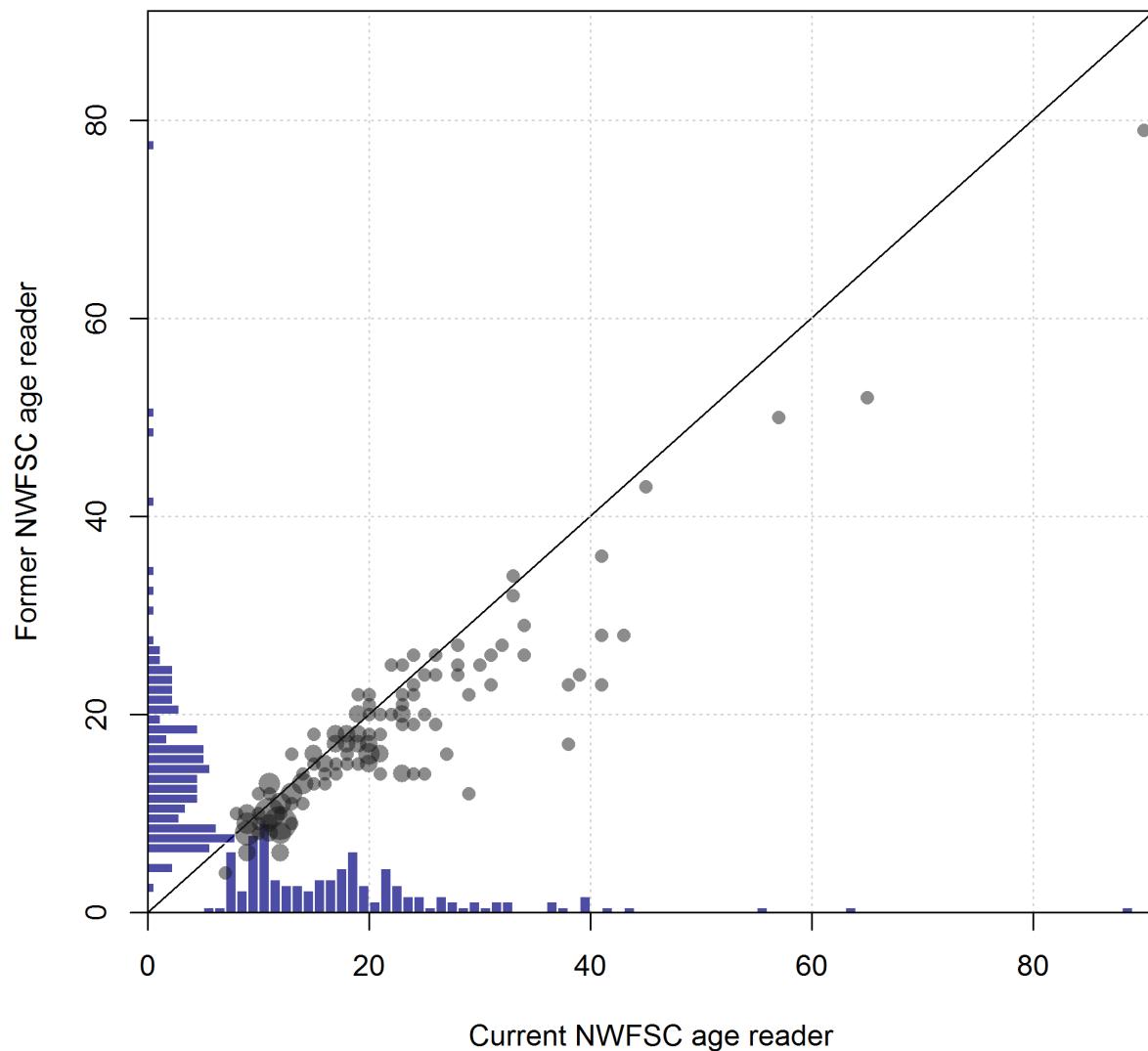


Figure 71: Aging precision between a current and former NWFSC age reader.

### NWFSC vs WDFW readings

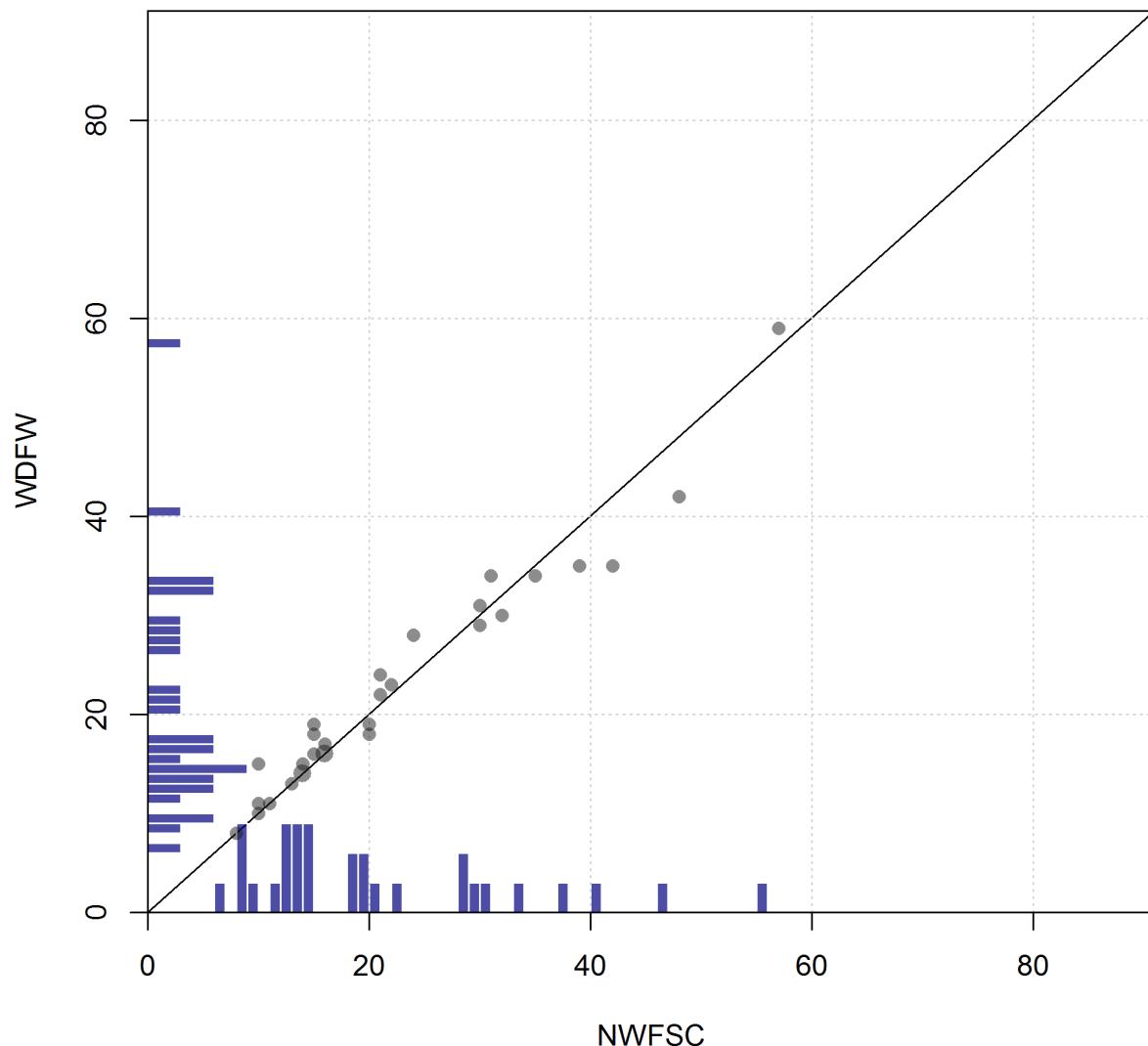


Figure 72: Aging precision between NWFSC and WDFW age readers.

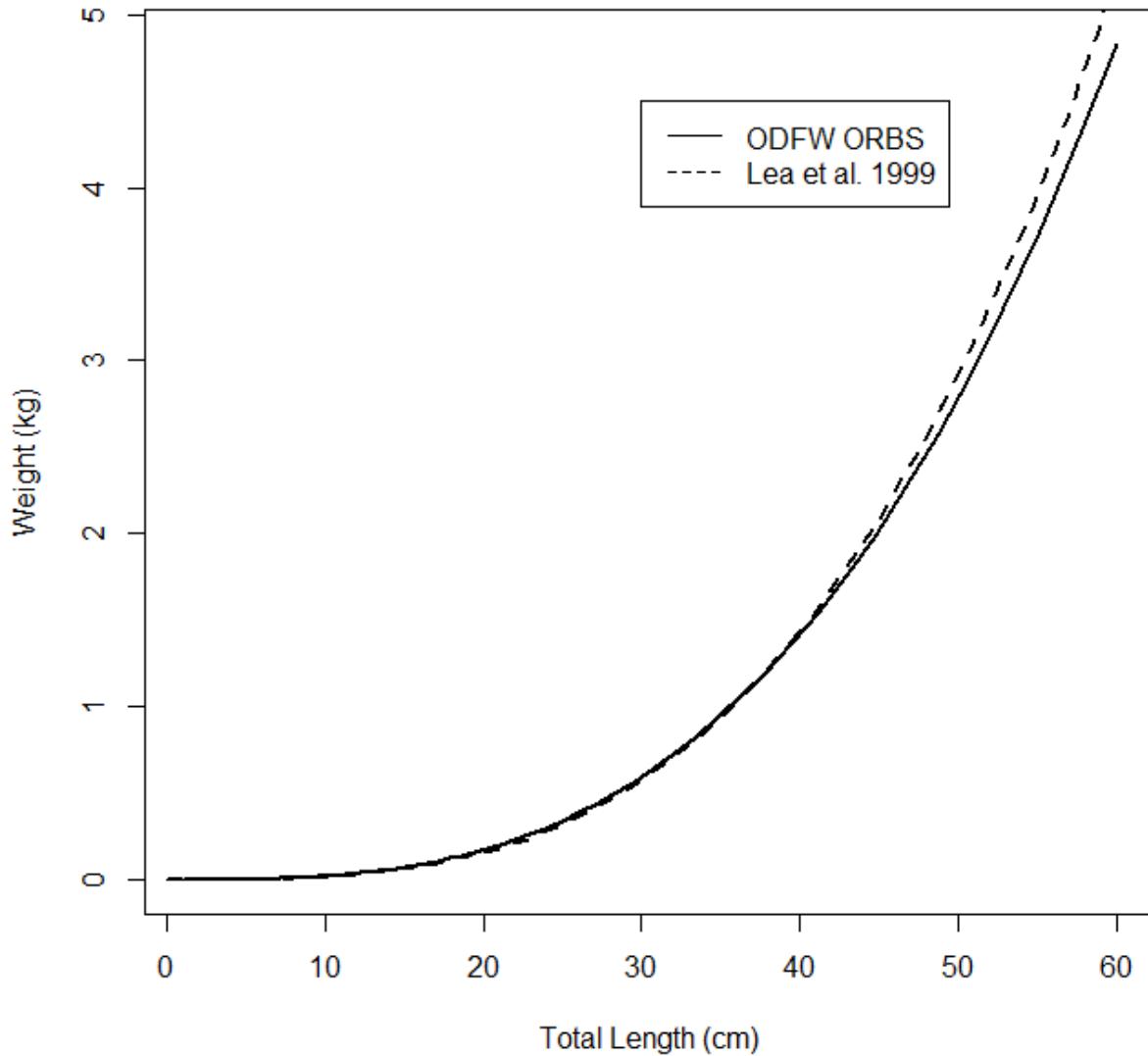


Figure 73: Comparison of the China rockfish weight-length curves from Lea et al. (1999) for California and those derived from the Oregon ORBS (dockside sampling program) data provided for this assessment.

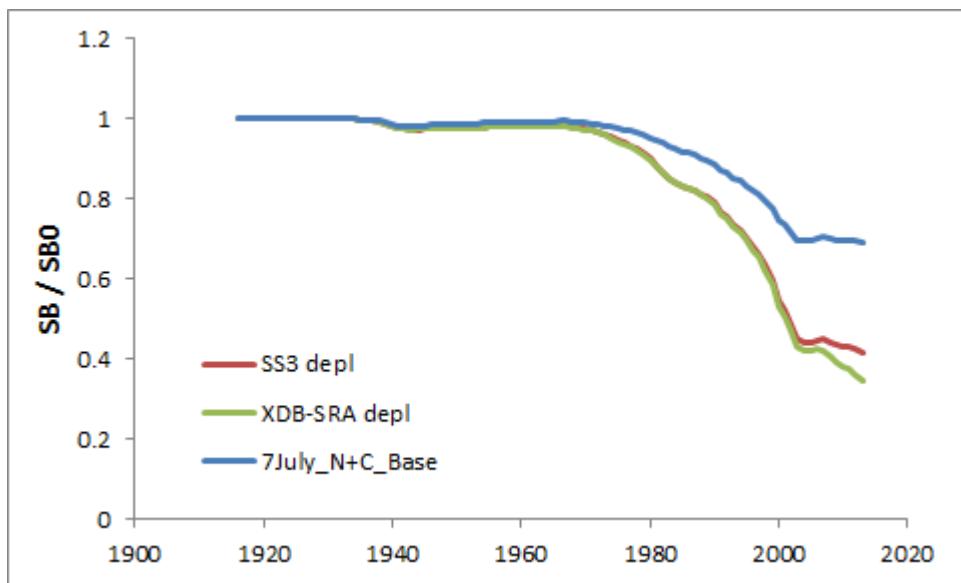


Figure 74: Comparison of depletion among the 2013 data moderate assessment, a SS3 bridge model, and the 2015 base case for the combined nothern and central models.

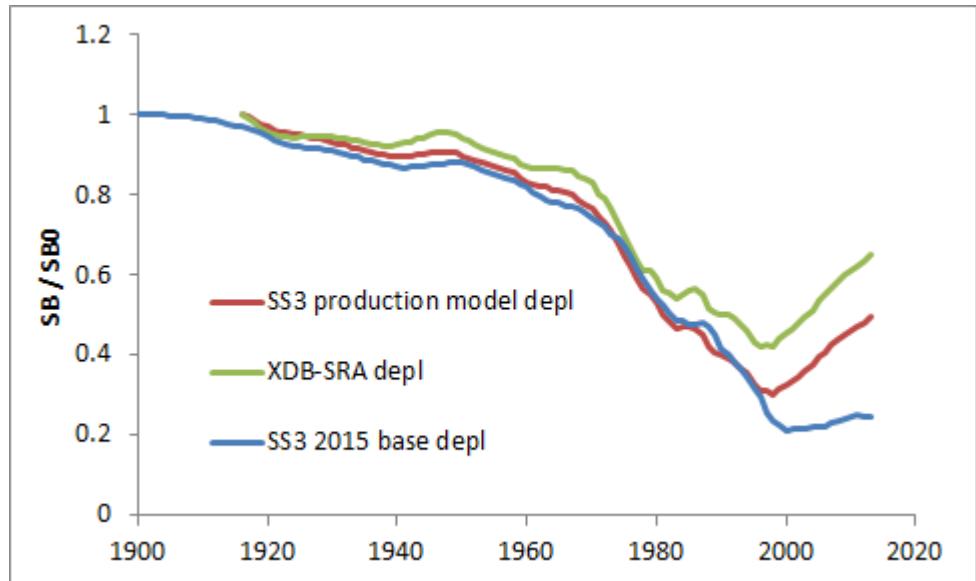


Figure 75: Comparison of depletion among the 2013 data moderate assessment, a SS3 bridge model, and the 2015 base case for the southern model.

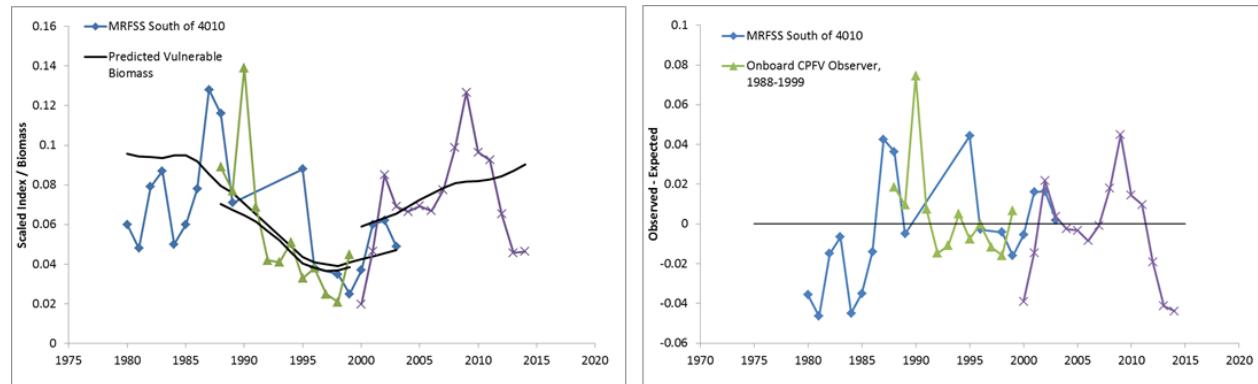


Figure 76: Normalized indices (left) and residuals for indices (right) for the southern model.

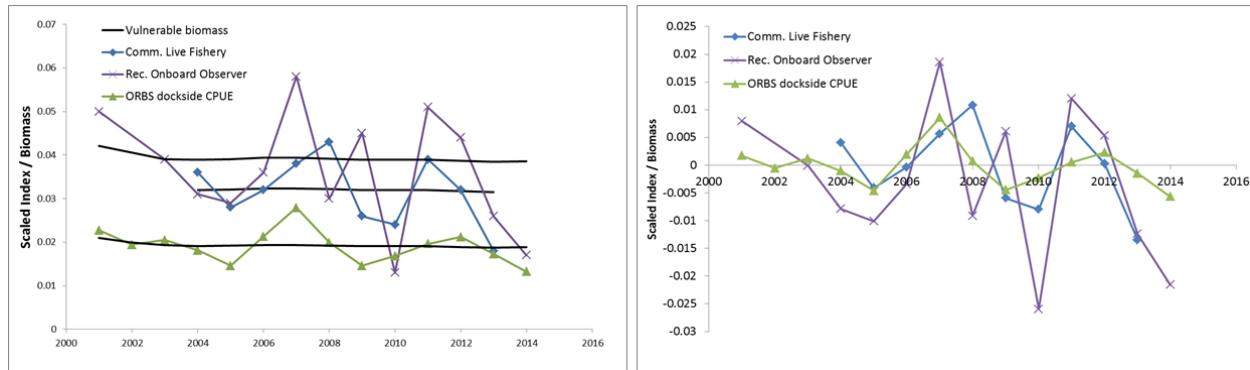


Figure 77: Normalized indices (left) and residuals for indices (right) for the central model.

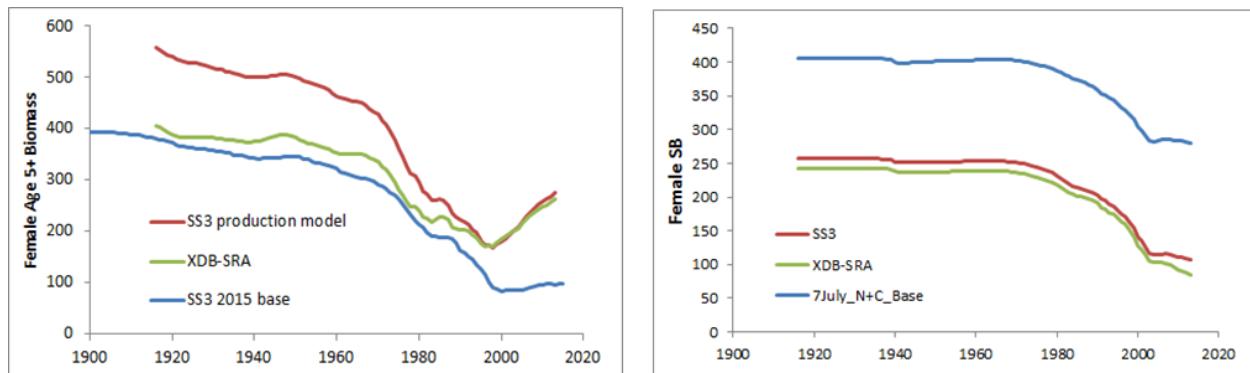


Figure 78: Comparison of depletion among the 2013 data moderate assessment, a SS3 bridge model, and the 2015 base case for the southern (left panel) and northern and central (right panel) models.

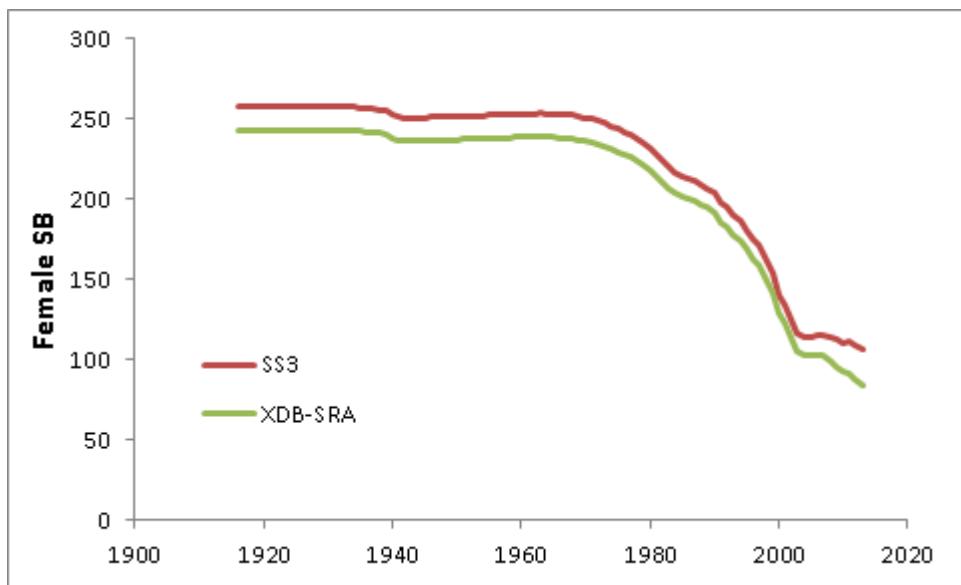


Figure 79: Time series of spawning biomass from the 2013 XDB-SRA assessment of China rockfish north of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

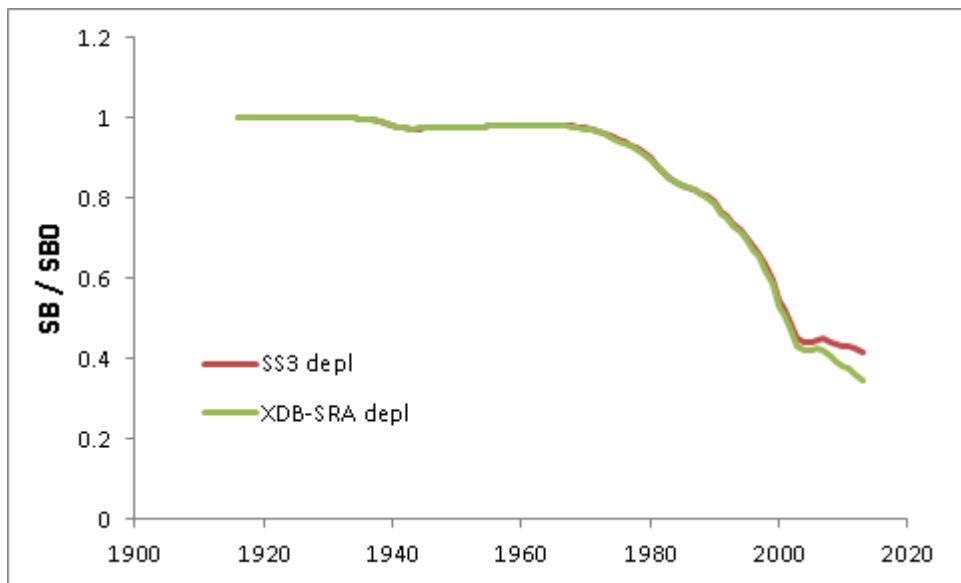


Figure 80: Time series of spawning biomass relative to unfished spawning biomass (“depletion”, or  $SB / SB_0$ ) from the 2013 XDB-SRA assessment of China rockfish north of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

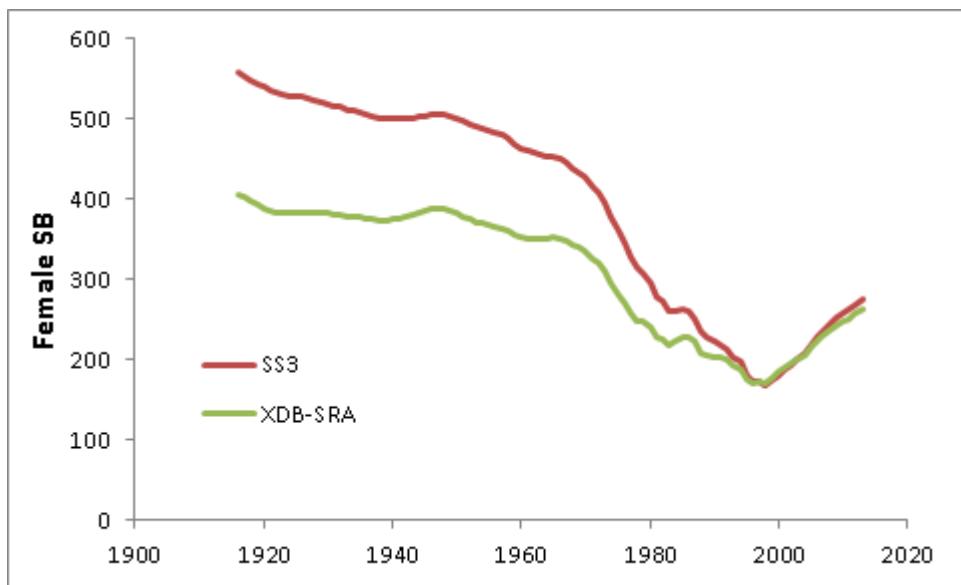


Figure 81: Time series of spawning biomass from the 2013 XDB-SRA assessment of China rockfish south of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

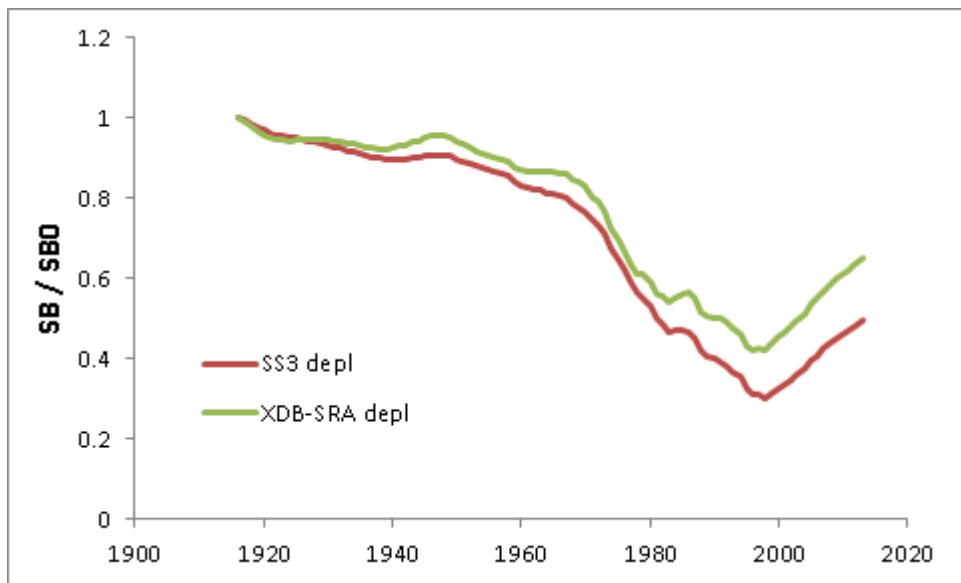


Figure 82: Time series of spawning biomass relative to unfished spawning biomass (“depletion”, or  $SB/SB_0$ ) from the 2013 XDB-SRA assessment of China rockfish south of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

### Ending year expected growth (with 95% intervals)

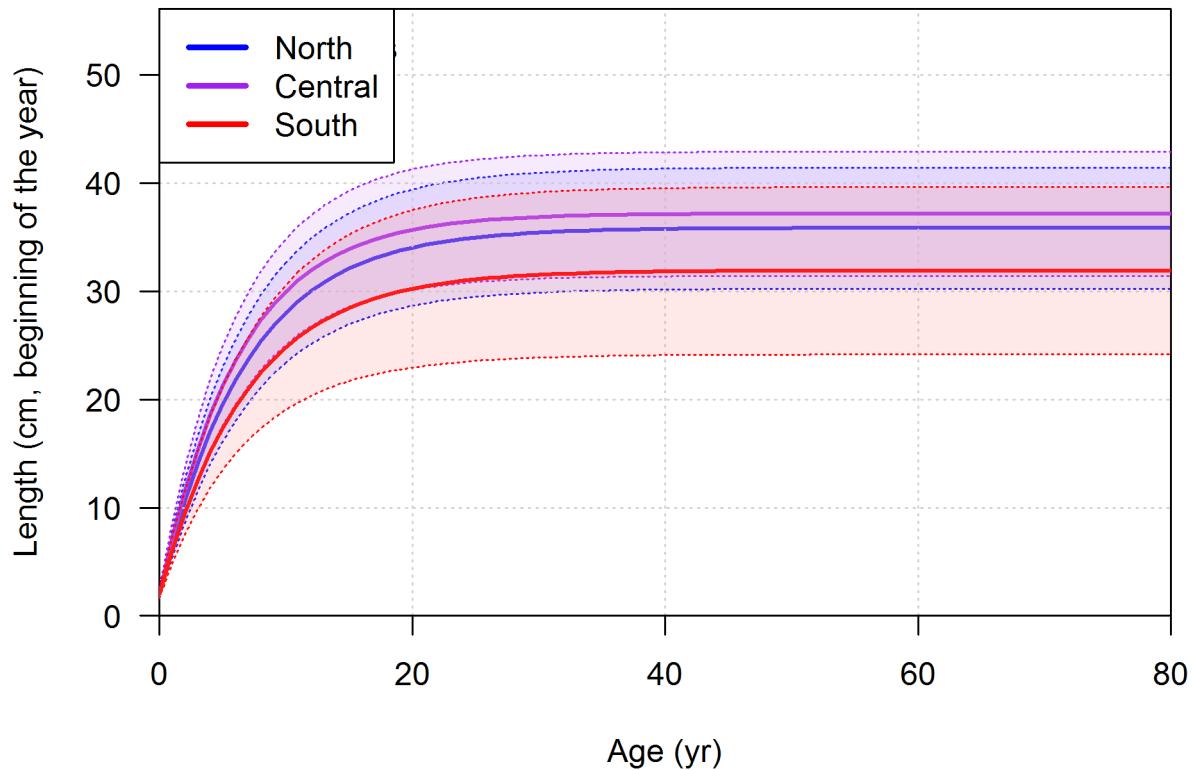


Figure 83: Fits to growth among models with no sex-specific growth.

**Index 3\_WA\_NorthernWA\_Rec\_PR**

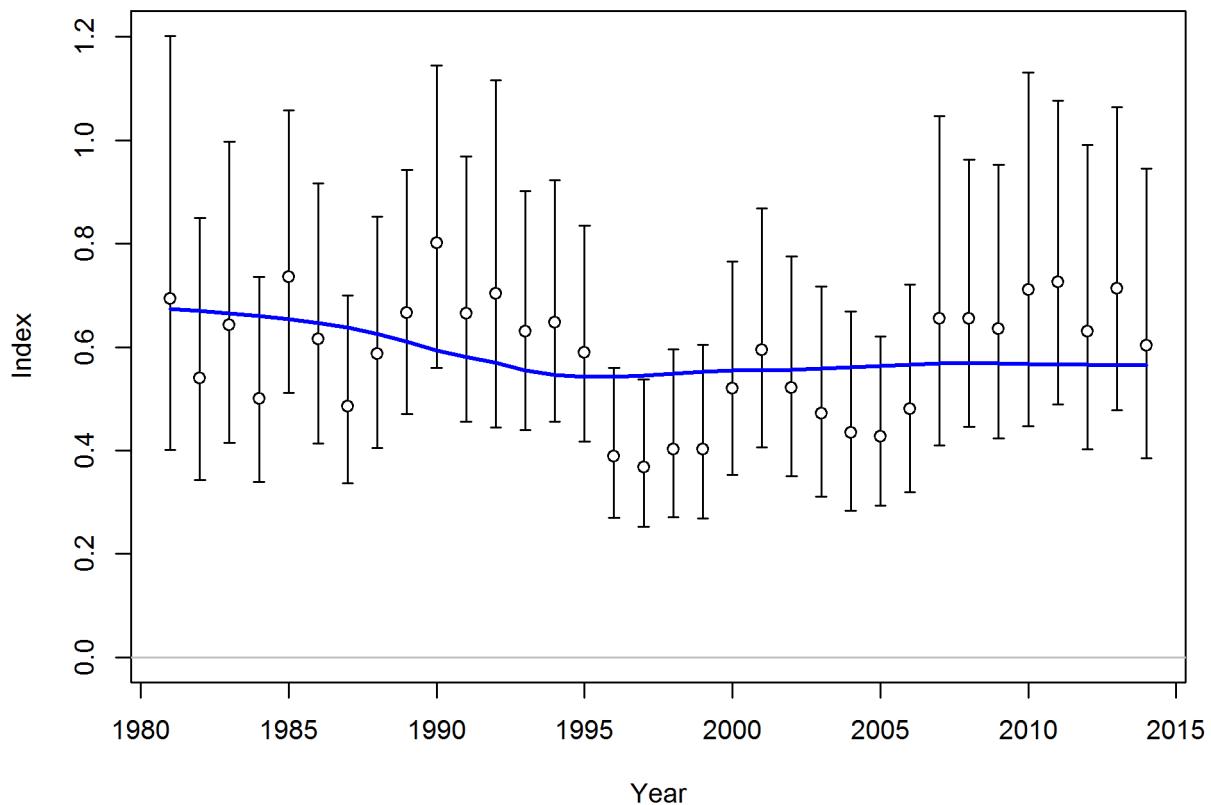


Figure 84: Fits to private boat recreational dockside index for Washington, northern model.

**length comps, retained, aggregated across time by fleet**

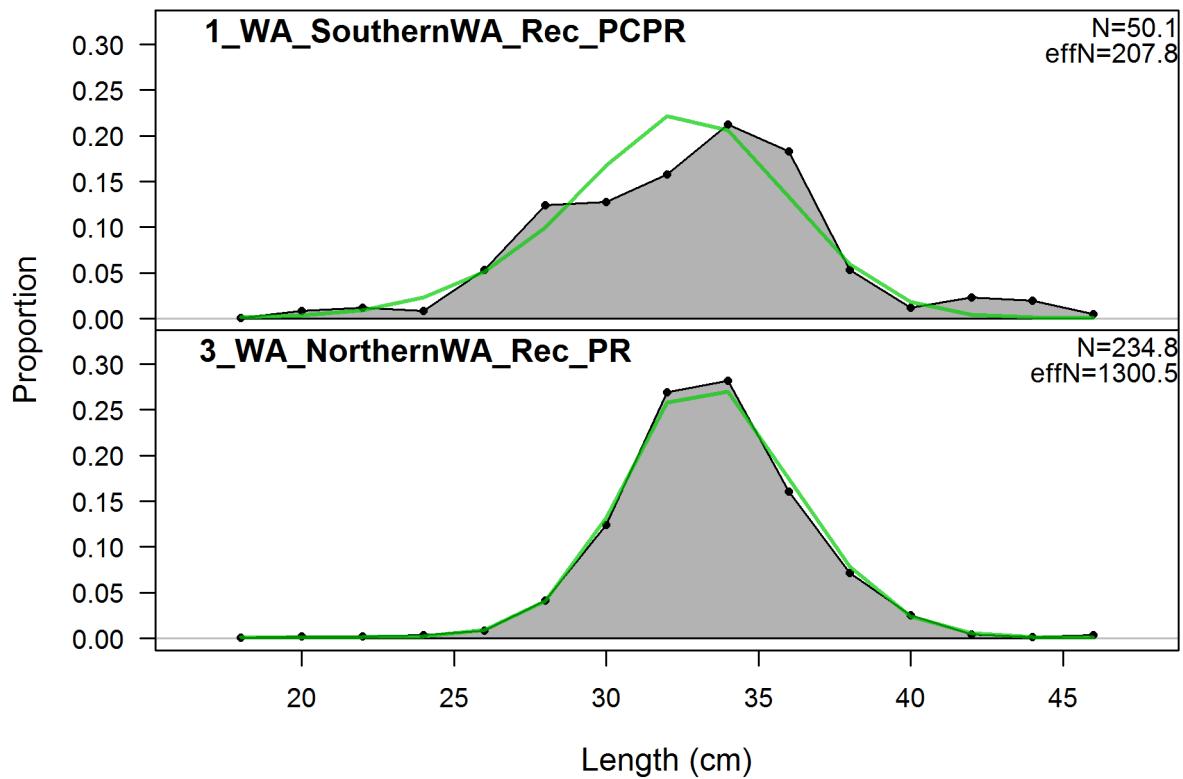


Figure 85: Fits to the time aggregated recreational length distributions for the northern model.

**Pearson residuals, sexes combined, retained, comparing across fleets**

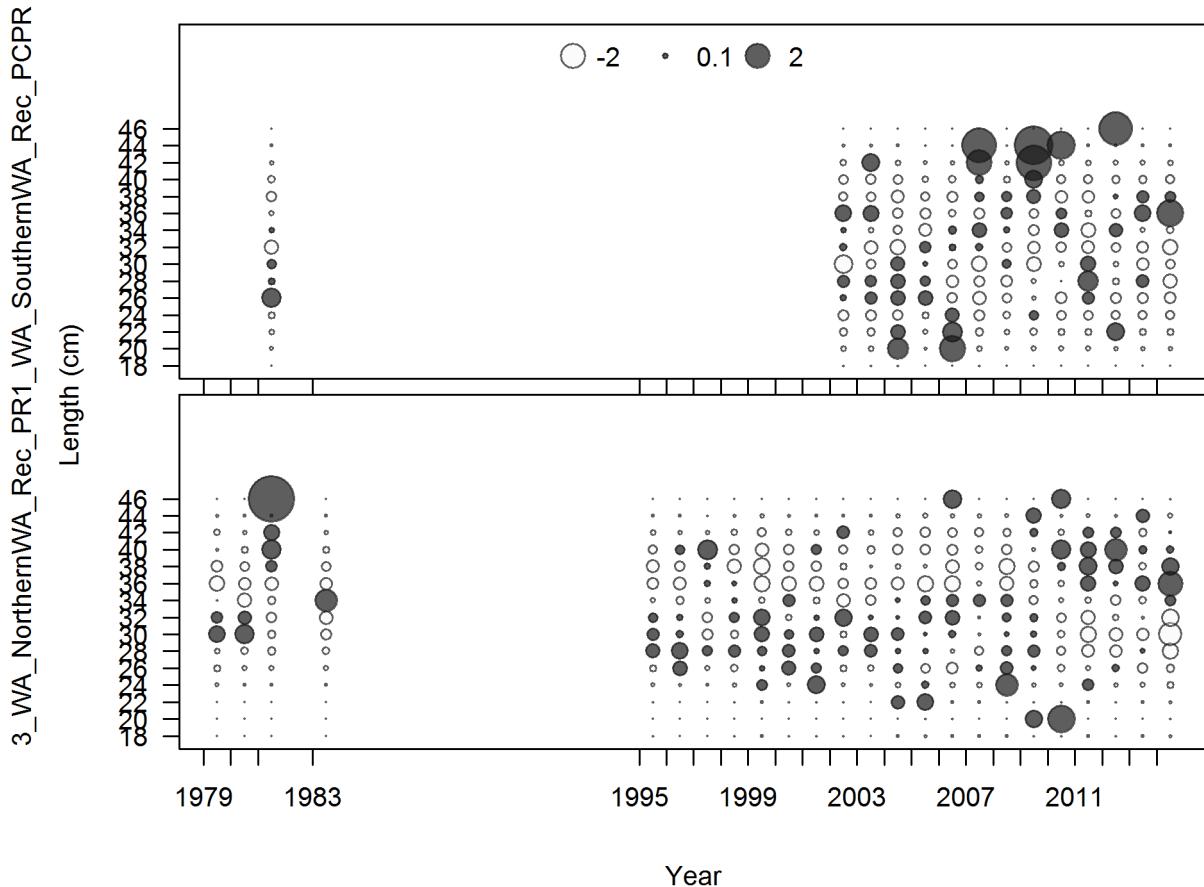


Figure 86: Residuals in fit to length compositions for northern model. Filled circles indicate observed values greater than expected values.

**Pearson residuals, retained, 3\_WA\_NorthernWA\_Rec\_PR (max=29.9)**

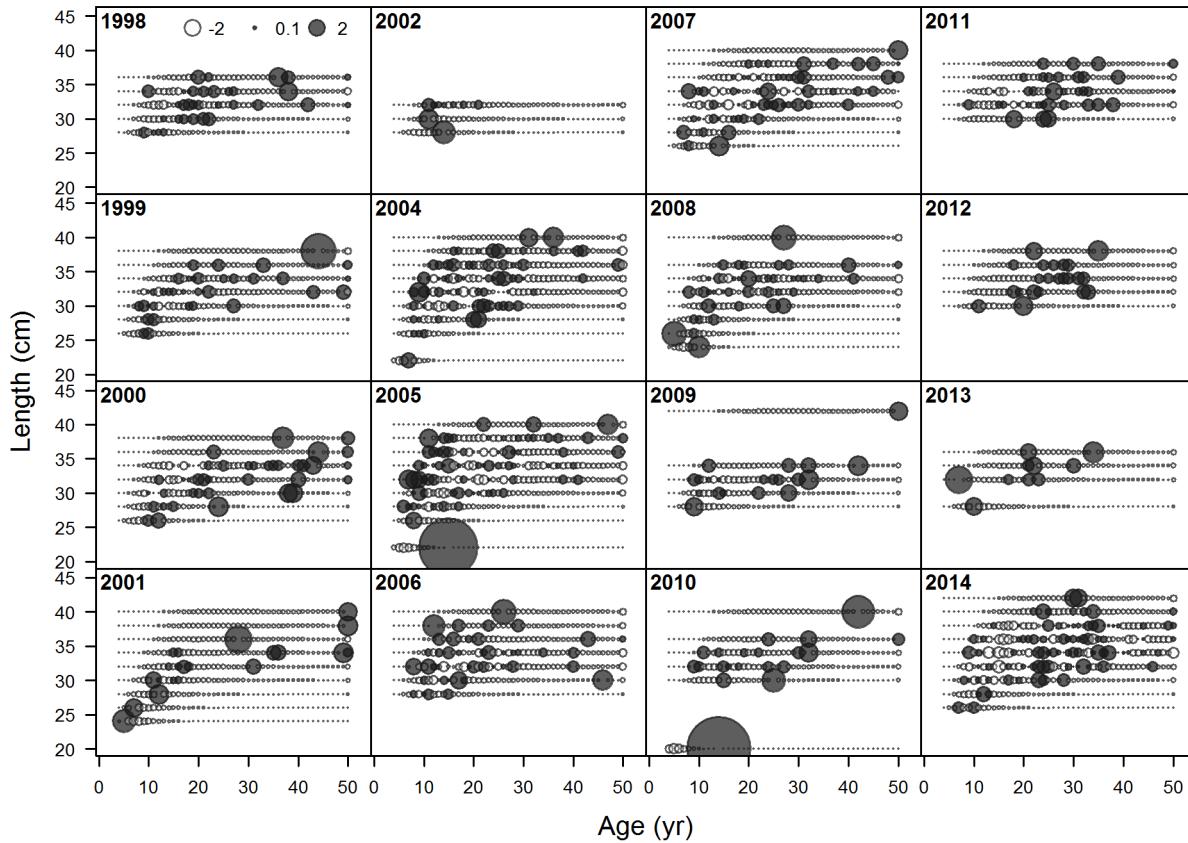


Figure 87: Residuals in fit to conditional age-at-length compositions for recreational private/rental catch in northern WA in the northern model. Filled circles indicate observed values greater than expected values.

### ghost age comps, retained, 3\_WA\_NorthernWA\_Rec\_PR

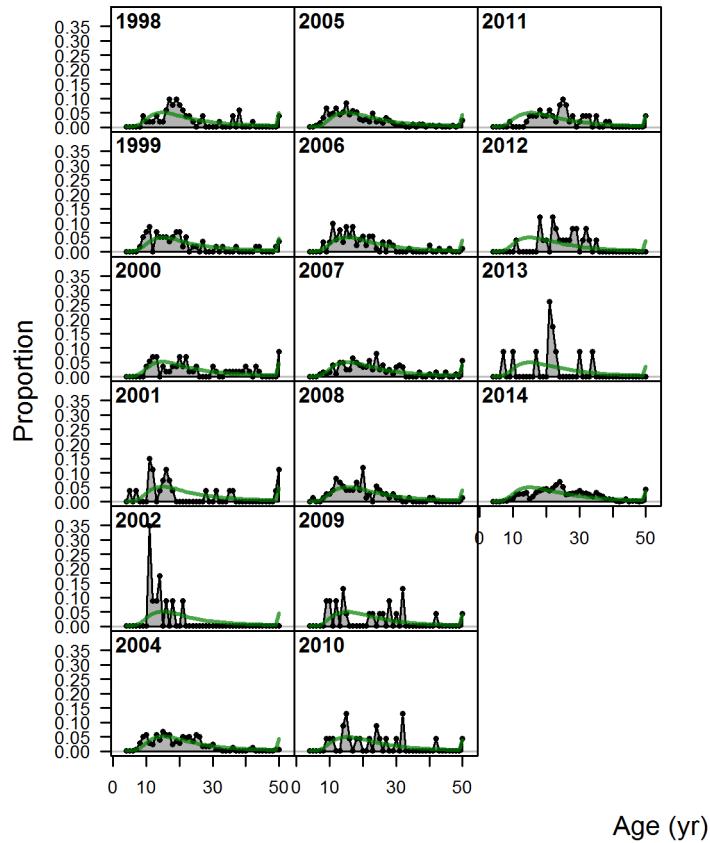


Figure 88: Implied fit to the marginal age-frequencies for recreational private/rental catch in northern WA in the northern model. Fits are provided for evaluation only, but not included in the model likelihood as these samples are included in the likelihood as conditional-age-at-length data.

### Length-based selectivity by fleet in 2014

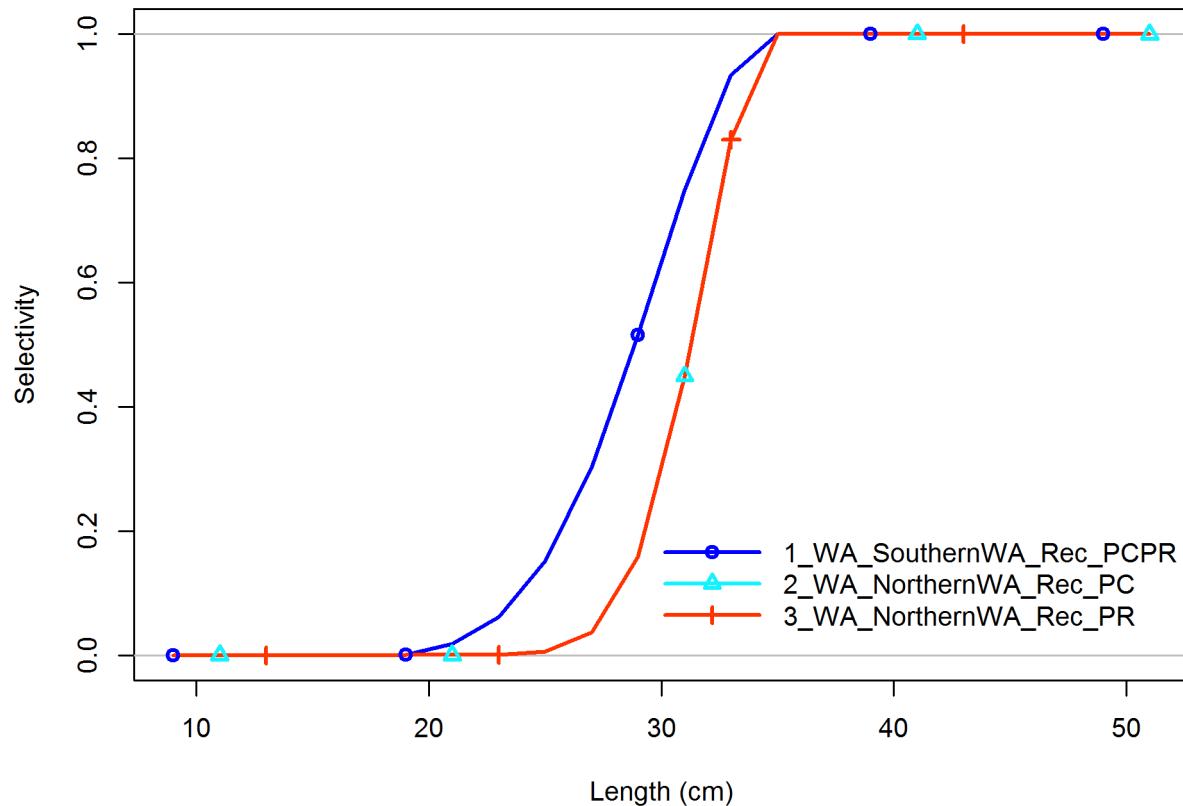


Figure 89: Estimated selectivity curves for the Washington recreational fleets.

### Index 6\_OR\_SouthernOR\_Comm\_Live

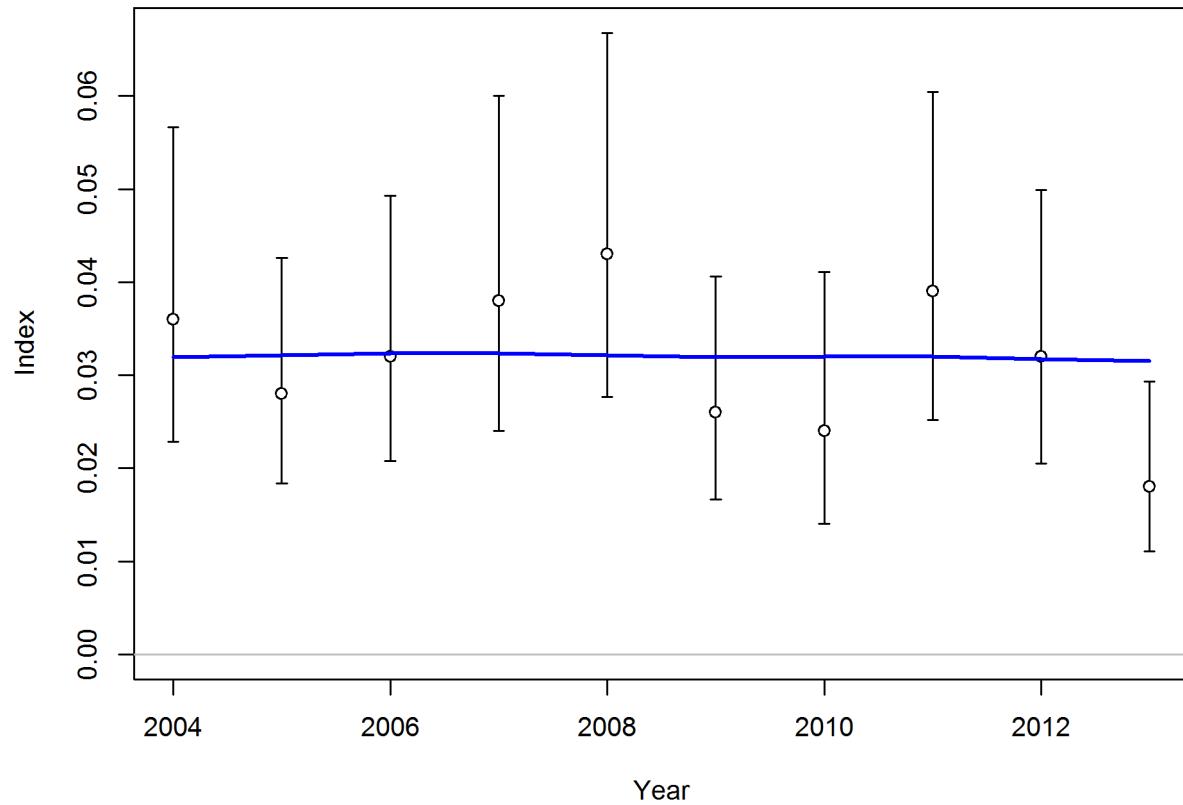


Figure 90: Fits to the southern Oregon commercial live-fish fishery for the central model.

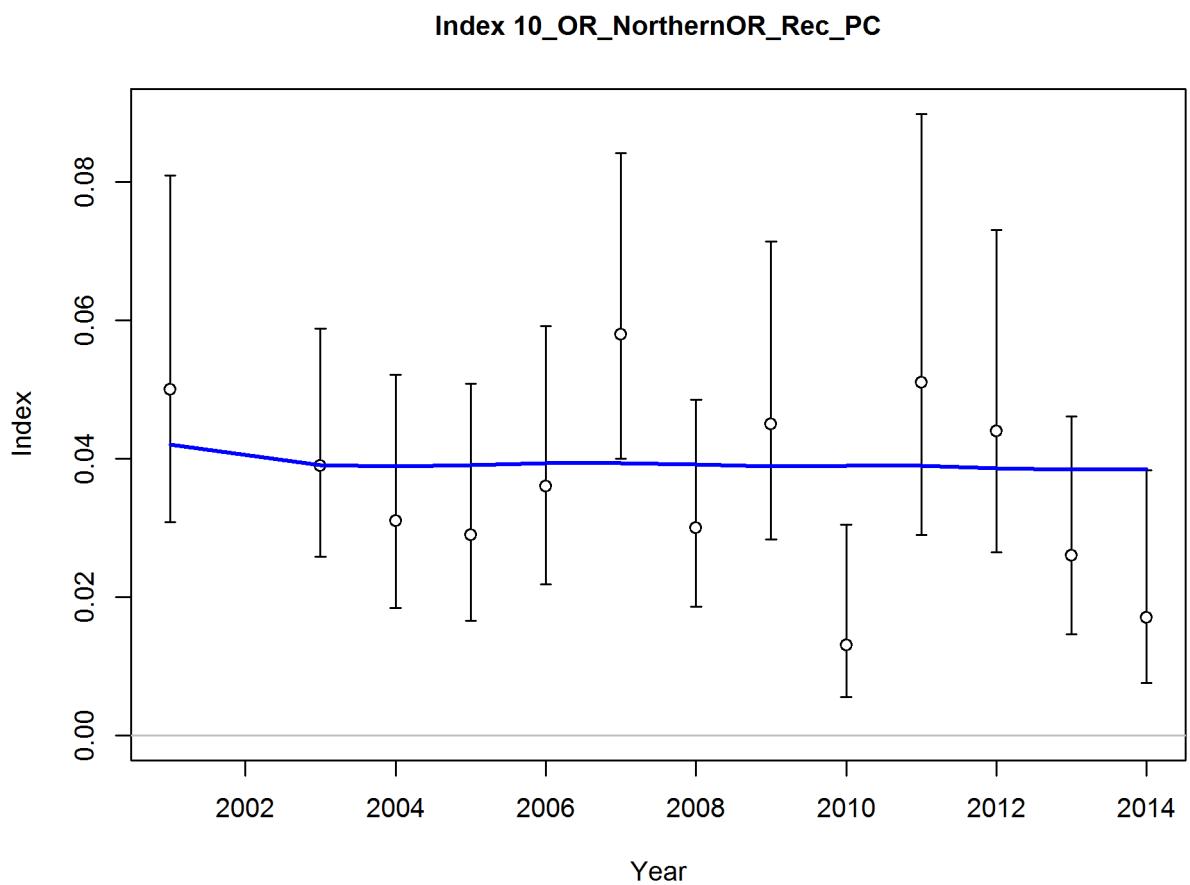


Figure 91: Fits to the northern Oregon recreational CPFV fleet onboard observer index for the central model.

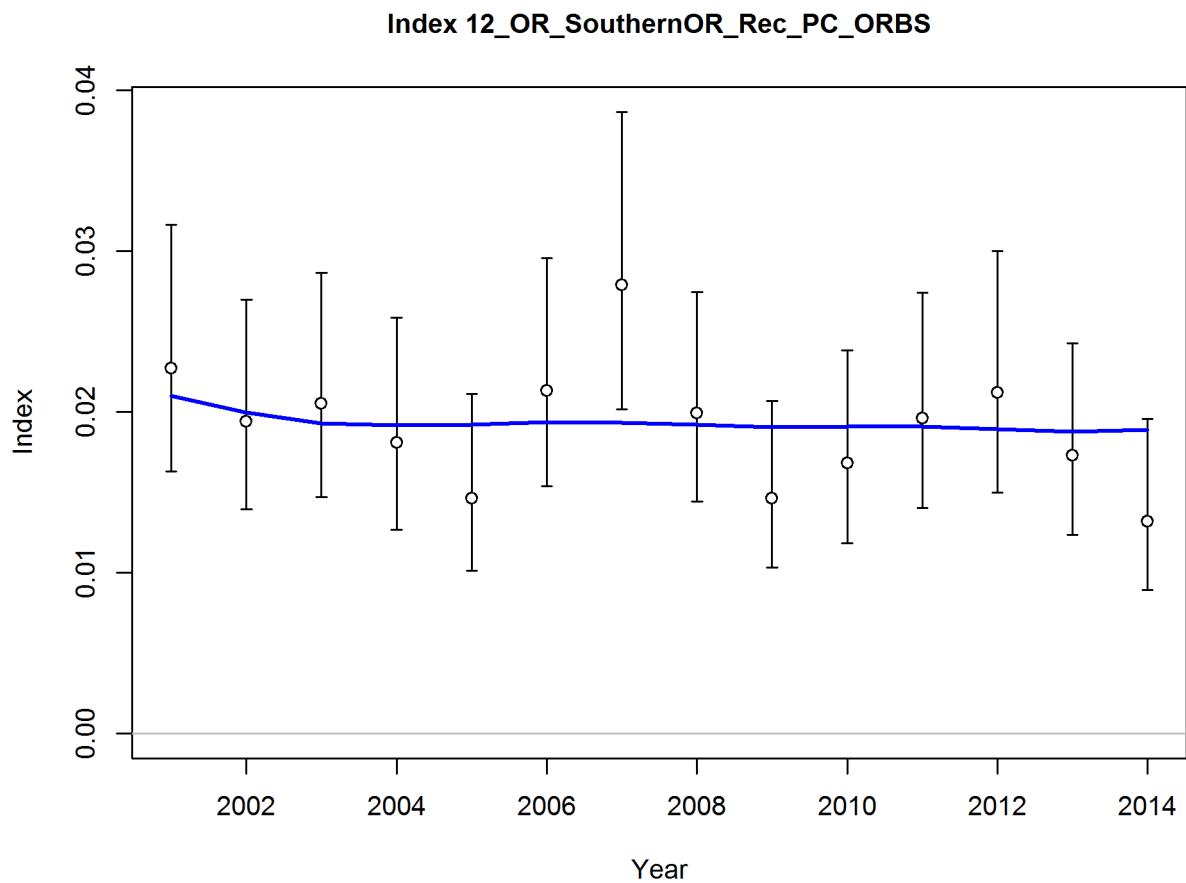


Figure 92: Fits to the northern Oregon recreational CPFV fleet ORBS dockside index for the central model.

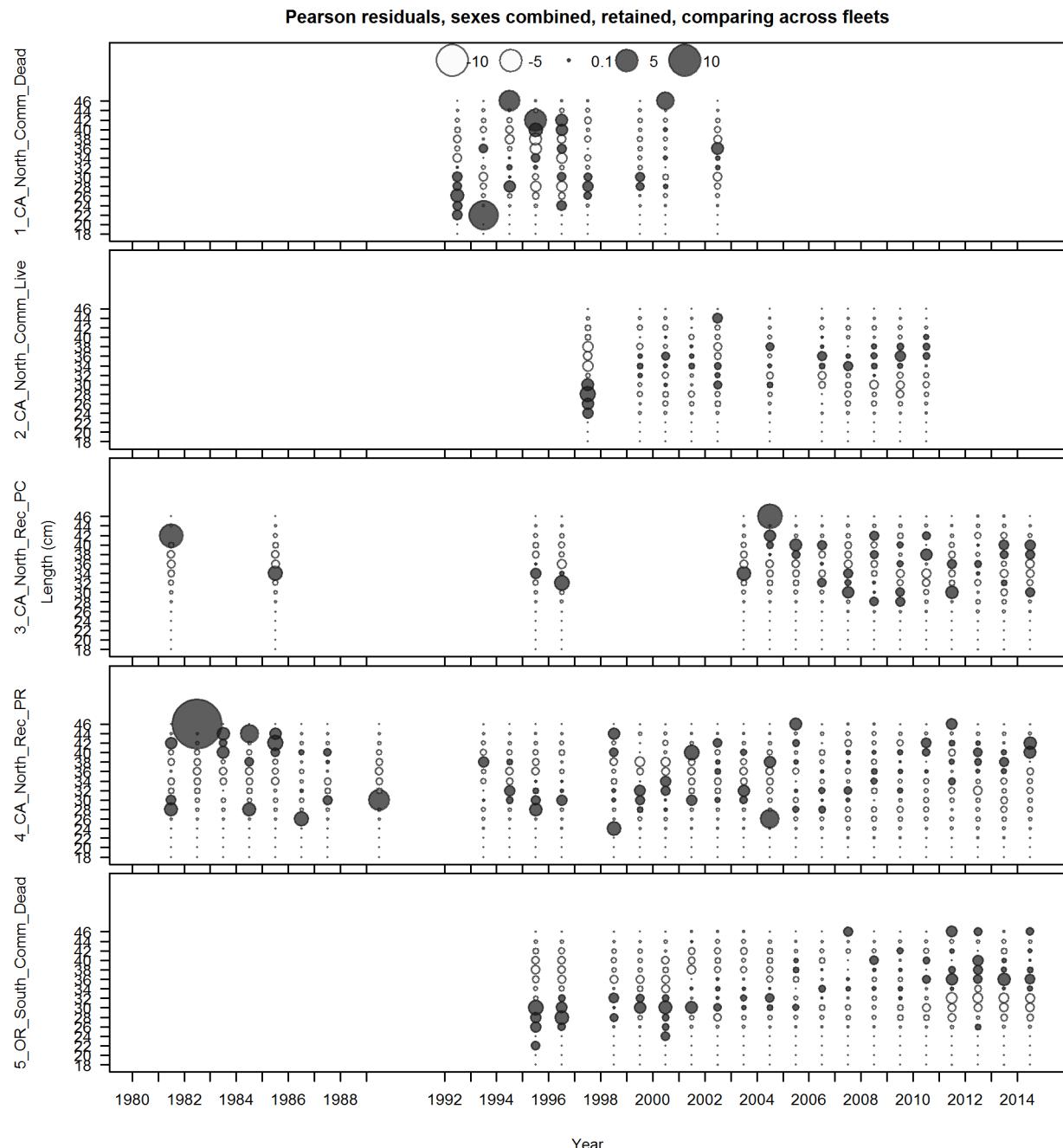


Figure 93: Residuals in fit to length compositions for northern model. Filled circles indicate observed values greater than expected, figure 1 of 2.

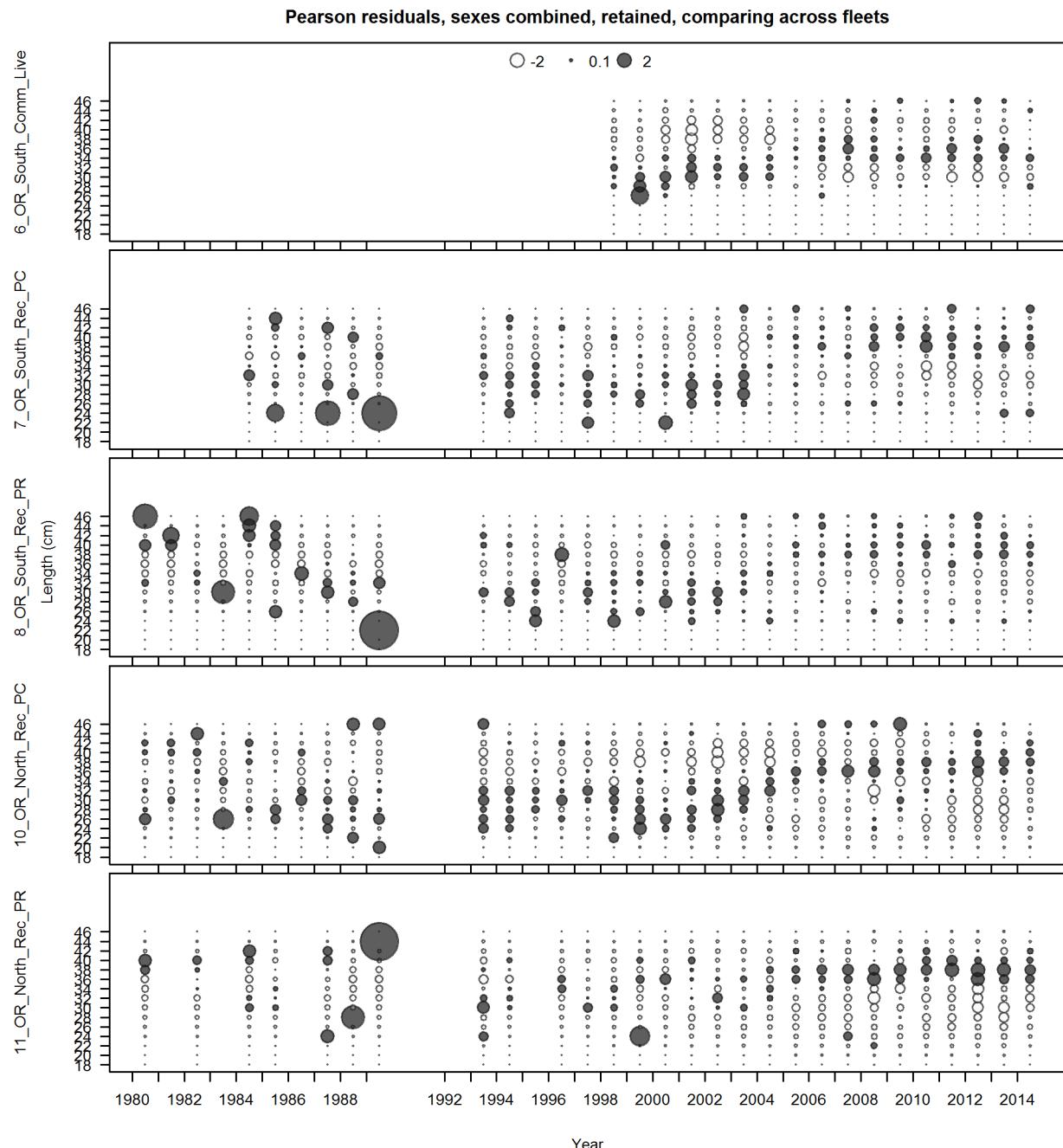


Figure 94: Residuals in fit to length compositions for northern model. Filled circles indicate observed values greater than expected values continued, figure 2 of 2.

**Pearson residuals, retained, 5\_OR\_SouthernOR\_Comm\_Dead (max=5.94)**

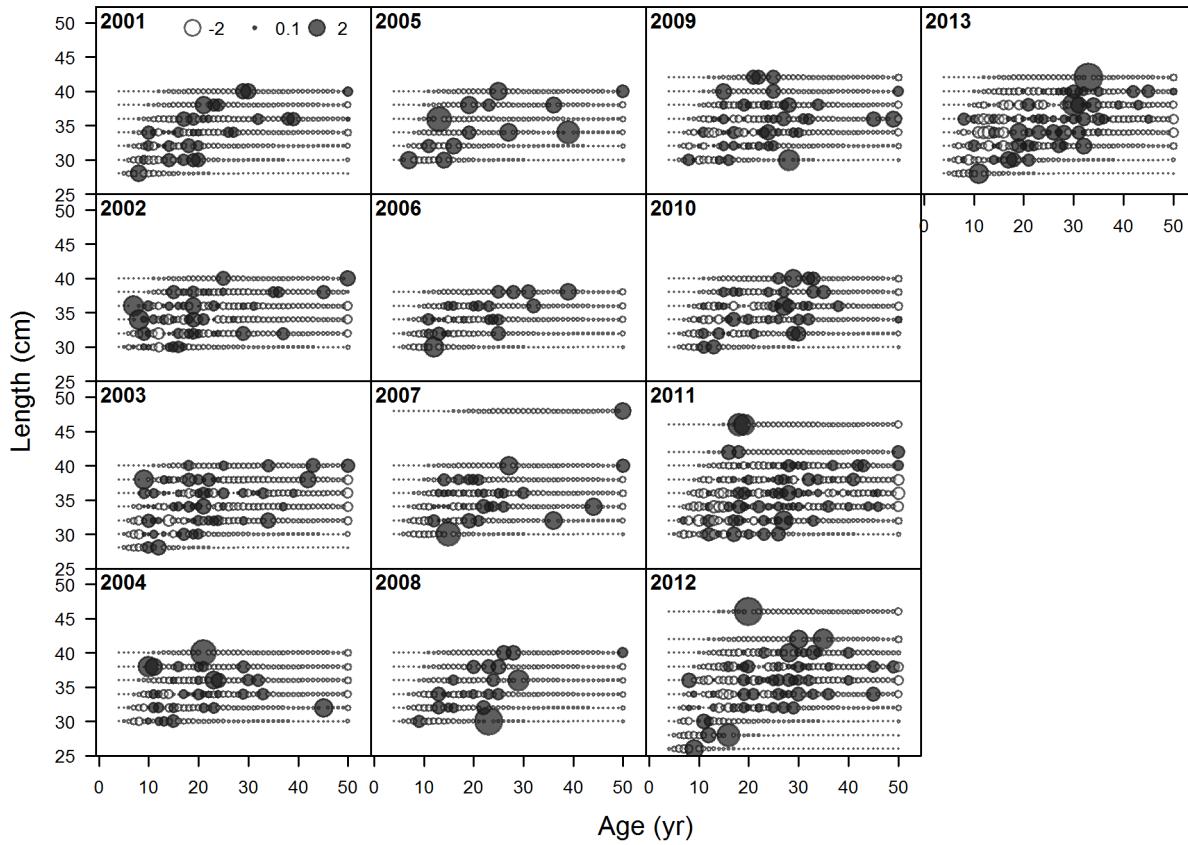


Figure 95: Residuals in fit to conditional age-at-length compositions for the commercial dead-fish fishery in southern OR in the central model. Filled circles indicate observed values greater than expected values.

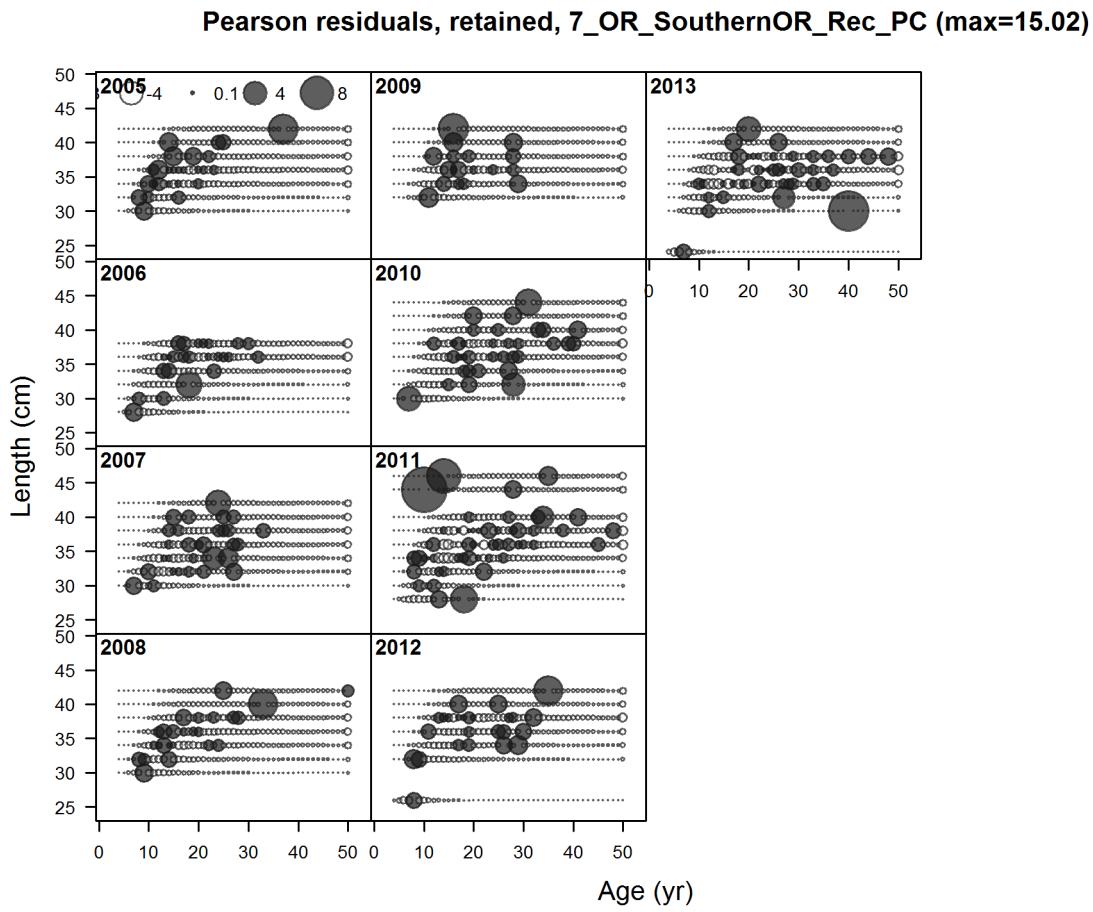


Figure 96: Residuals in fit to conditional age-at-length compositions for the recreational party/charter fishery in southern OR in the central model. Filled circles indicate observed values greater than expected values.

### age comps, retained, 10\_OR\_NorthernOR\_Rec\_PC

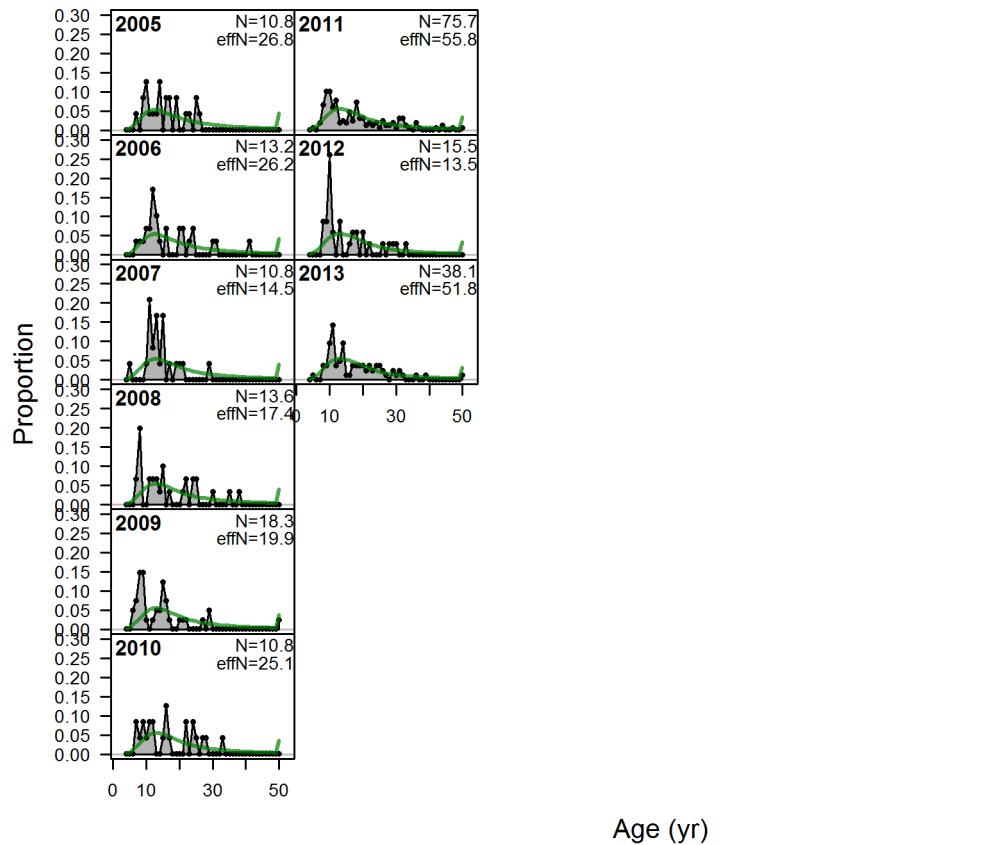


Figure 97: Fits to the marginal age composition for the northern OR recreational party/charter in the central model

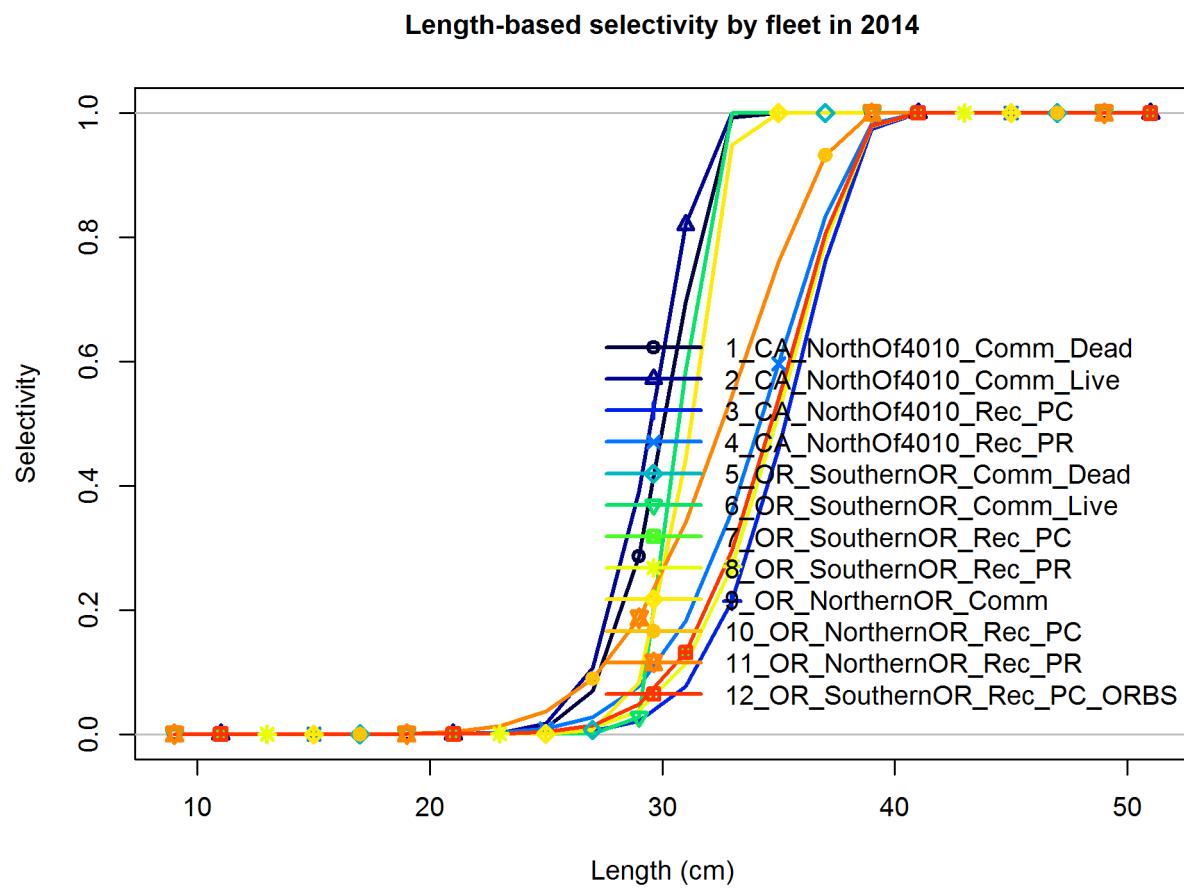


Figure 98: Length-based selectivity by fleet for the central model.

**Index 3\_CA\_SouthOf4010\_Rec\_PC**

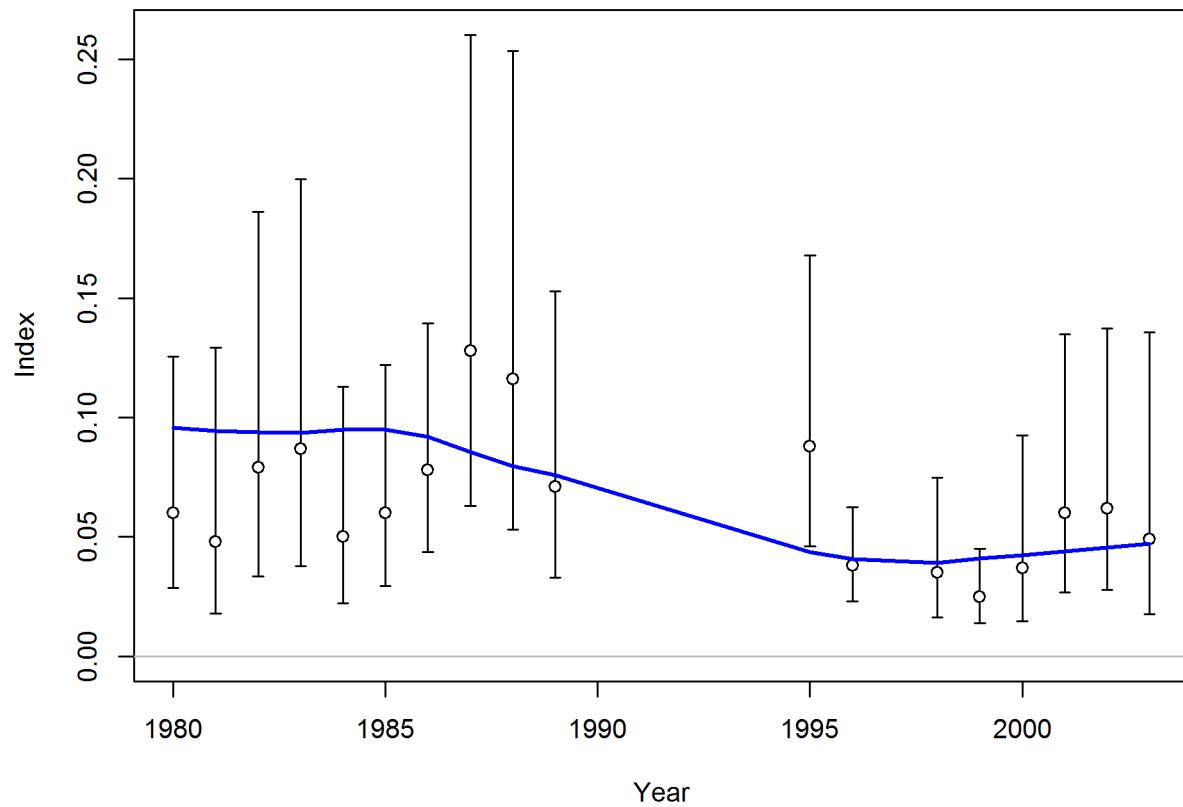


Figure 99: Fits to the CA recreational CPFV fleet dockside index for the southern model.

**Index 6\_CA\_SouthOf4010\_Rec\_PC\_DWV\_index**

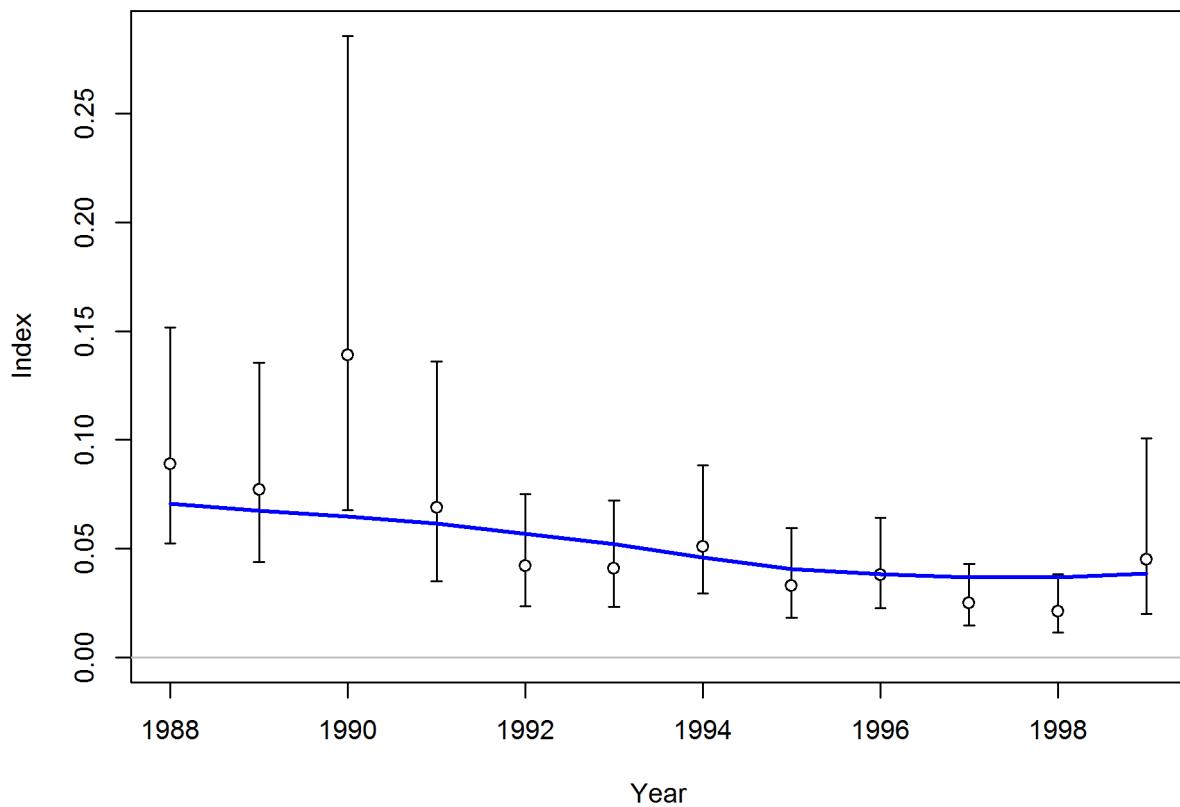


Figure 100: Fits to the CA recreational CPFV fleet 1988-1999 onboard observer index for the southern model.

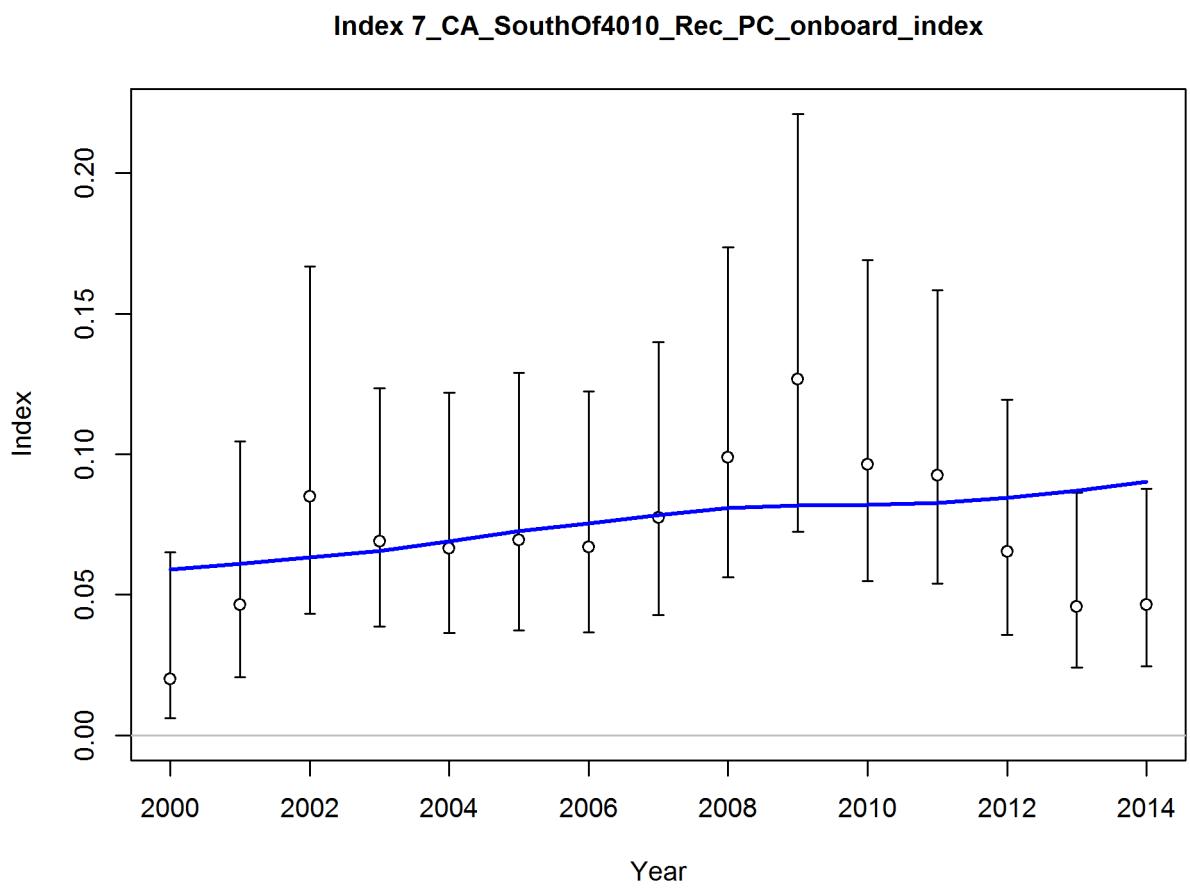


Figure 101: Fits to the CA recreational CPFV fleet 2000-2014 onboard observer index for the southern model.

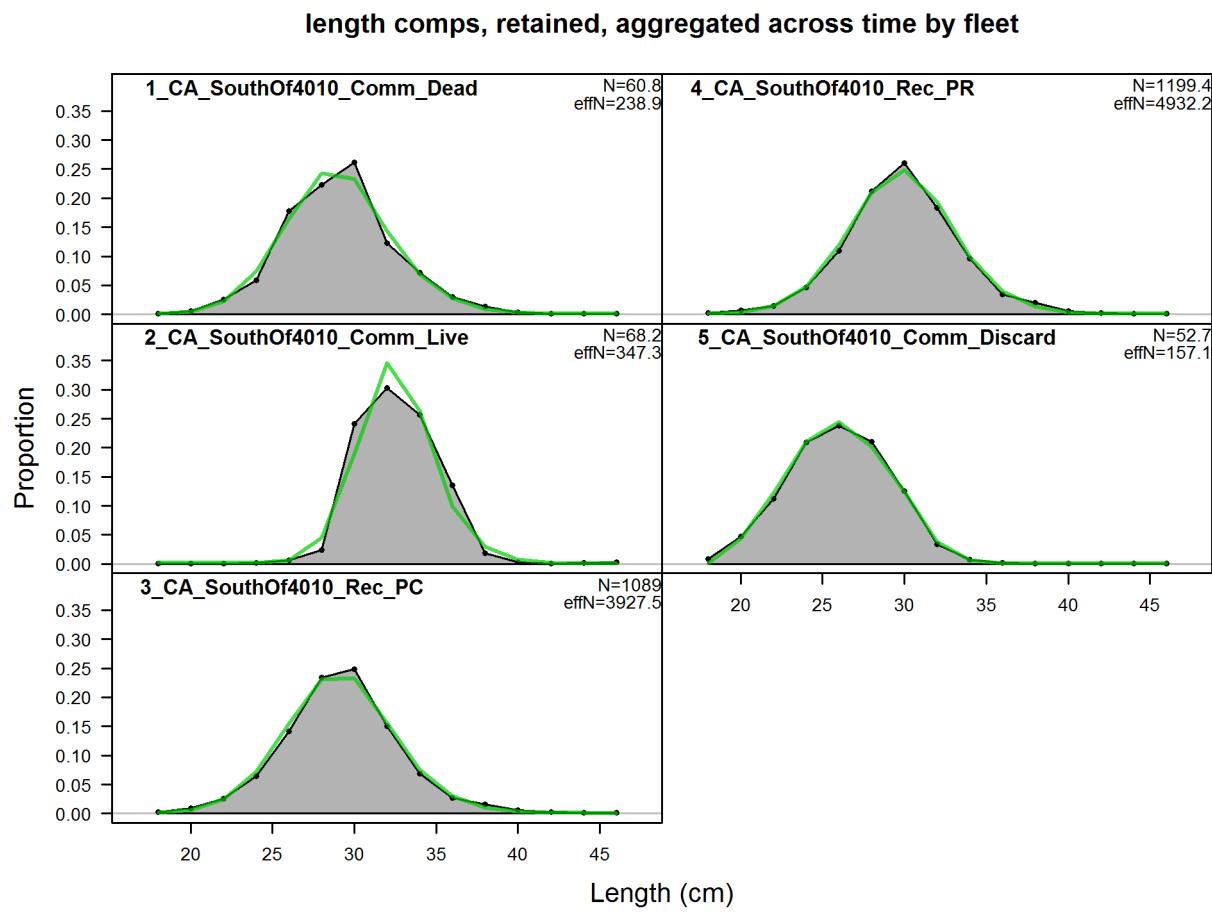
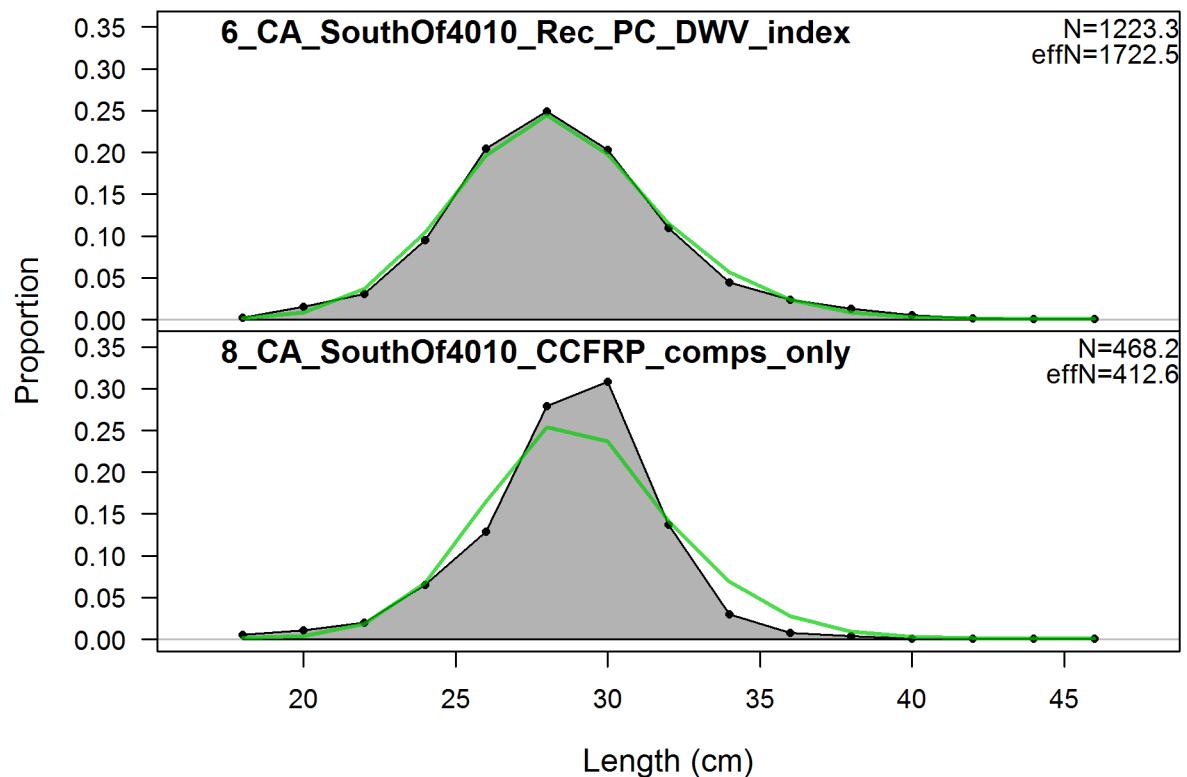


Figure 102: Fits to the length compositions from fleets in the southern model.

**length comps, whole catch, aggregated across time by fleet**



2746

2747 →

**length comps, whole catch, aggregated across time by fleet**

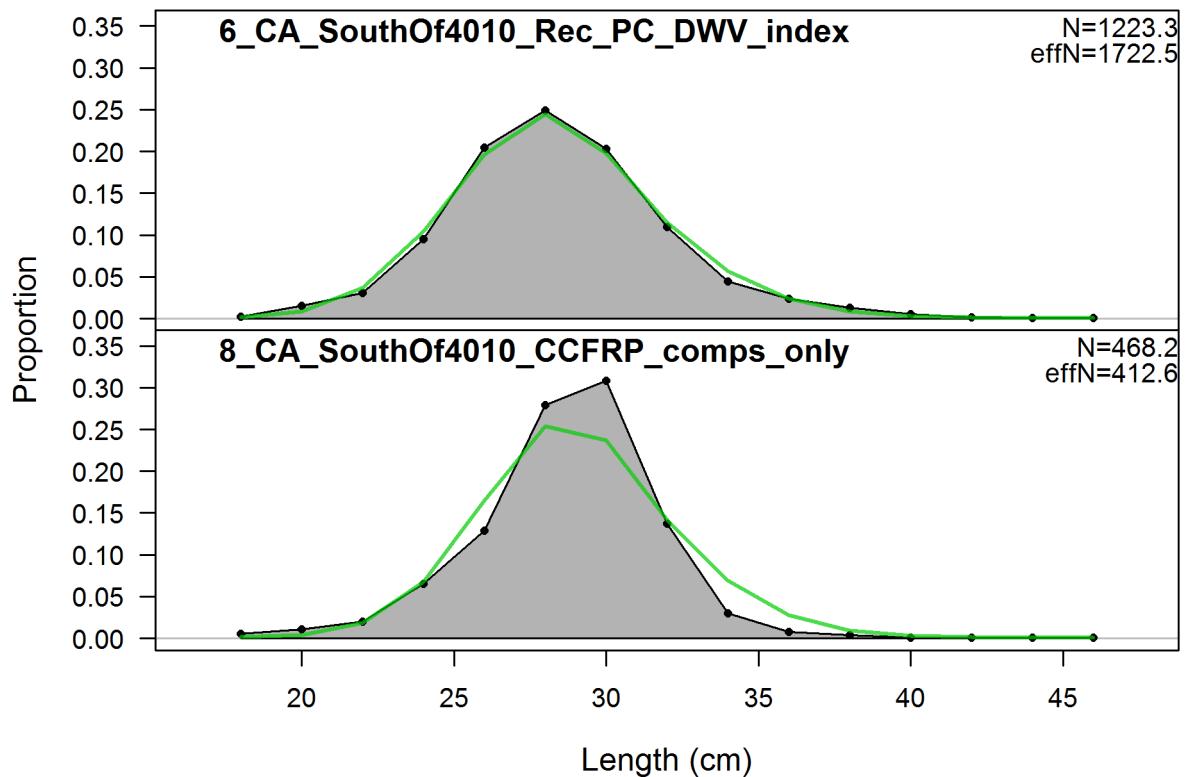


Figure 103: Fits to the length compositions of the central California 1988-1999 onboard observer and CCFRP surveys in the southern model.

Conditional AAL plot, whole catch, 9\_CA\_SouthOf4010\_Abrams\_thesis\_comps

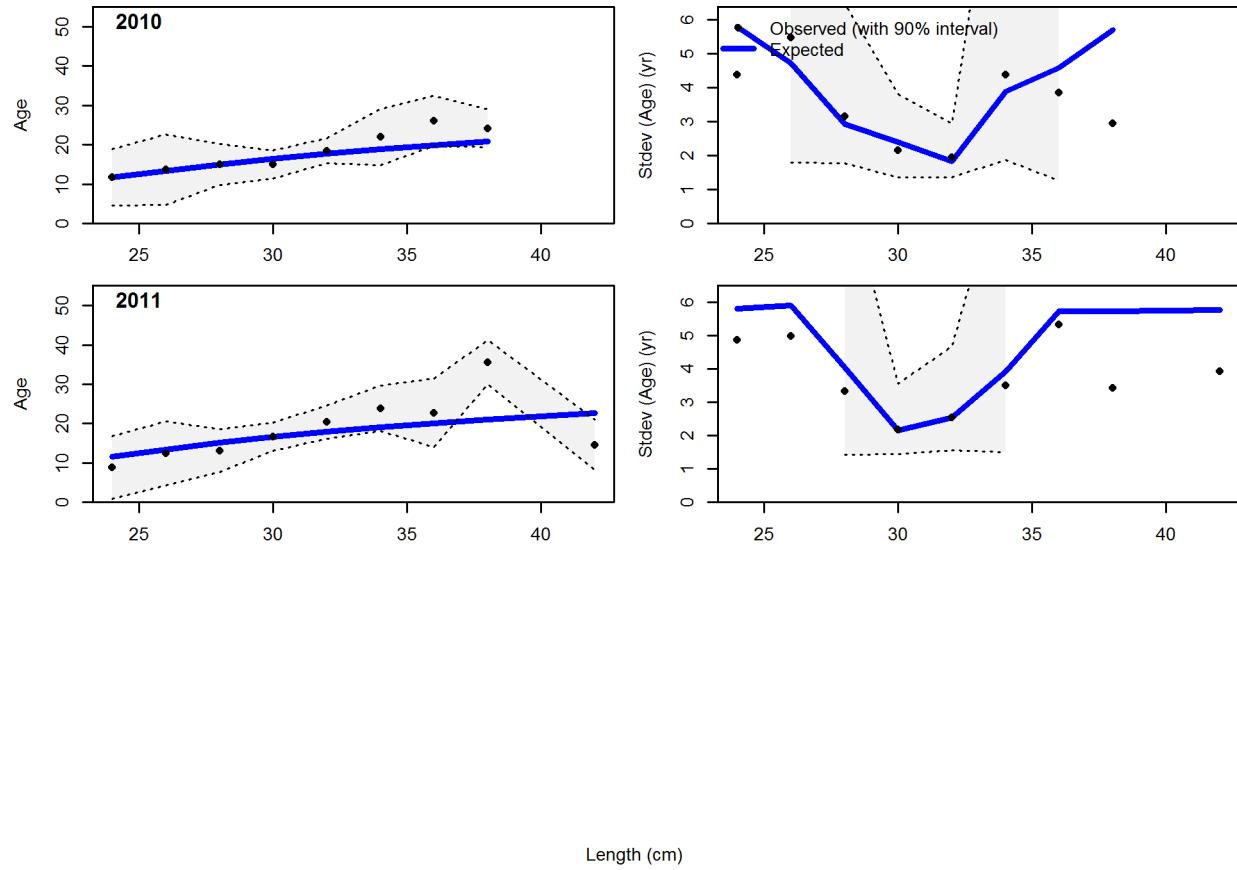


Figure 104: Fits to the conditional age-at-length data from Jeff Abrams' thesis, southern model.

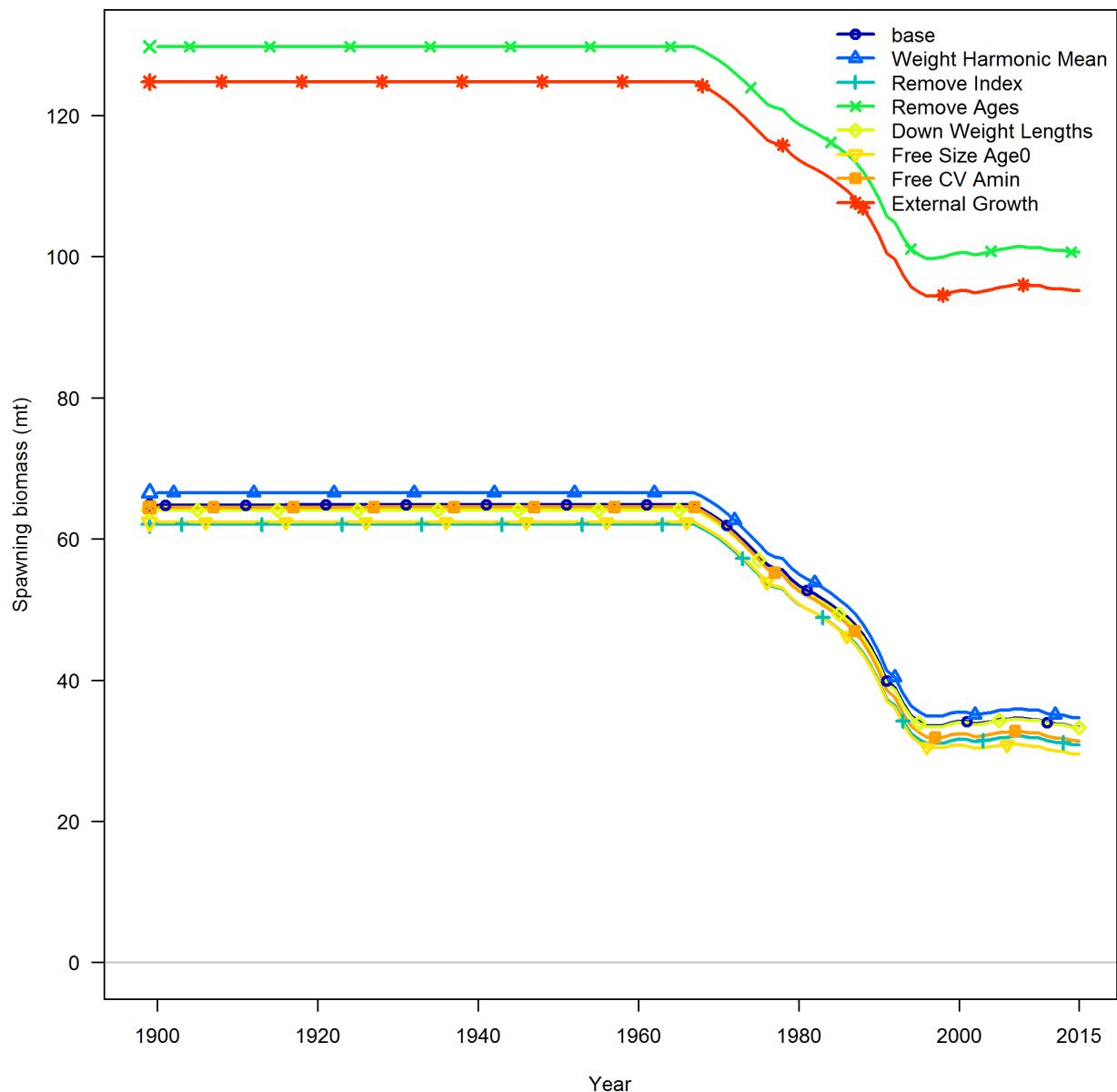


Figure 105: Sensitivity of the spawning biomass to dropping a single data type from the northern model.

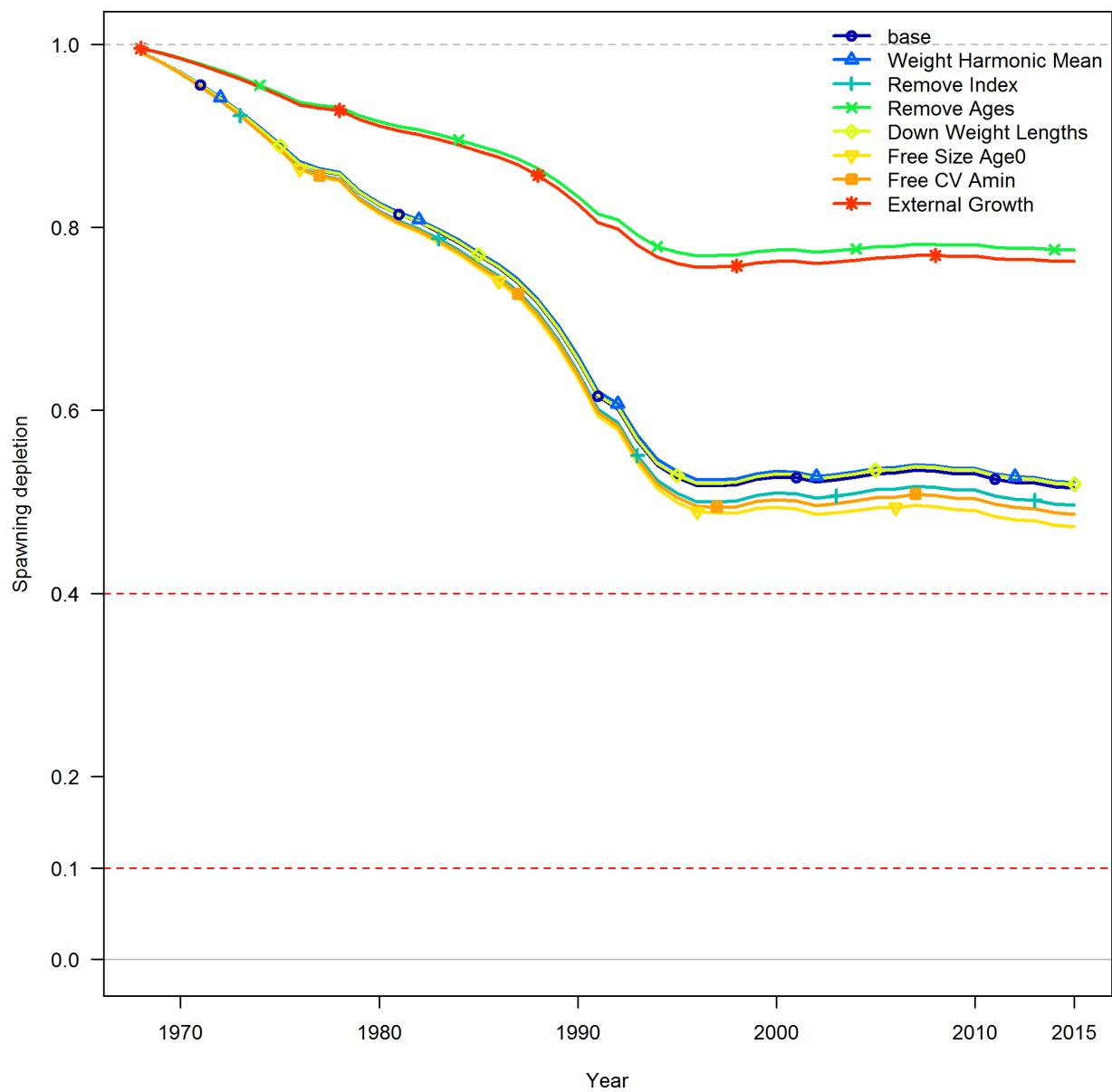


Figure 106: Sensitivity of the relative spawning biomass to dropping a single data type from the northern model.

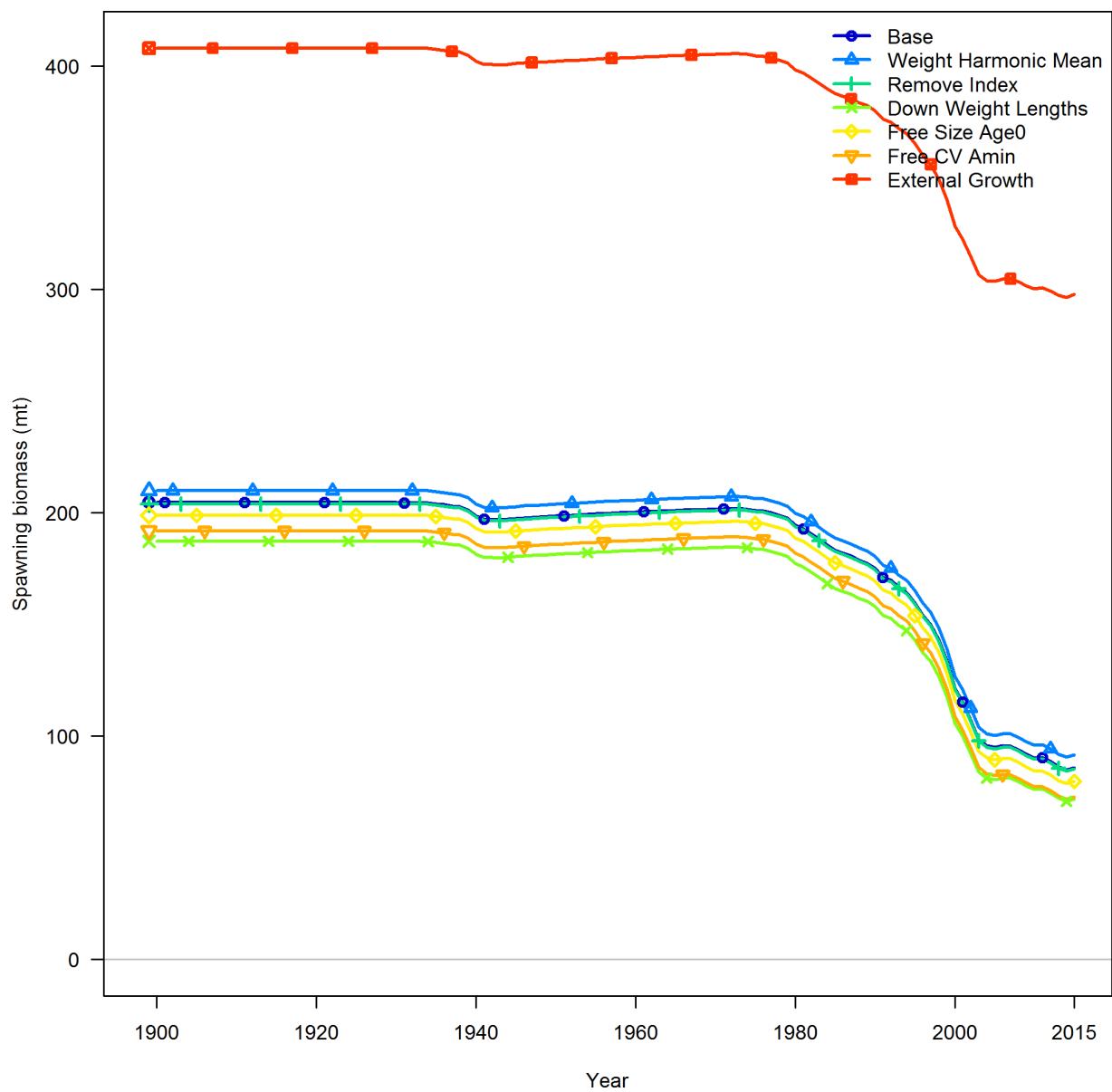


Figure 107: Sensitivity of the spawning biomass to dropping a single data type from the central model.

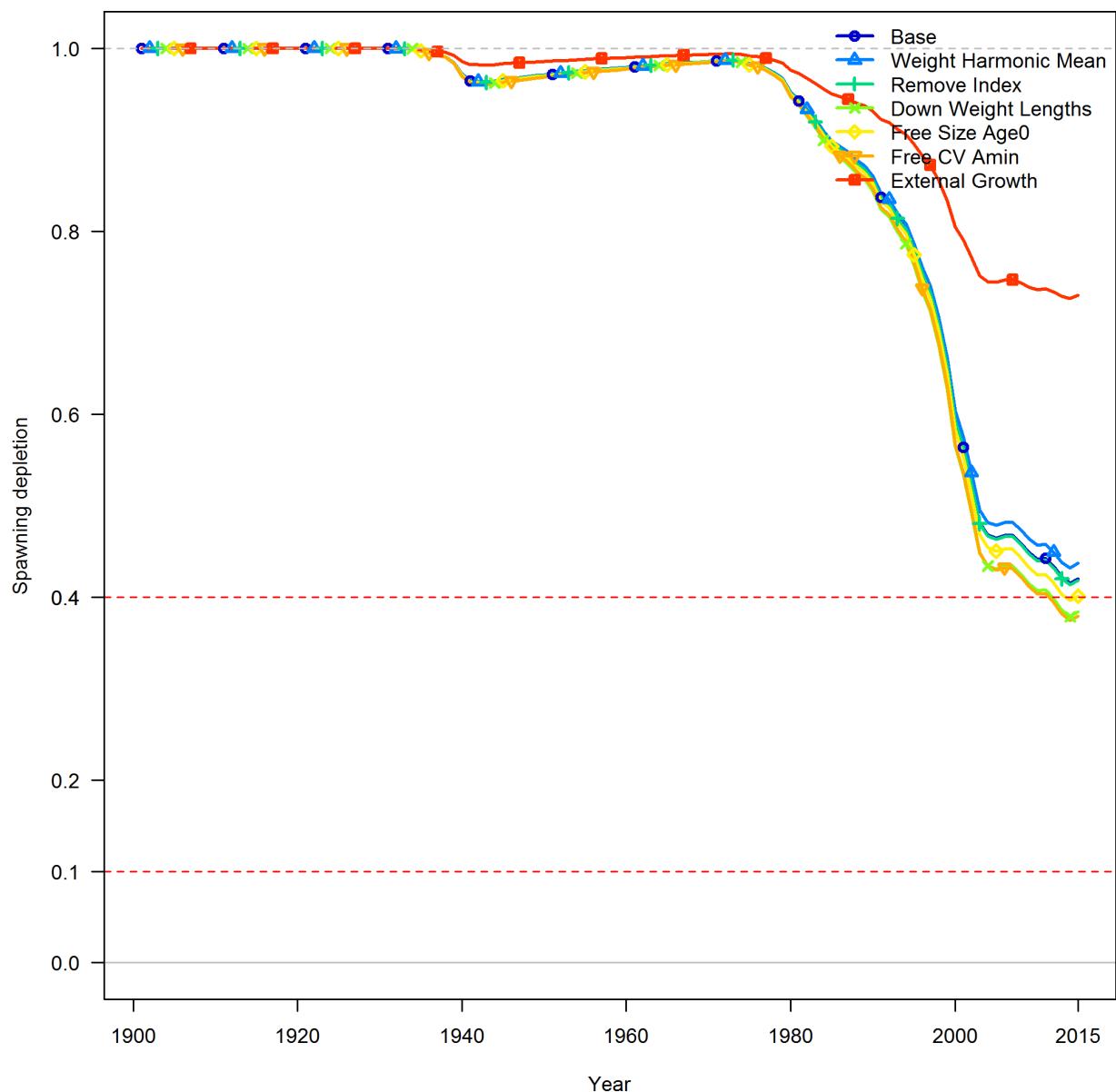


Figure 108: Sensitivity of the relative spawning biomass to dropping a single data type from the central model.

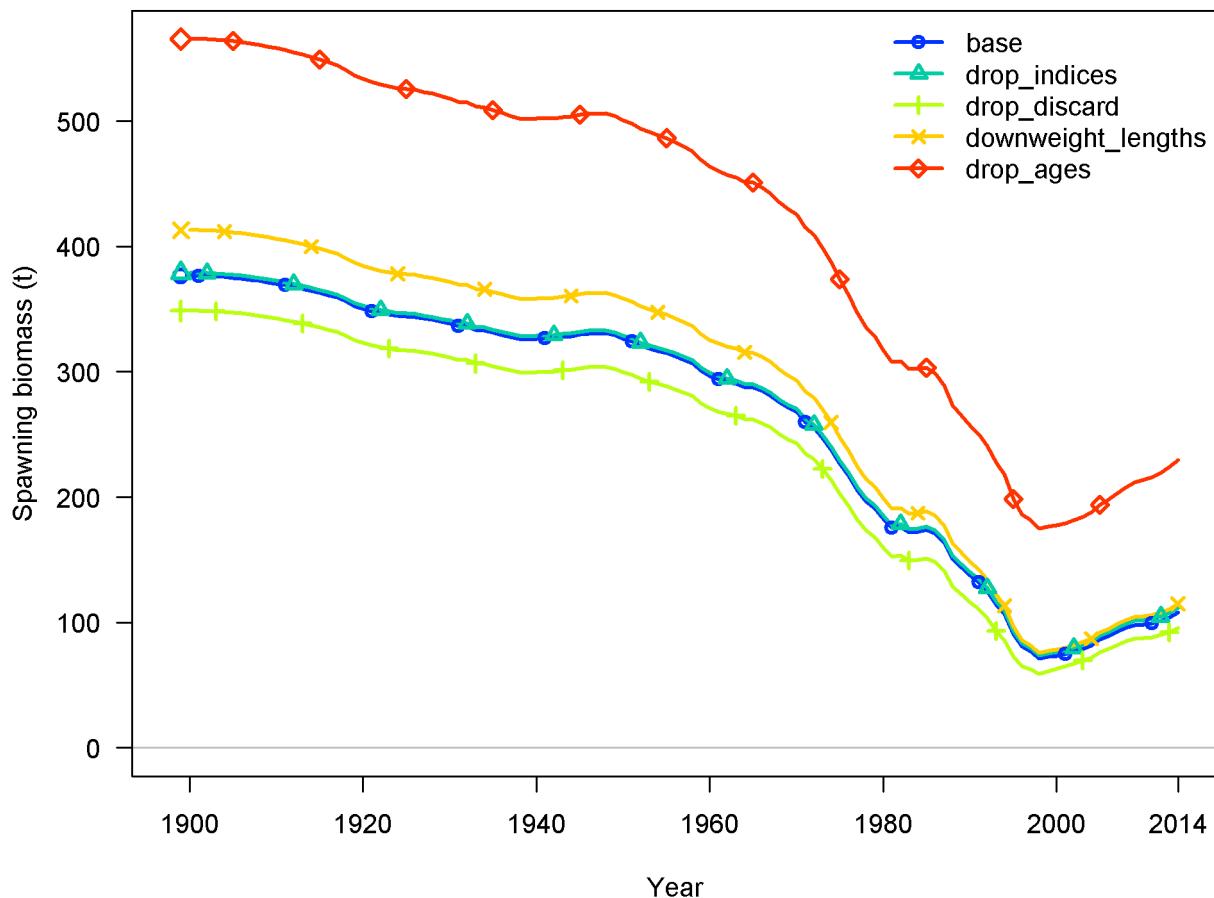


Figure 109: Sensitivity of the spawning biomass to dropping a single data type from the southern model.

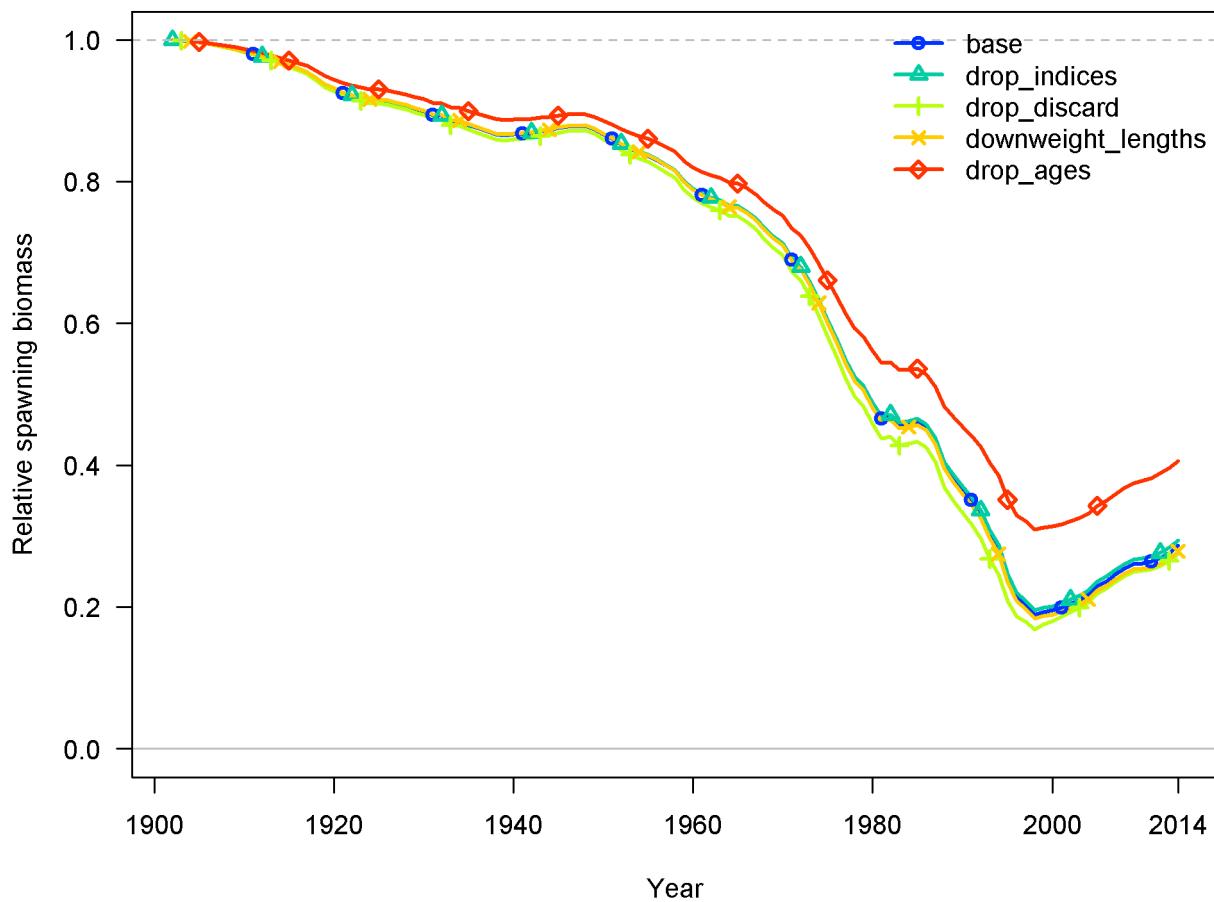


Figure 110: Sensitivity of the relative spawning biomass to dropping a single data type from the southern model.

### Ending year expected growth (with 95% intervals)

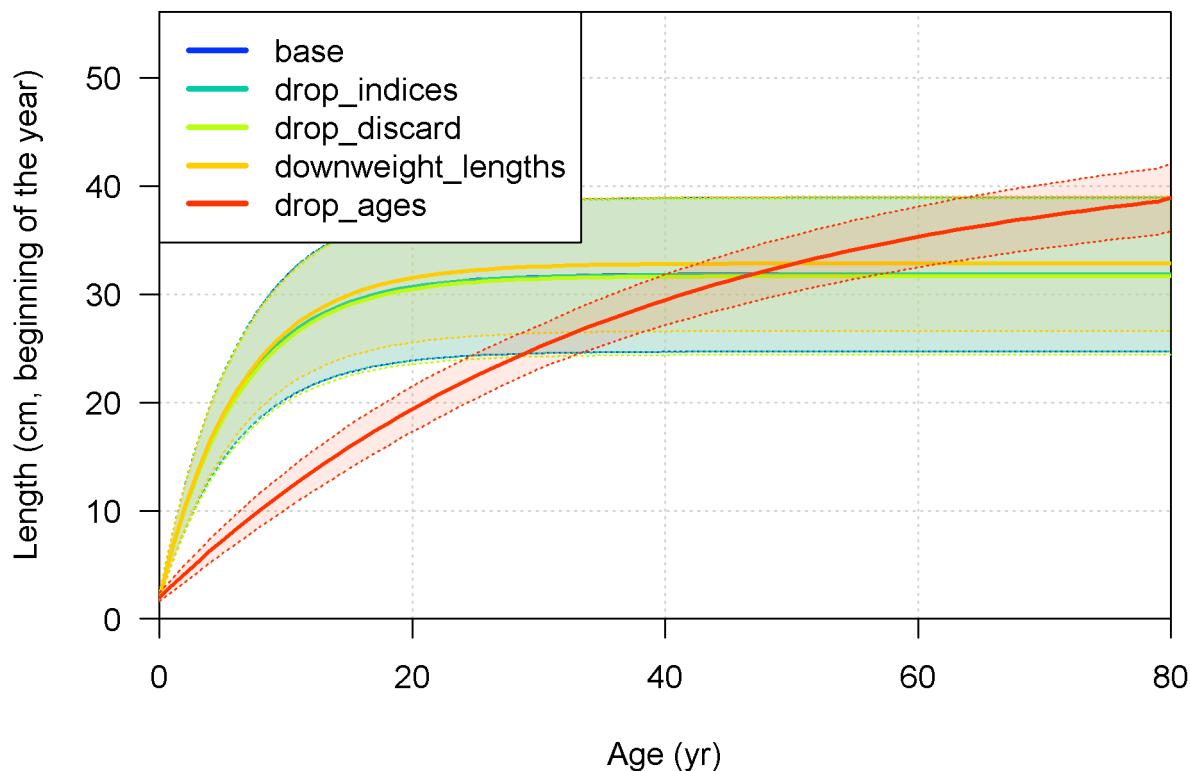


Figure 111: Sensitivity of removal of marginal age composition data and conditional age-at-length data from the southern model.

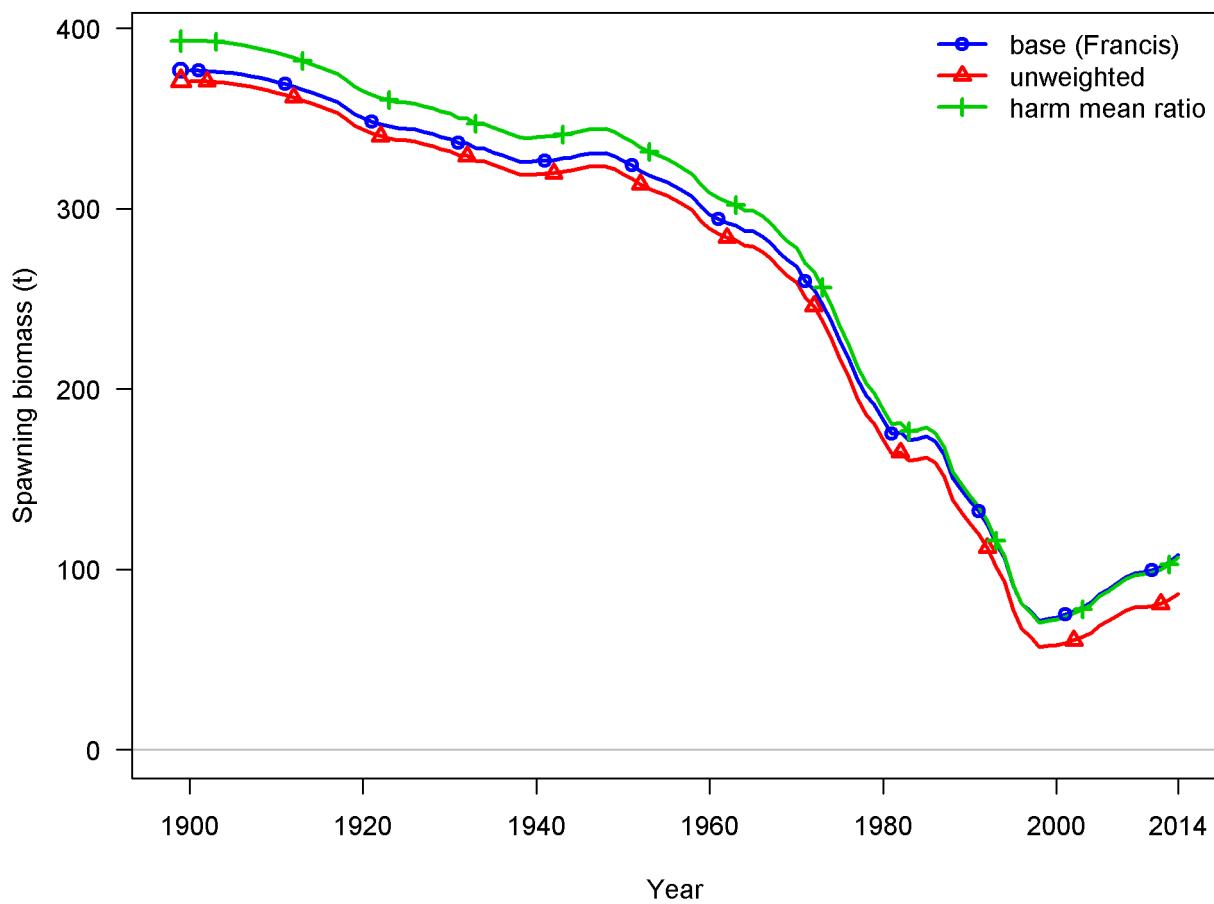


Figure 112: Sensitivity of the spawning biomass to the method of data weighting in the southern model.

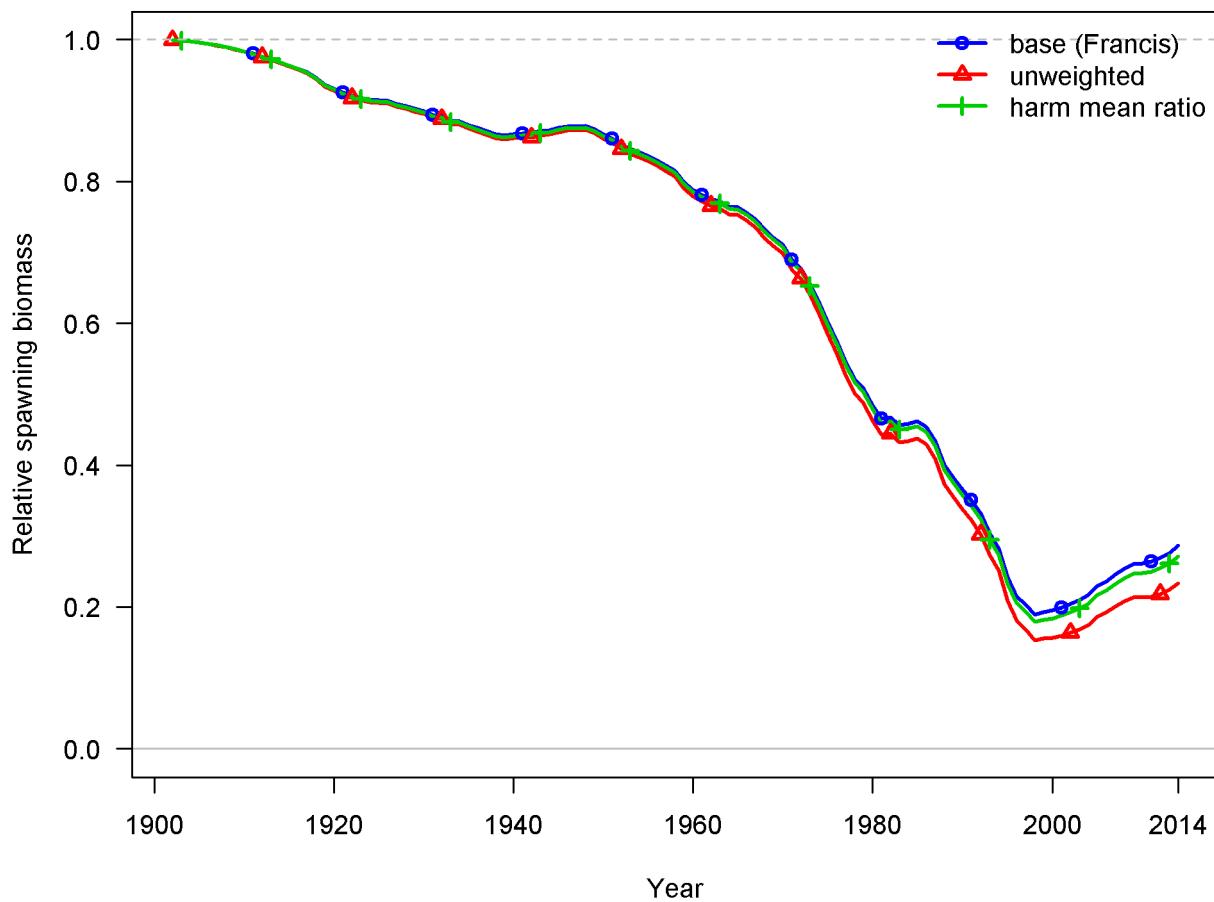


Figure 113: Sensitivity of the relative spawning biomass to the method of data weighting in the southern model.

### Ending year expected growth (with 95% intervals)

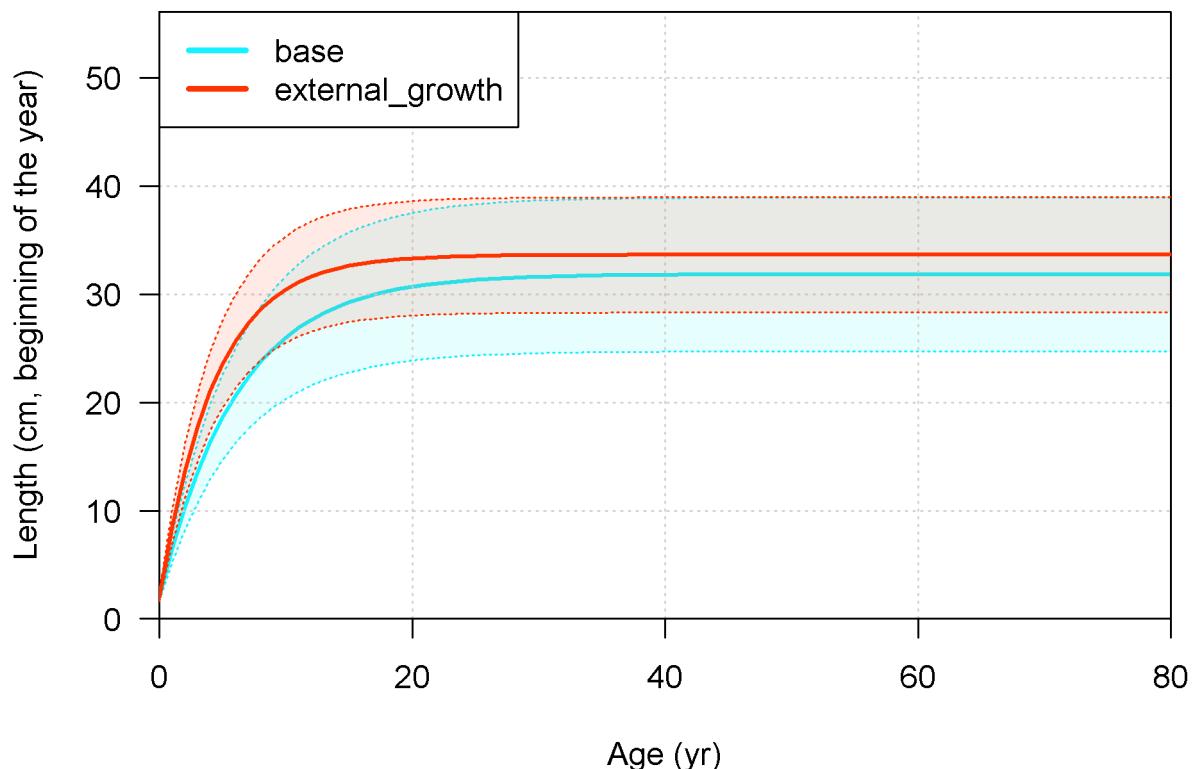


Figure 114: Sensitivity of the model to fixing growth parameters to external estimates in the southern model.

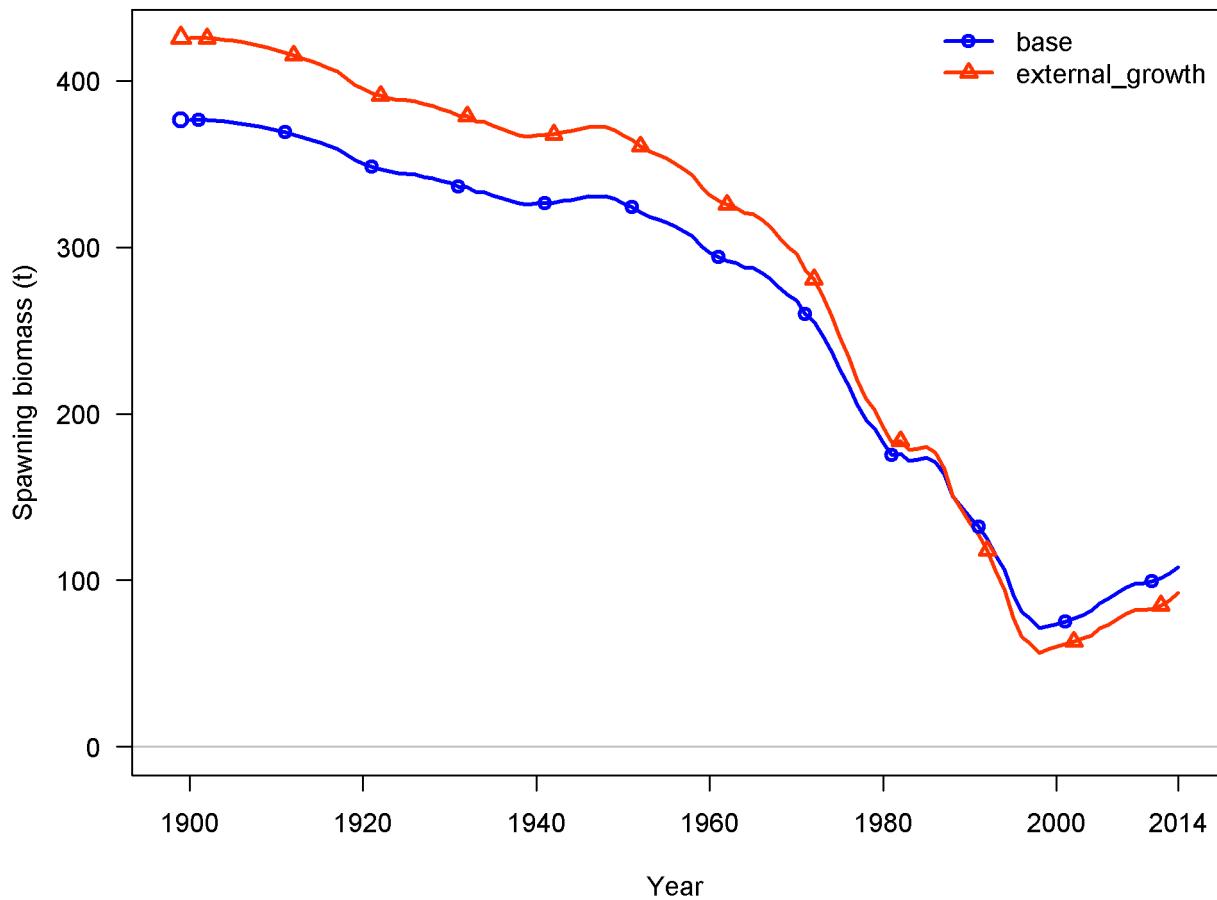


Figure 115: Sensitivity of the spawning biomass to fixing growth parameters to external estimates in the southern model.

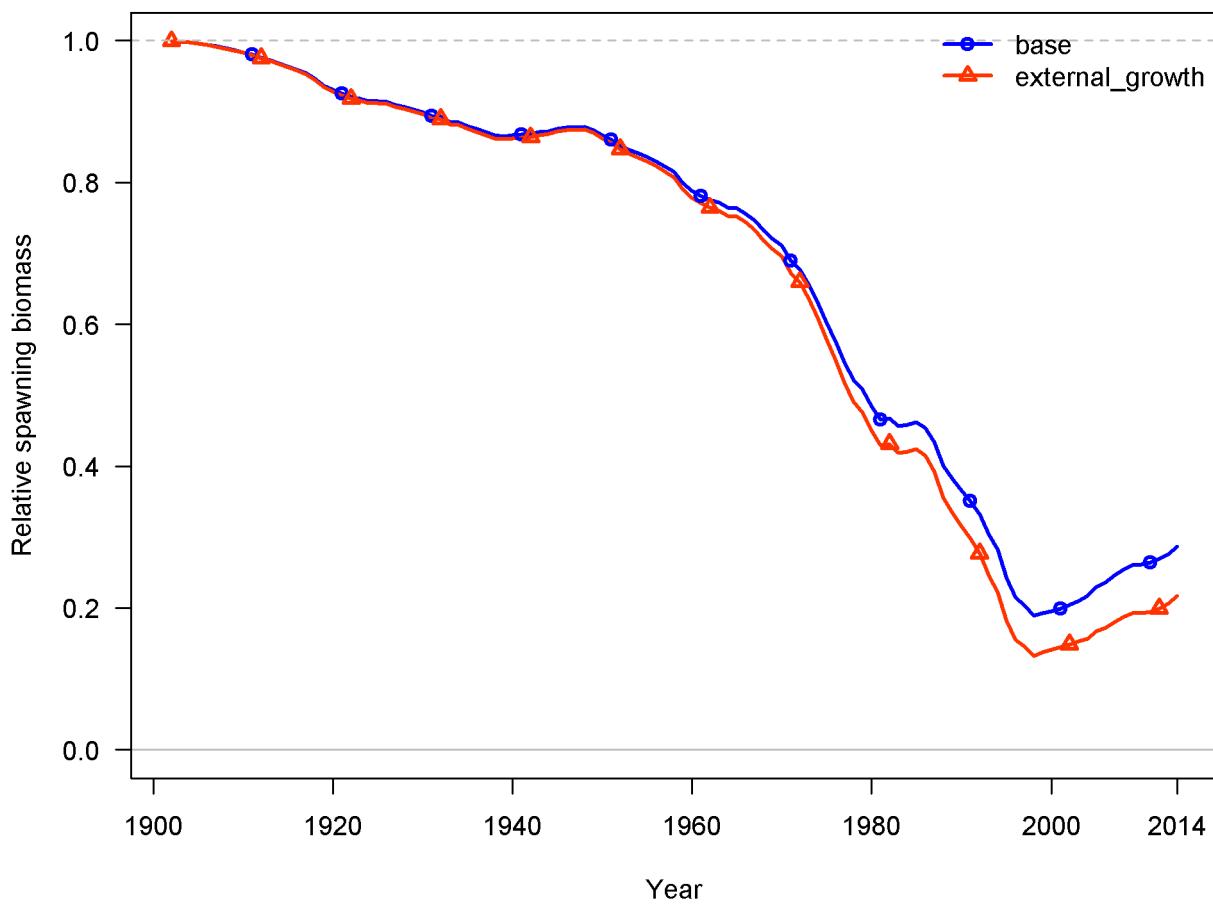


Figure 116: Sensitivity of the relative spawning biomass to fixing growth parameters to external estimates in the southern model.

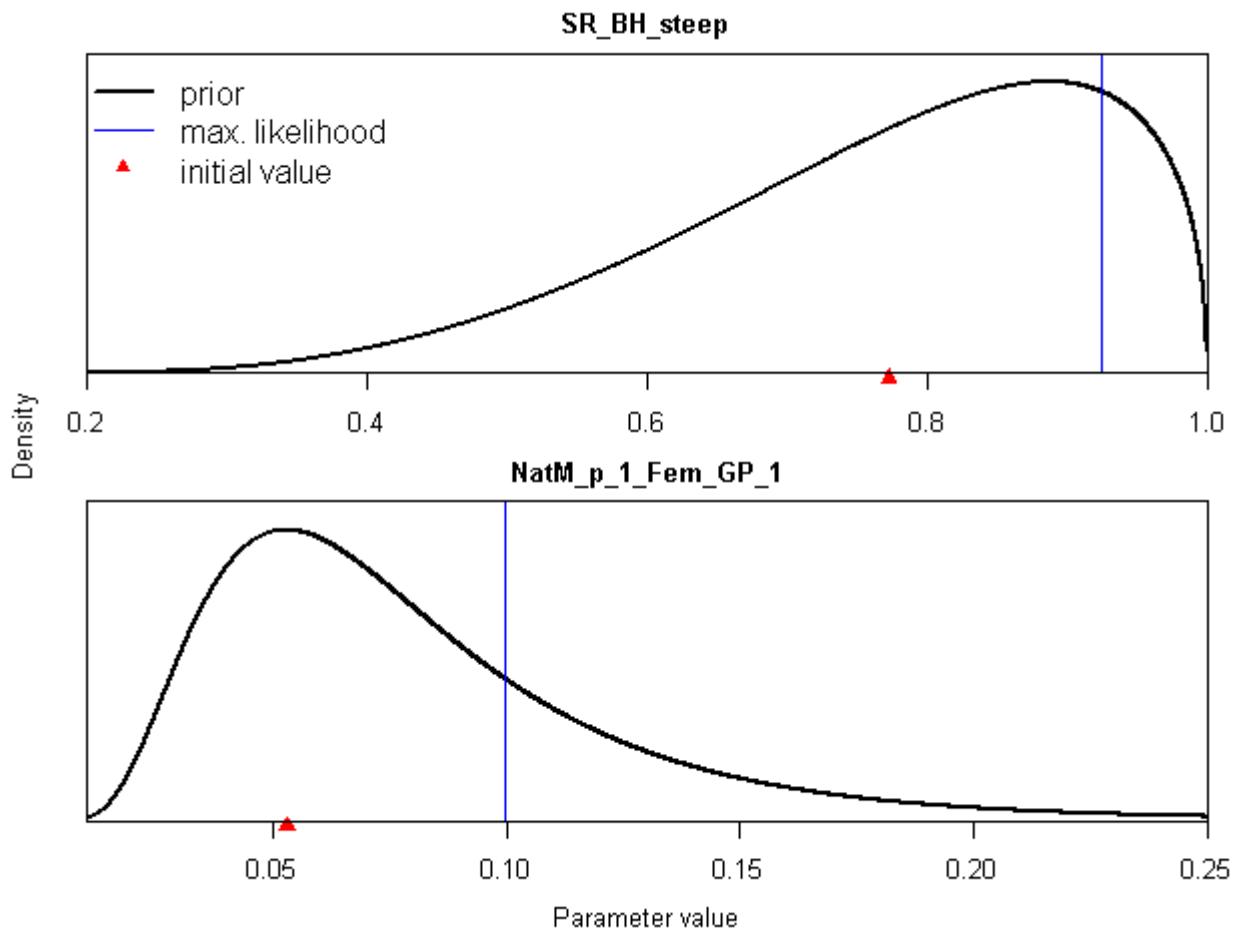


Figure 117: Prior distributions for stock-recruit steepness (upper panel) and natural mortality (lower panel). Fixed values used in all three base models are indicated by the red triangles. Blue vertical lines show estimates of these parameters from a southern model sensitivity analysis in which these values were estimated.

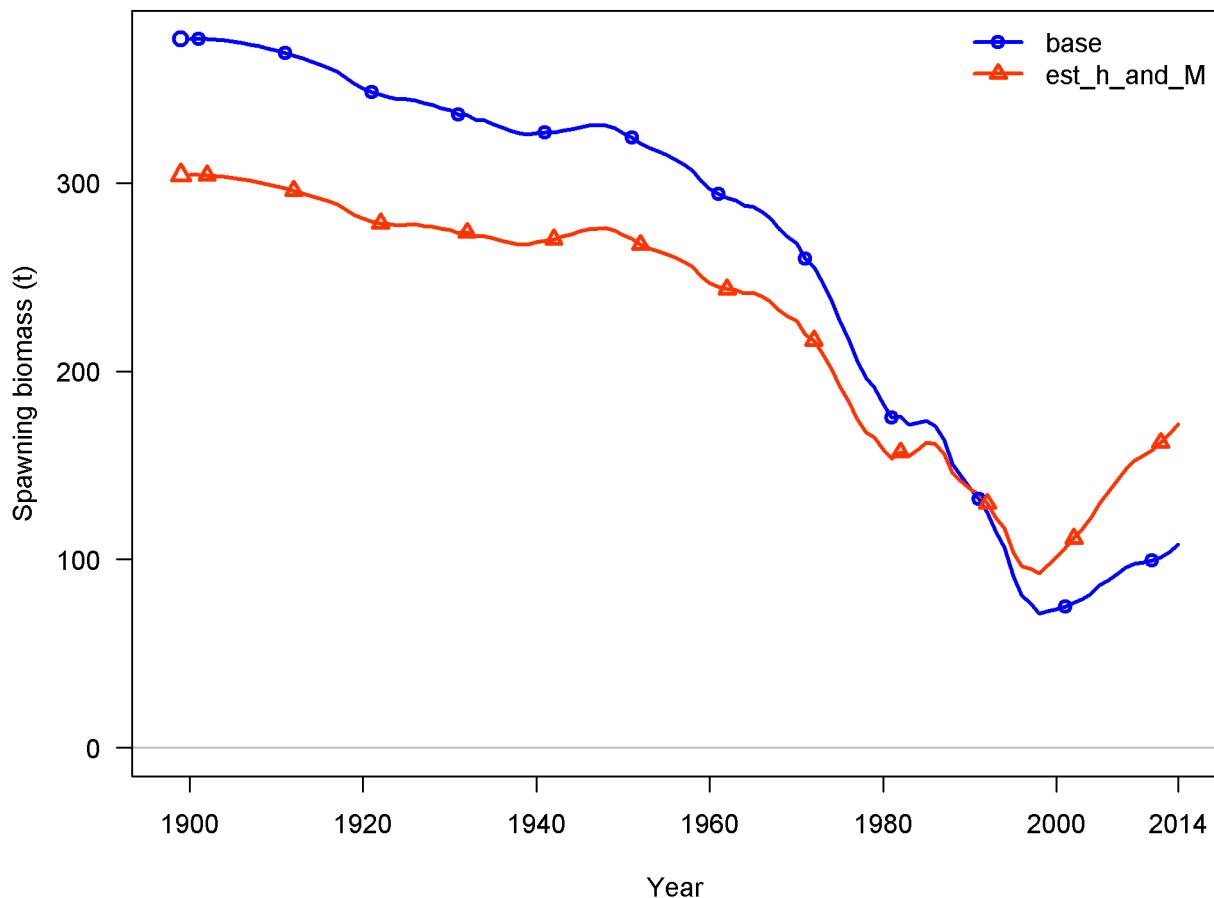


Figure 118: Sensitivity of spawning biomass to fixed versus estimated values of steepness and natural mortality to estimated values in the southern model.

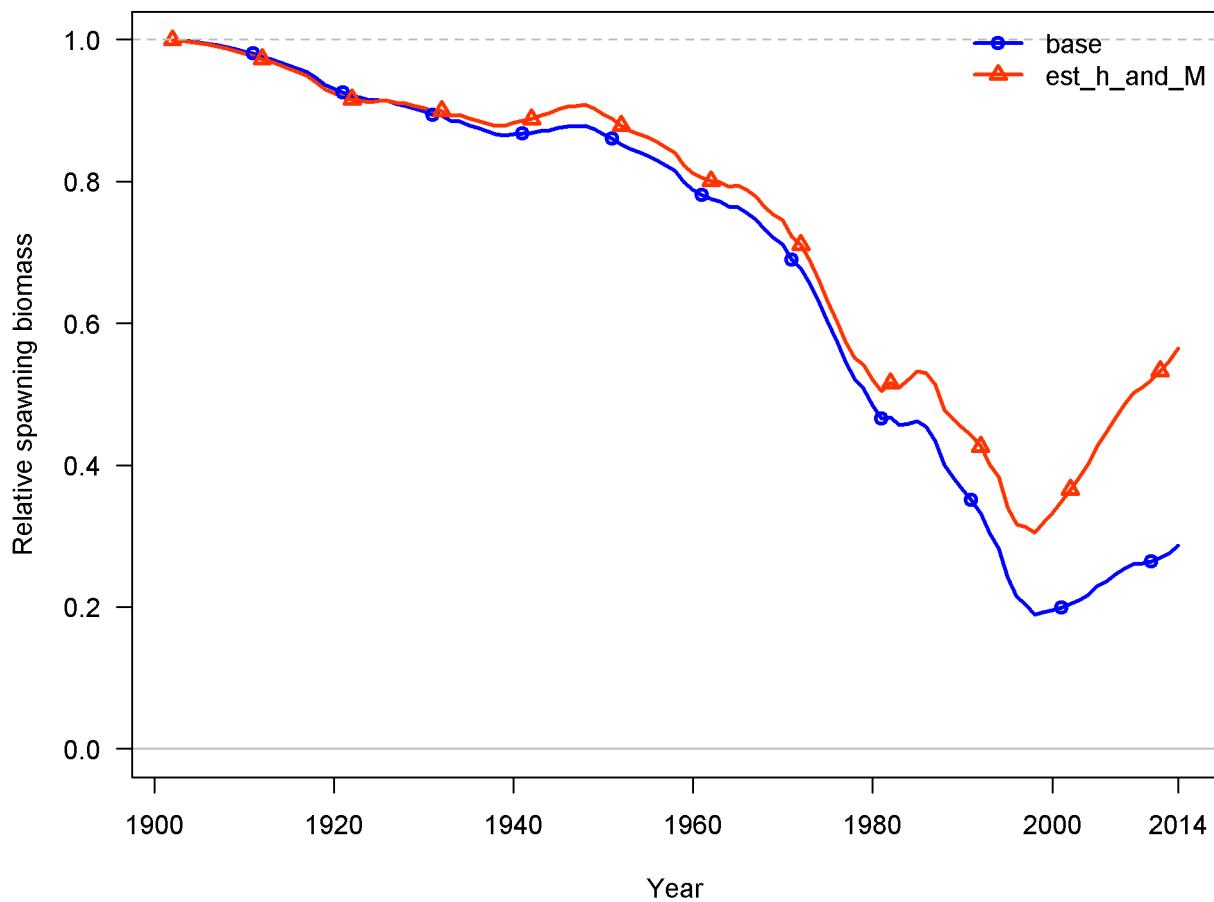


Figure 119: Sensitivity of relative spawning biomass to fixed versus estimated values of steepness and natural mortality to estimated values in the southern model.

### Ending year expected growth (with 95% intervals)

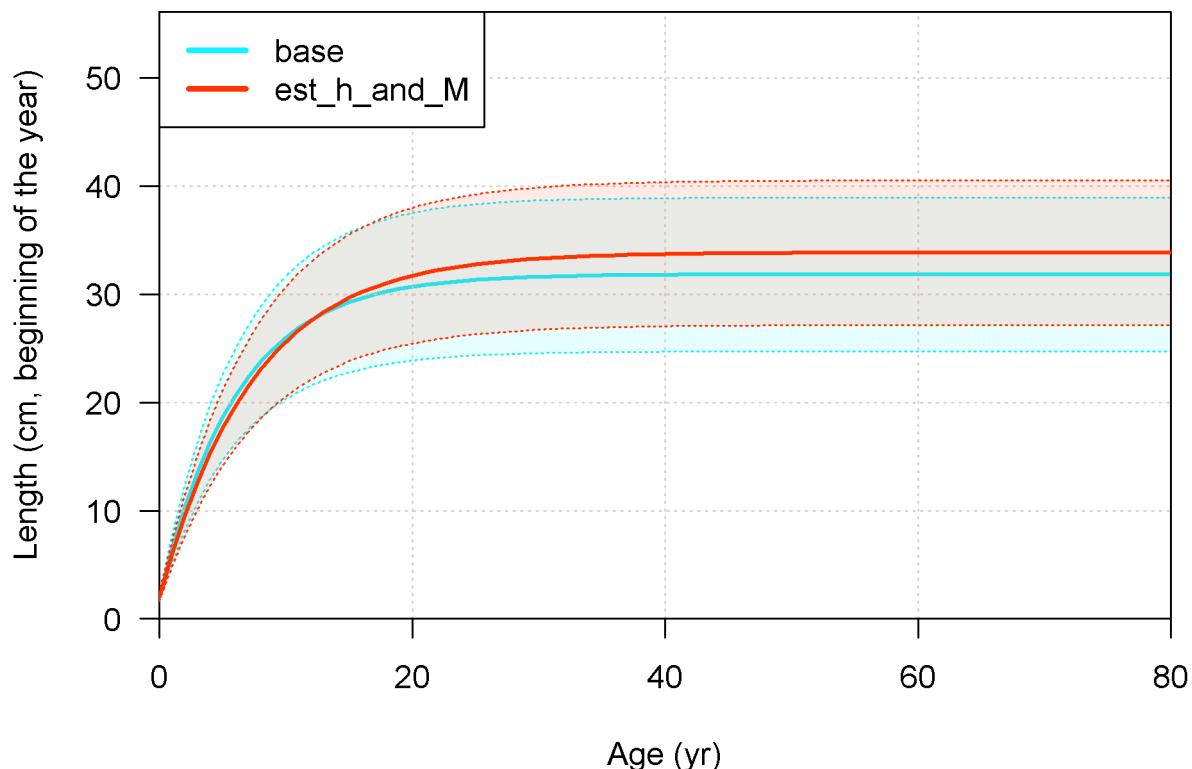


Figure 120: Sensitivity of growth to fixed versus estimated values of steepness and natural mortality to estimated values in the southern model.

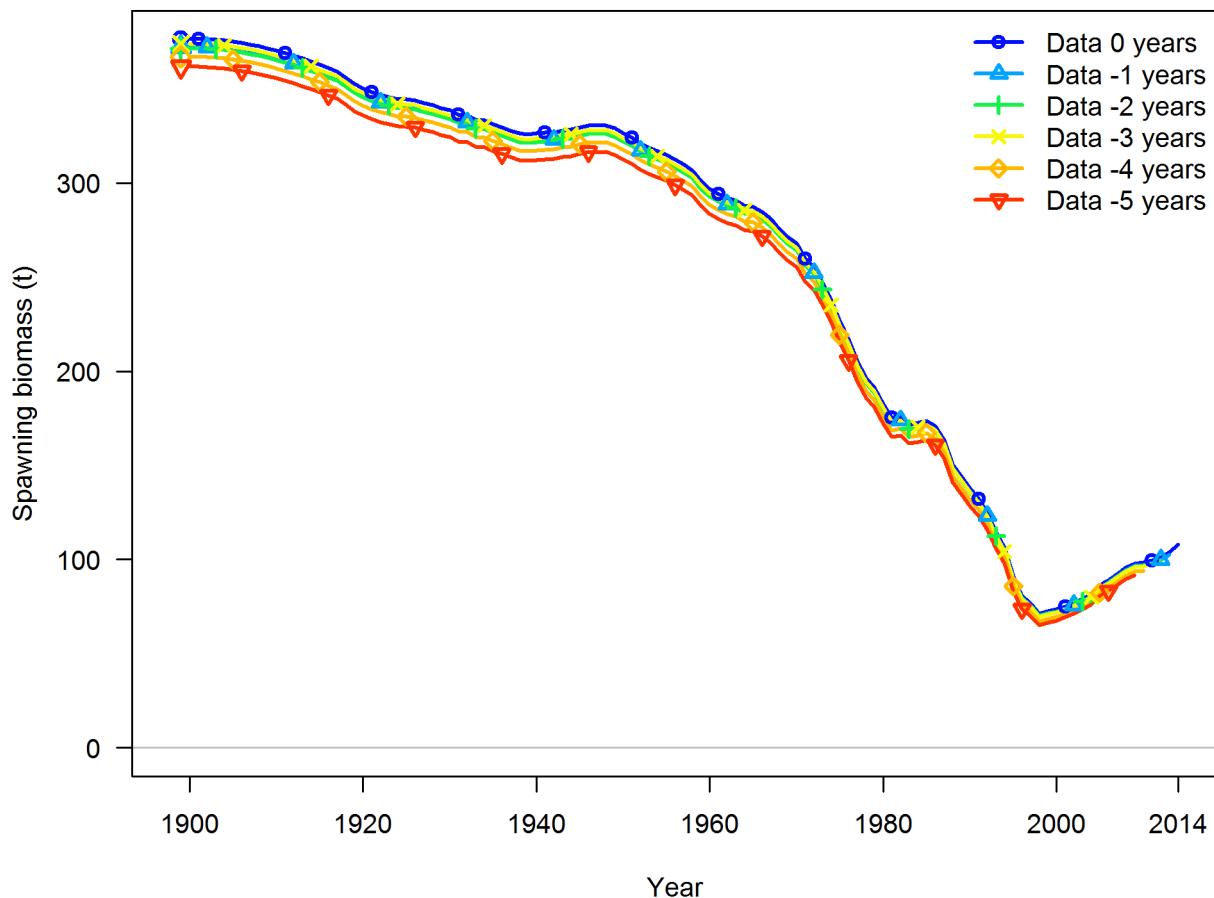


Figure 121: Retrospective analyses for the southern model.

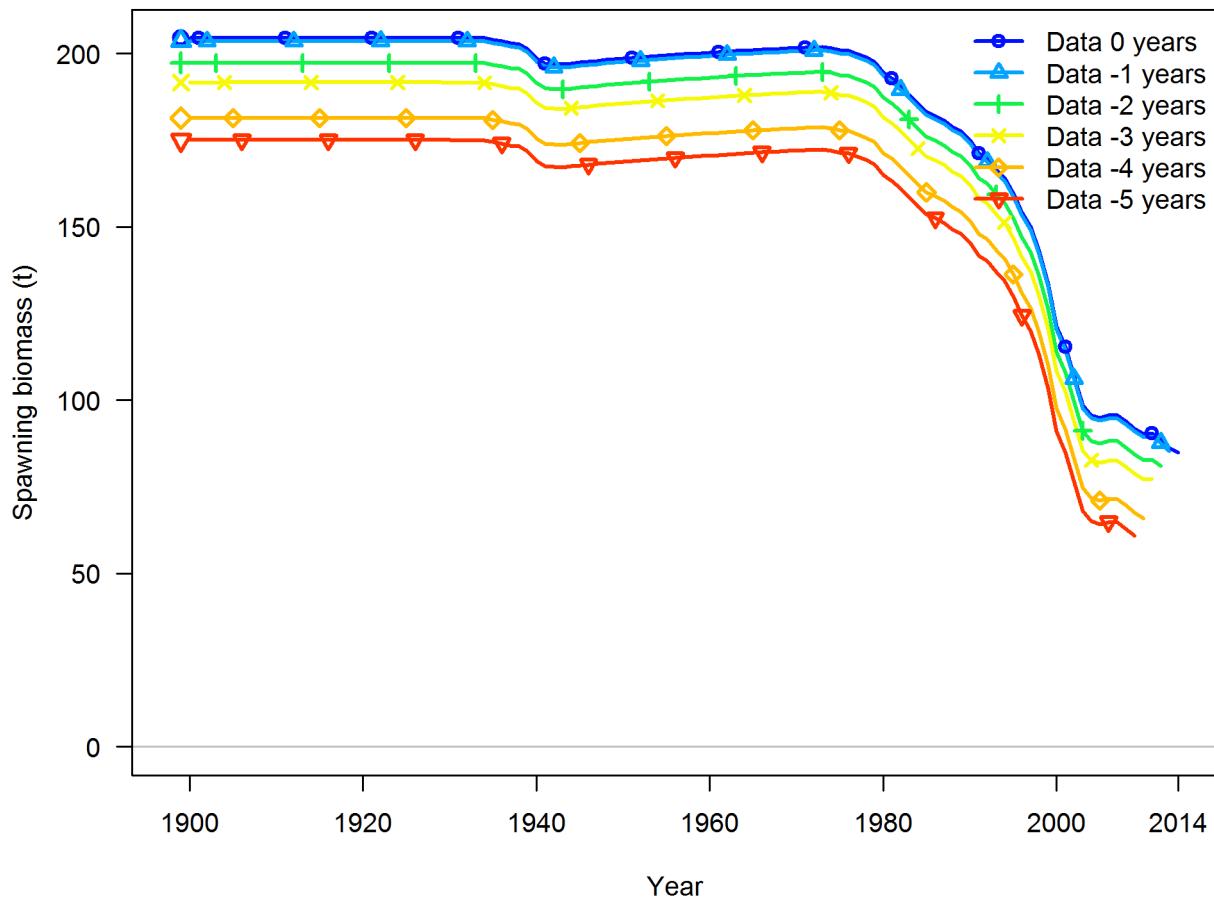


Figure 122: Retrospective analyses for the central model.

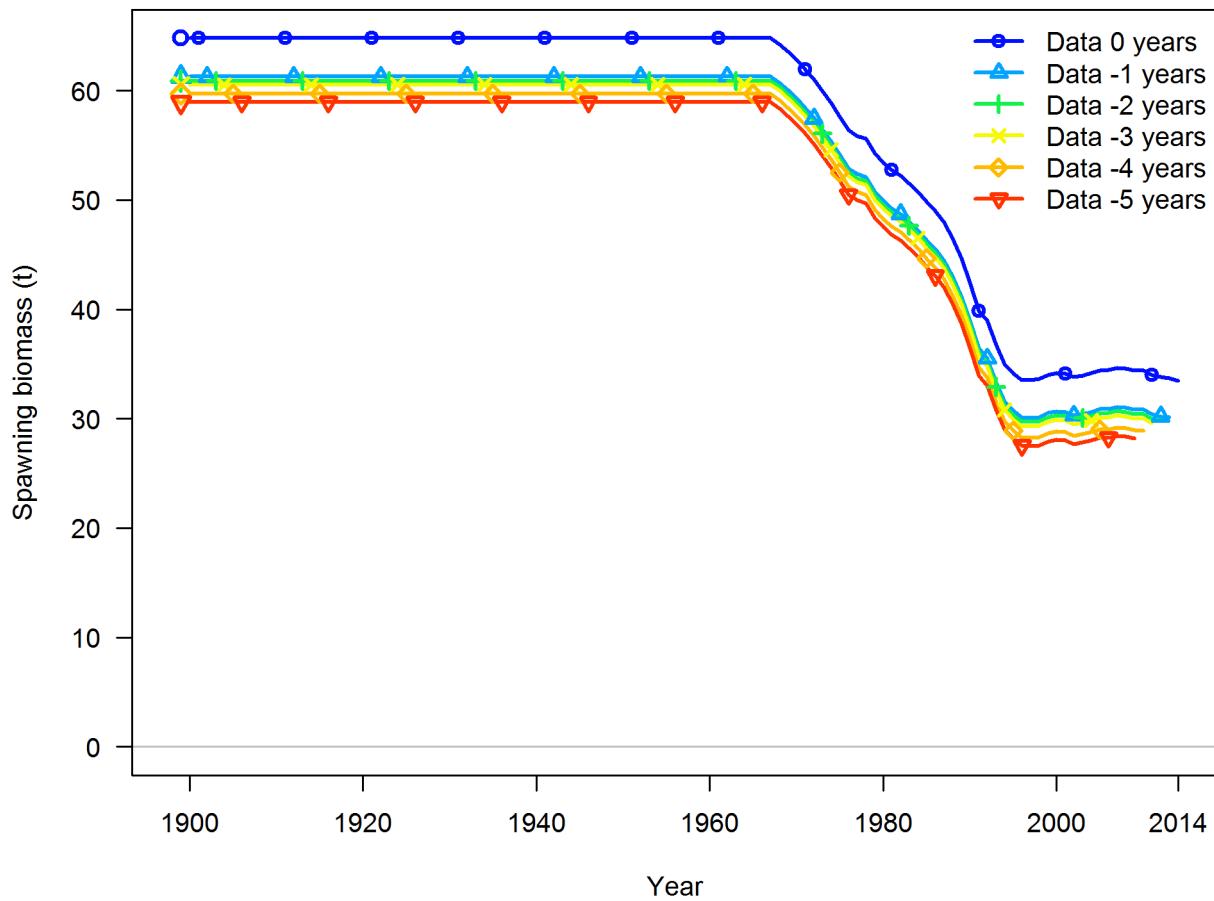


Figure 123: Retrospective analyses for the northern model.

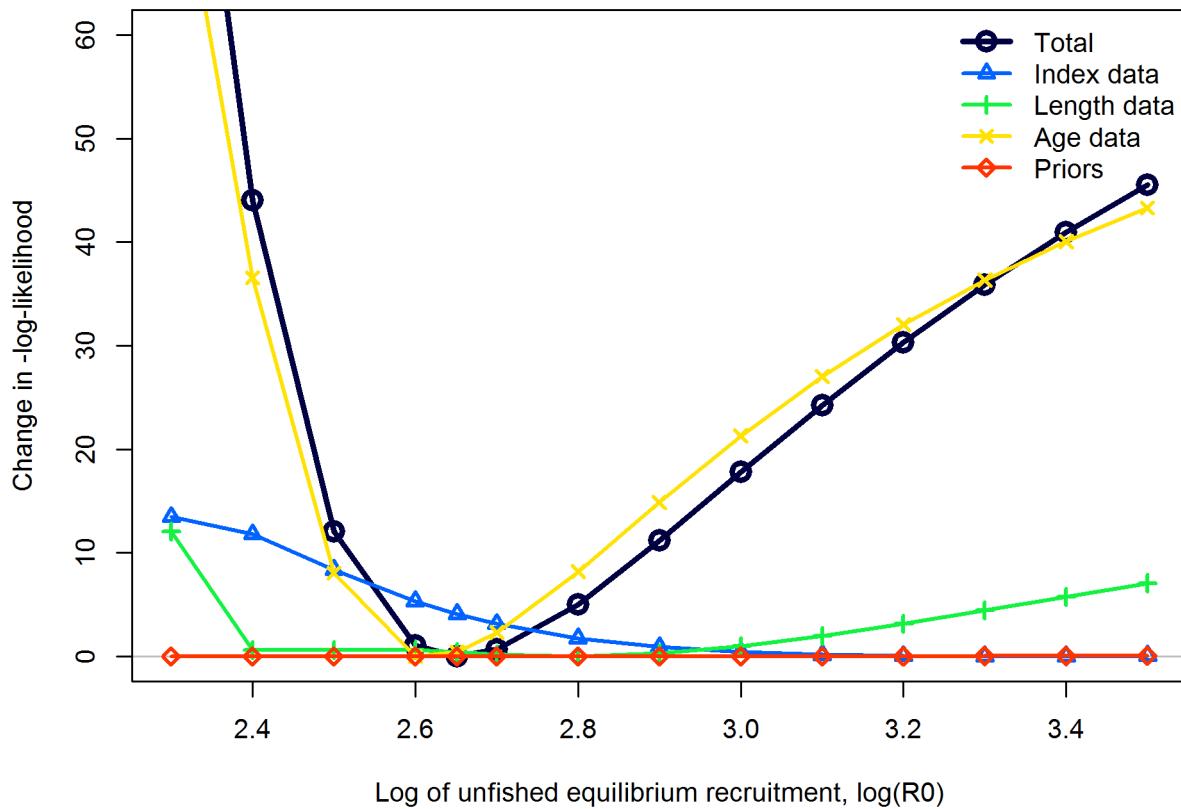


Figure 124: Likelihood profile over the log of equilibrium recruitment,  $\log(R_0)$  showing changes in negative log-likelihoods by data type for the pre-STAR northern model.

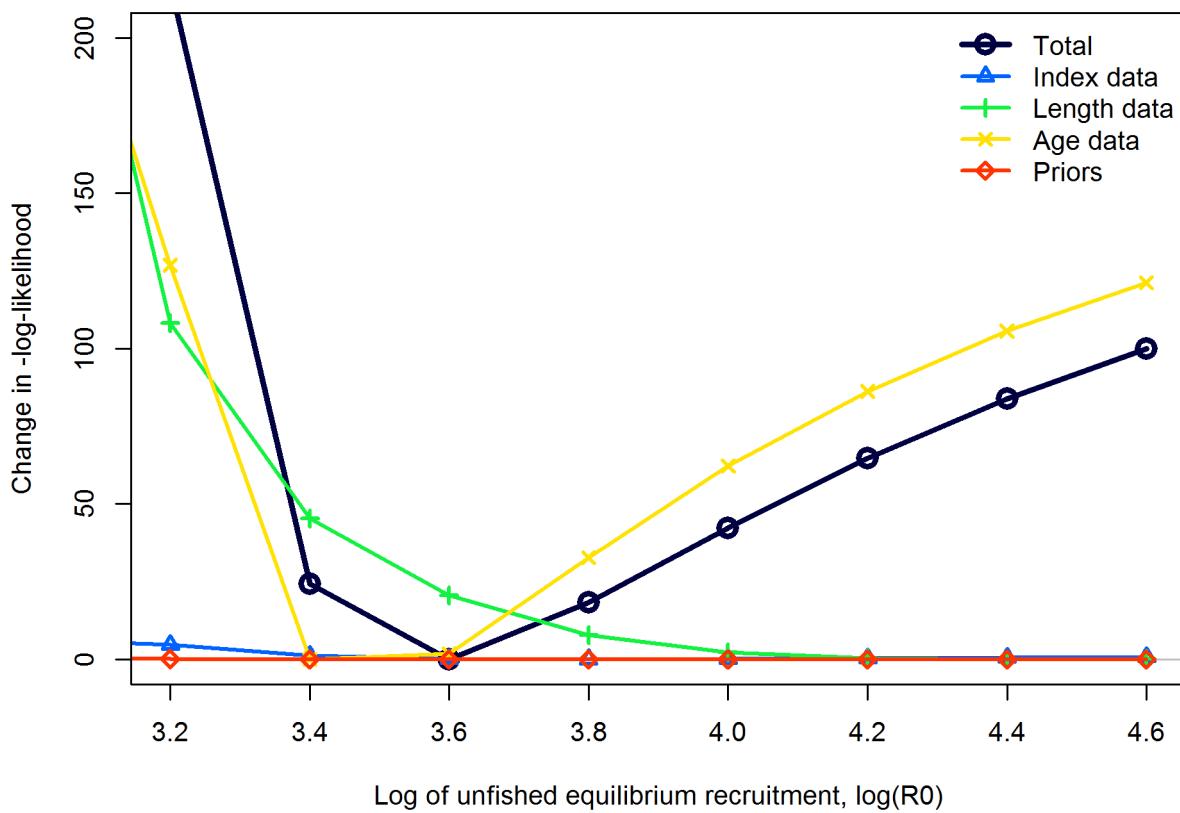


Figure 125: Likelihood profile over the log of equilibrium recruitment,  $\log(R_0)$  showing changes in negative log-likelihoods by data type for the pre-STAR central model.

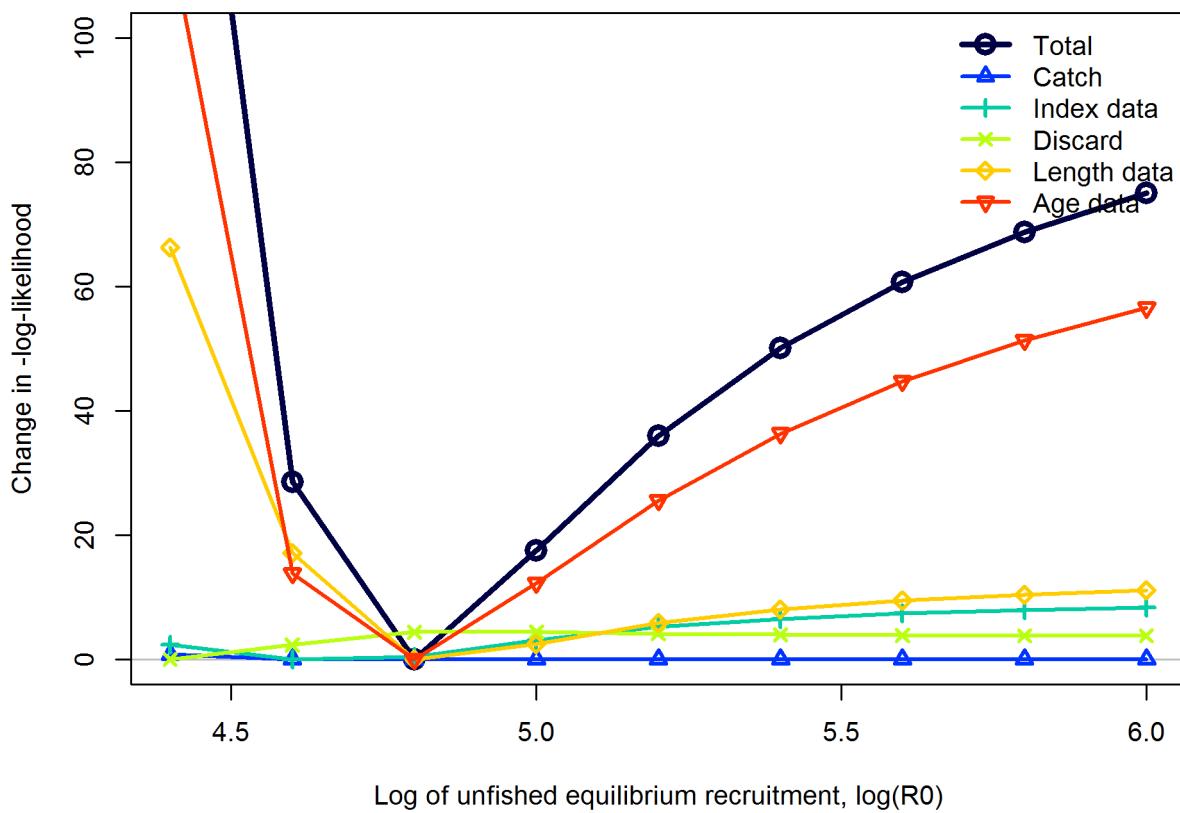


Figure 126: Likelihood profile over the log of equilibrium recruitment,  $\log(R_0)$  showing changes in negative log-likelihoods by data type for the pre-STAR southern model.

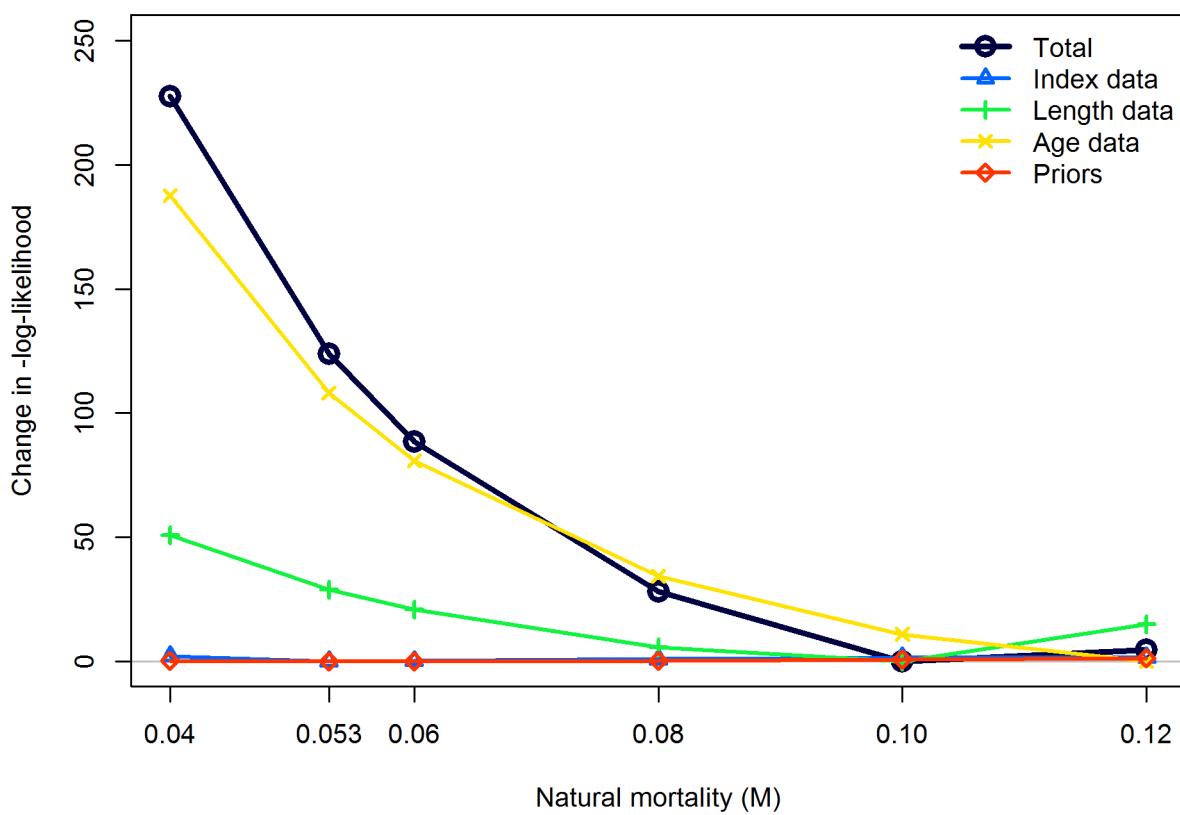


Figure 127: Likelihood profile over natural mortality,  $M$ , showing changes in negative log-likelihood by data type for the pre-STAR central model.

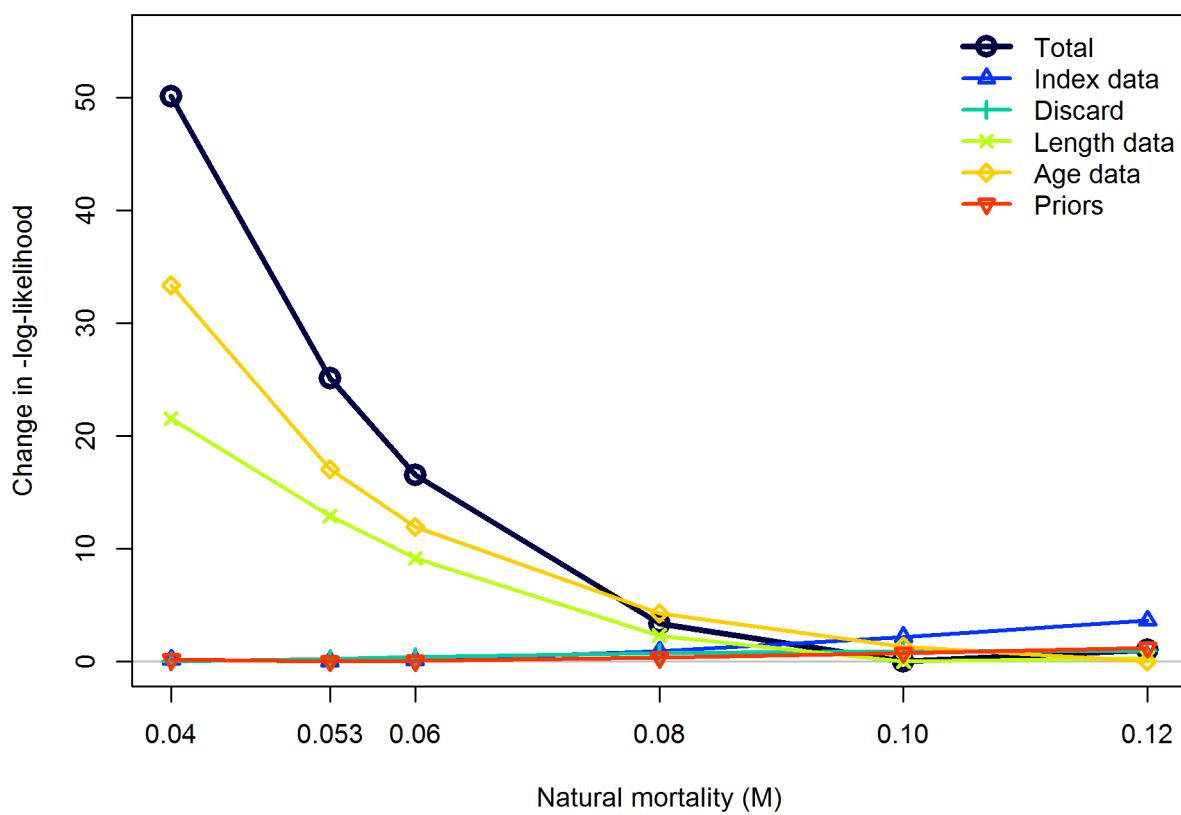


Figure 128: Likelihood profile over natural mortality,  $M$ , showing changes in negative log-likelihood by data type for the pre-STAR southern model.

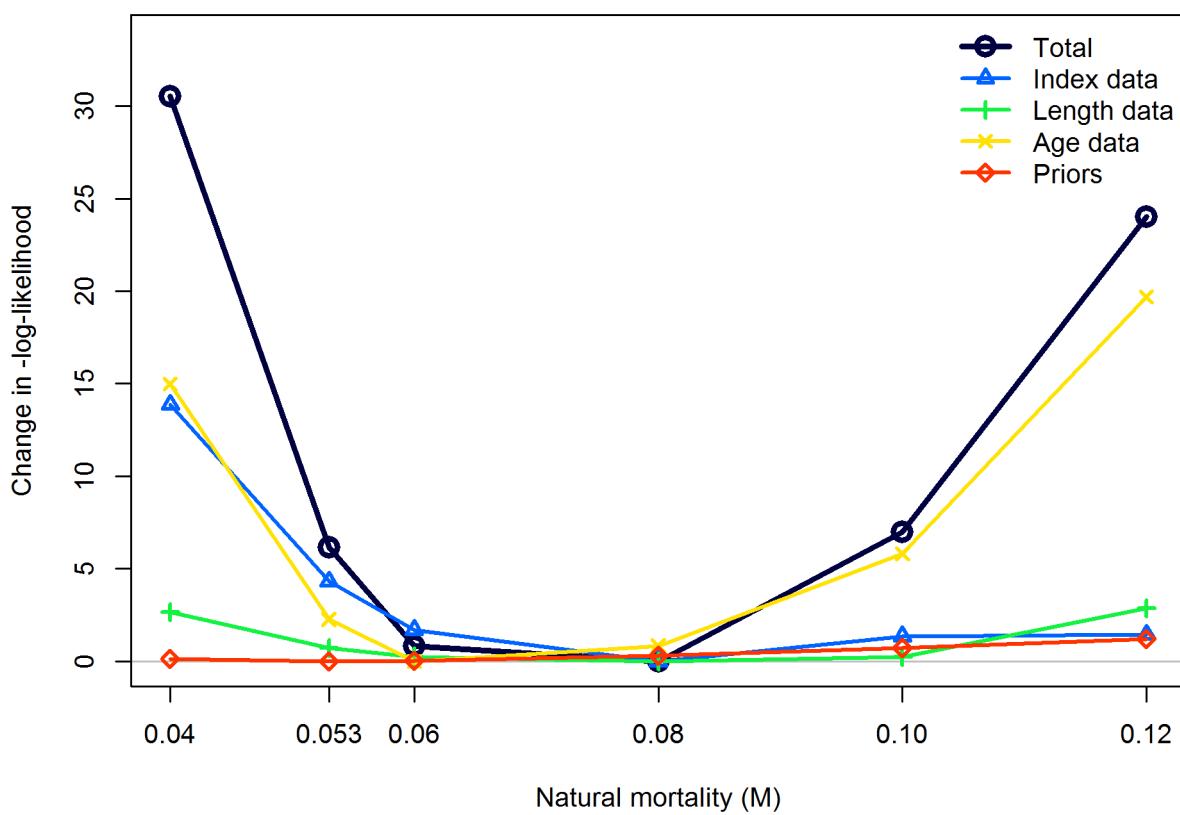


Figure 129: Likelihood profile over natural mortality,  $M$ , showing changes in negative log-likelihood by data type for the pre-STAR northern model.

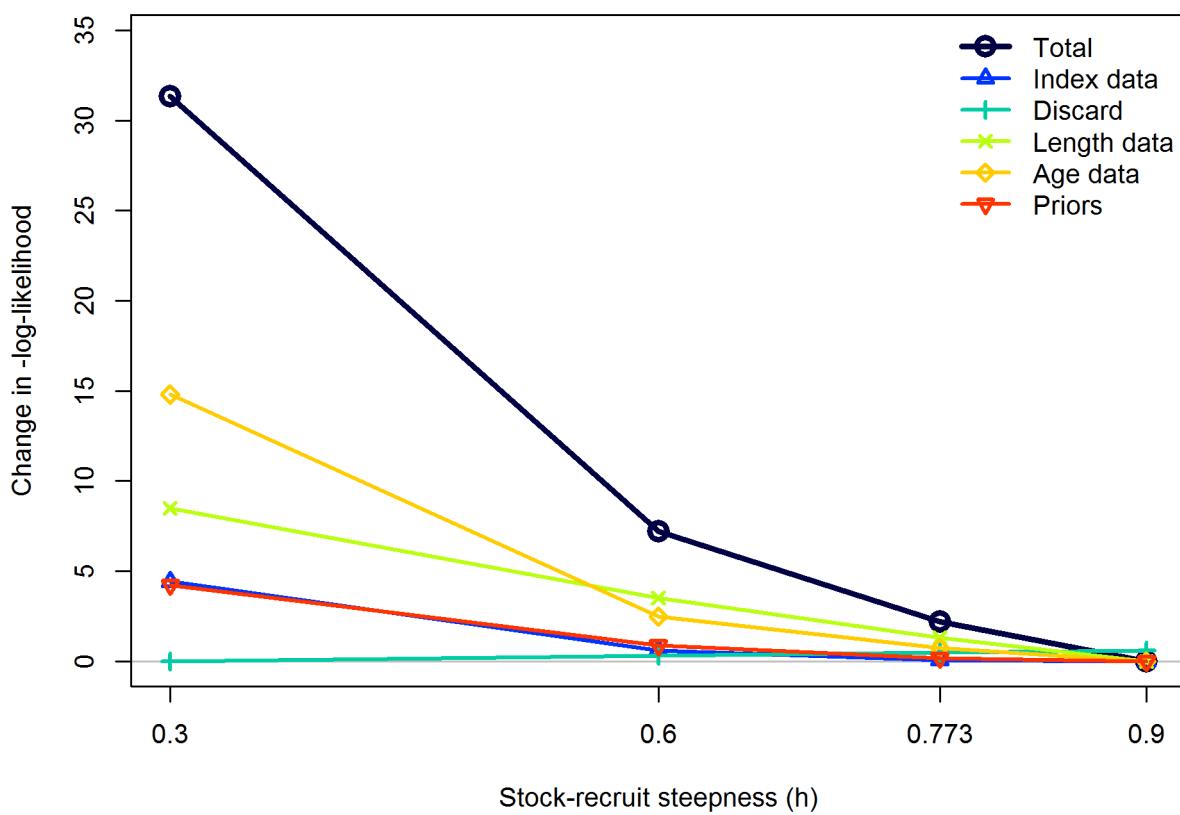


Figure 130: Likelihood profile over the steepness of the stock-recruit relationship,  $h$ , showing changes in negative log-likelihoods by data type for the pre-STAR southern model.

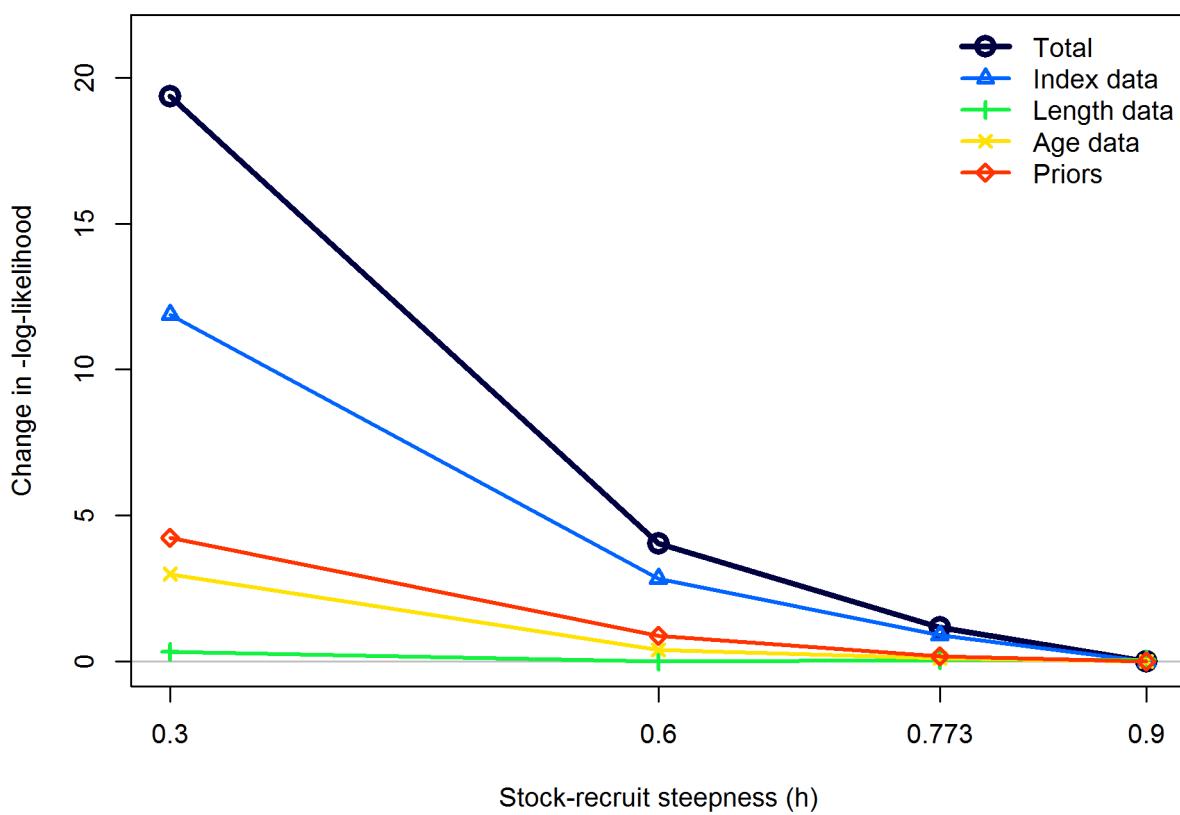


Figure 131: Likelihood profile over the steepness of the stock-recruit relationship,  $h$ , showing changes in negative log-likelihoods by data type for the pre-STAR northern model.

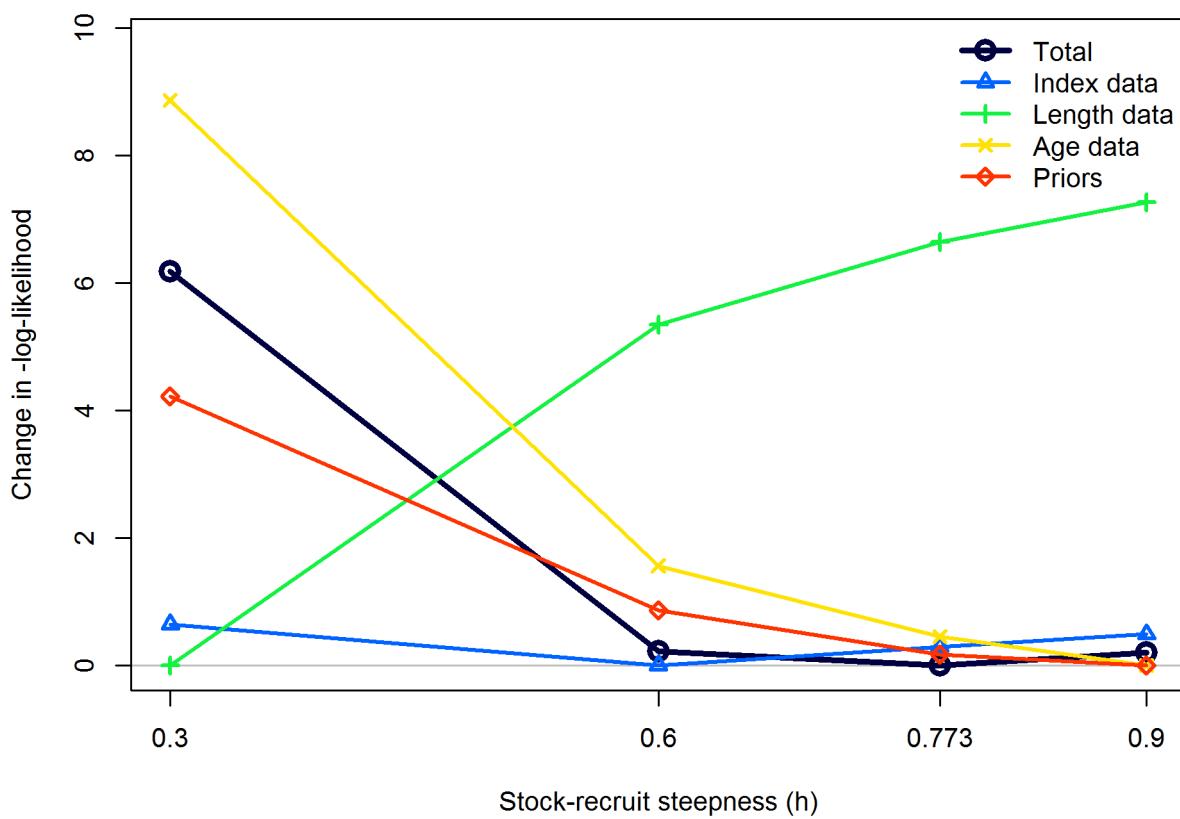


Figure 132: Likelihood profile over the steepness of the stock-recruit relationship,  $h$ , showing changes in negative log-likelihoods by data type for the pre-STAR central model.

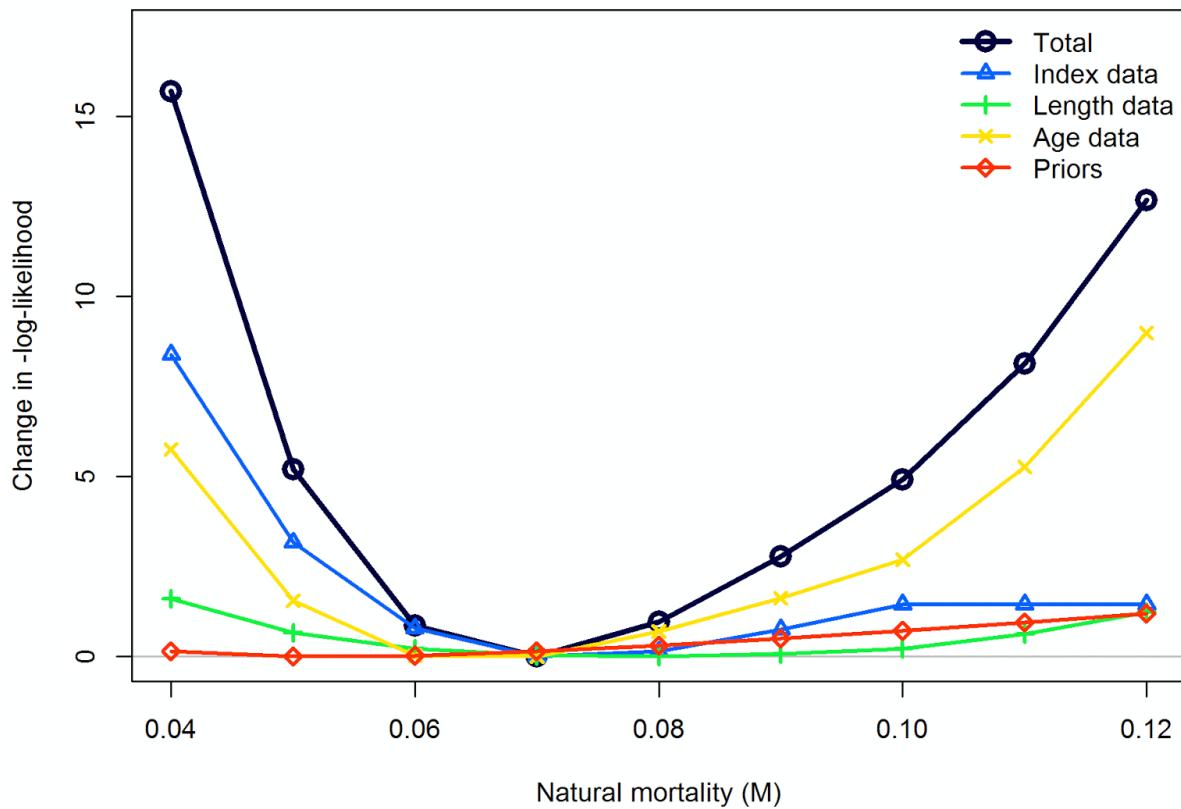


Figure 133: Likelihood profile over the natural mortality,  $M$ , for the final base model, showing changes in negative log-likelihoods by data type for the northern model.

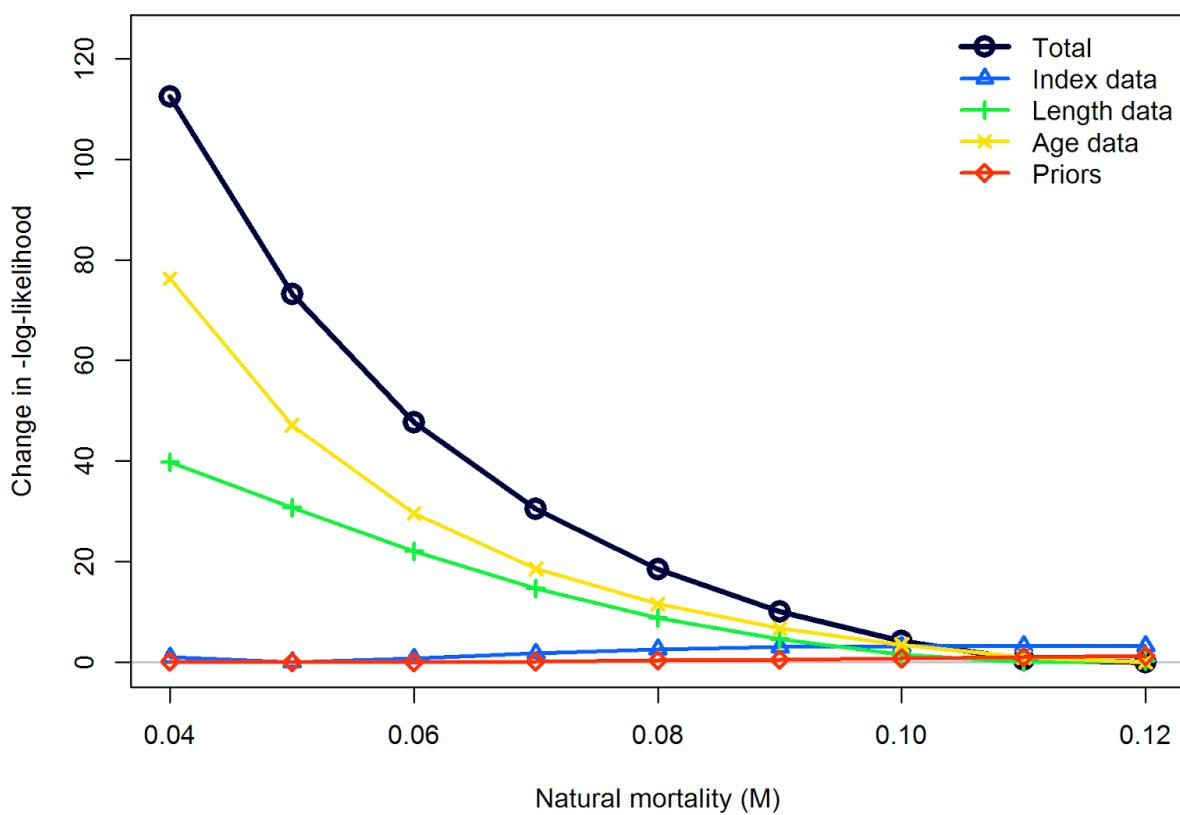


Figure 134: Likelihood profile over the natural mortality,  $M$ , for the final base model, showing changes in negative log-likelihoods by data type for the central model.

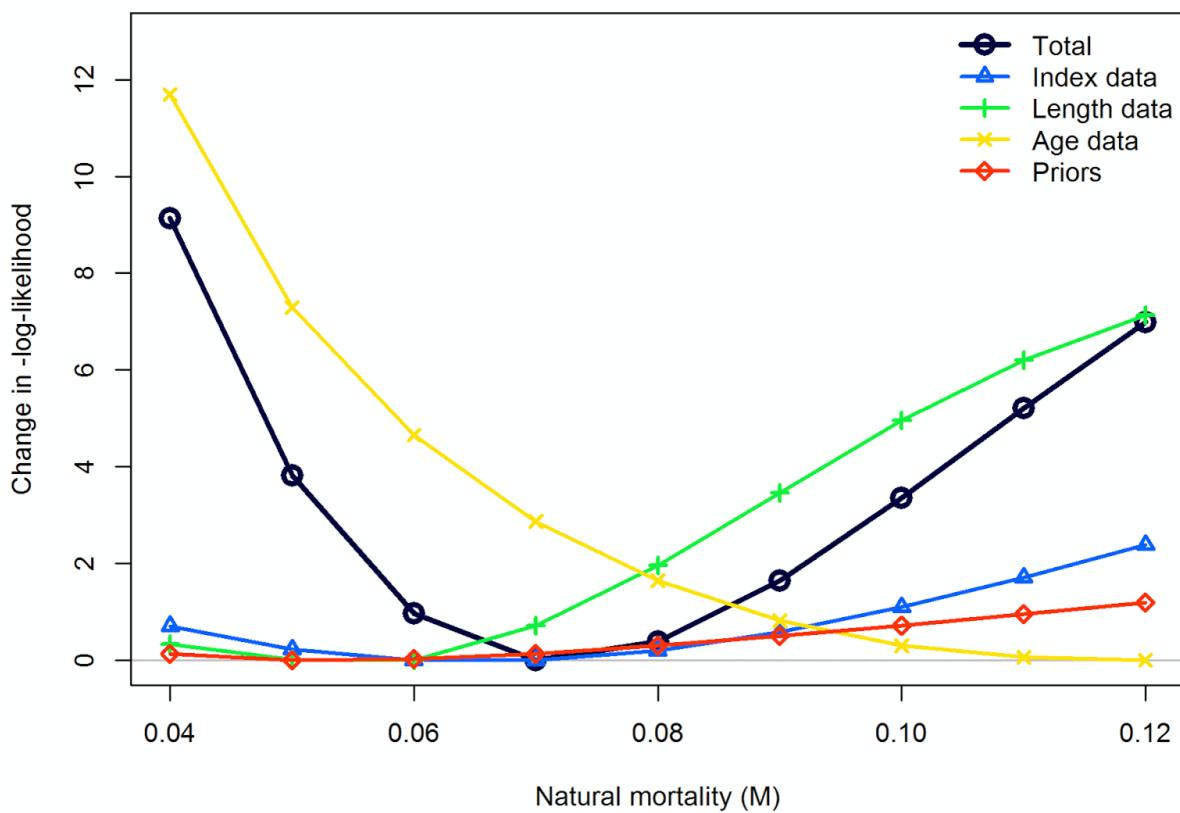


Figure 135: Likelihood profile over the natural mortality,  $M$ , for the final base model, showing changes in negative log-likelihoods by data type for the southern model.

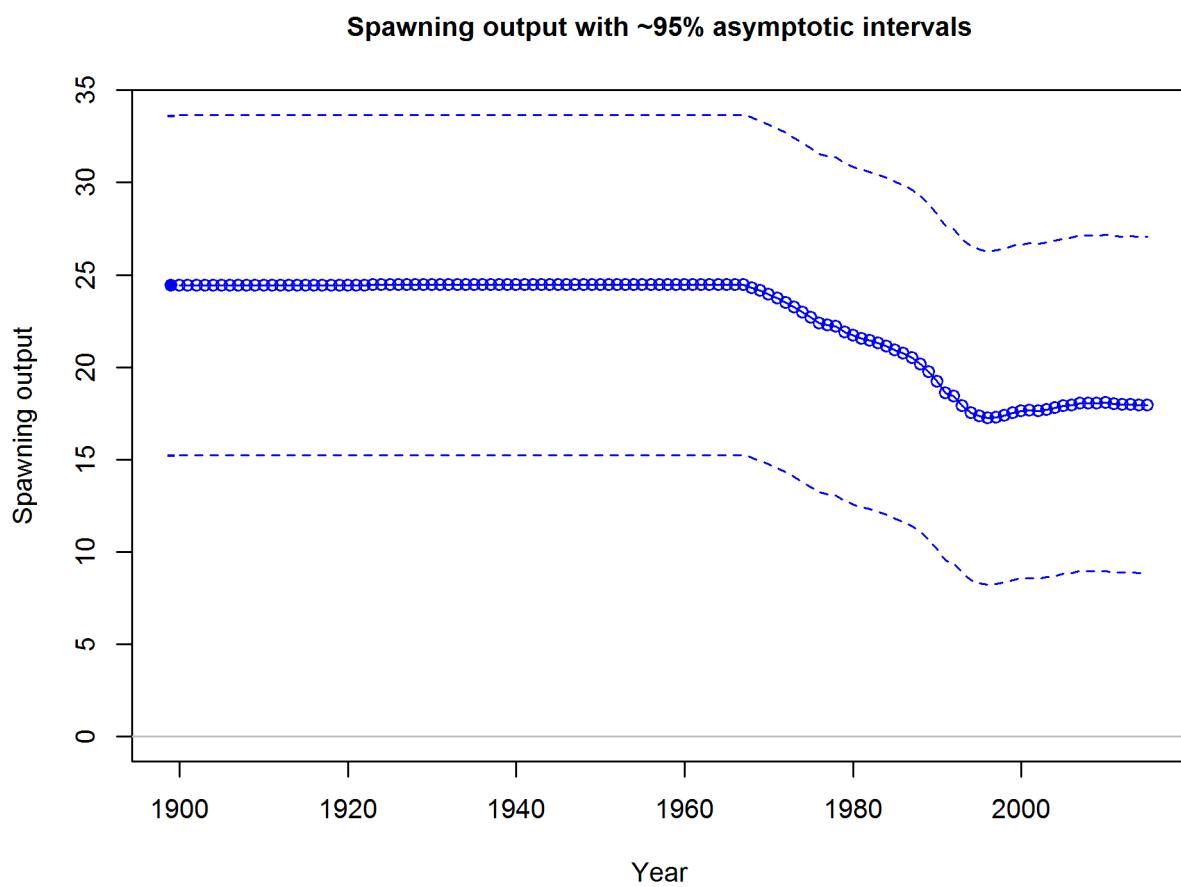


Figure 136: Time series of the spawning stock biomass for the northern model, with 95% asymptotic intervals.

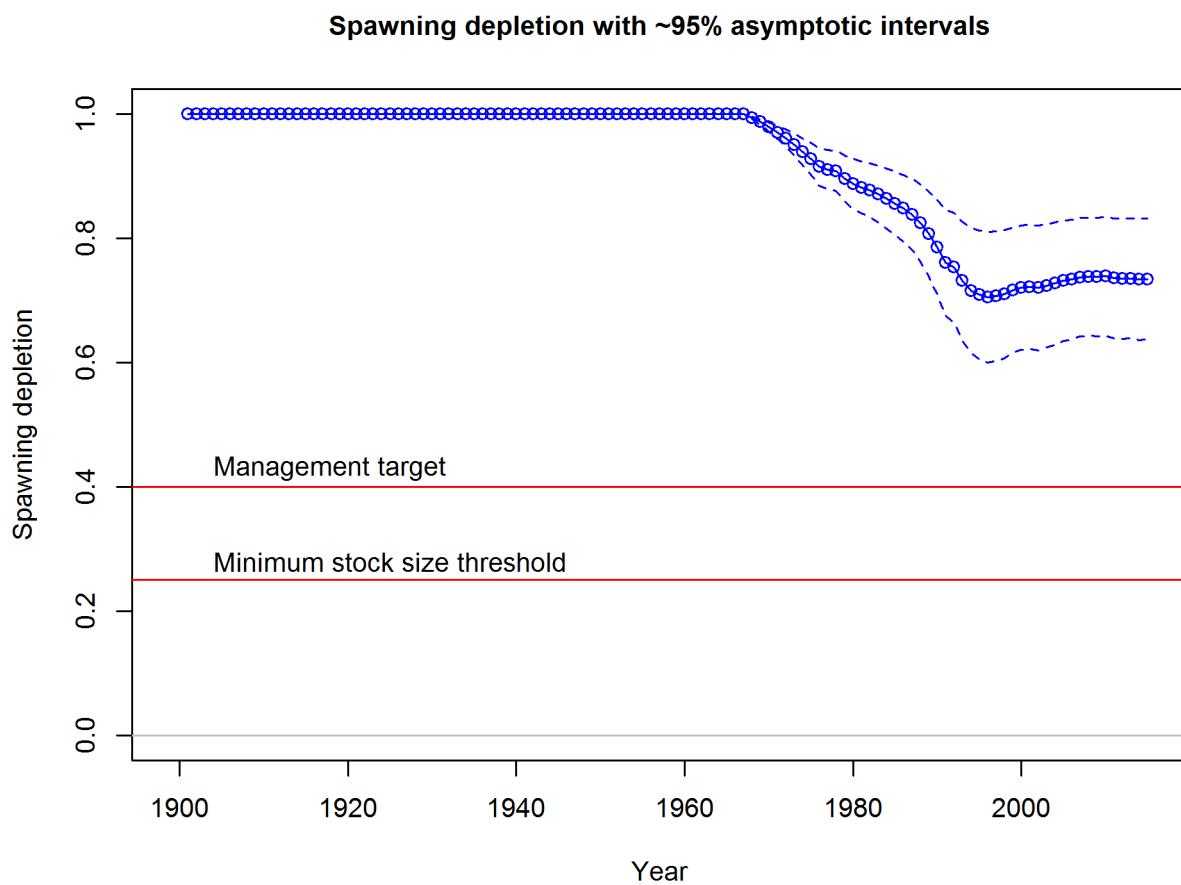


Figure 137: Spawning depletion relative to the management target and minimum stock size threshold for the northern model.

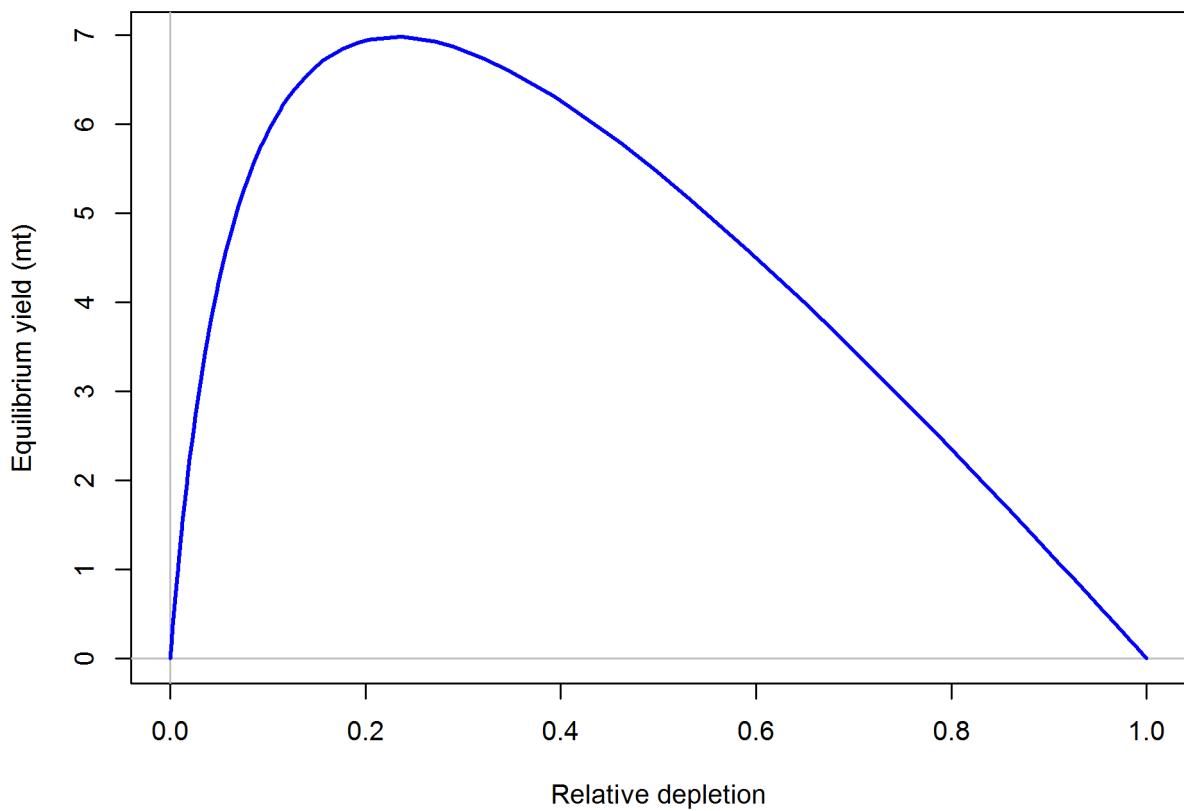


Figure 138: Equilibrium yield curve for the northern model.

**Spawning output with ~95% asymptotic intervals**

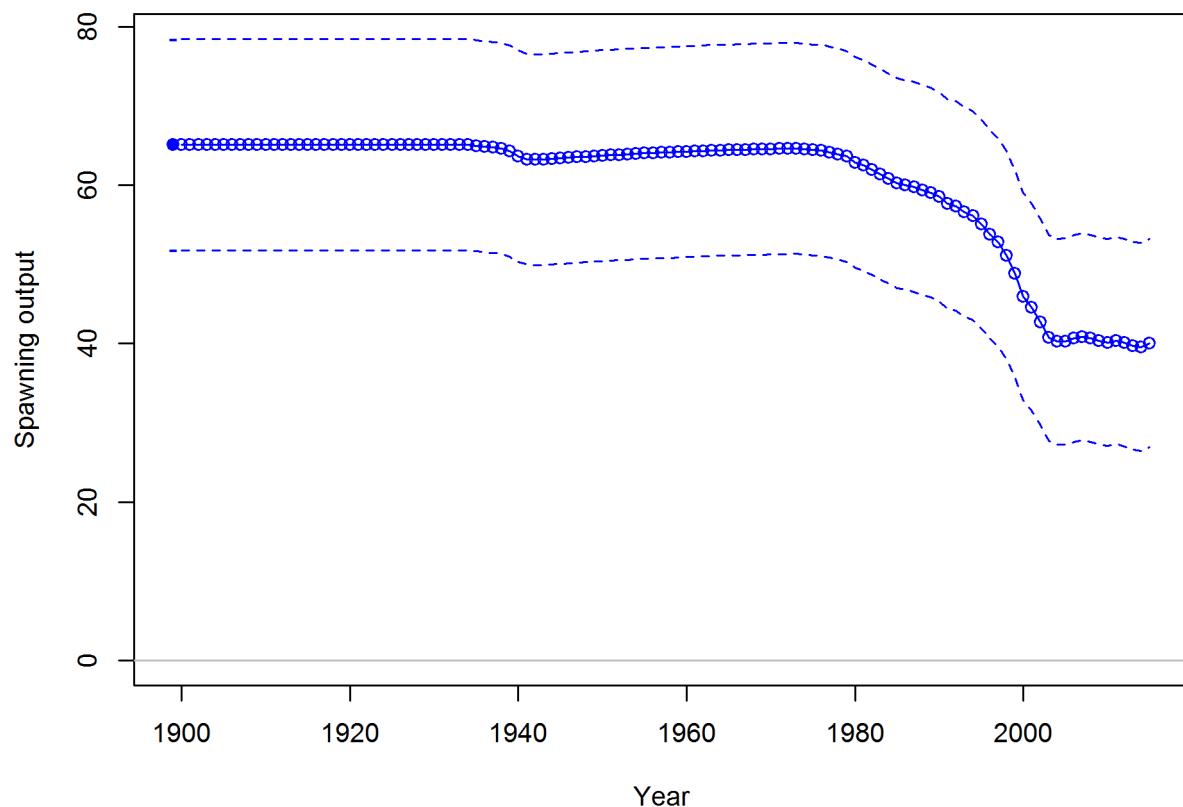


Figure 139: Time series of the spawning stock biomass for the central model, with 95% asymptotic intervals.

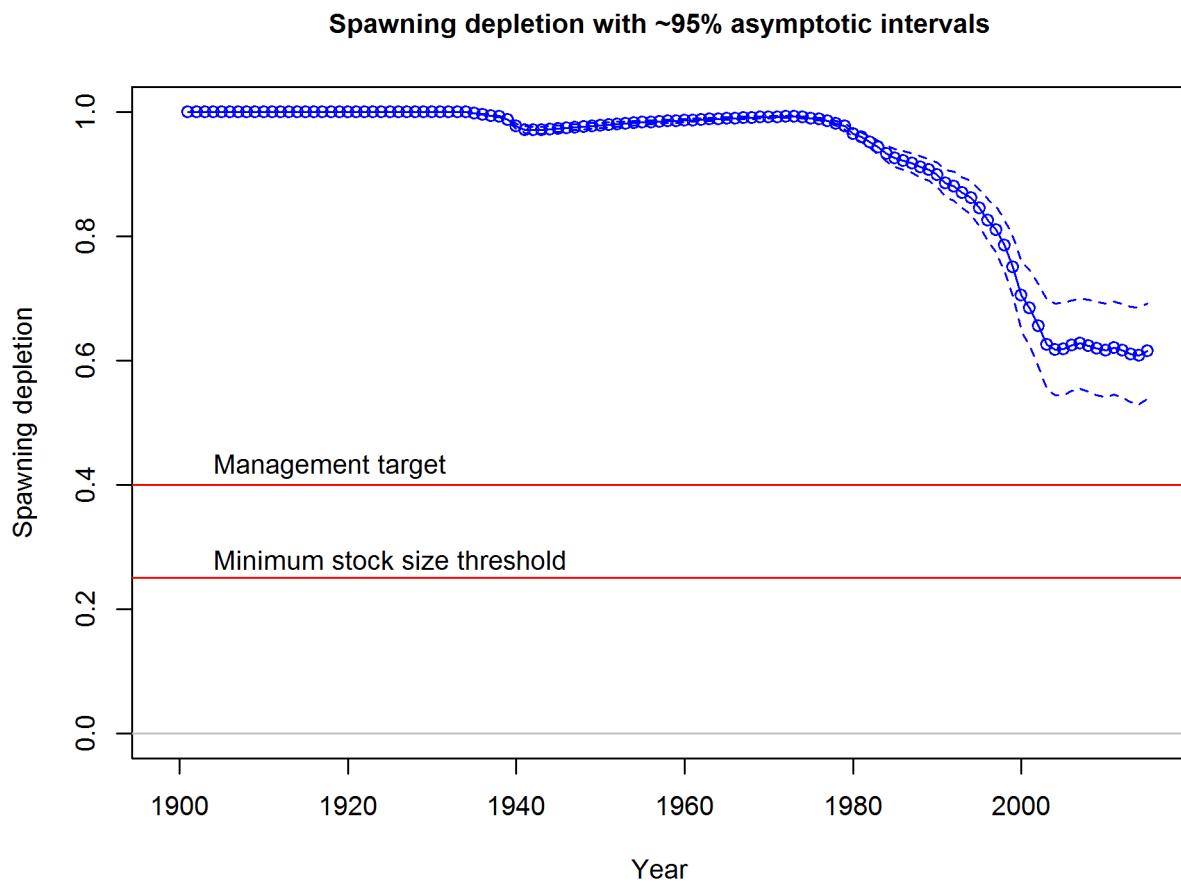


Figure 140: Spawning depletion relative to the management target and minimum stock size threshold for the central model.

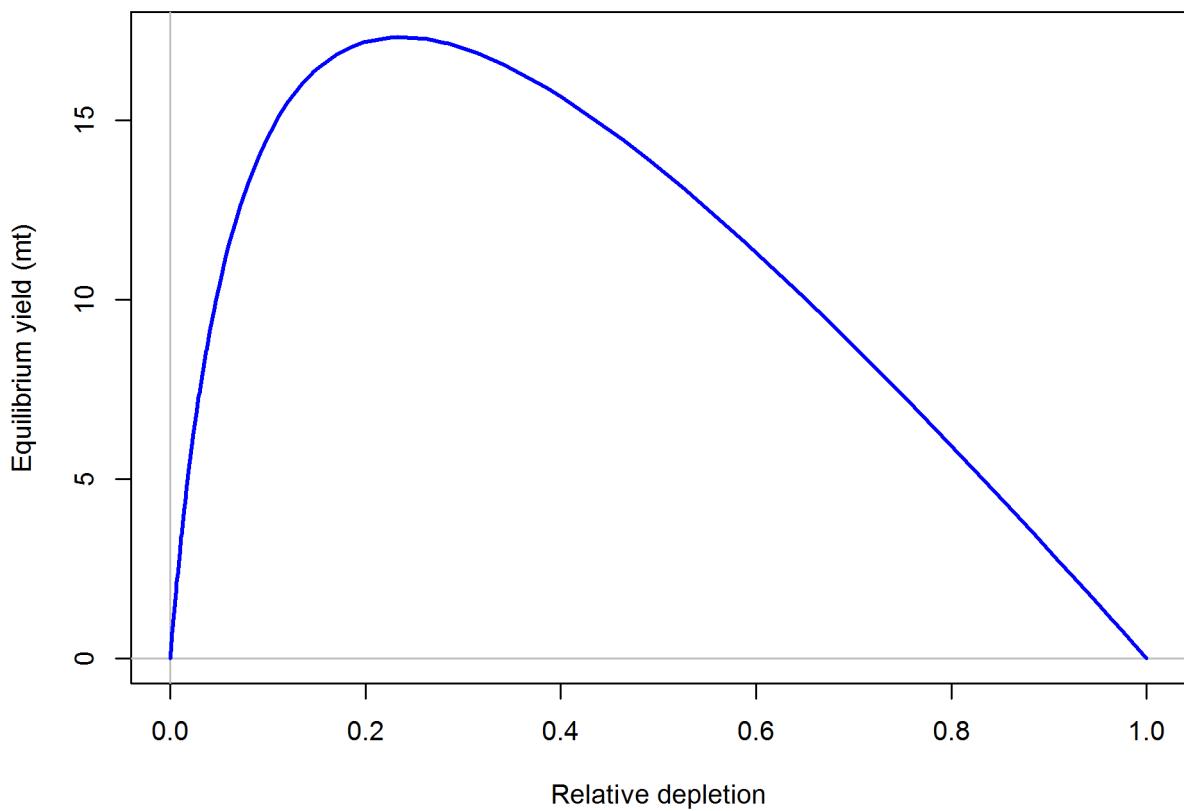


Figure 141: Equilibrium yield curve for the central model.

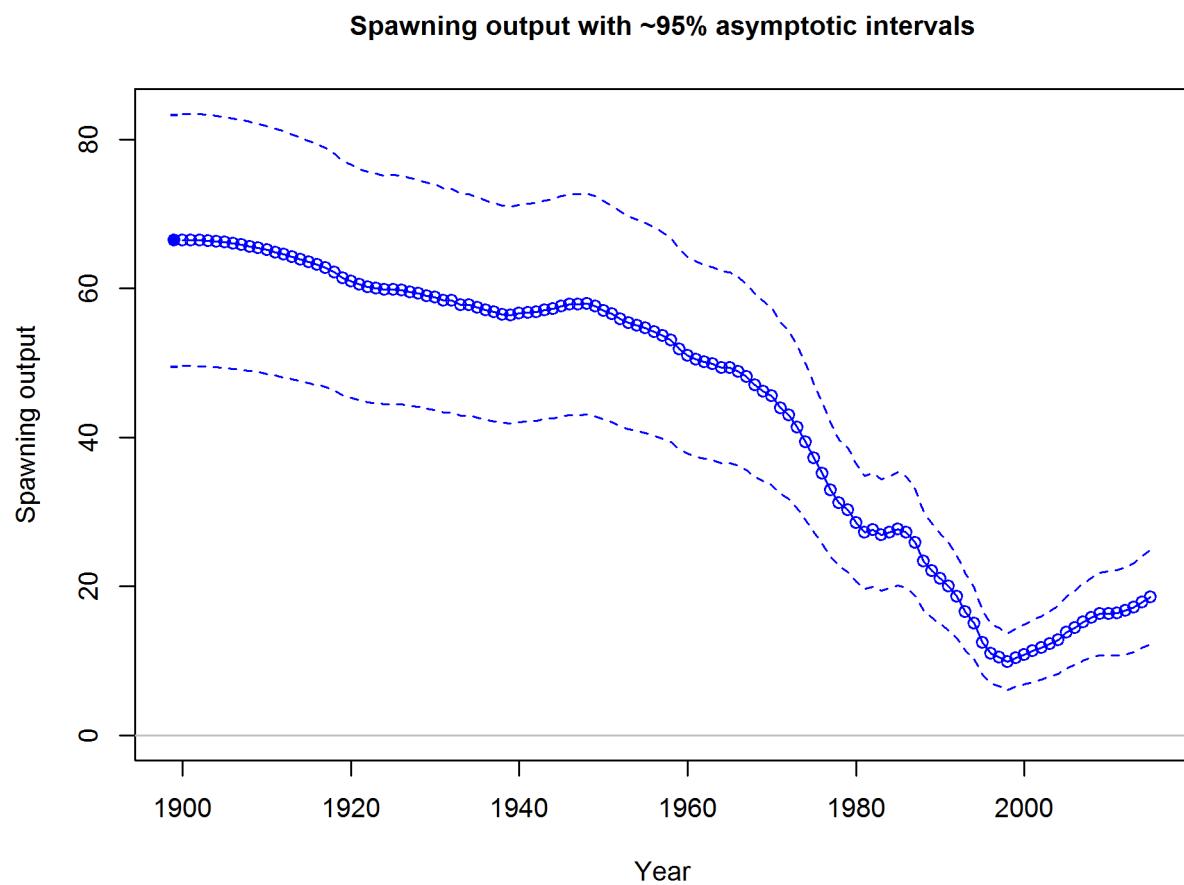


Figure 142: Time series of the spawning stock biomass for the southern model, with 95% asymptotic intervals.

**Spawning depletion with ~95% asymptotic intervals**

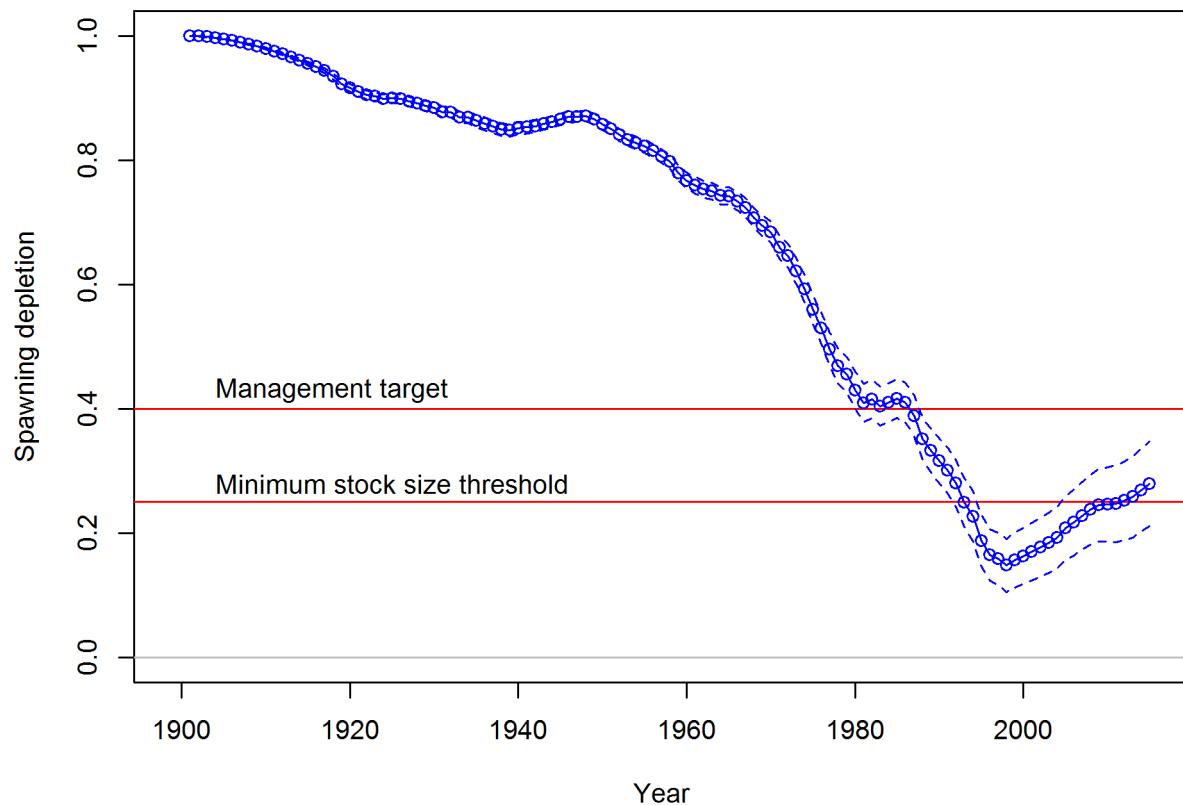


Figure 143: Spawning depletion relative to the management target and minimum stock size threshold for the southern model.

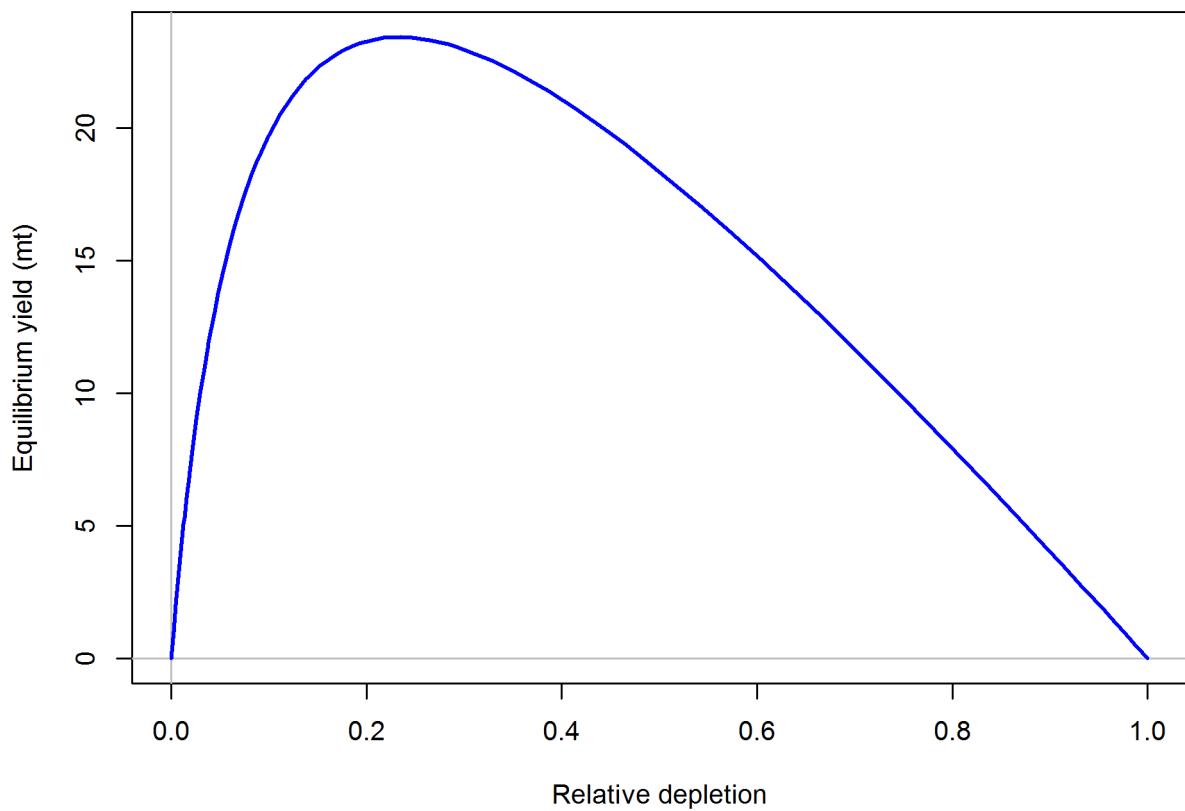


Figure 144: Equilibrium yield curve for the southern model.

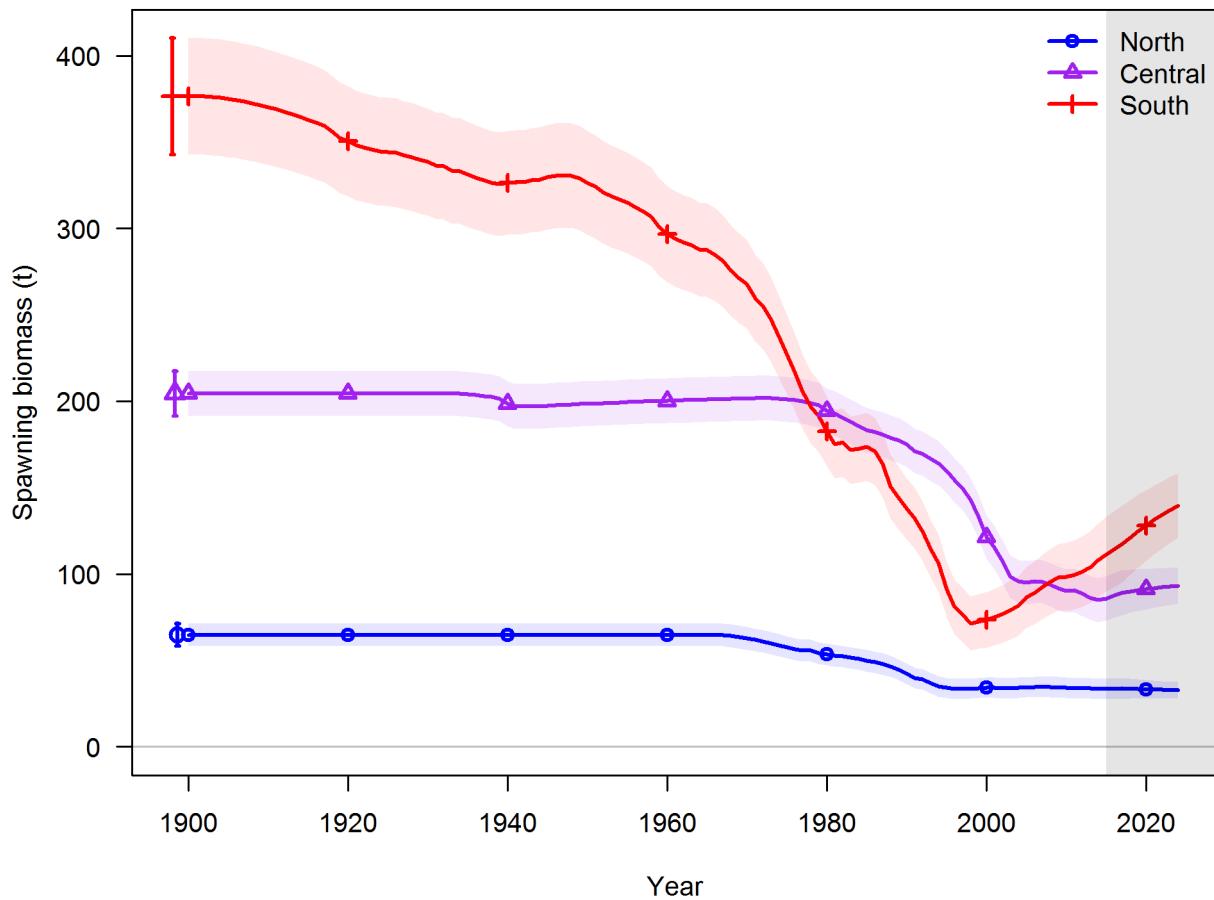


Figure 145: Time series of spawning biomass with a forecast to 2024 (shaded area) for the three base-case models.

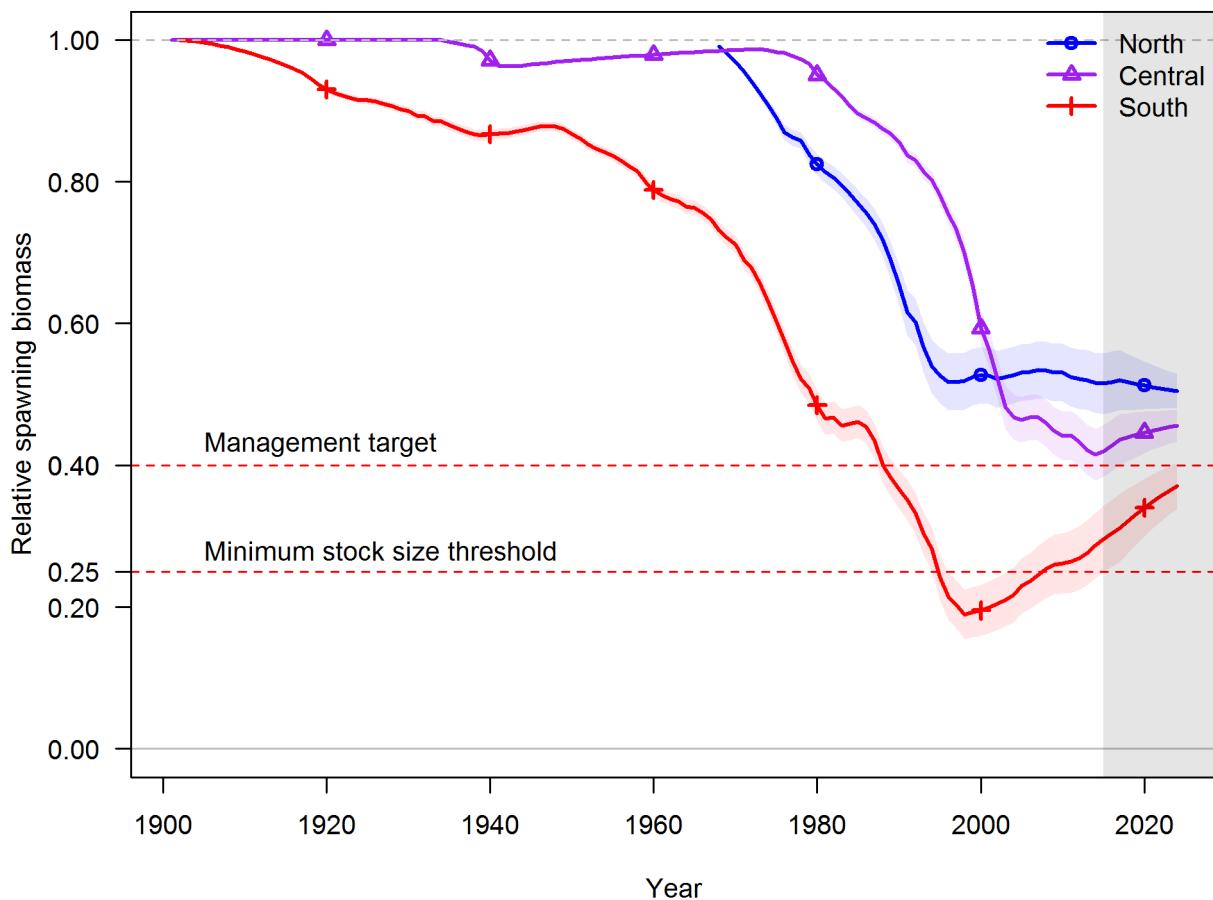


Figure 146: Time series of relative spawning biomass with a forecast to 2024 (shaded area) for the three base-case models.

## 2748 Appendix A. SS data file

```
2749 #V3.24u
2750 #C data file for China rockfish North of 4010
2751 #C adding multiple new data sources to approximate XDB-SRA model
2752 #C 1) extended time series of catch to match southern model (for combining,
2753 # later)
2754 #C 2) Combined Northern OR commercial (live+dead)
2755 #C 3) Combined Southern WA rec (PC+PR)
2756 #_observed data:
2757 1900 #_styr -- extended to match southern model start year
2758 2014 #_endyr
2759 1 #_nseas
2760 12 #_months/season
2761 1 #_spawn_seas
2762 3 #_Nfleet
2763 0 #_Nsurveys
2764 1 #_N_areas
2765 ## fleet names (second cut on June 7, 2015)
2766 1_WA_SouthernWA_Rec_PCPR%2_WA_NorthernWA_Rec_PC%3_WA_NorthernWA_Rec_PR
2767 ## 12_WA_SouthernWA_Rec_PCPR
2768 ## 13_WA_NorthernWA_Rec_PC
2769 ## 14_WA_NorthernWA_Rec_PR
2770 # following values are 1 per catch or survey fleet
2771 0.5 0.5 0.5 #_surveytiming_in_season -- mid-year, not exactly like XDB-SRA
2772 1 1 1 #_area_assignments_for_each_fishery_and_survey
2773 # following values are 1 per catch fleet
2774 1 1 1 #_units of catch: 1=bio; 2=num
2775 0.1 0.1 0.1 #_se of log(catch) only used for init_eq_catch and for Fmethod
2776 # 2 and 3; use -1 for discard only fleets
2777 2 #_Ngenders
2778 80 #_Nages
2779 0 0 0 #_init_equil_catch_for_each_fishery
2780 115 #_N_lines_of_catch_to_read
2781 #_catch_biomass(mtons):_columns_are_fisheries,year,season
2782 # this file has catch in SS format based on formulas in the adjacent Google
2783 # Doc "Catch Pivot" worksheet
2784 #fleet12 fleet13 fleet14 Year Season #
2785 0 0 0 1900 1 #
2786 0 0 0 1901 1 #
2787 0 0 0 1902 1 #
2788 0 0 0 1903 1 #
```

2789	0	0	0	1904	1	#
2790	0	0	0	1905	1	#
2791	0	0	0	1906	1	#
2792	0	0	0	1907	1	#
2793	0	0	0	1908	1	#
2794	0	0	0	1909	1	#
2795	0	0	0	1910	1	#
2796	0	0	0	1911	1	#
2797	0	0	0	1912	1	#
2798	0	0	0	1913	1	#
2799	0	0	0	1914	1	#
2800	0	0	0	1915	1	#
2801	0	0	0	1916	1	#
2802	0	0	0	1917	1	#
2803	0	0	0	1918	1	#
2804	0	0	0	1919	1	#
2805	0	0	0	1920	1	#
2806	0	0	0	1921	1	#
2807	0	0	0	1922	1	#
2808	0	0	0	1923	1	#
2809	0	0	0	1924	1	#
2810	0	0	0	1925	1	#
2811	0	0	0	1926	1	#
2812	0	0	0	1927	1	#
2813	0	0	0	1928	1	#
2814	0	0	0	1929	1	#
2815	0	0	0	1930	1	#
2816	0	0	0	1931	1	#
2817	0	0	0	1932	1	#
2818	0	0	0	1933	1	#
2819	0	0	0	1934	1	#
2820	0	0	0	1935	1	#
2821	0	0	0	1936	1	#
2822	0	0	0	1937	1	#
2823	0	0	0	1938	1	#
2824	0	0	0	1939	1	#
2825	0	0	0	1940	1	#
2826	0	0	0	1941	1	#
2827	0	0	0	1942	1	#
2828	0	0	0	1943	1	#
2829	0	0	0	1944	1	#
2830	0	0	0	1945	1	#

2831	0	0	0	1946	1	#
2832	0	0	0	1947	1	#
2833	0	0	0	1948	1	#
2834	0	0	0	1949	1	#
2835	0	0	0	1950	1	#
2836	0	0	0	1951	1	#
2837	0	0	0	1952	1	#
2838	0	0	0	1953	1	#
2839	0	0	0	1954	1	#
2840	0	0	0	1955	1	#
2841	0	0	0	1956	1	#
2842	0	0	0	1957	1	#
2843	0	0	0	1958	1	#
2844	0	0	0	1959	1	#
2845	0	0	0	1960	1	#
2846	0	0	0	1961	1	#
2847	0	0	0	1962	1	#
2848	0	0	0	1963	1	#
2849	0	0	0	1964	1	#
2850	0	0	0	1965	1	#
2851	0	0	0	1966	1	#
2852	0	0.27	1.04	1967	1	#
2853	0.02	0.32	1.25	1968	1	#
2854	0.04	0.37	1.45	1969	1	#
2855	0.06	0.43	1.66	1970	1	#
2856	0.08	0.48	1.87	1971	1	#
2857	0.10	0.53	2.08	1972	1	#
2858	0.11	0.59	2.29	1973	1	#
2859	0.13	0.64	2.49	1974	1	#
2860	0.15	0.69	2.7	1975	1	#
2861	0.02	0.38	1.48	1976	1	#
2862	0.01	0.29	1.12	1977	1	#
2863	0.06	0.78	3.02	1978	1	#
2864	0.01	0.62	2.4	1979	1	#
2865	0.02	0.53	2.04	1980	1	#
2866	0.06	0.47	1.83	1981	1	#
2867	0.05	0.56	2.18	1982	1	#
2868	0.00	0.62	2.42	1983	1	#
2869	0.11	0.67	2.62	1984	1	#
2870	0.06	0.68	2.64	1985	1	#
2871	0.16	0.78	3.02	1986	1	#
2872	0.20	1.03	3.73	1987	1	#

```

2873 0.24 1.28 4.45 1988 1 #
2874 0.27 1.54 5.16 1989 1 #
2875 0.31 1.79 5.88 1990 1 #
2876 0.23 0.51 3.58 1991 1 #
2877 0.35 1.46 5.81 1992 1 #
2878 0.32 1.13 5.08 1993 1 #
2879 0.32 1.18 3.24 1994 1 #
2880 0.10 0.6 3.43 1995 1 #
2881 0.12 0.45 2.29 1996 1 #
2882 0.19 0.4 2.13 1997 1 #
2883 0.26 0.08 1.65 1998 1 #
2884 0.06 0.09 2.35 1999 1 #
2885 0.10 0.41 2.51 2000 1 #
2886 0.25 0.25 3.13 2001 1 #
2887 0.09 0.23 2.17 2002 1 #
2888 0.09 0.12 2.18 2003 1 #
2889 0.12 0.14 1.97 2004 1 #
2890 0.03 0.19 2.46 2005 1 #
2891 0.03 0.08 2.2 2006 1 #
2892 0.07 0.15 2.73 2007 1 #
2893 0.17 0.31 2.68 2008 1 #
2894 0.07 0.17 2.55 2009 1 #
2895 0.19 0.13 3.36 2010 1 #
2896 0.07 0.17 3.02 2011 1 #
2897 0.08 0.25 2.63 2012 1 #
2898 0.07 0.27 3.06 2013 1 #
2899 0.04 0.3 2.68 2014 1 #

2900 #
2901 34 #_N_cpue_and_surveyabundance_observations
2902 #_Units: 0=numbers; 1=biomass; 2=F
2903 #_Errtype: -1=normal; 0=lognormal; >0=T
2904 #_Fleet Units Errtype
2905 1 0 0 # 12_WA_SouthernWA_Rec_PCPR
2906 2 0 0 # 13_WA_NorthernWA_Rec_PC
2907 3 0 0 # 14_WA_NorthernWA_Rec_PR

2908
2909
2910 ### Washington Rec CPUE (lognormal) - only use one of the following
2911 ### Index with Stevens-MacCall filtering and all positives retained
2912 ### Assigned to fleet: "14_WA_NorthernWA_Rec_PC"
2913 #_year seas index obs err (CV)
2914 1981 1 3 0.694 0.154 # WA Rec CPUE

```

```

2915 1982 1 3 0.54 0.105 # WA Rec CPUE
2916 1983 1 3 0.643 0.098 # WA Rec CPUE
2917 1984 1 3 0.5 0.071 # WA Rec CPUE
2918 1985 1 3 0.736 0.059 # WA Rec CPUE
2919 1986 1 3 0.616 0.077 # WA Rec CPUE
2920 1987 1 3 0.486 0.06 # WA Rec CPUE
2921 1988 1 3 0.587 0.064 # WA Rec CPUE
2922 1989 1 3 0.666 0.051 # WA Rec CPUE
2923 1990 1 3 0.801 0.056 # WA Rec CPUE
2924 1991 1 3 0.665 0.066 # WA Rec CPUE
2925 1992 1 3 0.704 0.109 # WA Rec CPUE
2926 1993 1 3 0.63 0.057 # WA Rec CPUE
2927 1994 1 3 0.648 0.054 # WA Rec CPUE
2928 1995 1 3 0.59 0.051 # WA Rec CPUE
2929 1996 1 3 0.389 0.06 # WA Rec CPUE
2930 1997 1 3 0.368 0.067 # WA Rec CPUE
2931 1998 1 3 0.402 0.075 # WA Rec CPUE
2932 1999 1 3 0.403 0.081 # WA Rec CPUE
2933 2000 1 3 0.52 0.071 # WA Rec CPUE
2934 2001 1 3 0.594 0.068 # WA Rec CPUE
2935 2002 1 3 0.521 0.077 # WA Rec CPUE
2936 2003 1 3 0.472 0.087 # WA Rec CPUE
2937 2004 1 3 0.435 0.093 # WA Rec CPUE
2938 2005 1 3 0.427 0.065 # WA Rec CPUE
2939 2006 1 3 0.48 0.081 # WA Rec CPUE
2940 2007 1 3 0.655 0.113 # WA Rec CPUE
2941 2008 1 3 0.655 0.07 # WA Rec CPUE
2942 2009 1 3 0.635 0.081 # WA Rec CPUE
2943 2010 1 3 0.711 0.111 # WA Rec CPUE
2944 2011 1 3 0.726 0.075 # WA Rec CPUE
2945 2012 1 3 0.631 0.104 # WA Rec CPUE
2946 2013 1 3 0.713 0.078 # WA Rec CPUE
2947 2014 1 3 0.603 0.103 # WA Rec CPUE
2948
2949 0 #_N_fleets_with_discard
2950 #_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
2951 #_discard_errtype: >0 for DF of T-dist(read CV below); 0 for normal with C
2952 # V; -1 for normal with se; -2 for lognormal
2953 #Fleet Disc_units err_type
2954 0 #N discard obs
2955 #_year seas index obs err
2956 #

```

```

2957 0 #_N_meanbodywt_obs
2958 30 #_DF_for_meanbodywt_T-distribution_like
2959
2960 2 # length bin method: 1=use databins; 2=generate from binwidth,min,max be
2961 # low; 3=read vector
2962 2 # binwidth for population size comp
2963 8 # minimum size in the population (lower edge of first bin and size at ag
2964 # e 0.00)
2965 50 # maximum size in the population (lower edge of last bin)
2966
2967 -0.0001 #_comp_tail_compression
2968 1e-003 #_add_to_comp
2969 0 #_combine males into females at or below this bin number
2970 15 #_N_LengthBins
2971 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
2972
2973 38 #_N_Length_obs
2974
2975 ##### WA Rec, South, All modes combined (represent 4% of WA removals, 1969-20
2976 # 14)
2977 ##### initially assigning to fleet: "12_WA_SouthernWA_Rec_PCP"
2978 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c
2979 # m 26cm 28cm 30cm 32cm 34cm 36cm 38cm 40cm 42cm
2980 # 44cm 46cm+ repeat
2981 1981 1 1 0 2 8 0 0 0 0 0
2982 2 0 1 2 0 2 1 0 0 0
2983 0 0 0 0 0 0 2 1 2 0
2984 2 1 0 0 0 0 0 0 0 0
2985 2002 1 1 0 2 31 0 0 0 0
2986 2 5 0 8 7 8 1 0 0 0
2987 0 0 0 0 0 0 2 5 0 8
2988 7 8 1 0 0 0 0 0 0 0
2989 2003 1 1 0 2 32 0 0 0 0
2990 3 5 4 4 6 8 1 0 0 1
2991 0 0 0 0 0 0 3 5 4 4
2992 6 8 1 0 0 1 0 0 0 0
2993 2004 1 1 0 2 25 0 1 0 0
2994 3 5 7 2 4 2 0 0 0 0
2995 0 0 0 1 1 0 3 5 7 2
2996 4 2 0 0 0 0 0 0 0 0
2997 2005 1 1 0 2 5 0 0 0 0
2998 1 1 1 2 0 0 0 0 0 0

```

2999	0	0	0	0	0	0	0	0	1	1	1	1	2
3000	0	0	0	0	0	0	0	0	0	0	0	0	
3001	2006	1	1	0	2	11	0	0	1	1	1	1	1
3002	0	0	0	1	3	3	1	0	0	0	0	0	
3003	0	0	0	1	1	1	0	0	0	0	1	1	3
3004	3	1	0	0	0	0	0	0	0	0	0	0	
3005	2007	1	1	0	2	35	0	0	0	0	0	0	
3006	0	2	2	9	11	3	3	3	1	2	2	2	
3007	2	0	0	0	0	0	0	0	2	2	2	9	
3008	11	3	3	1	2	8	0	0	0	0	0	0	
3009	2008	1	1	0	2	23	0	0	0	0	0	0	
3010	0	0	2	1	2	2	2	1	0	0	0	0	
3011	0	0	0	0	0	0	0	0	0	2	0	1	
3012	2	2	1	0	0	0	0	0	0	0	0	0	
3013	2009	1	1	0	2	23	0	0	0	0	0	1	
3014	1	2	1	3	3	1	2	3	2	2	3	3	
3015	2	0	0	0	0	1	1	2	2	1	1	3	
3016	3	2	3	2	3	2	3	2	0	0	0	3	
3017	2010	1	1	0	2	20	0	0	0	0	0	0	
3018	0	2	3	3	7	4	0	0	0	0	0	0	
3019	1	0	0	0	0	0	0	0	2	3	3	3	
3020	7	4	0	0	0	0	1	0	0	0	0	0	
3021	2011	1	1	0	2	19	0	0	0	0	0	0	
3022	2	6	6	2	1	2	0	0	0	0	0	0	
3023	0	0	0	0	0	0	0	2	6	6	6	2	
3024	1	2	0	0	0	0	0	0	0	0	0	0	
3025	2012	1	1	0	2	14	0	0	0	1	0	0	
3026	0	1	2	2	5	1	1	1	0	0	0	0	
3027	0	1	0	0	1	0	0	0	1	1	2	2	
3028	5	1	1	0	0	0	0	0	1	0	0	0	
3029	2013	1	1	0	2	16	0	0	0	0	0	0	
3030	0	3	1	2	3	5	2	0	0	0	0	0	
3031	0	0	0	0	0	0	0	0	3	1	0	2	
3032	3	5	2	0	0	0	0	0	0	0	0	0	
3033	2014	1	1	0	2	18	0	0	0	0	0	0	
3034	0	0	2	1	3	10	2	0	0	0	0	0	
3035	0	0	0	0	0	0	0	0	0	2	0	1	
3036	3	10	2	0	0	0	0	0	0	0	0	0	
3037	### WA Rec, North, All modes combined (represent 96% of WA removals, 1969-2												
3038	# 014)												
3039	### initially assigning to fleet: "14_WA_NorthernWA_Rec_PR"												

```

3041 #### ("WA_Rec_PC" has more catch than "WA_Rec_PC" but likely both will share
3042 # selectivity)
3043 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c
3044 # m 26cm 28cm 30cm 32cm 34cm 36cm 38cm 40cm 42cm
3045 # 44cm 46cm+ repeat
3046 1979 1 3 0 2 40 0 0 0 0 0
3047 0 0 1 11 14 11 1 1 1 1 0
3048 0 0 0 0 0 0 0 0 1 11 1
3049 4 11 1 1 1 0 0 0 0 0
3050 1980 1 3 0 2 2 0 0 0 0 0
3051 0 0 0 1 1 0 0 0 0 0 0
3052 0 0 0 0 0 0 0 0 0 1 1
3053 0 0 0 0 0 0 0 0 0 0
3054 1981 1 3 0 2 16 0 0 0 0
3055 0 0 1 2 3 0 0 3 3 1 1
3056 0 3 0 0 0 0 0 0 0 1 2
3057 3 0 3 3 3 1 0 3 0 0
3058 1983 1 3 0 2 2 0 0 0 0 0
3059 0 0 0 0 0 2 0 0 0 0 0
3060 0 0 0 0 0 0 0 0 0 0 0
3061 2 0 0 0 0 0 0 0 0 0
3062 1995 1 3 0 2 36 0 0 0 0 0
3063 0 4 8 12 9 3 0 0 0 0
3064 0 0 0 0 0 0 0 4 8 1
3065 2 9 3 0 0 0 0 0 0 0
3066 1996 1 3 0 2 16 0 0 0 0
3067 1 3 3 5 3 0 0 0 1 0
3068 0 0 0 0 0 0 1 3 3 5
3069 3 0 0 1 0 0 0 0 0
3070 1997 1 3 0 2 9 0 0 0 0
3071 0 1 0 1 2 2 1 2 0 0
3072 0 0 0 0 0 0 0 1 0 1
3073 2 2 1 2 0 0 0 0 0
3074 1998 1 3 0 2 58 0 0 0 0
3075 0 5 6 19 17 11 0 0 0 0
3076 0 0 0 0 0 0 0 5 6 1
3077 9 17 11 0 0 0 0 0 0
3078 1999 1 3 0 2 180 0 0 0 1
3079 2 10 36 65 46 17 3 0 10 36
3080 0 0 0 0 0 1 2 0 0 6
3081 5 46 17 3 0 0 0 0 0
3082 2000 1 3 0 2 55 0 0 0 0

```

3083	2	5	10	13	20	3	2	0	0	0	0
3084	0	0	0	0	0	2	5	0	10	0	1
3085	3	20	3	2	0	0	0	0	0	0	1
3086	2001	1	3	0	2	38	0	0	0	0	1
3087	1	2	10	11	9	1	1	1	2	0	0
3088	0	0	0	0	0	1	1	2	10	0	1
3089	1	9	1	1	2	0	0	0	0	0	1
3090	2002	1	3	0	2	38	0	0	0	0	0
3091	0	3	4	19	5	4	2	0	1	4	1
3092	0	0	0	0	0	0	3	0	8	0	1
3093	9	5	4	2	0	1	0	0	0	8	8
3094	2003	1	3	0	2	28	0	0	0	0	0
3095	0	3	8	8	5	2	2	0	0	35	5
3096	0	0	0	0	0	0	0	3	8	0	8
3097	5	2	2	0	0	0	0	0	0	0	0
3098	2004	1	3	0	2	198	0	0	1	0	0
3099	3	9	35	53	56	25	14	2	0	35	0
3100	0	0	0	0	1	0	9	3	9	35	5
3101	3	56	25	14	2	0	0	0	0	0	1
3102	2005	1	3	0	2	358	0	0	2	0	1
3103	1	16	49	109	106	42	27	5	0	0	0
3104	0	0	0	0	2	1	1	16	49	0	1
3105	09	106	42	27	5	0	0	0	0	39	8
3106	2006	1	3	0	2	266	0	0	0	0	0
3107	0	10	39	87	84	29	12	3	0	39	8
3108	0	2	0	0	0	0	0	10	0	39	8
3109	7	84	29	12	3	0	0	2	0	0	0
3110	2007	1	3	0	2	185	0	0	0	0	0
3111	2	5	24	48	60	31	12	3	0	0	0
3112	0	0	0	0	0	0	5	24	0	4	4
3113	8	60	31	12	3	0	0	0	0	0	0
3114	2008	1	3	0	2	135	0	0	0	0	3
3115	3	8	19	40	45	14	2	1	0	0	0
3116	0	0	0	0	0	3	8	19	0	4	4
3117	0	45	14	2	1	0	0	0	0	0	0
3118	2009	1	3	0	2	95	0	1	0	0	0
3119	1	7	14	28	22	14	4	2	14	1	2
3120	1	0	0	1	0	1	7	2	14	0	2
3121	8	22	14	4	2	1	0	0	0	0	0
3122	2010	1	3	0	2	58	0	2	0	0	0
3123	0	1	1	6	12	9	6	6	6	0	1
3124	0	1	0	2	0	0	1	6	6	0	1

```

3125 2      15     9      6      6      0      0      0      1
3126 2011   1      3      0      2      163    0      0      0      0      1
3127 1      2      10     30     42     41     25     9      2      25     9      2
3128 0      0      0      0      0      1      1      1      1      2      10     3
3129 0      42     41     25     9      2      0      0      0      0
3130 2012   1      3      0      2      63     0      0      0      0
3131 1      0      0      3      15     13     12     10     8      1
3132 0      0      0      0      0      0      1      0      0      3      1
3133 5      13     12     10     8      1      0      0
3134 2013   1      3      0      2      156    0      0      0      0
3135 0      7      14     40     39     40     10     5      0
3136 1      0      0      0      0      0      0      7      14     4
3137 0      39     40     10     5      0      1      0
3138 2014   1      3      0      2      423    0      0      0
3139 2      6      15     81     128    126    51     12     2
3140 0      0      0      0      0      0      2      6      15     8
3141 1      128    126    51     12     2      0      0
3142
3143
3144 47 #_N_age_bins
3145 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
3146 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
3147 2 #_N_ageerror_definitions
3148 # Default ageing error matrix (1st row is expected age, 2nd is standard dev
3149 # iation of age readings)
3150 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
3151 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
3152 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
3153 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
3154 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
3155 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
3156 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
3157 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
3158 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
3159 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
3160 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5
3161 10.5 11.5 12.5 13.5 14.5 15.5 16.5 17.5 18.5
3162 19.5 20.5 21.5 22.5 23.5 24.5 25.5 26.5 27.5 2
3163 8.5 29.5 30.5 31.5 32.5 33.5 34.5 35.5 36.5 37.5
3164 38.5 39.5 40.5 41.5 42.5 43.5 44.5 45.5 46.5
3165 47.5 48.5 49.5 50.5 51.5 52.5 53.5 54.5 55.5 56
3166 .5 57.5 58.5 59.5 60.5 61.5 62.5 63.5 64.5 65.5

```

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3167      66.5     67.5     68.5     69.5     70.5     71.5     72.5     73.5     74.5
3168      75.5     76.5     77.5     78.5     79.5     80.5     ### 81.5          82.5     83.
3169      # 5       84.5     85.5     86.5     87.5     88.5     89.5     90.5     #Expected_ag
3170      0.0968   0.0968   0.1936   0.2904   0.3872   0.4840   0.5807   0.6775   0.7743   0.8
3171      711      0.9679   1.0647   1.1615   1.2583   1.3551   1.4519   1.5487   1.6455   1.7422
3172      1.8390   1.9358   2.0326   2.1294   2.2262   2.3230   2.4198   2.5166   2.6134   2
3173      .7102    2.8070   2.9037   3.0005   3.0973   3.1941   3.2909   3.3877   3.4845   3.58
3174      13       3.6781   3.7749   3.8717   3.9684   4.0652   4.1620   4.2588   4.3556   4.4524
3175      4.5492   4.6460   4.7428   4.8396   4.9364   5.0332   5.1299   5.2267   5.3235   5.
3176      4203    5.5171   5.6139   5.7107   5.8075   5.9043   6.0011   6.0979   6.1946   6.291
3177      4       6.3882   6.4850   6.5818   6.6786   6.7754   6.8722   6.9690   7.0658   7.1626
3178      7.2594   7.3561   7.4529   7.5497   7.6465   7.7433   ### 7.8401          7.9369   8.0
3179      # 337    8.1305   8.2273   8.3241   8.4209   8.5176   8.6144   8.7112   #SD
3180
3181
3182
3183
3184
3185
3186
3187
3188          #####
3189      # Ageing error for ages associated with early years from former NWFSC age reader
3190      # (1st row is expected age, 2nd is standard deviation of age readings
3191      # )
3192      #
3193      #
3194      #
3195      #
3196      #
3197      # #####
3198      # Age 0 Age 1   Age 2   Age 3   Age 4   Age 5   Age 6   Age 7   Age 8   Age
3199      # 9   Age 10  Age 11  Age 12  Age 13  Age 14  Age 15  Age 16  Age 17  Age
3200      # 18  Age 19  Age 20  Age 21  Age 22  Age 23  Age 24  Age 25  Age 26  Age 2
3201      # 7   Age 28  Age 29  Age 30  Age 31  Age 32  Age 33  Age 34  Age 35  Age 36
3202      #   Age 37  Age 38  Age 39  Age 40  Age 41  Age 42  Age 43  Age 44  Age 45
3203      #   Age 46  Age 47  Age 48  Age 49  Age 50  Age 51  Age 52  Age 53  Age 54
3204      #   Age 55  Age 56  Age 57  Age 58  Age 59  Age 60  Age 61  Age 62  Age 63  A
3205      #   ge 64  Age 65  Age 66  Age 67  Age 68  Age 69  Age 70  Age 71  Age 72  Ag
3206      #   e 73  Age 74  Age 75  Age 76  Age 77  Age 78  Age 79  Age 80  ### Age 81
3207      #   Age 82  Age 83  Age 84  Age 85  Age 86  Age 87  Age 88  Age 89  Age
3208      0.43    1.29    2.16    3.02    3.88    4.75    5.61    6.47    7.33    8.2

```

```

3209 0 9.06 9.92 10.79 11.65 12.51 13.37 14.24 15.10 15.96
3210 16.83 17.69 18.55 19.41 20.28 21.14 22.00 22.86 23.73 2
3211 4.59 25.45 26.32 27.18 28.04 28.90 29.77 30.63 31.49 32.3
3212 6 33.22 34.08 34.94 35.81 36.67 37.53 38.40 39.26 40.12
3213 40.98 41.85 42.71 43.57 44.44 45.30 46.16 47.02 47.89 48
3214 .75 49.61 50.47 51.34 52.20 53.06 53.93 54.79 55.65 56.51
3215 57.38 58.24 59.10 59.97 60.83 61.69 62.55 63.42 64.28
3216 65.14 66.01 66.87 67.73 68.59 69.46 ### 70.32 71.18 72.
3217 # 05 72.91 73.77 74.63 75.50 76.36 77.22 78.09 #Expected_ag
3218 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
3219 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
3220 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
3221 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
3222 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
3223 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
3224 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
3225 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
3226 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
3227 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD
3228
3229 123 #_N_Agecomp_obs
3230 3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
3231 0 #_combine males into females at or below this bin number
3232
3233 ### WA Rec, South, All modes combined
3234 ### initially assigning to fleet: "12_WA_SouthernWA_Rec_PCPR"
3235 #Yr Seas Flt/Svy Gender Part AgeError LbinLo LbinHi Nsa
3236 # mp 4yrs 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yr
3237 # s 13yrs 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs
3238 # 22yrs 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs
3239 # 31yrs 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs
3240 # 40yrs 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs
3241 # 49yrs 50+yrs repeat
3242 2014 1 -1 0 0 1 -1 -1 15 0
3243 0 0 0 1 1 0 0 0 0 0
3244 0 0 0 1 1 1 0 0 0 1
3245 1 0 0 0 1 1 1 2 0 0
3246 0 0 1 0 1 0 0 0 0 0
3247 0 0 1 1 0 0 0 0 0 0
3248 0 0 0 0 1 1 0 0 0 0
3249 0 0 0 1 1 1 0 2 0 0
3250 1 1 0 0 0 1 1 1 0 0

```

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3251      0      0      1      0      1      0      0      0      0      0      0
3252
3253  ### WA Rec, North, All modes combined
3254  ### initially assigning to fleet: "14_WA_NorthernWA_Rec_PR"
3255  ### NOTE: setting fleet number negative to exclude from likelihood
3256  ###          to avoid double counting with conditional age-at-length values
3257  ###
3258 #Yr      Seas     Flt/Svy Gender Part    AgeErr  LbinLo  LbinHi Nsamp  4yr
3259 # s      5yrs    6yrs    7yrs   8yrs   9yrs   10yrs  11yrs  12yrs  13yr
3260 # s     14yrs   15yrs   16yrs  17yrs  18yrs  19yrs  20yrs  21yrs  22yrs
3261 #       23yrs   24yrs   25yrs  26yrs  27yrs  28yrs  29yrs  30yrs  31yrs
3262 #       32yrs   33yrs   34yrs  35yrs  36yrs  37yrs  38yrs  39yrs  40yrs
3263 #       41yrs   42yrs   43yrs  44yrs  45yrs  46yrs  47yrs  48yrs  49yrs
3264 # 50+ yrs repeat
3265 1998    1        -3      0      2      1      -1      -1      50      0
3266      0      0      0      0      0      2      1      1      1      2
3267      1      1      3      5      4      5      4      3      2      2
3268      1      0      0      1      2      0      0      0      0      1
3269      0      0      0      0      2      0      3      0      0      0
3270      1      0      0      0      0      0      0      0      2      0
3271      0      0      0      0      0      2      1      1      1      2
3272      1      1      3      5      4      5      4      3      2      1
3273      2      1      0      1      2      0      0      0      0      1
3274      0      0      0      0      2      0      3      0      0      0
3275 1999    1        -3      0      2      1      -1      -1      55      0
3276      0      0      0      1      1      3      4      5      0      4
3277      3      3      3      2      3      4      4      1      3      0
3278      1      1      1      0      2      0      0      0      1      0
3279      1      0      0      0      0      1      0      0      0      0
3280      0      1      1      0      0      0      0      1      2      0
3281      0      0      0      0      1      3      4      5      0      4
3282      3      3      3      2      3      4      4      1      3      0
3283      0      1      1      0      2      0      0      0      1      0
3284      1      0      0      0      0      1      0      0      0      0
3285 2000    1        -3      0      2      1      -1      -1      55      0
3286      0      0      0      0      0      0      2      3      4      4
3287      0      2      1      1      1      2      2      2      4      1
3288      1      2      2      0      0      0      0      2      1      0
3289      0      0      1      1      1      1      1      1      2      1
3290      0      2      1      1      0      0      0      0      0      0
3291      0      0      2      0      1      0      1      2      3      4
3292      0      2      1      1      0      0      2      2      4      4

```

3293	1	1	2	0	0	0	0	0	2	1	0
3294	0	1	1	-3	1	0	1	1	1	2	1
3295	2001	1	-3	0	2	1	1	-1	-1	26	0
3296	1	0	1	0	0	0	0	4	3	0	0
3297	1	2	3	2	1	0	0	0	0	0	0
3298	0	0	0	0	0	1	0	0	0	1	0
3299	0	0	1	1	0	0	0	0	0	0	0
3300	0	0	0	0	0	0	0	0	1	3	0
3301	1	0	1	0	0	0	0	0	4	3	0
3302	1	2	3	2	1	0	0	0	0	0	0
3303	0	0	0	0	0	1	0	0	0	1	0
3304	0	0	1	1	0	0	0	0	0	0	0
3305	2002	1	-3	0	2	1	-1	-1	-1	11	0
3306	0	0	0	0	0	0	0	4	1	1	1
3307	2	0	1	0	1	0	0	0	1	0	0
3308	0	0	0	0	0	0	0	0	0	0	0
3309	0	0	0	0	0	0	0	0	0	0	0
3310	0	0	0	0	0	0	0	0	0	0	0
3311	0	0	0	0	0	0	0	4	1	1	1
3312	2	0	1	0	1	0	0	0	1	0	0
3313	0	0	0	0	0	0	0	0	0	0	0
3314	0	0	0	0	0	0	0	0	0	0	0
3315	#2003	1	-3	0	2	1	-1	-1	0	0	0
3316	#	0	0	0	0	0	0	0	0	0	0
3317	#	0	0	0	0	0	0	0	0	0	0
3318	#	0	0	0	0	0	0	0	0	0	0
3319	#	0	0	0	0	0	0	0	0	0	0
3320	#	0	0	0	0	0	0	0	0	0	0
3321	#	0	0	0	0	0	0	0	0	0	0
3322	#	0	0	0	0	0	0	0	0	0	0
3323	#	0	0	0	0	0	0	0	0	0	0
3324	#	0	0	0	0	0	0	0	0	0	0
3325	2004	1	-3	0	2	1	-1	-1	-1	171	0
3326	0	0	1	5	9	10	5	5	4	10	0
3327	7	12	10	10	4	6	5	9	8	9	9
3328	6	10	9	3	3	3	5	4	1	1	1
3329	0	0	0	2	0	0	0	0	0	1	1
3330	2	0	0	0	0	0	0	1	1	1	0
3331	0	0	1	5	9	10	5	5	4	10	0
3332	7	12	10	10	4	6	5	9	8	9	9
3333	9	6	10	9	3	3	5	4	1	1	1
3334	0	0	0	2	0	0	0	0	1	1	0

3335	2005	1	-3	0	2	1	-1	-1	206	0
3336	0	1	3	7	14	9	10	14	9	1
3337	11	18	9	12	11	6	5	6	4	1
3338	0	4	5	3	7	5	3	1	1	2
3339	0	0	2	0	2	2	0	1	1	1
3340	0	1	0	0	0	1	0	1	5	0
3341	0	1	3	7	14	9	10	14	9	0
3342	11	18	9	12	11	6	5	6	4	
3343	10	4	5	3	7	5	3	1	1	2
3344	0	0	2	0	2	2	0	1	1	1
3345	2006	1	-3	0	2	1	-1	-1	88	0
3346	0	0	0	3	0	3	9	4	7	
3347	3	8	5	8	2	4	5	2	5	5
3348	1	0	3	0	3	2	0	0	0	
3349	0	1	0	0	0	0	0	2	0	
3350	0	1	0	0	1	0	0	1	1	0
3351	0	0	0	0	3	0	3	9	4	7
3352	3	8	5	8	2	4	5	2	5	
3353	5	1	0	3	0	3	2	0	0	0
3354	0	1	0	0	0	0	0	2	0	
3355	2007	1	-3	0	2	1	-1	-1	119	0
3356	0	0	1	2	1	2	5	1	6	
3357	6	3	3	8	6	5	4	4	7	3
3358	10	3	5	2	3	1	4	5	4	
3359	0	0	0	0	2	0	0	1	0	
3360	2	0	0	2	0	0	1	0	7	0
3361	0	0	1	2	1	2	5	1	6	
3362	6	3	3	8	6	5	4	4	7	
3363	3	10	3	5	2	3	1	4	5	4
3364	0	0	0	0	2	0	0	1	0	
3365	2008	1	-3	0	2	1	-1	-1	73	0
3366	1	0	0	1	2	2	3	6	5	
3367	4	3	3	3	5	3	9	1	2	0
3368	4	3	2	2	1	1	2	1	1	0
3369	0	1	0	0	0	0	0	1	1	
3370	0	0	0	0	0	0	0	1	1	0
3371	1	0	0	1	2	2	3	6	5	
3372	4	3	3	3	5	3	9	1	2	
3373	0	4	3	2	2	1	2	1	1	0
3374	0	1	0	0	0	0	0	1	1	
3375	2009	1	-3	0	2	1	-1	-1	22	0
3376	0	0	0	0	2	2	0	2	0	

3377	3	0	1	0	0	0	0	0	0	0	0	0	1	1
3378	0	0	1	0	1	0	0	0	2	0	0	1	0	3
3379	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3380	1	0	0	0	0	0	0	0	0	0	0	0	1	0
3381	0	0	0	0	0	0	0	2	0	2	0	0	2	0
3382	3	0	1	0	0	0	0	0	2	0	0	0	1	0
3383	1	0	0	1	1	0	0	2	0	0	1	0	0	3
3384	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3385	2010	1	-3	0	2	1	-1	-1	-1	22	0	0	0	0
3386	0	0	0	0	0	1	1	1	1	0	0	0	0	0
3387	2	3	1	0	0	1	1	1	0	0	0	1	1	0
3388	2	0	1	0	0	1	0	0	0	1	0	0	0	3
3389	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3390	1	0	0	0	0	0	0	0	0	0	0	1	0	0
3391	0	0	0	0	0	0	1	1	1	1	0	0	0	0
3392	2	3	1	0	0	1	1	1	0	0	0	0	1	0
3393	0	2	1	0	0	1	0	0	0	0	1	0	0	3
3394	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3395	2011	1	-3	0	2	1	-1	-1	-1	50	0	0	0	0
3396	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3397	1	2	2	2	3	2	2	2	2	3	2	2	1	1
3398	4	0	5	4	1	2	0	1	1	2	2	2	2	2
3399	2	0	0	2	0	0	0	0	1	1	0	0	0	0
3400	0	0	0	0	0	0	0	0	0	0	0	2	0	0
3401	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3402	1	2	2	2	3	2	2	2	2	3	2	2	2	2
3403	1	4	5	4	1	2	0	0	1	1	2	2	2	2
3404	2	0	2	0	0	0	0	1	1	1	0	0	0	0
3405	2012	1	-3	0	2	1	-1	-1	-1	24	0	0	0	0
3406	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3407	0	0	0	0	3	1	1	1	1	0	0	3	2	2
3408	1	0	1	1	1	2	2	2	0	0	1	1	2	2
3409	1	0	0	1	0	0	0	0	0	0	0	0	0	0
3410	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3411	0	0	0	0	0	0	0	0	0	1	0	0	0	0
3412	0	0	0	0	0	3	1	1	1	0	0	3	0	0
3413	2	1	1	1	1	1	2	2	2	0	1	1	2	2
3414	1	0	1	0	0	0	0	0	0	0	0	0	0	0
3415	2013	1	-3	0	2	1	-1	-1	-1	11	0	0	0	0
3416	0	0	0	1	0	0	0	1	0	0	0	0	0	0
3417	0	0	0	0	1	0	0	0	0	1	3	2	0	1
3418	0	0	0	0	0	0	0	0	0	1	0	0	0	0

```

3419      0      0      1      0      0      0      0      0      0      0      0      0      0      0      0      0      0
3420      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
3421      0      0      0      1      0      0      0      0      1      0      0      0      0      0      0      0      0
3422      0      0      0      0      1      0      0      0      0      0      0      0      3      2      0      0
3423      1      0      0      0      0      0      0      0      0      0      1      0      0      0      0      0      0
3424      0      1      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
3425 2014      1     -3      0      2      1      -1      -1      -1      398      0
3426      0      0      1      1      3      15      4      10      11      11      11      11
3427     13      3      7     13     15     17     18     15     19      2
3428     4     28     21     10     11     12     13     15     12     12
3429     10      7     13      9      7      3      0      3      2      1
3430      0      1      3      0      1      1      1      0      1      17      0
3431      0      0      1      1      3      15     17     18     15     11
3432     13      3      7     13     15     17     18     15     19
3433     24     28     21     10     11     12     13     15     12     12
3434     10      7     13      9      7      3      0      3      2      1
3435
3436
3437 ##### conditional age-at-length observations
3438
3439 ### WA Rec, North, All modes combined (represent 96% of landings)
3440 ### initially assigning to fleet: "14_WA_NorthernWA_Rec_PR"
3441 #Yr Seas Flt/Svy Gender Part AgeErr LbinLo LbinHi Nsamp 4yr
3442 # s 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yrs 13yr
3443 # s 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs 22yrs
3444 # 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs 31yrs
3445 # 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs 40yrs
3446 # 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs 49yrs
3447 # 50yrs repeat
3448 1998     1     3     0     2     1     28     28      5      0
3449     0     0     0     0     0     2     0     1     1     1
3450     0     0     0     0     0     0     0     0     0     0
3451     0     0     0     0     0     0     0     0     0     0
3452     0     0     0     0     0     0     0     0     0     0
3453     0     0     0     0     0     0     0     0     0     0
3454     0     0     0     0     0     2     0     1     1     1
3455     0     0     0     0     0     0     0     0     0     0
3456     0     0     0     0     0     0     0     0     0     0
3457     0     0     0     0     0     0     0     0     0     0
3458 1998     1     3     0     2     1     30     30      6      0
3459     0     0     0     1     0     0     0     0     0     1
3460     0     0     1     1     0     0     1     0     1     1     0

```

3461	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3463	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3464	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3465	0	0	0	1	1	0	0	1	0	0	1	0	1	1	0
3466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3467	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3468	1998	1	3	0	0	2	1	32	32	32	19	0	0	0	0
3469	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3470	1	1	2	3	3	0	2	2	0	0	0	0	0	0	0
3471	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
3472	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3473	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
3474	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3475	1	1	2	3	3	0	2	2	0	0	0	0	0	0	0
3476	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1
3477	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3478	1998	1	3	0	0	2	1	34	34	34	13	0	0	0	0
3479	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3480	0	0	0	1	1	1	2	0	0	2	0	0	0	0	2
3481	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
3482	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
3483	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3484	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3485	0	0	0	0	1	1	1	2	0	0	2	0	0	0	0
3486	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0
3487	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
3488	1998	1	3	0	0	2	1	36	36	36	7	0	0	0	0
3489	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3490	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
3491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3492	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0
3493	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3494	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3495	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
3496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3497	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0
3498	1999	1	3	0	0	2	1	26	26	26	2	0	0	0	0
3499	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
3500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3503	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3504	0	0	0	0	0	0	0	1	0	1	0	0	0	0
3505	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3506	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3507	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3508	1999	1	3	0	0	2	1	28	28	28	2	0	0	0
3509	0	0	0	0	0	0	0	1	1	0	0	0	0	0
3510	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3511	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3512	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3513	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3514	0	0	0	0	0	0	0	1	1	1	0	0	0	0
3515	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3516	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3517	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3518	1999	1	3	0	0	2	1	30	30	30	10	0	0	0
3519	0	0	0	0	1	2	1	1	2	0	0	1	0	0
3520	0	0	0	0	0	1	1	1	0	0	0	0	0	0
3521	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3522	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3523	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3524	0	0	0	0	0	1	2	1	1	2	0	0	1	0
3525	0	0	0	0	0	0	1	1	0	0	0	0	0	0
3526	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3527	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3528	1999	1	3	0	0	2	1	32	32	32	25	0	0	0
3529	0	0	0	0	0	0	0	1	1	2	0	3	0	0
3530	3	3	1	2	1	0	0	1	1	2	1	3	0	0
3531	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3532	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3533	0	1	0	0	0	0	0	0	0	1	0	0	0	0
3534	0	0	0	0	0	0	0	0	1	2	0	3	0	0
3535	3	3	1	2	1	0	0	1	1	2	1	3	0	0
3536	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3537	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3538	1999	1	3	0	0	2	1	34	34	34	11	0	0	0
3539	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540	0	0	2	0	0	1	1	1	2	0	0	0	0	0
3541	0	0	1	0	0	1	0	0	0	0	1	0	0	0
3542	0	0	0	0	0	0	1	0	0	0	0	0	1	0
3543	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3544	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3545	0	0	0	2	0	1	1	1	2	0	0	0	0
3546	0	0	0	1	0	1	0	0	0	0	1	0	0
3547	0	0	0	0	0	1	1	0	0	0	0	0	0
3548	1999	1	3	0	0	2	1	1	36	36	4	0	0
3549	0	0	0	0	0	0	0	0	0	0	0	0	0
3550	0	0	0	0	0	0	1	0	0	0	0	0	0
3551	1	0	0	0	0	0	0	0	0	0	0	0	0
3552	1	0	0	0	0	0	0	0	0	0	0	0	0
3553	0	0	0	0	0	0	0	0	0	0	1	0	0
3554	0	0	0	0	0	0	0	0	0	0	0	0	0
3555	0	0	0	0	0	0	1	0	0	0	0	0	0
3556	0	1	0	0	0	0	0	0	0	0	0	0	0
3557	1	0	0	0	0	0	0	0	0	0	0	0	0
3558	1999	1	3	0	0	2	1	1	38	38	1	0	0
3559	0	0	0	0	0	0	0	0	0	0	0	0	0
3560	0	0	0	0	0	0	0	0	0	0	0	0	0
3561	0	0	0	0	0	0	0	0	0	0	0	0	0
3562	0	0	0	0	1	0	0	0	0	0	0	0	0
3563	0	0	0	1	0	0	0	0	0	0	0	0	0
3564	0	0	0	0	0	0	0	0	0	0	0	0	0
3565	0	0	0	0	0	0	0	0	0	0	0	0	0
3566	0	0	0	0	0	0	0	0	0	0	0	0	0
3567	0	0	0	0	0	0	0	0	0	0	0	0	0
3568	2000	1	3	0	0	2	1	1	26	26	2	0	0
3569	0	0	0	0	0	0	0	1	0	0	1	0	0
3570	0	0	0	0	0	0	0	0	0	0	0	0	0
3571	0	0	0	0	0	0	0	0	0	0	0	0	0
3572	0	0	0	0	0	0	0	0	0	0	0	0	0
3573	0	0	0	0	0	0	0	0	0	0	0	0	0
3574	0	0	0	0	0	0	0	1	0	0	1	0	0
3575	0	0	0	0	0	0	0	0	0	0	0	0	0
3576	0	0	0	0	0	0	0	0	0	0	0	0	0
3577	0	0	0	0	0	0	0	0	0	0	0	0	0
3578	2000	1	3	0	0	2	1	1	28	28	5	0	0
3579	0	0	0	0	0	0	0	0	0	2	0	0	1
3580	0	1	0	0	0	0	0	0	0	0	0	0	0
3581	1	0	0	0	0	0	0	0	0	0	0	0	0
3582	0	0	0	0	0	0	0	0	0	0	0	0	0
3583	0	0	0	0	0	0	0	0	0	0	0	0	0
3584	0	0	1	0	0	0	0	0	0	2	0	0	1
3585	0	1	0	0	0	0	0	0	0	0	0	0	0
3586	0	1	0	0	0	0	0	0	0	0	0	0	0

3587	0	0	0	0	0	0	0	0	0	0	0	0	0
3588	2000	1	3	0	0	2	1	30	30	10	0	0	0
3589	0	0	0	0	0	0	1	1	1	1	2	0	0
3590	0	0	0	0	0	0	1	1	0	0	1	0	0
3591	0	0	0	0	0	0	0	0	0	0	0	0	0
3592	0	0	0	0	0	0	1	1	0	0	0	0	0
3593	0	0	0	0	0	0	0	0	0	0	0	0	0
3594	0	0	0	0	0	0	1	1	1	1	2	0	0
3595	0	0	0	0	0	0	1	1	0	0	1	0	0
3596	0	0	0	0	0	0	0	0	0	0	0	0	0
3597	0	0	0	0	0	0	1	1	0	0	0	0	0
3598	2000	1	3	0	0	2	1	32	32	13	0	0	0
3599	0	0	0	0	0	0	0	0	0	2	1	1	0
3600	0	0	0	1	1	0	0	2	2	1	1	0	0
3601	0	0	0	0	0	0	0	0	1	0	0	0	0
3602	0	0	0	0	0	0	0	0	0	1	0	0	0
3603	0	0	0	0	0	0	0	0	0	0	1	1	0
3604	0	0	0	0	0	0	0	0	0	2	2	1	1
3605	0	0	0	0	1	1	0	0	2	2	1	0	0
3606	0	0	0	0	0	0	0	0	0	1	0	0	0
3607	0	0	0	0	0	0	0	0	0	1	1	0	0
3608	2000	1	3	0	0	2	1	34	34	20	0	0	0
3609	0	0	0	0	0	0	0	0	0	0	0	0	0
3610	0	1	1	0	0	1	1	1	0	1	2	0	0
3611	0	0	2	0	0	0	0	0	1	1	1	0	0
3612	0	0	1	1	0	1	0	0	0	1	1	1	0
3613	0	2	0	0	0	0	0	0	0	0	2	0	0
3614	0	0	1	0	0	0	0	0	0	0	0	0	0
3615	0	0	1	1	0	1	1	1	0	1	2	0	0
3616	0	0	2	0	0	0	0	0	1	1	1	0	0
3617	0	0	1	1	0	1	0	0	0	1	1	1	0
3618	2000	1	3	0	0	2	1	36	36	3	0	0	0
3619	0	0	0	0	0	0	0	0	0	0	0	0	0
3620	0	0	0	0	0	0	0	0	0	0	0	0	1
3621	0	0	0	0	0	0	0	0	0	0	0	0	0
3622	0	0	0	0	0	0	0	0	0	0	0	0	0
3623	0	0	0	1	0	0	0	0	0	0	1	0	0
3624	0	0	0	0	0	0	0	0	0	0	0	0	0
3625	0	0	0	0	0	0	0	0	0	0	0	0	0
3626	1	0	0	0	0	0	0	0	0	0	0	0	0
3627	0	0	0	0	0	0	0	0	0	0	0	0	0
3628	2000	1	3	0	0	2	1	38	38	2	0	0	0

3629	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3630	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3631	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3632	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3633	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3635	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3636	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3637	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3638	2001	1	3	0	0	2	1	24	24	1	0	0	0	0
3639	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3640	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3641	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3642	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3643	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3644	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3645	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3646	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3647	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3648	2001	1	3	0	0	2	1	26	26	1	0	0	0	0
3649	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3650	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3651	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3652	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3654	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3655	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3656	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3657	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3658	2001	1	3	0	0	2	1	28	28	2	0	0	0	0
3659	0	0	0	0	0	0	0	0	0	0	2	0	0	0
3660	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3661	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3662	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3663	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3664	0	0	0	0	0	0	0	0	0	0	0	2	0	0
3665	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3666	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3667	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3668	2001	1	3	0	0	2	1	30	30	7	0	0	0	0
3669	0	0	1	0	0	0	0	0	4	0	1	0	0	0
3670	0	1	1	1	0	0	0	0	0	0	0	0	0	0

3671	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3672	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3673	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3674	0	0	0	0	0	0	0	0	0	4	0	1	0	0
3675	0	1	1	0	0	0	0	0	0	0	0	0	0	0
3676	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3677	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3678	2001	1	3	0	0	2	1	32	32	6	0	0	0	0
3679	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3680	1	0	1	2	1	0	0	0	0	0	0	0	0	0
3681	0	0	0	0	0	0	0	0	0	0	1	0	0	0
3682	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3683	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3684	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3685	1	0	1	2	1	0	0	0	0	0	0	0	0	0
3686	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3687	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3688	2001	1	3	0	0	2	1	34	34	6	0	0	0	0
3689	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3690	0	1	1	0	0	0	0	0	0	0	0	0	0	0
3691	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3692	0	0	0	1	1	0	0	0	0	0	0	0	0	0
3693	0	0	0	0	0	0	0	0	0	0	1	1	0	0
3694	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3695	0	1	1	0	0	0	0	0	0	0	0	0	0	0
3696	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3697	0	0	1	1	1	0	0	0	0	0	0	0	0	0
3698	2001	1	3	0	0	2	1	36	36	1	0	0	0	0
3699	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3700	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3701	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3702	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3703	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3704	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3705	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3706	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3707	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3708	2001	1	3	0	0	2	1	38	38	1	0	0	0	0
3709	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3710	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3711	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3712	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3713	0	0	0	0	0	0	0	0	0	0	0	1	0
3714	0	0	0	0	0	0	0	0	0	0	0	0	0
3715	0	0	0	0	0	0	0	0	0	0	0	0	0
3716	0	0	0	0	0	0	0	0	0	0	0	0	0
3717	0	0	0	0	0	0	0	0	0	0	0	0	0
3718	2001	1	3	0	0	2	1	40	40	1	0	0	0
3719	0	0	0	0	0	0	0	0	0	0	0	0	0
3720	0	0	0	0	0	0	0	0	0	0	0	0	0
3721	0	0	0	0	0	0	0	0	0	0	0	0	0
3722	0	0	0	0	0	0	0	0	0	0	0	1	0
3723	0	0	0	0	0	0	0	0	0	0	0	1	0
3724	0	0	0	0	0	0	0	0	0	0	0	0	0
3725	0	0	0	0	0	0	0	0	0	0	0	0	0
3726	0	0	0	0	0	0	0	0	0	0	0	0	0
3727	0	0	0	0	0	0	0	0	0	0	0	0	0
3728	2002	1	3	0	0	2	1	28	28	1	0	0	0
3729	0	0	0	0	0	0	0	0	0	0	0	0	0
3730	1	0	0	0	0	0	0	0	0	0	0	0	0
3731	0	0	0	0	0	0	0	0	0	0	0	0	0
3732	0	0	0	0	0	0	0	0	0	0	0	0	0
3733	0	0	0	0	0	0	0	0	0	0	0	0	0
3734	0	0	0	0	0	0	0	0	0	0	0	0	0
3735	1	0	0	0	0	0	0	0	0	0	0	0	0
3736	0	0	0	0	0	0	0	0	0	0	0	0	0
3737	0	0	0	0	0	0	0	0	0	0	0	0	0
3738	2002	1	3	0	0	2	1	30	30	2	0	0	0
3739	0	0	0	0	0	0	0	0	2	0	0	0	0
3740	0	0	0	0	0	0	0	0	0	0	0	0	0
3741	0	0	0	0	0	0	0	0	0	0	0	0	0
3742	0	0	0	0	0	0	0	0	0	0	0	0	0
3743	0	0	0	0	0	0	0	0	0	0	0	0	0
3744	0	0	0	0	0	0	0	0	2	0	0	0	0
3745	0	0	0	0	0	0	0	0	0	0	0	0	0
3746	0	0	0	0	0	0	0	0	0	0	0	0	0
3747	0	0	0	0	0	0	0	0	0	0	0	0	0
3748	2002	1	3	0	0	2	1	32	32	8	0	0	0
3749	0	0	0	1	0	0	0	0	2	1	1	0	1
3750	1	0	0	1	0	1	0	0	0	1	0	0	0
3751	0	0	0	0	0	0	0	0	0	0	0	0	0
3752	0	0	0	0	0	0	0	0	0	0	0	0	0
3753	0	0	0	0	0	0	0	0	2	0	1	0	1
3754	0	0	0	0	0	0	0	0	2	1	0	0	0

3755	1	0	0	1	0	0	1	0	0	0	1	0	0
3756	0	0	0	0	0	0	0	0	0	0	0	0	0
3757	0	0	0	0	0	0	0	0	0	0	0	0	0
3758	2004	1	3	0	0	2	1	22	22	22	1	0	0
3759	0	0	0	1	0	0	0	0	0	0	0	0	0
3760	0	0	0	0	0	0	0	0	0	0	0	0	0
3761	0	0	0	0	0	0	0	0	0	0	0	0	0
3762	0	0	0	0	0	0	0	0	0	0	0	0	0
3763	0	0	0	0	0	0	0	0	0	0	0	0	0
3764	0	0	0	1	0	0	0	0	0	0	0	0	0
3765	0	0	0	0	0	0	0	0	0	0	0	0	0
3766	0	0	0	0	0	0	0	0	0	0	0	0	0
3767	0	0	0	0	0	0	0	0	0	0	0	0	0
3768	2004	1	3	0	0	2	1	26	26	26	3	0	0
3769	0	0	0	0	1	1	1	0	0	0	0	0	0
3770	0	0	0	0	0	0	0	0	0	0	0	0	0
3771	0	0	0	0	0	0	0	0	0	0	0	0	0
3772	0	0	0	0	0	0	0	0	0	0	0	0	0
3773	0	0	0	0	0	0	0	0	0	0	0	0	0
3774	0	0	0	0	1	1	1	0	0	0	0	0	0
3775	0	0	0	0	0	0	0	0	0	0	0	0	0
3776	0	0	0	0	0	0	0	0	0	0	0	0	0
3777	0	0	0	0	0	0	0	0	0	0	0	0	0
3778	2004	1	3	0	0	2	1	28	28	28	5	0	0
3779	0	0	0	0	1	1	0	0	0	0	1	0	0
3780	0	0	0	0	0	0	0	0	1	1	0	0	0
3781	0	0	0	0	0	0	0	0	0	0	0	0	0
3782	0	0	0	0	0	0	0	0	0	0	0	0	0
3783	0	0	0	0	0	0	0	0	0	0	0	0	0
3784	0	0	0	0	1	1	0	0	0	0	0	1	0
3785	0	0	0	0	0	0	0	0	1	1	0	0	0
3786	0	0	0	0	0	0	0	0	0	0	0	0	0
3787	0	0	0	0	0	0	0	0	0	0	0	0	0
3788	2004	1	3	0	0	2	1	30	30	30	32	0	0
3789	0	0	0	0	2	1	3	1	1	2	0	0	0
3790	1	2	4	1	1	1	1	1	1	3	3	2	2
3791	0	1	1	1	0	1	0	1	0	0	0	0	0
3792	0	0	0	0	0	0	0	0	0	0	0	0	0
3793	0	0	0	0	0	0	0	0	0	0	0	0	0
3794	0	0	0	0	2	1	1	3	1	1	2	0	0
3795	1	2	4	1	1	1	1	1	1	3	3	0	0
3796	2	0	1	1	1	1	0	1	1	0	3	0	0

3797	0	0	0	0	0	0	0	0	0	0	0	0	0
3798	2004	1	3	0	0	2	1	32	32	48	0	6	0
3799	0	0	0	1	6	4	3	1	3	1	6		
3800	3	4	2	4	0	2	0	0	3	3	1	1	
3801	1	1	1	1	1	0	0	0	0	0	0	1	
3802	0	0	0	0	0	0	0	0	0	0	0	0	
3803	0	0	0	0	0	0	0	0	0	0	0	0	0
3804	0	0	0	0	1	6	4	3	1	6			
3805	3	4	2	4	0	2	0	0	3	3	1	3	
3806	1	1	1	1	1	0	0	0	0	0	0	0	1
3807	0	0	0	0	0	0	0	0	0	0	0	0	0
3808	2004	1	3	0	0	2	1	34	34	46	0		
3809	0	0	0	0	0	0	2	1	1	0	2		
3810	3	4	0	4	3	1	1	1	1	2		3	
3811	2	5	5	0	2	1	2	1	1	0	0	0	
3812	0	0	0	0	0	0	0	0	0	0	0	0	
3813	1	0	0	0	0	0	0	0	0	0	1	0	
3814	0	0	0	0	0	2	1	1	1	0	2	2	
3815	3	4	0	4	3	1	1	1	1	2			
3816	3	2	5	5	0	2	1	1	0	0	0	0	
3817	0	0	0	0	0	0	0	0	0	0	0	0	
3818	2004	1	3	0	0	2	1	36	36	20	0		
3819	0	0	0	0	0	0	0	0	1	0	1		
3820	0	2	3	0	0	0	2	2	0	0	0	0	3
3821	0	0	0	2	0	1	0	2	0	0	0	0	
3822	0	0	0	0	0	0	0	0	0	0	0	0	
3823	0	0	0	0	0	0	0	0	1	0	0	0	
3824	0	0	0	0	0	0	0	0	1	0	1	1	
3825	0	2	3	0	0	2	0	2	0	0	0	0	
3826	3	0	0	2	0	1	0	2	0	0	0	0	
3827	0	0	0	0	0	0	0	0	0	0	0	0	
3828	2004	1	3	0	0	2	1	38	38	14	0		
3829	0	0	0	0	0	0	0	0	0	0	0	0	
3830	0	0	1	1	0	0	0	0	1	0	0	0	0
3831	3	3	0	0	1	0	0	0	0	0	0	0	
3832	0	0	0	0	1	0	0	0	0	0	1	0	
3833	1	0	0	0	0	0	0	0	0	0	0	0	
3834	0	0	0	0	0	0	0	0	0	0	0	0	
3835	0	0	1	1	0	0	0	0	1	0	0	0	
3836	0	3	3	0	0	1	0	0	1	0	0	0	
3837	0	0	0	0	1	2	1	40	40	2	1	0	
3838	2004	1	3	0	0	2	1	40	40	2	0		

3839	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3840	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3841	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3842	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3843	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3844	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3845	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3846	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3847	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3848	2005	1	3	0	0	2	1	22	22	2	0	0	0	0
3849	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3850	0	2	0	0	0	0	0	0	0	0	0	0	0	0
3851	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3852	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3853	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3854	0	0	2	0	0	0	0	0	0	0	0	0	0	0
3855	0	0	2	0	0	0	0	0	0	0	0	0	0	0
3856	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3857	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3858	2005	1	3	0	0	2	1	26	26	1	0	0	0	0
3859	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3860	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3861	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3862	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3863	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3864	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3865	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3866	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3867	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3868	2005	1	3	0	0	2	1	28	28	12	0	0	0	0
3869	0	1	1	1	2	2	1	0	0	2	0	0	0	0
3870	2	0	0	0	1	0	0	0	0	0	0	0	0	0
3871	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3872	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3873	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3874	0	0	1	1	2	2	1	0	0	2	0	0	0	0
3875	2	0	0	0	1	0	0	0	0	0	0	0	0	0
3876	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3877	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3878	2005	1	3	0	0	2	1	30	30	31	0	0	0	0
3879	0	0	1	0	1	6	4	1	1	2	1	2	0	1
3880	0	1	3	4	1	2	1	1	1	0	1	1	0	1

3881	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
3882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3884	0	0	0	0	1	6	4	1	1	2	1	1	2	0	1
3885	0	1	3	4	1	0	2	0	1	0	0	0	0	0	0
3886	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
3887	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3888	2005	1	3	0	2	1	32	32	32	60	0	0	0	0	0
3889	0	0	2	3	5	3	3	6	7	7	0	0	0	0	3
3890	3	3	4	2	5	3	2	0	0	0	0	0	0	0	2
3891	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0
3892	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
3893	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3894	0	0	2	3	5	3	6	7	7	7	0	0	0	0	3
3895	3	3	4	2	5	3	2	0	0	0	0	0	0	0	0
3896	2	1	1	0	1	2	0	0	0	0	0	0	0	0	0
3897	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
3898	2005	1	3	0	0	2	1	34	34	34	60	0	0	0	0
3899	0	0	0	0	0	1	1	1	1	1	2	2	4	0	0
3900	3	9	1	4	3	1	1	1	1	1	4	3	5	0	0
3901	2	3	1	1	3	2	1	1	1	1	0	0	0	0	0
3902	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0
3903	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
3904	0	0	0	0	0	1	1	1	1	1	2	2	4	0	0
3905	3	9	1	4	3	1	1	1	1	1	4	3	5	0	0
3906	5	2	3	1	1	3	2	1	1	1	0	1	0	0	0
3907	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0
3908	2005	1	3	0	0	2	1	36	36	36	22	0	0	0	0
3909	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
3910	2	2	0	1	2	0	0	1	1	1	0	1	0	0	1
3911	0	1	0	0	3	1	1	1	0	0	0	0	0	0	0
3912	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3913	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
3914	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
3915	2	2	0	1	2	0	0	1	1	1	1	0	0	0	0
3916	1	0	1	0	3	1	1	1	0	0	0	0	0	0	0
3917	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3918	2005	1	3	0	2	1	38	38	38	15	0	0	0	0	0
3919	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
3920	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1
3921	0	0	0	1	1	0	1	0	0	1	0	0	1	0	1
3922	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0

3923	0	1	0	0	0	0	0	0	0	0	0	0	3	0
3924	0	0	1	0	0	0	0	0	0	0	1	0	0	0
3925	1	1	1	0	0	0	0	0	0	0	0	0	0	1
3926	1	0	0	0	1	1	0	0	0	1	0	0	1	1
3927	0	0	1	0	0	2	1	0	0	0	40	40	0	0
3928	2005	1	3	0	0	2	1	40	40	0	3	0	0	0
3929	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3930	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3931	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3932	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3933	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3935	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3936	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3937	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3938	2006	1	3	0	0	2	1	28	28	5	0	0	0	0
3939	0	0	0	0	1	0	0	1	2	0	0	0	0	0
3940	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3941	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3942	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3943	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3944	0	0	0	0	1	0	0	1	2	0	0	0	0	0
3945	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3946	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3947	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3948	2006	1	3	0	0	2	1	30	30	12	0	0	0	0
3949	0	0	0	0	0	0	0	2	0	0	0	1	0	0
3950	2	1	0	0	4	1	0	0	0	0	0	0	0	0
3951	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3952	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3953	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3954	0	0	0	0	0	0	0	2	0	0	0	0	1	0
3955	2	1	0	0	4	1	0	0	0	0	0	0	0	0
3956	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3957	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3958	2006	1	3	0	0	2	1	32	32	33	0	0	0	0
3959	0	0	0	0	2	0	0	0	6	3	3	3	0	0
3960	0	2	2	1	1	0	2	2	4	0	0	3	0	0
3961	1	0	0	1	0	0	2	0	0	0	0	0	0	0
3962	0	0	0	0	0	0	0	0	0	1	0	0	0	0
3963	0	0	0	0	0	2	0	0	0	6	0	3	0	3
3964	0	0	0	0	0	2	0	0	0	6	3	0	3	0

3965	0	2	2	1	0	0	2	2	4	0	0	3	
3966	0	1	0	1	0	0	2	0	0	0	0	0	0
3967	0	0	0	0	0	0	0	0	0	1	0	0	
3968	2006	1	3	0	0	2	1	34	34	25	0	0	
3969	0	0	0	0	0	0	0	0	1	0	0	2	
3970	1	4	1	2	1	1	1	1	0	0	2	4	
3971	0	0	1	0	1	0	1	1	0	0	0	0	
3972	0	1	0	0	0	0	0	0	0	1	0	0	
3973	0	0	0	0	0	0	0	0	0	0	0	0	
3974	0	0	0	0	0	0	0	0	1	1	0	2	
3975	1	4	1	2	1	1	1	1	0	0	2	0	
3976	4	0	0	1	0	0	1	1	0	0	0	0	
3977	0	1	0	0	0	0	0	0	0	1	0	0	
3978	2006	1	3	0	0	2	1	36	36	8	0	0	
3979	0	0	0	0	0	0	0	0	0	0	0	1	
3980	0	0	2	0	0	0	1	0	0	2	0	0	
3981	0	0	0	0	0	0	0	0	0	0	0	0	
3982	0	0	0	0	0	0	0	0	0	0	0	0	
3983	0	1	0	0	0	0	0	0	0	0	1	0	
3984	0	0	0	0	0	0	0	0	0	0	0	1	
3985	0	0	2	0	0	0	1	0	0	2	0	0	
3986	0	0	0	0	0	0	0	0	0	0	0	0	
3987	0	0	0	0	0	0	0	0	0	0	0	0	
3988	2006	1	3	0	0	2	1	38	38	4	0	0	
3989	0	0	0	0	0	0	0	0	0	1	0	0	
3990	0	0	0	1	0	0	0	0	0	0	0	0	1
3991	0	0	0	0	0	0	0	1	0	0	0	0	
3992	0	0	0	0	0	0	0	0	0	0	0	0	
3993	0	0	0	0	0	0	0	0	0	0	0	0	
3994	0	0	0	0	0	0	0	0	0	0	1	0	
3995	0	0	0	0	1	0	0	0	0	0	0	0	
3996	1	0	0	0	0	0	0	1	0	0	0	0	
3997	0	0	0	0	0	0	0	0	0	0	0	0	
3998	2006	1	3	0	0	2	1	40	40	1	0	0	
3999	0	0	0	0	0	0	0	0	0	0	0	0	
4000	0	0	0	0	0	0	0	0	0	0	0	0	
4001	0	0	0	1	0	0	0	0	0	0	0	0	
4002	0	0	0	0	0	0	0	0	0	0	0	0	
4003	0	0	0	0	0	0	0	0	0	0	0	0	
4004	0	0	0	0	0	0	0	0	0	0	0	0	
4005	0	0	0	0	1	0	0	0	0	0	0	0	
4006	0	0	0	0	1	0	0	0	0	0	0	0	

4007	0	0	0	0	0	0	0	0	0	0	0	0	0
4008	2007	1	3	0	0	2	1	26	26	2	0	0	0
4009	0	0	0	0	1	0	0	0	0	0	0	0	0
4010	1	0	0	0	0	0	0	0	0	0	0	0	0
4011	0	0	0	0	0	0	0	0	0	0	0	0	0
4012	0	0	0	0	0	0	0	0	0	0	0	0	0
4013	0	0	0	0	0	0	0	0	0	0	0	0	0
4014	0	0	0	0	1	0	0	0	0	0	0	0	0
4015	1	0	0	0	0	0	0	0	0	0	0	0	0
4016	0	0	0	0	0	0	0	0	0	0	0	0	0
4017	0	0	0	0	0	0	0	0	0	0	0	0	0
4018	2007	1	3	0	2	1	28	28	3	0	0	0	0
4019	0	0	1	0	0	0	0	1	0	0	0	0	0
4020	0	0	1	0	0	0	0	0	0	0	0	0	0
4021	0	0	0	0	0	0	0	0	0	0	0	0	0
4022	0	0	0	0	0	0	0	0	0	0	0	0	0
4023	0	0	0	0	0	0	0	0	0	0	0	0	0
4024	0	0	0	1	0	0	0	0	1	0	0	0	0
4025	0	0	0	1	0	0	0	0	0	0	0	0	0
4026	0	0	0	0	0	0	0	0	0	0	0	0	0
4027	0	0	0	0	0	0	0	0	0	0	0	0	0
4028	2007	1	3	0	2	1	30	30	10	0	0	0	0
4029	0	0	0	0	0	1	1	1	1	0	0	2	0
4030	1	0	0	0	1	1	1	0	0	0	1	0	0
4031	0	0	0	0	0	0	0	0	0	0	0	0	0
4032	0	0	0	0	0	0	0	0	0	0	0	0	0
4033	0	0	0	0	0	0	0	0	0	0	0	0	0
4034	0	0	0	0	0	1	1	1	1	0	0	2	0
4035	1	0	0	0	1	1	1	0	0	0	1	0	0
4036	0	0	0	0	0	0	0	0	0	0	0	0	0
4037	0	0	0	0	0	0	0	0	0	0	0	0	0
4038	2007	1	3	0	2	1	32	32	33	0	0	0	0
4039	0	0	0	0	0	0	0	1	0	0	0	4	0
4040	2	2	0	2	2	1	1	0	0	2	1	1	3
4041	2	2	2	3	1	1	0	0	2	0	0	1	1
4042	0	0	0	0	0	0	0	0	0	0	1	0	0
4043	0	0	0	0	0	0	0	0	0	0	0	0	0
4044	0	0	0	0	0	0	0	1	0	0	1	0	4
4045	2	2	0	2	2	1	1	0	0	2	1	1	1
4046	3	2	2	3	1	1	0	0	2	0	0	1	1
4047	0	0	0	0	0	0	0	34	34	1	46	0	0
4048	2007	1	3	0	2	1	34	34	46	0	0	0	0

4049	0	0	0	0	1	1	0	1	2	2	1	0
4050	2	1	2	4	3	0	1	2	2	2	3	0
4051	7	1	1	1	0	1	1	1	0	0	1	3
4052	0	0	0	0	0	1	0	0	0	0	0	0
4053	1	0	0	0	1	0	0	0	0	2	0	0
4054	0	0	0	0	1	0	0	1	2	1	0	0
4055	2	1	2	4	3	0	2	2	2	3	0	0
4056	0	7	1	1	0	1	1	1	0	1	1	3
4057	0	0	0	0	0	1	0	0	0	0	0	0
4058	2007	1	3	0	2	1	36	36	15	0	0	0
4059	0	0	0	0	0	0	0	0	0	0	0	0
4060	0	0	0	1	0	1	1	1	0	1	0	0
4061	0	0	0	1	1	1	0	2	2	0	0	0
4062	0	0	0	0	0	0	0	0	0	0	0	0
4063	0	0	0	0	0	0	0	1	0	0	3	0
4064	0	0	0	0	0	0	0	0	0	0	0	0
4065	0	0	0	0	1	0	1	1	0	1	1	0
4066	0	0	0	1	1	1	0	2	2	0	2	0
4067	0	0	0	0	0	0	0	0	0	0	0	0
4068	2007	1	3	0	2	1	38	38	9	0	0	0
4069	0	0	0	0	0	0	0	0	0	0	0	0
4070	0	0	0	0	0	0	0	1	0	1	0	0
4071	1	0	0	0	0	0	0	0	0	2	0	0
4072	0	0	0	0	0	1	0	0	0	0	0	0
4073	1	0	0	1	0	0	0	0	0	0	1	0
4074	0	0	0	0	0	0	0	0	0	0	0	0
4075	0	0	0	0	0	0	0	1	0	0	1	0
4076	0	1	0	0	0	0	0	0	0	2	0	0
4077	0	0	0	0	0	1	0	0	0	0	0	0
4078	2007	1	3	0	2	1	40	40	1	0	0	0
4079	0	0	0	0	0	0	0	0	0	0	0	0
4080	0	0	0	0	0	0	0	0	0	0	0	0
4081	0	0	0	0	0	0	0	0	0	0	0	0
4082	0	0	0	0	0	0	0	0	0	0	0	0
4083	0	0	0	0	0	0	0	0	0	1	0	0
4084	0	0	0	0	0	0	0	0	0	0	0	0
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4088	2008	1	3	0	2	1	24	24	1	0	0	0
4089	0	0	0	0	0	0	1	0	0	0	0	0
4090	0	0	0	0	0	0	0	0	0	0	0	0

4091	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4092	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4093	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4094	0	0	0	0	0	0	0	0	1	0	0	0	0	0
4095	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4096	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4097	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4098	2008	1	3	0	0	2	1	26	26	26	2	0	0	0
4099	1	0	0	0	0	1	0	0	0	0	0	0	0	0
4100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4101	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4102	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4103	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4104	1	0	0	0	0	0	1	0	0	0	0	0	0	0
4105	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4106	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4107	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4108	2008	1	3	0	0	2	1	28	28	28	3	0	0	0
4109	0	0	0	0	0	1	1	0	0	0	0	1	0	0
4110	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4111	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4112	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4113	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4114	0	0	0	0	0	0	1	1	0	0	0	0	0	1
4115	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4116	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4117	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4118	2008	1	3	0	0	2	1	30	30	30	7	0	0	0
4119	0	0	0	0	0	0	0	0	0	0	3	1	0	0
4120	0	0	0	0	0	1	1	0	0	0	0	0	0	0
4121	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4122	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4123	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4124	0	0	0	0	0	0	0	0	0	0	3	1	0	0
4125	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4126	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4127	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4128	2008	1	3	0	0	2	1	32	32	32	24	0	0	0
4129	0	0	0	0	1	1	0	0	3	3	2	2	0	0
4130	1	2	2	0	3	1	1	1	3	0	0	0	0	0
4131	0	2	0	0	1	0	0	0	1	0	0	0	0	0
4132	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4134	0	0	0	0	0	1	1	0	0	0	3	3	0	2	2
4135	1	2	3	1	1	1	0	0	1	3	0	0	0	0	0
4136	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0
4137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4138	2008	1	3	0	0	2	1	34	34	34	28	0	0	0	0
4139	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
4140	3	0	0	2	2	1	6	1	1	1	2	0	0	0	0
4141	2	2	0	0	0	0	1	1	1	1	1	0	1	0	0
4142	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0
4143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4144	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
4145	3	0	0	2	2	1	6	1	1	1	2	0	0	0	0
4146	0	2	2	0	0	0	0	1	1	1	1	1	1	1	0
4147	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
4148	2008	1	3	0	0	2	1	36	36	36	7	0	0	0	0
4149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4150	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0
4151	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4152	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4153	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4155	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0
4156	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
4157	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4158	2008	1	3	0	0	2	1	40	40	40	1	0	0	0	0
4159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4161	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4166	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4168	2009	1	3	0	0	2	1	28	28	28	1	0	0	0	0
4169	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4173	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
4174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4176	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4178	2009	1	3	0	0	2	1	30	30	30	6	0	0	0	0
4179	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4180	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0
4181	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4182	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4184	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
4185	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0
4186	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4188	2009	1	3	0	0	2	1	32	32	32	10	0	0	0	0
4189	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0
4190	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4191	0	0	1	1	0	0	0	0	0	1	0	0	0	0	2
4192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4193	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4194	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0
4195	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4196	1	0	1	1	0	0	0	0	0	0	1	0	0	0	2
4197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4198	2009	1	3	0	0	2	1	34	34	34	4	0	0	0	0
4199	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4201	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
4202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4203	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4204	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4206	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
4207	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4208	2009	1	3	0	0	2	1	42	42	42	1	0	0	0	0
4209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4210	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4213	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4214	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4217	0	0	0	0	0	0	0	0	0	0	0	0	0
4218	2010	1	3	0	0	2	1	20	20	1	0	0	0
4219	0	0	0	0	0	0	0	0	0	0	0	0	0
4220	1	0	0	0	0	0	0	0	0	0	0	0	0
4221	0	0	0	0	0	0	0	0	0	0	0	0	0
4222	0	0	0	0	0	0	0	0	0	0	0	0	0
4223	0	0	0	0	0	0	0	0	0	0	0	0	0
4224	0	0	0	0	0	0	0	0	0	0	0	0	0
4225	1	0	0	0	0	0	0	0	0	0	0	0	0
4226	0	0	0	0	0	0	0	0	0	0	0	0	0
4227	0	0	0	0	0	0	0	0	0	0	0	0	0
4228	2010	1	3	0	0	2	1	30	30	2	0	0	0
4229	0	0	0	0	0	0	0	0	0	0	0	0	0
4230	0	1	0	0	0	0	0	0	0	0	0	0	0
4231	0	1	0	0	0	0	0	0	0	0	0	0	0
4232	0	0	0	0	0	0	0	0	0	0	0	0	0
4233	0	0	0	0	0	0	0	0	0	0	0	0	0
4234	0	0	0	0	0	0	0	0	0	0	0	0	0
4235	0	1	0	0	0	0	0	0	0	0	0	0	0
4236	0	0	1	0	0	0	0	0	0	0	0	0	0
4237	0	0	0	0	0	0	0	0	0	0	0	0	0
4238	2010	1	3	0	0	2	1	32	32	8	0	0	0
4239	0	0	0	0	0	1	1	1	0	0	0	0	0
4240	0	2	1	0	0	1	1	0	0	0	0	0	0
4241	1	0	0	0	0	1	0	0	0	0	0	0	0
4242	0	0	0	0	0	0	0	0	0	0	0	0	0
4243	0	0	0	0	0	0	0	0	0	0	0	0	0
4244	0	0	0	0	0	0	1	1	0	0	0	0	0
4245	0	2	1	0	0	1	1	0	0	0	0	0	0
4246	0	1	0	0	0	1	0	0	0	0	0	0	0
4247	0	0	0	0	0	0	0	0	0	0	0	0	0
4248	2010	1	3	0	0	2	1	34	34	7	0	0	0
4249	0	0	0	0	0	0	0	0	1	0	0	0	0
4250	1	0	0	0	0	0	0	1	0	0	1	0	0
4251	0	0	0	0	0	0	0	0	0	1	0	0	2
4252	0	0	0	0	0	0	0	0	0	0	0	0	0
4253	0	0	0	0	0	0	0	0	0	0	0	0	0
4254	0	0	0	0	0	0	0	0	1	0	0	0	0
4255	1	0	0	0	0	0	0	1	0	0	1	0	1
4256	0	0	0	0	0	0	0	0	0	1	0	0	2
4257	0	0	0	0	0	2	0	0	0	36	36	3	0
4258	2010	1	3	0	0	2	1	36	36	3	0	0	0

4259	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4261	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4263	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4264	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4266	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4267	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4268	2010	1	3	0	0	2	1	40	40	1	0	0	0	0	0
4269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4272	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4273	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4274	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4275	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4276	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4277	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4278	2011	1	3	0	0	2	1	30	30	4	0	0	0	0	0
4279	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4280	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
4281	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4282	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4283	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4284	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4285	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
4286	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
4287	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4288	2011	1	3	0	0	2	1	32	32	16	0	0	0	0	0
4289	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4290	0	2	2	1	0	0	1	1	0	1	0	0	0	0	1
4291	1	0	2	0	0	0	0	1	0	0	0	0	0	0	0
4292	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0
4293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4294	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4295	0	2	2	1	0	0	0	1	1	0	0	1	0	0	0
4296	1	1	2	0	0	0	0	1	0	0	0	0	0	0	0
4297	1	0	1	1	0	0	0	0	1	1	0	0	0	0	0
4298	2011	1	1	3	0	0	2	1	34	34	19	0	0	0	0
4299	0	0	0	0	0	0	0	0	1	0	0	2	0	2	0
4300	1	0	0	0	1	0	1	1	1	1	2	0	2	0	0

4301	0	1	4	0	1	0	0	1	0	0	1	1
4302	1	0	0	0	0	0	0	0	0	0	0	0
4303	0	0	0	0	0	0	0	0	0	0	1	0
4304	0	0	0	0	0	0	0	0	0	0	0	0
4305	1	0	0	1	1	1	1	1	1	2	2	0
4306	0	1	4	0	1	0	0	0	0	0	1	1
4307	1	0	0	0	0	0	0	0	0	0	0	0
4308	2011	1	3	0	2	1	36	36	36	7	0	0
4309	0	0	0	0	0	0	0	0	0	0	0	0
4310	0	1	0	0	0	0	1	0	0	0	0	0
4311	1	1	0	0	1	0	0	0	0	1	1	1
4312	0	0	0	0	0	0	0	1	0	0	0	0
4313	0	0	0	0	0	0	0	0	0	0	0	0
4314	0	0	0	0	0	0	0	0	0	0	0	0
4315	0	0	0	0	0	0	0	1	0	0	0	0
4316	0	1	1	0	1	0	0	0	0	1	1	1
4317	0	0	0	0	0	0	0	1	0	0	0	0
4318	2011	1	3	0	2	1	38	38	38	4	0	0
4319	0	0	0	0	0	0	0	0	0	0	0	0
4320	0	1	0	0	0	0	0	0	0	0	0	0
4321	1	0	0	0	0	0	0	1	0	0	0	0
4322	0	0	0	1	0	0	0	0	0	0	0	0
4323	0	0	0	0	0	0	0	0	0	1	0	0
4324	0	0	0	0	0	0	0	0	0	0	0	0
4325	0	0	0	0	0	0	0	0	0	0	0	0
4326	0	1	0	0	0	0	0	0	0	1	0	0
4327	0	0	1	0	0	0	0	0	0	0	0	0
4328	2012	1	3	0	2	1	30	30	30	2	0	0
4329	0	0	0	0	0	0	0	1	1	0	0	0
4330	0	0	0	0	0	0	0	1	0	0	0	0
4331	0	0	0	0	0	0	0	0	0	0	0	0
4332	0	0	0	0	0	0	0	0	0	0	0	0
4333	0	0	0	0	0	0	0	0	0	0	0	0
4334	0	0	0	0	0	0	0	1	1	0	0	0
4335	0	0	0	0	0	0	0	1	0	0	0	0
4336	0	0	0	0	0	0	0	0	0	0	0	0
4337	0	0	0	0	0	0	0	0	0	0	0	0
4338	2012	1	3	0	2	1	32	32	32	8	0	0
4339	0	0	0	0	0	0	0	0	0	0	0	0
4340	0	0	0	0	2	1	0	0	0	2	1	1
4341	1	0	0	0	0	0	0	0	0	0	0	0
4342	1	0	0	0	0	0	0	0	0	0	1	0

4343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4345	0	0	0	0	0	0	2	0	1	0	0	0	0	2	1
4346	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4347	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4348	2012	1	3	0	0	2	1	34	34	34	7	0	0	0	0
4349	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4351	0	0	1	0	0	1	1	1	0	0	1	0	1	1	1
4352	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4355	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4356	1	0	1	0	0	1	1	1	0	1	0	1	1	1	1
4357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4358	2012	1	3	0	0	2	1	36	36	36	5	0	0	0	0
4359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4360	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4361	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0
4362	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4363	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4364	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4365	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4366	0	1	0	1	0	0	1	1	0	1	0	0	0	0	0
4367	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4368	2012	1	3	0	0	2	1	38	38	38	2	0	0	0	0
4369	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4370	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4371	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4372	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4374	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4375	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4377	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4378	2013	1	3	0	0	2	1	28	28	28	1	0	0	0	0
4379	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
4380	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4381	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4382	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4383	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
4384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4385	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4386	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4387	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4388	2013	1	3	0	0	2	1	32	32	32	4	0	0	0
4389	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4390	0	0	0	0	1	0	0	0	0	1	0	0	0	1
4391	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4392	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4393	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4394	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4395	0	0	0	0	1	0	0	0	0	0	1	0	0	0
4396	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4397	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4398	2013	1	3	0	0	2	1	34	34	34	4	0	0	0
4399	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4400	0	0	0	0	0	0	0	0	0	1	1	2	0	0
4401	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4402	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4403	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4404	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4405	0	0	0	0	0	0	0	0	0	1	1	2	0	0
4406	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4407	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4408	2013	1	3	0	0	2	1	36	36	36	2	0	0	0
4409	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4410	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4411	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4412	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4413	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4414	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4415	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4416	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4417	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4418	2014	1	3	0	0	2	1	26	26	26	2	0	0	0
4419	0	0	0	1	0	0	0	1	0	0	0	0	0	0
4420	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4421	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4422	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4423	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4424	0	0	0	0	1	0	0	0	1	0	0	0	0	0
4425	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4426	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4427	0	0	0	0	0	0	0	0	0	0	0	0	0
4428	2014	1	3	0	0	2	1	28	28	5	0	0	0
4429	0	0	0	0	0	0	0	0	1	3	1	0	0
4430	0	0	0	0	0	0	0	0	0	0	0	0	0
4431	0	0	0	0	0	0	0	0	0	0	0	0	0
4432	0	0	0	0	0	0	0	0	0	0	0	0	0
4433	0	0	0	0	0	0	0	0	0	0	0	0	0
4434	0	0	0	0	0	0	0	1	3	1	0	0	0
4435	0	0	0	0	0	0	0	0	0	0	0	0	0
4436	0	0	0	0	0	0	0	0	0	0	0	0	0
4437	0	0	0	0	0	0	0	0	0	0	0	0	0
4438	2014	1	3	0	2	1	1	30	30	14	0	0	0
4439	0	0	0	0	1	1	0	2	0	0	2	0	0
4440	0	1	0	2	0	1	1	0	0	0	0	0	2
4441	1	0	0	0	0	1	0	0	0	0	0	0	0
4442	0	0	0	0	0	0	0	0	0	0	0	0	0
4443	0	0	0	0	0	0	0	0	0	0	0	0	0
4444	0	0	0	1	0	1	0	2	0	0	2	0	0
4445	0	1	0	2	0	0	1	0	0	0	0	0	0
4446	2	1	0	0	0	0	1	0	0	0	0	0	0
4447	0	0	0	0	0	0	0	0	0	0	0	0	0
4448	2014	1	3	0	2	1	32	32	76	0	0	0	0
4449	0	0	0	0	0	0	2	4	3	3	7	0	0
4450	4	0	3	6	3	2	4	3	4	1	4	6	0
4451	6	5	0	0	1	0	2	1	0	1	4	0	0
4452	1	0	0	2	0	0	0	0	0	0	0	0	0
4453	0	0	0	0	1	0	0	0	0	1	0	0	0
4454	0	0	0	0	0	2	2	4	3	3	7	0	0
4455	4	0	3	6	3	2	4	3	4	1	4	6	0
4456	6	6	5	0	1	0	2	1	1	1	4	0	0
4457	1	0	0	2	0	0	0	0	0	0	0	0	0
4458	2014	1	3	0	2	1	34	34	118	0	0	0	0
4459	0	0	0	0	2	0	3	3	3	3	0	0	0
4460	5	1	3	3	8	5	5	3	4	4	9	0	0
4461	9	5	6	4	3	4	5	5	5	4	1	1	0
4462	0	2	6	3	5	1	1	1	1	1	1	1	0
4463	0	0	1	0	0	1	0	0	0	1	0	0	0
4464	0	0	0	0	2	0	0	3	3	3	0	0	0
4465	5	1	3	3	8	5	5	3	4	4	6	0	0
4466	9	9	5	6	4	3	4	5	5	4	1	1	1
4467	0	2	6	3	5	1	1	1	1	1	1	1	0
4468	2014	1	3	0	2	1	36	36	121	0	0	0	0

4469	0	0	0	0	0	0	0	1	0	2	1	
4470	3	1	1	2	2	4	7	7	8	8	9	5
4471	7	5	2	3	3	7	5	5	4	5		
4472	6	0	3	3	1	1	1	1	1	0	0	
4473	0	1	1	0	0	0	0	0	0	8	0	
4474	0	0	0	0	0	0	1	0	2	1		
4475	3	1	1	2	4	7	8	8	9			
4476	5	7	5	2	3	7	5	5	4	5		
4477	6	0	3	3	1	1	1	1	1	0		
4478	2014	1	3	0	2	1	38	38	49	0		
4479	0	0	0	0	0	0	0	0	0	0		
4480	1	0	0	0	0	2	1	1	1	1	2	
4481	2	5	2	3	1	1	2	2	2	1		
4482	3	3	4	1	1	1	1	1	0	0		
4483	0	0	1	0	0	0	0	0	1	5	0	
4484	0	0	0	0	0	0	0	0	0	0		
4485	1	0	0	0	0	2	1	1	1	1		
4486	2	2	5	2	3	1	2	2	2	2	1	
4487	3	3	4	1	1	1	1	1	0	0		
4488	2014	1	3	0	2	1	40	40	11	0		
4489	0	0	0	0	0	0	0	0	0	0		
4490	0	0	0	0	0	0	0	0	1	0		
4491	3	1	0	0	0	0	0	1	0	0		
4492	0	2	0	0	0	0	0	0	0	0		
4493	0	0	0	0	0	0	0	0	2	0		
4494	0	0	0	0	0	0	0	0	0	0		
4495	0	0	0	0	0	0	0	0	0	1		
4496	0	3	1	0	0	0	0	0	0	0		
4497	0	2	0	0	0	0	0	0	0	0		
4498	2014	1	3	0	2	1	42	42	2	0		
4499	0	0	0	0	0	0	0	0	0	0		
4500	0	0	0	0	0	0	0	0	0	0		
4501	0	0	0	0	0	0	0	1	1	0		
4502	0	0	0	0	0	0	0	0	0	0		
4503	0	0	0	0	0	0	0	0	0	0		
4504	0	0	0	0	0	0	0	0	0	0		
4505	0	0	0	0	0	0	0	0	0	0		
4506	0	0	0	0	0	0	0	0	1	1	0	
4507	0	0	0	0	0	0	0	0	0	0		
4508												
4509	0	#_N_MeanSize-at-Age_obs										
4510	#Yr Seas Flt/Svy Gender Part Ageerr Ignore	datavector(female-male)										

```

4511 # samplesize(female-male)
4512 # 1971 1 1 3 0 1 2 29.8931 40.6872 44.7411 50.027 52.5794 56.1489 57.1033 6
4513 # 1.1728 61.7417 63.368 64.4088 65.6889 67.616 68.5972 69.9177 71.0443 72.3
4514 # 609 32.8188 39.5964 43.988 50.1693 53.1729 54.9822 55.3463 60.3509 60.743
4515 # 9 62.3432 64.3224 65.1032 64.1965 66.7452 67.5154 70.8749 71.2768 20 20 2
4516 # 0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
4517 # 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
4518
4519 0 #_N_environ_variables
4520 0 #_N_environ_obs
4521 0 # N sizefreq methods to read
4522
4523 0 # no tag data
4524
4525 0 # no morphcomp data
4526
4527 999

```

## 4528 Central Model

```

4529 #V3.24u
4530 #C data file for China rockfish North of 4010 to OR/WA border
4531 #C changed from pre-star draft base by adding length comps from CA north of
4532 # 40-10
4533 #
4534 #_observed data:
4535 1900 #_styr -- extended to match southern model start year
4536 2014 #_endyr
4537 1 #_nseas
4538 12 #_months/season
4539 1 #_spawn_seas
4540 11 #_Nfleet
4541 1 #_Nsurveys
4542 1 #_N_areas
4543 ## fleet names (second cut on June 7, 2015)
4544 1_CA_NorthOf4010_Comm_Dead%2_CA_NorthOf4010_Comm_Live%3_CA_NorthOf4010_Rec_
4545 PC%4_CA_NorthOf4010_Rec_PR%5_OR_SouthernOR_Comm_Dead%6_OR_SouthernOR_Comm_L
4546 ive%7_OR_SouthernOR_Rec_PC%8_OR_SouthernOR_Rec_PR%9_OR_NorthernOR_Comm%10_O
4547 R_NorthernOR_Rec_PC%11_OR_NorthernOR_Rec_PR%12_OR_SouthernOR_Rec_PC_ORBS
4548 ## 1_CA_NorthOf4010_Comm_Dead
4549 ## 2_CA_NorthOf4010_Comm_Live
4550 ## 3_CA_NorthOf4010_Rec_PC

```

```

4551 ## 4_CA_NorthOf4010_Rec_PR
4552 ## 5_OR_SouthernOR_Comm_Dead
4553 ## 6_OR_SouthernOR_Comm_Live
4554 ## 7_OR_SouthernOR_Rec_PC
4555 ## 8_OR_SouthernOR_Rec_PR
4556 ## 9_OR_NorthernOR_Comm
4557 ## 10_OR_NorthernOR_Rec_PC
4558 ## 11_OR_NorthernOR_Rec_PR
4559 ## 12_OR_SouthernOR_Rec_PC_ORBS
4560 # following values are 1 per catch or survey fleet
4561 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 #_surveytiming_in_season --
4562 # mid-year, not exactly like XDB-SRA
4563 1 1 1 1 1 1 1 1 1 1 1 #_area_assignments_for_ea
4564 # ch_fishery_and_survey
4565 # following values are 1 per catch fleet
4566 1 1 1 1 1 1 1 1 1 1 #_units of catch: 1=bio; 2=num
4567 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 #_se of log(catch) only used fo
4568 # r init_eq_catch and for Fmethod 2 and 3; use -1 for discard only fleets
4569 2 #_Ngenders
4570 80 #_Nages
4571 0 0 0 0 0 0 0 0 0 0 #_init_equil_catch_for_each_fi
4572 # shery
4573 115 #_N_lines_of_catch_to_read
4574 #_catch_biomass(mtons):_columns_are_fisheries,year,season
4575 # this file has catch in SS format based on formulas in the adjacent Google
4576 # Doc "Catch Pivot" worksheet
4577 #_fleet1 fleet2 fleet3 fleet4 fleet5 fleet6 fleet7 fleet8 fleet9 fleet10 f
4578 # leet11 year seas
4579 0 0 0 0 0.01 0 0 0 0.01 0
4580 0 1900 1
4581 0 0 0 0 0 0 0 0 0 0
4582 0 1901 1
4583 0 0 0 0 0 0 0 0 0 0
4584 0 1902 1
4585 0 0 0 0 0 0 0 0 0 0
4586 0 1903 1
4587 0 0 0 0 0 0 0 0 0 0
4588 0 1904 1
4589 0 0 0 0 0 0 0 0 0 0
4590 0 1905 1
4591 0 0 0 0 0 0 0 0 0 0
4592 0 1906 1

```

4593	0	0	0	0	0	0	0	0	0	0	0
4594	0	1907	1	0	0	0	0	0	0	0	0
4595	0	0	0	0	0	0	0	0	0	0	0
4596	0	1908	1	0	0	0	0	0	0	0	0
4597	0	0	0	0	0	0	0	0	0	0	0
4598	0	1909	1	0	0	0	0	0	0	0	0
4599	0	0	0	0	0	0	0	0	0	0	0
4600	0	1910	1	0	0	0	0	0	0	0	0
4601	0	0	0	0	0	0	0	0	0	0	0
4602	0	1911	1	0	0	0	0	0	0	0	0
4603	0	0	0	0	0	0	0	0	0	0	0
4604	0	1912	1	0	0	0	0	0	0	0	0
4605	0	0	0	0	0	0	0	0	0	0	0
4606	0	1913	1	0	0	0	0	0	0	0	0
4607	0	0	0	0	0	0	0	0	0	0	0
4608	0	1914	1	0	0	0	0	0	0	0	0
4609	0	0	0	0	0	0	0	0	0	0	0
4610	0	1915	1	0	0	0	0	0	0	0	0
4611	0	0	0	0	0	0	0	0	0	0	0
4612	0	1916	1	0	0	0	0	0	0	0	0
4613	0	0	0	0	0	0	0	0	0	0	0
4614	0	1917	1	0	0	0	0	0	0	0	0
4615	0	0	0	0	0	0	0	0	0	0	0
4616	0	1918	1	0	0	0	0	0	0	0	0
4617	0	0	0	0	0	0	0	0	0	0	0
4618	0	1919	1	0	0	0	0	0	0	0	0
4619	0	0	0	0	0	0	0	0	0	0	0
4620	0	1920	1	0	0	0	0	0	0	0	0
4621	0	0	0	0	0	0	0	0	0	0	0
4622	0	1921	1	0	0	0	0	0	0	0	0
4623	0	0	0	0	0	0	0	0	0	0	0
4624	0	1922	1	0	0	0	0	0	0	0	0
4625	0	0	0	0	0	0	0	0	0	0	0
4626	0	1923	1	0	0	0	0	0	0	0	0
4627	0	0	0	0	0	0	0	0	0	0	0
4628	0	1924	1	0	0	0	0	0	0	0	0
4629	0	0	0	0	0	0	0	0	0	0	0
4630	0	1925	1	0	0	0	0	0	0	0	0
4631	0	0	0	0	0	0	0	0	0	0	0
4632	0	1926	1	0	0	0	0	0	0	0	0
4633	0	0	0	0	0	0	0	0	0	0	0
4634	0	1927	1	0	0	0	0	0	0	0	0

4635	0	0	0	0	0	0	0	0	0	0	0
4636	0	1928	1	0	0.01	0.01	0.01	0	0	0.01	0
4637	0.01	0	0	0	0.01	0.01	0.01	0	0	0.01	0
4638	0	1929	1	0	0	0.01	0.01	0	0	0.01	0
4639	0.01	0	0	0	0.01	0.01	0.01	0	0	0.01	0
4640	0	1930	1	0	0	0.01	0	0	0	0.01	0
4641	0	0	0	0	0.01	0	0	0	0	0	0
4642	0	1931	1	0	0	0.01	0	0	0	0	0
4643	0.03	0	0	0	0.01	0	0	0	0	0	0
4644	0	1932	1	0	0	0.01	0	0	0	0	0
4645	0.09	0	0	0	0.01	0	0	0	0	0	0
4646	0	1933	1	0	0.99	0	0	0	0	0	0
4647	0.99	0	0	0	0.01	0	0	0	0	0	0
4648	0	1934	1	0	0.82	0	0.01	0	0	0	0
4649	0.82	0	0.01	0	0.01	0	0	0	0	0	0
4650	0	1935	1	0	1.23	0	0.01	0.02	0.01	0	0
4651	1.23	0	0.01	0.02	0.01	0	0	0	0	0.01	0
4652	0	1936	1	0	0.78	0	0.01	0.02	0.01	0	0
4653	0.78	0	0.01	0.02	0.01	0	0	0	0	0.01	0
4654	0	1937	1	0	3.08	0	0.01	0.02	0	0	0
4655	3.08	0	0.01	0.02	0	0	0	0	0	0	0
4656	0	1938	1	0	5.95	0	0.01	0.02	0	0	0
4657	5.95	0	0.01	0.02	0	0	0	0	0	0	0
4658	0	1939	1	0	3.52	0	0.01	0.02	0.01	0	0
4659	3.52	0	0.01	0.02	0.01	0	0	0	0	0.01	0
4660	0	1940	1	0	0.99	0	0.01	0.02	0.01	0	0
4661	0.99	0	0.01	0.02	0.01	0	0	0	0	0.01	0
4662	0	1941	1	0	0.72	0	0	0.01	0.01	0	0
4663	0.72	0	0	0.01	0.01	0	0	0	0	0.01	0
4664	0	1942	1	0	0.02	0	0	0.01	0.04	0	0
4665	0.02	0	0	0.01	0.01	0.04	0	0	0	0.04	0
4666	0	1943	1	0	0	0.01	0.01	0	0	0.01	0
4667	0	0	0	0	0.01	0.01	0	0	0	0.01	0
4668	0	1944	1	0	0	0.01	0.04	0	0	0.04	0
4669	0	0	0	0	0.01	0.04	0	0	0	0.04	0
4670	0	1945	1	0	0.06	0	0.01	0.02	0.05	0	0
4671	0.06	0	0.01	0.02	0.05	0	0	0	0	0.05	0
4672	0	1946	1	0	0.08	0	0.01	0.02	0.01	0	0
4673	0.08	0	0.01	0.02	0.01	0	0	0	0	0.01	0
4674	0	1947	1	0	0.09	0	0.01	0.03	0.01	0	0
4675	0.09	0	0.01	0.03	0.01	0	0	0	0	0.01	0
4676	0	1948	1	0	0	0	0	0	0	0	0

4677	0.01	0	0.01	0.04	0.07	0	0	0	0.07	0
4678	0	1949	1							
4679	0.11	0	0.02	0.05	0.01	0	0	0	0.01	0
4680	0	1950	1							
4681	0.14	0	0.02	0.06	0	0	0	0	0	0
4682	0	1951	1							
4683	0	0	0.02	0.05	0	0	0	0	0	0
4684	0	1952	1							
4685	0	0	0.02	0.05	0	0	0	0	0	0
4686	0	1953	1							
4687	0	0	0.02	0.06	0	0	0	0	0	0
4688	0	1954	1							
4689	0	0	0.02	0.07	0	0	0	0	0	0
4690	0	1955	1							
4691	0	0	0.03	0.08	0	0	0	0	0	0
4692	0	1956	1							
4693	0.09	0	0.03	0.10	0	0	0	0	0	0
4694	0	1957	1							
4695	0	0	0.03	0.08	0	0	0	0	0	0
4696	0	1958	1							
4697	0.01	0	0.02	0.06	0	0	0	0	0	0
4698	0	1959	1							
4699	0	0	0.01	0.04	0	0	0	0	0	0
4700	0	1960	1							
4701	0	0	0.01	0.04	0	0	0	0	0	0
4702	0	1961	1							
4703	0	0	0.01	0.02	0	0	0	0	0	0
4704	0	1962	1							
4705	0	0	0.01	0.02	0	0	0	0	0	0
4706	0	1963	1							
4707	0	0	0.01	0.02	0.01	0	0	0	0.01	0
4708	0	1964	1							
4709	0.02	0	0.01	0.04	0	0	0	0	0	0
4710	0	1965	1							
4711	0.08	0	0	0.01	0	0	0	0	0	0
4712	0	1966	1							
4713	0.01	0	0.02	0.05	0	0	0	0	0	0
4714	0	1967	1							
4715	0	0	0.01	0.02	0	0	0	0	0	0
4716	0	1968	1							
4717	0	0	0.02	0.05	0	0	0	0	0	0
4718	0	1969	1							

4719	0	0	0.01	0.01	0	0	0	0	0	0
4720	0	1970	1	0.01	0.02	0	0	0	0	0
4721	0	0	0.01	0.02	0	0	0	0	0	0
4722	0	1971	1	0.02	0.05	0	0	0	0	0
4723	0.01	0	0.02	0.05	0	0	0	0	0	0
4724	0	1972	1	0.01	0.03	0	0	0.16	0.19	0
4725	0	0	0.01	0.03	0	0	0.27	0.32	0.01	0.75
4726	0.07	1973	1	0.01	0.02	0.01	0	0.13	0.16	0
4727	0.01	0	0.01	0.02	0.01	0	0.38	0.47	0	1.08
4728	0.13	1974	1	0	0.01	0	0	0.41	0.49	0.09
4729	0.01	0	0	0.01	0	0	0.53	0.64	0.01	1.50
4730	0.06	1975	1	0.02	0.01	0.09	0	2.94	1.53	0.13
4731	0.01	0	0	0.01	0	0	0.91	0.53	0.07	1.63
4732	0.27	1976	1	0.03	0.08	0.01	0	1.56	0.89	0.07
4733	0.02	0	0	0.03	0.10	0.13	0	1.36	0.81	0.35
4734	0.29	1977	1	0.04	0.08	0.07	0	1.42	0.82	0.32
4735	0.11	0	0.03	0.08	0.01	0	1.43	0.48	0.23	2.18
4736	0.25	1978	1	0.02	0.03	0.10	0.13	0	1.04	0.59
4737	0.02	0	0.03	0.14	0.33	0	0.99	0.57	0.14	1.58
4738	0.98	1979	1	0.01	0.04	0.08	0.07	0	0.70	0.45
4739	0.01	0	0.08	0.16	0.36	0	1.29	0.69	0.84	1.03
4740	0.90	1980	1	0	0.01	0.06	0.24	0	1.04	0.59
4741	0	0	0.04	0.10	0.07	0	1.43	0.48	0.23	2.71
4742	0.97	1981	1	0.01	0.03	0.14	0.33	0	1.42	0.82
4743	0.01	0	0.08	0.16	0.36	0	1.36	0.81	0.35	2.69
4744	0.95	1982	1	0	0.02	0.14	0.22	0	1.29	0.69
4745	0	0	0.08	0.16	0.36	0	1.04	0.59	0.21	1.38
4746	1.20	1983	1	0	0.02	0.14	0.22	0	1.04	0.59
4747	0	0	0.01	0.06	0.24	0	1.43	0.48	0.23	2.71
4748	1.21	1984	1	0	0.02	0.14	0.22	0	1.42	0.82
4749	0	0	0.02	0.14	0.22	0	1.36	0.81	0.35	2.69
4750	0.62	1985	1	0	0.12	0.49	0.14	0	1.29	0.69
4751	0	0	0.28	0.53	0.90	0	1.04	0.59	0.21	1.38
4752	0.70	1986	1	0	0.28	0.53	0.90	0	1.04	0.59
4753	0	0	0.46	1987	1	0.11	0.35	0.87	0	1.44
4754	0.01	0	0.29	1988	1	0.11	0.35	0.87	0	1.11
4755	0.23	0	0.29	1989	1	0.06	0.14	1.08	0	0.81
4756	0.31	0	0.23	2.53	0	0.23	0.61	1.16	0	2.21
4757	0.49	1990	1	0	0.23	0.61	1.16	0	1.29	1.81
4758	0.49	1990	1	0	0.23	0.61	1.16	0	0.53	2.19

4761	0.72	0	0.20	0.64	0.68	0	0.52	0.68	0.64	1.44
4762	0.31	1991	1							
4763	2.88	0	0.12	0.42	0.88	0	0.76	0.88	0.64	2.41
4764	0.65	1992	1							
4765	0.85	0	0.15	0.66	0.84	0	0.90	1.12	0.01	3.03
4766	0.99	1993	1							
4767	1.02	0	0.14	0.70	6.33	0	0.97	1.21	0	2.13
4768	0.73	1994	1							
4769	4.74	0	0.12	0.60	6.52	0	0.68	0.94	0	1.09
4770	0.51	1995	1							
4771	3.88	0.01	0.06	0.28	5.77	0	0.84	0.71	0	1.74
4772	0.26	1996	1							
4773	2.02	1.78	0.06	0.06	5.45	5.45	1.08	1.00	0	2.04
4774	0.47	1997	1							
4775	1.47	0.85	0.02	0.18	9.80	9.40	0.79	0.76	0	1.56
4776	0.47	1998	1							
4777	0.62	1.61	0.10	0.40	8.62	15.32	1.78	1.26	0	2.11
4778	0.45	1999	1							
4779	0.61	2.09	0.25	0.50	2.62	9.77	0.85	0.59	0	1.71
4780	0.39	2000	1							
4781	0.43	1.09	0.31	0.44	3.93	15.89	0.32	0.36	0	1.41
4782	0.57	2001	1							
4783	0.47	1.87	0.27	0.52	3.14	17.52	0.32	0.38	0	1.40
4784	0.60	2002	1							
4785	0.09	0.50	0.33	0.91	1.93	8.38	0.26	0.32	0	1.12
4786	0.51	2003	1							
4787	0.22	0.29	0.08	0.44	1.11	6.00	0.23	0.40	0	0.99
4788	0.43	2004	1							
4789	0.14	0.60	0.16	0.37	0.65	3.48	0.26	0.51	0	0.77
4790	0.51	2005	1							
4791	0.15	0.85	0.14	0.49	0.55	4.22	0.35	0.50	0	1.11
4792	0.67	2006	1							
4793	0.41	1.64	0.64	0.87	1.18	5.01	0.38	0.48	0.01	1.40
4794	0.82	2007	1							
4795	0.26	1.60	0.20	0.81	1.49	6.45	0.26	0.45	0.04	1.25
4796	0.89	2008	1							
4797	0.05	0.62	0.66	0.89	1.15	6.88	0.12	0.49	0.06	0.95
4798	0.76	2009	1							
4799	0.04	0.27	0.27	0.64	0.53	4.42	0.20	0.61	0.03	1.02
4800	0.73	2010	1							
4801	0.09	0.36	0.16	1.06	1.41	6.77	0.31	0.60	0.02	1.56
4802	0.96	2011	1							

```

4803      0.08  0.39  0.37  1.02  1.32  7.61  0.37  0.41  0.06  1.68
4804      1.24  2012    1
4805      0.05  0.17  0.26  0.97  1.59  5.56  0.25  0.64  0.02  1.48
4806      1.26  2013    1
4807      0.02  0.09  0.08  0.66  0.74  3.72  0.18  0.48  0.03  0.51
4808      0.53  2014    1
4809 #
4810 58 #_N_cpue_and_surveyabundance_observations
4811 #_Units: 0=numbers; 1=biomass; 2=F
4812 #_Errtype: -1=normal; 0=lognormal; >0=T
4813 #_Fleet Units Errtype
4814 1      0      0 # 1_CA_NorthOf4010_Comm_Dead
4815 2      0      0 # 2_CA_NorthOf4010_Comm_Live
4816 3      0      0 # 3_CA_NorthOf4010_Rec_PC
4817 4      0      0 # 4_CA_NorthOf4010_Rec_PR
4818 5      0      0 # 5_OR_SouthernOR_Comm_Dead
4819 6      1      0 # 6_OR_SouthernOR_Comm_Live
4820 7      1      0 # 7_OR_SouthernOR_Rec_PC
4821 8      0      0 # 8_OR_SouthernOR_Rec_PR
4822 9      0      0 # 9_OR_NorthernOR_Comm
4823 10     0      0 # 10_OR_NorthernOR_Rec_PC
4824 11     0      0 # 11_OR_NorthernOR_Rec_PR
4825 12     0      0 # 12_OR_SouthernOR_Rec_PC_ORBS (mirror of fleet 7)
4826
4827 ### Oregon commercial logbook index (southern OR; vessels from Port Orford,
4828 # Gold Beach, and Brookings)
4829 ### initially assigning to fleet: "6_OR_SouthernOR_Comm_Live"
4830 #_year seas index obs err
4831 2004   1     6    0.036  0.211  # OR Commercial Logbook
4832 2005   1     6    0.028  0.194  # OR Commercial Logbook
4833 2006   1     6    0.032  0.200  # OR Commercial Logbook
4834 2007   1     6    0.038  0.213  # OR Commercial Logbook
4835 2008   1     6    0.043  0.204  # OR Commercial Logbook
4836 2009   1     6    0.026  0.207  # OR Commercial Logbook
4837 2010   1     6    0.024  0.254  # OR Commercial Logbook
4838 2011   1     6    0.039  0.203  # OR Commercial Logbook
4839 2012   1     6    0.032  0.206  # OR Commercial Logbook
4840 2013   1     6    0.018  0.228  # OR Commercial Logbook
4841
4842 ### Northern CA + Oregon, MRFSS Dockside Charter Boat Trip-Based CPUE (nort
4843 # h of 40-10)
4844 ### assigned to fleet: "7_OR_SouthernOR_Rec_PC"

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4845  ### NOTE: fleet changed to be negative (removed from likelihood)
4846  ### due to issues identified at STAR panel (see report)
4847  #_year seas index obs err
4848  1980 1 -7 0.190 0.260 # NoCA-OR Rec MRFSS Charter Boat CP
4849  # UE
4850  1981 1 -7 0.086 0.221 # NoCA-OR Rec MRFSS Charter Boat CP
4851  # UE
4852  1982 1 -7 0.119 0.241 # NoCA-OR Rec MRFSS Charter Boat CP
4853  # UE
4854  1983 1 -7 0.152 0.350 # NoCA-OR Rec MRFSS Charter Boat CP
4855  # UE
4856  1984 1 -7 0.056 0.296 # NoCA-OR Rec MRFSS Charter Boat CP
4857  # UE
4858  1985 1 -7 0.091 0.269 # NoCA-OR Rec MRFSS Charter Boat CP
4859  # UE
4860  1986 1 -7 0.121 0.429 # NoCA-OR Rec MRFSS Charter Boat CP
4861  # UE
4862  1987 1 -7 0.234 0.167 # NoCA-OR Rec MRFSS Charter Boat CP
4863  # UE
4864  1988 1 -7 0.193 0.175 # NoCA-OR Rec MRFSS Charter Boat CP
4865  # UE
4866  1989 1 -7 0.084 0.162 # NoCA-OR Rec MRFSS Charter Boat CP
4867  # UE
4868  1993 1 -7 0.178 0.135 # NoCA-OR Rec MRFSS Charter Boat CP
4869  # UE
4870  1994 1 -7 0.152 0.135 # NoCA-OR Rec MRFSS Charter Boat CP
4871  # UE
4872  1995 1 -7 0.115 0.136 # NoCA-OR Rec MRFSS Charter Boat CP
4873  # UE
4874  1996 1 -7 0.093 0.178 # NoCA-OR Rec MRFSS Charter Boat CP
4875  # UE
4876  1997 1 -7 0.116 0.172 # NoCA-OR Rec MRFSS Charter Boat CP
4877  # UE
4878  1998 1 -7 0.131 0.183 # NoCA-OR Rec MRFSS Charter Boat CP
4879  # UE
4880  1999 1 -7 0.134 0.128 # NoCA-OR Rec MRFSS Charter Boat CP
4881  # UE
4882  2000 1 -7 0.132 0.147 # NoCA-OR Rec MRFSS Charter Boat CP
4883  # UE
4884  2001 1 -7 0.109 0.225 # NoCA-OR Rec MRFSS Charter Boat CP
4885  # UE
4886  2002 1 -7 0.109 0.196 # NoCA-OR Rec MRFSS Charter Boat CP

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4887 # UE
4888 2003 1 -7 0.044 0.530 # NoCA-OR Rec MRFSS Charter Boat CP
4889 # UE
4890
4891 ### OR ORBS Charter Boat Dockside Trip-Based CPUE
4892 ### (AREA WEIGHTED SUM OF REGIONAL TRENDS)
4893 ### assigning to fleet: "12_OR_SouthernOR_Rec_PC_ORBS" which is a mirror
4894 ### of fleet "7_OR_SouthernOR_Rec_PC"
4895 #_year seas index obs err
4896 2001 1 12 0.0227 0.078 #OR Rec ORBS Trip-based Charter CPU
4897 # E
4898 2002 1 12 0.0194 0.0771 #OR Rec ORBS Trip-based Charter CPU
4899 # E
4900 2003 1 12 0.0205 0.0792 #OR Rec ORBS Trip-based Charter CPU
4901 # E
4902 2004 1 12 0.0181 0.0907 #OR Rec ORBS Trip-based Charter CPU
4903 # E
4904 2005 1 12 0.0146 0.0971 #OR Rec ORBS Trip-based Charter CPU
4905 # E
4906 2006 1 12 0.0213 0.0758 #OR Rec ORBS Trip-based Charter CPU
4907 # E
4908 2007 1 12 0.0279 0.0751 #OR Rec ORBS Trip-based Charter CPU
4909 # E
4910 2008 1 12 0.0199 0.0731 #OR Rec ORBS Trip-based Charter CPU
4911 # E
4912 2009 1 12 0.0146 0.0867 #OR Rec ORBS Trip-based Charter CPU
4913 # E
4914 2010 1 12 0.0168 0.0873 #OR Rec ORBS Trip-based Charter CPU
4915 # E
4916 2011 1 12 0.0196 0.0798 #OR Rec ORBS Trip-based Charter CPU
4917 # E
4918 2012 1 12 0.0212 0.0863 #OR Rec ORBS Trip-based Charter CPU
4919 # E
4920 2013 1 12 0.0173 0.0817 #OR Rec ORBS Trip-based Charter CPU
4921 # E
4922 2014 1 12 0.0132 0.1091 #OR Rec ORBS Trip-based Charter CPU
4923 # E
4924
4925 ### OR onboard index
4926 ### initially assigning to fleet: "10_OR_NorthernOR_Rec_PC"
4927 #_year seas index obs err
4928 2001 1 10 0.050 0.246 #OR onboard

```

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4929 2003 1 10 0.039 0.210 #OR onboard
4930 2004 1 10 0.031 0.265 #OR onboard
4931 2005 1 10 0.029 0.287 #OR onboard
4932 2006 1 10 0.036 0.254 #OR onboard
4933 2007 1 10 0.058 0.190 #OR onboard
4934 2008 1 10 0.030 0.245 #OR onboard
4935 2009 1 10 0.045 0.236 #OR onboard
4936 2010 1 10 0.013 0.435 #OR onboard
4937 2011 1 10 0.051 0.289 #OR onboard
4938 2012 1 10 0.044 0.259 #OR onboard
4939 2013 1 10 0.026 0.293 #OR onboard
4940 2014 1 10 0.017 0.415 #OR onboard
4941
4942 0 #_N_fleets_with_discard
4943 #_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
4944 #_discard_errtype: >0 for DF of T-dist(read CV below); 0 for normal with C
4945 # V; -1 for normal with se; -2 for lognormal
4946 #Fleet Disc_units err_type
4947 0 #N discard obs
4948 #_year seas index obs err
4949 #
4950 0 #_N_meanbodywt_obs
4951 30 #_DF_for_meanbodywt_T-distribution_like
4952
4953 2 # length bin method: 1=use databins; 2=generate from binwidth,min,max be
4954 # low; 3=read vector
4955 2 # binwidth for population size comp
4956 8 # minimum size in the population (lower edge of first bin and size at ag
4957 # e 0.00)
4958 50 # maximum size in the population (lower edge of last bin)
4959
4960 -0.0001 #_comp_tail_compression
4961 1e-003 #_add_to_comp
4962 0 #_combine males into females at or below this bin number
4963 15 #_N_LengthBins
4964 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
4965
4966 221 # pre-STAR base was 156 #_N_Length_obs
4967
4968 ### CA commercial landings, dead fish, north of 40-10
4969 ### initially assigning to fleet: 1_CA_NorthOf4010_Comm_Dead
4970 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c

```

	#	m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
	#		44cm	46cm+	repeat						
4971											
4972											
4973	1992		1	1	0	2	4	0	0	8	11
4974		48		59	0	131	94	16	54	3	0
4975		0	0	0	0	8		11	48	59	131
4976	4		16	54	3	0	0	0	0	0	9
4977	1993		1	1	0	2	6	0	0	83	0
4978		0	0	0	0	104	135	208	69	0	0
4979		0	0	0	0	83	0	0	0	0	1
4980	04		135	208	69	0	0	0	0	0	0
4981	1994		1	1	0	2	9	0	0	0	0
4982		0	139	120	240	218	139	0	0	0	0
4983		0	60	0	0	0	0	0	0	139	120
4984	40		218	139	0	0	0	0	60		
4985	1995		1	1	0	2	41	0	0	0	0
4986		0	0	399	935	1200	393	134	533	533	
4987		0	0	0	0	0	0	0	0	399	9
4988	35		1200	393	134	533	533	0	0		
4989	1996		1	1	0	2	42	0	0	0	42
4990		0	0	714	811	598	1068	314	440	200	
4991		0	0	0	0	0	42	0	0	714	8
4992	11		598	1068	314	440	200	0	0		
4993	1997		1	1	0	2	25	0	0	0	0
4994		62	248	454	480	462	474	212	106	0	
4995		0	0	0	0	0	0	62	248	454	4
4996	80		462	474	212	106	0	0	0		
4997	1999		1	1	0	2	8	0	0	0	0
4998		7	91	224	147	161	126	63	28	0	
4999		0	0	0	0	0	0	7	91	224	1
5000	47		161	126	63	28	0	0	0		
5001	2000		1	1	0	2	5	0	0	0	0
5002		0	40	37	116	143	87	43	37	0	
5003		0	32	0	0	0	0	0	40	37	1
5004	16		143	87	43	37	0	0	32		
5005	2002		1	1	0	2	6	0	0	0	0
5006		0	0	0	0	153	153	255	0	0	
5007		0	0	0	0	0	0	0	0	0	1
5008	53		153	255	0	0	0	0	0		
5009											
5010			### CA commercial landings, live fish, north of 40-10								
5011			### initially assigning to fleet: 2_CA_NorthOf4010_Comm_Live								
5012	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	

	#	m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
5013	#		44cm	46cm+	repeat						
5014	1997		1	2	0	2	27	0	0	0	60
5015			180	664	852	448	164	232	0	60	0
5016			0	0	0	0	60	180	664	852	4
5017	48		164	232	0	60	0	0	0	0	0
5018	1999		1	2	0	2	22	0	0	0	0
5019			24	79	273	548	595	479	123	98	0
5020			0	0	0	0	0	24	79	273	5
5021	48		595	479	123	98	0	0	0	0	0
5022	2000		1	2	0	2	20	0	0	0	0
5023			0	57	342	270	480	540	171	102	0
5024			0	0	0	0	0	0	57	342	2
5025	70		480	540	171	102	0	0	0	0	0
5026	2001		1	2	0	2	12	0	0	0	0
5027			0	16	160	208	336	256	144	16	16
5028			0	0	0	0	0	0	0	160	2
5029	08		336	256	144	16	16	0	0	0	0
5030	2002		1	2	0	2	22	0	0	0	0
5031			0	90	535	570	640	210	50	45	0
5032	50		0	0	0	0	0	0	90	535	5
5033	70		640	210	50	45	0	50	0	0	0
5034	2004		1	2	0	2	3	0	0	0	0
5035			0	0	87	0	87	29	87	0	0
5036	0		0	0	0	0	0	0	0	87	0
5037			87	29	87	0	0	0	0	0	0
5038	2006		1	2	0	2	11	0	0	0	0
5039			20	74	66	70	316	360	130	54	0
5040			0	0	0	0	0	20	74	66	7
5041	0		316	360	130	54	0	0	0	0	0
5042	2007		1	2	0	2	16	0	0	0	0
5043			0	37	157	275	582	328	155	45	0
5044	0		0	0	0	0	0	0	37	157	2
5045	75		582	328	155	45	0	0	0	0	0
5046	2008		1	2	0	2	15	0	0	0	0
5047			0	56	56	350	420	357	210	49	0
5048			0	0	0	0	0	0	56	56	3
5049	0		420	357	210	49	0	0	0	0	0
5050	2009		1	2	0	2	13	0	0	0	0
5051			0	0	50	177	358	464	224	29	0
5052	77		358	464	224	29	0	0	0	50	1

	2010	1	2	0	0	21	2	2	0	0	21	0	0
5055	0	0	0	0	0	21	0	42	77	56	0	21	0
5056	0	0	0	0	0	0	0	0	0	0	0	0	2
5057	1	42	77	56	21	0	0	0	0	0	0	0	2
5058													
5059													
5060	### CA rec landings, PC mode, north of 40-10												
5061	### initially assigning to fleet: 3_CA_NorthOf4010_Rec_PC												
5062	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c			
5063	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm			
5064	#	44cm	46cm+	repeat									
5065	1981	1	3	0	2	1	0	0	0	0	0	0	0
5066	0	0	0	0	0	0	0	0	0	0	0	1	
5067	0	0	0	0	0	0	0	0	0	0	0	0	0
5068	0	0	0	0	0	1	0	0	0	0	0	0	
5069	1985	1	3	0	2	1	0	0	0	0	0	0	0
5070	0	0	0	0	0	1	0	0	0	0	0	0	
5071	0	0	0	0	0	0	0	0	0	0	0	0	0
5072	1	0	0	0	0	0	0	0	0	0	0	0	
5073	1995	1	3	0	2	3	0	0	0	0	0	0	0
5074	0	0	0	0	0	2	1	0	0	0	0	0	
5075	0	0	0	0	0	0	0	0	0	0	0	0	0
5076	2	1	0	0	0	0	0	0	0	0	0	0	
5077	1996	1	3	0	2	7	0	0	0	0	0	0	0
5078	0	0	0	0	4	2	0	1	0	0	0	0	
5079	0	0	0	0	0	0	0	0	0	0	0	0	4
5080	2	0	0	1	0	0	0	0	0	0	0	0	
5081	2003	1	3	0	2	1	0	0	0	0	0	0	0
5082	0	0	0	0	0	1	0	0	0	0	0	0	
5083	0	0	0	0	0	0	0	0	0	0	0	0	0
5084	1	0	0	0	0	0	0	0	0	0	0	0	
5085	2004	1	3	0	2	4	0	0	0	0	0	0	0
5086	0	0	0	0	0	0	0	1	0	1	0	1	
5087	0	1	0	0	0	0	0	0	0	0	0	0	0
5088	0	0	0	1	1	1	0	0	1	0	0	0	
5089	2005	1	3	0	2	2	0	0	0	0	0	0	0
5090	0	0	0	0	0	0	0	1	0	1	0	0	
5091	0	0	0	0	0	0	0	0	0	0	0	0	0
5092	0	0	0	1	1	0	0	0	0	0	0	0	
5093	2006	1	3	0	2	3	0	0	0	0	0	0	0
5094	0	0	0	0	1	0	0	1	0	0	1	0	
5095	0	0	0	0	0	0	0	0	0	0	0	0	1
5096	0	0	1	0	0	1	0	0	0	0	0	0	

	2007	1	3	0	2	2	11	0	0	0	0	0
5097	0	0	0	2	2	5	1	1	0	0	0	0
5098	0	0	0	0	0	0	0	0	0	2	0	2
5099	5	1	1	0	0	0	0	0	0	0	0	0
5100	1	3	0	1	2	25	0	0	0	0	0	0
5101	2008	1	3	0	3	4	5	0	8	0	1	0
5102	0	1	1	1	0	0	0	0	1	1	2	0
5103	0	0	0	0	0	0	0	0	1	1	1	3
5104	4	5	8	1	2	2	0	0	0	0	0	0
5105	1	3	0	2	21	0	0	0	0	0	0	0
5106	0	1	2	1	2	8	4	3	0	3	0	0
5107	0	0	0	0	0	0	0	1	2	0	1	1
5108	2	8	4	3	0	0	0	0	0	0	0	0
5109	2010	1	3	0	2	11	0	0	0	0	0	0
5110	0	0	0	0	0	0	3	6	1	1	0	0
5111	0	0	0	0	0	0	0	0	0	0	0	0
5112	0	3	6	1	1	0	0	0	0	0	0	0
5113	1	3	0	2	3	0	0	0	0	0	0	0
5114	0	0	1	0	0	2	0	0	0	0	0	0
5115	0	0	0	0	0	0	0	0	1	0	0	0
5116	0	2	0	0	0	0	0	0	0	0	0	0
5117	2012	1	3	0	2	32	0	0	0	0	0	0
5118	0	0	1	2	8	12	6	3	0	0	0	0
5119	0	0	0	0	0	0	0	0	1	0	0	2
5120	8	12	6	3	0	0	0	0	0	0	0	0
5121	2013	1	3	0	2	33	0	0	0	0	0	0
5122	0	0	0	5	4	8	10	6	0	0	0	0
5123	0	0	0	0	0	0	0	0	0	0	0	5
5124	4	8	10	6	0	0	0	0	0	0	0	0
5125	2014	1	3	0	2	6	0	0	0	0	0	0
5126	0	0	1	0	0	0	0	3	2	0	0	0
5127	0	0	0	0	0	0	0	0	1	0	1	0
5128	0	0	0	3	2	0	0	0	0	0	1	0
5129												
5130	### CA rec landings, PR mode, north of 40-10											
5131	### initially assigning to fleet: 4_CA_NorthOf4010_Rec_PR											
5132	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24cm		
5133	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm		
5134	#	44cm	46cm+	repeat								
5135	1981	1	4	0	2	4	0	0	0	0	0	
5136	0	1	1	1	0	0	1	0	0	1	1	
5137	0	0	1	0	0	0	1	0	0	1	0	
5138	0	0	1	0	0	0	1	0	0	1	0	

5139	1982	1	4	0	2	1	0	0	0	0	0	0	0
5140		0	0	0	0	0	0	0	0	0	0	0	0
5141		0	1	0	0	0	0	0	0	0	0	0	0
5142		0	0	0	0	0	0	0	0	1	0	0	0
5143	1983	1	4	0	2	8	0	0	1	0	4	0	0
5144		0	0	0	1	0	0	0	1	4	0	1	0
5145		1	0	0	0	0	0	0	0	0	0	0	1
5146		0	0	1	4	1	1	0	0	0	0	0	0
5147	1984	1	4	0	2	4	0	0	0	0	0	0	0
5148		0	1	0	0	0	0	0	2	0	0	0	0
5149		1	0	0	0	0	0	0	1	0	0	0	0
5150		0	0	2	0	0	1	0	0	0	0	0	0
5151	1985	1	4	0	2	11	0	0	0	3	0	4	0
5152		0	0	0	1	0	1	1	1	3	0	4	1
5153		1	0	0	0	0	0	0	0	0	0	0	1
5154		0	1	1	3	4	1	0	0	0	0	0	0
5155	1986	1	4	0	2	6	0	0	0	0	0	0	0
5156		1	0	0	1	1	1	1	1	1	0	0	0
5157		0	0	0	0	0	0	1	0	0	0	0	1
5158		1	1	1	1	0	0	0	0	0	0	0	0
5159	1987	1	4	0	2	4	0	0	0	0	0	0	0
5160		0	0	1	0	0	1	1	1	1	0	0	0
5161		0	0	0	0	0	0	0	0	1	1	0	0
5162		0	1	1	1	0	0	0	0	0	0	0	0
5163	1989	1	4	0	2	1	0	0	0	0	0	0	0
5164		0	0	1	0	0	0	0	0	0	0	0	0
5165		0	0	0	0	0	0	0	0	0	1	0	0
5166		0	0	0	0	0	0	0	0	0	0	0	0
5167	1993	1	4	0	2	16	0	0	0	0	0	0	0
5168		0	0	1	2	2	3	8	0	0	0	0	0
5169		0	0	0	0	0	0	0	0	1	0	2	0
5170		2	3	8	0	0	0	0	0	0	0	0	0
5171	1994	1	4	0	2	6	0	0	0	0	0	0	0
5172		0	0	1	3	0	0	0	2	0	0	0	0
5173		0	0	0	0	0	0	0	0	0	1	0	3
5174		0	0	2	0	0	0	0	0	0	0	0	0
5175	1995	1	4	0	2	4	0	0	0	0	0	0	0
5176		0	1	1	1	1	0	0	0	0	0	0	0
5177		0	0	0	0	0	0	0	1	1	0	1	1
5178		1	0	0	0	0	0	0	0	0	0	0	0
5179	1996	1	4	0	2	12	0	0	0	0	0	0	0
5180		0	0	3	2	3	2	2	2	0	0	0	0

5181	0	0	0	0	0	0	0	0	0	0	0	0	3	2
5182	3	2	2	0	0	0	0	0	0	0	0	0	0	1
5183	1998	1	4	0	2	0	11	0	0	0	0	0	0	1
5184	0	0	0	1	2	1	2	0	0	0	3	0	0	1
5185	1	0	0	0	0	0	1	0	0	0	0	1	0	2
5186	1	2	0	3	0	1	0	1	0	0	0	0	0	1
5187	1999	1	4	0	2	48	0	0	0	0	0	0	0	0
5188	0	2	7	14	11	8	1	4	1	7	1	1	1	1
5189	0	0	0	0	0	0	0	2	0	7	1	1	1	1
5190	4	11	8	1	4	1	0	0	0	0	0	0	0	0
5191	2000	1	4	0	2	31	0	0	0	0	0	0	0	0
5192	0	1	2	9	14	3	0	0	0	2	0	0	0	0
5193	0	0	0	0	0	0	0	0	1	2	0	0	0	9
5194	14	3	0	2	0	0	0	0	0	0	0	0	0	0
5195	2001	1	4	0	2	3	0	0	0	0	0	0	0	0
5196	0	0	0	1	0	0	0	0	0	2	0	0	1	0
5197	0	0	0	0	0	0	0	0	0	0	0	0	1	0
5198	0	0	0	0	2	0	0	0	0	0	0	0	0	0
5199	2002	1	4	0	2	7	0	0	0	0	0	0	0	0
5200	0	0	0	1	0	0	0	3	2	0	0	0	1	1
5201	0	0	0	0	0	0	0	0	0	0	0	0	1	0
5202	0	3	2	0	1	0	0	0	0	0	0	0	0	0
5203	2003	1	4	0	2	5	0	0	0	0	0	0	0	0
5204	0	0	1	3	0	0	0	0	0	1	0	0	0	0
5205	0	0	0	0	0	0	0	0	0	0	0	0	1	3
5206	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5207	2004	1	4	0	2	3	0	0	0	0	0	0	0	0
5208	1	0	0	0	0	0	0	0	2	0	0	0	0	0
5209	0	0	0	0	0	0	0	1	0	0	0	0	0	0
5210	0	0	2	0	0	0	0	0	0	0	0	0	0	0
5211	2005	1	4	0	2	36	0	0	0	0	0	0	0	0
5212	0	2	1	6	8	6	8	2	2	2	0	0	1	2
5213	0	1	0	0	0	0	0	0	2	1	0	0	1	6
5214	8	6	8	2	2	0	0	1	0	1	0	0	0	0
5215	2006	1	4	0	2	54	0	0	0	0	0	0	0	0
5216	0	3	4	11	10	15	8	2	1	4	1	0	1	1
5217	0	0	0	0	0	0	0	0	3	0	0	0	0	1
5218	1	10	15	8	2	1	0	0	0	0	0	0	0	0
5219	2007	1	4	0	2	99	0	0	0	0	0	0	0	0
5220	0	1	8	20	21	21	19	9	1	9	0	0	0	2
5221	0	21	21	19	9	0	0	0	0	8	0	0	0	2
5222	0	21	0	0	0	0	0	0	0	0	0	0	0	0

5223	2008	1	4	0	2	94	0	0	0	0	0
5224	0	0	1	6	10	27	28	13	8	1	1
5225	0	0	0	0	0	0	0	1	6	1	1
5226	0	27	28	13	8	1	0	0	0	0	0
5227	2009	1	4	0	2	73	0	0	7	0	0
5228	0	0	0	4	13	15	21	13	7	0	0
5229	0	0	0	0	0	0	0	0	4	1	1
5230	3	15	21	13	7	0	0	0	0	0	0
5231	2010	1	4	0	2	35	0	0	0	0	0
5232	0	0	0	1	4	6	10	6	5	3	4
5233	0	0	0	0	0	0	0	0	1	1	4
5234	6	10	6	5	3	0	0	0	0	0	0
5235	2011	1	4	0	2	50	0	0	0	0	0
5236	0	1	2	4	16	12	11	1	2	2	4
5237	0	1	0	0	0	0	0	1	2	2	4
5238	16	12	11	1	2	0	1	0	0	0	0
5239	2012	1	4	0	2	66	0	0	0	0	0
5240	0	1	3	3	13	19	16	9	2	3	3
5241	0	0	0	0	0	0	0	1	3	1	3
5242	13	19	16	9	2	0	0	0	0	0	0
5243	2013	1	4	0	2	62	0	0	0	0	0
5244	0	0	1	7	10	19	18	6	1	1	7
5245	0	0	0	0	0	0	0	0	1	1	7
5246	10	19	18	6	1	0	0	0	0	0	0
5247	2014	1	4	0	2	29	0	0	0	0	0
5248	0	0	1	2	5	4	5	8	4	2	2
5249	0	0	0	0	0	0	0	0	1	1	2
5250	5	4	5	8	4	0	0	0	0	0	0
5251											
5252	###	OR	Comm,	sexes	combined,	DEAD	FISHERY				
5253	###	initially		assigning		to	fleet:	5_OR_SouthernOR_Com			
5254	# m_Dead										
5255	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	
5256	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm	
5257	#	44cm	46cm+	repeat							
5258	1995	1	5	0	2	102	0	0	1	0	
5259		2.1	7	36.9	23.1	27.8	18.3	6.3	1.7	0	
5260	0	0	0	0	1	0	2.1	7	36.9	2	
5261	3.1	27.8	18.3	6.3	1.7	0	0	0	0	0	
5262	1996	1	5	0	2	118	0	0	0	0	
5263		1.1	10.4	23.9	35.6	25.9	15.2	8.1	2	0	
5264	0	0	0	0	0	0	1.1	10.4	23.9	3	

5265	5.6	25.9	15.2	8.1	2	0	0	0			
5266	1998	1	5	0	2	38	0	0	0	0	0
5267	0	3.7	6.5	28	15	3.2	5.3	1.1	0	0	
5268	0	0	0	0	0	0	0	3.7	6.5	2	
5269	8	15	3.2	5.3	1.1	0	0	0	0	0	
5270	1999	1	5	0	2	37	0	0	0	0	0
5271	0	0	11.3	14.5	6.2	2	3.1	1	0	0	
5272	0	0	0	0	0	0	0	0	11.3	1	
5273	4.5	6.2	2	3.1	1	0	0	0	0	0	
5274	2000	1	5	0	2	137	0	0	0	0	1.2
5275	1.2	5.3	37.8	45.8	26.2	20.1	14	2.2	2	2	
5276	0	0	0	0	0	1.2	1.2	5.3	37.8	4	
5277	5.8	26.2	20.1	14	2.2	2	0	0	0	0	
5278	2001	1	5	0	2	196	0	0	0	0	0
5279	0	2.3	50.2	55.4	64.2	50.2	16.2	6.6	0	0	
5280	1	0	0	0	0	0	0	2.3	50.2	5	
5281	5.4	64.2	50.2	16.2	6.6	0	1	0	0	0	
5282	2002	1	5	0	2	253	0	0	0	0	0
5283	0	0	37.3	65.3	72.3	56.8	24.2	9.1	1	1	
5284	0	0	0	0	0	0	0	0	37.3	6	
5285	5.3	72.3	56.8	24.2	9.1	1	0	0	0	0	
5286	2003	1	5	0	2	200	0	0	0	0	0
5287	0	2.4	30.1	70.7	66.8	49.1	21.9	9.8	0	0	
5288	0	0	0	0	0	0	0	2.4	30.1	7	
5289	0.7	66.8	49.1	21.9	9.8	0	0	0	0	0	
5290	2004	1	5	0	2	115	0	0	0	0	0
5291	0	1	16.8	43.3	32	17.9	9.5	3.1	0	0	
5292	0	0	0	0	0	0	0	1	16.8	4	
5293	3.3	32	17.9	9.5	3.1	0	0	0	0	0	
5294	2005	1	5	0	2	23	0	0	0	0	0
5295	0	0	4.9	4.5	6.2	2.3	5.1	2.1	0	0	
5296	0	0	0	0	0	0	0	0	4.9	4	
5297	.5	6.2	2.3	5.1	2.1	0	0	0	0	0	
5298	2006	1	5	0	2	30	0	0	0	0	0
5299	0	0	1.7	11.4	17.4	7.8	5.6	0	0	0	
5300	0	0	0	0	0	0	0	0	1.7	1	
5301	1.4	17.4	7.8	5.6	0	0	0	0	0	0	
5302	2007	1	5	0	2	44	0	0	0	0	0
5303	0	0	3.7	14.7	18.6	13.6	7.3	2.9	0	0	
5304	0	1	0	0	0	0	0	0	3.7	1	
5305	4.7	18.6	13.6	7.3	2.9	0	0	1	0	0	
5306	2008	1	5	0	2	28	0	0	0	0	0

5307	0	0	0	2	5.4	9	4	4.1	4.3	0
5308	0	0	0	0	0	0	0	0	2	5
5309	.4	9	4	4.1	4.3	0	0	0	0	
5310	2009	1	5	0	2	82	0	0	0	0
5311	0	0	0	6.2	26	28.3	15.5	12.6	4	3
5312	0	0	0	0	0	0	0	0	6.2	2
5313	6	28.3	15.5	12.6	4	3	0	0	0	
5314	2010	1	5	0	2	75	0	0	0	0
5315	0	0	0	2.1	18	19.8	24.9	9.4	7	0
5316	0	0	0	0	0	0	0	0	2.1	1
5317	8	19.8	24.9	9.4	7	0	0	0	0	
5318	2011	1	5	0	2	309	0	0	0	0
5319	0	0	0	21.2	48.9	87.4	96.9	47.1	15	5.7
5320	0	2.8	0	0	0	0	0	0	21.2	4
5321	8.9	87.4	96.9	47.1	15	5.7	0	2.8	0	
5322	2012	1	5	0	2	156	0	0	0	0
5323	1	2	8.1	22.2	31.4	45.5	30	17.2	2	
5324	0	1.1	0	0	0	0	1	2	8.1	2
5325	2.2	31.4	45.5	30	17.2	2	0	1.1	0	
5326	2013	1	5	0	2	265	0	0	0	0
5327	0	1	15.2	43.2	72.2	88.9	36.4	15.3	1	
5328	0	0	0	0	0	0	0	1	15.2	4
5329	3.2	72.2	88.9	36.4	15.3	1	0	0	0	
5330	2014	1	5	0	2	165	0	0	0	0
5331	0	0	8	25.4	49.2	50.7	24.2	8	3	
5332	0	1	0	0	0	0	0	0	8	2
5333	5.4	49.2	50.7	24.2	8	3	0	1	0	
5334										
5335	###	OR	Comm,	sexes	combined,	LIVE	FISHERY			
5336	###	initially		assigning	to	fleet:	6_OR_SouthernOR_Com			
5337	# m_Live									
5338	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c
5339	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
5340	#	44cm	46cm+	repeat						
5341	1998	1	6	0	2	100	0	0	0	0
5342	0	3.6	31	74.4	61.1	37.4	14.5	2	0	
5343	0	0	0	0	0	0	0	3.6	31	7
5344	4.4	61.1	37.4	14.5	2	0	0	0	0	
5345	1999	1	6	0	2	93	0	0	0	0
5346	5.9	7	30.6	30	13.2	15.2	7.6	2	1	
5347	0	0	0	0	0	5.9	7	30.6	3	
5348	0	13.2	15.2	7.6	2	1	0	0	0	

5349	2000	1	6	0	2	1095	0	0	0	0	0
5350		1.1	13.6	209.9	257	309.4	209.9	101.3	26.4	7.3	
5351	0	0	0	0	0	0	0	1.1	13.6	209.9	2
5352	57	309.4	209.9	101.3	26.4	7.3	0	0	0	0	
5353	2001	1	6	0	2	1858	0	0	0	0	0
5354		0	4	350.1	554	527.9	320.5	127.4	29.6	5	
5355	3	0	0	0	0	0	0	0	4	350.1	5
5356	54	527.9	320.5	127.4	29.6	5	3	0	0	0	
5357	2002	1	6	0	2	1339	0	0	0	0	0
5358		0	5.1	207.5	386.4	363.4	276	116.4	31.4	0	
5359	2	0	0	0	0	0	0	0	5.1	207.5	3
5360	86.4	363.4	276	116.4	31.4	0	2	0	0	0	
5361	2003	1	6	0	2	794	0	0	0	0	0
5362		0	1	144.5	239.7	205.8	145.4	64.1	17.3	4	
5363	1.1	0	0	0	0	0	0	0	1	144.5	2
5364	39.7	205.8	145.4	64.1	17.3	4	1.1	0	0	0	
5365	2004	1	6	0	2	586	0	0	0	0	0
5366		0	2	104.8	172.3	168.8	109.6	25.5	9.2	3.1	
5367	1	0	0	0	0	0	0	0	2	104.8	1
5368	72.3	168.8	109.6	25.5	9.2	3.1	1	0	0	0	
5369	2005	1	6	0	2	194	0	0	0	0	0
5370		0	0	26.9	46.2	53.2	44	19.3	8.3	1	
5371	0	0	0	0	0	0	0	0	0	26.9	4
5372	6.2	53.2	44	19.3	8.3	1	0	0	0	0	
5373	2006	1	6	0	2	408	0	0	0	0	0
5374		1	2	40.4	75.2	120.1	99.3	59.2	23.1	2	
5375	0	0	0	0	0	0	1	2	40.4	7	
5376	5.2	120.1	99.3	59.2	23.1	2	0	0	0	0	
5377	2007	1	6	0	2	680	0	0	0	0	0
5378		0	4	46.1	141.2	184.3	193.6	106	17.1	3	
5379	0	1	0	0	0	0	0	4	46.1	1	
5380	41.2	184.3	193.6	106	17.1	3	0	1	0	0	
5381	2008	1	6	0	2	348	0	0	0	0	0
5382		0	0	26.2	60.8	109.9	80.1	52.6	12	9.1	
5383	2.1	0	0	0	0	0	0	0	26.2	6	
5384	0.8	109.9	80.1	52.6	12	9.1	2.1	0	0	0	
5385	2009	1	6	0	2	348	0	0	0	0	0
5386		0	3.4	36.4	95.1	130.1	87.6	42.6	13.8	0	
5387	1.1	1.2	0	0	0	0	0	3.4	36.4	9	
5388	5.1	130.1	87.6	42.6	13.8	0	1.1	1.2	0	0	
5389	2010	1	6	0	2	454	0	0	0	0	0
5390		0	3.3	50.4	103.5	174.8	113.1	40.8	12.1	1	

5391	0	0	0	0	0	0	0	0	3.3	50.4	1
5392	03.5	174.8	113.1	40.8	12.1	1	0	0	0	0	0
5393	2011	1	6	0	2	688	0	0	0	0	0
5394	0	4.1	44.5	161.8	221.4	200.6	90.1	19.1	3.1	44.5	1
5395	1.1	1	0	0	0	0	0	4.1	44.5	1	
5396	61.8	221.4	200.6	90.1	19.1	3.1	1.1	1			
5397	2012	1	6	0	2	447	0	0	0	0	0
5398	0	3.1	28.1	92.3	149.9	99.9	74.6	21.5	1	28.1	9
5399	0	2	0	0	0	0	0	3.1	28.1	9	
5400	2.3	149.9	99.9	74.6	21.5	1	0	2			
5401	2013	1	6	0	2	423	0	0	0	0	0
5402	0	1.1	28.5	96.8	128	126.3	50.3	6.2	4.1		
5403	0	1	0	0	0	0	0	1.1	28.5	9	
5404	6.8	128	126.3	50.3	6.2	4.1	0	1			
5405	2014	1	6	0	2	355	0	0	0	0	0
5406	0	5.3	32.8	82.6	116.9	73.4	40.4	16.2	4.7		
5407	2	0	0	0	0	0	0	5.3	32.8	8	
5408	2.6	116.9	73.4	40.4	16.2	4.7	2	0			
5409											
5410	###	Oregon	Rec,	South,	Party/Charter						
5411	###	initially		assigning	to	fleet:	7_OR_SouthernOR_Rec				
5412	#_PC										
5413	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	
5414	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm	
5415	#	44cm	46cm+	repeat							
5416	1984	1	7	0	2	4	0	0	0	0	0
5417	0	0	0	0	2	1	0	1	0	0	0
5418	0	0	0	1	0	0	0	0	0	0	2
5419	1	0	1	0	0	0	0	0			
5420	1985	1	7	0	2	8	0	0	0	0	1
5421	0	0	1	0	0	2	0	2	0	0	1
5422	1	0	0	0	0	1	0	0	1	0	0
5423	2	0	2	0	0	1	1	0			
5424	1986	1	7	0	2	4	0	0	0	0	0
5425	0	0	0	0	0	1	2	1	0	0	0
5426	0	0	0	0	0	0	0	0	0	0	0
5427	1	2	1	0	0	0	0	0			
5428	1987	1	7	0	2	4	0	0	0	0	1
5429	0	0	1	0	0	0	1	0	0	1	0
5430	0	0	0	0	0	1	0	0	0	1	0
5431	0	1	0	0	2	7	0	0	0	0	0
5432	1988	1	7	0	2	7	0	0	0	0	0

5433	0	0	1	0	0	1	0	0	1	1	3	0	0
5434	0	0	0	1	0	0	3	0	0	0	1	0	1
5435	0	0	1	1	0	2	0	0	0	0	0	0	1
5436	1989	1	7	0	0	2	2	0	0	0	0	0	1
5437	0	0	0	0	0	0	0	1	1	0	0	0	0
5438	0	0	0	0	0	0	1	0	0	0	0	0	0
5439	0	0	1	0	0	0	0	0	0	0	0	0	0
5440	1993	1	7	0	0	2	9	0	0	0	0	0	0
5441	0	0	0	0	3	1	4	1	0	0	0	0	0
5442	0	0	0	0	0	0	0	0	0	0	0	0	3
5443	1	4	1	0	0	0	0	0	0	0	0	0	0
5444	1994	1	7	0	2	31	0	0	0	0	0	0	1
5445	1	1	4	8	3	5	3	2	1	2	2	4	2
5446	1	0	0	0	0	1	1	1	1	1	4	2	8
5447	3	5	3	2	2	2	1	1	0	0	0	0	0
5448	1995	1	7	0	2	12	0	0	0	0	0	0	0
5449	0	1	2	3	5	0	0	1	0	0	0	0	0
5450	0	0	0	0	0	0	0	1	1	2	2	0	3
5451	5	0	1	0	0	0	0	0	0	0	0	0	0
5452	1996	1	7	0	2	12	0	0	0	0	0	0	0
5453	0	0	1	1	2	3	3	1	1	1	1	1	1
5454	0	0	0	0	0	0	0	0	0	1	1	1	1
5455	2	3	3	1	1	1	0	0	0	0	0	0	0
5456	1997	1	7	0	2	29	0	0	0	0	1	1	0
5457	1	2	2	11	6	5	0	0	0	1	1	0	0
5458	0	0	0	0	1	0	1	0	2	1	2	0	1
5459	1	6	5	0	1	0	0	0	0	0	0	0	0
5460	1998	1	7	0	2	16	0	0	0	0	0	0	0
5461	0	1	2	1	4	4	1	1	3	0	0	0	0
5462	0	0	0	0	0	0	0	0	1	1	2	0	1
5463	4	4	1	3	0	0	0	0	0	0	0	0	0
5464	1999	1	7	0	2	31	0	0	0	0	0	0	0
5465	1	3	2	5	4	10	6	0	0	0	0	0	0
5466	0	0	0	0	0	0	0	1	3	0	2	0	5
5467	4	10	6	0	0	0	0	0	0	0	0	0	0
5468	2000	1	7	0	2	15	0	0	0	0	1	0	0
5469	0	0	2	4	4	3	1	0	0	0	0	0	0
5470	0	0	0	0	1	0	0	0	0	0	2	0	4
5471	4	3	1	0	0	0	0	0	0	0	0	0	0
5472	2001	1	7	0	2	96	0	17	12	0	0	0	0
5473	3	6	16	17	23	17	3	12	6	2	16	0	1
5474	0	0	0	0	0	0	0	0	0	0	0	0	0

5475	7	23	17	12	2	0	0	0	0	0	0
5476	2002	1	7	0	27	43	188	0	0	0	0
5477	2	6	19	0	0	0	50	2	30	9	2
5478	0	0	0	0	0	0	2	0	6	19	2
5479	7	43	50	30	9	2	0	0	0	0	0
5480	2003	1	7	0	2	257	0	0	0	0	0
5481	3	17	24	56	64	55	26	8	2	24	2
5482	0	2	0	0	0	0	3	17	2	24	5
5483	6	64	55	26	8	2	0	2	2	0	0
5484	2004	1	7	0	2	117	0	0	0	0	0
5485	0	2	5	13	31	31	21	13	1	5	1
5486	0	0	0	0	0	0	0	2	5	1	1
5487	3	31	31	21	13	1	0	0	0	0	0
5488	2005	1	7	0	2	137	0	0	0	0	0
5489	0	2	9	16	27	34	31	15	2	9	1
5490	0	1	0	0	0	0	0	2	0	9	1
5491	6	27	34	31	15	2	0	1	0	0	0
5492	2006	1	7	0	2	187	0	0	0	0	0
5493	0	3	8	12	40	52	49	17	6	8	1
5494	0	0	0	0	0	0	0	3	8	0	1
5495	2	40	52	49	17	6	0	0	0	0	0
5496	2007	1	7	0	2	317	0	0	0	0	0
5497	3	5	12	37	71	99	65	18	4	12	3
5498	2	1	0	0	0	0	0	5	0	12	3
5499	7	71	99	65	18	4	2	1	0	0	0
5500	2008	1	7	0	2	192	0	0	0	0	0
5501	2	3	5	16	29	48	57	23	9	5	1
5502	0	0	0	0	0	0	0	3	0	5	1
5503	6	29	48	57	23	9	0	0	0	0	0
5504	2009	1	7	0	2	106	0	0	0	0	0
5505	1	0	0	4	8	21	28	22	15	6	8
5506	1	0	0	0	0	0	1	0	4	0	8
5507	21	28	22	15	6	1	0	0	0	0	0
5508	2010	1	7	0	2	210	0	0	0	0	0
5509	1	2	10	10	22	53	72	32	8	0	0
5510	0	0	0	0	0	0	1	2	10	0	1
5511	0	22	53	72	32	8	0	0	0	0	0
5512	2011	1	7	0	2	230	0	0	0	0	0
5513	0	2	8	17	34	73	56	31	7	8	1
5514	0	2	0	0	0	0	0	2	0	0	0
5515	7	34	73	56	31	7	0	2	0	0	0
5516	2012	1	7	0	2	280	0	0	0	0	0

5517	1	1	1	3	23	63	86	69	24	9
5518	1	0	0	0	0	0	1	1	3	2
5519	3	63	86	69	24	9	1	0		
5520	2013	1	7	0	2	206	0	0	0	2
5521	1	1	8	9	44	51	63	20	6	9
5522	1	0	0	0	0	2	1	1	8	9
5523	44	51	63	20	6	1	0			
5524	2014	1	7	0	2	75	0	0	0	1
5525	0	1	0	3	17	15	25	9	3	
5526	0	1	0	0	1	0	0	1	0	3
5527	17	15	25	9	3	0	1			
5528										
5529	###	Oregon	Rec,	South	Private/Rental					
5530	###	initially		assigning	to	fleet:	8_0R_SouthernOR_Rec			
5531	# _PR									
5532	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c
5533	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
5534	#	44cm	46cm+	repeat						
5535	1980	1	8	0	2	4	0	0	0	0
5536	0	0	0	0	1	0	0	0	2	0
5537	0	1	0	0	0	0	0	0	0	1
5538	0	0	0	0	2	0	0	1		
5539	1981	1	8	0	2	2	0	0	0	0
5540	0	0	0	0	0	0	0	0	1	1
5541	0	0	0	0	0	0	0	0	0	0
5542	0	0	0	0	1	1	0	0		
5543	1982	1	8	0	2	5	0	0	0	0
5544	0	0	0	0	1	2	1	1	0	0
5545	0	0	0	0	0	0	0	0	0	1
5546	2	1	1	0	0	0	0	0		
5547	1983	1	8	0	2	1	0	0	0	0
5548	0	0	1	0	0	0	0	0	0	0
5549	0	0	0	0	0	0	0	0	1	0
5550	0	0	0	0	0	0	0	0		
5551	1984	1	8	0	2	7	0	0	0	0
5552	0	0	0	0	0	0	2	0	1	2
5553	1	1	0	0	0	0	0	0	0	0
5554	0	2	0	1	2	1	1	1		
5555	1985	1	8	0	2	11	0	0	0	0
5556	1	0	0	0	0	2	0	0	5	2
5557	1	0	0	0	0	0	1	0	0	0
5558	2	0	0	0	5	2	1	0		

5559	1986	1	8	0	0	2	1	0	0	0	0	0	0
5560		0	0	0	0	0	1	0	0	0	0	0	0
5561		0	0	0	0	0	0	0	0	0	0	0	0
5562		1	0	0	0	0	0	0	0	0	0	0	0
5563	1987	1	8	0	0	2	3	0	0	0	0	0	0
5564		0	0	1	1	0	0	1	0	0	0	0	0
5565		0	0	0	0	0	0	0	0	0	1	0	1
5566		0	1	0	0	0	0	0	0	0	0	0	0
5567	1988	1	8	0	0	2	10	0	0	0	0	0	0
5568		0	1	0	0	2	3	1	2	1	1	0	0
5569		0	0	0	0	0	0	0	0	1	0	0	2
5570		3	1	2	1	0	0	0	0	0	0	0	0
5571	1989	1	8	0	0	2	2	0	0	0	1	0	0
5572		0	0	0	1	0	0	0	0	0	0	0	0
5573		0	0	0	0	1	0	0	0	0	0	0	1
5574		0	0	0	0	0	0	0	0	0	0	0	0
5575	1993	1	8	0	0	2	10	0	0	0	0	0	0
5576		0	0	2	1	1	1	2	2	2	1	0	1
5577		0	0	0	0	0	0	0	0	0	2	2	1
5578		1	1	2	2	1	0	0	0	0	0	0	0
5579	1994	1	8	0	0	2	17	0	0	0	0	0	0
5580		0	2	3	1	2	4	2	2	3	0	0	1
5581		0	0	0	0	0	0	0	0	2	3	3	1
5582		2	4	2	3	0	0	0	0	0	0	0	0
5583	1995	1	8	0	0	2	17	0	0	0	0	0	1
5584		1	0	2	5	2	4	2	0	0	0	0	0
5585		0	0	0	0	0	1	1	0	0	2	0	5
5586		2	4	2	0	0	0	0	0	0	0	0	0
5587	1996	1	8	0	0	2	1	0	0	0	0	0	0
5588		0	0	0	0	0	0	0	1	0	0	0	0
5589		0	0	0	0	0	0	0	0	0	0	0	0
5590		0	0	1	0	0	0	0	0	0	0	0	0
5591	1997	1	8	0	0	2	42	0	0	0	0	0	0
5592		0	2	7	8	11	8	6	0	0	0	0	0
5593		0	0	0	0	0	0	0	2	0	7	0	8
5594		11	8	6	0	0	0	0	0	0	0	0	0
5595	1998	1	8	0	0	2	41	0	0	0	0	0	2
5596		1	1	3	9	13	8	2	1	1	1	1	1
5597		0	0	0	0	0	2	1	1	0	3	0	9
5598		13	8	2	1	1	0	0	0	0	0	0	0
5599	1999	1	8	0	0	2	21	0	0	0	0	0	0
5600		1	0	1	5	7	3	2	2	0	0	0	0

5601	0	0	0	0	0	0	0	0	1	0	0	1	5
5602	7	3	2	0	2	0	0	0	0	0	0	0	0
5603	2000	1	8	0	2	2	10	0	0	0	0	0	0
5604	0	2	1	0	0	3	1	0	0	3	0	0	0
5605	0	0	0	0	0	0	0	0	2	1	0	0	0
5606	3	1	0	3	0	0	0	0	0	0	0	0	0
5607	2001	1	8	0	2	81	0	0	0	0	0	0	1
5608	1	4	8	18	21	16	6	5	1	8	1	1	1
5609	0	0	0	0	0	1	1	4	8	8	1	1	1
5610	8	21	16	6	5	1	0	0	0	0	0	0	0
5611	2002	1	8	0	2	85	0	0	0	0	0	0	0
5612	1	5	13	13	19	17	11	4	2	13	2	1	1
5613	0	0	0	0	0	0	1	5	13	13	1	1	1
5614	3	19	17	11	4	2	0	0	0	0	0	0	0
5615	2003	1	8	0	2	159	0	0	0	0	0	0	0
5616	1	2	13	24	47	35	22	9	5	13	2	2	2
5617	0	1	0	0	0	0	1	2	1	13	2	2	2
5618	4	47	35	22	9	5	0	1	1	0	0	1	1
5619	2004	1	8	0	2	107	0	0	0	0	0	0	1
5620	1	1	3	8	32	34	19	6	2	2	2	2	2
5621	0	0	0	0	0	1	1	1	1	3	3	8	8
5622	32	34	19	6	2	0	0	0	0	0	0	0	0
5623	2005	1	8	0	2	200	0	0	0	0	0	0	0
5624	0	3	7	19	41	47	51	25	5	5	5	5	8
5625	1	1	0	0	0	0	0	3	7	7	1	1	1
5626	9	41	47	51	25	5	1	1	1	0	0	0	0
5627	2006	1	8	0	2	254	0	0	0	0	0	0	0
5628	1	4	14	15	52	75	65	16	7	14	14	14	1
5629	4	1	0	0	0	0	1	4	4	14	14	14	1
5630	5	52	75	65	16	7	4	1	1	0	0	0	0
5631	2007	1	8	0	2	212	0	0	0	0	0	0	0
5632	0	1	10	24	37	55	56	22	6	10	10	6	2
5633	1	0	0	0	0	0	0	1	2	10	10	2	2
5634	4	37	55	56	22	6	1	0	0	0	0	0	0
5635	2008	1	8	0	2	196	0	0	0	0	0	0	0
5636	2	3	9	22	26	45	56	24	6	24	24	6	2
5637	2	1	0	0	0	0	2	3	9	9	9	2	2
5638	2	26	45	56	24	6	2	1	1	0	0	0	0
5639	2009	1	8	0	2	169	0	0	0	0	0	0	1
5640	0	4	7	10	25	53	38	22	7	7	7	7	1
5641	2	0	0	0	0	1	0	4	7	7	7	1	1
5642	0	25	53	38	22	7	2	0	0	0	0	0	0

5643	2010	1	8	0	2	207	0	0	0	0	0
5644	0	2	6	0	24	30	52	54	32	6	6
5645	1	0	0	0	0	0	0	0	2	6	2
5646	4	30	52	54	32	6	1	0	0	0	1
5647	2011	1	8	0	2	272	0	0	0	0	1
5648	1	0	13	27	50	93	54	28	4	0	1
5649	0	1	0	0	0	1	1	0	13	2	2
5650	7	50	93	54	28	4	0	1	0	0	0
5651	2012	1	8	0	2	229	0	0	0	0	0
5652	0	1	7	24	32	62	64	26	8	7	2
5653	3	2	0	0	0	0	0	1	7	0	2
5654	4	32	62	64	26	8	3	2	0	0	1
5655	2013	1	8	0	2	261	0	0	0	0	1
5656	1	3	6	22	48	61	75	32	12	6	2
5657	0	0	0	0	0	1	1	3	0	6	2
5658	2	48	61	75	32	12	0	0	0	0	0
5659	2014	1	8	0	2	158	0	0	0	0	0
5660	1	0	4	11	25	50	42	21	4	4	1
5661	0	0	0	0	0	1	0	0	4	0	1
5662	1	25	50	42	21	4	0	0	0	0	0
5663											
5664	###	Oregon	Rec,	North,	Party/Charter						
5665	###	initially		assigning		to		fleet:	10_OR_NorthernOR_Re		
5666	# c_PC										
5667	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	
5668	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm	
5669	#	44cm	46cm+	repeat							
5670	1980	1	10	0	2	16	0	0	0	0	0
5671	2	1	0	0	3	2	4	1	2	1	1
5672	0	0	0	0	0	0	2	1	0	0	3
5673	2	4	1	2	1	0	0	0	0	0	0
5674	1981	1	10	0	2	11	0	0	0	0	0
5675	0	0	2	0	0	3	2	1	2	1	0
5676	0	0	0	0	0	0	0	0	2	2	0
5677	3	2	1	2	1	0	0	0	0	0	0
5678	1982	1	10	0	2	9	0	0	0	0	0
5679	0	0	1	0	1	1	3	0	2	0	0
5680	1	0	0	0	0	0	0	0	1	0	1
5681	1	3	0	2	0	1	0	0	0	0	0
5682	1983	1	10	0	2	2	0	0	0	0	0
5683	1	0	0	0	0	1	0	0	0	0	0
5684	0	0	0	0	0	0	1	0	0	0	0

5685	1	0	0	0	0	0	0	0	0	0	0	0	0
5686	1984	1	10	0	0	2	10	0	0	0	0	0	0
5687	0	1	0	0	1	1	2	0	3	1	1	1	1
5688	0	0	0	0	0	0	0	0	1	0	0	0	1
5689	1	2	3	1	1	1	0	0	0	0	0	0	0
5690	1985	1	10	0	0	2	9	0	0	0	0	0	0
5691	1	2	0	0	1	2	2	1	1	0	0	0	0
5692	0	0	0	0	0	0	0	1	2	0	0	0	1
5693	2	2	1	0	0	0	0	0	0	0	0	0	0
5694	1986	1	10	0	0	2	5	0	0	0	0	0	0
5695	0	0	2	0	2	0	0	0	0	1	0	0	0
5696	0	0	0	0	0	0	0	0	0	0	2	0	2
5697	0	0	0	0	1	0	0	0	0	0	0	0	0
5698	1987	1	10	0	0	2	22	0	0	0	0	0	1
5699	2	1	4	1	1	6	5	1	1	1	1	0	0
5700	0	0	0	0	0	0	1	2	1	1	4	0	1
5701	6	5	1	1	0	0	0	0	0	0	0	0	0
5702	1988	1	10	0	0	2	31	0	0	0	1	0	0
5703	1	2	6	3	2	2	8	5	2	2	6	0	3
5704	0	1	0	0	1	0	0	1	2	2	6	0	3
5705	2	8	5	2	0	0	0	0	1	1	0	0	0
5706	1989	1	10	0	0	2	37	0	1	0	0	0	0
5707	3	2	3	7	9	6	4	1	1	0	0	0	0
5708	0	1	0	1	0	0	0	3	2	2	3	0	7
5709	9	6	4	1	0	0	0	1	1	0	0	0	0
5710	1993	1	10	0	0	2	61	0	0	0	0	0	2
5711	3	4	11	15	9	11	5	0	0	0	0	0	0
5712	0	1	0	0	0	2	3	4	11	11	1	1	1
5713	5	9	11	5	0	0	0	1	0	0	0	0	0
5714	1994	1	10	0	0	2	37	0	0	0	0	0	1
5715	2	3	5	11	6	4	3	1	1	1	1	1	1
5716	0	0	0	0	0	1	2	3	3	5	0	0	1
5717	1	6	4	3	1	1	0	0	0	0	0	0	0
5718	1995	1	10	0	0	2	19	0	0	0	0	0	0
5719	0	2	3	5	2	5	1	0	1	1	0	0	0
5720	0	0	0	0	0	0	0	0	2	3	0	0	5
5721	2	5	1	1	0	0	0	0	0	0	0	0	0
5722	1996	1	10	0	0	2	19	0	0	0	0	0	0
5723	1	0	5	4	5	1	2	0	0	0	1	0	0
5724	0	0	0	0	0	0	1	0	0	5	0	0	4
5725	5	1	2	0	1	1	0	0	0	0	0	0	0
5726	1997	1	10	0	0	2	31	0	0	0	0	0	0

5727	0	0	1	4	0	10	5	8	1	1	1	1
5728	0	5	8	1	0	1	1	0	0	1	4	1
5729	1998	1	10	0	2	36	0	0	0	0	1	0
5730	1	3	7	11	2	9	2	0	2	0	1	0
5731	0	0	0	1	0	0	0	1	3	0	7	1
5732	1	2	9	2	0	0	0	0	3	0	7	1
5733	1999	1	10	0	2	79	0	0	0	0	0	4
5734	5	7	11	9	22	19	1	1	1	1	0	0
5735	0	0	0	0	4	5	7	11	11	11	9	9
5736	22	19	1	1	0	0	0	0	0	0	0	0
5737	2000	1	10	0	2	36	0	0	0	0	0	1
5738	3	2	4	3	8	9	5	0	0	0	0	1
5739	0	0	0	0	0	1	3	2	4	4	3	3
5740	8	9	5	0	1	0	0	0	0	0	0	0
5741	2001	1	10	0	2	161	0	0	0	0	0	3
5742	6	13	14	35	42	29	11	5	2	13	14	3
5743	1	0	0	0	0	3	6	11	13	14	14	3
5744	5	42	29	11	5	2	1	0	0	0	0	2
5745	2002	1	10	0	2	345	0	0	0	0	0	0
5746	11	32	51	64	84	72	22	6	51	51	0	6
5747	1	0	0	0	0	2	11	32	51	51	6	6
5748	4	84	72	22	6	0	0	0	0	0	0	0
5749	2003	1	10	0	2	229	0	0	0	0	0	0
5750	4	16	33	54	38	53	26	5	0	0	0	0
5751	0	0	0	0	0	0	4	16	33	33	5	5
5752	4	38	53	26	5	0	0	0	0	0	0	0
5753	2004	1	10	0	2	151	0	0	0	0	0	2
5754	0	5	12	38	44	41	8	1	0	0	0	0
5755	0	0	0	0	0	2	0	5	12	12	3	3
5756	8	44	41	8	1	0	0	0	0	0	0	0
5757	2005	1	10	0	2	220	0	0	0	0	0	0
5758	1	10	19	30	58	63	30	8	19	19	1	3
5759	0	0	0	0	0	1	1	10	10	10	10	3
5760	0	58	63	30	8	1	0	0	0	0	0	0
5761	2006	1	10	0	2	221	0	0	0	0	0	0
5762	3	8	15	35	54	61	38	5	15	15	1	3
5763	0	1	0	0	0	0	3	8	15	15	1	3
5764	5	54	61	38	5	1	0	0	0	0	0	0
5765	2007	1	10	0	2	301	0	0	0	0	0	1
5766	5	11	27	49	63	95	34	12	27	27	2	4
5767	1	0	0	0	1	1	11	11	11	11	11	4
5768	1	1	0	0	0	0	0	0	0	0	0	0

5769	9	63	95	34	12	2	1	1				
5770	2008	1	10	0	2	396	0	0	0	0	0	4
5771	9	18	29	37	0	93	117	68	17	2		
5772	1	0	0	0	0	4	9	18	29	2		3
5773	7	93	117	68	17	2	1	1				
5774	2009	1	10	0	2	286	0	0	0	0	0	2
5775	4	15	35	50	47	71	47	12	0	35		5
5776	0	3	0	0	0	2	4	15				
5777	0	47	71	47	12	0	0	3				
5778	2010	1	10	0	2	228	0	0	0	0	0	0
5779	0	10	23	43	42	55	43	11	1			
5780	0	0	0	0	0	0	0	10	23			4
5781	3	42	55	43	11	1	0	0				
5782	2011	1	10	0	2	273	0	0	0	0	0	0
5783	1	8	16	49	65	69	45	16	4			
5784	0	0	0	0	0	0	1	8	16			4
5785	9	65	69	45	16	4	0	0				
5786	2012	1	10	0	2	213	0	0	0	0	0	0
5787	1	2	11	31	33	65	48	15	5			
5788	2	0	0	0	0	0	1	2	11	3		
5789	1	33	65	48	15	5	2	0				
5790	2013	1	10	0	2	202	0	0	0	0	0	0
5791	0	1	10	30	48	54	41	15	3			
5792	0	0	0	0	0	0	0	1	10			3
5793	0	48	54	41	15	3	0	0				
5794	2014	1	10	0	2	58	0	0	0	0	0	0
5795	1	1	4	7	9	15	13	6	2			
5796	0	0	0	0	0	0	1	1	4			7
5797	9	15	13	6	2	0	0	0				
5798												
5799	## #Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm			
5800	# 24cm	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm			4
5801	# 2cm	44cm	46cm+	repeat	m20	m22	m24	m26	m28			m3
5802	# 0	m32	m34	m36	m38	m40	m42	m44	m46			
5803	## 2004	-1	10	0	1	23	0	0	0			
5804	# 2	3	5	2	5	3	0	3	0			
5805	# 0	0	0	0	0	0	2	3	5			2
5806	# 5	3	0	3	0	0	0	0	0			
5807	## 2014	-1	-10	0	1	23	0	0	0			
5808	# 2	3	5	2	5	3	0	3	0			0
5809	# 0	0	0	0	0	0	2	3	5			2
5810	# 5	3	0	3	0	0	0	0	0			

5811  
 5812   ###      Oregon Rec,      North,    Private/Rental  
 5813   ###      initially        assigning        to        fleet: 11\_OR\_NorthernOR\_Re  
 5814   # c\_PR  
 5815   #Yr      Seas      Flt/Svy    Gender    Part      Nsamp      18cm      20cm      22cm      24c  
 5816   # m      26cm      28cm      30cm      32cm      34cm      36cm      38cm      40cm      42cm  
 5817   #      44cm      46cm+      repeat  
 5818   1980      1      11      0      2      2      0      0      0      0      0      0      0  
 5819      0      0      0      0      0      0      0      1      1      1      0      0  
 5820      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5821      0      0      0      1      1      0      0      0      0      0  
 5822   1982      1      11      0      2      8      0      0      0      0      0      0      0  
 5823      0      0      0      0      0      2      2      2      2      2      0      0      0  
 5824      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5825      2      2      2      2      2      0      0      0      0      0      0      0      0  
 5826   1984      1      11      0      2      4      0      0      0      0      0      0      0  
 5827      0      0      0      1      1      0      0      0      0      1      1      1  
 5828      0      0      0      0      0      0      0      0      0      0      1      1      1  
 5829      0      0      0      0      1      1      0      0      0  
 5830   1985      1      11      0      2      6      0      0      0      0      0      0      0  
 5831      0      0      1      1      1      2      1      1      1      0      0      0      0  
 5832      0      0      0      0      0      0      0      0      0      0      1      1      1  
 5833      2      1      1      1      0      0      0      0      0  
 5834   1987      1      11      0      2      7      0      0      0      0      0      1      1  
 5835      0      0      0      0      0      1      1      1      1      2      1      0      0  
 5836      0      0      0      0      0      0      1      0      0      0      0      0      0  
 5837      1      1      1      1      2      1      0      0      0  
 5838   1988      1      11      0      2      1      0      0      0      0      0      0      0  
 5839      0      1      0      0      0      0      0      0      0      0      0      0      0  
 5840      0      0      0      0      0      0      0      0      1      0      0      0      0  
 5841      0      0      0      0      0      0      0      0      0  
 5842   1989      1      11      0      2      1      0      0      0      0      0      0      0  
 5843      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5844      1      0      0      0      0      0      0      0      0      0      0      0      0  
 5845      0      0      0      0      0      0      0      1      0  
 5846   1993      1      11      0      2      25      0      0      0      0      0      0      1  
 5847      0      0      7      6      5      1      1      5      0      0      0      0      0  
 5848      0      0      0      0      0      1      0      0      0      0      7      0      6  
 5849      5      1      5      0      0      0      0      0      0      0      0      0      0  
 5850   1994      1      11      0      2      7      0      0      0      0      0      0      0  
 5851      0      0      0      1      2      2      0      0      1      0      1      0      0  
 5852      0      0      0      0      0      0      0      0      1      0      1      1      2

5853	2	0	1	1	0	0	0	0	0	0	0	0	0
5854	1996	1	11	0	2	2	0	0	0	0	0	0	0
5855	0	0	0	0	0	1	1	0	0	0	0	0	0
5856	0	0	0	0	0	0	0	0	0	0	0	0	0
5857	1	1	0	0	0	0	0	0	0	0	0	0	0
5858	1997	1	11	0	2	6	0	0	0	0	0	0	0
5859	0	0	0	2	1	1	1	1	0	0	0	0	0
5860	0	0	0	0	0	0	0	0	0	0	2	0	1
5861	1	1	1	1	0	0	0	0	0	0	0	0	0
5862	1998	1	11	0	2	10	0	0	0	0	0	0	0
5863	0	0	0	2	2	4	1	1	0	0	0	0	0
5864	0	0	0	0	0	0	0	0	0	0	2	0	2
5865	4	1	1	0	0	0	0	0	0	0	0	0	0
5866	1999	1	11	0	2	6	0	0	0	0	0	0	2
5867	0	0	0	0	0	0	3	0	0	1	0	0	0
5868	0	0	0	0	0	2	0	0	0	0	0	0	0
5869	0	3	0	0	1	0	0	0	0	0	0	0	0
5870	2000	1	11	0	2	4	0	0	0	0	0	0	0
5871	0	0	0	0	0	1	3	0	0	0	0	0	0
5872	0	0	0	0	0	0	0	0	0	0	0	0	0
5873	1	3	0	0	0	0	0	0	0	0	0	0	0
5874	2001	1	11	0	2	35	0	0	0	0	0	0	0
5875	0	0	2	6	8	9	6	4	0	0	0	0	0
5876	0	0	0	0	0	0	0	0	0	0	2	0	6
5877	8	9	6	4	0	0	0	0	0	0	0	0	0
5878	2002	1	11	0	2	26	0	0	0	0	0	0	0
5879	0	0	3	9	3	7	3	1	0	0	3	0	9
5880	0	0	0	0	0	0	0	0	0	0	3	0	9
5881	3	7	3	1	0	0	0	0	0	0	0	0	0
5882	2003	1	11	0	2	40	0	0	0	0	0	0	0
5883	0	1	6	6	8	12	5	2	0	0	0	0	0
5884	0	0	0	0	0	0	0	1	0	0	6	0	6
5885	8	12	5	2	0	0	0	0	0	0	0	0	0
5886	2004	1	11	0	2	20	0	0	0	0	0	0	0
5887	0	0	1	5	7	2	5	0	0	0	0	0	0
5888	0	0	0	0	0	0	0	0	0	0	1	0	5
5889	7	2	5	0	0	0	0	0	0	0	0	0	0
5890	2005	1	11	0	2	62	0	0	0	0	0	0	0
5891	0	1	2	8	14	19	13	3	0	0	2	0	8
5892	0	0	0	0	0	0	0	1	0	0	2	0	0
5893	14	19	13	3	2	51	0	0	0	0	0	0	0
5894	2006	1	11	0	2	51	0	0	0	0	0	0	0

```

5895      0   0   0   2   5   13   15   13   2   1
5896      0   0   0   0   0   0   0   0   0   1
5897     13   15   13   2   1   69   0   0   0   0
5898 2007   1   11   0   2   69   0   0   0   0
5899      0   0   0   4   7   14   21   18   3   0
5900      0   0   0   0   0   2   0   0   0   4
5901     14   21   18   3   0   0   0   0   0   7
5902 2008   1   11   0   2   123   0   0   0   1
5903     1   4   6   5   20   48   29   7   2   2
5904      0   0   0   0   1   0   1   4   6   5
5905     20   48   29   7   2   0   0   0   0   1
5906 2009   1   11   0   2   92   0   0   0   0
5907     1   4   5   15   11   27   25   2   2   2
5908      0   0   0   0   0   0   1   4   5   1
5909     5   11   27   25   2   2   0   0   0   1
5910 2010   1   11   0   2   97   0   0   0   0
5911      0   1   8   9   20   24   23   9   3   3
5912      0   0   0   0   0   0   1   8   8   9
5913     20   24   23   9   3   0   0   0   0   9
5914 2011   1   11   0   2   111   0   0   0   0
5915      0   1   8   13   20   23   32   13   13   1
5916      0   0   0   0   0   0   1   8   8   1
5917     3   20   23   32   13   1   0   0   0   1
5918 2012   1   11   0   2   124   0   0   0   0
5919     1   2   2   11   13   48   35   10   2   2
5920      0   0   0   0   0   0   1   2   2   1
5921     1   13   48   35   10   2   0   0   0   0
5922 2013   1   11   0   2   123   0   0   0   0
5923      0   0   2   17   24   37   33   10   0   0
5924      0   0   0   0   0   0   0   2   2   1
5925     7   24   37   33   10   0   0   0   0   0
5926 2014   1   11   0   2   29   0   0   0   0
5927      0   1   0   1   3   11   9   3   1   1
5928      0   0   0   0   0   0   0   0   0   1
5929      3   11   9   3   1   0   0   0   0   1
5930
5931 47 #_N_age_bins
5932 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
5933 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
5934 2 #_N_ageerror_definitions
5935 # Default ageing error matrix (1st row is expected age, 2nd is standard dev
5936 # iation of age readings)

```

```

5937 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
5938 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
5939 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
5940 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
5941 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
5942 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
5943 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
5944 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
5945 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
5946 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
5947 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5
5948 10.5 11.5 12.5 13.5 14.5 15.5 16.5 17.5 18.5
5949 19.5 20.5 21.5 22.5 23.5 24.5 25.5 26.5 27.5 2
5950 8.5 29.5 30.5 31.5 32.5 33.5 34.5 35.5 36.5 37.5
5951 38.5 39.5 40.5 41.5 42.5 43.5 44.5 45.5 46.5
5952 47.5 48.5 49.5 50.5 51.5 52.5 53.5 54.5 55.5 56
5953 .5 57.5 58.5 59.5 60.5 61.5 62.5 63.5 64.5 65.5
5954 66.5 67.5 68.5 69.5 70.5 71.5 72.5 73.5 74.5
5955 75.5 76.5 77.5 78.5 79.5 80.5 ### 81.5 82.5 83.
5956 # 5 84.5 85.5 86.5 87.5 88.5 89.5 90.5 #Expected_ag
5957 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
5958 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
5959 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
5960 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
5961 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
5962 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
5963 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
5964 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
5965 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
5966 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD

5967
5968
5969
5970
5971
5972
5973
5974
5975 #####
5976 # Ageing error for ages associated with early years from former NWFSC age r
5977 # eader (1st row is expected age, 2nd is standard deviation of age readings
5978 # )

```

```

5979 #
5980 #
5981 #
5982 #
5983 #
5984 # #####
5985 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
5986 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
5987 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
5988 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
5989 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
5990 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
5991 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
5992 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
5993 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
5994 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
5995 0.43 1.29 2.16 3.02 3.88 4.75 5.61 6.47 7.33 8.2
5996 0 9.06 9.92 10.79 11.65 12.51 13.37 14.24 15.10 15.96
5997 16.83 17.69 18.55 19.41 20.28 21.14 22.00 22.86 23.73 2
5998 4.59 25.45 26.32 27.18 28.04 28.90 29.77 30.63 31.49 32.3
5999 6 33.22 34.08 34.94 35.81 36.67 37.53 38.40 39.26 40.12
6000 40.98 41.85 42.71 43.57 44.44 45.30 46.16 47.02 47.89 48
6001 .75 49.61 50.47 51.34 52.20 53.06 53.93 54.79 55.65 56.51
6002 57.38 58.24 59.10 59.97 60.83 61.69 62.55 63.42 64.28
6003 65.14 66.01 66.87 67.73 68.59 69.46 ### 70.32 71.18 72.
6004 # 05 72.91 73.77 74.63 75.50 76.36 77.22 78.09 #Expected_ag
6005 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
6006 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
6007 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
6008 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
6009 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
6010 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
6011 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
6012 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
6013 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
6014 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD
6015
6016 #154 #_N_Agecomp_obs
6017 186 #_N_Agecomp_obs
6018 3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
6019 0 #_combine males into females at or below this bin number
6020

```

```

6021 ### OR Comm, dead landings, expanded by catch (mainly southern OR, landed d
6022 # ead); 17/1393 fish from "live" fishery dropped; is dead catch representat
6023 # ive of live fishery?
6024 ### initially assigning to fleet: "5_OR_SouthernOR_Comm_Dead"
6025 ### negative fleet because these data are represented below as conditioned
6026 # on length
6027 #fishyr season fleet gender part ageErr LbinLo LbinHi Nsamps A4
6028 # A5 A6 A7 A8 A9 A10 A11 A12 A13
6029 # A14 A15 A16 A17 A18 A19 A20 A21 A22
6030 # A23 A24 A25 A26 A27 A28 A29 A30 A31
6031 # A32 A33 A34 A35 A36 A37 A38 A39 A40
6032 # A41 A42 A43 A44 A45 A46 A47 A48 A49
6033 # A50 repeat
6034 2001 1 -5 0 2 1 -1 -1 47 0
6035 0 0 0 1.29 3.04 4.66 1 1.07 2
6036 6.57 1.07 2.07 6.62 2.82 5.27 3.82 3.07 1.07 1
6037 1.07 0 1 1.29 0 1 1 0 0 1
6038 0 0 0 0 0 1.07 1.75 0 0 0
6039 0 0 0 0 0 0 0 0 3.12 0
6040 0 0 0 1.29 3.04 4.66 1 1.07 2
6041 6.57 1.07 2.07 6.62 2.82 5.27 3.82 3.07 1.07
6042 1 1.07 0 1 1.29 0 1 1 0 1
6043 0 0 0 0 0 1.07 1.75 0 0 0
6044 2002 1 -5 0 2 1 -1 -1 121 0
6045 0 0 2.01 4.23 11.34 9.14 6.12 1 9.32
6046 7.42 10.11 9.07 4 6.17 15.77 3.39 4.16 2.06 4
6047 .24 2.21 2 0 1.06 0 3.54 0 1.3 0
6048 0 0 1 1.16 1.21 0 0 0 0 0
6049 0 0 0 1.01 0 0 0 0 3.03 0
6050 0 0 2.01 4.23 11.34 9.14 6.12 1 9.32
6051 7.42 10.11 9.07 4 6.17 15.77 3.39 4.16 2.06
6052 4.24 2.21 2 0 1.06 0 3.54 0 1.3 0
6053 0 0 1 1.16 1.21 0 0 0 0 0
6054 2003 1 -5 0 2 1 -1 -1 181 0
6055 0 0 0 0 10.58 19 20.27 15.74 13.46
6056 9.49 10.88 14.14 8.67 13.88 9.89 13.47 12.06 10.16 4
6057 .27 4.82 7.15 1.37 1 1.35 3.89 0 1.35 1.22
6058 2 4.08 0 0 1.02 0 1 0 0 0
6059 2.05 1.05 0 0 0 0 0 0 3.76 0
6060 0 0 0 0 10.58 19 20.27 15.74 13.46
6061 9.49 10.88 14.14 8.67 13.88 9.89 13.47 12.06 10.16
6062 4.27 4.82 7.15 1.37 1 1.35 3.89 0 1.35 1.2

```

6063	2	2	4.08	0	0	0	1.02	0	1	0	0	0
6064	2004	1	-5	0	0	2	1	-1	-1	55	0	0
6065	0	0	0	0	0	1.01	4.09	7.18	7.12	3	3	4
6066	0	6.52	2	2	1.02	1.02	4.02	4.08	1	0	1	4
6067	.08	3.03	0	0	0	0	2.02	1	0	0	0	1
6068	1	0	0	0	0	0	0	0	0	0	0	0
6069	0	0	0	1.02	0	0	0	0	0	0	0	0
6070	0	0	0	0	0	1.01	4.09	7.18	7.12	3	3	4
6071	0	6.52	2	2	1.02	1.02	4.02	4.08	1	0	0	1
6072	4.08	3.03	0	0	0	0	2.02	1	0	0	0	1
6073	1	0	0	0	0	0	0	0	0	0	0	0
6074	2005	1	-5	0	2	1	-1	-1	-1	14	0	0
6075	0	0	1	0	0	0	0	1	0	0	1	1
6076	1	0	1.64	0	0	3	0	0	0	0	0	1
6077	0	1	0	1.64	0	0	0	0	0	0	0	0
6078	0	0	0	0	1.6	0	0	1	0	0	0	0
6079	0	0	0	0	0	0	0	0	0	1.6	0	0
6080	0	0	0	1	0	0	0	0	1	0	0	1
6081	1	0	1.64	0	0	3	0	0	0	0	0	0
6082	1	0	1	0	1.64	0	0	0	0	0	0	0
6083	0	0	0	0	1.6	0	0	1	0	0	0	0
6084	2006	1	-5	0	2	1	-1	-1	-1	29	0	0
6085	0	0	0	0	0	0	0	4.88	2.88	4.88	4.88	4.88
6086	2.75	2	2.14	0	1.75	0	1	1	1	0	0	3
6087	.5	1	4.92	0	0	1	0	0	0	1.74	0	1
6088	0	0	0	0	0	0	0	1.42	0	0	0	0
6089	0	0	0	0	0	0	0	0	0	0	0	0
6090	0	0	0	0	0	0	0	4.88	2.88	4.88	4.88	4.88
6091	2.75	2	2.14	0	1.75	0	1	1	1	0	0	0
6092	3.5	1	4.92	0	0	1	0	0	0	1.74	0	1
6093	0	0	0	0	0	0	0	1.42	0	0	0	0
6094	2007	1	-5	0	2	1	-1	-1	-1	40	0	0
6095	0	0	0	0	0	0	0	0	0	5.55	4.07	4.07
6096	5.27	5.78	1.52	1.75	2	4.03	1.52	3.52	4.55	1	1	1
6097	.75	1.52	1	3.03	1.4	0	0	0	1.52	0	0	0
6098	0	0	0	0	1	0	0	0	0	0	0	0
6099	0	0	1.52	0	0	0	0	0	0	2.52	0	0
6100	0	0	0	0	0	0	0	0	0	5.55	4.07	4.07
6101	5.27	5.78	1.52	1.75	2	4.03	1.52	3.52	4.55	1	1	1
6102	1.75	1.52	1	3.03	1.4	0	0	0	1.52	0	0	0
6103	0	0	0	0	1	0	0	0	0	0	0	0
6104	2008	1	-5	0	2	1	-1	-1	-1	26	0	0

6105	0	0	0	0	0	0	1	1	0	0	0	0	5.27
6106	1	2	2	0	0	0	1	0	2	2	0	0	1.12
6107	.02	1.02	2.05	1.05	0	0	1.02	2	0	0	0	0	0
6108	0	0	0	0	0	0	0	0	0	0	0	0	0
6109	0	0	0	0	0	0	0	0	0	0	0	0	1.27
6110	0	0	0	0	0	0	1	0	0	0	0	0	5.27
6111	1	2	2	0	0	1	0	0	2	0	0	0	1.12
6112	3.02	1.02	2.05	1.05	0	0	1.02	2	0	0	0	0	0
6113	0	0	0	0	0	0	0	0	0	0	0	0	0
6114	2009	1	-5	0	2	1	-1	-1	79	0			
6115	0	0	0	2.13	2.12	3.33	4.1	2	3.02				
6116	4.77	9.77	5.03	8.19	1	3.02	3	1	3.75	3			
6117	.77	7.1	4.02	1.75	3.05	3.18	1	1	1.11	1			
6118	0	1	0	0	0	0	0	0	0	0	0	0	0
6119	0	0	0	1.75	0	0	0	0	0	0	0	2.75	0
6120	0	0	0	2.13	2.12	3.33	4.1	2	3.02				
6121	4.77	9.77	5.03	8.19	1	3.02	3	1	3.75				
6122	3.77	7.1	4.02	1.75	3.05	3.18	1	1	1.11	1			
6123	0	1	0	0	0	0	0	0	0	0	0	0	0
6124	2010	1	-5	0	2	1	-1	-1	65	0			
6125	0	0	0	0	0	0	1	1	5.12	1.75	3.05		
6126	5.8	5.26	4.23	5	3.02	1	3	1.2	0	0	0	0	0
6127	2	2	3	5	2	3	2.05	1	3.05				
6128	2.32	0	1.54	0	0	0	1	0	0	0	0	0	0
6129	0	0	0	0	0	0	0	0	1	0	0	0	0
6130	0	0	0	0	0	0	1	5.12	1.75	3.05			
6131	5.8	5.26	4.23	5	3.02	1	3	1.2	0				
6132	0	2	2	3	5	2	3	2.05	1	3.05			
6133	5	2.32	0	1.54	0	0	1	0	0	0	0	0	0
6134	2011	1	-5	0	2	1	-1	-1	307	0			
6135	0	0	1	1	5	3.21	7.49	27.48	7.08				
6136	10.89	8.04	17.17	21.74	29.1	24.18	18.03	6.75	9.17	8			
6137	.5	10.12	10.45	13.78	15.57	14.23	5.05	6.05	5.04	5.11			
6138	3.35	4.04	1	2	2	1	0	0	2.03	2			
6139	1.03	1	1	1	2	0	0	0	6.5	0			
6140	0	0	1	1	5	3.21	7.49	27.48	7.08				
6141	10.89	8.04	17.17	21.74	29.1	24.18	18.03	6.75	9.17				
6142	8.5	10.12	10.45	13.78	15.57	14.23	5.05	6.05	5.04	5.1			
6143	1	3.35	4.04	1	2	2	1	0	2.03	2			
6144	2012	1	-5	0	2	1	-1	-1	152	0			
6145	0	0	0	2	4.02	4	7.15	6.09	8.39				
6146	2.1	3.03	5.02	4.16	6.91	16.04	10.09	4.14	6.3	5			

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6147      2        4.24      8.26      3.06      9.19      4        9.28      2        5
6148      3        1        1        2        0        0        0        2        0
6149      2.16     0        0        2        0        0        0        1        1        0
6150      0        0        0        2        4.02      4        7.15      6.09      8.39
6151      2.1      3.03      5.02      4.16      6.91      16.04     10.09     4.14      6.3
6152      5        2        4.24      8.26      3.06      9.19      4        9.28      2        5
6153      3        1        1        2        0        0        0        2        0
6154 2013      1        -5        0        2        1        -1        -1        260      0
6155      0        0        0        4.02      2.11      12.32      5.22      4.03      4
6156      23.32     10.12     3.03     14.93     13.45     19.32     11.33     17.29     11.31     1
6157      1.11      7.09      5.77      9.08      8.2       9.23      3.19      13.18     10.14     9.04
6158      3.02      3.01      5.3       2.75      1        0        2        0        0
6159      1        1.02     0        2.06      0        0        0        0        4.25      0
6160      0        0        0        4.02      2.11      12.32      5.22      4.03      4
6161      23.32     10.12     3.03     14.93     13.45     19.32     11.33     17.29     11.31
6162      11.11     7.09      5.77      9.08      8.2       9.23      3.19      13.18     10.14     9.0
6163      4        3.02     3.01      5.3       2.75      1        0        2        0        0
6164
6165 #### OR Rec South, 2005-2013, all modes combined,no BARSS
6166 #### initially assigning to fleet: "7_OR_SouthernOR_Rec_PC"
6167 #### negative fleet because these data are represented below as conditioned
6168 # on length
6169 #fishyr season fleet gender part      ageErr LbinLo LbinHi Nsamps A4
6170 #      A5      A6      A7      A8      A9      A10     A11     A12     A13
6171 #      A14     A15     A16     A17     A18     A19     A20     A21     A22
6172 #      A23     A24     A25     A26     A27     A28     A29     A30     A31
6173 #      A32     A33     A34     A35     A36     A37     A38     A39     A40
6174 #      A41     A42     A43     A44     A45     A46     A47     A48     A49
6175 # A50      repeat
6176 2005      1      -7        0        2        1        -1        -1        32      0
6177      0        0        0        1        1        1        3        2        5        0
6178      3        3        3        1        0        0        2        2        1        1        1
6179      1        1        1        0        0        0        0        0        0        0        0
6180      0        0        0        0        0        1        0        0        0        0        0
6181      0        0        0        0        0        0        0        0        0        0        0
6182      0        0        0        0        1        1        3        2        5        0
6183      3        3        3        1        0        0        2        2        1        1
6184      1        1        1        0        0        0        0        0        0        0        0
6185      0        0        0        0        0        1        0        0        0        0        0
6186 2006      1      -7        0        2        1        -1        -1        32      0
6187      0        0        1        1        0        0        0        0        0        0        4
6188      3        2        2        4        4        0        0        1        1        2        1

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6189	1	1	1	1	0	0	1	0	0	1	0	0	1
6190	0	0	0	0	0	0	0	0	0	0	0	0	0
6191	0	0	0	0	0	0	0	0	0	0	0	0	0
6192	0	0	0	1	1	0	0	0	0	0	0	0	4
6193	3	2	2	4	4	0	0	1	1	1	1	2	0
6194	1	1	1	1	0	0	1	0	1	0	0	0	1
6195	0	0	0	0	0	0	0	0	0	0	0	0	0
6196	2007	1	-7	0	2	1	-1	-1	-1	37	0	0	0
6197	0	0	1	0	0	3	1	1	0	1	0	1	0
6198	3	2	2	0	4	1	1	1	3	0	0	0	3
6199	2	2	3	3	1	0	0	0	0	0	0	0	0
6200	1	0	0	0	0	0	0	0	0	0	0	0	0
6201	0	0	0	0	0	0	0	0	0	0	0	0	0
6202	0	0	1	0	0	3	1	1	0	1	0	0	1
6203	3	2	2	0	4	1	1	1	3	0	0	0	0
6204	3	2	2	3	3	1	0	0	0	0	0	0	0
6205	1	0	0	0	0	0	0	0	0	0	0	0	0
6206	2008	1	-7	0	2	1	-1	-1	-1	31	0	0	0
6207	0	0	0	1	2	0	0	1	2	1	5	0	0
6208	3	3	0	3	0	1	1	2	0	0	1	0	1
6209	1	1	0	0	1	0	1	0	0	0	0	0	0
6210	1	0	0	0	0	0	0	0	0	0	0	0	0
6211	0	0	0	0	0	0	0	0	0	1	0	1	0
6212	0	0	0	0	1	2	0	0	1	2	1	5	0
6213	3	3	0	3	0	1	1	2	0	0	1	0	1
6214	1	1	1	0	1	0	1	0	0	0	0	0	0
6215	1	0	0	0	0	0	0	0	0	0	0	0	0
6216	2009	1	-7	0	2	1	-1	-1	-1	23	0	0	0
6217	0	0	0	0	0	0	0	1	1	1	0	0	0
6218	2	3	4	4	1	1	1	1	0	0	0	0	0
6219	1	0	0	0	0	3	1	0	0	0	0	0	0
6220	0	0	0	0	0	0	0	0	0	0	0	0	0
6221	0	0	0	0	0	0	0	0	0	0	0	0	0
6222	0	0	0	0	0	0	0	1	1	1	0	0	0
6223	2	3	4	4	1	1	1	1	0	0	0	0	0
6224	0	1	0	0	0	3	1	0	0	0	0	0	0
6225	0	0	0	0	0	0	0	0	0	0	0	0	0
6226	2010	1	-7	0	2	1	-1	-1	-1	37	0	0	0
6227	0	0	1	0	0	0	0	0	0	1	1	0	0
6228	0	1	3	3	3	4	2	2	1	0	1	0	0
6229	2	1	1	0	1	2	0	2	1	1	1	1	0
6230	1	1	0	1	1	0	1	1	1	1	1	1	0

6231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6232	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0
6233	0	1	3	3	0	3	0	4	2	2	0	1	0	1	0
6234	0	2	1	1	1	2	3	2	0	1	0	1	1	1	0
6235	1	1	0	0	1	0	0	0	1	1	-1	1	1	1	1
6236	2011	1	-7	0	0	2	1	-1	-1	-1	75	0			
6237	0	0	0	0	2	3	2	1	1	6	3	3	6	3	
6238	3	0	1	4	4	9	3	3	3	3	1	3	1	1	5
6239	2	3	1	1	3	2	3	1	1	6	0	0	0	2	
6240	1	2	1	0	0	1	0	1	0	0	0	0	1		
6241	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
6242	0	0	0	0	2	3	2	1	1	6	3	3	6	3	
6243	3	0	1	4	4	9	3	3	3	3	1	3	1	1	
6244	5	2	3	1	1	3	2	3	1	1	0	0	0	2	
6245	1	2	1	0	0	0	1	0	0	0	0	0	0	1	
6246	2012	1	-7	0	0	2	1	-1	-1	-1	27	0			
6247	0	0	0	2	2	1	1	0	1	0	0	0	0	1	
6248	1	1	0	3	1	4	1	1	0	0	0	0	0	0	0
6249	0	2	2	1	1	1	1	1	1	1	0	0	0	2	
6250	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
6251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6252	0	0	0	0	2	1	1	0	1	0	0	0	0	1	
6253	1	1	0	3	1	4	1	1	0	0	0	0	0	0	
6254	0	0	2	2	1	1	1	1	1	1	0	0	0	2	
6255	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
6256	2013	1	-7	0	0	2	1	-1	-1	-1	65	0			
6257	0	0	1	1	0	0	0	2	2	2	2	2	2	0	
6258	1	4	1	5	6	3	3	2	3	2	2	6	2	1	
6259	2	3	3	3	1	1	1	2	2	0	0	0	0	0	
6260	3	0	1	1	1	1	0	0	0	2	2	0	0	0	
6261	0	0	1	0	0	0	0	1	0	1	0	0	0	0	
6262	0	0	0	1	1	0	0	2	2	2	2	2	2	0	
6263	1	4	1	5	6	3	3	2	3	2	2	6	2	0	
6264	1	2	3	3	3	1	1	2	2	2	0	0	0	0	
6265	3	0	1	1	1	1	0	0	0	2	2	2	2	0	
6266															
6267	### OR Rec North, 2002-2013, all modes combined, no BARSS														
6268	### initially assigning to fleet: "10_OR_NorthernOR_Rec_PC"														
6269	#fishyr	season	fleet	gender	part	ageErr	LbinLo	LbinHi	Nsamps	A4					
6270	#	A5	A6	A7	A8	A9	A10	A11	A12	A13					
6271	#	A14	A15	A16	A17	A18	A19	A20	A21	A22					
6272	#	A23	A24	A25	A26	A27	A28	A29	A30	A31					

	#	A32	A33	A34	A35	A36	A37	A38	A39	A40
6273	#	A41	A42	A43	A44	A45	A46	A47	A48	A49
6274	#	A50	repeat							
6275	2005	1	10	0	2	1	-1	-1	23	0
6276	0	0	1	0	2	3	1	1	1	1
6277	3	0	2	2	0	0	0	0	0	0
6278	0	0	2	1	0	0	0	0	0	0
6279	0	0	0	0	0	0	0	0	0	0
6280	0	0	0	0	0	0	0	0	0	0
6281	0	0	0	0	0	0	0	0	0	0
6282	0	0	1	0	2	3	1	1	1	1
6283	3	0	2	2	0	2	0	0	0	1
6284	1	0	2	1	0	0	0	0	0	0
6285	0	0	0	0	0	0	0	0	0	0
6286	2006	1	10	0	2	1	-1	-1	28	0
6287	0	0	1	1	1	2	2	2	5	3
6288	1	0	2	0	0	0	2	2	0	1
6289	2	0	0	0	0	0	0	1	1	0
6290	0	0	0	0	0	0	0	0	0	1
6291	0	0	0	0	0	0	0	0	0	0
6292	0	0	0	1	1	2	2	2	5	3
6293	1	0	2	0	0	0	2	2	2	0
6294	1	2	0	0	0	0	0	1	1	0
6295	0	0	0	0	0	0	0	0	0	1
6296	2007	1	10	0	2	1	-1	-1	23	0
6297	1	0	0	0	0	1	1	5	2	4
6298	1	4	0	1	0	1	1	1	0	0
6299	0	0	0	0	0	0	1	0	0	0
6300	0	0	0	0	0	0	0	0	0	0
6301	0	0	0	0	0	0	0	0	0	0
6302	1	0	0	0	0	0	1	5	2	4
6303	1	4	0	1	0	1	1	1	1	0
6304	0	0	0	0	0	0	1	0	0	0
6305	0	0	0	0	0	0	0	0	0	0
6306	2008	1	10	0	2	1	-1	-1	29	0
6307	0	0	2	6	0	0	2	2	2	2
6308	1	3	0	1	0	0	0	1	2	0
6309	2	0	2	0	0	0	0	1	0	0
6310	0	0	1	0	0	1	0	0	0	0
6311	0	0	0	0	0	0	0	0	0	0
6312	0	0	0	2	6	0	0	2	2	2
6313	1	3	0	1	0	0	0	1	2	0
6314	0	2	2	0	0	0	0	1	0	0

6315	0	0	1	0	0	0	0	1	1	0	0	0	0
6316	2009	1	10	0	2	1	-1	-1	39	0	0		
6317	0	2	3	6	6	1	0	1	0	1	1	2	
6318	2	5	3	1	0	0	1	1	1	1	1	0	0
6319	0	0	0	0	1	0	2	0	0	0	0	0	
6320	0	0	0	0	0	0	0	0	0	0	0	0	
6321	0	0	0	0	0	0	0	0	0	1	1	0	
6322	0	2	3	6	6	1	0	1	0	1	1	2	
6323	2	5	3	1	0	0	0	1	1	1	1	1	
6324	0	0	0	0	1	0	2	0	0	0	0	0	
6325	0	0	0	0	0	0	0	0	0	0	0	0	
6326	2010	1	10	0	2	1	-1	-1	23	0			
6327	0	0	2	1	1	2	1	2	2	0	2	0	
6328	0	1	3	1	0	0	0	0	0	0	2	0	
6329	2	1	0	0	1	0	1	0	0	0	0	0	
6330	1	0	0	0	0	0	0	0	0	0	0	0	
6331	0	0	0	0	0	0	0	0	0	0	0	0	
6332	0	0	0	2	1	1	2	1	2	2	0		
6333	0	1	3	1	0	0	0	0	0	0	2	0	
6334	0	2	1	0	1	0	1	0	0	0	0	0	
6335	1	0	0	0	0	0	0	0	0	0	0	0	
6336	2011	1	10	0	2	1	-1	-1	161	0			
6337	1	0	3	11	17	17	17	10	13	3			
6338	4	3	8	4	12	5	5	2	3	3	5	2	
6339	3	1	0	4	2	2	3	1	0	5	5	5	
6340	2	1	0	0	3	1	0	0	0	0	0	0	
6341	1	0	2	0	0	1	0	0	0	1	1	0	
6342	1	0	3	11	17	17	10	10	13	3			
6343	4	3	8	4	12	5	5	2	2	3	3	3	
6344	2	3	1	4	2	2	3	1	0	1	5	5	
6345	2	1	0	3	1	0	0	0	0	0	0	0	
6346	2012	1	10	0	2	1	-1	-1	33	0			
6347	0	0	0	0	3	3	9	2	0	0	3		
6348	0	0	1	2	2	0	2	0	0	1	0	0	
6349	0	0	0	1	0	1	1	1	0	0	0	0	
6350	1	0	0	0	0	0	0	0	0	0	0	0	
6351	0	0	0	0	0	0	0	0	0	0	0	0	
6352	0	0	0	0	3	3	9	2	0	0	0	3	
6353	0	0	1	2	2	0	2	0	0	1	0	1	
6354	0	0	0	1	0	1	0	1	0	0	0	0	
6355	1	0	0	0	0	0	0	0	0	0	0	0	
6356	2013	1	10	0	2	1	-1	-1	81	0			

```

6357      1      0      0      0      3      3      3      8      12      3      4
6358      8      1      1      1      3      3      3      3      3      2      3      3      2
6359      3      3      2      1      0      0      2      1      1      2      2      1
6360      0      0      0      0      1      0      0      0      1      0      0      0
6361      0      0      0      0      0      0      0      0      0      1      0      1      0
6362      1      0      0      0      3      3      3      8      12      3      4
6363      8      1      1      3      3      3      3      3      3      2      3      3      4
6364      2      3      3      2      1      0      0      2      1      1      0      2      1
6365      0      0      0      0      1      0      0      0      1      0      0      0
6366
6367 ### WA Rec, South, All modes combined
6368 ### initially assigning to fleet: "12_WA_SouthernWA_Rec_PCPR"
6369 #Yr Seas Flt/Svy Gender Part AgeError LbinLo LbinHi Nsa
6370 # mp 4yrs 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yr
6371 # s 13yrs 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs
6372 # 22yrs 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs
6373 # 31yrs 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs
6374 # 40yrs 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs
6375 # 49yrs 50+ yrs repeat
6376 -2014 1      -12      0      2      1      -1      -1      15      0
6377 0      0      0      0      1      1      1      0      0      0
6378 0      0      0      0      1      1      1      0      0      0
6379 1      1      0      0      1      1      1      1      2      0
6380 0      0      0      1      0      1      0      0      0      0
6381 0      0      0      1      1      0      0      0      0      0
6382 0      0      0      0      0      1      0      0      0      0
6383 0      0      0      0      1      1      1      0      0      0
6384 1      1      0      0      0      1      1      1      2      0
6385 0      0      0      1      0      0      1      0      0      0
6386
6387
6388 ##### conditional age-at-length observations
6389
6390 ### OR commercial dead, South
6391 ### initially assigning to fleet: "5_OR_SouthernOR_Comm_Dead"
6392 #Yr Seas Flt/Svy Gender Part AgeErr LbinLo LbinHi Nsamp 4yr
6393 # s 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yrs 13yrs
6394 # s 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs 22yrs
6395 # 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs 31yrs
6396 # 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs 40yrs
6397 # 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs 49yrs
6398 # 50yrs repeat

```

6399	2001	1	5	0	0	2	1	28	28	1	0
6400	0	0	0	0	1	0	0	0	0	0	0
6401	0	0	0	0	0	0	0	0	0	0	0
6402	0	0	0	0	0	0	0	0	0	0	0
6403	0	0	0	0	0	0	0	0	0	0	0
6404	0	0	0	0	0	0	0	0	0	0	0
6405	0	0	0	0	1	0	0	0	0	0	0
6406	0	0	0	0	0	0	0	0	0	0	0
6407	0	0	0	0	0	0	0	0	0	0	0
6408	0	0	0	0	0	0	0	0	0	0	0
6409	2001	1	5	0	0	2	1	30	30	7	0
6410	0	0	0	0	0	2	0	0	0	0	0
6411	2	0	0	0	1	0	1	0	0	0	0
6412	0	0	0	0	0	0	0	0	0	0	0
6413	0	0	0	0	0	0	0	0	0	0	0
6414	0	0	0	0	0	0	0	0	0	0	0
6415	0	0	0	0	0	2	0	0	0	0	0
6416	2	0	0	0	1	0	1	1	0	0	0
6417	0	0	0	0	0	0	0	0	0	0	0
6418	0	0	0	0	0	0	0	0	0	0	0
6419	2001	1	5	0	0	2	1	32	32	9	0
6420	0	0	0	0	0	0	2	0	0	1	1
6421	2	0	0	0	0	2	0	1	0	0	0
6422	0	0	0	0	0	0	0	0	0	0	0
6423	0	0	0	0	0	0	0	0	0	0	0
6424	0	0	0	0	0	0	0	0	0	0	0
6425	0	0	0	0	0	2	0	1	0	1	1
6426	2	0	0	0	0	0	2	0	1	0	0
6427	0	0	0	0	0	0	0	0	0	0	0
6428	0	0	0	0	0	0	0	0	0	0	0
6429	2001	1	5	0	0	2	1	34	34	12	0
6430	0	0	0	0	0	0	0	2	1	0	1
6431	1	1	2	0	0	0	1	1	0	0	0
6432	0	0	0	1	0	1	0	0	0	0	0
6433	0	0	0	0	0	0	0	0	0	0	0
6434	0	0	0	0	0	0	0	0	0	0	0
6435	0	0	0	0	0	0	0	2	1	0	1
6436	1	1	2	0	0	0	1	1	0	0	0
6437	0	0	0	1	0	1	0	0	0	0	0
6438	0	0	0	0	0	0	0	0	0	0	0
6439	2001	1	5	0	0	2	0	36	36	11	0
6440	0	0	0	0	0	0	0	0	0	0	0

6441	0	0	0	0	3	0	0	2	0	0	1	1	0
6442	0	0	0	0	0	0	0	0	1	0	0	0	1
6443	0	0	0	0	0	0	0	1	0	1	0	0	0
6444	0	0	0	0	0	0	0	0	0	0	1	1	0
6445	0	0	0	0	0	3	0	0	2	0	0	1	0
6446	0	0	0	0	3	0	0	2	0	0	1	1	0
6447	0	0	0	0	0	0	0	0	0	1	0	0	1
6448	0	0	0	0	0	0	0	1	1	0	0	0	0
6449	2001	1	5	0	0	2	1	38	38	38	4	0	0
6450	0	0	0	0	0	0	0	0	0	0	0	0	0
6451	0	0	0	0	0	0	0	0	0	2	0	0	1
6452	1	0	0	0	0	0	0	0	0	0	0	0	0
6453	0	0	0	0	0	0	0	0	0	0	0	0	0
6454	0	0	0	0	0	0	0	0	0	0	0	0	0
6455	0	0	0	0	0	0	0	0	0	0	0	0	0
6456	0	0	0	0	0	0	0	0	0	2	0	0	0
6457	1	1	0	0	0	0	0	0	0	0	0	0	0
6458	0	0	0	0	0	0	0	0	0	0	0	0	0
6459	2001	1	5	0	0	2	1	40	40	40	3	0	0
6460	0	0	0	0	0	0	0	0	0	0	0	0	0
6461	0	0	0	0	0	0	0	0	0	1	0	0	0
6462	0	0	0	0	0	0	0	1	1	0	0	0	0
6463	0	0	0	0	0	0	0	0	0	0	0	1	0
6464	0	0	0	0	0	0	0	0	0	0	0	1	0
6465	0	0	0	0	0	0	0	0	0	0	0	0	0
6466	0	0	0	0	0	0	0	0	0	1	0	0	0
6467	0	0	0	0	0	0	0	0	1	1	0	0	0
6468	0	0	0	0	0	0	0	0	0	0	0	0	0
6469	2002	1	5	0	0	2	1	30	30	30	17	0	0
6470	0	0	1	1	1	3	3	1	0	0	1	0	0
6471	2	2	2	1	0	0	0	0	0	0	0	0	0
6472	0	0	0	0	0	0	0	0	0	0	0	0	0
6473	0	0	0	0	0	0	0	0	0	0	0	0	0
6474	0	0	0	0	0	0	0	0	0	0	0	0	0
6475	0	0	0	1	1	3	3	1	0	0	0	1	0
6476	2	2	2	1	0	0	0	0	0	0	0	0	0
6477	0	0	0	0	0	0	0	0	0	0	0	0	0
6478	0	0	0	0	0	0	0	0	0	0	0	0	0
6479	2002	1	5	0	0	2	1	32	32	32	37	0	0
6480	0	0	0	0	0	0	6	4	2	2	0	3	0
6481	3	2	4	0	0	3	3	2	0	0	0	0	1
6482	1	0	0	0	0	0	0	0	0	0	0	0	0

6483	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6484	0	0	0	0	0	0	0	6	0	4	0	0	0	0	0
6485	0	0	0	0	0	0	3	6	2	2	0	0	0	0	3
6486	3	2	4	0	0	0	3	3	2	2	0	0	0	0	0
6487	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0
6488	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6489	2002	1	5	0	0	2	1	1	34	34	31	0	0	0	0
6490	0	0	0	0	3	1	1	5	3	1	4	0	0	0	0
6491	0	3	1	0	0	3	0	5	0	3	1	1	0	0	1
6492	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6493	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6494	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0
6495	0	0	0	0	0	3	1	5	1	3	1	4	0	0	0
6496	0	3	1	0	0	3	0	5	0	0	3	1	0	0	0
6497	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6499	2002	1	5	0	0	2	1	36	36	21	0	0	0	0	0
6500	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1
6501	2	1	2	2	0	0	0	5	1	1	0	0	0	0	2
6502	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0
6503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6504	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6505	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
6506	2	1	2	2	0	0	0	5	1	1	0	0	0	0	0
6507	2	1	0	0	0	0	0	0	1	0	0	1	0	0	0
6508	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6509	2002	1	5	0	0	2	1	38	38	12	0	0	0	0	0
6510	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6511	0	2	0	1	0	0	2	0	0	1	0	1	0	0	0
6512	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6513	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
6514	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
6515	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6516	0	2	0	1	0	1	0	2	0	0	1	0	1	1	0
6517	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6518	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
6519	2002	1	5	0	0	2	1	40	40	3	0	0	0	0	0
6520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6521	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6522	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6523	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
6524	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6525	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6526	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6527	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6528	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6529	2003	1	5	0	0	2	1	28	28	2	0	0	0	0
6530	0	0	0	0	0	0	1	0	0	1	0	0	0	0
6531	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6532	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6533	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6534	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6535	0	0	0	0	0	0	1	0	0	1	0	0	0	0
6536	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6537	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6538	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6539	2003	1	5	0	0	2	1	30	30	20	0	0	0	0
6540	0	0	0	0	0	3	3	4	2	2	0	0	0	0
6541	1	0	1	2	0	0	1	1	0	0	0	0	0	0
6542	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6543	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6544	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6545	0	0	0	0	0	3	3	4	2	2	0	0	0	0
6546	1	0	1	2	0	0	1	1	0	0	0	0	0	0
6547	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6548	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6549	2003	1	5	0	0	2	1	32	32	48	0	0	0	0
6550	0	0	0	0	0	2	2	9	6	6	4	0	0	0
6551	0	2	2	1	2	2	2	3	0	2	2	0	0	0
6552	2	0	0	0	0	0	0	1	0	0	0	0	0	0
6553	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6554	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6555	0	0	0	0	0	0	2	9	6	6	4	0	0	0
6556	0	2	2	1	2	2	2	3	0	2	2	0	0	0
6557	2	2	0	0	0	0	0	1	0	0	0	0	0	0
6558	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6559	2003	1	5	0	0	2	1	34	34	48	0	0	0	0
6560	0	0	0	0	0	1	2	3	2	2	2	0	0	0
6561	3	5	5	3	5	3	3	6	1	1	1	0	0	1
6562	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6563	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6564	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6565	3	5	5	3	5	3	3	6	2	2	2	1	2	0
6566	3	5	5	3	5	3	3	6	2	2	2	1	2	0

6567	1	0	2	0	0	0	0	0	0	0	0	0	0	0
6568	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6569	2003	1	5	0	0	2	1	1	36	36	39	39	0	0
6570	0	0	0	0	0	1	0	0	2	1	2	1	2	0
6571	2	2	3	1	1	0	1	1	3	4	3	3	0	0
6572	1	3	1	1	1	0	1	2	0	1	0	1	1	0
6573	2	0	0	0	0	0	0	0	1	0	0	0	0	0
6574	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6575	0	0	0	0	0	1	0	0	2	1	1	2	0	0
6576	2	2	3	1	0	0	1	1	3	4	3	3	0	0
6577	0	1	3	1	1	1	0	2	0	1	0	1	1	0
6578	2	0	0	0	0	0	0	0	1	0	0	0	0	0
6579	2003	1	5	0	0	2	1	1	38	38	38	17	0	0
6580	0	0	0	0	0	1	0	0	0	0	0	0	1	0
6581	1	0	1	0	0	3	0	0	2	1	3	1	1	0
6582	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6583	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6584	2	0	0	0	0	0	0	0	0	0	0	0	0	0
6585	0	0	0	0	0	0	1	0	0	0	0	0	1	0
6586	1	0	1	0	0	3	0	0	2	1	3	0	0	0
6587	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6588	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6589	2003	1	5	0	0	2	1	1	40	40	40	7	0	0
6590	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6591	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6592	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6593	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6594	0	1	0	0	0	0	0	0	0	0	0	3	0	0
6595	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6596	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6597	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6598	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6599	2004	1	5	0	0	2	1	1	30	30	30	10	0	0
6600	0	0	0	0	0	0	1	2	1	2	2	2	0	0
6601	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6602	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6603	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6604	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6605	0	0	0	0	0	0	1	2	1	2	2	0	2	0
6606	0	0	2	0	0	0	0	0	0	0	0	0	0	0
6607	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6608	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6609	2004	1	5	0	0	2	1	32	32	13	0
6610	0	0	0	0	0	0	1	3	3	3	1
6611	0	2	0	0	0	0	0	0	1	0	1
6612	0	0	0	0	0	0	0	0	0	0	0
6613	0	0	0	0	0	0	0	0	0	0	0
6614	0	0	0	0	1	0	0	0	0	0	0
6615	0	0	0	0	0	0	1	3	3	3	1
6616	0	2	0	0	0	0	0	0	1	0	0
6617	1	0	0	0	0	0	0	0	0	0	0
6618	0	0	0	0	0	0	0	0	0	0	0
6619	2004	1	5	0	0	2	1	34	34	17	0
6620	0	0	0	0	0	0	0	2	2	2	0
6621	0	1	1	1	2	1	1	2	1	1	0
6622	1	0	0	0	0	0	0	1	0	0	0
6623	1	0	0	0	0	0	0	0	0	0	0
6624	0	0	0	0	0	0	0	0	0	0	0
6625	0	0	0	0	0	0	0	0	2	2	0
6626	0	1	1	1	2	1	1	2	1	1	1
6627	0	1	0	0	0	0	0	1	0	0	0
6628	1	0	0	0	0	0	0	0	0	0	0
6629	2004	1	5	0	0	2	1	36	36	9	0
6630	0	0	0	0	0	0	0	0	0	0	0
6631	0	1	0	0	0	0	0	1	0	0	3
6632	2	0	0	0	0	0	0	0	1	0	1
6633	0	0	0	0	0	0	0	0	0	0	0
6634	0	0	0	0	0	0	0	0	0	0	0
6635	0	0	0	0	0	0	0	0	0	0	0
6636	0	1	0	0	0	0	0	0	1	0	0
6637	3	2	0	0	0	0	0	0	0	1	0
6638	0	0	0	0	0	0	0	0	0	0	0
6639	2004	1	5	0	0	2	1	38	38	6	0
6640	0	0	0	1	0	0	0	1	1	0	0
6641	0	0	1	0	0	0	0	1	1	1	0
6642	0	0	0	0	0	0	0	1	0	0	0
6643	0	0	0	0	0	0	0	0	0	0	0
6644	0	0	0	0	0	0	0	0	0	0	0
6645	0	0	0	0	0	0	0	1	1	0	0
6646	0	0	1	0	0	0	0	0	1	1	0
6647	0	0	0	0	0	0	0	1	0	0	0
6648	0	0	0	0	0	0	0	0	0	0	0
6649	2004	1	5	0	0	2	1	40	40	1	0
6650	0	0	0	0	0	0	0	0	0	0	0

6651	0	0	0	0	0	0	0	0	0	0	1	0	0	0
6652	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6654	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6655	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6656	0	0	0	0	0	0	0	0	0	0	1	0	0	0
6657	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6658	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6659	2005	1	5	0	2	1	30	30	30	2	0	0	0	0
6660	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6661	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6662	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6663	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6664	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6665	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6666	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6667	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6668	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6669	2005	1	5	0	2	1	32	32	32	2	0	0	0	0
6670	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6671	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6672	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6673	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6674	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6675	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6676	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6677	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6678	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6679	2005	1	5	0	2	1	34	34	34	3	0	0	0	0
6680	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6681	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6682	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6683	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6684	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6685	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6686	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6687	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6688	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6689	2005	1	5	0	2	1	36	36	36	1	0	0	0	0
6690	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6691	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6692	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6694	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6695	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6696	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6697	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6698	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6699	2005	1	5	0	0	2	1	38	38	4	0	0	0	0	0
6700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6701	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1
6702	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6703	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6704	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6706	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
6707	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6708	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6709	2005	1	5	0	0	2	1	40	40	2	0	0	0	0	0
6710	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6711	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6712	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6713	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6714	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
6715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6716	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6717	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6718	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6719	2006	1	5	0	0	2	1	30	30	1	0	0	0	0	0
6720	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6721	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6722	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6723	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6724	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6725	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
6726	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6727	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6728	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6729	2006	1	5	0	0	2	1	32	32	8	0	0	0	0	0
6730	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0
6731	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6732	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6733	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6734	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6735	0	0	0	0	0	0	0	0	0	2	0	0	3
6736	1	0	1	0	0	0	0	0	0	0	0	0	0
6737	0	0	1	0	0	0	0	0	0	0	0	0	0
6738	0	0	0	0	0	0	0	0	0	0	0	0	0
6739	2006	1	5	0	0	2	1	34	34	34	10	0	0
6740	0	0	0	0	0	0	0	0	2	1	1	1	1
6741	1	0	1	1	0	1	0	0	0	0	0	0	1
6742	1	1	0	0	0	0	0	0	0	0	0	0	0
6743	0	0	0	0	0	0	0	0	0	0	0	0	0
6744	0	0	0	0	0	0	0	0	0	0	1	0	0
6745	0	0	0	0	0	0	0	0	2	1	1	1	1
6746	1	0	1	0	0	1	0	0	0	0	0	0	0
6747	1	1	1	0	0	0	0	0	0	0	0	0	0
6748	0	0	0	0	0	0	0	0	0	0	0	0	0
6749	2006	1	5	0	0	2	1	36	36	36	6	0	0
6750	0	0	0	0	0	0	0	0	0	0	0	0	0
6751	0	1	1	0	0	0	0	1	1	1	0	0	1
6752	0	0	0	0	0	0	0	0	0	0	0	0	1
6753	0	0	0	0	0	0	0	0	0	0	0	0	0
6754	0	0	0	0	0	0	0	0	0	0	0	0	0
6755	0	0	0	0	0	0	0	0	0	0	0	0	0
6756	0	1	1	0	0	0	0	0	1	1	0	0	0
6757	1	0	0	0	0	0	0	0	0	0	0	0	1
6758	0	0	0	0	0	0	0	0	0	0	0	0	0
6759	2006	1	5	0	0	2	1	38	38	38	4	0	0
6760	0	0	0	0	0	0	0	0	0	0	0	0	0
6761	0	0	0	0	0	0	0	0	0	0	0	0	0
6762	0	0	1	0	0	0	1	0	0	1	0	0	0
6763	0	0	0	0	0	0	0	0	1	0	0	0	0
6764	0	0	0	0	0	0	0	0	0	0	0	0	0
6765	0	0	0	0	0	0	0	0	0	0	0	0	0
6766	0	0	0	0	0	0	0	0	0	0	0	0	0
6767	0	0	1	0	0	0	1	0	0	0	1	0	0
6768	0	0	0	0	0	0	0	0	1	0	0	0	0
6769	2007	1	5	0	0	2	1	30	30	30	1	0	0
6770	0	0	0	0	0	0	0	0	0	0	0	0	0
6771	0	1	0	0	0	0	0	0	0	0	0	0	0
6772	0	0	0	0	0	0	0	0	0	0	0	0	0
6773	0	0	0	0	0	0	0	0	0	0	0	0	0
6774	0	0	0	0	0	0	0	0	0	0	0	0	0
6775	0	0	1	0	0	0	0	0	0	0	0	0	0
6776	0	0	0	0	0	0	0	0	0	0	0	0	0

6777	0	0	0	0	0	0	0	0	0	0	0	0	0
6778	0	0	0	0	0	0	0	0	0	0	0	0	0
6779	2007	1	5	0	0	2	1	32	32	32	10	0	0
6780	0	0	0	0	0	0	0	0	0	0	3	1	0
6781	1	1	0	0	0	0	2	0	0	1	0	0	0
6782	0	0	0	0	0	0	0	0	0	0	0	0	0
6783	0	0	0	0	1	0	0	0	0	0	0	0	0
6784	0	0	0	0	0	0	0	0	0	0	0	0	0
6785	0	0	0	0	0	0	0	0	0	0	3	1	0
6786	1	1	0	0	0	0	2	0	0	1	0	0	0
6787	0	0	0	0	0	0	0	0	0	0	0	0	0
6788	0	0	0	1	0	0	0	0	0	0	0	0	0
6789	2007	1	5	0	0	2	1	34	34	34	11	0	0
6790	0	0	0	0	0	0	0	0	0	0	1	1	0
6791	1	1	0	0	1	0	0	0	0	0	2	1	1
6792	1	0	0	1	0	0	0	0	0	0	0	0	0
6793	0	0	0	0	0	0	0	0	0	0	0	0	0
6794	0	0	1	0	0	0	0	0	0	0	0	0	0
6795	0	0	0	0	0	0	0	0	0	0	1	1	0
6796	1	1	0	0	0	1	0	0	0	0	0	2	0
6797	1	1	0	1	0	0	0	0	0	0	0	0	0
6798	0	0	0	0	0	0	0	0	0	0	0	0	0
6799	2007	1	5	0	0	2	1	36	36	36	10	0	0
6800	0	0	0	0	0	0	0	0	0	0	0	1	1
6801	1	1	1	0	0	1	0	0	0	0	1	1	0
6802	0	0	1	1	0	0	0	0	0	0	1	0	0
6803	0	0	0	0	0	0	0	0	0	0	0	0	0
6804	0	0	0	0	0	0	0	0	0	0	0	0	0
6805	0	0	0	0	0	0	0	0	0	0	0	0	1
6806	1	1	1	0	0	1	0	0	0	0	1	1	1
6807	0	0	1	1	0	0	0	0	0	0	1	0	0
6808	0	0	0	0	0	0	0	0	0	0	0	0	0
6809	2007	1	5	0	0	2	1	38	38	38	5	0	0
6810	0	0	0	0	0	0	0	0	0	0	0	0	0
6811	1	0	0	0	1	0	0	1	0	1	0	0	0
6812	0	0	0	0	0	0	0	0	0	0	0	0	0
6813	0	0	0	0	0	0	0	0	0	0	0	0	0
6814	0	0	0	0	0	0	0	0	0	0	0	0	0
6815	0	0	0	0	0	0	0	0	0	0	0	0	0
6816	1	0	0	0	0	1	0	0	1	0	1	0	0
6817	0	0	0	0	0	0	0	0	0	0	0	0	0
6818	0	0	0	0	0	0	0	0	0	0	0	0	0

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6819 2007   1    5    0    0    2    1    40   40    2    0    0
6820   0    0    0    0    0    0    0    0    0    0    0    0
6821   0    0    0    0    0    1    0    0    0    0    0    0
6822   0    0    0    0    1    0    0    0    0    0    0    0
6823   0    0    0    0    0    0    0    0    0    0    0    1
6824   0    0    0    0    0    0    0    0    0    0    1    0
6825   0    0    0    0    0    0    0    0    0    0    0    0
6826   0    0    0    0    0    0    0    0    0    0    0    0
6827   0    0    0    0    0    1    0    0    0    0    0    0
6828   0    0    0    0    0    0    0    0    0    0    0    0
6829 # change Lbin_lo and Lbin_hi for next line from 54
6830 # to      48 (length bin plus group is 48+)
6831 2007   1    5    0    0    2    1    48   48    1    0    0
6832   0    0    0    0    0    0    0    0    0    0    0    0
6833   0    0    0    0    0    0    0    0    0    0    0    0
6834   0    0    0    0    0    0    0    0    0    0    0    0
6835   0    0    0    0    0    0    0    0    0    0    0    1
6836   0    0    0    0    0    0    0    0    0    0    1    0
6837   0    0    0    0    0    0    0    0    0    0    0    0
6838   0    0    0    0    0    0    0    0    0    0    0    0
6839   0    0    0    0    0    0    0    0    0    0    0    0
6840   0    0    0    0    0    0    0    0    0    0    0    0
6841 2008   1    5    0    0    2    1    30   30    2    0    0
6842   0    0    0    0    0    1    0    0    0    0    0    0
6843   0    0    0    0    0    0    0    0    0    0    0    1
6844   0    0    0    0    0    0    0    0    0    0    0    0
6845   0    0    0    0    0    0    0    0    0    0    0    0
6846   0    0    0    0    0    0    0    1    0    0    0    0
6847   0    0    0    0    0    0    1    0    0    0    0    0
6848   0    0    0    0    0    0    0    0    0    0    0    0
6849   1    0    0    0    0    0    0    0    0    0    0    0
6850   0    0    0    0    0    0    0    0    0    0    0    0
6851 2008   1    5    0    0    2    1    32   32    5    0
6852   0    0    0    0    0    0    0    0    0    0    0    2
6853   0    1    1    0    0    0    0    0    0    0    1    0
6854   0    0    0    0    0    0    0    0    0    0    0    0
6855   0    0    0    0    0    0    0    0    0    0    0    0
6856   0    0    0    0    0    0    0    0    0    0    0    0
6857   0    0    0    0    0    0    0    0    0    0    0    2
6858   0    0    1    1    0    0    0    0    0    0    1    0
6859   0    0    0    0    0    0    0    0    0    0    0    0
6860   0    0    0    0    0    0    0    0    0    0    0    0

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6861	2008	1	5	0	0	2	1	34	34	9	0
6862	0	0	0	0	0	0	0	0	0	3	0
6863	1	1	0	0	0	1	0	1	0	0	1
6864	0	0	1	0	0	0	0	0	0	0	0
6865	0	0	0	0	0	0	0	0	0	0	0
6866	0	0	0	0	0	0	0	0	0	0	0
6867	0	0	0	0	0	0	0	0	0	0	3
6868	1	1	0	0	0	1	0	1	0	0	0
6869	1	0	1	0	0	0	0	0	0	0	0
6870	0	0	0	0	0	0	0	0	0	0	0
6871	2008	1	5	0	0	2	1	36	36	4	0
6872	0	0	0	0	0	0	0	0	0	0	0
6873	0	0	1	0	0	0	0	0	0	0	0
6874	1	0	0	0	0	0	0	2	0	0	0
6875	0	0	0	0	0	0	0	0	0	0	0
6876	0	0	0	0	0	0	0	0	0	0	0
6877	0	0	0	0	0	0	0	0	0	0	0
6878	0	0	1	0	0	0	0	0	0	0	0
6879	0	1	0	0	0	0	0	2	0	0	0
6880	0	0	0	0	0	0	0	0	0	0	0
6881	2008	1	5	0	0	2	1	38	38	3	0
6882	0	0	0	0	0	0	0	0	0	0	0
6883	0	0	0	0	0	0	0	1	0	0	1
6884	0	0	1	0	0	0	0	0	0	0	0
6885	0	0	0	0	0	0	0	0	0	0	0
6886	0	0	0	0	0	0	0	0	0	0	0
6887	0	0	0	0	0	0	0	0	0	0	0
6888	0	0	0	0	0	0	0	0	1	0	0
6889	1	0	1	0	0	0	0	0	0	0	0
6890	0	0	0	0	0	0	0	0	0	0	0
6891	2008	1	5	0	0	2	1	40	40	3	0
6892	0	0	0	0	0	0	0	0	0	0	0
6893	0	0	0	0	0	0	0	0	0	0	0
6894	0	0	0	1	0	0	1	0	0	0	0
6895	0	0	0	0	0	0	0	0	0	0	0
6896	0	0	0	0	0	0	0	0	0	1	0
6897	0	0	0	0	0	0	0	0	0	0	0
6898	0	0	0	0	0	0	0	0	0	0	0
6899	0	0	0	1	0	0	1	0	0	0	0
6900	0	0	0	0	0	0	0	0	0	0	0
6901	2009	1	5	0	0	2	1	30	30	6	0
6902	0	0	0	0	2	1	0	0	0	0	0

6903	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6904	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6905	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6907	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0
6908	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6909	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6910	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6911	2009	1	5	0	0	2	1	32	32	32	20	20	0	0	0
6912	0	0	0	0	0	1	1	2	1	1	2	2	2	0	0
6913	1	3	1	1	2	1	0	0	1	0	0	1	0	0	0
6914	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6915	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6916	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6917	0	0	0	0	0	1	1	2	1	1	2	2	2	0	0
6918	1	3	1	1	2	1	0	0	1	0	0	1	0	0	1
6919	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6921	2009	1	5	0	0	2	1	34	34	34	23	23	0	0	0
6922	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0
6923	1	2	2	4	0	0	0	0	1	1	0	1	1	2	2
6924	3	0	0	1	0	0	0	0	1	1	0	0	0	0	0
6925	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6926	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6927	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0
6928	1	2	2	4	0	0	0	0	1	1	0	1	0	1	0
6929	2	3	0	1	0	0	0	0	1	1	1	0	0	0	0
6930	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6931	2009	1	5	0	0	2	1	36	36	36	14	14	0	0	0
6932	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6933	1	2	1	0	0	0	0	1	0	0	0	0	0	0	0
6934	1	1	0	0	2	0	0	0	0	0	0	1	0	1	0
6935	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6936	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
6937	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6938	1	2	1	0	0	0	0	1	0	0	0	0	0	0	0
6939	0	1	1	0	2	0	0	0	0	0	0	1	0	1	1
6940	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6941	2009	1	5	0	0	2	1	38	38	38	10	10	0	0	0
6942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6943	0	1	0	0	0	0	0	2	2	0	1	0	0	0	1
6944	1	0	0	0	0	1	0	2	0	0	0	0	0	0	0

6945	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6946	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6947	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6948	0	1	0	0	0	0	0	2	2	1	0	0	0	0	0
6949	1	1	0	0	0	1	2	0	0	0	0	0	0	0	0
6950	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6951	2009	1	5	0	0	2	1	40	40	40	3	0	0	0	0
6952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6953	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6954	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6956	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6957	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6958	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6959	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6960	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6961	2009	1	5	0	0	2	1	42	42	42	3	0	0	0	0
6962	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
6963	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
6964	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6965	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6966	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6967	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6968	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
6969	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6970	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6971	2010	1	5	0	0	2	1	30	30	30	2	0	0	0	0
6972	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
6973	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6974	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6975	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6977	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
6978	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6979	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6981	2010	1	5	0	0	2	1	32	32	32	13	0	0	0	0
6982	0	0	0	0	0	0	0	0	0	3	1	1	1	1	0
6983	3	1	1	0	0	0	0	0	0	0	1	1	0	0	0
6984	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
6985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6987	0	0	0	0	0	0	0	0	0	0	3	1	1	1
6988	3	0	1	0	1	0	0	0	0	0	0	1	1	0
6989	0	0	0	0	0	0	0	0	0	1	1	0	0	0
6990	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6991	2010	1	5	0	0	2	1	34	34	34	17	0	0	0
6992	0	0	0	0	0	0	1	0	0	0	0	0	1	0
6993	0	1	2	4	1	0	0	2	0	0	0	0	0	0
6994	1	0	1	0	0	0	0	0	1	0	0	0	0	1
6995	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6996	0	0	0	0	0	0	0	0	0	0	1	0	0	0
6997	0	0	0	0	0	0	1	0	0	0	0	0	0	1
6998	0	1	2	4	1	0	0	2	0	0	0	0	0	0
6999	0	1	0	1	0	0	0	0	1	0	0	0	0	1
7000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7001	2010	1	5	0	0	2	1	36	36	36	21	0	0	0
7002	0	0	0	0	0	0	0	1	1	0	0	0	0	0
7003	2	2	1	0	1	1	1	1	0	0	0	0	0	0
7004	0	2	1	4	2	0	0	0	1	0	0	1	0	1
7005	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7007	0	0	0	0	0	0	0	0	1	1	0	0	0	0
7008	2	2	1	0	1	1	1	1	0	0	0	0	0	0
7009	0	0	2	1	4	2	0	0	0	0	0	1	0	1
7010	0	0	0	0	0	0	0	1	1	0	0	0	0	0
7011	2010	1	5	0	0	2	1	38	38	38	7	0	0	0
7012	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7013	0	1	0	1	1	1	0	0	0	0	0	0	0	0
7014	1	0	0	1	0	1	0	0	0	0	0	0	0	0
7015	1	0	0	1	0	0	0	0	0	0	0	0	0	0
7016	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7017	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7018	0	1	0	1	1	1	0	0	0	0	0	0	0	0
7019	0	1	0	0	1	0	0	0	0	0	0	0	0	0
7020	1	0	1	0	0	0	0	0	0	0	0	0	0	0
7021	2010	1	5	0	0	2	1	40	40	40	5	0	0	0
7022	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7023	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7024	0	0	0	1	0	0	0	2	0	0	0	0	0	1
7025	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7026	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7027	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7028	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7029	0	0	0	1	0	0	0	2	0	0	0	1
7030	1	0	0	0	0	0	0	0	0	0	0	0
7031	2011	1	5	0	0	2	1	30	30	30	21	0
7032	0	0	0	1	3	1	2	2	1	6	0	0
7033	2	0	0	1	3	0	0	0	1	0	0	1
7034	0	0	0	1	0	0	0	0	0	0	0	0
7035	0	0	0	0	0	0	0	0	0	0	0	0
7036	0	0	0	0	0	0	0	0	0	0	0	0
7037	0	0	0	0	1	2	2	2	1	6	0	0
7038	2	0	0	1	3	0	0	0	1	0	0	0
7039	1	0	0	1	0	0	0	0	0	0	0	0
7040	0	0	0	0	0	0	0	0	0	0	0	0
7041	2011	1	5	0	0	2	1	32	32	46	0	0
7042	0	0	1	1	0	3	0	3	9	1	1	2
7043	2	3	1	5	4	4	2	1	0	1	0	2
7044	1	0	0	1	4	1	0	0	0	0	0	0
7045	1	0	0	0	0	0	0	0	0	0	0	0
7046	0	0	0	0	0	0	0	0	0	0	0	0
7047	0	0	1	0	3	0	0	3	9	1	1	1
7048	2	3	1	5	4	2	1	0	0	0	1	1
7049	2	1	0	1	4	1	0	0	0	0	0	0
7050	1	0	0	0	0	0	0	0	0	0	0	0
7051	2011	1	5	0	2	1	34	34	84	0	0	0
7052	0	0	0	0	0	0	1	3	8	1	1	2
7053	2	2	9	6	10	6	4	2	1	6	0	2
7054	3	2	0	3	2	2	2	2	1	1	0	0
7055	0	0	0	0	2	0	0	0	0	1	0	0
7056	0	0	1	0	1	0	0	0	0	0	0	0
7057	0	0	0	0	0	0	1	3	8	1	1	1
7058	2	2	9	6	10	6	4	2	2	6	0	2
7059	2	3	2	3	2	2	2	2	2	1	0	0
7060	0	0	0	2	0	0	0	0	0	1	0	0
7061	2011	1	5	0	2	1	36	36	93	0	0	0
7062	0	0	0	0	0	0	0	0	4	3	1	3
7063	2	2	4	4	10	10	6	3	1	1	2	2
7064	4	5	1	5	4	7	2	3	2	0	0	2
7065	1	2	1	0	0	1	0	0	0	1	0	0
7066	0	0	0	1	1	0	0	0	0	0	0	0
7067	0	0	0	0	0	0	0	0	4	3	1	3
7068	2	2	4	4	10	10	6	3	1	1	2	2
7069	2	4	5	5	0	7	1	3	1	2	0	2
7070	1	2	1	1	0	7	1	0	0	0	0	0

7071	2011	1	5	0	2	1	38	38	43	0
7072	0	0	0	0	0	0	0	0	0	1
7073	2	1	1	3	2	3	4	1	1	1
7074	2	2	2	3	3	2	0	1	1	3
7075	1	2	0	0	1	0	0	0	2	0
7076	0	0	0	0	0	0	0	0	0	0
7077	0	0	0	0	0	0	0	0	0	1
7078	2	1	1	3	2	3	4	1	1	1
7079	1	2	2	3	3	2	0	1	1	3
7080	1	2	0	0	1	0	0	0	2	0
7081	2011	1	5	0	2	1	40	40	15	0
7082	0	0	0	0	0	0	0	0	0	0
7083	0	0	0	0	1	0	1	0	0	0
7084	0	1	0	0	1	2	1	1	1	0
7085	0	0	0	0	0	1	0	0	0	0
7086	1	1	0	0	0	0	0	0	3	0
7087	0	0	0	0	0	0	0	0	0	0
7088	0	0	0	0	1	0	1	0	0	0
7089	0	0	1	0	1	2	1	1	1	0
7090	0	0	0	0	1	0	0	0	0	0
7091	2011	1	5	0	2	1	42	42	4	0
7092	0	0	0	0	0	0	0	0	0	0
7093	0	0	1	0	1	0	0	0	0	0
7094	0	0	0	0	0	0	0	0	0	0
7095	0	0	0	0	0	0	0	0	0	0
7096	0	0	0	0	0	0	0	0	2	0
7097	0	0	0	0	0	0	0	0	0	0
7098	0	0	0	1	0	1	0	0	0	0
7099	0	0	0	0	0	0	0	0	0	0
7100	0	0	0	0	0	0	0	0	0	0
7101	2011	1	5	0	2	1	46	46	2	0
7102	0	0	0	0	0	0	0	0	0	0
7103	0	0	0	0	1	1	0	0	0	0
7104	0	0	0	0	0	0	0	0	0	0
7105	0	0	0	0	0	0	0	0	0	0
7106	0	0	0	0	0	0	0	0	0	0
7107	0	0	0	0	0	0	0	0	0	0
7108	0	0	0	0	1	1	0	0	0	0
7109	0	0	0	0	0	0	0	0	0	0
7110	0	0	0	0	0	0	0	0	0	0
7111	2012	1	5	0	2	1	26	26	1	0
7112	0	0	0	0	1	0	0	0	0	0

7113	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7114	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7115	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7116	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7117	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7118	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7119	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7120	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7121	2012	1	5	0	0	2	1	28	28	28	2	0	0	0
7122	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7123	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7124	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7125	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7126	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7127	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7128	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7129	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7130	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7131	2012	1	5	0	0	2	1	30	30	30	8	0	0	0
7132	0	0	0	0	0	0	1	1	1	4	2	0	0	0
7133	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7134	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7135	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7136	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7137	0	0	0	0	0	0	1	0	1	4	2	0	0	0
7138	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7139	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7140	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7141	2012	1	5	0	0	2	1	32	32	32	21	0	0	0
7142	0	0	0	0	1	1	1	2	2	2	2	3	0	0
7143	0	1	0	2	0	2	0	2	1	1	0	1	0	0
7144	0	0	1	0	0	1	0	0	1	0	0	0	0	0
7145	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7146	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7147	0	0	0	0	1	1	0	2	2	2	2	3	0	0
7148	0	1	0	2	0	2	0	2	1	1	0	1	0	0
7149	0	0	1	0	0	1	0	0	1	0	0	0	0	0
7150	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7151	2012	1	5	0	0	2	1	34	34	34	29	0	0	0
7152	0	0	0	0	0	0	1	1	1	1	1	3	0	0
7153	1	0	0	0	2	1	2	1	4	1	1	1	1	0
7154	0	0	0	0	2	1	1	4	0	1	2	3	0	0

7155	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
7156	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7157	0	0	0	0	0	1	0	1	4	1	1	1	1	3	1	3
7158	1	0	0	0	0	1	2	4	1	1	3	1	1	1	1	1
7159	0	0	0	2	1	1	0	1	0	0	2	0	0	0	0	0
7160	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7161	2012	1	5	0	0	2	0	1	36	36	41	0	0	0	0	0
7162	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	2
7163	1	1	1	1	1	2	5	3	0	0	3	0	3	2	2	2
7164	2	3	3	3	1	0	3	2	2	2	0	0	0	2	0	2
7165	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7166	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7167	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	2
7168	1	1	1	1	1	2	5	3	0	0	3	0	0	3	0	3
7169	2	2	3	3	1	1	3	2	2	2	0	0	0	2	0	2
7170	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7171	2012	1	5	0	0	2	0	1	38	38	26	0	0	0	0	0
7172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7173	0	0	3	0	0	2	3	4	1	1	1	1	1	1	1	1
7174	0	0	0	2	0	1	0	1	1	2	1	1	1	1	1	1
7175	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
7176	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
7177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7178	0	0	3	0	0	2	3	4	1	1	1	1	1	1	1	1
7179	1	0	0	0	2	0	1	1	1	2	1	1	1	1	1	1
7180	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7181	2012	1	5	0	0	2	0	1	40	40	15	0	0	0	0	0
7182	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7183	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0
7184	0	0	0	1	0	0	4	0	0	1	1	1	1	0	0	0
7185	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7186	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
7187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7188	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7189	2	0	0	1	0	0	4	0	0	1	1	1	1	0	0	0
7190	2	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0
7191	2012	1	5	0	0	2	0	1	42	42	2	0	0	0	0	0
7192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7193	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7194	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7195	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7197	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7198	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7199	0	0	0	0	1	0	0	0	0	0	1	0	0	0
7200	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7201	2012	1	5	0	0	2	1	46	46	46	1	0	0	0
7202	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7203	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7204	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7205	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7206	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7207	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7208	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7209	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7210	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7211	2013	1	5	0	0	2	1	28	28	28	1	0	0	0
7212	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7213	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7214	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7215	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7216	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7217	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7218	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7219	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7220	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7221	2013	1	5	0	0	2	1	30	30	30	15	0	0	0
7222	0	0	0	0	2	0	1	1	1	1	1	1	1	0
7223	2	1	0	0	3	2	0	0	0	1	0	0	0	0
7224	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7225	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7226	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7227	0	0	0	0	2	0	1	0	1	1	1	1	1	1
7228	2	1	0	0	3	2	0	0	0	1	0	0	0	0
7229	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7230	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7231	2013	1	5	0	0	2	1	32	32	32	42	0	0	0
7232	0	0	0	0	1	1	1	7	3	3	3	1	1	0
7233	4	4	0	0	1	0	5	2	3	3	2	0	0	0
7234	0	0	0	0	0	2	1	0	0	0	0	0	2	0
7235	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7236	0	0	0	0	0	0	0	0	7	3	3	3	2	1
7237	4	0	4	0	0	1	1	0	1	3	3	3	2	1
7238	4	4	0	0	1	0	5	2	3	3	2	0	0	0

7239	0	0	0	0	0	2	1	0	0	0	0	2
7240	0	0	0	0	0	0	1	0	0	0	0	0
7241	2013	1	5	0	0	2	1	34	34	68	0	0
7242	0	0	0	0	0	1	2	0	0	0	0	0
7243	9	2	1	4	3	12	2	4	2	2	6	1
7244	1	2	5	2	4	0	0	1	3	0	1	1
7245	0	0	1	0	0	0	0	0	0	0	0	0
7246	0	0	0	0	0	0	0	0	0	0	0	0
7247	0	0	0	0	1	2	0	0	0	0	0	0
7248	9	2	1	4	3	12	2	4	2	2	6	1
7249	6	1	2	5	2	4	0	1	3	0	1	1
7250	0	0	1	0	0	0	0	0	0	0	0	0
7251	2013	1	5	0	0	2	1	36	36	83	0	0
7252	0	0	0	0	1	0	2	0	0	0	1	1
7253	7	2	2	6	6	2	5	4	5	5	5	5
7254	5	2	3	2	3	2	1	0	3	2	4	4
7255	1	0	3	2	1	0	0	0	0	0	0	0
7256	0	0	0	1	0	0	0	0	0	1	0	0
7257	0	0	0	0	1	0	2	0	0	0	1	1
7258	7	2	2	6	6	2	5	4	5	5	5	5
7259	5	5	2	3	2	3	2	2	3	2	4	4
7260	1	0	3	2	1	0	0	0	0	0	0	0
7261	2013	1	5	0	0	2	1	38	38	35	0	0
7262	0	0	0	0	0	0	0	0	0	0	1	1
7263	1	1	0	0	2	0	0	1	5	2	0	0
7264	0	1	1	1	1	0	0	0	7	4	1	1
7265	1	3	0	0	0	0	0	0	1	0	0	0
7266	0	1	0	0	0	0	0	0	0	1	0	0
7267	0	0	0	0	0	0	0	0	0	0	1	1
7268	1	1	0	0	2	0	0	1	5	2	0	0
7269	0	0	1	1	1	0	0	0	7	4	1	1
7270	1	3	0	0	0	0	0	0	1	0	0	0
7271	2013	1	5	0	0	2	1	40	40	14	0	0
7272	0	0	0	0	0	0	0	0	0	0	0	0
7273	0	0	0	0	0	0	0	1	0	0	0	0
7274	1	0	0	0	1	0	1	1	2	1	1	1
7275	0	0	1	0	0	0	0	0	0	0	0	0
7276	1	0	0	1	0	0	0	0	0	2	0	0
7277	0	0	0	0	0	0	0	0	0	0	0	0
7278	0	1	0	0	0	0	0	1	1	0	0	0
7279	0	1	0	0	1	0	1	0	1	2	1	1
7280	0	0	0	1	0	0	0	0	0	0	0	0

```

7281 2013   1     5     0     0     2     1     42    42     1     0
7282   0     0     0     0     0     0     0     0     0     0     0
7283   0     0     0     0     0     0     0     0     0     0     0
7284   0     0     0     0     0     0     0     0     0     0     0
7285   1     0     0     0     0     0     0     0     0     0     0
7286   0     0     0     0     0     0     0     0     0     0     0
7287   0     0     0     0     0     0     0     0     0     0     0
7288   0     0     0     0     0     0     0     0     0     0     0
7289   0     0     0     0     0     0     0     0     0     0     0
7290   1     0     0     0     0     0     0     0     0     0     0
7291
7292 #### OR rec private, South
7293 #Yr      Seas   Flt/Svy Gender Part   AgeErr  LbinLo  LbinHi Nsamp  4yr
7294 # s      5yrs   6yrs   7yrs   8yrs   9yrs   10yrs  11yrs  12yrs  13yr
7295 # s     14yrs  15yrs  16yrs  17yrs  18yrs  19yrs  20yrs  21yrs  22yrs
7296 #     23yrs  24yrs  25yrs  26yrs  27yrs  28yrs  29yrs  30yrs  31yrs
7297 #     32yrs  33yrs  34yrs  35yrs  36yrs  37yrs  38yrs  39yrs  40yrs
7298 #     41yrs  42yrs  43yrs  44yrs  45yrs  46yrs  47yrs  48yrs  49yrs
7299 #     50yrs  repeat
7300 2005   1     7     0     0     2     1     30    30     1     0
7301   0     0     0     0     0     1     0     0     0     0     0
7302   0     0     0     0     0     0     0     0     0     0     0
7303   0     0     0     0     0     0     0     0     0     0     0
7304   0     0     0     0     0     0     0     0     0     0     0
7305   0     0     0     0     0     0     0     0     0     0     0
7306   0     0     0     0     0     0     1     0     0     0     0
7307   0     0     0     0     0     0     0     0     0     0     0
7308   0     0     0     0     0     0     0     0     0     0     0
7309   0     0     0     0     0     0     0     0     0     0     0
7310 2005   1     7     0     0     2     1     32    32     3     0
7311   0     0     0     0     1     0     0     1     0     0     0
7312   0     0     0     1     0     0     0     0     0     0     0
7313   0     0     0     0     0     0     0     0     0     0     0
7314   0     0     0     0     0     0     0     0     0     0     0
7315   0     0     0     0     0     0     0     0     0     0     0
7316   0     0     0     0     1     0     0     1     0     0     0
7317   0     0     0     1     0     0     0     0     0     0     0
7318   0     0     0     0     0     0     0     0     0     0     0
7319   0     0     0     0     0     0     0     0     0     0     0
7320 2005   1     7     0     0     2     1     34    34     8     0
7321   0     0     0     1     0     0     0     2     1     2     0
7322   1     0     0     1     0     0     0     0     1     0     0

```

7323	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7324	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7325	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7326	0	0	0	0	0	0	0	0	2	0	1	1	2	0	0
7327	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0
7328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7329	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7330	2005	1	7	0	0	2	1	36	36	36	11	0	0	0	0
7331	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0
7332	1	1	1	1	0	0	0	1	1	1	0	0	0	0	1
7333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7334	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7335	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7336	0	0	0	0	0	0	0	0	0	1	1	3	0	0	0
7337	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0
7338	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7339	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7340	2005	1	7	0	0	2	1	38	38	38	5	0	0	0	0
7341	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7342	0	2	0	0	0	0	0	2	0	0	0	0	1	0	0
7343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7346	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7347	0	2	0	0	0	0	0	2	0	0	0	0	1	0	0
7348	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7349	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7350	2005	1	7	0	0	2	1	40	40	40	3	0	0	0	0
7351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7352	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7353	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7355	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7356	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7357	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7358	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7360	2005	1	7	0	0	2	1	42	42	42	1	0	0	0	0
7361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7362	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7363	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7364	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

7365	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7366	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7367	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7368	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7369	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7370	2006	1	7	0	2	1	28	28	1	0	0	0	0	0
7371	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7372	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7373	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7374	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7375	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7376	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7377	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7378	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7379	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7380	2006	1	7	0	2	1	30	30	2	0	0	0	0	0
7381	0	0	0	0	1	0	0	0	0	0	0	0	1	0
7382	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7383	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7384	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7385	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7386	0	0	0	0	1	0	0	0	0	0	0	0	0	1
7387	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7388	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7389	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7390	2006	1	7	0	2	1	32	32	2	0	0	0	0	0
7391	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7392	0	0	0	0	2	0	0	0	0	0	0	0	0	0
7393	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7394	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7395	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7396	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7397	0	0	0	0	0	2	0	0	0	0	0	0	0	0
7398	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7399	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7400	2006	1	7	0	2	1	34	34	5	0	0	0	0	0
7401	0	0	0	0	0	0	0	0	0	0	0	0	2	0
7402	2	0	0	0	0	0	0	0	0	0	0	0	0	1
7403	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7404	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7405	0	0	0	0	0	0	0	0	0	0	0	0	2	0
7406	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7407	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7408	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7410	2006	1	7	0	0	2	1	36	36	13	0	0	0	0	0
7411	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
7412	1	2	0	2	2	0	0	0	0	0	0	0	1	1	0
7413	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1
7414	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7415	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7416	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7417	1	2	0	2	2	0	0	0	0	0	0	0	0	1	1
7418	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1
7419	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7420	2006	1	7	0	0	2	1	38	38	9	0	0	0	0	0
7421	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7422	0	0	0	2	2	0	0	1	0	1	1	1	1	1	0
7423	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
7424	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7425	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7427	0	0	0	2	2	0	0	0	1	0	1	1	1	1	1
7428	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7429	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7430	2007	1	7	0	0	2	1	30	30	2	0	0	0	0	0
7431	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
7432	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7433	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7434	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7435	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7436	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
7437	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7440	2007	1	7	0	0	2	1	32	32	8	0	0	0	0	0
7441	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0
7442	0	1	1	1	0	1	1	0	0	0	1	0	0	0	0
7443	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7445	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
7446	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
7447	0	0	1	1	0	0	1	1	0	0	0	1	0	0	0
7448	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

7449	0	0	0	0	0	0	0	0	0	0	0	0	0
7450	2007	1	7	0	0	2	1	34	34	8	0	0	0
7451	0	0	0	0	0	0	0	0	0	0	0	1	0
7452	1	0	0	0	0	0	1	0	0	0	0	0	3
7453	0	0	0	2	0	0	0	0	0	0	0	0	0
7454	0	0	0	0	0	0	0	0	0	0	0	0	0
7455	0	0	0	0	0	0	0	0	0	0	0	0	0
7456	0	0	0	0	0	0	0	0	0	0	0	0	1
7457	1	0	0	0	0	0	1	0	0	0	0	0	0
7458	3	0	0	2	0	0	0	0	0	0	0	0	0
7459	0	0	0	0	0	0	0	0	0	0	0	0	0
7460	2007	1	7	0	2	1	36	36	8	0	0	0	0
7461	0	0	0	0	0	0	0	0	0	0	0	0	0
7462	1	0	0	0	2	0	1	2	0	0	0	0	0
7463	0	0	0	0	1	1	0	0	0	0	0	0	0
7464	0	0	0	0	0	0	0	0	0	0	0	0	0
7465	0	0	0	0	0	0	0	0	0	0	0	0	0
7466	0	0	0	0	0	0	0	0	0	0	0	0	0
7467	1	0	0	0	0	2	0	1	2	0	0	0	0
7468	0	0	0	0	1	1	0	0	0	0	0	0	0
7469	0	0	0	0	0	0	0	0	0	0	0	0	0
7470	2007	1	7	0	2	1	38	38	6	0	0	0	0
7471	0	0	0	0	0	0	0	0	0	0	0	0	0
7472	1	0	1	0	0	0	0	0	0	0	0	0	0
7473	1	1	1	1	0	0	0	0	0	0	0	0	0
7474	1	0	0	0	0	0	0	0	0	0	0	0	0
7475	0	0	0	0	0	0	0	0	0	0	0	0	0
7476	0	0	0	0	0	0	0	0	0	0	0	0	0
7477	1	0	1	0	0	0	0	0	0	0	0	0	0
7478	0	1	1	1	0	0	0	0	0	0	0	0	0
7479	1	0	0	0	0	0	0	0	0	0	0	0	0
7480	2007	1	7	0	2	1	40	40	4	0	0	0	0
7481	0	0	0	0	0	0	0	0	0	0	0	0	0
7482	0	1	0	0	1	0	0	0	0	0	0	0	0
7483	0	0	1	0	1	0	0	0	0	0	0	0	0
7484	0	0	0	0	0	0	0	0	0	0	0	0	0
7485	0	0	0	0	0	0	0	0	0	0	0	0	0
7486	0	0	0	0	0	0	0	0	0	0	0	0	0
7487	0	1	0	0	1	0	0	0	0	0	0	0	0
7488	0	0	1	0	0	1	0	0	0	0	0	0	0
7489	0	0	0	2	1	0	0	42	42	1	0	0	0
7490	2007	1	7	0	2	1	42	42	1	0	0	0	0

7491	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7492	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7493	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7494	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7495	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7496	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7497	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7498	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7499	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7500	2008	1	7	0	0	2	1	30	30	1	0	0	0	0
7501	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7502	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7503	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7504	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7505	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7506	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7507	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7508	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7509	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7510	2008	1	7	0	0	2	1	32	32	4	0	0	0	0
7511	0	0	0	0	1	1	0	0	0	0	0	0	0	0
7512	2	0	0	0	0	0	0	0	0	0	0	0	0	0
7513	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7514	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7515	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7516	0	0	0	0	0	1	1	0	0	0	0	0	0	0
7517	2	0	0	0	0	0	0	0	0	0	0	0	0	0
7518	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7519	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7520	2008	1	7	0	0	2	1	34	34	9	0	0	0	0
7521	0	0	0	0	0	0	0	0	1	1	3	0	0	0
7522	1	1	0	0	0	0	0	0	0	0	1	0	0	0
7523	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7524	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7525	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7526	0	0	0	0	0	0	0	0	1	1	3	0	0	0
7527	1	1	0	0	0	0	0	0	0	0	1	0	1	0
7528	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7529	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7530	2008	1	7	0	0	2	1	36	36	8	0	0	0	0
7531	0	2	0	0	1	0	0	1	0	1	0	2	0	0
7532	0	2	0	1	0	0	1	0	1	0	1	0	0	0

7533	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7534	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7535	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7536	0	0	0	0	0	0	0	0	0	0	1	0	2	0
7537	0	2	0	0	1	0	0	1	0	1	0	0	0	0
7538	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7539	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7540	2008	1	7	0	0	2	1	38	38	38	6	0	0	0
7541	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7542	0	0	0	2	0	0	1	0	0	0	0	0	0	1
7543	0	0	0	0	1	0	1	0	0	0	0	0	0	0
7544	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7545	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7546	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7547	0	0	0	0	2	0	0	0	1	0	0	0	0	0
7548	1	0	0	0	0	1	0	1	0	0	0	0	0	0
7549	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7550	2008	1	7	0	0	2	1	40	40	40	1	0	0	0
7551	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7552	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7553	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7554	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7555	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7556	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7557	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7558	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7559	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7560	2008	1	7	0	0	2	1	42	42	42	2	0	0	0
7561	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7562	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7563	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7564	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7565	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7566	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7567	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7568	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7569	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7570	2009	1	7	0	0	2	1	32	32	32	1	0	0	0
7571	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7572	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7573	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7574	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7575	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7576	0	0	0	0	0	0	0	0	0	1	0	0	0	0
7577	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7578	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7579	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7580	2009	1	7	0	0	2	1	34	34	5	0	0	0	0
7581	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7582	2	0	0	0	1	1	0	0	0	0	0	0	0	0
7583	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7584	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7585	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7586	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7587	2	0	0	0	1	1	0	0	0	0	0	0	0	0
7588	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7589	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7590	2009	1	7	0	0	2	1	36	36	10	0	0	0	0
7591	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7592	0	3	1	3	0	0	1	0	0	0	0	0	0	0
7593	1	0	0	0	0	0	1	0	0	0	0	0	0	0
7594	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7595	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7596	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7597	0	3	1	3	0	0	0	1	0	0	0	0	0	0
7598	0	1	0	0	0	0	1	0	0	0	0	0	0	0
7599	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7600	2009	1	7	0	0	2	1	38	38	4	0	0	0	0
7601	0	0	0	0	0	0	0	0	0	1	0	0	0	0
7602	0	0	1	0	0	0	1	1	0	0	0	0	0	0
7603	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7604	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7605	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7606	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7607	0	0	0	1	0	0	0	1	0	0	0	0	0	0
7608	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7609	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7610	2009	1	7	0	0	2	1	40	40	2	0	0	0	0
7611	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7612	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7613	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7614	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7615	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7616	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7617	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7618	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7619	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7620	2009	1	7	0	0	2	1	42	42	1	0	0	0	0
7621	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7622	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7623	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7624	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7625	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7626	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7627	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7628	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7629	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7630	2010	1	7	0	0	2	1	30	30	1	0	0	0	0
7631	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7632	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7633	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7635	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7636	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7637	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7638	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7639	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7640	2010	1	7	0	0	2	1	32	32	3	0	0	0	0
7641	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7642	0	1	0	0	0	0	1	1	0	0	0	0	0	0
7643	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7644	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7645	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7646	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7647	0	0	1	0	0	0	0	1	0	0	0	0	0	0
7648	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7649	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7650	2010	1	7	0	0	2	1	34	34	4	0	0	0	0
7651	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7652	0	0	0	0	0	1	1	0	0	1	0	0	0	0
7653	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7654	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7655	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7656	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7657	0	0	0	0	0	0	1	1	0	0	1	0	0	0
7658	0	0	0	0	0	1	0	1	0	0	0	0	0	0

7659	0	0	0	0	0	0	0	0	0	0	0	0	0
7660	2010	1	7	0	0	2	1	36	36	10	0	0	0
7661	0	0	0	0	0	0	0	0	0	0	0	0	0
7662	0	0	2	1	1	2	0	0	0	0	0	0	0
7663	1	0	1	0	0	1	0	0	0	0	0	0	0
7664	0	0	0	0	0	0	0	0	0	0	0	0	0
7665	0	0	0	0	0	0	0	0	0	0	0	0	0
7666	0	0	0	0	0	0	0	0	0	0	0	0	0
7667	0	0	2	1	1	2	0	0	0	0	0	0	0
7668	0	1	0	1	0	1	1	0	0	0	0	0	0
7669	0	0	0	0	0	0	0	0	0	0	0	0	0
7670	2010	1	7	0	0	2	1	38	38	11	0	0	0
7671	0	0	0	0	0	0	0	0	0	1	0	0	0
7672	0	0	1	2	1	0	0	0	0	0	0	0	0
7673	1	0	0	0	1	0	0	1	0	0	0	0	0
7674	0	0	0	0	1	0	0	0	1	0	0	0	0
7675	0	0	0	0	0	0	0	0	0	0	0	0	0
7676	0	0	0	0	0	0	0	0	0	0	1	0	0
7677	0	0	1	2	1	0	0	0	0	0	0	0	0
7678	0	1	0	0	0	1	0	0	1	0	0	0	0
7679	0	0	0	0	1	0	0	0	1	1	0	0	0
7680	2010	1	7	0	0	2	1	40	40	5	0	0	0
7681	0	0	0	0	0	0	0	0	0	0	0	0	0
7682	0	0	0	0	0	0	0	0	1	0	0	0	0
7683	0	0	1	0	0	0	0	0	0	0	0	0	0
7684	1	0	1	0	0	0	0	0	0	0	0	0	1
7685	0	0	0	0	0	0	0	0	0	0	0	0	0
7686	0	0	0	0	0	0	0	0	0	0	0	0	0
7687	0	0	0	0	0	0	0	0	1	0	0	0	0
7688	0	0	1	0	0	0	0	0	0	0	0	0	0
7689	1	0	1	0	0	0	0	0	0	0	0	0	1
7690	2010	1	7	0	0	2	1	42	42	2	0	0	0
7691	0	0	0	0	0	0	0	0	0	0	0	0	0
7692	0	0	0	0	0	0	0	1	0	0	0	0	0
7693	0	0	0	0	0	0	1	0	0	0	0	0	0
7694	0	0	0	0	0	0	0	0	0	0	0	0	0
7695	0	0	0	0	0	0	0	0	0	0	0	0	0
7696	0	0	0	0	0	0	0	0	0	0	0	0	0
7697	0	0	0	0	0	0	0	1	0	0	0	0	0
7698	0	0	0	0	0	0	1	0	0	0	0	0	0
7699	0	0	0	0	0	0	0	44	44	1	0	0	0
7700	2010	1	7	0	0	2	1	44	44	1	0	0	0

7701	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7702	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7703	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7704	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7705	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7706	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7707	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7708	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7709	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7710	2011	1	7	0	0	2	1	28	28	2	0	0	0	0
7711	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7712	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7713	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7714	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7715	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7716	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7717	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7718	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7719	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7720	2011	1	7	0	0	2	1	30	30	2	0	0	0	0
7721	0	0	0	0	0	0	1	0	0	0	1	0	0	0
7722	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7723	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7724	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7725	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7726	0	0	0	0	0	0	1	0	0	0	0	1	0	0
7727	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7728	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7729	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7730	2011	1	7	0	0	2	1	32	32	4	0	0	0	0
7731	0	0	0	0	1	0	0	0	0	0	0	1	1	0
7732	1	0	0	0	0	0	0	0	0	0	0	1	0	0
7733	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7734	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7735	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7736	0	0	0	0	0	1	0	0	0	0	0	0	1	0
7737	1	0	0	0	0	0	0	0	0	0	0	0	1	0
7738	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7739	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7740	2011	1	7	0	0	2	1	34	34	17	0	0	0	0
7741	0	0	0	0	0	2	1	2	3	1	1	2	0	0
7742	0	0	0	0	2	1	2	3	0	1	1	0	0	1

7743	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7744	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7745	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7746	0	0	0	0	1	2	2	1	0	1	2	0	0	0	0
7747	0	0	0	0	2	2	3	0	0	0	1	0	0	0	0
7748	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7749	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7750	2011	1	7	0	0	2	1	36	36	36	25	0	0	0	0
7751	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0
7752	0	0	1	1	1	4	2	1	1	1	0	0	0	0	1
7753	2	2	0	0	2	0	0	1	1	0	0	0	0	0	1
7754	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7755	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7756	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1
7757	0	0	1	1	1	4	2	1	1	1	0	0	0	0	0
7758	1	2	2	0	0	2	0	1	1	1	0	0	0	0	1
7759	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7760	2011	1	7	0	0	2	1	38	38	38	15	0	0	0	0
7761	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7762	1	0	0	0	1	0	1	1	1	1	0	0	0	0	3
7763	0	1	0	0	0	0	1	2	0	0	0	0	0	0	1
7764	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7765	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7766	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7767	1	0	0	0	1	0	0	1	1	1	0	0	0	0	0
7768	3	0	1	0	0	0	1	2	0	0	0	0	0	0	1
7769	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
7770	2011	1	7	0	0	2	1	40	40	40	6	0	0	0	0
7771	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7772	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7773	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7774	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1
7775	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7776	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7777	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7778	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7779	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1
7780	2011	1	7	0	0	2	1	44	44	44	2	0	0	0	0
7781	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7783	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7784	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7785	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7786	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7787	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7788	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7789	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7790	2011	1	7	0	0	2	1	46	46	46	2	0	0	0
7791	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7792	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7793	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7794	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7795	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7796	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7797	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7798	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7799	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7800	2012	1	7	0	0	2	1	26	26	26	1	0	0	0
7801	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7802	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7803	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7804	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7805	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7806	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7807	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7808	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7809	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7810	2012	1	7	0	0	2	1	32	32	32	2	0	0	0
7811	0	0	0	0	1	0	1	0	0	0	0	0	0	0
7812	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7813	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7814	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7815	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7816	0	0	0	0	0	1	0	1	0	0	0	0	0	0
7817	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7818	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7819	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7820	2012	1	7	0	0	2	1	34	34	34	4	0	0	0
7821	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7822	0	0	0	0	1	0	0	1	0	0	0	0	0	0
7823	0	0	0	0	1	0	0	0	1	0	0	0	0	0
7824	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7825	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7826	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7827	0	0	0	0	0	1	0	0	1	0	0	0	0	0
7828	0	0	0	0	1	0	0	0	1	0	0	0	0	0
7829	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7830	2012	1	7	0	0	2	1	36	36	5	0	0	0	0
7831	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7832	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7833	0	0	1	1	0	0	0	0	1	0	0	0	0	0
7834	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7835	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7836	0	0	0	0	0	0	0	1	0	1	0	0	0	0
7837	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7838	0	0	1	1	0	0	0	0	0	1	0	0	0	0
7839	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7840	2012	1	7	0	0	2	1	38	38	12	0	0	0	0
7841	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7842	1	1	0	0	1	1	2	1	0	0	0	0	0	0
7843	0	0	0	0	0	1	1	0	0	0	0	0	0	2
7844	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7845	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7846	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7847	1	1	0	0	1	1	2	1	0	0	0	0	0	0
7848	0	0	0	0	0	1	1	0	0	0	0	0	0	2
7849	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7850	2012	1	7	0	0	2	1	40	40	2	0	0	0	0
7851	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7852	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7853	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7854	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7855	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7856	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7857	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7858	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7859	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7860	2012	1	7	0	0	2	1	42	42	1	0	0	0	0
7861	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7862	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7863	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7864	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7865	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7866	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7867	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7868	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7869	0	0	0	1	0	0	0	0	0	0	0	0	0
7870	2013	1	7	0	2	1	24	24	1	0	0	0	0
7871	0	0	1	0	0	0	0	0	0	0	0	0	0
7872	0	0	0	0	0	0	0	0	0	0	0	0	0
7873	0	0	0	0	0	0	0	0	0	0	0	0	0
7874	0	0	0	0	0	0	0	0	0	0	0	0	0
7875	0	0	0	0	0	0	0	0	0	0	0	0	0
7876	0	0	0	1	0	0	0	0	0	0	0	0	0
7877	0	0	0	0	0	0	0	0	0	0	0	0	0
7878	0	0	0	0	0	0	0	0	0	0	0	0	0
7879	0	0	0	0	0	0	0	0	0	0	0	0	0
7880	2013	1	7	0	2	1	30	30	2	0	0	0	0
7881	0	0	0	0	0	0	0	0	1	0	0	0	0
7882	0	0	0	0	0	0	0	0	0	0	0	0	0
7883	0	0	0	0	0	0	0	0	0	0	0	0	0
7884	0	0	0	0	0	0	0	0	1	0	0	0	0
7885	0	0	0	0	0	0	0	0	0	0	0	0	0
7886	0	0	0	0	0	0	0	0	1	0	0	0	0
7887	0	0	0	0	0	0	0	0	0	0	0	0	0
7888	0	0	0	0	0	0	0	0	0	0	0	0	0
7889	0	0	0	0	0	0	0	0	1	0	0	0	0
7890	2013	1	7	0	2	1	32	32	3	0	0	0	0
7891	0	0	0	0	0	0	0	0	1	0	0	0	0
7892	0	1	0	0	0	0	0	0	0	0	0	0	0
7893	0	0	0	0	1	0	0	0	0	0	0	0	0
7894	0	0	0	0	0	0	0	0	0	0	0	0	0
7895	0	0	0	0	0	0	0	0	0	0	0	0	0
7896	0	0	0	0	0	0	0	0	1	0	0	0	0
7897	0	1	0	0	0	0	0	0	0	0	0	0	0
7898	0	0	0	0	1	0	0	0	0	0	0	0	0
7899	0	0	0	0	0	0	0	0	0	0	0	0	0
7900	2013	1	7	0	2	1	34	34	20	0	0	0	0
7901	0	0	0	0	0	0	2	2	0	0	0	0	0
7902	0	2	0	2	0	2	0	0	1	3	0	0	0
7903	1	0	0	0	1	0	1	1	0	0	0	0	0
7904	1	0	0	1	0	0	0	0	0	0	0	0	0
7905	0	0	0	0	0	0	0	0	0	0	0	0	0
7906	0	0	0	0	0	0	2	2	0	0	0	0	0
7907	0	2	0	2	0	0	2	0	1	3	0	0	0
7908	0	1	0	0	1	0	1	1	0	0	0	0	0
7909	1	0	1	0	0	0	0	0	0	0	0	0	0
7910	2013	1	7	0	2	1	36	36	23	0	0	0	0

7911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7912	1	1	1	1	2	2	3	0	1	0	1	0	2	0	1
7913		1	1	2	2	1	0	0	0	2	0	0	0	0	0
7914		1	0	0	0	0	1	0	0	0	0	0	0	0	0
7915	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7916		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7917		1	1	1	2	2	3	0	1	0	1	0	2	0	0
7918	1	1	2	2	1	0	1	0	0	2	0	0	0	0	0
7919		1	0	0	0	1	0	0	0	0	0	0	0	0	0
7920	2013	1	7	0	0	2	1	38	38	38	13	0	0	0	0
7921		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7922	0	0	0	0	0	3	0	0	1	1	0	1	1	0	0
7923		0	1	0	0	0	0	1	0	0	0	0	0	0	0
7924		1	0	0	1	0	0	0	0	0	1	0	1	0	0
7925	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
7926		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7927	0	0	0	0	0	0	3	0	0	1	1	0	1	1	0
7928	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
7929		1	0	0	0	1	0	0	0	0	0	1	0	0	0
7930	2013	1	7	0	0	2	1	40	40	40	2	0	0	0	0
7931		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7932	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7933		0	0	0	1	0	0	0	0	0	0	0	0	0	0
7934	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7935	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7936		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7937	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7938	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7939		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7940	2013	1	7	0	0	2	1	42	42	42	1	0	0	0	0
7941		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7942	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7943		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7945	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7946		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7947	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7948	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7949		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7950															
7951	0	#_N_MeanSize-at-Age_obs													
7952	#Yr Seas Flt/Svy Gender Part Ageerr Ignore	datavector(female-male)													

```

7953 # samplesize(female-male)
7954 # 1971 1 1 3 0 1 2 29.8931 40.6872 44.7411 50.027 52.5794 56.1489 57.1033 6
7955 # 1.1728 61.7417 63.368 64.4088 65.6889 67.616 68.5972 69.9177 71.0443 72.3
7956 # 609 32.8188 39.5964 43.988 50.1693 53.1729 54.9822 55.3463 60.3509 60.743
7957 # 9 62.3432 64.3224 65.1032 64.1965 66.7452 67.5154 70.8749 71.2768 20 20 2
7958 # 0 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
7959 # 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
```

7960

```

7961 0 #_N_environ_variables
7962 0 #_N_environ_obs
7963 0 # N sizefreq methods to read
```

7964

```

7965 0 # no tag data
```

7966

```

7967 0 # no morphcomp data
```

7968

```

7969 999
```

## 7970 Southern Model

```

7971 #V3.24u
7972 #C data file for China rockfish South of 4010
7973 # discard included as separate fleet
7974 #_observed data:
7975 1900 #_styr
7976 2014 #_endyr
7977 1 #_nseas
7978 12 #_months/season
7979 1 #_spawn_seas
7980 5 #_Nfleet
7981 4 #_Nsurveys
7982 1 #_N_areas
7983
7984 ## fleet names
7985 1_CA_SouthOf4010_Comm_Dead%2_CA_SouthOf4010_Comm_Live%3_CA_SouthOf4010_Rec_
7986 PC%4_CA_SouthOf4010_Rec_PR%5_CA_SouthOf4010_Comm_Discard%6_CA_SouthOf4010_R
7987 ec_PC_DWV_index%7_CA_SouthOf4010_Rec_PC_onboard_index%8_CA_SouthOf4010_CCFR
7988 P_comps_only%9_CA_SouthOf4010_Abrams_thesis_comps
7989 ## 1_CA_SouthOf4010_Comm_Dead
7990 ## 2_CA_SouthOf4010_Comm_Live
7991 ## 3_CA_SouthOf4010_Rec_PC
7992 ## 4_CA_SouthOf4010_Rec_PR
```

```

7993 ## 5_CA_SouthOf4010_Comm_Discard (THIS IS DEAD DISCARD)
7994 ## 6_CA_SouthOf4010_Rec_PC_DWV_index
7995 ## 7_CA_SouthOf4010_Rec_PC_onboard_index
7996 ## 8_CA_SouthOf4010_CCFRP_comps_only
7997 ## 9_CA_SouthOf4010_Abrams_thesis_comps
7998
7999 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 #_surveytiming_in_season -- mid-year, n
8000 # ot exactly like XDB-SRA
8001 1 1 1 1 1 1 1 1 #_area_assignments_for_each_fishery_and
8002 # _survey
8003 1 1 1 1 1 #_units of catch: 1=bio; 2=num
8004 0.1 0.1 0.1 0.1 0.1 #_se of log(catch) only used for init_eq_catch and fo
8005 # r Fmethod 2 and 3
8006
8007 2 #_Ngenders
8008 80 #_Nages
8009 0 0 0 0 0 #_init_equil_catch_for_each_fishery
8010
8011 115 #_N_lines_of_catch_to_read
8012 #_catch_biomass(mtons):_columns_are_fisheries,year,season
8013 #fleet1 fleet2 fleet3 fleet4 fleet5 Year Season # total catch
8014 0 0 0 0 1900 1 # 0
8015 0.383 0 0 0 0 1901 1 # 0.383
8016 0.766 0 0 0 0 1902 1 # 0.766
8017 1.149 0 0 0 0 1903 1 # 1.149
8018 1.532 0 0 0 0 1904 1 # 1.532
8019 1.915 0 0 0 0 1905 1 # 1.915
8020 2.299 0 0 0 0 1906 1 # 2.299
8021 2.682 0 0 0 0 1907 1 # 2.682
8022 3.065 0 0 0 0 1908 1 # 3.065
8023 3.448 0 0 0 0 1909 1 # 3.448
8024 3.831 0 0 0 0 1910 1 # 3.831
8025 4.214 0 0 0 0 1911 1 # 4.214
8026 4.597 0 0 0 0 1912 1 # 4.597
8027 4.98 0 0 0 0 1913 1 # 4.98
8028 5.363 0 0 0 0 1914 1 # 5.363
8029 5.746 0 0 0 0 1915 1 # 5.746
8030 6.129 0 0 0 0 1916 1 # 6.129
8031 9.522 0 0 0 0 1917 1 # 9.522
8032 11.133 0 0 0 0 1918 1 # 11.133
8033 7.741 0 0 0 0 1919 1 # 7.741
8034 7.895 0 0 0 0 1920 1 # 7.895

```

8035 6.519 0 0 0 0 1921 1 # 6.519  
8036 5.609 0 0 0 0 1922 1 # 5.609  
8037 6.066 0 0 0 0 1923 1 # 6.066  
8038 3.514 0 0 0 0 1924 1 # 3.514  
8039 4.388 0 0 0 0 1925 1 # 4.388  
8040 7.084 0 0 0 0 1926 1 # 7.084  
8041 6.016 0 0 0 0 1927 1 # 6.016  
8042 7.266 0 0.104 0.311 0 1928 1 # 7.681  
8043 6.015 0 0.208 0.623 0 1929 1 # 6.846  
8044 8.519 0 0.239 0.716 0 1930 1 # 9.474  
8045 3.626 0 0.318 0.955 0 1931 1 # 4.899  
8046 9.266 0 0.398 1.193 0 1932 1 # 10.857  
8047 3.33 0 0.477 1.432 0 1933 1 # 5.239  
8048 7.089 0 0.557 1.67 0 1934 1 # 9.316  
8049 6.309 0 0.636 1.909 0 1935 1 # 8.854  
8050 6.221 0 0.716 2.147 0 1936 1 # 9.084  
8051 5.599 0 0.849 2.546 0 1937 1 # 8.994  
8052 3.261 0 0.835 2.504 0 1938 1 # 6.6  
8053 0.723 0 0.73 2.19 0 1939 1 # 3.643  
8054 0.298 0 1.05 3.149 0 1940 1 # 4.497  
8055 0.849 0 0.97 2.911 0 1941 1 # 4.73  
8056 0.519 0 0.516 1.547 0 1942 1 # 2.582  
8057 1.745 0 0.493 1.479 0 1943 1 # 3.717  
8058 0.49 0 0.405 1.214 0 1944 1 # 2.109  
8059 0.553 0 0.54 1.619 0 1945 1 # 2.712  
8060 1.449 0 0.929 2.786 0 1946 1 # 5.164  
8061 1.484 0 0.738 2.215 0 1947 1 # 4.437  
8062 3.253 0 1.475 4.426 0 1948 1 # 9.154  
8063 4.428 0 1.912 5.735 0 1949 1 # 12.075  
8064 1.807 0 2.33 6.989 0 1950 1 # 11.126  
8065 2.65 0 2.732 8.197 0 1951 1 # 13.579  
8066 2.419 0 2.383 7.149 0 1952 1 # 11.951  
8067 2.289 0 2.036 6.107 0 1953 1 # 10.432  
8068 0.746 0 2.553 7.658 0 1954 1 # 10.957  
8069 0.335 0 3.071 9.212 0 1955 1 # 12.618  
8070 0.192 0 3.433 10.299 0 1956 1 # 13.924  
8071 0.414 0 3.416 10.248 0 1957 1 # 14.078  
8072 0.24 0 5.617 16.85 0 1958 1 # 22.707  
8073 0.629 0 4.356 13.068 0 1959 1 # 18.053  
8074 0.475 0 3.633 10.9 0 1960 1 # 15.008  
8075 1.001 0 3.164 9.491 0 1961 1 # 13.656  
8076 0.375 0 2.976 8.928 0 1962 1 # 12.279

8077 0.806 0 3.722 11.167 0 1963 1 # 15.695  
8078 0.026 0 2.518 7.555 0 1964 1 # 10.099  
8079 0.18 0 4.126 12.377 0 1965 1 # 16.683  
8080 0.252 0 4.653 13.96 0 1966 1 # 18.865  
8081 0.124 0 6.034 18.101 0 1967 1 # 24.259  
8082 0.01 0 5.283 15.848 0 1968 1 # 21.141  
8083 1.569 0 4.494 13.483 0 1969 1 # 19.546  
8084 1.841 0 7.588 22.764 0 1970 1 # 32.193  
8085 1.261 0 5.572 16.716 0 1971 1 # 23.549  
8086 2.1 0 7.839 23.516 0 1972 1 # 33.455  
8087 3.419 0 8.674 26.021 0 1973 1 # 38.114  
8088 2.526 0 9.839 29.518 0 1974 1 # 41.883  
8089 2.719 0 9.507 28.52 0 1975 1 # 40.746  
8090 3.813 0 10.278 30.834 0 1976 1 # 44.925  
8091 3.074 0 9.3 27.899 0 1977 1 # 40.273  
8092 1.448 0 7.331 21.994 0 1978 1 # 30.773  
8093 7.95 0 8.341 25.023 0 1979 1 # 41.314  
8094 5.009 0 10.936 21.847 0 1980 1 # 37.792  
8095 0.762 0 4.755 10.989 0 1981 1 # 16.506  
8096 0.556 0 5.676 24.998 0 1982 1 # 31.23  
8097 1.664 0 5.103 10.824 0 1983 1 # 17.591  
8098 3.342 0 1.047 12.167 0 1984 1 # 16.556  
8099 1.087 0 3.279 23.873 0 1985 1 # 28.239  
8100 1.06 0 7.754 31.95 0 1986 1 # 40.764  
8101 3.364 0 18.353 34.123 0 1987 1 # 55.84  
8102 4.218 0 8.276 26.826 0 1988 1 # 39.32  
8103 6.006 0 9.546 22.426 0 1989 1 # 37.978  
8104 6.156 0 8.462 22.738 0 1990 1 # 37.356  
8105 11.51 0 7.566 23.488 0.183 1991 1 # 42.747  
8106 20.992 0 6.737 24.48 0.326 1992 1 # 52.535  
8107 14.868 0.168 5.782 25.017 0.432 1993 1 # 46.267  
8108 21.46 11.07 4.882 25.246 1.544 1994 1 # 64.202  
8109 14.94 9.14 3.981 20.01 1.587 1995 1 # 49.658  
8110 8.783 6.158 3.123 14.766 1.347 1996 1 # 34.177  
8111 23.311 6.504 3.6 3.544 1.711 1997 1 # 38.670  
8112 5.307 5.388 0.839 6.4 1.205 1998 1 # 19.139  
8113 2.34 3.797 2.971 11.709 1.474 1999 1 # 22.291  
8114 0.667 2.288 5.638 11.244 1.918 2000 1 # 21.755  
8115 0.77 2.436 6.506 9.19 2.163 2001 1 # 21.065  
8116 0.677 2.106 5.144 9.996 1.754 2002 1 # 19.677  
8117 0.269 0.719 4.402 12.124 1.239 2003 1 # 18.753  
8118 0.567 1.41 3.717 4.086 0.351 2004 1 # 10.131

```

8119 0.71 1.624 8.485 4.901 0.647 2005 1 # 16.367
8120 0.526 1.49 4.859 5.863 0.478 2006 1 # 13.216
8121 0.73 1.471 4.399 6.79 0.608 2007 1 # 13.998
8122 0.771 1.57 5.236 7.58 0.810 2008 1 # 15.967
8123 0.437 1.538 7.033 11.139 0.956 2009 1 # 21.103
8124 0.761 1.053 7.813 9.134 1.684 2010 1 # 20.445
8125 0.434 1.117 7.461 6.611 1.383 2011 1 # 17.006
8126 0.709 0.669 6.149 6.258 1.815 2012 1 # 15.600
8127 0.379 0.831 4.528 4.273 1.275 2013 1 # 11.286
8128 0.251 1.334 4.336 5.249 1.275 2014 1 # 12.445
8129 #
8130 45 #_N_cpue_and_surveyabundance_observations
8131 #_Units: 0=numbers; 1=biomass; 2=F
8132 #_Errtype: -1=normal; 0=lognormal; >0=T
8133 #_Fleet Units Errtype
8134 1      0      0 # 1_CA_SouthOf4010_Comm_Dead
8135 2      0      0 # 2_CA_SouthOf4010_Comm_Live
8136 3      0      0 # 3_CA_SouthOf4010_Rec_PC
8137 4      0      0 # 4_CA_SouthOf4010_Rec_PR
8138 5      0      0 # 5_CA_SouthOf4010_Comm_Discard
8139 6      0      0 # 6_CA_SouthOf4010_Rec_PC_DWV_index
8140 7      0      0 # 7_CA_SouthOf4010_Rec_PC_onboard_index
8141 8      0      0 # 8_CA_SouthOf4010_CCFRP_comps_only
8142 9      0      0 # 9_CA_SouthOf4010_Abrams_thesis_comps
8143
8144 ### assigned to fleet "3_CA_SouthOf4010_Rec_PC"
8145 ### CA MRFSS dockside index, south of 4010
8146 #_year seas index obs err
8147 1980 1 3 0.060 0.260 # CA MRFSS dockside South of 4010
8148 1981 1 3 0.048 0.389 # CA MRFSS dockside South of 4010
8149 1982 1 3 0.079 0.320 # CA MRFSS dockside South of 4010
8150 1983 1 3 0.087 0.307 # CA MRFSS dockside South of 4010
8151 1984 1 3 0.050 0.299 # CA MRFSS dockside South of 4010
8152 1985 1 3 0.060 0.245 # CA MRFSS dockside South of 4010
8153 1986 1 3 0.078 0.180 # CA MRFSS dockside South of 4010
8154 1987 1 3 0.128 0.245 # CA MRFSS dockside South of 4010
8155 1988 1 3 0.116 0.282 # CA MRFSS dockside South of 4010
8156 1989 1 3 0.071 0.274 # CA MRFSS dockside South of 4010
8157 1995 1 3 0.088 0.213 # CA MRFSS dockside South of 4010
8158 1996 1 3 0.038 0.137 # CA MRFSS dockside South of 4010
8159 1998 1 3 0.035 0.271 # CA MRFSS dockside South of 4010
8160 1999 1 3 0.025 0.184 # CA MRFSS dockside South of 4010

```

```

8161 2000 1 3 0.037 0.350 # CA MRFSS dockside South of 4010
8162 2001 1 3 0.060 0.296 # CA MRFSS dockside South of 4010
8163 2002 1 3 0.062 0.289 # CA MRFSS dockside South of 4010
8164 2003 1 3 0.049 0.403 # CA MRFSS dockside South of 4010
8165
8166 ### CA historic onboard - south of 4010
8167 ### assigning to survey: "6_CA_SouthOf4010_Rec_PC_DWV_index" due to overlap
8168 # in years with other indices
8169 #_year seas index obs err
8170 1988 1 6 0.089 0.126 #CA onboard historic south 4010
8171 1989 1 6 0.077 0.143 #CA onboard historic south 4010
8172 1990 1 6 0.139 0.222 #CA onboard historic south 4010
8173 1991 1 6 0.069 0.201 #CA onboard historic south 4010
8174 1992 1 6 0.042 0.150 #CA onboard historic south 4010
8175 1993 1 6 0.041 0.143 #CA onboard historic south 4010
8176 1994 1 6 0.051 0.135 #CA onboard historic south 4010
8177 1995 1 6 0.033 0.155 #CA onboard historic south 4010
8178 1996 1 6 0.038 0.121 #CA onboard historic south 4010
8179 1997 1 6 0.025 0.129 #CA onboard historic south 4010
8180 1998 1 6 0.021 0.161 #CA onboard historic south 4010
8181 1999 1 6 0.045 0.266 #CA onboard historic south 4010
8182
8183 ### CA current onboard - south of 4010
8184 ### assigning to survey: "7_CA_SouthOf4010_Rec_PC_onboard_index" due to ove
8185 # rlap in years with other indices
8186 #_year seas index obs err
8187 2000 1 7 0.0199 0.4302 #CA onboard current south 4010
8188 2001 1 7 0.0465 0.2381 #CA onboard current south 4010
8189 2002 1 7 0.0850 0.1685 #CA onboard current south 4010
8190 2003 1 7 0.0691 0.1209 #CA onboard current south 4010
8191 2004 1 7 0.0665 0.1336 #CA onboard current south 4010
8192 2005 1 7 0.0694 0.1406 #CA onboard current south 4010
8193 2006 1 7 0.0669 0.1328 #CA onboard current south 4010
8194 2007 1 7 0.0774 0.1268 #CA onboard current south 4010
8195 2008 1 7 0.0988 0.1124 #CA onboard current south 4010
8196 2009 1 7 0.1266 0.1090 #CA onboard current south 4010
8197 2010 1 7 0.0964 0.1115 #CA onboard current south 4010
8198 2011 1 7 0.0925 0.0992 #CA onboard current south 4010
8199 2012 1 7 0.0653 0.1322 #CA onboard current south 4010
8200 2013 1 7 0.0457 0.1497 #CA onboard current south 4010
8201 2014 1 7 0.0464 0.1495 #CA onboard current south 4010
8202

```

```

8203 0 #_N_fleets_with_discard
8204 #Fleet units err_type
8205 #2 1 0
8206 0 #N discard obs (TOTAL DISCARD -- DEAD+SURVIVING)
8207 #_year seas fleet obs(mt) err # fraction average:
8208 #2004 1 2 0.6147 0.505781 # 15.2% 33.9%
8209 #2005 1 2 1.4013 0.509880 # 21.6%
8210 #2006 1 2 0.8719 0.475889 # 19.1%
8211 #2007 1 2 1.0594 0.190865 # 21.6%
8212 #2008 1 2 1.3497 0.767199 # 26.2%
8213 #2009 1 2 1.7689 0.643454 # 32.7%
8214 #2010 1 2 2.6821 0.692105 # 48.3%
8215 #2011 1 2 2.9231 0.445517 # 47.2%
8216 #2012 1 2 2.7292 0.816548 # 55.8%
8217 #2013 1 2 1.6141 0.528085 # 51.5%
8218 #
8219 0 #_N_meanbodywt_obs
8220 30 #_DF_for_meanbodywt_T-distribution_like
8221
8222 2 # length bin method: 1=use databins; 2=generate from binwidth,min,max be
8223 # low; 3=read vector
8224 2 # binwidth for population size comp
8225 8 # minimum size in the population (lower edge of first bin and size at ag
8226 # e 0.00)
8227 50 # maximum size in the population (lower edge of last bin)
8228
8229 -0.0001 #_comp_tail_compression
8230 1e-003 #_add_to_comp
8231 0 #_combine males into females at or below this bin number
8232 15 #_N_LengthBins
8233 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
8234
8235 120 #_N_Length_obs
8236
8237 ### CA commercial landings, dead fish, south of 40-10
8238 ### assigned to fleet: "1_CA_SouthOf4010_Comm_Dead"
8239 ### Nsamp = number of clusters; dropped 1998 & 2006 (outliers); 1999 (borro
8240 # wed size comp from adjacent port)
8241 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8242 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+
8243 1992 1 1 0 2 26 0 6 886 381 765 4052 9331 5421 2889 1253 278 0 0 0 54 0 6 8
8244 86 381 765 4052 9331 5421 2889 1253 278 0 0 0 54

```

```

8245 1993 1 1 0 2 22 0 0 270 1521 2870 1482 2115 408 940 119 244 105 13 0 0 0 0
8246 270 1521 2870 1482 2115 408 940 119 244 105 13 0 0
8247 1994 1 1 0 2 54 57 263 695 1898 6424 6550 6693 2431 759 769 168 117 0 0 0 5
8248 7 263 695 1898 6424 6550 6693 2431 759 769 168 117 0 0 0
8249 1995 1 1 0 2 10 0 429 429 839 3844 5553 2608 2365 287 429 0 0 0 0 0 429 4
8250 29 839 3844 5553 2608 2365 287 429 0 0 0 0 0
8251 1996 1 1 0 2 16 4 0 150 164 1007 1383 1166 253 508 253 253 0 0 0 0 4 0 150
8252 164 1007 1383 1166 253 508 253 253 0 0 0 0
8253 1997 1 1 0 2 19 0 0 17 50 849 4200 5238 4028 1966 146 0 0 0 0 0 0 17 50 8
8254 49 4200 5238 4028 1966 146 0 0 0 0 0
8255 -1998 1 1 0 2 2 265 0 272 1346 333 68 68 0 0 0 0 0 0 0 265 0 272 1346 333
8256 68 68 0 0 0 0 0 0 0 0
8257 -1999 1 1 0 2 0 0 0 0 0 59 236 118 118 59 0 0 0 0 0 0 0 0 0 0 59 236 118
8258 118 59 0 0 0 0 0
8259 -2006 1 1 0 2 1 0 0 0 0 0 0 0 0 0 0 0 0 36 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8260 36
8261
8262 ### CA commercial RETAINED CATCH, live fish, south of 40-10
8263 ### assigned to fleet: "2_CA_SouthOf4010_Comm_Live"
8264 ### Nsamp = number of clusters
8265 ### Partition = 2 (retained catch)
8266 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8267 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+
8268 1997 1 2 0 2 11 0 0 0 80 240 890 1140 600 220 310 0 80 0 0 0 0 0 0 80 240 8
8269 90 1140 600 220 310 0 80 0 0 0
8270 1999 1 2 0 2 24 0 0 0 0 72 216 1152 1008 576 360 72 0 0 0 0 0 0 0 0 72 216
8271 1152 1008 576 360 72 0 0 0 0
8272 2000 1 2 0 2 31 0 0 0 0 0 28 707 829 345 140 84 0 0 0 0 0 0 0 0 0 28 707 82
8273 9 345 140 84 0 0 0 0
8274 2001 1 2 0 2 17 0 0 0 0 34 96 784 844 322 192 32 32 0 0 0 0 0 0 0 34 96 784
8275 844 322 192 32 32 0 0 0
8276 2002 1 2 0 2 8 0 0 0 0 0 0 512 672 416 96 64 0 0 64 0 0 0 0 0 0 0 512 672 4
8277 16 96 64 0 0 64 0
8278 2003 1 2 0 2 6 0 0 0 0 0 0 0 140 252 140 0 0 0 0 0 0 0 0 0 0 0 0 0 0 140 252 14
8279 0 0 0 0 0
8280 2004 1 2 0 2 29 0 0 0 0 0 0 0 153 427 497 79 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 153 427
8281 497 79 0 0 0 0
8282 2005 1 2 0 2 28 0 0 0 0 0 0 0 417 728 419 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 417 728 419
8283 0 0 0 0 0 0
8284 2006 1 2 0 2 13 0 0 0 0 0 0 50 1949 4331 2432 1216 0 0 0 0 448 0 0 0 0 0 50 1
8285 949 4331 2432 1216 0 0 0 0 448
8286 2007 1 2 0 2 22 0 0 0 0 0 0 571 643 309 126 0 0 0 0 0 0 0 0 0 0 0 0 0 0 571 643 3

```

```

8287 09 126 0 0 0 0 0
8288 2008 1 2 0 2 29 0 0 0 0 0 63 336 588 420 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 63 336 588
8289 420 0 0 0 0 0
8290 2009 1 2 0 2 22 0 0 0 0 6 26 329 862 1413 237 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 6 26 329
8291 862 1413 237 100 0 0 0 0
8292 2010 1 2 0 2 12 0 0 0 0 0 91 390 429 182 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 91 390 429
8293 182 0 0 0 0 0
8294 2011 1 2 0 2 13 0 0 0 0 0 8 104 16 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 104 16 8 0 0 0
8295 0 0 0
8296 2012 1 2 0 2 5 0 0 0 0 0 0 72 24 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 72 24 0 0 0 0 0
8297 0 0
8298
8299 ### CA commercial DISCARDED CATCH TREATED AS FISHERY, live+dead fish fisher
8300 # ies, south of 40-10
8301 ### assigned to fleet: "5_CA_SouthOf4010_Comm_Discard"
8302 ### WCGOP Discards south of 40-10 (discards north of 40-10 too small to mod
8303 # el with length comps)
8304 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8305 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+ repeat m20 m22 m24 m26 m28 m30 m32 m3
8306 # 4 m36 m38 m40 m42 m44 m46
8307 2004 1 5 0 2 11 0 0 2 1 6 15 10 0 1 0 0 0 0 0 0 0 0 2 1 6 15 10 0 1 0 0 0 0
8308 0 0
8309 2005 1 5 0 2 19 1 1 1 4 5 6 8 5 1 0 0 0 0 0 0 0 1 1 1 4 5 6 8 5 1 0 0 0 0 0 0
8310 2006 1 5 0 2 16 0 0 1 5 4 10 5 0 0 0 0 0 0 0 0 0 1 5 4 10 5 0 0 0 0 0 0 0
8311 0
8312 2007 1 5 0 2 14 0 1 1 2 6 11 6 1 0 0 0 0 0 0 0 0 1 1 2 6 11 6 1 0 0 0 0 0 0
8313 0
8314 2008 1 5 0 2 6 0 3 5 2 3 6 8 0 0 0 0 0 0 0 0 0 3 5 2 3 6 8 0 0 0 0 0 0 0 0
8315 2009 1 5 0 2 16 1 1 3 3 13 12 15 4 0 1 0 0 0 0 0 1 1 3 3 13 12 15 4 0 1 0 0
8316 0 0 0
8317 2010 1 5 0 2 31 3 13 41 64 71 30 6 1 0 0 0 0 0 0 0 3 13 41 64 71 30 6 1 0 0
8318 0 0 0 0 0
8319 2011 1 5 0 2 44 1 15 20 47 30 19 11 1 2 0 0 0 0 0 0 1 15 20 47 30 19 11 1 2
8320 0 0 0 0 0 0
8321 2012 1 5 0 2 38 0 13 46 105 103 22 7 0 0 0 0 0 0 0 0 0 13 46 105 103 22 7 0
8322 0 0 0 0 0 0 0
8323 2013 1 5 0 2 20 0 0 8 3 16 26 6 7 0 0 0 0 0 0 0 0 0 8 3 16 26 6 7 0 0 0 0 0
8324 0 0
8325
8326 ### CA rec landings, PC mode, south of 40-10 (combines Miller+Gotshall 1960
8327 # , CA rec sampling 1978-1984, and MRFSS sampling 1980-2003)
8328 ### assigned to fleet: "3_CA_SouthOf4010_Rec_PC"

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8329 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8330 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+
8331 1960 1 -3 0 2 85 0 0 0 0 0 3 4 10 11 19 24 9 4 0 1 0 0 0 0 0 3 4 10 11 19 2
8332 4 9 4 0 1
8333 1978 1 3 0 2 25 0 0 0 0 3 2 8 4 6 1 0 0 1 0 0 0 0 0 0 3 2 8 4 6 1 0 0 1 0 0
8334 1979 1 3 0 2 23 0 0 0 2 1 3 6 3 4 1 2 1 0 0 0 0 0 0 2 1 3 6 3 4 1 2 1 0 0 0
8335 1980 1 3 0 2 72 0 1 0 1 3 10 18 13 14 5 4 3 0 0 0 0 1 0 1 3 10 18 13 14 5 4
8336 3 0 0 0
8337 1981 1 3 0 2 28 0 0 0 1 0 4 9 5 3 2 2 1 1 0 0 0 0 0 1 0 4 9 5 3 2 2 1 1 0 0
8338 1982 1 3 0 2 28 0 0 0 3 1 1 5 5 3 2 6 1 0 1 0 0 0 0 3 1 1 5 5 3 2 6 1 0 1 0
8339 1983 1 3 0 2 34 0 0 0 0 1 5 9 9 2 5 3 0 0 0 0 0 0 0 1 5 9 9 2 5 3 0 0 0 0
8340 1984 1 3 0 2 20 0 0 0 0 5 3 5 4 1 1 0 0 1 0 0 0 0 0 0 5 3 5 4 1 1 0 0 1 0 0
8341 1985 1 3 0 2 42 1 1 5 4 3 8 7 7 2 1 3 0 0 0 0 1 1 5 4 3 8 7 7 2 1 3 0 0 0 0
8342 1986 1 3 0 2 89 0 1 3 9 23 11 11 14 8 5 3 1 0 0 0 0 1 3 9 23 11 11 14 8 5 3
8343 1 0 0 0
8344 1987 1 3 0 2 65 1 0 3 3 11 9 11 8 12 3 3 1 0 0 0 1 0 3 3 11 9 11 8 12 3 3 1
8345 0 0 0
8346 1988 1 3 0 2 28 1 1 1 3 3 6 5 4 2 0 1 1 0 0 0 1 1 1 3 3 6 5 4 2 0 1 1 0 0 0
8347 1989 1 3 0 2 65 0 0 2 7 5 15 10 7 10 2 3 4 0 0 0 0 0 2 7 5 15 10 7 10 2 3 4
8348 0 0 0
8349 1993 1 3 0 2 5 0 0 0 0 1 3 1 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
8350 1994 1 3 0 2 6 0 0 0 0 3 1 1 1 0 0 0 0 0 0 0 0 0 0 3 1 1 1 0 0 0 0 0 0 0 0 0
8351 1995 1 3 0 2 39 0 1 2 0 11 12 7 3 3 0 0 0 0 0 0 0 1 2 0 11 12 7 3 3 0 0 0 0
8352 0 0
8353 1996 1 3 0 2 91 0 4 5 4 18 29 18 6 4 3 0 0 0 0 0 0 4 5 4 18 29 18 6 4 3 0 0
8354 0 0 0
8355 1998 1 3 0 2 20 0 0 0 3 4 8 2 0 0 0 2 0 1 0 0 0 0 0 3 4 8 2 0 0 0 2 0 1 0 0
8356 1999 1 3 0 2 81 0 3 3 2 13 24 20 8 3 3 2 0 0 0 0 0 3 3 2 13 24 20 8 3 3 2 0
8357 0 0 0
8358 2000 1 3 0 2 39 0 0 1 3 9 10 8 5 2 0 0 1 0 0 0 0 0 1 3 9 10 8 5 2 0 0 1 0 0
8359 0
8360 2001 1 3 0 2 89 0 1 3 14 11 22 18 12 6 2 0 0 0 0 0 0 1 3 14 11 22 18 12 6 2
8361 0 0 0 0 0
8362 2002 1 3 0 2 144 0 1 2 12 28 35 37 19 3 4 1 0 0 0 2 0 1 2 12 28 35 37 19 3
8363 4 1 0 0 0 2
8364 2003 1 3 0 2 241 0 0 7 15 47 62 58 32 13 4 2 0 0 0 1 0 0 7 15 47 62 58 32 1
8365 3 4 2 0 0 0 1
8366 2004 1 3 0 2 228 0 6 5 20 42 51 61 27 12 3 0 0 1 0 0 0 6 5 20 42 51 61 27 1
8367 2 3 0 0 1 0 0
8368 2005 1 3 0 2 169 0 1 6 8 23 42 48 32 8 1 0 0 0 0 0 0 1 6 8 23 42 48 32 8 1
8369 0 0 0 0 0
8370 2006 1 3 0 2 156 0 1 2 14 23 41 43 25 4 3 0 0 0 0 0 0 1 2 14 23 41 43 25 4

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8371 3 0 0 0 0 0
8372 2007 1 3 0 2 275 0 0 12 13 31 63 73 49 20 8 3 1 0 1 1 0 0 12 13 31 63 73 49
8373 20 8 3 1 0 1 1
8374 2008 1 3 0 2 347 0 4 8 28 42 80 105 62 8 7 3 0 0 0 0 0 4 8 28 42 80 105 62
8375 8 7 3 0 0 0 0
8376 2009 1 3 0 2 495 0 1 20 41 76 125 117 64 28 16 5 2 0 0 0 0 1 20 41 76 125 1
8377 17 64 28 16 5 2 0 0 0
8378 2010 1 3 0 2 481 2 6 13 32 75 130 119 65 32 3 4 0 0 0 0 2 6 13 32 75 130 11
8379 9 65 32 3 4 0 0 0 0
8380 2011 1 3 0 2 584 0 4 14 45 94 150 160 62 38 13 3 1 0 0 0 0 4 14 45 94 150 1
8381 60 62 38 13 3 1 0 0 0
8382 2012 1 3 0 2 406 0 1 2 19 44 103 110 73 27 16 10 1 0 0 0 0 1 2 19 44 103 11
8383 0 73 27 16 10 1 0 0 0
8384 2013 1 3 0 2 244 2 1 5 10 32 51 58 36 29 10 4 6 0 0 0 2 1 5 10 32 51 58 36
8385 29 10 4 6 0 0 0
8386 2014 1 3 0 2 325 1 3 4 5 24 61 85 90 35 9 6 1 1 0 0 1 3 4 5 24 61 85 90 35
8387 9 6 1 1 0 0
8388
8389 ### CA rec landings, PR mode, south of 40-10 (includes Miller and Gotshall,
8390 # MRFSS)
8391 ### assigned to fleet: "4_CA_SouthOf4010_Rec_PR"
8392 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8393 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+ repeat
8394 1959 1 -4 0 2 51 0 0 0 1 0 0 1 5 10 15 14 5 0 0 0 0 0 0 1 0 0 1 5 10 15 14
8395 5 0 0 0
8396 1980 1 4 0 2 60 0 0 0 1 2 11 14 8 8 5 11 0 0 0 0 0 0 0 1 2 11 14 8 8 5 11 0
8397 0 0 0
8398 1981 1 4 0 2 35 0 0 0 1 2 3 8 6 3 3 5 3 1 0 0 0 0 0 1 2 3 8 6 3 3 5 3 1 0 0
8399 1982 1 4 0 2 71 1 0 1 2 2 11 12 9 7 5 10 8 1 1 1 1 0 1 2 2 11 12 9 7 5 10 8
8400 1 1 1
8401 1983 1 4 0 2 34 0 1 0 1 4 12 3 6 0 3 3 1 0 0 0 0 1 0 1 4 12 3 6 0 3 3 1 0 0
8402 0
8403 1984 1 4 0 2 54 2 0 1 1 2 12 13 5 7 6 5 0 0 0 0 2 0 1 1 2 12 13 5 7 6 5 0 0
8404 0 0
8405 1985 1 4 0 2 100 1 4 2 1 6 17 28 13 14 3 5 4 2 0 0 1 4 2 1 6 17 28 13 14 3
8406 5 4 2 0 0
8407 1986 1 4 0 2 135 0 1 4 6 9 19 30 27 14 8 11 6 0 0 0 0 1 4 6 9 19 30 27 14 8
8408 11 6 0 0 0
8409 1987 1 4 0 2 76 0 5 1 5 3 8 9 14 10 9 9 3 0 0 0 0 5 1 5 3 8 9 14 10 9 9 3 0
8410 0 0
8411 1988 1 4 0 2 63 0 0 1 6 4 10 15 15 5 4 3 0 0 0 0 0 0 1 6 4 10 15 15 5 4 3 0
8412 0 0 0

```

8413 1989 1 4 0 2 54 0 1 1 4 9 10 8 7 6 4 3 1 0 0 0 0 1 1 4 9 10 8 7 6 4 3 1 0 0  
 8414 0  
 8415 1993 1 4 0 2 144 0 2 5 7 25 40 26 14 18 3 3 1 0 0 0 0 2 5 7 25 40 26 14 18  
 8416 3 3 1 0 0 0  
 8417 1994 1 4 0 2 168 0 0 4 7 29 42 34 21 17 8 4 0 2 0 0 0 0 4 7 29 42 34 21 17  
 8418 8 4 0 2 0 0  
 8419 1995 1 4 0 2 60 0 0 0 7 7 11 15 9 6 4 1 0 0 0 0 0 0 0 7 7 11 15 9 6 4 1 0 0  
 8420 0 0  
 8421 1996 1 4 0 2 118 0 0 2 6 13 32 37 16 7 3 2 0 0 0 0 0 0 2 6 13 32 37 16 7 3  
 8422 2 0 0 0 0  
 8423 1997 1 4 0 2 27 0 0 2 4 1 6 7 6 0 1 0 0 0 0 0 0 0 2 4 1 6 7 6 0 1 0 0 0 0 0  
 8424 1998 1 4 0 2 29 0 0 0 0 3 7 8 4 2 1 1 0 2 0 1 0 0 0 0 3 7 8 4 2 1 1 0 2 0 1  
 8425 1999 1 4 0 2 63 0 1 0 5 9 7 16 10 6 6 1 0 1 1 0 0 1 0 5 9 7 16 10 6 6 1 0 1  
 8426 1 0  
 8427 2000 1 4 0 2 51 0 0 3 4 2 8 9 6 13 2 1 2 1 0 0 0 0 3 4 2 8 9 6 13 2 1 2 1 0  
 8428 0  
 8429 2001 1 4 0 2 18 0 0 0 0 2 6 6 4 0 0 0 0 0 0 0 0 0 0 2 6 6 4 0 0 0 0 0 0 0  
 8430 2002 1 4 0 2 34 0 0 0 1 2 9 12 6 2 1 0 1 0 0 0 0 0 0 1 2 9 12 6 2 1 0 1 0 0  
 8431 0  
 8432 2003 1 4 0 2 62 0 0 0 1 8 16 17 15 2 3 0 0 0 0 0 0 0 0 1 8 16 17 15 2 3 0 0  
 8433 0 0 0  
 8434 2004 1 4 0 2 257 0 0 3 5 19 51 77 61 20 10 7 2 1 1 0 0 0 3 5 19 51 77 61 20  
 8435 10 7 2 1 1 0  
 8436 2005 1 4 0 2 537 0 6 6 28 52 112 162 107 45 10 7 0 1 1 0 0 6 6 28 52 112 16  
 8437 2 107 45 10 7 0 1 1 0  
 8438 2006 1 4 0 2 740 1 1 4 30 81 148 208 160 67 27 9 2 0 1 1 1 4 30 81 148 20  
 8439 8 160 67 27 9 2 0 1 1  
 8440 2007 1 4 0 2 689 0 1 14 26 76 141 168 157 79 18 7 1 1 0 0 0 1 14 26 76 141  
 8441 168 157 79 18 7 1 1 0 0  
 8442 2008 1 4 0 2 975 1 2 10 39 121 196 252 188 115 33 16 2 0 0 0 1 2 10 39 121  
 8443 196 252 188 115 33 16 2 0 0 0  
 8444 2009 1 4 0 2 1010 1 4 10 43 116 238 257 217 90 29 4 1 0 0 0 1 4 10 43 116 2  
 8445 38 257 217 90 29 4 1 0 0 0  
 8446 2010 1 4 0 2 771 0 1 10 37 109 180 220 134 52 15 10 2 1 0 0 0 1 10 37 109 1  
 8447 80 220 134 52 15 10 2 1 0 0  
 8448 2011 1 4 0 2 768 1 16 18 51 88 175 220 108 66 18 6 0 0 1 0 1 16 18 51 88 17  
 8449 5 220 108 66 18 6 0 0 1 0  
 8450 2012 1 4 0 2 529 0 2 6 34 72 133 146 75 33 15 8 3 0 0 2 0 2 6 34 72 133 146  
 8451 75 33 15 8 3 0 0 2  
 8452 2013 1 4 0 2 406 0 1 4 20 35 75 104 77 61 19 9 1 0 0 0 0 1 4 20 35 75 104 7  
 8453 7 61 19 9 1 0 0 0  
 8454 2014 1 4 0 2 356 2 3 2 8 25 76 100 70 47 14 6 1 2 0 0 2 3 2 8 25 76 100 70

8455 47 14 6 1 2 0 0  
 8456  
 8457 ### CA Rec onboard observer DWV; south of 40-10  
 8458 ### dropped 1987 (Monterey only)  
 8459 ### assigned to survey: "6\_CA\_SouthOf4010\_Rec\_PC\_DWV\_index"  
 8460 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c  
 8461 # m 26cm 28cm 30cm 32cm 34cm 36cm 38cm 40cm 42cm  
 8462 # 44cm 46cm+ repeat  
 8463 -1987 1 6 0 0 15 0 0 4 1 2 3 3 2 0 0 0 0 0 0 0 0 4 1 2 3 3 2 0 0 0 0 0 0 0  
 8464 0  
 8465 1988 1 6 0 0 449 2 11 7 43 74 106 109 49 25 10 7 6 0 0 0 2 11 7 43 74 106 1  
 8466 09 49 25 10 7 6 0 0 0  
 8467 1989 1 6 0 0 360 1 5 17 35 70 66 73 43 20 18 9 3 0 0 0 1 5 17 35 70 66 73 4  
 8468 3 20 18 9 3 0 0 0  
 8469 1990 1 6 0 0 119 0 0 7 6 27 33 24 6 6 6 3 1 0 0 0 0 0 7 6 27 33 24 6 6 6 3  
 8470 1 0 0 0  
 8471 1991 1 6 0 0 138 1 0 1 4 24 55 32 13 5 3 0 0 0 0 1 0 1 4 24 55 32 13 5 3  
 8472 0 0 0 0 0  
 8473 1992 1 6 0 0 137 0 1 2 16 40 35 22 14 5 1 1 0 0 0 0 0 1 2 16 40 35 22 14 5  
 8474 1 1 0 0 0 0  
 8475 1993 1 6 0 0 211 0 2 9 27 44 50 37 28 12 0 1 0 1 0 0 0 2 9 27 44 50 37 28 1  
 8476 2 0 1 0 1 0 0  
 8477 1994 1 6 0 0 236 0 2 8 24 60 49 51 27 5 8 2 0 0 0 0 0 2 8 24 60 49 51 27 5  
 8478 8 2 0 0 0 0  
 8479 1995 1 6 0 0 212 0 5 7 26 50 58 30 18 14 2 2 0 0 0 0 0 5 7 26 50 58 30 18 1  
 8480 4 2 2 0 0 0 0  
 8481 1996 1 6 0 0 304 0 6 10 21 63 79 70 41 10 3 1 0 0 0 0 0 6 10 21 63 79 70 41  
 8482 10 3 1 0 0 0 0  
 8483 1997 1 6 0 0 227 0 3 7 21 40 65 45 29 8 6 3 0 0 0 0 0 3 7 21 40 65 45 29 8  
 8484 6 3 0 0 0 0  
 8485 1998 1 6 0 0 106 0 1 1 16 24 33 19 7 1 1 1 1 1 0 0 0 1 1 16 24 33 19 7 1 1  
 8486 1 1 1 0 0  
 8487  
 8488 ### CCFRP Fishery-Independent Survey Comps, Central CA only (Point Buchon t  
 8489 # o Ano Nuevo); all south of 40-10  
 8490 ### assigned to survey: "8\_CA\_SouthOf4010\_CCFRP\_comps\_only"  
 8491 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm  
 8492 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+ repeat  
 8493 2007 1 8 0 0 86 0 2 1 9 12 18 26 14 2 1 1 0 0 0 0 0 2 1 9 12 18 26 14 2 1 1  
 8494 0 0 0 0  
 8495 2008 1 8 0 0 113 0 1 3 7 14 39 31 12 4 2 0 0 0 0 0 0 1 3 7 14 39 31 12 4 2  
 8496 0 0 0 0 0

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8497 2009 1 8 0 0 91 0 1 1 8 10 27 29 13 2 0 0 0 0 0 0 0 1 1 8 10 27 29 13 2 0 0
8498 0 0 0 0
8499 2010 1 8 0 0 106 2 1 4 10 17 27 31 12 1 0 1 0 0 0 0 2 1 4 10 17 27 31 12 1
8500 0 1 0 0 0 0
8501 2011 1 8 0 0 65 0 1 2 1 7 20 24 8 2 0 0 0 0 0 0 0 1 2 1 7 20 24 8 2 0 0 0 0
8502 0 0
8503 2012 1 8 0 0 116 0 0 1 4 17 31 40 18 4 1 0 0 0 0 0 0 0 1 4 17 31 40 18 4 1
8504 0 0 0 0 0
8505 2013 1 8 0 0 39 1 0 0 1 3 12 11 8 3 0 0 0 0 0 0 1 0 0 1 3 12 11 8 3 0 0 0 0
8506 0 0
8507
8508 47 #_N_age_bins
8509 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
8510 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
8511 2 #_N_ageerror_definitions
8512 # Default ageing error matrix (1st row is expected age, 2nd is standard dev
8513 # iation of age readings)
8514 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
8515 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
8516 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
8517 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
8518 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
8519 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
8520 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
8521 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
8522 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
8523 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
8524 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5
8525 10.5 11.5 12.5 13.5 14.5 15.5 16.5 17.5 18.5
8526 19.5 20.5 21.5 22.5 23.5 24.5 25.5 26.5 27.5 2
8527 8.5 29.5 30.5 31.5 32.5 33.5 34.5 35.5 36.5 37.5
8528 38.5 39.5 40.5 41.5 42.5 43.5 44.5 45.5 46.5
8529 47.5 48.5 49.5 50.5 51.5 52.5 53.5 54.5 55.5 56
8530 .5 57.5 58.5 59.5 60.5 61.5 62.5 63.5 64.5 65.5
8531 66.5 67.5 68.5 69.5 70.5 71.5 72.5 73.5 74.5
8532 75.5 76.5 77.5 78.5 79.5 80.5 ### 81.5 82.5 83.
8533 # 5 84.5 85.5 86.5 87.5 88.5 89.5 90.5 #Expected_ag
8534 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
8535 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
8536 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
8537 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
8538 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524

```

```

8539  4.5492  4.6460  4.7428  4.8396  4.9364  5.0332  5.1299  5.2267  5.3235  5.
8540  4203   5.5171  5.6139  5.7107  5.8075  5.9043  6.0011  6.0979  6.1946  6.291
8541  4   6.3882  6.4850  6.5818  6.6786  6.7754  6.8722  6.9690  7.0658  7.1626
8542  7.2594  7.3561  7.4529  7.5497  7.6465  7.7433  ### 7.8401      7.9369  8.0
8543  # 337   8.1305  8.2273  8.3241  8.4209  8.5176  8.6144  8.7112  #SD

8544
8545
8546
8547
8548
8549
8550
8551
8552          #####
8553  # Ageing error for ages associated with early years from former NWFSC age r
8554  # eader (1st row is expected age, 2nd is standard deviation of age readings
8555  # )
8556  #
8557  #
8558  #
8559  #
8560  #
8561  #          #####
8562  # Age 0 Age 1  Age 2  Age 3  Age 4  Age 5  Age 6  Age 7  Age 8  Age
8563  # 9  Age 10  Age 11  Age 12  Age 13  Age 14  Age 15  Age 16  Age 17  Age
8564  # 18  Age 19  Age 20  Age 21  Age 22  Age 23  Age 24  Age 25  Age 26  Age 2
8565  # 7  Age 28  Age 29  Age 30  Age 31  Age 32  Age 33  Age 34  Age 35  Age 36
8566  #  Age 37  Age 38  Age 39  Age 40  Age 41  Age 42  Age 43  Age 44  Age 45
8567  #  Age 46  Age 47  Age 48  Age 49  Age 50  Age 51  Age 52  Age 53  Age 54
8568  #  Age 55  Age 56  Age 57  Age 58  Age 59  Age 60  Age 61  Age 62  Age 63  A
8569  #  ge 64  Age 65  Age 66  Age 67  Age 68  Age 69  Age 70  Age 71  Age 72  Ag
8570  #  e 73  Age 74  Age 75  Age 76  Age 77  Age 78  Age 79  Age 80  ### Age 81
8571  #      Age 82  Age 83  Age 84  Age 85  Age 86  Age 87  Age 88  Age 89  Age
8572  0.43    1.29    2.16    3.02    3.88    4.75    5.61    6.47    7.33    8.2
8573  0   9.06   9.92   10.79   11.65   12.51   13.37   14.24   15.10   15.96
8574  16.83  17.69  18.55  19.41  20.28  21.14  22.00  22.86  23.73  2
8575  4.59   25.45  26.32  27.18  28.04  28.90  29.77  30.63  31.49  32.3
8576  6   33.22  34.08  34.94  35.81  36.67  37.53  38.40  39.26  40.12
8577  40.98  41.85  42.71  43.57  44.44  45.30  46.16  47.02  47.89  48
8578  .75   49.61  50.47  51.34  52.20  53.06  53.93  54.79  55.65  56.51
8579  57.38  58.24  59.10  59.97  60.83  61.69  62.55  63.42  64.28
8580  65.14  66.01  66.87  67.73  68.59  69.46  ### 70.32      71.18  72.

```

```

8581 # 05 72.91 73.77 74.63 75.50 76.36 77.22 78.09 #Expected_ag
8582 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
8583 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
8584 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
8585 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
8586 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
8587 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
8588 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
8589 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
8590 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
8591 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD
8592
8593 41 #_N_Agecomp_obs
8594 3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
8595 0 #_combine males into females at or below this bin number
8596
8597 ### Combined: "CA, Rec CPFV south 4010 (1977-1986)" plus "California Rec CP
8598 # FV samples, 1980-84, south of 4010"
8599 ### assigned to fleet: "8_CA_SouthOf4010_Abrams_thesis_comps"
8600 # year season fleet gender part ageErr LbinLo LbinHi Nsamps A4 A5 A6 A7 A8
8601 # A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25 A26 A2
8602 # 7 A28 A29 A30 A31 A32 A33 A34 A35 A36 A37 A38 A39 A40 A41 A42 A43 A44 A45
8603 # A46 A47 A48 A49 A50 repeat
8604 1977 1 3 0 0 1 -1 -1 14 0 0 0 2 1 5 0 0 0 0 0 1 0 1 1 0 1 0 1 0 0 0 0 0 0 0
8605 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 2 1 5 0 0 0 0 0 1 0 1 1 0
8606 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 0 0 0 0 0
8607 1978 1 3 0 0 1 -1 -1 13 0 0 1 0 2 2 4 1 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0
8608 0 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 4 1 0 0 0 1 0 0 0 0
8609 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
8610 1979 1 3 0 0 1 -1 -1 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8611 0 0 0 0 0 0 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
8612 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8613 1980 1 3 0 0 1 -1 -1 33 0 1 0 1 1 2 5 8 8 1 1 0 0 1 1 0 1 0 0 0 0 0 0 0 0 0 0
8614 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1 2 5 8 8 1 1 0 0 1 1 0
8615 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8616 1981 1 3 0 0 1 -1 -1 7 0 0 0 0 0 0 0 4 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8617 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8618 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8619 1982 1 3 0 0 1 -1 -1 15 3 0 0 1 0 1 1 0 0 3 2 1 0 0 0 0 1 0 0 0 0 0 0 1 0 0 0
8620 0 0 0 0 0 0 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 3 2 1 0 0 0 0
8621 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
8622 1983 1 3 0 0 1 -1 -1 9 0 0 0 0 1 1 0 0 2 0 2 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0

```









## 8774 Appendix B. SS control file

### 8775 Northern Model

```
8776 #V3.24u
8777 #C China rockfish control file for north model (WA only)
8778 1 #_N_Growth_Patterns
8779 1 #_N_Morphs_Within_GrowthPattern
8780 ## 2 # Number of recruitment assignments
8781 ## 0 # Recruitment interaction requested?
8782 ## 1 1 1 # Recruitment assignment to GP 1, seas 1, area 1
8783 ## 1 1 2 # Recruitment assignment to GP 1, seas 1, area 2
8784 0 #_Nblock_Patterns
8785 #_Cond 0 #_blocks_per_pattern
8786 # begin and end years of blocks
8787 #
8788 ## 0 # N movement definitions
8789
8790 0.5      #_fracfemale
8791 0          #_natM_type:_0=1Parm; _1=N_breakpoints; _2=Lorenzen; _3=agespecific; _4
8792 # =agespec_withseasinterpolate
8793           #_no additional input for selected M option; read 1P per morph
8794 1          # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_s
8795 # peciific_K; 4=not implemented
8796 0          #_Growth_Age_for_L1
8797 30         #_Growth_Age_for_L2 (999 to use as Linf)
8798 0          #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
8799 0          #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
8800 # ; 4 logSD=F(A)
8801 1          #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-ma
8802 # turity matrix by growth_pattern; 4=read age-fecundity; 5=read fec and wt
8803 # from wtatage.ss
8804 #0          0          0          0          1          1          1          1          1          1          1
8805 #           1          1          1          1          1          1          1          1          1          1          1
8806 #           1          1          1          1          1          1          1          1          1          1          1
8807 #           1          1          1          1          1          1          1          1          1          1          1
8808 #           1          1          1          1          1          1          1          1          1          1          1
8809 #           1          1          1          1          1          1          1          1          1          1          1
8810 #           1          1          1          1          1          1          1          1          1          1          1
8811 #           1          1          1          1          1          1          1          1          1          1          1
8812 #           1          1          1          1          1          1          1          1          1          1          1
8813 # placeholder for empirical age-maturity by growth pattern
```

```

8814 1      #_First_Mature_Age
8815 1      #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
8816 # ; (4)eggs=a+b*L; (5)eggs=a+b*W
8817 0      #_hermaphroditism option: 0=none; 1=age-specific fxn
8818 2      #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from f
8819 # emale-GP1, 3=like SS2 V1.x)
8820 2      #_env/block/dev_adjust_method (1=standard; 2=logistic transform kee
8821 # ps in base parm bounds; 3=standard w/ no bound check)
8822 #
8823 #_growth_parms
8824 #_LO    HI     INIT    PRIOR   PR_type SD    PHASE env-var use_dev dev_miny
8825 # r dev_maxyr dev_SD Block Block_Fxn
8826 # female growth
8827 0.01   0.15   0.07   -2.94   3     0.53   -3     0     0     0
8828 0       0       0       0       0     #       NatM_p_1_Fem_GP_1 (with prior
8829 # from Owen)
8830 #0.01   0.15   0.06   0.06   -1     0.8    3     0     0     0
8831 #       0       0       0       0     #       NatM_p_1_Fem_GP_1 - no prio
8832 # r
8833 -10    45     2       2       0     10    -2     0     0     0
8834 0       0       0       0       0     #       L_at_Amin_Fem_GP_1
8835 20    50     34     34     0     10    6     0     0     0
8836 0       0       0       0       0     #       L_at_Amax_Fem_GP_1
8837 0.01   0.3    0.1    0.1    0     0.8    6     0     0     0
8838 0       0       0       0       0     #       VonBert_K_Fem_GP_1
8839 0.01   0.25   0.1    0.1    -1    0.8    -6    0     0     0
8840 0       0       0       0       0     #       CV_young_Fem_GP_1
8841 0.01   0.25   0.1    0.1    -1    0.8    6     0     0     0
8842 0       0       0       0       0     #       CV_old_Fem_GP_1
8843 ### male growth with absolute offsets = 0 (effectively single gender model)
8844 -1    0.15   0     0.053   -1    0.8    -3     0     0     0
8845 0       0       0       0       0     #       NatM_p_1_Mal_GP_1
8846 -1    45     0       2       0     10    -2     0     0     0
8847 0       0       0       0       0     #       L_at_Amin_Mal_GP_1
8848 -1    50     0     33.13   0     10    -4     0     0     0
8849 0       0       0       0       0     #       L_at_Amax_Mal_GP_1
8850 -1    0.3    0     0.2461   0     0.8    -4     0     0     0
8851 0       0       0       0       0     #       VonBert_K_Mal_GP_1
8852 -1    0.25   0     0.1    -1    0.8    -3     0     0     0
8853 0       0       0       0       0     #       CV_young_Mal_GP_1
8854 -1    0.25   0     0.1    -1    0.8    -3     0     0     0
8855 0       0       0       0       0     #       CV_old_Mal_GP_1

```

```

8856 # female weight-length, maturity, and fecundity
8857 0      1      1.17E-5 1.17E-5 -1      0.8      -3      0      0      0
8858      0      0      0      0      #      Wtlen_1_Fem # converted to (cm
8859 # ,kg) from Lea et al. 1999
8860 2      4      3.177    3      -1      0.8      -3      0      0      0
8861      0      0      0      0      #      Wtlen_2_Fem # from Lea et al.
8862 # 1999
8863 1      100     28.5    28.5    -1      0.8      -3      0      0      0
8864      0      0      0      0      #      Mat50%_Fem
8865 -9      9      -1.0    0      -1      0.8      -3      0      0      0
8866      0      0      0      0      #      Mat_slope_Fem
8867 -3 3 0.196 1 -1 0.8 -3 0 0 0 0 0 0 0 #      Eggs/kg_inter_Fem
8868 -3 3 0.0571 0 -1 0.8 -3 0 0 0 0 0 0 0 #      Eggs/kg_slope_wt_Fem
8869 ### male W-L with absolute offsets = 0 (effectively single gender model)
8870 0      1      1.17E-5 1.17E-5 -1      0.8      -3      0      0      0
8871      0      0      0      0      #      Wtlen_1_Mal # converted to (cm
8872 # ,kg) from Lea et al. 1999
8873 2      4      3.177    3      -1      0.8      -3      0      0      0
8874      0      0      0      0      #      Wtlen_2_Mal # from Lea et al.
8875 # 1999
8876
8877 0      0      0      0      -1      0      -4      0      0      0
8878      0      0      0      0      #      RecrDist_GP_1
8879 # non-spatial model uses following recruit distribution parameter
8880 0      0      0      0      -1      0      -4      0      0      0
8881      0      0      0      0      #      RecrDist_Area_1
8882 # spatial model uses next 2 lines for recruit distribution, only 1 estimate
8883 # d
8884 ## -4      4      0      1      -1      50      -1      0      0
8885 # 0      0      0      0      0      #      RecrDist_Area_1
8886 ## -4      4      0      1      -1      50      1      0      0
8887 # 0      0      0      0      0      #      RecrDist_Area_1
8888 0      0      0      0      -1      0      -4      0      0      0
8889      0      0      0      0      0      #      RecrDist_Seas_1
8890 0      0      0      0      -1      0      -4      0      0      0
8891      0      0      0      0      0      #      CohortGrowDev
8892 #
8893 #_Cond 0 #custom_MG-env_setup (0/1)
8894 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
8895 #
8896 #_Cond 0 #custom_MG-block_setup (0/1)
8897 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters

```

```

8898 #_Cond No MG parm trends
8899 #
8900 #_seasonal_effects_on_biology_parms
8901 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,m
8902 # alewtlen2,L1,K
8903 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
8904 #
8905 #_Cond -4 #_MGparm_Dev_Phase
8906 #
8907 #_Spawner-Recruitment
8908 3      #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop
8909 # ; 7=survival_3Parm
8910 #_LO    HI     INIT    PRIOR   PR_type SD      PHASE
8911 2       12     2.7      6        -1      10      1       #
8912 # )
8913 0.2     1      0.773    0.773    2       0.147    -3      #
8914 # p
8915 0       2      0.5      0.5      -1      0.8      -3      #
8916 -5      5      0.1      0        -1      1       -3      #
8917 -5      5      0        0        -1      1       -4      #
8918 # t
8919 0       0      0        0        -1      0       -99     #
8920 0 #_SR_env_link
8921 0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
8922 0 #do_recdev: 0=none; 1=devvector; 2=simple deviations
8923 1971 # first year of main recr_devs; early devs can preceed this era
8924 2001 # last year of main recr_devs; forecast devs start in following year
8925 -2 #_recdev phase
8926 1 # (0/1) to read 13 advanced options
8927 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start
8928 # )
8929 -4 #_recdev_early_phase
8930 -4 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxp
8931 # hase+1)
8932 1 #_lambda for Fcast_recr_like occurring before endyr+1
8933 1980 #_last_early_yr_nobias_adj_in_MP
8934 1985 #_first_yr_fullbias_adj_in_MP
8935 2001 #_last_yr_fullbias_adj_in_MP
8936 2015 #_first_recent_yr_nobias_adj_in_MP
8937 1 #_max_bias_adj_in_MP (-1 to override ramp and set biasadj=1.0 for all
8938 # estimated recdevs)
8939 0 #_period of cycles in recruitment (N parms read below)

```

```

8940 -5      #_min_rec_dev
8941 5       #_max_rec_dev
8942 0       #_read_recdevs
8943 #_end of advanced SR options
8944 #
8945 #
8946 #Fishing Mortality info
8947 0.3 # F ballpark for tuning early phases
8948 -2001 # F ballpark year (neg value to disable)
8949 3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
8950 2.9 # max F or harvest rate, depends on F_Method
8951 # no additional F input needed for Fmethod 1
8952 # if Fmethod=2; read overall start F value; overall phase; N detailed input
8953 # s to read
8954 # if Fmethod=3; read N iterations for tuning for Fmethod 3
8955 5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
8956 #
8957 #_initial_F_parms (1 per catch fleet)
8958 #_LO HI INIT PRIOR PR_type SD PHASE
8959 0     1   0    0.01  -1      99 -1    # 1_WA_SouthernWA_Rec_PCPR
8960 0     1   0    0.01  -1      99 -1    # 2_WA_NorthernWA_Rec_PC
8961 0     1   0    0.01  -1      99 -1    # 3_WA_NorthernWA_Rec_PR
8962 #
8963 #_Q_setup
8964 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nob
8965 # iasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_ass
8966 # ign_to_parm
8967 #_for_env-var:_enter_index_of_the_env-var_to_be_linked
8968
8969 ### NOTE: initially turning off extra sd parameters
8970 ### until we sort out which fleets have indices
8971 ### (changed 3rd column below from 1 to 0)
8972
8973 #_Den-dep env-var extra_se Q_type
8974 0         0         0         1 # 1_WA_SouthernWA_Rec_PCPR
8975 0         0         0         1 # 2_WA_NorthernWA_Rec_PC
8976 0         0         1         1 # 3_WA_NorthernWA_Rec_PR
8977 #
8978 ## #_LO HI INIT PRIOR PR_type SD PHASE
8979 0     2   0.15  1      -1      99 2 # extra sd index for fleet 3
8980
8981 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet w

```

```

8982 # ith random q; 1=read a parm for each year of index
8983 #_Q_parms(if_any)
8984 # LO HI INIT PRIOR PR_type SD PHASE
8985 #
8986 #_size_selex_types
8987 #discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_
8988 # discarded_dead
8989 #_Pattern Discard Male Special
8990 24      0      0      0      # 1_WA_SouthernWA_Rec_PCPR
8991 24      0      0      0      # 2_WA_NorthernWA_Rec_PC (no comp, mirrored b
8992 # y Rec_PR)
8993 15      0      0      2      # 3_WA_NorthernWA_Rec_PR
8994 #
8995 #_age_selex_types
8996 #_Pattern ___ Male Special
8997 10      0      0      0      # 1_WA_SouthernWA_Rec_PCPR
8998 10      0      0      0      # 2_WA_NorthernWA_Rec_PC
8999 10      0      0      0      # 3_WA_NorthernWA_Rec_PR
9000
9001 # ALL DOUBLE-NORMALS, BUT FIXED AS ASYMPTOTIC
9002 #_LO    HI     INIT     PRIOR    PR_type SD      PHASE   env-var use_dev dev
9003 #_minyr    dev_maxyr    dev_SD  Block   Block_Fxn
9004 # Fleet 1 (1_WA_SouthernWA_Rec_PCPR)
9005 # Note: First parameter hitting upper bounds, fixed at peak of other fleet(
9006 # s)
9007 19      36      34.89    30      -1      50      -4      0      0      0
9008      0      0      0      0      0 # PEAK (fixed at estimated value of other f
9009 # leet)
9010 -9      5      -4      -4      -1      50      -9      0      0      0
9011      0      0      0      0      0 # TOP (logistic)
9012 0      9      3      4      -1      50      5      0      0      0
9013      0      0      0      0      0 # Asc WIDTH exp
9014 0      9      8      8      -1      50      -9      0      0      0
9015      0      0      0      0      0 # Desc WIDTH exp
9016 -9      9      -8      -5      -1      50      -9      0      0      0
9017      0      0      0      0      0 # INIT (logistic)
9018 -9      9      8      5      -1      50      -9      0      0      0
9019      0      0      0      0      0 # FINAL (logistic)
9020 # Fleets 2-3 (2_WA_NorthernWA_Rec_PC and 3_WA_NorthernWA_Rec_PR)
9021 19      36      34      30      -1      50      4      0      0      0
9022      0      0      0      0      0 # PEAK
9023 -9      5      -4      -4      -1      50      -9      0      0      0

```

```

9024      0      0      0      0      0 # TOP (logistic)
9025  0      9      3      4      -1      50      5      0      0      0
9026      0      0      0      0      0 # Asc WIDTH exp
9027  0      9      8      8      -1      50     -9      0      0      0
9028      0      0      0      0      0 # Desc WIDTH exp
9029  -9      9     -8     -5      -1      50     -9      0      0      0
9030      0      0      0      0      0 # INIT (logistic)
9031  -9      9      8      5      -1      50     -9      0      0      0
9032      0      0      0      0      0 # FINAL (logistic)
9033 #_Cond 0 #_custom_sel-env_setup (0/1)
9034 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
9035 #_Cond 0 #_custom_sel-blk_setup (0/1)
9036 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no block usage
9037 #_Cond No selex parm trends
9038 #_Cond -4 # placeholder for selparm_Dev_Phase
9039 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to kee
9040 # p in base parm bounds; 3=standard w/ no bound check)
9041 #
9042 # Tag loss and Tag reporting parameters go next
9043 0 # TG_custom: 0=no read; 1=read if tags exist
9044 #_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 #_placeholder if no parameters
9045 #
9046 1 #_Variance_adjustments_to_input_values
9047 #_fleet: 1 2 3
9048 #F1    F2    F3
9049  0      0      0      #_add_to_survey_CV
9050  0      0      0      #_add_to_discard_stddev
9051  0      0      0      #_add_to_bodywt_CV
9052  0.189  1      0.089 #_mult_by_lencomp_N
9053  1      1      0.2428 #_mult_by_agecomp_N
9054  1      1      1      #_mult_by_size-at-age_N
9055 #
9056 4 #_maxlambdaphase
9057 1 #_sd_offset
9058 #
9059 0 # number of changes to make to default Lambdas (default value is 1.0)
9060 # Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=s
9061 # izeage; 8=catch;
9062 # 9=init_equCatch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14
9063 # =Morphcomp; 15=Tag-comp; 16=Tag-negbin
9064 #like_comp fleet/survey phase value sizefreq_method
9065 # 1 2 2 1 1

```

```

9066 # 4 2 2 1 1
9067 # 4 2 3 1 1
9068 #
9069 # lambdas (for info only; columns are phases)
9070 # 0 0 0 0 #_CPUE/survey:_1
9071 # 1 1 1 1 #_CPUE/survey:_2
9072 # 1 1 1 1 #_CPUE/survey:_3
9073 # 1 1 1 1 #_lencomp:_1
9074 # 1 1 1 1 #_lencomp:_2
9075 # 0 0 0 0 #_lencomp:_3
9076 # 1 1 1 1 #_agecomp:_1
9077 # 1 1 1 1 #_agecomp:_2
9078 # 0 0 0 0 #_agecomp:_3
9079 # 1 1 1 1 #_size-age:_1
9080 # 1 1 1 1 #_size-age:_2
9081 # 0 0 0 0 #_size-age:_3
9082 # 1 1 1 1 #_init_equ_catch
9083 # 1 1 1 1 #_recruitments
9084 # 1 1 1 1 #_parameter-priors
9085 # 1 1 1 1 #_parameter-dev-vectors
9086 # 1 1 1 1 #_crashPenLambda
9087 0 # (0/1) read specs for more stddev reporting
9088 # 1 1 -1 5 1 5 1 -1 5 # selex type, len/age, year, N selex bins, Growth pat
9089 # tern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
9090 # 5 15 25 35 43 # vector with selex std bin picks (-1 in first bin to self-
9091 # generate)
9092 # 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-
9093 # generate)
9094 # 1 2 14 26 40 # vector with NatAge std bin picks (-1 in first bin to self-
9095 # generate)
9096 999

```

## 9097 Central Model

```

9098 #V3.24u
9099 #C China rockfish control file for central model (40-10 to OR/WA border)
9100 1 #_N_Growth_Patterns
9101 1 #_N_Morphs_Within_GrowthPattern
9102 ## 2 # Number of recruitment assignments
9103 ## 0 # Recruitment interaction requested?
9104 ## 1 1 1 # Recruitment assignment to GP 1, seas 1, area 1
9105 ## 1 1 2 # Recruitment assignment to GP 1, seas 1, area 2

```

```

9106 0 #_Nblock_Patterns
9107 #_Cond 0 #_blocks_per_pattern
9108 # begin and end years of blocks
9109 #
9110 ## 0 # N movement definitions
9111
9112 0.5      #_fracfemale
9113 0          #_natM_type:_0=1Parm; _1=N_breakpoints; _2=Lorenzen; _3=agespecific; _4
9114 # =agespec_withseasinterpolate
9115         #_no additional input for selected M option; read 1P per morph
9116 1          # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_s
9117 # peciific_K; 4=not implemented
9118 0          #_Growth_Age_for_L1
9119 30         #_Growth_Age_for_L2 (999 to use as Linf)
9120 0          #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
9121 0          #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
9122 # ; 4 logSD=F(A)
9123 1          #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-ma
9124 # turity matrix by growth_pattern; 4=read age-fecundity; 5=read fec and wt
9125 # from wtatage.ss
9126 #0          0          0          0          1          1          1          1          1          1          1          1
9127 #           1          1          1          1          1          1          1          1          1          1          1
9128 #           1          1          1          1          1          1          1          1          1          1          1
9129 #           1          1          1          1          1          1          1          1          1          1          1
9130 #           1          1          1          1          1          1          1          1          1          1          1
9131 #           1          1          1          1          1          1          1          1          1          1          1
9132 #           1          1          1          1          1          1          1          1          1          1          1
9133 #           1          1          1          1          1          1          1          1          1          1          1
9134 #           1          1          1          1          1          1          1          1          1          1          1
9135 #_placeholder for empirical age-maturity by growth pattern
9136 1          #_First_Mature_Age
9137 1          #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
9138 # ; (4)eggs=a+b*L; (5)eggs=a+b*W
9139 0          #_hermaphroditism option: 0=none; 1=age-specific fxn
9140 2          #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from f
9141 # emale-GP1, 3=like SS2 V1.x)
9142 2          #_env/block/dev_adjust_method (1=standard; 2=logistic transform kee
9143 # ps in base parm bounds; 3=standard w/ no bound check)
9144 #
9145 #_growth_parms
9146 #_LO      HI      INIT      PRIOR     PR_type SD      PHASE env-var use_dev dev_miny
9147 # r dev_maxyr dev_SD Block Block_Fxn

```

```

9148 # female growth
9149 0.01 0.15 0.07 -2.94 3 0.53 -3 0 0 0
9150 0 0 0 0 0 # NatM_p_1_Fem_GP_1 (with prior
9151 # from Owen)
9152 #0.01 0.15 0.053 -2.94 3 0.53 -3 0 0
9153 # 0 0 0 0 0 # NatM_p_1_Fem_GP_1 (with p
9154 # rior from Owen)
9155 #0.01 0.15 0.06 0.06 -1 0.8 3 0 0 0
9156 # 0 0 0 0 0 # NatM_p_1_Fem_GP_1 - no prio
9157 # r
9158 -10 45 2 2 -1 10 -2 0 0 0
9159 0 0 0 0 0 # L_at_Amin_Fem_GP_1
9160 20 50 34 34 -1 10 6 0 0 0
9161 0 0 0 0 0 # L_at_Amax_Fem_GP_1
9162 0.01 0.3 0.1 0.1 -1 0.8 6 0 0 0
9163 0 0 0 0 0 # VonBert_K_Fem_GP_1
9164 0.01 0.25 0.1 0.1 -1 0.8 -6 0 0 0
9165 0 0 0 0 0 # CV_young_Fem_GP_1
9166 0.01 0.25 0.1 0.1 -1 0.8 6 0 0 0
9167 0 0 0 0 0 # CV_old_Fem_GP_1
9168 ### male growth with absolute offsets = 0 (effectively single gender model)
9169 -1 0.15 0 0.053 -1 0.8 -3 0 0 0
9170 0 0 0 0 0 # NatM_p_1_Mal_GP_1
9171 -1 45 0 2 -1 10 -2 0 0 0
9172 0 0 0 0 0 # L_at_Amin_Mal_GP_1
9173 -1 50 0 33.13 -1 10 -4 0 0 0
9174 0 0 0 0 0 # L_at_Amax_Mal_GP_1
9175 -1 0.3 0 0.2461 -1 0.8 -4 0 0 0
9176 0 0 0 0 0 # VonBert_K_Mal_GP_1
9177 -1 0.25 0 0.1 -1 0.8 -3 0 0 0
9178 0 0 0 0 0 # CV_young_Mal_GP_1
9179 -1 0.25 0 0.1 -1 0.8 -3 0 0 0
9180 0 0 0 0 0 # CV_old_Mal_GP_1
9181 # female weight-length, maturity, and fecundity
9182 0 1 1.17E-5 1.17E-5 -1 0.8 -3 0 0 0
9183 0 0 0 0 0 # Wtlen_1_Fem # converted to (cm
9184 # ,kg) from Lea et al. 1999
9185 2 4 3.177 3 -1 0.8 -3 0 0 0
9186 0 0 0 0 0 # Wtlen_2_Fem # from Lea et al.
9187 # 1999
9188 1 100 28.5 28.5 -1 0.8 -3 0 0 0
9189 0 0 0 0 0 # Mat50%_Fem

```

```

9190 -9      9      -1.0    0      -1      0.8     -3      0      0
9191      0      0      0      0      #      Mat_slope_Fem
9192 -3 3 0.196 1 -1 0.8 -3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
9193 -3 3 0.0571 0 -1 0.8 -3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
9194 ## -3      3      1      1      -1      0.8     -3      0      0
9195 # 0      0      0      0      0      #      Eggs/kg_inter_Fem
9196 ## -3      3      0      0      -1      0.8     -3      0      0
9197 # 0      0      0      0      0      #      Eggs/kg_slope_wt_Fem
9198 ### male W-L with absolute offsets = 0 (effectively single gender model)
9199 0      1      1.17E-5 1.17E-5 -1      0.8     -3      0      0      0
9200      0      0      0      0      #      Wtlen_1_Mal # converted to (cm
9201 # ,kg) from Lea et al. 1999
9202 2      4      3.177   3      -1      0.8     -3      0      0      0
9203      0      0      0      0      #      Wtlen_2_Mal # from Lea et al.
9204 # 1999

9205
9206 0      0      0      0      -1      0      -4      0      0      0
9207      0      0      0      0      #      RecrDist_GP_1
9208 # non-spatial model uses following recruit distribution parameter
9209 0      0      0      0      -1      0      -4      0      0      0
9210      0      0      0      0      #      RecrDist_Area_1
9211 # spatial model uses next 2 lines for recruit distribution, only 1 estimate
9212 # d
9213 ## -4      4      0      1      -1      50      -1      0      0
9214 # 0      0      0      0      0      #      RecrDist_Area_1
9215 ## -4      4      0      1      -1      50      1      0      0
9216 # 0      0      0      0      0      #      RecrDist_Area_1
9217 0      0      0      0      -1      0      -4      0      0      0
9218      0      0      0      0      0      #      RecrDist_Seas_1
9219 0      0      0      0      -1      0      -4      0      0      0
9220      0      0      0      0      0      #      CohortGrowDev
9221 #
9222 #_Cond 0 #custom_MG-env_setup (0/1)
9223 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
9224 #
9225 #_Cond 0 #custom_MG-block_setup (0/1)
9226 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
9227 #_Cond No MG parm trends
9228 #
9229 #_seasonal_effects_on_biology_parms
9230 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,m
9231 # alewtlen2,L1,K

```

```

9232 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
9233 #
9234 #_Cond -4 #_MGparm_Dev_Phase
9235 #
9236 #_Spawner-Recruitment
9237 3      #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop
9238 # ; 7=survival_3Parm
9239 #_LO    HI     INIT    PRIOR   PR_type SD      PHASE
9240 3       12      6       6        -1      10      1       #       SR_LN(R0)
9241 0.2     1       0.773   0.773   2       0.147   -3      #       SR_BH_stee
9242 # p
9243 0       2       0.5     0.5      -1      0.8     -3      #       SR_sigmaR
9244 -5      5       0.1     0        -1      1       -3      #       SR_envlink
9245 -5      5       0       0        -1      1       -4      #       SR_R1_offse
9246 # t
9247 0       0       0       0        -1      0       -99     #       SR_autocorr
9248 0 #_SR_env_link
9249 0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
9250 1      #do_recdev: 0=none; 1=devvector; 2=simple deviations
9251 1971 # first year of main recr_devs; early devs can preceed this era
9252 2001 # last year of main recr_devs; forecast devs start in following year
9253 -2 #_recdev phase
9254 1      # (0/1) to read 13 advanced options
9255 0      #_recdev_early_start (0=none; neg value makes relative to recdev_start
9256 # )
9257 -4 #_recdev_early_phase
9258 -4 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxp
9259 # hase+1)
9260 1      #_lambda for Fcast_recr_like occurring before endyr+1
9261 900 #_last_early_yr_nobias_adj_in_MP
9262 1820 #_first_yr_fullbias_adj_in_MP
9263 2001 #_last_yr_fullbias_adj_in_MP
9264 2015 #_first_recent_yr_nobias_adj_in_MP
9265 1      #_max_bias_adj_in_MP (-1 to override ramp and set biasadj=1.0 for all
9266 # estimated recdevs)
9267 0      #_period of cycles in recruitment (N parms read below)
9268 -5 #_min_rec_dev
9269 5 #_max_rec_dev
9270 0 #_read_recdevs
9271 #_end of advanced SR options
9272 #
9273 #

```

```

9274 #Fishing Mortality info
9275 0.3 # F ballpark for tuning early phases
9276 -2001 # F ballpark year (neg value to disable)
9277 3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
9278 2.9 # max F or harvest rate, depends on F_Method
9279 # no additional F input needed for Fmethod 1
9280 # if Fmethod=2; read overall start F value; overall phase; N detailed input
9281 # s to read
9282 # if Fmethod=3; read N iterations for tuning for Fmethod 3
9283 5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
9284 #
9285 #_initial_F_parms (1 per catch fleet)
9286 #_LO HI INIT PRIOR PR_type SD PHASE
9287 0 1 0 0.01 -1 99 -1 # 1_CA_NorthOf4010_Comm_Dead
9288 0 1 0 0.01 -1 99 -1 # 2_CA_NorthOf4010_Comm_Live
9289 0 1 0 0.01 -1 99 -1 # 3_CA_NorthOf4010_Rec_PC
9290 0 1 0 0.01 -1 99 -1 # 4_CA_NorthOf4010_Rec_PR
9291 0 1 0 0.01 -1 99 -1 # 5_OR_SouthernOR_Comm_Dead
9292 0 1 0 0.01 -1 99 -1 # 6_OR_SouthernOR_Comm_Live
9293 0 1 0 0.01 -1 99 -1 # 7_OR_SouthernOR_Rec_PC
9294 0 1 0 0.01 -1 99 -1 # 8_OR_SouthernOR_Rec_PR
9295 0 1 0 0.01 -1 99 -1 # 9_OR_NorthernOR_Comm
9296 0 1 0 0.01 -1 99 -1 # 10_OR_NorthernOR_Rec_PC
9297 0 1 0 0.01 -1 99 -1 # 11_OR_NorthernOR_Rec_PR
9298 #
9299 #_Q_setup
9300 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nob
9301 # iasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_ass
9302 # ign_to_parm
9303 #_for_env-var:_enter_index_of_the_env-var_to_be_linked
9304
9305 ### NOTE: initially turning off extra sd parameters
9306 ### until we sort out which fleets have indices
9307 ### (changed 3rd column below from 1 to 0)
9308
9309 #_Den-dep env-var extra_se Q_type
9310 0 0 0 1 # 1_CA_NorthOf4010_Comm_Dead
9311 0 0 0 1 # 2_CA_NorthOf4010_Comm_Live
9312 0 0 0 1 # 3_CA_NorthOf4010_Rec_PC
9313 0 0 0 1 # 4_CA_NorthOf4010_Rec_PR
9314 0 0 0 1 # 5_OR_SouthernOR_Comm_Dead
9315 0 0 1 1 # 6_OR_SouthernOR_Comm_Live # no extra_se beca

```

```

9316 # use hit lower bound
9317 0 0 0 1 # 7_OR_SouthernOR_Rec_PC
9318 0 0 0 1 # 8_OR_SouthernOR_Rec_PR
9319 0 0 0 1 # 9_OR_NorthernOR_Comm
9320 0 0 0 1 # 10_OR_NorthernOR_Rec_PC
9321 0 0 1 1 # 11_OR_NorthernOR_Rec_PR
9322 0 0 1 1 # 15_OR_SouthernOR_Rec_PC_index
9323 #
9324 # additive variance parms for indices
9325 #_LO HI INIT PRIOR PR_type SD PHASE
9326 0 2 0.5 1 -1 99 2 # extra sd index for fleet 6 # was hitting
9327 # lower bound
9328 #0 2 0.5 1 -1 99 2 # extra sd index for fleet 7 # index remov
9329 # ed
9330 0 2 0.5 1 -1 99 2 # extra sd index for fleet 11
9331 0 2 0.5 1 -1 99 2 # extra sd index for fleet 12
9332
9333 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet w
9334 # ith random q; 1=read a parm for each year of index
9335 #_Q_parms(if_any)
9336 # LO HI INIT PRIOR PR_type SD PHASE
9337 #
9338 #_size_selex_types
9339 #discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_
9340 # discarded_dead
9341 #_Pattern Discard Male Special
9342 24 0 0 0 # 1_CA_NorthOf4010_Comm_Dead
9343 24 0 0 0 # 2_CA_NorthOf4010_Comm_Live
9344 24 0 0 0 # 3_CA_NorthOf4010_Rec_PC
9345 24 0 0 0 # 4_CA_NorthOf4010_Rec_PR
9346 24 0 0 0 # 5_OR_SouthernOR_Comm_Dead
9347 24 0 0 0 # 6_OR_SouthernOR_Comm_Live
9348 24 0 0 0 # 7_OR_SouthernOR_Rec_PC
9349 24 0 0 0 # 8_OR_SouthernOR_Rec_PR
9350 15 0 0 5 # 9_OR_NorthernOR_Comm (no comp, mirroring So
9351 # uthernOR_Comm_Dead)
9352 24 0 0 0 # 10_OR_NorthernOR_Rec_PC
9353 15 0 0 10 # 11_OR_NorthernOR_Rec_PR (no comp, mirroring
9354 # Rec_PC)
9355 15 0 0 7 # 15_OR_SouthernOR_Rec_PC_index (should alway
9356 # s match fleet 7)
9357 #

```

```

9358 #_age_selex_types
9359 #_Pattern ___ Male Special
9360 10      0      0      0      # 1_CA_NorthOf4010_Comm_Dead
9361 10      0      0      0      # 2_CA_NorthOf4010_Comm_Live
9362 10      0      0      0      # 3_CA_NorthOf4010_Rec_PC
9363 10      0      0      0      # 4_CA_NorthOf4010_Rec_PR
9364 10      0      0      0      # 5_OR_SouthernOR_Comm_Dead
9365 10      0      0      0      # 6_OR_SouthernOR_Comm_Live
9366 10      0      0      0      # 7_OR_SouthernOR_Rec_PC
9367 10      0      0      0      # 8_OR_SouthernOR_Rec_PR
9368 10      0      0      0      # 9_OR_NorthernOR_Comm
9369 10      0      0      0      # 10_OR_NorthernOR_Rec_PC
9370 10      0      0      0      # 11_OR_NorthernOR_Rec_PR
9371 10      0      0      0      # 15_OR_SouthernOR_Rec_PC_index

9372
9373 # ALL DOUBLE-NORMALS, BUT FIXED AS ASYMPTOTIC
9374 #_LO    HI      INIT     PRIOR   PR_type SD      PHASE env-var use_dev dev
9375 #_minyr dev_maxyr          dev_SD  Block   Block_Fxn
9376 # Fleet group 1
9377 19      45      28      30      -1      50      4      0      0      0
9378 0       0       0       0       0 # PEAK
9379 -9      5       -4      -4      -1      50      -9      0      0      0
9380 0       0       0       0       0 # TOP (logistic)
9381 0       9       3       4       -1      50      5      0      0      0
9382 0       0       0       0       0 # Asc WIDTH exp
9383 0       9       8       8       -1      50      -9      0      0      0
9384 0       0       0       0       0 # Desc WIDTH exp
9385 -9      9       -8      -5      -1      50      -9      0      0      0
9386 0       0       0       0       0 # INIT (logistic)
9387 -9      9       8       5       -1      50      -9      0      0      0
9388 0       0       0       0       0 # FINAL (logistic)
9389 # Fleet group 2
9390 19      45      28      30      -1      50      4      0      0      0
9391 0       0       0       0       0 # PEAK
9392 -9      5       -4      -4      -1      50      -9      0      0      0
9393 0       0       0       0       0 # TOP (logistic)
9394 0       9       3       4       -1      50      5      0      0      0
9395 0       0       0       0       0 # Asc WIDTH exp
9396 0       9       8       8       -1      50      -9      0      0      0
9397 0       0       0       0       0 # Desc WIDTH exp
9398 -9      9       -8      -5      -1      50      -9      0      0      0
9399 0       0       0       0       0 # INIT (logistic)

```

9400	-9	9	8	5	-1	50	-9	0	0	0
9401	0	0	0	0	0	# FINAL (logistic)				
9402	# Fleet group 3									
9403	19	45	39.9	30	-1	50	-4	0	0	0
9404	0	0	0	0	0	# PEAK				
9405	-9	5	-4	-4	-1	50	-9	0	0	0
9406	0	0	0	0	0	# TOP (logistic)				
9407	0	9	3	4	-1	50	5	0	0	0
9408	0	0	0	0	0	# Asc WIDTH exp				
9409	0	9	8	8	-1	50	-9	0	0	0
9410	0	0	0	0	0	# Desc WIDTH exp				
9411	-9	9	-8	-5	-1	50	-9	0	0	0
9412	0	0	0	0	0	# INIT (logistic)				
9413	-9	9	8	5	-1	50	-9	0	0	0
9414	0	0	0	0	0	# FINAL (logistic)				
9415	# Fleet group 4									
9416	19	45	39.9	30	-1	50	-4	0	0	0
9417	0	0	0	0	0	# PEAK				
9418	-9	5	-4	-4	-1	50	-9	0	0	0
9419	0	0	0	0	0	# TOP (logistic)				
9420	0	9	3	4	-1	50	5	0	0	0
9421	0	0	0	0	0	# Asc WIDTH exp				
9422	0	9	8	8	-1	50	-9	0	0	0
9423	0	0	0	0	0	# Desc WIDTH exp				
9424	-9	9	-8	-5	-1	50	-9	0	0	0
9425	0	0	0	0	0	# INIT (logistic)				
9426	-9	9	8	5	-1	50	-9	0	0	0
9427	0	0	0	0	0	# FINAL (logistic)				
9428	# Fleet group 5									
9429	19	45	39.9	30	-1	50	4	0	0	0
9430	0	0	0	0	0	# PEAK				
9431	-9	5	-4	-4	-1	50	-9	0	0	0
9432	0	0	0	0	0	# TOP (logistic)				
9433	0	9	3	4	-1	50	5	0	0	0
9434	0	0	0	0	0	# Asc WIDTH exp				
9435	0	9	8	8	-1	50	-9	0	0	0
9436	0	0	0	0	0	# Desc WIDTH exp				
9437	-9	9	-8	-5	-1	50	-9	0	0	0
9438	0	0	0	0	0	# INIT (logistic)				
9439	-9	9	8	5	-1	50	-9	0	0	0
9440	0	0	0	0	0	# FINAL (logistic)				
9441	# Fleet group 6									

9442	19	45	39.9	30	-1	50	4	0	0	0	
9443	0	0	0	0	0	# PEAK					
9444	-9	5	-4	-4	-1	50	-9	0	0	0	
9445	0	0	0	0	0	# TOP (logistic)					
9446	0	9	3	4	-1	50	5	0	0	0	
9447	0	0	0	0	0	# Asc WIDTH exp					
9448	0	9	8	8	-1	50	-9	0	0	0	
9449	0	0	0	0	0	# Desc WIDTH exp					
9450	-9	9	-8	-5	-1	50	-9	0	0	0	
9451	0	0	0	0	0	# INIT (logistic)					
9452	-9	9	8	5	-1	50	-9	0	0	0	
9453	0	0	0	0	0	# FINAL (logistic)					
9454	# Fleet group 7										
9455	19	45	39.9	30	-1	50	-4	0	0	0	
9456	0	0	0	0	0	# PEAK					
9457	-9	5	-4	-4	-1	50	-9	0	0	0	
9458	0	0	0	0	0	# TOP (logistic)					
9459	0	9	3	4	-1	50	5	0	0	0	
9460	0	0	0	0	0	# Asc WIDTH exp					
9461	0	9	8	8	-1	50	-9	0	0	0	
9462	0	0	0	0	0	# Desc WIDTH exp					
9463	-9	9	-8	-5	-1	50	-9	0	0	0	
9464	0	0	0	0	0	# INIT (logistic)					
9465	-9	9	8	5	-1	50	-9	0	0	0	
9466	0	0	0	0	0	# FINAL (logistic)					
9467	# Fleet group 8										
9468	19	45	39.9	30	-1	50	-4	0	0	0	
9469	0	0	0	0	0	# PEAK					
9470	-9	5	-4	-4	-1	50	-9	0	0	0	
9471	0	0	0	0	0	# TOP (logistic)					
9472	0	9	3	4	-1	50	5	0	0	0	
9473	0	0	0	0	0	# Asc WIDTH exp					
9474	0	9	8	8	-1	50	-9	0	0	0	
9475	0	0	0	0	0	# Desc WIDTH exp					
9476	-9	9	-8	-5	-1	50	-9	0	0	0	
9477	0	0	0	0	0	# INIT (logistic)					
9478	-9	9	8	5	-1	50	-9	0	0	0	
9479	0	0	0	0	0	# FINAL (logistic)					
9480	# Fleet group 9										
9481	# Fleet 9 mirrors fleet 5, this is for fleet 10										
9482	19	45	39.9	30	-1	50	4	0	0	0	
9483	0	0	0	0	0	# PEAK					

```

9484 -9      5      -4      -4      -1      50      -9      0      0      0
9485     0      0      0      0      0 # TOP (logistic)
9486 0       9      3      4      -1      50      5      0      0      0
9487     0      0      0      0      0 # Asc WIDTH exp
9488 0       9      8      8      -1      50      -9      0      0      0
9489     0      0      0      0      0 # Desc WIDTH exp
9490 -9      9      -8      -5      -1      50      -9      0      0      0
9491     0      0      0      0      0 # INIT (logistic)
9492 -9      9      8      5      -1      50      -9      0      0      0
9493     0      0      0      0      0 # FINAL (logistic)
9494 #_Cond 0 #_custom_sel-env_setup (0/1)
9495 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
9496 #_Cond 0 #_custom_sel-blk_setup (0/1)
9497 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no block usage
9498 #_Cond No selex parm trends
9499 #_Cond -4 # placeholder for selparm_Dev_Phase
9500 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to kee
9501 # p in base parm bounds; 3=standard w/ no bound check)
9502 #
9503 # Tag loss and Tag reporting parameters go next
9504 0 # TG_custom: 0=no read; 1=read if tags exist
9505 #_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 #_placeholder if no parameters
9506 #
9507 1 #_Variance_adjustments_to_input_values
9508 #F1    F2    F3    F4    F5    F6    F7    F8    F9    F10   F11   F15
9509 0      0      0      0      0      0      0      0      0      0      0      0 #_add_to
9510 # _survey_CV
9511 0      0      0      0      0      0      0      0      0      0      0      0 #_add_to
9512 # _discard_stddev
9513 0      0      0      0      0      0      0      0      0      0      0      0 #_add_to
9514 # _bodywt_CV
9515 # .72  .28  .22  .11  .066  .027  .052  .046  1      .094  .123  1 #_mult_
9516 # by_lencomp_N
9517 0.68 0.33 0.25 0.12 0.09 0.04 0.06 0.04 1      0.13 0.15 1 #_mult_b
9518 # y_lencomp_N
9519 1      1      1      1      .259  1      .428  1      1      .470  1      1 #_mult_b
9520 # y_agecom_N
9521 1      1      1      1      1      1      1      1      1      1      1      1 #_mult_b
9522 # y_size-at-age_N
9523 #
9524 4 #_maxlambdaphase
9525 1 #_sd_offset

```

```

9526 #
9527 0 # number of changes to make to default Lambdas (default value is 1.0)
9528 # Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=s
9529 # izeage; 8=catch;
9530 # 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14
9531 # =Morphcomp; 15=Tag-comp; 16=Tag-negbin
9532 #like_comp fleet/survey phase value sizefreq_method
9533 # 1 2 2 1 1
9534 # 4 2 2 1 1
9535 # 4 2 3 1 1
9536 #
9537 # lambdas (for info only; columns are phases)
9538 # 0 0 0 0 #_CPUE/survey:_1
9539 # 1 1 1 1 #_CPUE/survey:_2
9540 # 1 1 1 1 #_CPUE/survey:_3
9541 # 1 1 1 1 #_lencomp:_1
9542 # 1 1 1 1 #_lencomp:_2
9543 # 0 0 0 0 #_lencomp:_3
9544 # 1 1 1 1 #_agecomp:_1
9545 # 1 1 1 1 #_agecomp:_2
9546 # 0 0 0 0 #_agecomp:_3
9547 # 1 1 1 1 #_size-age:_1
9548 # 1 1 1 1 #_size-age:_2
9549 # 0 0 0 0 #_size-age:_3
9550 # 1 1 1 1 #_init_equ_catch
9551 # 1 1 1 1 #_recruitments
9552 # 1 1 1 1 #_parameter-priors
9553 # 1 1 1 1 #_parameter-dev-vectors
9554 # 1 1 1 1 #_crashPenLambda
9555 0 # (0/1) read specs for more stddev reporting
9556 # 1 1 -1 5 1 5 1 -1 5 # selex type, len/age, year, N selex bins, Growth pat
9557 # tern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
9558 # 5 15 25 35 43 # vector with selex std bin picks (-1 in first bin to self-
9559 # generate)
9560 # 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-
9561 # generate)
9562 # 1 2 14 26 40 # vector with NatAge std bin picks (-1 in first bin to self-
9563 # generate)
9564 999

```

## 9565 Southern Model

```
9566 #V3.24u
```

```

9567 #C China rockfish REVISED base model 7/7/15
9568 1 #_N_Growth_Patterns
9569 1 #_N_Morphs_Within_GrowthPattern
9570 0 #_Nblock_Patterns
9571 #_Cond 0 #_blocks_per_pattern
9572 # begin and end years of blocks
9573 #
9574 0.5      #_fracfemale
9575 0          #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4
9576 # =agespec_withseasinterpolate
9577           #_no additional input for selected M option; read 1P per morph
9578 1          # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_s
9579 # peciific_K; 4=not implemented
9580 0          #_Growth_Age_for_L1
9581 30         #_Growth_Age_for_L2 (999 to use as Linf)
9582 0          #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
9583 0          #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
9584 # ; 4 logSD=F(A)
9585 1          #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-ma
9586 # turity matrix by growth_pattern; 4=read age-fecundity; 5=read fec and wt
9587 # from wtatage.ss
9588 #0          0          0          0          1          1          1          1          1          1          1
9589 #          1          1          1          1          1          1          1          1          1          1
9590 #          1          1          1          1          1          1          1          1          1          1
9591 #          1          1          1          1          1          1          1          1          1          1
9592 #          1          1          1          1          1          1          1          1          1          1
9593 #          1          1          1          1          1          1          1          1          1          1
9594 #          1          1          1          1          1          1          1          1          1          1
9595 #          1          1          1          1          1          1          1          1          1          1
9596 #          1          1          1          1          1          1          1          1          1          1
9597 #_placeholder for empirical age-maturity by growth pattern
9598 1          #_First_Mature_Age
9599 1          #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
9600 # ; (4)eggs=a+b*L; (5)eggs=a+b*W
9601 0          #_hermaphroditism option: 0=none; 1=age-specific fxn
9602 2          #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from f
9603 # emale-GP1, 3=like SS2 V1.x)
9604 2          #_env/block/dev_adjust_method (1=standard; 2=logistic transform kee
9605 # ps in base parm bounds; 3=standard w/ no bound check)
9606 #
9607 #_growth_parms
9608 #_LO      HI      INIT      PRIOR     PR_type SD      PHASE env-var use_dev dev_miny

```

```

9609 # r dev_maxyr dev_SD Block Block_Fxn
9610 # female growth
9611 0.01 0.25 0.07 -2.94 3 0.53 -7 0 0 0
9612 0 0 0 0 0 # NatM_p_1_Fem_GP_1 (with prior
9613 # from Owen)
9614 0 10 2 2 -1 10 -2 0 0 0
9615 0 0 0 0 0 # L_at_Amin_Fem_GP_1
9616 25 45 33 34 -1 10 6 0 0 0
9617 0 0 0 0 0 # L_at_Amax_Fem_GP_1
9618 0.05 0.3 0.15 0.1 -1 0.8 6 0 0 0
9619 0 0 0 0 0 # VonBert_K_Fem_GP_1
9620 0.01 0.2 0.1 0.1 -1 0.8 -6 0 0 0
9621 0 0 0 0 0 # CV_young_Fem_GP_1
9622 0.03 0.2 0.1 0.1 -1 0.8 6 0 0 0
9623 0 0 0 0 0 # CV_old_Fem_GP_1
9624 ### male growth with absolute offsets = 0 (effectively single gender model)
9625 -1 0.15 0 0 -1 0.8 -3 0 0 0
9626 0 0 0 0 0 # NatM_p_1_Mal_GP_1
9627 -1 45 0 0 -1 10 -2 0 0 0
9628 0 0 0 0 0 # L_at_Amin_Mal_GP_1
9629 -1 50 0 0 -1 10 -4 0 0 0
9630 0 0 0 0 0 # L_at_Amax_Mal_GP_1
9631 -1 0.3 0 0 -1 0.8 -4 0 0 0
9632 0 0 0 0 0 # VonBert_K_Mal_GP_1
9633 -1 0.25 0 0 -1 0.8 -3 0 0 0
9634 0 0 0 0 0 # CV_young_Mal_GP_1
9635 -1 0.25 0 0 -1 0.8 -3 0 0 0
9636 0 0 0 0 0 # CV_old_Mal_GP_1
9637 # female weight-length, maturity, and fecundity
9638 0 1 1.17E-5 1.17E-5 -1 0.8 -3 0 0 0
9639 0 0 0 0 0 # Wtlen_1_Fem # converted to (cm
9640 # ,kg) from Lea et al. 1999
9641 2 4 3.177 3 -1 0.8 -3 0 0 0
9642 0 0 0 0 0 # Wtlen_2_Fem # from Lea et al.
9643 # 1999
9644 1 100 27 27 -1 0.8 -3 0 0 0
9645 0 0 0 0 0 # Mat50%_Fem
9646 -9 9 -1.0 0 -1 0.8 -3 0 0 0
9647 0 0 0 0 0 # Mat_slope_Fem
9648 0 1 0.196 1 -1 0.8 -3 0 0 0
9649 0 0 0 0 0 # Eggs/kg_inter_Fem
9650 0 1 0.0571 0 -1 0.8 -3 0 0 0

```

```

9651      0      0      0      0      #      Eggs/kg_slope_wt_Fem
9652  # male W-L
9653  0      1      1.17E-5 1.17E-5 -1      0.8      -3      0      0      0
9654      0      0      0      0      #      Wtlen_1_Mal # converted to (cm
9655  # ,kg) from Lea et al. 1999
9656  2      4      3.177   3      -1      0.8      -3      0      0      0
9657      0      0      0      0      #      Wtlen_2_Mal # from Lea et al.
9658  # 1999
9659
9660  0      0      0      0      -1      0      -4      0      0      0
9661      0      0      0      0      #      RecrDist_GP_1
9662  0      0      0      0      -1      0      -4      0      0      0
9663      0      0      0      0      #      RecrDist_Area_1
9664  0      0      0      0      -1      0      -4      0      0      0
9665      0      0      0      0      #      RecrDist_Seas_1
9666  0      0      0      0      -1      0      -4      0      0      0
9667      0      0      0      0      #      CohortGrowDev
9668  #
9669  #_Cond 0 #custom_MG-env_setup (0/1)
9670  #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
9671  #
9672  #_Cond 0 #custom_MG-block_setup (0/1)
9673  #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
9674  #_Cond No MG parm trends
9675  #
9676  #_seasonal_effects_on_biology_parms
9677  0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,m
9678  # alewtlen2,L1,K
9679  #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
9680  #
9681  #_Cond -4 #_MGparm_Dev_Phase
9682  #
9683  #_Spawner-Recruitment
9684  3      #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop
9685  # ; 7=survival_3Parm
9686  #_LO    HI     INIT    PRIOR   PR_type SD      PHASE
9687  4      7      5      4      -1      10      1      #      SR_LN(R0)
9688  0.2    1      0.773  0.773  2      0.147  -3      #      SR_BH_stEEP
9689  0      2      0.5    0.5    -1      0.8    -3      #      SR_sigmaR
9690  -5     5      0.1    0      -1      1      -3      #      SR_envlink
9691  -5     5      0      0      -1      1      -4      #      SR_R1_offse
9692  # t

```

```

9693 0      0      0      0      -1      0      -9      #      SR_autocorr
9694 0 #_SR_env_link
9695 0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
9696 1 #do_recdev: 0=none; 1=devvector; 2=simple deviations
9697 1971 # first year of main recr_devs; early devs can preceed this era
9698 2001 # last year of main recr_devs; forecast devs start in following year
9699 -2 #_recdev phase
9700 1 # (0/1) to read 13 advanced options
9701 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
9702 -4 #_recdev_early_phase
9703 -4 #_forecast_recruitment_phase (incl. late recr) (0 value resets to maxph
9704 # ase+1)
9705 1 #_lambda for Fcast_recr_like occurring before endyr+1
9706 900 #_last_early_yr_nobias_adj_in_MPD
9707 1820 #_first_yr_fullbias_adj_in_MPD
9708 2001 #_last_yr_fullbias_adj_in_MPD
9709 2015 #_first_recent_yr_nobias_adj_in_MPD
9710 1 #_max_bias_adj_in_MPD (-1 to override ramp and set biasadj=1.0 for all e
9711 # stimated recdevs)
9712 0 #_period of cycles in recruitment (N parms read below)
9713 -5 #min rec_dev
9714 5 #max rec_dev
9715 0 #_read_recdevs
9716 #_end of advanced SR options
9717 #
9718 #
9719 #Fishing Mortality info
9720 0.2 # F ballpark for tuning early phases
9721 -2001 # F ballpark year (neg value to disable)
9722 3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
9723 2.9 # max F or harvest rate, depends on F_Method
9724 # no additional F input needed for Fmethod 1
9725 # if Fmethod=2; read overall start F value; overall phase; N detailed input
9726 # s to read
9727 # if Fmethod=3; read N iterations for tuning for Fmethod 3
9728 5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
9729 #
9730 #_initial_F_parms
9731 #_LO HI INIT PRIOR PR_type SD PHASE
9732 0    1  0    0.01  -1     99 -1   # 1_CA_SouthOf4010_Comm_Dead
9733 0    1  0    0.01  -1     99 -1   # 2_CA_SouthOf4010_Comm_Live
9734 0    1  0    0.01  -1     99 -1   # 3_CA_SouthOf4010_Rec_PC

```

```

9735 0 1 0 0.01 -1 99 -1 # 4_CA_SouthOf4010_Rec_PR
9736 0 1 0 0.01 -1 99 -1 # 5_CA_SouthOf4010_Comm_Discard
9737 #
9738 #_Q_setup
9739 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nob
9740 # iasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_ass
9741 # ign_to_parm
9742 #_for_env-var:_enter_index_of_the_env-var_to_be_linked
9743
9744 #_Den-dep env-var extra_se Q_type
9745 0 0 0 1 # 1_CA_SouthOf4010_Comm_Dead
9746 0 0 0 1 # 2_CA_SouthOf4010_Comm_Live
9747 0 0 1 1 # 3_CA_SouthOf4010_Rec_PC
9748 0 0 0 1 # 4_CA_SouthOf4010_Rec_PR
9749 0 0 0 1 # 5_CA_SouthOf4010_Comm_Discard
9750 0 0 1 1 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9751 0 0 1 1 # 7_CA_SouthOf4010_Rec_PC_onboard_index
9752 0 0 0 1 # 8_CA_SouthOf4010_CCFRP_comps_only
9753 0 0 0 1 # 9_CA_SouthOf4010_Abrams_thesis_comps
9754
9755 # additive variance parms for indices
9756 #_LO HI INIT PRIOR PR_type SD PHASE
9757 0 2 0.5 1 -1 99 2 # extra sd index for fleet 3
9758 0 2 0.5 1 -1 99 2 # extra sd index for "survey" 6
9759 0 2 0.5 1 -1 99 2 # extra sd index for "survey" 7
9760
9761 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet w
9762 # ith random q; 1=read a parm for each year of index
9763 #_Q_parms(if_any)
9764 # LO HI INIT PRIOR PR_type SD PHASE
9765 #
9766 # Selectivity section
9767 # Size-based setup
9768 # A=Selex option: 1-24
9769 # B=Do_retention: 0=no, 1=yes
9770 # C=Male offset to female: 0=no, 1=yes, 2=Female offset to male
9771 # D=Mirror selex (#)
9772 # A B C D
9773 24 0 0 0 # 1_CA_SouthOf4010_Comm_Dead
9774 24 0 0 0 # 2_CA_SouthOf4010_Comm_Live
9775 24 0 0 0 # 3_CA_SouthOf4010_Rec_PC
9776 24 0 0 0 # 4_CA_SouthOf4010_Rec_PR

```

```

9777 24 0 0 0 # 5_CA_SouthOf4010_Comm_Discard
9778 24 0 0 0 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9779 #15 0 0 3 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9780 15 0 0 3 # 7_CA_SouthOf4010_Rec_PC_onboard_index
9781 #15 0 0 3 # 8_CA_SouthOf4010_CCFRP_comps_only
9782 24 0 0 0 # 8_CA_SouthOf4010_CCFRP_comps_only
9783 15 0 0 3 # 9_CA_SouthOf4010_Abrams_thesis_comps
9784 #
9785 #_age_selex_types
9786 #_Pattern ___ Male Special
9787 10 0 0 0 # 1_CA_SouthOf4010_Comm_Dead
9788 10 0 0 0 # 2_CA_SouthOf4010_Comm_Live
9789 10 0 0 0 # 3_CA_SouthOf4010_Rec_PC
9790 10 0 0 0 # 4_CA_SouthOf4010_Rec_PR
9791 10 0 0 0 # 5_CA_SouthOf4010_Comm_Discard
9792 10 0 0 0 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9793 10 0 0 0 # 7_CA_SouthOf4010_Rec_PC_onboard_index
9794 10 0 0 0 # 8_CA_SouthOf4010_CCFRP_comps_only
9795 10 0 0 0 # 9_CA_SouthOf4010_Abrams_thesis_comps
9796
9797 # ALL SELEX ARE DOUBLE-NORMALS, SOME ARE FIXED AS ASYMPTOTIC
9798 #_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev
9799 # _SD Block Block_Fxn
9800 # 1_CA_SouthOf4010_Comm_Dead
9801 19 45 28 30 -1 50 4 0 0 0 0 0 0 0 # PEAK
9802 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 0 # TOP (logistic)
9803 0 9 3 4 -1 50 5 0 0 0 0 0 0 0 # Asc WIDTH exp
9804 0 9 8 8 -1 50 -9 0 0 0 0 0 0 0 # Desc WIDTH exp
9805 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 0 # INIT (logistic)
9806 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 0 # FINAL (logistic)
9807 # 2_CA_SouthOf4010_Comm_Live
9808 20 45 32 25 -1 50 4 0 0 0 0 0 0 0 # PEAK
9809 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 0 # TOP (logistic)
9810 0 9 3 3 -1 50 5 0 0 0 0 0 0 0 # Asc WIDTH exp
9811 0 9 8 8 -1 50 -9 0 0 0 0 0 0 0 # Desc WIDTH exp
9812 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 0 # INIT (logistic)
9813 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 0 # FINAL (logistic)
9814 # 3_CA_SouthOf4010_Rec_PC
9815 19 45 26 30 -1 50 4 0 0 0 0 0 0 0 # PEAK
9816 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 0 # TOP (logistic)
9817 0 9 3 4 -1 50 5 0 0 0 0 0 0 0 # Asc WIDTH exp
9818 0 9 8 8 -1 50 -9 0 0 0 0 0 0 0 # Desc WIDTH exp

```

```

9819 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9820 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9821 # 4_CA_SouthOf4010_Rec_PR
9822 19 45 27 30 -1 50 4 0 0 0 0 0 0 # PEAK
9823 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9824 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9825 0 9 8 8 -1 50 -9 0 0 0 0 0 0 # Desc WIDTH exp
9826 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9827 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9828 # 5_CA_SouthOf4010_Comm_Discard
9829 19 45 27 30 -1 50 4 0 0 0 0 0 0 # PEAK
9830 -9 5 -8 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9831 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9832 0 9 3 8 -1 50 5 0 0 0 0 0 0 # Desc WIDTH exp
9833 -9 -8 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9834 -9 -8 -8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9835 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9836 19 45 30 30 -1 50 4 0 0 0 0 0 0 # PEAK
9837 -9 9 -8 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9838 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9839 0 9 8 8 -1 50 -9 0 0 0 0 0 0 # Desc WIDTH exp
9840 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9841 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9842 # 8_CA_SouthOf4010_CCFRP_comps_only
9843 19 45 30 30 -1 50 4 0 0 0 0 0 0 # PEAK
9844 -9 9 -8 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9845 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9846 0 9 8 8 -1 50 -9 0 0 0 0 0 0 # Desc WIDTH exp
9847 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9848 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9849
9850 #_Cond 0 #_custom_sel-env_setup (0/1)
9851 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
9852 #_Cond 0 #_custom_sel-blk_setup (0/1)
9853 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no block usage
9854 #_Cond No selex parm trends
9855 #_Cond -4 # placeholder for selparm_Dev_Phase
9856 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to kee
9857 # p in base parm bounds; 3=standard w/ no bound check)
9858 #
9859 # Tag loss and Tag reporting parameters go next
9860 0 # TG_custom: 0=no read; 1=read if tags exist

```

```

9861 #_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0 #_placeholder if no parameters
9862 #
9863 1 #_Variance_adjustments_to_input_values
9864 #F1 F2 F3 F4 F5 F6 F7 F8 F9
9865 0 0 0 0 0 0 0 0 #_add_to_survey_CV
9866 0 0 0 0 0 0 0 0 #_add_to_discard_stddev
9867 0 0 0 0 0 0 0 0 #_add_to_bodywt_CV
9868 # 1 1 1 1 1 1 1 1 #_mult_by_lencomp_N
9869 0.4134 0.2527 0.2185 0.1412 0.2453 0.4895 1 0.76 1 #_mult_by_lenc
9870 #_omp_N
9871 1 1 0.2919 1 1 1 1 1 0.30825 #_mult_by_agecomp_N
9872 1 1 1 1 1 1 1 1 #_mult_by_size-at-age_N
9873 #
9874 4 #_maxlambdaphase
9875 1 #_sd_offset
9876 #
9877 0 # number of changes to make to default Lambdas (default value is 1.0)
9878 # Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=s
9879 # izeage; 8=catch;
9880 # 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14
9881 # =Morphcomp; 15=Tag-comp; 16=Tag-negbin
9882 #like_comp fleet/survey phase value sizefreq_method
9883 # 1 2 2 1 1
9884 # 4 2 2 1 1
9885 # 4 2 3 1 1
9886 #
9887 # lambdas (for info only; columns are phases)
9888 # 0 0 0 0 #_CPUE/survey:_1
9889 # 1 1 1 1 #_CPUE/survey:_2
9890 # 1 1 1 1 #_CPUE/survey:_3
9891 # 1 1 1 1 #_lencomp:_1
9892 # 1 1 1 1 #_lencomp:_2
9893 # 0 0 0 0 #_lencomp:_3
9894 # 1 1 1 1 #_agecomp:_1
9895 # 1 1 1 1 #_agecomp:_2
9896 # 0 0 0 0 #_agecomp:_3
9897 # 1 1 1 1 #_size-age:_1
9898 # 1 1 1 1 #_size-age:_2
9899 # 0 0 0 0 #_size-age:_3
9900 # 1 1 1 1 #_init_equ_catch
9901 # 1 1 1 1 #_recruitments
9902 # 1 1 1 1 #_parameter-priors

```

```
9903 # 1 1 1 1 #_parameter-dev-vectors
9904 # 1 1 1 1 #_crashPenLambda
9905 0 # (0/1) read specs for more stddev reporting
9906 # 1 1 -1 5 1 5 1 -1 5 # selex type, len/age, year, N selex bins, Growth pat
9907 # tern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
9908 # 5 15 25 35 43 # vector with selex std bin picks (-1 in first bin to self-
9909 # generate)
9910 # 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-
9911 # generate)
9912 # 1 2 14 26 40 # vector with NatAge std bin picks (-1 in first bin to self-
9913 # generate)
9914 999
```

## 9915 Appendix C. SS starter file

### 9916 Northern Model

```
9917 #V3.24u
9918 #C starter comment here
9919 china_WAonly_data.ss
9920 china_WAonly_control.ss
9921 0 # 0=use init values in control file; 1=use ss3.par
9922 1 # run display detail (0,1,2)
9923 1 # detailed age-structured reports in REPORT.SSO (0,1)
9924 0 # write detailed checkup.sso file (0,1)
9925 0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=e
9926 # very_iter,all_parms; 4=every,active)
9927 1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
9928 1 # Include prior_like for non-estimated parameters (0,1)
9929 1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
9930 2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and
9931 # higher are bootstrap
9932 10 # Turn off estimation for parameters entering after this phase
9933 0 # MCeval burn interval
9934 1 # MCeval thin interval
9935 0 # jitter initial parm value by this fraction
9936 -1 # min yr for sdreport outputs (-1 for styr)
9937 -2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
9938 0 # N individual STD years
9939 #vector of year values
9940
9941 1.0e-04 # final convergence criteria (e.g. 1.0e-04)
9942 0 # retrospective year relative to end year (e.g. -4)
9943 5 # min age for calc of summary biomass
9944 1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B
9945 # _styr
9946 1.0 # Fraction (X) for Depletion denominator (e.g. 0.4)
9947 1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY)
9948 # ; 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
9949 1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum
9950 # (Frates); 4=true F for range of ages
9951 #5 80 #_min and max age over which average F will be calculated
9952 1 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
9953 999 # check value for end of file
```

### 9954 Central Model

```

9955 #V3.24u
9956 #C starter comment here
9957 china_central_data.ss
9958 china_central_control.ss
9959 0 # 0=use init values in control file; 1=use ss3.par
9960 1 # run display detail (0,1,2)
9961 1 # detailed age-structured reports in REPORT.SSO (0,1)
9962 0 # write detailed checkup.sso file (0,1)
9963 0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=e
9964 # very_iter,all_parms; 4=every,active)
9965 1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
9966 1 # Include prior_like for non-estimated parameters (0,1)
9967 1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
9968 2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and
9969 # higher are bootstrap
9970 10 # Turn off estimation for parameters entering after this phase
9971 0 # MCeval burn interval
9972 1 # MCeval thin interval
9973 0 # jitter initial parm value by this fraction
9974 -1 # min yr for sdreport outputs (-1 for styr)
9975 -2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
9976 0 # N individual STD years
9977 #vector of year values
9978
9979 1.0e-04 # final convergence criteria (e.g. 1.0e-04)
9980 0 # retrospective year relative to end year (e.g. -4)
9981 5 # min age for calc of summary biomass
9982 1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B
9983 # _styr
9984 1.0 # Fraction (X) for Depletion denominator (e.g. 0.4)
9985 1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY)
9986 # ; 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
9987 1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum
9988 # (Frates); 4=true F for range of ages
9989 #5 80 #_min and max age over which average F will be calculated
9990 1 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
9991 999 # check value for end of file

```

## 9992 Southern Model

```

9993 #V3.24u
9994 #C starter comment here

```

```

9995  china_south_data.ss
9996  china_south_control.ss
9997  0 # 0=use init values in control file; 1=use ss3.par
9998  1 # run display detail (0,1,2)
9999  1 # detailed age-structured reports in REPORT.SSO (0,1)
10000 0 # write detailed checkup.sso file (0,1)
10001 0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=e
10002 # very_iter,all_parms; 4=every,active)
10003 1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
10004 1 # Include prior_like for non-estimated parameters (0,1)
10005 1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
10006 2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and
10007 # higher are bootstrap
10008 10 # Turn off estimation for parameters entering after this phase
10009 0 # MCeval burn interval
10010 1 # MCeval thin interval
10011 0 # jitter initial parm value by this fraction
10012 -1 # min yr for sdreport outputs (-1 for styr)
10013 -2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
10014 0 # N individual STD years
10015 #vector of year values
10016
10017 1.0e-04 # final convergence criteria (e.g. 1.0e-04)
10018 0 # retrospective year relative to end year (e.g. -4)
10019 5 # min age for calc of summary biomass
10020 1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B
10021 # _styr
10022 1 # Fraction (X) for Depletion denominator (e.g. 0.4)
10023 1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY)
10024 # ; 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
10025 1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum
10026 # (Frates); 4=true F for range of ages
10027 #5 80 #_min and max age over which average F will be calculated
10028 1 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
10029 999 # check value for end of file

```

## 10030 Appendix D. SS forecast file

### 10031 Northern Model

```
10032 #V3.24U
10033 #C generic forecast file
10034 # for all year entries except rebuilder; enter either: actual year, -999 fo
10035 # r styr, 0 for endyr, neg number for rel. endyr
10036 1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
10037 2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endy
10038 # r)
10039 0.5 # SPR target (e.g. 0.40)
10040 0.4 # Biomass target (e.g. 0.40)
10041 #_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relf, end_relf (
10042 # enter actual year, or values of 0 or -integer to be rel. endyr)
10043 0 0 0 0 0 0
10044 1 #Bmark_relf_Basis: 1 = use year range; 2 = set relF same as forecast belo
10045 # w
10046 #
10047 1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-las
10048 # t relF yrs); 5=input annual F scalar
10049 12 # N forecast years
10050 1.0 # F scalar (only used for Do_Forecast==5)
10051 #_Fcast_years: beg_selex, end_selex, beg_relf, end_relf (enter actual yea
10052 # r, or values of 0 or -integer to be rel. endyr)
10053 -4 0 -4 0
10054 1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
10055 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.4
10056 # 0); (Must be > the no F level below)
10057 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
10058 # multiplier below based on P*=0.45 and Category 2 Sigma = 0.72
10059 # qlnorm(0.45, 0, 0.72) = 0.913
10060 0.913 # Control rule target as fraction of Flimit (e.g. 0.75)
10061 3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch
10062 # with allocations applied)
10063 3 #_First forecast loop with stochastic recruitment
10064 0 #_Forecast loop control #3 (reserved for future bells&whistles)
10065 0 #_Forecast loop control #4 (reserved for future bells&whistles)
10066 0 #_Forecast loop control #5 (reserved for future bells&whistles)
10067 2026 #FirstYear for caps and allocations (should be after years with fixed
10068 # inputs)
10069 0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 t
```

```

10070 # o cause active impl_error)
10071 0 # Do West Coast gfish rebuilder output (0/1)
10072 -1 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to
10073 # set to 1999)
10074 -1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endye
10075 # ar+1)
10076 1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x flee
10077 # t(col) below
10078 # Note that fleet allocation is used directly as average F if Do_Forecast=4
10079 #
10080 2 # basis for fcast catch tuning and for fcast catch caps and allocation (
10081 # 2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
10082 # Conditional input if relative F choice = 2
10083 # Fleet relative F: rows are seasons, columns are fleets
10084 #_Fleet: 1_CA_SouthOf4010_Comm_Dead 2_CA_SouthOf4010_Comm_Live 3_CA_SouthO
10085 # f4010_Rec_PC 4_CA_SouthOf4010_Rec_PR
10086 # 0 0 0 0
10087 # max totalcatch by fleet (-1 to have no max) must enter value for each fle
10088 # et
10089 -1 -1 -1
10090 # max totalcatch by area (-1 to have no max); must enter value for each are
10091 # a
10092 -1
10093 # fleet assignment to allocation group (enter group ID# for each fleet, 0 f
10094 # or not included in an alloc group)
10095 0 0 0
10096 #_Conditional on >1 allocation group
10097 # allocation fraction for each of: 0 allocation groups
10098 # no allocation groups
10099 6 # Number of forecast catch levels to input (else calc catch from forecast
10100 # F)
10101 2 # code means to read fleet/time specific basis (2=dead catch; 3=retained
10102 # catch; 99=F) as below (units are from fleetunits; note new codes in SSV3
10103 # .20)
10104 # Input fixed catch values
10105 #Year Seas Fleet Catch(or_F) Basis
10106 #Scaled to ACLs Northern model average catches
10107 #Year Seas Fleet Catch
10108 2015 1 1 0.02
10109 2015 1 2 0.19
10110 2015 1 3 1.76
10111 2016 1 1 0.02

```

```

10112 2016 1 2 0.2
10113 2016 1 3 1.81
10114
10115 999 # verify end of input

10116 Central Model

10117 #V3.24U
10118 #C forecast file for China Rockfish
10119 #C with 2015/16 fixed catches
10120 #C 2017 and beyond based on SPR-50%, 40-10, and P*=0.45 for category 2 ass
10121 # essment
10122 #
10123 # for all year entries except rebuilder; enter either: actual year, -999 fo
10124 # r styr, 0 for endyr, neg number for rel. endyr
10125 1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
10126 2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endy
10127 # r)
10128 0.5 # SPR target (e.g. 0.40)
10129 0.4 # Biomass target (e.g. 0.40)
10130 #_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relf, end_relf (
10131 # enter actual year, or values of 0 or -integer to be rel. endyr)
10132 0 0 0 0 0 0
10133 1 #Bmark_relf_Basis: 1 = use year range; 2 = set relF same as forecast belo
10134 # w
10135 #
10136 1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-las
10137 # t relF yrs); 5=input annual F scalar
10138 12 # N forecast years
10139 1.0 # F scalar (only used for Do_Forecast==5)
10140 #_Fcast_years: beg_selex, end_selex, beg_relf, end_relf (enter actual yea
10141 # r, or values of 0 or -integer to be rel. endyr)
10142 -4 0 -4 0
10143 1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
10144 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.4
10145 # 0); (Must be > the no F level below)
10146 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
10147 # multiplier below based on P*=0.45 and Category 2 Sigma = 0.72
10148 # qlnorm(0.45, 0, 0.72) = 0.913
10149 0.913 # Control rule target as fraction of Flimit (e.g. 0.75)
10150 3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch
10151 # with allocations applied)

```

```

10152 3 # First forecast loop with stochastic recruitment
10153 0 #_Forecast loop control #3 (reserved for future bells&whistles)
10154 0 #_Forecast loop control #4 (reserved for future bells&whistles)
10155 0 #_Forecast loop control #5 (reserved for future bells&whistles)
10156 2025 #FirstYear for caps and allocations (should be after years with fixed
10157 # inputs)
10158 0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 t
10159 # o cause active impl_error)
10160 0 # Do West Coast gfish rebuilder output (0/1)
10161 -1 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to
10162 # set to 1999)
10163 -1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endye
10164 # ar+1)
10165 1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x flee
10166 # t(col) below
10167 # Note that fleet allocation is used directly as average F if Do_Forecast=4
10168 2 # basis for fcast catch tuning and for fcast catch caps and allocation (
10169 # 2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
10170 # Conditional input if relative F choice = 2
10171 # Fleet relative F: rows are seasons, columns are fleets
10172 #_Fleet: 1_CA_SouthOf4010_Comm_Dead 2_CA_SouthOf4010_Comm_Live 3_CA_South0
10173 # f4010_Rec_PC 4_CA_SouthOf4010_Rec_PR
10174 # 0 0 0 0
10175 # max totalcatch by fleet (-1 to have no max) must enter value for each fle
10176 # et
10177 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
10178 # max totalcatch by area (-1 to have no max); must enter value for each are
10179 # a
10180 -1
10181 # fleet assignment to allocation group (enter group ID# for each fleet, 0 f
10182 # or not included in an alloc group)
10183 0 0 0 0 0 0 0 0 0 0
10184 #_Conditional on >1 allocation group
10185 # allocation fraction for each of: 0 allocation groups
10186 # no allocation groups
10187 22 # Number of forecast catch levels to input (else calc catch from forecas
10188 # t F)
10189 2 # code means to read fleet/time specific basis (2=dead catch; 3=retained
10190 # catch; 99=F) as below (units are from fleetunits; note new codes in SSV
10191 # 3.20)
10192 # Input fixed catch values
10193 # these catches based on making the sum of northern and central models

```

```

10194 # equal to the 2015/16 ACL contributions from John DeVore which are 6.6mt a
10195 # nd 6.8mt
10196 #Year Seas Fleet Catch
10197 2015 1 1 0.02 # total for 2015: 4.64
10198 2015 1 2 0.06
10199 2015 1 3 0.06
10200 2015 1 4 0.44
10201 2015 1 5 0.48
10202 2015 1 6 2.44
10203 2015 1 7 0.12
10204 2015 1 8 0.31
10205 2015 1 9 0.02
10206 2015 1 10 0.34
10207 2015 1 11 0.35
10208 #
10209 2016 1 1 0.02 # total for 2016: 4.78
10210 2016 1 2 0.06
10211 2016 1 3 0.06
10212 2016 1 4 0.45
10213 2016 1 5 0.5
10214 2016 1 6 2.52
10215 2016 1 7 0.12
10216 2016 1 8 0.32
10217 2016 1 9 0.02
10218 2016 1 10 0.35
10219 2016 1 11 0.36
10220 #
10221 999 # verify end of input

```

## 10222 Southern Model

```

10223 #V3.24U
10224 #C generic forecast file
10225 # for all year entries except rebuilder; enter either: actual year, -999 fo
10226 # r styr, 0 for endyr, neg number for rel. endyr
10227 1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
10228 2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endy
10229 # r)
10230 0.5 # SPR target (e.g. 0.40)
10231 0.4 # Biomass target (e.g. 0.40)
10232 #_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (
10233 # enter actual year, or values of 0 or -integer to be rel. endyr)

```

```

10234 0 0 0 0 0 0
10235 1 #Bmark_relf_Basis: 1 = use year range; 2 = set relF same as forecast belo
10236 # W
10237 #
10238 1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-las
10239 # t relF yrs); 5=input annual F scalar
10240 10 # N forecast years
10241 1.0 # F scalar (only used for Do_Forecast==5)
10242 #_Fcast_years: beg_selex, end_selex, beg_relf, end_relf (enter actual yea
10243 # r, or values of 0 or -integer to be rel. endyr)
10244 -4 0 -4 0
10245 1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
10246 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.4
10247 # 0); (Must be > the no F level below)
10248 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
10249 1.0 # Control rule target as fraction of Flimit (e.g. 0.75)
10250 3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch
10251 # with allocations applied)
10252 3 #_First forecast loop with stochastic recruitment
10253 0 #_Forecast loop control #3 (reserved for future bells&whistles)
10254 0 #_Forecast loop control #4 (reserved for future bells&whistles)
10255 0 #_Forecast loop control #5 (reserved for future bells&whistles)
10256 2025 #FirstYear for caps and allocations (should be after years with fixed
10257 # inputs)
10258 0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 t
10259 # o cause active impl_error)
10260 0 # Do West Coast gfish rebuilder output (0/1)
10261 -1 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to
10262 # set to 1999)
10263 -1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endye
10264 # ar+1)
10265 1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x flee
10266 # t(col) below
10267 # Note that fleet allocation is used directly as average F if Do_Forecast=4
10268 #
10269 2 # basis for fcast catch tuning and for fcast catch caps and allocation (
10270 # 2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
10271 # Conditional input if relative F choice = 2
10272 # Fleet relative F: rows are seasons, columns are fleets
10273 #_Fleet: 1_CA_SouthOf4010_Comm_Dead 2_CA_SouthOf4010_Comm_Live 3_CA_South0
10274 # f4010_Rec_PC 4_CA_SouthOf4010_Rec_PR
10275 # 0 0 0 0

```

```
10276 # max totalcatch by fleet (-1 to have no max) must enter value for each fle
10277 # et
10278 -1 -1 -1 -1 -1
10279 # max totalcatch by area (-1 to have no max); must enter value for each are
10280 # a
10281 -1
10282 # fleet assignment to allocation group (enter group ID# for each fleet, 0 f
10283 # or not included in an alloc group)
10284 0 0 0 0 0
10285 #_Conditional on >1 allocation group
10286 # allocation fraction for each of: 0 allocation groups
10287 # no allocation groups
10288 0 # Number of forecast catch levels to input (else calc catch from forecast
10289 # F)
10290 2 # code means to read fleet/time specific basis (2=dead catch; 3=retained
10291 # catch; 99=F) as below (units are from fleetunits; note new codes in SSV3
10292 # .20)
10293 # Input fixed catch values
10294 #Year Seas Fleet Catch(or_F) Basis
10295 #
10296 999 # verify end of input
```

## 10297 Appendix E. Observed Angler Prediction

10298 The 1987-1998 CDFW onboard observer program did not record the number of anglers at a  
10299 fishing stop from 4/22/87 until 7/9/92. The goal of this analysis is to impute the number of  
10300 observed anglers in the initial period of the sampling program from the number of observed  
10301 anglers and onboard anglers from the later years of the program.

10302 The number of observed anglers at a fishing stop is a subset of the number of total number of  
10303 anglers onboard the vessel (paid plus free anglers); a quantity which is consistently recorded  
10304 throughout the entire dataset. We explored the using the total number of observed anglers  
10305 onboard the vessel in the following analyses, but it was not recorded in a consitent manner  
10306 through time, e.g., recorded as the maximum number of anglers observed at a fishing stop  
10307 during the trip, a sum of the observed anglers at each fishing stop, or the average number  
10308 of observed anglers at all fishings stops, etc.

10309 We explored a binomial regression model to predict the mean number of observed anglers at  
10310 a fishing stop from the number of total anglers, in the initial period of the data. Binomial  
10311 regression models of this general form were considered in this analysis, as well as a sensitivity  
10312 analysis among the other potential covariates available in the dataset. Among the potential  
10313 predictor variables in this study, effects related to the interviewer, and trip date were con-  
10314 sidered for inclusion in the final model by pairwise comparison of fitted model AIC values  
10315 as well as analysis of parameter significance.

10316 Effects related to interviewer were found to be very significant, although due to the high  
10317 turn-over rate of the interviewers in these data, interviewer specific effects are not useful for  
10318 prediction here. However, the total number of interviewers onboard the vessel (one or two  
10319 interviewers) was found to be strongly significant and was included in the final models as a  
10320 categorical effect.

10321 For imputing the observed number of observed anglers for the early period of the dataset  
10322 it is important to motivate an assumption of stationarity in the number of observed ang-  
10323 glers through time. Thus trip date was considered for inclusion in the model to check for  
10324 any possibility significance through time. Firstly, date was considered for inclusion in the  
10325 model as a discrete time variable; secondly, a separate model was tested using only year as  
10326 categorical variable to consider any temporal patterns. Given the number of total anglers,  
10327 neither of the models considering temporal effects were able demonstrate that the number  
10328 of observed anglers varied significantly through time. All models which included temporal  
10329 effects produced higher overall AIC values, thus supporting the assumption of stationarity  
10330 in time.

10331 Log Model:

$$y_{ij} \sim \beta_{0j} + \beta_{1j} \log(x_{ij}) + \epsilon_{ij} \quad \epsilon_{ij} \sim N(0, \sigma_j) \quad (1)$$

10332 Binomial Log Model:

**Log Model: AIC=64636.72, MSE=5.13**

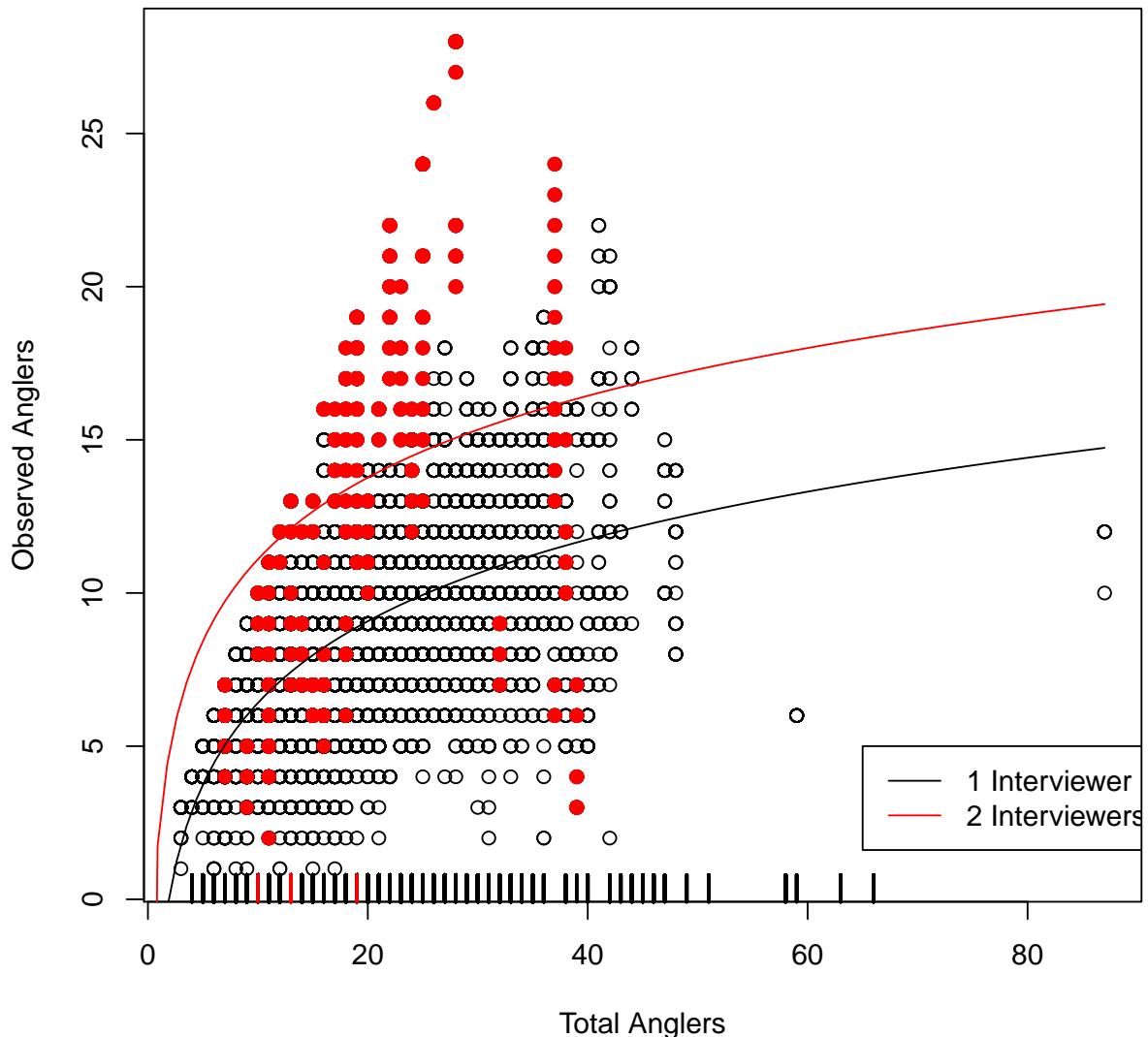


Figure E1: The number of observed anglers plotted as a function of the number of total anglers. The log-normal mean curves are plotted on the scale of the data, and colored to indicate if the data was collected in the presence of one or two interviewers. Additionally, a total anglers rug plot is included to show the total angler data for which the number of observed anglers needs to be imputed.

$$y_{ij} \sim B\left( N_{ij}, \text{ logit}\left(\beta_{0j} + \beta_{1j} \log(x_{ij})\right) \right) \quad (2)$$

	totAng	totAng + intNum	log(totAng) + intNum
Normal	67387.29	65317.02	64636.72
Binomial	66099.40	63753.06	62498.83

10333 The log model considers a typical normal linear model for each interviewer level, except it  
 10334 uses the log of the number of total anglers as a predictor rather than the raw numbers of  
 10335 total anglers. The log model has several nice features for prediction in this case. Firstly by  
 10336 regressing on the log of the total anglers it improves the correlation and relative homoscedas-  
 10337 ticity of the joint data and improves the accuracy of sensitivity analysis by improving the  
 10338 standard error estimates for each parameter. Secondly the log transformation introduces the  
 10339 expected mean prediction shape, by emphasizing order of magnitude differences in the total  
 10340 number of anglers. The binomial log model considers the observed angler counts as indepen-  
 10341 dent draws from a binomial given the know number of total anglers. The log transformation  
 10342 in the binomial case is justified over the traditional binomial `glm` for similar reasons as the  
 10343 normal log model, as well as simple AIC support of the transformation. All models and  
 10344 model selection criterion were computed using the standard `glm` function in the R software  
 10345 environment for statistical computing (R Development Core Team 2013).

10346 The binomial log model was chosen for its low AIC value and reasonable mean predictions.  
 10347 Untransformed binomial models were considered, however they produce unreasonable ob-  
 10348 served angler predictions associated with the high numbers of total anglers. The log trans-  
 10349 formed Normal model provides mostly reasonable predictions, but is not supported by AIC  
 10350 when compared to the binomial models. Additionally transforms of Normal likelihood mod-  
 10351 els have no distributional way of producing observed angler predictions which do not exceed  
 10352 the total number of anglers. If a Normal likelihood model were to gather AIC support,  
 10353 predictions may require truncation. These data contain considerable noise, likely due to  
 10354 the high interviewer turnover rate, which would most effectively be modeled by including  
 10355 appropriate additional predictors to control for these effects. At this point no additional  
 10356 predictors from this dataset were considered to be both sensitive and appropriate for use  
 10357 with prediction in this case.

**Binomial Log Model: AIC=62498.83, MSE=5.14**

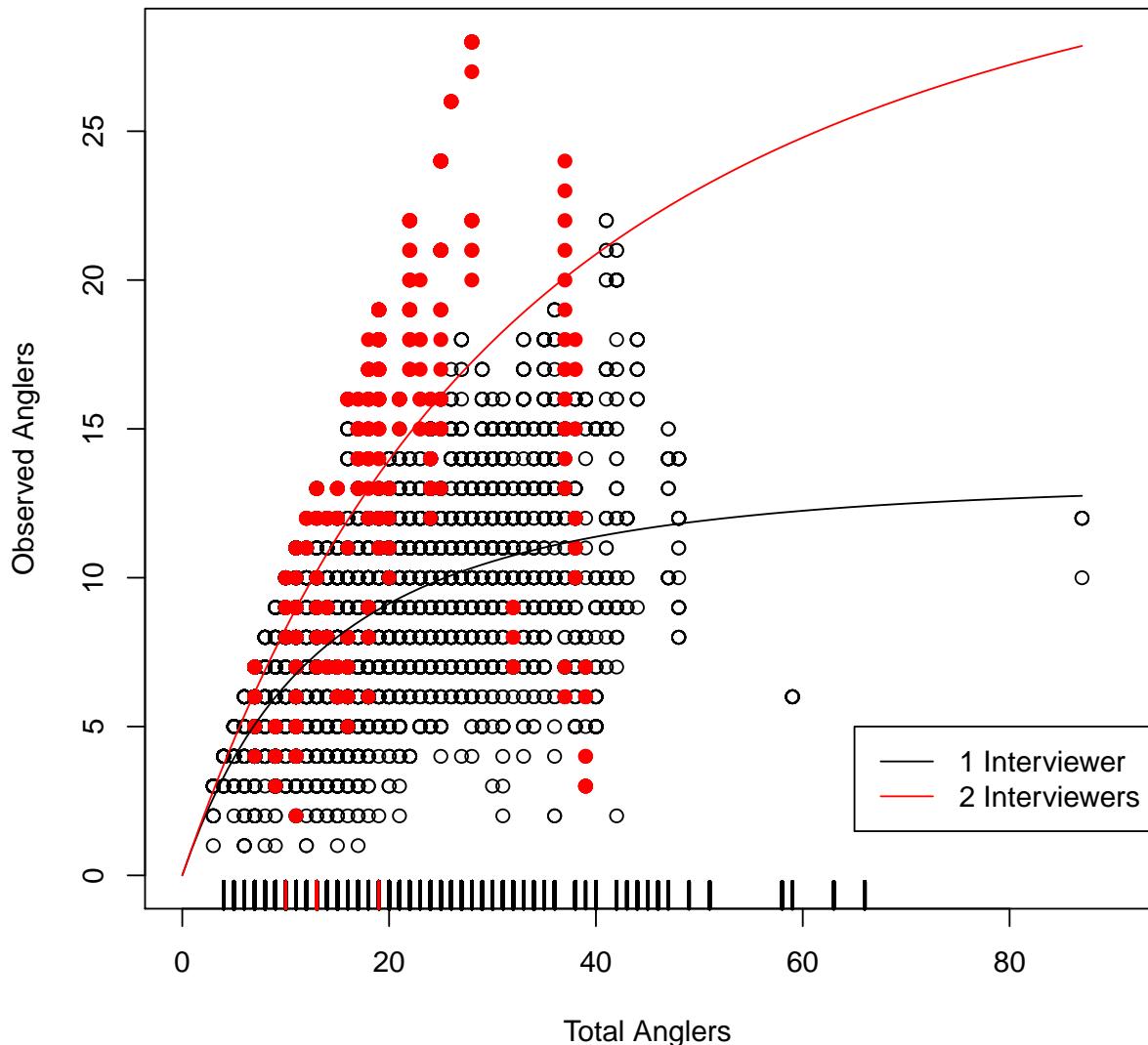


Figure E2: The number of observed anglers plotted as a function of the number of total anglers. The binomial mean curves are plotted on the scale of the data, and colored to indicate if the data was collected in the presence of one or two interviewers. Additionally, a total anglers rug plot is included to show the total angler data for which the number of observed anglers needs to be imputed.

10358 **Appendix F. Reef Delineation and Drift Selection**  
10359 **Methodologies**

10360 **Reef Delineation** We identified reefs as potential habitat for China rockfish in California,  
10361 Oregon and Washington using a variety of newly available spatial data sources, including 2,  
10362 3 and 5 m bathymetry, substrate, lithology and Habitat Suitability geodatabases. Available  
10363 data sources varied by latitude. To delineate reefs from Point Conception to the Oregon  
10364 border we used a 2 m binary raster layer (3 m for Cordell Bank) for substrate, where 1 =  
10365 rough, and 0 = smooth habitat (California Seafloor Mapping Project, data available from:  
10366 <http://seafloor.otterlabs.org/index.html>). Rough and smooth substrate was identified by  
10367 CSMP using 2 rugosity indices based upon bathymetric data, surface:planar area (SA:PA),  
10368 and vector ruggedness measure (VRM). We considered areas identified as ‘rough’ as reef  
10369 habitat. For reefs named Asilomar, Cypress Point, Portuguese Ledge, and Point Joe only a  
10370 portion of the reefs were mapped at the 2 m resolution, therefore to identify the remaining  
10371 reef, we used either a 5 m resolution VRM dataset, where the VRM cutoff was greater than  
10372 0.001 (Young et al. 2010). For all reefs derived from either 2 m, 3 m or 5 m resolution,  
10373 we applied a 5 m buffer around each reef habitat for potential error in positional accuracy  
10374 and all reefs with an area greater than or equal to 100 m<sup>2</sup> were included. We identified  
10375 seven reefs outside of the 2 m layer that contained a significant number of CPFV points,  
10376 which we decided to include in the indices. Big Reef, Blunts Reef, Isle of St. James, Point  
10377 Sur Deep, Sandhill Ledge, portions of San Gregario and Soap Bank reefs were located just  
10378 outside of 2 m, 3 m and 5 m ‘footprint’, therefore for these reefs we used the 2005 Habitat  
10379 Suitability Probability (HSP) geodatabase for China rockfish (NMFS 2005). The HSP is a  
10380 modeled output from Essential Fish Habitat geodatabase and is based upon habitat data,  
10381 depth, and location, where input data are NMFS trawl datasets. In order to identify reef  
10382 habitats from the Oregon border to Washington, we used a lithology shapefile (Goldfinger et  
10383 al. 2014) that was based upon multiple seafloor mapping surveys including multibeam and  
10384 sidescan sonar, sediment grab and core samples, and images. Seafloor types were classified  
10385 according to established classification schemes (Greene et al. 1999). We considered the  
10386 following lithology types as ‘reef habitat:’ Boulder, cobble, cobble mix, hard, rock, and rock  
10387 mix. All spatial data was projected to NAD 1983 UTM Zone 10.

10388 Reef systems were grouped and stratified by depth at a spatial scale biologically meaningful  
10389 to China rockfish. China rockfish are typically sedentary and have high site fidelity,  
10390 therefore we grouped reefs in consideration of how a China rockfish would experience its sur-  
10391 roundings. Lea (1999) recaptured China rockfish in the same general location as where they  
10392 were released, however a few individuals of other rockfish species (copper (*Sebastodes caurinus*),  
10393 gopher (*Sebastodes carnatus*), olive (*Sebastodes serranoides*) and yellowtail (*Sebastodes flavidus*))  
10394 demonstrated movement up to 1.5 nautical miles (about 2,700 m), but all were captured  
10395 within the same reef system. In the Puget Sound copper, brown and quillback were found  
10396 to have a home range less than 30m<sup>2</sup> in high relief rocky areas (Matthews 1990). In other  
10397 rockfish movement studies, China rockfish were tagged but never recaptured, or there was a

10398 sample size of 1 (Hannah and Rankin 2011), Hannah 2012). Using this limited information,  
 10399 we considered that China rockfish would swim no more than 200 m over smooth, sand, or  
 10400 muddy habitat to a neighboring reef, therefore if a reef was greater than ~200 m from rocky  
 10401 reef habitat it was considered a different reef system. If a reef system has contiguous habitat  
 10402 (no channels greater than 200 m) it remained intact, no matter how large the reef (Figures  
 10403 F1 and F2). A small number of reefs were merged into ‘super reefs’ to accommodate 1980s-  
 10404 1990s CDFW location codes that overlapped multiple reefs [ . Reef areas were calculated  
 10405 using the zonal stats tool in ArcGIS, stratified by the depth bins 0-19 m, 20-39 m, 40-59 m,  
 10406 60-79 m, 80-99 m and greater than 100 m using the CSMP depth raster (2 m, 3 m or 5 m  
 10407 resolution). To get depths for those reefs outside the CSMP ‘footprint’ we used the NOAA  
 10408 Coastal Relief Model raster dataset (90 m) for California, and 100 m digital elevation model  
 10409 (DEM) bathymetry from the Active Tectonics and Seafloor Mapping Lab for Oregon.

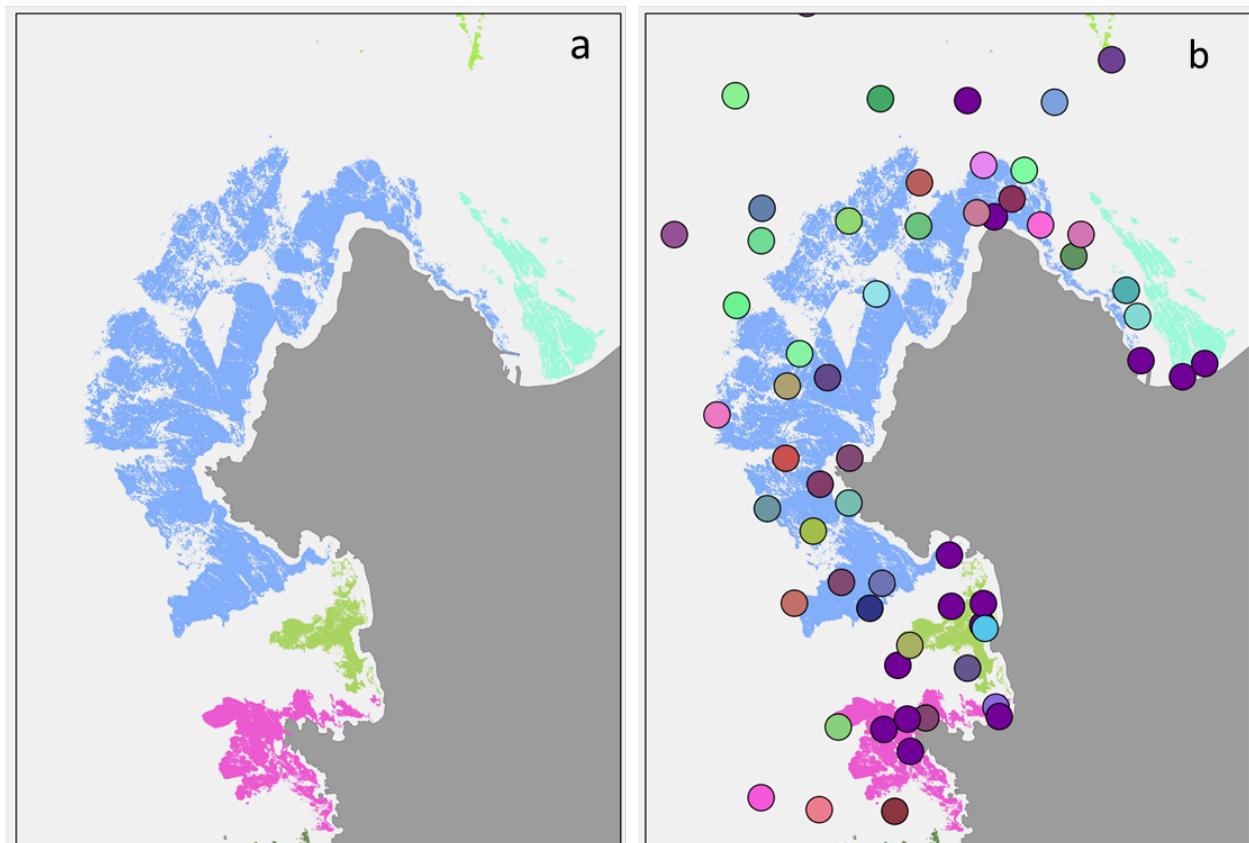


Figure F1: Map of the reefs near the Monterey peninsula in CA (a) and overlaid with the fishing location codes from the CDFW 1987-1998 onboard observer program. All fishing locations follow the confidentiality guidelines and were fished by at least three vessels during the study. Note that the size of the fishing location points does not reflect the area fished.

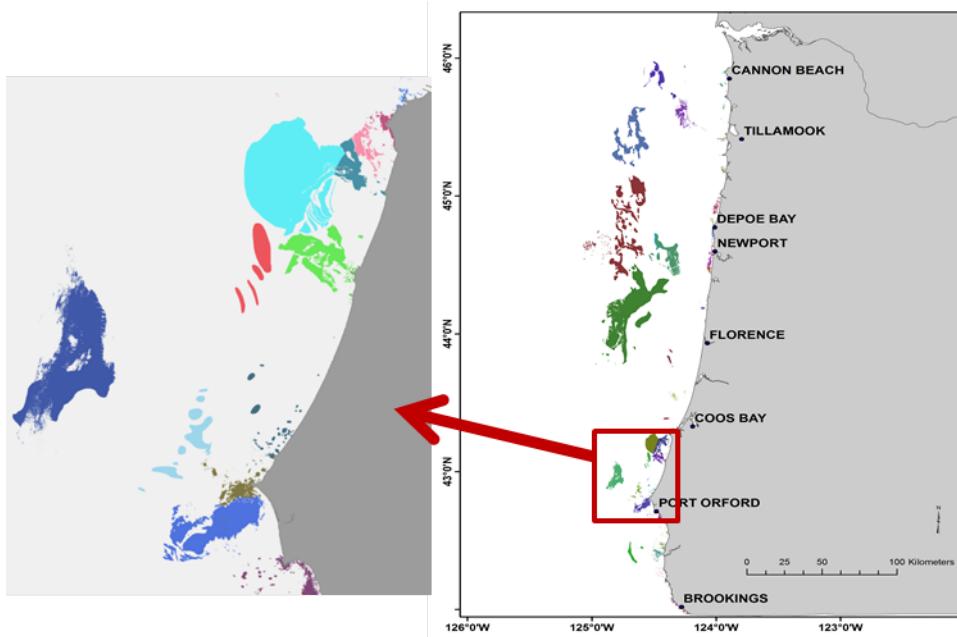


Figure F2: Example of the reefs in Oregon.

10410 Regions were designated to gain appropriate sample sizes needed for modelling. For Oregon,  
 10411 region differences north and south of Florence were explored. In California, 12 regions north  
 10412 of Pt. Conception were defined as follows:

- 10413 Region 1: Pt. Conception to Pt. Arguello
- 10414 Region 2: Purisima Point to Pt. Sal
- 10415 Region 3: San Luis Obispo Bay to Mill Creek ( $39.959^{\circ}$  N)
- 10416 Region 4: Lopez Point to Monterey Peninsula
- 10417 Region 5: Moss Landing to San Francisco Bay
- 10418 Region 6: Farallon Islands
- 10419 Region 7: Point Bonita to Drakes Bay
- 10420 Region 8: Point Reyes to Point Arena
- 10421 Region 9: Point Arena to south of Ten Mile River
- 10422 Region 10: north of Ten Mile River to Cape Mendocino ( $40.16667^{\circ}$  N)
- 10423 Region 11: Cape Mendocino to Eel River
- 10424 Region 12: Trinidad Head to CA/OR border

10425 **CPFV drift selection** During the 1987-1998 CDFW onboard observer program, fishing  
 10426 location was recorded as one of 459 location codes. When available, the observer also recorded  
 10427 coordinates, either latitude/longitude or Loran. The SWFSC converted all Loran coordinates  
 10428 to latitude/longitude. Using the fishing stops with available coordinates, we assigned a  
 10429 fishing location code to a reef. A handful of fishing location codes were obviously not  
 10430 associated with a reef, or a reef as identified in the above methods, and were not selected in  
 10431 the final dataset. If the coordinates spanned two reefs and we were unable to tell which reef

10432 was consistently fished for a given location code, we created aggregated the reefs. This most  
10433 commonly occurred around the Monterey Bay peninsula. This was necessary as two-thirds  
10434 of the fishing stops encountering China rockfish had no recorded coordinates and allowed  
10435 us to retain all fishing location data. Therefore, for the 1987-1998 CDFW data, any fishing  
10436 location that was assigned to a reef was included in the analyses as one of the filters applied  
10437 to the data.

10438 For each CPFV location in the California 1999-2014 and Oregon 2001-2014 data we calcu-  
10439 lated depth, nearest reef, distance from reef, nearest MPA, distance from MPA using ArcGIS.  
10440 Geoprocessing steps used were ‘near’ and ‘extract values to points.’ For consistency across  
10441 databases, we used the starting location of the drift to determine if the drift was targeting  
10442 fish associated with a reef. Drifts that had a distance of 0 m, i.e., were fishing directly on the  
10443 reef, were included in analyses. Recognizing that some drifts begin adjacent to a reef with  
10444 the intention of drifting on to the reef, as well as the fact that the starting location may not  
10445 be recorded at the very start of a drift, we devised a method for including drifts within a  
10446 certain distance of a reef.

10447 We compiled a list of rockfish species that are strictly reef associated (black and yellow rock-  
10448 fish (*Sebastodes chrysomelas*), canary rockfish (*Sebastodes pinniger*), China rockfish (*Sebastodes*  
10449 *nebulosus*), cowcod (*Sebastodes levis*), flag rockfish (*Sebastodes rubrivinctus*), gopher rockfish  
10450 (*Sebastodes carnatus*), grass rockfish (*Sebastodes rastrelliger*), greenblotched rockfish (*Sebastodes*  
10451 *rosenblatti*), kelp rockfish (*Sebastodes atrovirens*), quillback rockfish (*Sebastodes maliger*), rosy  
10452 rockfish (*Sebastodes rosaceus*), starry rockfish (*Sebastodes constellatus*), Treefish (*Sebastodes serri-*  
10453 *ceps*), vermillion rockfish (*Sebastodes miniatus*), yelloweye rockfish (*Sebastodes ruberrimus*)) (per-  
10454 sonal communication John Field and Tom Laidig, NMFS SWFSC). Using drifts that were  
10455 greater than 0m from a reef and encountered one at least one of the fifteen species listed  
10456 above, we calculated the depth for which 75% of the drifts were included. For Oregon this  
10457 was 83 m, and for California it was 34 m for drifts within the ‘footprint’ and 141 m for drifts  
10458 outside the ‘footprint.’ Any drift (with or without catch) greater than 83 m from a reef was  
10459 excluded from the analyses.

## **10460 Appendix G. Commercial Regulations Histories**

### **10461 Federal waters**

**10462** For a list of the commercial regulations in federal waters see the [Commercial Regulations Home Page](#), which is housed in the CALCOM database.

### **10464 Washington**

**10465** The following commercial regulations pertain to China rockfish species in Washington and  
**10466** were provided by the Washington Department of Fish and Wildlife.

### **10467 2008**

**10468** The groundfish trawl fishery was closed in Washington from the seaward RCA boundary  
**10469** to the shore north of 48°10' N latitude to address increased encounters with yelloweye  
**10470** and canary rockfish

### **10471 2002**

**10472** Non-Trawl RCA closed from shore to 100 fm north of 46°16' N latitude

### **10473 1995**

**10474** Commercial hook-and-line fishing in state waters (0-3 miles) was closed to preserve  
**10475** recreational fishing opportunities and avoid localized depletion; trawlers included in  
**10476** 1999

### **10477 1992**

**10478** Commercial hook-and-line limits reduced to 100 lbs north of Cape Alava and from  
**10479** Destruction Island to Leadbetter Pt.

### **10480 Oregon**

**10481** The following commercial regulations pertain to China rockfish in Oregon and were provided  
**10482** by the Oregon Department of Fish and Wildlife.

**10483** China rockfish are managed in the Other Nearshore Rockfish complex

**10484** **Harvest cap:** Total amount in regulation allowed to be impacted in a fishery (for a given  
**10485** season) including both discard mortality and landed catch mortality. Prior to 2007 this term  
**10486** was synonymous with “landing cap.”

**10487** **Landing cap:** Total amount in regulation allowed to be landed in a fishery (for a given  
**10488** season). Includes only landed catch mortality (known as a harvest cap before 2007).

### **10489 Incidental Catch Limits in Other Fisheries (established in 2004)**

**10490** **Non-permitted vessels:** 15 lbs per day of black rockfish, blue rockfish, and nearshore fish,  
**10491** combined, for no more than one landing per day. These species must make-up 25% or less  
**10492** of landed poundage, and must be taken with gear legal in the permitted fishery.

10493 **Groundfish trawl fishery:** Vessels may land no more than 1,000 lbs of dead black rockfish,  
10494 blue rockfish, and nearshore fish combined per calendar year if these species make-up 25%  
10495 or less of landing.

10496 **Non-profit aquaria or vessels contracted by non-profit aquaria** may land black  
10497 rockfish, blue rockfish, and nearshore fish for purposes of display or for conducting research  
10498 on these species.

10499 **Regulations History**

10500 A minimum size limit of 12 inches (measured from the tip of the snout to the extreme end  
10501 of the tail) was implemented for China rockfish in 2000. A sorting requirement for China  
10502 rockfish was implemented in 2003.

10503 **2014**

10504 Other Nearshore Rockfish landing cap: 14.3 mt

10505 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10506 Rockfish Conservation Area: fishing restricted to inside 30 fm

10507 **2013**

10508 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-  
10509 fishes)

10510 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10511 Legal Gear Types: hook-and-line (including pole and line, troll, longline, and stick  
10512 gear) and pot gear (max 35 pots) if a Developmental Fisheries permit for Nearshore  
10513 species using pot gear was issued in 2003

10514 Rockfish Conservation Area: fishing restricted to inside 30 fm

10515 **2012**

10516 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-  
10517 fishes)

10518 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10519 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted  
10520 to inside 20 fm from 42° – 43° N

10521 **2011**

10522 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-  
10523 fishes)

10524 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10525 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted  
10526 to inside 20 fm from 42° – 43° N

- 10527 **2010**
- 10528 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-fishes)
- 10529
- 10530 Other Nearshore Rockfish Period Limits: All Periods 700 lbs
- 10531 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted to inside 20 fm from 42° – 43° N
- 10532
- 10533 **2009**
- 10534 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-fishes)
- 10535
- 10536 Other Nearshore Rockfish Period Limits: All Periods 700 lbs
- 10537 Legal Gear Types: hook-and-line (including pole and line, troll, longline, and stick gear) and pot gear (max 35 pots) if a Developmental Fisheries permit for Nearshore species using pot gear was issued in 2003
- 10538
- 10539
- 10540 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted to inside 20 fm from 42° – 43° N
- 10541
- 10542 **2008**
- 10543 Other Nearshore Rockfish landing cap: 12.0 mt (excluding tiger and vermillion rock-fishes)
- 10544
- 10545 Other Nearshore Rockfish Period Limits: All Periods 700 lbs
- 10546 Sorting Requirement for All Nearshore Rockfish to Species: first year of all nearshore rockfish recorded to species on commercial fish tickets
- 10547
- 10548 Rockfish Conservation Area: fishing restricted to inside 30 fm
- 10549 **2007**
- 10550 First year of commercial landing caps (formerly known as harvest caps)
- 10551 Other Nearshore Rockfish landing cap: 12.0 mt (excluding tiger and vermillion rock-fishes)
- 10552
- 10553 Other Nearshore Rockfish Period Limits: All Periods 600 lbs
- 10554 Rockfish Conservation Area: fishing restricted to inside 30 fm
- 10555 9/1: Other Nearshore Rockfish changes: Period 5 increase to 700 lbs; Period 6 increase to 700 lbs
- 10556
- 10557 11/28: Other Nearshore Rockfish change: Period 6 closed
- 10558 **2006**
- 10559 First and only year with 1-month trip limits
- 10560 Other Nearshore Rockfish harvest cap: 13.5 mt (including tiger and vermillion rock-fishes)
- 10561

- 10562 Other Nearshore Rockfish 1-month Period Limits: All Periods 200 lbs per month  
10563 Rockfish Conservation Area: fishing restricted to inside 30 fm  
10564 7/1: Other Nearshore Rockfish change: July increase to 300 lbs  
10565 8/11: Other Nearshore Rockfish changes: increase to 350 lbs per month for all remain-  
10566 ing months
- 2005**
- 10567 Other Nearshore Rockfish harvest cap: 12.0 mt 16.0 mt (excluding tiger and vermillion  
10568 rockfishes, 13.5 mt including these fish)  
10569 Other Nearshore Rockfish Period Limits (Sub-limit from black and blue Rockfish trip  
10570 limits): (includes tiger and vermillion rockfishes, sublimit of black and blue Rockfish  
10571 limit): All Periods: 450 lbs  
10572 Rockfish Conservation Area: fishing restricted to inside 30 fm  
10573 5/1: Other Nearshore Rockfish changes: Periods 3 thru 5 decrease to 325 lbs  
10574 10/11: Other Nearshore Rockfish changes: Period 5 and 6 increase to 400 lbs
- 2004**
- 10575 Permit required for vessels to land black and blue rockfishes and other nearshore fish  
10576 identified in House Bill 3108  
10577 Nearshore logbook required for all vessels participating in the fishery  
10578 ODFW allowed to prescribe legal gear under this permit except: 1. Diving gear may not  
10579 be used 2. Pots may not be used unless a vessel was previously issued a pot endorsement  
10580 in the Interim Nearshore Fisheries Plan through the Developmental Fisheries Program  
10581 during 2003  
10582 Other Nearshore Rockfish harvest cap: 16.0 mt (including tiger and vermillion rock-  
10583 fishes)  
10584 Other Nearshore Rockfish 1-month Period Limits (Sub-limit from black and blue Rock-  
10585 fish trip limits): (includes tiger and vermillion Rockfish), All Periods: 450 lbs  
10586 Rockfish Conservation Area: fishing restricted to inside 30 fm  
10587 9/28: Other Nearshore Rockfish change: Period 5 decrease to 100 lbs  
10588 11/1: Other Nearshore Rockfish change: Period 6 closed
- 2003**
- 10589 Commercial Nearshore Fishery (21 nearshore species) placed in the Developmental  
10590 Fisheries Program  
10591 House Bill 3108 establishes formal management of the commercial nearshore fishery,  
10592 comprised of landings of species on the 'nearshore fish' list beginning, January 1, 2004  
10593 Oregon Fish and Wildlife Commission first establishes harvest caps for nearshore  
10594 species: Other Nearshore Rockfish harvest cap: 21.3 mt  
10595

10598 Bi-monthly trip limits first put into place mid-season (July 16th) in 2003  
10599 Other Nearshore Rockfish (Sub-limit from black and blue rockfish): All periods 300  
10600 lbs  
10601 Rockfish Conservation Area: fishing restricted to inside 27 fm from January – October

10602 **2002**

10603 In October, the Pacific Fishery Management Council adopted conservative harvest  
10604 limits for 2003 equal to landings from 2000  
10605 Oregon Fish and Wildlife Commission directs the Marine Resources Program to eval-  
10606 uate a harvest reduction equal to or greater than 20  
10607 Interim commercial harvest management plan implemented place a cap on fishery par-  
10608 ticipants and reduced the nearshore fleet by 50  
10609 National Marine Fishery Service begins collecting fishery-dependent data at-sea from  
10610 vessels participating in the fishery

10611 **2000**

10612 Pacific City Open Access Minor Nearshore Rockfish Limit (including black and blue  
10613 rockfish here): May 1 - September 30 limit 2,200 lbs per month of which no more than  
10614 700 lbs can be rockfish other than black and blue rockfishes

10615 **1997**

10616 New live fish markets in California accelerate growth of the Commercial Nearshore  
10617 Fishery

10618 **Early to mid 1990s**

10619 Commercial Nearshore Fishery develops as an open access fishery

10620 **California**

10621 The following commercial regulations pertain to China rockfish species in California and  
10622 were provided by the California Department of Fish and Wildlife. There has been a 12 inch  
10623 minimum size limit on China rockfish since 2001.

10624 **Gear Restrictions**

10625 **2001**

10626 hook-and-line limited to 150 hooks with 15 hooks per line within 1 mile of shore

10627 **1996**

10628 Finfish trap permit required

- <sup>10629</sup> **1994**  
<sup>10630</sup> Proposition 132 implemented to prohibit gill nets within state waters
- <sup>10631</sup> **1953**  
<sup>10632</sup> Legislation prohibits trawl within 3 miles of shore
- <sup>10633</sup> **Trip Limits and Depth Restrictions**
- <sup>10634</sup> Trips limits now vary according to constraints from bycatch of canary and yelloweye rock-fishes
- <sup>10635</sup>
- <sup>10636</sup> **2003**  
<sup>10637</sup> A shallow nearshore permit is needed in 4 management regions  
<sup>10638</sup> Trip limits for restricted access fishery, with differential trip limits north and south of  
<sup>10639</sup> 40°10' N  
<sup>10640</sup> Subject to depth restrictions consistent with the shoreward non-trawl RCA
- <sup>10641</sup> **2002**  
<sup>10642</sup> Closed all waters January and February south of 34°27' N  
<sup>10643</sup> Closed all waters March and April between 40°10' N and 34°27' N March-April
- <sup>10644</sup> **2001**  
<sup>10645</sup> Closed January and February outside of 20 fm south of 34°27' N  
<sup>10646</sup> Closed March and April all waters between 40°10' N and 34°27' N
- <sup>10647</sup> **2000**  
<sup>10648</sup> Closed January and February south of 36° N  
<sup>10649</sup> Closed March and April between 40°10' N and 36° N
- <sup>10650</sup> **1999**  
<sup>10651</sup> Nearshore fishery permit required
- <sup>10652</sup> **1994**  
<sup>10653</sup> Limited entry permits and open access fishery established for *Sebastodes* complex  
<sup>10654</sup> Limited entry and open access trip limits on the *Sebastodes* complex
- <sup>10655</sup> **Nearshore Fishery Bycatch Permit** This special non-transferable permit is issued as of  
<sup>10656</sup> 2003 to those qualifying individuals who use either trawl or entangling nets (gill nets). It  
<sup>10657</sup> allows a minimal bycatch of minor nearshore species (which includes China rockfish) as per  
<sup>10658</sup> the following:  
<sup>10659</sup> South Central Coast Region 25 pounds of nearshore fish stocks may be taken per trip  
<sup>10660</sup> South Coast Region – 50 pounds of nearshore fish stocks may be taken per trip  
<sup>10661</sup> No permits are issued for either the North Coast or North-Central Coast Regions.

**10662 Appendix H. Recreational Regulations Histories**

**10663 Washington**

**10664** The following recreational regulations pertain to nearshore rockfish species in Washington  
**10665** and were provided by the Washington Department of Fish and Wildlife. The sport regula-  
**10666** tions run from 1 May to 30 April the following year. Depth restrictions were implemented  
**10667** late in the summer of 2005 by emergency rule and became permanent in 2006.

**10668 North Coast (MCA 3 and 4)**

**10669 2014-2013**

**10670** May 1 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms except  
**10671** lingcod; Pacific cod and sablefish on days open to halibut fishing

**10672 2012-2011**

**10673** June 1 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms, except on  
**10674** days open to halibut fishing

**10675 2010-2009**

**10676** May 21 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms except on  
**10677** days open to halibut fishing

**10678 2008-2007**

**10679** May 21 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms

**10680 2006**

**10681** May 21 - Sept 30: Rockfish and lingcod retention is prohibited seaward of 20 fathoms

**10682 South Coast (MCA 2)**

**10683 2014-2013**

**10684** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms except  
**10685** rockfish; Pacific cod and sablefish allowed May 1 June 15; lingcod allowed on days  
**10686** open to halibut

**10687 2012-2011**

**10688** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms except  
**10689** rockfish; Pacific cod and sablefish allowed May 1 June 15; lingcod allowed on days  
**10690** open to halibut

**10691 2010-2009**

**10692** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms; Pacific  
**10693** cod and sablefish allowed May 1 June 15

**10694 2008-2007**

**10695** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms; Pacific  
**10696** cod and sablefish allowed May 1 June 15

**10697 2006**

**10698** March 18 - June 15: Rockfish and lingcod retention is prohibited seaward of 30 fathoms

**10699 Columbia River (MCA 1)** This area has no depth restriction.

**10700 2014-2006**

**10701** Year-round: No groundfish except Pacific cod and sablefish allowed with halibut on  
**10702** board

**10703 Daily Groundfish and Rockfish Limits**

**10704** Groundfish includes: rockfish, Pacific cod, flatfish (except halibut), lingcod, ratfish, sablefish,  
**10705** cabezon, greenling, sculpins, sharks, skates, and surfperch excluding shiner perch. There are  
**10706** sub-bag limits for lingcod (2) coastwide and cabezon (1) in Marine Area 4. The groundfish  
**10707** daily bag limit in Marine Area 4B was reduced to 10 in 2011.

**10708** Groundfish Daily Limits

**10709 2015-2011:** 12 fish

**10710 2010-1961:** 15 fish

**10711 1960-1938:** 20 lbs/day

**10712** Rockfish Daily Limits

**10713** There is no minimum size limit for rockfish. Marine Area 4B bag limit allows retention of 6  
**10714** blue and black rockfish only (2010-2015).

**10715 2015-1995:** 10 fish

**10716 1994-1992:** 12 fish

**10717 1991-1961:** 15 fish

**10718 1960-1954:** 20 lb/day

**10719 Oregon**

**10720** The following regulations pertain to nearshore rockfish species in Oregon and were provided  
**10721** by the Oregon Department of Fish and Wildlife. There were no bag limits prior to 1976.  
**10722** Gear restrictions have remained the same for all years, i.e., three hooks.

- 2015**
- All rockfish, greenlings, Cabezon, skates, and other marine fish species not listed in the 2015 Oregon Sport Fishing Regulations in the Marine Zone: 7-fish daily bag limit in aggregate, of which no more than three may be blue rockfish and no more than one may be a Cabezon (when Cabezon is open), and no more than one may be a canary rockfish.
- Retention of Yelloweye, Canary, China, Copper and Quillback rockfish is prohibited.
- 2014 - 2013**
- Same a 2012
- 2012**
- Rockfish, Cabezon, greenlings (10" min.), and other marine species not listed under Marine Zone in the Oregon Sport Fishing Regulations: 7 daily in aggregate of which no more than 1 may be a Cabezon April 1 – Sept. 30.
- 30-fathom curve: Seaward closed April 1-Sept. 30 [for groundfish group].
- 2011**
- Rockfish, Cabezon, greenling (10" min.), and other marine species not listed under Marine Zone in the Oregon Sport Fishing Regulations: 7 daily in aggregate of which no more than 1 may be a Cabezon April 1 – Sept. 30
- 40-fm curve: Seaward closed April 1-Sept. 30
- 7/21: Offshore of 20-fm line closed due to yelloweye rockfish impacts
- 8/13: Groundfish retention with nearshore halibut (central coast) prohibited
- 10/1: All depths reopened for groundfish (yelloweye rockfish impacts sufficiently slowed); Groundfish retention with nearshore halibut allowed again
- 2010**
- Same as 2009 including "rockfish" et al bag limit: 7 (misprinted in regulations booklet as 6)
- Definition of "groundfish group" added
- 7/24: Offshore of 20-fm line closed through Dec. 31 due to yelloweye rockfish impacts
- 2009**
- Same as 2008 through April 30 (adopted late), then increase in "marine fish" bag limit
- Rockfish, Cabezon, greenling (10" min.), and other marine species not listed: 6
- 40-fm curve: Seaward closed April 1-Sept. 30
- 5/1: "Rockfish" et al. bag limit increased to 7 (in permanent rule)

**2008**

10756 Same as 2007

10758 7/7: "Rockfish" et al bag limit reduced from 6 to 5 and closed outside 20-fm line through Dec. 31 [sic – see 9/7 change] and flatfish closed outside 40-fm line through Dec. 31 [sic]

10761 9/7: Return to preseason regs., i.e., "rockfish" et al bag limit back to 6 and waters closed offshore of 40-fm line only through Sept. 30 (open offshore Oct-Dec)

**2007**

10764 Rockfish, Cabezon, greenling (10" min.), and other marine species not listed: 6

10765 40-fm curve: Seaward closed April 1-Sept. 30

**2006**

10767 Rockfish, Cabezon, greenling (10" min.), flounder, sole and other marine species not listed: 6

10769 40-fm curve: Seaward closed June 1-Sept. 30

**2005**

10771 Rockfish, Cabezon, greenling (10" min.), flounder, sole and other marine species not listed: 8

10773 40-fm curve: Seaward closed June 1-Sept. 30

10774 7/16: Rockfish et al. bag limit reduced to 5

10775 10/18: Black RF prohibited for boats, Groundfish closed seaward of 40 fm

**2004**

10777 Rockfish, Cabezon, greenling (10" min.), flounder, sole and other marine species not listed: 10, no more than 1 P. Halibut

10779 Retention of yelloweye rockfish and canary rockfish prohibited

10780 40-fm curve: Seaward closed June 1-Sept. 30

10781 9/3: Rockfish, lingcod and greenling prohibited

**2003**

10783 Rockfish, Cabezon, greenling, flounder, sole and other marine species not listed: 10, no more than 1 Canary RF, 1 Yelloweye RF and 1 P. Halibut

10785 11/21: ocean closed to GF outside 27-fm line

**2002**

10787 Rockfish: 10, no more than 1 Canary RF and 1 Yelloweye RF

**2001**

10789 Rockfish: 10, no more than 1 Canary RF

**10790 2000**

**10791** Rockfish: 10, no more than 3 canary RF

**10792 1999-1994**

**10793** Rockfish: 15, no more than 10 black rockfish

**10794 1993-1986**

**10795** Rockfish, Cabezon and greenling: 15

**10796 1985-1979**

**10797** Other fish: 25, no more than 3 lingcod, 2 halibut and 15 rockfish/Cabezon/greenling

**10798 1978**

**10799** Other fish: 10 Then effective 4/1 = - other fish: 25, no more than 3 lingcod, 2 halibut  
**10800** and 15 rockfish/Cabezon/greenling

**10801 1977**

**10802** Other fish: 25, no more than 5 lingcod and 2 halibut

**10803 1976**

**10804** Other fish: 25

**10805 California**

**10806** The following regulations pertain to nearshore rockfish species in Oregon and were provided  
**10807** by the California Department of Fish and Wildlife. In 2000, a 3-hook and 1-line gear re-  
**10808** striction was enacted. As of 2001, the gear restriction is 2-hooks and 1-line per angler. The  
**10809** general rockfish (Rockfish/Cabezon/Greenling as of 2002) bag limit was 15 fish statewide  
**10810** in 1999. As of 2000, it is 10 rockfish. The nearshore rockfish bag limit is the same as the  
**10811** general rockfish bag limit except in 2003 and 2004. In 2003, the nearshore rockfish bag limit  
**10812** was 2 fish south of Cape Mendocino in 2003 and for a portion of 2004.



## CDFW Recreational Season Lengths and Depth Restrictions for Select California Groundfish (1999-2014)



The following are summarized recreational season and depth limit regulations for select California groundfish from 1999 through 2014, including most inseason changes. Information was compiled from California's sport fishing booklet and supplemental booklets, as well as some emergency rulemakings.

Nearshore rockfish is defined as: black, black-and-yellow, blue, brown, calico, China, copper, gopher, grass, kelp, olive, quillback, and treefish rockfishes.

Shelf rockfish is defined as: bocaccio, canary, cowcod, widow, yelloweye, yellowtail, shortbelly, bronzespotted, chameleon, chilipepper, dwarf-red, flag, freckled, greenblotched, greenspotted, greenstriped, halfbanded, honeycomb, Mexican, pink, pinkrose, pygmy, redstripe, rosethorn, rosy, silvergrey, speckled, squarespot, starry, striptail, swordspine, tiger, and vermillion rockfishes.

**Key:**

	Allowed in all waters		
20	Depth closed greater than 20fm		
30	Depth closed greater than 30fm		
40	Depth closed greater than 40fm		
50	Depth closed greater than 50fm		
60	Depth closed greater than 60fm		
30-60	Depth open between 30-60fm		
	Closed	depth	In-season change
			In-season closure

### CALIFORNIA RECREATIONAL REGULATORY HISTORY, 1999

Statewide

California/Oregon Border to California/Mexico border

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish, Lingcod, Sanddabs												

### CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2000

Northern Management Area

California/Oregon Border to Near Cape Mendocino (40° 10' N lat.)

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean Whitefish, Shelf rockfish												
Lingcod'												
Sanddabs												

Central Management Area

Near Cape Mendocino (40° 10' N lat.) to Lopez Point (36° 00' N lat.)

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean Whitefish												
Nearshore rockfish, Shelf rockfish												
Lingcod'												
Sanddabs												

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Figure H2

**Southern Management Area**  
**Lopez Point (36° 00' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish												
Nearshore rockfish, Shelf rockfish												
Lingcod <sup>1</sup>												
Sanddabs												

**Notes for 2000:**

1. Statewide emergency lingcod closure in November and December; closure did not apply to shore-based anglers.

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2001**

**Northern Management Area<sup>1, 2, 3</sup>**  
**California/Oregon Border to Near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), & Ocean whitefish												
Shelf rockfish <sup>3</sup> , Lingcod <sup>3</sup>												
Sanddabs												

**Central Management Area<sup>1, 2, 3</sup>**  
**Near Cape Mendocino (40° 10' N lat.) to Point Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish					20	20					20	20
California sheephead, Ocean whitefish												
Cabezon, Greenlings (rock, kelp)											20	20
Shelf rockfish <sup>3</sup> , Lingcod <sup>3</sup>												
Sanddabs												

**Southern Management Area<sup>1, 2, 3</sup>**  
**Point Conception (34° 27' N lat.) to the U.S./Mexico border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish											20	20
California scorpionfish, Ocean whitefish	20	20									20	20
California sheephead												
Cabezon, Greenlings (rock, kelp)											20	20
Shelf rockfish <sup>3</sup> , Lingcod <sup>3</sup>												
Sanddabs												

**Notes for 2001:**

1. Emergency action was taken by the Commission in order to conform to federal regulations; closures did not apply to shore-based anglers.
2. Inseason emergency closure on October 29 prohibited angling for shelf and slope rockfishes and lingcod. Possession of these fishes was prohibited in state waters. In waters less than 20 fathoms, fishing for nearshore rockfishes, California scorpionfish, cabezon, and greenlings continued to be permitted (including waters around offshore rocks and islands less than 20 fathoms). Fishing for California sheephead continued to be permitted in all waters except the Cowcod Conservation Areas.
3. On January 1, 2000 the California Fish and Game Commission adopted regulations to be effective through 2002 that closed lingcod, nearshore, and shelf rockfishes as follows: south of Lopez Point to the Mexico border Jan. - Feb.; and north of Lopez Point to Cape Mendocino Mar. - Apr. New regulations that superceded the regulations adopted January 1, 2000 went into effect Mar. 5, 2001. These new regulations included a different regional management boundary between the central and southern management areas – Point Conception instead of Lopez Point. Because of the delay in implementation (March instead of January), the area between Lopez Point and Point Conception was closed from Jan. 1 - Feb. 28, 2001 (as part of the southern area under the 2000 regulations). This area then was open to fishing from March

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Figure H3

1- 4, 2001 (as part of the 2000 open fishing period for the southern area). However, once the 2001 regulations took effect on Mar. 5, 2001, this section of coast was closed again from Mar. 5 – Apr. 30 (as part of the central area under the 2001 regulations).

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## CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2002

### Northern Management Area<sup>1, 2, 3</sup> California/Oregon Border to near Cape Mendocino (40° 10' N lat.)

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, Ocean whitefish, Shelf rockfish, Lingcod												
California sheephead <sup>1</sup>												
Cabezon <sup>1</sup>												
Greenlings (rock, kelp) <sup>1</sup>												
Sanddabs												

### Central Management Area<sup>1, 2, 3</sup> Near Cape Mendocino (40° 10' N lat.) to Point Conception (34° 27' N lat.)

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish					20	20	20	20	20	20		
California sheephead <sup>1</sup>												
Cabezon <sup>1</sup>												
Greenlings (rock, kelp) <sup>1</sup>												
Ocean whitefish <sup>2</sup>							20	20	20	20	20	20
Shelf rockfish <sup>2</sup> , Lingcod <sup>2</sup>				20	20	20	20	20	20			
Sanddabs												

### Southern Management Area<sup>1, 2, 3</sup> Point Conception (34° 27' N lat.) to the U.S./Mexico border

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish <sup>2</sup>							20	20	20	20		
California sheephead <sup>1</sup>												
Cabezon <sup>1</sup>												
Greenlings (rock, kelp) <sup>1</sup>												
Ocean whitefish <sup>2</sup>							20	20	20	20	20	20
Shelf rockfish <sup>2</sup> , Lingcod <sup>2</sup>							20	20	20	20		
Sanddabs												

#### Notes for 2002:

- Inseason emergency closure took effect for greenlings on July 1, cabezon on July 29, and California sheephead on November 1. Closures do not apply to shore-based anglers, or spearfishing from shore or a man-made structure.
  - The emergency closure for shelf rockfish, lingcod, California scorpionfish, and ocean whitefish went into effect July 1. Nearshore fishing was still allowed in waters shallower than 20 fathoms for nearshore rockfishes, California scorpionfish, and ocean whitefish. There was a special allowance for two shelf rockfish ONLY if taken incidental to nearshore fishing in less than 20 fathoms EXCLUDING bocaccio, canary, cowcod, and yelloweye rockfish, which could not be taken.
  - Management Area boundaries changed January 10, 2002.
- 

## CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2003

### Northern Management Area<sup>2, 3</sup> California/Oregon Border to near Cape Mendocino (40° 10' N lat.)

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish <sup>3</sup> , California scorpionfish <sup>2</sup>												
California sheephead <sup>2</sup> , Cabezon <sup>2</sup> , Greenlings (rock, kelp) <sup>2</sup>												
Ocean whitefish												
Shelf rockfish <sup>2</sup> , Lingcod <sup>3</sup>												
Sanddabs												

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Figure H4

**Central Management Area<sup>2,3</sup>**  
**Near Cape Mendocino (40° 10' N lat.) to Point Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
California scorpionfish <sup>3</sup>	20	20					20	20	20	20	20	
California sheephead <sup>2</sup>												
Cabezon <sup>2</sup> , Greenlings (rock, kelp) <sup>2</sup>							20	20	20			
Ocean whitefish							20	20	20	20	20	20
Nearshore rockfish <sup>3</sup> , Shelf rockfish <sup>3</sup> , Lingcod <sup>3</sup>							20	20	20	20	20	
Sanddabs												

**Southern Management Area<sup>1,2,3</sup>**  
**Point Conception (34° 27' N lat.) to the U.S./Mexico border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
California scorpionfish <sup>1,3</sup>	20	20					20	20	30	30	30	
California sheephead <sup>2</sup>												
Cabezon <sup>2</sup> , Greenlings (rock,kelp) <sup>2</sup>							20	20	30			
Ocean whitefish							20	20	30	30	30	30
Nearshore rockfish <sup>3</sup> , Shelf rockfish <sup>3</sup> , Lingcod <sup>3</sup>							20	20	30	30	30	
Sanddabs												

**Notes for 2003:**

1. Fishing for California scorpionfish was allowed in less than 50 fathoms during July and August, only in the area of Huntington Flats, as defined by California Code of Regulations, Title 14, subsection 27.82(d)(7).
2. Inseason emergency closures on October 8 for cabezon, greenlings, and California sheephead to all recreational take in all waters at all depths..
3. Inseason emergency closure on December 8 for nearshore rockfishes, California scorpionfish, shelf rockfishes, and lingcod.

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2004**

**Northern Management Area<sup>1,2</sup>**  
**California/Oregon Border to near Cape Mendocino (40°10'N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish					30	30	30	30	30	30	30	30
Black rockfish <sup>1</sup>						30	30	30				
Lingcod <sup>2</sup>					30	30	30	30	30	30		
Sanddabs												

**North-Central Management Area<sup>2,3</sup>**  
**Near Cape Mendocino (40°10'N lat.) to Lopez Point (36°00'N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish	30	30						20	20	20		
Lingcod <sup>2</sup>	30	30						20	20	20		
Sanddabs												

**South-Central Management Area<sup>2</sup>**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish	30	30			20	20		20	20	20	20	20
Lingcod <sup>2</sup>	30	30			20	20		20	20	20		
Sanddabs												

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Figure H5

**Southern Management Area<sup>2</sup>**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	30	30	60	60
California scorpionfish			60	60							60	60
Lingcod <sup>2</sup>			60	60	60	60	60	60	30	30		
Sanddabs												

**Notes for 2004:**

1. Inseason change on May 16 reduced rockfish bag limit to zero in May, and September through December.
  2. Inseason change on April 1 decreased lingcod bag limit from two to one fish and increased size limit from 24 to 30 inches.
  3. Inseason change on March 1 closed rockfish, lingcod and associated species on Cordell Bank (Marin County).
- 

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2005**

**Northern Management Area<sup>1</sup>**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish					30	30	30	30	30	30	30	30
Cabezon <sup>1</sup>					30	30	30	30	30	30	30	
Lingcod					30	30	30	30	30	30	30	
Sanddabs												

**North-Central Management Area<sup>1</sup>**  
**Near Cape Mendocino (40° 10' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish							20	20	20	20	20	20
Cabezon <sup>1</sup>							20	20	20	20	20	
Lingcod							20	20	20	20	20	
Sanddabs												

**Monterey South – Central Management Area<sup>1</sup>**  
**Pigeon Point (37° 11' N lat.) to Lopez Point (36° 00' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish							20	20	20	20	20	20
Cabezon <sup>1</sup>							20	20	20	20	20	
Lingcod							20	20	20	20	20	
Sanddabs												

**Morro Bay South – Central Management Area<sup>1</sup>**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon <sup>1</sup> , Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40			
Sanddabs												

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Figure H6

**Southern Management Area<sup>1</sup>**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Greenlings, Ocean whitefish, Shelf rockfish			30-60	60	60	60	60	60	30	30	60	60
Cabezon <sup>1</sup>										30	60	60
Lingcod			30-60	60	60	60	60	60	30	30	60	
Sanddabs				60	60	60	60	60	30	30	60	

**Notes for 2005:**

1. Inseason change on November 18 closed cabezon statewide for December.
- 

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2006**

**Northern Management Area<sup>1</sup>**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish					30	30	30	30	30	30	30	30
Lingcod					30	30	30	30	30	30	30	
Sanddabs												

**North-Central Management Area<sup>2,3</sup>**  
**Near Cape Mendocino (40° 10' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish							30	30	30	30	30	30
Lingcod							30	30	30	30	30	
Sanddabs												

**Monterey South – Central Management Area<sup>2,3</sup>**  
**Pigeon Point (37° 11' N lat.) to Lopez Point (36° 00' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish							30	30	30	30	30	30
Lingcod							30	30	30	30	30	
Sanddabs												

**Morro Bay South – Central Management Area<sup>4</sup>**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40		
Sanddabs												

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Figure H7

**Southern Management Area<sup>5,6</sup>**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean Whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	60	60
Lingcod				60	60	60	60	60	60	60	60	
Sanddabs												

**Notes for 2006:**

1. Inseason change on March 28 decreased the fishing depth limit from 40 to 30 fathoms in the Northern management area, and opened the months of November and December to recreational fishing (except for lingcod which was closed).
  2. Inseason change on March 28 kept depth limit at 20 fathoms in the North-Central and Monterey South-Central management areas, but opened December to recreational fishing (except for lingcod which was closed).
  3. Inseason change on July 1 liberated the fishing depth limit from 20 fathoms to 30 fathoms in the North-Central and Monterey South-Central management areas (except for lingcod which was closed).
  4. Inseason change on July 1 opened October to recreational fishing in the Morro Bay South-Central management area.
  5. Inseason change on March 28 allowed recreational fishing in the Southern Management area during October (with 30 fathom depth limit), November (60 fathom depth limit), and December (60 fathom depth limit), except for lingcod which was closed to all fishing.
  6. Inseason change on July 1 liberated the fishing depth limit from 30 fathoms to 60 fathoms in the Southern Management area for the remainder of the season (except for lingcod which remained closed in December).
- 

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2007**

**Northern Management Area<sup>1</sup>**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, Cabezon, Greenlings (rock, kelp), Shelf rockfish, Lingcod					30	30	30	30	30			
California sheephead, Ocean whitefish					30	30	30	30	30	30	30	30
Sanddabs												

**North-Central Management Area<sup>1</sup>**  
**Near Cape Mendocino (40° 10' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, Cabezon, Greenlings (rock, kelp), Shelf rockfish, Lingcod						30	30	30	30			
California sheephead, Ocean whitefish						30	30	30	30	30	30	
Sanddabs												

**Monterey South – Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Lopez Point (36° 00' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

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Figure H8

**Morro Bay South – Central Management Area**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Southern Management Area<sup>2</sup>**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings (rock, kelp), Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	60	60
California scorpionfish	40	40	60	60	60	60	60	60	60	60	60	60
Lingcod				60	60	60	60	60	60	60	60	
Sanddabs												

**Notes for 2007:**

1. Inseason emergency closure on October 1 north of Pigeon Point (37°11'N. lat) for nearshore rockfish, black rockfish, cabezon, greenlings, shelf rockfish and lingcod.
  2. Cowcod Conservation area (west of San Diego) was open to recreational fishing from March through December from shore to 20 fathoms (see <http://www.dfg.ca.gov/marine/cowcod.asp>)
- 

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2008**

**Northern Management Area<sup>1,3</sup>**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish					20	20	20	20				
Lingcod					20	20	20	20				
Sanddabs												

**North-Central North of Point Arena Management Area<sup>1,2,3</sup>**  
**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						20	20	20				
Sanddabs												

**North - Central South of Point Arena Management Area<sup>1,2</sup>**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						20	20	20	20	20	20	
Sanddabs												

Version 05/21/15

Figure H9

**Monterey South – Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Lopez Point (36° 00' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Morro Bay South – Central Management**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Southern Management Area<sup>4</sup>**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	60	60
California scorpionfish	40	40	60	60	60	60	60	60	60	60	60	60
Lingcod				60	60	60	60	60	60	60	60	
Sanddabs												

**Notes for 2008:**

1. Inseason change on May 9 decreased depth limit from 30 fathoms to 20 fathoms in the Northern and North-Central Management Areas.
2. Inseason emergency change on September 2 split the North-Central Management Area into two areas: North-Central North of Point Arena, and North-Central South of Point Arena.
3. Inseason emergency closure on September 2 for nearshore rockfish, California sheephead, California scorpionfish, cabezon, greenlings, Ocean whitefish, shelf rockfish and lingcod for the Northern and North-Central North of Point Arena Management areas.
4. Cowcod Conservation area (west of San Diego) was open to recreational fishing from March through December from shore to 20 fathoms (see <http://www.dfg.ca.gov/marine/cowcod.asp>)

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2009**

**Northern Management Area**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20	20			
Sanddabs												

**North-Central - North of Point Arena Management Area**  
**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

Version 05/21/15

Figure H10

**North-Central South of Point Arena Management Area**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						20	20	20	20	20	20	
Sanddabs												

**Monterey South – Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Lopez Point (36° 00' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Morro Bay South – Central Management Area**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Southern Management Area**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	60	60
California scorpionfish	40	40	60	60	60	60	60	60	60	60	60	60
Lingcod				60	60	60	60	60	60	60	60	
Sanddabs												

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2010**

**Northern Management Area**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

**North-Central - North of Point Arena Management Area**  
**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

Version 05/21/15

Figure H11

**North-Central South of Point Arena Management Area**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						30	30	30	30	30		
Sanddabs												

**Monterey South – Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Lopez Point (36° 00' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Morro Bay South – Central Management Area**  
**Lopez Point (36° 00' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	
Sanddabs												

**Southern Management Area**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	60	60
California scorpionfish	40	40	60	60	60	60	60	60	60	60	60	60
Lingcod				60	60	60	60	60	60	60	60	
Sanddabs												

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2011**

**Northern Management Area**

**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20	20	20		
Sanddabs												

**Mendocino Management Area**

**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

Version 05/21/15

Figure H12

**San Francisco Management Area**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						30	30	30	30	30	30	30
Sanddabs												

**Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	40
Sanddabs												

**Southern Management Area**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	60	60
California scorpionfish	60	60	60	60	60	60	60	60	60	60	60	60
Lingcod			60	60	60	60	60	60	60	60	60	60
Sanddabs												

**Notes for 2011:**

- As part of the biennial management specification process, the North-Central North of Point Arena Management area was renamed the Mendocino Management Area, the North-Central South of Point Arena Management Area was renamed the San Francisco Management Area, and the Monterey South-Central and Morro Bay South-Central Management Areas were combined into the Central Management Area.
- Due to a delay in the federal regulatory process, recreational regulations for 2011 in California did not go into effect until June 11, 2011.

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2012**

**Northern Management Area**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20	20	20		
Sanddabs												

**Mendocino Management Area**  
**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

Version 05/21/15

Figure H13

**San Francisco Management Area**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						30	30	30	30	30	30	30
Sanddabs												

**Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	40
Sanddabs												

**Southern Management Area**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish			60	60	60	60	60	60	60	60	50	50
California scorpionfish	60	60	60	60	60	60	60	60	60	60	50	50
Lingcod			60	60	60	60	60	60	60	60	50	50
Sanddabs												

**Notes for 2012:**

1. Sub-bag limit for greenling increased from two fish to 10 fish within the 10 fish daily RGC bag limit.
  2. High encounter rates for cowcod in the SMA lead to inseason action to restrict anglers' maximum fishing depth from 60fm to 50fm.
- 

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2013**

**Northern Management Area**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, Black rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20	20	20		
Sanddabs												

**Mendocino Management Area**  
**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

Version 05/21/15

Figure H14

**San Francisco Management Area**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod						30	30	30	30	30	30	30
Sanddabs												

**Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	40
Sanddabs												

**Southern Management Area**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish			50	50	50	50	50	50	50	50	50	50
California scorpionfish	50	50	50	50	50	50	50	50	50	50	50	50
Lingcod			50	50	50	50	50	50	50	50	50	50
Sanddabs												

**Notes for 2013-2014:**

1. Season in Mendocino Management Area was extended two weeks from previous years.
2. More optimistic results from 2011 bocaccio stock assessment allowed increase of daily sub-bag limit from two fish to three fish, and removal of minimum size limit.

**CALIFORNIA RECREATIONAL REGULATORY HISTORY, 2014**

**Northern Management Area**  
**California/Oregon Border to near Cape Mendocino (40° 10' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20	20	20		
Sanddabs												

**Mendocino Management Area**  
**Near Cape Mendocino (40° 10' N lat.) to Point Arena (38° 57' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					20	20	20	20				
Sanddabs												

Version 05/21/15

Figure H15

**San Francisco Management Area**  
**Point Arena (38° 57' N lat.) to Pigeon Point (37° 11' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California scorpionfish						30	30	30	30	30	30	30
California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod												

**Central Management Area**  
**Pigeon Point (37° 11' N lat.) to Pt. Conception (34° 27' N lat.)**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod					40	40	40	40	40	40	40	40
California scorpionfish					40	40	40	40	40	40		

**Southern Management Area**  
**Pt. Conception (34° 27' N lat.) to US/Mexico Border**

Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Nearshore rockfish, California sheephead, Cabezon, Greenlings, Ocean whitefish, Shelf rockfish, Lingcod			50	50	50	50	50	50	50	50	50	50
California scorpionfish	50	50	50	50	50	50	50	50	50	50		

**Notes for 2014:**

1. Based on projected estimates for 2014, it was predicted that the California scorpionfish annual catch limit would be exceeded unless closed. Thus, in-season action was taken to close the fishery from November 15 through the end of year.

Version 05/21/15

Figure H16

10813 **References**

- 10814 Abrams, J. 2014. The effect of local fishing pressure on teh size and age structure of fishes  
10815 associated with ocky habitats along California's north coast. PhD thesis, Humboldt State  
10816 University.
- 10817 Alverson, D.L., Pruter, a T., and Ronholt, L.L. 1964. A Study of Demersal Fishes and  
10818 Fisheries of the Northeastern Pacific Ocean. Institute of Fisheries, University of British  
10819 Columbia.
- 10820 Anderson, T. 1983. Identification and development of nearshore juvenile rockfishes  
10821 (genus emph{Sebastes}) in central California kelp forests. PhD thesis, Fresno State  
10822 University. Available from [https://scholar.google.com/scholar?hl=en&q=+Identification+and+development+of+nearshore+juvenile+rockfishes+/%28Genus+Sebastes/%29+in+kelp+forests+off+central+California.+Masters+Thesis/%2C+Fresno+State+University.&btnG=/&as/\\_sdt=1/%2C5/&as/\\_sdtp=#0](https://scholar.google.com/scholar?hl=en&q=+Identification+and+development+of+nearshore+juvenile+rockfishes+/%28Genus+Sebastes/%29+in+kelp+forests+off+central+California.+Masters+Thesis/%2C+Fresno+State+University.&btnG=/&as/_sdt=1/%2C5/&as/_sdtp=#0).
- 10826 Beamish, R. 1979. New information on the longevity of Pacific ocean perch (emph{Sebastes  
10827 alutus}). Journal of the Fisheries Board of Canada **36**: 1395–1400.
- 10828 Bertalanffy, L. von. 1938. A quantitative theory of organic growth. Human Biology **10**:  
10829 181–213.
- 10830 Bodkin, J. 1986. Fish assemblages in emph{Macrocystis} and emph{Nereocystis} kelp  
10831 forests off central California. Fishery Bulletin **84**: 799–808.
- 10832 Botsford, L., and Lawrence, C. 2002. Patterns of co-variability among California Cur-  
10833 rent chinook salmon, coho salmon, Dungeness crab, and physical oceanographic conditions.  
10834 Progress in Oceanography **53**: 283–305. Available from <http://www.sciencedirect.com/science/article/pii/S0079661102000344>.
- 10836 Buckley, R. 1967. 1965 bottomfish sport fishery. Sport fishery investigations 1965. Supple-  
10837 mental progress report. Department of Fisheries. State of Washington.
- 10838 Buonaccorsi, V. 2002. Population structure of copper rockfish (*Sebastes caurinus*) reflects  
10839 postglacial colonization and contemporary patterns of larval dispersal. Canadian Journal of  
10840 Fisheries and Aquatic Sciences **59**: 1374–1384. Available from <http://www.nrcresearchpress.com/doi/abs/10.1139/f02-101>.
- 10842 Buonaccorsi, V., Westerman, M., and Stannard, J. 2004. Molecular genetic structure sug-  
10843 gests limited larval dispersal in grass rockfish, *Sebastes rastrelliger*. Marine Biology **145**:  
10844 779–788. Available from <http://link.springer.com/article/10.1007/s00227-004-1362-2>.
- 10845 Burford, M., and Bernardi, G. 2008. Incipient speciation within a subgenus of rockfish  
10846 (*Sebastosomus*) provides evidence of recent radiations within an ancient species flock.  
10847 Marine Biology **154**: 701–717. Available from <http://link.springer.com/article/10.1007/s00227-008-0963-6>.

- 10849 CDFG. 2002. Review of Some California Fisheries for 2001: market squid, sea urchin,  
10850 dungeness crab, lobster, prawn, abalone, groundfish, swordfish and shark, coastal pelagic  
10851 finfish, ocean salmon, nearshore live-fish, Pacific herring, white seabass, and kelp. California  
10852 Cooperative Oceanic Fisheries Investigations Reports **43**: 13–30.
- 10853 Checkley, D., and Barth, J. 2009. Patterns and processes in the California Current System.  
10854 Progress in Oceanography **83**: 49–64. Available from <http://www.sciencedirect.com/science/article/pii/S0079661109001098>.
- 10855 Cope, J. 2004. Population genetics and phylogeography of the blue rockfish (*Sebastodes mystinus*) from Washington to California. Canadian Journal of Fisheries and Aquatic Sciences  
10856 **61**: 332–342. Available from <http://www.nrcresearchpress.com/doi/abs/10.1139/f04-008>.
- 10857 Cope, J., Dick, E., MacCall, A., Monk, M., Soper, B., and Wetzel, C. 2015. Data-moderate  
10858 stock assessments for brown, China, copper, sharpchin, stripetail, and yellowtail rockfishes  
10859 and English and rex soles in 2013. Pacific Fisheries Management Council, Portland, OR.
- 10860 Dick, E. 2009. Modeling the reproductive potential of rockfishes (emph{*Sebastodes*} spp.).  
10861 PhD thesis, University of California Santa Cruz.
- 10862 Dick, E.J., and MacCall, A.D. 2010. Estimates of sustainable yield for 50 data-poor stocks  
10863 in the Pacific Coast Groundfish Fishery Management Plan. NOAA Technical Memorandum  
10864 NMFS NOAA-TM-NMFS-SWFSC-460.
- 10865 Dick, E.J., and MacCall, A.D. 2011. Depletion-Based Stock Reduction Analysis: A catch-  
10866 based method for determining sustainable yields for data-poor fish stocks. Fisheries Research  
10867 **110**(2): 331–341. doi: [10.1016/j.fishres.2011.05.007](https://doi.org/10.1016/j.fishres.2011.05.007).
- 10868 Douglas, D. 1998. Species composition of rockfish catches by Oregon trawlers, 1963–93.  
10869 Oregon Dept. of Fish and Wildlife. Marine Program Data Series Report.
- 10870 Drake, P., and Edwards, C. 2013. Influence of larval behavior on transport and popula-  
10871 tion connectivity in a realistic simulation of the California Current System. Journal of  
10872 Marine ... **71**: 317–350. Available from <http://www.ingentaconnect.com/content/jmr/jmr/2013/00000071/00000004/art00003>.
- 10873 Echeverria, T. 1987. Thirty-four species of California rockfishes: maturity and seasonality  
10874 of reproduction. Fishery Bulletin **85**: 229–250.
- 10875 Field, J., and Ralston, S. 2005. Spatial variability in rockfish (*Sebastodes* spp.) recruitment  
10876 events in the California Current System. Canadian Journal of Fisheries and Aquatic Sciences  
10877 **62**: 2199–2210. Available from <http://www.nrcresearchpress.com/doi/abs/10.1139/f05-134>.
- 10878 Fisk, M., Duncan, R., Fox, C., and Witter, J. 1993. Emergence and petrology of the Mendo-  
10879 cino Ridge. Marine geophysical researches. Available from <http://link.springer.com/article/10.1007/BF01982386>.
- 10880 Francis, R. 2011. Data weighting in statistical fisheries stock assessment models. Canadian  
10881 Journal of Fisheries and Aquatic Sciences **68**: 1124–1138.

- 10886 Francis, R., Little, J., and Bloeser, J. 2009. Matching spatial scales of ecology, economy, and  
10887 management for groundfish of the US West Coast marine ecosystem: a state of the science  
10888 review. A report to the Lensfest Ocean .... Available from <http://nsgl.gso.uri.edu/washu/washut09008.pdf>.
- 10890 Goldfinger, C., Henkel, S., Romsos, C., and Andrea Havron, B.B. 2014. Benthic habitat  
10891 characterization offshore the Pacific Northwest volume 1: evaluation of continental shelf  
10892 geology. US Dept. of the Interior, Bureau of Ocean Energy Management, Pacific OCS  
10893 Region. OCS Study BOEM 2014-662.
- 10894 Gottscho, A. 2014. Zoogeography of the San Andreas Fault system: Great Pacific Fracture  
10895 Zones correspond with spatially concordant phylogeographic boundaries in western North.  
10896 Biological Reviews **2014**: 1–21. Available from <http://onlinelibrary.wiley.com/doi/10.1111/brv.12167/full>.
- 10898 Greene, H.G., Yoklavich, M.M., Starr, R.M., O'Connell, V.M., Wakefield, W.W., Sullivan,  
10899 D.E., McRea, J.E., and Cailliet, G.M. 1999. A classification scheme for deep seafloor habitats.  
10900 Oceanologica Acta **22**: 663–678.
- 10901 Hamel, O. 2015. A method for calculating a meta-analytical prior for the natural mortality  
10902 rate using multiple life history correlates. ICES Journal of Marine Science **72**: 62–69.
- 10903 Hanan, D., and Curry, B. 2012. Long-term movement patterns and habitat use of nearshore  
10904 groundfish: tag-recapture in central and southern California waters. Open Fish Science  
10905 Journal **5**: 30–43.
- 10906 Hannah, R.W., and Rankin, P.S. 2011. Site fidelity and movement of eight species of Pacific  
10907 rockfish at a high-relief rocky reef on the Oregon coast. North American Journal of Fisheries  
10908 Management **31**: 483–494.
- 10909 Harry, G., and Morgan, A. 1961. History of the trawl fishery, 1884-1961. Oregon Fish  
10910 Commission Research Briefs **19**: 5–26.
- 10911 Hickey, B.M. 1979. The California current system—hypotheses and facts. Progress in  
10912 Oceanography **8**(4): 191–279. doi: [10.1016/0079-6611\(79\)90002-8](https://doi.org/10.1016/0079-6611(79)90002-8).
- 10913 Hoenig, J. 1983. Empirical use of longevity data to estimate mortality-rates. Fishery Bulletin  
10914 **82**: 898–903.
- 10915 Karnowski, M., Gertseva, V., and Stephens, A. 2014. Historic reconstruction of Oregon's  
10916 commercial fisheries landings. Oregon Dept. of Fish & Wildlife. Marine Program Data  
10917 Series Report.
- 10918 Kimura, D., Mandapat, R., and Oxford, S. 1979. Method, validity, and variability in the  
10919 age determination of yellowtail rockfish (*Sebastodes flavidus*), using otoliths. Journal  
10920 of the Fisheries Research Board of Canada **35**: 377–383.
- 10921 Lea, R., McAllister, R., and VenTresca, D. 1999. Biological aspects of nearshore rockfishes of  
10922 the genus *Sebastodes* from Central California, with notes on ecologically related sport  
10923 fishes. California Department of Fish and Game, Fish Bulletin **177**.

- 10924 Lee, J., and Berejikian, B. 2009. Structural complexity in relation to the habitat preferences,  
10925 territoriality, and hatchery rearing of juvenile China rockfish (*Sebastodes nebulosus*).  
10926 Environmental biology of fishes **84**: 411–419.
- 10927 Lenarz, W., and Echeverria, T. 1991. Sexual dimorphism in *Sebastodes*. Environmental  
10928 Biology of Fishes **30**: 71–80.
- 10929 Lo, N.C.-h., Jacobson, L.D., and Squire, J.L. 1992. Indices of relative abundance from fish  
10930 spotter data based on delta-lognormal models.
- 10931 Love, M., Yoklavich, M., and Thorsteinson, L. 2002. The rockfishes of the northeast Pacific.  
10932 University of California Press, Berkeley, CA, USA.
- 10933 Love, M.S., Caselle, J., and Buskirk, W.V. 1998. A severe decline in the commercial pas-  
10934 senger fishing vessel rockfish (*Sebastodes* spp.) catch in the Southern California Bight,  
10935 1980–1996. California Cooperative Oceanic Fisheries Investigations Reports **39**: 180–195.
- 10936 MacCall, A.D. 2009. Depletion-corrected average catch: A simple formula for estimating  
10937 sustainable yields in data-poor situations. ICES Journal of Marine Science **66**: 2267–2271.  
10938 doi: [10.1093/icesjms/fsp209](https://doi.org/10.1093/icesjms/fsp209).
- 10939 Magnell, B., Bray, N., and Winant, C. 1990. Convergent shelf flow at Cape Mendo-  
10940 cino. Oceanography **3**: 4–11. Available from [http://www.researchgate.net/profile/Clive/\\_Dorman/publication/237833057/\\_CONVERGENT/\\_SHELF/\\_FLOW/\\_AT/\\_CAPE/\\_MENDOCINO/links/00b7d53309c19a1938000000.pdf](http://www.researchgate.net/profile/Clive/_Dorman/publication/237833057/_CONVERGENT/_SHELF/_FLOW/_AT/_CAPE/_MENDOCINO/links/00b7d53309c19a1938000000.pdf).
- 10941 Matthews, K. 1990. An experimental study of the habitat preferences and movement pat-  
10942 terns of copper, quillback, and brown rockfishes (*Sebastodes* spp.). Environmental  
10943 Biology of Fishes **29**: 161–178.
- 10944 McAllister, M.K., and Ianelli, J.N. 1997. Bayesian stock assessment using catch-age data  
10945 and the sampling - importance resampling algorithm. Canadian Journal of Fisheries and  
10946 Aquatic Sciences **54**(2): 284–300. doi: [10.1139/f96-285](https://doi.org/10.1139/f96-285).
- 10947 Methot, R.D. 2015. User manual for Stock Synthesis model version 3.24s. NOAA Fisheries,  
10948 US Department of Commerce.
- 10949 Methot, R.D., and Wetzel, C.R. 2013. Stock synthesis: A biological and statistical framework  
10950 for fish stock assessment and fishery management. Fisheries Research **142**: 86–99. doi:  
10951 [10.1016/j.fishres.2012.10.012](https://doi.org/10.1016/j.fishres.2012.10.012).
- 10952 Miller, D., and Gotshall, D. 1965. Ocean sportfish catch and effort from Oregon to Point  
10953 Arguello, California July 1, 1957–June 30, 1961. State of California, The Resources Agency  
10954 Department of Fish and Game, Fish Bulletin **130**.
- 10955 Monk, M., Dick, E., and Pearson, D. 2014. Documentation of a relational database for  
10956 the California recreational fisheries survey onboard observer sampling program, 1999–2011.  
10957 NOAA-TM-NMFS-SWFSC-529.
- 10958 Monk, M., Dick, E., Buell, T., ZumBrunnen, L., Dauble, A., and Pearson, D. 2013. Doc-  
10959 umentation of a relational database for the Oregon Sport Groundfish Onboard Sampling

- 10962 Program. NOAA-TM-NMFS-SWFSC-519.
- 10963 Munk, K. 2001. Maximum ages of groundfishes in waters off Alaska and British Columbia  
10964 and considerations of age determination. *Alaska Fishery Research Bulletin* **8**: 12–21.
- 10965 NMFS. 2005. Pacific Coast Fishery Management Plan: Essential Fish Habitat Designation  
10966 and Minimization of Adverse Impacts: Final Environmental Impact Statement. Seattle, WA.
- 10967 Pacific Fishery Management Council. 2013. Pacific Coast Fishery Ecosystem Plan for the  
10968 U.S. Portion of the California Current Large Marine Ecosystem. Pacific Fishery Management  
10969 Council, 7700 NE Ambassador Place, Suite 101, Portland, Oregon 97220-1384.
- 10970 Pikitch, E., Erickson, D., and Wallace, J. 1988. An evaluation of the effectiveness of trip  
10971 limits as a management tool. Northwest and Alaska Fisheries Center, National Marine  
10972 Fisheries Service, US Department of Commerce.
- 10973 R Development Core Team. 2013. R: A language and environment for statistical computing.  
10974 R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.
- 10975 Ralston, S., Pearson, D., Field, J., and Key, M. 2010. Documentation of California catch  
10976 reconstruction project. NOAA-TM-NMFS-SWFSC-461.
- 10977 Reilly, P.N., Wilson-Vandenberge, D., Wilson, C.E., and Mayer, K. 1998. Onboard sampling  
10978 of the rockfish and lingcod commercial passenger fishing vessel industry in northern and  
10979 central California, January through December 1995. *Marine region, Admin. Rep.* **98-1**:  
10980 1–110.
- 10981 Rodomsky, B., Krutzikowsky, G., Ireland, R., and Calavan, R. 2014. The 2013 Oregon  
10982 commercial nearshore fishery summary. Oregon Dept of Fish & Wildlife. Marine Program  
10983 Data Series Report.
- 10984 Rogers, J., and Pikitch, E. 1992. Numerical definition of groundfish assemblages caught off  
10985 the coasts of Oregon and Washington using commercial fishing strategies. *Canadian Journal  
10986 of Fisheries and Aquatic Sciences* **49**: 2648–2656.
- 10987 Sivasundar, A., and Palumbi, S. 2010. Life history, ecology and the biogeography of strong  
10988 genetic breaks among 15 species of Pacific rockfish, *Sebastodes*. *Marine biology* **157**:  
10989 1433–1452.
- 10990 Sotka, E., Wares, J., and Barth, J. 2004. Strong genetic clines and geographical variation in  
10991 gene flow in the rocky intertidal barnacle *Balanus glandula*. *Molecular Ecology* **13**: 2143–  
10992 2156. Available from <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-294X.2004.02225.x/pdf>.
- 10993 Starr, R., Wendt, D., Barnes, C., Marks, C., Malone, D., Waltz, G., Schmidt, K., Chiu, J.,  
10994 Launer, A., Hall, N., and Yochum, N. 2015. Variation in responses of fishes across multiple  
10995 reserves within a network of marine protected areas in temperate waters. *PLoS one* **10**:  
10996 e0118502.
- 10997 Stefánsson, G. 1996. Analysis of groundfish survey abundance data: combining the GLM  
10998 and delta approaches. *ICES Journal of Marine Science* **53**: 577–588.

- 11000 Stephens, A., and MacCall, A. 2004. A multispecies approach to subsetting logbook data  
11001 for purposes of estimating CPUE. *Fisheries Research* **70**: 299–310.
- 11002 Stephens, J., Wilson-vandenbergh, D., Wendt, D., Carroll, J., Nakamura, R., Nakada, E.,  
11003 Reinecke, S.J., and Wilson, J. 2006. Rockfish resources of the south central California coast:  
11004 analysis of the resource from partyboat data, 1980 – 2005. *The California Cooperative  
11005 Oceanic Fisheries Investigations Reports* **47**: 140–155.
- 11006 Tolimieri, N., and Levin, P. 2006. Assemblage structure of eastern Pacific groundfishes on  
11007 the US continental slope in relation to physical and environmental variables. *Transactions  
11008 of the American Fisheries ...* **135**(2): 317–332. Available from <http://www.tandfonline.com/doi/abs/10.1577/T05-092.1>.
- 11010 Van Voorhees, D., Hoffman, A., Lowther, A., Van Buskirk, W., Weinstein, J., and White, J.  
11011 2000. An evaluation of alternative estimators of ocean boat fish effort and catch in Oregon.  
11012 The Pacific RecFIN Statistics Subcommittee, [http://old.recfin.org/lib/RecFIN\\_ORBS\\_MRFSS\\_Comparison.PDF](http://old.recfin.org/lib/RecFIN_ORBS_MRFSS_Comparison.PDF).
- 11014 Williams, E.H., and Ralston, S. 2002. Distribution and co-occurrence of rockfishes (family:  
11015 Sebastidae) over trawlable shelf and slope habitats of California and southern Oregon.  
11016 *Fishery Bulletin* **100**(4): 836–855.
- 11017 Young, M.A., Iampietro, P.J., Kvitek, R.G., and Garza, C.D. 2010. Multivariate bathymetry-  
11018 derived generalized linear model accurately predicts rockfish distribution on Cordell Bank,  
11019 California, USA. *Marine Ecology Progress Series* **415**: 247–261.