

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



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<sup>103</sup> **Executive summary**

<sup>104</sup> **Stock**

<sup>105</sup> This assessment reports the status of the China rockfish (*Sebastodes nebulosus*) resource in  
<sup>106</sup> U.S. waters off the coast of California, Oregon, and Washington using data through 2014.  
<sup>107</sup> China rockfish are modelled with three independent stock assessments to account for spatial  
<sup>108</sup> variation in exploitation history as well as regional differences in growth and size composition  
<sup>109</sup> of the catch. The northern area model is defined as Washington state Marine Catch Areas  
<sup>110</sup> (MCAs) 1-4. The central area model spans from the Oregon-Washington border to 40°10'  
<sup>111</sup> N. latitude. The southern area model spans 40°10' N. latitude to the U.S.-Mexico border.  
<sup>112</sup> However, very little catch of China rockfish occurs south of Point Conception, California  
<sup>113</sup> (34°27' N. latitude).

<sup>114</sup> **Catches**

<sup>115</sup> China rockfish are most often caught by hook-and-line (both recreational and commercial  
<sup>116</sup> fisheries) as well as by traps in the commercial live-fish fishery. Although China rockfish  
<sup>117</sup> were not a major target species, the commercial rockfish fishery along the U.S. Pacific West  
<sup>118</sup> Coast developed in the late 1800s and early 1990s. Available estimates of China rockfish  
<sup>119</sup> catch in California begin in the early 1900s, along with small commercial catches in Oregon  
<sup>120</sup> until recreational landings began to increase in the early 1970s (Figures a-c). Reconstructed  
<sup>121</sup> recreational landings of China rockfish in the northern assessment begin in 1967. As of  
<sup>122</sup> 1995, Washington has prohibited commercial nearshore fixed gear in state waters and does  
<sup>123</sup> not have a historical reconstruction of China rockfish commercial landings. The majority of  
<sup>124</sup> commercial removals of China rockfish are now landed by live-fish fisheries in California and  
<sup>125</sup> southern Oregon. The magnitude of total removals over the last 10 years peaked in 2009  
<sup>126</sup> (35.52 mt) and has been decreasing since then. In recent years, California has the largest  
<sup>127</sup> removals of the three states (dominated by the recreational fleet) with smallest removals  
<sup>128</sup> coming from the Oregon recreational fleet (Table a).

<sup>129</sup> The nearshore live-fish fishery developed in California in the late 1980s and early 1990s and  
<sup>130</sup> extended into Oregon by the mid-1990s, driven by the market prices for live fish. Northern  
<sup>131</sup> Oregon (north of Florence) does not contribute significantly to the live-fish fishery (maximum  
<sup>132</sup> removal of 0.02 mt) as the market for this sector of the fishery is centered in California.  
<sup>133</sup> Catches from the live-fish fishery in southern Oregon (south of Florence) has composed the  
<sup>134</sup> majority of the catch in that state since 1999, and peaked in 2002. In California, the landings  
<sup>135</sup> of live fish begin exceeding the landings of dead fish south of 40°10' N. latitude in 1998 and  
<sup>136</sup> north of 40°10' N. latitude in 1999; and the pattern continues through 2014.

<sup>137</sup> The historical reconstruction of landings from the recreational fishery for China rockfish in  
<sup>138</sup> California goes back to 1928, and the fishery began significantly increasing in the late 1940s.  
<sup>139</sup> The recreational catches in California are significantly higher than the commercial catches,

<sup>140</sup> and have decreased in the last five years (Table a). Recreational catches in California peaked  
<sup>141</sup> in 1987 at 53.29 mt and have declined to roughly 10-20 mt per year over the last 10 years.  
<sup>142</sup> The trend is opposite in Oregon, with the magnitude of the commercial landings greater than  
<sup>143</sup> the recreational landings. The historical landings from the recreational fleet in Oregon start  
<sup>144</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>145</sup> catches over the last 10 years in Oregon have ranged from 1.67 mt in 2014 to 3.66 mt in 2007.  
<sup>146</sup> Recreational landings in Washington peaked in 1992 (7.98 mt) and have remained between  
<sup>147</sup> 2-4 mt from 2005-2014.

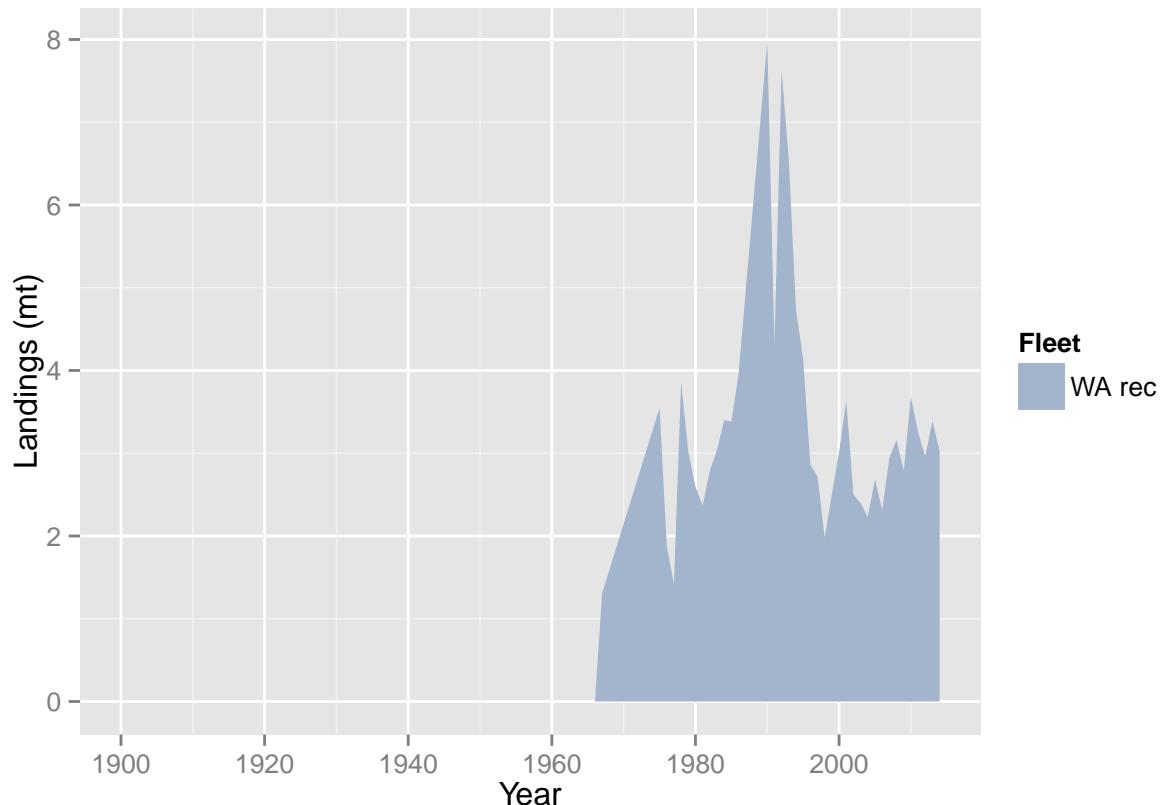


Figure a: China rockfish landings for Washington. Washington has does not have a commercial nearshore fishery.

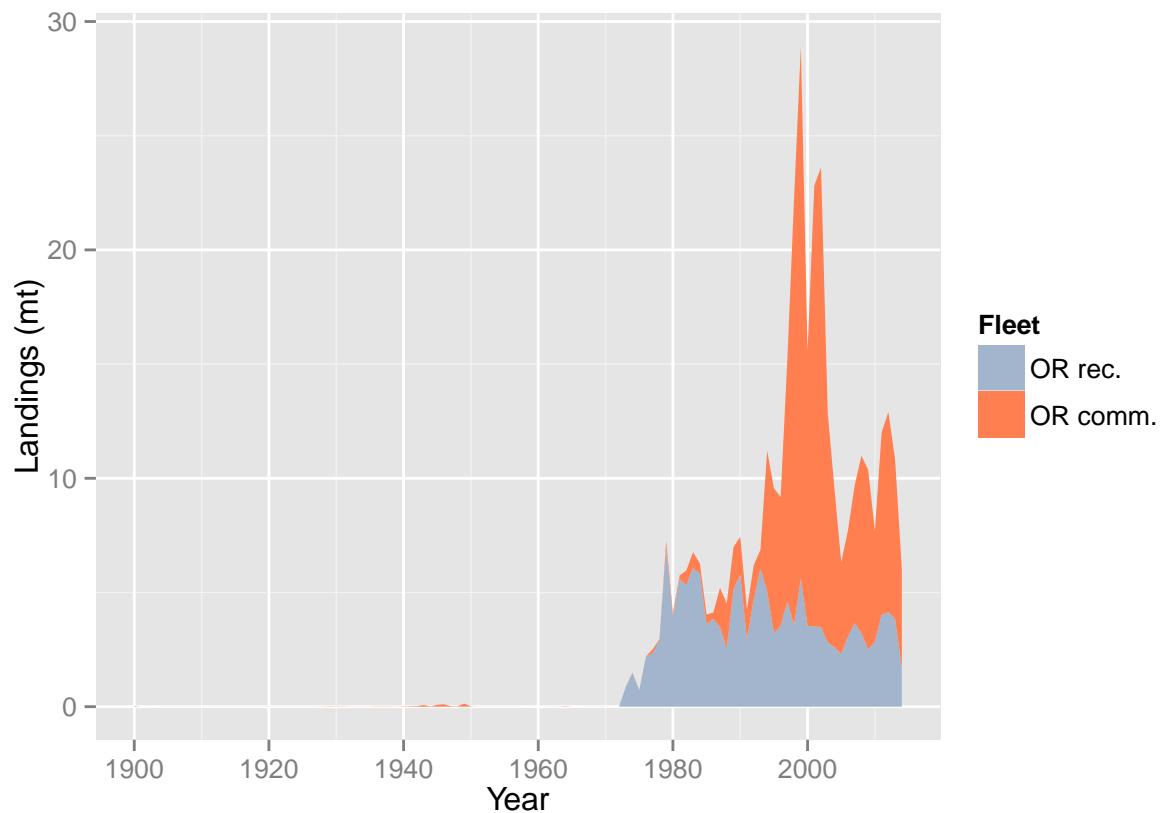


Figure b: Stacked line plot of China rockfish landings history for Oregon by fleet (recreational and commercial).

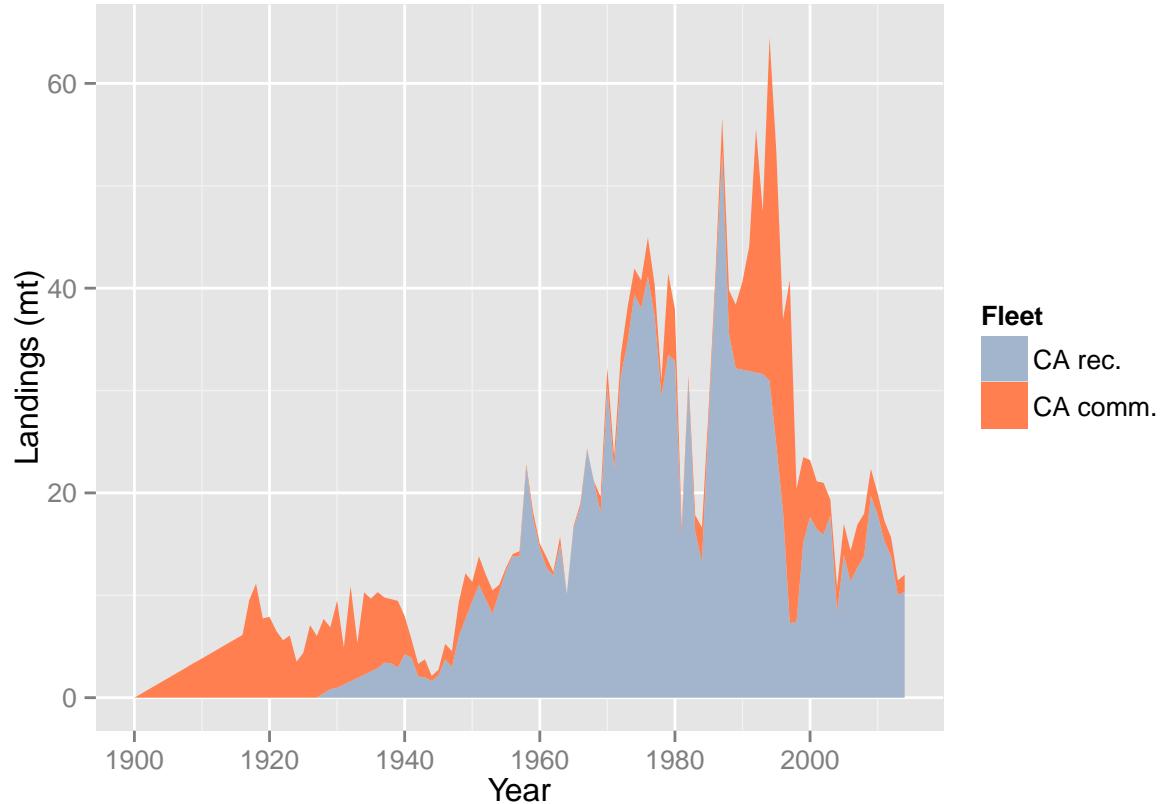


Figure c: Stacked line plot of China rockfish landings history for California by fleet (recreational and commercial).

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

## 148 Data and assessment

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

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

## 164 Stock biomass

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

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

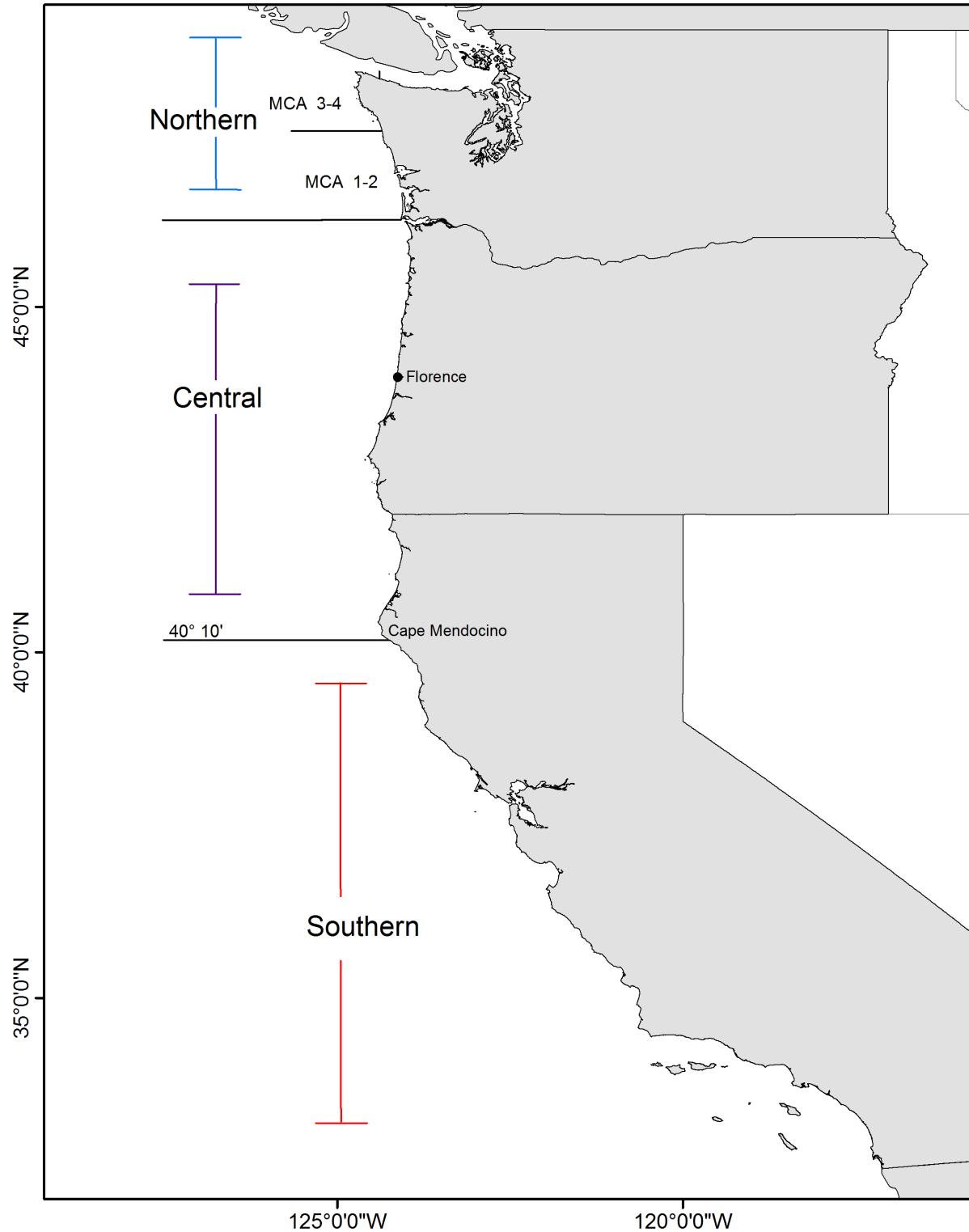


Figure d: Map depicting the boundaries for the three base-case models, Southern model (south of  $40^{\circ}10'$  N. latitude), Central model (south of  $40^{\circ}10'$  N. latitude to the OR-WA border), and the Northern model (WA state MCAs 1-4).

<sup>171</sup> the biomass target in 2015 (Figure [e](#) and Table [c](#)). The rate of spawning output decline is  
<sup>172</sup> estimated to be steepest during the 1980s to 1990s and continued to decline from the early  
<sup>173</sup> 2000s at a slower rate to an estimated minimum of 39.6% in 2014. The estimated relative  
<sup>174</sup> depletion level of the central stock in 2015 is 61.5% (~95% asymptotic interval:  $\pm 53.8\%$  -  
<sup>175</sup> 69.2%) (Figure [f](#)).

<sup>176</sup> The assessment for the southern management area suggests that China rockfish were lightly,  
<sup>177</sup> but steadily exploited since the early 1900s, with more rapid declines in spawning output  
<sup>178</sup> beginning with development of the recreational fishery in the 1950s (Figure [e](#) and Table  
<sup>179</sup> [d](#)). The estimated relative depletion level of the southern stock in 2015 is 29.6% (~95%  
<sup>180</sup> asymptotic interval:  $\pm 25.0\%$  - 34.3%) (Figure [f](#)). Although spawning output in the southern  
<sup>181</sup> area is more depleted than the central and northern areas, it is the only area with an  
<sup>182</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)

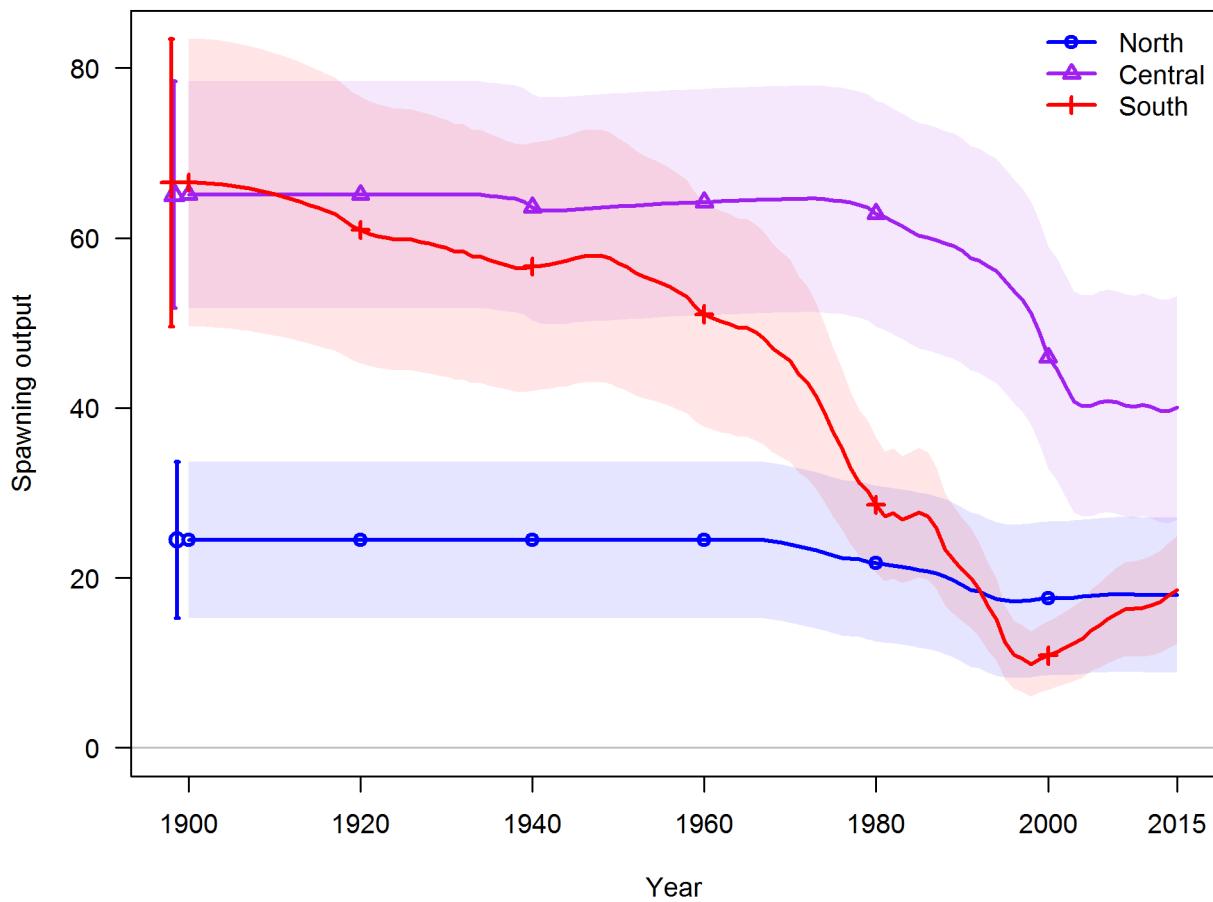


Figure e: Time series of spawning output trajectory (circles and line: median; light broken lines: 95% credibility intervals) for the three models of China rockfish (North=Washington state, Central =  $40^{\circ}10'$  N. latitude to the OR/WA border, and South = south of  $40^{\circ}10'$  N. latitude).

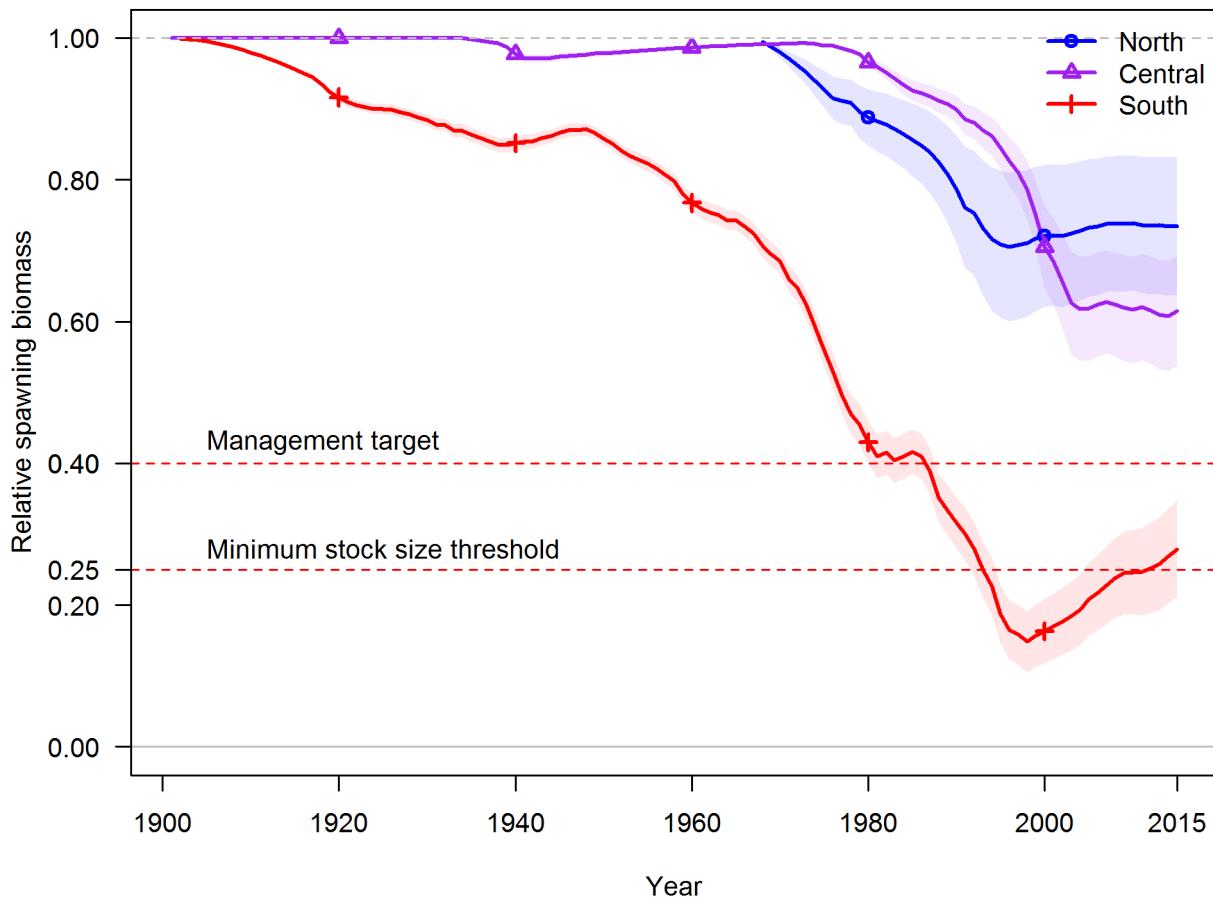


Figure f: Estimated relative depletion with approximate 95% asymptotic confidence intervals (dashed lines) for the three base case assessment models.

<sup>183</sup> **Recruitment**

<sup>184</sup> Length and age composition data for China rockfish contain insufficient information to reli-  
<sup>185</sup> ably resolve year-class strength. Therefore, all three base models assume that recruitment  
<sup>186</sup> follows a deterministic Beverton-Holt stock-recruitment relationship, so trends in recruit-  
<sup>187</sup> ment reflect trends in estimated spawning output. Given the assumed value of steepness and  
<sup>188</sup> estimates of current stock status, estimated recruitment has remained fairly constant in the  
<sup>189</sup> central and northern models, while the estimated biomass in the southern area has declined  
<sup>190</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. latitude 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)

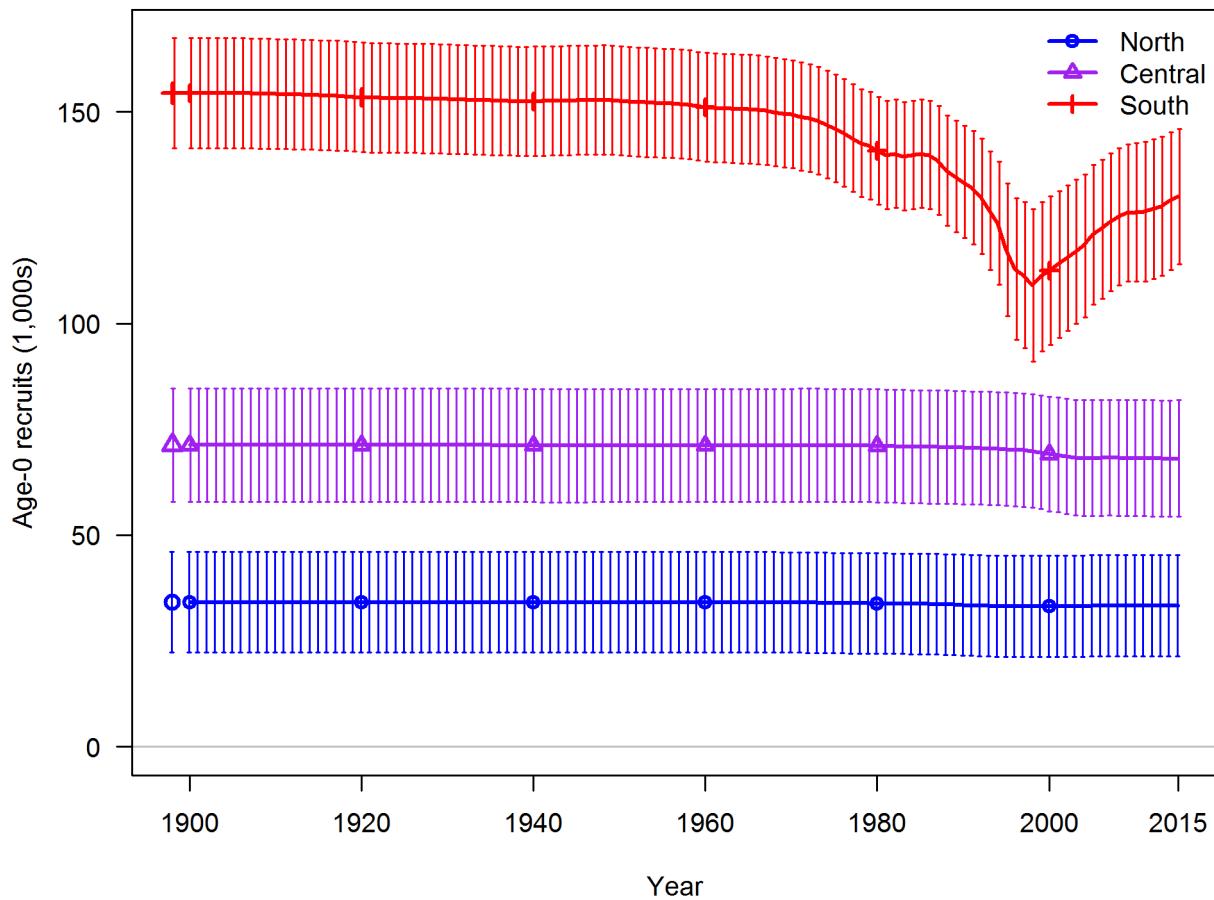


Figure g: Time series of estimated China rockfish recruitments for the three base-case models with 95% confidence or credibility intervals.

<sup>191</sup> **Exploitation status**

<sup>192</sup> Harvest rates estimated by the northern area model for Washington have never exceeded  
<sup>193</sup> management target levels (Table [h](#) and Figure [h](#)). Model results for the central area suggest  
<sup>194</sup> that harvest rates have briefly exceeded the current proxy MSY value around 2000, but has  
<sup>195</sup> remained below the management target in the last decade (Table [i](#) and Figure [h](#)). Historical  
<sup>196</sup> harvest rates for China rockfish rose steadily in the southern management area until the  
<sup>197</sup> mid-1990s and exceeded the target SPR harvest rate for several decades, and is just below  
<sup>198</sup> the target harvest rate as of 2013 (Table [j](#) and Figure [h](#)). A summary of China rockfish  
<sup>199</sup> 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). Fishing intensity is (1-SPR) divided by 50% (the SPR target) and exploitation is F divided by  $F_{SPR}$ .

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. latitude to the OR/WA border). Fishing intensity is  $(1-SPR)$  divided by 50% (the SPR target) and exploitation is  $F$  divided by  $F_{SPR}$ .

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). Fishing intensity is  $(1-SPR)$  divided by 50% (the SPR target) and exploitation is  $F$  divided by  $F_{SPR}$ .

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)

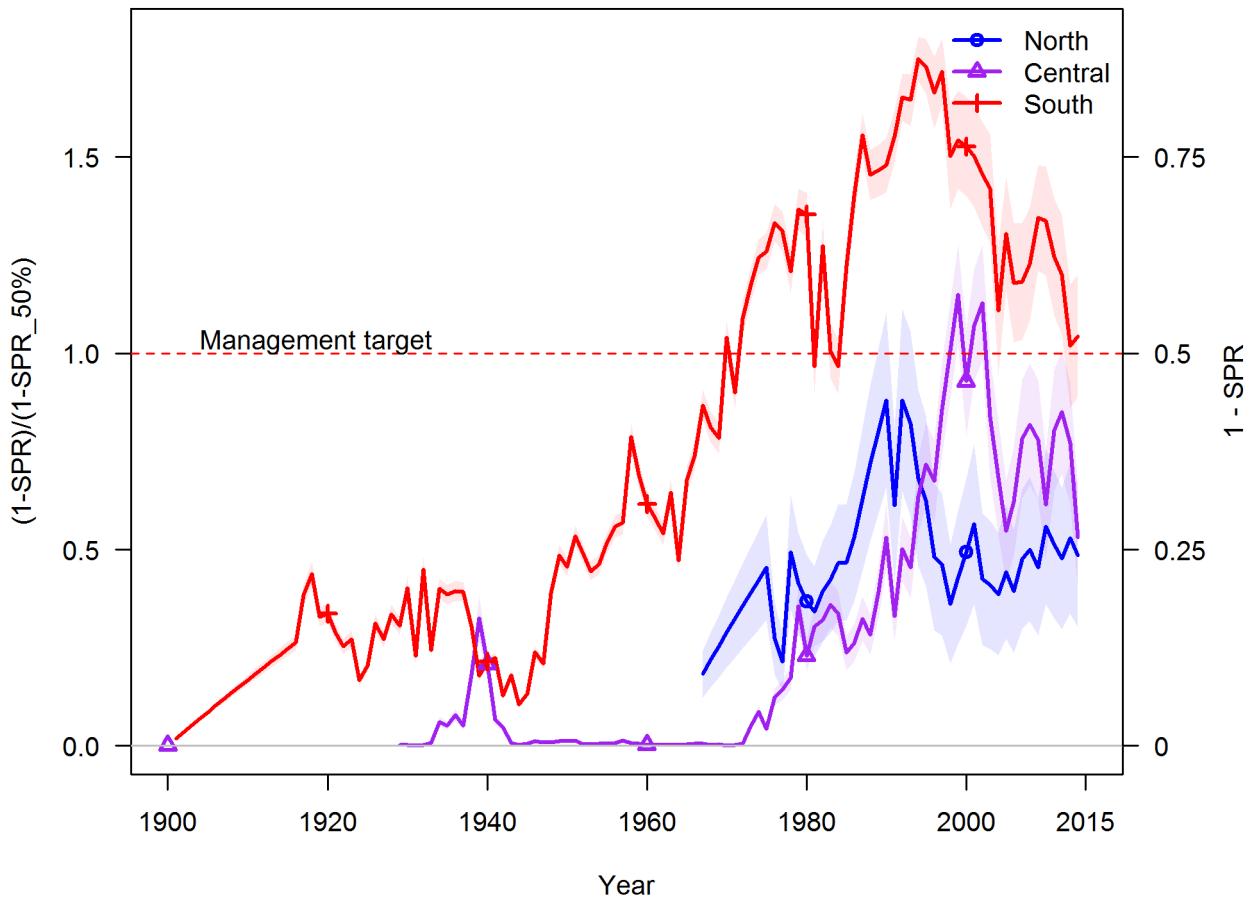


Figure h: Estimated spawning potential ratio (SPR) for the northern, central, and southern base-case models. One minus SPR is plotted so that higher exploitation rates occur on the upper portion of the y-axis. The management target is plotted as a red horizontal line and values above this reflect harvests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

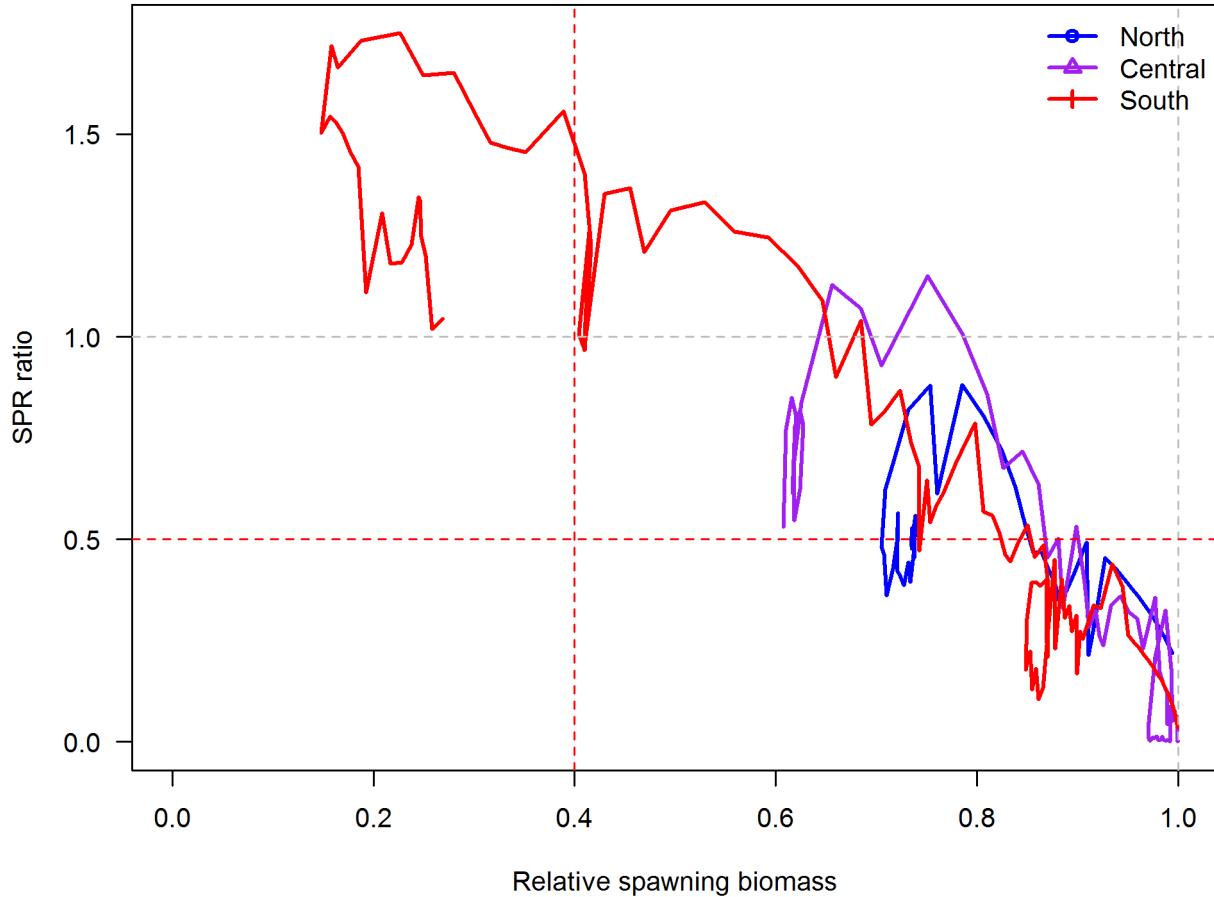


Figure i: Phase plot of estimated relative (1-SPR) vs. relative spawning biomass for the southern, central, and northern base case models. The relative (1-SPR) is (1-SPR) divided by 50% (the SPR target). Relative depletion is the annual spawning biomass divided by the unfished spawning biomass.

200 **Ecosystem considerations**

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

206 **Reference points**

- 207 The management line for China rockfish is at 40°10' N. latitude, with differing management  
208 guidelines north and south. From 2005-2010, the Nearshore Rockfish Complexes north and  
209 south of 40°10' N. latitude were managed by a total catch Optimum Yield (OY). As of the  
210 Pacific Fishery Management Council (PFMC) 2011-12 management cycle, China rockfish  
211 has a component OFL and ABC within the northern and southern Nearshore Rockfish  
212 Complexes, based on the work by Dick and MacCall (2010).  
213 This stock assessment estimates that China rockfish in the north are above the biomass  
214 target. The spawning output of the stock declined between the 1960s and 1990s but has  
215 largely been stable during the past few decades. The estimated relative depletion level in  
216 2015 is 73.4% (~95% asymptotic interval:  $\pm 63.7\% - 83.2\%$ , corresponding to an unfished  
217 spawning output of 24.4 billion eggs (~95% asymptotic interval: 15.2 – 33.7 billion eggs) of  
218 spawning output in the base model (Table k). Unfished age 5+ biomass was estimated to be  
219 240.8 mt in the base case model. The target spawning output based on the biomass target  
220 ( $SB_{40\%}$ ) is 9.8 billion eggs, which gives a catch of 6.3 mt. Equilibrium yield at the proxy  
221  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 5.8 mt.  
222 This stock assessment estimates that central area China rockfish are just above the biomass  
223 target. The rate of spawning output decline is estimated to be steepest during the 1980s to  
224 1990s and has continued to decline since the 1990s at a slower rate. The estimated relative  
225 depletion level in 2015 is 61.5% (~95% asymptotic interval:  $\pm 53.8\% - 69.2\%$ ), corresponding  
226 to an unfished spawning output of 65.1 billion eggs (~95% asymptotic interval: 51.8 – 78.4  
227 billion eggs) of spawning output in the base model (Table l). Unfished age 5+ biomass was  
228 estimated to be 591.5 mt in the base case model. The target spawning output based on the  
229 biomass target ( $SB_{40\%}$ ) is 26 billion eggs, which gives a catch of 15.7 mt. Equilibrium yield  
230 at the proxy  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 14.5 mt.  
231 This stock assessment estimates that China rockfish south of 40°10' N. latitude are below the  
232 biomass target, but above the minimum stock size threshold, and have been increasing over  
233 the last 15 years. The estimated relative depletion level in 2015 is 27.9% (~95% asymptotic  
234 interval:  $\pm 21.2\% - 34.7\%$ ), corresponding to an unfished spawning output of 66.5 billion eggs  
235 (~95% asymptotic interval: 49.6 - 83.4 billion eggs) of spawning output in the base model  
236 (Table m). Unfished age 5+ biomass was estimated to be 768.6 mt in the base case model.

<sup>237</sup> The target spawning output based on the biomass target ( $SB_{40\%}$ ) is 26.6 billion eggs, which  
<sup>238</sup> gives a catch of 21.1 mt. Equilibrium yield at the proxy  $F_{MSY}$  harvest rate corresponding  
<sup>239</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 ( $40^{\circ}10' N$ . latitude 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)

## 240 Management performance

241 China rockfish is managed in the northern and southern Nearshore Rockfish Complex (split at  
 242 40°10' N. latitude. Since the 2011-2012 management cycle, China rockfish has a contribution  
 243 OFL and ACL within each the northern and southern Nearshore Rockfish Complexes (Table  
 244 n). The estimated catch of China rockfish north of 40°10' N. latitude of Nearshore Rockfish  
 245 Complex has been above both the China rockfish contribution to the northern Nearshore  
 246 Rockfish Complex OFL and ACL in all years (2011-2014). The estimated catch of China  
 247 rockfish south of 40°10' N. latitude of Nearshore Rockfish Complex has been below the China  
 248 rockfish contribution to the northern Nearshore Rockfish Complex OFL and ACL in all years  
 249 (2011-2014). A summary of these values as well as other base case summary results can be  
 250 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	

**251 Unresolved problems and major uncertainties**

**252** As in most/all stock assessments, the appropriate value for stock-recruit steepness remains  
**253** a major uncertainty for China rockfish. In this assessment a prior value was available from  
**254** a meta-analysis, allowing bracketing of the uncertainty. Exploration of the southern model  
**255** during the STAR panel meeting established that the range of uncertainty in current and  
**256** projected biomass status provided by this bracketing was very similar to the range due to  
**257** natural mortality, and that natural mortality alone would be used to bracket uncertainty in  
**258** model results for management advice.

**262** While the northern and the southern area models are able to estimate a plausible value of  
**263** natural mortality with an apparently good level of precision, this was not possible with the  
**264** central area model.

**262** The fishery-dependent abundance indices used in the assessment are relatively noisy. There  
**263** is no fishery-independent index. The assessments assume that trends in CPUE indices are  
**264** representative of population trends.

**265** Assessment results for the central and the northern area models are dependent on the method  
**266** used for weighting the conditional age-at-length data. This is an area of active research and  
**267** there is a lack of consensus on an agreed approach. A workshop is planned for later this year  
**268** that might provide guidance. For this assessment, the Panel recommended use of harmonic  
**269** mean method, because it is a well-understood and frequently applied method that provided  
**270** intermediate results compared to other alternatives.

**271** The current term of reference for stock assessment require development of a single decision  
**272** table with states of nature ranging along the dominant axis of uncertainty. This presumes  
**273** that uncertainty is consequential only for a single variable or estimated quantity, such as  
**274** natural mortality, steepness, or ending biomass. This approach may fail to capture important  
**275** elements of uncertainty that should be communicated to the Council and its advisory bodies.  
**276** Additional flexibility in the development of decision tables is needed.

**277 Decision Tables**

**278** The forecasts of stock abundance and yield were developed using the final base models. The  
**279** total catches in 2015 and 2016 are set to the PFMC adopted China rockfish contribution  
**280** ACLs in the northern and central models (Table [n](#)). The southern model total catches in  
**281** 2015 and 2016 are set to the average annual catch from 2012-2014. The exploitation rate  
**282** for 2017 and beyond is based upon an SPR harvest rate of 50%. The average of 2010-2014  
**283** catch by fleet was used to distribute catches in forecasted years. The forecasted projections  
**284** of the OFL for each model are presented in Table [o](#).

**285** Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
**286** panel and are based on a low value of M, 0.05, and a high value, 0.09. Current medium-term  
**287** forecasts based on the alternative states of nature project that the stock, under the current

control rule as applied to the base model, will decline towards the target stock size Table p. The current control rule under the low state of nature results in a stock decline into the precautionary zone, while the high state of nature maintains the stock at near unfished levels. Removing the catches resulting from the low M state of nature, assuming the base and high values of M both maintain the stock at well above the current target stock size, as does removing the recent average catches under all states of nature. Removing the high M catches under the base model M and high M states of nature results in the population going to extremely low levels during the projection period, spawning biomass and stock depletion values are not reported for years in which the stock goes to these very low levels.

Current medium-term forecasts based on the alternative states of nature for the central model project that the stock, under the current control rule as applied to the base model, will decline towards the target stock size Table q. The current control rule under the low state of nature results in a stock in the precautionary zone, while the high state of nature maintains the stock increasing from 40% to 50% depletion from 2017 - 2026. Removing the catches resulting from the low M state of nature, assuming the base and high values of M both maintain the stock at well above the current target stock size. Removing the high M catches under the base model M and low M states of nature results in the population going to extremely low levels during the projection period. Removing average catches under the base M and high M states of nature result in the stock remaining above the current target stock size, and an ending depletion of 37% in 2026 for the low M state of nature.

Assuming that catches in 2015 and 2016 equal recent average catch, and that catches beginning in 2017 follow the default ACL harvest control rule, projections of expected China spawning output from the southern base model suggest the stock will be at roughly 30% of unfished spawning output in 2017, and increase to 38% by 2026 (Table r). The stock is expected to remain below the target stock size (40% of unfished spawning output) in the base model and “low M” states of nature through 2026, and to exceed target size in the “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/OFCL						11.6	11.6	11.0	11.0	88
	China contrib. ABC/OFCL						11.7	11.7	9.8	9.8	7.2
	Nearshore RF OY/ACL	122	142	142	155	155	99	99	94	94	69
	China contrib. OY/ACL						9.8	9.8	8.2	8.2	6.6
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/OFCL						1.156	1.145	1.164	1.160	1,313
	China contrib. ABC/OFCL						19.8	19.8	16.6	16.6	55,2
	Nearshore RF OY/ACL	615	564	564	650	650	1,001	990	1,005	1,001	1,114
	China contrib. OY/ACL						16.5	16.5	13.8	13.8	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)	(8.94-27.14)	(8.93-27.13)	(8.96-27.17)	(8.89-27.11)	(8.86-27.08)	(8.87-27.09)	(8.83-27.06)	(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)	(0.538-0.692)
	95% CI	(54.64 - 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)	(110.52 - 143.46)	(111.29 - 144.13)	(112.72 - 145.15)	(113.95 - 146.03)	(113.95 - 146.03)

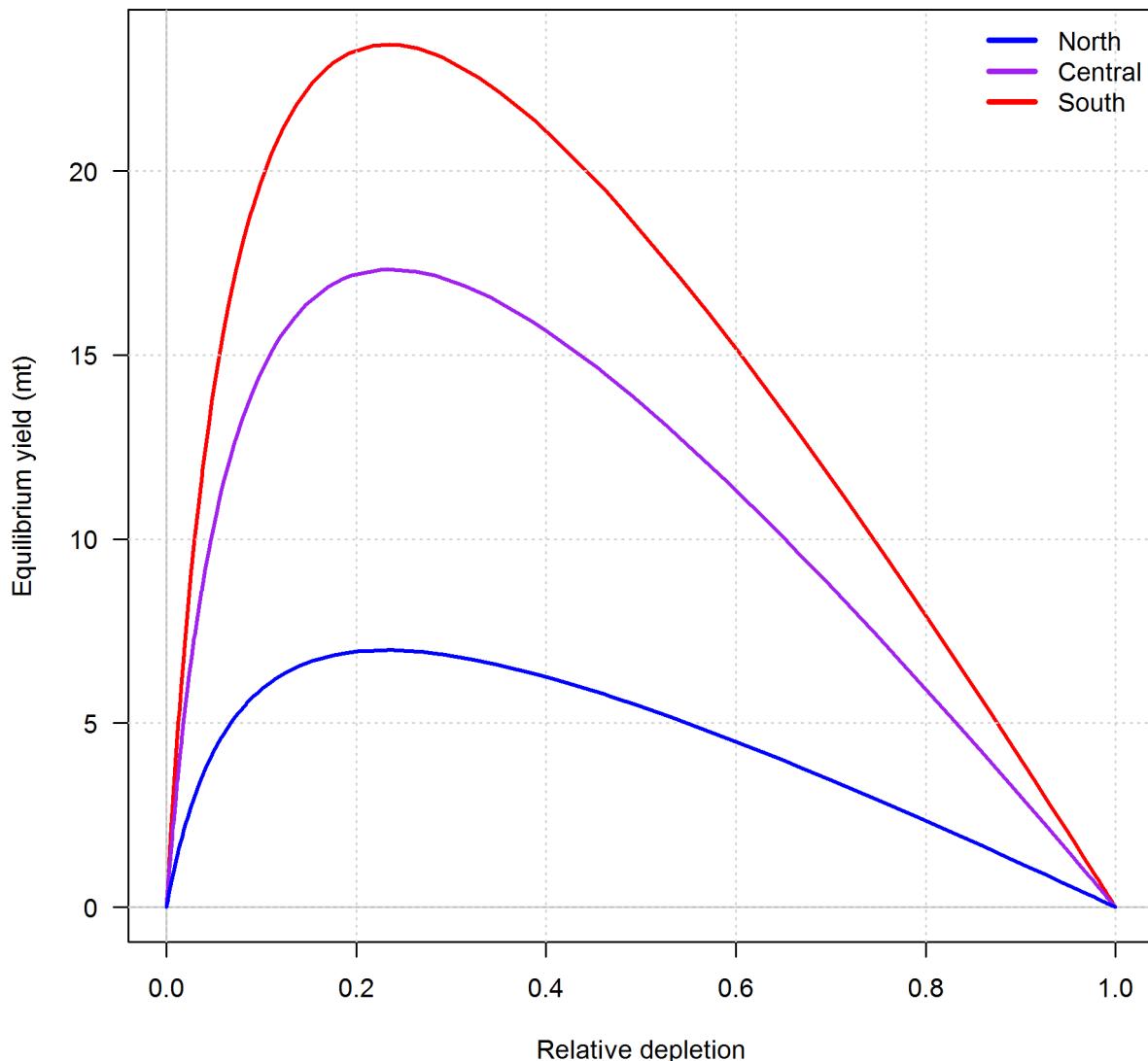


Figure j: Equilibrium yield curve for the base case models. Values are based on the 2014 fishery selectivity and with steepness fixed at 0.773.

315 **Research and data needs**

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

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

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

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

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

<sup>398</sup> **1 Introduction**

<sup>399</sup> **1.1 Basic Information and Life History**

<sup>400</sup> China rockfish (*Sebastes nebulosus*) is a medium-sized, commercially (mainly in the live-fish  
<sup>401</sup> fishery) and recreationally prized deeper-dwelling nearshore rockfish ranging from southern  
<sup>402</sup> California, north to the Gulf of Alaska (Love et al. 2002). Core abundance is found from  
<sup>403</sup> northern California to southern British Columbia, Canada. China rockfish are rarely encoun-  
<sup>404</sup> tered in the Southern California Bight (Love et al. 1998).

<sup>405</sup> There is limited information available on either stock structure or life history. No genetic  
<sup>406</sup> research has been conducted for China rockfish, and no published research indicates separate  
<sup>407</sup> stocks along the West Coast. China rockfish do not appear to exhibit sexual dimorphism  
<sup>408</sup> (Lenarz and Echeverria 1991), although data are limited. Fits to von Bertalanffy growth  
<sup>409</sup> curves (Bertalanffy 1938) using age-length data from Washington, Oregon, and California  
<sup>410</sup> indicate regional differences in growth and estimates of  $L_{\infty}$ . These data represent fish col-  
<sup>411</sup> lected from the recreational and commercial sectors as well as for research.

<sup>412</sup> China rockfish are among the longer-lived rockfish. Love (2002) reports China rockfish live to  
<sup>413</sup> at least 79 years, which is corroborated by the available age data used in this assessment. The  
<sup>414</sup> oldest aged China rockfish from Alaska was 78 years old (Munk 2001). Recently aged China  
<sup>415</sup> rockfish from the West Coast had a maximum age of 83 years from California (recreational  
<sup>416</sup> or research) in 1973. The oldest aged fish from Oregon was 79 from the commercial dead-fish  
<sup>417</sup> fishery in 2003 and in Washington, 77 years from the recreational fleet in 2000.

<sup>418</sup> Little is known about the maturity schedule and fecundity of China rockfish. Echeverria  
<sup>419</sup> (1987) collected 69 China rockfish, of which the age at first maturity was 3 years for males  
<sup>420</sup> and females (26 cm). Both males and females exhibited 50% maturity at 4 years (27 cm) and  
<sup>421</sup> 100% maturity at 6 years (30 cm). A study by Lea et al. (1999) captured females releasing  
<sup>422</sup> larvae in April and May, and spent females in April, June and October off the coast of  
<sup>423</sup> California. Echeverria (1987) identified January - June as the months of parturition for  
<sup>424</sup> China rockfish in north-central California, with the peak of reproductive activity in January.

<sup>425</sup> One diet study indicated that China rockfish in central California predominantly feed on  
<sup>426</sup> crustaceans and ophiuroids, while the diets of China rockfish in northern California was  
<sup>427</sup> dominated by crustaceans and mollusks (Lea et al. 1999). This is similar to the diet described  
<sup>428</sup> by Love et al. (2002) of benthic organisms, including brittle stars, crabs, and shrimps.

<sup>429</sup> Both juvenile and adult China rockfish tend to be solitary and exhibit high site fidelity  
<sup>430</sup> within rocky habitats. Surveys of rockfishes in *Nereocystis* and *Macrocystis* kelp forests  
<sup>431</sup> observed China rockfish in only the *Macrocystis* kelp forests, and overall sightings within  
<sup>432</sup> the kelp forests were rare (Bodkin 1986). Juvenile China rockfish inhabit shallow, subtidal  
<sup>433</sup> waters (Love et al. 2002), and an experimental study with captive China rockfish found  
<sup>434</sup> that juveniles exhibit both site fidelity and territoriality (Lee and Berejikian 2009). A tag  
<sup>435</sup> and recapture study by Lea et al. (1999) indicated China rockfish have high site fidelity.

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

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

#### 454 1.1.1 Early Life History

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

#### 464 1.2 Map

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

#### 467 1.3 Ecosystem Considerations

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

470 observer program indices of relative abundance from California and Oregon. The onboard  
471 observer program collects location-specific encounters of China rockfish. We overlaid the  
472 locations of China rockfish encounters with high-resolution bathymetry data to obtain a  
473 proxy of the extent of China rockfish habitat (see Appendix F for details, p.[F-1](#)).  
474

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

## 476 1.4 Fishery Information and Summary of Management History

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

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

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

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

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

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

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

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

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

## 525 1.5 Management Performance

526 China rockfish is managed in the northern and southern Nearshore Rockfish Complex, split at  
527 40°10' N. latitude. Since the 2011-2012 management cycle, China rockfish has a contribution  
528 OFL and ACL within each the northern and southern Nearshore Rockfish Complexes (Table  
529 n). The estimated catch of China rockfish north of 40°10' N. latitude of Nearshore Rockfish  
530 Complex has been above both the China rockfish contribution to the northern Nearshore  
531 Rockfish Complex OFL and ACL in all years (2011-2014). The estimated catch of China  
532 rockfish south of 40°10' N. latitude of Nearshore Rockfish Complex has been below the China  
533 rockfish contribution to the northern Nearshore Rockfish Complex OFL and ACL in all years  
534 (2011-2014). A summary of these values as well as other base case summary results can be  
535 found in Table s.

## 536 2 Assessment

### 537 2.1 Data

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

540 **2.1.1 Fishery-Dependent Data: Commercial Landings**

541 **Washington**

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

545 **Oregon**

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

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

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

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

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

## 586 California

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

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

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

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

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

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

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

620 California's commercial live-fish fishery began targeting nearshore rockfish species in the mid-  
621 1980s in southern California, and condition codes (live or dead) were required on landing  
622 receipts starting in 1993 (CDFG 2002). However, fish landed live are not always recorded  
623 as live landings on the landing receipts, so estimates of live landings should be viewed as a  
624 minimum estimate (CDFG 2002). Live annual landings of China rockfish surpassed landings  
625 of dead fish by the late 1990s, due to the increased value of fish landed live (Table 2, Figure  
626 9).

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

### 638 2.1.2 Fishery-Dependent Data: Commercial Discards

#### 639 Washington

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

#### 644 Oregon and California

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

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

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

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

666 Discard patterns in the area of Northern California between 40°10' N. latitude, and 42° N.  
667 latitude appears to be more similar to Oregon than the rest of California (Table 4). Although  
668 expanded fleet-wide discard estimates were not available on this smaller spatial-scale, only  
669 9% of observed trips between 40°10' N. latitude to 42° N. latitude that were associated with  
670 any catch of China rockfish had any observed discards of China rockfish. South of 40°10',  
671 82%-100% of such trips had observed discards of China rockfish.

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

### 683 2.1.3 Fishery-Dependent Data: Recreational Landings and Discards

#### 684 Washington

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

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

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

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

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

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

727 We assumed an average weight of 0.88 kg/fish ([RecFIN](#)) to convert the estimates from number  
728 of fish to metric tons for all years. The split between charter and private vessels prior to  
729 1990 was based on a ratio estimator using 1990-1994 data.

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

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

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

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

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

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

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

771 The sport reconstruction addressed four spatial and temporal coverage biases identified dur-  
772 ing an external review of ORBS by the RecFIN Statistical Subcommittee (Van Voorhees et  
773 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

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

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

#### 828 2.1.4 Fishery-Dependent Data: Oregon Commercial Logbook

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

838 Logbook information went through several data quality filters to attain as best as possible a  
839 consistent and representative data set through time to estimate a relative abundance trend.  
840 Results from the filtration algorithm are summarized in Table 9. Of note, only logbook  
841 submissions from black and blue rockfish permitted vessels with a nearshore endorsement  
842 were included in the analysis, because these vessels consistently fish in areas where China  
843 rockfish are encountered. To minimize temporal variation in reporting errors (or nuances),  
844 only vessels that fished all 10 years (2004 to 2013) were deemed the most likely to provide  
845 consistent responses through time. Operators of endorsed vessels may have changed through  
846 time. Individual observations of catch (kg) and effort (hook hour) were at the trip level,  
847 where multi-set trips were aggregated to the trip level. ODFW sets bimonthly trip landing  
848 limits for China rockfish and these have changed through time. However, trip limits have  
849 not generally been breached in the subset of logbook data used for China rockfish, and thus  
850 there was no need to exclude subsequent trips. The final subset of logbook data included  
851 3,575 trips (14% of the full set of logbook data) from 10 vessels (Figure 20).

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

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

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

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

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

893 **2.1.5 Fishery-Dependent Data: Recreational Dockside Surveys**

894 **Washington**

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

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

916 Covariates considered in the full model included *year*, *month*, *boat type*, *daily bag limits*,  
917 and *depth restrictions* (Figure 24). All covariates were specified as categorical variables.  
918 The stepwise selection of covariates included in the final model was evaluated using standard  
919 information criterion for relative goodness of fit (AIC). *Depth* was not included in the analysis  
920 because it was not uniformly recorded through time; depth data collection began during 2003.  
921 The covariates for *daily bag limits* and *depth restrictions* represent management changes.  
922 Summer fishing restrictions based on depth limitations were implemented during 2006 in  
923 WDFW areas 2, 3, and 4. The daily rockfish limit was 15 fish from 1961-1991, 12 fish from  
924 1992-1994, and reduced to 10 fish in 1995 (see Appendix H for the history of recreational  
925 regulations, p.H-1).

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

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

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

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

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

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

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

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

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

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

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

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

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

999 CPUE (number of fish per angler hour) was modelled using a “delta-GLM” model (Lo  
1000 et al. 1992, Stefánsson 1996). Model selection using AIC supported inclusion of *year* and  
1001 *region* effects in both the binomial and lognormal components of the index (Table 18). The  
1002 addition of two-month *wave* effects (to allow for seasonal changes in CPUE) did not improve  
1003 model fit. Data in the binomial component also supported inclusion of a distance from  
1004 shore variable (*AREA\_X*). Residual-based model diagnostics for the positive component of  
1005 the index suggest the data generally met the assumptions of the GLM (Figure 31). The  
1006 resulting index is highly variable, but suggests a decline in catch rates after 1995 relative to  
1007 preceding years (Table 19; Figure 32).

1008 **California North of 40°10' and Oregon Dockside Charter Boat Indices (MRFSS  
1009 and ORBS)**

1010 For the Oregon sport fisheries, three indices of abundance were used in the pre-STAR Panel  
1011 base model: (1) catch rates from the onboard observer program, (2) catch rates from the  
1012 dockside survey component of the ORBS, and (3) catch rates from the dockside MRFSS (see

1013 description of California MRFSS index, above). For the onboard observer index, all data  
1014 elements were verified by a biologist, and thus there was a high degree of certainty in the  
1015 catch, effort, and locations fished; however, there was limited spatial-temporal coverage and  
1016 only charter boats were included (not private boats). In contrast, the ORBS dockside survey  
1017 has more comprehensive coverage and much greater samples sizes (i.e., 50-70 times more trips  
1018 than onboard observer program), but there was less confidence in the data elements, as only  
1019 catch and the number of anglers were verified by biologists (all other trip details were angler-  
1020 reported). The two dockside programs (ORBS and MRFSS) differ in terms of the measure  
1021 of fishing effort (details below). A single fishing trip can be sampled in both by the onboard  
1022 observer program and also dockside within ORBS. Because the onboard observer program  
1023 data is at a much finer scale than the trip-based dockside data; we removed trips from the  
1024 ORBS database that were double-sampled and chose to retain all onboard observer trips.

1025 **Index Standardization: MRFSS Dockside Charter Boat CPUE for California**  
1026 **North of 40°10' and Oregon**

1027 An index based on MRFSS data for northern California and Oregon was developed for the  
1028 pre-STAR base model. Prior to the review meeting, it was discovered that the data were not  
1029 trip-level data, and the index was removed from the final base model, with negligible effect  
1030 on model results. The STAT recommends that future China rockfish assessments examine  
1031 trip-level MRFSS catch and effort data as a potential index of abundance.

1032 **Index Standardization: Oregon Recreational Boat Survey (ORBS) Dockside**  
1033 **Charter Boat CPUE**

1034 In order to provide estimates of total catch and effort for the Oregon sport fisheries, ORBS  
1035 obtains catch rates from a portion of vessels via a dockside survey, and applies them to total  
1036 effort counts. During the dockside survey, biologists intercept vessels returning from fishing  
1037 trips and record catch, effort, and other trip-related details (e.g., grid area fished, target  
1038 species, depth, port, etc.). Since catch and effort per sampled trip are both obtained, the  
1039 dockside survey of ORBS was also used to develop an index of abundance for China rockfish.

1040 Modifications had to be made to trip hours from the original ORBS dataset to create a  
1041 standardized unit of effort. Since trip hours in ORBS are not hours fished, as in MRFSS,  
1042 but rather the total duration of the trip (as measured from the time the boat crossed into the  
1043 ocean until the time they were interviewed at the dock), travel times had to be determined  
1044 and subtracted from trip hours in order to get a standardized measure of fishing effort per  
1045 trip. Accordingly, a total distance function was created for each trip based on the river  
1046 miles (distance along the navigable channel from the port to the bar (river mouth)) and  
1047 ocean miles (i.e., straight distance from the river bar to the ocean grid fished, wrapping  
1048 around obstructions if needed). Total distance was then converted to travel time based on  
1049 generalized vessel speeds for private (i.e., 18 mph) and charter boats (i.e., 13 mph) provided  
1050 by Wayne Butler (Oregon charter captain; personal communication). It is important to note  
1051 that the original trips hours minus travel hours still does not equal hours fished because it  
1052 does account for time needed to move from drift to drift; however, since the number of resets  
1053 between drifts would be expected to be related to fish abundance (as with catch rates),

1054 the modified trips hours was deemed a viable effort unit for the assessment. Some trips  
1055 had erroneous trips hours (discrepancies between values entered on paper and then entered  
1056 electronically later). These were the steps taken to correct the issue:

- 1057 1. Trip hours is computed automatically by the data logger based on the time the inter-  
1058 view is entered electronically
- 1059 2. If samplers write their interviews on paper and enter them electronically later when  
1060 they have time (as believed to have happened despite being instructed not to), then  
1061 the trip hours are inflated.
- 1062 3. To potentially remove these errors, we computed time intervals between interviews.  
1063 Pulses of interviews a minute or two apart are very likely to have been from bunches  
1064 of paper interviews entered at electronically in one sitting, as normal interviews are  
1065 somewhat sporadic and take more than a minute to complete.

1066 The ORBS dockside charter boat records (years 2001-2014) include 36,752 trips in the un-  
1067 filtered data set, of which 4,080 caught China rockfish (11%). As with the other trip-based  
1068 CPUE data sets, the Stephens-MacCall method was used to identify trips with a high prob-  
1069 ability of catching China rockfish. Prior to using the Stephens-MacCall approach to select  
1070 relevant trips, a number of other filters were applied to the data to minimize variability in  
1071 CPUE estimates. Criteria for valid trips included vessels with 20+ sampled trips (13% of  
1072 vessels accounted for 89% of trips) and trip hours <12. Trips targeting tuna and dive trips  
1073 were excluded from the analysis (see Table 20 for other filters).

1074 As with the MRFSS indices, potentially informative species for the Stephens-MacCall analy-  
1075 sis were defined as those occurring in at least 30 unique trips, in 10 different years (Figure 33).  
1076 Some of these never occurred with China rockfish (strong ‘counter-indicators’) and records  
1077 with these species were removed from the data prior to estimation of the index. Strong  
1078 counter-indicators for the ORBS data set included blue shark, white sturgeon, steelhead,  
1079 and albacore. Trips in which at least 99% of the catch consisted of pelagic rockfish were also  
1080 excluded, as anglers were likely targeting semi-pelagic rockfish (Table 20).

1081 Coefficients from the Stephens-MacCall analysis identified several rockfish species (black,  
1082 rosy, tiger, bocaccio, vermillion, yelloweye, copper, etc.) as indicators of positive China  
1083 rockfish catch, along with lingcod, kelp greenling, and cabezon. Counter-indicators included  
1084 deep-water rockfish, salmonids, and Pacific Halibut. Brown rockfish, another nearshore  
1085 rockfish species, was among the counter-indicator species, reasons for which are unclear to  
1086 the STAT at this time.

1087 A total of 6232 trips were retained following the Stephens-MacCall filter (Table 21). Model  
1088 selection with AIC proceeded as with the other dockside indices, but the ORBS data sup-  
1089 ported an interaction term in the lognormal component of the delta-GLM (Table 22). The  
1090 interaction was not supported by the binomial model (although AIC retained a region effect),  
1091 but the keeping the year-region interaction term in the positive model reduced the AIC by  
1092 38 points over a model with year and region alone (Table 22).

1093 To account for this interaction, separate delta-GLM models (each with a year and wave  
1094 effect) were fit to the regional data (Southern OR and Northern OR, split at Florence). The  
1095 regional indices show little change in the northern region, but a decline in catch rates in  
1096 the south (Figure 34). Residual diagnostics for the regional models did not show strong  
1097 deviations from model assumptions in either area (Figures 35 and 36). Estimated area of  
1098 rocky reefs off Oregon was generated using GIS (see description of onboard observer indices),  
1099 and we calculated an area-weighted index based on the relative proportion of reef habitat in  
1100 each region (total reef habitat distributed as 35.4% north, 64.6% south).

1101 The final, area-weighted index (Table 23, Figure 37) shows a declining stock (on average,  
1102 statewide), but the STAT emphasizes that this does not capture regional patterns in CPUE,  
1103 and may underestimate the fishing impacts in the southern region, and overestimate impacts  
1104 in the north.

#### 1105 2.1.6 Fishery-Dependent Data: Recreational Onboard Observer Surveys

1106 The goal of the Observer Programs in California and Oregon is to collect data including  
1107 charter boat fishing locations, catch and discard of observed fish by species, and lengths of  
1108 discarded fish. Both states sample the commercial passenger fishing vessel (CPFV), i.e., char-  
1109 ter boat or for-hire fleet. The onboard observer programs collect drift-specific information  
1110 at each fishing stop on an observed trip. At each fishing stop recorded information includes  
1111 start and end times, start and end location (latitude/longitude), start and end depth, num-  
1112 ber of observed anglers (a subset of the total anglers), and the catch (retained and discarded)  
1113 by species of the observed anglers. Data for the onboard observer indices for the recreational  
1114 CPFV fleet are from four sampling programs.

1115 The CDFW conducted an onboard observer program in central California from 1987-1998  
1116 (Reilly et al. 1998). These data were previously used in the 2013 data moderate assessments  
1117 (Cope et al. 2015), at the level of a fishing trip. Since the 2013 assessments, the original  
1118 data sheets were acquired and data were keypunched to the level of fishing stop. One caveat  
1119 of this data is that location data were recorded at a finer scale than the catch data. We  
1120 aggregated the relevant location information (time and number of observed anglers) to match  
1121 the available catch information. Between April 1987 and July 1992 the number of observed  
1122 anglers was not recorded for each fishing stop, but the number of anglers aboard the vessel is  
1123 available. We imputed the number of observed anglers using the number of anglers aboard  
1124 the vessel and the number of observed anglers at each fishing stop from the August 1992-  
1125 December 1998 data (see Appendix E for details, p.E-1). In 1987, trips were only observed  
1126 in Monterey, CA and were therefore excluded from the analysis. CDFW collected lengths of  
1127 both retained and discarded fish during this time period. All China rockfish measured were  
1128 retained and lengths are used as length compositions for this index.

1129 California implemented a statewide sampling program in 1999 (Monk et al. 2014). California  
1130 Polytechnic State University (Cal Poly) has conducted an independent onboard sampling  
1131 program as of 2003 for boats in Port San Luis and Morro Bay (Stephens et al. 2006), but

1132 follows the protocols established in Reilly et al. (1998), and modified to reflect sampling  
1133 changes that CDFW has also adopted, e.g., observing fish as they are landed instead of at  
1134 the level of a fisher's bag. Therefore, the Cal Poly data area incorporated in the same index  
1135 as the CDFW data from 1999-2014. CalPoly collects lengths of both retained and discarded  
1136 fish.

1137 We generated separate relative indices of abundance in California for the 1987-1999 and  
1138 2000-2014 datasets due to the number of regulation changes occurring throughout the time  
1139 period (see Appendix H, p.[H-1](#)). CDFW implemented a regulation of three hooks in 2000,  
1140 which was reduced to (and remains at) two hooks in 2001.

1141 The ODFW initiated an onboard observer program in 2001, which became a yearly sampling  
1142 program in 2003 (Monk et al. 2013). Both California and Oregon provided onboard sampling  
1143 data through 2014. Both of these programs only collected lengths of discarded fish, and the  
1144 number of lengths of China rockfish from these studies is small (Figure [38](#)).

1145 All indices were standardized using a delta-GLM modeling approach (Lo et al. 1992). Data  
1146 were analyzed at the drift level and catch was taken to be the sum of observed retained and  
1147 discarded fish, i.e., number of fish encountered per angler hour. The onboard observer data  
1148 from the CDFW 1999-2014 data between north of 40°10' N. latitude and the Oregon border  
1149 were too sparse to include in the index. Therefore, indices used in the model with a break  
1150 at 40°10' N. latitude remain the same as the state-specific onboard observer indices.

#### 1151 *Data Filtering*

1152 Prior to any analyses, a preliminary data filter was applied.

1153 Trips/drifts from the CDFW 1988-1998 meeting the following criteria were excluded from  
1154 analyses:

- 1155 1. Drift associated with a fishing location code that was not assigned to a reef
- 1156 2. Drifts identified as having possible erroneous location, observed anglers, or time data
- 1157 3. Trips encountering <50% groundfish species (number of fish)

1158 Trips/drifts from the ODFW, CDFW 1999-2014, and Cal Poly databases meeting the fol-  
1159 lowing criteria were excluded from analyses:

- 1160 1. ODFW halibut-targeted trips were excluded
- 1161 2. Drifts south of Pt. Conception (only 2 China rockfish observed south of Pt. Conception)
- 1162 3. Trips encountering <50% groundfish species
- 1163 4. Drifts within the current Stonewall Bank Yelloweye Rockfish Conservation
- 1164 5. Drifts within Arcata Bay, Humboldt Bay, South Bay, or San Francisco Bay
- 1165 6. Drifts missing a starting location (latitude/longitude)
- 1166 7. Drifts identified as having possible erroneous location or time data
- 1167 8. Drifts missing both starting and ending depths
- 1168 9. Drifts within the habitat data occurring farther than 83 m from a reef in Oregon and 34
- 1169 m in California (see Appendix F (p. [F-1](#)) for details)
- 1170 10. Drifts outside the habitat data in California occurring farther than 141 m from reef (see
- 1171 Appendix F (p. [F-1](#)) for details)

- 1172 11. Drifts occurring on a reef with <3 positive encounters of China rockfish  
1173 12. Drifts occurring on a reef in which China rockfish was observed in <25% of years the  
1174 reef was visited

1175 **Index standardization: Oregon**

1176 At the March 2015 Nearshore Stock Assessments Workshop the issue of hook saturation by  
1177 black rockfish (*Sebastodes melanops*) in Oregon was raised ([Agenda Item D.8 Attachment 10](#),  
1178 June 2015). The recreational fishery in Oregon specifically targets black rockfish. While black  
1179 rockfish associate with rocky habitat, they are a schooling, midwater species. Fishermen  
1180 specifically targeting black rockfish may not drop their lines to the seafloor, or may encounter  
1181 black rockfish and other midwater species before their lines can reach the seafloor. To address  
1182 this issue in the onboard observer data, we filtered out drifts for which the catch (retained  
1183 plus discarded) consisted of at least 95% black, blue (*Sebastodes mystinus*) and yellowtail  
1184 (*Sebastodes flavidus*) rockfishes, the most commonly occurring midwater rockfish species. This  
1185 resulted in a decrease in the number of drifts by 4,092, only three of which observed China  
1186 rockfish.

1187 The filtered dataset included 6,038 drifts, of which 259 (4%) drifts with positive encounters  
1188 (Table 24). The majority of drifts sampled (75%) were from north of Florence, although  
1189 China rockfish were present in 6% of drifts in southern Oregon and 3% of drifts in the north.  
1190 Covariates considered in the full model included *year*, *depth*, *month* or *2-month wave* and,  
1191 *region* (Figures 39 and 40). To increase sample sizes data from waves 2 and 3 were aggregated  
1192 as well as from 4 and 5 (ODFW does not sample in waves 1 and 6). Depths greater than 20  
1193 m were also binned to 20-59 m.

1194 The final selected dataset contained categorical variables for *year* (13 levels), *wave* (2 levels),  
1195 *region* (2 levels, north and south of Florence), and three depth bins (*depth*: 0-19 m, and  
1196 20-59 m). A lognormal model was selected over a gamma for the positive encounters by a  
1197 deltaAIC of 20.01. Model selection, using AIC, selected a lognormal model with *year*, *wave*,  
1198 *depth*, *region*, and a *wave:depth* interaction, while a binomial with *year*, *region*, and *wave*  
1199 was selected (Table 25). In the lognormal submodel, stepwise BIC retained the *year*. In  
1200 the binomial model, stepwise BIC retained *region* and *wave*. The final *year* effects from the  
1201 delta-GLM with main effects *year*, *region*, and *wave* are shown in Table 26 and Figure 41).  
1202 The final model suggests that relative abundance was slightly higher in southern Oregon,  
1203 and in waves 4 and 5. Standard model diagnostics show adequate fit and general consistency  
1204 with GLM model assumptions for the positive catch component (Figure 42).

1205 **Index standardization: California**

1206 *Central California 1988-1998*

1207 The filtered dataset included 5,557 drifts, of which 852 (15%) drifts with positive encounters  
1208 (Table 24). To increase sample sizes, data from Regions 2 and 3 were aggregated as well as  
1209 Regions 8 and 9. Samples north of Ten Mile River were too sparse to reliably include in the  
1210 index.

1211 Covariates considered in the full model included *year*, *depth*, *month or 2-month wave* and,  
1212 *region* (Figures 43 and 44). The selected data contained categorical variables for *year* (13  
1213 levels), *wave* (6 levels), *region* (5 levels), and four depth bins (*depth*: 0-19 m, 20-39 m, 40-59 m,  
1214 and 60-79 m). A lognormal model was selected over a gamma for the positive encounters by a  
1215 deltaAIC of 125.06. Model selection, using AIC, selected a lognormal model with *year*, *depth*,  
1216 *and region*, while a binomial with *year*, *region*, *depth*, *wave*, and a *year:region* interaction was  
1217 selected. However, the standard errors of the binomial model with interactions were large,  
1218 and suggested data were too sparse to explore the *year:region* interaction. For the lognormal  
1219 submodel, stepwise BIC retained the *depth* and *region* (Table 27). For the binomial submodel,  
1220 stepwise BIC retained *year*, *region*, and *depth*. The final *year* effects from the delta-GLM with  
1221 main effects *year*, *region*, and *depth* are shown in Table 28 and Figure 45). The covariates in  
1222 the final model suggest the relative abundance of China rockfish decreases with depth and  
1223 increases north of Monterey, CA. Standard model diagnostics show adequate fit and general  
1224 consistency with GLM model assumptions for the positive catch component (Figure 46)

1225 *California (north of Pt. Conception) 2000-2014*

1226 The filtered dataset included 13,993 drifts, of which 1,403 (10%) drifts with positive encoun-  
1227 ters (Table 24). CDFW began sampling Region 12 (Trinidad Head to the OR border) in  
1228 2008 and no trips from Region 11 (Cape Mendocino to the Eel River) were sampled from  
1229 2000-2014. From 2008-2014, only 10 drifts encountering China rockfish were observed in  
1230 Region 12. Therefore, the following index only reflects the population south of Cape Mendo-  
1231 cino. Further, to increase sample sizes drifts from Regions 2 and 3 were aggregated as well  
1232 as Regions 7 and 8, and Regions 9 and 10.

1233 Covariates considered in the full model included *year*, *depth*, *month or 2-month wave* and,  
1234 *region* (Figures 47 and 48). The selected data contained categorical variables for *year* (15  
1235 levels), *wave* (6 levels), *region* (6 levels), and four depth bins (*depth*: 0-19 m, 20-39 m, 40-59  
1236 m, and 60-79 m). A lognormal model was selected over a gamma for the positive encounters  
1237 by a deltaAIC of 115.91. Model selection, using AIC, selected a lognormal model with *year*,  
1238 *depth*, *and region*, while a binomial with *year*, *region*, *depth*, and a *year:region* interaction was  
1239 selected. However, the standard errors of the binomial model with interactions were large,  
1240 and suggested data were too sparse to explore the *year:region* interaction. For the lognormal  
1241 submodel, stepwise BIC retained the *year* and *region* (Table 29). For the binomial submodel,  
1242 stepwise BIC retained *region*, and *depth*. The final *YEAR* effects from the delta-GLM with  
1243 main effects *year*, *region*, and *depth* are shown in Table 30 and Figure 49). The covariates  
1244 in the final model suggest the relative abundance of China rockfish decreases with depth,  
1245 specifically in depths greater than 59 m, and increases south to north. Standard model  
1246 diagnostics show adequate fit and general consistency with GLM model assumptions for the  
1247 positive catch component (Figure 50)

1248 **2.1.7 Fishery-Independent Data: sources considered, but not used in assess-**  
1249 **ment**

1250 *Northwest Fisheries Science Center (NWFSC) slope survey*

1251 The NWFSC slope survey was conducted annually from 1999 to 2002. The depth range of  
1252 this survey (100-700 fm) is outside the depth range of China rockfish, and was therefore not  
1253 used in this assessment.

1254 *Northwest Fisheries Science Center (NWFSC) shelf-slope survey*

1255 This survey is referred to as the “combo,” conducted annually since 2003. The survey  
1256 consistently covered depths between 30 and 700 fm, and has never encountered a China  
1257 rockfish. Therefore, the combo survey was not used in this assessment.

1258 *Alaska Fisheries Science Center (AFSC) shelf survey*

1259 The survey, often referred to as the “triennial” survey was conducted every third year between  
1260 1977 and (and conducted in 2004 by the NWFSC using the same protocols). The triennial  
1261 survey trawls in depths (generally 30 to 275 fm) that are deeper the range and habitats of  
1262 China rockfish, and was therefore not used in this assessment.

1263 *Pikitch study*

1264 The Pikitch study was conducted between 1985 and 1987 (Pikitch et al. 1988). The northern  
1265 and southern boundaries of the study were 48°42' N latitude and 42°60' N. latitude respec-  
1266 tively, which is primarily within the Columbia INPFC area (Pikitch et al. 1988 , Rogers and  
1267 Pikitch 1992). Participation in the study was voluntary and included vessels using bottom,  
1268 midwater, and shrimp trawl gears. Observers of normal fishing operations on commercial  
1269 vessels collected the data, estimated the total weight of the catch by tow and recorded the  
1270 weight of species retained and discarded in the sample. China rockfish are not targeted using  
1271 trawl gear, and therefore we did not use data from this survey in the assessment.

1272 *Enhanced Data Collection Project (EDCP)*

1273 The EDCP was conducted by ODFW to collect information on bycatch and discard ground-  
1274 fish species off the coast of Oregon from late 1995 to early 1999. EDCP had limited spatial  
1275 coverage in Oregon waters only. China rockfish are not targeted using trawl gear, and  
1276 therefore we did not use data from this survey in the assessment.

1277 *Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)*

1278 A total of 59 China rockfish were observed in 17,657 SCUBA transects conducted in the  
1279 southern and central survey regions. Transects were conducted in Northern California and  
1280 Oregon for two years (2010-2011), with a higher occurrence of China rockfish (156 out of  
1281 956 transects).

1282 **2.1.8 Biological Data: Length and age compositions**

1283 Length compositions were provided from the following sources, by region, with brief descrip-  
1284 tions below:

1285 Southern model (*south of 40°10' N. latitude*)

- 1286 • Jeff Abrams' thesis (*research, 2010-2011*)
- 1287 • CALCOM (*commercial dead fish, 1992-2006, excluding 1999*)
- 1288 • CALCOM (*commercial live fish, 1997-2012*)
- 1289 • CDFW onboard observer (*recreational charter, 1987-1998*)
- 1290 • California recreational sources combined (*charter mode, 1960, 1978-2014*)
  - 1291 – Miller and Gotshall survey
  - 1292 – CA rec. sampling (1978-1985)
  - 1293 – MRFSS (1980-2003)
  - 1294 – CRFS (2004-2014)
- 1295 • California recreational sources combined (*private mode, 1959 and 1980-2014*)
  - 1296 – Miller and Gotshall survey
  - 1297 – CA recreational sampling (1978-1985)
  - 1298 – MRFSS (1980-2003)
  - 1299 – CRFS (2004-2014)
- 1300 • CCFRP (*research, Point Buchon to Año Nuevo, 2007-2013*)
- 1301 • WCGOP (*discards, 2004-2013*)

1302 Central model (*California north of 40°10' N. latitude to the OR/WA border*)

- 1303 • ORBS north of Florence (*recreational, charter and private modes, 1980-2014*)
- 1304 • ORBS south of Florence (*recreational, charter mode, 1984-2014*)
- 1305 • ORBS south of Florence (*recreational, private mode, 1980-2014*)
- 1306 • PacFIN Oregon (*commercial live fishery, sexes combined, 1998-2014*)
- 1307 • PacFIN Oregon (*commercial dead fishery, sexes combined, 1995-2014*)
- 1308 • CALCOM (*commercial dead fish, 1992-2002*)
- 1309 • CALCOM (*commercial live fish, 1997-2010*)
- 1310 • California recreational sources combined (*charter and private modes, 1981-2014*)
  - 1311 – MRFSS (1981-2003)
  - 1312 – CRFS (2004-2014)

1313 Northern model (*Washington state MCAs 1-4*)

- 1314 • Washington MCAs 3-4 (*recreational all modes, 1979-2014*)
- 1315 • Washington MCAs 1-2 (*recreational all modes, 1969-2014*)

1316 Recreational: Washington (WDFW)

1317 Recreational length- and age- composition data were provided directly from WDFW during winter 2015. The WDFW routinely collected recreational biological samples for Chinook 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 1323

1324 summarized by the number of fish sampled (Table 31). The WA recreational length- and  
1325 age- compositions are shown in Figures 51, 52, 9, and 53.

1326 *Recreational: California MRFSS and CRFS length composition data*

1327 Individual fish lengths recorded by MRFSS (1980-2003) and CRFS (2004-2011) samplers were  
1328 downloaded from the RecFIN website ([www.recfin.org](http://www.recfin.org)). CRFS data from 2012-2014 were  
1329 obtained directly from CDFW. Fish were assigned to the northern and southern management  
1330 areas based on county and interview site number. To examine finer scale spatial differences  
1331 in size composition data, interview sites in each county were assigned to a CRFS district  
1332 (including years prior to 2004). Distributions of lengths increased from south to north, with  
1333 the largest change in mean length occurring between CRFS districts 5 & 6 (roughly around  
1334 Cape Mendocino; Figure 54). This pattern was consistent across all years of CRFS sampling  
1335 (2004-2014; Figure 55). Sizes of retained fish north of Cape Mendocino were more similar  
1336 to fish caught in Oregon than fish caught south of Cape Mendocino. Since both biological  
1337 (e.g. growth) and fishery-related (e.g. selectivity, retention) factors can influence the size  
1338 compositions, length at age was estimated internal to the assessment models in all three  
1339 areas.

1340 *Recreational: Oregon Recreational Boat Survey (ORBS)*

1341 Biological data from the ORBS program were provided by ODFW. The ORBS is a dockside  
1342 sampling program for the both the recreational CPFV and private modes. Length compo-  
1343 sition samples from north of Florence for the CPFV and private fleets were provided from  
1344 1980-2014. Samples from south of Florence spanned 1984-2014. Distributions of length data  
1345 from these southern and northern parts of Oregon were similar to each other, and across  
1346 years (Figure 56).

1347 *Recreational: Miller and Gotshall (1965)*

1348 The Northern California Marine Sport Fish Survey conducted an assessment survey with  
1349 goals that included estimation of annual fishing effort by all recreational fishing modes,  
1350 catch by weight, CPUE, and collection of data to analyze length compositions. Lengths  
1351 from 101 China rockfish were collected from 1959-1960. Lengths of China rockfish from 1959  
1352 primarily came from private/rental boats, and lengths from 1960 came from charter boats.  
1353 These two years of data were not consistent with length composition data from later years,  
1354 and were influential on model results (see model sensitivities to these data).

1355 *Commercial: PacFIN (Oregon and California)*

1356 Biological data from commercial fisheries for China rockfish were extracted from PacFIN  
1357 (PSMFC) on May 18, 2015. Commercial landings and the biological characteristics of hook-  
1358 and-line landings were sampled from 1995-2014 in Oregon and in 1991-2013 California. There  
1359 is no commercial catch of China rockfish in the state of Washington. Currently, port biol-  
1360 ogists employed by each state fishery agency collect species-composition information and  
1361 biological data from the landed catches. The monitoring programs currently in place vary  
1362 between the states but are generally based on stratified, multistage sampling designs. The  
1363 OR data were available by live fish fishery landings and dead fish fishery landings, but fish

1364 conditions were not available for PacFIN for the CA landings. Due to the lack of fish condition  
1365 data for CA in PacFIN, the CA commercial fishery compositions were downloaded from  
1366 the [CALCOM](#) database.

1367 Annual commercial length- and age-frequency distributions were developed for each state for  
1368 which observations were available, following the same bin structure as was used for research  
1369 observations. For each fleet, the raw observations were expanded to the sample level, to  
1370 allow for any fish that were not measured, then to the trip level to account for the relative  
1371 size of the landing from which the sample was obtained. Length and age data collected from  
1372 commercial landings for OR and CA are summarized by the number of port samples (Tables  
1373 [32](#) and [33](#)). Figures [57](#), [58](#), [59](#), [60](#), [61](#), and [62](#) show plots of the commercial length and age  
1374 composition data for the central model. Figures [63](#), [64](#), and [65](#) show plots of the commercial  
1375 length and age composition data for the southern model.

1376 *Research: NMFS groundfish ecology survey*

1377 From 2001-2005, the SWFSC Fisheries Ecology Division conducted longline surveys aboard  
1378 a chartered commercial longline vessel at various stations between Monterey and Davenport,  
1379 CA (36° N. latitude to 37.5° N. latitude)(pers. comm. Don Pearson, SWFSC). Longline gear  
1380 was set in various depths from 10 meters to 700 meters, parallel to the depth contour. Each  
1381 longline set consisted of 3-5 skates, each with about 250 2/0 circle hooks baited with squid.  
1382 In nearshore habitats, we allowed the gear to soak for roughly 30 minutes. A small number  
1383 of China rockfish length samples were available from this cruise, but were not included in  
1384 the assessments due to sample size and potential differences in selectivity.

1385 *Research: California Collaborative Fisheries Research Program (CCFRP)*

1386 The [California Collaborative Fisheries Research Program](#) (CCFRP), created by Rick Starr  
1387 (Sea Grant and Moss Landing Marine Laboratory) and Dean Wendt (Cal Poly San Luis  
1388 Obispo), monitors marine protected areas (MPAs) and gathers information useful for fisheries  
1389 management (Starr et al. 2015). This program has been running in Central California since  
1390 2007. Length compositions for China rockfish were included in this assessment (Figure [66](#)).

1391 Future research is planned to use CPUE information from this program, comparing relative  
1392 abundance indices derived from fishery-dependent and fishery-independent monitoring pro-  
1393 grams. The CCFRP data provide a time series of fishery-independent catch and effort at  
1394 fixed stations, collecting information at sample sites inside and outside of MPAs spanning  
1395 about 200 miles of the California coast from Point Buchon to Año Nuevo. This fishery-  
1396 independent information, combined with our current fishery-dependent information (i.e.,  
1397 CPFV onboard observer data), provides an opportunity for fine-scale spatial and temporal  
1398 analysis of catch rates and species compositions, specifically addressing the research needs  
1399 identified in nearshore rockfish stock assessments.

1400 *Research: Abrams Thesis*

1401 Jeff Abrams (2014) conducted a research study aboard recreational charter boats from Cres-  
1402 cent City Harbor, Trinidad Bay and the Noyo River Harbor. Rocky habitat was identified

1403 from high resolution bathymetric data and gridded into 500 m by 500 m cells (California  
1404 Seafloor Mapping Project, data available from: <http://seafloor.ottrelabs.org/index.html>).  
1405 During a sampling event, cells were randomly selected to fish. Fish were captured via hook-  
1406 and-line by either researchers, students, or recreational fishers. The charter boat captain  
1407 was not allowed to search and target fish within the cell. Fishing drifts started at the up-  
1408 current/wind side of the cell and drifted to the opposite edge of the cell, then stopped the  
1409 clock and reset for another drift (Jeff Abrams, pers. comm.) If it was certain that fishing  
1410 was occurring over sand, the captain would generally reset. However, because cells were  
1411 selected with a minimum area of rocky habitat, this was rare. This study provided 138  
1412 individual China rockfish, which were used as Conditional Age-at-Length (CAAL) in the  
1413 southern model (Figure 67).

#### 1414 2.1.9 Biological Data: Age structures

1415 Age structure data were available from the following sources:

1416 *Southern model (California south of 40°10' N latitude)*

- 1417 • Jeff Abrams' thesis (*research*, 2010-2011)
- 1418 • CDFW (*recreational and research*, 1972-1985)
- 1419 • CDFW (*recreational CPFV*, 1977-1986)
- 1420 • CDFW (*recreational CPFV*, 1980-1984)
- 1421 • NMFS groundfish ecology (*research*, 2003-2005)

1422 *Central model (California north of 40°10' N latitude to the OR/WA border)*

- 1423
- 1424 • Oregon, majority south of Florence (*commercial dead landings*, 2001-2013)
  - 1425 • Oregon, north of Florence (*recreational, all modes combined*, 2005-2013)
  - 1426 • Oregon, south of Florence (*recreational, all modes combined*, 2005-2013)

1427 *Northern model (Washington state MCAs 1-4)*

- 1428
- 1429 • Washington South (MCAs 1-2, *recreational, all modes combined*, 2014)
  - Washington North (MCAs 3-4, *recreational, all modes combined*, 1998-2014)

1430 The commercial ages from Oregon were extracted from PacFIN, and these data are uploaded  
1431 by the states. The Washington state ages were provided by Tien-Shui Tsou (pers. comm.)  
1432 and aged by WDFW. Otoliths from various CDFW sampling programs (1972-1985) were  
1433 aged for this assessment. It is unclear whether the otoliths were obtained from recreational  
1434 boat modes, research cruises, and diving modes. For this reason, these ages were not included  
1435 in the assessment models, but were used for external estimation of size at age. Commercial  
1436 port samplers in California sampled catch from recreational charter boats in the late 1970s  
1437 and early 1980s.

1438 A total of 3,963 fish were aged/re-aged for this assessment (Table 34), very few of which  
1439 were small or young fish(Figure 68). Prior to this assessment, the only available growth

1440 curve for China rockfish was estimated from Lea et al. (1999). Lea et al. (1999) aged China  
1441 rockfish via the surface aging method. Surface ages are biased towards younger ages; the  
1442 break-and-burn method is preferred and more precise (Beamish 1979, Kimura et al. 1979).  
1443 All ages for this assessment were aged using the break-and-burn method, either by WDFW  
1444 or the NMFS NWFSC Aging Lab.

1445 Length-at-age was initially estimated external to the population dynamics models using the  
1446 von Bertalanffy growth curve (Bertalanffy 1938),  $L_i = L_\infty e^{(-k[t-t_0])}$ , where  $L_i$  is the length  
1447 (cm) at age  $i$ ,  $t$  is age in years,  $k$  is rate of increase in growth,  $t_0$  is the intercept, and  $L_\infty$   
1448 is the asymptotic length. The unavailability of small fish results in unrealistic estimates  
1449 of  $t_0$ , on the order of -9 to -20 depending on the subset of data modeled. For exploratory  
1450 purposes,  $t_0$  was fixed at 0, and for final estimates of growth the length of age-0 fish was  
1451 fixed at 2 cm. The NMFS SWFSC conducts an annual rockfish recruitment and ecosystem  
1452 assessment survey. Pelagic juvenile rockfish are collected at an average age of approximately  
1453 100 days. The mean size of all rockfish species at 1 month of age was roughly 2 cm. At  
1454 this age, length-at-age is fairly consistent among species and therefore differences in growth  
1455 among species are unlikely to introduce considerable bias. We approximated size-at-age zero  
1456 in the assessment with a value of 2 cm.

1457 Differences in growth between sexes, among fleets, and regions were explored. To remove  
1458 biases introduced by region or fleet, we used data from the southern Oregon (south of  
1459 Florence, OR) commercial (dead fish) fleet to look at the growth difference between males  
1460 and females. Few fish were aged older than 37 years (5.8%). For ages in which there were  
1461 fish aged older than 37 years, there was only one fish in each age. Including these fish  
1462 in the model proved to bias the von Bertalanffy growth estimates (large ( $>1.5$ ) standard  
1463 errors in estimates of  $L_\infty$ ). Therefore, the following exploratory analyses exclude fish older  
1464 than 37 years. Fixing  $t_0$  at 0, the other parameters for males and females were similar and  
1465 the differences were not biologically significant, (Males:  $L_\infty = 37.14, k = 0.21$ ; Females:  
1466  $L_\infty = 35.91, k = 0.23$ ). This result, estimating males having a larger asymptotic size of  
1467 approximately 1 cm than females, is anomalous, as females are larger than males in all but  
1468 one rockfish species (Love et al. 2002). This is also inconsistent with the analysis of Lenarz  
1469 and Echeverria (1991), which identified no significant sexually dimorphic characters in China  
1470 rockfish. Quillback rockfish (*Sebastodes maliger*, also in the *Pteropodus* subgenus) are also long-  
1471 lived and don't exhibit dimorphic growth until approximately age 30, with an estimated  $L_\infty$   
1472 of 0.5 cm greater for females than males (Love et al. 2002). Given the sparse data for older  
1473 China rockfish and the unlikelihood of China rockfish being the only rockfish species where  
1474 males are larger than females, growth is assumed the same for males and females in this  
1475 assessment.

1476 Using data from southern Oregon (south of Florence, OR), differences in growth among  
1477 the commercial (dead fish) and the private recreational fleets were explored. There were  
1478 significant differences in growth between the fleets (Commercial:  $L_\infty = 36.23, k = 0.22$ ;  
1479 Recreational:  $L_\infty = 37.93, k = 0.22$ ), suggesting differing selectivity between the fleets.  
1480 The commercial fleet has been restricted to a 12 in minimum size limit since 2000, with a

1481 preference for plate-sized fish. All of the age data from the southern Oregon commercial  
1482 (dead fish) fleet are from 2001-2013. The recreational fleet has no minimum size limit and  
1483 all samples are from 2005-2013.

1484 Regional differences in growth were significant. In general, the asymptotic size of fish were  
1485 smallest in southern California (south of 40°10' N. latitude), increased in northern California  
1486 (north of 40°10' N. latitude) to southern Washington (MCAs 1 & 2) and decreased again in  
1487 northern Washington (Table 35 and Figure 69).

1488 Stock Synthesis models growth as the Schnute parameterization of the von Bertalanffy  
1489 growth model. The size of fish at age-0 was fixed at 2 cm with a CV of 0.1, and all other  
1490 parameters estimated within the model.

### 1491 2.1.10 Biological Data: Aging precision and bias

1492 Ageing imprecision was estimated using a collection of 529 China rockfish otoliths with  
1493 multiple age reads (Figures 70 - 72). We analyzed this data set using the ageing error  
1494 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  
1495 from some early samples read by a former NWFSC age reader and these were excluded from  
1496 the compositions used in the model. The variability in age readings of the remaining readers  
1497 was estimated under an assumption of a linear increase in standard deviation with age. The  
1498 resulting estimate indicated a standard deviation in age readings increasing from 0.1 years  
1499 at age 1 by about 1 year of uncertainty per 10 years of age to a standard deviation of 7.7  
1500 years at age 80.

### 1502 2.1.11 Biological Data: Weight-Length

1503 The weight-length relationship is based on the standard power function:  $W = \alpha(L^\beta)$  where  
1504  $W$  is individual weight (kg),  $L$  is length (cm), and  $\alpha$  and  $\beta$  are coefficients used as constants.

1505 This assessment uses weight-length parameters for females of  $\alpha = 1.17 \times 10^{-5}$  and  $\beta = 3.177$ ,  
1506 derived from Lea et al. (1999). A fit of the length-weight relationship to the Oregon ORBS  
1507 data,  $\alpha = 2.06 \times 10^{-5}$  and  $\beta = 3.02$ , yielded a curve that was very similar to that reported in  
1508 Lea et al. (1999)(Figure 73).

### 1509 2.1.12 Biological Data: Maturity and Fecundity

1510 China rockfish maturity-at-length data were sparse and was gathered from two available  
1511 sources, one from California and one from Oregon. Echeverria (1987) collected 69 China  
1512 rockfish from central and northern California, of which the age at first maturity was 3 years  
1513 for males and females (26 cm). Both males and females exhibited 50% maturity at 4 years  
1514 (27 cm) and 100% maturity at 6 years (30 cm).

1515 In Oregon, Hannah and Blume (2011) determined a length at 50% maturity at 28.5 cm from  
1516 a sample size of 239 China rockfish. Maturity was fit to a logistic curve,  $p_l = \frac{e^{B_0+B_l l}}{1+e^{B_0+B_l l}}$ ,  
1517 where  $p_l$  is the proportion of the natural fish at length  $l$ , and  $B_0$  and  $B_1$  are the regression  
1518 coefficients. Parameter estimates from Hannah and Blume (2011) are  $B_0 = -13.320$  and  
1519  $B_1 = 0.467$ .

1520 The southern base model used the California estimate (50% mature at 27cm) while the  
1521 central and northern draft based models used the Oregon estimate (50% mature at 28.5 cm).  
1522 Fecundity is assumed proportional to female spawning biomass in the draft base models.

### 1523 2.1.13 Biological Data: Natural Mortality

1524 Natural mortality for wild fish populations is extremely difficult to estimate.

1525 Dick and MacCall (2010) estimated natural mortality for 50 data poor stocks using Hoenig's  
1526 (1983) method. The total mortality rate ( $Z$ , the sum of natural and fishing mortality rates),  
1527 is estimated as,  $\log(Z) = 1.710 - 1.084\log(A_{max})$ , where  $A_{max}$  is the maximum observed age.  
1528 The mortality rate was back-transformed to arithmetic space using a bias correction factor,  
1529 log-scale standard deviation of 0.4.

1530 Cope et al. (2015) used the maximum age for China rockfish of 79 years in the 2013 data  
1531 moderate assessment, which produces a natural mortality rate of 0.055. The maximum age  
1532 of China rockfish on the West Coast is now 83 years (age data for this assessment), which  
1533 gives a natural mortality of 0.056 when calculated from Hoenig's method.

### 1534 2.1.14 Biological Data: Sex ratios

1535 The sex ratio from all of the aged China rockfish for this assessment were approximately  
1536 50% each males and females (WA:47%, OR:47%, and CA: 49% female). These fishes came  
1537 from a mixture of recreational, commercial, and research collections.

## 1538 2.2 History of Modeling Approaches Used for this Stock

### 1539 2.2.1 Previous assessments

1540 Dick and MacCall (2010) estimated the overfishing level (OFL) for China, which was adopted  
1541 for the PFMC's 2011-12 and 2013-14 management cycles, as components of the stock complex  
1542 OFLs associated with each species.

1543 China rockfish was assessed as a data moderate species in 2013 (Cope et al. 2015). The  
1544 accepted assessment modelled removal and index data using Extended Depletion-Based Stock  
1545 Reduction Analysis (XDB-SRA) (Dick and MacCall 2011), which is a Bayesian surplus  
1546 production model reparameterized in terms of MacCall's (2009) Depletion-Corrected Average

1547 Catch method. The STAR panel favored regional models for China rockfish, north and south  
1548 of 40°10' N. latitude.

1549 The stock north of 40°10' N. latitude was found to be below target biomass, as a percentage of  
1550 unfished biomass (a.k.a. “depletion”), but above the minimum stock size threshold (MSST).  
1551 The median of the posterior northern spawning biomass in 2013 was estimated at 37% (84  
1552 mt), and the fishing mortality rate in 2012 was 21.5% of  $F_{MSY}$ .

1553 The stock south of 40°10' N. latitude was found to be above target biomass, as a percentage  
1554 of unfished biomass (a.k.a. “depletion”). The median of the posterior southern spawning  
1555 biomass in 2013 was estimated at 66% (264 mt), and the fishing mortality rate in 2012 was  
1556 27% of  $F_{MSY}$ .

## 1557 2.2.2 Spatial stock structure

1558 The waters and biological communities of the California Current System tend to exhibit the  
1559 greatest change at the major promontories along the West Coast, including Point Conception,  
1560 Cape Mendocino, Cape Blanco and the northern tip of Vancouver Island (Checkley and Barth  
1561 (2009); Hickey (1979); Gottscho (2014)). In particular, the waters off Cape Mendocino are  
1562 a known biogeographical boundary along the West Coast of the U.S. and has been shown  
1563 as a geographical boundary across a number of terrestrial and marine taxa (see Gottscho  
1564 (2014) for a review). The waters off Cape Mendocino, CA are characterized by turbulent  
1565 waters and some of the strongest winds and upwelling found within the California Current  
1566 (Botsford and Lawrence 2002, Pacific Fishery Management Council 2013).

1567 The California Current is the equatorward surface flow that extends from the Vancouver  
1568 Island, Canada (approx. 50° N. latitude) with equatorward flow to Baja California, Mexico  
1569 (approx. 15° – 25° N. latitude) (Hickey 1979, Checkley and Barth 2009). Winds associated  
1570 with the North Pacific High, the Aleutian Low, and a thermal low-pressure system drive the  
1571 oceanographic dynamics that stretch from central California to northern Mexico (Checkley  
1572 and Barth 2009). Seasonal winds drive the frequency and intensity of upwelling along the  
1573 coast. Off the coast of Washington south to Cape Blanco, OR the winds and therefore  
1574 upwelling is generally weak. Starting near Cape Blanco, OR the continental shelf narrows  
1575 and winds and upwelling intensity increases (Francis et al. 2009). The winter environment  
1576 south of Cape Mendocino is dominated by upwelling from southerly winds pushing water  
1577 offshore through Ekman transport, whereas northward winds north of Cape Mendocino result  
1578 in downwelling. Summer upwelling is dominant along the entire West Coast of the US from  
1579 the northerly winds pushing the surface waters offshore via Ekman transport. South of  
1580 Cape Mendocino upwelling conditions persist all year, with the northerly winds strongest  
1581 from April-June. North of Cape Mendocino a low pressure system in the Gulf of Alaska  
1582 produces westerly and southwesterly winds that blow surface waters towards shore and result  
1583 in downwelling.

1584 In addition to the oceanic conditions in the California Current, there is also a prominent  
1585 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-

1627 entiation. While Sivasundar and Palumbi (2010) did not specifically look at China rockfish,  
1628 the *Pteropodus* subgenus was represented by copper, gopher and brown rockfishes, all three  
1629 of which exhibited only moderate genetic differentiation along the coast. Additional genetic  
1630 studies of copper, grass and brown rockfishes indicate limited larval dispersal and increasing  
1631 genetic divergence with increasing geographic distance [Buonaccorsi (2002); Buonaccorsi et  
1632 al. (2004); Buonaccorsi unpubl. data]. Much additional work is needed to fully understand  
1633 the genetic differentiation of rockfish species along the west coast. However, these studies  
1634 support the hypotheses that oceanographic and physical barriers are likely to limit larval  
1635 dispersal along the coast.

1636 California has managed the area from Cape Mendocino to the Oregon/California border as  
1637 its own management area since 2000 (see Appendices G and H for details). The Pacific  
1638 Fishery Management Council developed a Pacific Coast Fishery Ecosystem Plan in which  
1639 the California Current Large Marine Ecosystem and recognizes the transitional zone between  
1640 Cape Blanco, OR and Cape Mendocino, CA (Francis et al. 2009, Pacific Fishery Management  
1641 Council 2013).

1642 The 2013 stock assessment of China rockfish consisted of two, independent models, north  
1643 and south of 40°10' N. latitude. Following the STAR panel, a request was made to stratify  
1644 the assessment north and south of 42° N. latitude (the CA-OR border), based on concerns  
1645 over spatial differences in exploitation history and insufficient trend data between 40°10' N.  
1646 latitude and 42° N. latitude ([Agenda Item F.5.b Supplemental GMT Report](#), June 2013). In  
1647 November 2013, after examining results from both area stratifications, the SSC concluded  
1648 that there was no evidence in support of either stratification, and recommended that the  
1649 Council retain the model stratified around the existing management boundary ([Agenda Item](#)  
1650 [H.5.b Supplemental SSC Report](#), November 2013).

1651 The 2013 China rockfish assessment was a data-moderate assessment and therefore did not  
1652 consider size and age composition data as part of the analysis. For this assessment, the  
1653 STAT made efforts to examine all available data sources that might provide evidence of  
1654 spatial stock structure. Data sets with sufficient sample sizes and spatial coverage included  
1655 length frequency and length at age data.

1656 The largest source of length composition data came from the recreational fleets in each state.  
1657 In California, the California Recreational Fisheries Survey (CRFS) has collected length data  
1658 by CRFS district since 2004. Distributions of length for sampled (retained) catch varied  
1659 by district, with mean length smallest in the southernmost district with adequate samples  
1660 (CRFS District 3), and largest in the northernmost district, CRFS District 6, roughly the  
1661 area between Cape Mendocino and the California-Oregon border (Figure 55). There is some  
1662 indication of a gradient in average length of retained fish, but the largest increase in mean  
1663 length between adjacent CRFS Districts occurs between CRFS Districts 5 & 6 (roughly  
1664 across Cape Mendocino).

1665 Since length compositions of retained fish are affected by numerous processes (e.g., growth,  
1666 recruitment, exploitation, selectivity), the STAT also compared growth curves fit to size at  
1667 age data. External fits indicated differences in growth among regions, and these patterns

1668 were consistent with growth curves estimated within the assessment models (see base model  
1669 results for details).

1670 **2.2.3 2013 Data Moderate Recommendations**

1671 **Recommendation 1:** Continued research on the uncertainty in the catch histories  
1672 of all groundfishes. Reconstructions of historical catches are still needed  
1673 for certain areas, time periods, and fisheries. Currently, reconstructed  
1674 catches are available for California's commercial and recreational fisheries  
1675 extending back to 1916 and 1928, respectively (Ralston et al. 2010).  
1676 Oregon has completed a reconstruction for its commercial catch since 1876  
1677 (V. Gertseva, NMFS; pers. comm.), but recreational catch prior to 1980  
1678 is assumed to be zero in this analysis. Recreational catch in Washington  
1679 was reconstructed to 1975 for these assessments, and interpolated back to  
1680 1960. A thorough reconstruction of historical commercial catches (prior  
1681 to 1981) is urgently needed for Washington. Estimates of uncertainty in  
1682 historical catch reconstructions are needed for all states.

1683  
1684 2015 STAT response: Oregon completed a reconstruction of the recreational catches  
1685 back to 1973. There is currently no reconstruction of the commercial catches in Wash-  
1686 ington, and no estimates of uncertainty are available for any catch reconstruction.

1687 **Recommendation 2:** Single-species stock assessment models are still unable to  
1688 address systematic changes in productivity due to external factors such  
1689 as inter-species relationships and low-frequency aspects of climate change.  
1690 Relatively simple data-moderate models may provide tractable linkages to  
1691 ecosystem models, and are relatively easy to modify to reflect ecosystem  
1692 forces.

1693  
1694 2015 STAT response: No additional ecosystem or environmental data were included in  
1695 the 2015 China rockfish assessment.

1696 **Recommendation 3:** Exploration of trans-boundary assessments with Canada  
1697 should be initiated, and would benefit all parties. This also requires  
1698 development of data inputs including historical catch reconstructions. Due  
1699 to their transparency, data-moderate assessments may play an especially  
1700 useful role in promoting trans-boundary fishery science.

1701  
1702 2015 STAT response: Canada has not conducted a stock assessment for China rockfish.

1703 **Recommendation 4:** The data-moderate assessments assume known catches,  
1704 but there is considerable uncertainty in historical catch reconstructions,

1705 particularly for the recreational fishery. This uncertainty has not been  
1706 measured, and tools for incorporating this uncertainty in assessments are  
1707 not well developed. This is an issue for all assessments.

1708  
1709 2015 STAT response: See response to the first recommendation.

1710 **Recommendation 5:** There are fundamental differences between XDB-SRA and  
1711 exSSS in how stock productivity is modeled. For exSSS, FMSY increases  
1712 as the ratio of BMSY/B0 decreases in a deterministic way, while there  
1713 is no prior relationship between FMSY and the ratio of BMSY/B0 for  
1714 XDB-SRA. It is unclear which of these assumptions is most appropriate.  
1715 This is a broader issue than for just data-moderate assessments, since  
1716 it questions the appropriateness of two-parameter curves such as Bever-  
1717 ton-Holt to model the stock recruit relationship. Research to improve  
1718 understanding of the relationship between the inputs of the XDB-SRA and  
1719 exSSS productivity parameters is encouraged.

1720  
1721 2015 STAT response: The 2015 China rockfish assessment assumes a Beverton-Holt  
1722 stock-recruit relationship, with a fixed value for steepness in all three models. The  
1723 STAT agrees with the recommendation, and considers this a priority for “off-year”  
1724 research.

1725 **Recommendation 6:** Different priors (uniform of q / uniform on log-q) for the  
1726 additional variance term were used in the two assessment models. It is  
1727 unclear which performs best, and, since this term affects the weights given  
1728 to each index in the model fitting, the form of the prior will influence  
1729 model results, particularly when the indices are in conflict.

1730  
1731 2015 STAT response: Additional variance parameters were estimated for all indices in  
1732 the China rockfish models, but no explicit prior was used in Stock Synthesis, apart  
1733 from specifying parameter bounds.

1734 **Recommendation 7:** Compare the standardized (onboard observer) indices from  
1735 the proposed method with indices constructed by applying the Stephens--  
1736 MacCall approach to the data aggregated by trip.

1737  
1738 2015 STAT response: Time constraints have not allowed for this analysis and it is a  
1739 priority research topic for the next off-cycle year.

1740 **Recommendation 8:** The GMT representative also recommended expanding  
1741 the analysis of CPUE data to additional sectors of the recreational fishery,  
1742 such as private and rental boats. CPUE indices from these sectors may be

1743 useful in future assessments of nearshore stocks.

1744

1745 2015 STAT response: Time constraints did not allow a private-mode index for the  
1746 California recreational dockside survey. Oregon and Washington both provided data  
1747 for the private/rental and party/charter recreational fleets from dockside surveys. A  
1748 private boat mode index was considered for Oregon, but rejected due to infrequent  
1749 catches of China. The WA recreational index included boat mode (charter and private)  
1750 as a categorical variable in the delta-GLM analysis.

1751

1752 **Recommendation 9:** The GMT representative noted that for certain nearshore  
1753 species there is potential utility in using post-2003 RecFIN dockside  
1754 data as well as onboard sampling data since depth restrictions have not  
1755 constrained access to the adult population.

1756

1757 2015 STAT response: The 2015 China rockfish assessment utilizes data through 2014  
1758 for the onboard observer programs in California and Oregon. The California post-  
1759 2003 dockside data were not used because a large percentage of the trips north of Pt.  
1760 Conception were also sampled by the onboard observer program.

1761 **Recommendation 10:** The Panel strongly emphasizes the value of conducting  
1762 a data workshop during which catches, indices, biology, and other data  
1763 inputs are reviewed.

1764

1765 2015 STAT response: The China STAT team participated in the Nearshore Stock  
1766 Assessment Workshop held March 31-April 2, 2015 in Portland, OR.

1767 **Recommendation 11:** The historical CPFV drift-specific data should be key-  
1768 punched, which should allow the algorithm for developing CPFV-based  
1769 data indices to be improved.

1770

1771 2015 STAT response: The SWFSC Fisheries Ecology Division key-punched and error-  
1772 checked the CDFW 1987-1998 onboard observer survey data. These data were included  
1773 in an onboard index.

1774 **Recommendation 12:** Recommendation: Habitat maps should be developed so  
1775 that structural rather than true zeros are designated using data which are  
1776 independent from the data used to determine the indices.

1777

1778 2015 STAT response: Habitat maps and 'reefs' were defined by the SWFSC using the  
1779 California Seafloor Mapping Project and the Oregon State waters Mapping Program  
1780 mapping products. These habitat maps were used to select data for the onboard  
1781 observer indices in both California and Oregon.

1782 **2.3 Response to the 2015 STAR Panel Requests**

1783 **Request No. 1: Explore the utility of using California Recreational Fisheries  
1784 Survey (CRFS) data from 2004-2007 to partition California catches in the  
1785 early years based on the proportion of catch in the private recreational and  
1786 charter modes north and south of 40°10' N latitude (concerns the southern  
1787 and central models).**

1788

1789 **Rationale:** This may be a better alternative to the current approach of using logbook  
1790 data to partition the recreational catches north and south of 40°10' N latitude.

1791 **STAT Response:** This request was not completed, and was repeated as request no.  
1792 13.

1793 **Request No. 2: Add the current assessment biomass trends for current base  
1794 model to the plot in the draft assessment that compares the XDB-SRA  
1795 and SS3 runs and plot an additional set of runs for all models where  
1796 steepness and natural mortality are estimated with priors (add results  
1797 from the northern and central models). This would be two sets of plots  
1798 with spawning biomass and depletion (all models).**

1799

1800 **Rationale:** To provide a comparison between the previous assessment results using  
1801 XDB-SRA and the current assessment. XDB-SRA has more flexible productivity as-  
1802 sumptions than SS3, so estimating h and M was regarded as a way to more closely  
1803 mimic XDB-SRA using stock synthesis.

1804 **STAT Response:** The plots were provided (Figures 74 and 75). Since XDB-SRA  
1805 had knife-edge maturity at age 5, summary biomass for ages 5 and older was used  
1806 in the plot to provide a common basis for comparison. For the southern model, the  
1807 SS3 model with estimated h and M and XDB-SRA show similar results in absolute  
1808 summary biomass and depletion. For the north plus central models, it was not possible  
1809 to simultaneously estimate h and M, but again the results were similar.

1810 **Request No. 3: Compare the amount of available habitat for China rockfish in  
1811 the area covered by northern and central models with estimates of  $R_0$  for  
1812 the northern and central models.**

1813

1814 **Rationale:** Available habitat by region may provide an independent proxy for the  
1815 relative abundance of the stock in each region.

1816 **STAT Response:** Available rocky habitat was examined using two methods, and  
1817 ratios of habitat between areas showed an increase in habitat from the northern area,  
1818 to the central area, and to southern area with the most habitat. The Panel regarded this  
1819 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).

1858           **STAT Response:** The selectivity pattern improved but estimates a very high M  
1859           (0.12) and produces an implausible estimate of biomass (>1000 times the base model).  
1860           The model is not supportable as a change to the base model.

1861       **Request No. 7: Exclude the Marine Recreational Fisheries Statistics Survey**  
1862       **(MRFSS) index in Oregon to define a new base case for the central model.**

1863

1864

1865           **Rationale:** It was learned that multiple intercept interviews were done for a single  
1866           trip, so the index was not constructed from trip level data, as was intended. This only  
1867           affects MRFSS index for Oregon.

1868           **STAT Response:** Excluding this index had a minor effect on model results. This  
1869           problem should be correctable so the STAR panel will list this as a research recommen-  
1870           dation.

1871       **Request No. 8: Add in the northern California length composition data to**  
1872       **central area model. The selectivity pattern for this fishery should mirror**  
1873       **the southern Oregon selectivity pattern. Retune the length composition**  
1874       **data.**

1875

1876           **Rationale:** These data were inadvertently left out of the model.

1877           **STAT Response:** This was done. Adding these data had a minor effect on model  
1878           results.

1879       **Request No. 9: For the central area model, attempt to estimate the selectivity**  
1880       **patterns for each fishery and determine which of the selectivity patterns**  
1881       **provides plausible estimates. Take the mean of those estimates (peak**  
1882       **and/or spread parameters) and use the mean as a prior for the poorly**  
1883       **estimated selectivities. Consider using the mode of the observed length**  
1884       **distribution as a prior for the peak parameter.**

1885

1886           **Rationale:** To provide a more objective means to reflect selectivity parameters for  
1887           those fleets where those parameters cannot be estimated.

1888           **STAT Response:** Alternative procedures resulted in models with small difference  
1889           to the base case depletion, though scale is dependent on the choice of peak value for  
1890           selectivity for parameters that were required to be fixed (highest estimated value that  
1891           didn't hit the bound of 45 cm). The Panel agreed that the original procedure used for  
1892           the base case was simple and more supportable from a methodological viewpoint.

1893       **Request No. 10: For the central area model, repeat Request No. 9 using a two**  
1894       **parameter ascending logistic curve for selectivity.**

1895

1896     **Rationale:** To examine the effect on model results of using a different functional form  
1897     for asymptotic selectivity.

1898     **STAT Response:** Logistic curves did not improve model results, and all the same  
1899     issues remain.

1900     **Request No. 11: Turn on estimation of recruitment deviations for all models,  
1901     and iteratively increase  $\sigma_R$  from a low value until the residual pattern  
1902     stabilizes.**

1904     **Rationale:** To determine whether estimating recruitment deviations can be supported  
1905     by any of the models.

1906     **STAT Response:** All models estimated extremely large recruitments in the 1980s  
1907     and early 1990s that seem implausible and are not obvious in size composition data.  
1908     For the southern area model, the standard error of recruitment deviance is larger than  
1909      $\sigma_R$  for many early estimates, which is a nonsensical result. The likelihood components  
1910     show slightly worse fit to indices, an improved fit for age composition data, and the  
1911     most improvement for size composition data. This suggests that the estimated recruit-  
1912     ment deviations are being driven by relatively subtle signals in the length composition  
1913     data rather than improved ability to fit the trends in the indices. The Panel concluded  
1914     that there was insufficient information to estimate recruitment deviations for all mod-  
1915     els. Therefore no changes were made to the base model. One potential area of research  
1916     for data-moderate stocks would be evaluate the effect of assuming different levels au-  
1917     tocorrelation in the stock-recruit relationship. This might help curb the tendency to  
1918     estimate extreme recruitment with sparse datasets.

1919     **Request No. 12: For all models, explore alternative methods of reweighting the  
1920     conditional age-at-length data, but do not increase the weight on any data  
1921     set. Alternatives to evaluate are: the unmodified sample size (the method  
1922     used for the base case), and Francis weighting method A and B (report the  
1923     values of A and B).**

1925     **Rationale:** Methods for weighting conditional age-at-length data are a current active  
1926     area of research with no generally agreed procedures, so model sensitivity to each  
1927     method requires examination.

1928     **STAT Response:** For the southern area model the weights for both the Francis A and  
1929     B methods were above one, so no reweighting was applied. For both the central and  
1930     the northern area models, Francis method A for the most part strongly downweights  
1931     the conditional age-at-length data. The situation is most extreme for the northern  
1932     area model, where iterative application of Frances method A appeared to be leading  
1933     to a zero weight being given to conditional age-at-length data. Weighting is highly  
1934     influential on both absolute biomass and relative depletion.

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

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

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

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

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

- Use weight specific fecundity relationships from Dick (2009) for all models.
- Update 2011 and 2012 data in the onboard observer CPUE index (southern model).
- Change the years in the Abrams dataset to 2010-2011; remove observations 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.

2014   **Request No. 17:** Provide likelihood profiles for M in all revised base models;  
2015    consider providing a combined likelihood profile in one graphic for all  
2016    models.

2017

2018   **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.

2019   **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.

2020   **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.

2031

2032   **Rationale:** To assess the comparability of indices prior to incorporation in the assessment model.

2033   **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.

2048   **Request No. 19:** Provide likelihood profiles on M for all base models, which  
2049    now are using a fixed value of M of 0.07. Plot predicted spawning output  
2050    on the M profile plots.

2051

2052   **Rationale:** To evaluate whether the profiles for M for the base models for the northern  
2053    and southern area are well determined as a justification using a single fixed value across

2054 all models, and to also demonstrate the inadequacy of the central model for estimating  
2055 M

2056 **STAT Response:** This was done. The new base models behaved as expected (except  
2057 for spawning output declining at very high M for southern area model).

2058 **Request No. 20:** Provide bracketing model runs varying M (high and low Ms  
2059 should be equidistant from the base M (high M = 0.09; base M = 0.07; low  
2060 M = 0.05 (set to the median of the prior)) for potential decision tables.  
2061 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  
2062 provide projected ACL removals under base case, and recent year catches  
2063 (if different than base case ACLs).

2065 **Rationale:** Development of a potential axis of uncertainty based on M.

2066 **STAT Response:** This was done.

2068 **Request No. 21:** Update the figures from Request No. 2 with the new base  
2069 models (show summary biomass).

2071 **Rationale:** To provide a comparison between the previous assessment results using  
2072 XDB-SRA and the current assessment.

2073 **STAT Response:** This was done (Figure 78). The current base models deviate more  
2074 strongly from the results using XDB-SRA than the pre-STAR models, but results  
2075 remain broadly consistent (i.e., biomass estimates differ by no more than a factor of  
2076 two).

2077 **Request No. 22:** Provide runs of for the central model treating all age com-  
2078 positions as marginal (fix growth parameters, and alternatively fix and  
2079 estimate M).

2081 **Rationale:** This may provide improved fits to composition data, and may also provide  
2082 further evidence that large values for M above 0.1 for the central model are implausible.

2083 **STAT Response:** Results were only very slightly different to the base model, so no  
2084 additional information was provided for the assessment.

2085 **Request No. 23:** Provide two runs from the base for the southern area model  
2086 that bracket uncertainty in steepness. Use values of 0.6 and 0.9 which  
2087 are close to the 12.5 and 87.5 percentiles from the Thorson prior. Pro-  
2088 vide projected biomass to compare with current bracketing models with M.

2090 **Rationale:** To determine whether uncertainty in M sufficiently captures uncertainty  
2091 for decision tables for the southern area model.

2092       **STAT Response:** This was done. The bracketing model runs for steepness and M  
2093       produced remarkably similar results, allowing the Panel to agree to use only M to  
2094       bracket uncertainty for management advice for the southern area model, and to do the  
2095       same for the northern and central area models.

2096       **Request No. 24:** The STAR panel requested a detailed justification be provided  
2097       for the decisions regarding stock structure assumed in the assessment(s)  
2098       (i.e., growth differences, size composition, fishery discard rates, evidence  
2099       of low larval drift, and management history and jurisdiction).

2100  
2101       **Rationale:** This information was not provided in detail in the draft assessment doc-  
2102       ument. This is just a bookkeeping request as the Panel had discussed with the STAT  
2103       the importance of providing supporting information on stock structure decisions, but  
2104       no formal request was forwarded to the STAT.

2105       **STAT Response:** This information will be included in the final assessment document.

## 2106       2.4 Model Description

### 2107       2.4.1 Transition from the 2013 to 2015 stock assessment

2108       The first formal assessment of China rockfish was conducted as a data moderate assessment  
2109       in 2013 (Cope et al. 2015). The results of the 2013 assessment were based on catch histories  
2110       and indices of abundance from onboard (OR and CA) and dockside (OR and CA) surveys of  
2111       the recreational fishing fleet. Below, we describe the most important changes made since the  
2112       last full assessment and explain rationale for each change. [Note: descriptions below apply  
2113       to the pre-STAR base model, and were not modified to reflect the final base model in order  
2114       to provide a record of events leading to selection of the final model]:

- 2115       1. Population dynamics model changed from a Bayesian surplus production model (XDB-  
2116       SRA) with two areas (U.S. waters north and south of 40°10' N. latitude) to a length-  
2117       based, age-structured statistical catch at age model (Stock Synthesis) with three areas  
2118       (U.S. waters south of 40°10' N. latitude, 40°10' N. latitude to the OR-WA border, and  
2119       from the OR-WA border to the U.S.-Canadian border). *Rationale:* The assessment  
2120       is moving from a data moderate to a full assessment, incorporating new data sources,  
2121       e.g. individual growth, age and length compositions of landed and discarded catch.
- 2122       2. New point estimate for annual natural mortality rate (0.053). *Rationale:* median of a  
2123       prior distribution derived from a method endorsed by the SSC (O. Hamel, NWFSC;  
2124       pers. comm.).

- 2125 3. Beverton-Holt stock-recruitment relationship with steepness fixed at 0.773. *Rationale*:  
2126 when estimated, steepness in the model approaches implausible values (near 1). Al-  
2127 though uncertainty in model results is greatly underestimated, steepness in each sub-  
2128 model was fixed at the mean of a prior distribution derived from a meta-analysis of  
2129 rockfish steepness parameters (J. Thorson, NWFSC; pers. comm.).
- 2130 4. Revised catch histories for California, Oregon, and Washington. *Rationale*: agency  
2131 representatives for each state either prepared (OR and WA) or reviewed (CA) revised  
2132 catch histories for the commercial and recreational fisheries.
- 2133 5. Updated indices of abundance through 2014. *Rationale*: following research recommen-  
2134 dations from the last assessment, current indices include revised recreational CPUE  
2135 based on spatially-referenced, onboard observer data combined with habitat data, as  
2136 well as catch and effort data by fishing-stop from the 1988-1999 CDFW onboard ob-  
2137 server program.
- 2138 6. Two new recreational dockside CPUE indices for northern Washington (1981-2014)  
2139 and Oregon (2004-2014). *Rationale*: previous assessment had no trend information  
2140 for Washington state, and did not include CPUE from the high-intensity dockside  
2141 sampling program in Oregon (ORBS).
- 2142 7. New commercial logbook CPUE index for the southern Oregon nearshore fishery (2004-  
2143 2013). *Rationale*: previous assessment contained no indices of abundance based on  
2144 commercial fisheries data. This (primarily live-fish) nearshore fishery has expanded  
2145 rapidly over the past two decades.
- 2146 8. Models include new age data representing all three states. *Rationale*: allows growth to  
2147 be estimated in each sub-model based on conditional-age-at-length composition data.
- 2148 9. Discards modeled explicitly with selectivity and retention curves in the southern area  
2149 model. *Rationale*: new length composition data for discarded catch permits explicit  
2150 modeling of retention and selectivity in the southern commercial live-fish fishery.
- 2151 Prior to the STAR Panel review meeting, age-structured production models (i.e., fit only  
2152 to indices of abundance) were developed in Stock Synthesis to mimic the XDB-SRA mod-  
2153 els from the 2013 stock assessment. Trends in stock status and overall scale were similar  
2154 among models for the northern substock (Figures 79 and 80), but the southern substock  
2155 was estimated to have a larger unfished biomass and similar current biomass (i.e. a more  
2156 depleted stock) when the data were fit in Stock Synthesis (Figures 81 and 82). The age-  
2157 structured model makes different assumptions from the last assessment about production  
2158 (Beverton-Holt stock-recruitment relationship, with steepness estimated at 0.88 and 0.89 in  
2159 the northern and southern models, respectively) and growth, which may explain the differ-  
2160 ences between the two population dynamics models. See Request #2 from the 2015 STAR  
2161 Panel for a comparison of final base model results to the 2013 assessment.

2162 **2.4.2 Definition of fleets and areas**

2163 We generated data sources for each of the models. Fleets include:

2164 **Northern Model**

2165 *Recreational*: All catch in the northern model is recreational. The recreational fleets include  
2166 separate landings from the party/charter and private./rental modes in MCAs 3-4 and com-  
2167 bined party/charter and private/rental modes for MCAs 1-2 (where catches and sample sizes  
2168 were lower).

2169 **Central Model**

2170 *Commercial*: The commercial fleets include five separate fleets, one each for the live and dead  
2171 commercial fishers in the following areas, California north of 40°10' N. latitude, southern Ore-  
2172 gon. Live and dead commercial fisheries were combined for northern Oregon as commercial  
2173 landings were low in this area.

2174 *Recreational*: The recreational fleets include six separate fleets, one each for the party/charter  
2175 and private/rental modes in the following areas, California north of 40°10' N. latitude, south-  
2176 ern Oregon, and northern Oregon.

2177 **Southern Model**

2178 *Commercial*: The commercial fleets include separate catches for the live and dead fish fish-  
2179 eries, as well as discards from the live-fish fishery.

2180 *Recreational*: The recreational fleets include landings from the party/charter and pri-  
2181 vate/rental modes. There are three indices of abundance: CDFW 1989-1999 CPFV onboard  
2182 observer, CDFW 2000-2014 CPFV onboard observer, MRFSS 1980-2003 CPFV dockside.

2183 *Research*: Length compositions from Jeff Abrams thesis (Abrams 2014) and the CCFRP  
2184 study.

2185 **2.4.3 Summary of data for fleets and areas**

2186 **2.4.4 Modeling software**

2187 The STAT team used Stock Synthesis 3 version 3.24u by Dr. Richard Methot at the NWFSC.  
2188 This most recent version (SS-V3.24u) was used, since it included improvements and correc-  
2189 tions to older versions.

2190 **2.4.5 Data weighting**

2191 Length composition sample sizes for all models were tuned by the “Francis method” (also  
2192 known as “TA1.8”) (Francis 2011), as implemented in the r4ss package. This approach  
2193 involves comparing the residuals in the model’s expected mean length with respect to the  
2194 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).

2230 The following likelihood components are included: catch, indices, discards (south only),  
2231 discarded catch (south only), length compositions, age compositions, parameter priors, and  
2232 parameter soft bounds. See the SS technical documentation for details (Methot and Wetzel  
2233 2013).

2234 Model data, control, starter, and forecast files can be found in Appendices A-D.

#### 2235 **2.4.8 Estimated and fixed parameters**

2236 A full list of all estimated and fixed parameters is provided in Tables 36, 37, and 38. Time-  
2237 invariant, sex-aggregated growth is estimated for all modeled areas in this assessment. Re-  
2238 cruitment deviations are not estimated due to a lack of visible cohorts in either the length  
2239 or age data. In the pre-STAR models natural mortality was fixed at 0.053, the median  
2240 of the Hamel prior (Hamel 2015), and the stock-recruitment steepness is fixed at the SSC  
2241 approved steepness prior of 0.773. However, post-STAR models fix M at 0.07 for all models,  
2242 the average of the estimated M's from the northern and southern models (the central area  
2243 model was unable to estimate M). Asymptotic selectivity is generally used in the base case  
2244 models.

### 2245 **2.5 Model Selection and Evaluation**

#### 2246 **2.5.1 Key assumptions and structural choices**

2247 All structural choices for stock assessment models are likely to be important under some  
2248 circumstances. In this assessment these choices are generally made to 1) be as objective as  
2249 possible and 2) follow generally accepted methods of approaching similar models and data.  
2250 The relative effect on assessment results of each of these choices is often unknown; however  
2251 an effort is made to explore alternate choices through sensitivity analysis. Major choices in  
2252 the structuring of this stock assessment model include the independent north, central and  
2253 south area models that use disaggregated fleet structuring and mirrored selectivity for fleets  
2254 with little or no length and age composition data. All of these models fix the values for  
2255 natural mortality and stock-recruitment steepness as there is not enough information in the  
2256 data to reliably estimate these important productivity parameters. Recruitment is assumed  
2257 to be deterministic in all models, as the data do not contain sufficient information to resolve  
2258 the strength of individual year classes.

#### 2259 **2.5.2 Alternate models explored**

2260 Sensitivity analyses included a comparison of key model assumptions were based on nested  
2261 models and included asymptotic vs. domed selectivity, alternative values of M, and alter-  
2262 native fleet mirroring structure for estimating selectivity. For the area North of 40°10' N.  
2263 latitude, an alternative model in which both Central and North areas were included in a

2264 single, spatially-explicit model. However, differences in growth found between Oregon and  
2265 Washington supported independent models.

2266 **2.5.3 Convergence**

2267 Convergence testing through use of dispersed starting values often requires extreme values  
2268 to actually explore new areas of the multivariate likelihood surface. Jitter is a SS option  
2269 that generates random starting values from a normal distribution logistically transformed  
2270 into each parameter's range (Methot 2015). Table 39 shows the results of running 100 jitters  
2271 for each pre-STAR base model. The northern model, which has the least amount of data  
2272 and the fewest number of estimating parameters (8), returned to the same base case solution  
2273 every time. The central model, with 14 parameters had 6% of the starting values cause  
2274 errors in the likelihood but the remaining runs returned to the base model. The southern  
2275 model, which had the most estimated parameters (16), had some jitters converge to a local  
2276 minimum with worse likelihood, but the majority returned to the base model.

2277 **2.6 Base-Model(s) Results**

2278 Base models for all three areas (northern, central, and southern) are combined sex models,  
2279 based on lack of evidence for sexually dimorphic growth in the available size-at-age data as  
2280 well as in previous studies. Key productivity parameters are fixed at measures of central ten-  
2281 dency from prior distributions endorsed by the PFMC's SSC due to the models' inability to  
2282 estimate reasonable parameter values. Specifically, steepness of the assumed Beverton-Holt  
2283 stock-recruitment relationship was fixed at 0.773. In the final base models the instantaneous  
2284 rate of annual natural mortality was fixed at  $0.07\text{yr}^{-1}$ , the average between the estimated  
2285 natural mortality from the northern and southern models. Estimated parameters in each  
2286 model vary, and are described in the area-specific results sections, below.

2287 **Northern**

2288 The northern base-case model produces reasonable estimates of growth parameters, with  
2289 China rockfish in northern Washington reaching a maximum length of 35.4 cm (Table 36,  
2290 Figure 83). The northern base-case model was able to fit the northern Washington recre-  
2291 ational index of abundance with an estimated additional standard deviation of 0.13 (Table  
2292 36). However, there are runs of years in which the model consistently either over or under  
2293 fits the data (Figure 84). The model fit to the index estimates a declining trend in the fit  
2294 between the 1980s and 1990s, followed by a flat trend through recent years.

2295 Fits to the time aggregated southern Washington recreational length distributions are poor,  
2296 where data are sparse, with the model expecting more fish sized approximately 27 cm to 34  
2297 cm and fewer fish greater than 40 cm than are present in the data (Figure 85). However, fits  
2298 to the time aggregated northern Washington recreational length distributions, the area with  
2299 most of the data and landings, are good (Figures 85 and 86). The model fits the recreational

2300 conditional age-at-length data reasonably (Figures 87 and 88). There are a few outliers,  
2301 including two 15-year-old fish in the 22 cm bin in 2005 and one 14-year-old fish in the 20 cm  
2302 bin in 2010 but there are no strong patterns in the residuals.

2303 Estimated selectivity curves for the Washington recreational southern and northern fleets  
2304 suggest different ascending width parameters, resulting in the southern fleet selecting smaller  
2305 China rockfish than the northern fleet (Figure 89). The southern fleet asymptote was unable  
2306 to be estimated so it was fixed to the estimate from the northern fleet.

## 2307 Central

2308 The central base-case model produces reasonable estimates of growth parameters, with China  
2309 rockfish in the central area reaching a length of 37.44 cm at age 30 (Table 37, Figure 83). The  
2310 central base-case model fits to the indices of abundance are generally flat to slightly declining,  
2311 with many model fits showing runs of years in which the model consistently either over or  
2312 under fits the data (Figures 90, 91, 92). Each of the central model indices of abundance except  
2313 the Oregon southern commercial live fish fishery were fit estimating additional standard  
2314 deviations of 0.15, 0.50, and 0.08 for the Oregon commercial logbook index, the Oregon  
2315 onboard recreational index, and the Oregon ORBS index, respectively (Table 37).

2316 Fits to the central model length distributions are reasonable given the small samples sizes,  
2317 particularly during the early years, and the constraints applied to selectivity parameters  
2318 (Figures 93, and 94). The model fits the Oregon southern commercial fishery best, shifts the  
2319 peak of the fitted distribution to the left for the Oregon southern recreational private/rental,  
2320 Oregon southern recreational party/charter, and Oregon northern recreational private/rental  
2321 fleets, and under fits the peak of the time aggregated length distributions for the Oregon  
2322 southern commercial live fish and Oregon northern recreational party/charter fleets. The  
2323 model fits the conditional age-at-length data from the southern Oregon commercial dead-  
2324 fish fishery poorly with clusters in the residuals and fewer observations in the age-50+ bin  
2325 than expected by the model (Figure 95). The residual patterns are less notable in the fit to  
2326 conditional age-at-length data from the southern Oregon recreational party/charter (Figure  
2327 96). For both these datasets, the largest residuals are associated with young fish at large  
2328 sizes, including commercial catch of fish aged 10 years and younger in the 35-40cm range in  
2329 2002 through 2004 and a recreational observation in 2011 in the 44 cm length bin estimated  
2330 at 10 years old. In many years the model expects more fish in the plus group (age 50) than are  
2331 actually present in the data, but years where 50+ age fish were observed, this observations  
2332 is typically larger than the expectation. The fit to the marginal age compositions from the  
2333 northern Oregon recreational fishery are reasonable given the low sample sizes of this fleet  
2334 (which is the reason it was not represented as conditioned on length) although generally more  
2335 fish in the 5-10 year old range were observed than expected by the model (Figure 97).

2336 The central model does not explicitly model discards due to low discard rates and the limited  
2337 availability of discard data. However, a discard fraction of 2.69% of the annual commercial  
2338 landings has been added to the commercial landings to account for the total removals by the  
2339 commercial fisheries.

2340 Asymptotic selectivity curves are estimated for all fleets with length compositions (Figure  
2341 98). The exceptions included the northern Oregon commercial fishery which shared the se-  
2342 lectivity curve for the southern Oregon life-fish commercial fishery, and the northern Oregon  
2343 private/rental fleet that was assumed to share the selectivity with the party/charter fleet  
2344 in this same area. Many of the recreational has estimates of peak selectivity that hit the  
2345 upper bound of 45 cm, well above the estimated asymptotic size. These parameters were  
2346 all reduced to (fixed at) the highest peak selectivity parameter among the recreational fleets  
2347 that was not hitting a bound: 39.9 cm. The ascending width parameters showed small dif-  
2348 ferences among all fleets (Table 37). The commercial selectivity parameters generally had  
2349 peak values estimated at a lower point than the recreational selectivities.

## 2350 Southern

2351 The model for the area south of 40°10' N. latitude produces reasonable values of estimated  
2352 growth parameters in the base-case model, with China rockfish in the southern management  
2353 area reaching an asymptotic length (converted from Schnute parameterization) of 31.5 cm,  
2354 with von Bertalanffy growth coefficient,  $k = 0.144$ , and a coefficient of variation of 12%  
2355 for length at age 30 (Figure 83). The southern base-case model best fit the southern area  
2356 recreational dockside index of abundance with an estimated additional standard deviation  
2357 of 0.12, and the two recreational onboard indices (1988-1999 and 2000-2014) with additional  
2358 SDs of 0.15 and 0.18, respectively (Table 38). However, in all three indices there are runs  
2359 of positive or negative residuals. The model is able to capture a decline in catch rates from  
2360 the 1980s to the late 1990s / early 2000s in the dockside recreational CPUE index (Figure  
2361 99), but slightly underestimates a declining trend in the 1988-1999 onboard observer index  
2362 (Figure 100). The model is consistent with an observed increasing trend from 2000-2012 in  
2363 the more recent onboard observer index, but was not able to capture a recent drop in catch  
2364 rates in recent years (Figure 101).

2365 Fits to the time-aggregated southern recreational private and charter boat length distribu-  
2366 tions, the fleets with most of the data and landings, are most consistent with the observed  
2367 data (Figure 102). Length data from the commercial fisheries (live-fish fishery and fish  
2368 landed dead) are fit reasonably well by the model (Figure 102).

2369 Fits to the length compositions from the central California onboard observer and CCFRP  
2370 surveys (fleets observing whole, retained plus discarded, catch) are good for the onboard  
2371 observer data (which mirrors the selectivity of the recreational charter boat fishery), but the  
2372 model a larger variance and smaller mode in time-aggregated lengths relative to the data  
2373 from the CCFRP survey (Figure 103).

2374 The model fits the conditional age-at-length data from Jeff Abrams' thesis (Abrams 2014)  
2375 reasonably well (Figure 104), particularly for years with larger sample sizes.

2376 Length-based selectivity parameters estimated in the southern base model include, for each  
2377 fleet, the size at 100% vulnerability ('peak' parameter), and the 'width' of the ascending  
2378 limb of the selectivity curve (a cumulative normal distribution). Peak values ranged from  
2379 27.6 cm (commercial discards) to 35.5 cm (commercial live-fish fishery). The recreational

2380 catches represent both retained and discarded fish, the composition data in the base model  
2381 represents only retained fish. Recreational length composition data for discarded fish are  
2382 available from the onboard charter boat observer programs, and could potentially be used to  
2383 model retention and selectivity separately. The STAT was not able to attempt this analysis  
2384 for the southern model due to time constraints (see research recommendations).

2385 Discards in the pre-STAR base model were estimated in the southern area model for the  
2386 commercial live-fish fishery. This model did not fit the length composition data for the  
2387 commercial live-fish fishery well, and did not capture the increasing trend in the proportion  
2388 of discarded catch south of Cape Mendocino. During the STAR panel, the STAT adopted a  
2389 recommendation made by the panel to treat discarded commercial catch as a separate “fleet”  
2390 in Stock Synthesis, which greatly improved the fits to the discard length composition data  
2391 and greatly improved the fits to the length composition of retained catch in the commercial  
2392 live-fish fishery.

## 2393 2.7 Uncertainty and Sensitivity Analyses

2394 The base-case assessment model includes parameter uncertainty from a variety of sources,  
2395 but underestimates the considerable uncertainty in recent trend and current stock status. For  
2396 this reason, in addition to asymptotic confidence intervals (based upon the model’s analytical  
2397 estimate of the variance near the converged solution), two alternate states of nature (low  
2398 and high values of M) are presented in a decision table. Much additional exploration of  
2399 uncertainty was performed prior the STAR panel. Some of that exploration of other sources  
2400 of uncertainty is provided below. Specifically, for each pre-STAR area model, the following  
2401 sensitivity runs were performed:

- 2402 1. “Drop-one” analyses: remove single data types from the model – indices, discards,  
2403 length compositions (down-weighted by scaling Francis weights by factor of 0.25), and  
2404 age compositions.
- 2405 2. Alternative data-weighting criterion. The base model length compositions are tuned  
2406 based on the Francis method (Francis2011), as implemented in the r4ss package. An  
2407 alternative method based on the harmonic mean effective sample size (McAllister and  
2408 Ianelli 1997).
- 2409 3. Free up size at age 0 (1 run) and CV at A\_min (1 run)
- 2410 4. Fix growth at external estimate (1 run)

### 2411 Northern Model

2412 Tabular results for the northern area pre-STAR model sensitivity runs can be viewed here:  
2413 [40](#), and associated figures are here: Figures [105](#) and [106](#). The model for the northern management  
2414 area was not sensitive to dropping the index of abundance, data weighting methods,

2415 downweighting length comps (75% reduction in Francis weights, i.e. weights multiplied by  
2416 0.25). The pre-STAR models that attempted to estimate the size at age 0 and CV at Age  
2417 minimum growth parameters resulted parameters going to bounds, producing unrealistic  
2418 estimates for these parameter values. The pre-STAR model was highly sensitive to the  
2419 exclusion of age the com- position data and fixing growth the the externally estimated values.  
2420 Lack of age data and fixing growth to the external estimates produced an approximate  
2421 doubling in the estimates of the stock size and in the status of the population. Removal of  
2422 the age composition data, modeled as conditional age-at-length, impacts the scale of the pre-  
2423 STAR model, in part because the pre-STAR model is no longer able to estimate reasonable  
2424 values of growth parameters. Fixing growth to the externally estimated values is problematic  
2425 because the data lack small/young fish, resulting in high sensitivity to the k estimate.

2426 When estimated with their respective prior distributions, both steepness and natural mor-  
2427 tality are larger than the fixed values in the pre-STAR base model ( $h = 0.95$ , and  $M = 0.07$ ).  
2428 However, the higher estimate of  $M$  contradicts the observed maximum age of 83 and the  
2429 higher  $h$  estimate is inconsistent with the current understanding of rockfish productivity.

2430 Additional sensitivities conducted during the STAR panel are described in the section “Re-  
2431 sponse to the 2015 STAR Panel Requests.”

## 2432 Central Model

2433 Tabular results for the central area pre-STAR model sensitivity runs can be viewed here:  
2434 Table 41, and associated figures are here: Figures 107 and 108. The pre-STAR model for the  
2435 central management area was not sensitive to dropping the index of abundance, data weight-  
2436 ing methods, downweighting length comps (75% reduction in Francis weights, i.e. weights  
2437 multiplied by 0.25). The pre-STAR models that attempted to estimate the size at age 0 and  
2438 CV at Age minimum growth parameters resulted parameters going to bounds, producing  
2439 unrealistic estimates for these parameter values. The pre-STAR model was highly sensitive  
2440 to the exclusion of age the composition data and fixing growth the externally estimated  
2441 values. Lack of age data resulted in an inability to estimate  $R_0$ , leading to unrealistic model  
2442 results. Fixing growth to the external estimates produced an approximate doubling in the  
2443 estimates of the stock size and in the status of the population. Fixing growth to the exter-  
2444 nally estimated values is problematic because the data lack small/young fish, resulting in  
2445 high sensitivity to the k estimate.

2446 The central pre-STAR base model is unable to estimate  $M$  but when  $h$  is estimated it goes  
2447 to a value of 0.75, very close to the fixed value from the pre-STAR base model of 0.773,  
2448 indicating that the data do not contain much information about stock productivity.

2449 Additional sensitivities conducted during the STAR panel are described in the section “Re-  
2450 sponse to the 2015 STAR Panel Requests.”

## 2451 Southern Model

2452 The pre-STAR base model for the southern management area was not very sensitive to drop-  
2453 ping indices or discard data, or to downweighting length comps (75% reduction in Francis

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 110). Removal of marginal age composition data and conditional age-at-length data had a dramatic effect on model results, in part because the model is no longer able to estimate credible values of growth parameters (e.g. von Bertalanffy  $k = 0.027$ ; Figure 111).

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

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

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

Additional sensitivities conducted during the STAR panel are described in the section “Response to the 2015 STAR Panel Requests.”

### 2.7.1 Retrospective analysis

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

2492 **2.7.2 Likelihood profiles**

2493 **Pre-STAR base model likelihood profiles**

2494 Likelihood profiles for equilibrium recruitment ( $R_0$ ), natural mortality ( $M$ ), and steepness  
2495 ( $h$ ), were completed to investigate the uncertainty in these parameters and their influence  
2496 on the fit to different data sources. For all models, the age data had the largest influence  
2497 on the scale of the population as indicated by the data type most influenced by  $R_0$  (Figures  
2498 124, 125, and 126). In the southern model, the length and index data also had the best fit at  
2499 a similar scale, showing consistency in these data sources about the population size. In the  
2500 central model, lower  $R_0$  values caused the model to fit the length data less well but higher  
2501 values had little influence. The index data was most influential on the  $R_0$  estimates in the  
2502 northern model, where they were best fit with a higher equilibrium recruitment.

2503 Profiles over natural mortality showed length and age data best fit by high  $M$  values (greater  
2504 than 0.10) in the central and south models (Figures 127 and 128), while the value among  
2505 those in the profile with best likelihood in the northern model was  $M = 0.08$  (Figure 129).  
2506 As in the profile over  $R_0$ , the index data in the northern model showed a larger influence on  
2507  $M$  than the index data in the central and southern models.

2508 Likelihood profiles were conducted over four values for the steepness of the stock-recruit  
2509 curve ( $h = 0.3, 0.6, 0.773$ , and  $0.9$ ), where  $0.773$  is the mean of the prior distribution and  
2510 chosen as a fixed value in the three base models. These profiles indicated that for the  
2511 southern and northern models (Figures 130 and 131), length and age data were best fit by  
2512 high steepness values, with the index in the northern model also showing a better fit at  
2513 higher steepness. The central model, however, showed the best combined fit to all data  
2514 sources at an intermediate value of steepness, with an MLE estimate when the parameter  
2515 was estimated of  $h = 0.753$ , which is close to the prior mean (Figure 132). This estimate  
2516 represents a balance between the age data and steepness prior, which were best fit at higher  
2517 steepness values, and the length data, which was best fit at lower steepness values. The index  
2518 data in the central model showed less change in likelihood as a result of the steepness profile  
2519 than the other data types, but it was the only type that was best fit at an intermediate  
2520 value,  $h = 0.6$ .

2521 **Final base model likelihood profiles**

2522 Likelihood profiles over natural mortality were conducted for all of the final base models,  
2523 and sensitivities to those models (Figures 133, 134, and 135). The northern model had the  
2524 best combined fit at the estimated value of natural mortality. The southern model showed a  
2525 good fit to the estimated value of natural mortality for the index data and the priors. The  
2526 length data in the souther model indicated a better fit at a lower value of natural mortality  
2527 whereas the age data indicated the best fit towards the upper bound of the profile,  $M=0.12$ .  
2528 The central model was not able to estimate a reasonable value for natural mortality, with all  
2529 data sources indicating the best fit to the data towards the upper bound of natural mortality  
2530 in the profile.

## 2531 3 Reference Points

### 2532 Northern Model

2533 This stock assessment estimates that China rockfish in the north are well above the biomass  
2534 target. The spawning biomass of the stock declined between the 1960s and 1990s but has  
2535 largely been stable during the past few decades (Table 43; Figure 136). The estimated relative  
2536 depletion level in 2015 is 73.4% (~95% asymptotic interval:  $\pm 63.6\% - 83.2\%$ ), corresponding  
2537 to an unfished spawning output of 17.9 billion eggs (~95% asymptotic interval: 8.8 – 27.1  
2538 billion eggs) of spawning output in the base model (Table b; Figure 137). Unfished spawning  
2539 output was estimated to be 24.4 billion eggs in the base case model. The target spawning  
2540 output based on the biomass target ( $SB_{40\%}$ ) is 9.8 billion eggs, which gives a catch of 6.2  
2541 mt. Equilibrium yield at the proxy  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 5.8 mt.  
2542 Table k shows the full suite of estimated reference points for the northern area model and  
2543 Figure 138 shows the equilibrium yield curve.

### 2544 Central Model

2545 This stock assessment estimates that central area China rockfish are just above the biomass  
2546 target (Table 44; Figure 139). The rate of spawning output decline is estimated to be  
2547 steepest during the 1980s to 1990s and has continued to decline since the 1990s at a slower  
2548 rate (Figure 140). The estimated relative depletion level in 2015 is 61.5% (~95% asymptotic  
2549 interval:  $\pm 53.8\% - 69.2\%$ ), corresponding to an unfished spawning output of 65.1 billion eggs  
2550 (~95% asymptotic interval: 51.8 – 78.4 billion eggs) of spawning output in the base model  
2551 (Table c). Unfished age 5+ biomass was estimated to be 591.5 mt in the base case model.  
2552 The target spawning output based on the biomass target ( $SB_{40\%}$ ) is 26 billion eggs, which  
2553 gives a catch of 15.7 mt. Equilibrium yield at the proxy  $F_{MSY}$  harvest rate corresponding to  
2554  $SPR_{50\%}$  is 14.5 mt. Table l shows the full suite of estimated reference points for the central  
2555 area model and Figure 141 shows the equilibrium yield curve.

### 2556 Southern Model

2557 This stock assessment estimates that China rockfish south of  $40^{\circ}10' N.$  latitude are below the  
2558 biomass target, but above the minimum stock size threshold, and have been increasing over  
2559 the last 15 years (Table 45; Figure 142). The estimated relative depletion level in 2015 is  
2560 27.9% (~95% asymptotic interval:  $\pm 21.2\% - 34.7\%$ ), corresponding to an unfished spawning  
2561 output of 66.5 billion eggs (~95% asymptotic interval: 49.6 - 83.4 billion eggs) of spawning  
2562 output in the base model (Table d). Unfished age 5+ biomass was estimated to be 768.6  
2563 mt in the base case model (Figure 143). The target spawning output based on the biomass  
2564 target ( $SB_{40\%}$ ) is 26.6 billion eggs, which gives a catch of 21.1 mt. Equilibrium yield at  
2565 the proxy  $F_{MSY}$  harvest rate corresponding to  $SPR_{50\%}$  is 19.5 mt. Table m shows the full  
2566 suite of estimated reference points for the southern area model and Figure 144 shows the  
2567 equilibrium yield curve.

## 2568 4 Harvest Projections and Decision Tables

2569 The forecasts of stock abundance and yield were developed using the final base models. The  
2570 total catches in 2015 and 2016 are set to the PFMC adopted China rockfish contribution  
2571 ACLs in the northern and central models (Table n). The southern model total catches in  
2572 2015 and 2016 are set to the average annual catch from 2012-2014. The exploitation rate for  
2573 2017 and beyond is based upon an SPR harvest rate of 50%, adjusted by the default 40-10  
2574 harvest control rule. The average of 2010-2014 catch by fleet was used to distribute catches  
2575 in forecasted years.

2576 **Northern Model** Current medium-term projections of expected China spawning biomass  
2577 from the northern base model suggests slight declines from the current levels as the stock  
2578 moves towards the current target stock size under the default harvest control rule (Table 46,  
2579 Figures 145 and 146). The stock is expected to remain above the target stock size during  
2580 the projection period, assuming stationarity in the stock-recruitment assumptions.

2581 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
2582 panel and are based on a low value of M, 0.05, and a high value, 0.09. Current medium-term  
2583 forecasts based on the alternative states of nature project that the stock, under the current  
2584 control rule as applied to the base model, will decline towards the target stock size Table  
2585 p. The current control rule under the low state of nature results in a stock decline into  
2586 the precautionary zone, while the high state of nature maintains the stock at near unfished  
2587 levels. Removing the catches resulting from the low M state of nature, assuming the base  
2588 and high values of M both maintain the stock at well above the current target stock size, as  
2589 does removing the recent average catches under all states of nature. Removing the high M  
2590 catches under the base model M and high M states of nature results in the population going  
2591 to extremely low levels during the projection period, spawning biomass and stock depletion  
2592 values are not reported for years in which the stock goes to these very low levels.

### 2593 Central Model

2594 Current medium-term projections of expected China spawning biomass from the central base  
2595 model suggests stable catches near current levels as the stock is just above the current target  
2596 stock size under the default harvest control rule (Table 47, Figures 145 and 146). The stock is  
2597 expected to remain just above the target stock size, increasing slightly, during the projection  
2598 period, assuming stationarity in the stock-recruitment assumptions.

2599 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
2600 panel and are based on a low value of M, 0.05, and a high value, 0.09. Current medium-  
2601 term forecasts based on the alternative states of nature project that the stock, under the  
2602 current control rule as applied to the base model, will decline towards the target stock size  
2603 Table q. The current control rule under the low state of nature results in a stock in the  
2604 precautionary zone, while the high state of nature maintains the stock increasing from 40%  
2605 to 50% depletion from 2017 - 2026. Removing the catches resulting from the low M state of  
2606 nature, assuming the base and high values of M both maintain the stock at well above the

2607 current target stock size. Removing the high M catches under the base model M and low M  
2608 states of nature results in the population going to extremely low levels during the projection  
2609 period. Removing average catches under the base M and high M states of nature result in  
2610 the stock remaining above the current target stock size, and an ending depletion of 37% in  
2611 2026 for the low M state of nature.

## 2612 Southern Model

2613 Assuming that catches in 2015 and 2016 equal recent average catch, and that catches be-  
2614 ginning in 2017 follow the default ACL harvest control rule, projections of expected China  
2615 spawning output from the southern base model suggest the stock will be at roughly 30% of  
2616 unfished spawning output in 2017, and increase to 38% by 2026 (Table 48, Figures 145 and  
2617 146). The stock is expected to remain below the target stock size (40% of unfished spawning  
2618 output) in the base model and “low M” states of nature through 2026, and to exceed target  
2619 size in the “high M” scenario, assuming stationarity in the stock-recruitment assumptions.

2620 Uncertainty in the forecasts is based upon the three states of nature agreed upon at the STAR  
2621 panel: a low value of M, 0.05, the base model value, M=0.07, and a high value, M=0.09.  
2622 Stock status under the alternative states of nature ranges from an overfished state in 2017  
2623 for the low-M scenario (21% of unfished spawning output) to a stock at target biomass (40%  
2624 of unfished) in the high-M scenario (Table r). Annual catches based on the low-M state of  
2625 nature increase from 5 to 10 mt over the projection period, and result in an increasing stock  
2626 under all three states of nature. Catches derived from the base model increase from 11 mt  
2627 in 2017 to 15 mt in 2026, and also produce increasing trends (at different rates) in spawning  
2628 output under all three states of nature. Catches under the high-M state of nature produce  
2629 very little change in spawning output over the projection period for all three states of nature.

## 2630 5 Regional Management Considerations

2631 China rockfish is currently managed as part of the nearshore rockfish stock complex, and  
2632 as such, does not have a species-specific ACL. The complex is divided into northern and  
2633 southern components around the PFMC management line at 40°10' N. latitude (near Cape  
2634 Mendocino, California). This management boundary is consistent with observed spatial pat-  
2635 terns in the data (e.g. length compositions, size at age, commercial discard rates), and OFL  
2636 estimates for the northern and southern management regions can be calculated directly from  
2637 the base model runs and projections (southern model = OFL for southern nearshore rockfish  
2638 complex, central + northern models = OFL for northern nearshore rockfish complex).

## 2639 6 Research Needs

- 2640 1. The number of hours fished in Washington should be recorded for each dockside sample  
2641 (vessel) so that future CPUE can be measured as angler hours rather than just number

- 2642 of anglers per trip. This will allow for a more accurate calculation of effort.
- 2643 2. The number of hours fished in Oregon should be recorded for each dockside sample  
2644 (vessel), instead of the number of the start and end times of the entire trip. This will  
2645 allow for a more accurate calculation of effort.
- 2646 3. Compare the habitat-based methods used to subset data for the onboard observer  
2647 indices to Stephens-MacCall and other filtering methods.
- 2648 4. Explore the sensitivity of Stephens-MacCall when the target species is “rare” or not  
2649 common encountered in the data samples.
- 2650 5. A standardized fishery independent survey sampling nearshore rockfish in all three  
2651 states would provide a more reliable index of abundance than the indices developed  
2652 from catch rates in recreational and commercial fisheries. However, information value  
2653 of such surveys would depend on the consistency in methods over time and space and  
2654 would require many years of sampling before an informative index could be obtained.
- 2655 6. A coastwide evaluation of genetic structure of China rockfish is a research priority.  
2656 Genetic samples should be collected at sites spaced regularly along the coast throughout  
2657 the range of the species to estimate genetic differences at multiple spatial scales (i.e.,  
2658 isolation by distance).
- 2659 7. Difficulties were encountered when attempting to reconstruct historical recreational  
2660 catches at smaller spatial scales, and in distinguishing between landings from the pri-  
2661 vate and charter vessels. Improved methods are needed to allocate reconstructed recre-  
2662ational catches to sub-state regions within each fishing mode.
- 2663 8. There was insufficient time during the STAR Panel review to fully review the abun-  
2664 dance indices used in the China rockfish assessments. Consideration should be given to  
2665 scheduling a data workshop prior to STAR Panel review for review of assessment input  
2666 data and standardization procedures for indices, potentially for all species scheduled  
2667 for assessment. The nearshore data workshop, held earlier this year, was a step in this  
2668 direction, but that meeting did not deal with the modeling part of index development.
- 2669 9. The Marine Recreational Fisheries Statistics Survey (MRFSS) index in Oregon was  
2670 excluded from the assessment model because it was learned that multiple intercept  
2671 interviews were done for a single trip. Evaluate whether database manipulations or  
2672 some other approach can resolve this issue and allow these data to be used in the  
2673 assessment.
- 2674 10. Many of the indices used in the China rockfish assessment model used the Stephens-  
2675 MacCall (2004) approach to subset the CPUE data. Research is need to evaluate  
2676 the performance of the method when there are changes in management restrictions  
2677 and in relative abundance of different species. Examination of the characteristics of

2678 trips retained/removed should be a routine part of index standardization, such as an  
2679 evaluation of whether there are time trends in the proportion of discarded trips.

- 2680 11. Fishery-dependent CPUE indices are likely to be the only trend information for many  
2681 nearshore species for the foreseeable future. Indices from a multi-species hook-and-line  
2682 fishery may be influenced by regulatory changes, such as bag limits, and by interactions  
2683 with other species (e.g. black rockfish) due to hook competition. It may be possible  
2684 to address many of these concerns if a multi-species approach is used to develop the  
2685 indices, allowing potential interactions and common forcing to be evaluated.
- 2686 12. Consider the development of a fishery-independent survey for nearshore stocks. As  
2687 the current base model structure has no direct fishery-independent measure of stock  
2688 trends, any work to commence collection of such a measure for nearshore rockfish, or  
2689 use of existing data to derive such an index would greatly assist with this assessment.
- 2690 13. Basic life history research may help to resolve assessment uncertainties regarding ap-  
2691 propriate values for natural mortality and steepness.
- 2692 14. Examine length composition data of discarded fish from recreational onboard observer  
2693 programs in California and Oregon. Consider modeling discarded catch using selec-  
2694 tivity and retention functions in Stock Synthesis rather than combining retained and  
2695 discarded catch and assuming they have identical size compositions. Another option  
2696 would be to model discarded recreational catch as a separate fleet, similar to the way  
2697 commercial discards were treated in the southern model.
- 2698 15. Ageing data were influential in the China rockfish stock assessments. Collection and  
2699 ageing of China rockfish otoliths should continue. Samples from younger fish not  
2700 typically selected by the fishery are needed to better define the growth curve.
- 2701 16. Consider evaluating depletion estimators of abundance using within season CPUE  
2702 indices. This approach would require information on total removals on a reef-by-reef  
2703 basis.
- 2704 17. The extensive use of habitat information in index development is a strength of the  
2705 China rockfish assessment. Consideration should be given to how to further incorporate  
2706 habitat data into the assessment of nearshore species. The most immediate need seems  
2707 to be to increase the resolution of habitat maps for waters off Oregon and Washington,  
2708 and standardization of habitat data format among states.
- 2709 18. Although all the current models for China rockfish estimated implausibly large recruit-  
2710 ment deviations when allowed to do so, particularly early in the modeled time period,  
2711 further exploration of available options in stock synthesis could produce acceptable  
2712 results. In addition, this work may provide guidance on any additional options that could  
2713 be added to stock synthesis to better handle this situation. For example, assuming dif-  
2714 ferent levels autocorrelation in the stock-recruit relationship for data-moderate stocks  
2715 may help curb the tendency to estimate extreme recruitment with sparse datasets.

2716     19. Research is needed on data-weighting methods in stock assessments. In particular,  
2717       a standard approach for conditional age-at-length data is needed. The Center for  
2718       the Advancement of Population Assessment Methodology (CAPAM) data weighting  
2719       workshop, scheduled for later this year, should make important progress on this research  
2720       need.

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<sup>2744</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 exploitation 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

2745 **9 Figures**

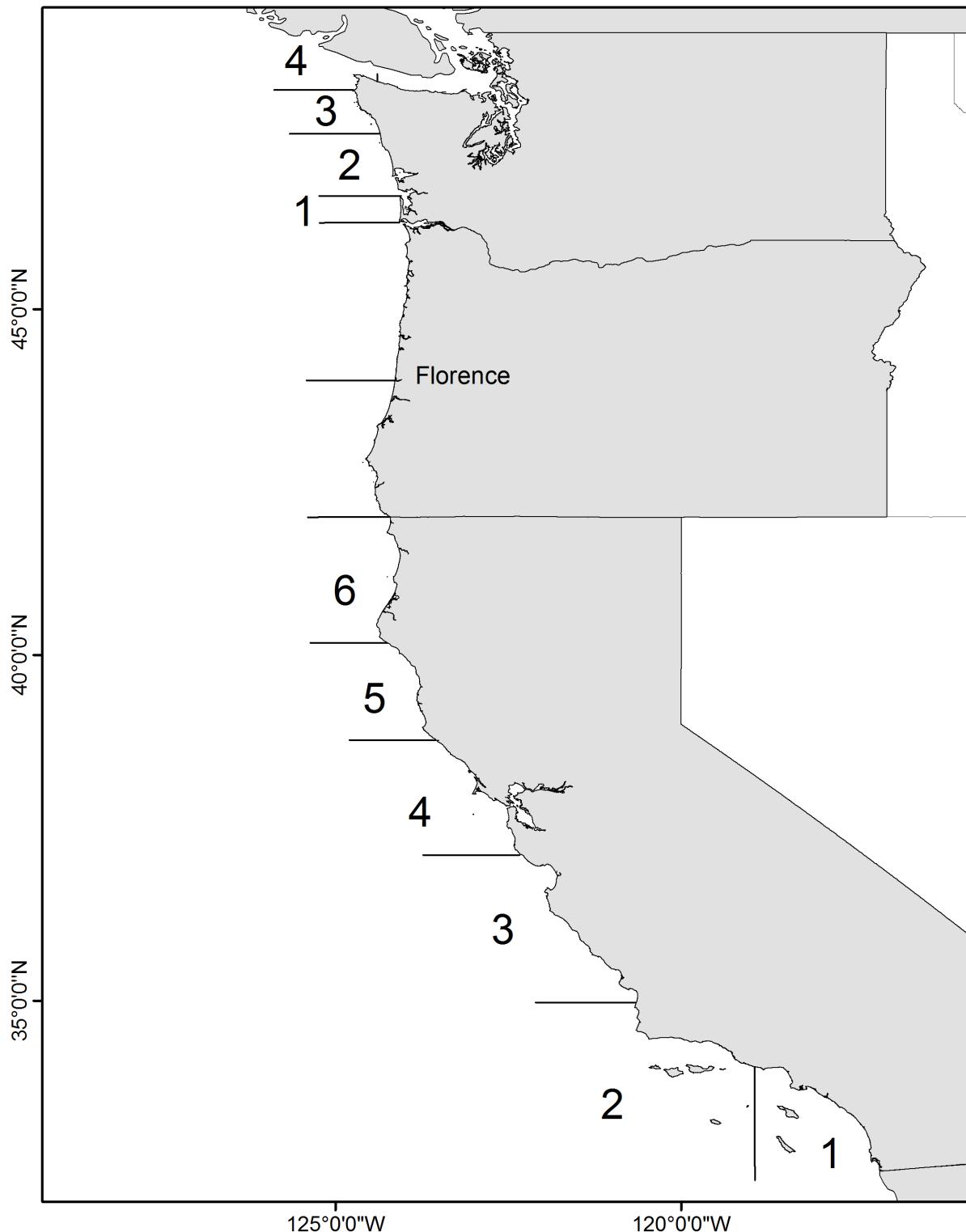


Figure 1: Map showing the state boundary lines for management of the recreational fishing fleets. CRFS Districts 1-6 in California are presented as well as the WDFW Recreational Management Areas in Washington. Florence, OR is shown as a potential location of model stratification.

### Data by type and year

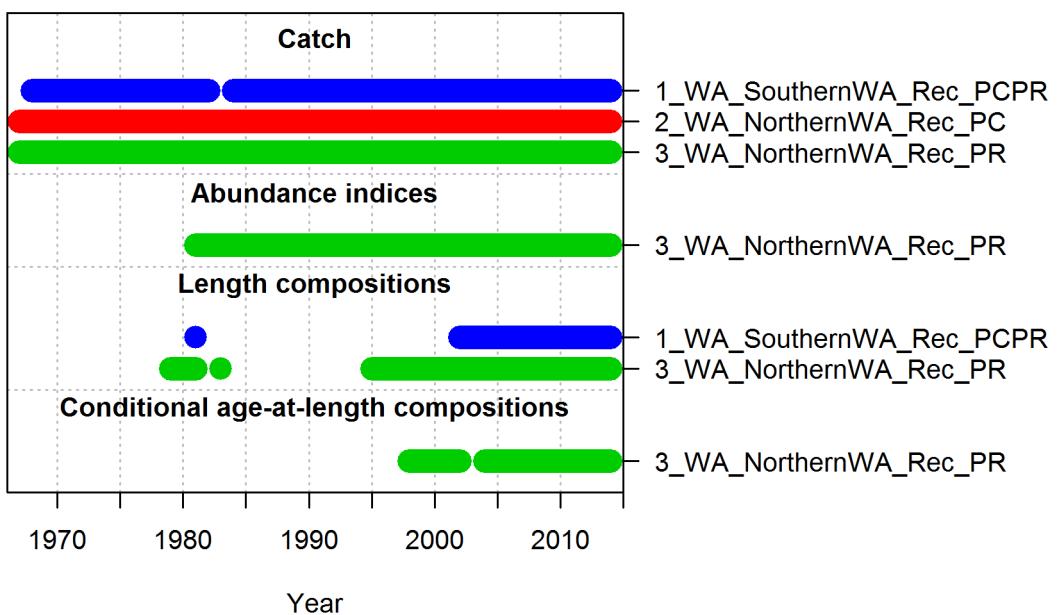


Figure 2: Summary of data sources used in the northern assessment.

### Data by type and year

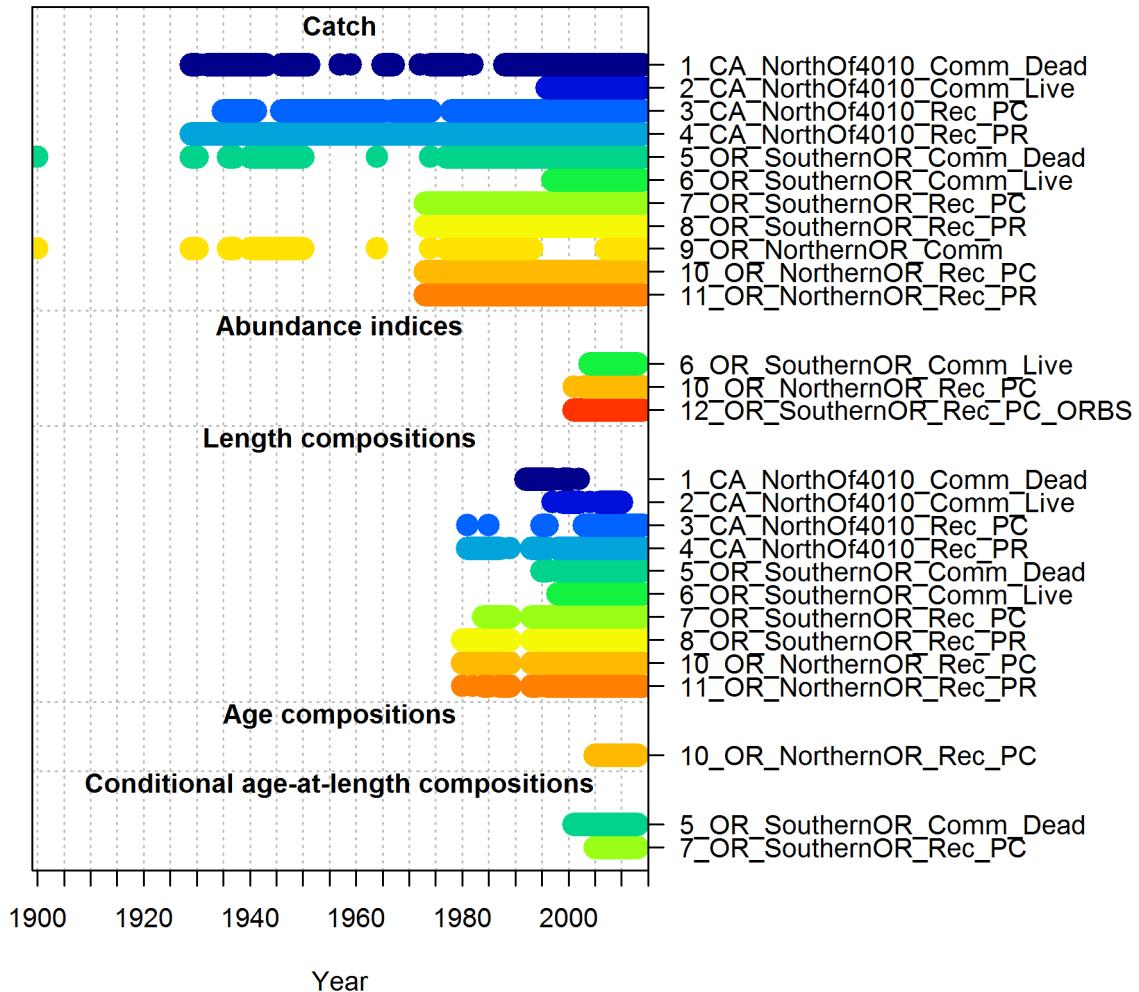


Figure 3: Summary of data sources used in the central assessment.

### Data by type and year

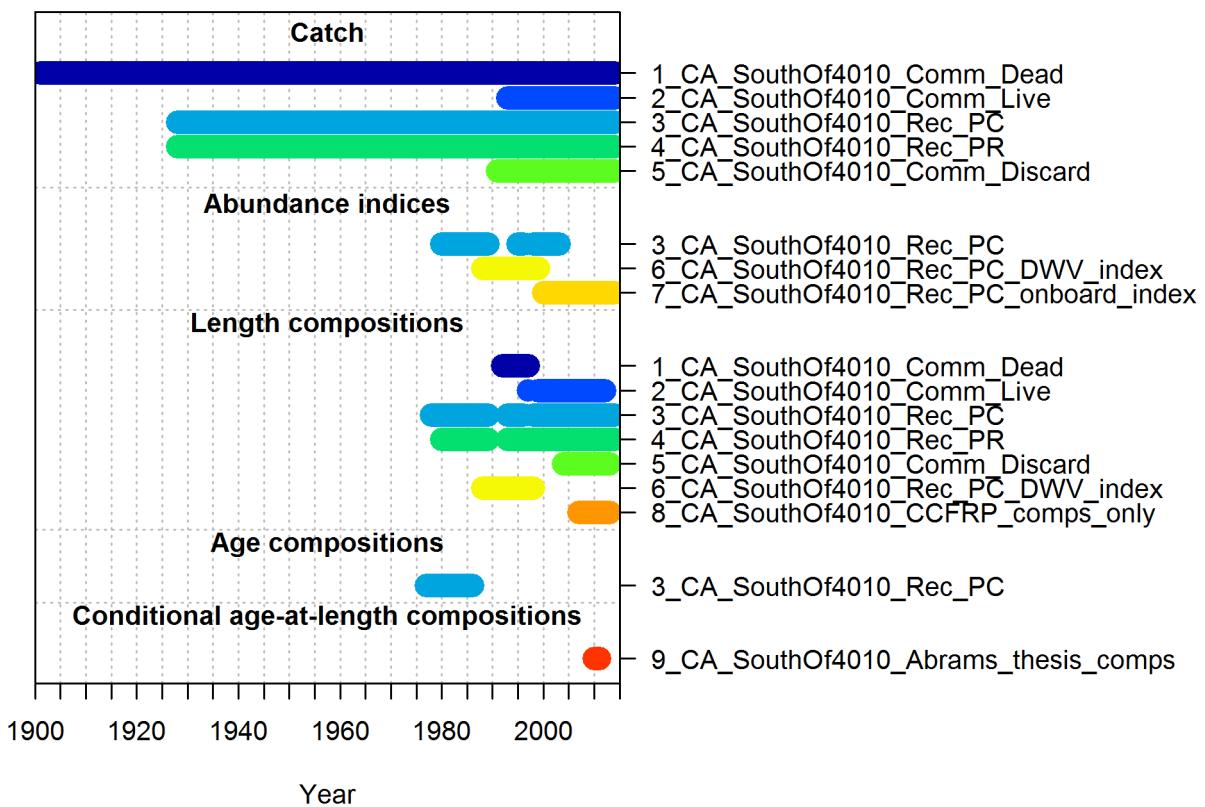


Figure 4: Summary of data sources used in the southern assessment.

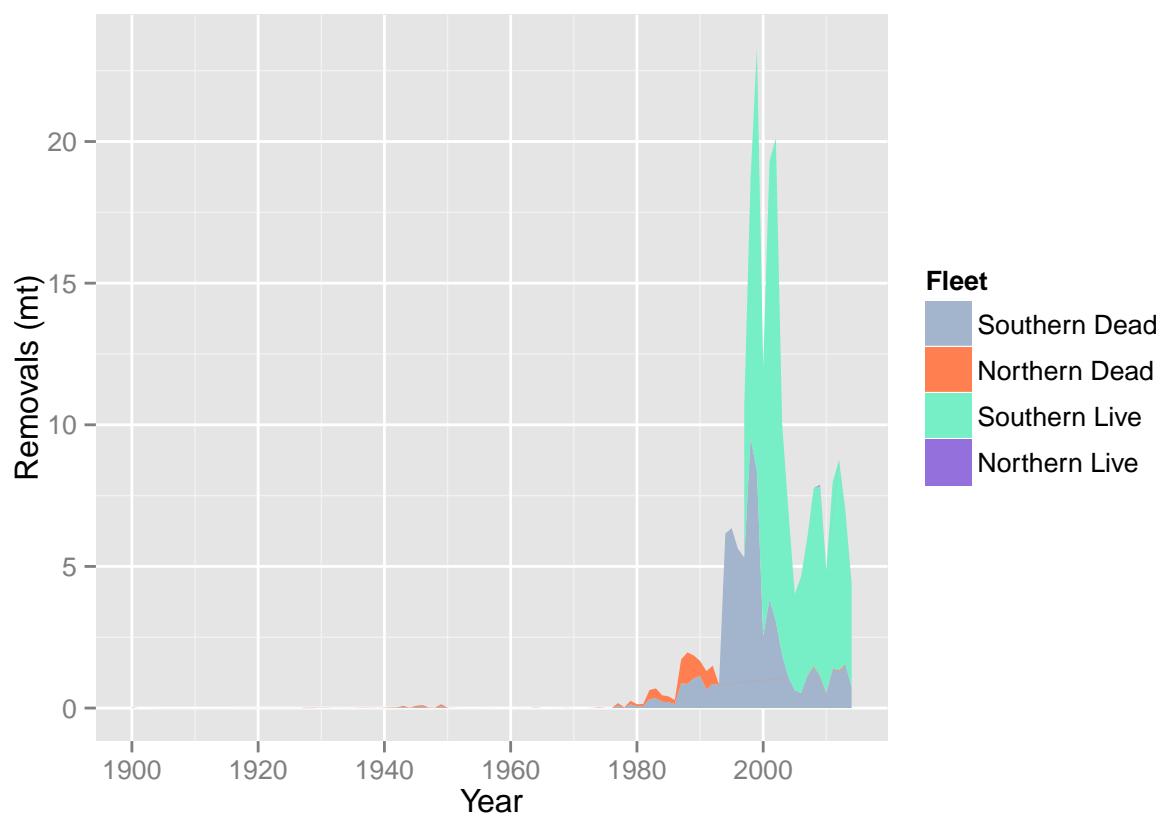


Figure 5: Removals (mt) from the Oregon commercial fleet, north and south of Florence, OR.

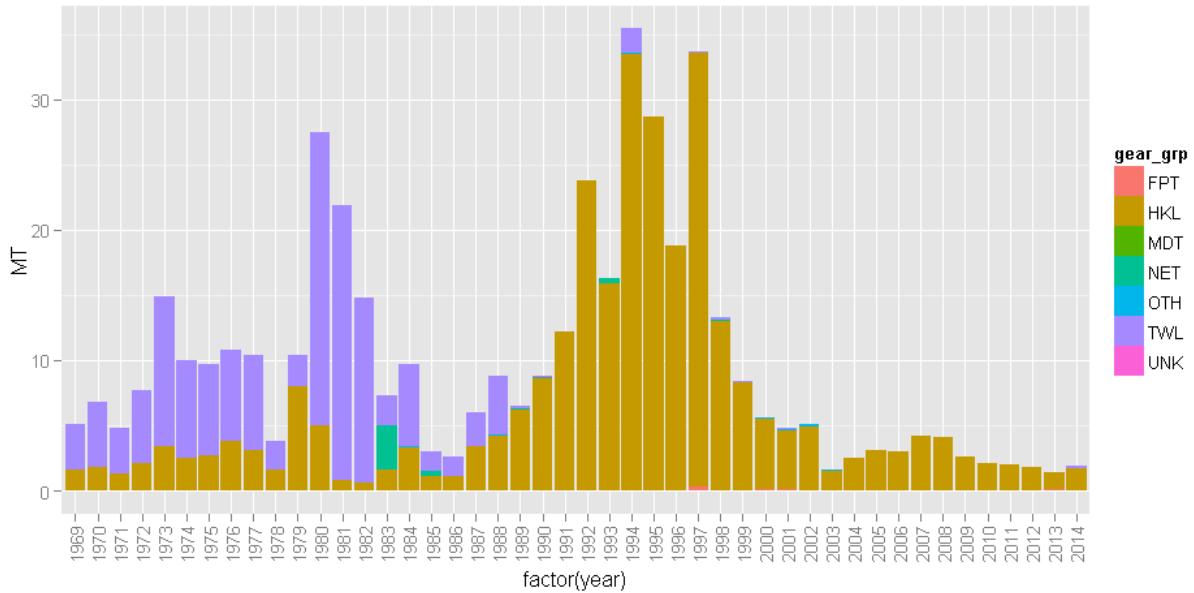


Figure 6: Estimated commercial landings of China rockfish (mt) in California by year and gear group (Source: CALCOM).

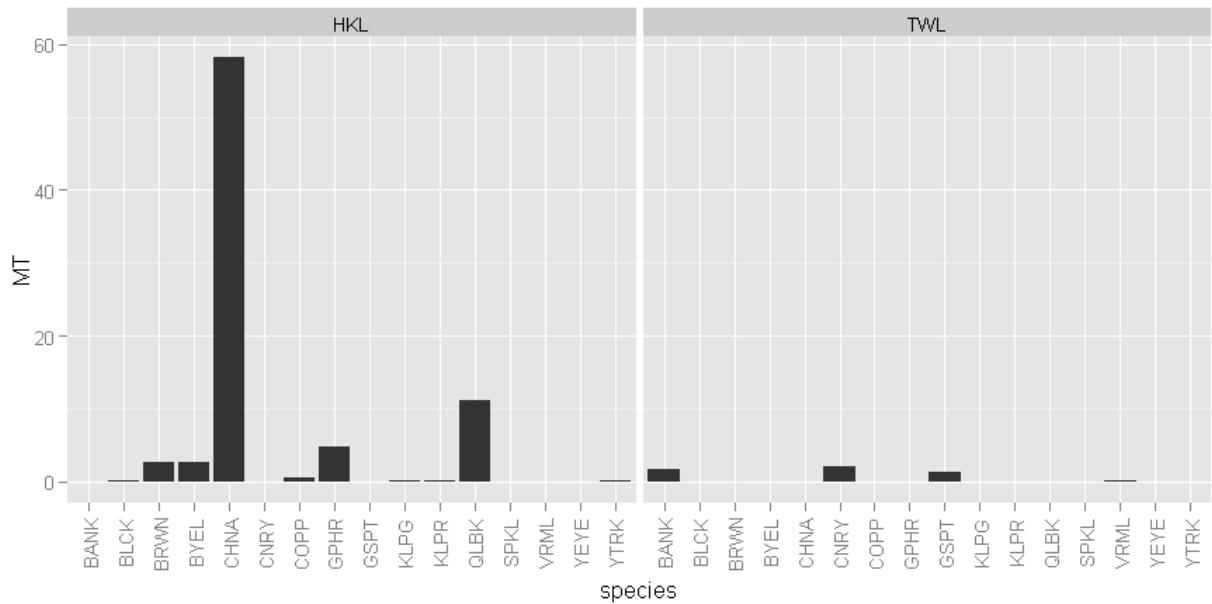


Figure 7: California commercial landings (mt) based on port samples in the China rockfish market category (258) by species and gear group, 1969-2014. hook-and-line (“HKL”) gears are landing nearshore species in this category, mainly China rockfish, whereas trawl (“TWL”) gears landed species with a deeper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

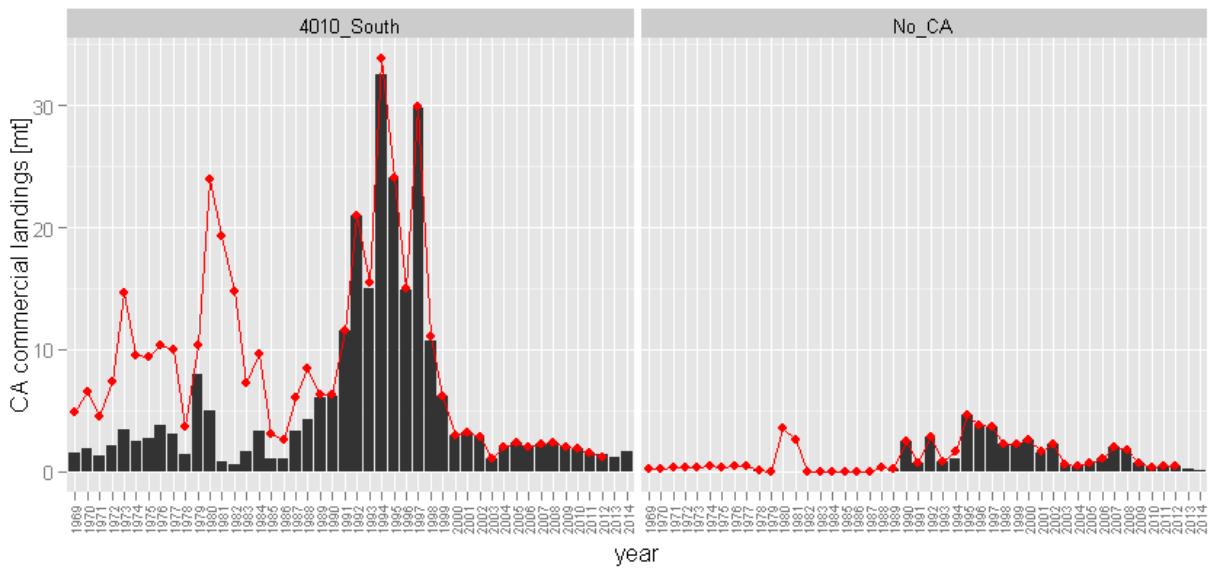


Figure 8: Revised California commercial landing estimates (mt) of China rockfish, north and south of Cape Mendocino, 1969-2014 (black bars). Estimates of California's annual landed commercial catch used in the 2013 stock assessment are plotted for comparison (red line).

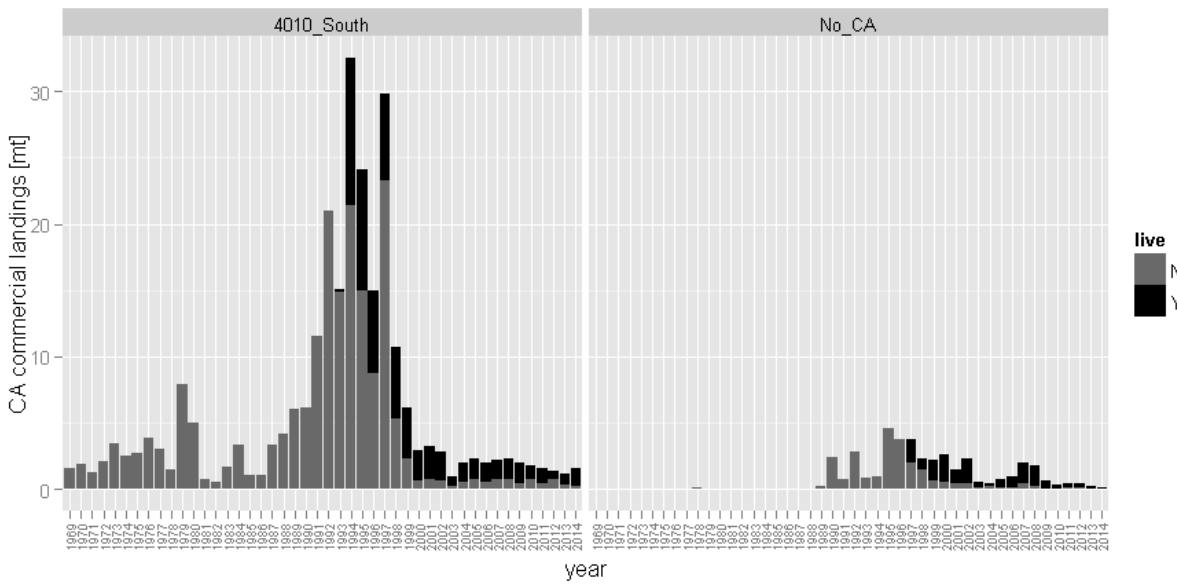


Figure 9: Revised commercial landing estimates (mt) of China rockfish landed live and dead, north and south of Cape Mendocino, 1969-2014.

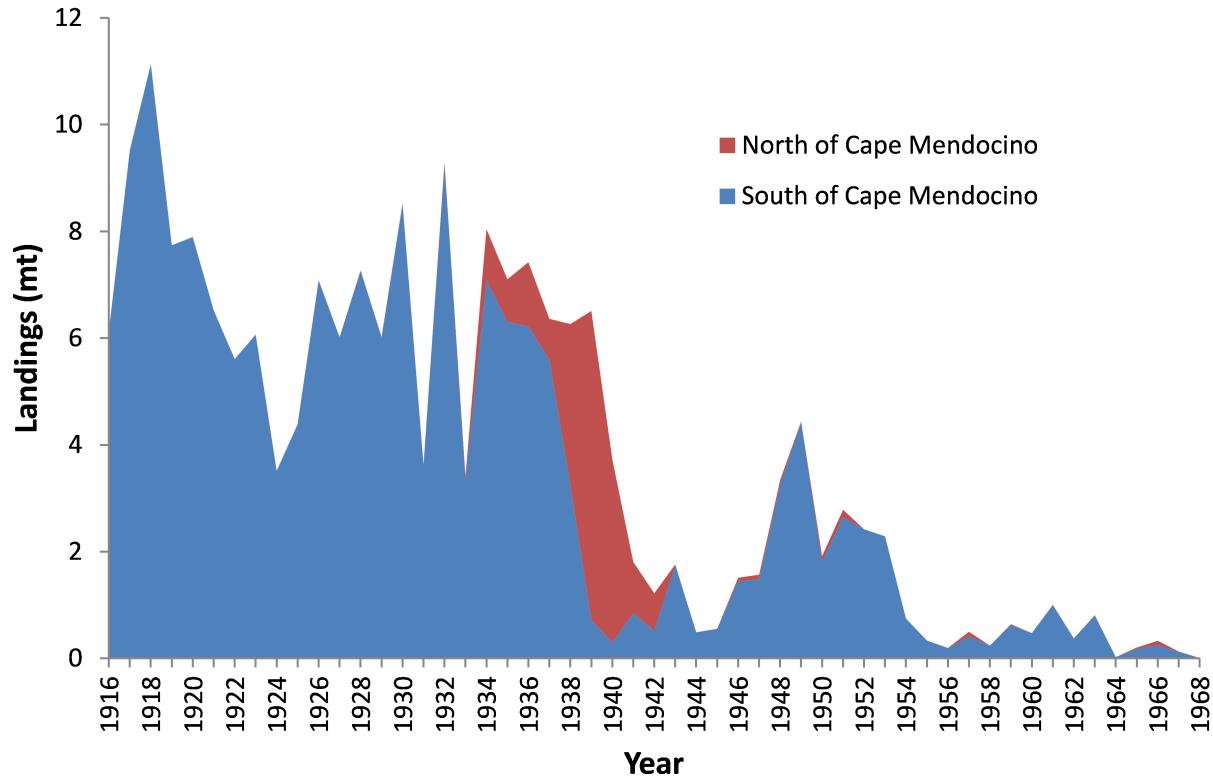
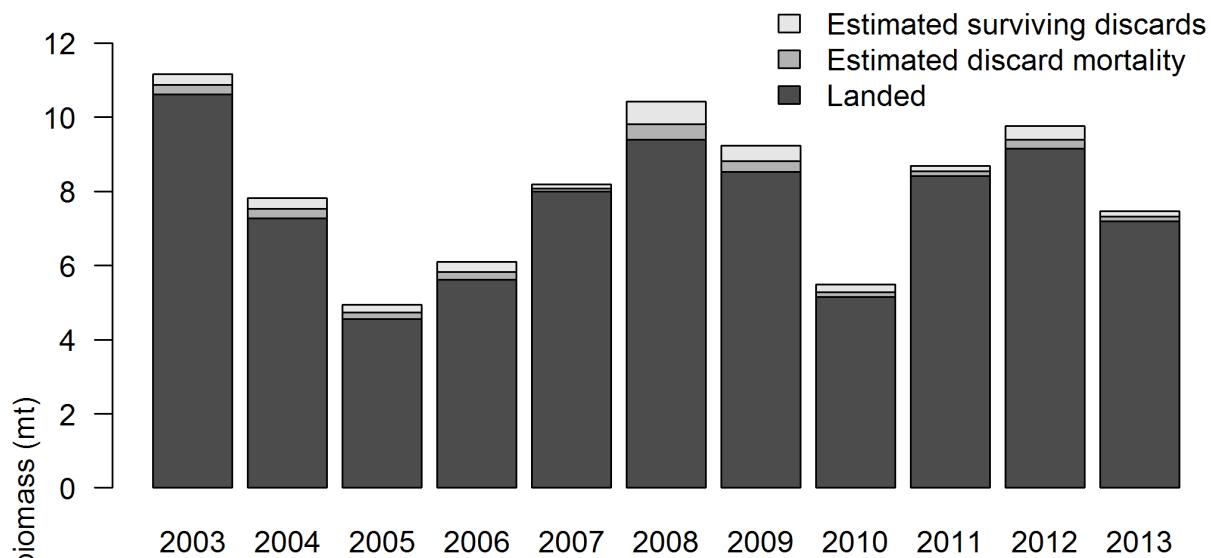


Figure 10: Reconstructed historical commercial landings of China rockfish in California, excluding trawl gear landings, 1916-1968. Source: Ralston et al. 2010

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



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

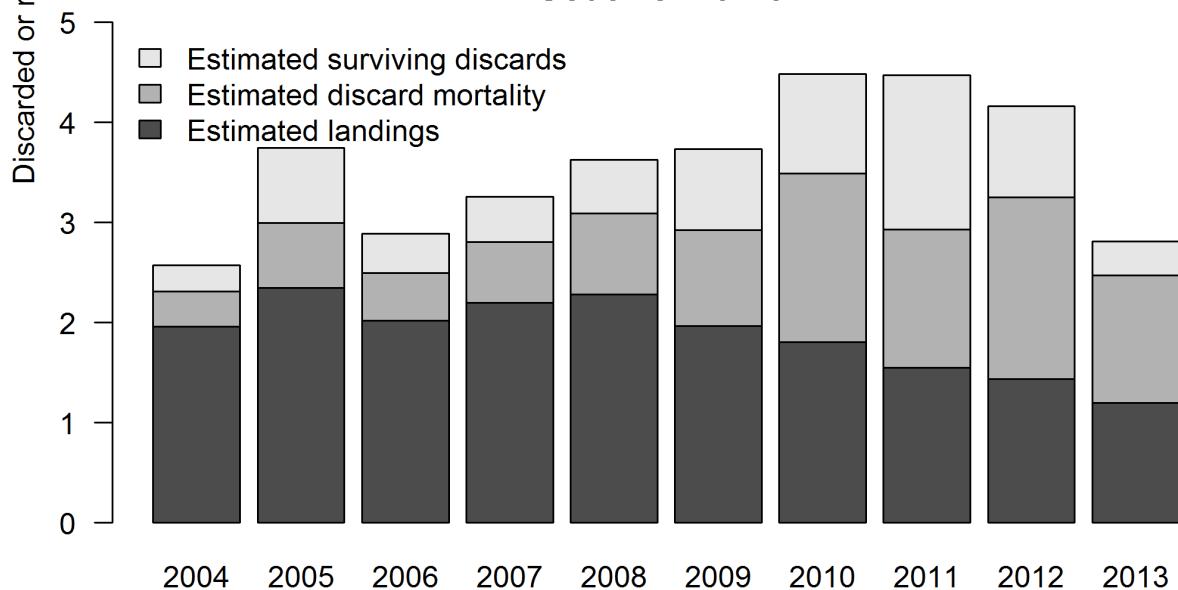


Figure 11: Estimates of discarded and retained China rockfish north and south of  $40^{\circ}10'$  in the commercial Nearshore Fixed-gear fishery. Note that the y-axis limits and range of years differ between panels.

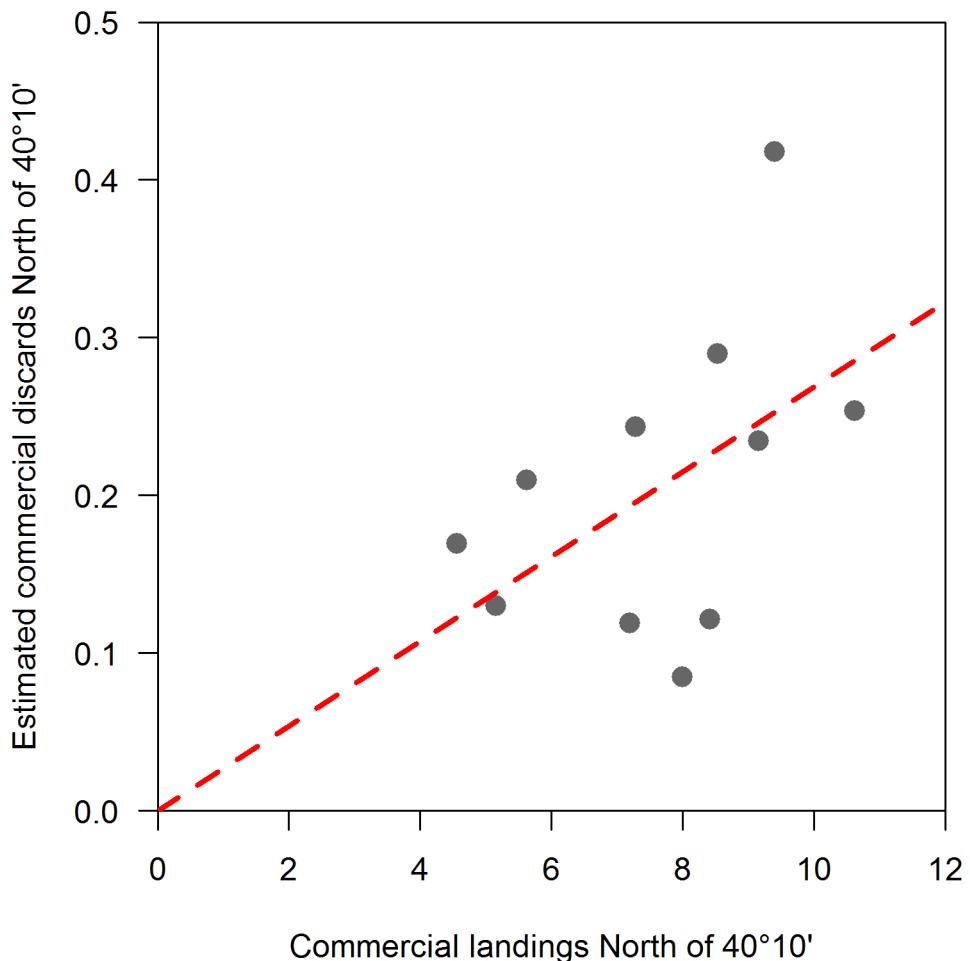


Figure 12: Relationship between estimated discards and landings of China rockfish in the Nearshore Fixed-gear fishery north of  $40^{\circ}10'$ . The gray points indicate estimates from individual years and the red line is a linear regression through those estimates with intercept fixed at 0. The slope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

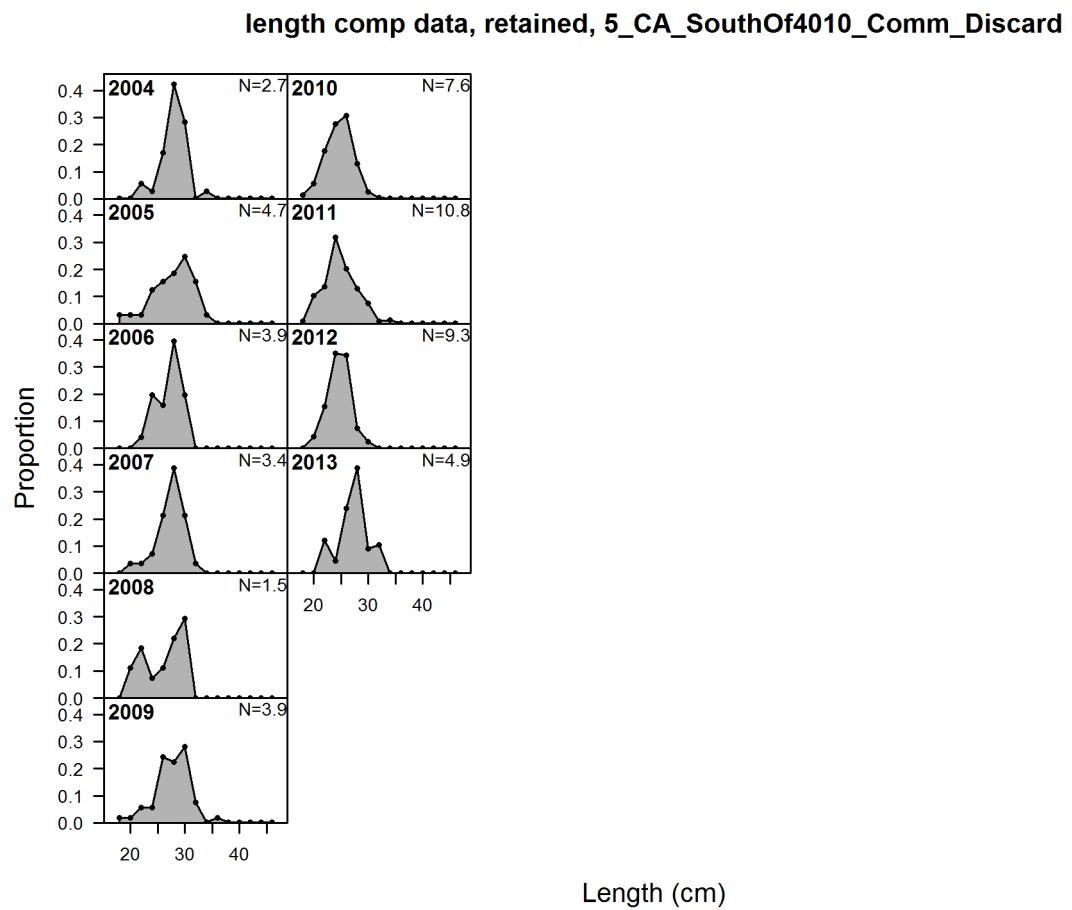


Figure 13: Length compositions by year for discarded fish in the California commercial fishery south of  $40^{\circ}10'$ .

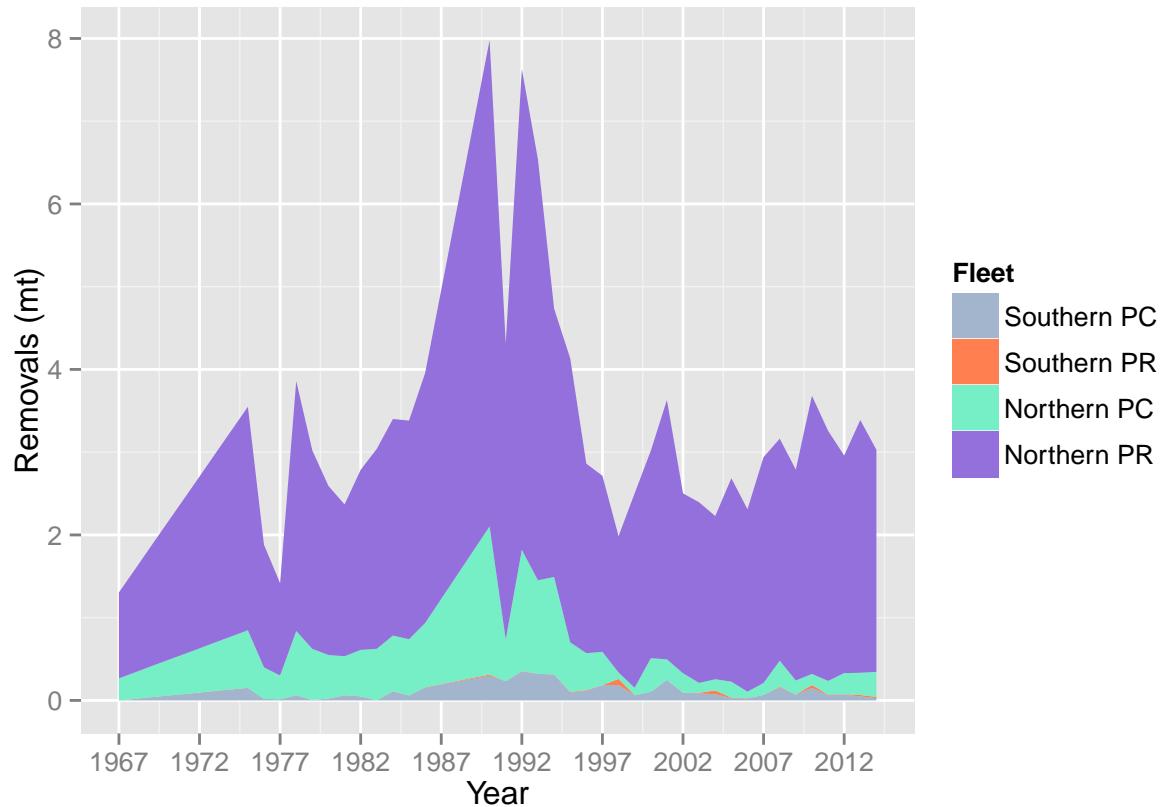


Figure 14: Removals (mt) from the Washington recreational party/charter and private sectors. Northern WA represents MCAs 3 and 4 and southern WA represents MCAs 1 and 2.

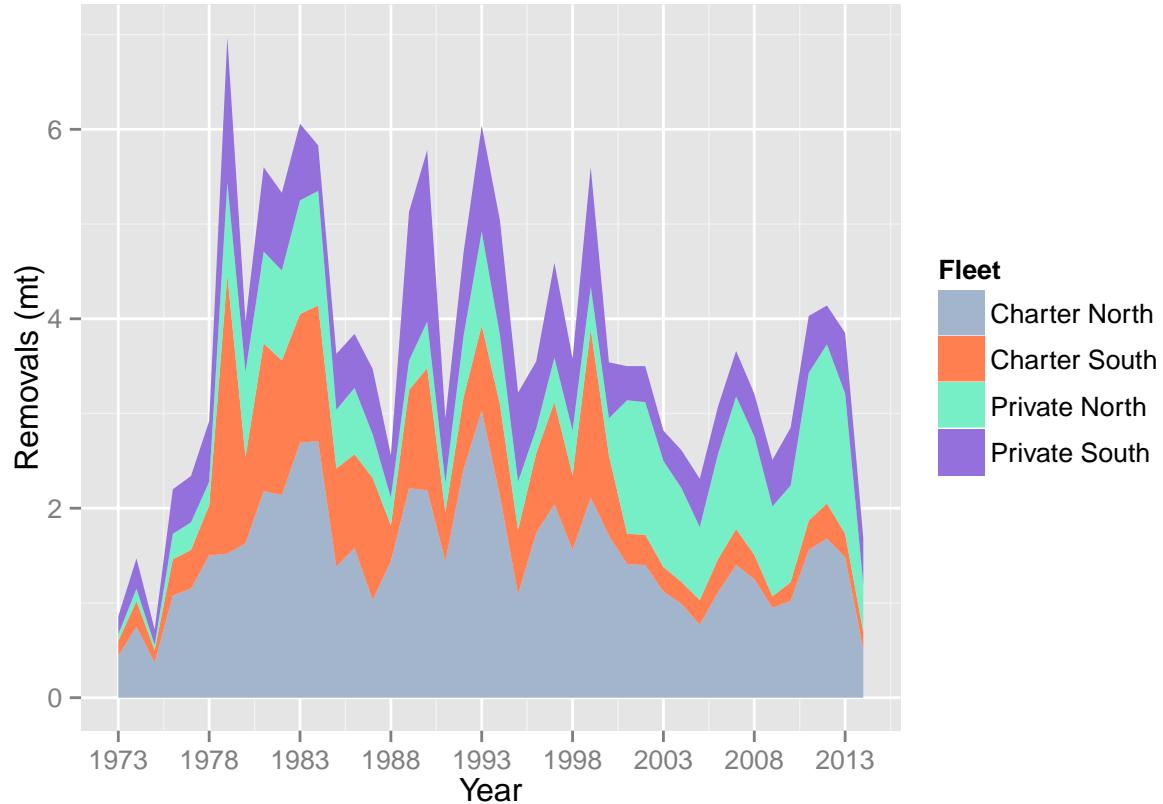


Figure 15: Removals (mt) from the Oregon recreational party/charter and private sectors, north and south of Florence, OR.

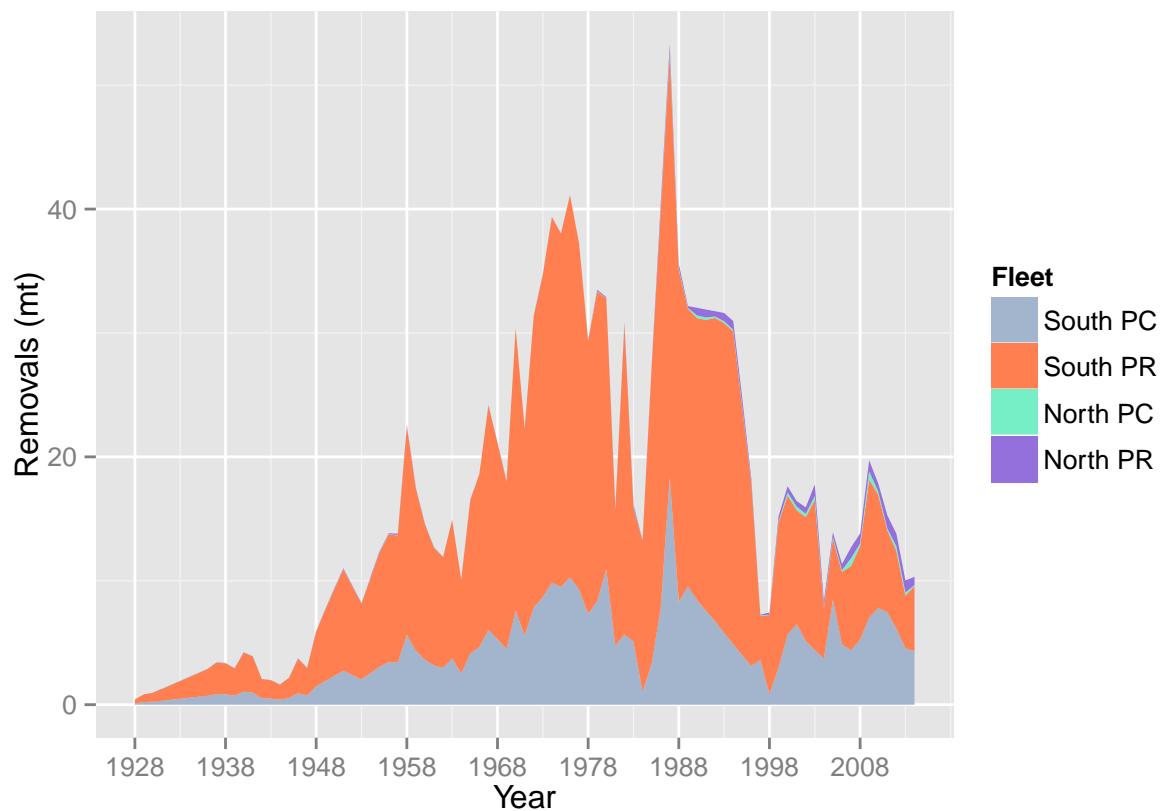


Figure 16: Removals (mt) from the California recreational party/charter and private sectors, north and south of  $40^{\circ}10'$ .

## Oregon Commercial China Rockfish Catch: 2004 - 2013

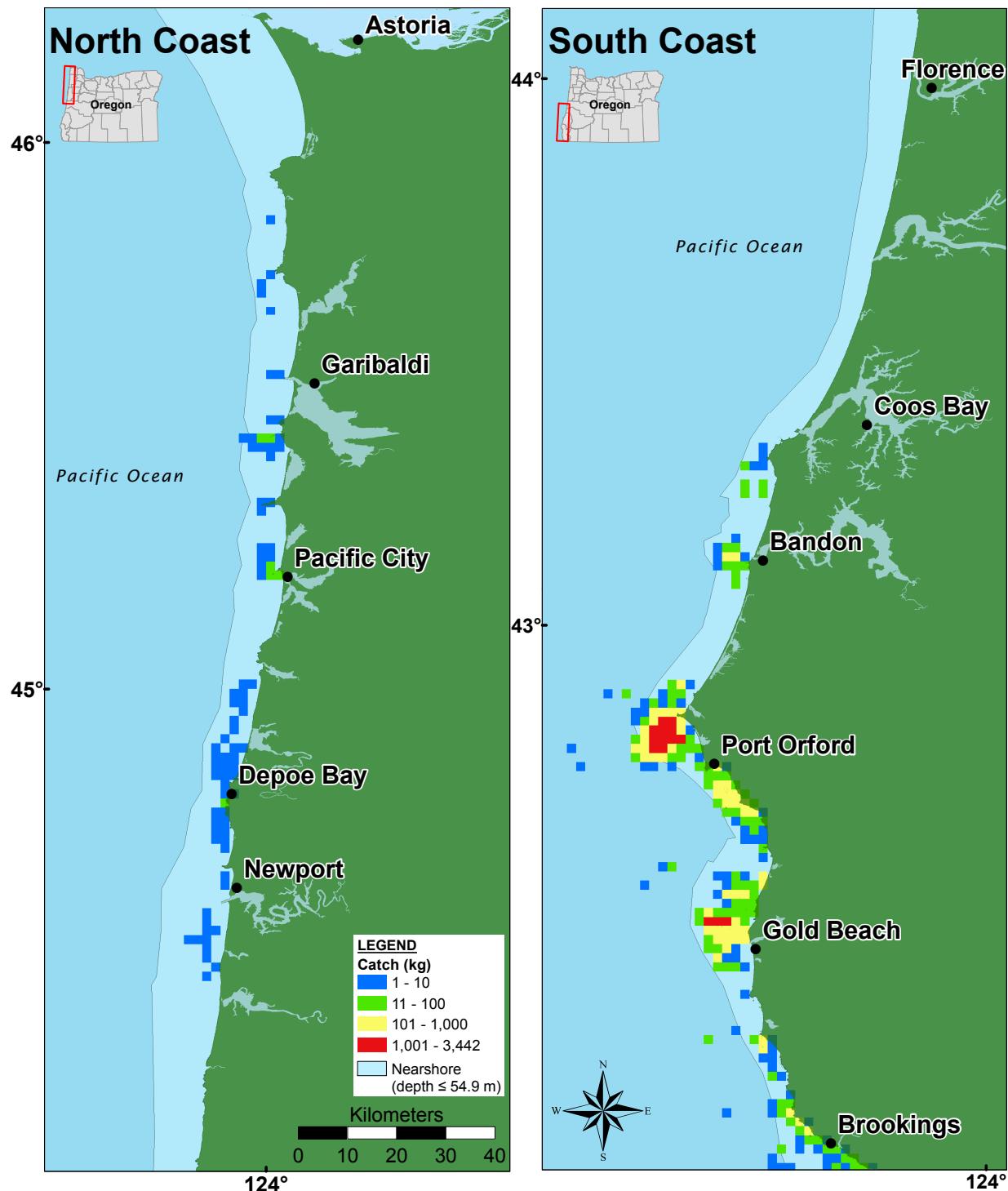


Figure 17: Landings from the commercial fishery logbooks in Oregon. All fishing locations follow the confidentiality guidelines and were fished by at least three vessels during the study.

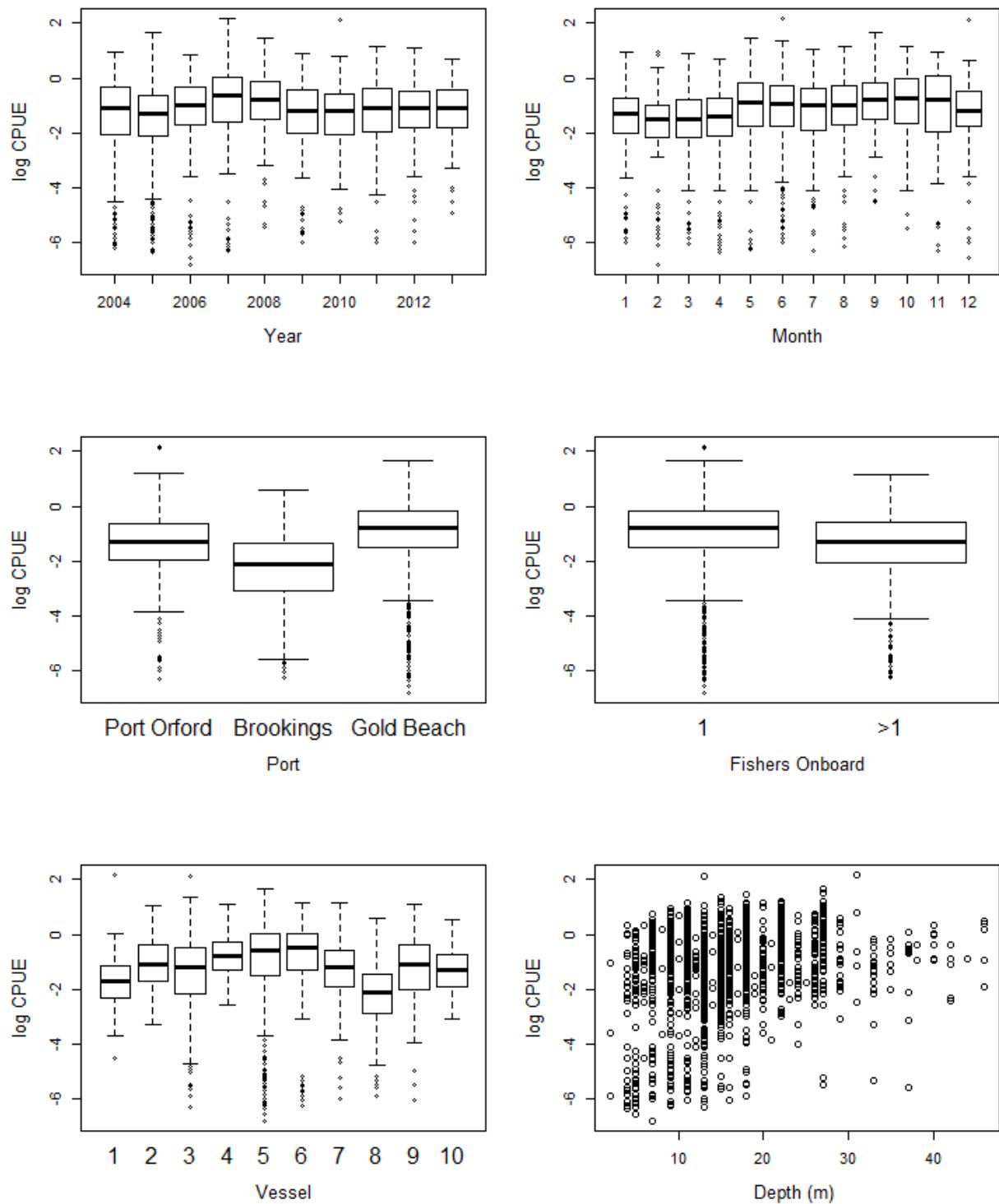


Figure 18: The distribution of set-level raw positive catch CPUE data relative to potential covariates evaluated in the China rockfish Oregon commercial logbook delta-GLM analysis.

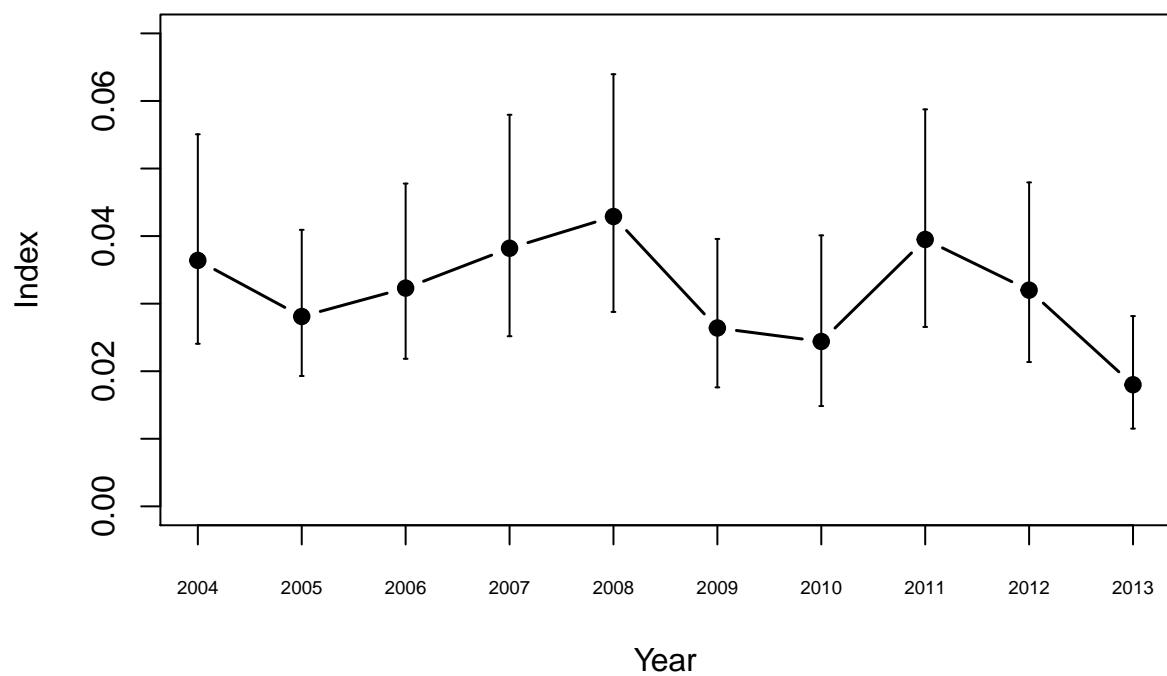


Figure 19: Index for the Oregon commercial logbook, with 95% lognormal confidence intervals.

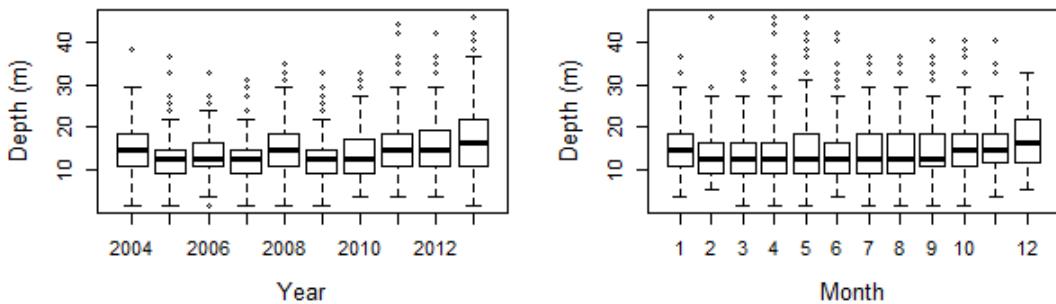
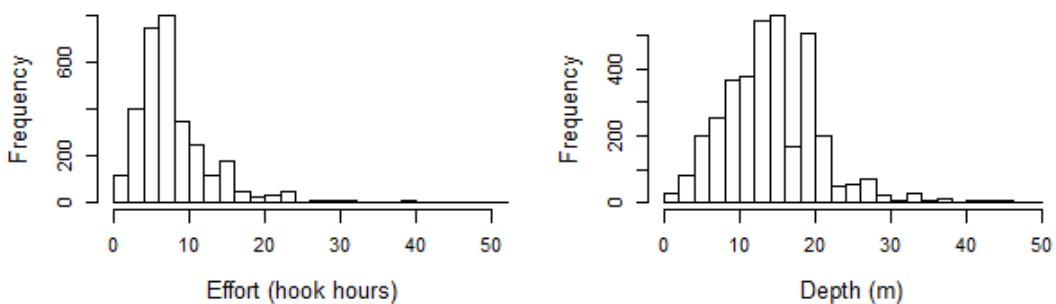
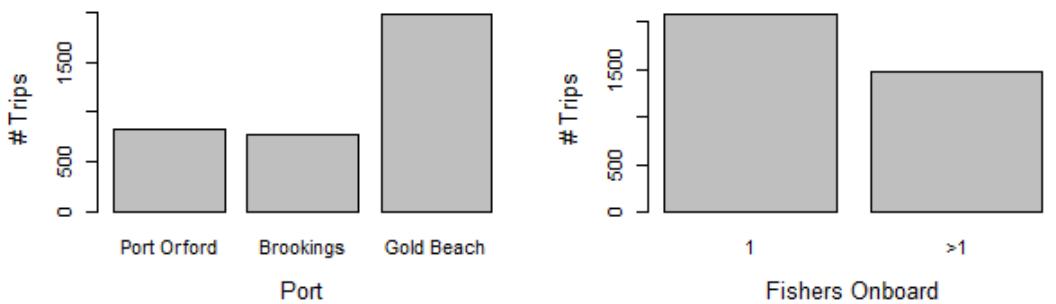
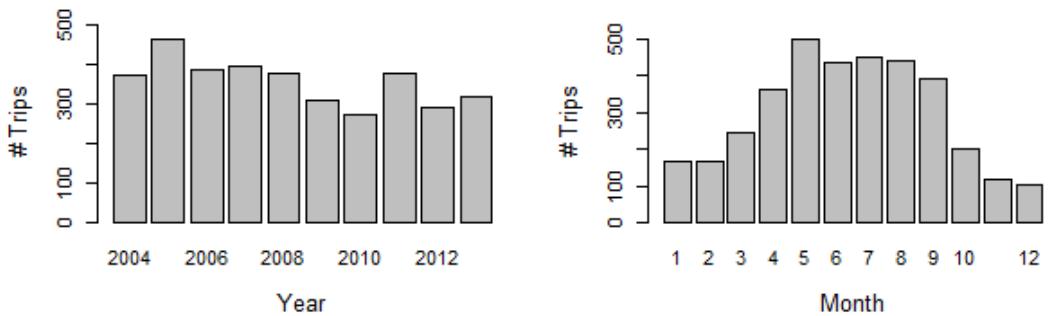


Figure 20: Characterization of the final subset of Oregon commercial logbook data used in delta-GLM analyses for China rockfish. 164

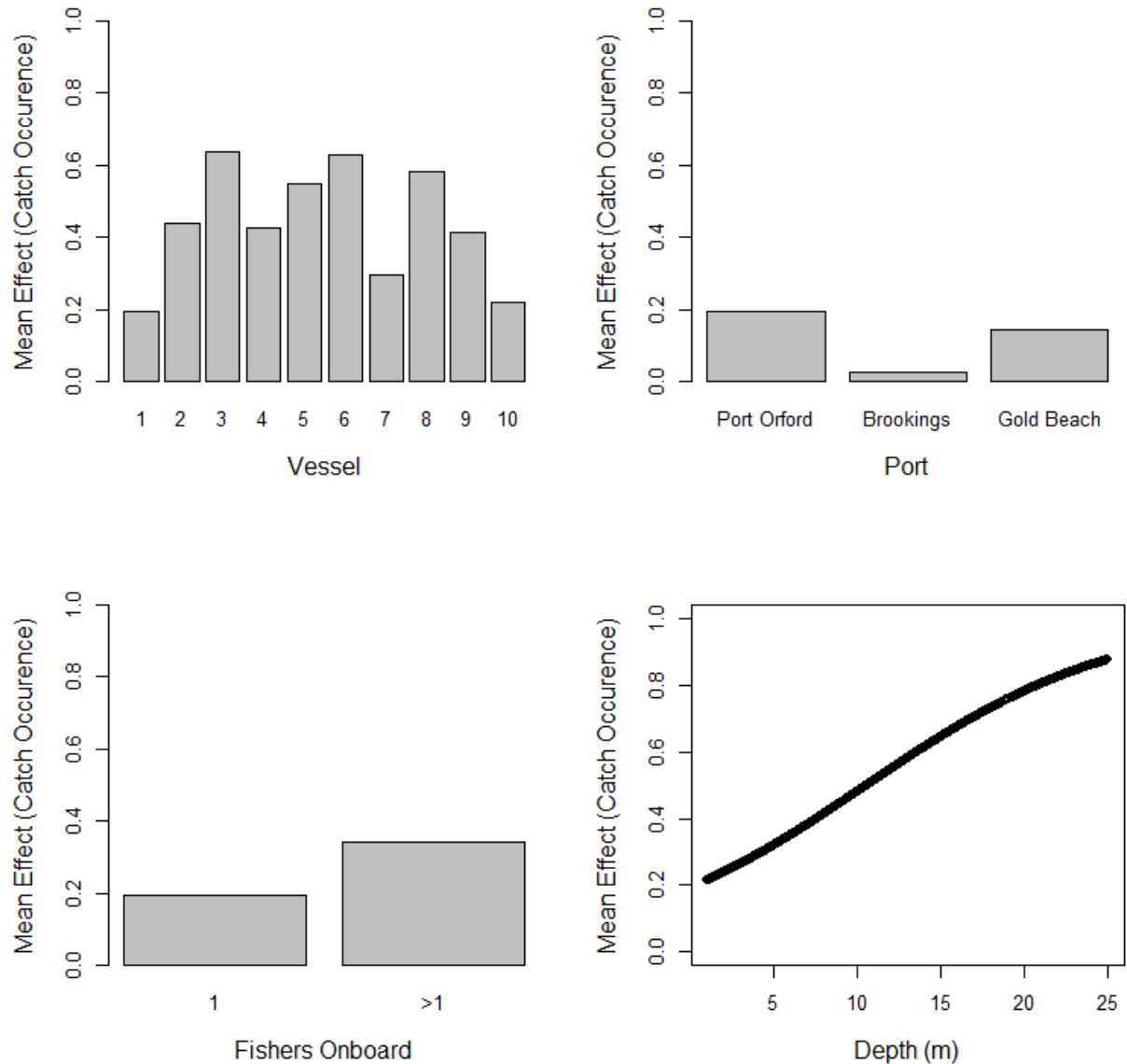


Figure 21: Summary of the relative effects of each covariate in the catch occurrence model component for the Oregon commercial logbook index.

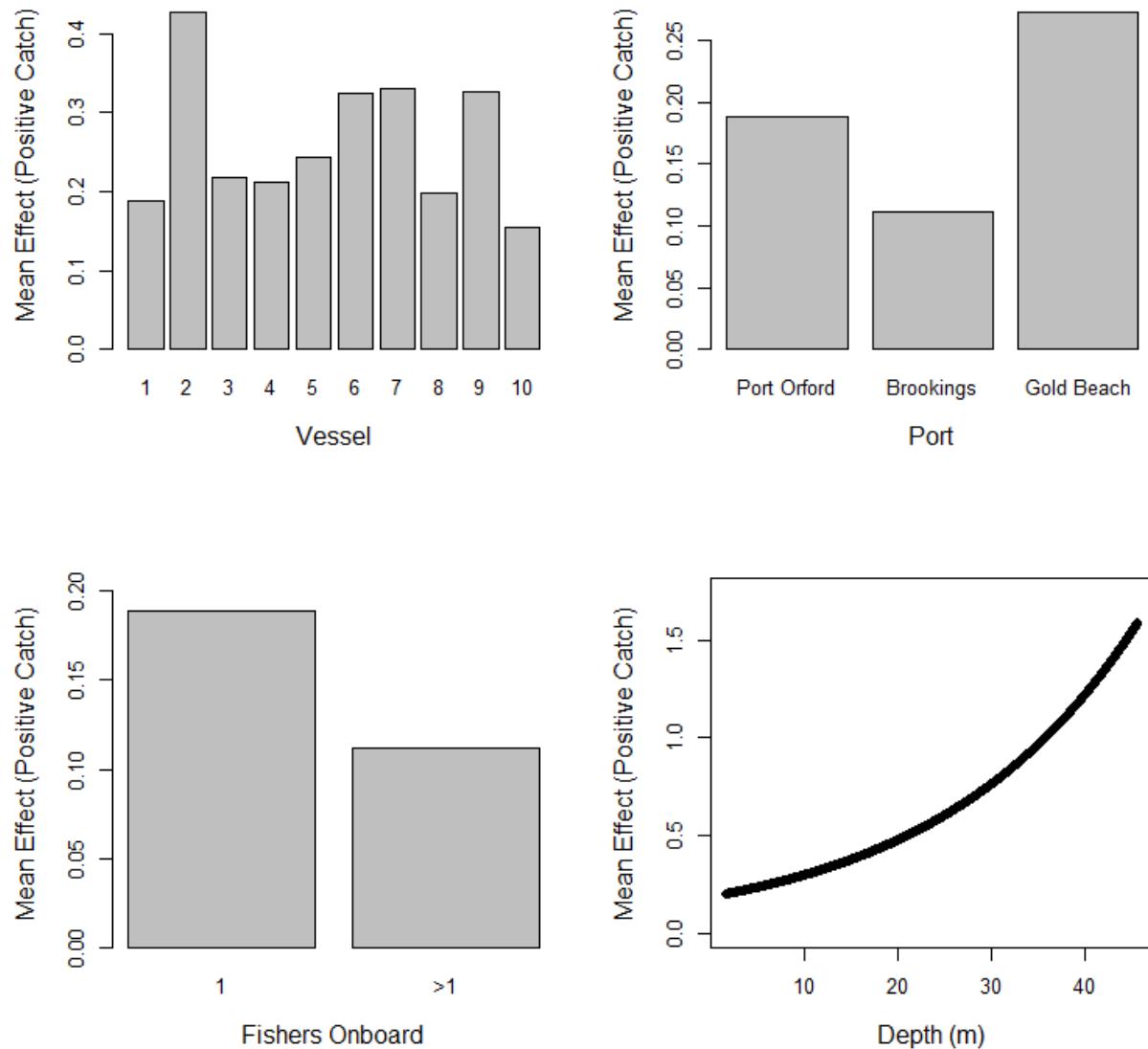


Figure 22: Summary of the relative effects of each covariate in the positive catch model component for China rockfish in the Oregon commercial logbook index.

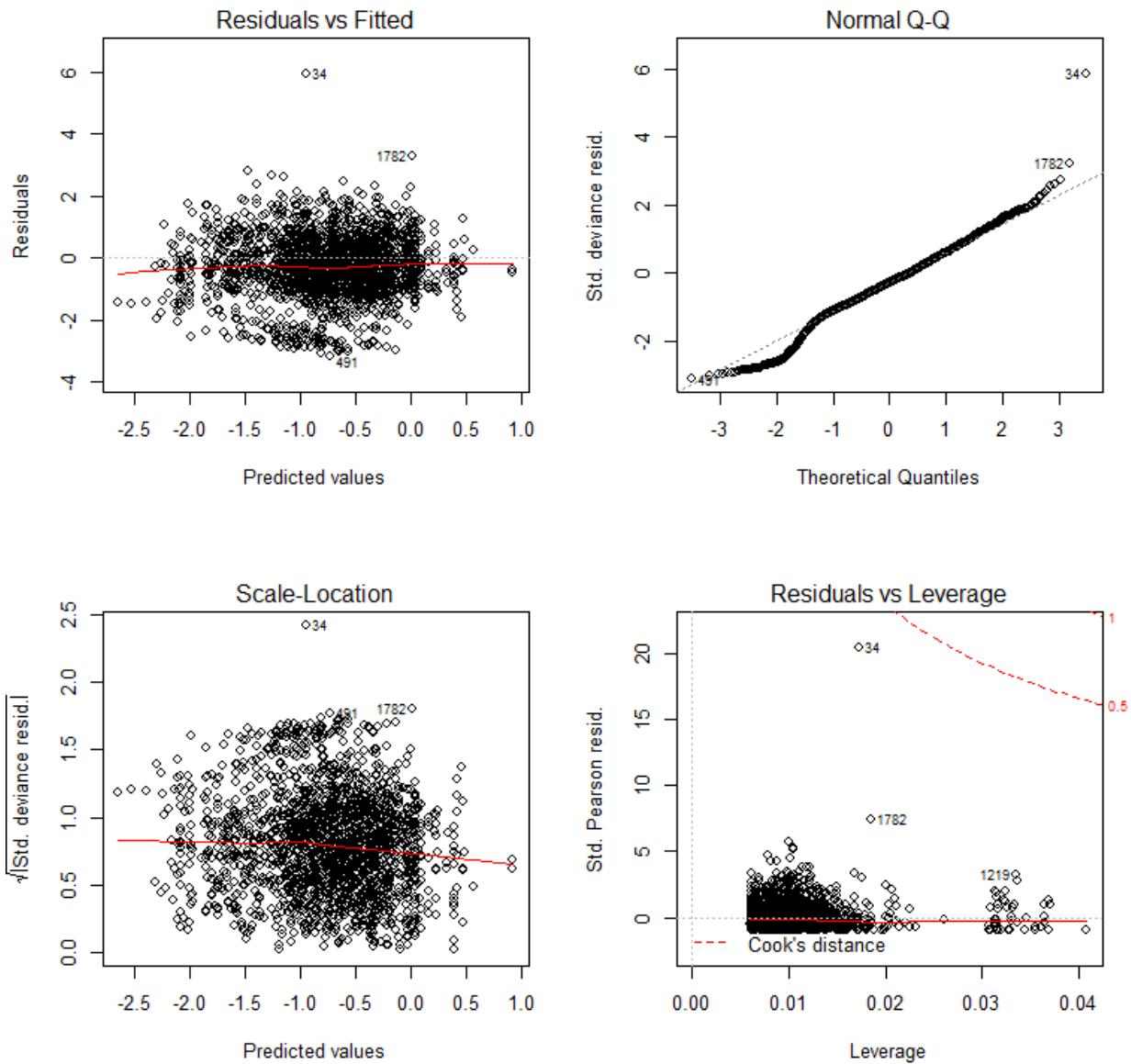


Figure 23: Diagnostic plots for the China rockfish positive catch component delta-GLM model for the Oregon commercial logbook index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers (bottom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

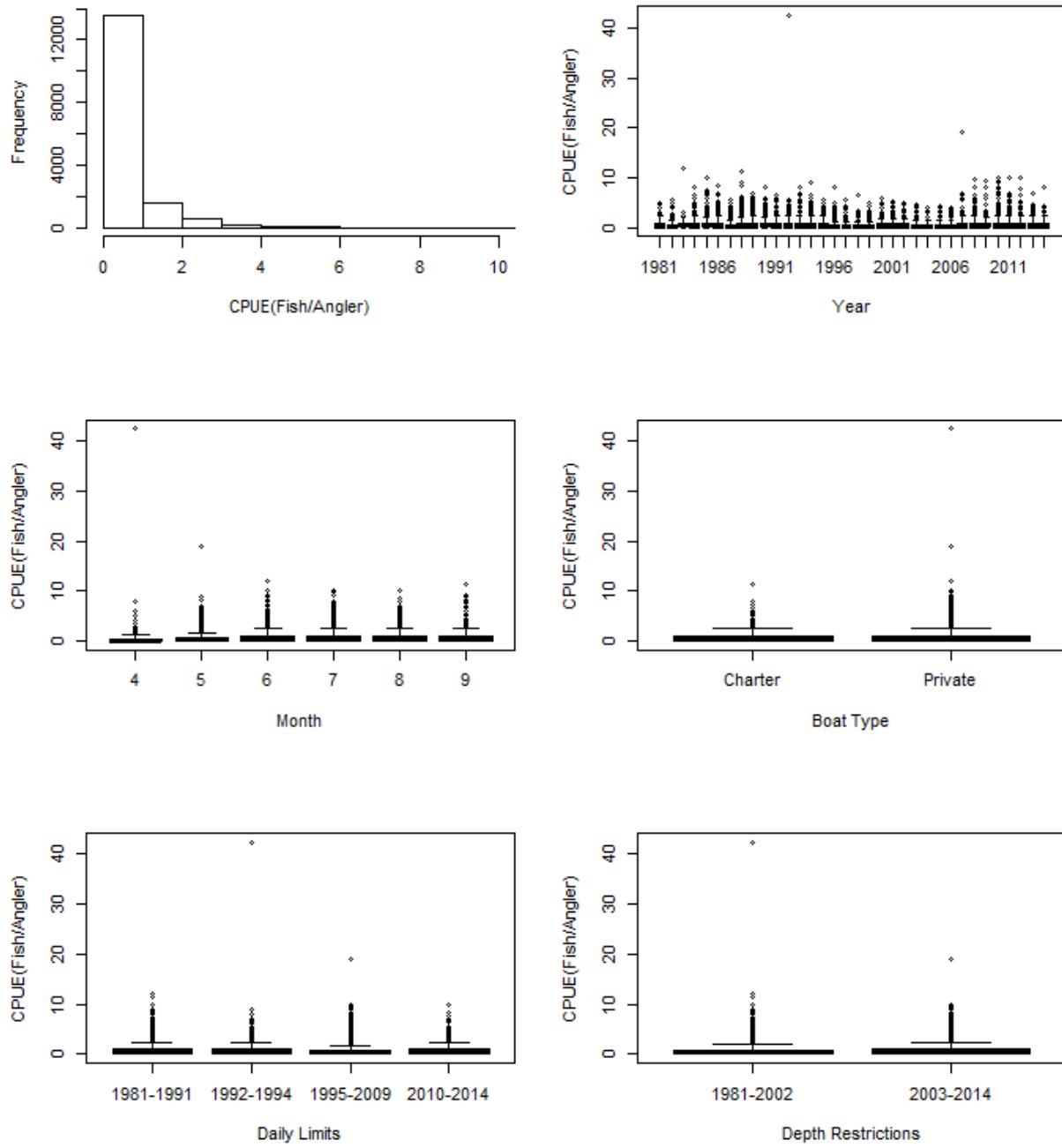


Figure 24: Summary data plots for the data set with Stephens-MacCall filtering for the Washington dockside index.

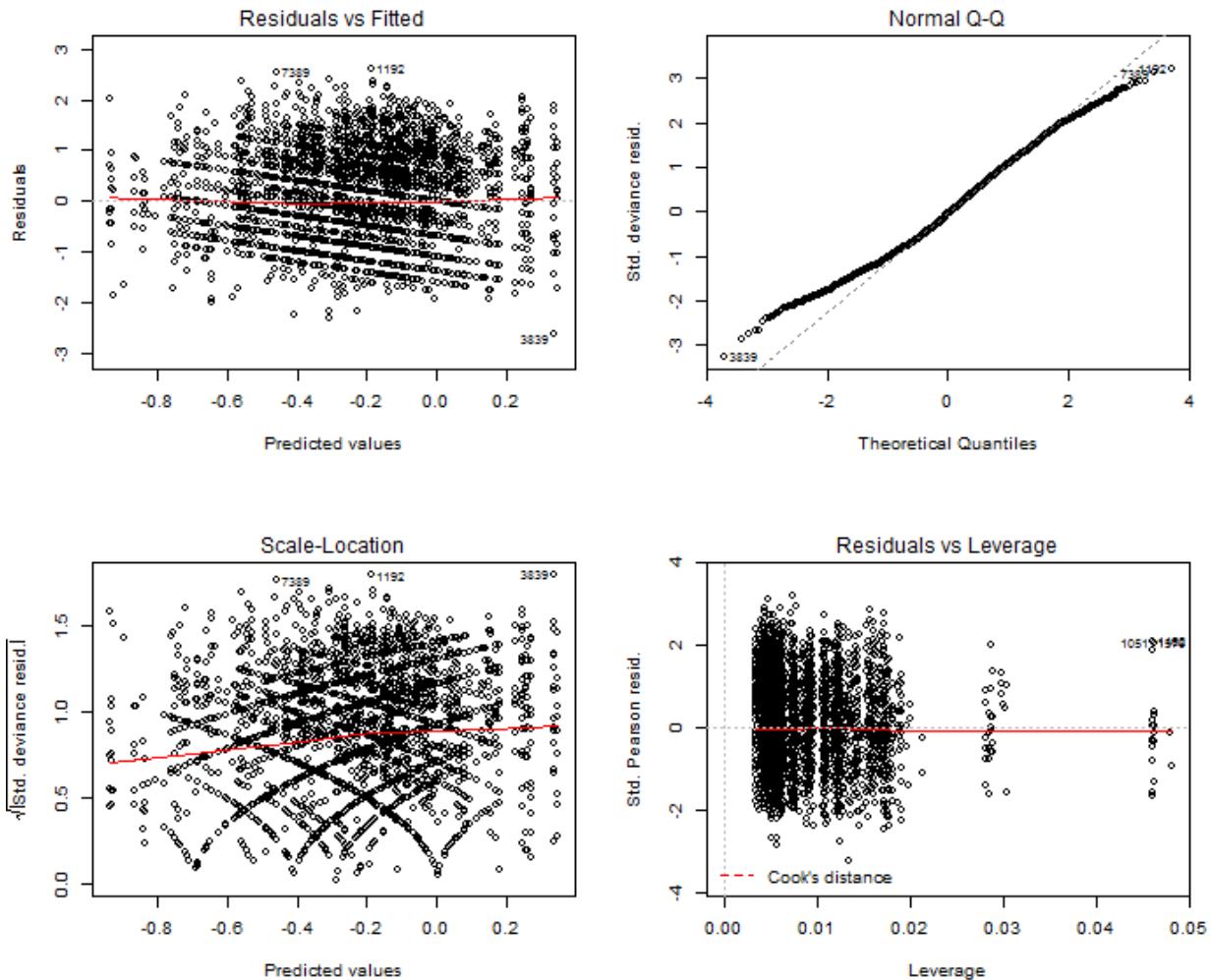


Figure 25: Diagnostic plots for the China rockfish positive catch component longnormal delta-GLM model for the dataset applying the Stephens-MacCall data filter for the Washington dockside index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant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

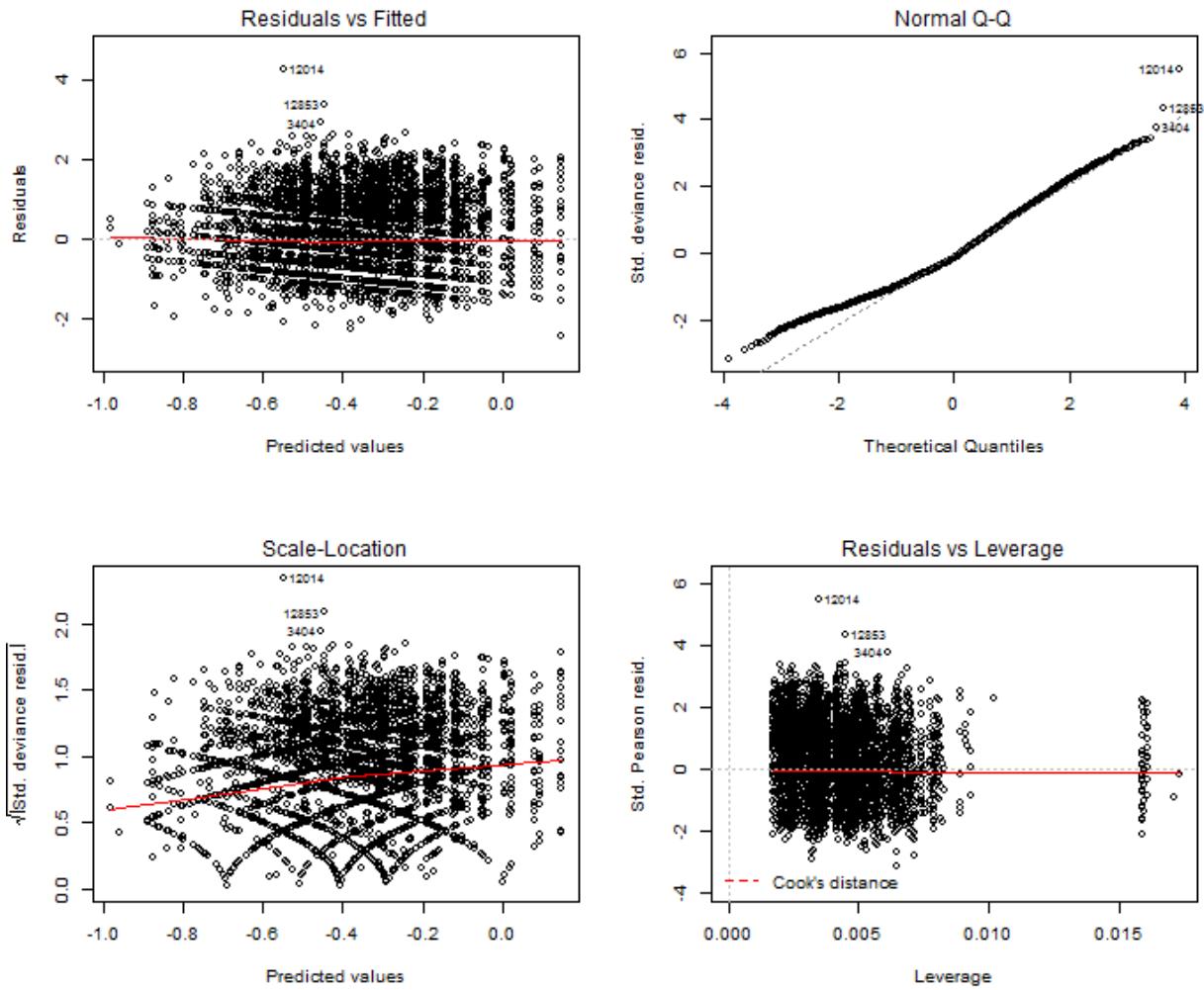


Figure 26: Diagnostic plots for the China rockfish positive catch component longnormal delta-GLM model for the dataset applying the Stephens-MacCall data filter, but retaining all of the positive records for the Washington dockside index. These are used to evaluate model fit (top left), assumptions of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

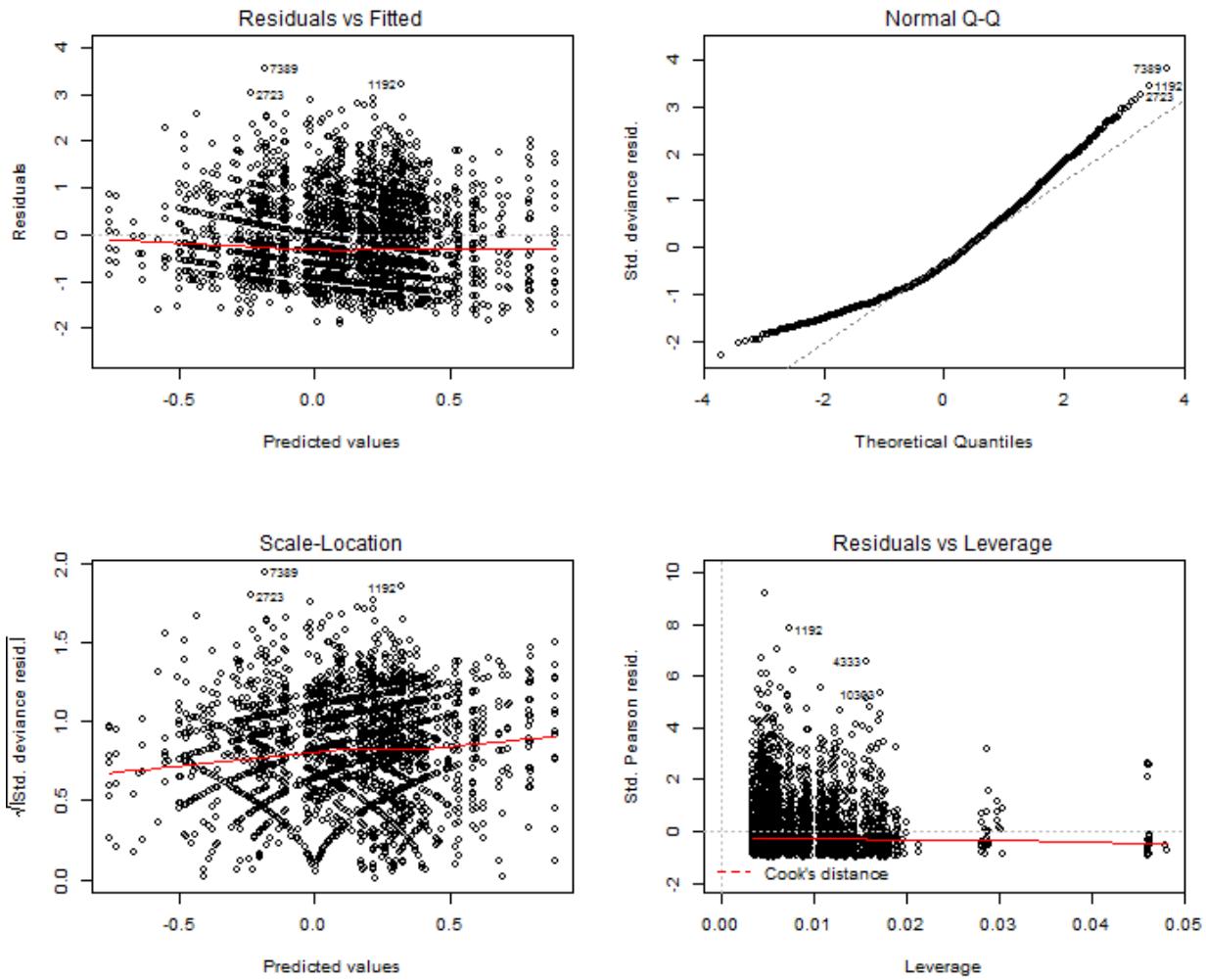


Figure 27: Diagnostic plots for the China rockfish positive catch component gamma delta-GLM model for the dataset without Stephens-MacCall filtering for the Washington dockside index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance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

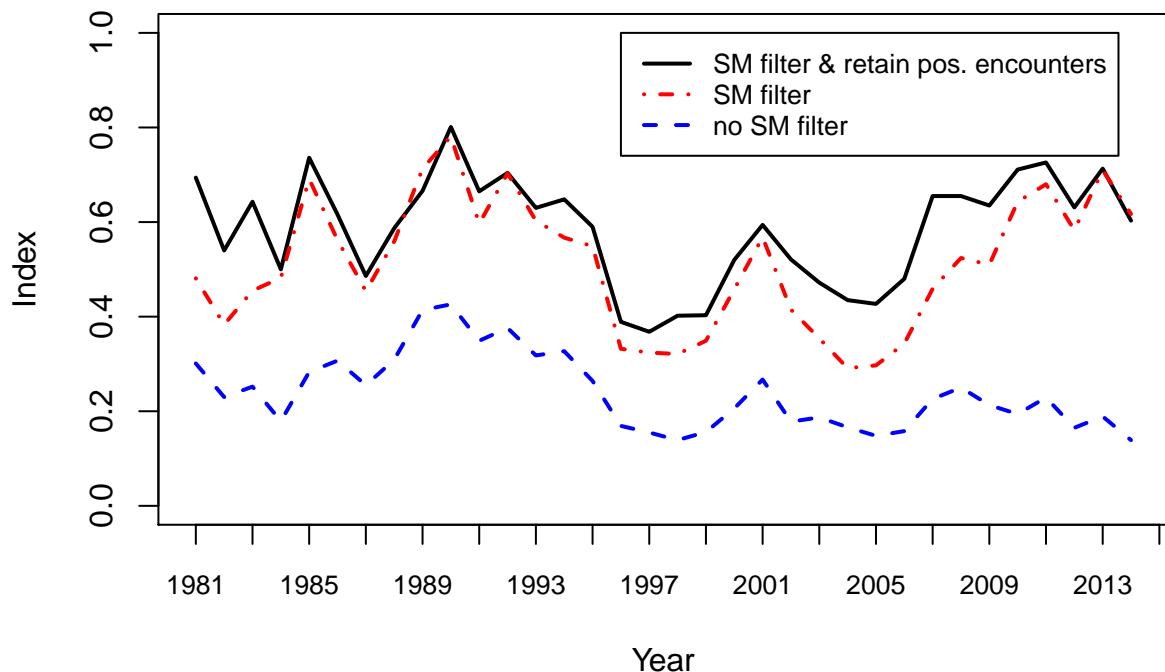


Figure 28: Three indices considered for the Washington dockside program, applying the Stephens-MacCall filters and retaining all positive encounters (black), applying the Stephens-MacCall filter and retaining only those trips above the threshold value (red), and the index with no Stephens-MacCall filter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

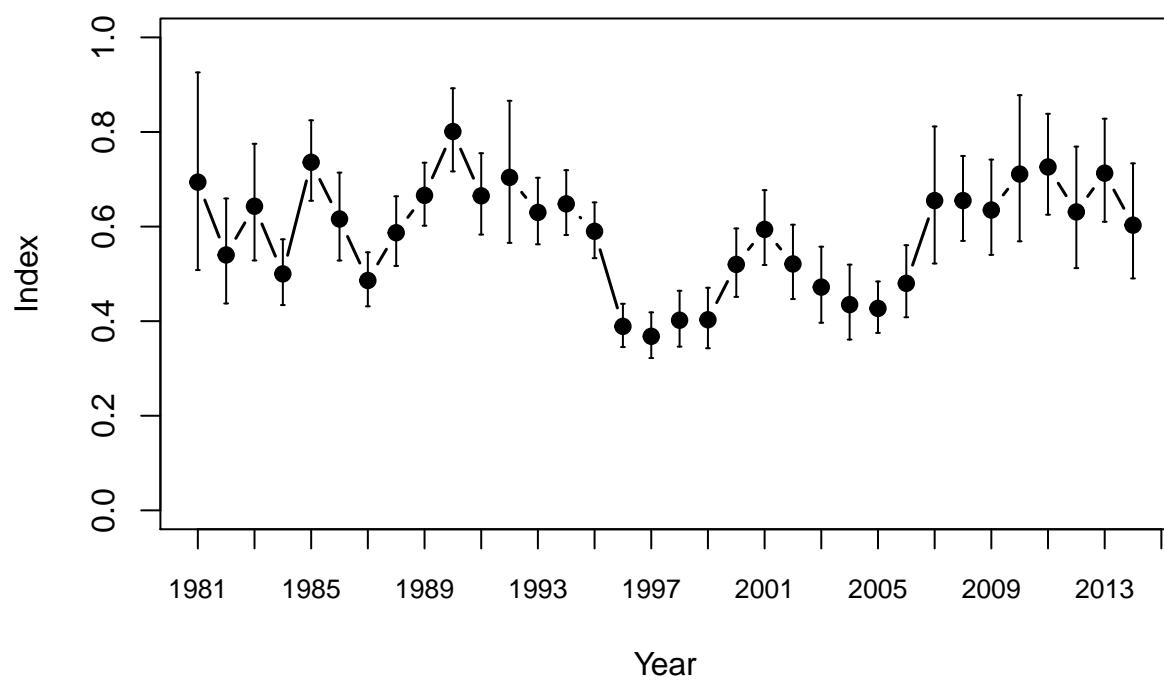


Figure 29: Index for the Washington dockside program, with 95% lognormal confidence intervals, applying the Stephens-MaCall data filter and retaining all positive observations.

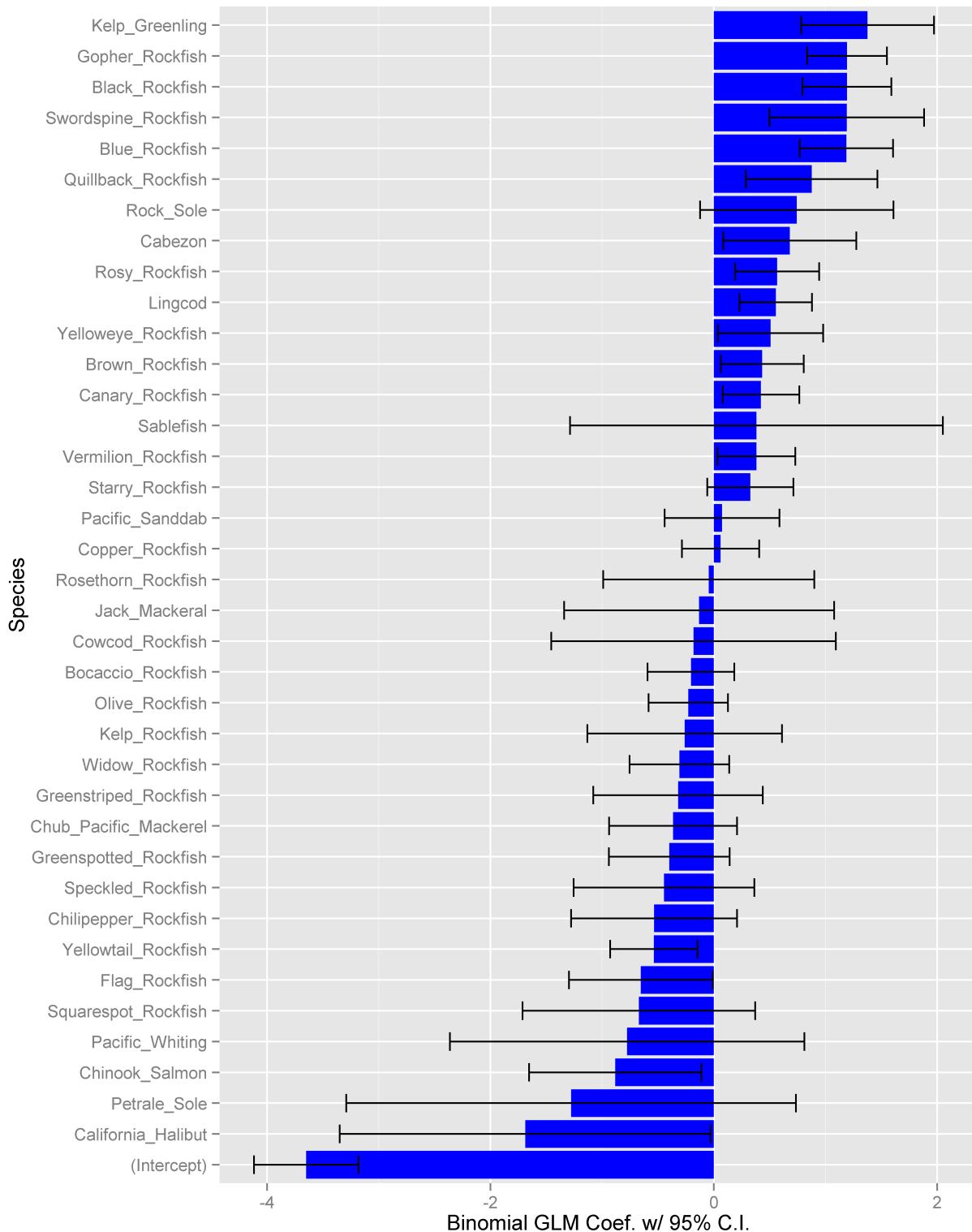


Figure 30: Species coefficients from the binomial GLM for presence/absence of China rockfish in the MRFSS data for California south of 40°10' N. latitude. Horizontal bars are 95% confidence intervals. Albacore coefficient (<-10) excluded for scale.

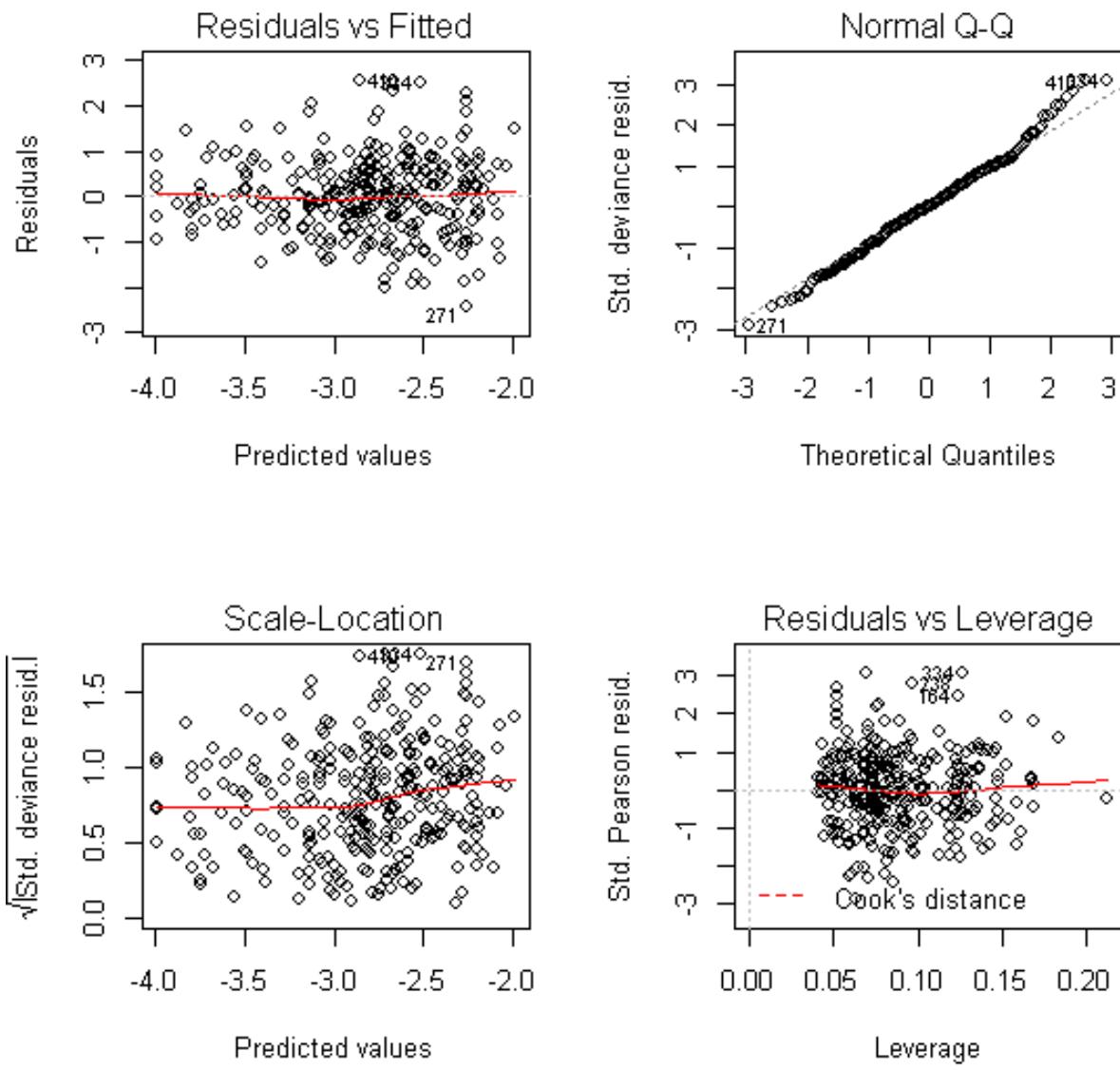


Figure 31: Diagnostic plots for the China rockfish delta-GLM index (lognormal component) for the MRFSS data for California south of  $40^{\circ}10'$  N. latitude. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and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

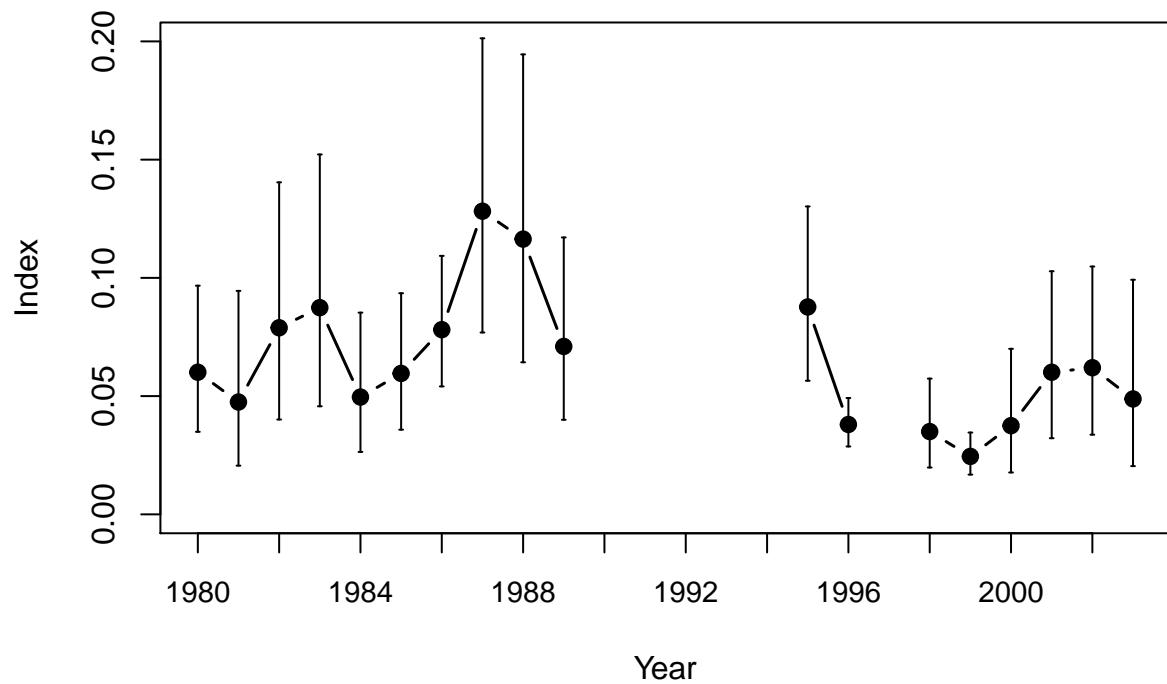


Figure 32: Index for the MRFSS data for California south of  $40^{\circ}10'$  N. latitude, with 95% lognormal confidence intervals.

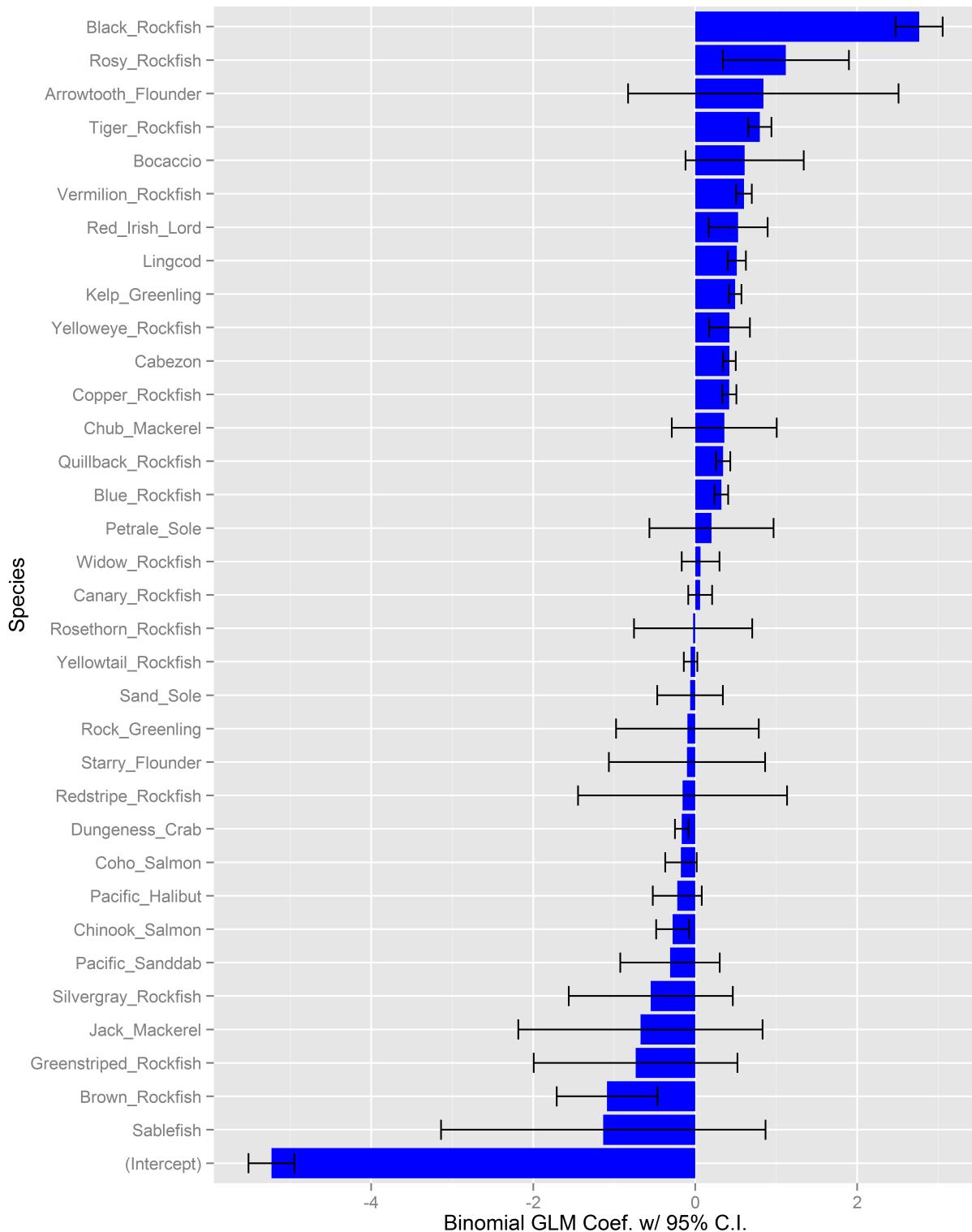


Figure 33: . Species coefficients from the binomial GLM for presence/absence of China rockfish in the Oregon Recreational Boat Survey (ORBS) data set. Horizontal bars are 95% confidence intervals.

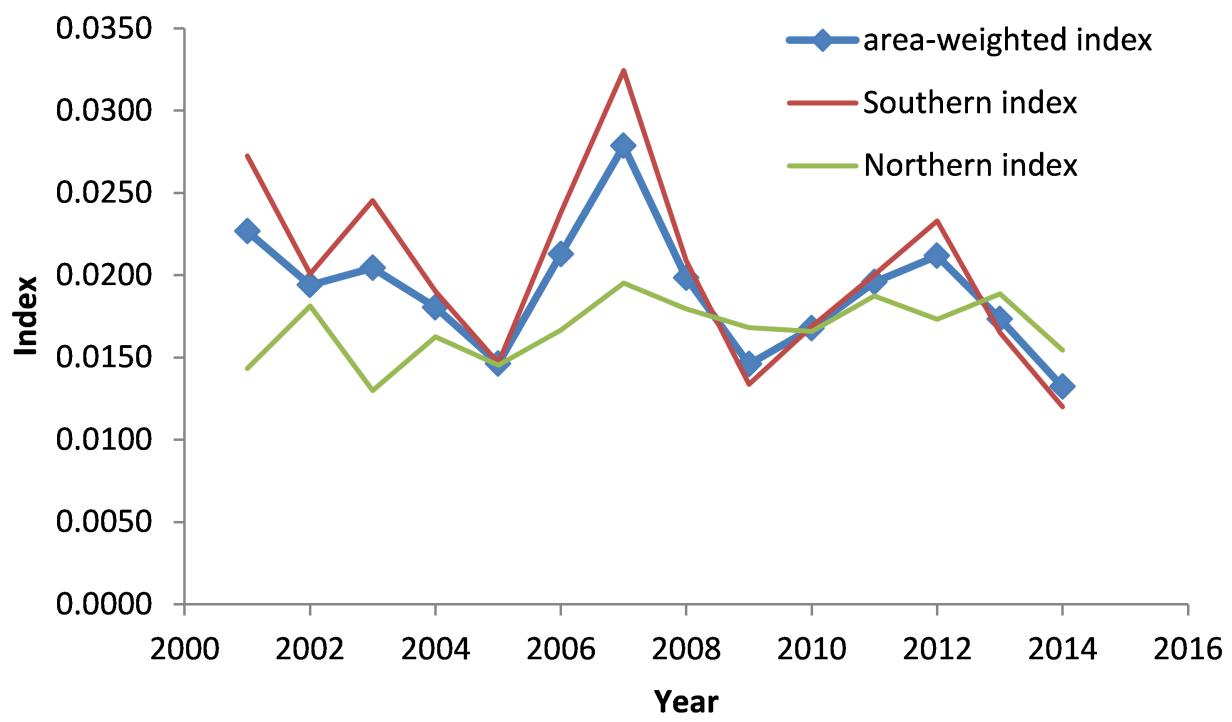


Figure 34: . Comparison of delta-GLM index trends in Southern Oregon, Northern Oregon, and a habitat area-weighted index.

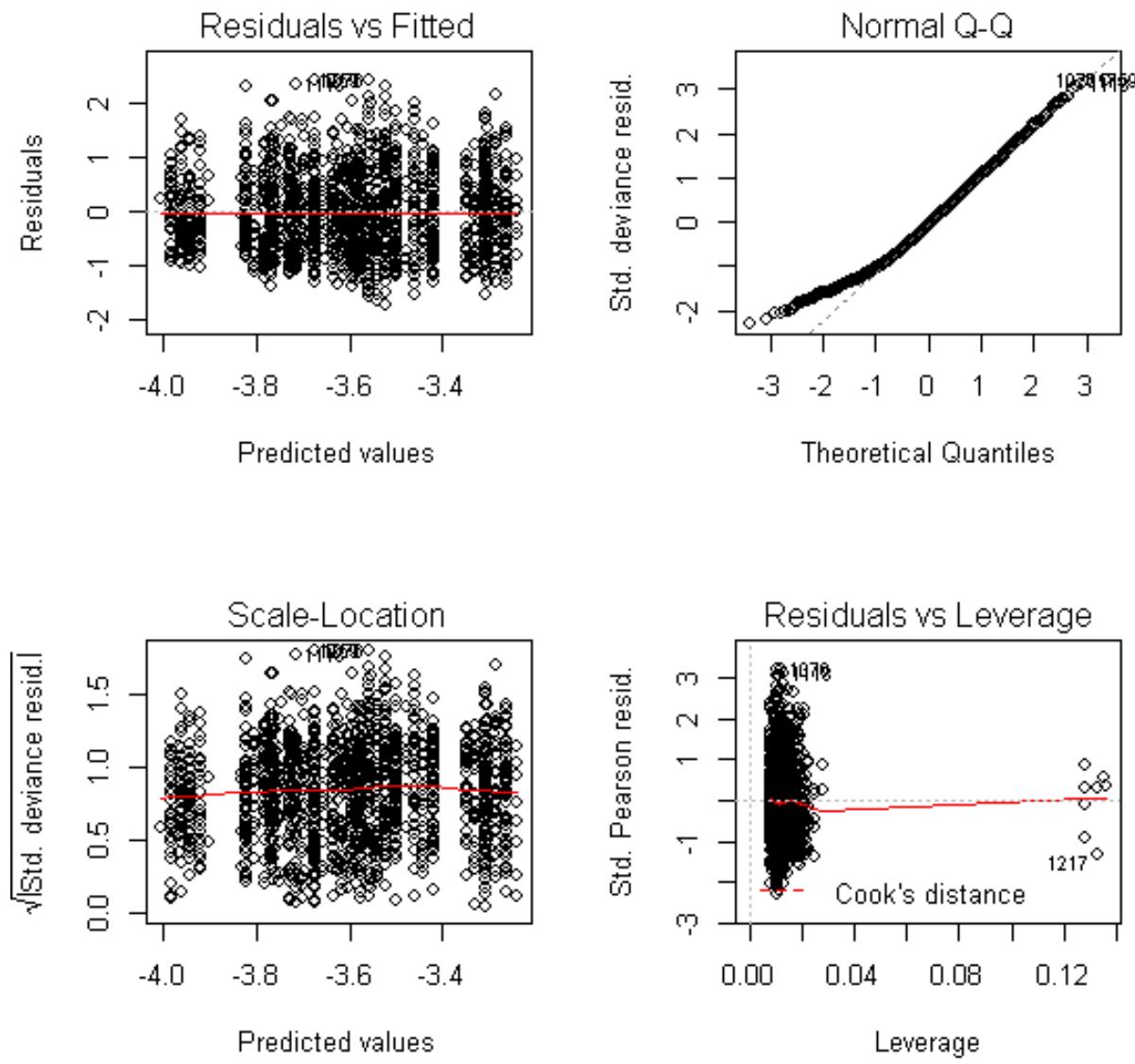


Figure 35: . Diagnostic plots for the China rockfish delta-GLM index (lognormal component) for the Southern Oregon Recreational Boat Survey (ORBS) data set. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence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

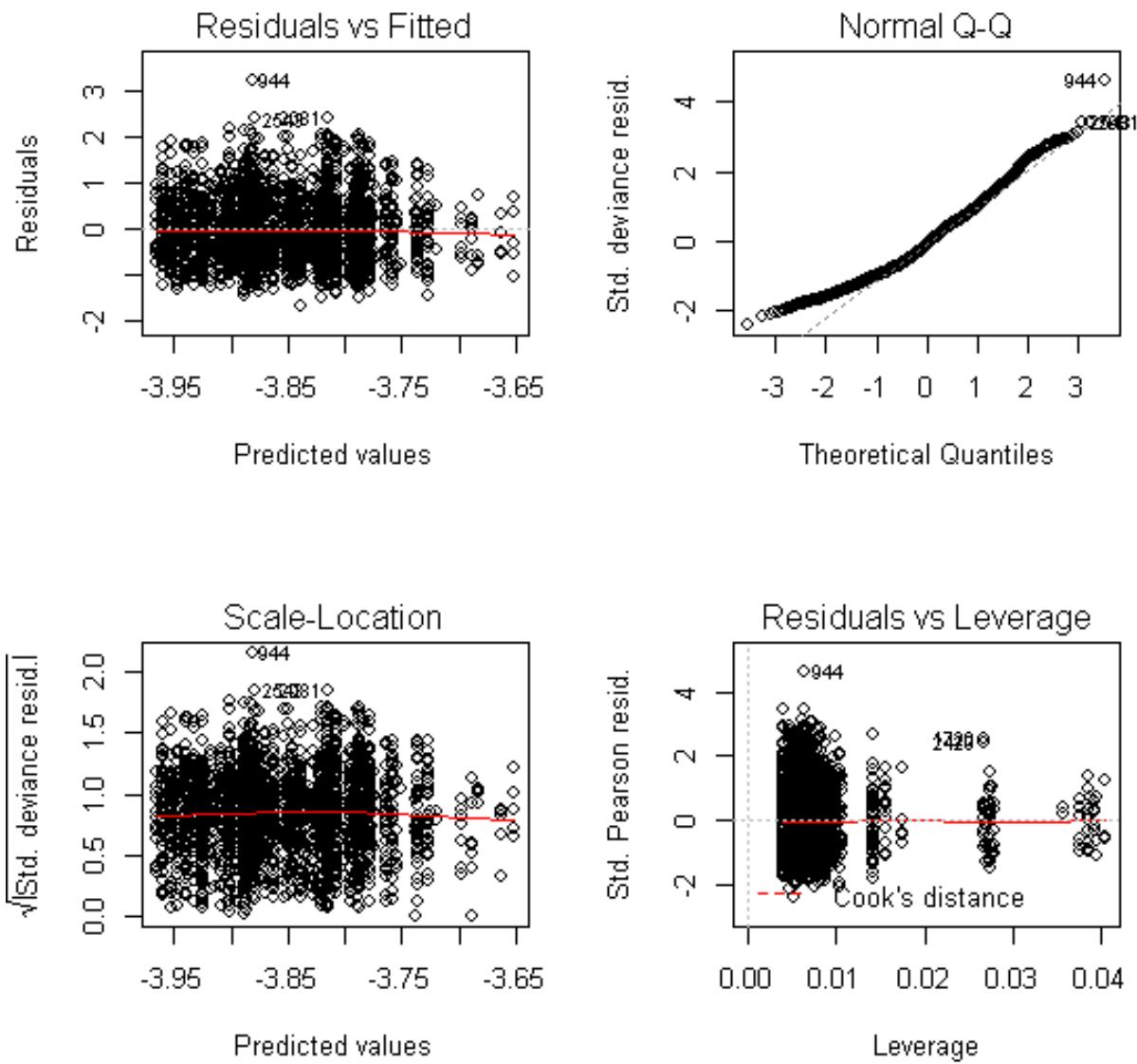


Figure 36: Diagnostic plots for the China rockfish delta-GLM index (gamma component) for the Northern Oregon Recreational Boat Survey (ORBS) data set. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence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

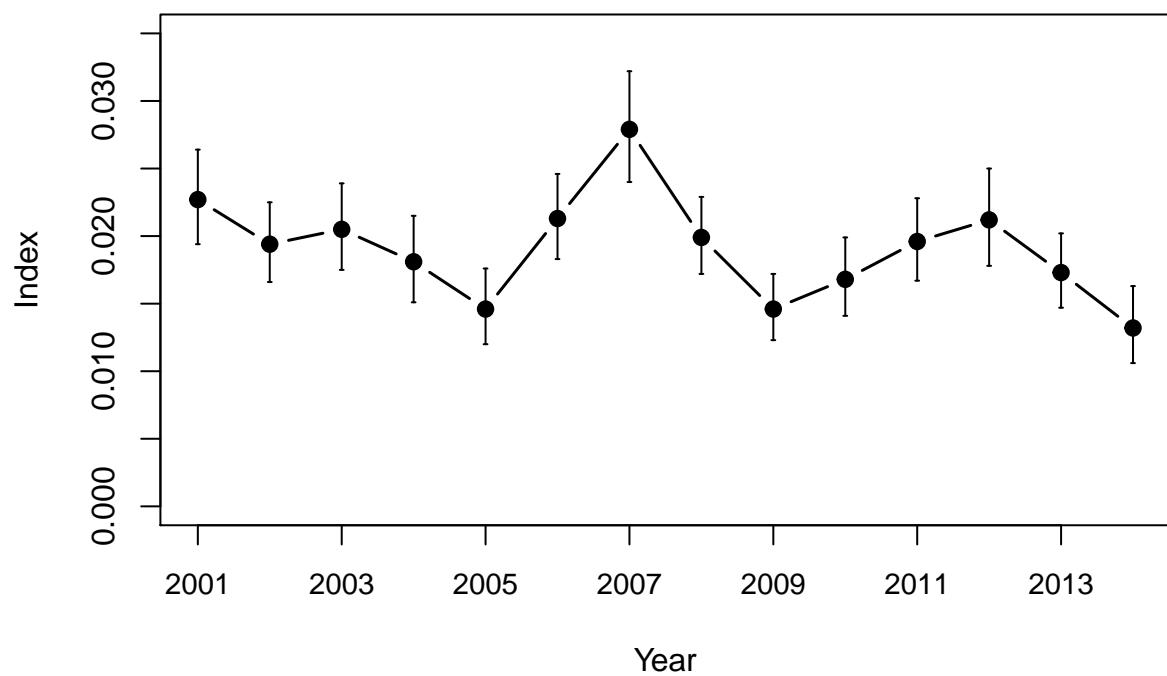


Figure 37: Oregon Recreational Boat Survey (ORBS) charter boat index (area-weighted), with 95% lognormal confidence intervals.

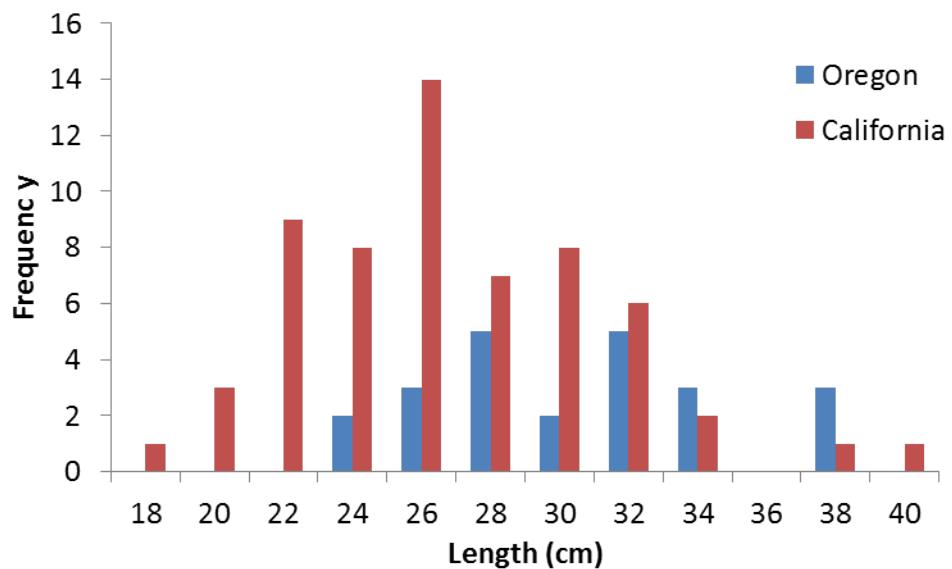


Figure 38: Frequencies of the discard lengths from the Oregon (ODFW 2001,2003-2014) and California (CDFW 1999-2014 and CalPoly 2001-2014) onboard observer programs.

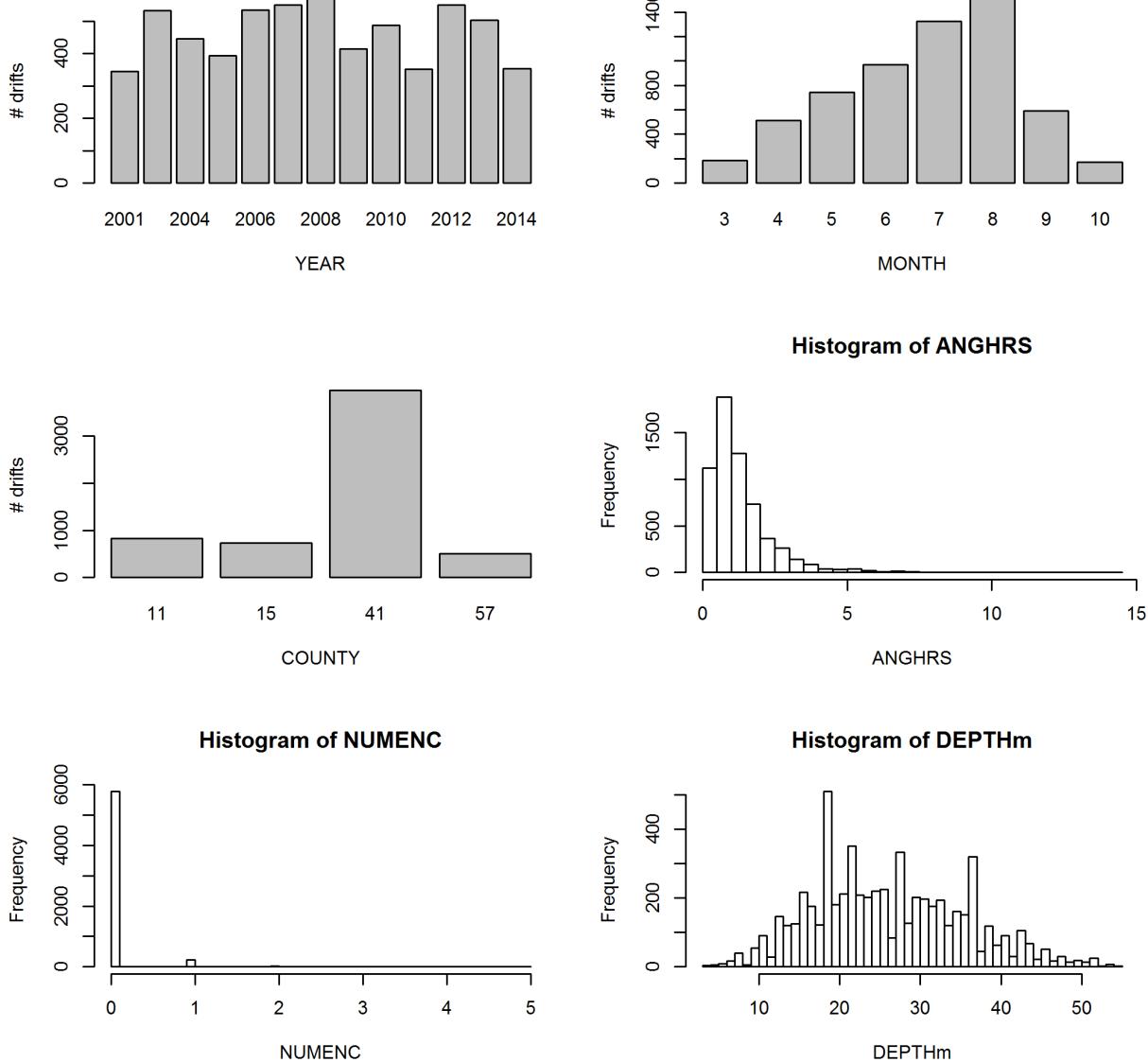


Figure 39: Characterization of the final subset of Oregon onboard observer data used in delta-GLM analyses for China rockfish.

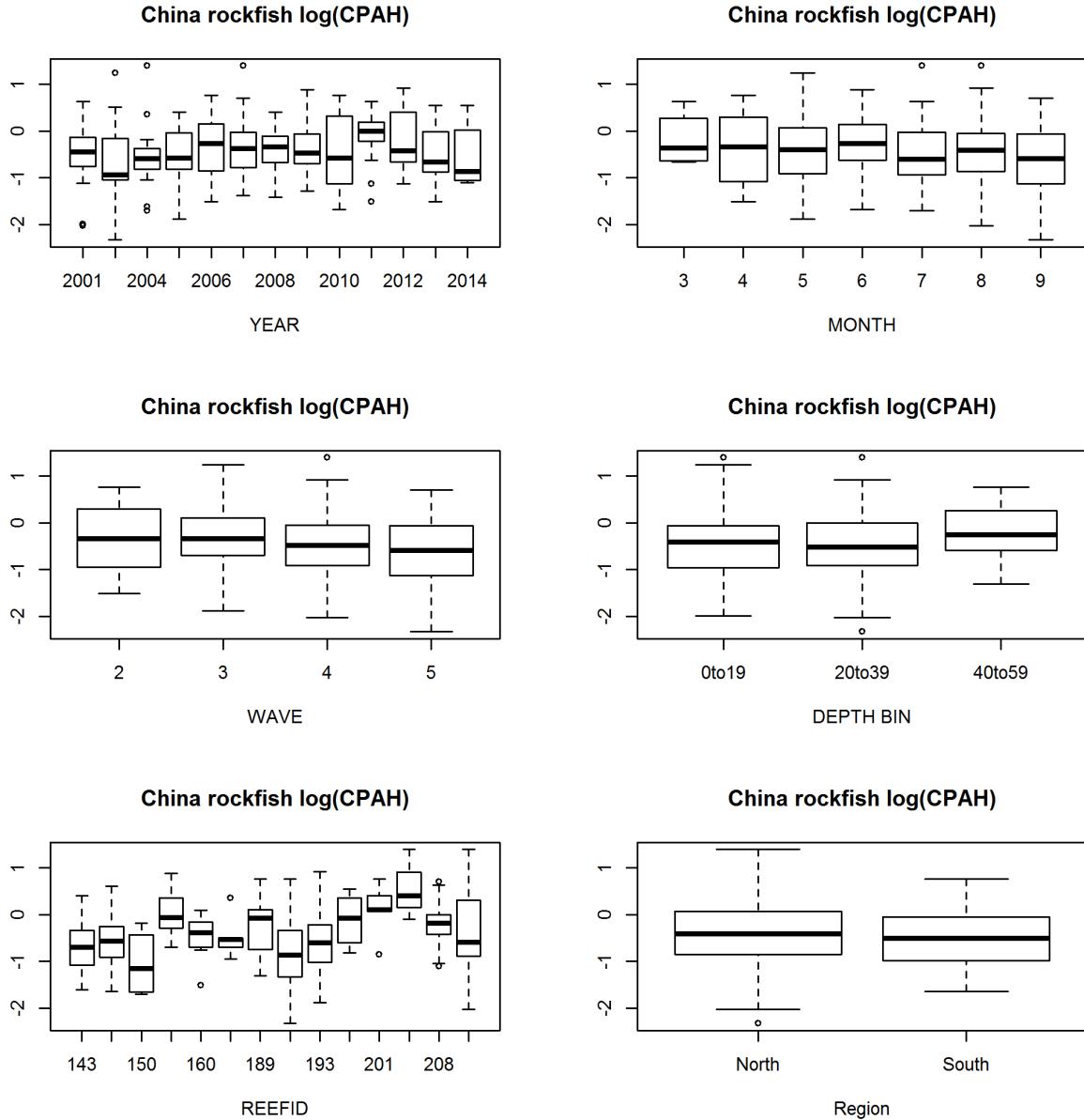


Figure 40: The distribution of drift-level CPUE data relative to potential covariates evaluated in the China rockfish Oregon onboard observer delta-GLM analysis(positive encounters only).

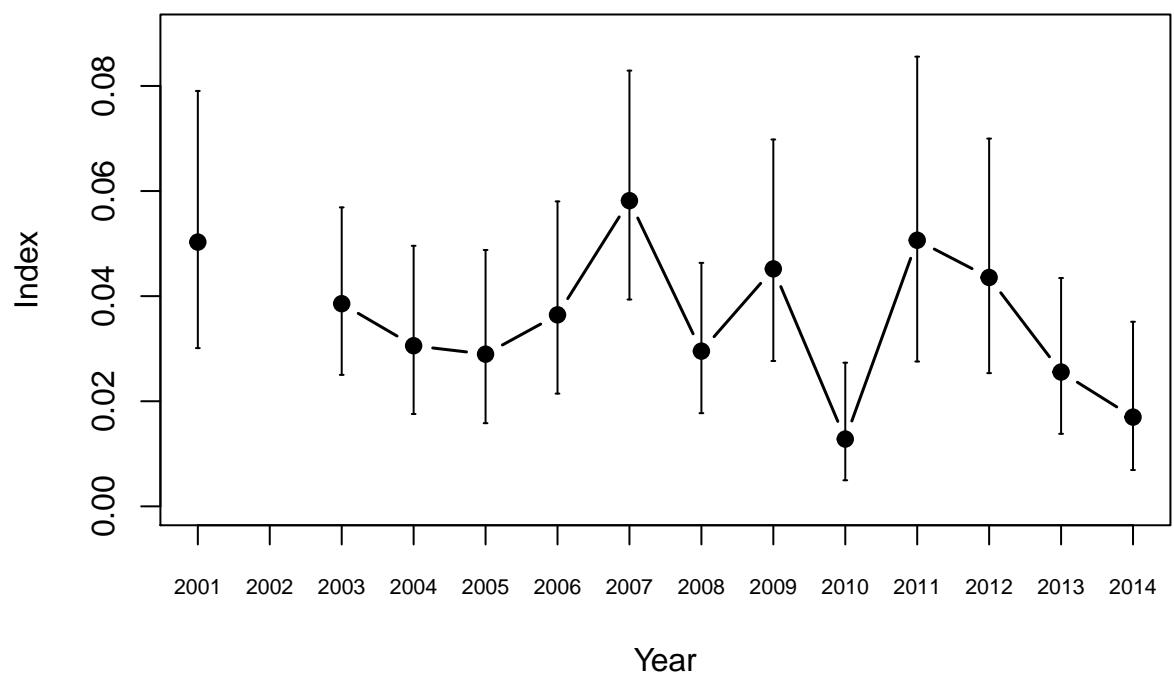


Figure 41: Index for the Oregon onboard observer program, with 95% lognormal confidence intervals.

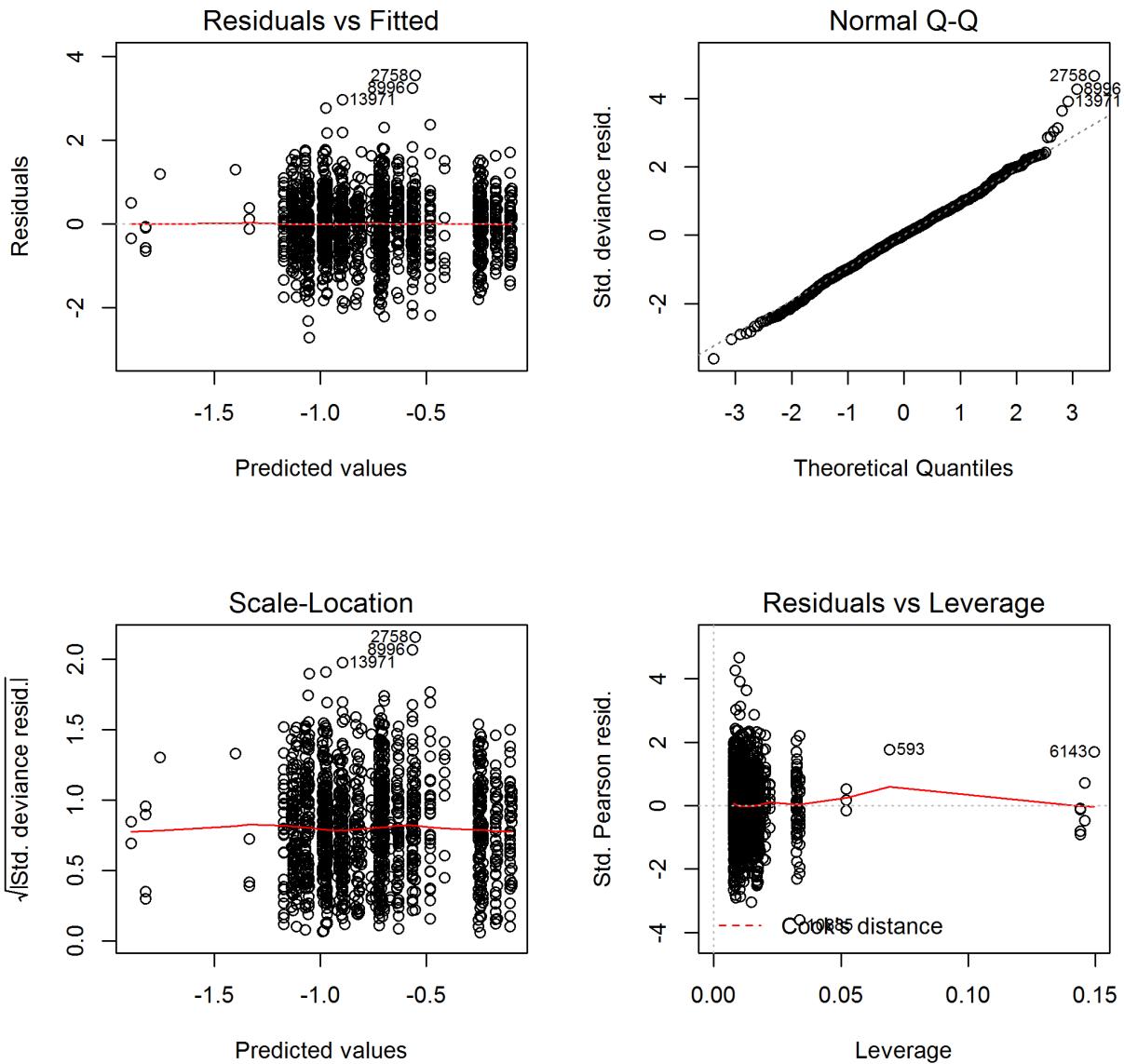


Figure 42: Diagnostic plots for the China rockfish positive catch component lognormal delta-GLM model for the Oregon onboard observer index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence of outliers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

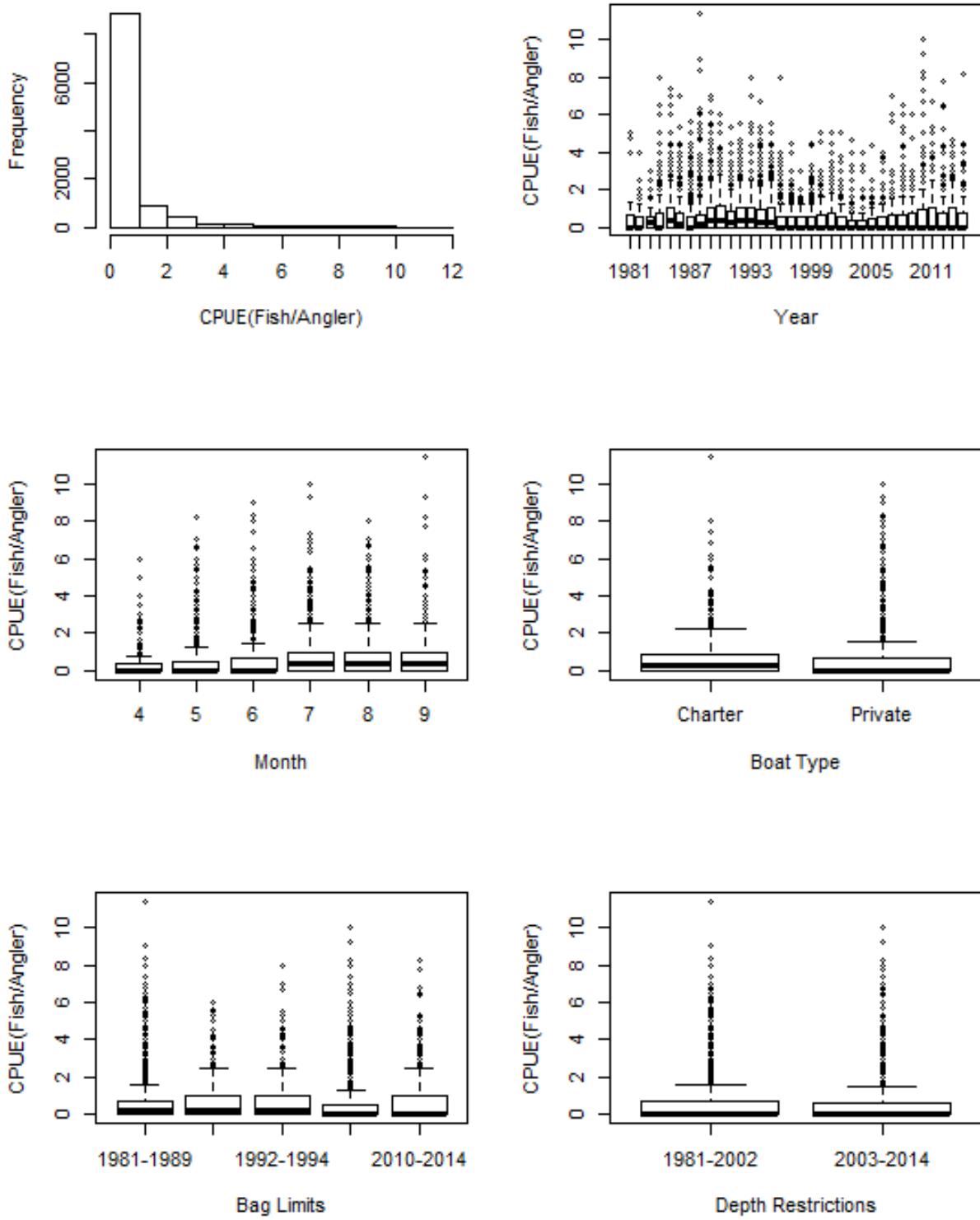


Figure 43: Characterization of the final subset of 1988-1999 California onboard observer data used in delta-GLM analyses for China rockfish.

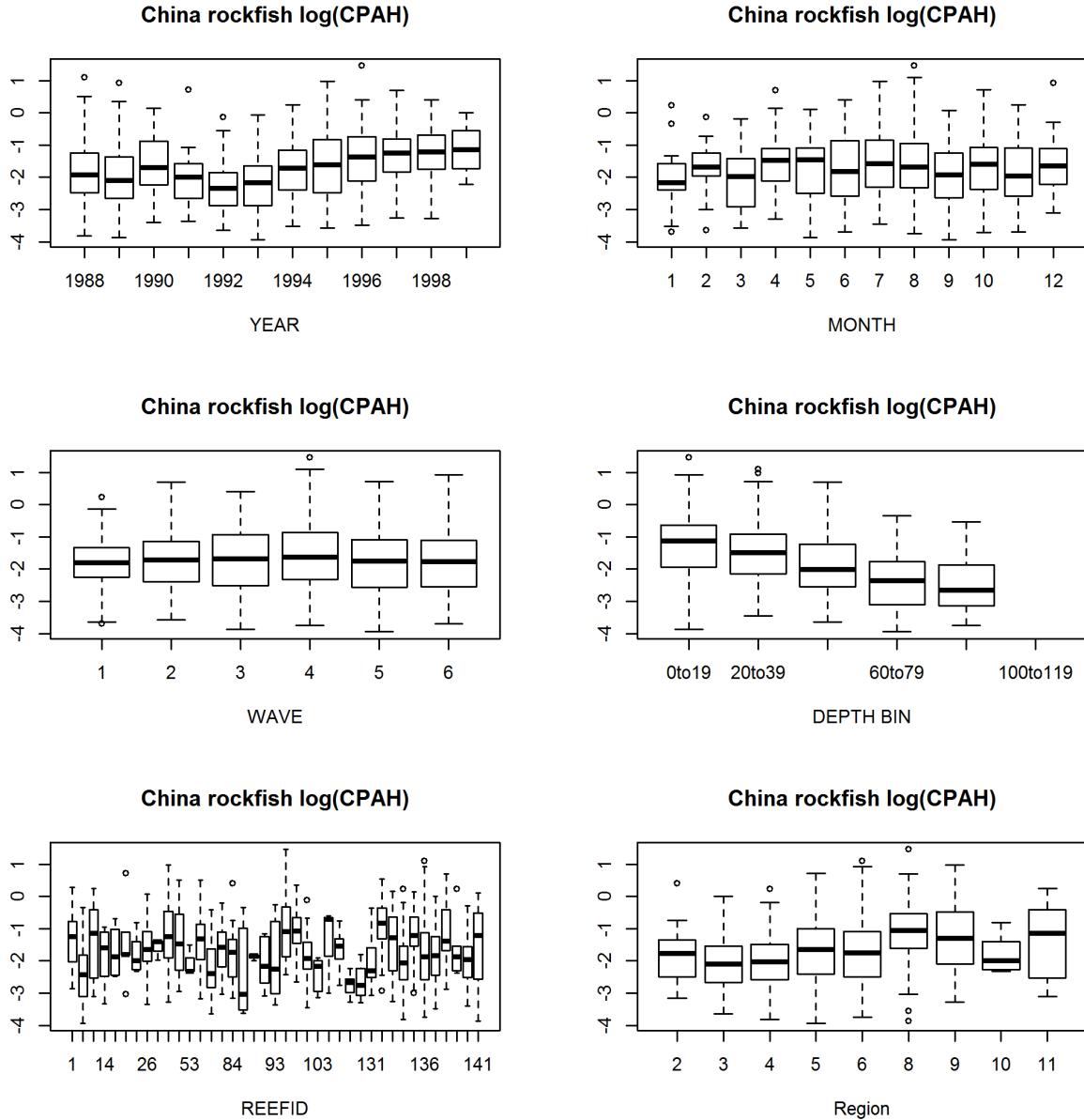


Figure 44: The distribution of drift-level CPUE data relative to potential covariates evaluated in the China rockfish 1988-1999 California onboard observer delta-GLM analysis (positive encounters only).

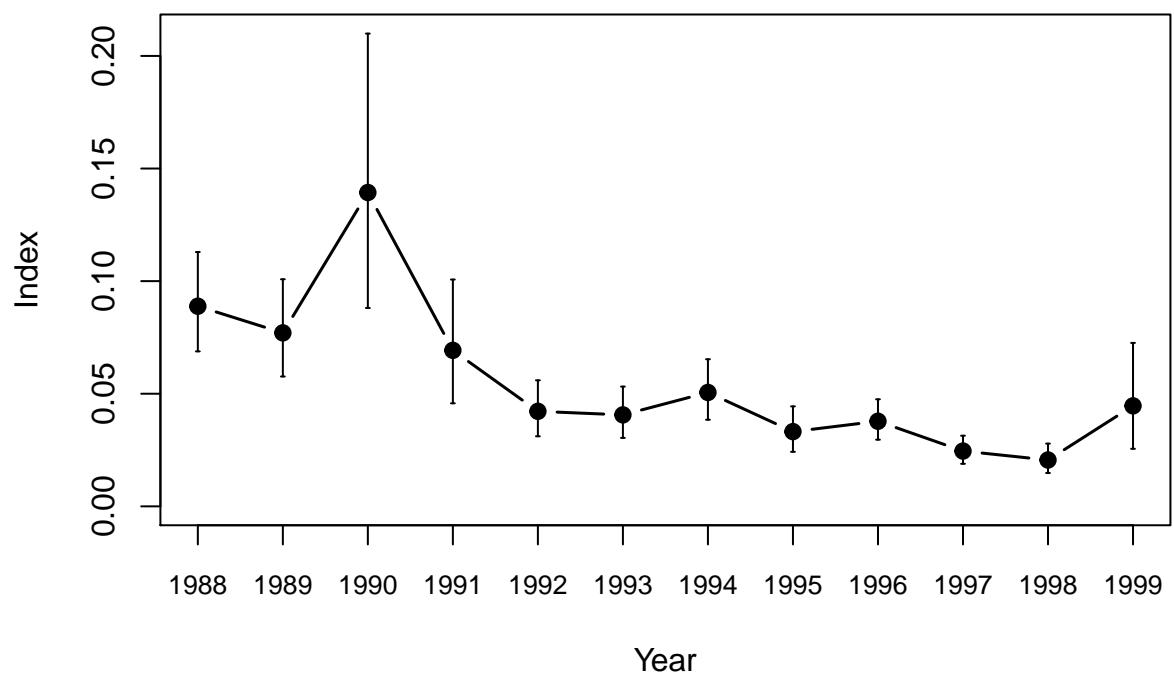


Figure 45: Index for the California 1988-1999 onboard observer program, with 95% lognormal confidence intervals.

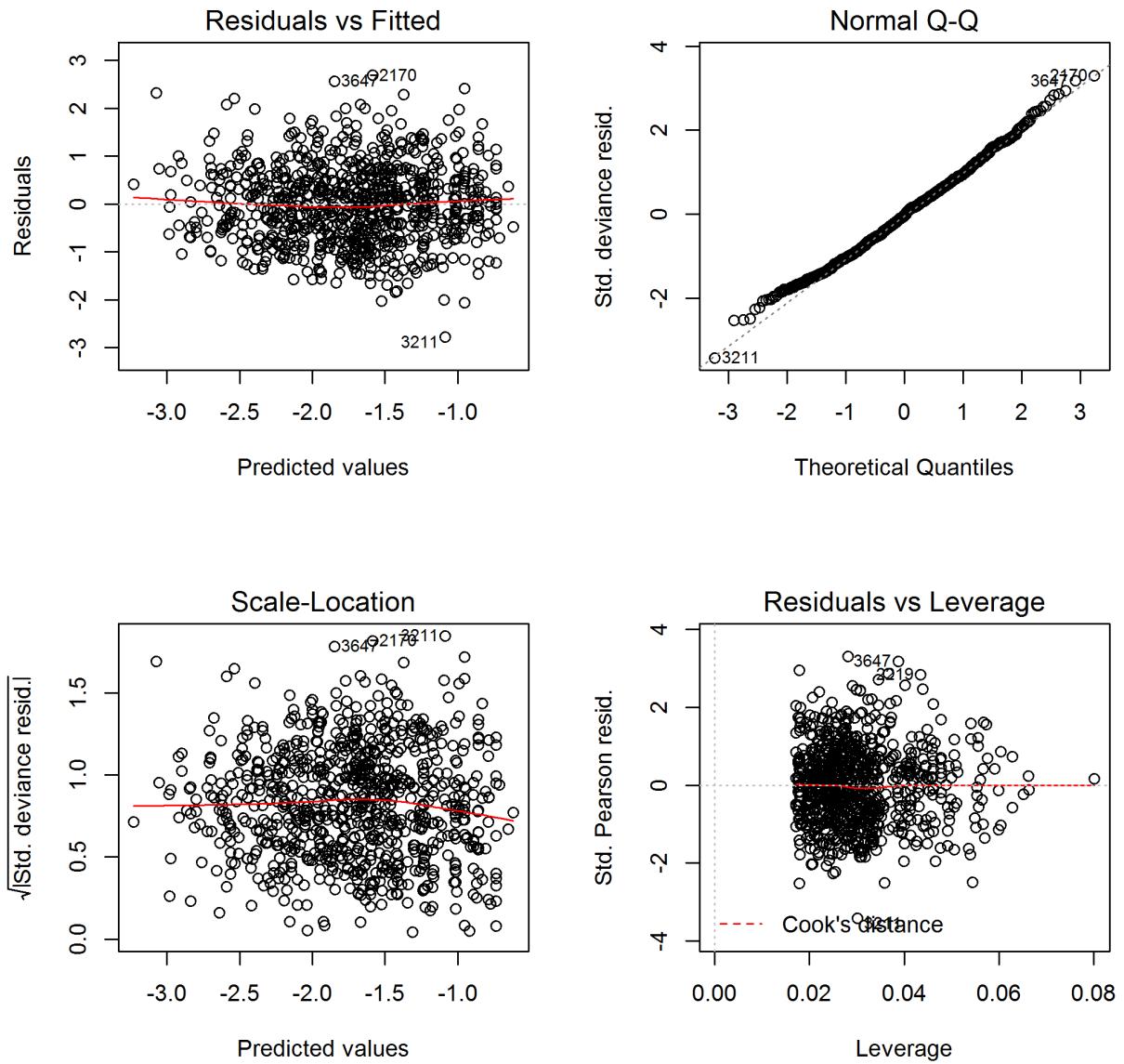


Figure 46: Diagnostic plots for the China rockfish positive catch component lognormal delta-GLM model for the 1988-1999 California onboard observer index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence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

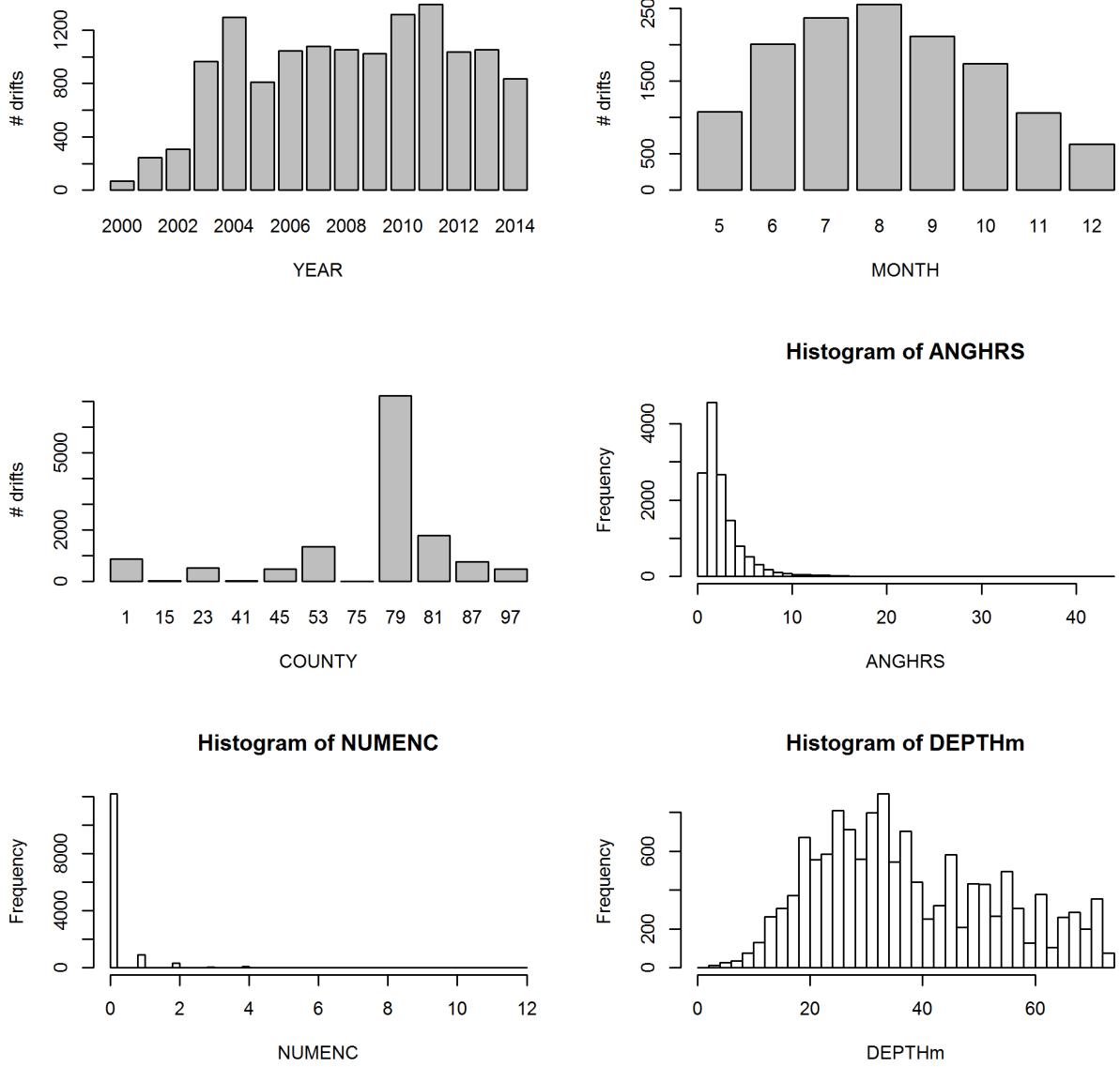


Figure 47: Characterization of the final subset of 2000-2014 California onboard observer data used in delta-GLM analyses for China rockfish.

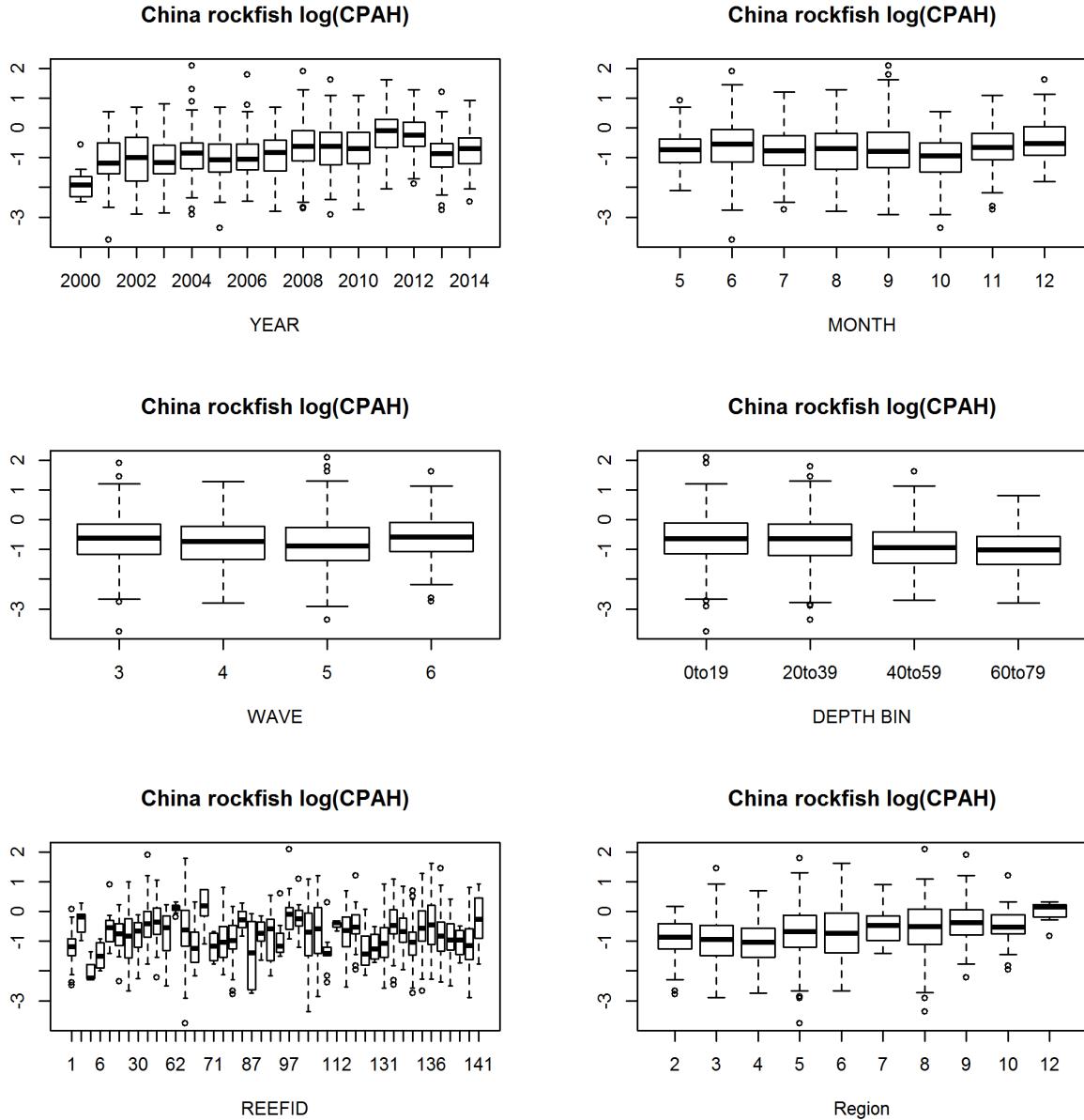


Figure 48: The distribution of drift-level CPUE data relative to potential covariates evaluated in the China rockfish 2000-2014 California onboard observer delta-GLM analysis (positive encounters only).

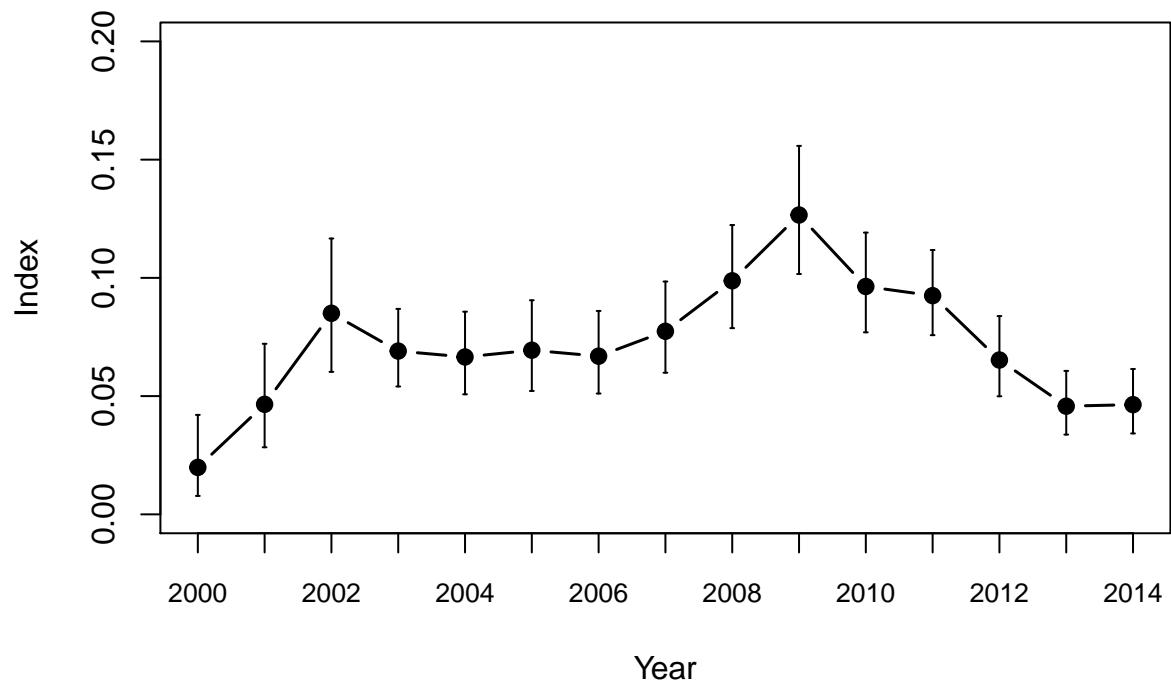


Figure 49: Index for the California 2000-2014 onboard observer program, with 95% lognormal confidence intervals.

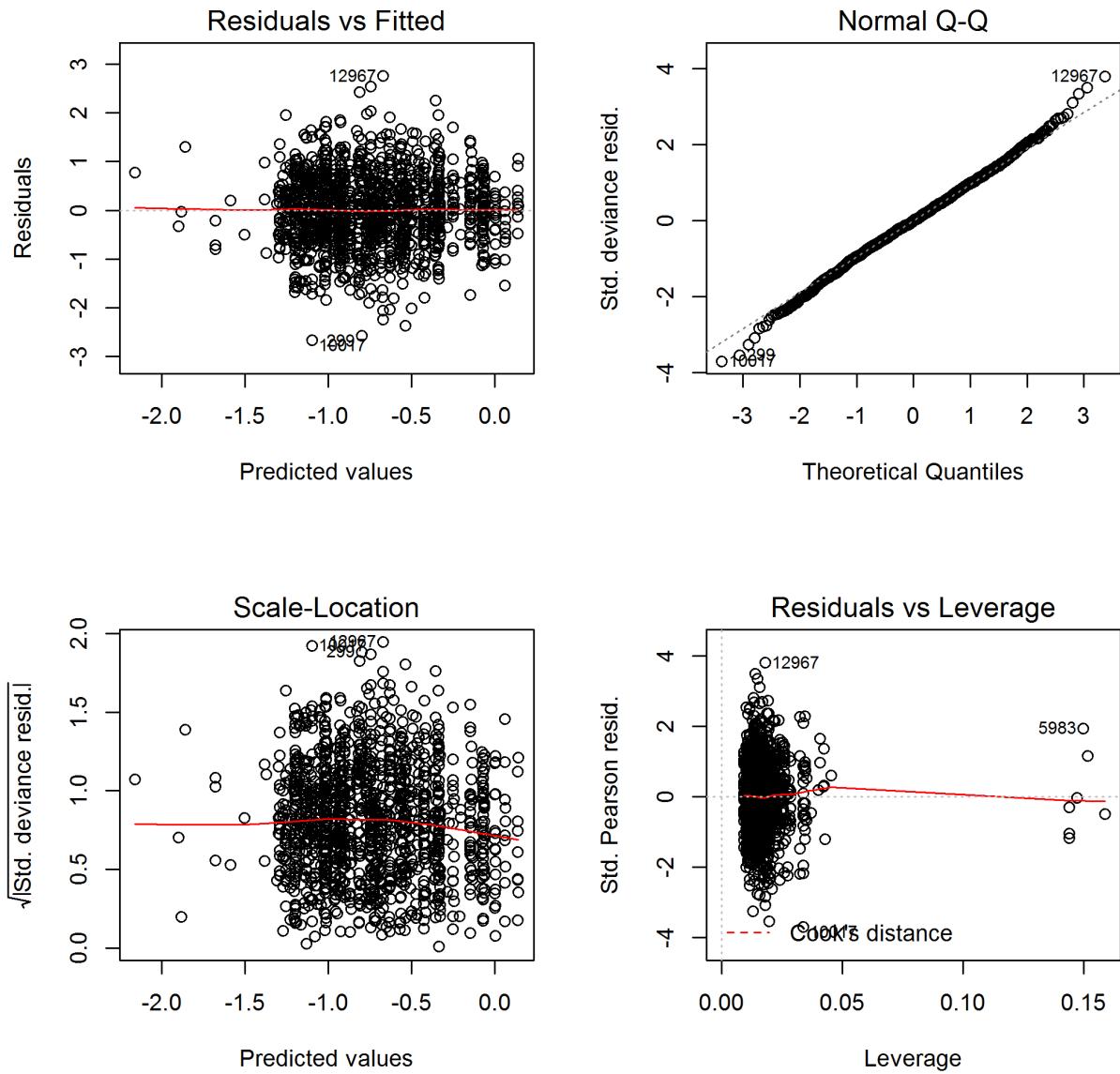


Figure 50: Diagnostic plots for the China rockfish positive catch component lognormal delta-GLM model for the 2000-2014 California onboard observer index. These are used to evaluate model fit (top left), assumptions of normality (top right), assumptions of constant variance (bottom left), and the presence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

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

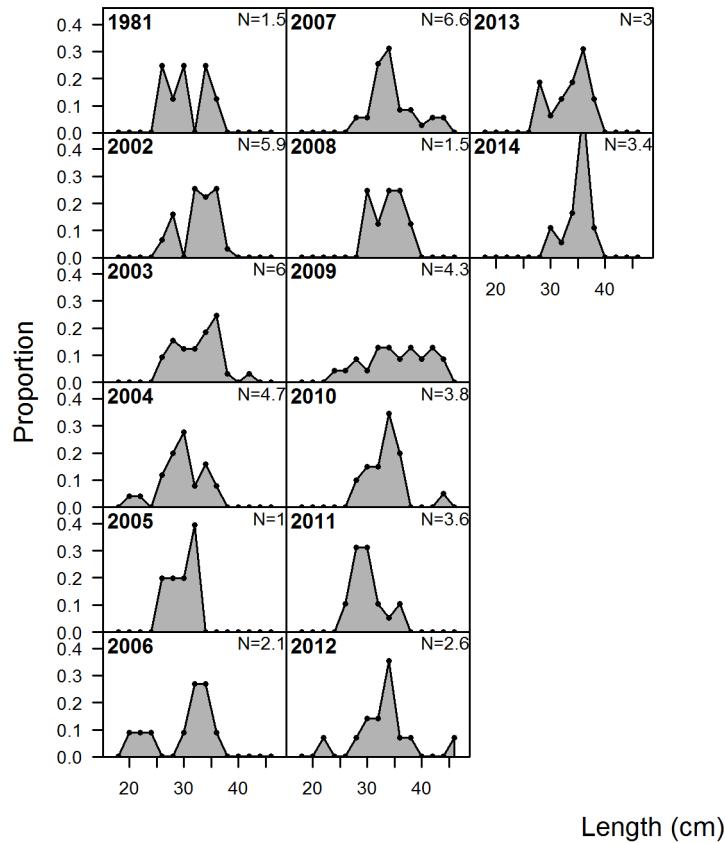


Figure 51: WDFW length compositions for the southern Washington recreational fleet, all modes.

2746 [Length compositions for northern model. ](r4ss/plots\_N/(r4ss/plots\_N/comp\_lendat\_sex1mkt2\_multi-  
 2747 fleet\_comparison.png)

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

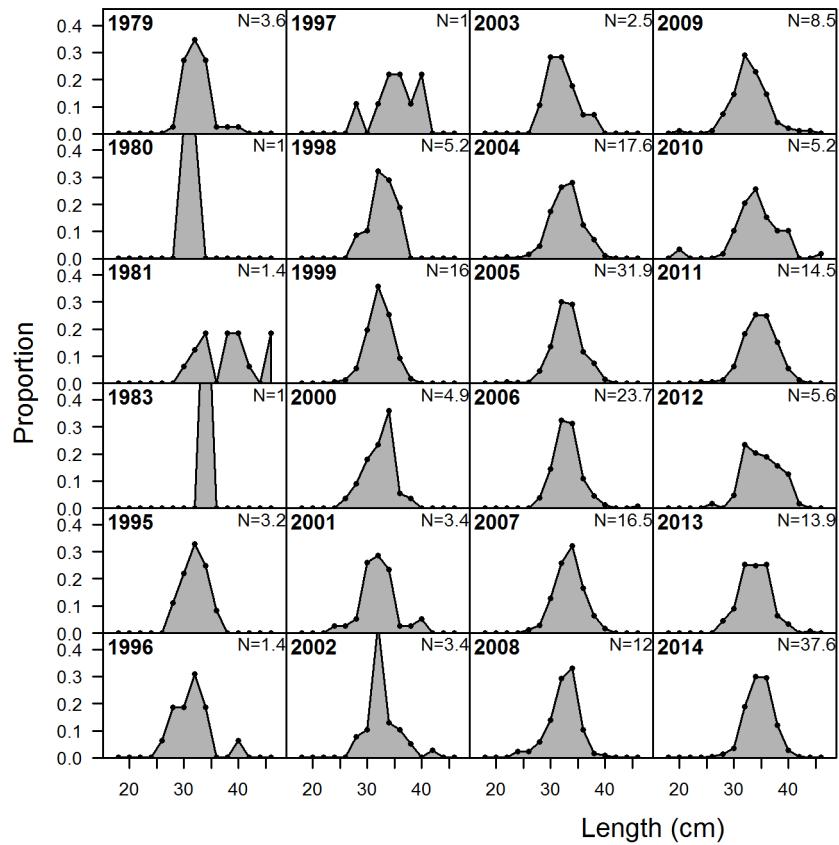


Figure 52: WDFW length compositions for the northern Washington recreational CPFV fleet.

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

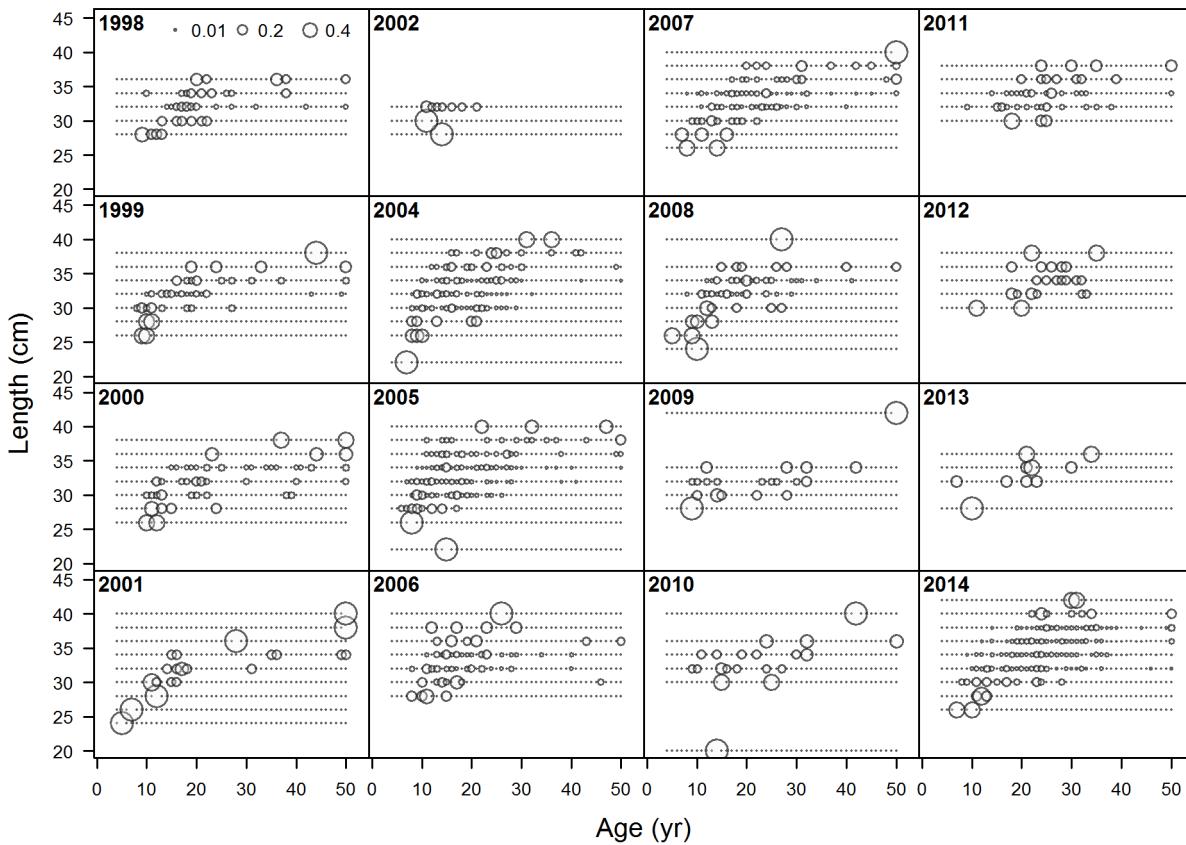


Figure 53: Conditional age-at-length compositions for recreational private/rental catch in northern WA in the northern model.

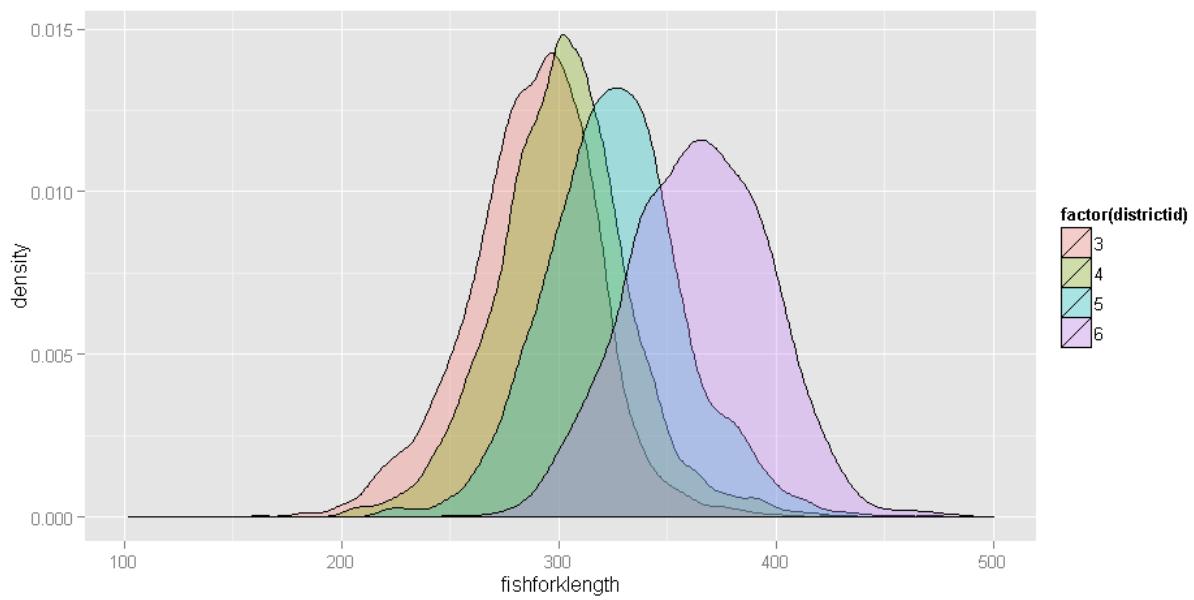


Figure 54: Distribution of lengths by CRFS district from CDFW, south of Cape Mendocino.

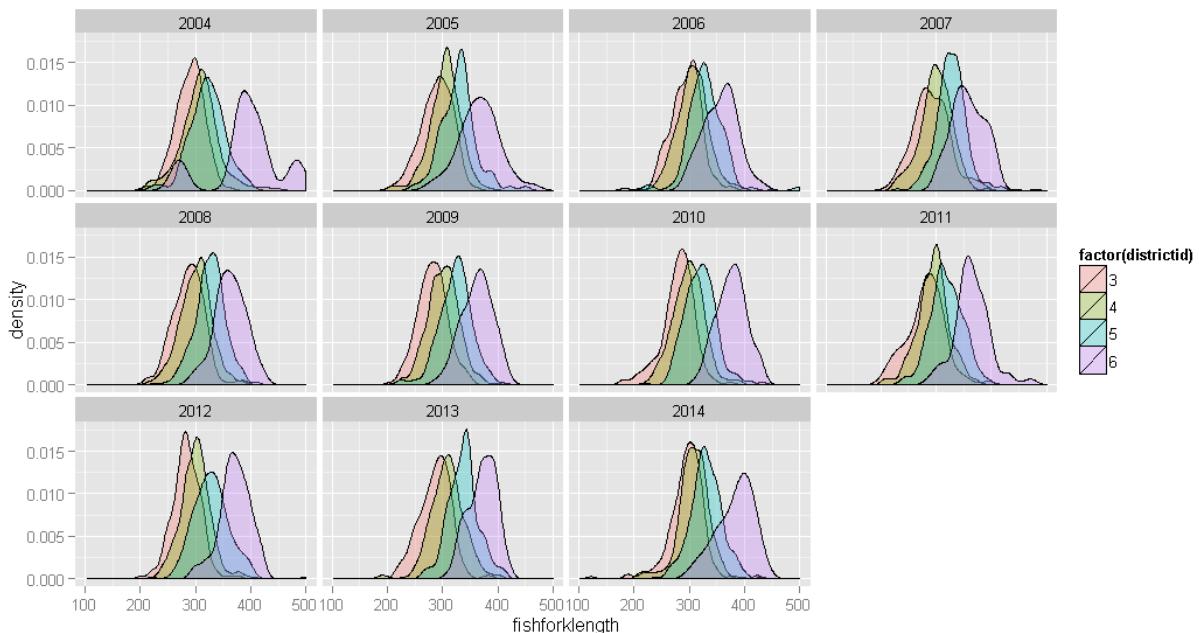


Figure 55: Distribution of lengths from the CDFW CRFS survey south of Cape Mendocino, by year and district.

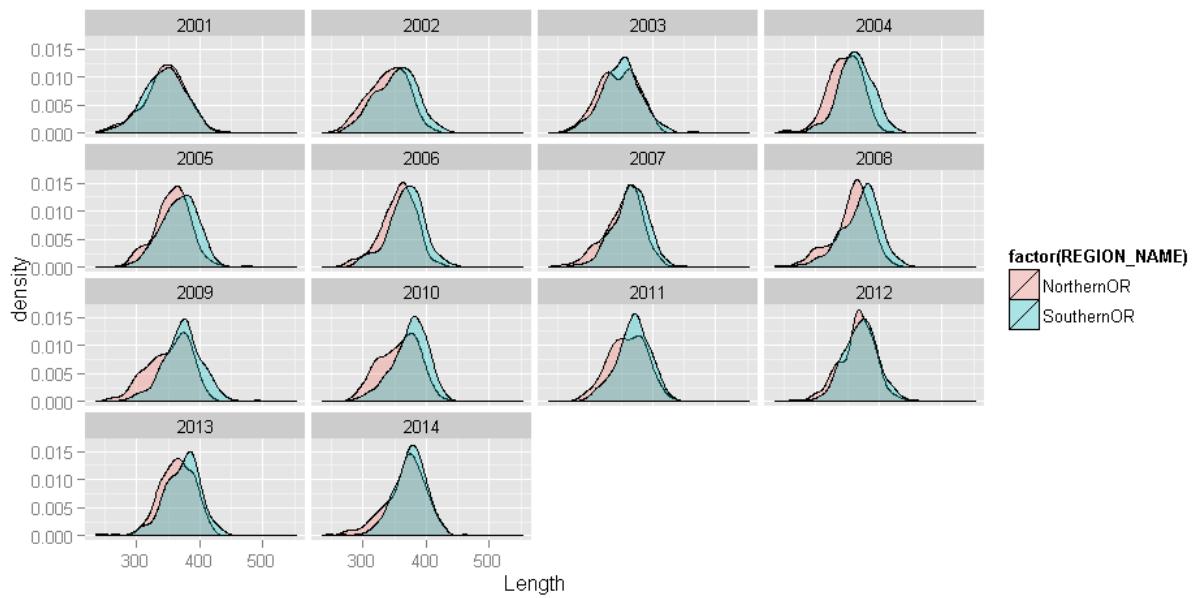


Figure 56: Oregon (ORBS) recreational CPFV fleet length distributions by region and year.

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

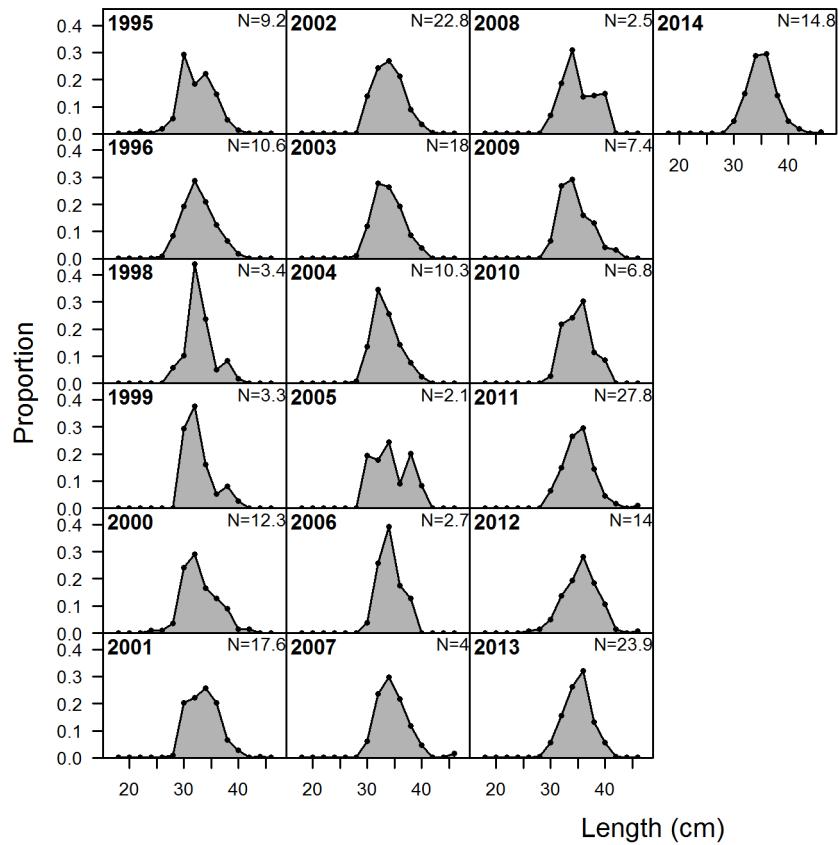


Figure 57: Length compositions for retained fish from the southern Oregon commercial dead-fish fishery.

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

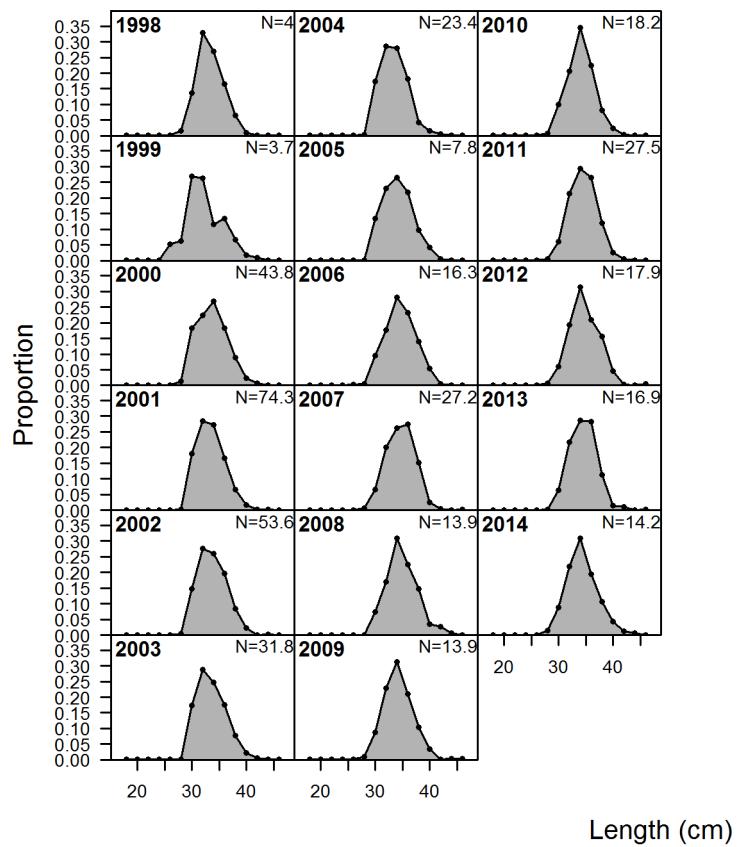


Figure 58: Length compositions for retained fish from the southern Oregon commercial live-fish fishery.

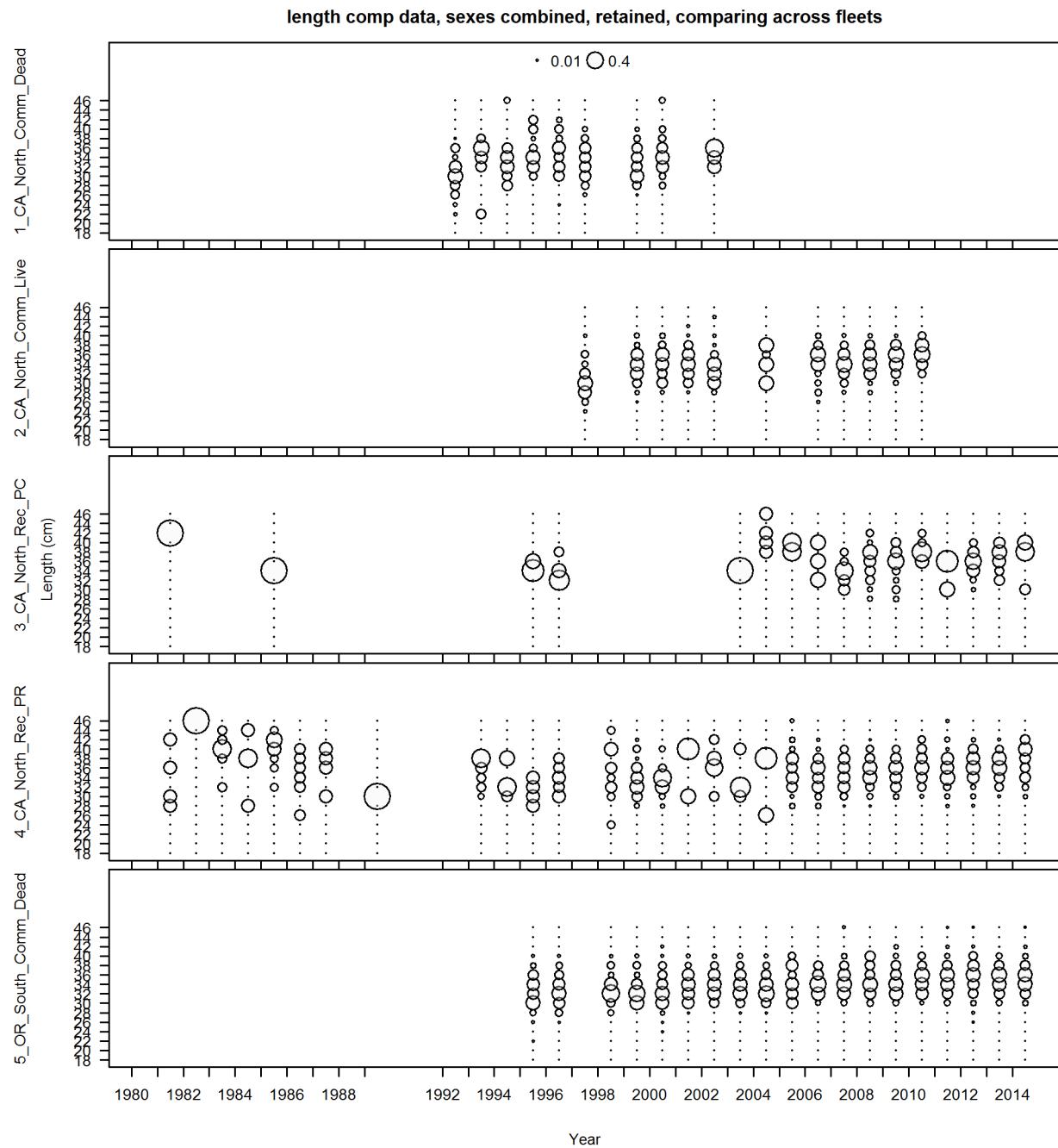


Figure 59: Length compositions for central model, figure 1 of 2.

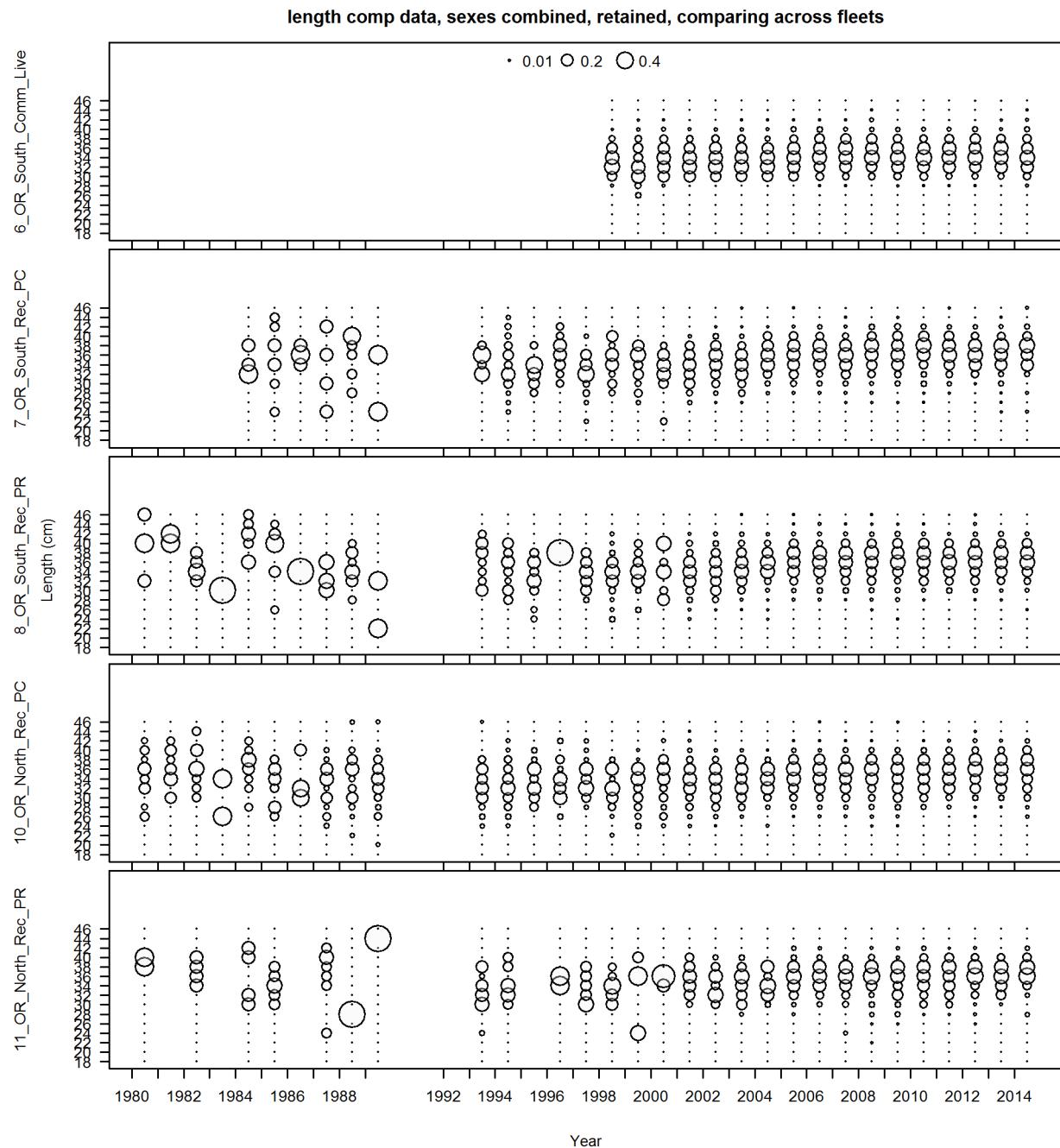


Figure 60: Length compositions for central model continued, figure 2 of 2.

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

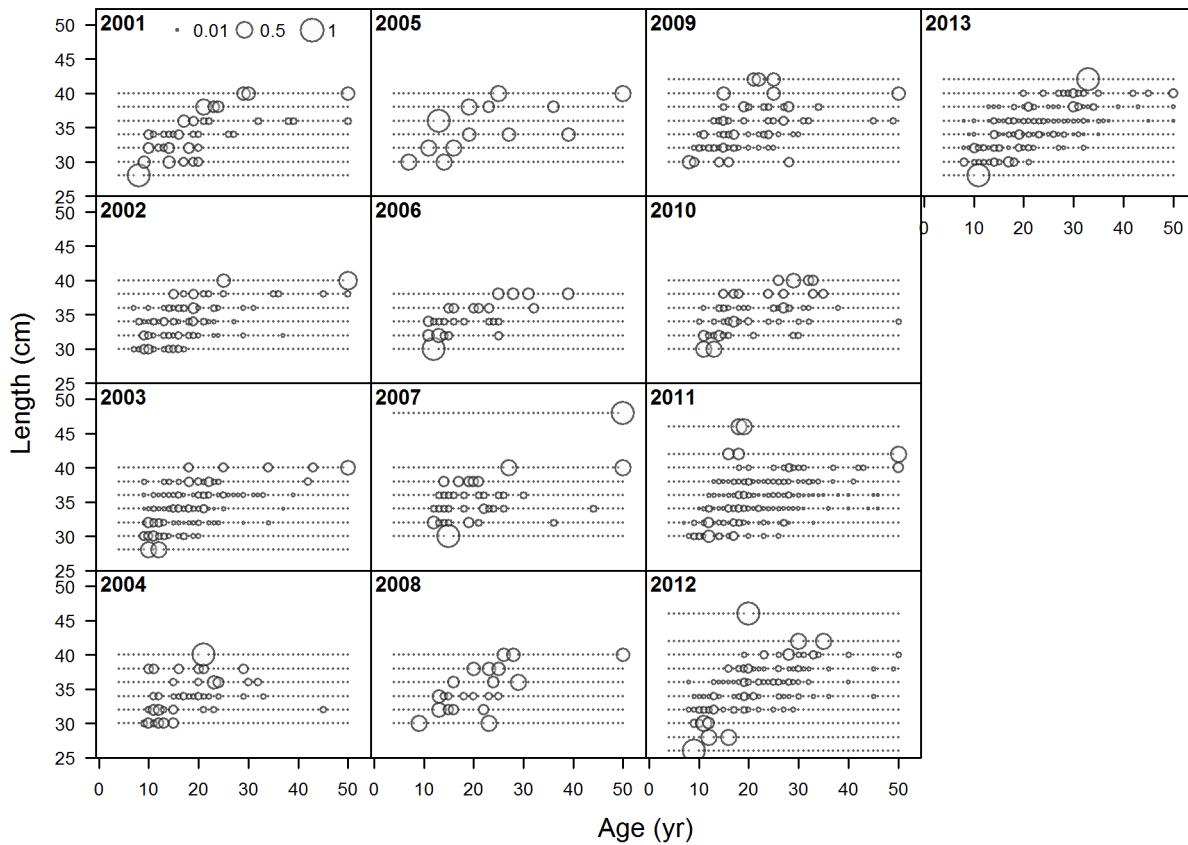


Figure 61: Conditional age-at-length data for retained fish from the southern Oregon commercial dead-fish fishery.

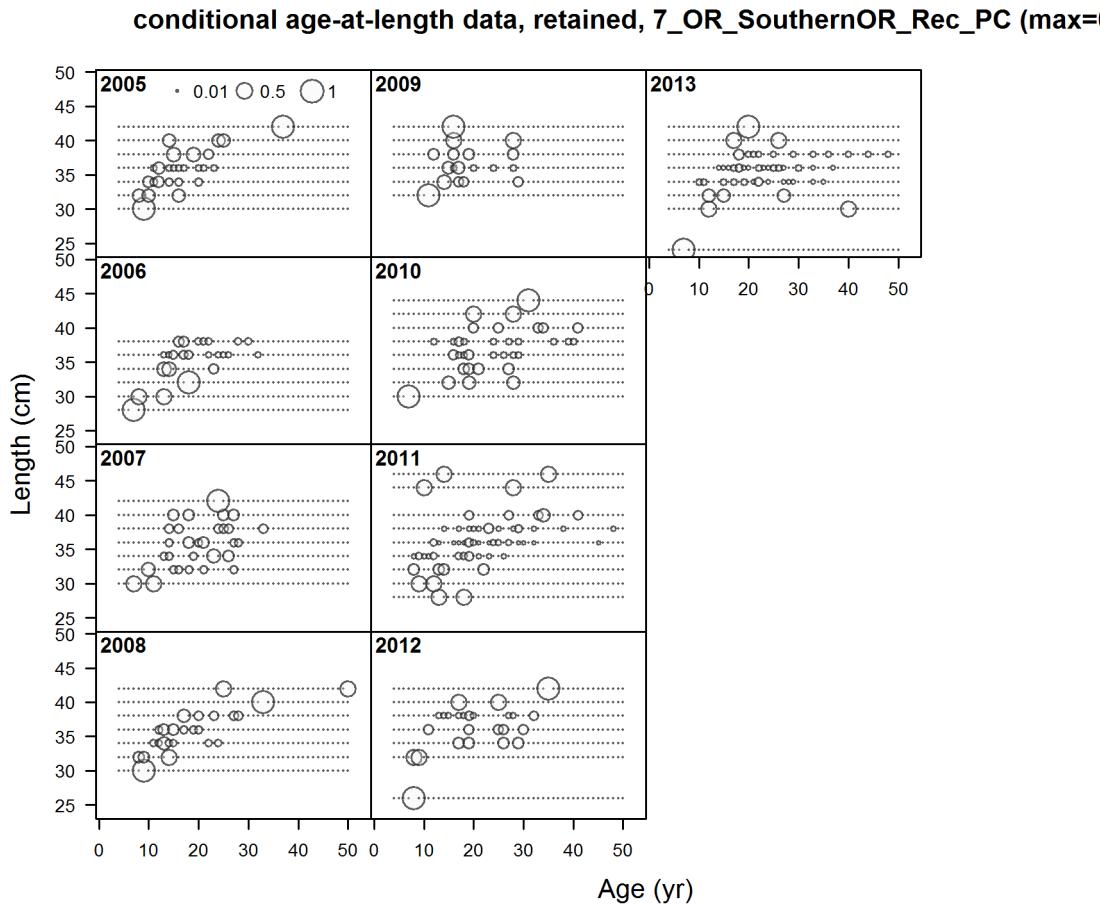


Figure 62: Conditional age-at-length compositions for the commercial dead-fish fishery in southern OR in the central model.

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

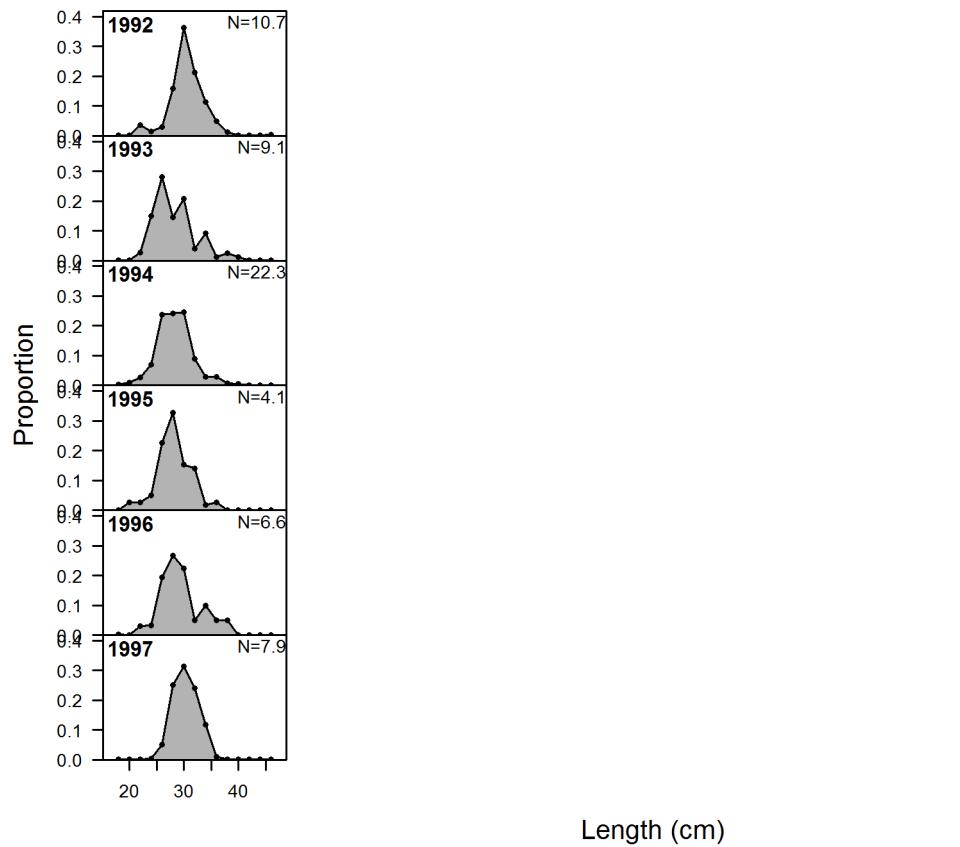


Figure 63: Length compositions by year for the California commercial dead-fish fishery south of  $40^{\circ}10'$ .

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

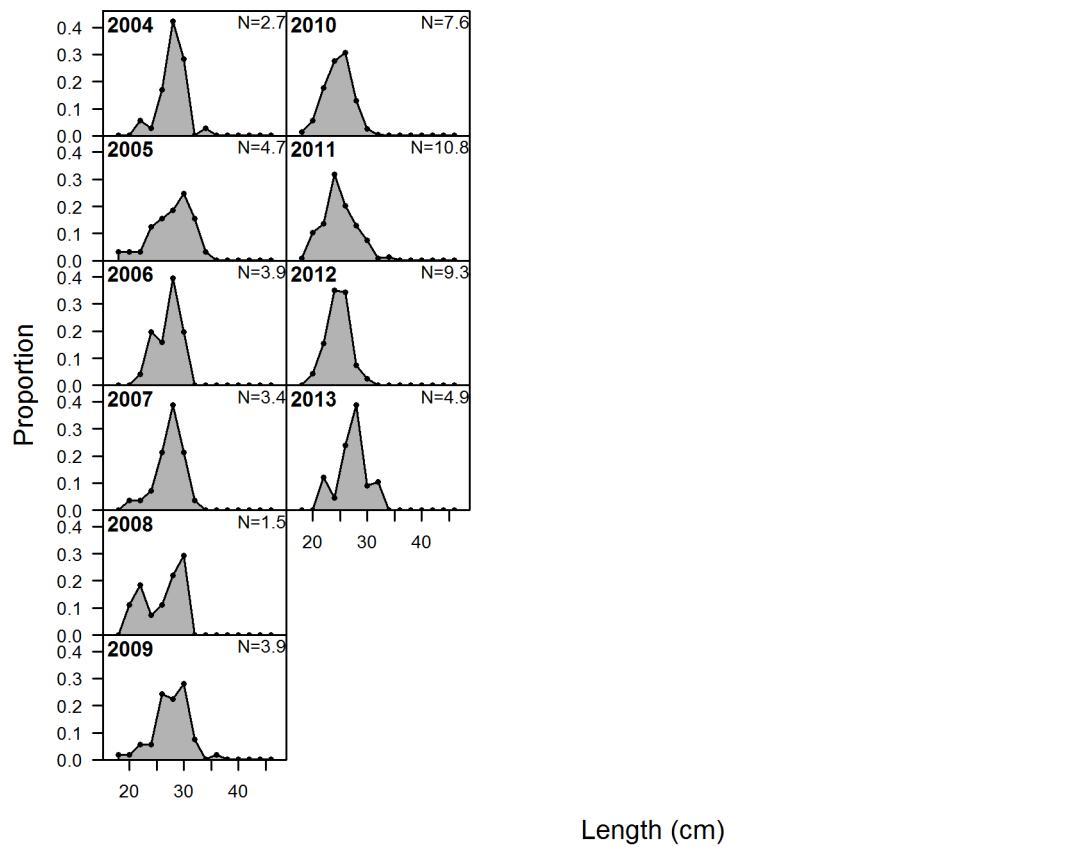


Figure 64: Length compositions by year for discarded fish in the California commercial fishery south of  $40^{\circ}10'$ .

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

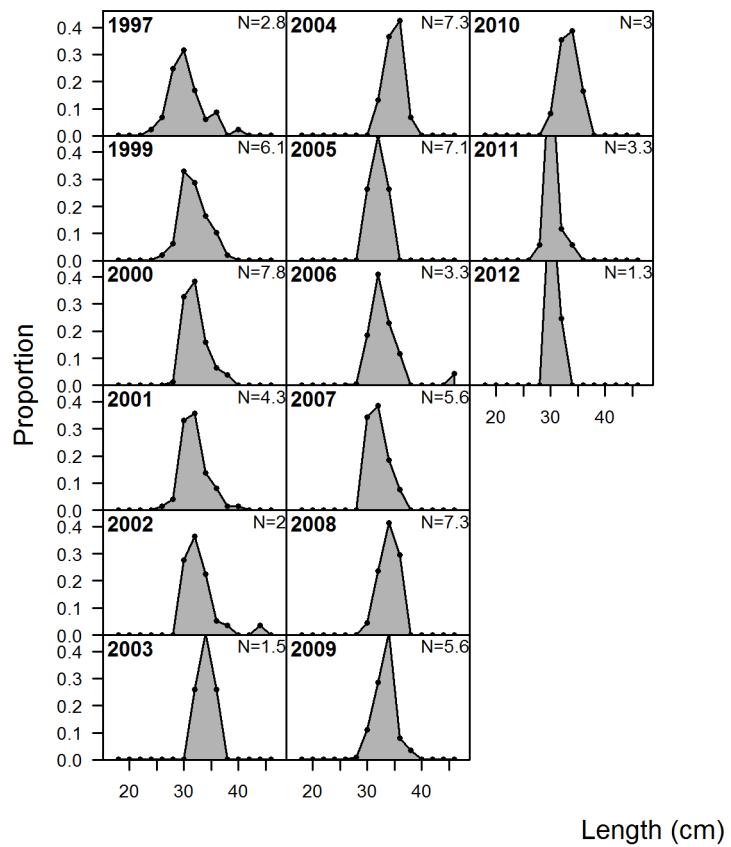


Figure 65: Length compositions by year for retained fish in the California commercial live-fish fishery south of  $40^{\circ}10'$ .

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

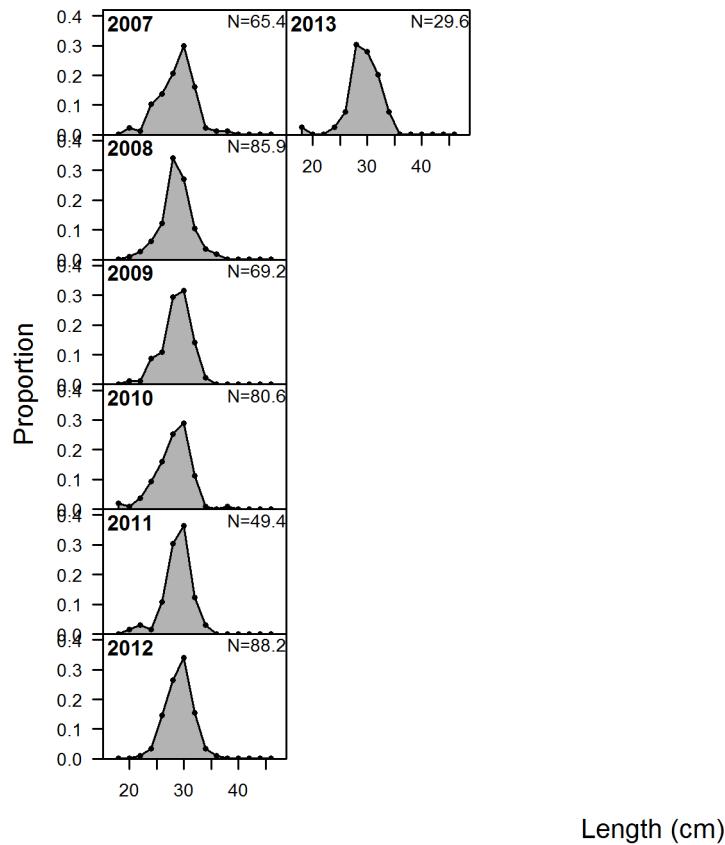


Figure 66: CCFRP research program length compositions for the southern model.

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

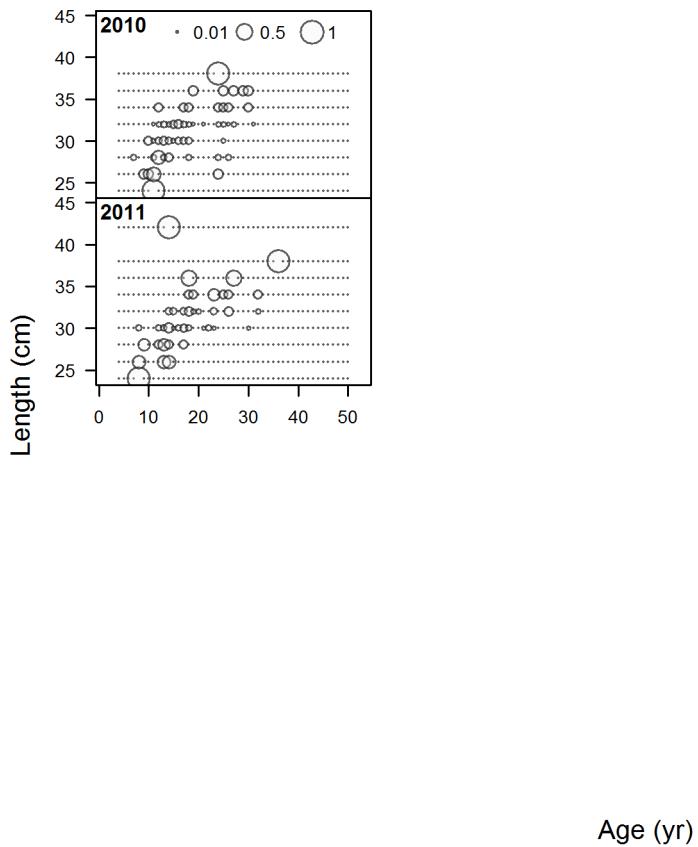
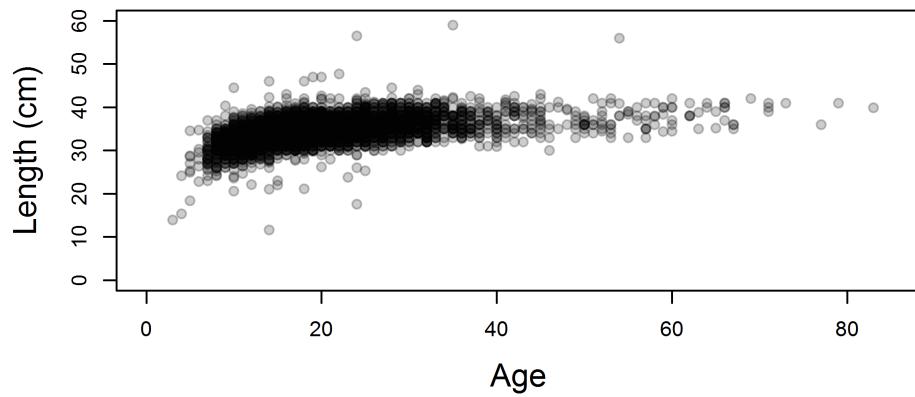
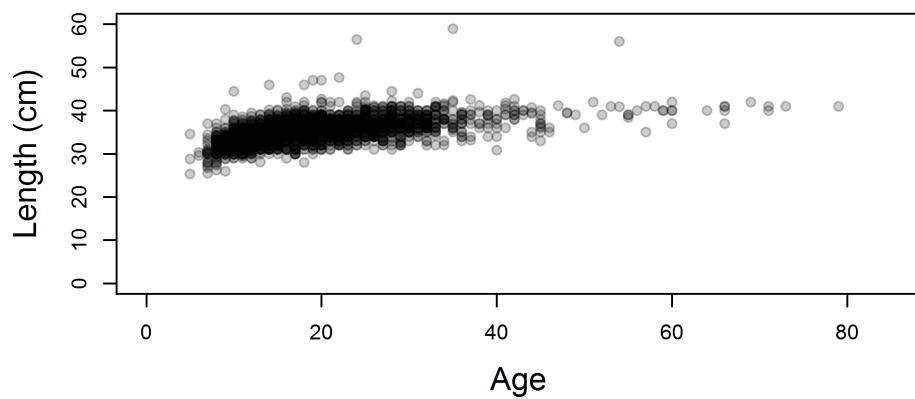


Figure 67: Conditional age-at-length compositions by year from the Abrams thesis study, used in the southern model.

**Washington**



**Oregon**



**California**

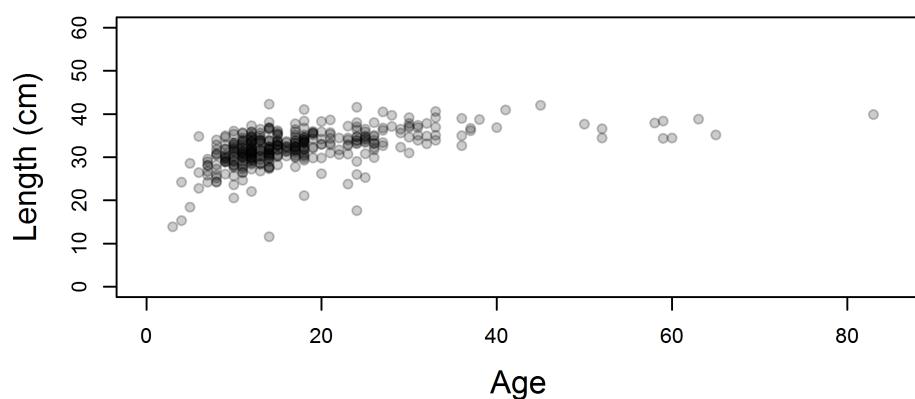


Figure 68: Raw length at age data by state.

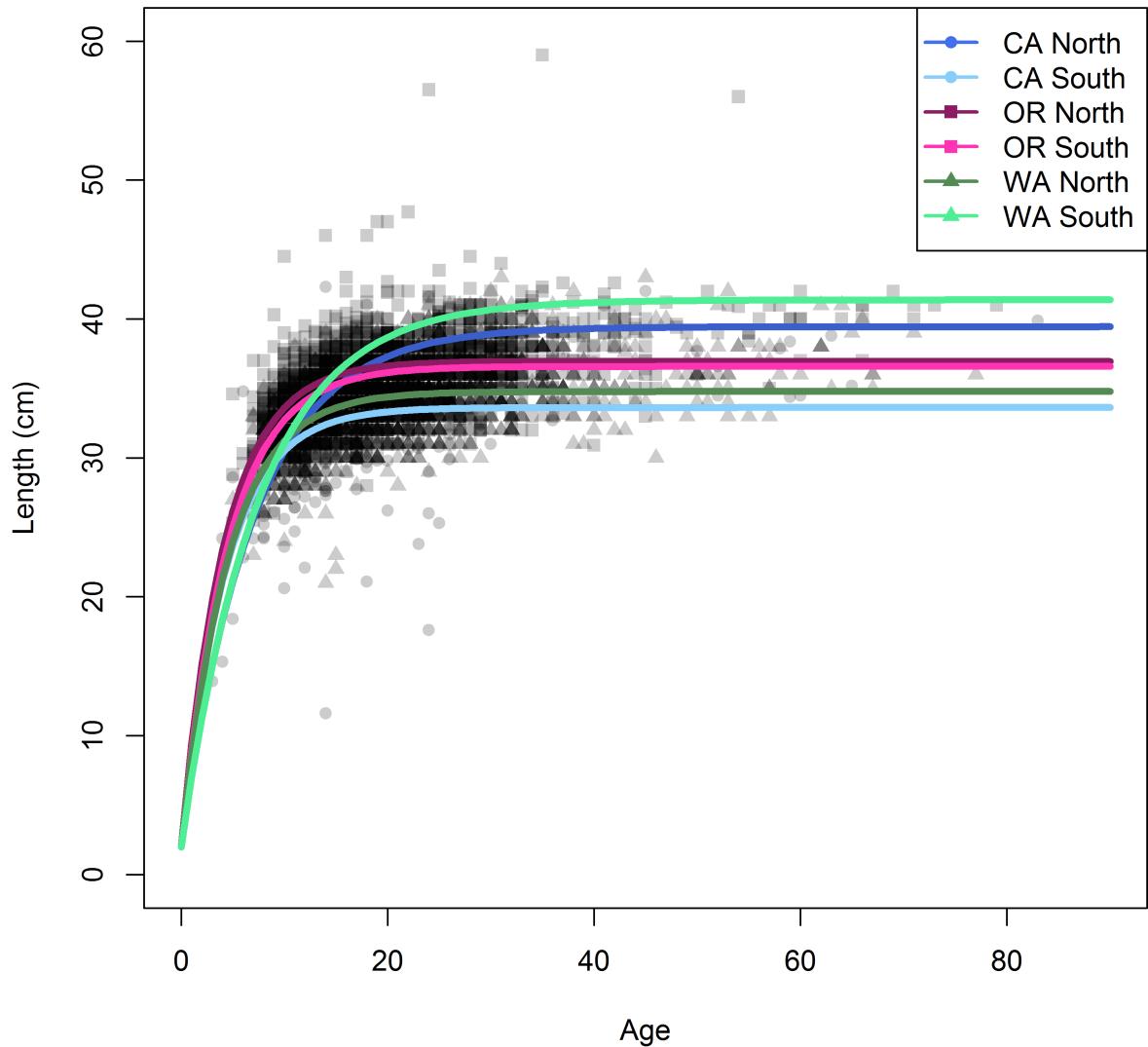


Figure 69: Fits by region to the von Bertalanffy growth curve with age-0 fixed at 2 cm. California is split at  $40^{\circ}106'$ , Oregon at Florence, OR, and Washington between MCAs 2 and 3.

### Comparison of current NWFSC age readers

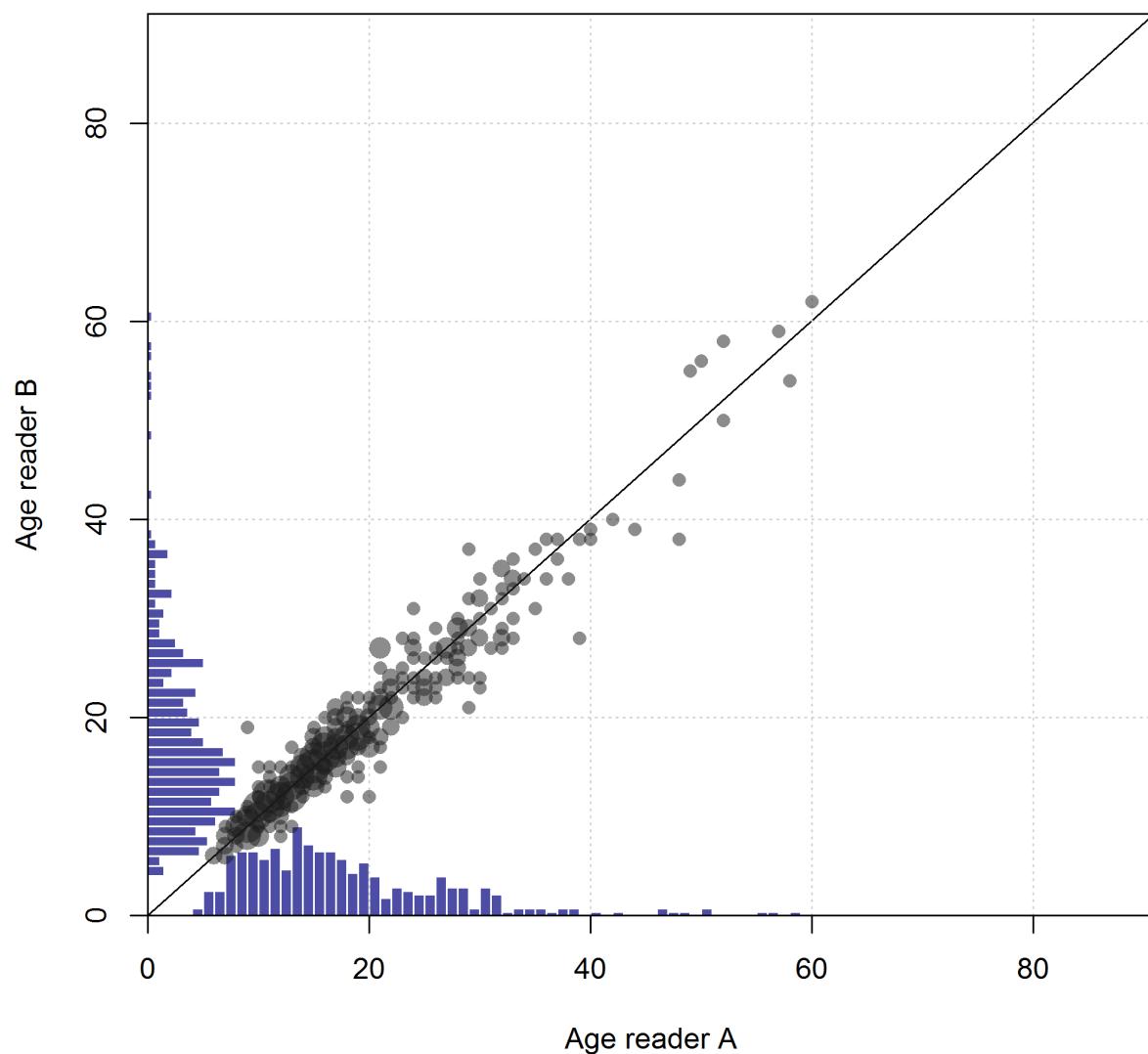


Figure 70: Aging precision between two current age readers at the NWFSC.

### Current vs. former NWFSC age readers

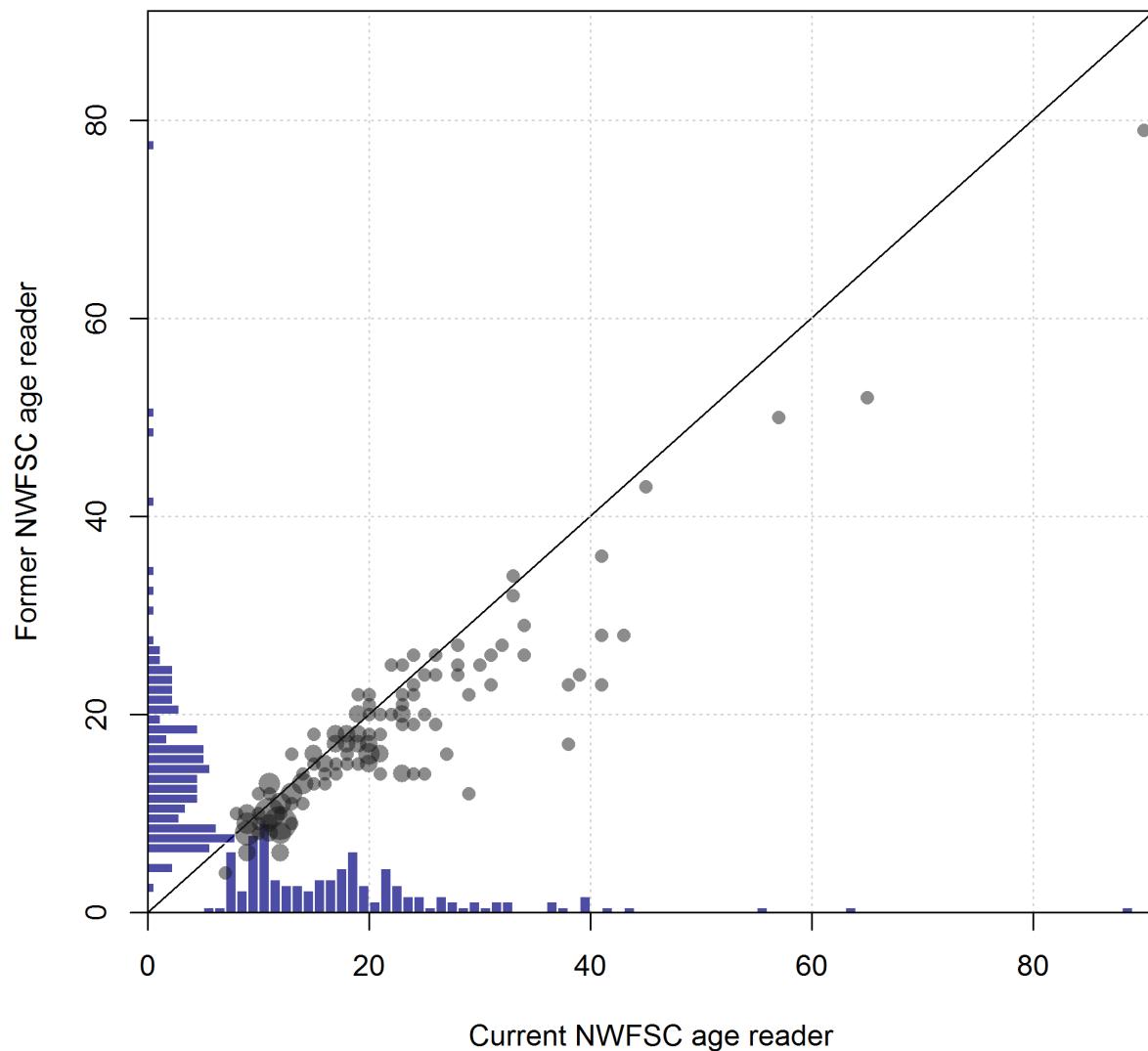


Figure 71: Aging precision between a current and former NWFSC age reader.

### NWFSC vs WDFW readings

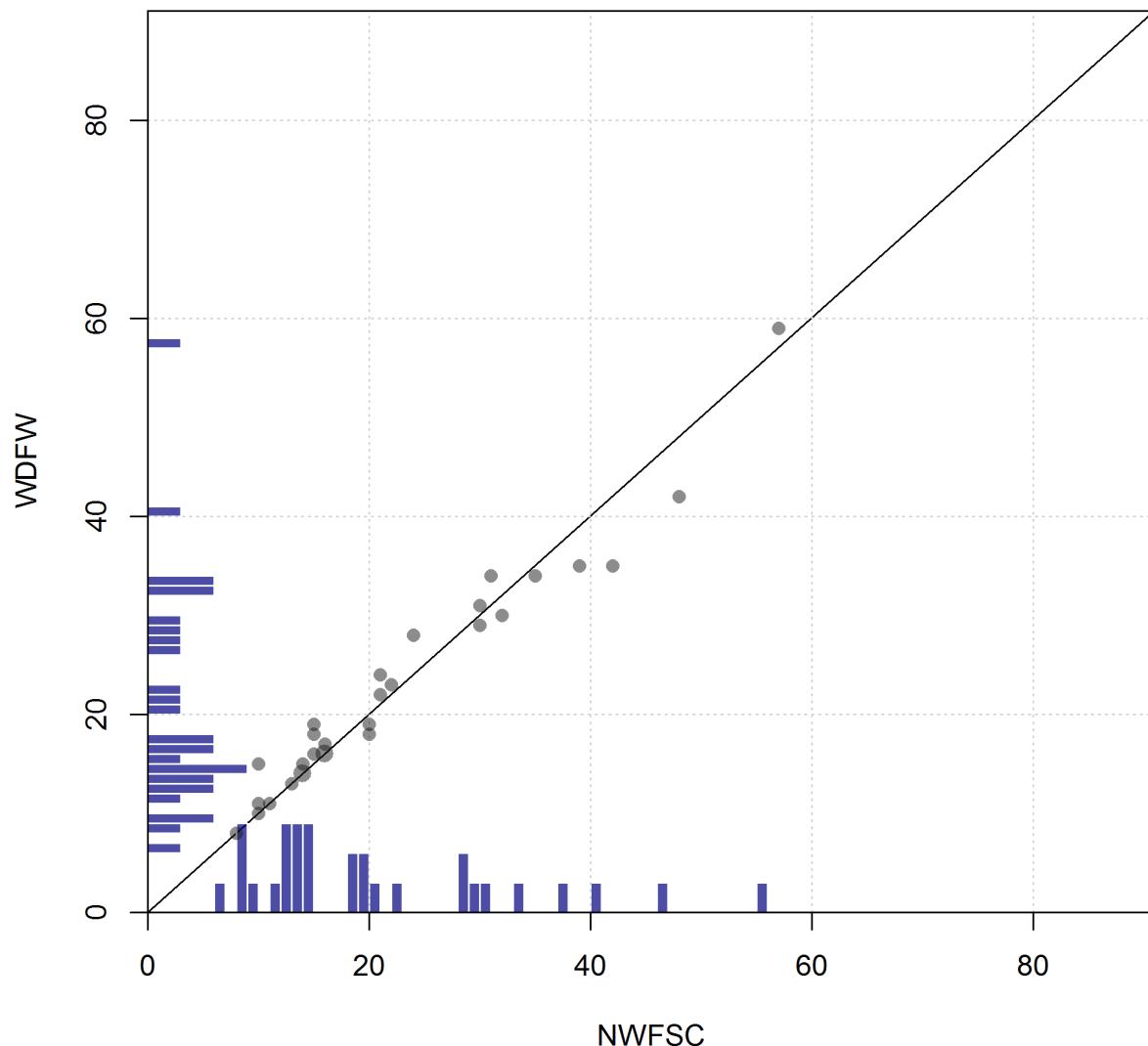


Figure 72: Aging precision between NWFSC and WDFW age readers.

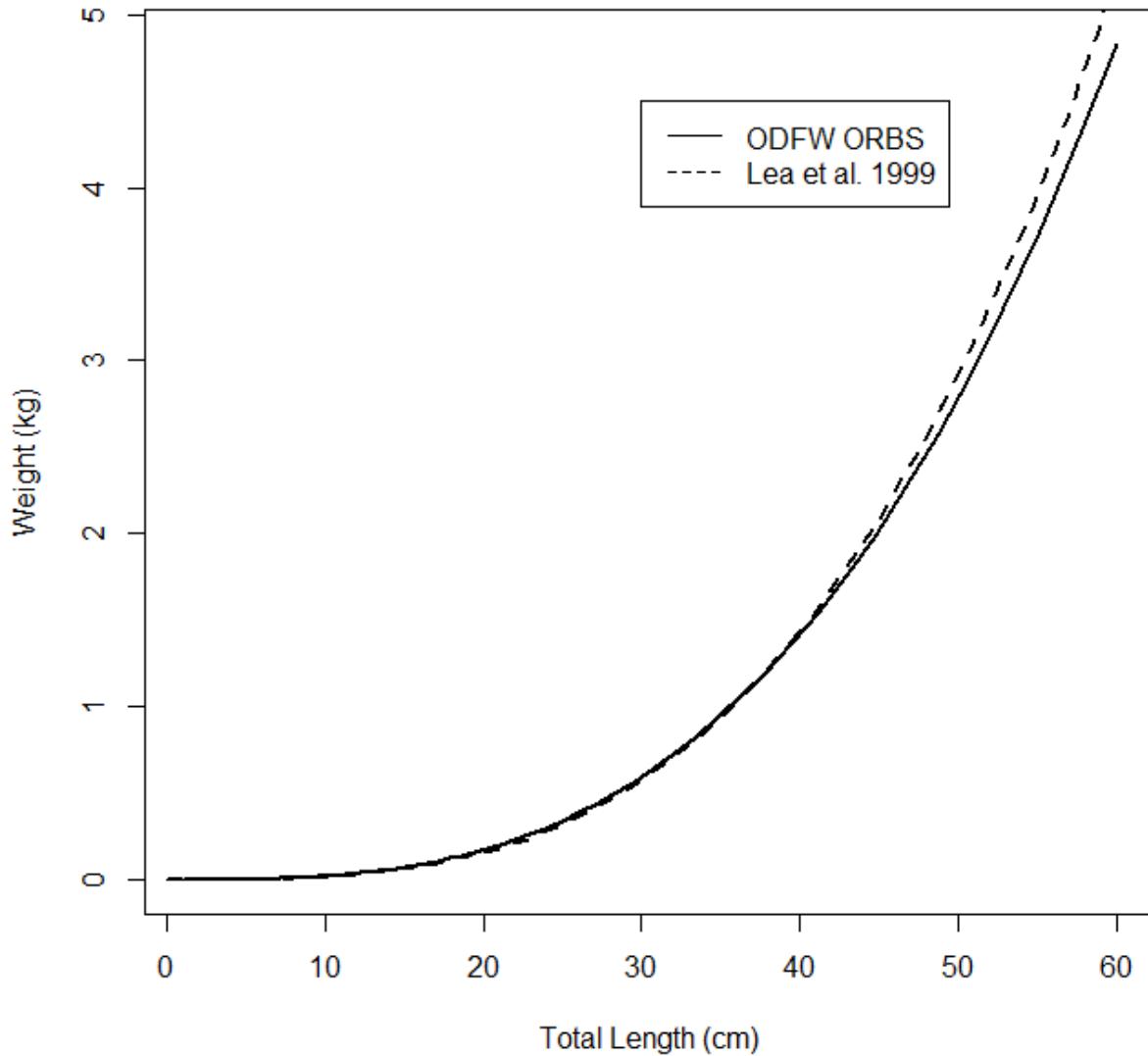


Figure 73: Comparison of the China rockfish weight-length curves from Lea et al. (1999) for California and those derived from the Oregon ORBS (dockside sampling program) data provided for this assessment.

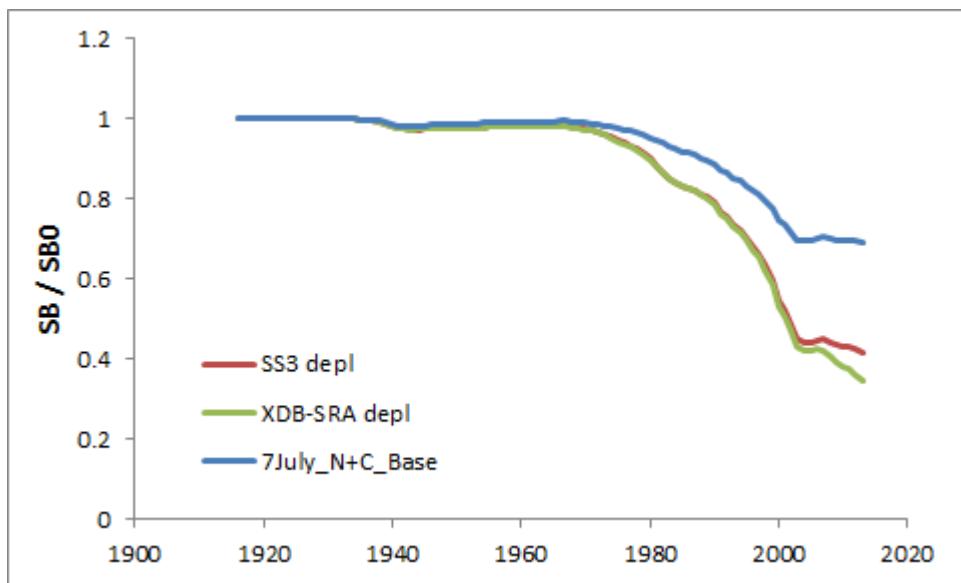


Figure 74: Comparison of depletion among the 2013 data moderate assessment, a SS3 bridge model, and the 2015 base case for the combined nothern and central models.

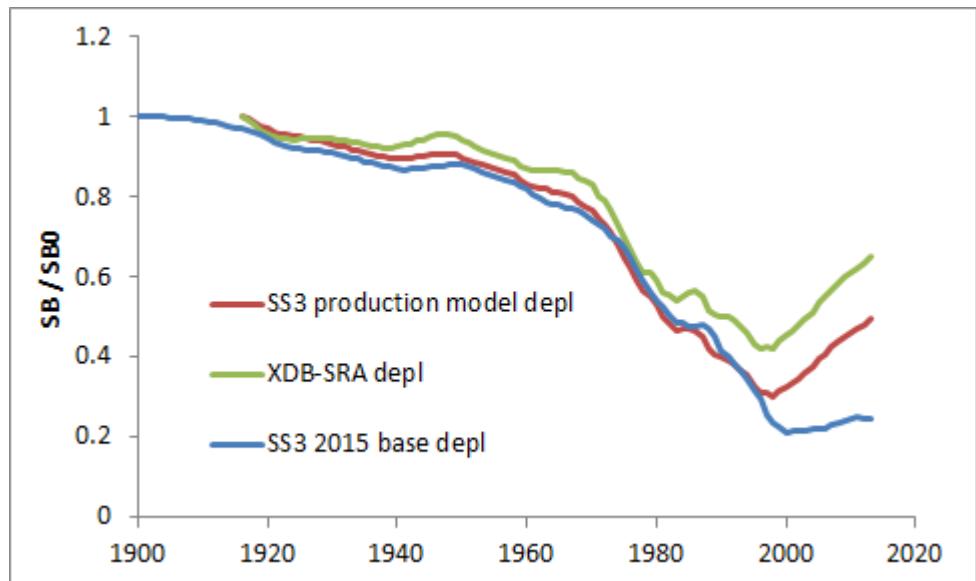


Figure 75: Comparison of depletion among the 2013 data moderate assessment, a SS3 bridge model, and the 2015 base case for the southern model.

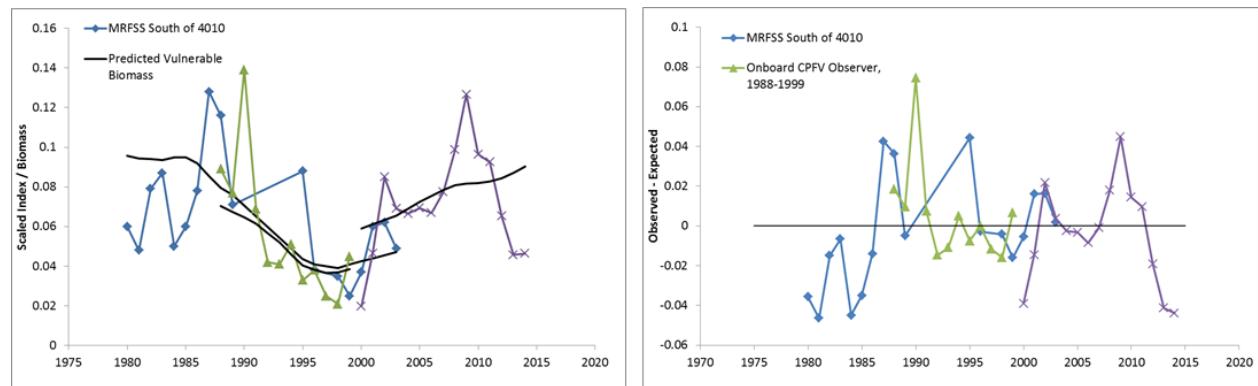


Figure 76: Normalized indices (left) and residuals for indices (right) for the southern model.

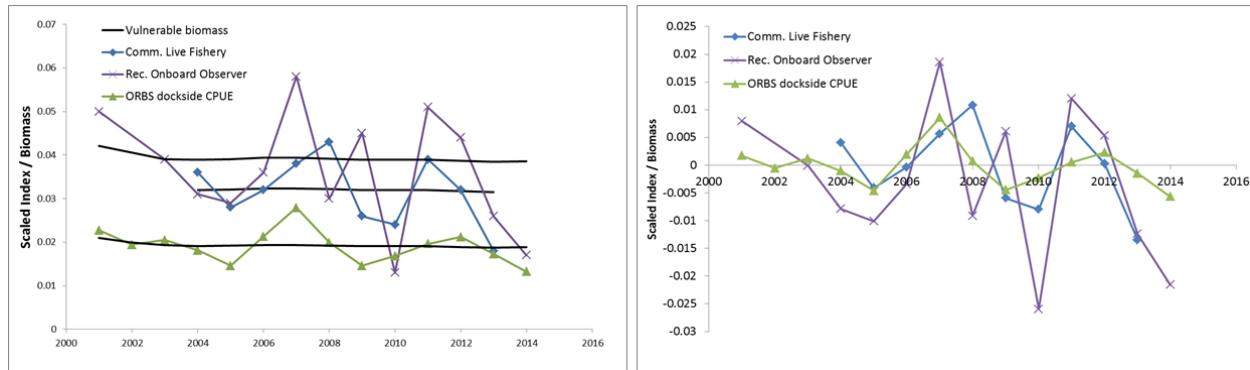


Figure 77: Normalized indices (left) and residuals for indices (right) for the central model.

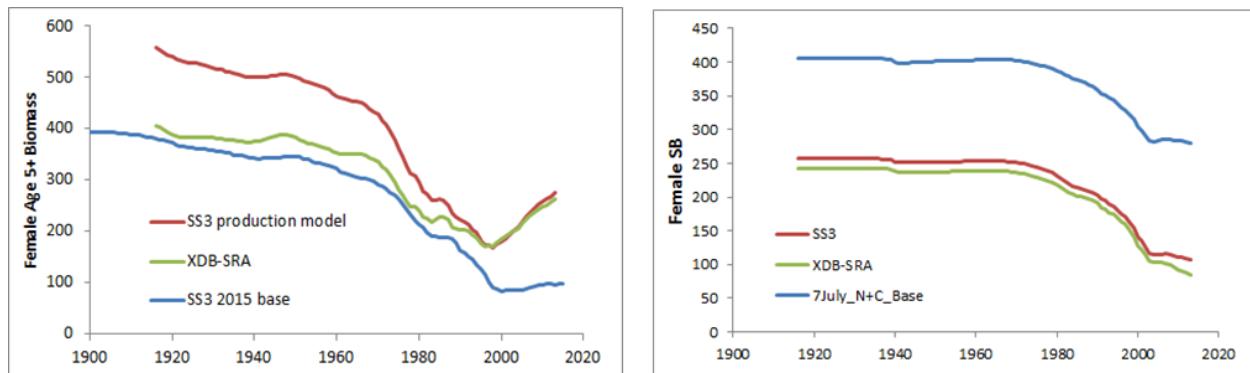


Figure 78: Comparison of depletion among the 2013 data moderate assessment, a SS3 bridge model, and the 2015 base case for the southern (left panel) and northern and central (right panel) models.

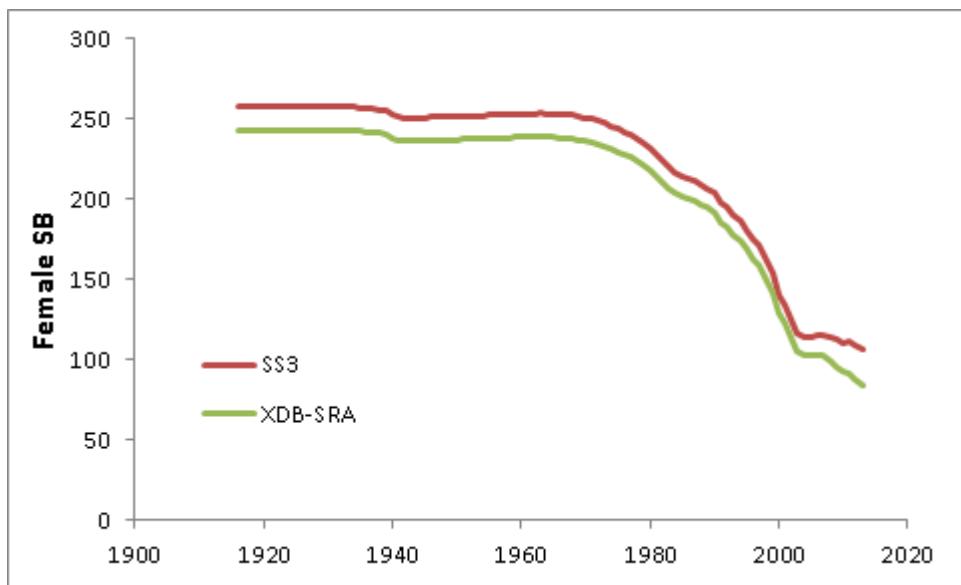


Figure 79: Time series of spawning biomass from the 2013 XDB-SRA assessment of China rockfish north of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

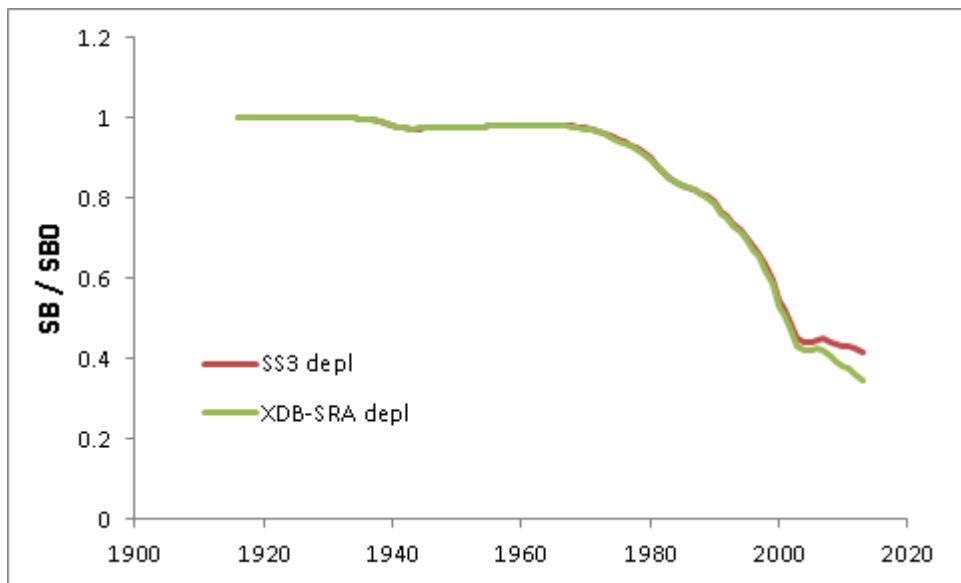


Figure 80: Time series of spawning biomass relative to unfished spawning biomass (“depletion”, or  $SB / SB_0$ ) from the 2013 XDB-SRA assessment of China rockfish north of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

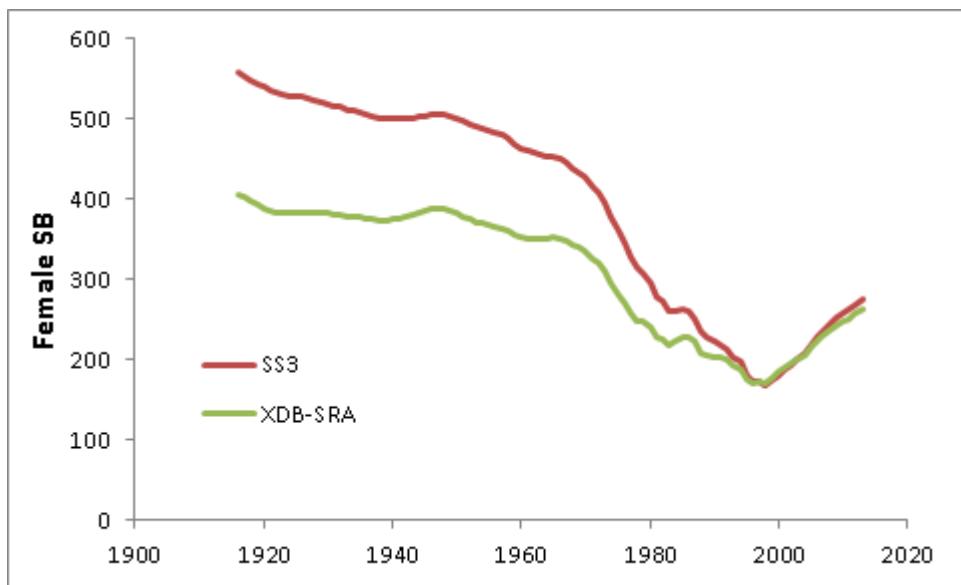


Figure 81: Time series of spawning biomass from the 2013 XDB-SRA assessment of China rockfish south of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

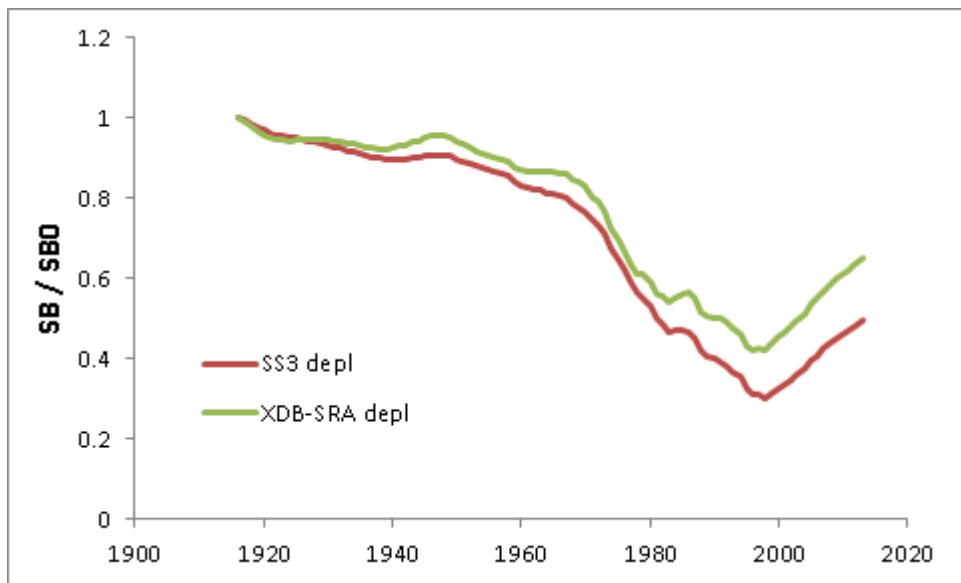


Figure 82: Time series of spawning biomass relative to unfished spawning biomass (“depletion”, or  $SB/SB_0$ ) from the 2013 XDB-SRA assessment of China rockfish south of  $40^{\circ}10'$  N. latitude, and an age-structured production model in Stock Synthesis v3 (SS3) fit to the same data.

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

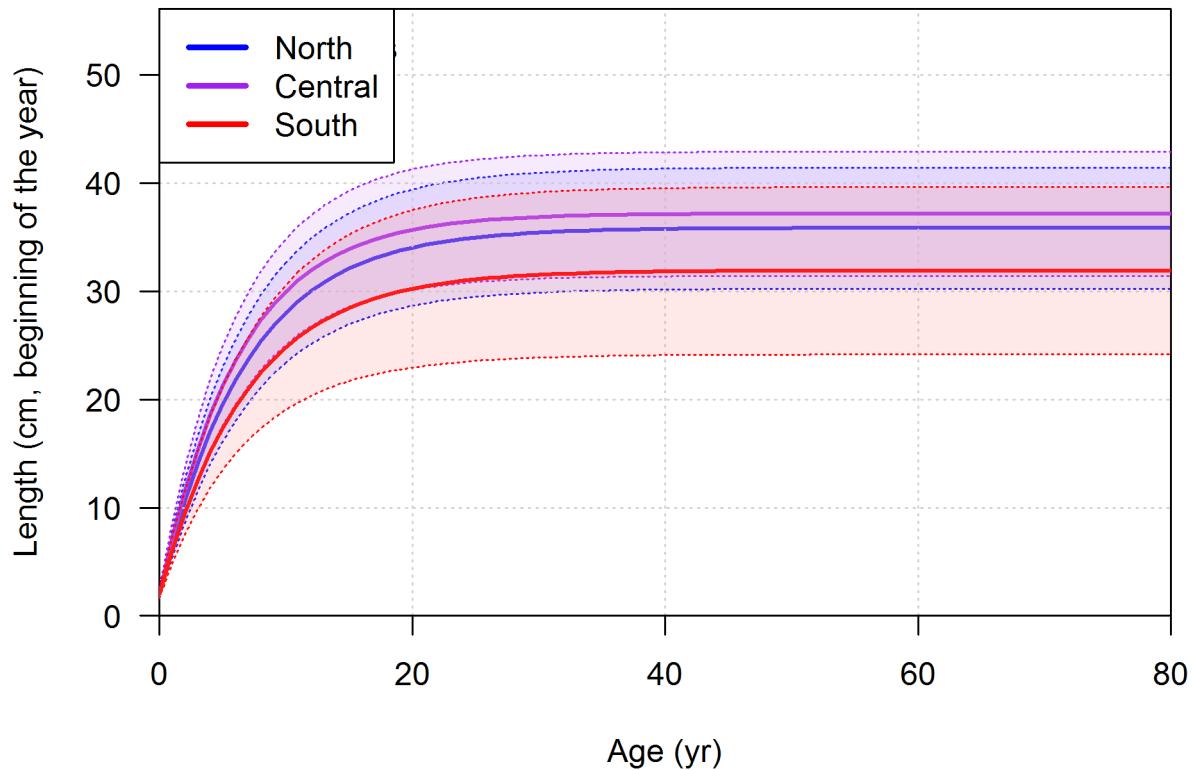


Figure 83: Fits to growth among models with no sex-specific growth.

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

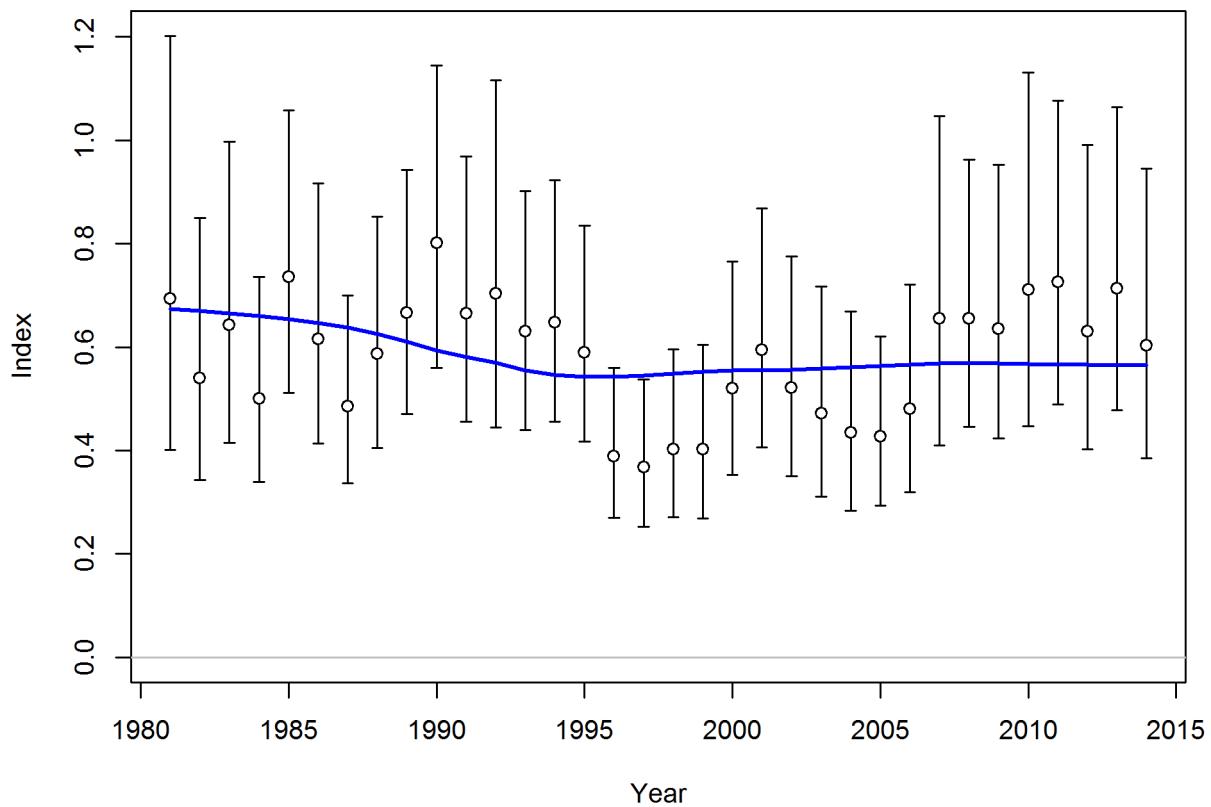


Figure 84: Fits to private boat recreational dockside index for Washington, northern model.

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

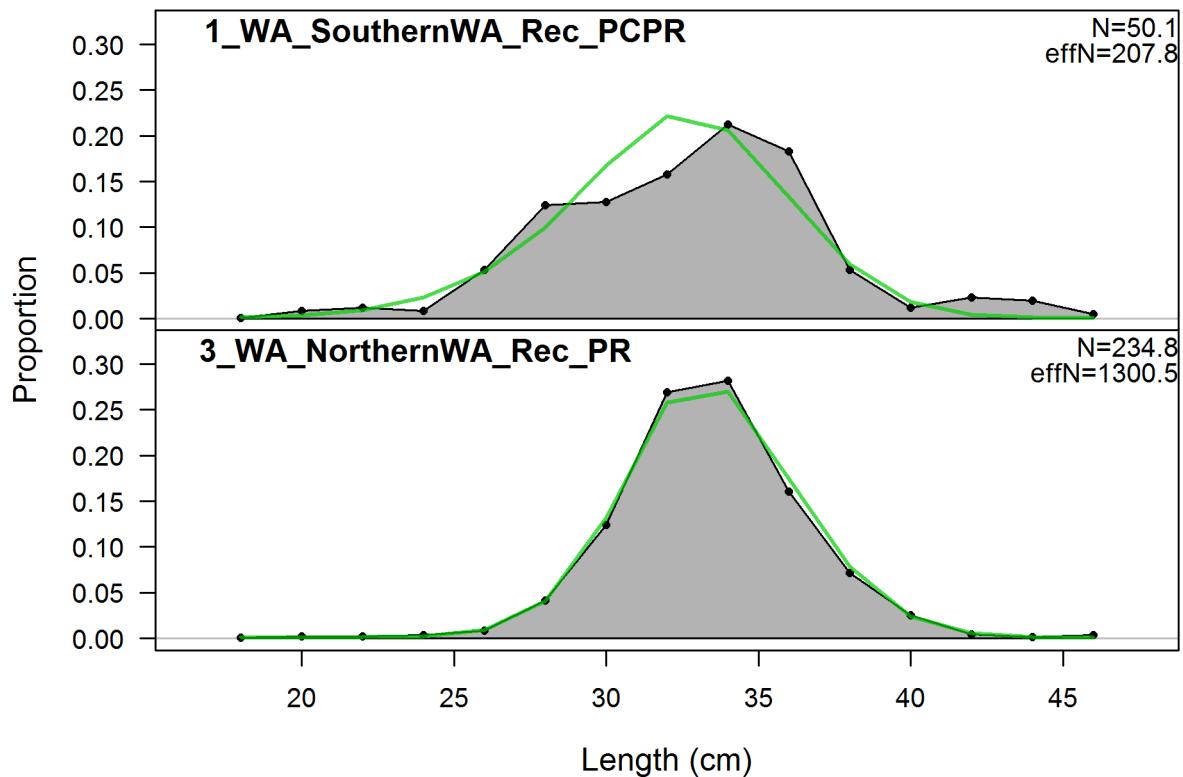


Figure 85: Fits to the time aggregated recreational length distributions for the northern model.

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

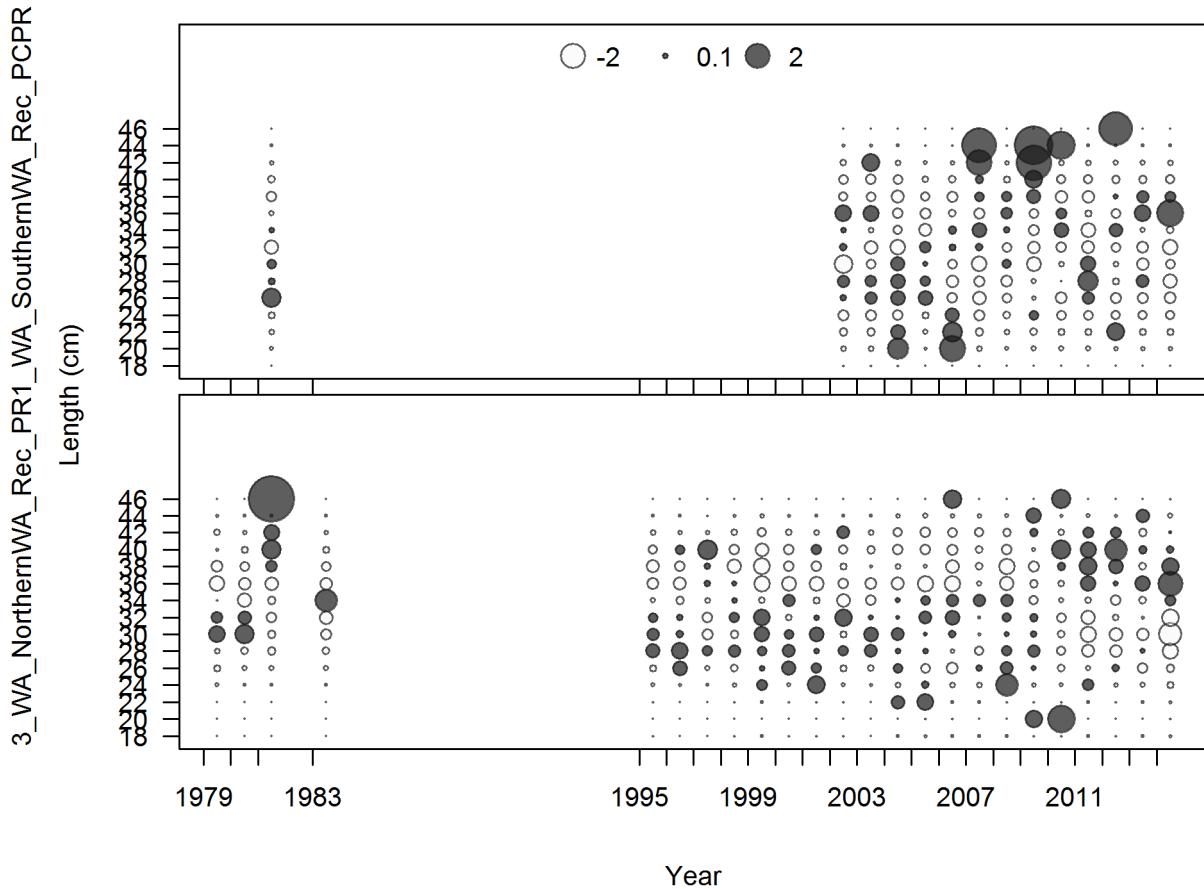


Figure 86: Residuals in fit to length compositions for northern model. Filled circles indicate observed values greater than expected values.

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

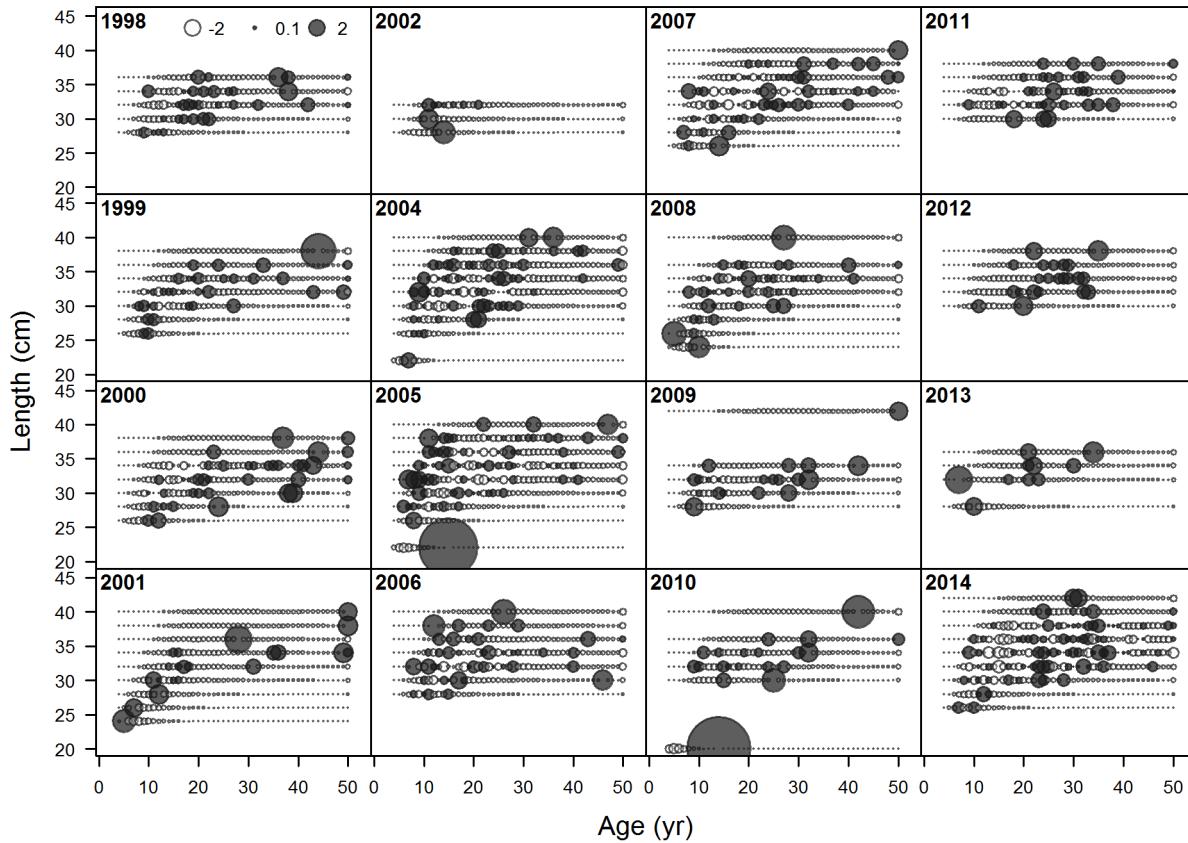


Figure 87: Residuals in fit to conditional age-at-length compositions for recreational private/rental catch in northern WA in the northern model. Filled circles indicate observed values greater than expected values.

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

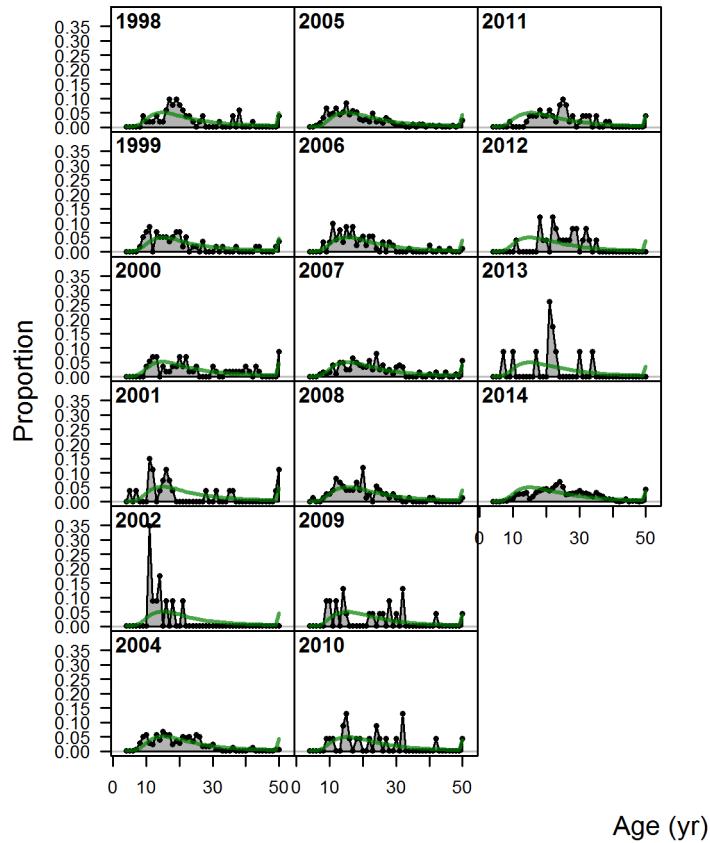


Figure 88: Implied fit to the marginal age-frequencies for recreational private/rental catch in northern WA in the northern model. Fits are provided for evaluation only, but not included in the model likelihood as these samples are included in the likelihood as conditional-age-at-length data.

### Length-based selectivity by fleet in 2014

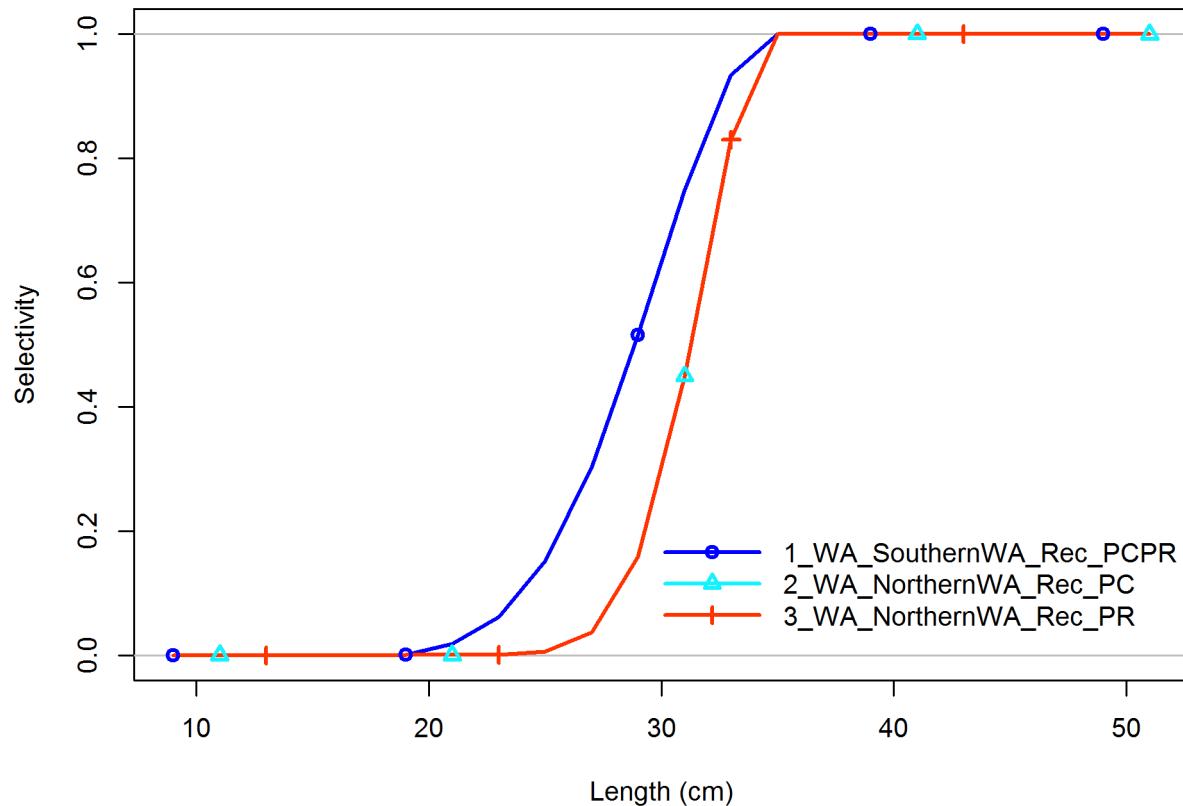


Figure 89: Estimated selectivity curves for the Washington recreational fleets.

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

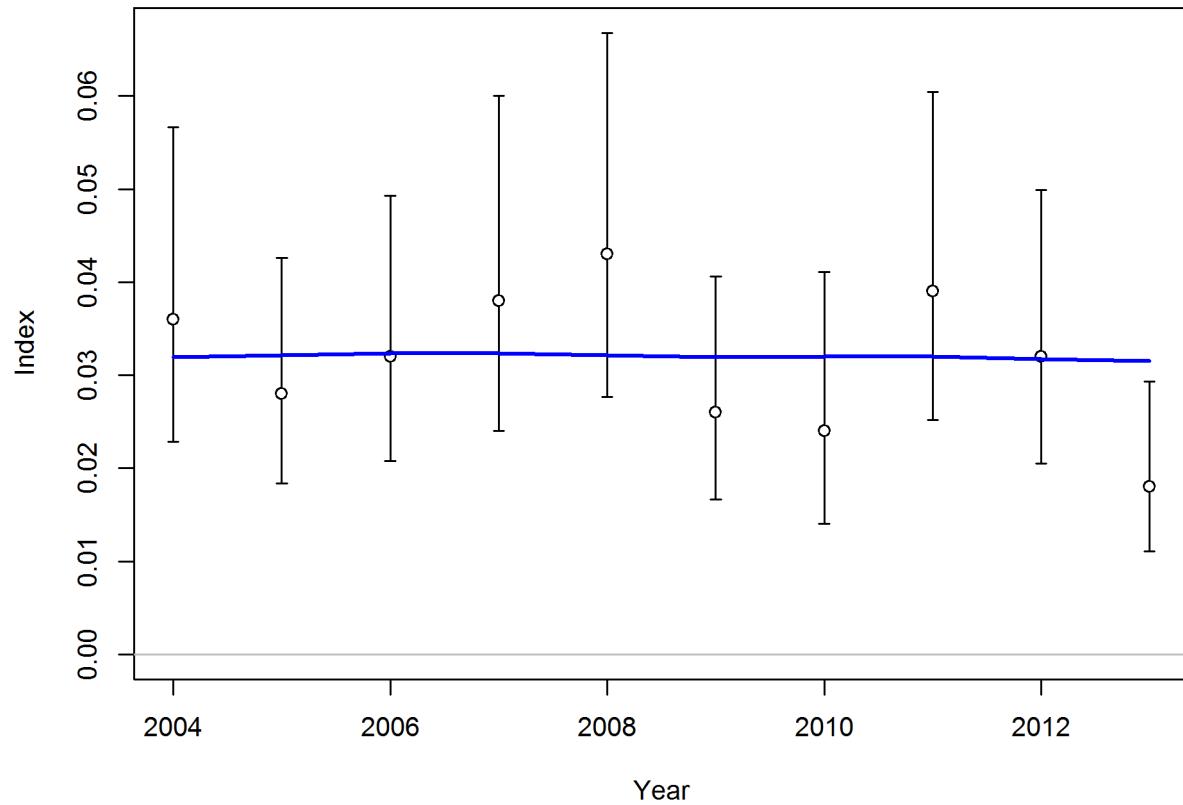


Figure 90: Fits to the southern Oregon commercial live-fish fishery for the central model.

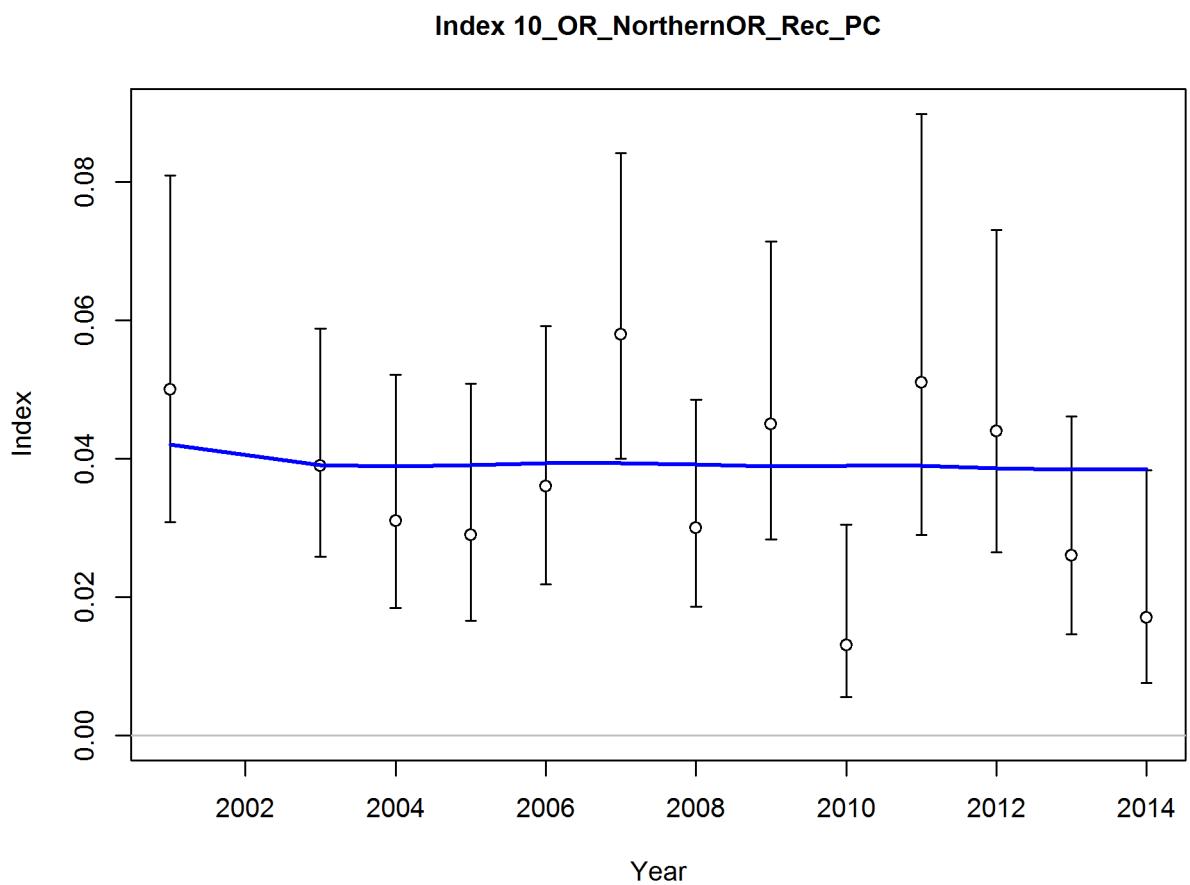


Figure 91: Fits to the northern Oregon recreational CPFV fleet onboard observer index for the central model.

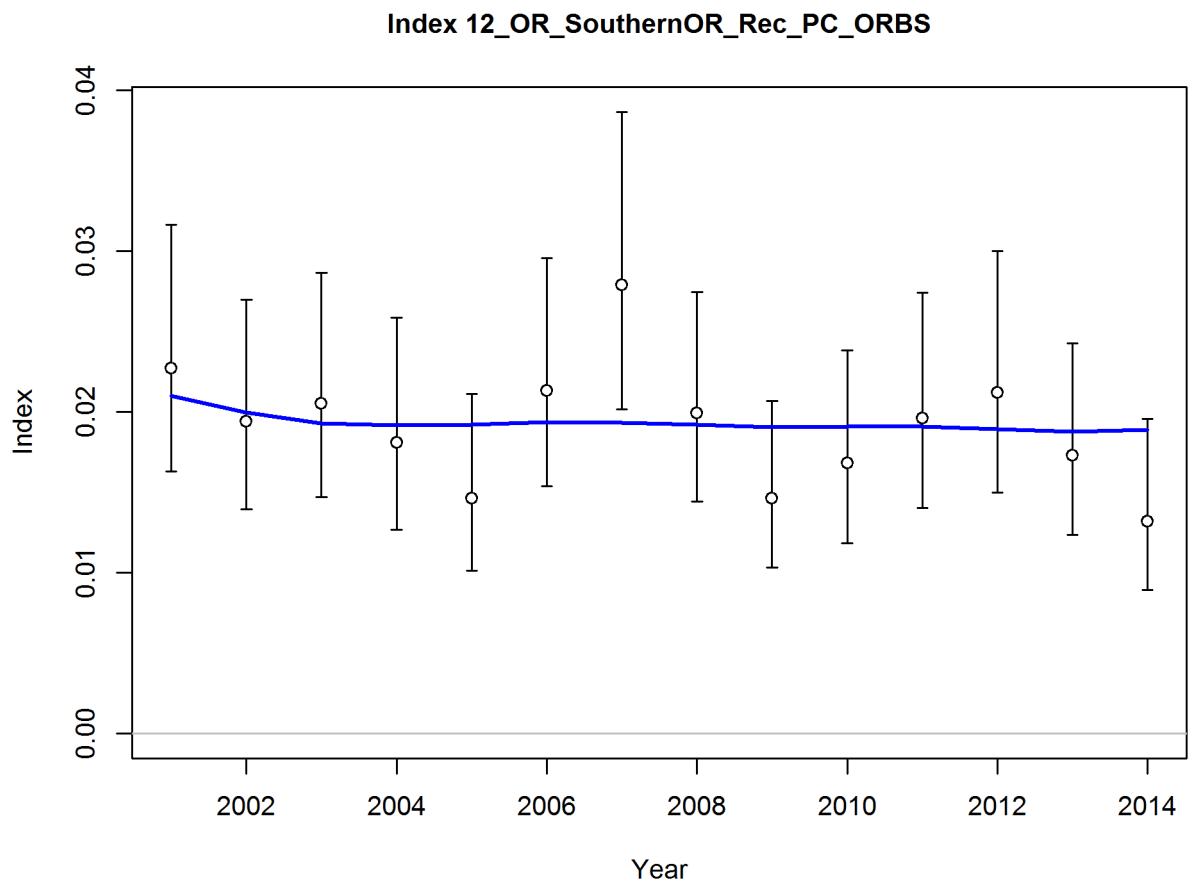


Figure 92: Fits to the northern Oregon recreational CPFV fleet ORBS dockside index for the central model.

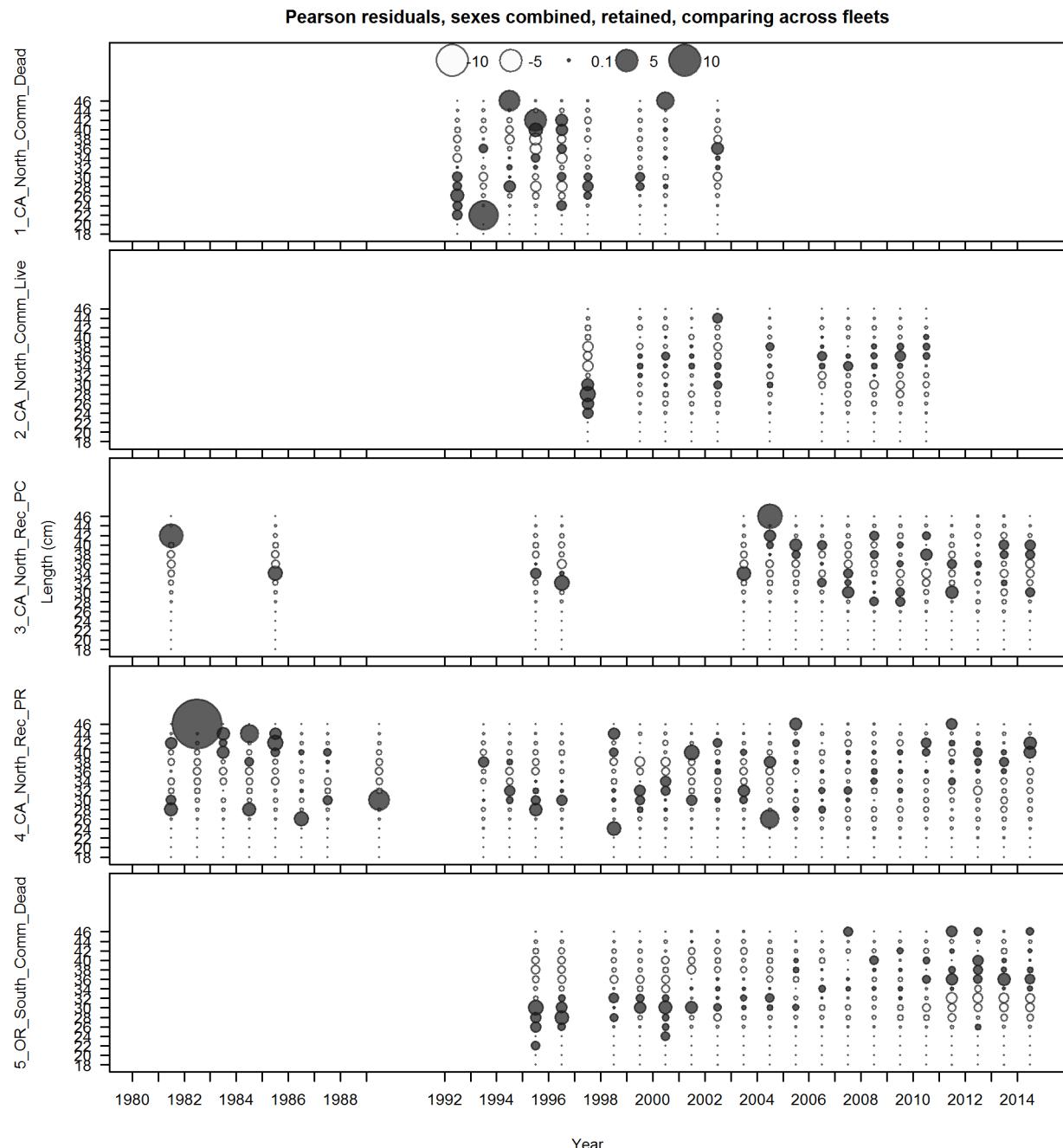


Figure 93: Residuals in fit to length compositions for northern model. Filled circles indicate observed values greater than expected, figure 1 of 2.

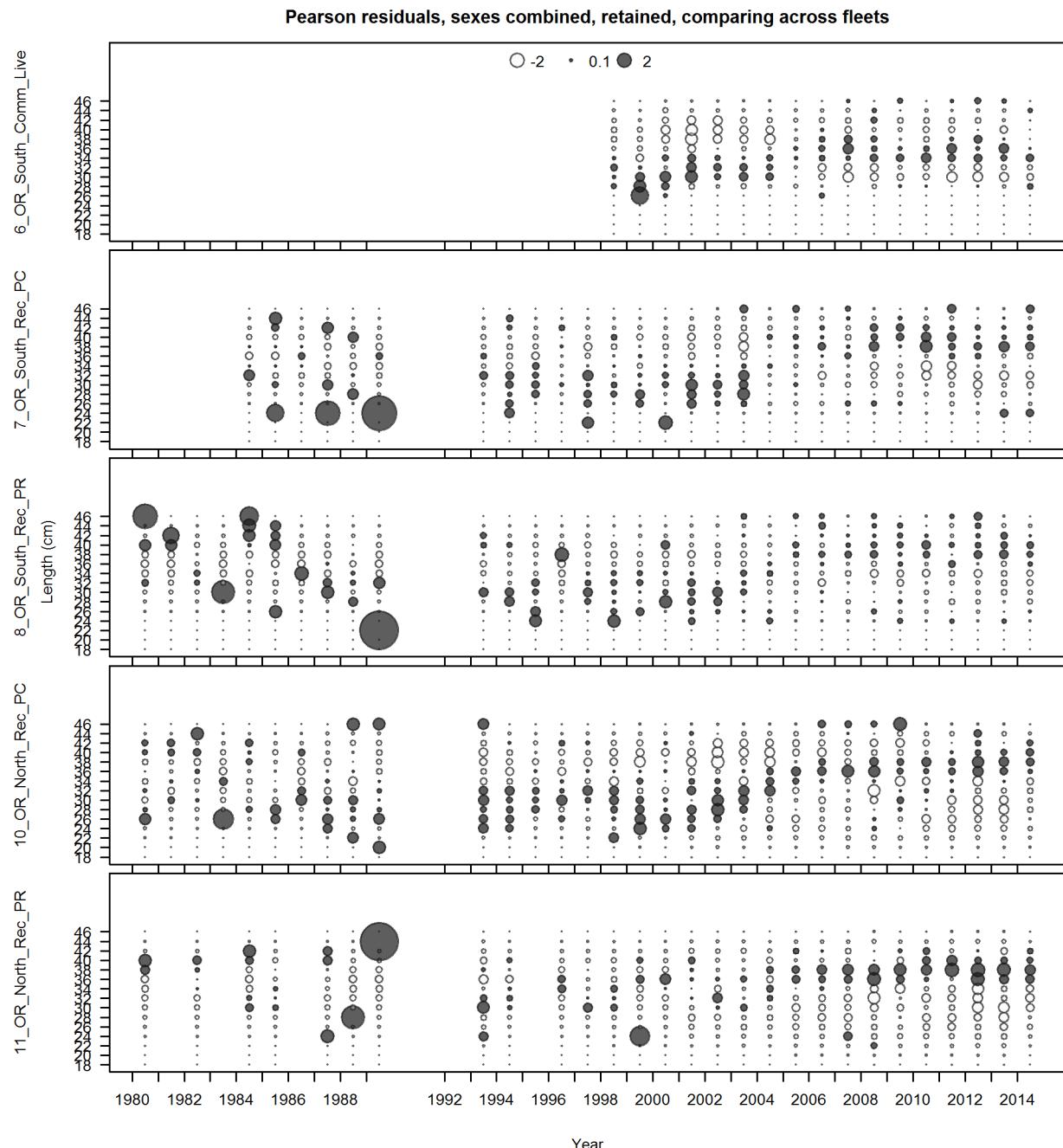


Figure 94: Residuals in fit to length compositions for northern model. Filled circles indicate observed values greater than expected values continued, figure 2 of 2.

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

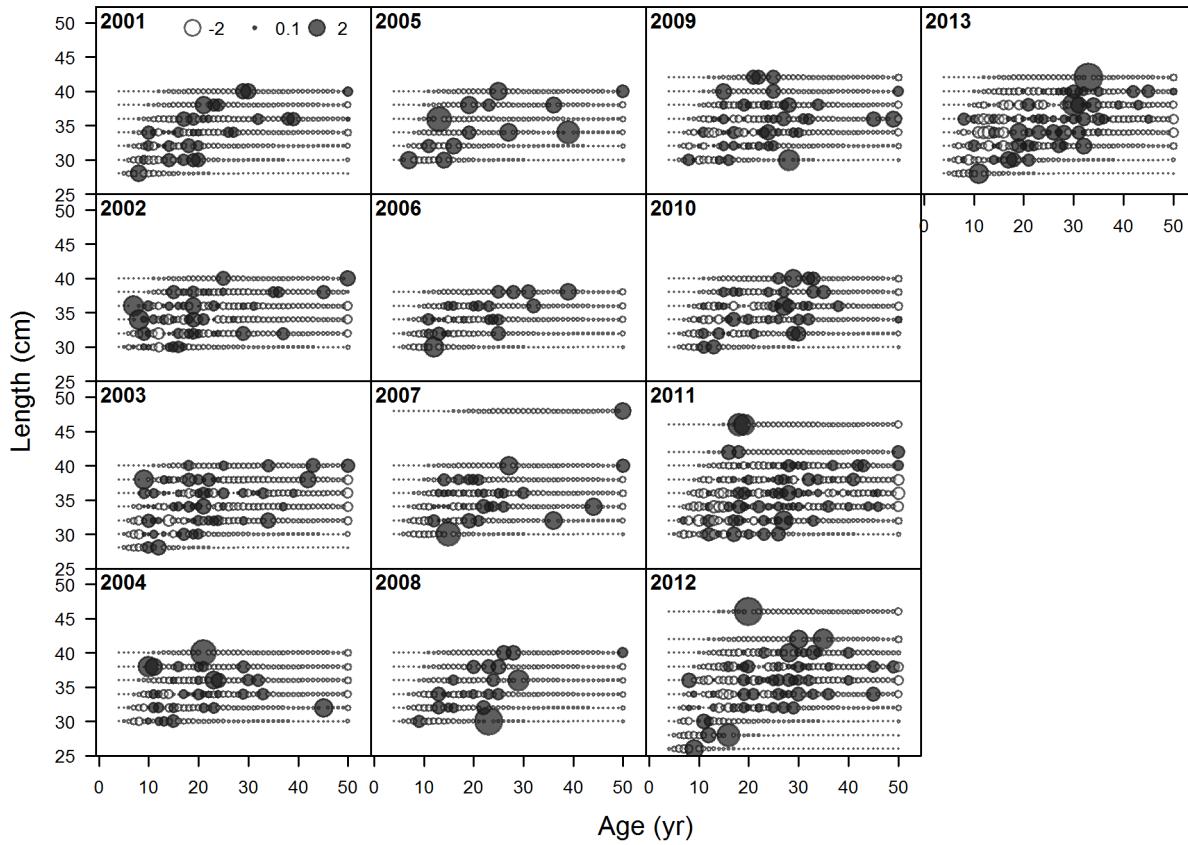


Figure 95: Residuals in fit to conditional age-at-length compositions for the commercial dead-fish fishery in southern OR in the central model. Filled circles indicate observed values greater than expected values.

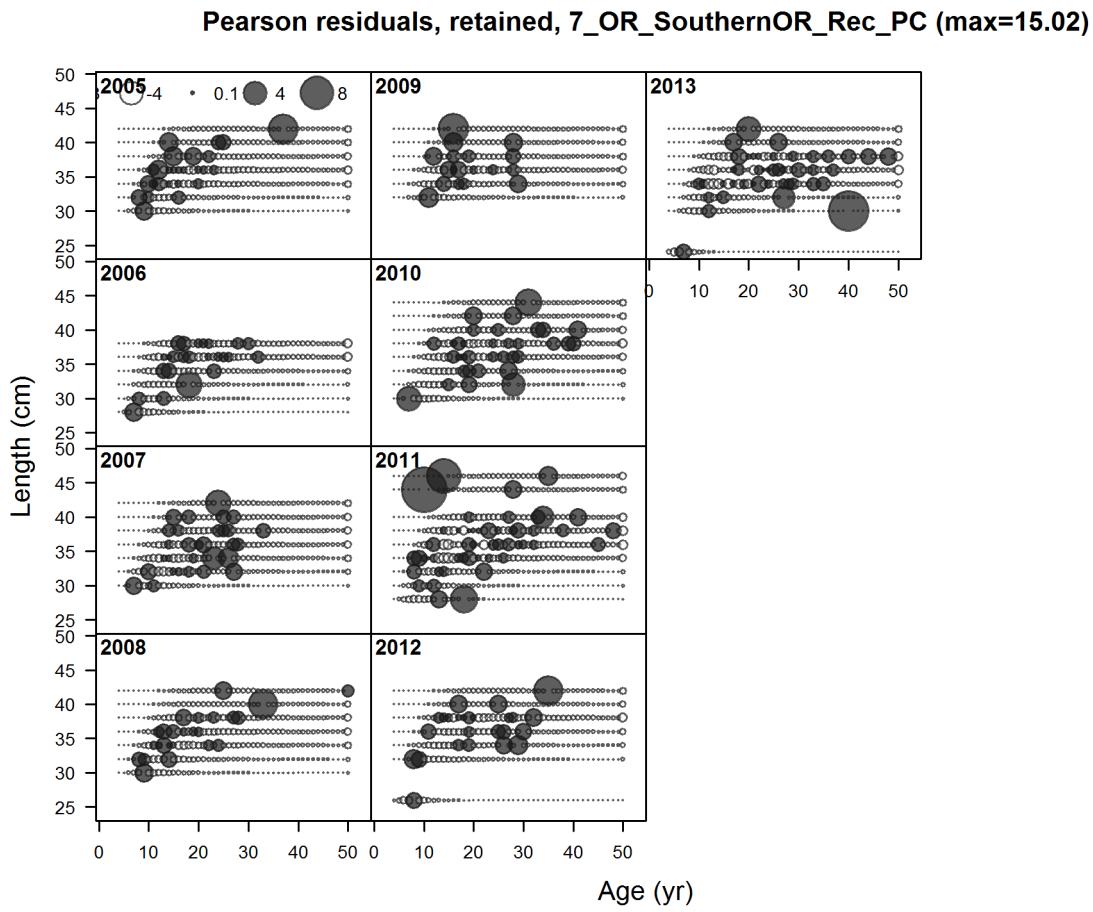


Figure 96: Residuals in fit to conditional age-at-length compositions for the recreational party/charter fishery in southern OR in the central model. Filled circles indicate observed values greater than expected values.

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

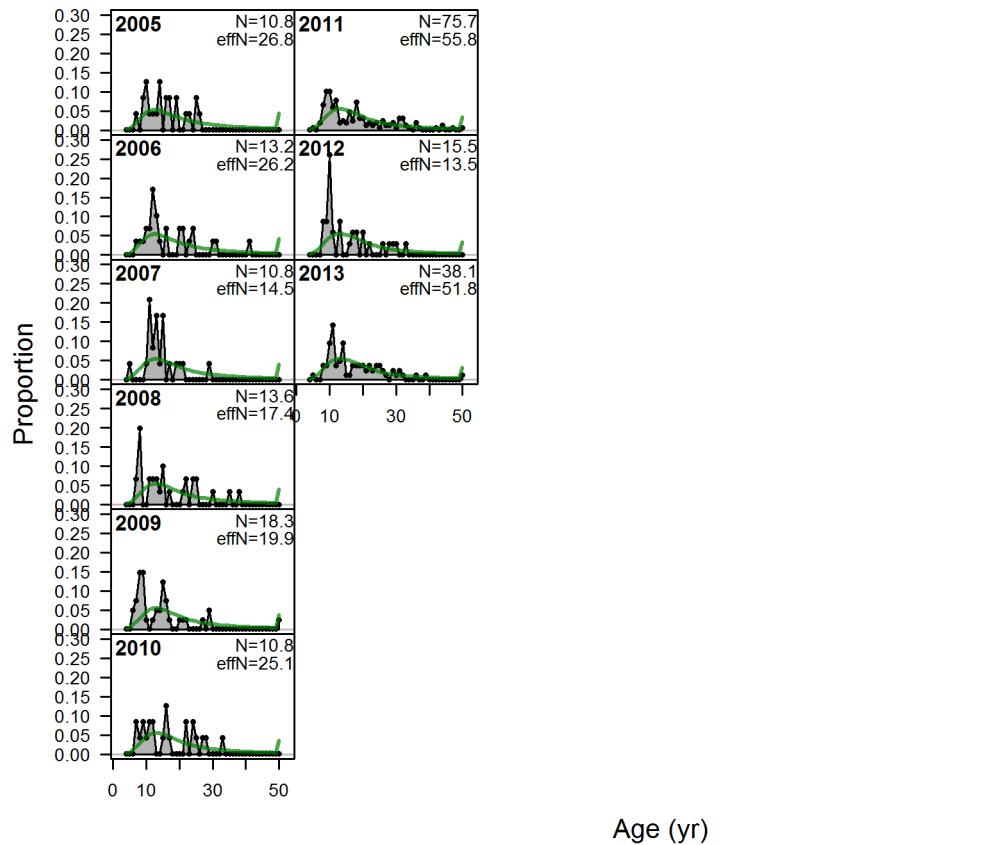


Figure 97: Fits to the marginal age composition for the northern OR recreational party/charter in the central model

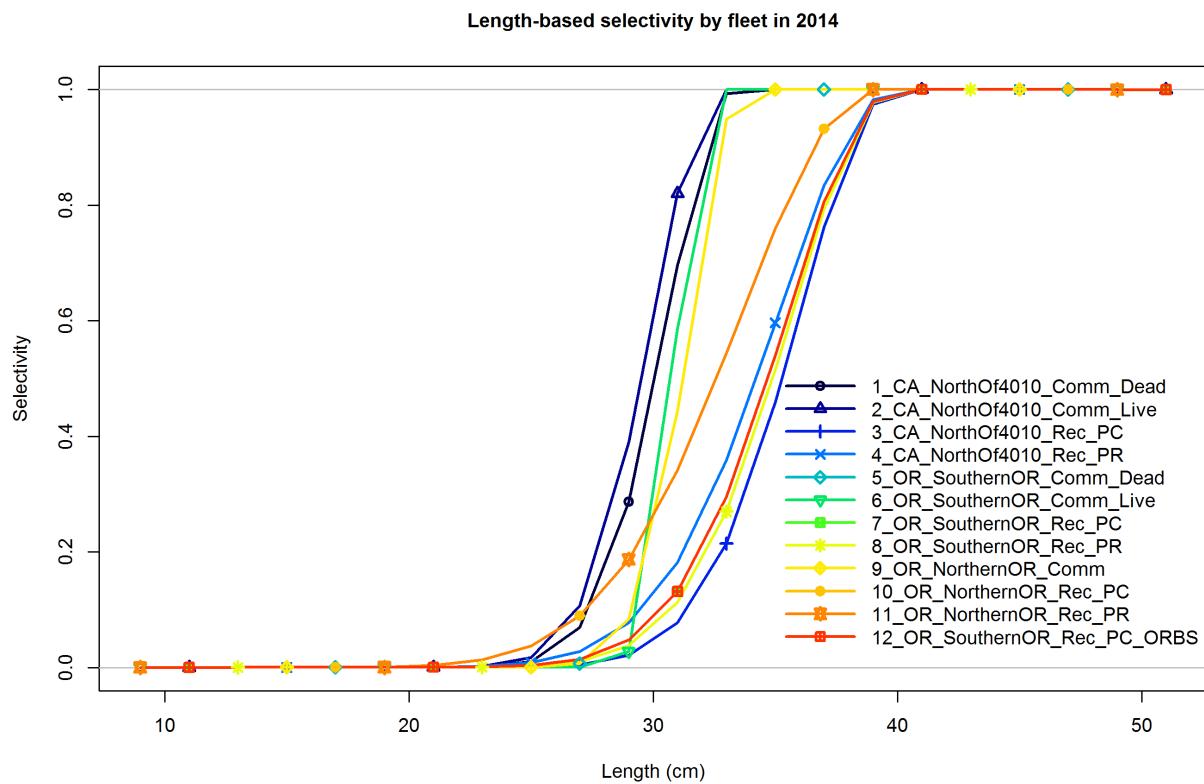


Figure 98: Length-based selectivity by fleet for the central model.

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

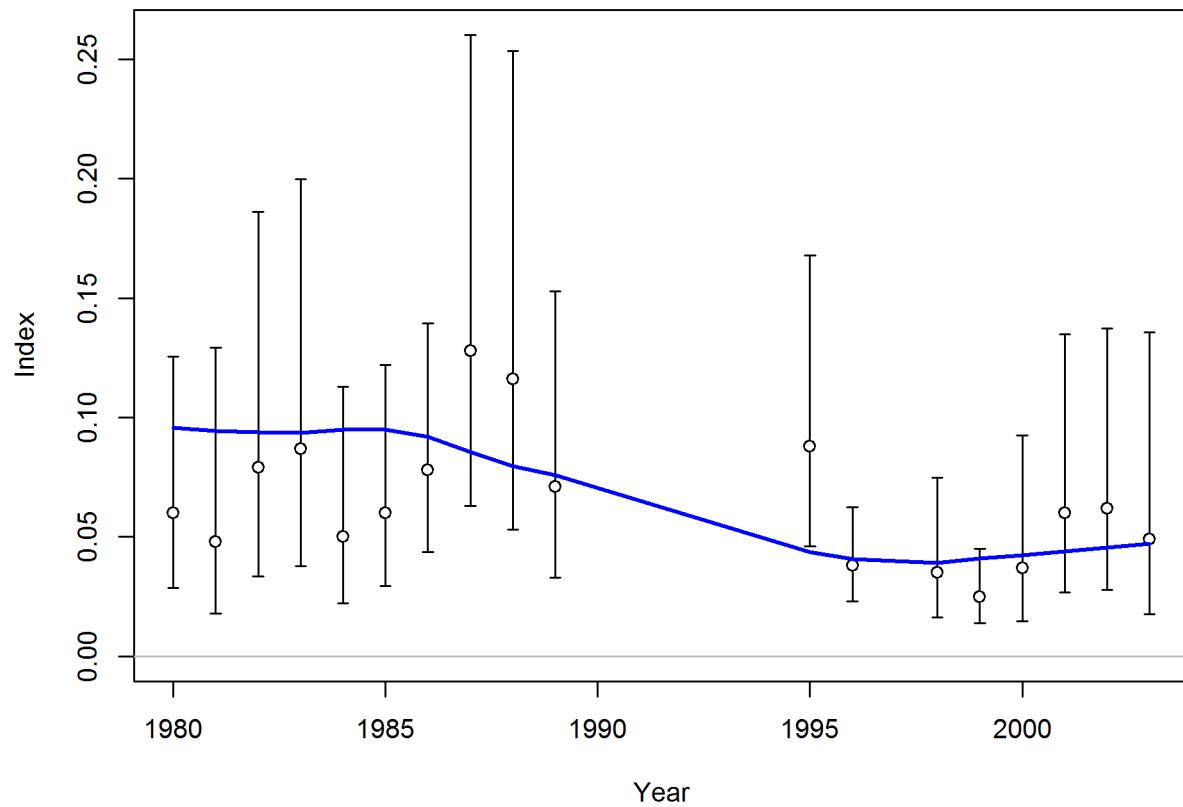


Figure 99: Fits to the CA recreational CPFV fleet dockside index for the southern model.

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

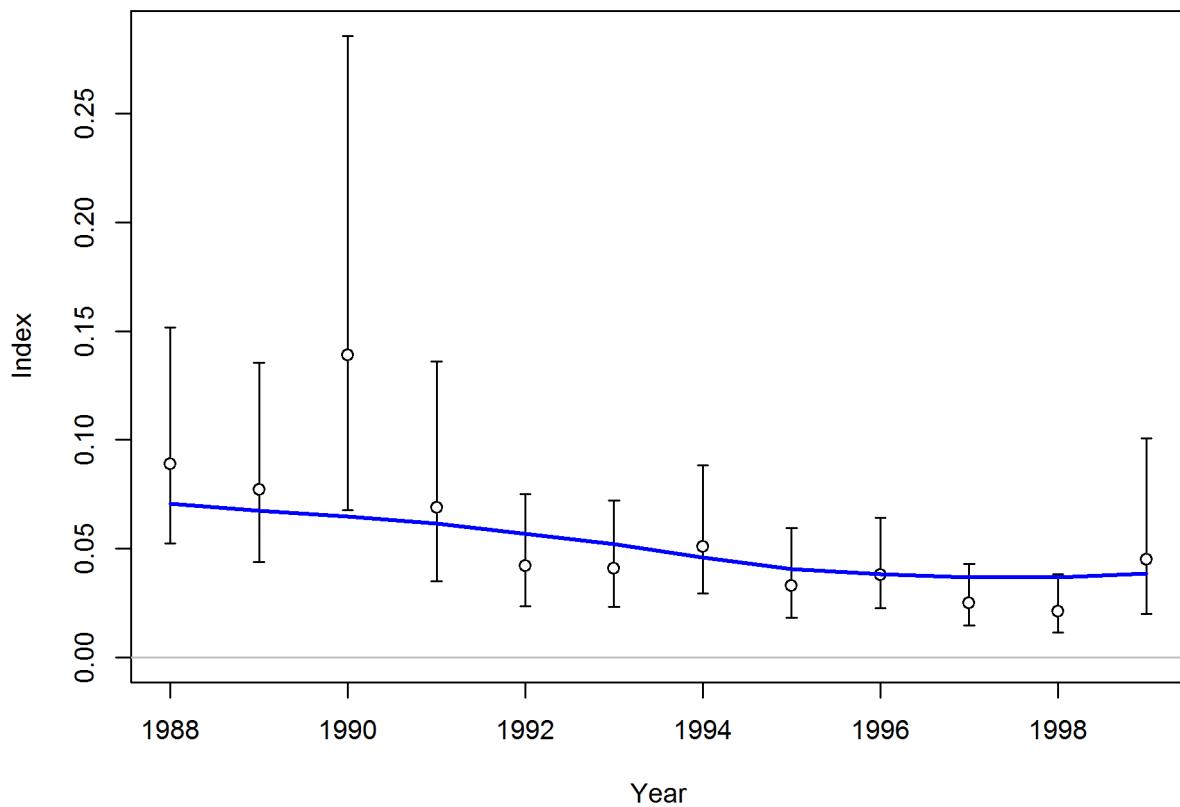


Figure 100: Fits to the CA recreational CPFV fleet 1988-1999 onboard observer index for the southern model.

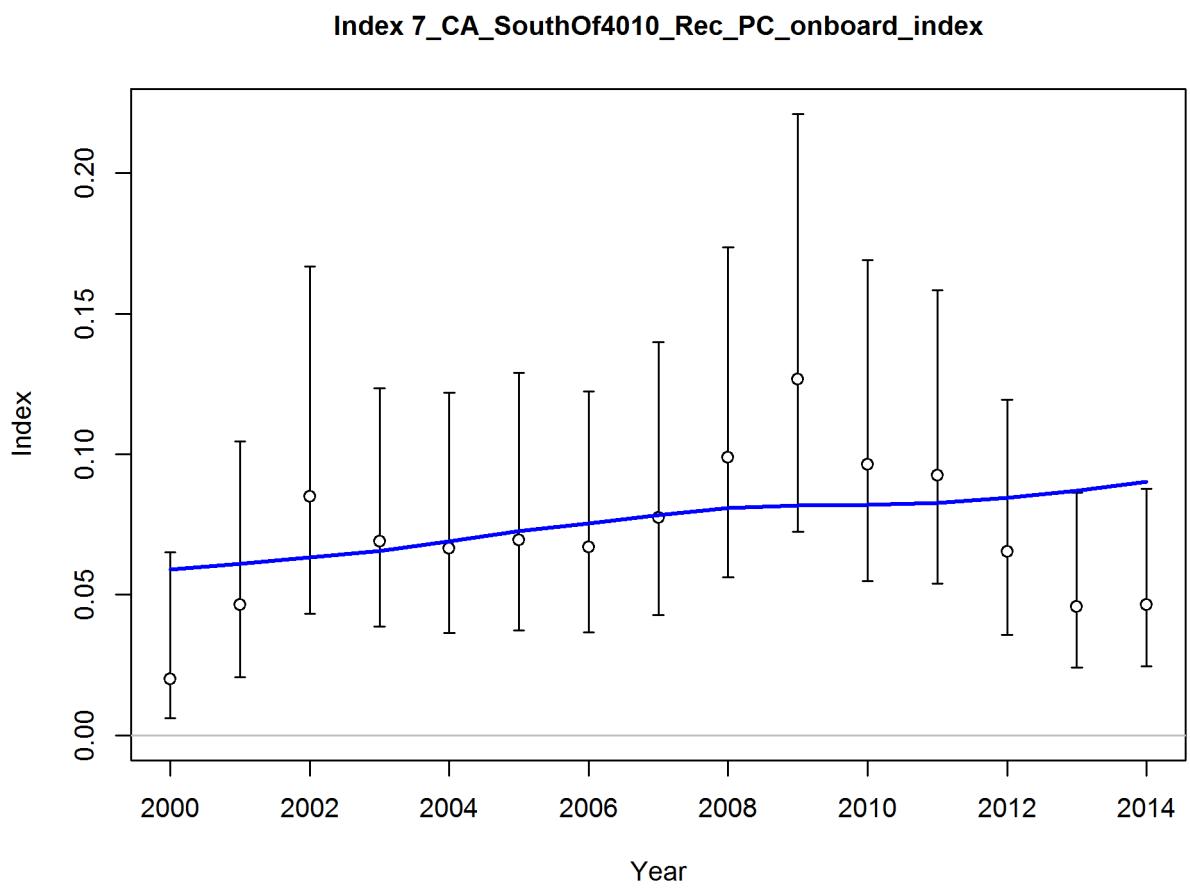


Figure 101: Fits to the CA recreational CPFV fleet 2000-2014 onboard observer index for the southern model.

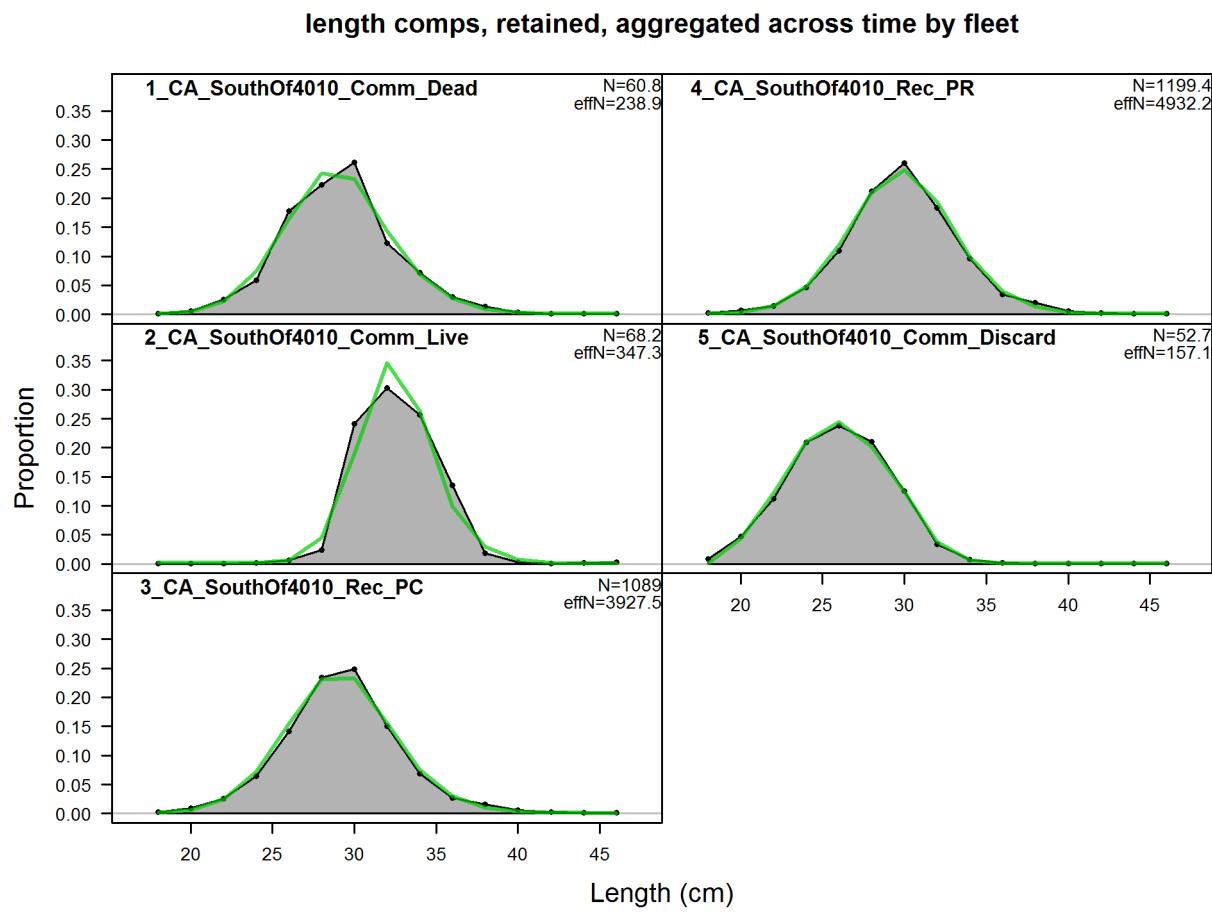
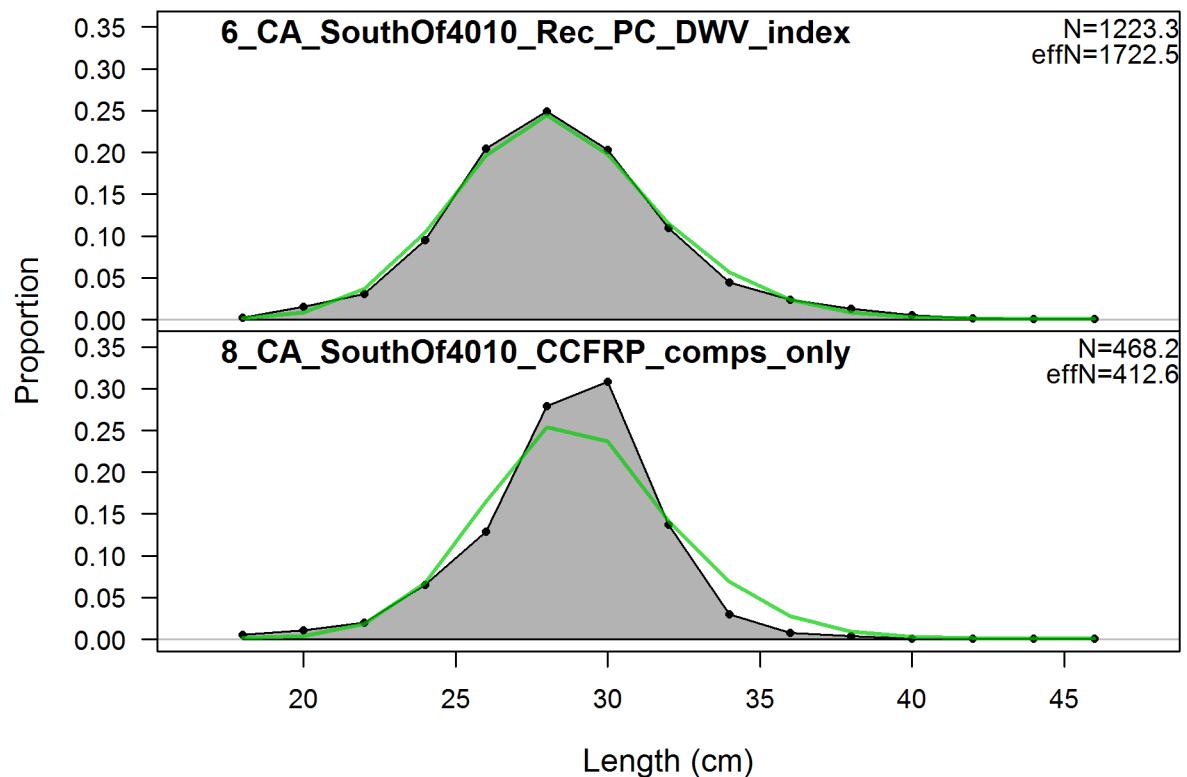


Figure 102: Fits to the length compositions from fleets in the southern model.

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



2748

2749 →

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

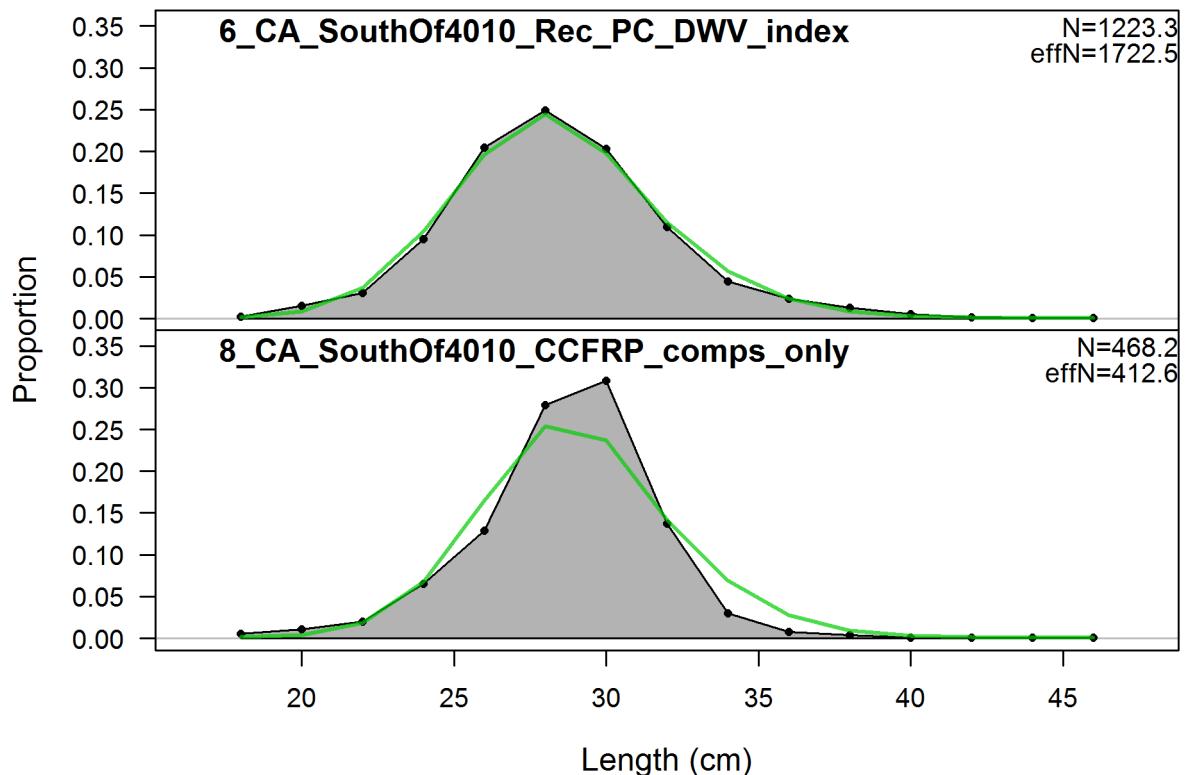


Figure 103: Fits to the length compositions of the central California 1988-1999 onboard observer and CCFRP surveys in the southern model.

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

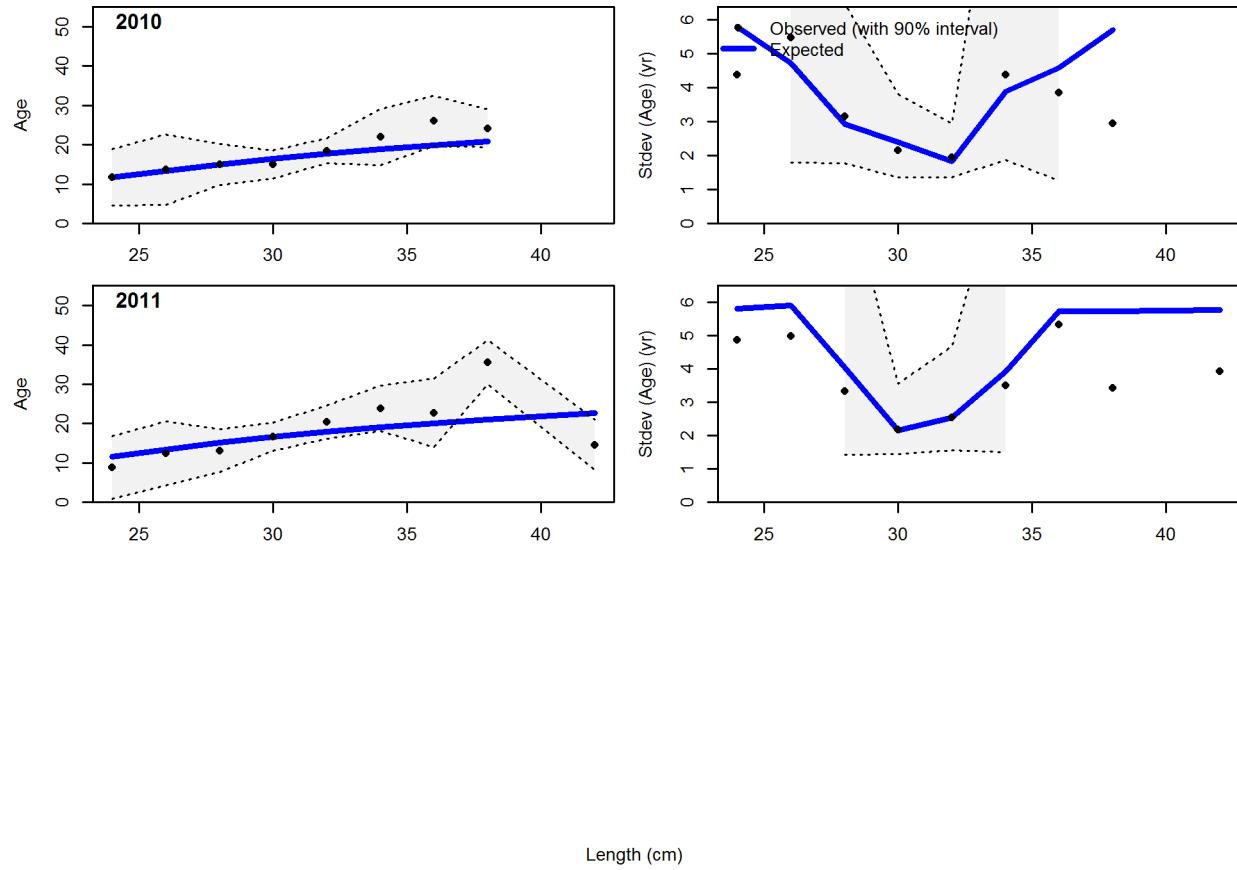


Figure 104: Fits to the conditional age-at-length data from Jeff Abrams' thesis, southern model.

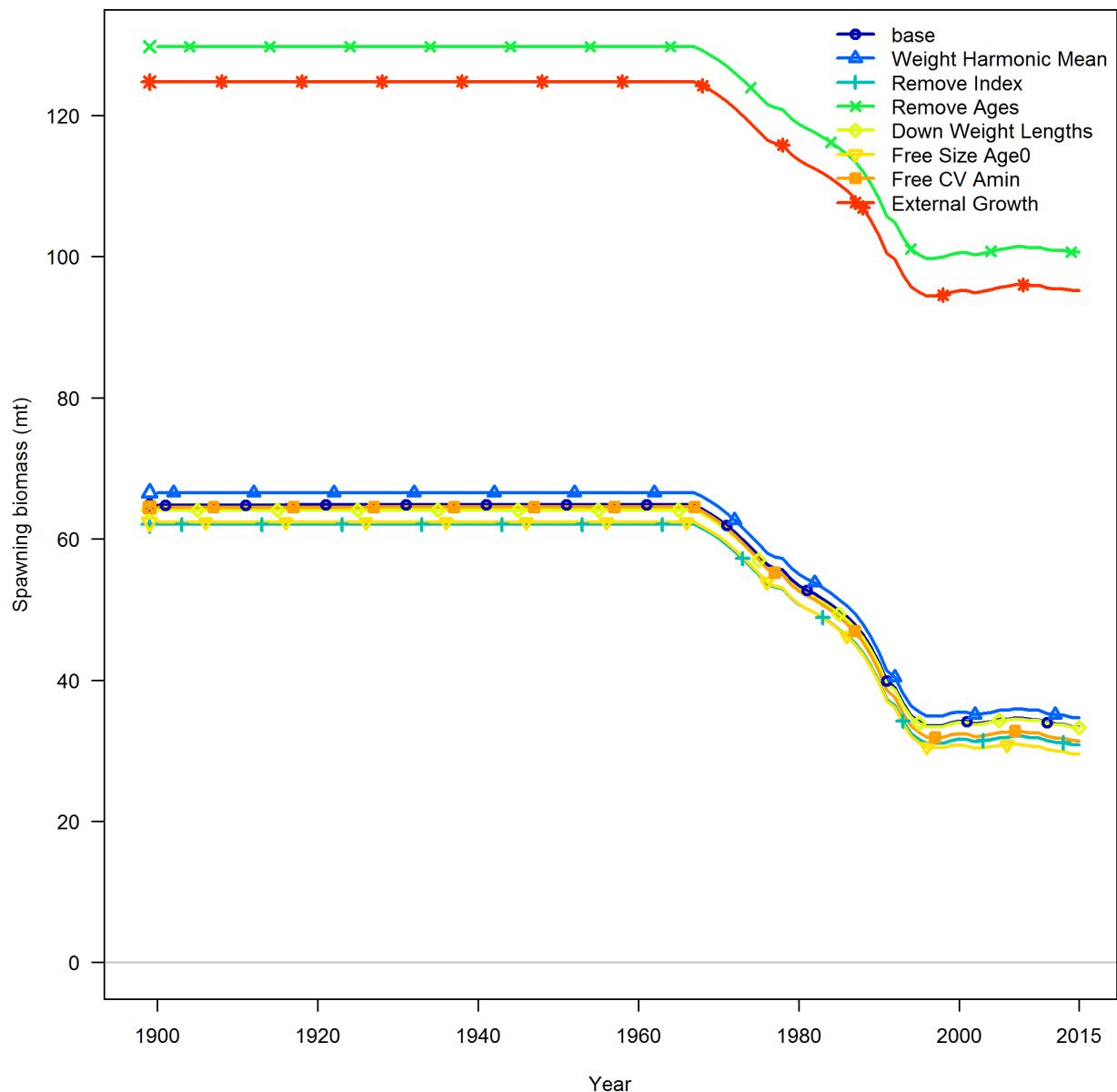


Figure 105: Sensitivity of the spawning biomass to dropping a single data type from the northern model.

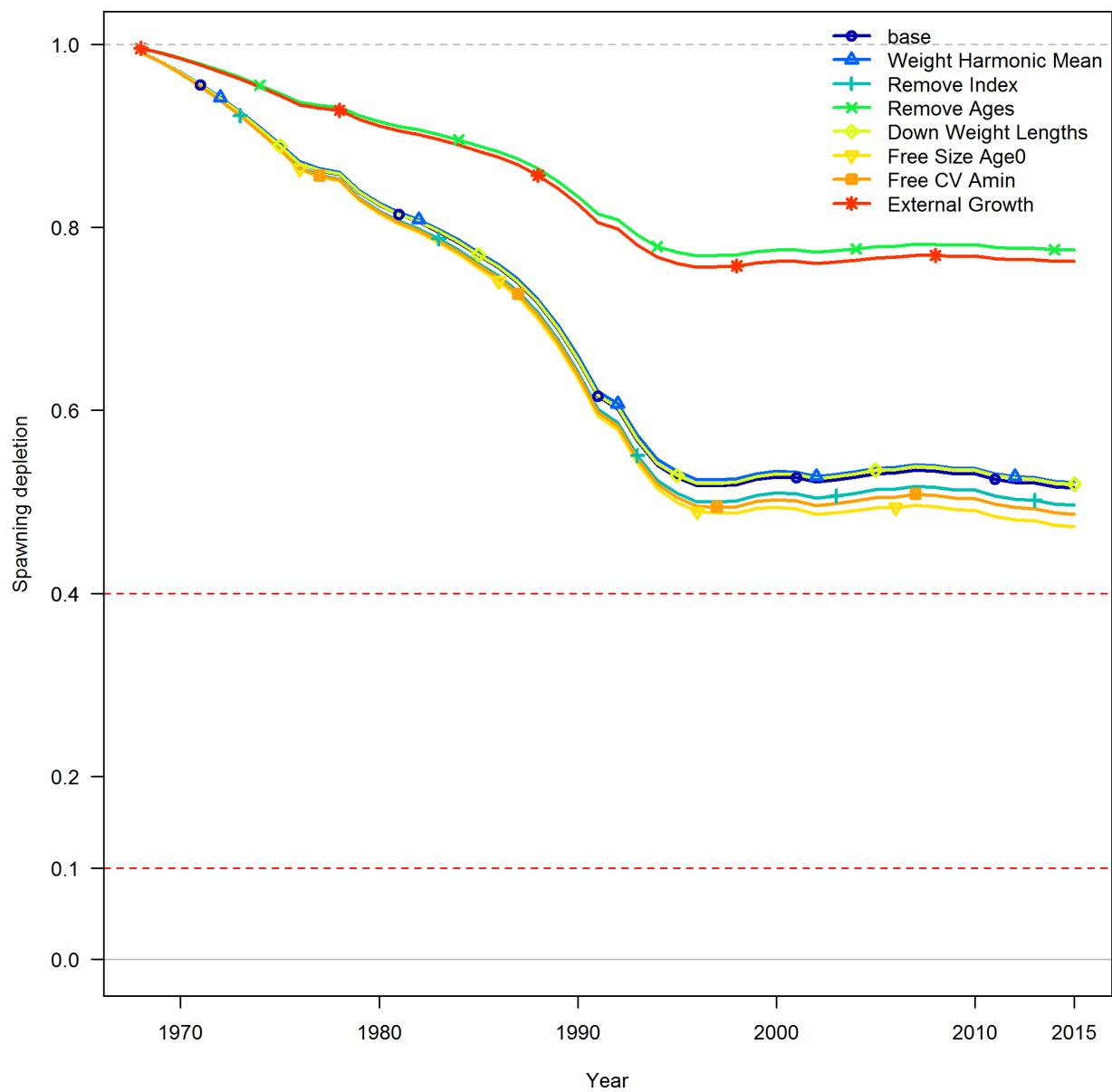


Figure 106: Sensitivity of the relative spawning biomass to dropping a single data type from the northern model.

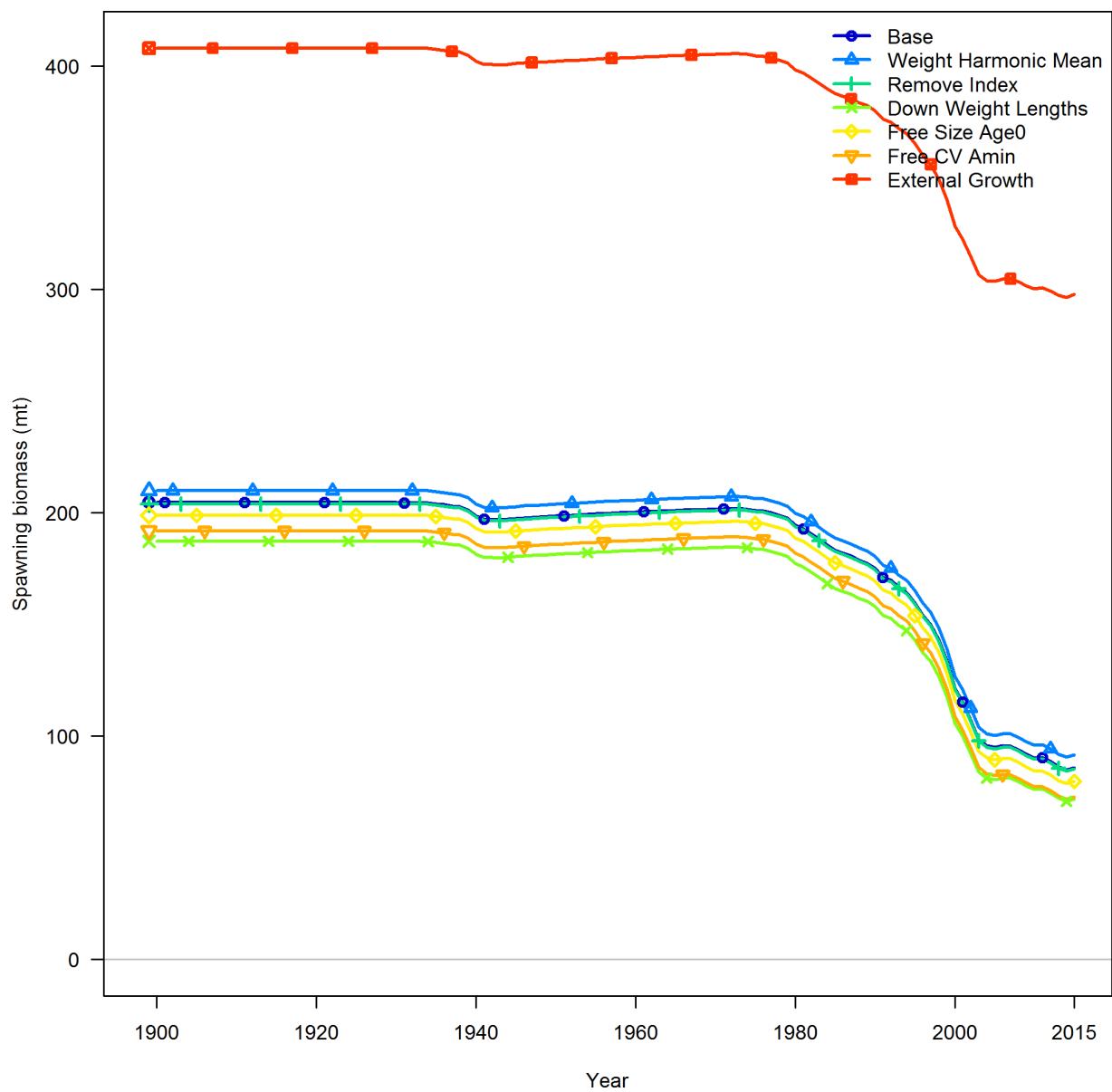


Figure 107: Sensitivity of the spawning biomass to dropping a single data type from the central model.

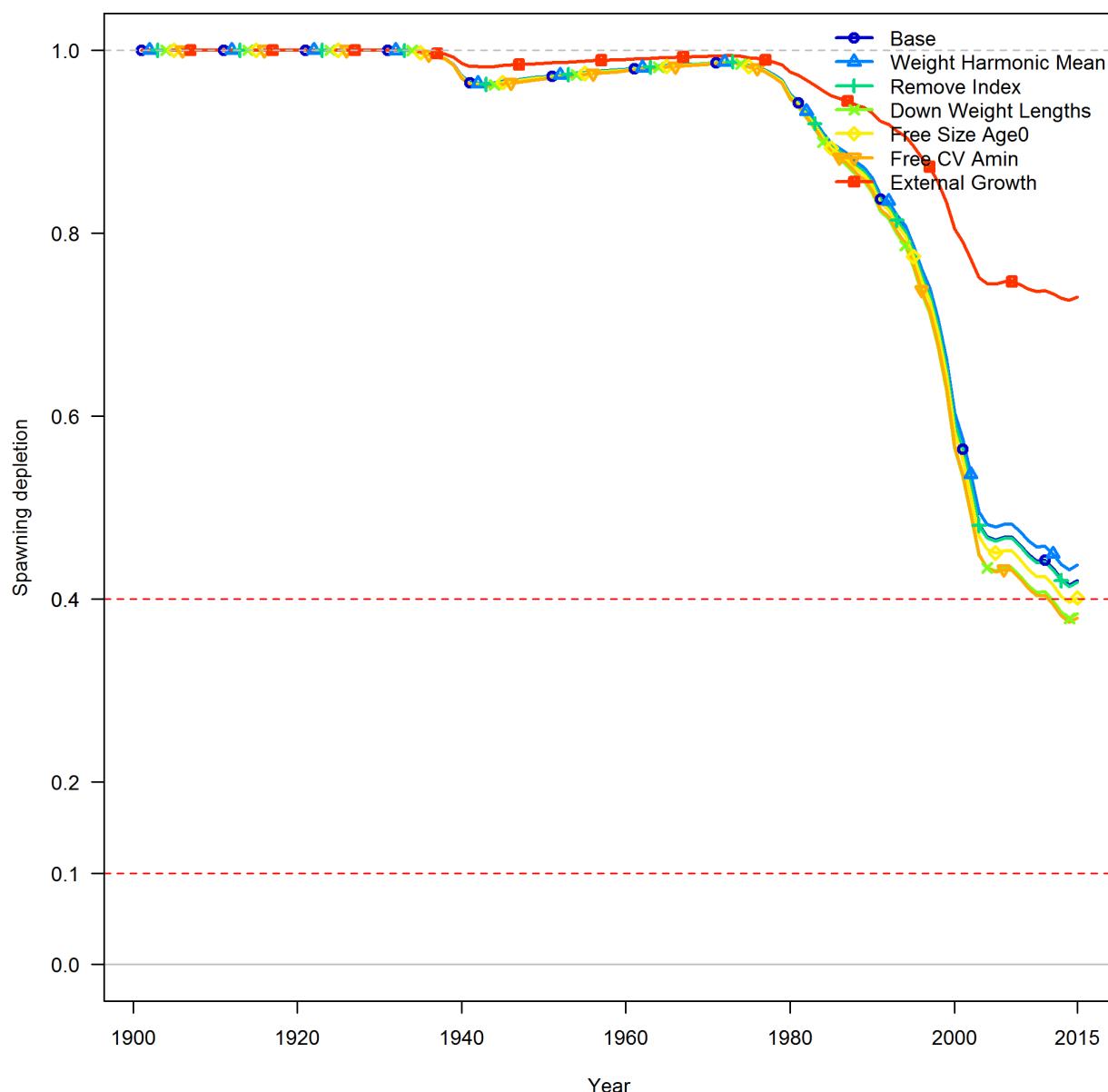


Figure 108: Sensitivity of the relative spawning biomass to dropping a single data type from the central model.

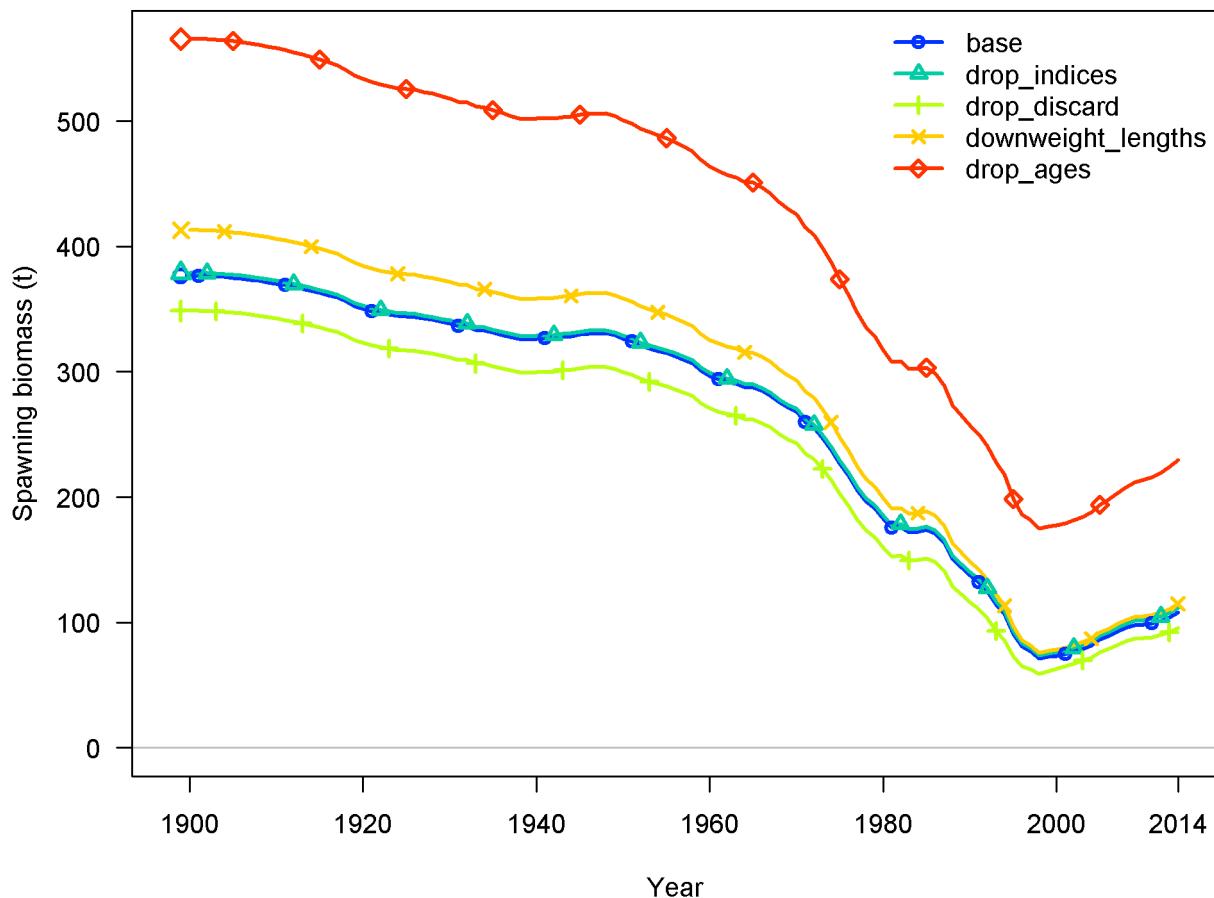


Figure 109: Sensitivity of the spawning biomass to dropping a single data type from the southern model.

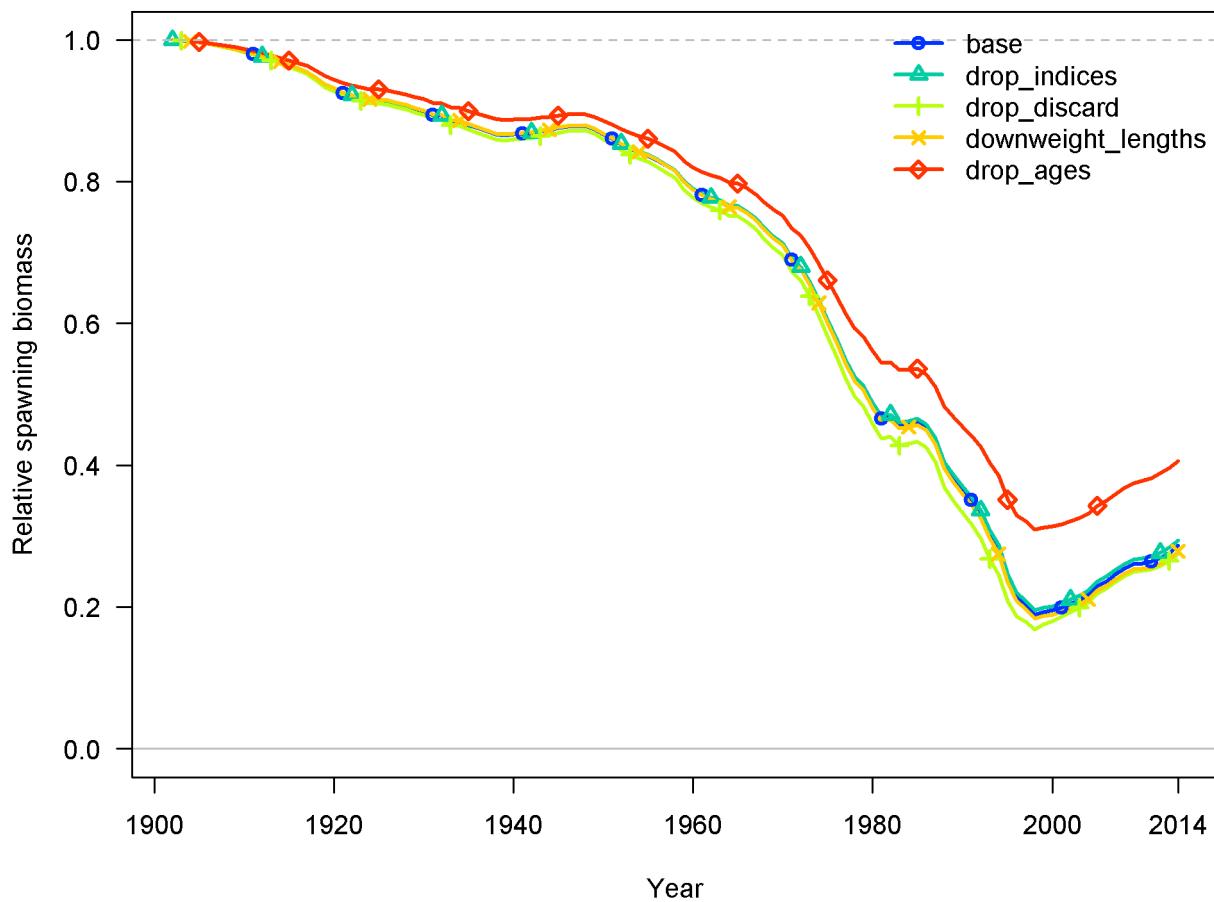


Figure 110: Sensitivity of the relative spawning biomass to dropping a single data type from the southern model.

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

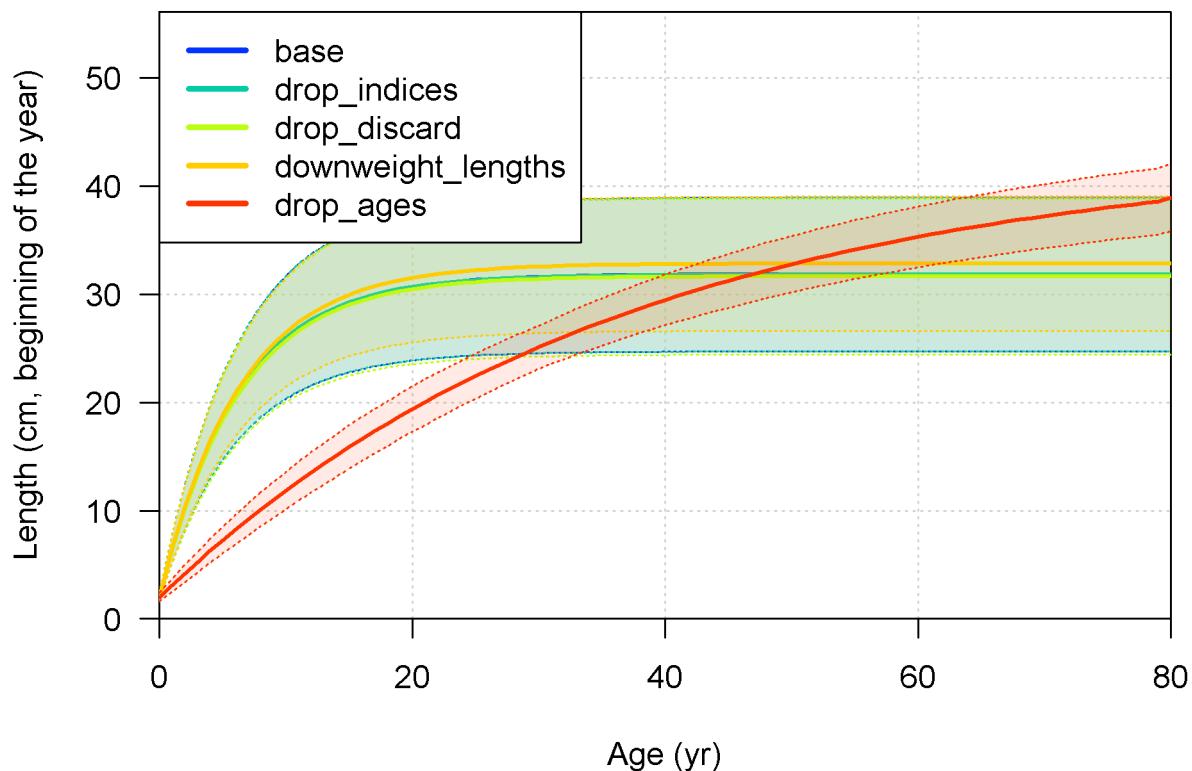


Figure 111: Sensitivity of removal of marginal age composition data and conditional age-at-length data from the southern model.

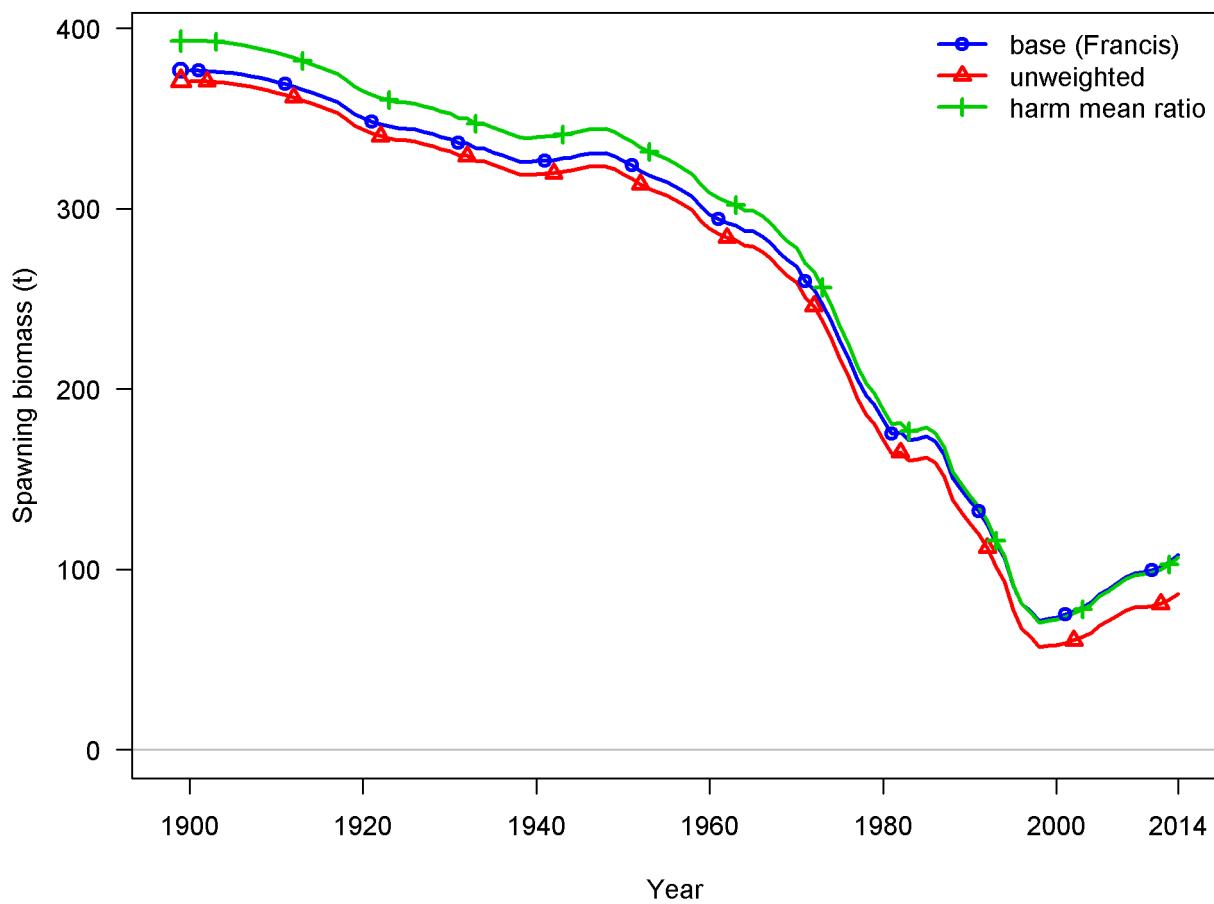


Figure 112: Sensitivity of the spawning biomass to the method of data weighting in the southern model.

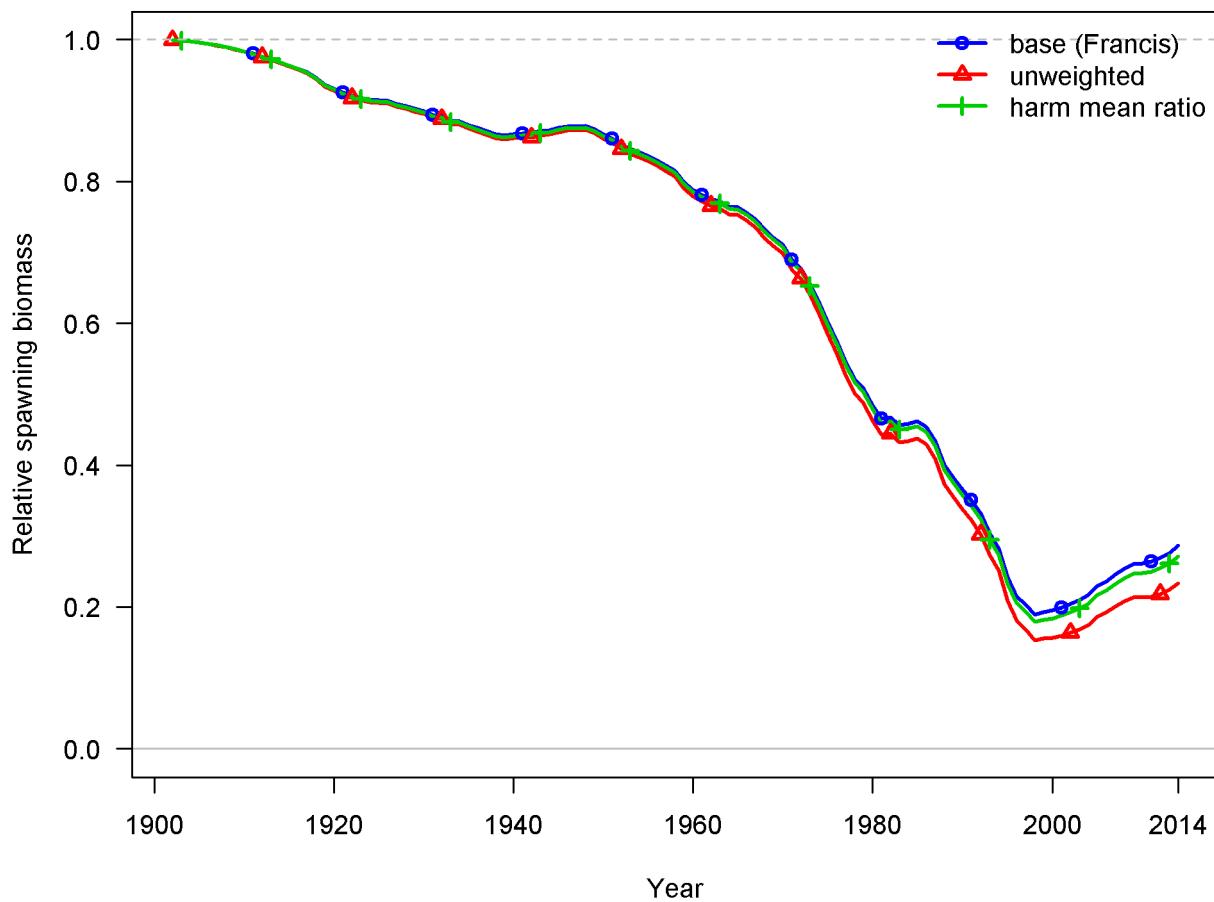


Figure 113: Sensitivity of the relative spawning biomass to the method of data weighting in the southern model.

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

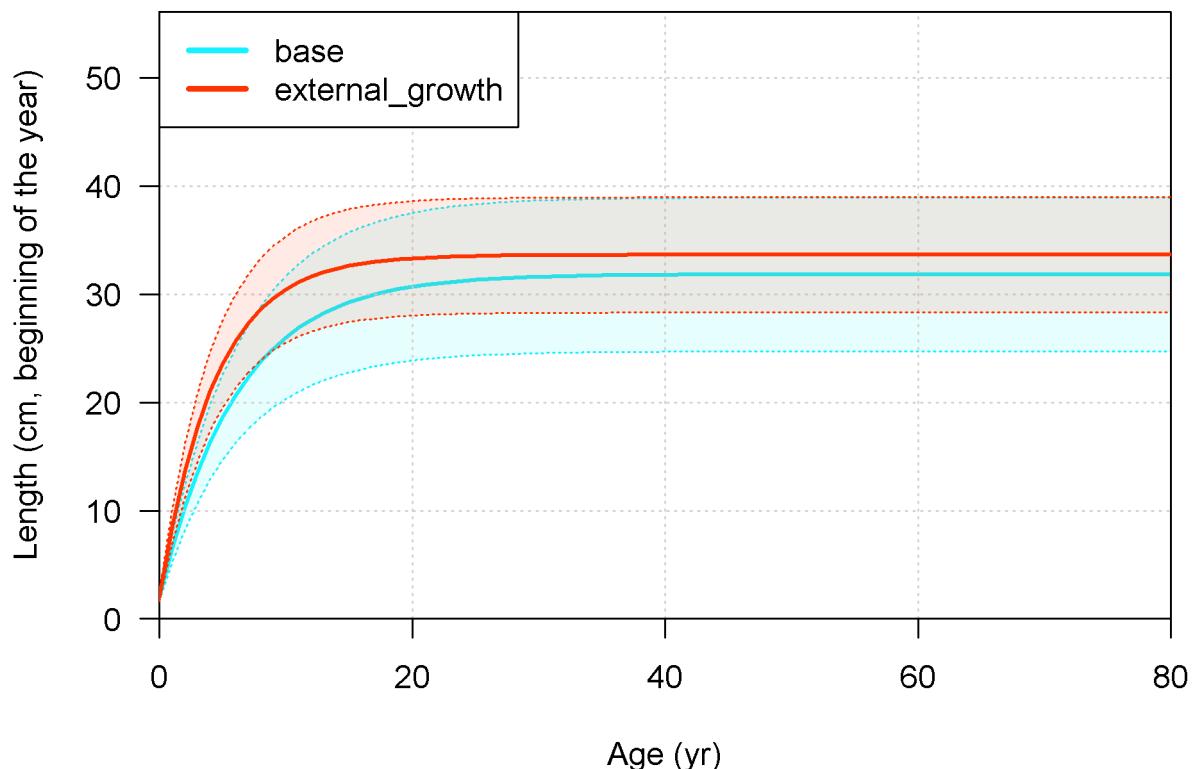


Figure 114: Sensitivity of the model to fixing growth parameters to external estimates in the southern model.

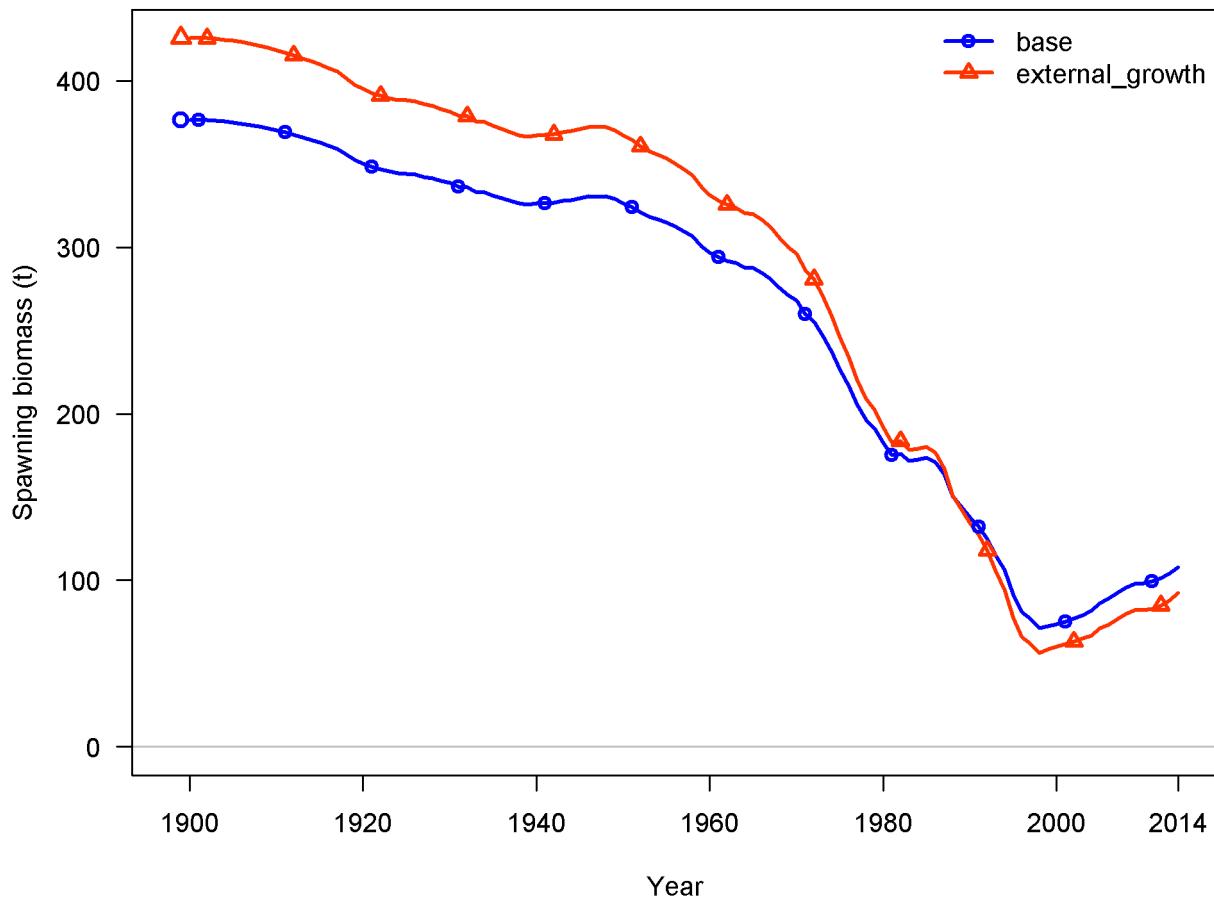


Figure 115: Sensitivity of the spawning biomass to fixing growth parameters to external estimates in the southern model.

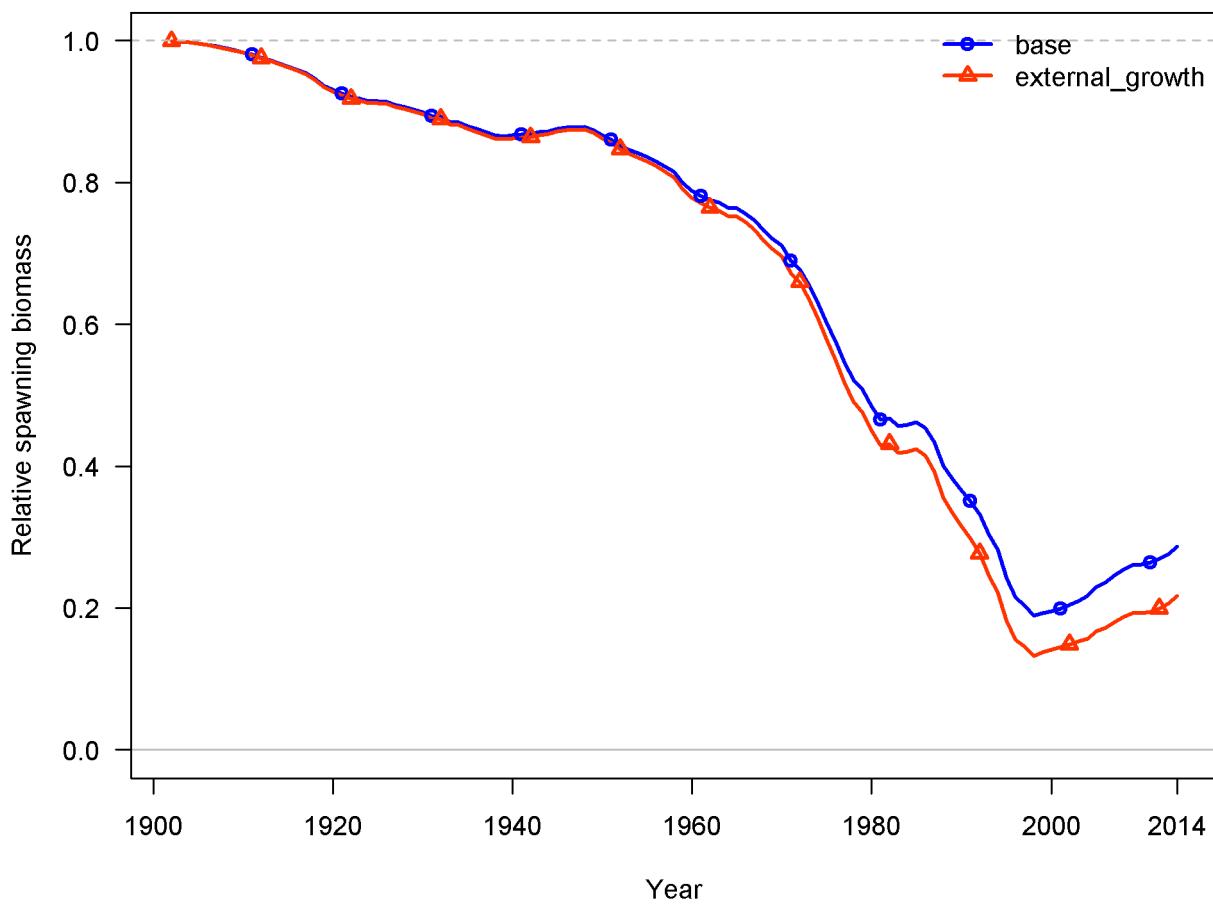


Figure 116: Sensitivity of the relative spawning biomass to fixing growth parameters to external estimates in the southern model.

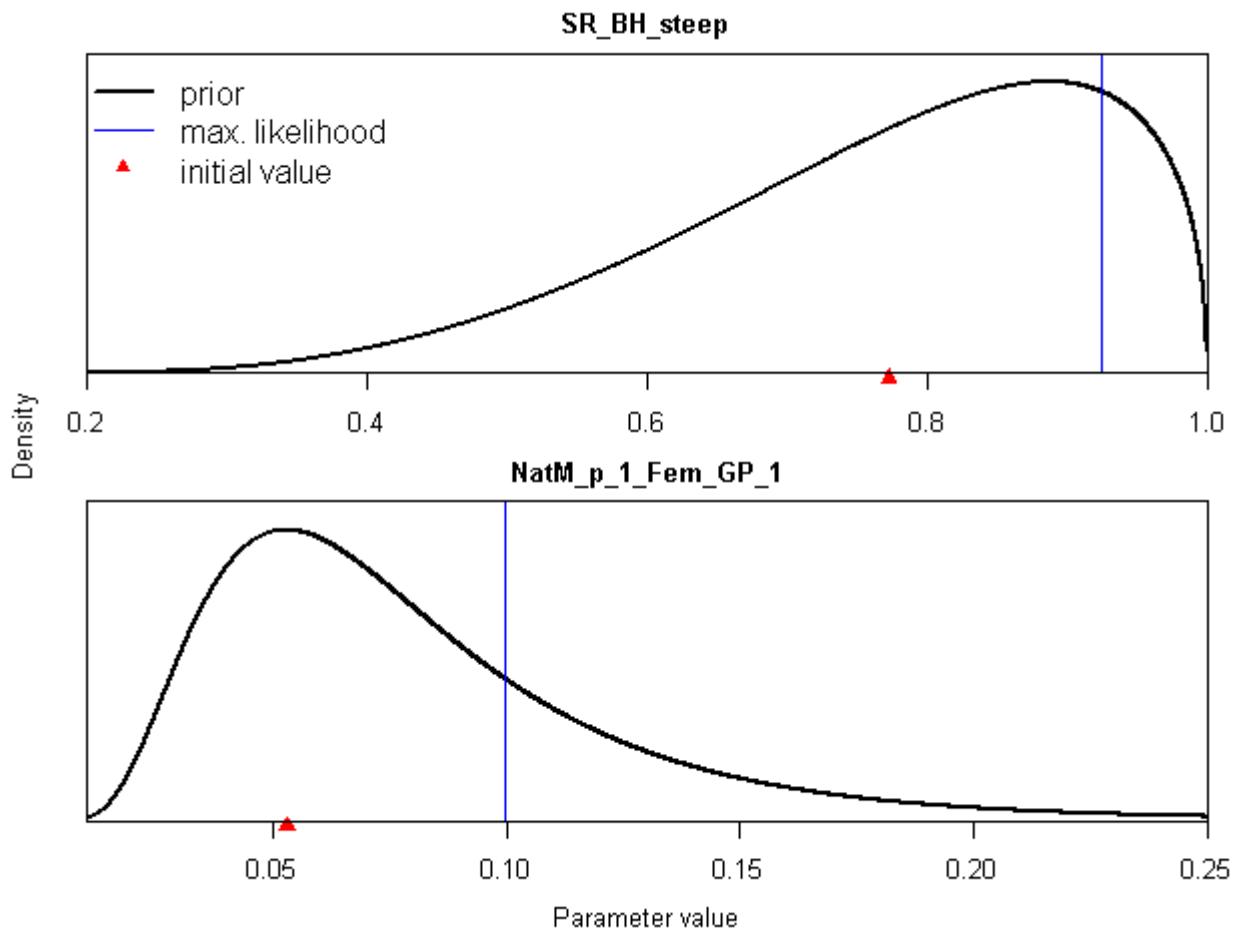


Figure 117: Prior distributions for stock-recruit steepness (upper panel) and natural mortality (lower panel). Fixed values used in all three base models are indicated by the red triangles. Blue vertical lines show estimates of these parameters from a southern model sensitivity analysis in which these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

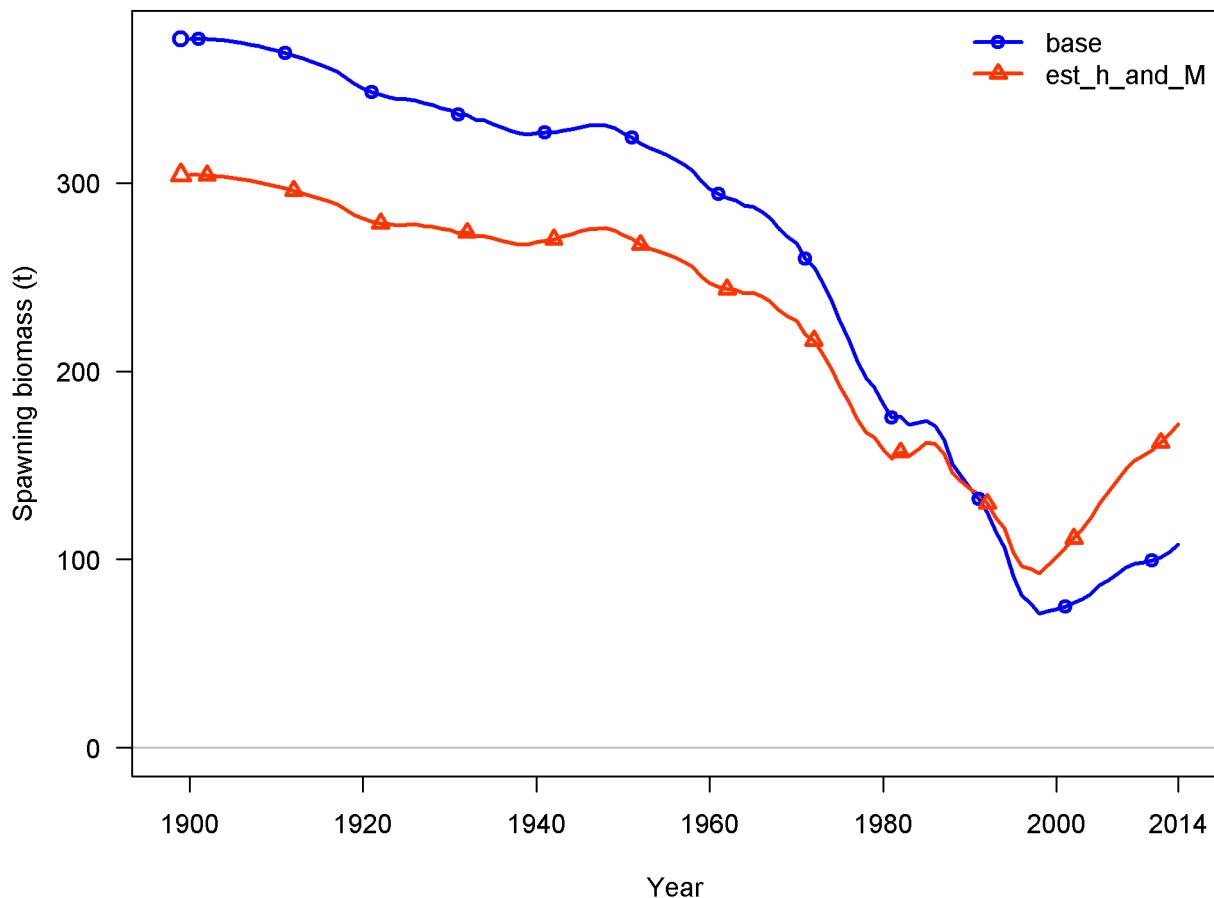


Figure 118: Sensitivity of spawning biomass to fixed versus estimated values of steepness and natural mortality to estimated values in the southern model.

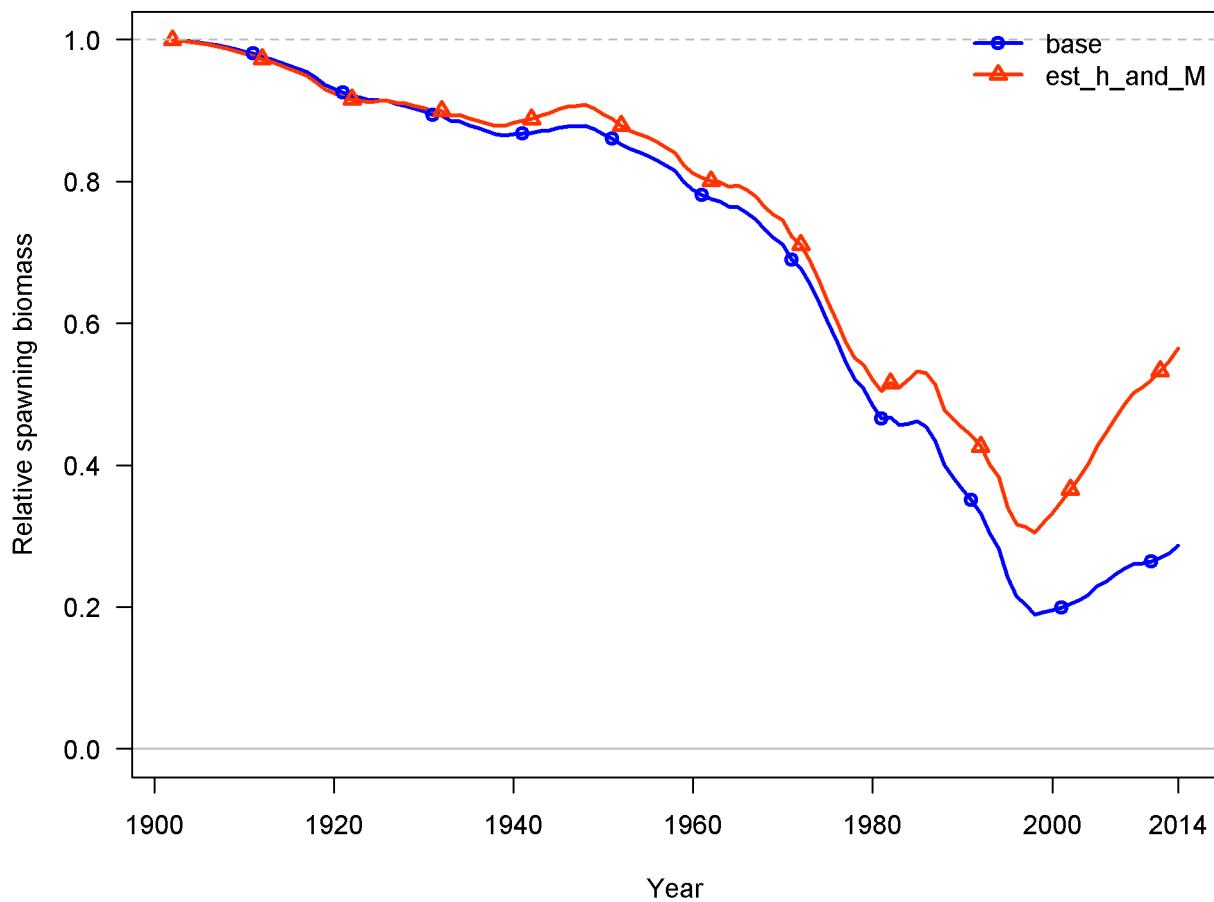


Figure 119: Sensitivity of relative spawning biomass to fixed versus estimated values of steepness and natural mortality to estimated values in the southern model.

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

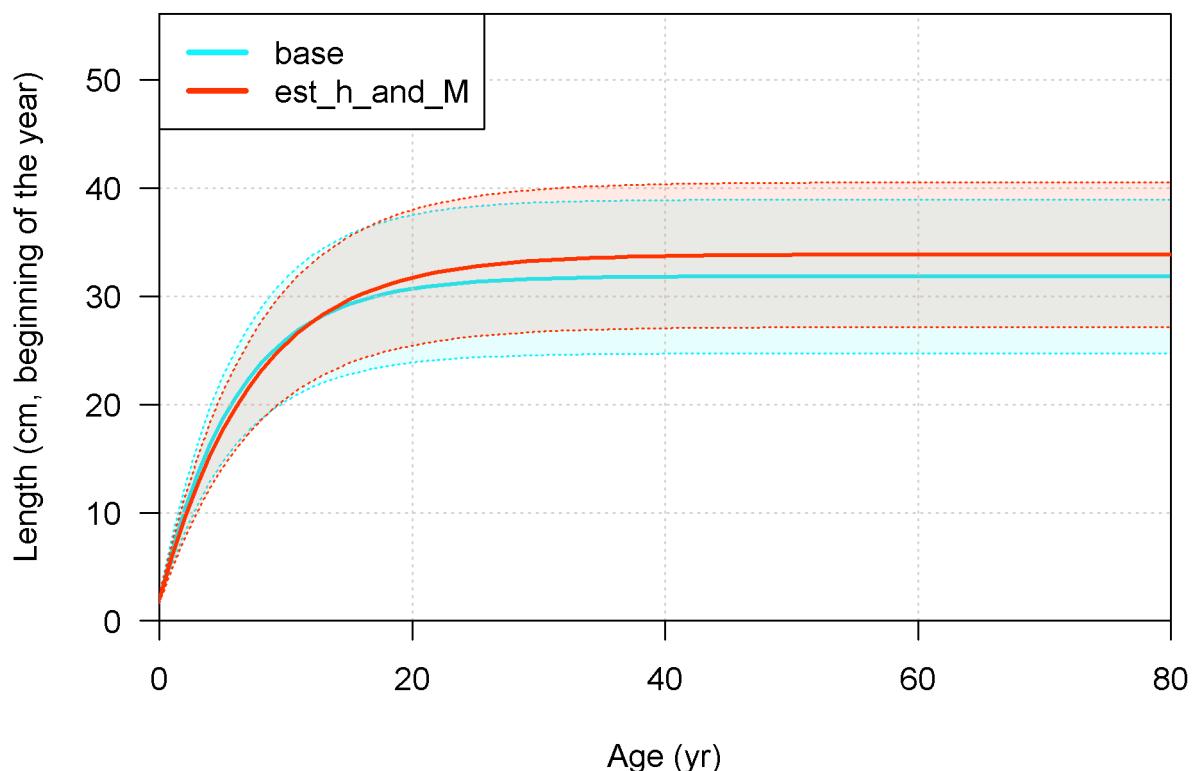


Figure 120: Sensitivity of growth to fixed versus estimated values of steepness and natural mortality to estimated values in the southern model.

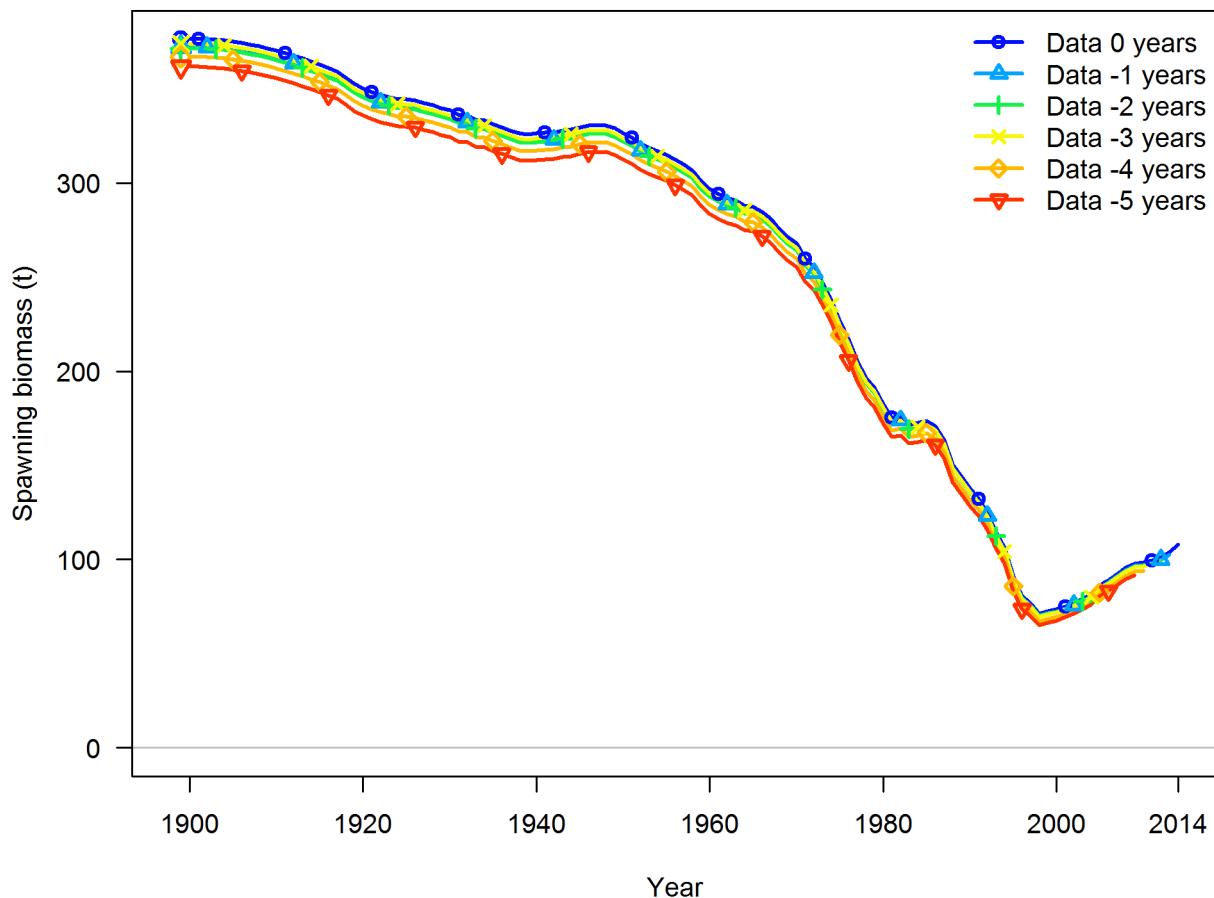


Figure 121: Retrospective analyses for the southern model.

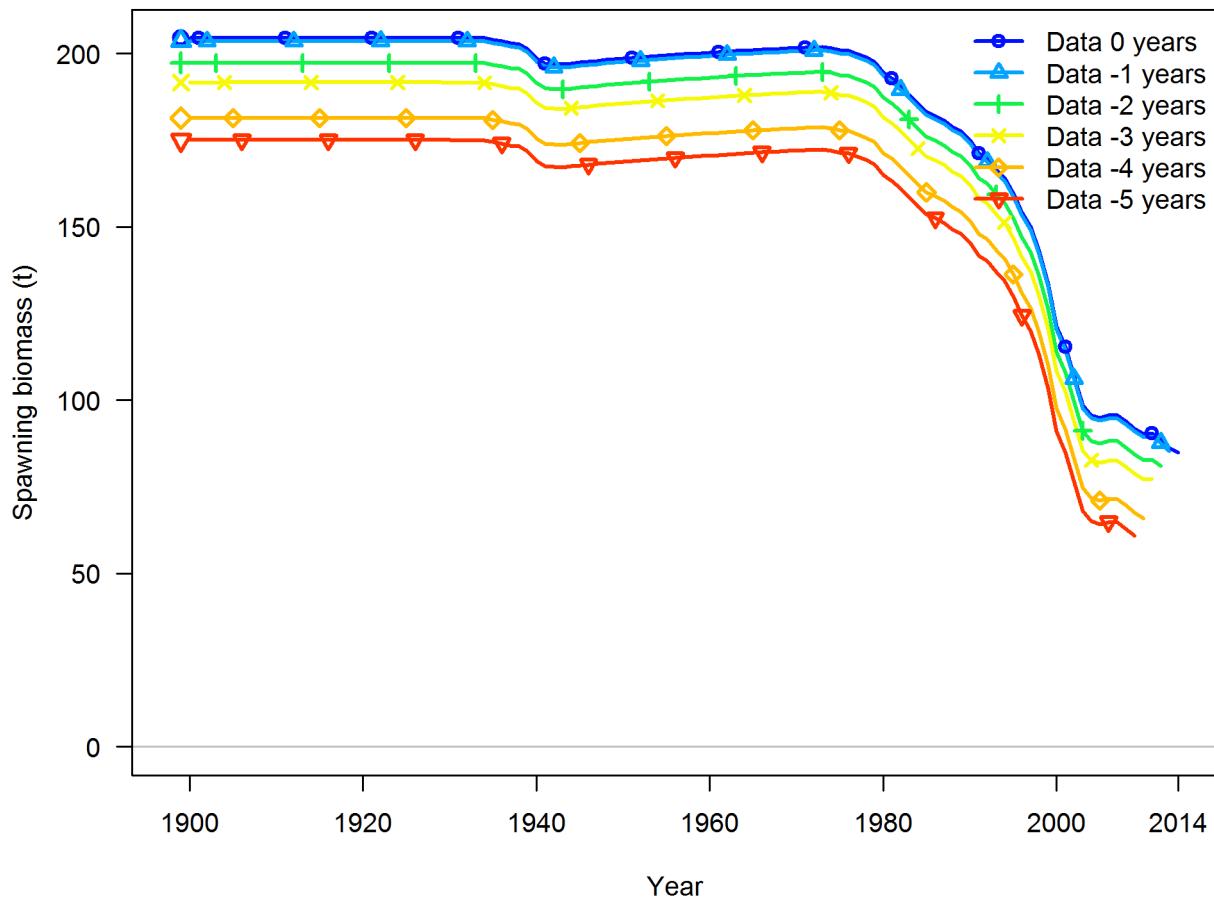


Figure 122: Retrospective analyses for the central model.

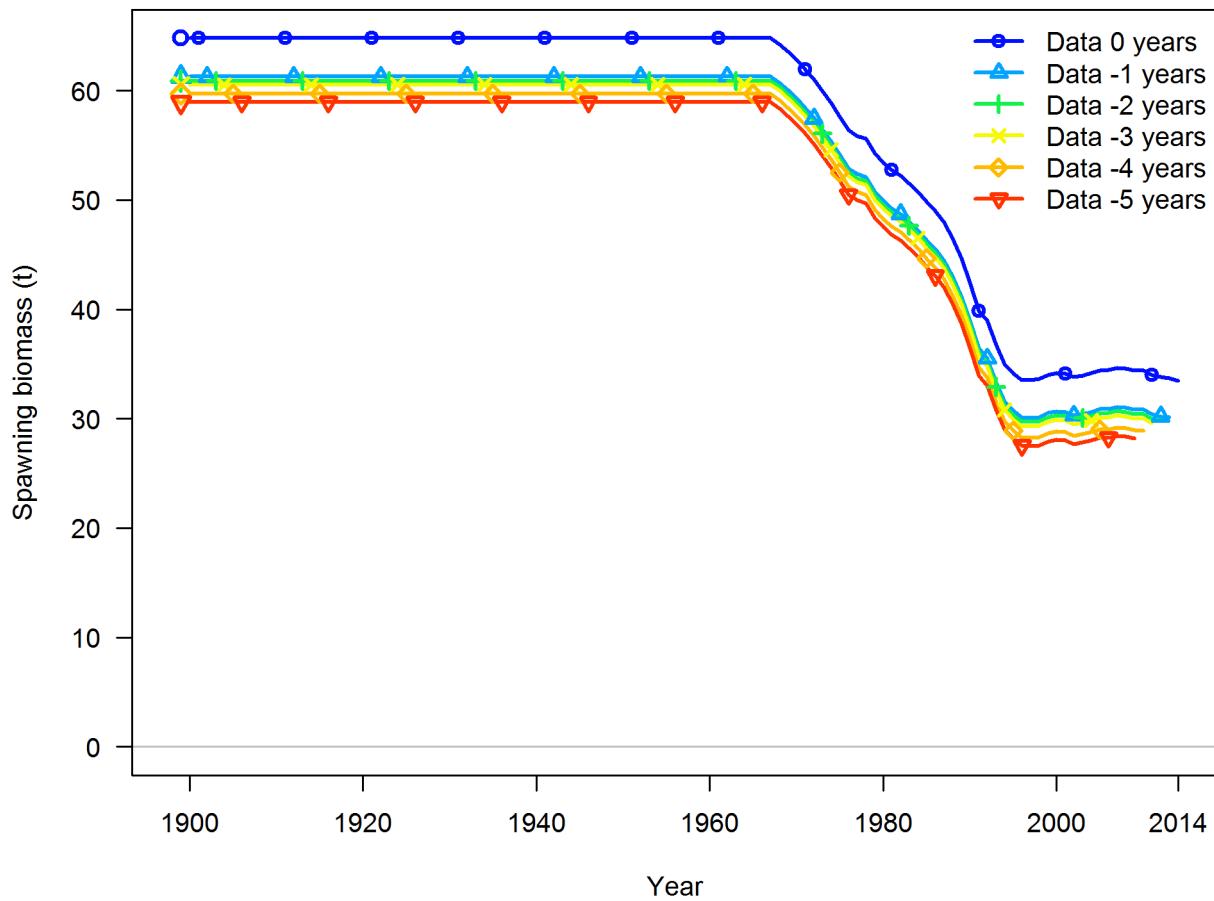


Figure 123: Retrospective analyses for the northern model.

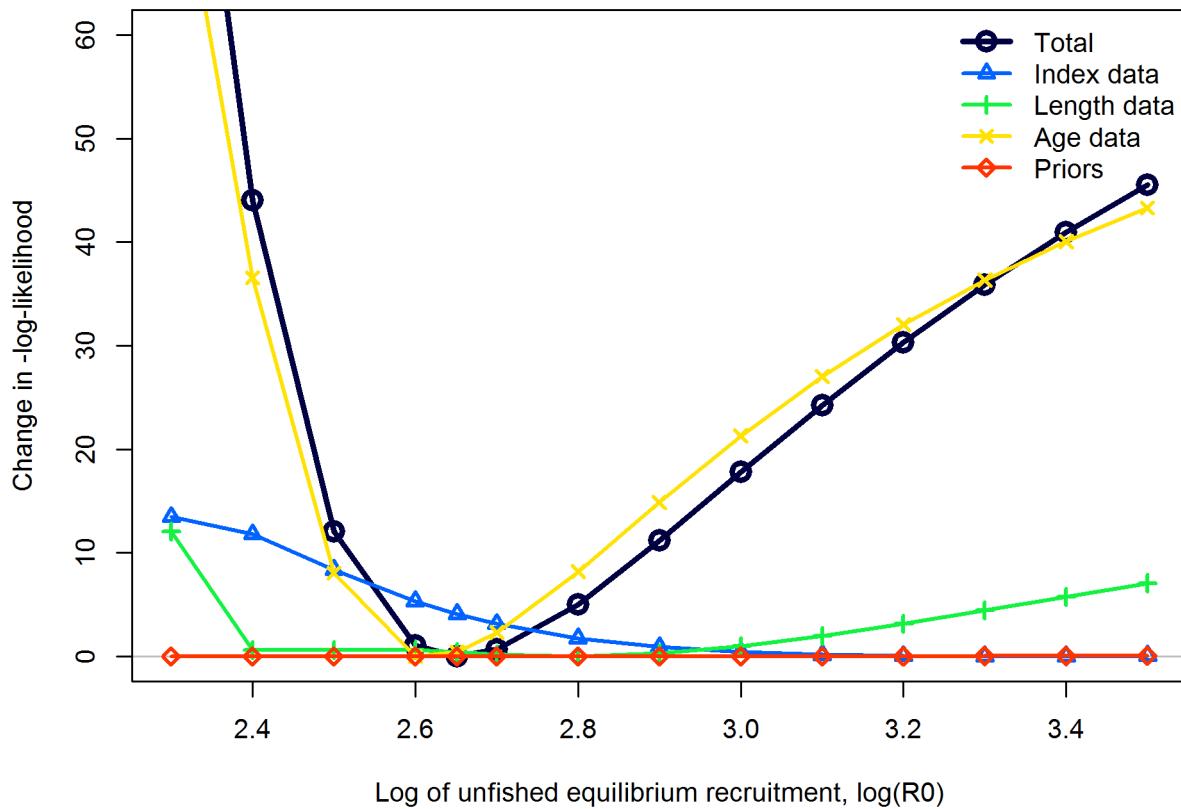


Figure 124: Likelihood profile over the log of equilibrium recruitment,  $\log(R_0)$  showing changes in negative log-likelihoods by data type for the pre-STAR northern model.

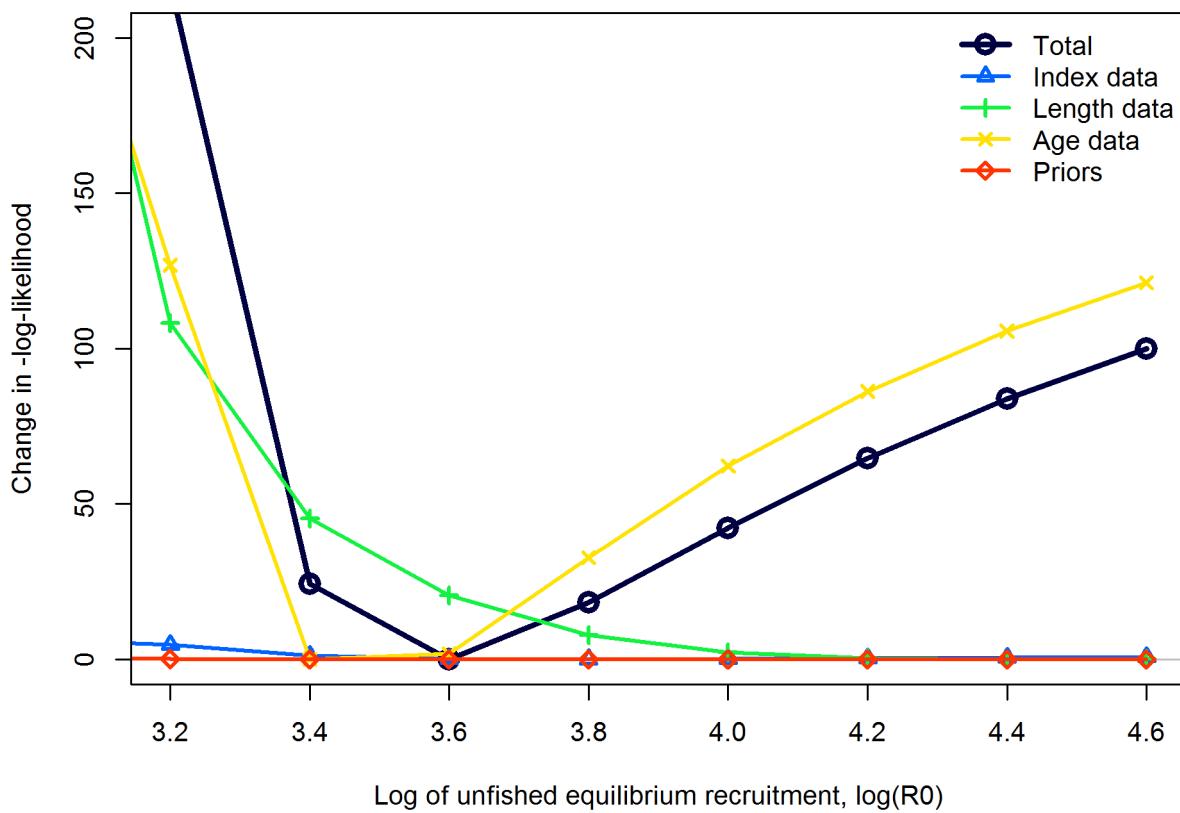


Figure 125: Likelihood profile over the log of equilibrium recruitment,  $\log(R_0)$  showing changes in negative log-likelihoods by data type for the pre-STAR central model.

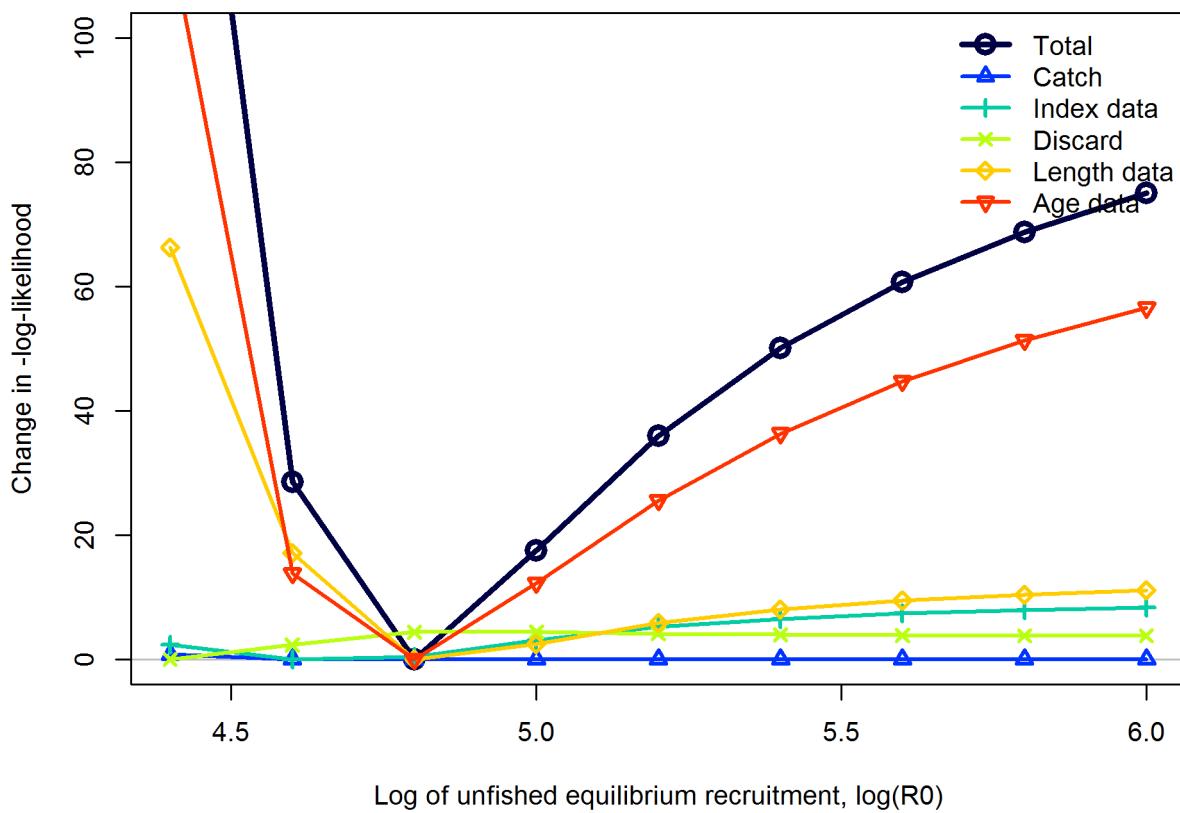


Figure 126: Likelihood profile over the log of equilibrium recruitment,  $\log(R_0)$  showing changes in negative log-likelihoods by data type for the pre-STAR southern model.

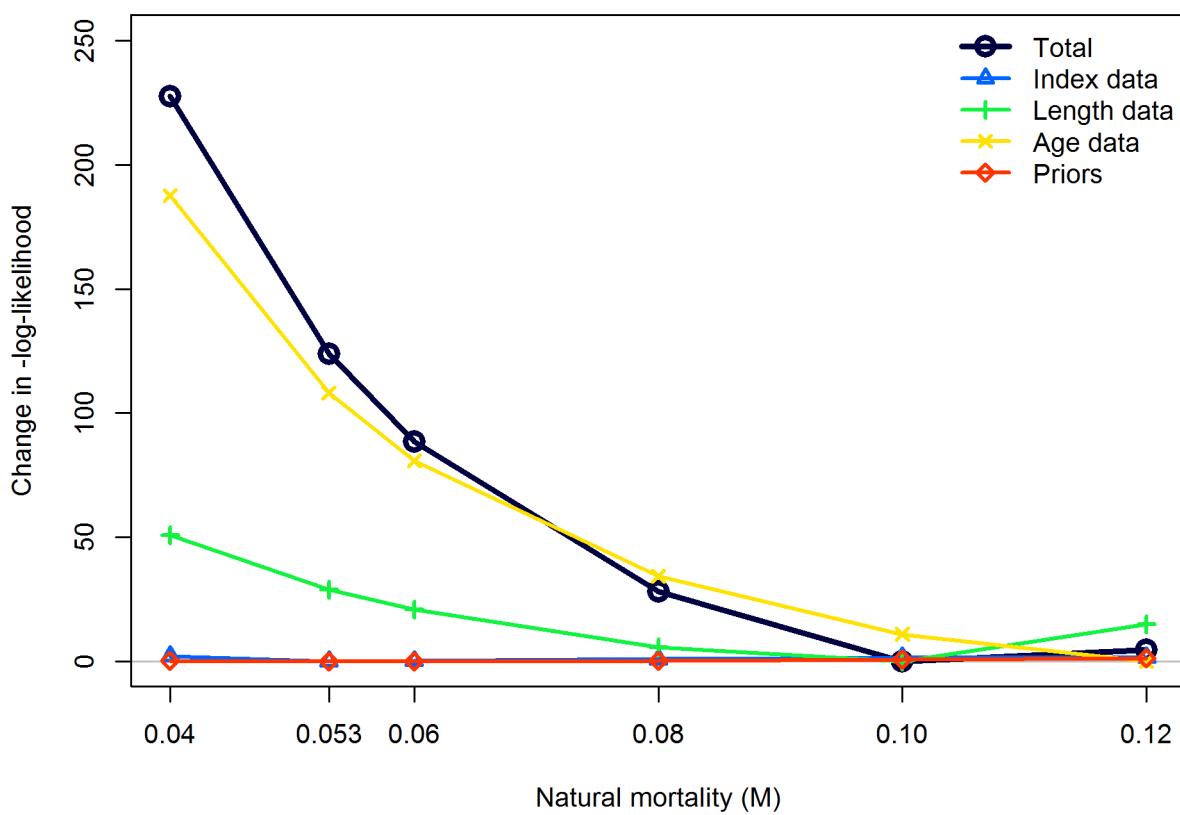


Figure 127: Likelihood profile over natural mortality,  $M$ , showing changes in negative log-likelihood by data type for the pre-STAR central model.

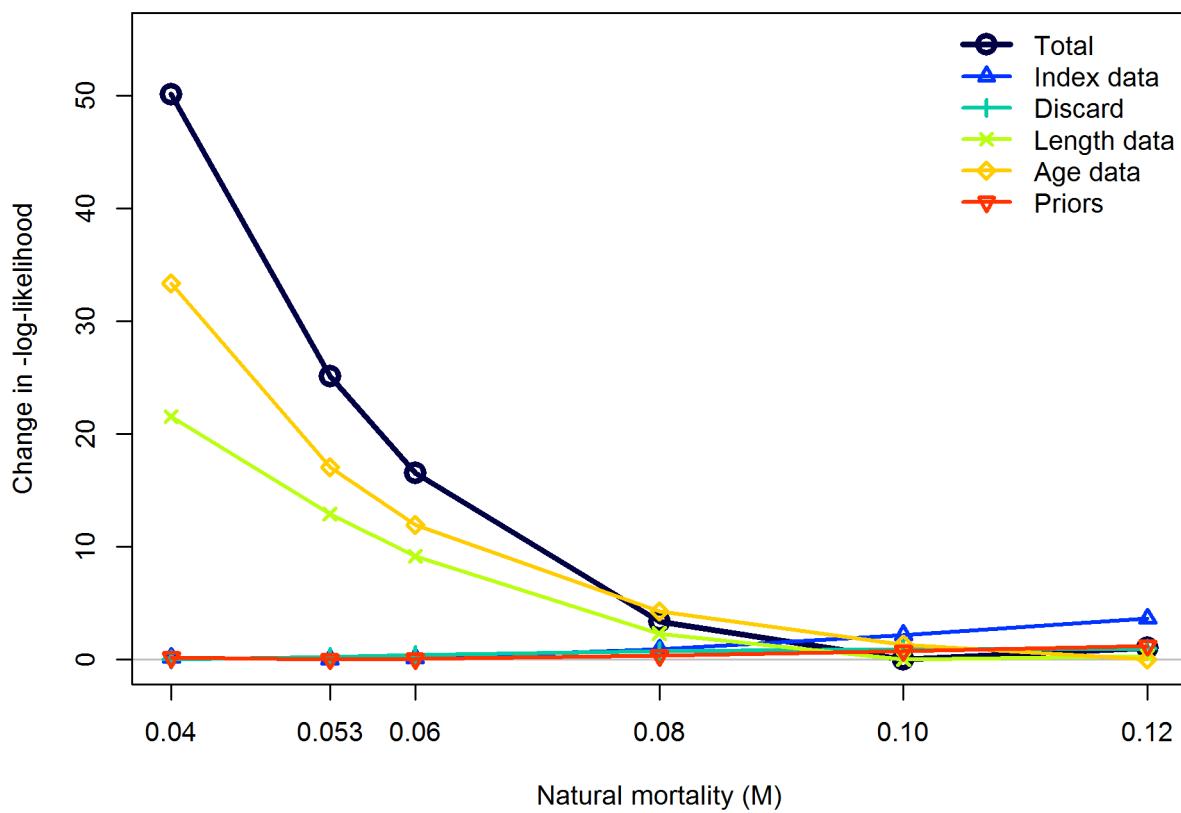


Figure 128: Likelihood profile over natural mortality,  $M$ , showing changes in negative log-likelihood by data type for the pre-STAR southern model.

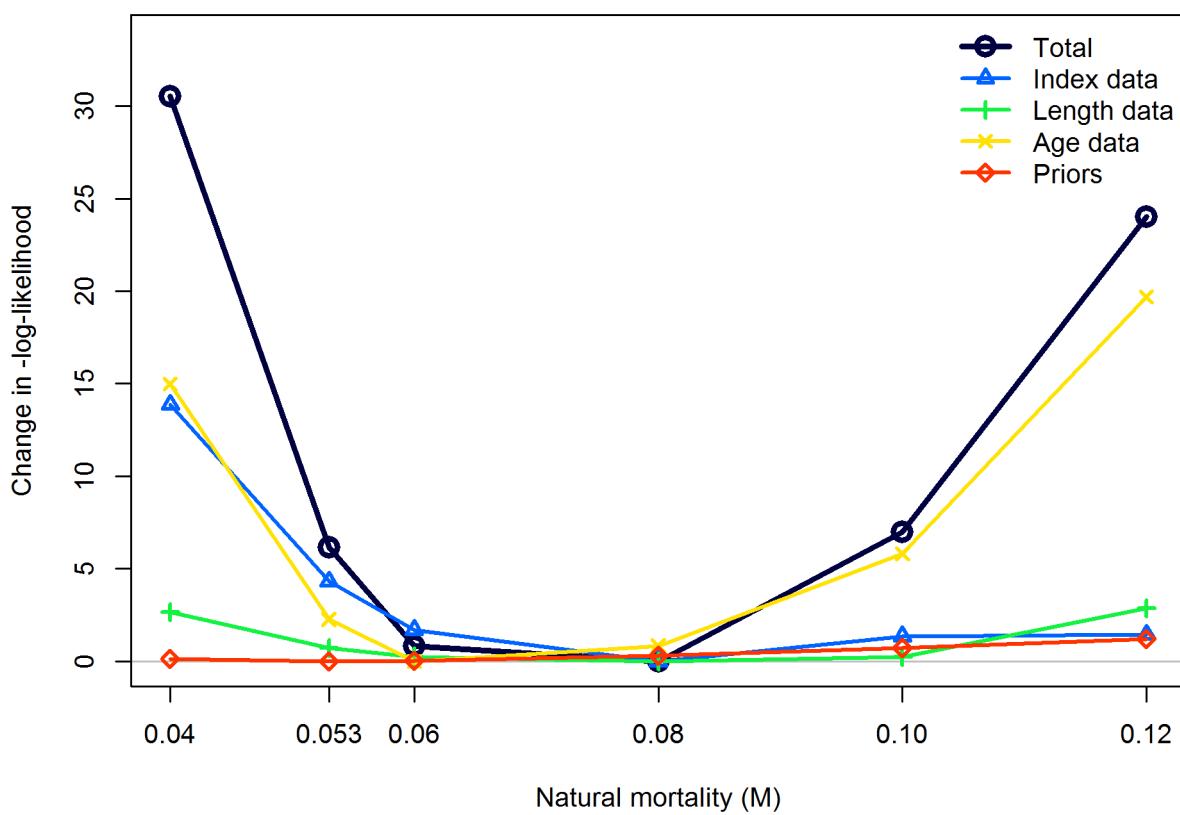


Figure 129: Likelihood profile over natural mortality,  $M$ , showing changes in negative log-likelihood by data type for the pre-STAR northern model.

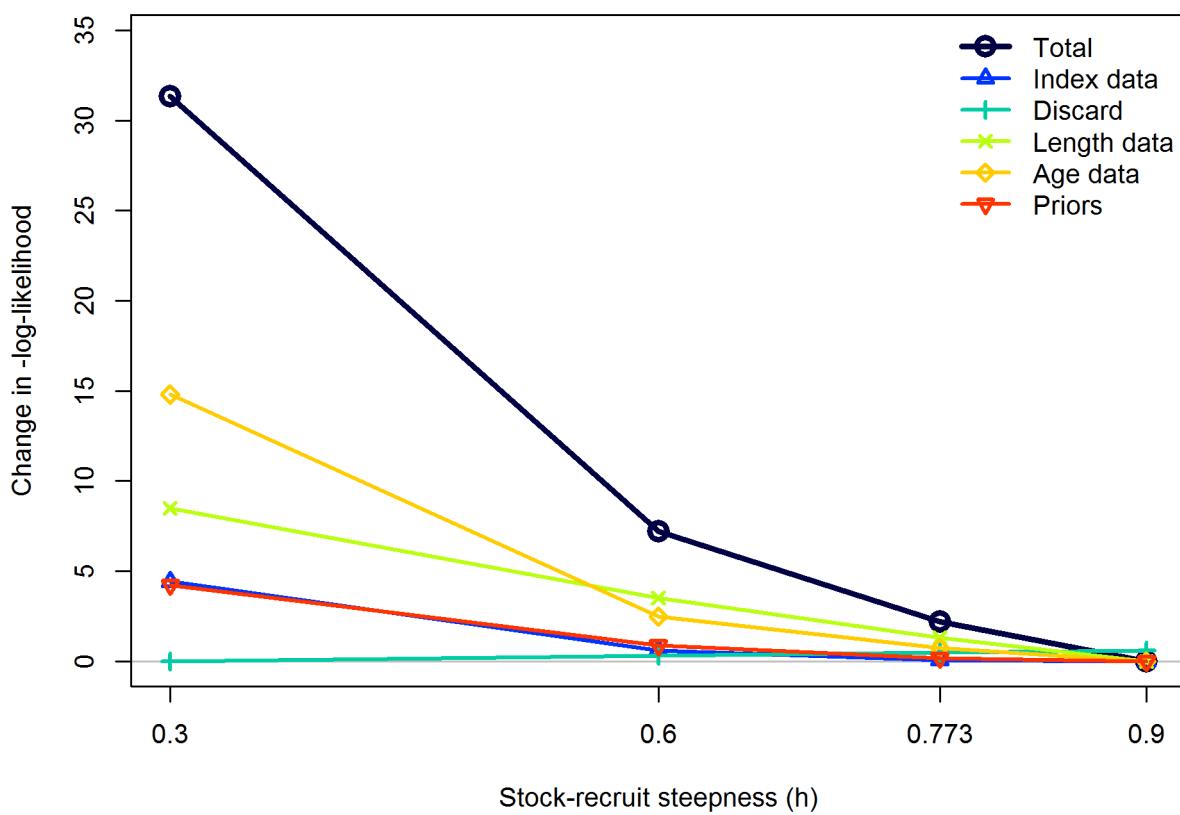


Figure 130: Likelihood profile over the steepness of the stock-recruit relationship,  $h$ , showing changes in negative log-likelihoods by data type for the pre-STAR southern model.

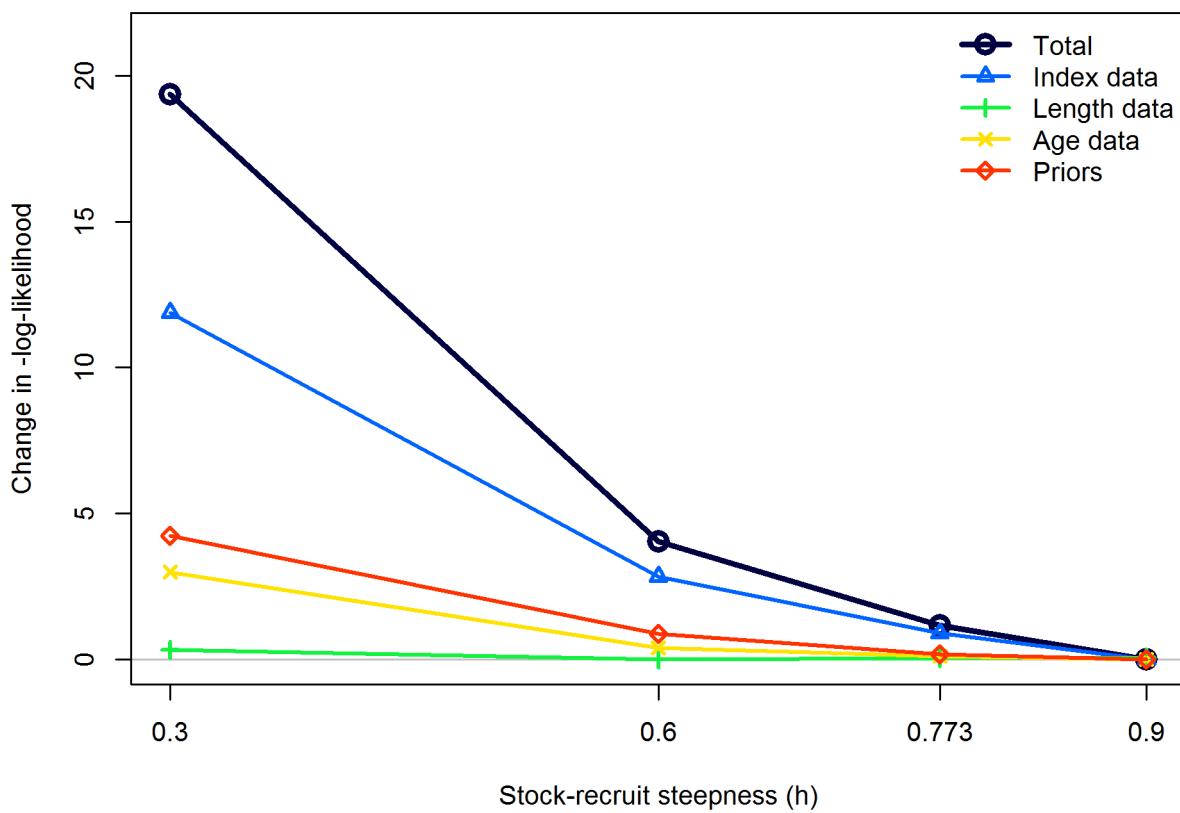


Figure 131: Likelihood profile over the steepness of the stock-recruit relationship,  $h$ , showing changes in negative log-likelihoods by data type for the pre-STAR northern model.

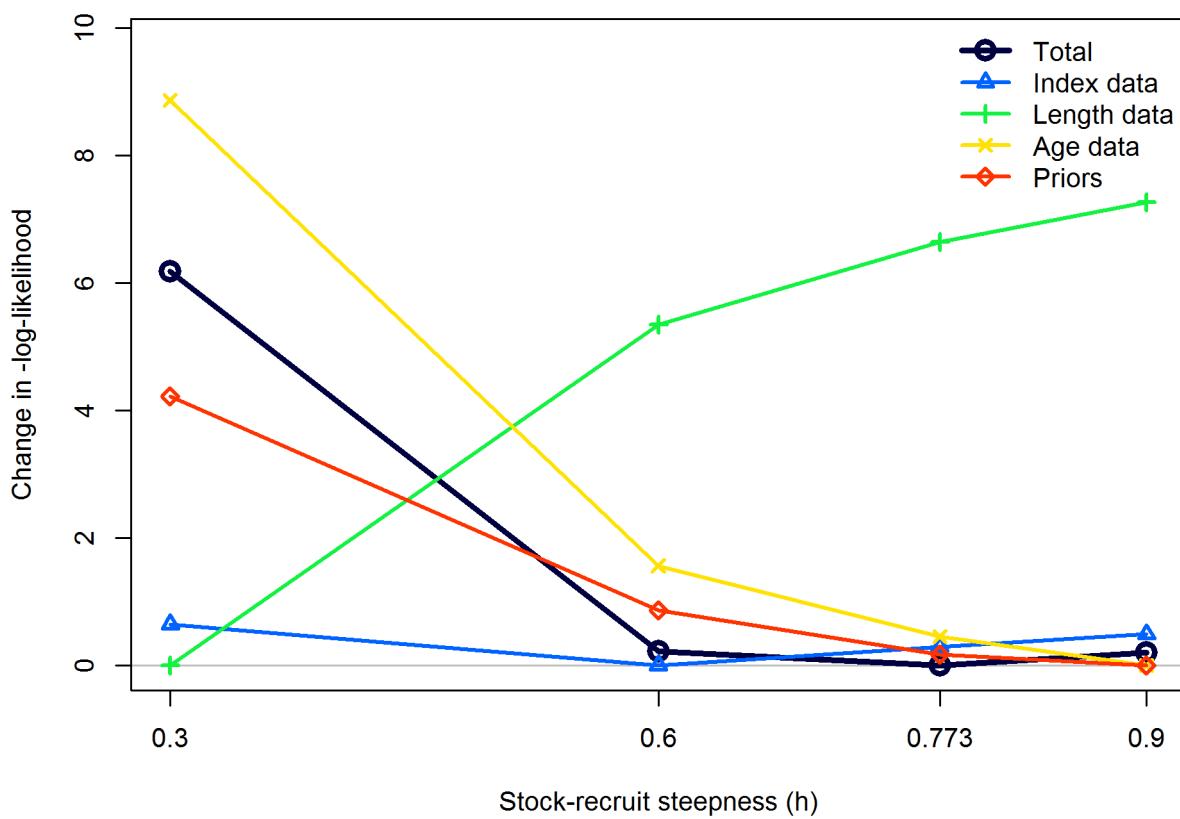


Figure 132: Likelihood profile over the steepness of the stock-recruit relationship,  $h$ , showing changes in negative log-likelihoods by data type for the pre-STAR central model.

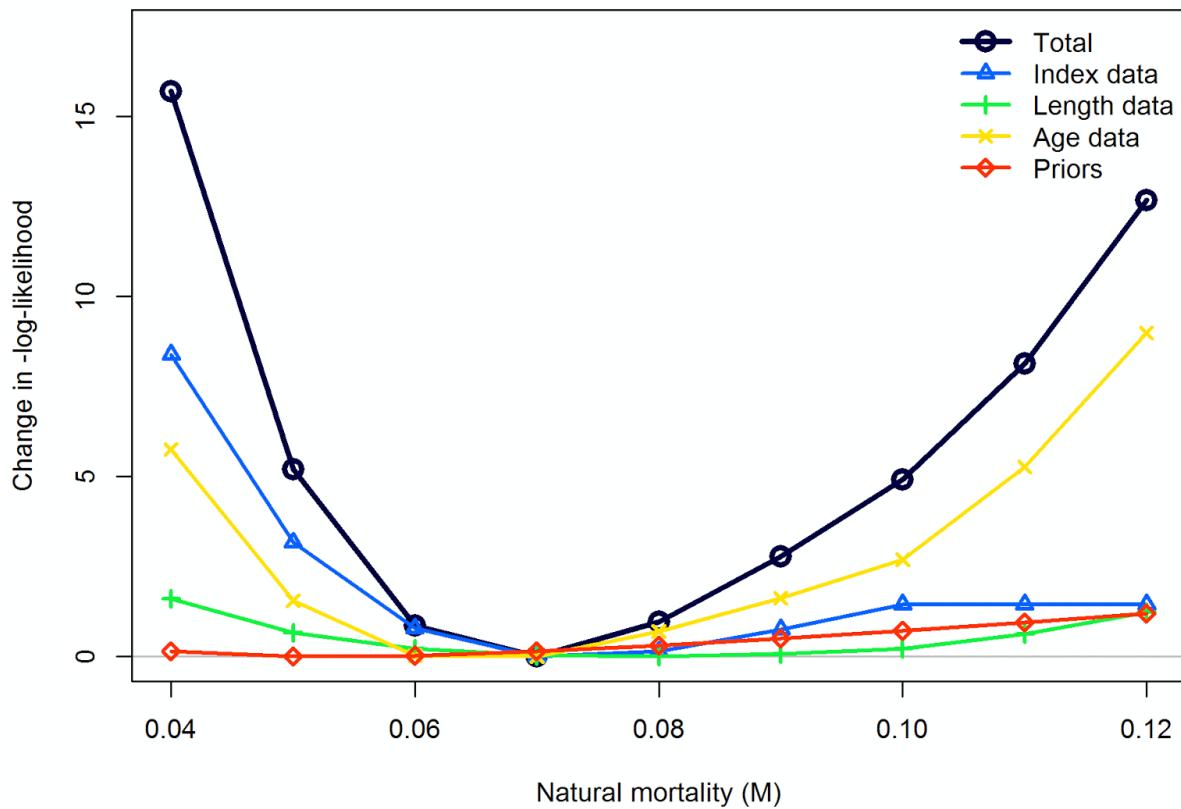


Figure 133: Likelihood profile over the natural mortality,  $M$ , for the final base model, showing changes in negative log-likelihoods by data type for the northern model.

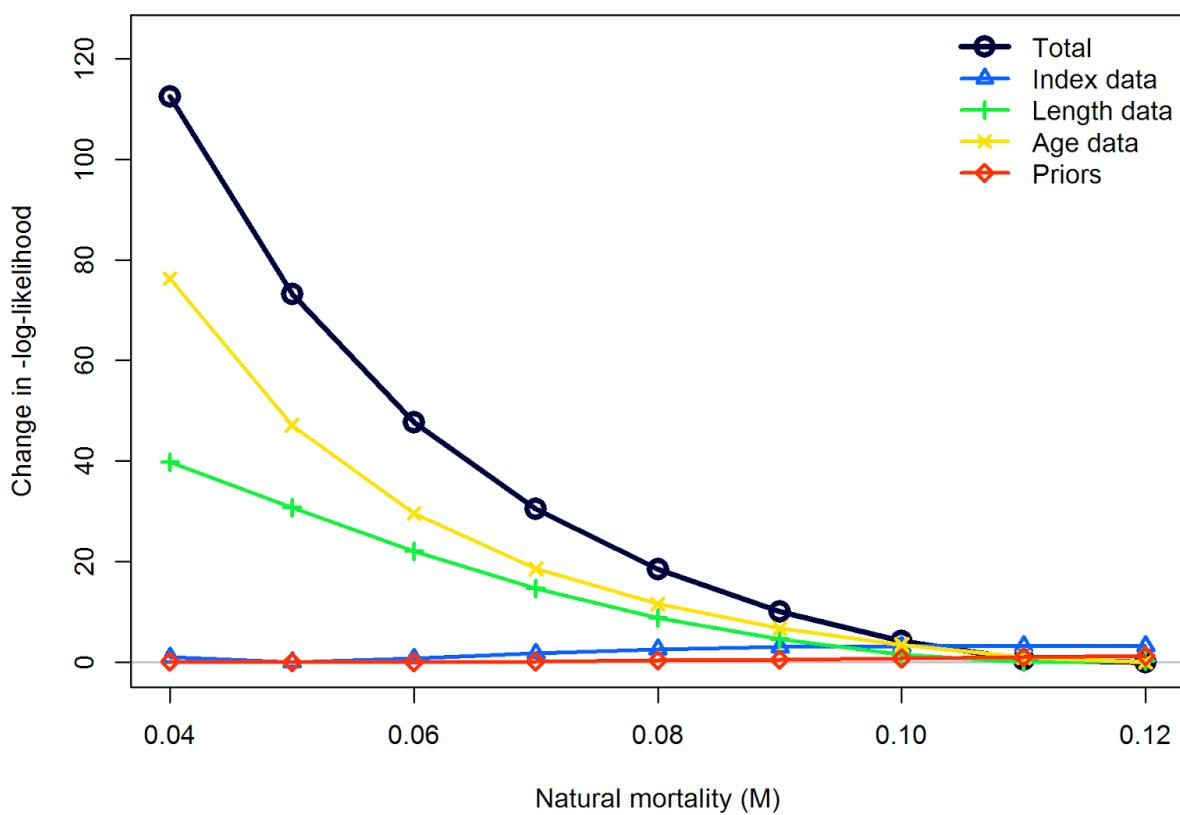


Figure 134: Likelihood profile over the natural mortality,  $M$ , for the final base model, showing changes in negative log-likelihoods by data type for the central model.

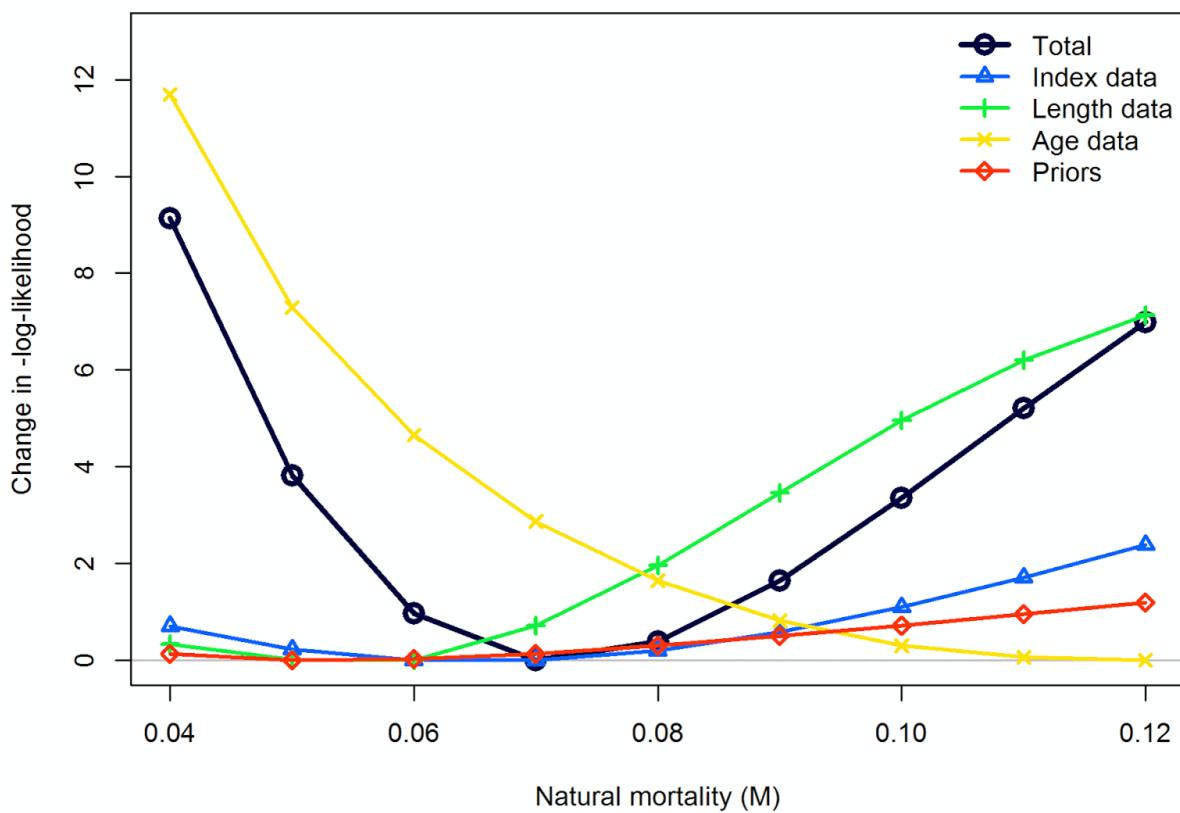


Figure 135: Likelihood profile over the natural mortality,  $M$ , for the final base model, showing changes in negative log-likelihoods by data type for the southern model.

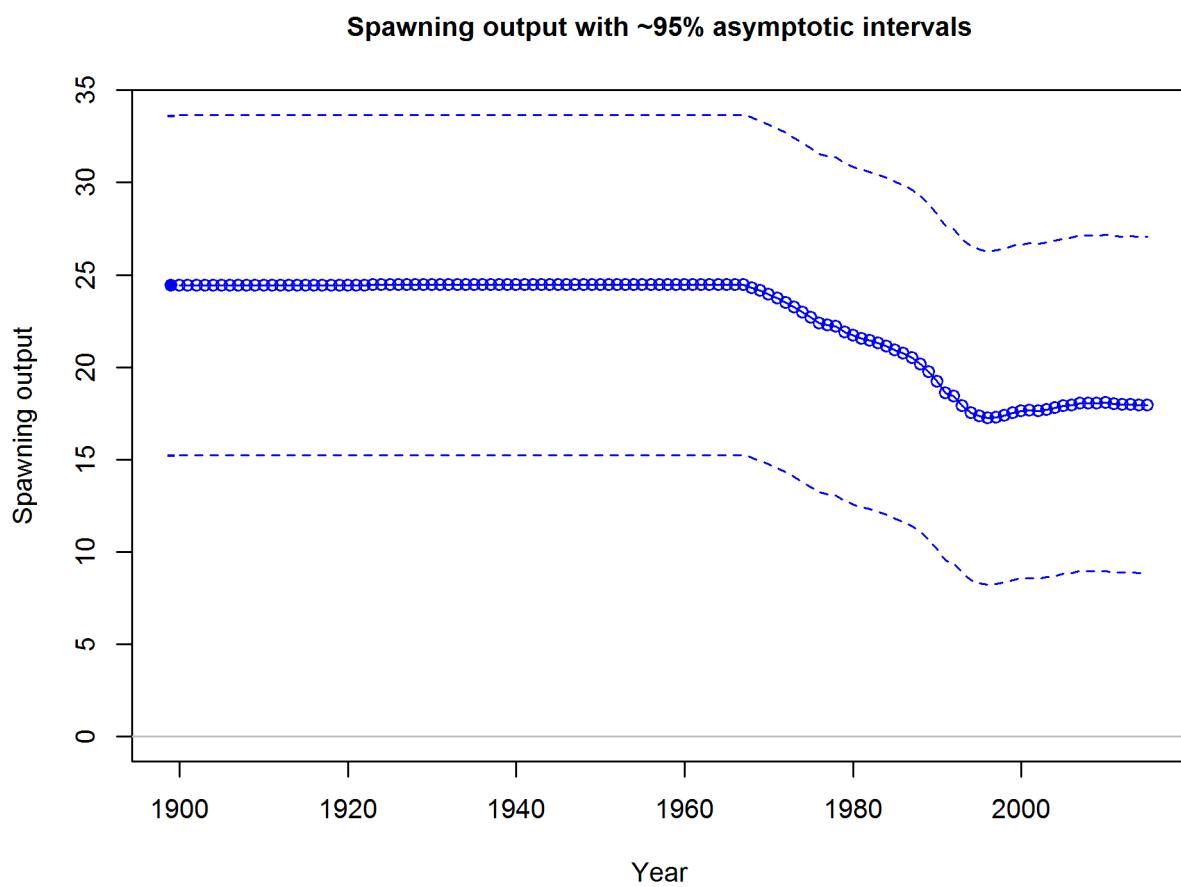


Figure 136: Time series of the spawning stock biomass for the northern model, with 95% asymptotic intervals.

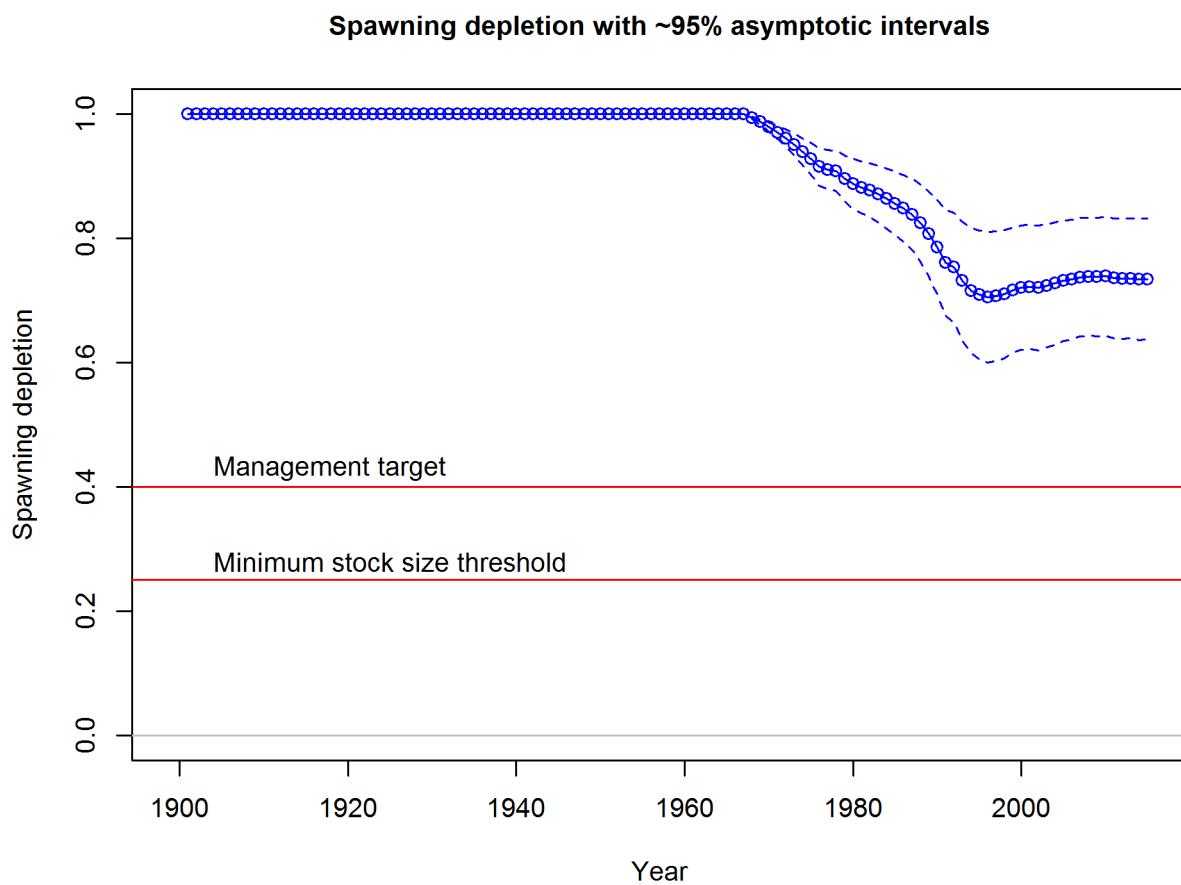


Figure 137: Spawning depletion relative to the management target and minimum stock size threshold for the northern model.

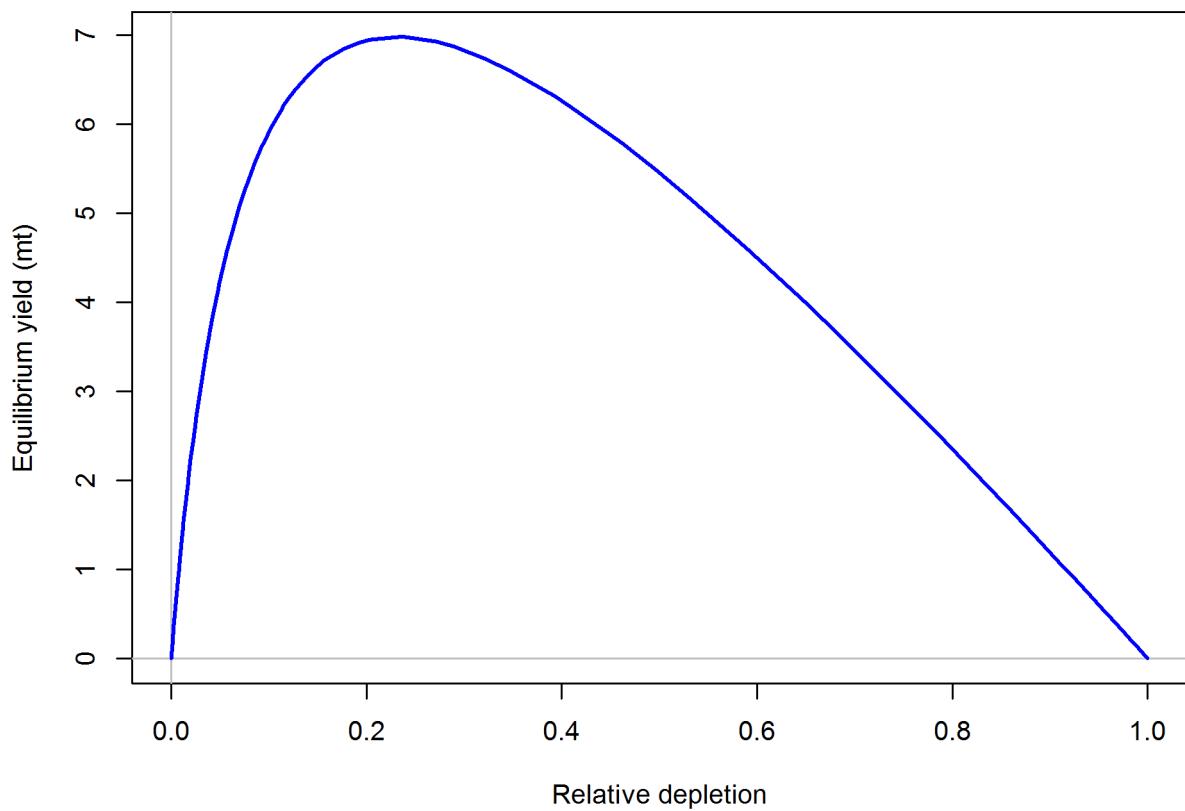


Figure 138: Equilibrium yield curve for the northern model.

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

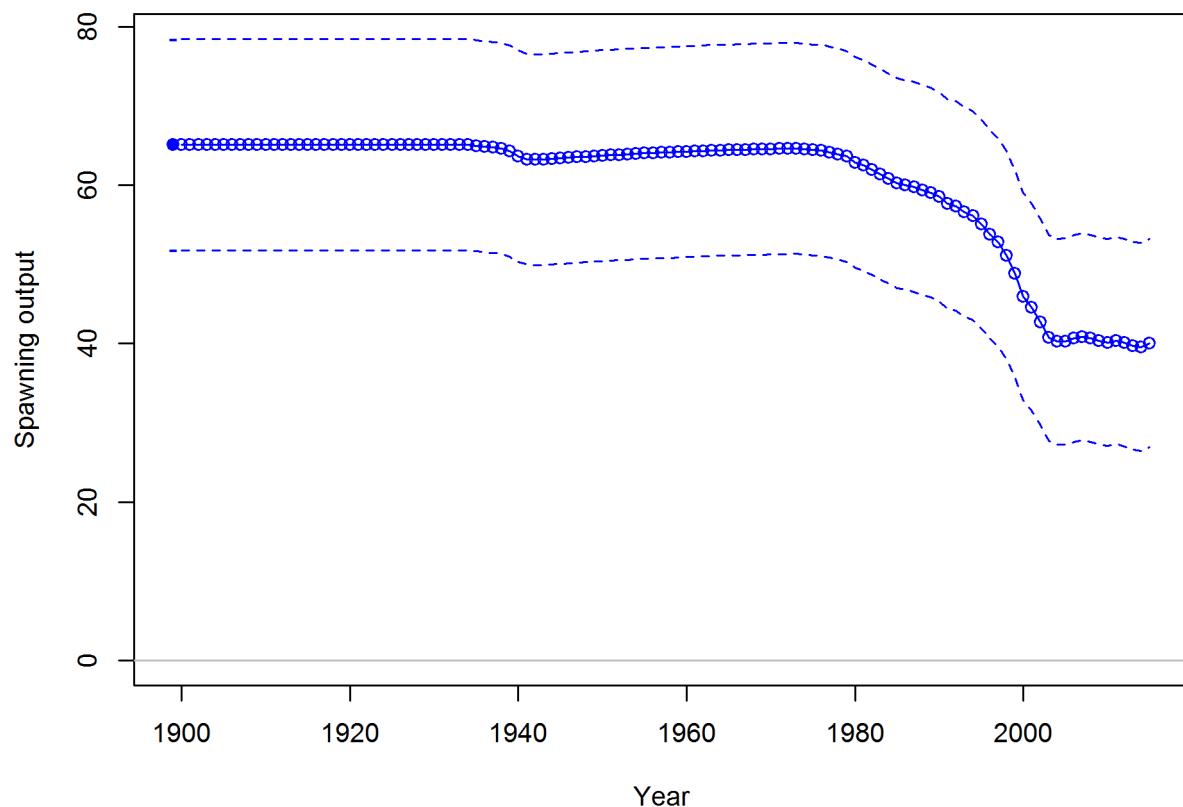


Figure 139: Time series of the spawning stock biomass for the central model, with 95% asymptotic intervals.

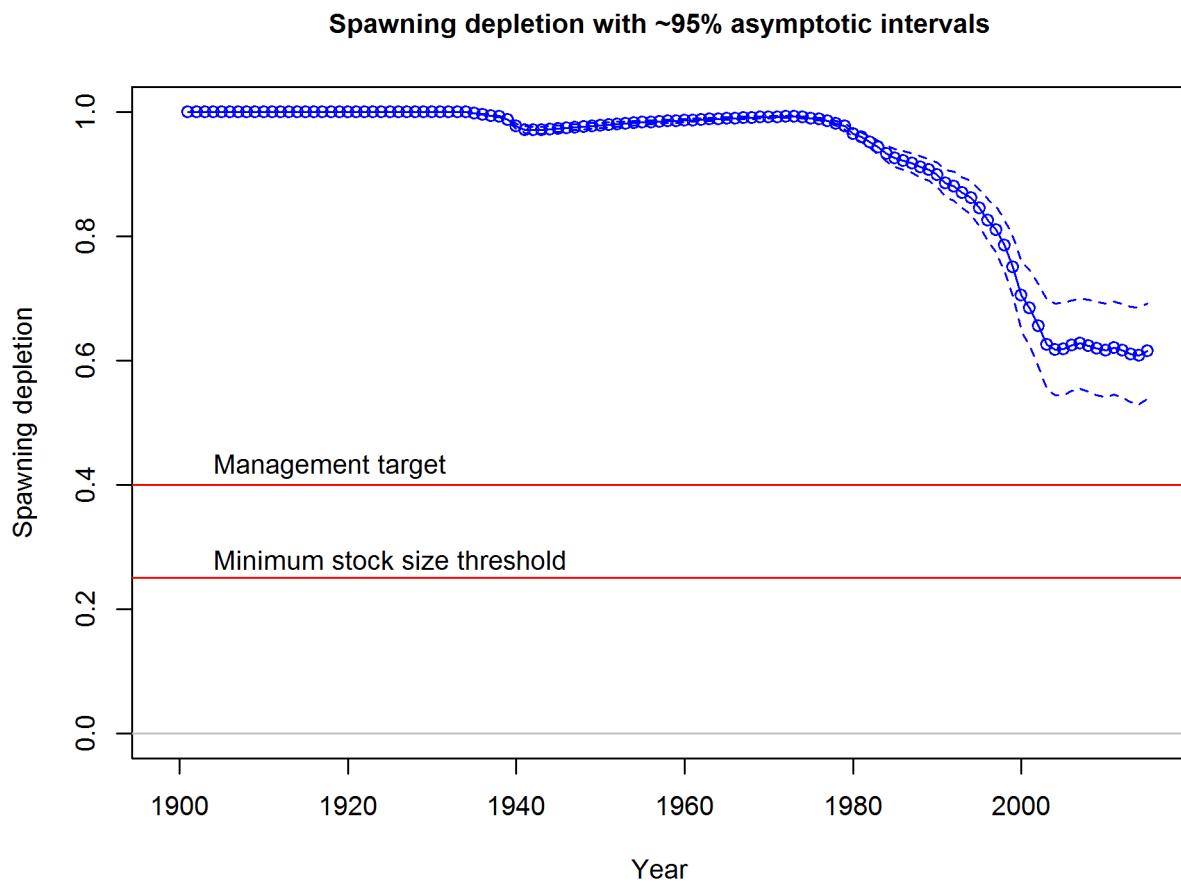


Figure 140: Spawning depletion relative to the management target and minimum stock size threshold for the central model.

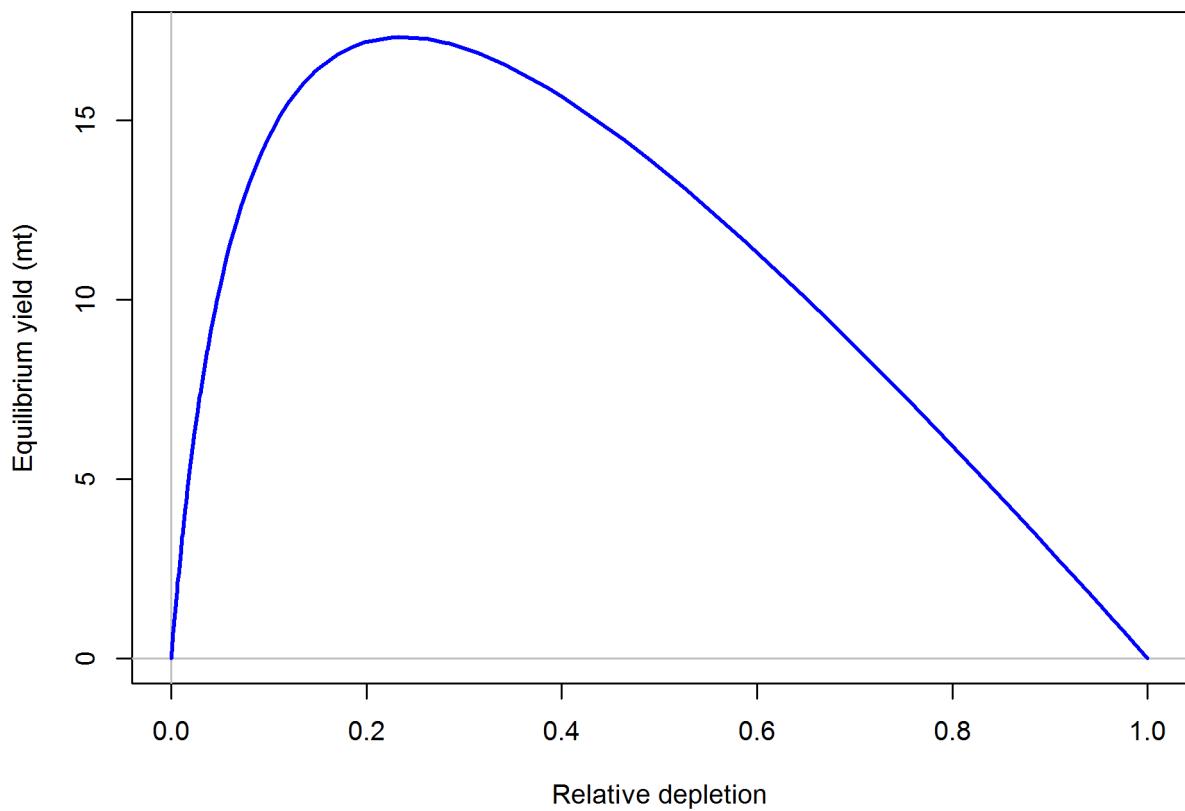


Figure 141: Equilibrium yield curve for the central model.

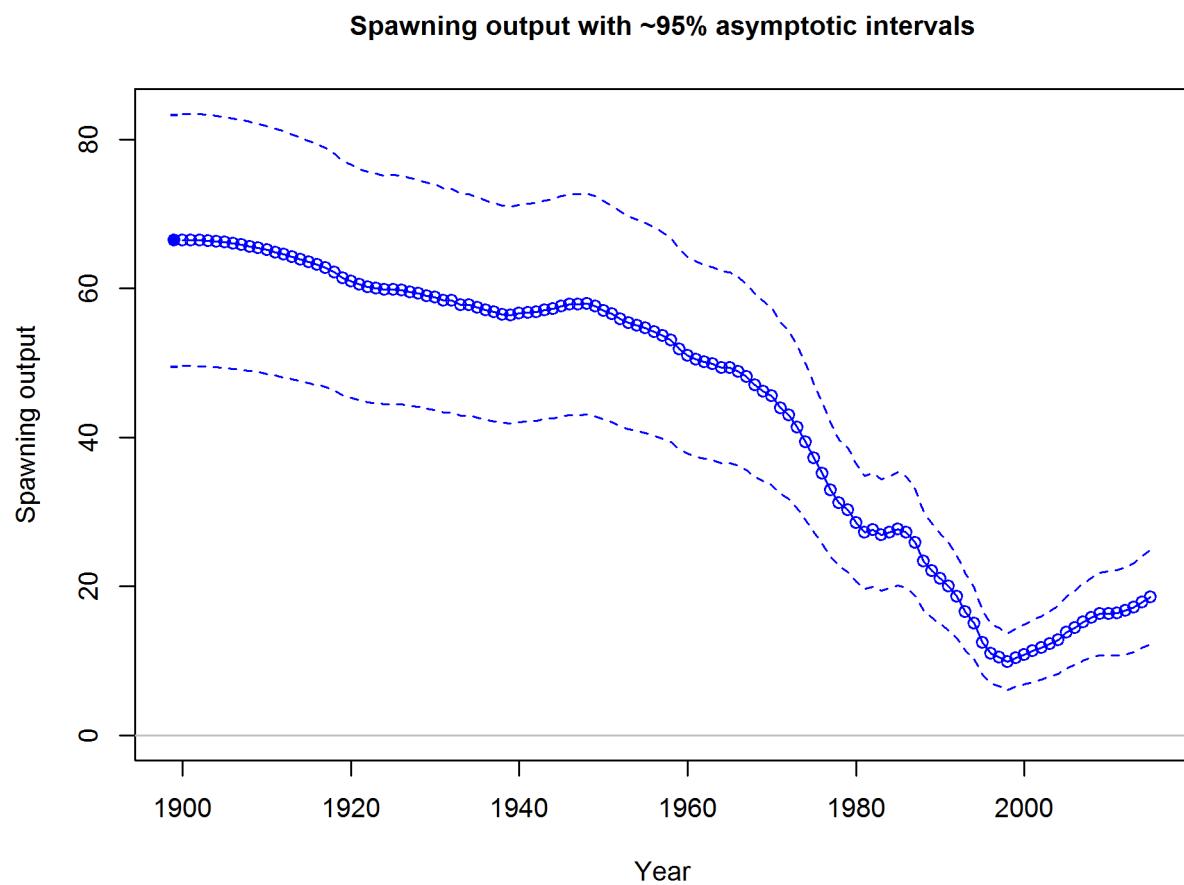


Figure 142: Time series of the spawning stock biomass for the southern model, with 95% asymptotic intervals.

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

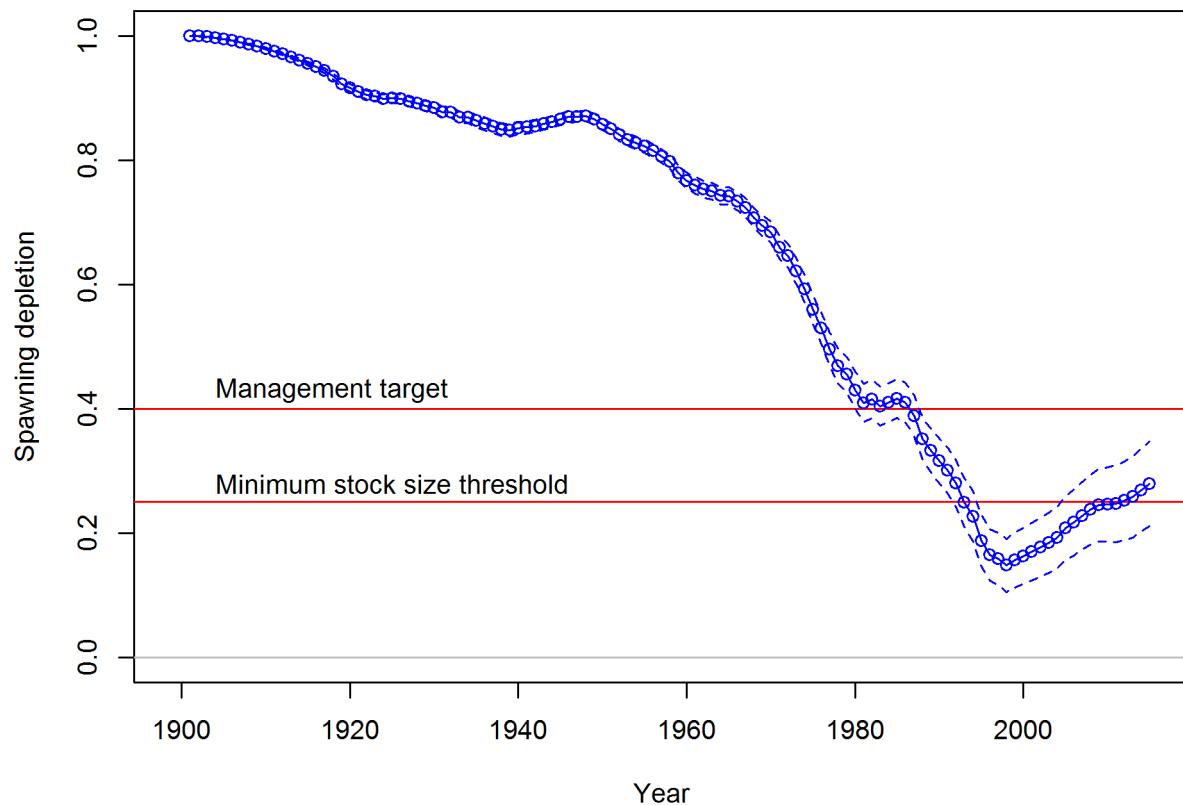


Figure 143: Spawning depletion relative to the management target and minimum stock size threshold for the southern model.

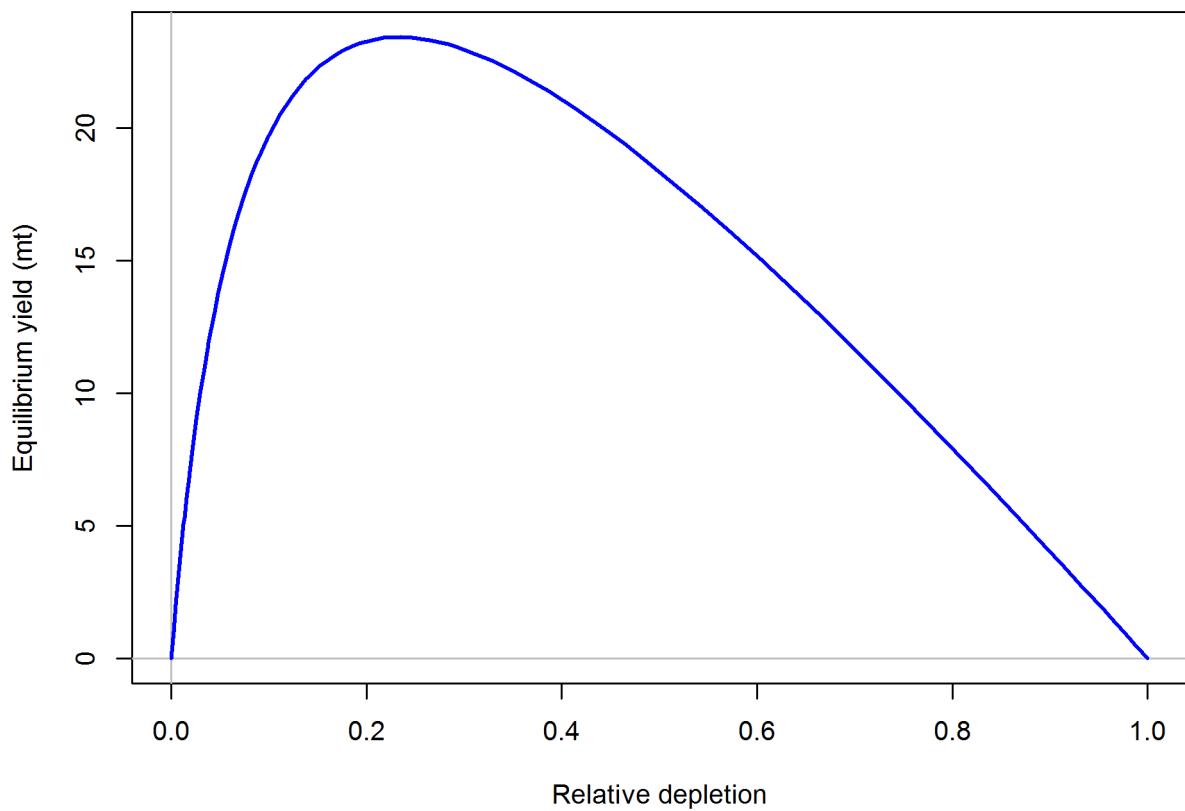


Figure 144: Equilibrium yield curve for the southern model.

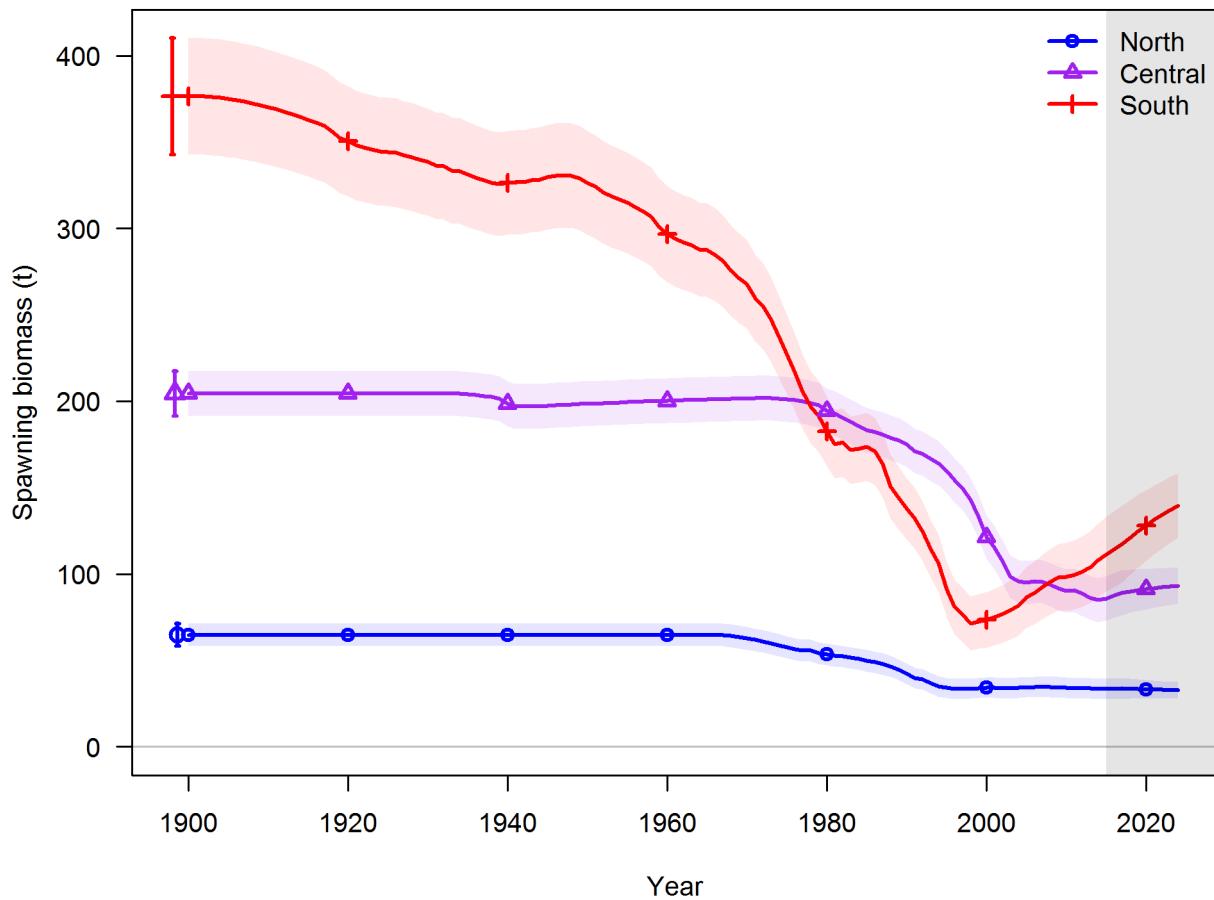


Figure 145: Time series of spawning biomass with a forecast to 2024 (shaded area) for the three base-case models.

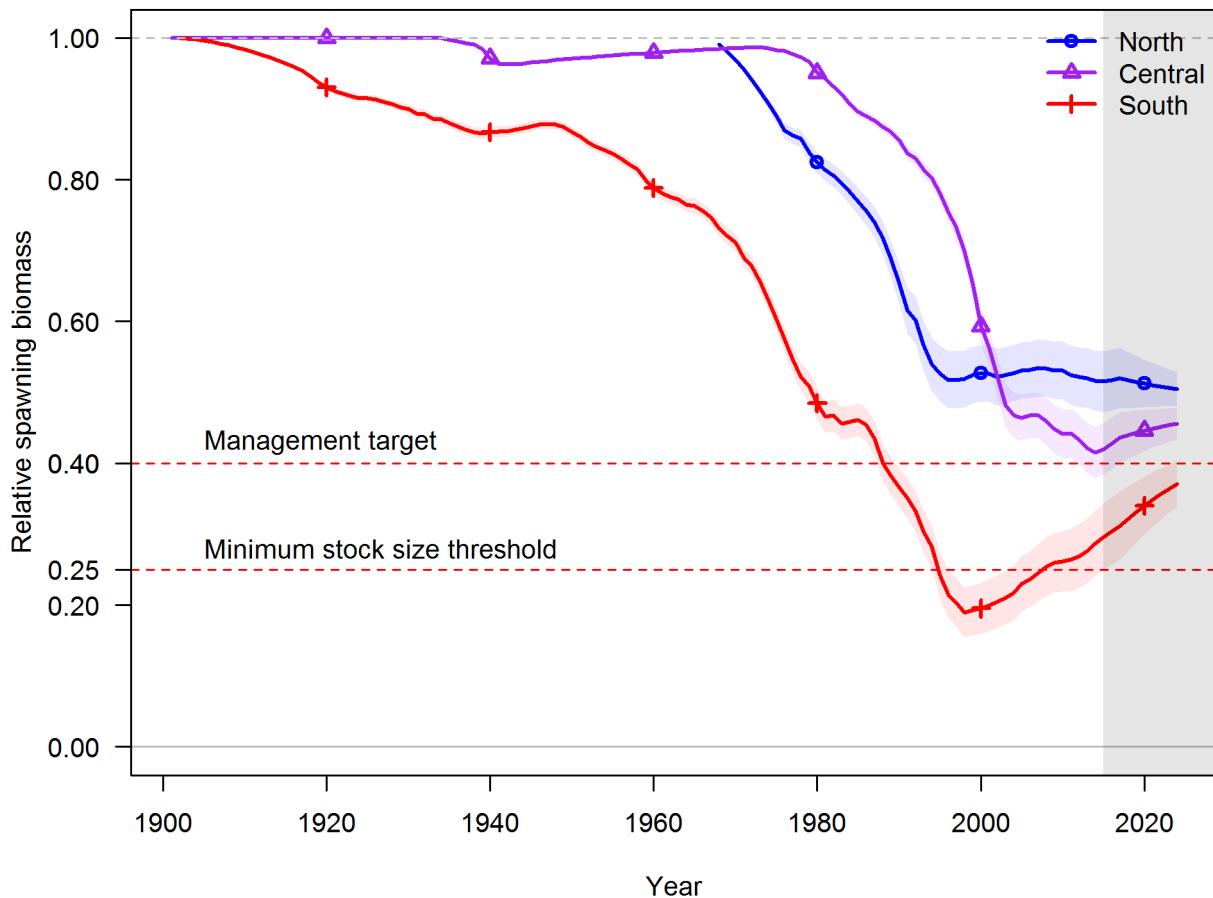


Figure 146: Time series of relative spawning biomass with a forecast to 2024 (shaded area) for the three base-case models.

## 2750 Appendix A. SS data file

```
2751 #V3.24u
2752 #C data file for China rockfish North of 4010
2753 #C adding multiple new data sources to approximate XDB-SRA model
2754 #C 1) extended time series of catch to match southern model (for combining,
2755 # later)
2756 #C 2) Combined Northern OR commercial (live+dead)
2757 #C 3) Combined Southern WA rec (PC+PR)
2758 #_observed data:
2759 1900 #_styr -- extended to match southern model start year
2760 2014 #_endyr
2761 1 #_nseas
2762 12 #_months/season
2763 1 #_spawn_seas
2764 3 #_Nfleet
2765 0 #_Nsurveys
2766 1 #_N_areas
2767 ## fleet names (second cut on June 7, 2015)
2768 1_WA_SouthernWA_Rec_PCPR%2_WA_NorthernWA_Rec_PC%3_WA_NorthernWA_Rec_PR
2769 ## 12_WA_SouthernWA_Rec_PCPR
2770 ## 13_WA_NorthernWA_Rec_PC
2771 ## 14_WA_NorthernWA_Rec_PR
2772 # following values are 1 per catch or survey fleet
2773 0.5 0.5 0.5 #_surveytiming_in_season -- mid-year, not exactly like XDB-SRA
2774 1 1 1 #_area_assignments_for_each_fishery_and_survey
2775 # following values are 1 per catch fleet
2776 1 1 1 #_units of catch: 1=bio; 2=num
2777 0.1 0.1 0.1 #_se of log(catch) only used for init_eq_catch and for Fmethod
2778 # 2 and 3; use -1 for discard only fleets
2779 2 #_Ngenders
2780 80 #_Nages
2781 0 0 0 #_init_equil_catch_for_each_fishery
2782 115 #_N_lines_of_catch_to_read
2783 #_catch_biomass(mtons):_columns_are_fisheries,year,season
2784 # this file has catch in SS format based on formulas in the adjacent Google
2785 # Doc "Catch Pivot" worksheet
2786 #fleet12 fleet13 fleet14 Year Season #
2787 0 0 0 1900 1 #
2788 0 0 0 1901 1 #
2789 0 0 0 1902 1 #
2790 0 0 0 1903 1 #
```

2791	0	0	0	1904	1	#
2792	0	0	0	1905	1	#
2793	0	0	0	1906	1	#
2794	0	0	0	1907	1	#
2795	0	0	0	1908	1	#
2796	0	0	0	1909	1	#
2797	0	0	0	1910	1	#
2798	0	0	0	1911	1	#
2799	0	0	0	1912	1	#
2800	0	0	0	1913	1	#
2801	0	0	0	1914	1	#
2802	0	0	0	1915	1	#
2803	0	0	0	1916	1	#
2804	0	0	0	1917	1	#
2805	0	0	0	1918	1	#
2806	0	0	0	1919	1	#
2807	0	0	0	1920	1	#
2808	0	0	0	1921	1	#
2809	0	0	0	1922	1	#
2810	0	0	0	1923	1	#
2811	0	0	0	1924	1	#
2812	0	0	0	1925	1	#
2813	0	0	0	1926	1	#
2814	0	0	0	1927	1	#
2815	0	0	0	1928	1	#
2816	0	0	0	1929	1	#
2817	0	0	0	1930	1	#
2818	0	0	0	1931	1	#
2819	0	0	0	1932	1	#
2820	0	0	0	1933	1	#
2821	0	0	0	1934	1	#
2822	0	0	0	1935	1	#
2823	0	0	0	1936	1	#
2824	0	0	0	1937	1	#
2825	0	0	0	1938	1	#
2826	0	0	0	1939	1	#
2827	0	0	0	1940	1	#
2828	0	0	0	1941	1	#
2829	0	0	0	1942	1	#
2830	0	0	0	1943	1	#
2831	0	0	0	1944	1	#
2832	0	0	0	1945	1	#

2833	0	0	0	1946	1	#
2834	0	0	0	1947	1	#
2835	0	0	0	1948	1	#
2836	0	0	0	1949	1	#
2837	0	0	0	1950	1	#
2838	0	0	0	1951	1	#
2839	0	0	0	1952	1	#
2840	0	0	0	1953	1	#
2841	0	0	0	1954	1	#
2842	0	0	0	1955	1	#
2843	0	0	0	1956	1	#
2844	0	0	0	1957	1	#
2845	0	0	0	1958	1	#
2846	0	0	0	1959	1	#
2847	0	0	0	1960	1	#
2848	0	0	0	1961	1	#
2849	0	0	0	1962	1	#
2850	0	0	0	1963	1	#
2851	0	0	0	1964	1	#
2852	0	0	0	1965	1	#
2853	0	0	0	1966	1	#
2854	0	0.27	1.04	1967	1	#
2855	0.02	0.32	1.25	1968	1	#
2856	0.04	0.37	1.45	1969	1	#
2857	0.06	0.43	1.66	1970	1	#
2858	0.08	0.48	1.87	1971	1	#
2859	0.10	0.53	2.08	1972	1	#
2860	0.11	0.59	2.29	1973	1	#
2861	0.13	0.64	2.49	1974	1	#
2862	0.15	0.69	2.7	1975	1	#
2863	0.02	0.38	1.48	1976	1	#
2864	0.01	0.29	1.12	1977	1	#
2865	0.06	0.78	3.02	1978	1	#
2866	0.01	0.62	2.4	1979	1	#
2867	0.02	0.53	2.04	1980	1	#
2868	0.06	0.47	1.83	1981	1	#
2869	0.05	0.56	2.18	1982	1	#
2870	0.00	0.62	2.42	1983	1	#
2871	0.11	0.67	2.62	1984	1	#
2872	0.06	0.68	2.64	1985	1	#
2873	0.16	0.78	3.02	1986	1	#
2874	0.20	1.03	3.73	1987	1	#

```

2875 0.24 1.28 4.45 1988 1 #
2876 0.27 1.54 5.16 1989 1 #
2877 0.31 1.79 5.88 1990 1 #
2878 0.23 0.51 3.58 1991 1 #
2879 0.35 1.46 5.81 1992 1 #
2880 0.32 1.13 5.08 1993 1 #
2881 0.32 1.18 3.24 1994 1 #
2882 0.10 0.6 3.43 1995 1 #
2883 0.12 0.45 2.29 1996 1 #
2884 0.19 0.4 2.13 1997 1 #
2885 0.26 0.08 1.65 1998 1 #
2886 0.06 0.09 2.35 1999 1 #
2887 0.10 0.41 2.51 2000 1 #
2888 0.25 0.25 3.13 2001 1 #
2889 0.09 0.23 2.17 2002 1 #
2890 0.09 0.12 2.18 2003 1 #
2891 0.12 0.14 1.97 2004 1 #
2892 0.03 0.19 2.46 2005 1 #
2893 0.03 0.08 2.2 2006 1 #
2894 0.07 0.15 2.73 2007 1 #
2895 0.17 0.31 2.68 2008 1 #
2896 0.07 0.17 2.55 2009 1 #
2897 0.19 0.13 3.36 2010 1 #
2898 0.07 0.17 3.02 2011 1 #
2899 0.08 0.25 2.63 2012 1 #
2900 0.07 0.27 3.06 2013 1 #
2901 0.04 0.3 2.68 2014 1 #

2902 #
2903 34 #_N_cpue_and_surveyabundance_observations
2904 #_Units: 0=numbers; 1=biomass; 2=F
2905 #_Errtype: -1=normal; 0=lognormal; >0=T
2906 #_Fleet Units Errtype
2907 1 0 0 # 12_WA_SouthernWA_Rec_PCPR
2908 2 0 0 # 13_WA_NorthernWA_Rec_PC
2909 3 0 0 # 14_WA_NorthernWA_Rec_PR

2910
2911
2912 ### Washington Rec CPUE (lognormal) - only use one of the following
2913 ### Index with Stevens-MacCall filtering and all positives retained
2914 ### Assigned to fleet: "14_WA_NorthernWA_Rec_PC"
2915 #_year seas index obs err (CV)
2916 1981 1 3 0.694 0.154 # WA Rec CPUE

```

```

2917 1982 1 3 0.54 0.105 # WA Rec CPUE
2918 1983 1 3 0.643 0.098 # WA Rec CPUE
2919 1984 1 3 0.5 0.071 # WA Rec CPUE
2920 1985 1 3 0.736 0.059 # WA Rec CPUE
2921 1986 1 3 0.616 0.077 # WA Rec CPUE
2922 1987 1 3 0.486 0.06 # WA Rec CPUE
2923 1988 1 3 0.587 0.064 # WA Rec CPUE
2924 1989 1 3 0.666 0.051 # WA Rec CPUE
2925 1990 1 3 0.801 0.056 # WA Rec CPUE
2926 1991 1 3 0.665 0.066 # WA Rec CPUE
2927 1992 1 3 0.704 0.109 # WA Rec CPUE
2928 1993 1 3 0.63 0.057 # WA Rec CPUE
2929 1994 1 3 0.648 0.054 # WA Rec CPUE
2930 1995 1 3 0.59 0.051 # WA Rec CPUE
2931 1996 1 3 0.389 0.06 # WA Rec CPUE
2932 1997 1 3 0.368 0.067 # WA Rec CPUE
2933 1998 1 3 0.402 0.075 # WA Rec CPUE
2934 1999 1 3 0.403 0.081 # WA Rec CPUE
2935 2000 1 3 0.52 0.071 # WA Rec CPUE
2936 2001 1 3 0.594 0.068 # WA Rec CPUE
2937 2002 1 3 0.521 0.077 # WA Rec CPUE
2938 2003 1 3 0.472 0.087 # WA Rec CPUE
2939 2004 1 3 0.435 0.093 # WA Rec CPUE
2940 2005 1 3 0.427 0.065 # WA Rec CPUE
2941 2006 1 3 0.48 0.081 # WA Rec CPUE
2942 2007 1 3 0.655 0.113 # WA Rec CPUE
2943 2008 1 3 0.655 0.07 # WA Rec CPUE
2944 2009 1 3 0.635 0.081 # WA Rec CPUE
2945 2010 1 3 0.711 0.111 # WA Rec CPUE
2946 2011 1 3 0.726 0.075 # WA Rec CPUE
2947 2012 1 3 0.631 0.104 # WA Rec CPUE
2948 2013 1 3 0.713 0.078 # WA Rec CPUE
2949 2014 1 3 0.603 0.103 # WA Rec CPUE
2950
2951 0 #_N_fleets_with_discard
2952 #_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
2953 #_discard_errtype: >0 for DF of T-dist(read CV below); 0 for normal with C
2954 # V; -1 for normal with se; -2 for lognormal
2955 #Fleet Disc_units err_type
2956 0 #N discard obs
2957 #_year seas index obs err
2958 #

```

```

2959 0 #_N_meanbodywt_obs
2960 30 #_DF_for_meanbodywt_T-distribution_like
2961
2962 2 # length bin method: 1=use databins; 2=generate from binwidth,min,max be
2963 # low; 3=read vector
2964 2 # binwidth for population size comp
2965 8 # minimum size in the population (lower edge of first bin and size at ag
2966 # e 0.00)
2967 50 # maximum size in the population (lower edge of last bin)
2968
2969 -0.0001 #_comp_tail_compression
2970 1e-003 #_add_to_comp
2971 0 #_combine males into females at or below this bin number
2972 15 #_N_LengthBins
2973 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
2974
2975 38 #_N_Length_obs
2976
2977 ### WA Rec, South, All modes combined (represent 4% of WA removals, 1969-20
2978 # 14)
2979 ### initially assigning to fleet: "12_WA_SouthernWA_Rec_PCP"
2980 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c
2981 # m 26cm 28cm 30cm 32cm 34cm 36cm 38cm 40cm 42cm
2982 # 44cm 46cm+ repeat
2983 1981 1 1 0 2 8 0 0 0 0 0
2984 2 0 1 2 0 2 1 0 0 0
2985 0 0 0 0 0 0 2 1 2 0
2986 2 1 0 0 0 0 0 0 0 0
2987 2002 1 1 0 2 31 0 0 0 0
2988 2 5 0 8 7 8 1 0 0 0
2989 0 0 0 0 0 0 2 5 0 8
2990 7 8 1 0 0 0 0 0 0 0
2991 2003 1 1 0 2 32 0 0 0 0
2992 3 5 4 4 6 8 1 0 1 0
2993 0 0 0 0 0 0 3 5 4 4
2994 6 8 1 0 0 1 0 0 0 0
2995 2004 1 1 0 2 25 0 1 1 0
2996 3 5 7 2 4 2 0 0 7 0
2997 0 0 0 1 1 0 3 5 7 2
2998 4 2 0 0 0 0 0 0 0 0
2999 2005 1 1 0 2 5 0 0 0 0
3000 1 1 1 2 0 0 0 0 0 0

```

3001	0	0	0	0	0	0	0	0	1	1	1	1	2
3002	0	0	0	0	0	0	0	0	0	0	0	0	
3003	2006	1	1	0	2	11	0	0	1	1	1	1	1
3004	0	0	0	1	3	3	1	0	0	0	0	0	
3005	0	0	0	1	1	1	0	0	0	0	1	1	3
3006	3	1	0	0	0	0	0	0	0	0	0	0	
3007	2007	1	1	0	2	35	0	0	0	0	0	0	0
3008	0	2	2	9	11	3	3	3	1	2	2	2	
3009	2	0	0	0	0	0	0	0	2	2	2	9	
3010	11	3	3	1	2	2	2	0	0	0	0	0	
3011	2008	1	1	0	2	8	0	0	0	0	0	0	
3012	0	0	2	1	2	2	2	1	0	0	0	0	
3013	0	0	0	0	0	0	0	0	0	2	0	1	
3014	2	2	1	0	0	0	0	0	0	0	0	0	
3015	2009	1	1	0	2	23	0	0	0	0	0	1	
3016	1	2	1	3	3	2	1	3	2	2	3	3	
3017	2	0	0	0	0	1	1	2	2	1	1	3	
3018	3	2	3	2	3	3	2	0	0	0	0	3	
3019	2010	1	1	0	2	20	0	0	0	0	0	0	
3020	0	2	3	3	7	4	4	0	0	0	0	0	
3021	1	0	0	0	0	0	0	0	2	3	3	3	
3022	7	4	0	0	0	0	1	0	0	0	0	0	
3023	2011	1	1	0	2	19	0	0	0	0	0	0	
3024	2	6	6	2	1	2	0	0	0	0	0	0	
3025	0	0	0	0	0	0	0	2	6	6	6	2	
3026	1	2	0	0	0	0	0	0	0	0	0	0	
3027	2012	1	1	0	2	14	0	0	0	1	0	0	
3028	0	1	2	2	5	1	1	1	0	0	0	0	
3029	0	1	0	0	1	0	0	0	1	1	2	2	
3030	5	1	1	0	0	0	0	0	1	0	0	0	
3031	2013	1	1	0	2	16	0	0	0	0	0	0	
3032	0	3	1	2	3	5	2	0	0	0	0	0	
3033	0	0	0	0	0	0	0	0	3	1	1	2	
3034	3	5	2	0	0	0	0	0	0	0	0	0	
3035	2014	1	1	0	2	18	0	0	0	0	0	0	
3036	0	0	2	1	3	10	2	0	0	0	0	0	
3037	0	0	0	0	0	0	0	0	0	2	0	1	
3038	3	10	2	0	0	0	0	0	0	0	0	0	
3039	### WA Rec, North, All modes combined (represent 96% of WA removals, 1969-2												
3040	# 014)												
3041	### initially assigning to fleet: "14_WA_NorthernWA_Rec_PR"												

```

3043 ### ("WA_Rec_PC" has more catch than "WA_Rec_PC" but likely both will share
3044 # selectivity)
3045 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c
3046 # m 26cm 28cm 30cm 32cm 34cm 36cm 38cm 40cm 42cm
3047 # 44cm 46cm+ repeat
3048 1979 1 3 0 2 40 0 0 0 0
3049 0 0 1 11 14 11 1 1 1 1 0
3050 0 0 0 0 0 0 0 0 1 11 1
3051 4 11 1 1 1 0 0 0 0 0
3052 1980 1 3 0 2 2 0 0 0 0 0
3053 0 0 1 1 0 0 0 0 0 0 0
3054 0 0 0 0 0 0 0 0 0 1 1
3055 0 0 0 0 0 0 0 0 0 0
3056 1981 1 3 0 2 16 0 0 0 0
3057 0 0 1 2 3 0 0 3 3 1 1
3058 0 3 0 0 0 0 0 0 0 1 2
3059 3 0 3 3 1 0 3
3060 1983 1 3 0 2 2 0 0 0 0 0
3061 0 0 0 0 0 2 0 0 0 0 0
3062 0 0 0 0 0 0 0 0 0 0 0
3063 2 0 0 0 0 0 0 0 0
3064 1995 1 3 0 2 36 0 0 0 0 0
3065 0 4 8 12 9 3 0 0 0 0
3066 0 0 0 0 0 0 0 4 8 1
3067 2 9 3 0 0 0 0 0 0 0
3068 1996 1 3 0 2 16 0 0 0 0
3069 1 3 3 5 3 0 0 0 1 0
3070 0 0 0 0 0 0 1 3 3 5
3071 3 0 0 1 0 0 0 0
3072 1997 1 3 0 2 9 0 0 0 0
3073 0 1 0 1 2 2 1 2 0 0
3074 0 0 0 0 0 0 0 1 0 1
3075 2 2 1 2 0 0 0 0
3076 1998 1 3 0 2 58 0 0 0 0
3077 0 5 6 19 17 11 0 0 0 0
3078 0 0 0 0 0 0 0 5 6 1
3079 9 17 11 0 0 0 0 0 0
3080 1999 1 3 0 2 180 0 0 0 1
3081 2 10 36 65 46 17 3 0 10 36 6
3082 0 0 0 0 0 0 1 2 10 36 6
3083 5 46 17 3 0 0 0 0 0 0
3084 2000 1 3 0 2 55 0 0 0 0

```

3085	2	5	10	13	20	3	2	0	0	0	0
3086	0	0	0	0	0	0	2	5	10	1	
3087	3	20	3	2	0	0	0	0	0	0	1
3088	2001	1	3	0	2	38	0	0	0	0	1
3089	1	2	10	11	9	1	1	1	2	0	0
3090	0	0	0	0	0	1	1	2	10	1	
3091	1	9	1	1	2	0	0	0	0	0	1
3092	2002	1	3	0	2	38	0	0	0	0	0
3093	0	3	4	19	5	4	2	0	1		
3094	0	0	0	0	0	0	3	4	4	1	
3095	9	5	4	2	0	1	0	0	0	0	
3096	2003	1	3	0	2	28	0	0	0	0	0
3097	0	3	8	8	5	2	2	0	8	0	
3098	0	0	0	0	0	0	0	3	8	8	
3099	5	2	2	0	0	0	0	0	0	0	
3100	2004	1	3	0	2	198	0	0	1	0	0
3101	3	9	35	53	56	25	14	2	0	0	
3102	0	0	0	1	0	3	9	35	5	5	
3103	3	56	25	14	2	0	0	0	0	0	
3104	2005	1	3	0	2	358	0	0	2	1	
3105	1	16	49	109	106	42	27	5	0	0	
3106	0	0	0	0	2	1	1	16	49	1	
3107	09	106	42	27	5	0	0	0	0	0	
3108	2006	1	3	0	2	266	0	0	0	0	
3109	0	10	39	87	84	29	12	3	0	0	
3110	0	2	0	0	0	0	10	39	8		
3111	7	84	29	12	3	0	0	2	0	0	
3112	2007	1	3	0	2	185	0	0	0	0	
3113	2	5	24	48	60	31	12	3	0	0	
3114	0	0	0	0	0	2	5	24	4		
3115	8	60	31	12	3	0	0	0	0	0	
3116	2008	1	3	0	2	135	0	0	0	0	
3117	3	8	19	40	45	14	2	1	0	0	
3118	0	0	0	0	0	3	8	19	4		
3119	0	45	14	2	1	0	0	0	0	0	
3120	2009	1	3	0	2	95	0	1	0	0	
3121	1	7	14	28	22	14	4	2	14	1	
3122	1	0	1	0	0	1	1	7	14	2	
3123	8	22	14	4	2	1	1	0	0	0	
3124	2010	1	3	0	2	58	0	2	0	0	
3125	0	1	1	6	12	9	6	6	6	0	
3126	0	1	0	2	0	0	1	6	6	1	

```

3127 2      15     9      6      6      0      0      0      1
3128 2011   1      3      0      0      2      163    0      0      0      0      1
3129 1      2      10     30     42     41     25     1      1      25     9      2
3130 0      0      0      0      0      0      2      63    0      0      2      10     3
3131 0      42     41     25     9      2      0      0      0      0      0      0
3132 2012   1      3      0      0      2      63    0      0      0      0      0
3133 1      0      0      3      15     13     12     10     8      1      0
3134 0      0      0      0      0      0      0      1      0      0      3      1
3135 5      13     12     10     8      1      0      0      0      0
3136 2013   1      3      0      0      2      156   0      0      0      0
3137 0      7      14     40     39     40     10     5      0      5      0
3138 1      0      0      0      0      0      0      0      7      14     4
3139 0      39     40     10     5      0      1      0      0
3140 2014   1      3      0      0      2      423   0      0      0      0
3141 2      6      15     81     128   126   51     12     6      15     2
3142 0      0      0      0      0      0      2      0      0      15     8
3143 1      128   126   51     12     2      0      0      0
3144
3145
3146 47 #_N_age_bins
3147 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
3148 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
3149 2 #_N_ageerror_definitions
3150 # Default ageing error matrix (1st row is expected age, 2nd is standard dev
3151 # iation of age readings)
3152 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
3153 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
3154 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
3155 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
3156 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
3157 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
3158 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
3159 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
3160 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
3161 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
3162 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5
3163 10.5 11.5 12.5 13.5 14.5 15.5 16.5 17.5 18.5
3164 19.5 20.5 21.5 22.5 23.5 24.5 25.5 26.5 27.5 2
3165 8.5 29.5 30.5 31.5 32.5 33.5 34.5 35.5 36.5 37.5
3166 38.5 39.5 40.5 41.5 42.5 43.5 44.5 45.5 46.5
3167 47.5 48.5 49.5 50.5 51.5 52.5 53.5 54.5 55.5 56
3168 .5 57.5 58.5 59.5 60.5 61.5 62.5 63.5 64.5 65.5

```

```

3169      66.5     67.5     68.5     69.5     70.5     71.5     72.5     73.5     74.5
3170    75.5     76.5     77.5     78.5     79.5     80.5     ### 81.5          82.5     83.
3171    # 5       84.5     85.5     86.5     87.5     88.5     89.5     90.5     #Expected_ag
3172    0.0968   0.0968   0.1936   0.2904   0.3872   0.4840   0.5807   0.6775   0.7743   0.8
3173    711      0.9679   1.0647   1.1615   1.2583   1.3551   1.4519   1.5487   1.6455   1.7422
3174    1.8390   1.9358   2.0326   2.1294   2.2262   2.3230   2.4198   2.5166   2.6134   2
3175    .7102    2.8070   2.9037   3.0005   3.0973   3.1941   3.2909   3.3877   3.4845   3.58
3176    13       3.6781   3.7749   3.8717   3.9684   4.0652   4.1620   4.2588   4.3556   4.4524
3177    4.5492   4.6460   4.7428   4.8396   4.9364   5.0332   5.1299   5.2267   5.3235   5.
3178    4203    5.5171   5.6139   5.7107   5.8075   5.9043   6.0011   6.0979   6.1946   6.291
3179    4       6.3882   6.4850   6.5818   6.6786   6.7754   6.8722   6.9690   7.0658   7.1626
3180    7.2594   7.3561   7.4529   7.5497   7.6465   7.7433   ### 7.8401          7.9369   8.0
3181    # 337    8.1305   8.2273   8.3241   8.4209   8.5176   8.6144   8.7112   #SD
3182
3183
3184
3185
3186
3187
3188
3189
3190                      #####
3191    # Ageing error for ages associated with early years from former NWFSC age reader
3192    # (1st row is expected age, 2nd is standard deviation of age readings
3193    #
3194    #
3195    #
3196    #
3197    #
3198    #
3199    #
3200    # Age 0 Age 1   Age 2   Age 3   Age 4   Age 5   Age 6   Age 7   Age 8   Age
3201    # 9   Age 10  Age 11  Age 12  Age 13  Age 14  Age 15  Age 16  Age 17  Age
3202    # 18  Age 19  Age 20  Age 21  Age 22  Age 23  Age 24  Age 25  Age 26  Age 2
3203    # 7   Age 28  Age 29  Age 30  Age 31  Age 32  Age 33  Age 34  Age 35  Age 36
3204    #   Age 37  Age 38  Age 39  Age 40  Age 41  Age 42  Age 43  Age 44  Age 45
3205    #   Age 46  Age 47  Age 48  Age 49  Age 50  Age 51  Age 52  Age 53  Age 54
3206    #   Age 55  Age 56  Age 57  Age 58  Age 59  Age 60  Age 61  Age 62  Age 63  A
3207    #   ge 64  Age 65  Age 66  Age 67  Age 68  Age 69  Age 70  Age 71  Age 72  Ag
3208    #   e 73  Age 74  Age 75  Age 76  Age 77  Age 78  Age 79  Age 80  ### Age 81
3209    #   Age 82  Age 83  Age 84  Age 85  Age 86  Age 87  Age 88  Age 89  Age
3210    0.43     1.29     2.16     3.02     3.88     4.75     5.61     6.47     7.33     8.2

```

```

3211 0 9.06 9.92 10.79 11.65 12.51 13.37 14.24 15.10 15.96
3212 16.83 17.69 18.55 19.41 20.28 21.14 22.00 22.86 23.73 2
3213 4.59 25.45 26.32 27.18 28.04 28.90 29.77 30.63 31.49 32.3
3214 6 33.22 34.08 34.94 35.81 36.67 37.53 38.40 39.26 40.12
3215 40.98 41.85 42.71 43.57 44.44 45.30 46.16 47.02 47.89 48
3216 .75 49.61 50.47 51.34 52.20 53.06 53.93 54.79 55.65 56.51
3217 57.38 58.24 59.10 59.97 60.83 61.69 62.55 63.42 64.28
3218 65.14 66.01 66.87 67.73 68.59 69.46 ### 70.32 71.18 72.
3219 # 05 72.91 73.77 74.63 75.50 76.36 77.22 78.09 #Expected_ag
3220 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
3221 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
3222 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
3223 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
3224 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
3225 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
3226 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
3227 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
3228 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
3229 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD
3230
3231 123 #_N_Agecomp_obs
3232 3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
3233 0 #_combine males into females at or below this bin number
3234
3235 ### WA Rec, South, All modes combined
3236 ### initially assigning to fleet: "12_WA_SouthernWA_Rec_PCPR"
3237 #Yr Seas Flt/Svy Gender Part AgeError LbinLo LbinHi Nsa
3238 # mp 4yrs 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yr
3239 # s 13yrs 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs
3240 # 22yrs 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs
3241 # 31yrs 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs
3242 # 40yrs 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs
3243 # 49yrs 50+yrs repeat
3244 2014 1 -1 0 0 1 -1 -1 15 0
3245 0 0 0 1 1 0 0 0 0 0
3246 0 0 0 1 1 1 0 0 0 1
3247 1 0 0 0 1 1 1 1 2 0
3248 0 0 1 0 1 0 0 0 0 0
3249 0 0 1 1 0 0 0 0 0 0
3250 0 0 0 0 1 1 0 0 0 0
3251 0 0 0 0 1 1 1 0 2 0
3252 1 1 0 0 0 1 1 1 2 0

```

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3253      0      0      1      0      1      0      0      0      0      0      0
3254
3255  ### WA Rec, North, All modes combined
3256  ### initially assigning to fleet: "14_WA_NorthernWA_Rec_PR"
3257  ### NOTE: setting fleet number negative to exclude from likelihood
3258  ###          to avoid double counting with conditional age-at-length values
3259  ###
3260 #Yr      Seas     Flt/Svy Gender Part    AgeErr  LbinLo  LbinHi Nsamp  4yr
3261 # s      5yrs    6yrs    7yrs   8yrs   9yrs   10yrs  11yrs  12yrs  13yr
3262 # s     14yrs   15yrs   16yrs  17yrs  18yrs  19yrs  20yrs  21yrs  22yrs
3263 #     23yrs   24yrs   25yrs  26yrs  27yrs  28yrs  29yrs  30yrs  31yrs
3264 #     32yrs   33yrs   34yrs  35yrs  36yrs  37yrs  38yrs  39yrs  40yrs
3265 #     41yrs   42yrs   43yrs  44yrs  45yrs  46yrs  47yrs  48yrs  49yrs
3266 # 50+ yrs repeat
3267 1998    1        -3      0      2      1      -1      -1      50      0
3268      0      0      0      0      0      2      1      1      1      2
3269      1      1      3      5      4      5      4      3      2      2
3270      1      0      0      1      2      0      0      0      0      1
3271      0      0      0      0      2      0      3      0      0      0
3272      1      0      0      0      0      0      0      0      2      0
3273      0      0      0      0      0      2      1      1      1      2
3274      1      1      3      5      4      5      4      3      2      0
3275      2      1      0      1      2      0      0      0      0      1
3276      0      0      0      0      2      0      3      0      0      0
3277 1999    1        -3      0      2      1      -1      -1      55      0
3278      0      0      0      1      3      3      4      5      0      4
3279      3      3      3      2      3      4      4      1      3      0
3280      1      1      1      0      0      2      0      0      1      0
3281      1      0      0      0      0      1      0      0      0      0
3282      0      1      1      0      0      0      0      1      2      0
3283      0      0      0      0      1      3      4      5      0      4
3284      3      3      3      2      3      4      4      1      3      0
3285      0      1      1      0      2      0      0      0      1      0
3286      1      0      0      0      0      1      0      0      0      0
3287 2000    1        -3      0      2      1      -1      -1      55      0
3288      0      0      0      0      0      2      0      2      4      4
3289      0      2      1      1      0      2      2      4      2      1
3290      1      2      2      0      0      0      0      2      1      0
3291      0      1      1      1      0      1      1      1      2      1
3292      0      2      1      1      0      0      0      0      5      0
3293      0      0      0      1      0      1      2      2      3      4
3294      0      2      1      0      1      0      2      2      4      4

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3295	1	1	2	0	0	0	0	0	2	1	0
3296	0	1	1	-3	1	0	1	1	1	2	1
3297	2001	1	-3	0	2	1	1	-1	-1	26	0
3298	1	0	1	0	0	0	0	4	3	0	0
3299	1	2	3	2	1	0	0	0	0	0	0
3300	0	0	0	0	0	1	0	0	0	1	0
3301	0	0	1	1	0	0	0	0	0	0	0
3302	0	0	0	0	0	0	0	0	1	3	0
3303	1	0	1	0	0	0	0	0	4	3	0
3304	1	2	3	2	1	0	0	0	0	0	0
3305	0	0	0	0	0	1	0	0	0	1	0
3306	0	0	1	1	0	0	0	0	0	0	0
3307	2002	1	-3	0	2	1	0	-1	-1	11	0
3308	0	0	0	0	0	0	0	4	1	1	1
3309	2	0	1	0	1	0	0	0	1	0	0
3310	0	0	0	0	0	0	0	0	0	0	0
3311	0	0	0	0	0	0	0	0	0	0	0
3312	0	0	0	0	0	0	0	0	0	0	0
3313	0	0	0	0	0	0	0	4	1	1	1
3314	2	0	1	0	1	0	0	0	1	0	0
3315	0	0	0	0	0	0	0	0	0	0	0
3316	0	0	0	0	0	0	0	0	0	0	0
3317	#2003	1	-3	0	2	1	-1	-1	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	#	0	0	0	0	0	0	0	0	0	0
3326	#	0	0	0	0	0	0	0	0	0	0
3327	2004	1	-3	0	2	1	-1	-1	171	0	0
3328	0	0	1	5	9	10	5	4	4	10	0
3329	7	12	10	9	4	3	6	5	9	8	9
3330	6	10	9	3	3	3	3	4	1	1	1
3331	0	0	0	2	0	0	0	0	0	1	1
3332	2	0	0	0	0	0	0	1	1	1	0
3333	0	0	1	5	9	10	5	4	9	10	0
3334	7	12	10	9	4	6	5	9	8	1	1
3335	9	6	10	9	3	3	3	4	1	1	1
3336	0	0	0	2	0	0	0	0	0	1	1

3337	2005	1	-3	0	2	1	-1	-1	206	0
3338	0	1	3	7	14	9	10	14	9	1
3339	11	18	9	12	11	6	5	6	4	1
3340	0	4	5	3	7	5	3	1	1	2
3341	0	0	2	0	2	2	0	1	1	1
3342	0	1	0	0	0	1	0	1	5	0
3343	0	1	3	7	14	9	10	14	9	0
3344	11	18	9	12	11	6	5	6	4	
3345	10	4	5	3	7	5	3	1	1	2
3346	0	0	2	0	2	2	0	1	1	1
3347	2006	1	-3	0	2	1	-1	-1	88	0
3348	0	0	0	3	0	3	9	4	7	
3349	3	8	5	8	2	4	5	2	5	5
3350	1	0	3	0	3	2	0	0	0	0
3351	0	1	0	0	0	0	0	2	0	0
3352	0	1	0	0	1	0	0	0	1	0
3353	0	0	0	0	3	0	3	9	4	7
3354	3	8	5	8	2	4	5	2	5	
3355	5	1	0	3	0	3	2	0	0	0
3356	0	1	0	0	0	0	0	2	0	0
3357	2007	1	-3	0	2	1	-1	-1	119	0
3358	0	0	1	2	1	2	5	1	6	
3359	6	3	3	8	6	5	4	4	7	3
3360	10	3	5	2	3	1	4	5	4	
3361	0	0	0	0	2	0	0	1	0	0
3362	2	0	0	2	0	0	1	0	7	0
3363	0	0	1	2	1	2	5	1	6	
3364	6	3	3	8	6	5	4	4	7	
3365	3	10	3	5	2	3	1	4	5	4
3366	0	0	0	0	2	0	0	1	0	0
3367	2008	1	-3	0	2	1	-1	-1	73	0
3368	1	0	0	1	2	2	3	6	5	
3369	4	3	3	3	5	3	9	1	2	0
3370	4	3	2	2	1	3	2	1	1	0
3371	0	1	0	0	0	0	0	1	1	1
3372	0	0	0	0	0	0	0	1	1	0
3373	1	0	0	1	2	2	3	6	5	
3374	4	3	3	3	5	3	9	1	2	
3375	0	4	3	2	2	1	2	1	1	0
3376	0	1	0	0	0	0	0	1	1	1
3377	2009	1	-3	0	2	1	-1	-1	22	0
3378	0	0	0	0	2	2	0	2	0	0

3379	3	0	1	0	0	0	0	0	0	0	0	0	1	1
3380	0	0	1	0	1	0	0	0	2	0	0	1	0	3
3381	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3382	1	0	0	0	0	0	0	0	0	0	0	0	1	0
3383	0	0	0	0	0	0	0	2	0	2	0	0	2	0
3384	3	0	1	0	0	0	0	0	2	0	0	0	1	1
3385	1	0	0	1	1	0	0	2	0	0	1	0	0	3
3386	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3387	2010	1	-3	0	2	1	-1	-1	-1	22	0	0	0	0
3388	0	0	0	0	0	1	1	1	1	0	0	0	0	0
3389	2	3	1	0	0	1	1	1	0	0	0	1	1	0
3390	2	2	1	0	0	1	0	0	0	1	0	0	0	3
3391	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3392	1	0	0	0	0	0	0	0	0	0	0	1	0	0
3393	0	0	0	0	0	0	1	1	1	1	0	0	0	0
3394	2	3	1	0	0	1	1	1	0	0	0	0	1	1
3395	0	2	1	0	0	1	0	0	0	0	1	0	0	3
3396	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3397	2011	1	-3	0	2	1	-1	-1	-1	50	0	0	0	0
3398	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3399	1	2	2	2	3	2	2	2	2	3	2	2	1	1
3400	4	5	4	1	2	0	2	0	1	1	2	2	2	2
3401	2	0	2	0	0	0	0	1	1	0	0	0	0	0
3402	0	0	0	0	0	0	0	0	0	0	2	0	0	0
3403	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3404	1	2	2	2	3	2	2	2	2	3	2	2	1	1
3405	1	4	5	4	1	2	0	0	1	1	2	2	2	2
3406	2	0	2	0	0	0	0	1	1	1	0	0	0	0
3407	2012	1	-3	0	2	1	-1	-1	-1	24	0	0	0	0
3408	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3409	0	0	0	0	3	1	1	1	1	0	0	3	2	2
3410	1	1	1	1	1	2	2	2	0	0	1	1	2	2
3411	1	0	1	0	0	0	0	0	0	0	0	0	0	0
3412	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3413	0	0	0	0	0	0	0	0	0	1	0	0	0	0
3414	0	0	0	0	0	3	1	1	1	0	0	3	2	2
3415	2	1	1	1	1	1	2	2	2	0	1	1	2	2
3416	1	0	1	0	0	0	0	0	0	0	0	0	0	0
3417	2013	1	-3	0	2	1	-1	-1	-1	11	0	0	0	0
3418	0	0	0	1	0	0	0	1	0	0	0	0	0	0
3419	0	0	0	0	1	0	0	0	0	1	3	2	2	1
3420	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```

3421      0      0      1      0      0      0      0      0      0      0      0      0      0      0      0      0      0
3422      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
3423      0      0      0      1      0      0      0      0      1      0      0      0      0      0      0      0      0
3424      0      0      0      0      1      0      0      0      0      0      0      0      3      2      0      0
3425      1      0      0      0      0      0      0      0      0      0      1      0      0      0      0      0      0
3426      0      1      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
3427 2014     1     -3      0      2      1      -1      -1      -1      398      0
3428      0      0      1      1      3      15      4      17      18      10      11      11      11
3429     13      3      7     13     15     17     18     15     19      2
3430     4     28     21     10     11     12     13     15     12     12     12     12
3431     10      7     13      9      7      3      1      0      3      2      1
3432      0      1      3      0      1      1      1      0      1      17      0
3433      0      0      1      1      3      4      4      10      11      11      11
3434     13      3      7     13     15     17     18     15     19
3435     24     28     21     10     11     12     13     15     12     12     12
3436     10      7     13      9      7      3      1      0      2      1
3437
3438
3439 ##### conditional age-at-length observations
3440
3441 #### WA Rec, North, All modes combined (represent 96% of landings)
3442 #### initially assigning to fleet: "14_WA_NorthernWA_Rec_PR"
3443 #Yr      Seas     Flt/Svy Gender Part      AgeErr LbinLo LbinHi Nsamp   4yr
3444 # s      5yrs    6yrs    7yrs    8yrs    9yrs   10yrs   11yrs   12yrs   13yr
3445 # s     14yrs   15yrs   16yrs   17yrs   18yrs   19yrs   20yrs   21yrs   22yrs
3446 #     23yrs   24yrs   25yrs   26yrs   27yrs   28yrs   29yrs   30yrs   31yrs
3447 #     32yrs   33yrs   34yrs   35yrs   36yrs   37yrs   38yrs   39yrs   40yrs
3448 #     41yrs   42yrs   43yrs   44yrs   45yrs   46yrs   47yrs   48yrs   49yrs
3449 #     50yrs   repeat
3450 1998     1      3      0      2      1      28      28      5      0
3451     0      0      0      0      0      2      0      1      1      1
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      0      0      0      0      0
3455     0      0      0      0      0      0      0      0      0      0
3456     0      0      0      0      0      2      0      1      1      1
3457     0      0      0      0      0      0      0      0      0      0
3458     0      0      0      0      0      0      0      0      0      0
3459     0      0      0      0      0      0      0      0      0      0
3460 1998     1      3      0      2      1      30      30      6      0
3461     0      0      0      1      0      0      0      1      0      1
3462     0      0      1      1      1      0      1      0      1      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	0
3465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3467	0	0	0	1	1	0	0	1	0	0	1	0	1	1	0
3468	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3469	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3470	1998	1	3	0	0	2	1	32	32	32	19	0	0	0	0
3471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3472	1	1	2	3	3	0	2	2	0	0	0	0	0	0	0
3473	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
3474	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3475	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
3476	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3477	1	1	2	3	3	0	2	2	0	0	0	0	0	0	0
3478	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1
3479	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3480	1998	1	3	0	0	2	1	34	34	34	13	0	0	0	0
3481	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3482	0	0	0	1	1	1	2	0	0	2	0	0	0	0	2
3483	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
3484	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
3485	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3486	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3487	0	0	0	0	1	1	1	2	0	0	2	0	0	0	0
3488	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0
3489	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
3490	1998	1	3	0	0	2	1	36	36	36	7	0	0	0	0
3491	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3492	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
3493	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3494	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0
3495	0	0	0	0	0	0	0	0	0	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	0	0	0	0	2	0	0	1	0	0	0
3498	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3499	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0
3500	1999	1	3	0	0	2	1	26	26	26	2	0	0	0	0
3501	0	0	0	0	0	0	1	1	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	0
3504	0	0	0	0	0	0	0	0	0	0	0	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	1	0	1	0	0	0	0
3507	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3508	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3509	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3510	1999	1	3	0	0	2	1	28	28	28	2	0	0	0
3511	0	0	0	0	0	0	1	1	1	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	0	0	0	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	1	1	1	0	0	0	0
3517	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3518	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3519	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3520	1999	1	3	0	0	2	1	30	30	30	10	0	0	0
3521	0	0	0	0	1	2	1	1	2	0	0	1	0	0
3522	0	0	0	0	0	1	1	1	0	0	0	0	0	0
3523	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3524	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3525	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3526	0	0	0	0	0	1	2	1	1	2	0	0	1	0
3527	0	0	0	0	0	0	1	1	0	0	0	0	0	0
3528	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3529	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3530	1999	1	3	0	0	2	1	32	32	32	25	0	0	0
3531	0	0	0	0	0	0	0	1	1	2	0	3	3	0
3532	3	3	1	2	1	0	1	1	2	1	3	0	0	0
3533	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3534	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3535	0	1	0	0	0	0	0	0	0	1	0	0	0	0
3536	0	0	0	0	0	0	0	1	1	2	0	3	0	0
3537	3	3	1	2	1	0	1	1	2	1	3	0	0	0
3538	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3539	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3540	1999	1	3	0	0	2	1	34	34	34	11	0	0	0
3541	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3542	0	0	2	0	0	1	1	1	2	0	0	0	0	0
3543	0	0	1	0	0	1	0	0	0	0	1	0	0	0
3544	0	0	0	0	0	0	1	0	0	0	0	0	1	0
3545	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3546	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3547	0	0	0	2	0	1	1	1	2	0	0	0	0
3548	0	0	0	1	0	1	0	0	0	0	1	0	0
3549	0	0	0	0	0	1	1	0	0	0	0	0	0
3550	1999	1	3	0	0	2	1	1	36	36	4	0	0
3551	0	0	0	0	0	0	0	0	0	0	0	0	0
3552	0	0	0	0	0	0	1	0	0	0	0	0	0
3553	1	0	0	0	0	0	0	0	0	0	0	0	0
3554	1	0	0	0	0	0	0	0	0	0	0	0	0
3555	0	0	0	0	0	0	0	0	0	0	1	0	0
3556	0	0	0	0	0	0	0	1	0	0	0	0	0
3557	0	0	0	0	0	0	0	1	0	0	0	0	0
3558	0	1	0	0	0	0	0	0	0	0	0	0	0
3559	1	0	0	0	0	0	0	0	0	0	0	0	0
3560	1999	1	3	0	0	2	1	1	38	38	1	0	0
3561	0	0	0	0	0	0	0	0	0	0	0	0	0
3562	0	0	0	0	0	0	0	0	0	0	0	0	0
3563	0	0	0	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
3569	0	0	0	0	0	0	0	0	0	0	0	0	0
3570	2000	1	3	0	0	2	1	1	26	26	2	0	0
3571	0	0	0	0	0	0	0	1	0	0	1	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	0	0	0	0	0	0
3575	0	0	0	0	0	0	0	0	1	0	0	1	0
3576	0	0	0	0	0	0	0	0	1	0	0	1	0
3577	0	0	0	0	0	0	0	0	0	0	0	0	0
3578	0	0	0	0	0	0	0	0	0	0	0	0	0
3579	0	0	0	0	0	0	0	0	0	0	0	0	0
3580	2000	1	3	0	0	2	1	1	28	28	5	0	0
3581	0	0	0	0	0	0	0	0	0	2	0	1	0
3582	0	1	0	0	0	0	0	0	0	0	0	0	0
3583	1	0	0	0	0	0	0	0	0	0	0	0	0
3584	0	0	0	0	0	0	0	0	0	0	0	0	0
3585	0	0	0	0	0	0	0	0	0	0	0	0	0
3586	0	0	0	0	0	0	0	0	0	2	0	0	1
3587	0	1	0	0	0	0	0	0	0	0	0	0	0
3588	0	1	0	0	0	0	0	0	0	0	0	0	0

3589	0	0	0	0	0	0	0	0	0	0	0	0	0
3590	2000	1	3	0	0	2	1	30	30	10	0	0	0
3591	0	0	0	0	0	0	1	1	1	1	2	0	0
3592	0	0	0	0	0	0	1	1	0	0	1	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	0	0	0	0	0
3595	0	0	0	0	0	0	0	0	0	0	0	0	0
3596	0	0	0	0	0	0	1	1	1	1	2	0	0
3597	0	0	0	0	0	0	1	1	0	0	1	0	0
3598	0	0	0	0	0	0	0	0	0	0	0	0	0
3599	0	0	0	0	0	0	1	1	0	0	0	0	0
3600	2000	1	3	0	0	2	1	32	32	13	0	0	0
3601	0	0	0	0	0	0	0	0	0	2	1	1	0
3602	0	0	0	1	1	0	0	2	2	1	0	0	0
3603	0	0	0	0	0	0	0	0	1	0	0	0	0
3604	0	0	0	0	0	0	0	0	0	1	0	0	0
3605	0	0	0	0	0	0	0	0	0	0	1	0	0
3606	0	0	0	0	0	0	0	0	0	2	2	1	1
3607	0	0	0	0	1	1	0	0	2	2	1	0	0
3608	0	0	0	0	0	0	0	0	1	0	0	0	0
3609	0	0	0	0	0	0	0	0	0	1	0	0	0
3610	2000	1	3	0	0	2	1	34	34	20	0	0	0
3611	0	0	0	0	0	0	0	0	0	0	0	0	0
3612	0	1	1	0	0	1	1	1	0	1	2	0	0
3613	0	0	2	0	0	0	0	0	1	1	1	0	0
3614	0	1	1	0	1	0	0	0	0	1	1	0	0
3615	0	2	0	0	0	0	0	0	0	0	2	0	0
3616	0	0	0	0	0	0	0	0	0	0	0	0	0
3617	0	1	1	0	0	1	1	0	1	0	2	0	0
3618	0	0	2	0	0	0	0	0	1	1	1	0	0
3619	0	1	1	1	0	1	0	0	0	1	1	1	0
3620	2000	1	3	0	0	2	1	36	36	3	0	0	0
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	1
3623	0	0	0	0	0	0	0	0	0	0	0	0	0
3624	0	0	0	0	0	0	0	0	0	0	0	0	0
3625	0	0	1	0	0	0	0	0	0	0	1	0	0
3626	0	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	1	0	0	0	0	0	0	0	0	0	0	0	0
3629	0	0	0	0	0	0	0	0	0	0	0	0	0
3630	2000	1	3	0	0	2	1	38	38	2	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	0	0	0	0	0	0	0	0
3633	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3634	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3635	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3636	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3637	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3638	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3639	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3640	2001	1	3	0	0	2	1	24	24	1	0	0	0	0
3641	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3649	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3650	2001	1	3	0	0	2	1	26	26	1	0	0	0	0
3651	0	0	0	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3659	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3660	2001	1	3	0	0	2	1	28	28	2	0	0	0	0
3661	0	0	0	0	0	0	0	0	0	0	2	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	0	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	2	0	0
3667	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3668	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3669	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3670	2001	1	3	0	0	2	1	30	30	7	0	0	0	0
3671	0	0	1	0	0	0	0	0	4	0	1	0	0	0
3672	0	1	1	1	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	0	0	0	0	0
3675	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3676	0	0	0	1	0	0	0	0	0	4	0	1	0	0
3677	0	0	1	1	0	0	0	0	0	0	0	0	0	0
3678	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3679	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3680	2001	1	3	0	0	2	1	32	32	6	0	0	0	0
3681	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3682	1	0	1	2	1	0	0	0	0	0	0	0	0	0
3683	0	0	0	0	0	0	0	0	0	0	1	0	0	0
3684	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3685	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3686	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3687	1	0	0	1	2	1	0	0	0	0	0	0	0	0
3688	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3689	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3690	2001	1	3	0	0	2	1	34	34	6	0	0	0	0
3691	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3692	0	1	1	0	0	0	0	0	0	0	0	0	0	0
3693	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3694	0	0	0	1	1	0	0	0	0	0	0	0	0	0
3695	0	0	0	0	0	0	0	0	0	0	1	1	0	0
3696	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3697	0	1	1	0	0	0	0	0	0	0	0	0	0	0
3698	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3699	0	0	0	1	1	0	0	0	0	0	0	0	0	0
3700	2001	1	3	0	0	2	1	36	36	1	0	0	0	0
3701	0	0	0	0	0	0	0	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	1	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	0	0	0	0	0	0	0	0
3707	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3708	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3709	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3710	2001	1	3	0	0	2	1	38	38	1	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	0	0	0
3714	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
3719	0	0	0	0	0	0	0	0	0	0	0	0	0
3720	2001	1	3	0	0	2	1	40	40	1	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	0	0
3723	0	0	0	0	0	0	0	0	0	0	0	0	0
3724	0	0	0	0	0	0	0	0	0	0	0	1	0
3725	0	0	0	0	0	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
3729	0	0	0	0	0	0	0	0	0	0	0	0	0
3730	2002	1	3	0	0	2	1	28	28	1	0	0	0
3731	0	0	0	0	0	0	0	0	0	0	0	0	0
3732	1	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	0	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	1	0	0	0	0	0	0	0	0	0	0	0	0
3738	0	0	0	0	0	0	0	0	0	0	0	0	0
3739	0	0	0	0	0	0	0	0	0	0	0	0	0
3740	2002	1	3	0	0	2	1	30	30	2	0	0	0
3741	0	0	0	0	0	0	0	0	2	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	0	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	2	0	0	0	0
3747	0	0	0	0	0	0	0	0	0	0	0	0	0
3748	0	0	0	0	0	0	0	0	0	0	0	0	0
3749	0	0	0	0	0	0	0	0	0	0	0	0	0
3750	2002	1	3	0	0	2	1	32	32	8	0	0	0
3751	0	0	0	1	0	0	0	0	2	1	1	0	1
3752	1	0	0	1	0	1	0	0	0	1	0	0	0
3753	0	0	0	0	0	0	0	0	0	0	0	0	0
3754	0	0	0	0	0	0	0	0	0	0	0	0	0
3755	0	0	0	0	0	0	0	0	2	0	1	0	1
3756	0	0	0	0	0	0	0	0	0	1	0	0	0

3757	1	0	0	1	0	0	1	0	0	0	1	0	0
3758	0	0	0	0	0	0	0	0	0	0	0	0	0
3759	0	0	0	0	0	0	0	0	0	0	0	0	0
3760	2004	1	3	0	0	2	1	22	22	22	1	0	0
3761	0	0	0	1	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	0	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	1	0	0	0	0	0	0	0	0	0
3767	0	0	0	0	0	0	0	0	0	0	0	0	0
3768	0	0	0	0	0	0	0	0	0	0	0	0	0
3769	0	0	0	0	0	0	0	0	0	0	0	0	0
3770	2004	1	3	0	0	2	1	26	26	26	3	0	0
3771	0	0	0	0	1	0	1	1	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	0	0	0	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	1	0	1	0	0	0	0	0
3777	0	0	0	0	0	0	0	0	0	0	0	0	0
3778	0	0	0	0	0	0	0	0	0	0	0	0	0
3779	0	0	0	0	0	0	0	0	0	0	0	0	0
3780	2004	1	3	0	0	2	1	1	28	28	28	5	0
3781	0	0	0	0	1	0	1	0	0	0	0	1	0
3782	0	0	0	0	0	0	0	0	1	1	0	0	0
3783	0	0	0	0	0	0	0	0	0	0	0	0	0
3784	0	0	0	0	0	0	0	0	0	0	0	0	0
3785	0	0	0	0	0	0	0	0	0	0	0	0	0
3786	0	0	0	0	0	1	0	1	0	0	1	0	1
3787	0	0	0	0	0	0	0	0	1	0	1	0	0
3788	0	0	0	0	0	0	0	0	0	0	0	0	0
3789	0	0	0	0	0	0	0	0	0	0	0	0	0
3790	2004	1	3	0	0	2	1	1	30	30	30	32	0
3791	0	0	0	0	2	1	1	3	1	1	2	0	0
3792	1	2	4	1	1	1	1	1	1	3	3	3	2
3793	0	1	1	1	0	1	0	0	1	0	0	0	0
3794	0	0	0	0	0	0	0	0	0	0	0	0	0
3795	0	0	0	0	0	0	0	0	0	0	0	0	0
3796	0	0	0	0	2	1	1	3	1	1	2	0	0
3797	1	2	4	1	1	1	1	0	1	1	1	3	0
3798	2	0	1	1	1	1	0	1	1	1	0	3	0

3799	0	0	0	0	0	0	0	0	0	0	0	0	0
3800	2004	1	3	0	0	2	1	32	32	48	0	0	0
3801	0	0	0	1	6	4	3	1	6				
3802	3	4	2	4	0	2	0	3	3	3	1	1	1
3803	1	1	1	1	1	0	0	0	0	0	0	0	1
3804	0	0	0	0	0	0	0	0	0	0	0	0	0
3805	0	0	0	0	0	0	0	0	0	0	0	0	0
3806	0	0	0	0	1	6	4	3	1	6			
3807	3	4	2	4	0	2	0	3	3	3	1	3	
3808	1	1	1	1	1	0	0	0	0	0	0	0	1
3809	0	0	0	0	0	0	0	0	0	0	0	0	0
3810	2004	1	3	0	0	2	1	34	34	46	0	0	0
3811	0	0	0	0	0	0	2	1	1	0	2	2	
3812	3	4	0	4	3	1	1	1	1	2		3	
3813	2	5	5	0	0	2	2	1	1	0	0	0	
3814	0	0	0	0	0	0	0	0	0	0	0	0	
3815	1	0	0	0	0	0	0	0	0	1	0	0	
3816	0	0	0	0	0	2	1	1	0	0	2	2	
3817	3	4	0	4	3	1	1	1	1	2			
3818	3	2	5	5	0	2	2	1	1	0	0	0	
3819	0	0	0	0	0	0	0	0	0	0	0	0	
3820	2004	1	3	0	0	2	1	36	36	20	0	0	0
3821	0	0	0	0	0	0	0	0	1	0	1	0	
3822	0	2	3	0	0	0	2	0	0	0	0	0	3
3823	0	0	0	2	0	1	0	2	0	0	0	0	
3824	0	0	0	0	0	0	0	0	0	0	0	0	
3825	0	0	0	0	0	0	0	0	1	0	0	0	
3826	0	0	0	0	0	0	0	0	1	0	1	0	
3827	0	2	3	0	0	2	0	2	0	0	0	0	
3828	3	0	0	2	0	1	0	0	2	0	0	0	
3829	0	0	0	0	0	0	0	0	0	0	0	0	
3830	2004	1	3	0	0	2	1	38	38	14	0	0	0
3831	0	0	0	0	0	0	0	0	0	0	0	0	
3832	0	0	1	1	0	0	0	0	1	0	0	0	
3833	3	3	0	0	1	0	0	0	0	0	0	0	
3834	0	0	0	0	1	0	0	0	0	0	1	0	
3835	1	0	0	0	0	0	0	0	0	0	0	0	
3836	0	0	0	0	0	0	0	0	0	0	0	0	
3837	0	0	1	1	0	0	0	0	1	0	0	0	
3838	0	3	3	0	0	1	0	0	1	0	0	0	
3839	0	0	0	0	1	2	1	40	40	2	1	0	
3840	2004	1	3	0	0	2	1	40	40	2	0	0	

3841	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3842	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3843	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3844	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3845	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3846	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3847	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3848	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3849	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3850	2005	1	3	0	0	2	1	22	22	2	0	0	0	0
3851	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3852	0	2	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	0	0	0	0	0	0	0	0	0	0	0	0
3855	0	0	0	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	2	0	0	0	0	0	0	0	0	0	0	0	0
3858	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3859	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3860	2005	1	3	0	0	2	1	26	26	1	0	0	0	0
3861	0	0	0	0	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3869	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3870	2005	1	3	0	0	2	1	28	28	12	0	0	0	0
3871	0	1	1	1	2	2	1	0	0	2	0	0	0	0
3872	2	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0
3875	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3876	0	0	1	1	2	2	1	0	0	2	0	0	0	0
3877	2	0	0	0	1	0	0	0	0	0	0	0	0	0
3878	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3879	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3880	2005	1	3	0	0	2	1	30	30	31	0	0	0	0
3881	0	0	0	0	1	6	4	1	1	2	1	2	0	1
3882	0	1	3	4	1	2	1	1	1	0	1	0	1	1

3883	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
3884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3885	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3886	0	0	0	0	1	6	4	1	1	2	1	1	2	0	1
3887	0	1	3	4	1	2	1	0	0	0	0	0	0	0	0
3888	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
3889	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3890	2005	1	3	0	2	1	32	32	32	60	0	0	0	0	0
3891	0	0	2	3	5	3	6	7	7	3	0	0	0	0	0
3892	3	3	4	2	5	3	2	0	0	0	0	0	0	0	2
3893	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0
3894	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
3895	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3896	0	0	2	3	5	3	6	7	7	3	0	0	0	0	3
3897	3	3	4	2	5	3	2	0	0	0	0	0	0	0	0
3898	2	1	1	0	1	2	0	0	0	0	0	0	0	0	0
3899	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
3900	2005	1	3	0	0	2	1	34	34	34	60	0	0	0	0
3901	0	0	0	0	0	1	1	1	1	1	2	1	4	0	0
3902	3	9	1	4	3	1	1	4	3	1	1	1	3	0	5
3903	2	3	1	1	3	2	1	1	1	1	0	1	0	0	0
3904	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0
3905	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
3906	0	0	0	0	0	1	1	1	1	1	2	1	4	0	0
3907	3	9	1	4	3	1	1	1	1	1	4	3	0	0	0
3908	5	2	3	1	1	3	2	1	1	1	0	1	0	0	0
3909	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0
3910	2005	1	3	0	0	2	1	36	36	36	22	0	0	0	0
3911	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
3912	2	2	0	1	2	0	0	1	0	1	1	1	0	0	1
3913	0	0	1	0	0	3	1	1	1	0	0	0	0	0	0
3914	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3915	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0
3916	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
3917	2	2	0	1	2	0	0	1	0	1	1	1	0	0	0
3918	1	0	1	0	3	1	1	1	1	0	0	0	0	0	0
3919	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
3920	2005	1	3	0	2	1	38	38	38	15	0	0	0	0	0
3921	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
3922	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1
3923	0	0	0	1	1	0	1	0	0	1	0	0	1	0	1
3924	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0

3925	0	1	0	0	0	0	0	0	0	0	0	0	3	0
3926	0	0	1	0	0	0	0	0	0	0	1	0	0	0
3927	1	1	1	0	0	0	0	0	0	0	0	0	0	1
3928	1	0	0	0	1	1	0	0	0	1	0	0	1	1
3929	0	0	1	0	0	2	1	0	0	0	40	40	0	0
3930	2005	1	3	0	0	1	1	40	40	0	3	0	0	0
3931	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3932	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3933	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3934	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3935	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3936	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3937	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3938	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3939	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3940	2006	1	3	0	0	2	1	28	28	5	0	0	0	0
3941	0	0	0	0	1	0	0	1	2	0	0	0	0	0
3942	0	1	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	0	0	0	0	0	0	0	0	0	0
3945	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3946	0	0	0	0	1	0	0	1	2	0	0	0	0	0
3947	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3948	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3949	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3950	2006	1	3	0	0	2	1	30	30	12	0	0	0	0
3951	0	0	0	0	0	0	0	2	0	0	0	0	1	0
3952	2	1	0	0	4	1	0	0	0	0	0	0	0	0
3953	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3954	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3955	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3956	0	0	0	0	0	0	0	2	0	0	0	0	0	1
3957	2	1	0	0	4	1	0	0	0	0	0	0	0	0
3958	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3959	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3960	2006	1	3	0	0	2	1	32	32	33	0	0	0	0
3961	0	0	0	0	2	0	0	0	6	3	3	3	0	0
3962	0	2	2	1	1	0	2	2	4	0	0	3	0	0
3963	1	0	0	1	0	0	2	0	0	0	0	0	0	0
3964	0	0	0	0	0	0	0	0	0	1	0	0	0	0
3965	0	0	0	0	0	2	0	0	6	0	3	0	3	0
3966	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3967	0	2	2	1	0	2	2	4	0	0	3	
3968	0	1	0	1	0	2	0	0	0	0	0	0
3969	0	0	0	0	0	0	0	0	1	0	0	0
3970	2006	1	3	0	0	2	1	34	34	25	0	0
3971	0	0	0	0	0	0	0	1	1	0	2	2
3972	1	4	1	2	1	1	1	0	0	2	4	
3973	0	0	1	1	0	1	1	0	0	0	0	0
3974	0	1	0	0	0	0	0	0	1	0	0	0
3975	0	0	0	0	0	0	0	0	0	0	0	0
3976	0	0	0	0	0	0	0	1	1	0	2	
3977	1	4	1	2	1	1	1	0	0	2	0	0
3978	4	0	0	1	0	1	1	1	0	0	0	0
3979	0	1	0	0	0	0	0	0	1	0	0	0
3980	2006	1	3	0	0	2	1	36	36	8	0	0
3981	0	0	0	0	0	0	0	0	0	0	1	
3982	0	0	2	0	0	0	1	0	2	0	0	0
3983	0	0	0	0	0	0	0	0	0	0	0	0
3984	0	0	0	0	0	0	0	0	0	0	0	0
3985	0	1	0	0	0	0	0	0	0	1	0	0
3986	0	0	0	0	0	0	0	0	0	0	1	
3987	0	0	2	0	0	0	1	0	0	2	0	0
3988	0	0	0	0	0	0	0	0	0	0	0	0
3989	0	0	0	0	0	0	0	0	0	0	0	0
3990	2006	1	3	0	0	2	1	38	38	4	0	0
3991	0	0	0	0	0	0	0	0	0	1	0	0
3992	0	0	0	1	0	0	0	0	0	0	0	1
3993	0	0	0	0	0	0	1	0	0	0	0	0
3994	0	0	0	0	0	0	0	0	0	0	0	0
3995	0	0	0	0	0	0	0	0	0	0	0	0
3996	0	0	0	0	0	0	0	0	0	1	0	0
3997	0	0	0	0	1	0	0	0	0	0	0	0
3998	1	0	0	0	0	0	0	1	0	0	0	0
3999	0	0	0	0	0	0	0	0	0	0	0	0
4000	2006	1	3	0	0	2	1	40	40	1	0	0
4001	0	0	0	0	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	1	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	0	0	0	0	0	0	0	0
4006	0	0	0	0	0	0	0	0	0	0	0	0
4007	0	0	0	0	1	0	0	0	0	0	0	0
4008	0	0	0	0	1	0	0	0	0	0	0	0

4009	0	0	0	0	0	0	0	0	0	0	0	0	0
4010	2007	1	3	0	0	2	1	26	26	2	0	0	0
4011	0	0	0	0	1	0	0	0	0	0	0	0	0
4012	1	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	0	0	0	0	0	0	0	0	0
4015	0	0	0	0	0	0	0	0	0	0	0	0	0
4016	0	0	0	0	1	0	0	0	0	0	0	0	0
4017	1	0	0	0	0	0	0	0	0	0	0	0	0
4018	0	0	0	0	0	0	0	0	0	0	0	0	0
4019	0	0	0	0	0	0	0	0	0	0	0	0	0
4020	2007	1	3	0	2	1	28	28	3	0	0	0	0
4021	0	0	0	1	0	0	0	0	1	0	0	0	0
4022	0	0	1	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	0	0	0	0	0	0	0	0	0	0
4025	0	0	0	0	0	0	0	0	0	0	0	0	0
4026	0	0	0	1	0	0	0	0	1	0	0	0	0
4027	0	0	0	1	0	0	0	0	0	0	0	0	0
4028	0	0	0	0	0	0	0	0	0	0	0	0	0
4029	0	0	0	0	0	0	0	0	0	0	0	0	0
4030	2007	1	3	0	2	1	30	30	10	0	0	0	0
4031	0	0	0	0	0	1	1	1	1	0	0	2	0
4032	1	0	0	0	1	1	1	0	0	0	1	0	0
4033	0	0	0	0	0	0	0	0	0	0	0	0	0
4034	0	0	0	0	0	0	0	0	0	0	0	0	0
4035	0	0	0	0	0	0	0	0	0	0	0	0	0
4036	0	0	0	0	0	0	1	1	1	0	0	2	0
4037	1	0	0	0	1	1	1	0	0	0	0	1	0
4038	0	0	0	0	0	0	0	0	0	0	0	0	0
4039	0	0	0	0	0	0	0	0	0	0	0	0	0
4040	2007	1	3	0	2	1	32	32	33	0	0	0	0
4041	0	0	0	0	0	0	0	1	0	1	0	4	0
4042	2	2	0	2	2	1	1	0	0	2	1	1	3
4043	2	2	2	3	1	1	0	0	2	0	0	1	1
4044	0	0	0	0	0	0	0	0	0	1	0	0	0
4045	0	0	0	0	0	0	0	0	0	0	0	0	0
4046	0	0	0	0	0	0	0	1	0	0	1	0	4
4047	2	2	0	2	2	1	1	0	0	2	1	1	0
4048	3	2	2	3	1	1	0	0	2	0	0	1	1
4049	0	0	0	0	0	0	0	34	34	46	1	0	0
4050	2007	1	3	0	2	1	34	34	46	0	0	0	0

4051	0	0	0	0	1	1	0	1	2	2	1	0
4052	2	1	2	4	3	0	1	2	2	2	3	0
4053	7	1	1	1	0	1	1	1	0	0	1	3
4054	0	0	0	0	0	1	0	0	0	0	0	0
4055	1	0	0	0	1	0	0	0	0	2	2	0
4056	0	0	0	0	1	0	0	1	2	2	1	0
4057	2	1	2	4	3	0	2	2	2	2	3	0
4058	0	7	1	1	0	1	1	1	0	0	1	3
4059	0	0	0	0	0	1	0	0	0	0	0	0
4060	2007	1	3	0	2	1	36	36	15	0	0	0
4061	0	0	0	0	0	0	0	0	0	0	0	0
4062	0	0	0	1	0	1	1	0	0	1	0	0
4063	0	0	0	1	1	1	0	2	2	0	0	0
4064	0	0	0	0	0	0	0	0	0	0	0	0
4065	0	0	0	0	0	0	0	1	0	0	3	0
4066	0	0	0	0	0	0	0	0	0	0	0	0
4067	0	0	0	0	1	0	1	1	0	1	0	1
4068	0	0	0	1	1	1	0	2	2	0	0	0
4069	0	0	0	0	0	0	0	0	0	0	0	0
4070	2007	1	3	0	2	1	38	38	9	0	0	0
4071	0	0	0	0	0	0	0	0	0	0	0	0
4072	0	0	0	0	0	0	0	1	0	0	1	0
4073	1	0	0	0	0	0	0	0	0	2	0	0
4074	0	0	0	0	0	1	0	0	0	0	0	0
4075	1	0	0	1	0	0	0	0	0	0	1	0
4076	0	0	0	0	0	0	0	0	0	0	0	0
4077	0	0	0	0	0	0	0	1	0	0	1	0
4078	0	1	0	0	0	0	0	0	0	2	0	0
4079	0	0	0	0	0	1	0	0	0	0	0	0
4080	2007	1	3	0	2	1	40	40	1	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	0	0	0
4084	0	0	0	0	0	0	0	0	0	0	0	0
4085	0	0	0	0	0	0	0	0	0	0	1	0
4086	0	0	0	0	0	0	0	0	0	0	0	0
4087	0	0	0	0	0	0	0	0	0	0	0	0
4088	0	0	0	0	0	0	0	0	0	0	0	0
4089	0	0	0	0	0	0	0	0	0	0	0	0
4090	2008	1	3	0	2	1	24	24	1	0	0	0
4091	0	0	0	0	0	0	1	0	0	0	0	0
4092	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	0	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	1	0	0	0	0	0	0
4097	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4098	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4099	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4100	2008	1	3	0	0	2	1	26	26	2	0	0	0	0
4101	1	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4105	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4106	1	0	0	0	0	0	1	0	0	0	0	0	0	0
4107	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4108	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4109	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4110	2008	1	3	0	0	2	1	28	28	3	0	0	0	0
4111	0	0	0	0	0	1	1	0	0	0	1	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	0	0	0	0	0	0	0	0
4115	0	0	0	0	0	0	0	1	0	0	0	0	0	0
4116	0	0	0	0	0	0	1	1	0	0	0	0	0	1
4117	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4118	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4119	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4120	2008	1	3	0	0	2	1	30	30	7	0	0	0	0
4121	0	0	0	0	0	0	0	0	0	3	1	0	0	0
4122	0	0	0	0	0	1	1	0	0	0	0	0	0	0
4123	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4124	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4125	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4126	0	0	0	0	0	0	0	0	0	0	3	0	0	1
4127	0	0	0	0	0	1	1	0	0	0	0	0	0	0
4128	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4129	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4130	2008	1	3	0	0	2	1	32	32	24	0	0	0	0
4131	0	0	0	1	1	0	0	0	3	3	2	2	0	0
4132	1	2	2	3	1	1	1	0	1	3	0	0	0	0
4133	0	2	0	0	1	0	0	0	1	0	0	0	0	0
4134	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4136	0	0	0	0	0	1	1	0	0	0	3	3	0	2	2
4137	1	2	3	1	1	1	0	1	3	0	0	0	0	0	0
4138	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0
4139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4140	2008	1	3	0	0	2	1	34	34	34	28	0	0	0	0
4141	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
4142	3	0	0	2	2	1	6	1	1	1	2	0	0	0	0
4143	2	2	0	0	0	0	1	1	1	1	1	1	1	0	0
4144	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
4145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4146	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
4147	3	0	0	2	2	1	6	1	1	1	2	0	0	0	0
4148	0	2	2	0	0	0	0	1	1	1	1	1	1	1	0
4149	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
4150	2008	1	3	0	0	2	1	36	36	36	7	0	0	0	0
4151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4152	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0
4153	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4154	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4155	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4157	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0
4158	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
4159	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4160	2008	1	3	0	0	2	1	40	40	40	1	0	0	0	0
4161	0	0	0	0	0	0	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	1	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	0	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	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4169	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4170	2009	1	3	0	0	2	1	28	28	28	1	0	0	0	0
4171	0	0	0	0	0	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4180	2009	1	3	0	0	2	1	30	30	30	6	0	0	0	0
4181	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4182	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0
4183	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4184	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4186	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
4187	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0
4188	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
4189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4190	2009	1	3	0	0	2	1	32	32	32	10	0	0	0	0
4191	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
4192	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4193	0	0	1	1	0	0	0	0	0	1	0	0	0	0	2
4194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4196	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0
4197	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4198	1	0	1	1	0	0	0	0	0	0	1	0	0	0	2
4199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4200	2009	1	3	0	0	2	1	34	34	34	4	0	0	0	0
4201	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
4202	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
4203	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
4204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4205	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4206	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4207	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4208	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
4209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4210	2009	1	3	0	0	2	1	42	42	42	1	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	0	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	1	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	0	0
4218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4219	0	0	0	0	0	0	0	0	0	0	0	0	0
4220	2010	1	3	0	0	2	1	20	20	1	0	0	0
4221	0	0	0	0	0	0	0	0	0	0	0	0	0
4222	1	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	0	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	1	0	0	0	0	0	0	0	0	0	0	0	0
4228	0	0	0	0	0	0	0	0	0	0	0	0	0
4229	0	0	0	0	0	0	0	0	0	0	0	0	0
4230	2010	1	3	0	0	2	1	30	30	2	0	0	0
4231	0	0	0	0	0	0	0	0	0	0	0	0	0
4232	0	1	0	0	0	0	0	0	0	0	0	0	0
4233	0	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0
4236	0	0	0	0	0	0	0	0	0	0	0	0	0
4237	0	1	0	0	0	0	0	0	0	0	0	0	0
4238	0	0	1	0	0	0	0	0	0	0	0	0	0
4239	0	0	0	0	0	0	0	0	0	0	0	0	0
4240	2010	1	3	0	0	2	1	32	32	8	0	0	0
4241	0	0	0	0	0	1	1	0	0	0	0	0	0
4242	0	2	1	0	0	1	0	0	0	0	0	0	0
4243	1	0	0	0	0	1	0	0	0	0	0	0	0
4244	0	0	0	0	0	0	0	0	0	0	0	0	0
4245	0	0	0	0	0	0	0	0	0	0	0	0	0
4246	0	0	0	0	0	0	1	0	0	0	0	0	0
4247	0	2	1	0	0	1	1	0	0	0	0	0	0
4248	0	1	0	0	0	1	0	0	0	0	0	0	0
4249	0	0	0	0	0	0	0	0	0	0	0	0	0
4250	2010	1	3	0	0	2	1	34	34	7	0	0	0
4251	0	0	0	0	0	0	0	0	1	0	0	0	0
4252	1	0	0	0	0	0	0	1	0	0	1	0	0
4253	0	0	0	0	0	0	0	0	0	1	0	0	2
4254	0	0	0	0	0	0	0	0	0	0	0	0	0
4255	0	0	0	0	0	0	0	0	0	0	0	0	0
4256	0	0	0	0	0	0	0	0	1	0	0	1	0
4257	1	0	0	0	0	0	0	1	0	0	0	1	0
4258	0	0	0	0	0	0	0	0	0	1	0	0	2
4259	0	0	0	0	0	2	0	0	0	36	36	3	0
4260	2010	1	3	0	0	2	1	36	36	3	0	0	0

4261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4263	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	1	0	0
4266	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4267	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4268	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4270	2010	1	3	0	0	2	1	40	40	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4279	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4280	2011	1	3	0	0	2	1	30	30	4	0	0	0	0	0
4281	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4282	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
4283	1	0	1	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	0	0	0	0	0	0	0	0	0	0
4286	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
4287	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
4288	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
4289	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4290	2011	1	3	0	0	2	1	32	32	16	0	0	0	0	0
4291	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4292	0	2	2	1	0	0	1	1	0	1	0	0	0	0	1
4293	1	0	2	0	0	0	0	1	0	0	0	0	0	0	0
4294	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0
4295	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4296	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
4297	0	2	2	1	0	0	0	1	1	0	0	1	0	0	0
4298	1	1	2	0	0	0	0	1	0	0	0	0	0	0	0
4299	1	0	1	1	0	0	0	0	1	1	0	0	0	0	0
4300	2011	1	1	3	0	0	2	1	34	34	19	0	0	0	0
4301	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0
4302	1	0	0	0	1	0	1	1	1	2	0	2	0	0	0

4303	0	1	4	0	1	0	0	1	0	0	0	1	1
4304	1	0	0	0	0	0	0	0	0	0	0	0	0
4305	0	0	0	0	0	0	0	0	0	0	0	1	0
4306	0	0	0	0	0	0	0	0	0	0	0	0	0
4307	1	0	0	1	1	1	1	1	1	2	2	0	0
4308	0	0	1	4	0	1	0	0	0	0	0	1	1
4309	1	0	0	0	0	0	0	0	0	0	0	0	0
4310	2011	1	3	0	0	2	1	36	36	36	7	0	0
4311	0	0	0	0	0	0	0	0	0	0	0	0	0
4312	0	0	0	0	0	0	0	1	0	0	0	0	0
4313	1	1	0	0	1	0	0	0	0	1	0	1	1
4314	0	0	0	0	0	0	0	0	1	0	0	0	0
4315	0	0	0	0	0	0	0	0	0	0	0	0	0
4316	0	0	0	0	0	0	0	0	0	0	0	0	0
4317	0	0	0	0	0	0	0	0	1	0	0	0	0
4318	0	1	1	0	0	1	0	0	0	0	1	0	1
4319	0	0	0	0	0	0	0	0	1	0	0	0	0
4320	2011	1	3	0	0	2	1	38	38	38	4	0	0
4321	0	0	0	0	0	0	0	0	0	0	0	0	0
4322	0	0	0	0	0	0	0	0	0	0	0	0	0
4323	1	0	0	0	0	0	0	0	1	0	0	0	0
4324	0	0	0	1	0	0	0	0	0	0	0	0	0
4325	0	0	0	0	0	0	0	0	0	0	1	0	0
4326	0	0	0	0	0	0	0	0	0	0	0	0	0
4327	0	0	0	0	0	0	0	0	0	0	0	0	0
4328	0	1	0	0	0	0	0	0	0	1	0	0	0
4329	0	0	0	1	0	0	0	0	0	0	0	0	0
4330	2012	1	3	0	0	2	1	30	30	30	2	0	0
4331	0	0	0	0	0	0	0	0	1	0	0	0	0
4332	0	0	0	0	0	0	0	0	1	0	0	0	0
4333	0	0	0	0	0	0	0	0	0	0	0	0	0
4334	0	0	0	0	0	0	0	0	0	0	0	0	0
4335	0	0	0	0	0	0	0	0	0	0	0	0	0
4336	0	0	0	0	0	0	0	0	1	1	0	0	0
4337	0	0	0	0	0	0	0	0	1	0	0	0	0
4338	0	0	0	0	0	0	0	0	0	0	0	0	0
4339	0	0	0	0	0	0	0	0	0	0	0	0	0
4340	2012	1	3	0	0	2	1	32	32	32	8	0	0
4341	0	0	0	0	0	0	0	0	0	0	0	0	0
4342	0	0	0	0	0	2	1	0	0	0	0	2	1
4343	1	0	0	0	0	0	0	0	0	0	0	0	1
4344	1	0	0	0	0	0	0	0	0	0	0	0	0

4345	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4346	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4347	0	0	0	0	0	0	2	0	1	0	0	0	0	2	1
4348	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4349	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4350	2012	1	3	0	0	2	1	34	34	34	7	0	0	0	0
4351	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4352	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4353	0	0	1	0	0	1	1	1	0	0	1	0	1	1	1
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4357	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4358	1	0	0	1	0	0	1	1	1	1	0	1	1	1	1
4359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4360	2012	1	3	0	0	2	1	36	36	36	5	0	0	0	0
4361	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4362	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
4363	1	0	0	0	1	0	0	1	1	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	0	0	0	0	0	0	0	0	0	0
4366	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4367	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4368	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0
4369	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4370	2012	1	3	0	0	2	1	38	38	38	2	0	0	0	0
4371	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4372	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
4373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4374	0	0	0	1	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	0	0
4376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4377	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4378	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4379	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4380	2013	1	3	0	0	2	1	28	28	28	1	0	0	0	0
4381	0	0	0	0	0	0	0	1	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	0	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	1	0	0	0	0	0	0
4386	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4389	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4390	2013	1	3	0	0	2	1	32	32	32	4	0	0	0
4391	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4392	0	0	0	0	1	0	0	0	0	1	0	0	0	1
4393	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4394	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4395	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4396	0	0	0	1	0	0	0	0	0	0	0	0	0	0
4397	0	0	0	0	1	0	0	0	0	0	1	0	0	0
4398	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4399	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4400	2013	1	3	0	0	2	1	34	34	34	4	0	0	0
4401	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4402	0	0	0	0	0	0	0	0	0	1	1	2	0	0
4403	0	0	0	0	0	0	0	0	0	1	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	0	0	0	0	0
4406	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4407	0	0	0	0	0	0	0	0	0	0	1	1	2	0
4408	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4409	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4410	2013	1	3	0	0	2	1	36	36	36	2	0	0	0
4411	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4412	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4413	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4414	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4415	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4416	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4417	0	0	0	0	0	0	0	0	0	0	1	0	0	0
4418	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4419	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4420	2014	1	3	0	0	2	1	26	26	26	2	0	0	0
4421	0	0	0	1	0	0	0	1	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	0	0	0	0	0	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	1	0	0	0	1	0	0	0	0	0
4427	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4428	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4429	0	0	0	0	0	0	0	0	0	0	0	0	0
4430	2014	1	3	0	0	2	1	28	28	5	0	0	0
4431	0	0	0	0	0	0	0	0	1	3	1	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	0	0	0	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	1	3	1	0	0	0
4437	0	0	0	0	0	0	0	0	0	0	0	0	0
4438	0	0	0	0	0	0	0	0	0	0	0	0	0
4439	0	0	0	0	0	0	0	0	0	0	0	0	0
4440	2014	1	3	0	0	2	1	30	30	14	0	0	0
4441	0	0	0	0	1	0	1	0	2	0	0	2	0
4442	0	1	0	0	2	0	1	1	0	0	0	0	2
4443	1	0	0	0	0	0	1	0	0	0	0	0	0
4444	0	0	0	0	0	0	0	0	0	0	0	0	0
4445	0	0	0	0	0	0	0	0	0	0	0	0	0
4446	0	0	0	0	1	0	1	0	2	0	0	2	0
4447	0	1	0	0	2	0	0	1	0	0	0	0	0
4448	2	1	0	0	0	0	1	0	0	0	0	0	0
4449	0	0	0	0	0	0	0	0	0	0	0	0	0
4450	2014	1	3	0	0	2	1	32	32	76	0	0	0
4451	0	0	0	0	0	0	2	4	4	3	7	0	0
4452	4	0	3	6	3	2	4	3	4	4	6	0	0
4453	6	5	0	0	1	0	2	1	1	1	4	0	0
4454	1	0	0	0	2	0	0	0	0	0	0	0	0
4455	0	0	0	0	1	0	0	0	0	1	1	0	0
4456	0	0	0	0	0	2	0	2	4	3	7	0	0
4457	4	0	3	6	3	2	4	3	4	3	4	0	0
4458	6	6	5	0	1	0	2	1	1	1	4	0	0
4459	1	0	0	2	0	0	0	0	0	0	0	0	0
4460	2014	1	3	0	0	2	1	34	34	118	0	0	0
4461	0	0	0	0	0	2	0	3	3	3	0	0	0
4462	5	1	3	3	8	5	5	5	3	4	9	0	0
4463	9	5	6	4	3	4	5	4	5	4	1	0	0
4464	0	2	6	3	5	1	1	1	1	1	1	1	0
4465	0	0	1	0	0	1	0	0	0	1	1	0	0
4466	0	0	0	0	0	2	0	3	3	3	0	0	0
4467	5	1	3	3	8	5	5	5	3	4	4	0	0
4468	9	9	5	6	4	3	4	5	5	4	1	1	1
4469	0	2	6	3	5	1	1	1	1	1	1	1	0
4470	2014	1	3	0	2	1	36	36	121	0	0	0	0

```

4471    0   0   0   0   0   0   0   0   1   0   2   2   1
4472    3   1   1   2   2   4   7   7   8   8   9   9   5
4473    7   5   2   3   3   1   7   5   5   4   5   5
4474    6   0   3   0   3   1   1   0   1   1   1   0
4475    0   1   1   0   0   0   0   0   0   0   0   0
4476    0   0   0   0   0   0   0   1   0   2   2   1
4477    3   1   1   2   2   4   7   7   8   8   9   1
4478    5   7   5   2   3   3   1   1   5   5   4   5
4479    6   0   3   3   3   1   1   1   1   1   0
4480 2014   1   3   0   2   1   38   38   49   0
4481    0   0   0   0   0   0   0   0   0   0   0
4482    1   0   0   0   0   2   1   2   1   1   1   2
4483    2   5   2   3   1   1   1   2   2   2   2   1
4484    3   3   4   1   1   1   1   1   0   0
4485    0   0   1   0   0   0   0   0   1   5   0
4486    0   0   0   0   0   0   0   0   0   0
4487    1   0   0   0   0   0   2   1   1   1   1
4488    2   2   5   2   3   1   1   2   2   2   1
4489    3   3   4   1   1   1   1   1   0   0
4490 2014   1   3   0   2   1   40   40   11   0
4491    0   0   0   0   0   0   0   0   0   0
4492    0   0   0   0   0   0   0   0   0   1   0
4493    3   1   0   0   0   0   0   0   1   0   1
4494    0   2   0   0   0   0   0   0   0   0
4495    0   0   0   0   0   0   0   0   0   2   0
4496    0   0   0   0   0   0   0   0   0   0
4497    0   0   0   0   0   0   0   0   0   0   1
4498    0   3   1   0   0   0   0   0   1   0   1
4499    0   2   0   0   0   0   0   0   0   0
4500 2014   1   3   0   2   1   42   42   2   0
4501    0   0   0   0   0   0   0   0   0   0
4502    0   0   0   0   0   0   0   0   0   0
4503    0   0   0   0   0   0   0   0   1   1   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   0   0
4507    0   0   0   0   0   0   0   0   0   0
4508    0   0   0   0   0   0   0   0   1   1   0
4509    0   0   0   0   0   0   0   0   0   0
4510
4511 0 #_N_MeanSize-at-Age_obs
4512 #Yr Seas Flt/Svy Gender Part Ageerr Ignore datavector(female-male)

```

```

4513 # samplesize(female-male)
4514 # 1971 1 1 3 0 1 2 29.8931 40.6872 44.7411 50.027 52.5794 56.1489 57.1033 6
4515 # 1.1728 61.7417 63.368 64.4088 65.6889 67.616 68.5972 69.9177 71.0443 72.3
4516 # 609 32.8188 39.5964 43.988 50.1693 53.1729 54.9822 55.3463 60.3509 60.743
4517 # 9 62.3432 64.3224 65.1032 64.1965 66.7452 67.5154 70.8749 71.2768 20 20 2
4518 # 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 20
4519 # 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 20
```

4520

```

4521 0 #_N_environ_variables
4522 0 #_N_environ_obs
4523 0 # N sizefreq methods to read
```

4524

```

4525 0 # no tag data
```

4526

```

4527 0 # no morphcomp data
```

4528

```

4529 999
```

### 4530 Central Model

```

4531 #V3.24u
4532 #C data file for China rockfish North of 4010 to OR/WA border
4533 #C changed from pre-star draft base by adding length comps from CA north of
4534 # 40-10
4535 #
4536 #_observed data:
4537 1900 #_styr -- extended to match southern model start year
4538 2014 #_endyr
4539 1 #_nseas
4540 12 #_months/season
4541 1 #_spawn_seas
4542 11 #_Nfleet
4543 1 #_Nsurveys
4544 1 #_N_areas
4545 ## fleet names (second cut on June 7, 2015)
4546 1_CA_NorthOf4010_Comm_Dead%2_CA_NorthOf4010_Comm_Live%3_CA_NorthOf4010_Rec_
4547 PC%4_CA_NorthOf4010_Rec_PR%5_OR_SouthernOR_Comm_Dead%6_OR_SouthernOR_Comm_L
4548 ive%7_OR_SouthernOR_Rec_PC%8_OR_SouthernOR_Rec_PR%9_OR_NorthernOR_Comm%10_O
4549 R_NorthernOR_Rec_PC%11_OR_NorthernOR_Rec_PR%12_OR_SouthernOR_Rec_PC_ORBS
4550 ## 1_CA_NorthOf4010_Comm_Dead
4551 ## 2_CA_NorthOf4010_Comm_Live
4552 ## 3_CA_NorthOf4010_Rec_PC
```

```

4553 ## 4_CA_NorthOf4010_Rec_PR
4554 ## 5_OR_SouthernOR_Comm_Dead
4555 ## 6_OR_SouthernOR_Comm_Live
4556 ## 7_OR_SouthernOR_Rec_PC
4557 ## 8_OR_SouthernOR_Rec_PR
4558 ## 9_OR_NorthernOR_Comm
4559 ## 10_OR_NorthernOR_Rec_PC
4560 ## 11_OR_NorthernOR_Rec_PR
4561 ## 12_OR_SouthernOR_Rec_PC_ORBS
4562 # following values are 1 per catch or survey fleet
4563 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 --
4564 # mid-year, not exactly like XDB-SRA
4565 1 1 1 1 1 1 1 1 1 1 1 #_area_assignments_for_ea
4566 # ch_fishery_and_survey
4567 # following values are 1 per catch fleet
4568 1 1 1 1 1 1 1 1 1 1 #_units of catch: 1=bio; 2=num
4569 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
4570 # r init_eq_catch and for Fmethod 2 and 3; use -1 for discard only fleets
4571 2 #_Ngenders
4572 80 #_Nages
4573 0 0 0 0 0 0 0 0 0 0 #_init_equil_catch_for_each_fi
4574 # shery
4575 115 #_N_lines_of_catch_to_read
4576 #_catch_biomass(mtons):_columns_are_fisheries,year,season
4577 # this file has catch in SS format based on formulas in the adjacent Google
4578 # Doc "Catch Pivot" worksheet
4579 #_fleet1 fleet2 fleet3 fleet4 fleet5 fleet6 fleet7 fleet8 fleet9 fleet10 f
4580 # leet11 year seas
4581 0 0 0 0 0.01 0 0 0 0.01 0
4582 0 1900 1
4583 0 0 0 0 0 0 0 0 0 0
4584 0 1901 1
4585 0 0 0 0 0 0 0 0 0 0
4586 0 1902 1
4587 0 0 0 0 0 0 0 0 0 0
4588 0 1903 1
4589 0 0 0 0 0 0 0 0 0 0
4590 0 1904 1
4591 0 0 0 0 0 0 0 0 0 0
4592 0 1905 1
4593 0 0 0 0 0 0 0 0 0 0
4594 0 1906 1

```

4595	0	0	0	0	0	0	0	0	0	0	0
4596	0	1907	1	0	0	0	0	0	0	0	0
4597	0	0	0	0	0	0	0	0	0	0	0
4598	0	1908	1	0	0	0	0	0	0	0	0
4599	0	0	0	0	0	0	0	0	0	0	0
4600	0	1909	1	0	0	0	0	0	0	0	0
4601	0	0	0	0	0	0	0	0	0	0	0
4602	0	1910	1	0	0	0	0	0	0	0	0
4603	0	0	0	0	0	0	0	0	0	0	0
4604	0	1911	1	0	0	0	0	0	0	0	0
4605	0	0	0	0	0	0	0	0	0	0	0
4606	0	1912	1	0	0	0	0	0	0	0	0
4607	0	0	0	0	0	0	0	0	0	0	0
4608	0	1913	1	0	0	0	0	0	0	0	0
4609	0	0	0	0	0	0	0	0	0	0	0
4610	0	1914	1	0	0	0	0	0	0	0	0
4611	0	0	0	0	0	0	0	0	0	0	0
4612	0	1915	1	0	0	0	0	0	0	0	0
4613	0	0	0	0	0	0	0	0	0	0	0
4614	0	1916	1	0	0	0	0	0	0	0	0
4615	0	0	0	0	0	0	0	0	0	0	0
4616	0	1917	1	0	0	0	0	0	0	0	0
4617	0	0	0	0	0	0	0	0	0	0	0
4618	0	1918	1	0	0	0	0	0	0	0	0
4619	0	0	0	0	0	0	0	0	0	0	0
4620	0	1919	1	0	0	0	0	0	0	0	0
4621	0	0	0	0	0	0	0	0	0	0	0
4622	0	1920	1	0	0	0	0	0	0	0	0
4623	0	0	0	0	0	0	0	0	0	0	0
4624	0	1921	1	0	0	0	0	0	0	0	0
4625	0	0	0	0	0	0	0	0	0	0	0
4626	0	1922	1	0	0	0	0	0	0	0	0
4627	0	0	0	0	0	0	0	0	0	0	0
4628	0	1923	1	0	0	0	0	0	0	0	0
4629	0	0	0	0	0	0	0	0	0	0	0
4630	0	1924	1	0	0	0	0	0	0	0	0
4631	0	0	0	0	0	0	0	0	0	0	0
4632	0	1925	1	0	0	0	0	0	0	0	0
4633	0	0	0	0	0	0	0	0	0	0	0
4634	0	1926	1	0	0	0	0	0	0	0	0
4635	0	0	0	0	0	0	0	0	0	0	0
4636	0	1927	1	0	0	0	0	0	0	0	0

4637	0	0	0	0	0	0	0	0	0	0	0
4638	0	1928	1	0	0.01	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	1929	1	0	0.01	0.01	0.01	0	0	0.01	0
4641	0.01	0	0	0	0.01	0.01	0.01	0	0	0.01	0
4642	0	1930	1	0	0	0.01	0	0	0	0.01	0
4643	0	0	0	0	0	0.01	0	0	0	0	0
4644	0	1931	1	0	0	0.01	0	0	0	0	0
4645	0.03	0	0	0	0	0.01	0	0	0	0	0
4646	0	1932	1	0	0	0.01	0	0	0	0	0
4647	0.09	0	0	0	0	0.01	0	0	0	0	0
4648	0	1933	1	0	0.99	0	0	0	0	0	0
4649	0.99	0	0	0	0	0.01	0	0	0	0	0
4650	0	1934	1	0	0.82	0	0.01	0.01	0	0	0
4651	0.82	0	0	0.01	0.01	0	0	0	0	0	0
4652	0	1935	1	0	1.23	0	0.01	0.02	0.01	0	0
4653	1.23	0	0	0.01	0.02	0.02	0.01	0	0	0.01	0
4654	0	1936	1	0	0.78	0	0.01	0.02	0.01	0	0
4655	0.78	0	0	0.01	0.02	0.02	0.01	0	0	0.01	0
4656	0	1937	1	0	3.08	0	0.01	0.02	0	0	0
4657	3.08	0	0	0.01	0.02	0.02	0	0	0	0	0
4658	0	1938	1	0	5.95	0	0.01	0.02	0	0	0
4659	5.95	0	0	0.01	0.02	0.02	0.01	0	0	0	0
4660	0	1939	1	0	3.52	0	0.01	0.02	0.01	0	0
4661	3.52	0	0	0.01	0.02	0.02	0.01	0	0	0.01	0
4662	0	1940	1	0	0.99	0	0.01	0.02	0.01	0	0
4663	0.99	0	0	0.01	0.02	0.02	0.01	0	0	0.01	0
4664	0	1941	1	0	0.72	0	0	0.01	0.01	0	0
4665	0.72	0	0	0	0	0.01	0.01	0.01	0	0	0.01
4666	0	1942	1	0	0.02	0	0	0.01	0.04	0	0
4667	0.02	0	0	0	0	0.01	0.01	0.04	0	0	0.04
4668	0	1943	1	0	0	0	0.01	0.01	0	0	0.01
4669	0	0	0	0	0	0.01	0.01	0	0	0	0.01
4670	0	1944	1	0	0	0	0.01	0.04	0	0	0.04
4671	0	0	0	0	0	0.01	0.01	0.04	0	0	0.04
4672	0	1945	1	0	0.06	0	0.01	0.02	0.05	0	0
4673	0.06	0	0	0.01	0.01	0.02	0.02	0.05	0	0	0.05
4674	0	1946	1	0	0.08	0	0.01	0.02	0.01	0	0
4675	0.08	0	0	0.01	0.01	0.02	0.02	0.01	0	0	0.01
4676	0	1947	1	0	0.09	0	0.01	0.03	0.01	0	0
4677	0.09	0	0	0.01	0.01	0.03	0.03	0.01	0	0	0.01
4678	0	1948	1	0	0.09	0	0.01	0.03	0.01	0	0

4679	0.01	0	0.01	0.04	0.07	0	0	0	0.07	0
4680	0	1949	1							
4681	0.11	0	0.02	0.05	0.01	0	0	0	0.01	0
4682	0	1950	1							
4683	0.14	0	0.02	0.06	0	0	0	0	0	0
4684	0	1951	1							
4685	0	0	0.02	0.05	0	0	0	0	0	0
4686	0	1952	1							
4687	0	0	0.02	0.05	0	0	0	0	0	0
4688	0	1953	1							
4689	0	0	0.02	0.06	0	0	0	0	0	0
4690	0	1954	1							
4691	0	0	0.02	0.07	0	0	0	0	0	0
4692	0	1955	1							
4693	0	0	0.03	0.08	0	0	0	0	0	0
4694	0	1956	1							
4695	0.09	0	0.03	0.10	0	0	0	0	0	0
4696	0	1957	1							
4697	0	0	0.03	0.08	0	0	0	0	0	0
4698	0	1958	1							
4699	0.01	0	0.02	0.06	0	0	0	0	0	0
4700	0	1959	1							
4701	0	0	0.01	0.04	0	0	0	0	0	0
4702	0	1960	1							
4703	0	0	0.01	0.04	0	0	0	0	0	0
4704	0	1961	1							
4705	0	0	0.01	0.02	0	0	0	0	0	0
4706	0	1962	1							
4707	0	0	0.01	0.02	0	0	0	0	0	0
4708	0	1963	1							
4709	0	0	0.01	0.02	0.01	0	0	0	0.01	0
4710	0	1964	1							
4711	0.02	0	0.01	0.04	0	0	0	0	0	0
4712	0	1965	1							
4713	0.08	0	0	0.01	0	0	0	0	0	0
4714	0	1966	1							
4715	0.01	0	0.02	0.05	0	0	0	0	0	0
4716	0	1967	1							
4717	0	0	0.01	0.02	0	0	0	0	0	0
4718	0	1968	1							
4719	0	0	0.02	0.05	0	0	0	0	0	0
4720	0	1969	1							

4721	0	0	0	0.01	0.01	0	0	0	0	0	0
4722	0	1970	1								
4723	0	0	0	0.01	0.02	0	0	0	0	0	0
4724	0	1971	1								
4725	0.01	0	0	0.02	0.05	0	0	0	0	0	0
4726	0	1972	1								
4727	0	0	0	0.01	0.03	0	0	0.16	0.19	0	0.44
4728	0.07	1973	1								
4729	0.01	0	0	0.01	0.02	0.01	0	0.27	0.32	0.01	0.75
4730	0.13	1974	1								
4731	0.01	0	0	0	0.01	0	0	0.13	0.16	0	0.37
4732	0.06	1975	1								
4733	0.01	0	0	0	0.01	0	0	0.38	0.47	0	1.08
4734	0.27	1976	1								
4735	0.02	0	0	0	0.01	0.09	0	0.41	0.49	0.09	1.15
4736	0.29	1977	1								
4737	0.11	0	0	0.03	0.08	0.01	0	0.53	0.64	0.01	1.50
4738	0.25	1978	1								
4739	0.02	0	0	0.03	0.10	0.13	0	2.94	1.53	0.13	1.52
4740	0.98	1979	1								
4741	0.01	0	0	0.04	0.08	0.07	0	0.91	0.53	0.07	1.63
4742	0.90	1980	1								
4743	0	0	0	0.04	0.10	0.07	0	1.56	0.89	0.07	2.18
4744	0.97	1981	1								
4745	0.01	0	0	0.03	0.14	0.33	0	1.42	0.82	0.32	2.14
4746	0.95	1982	1								
4747	0	0	0	0.08	0.16	0.36	0	1.36	0.81	0.35	2.69
4748	1.20	1983	1								
4749	0	0	0	0.01	0.06	0.24	0	1.43	0.48	0.23	2.71
4750	1.21	1984	1								
4751	0	0	0	0.02	0.14	0.22	0	1.04	0.59	0.21	1.38
4752	0.62	1985	1								
4753	0	0	0	0.12	0.49	0.14	0	0.99	0.57	0.14	1.58
4754	0.70	1986	1								
4755	0	0	0	0.28	0.53	0.90	0	1.29	0.69	0.84	1.03
4756	0.46	1987	1								
4757	0.01	0	0	0.11	0.35	0.87	0	0.38	0.45	1.11	1.44
4758	0.29	1988	1								
4759	0.23	0	0	0.06	0.14	1.08	0	1.04	1.57	0.81	2.21
4760	0.31	1989	1								
4761	2.53	0	0	0.23	0.61	1.16	0	1.29	1.81	0.53	2.19
4762	0.49	1990	1								

4763	0.72	0	0.20	0.64	0.68	0	0.52	0.68	0.64	1.44
4764	0.31	1991	1							
4765	2.88	0	0.12	0.42	0.88	0	0.76	0.88	0.64	2.41
4766	0.65	1992	1							
4767	0.85	0	0.15	0.66	0.84	0	0.90	1.12	0.01	3.03
4768	0.99	1993	1							
4769	1.02	0	0.14	0.70	6.33	0	0.97	1.21	0	2.13
4770	0.73	1994	1							
4771	4.74	0	0.12	0.60	6.52	0	0.68	0.94	0	1.09
4772	0.51	1995	1							
4773	3.88	0.01	0.06	0.28	5.77	0	0.84	0.71	0	1.74
4774	0.26	1996	1							
4775	2.02	1.78	0.06	0.06	5.45	5.45	1.08	1.00	0	2.04
4776	0.47	1997	1							
4777	1.47	0.85	0.02	0.18	9.80	9.40	0.79	0.76	0	1.56
4778	0.47	1998	1							
4779	0.62	1.61	0.10	0.40	8.62	15.32	1.78	1.26	0	2.11
4780	0.45	1999	1							
4781	0.61	2.09	0.25	0.50	2.62	9.77	0.85	0.59	0	1.71
4782	0.39	2000	1							
4783	0.43	1.09	0.31	0.44	3.93	15.89	0.32	0.36	0	1.41
4784	0.57	2001	1							
4785	0.47	1.87	0.27	0.52	3.14	17.52	0.32	0.38	0	1.40
4786	0.60	2002	1							
4787	0.09	0.50	0.33	0.91	1.93	8.38	0.26	0.32	0	1.12
4788	0.51	2003	1							
4789	0.22	0.29	0.08	0.44	1.11	6.00	0.23	0.40	0	0.99
4790	0.43	2004	1							
4791	0.14	0.60	0.16	0.37	0.65	3.48	0.26	0.51	0	0.77
4792	0.51	2005	1							
4793	0.15	0.85	0.14	0.49	0.55	4.22	0.35	0.50	0	1.11
4794	0.67	2006	1							
4795	0.41	1.64	0.64	0.87	1.18	5.01	0.38	0.48	0.01	1.40
4796	0.82	2007	1							
4797	0.26	1.60	0.20	0.81	1.49	6.45	0.26	0.45	0.04	1.25
4798	0.89	2008	1							
4799	0.05	0.62	0.66	0.89	1.15	6.88	0.12	0.49	0.06	0.95
4800	0.76	2009	1							
4801	0.04	0.27	0.27	0.64	0.53	4.42	0.20	0.61	0.03	1.02
4802	0.73	2010	1							
4803	0.09	0.36	0.16	1.06	1.41	6.77	0.31	0.60	0.02	1.56
4804	0.96	2011	1							

```

4805      0.08   0.39   0.37   1.02   1.32   7.61   0.37   0.41   0.06   1.68
4806    1.24 2012     1
4807      0.05   0.17   0.26   0.97   1.59   5.56   0.25   0.64   0.02   1.48
4808    1.26 2013     1
4809      0.02   0.09   0.08   0.66   0.74   3.72   0.18   0.48   0.03   0.51
4810    0.53 2014     1
4811 #
4812 58 #_N_cpue_and_surveyabundance_observations
4813 #_Units: 0=numbers; 1=biomass; 2=F
4814 #_Errtype: -1=normal; 0=lognormal; >0=T
4815 #_Fleet Units Errtype
4816 1      0      0 # 1_CA_NorthOf4010_Comm_Dead
4817 2      0      0 # 2_CA_NorthOf4010_Comm_Live
4818 3      0      0 # 3_CA_NorthOf4010_Rec_PC
4819 4      0      0 # 4_CA_NorthOf4010_Rec_PR
4820 5      0      0 # 5_OR_SouthernOR_Comm_Dead
4821 6      1      0 # 6_OR_SouthernOR_Comm_Live
4822 7      1      0 # 7_OR_SouthernOR_Rec_PC
4823 8      0      0 # 8_OR_SouthernOR_Rec_PR
4824 9      0      0 # 9_OR_NorthernOR_Comm
4825 10     0      0 # 10_OR_NorthernOR_Rec_PC
4826 11     0      0 # 11_OR_NorthernOR_Rec_PR
4827 12     0      0 # 12_OR_SouthernOR_Rec_PC_ORBS (mirror of fleet 7)
4828
4829 ### Oregon commercial logbook index (southern OR; vessels from Port Orford,
4830 # Gold Beach, and Brookings)
4831 ### initially assigning to fleet: "6_OR_SouthernOR_Comm_Live"
4832 #_year seas index obs err
4833 2004   1     6    0.036  0.211  # OR Commercial Logbook
4834 2005   1     6    0.028  0.194  # OR Commercial Logbook
4835 2006   1     6    0.032  0.200  # OR Commercial Logbook
4836 2007   1     6    0.038  0.213  # OR Commercial Logbook
4837 2008   1     6    0.043  0.204  # OR Commercial Logbook
4838 2009   1     6    0.026  0.207  # OR Commercial Logbook
4839 2010   1     6    0.024  0.254  # OR Commercial Logbook
4840 2011   1     6    0.039  0.203  # OR Commercial Logbook
4841 2012   1     6    0.032  0.206  # OR Commercial Logbook
4842 2013   1     6    0.018  0.228  # OR Commercial Logbook
4843
4844 ### Northern CA + Oregon, MRFSS Dockside Charter Boat Trip-Based CPUE (nort
4845 # h of 40-10)
4846 ### assigned to fleet: "7_OR_SouthernOR_Rec_PC"

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4847 ### NOTE: fleet changed to be negative (removed from likelihood)
4848 ### due to issues identified at STAR panel (see report)
4849 #_year seas index obs err
4850 1980 1 -7 0.190 0.260 # NoCA-OR Rec MRFSS Charter Boat CP
4851 # UE
4852 1981 1 -7 0.086 0.221 # NoCA-OR Rec MRFSS Charter Boat CP
4853 # UE
4854 1982 1 -7 0.119 0.241 # NoCA-OR Rec MRFSS Charter Boat CP
4855 # UE
4856 1983 1 -7 0.152 0.350 # NoCA-OR Rec MRFSS Charter Boat CP
4857 # UE
4858 1984 1 -7 0.056 0.296 # NoCA-OR Rec MRFSS Charter Boat CP
4859 # UE
4860 1985 1 -7 0.091 0.269 # NoCA-OR Rec MRFSS Charter Boat CP
4861 # UE
4862 1986 1 -7 0.121 0.429 # NoCA-OR Rec MRFSS Charter Boat CP
4863 # UE
4864 1987 1 -7 0.234 0.167 # NoCA-OR Rec MRFSS Charter Boat CP
4865 # UE
4866 1988 1 -7 0.193 0.175 # NoCA-OR Rec MRFSS Charter Boat CP
4867 # UE
4868 1989 1 -7 0.084 0.162 # NoCA-OR Rec MRFSS Charter Boat CP
4869 # UE
4870 1993 1 -7 0.178 0.135 # NoCA-OR Rec MRFSS Charter Boat CP
4871 # UE
4872 1994 1 -7 0.152 0.135 # NoCA-OR Rec MRFSS Charter Boat CP
4873 # UE
4874 1995 1 -7 0.115 0.136 # NoCA-OR Rec MRFSS Charter Boat CP
4875 # UE
4876 1996 1 -7 0.093 0.178 # NoCA-OR Rec MRFSS Charter Boat CP
4877 # UE
4878 1997 1 -7 0.116 0.172 # NoCA-OR Rec MRFSS Charter Boat CP
4879 # UE
4880 1998 1 -7 0.131 0.183 # NoCA-OR Rec MRFSS Charter Boat CP
4881 # UE
4882 1999 1 -7 0.134 0.128 # NoCA-OR Rec MRFSS Charter Boat CP
4883 # UE
4884 2000 1 -7 0.132 0.147 # NoCA-OR Rec MRFSS Charter Boat CP
4885 # UE
4886 2001 1 -7 0.109 0.225 # NoCA-OR Rec MRFSS Charter Boat CP
4887 # UE
4888 2002 1 -7 0.109 0.196 # NoCA-OR Rec MRFSS Charter Boat CP

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4889 # UE
4890 2003 1 -7 0.044 0.530 # NoCA-OR Rec MRFSS Charter Boat CP
4891 # UE
4892
4893 ### OR ORBS Charter Boat Dockside Trip-Based CPUE
4894 ### (AREA WEIGHTED SUM OF REGIONAL TRENDS)
4895 ### assigning to fleet: "12_OR_SouthernOR_Rec_PC_ORBS" which is a mirror
4896 ### of fleet "7_OR_SouthernOR_Rec_PC"
4897 #_year seas index obs err
4898 2001 1 12 0.0227 0.078 #OR Rec ORBS Trip-based Charter CPU
4899 # E
4900 2002 1 12 0.0194 0.0771 #OR Rec ORBS Trip-based Charter CPU
4901 # E
4902 2003 1 12 0.0205 0.0792 #OR Rec ORBS Trip-based Charter CPU
4903 # E
4904 2004 1 12 0.0181 0.0907 #OR Rec ORBS Trip-based Charter CPU
4905 # E
4906 2005 1 12 0.0146 0.0971 #OR Rec ORBS Trip-based Charter CPU
4907 # E
4908 2006 1 12 0.0213 0.0758 #OR Rec ORBS Trip-based Charter CPU
4909 # E
4910 2007 1 12 0.0279 0.0751 #OR Rec ORBS Trip-based Charter CPU
4911 # E
4912 2008 1 12 0.0199 0.0731 #OR Rec ORBS Trip-based Charter CPU
4913 # E
4914 2009 1 12 0.0146 0.0867 #OR Rec ORBS Trip-based Charter CPU
4915 # E
4916 2010 1 12 0.0168 0.0873 #OR Rec ORBS Trip-based Charter CPU
4917 # E
4918 2011 1 12 0.0196 0.0798 #OR Rec ORBS Trip-based Charter CPU
4919 # E
4920 2012 1 12 0.0212 0.0863 #OR Rec ORBS Trip-based Charter CPU
4921 # E
4922 2013 1 12 0.0173 0.0817 #OR Rec ORBS Trip-based Charter CPU
4923 # E
4924 2014 1 12 0.0132 0.1091 #OR Rec ORBS Trip-based Charter CPU
4925 # E
4926
4927 ### OR onboard index
4928 ### initially assigning to fleet: "10_OR_NorthernOR_Rec_PC"
4929 #_year seas index obs err
4930 2001 1 10 0.050 0.246 #OR onboard

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4931 2003 1 10 0.039 0.210 #OR onboard
4932 2004 1 10 0.031 0.265 #OR onboard
4933 2005 1 10 0.029 0.287 #OR onboard
4934 2006 1 10 0.036 0.254 #OR onboard
4935 2007 1 10 0.058 0.190 #OR onboard
4936 2008 1 10 0.030 0.245 #OR onboard
4937 2009 1 10 0.045 0.236 #OR onboard
4938 2010 1 10 0.013 0.435 #OR onboard
4939 2011 1 10 0.051 0.289 #OR onboard
4940 2012 1 10 0.044 0.259 #OR onboard
4941 2013 1 10 0.026 0.293 #OR onboard
4942 2014 1 10 0.017 0.415 #OR onboard
4943
4944 0 #_N_fleets_with_discard
4945 #_discard_units (1=same_as_catchunits(bio/num); 2=fraction; 3=numbers)
4946 #_discard_errtype: >0 for DF of T-dist(read CV below); 0 for normal with C
4947 # V; -1 for normal with se; -2 for lognormal
4948 #Fleet Disc_units err_type
4949 0 #N discard obs
4950 #_year seas index obs err
4951 #
4952 0 #_N_meanbodywt_obs
4953 30 #_DF_for_meanbodywt_T-distribution_like
4954
4955 2 # length bin method: 1=use databins; 2=generate from binwidth,min,max be
4956 # low; 3=read vector
4957 2 # binwidth for population size comp
4958 8 # minimum size in the population (lower edge of first bin and size at ag
4959 # e 0.00)
4960 50 # maximum size in the population (lower edge of last bin)
4961
4962 -0.0001 #_comp_tail_compression
4963 1e-003 #_add_to_comp
4964 0 #_combine males into females at or below this bin number
4965 15 #_N_LengthBins
4966 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
4967
4968 221 # pre-STAR base was 156 #_N_Length_obs
4969
4970 ### CA commercial landings, dead fish, north of 40-10
4971 ### initially assigning to fleet: 1_CA_NorthOf4010_Comm_Dead
4972 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c

```

	#	m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
	#		44cm	46cm+	repeat						
4973											
4974	1992		1	1	0	2	4	0	0	8	11
4975			48	59	131	94	16	54	3	0	0
4976			0	0	0	8	11	48	59	131	9
4977	4		16	54	3	0	0	0	0	0	0
4978	1993		1	1	0	2	6	0	0	83	0
4979			0	0	0	104	135	208	69	0	0
4980			0	0	0	83	0	0	0	0	1
4981	04		135	208	69	0	0	0	0	0	0
4982	1994		1	1	0	2	9	0	0	0	0
4983			0	139	120	240	218	139	0	0	0
4984			0	60	0	0	0	0	139	120	2
4985	40		218	139	0	0	0	0	60		
4986	1995		1	1	0	2	41	0	0	0	0
4987			0	0	399	935	1200	393	134	533	533
4988			0	0	0	0	0	0	0	399	9
4989	35		1200	393	134	533	533	0	0		
4990	1996		1	1	0	2	42	0	0	0	42
4991			0	0	714	811	598	1068	314	440	200
4992			0	0	0	0	42	0	0	714	8
4993	11		598	1068	314	440	200	0	0		
4994	1997		1	1	0	2	25	0	0	0	0
4995			62	248	454	480	462	474	212	106	0
4996			0	0	0	0	0	62	248	454	4
4997	80		462	474	212	106	0	0	0		
4998	1999		1	1	0	2	8	0	0	0	0
5000			7	91	224	147	161	126	63	28	0
5001			0	0	0	0	0	7	91	224	1
5002	47		161	126	63	28	0	0	0		
5003	2000		1	1	0	2	5	0	0	0	0
5004			0	40	37	116	143	87	43	37	0
5005			0	32	0	0	0	0	40	37	1
5006	16		143	87	43	37	0	0	32		
5007	2002		1	1	0	2	6	0	0	0	0
5008			0	0	0	153	153	255	0	0	0
5009			0	0	0	0	0	0	0	0	1
5010	53		153	255	0	0	0	0	0		
5011											
5012			### CA commercial landings, live fish, north of 40-10								
5013			### initially assigning to fleet: 2_CA_NorthOf4010_Comm_Live								
5014	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	

	#	m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
5015	#		44cm	46cm+	repeat						
5016	1997		1	2	0	2	27	0	0	0	60
5017			180	664	852	448	164	232	0	60	0
5018	0		0	0	0	0	60	180	664	852	4
5019	48		164	232	0	60	0	0	0	0	0
5020	1999		1	2	0	2	22	0	0	0	0
5021			24	79	273	548	595	479	123	98	0
5022	0		0	0	0	0	0	24	79	273	5
5023	48		595	479	123	98	0	0	0	0	0
5024	2000		1	2	0	2	20	0	0	0	0
5025			0	57	342	270	480	540	171	102	0
5026	0		0	0	0	0	0	0	57	342	2
5027	70		480	540	171	102	0	0	0	0	0
5028	2001		1	2	0	2	12	0	0	0	0
5029			0	16	160	208	336	256	144	16	16
5030	0		0	0	0	0	0	0	0	160	2
5031	08		336	256	144	16	16	0	0	0	0
5032	2002		1	2	0	2	22	0	0	0	0
5033			0	90	535	570	640	210	50	45	0
5034	50		0	0	0	0	0	0	90	535	5
5035	70		640	210	50	45	0	50	0	0	0
5036	2004		1	2	0	2	3	0	0	0	0
5037			0	0	87	0	87	29	87	0	0
5038	0		0	0	0	0	0	0	0	87	0
5039	5040		87	29	87	0	0	0	0	0	0
5041	2006		1	2	0	2	11	0	0	0	0
5042			20	74	66	70	316	360	130	54	0
5043	0		0	0	0	0	0	20	74	66	7
5044	0		316	360	130	54	0	0	0	0	0
5045	2007		1	2	0	2	16	0	0	0	0
5046			0	37	157	275	582	328	155	45	0
5047	0		0	0	0	0	0	0	37	157	2
5048	75		582	328	155	45	0	0	0	0	0
5049	2008		1	2	0	2	15	0	0	0	0
5050			0	56	56	350	420	357	210	49	0
5051	0		0	0	0	0	0	0	56	56	3
5052	50		420	357	210	49	0	0	0	0	0
5053	2009		1	2	0	2	13	0	0	0	0
5054			0	0	50	177	358	464	224	29	0
5055	0		0	0	0	0	0	0	0	50	1
5056	77		358	464	224	29	0	0	0	0	0

	2010	1	2	0	0	21	2	2	0	0	0	0	0
5057	0	0	0	0	0	21	0	42	77	0	56	0	21
5058	0	0	0	0	0	0	0	0	0	0	0	0	0
5059	1	42	77	56	21	0	0	0	0	0	0	0	2
5060													
5061													
5062	### CA rec landings, PC mode, north of 40-10												
5063	### initially assigning to fleet: 3_CA_NorthOf4010_Rec_PC												
5064	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c			
5065	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm			
5066	#	44cm	46cm+	repeat									
5067	1981	1	3	0	2	1	0	0	0	0	0	0	0
5068	0	0	0	0	0	0	0	0	0	0	0	0	1
5069	0	0	0	0	0	0	0	0	0	0	0	0	0
5070	0	0	0	0	0	1	0	0	0	0			
5071	1985	1	3	0	2	1	0	0	0	0	0	0	0
5072	0	0	0	0	0	1	0	0	0	0	0	0	0
5073	0	0	0	0	0	0	0	0	0	0	0	0	0
5074	1	0	0	0	0	0	0	0	0	0			
5075	1995	1	3	0	2	3	0	0	0	0	0	0	0
5076	0	0	0	0	0	2	1	0	0	0	0	0	0
5077	0	0	0	0	0	0	0	0	0	0	0	0	0
5078	2	1	0	0	0	0	0	0	0	0			
5079	1996	1	3	0	2	7	0	0	0	0	0	0	0
5080	0	0	0	0	4	2	0	0	1	0	0	0	0
5081	0	0	0	0	0	0	0	0	0	0	0	0	4
5082	2	0	1	0	0	0	0	0	0	0			
5083	2003	1	3	0	2	1	0	0	0	0	0	0	0
5084	0	0	0	0	0	1	0	0	0	0	0	0	0
5085	0	0	0	0	0	0	0	0	0	0	0	0	0
5086	1	0	0	0	0	0	0	0	0	0			
5087	2004	1	3	0	2	4	0	0	0	0	0	0	0
5088	0	0	0	0	0	0	0	0	1	0	1	0	1
5089	0	1	0	0	0	0	0	0	0	0	0	0	0
5090	0	0	0	1	1	1	0	0	1	0	1		
5091	2005	1	3	0	2	2	0	0	0	0	0	0	0
5092	0	0	0	0	0	0	0	0	1	0	1	0	0
5093	0	0	0	0	0	0	0	0	0	0	0	0	0
5094	0	0	1	1	0	0	0	0	0	0			
5095	2006	1	3	0	2	3	0	0	0	0	0	0	0
5096	0	0	0	0	1	0	0	1	0	0	1	0	0
5097	0	0	0	0	0	1	0	0	0	0	0	0	1
5098	0	0	1	0	0	1	0	0	0	0	0	0	

	2007	1	3	0	2	2	11	0	0	0	0	0
5099	0	0	0	2	2	5	1	0	0	0	0	0
5100	0	0	0	0	0	0	0	0	0	2	0	2
5101	0	5	1	1	0	0	0	0	0	0	0	0
5102	1	3	0	0	2	25	0	0	0	0	0	0
5103	0	1	1	1	3	4	5	0	8	1	1	2
5104	0	0	0	0	0	0	0	0	1	1	1	3
5105	0	4	5	8	1	2	0	0	0	0	0	0
5106	1	3	0	0	2	21	0	0	0	0	0	0
5107	0	0	1	2	1	8	4	3	3	2	0	1
5108	0	2	8	4	3	0	0	0	0	1	0	1
5109	1	3	0	0	2	11	0	0	0	2	0	1
5110	0	0	0	0	0	0	0	0	0	0	0	0
5111	1	3	0	0	2	11	0	0	0	0	0	0
5112	0	0	0	0	0	0	3	6	1	1	0	1
5113	0	0	0	0	0	0	0	0	0	0	0	0
5114	0	3	6	1	1	0	0	0	0	0	0	0
5115	1	3	0	0	2	3	0	0	0	0	0	0
5116	0	0	0	1	0	0	2	0	0	0	0	0
5117	0	0	0	0	0	0	0	0	0	1	0	0
5118	0	2	0	0	0	0	0	0	0	0	0	0
5119	1	3	0	0	2	32	0	0	0	0	0	0
5120	0	0	0	1	2	8	12	6	3	0	0	0
5121	0	0	0	0	0	0	0	0	1	1	0	2
5122	8	12	6	3	0	0	0	0	0	0	0	0
5123	1	3	0	0	2	33	0	0	0	0	0	0
5124	0	0	0	0	5	4	8	10	6	0	0	5
5125	0	0	0	0	0	0	0	0	0	0	0	0
5126	4	8	10	6	0	0	0	0	0	0	0	0
5127	1	3	0	0	2	6	0	0	0	0	0	0
5128	0	0	0	1	0	0	0	3	2	0	0	0
5129	0	0	0	0	0	0	0	0	0	1	0	0
5130	0	0	0	3	2	0	0	0	0	0	1	0
5131												
5132	### CA rec landings, PR mode, north of 40-10											
5133	### initially assigning to fleet: 4_CA_NorthOf4010_Rec_PR											
5134	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24cm		
5135	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm		
5136	#	44cm	46cm+	repeat								
5137	1981	1	4	0	2	4	0	0	0	0	0	
5138	0	0	1	1	0	0	1	0	0	1	1	
5139	0	0	1	0	0	0	1	0	0	1	0	
5140	0	0	1	0	0	0	1	0	0	1	0	

5141	1982	1	4	0	2	1	0	0	0	0	0	0	0
5142		0	0	0	0	0	0	0	0	0	0	0	0
5143		0	1	0	0	0	0	0	0	0	0	0	0
5144		0	0	0	0	0	0	0	0	1	0	0	0
5145	1983	1	4	0	2	8	0	0	1	0	4	0	0
5146		0	0	0	1	0	0	0	1	4	1	0	0
5147		1	0	0	0	0	0	0	0	0	0	0	1
5148		0	0	1	4	1	1	0	0	0	0	0	0
5149	1984	1	4	0	2	4	0	0	0	0	0	0	0
5150		0	1	0	0	0	0	0	2	0	0	0	0
5151		1	0	0	0	0	0	0	1	0	0	0	0
5152		0	0	2	0	0	1	0	0	0	0	0	0
5153	1985	1	4	0	2	11	0	0	0	3	0	4	0
5154		0	0	0	1	0	1	1	1	3	0	4	0
5155		1	0	0	0	0	0	0	0	0	0	0	1
5156		0	1	1	3	4	1	0	0	0	0	0	0
5157	1986	1	4	0	2	6	0	0	0	0	0	0	0
5158		1	0	0	1	1	1	1	1	1	0	0	0
5159		0	0	0	0	0	0	1	0	0	0	0	1
5160		1	1	1	1	0	0	0	0	0	0	0	0
5161	1987	1	4	0	2	4	0	0	0	0	0	0	0
5162		0	0	1	0	0	0	1	1	1	0	0	0
5163		0	0	0	0	0	0	0	0	0	1	1	0
5164		0	1	1	1	0	0	0	0	0	0	0	0
5165	1989	1	4	0	2	1	0	0	0	0	0	0	0
5166		0	0	1	0	0	0	0	0	0	0	0	0
5167		0	0	0	0	0	0	0	0	0	1	0	0
5168		0	0	0	0	0	0	0	0	0	0	0	0
5169	1993	1	4	0	2	16	0	0	0	0	0	0	0
5170		0	0	1	2	2	3	8	0	0	0	0	0
5171		0	0	0	0	0	0	0	0	1	0	0	2
5172		2	3	8	0	0	0	0	0	0	0	0	0
5173	1994	1	4	0	2	6	0	0	0	0	0	0	0
5174		0	0	1	3	0	0	0	2	0	0	0	0
5175		0	0	0	0	0	0	0	0	0	1	0	3
5176		0	0	2	0	0	0	0	0	0	0	0	0
5177	1995	1	4	0	2	4	0	0	0	0	0	0	0
5178		0	1	1	1	1	0	0	0	0	0	0	0
5179		0	0	0	0	0	0	0	1	0	1	0	1
5180		1	0	0	0	0	0	0	0	0	0	0	0
5181	1996	1	4	0	2	12	0	0	0	0	0	0	0
5182		0	0	3	2	3	2	2	0	0	0	0	0

5183	0	0	0	0	0	0	0	0	0	0	0	0	3	2
5184	3	2	2	0	0	0	0	0	0	0	0	0	0	1
5185	1998	1	4	0	2	0	11	0	0	0	0	0	0	1
5186	0	0	0	1	2	1	2	0	0	0	3	0	0	1
5187	1	0	0	0	0	0	1	0	0	0	0	1	0	2
5188	1	2	0	3	0	0	1	0	0	0	0	0	0	1
5189	1999	1	4	0	2	48	0	0	0	0	0	0	0	0
5190	0	2	7	14	11	8	1	0	2	4	1	7	1	1
5191	0	0	0	0	0	0	0	0	2	0	7	1	1	1
5192	4	11	8	1	4	1	0	0	0	0	0	0	0	0
5193	2000	1	4	0	2	31	0	0	0	0	0	0	0	0
5194	0	1	2	9	14	3	0	0	0	2	0	0	0	0
5195	0	0	0	0	0	0	0	0	1	2	0	0	0	9
5196	14	3	0	2	0	0	0	0	0	0	0	0	0	0
5197	2001	1	4	0	2	3	0	0	0	0	0	0	0	0
5198	0	0	0	1	0	0	0	0	0	2	0	0	0	0
5199	0	0	0	0	0	0	0	0	0	0	1	0	0	0
5200	0	0	0	0	2	0	0	0	0	0	0	0	0	0
5201	2002	1	4	0	2	7	0	0	0	0	0	0	0	0
5202	0	0	0	1	0	0	0	3	2	0	0	0	1	1
5203	0	0	0	0	0	0	0	0	0	0	1	0	0	0
5204	0	3	2	0	1	0	0	0	0	0	0	0	0	0
5205	2003	1	4	0	2	5	0	0	0	0	0	0	0	0
5206	0	0	0	1	3	0	0	0	0	0	1	0	0	0
5207	0	0	0	0	0	0	0	0	0	0	1	1	0	3
5208	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5209	2004	1	4	0	2	3	0	0	0	0	0	0	0	0
5210	1	0	0	0	0	0	0	0	2	0	0	0	0	0
5211	0	0	0	0	0	0	0	1	0	0	0	0	0	0
5212	0	0	2	0	0	0	0	0	0	0	0	0	0	0
5213	2005	1	4	0	2	36	0	0	0	0	0	0	0	0
5214	0	2	1	6	8	6	8	2	2	1	2	1	2	6
5215	0	1	0	0	0	0	0	0	2	1	2	1	1	6
5216	8	6	8	2	2	2	0	1	0	0	1	0	0	0
5217	2006	1	4	0	2	54	0	0	0	0	0	0	0	0
5218	0	3	4	11	10	15	8	2	2	1	2	1	1	1
5219	0	0	0	0	0	0	0	0	3	4	3	4	1	1
5220	1	10	15	8	2	1	0	0	0	0	0	0	0	0
5221	2007	1	4	0	2	99	0	0	0	0	0	0	0	0
5222	0	1	8	20	21	21	19	9	1	9	8	0	0	2
5223	0	21	21	19	9	0	0	0	0	0	8	0	0	2
5224	0	21	21	19	9	0	0	0	0	0	0	0	0	0

5225	2008	1	4	0	2	94	0	0	0	0	0
5226	0	0	1	6	10	27	28	13	8	1	1
5227	0	0	0	0	0	0	0	0	6	1	1
5228	0	27	28	13	8	1	0	0	0	0	0
5229	2009	1	4	0	2	73	0	0	0	0	0
5230	0	0	0	4	13	15	21	13	7	0	0
5231	0	0	0	0	0	0	0	0	4	1	1
5232	3	15	21	13	7	0	0	0	0	0	0
5233	2010	1	4	0	2	35	0	0	0	0	0
5234	0	0	0	1	4	6	10	6	5	3	4
5235	0	0	0	0	0	0	0	0	1	1	4
5236	6	10	6	5	3	0	0	0	0	0	0
5237	2011	1	4	0	2	50	0	0	0	0	0
5238	0	1	2	4	16	12	11	1	2	2	0
5239	0	1	0	0	0	0	0	1	2	4	0
5240	16	12	11	1	2	0	0	1	0	0	0
5241	2012	1	4	0	2	66	0	0	0	0	0
5242	0	1	3	3	13	19	16	9	2	3	3
5243	0	0	0	0	0	0	0	1	3	3	3
5244	13	19	16	9	2	0	0	0	0	0	0
5245	2013	1	4	0	2	62	0	0	0	0	0
5246	0	0	0	1	7	10	19	18	6	1	7
5247	0	0	0	0	0	0	0	0	1	1	7
5248	10	19	18	6	1	0	0	0	0	0	0
5249	2014	1	4	0	2	29	0	0	0	0	0
5250	0	0	0	1	2	5	4	5	8	4	2
5251	0	0	0	0	0	0	0	0	1	1	2
5252	5	4	5	8	4	0	0	0	0	0	0
5253											
5254	###	OR	Comm,	sexes	combined,		DEAD	FISHERY			
5255	###	initially		assigning		to	fleet:	5_OR_SouthernOR_Com			
5256	# m_Dead										
5257	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	
5258	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm	
5259	#	44cm	46cm+	repeat							
5260	1995	1	5	0	2	102	0	0	1	0	
5261		2.1	7	36.9	23.1	27.8	18.3	6.3	1.7	0	
5262	0	0	0	0	1	0	2.1	7	36.9	2	
5263	3.1	27.8	18.3	6.3	1.7	0	0	0	0	0	
5264	1996	1	5	0	2	118	0	0	0	0	
5265		1.1	10.4	23.9	35.6	25.9	15.2	8.1	2	0	
5266	0	0	0	0	0	0	1.1	10.4	23.9	3	

5267	5.6	25.9	15.2	8.1	2	0	0	0			
5268	1998	1	5	0	2	38	0	0	0	0	0
5269	0	3.7	6.5	28	15	3.2	5.3	1.1	0	0	
5270	0	0	0	0	0	0	0	3.7	6.5	2	
5271	8	15	3.2	5.3	1.1	0	0	0	0	0	
5272	1999	1	5	0	2	37	0	0	0	0	0
5273	0	0	11.3	14.5	6.2	2	3.1	1	0	0	
5274	0	0	0	0	0	0	0	0	11.3	1	
5275	4.5	6.2	2	3.1	1	0	0	0	0	0	
5276	2000	1	5	0	2	137	0	0	0	0	1.2
5277	1.2	5.3	37.8	45.8	26.2	20.1	14	2.2	2	2	
5278	0	0	0	0	0	1.2	1.2	5.3	37.8	4	
5279	5.8	26.2	20.1	14	2.2	2	0	0	0	0	
5280	2001	1	5	0	2	196	0	0	0	0	0
5281	0	2.3	50.2	55.4	64.2	50.2	16.2	6.6	0	0	
5282	1	0	0	0	0	0	0	2.3	50.2	5	
5283	5.4	64.2	50.2	16.2	6.6	0	1	0	0	0	
5284	2002	1	5	0	2	253	0	0	0	0	0
5285	0	0	37.3	65.3	72.3	56.8	24.2	9.1	1	1	
5286	0	0	0	0	0	0	0	0	37.3	6	
5287	5.3	72.3	56.8	24.2	9.1	1	0	0	0	0	
5288	2003	1	5	0	2	200	0	0	0	0	0
5289	0	2.4	30.1	70.7	66.8	49.1	21.9	9.8	0	0	
5290	0	0	0	0	0	0	0	2.4	30.1	7	
5291	0.7	66.8	49.1	21.9	9.8	0	0	0	0	0	
5292	2004	1	5	0	2	115	0	0	0	0	0
5293	0	1	16.8	43.3	32	17.9	9.5	3.1	0	0	
5294	0	0	0	0	0	0	0	1	16.8	4	
5295	3.3	32	17.9	9.5	3.1	0	0	0	0	0	
5296	2005	1	5	0	2	23	0	0	0	0	0
5297	0	0	4.9	4.5	6.2	2.3	5.1	2.1	0	0	
5298	0	0	0	0	0	0	0	0	4.9	4	
5299	.5	6.2	2.3	5.1	2.1	0	0	0	0	0	
5300	2006	1	5	0	2	30	0	0	0	0	0
5301	0	0	1.7	11.4	17.4	7.8	5.6	0	0	0	
5302	0	0	0	0	0	0	0	0	1.7	1	
5303	1.4	17.4	7.8	5.6	0	0	0	0	0	0	
5304	2007	1	5	0	2	44	0	0	0	0	0
5305	0	0	3.7	14.7	18.6	13.6	7.3	2.9	0	0	
5306	0	1	0	0	0	0	0	0	3.7	1	
5307	4.7	18.6	13.6	7.3	2.9	0	0	1	0	0	
5308	2008	1	5	0	2	28	0	0	0	0	0

5309	0	0	0	2	5.4	9	4	4.1	4.3	0
5310	0	0	0	0	0	0	0	0	2	5
5311	.4	9	4	4.1	4.3	0	0	0	0	
5312	2009	1	5	0	2	82	0	0	0	0
5313	0	0	0	6.2	26	28.3	15.5	12.6	4	3
5314	0	0	0	0	0	0	0	0	6.2	2
5315	6	28.3	15.5	12.6	4	3	0	0	0	
5316	2010	1	5	0	2	75	0	0	0	0
5317	0	0	2.1	18	19.8	24.9	9.4	7	0	0
5318	0	0	0	0	0	0	0	0	2.1	1
5319	8	19.8	24.9	9.4	7	0	0	0	0	
5320	2011	1	5	0	2	309	0	0	0	0
5321	0	0	21.2	48.9	87.4	96.9	47.1	15	5.7	
5322	0	2.8	0	0	0	0	0	0	21.2	4
5323	8.9	87.4	96.9	47.1	15	5.7	0	2.8	0	
5324	2012	1	5	0	2	156	0	0	0	0
5325	1	2	8.1	22.2	31.4	45.5	30	17.2	2	
5326	0	1.1	0	0	0	0	1	2	8.1	2
5327	2.2	31.4	45.5	30	17.2	2	0	1.1	0	
5328	2013	1	5	0	2	265	0	0	0	0
5329	0	1	15.2	43.2	72.2	88.9	36.4	15.3	1	
5330	0	0	0	0	0	0	0	1	15.2	4
5331	3.2	72.2	88.9	36.4	15.3	1	0	0	0	
5332	2014	1	5	0	2	165	0	0	0	0
5333	0	0	8	25.4	49.2	50.7	24.2	8	3	
5334	0	1	0	0	0	0	0	0	8	2
5335	5.4	49.2	50.7	24.2	8	3	0	1	0	
5336										
5337	###	OR	Comm,	sexes	combined,	LIVE	FISHERY			
5338	###	initially		assigning	to	fleet:	6_OR_SouthernOR_Com			
5339	# m_Live									
5340	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c
5341	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
5342	#	44cm	46cm+	repeat						
5343	1998	1	6	0	2	100	0	0	0	0
5344	0	3.6	31	74.4	61.1	37.4	14.5	2	0	
5345	0	0	0	0	0	0	0	3.6	31	7
5346	4.4	61.1	37.4	14.5	2	0	0	0	0	
5347	1999	1	6	0	2	93	0	0	0	0
5348	5.9	7	30.6	30	13.2	15.2	7.6	2	1	
5349	0	0	0	0	0	5.9	7	30.6	3	
5350	0	13.2	15.2	7.6	2	1	0	0	0	

5351	2000	1	6	0	2	1095	0	0	0	0	0
5352		1.1	13.6	209.9	257	309.4	209.9	101.3	26.4	7.3	
5353	0	0	0	0	0	0	1.1	0	13.6	209.9	2
5354	57	309.4	209.9	101.3	26.4	7.3	0	0	0	0	
5355	2001	1	6	0	2	1858	0	0	0	0	0
5356		0	4	350.1	554	527.9	320.5	127.4	29.6	5	
5357	3	0	0	0	0	0	0	4	350.1	5	
5358	54	527.9	320.5	127.4	29.6	5	3	0	0	0	
5359	2002	1	6	0	2	1339	0	0	0	0	0
5360		0	5.1	207.5	386.4	363.4	276	116.4	31.4	0	
5361	2	0	0	0	0	0	0	5.1	207.5	3	
5362	86.4	363.4	276	116.4	31.4	0	2	0	0	0	
5363	2003	1	6	0	2	794	0	0	0	0	0
5364		0	1	144.5	239.7	205.8	145.4	64.1	17.3	4	
5365	1.1	0	0	0	0	0	0	1	144.5	2	
5366	39.7	205.8	145.4	64.1	17.3	4	1.1	0	0	0	
5367	2004	1	6	0	2	586	0	0	0	0	0
5368		0	2	104.8	172.3	168.8	109.6	25.5	9.2	3.1	
5369	1	0	0	0	0	0	0	2	104.8	1	
5370	72.3	168.8	109.6	25.5	9.2	3.1	1	0	0	0	
5371	2005	1	6	0	2	194	0	0	0	0	0
5372		0	0	26.9	46.2	53.2	44	19.3	8.3	1	
5373	0	0	0	0	0	0	0	0	26.9	4	
5374	6.2	53.2	44	19.3	8.3	1	0	0	0	0	
5375	2006	1	6	0	2	408	0	0	0	0	0
5376		1	2	40.4	75.2	120.1	99.3	59.2	23.1	2	
5377	0	0	0	0	0	0	1	2	40.4	7	
5378	5.2	120.1	99.3	59.2	23.1	2	0	0	0	0	
5379	2007	1	6	0	2	680	0	0	0	0	0
5380		0	4	46.1	141.2	184.3	193.6	106	17.1	3	
5381	0	1	0	0	0	0	0	4	46.1	1	
5382	41.2	184.3	193.6	106	17.1	3	0	1	0	0	
5383	2008	1	6	0	2	348	0	0	0	0	0
5384		0	0	26.2	60.8	109.9	80.1	52.6	12	9.1	
5385	2.1	0	0	0	0	0	0	0	26.2	6	
5386	0.8	109.9	80.1	52.6	12	9.1	2.1	0	0	0	
5387	2009	1	6	0	2	348	0	0	0	0	0
5388		0	3.4	36.4	95.1	130.1	87.6	42.6	13.8	0	
5389	1.1	1.2	0	0	0	0	0	3.4	36.4	9	
5390	5.1	130.1	87.6	42.6	13.8	0	1.1	1.2	0	0	
5391	2010	1	6	0	2	454	0	0	0	0	0
5392		0	3.3	50.4	103.5	174.8	113.1	40.8	12.1	1	

5393	0	0	0	0	0	0	0	0	3.3	50.4	1
5394	03.5	174.8	113.1	40.8	12.1	1	0	0	0	0	
5395	2011	1	6	0	2	688	0	0	0	0	0
5396	0	4.1	44.5	161.8	221.4	200.6	90.1	19.1	3.1		
5397	1.1	1	0	0	0	0	0	4.1	44.5	1	
5398	61.8	221.4	200.6	90.1	19.1	3.1	1.1	1			
5399	2012	1	6	0	2	447	0	0	0	0	0
5400	0	3.1	28.1	92.3	149.9	99.9	74.6	21.5	1		
5401	0	2	0	0	0	0	0	3.1	28.1	9	
5402	2.3	149.9	99.9	74.6	21.5	1	0	2			
5403	2013	1	6	0	2	423	0	0	0	0	0
5404	0	1.1	28.5	96.8	128	126.3	50.3	6.2	4.1		
5405	0	1	0	0	0	0	0	1.1	28.5	9	
5406	6.8	128	126.3	50.3	6.2	4.1	0	1			
5407	2014	1	6	0	2	355	0	0	0	0	0
5408	0	5.3	32.8	82.6	116.9	73.4	40.4	16.2	4.7		
5409	2	0	0	0	0	0	0	5.3	32.8	8	
5410	2.6	116.9	73.4	40.4	16.2	4.7	2	0			
5411											
5412	###	Oregon	Rec,	South,	Party/Charter						
5413	###	initially		assigning	to						
5414	#_PC										
5415	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	
5416	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm	
5417	#	44cm	46cm+	repeat							
5418	1984	1	7	0	2	4	0	0	0	0	0
5419	0	0	0	0	2	1	0	1	0	0	0
5420	0	0	0	0	0	0	0	0	0	0	2
5421	1	0	1	0	0	0	0	0	0		
5422	1985	1	7	0	2	8	0	0	0	0	1
5423	0	0	1	0	0	2	0	2	0	1	1
5424	1	0	0	0	0	1	0	0	1	0	
5425	2	0	2	0	0	1	1	0			
5426	1986	1	7	0	2	4	0	0	0	0	0
5427	0	0	0	0	0	1	2	1	0	0	0
5428	0	0	0	0	0	0	0	0	0	0	0
5429	1	2	1	0	0	0	0	0			
5430	1987	1	7	0	2	4	0	0	0	0	1
5431	0	0	1	0	0	0	1	0	0	1	0
5432	0	0	0	0	0	1	0	0	1	0	0
5433	0	1	0	0	2	7	0	0	0	0	0
5434	1988	1	7	0	2	7	0	0	0	0	0

5435	0	0	1	0	0	1	0	0	1	1	3	0	0
5436	0	0	0	0	0	0	0	0	0	1	0	0	1
5437	0	0	1	0	1	3	0	0	0	0	0	0	1
5438	1989	1	7	0	0	2	0	2	0	0	0	0	1
5439	0	0	0	0	0	0	0	1	1	0	0	0	0
5440	0	0	0	0	0	0	1	0	0	0	0	0	0
5441	0	0	1	0	0	0	0	0	0	0	0	0	0
5442	1993	1	7	0	0	2	9	0	0	0	0	0	0
5443	0	0	0	3	1	4	1	0	1	0	0	0	0
5444	0	0	0	0	0	0	0	0	0	0	0	0	3
5445	1	4	1	0	0	0	0	0	0	0	0	0	0
5446	1994	1	7	0	2	31	0	0	0	0	0	0	1
5447	1	1	4	8	3	5	3	2	1	2	2	4	2
5448	1	0	0	0	0	1	1	1	1	1	4	2	8
5449	3	5	3	2	2	1	1	0	0	0	0	0	0
5450	1995	1	7	0	2	12	0	0	0	0	0	0	0
5451	0	1	2	3	5	0	0	1	0	0	0	0	0
5452	0	0	0	0	0	0	0	1	1	2	0	0	3
5453	5	0	1	0	0	0	0	0	0	0	0	0	0
5454	1996	1	7	0	2	12	0	0	0	0	0	0	0
5455	0	0	1	1	2	3	3	0	1	1	1	1	1
5456	0	0	0	0	0	0	0	0	0	0	0	0	1
5457	2	3	3	1	1	0	0	0	0	0	0	0	0
5458	1997	1	7	0	2	29	0	0	0	0	1	1	0
5459	1	2	2	11	6	5	0	0	0	1	0	0	0
5460	0	0	0	0	1	0	1	0	2	2	0	0	1
5461	1	6	5	0	1	0	0	0	0	0	0	0	0
5462	1998	1	7	0	2	16	0	0	0	0	0	0	0
5463	0	1	2	1	4	4	1	0	1	3	0	0	0
5464	0	0	0	0	0	0	0	0	1	1	2	0	1
5465	4	4	1	3	0	0	0	0	0	0	0	0	0
5466	1999	1	7	0	2	31	0	0	0	0	0	0	0
5467	1	3	2	5	4	10	6	0	0	0	0	0	0
5468	0	0	0	0	0	0	1	0	3	0	2	0	5
5469	4	10	6	0	0	0	0	0	0	0	0	0	0
5470	2000	1	7	0	2	15	0	0	0	0	1	0	0
5471	0	0	2	4	4	3	1	0	0	0	0	0	0
5472	0	0	0	0	1	0	0	0	0	0	2	0	4
5473	4	3	1	0	0	0	0	0	0	0	0	0	0
5474	2001	1	7	0	2	96	0	0	0	0	0	0	0
5475	3	6	16	17	23	17	3	12	2	16	0	0	1
5476	0	0	0	0	0	0	0	0	0	0	0	0	0

5477	7	23	17	12	2	0	0	0	0	0	0
5478	2002	1	7	0	27	43	188	0	0	0	0
5479	2	6	19	0	0	0	50	2	30	9	2
5480	0	0	0	0	0	0	2	6	19	2	2
5481	7	43	50	30	9	2	0	0	0	0	0
5482	2003	1	7	0	2	257	0	0	0	0	0
5483	3	17	24	56	64	55	26	8	2	24	2
5484	0	2	0	0	0	0	3	17	24	5	
5485	6	64	55	26	8	2	0	2	2	0	
5486	2004	1	7	0	2	117	0	0	0	0	0
5487	0	2	5	13	31	31	21	13	1	5	1
5488	0	0	0	0	0	0	0	2	5	1	
5489	3	31	31	21	13	1	0	0	0	0	
5490	2005	1	7	0	2	137	0	0	0	0	0
5491	0	2	9	16	27	34	31	15	2	9	1
5492	0	1	0	0	0	0	0	0	0	0	
5493	6	27	34	31	15	2	0	1	0	0	
5494	2006	1	7	0	2	187	0	0	0	0	0
5495	0	3	8	12	40	52	49	17	6	8	1
5496	0	0	0	0	0	0	0	3	8	0	
5497	2	40	52	49	17	6	0	0	0	0	
5498	2007	1	7	0	2	317	0	0	0	0	0
5499	3	5	12	37	71	99	65	18	4	0	
5500	2	1	0	0	0	0	3	5	12	3	
5501	7	71	99	65	18	4	2	1	0	0	
5502	2008	1	7	0	2	192	0	0	0	0	0
5503	2	3	5	16	29	48	57	23	9	0	
5504	0	0	0	0	0	0	0	0	0	0	
5505	6	29	48	57	23	9	0	0	0	0	
5506	2009	1	7	0	2	106	0	0	0	0	0
5507	1	0	0	4	8	21	28	22	15	6	
5508	1	0	0	0	0	0	1	0	4	8	
5509	21	28	22	15	6	1	0	0	0	0	
5510	2010	1	7	0	2	210	0	0	0	0	0
5511	1	2	10	10	22	53	72	32	8	0	
5512	0	0	0	0	0	0	1	2	10	1	
5513	0	22	53	72	32	8	0	0	0	0	
5514	2011	1	7	0	2	230	0	0	0	0	0
5515	0	2	8	17	34	73	56	31	7	0	
5516	0	2	0	0	0	0	0	2	8	1	
5517	7	34	73	56	31	7	0	2	0	0	
5518	2012	1	7	0	2	280	0	0	0	0	0

5519	1	1	1	3	23	63	86	69	24	9
5520	1	0	0	0	0	0	1	1	3	2
5521	3	63	86	69	24	9	1	0		
5522	2013	1	7	0	2	206	0	0	0	2
5523	1	1	8	9	44	51	63	20	6	
5524	1	0	0	0	0	2	1	1	8	9
5525	44	51	63	20	6	1	0			
5526	2014	1	7	0	2	75	0	0	0	1
5527	0	1	0	3	17	15	25	9	3	
5528	0	1	0	0	1	0	0	1	0	3
5529	17	15	25	9	3	0	1			
5530										
5531	###	Oregon	Rec,	South	Private/Rental					
5532	###	initially		assigning	to	fleet:	8_OR_SouthernOR_Rec			
5533	#_PR									
5534	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c
5535	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm
5536	#	44cm	46cm+	repeat						
5537	1980	1	8	0	2	4	0	0	0	0
5538	0	0	0	0	1	0	0	0	2	0
5539	0	1	0	0	0	0	0	0	0	1
5540	0	0	0	0	2	0	0	1		
5541	1981	1	8	0	2	2	0	0	0	0
5542	0	0	0	0	0	0	0	0	1	1
5543	0	0	0	0	0	0	0	0	0	0
5544	0	0	0	0	1	1	0	0		
5545	1982	1	8	0	2	5	0	0	0	0
5546	0	0	0	0	1	2	1	1	0	0
5547	0	0	0	0	0	0	0	0	0	1
5548	2	1	1	0	0	0	0	0		
5549	1983	1	8	0	2	1	0	0	0	0
5550	0	0	1	0	0	0	0	0	0	0
5551	0	0	0	0	0	0	0	0	1	0
5552	0	0	0	0	0	0	0	0		
5553	1984	1	8	0	2	7	0	0	0	0
5554	0	0	0	0	0	0	2	0	1	2
5555	1	1	0	0	0	0	0	0	0	0
5556	0	2	0	1	2	1	1	1		
5557	1985	1	8	0	2	11	0	0	0	0
5558	1	0	0	0	0	2	0	0	5	2
5559	1	0	0	0	0	0	1	0	0	0
5560	2	0	0	0	5	2	1	0		

5561	1986	1	8	0	2	1	0	0	0	0	0	0	0
5562		0	0	0	0	1	0	0	0	0	0	0	0
5563		0	0	0	0	0	0	0	0	0	0	0	0
5564		1	0	0	0	0	0	0	0	0	0	0	0
5565	1987	1	8	0	2	3	0	0	0	0	0	0	0
5566		0	0	1	1	0	1	0	0	0	0	0	0
5567		0	0	0	0	0	0	0	0	0	1	0	1
5568		0	1	0	0	0	0	0	0	0	0	0	0
5569	1988	1	8	0	2	10	0	0	0	0	0	0	0
5570		0	1	0	2	3	1	2	1	1	0	0	0
5571		0	0	0	0	0	0	0	1	0	0	2	0
5572		3	1	2	1	0	0	0	0	0	0	0	0
5573	1989	1	8	0	2	2	0	0	0	0	1	0	0
5574		0	0	0	1	0	0	0	0	0	0	0	0
5575		0	0	0	0	1	0	0	0	0	0	0	1
5576		0	0	0	0	0	0	0	0	0	0	0	0
5577	1993	1	8	0	2	10	0	0	0	0	0	0	0
5578		0	0	2	1	1	1	2	2	1	0	0	0
5579		0	0	0	0	0	0	0	0	0	2	2	1
5580		1	1	2	2	1	0	0	0	0	0	0	0
5581	1994	1	8	0	2	17	0	0	0	0	0	0	0
5582		0	2	3	1	2	4	2	3	0	0	0	0
5583		0	0	0	0	0	0	0	2	3	0	1	0
5584		2	4	2	3	0	0	0	0	0	0	0	0
5585	1995	1	8	0	2	17	0	0	0	0	0	0	1
5586		1	0	2	5	2	4	2	0	0	0	0	0
5587		0	0	0	0	0	1	0	0	0	2	0	5
5588		2	4	2	0	0	0	0	0	0	0	0	0
5589	1996	1	8	0	2	1	0	0	0	0	0	0	0
5590		0	0	0	0	0	0	0	1	0	0	0	0
5591		0	0	0	0	0	0	0	0	0	0	0	0
5592		0	0	1	0	0	0	0	0	0	0	0	0
5593	1997	1	8	0	2	42	0	0	0	0	0	0	0
5594		0	2	7	8	11	8	6	0	0	7	0	0
5595		0	0	0	0	0	0	0	2	0	7	0	8
5596		11	8	6	0	0	0	0	0	0	0	0	0
5597	1998	1	8	0	2	41	0	0	0	0	0	0	2
5598		1	1	3	9	13	8	2	1	1	1	0	1
5599		0	0	0	0	0	1	0	1	1	3	0	9
5600		13	8	2	1	1	0	0	0	0	0	0	0
5601	1999	1	8	0	2	21	0	0	0	0	0	0	0
5602		1	0	1	5	7	3	2	2	0	0	0	0

5603	0	0	0	0	0	0	0	0	1	0	0	1	5
5604	7	3	2	0	2	0	0	0	0	0	0	0	0
5605	2000	1	8	0	0	2	10	0	0	0	0	0	0
5606	0	2	1	0	0	0	3	1	0	0	3	1	0
5607	0	0	0	0	0	0	0	0	0	2	1	0	0
5608	3	1	0	3	0	0	0	0	0	0	0	0	0
5609	2001	1	8	0	2	81	0	0	0	0	0	0	1
5610	1	4	8	18	21	16	6	5	5	1	8	1	1
5611	0	0	0	0	0	1	1	4	4	8	1	1	1
5612	8	21	16	6	5	1	0	0	0	0	0	0	0
5613	2002	1	8	0	2	85	0	0	0	0	0	0	0
5614	1	5	13	13	19	17	11	4	4	2	5	1	1
5615	0	0	0	0	0	0	1	5	5	13	13	1	1
5616	3	19	17	11	4	2	0	0	0	0	0	0	0
5617	2003	1	8	0	2	159	0	0	0	0	0	0	0
5618	1	2	13	24	47	35	22	9	5	13	5	2	2
5619	0	1	0	0	0	0	1	2	2	13	13	2	2
5620	4	47	35	22	9	5	0	1	1	0	0	1	1
5621	2004	1	8	0	2	107	0	0	0	0	0	0	1
5622	1	1	3	8	32	34	19	6	6	2	2	2	2
5623	0	0	0	0	0	1	1	1	1	3	3	8	8
5624	32	34	19	6	2	0	0	0	0	0	0	0	0
5625	2005	1	8	0	2	200	0	0	0	0	0	0	0
5626	0	3	7	19	41	47	51	25	5	25	5	5	2
5627	1	1	0	0	0	0	0	3	3	7	7	1	1
5628	9	41	47	51	25	5	1	1	1	0	0	0	0
5629	2006	1	8	0	2	254	0	0	0	0	0	0	0
5630	1	4	14	15	52	75	65	16	16	7	7	7	7
5631	4	1	0	0	0	0	1	4	4	14	14	1	1
5632	5	52	75	65	16	7	4	1	1	0	0	0	2
5633	2007	1	8	0	2	212	0	0	0	0	0	0	0
5634	0	1	10	24	37	55	56	22	22	6	6	6	2
5635	1	0	0	0	0	0	0	1	1	10	10	2	2
5636	4	37	55	56	22	6	1	0	0	0	0	0	0
5637	2008	1	8	0	2	196	0	0	0	0	0	0	0
5638	2	3	9	22	26	45	56	24	24	6	6	6	2
5639	2	1	0	0	0	2	3	3	3	9	9	2	2
5640	2	26	45	56	24	6	2	1	1	0	0	0	0
5641	2009	1	8	0	2	169	0	0	0	0	0	0	1
5642	0	4	7	10	25	53	38	22	22	7	7	7	1
5643	2	0	0	0	0	1	0	4	4	7	7	1	1
5644	0	25	53	38	22	7	2	0	0	0	0	0	0

5645	2010	1	8	0	2	207	0	0	0	0	0
5646	0	2	6	24	30	52	54	32	6	6	0
5647	1	0	0	0	0	0	0	2	6	2	2
5648	4	30	52	54	32	6	1	0	0	0	0
5649	2011	1	8	0	2	272	0	0	0	0	1
5650	1	0	13	27	50	93	54	28	4	1	1
5651	0	1	0	0	0	1	1	0	13	2	2
5652	7	50	93	54	28	4	0	1	7	2	2
5653	2012	1	8	0	2	229	0	0	0	0	0
5654	0	1	7	24	32	62	64	26	8	2	2
5655	3	2	0	0	0	0	0	1	7	2	2
5656	4	32	62	64	26	8	3	2	0	0	0
5657	2013	1	8	0	2	261	0	0	0	1	1
5658	1	3	6	22	48	61	75	32	12	12	12
5659	0	0	0	0	0	1	1	3	6	2	2
5660	2	48	61	75	32	12	0	0	0	0	0
5661	2014	1	8	0	2	158	0	0	0	0	0
5662	1	0	4	11	25	50	42	21	4	4	1
5663	0	0	0	0	0	1	0	0	4	1	1
5664	1	25	50	42	21	4	0	0	0	0	0
5665											
5666	###	Oregon	Rec,	North,	Party/Charter						
5667	###	initially		assigning	to	fleet:	10_OR_NorthernOR_Re				
5668	# c_PC										
5669	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24c	
5670	# m	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	42cm	
5671	#	44cm	46cm+	repeat							
5672	1980	1	10	0	2	16	0	0	0	0	0
5673	2	1	0	0	3	2	4	1	2	1	3
5674	0	0	0	0	0	0	2	1	0	0	3
5675	2	4	1	2	1	0	0	0	0	0	0
5676	1981	1	10	0	2	11	0	0	0	0	0
5677	0	0	2	0	0	3	2	1	2	1	1
5678	0	0	0	0	0	0	0	0	2	0	0
5679	3	2	1	2	1	0	0	0	0	0	0
5680	1982	1	10	0	2	9	0	0	0	0	0
5681	0	0	1	1	1	3	0	0	2	0	0
5682	1	0	0	0	0	0	0	0	1	0	1
5683	1	3	0	2	0	1	0	0	0	0	0
5684	1983	1	10	0	2	2	0	0	0	0	0
5685	1	0	0	0	0	1	0	0	0	0	0
5686	0	0	0	0	0	0	0	0	0	0	0

5687	1	0	0	0	0	0	0	0	0	0	0	0	0
5688	1984	1	10	0	0	2	10	0	0	0	0	0	0
5689	0	1	0	0	1	1	2	3	1	1	1	1	1
5690	0	0	0	0	0	0	0	0	0	1	0	0	1
5691	1	2	3	1	1	1	0	0	0	0	0	0	0
5692	1985	1	10	0	0	2	9	0	0	0	0	0	0
5693	1	2	0	1	1	2	2	1	1	0	0	0	0
5694	0	0	0	0	0	0	0	1	2	0	0	0	1
5695	2	2	1	0	0	0	0	0	0	0	0	0	0
5696	1986	1	10	0	2	5	0	0	0	0	1	0	0
5697	0	0	2	2	0	0	0	0	0	1	0	0	0
5698	0	0	0	0	0	0	0	0	0	0	2	0	2
5699	0	0	0	1	0	0	0	0	0	0	0	0	0
5700	1987	1	10	0	2	22	0	0	0	1	1	0	1
5701	2	1	4	1	6	5	1	1	1	1	1	0	0
5702	0	0	0	0	0	1	1	2	1	1	4	0	1
5703	6	5	1	1	0	0	0	0	0	0	0	0	0
5704	1988	1	10	0	2	31	0	0	0	0	1	0	0
5705	1	2	6	3	2	8	5	5	2	2	6	0	3
5706	0	1	0	0	1	0	1	1	2	1	6	0	3
5707	2	8	5	2	0	0	0	1	1	1	0	0	0
5708	1989	1	10	0	2	37	0	0	1	0	0	0	0
5709	3	2	3	7	9	6	4	1	1	0	0	0	0
5710	0	1	0	1	0	0	0	3	2	3	7	0	0
5711	9	6	4	1	0	0	0	1	1	1	0	0	0
5712	1993	1	10	0	2	61	0	0	0	0	0	0	2
5713	3	4	11	15	9	11	5	0	0	0	0	0	0
5714	0	1	0	0	0	2	3	4	11	11	1	1	1
5715	5	9	11	5	0	0	0	1	0	0	0	0	0
5716	1994	1	10	0	2	37	0	0	0	0	0	0	1
5717	2	3	5	11	6	4	3	1	1	1	1	1	1
5718	0	0	0	0	0	1	2	3	5	5	1	1	1
5719	1	6	4	3	1	1	0	0	0	0	0	0	0
5720	1995	1	10	0	2	19	0	0	0	0	0	0	0
5721	0	2	3	5	2	5	1	1	1	1	3	0	5
5722	0	0	0	0	0	0	0	0	2	0	0	0	5
5723	2	5	1	1	0	0	0	0	0	0	0	0	0
5724	1996	1	10	0	2	19	0	0	0	0	0	0	0
5725	1	0	5	4	5	1	2	0	0	0	1	0	4
5726	0	0	0	0	0	0	1	0	0	0	5	0	4
5727	5	1	2	0	1	0	0	0	0	0	0	0	0
5728	1997	1	10	0	2	31	0	0	0	0	0	0	0

5729	0	0	1	4	0	10	5	8	1	1	1	1
5730	0	0	8	1	0	1	1	0	0	1	4	1
5731	0	5	10	0	1	2	36	0	0	0	1	0
5732	1998	1	3	7	0	11	2	9	2	0	1	0
5733	1	0	0	0	0	1	0	1	3	0	7	1
5734	0	2	9	2	0	0	0	1	3	0	7	1
5735	1	1	10	0	2	79	0	0	0	0	0	4
5736	1999	1	7	11	9	22	19	1	1	1	0	0
5737	5	0	0	0	0	4	5	7	11	0	9	
5738	0	22	19	1	1	0	0	0	7	11	9	
5739	2000	1	10	0	2	36	0	0	0	0	0	1
5740	3	2	4	3	8	9	5	2	0	4	1	3
5741	0	0	0	0	0	1	3	0	0	0	0	
5742	8	9	5	0	1	0	0	0	0	0	0	
5743	2001	1	10	0	2	161	0	0	0	0	0	3
5744	6	13	14	35	42	29	11	5	2	14	2	
5745	1	0	0	0	0	3	6	13	14	3		
5746	5	42	29	11	5	2	1	0	0	0	0	
5747	2002	1	10	0	2	345	0	0	0	0	0	2
5748	11	32	51	64	84	72	22	6	51	0		
5749	1	0	0	0	0	2	11	32	51	6		
5750	4	84	72	22	6	0	1	0	0	0		
5751	2003	1	10	0	2	229	0	0	0	0		
5752	4	16	33	54	38	53	26	5	0	0		
5753	0	0	0	0	0	0	4	16	33	5		
5754	4	38	53	26	5	0	0	0	0	0		
5755	2004	1	10	0	2	151	0	0	0	0		
5756	0	5	12	38	44	41	8	1	0	0		
5757	0	0	0	0	0	2	0	5	12	3		
5758	8	44	41	8	1	0	0	0	0	0		
5759	2005	1	10	0	2	220	0	0	0	0		
5760	1	10	19	30	58	63	30	8	1	0		
5761	0	0	0	0	0	0	1	10	19	3		
5762	0	58	63	30	8	1	0	0	0	0		
5763	0	1	10	0	2	221	0	0	0	0		
5764	2006	3	8	15	35	54	61	38	5	1	0	
5765	0	1	0	0	0	0	3	8	15	3		
5766	5	54	61	38	5	1	0	0	0	0		
5767	2007	1	10	0	2	301	0	0	0	0		
5768	5	11	27	49	63	95	34	12	27	2		
5769	1	0	0	0	0	1	5	11	27	4		
5770	1	1	0	0	0	1	5	11	27	4		

5771	9	63	95	34	12	2	1	1				
5772	2008	1	10	0	2	396	0	0	0	0	0	4
5773	9	18	29	37	93	117	68	17	2	17	2	3
5774	1	0	0	0	0	4	9	18	29	29	2	3
5775	7	93	117	68	17	2	1	1				
5776	2009	1	10	0	2	286	0	0	0	0	0	2
5777	4	15	35	50	47	71	47	12	0	35	0	5
5778	0	3	0	0	0	2	4	15	15	35		
5779	0	47	71	47	12	0	0	3				
5780	2010	1	10	0	2	228	0	0	0	0	0	0
5781	0	10	23	43	42	55	43	11	1	23	1	4
5782	0	0	0	0	0	0	0	10	10	23		
5783	3	42	55	43	11	1	0	0				
5784	2011	1	10	0	2	273	0	0	0	0	0	0
5785	1	8	16	49	65	69	45	16	4			
5786	0	0	0	0	0	0	1	8	16	16		
5787	9	65	69	45	16	4	0	0				
5788	2012	1	10	0	2	213	0	0	0	0	0	0
5789	1	2	11	31	33	65	48	15	5			
5790	2	0	0	0	0	0	1	2	11	11	3	
5791	1	33	65	48	15	5	2	0				
5792	2013	1	10	0	2	202	0	0	0	0	0	0
5793	0	1	10	30	48	54	41	15	3			
5794	0	0	0	0	0	0	0	1	10	10	3	
5795	0	48	54	41	15	3	0	0				
5796	2014	1	10	0	2	58	0	0	0	0	0	0
5797	1	1	4	7	9	15	13	6	2			
5798	0	0	0	0	0	0	1	1	4	7		
5799	9	15	13	6	2	0	0	0				
5800												
5801	## #Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm			
5802	# 24cm	26cm	28cm	30cm	32cm	34cm	36cm	38cm	40cm	4		
5803	# 2cm	44cm	46cm+	repeat	m20	m22	m24	m26	m28	m3		
5804	# 0	m32	m34	m36	m38	m40	m42	m44	m46			
5805	## 2004	-1	10	0	1	23	0	0	0			
5806	# 2	3	5	2	5	3	0	3	0			
5807	# 0	0	0	0	0	0	2	3	5	2		
5808	# 5	3	0	3	0	0	0	0	0			
5809	## 2014	-1	-10	0	1	23	0	0	0			
5810	# 2	3	5	2	5	3	0	3	0			
5811	# 0	0	0	0	0	0	2	3	5	2		
5812	# 5	3	0	3	0	0	0	0	0			

5813  
 5814   ###      Oregon Rec,      North,    Private/Rental  
 5815   ###      initially        assigning        to        fleet: 11\_OR\_NorthernOR\_Re  
 5816   # c\_PR  
 5817   #Yr      Seas      Flt/Svy    Gender    Part      Nsamp      18cm      20cm      22cm      24c  
 5818   # m      26cm      28cm      30cm      32cm      34cm      36cm      38cm      40cm      42cm  
 5819   #      44cm      46cm+      repeat  
 5820   1980      1      11      0      2      2      0      0      0      0      0      0      0  
 5821      0      0      0      0      0      0      0      1      1      1      0      0  
 5822      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5823      0      0      0      1      1      0      0      0      0      0      0      0      0  
 5824   1982      1      11      0      2      8      0      0      0      0      0      0      0  
 5825      0      0      0      0      0      2      2      2      2      2      0      0      0  
 5826      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5827      2      2      2      2      2      0      0      0      0      0      0      0      0  
 5828   1984      1      11      0      2      4      0      0      0      0      0      1      0  
 5829      0      0      0      1      1      0      0      0      0      0      1      1      1  
 5830      0      0      0      0      0      0      0      0      0      0      1      1      1  
 5831      0      0      0      0      1      1      0      0      0      0      0      0      0  
 5832   1985      1      11      0      2      6      0      0      0      0      0      0      0  
 5833      0      0      1      1      2      2      1      1      1      0      0      0      0  
 5834      0      0      0      0      0      0      0      0      0      0      1      1      1  
 5835      2      1      1      1      0      0      0      0      0      0      0      0      0  
 5836   1987      1      11      0      2      7      0      0      0      0      0      0      1  
 5837      0      0      0      0      0      1      1      1      1      0      2      1      1  
 5838      0      0      0      0      0      0      1      1      0      0      0      0      0  
 5839      1      1      1      1      2      1      0      0      0      0      0      0      0  
 5840   1988      1      11      0      2      1      0      0      0      0      0      0      0  
 5841      0      1      0      0      0      0      0      0      0      0      0      0      0  
 5842      0      0      0      0      0      0      0      0      0      1      0      0      0  
 5843      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5844   1989      1      11      0      2      1      0      0      0      0      0      0      0  
 5845      0      0      0      0      0      0      0      0      0      0      0      0      0  
 5846      1      0      0      0      0      0      0      0      0      0      0      0      0  
 5847      0      0      0      0      0      0      0      1      0      0      0      0      0  
 5848   1993      1      11      0      2      25      0      0      0      0      0      0      1  
 5849      0      0      7      6      5      1      1      5      0      0      0      0      0  
 5850      0      0      0      0      0      1      0      0      0      0      7      0      6  
 5851      5      1      5      0      0      0      0      0      0      0      0      0      0  
 5852   1994      1      11      0      2      7      0      0      0      0      0      0      0  
 5853      0      0      0      1      2      2      0      0      1      0      1      0      0  
 5854      0      0      0      0      0      0      0      0      0      1      1      1      2

5855		2	0	1	1	0	0	0	0	0	0	0	0	0	0
5856	1996	1	11	0	0	2	2	0	0	0	0	0	0	0	0
5857		0	0	0	0	0	1	1	0	0	0	0	0	0	0
5858		0	0	0	0	0	0	0	0	0	0	0	0	0	0
5859		1	1	0	0	0	0	0	0	0	0	0	0	0	0
5860	1997	1	11	0	0	2	6	0	0	0	0	0	0	0	0
5861		0	0	2	1	1	1	1	1	0	0	0	0	0	0
5862		0	0	0	0	0	0	0	0	0	0	2	0	1	
5863		1	1	1	0	0	0	0	0	0	0	0	0	0	0
5864	1998	1	11	0	2	2	10	0	1	0	0	0	0	0	0
5865		0	0	2	2	4	1	1	0	0	0	0	0	0	0
5866		0	0	0	0	0	0	0	0	0	0	2	2	2	
5867		4	1	1	0	0	0	0	0	0	0	0	0	0	0
5868	1999	1	11	0	0	2	6	0	0	0	0	0	0	0	2
5869		0	0	0	0	0	0	3	0	0	1	0	0	0	0
5870		0	0	0	0	0	2	0	0	0	0	0	0	0	0
5871		0	3	0	1	0	0	0	0	0	0	0	0	0	0
5872	2000	1	11	0	2	4	0	0	0	0	0	0	0	0	0
5873		0	0	0	0	1	3	0	0	0	0	0	0	0	0
5874		0	0	0	0	0	0	0	0	0	0	0	0	0	0
5875		1	3	0	0	0	0	0	0	0	0	0	0	0	0
5876	2001	1	11	0	2	35	0	0	0	0	0	0	0	0	0
5877		0	0	2	6	8	9	6	4	0	0	0	0	0	0
5878		0	0	0	0	0	0	0	0	0	0	2	6	6	
5879		8	9	6	4	0	0	0	0	0	0	0	0	0	0
5880	2002	1	11	0	2	26	0	0	0	0	0	0	0	0	0
5881		0	0	3	9	3	7	3	1	0	0	3	0	0	0
5882		0	0	0	0	0	0	0	0	0	0	3	0	9	
5883		3	7	3	1	0	0	0	0	0	0	0	0	0	0
5884	2003	1	11	0	2	40	0	0	0	0	0	0	0	0	0
5885		0	1	6	6	8	12	5	2	0	0	0	0	0	0
5886		0	0	0	0	0	0	0	1	6	1	0	6	6	6
5887		8	12	5	2	0	0	0	0	0	0	0	0	0	0
5888	2004	1	11	0	2	20	0	0	0	0	0	0	0	0	0
5889		0	0	1	5	7	2	5	0	0	0	0	0	0	0
5890		0	0	0	0	0	0	0	0	0	1	0	0	5	
5891		7	2	5	0	0	0	0	0	0	0	0	0	0	0
5892	2005	1	11	0	2	62	0	0	0	0	0	0	0	0	0
5893		0	1	2	8	14	19	13	3	2	1	0	2	2	8
5894		0	0	0	0	0	0	0	1	0	0	0	0	0	0
5895		14	19	13	3	2	51	0	0	0	0	0	0	0	0
5896	2006	1	11	0	2	51	0	0	0	0	0	0	0	0	0

```

5897      0   0   0   2   5   13   15   13   2   1
5898      0   0   0   0   0   0   0   0   0   1
5899     13   15   13   2   1   0   0   0   0   0
5900 2007   1   11   0   2   69   0   0   0   0
5901      0   0   0   4   7   14   21   18   3   0
5902      0   0   0   0   0   2   0   0   0   4
5903     14   21   18   3   0   0   0   0   0   7
5904 2008   1   11   0   2   123   0   0   0   1
5905      1   4   6   5   20   48   29   7   1   2
5906      0   0   0   0   1   0   1   0   4   5
5907     20   48   29   7   2   0   0   0   0   5
5908 2009   1   11   0   2   92   0   0   0   0
5909      1   4   5   15   11   27   25   2   2   2
5910      0   0   0   0   0   0   1   0   4   1
5911      5   11   27   25   2   2   0   0   0   1
5912 2010   1   11   0   2   97   0   0   0   0
5913      0   1   8   9   20   24   23   11   9   3
5914      0   0   0   0   0   0   0   0   1   8
5915     20   24   23   9   3   0   0   0   0   9
5916 2011   1   11   0   2   111   0   0   0   0
5917      0   1   8   13   20   23   32   13   13   1
5918      0   0   0   0   0   0   0   0   1   8
5919      3   20   23   32   13   1   0   0   0   1
5920 2012   1   11   0   2   124   0   0   0   0
5921      1   2   2   11   13   48   35   0   10   2
5922      0   0   0   0   0   0   1   0   2   2
5923      1   13   48   35   10   2   0   0   0   1
5924 2013   1   11   0   2   123   0   0   0   0
5925      0   0   2   17   24   37   33   0   10   0
5926      0   0   0   0   0   0   0   0   2   1
5927      7   24   37   33   10   0   0   0   0   0
5928 2014   1   11   0   2   29   0   0   0   0
5929      0   1   0   1   3   11   9   3   1   1
5930      0   0   0   0   0   0   0   1   0   1
5931      3   11   9   3   1   0   0   0   0   1
5932
5933 47 #_N_age_bins
5934 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
5935 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
5936 2 #_N_ageerror_definitions
5937 # Default ageing error matrix (1st row is expected age, 2nd is standard dev
5938 # iation of age readings)

```

```

5939 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
5940 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
5941 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
5942 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
5943 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
5944 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
5945 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
5946 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
5947 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
5948 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
5949 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5
5950 10.5 11.5 12.5 13.5 14.5 15.5 16.5 17.5 18.5
5951 19.5 20.5 21.5 22.5 23.5 24.5 25.5 26.5 27.5 2
5952 8.5 29.5 30.5 31.5 32.5 33.5 34.5 35.5 36.5 37.5
5953 38.5 39.5 40.5 41.5 42.5 43.5 44.5 45.5 46.5
5954 47.5 48.5 49.5 50.5 51.5 52.5 53.5 54.5 55.5 56
5955 .5 57.5 58.5 59.5 60.5 61.5 62.5 63.5 64.5 65.5
5956 66.5 67.5 68.5 69.5 70.5 71.5 72.5 73.5 74.5
5957 75.5 76.5 77.5 78.5 79.5 80.5 ### 81.5 82.5 83.
5958 # 5 84.5 85.5 86.5 87.5 88.5 89.5 90.5 #Expected_ag
5959 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
5960 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
5961 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
5962 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
5963 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
5964 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
5965 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
5966 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
5967 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
5968 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD

5969
5970
5971
5972
5973
5974
5975
5976
5977 #####
5978 # Ageing error for ages associated with early years from former NWFSC age r
5979 # eader (1st row is expected age, 2nd is standard deviation of age readings
5980 # )

```

```

5981 #
5982 #
5983 #
5984 #
5985 #
5986 # #####
5987 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
5988 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
5989 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
5990 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
5991 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
5992 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
5993 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
5994 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
5995 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
5996 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
5997 0.43 1.29 2.16 3.02 3.88 4.75 5.61 6.47 7.33 8.2
5998 0 9.06 9.92 10.79 11.65 12.51 13.37 14.24 15.10 15.96
5999 16.83 17.69 18.55 19.41 20.28 21.14 22.00 22.86 23.73 2
6000 4.59 25.45 26.32 27.18 28.04 28.90 29.77 30.63 31.49 32.3
6001 6 33.22 34.08 34.94 35.81 36.67 37.53 38.40 39.26 40.12
6002 40.98 41.85 42.71 43.57 44.44 45.30 46.16 47.02 47.89 48
6003 .75 49.61 50.47 51.34 52.20 53.06 53.93 54.79 55.65 56.51
6004 57.38 58.24 59.10 59.97 60.83 61.69 62.55 63.42 64.28
6005 65.14 66.01 66.87 67.73 68.59 69.46 ### 70.32 71.18 72.
6006 # 05 72.91 73.77 74.63 75.50 76.36 77.22 78.09 #Expected_ag
6007 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
6008 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
6009 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
6010 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
6011 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
6012 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
6013 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
6014 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
6015 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
6016 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD
6017
6018 #154 #_N_Agecomp_obs
6019 186 #_N_Agecomp_obs
6020 3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
6021 0 #_combine males into females at or below this bin number
6022

```

```

6023 ### OR Comm, dead landings, expanded by catch (mainly southern OR, landed d
6024 # ead); 17/1393 fish from "live" fishery dropped; is dead catch representat
6025 # ive of live fishery?
6026 ### initially assigning to fleet: "5_OR_SouthernOR_Comm_Dead"
6027 ### negative fleet because these data are represented below as conditioned
6028 # on length
6029 #fishyr season fleet gender part ageErr LbinLo LbinHi Nsamps A4
6030 # A5 A6 A7 A8 A9 A10 A11 A12 A13
6031 # A14 A15 A16 A17 A18 A19 A20 A21 A22
6032 # A23 A24 A25 A26 A27 A28 A29 A30 A31
6033 # A32 A33 A34 A35 A36 A37 A38 A39 A40
6034 # A41 A42 A43 A44 A45 A46 A47 A48 A49
6035 # A50 repeat
6036 2001 1 -5 0 2 1 -1 -1 47 0
6037 0 0 0 1.29 3.04 4.66 1 1.07 2
6038 6.57 1.07 2.07 6.62 2.82 5.27 3.82 3.07 1.07 1
6039 1.07 0 1 1.29 0 1 1 0 0 1
6040 0 0 0 0 0 1.07 1.75 0 0 0
6041 0 0 0 0 0 0 0 0 3.12 0
6042 0 0 0 1.29 3.04 4.66 1 1.07 2
6043 6.57 1.07 2.07 6.62 2.82 5.27 3.82 3.07 1.07
6044 1 1.07 0 1 1.29 0 1 1 0 1
6045 0 0 0 0 0 1.07 1.75 0 0 0
6046 2002 1 -5 0 2 1 -1 -1 121 0
6047 0 0 2.01 4.23 11.34 9.14 6.12 1 9.32
6048 7.42 10.11 9.07 4 6.17 15.77 3.39 4.16 2.06 4
6049 .24 2.21 2 0 1.06 0 3.54 0 1.3 0
6050 0 0 1 1.16 1.21 0 0 0 0 0
6051 0 0 0 1.01 0 0 0 0 3.03 0
6052 0 0 2.01 4.23 11.34 9.14 6.12 1 9.32
6053 7.42 10.11 9.07 4 6.17 15.77 3.39 4.16 2.06
6054 4.24 2.21 2 0 1.06 0 3.54 0 1.3 0
6055 0 0 1 1.16 1.21 0 0 0 0 0
6056 2003 1 -5 0 2 1 -1 -1 181 0
6057 0 0 0 0 10.58 19 20.27 15.74 13.46
6058 9.49 10.88 14.14 8.67 13.88 9.89 13.47 12.06 10.16 4
6059 .27 4.82 7.15 1.37 1 1.35 3.89 0 1.35 1.22
6060 2 4.08 0 0 1.02 0 1 0 0 0
6061 2.05 1.05 0 0 0 0 0 0 3.76 0
6062 0 0 0 0 10.58 19 20.27 15.74 13.46
6063 9.49 10.88 14.14 8.67 13.88 9.89 13.47 12.06 10.16
6064 4.27 4.82 7.15 1.37 1 1.35 3.89 0 1.35 1.2

```

6065	2	2	4.08	0	0	0	1.02	0	1	0	0	0
6066	2004	1	-5	0	0	2	1	-1	-1	55	0	0
6067	0	0	0	0	0	1.01	4.09	7.18	7.12	3	3	4
6068	0	6.52	2	2	1.02	1.02	4.02	4.08	1	0	1	4
6069	.08	3.03	0	0	0	0	2.02	1	0	0	0	1
6070	1	0	0	0	0	0	0	0	0	0	0	0
6071	0	0	0	1.02	0	0	0	0	0	0	0	0
6072	0	0	0	0	0	1.01	4.09	7.18	7.12	3	3	4
6073	0	6.52	2	2	1.02	1.02	4.02	4.08	1	0	1	4
6074	4.08	3.03	0	0	0	0	2.02	1	0	0	0	1
6075	1	0	0	0	0	0	0	0	0	0	0	0
6076	2005	1	-5	0	0	2	1	-1	-1	14	0	0
6077	0	0	1	0	0	0	0	1	0	0	1	0
6078	1	0	1.64	0	0	0	3	0	0	0	0	1
6079	0	1	0	1.64	0	0	0	0	0	0	0	0
6080	0	0	0	0	1.6	0	0	1	0	0	0	0
6081	0	0	0	0	0	0	0	0	0	1.6	0	0
6082	0	0	0	1	0	0	0	0	1	0	0	1
6083	1	0	1.64	0	0	0	3	0	0	0	0	0
6084	1	0	1	0	0	1.64	0	0	0	0	0	0
6085	0	0	0	0	1.6	0	0	0	1	0	0	0
6086	2006	1	-5	0	0	2	1	-1	-1	29	0	0
6087	0	0	0	0	0	0	0	0	4.88	2.88	4.88	4.88
6088	2.75	2	2.14	0	0	1.75	0	1	1	0	0	3
6089	.5	1	4.92	0	0	1	0	0	0	1.74	0	1
6090	0	0	0	0	0	0	0	1.42	0	0	0	0
6091	0	0	0	0	0	0	0	0	0	0	0	0
6092	0	0	0	0	0	0	0	4.88	2.88	4.88	4.88	4.88
6093	2.75	2	2.14	0	0	1.75	0	1	1	0	0	0
6094	3.5	1	4.92	0	0	1	0	0	0	1.74	0	1
6095	0	0	0	0	0	0	0	1.42	0	0	0	0
6096	2007	1	-5	0	0	2	1	-1	-1	40	0	0
6097	0	0	0	0	0	0	0	0	0	5.55	4.07	4.07
6098	5.27	5.78	1.52	1.75	2	4.03	1.52	3.52	4.55	1	1	1
6099	.75	1.52	1	3.03	1.4	0	0	0	1.52	0	0	0
6100	0	0	0	0	1	0	0	0	0	0	0	0
6101	0	0	1.52	0	0	0	0	0	0	2.52	0	0
6102	0	0	0	0	0	0	0	0	0	5.55	4.07	4.07
6103	5.27	5.78	1.52	1.75	2	4.03	1.52	3.52	4.55	1	1	1
6104	1.75	1.52	1	3.03	1.4	0	0	0	1.52	0	0	0
6105	0	0	0	0	1	0	0	0	0	0	0	0
6106	2008	1	-5	0	0	2	1	-1	-1	26	0	0

6107	0	0	0	0	0	0	1	1	0	0	0	0	5.27
6108	1	2	2	0	0	0	1	0	2	2	0	0	1.12 3
6109	.02	1.02	2.05	1.05	0	0	1.02	2	0	0	0	0	0
6110	0	0	0	0	0	0	0	0	0	0	0	0	0
6111	0	0	0	0	0	0	0	0	0	0	0	1.27	0
6112	0	0	0	0	0	0	1	0	0	0	0	0	5.27
6113	1	2	2	0	1	0	0	2	0	0	0	0	1.12
6114	3.02	1.02	2.05	1.05	0	0	1.02	2	0	0	0	0	0
6115	0	0	0	0	0	0	0	0	0	0	0	0	0
6116	2009	1	-5	0	2	1	-1	-1	79	0			
6117	0	0	0	2.13	2.12	3.33	4.1	2	3.02				
6118	4.77	9.77	5.03	8.19	1	3.02	3	1	3.75	3			
6119	.77	7.1	4.02	1.75	3.05	3.18	1	1	1.11	1			
6120	0	1	0	0	0	0	0	0	0	0	0	0	0
6121	0	0	0	1.75	0	0	0	0	0	0	0	2.75	0
6122	0	0	0	2.13	2.12	3.33	4.1	2	3.02				
6123	4.77	9.77	5.03	8.19	1	3.02	3	1	3.75				
6124	3.77	7.1	4.02	1.75	3.05	3.18	1	1	1.11	1			
6125	0	1	0	0	0	0	0	0	0	0	0	0	0
6126	2010	1	-5	0	2	1	-1	-1	65	0			
6127	0	0	0	0	0	0	1	1	5.12	1.75	3.05		
6128	5.8	5.26	4.23	5	3.02	1	3	1.2	0	0	0	0	0
6129	2	2	3	5	2	3	2.05	1	3.05				
6130	2.32	0	1.54	0	0	0	1	0	0	0	0	0	0
6131	0	0	0	0	0	0	0	0	1	0	0	0	0
6132	0	0	0	0	0	0	1	5.12	1.75	3.05			
6133	5.8	5.26	4.23	5	3.02	1	3	1.2	0				
6134	0	2	2	3	5	2	3	2.05	1	3.05			
6135	5	2.32	0	1.54	0	0	1	0	0	0	0	0	0
6136	2011	1	-5	0	2	1	-1	-1	307	0			
6137	0	0	1	1	5	3.21	7.49	27.48	7.08				
6138	10.89	8.04	17.17	21.74	29.1	24.18	18.03	6.75	9.17	8			
6139	.5	10.12	10.45	13.78	15.57	14.23	5.05	6.05	5.04	5.11			
6140	3.35	4.04	1	2	2	1	0	0	2.03	2			
6141	1.03	1	1	1	2	0	0	0	6.5	0			
6142	0	0	1	1	5	3.21	7.49	27.48	7.08				
6143	10.89	8.04	17.17	21.74	29.1	24.18	18.03	6.75	9.17				
6144	8.5	10.12	10.45	13.78	15.57	14.23	5.05	6.05	5.04	5.1			
6145	1	3.35	4.04	1	2	2	1	0	2.03	2			
6146	2012	1	-5	0	2	1	-1	-1	152	0			
6147	0	0	0	2	4.02	4	7.15	6.09	8.39				
6148	2.1	3.03	5.02	4.16	6.91	16.04	10.09	4.14	6.3	5			

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6149      2        4.24      8.26      3.06      9.19      4        9.28      2        5
6150      3        1        1        2        0        0        0        2        0
6151    2.16      0        0        2        0        0        0        1        1        0
6152      0        0        0        2        4.02      4        7.15      6.09      8.39
6153    2.1      3.03      5.02      4.16      6.91     16.04     10.09     4.14      6.3
6154    5        2        4.24      8.26      3.06      9.19      4        9.28      2        5
6155      3        1        1        2        0        0        0        2        0
6156  2013      1        -5        0        2        1        -1        -1      260        0
6157      0        0        0        4.02      2.11     12.32      5.22      4.03      4
6158  23.32    10.12    3.03    14.93    13.45    19.32    11.33    17.29    11.31      1
6159  1.11     7.09     5.77     9.08     8.2      9.23     3.19     13.18    10.14    9.04
6160  3.02     3.01     5.3      2.75      1        0        2        0        0
6161    1      1.02      0      2.06      0        0        0        0      4.25      0
6162      0        0        0      4.02      2.11     12.32      5.22      4.03      4
6163  23.32    10.12    3.03    14.93    13.45    19.32    11.33    17.29    11.31
6164  11.11    7.09     5.77     9.08     8.2      9.23     3.19     13.18    10.14    9.0
6165    4      3.02     3.01     5.3      2.75      1        0        2        0        0
6166
6167  ### OR Rec South, 2005-2013, all modes combined,no BARSS
6168  ### initially assigning to fleet: "7_OR_SouthernOR_Rec_PC"
6169  ### negative fleet because these data are represented below as conditioned
6170  # on length
6171  #fishyr season fleet gender part      ageErr LbinLo LbinHi Nsamps A4
6172  #      A5       A6       A7       A8       A9       A10      A11      A12      A13
6173  #      A14      A15      A16      A17      A18      A19      A20      A21      A22
6174  #      A23      A24      A25      A26      A27      A28      A29      A30      A31
6175  #      A32      A33      A34      A35      A36      A37      A38      A39      A40
6176  #      A41      A42      A43      A44      A45      A46      A47      A48      A49
6177  # A50      repeat
6178  2005      1      -7        0        2        1        -1        -1      32        0
6179      0        0        0        1        1        1        3        2        5        0
6180      3        3        3        1        0        0        2        2        1        1        1
6181      1        1        1        0        0        0        0        0        0        0        0
6182      0        0        0        0        0        1        0        0        0        0        0
6183      0        0        0        0        0        0        0        0        0        0        0
6184      0        0        0        0        1        1        3        2        5        0
6185      3        3        3        1        0        0        2        2        1        1
6186      1        1        1        0        0        0        0        0        0        0        0
6187      0        0        0        0        0        1        0        0        0        0        0
6188  2006      1      -7        0        2        1        -1        -1      32        0
6189      0        0        1        1        0        0        0        0        0        0        4
6190      3        2        2        4        4        0        0        1        1        2        1

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6191	1	1	1	1	0	0	1	0	0	1	0	0	1
6192	0	0	0	0	0	0	0	0	0	0	0	0	0
6193	0	0	0	0	0	0	0	0	0	0	0	0	0
6194	0	0	0	1	1	4	0	0	0	0	0	0	4
6195	3	2	2	4	4	0	0	1	0	1	1	2	0
6196	1	1	1	1	0	0	1	0	0	1	0	0	1
6197	0	0	0	0	0	0	0	0	0	0	0	0	0
6198	2007	1	-7	0	2	1	-1	-1	-1	37	0	0	0
6199	0	0	1	0	0	0	3	1	1	0	0	1	0
6200	3	2	2	0	4	1	1	1	3	0	0	3	0
6201	2	2	3	3	1	0	0	0	0	0	0	0	0
6202	1	0	0	0	0	0	0	0	0	0	0	0	0
6203	0	0	0	0	0	0	0	0	0	0	0	0	0
6204	0	0	1	0	0	0	3	1	1	0	0	1	0
6205	3	2	2	0	4	1	1	1	3	0	0	0	0
6206	3	2	2	3	3	1	0	0	0	0	0	0	0
6207	1	0	0	0	0	0	0	0	0	0	0	0	0
6208	2008	1	-7	0	2	1	-1	-1	-1	31	0	0	0
6209	0	0	0	1	2	0	0	1	2	1	5	0	0
6210	3	3	0	3	0	1	1	1	0	0	1	1	0
6211	1	1	1	0	1	0	1	0	0	0	0	0	0
6212	1	0	0	0	0	0	0	0	0	0	0	0	0
6213	0	0	0	0	0	0	0	0	0	1	0	1	0
6214	0	0	0	0	1	2	0	0	1	2	1	5	0
6215	3	3	0	3	0	1	1	1	2	0	0	1	1
6216	1	1	1	0	1	0	1	0	0	0	0	0	0
6217	1	0	0	0	0	0	0	0	0	0	0	0	0
6218	2009	1	-7	0	2	1	-1	-1	-1	23	0	0	0
6219	0	0	0	0	0	0	0	1	1	1	0	0	0
6220	2	3	4	4	1	1	1	1	0	0	0	0	0
6221	1	0	0	0	0	3	1	0	0	0	0	0	0
6222	0	0	0	0	0	0	0	0	0	0	0	0	0
6223	0	0	0	0	0	0	0	0	0	0	0	0	0
6224	0	0	0	0	0	0	0	1	1	1	0	0	0
6225	2	3	4	4	1	1	1	1	0	0	0	0	0
6226	0	1	0	0	0	0	3	1	0	0	0	0	0
6227	0	0	0	0	0	0	0	0	0	0	0	0	0
6228	2010	1	-7	0	2	1	-1	-1	-1	37	0	0	0
6229	0	0	1	0	0	0	0	0	0	1	1	0	0
6230	0	1	3	3	3	4	2	2	1	0	1	0	0
6231	2	1	1	0	1	2	0	3	0	1	1	1	0
6232	1	1	0	1	1	1	0	1	1	1	1	1	0

6233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6234	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0
6235	0	1	3	3	0	3	0	4	2	2	0	1	0	1	0
6236	0	2	1	1	1	2	3	2	0	1	0	1	1	1	0
6237	1	1	-7	0	0	2	1	0	1	-1	-1	1	1	1	0
6238	2011	1	-7	0	0	2	1	-1	-1	-1	75	0			
6239	0	0	0	0	2	3	2	1	1	6	3	3	6	3	
6240	3	0	1	4	4	9	3	3	3	1	3	1	1	5	
6241	2	3	1	1	3	2	3	1	1	0	0	0	0	2	
6242	1	2	1	0	0	1	0	1	0	0	0	0	1		
6243	0	0	0	1	0	0	0	1	0	0	0	0	0	0	
6244	0	0	0	0	2	3	2	1	1	6	3	3	6	3	
6245	3	0	1	4	4	9	3	3	3	1	3	1	1	2	
6246	5	2	3	1	1	3	2	3	1	1	0	0	0	2	
6247	1	2	1	0	0	0	1	0	0	0	0	0	0	1	
6248	2012	1	-7	0	0	2	1	1	-1	-1	-1	27	0		
6249	0	0	0	0	2	1	1	0	1	1	0	0	0	1	
6250	1	1	0	3	1	4	1	1	0	0	0	0	0	0	
6251	0	2	2	1	1	1	1	1	1	1	0	0	0	2	
6252	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
6253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6254	0	0	0	0	2	1	1	0	1	0	0	0	0	1	
6255	1	1	0	3	1	4	1	1	0	0	0	0	0	0	
6256	0	0	2	2	1	1	1	1	1	1	0	0	0	2	
6257	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
6258	2013	1	-7	0	0	2	1	-1	-1	-1	65	0			
6259	0	0	1	1	0	0	0	2	2	2	2	2	2	0	
6260	1	4	1	5	6	3	3	3	2	2	2	6	6	1	
6261	2	3	3	3	1	1	1	2	2	0	0	0	0	0	
6262	3	0	1	1	1	0	0	0	0	2	2	0	0	0	
6263	0	0	1	0	0	0	0	1	0	0	0	0	0	0	
6264	0	0	0	1	1	0	0	2	2	2	2	2	2	0	
6265	1	4	1	5	6	3	3	3	2	2	2	6	6		
6266	1	2	3	3	3	1	1	1	2	2	2	0	0	0	
6267	3	0	1	1	1	1	1	0	0	2	2	2	2	0	
6268															
6269	### OR Rec North, 2002-2013, all modes combined, no BARSS														
6270	### initially assigning to fleet: "10_OR_NorthernOR_Rec_PC"														
6271	#fishyr season fleet gender part ageErr LbinLo LbinHi Nsamps A4														
6272	# A5 A6 A7 A8 A9 A10 A11 A12 A13														
6273	# A14 A15 A16 A17 A18 A19 A20 A21 A22														
6274	# A23 A24 A25 A26 A27 A28 A29 A30 A31														

	#	A32	A33	A34	A35	A36	A37	A38	A39	A40
6275	#	A41	A42	A43	A44	A45	A46	A47	A48	A49
6276	#	A50	repeat							
6278	2005	1	10	0	2	1	-1	-1	23	0
6279	0	0	1	0	2	3	1	1	1	1
6280	3	0	2	2	0	2	0	0	1	1
6281	0	0	2	1	0	0	0	0	0	0
6282	0	0	0	0	0	0	0	0	0	0
6283	0	0	0	0	0	0	0	0	0	0
6284	0	0	0	1	0	2	3	1	1	1
6285	3	0	2	2	0	2	0	0	0	1
6286	1	0	2	1	0	0	0	0	0	0
6287	0	0	0	0	0	0	0	0	0	0
6288	2006	1	10	0	2	1	-1	-1	28	0
6289	0	0	1	1	1	2	2	5	3	
6290	1	0	2	0	0	0	2	2	0	1
6291	2	0	0	0	0	0	0	1	1	0
6292	0	0	0	0	0	0	0	0	0	1
6293	0	0	0	0	0	0	0	0	0	0
6294	0	0	1	1	1	2	2	5	3	
6295	1	0	2	0	0	0	2	2	0	0
6296	1	2	0	0	0	0	0	1	1	0
6297	0	0	0	0	0	0	0	0	0	1
6298	2007	1	10	0	2	1	-1	-1	23	0
6299	1	0	0	0	0	0	1	5	2	4
6300	1	4	0	1	0	1	1	1	0	0
6301	0	0	0	0	0	0	1	0	0	0
6302	0	0	0	0	0	0	0	0	0	0
6303	0	0	0	0	0	0	0	0	0	0
6304	1	0	0	0	0	0	1	5	2	4
6305	1	4	0	1	0	1	1	1	1	0
6306	0	0	0	0	0	0	1	0	0	0
6307	0	0	0	0	0	0	0	0	0	0
6308	2008	1	10	0	2	1	-1	-1	29	0
6309	0	0	2	6	0	0	0	2	2	2
6310	1	3	0	1	0	0	0	0	2	0
6311	2	2	0	0	0	0	0	1	0	0
6312	0	0	1	0	0	0	1	0	0	0
6313	0	0	0	0	0	0	0	0	0	0
6314	0	0	0	2	6	0	0	2	2	2
6315	1	3	0	1	0	0	0	1	1	0
6316	0	2	2	0	0	0	0	1	0	0

6317	0	0	1	0	0	0	0	1	1	0	0	0	0
6318	2009	1	10	0	2	1	-1	-1	39	0	0		
6319	0	2	3	6	6	1	0	1	0	1	2		
6320	2	5	3	1	0	0	1	1	1	1	0	1	0
6321	0	0	0	0	1	0	0	2	0	0	0	0	0
6322	0	0	0	0	0	0	0	0	0	0	0	0	0
6323	0	0	0	0	0	0	0	0	0	1	1	0	0
6324	0	2	3	6	6	1	0	1	0	1	2		
6325	2	5	3	1	0	0	0	1	1	1	1	1	
6326	0	0	0	0	1	0	2	0	0	0	0	0	0
6327	0	0	0	0	0	0	0	0	0	0	0	0	0
6328	2010	1	10	0	2	1	-1	-1	23	0			
6329	0	0	2	1	2	1	2	1	2	2	0		
6330	0	1	3	1	0	0	0	0	0	2	0		
6331	2	1	0	0	1	0	1	0	0	0	0		
6332	1	0	0	0	0	0	0	0	0	0	0		
6333	0	0	0	0	0	0	0	0	0	0	0		
6334	0	0	0	2	1	2	1	2	2	2	0		
6335	0	1	3	1	0	0	0	0	0	0	2		
6336	0	2	1	0	1	0	1	0	0	0	0		
6337	1	0	0	0	0	0	0	0	0	0	0		
6338	2011	1	10	0	2	1	-1	-1	161	0			
6339	1	0	3	11	17	17	17	10	13	3			
6340	4	3	8	4	12	5	5	2	3	3	2	2	2
6341	3	1	0	4	2	2	3	1	5	5	5	5	
6342	2	1	0	3	1	0	0	0	0	0	0	0	
6343	1	0	2	0	0	1	1	0	1	1	0		
6344	1	0	3	11	17	17	17	10	13	3			
6345	4	3	8	4	12	5	5	2	3	3	2	2	2
6346	2	3	1	4	2	2	3	1	5	5	5	5	
6347	2	1	0	3	1	0	0	0	0	0	0	0	
6348	2012	1	10	0	2	1	-1	-1	33	0			
6349	0	0	0	0	3	3	9	2	0	0	3		
6350	0	0	1	2	2	0	0	2	0	1	1	0	
6351	0	0	0	1	0	1	1	1	0	0	0	0	
6352	1	0	0	0	0	0	0	0	0	0	0	0	
6353	0	0	0	0	0	0	0	0	0	0	0	0	
6354	0	0	0	0	3	3	9	2	0	0	3		
6355	0	0	1	2	2	0	0	2	0	0	1		
6356	0	0	0	1	0	1	0	1	0	0	0	0	
6357	1	0	0	0	0	0	0	0	0	0	0	0	
6358	2013	1	10	0	2	1	-1	-1	81	0			

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6359      1     0     0     0     3     3     3     8     12    3     4
6360      8     1     1     1     3     3     3     3     3     2     3     3     2
6361      3     3     2     1     0     0     2     1     1     2     2     1
6362      0     0     0     0     1     0     0     0     1     0     0     0
6363      0     0     0     0     0     0     0     0     0     1     0     1     0
6364      1     0     0     0     3     3     3     8     12    3     3     4
6365      8     1     1     1     3     3     3     3     3     2     1     2     3
6366      2     3     3     2     1     1     0     0     2     1     1     2     1
6367      0     0     0     0     1     0     0     0     1     0     0     0
6368
6369  ### WA Rec, South, All modes combined
6370  ### initially assigning to fleet: "12_WA_SouthernWA_Rec_PCPR"
6371  #Yr Seas Flt/Svy Gender Part AgeError LbinLo LbinHi Nsa
6372  # mp 4yrs 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yr
6373  # s 13yrs 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs
6374  # 22yrs 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs
6375  # 31yrs 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs
6376  # 40yrs 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs
6377  # 49yrs 50+ yrs repeat
6378 -2014 1     -12    0     2     1     -1     -1     15    0
6379 0     0     0     0     1     1     0     0     0     0
6380 0     0     0     0     1     1     1     0     0     0
6381 1     1     0     0     0     1     1     1     2     0
6382 0     0     0     1     0     0     1     0     0     0
6383 0     0     0     1     1     0     0     0     0     0
6384 0     0     0     0     0     1     0     0     0     0
6385 0     0     0     0     0     1     1     1     0     0
6386 1     1     0     0     0     1     1     1     2     0
6387 0     0     0     1     0     0     1     0     0     0
6388
6389
6390  ##### conditional age-at-length observations
6391
6392  ### OR commercial dead, South
6393  ### initially assigning to fleet: "5_OR_SouthernOR_Comm_Dead"
6394  #Yr Seas Flt/Svy Gender Part AgeErr LbinLo LbinHi Nsamp 4yr
6395  # s 5yrs 6yrs 7yrs 8yrs 9yrs 10yrs 11yrs 12yrs 13yr
6396  # s 14yrs 15yrs 16yrs 17yrs 18yrs 19yrs 20yrs 21yrs 22yrs
6397  # 23yrs 24yrs 25yrs 26yrs 27yrs 28yrs 29yrs 30yrs 31yrs
6398  # 32yrs 33yrs 34yrs 35yrs 36yrs 37yrs 38yrs 39yrs 40yrs
6399  # 41yrs 42yrs 43yrs 44yrs 45yrs 46yrs 47yrs 48yrs 49yrs
6400  # 50yrs repeat

```

6401	2001	1	5	0	0	2	1	28	28	1	0
6402	0	0	0	0	1	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	0	0	0	0	0	0	0
6406	0	0	0	0	0	0	0	0	0	0	0
6407	0	0	0	0	1	0	0	0	0	0	0
6408	0	0	0	0	0	0	0	0	0	0	0
6409	0	0	0	0	0	0	0	0	0	0	0
6410	0	0	0	0	0	0	0	0	0	0	0
6411	2001	1	5	0	0	2	1	30	30	7	0
6412	0	0	0	0	0	2	0	0	0	0	0
6413	2	0	0	0	1	0	1	1	0	0	0
6414	0	0	0	0	0	0	0	0	0	0	0
6415	0	0	0	0	0	0	0	0	0	0	0
6416	0	0	0	0	0	0	0	0	0	0	0
6417	0	0	0	0	0	2	0	0	0	0	0
6418	2	0	0	0	1	0	1	1	0	0	0
6419	0	0	0	0	0	0	0	0	0	0	0
6420	0	0	0	0	0	0	0	0	0	0	0
6421	2001	1	5	0	0	2	1	32	32	9	0
6422	0	0	0	0	0	0	2	0	1	0	1
6423	2	0	0	0	0	2	0	1	0	0	0
6424	0	0	0	0	0	0	0	0	0	0	0
6425	0	0	0	0	0	0	0	0	0	0	0
6426	0	0	0	0	0	0	0	0	0	0	0
6427	0	0	0	0	0	0	2	0	1	0	1
6428	2	0	0	0	0	2	0	1	0	0	0
6429	0	0	0	0	0	0	0	0	0	0	0
6430	0	0	0	0	0	0	0	0	0	0	0
6431	2001	1	5	0	0	2	1	34	34	12	0
6432	0	0	0	0	0	0	0	2	1	0	1
6433	1	1	2	0	0	0	1	1	0	0	0
6434	0	0	0	1	0	1	0	0	0	0	0
6435	0	0	0	0	0	0	0	0	0	0	0
6436	0	0	0	0	0	0	0	0	0	0	0
6437	0	0	0	0	0	0	0	2	1	0	1
6438	1	1	2	0	0	0	1	1	0	0	0
6439	0	0	0	1	0	1	0	0	0	0	0
6440	0	0	0	0	0	0	0	0	0	0	0
6441	2001	1	5	0	0	2	1	36	36	11	0
6442	0	0	0	0	0	0	0	0	0	0	0

6443	0	0	0	0	3	0	0	2	0	0	1	1	0
6444	0	0	0	0	0	0	0	0	1	0	0	0	1
6445	0	0	0	0	0	0	0	1	1	0	0	1	0
6446	0	0	0	0	0	0	0	0	0	0	1	1	0
6447	0	0	0	0	0	3	0	0	0	0	0	1	0
6448	0	0	0	0	3	0	0	2	0	0	1	1	0
6449	0	0	0	0	0	0	0	0	0	1	0	0	1
6450	0	0	0	0	0	0	0	1	1	0	0	0	0
6451	2001	1	5	0	0	2	1	38	38	38	4	0	0
6452	0	0	0	0	0	0	0	0	0	0	0	0	0
6453	0	0	0	0	0	0	0	0	0	2	0	0	1
6454	1	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	0	0	0	0
6457	0	0	0	0	0	0	0	0	0	0	0	0	0
6458	0	0	0	0	0	0	0	0	0	2	0	0	0
6459	1	1	0	0	0	0	0	0	0	0	0	0	0
6460	0	0	0	0	0	0	0	0	0	0	0	0	0
6461	2001	1	5	0	0	2	1	40	40	40	3	0	0
6462	0	0	0	0	0	0	0	0	0	0	0	0	0
6463	0	0	0	0	0	0	0	0	0	0	0	0	0
6464	0	0	0	0	0	0	0	1	1	0	0	0	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	0	1	0	0
6467	0	0	0	0	0	0	0	0	0	0	0	0	0
6468	0	0	0	0	0	0	0	0	0	0	0	0	0
6469	0	0	0	0	0	0	0	1	1	0	0	0	0
6470	0	0	0	0	0	0	0	0	0	0	0	0	0
6471	2002	1	5	0	0	2	1	30	30	30	17	0	0
6472	0	0	1	1	1	3	3	1	0	0	1	0	0
6473	2	2	2	1	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	0	0	0	0	0	0	0	0	0	0
6476	0	0	0	0	0	0	0	0	0	0	0	0	0
6477	0	0	1	1	1	3	3	1	0	0	0	1	0
6478	2	2	2	1	0	0	0	0	0	0	0	0	0
6479	0	0	0	0	0	0	0	0	0	0	0	0	0
6480	0	0	0	0	0	0	0	0	0	0	0	0	0
6481	2002	1	5	0	0	2	1	32	32	32	37	0	0
6482	0	0	0	0	0	6	6	4	2	2	0	3	0
6483	3	2	4	0	0	3	3	2	2	0	0	0	1
6484	1	0	0	0	0	0	0	0	0	0	0	0	0

6485	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6486	0	0	0	0	0	0	0	6	0	4	0	0	0	0	0
6487	0	0	0	0	0	0	3	6	4	2	2	0	0	0	3
6488	3	2	4	0	0	0	3	3	2	2	0	0	0	0	0
6489	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0
6490	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
6491	2002	1	5	0	0	2	1	1	34	34	34	31	0	0	0
6492	0	0	0	0	3	1	1	5	1	3	1	1	4	0	0
6493	0	3	1	0	0	3	0	5	0	0	3	1	1	1	1
6494	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6495	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6496	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6497	0	0	0	0	3	1	3	1	1	3	1	1	4	0	0
6498	0	3	1	0	0	3	1	5	0	0	3	1	1	1	0
6499	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6501	2002	1	5	0	0	2	1	1	36	36	36	21	0	0	0
6502	0	0	1	0	1	0	0	0	1	0	0	0	0	1	0
6503	2	1	2	0	2	0	0	5	1	1	0	0	0	0	2
6504	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0
6505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6507	0	0	0	1	0	0	0	1	1	0	0	0	0	0	1
6508	2	1	2	0	2	0	0	5	1	1	0	0	0	0	0
6509	2	1	0	0	0	0	0	0	1	0	0	1	0	0	0
6510	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6511	2002	1	5	0	0	2	1	1	38	38	38	12	0	0	0
6512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6513	0	2	0	1	0	0	2	0	0	0	1	1	0	0	0
6514	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6515	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
6516	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
6517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6518	0	2	0	1	0	1	0	2	0	0	1	1	1	0	0
6519	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6520	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
6521	2002	1	5	0	0	2	1	1	40	40	40	3	0	0	0
6522	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6523	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6524	0	0	1	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	2	0	0
6526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6527	0	0	0	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	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6530	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6531	2003	1	5	0	0	2	1	28	28	2	0	0	0	0
6532	0	0	0	0	0	0	1	0	0	1	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	0	0	0	0	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	1	0	0	1	0	0	0	0
6538	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6539	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6540	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6541	2003	1	5	0	0	2	1	30	30	20	0	0	0	0
6542	0	0	0	0	0	3	3	4	2	2	0	0	0	0
6543	1	0	1	2	0	0	1	1	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	0	0	0	0	0	0	0	0	0
6546	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6547	0	0	0	0	0	3	3	4	2	2	0	0	0	0
6548	1	0	1	2	0	0	1	1	0	0	0	0	0	0
6549	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6551	2003	1	5	0	0	2	1	32	32	48	0	0	0	0
6552	0	0	0	0	0	2	9	6	6	4	0	0	0	0
6553	0	2	2	1	2	2	3	0	0	2	0	0	0	0
6554	2	0	0	0	0	0	1	0	0	0	0	0	0	0
6555	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6556	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6557	0	0	0	0	0	2	9	6	6	4	0	0	0	0
6558	0	2	2	1	2	2	3	0	0	2	0	0	0	0
6559	2	2	0	0	0	0	0	1	0	0	0	0	0	0
6560	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6561	2003	1	5	0	0	2	1	34	34	48	0	0	0	0
6562	0	0	0	0	0	1	2	3	2	2	0	0	0	0
6563	3	5	5	3	5	3	6	1	0	1	0	0	0	0
6564	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6565	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6566	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6567	3	5	5	3	5	3	6	2	3	2	1	0	0	0
6568	3	5	5	3	5	3	6	2	3	2	1	0	0	0

6569	1	0	2	0	0	0	0	0	0	0	0	0	0	0
6570	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6571	2003	1	5	0	0	2	1	1	36	36	39	39	0	0
6572	0	0	0	0	0	1	0	0	2	1	2	1	2	0
6573	2	2	3	1	1	0	1	1	3	4	3	3	0	0
6574	1	3	1	1	1	0	1	2	0	1	1	1	1	0
6575	2	0	0	0	0	0	0	0	1	0	0	0	0	0
6576	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6577	0	0	0	0	0	1	0	0	2	1	2	1	2	0
6578	2	2	3	1	0	0	1	1	3	4	3	3	1	1
6579	0	1	3	1	1	1	1	2	0	1	1	1	1	1
6580	2	0	0	0	0	0	0	0	1	0	0	0	0	0
6581	2003	1	5	0	0	2	1	1	38	38	38	17	0	0
6582	0	0	0	0	0	1	0	0	0	0	0	0	1	1
6583	1	0	1	0	0	3	0	0	2	1	3	3	1	1
6584	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6585	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6586	2	0	0	0	0	0	0	0	0	0	0	0	0	0
6587	0	0	0	0	0	0	1	0	0	0	0	0	1	1
6588	1	0	1	0	0	3	0	0	2	1	3	3	1	1
6589	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6590	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6591	2003	1	5	0	0	2	1	1	40	40	40	7	0	0
6592	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6593	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6594	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6595	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6596	0	1	0	0	0	0	0	0	0	0	0	3	0	0
6597	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6598	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6599	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6600	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6601	2004	1	5	0	0	2	1	1	30	30	30	10	0	0
6602	0	0	0	0	0	0	1	2	1	2	2	2	2	0
6603	0	2	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	0	0	0	0	0	0	0	0
6606	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6607	0	0	0	0	0	0	1	2	1	2	2	2	2	0
6608	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6609	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6610	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6611	2004	1	5	0	0	2	1	32	32	13	0
6612	0	0	0	0	0	0	1	3	3	3	1
6613	0	2	0	0	0	0	0	0	1	0	1
6614	0	0	0	0	0	0	0	0	0	0	0
6615	0	0	0	0	0	0	0	0	0	0	0
6616	0	0	0	1	0	0	0	0	0	0	0
6617	0	0	0	0	0	0	1	3	3	3	1
6618	0	2	0	0	0	0	0	0	1	0	0
6619	1	0	0	0	0	0	0	0	0	0	0
6620	0	0	0	0	0	0	0	0	0	0	0
6621	2004	1	5	0	0	2	1	34	34	17	0
6622	0	0	0	0	0	0	0	2	2	2	0
6623	0	1	1	1	2	1	1	2	1	1	0
6624	1	0	0	0	0	0	0	1	0	0	0
6625	1	0	0	0	0	0	0	0	0	0	0
6626	0	0	0	0	0	0	0	0	0	0	0
6627	0	0	0	0	0	0	0	0	2	2	0
6628	0	1	1	1	2	1	1	2	1	1	1
6629	0	1	0	0	0	0	0	1	0	0	0
6630	1	0	0	0	0	0	0	0	0	0	0
6631	2004	1	5	0	0	2	1	36	36	9	0
6632	0	0	0	0	0	0	0	0	0	0	0
6633	0	1	0	0	0	0	0	1	0	0	3
6634	2	0	0	0	0	0	0	0	1	0	1
6635	0	0	0	0	0	0	0	0	0	0	0
6636	0	0	0	0	0	0	0	0	0	0	0
6637	0	0	0	0	0	0	0	0	0	0	0
6638	0	1	0	0	0	0	0	0	1	0	0
6639	3	2	0	0	0	0	0	0	0	0	1
6640	0	0	0	0	0	0	0	0	0	0	0
6641	2004	1	5	0	0	2	1	38	38	6	0
6642	0	0	0	1	0	0	0	1	1	0	0
6643	0	0	0	1	0	0	0	1	1	1	0
6644	0	0	0	0	0	0	0	1	0	0	0
6645	0	0	0	0	0	0	0	0	0	0	0
6646	0	0	0	0	0	0	0	0	0	0	0
6647	0	0	0	0	0	0	0	1	1	0	0
6648	0	0	0	1	0	0	0	0	1	1	0
6649	0	0	0	0	0	0	0	1	0	0	0
6650	0	0	0	0	0	0	0	0	0	0	0
6651	2004	1	5	0	0	2	1	40	40	1	0
6652	0	0	0	0	0	0	0	0	0	0	0

6653	0	0	0	0	0	0	0	0	0	0	1	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	0	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	1	0	0	0
6659	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6660	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6661	2005	1	5	0	2	1	30	30	30	2	0	0	0	0
6662	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6663	1	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	0	0	0	0	0	0	0	0	0	0	0
6666	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6667	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6668	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6669	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6670	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6671	2005	1	5	0	2	1	32	32	32	2	0	0	0	0
6672	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6673	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6674	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6675	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6676	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6677	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6678	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6679	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6680	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6681	2005	1	5	0	2	1	34	34	34	3	0	0	0	0
6682	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6683	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6684	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6685	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6686	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6687	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6688	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6689	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6690	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6691	2005	1	5	0	2	1	36	36	36	1	0	0	0	0
6692	0	0	0	0	0	0	0	0	0	0	0	1	0	0
6693	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

6695	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	1
6698	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6699	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6701	2005	1	5	0	0	2	1	38	38	4	0	0	0	0	0
6702	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6703	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1
6704	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6705	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6707	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6708	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
6709	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6710	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6711	2005	1	5	0	0	2	1	40	40	2	0	0	0	0	0
6712	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6713	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6714	0	0	1	0	0	0	0	0	0	0	0	0	0	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	1	0	0
6717	0	0	0	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	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6720	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6721	2006	1	5	0	0	2	1	30	30	1	0	0	0	0	0
6722	0	0	0	0	0	0	0	0	0	0	1	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	0	0
6725	0	0	0	0	0	0	0	0	0	0	0	0	0	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	1	0	0	0
6728	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6729	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6730	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6731	2006	1	5	0	0	2	1	32	32	8	0	0	0	0	0
6732	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0
6733	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6734	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6735	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6737	0	0	0	0	0	0	0	0	0	2	0	0	3
6738	1	0	1	0	0	0	0	0	0	0	0	0	0
6739	0	0	1	0	0	0	0	0	0	0	0	0	0
6740	0	0	0	0	0	0	0	0	0	0	0	0	0
6741	2006	1	5	0	0	2	1	34	34	34	10	0	0
6742	0	0	0	0	0	0	0	0	2	1	1	1	1
6743	1	0	1	1	0	1	0	0	0	0	0	0	1
6744	1	0	1	0	0	0	0	0	0	0	0	0	0
6745	0	0	0	0	0	0	0	0	0	0	0	0	0
6746	0	0	0	0	0	0	0	0	0	0	0	0	0
6747	0	0	0	0	0	0	0	0	2	1	1	1	1
6748	1	0	1	0	0	1	0	0	0	0	0	0	0
6749	1	1	1	0	0	0	0	0	0	0	0	0	0
6750	0	0	0	0	0	0	0	0	0	0	0	0	0
6751	2006	1	5	0	0	2	1	36	36	36	6	0	0
6752	0	0	0	0	0	0	0	0	0	0	0	0	0
6753	0	1	1	0	0	0	0	0	1	1	0	0	1
6754	0	0	0	0	0	0	0	0	0	0	0	0	1
6755	0	0	0	0	0	0	0	0	0	0	0	0	0
6756	0	0	0	0	0	0	0	0	0	0	0	0	0
6757	0	0	0	0	0	0	0	0	0	0	0	0	0
6758	0	1	1	0	0	0	0	0	1	1	0	0	0
6759	1	0	0	0	0	0	0	0	0	0	0	0	1
6760	0	0	0	0	0	0	0	0	0	0	0	0	0
6761	2006	1	5	0	0	2	1	38	38	38	4	0	0
6762	0	0	0	0	0	0	0	0	0	0	0	0	0
6763	0	0	0	0	0	0	0	0	0	0	0	0	0
6764	0	0	1	0	0	0	1	0	0	1	0	0	0
6765	0	0	0	0	0	0	0	0	1	0	0	0	0
6766	0	0	0	0	0	0	0	0	0	0	0	0	0
6767	0	0	0	0	0	0	0	0	0	0	0	0	0
6768	0	0	0	0	0	0	0	0	0	0	0	0	0
6769	0	0	1	0	0	0	1	0	0	0	1	0	0
6770	0	0	0	0	0	0	0	0	1	0	0	0	0
6771	2007	1	5	0	0	2	1	30	30	30	1	0	0
6772	0	0	0	0	0	0	0	0	0	0	0	0	0
6773	0	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
6780	0	0	0	0	0	0	0	0	0	0	0	0	0
6781	2007	1	5	0	0	2	1	32	32	32	10	0	0
6782	0	0	0	0	0	0	0	0	0	0	3	1	0
6783	1	1	0	0	0	0	2	0	0	1	0	0	0
6784	0	0	0	0	0	0	0	0	0	0	0	0	0
6785	0	0	0	0	1	0	0	0	0	0	0	0	0
6786	0	0	0	0	0	0	0	0	0	0	0	0	0
6787	0	0	0	0	0	0	0	0	0	0	3	1	0
6788	1	1	0	0	0	0	2	0	0	1	0	0	0
6789	0	0	0	0	0	0	0	0	0	0	0	0	0
6790	0	0	0	1	0	0	0	0	0	0	0	0	0
6791	2007	1	5	0	0	2	1	34	34	34	11	0	0
6792	0	0	0	0	0	0	0	0	0	1	1	1	0
6793	1	1	0	0	1	0	0	0	0	0	2	1	1
6794	1	0	0	1	0	0	0	0	0	0	0	0	0
6795	0	0	0	0	0	0	0	0	0	0	0	0	0
6796	0	0	1	0	0	0	0	0	0	0	0	0	0
6797	0	0	0	0	0	0	0	0	0	0	1	1	0
6798	1	1	0	0	0	1	0	0	0	0	0	2	0
6799	1	1	0	1	0	0	0	0	0	0	0	0	0
6800	0	0	0	0	0	0	0	0	0	0	0	0	0
6801	2007	1	5	0	0	2	1	36	36	36	10	0	0
6802	0	0	0	0	0	0	0	0	0	0	0	1	1
6803	1	1	1	0	1	0	0	0	0	1	1	1	0
6804	0	1	1	1	0	0	0	0	0	1	0	0	0
6805	0	0	0	0	0	0	0	0	0	0	0	0	0
6806	0	0	0	0	0	0	0	0	0	0	0	0	0
6807	0	0	0	0	0	0	0	0	0	0	0	0	1
6808	1	1	1	0	1	0	0	0	0	0	1	1	1
6809	0	0	1	1	0	0	0	0	0	1	0	0	0
6810	0	0	0	0	0	0	0	0	0	0	0	0	0
6811	2007	1	5	0	0	2	1	38	38	38	5	0	0
6812	0	0	0	0	0	0	0	0	0	0	0	0	0
6813	1	0	0	0	1	0	0	1	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0
6817	0	0	0	0	0	0	0	0	0	0	0	0	0
6818	1	0	0	0	1	0	0	1	0	1	0	0	0
6819	0	0	0	0	0	0	0	0	0	0	0	0	0
6820	0	0	0	0	0	0	0	0	0	0	0	0	0

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6821 2007   1   5   0   0   2   1   40   40   2   0   0
6822   0   0   0   0   0   0   0   0   0   0   0   0
6823   0   0   0   0   0   0   0   0   0   0   0   0
6824   0   0   0   0   0   1   0   0   0   0   0   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   1   0
6827   0   0   0   0   0   0   0   0   0   0   0   0
6828   0   0   0   0   0   0   0   0   0   0   0   0
6829   0   0   0   0   0   1   0   0   0   0   0   0
6830   0   0   0   0   0   0   0   0   0   0   0   0
6831 # change Lbin_lo and Lbin_hi for next line from 54
6832 # to      48 (length bin plus group is 48+)
6833 2007   1   5   0   0   2   1   48   48   1   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   0
6836   0   0   0   0   0   0   0   0   0   0   0   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   1   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   0   0   0   0   0   0   0   0   0   0   0   0
6842   0   0   0   0   0   0   0   0   0   0   0   0
6843 2008   1   5   0   0   2   1   30   30   2   0
6844   0   0   0   0   0   1   0   0   0   0   0   0
6845   0   0   0   0   0   0   0   0   0   0   0   1
6846   0   0   0   0   0   0   0   0   0   0   0   0
6847   0   0   0   0   0   0   0   0   0   0   0   0
6848   0   0   0   0   0   0   0   0   0   0   0   0
6849   0   0   0   0   0   0   1   0   0   0   0   0
6850   0   0   0   0   0   0   0   0   0   0   0   0
6851   1   0   0   0   0   0   0   0   0   0   0   0
6852   0   0   0   0   0   0   0   0   0   0   0   0
6853 2008   1   5   0   0   2   1   32   32   5   0
6854   0   0   0   0   0   0   0   0   0   0   0   2
6855   0   1   1   0   0   0   0   0   0   0   1   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   0
6858   0   0   0   0   0   0   0   0   0   0   0   0
6859   0   0   0   0   0   0   0   0   0   0   0   2
6860   0   0   1   1   0   0   0   0   0   0   1   0
6861   0   0   0   0   0   0   0   0   0   0   0   0
6862   0   0   0   0   0   0   0   0   0   0   0   0

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6863	2008	1	5	0	0	2	1	34	34	9	0
6864	0	0	0	0	0	0	0	0	0	0	3
6865	1	1	0	0	0	1	0	1	0	0	1
6866	0	0	1	0	0	0	0	0	0	0	0
6867	0	0	0	0	0	0	0	0	0	0	0
6868	0	0	0	0	0	0	0	0	0	0	0
6869	0	0	0	0	0	0	0	0	0	0	3
6870	1	1	0	0	0	1	0	1	0	0	0
6871	1	0	1	0	0	0	0	0	0	0	0
6872	0	0	0	0	0	0	0	0	0	0	0
6873	2008	1	5	0	0	2	1	36	36	4	0
6874	0	0	0	0	0	0	0	0	0	0	0
6875	0	0	1	0	0	0	0	0	0	0	0
6876	1	0	0	0	0	0	0	2	0	0	0
6877	0	0	0	0	0	0	0	0	0	0	0
6878	0	0	0	0	0	0	0	0	0	0	0
6879	0	0	0	0	0	0	0	0	0	0	0
6880	0	0	0	1	0	0	0	0	0	0	0
6881	0	1	0	0	0	0	0	2	0	0	0
6882	0	0	0	0	0	0	0	0	0	0	0
6883	2008	1	5	0	0	2	1	38	38	3	0
6884	0	0	0	0	0	0	0	0	0	0	0
6885	0	0	0	0	0	0	0	1	0	0	1
6886	0	0	1	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	0	0	0
6889	0	0	0	0	0	0	0	0	0	0	0
6890	0	0	0	0	0	0	0	0	1	0	0
6891	1	0	1	0	0	0	0	0	0	0	0
6892	0	0	0	0	0	0	0	0	0	0	0
6893	2008	1	5	0	0	2	1	40	40	3	0
6894	0	0	0	0	0	0	0	0	0	0	0
6895	0	0	0	0	0	0	0	0	0	0	0
6896	0	0	0	1	0	0	1	0	0	0	0
6897	0	0	0	0	0	0	0	0	0	0	0
6898	0	0	0	0	0	0	0	0	0	1	0
6899	0	0	0	0	0	0	0	0	0	0	0
6900	0	0	0	0	0	0	0	0	0	0	0
6901	0	0	0	1	0	0	1	0	0	0	0
6902	0	0	0	0	0	0	0	0	0	0	0
6903	2009	1	5	0	0	2	1	30	30	6	0
6904	0	0	0	0	2	1	0	0	0	0	0

6905	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6906	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
6907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6908	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6909	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0
6910	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6911	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6912	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6913	2009	1	5	0	0	2	1	32	32	32	20	20	0	0	0
6914	0	0	0	0	0	1	1	2	1	1	2	2	2	2	0
6915	1	3	1	1	2	1	0	0	1	0	0	1	0	0	0
6916	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6919	0	0	0	0	0	1	1	2	1	1	2	2	2	2	0
6920	1	3	1	1	2	1	0	0	1	0	0	1	0	1	1
6921	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6922	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6923	2009	1	5	0	0	2	1	34	34	34	23	23	0	0	0
6924	0	0	0	0	0	0	0	1	3	3	0	0	0	0	0
6925	1	2	2	4	0	0	0	0	1	1	0	1	1	2	2
6926	3	0	0	1	0	0	0	0	1	1	0	0	0	0	0
6927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6928	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6929	0	0	0	0	0	0	0	1	3	3	0	0	0	0	0
6930	1	2	2	4	0	0	0	0	1	1	0	1	1	0	0
6931	2	3	0	1	0	0	0	0	1	1	1	1	0	0	0
6932	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6933	2009	1	5	0	0	2	1	36	36	36	14	14	0	0	0
6934	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
6935	1	2	1	1	0	0	0	1	0	0	0	0	0	0	0
6936	1	1	1	0	0	2	0	0	0	0	0	1	1	1	1
6937	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6938	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
6939	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
6940	1	2	1	1	0	0	0	1	0	0	0	0	0	0	0
6941	0	1	1	0	0	2	0	0	0	0	0	1	1	1	1
6942	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6943	2009	1	5	0	0	2	1	38	38	38	10	10	0	0	0
6944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6945	0	1	0	0	0	0	0	2	2	1	0	0	0	0	1
6946	1	0	0	0	0	1	0	2	0	0	0	0	0	0	0

6947	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6948	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6950	0	1	0	0	0	0	0	2	2	1	0	0	0	0	0
6951	1	1	0	0	0	1	2	0	0	0	0	0	0	0	0
6952	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6953	2009	1	5	0	0	2	1	40	40	40	3	0	0	0	0
6954	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6955	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6956	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6957	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6958	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
6959	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6960	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6961	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6962	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6963	2009	1	5	0	0	2	1	42	42	42	3	0	0	0	0
6964	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6965	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
6966	0	0	1	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	0	0	0	0	0
6969	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6970	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
6971	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6973	2010	1	5	0	0	2	1	30	30	30	2	0	0	0	0
6974	0	0	0	0	0	0	0	0	0	1	0	0	1	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	0	0	0	0	0	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	1	0	0	0	1	0
6980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6982	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6983	2010	1	5	0	0	2	1	32	32	32	13	0	0	0	0
6984	0	0	0	0	0	0	0	0	0	3	1	1	1	1	0
6985	3	1	1	0	0	0	0	0	0	0	1	1	0	0	0
6986	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
6987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6989	0	0	0	0	0	0	0	0	0	0	3	1	1	1
6990	3	0	1	0	1	0	0	0	0	0	0	1	1	0
6991	0	0	0	0	0	0	0	0	0	1	1	0	0	0
6992	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6993	2010	1	5	0	0	2	1	34	34	34	17	0	0	0
6994	0	0	0	0	0	0	1	0	0	0	0	0	1	0
6995	0	1	2	4	1	0	0	2	0	0	0	0	0	0
6996	1	0	1	0	0	0	0	0	1	0	0	0	0	1
6997	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6998	0	0	0	0	0	0	0	0	0	0	1	0	1	0
6999	0	0	0	0	0	0	1	0	0	0	0	0	1	0
7000	0	1	2	4	1	0	0	2	0	0	0	0	0	0
7001	0	1	0	1	0	0	0	0	1	0	0	0	0	1
7002	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7003	2010	1	5	0	0	2	1	36	36	36	21	0	0	0
7004	0	0	0	0	0	0	0	1	0	1	0	0	0	0
7005	2	2	1	0	1	1	1	1	0	0	0	0	0	0
7006	0	2	1	4	2	0	0	0	1	0	0	1	0	1
7007	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7008	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7009	0	0	0	0	0	0	0	0	1	1	0	0	0	0
7010	2	2	1	0	1	1	1	1	0	0	0	0	0	0
7011	0	0	2	1	4	2	0	0	0	0	0	1	0	1
7012	0	0	0	0	0	0	1	1	0	0	0	0	0	0
7013	2010	1	5	0	0	2	1	38	38	38	7	0	0	0
7014	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7015	0	1	0	1	1	1	0	0	0	0	0	0	0	0
7016	1	0	0	1	0	1	0	0	0	0	0	0	0	0
7017	1	0	0	1	0	0	0	0	0	0	0	0	0	0
7018	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7019	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7020	0	1	0	0	1	1	0	0	0	0	0	0	0	0
7021	0	1	0	0	1	0	0	0	0	0	0	0	0	0
7022	1	0	1	0	0	0	0	0	0	0	0	0	0	0
7023	2010	1	5	0	0	2	1	40	40	40	5	0	0	0
7024	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7025	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7026	0	0	0	1	0	0	0	2	0	0	0	0	0	1
7027	1	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	0	0	0	0	0	0	0	0	0	0	0
7030	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7031	0	0	0	1	0	0	0	2	0	0	0	1
7032	1	0	0	0	0	0	0	0	0	0	0	0
7033	2011	1	5	0	0	2	1	30	30	30	21	0
7034	0	0	0	1	3	1	2	2	1	6	0	0
7035	2	0	0	1	3	0	0	0	1	0	0	1
7036	0	0	0	1	0	0	0	0	0	0	0	0
7037	0	0	0	0	0	0	0	0	0	0	0	0
7038	0	0	0	0	0	0	0	0	0	0	0	0
7039	0	0	0	0	1	2	2	1	1	6	0	0
7040	2	0	0	1	3	0	0	0	1	0	0	0
7041	1	0	0	1	0	0	0	0	0	0	0	0
7042	0	0	0	0	0	0	0	0	0	0	0	0
7043	2011	1	5	0	0	2	1	32	32	46	0	0
7044	0	0	0	1	0	3	0	3	9	1	1	0
7045	2	3	1	5	4	2	1	0	0	1	0	2
7046	1	0	0	1	4	1	0	0	0	0	0	0
7047	1	0	0	0	0	0	0	0	0	0	0	0
7048	0	0	0	0	0	0	0	0	0	0	0	0
7049	0	0	0	1	0	3	0	0	3	9	1	1
7050	2	3	1	5	4	2	1	0	0	0	1	0
7051	2	1	0	1	4	1	0	0	0	0	0	0
7052	1	0	0	0	0	0	0	0	0	0	0	0
7053	2011	1	5	0	0	2	1	34	34	84	0	0
7054	0	0	0	0	0	0	1	3	8	1	1	0
7055	2	2	9	6	10	6	4	2	2	6	1	2
7056	3	2	0	3	2	2	2	0	2	1	1	0
7057	0	0	0	0	2	0	0	0	0	1	0	0
7058	0	0	1	0	1	0	0	0	0	0	0	0
7059	0	0	0	0	0	1	0	3	8	1	1	0
7060	2	2	9	6	10	6	4	2	2	6	1	2
7061	2	3	2	3	2	2	2	0	2	2	1	0
7062	0	0	0	2	0	0	0	0	0	1	0	0
7063	2011	1	5	0	2	1	36	36	93	0	0	0
7064	0	0	0	0	0	0	0	0	4	3	1	3
7065	2	2	4	4	10	10	6	3	3	1	1	2
7066	4	5	1	5	4	7	2	3	2	2	0	2
7067	1	2	1	0	0	1	0	0	0	1	0	0
7068	0	0	0	1	1	0	0	0	0	0	0	0
7069	0	0	0	0	0	0	0	0	4	3	1	3
7070	2	2	4	4	10	10	6	3	3	1	1	2
7071	2	4	5	5	0	7	1	2	3	1	2	0
7072	1	2	1	1	0	0	0	0	0	0	0	0

7073	2011	1	5	0	2	1	38	38	43	0
7074	0	0	0	0	0	0	0	0	0	1
7075	2	1	1	3	2	3	4	1	1	1
7076	2	2	2	3	3	2	0	1	1	3
7077	1	2	0	0	1	0	0	0	2	0
7078	0	0	0	0	0	0	0	0	0	0
7079	0	0	0	0	0	0	0	0	0	1
7080	2	1	1	3	2	3	4	1	1	1
7081	1	2	2	3	3	2	0	1	1	3
7082	1	2	0	0	1	0	0	0	2	0
7083	2011	1	5	0	2	1	40	40	15	0
7084	0	0	0	0	0	0	0	0	0	0
7085	0	0	0	0	1	0	1	0	0	0
7086	0	1	0	0	1	2	1	1	1	0
7087	0	0	0	0	1	0	0	0	0	0
7088	1	1	0	0	0	0	0	0	3	0
7089	0	0	0	0	0	0	0	0	0	0
7090	0	0	0	0	1	0	1	0	0	0
7091	0	0	1	0	1	2	1	1	1	0
7092	0	0	0	0	0	1	0	0	0	0
7093	2011	1	5	0	2	1	42	42	4	0
7094	0	0	0	0	0	0	0	0	0	0
7095	0	0	1	0	1	0	0	0	0	0
7096	0	0	0	0	0	0	0	0	0	0
7097	0	0	0	0	0	0	0	0	0	0
7098	0	0	0	0	0	0	0	0	2	0
7099	0	0	0	0	0	0	0	0	0	0
7100	0	0	0	1	0	1	0	0	0	0
7101	0	0	0	0	0	0	0	0	0	0
7102	0	0	0	0	0	0	0	0	0	0
7103	2011	1	5	0	2	1	46	46	2	0
7104	0	0	0	0	0	0	0	0	0	0
7105	0	0	0	0	1	1	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	0	0	0	0	0	0
7109	0	0	0	0	0	0	0	0	0	0
7110	0	0	0	0	1	1	0	0	0	0
7111	0	0	0	0	0	0	0	0	0	0
7112	0	0	0	0	0	0	0	0	0	0
7113	2012	1	5	0	2	1	26	26	1	0
7114	0	0	0	0	1	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	0	0	0	0	0	0	0
7117	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7118	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7119	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7120	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7121	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7122	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7123	2012	1	5	0	0	2	1	28	28	28	2	0	0	0
7124	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7125	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7126	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7127	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7128	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7129	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7130	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7131	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7132	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7133	2012	1	5	0	0	2	1	30	30	30	8	0	0	0
7134	0	0	0	0	0	0	1	1	1	4	2	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	0	0	0	0	0	0	0	0
7138	0	0	0	0	0	0	0	1	0	0	4	0	2	0
7139	0	0	0	0	0	0	1	1	1	4	2	0	0	0
7140	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7141	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7142	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7143	2012	1	5	0	0	2	1	32	32	32	21	0	0	0
7144	0	0	0	0	1	1	1	2	2	2	2	3	0	0
7145	0	1	0	2	0	0	2	1	1	0	1	0	1	0
7146	0	0	1	0	0	1	0	0	1	0	0	0	0	0
7147	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7148	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7149	0	0	0	0	1	1	1	2	2	2	2	3	0	0
7150	0	1	0	2	0	0	2	1	1	0	0	1	0	0
7151	0	0	1	0	1	0	1	0	0	1	0	0	0	0
7152	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7153	2012	1	5	0	0	2	1	34	34	34	29	0	0	0
7154	0	0	0	0	0	0	1	1	1	1	1	3	0	0
7155	1	0	0	0	2	1	2	1	4	1	1	1	1	0
7156	0	0	0	0	1	1	2	1	0	1	2	3	0	0

7157	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
7158	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7159	0	0	0	0	0	1	0	1	4	1	1	1	1	3	1	3
7160	1	0	0	0	1	1	2	4	1	1	3	1	1	1	1	3
7161	0	0	0	2	1	1	0	1	0	0	2	0	0	0	0	0
7162	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7163	2012	1	5	0	2	0	1	36	36	41	0	0	0	0	0	0
7164	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	2
7165	1	1	1	1	2	2	5	3	0	0	3	0	0	3	2	2
7166	2	3	3	3	1	3	3	2	2	2	0	0	1	0	0	2
7167	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
7168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7169	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	2
7170	1	1	1	1	2	2	5	3	0	0	3	0	0	3	0	3
7171	2	2	3	3	1	1	3	2	2	2	0	0	1	0	0	2
7172	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
7173	2012	1	5	0	2	1	1	38	38	26	0	0	0	0	0	0
7174	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7175	0	0	3	0	2	2	3	4	1	1	1	1	1	1	1	1
7176	0	0	0	2	0	1	1	1	2	1	1	1	1	1	1	1
7177	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7178	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
7179	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7180	0	0	3	0	2	3	4	1	1	1	1	1	1	1	1	1
7181	1	0	0	2	0	1	1	1	2	0	1	1	1	1	1	1
7182	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7183	2012	1	5	0	2	1	1	40	40	15	0	0	0	0	0	0
7184	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7185	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
7186	0	0	0	1	0	0	4	0	0	1	1	1	1	0	0	0
7187	2	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0
7188	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7189	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7190	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7191	2	0	0	1	0	0	4	0	0	1	1	1	1	0	0	0
7192	2	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0
7193	2012	1	5	0	2	1	1	42	42	2	0	0	0	0	0	0
7194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7195	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7196	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
7197	0	0	0	1	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	0	0

7199	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7200	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7201	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7202	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7203	2012	1	5	0	0	2	1	46	46	46	1	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	1	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	0	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	1	0	0	0	0	0	0
7211	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7212	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7213	2013	1	5	0	0	2	1	28	28	28	1	0	0	0
7214	0	0	0	0	0	0	0	0	1	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	0	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	1	0	0	0	0	0
7220	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7221	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7222	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7223	2013	1	5	0	0	2	1	30	30	30	15	0	0	0
7224	0	0	0	0	2	0	1	1	1	1	1	1	1	1
7225	2	1	0	0	3	2	0	0	0	1	0	0	0	0
7226	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7227	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7228	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7229	0	0	0	0	2	0	1	1	1	1	1	1	1	1
7230	2	1	0	0	3	2	0	0	0	1	0	0	0	0
7231	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7232	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7233	2013	1	5	0	0	2	1	32	32	32	42	0	0	0
7234	0	0	0	0	1	1	1	7	3	3	3	1	1	1
7235	4	4	0	0	1	0	5	2	3	3	2	0	2	0
7236	0	0	0	0	0	2	1	0	0	0	0	0	2	0
7237	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7238	0	0	0	0	0	0	1	7	3	3	3	1	0	0
7239	4	0	4	0	0	1	0	5	2	3	3	2	1	0
7240	4	4	0	0	1	0	5	2	3	3	2	0	0	0

7241	0	0	0	0	0	2	1	0	0	0	0	2
7242	0	0	0	0	0	0	1	0	0	0	0	0
7243	2013	1	5	0	0	2	1	34	34	68	0	0
7244	0	0	0	0	0	1	2	0	0	0	0	0
7245	9	2	1	4	3	12	2	4	2	2	6	1
7246	1	2	5	2	4	0	1	3	0	1	1	1
7247	0	0	1	0	0	0	0	0	0	0	0	0
7248	0	0	0	0	0	0	0	0	0	0	0	0
7249	0	0	0	0	1	2	0	0	0	0	0	0
7250	9	2	1	4	3	12	2	4	2	2	6	1
7251	6	1	2	5	2	4	0	1	3	0	1	1
7252	0	0	1	0	0	0	0	0	0	0	0	0
7253	2013	1	5	0	0	2	1	36	36	83	0	0
7254	0	0	0	0	1	0	2	0	0	0	1	1
7255	7	2	2	6	6	2	5	4	5	5	5	5
7256	5	2	3	2	3	2	2	3	4	2	4	4
7257	1	0	3	2	1	0	0	0	0	0	0	0
7258	0	0	0	1	0	0	0	0	0	1	0	0
7259	0	0	0	0	1	0	2	0	0	0	1	1
7260	7	2	2	6	6	2	5	4	5	5	5	5
7261	5	5	2	3	2	3	2	3	2	2	4	4
7262	1	0	3	2	1	0	0	0	0	0	0	0
7263	2013	1	5	0	0	2	1	38	38	35	0	0
7264	0	0	0	0	0	0	0	0	0	0	1	1
7265	1	1	0	0	2	0	1	5	2	2	0	0
7266	0	1	1	1	1	0	0	7	4	1	1	1
7267	1	3	0	0	0	0	0	1	0	0	0	0
7268	0	1	0	0	0	0	0	0	0	1	0	0
7269	0	0	0	0	0	0	0	0	0	0	1	1
7270	1	1	0	0	2	0	1	5	2	2	0	0
7271	0	0	1	1	1	0	0	7	4	4	1	1
7272	1	3	0	0	0	0	0	1	0	0	0	0
7273	2013	1	5	0	0	2	1	40	40	14	0	0
7274	0	0	0	0	0	0	0	0	0	0	0	0
7275	0	0	0	0	0	0	1	1	0	0	0	0
7276	1	0	0	0	1	1	1	2	1	1	1	1
7277	0	0	1	0	0	0	0	0	0	0	0	0
7278	1	0	0	1	0	0	0	0	0	2	0	0
7279	0	0	0	0	0	0	0	0	0	0	0	0
7280	0	1	0	0	0	0	1	1	1	0	0	1
7281	0	1	0	1	0	1	0	1	2	0	1	1
7282	0	0	0	1	0	0	0	0	0	0	0	0

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7283 2013   1     5     0     0     2     1     42    42     1     0
7284   0     0     0     0     0     0     0     0     0     0     0
7285   0     0     0     0     0     0     0     0     0     0     0
7286   0     0     0     0     0     0     0     0     0     0     0
7287   1     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   0     0     0     0     0     0     0     0     0     0     0
7291   0     0     0     0     0     0     0     0     0     0     0
7292   1     0     0     0     0     0     0     0     0     0     0
7293
7294 ### OR rec private, South
7295 #Yr      Seas   Flt/Svy Gender Part   AgeErr  LbinLo  LbinHi Nsamp  4yr
7296 # s      5yrs   6yrs   7yrs   8yrs   9yrs   10yrs  11yrs  12yrs  13yr
7297 # s     14yrs  15yrs  16yrs  17yrs  18yrs  19yrs  20yrs  21yrs  22yrs
7298 #     23yrs  24yrs  25yrs  26yrs  27yrs  28yrs  29yrs  30yrs  31yrs
7299 #     32yrs  33yrs  34yrs  35yrs  36yrs  37yrs  38yrs  39yrs  40yrs
7300 #     41yrs  42yrs  43yrs  44yrs  45yrs  46yrs  47yrs  48yrs  49yrs
7301 #     50yrs  repeat
7302 2005   1     7     0     0     2     1     30    30     1     0
7303   0     0     0     0     0     1     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     0     0     0     0     0
7307   0     0     0     0     0     0     0     0     0     0     0
7308   0     0     0     0     0     0     1     0     0     0     0
7309   0     0     0     0     0     0     0     0     0     0     0
7310   0     0     0     0     0     0     0     0     0     0     0
7311   0     0     0     0     0     0     0     0     0     0     0
7312 2005   1     7     0     0     2     1     32    32     3     0
7313   0     0     0     0     1     0     0     1     0     0     0
7314   0     0     0     1     0     0     0     0     0     0     0
7315   0     0     0     0     0     0     0     0     0     0     0
7316   0     0     0     0     0     0     0     0     0     0     0
7317   0     0     0     0     0     0     0     0     0     0     0
7318   0     0     0     0     0     1     0     0     1     0     0
7319   0     0     0     1     0     0     0     0     0     0     0
7320   0     0     0     0     0     0     0     0     0     0     0
7321   0     0     0     0     0     0     0     0     0     0     0
7322 2005   1     7     0     0     2     1     34    34     8     0
7323   0     0     0     1     0     0     0     2     1     2     0     0
7324   1     0     0     1     0     0     0     0     1     0     0     0

```

7325	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7326	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7327	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7328	0	0	0	0	0	0	0	2	0	1	1	2	0	0
7329	1	0	0	1	0	0	0	0	0	1	0	0	0	0
7330	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7331	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7332	2005	1	7	0	0	2	1	36	36	36	11	0	0	0
7333	0	0	0	0	0	0	0	0	1	1	3	0	0	0
7334	1	1	1	1	0	0	0	1	1	1	0	0	0	1
7335	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7336	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7337	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7338	0	0	0	0	0	0	0	0	1	1	3	0	0	0
7339	1	1	1	1	0	0	0	0	1	1	1	0	0	0
7340	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7341	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7342	2005	1	7	0	0	2	1	38	38	38	5	0	0	0
7343	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7344	0	2	0	0	0	0	0	2	0	0	0	1	0	0
7345	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
7347	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7348	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7349	0	2	0	0	0	0	0	2	0	0	0	0	1	0
7350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7351	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7352	2005	1	7	0	0	2	1	40	40	40	3	0	0	0
7353	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7354	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7355	1	1	1	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
7357	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7358	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7359	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7360	0	1	1	0	0	0	0	0	0	0	0	0	0	0
7361	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7362	2005	1	7	0	0	2	1	42	42	42	1	0	0	0
7363	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7364	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7365	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7366	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0
7370	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7371	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7372	2006	1	7	0	2	1	28	28	1	0	0	0	0	0
7373	0	0	0	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7381	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7382	2006	1	7	0	2	1	30	30	2	0	0	0	0	0
7383	0	0	0	0	1	0	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0
7387	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7388	0	0	0	0	1	0	0	0	0	0	0	0	0	1
7389	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7390	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7391	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7392	2006	1	7	0	2	1	32	32	2	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	2	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	0	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	2	0	0	0	0	0	0	0	0	0
7400	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7401	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7402	2006	1	7	0	2	1	34	34	5	0	0	0	0	0
7403	0	0	0	0	0	0	0	0	0	0	0	0	2	0
7404	2	0	0	0	0	0	0	0	0	0	0	0	0	1
7405	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7406	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7407	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7408	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7409	2	0	0	0	0	0	0	0	0	0	0	0	0	0
7410	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7411	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7412	2006	1	7	0	0	2	1	36	36	13	0	0	0	0
7413	0	0	0	0	0	0	0	0	0	0	0	0	1	1
7414	1	2	0	2	2	0	0	0	0	0	0	1	1	0
7415	1	1	1	1	0	0	0	0	0	0	0	0	0	1
7416	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7417	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7418	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7419	1	2	0	2	2	0	0	0	0	0	0	0	1	0
7420	0	1	1	1	0	0	0	0	0	0	0	0	0	1
7421	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7422	2006	1	7	0	0	2	1	38	38	9	0	0	0	0
7423	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7424	0	0	0	2	2	0	0	1	0	1	1	1	0	0
7425	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7426	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7427	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7428	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7429	0	0	0	2	2	0	0	0	1	1	1	1	1	0
7430	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7431	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7432	2007	1	7	0	0	2	1	30	30	2	0	0	0	0
7433	0	0	0	1	0	0	0	0	1	0	0	0	0	0
7434	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7435	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7436	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7437	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7438	0	0	0	1	0	0	0	0	0	1	0	0	0	0
7439	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7440	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7441	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7442	2007	1	7	0	0	2	1	32	32	8	0	0	0	0
7443	0	0	0	0	0	0	0	3	0	0	0	0	0	0
7444	0	1	1	0	0	1	0	0	0	1	0	0	0	0
7445	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7446	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7447	0	0	0	0	0	0	0	0	3	0	0	0	0	0
7448	0	0	1	0	0	0	0	0	3	0	0	1	0	0
7449	0	0	1	1	0	0	1	1	0	0	0	1	0	0
7450	0	0	0	0	0	1	0	0	0	0	0	0	0	0

7451	0	0	0	0	0	0	0	0	0	0	0	0	0
7452	2007	1	7	0	0	2	1	34	34	8	0	0	0
7453	0	0	0	0	0	0	0	0	0	0	0	1	0
7454	1	0	0	0	0	0	1	0	0	0	0	0	3
7455	0	0	0	2	0	0	0	0	0	0	0	0	0
7456	0	0	0	0	0	0	0	0	0	0	0	0	0
7457	0	0	0	0	0	0	0	0	0	0	0	0	0
7458	0	0	0	0	0	0	0	0	0	0	0	0	1
7459	1	0	0	0	0	0	1	0	0	0	0	0	0
7460	3	0	0	2	0	0	0	0	0	0	0	0	0
7461	0	0	0	0	0	0	0	0	0	0	0	0	0
7462	2007	1	7	0	0	2	1	36	36	8	0	0	0
7463	0	0	0	0	0	0	0	0	0	0	0	0	0
7464	1	0	0	0	0	2	0	1	2	0	0	0	0
7465	0	0	0	0	1	1	0	0	0	0	0	0	0
7466	0	0	0	0	0	0	0	0	0	0	0	0	0
7467	0	0	0	0	0	0	0	0	0	0	0	0	0
7468	0	0	0	0	0	0	0	0	0	0	0	0	0
7469	1	0	0	0	0	2	0	1	2	0	0	0	0
7470	0	0	0	0	1	1	0	0	0	0	0	0	0
7471	0	0	0	0	0	0	0	0	0	0	0	0	0
7472	2007	1	7	0	0	2	1	38	38	6	0	0	0
7473	0	0	0	0	0	0	0	0	0	0	0	0	0
7474	1	0	1	0	0	0	0	0	0	0	0	0	0
7475	1	1	1	1	0	0	0	0	0	0	0	0	0
7476	1	0	0	0	0	0	0	0	0	0	0	0	0
7477	0	0	0	0	0	0	0	0	0	0	0	0	0
7478	0	0	0	0	0	0	0	0	0	0	0	0	0
7479	1	0	1	0	0	0	0	0	0	0	0	0	0
7480	0	1	1	1	0	0	0	0	0	0	0	0	0
7481	1	0	0	0	0	0	0	0	0	0	0	0	0
7482	2007	1	7	0	0	2	1	40	40	4	0	0	0
7483	0	0	0	0	0	0	0	0	0	0	0	0	0
7484	0	1	0	0	0	1	0	0	0	0	0	0	0
7485	0	0	1	0	0	1	0	0	0	0	0	0	0
7486	0	0	0	0	0	0	0	0	0	0	0	0	0
7487	0	0	0	0	0	0	0	0	0	0	0	0	0
7488	0	0	0	0	0	0	0	0	0	0	0	0	0
7489	0	0	1	0	0	1	0	0	0	0	0	0	0
7490	0	0	1	0	0	1	0	0	0	0	0	0	0
7491	0	0	0	7	0	2	1	42	42	1	0	0	0
7492	2007	1	7	0	0	2	1	42	42	1	0	0	0

7493	0	0	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	0
7495	1	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	0
7497	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7498	0	0	0	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	0
7500	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7502	2008	1	7	0	0	2	1	30	30	1	0	0	0	0	0
7503	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7504	0	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	0
7506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7507	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7508	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7509	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7510	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7512	2008	1	7	0	0	2	1	32	32	4	0	0	0	0	0
7513	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
7514	2	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	0
7516	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7517	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7518	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
7519	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7521	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7522	2008	1	7	0	0	2	1	34	34	9	0	0	0	0	0
7523	0	0	0	0	0	0	0	0	0	1	1	1	3	0	0
7524	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
7525	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7527	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7528	0	0	0	0	0	0	0	0	0	1	1	1	3	0	0
7529	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0
7530	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7531	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7532	2008	1	7	0	0	2	1	36	36	8	0	0	1	2	0
7533	0	2	0	0	1	0	0	0	1	0	0	1	0	2	0
7534	0	2	0	1	0	1	0	1	1	0	1	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	0	0	0	0
7537	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7538	0	0	0	0	0	0	0	0	0	0	1	0	2	0
7539	0	2	0	0	1	0	0	1	0	1	0	0	0	0
7540	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7541	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7542	2008	1	7	0	0	2	1	38	38	38	6	0	0	0
7543	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7544	0	0	0	0	2	0	0	1	0	0	0	0	0	1
7545	0	0	0	0	0	1	0	1	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	0	0	0	0	0	0	0	0	0	0
7548	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7549	0	0	0	0	2	0	0	0	1	0	0	0	0	0
7550	1	0	0	0	0	1	0	1	0	0	0	0	0	0
7551	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7552	2008	1	7	0	0	2	1	40	40	40	1	0	0	0
7553	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7554	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7560	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7561	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7562	2008	1	7	0	0	2	1	42	42	42	2	0	0	0
7563	0	0	0	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	1	0	0	0	0	0	0	0	0	0	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	1	0	0
7568	0	0	0	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	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7571	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7572	2009	1	7	0	0	2	1	32	32	32	1	0	0	0
7573	0	0	0	0	0	0	0	0	0	1	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	0	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	1	0	0	0	0
7579	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7580	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7581	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7582	2009	1	7	0	0	2	1	34	34	5	0	0	0	0
7583	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7584	2	0	0	0	1	1	0	0	0	0	0	0	0	0
7585	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7586	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7587	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7588	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7589	2	0	0	0	1	1	0	0	0	0	0	0	0	0
7590	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7591	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7592	2009	1	7	0	0	2	1	36	36	10	0	0	0	0
7593	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7594	0	3	1	3	0	0	1	0	0	0	0	0	0	0
7595	1	0	0	0	0	0	1	0	0	0	0	0	0	0
7596	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7597	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7598	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7599	0	3	1	3	0	0	0	1	0	0	0	0	0	0
7600	0	1	0	0	0	0	1	0	0	0	0	0	0	0
7601	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7602	2009	1	7	0	0	2	1	38	38	4	0	0	0	0
7603	0	0	0	0	0	0	0	0	0	1	0	0	0	0
7604	0	0	1	0	0	0	1	1	0	0	0	0	0	0
7605	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7606	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7607	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7608	0	0	0	0	0	0	0	0	0	0	1	0	0	0
7609	0	0	0	1	0	0	0	1	0	0	0	0	0	0
7610	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7611	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7612	2009	1	7	0	0	2	1	40	40	2	0	0	0	0
7613	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7614	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7615	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0	0
7618	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7619	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7620	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7621	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7622	2009	1	7	0	0	2	1	42	42	1	0	0	0	0
7623	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7624	0	0	0	1	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	0	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	1	0	0	0	0	0	0	0	0	0	0
7630	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7631	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7632	2010	1	7	0	0	2	1	30	30	1	0	0	0	0
7633	0	0	0	1	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	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7641	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7642	2010	1	7	0	0	2	1	32	32	3	0	0	0	0
7643	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7644	0	1	0	0	0	0	1	1	0	0	0	0	0	0
7645	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0	0	0
7648	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7649	0	0	1	0	0	0	0	1	0	0	0	0	0	0
7650	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7651	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7652	2010	1	7	0	0	2	1	34	34	4	0	0	0	0
7653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7654	0	0	0	0	0	1	1	0	0	1	0	0	0	0
7655	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7656	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7657	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7658	0	0	0	0	0	0	0	1	0	0	0	1	0	0
7659	0	0	0	0	0	0	1	1	0	0	1	0	0	0
7660	0	0	0	0	0	1	0	0	1	0	0	0	0	0

7661	0	0	0	0	0	0	0	0	0	0	0	0	0
7662	2010	1	7	0	0	2	1	36	36	10	0	0	0
7663	0	0	0	0	0	0	0	0	0	0	0	0	0
7664	0	0	2	1	1	2	0	0	0	0	0	0	0
7665	1	0	1	0	0	1	0	0	0	0	0	0	0
7666	0	0	0	0	0	0	0	0	0	0	0	0	0
7667	0	0	0	0	0	0	0	0	0	0	0	0	0
7668	0	0	0	0	0	0	0	0	0	0	0	0	0
7669	0	0	2	1	1	2	0	0	0	0	0	0	0
7670	0	1	0	1	0	1	1	0	0	0	0	0	0
7671	0	0	0	0	0	0	0	0	0	0	0	0	0
7672	2010	1	7	0	0	2	1	38	38	11	0	0	0
7673	0	0	0	0	0	0	0	0	0	1	0	0	0
7674	0	0	1	2	1	1	0	0	0	0	0	0	0
7675	1	0	0	0	1	0	0	1	0	0	0	0	0
7676	0	0	0	0	1	0	0	0	1	0	0	0	0
7677	0	0	0	0	0	0	0	0	0	0	0	0	0
7678	0	0	0	0	0	0	0	0	0	0	1	0	0
7679	0	0	1	2	1	0	0	0	0	0	0	0	0
7680	0	1	0	0	1	1	0	1	0	0	0	0	0
7681	0	0	0	0	1	0	0	0	1	1	0	0	0
7682	2010	1	7	0	0	2	1	40	40	5	0	0	0
7683	0	0	0	0	0	0	0	0	0	0	0	0	0
7684	0	0	0	0	0	0	0	1	0	0	0	0	0
7685	0	0	1	0	0	0	0	0	0	0	0	0	0
7686	1	0	1	0	0	0	0	0	0	0	0	0	1
7687	0	0	0	0	0	0	0	0	0	0	0	0	0
7688	0	0	0	0	0	0	0	0	0	0	0	0	0
7689	0	0	0	0	0	0	0	0	1	0	0	0	0
7690	0	0	1	0	0	0	0	0	0	0	0	0	0
7691	1	0	1	0	0	0	0	0	0	0	0	0	1
7692	2010	1	7	0	0	2	1	42	42	2	0	0	0
7693	0	0	0	0	0	0	0	0	0	0	0	0	0
7694	0	0	0	0	0	0	0	1	0	0	0	0	0
7695	0	0	0	0	0	1	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	0	0	0	0	0	0
7698	0	0	0	0	0	0	0	0	0	0	0	0	0
7699	0	0	0	0	0	0	0	1	0	0	0	0	0
7700	0	0	0	0	0	0	1	0	0	0	0	0	0
7701	0	0	0	0	0	0	0	0	44	44	1	0	0
7702	2010	1	7	0	0	2	1	44	44	1	0	0	0

7703	0	0	0	0	0	0	0	0	0	0	0	0	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	1	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	0	0
7708	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7709	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7710	0	0	0	0	0	0	0	0	0	0	0	1	0	0
7711	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7712	2011	1	7	0	0	2	1	28	28	2	0	0	0	0
7713	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7714	0	0	0	0	0	1	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	0	0
7717	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7718	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7719	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7720	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7721	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7722	2011	1	7	0	0	2	1	30	30	2	0	0	0	0
7723	0	0	0	0	0	0	1	0	0	0	1	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	0	0	0	0	0	0	0	0
7727	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7728	0	0	0	0	0	0	1	0	0	0	0	1	0	0
7729	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7730	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7731	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7732	2011	1	7	0	0	2	1	32	32	4	0	0	0	0
7733	0	0	0	0	1	0	0	0	0	0	0	0	1	1
7734	1	0	0	0	0	0	0	0	0	0	0	1	0	0
7735	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7736	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7737	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7738	0	0	0	0	0	1	0	0	0	0	0	0	0	1
7739	1	0	0	0	0	0	0	0	0	0	0	0	1	0
7740	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7741	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7742	2011	1	7	0	0	2	1	34	34	17	0	0	0	0
7743	0	0	0	0	0	1	2	2	1	2	1	2	0	0
7744	0	0	0	0	2	1	2	3	0	1	1	0	0	1

7745	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7746	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7747	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7748	0	0	0	0	0	1	2	2	1	0	1	2	0	0	0
7749	0	0	0	0	2	2	3	0	0	0	1	0	0	0	0
7750	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7751	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7752	2011	1	7	0	0	2	1	36	36	36	25	0	0	0	0
7753	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0
7754	0	0	1	1	1	1	4	2	1	1	0	0	0	0	1
7755	2	2	0	0	2	0	0	1	1	0	0	0	0	0	1
7756	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7757	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7758	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1
7759	0	0	0	1	1	1	4	2	1	1	0	0	0	0	0
7760	1	2	2	0	0	2	0	1	1	0	0	0	0	0	1
7761	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7762	2011	1	7	0	0	2	1	38	38	38	15	0	0	0	0
7763	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7764	1	0	0	0	1	0	0	1	1	1	0	1	0	0	3
7765	0	1	0	0	0	0	0	1	2	0	0	0	0	0	1
7766	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7767	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7769	1	0	0	0	1	0	0	1	1	1	0	1	0	0	0
7770	3	0	1	0	0	0	0	1	2	0	0	0	0	0	1
7771	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
7772	2011	1	7	0	0	2	1	40	40	40	6	0	0	0	0
7773	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7774	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7775	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7776	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1
7777	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7778	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7779	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7780	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7781	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1
7782	2011	1	7	0	0	2	1	44	44	44	2	0	0	0	0
7783	0	0	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0
7786	0	0	0	0	0	0	0	0	0	0	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	0	1	0	0	0	0	0
7789	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7790	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7791	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7792	2011	1	7	0	0	2	1	46	46	46	2	0	0	0
7793	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7794	1	0	0	0	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	1	0	0	0	0	0	0	0	0	0	0
7797	0	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7800	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7801	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7802	2012	1	7	0	0	2	1	26	26	26	1	0	0	0
7803	0	0	0	0	1	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	0	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	1	0	0	0	0	0	0	0	0
7809	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7810	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7811	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7812	2012	1	7	0	0	2	1	32	32	32	2	0	0	0
7813	0	0	0	0	1	0	1	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	0	0	0	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	1	0	1	0	0	0	0	0	0
7819	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7820	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7821	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7822	2012	1	7	0	0	2	1	34	34	34	4	0	0	0
7823	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7824	0	0	0	1	0	0	1	0	0	0	0	0	0	0
7825	0	0	0	1	0	0	0	1	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	0	0	0	0	0	0	0	0	0
7828	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7829	0	0	0	0	0	1	0	0	1	0	0	0	0	0
7830	0	0	0	0	1	0	0	0	1	0	0	0	0	0
7831	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7832	2012	1	7	0	0	2	1	36	36	5	0	0	0	0
7833	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7834	0	0	0	0	0	0	1	0	0	1	0	0	0	0
7835	0	0	1	1	0	0	0	0	0	1	0	0	0	0
7836	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7837	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7838	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7839	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7840	0	0	1	1	0	0	0	0	0	1	0	0	0	0
7841	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7842	2012	1	7	0	0	2	1	38	38	12	0	0	0	0
7843	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7844	1	1	0	0	1	1	2	1	0	0	0	0	0	0
7845	0	0	0	0	0	1	1	0	0	0	0	0	0	2
7846	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7847	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7848	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7849	1	1	0	0	1	1	2	1	0	0	0	0	0	0
7850	0	0	0	0	0	1	1	0	0	0	0	0	0	2
7851	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7852	2012	1	7	0	0	2	1	40	40	2	0	0	0	0
7853	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7854	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7855	0	0	1	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	0	0	0	0	0	0	0	0	0	0
7858	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7859	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7860	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7861	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7862	2012	1	7	0	0	2	1	42	42	1	0	0	0	0
7863	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7864	0	0	0	0	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	1	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	0	0	0	0	0	0	0	0	0	0	0
7870	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7871	0	0	0	1	0	0	0	0	0	0	0	0	0
7872	2013	1	7	0	2	1	24	24	1	0	0	0	0
7873	0	0	1	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	0	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	1	0	0	0	0	0	0	0	0	0
7879	0	0	0	0	0	0	0	0	0	0	0	0	0
7880	0	0	0	0	0	0	0	0	0	0	0	0	0
7881	0	0	0	0	0	0	0	0	0	0	0	0	0
7882	2013	1	7	0	2	1	30	30	2	0	0	0	0
7883	0	0	0	0	0	0	0	0	1	0	0	0	0
7884	0	0	0	0	0	0	0	0	0	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	1	0	0	0	0
7889	0	0	0	0	0	0	0	0	0	0	0	0	0
7890	0	0	0	0	0	0	0	0	0	0	0	0	0
7891	0	0	0	0	0	0	0	0	1	0	0	0	0
7892	2013	1	7	0	2	1	32	32	3	0	0	0	0
7893	0	0	0	0	0	0	0	0	1	0	0	0	0
7894	0	1	0	0	0	0	0	0	0	0	0	0	0
7895	0	0	0	0	1	0	0	0	0	0	0	0	0
7896	0	0	0	0	0	0	0	0	0	0	0	0	0
7897	0	0	0	0	0	0	0	0	0	0	0	0	0
7898	0	0	0	0	0	0	0	0	1	0	0	0	0
7899	0	1	0	0	0	0	0	0	0	0	0	0	0
7900	0	0	0	0	1	0	0	0	0	0	0	0	0
7901	0	0	0	0	0	0	0	0	0	0	0	0	0
7902	2013	1	7	0	2	1	34	34	20	0	0	0	0
7903	0	0	0	0	0	0	2	2	0	0	0	0	0
7904	0	2	0	2	0	2	0	0	1	3	0	0	0
7905	1	0	0	0	1	0	1	1	0	0	0	0	0
7906	1	0	0	1	0	0	0	0	0	0	0	0	0
7907	0	0	0	0	0	0	0	0	0	0	0	0	0
7908	0	0	0	0	0	0	2	2	0	0	0	0	0
7909	0	2	0	2	0	2	0	1	0	1	3	0	0
7910	0	1	0	0	1	0	1	1	0	0	0	0	0
7911	1	0	1	0	0	0	0	0	36	0	23	0	0
7912	2013	1	7	0	2	1	36	36	23	0	0	0	0

7913	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7914	1	1	1	1	2	2	3	0	1	0	1	0	2	0	1
7915		1	1	2	2	1	0	0	0	2	0	0	0	0	0
7916		1	0	0	0	0	1	0	0	0	0	0	0	0	0
7917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7918		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7919	1	1	1	1	2	2	3	0	1	0	1	0	2	0	0
7920	1	1	2	2	1	0	0	0	0	2	0	0	0	0	0
7921		1	0	0	0	1	0	0	0	0	0	0	0	0	0
7922	2013	1	7	0	0	2	1	38	38	38	13	0	0	0	0
7923		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7924	0	0	0	0	0	3	0	0	1	1	0	1	1	0	0
7925		0	1	0	0	0	0	0	1	0	0	1	0	0	0
7926	1	0	0	0	1	0	0	0	0	0	1	0	1	0	0
7927	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
7928		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7929	0	0	0	0	0	3	0	0	1	1	1	1	1	0	0
7930	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
7931	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0
7932	2013	1	7	0	0	2	1	40	40	40	2	0	0	0	0
7933		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7934	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7935		0	0	0	1	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	0
7937	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7938		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7939	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7940	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7941		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7942	2013	1	7	0	0	2	1	42	42	42	1	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	1	0	0	0	0	0	0
7945		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	0
7947	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7948		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7949	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
7950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7951		0	0	0	0	0	0	0	0	0	0	0	0	0	0
7952															
7953	0	#_N_MeanSize-at-Age_obs													
7954	#Yr Seas Flt/Svy Gender Part Ageerr Ignore	datavector(female-male)													

```

7955 # samplesize(female-male)
7956 # 1971 1 1 3 0 1 2 29.8931 40.6872 44.7411 50.027 52.5794 56.1489 57.1033 6
7957 # 1.1728 61.7417 63.368 64.4088 65.6889 67.616 68.5972 69.9177 71.0443 72.3
7958 # 609 32.8188 39.5964 43.988 50.1693 53.1729 54.9822 55.3463 60.3509 60.743
7959 # 9 62.3432 64.3224 65.1032 64.1965 66.7452 67.5154 70.8749 71.2768 20 20 2
7960 # 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
7961 # 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
7962
7963 0 #_N_environ_variables
7964 0 #_N_environ_obs
7965 0 # N sizefreq methods to read
7966
7967 0 # no tag data
7968
7969 0 # no morphcomp data
7970
7971 999

```

## 7972 Southern Model

```

7973 #V3.24u
7974 #C data file for China rockfish South of 4010
7975 # discard included as separate fleet
7976 #_observed data:
7977 1900 #_styr
7978 2014 #_endyr
7979 1 #_nseas
7980 12 #_months/season
7981 1 #_spawn_seas
7982 5 #_Nfleet
7983 4 #_Nsurveys
7984 1 #_N_areas
7985
7986 ## fleet names
7987 1_CA_SouthOf4010_Comm_Dead%2_CA_SouthOf4010_Comm_Live%3_CA_SouthOf4010_Rec_
7988 PC%4_CA_SouthOf4010_Rec_PR%5_CA_SouthOf4010_Comm_Discard%6_CA_SouthOf4010_R
7989 ec_PC_DWV_index%7_CA_SouthOf4010_Rec_PC_onboard_index%8_CA_SouthOf4010_CCFR
7990 P_comps_only%9_CA_SouthOf4010_Abrams_thesis_comps
7991 ## 1_CA_SouthOf4010_Comm_Dead
7992 ## 2_CA_SouthOf4010_Comm_Live
7993 ## 3_CA_SouthOf4010_Rec_PC
7994 ## 4_CA_SouthOf4010_Rec_PR

```

```

7995 ## 5_CA_SouthOf4010_Comm_Discard (THIS IS DEAD DISCARD)
7996 ## 6_CA_SouthOf4010_Rec_PC_DWV_index
7997 ## 7_CA_SouthOf4010_Rec_PC_onboard_index
7998 ## 8_CA_SouthOf4010_CCFRP_comps_only
7999 ## 9_CA_SouthOf4010_Abrams_thesis_comps

8000
8001 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 #_surveytiming_in_season -- mid-year, n
8002 # ot exactly like XDB-SRA
8003 1 1 1 1 1 1 1 1 #_area_assignments_for_each_fishery_and
8004 # _survey
8005 1 1 1 1 1 #_units of catch: 1=bio; 2=num
8006 0.1 0.1 0.1 0.1 0.1 #_se of log(catch) only used for init_eq_catch and fo
8007 # r Fmethod 2 and 3

8008
8009 2 #_Ngenders
8010 80 #_Nages
8011 0 0 0 0 0 #_init_equil_catch_for_each_fishery

8012
8013 115 #_N_lines_of_catch_to_read
8014 #_catch_biomass(mtons):_columns_are_fisheries,year,season
8015 #fleet1 fleet2 fleet3 fleet4 fleet5 Year Season # total catch
8016 0 0 0 0 1900 1 # 0
8017 0.383 0 0 0 0 1901 1 # 0.383
8018 0.766 0 0 0 0 1902 1 # 0.766
8019 1.149 0 0 0 0 1903 1 # 1.149
8020 1.532 0 0 0 0 1904 1 # 1.532
8021 1.915 0 0 0 0 1905 1 # 1.915
8022 2.299 0 0 0 0 1906 1 # 2.299
8023 2.682 0 0 0 0 1907 1 # 2.682
8024 3.065 0 0 0 0 1908 1 # 3.065
8025 3.448 0 0 0 0 1909 1 # 3.448
8026 3.831 0 0 0 0 1910 1 # 3.831
8027 4.214 0 0 0 0 1911 1 # 4.214
8028 4.597 0 0 0 0 1912 1 # 4.597
8029 4.98 0 0 0 0 1913 1 # 4.98
8030 5.363 0 0 0 0 1914 1 # 5.363
8031 5.746 0 0 0 0 1915 1 # 5.746
8032 6.129 0 0 0 0 1916 1 # 6.129
8033 9.522 0 0 0 0 1917 1 # 9.522
8034 11.133 0 0 0 0 1918 1 # 11.133
8035 7.741 0 0 0 0 1919 1 # 7.741
8036 7.895 0 0 0 0 1920 1 # 7.895

```

8037 6.519 0 0 0 0 1921 1 # 6.519  
8038 5.609 0 0 0 0 1922 1 # 5.609  
8039 6.066 0 0 0 0 1923 1 # 6.066  
8040 3.514 0 0 0 0 1924 1 # 3.514  
8041 4.388 0 0 0 0 1925 1 # 4.388  
8042 7.084 0 0 0 0 1926 1 # 7.084  
8043 6.016 0 0 0 0 1927 1 # 6.016  
8044 7.266 0 0.104 0.311 0 1928 1 # 7.681  
8045 6.015 0 0.208 0.623 0 1929 1 # 6.846  
8046 8.519 0 0.239 0.716 0 1930 1 # 9.474  
8047 3.626 0 0.318 0.955 0 1931 1 # 4.899  
8048 9.266 0 0.398 1.193 0 1932 1 # 10.857  
8049 3.33 0 0.477 1.432 0 1933 1 # 5.239  
8050 7.089 0 0.557 1.67 0 1934 1 # 9.316  
8051 6.309 0 0.636 1.909 0 1935 1 # 8.854  
8052 6.221 0 0.716 2.147 0 1936 1 # 9.084  
8053 5.599 0 0.849 2.546 0 1937 1 # 8.994  
8054 3.261 0 0.835 2.504 0 1938 1 # 6.6  
8055 0.723 0 0.73 2.19 0 1939 1 # 3.643  
8056 0.298 0 1.05 3.149 0 1940 1 # 4.497  
8057 0.849 0 0.97 2.911 0 1941 1 # 4.73  
8058 0.519 0 0.516 1.547 0 1942 1 # 2.582  
8059 1.745 0 0.493 1.479 0 1943 1 # 3.717  
8060 0.49 0 0.405 1.214 0 1944 1 # 2.109  
8061 0.553 0 0.54 1.619 0 1945 1 # 2.712  
8062 1.449 0 0.929 2.786 0 1946 1 # 5.164  
8063 1.484 0 0.738 2.215 0 1947 1 # 4.437  
8064 3.253 0 1.475 4.426 0 1948 1 # 9.154  
8065 4.428 0 1.912 5.735 0 1949 1 # 12.075  
8066 1.807 0 2.33 6.989 0 1950 1 # 11.126  
8067 2.65 0 2.732 8.197 0 1951 1 # 13.579  
8068 2.419 0 2.383 7.149 0 1952 1 # 11.951  
8069 2.289 0 2.036 6.107 0 1953 1 # 10.432  
8070 0.746 0 2.553 7.658 0 1954 1 # 10.957  
8071 0.335 0 3.071 9.212 0 1955 1 # 12.618  
8072 0.192 0 3.433 10.299 0 1956 1 # 13.924  
8073 0.414 0 3.416 10.248 0 1957 1 # 14.078  
8074 0.24 0 5.617 16.85 0 1958 1 # 22.707  
8075 0.629 0 4.356 13.068 0 1959 1 # 18.053  
8076 0.475 0 3.633 10.9 0 1960 1 # 15.008  
8077 1.001 0 3.164 9.491 0 1961 1 # 13.656  
8078 0.375 0 2.976 8.928 0 1962 1 # 12.279

8079 0.806 0 3.722 11.167 0 1963 1 # 15.695  
8080 0.026 0 2.518 7.555 0 1964 1 # 10.099  
8081 0.18 0 4.126 12.377 0 1965 1 # 16.683  
8082 0.252 0 4.653 13.96 0 1966 1 # 18.865  
8083 0.124 0 6.034 18.101 0 1967 1 # 24.259  
8084 0.01 0 5.283 15.848 0 1968 1 # 21.141  
8085 1.569 0 4.494 13.483 0 1969 1 # 19.546  
8086 1.841 0 7.588 22.764 0 1970 1 # 32.193  
8087 1.261 0 5.572 16.716 0 1971 1 # 23.549  
8088 2.1 0 7.839 23.516 0 1972 1 # 33.455  
8089 3.419 0 8.674 26.021 0 1973 1 # 38.114  
8090 2.526 0 9.839 29.518 0 1974 1 # 41.883  
8091 2.719 0 9.507 28.52 0 1975 1 # 40.746  
8092 3.813 0 10.278 30.834 0 1976 1 # 44.925  
8093 3.074 0 9.3 27.899 0 1977 1 # 40.273  
8094 1.448 0 7.331 21.994 0 1978 1 # 30.773  
8095 7.95 0 8.341 25.023 0 1979 1 # 41.314  
8096 5.009 0 10.936 21.847 0 1980 1 # 37.792  
8097 0.762 0 4.755 10.989 0 1981 1 # 16.506  
8098 0.556 0 5.676 24.998 0 1982 1 # 31.23  
8099 1.664 0 5.103 10.824 0 1983 1 # 17.591  
8100 3.342 0 1.047 12.167 0 1984 1 # 16.556  
8101 1.087 0 3.279 23.873 0 1985 1 # 28.239  
8102 1.06 0 7.754 31.95 0 1986 1 # 40.764  
8103 3.364 0 18.353 34.123 0 1987 1 # 55.84  
8104 4.218 0 8.276 26.826 0 1988 1 # 39.32  
8105 6.006 0 9.546 22.426 0 1989 1 # 37.978  
8106 6.156 0 8.462 22.738 0 1990 1 # 37.356  
8107 11.51 0 7.566 23.488 0.183 1991 1 # 42.747  
8108 20.992 0 6.737 24.48 0.326 1992 1 # 52.535  
8109 14.868 0.168 5.782 25.017 0.432 1993 1 # 46.267  
8110 21.46 11.07 4.882 25.246 1.544 1994 1 # 64.202  
8111 14.94 9.14 3.981 20.01 1.587 1995 1 # 49.658  
8112 8.783 6.158 3.123 14.766 1.347 1996 1 # 34.177  
8113 23.311 6.504 3.6 3.544 1.711 1997 1 # 38.670  
8114 5.307 5.388 0.839 6.4 1.205 1998 1 # 19.139  
8115 2.34 3.797 2.971 11.709 1.474 1999 1 # 22.291  
8116 0.667 2.288 5.638 11.244 1.918 2000 1 # 21.755  
8117 0.77 2.436 6.506 9.19 2.163 2001 1 # 21.065  
8118 0.677 2.106 5.144 9.996 1.754 2002 1 # 19.677  
8119 0.269 0.719 4.402 12.124 1.239 2003 1 # 18.753  
8120 0.567 1.41 3.717 4.086 0.351 2004 1 # 10.131

```

8121 0.71 1.624 8.485 4.901 0.647 2005 1 # 16.367
8122 0.526 1.49 4.859 5.863 0.478 2006 1 # 13.216
8123 0.73 1.471 4.399 6.79 0.608 2007 1 # 13.998
8124 0.771 1.57 5.236 7.58 0.810 2008 1 # 15.967
8125 0.437 1.538 7.033 11.139 0.956 2009 1 # 21.103
8126 0.761 1.053 7.813 9.134 1.684 2010 1 # 20.445
8127 0.434 1.117 7.461 6.611 1.383 2011 1 # 17.006
8128 0.709 0.669 6.149 6.258 1.815 2012 1 # 15.600
8129 0.379 0.831 4.528 4.273 1.275 2013 1 # 11.286
8130 0.251 1.334 4.336 5.249 1.275 2014 1 # 12.445
8131 #
8132 45 #_N_cpue_and_surveyabundance_observations
8133 #_Units: 0=numbers; 1=biomass; 2=F
8134 #_Errtype: -1=normal; 0=lognormal; >0=T
8135 #_Fleet Units Errtype
8136 1      0      0 # 1_CA_SouthOf4010_Comm_Dead
8137 2      0      0 # 2_CA_SouthOf4010_Comm_Live
8138 3      0      0 # 3_CA_SouthOf4010_Rec_PC
8139 4      0      0 # 4_CA_SouthOf4010_Rec_PR
8140 5      0      0 # 5_CA_SouthOf4010_Comm_Discard
8141 6      0      0 # 6_CA_SouthOf4010_Rec_PC_DWV_index
8142 7      0      0 # 7_CA_SouthOf4010_Rec_PC_onboard_index
8143 8      0      0 # 8_CA_SouthOf4010_CCFRP_comps_only
8144 9      0      0 # 9_CA_SouthOf4010_Abrams_thesis_comps
8145
8146 ### assigned to fleet "3_CA_SouthOf4010_Rec_PC"
8147 ### CA MRFSS dockside index, south of 4010
8148 #_year seas index obs err
8149 1980 1 3 0.060 0.260 # CA MRFSS dockside South of 4010
8150 1981 1 3 0.048 0.389 # CA MRFSS dockside South of 4010
8151 1982 1 3 0.079 0.320 # CA MRFSS dockside South of 4010
8152 1983 1 3 0.087 0.307 # CA MRFSS dockside South of 4010
8153 1984 1 3 0.050 0.299 # CA MRFSS dockside South of 4010
8154 1985 1 3 0.060 0.245 # CA MRFSS dockside South of 4010
8155 1986 1 3 0.078 0.180 # CA MRFSS dockside South of 4010
8156 1987 1 3 0.128 0.245 # CA MRFSS dockside South of 4010
8157 1988 1 3 0.116 0.282 # CA MRFSS dockside South of 4010
8158 1989 1 3 0.071 0.274 # CA MRFSS dockside South of 4010
8159 1995 1 3 0.088 0.213 # CA MRFSS dockside South of 4010
8160 1996 1 3 0.038 0.137 # CA MRFSS dockside South of 4010
8161 1998 1 3 0.035 0.271 # CA MRFSS dockside South of 4010
8162 1999 1 3 0.025 0.184 # CA MRFSS dockside South of 4010

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```

8163 2000 1 3 0.037 0.350 # CA MRFSS dockside South of 4010
8164 2001 1 3 0.060 0.296 # CA MRFSS dockside South of 4010
8165 2002 1 3 0.062 0.289 # CA MRFSS dockside South of 4010
8166 2003 1 3 0.049 0.403 # CA MRFSS dockside South of 4010
8167
8168 ### CA historic onboard - south of 4010
8169 ### assigning to survey: "6_CA_SouthOf4010_Rec_PC_DWV_index" due to overlap
8170 # in years with other indices
8171 #_year seas index obs err
8172 1988 1 6 0.089 0.126 #CA onboard historic south 4010
8173 1989 1 6 0.077 0.143 #CA onboard historic south 4010
8174 1990 1 6 0.139 0.222 #CA onboard historic south 4010
8175 1991 1 6 0.069 0.201 #CA onboard historic south 4010
8176 1992 1 6 0.042 0.150 #CA onboard historic south 4010
8177 1993 1 6 0.041 0.143 #CA onboard historic south 4010
8178 1994 1 6 0.051 0.135 #CA onboard historic south 4010
8179 1995 1 6 0.033 0.155 #CA onboard historic south 4010
8180 1996 1 6 0.038 0.121 #CA onboard historic south 4010
8181 1997 1 6 0.025 0.129 #CA onboard historic south 4010
8182 1998 1 6 0.021 0.161 #CA onboard historic south 4010
8183 1999 1 6 0.045 0.266 #CA onboard historic south 4010
8184
8185 ### CA current onboard - south of 4010
8186 ### assigning to survey: "7_CA_SouthOf4010_Rec_PC_onboard_index" due to ove
8187 # rlap in years with other indices
8188 #_year seas index obs err
8189 2000 1 7 0.0199 0.4302 #CA onboard current south 4010
8190 2001 1 7 0.0465 0.2381 #CA onboard current south 4010
8191 2002 1 7 0.0850 0.1685 #CA onboard current south 4010
8192 2003 1 7 0.0691 0.1209 #CA onboard current south 4010
8193 2004 1 7 0.0665 0.1336 #CA onboard current south 4010
8194 2005 1 7 0.0694 0.1406 #CA onboard current south 4010
8195 2006 1 7 0.0669 0.1328 #CA onboard current south 4010
8196 2007 1 7 0.0774 0.1268 #CA onboard current south 4010
8197 2008 1 7 0.0988 0.1124 #CA onboard current south 4010
8198 2009 1 7 0.1266 0.1090 #CA onboard current south 4010
8199 2010 1 7 0.0964 0.1115 #CA onboard current south 4010
8200 2011 1 7 0.0925 0.0992 #CA onboard current south 4010
8201 2012 1 7 0.0653 0.1322 #CA onboard current south 4010
8202 2013 1 7 0.0457 0.1497 #CA onboard current south 4010
8203 2014 1 7 0.0464 0.1495 #CA onboard current south 4010
8204

```

```

8205 0 #_N_fleets_with_discard
8206 #Fleet units err_type
8207 #2 1 0
8208 0 #N discard obs (TOTAL DISCARD -- DEAD+SURVIVING)
8209 #_year seas fleet obs(mt) err # fraction average:
8210 #2004 1 2 0.6147 0.505781 # 15.2% 33.9%
8211 #2005 1 2 1.4013 0.509880 # 21.6%
8212 #2006 1 2 0.8719 0.475889 # 19.1%
8213 #2007 1 2 1.0594 0.190865 # 21.6%
8214 #2008 1 2 1.3497 0.767199 # 26.2%
8215 #2009 1 2 1.7689 0.643454 # 32.7%
8216 #2010 1 2 2.6821 0.692105 # 48.3%
8217 #2011 1 2 2.9231 0.445517 # 47.2%
8218 #2012 1 2 2.7292 0.816548 # 55.8%
8219 #2013 1 2 1.6141 0.528085 # 51.5%
8220 #
8221 0 #_N_meanbodywt_obs
8222 30 #_DF_for_meanbodywt_T-distribution_like
8223
8224 2 # length bin method: 1=use databins; 2=generate from binwidth,min,max be
8225 # low; 3=read vector
8226 2 # binwidth for population size comp
8227 8 # minimum size in the population (lower edge of first bin and size at ag
8228 # e 0.00)
8229 50 # maximum size in the population (lower edge of last bin)
8230
8231 -0.0001 #_comp_tail_compression
8232 1e-003 #_add_to_comp
8233 0 #_combine males into females at or below this bin number
8234 15 #_N_LengthBins
8235 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
8236
8237 120 #_N_Length_obs
8238
8239 ### CA commercial landings, dead fish, south of 40-10
8240 ### assigned to fleet: "1_CA_SouthOf4010_Comm_Dead"
8241 ### Nsamp = number of clusters; dropped 1998 & 2006 (outliers); 1999 (borro
8242 # wed size comp from adjacent port)
8243 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8244 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+
8245 1992 1 1 0 2 26 0 6 886 381 765 4052 9331 5421 2889 1253 278 0 0 0 54 0 6 8
8246 86 381 765 4052 9331 5421 2889 1253 278 0 0 0 54

```

```

8247 1993 1 1 0 2 22 0 0 270 1521 2870 1482 2115 408 940 119 244 105 13 0 0 0 0
8248 270 1521 2870 1482 2115 408 940 119 244 105 13 0 0
8249 1994 1 1 0 2 54 57 263 695 1898 6424 6550 6693 2431 759 769 168 117 0 0 0 5
8250 7 263 695 1898 6424 6550 6693 2431 759 769 168 117 0 0 0
8251 1995 1 1 0 2 10 0 429 429 839 3844 5553 2608 2365 287 429 0 0 0 0 0 429 4
8252 29 839 3844 5553 2608 2365 287 429 0 0 0 0 0
8253 1996 1 1 0 2 16 4 0 150 164 1007 1383 1166 253 508 253 253 0 0 0 0 4 0 150
8254 164 1007 1383 1166 253 508 253 253 0 0 0 0
8255 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
8256 49 4200 5238 4028 1966 146 0 0 0 0 0
8257 -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
8258 68 68 0 0 0 0 0 0 0 0
8259 -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
8260 118 59 0 0 0 0 0
8261 -2006 1 1 0 2 1 0 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
8262 36
8263
8264 ### CA commercial RETAINED CATCH, live fish, south of 40-10
8265 ### assigned to fleet: "2_CA_SouthOf4010_Comm_Live"
8266 ### Nsamp = number of clusters
8267 ### Partition = 2 (retained catch)
8268 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8269 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+
8270 1997 1 2 0 2 11 0 0 0 80 240 890 1140 600 220 310 0 80 0 0 0 0 0 0 0 80 240 8
8271 90 1140 600 220 310 0 80 0 0 0
8272 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 0 72 216
8273 1152 1008 576 360 72 0 0 0 0
8274 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
8275 9 345 140 84 0 0 0 0
8276 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
8277 844 322 192 32 32 0 0 0
8278 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
8279 16 96 64 0 0 64 0
8280 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
8281 0 0 0 0 0
8282 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
8283 497 79 0 0 0 0
8284 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
8285 0 0 0 0 0 0
8286 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 50 1
8287 949 4331 2432 1216 0 0 0 0 448
8288 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 0 571 643 3

```

```

8289 09 126 0 0 0 0 0
8290 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 0 0 0 63 336 588
8291 420 0 0 0 0 0
8292 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 0 0 0 6 26 329
8293 862 1413 237 100 0 0 0 0
8294 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 0 0 0 91 390 429
8295 182 0 0 0 0 0
8296 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 0 0 8 104 16 8 0 0 0
8297 0 0 0
8298 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 0 0 72 24 0 0 0 0 0
8299 0 0

8300
8301 ### CA commercial DISCARDED CATCH TREATED AS FISHERY, live+dead fish fisher
8302 # ies, south of 40-10
8303 ### assigned to fleet: "5_CA_SouthOf4010_Comm_Discard"
8304 ### WCGOP Discards south of 40-10 (discards north of 40-10 too small to mod
8305 # el with length comps)
8306 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8307 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+ repeat m20 m22 m24 m26 m28 m30 m32 m3
8308 # 4 m36 m38 m40 m42 m44 m46
8309 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
8310 0 0
8311 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
8312 2006 1 5 0 2 16 0 0 1 5 4 10 5 0 0 0 0 0 0 0 0 0 0 1 5 4 10 5 0 0 0 0 0 0 0
8313 0
8314 2007 1 5 0 2 14 0 1 1 2 6 11 6 1 0 0 0 0 0 0 0 0 0 1 1 2 6 11 6 1 0 0 0 0 0 0
8315 0
8316 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
8317 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
8318 0 0 0
8319 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
8320 0 0 0 0 0
8321 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
8322 0 0 0 0 0 0
8323 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
8324 0 0 0 0 0 0 0
8325 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
8326 0 0

8327
8328 ### CA rec landings, PC mode, south of 40-10 (combines Miller+Gotshall 1960
8329 # , CA rec sampling 1978-1984, and MRFSS sampling 1980-2003)
8330 ### assigned to fleet: "3_CA_SouthOf4010_Rec_PC"

```

	#Yr	Seas	Flt/Svy	Gender	Part	Nsamp	18cm	20cm	22cm	24cm	26cm	28cm	30cm	32cm																							
8331																																					
8332	#	34cm	36cm	38cm	40cm	42cm	44cm	46cm+																													
8333	1960	1	-3	0	2	85	0	0	0	0	3	4	10	11	19	24	9	4	0	1	0	0	0	0	3	4	10	11	19	2							
8334		4	9	4	0	1																															
8335	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	
8336	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	
8337	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					
8338						3	0	0	0																												
8339	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	
8340	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	
8341	1983	1	3	0	2	34	0	0	0	0	1	5	9	9	2	5	3	0	0	0	0	0	0	0	0	1	5	9	9	2	5	3	0	0	0	0	
8342	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	
8343	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	
8344	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					
8345						1	0	0	0																												
8346	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				
8347						0	0	0																													
8348	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	
8349	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				
8350						0	0	0																													
8351	1993	1	3	0	2	5	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0
8352	1994	1	3	0	2	6	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0
8353	1995	1	3	0	2	39	0	1	2	0	11	12	7	3	3	0	0	0	0	0	0	0	0	0	1	2	0	11	12	7	3	3	0	0	0	0	
8354						0	0	0																													
8355	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	0	0		
8356						0	0	0																													
8357	1998	1	3	0	2	20	0	0	0	3	4	8	2	0	0	0	2	0	1	0	0	0	0	3	4	8	2	0	0	0	2	0	1	0	0	0	
8358	1999	1	3	0	2	81	0	3	3	2	13	24	20	8	3	3	2	0	0	0	0	3	3	2	13	24	20	8	3	3	2	0					
8359						0	0	0																													
8360	2000	1	3	0	2	39	0	0	1	3	9	10	8	5	2	0	0	1	0	0	0	0	1	3	9	10	8	5	2	0	0	1	0	0	0		
8361						0																															
8362	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						
8363						0	0	0	0																												
8364	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							
8365						4	1	0	0	0	2																										
8366	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							
8367						3	4	2	0	0	0	1																									
8368	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							
8369						2	3	0	0	1	0	0																									
8370	2005	1	3	0	2	169	0	1	6	8	23	42	48	32	8	1	0	0	0	0	0	1	6	8	23	42	48	32	8	1							
8371						0	0	0	0	0																											
8372	2006	1	3	0	2	156	0	1	2	14	23	41	43	25	4	3	0	0	0	0	0	1	2	14	23	41	43	25	4								

```

8373 3 0 0 0 0 0
8374 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
8375 20 8 3 1 0 1 1
8376 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
8377 8 7 3 0 0 0 0
8378 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
8379 17 64 28 16 5 2 0 0 0
8380 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
8381 9 65 32 3 4 0 0 0 0
8382 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
8383 60 62 38 13 3 1 0 0 0
8384 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
8385 0 73 27 16 10 1 0 0 0
8386 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
8387 29 10 4 6 0 0 0
8388 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
8389 9 6 1 1 0 0

8390
8391 ### CA rec landings, PR mode, south of 40-10 (includes Miller and Gotshall,
8392 # MRFSS)
8393 ### assigned to fleet: "4_CA_SouthOf4010_Rec_PR"
8394 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8395 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+ repeat
8396 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
8397 5 0 0 0
8398 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
8399 0 0 0
8400 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
8401 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
8402 1 1 1
8403 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
8404 0
8405 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
8406 0 0
8407 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
8408 5 4 2 0 0
8409 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
8410 11 6 0 0 0
8411 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
8412 0 0
8413 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
8414 0 0 0

```

8415 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  
 8416 0  
 8417 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  
 8418 3 3 1 0 0 0  
 8419 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  
 8420 8 4 0 2 0 0  
 8421 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  
 8422 0 0  
 8423 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  
 8424 2 0 0 0 0  
 8425 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  
 8426 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  
 8427 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  
 8428 1 0  
 8429 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  
 8430 0  
 8431 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  
 8432 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  
 8433 0  
 8434 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  
 8435 0 0 0  
 8436 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  
 8437 10 7 2 1 1 0  
 8438 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  
 8439 2 107 45 10 7 0 1 1 0  
 8440 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  
 8441 8 160 67 27 9 2 0 1 1  
 8442 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  
 8443 168 157 79 18 7 1 1 0 0  
 8444 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  
 8445 196 252 188 115 33 16 2 0 0 0  
 8446 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  
 8447 38 257 217 90 29 4 1 0 0 0  
 8448 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  
 8449 80 220 134 52 15 10 2 1 0 0  
 8450 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  
 8451 5 220 108 66 18 6 0 0 1 0  
 8452 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  
 8453 75 33 15 8 3 0 0 2  
 8454 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  
 8455 7 61 19 9 1 0 0 0  
 8456 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

```

8457 47 14 6 1 2 0 0
8458
8459 ### CA Rec onboard observer DWV; south of 40-10
8460 ### dropped 1987 (Monterey only)
8461 ### assigned to survey: "6_CA_SouthOf4010_Rec_PC_DWV_index"
8462 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24c
8463 # m 26cm 28cm 30cm 32cm 34cm 36cm 38cm 40cm 42cm
8464 # 44cm 46cm+ repeat
8465 -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
8466 0
8467 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
8468 09 49 25 10 7 6 0 0 0
8469 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
8470 3 20 18 9 3 0 0 0
8471 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
8472 1 0 0 0
8473 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
8474 0 0 0 0 0
8475 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
8476 1 1 0 0 0 0
8477 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
8478 2 0 1 0 1 0 0
8479 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
8480 8 2 0 0 0 0
8481 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
8482 4 2 2 0 0 0 0
8483 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
8484 10 3 1 0 0 0 0
8485 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
8486 6 3 0 0 0 0
8487 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
8488 1 1 1 0 0
8489
8490 ### CCFRP Fishery-Independent Survey Comps, Central CA only (Point Buchon t
8491 # o Ano Nuevo); all south of 40-10
8492 ### assigned to survey: "8_CA_SouthOf4010_CCFRP_comps_only"
8493 #Yr Seas Flt/Svy Gender Part Nsamp 18cm 20cm 22cm 24cm 26cm 28cm 30cm 32cm
8494 # 34cm 36cm 38cm 40cm 42cm 44cm 46cm+ repeat
8495 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
8496 0 0 0 0
8497 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
8498 0 0 0 0 0

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8499 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
8500 0 0 0 0
8501 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
8502 0 1 0 0 0 0
8503 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
8504 0 0
8505 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
8506 0 0 0 0
8507 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
8508 0 0
8509
8510 47 #_N_age_bins
8511 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
8512 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
8513 2 #_N_ageerror_definitions
8514 # Default ageing error matrix (1st row is expected age, 2nd is standard dev
8515 # iation of age readings)
8516 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
8517 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
8518 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
8519 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
8520 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
8521 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
8522 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
8523 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
8524 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
8525 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
8526 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5
8527 10.5 11.5 12.5 13.5 14.5 15.5 16.5 17.5 18.5
8528 19.5 20.5 21.5 22.5 23.5 24.5 25.5 26.5 27.5 2
8529 8.5 29.5 30.5 31.5 32.5 33.5 34.5 35.5 36.5 37.5
8530 38.5 39.5 40.5 41.5 42.5 43.5 44.5 45.5 46.5
8531 47.5 48.5 49.5 50.5 51.5 52.5 53.5 54.5 55.5 56
8532 .5 57.5 58.5 59.5 60.5 61.5 62.5 63.5 64.5 65.5
8533 66.5 67.5 68.5 69.5 70.5 71.5 72.5 73.5 74.5
8534 75.5 76.5 77.5 78.5 79.5 80.5 ### 81.5 82.5 83.
8535 # 5 84.5 85.5 86.5 87.5 88.5 89.5 90.5 #Expected_ag
8536 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
8537 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
8538 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
8539 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
8540 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524

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```

8541 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
8542 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
8543 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
8544 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
8545 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD

8546
8547
8548
8549
8550
8551
8552
8553
8554 #####
8555 # Ageing error for ages associated with early years from former NWFSC age reader
8556 # (1st row is expected age, 2nd is standard deviation of age readings
8557 # )
8558 #
8559 #
8560 #
8561 #
8562 #
8563 #
8564 # Age 0 Age 1 Age 2 Age 3 Age 4 Age 5 Age 6 Age 7 Age 8 Age
8565 # 9 Age 10 Age 11 Age 12 Age 13 Age 14 Age 15 Age 16 Age 17 Age
8566 # 18 Age 19 Age 20 Age 21 Age 22 Age 23 Age 24 Age 25 Age 26 Age 2
8567 # 7 Age 28 Age 29 Age 30 Age 31 Age 32 Age 33 Age 34 Age 35 Age 36
8568 # Age 37 Age 38 Age 39 Age 40 Age 41 Age 42 Age 43 Age 44 Age 45
8569 # Age 46 Age 47 Age 48 Age 49 Age 50 Age 51 Age 52 Age 53 Age 54
8570 # Age 55 Age 56 Age 57 Age 58 Age 59 Age 60 Age 61 Age 62 Age 63 A
8571 # ge 64 Age 65 Age 66 Age 67 Age 68 Age 69 Age 70 Age 71 Age 72 Ag
8572 # e 73 Age 74 Age 75 Age 76 Age 77 Age 78 Age 79 Age 80 ### Age 81
8573 # Age 82 Age 83 Age 84 Age 85 Age 86 Age 87 Age 88 Age 89 Age
8574 0.43 1.29 2.16 3.02 3.88 4.75 5.61 6.47 7.33 8.2
8575 0 9.06 9.92 10.79 11.65 12.51 13.37 14.24 15.10 15.96
8576 16.83 17.69 18.55 19.41 20.28 21.14 22.00 22.86 23.73 2
8577 4.59 25.45 26.32 27.18 28.04 28.90 29.77 30.63 31.49 32.3
8578 6 33.22 34.08 34.94 35.81 36.67 37.53 38.40 39.26 40.12
8579 40.98 41.85 42.71 43.57 44.44 45.30 46.16 47.02 47.89 48
8580 .75 49.61 50.47 51.34 52.20 53.06 53.93 54.79 55.65 56.51
8581 57.38 58.24 59.10 59.97 60.83 61.69 62.55 63.42 64.28
8582 65.14 66.01 66.87 67.73 68.59 69.46 ### 70.32 71.18 72.

```

```

8583 # 05 72.91 73.77 74.63 75.50 76.36 77.22 78.09 #Expected_ag
8584 0.0968 0.0968 0.1936 0.2904 0.3872 0.4840 0.5807 0.6775 0.7743 0.8
8585 711 0.9679 1.0647 1.1615 1.2583 1.3551 1.4519 1.5487 1.6455 1.7422
8586 1.8390 1.9358 2.0326 2.1294 2.2262 2.3230 2.4198 2.5166 2.6134 2
8587 .7102 2.8070 2.9037 3.0005 3.0973 3.1941 3.2909 3.3877 3.4845 3.58
8588 13 3.6781 3.7749 3.8717 3.9684 4.0652 4.1620 4.2588 4.3556 4.4524
8589 4.5492 4.6460 4.7428 4.8396 4.9364 5.0332 5.1299 5.2267 5.3235 5.
8590 4203 5.5171 5.6139 5.7107 5.8075 5.9043 6.0011 6.0979 6.1946 6.291
8591 4 6.3882 6.4850 6.5818 6.6786 6.7754 6.8722 6.9690 7.0658 7.1626
8592 7.2594 7.3561 7.4529 7.5497 7.6465 7.7433 ### 7.8401 7.9369 8.0
8593 # 337 8.1305 8.2273 8.3241 8.4209 8.5176 8.6144 8.7112 #SD
8594
8595 41 #_N_Agecomp_obs
8596 3 #_Lbin_method: 1=poplenbins; 2=datalenbins; 3=lengths
8597 0 #_combine males into females at or below this bin number
8598
8599 ### Combined: "CA, Rec CPFV south 4010 (1977-1986)" plus "California Rec CP
8600 # FV samples, 1980-84, south of 4010"
8601 ### assigned to fleet: "8_CA_SouthOf4010_Abrams_thesis_comps"
8602 # year season fleet gender part ageErr LbinLo LbinHi Nsamps A4 A5 A6 A7 A8
8603 # A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25 A26 A2
8604 # 7 A28 A29 A30 A31 A32 A33 A34 A35 A36 A37 A38 A39 A40 A41 A42 A43 A44 A45
8605 # A46 A47 A48 A49 A50 repeat
8606 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
8607 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
8608 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
8609 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
8610 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
8611 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
8612 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
8613 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
8614 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
8615 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
8616 0 0 0 0 0 0 0 1 1 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
8617 1 0 0 0 0 0 0 0 0 0 0 0 0 0 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 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
8619 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 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 0 0 0 0 0 0 0 0 0 0 0 0
8621 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
8622 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 3 0 0 1 0 1 1 0 0 3 2 1 0 0 0 0
8623 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 1
8624 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

```









## 8776 Appendix B. SS control file

### 8777 Northern Model

```
8778 #V3.24u
8779 #C China rockfish control file for north model (WA only)
8780 1 #_N_Growth_Patterns
8781 1 #_N_Morphs_Within_GrowthPattern
8782 ## 2 # Number of recruitment assignments
8783 ## 0 # Recruitment interaction requested?
8784 ## 1 1 1 # Recruitment assignment to GP 1, seas 1, area 1
8785 ## 1 1 2 # Recruitment assignment to GP 1, seas 1, area 2
8786 0 #_Nblock_Patterns
8787 #_Cond 0 #_blocks_per_pattern
8788 # begin and end years of blocks
8789 #
8790 ## 0 # N movement definitions
8791
8792 0.5      #_fracfemale
8793 0          #_natM_type:_0=1Parm; 1=N_breakpoints; _2=Lorenzen; _3=agespecific; _4
8794 # =agespec_withseasinterpolate
8795           #_no additional input for selected M option; read 1P per morph
8796 1          # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_s
8797 # peciific_K; 4=not implemented
8798 0          #_Growth_Age_for_L1
8799 30         #_Growth_Age_for_L2 (999 to use as Linf)
8800 0          #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
8801 0          #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
8802 # ; 4 logSD=F(A)
8803 1          #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-ma
8804 # turity matrix by growth_pattern; 4=read age-fecundity; 5=read fec and wt
8805 # from wtatage.ss
8806 #0          0          0          0          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 #          1          1          1          1          1          1          1          1          1          1          1
8814 #          1          1          1          1          1          1          1          1          1          1          1
8815 #_placeholder for empirical age-maturity by growth pattern
```

```

8816 1      #_First_Mature_Age
8817 1      #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
8818 # ; (4)eggs=a+b*L; (5)eggs=a+b*W
8819 0      #_hermaphroditism option: 0=none; 1=age-specific fxn
8820 2      #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from f
8821 # emale-GP1, 3=like SS2 V1.x)
8822 2      #_env/block/dev_adjust_method (1=standard; 2=logistic transform kee
8823 # ps in base parm bounds; 3=standard w/ no bound check)
8824 #
8825 #_growth_parms
8826 #_LO    HI     INIT    PRIOR   PR_type SD    PHASE env-var use_dev dev_miny
8827 # r dev_maxyr dev_SD Block Block_Fxn
8828 # female growth
8829 0.01   0.15   0.07   -2.94   3     0.53   -3     0     0     0
8830 0       0       0       0       0     #       NatM_p_1_Fem_GP_1 (with prior
8831 # from Owen)
8832 #0.01   0.15   0.06   0.06   -1     0.8    3     0     0     0
8833 #       0       0       0       0     #       NatM_p_1_Fem_GP_1 - no prio
8834 # r
8835 -10    45     2       2       0     10    -2     0     0     0
8836 0       0       0       0       0     #       L_at_Amin_Fem_GP_1
8837 20    50     34     34     0     10    6     0     0     0
8838 0       0       0       0       0     #       L_at_Amax_Fem_GP_1
8839 0.01   0.3    0.1    0.1    0     0.8    6     0     0     0
8840 0       0       0       0       0     #       VonBert_K_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_young_Fem_GP_1
8843 0.01   0.25   0.1    0.1    -1    0.8    6     0     0     0
8844 0       0       0       0       0     #       CV_old_Fem_GP_1
8845 ### male growth with absolute offsets = 0 (effectively single gender model)
8846 -1    0.15   0     0.053   -1    0.8    -3     0     0     0
8847 0       0       0       0       0     #       NatM_p_1_Mal_GP_1
8848 -1    45     0       2       0     10    -2     0     0     0
8849 0       0       0       0       0     #       L_at_Amin_Mal_GP_1
8850 -1    50     0     33.13   0     10    -4     0     0     0
8851 0       0       0       0       0     #       L_at_Amax_Mal_GP_1
8852 -1    0.3    0     0.2461   0     0.8    -4     0     0     0
8853 0       0       0       0       0     #       VonBert_K_Mal_GP_1
8854 -1    0.25   0     0.1    -1    0.8    -3     0     0     0
8855 0       0       0       0       0     #       CV_young_Mal_GP_1
8856 -1    0.25   0     0.1    -1    0.8    -3     0     0     0
8857 0       0       0       0       0     #       CV_old_Mal_GP_1

```

```

8858 # female weight-length, maturity, and fecundity
8859 0      1      1.17E-5 1.17E-5 -1      0.8      -3      0      0      0
8860      0      0      0      0      #      Wtlen_1_Fem # converted to (cm
8861 # ,kg) from Lea et al. 1999
8862 2      4      3.177   3      -1      0.8      -3      0      0      0
8863      0      0      0      0      #      Wtlen_2_Fem # from Lea et al.
8864 # 1999
8865 1      100     28.5    28.5    -1      0.8      -3      0      0      0
8866      0      0      0      0      #      Mat50%_Fem
8867 -9      9      -1.0    0      -1      0.8      -3      0      0      0
8868      0      0      0      0      #      Mat_slope_Fem
8869 -3 3 0.196 1 -1 0.8 -3 0 0 0 0 0 0 0 0 #      Eggs/kg_inter_Fem
8870 -3 3 0.0571 0 -1 0.8 -3 0 0 0 0 0 0 0 0 #      Eggs/kg_slope_wt_Fem
8871 ### male W-L with absolute offsets = 0 (effectively single gender model)
8872 0      1      1.17E-5 1.17E-5 -1      0.8      -3      0      0      0
8873      0      0      0      0      #      Wtlen_1_Mal # converted to (cm
8874 # ,kg) from Lea et al. 1999
8875 2      4      3.177   3      -1      0.8      -3      0      0      0
8876      0      0      0      0      #      Wtlen_2_Mal # from Lea et al.
8877 # 1999
8878
8879 0      0      0      0      -1      0      -4      0      0      0
8880      0      0      0      0      #      RecrDist_GP_1
8881 # non-spatial model uses following recruit distribution parameter
8882 0      0      0      0      -1      0      -4      0      0      0
8883      0      0      0      0      #      RecrDist_Area_1
8884 # spatial model uses next 2 lines for recruit distribution, only 1 estimate
8885 # d
8886 ## -4      4      0      1      -1      50      -1      0      0
8887 # 0      0      0      0      0      #      RecrDist_Area_1
8888 ## -4      4      0      1      -1      50      1      0      0
8889 # 0      0      0      0      0      #      RecrDist_Area_1
8890 0      0      0      0      -1      0      -4      0      0      0
8891      0      0      0      0      0      #      RecrDist_Seas_1
8892 0      0      0      0      -1      0      -4      0      0      0
8893      0      0      0      0      0      #      CohortGrowDev
8894 #
8895 #_Cond 0 #custom_MG-env_setup (0/1)
8896 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
8897 #
8898 #_Cond 0 #custom_MG-block_setup (0/1)
8899 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters

```

```

8900 #_Cond No MG parm trends
8901 #
8902 #_seasonal_effects_on_biology_parms
8903 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,m
8904 # alewtlen2,L1,K
8905 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
8906 #
8907 #_Cond -4 #_MGparm_Dev_Phase
8908 #
8909 #_Spawner-Recruitment
8910 3      #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop
8911 # ; 7=survival_3Parm
8912 #_LO    HI     INIT    PRIOR   PR_type SD      PHASE
8913 2       12     2.7      6        -1      10      1       #
8914 # )
8915 0.2     1      0.773    0.773    2       0.147    -3      #
8916 # p
8917 0       2      0.5      0.5      -1      0.8      -3      #
8918 -5      5      0.1      0        -1      1       -3      #
8919 -5      5      0        0        -1      1       -4      #
8920 # t
8921 0       0      0        0        -1      0       -99     #
8922 0 #_SR_env_link
8923 0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
8924 0 #do_recdev: 0=none; 1=devvector; 2=simple deviations
8925 1971 # first year of main recr_devs; early devs can preceed this era
8926 2001 # last year of main recr_devs; forecast devs start in following year
8927 -2 #_recdev phase
8928 1 # (0/1) to read 13 advanced options
8929 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start
8930 # )
8931 -4 #_recdev_early_phase
8932 -4 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxp
8933 # hase+1)
8934 1 #_lambda for Fcast_recr_like occurring before endyr+1
8935 1980 #_last_early_yr_nobias_adj_in_MP
8936 1985 #_first_yr_fullbias_adj_in_MP
8937 2001 #_last_yr_fullbias_adj_in_MP
8938 2015 #_first_recent_yr_nobias_adj_in_MP
8939 1 #_max_bias_adj_in_MP (-1 to override ramp and set biasadj=1.0 for all
8940 # estimated recdevs)
8941 0 #_period of cycles in recruitment (N parms read below)

```

```

8942 -5      #_min_rec_dev
8943 5       #_max_rec_dev
8944 0       #_read_recdevs
8945 #_end of advanced SR options
#
8947 #
8948 #Fishing Mortality info
8949 0.3 # F ballpark for tuning early phases
8950 -2001 # F ballpark year (neg value to disable)
8951 3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
8952 2.9 # max F or harvest rate, depends on F_Method
8953 # no additional F input needed for Fmethod 1
8954 # if Fmethod=2; read overall start F value; overall phase; N detailed input
8955 # s to read
8956 # if Fmethod=3; read N iterations for tuning for Fmethod 3
8957 5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
8958 #
8959 #_initial_F_parms (1 per catch fleet)
8960 #_LO HI INIT PRIOR PR_type SD PHASE
8961 0     1   0    0.01  -1      99 -1    # 1_WA_SouthernWA_Rec_PCPR
8962 0     1   0    0.01  -1      99 -1    # 2_WA_NorthernWA_Rec_PC
8963 0     1   0    0.01  -1      99 -1    # 3_WA_NorthernWA_Rec_PR
8964 #
8965 #_Q_setup
8966 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nob
8967 # iasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_ass
8968 # ign_to_parm
8969 #_for_env-var:_enter_index_of_the_env-var_to_be_linked
8970
8971 ### NOTE: initially turning off extra sd parameters
8972 ### until we sort out which fleets have indices
8973 ### (changed 3rd column below from 1 to 0)
8974
8975 #_Den-dep env-var extra_se Q_type
8976 0         0         0         1 # 1_WA_SouthernWA_Rec_PCPR
8977 0         0         0         1 # 2_WA_NorthernWA_Rec_PC
8978 0         0         1         1 # 3_WA_NorthernWA_Rec_PR
8979 #
8980 ## #_LO HI INIT PRIOR PR_type SD PHASE
8981 0     2   0.15  1      -1      99 2 # extra sd index for fleet 3
8982
8983 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet w

```

```

8984 # ith random q; 1=read a parm for each year of index
8985 #_Q_parms(if_any)
8986 # LO HI INIT PRIOR PR_type SD PHASE
8987 #
8988 #_size_selex_types
8989 #discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_
8990 # discarded_dead
8991 #_Pattern Discard Male Special
8992 24      0      0      0      # 1_WA_SouthernWA_Rec_PCPR
8993 24      0      0      0      # 2_WA_NorthernWA_Rec_PC (no comp, mirrored b
8994 # y Rec_PR)
8995 15      0      0      2      # 3_WA_NorthernWA_Rec_PR
8996 #
8997 #_age_selex_types
8998 #_Pattern ___ Male Special
8999 10      0      0      0      # 1_WA_SouthernWA_Rec_PCPR
9000 10      0      0      0      # 2_WA_NorthernWA_Rec_PC
9001 10      0      0      0      # 3_WA_NorthernWA_Rec_PR
9002
9003 # ALL DOUBLE-NORMALS, BUT FIXED AS ASYMPTOTIC
9004 #_LO    HI     INIT     PRIOR    PR_type SD      PHASE   env-var use_dev dev
9005 #_minyr    dev_maxyr    dev_SD  Block   Block_Fxn
9006 # Fleet 1 (1_WA_SouthernWA_Rec_PCPR)
9007 # Note: First parameter hitting upper bounds, fixed at peak of other fleet(
9008 # s)
9009 19      36      34.89    30      -1      50      -4      0      0      0
9010      0      0      0      0      0 # PEAK (fixed at estimated value of other f
9011 # leet)
9012 -9      5      -4      -4      -1      50      -9      0      0      0
9013      0      0      0      0      0 # TOP (logistic)
9014 0       9      3       4      -1      50      5       0      0      0
9015      0      0      0      0      0 # Asc WIDTH exp
9016 0       9      8       8      -1      50      -9      0      0      0
9017      0      0      0      0      0 # Desc WIDTH exp
9018 -9      9      -8      -5      -1      50      -9      0      0      0
9019      0      0      0      0      0 # INIT (logistic)
9020 -9      9      8       5      -1      50      -9      0      0      0
9021      0      0      0      0      0 # FINAL (logistic)
9022 # Fleets 2-3 (2_WA_NorthernWA_Rec_PC and 3_WA_NorthernWA_Rec_PR)
9023 19      36      34      30      -1      50      4       0      0      0
9024      0      0      0      0      0 # PEAK
9025 -9      5      -4      -4      -1      50      -9      0      0      0

```

```

9026      0      0      0      0      0 # TOP (logistic)
9027  0      9      3      4      -1      50      5      0      0      0
9028      0      0      0      0      0 # Asc WIDTH exp
9029  0      9      8      8      -1      50     -9      0      0      0
9030      0      0      0      0      0 # Desc WIDTH exp
9031  -9      9     -8     -5      -1      50     -9      0      0      0
9032      0      0      0      0      0 # INIT (logistic)
9033  -9      9      8      5      -1      50     -9      0      0      0
9034      0      0      0      0      0 # FINAL (logistic)
9035 #_Cond 0 #_custom_sel-env_setup (0/1)
9036 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
9037 #_Cond 0 #_custom_sel-blk_setup (0/1)
9038 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no block usage
9039 #_Cond No selex parm trends
9040 #_Cond -4 # placeholder for selparm_Dev_Phase
9041 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to kee
9042 # p in base parm bounds; 3=standard w/ no bound check)
9043 #
9044 # Tag loss and Tag reporting parameters go next
9045 0 # TG_custom: 0=no read; 1=read if tags exist
9046 #_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 #_placeholder if no parameters
9047 #
9048 1 #_Variance_adjustments_to_input_values
9049 #_fleet: 1 2 3
9050 #F1    F2    F3
9051  0      0      0      #_add_to_survey_CV
9052  0      0      0      #_add_to_discard_stddev
9053  0      0      0      #_add_to_bodywt_CV
9054  0.189  1      0.089 #_mult_by_lencomp_N
9055  1      1      0.2428 #_mult_by_agecomp_N
9056  1      1      1      #_mult_by_size-at-age_N
9057 #
9058 4 #_maxlambdaphase
9059 1 #_sd_offset
9060 #
9061 0 # number of changes to make to default Lambdas (default value is 1.0)
9062 # Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=s
9063 # izeage; 8=catch;
9064 # 9=init_equCatch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14
9065 # =Morphcomp; 15=Tag-comp; 16=Tag-negbin
9066 #like_comp fleet/survey phase value sizefreq_method
9067 # 1 2 2 1 1

```

```

9068 # 4 2 2 1 1
9069 # 4 2 3 1 1
9070 #
9071 # lambdas (for info only; columns are phases)
9072 # 0 0 0 0 #_CPUE/survey:_1
9073 # 1 1 1 1 #_CPUE/survey:_2
9074 # 1 1 1 1 #_CPUE/survey:_3
9075 # 1 1 1 1 #_lencomp:_1
9076 # 1 1 1 1 #_lencomp:_2
9077 # 0 0 0 0 #_lencomp:_3
9078 # 1 1 1 1 #_agecomp:_1
9079 # 1 1 1 1 #_agecomp:_2
9080 # 0 0 0 0 #_agecomp:_3
9081 # 1 1 1 1 #_size-age:_1
9082 # 1 1 1 1 #_size-age:_2
9083 # 0 0 0 0 #_size-age:_3
9084 # 1 1 1 1 #_init_equ_catch
9085 # 1 1 1 1 #_recruitments
9086 # 1 1 1 1 #_parameter-priors
9087 # 1 1 1 1 #_parameter-dev-vectors
9088 # 1 1 1 1 #_crashPenLambda
9089 0 # (0/1) read specs for more stddev reporting
9090 # 1 1 -1 5 1 5 1 -1 5 # selex type, len/age, year, N selex bins, Growth pat
9091 # tern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
9092 # 5 15 25 35 43 # vector with selex std bin picks (-1 in first bin to self-
9093 # generate)
9094 # 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-
9095 # generate)
9096 # 1 2 14 26 40 # vector with NatAge std bin picks (-1 in first bin to self-
9097 # generate)
9098 999

```

## 9099 Central Model

```

9100 #V3.24u
9101 #C China rockfish control file for central model (40-10 to OR/WA border)
9102 1 #_N_Growth_Patterns
9103 1 #_N_Morphs_Within_GrowthPattern
9104 ## 2 # Number of recruitment assignments
9105 ## 0 # Recruitment interaction requested?
9106 ## 1 1 1 # Recruitment assignment to GP 1, seas 1, area 1
9107 ## 1 1 2 # Recruitment assignment to GP 1, seas 1, area 2

```

```

9108 0 #_Nblock_Patterns
9109 #_Cond 0 #_blocks_per_pattern
9110 # begin and end years of blocks
9111 #
9112 ## 0 # N movement definitions
9113
9114 0.5      #_fracfemale
9115 0          #_natM_type:_0=1Parm; 1=N_breakpoints; _2=Lorenzen; _3=agespecific; _4
9116 # =agespec_withseasinterpolate
9117         #_no additional input for selected M option; read 1P per morph
9118 1          # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_s
9119 # peciific_K; 4=not implemented
9120 0          #_Growth_Age_for_L1
9121 30         #_Growth_Age_for_L2 (999 to use as Linf)
9122 0          #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
9123 0          #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
9124 # ; 4 logSD=F(A)
9125 1          #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-ma
9126 # turity matrix by growth_pattern; 4=read age-fecundity; 5=read fec and wt
9127 # from wtatage.ss
9128 #0          0          0          0          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 #           1          1          1          1          1          1          1          1          1          1          1
9136 #           1          1          1          1          1          1          1          1          1          1          1
9137 #_placeholder for empirical age-maturity by growth pattern
9138 1          #_First_Mature_Age
9139 1          #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
9140 # ; (4)eggs=a+b*L; (5)eggs=a+b*W
9141 0          #_hermaphroditism option: 0=none; 1=age-specific fxn
9142 2          #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from f
9143 # emale-GP1, 3=like SS2 V1.x)
9144 2          #_env/block/dev_adjust_method (1=standard; 2=logistic transform kee
9145 # ps in base parm bounds; 3=standard w/ no bound check)
9146 #
9147 #_growth_parms
9148 #_LO      HI      INIT      PRIOR     PR_type SD      PHASE env-var use_dev dev_miny
9149 # r dev_maxyr dev_SD Block Block_Fxn

```

```

9150 # female growth
9151 0.01 0.15 0.07 -2.94 3 0.53 -3 0 0 0
9152 0 0 0 0 0 # NatM_p_1_Fem_GP_1 (with prior
9153 # from Owen)
9154 #0.01 0.15 0.053 -2.94 3 0.53 -3 0 0
9155 # 0 0 0 0 0 # NatM_p_1_Fem_GP_1 (with p
9156 # rior from Owen)
9157 #0.01 0.15 0.06 0.06 -1 0.8 3 0 0 0
9158 # 0 0 0 0 0 # NatM_p_1_Fem_GP_1 - no prio
9159 # r
9160 -10 45 2 2 -1 10 -2 0 0 0
9161 0 0 0 0 0 # L_at_Amin_Fem_GP_1
9162 20 50 34 34 -1 10 6 0 0 0
9163 0 0 0 0 0 # L_at_Amax_Fem_GP_1
9164 0.01 0.3 0.1 0.1 -1 0.8 6 0 0 0
9165 0 0 0 0 0 # VonBert_K_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_young_Fem_GP_1
9168 0.01 0.25 0.1 0.1 -1 0.8 6 0 0 0
9169 0 0 0 0 0 # CV_old_Fem_GP_1
9170 ### male growth with absolute offsets = 0 (effectively single gender model)
9171 -1 0.15 0 0.053 -1 0.8 -3 0 0 0
9172 0 0 0 0 0 # NatM_p_1_Mal_GP_1
9173 -1 45 0 2 -1 10 -2 0 0 0
9174 0 0 0 0 0 # L_at_Amin_Mal_GP_1
9175 -1 50 0 33.13 -1 10 -4 0 0 0
9176 0 0 0 0 0 # L_at_Amax_Mal_GP_1
9177 -1 0.3 0 0.2461 -1 0.8 -4 0 0 0
9178 0 0 0 0 0 # VonBert_K_Mal_GP_1
9179 -1 0.25 0 0.1 -1 0.8 -3 0 0 0
9180 0 0 0 0 0 # CV_young_Mal_GP_1
9181 -1 0.25 0 0.1 -1 0.8 -3 0 0 0
9182 0 0 0 0 0 # CV_old_Mal_GP_1
9183 # female weight-length, maturity, and fecundity
9184 0 1 1.17E-5 1.17E-5 -1 0.8 -3 0 0 0
9185 0 0 0 0 0 # Wtlen_1_Fem # converted to (cm
9186 # ,kg) from Lea et al. 1999
9187 2 4 3.177 3 -1 0.8 -3 0 0 0
9188 0 0 0 0 0 # Wtlen_2_Fem # from Lea et al.
9189 # 1999
9190 1 100 28.5 28.5 -1 0.8 -3 0 0 0
9191 0 0 0 0 0 # Mat50%_Fem

```

```

9192 -9      9      -1.0    0      -1      0.8     -3      0      0      0
9193   0      0      0      0      #      Mat_slope_Fem
9194 -3      3      0.196   1      -1      0.8     -3      0      0      0      0      #
9195 -3      3      0.0571  0      -1      0.8     -3      0      0      0      0      0      #
9196 ## -3      3      1      1      -1      0.8     -3      0      0
9197 # 0      0      0      0      0      #      Eggs/kg_inter_Fem
9198 ## -3      3      0      0      -1      0.8     -3      0      0
9199 # 0      0      0      0      0      #      Eggs/kg_slope_wt_Fem
9200 ### male W-L with absolute offsets = 0 (effectively single gender model)
9201 0      1      1.17E-5 1.17E-5 -1      0.8     -3      0      0      0
9202   0      0      0      0      #      Wtlen_1_Mal # converted to (cm
9203 # ,kg) from Lea et al. 1999
9204 2      4      3.177   3      -1      0.8     -3      0      0      0
9205   0      0      0      0      #      Wtlen_2_Mal # from Lea et al.
9206 # 1999

9207
9208 0      0      0      0      -1      0      -4      0      0      0
9209   0      0      0      0      #      RecrDist_GP_1
9210 # non-spatial model uses following recruit distribution parameter
9211 0      0      0      0      -1      0      -4      0      0      0
9212   0      0      0      0      #      RecrDist_Area_1
9213 # spatial model uses next 2 lines for recruit distribution, only 1 estimate
9214 # d
9215 ## -4      4      0      1      -1      50      -1      0      0
9216 # 0      0      0      0      0      #      RecrDist_Area_1
9217 ## -4      4      0      1      -1      50      1      0      0
9218 # 0      0      0      0      0      #      RecrDist_Area_1
9219 0      0      0      0      -1      0      -4      0      0      0
9220   0      0      0      0      0      #      RecrDist_Seas_1
9221 0      0      0      0      -1      0      -4      0      0      0
9222   0      0      0      0      0      #      CohortGrowDev
9223 #
9224 #_Cond 0 #custom_MG-env_setup (0/1)
9225 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
9226 #
9227 #_Cond 0 #custom_MG-block_setup (0/1)
9228 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
9229 #_Cond No MG parm trends
9230 #
9231 #_seasonal_effects_on_biology_parms
9232 0 0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,m
9233 # alewtlen2,L1,K

```

```

9234 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
9235 #
9236 #_Cond -4 #_MGparm_Dev_Phase
9237 #
9238 #_Spawner-Recruitment
9239 3      #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop
9240 # ; 7=survival_3Parm
9241 #_LO    HI     INIT    PRIOR   PR_type SD      PHASE
9242 3       12      6       6        -1      10      1       #       SR_LN(R0)
9243 0.2     1       0.773   0.773   2       0.147   -3      #       SR_BH_stee
9244 # p
9245 0       2       0.5     0.5      -1      0.8     -3      #       SR_sigmaR
9246 -5      5       0.1     0        -1      1       -3      #       SR_envlink
9247 -5      5       0       0        -1      1       -4      #       SR_R1_offse
9248 # t
9249 0       0       0       0        -1      0       -99     #       SR_autocorr
9250 0 #_SR_env_link
9251 0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
9252 1      #do_recdev: 0=none; 1=devvector; 2=simple deviations
9253 1971 # first year of main recr_devs; early devs can preceed this era
9254 2001 # last year of main recr_devs; forecast devs start in following year
9255 -2 #_recdev phase
9256 1      # (0/1) to read 13 advanced options
9257 0      #_recdev_early_start (0=none; neg value makes relative to recdev_start
9258 # )
9259 -4 #_recdev_early_phase
9260 -4 #_forecast_recruitment phase (incl. late recr) (0 value resets to maxp
9261 # hase+1)
9262 1      #_lambda for Fcast_recr_like occurring before endyr+1
9263 900 #_last_early_yr_nobias_adj_in_MP
9264 1820 #_first_yr_fullbias_adj_in_MP
9265 2001 #_last_yr_fullbias_adj_in_MP
9266 2015 #_first_recent_yr_nobias_adj_in_MP
9267 1      #_max_bias_adj_in_MP (-1 to override ramp and set biasadj=1.0 for all
9268 # estimated recdevs)
9269 0      #_period of cycles in recruitment (N parms read below)
9270 -5 #_min_rec_dev
9271 5 #_max_rec_dev
9272 0 #_read_recdevs
9273 #_end of advanced SR options
9274 #
9275 #

```

```

9276 #Fishing Mortality info
9277 0.3 # F ballpark for tuning early phases
9278 -2001 # F ballpark year (neg value to disable)
9279 3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
9280 2.9 # max F or harvest rate, depends on F_Method
9281 # no additional F input needed for Fmethod 1
9282 # if Fmethod=2; read overall start F value; overall phase; N detailed input
9283 # s to read
9284 # if Fmethod=3; read N iterations for tuning for Fmethod 3
9285 5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
9286 #
9287 #_initial_F_parms (1 per catch fleet)
9288 #_LO HI INIT PRIOR PR_type SD PHASE
9289 0 1 0 0.01 -1 99 -1 # 1_CA_NorthOf4010_Comm_Dead
9290 0 1 0 0.01 -1 99 -1 # 2_CA_NorthOf4010_Comm_Live
9291 0 1 0 0.01 -1 99 -1 # 3_CA_NorthOf4010_Rec_PC
9292 0 1 0 0.01 -1 99 -1 # 4_CA_NorthOf4010_Rec_PR
9293 0 1 0 0.01 -1 99 -1 # 5_OR_SouthernOR_Comm_Dead
9294 0 1 0 0.01 -1 99 -1 # 6_OR_SouthernOR_Comm_Live
9295 0 1 0 0.01 -1 99 -1 # 7_OR_SouthernOR_Rec_PC
9296 0 1 0 0.01 -1 99 -1 # 8_OR_SouthernOR_Rec_PR
9297 0 1 0 0.01 -1 99 -1 # 9_OR_NorthernOR_Comm
9298 0 1 0 0.01 -1 99 -1 # 10_OR_NorthernOR_Rec_PC
9299 0 1 0 0.01 -1 99 -1 # 11_OR_NorthernOR_Rec_PR
9300 #
9301 #_Q_setup
9302 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nob
9303 # iasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_ass
9304 # ign_to_parm
9305 #_for_env-var:_enter_index_of_the_env-var_to_be_linked
9306
9307 ### NOTE: initially turning off extra sd parameters
9308 ### until we sort out which fleets have indices
9309 ### (changed 3rd column below from 1 to 0)
9310
9311 #_Den-dep env-var extra_se Q_type
9312 0 0 0 1 # 1_CA_NorthOf4010_Comm_Dead
9313 0 0 0 1 # 2_CA_NorthOf4010_Comm_Live
9314 0 0 0 1 # 3_CA_NorthOf4010_Rec_PC
9315 0 0 0 1 # 4_CA_NorthOf4010_Rec_PR
9316 0 0 0 1 # 5_OR_SouthernOR_Comm_Dead
9317 0 0 1 1 # 6_OR_SouthernOR_Comm_Live # no extra_se beca

```

```

9318 # use hit lower bound
9319 0 0 0 1 # 7_OR_SouthernOR_Rec_PC
9320 0 0 0 1 # 8_OR_SouthernOR_Rec_PR
9321 0 0 0 1 # 9_OR_NorthernOR_Comm
9322 0 0 0 1 # 10_OR_NorthernOR_Rec_PC
9323 0 0 1 1 # 11_OR_NorthernOR_Rec_PR
9324 0 0 1 1 # 15_OR_SouthernOR_Rec_PC_index
9325 #
9326 # additive variance parms for indices
9327 #_LO HI INIT PRIOR PR_type SD PHASE
9328 0 2 0.5 1 -1 99 2 # extra sd index for fleet 6 # was hitting
9329 # lower bound
9330 #0 2 0.5 1 -1 99 2 # extra sd index for fleet 7 # index remov
9331 # ed
9332 0 2 0.5 1 -1 99 2 # extra sd index for fleet 11
9333 0 2 0.5 1 -1 99 2 # extra sd index for fleet 12
9334
9335 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet w
9336 # ith random q; 1=read a parm for each year of index
9337 #_Q_parms(if_any)
9338 # LO HI INIT PRIOR PR_type SD PHASE
9339 #
9340 #_size_selex_types
9341 #discard_options:_0=none;_1=define_retention;_2=retention&mortality;_3=all_
9342 # discarded_dead
9343 #_Pattern Discard Male Special
9344 24 0 0 0 # 1_CA_NorthOf4010_Comm_Dead
9345 24 0 0 0 # 2_CA_NorthOf4010_Comm_Live
9346 24 0 0 0 # 3_CA_NorthOf4010_Rec_PC
9347 24 0 0 0 # 4_CA_NorthOf4010_Rec_PR
9348 24 0 0 0 # 5_OR_SouthernOR_Comm_Dead
9349 24 0 0 0 # 6_OR_SouthernOR_Comm_Live
9350 24 0 0 0 # 7_OR_SouthernOR_Rec_PC
9351 24 0 0 0 # 8_OR_SouthernOR_Rec_PR
9352 15 0 0 5 # 9_OR_NorthernOR_Comm (no comp, mirroring So
9353 # uthernOR_Comm_Dead)
9354 24 0 0 0 # 10_OR_NorthernOR_Rec_PC
9355 15 0 0 10 # 11_OR_NorthernOR_Rec_PR (no comp, mirroring
9356 # Rec_PC)
9357 15 0 0 7 # 15_OR_SouthernOR_Rec_PC_index (should alway
9358 # s match fleet 7)
9359 #

```

```

9360 #_age_selex_types
9361 #_Pattern ___ Male Special
9362 10      0      0      0      # 1_CA_NorthOf4010_Comm_Dead
9363 10      0      0      0      # 2_CA_NorthOf4010_Comm_Live
9364 10      0      0      0      # 3_CA_NorthOf4010_Rec_PC
9365 10      0      0      0      # 4_CA_NorthOf4010_Rec_PR
9366 10      0      0      0      # 5_OR_SouthernOR_Comm_Dead
9367 10      0      0      0      # 6_OR_SouthernOR_Comm_Live
9368 10      0      0      0      # 7_OR_SouthernOR_Rec_PC
9369 10      0      0      0      # 8_OR_SouthernOR_Rec_PR
9370 10      0      0      0      # 9_OR_NorthernOR_Comm
9371 10      0      0      0      # 10_OR_NorthernOR_Rec_PC
9372 10      0      0      0      # 11_OR_NorthernOR_Rec_PR
9373 10      0      0      0      # 15_OR_SouthernOR_Rec_PC_index

9374
9375 # ALL DOUBLE-NORMALS, BUT FIXED AS ASYMPTOTIC
9376 #_LO    HI      INIT     PRIOR   PR_type SD      PHASE env-var use_dev dev
9377 #_minyr dev_maxyr          dev_SD  Block  Block_Fxn
9378 # Fleet group 1
9379 19      45      28      30      -1      50      4      0      0      0
9380 0       0       0       0       0 # PEAK
9381 -9      5       -4      -4      -1      50      -9      0      0      0
9382 0       0       0       0       0 # TOP (logistic)
9383 0       9       3       4       -1      50      5      0      0      0
9384 0       0       0       0       0 # Asc WIDTH exp
9385 0       9       8       8       -1      50      -9      0      0      0
9386 0       0       0       0       0 # Desc WIDTH exp
9387 -9      9       -8      -5      -1      50      -9      0      0      0
9388 0       0       0       0       0 # INIT (logistic)
9389 -9      9       8       5       -1      50      -9      0      0      0
9390 0       0       0       0       0 # FINAL (logistic)
9391 # Fleet group 2
9392 19      45      28      30      -1      50      4      0      0      0
9393 0       0       0       0       0 # PEAK
9394 -9      5       -4      -4      -1      50      -9      0      0      0
9395 0       0       0       0       0 # TOP (logistic)
9396 0       9       3       4       -1      50      5      0      0      0
9397 0       0       0       0       0 # Asc WIDTH exp
9398 0       9       8       8       -1      50      -9      0      0      0
9399 0       0       0       0       0 # Desc WIDTH exp
9400 -9      9       -8      -5      -1      50      -9      0      0      0
9401 0       0       0       0       0 # INIT (logistic)

```

9402	-9	9	8	5	-1	50	-9	0	0	0
9403	0	0	0	0	0	# FINAL (logistic)				
9404	# Fleet group 3									
9405	19	45	39.9	30	-1	50	-4	0	0	0
9406	0	0	-4	-4	0	# PEAK				
9407	-9	5	-4	-4	-1	50	-9	0	0	0
9408	0	0	0	0	0	# TOP (logistic)				
9409	0	9	3	4	-1	50	5	0	0	0
9410	0	0	0	0	0	# Asc WIDTH exp				
9411	0	9	8	8	-1	50	-9	0	0	0
9412	0	0	0	0	0	# Desc WIDTH exp				
9413	-9	9	-8	-5	-1	50	-9	0	0	0
9414	0	0	0	0	0	# INIT (logistic)				
9415	-9	9	8	5	-1	50	-9	0	0	0
9416	0	0	0	0	0	# FINAL (logistic)				
9417	# Fleet group 4									
9418	19	45	39.9	30	-1	50	-4	0	0	0
9419	0	0	0	0	0	# PEAK				
9420	-9	5	-4	-4	-1	50	-9	0	0	0
9421	0	0	0	0	0	# TOP (logistic)				
9422	0	9	3	4	-1	50	5	0	0	0
9423	0	0	0	0	0	# Asc WIDTH exp				
9424	0	9	8	8	-1	50	-9	0	0	0
9425	0	0	0	0	0	# Desc WIDTH exp				
9426	-9	9	-8	-5	-1	50	-9	0	0	0
9427	0	0	0	0	0	# INIT (logistic)				
9428	-9	9	8	5	-1	50	-9	0	0	0
9429	0	0	0	0	0	# FINAL (logistic)				
9430	# Fleet group 5									
9431	19	45	39.9	30	-1	50	4	0	0	0
9432	0	0	0	0	0	# PEAK				
9433	-9	5	-4	-4	-1	50	-9	0	0	0
9434	0	0	0	0	0	# TOP (logistic)				
9435	0	9	3	4	-1	50	5	0	0	0
9436	0	0	0	0	0	# Asc WIDTH exp				
9437	0	9	8	8	-1	50	-9	0	0	0
9438	0	0	0	0	0	# Desc WIDTH exp				
9439	-9	9	-8	-5	-1	50	-9	0	0	0
9440	0	0	0	0	0	# INIT (logistic)				
9441	-9	9	8	5	-1	50	-9	0	0	0
9442	0	0	0	0	0	# FINAL (logistic)				
9443	# Fleet group 6									

9444	19	45	39.9	30	-1	50	4	0	0	0	
9445	0	0	0	0	0	# PEAK					
9446	-9	5	-4	-4	-1	50	-9	0	0	0	
9447	0	0	0	0	0	# TOP (logistic)					
9448	0	9	3	4	-1	50	5	0	0	0	
9449	0	0	0	0	0	# Asc WIDTH exp					
9450	0	9	8	8	-1	50	-9	0	0	0	
9451	0	0	0	0	0	# Desc WIDTH exp					
9452	-9	9	-8	-5	-1	50	-9	0	0	0	
9453	0	0	0	0	0	# INIT (logistic)					
9454	-9	9	8	5	-1	50	-9	0	0	0	
9455	0	0	0	0	0	# FINAL (logistic)					
9456	# Fleet group 7										
9457	19	45	39.9	30	-1	50	-4	0	0	0	
9458	0	0	0	0	0	# PEAK					
9459	-9	5	-4	-4	-1	50	-9	0	0	0	
9460	0	0	0	0	0	# TOP (logistic)					
9461	0	9	3	4	-1	50	5	0	0	0	
9462	0	0	0	0	0	# Asc WIDTH exp					
9463	0	9	8	8	-1	50	-9	0	0	0	
9464	0	0	0	0	0	# Desc WIDTH exp					
9465	-9	9	-8	-5	-1	50	-9	0	0	0	
9466	0	0	0	0	0	# INIT (logistic)					
9467	-9	9	8	5	-1	50	-9	0	0	0	
9468	0	0	0	0	0	# FINAL (logistic)					
9469	# Fleet group 8										
9470	19	45	39.9	30	-1	50	-4	0	0	0	
9471	0	0	0	0	0	# PEAK					
9472	-9	5	-4	-4	-1	50	-9	0	0	0	
9473	0	0	0	0	0	# TOP (logistic)					
9474	0	9	3	4	-1	50	5	0	0	0	
9475	0	0	0	0	0	# Asc WIDTH exp					
9476	0	9	8	8	-1	50	-9	0	0	0	
9477	0	0	0	0	0	# Desc WIDTH exp					
9478	-9	9	-8	-5	-1	50	-9	0	0	0	
9479	0	0	0	0	0	# INIT (logistic)					
9480	-9	9	8	5	-1	50	-9	0	0	0	
9481	0	0	0	0	0	# FINAL (logistic)					
9482	# Fleet group 9										
9483	# Fleet 9 mirrors fleet 5, this is for fleet 10										
9484	19	45	39.9	30	-1	50	4	0	0	0	
9485	0	0	0	0	0	# PEAK					

```

9486 -9      5      -4      -4      -1      50      -9      0      0      0
9487     0      0      0      0      0 # TOP (logistic)
9488 0       9      3      4      -1      50      5      0      0      0
9489     0      0      0      0      0 # Asc WIDTH exp
9490 0       9      8      8      -1      50      -9      0      0      0
9491     0      0      0      0      0 # Desc WIDTH exp
9492 -9      9      -8      -5      -1      50      -9      0      0      0
9493     0      0      0      0      0 # INIT (logistic)
9494 -9      9      8      5      -1      50      -9      0      0      0
9495     0      0      0      0      0 # FINAL (logistic)
9496 #_Cond 0 #_custom_sel-env_setup (0/1)
9497 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
9498 #_Cond 0 #_custom_sel-blk_setup (0/1)
9499 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no block usage
9500 #_Cond No selex parm trends
9501 #_Cond -4 # placeholder for selparm_Dev_Phase
9502 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to kee
9503 # p in base parm bounds; 3=standard w/ no bound check)
9504 #
9505 # Tag loss and Tag reporting parameters go next
9506 0 # TG_custom: 0=no read; 1=read if tags exist
9507 #_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 #_placeholder if no parameters
9508 #
9509 1 #_Variance_adjustments_to_input_values
9510 #F1    F2    F3    F4    F5    F6    F7    F8    F9    F10   F11   F15
9511 0     0     0     0     0     0     0     0     0     0     0     0     0 #_add_to
9512 # _survey_CV
9513 0     0     0     0     0     0     0     0     0     0     0     0     0 #_add_to
9514 # _discard_stddev
9515 0     0     0     0     0     0     0     0     0     0     0     0     0 #_add_to
9516 # _bodywt_CV
9517 # .72  .28  .22  .11  .066  .027  .052  .046  1     .094  .123  1 #_mult_
9518 # by_lencomp_N
9519 0.68 0.33 0.25 0.12 0.09  0.04 0.06  0.04  1     0.13 0.15  1 #_mult_b
9520 # y_lencomp_N
9521 1     1     1     1     .259  1     .428  1     1     .470  1     1     1 #_mult_b
9522 # y_agecomp_N
9523 1     1     1     1     1     1     1     1     1     1     1     1     1 #_mult_b
9524 # y_size-at-age_N
9525 #
9526 4 #_maxlambdaphase
9527 1 #_sd_offset

```

```

9528 #
9529 0 # number of changes to make to default Lambdas (default value is 1.0)
9530 # Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=s
9531 # izeage; 8=catch;
9532 # 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14
9533 # =Morphcomp; 15=Tag-comp; 16=Tag-negbin
9534 #like_comp fleet/survey phase value sizefreq_method
9535 # 1 2 2 1 1
9536 # 4 2 2 1 1
9537 # 4 2 3 1 1
9538 #
9539 # lambdas (for info only; columns are phases)
9540 # 0 0 0 0 #_CPUE/survey:_1
9541 # 1 1 1 1 #_CPUE/survey:_2
9542 # 1 1 1 1 #_CPUE/survey:_3
9543 # 1 1 1 1 #_lencomp:_1
9544 # 1 1 1 1 #_lencomp:_2
9545 # 0 0 0 0 #_lencomp:_3
9546 # 1 1 1 1 #_agecomp:_1
9547 # 1 1 1 1 #_agecomp:_2
9548 # 0 0 0 0 #_agecomp:_3
9549 # 1 1 1 1 #_size-age:_1
9550 # 1 1 1 1 #_size-age:_2
9551 # 0 0 0 0 #_size-age:_3
9552 # 1 1 1 1 #_init_equ_catch
9553 # 1 1 1 1 #_recruitments
9554 # 1 1 1 1 #_parameter-priors
9555 # 1 1 1 1 #_parameter-dev-vectors
9556 # 1 1 1 1 #_crashPenLambda
9557 0 # (0/1) read specs for more stddev reporting
9558 # 1 1 -1 5 1 5 1 -1 5 # selex type, len/age, year, N selex bins, Growth pat
9559 # tern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
9560 # 5 15 25 35 43 # vector with selex std bin picks (-1 in first bin to self-
9561 # generate)
9562 # 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-
9563 # generate)
9564 # 1 2 14 26 40 # vector with NatAge std bin picks (-1 in first bin to self-
9565 # generate)
9566 999

```

## 9567 Southern Model

```
9568 #V3.24u
```

```

9569 #C China rockfish REVISED base model 7/7/15
9570 1 #_N_Growth_Patterns
9571 1 #_N_Morphs_Within_GrowthPattern
9572 0 #_Nblock_Patterns
9573 #_Cond 0 #_blocks_per_pattern
9574 # begin and end years of blocks
9575 #
9576 0.5      #_fracfemale
9577 0          #_natM_type:_0=1Parm; 1=N_breakpoints;_2=Lorenzen;_3=agespecific;_4
9578 # =agespec_withseasinterpolate
9579           #_no additional input for selected M option; read 1P per morph
9580 1          # GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age_s
9581 # peciific_K; 4=not implemented
9582 0          #_Growth_Age_for_L1
9583 30         #_Growth_Age_for_L2 (999 to use as Linf)
9584 0          #_SD_add_to_LAA (set to 0.1 for SS2 V1.x compatibility)
9585 0          #_CV_Growth_Pattern: 0 CV=f(LAA); 1 CV=F(A); 2 SD=F(LAA); 3 SD=F(A)
9586 # ; 4 logSD=F(A)
9587 1          #_maturity_option: 1=length logistic; 2=age logistic; 3=read age-ma
9588 # turity matrix by growth_pattern; 4=read age-fecundity; 5=read fec and wt
9589 # from wtatage.ss
9590 #0          0          0          0          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 #           1          1          1          1          1          1          1          1          1          1
9598 #           1          1          1          1          1          1          1          1          1          1
9599 #_placeholder for empirical age-maturity by growth pattern
9600 1          #_First_Mature_Age
9601 1          #_fecundity option:(1)eggs=Wt*(a+b*Wt);(2)eggs=a*L^b;(3)eggs=a*Wt^b
9602 # ; (4)eggs=a+b*L; (5)eggs=a+b*W
9603 0          #_hermaphroditism option: 0=none; 1=age-specific fxn
9604 2          #_parameter_offset_approach (1=none, 2= M, G, CV_G as offset from f
9605 # emale-GP1, 3=like SS2 V1.x)
9606 2          #_env/block/dev_adjust_method (1=standard; 2=logistic transform kee
9607 # ps in base parm bounds; 3=standard w/ no bound check)
9608 #
9609 #_growth_parms
9610 #_LO      HI      INIT      PRIOR     PR_type SD      PHASE env-var use_dev dev_miny

```

```

9611 # r dev_maxyr dev_SD Block Block_Fxn
9612 # female growth
9613 0.01 0.25 0.07 -2.94 3 0.53 -7 0 0 0
9614 0 0 0 0 0 # NatM_p_1_Fem_GP_1 (with prior
9615 # from Owen)
9616 0 10 2 2 -1 10 -2 0 0 0
9617 0 0 0 0 0 # L_at_Amin_Fem_GP_1
9618 25 45 33 34 -1 10 6 0 0 0
9619 0 0 0 0 0 # L_at_Amax_Fem_GP_1
9620 0.05 0.3 0.15 0.1 -1 0.8 6 0 0 0
9621 0 0 0 0 0 # VonBert_K_Fem_GP_1
9622 0.01 0.2 0.1 0.1 -1 0.8 -6 0 0 0
9623 0 0 0 0 0 # CV_young_Fem_GP_1
9624 0.03 0.2 0.1 0.1 -1 0.8 6 0 0 0
9625 0 0 0 0 0 # CV_old_Fem_GP_1
9626 ### male growth with absolute offsets = 0 (effectively single gender model)
9627 -1 0.15 0 0 -1 0.8 -3 0 0 0
9628 0 0 0 0 0 # NatM_p_1_Mal_GP_1
9629 -1 45 0 0 -1 10 -2 0 0 0
9630 0 0 0 0 0 # L_at_Amin_Mal_GP_1
9631 -1 50 0 0 -1 10 -4 0 0 0
9632 0 0 0 0 0 # L_at_Amax_Mal_GP_1
9633 -1 0.3 0 0 -1 0.8 -4 0 0 0
9634 0 0 0 0 0 # VonBert_K_Mal_GP_1
9635 -1 0.25 0 0 -1 0.8 -3 0 0 0
9636 0 0 0 0 0 # CV_young_Mal_GP_1
9637 -1 0.25 0 0 -1 0.8 -3 0 0 0
9638 0 0 0 0 0 # CV_old_Mal_GP_1
9639 # female weight-length, maturity, and fecundity
9640 0 1 1.17E-5 1.17E-5 -1 0.8 -3 0 0 0
9641 0 0 0 0 0 # Wtlen_1_Fem # converted to (cm
9642 # ,kg) from Lea et al. 1999
9643 2 4 3.177 3 -1 0.8 -3 0 0 0
9644 0 0 0 0 0 # Wtlen_2_Fem # from Lea et al.
9645 # 1999
9646 1 100 27 27 -1 0.8 -3 0 0 0
9647 0 0 0 0 0 # Mat50%_Fem
9648 -9 9 -1.0 0 -1 0.8 -3 0 0 0
9649 0 0 0 0 0 # Mat_slope_Fem
9650 0 1 0.196 1 -1 0.8 -3 0 0 0
9651 0 0 0 0 0 # Eggs/kg_inter_Fem
9652 0 1 0.0571 0 -1 0.8 -3 0 0 0

```

```

9653      0      0      0      0      #      Eggs/kg_slope_wt_Fem
9654  # male W-L
9655  0      1      1.17E-5 1.17E-5 -1      0.8      -3      0      0      0
9656      0      0      0      0      #      Wtlen_1_Mal # converted to (cm
9657  # ,kg) from Lea et al. 1999
9658  2      4      3.177   3      -1      0.8      -3      0      0      0
9659      0      0      0      0      #      Wtlen_2_Mal # from Lea et al.
9660  # 1999
9661
9662  0      0      0      0      -1      0      -4      0      0      0
9663      0      0      0      0      #      RecrDist_GP_1
9664  0      0      0      0      -1      0      -4      0      0      0
9665      0      0      0      0      #      RecrDist_Area_1
9666  0      0      0      0      -1      0      -4      0      0      0
9667      0      0      0      0      #      RecrDist_Seas_1
9668  0      0      0      0      -1      0      -4      0      0      0
9669      0      0      0      0      #      CohortGrowDev
9670  #
9671  #_Cond 0 #custom_MG-env_setup (0/1)
9672  #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-environ parameters
9673  #
9674  #_Cond 0 #custom_MG-block_setup (0/1)
9675  #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no MG-block parameters
9676  #_Cond No MG parm trends
9677  #
9678  #_seasonal_effects_on_biology_parms
9679  0 0 0 0 0 0 0 0 #_femwtlen1,femwtlen2,mat1,mat2,fec1,fec2,Malewtlen1,m
9680  # alewtlen2,L1,K
9681  #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no seasonal MG parameters
9682  #
9683  #_Cond -4 #_MGparm_Dev_Phase
9684  #
9685  #_Spawner-Recruitment
9686  3      #_SR_function: 2=Ricker; 3=std_B-H; 4=SCAA; 5=Hockey; 6=B-H_flattop
9687  # ; 7=survival_3Parm
9688  #_LO    HI     INIT    PRIOR   PR_type SD      PHASE
9689  4      7      5      4      -1      10      1      #      SR_LN(R0)
9690  0.2    1      0.773  0.773  2      0.147  -3      #      SR_BH_stEEP
9691  0      2      0.5    0.5    -1      0.8    -3      #      SR_sigmaR
9692  -5     5      0.1    0      -1      1      -3      #      SR_envlink
9693  -5     5      0      0      -1      1      -4      #      SR_R1_offse
9694  # t

```

```

9695 0      0      0      0      -1      0      -9      #      SR_autocorr
9696 0 #_SR_env_link
9697 0 #_SR_env_target_0=none;1=devs;_2=R0;_3=steepness
9698 1 #do_recdev: 0=none; 1=devvector; 2=simple deviations
9699 1971 # first year of main recr_devs; early devs can preceed this era
9700 2001 # last year of main recr_devs; forecast devs start in following year
9701 -2 #_recdev phase
9702 1 # (0/1) to read 13 advanced options
9703 0 #_recdev_early_start (0=none; neg value makes relative to recdev_start)
9704 -4 #_recdev_early_phase
9705 -4 #_forecast_recruitment_phase (incl. late recr) (0 value resets to maxph
9706 # ase+1)
9707 1 #_lambda for Fcast_recr_like occurring before endyr+1
9708 900 #_last_early_yr_nobias_adj_in_MPD
9709 1820 #_first_yr_fullbias_adj_in_MPD
9710 2001 #_last_yr_fullbias_adj_in_MPD
9711 2015 #_first_recent_yr_nobias_adj_in_MPD
9712 1 #_max_bias_adj_in_MPD (-1 to override ramp and set biasadj=1.0 for all e
9713 # stimated recdevs)
9714 0 #_period of cycles in recruitment (N parms read below)
9715 -5 #min rec_dev
9716 5 #max rec_dev
9717 0 #_read_recdevs
9718 #_end of advanced SR options
9719 #
9720 #
9721 #Fishing Mortality info
9722 0.2 # F ballpark for tuning early phases
9723 -2001 # F ballpark year (neg value to disable)
9724 3 # F_Method: 1=Pope; 2=instan. F; 3=hybrid (hybrid is recommended)
9725 2.9 # max F or harvest rate, depends on F_Method
9726 # no additional F input needed for Fmethod 1
9727 # if Fmethod=2; read overall start F value; overall phase; N detailed input
9728 # s to read
9729 # if Fmethod=3; read N iterations for tuning for Fmethod 3
9730 5 # N iterations for tuning F in hybrid method (recommend 3 to 7)
9731 #
9732 #_initial_F_parms
9733 #_LO HI INIT PRIOR PR_type SD PHASE
9734 0    1  0    0.01 -1     99 -1   # 1_CA_SouthOf4010_Comm_Dead
9735 0    1  0    0.01 -1     99 -1   # 2_CA_SouthOf4010_Comm_Live
9736 0    1  0    0.01 -1     99 -1   # 3_CA_SouthOf4010_Rec_PC

```

```

9737 0 1 0 0.01 -1 99 -1 # 4_CA_SouthOf4010_Rec_PR
9738 0 1 0 0.01 -1 99 -1 # 5_CA_SouthOf4010_Comm_Discard
9739 #
9740 #_Q_setup
9741 # Q_type options: <0=mirror, 0=float_nobiasadj, 1=float_biasadj, 2=parm_nob
9742 # iasadj, 3=parm_w_random_dev, 4=parm_w_randwalk, 5=mean_unbiased_float_ass
9743 # ign_to_parm
9744 #_for_env-var:_enter_index_of_the_env-var_to_be_linked
9745
9746 #_Den-dep env-var extra_se Q_type
9747 0 0 0 1 # 1_CA_SouthOf4010_Comm_Dead
9748 0 0 0 1 # 2_CA_SouthOf4010_Comm_Live
9749 0 0 1 1 # 3_CA_SouthOf4010_Rec_PC
9750 0 0 0 1 # 4_CA_SouthOf4010_Rec_PR
9751 0 0 0 1 # 5_CA_SouthOf4010_Comm_Discard
9752 0 0 1 1 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9753 0 0 1 1 # 7_CA_SouthOf4010_Rec_PC_onboard_index
9754 0 0 0 1 # 8_CA_SouthOf4010_CCFRP_comps_only
9755 0 0 0 1 # 9_CA_SouthOf4010_Abrams_thesis_comps
9756
9757 # additive variance parms for indices
9758 #_LO HI INIT PRIOR PR_type SD PHASE
9759 0 2 0.5 1 -1 99 2 # extra sd index for fleet 3
9760 0 2 0.5 1 -1 99 2 # extra sd index for "survey" 6
9761 0 2 0.5 1 -1 99 2 # extra sd index for "survey" 7
9762
9763 #_Cond 0 #_If q has random component, then 0=read one parm for each fleet w
9764 # ith random q; 1=read a parm for each year of index
9765 #_Q_parms(if_any)
9766 # LO HI INIT PRIOR PR_type SD PHASE
9767 #
9768 # Selectivity section
9769 # Size-based setup
9770 # A=Selex option: 1-24
9771 # B=Do_retention: 0=no, 1=yes
9772 # C=Male offset to female: 0=no, 1=yes, 2=Female offset to male
9773 # D=Mirror selex (#)
9774 # A B C D
9775 24 0 0 0 # 1_CA_SouthOf4010_Comm_Dead
9776 24 0 0 0 # 2_CA_SouthOf4010_Comm_Live
9777 24 0 0 0 # 3_CA_SouthOf4010_Rec_PC
9778 24 0 0 0 # 4_CA_SouthOf4010_Rec_PR

```

```

9779 24 0 0 0 # 5_CA_SouthOf4010_Comm_Discard
9780 24 0 0 0 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9781 #15 0 0 3 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9782 15 0 0 3 # 7_CA_SouthOf4010_Rec_PC_onboard_index
9783 #15 0 0 3 # 8_CA_SouthOf4010_CCFRP_comps_only
9784 24 0 0 0 # 8_CA_SouthOf4010_CCFRP_comps_only
9785 15 0 0 3 # 9_CA_SouthOf4010_Abrams_thesis_comps
9786 #
9787 #_age_selex_types
9788 #_Pattern ___ Male Special
9789 10 0 0 0 # 1_CA_SouthOf4010_Comm_Dead
9790 10 0 0 0 # 2_CA_SouthOf4010_Comm_Live
9791 10 0 0 0 # 3_CA_SouthOf4010_Rec_PC
9792 10 0 0 0 # 4_CA_SouthOf4010_Rec_PR
9793 10 0 0 0 # 5_CA_SouthOf4010_Comm_Discard
9794 10 0 0 0 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9795 10 0 0 0 # 7_CA_SouthOf4010_Rec_PC_onboard_index
9796 10 0 0 0 # 8_CA_SouthOf4010_CCFRP_comps_only
9797 10 0 0 0 # 9_CA_SouthOf4010_Abrams_thesis_comps
9798
9799 # ALL SELEX ARE DOUBLE-NORMALS, SOME ARE FIXED AS ASYMPTOTIC
9800 #_LO HI INIT PRIOR PR_type SD PHASE env-var use_dev dev_minyr dev_maxyr dev
9801 # _SD Block Block_Fxn
9802 # 1_CA_SouthOf4010_Comm_Dead
9803 19 45 28 30 -1 50 4 0 0 0 0 0 0 0 # PEAK
9804 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 0 # TOP (logistic)
9805 0 9 3 4 -1 50 5 0 0 0 0 0 0 0 # Asc WIDTH exp
9806 0 9 8 8 -1 50 -9 0 0 0 0 0 0 0 # Desc WIDTH exp
9807 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 0 # INIT (logistic)
9808 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 0 # FINAL (logistic)
9809 # 2_CA_SouthOf4010_Comm_Live
9810 20 45 32 25 -1 50 4 0 0 0 0 0 0 0 # PEAK
9811 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 0 # TOP (logistic)
9812 0 9 3 3 -1 50 5 0 0 0 0 0 0 0 # Asc WIDTH exp
9813 0 9 8 8 -1 50 -9 0 0 0 0 0 0 0 # Desc WIDTH exp
9814 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 0 # INIT (logistic)
9815 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 0 # FINAL (logistic)
9816 # 3_CA_SouthOf4010_Rec_PC
9817 19 45 26 30 -1 50 4 0 0 0 0 0 0 0 # PEAK
9818 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 0 # TOP (logistic)
9819 0 9 3 4 -1 50 5 0 0 0 0 0 0 0 # Asc WIDTH exp
9820 0 9 8 8 -1 50 -9 0 0 0 0 0 0 0 # Desc WIDTH exp

```

```

9821 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9822 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9823 # 4_CA_SouthOf4010_Rec_PR
9824 19 45 27 30 -1 50 4 0 0 0 0 0 0 # PEAK
9825 -9 5 -4 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9826 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9827 0 9 8 8 -1 50 -9 0 0 0 0 0 0 # Desc WIDTH exp
9828 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9829 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9830 # 5_CA_SouthOf4010_Comm_Discard
9831 19 45 27 30 -1 50 4 0 0 0 0 0 0 # PEAK
9832 -9 5 -8 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9833 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9834 0 9 3 8 -1 50 5 0 0 0 0 0 0 # Desc WIDTH exp
9835 -9 -8 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9836 -9 -8 -8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9837 # 6_CA_SouthOf4010_Rec_PC_DWV_index
9838 19 45 30 30 -1 50 4 0 0 0 0 0 0 # PEAK
9839 -9 9 -8 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9840 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9841 0 9 8 8 -1 50 -9 0 0 0 0 0 0 # Desc WIDTH exp
9842 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9843 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)
9844 # 8_CA_SouthOf4010_CCFRP_comps_only
9845 19 45 30 30 -1 50 4 0 0 0 0 0 0 # PEAK
9846 -9 9 -8 -4 -1 50 -9 0 0 0 0 0 0 # TOP (logistic)
9847 0 9 3 4 -1 50 5 0 0 0 0 0 0 # Asc WIDTH exp
9848 0 9 8 8 -1 50 -9 0 0 0 0 0 0 # Desc WIDTH exp
9849 -9 9 -8 -5 -1 50 -9 0 0 0 0 0 0 # INIT (logistic)
9850 -9 9 8 5 -1 50 -9 0 0 0 0 0 0 # FINAL (logistic)

9851
9852 #_Cond 0 #_custom_sel-env_setup (0/1)
9853 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no enviro fxns
9854 #_Cond 0 #_custom_sel-blk_setup (0/1)
9855 #_Cond -2 2 0 0 -1 99 -2 #_placeholder when no block usage
9856 #_Cond No selex parm trends
9857 #_Cond -4 # placeholder for selparm_Dev_Phase
9858 #_Cond 0 #_env/block/dev_adjust_method (1=standard; 2=logistic trans to kee
9859 # p in base parm bounds; 3=standard w/ no bound check)
9860 #
9861 # Tag loss and Tag reporting parameters go next
9862 0 # TG_custom: 0=no read; 1=read if tags exist

```

```

9863 #_Cond -6 6 1 1 2 0.01 -4 0 0 0 0 0 0 0 #_placeholder if no parameters
9864 #
9865 1 #_Variance_adjustments_to_input_values
9866 #F1 F2 F3 F4 F5 F6 F7 F8 F9
9867 0 0 0 0 0 0 0 0 #_add_to_survey_CV
9868 0 0 0 0 0 0 0 0 #_add_to_discard_stddev
9869 0 0 0 0 0 0 0 0 #_add_to_bodywt_CV
9870 # 1 1 1 1 1 1 1 1 #_mult_by_lencomp_N
9871 0.4134 0.2527 0.2185 0.1412 0.2453 0.4895 1 0.76 1 #_mult_by_lenc
9872 #_omp_N
9873 1 1 0.2919 1 1 1 1 1 0.30825 #_mult_by_agecomp_N
9874 1 1 1 1 1 1 1 1 #_mult_by_size-at-age_N
9875 #
9876 4 #_maxlambdaphase
9877 1 #_sd_offset
9878 #
9879 0 # number of changes to make to default Lambdas (default value is 1.0)
9880 # Like_comp codes: 1=surv; 2=disc; 3=mnwt; 4=length; 5=age; 6=SizeFreq; 7=s
9881 # izeage; 8=catch;
9882 # 9=init_equ_catch; 10=recrdev; 11=parm_prior; 12=parm_dev; 13=CrashPen; 14
9883 # =Morphcomp; 15=Tag-comp; 16=Tag-negbin
9884 #like_comp fleet/survey phase value sizefreq_method
9885 # 1 2 2 1 1
9886 # 4 2 2 1 1
9887 # 4 2 3 1 1
9888 #
9889 # lambdas (for info only; columns are phases)
9890 # 0 0 0 0 #_CPUE/survey:_1
9891 # 1 1 1 1 #_CPUE/survey:_2
9892 # 1 1 1 1 #_CPUE/survey:_3
9893 # 1 1 1 1 #_lencomp:_1
9894 # 1 1 1 1 #_lencomp:_2
9895 # 0 0 0 0 #_lencomp:_3
9896 # 1 1 1 1 #_agecomp:_1
9897 # 1 1 1 1 #_agecomp:_2
9898 # 0 0 0 0 #_agecomp:_3
9899 # 1 1 1 1 #_size-age:_1
9900 # 1 1 1 1 #_size-age:_2
9901 # 0 0 0 0 #_size-age:_3
9902 # 1 1 1 1 #_init_equ_catch
9903 # 1 1 1 1 #_recruitments
9904 # 1 1 1 1 #_parameter-priors

```

```
9905 # 1 1 1 1 #_parameter-dev-vectors
9906 # 1 1 1 1 #_crashPenLambda
9907 0 # (0/1) read specs for more stddev reporting
9908 # 1 1 -1 5 1 5 1 -1 5 # selex type, len/age, year, N selex bins, Growth pat
9909 # tern, N growth ages, NatAge_area(-1 for all), NatAge_yr, N Natages
9910 # 5 15 25 35 43 # vector with selex std bin picks (-1 in first bin to self-
9911 # generate)
9912 # 1 2 14 26 40 # vector with growth std bin picks (-1 in first bin to self-
9913 # generate)
9914 # 1 2 14 26 40 # vector with NatAge std bin picks (-1 in first bin to self-
9915 # generate)
9916 999
```

## 9917 Appendix C. SS starter file

### 9918 Northern Model

```
9919 #V3.24u
9920 #C starter comment here
9921 china_WAonly_data.ss
9922 china_WAonly_control.ss
9923 0 # 0=use init values in control file; 1=use ss3.par
9924 1 # run display detail (0,1,2)
9925 1 # detailed age-structured reports in REPORT.SSO (0,1)
9926 0 # write detailed checkup.sso file (0,1)
9927 0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=e
9928 # very_iter,all_parms; 4=every,active)
9929 1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
9930 1 # Include prior_like for non-estimated parameters (0,1)
9931 1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
9932 2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and
9933 # higher are bootstrap
9934 10 # Turn off estimation for parameters entering after this phase
9935 0 # MCeval burn interval
9936 1 # MCeval thin interval
9937 0 # jitter initial parm value by this fraction
9938 -1 # min yr for sdreport outputs (-1 for styr)
9939 -2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
9940 0 # N individual STD years
9941 #vector of year values
9942
9943 1.0e-04 # final convergence criteria (e.g. 1.0e-04)
9944 0 # retrospective year relative to end year (e.g. -4)
9945 5 # min age for calc of summary biomass
9946 1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B
9947 # _styr
9948 1.0 # Fraction (X) for Depletion denominator (e.g. 0.4)
9949 1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY)
9950 # ; 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
9951 1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum
9952 # (Frates); 4=true F for range of ages
9953 #5 80 #_min and max age over which average F will be calculated
9954 1 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
9955 999 # check value for end of file
```

### 9956 Central Model

```

9957 #V3.24u
9958 #C starter comment here
9959 china_central_data.ss
9960 china_central_control.ss
9961 0 # 0=use init values in control file; 1=use ss3.par
9962 1 # run display detail (0,1,2)
9963 1 # detailed age-structured reports in REPORT.SSO (0,1)
9964 0 # write detailed checkup.sso file (0,1)
9965 0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=e
9966 # very_iter,all_parms; 4=every,active)
9967 1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
9968 1 # Include prior_like for non-estimated parameters (0,1)
9969 1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
9970 2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and
9971 # higher are bootstrap
9972 10 # Turn off estimation for parameters entering after this phase
9973 0 # MCeval burn interval
9974 1 # MCeval thin interval
9975 0 # jitter initial parm value by this fraction
9976 -1 # min yr for sdreport outputs (-1 for styr)
9977 -2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
9978 0 # N individual STD years
9979 #vector of year values
9980
9981 1.0e-04 # final convergence criteria (e.g. 1.0e-04)
9982 0 # retrospective year relative to end year (e.g. -4)
9983 5 # min age for calc of summary biomass
9984 1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B
9985 # _styr
9986 1.0 # Fraction (X) for Depletion denominator (e.g. 0.4)
9987 1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY)
9988 # ; 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
9989 1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum
9990 # (Frates); 4=true F for range of ages
9991 #5 80 #_min and max age over which average F will be calculated
9992 1 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
9993 999 # check value for end of file

```

#### 9994 Southern Model

```

9995 #V3.24u
9996 #C starter comment here

```

```

9997  china_south_data.ss
9998  china_south_control.ss
9999  0 # 0=use init values in control file; 1=use ss3.par
10000 1 # run display detail (0,1,2)
10001 1 # detailed age-structured reports in REPORT.SSO (0,1)
10002 0 # write detailed checkup.sso file (0,1)
10003 0 # write parm values to ParmTrace.sso (0=no,1=good,active; 2=good,all; 3=e
10004 # very_iter,all_parms; 4=every,active)
10005 1 # write to cumreport.sso (0=no,1=like&timeseries; 2=add survey fits)
10006 1 # Include prior_like for non-estimated parameters (0,1)
10007 1 # Use Soft Boundaries to aid convergence (0,1) (recommended)
10008 2 # Number of datafiles to produce: 1st is input, 2nd is estimates, 3rd and
10009 # higher are bootstrap
10010 10 # Turn off estimation for parameters entering after this phase
10011 0 # MCeval burn interval
10012 1 # MCeval thin interval
10013 0 # jitter initial parm value by this fraction
10014 -1 # min yr for sdreport outputs (-1 for styr)
10015 -2 # max yr for sdreport outputs (-1 for endyr; -2 for endyr+Nforecastyrs)
10016 0 # N individual STD years
10017 #vector of year values
10018
10019 1.0e-04 # final convergence criteria (e.g. 1.0e-04)
10020 0 # retrospective year relative to end year (e.g. -4)
10021 5 # min age for calc of summary biomass
10022 1 # Depletion basis: denom is: 0=skip; 1=rel X*B0; 2=rel X*Bmsy; 3=rel X*B
10023 # _styr
10024 1 # Fraction (X) for Depletion denominator (e.g. 0.4)
10025 1 # SPR_report_basis: 0=skip; 1=(1-SPR)/(1-SPR_tgt); 2=(1-SPR)/(1-SPR_MSY)
10026 # ; 3=(1-SPR)/(1-SPR_Btarget); 4=rawSPR
10027 1 # F_report_units: 0=skip; 1=exploitation(Bio); 2=exploitation(Num); 3=sum
10028 # (Frates); 4=true F for range of ages
10029 #5 80 #_min and max age over which average F will be calculated
10030 1 # F_report_basis: 0=raw; 1=F/Fspr; 2=F/Fmsy ; 3=F/Fbtgt
10031 999 # check value for end of file

```

## 10032 Appendix D. SS forecast file

### 10033 Northern Model

```
10034 #V3.24U
10035 #C generic forecast file
10036 # for all year entries except rebuilder; enter either: actual year, -999 fo
10037 # r styr, 0 for endyr, neg number for rel. endyr
10038 1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
10039 2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endy
10040 # r)
10041 0.5 # SPR target (e.g. 0.40)
10042 0.4 # Biomass target (e.g. 0.40)
10043 #_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relf, end_relf (
10044 # enter actual year, or values of 0 or -integer to be rel. endyr)
10045 0 0 0 0 0 0
10046 1 #Bmark_relf_Basis: 1 = use year range; 2 = set relF same as forecast belo
10047 # w
10048 #
10049 1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-las
10050 # t relF yrs); 5=input annual F scalar
10051 12 # N forecast years
10052 1.0 # F scalar (only used for Do_Forecast==5)
10053 #_Fcast_years: beg_selex, end_selex, beg_relf, end_relf (enter actual yea
10054 # r, or values of 0 or -integer to be rel. endyr)
10055 -4 0 -4 0
10056 1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
10057 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.4
10058 # 0); (Must be > the no F level below)
10059 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
10060 # multiplier below based on P*=0.45 and Category 2 Sigma = 0.72
10061 # qlnorm(0.45, 0, 0.72) = 0.913
10062 0.913 # Control rule target as fraction of Flimit (e.g. 0.75)
10063 3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch
10064 # with allocations applied)
10065 3 #_First forecast loop with stochastic recruitment
10066 0 #_Forecast loop control #3 (reserved for future bells&whistles)
10067 0 #_Forecast loop control #4 (reserved for future bells&whistles)
10068 0 #_Forecast loop control #5 (reserved for future bells&whistles)
10069 2026 #FirstYear for caps and allocations (should be after years with fixed
10070 # inputs)
10071 0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 t
```

```

10072 # o cause active impl_error)
10073 0 # Do West Coast gfish rebuilder output (0/1)
10074 -1 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to
10075 # set to 1999)
10076 -1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endye
10077 # ar+1)
10078 1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x flee
10079 # t(col) below
10080 # Note that fleet allocation is used directly as average F if Do_Forecast=4
10081 #
10082 2 # basis for fcast catch tuning and for fcast catch caps and allocation (
10083 # 2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
10084 # Conditional input if relative F choice = 2
10085 # Fleet relative F: rows are seasons, columns are fleets
10086 #_Fleet: 1_CA_SouthOf4010_Comm_Dead 2_CA_SouthOf4010_Comm_Live 3_CA_SouthO
10087 # f4010_Rec_PC 4_CA_SouthOf4010_Rec_PR
10088 # 0 0 0 0
10089 # max totalcatch by fleet (-1 to have no max) must enter value for each fle
10090 # et
10091 -1 -1 -1
10092 # max totalcatch by area (-1 to have no max); must enter value for each are
10093 # a
10094 -1
10095 # fleet assignment to allocation group (enter group ID# for each fleet, 0 f
10096 # or not included in an alloc group)
10097 0 0 0
10098 #_Conditional on >1 allocation group
10099 # allocation fraction for each of: 0 allocation groups
10100 # no allocation groups
10101 6 # Number of forecast catch levels to input (else calc catch from forecast
10102 # F)
10103 2 # code means to read fleet/time specific basis (2=dead catch; 3=retained
10104 # catch; 99=F) as below (units are from fleetunits; note new codes in SSV3
10105 # .20)
10106 # Input fixed catch values
10107 #Year Seas Fleet Catch(or_F) Basis
10108 #Scaled to ACLs Northern model average catches
10109 #Year Seas Fleet Catch
10110 2015 1 1 0.02
10111 2015 1 2 0.19
10112 2015 1 3 1.76
10113 2016 1 1 0.02

```

```

10114 2016 1 2 0.2
10115 2016 1 3 1.81
10116
10117 999 # verify end of input

10118 Central Model

10119 #V3.24U
10120 #C forecast file for China Rockfish
10121 #C with 2015/16 fixed catches
10122 #C 2017 and beyond based on SPR-50%, 40-10, and P*=0.45 for category 2 ass
10123 # essment
10124 #
10125 # for all year entries except rebuilder; enter either: actual year, -999 fo
10126 # r styr, 0 for endyr, neg number for rel. endyr
10127 1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
10128 2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endy
10129 # r)
10130 0.5 # SPR target (e.g. 0.40)
10131 0.4 # Biomass target (e.g. 0.40)
10132 #_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relf, end_relf (
10133 # enter actual year, or values of 0 or -integer to be rel. endyr)
10134 0 0 0 0 0 0
10135 1 #Bmark_relf_Basis: 1 = use year range; 2 = set relF same as forecast belo
10136 # w
10137 #
10138 1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-las
10139 # t relF yrs); 5=input annual F scalar
10140 12 # N forecast years
10141 1.0 # F scalar (only used for Do_Forecast==5)
10142 #_Fcast_years: beg_selex, end_selex, beg_relf, end_relf (enter actual yea
10143 # r, or values of 0 or -integer to be rel. endyr)
10144 -4 0 -4 0
10145 1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
10146 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.4
10147 # 0); (Must be > the no F level below)
10148 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
10149 # multiplier below based on P*=0.45 and Category 2 Sigma = 0.72
10150 # qlnorm(0.45, 0, 0.72) = 0.913
10151 0.913 # Control rule target as fraction of Flimit (e.g. 0.75)
10152 3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch
10153 # with allocations applied)

```

```

10154 3 # First forecast loop with stochastic recruitment
10155 0 #_Forecast loop control #3 (reserved for future bells&whistles)
10156 0 #_Forecast loop control #4 (reserved for future bells&whistles)
10157 0 #_Forecast loop control #5 (reserved for future bells&whistles)
10158 2025 #FirstYear for caps and allocations (should be after years with fixed
10159 # inputs)
10160 0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 t
10161 # o cause active impl_error)
10162 0 # Do West Coast gfish rebuilder output (0/1)
10163 -1 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to
10164 # set to 1999)
10165 -1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endye
10166 # ar+1)
10167 1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x flee
10168 # t(col) below
10169 # Note that fleet allocation is used directly as average F if Do_Forecast=4
10170 2 # basis for fcast catch tuning and for fcast catch caps and allocation (
10171 # 2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
10172 # Conditional input if relative F choice = 2
10173 # Fleet relative F: rows are seasons, columns are fleets
10174 #_Fleet: 1_CA_SouthOf4010_Comm_Dead 2_CA_SouthOf4010_Comm_Live 3_CA_South0
10175 # f4010_Rec_PC 4_CA_SouthOf4010_Rec_PR
10176 # 0 0 0 0
10177 # max totalcatch by fleet (-1 to have no max) must enter value for each fle
10178 # et
10179 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1
10180 # max totalcatch by area (-1 to have no max); must enter value for each are
10181 # a
10182 -1
10183 # fleet assignment to allocation group (enter group ID# for each fleet, 0 f
10184 # or not included in an alloc group)
10185 0 0 0 0 0 0 0 0 0 0
10186 #_Conditional on >1 allocation group
10187 # allocation fraction for each of: 0 allocation groups
10188 # no allocation groups
10189 22 # Number of forecast catch levels to input (else calc catch from forecas
10190 # t F)
10191 2 # code means to read fleet/time specific basis (2=dead catch; 3=retained
10192 # catch; 99=F) as below (units are from fleetunits; note new codes in SSV
10193 # 3.20)
10194 # Input fixed catch values
10195 # these catches based on making the sum of northern and central models

```

```

10196 # equal to the 2015/16 ACL contributions from John DeVore which are 6.6mt a
10197 # nd 6.8mt
10198 #Year Seas Fleet Catch
10199 2015 1 1 0.02 # total for 2015: 4.64
10200 2015 1 2 0.06
10201 2015 1 3 0.06
10202 2015 1 4 0.44
10203 2015 1 5 0.48
10204 2015 1 6 2.44
10205 2015 1 7 0.12
10206 2015 1 8 0.31
10207 2015 1 9 0.02
10208 2015 1 10 0.34
10209 2015 1 11 0.35
10210 #
10211 2016 1 1 0.02 # total for 2016: 4.78
10212 2016 1 2 0.06
10213 2016 1 3 0.06
10214 2016 1 4 0.45
10215 2016 1 5 0.5
10216 2016 1 6 2.52
10217 2016 1 7 0.12
10218 2016 1 8 0.32
10219 2016 1 9 0.02
10220 2016 1 10 0.35
10221 2016 1 11 0.36
10222 #
10223 999 # verify end of input

```

## 10224 Southern Model

```

10225 #V3.24U
10226 #C generic forecast file
10227 # for all year entries except rebuilder; enter either: actual year, -999 fo
10228 # r styr, 0 for endyr, neg number for rel. endyr
10229 1 # Benchmarks: 0=skip; 1=calc F_spr,F_btgt,F_msy
10230 2 # MSY: 1= set to F(SPR); 2=calc F(MSY); 3=set to F(Btgt); 4=set to F(endy
10231 # r)
10232 0.5 # SPR target (e.g. 0.40)
10233 0.4 # Biomass target (e.g. 0.40)
10234 #_Bmark_years: beg_bio, end_bio, beg_selex, end_selex, beg_relF, end_relF (
10235 # enter actual year, or values of 0 or -integer to be rel. endyr)

```

```

10236 0 0 0 0 0 0
10237 1 #Bmark_relf_Basis: 1 = use year range; 2 = set relF same as forecast belo
10238 # w
10239 #
10240 1 # Forecast: 0=none; 1=F(SPR); 2=F(MSY) 3=F(Btgt); 4=Ave F (uses first-las
10241 # t relF yrs); 5=input annual F scalar
10242 10 # N forecast years
10243 1.0 # F scalar (only used for Do_Forecast==5)
10244 #_Fcast_years: beg_selex, end_selex, beg_relf, end_relf (enter actual yea
10245 # r, or values of 0 or -integer to be rel. endyr)
10246 -4 0 -4 0
10247 1 # Control rule method (1=catch=f(SSB) west coast; 2=F=f(SSB) )
10248 0.4 # Control rule Biomass level for constant F (as frac of Bzero, e.g. 0.4
10249 # 0); (Must be > the no F level below)
10250 0.1 # Control rule Biomass level for no F (as frac of Bzero, e.g. 0.10)
10251 1.0 # Control rule target as fraction of Flimit (e.g. 0.75)
10252 3 #_N forecast loops (1=OFL only; 2=ABC; 3=get F from forecast ABC catch
10253 # with allocations applied)
10254 3 #_First forecast loop with stochastic recruitment
10255 0 #_Forecast loop control #3 (reserved for future bells&whistles)
10256 0 #_Forecast loop control #4 (reserved for future bells&whistles)
10257 0 #_Forecast loop control #5 (reserved for future bells&whistles)
10258 2025 #FirstYear for caps and allocations (should be after years with fixed
10259 # inputs)
10260 0 # stddev of log(realized catch/target catch) in forecast (set value>0.0 t
10261 # o cause active impl_error)
10262 0 # Do West Coast gfish rebuilder output (0/1)
10263 -1 # Rebuilder: first year catch could have been set to zero (Ydecl)(-1 to
10264 # set to 1999)
10265 -1 # Rebuilder: year for current age structure (Yinit) (-1 to set to endye
10266 # ar+1)
10267 1 # fleet relative F: 1=use first-last alloc year; 2=read seas(row) x flee
10268 # t(col) below
10269 # Note that fleet allocation is used directly as average F if Do_Forecast=4
10270 #
10271 2 # basis for fcast catch tuning and for fcast catch caps and allocation (
10272 # 2=deadbio; 3=retainbio; 5=deadnum; 6=retainnum)
10273 # Conditional input if relative F choice = 2
10274 # Fleet relative F: rows are seasons, columns are fleets
10275 #_Fleet: 1_CA_SouthOf4010_Comm_Dead 2_CA_SouthOf4010_Comm_Live 3_CA_South0
10276 # f4010_Rec_PC 4_CA_SouthOf4010_Rec_PR
10277 # 0 0 0 0

```

```
10278 # max totalcatch by fleet (-1 to have no max) must enter value for each fle
10279 # et
10280 -1 -1 -1 -1 -1
10281 # max totalcatch by area (-1 to have no max); must enter value for each are
10282 # a
10283 -1
10284 # fleet assignment to allocation group (enter group ID# for each fleet, 0 f
10285 # or not included in an alloc group)
10286 0 0 0 0 0
10287 #_Conditional on >1 allocation group
10288 # allocation fraction for each of: 0 allocation groups
10289 # no allocation groups
10290 0 # Number of forecast catch levels to input (else calc catch from forecast
10291 # F)
10292 2 # code means to read fleet/time specific basis (2=dead catch; 3=retained
10293 # catch; 99=F) as below (units are from fleetunits; note new codes in SSV3
10294 # .20)
10295 # Input fixed catch values
10296 #Year Seas Fleet Catch(or_F) Basis
10297 #
10298 999 # verify end of input
```

10299 **Appendix E. Observed Angler Prediction**

10300 The 1987-1998 CDFW onboard observer program did not record the number of anglers at a  
10301 fishing stop from 4/22/87 until 7/9/92. The goal of this analysis is to impute the number of  
10302 observed anglers in the initial period of the sampling program from the number of observed  
10303 anglers and onboard anglers from the later years of the program.

10304 The number of observed anglers at a fishing stop is a subset of the number of total number of  
10305 anglers onboard the vessel (paid plus free anglers); a quantity which is consistently recorded  
10306 throughout the entire dataset. We explored the using the total number of observed anglers  
10307 onboard the vessel in the following analyses, but it was not recorded in a consitent manner  
10308 through time, e.g., recorded as the maximum number of anglers observed at a fishing stop  
10309 during the trip, a sum of the observed anglers at each fishing stop, or the average number  
10310 of observed anglers at all fishings stops, etc.

10311 We explored a binomial regression model to predict the mean number of observed anglers at  
10312 a fishing stop from the number of total anglers, in the initial period of the data. Binomial  
10313 regression models of this general form were considered in this analysis, as well as a sensitivity  
10314 analysis among the other potential covariates available in the dataset. Among the potential  
10315 predictor variables in this study, effects related to the interviewer, and trip date were con-  
10316 sidered for inclusion in the final model by pairwise comparison of fitted model AIC values  
10317 as well as analysis of parameter significance.

10318 Effects related to interviewer were found to be very significant, although due to the high  
10319 turn-over rate of the interviewers in these data, interviewer specific effects are not useful for  
10320 prediction here. However, the total number of interviewers onboard the vessel (one or two  
10321 interviewers) was found to be strongly significant and was included in the final models as a  
10322 categorical effect.

10323 For imputing the observed number of observed anglers for the early period of the dataset  
10324 it is important to motivate an assumption of stationarity in the number of observed ang-  
10325 glers through time. Thus trip date was considered for inclusion in the model to check for  
10326 any possibility significance through time. Firstly, date was considered for inclusion in the  
10327 model as a discrete time variable; secondly, a separate model was tested using only year as  
10328 categorical variable to consider any temporal patterns. Given the number of total anglers,  
10329 neither of the models considering temporal effects were able demonstrate that the number  
10330 of observed anglers varied significantly through time. All models which included temporal  
10331 effects produced higher overall AIC values, thus supporting the assumption of stationarity  
10332 in time.

10333 Log Model:

$$y_{ij} \sim \beta_{0j} + \beta_{1j} \log(x_{ij}) + \epsilon_{ij} \quad \epsilon_{ij} \sim N(0, \sigma_j) \quad (1)$$

10334 Binomial Log Model:

**Log Model: AIC=64636.72, MSE=5.13**

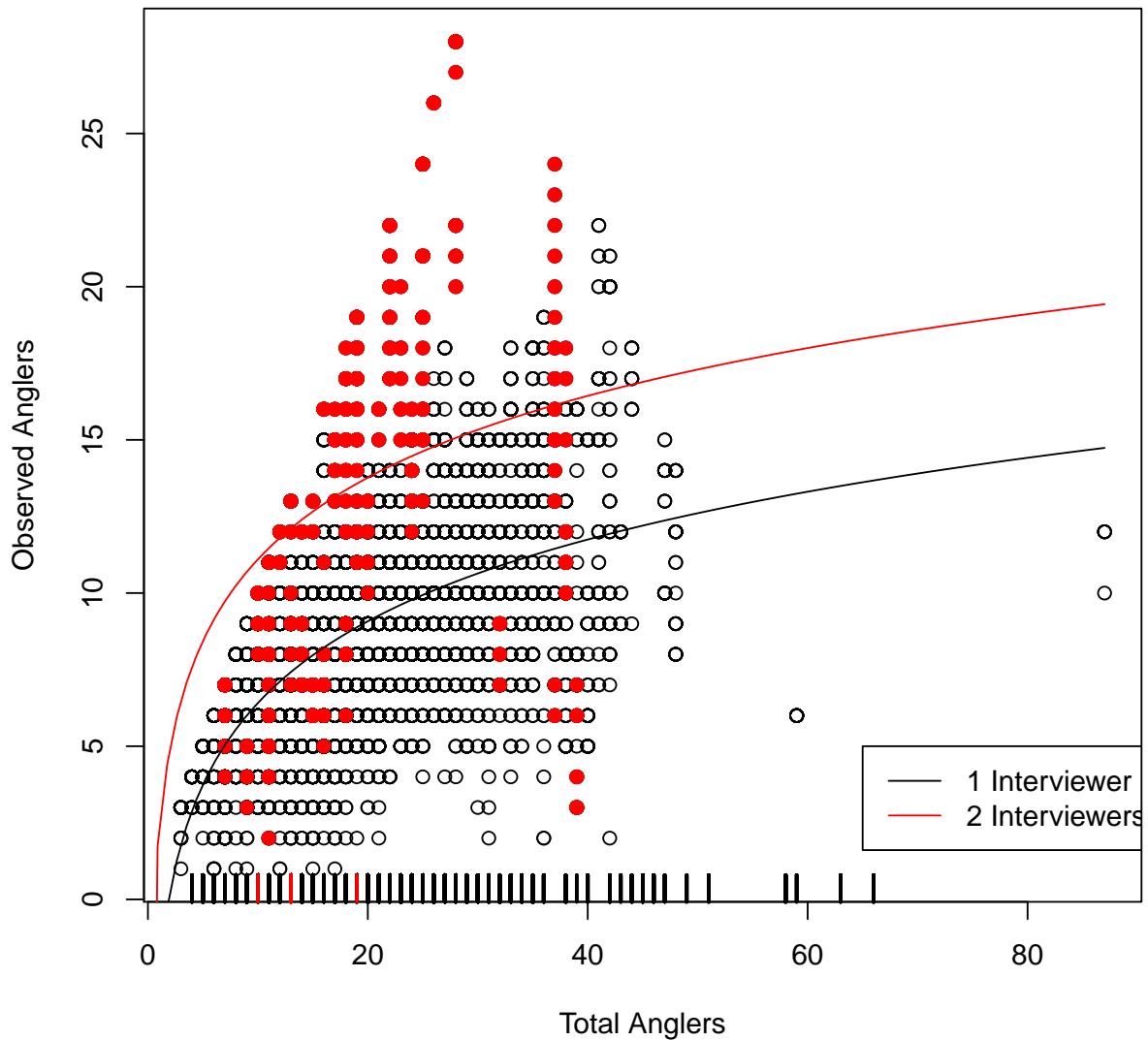


Figure E1: The number of observed anglers plotted as a function of the number of total anglers. The log-normal mean curves are plotted on the scale of the data, and colored to indicate if the data was collected in the presence of one or two interviewers. Additionally, a total anglers rug plot is included 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

10335 The log model considers a typical normal linear model for each interviewer level, except it  
 10336 uses the log of the number of total anglers as a predictor rather than the raw numbers of  
 10337 total anglers. The log model has several nice features for prediction in this case. Firstly by  
 10338 regressing on the log of the total anglers it improves the correlation and relative homoscedas-  
 10339 ticity of the joint data and improves the accuracy of sensitivity analysis by improving the  
 10340 standard error estimates for each parameter. Secondly the log transformation introduces the  
 10341 expected mean prediction shape, by emphasizing order of magnitude differences in the total  
 10342 number of anglers. The binomial log model considers the observed angler counts as indepen-  
 10343 dent draws from a binomial given the know number of total anglers. The log transformation  
 10344 in the binomial case is justified over the traditional binomial `glm` for similar reasons as the  
 10345 normal log model, as well as simple AIC support of the transformation. All models and  
 10346 model selection criterion were computed using the standard `glm` function in the R software  
 10347 environment for statistical computing (R Development Core Team 2013).

10348 The binomial log model was chosen for its low AIC value and reasonable mean predictions.  
 10349 Untransformed binomial models were considered, however they produce unreasonable ob-  
 10350 served angler predictions associated with the high numbers of total anglers. The log trans-  
 10351 formed Normal model provides mostly reasonable predictions, but is not supported by AIC  
 10352 when compared to the binomial models. Additionally transforms of Normal likelihood mod-  
 10353 els have no distributional way of producing observed angler predictions which do not exceed  
 10354 the total number of anglers. If a Normal likelihood model were to gather AIC support,  
 10355 predictions may require truncation. These data contain considerable noise, likely due to  
 10356 the high interviewer turnover rate, which would most effectively be modeled by including  
 10357 appropriate additional predictors to control for these effects. At this point no additional  
 10358 predictors from this dataset were considered to be both sensitive and appropriate for use  
 10359 with prediction in this case.

**Binomial Log Model: AIC=62498.83, MSE=5.14**

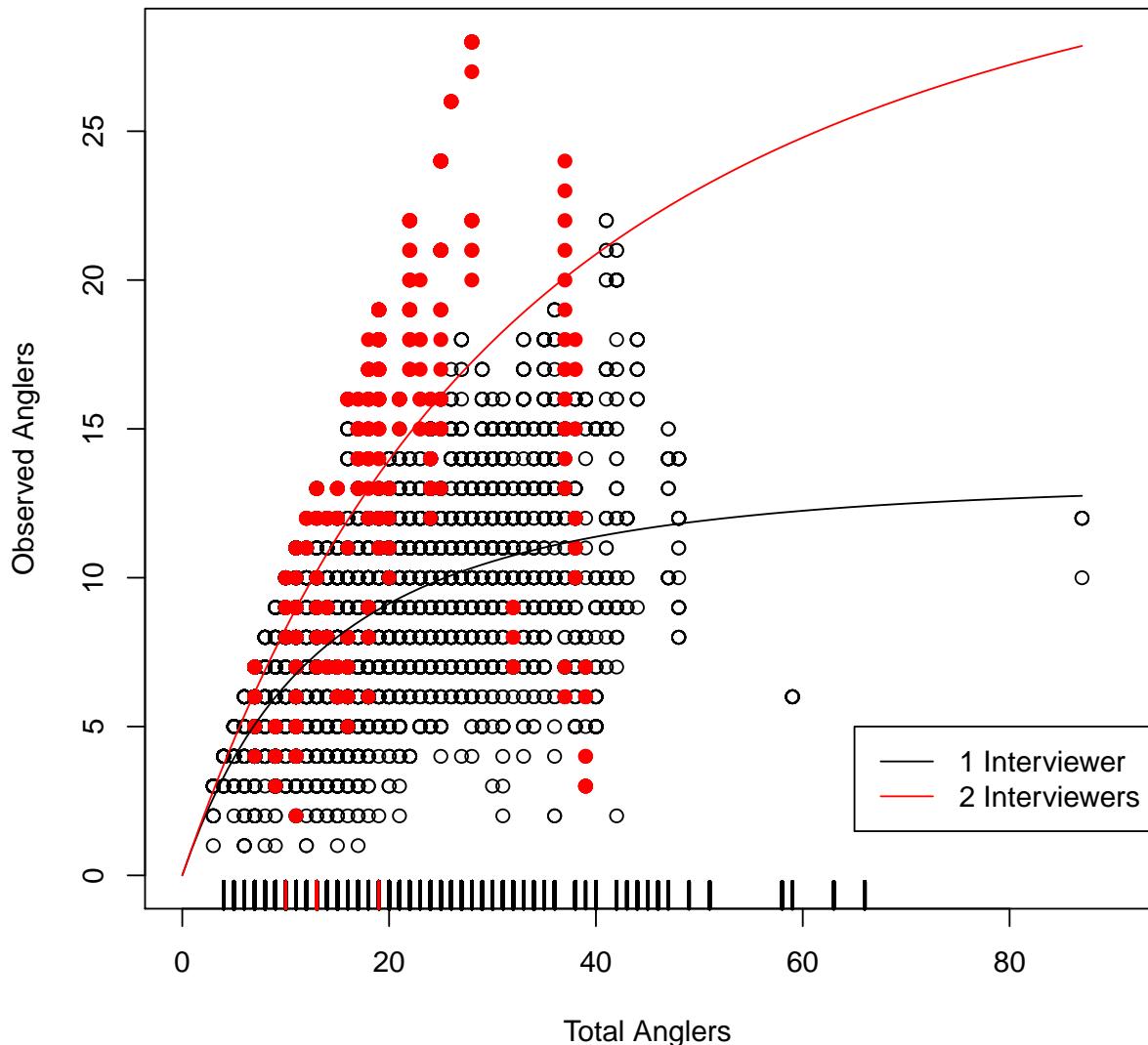


Figure E2: The number of observed anglers plotted as a function of the number of total anglers. The binomial mean curves are plotted on the scale of the data, and colored to indicate if the data was collected in the presence of one or two interviewers. Additionally, a total anglers rug plot is included to show the total angler data for which the number of observed anglers needs to be imputed.

10360 **Appendix F. Reef Delineation and Drift Selection**  
10361 **Methodologies**

10362 **Reef Delineation** We identified reefs as potential habitat for China rockfish in California,  
10363 Oregon and Washington using a variety of newly available spatial data sources, including 2,  
10364 3 and 5 m bathymetry, substrate, lithology and Habitat Suitability geodatabases. Available  
10365 data sources varied by latitude. To delineate reefs from Point Conception to the Oregon  
10366 border we used a 2 m binary raster layer (3 m for Cordell Bank) for substrate, where 1 =  
10367 rough, and 0 = smooth habitat (California Seafloor Mapping Project, data available from:  
10368 <http://seafloor.otterlabs.org/index.html>). Rough and smooth substrate was identified by  
10369 CSMP using 2 rugosity indices based upon bathymetric data, surface:planar area (SA:PA),  
10370 and vector ruggedness measure (VRM). We considered areas identified as ‘rough’ as reef  
10371 habitat. For reefs named Asilomar, Cypress Point, Portuguese Ledge, and Point Joe only a  
10372 portion of the reefs were mapped at the 2 m resolution, therefore to identify the remaining  
10373 reef, we used either a 5 m resolution VRM dataset, where the VRM cutoff was greater than  
10374 0.001 (Young et al. 2010). For all reefs derived from either 2 m, 3 m or 5 m resolution,  
10375 we applied a 5 m buffer around each reef habitat for potential error in positional accuracy  
10376 and all reefs with an area greater than or equal to 100 m<sup>2</sup> were included. We identified  
10377 seven reefs outside of the 2 m layer that contained a significant number of CPFV points,  
10378 which we decided to include in the indices. Big Reef, Blunts Reef, Isle of St. James, Point  
10379 Sur Deep, Sandhill Ledge, portions of San Gregario and Soap Bank reefs were located just  
10380 outside of 2 m, 3 m and 5 m ‘footprint’, therefore for these reefs we used the 2005 Habitat  
10381 Suitability Probability (HSP) geodatabase for China rockfish (NMFS 2005). The HSP is a  
10382 modeled output from Essential Fish Habitat geodatabase and is based upon habitat data,  
10383 depth, and location, where input data are NMFS trawl datasets. In order to identify reef  
10384 habitats from the Oregon border to Washington, we used a lithology shapefile (Goldfinger et  
10385 al. 2014) that was based upon multiple seafloor mapping surveys including multibeam and  
10386 sidescan sonar, sediment grab and core samples, and images. Seafloor types were classified  
10387 according to established classification schemes (Greene et al. 1999). We considered the  
10388 following lithology types as ‘reef habitat:’ Boulder, cobble, cobble mix, hard, rock, and rock  
10389 mix. All spatial data was projected to NAD 1983 UTM Zone 10.

10390 Reef systems were grouped and stratified by depth at a spatial scale biologically meaningful  
10391 to China rockfish. China rockfish are typically sedentary and have high site fidelity,  
10392 therefore we grouped reefs in consideration of how a China rockfish would experience its sur-  
10393 roundings. Lea (1999) recaptured China rockfish in the same general location as where they  
10394 were released, however a few individuals of other rockfish species (copper (*Sebastodes caurinus*),  
10395 gopher (*Sebastodes carnatus*), olive (*Sebastodes serranoides*) and yellowtail (*Sebastodes flavidus*))  
10396 demonstrated movement up to 1.5 nautical miles (about 2,700 m), but all were captured  
10397 within the same reef system. In the Puget Sound copper, brown and quillback were found  
10398 to have a home range less than 30m<sup>2</sup> in high relief rocky areas (Matthews 1990). In other  
10399 rockfish movement studies, China rockfish were tagged but never recaptured, or there was a

sample size of 1 (Hannah and Rankin 2011), Hannah 2012). Using this limited information, we considered that China rockfish would swim no more than 200 m over smooth, sand, or muddy habitat to a neighboring reef, therefore if a reef was greater than ~200 m from rocky reef habitat it was considered a different reef system. If a reef system has contiguous habitat (no channels greater than 200 m) it remained intact, no matter how large the reef (Figures F1 and F2). A small number of reefs were merged into ‘super reefs’ to accommodate 1980s-1990s CDFW location codes that overlapped multiple reefs []. Reef areas were calculated using the zonal stats tool in ArcGIS, stratified by the depth bins 0-19 m, 20-39 m, 40-59 m, 60-79 m, 80-99 m and greater than 100 m using the CSMP depth raster (2 m, 3 m or 5 m resolution). To get depths for those reefs outside the CSMP ‘footprint’ we used the NOAA Coastal Relief Model raster dataset (90 m) for California, and 100 m digital elevation model (DEM) bathymetry from the Active Tectonics and Seafloor Mapping Lab for Oregon.

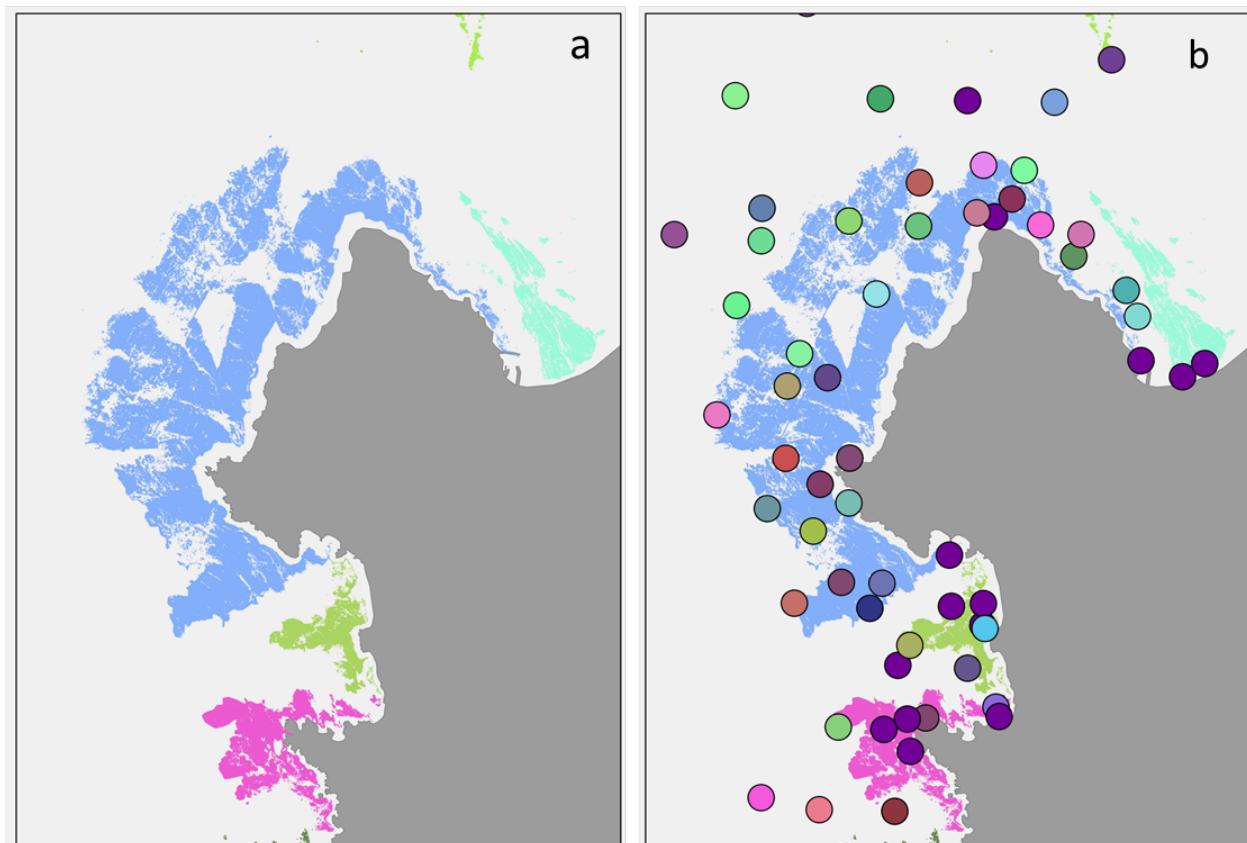


Figure F1: Map of the reefs near the Monterey peninsula in CA (a) and overlaid with the fishing location codes from the CDFW 1987-1998 onboard observer program. All fishing locations follow the confidentiality guidelines and were fished by at least three vessels during the study. Note that the size of the fishing location points does not reflect the area fished.

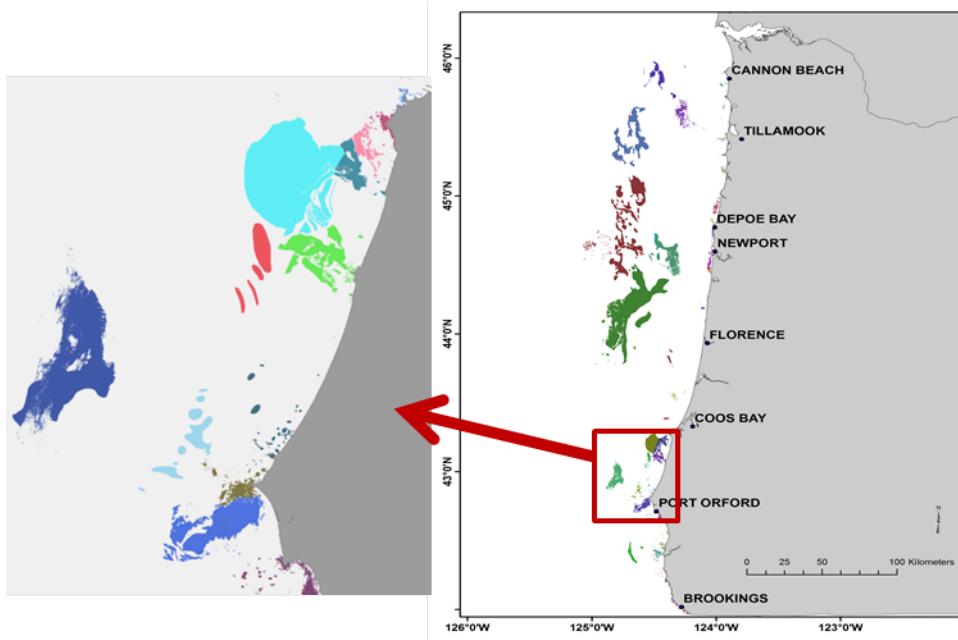


Figure F2: Example of the reefs in Oregon.

10412 Regions were designated to gain appropriate sample sizes needed for modelling. For Oregon,  
 10413 region differences north and south of Florence were explored. In California, 12 regions north  
 10414 of Pt. Conception were defined as follows:

- 10415 Region 1: Pt. Conception to Pt. Arguello
- 10416 Region 2: Purisima Point to Pt. Sal
- 10417 Region 3: San Luis Obispo Bay to Mill Creek ( $39.959^{\circ}$  N)
- 10418 Region 4: Lopez Point to Monterey Peninsula
- 10419 Region 5: Moss Landing to San Francisco Bay
- 10420 Region 6: Farallon Islands
- 10421 Region 7: Point Bonita to Drakes Bay
- 10422 Region 8: Point Reyes to Point Arena
- 10423 Region 9: Point Arena to south of Ten Mile River
- 10424 Region 10: north of Ten Mile River to Cape Mendocino ( $40.16667^{\circ}$  N)
- 10425 Region 11: Cape Mendocino to Eel River
- 10426 Region 12: Trinidad Head to CA/OR border

10427 **CPFV drift selection** During the 1987-1998 CDFW onboard observer program, fishing  
 10428 location was recorded as one of 459 location codes. When available, the observer also recorded  
 10429 coordinates, either latitude/longitude or Loran. The SWFSC converted all Loran coordinates  
 10430 to latitude/longitude. Using the fishing stops with available coordinates, we assigned a  
 10431 fishing location code to a reef. A handful of fishing location codes were obviously not  
 10432 associated with a reef, or a reef as identified in the above methods, and were not selected in  
 10433 the final dataset. If the coordinates spanned two reefs and we were unable to tell which reef

10434 was consistently fished for a given location code, we created aggregated the reefs. This most  
10435 commonly occurred around the Monterey Bay peninsula. This was necessary as two-thirds  
10436 of the fishing stops encountering China rockfish had no recorded coordinates and allowed  
10437 us to retain all fishing location data. Therefore, for the 1987-1998 CDFW data, any fishing  
10438 location that was assigned to a reef was included in the analyses as one of the filters applied  
10439 to the data.

10440 For each CPFV location in the California 1999-2014 and Oregon 2001-2014 data we calcu-  
10441 lated depth, nearest reef, distance from reef, nearest MPA, distance from MPA using ArcGIS.  
10442 Geoprocessing steps used were ‘near’ and ‘extract values to points.’ For consistency across  
10443 databases, we used the starting location of the drift to determine if the drift was targeting  
10444 fish associated with a reef. Drifts that had a distance of 0 m, i.e., were fishing directly on the  
10445 reef, were included in analyses. Recognizing that some drifts begin adjacent to a reef with  
10446 the intention of drifting on to the reef, as well as the fact that the starting location may not  
10447 be recorded at the very start of a drift, we devised a method for including drifts within a  
10448 certain distance of a reef.

10449 We compiled a list of rockfish species that are strictly reef associated (black and yellow rock-  
10450 fish (*Sebastodes chrysomelas*), canary rockfish (*Sebastodes pinniger*), China rockfish (*Sebastodes*  
10451 *nebulosus*), cowcod (*Sebastodes levis*), flag rockfish (*Sebastodes rubrivinctus*), gopher rockfish  
10452 (*Sebastodes carnatus*), grass rockfish (*Sebastodes rastrelliger*), greenblotched rockfish (*Sebastodes*  
10453 *rosenblatti*), kelp rockfish (*Sebastodes atrovirens*), quillback rockfish (*Sebastodes maliger*), rosy  
10454 rockfish (*Sebastodes rosaceus*), starry rockfish (*Sebastodes constellatus*), Treefish (*Sebastodes serri-*  
10455 *ceps*), vermillion rockfish (*Sebastodes miniatus*), yelloweye rockfish (*Sebastodes ruberrimus*)) (per-  
10456 sonal communication John Field and Tom Laidig, NMFS SWFSC). Using drifts that were  
10457 greater than 0m from a reef and encountered one at least one of the fifteen species listed  
10458 above, we calculated the depth for which 75% of the drifts were included. For Oregon this  
10459 was 83 m, and for California it was 34 m for drifts within the ‘footprint’ and 141 m for drifts  
10460 outside the ‘footprint.’ Any drift (with or without catch) greater than 83 m from a reef was  
10461 excluded from the analyses.

## **10462 Appendix G. Commercial Regulations Histories**

### **10463 Federal waters**

**10464** For a list of the commercial regulations in federal waters see the [Commercial Regulations Home Page](#), which is housed in the CALCOM database.

### **10466 Washington**

**10467** The following commercial regulations pertain to China rockfish species in Washington and  
**10468** were provided by the Washington Department of Fish and Wildlife.

### **10469 2008**

**10470** The groundfish trawl fishery was closed in Washington from the seaward RCA boundary  
**10471** to the shore north of 48°10' N latitude to address increased encounters with yelloweye  
**10472** and canary rockfish

### **10473 2002**

**10474** Non-Trawl RCA closed from shore to 100 fm north of 46°16' N latitude

### **10475 1995**

**10476** Commercial hook-and-line fishing in state waters (0-3 miles) was closed to preserve  
**10477** recreational fishing opportunities and avoid localized depletion; trawlers included in  
**10478** 1999

### **10479 1992**

**10480** Commercial hook-and-line limits reduced to 100 lbs north of Cape Alava and from  
**10481** Destruction Island to Leadbetter Pt.

### **10482 Oregon**

**10483** The following commercial regulations pertain to China rockfish in Oregon and were provided  
**10484** by the Oregon Department of Fish and Wildlife.

**10485** China rockfish are managed in the Other Nearshore Rockfish complex

**10486** **Harvest cap:** Total amount in regulation allowed to be impacted in a fishery (for a given  
**10487** season) including both discard mortality and landed catch mortality. Prior to 2007 this term  
**10488** was synonymous with “landing cap.”

**10489** **Landing cap:** Total amount in regulation allowed to be landed in a fishery (for a given  
**10490** season). Includes only landed catch mortality (known as a harvest cap before 2007).

### **10491 Incidental Catch Limits in Other Fisheries (established in 2004)**

**10492** **Non-permitted vessels:** 15 lbs per day of black rockfish, blue rockfish, and nearshore fish,  
**10493** combined, for no more than one landing per day. These species must make-up 25% or less  
**10494** of landed poundage, and must be taken with gear legal in the permitted fishery.

10495 **Groundfish trawl fishery:** Vessels may land no more than 1,000 lbs of dead black rockfish,  
10496 blue rockfish, and nearshore fish combined per calendar year if these species make-up 25%  
10497 or less of landing.

10498 **Non-profit aquaria or vessels contracted by non-profit aquaria** may land black  
10499 rockfish, blue rockfish, and nearshore fish for purposes of display or for conducting research  
10500 on these species.

10501 **Regulations History**

10502 A minimum size limit of 12 inches (measured from the tip of the snout to the extreme end  
10503 of the tail) was implemented for China rockfish in 2000. A sorting requirement for China  
10504 rockfish was implemented in 2003.

10505 **2014**

10506 Other Nearshore Rockfish landing cap: 14.3 mt

10507 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10508 Rockfish Conservation Area: fishing restricted to inside 30 fm

10509 **2013**

10510 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-  
10511 fishes)

10512 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10513 Legal Gear Types: hook-and-line (including pole and line, troll, longline, and stick  
10514 gear) and pot gear (max 35 pots) if a Developmental Fisheries permit for Nearshore  
10515 species using pot gear was issued in 2003

10516 Rockfish Conservation Area: fishing restricted to inside 30 fm

10517 **2012**

10518 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-  
10519 fishes)

10520 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10521 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted  
10522 to inside 20 fm from 42° – 43° N

10523 **2011**

10524 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-  
10525 fishes)

10526 Other Nearshore Rockfish Period Limits: All Periods 700 lbs

10527 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted  
10528 to inside 20 fm from 42° – 43° N

- 10529 **2010**
- 10530 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-fishes)
- 10531
- 10532 Other Nearshore Rockfish Period Limits: All Periods 700 lbs
- 10533 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted to inside 20 fm from 42° – 43° N
- 10534
- 10535 **2009**
- 10536 Other Nearshore Rockfish landing cap: 14.3 mt (excluding tiger and vermillion rock-fishes)
- 10537
- 10538 Other Nearshore Rockfish Period Limits: All Periods 700 lbs
- 10539 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
- 10540
- 10541
- 10542 Rockfish Conservation Area: fishing restricted to inside 30 fm north of 43° N, restricted to inside 20 fm from 42° – 43° N
- 10543
- 10544 **2008**
- 10545 Other Nearshore Rockfish landing cap: 12.0 mt (excluding tiger and vermillion rock-fishes)
- 10546
- 10547 Other Nearshore Rockfish Period Limits: All Periods 700 lbs
- 10548 Sorting Requirement for All Nearshore Rockfish to Species: first year of all nearshore rockfish recorded to species on commercial fish tickets
- 10549
- 10550 Rockfish Conservation Area: fishing restricted to inside 30 fm
- 10551 **2007**
- 10552 First year of commercial landing caps (formerly known as harvest caps)
- 10553 Other Nearshore Rockfish landing cap: 12.0 mt (excluding tiger and vermillion rock-fishes)
- 10554
- 10555 Other Nearshore Rockfish Period Limits: All Periods 600 lbs
- 10556 Rockfish Conservation Area: fishing restricted to inside 30 fm
- 10557 9/1: Other Nearshore Rockfish changes: Period 5 increase to 700 lbs; Period 6 increase to 700 lbs
- 10558
- 10559 11/28: Other Nearshore Rockfish change: Period 6 closed
- 10560 **2006**
- 10561 First and only year with 1-month trip limits
- 10562 Other Nearshore Rockfish harvest cap: 13.5 mt (including tiger and vermillion rock-fishes)
- 10563

- 10564 Other Nearshore Rockfish 1-month Period Limits: All Periods 200 lbs per month  
10565 Rockfish Conservation Area: fishing restricted to inside 30 fm  
10566 7/1: Other Nearshore Rockfish change: July increase to 300 lbs  
10567 8/11: Other Nearshore Rockfish changes: increase to 350 lbs per month for all remain-  
10568 ing months
- 2005**
- 10569 Other Nearshore Rockfish harvest cap: 12.0 mt 16.0 mt (excluding tiger and vermillion  
10570 rockfishes, 13.5 mt including these fish)  
10571 Other Nearshore Rockfish Period Limits (Sub-limit from black and blue Rockfish trip  
10572 limits): (includes tiger and vermillion rockfishes, sublimit of black and blue Rockfish  
10573 limit): All Periods: 450 lbs  
10574 Rockfish Conservation Area: fishing restricted to inside 30 fm  
10575 5/1: Other Nearshore Rockfish changes: Periods 3 thru 5 decrease to 325 lbs  
10576 10/11: Other Nearshore Rockfish changes: Period 5 and 6 increase to 400 lbs
- 2004**
- 10577 Permit required for vessels to land black and blue rockfishes and other nearshore fish  
10578 identified in House Bill 3108  
10579 Nearshore logbook required for all vessels participating in the fishery  
10580 ODFW allowed to prescribe legal gear under this permit except: 1. Diving gear may not  
10581 be used 2. Pots may not be used unless a vessel was previously issued a pot endorsement  
10582 in the Interim Nearshore Fisheries Plan through the Developmental Fisheries Program  
10583 during 2003  
10584 Other Nearshore Rockfish harvest cap: 16.0 mt (including tiger and vermillion rock-  
10585 fishes)  
10586 Other Nearshore Rockfish 1-month Period Limits (Sub-limit from black and blue Rock-  
10587 fish trip limits): (includes tiger and vermillion Rockfish), All Periods: 450 lbs  
10588 Rockfish Conservation Area: fishing restricted to inside 30 fm  
10589 9/28: Other Nearshore Rockfish change: Period 5 decrease to 100 lbs  
10590 11/1: Other Nearshore Rockfish change: Period 6 closed
- 2003**
- 10591 Commercial Nearshore Fishery (21 nearshore species) placed in the Developmental  
10592 Fisheries Program  
10593 House Bill 3108 establishes formal management of the commercial nearshore fishery,  
10594 comprised of landings of species on the 'nearshore fish' list beginning, January 1, 2004  
10595 Oregon Fish and Wildlife Commission first establishes harvest caps for nearshore  
10596 species: Other Nearshore Rockfish harvest cap: 21.3 mt

10600 Bi-monthly trip limits first put into place mid-season (July 16th) in 2003  
10601 Other Nearshore Rockfish (Sub-limit from black and blue rockfish): All periods 300  
10602 lbs  
10603 Rockfish Conservation Area: fishing restricted to inside 27 fm from January – October

10604 **2002**

10605 In October, the Pacific Fishery Management Council adopted conservative harvest  
10606 limits for 2003 equal to landings from 2000  
10607 Oregon Fish and Wildlife Commission directs the Marine Resources Program to eval-  
10608 uate a harvest reduction equal to or greater than 20  
10609 Interim commercial harvest management plan implemented place a cap on fishery par-  
10610 ticipants and reduced the nearshore fleet by 50  
10611 National Marine Fishery Service begins collecting fishery-dependent data at-sea from  
10612 vessels participating in the fishery

10613 **2000**

10614 Pacific City Open Access Minor Nearshore Rockfish Limit (including black and blue  
10615 rockfish here): May 1 - September 30 limit 2,200 lbs per month of which no more than  
10616 700 lbs can be rockfish other than black and blue rockfishes

10617 **1997**

10618 New live fish markets in California accelerate growth of the Commercial Nearshore  
10619 Fishery

10620 **Early to mid 1990s**

10621 Commercial Nearshore Fishery develops as an open access fishery

10622 **California**

10623 The following commercial regulations pertain to China rockfish species in California and  
10624 were provided by the California Department of Fish and Wildlife. There has been a 12 inch  
10625 minimum size limit on China rockfish since 2001.

10626 **Gear Restrictions**

10627 **2001**

10628 hook-and-line limited to 150 hooks with 15 hooks per line within 1 mile of shore

10629 **1996**

10630 Finfish trap permit required

- <sup>10631</sup> **1994**  
<sup>10632</sup> Proposition 132 implemented to prohibit gill nets within state waters
- <sup>10633</sup> **1953**  
<sup>10634</sup> Legislation prohibits trawl within 3 miles of shore
- <sup>10635</sup> **Trip Limits and Depth Restrictions**
- <sup>10636</sup> Trips limits now vary according to constraints from bycatch of canary and yelloweye rock-fishes
- <sup>10637</sup>
- <sup>10638</sup> **2003**  
<sup>10639</sup> A shallow nearshore permit is needed in 4 management regions  
<sup>10640</sup> Trip limits for restricted access fishery, with differential trip limits north and south of  
<sup>10641</sup> 40°10' N  
<sup>10642</sup> Subject to depth restrictions consistent with the shoreward non-trawl RCA
- <sup>10643</sup> **2002**  
<sup>10644</sup> Closed all waters January and February south of 34°27' N  
<sup>10645</sup> Closed all waters March and April between 40°10' N and 34°27' N March-April
- <sup>10646</sup> **2001**  
<sup>10647</sup> Closed January and February outside of 20 fm south of 34°27' N  
<sup>10648</sup> Closed March and April all waters between 40°10' N and 34°27' N
- <sup>10649</sup> **2000**  
<sup>10650</sup> Closed January and February south of 36° N  
<sup>10651</sup> Closed March and April between 40°10' N and 36° N
- <sup>10652</sup> **1999**  
<sup>10653</sup> Nearshore fishery permit required
- <sup>10654</sup> **1994**  
<sup>10655</sup> Limited entry permits and open access fishery established for *Sebastodes* complex  
<sup>10656</sup> Limited entry and open access trip limits on the *Sebastodes* complex
- <sup>10657</sup> **Nearshore Fishery Bycatch Permit** This special non-transferable permit is issued as of  
<sup>10658</sup> 2003 to those qualifying individuals who use either trawl or entangling nets (gill nets). It  
<sup>10659</sup> allows a minimal bycatch of minor nearshore species (which includes China rockfish) as per  
<sup>10660</sup> the following:
- <sup>10661</sup> South Central Coast Region 25 pounds of nearshore fish stocks may be taken per trip  
<sup>10662</sup> South Coast Region – 50 pounds of nearshore fish stocks may be taken per trip  
<sup>10663</sup> No permits are issued for either the North Coast or North-Central Coast Regions.

**10664 Appendix H. Recreational Regulations Histories**

**10665 Washington**

**10666** The following recreational regulations pertain to nearshore rockfish species in Washington  
**10667** and were provided by the Washington Department of Fish and Wildlife. The sport regula-  
**10668** tions run from 1 May to 30 April the following year. Depth restrictions were implemented  
**10669** late in the summer of 2005 by emergency rule and became permanent in 2006.

**10670 North Coast (MCA 3 and 4)**

**10671 2014-2013**

**10672** May 1 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms except  
**10673** lingcod; Pacific cod and sablefish on days open to halibut fishing

**10674 2012-2011**

**10675** June 1 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms, except on  
**10676** days open to halibut fishing

**10677 2010-2009**

**10678** May 21 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms except on  
**10679** days open to halibut fishing

**10680 2008-2007**

**10681** May 21 - Sept 30: Groundfish retention is prohibited seaward of 20 fathoms

**10682 2006**

**10683** May 21 - Sept 30: Rockfish and lingcod retention is prohibited seaward of 20 fathoms

**10684 South Coast (MCA 2)**

**10685 2014-2013**

**10686** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms except  
**10687** rockfish; Pacific cod and sablefish allowed May 1 June 15; lingcod allowed on days  
**10688** open to halibut

**10689 2012-2011**

**10690** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms except  
**10691** rockfish; Pacific cod and sablefish allowed May 1 June 15; lingcod allowed on days  
**10692** open to halibut

**10693 2010-2009**

**10694** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms; Pacific  
**10695** cod and sablefish allowed May 1 June 15

**10696 2008-2007**

**10697** March 18 - June 15: Groundfish retention is prohibited seaward of 30 fathoms; Pacific  
**10698** cod and sablefish allowed May 1 June 15

**10699 2006**

**10700** March 18 - June 15: Rockfish and lingcod retention is prohibited seaward of 30 fathoms

**10701 Columbia River (MCA 1)** This area has no depth restriction.

**10702 2014-2006**

**10703** Year-round: No groundfish except Pacific cod and sablefish allowed with halibut on  
**10704** board

**10705 Daily Groundfish and Rockfish Limits**

**10706** Groundfish includes: rockfish, Pacific cod, flatfish (except halibut), lingcod, ratfish, sablefish,  
**10707** cabezon, greenling, sculpins, sharks, skates, and surfperch excluding shiner perch. There are  
**10708** sub-bag limits for lingcod (2) coastwide and cabezon (1) in Marine Area 4. The groundfish  
**10709** daily bag limit in Marine Area 4B was reduced to 10 in 2011.

**10710** Groundfish Daily Limits

**10711** **2015-2011:** 12 fish

**10712** **2010-1961:** 15 fish

**10713** **1960-1938:** 20 lbs/day

**10714** Rockfish Daily Limits

**10715** There is no minimum size limit for rockfish. Marine Area 4B bag limit allows retention of 6  
**10716** blue and black rockfish only (2010-2015).

**10717** **2015-1995:** 10 fish

**10718** **1994-1992:** 12 fish

**10719** **1991-1961:** 15 fish

**10720** **1960-1954:** 20 lb/day

**10721 Oregon**

**10722** The following regulations pertain to nearshore rockfish species in Oregon and were provided  
**10723** by the Oregon Department of Fish and Wildlife. There were no bag limits prior to 1976.  
**10724** 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**

10759 Same as 2007

10760 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]

10763 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**

10766 Rockfish, Cabezon, greenling (10" min.), and other marine species not listed: 6

10767 40-fm curve: Seaward closed April 1-Sept. 30

**2006**

10769 Rockfish, Cabezon, greenling (10" min.), flounder, sole and other marine species not listed: 6

10771 40-fm curve: Seaward closed June 1-Sept. 30

**2005**

10773 Rockfish, Cabezon, greenling (10" min.), flounder, sole and other marine species not listed: 8

10775 40-fm curve: Seaward closed June 1-Sept. 30

10776 7/16: Rockfish et al. bag limit reduced to 5

10777 10/18: Black RF prohibited for boats, Groundfish closed seaward of 40 fm

**2004**

10779 Rockfish, Cabezon, greenling (10" min.), flounder, sole and other marine species not listed: 10, no more than 1 P. Halibut

10781 Retention of yelloweye rockfish and canary rockfish prohibited

10782 40-fm curve: Seaward closed June 1-Sept. 30

10783 9/3: Rockfish, lingcod and greenling prohibited

**2003**

10785 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

10787 11/21: ocean closed to GF outside 27-fm line

**2002**

10789 Rockfish: 10, no more than 1 Canary RF and 1 Yelloweye RF

**2001**

10791 Rockfish: 10, no more than 1 Canary RF

**10792 2000**

10793 Rockfish: 10, no more than 3 canary RF

**10794 1999-1994**

10795 Rockfish: 15, no more than 10 black rockfish

**10796 1993-1986**

10797 Rockfish, Cabezon and greenling: 15

**10798 1985-1979**

10799 Other fish: 25, no more than 3 lingcod, 2 halibut and 15 rockfish/Cabezon/greenling

**10800 1978**

10801 Other fish: 10 Then effective 4/1 = - other fish: 25, no more than 3 lingcod, 2 halibut  
10802 and 15 rockfish/Cabezon/greenling

**10803 1977**

10804 Other fish: 25, no more than 5 lingcod and 2 halibut

**10805 1976**

10806 Other fish: 25

**10807 California**

10808 The following regulations pertain to nearshore rockfish species in Oregon and were provided  
10809 by the California Department of Fish and Wildlife. In 2000, a 3-hook and 1-line gear re-  
10810 striction was enacted. As of 2001, the gear restriction is 2-hooks and 1-line per angler. The  
10811 general rockfish (Rockfish/Cabezon/Greenling as of 2002) bag limit was 15 fish statewide  
10812 in 1999. As of 2000, it is 10 rockfish. The nearshore rockfish bag limit is the same as the  
10813 general rockfish bag limit except in 2003 and 2004. In 2003, the nearshore rockfish bag limit  
10814 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												

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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>)
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**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

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