Model 1 with new growth function. September 2012 snow crab assessment.

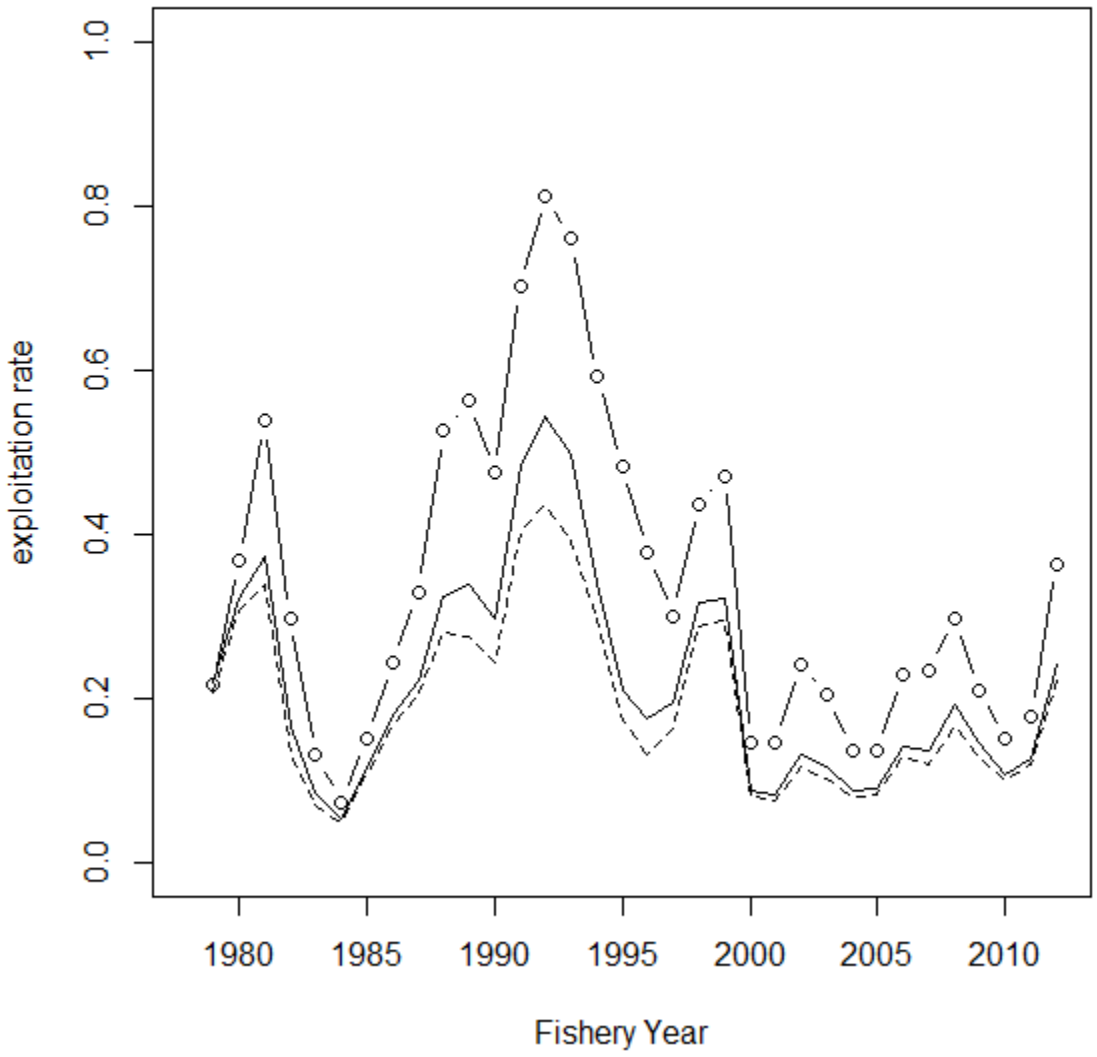

Figure 3. Model 1. Exploitation fraction estimated as the catch biomass (total or retained) divided by the mature male biomass from the model at the time of the fishery (solid line is total and dotted line is retianed). The exploitation rate for total catch divided by the male biomass greater than 101 mm is the solid line with dots. Year is the year of the fishery.

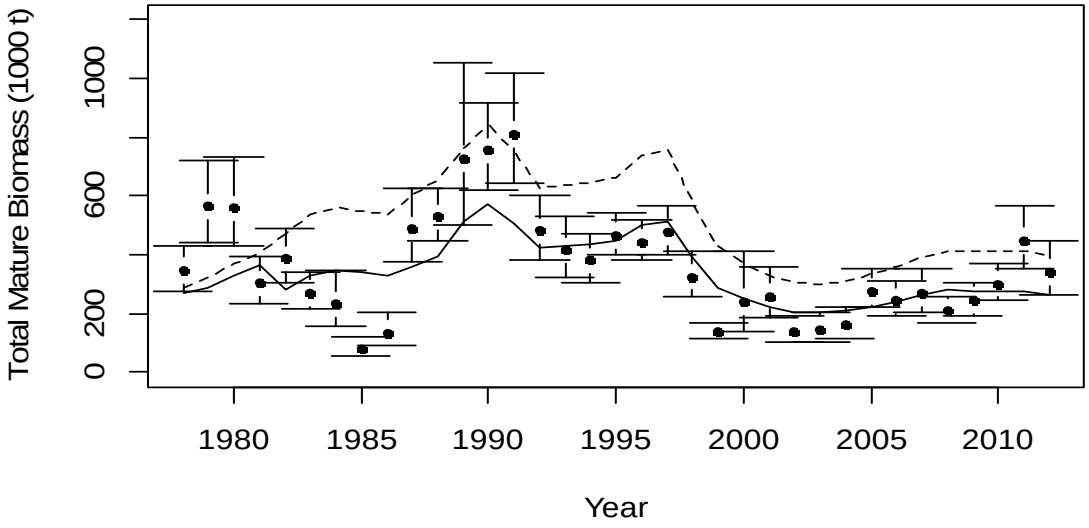

Figure 4. Model 1. Population total mature biomass (millions of pounds, solid line), model estimate of survey mature biomass (dotted line) and observed survey mature biomass with approximate lognormal 95% confidence intervals.

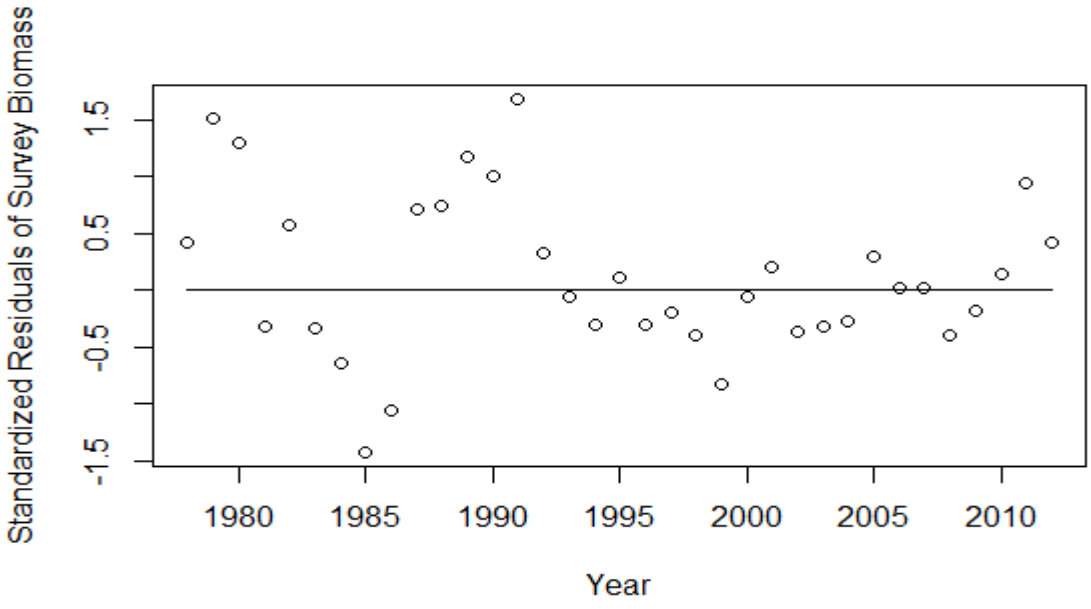

Figure 5. Standardized residuals for model fit to total mature biomass from Figure 4.

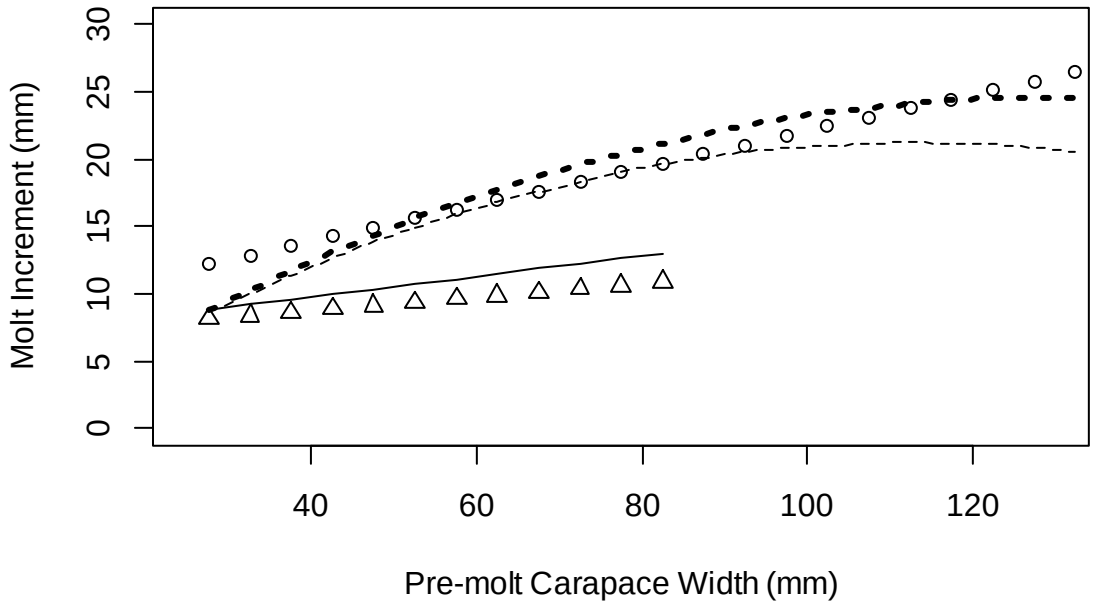

Figure 55. Model 1 with new growth function. Growth(mm) for male(dotted line) and female snow crab (solid line). Circles are the observed growth curve. Heavy dotted line is the growth curve estimated by Somerton from the 2011 growth study (post-molt CW = -0.75 + 1.39 Premolt CW – 0.0015 * (Premolt CW)^2. Estimated parameters model 1 are post-molt CW = -0.659 + 1.386 Premolt CW – 0.0017 *(Premolt CW)^2.

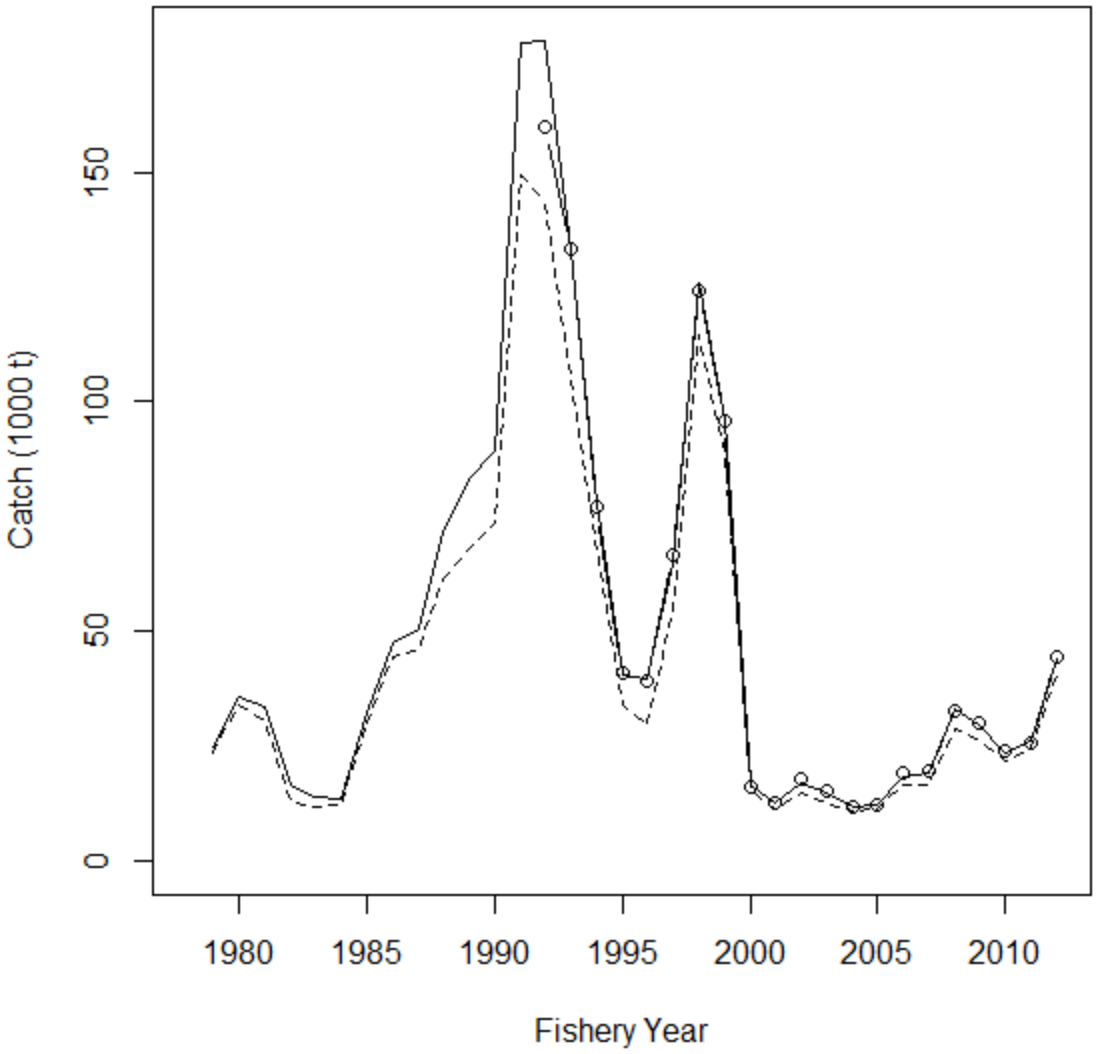

Figure 58. Model 1. Estimated total catch(discard + retained) (solid line), observed total catch (solid line with circles) (assuming 50% mortality of discarded crab) and observed retained catch (dotted line).

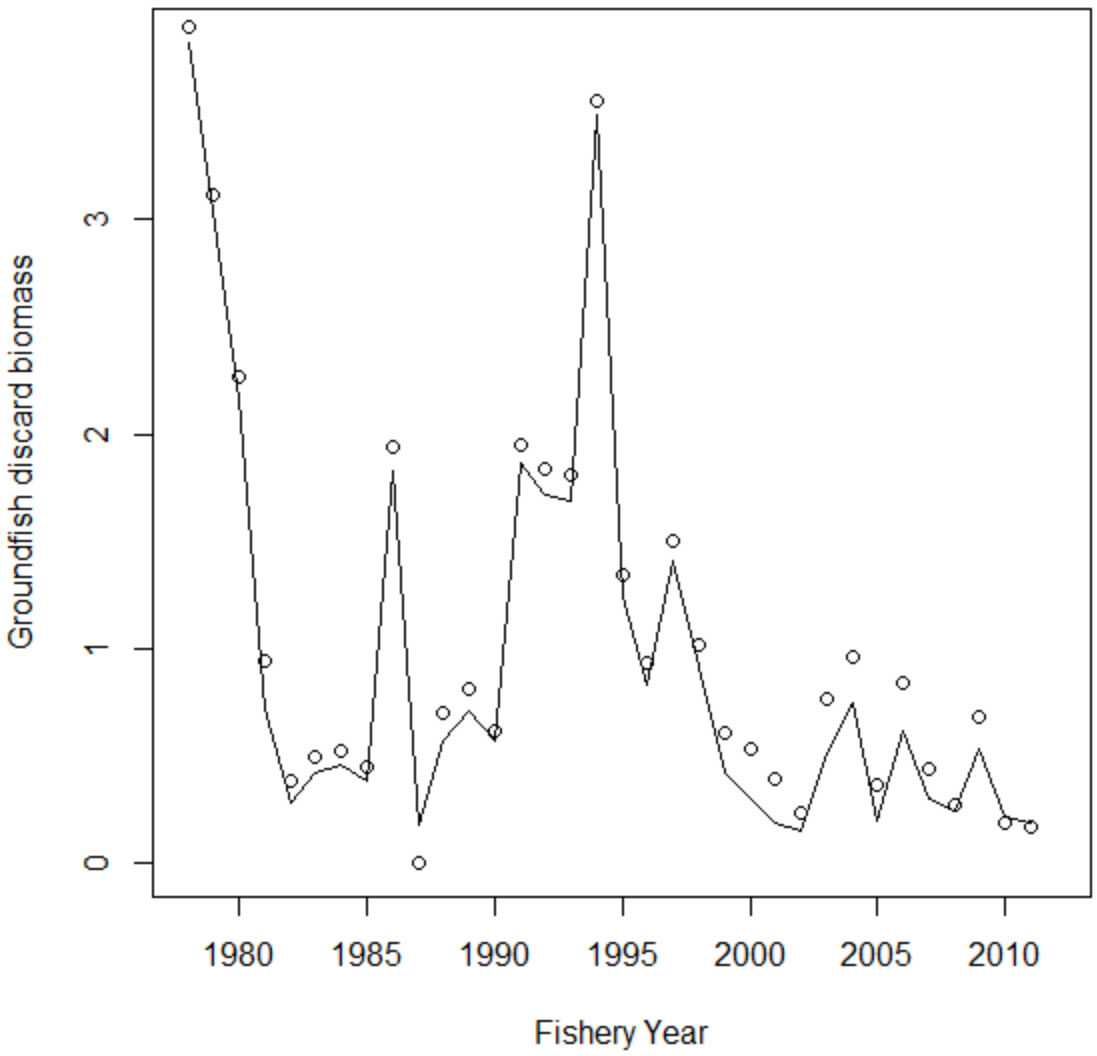

Figure 59. Model 1. Model fit to groundfish bycatch. Circles are observed catch, line is model estimate.

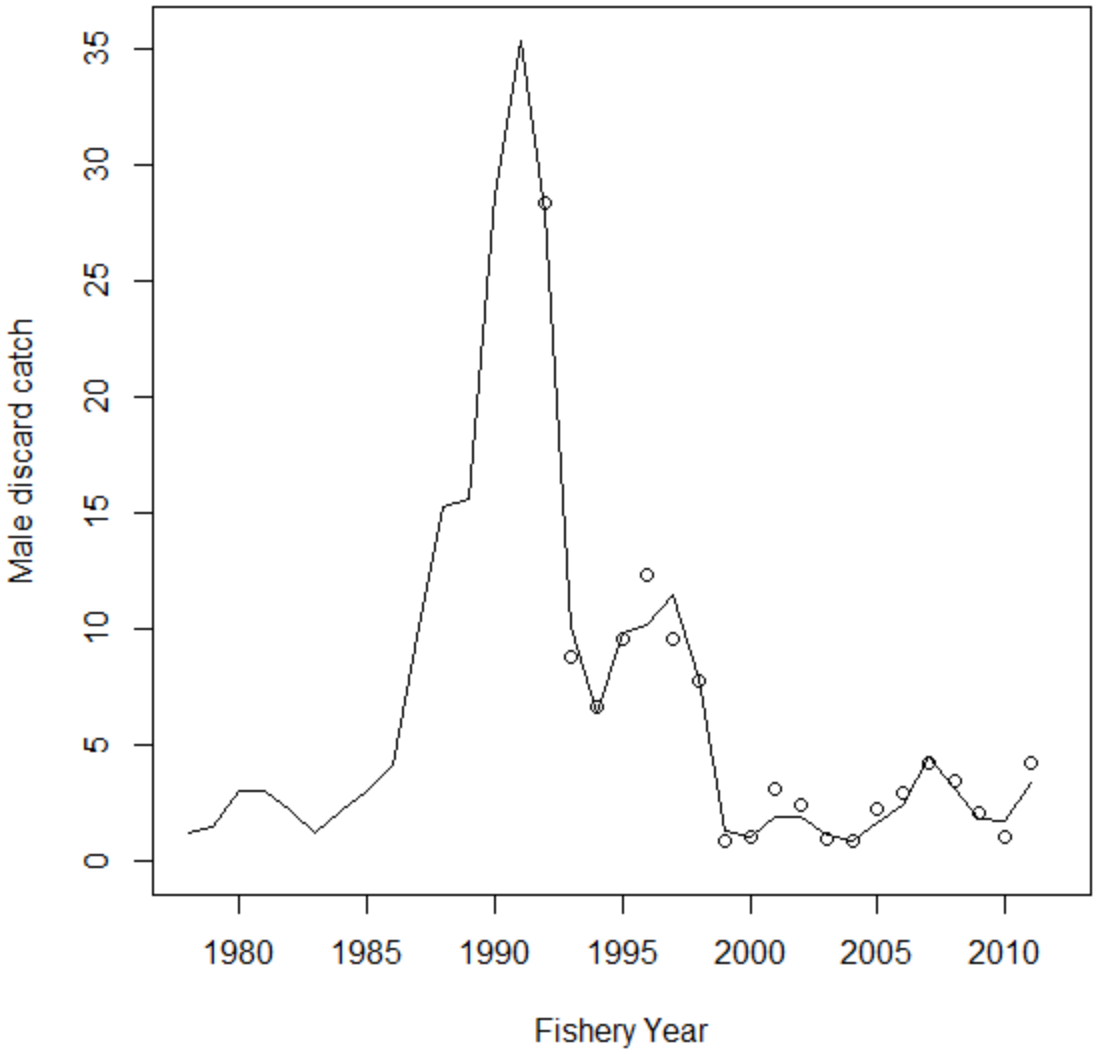

Figure 60. Model 1. Model fit to male directed discard catch for 1992/93 to 2010/11 and estimated male discard catch from 1978 to 1991.

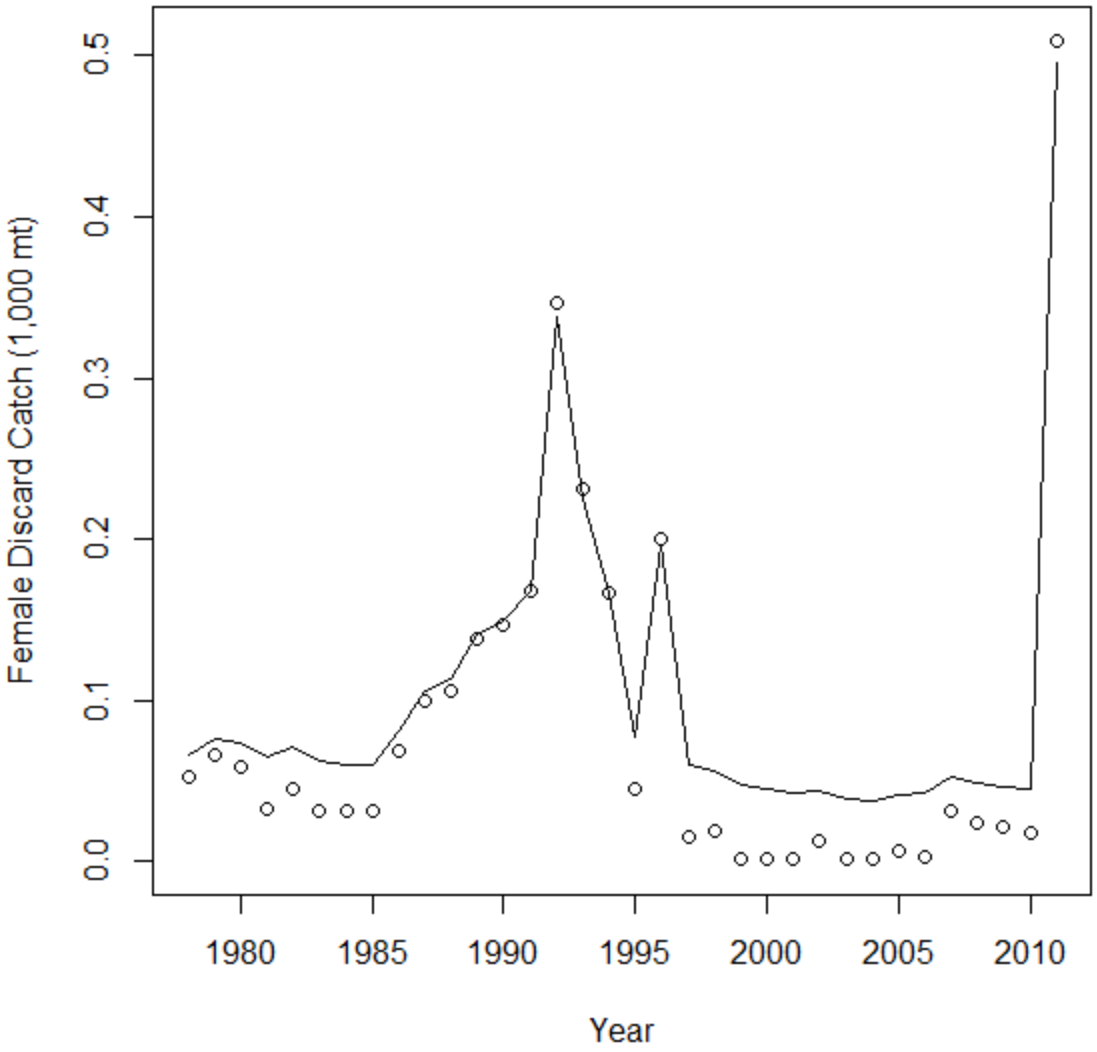

Figure 61. Model 1. Model fit to female discard bycatch in the directed fishery from 1992/93 to 2010/11 and model estimates of discard from 1978 to 1991.

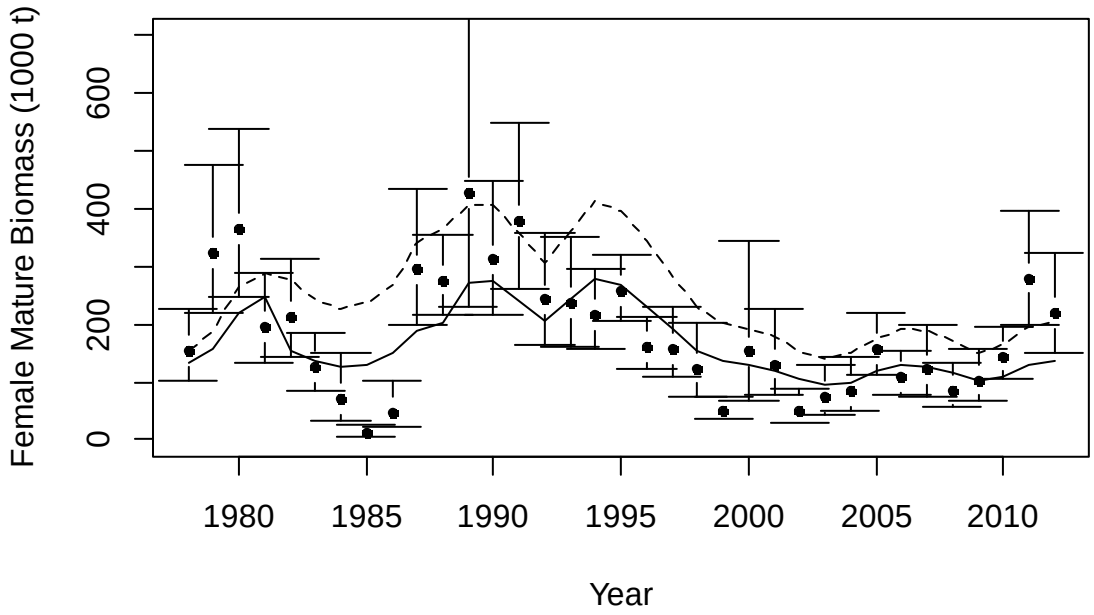

Figure 62. Model 1. Population female mature biomass (1000 t, dotted line), model estimate of survey female mature biomass (solid line) and observed survey female mature biomass with approximate lognormal 95% confidence intervals.

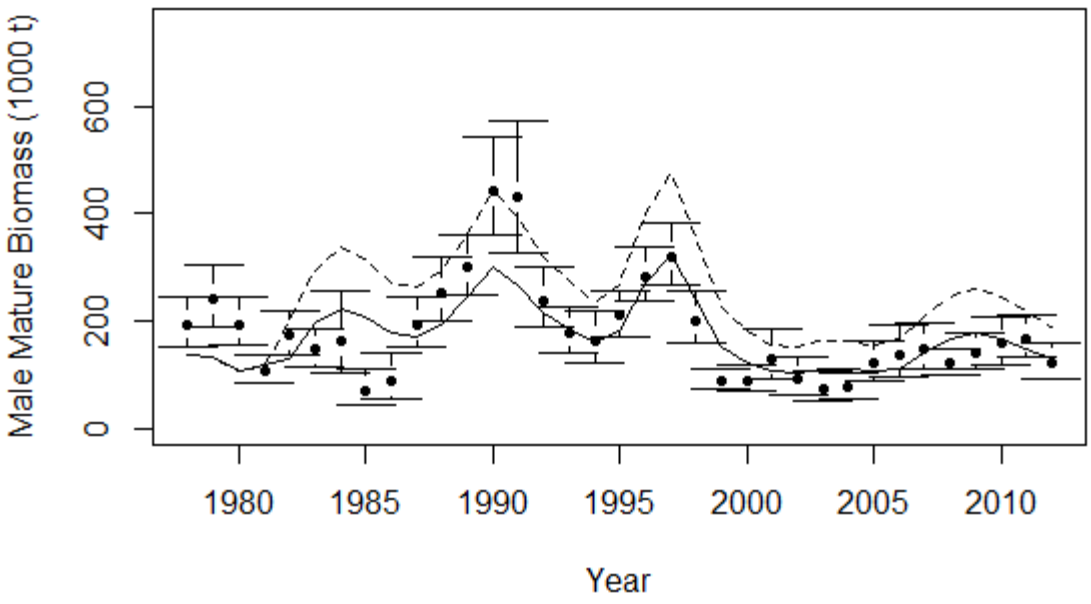

Figure 64. Model 1. Population male mature biomass (1000 t, dotted line), model estimate of survey male mature biomass (solid line) and observed survey male mature biomass with approximate lognormal 95% confidence intervals.

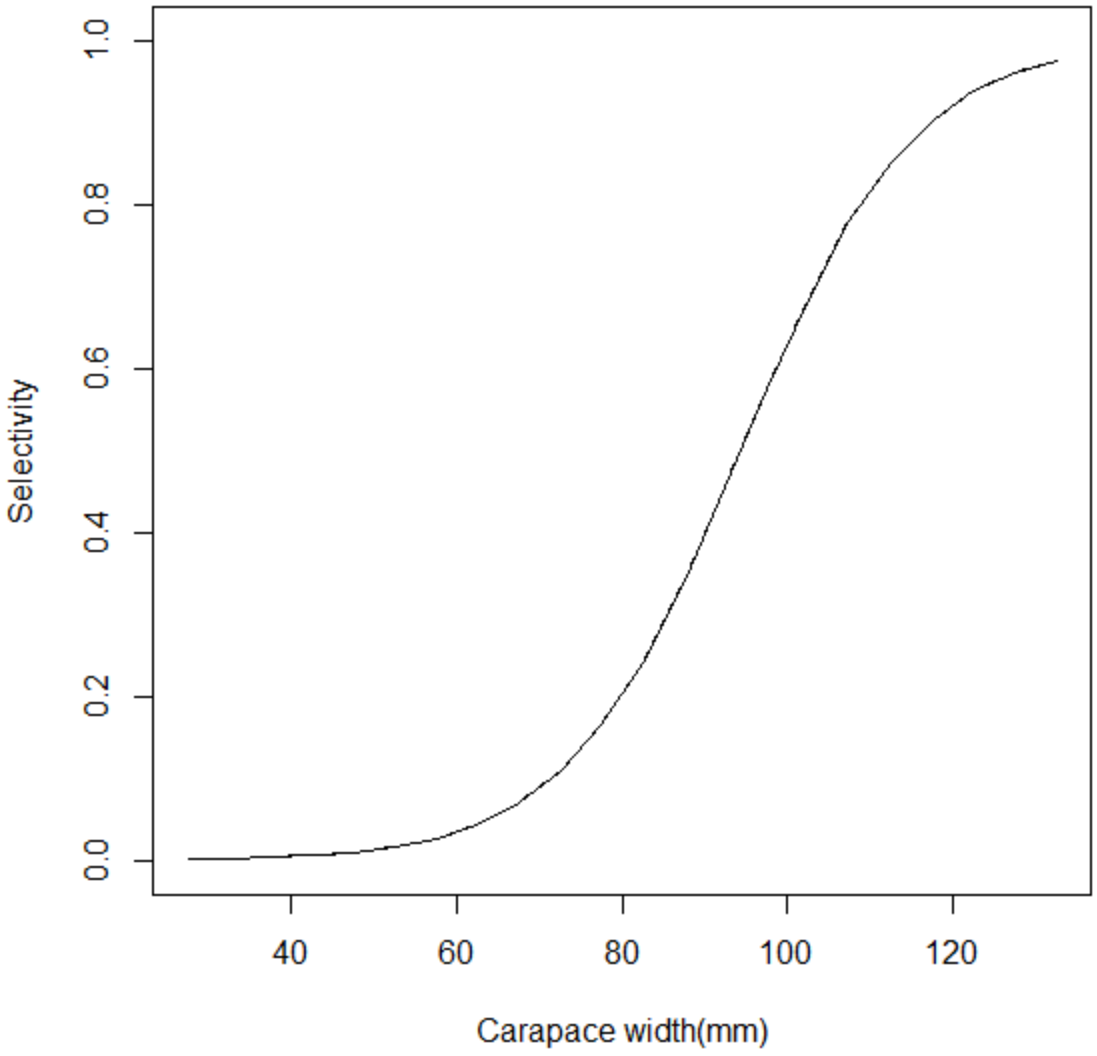

Figure 67. Model 1. Selectivity curve estimated by the model for bycatch in the groundfish trawl fishery for females and males.

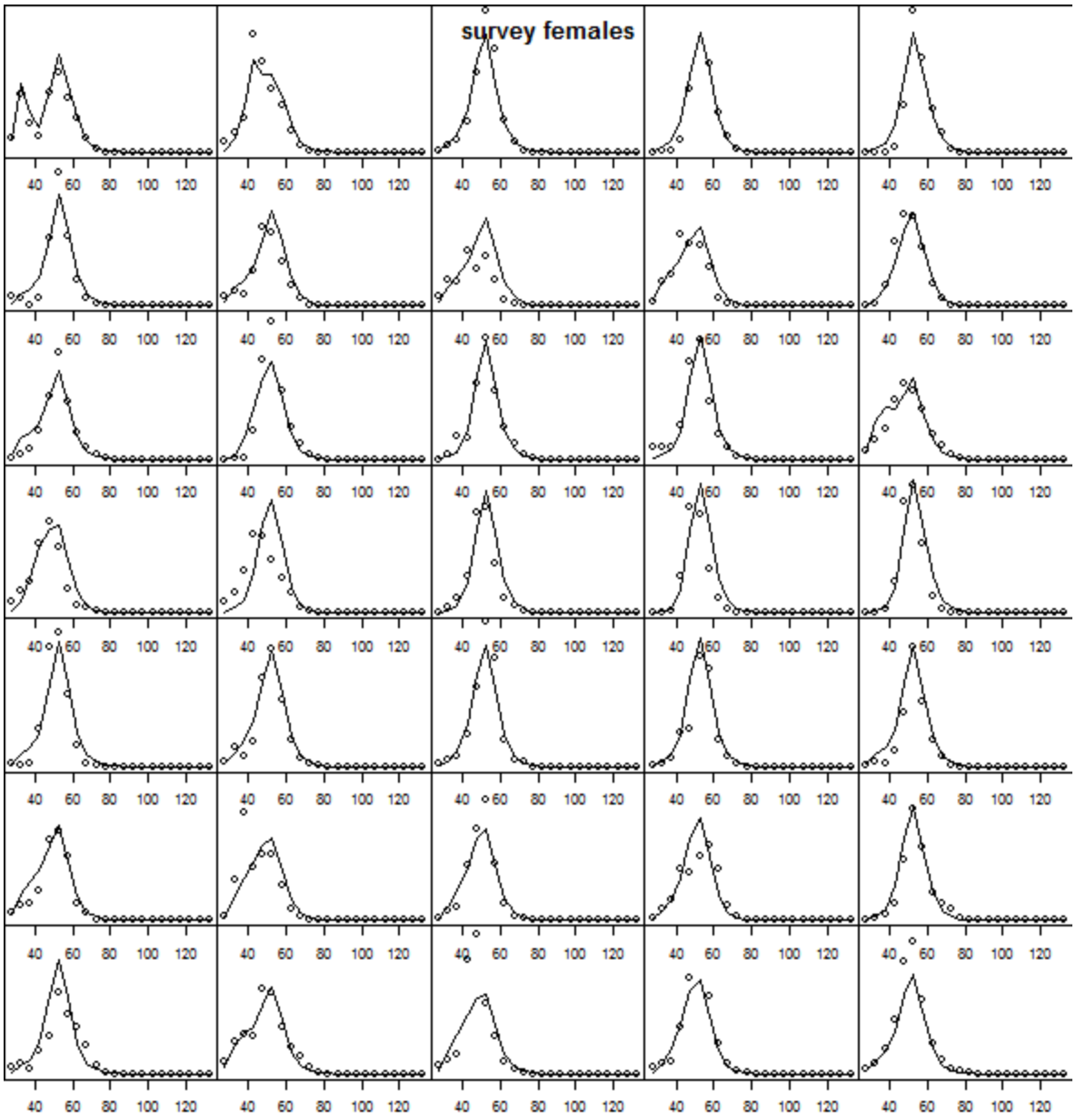

Figure 68. Model 1. Model fit to the survey female size frequency data. Circles are observed survey data. Solid line is the model fit.

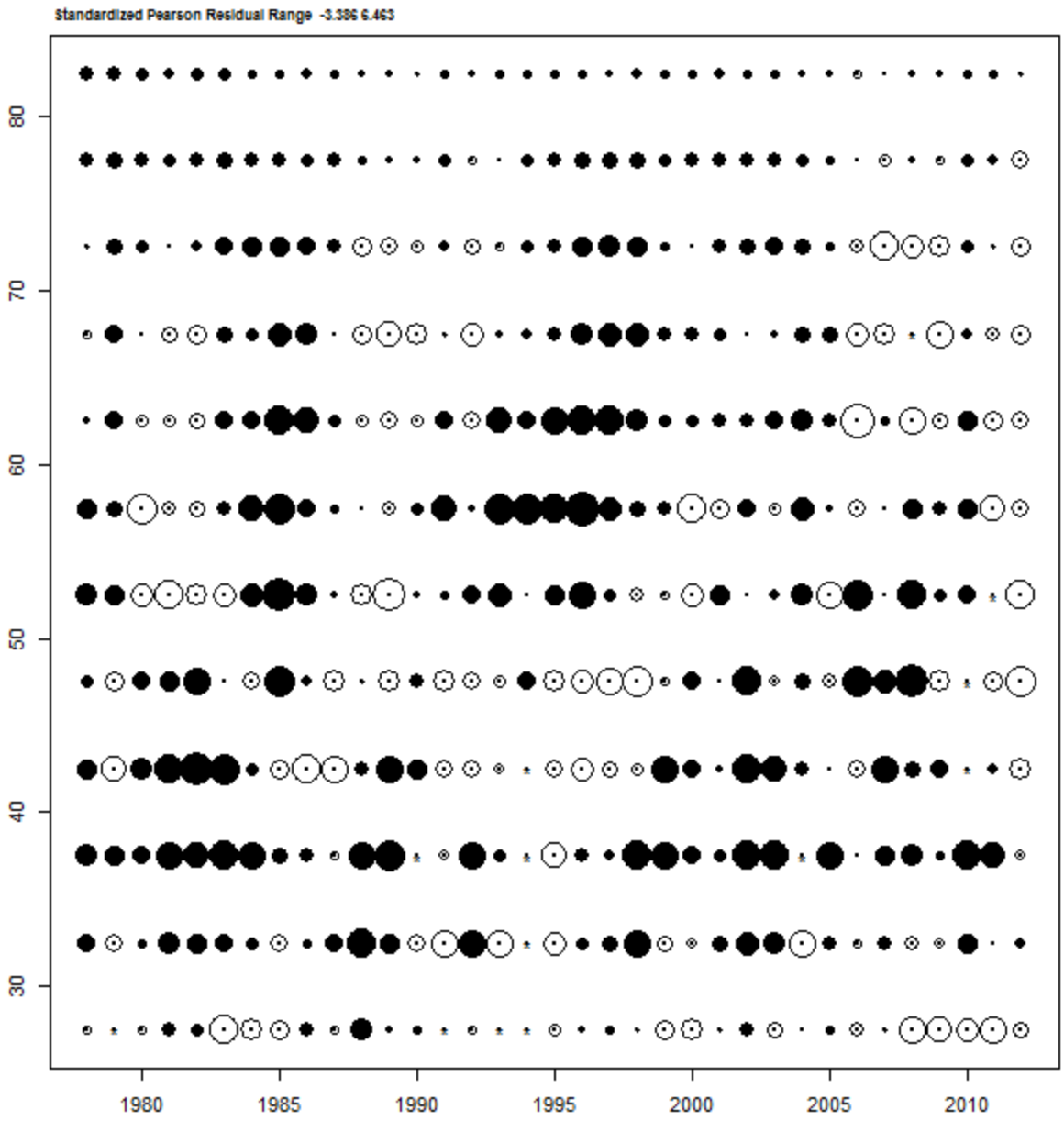

Figure 69. Model 1. Residuals of fit to survey female size frequency. Filled circles are negative residuals.

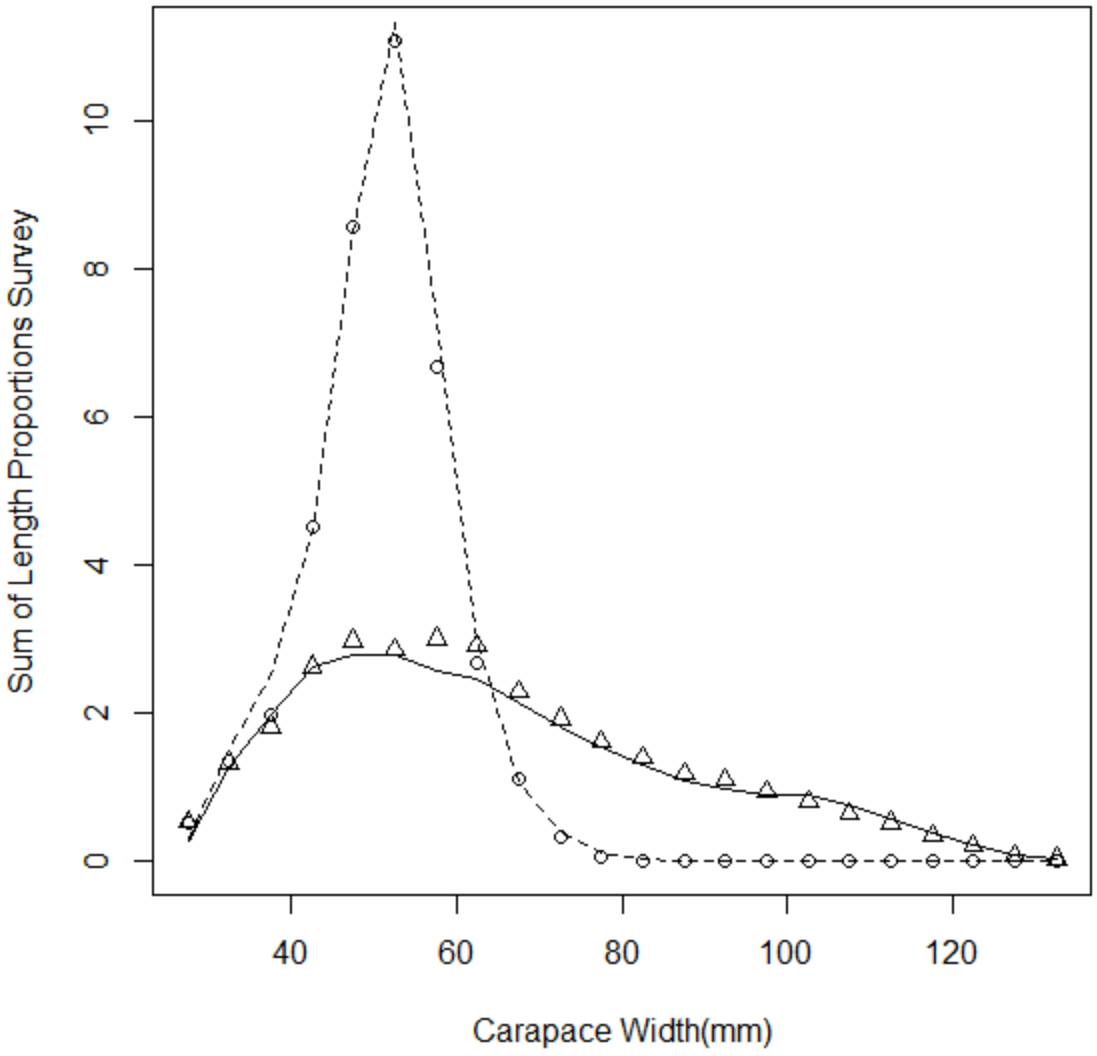

Figure 72. Model 1. Summary over years of fit to survey length frequency data by sex. Dotted line is fit for females, circles are observed. Solid line is fit for males, triangles are observed.

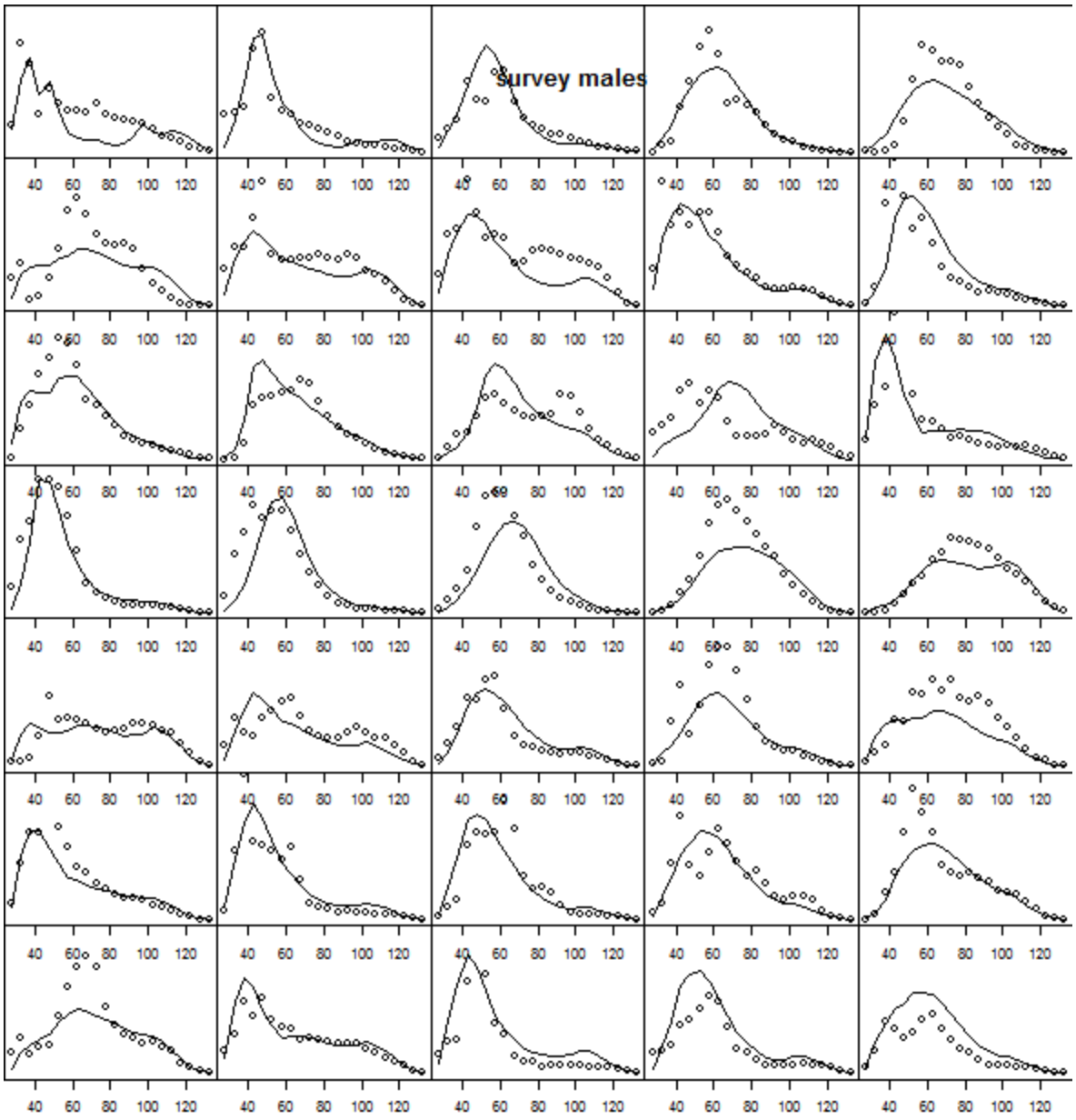

Figure 70. Model 1. Model fit to the survey male size frequency data. Circles are observed survey data. Solid line is the model fit.

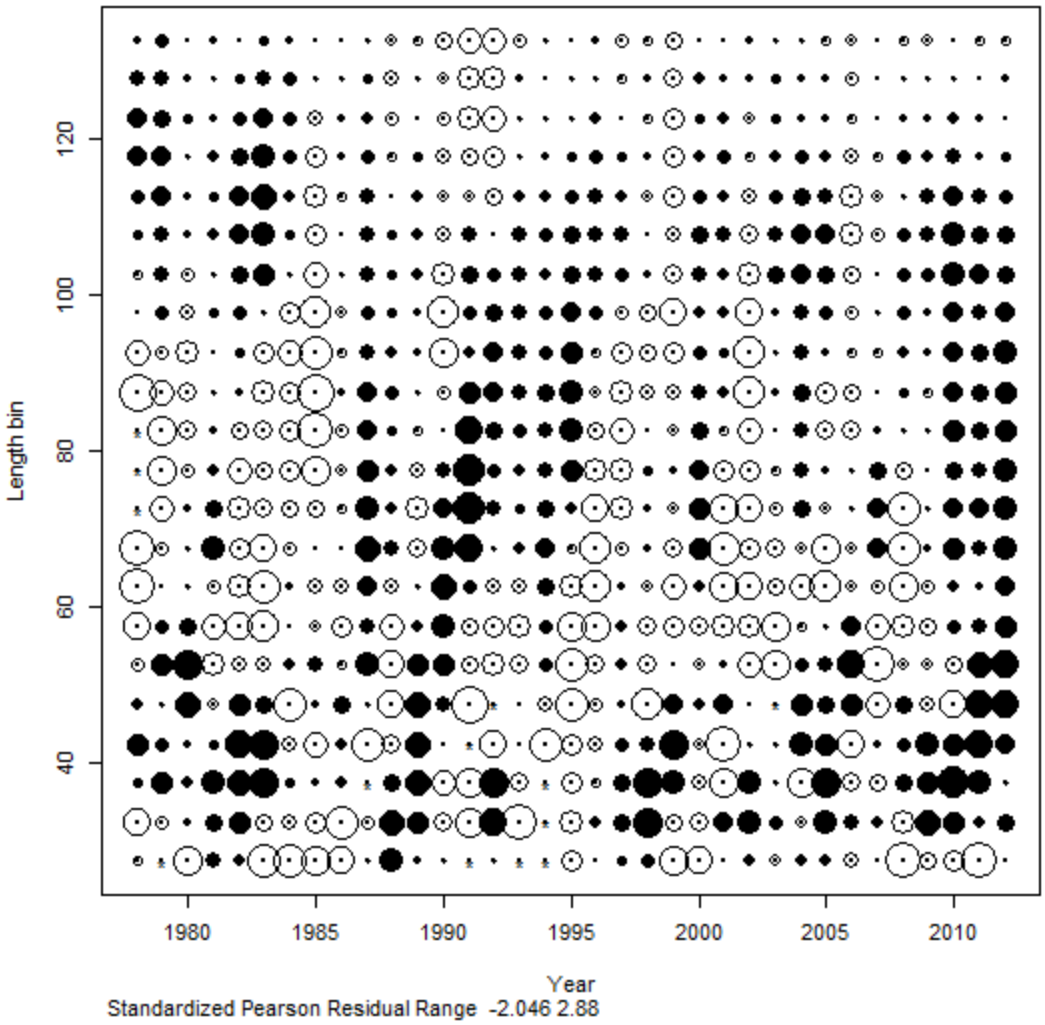

Figure 71. Model 1. Residuals for fit to survey male size frequency. . Filled circles are negative residuals (predicted higher than observed).

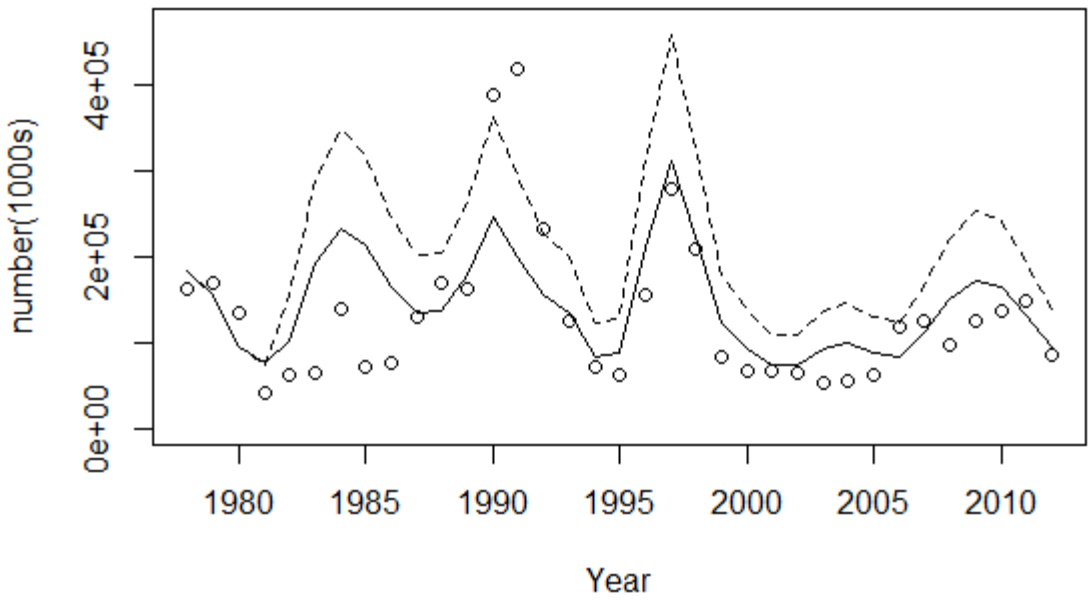

Figure 73. Model 1. Observed survey numbers of males >101mm (circles), model estimates of the population number of males >101mm(solid line) and model estimates of survey numbers of males >101 mm (dotted line).

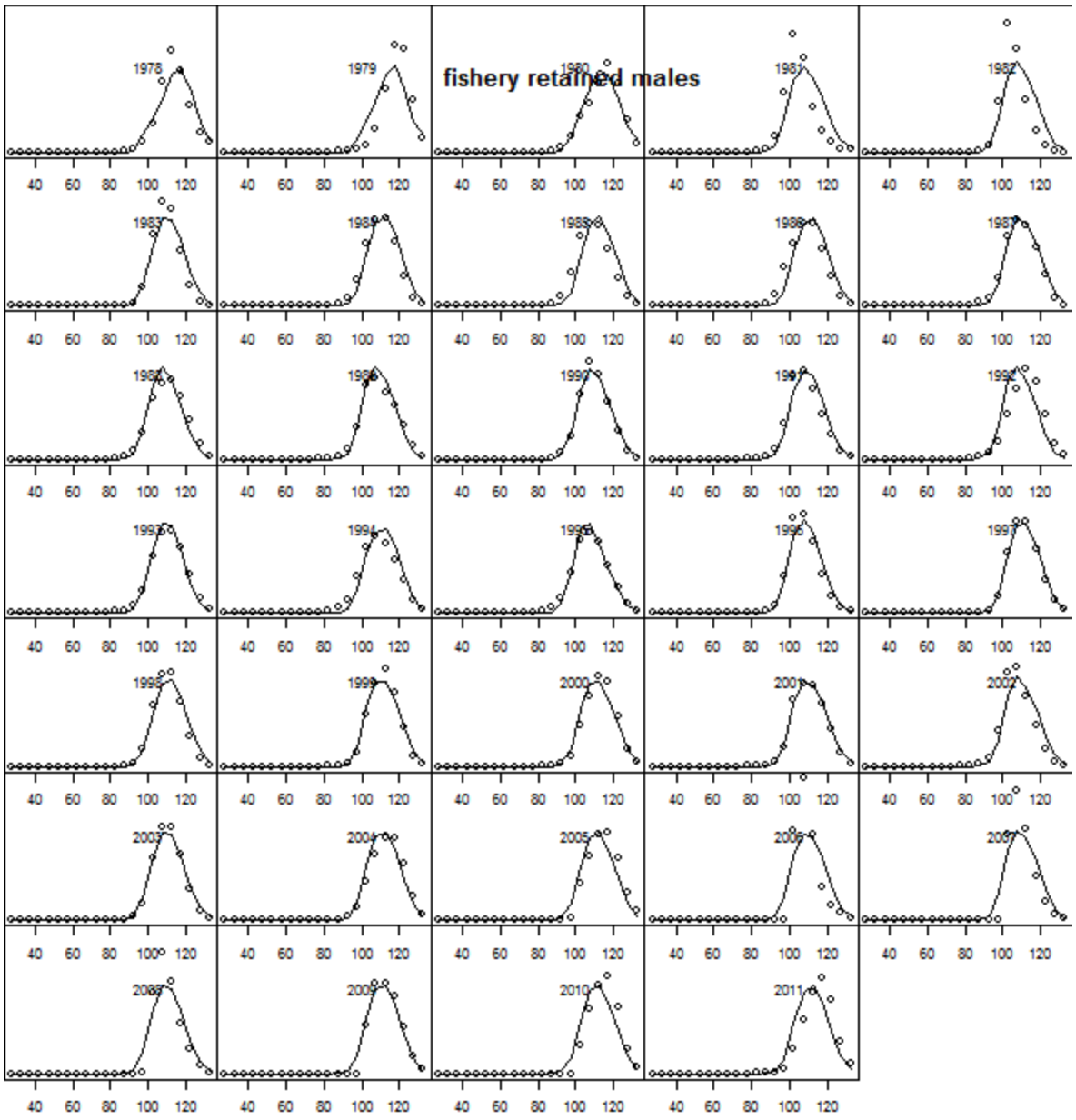

Figure 76. Model 1. Model fit to the retained male size frequency data, shell condition combined. Solid line is the model fit. Circles are observed data. Year is the survey year.

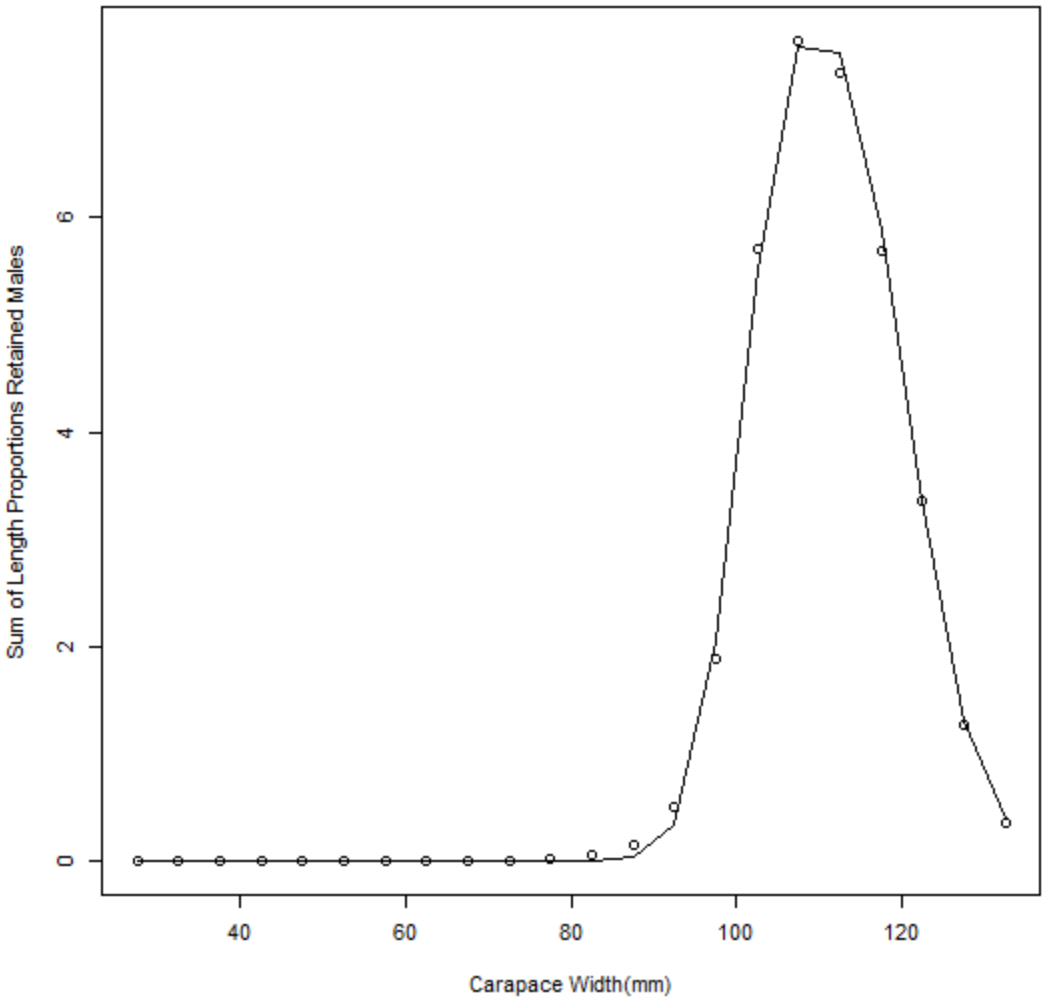

Figure 77. Model 1. Summary fit to retained male length.

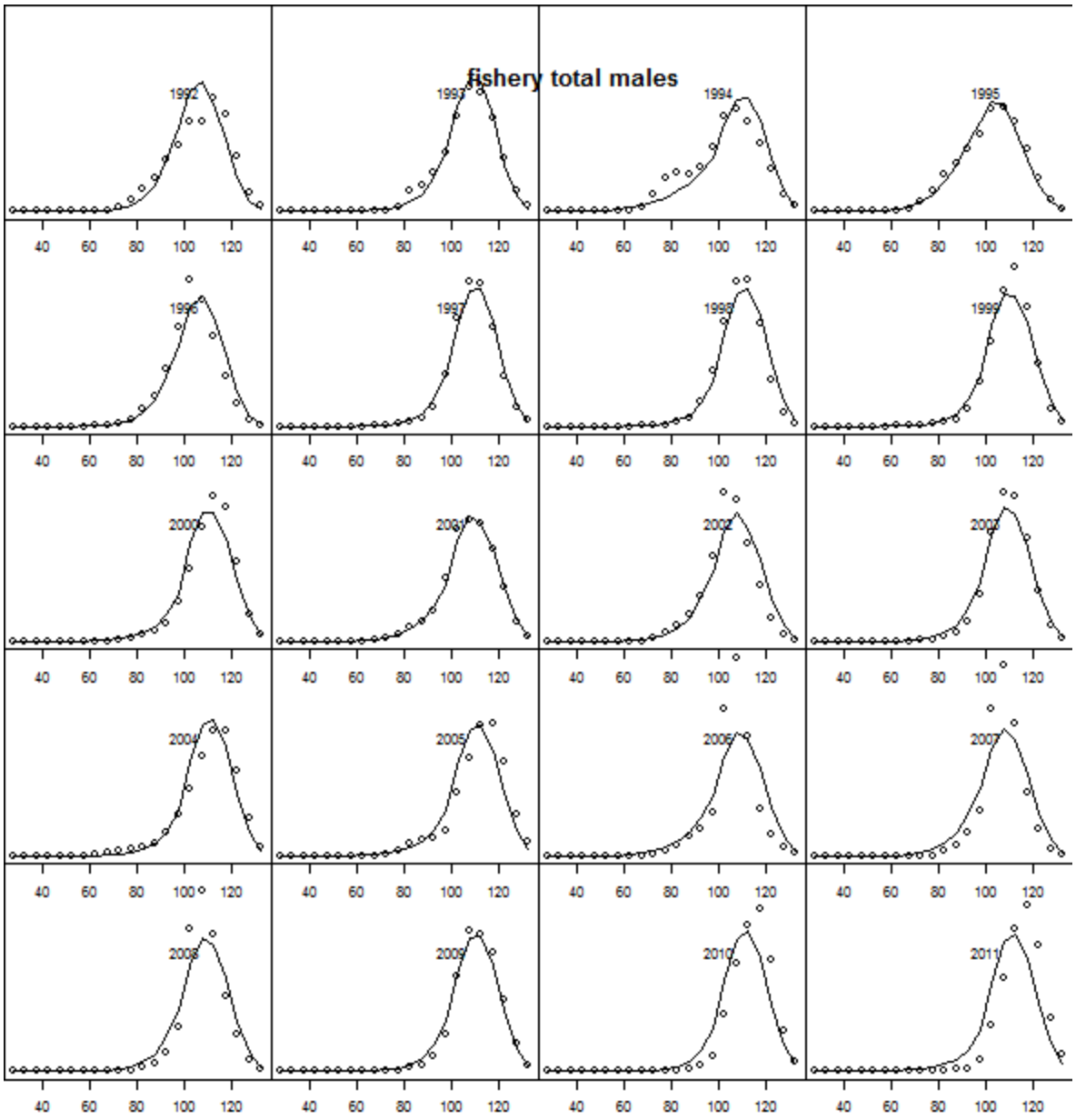

Figure 78. Model 1. Model fit to the total (discard plus retained) male size frequency data, shell condition combined. Solid line is the model fit. Circles are observed data. Year is the survey year.

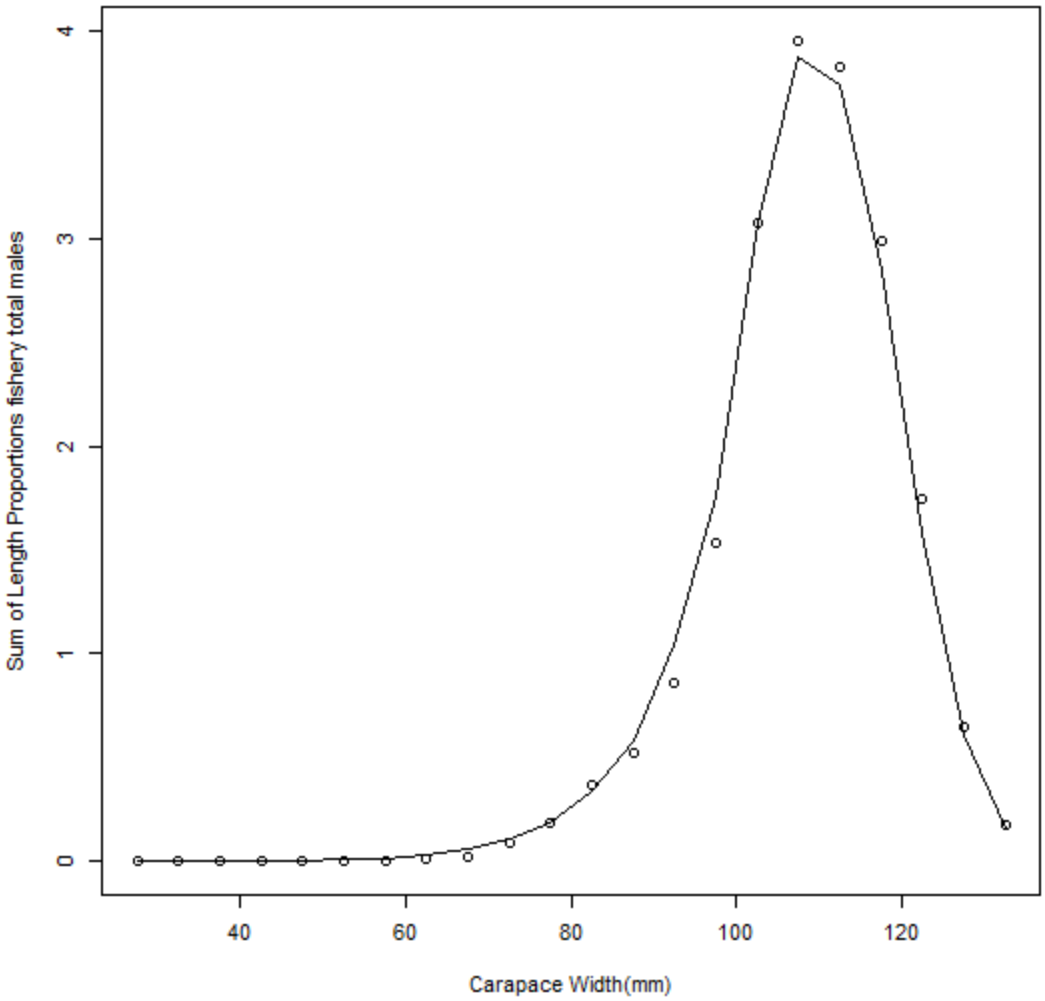

Figure 79. Model 1. Summary fit to total length frequency male catch.

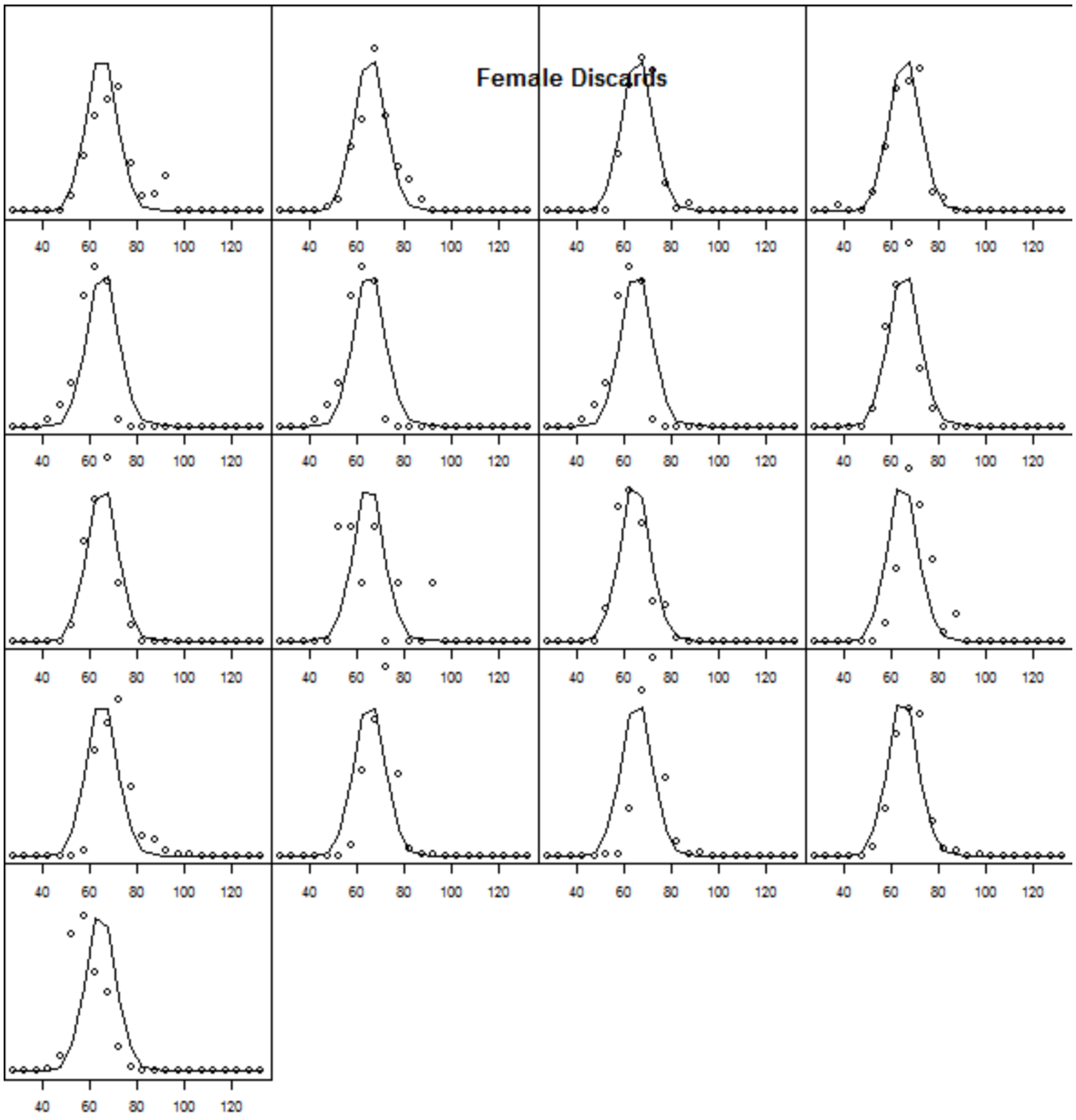

Figure 80. Model 1. Model fit to the discard female size frequency data. Solid line is the model fit. Circles are observed data. Year is the survey year.

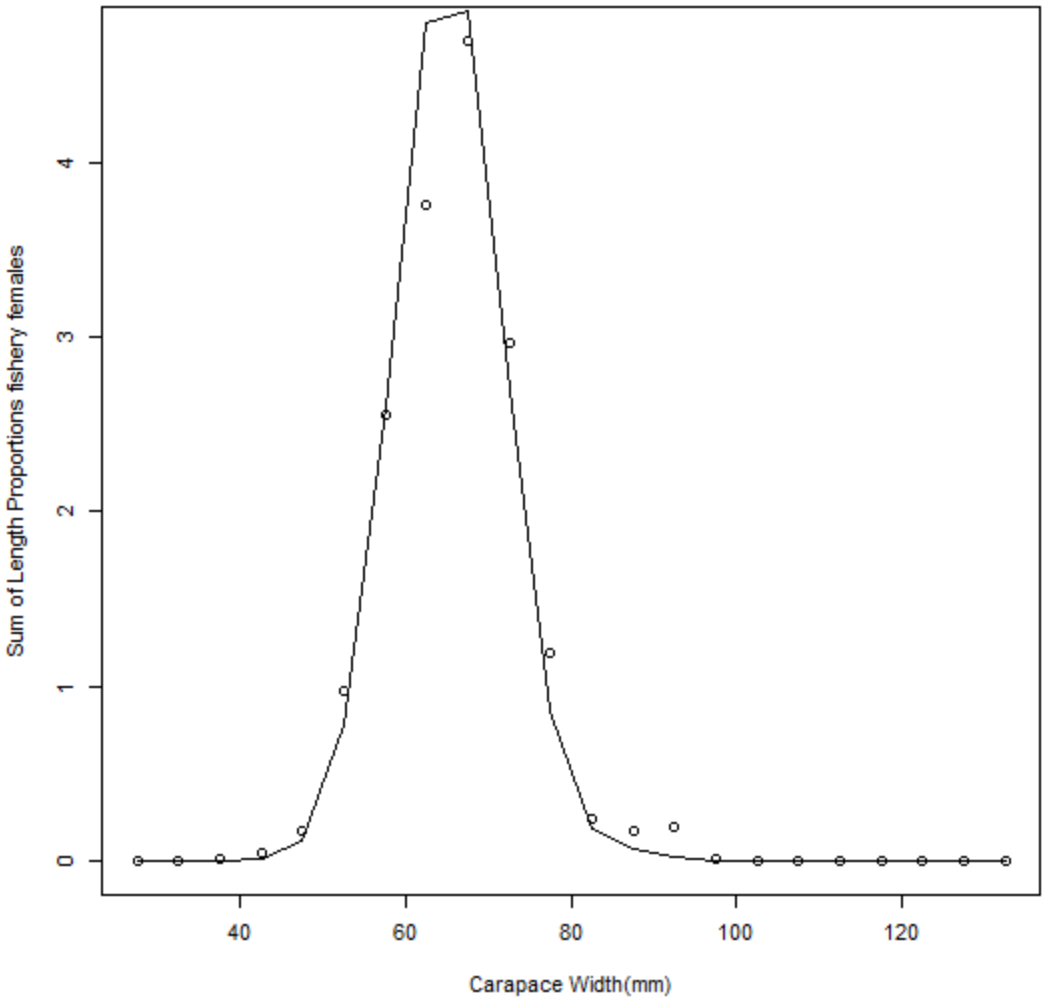

Figure 81. Model 1. Summary fit to directed fishery female discards.

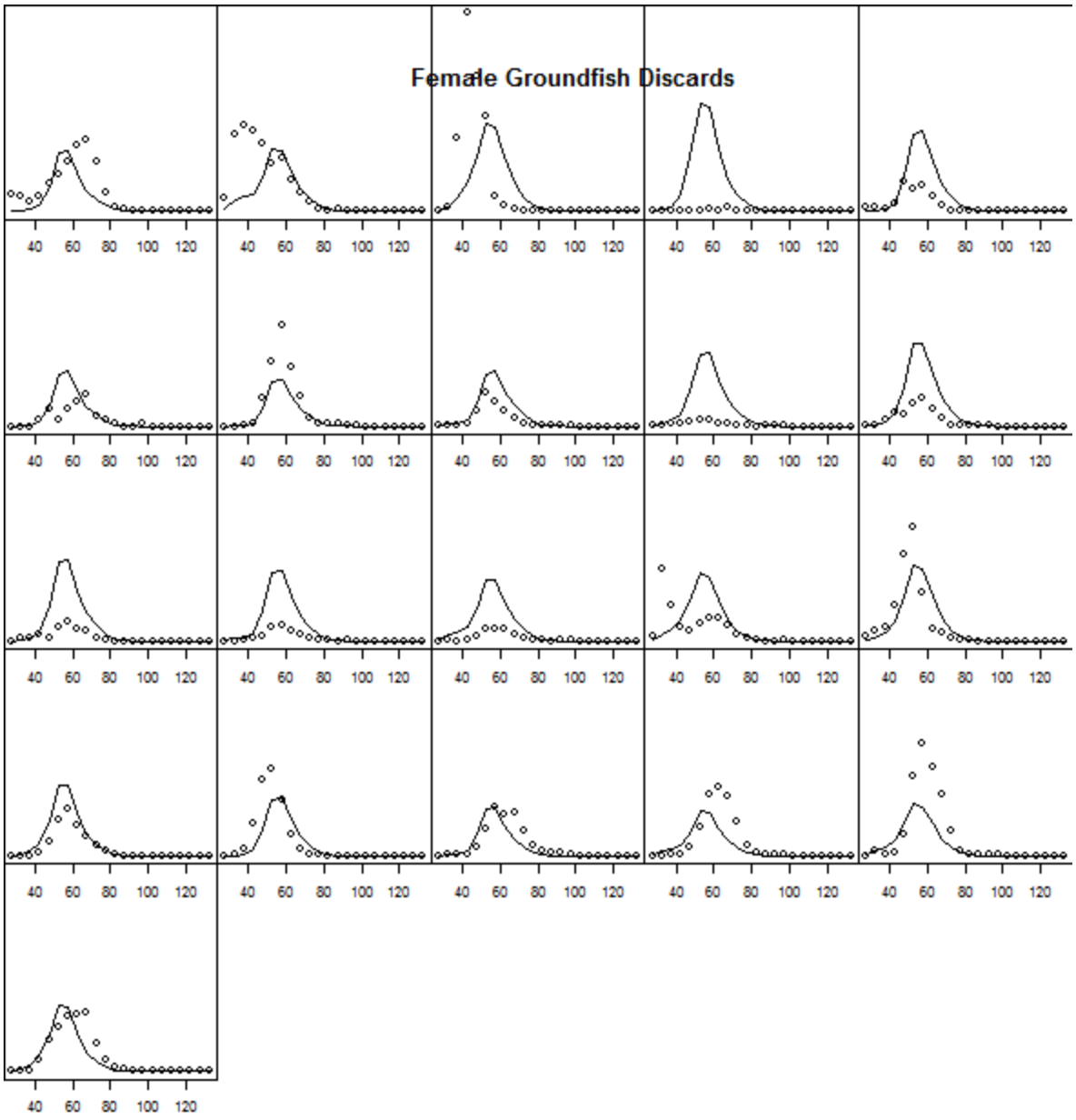

Figure 82. Model 1. Model fit to the groundfish trawl discard female size frequency data. Solid line is the model fit. Circles are observed data. Year is the survey year.

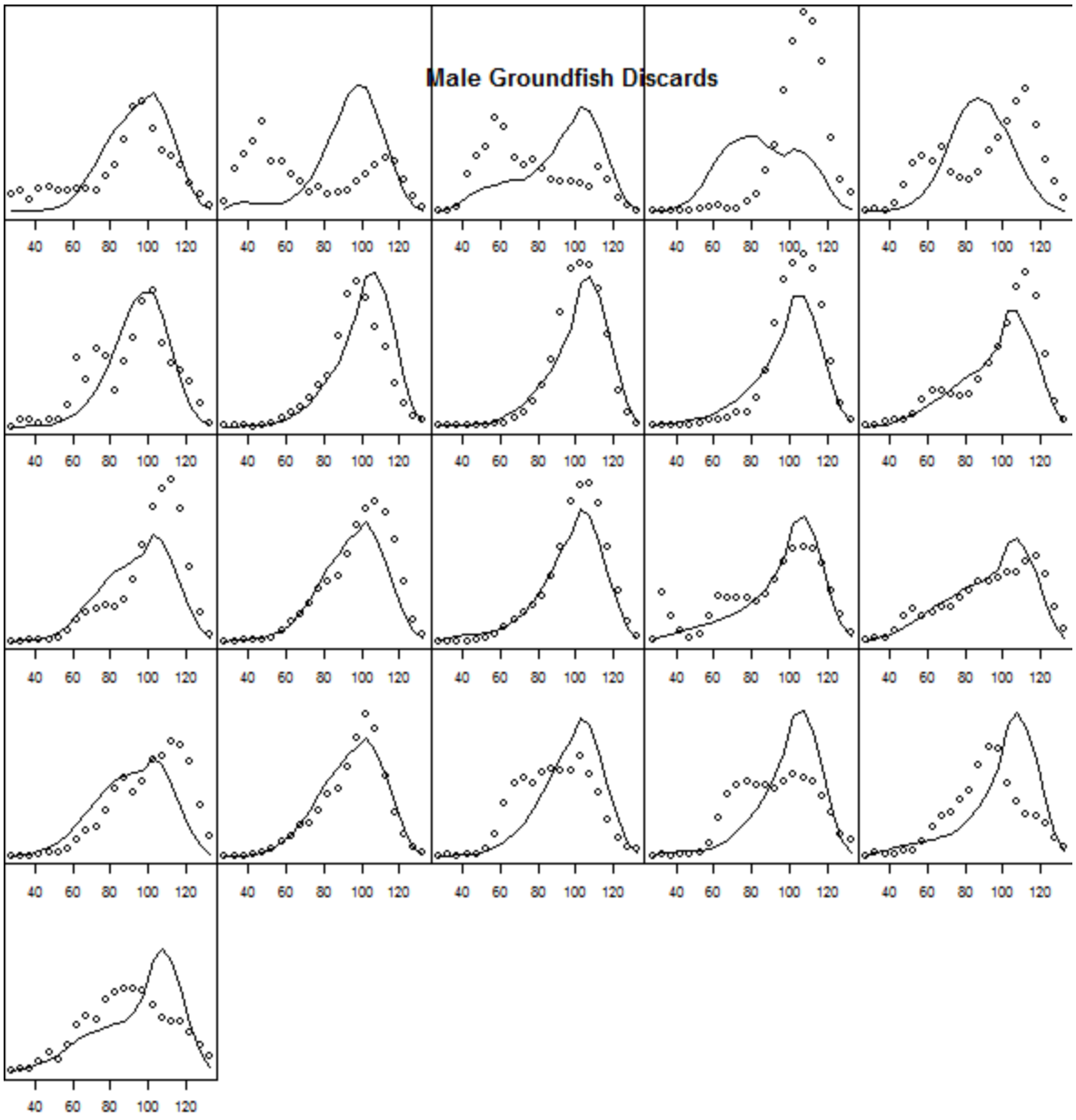

Figure 83. Model 1. Model fit to the groundfish trawl discard male size frequency data. Solid line is the model fit. Circles are observed data.

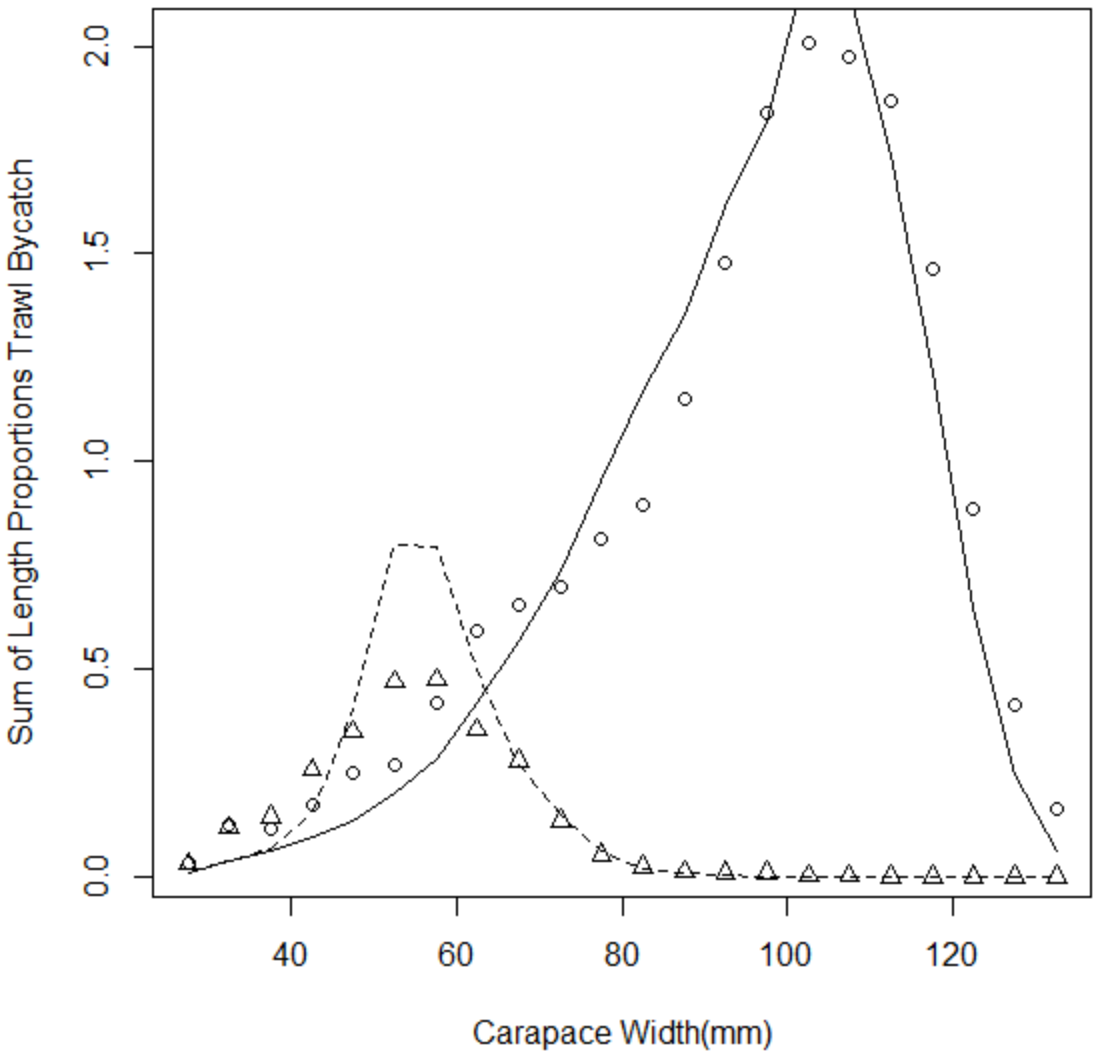

Figure 84. Model 1. Summary fit to groundfish length frequency.

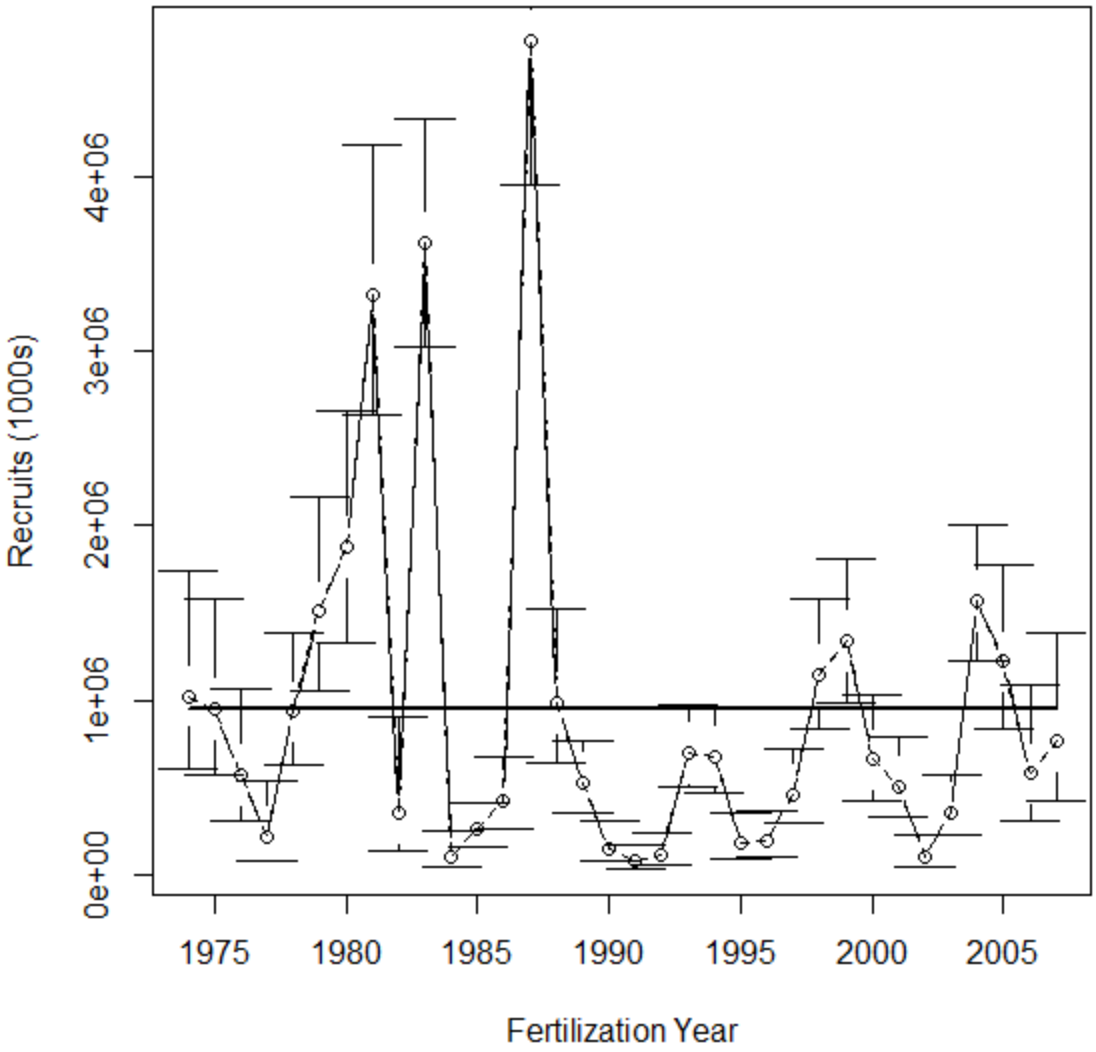

Figure 74. Model 1. Recruitment to the model for crab 25 mm to 50 mm. Total recruitment is 2 times recruitment in the plot. Male and female recruitment fixed to be equal. Solid horizontal line is average recruitment. Error bars are 95% C.I.

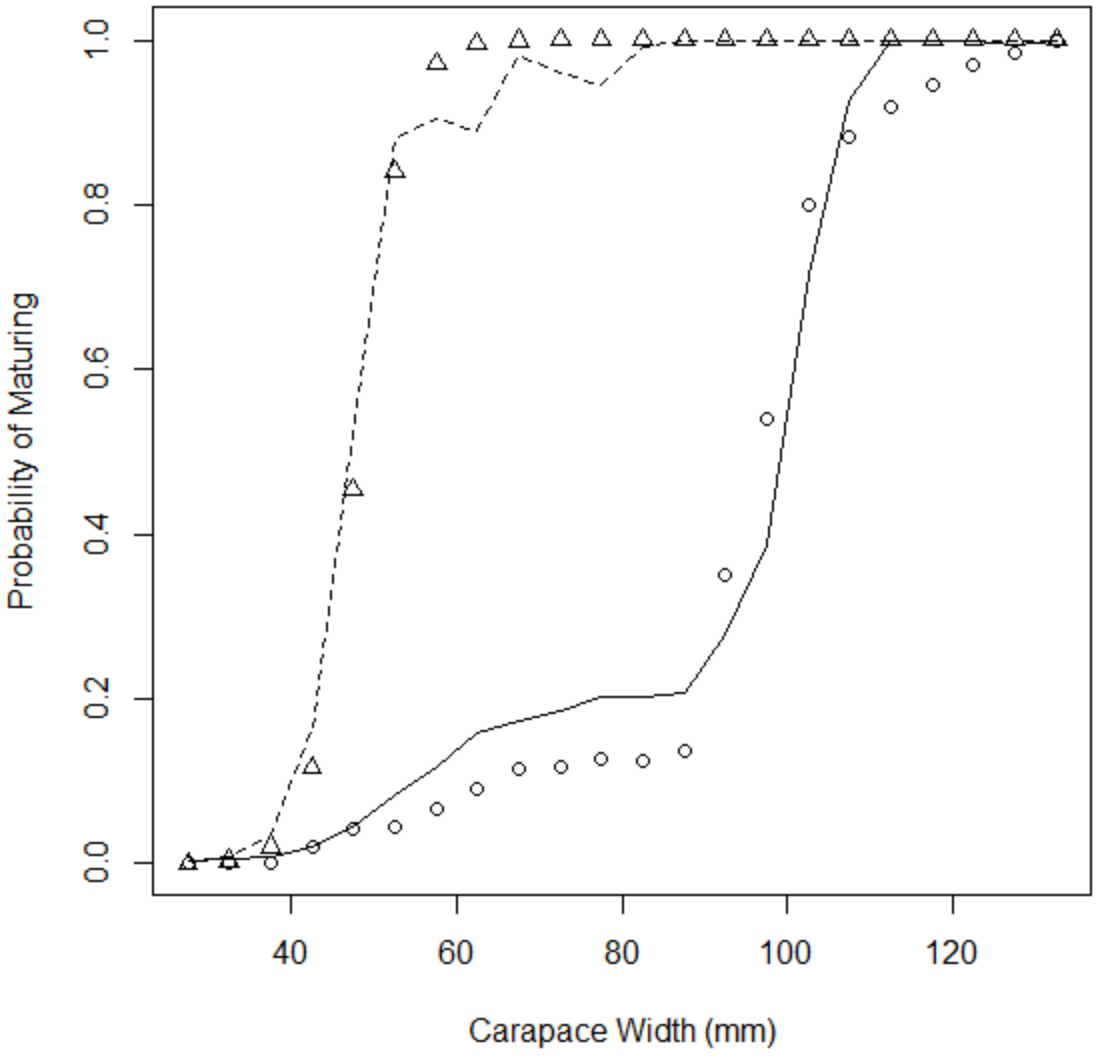

Figure 48. Model 1. Probability of maturing by size estimated in the model for male(solid line) and female (dashed line) snow crab (not the average fraction mature). Triangles are values for females used in the 2009 assessment. Circles are values for males used in the 2009 assessment.

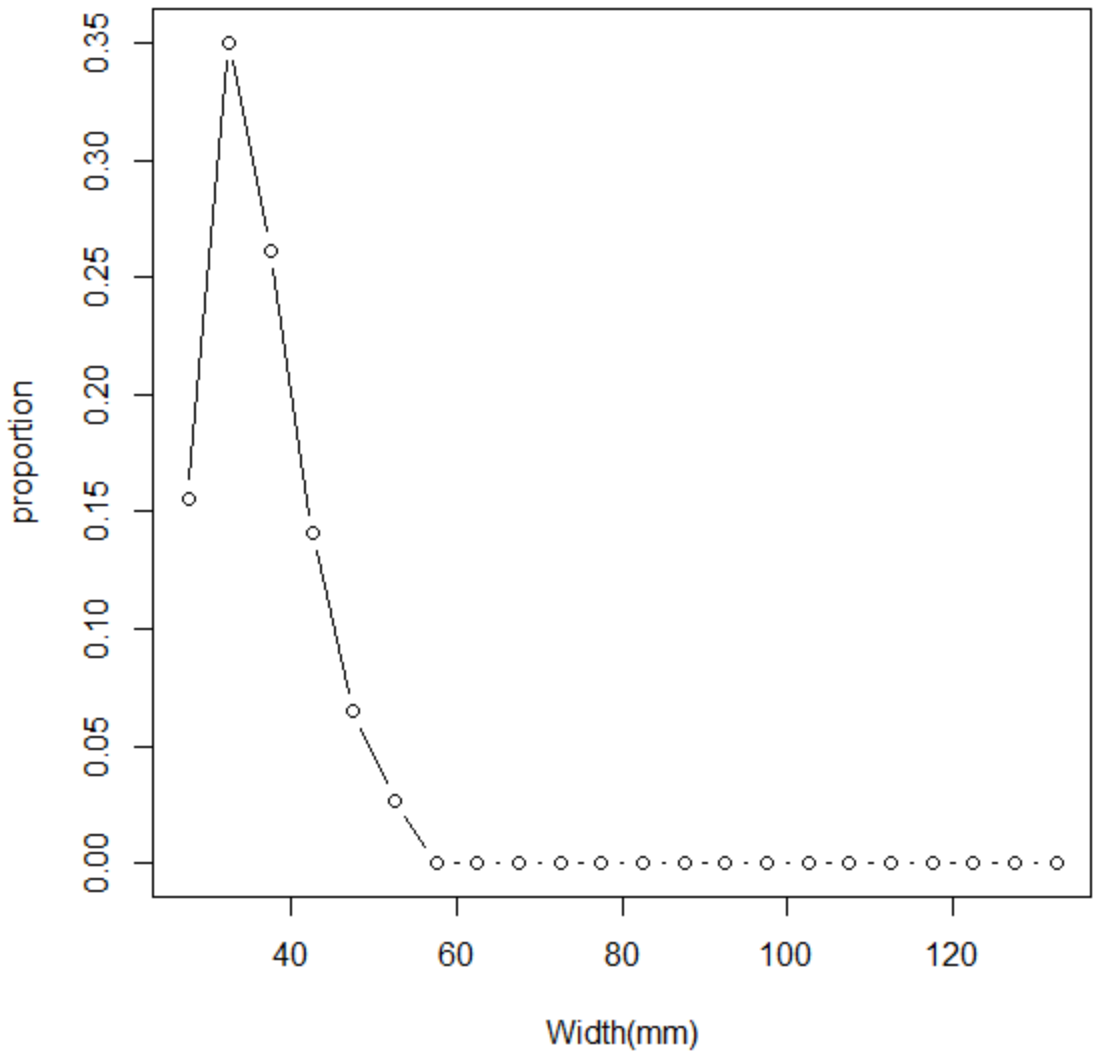

Figure 75. Model 1. Distribution of recruits to length bins estimated by the model.

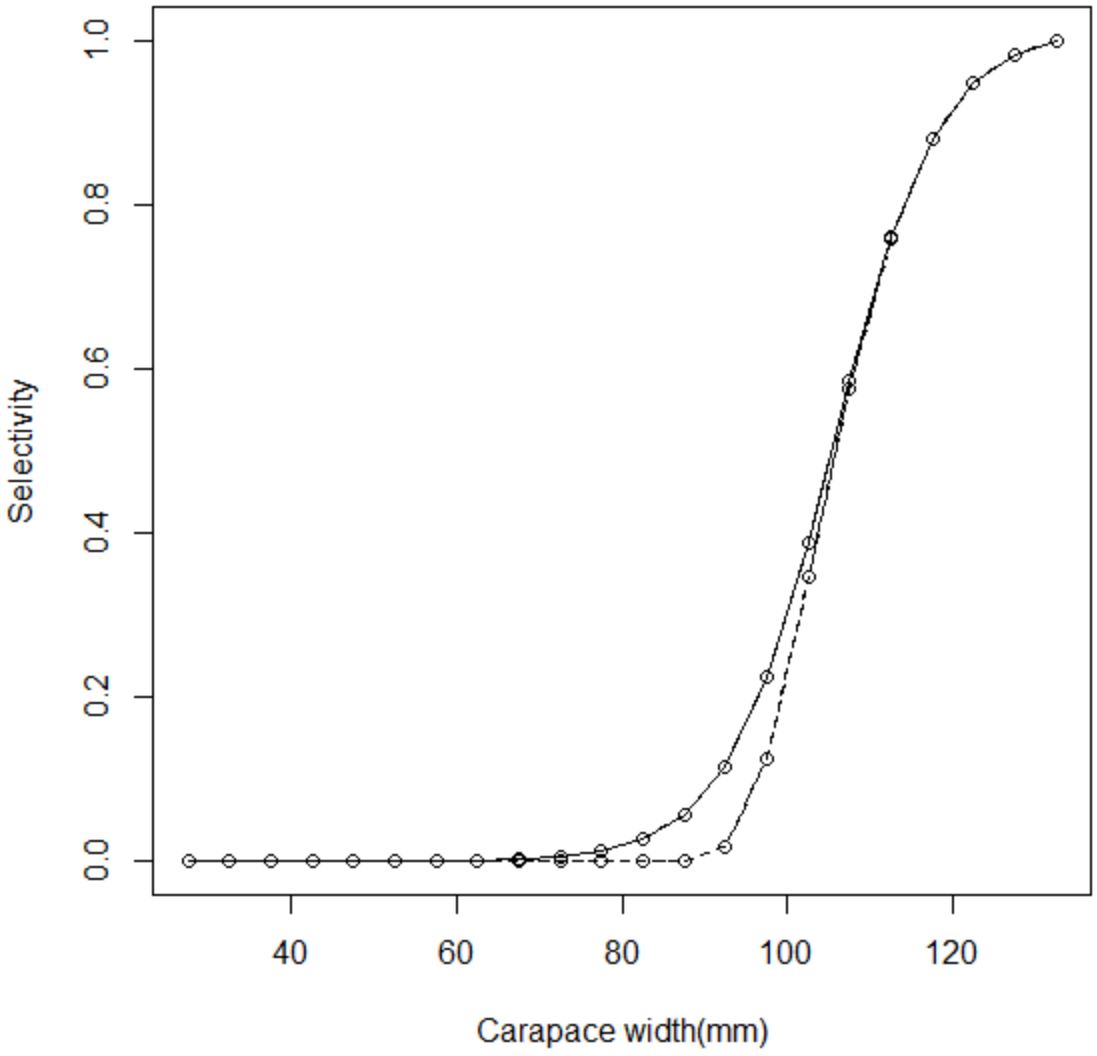

Figure 56. Model 1. Selectivity curve for total catch (discard plus retained, solid line) and retained catch (dotted line) for combined shell condition male snow crab.

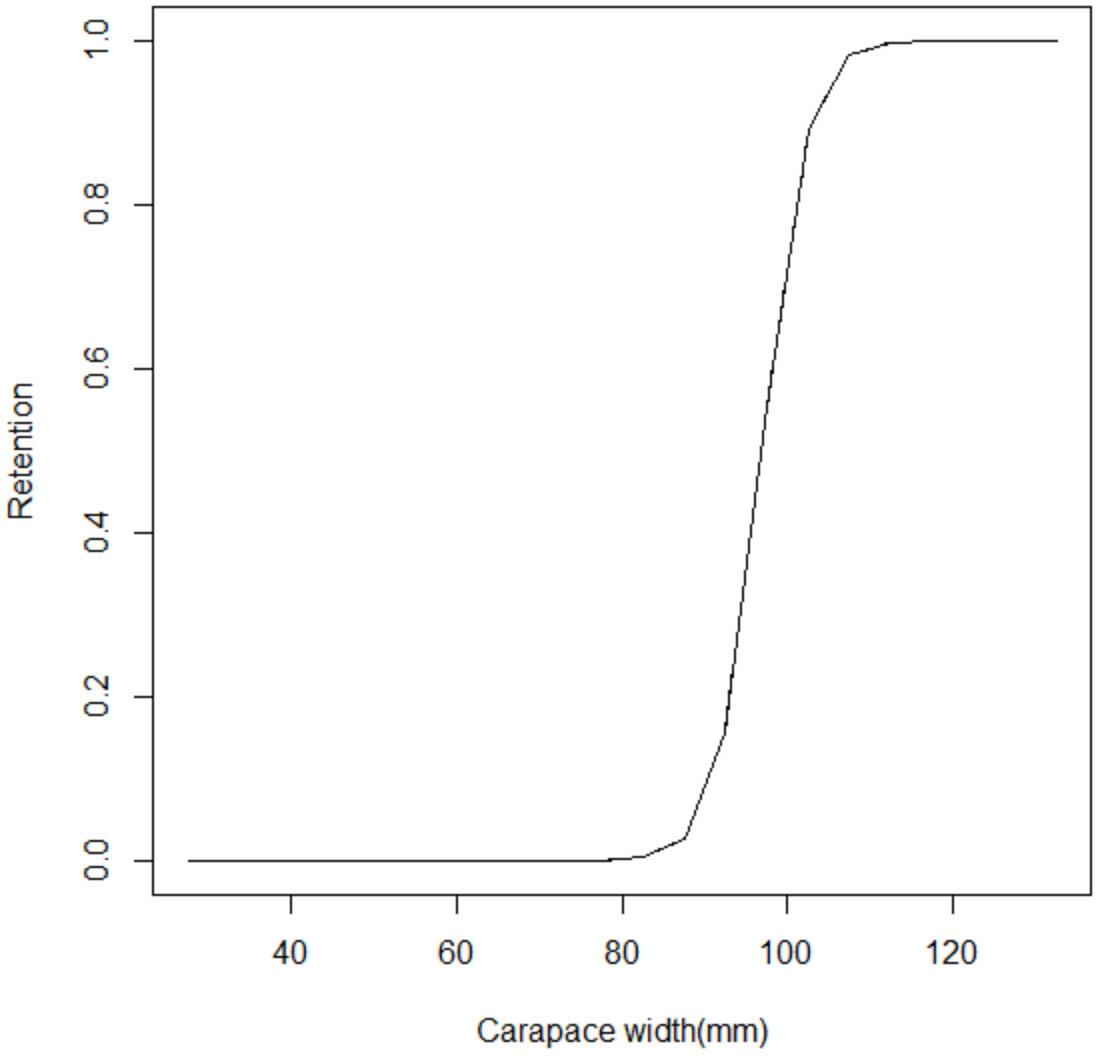

Figure 57. Model 1. Retention curve for directed fishery.

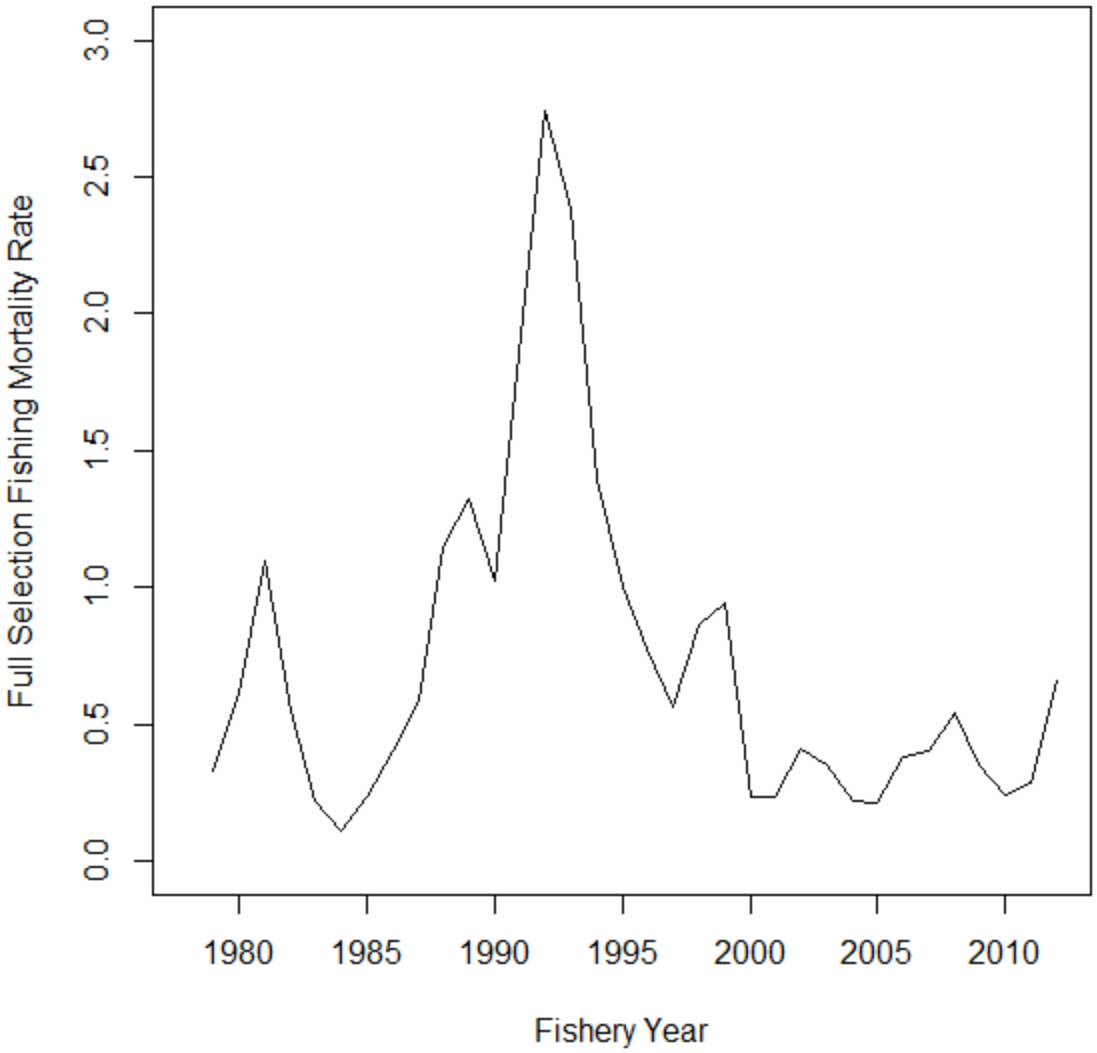

Figure 85. Model 1. Full selection fishing mortality estimated in the model from 1978/79 to 2011/12 fishery seasons.

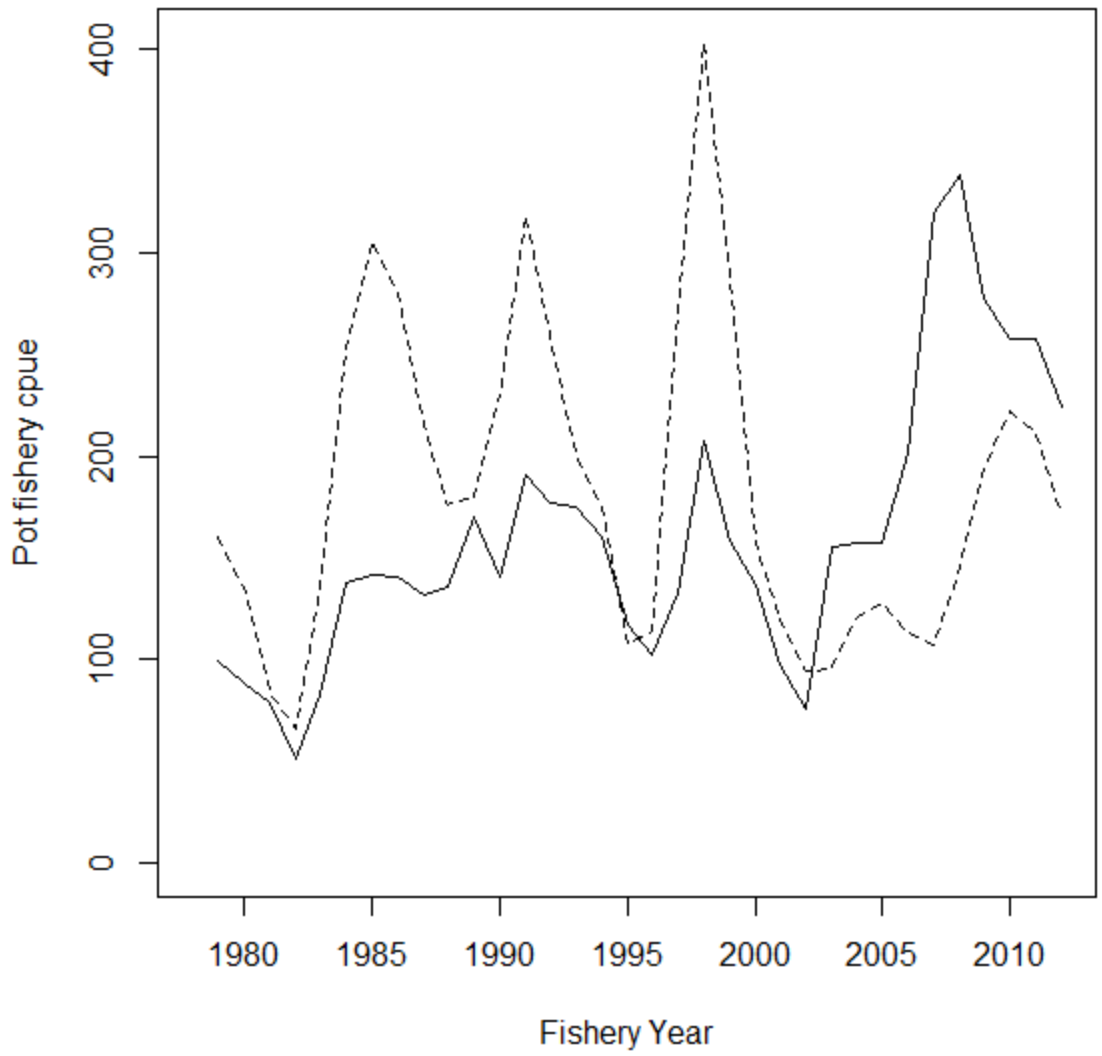

Figure 86. Model 1. Fit to pot fishery cpue for retained males (q is fixed in model). Solid line is observed fishery cpue, dotted line model fit.

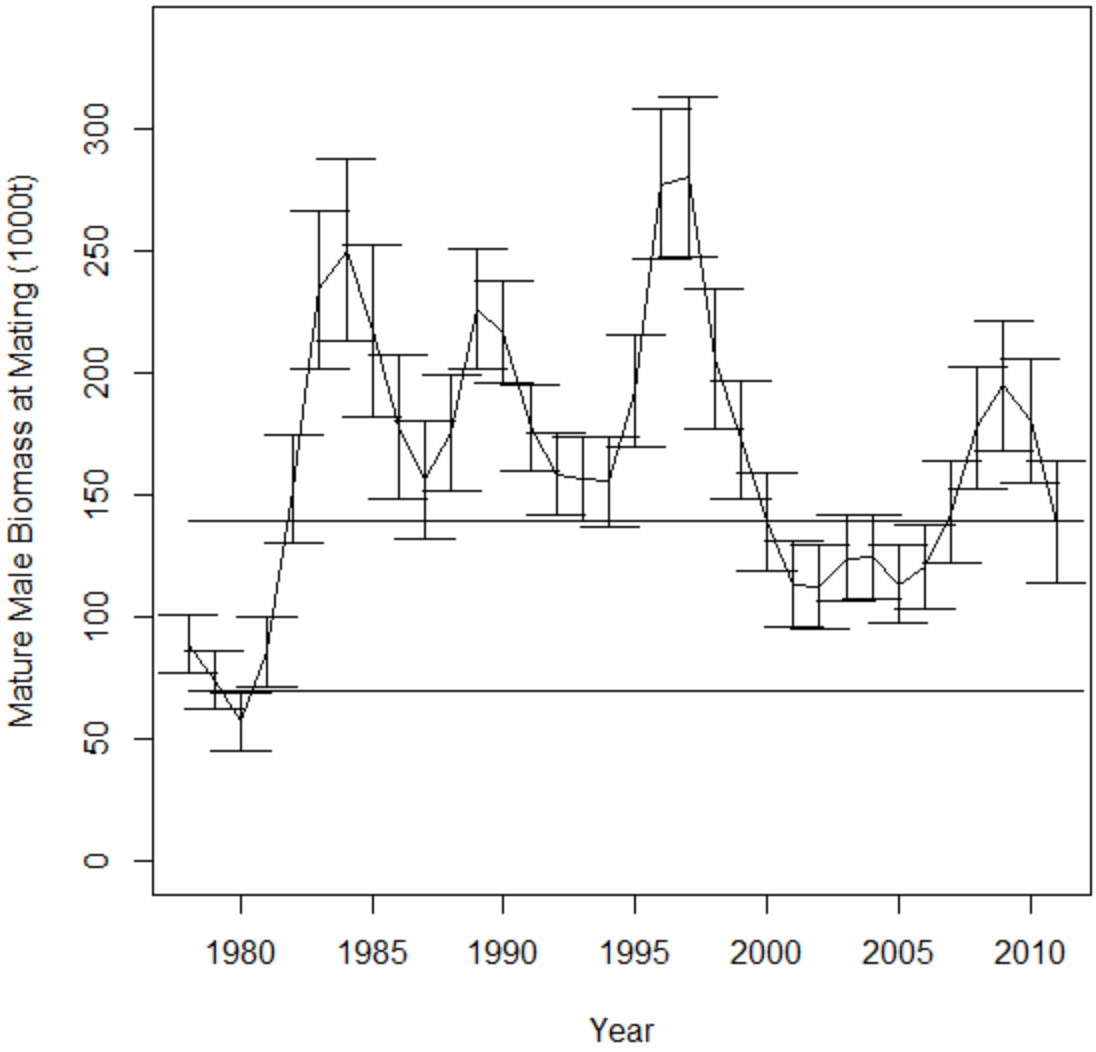

Figure 88. Model 1. Mature Male Biomass at mating with 95% confidence intervals. Top horizontal line is B35%, lower line is ½ B35%.

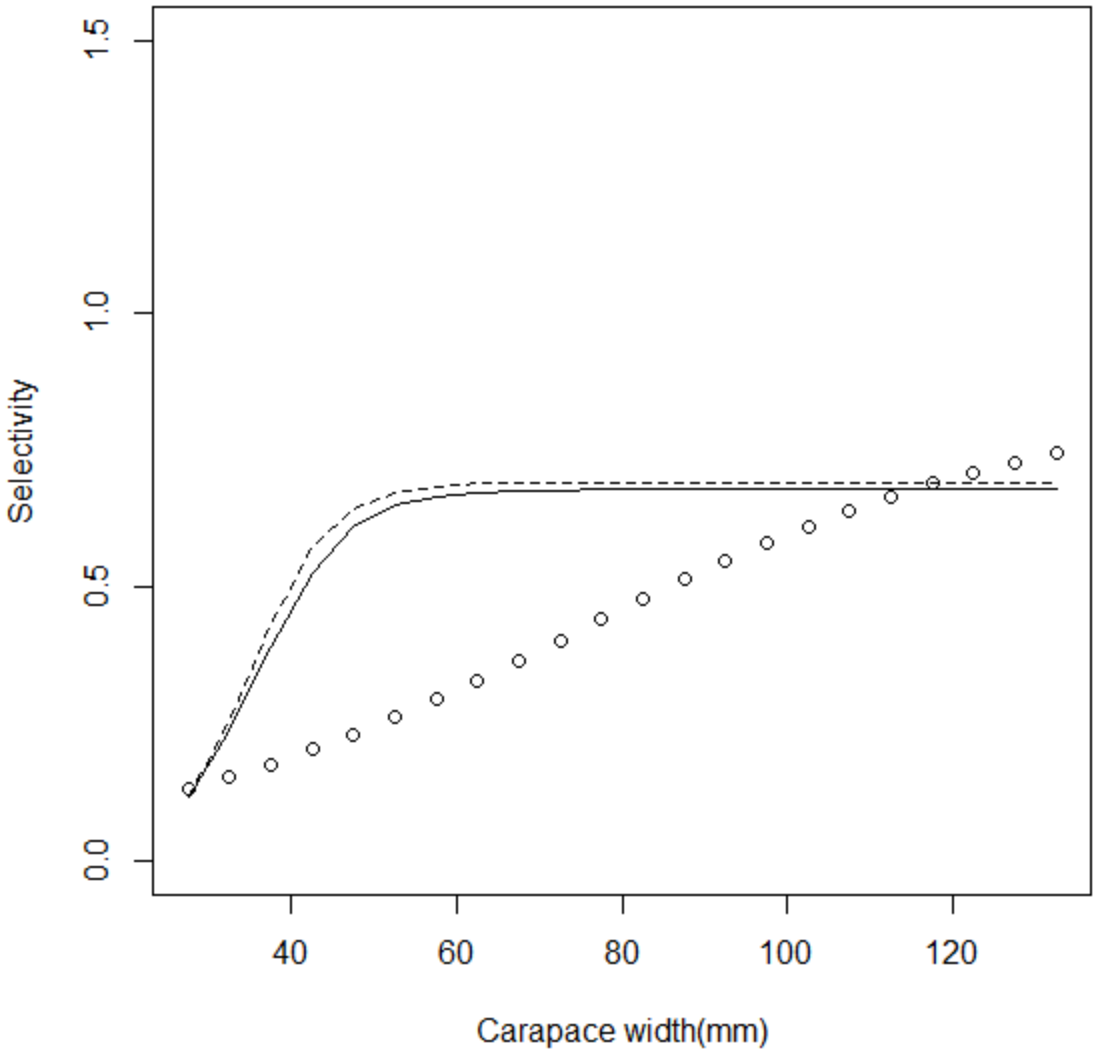

Figure 57. Base Model. Survey selectivity curves for female (dotted lines) and male snow crab (solid lines) estimated by the model for 1989 to present. Survey selectivities estimated by Somerton from 2009 study area data (2010) are the circles.

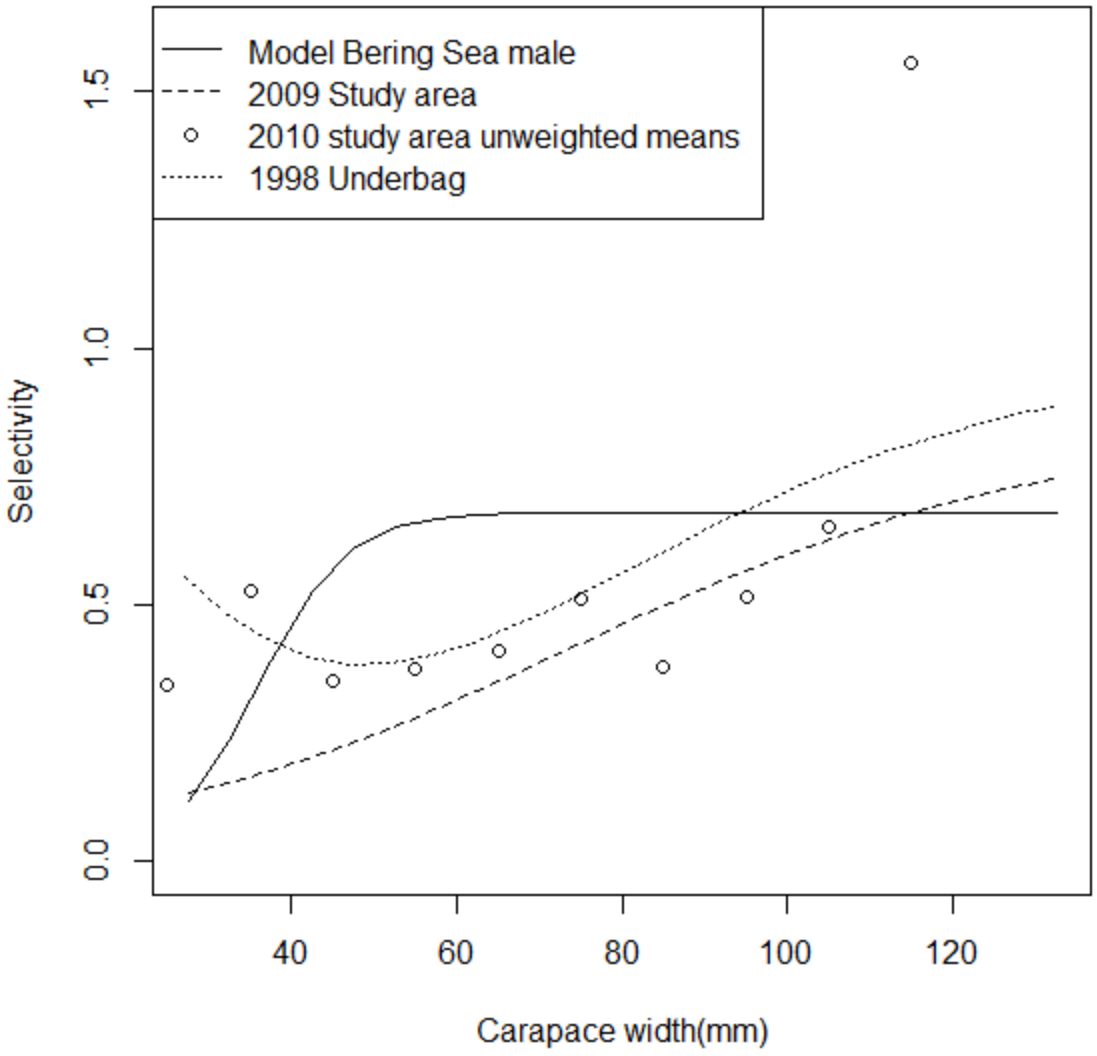

Figure 92. Model 1. Survey selectivity for male crab 1989- present (Model Bering Sea male), with selectivity curves estimated outside the model. 2009 study area is the curve estimated by Somerton from the 2009 study area data.

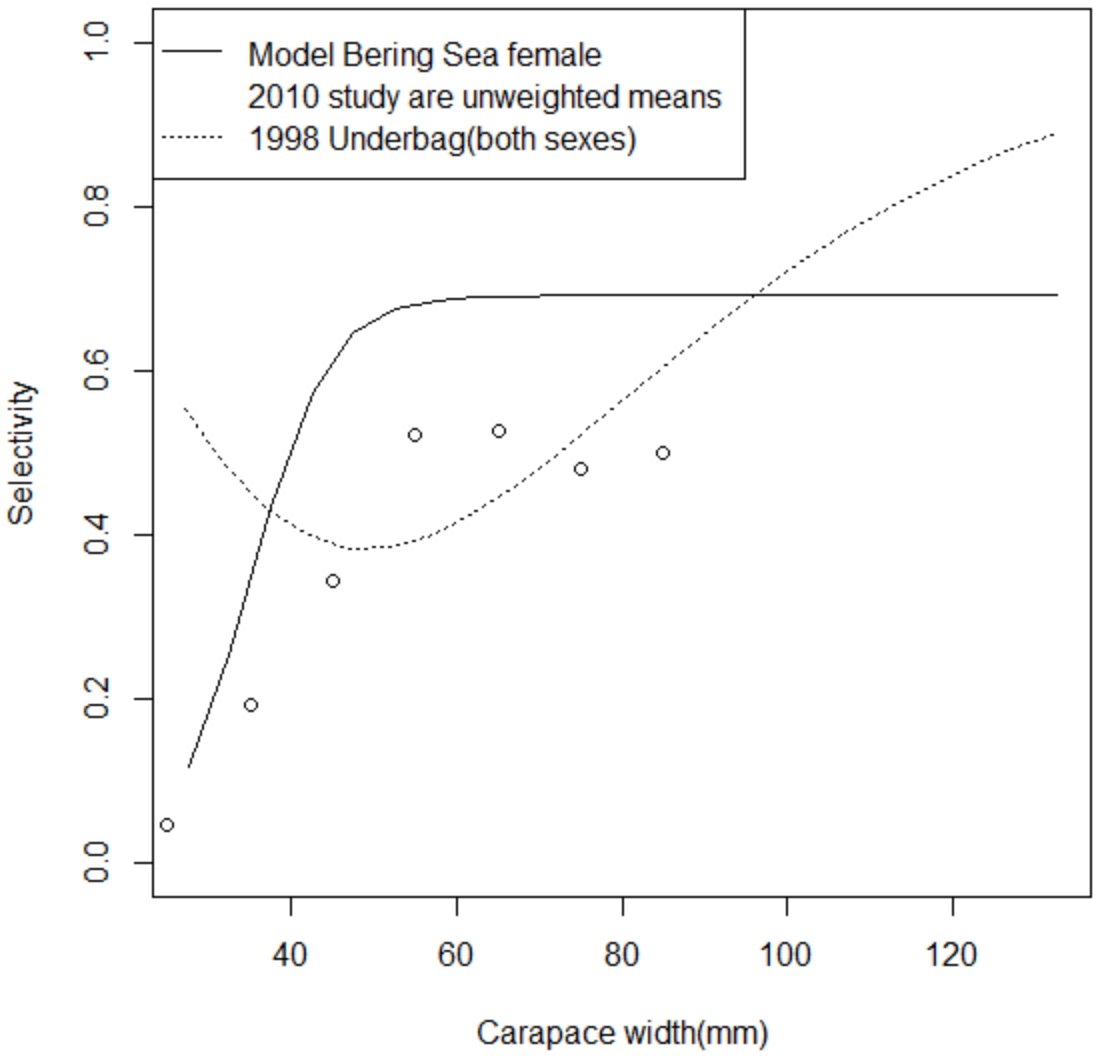

Figure 93. Model 1. Survey selectivity for female crab 1989- present (Model Bering Sea female).

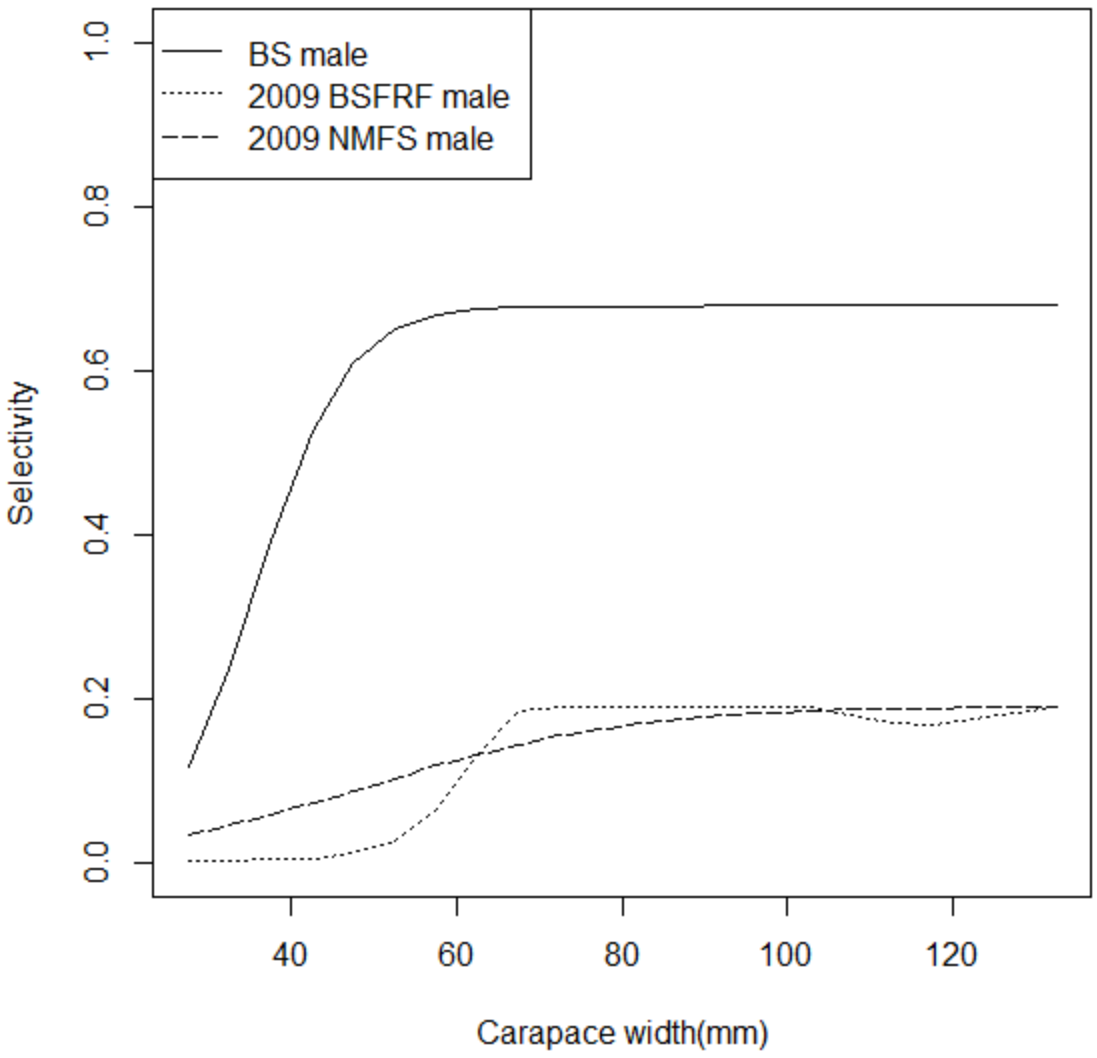

Figure 94. Model 1. Survey selectivity curves for male crab in the entire Bering sea 1989-present (BS male), 2009 study area BSFRF male and 2009 study area NMFS male.

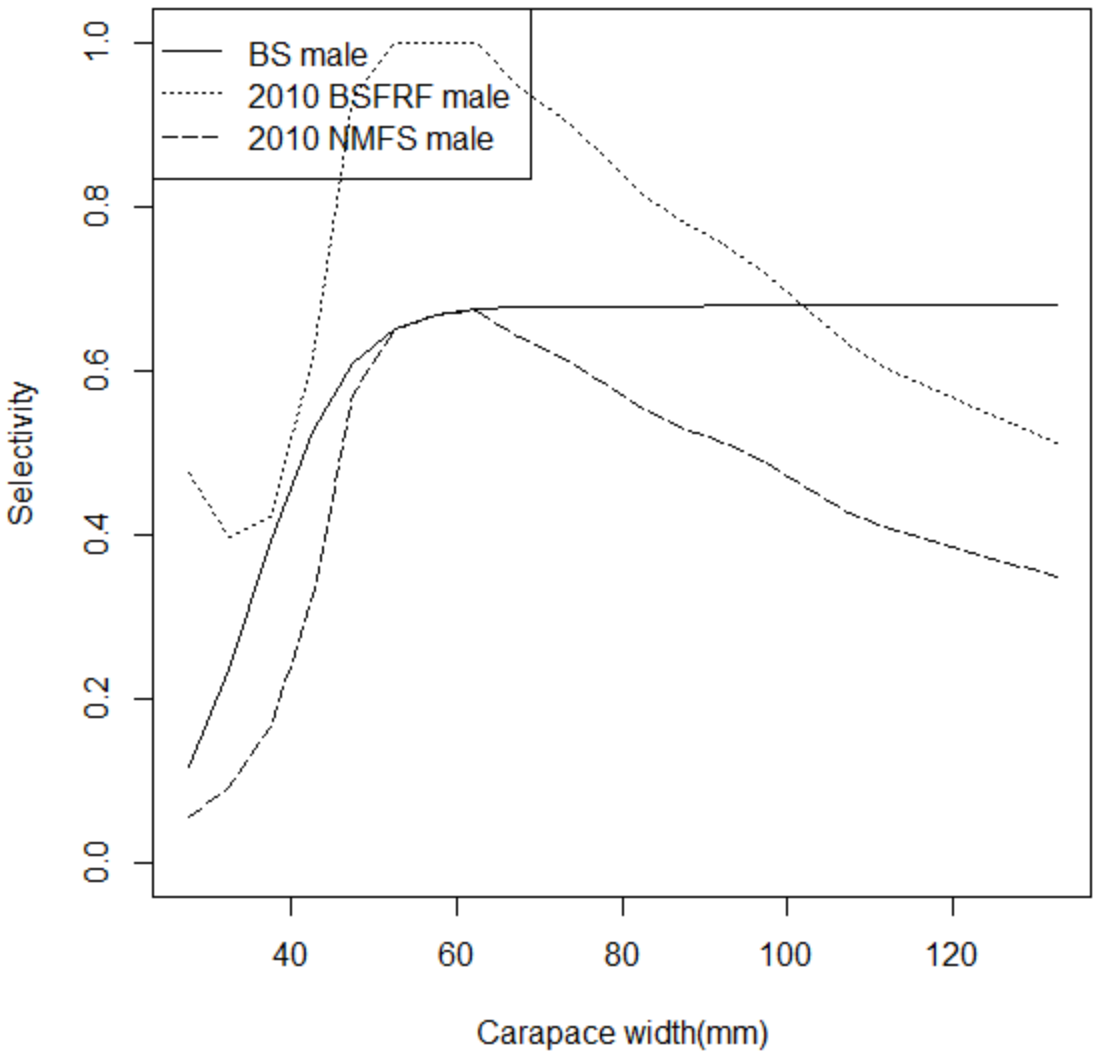

Figure 95. Model 1. Survey selectivity curves for male crab in the entire Bering sea 1989-present (BS male), 2010 study area BSFRF male and 2010 study area NMFS male.

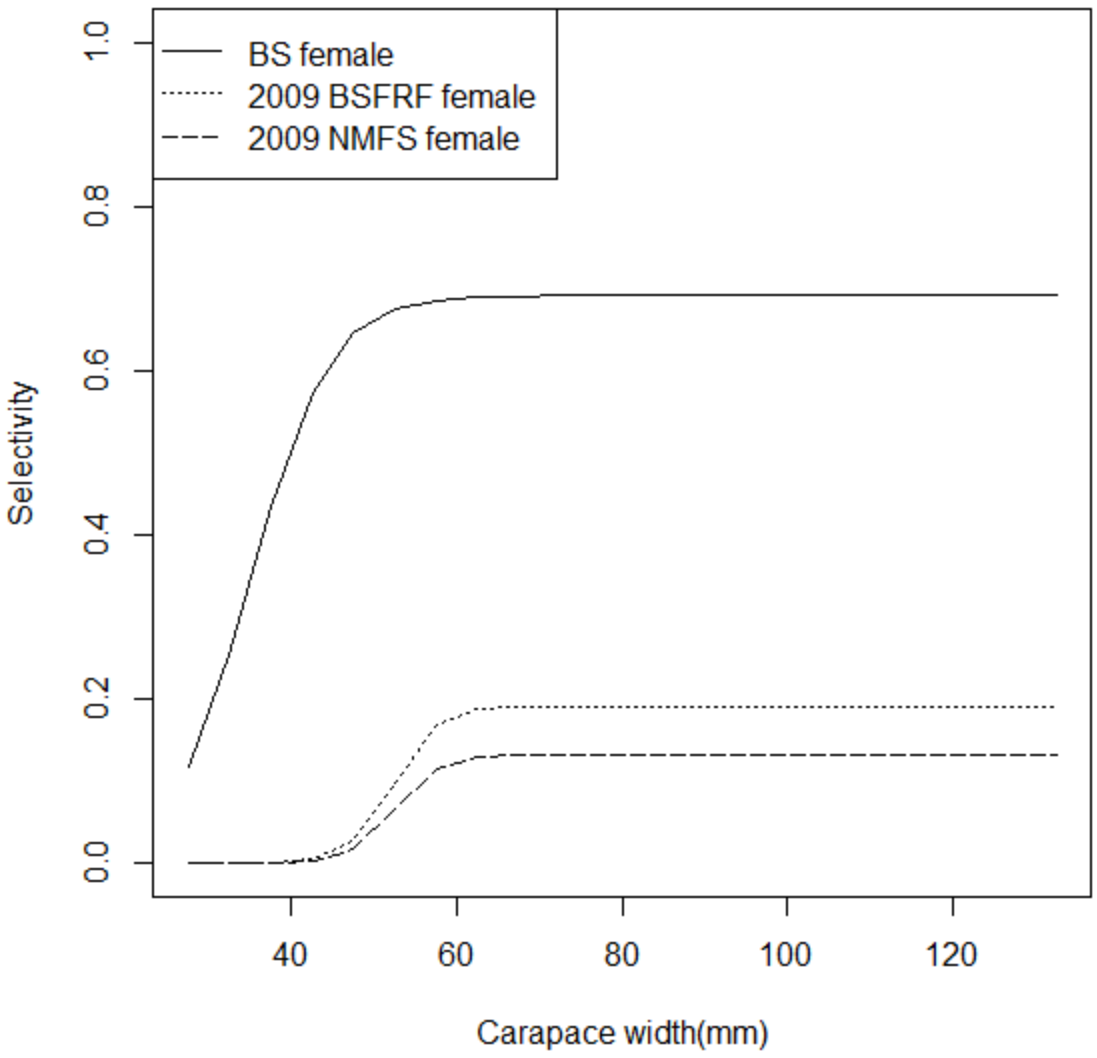

Figure 96. Model 1. Survey selectivity curves for female crab in the entire Bering sea 1989-present (BS female), 2009 study area BSFRF female and 2009 study area NMFS female.

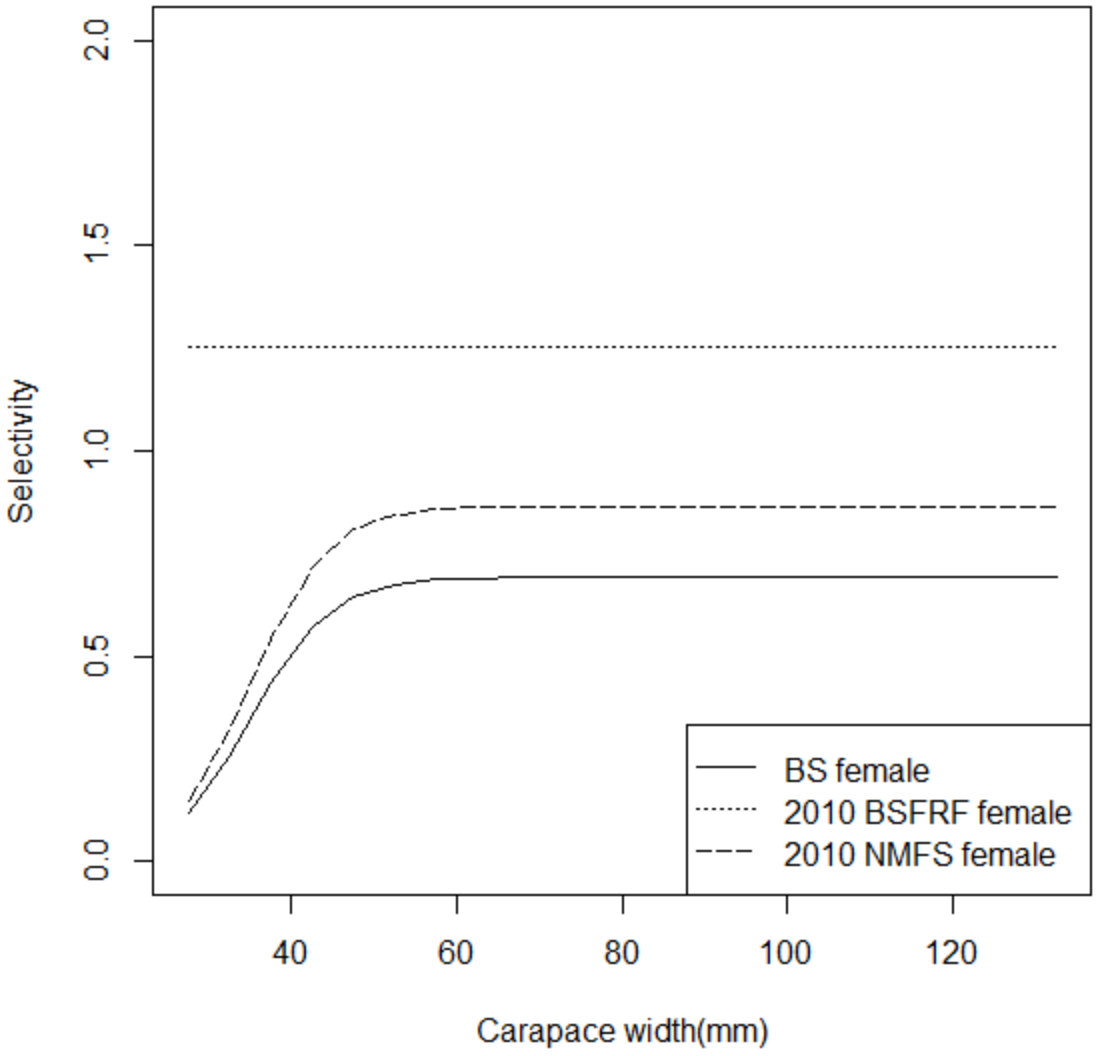

Figure 97. Model 1. Survey selectivity curves for female crab in the entire Bering sea 1989-present (BS female), 2010 study area BSFRF female and 2010 study area NMFS female.

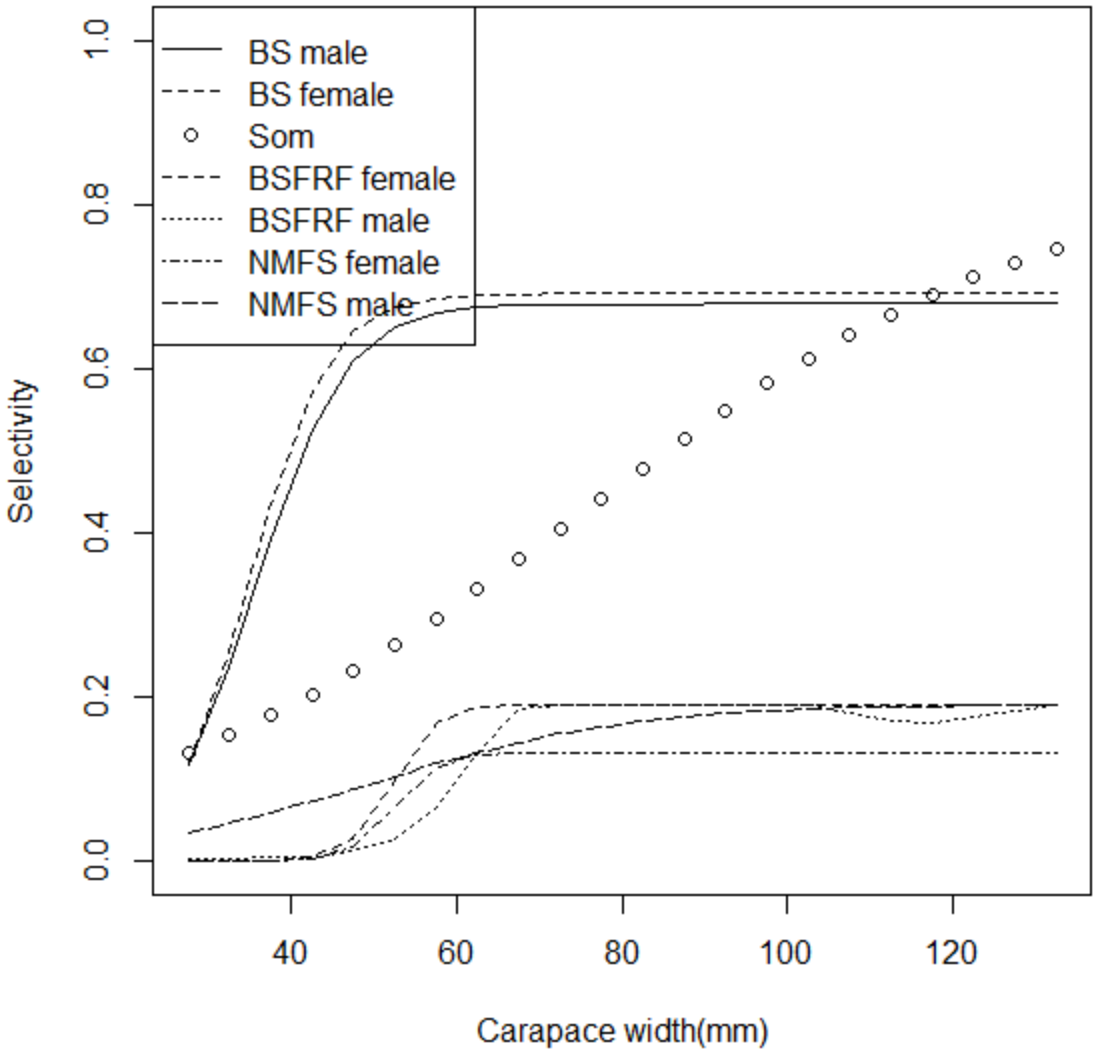

Figure 90. Model 1. Survey selectivity curves entire Bering Sea survey for female (upper dashed line) and male snow crab (solid lines) estimated by the model for 1989 to present. Survey selectivities estimated by Somerton(2010) from 2009 study area data are the circles. Lower lines are survey selectivities in the study area for BSFRF male and female crab and NMFS male and female crab.

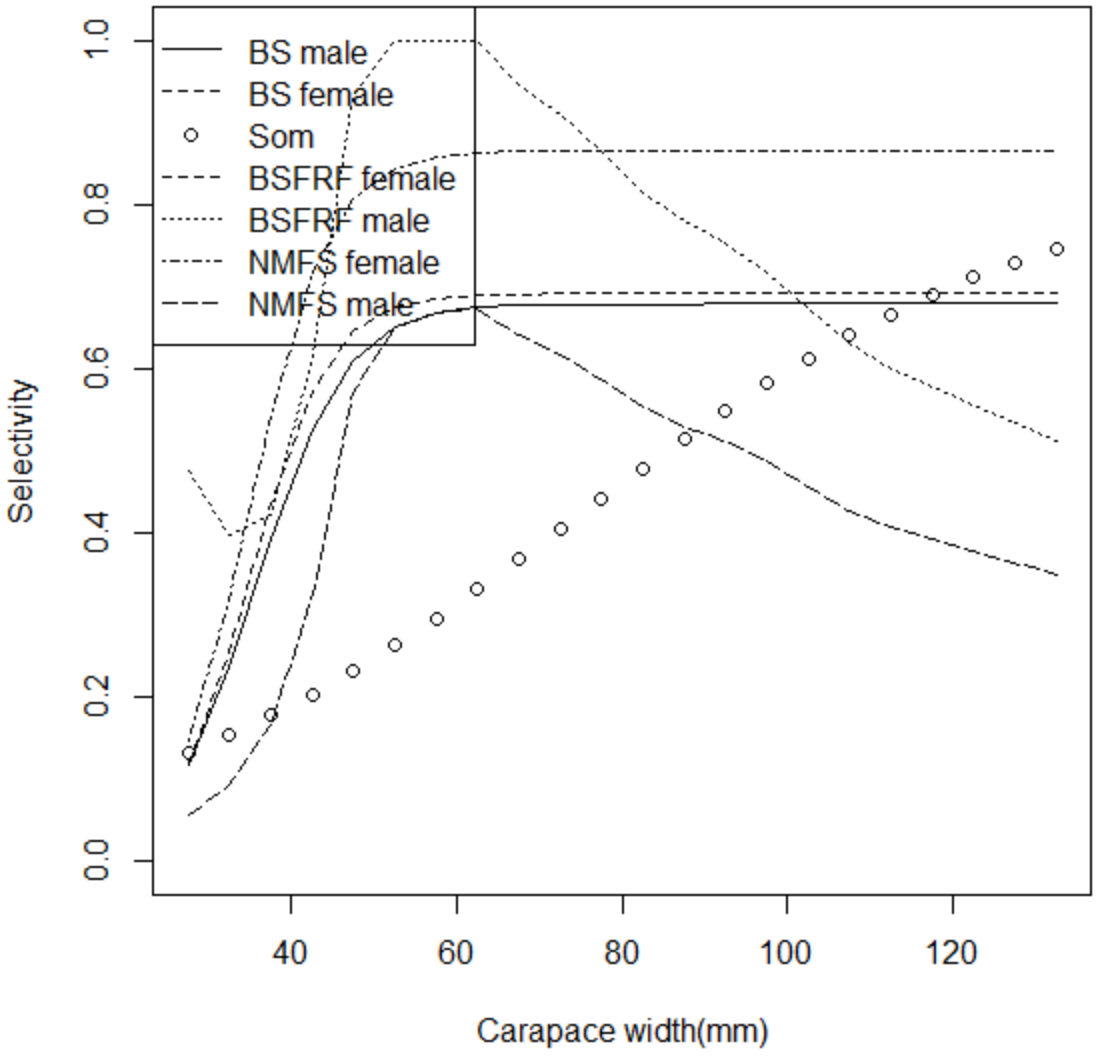

Figure 91. Model 1. 2010 study area survey selectivity curves (BSFRF and NMFS). BS are survey selectivity curves for the entire Bering Sea. Som is the selectivity curve estimated by Somerton from the 2009 study area data.

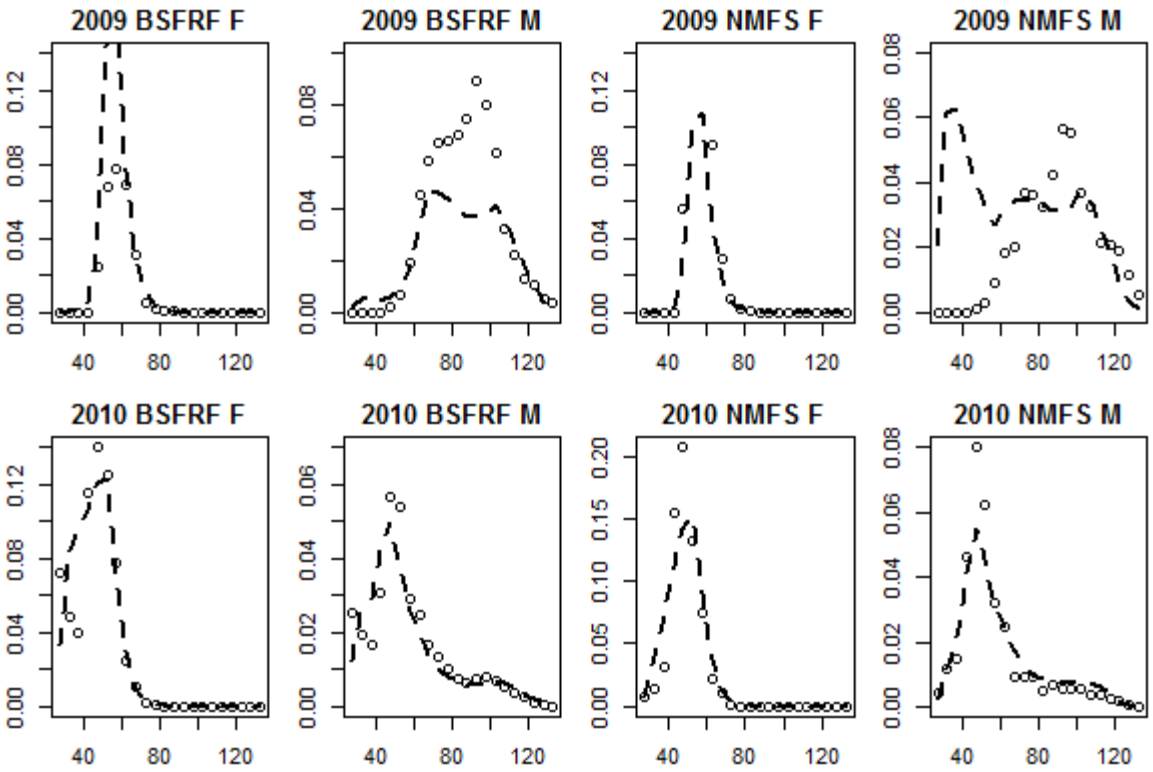

Figure 98. Model 1. Model fit to length frequency for BSFRF and NMFS females and males in the study area.

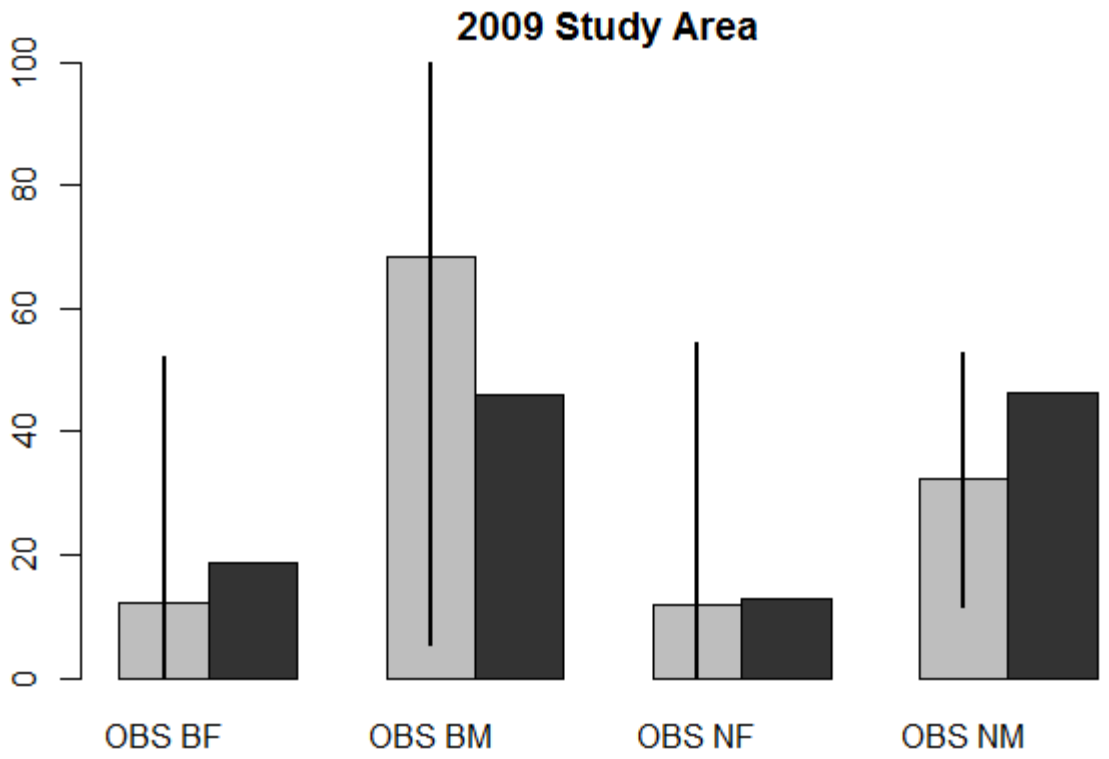

Figure 99. Model 1. Fits to 2009 study area mature biomass by sex for BSFRF and NMFS data.

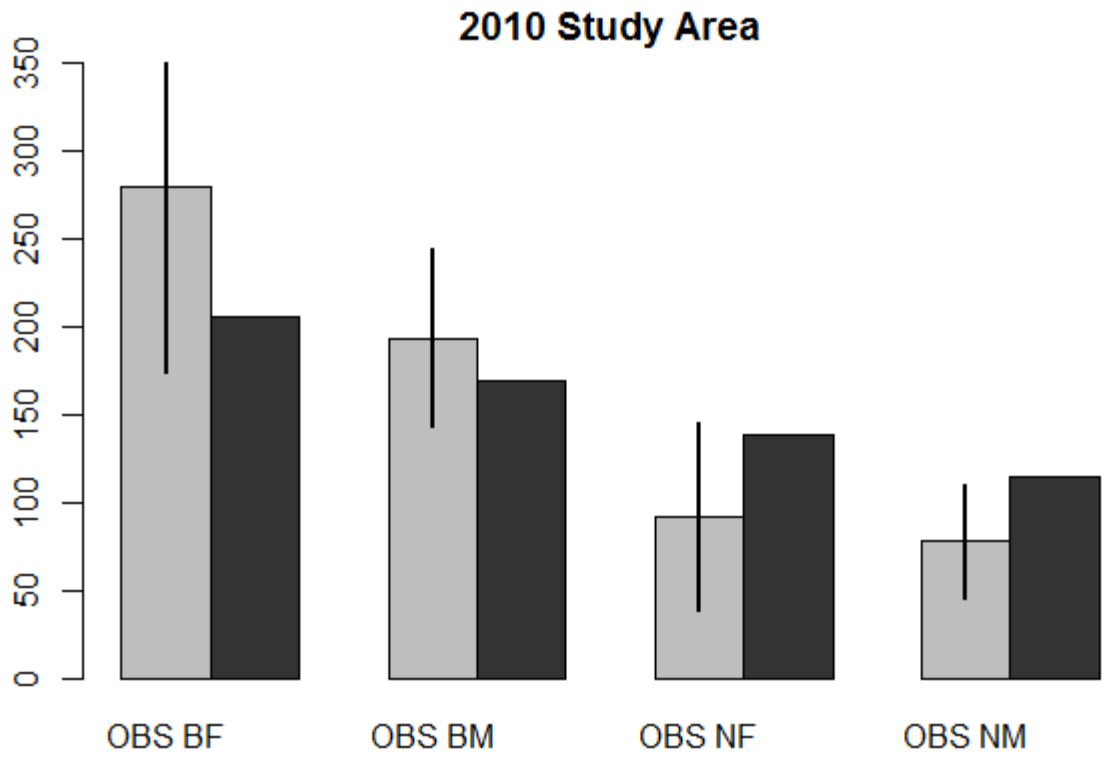

Figure 100. Model 1. Fits to 2010 study area mature biomass by sex for BSFRF and NMFS data.

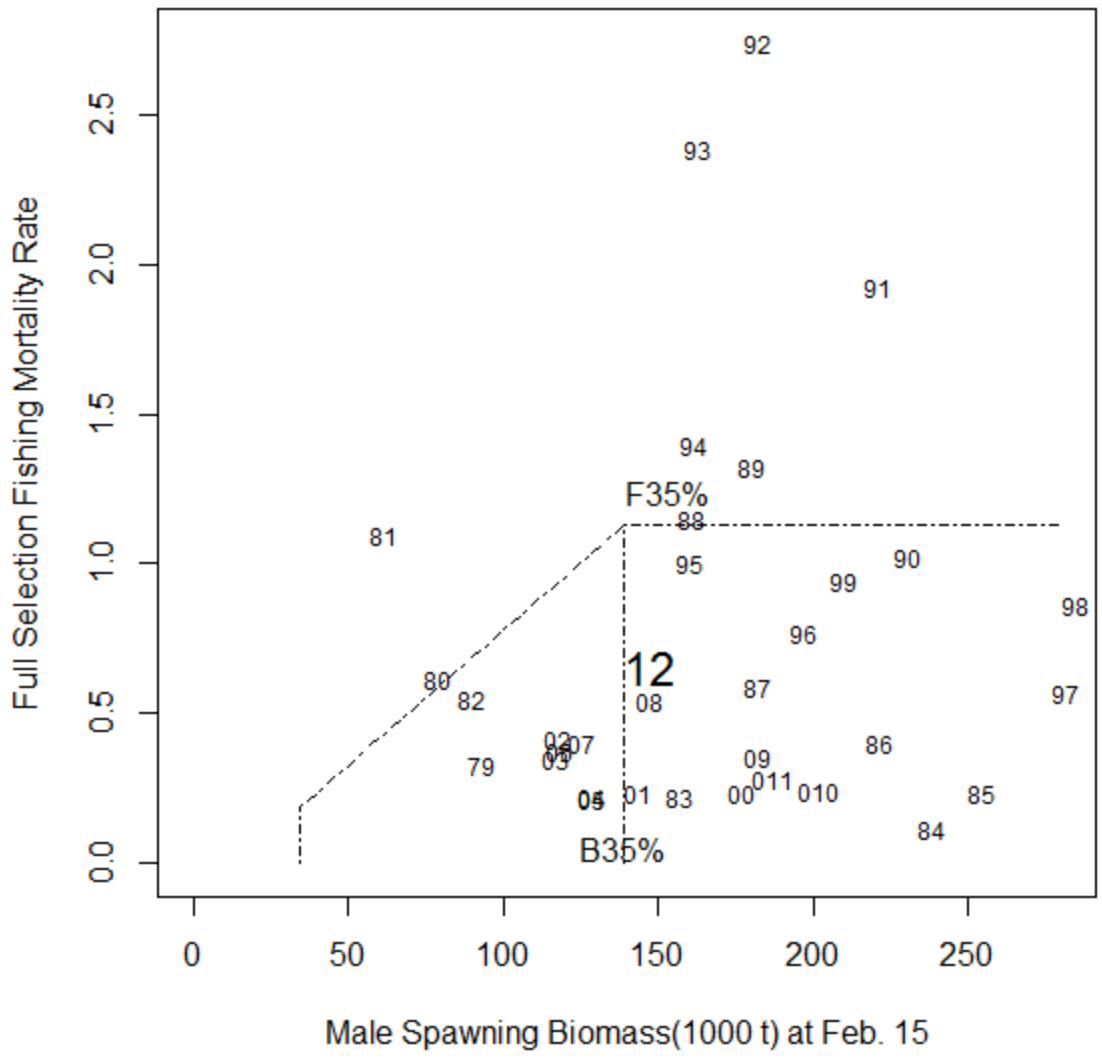

Figure 101. Model 1. Fishing mortality estimated from fishing years 1979 to 20011/12 (labeled 12 in the plot). The OFL control rule (F35%) is shown for comparison. The vertical line is B35%, estimated from the product of spawning biomass per recruit fishing at F35% and mean recruitment from the stock assessment model.