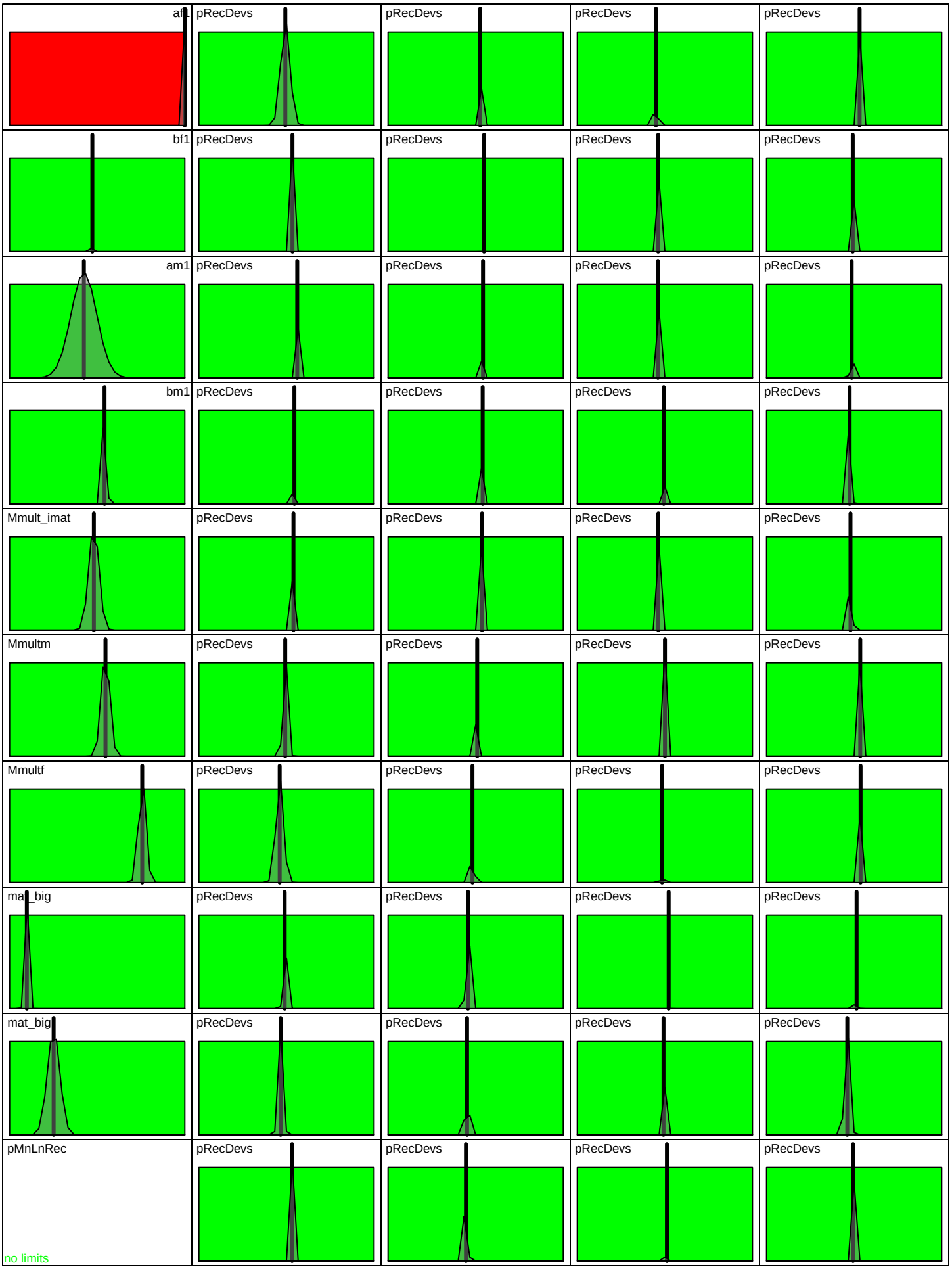
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bm1
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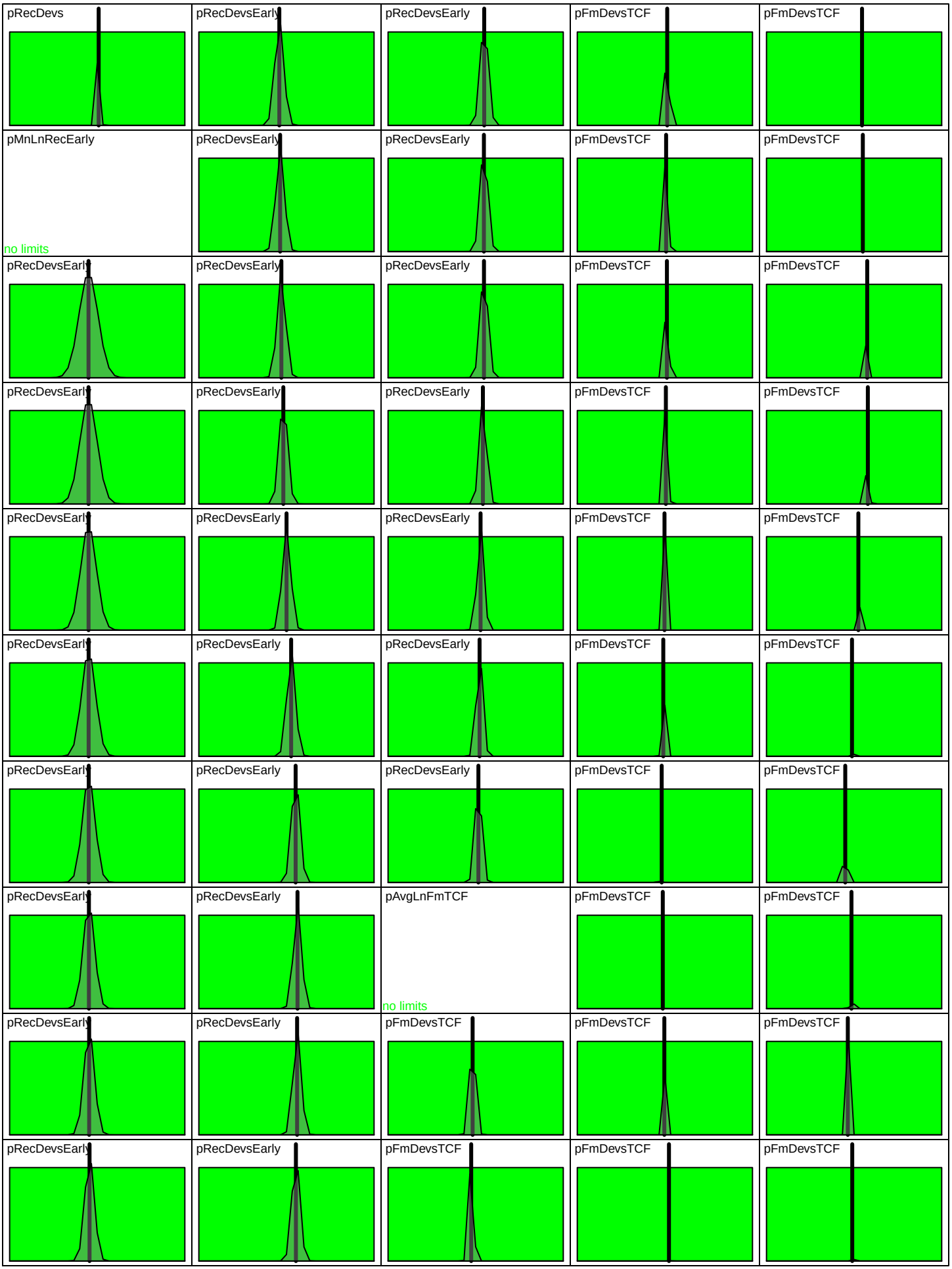
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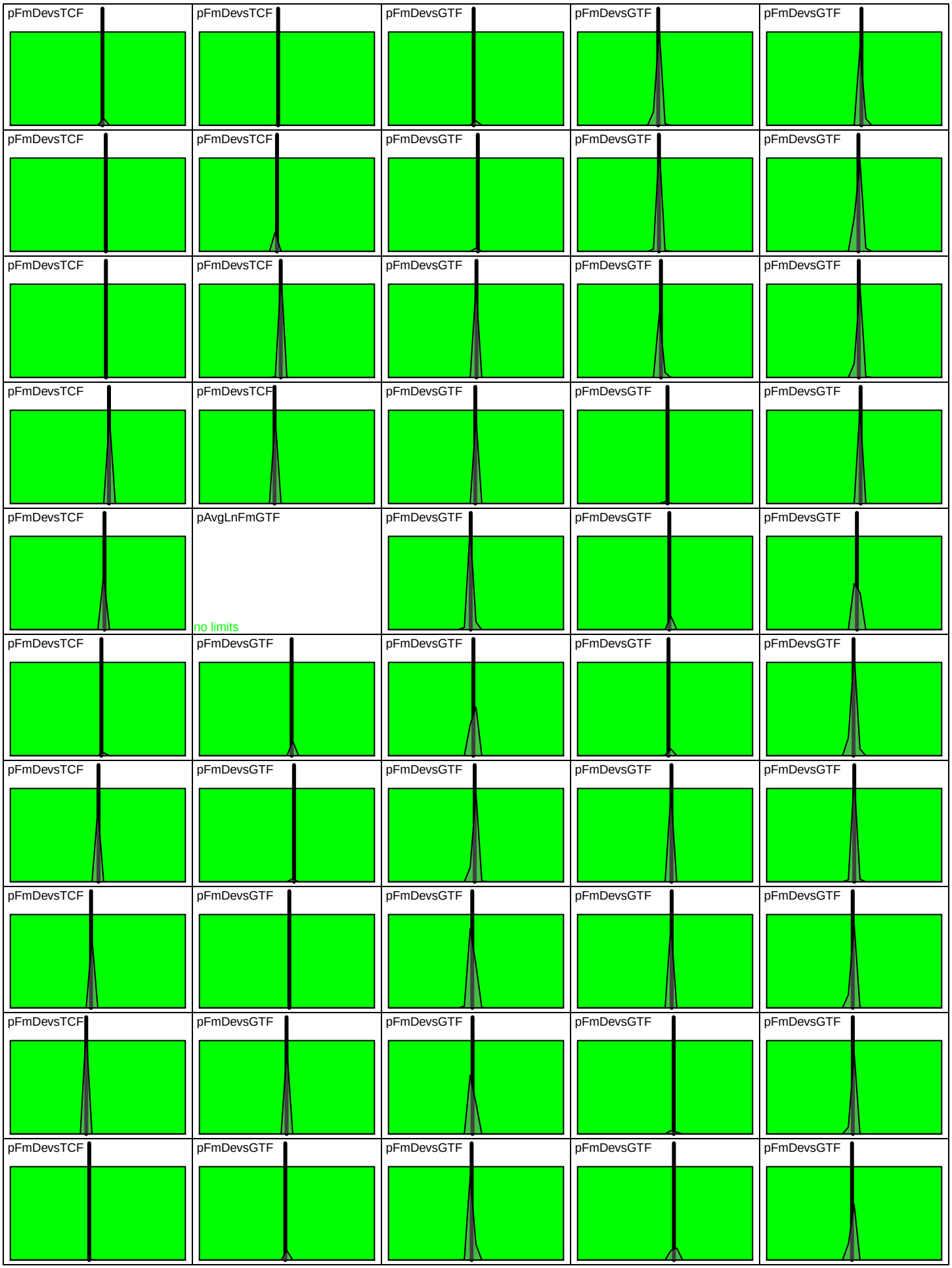
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no limits
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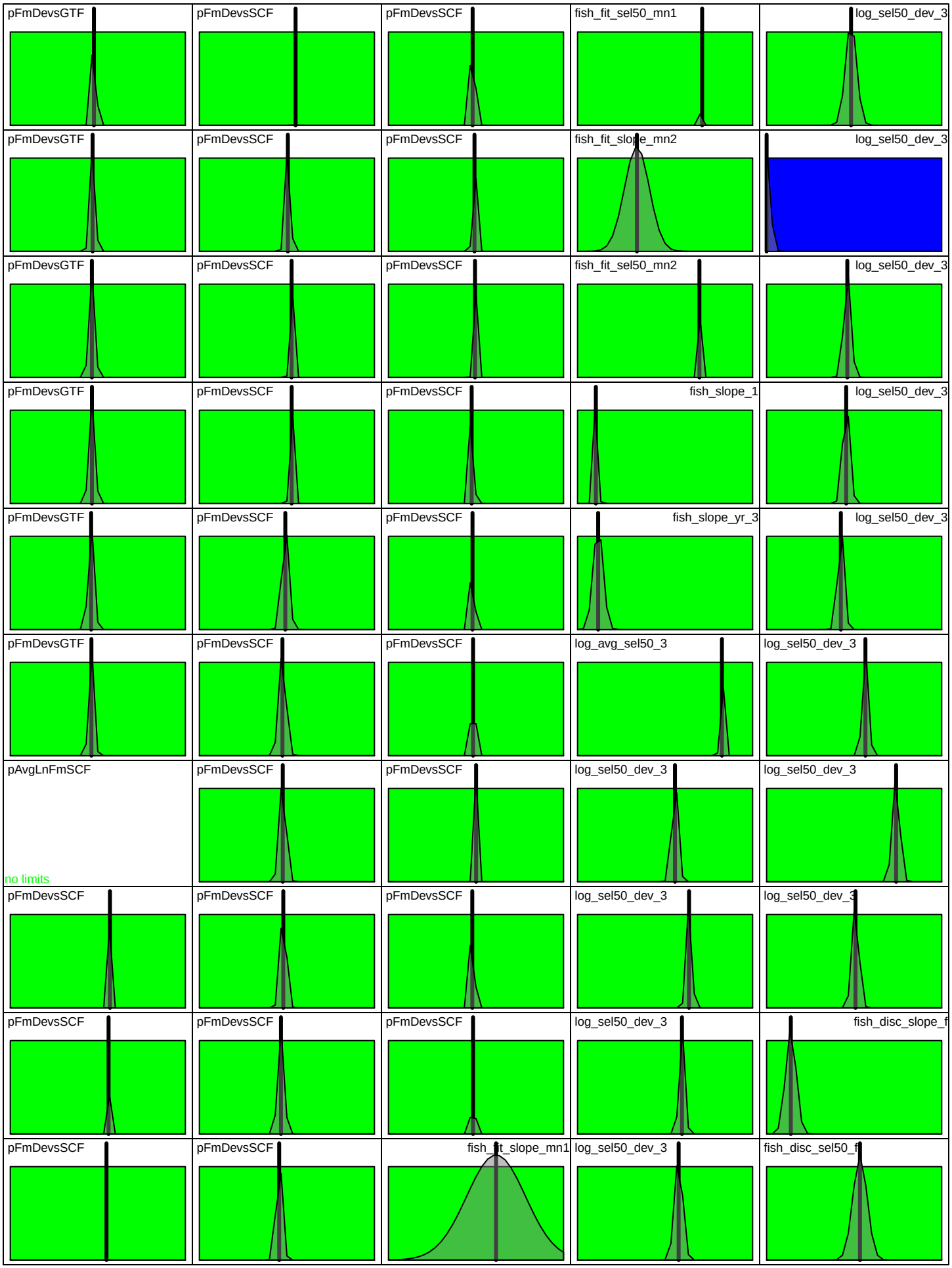
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log_sel50_dev_3
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fish_slope_yr_3
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fish_fit_slope_mn1
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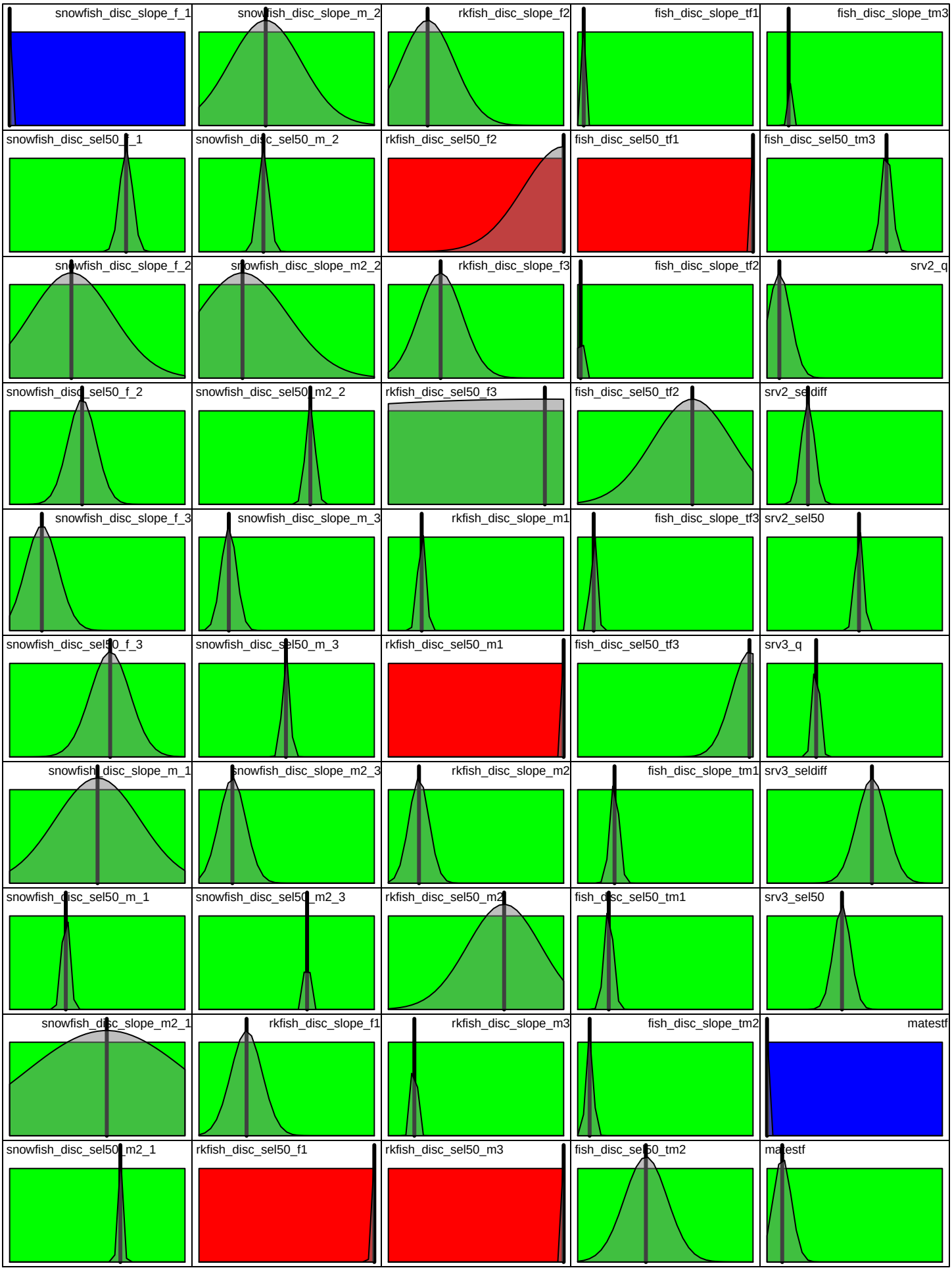
fish_disc_sel50_f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snowfish_disc_slope_m_2
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fish_disc_slope_tf1
fish_disc_slope_tm3
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snowfish_disc_sel50_m_2
rkfish_disc_sel50_f2
fish_disc_sel50_tf1
fish_disc_sel50_tm3
snowfish_disc_slope_f_2
snowfish_disc_slope_m2_2
rkfish_disc_slope_f3
fish_disc_slope_tf2
srv2_q
snowfish_disc_sel50_f_2
snowfish_disc_sel50_m2_2
rkfish_disc_sel50_f3
fish_disc_sel50_tf2
srv2_seldiff
snowfish_disc_slope_f_3
snowfish_disc_slope_m_3
rkfish_disc_slope_m1
fish_disc_slope_tf3
srv2_sel50
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fish_disc_slope_tm1
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fish_disc_sel50_tm1
srv3_sel50
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rkfish_disc_slope_f1
rkfish_disc_slope_m3
fish_disc_slope_tm2
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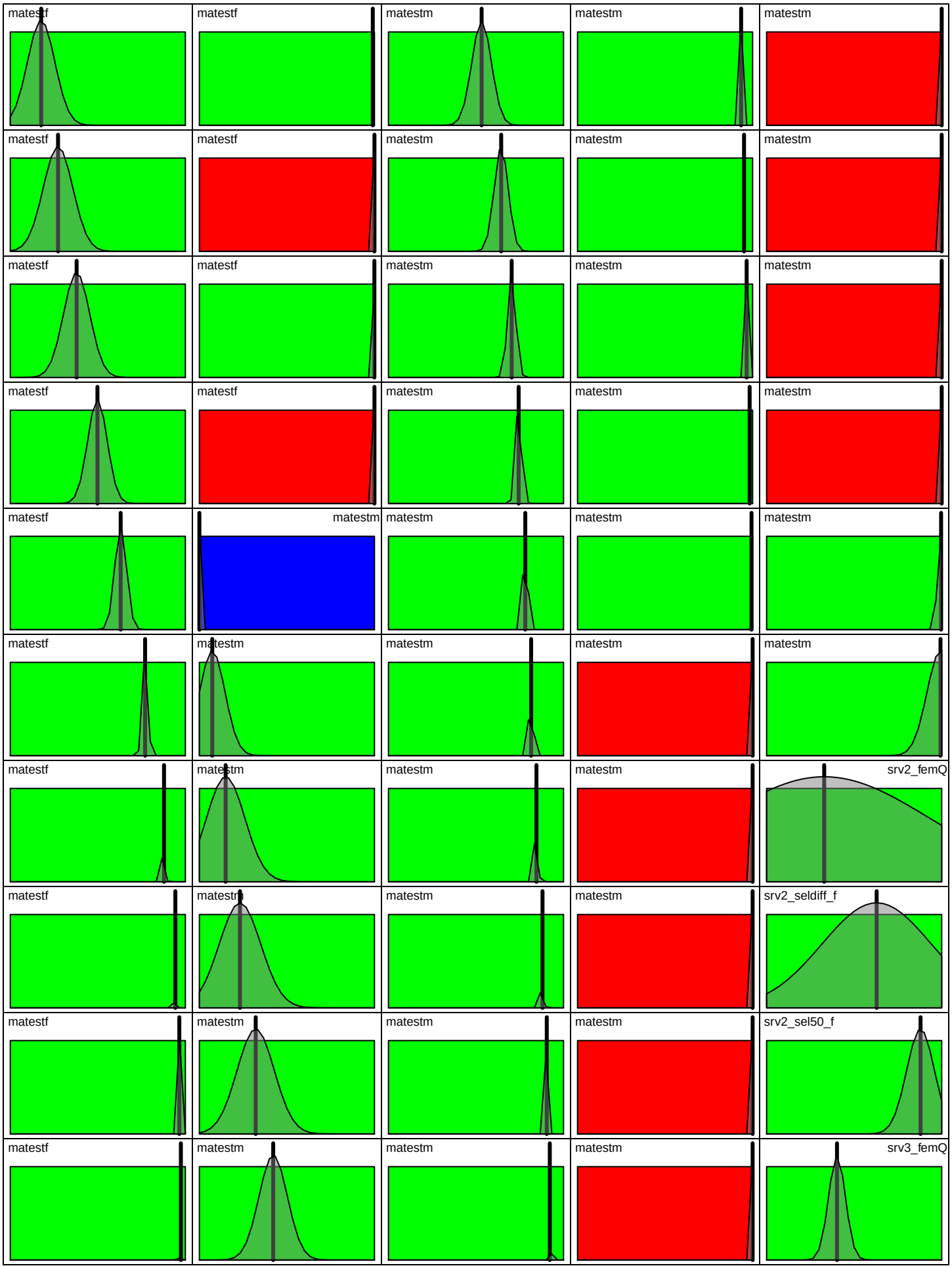
matestf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srv2_femQ
matestf
matestm
matestm
matestm
srv2_seldiff_f
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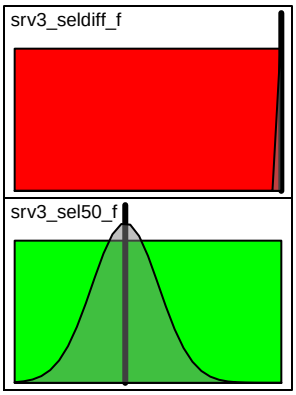
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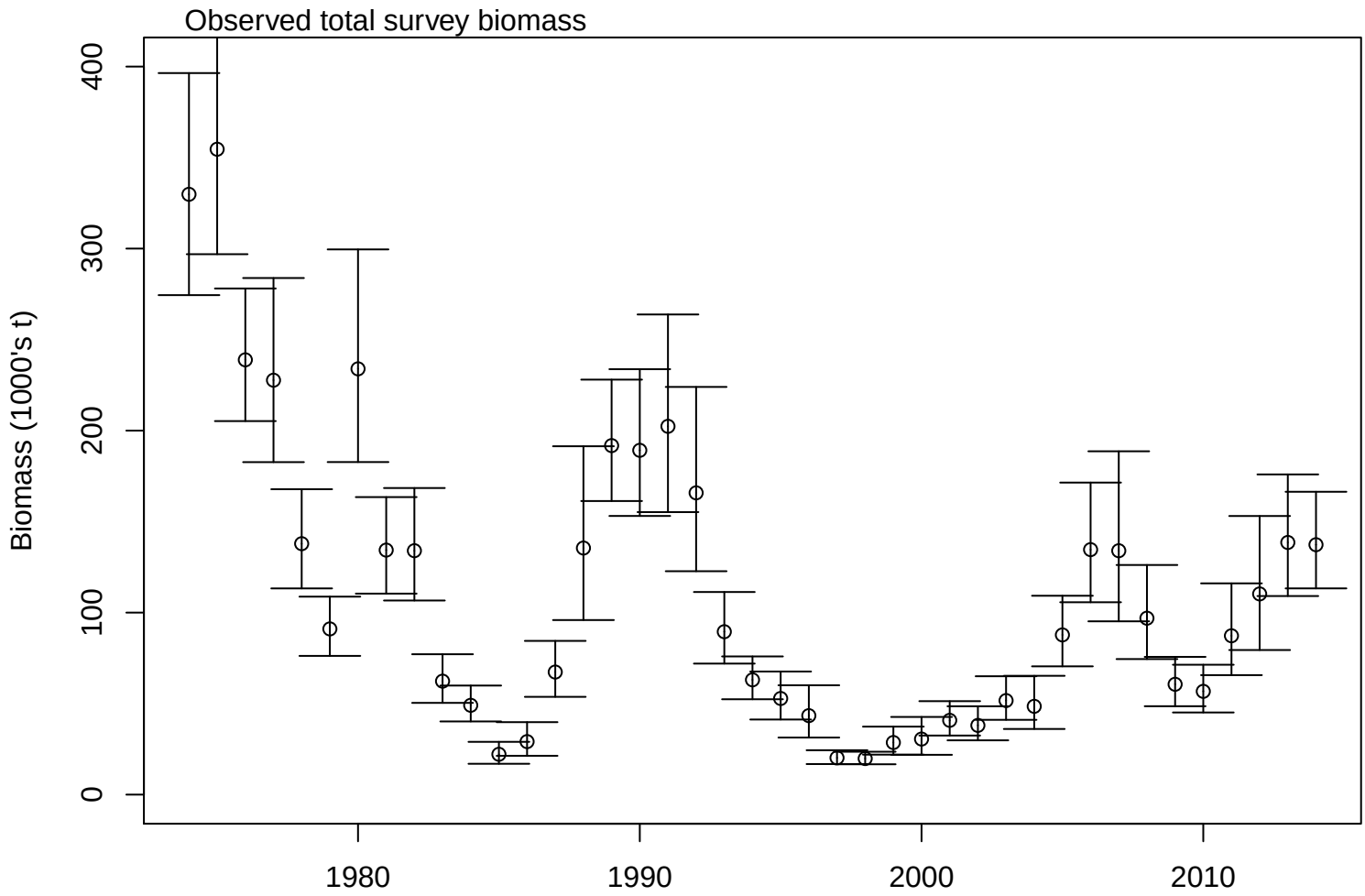
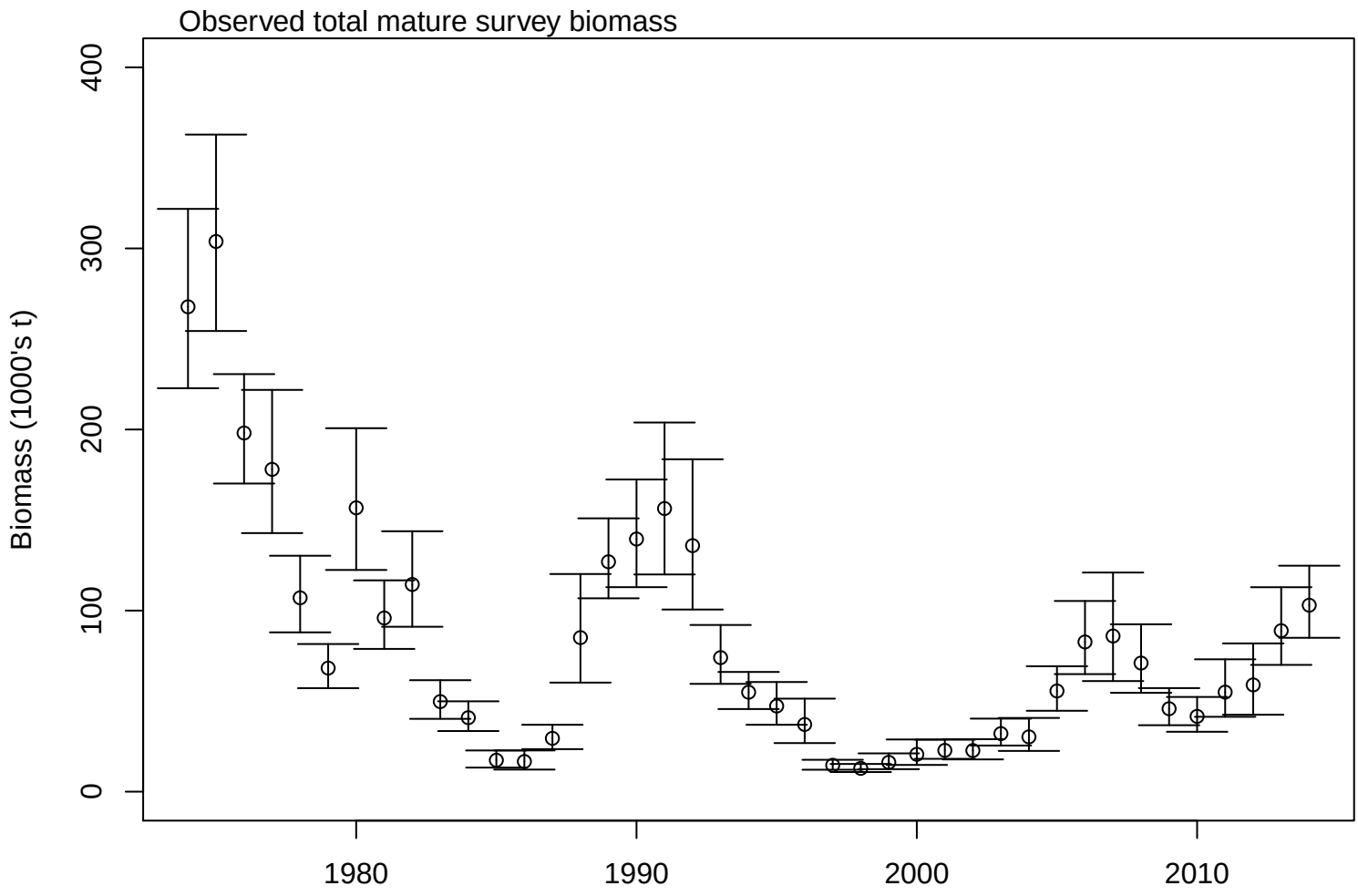
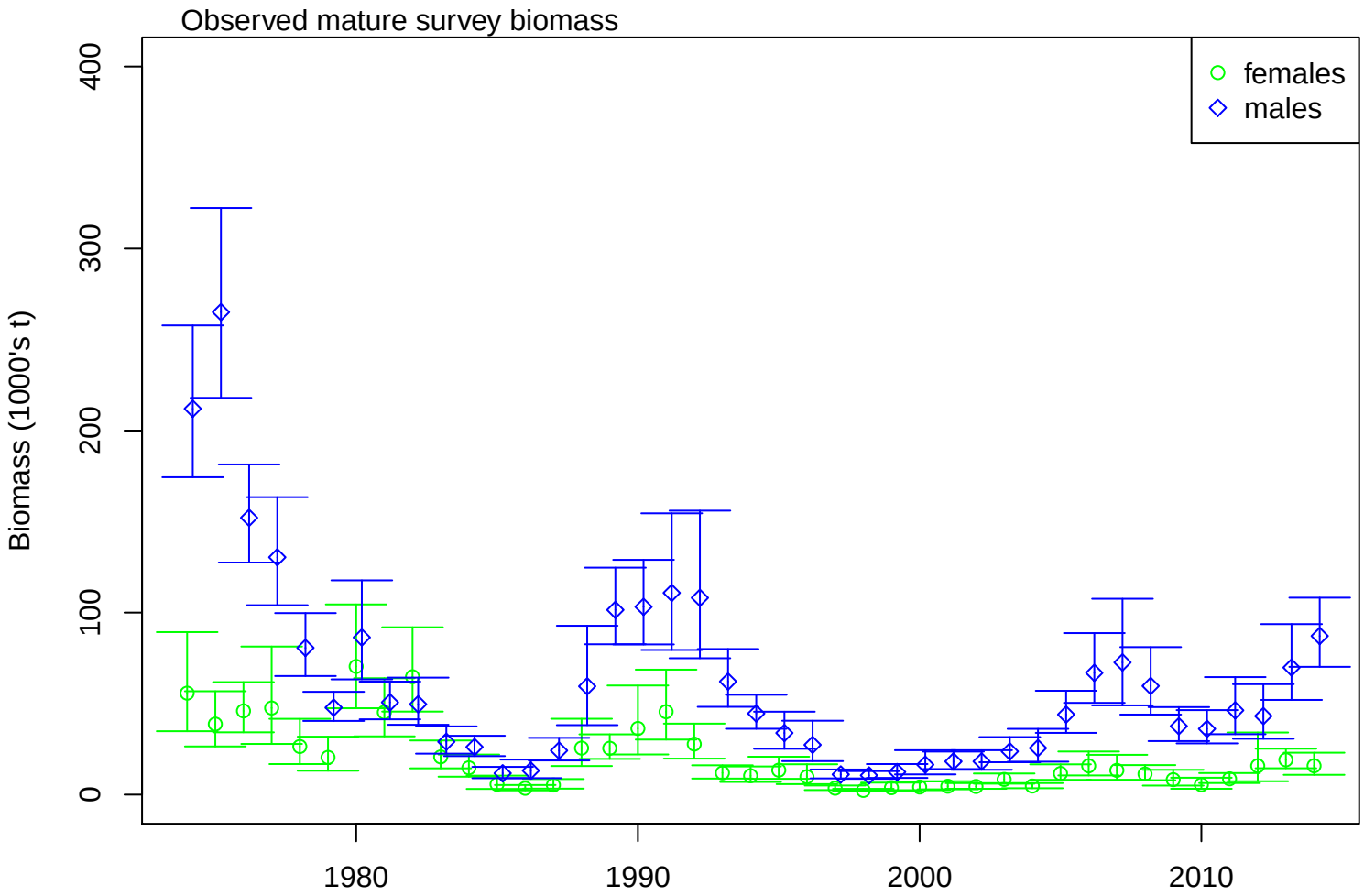
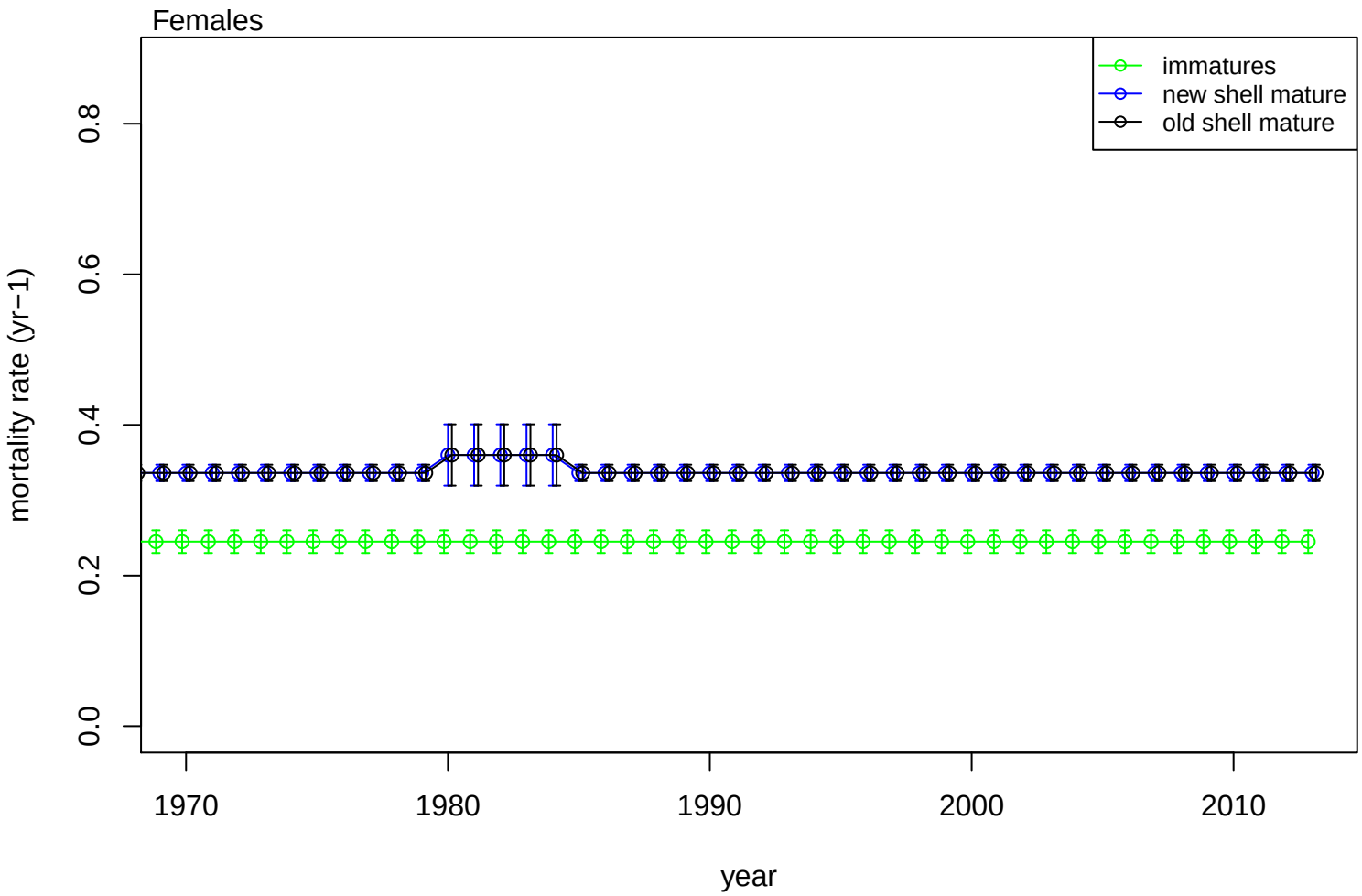
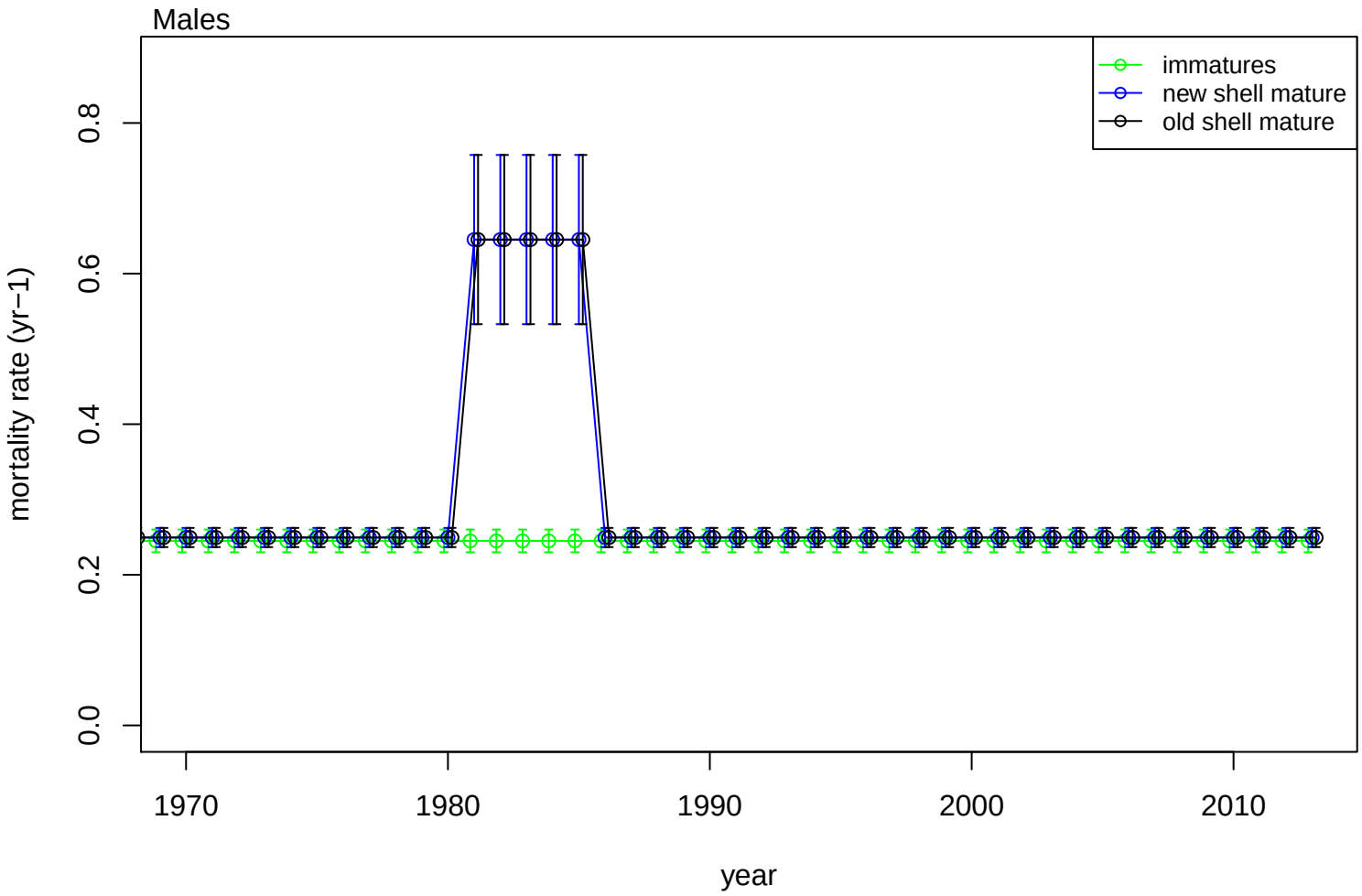
srv3_sel50_f

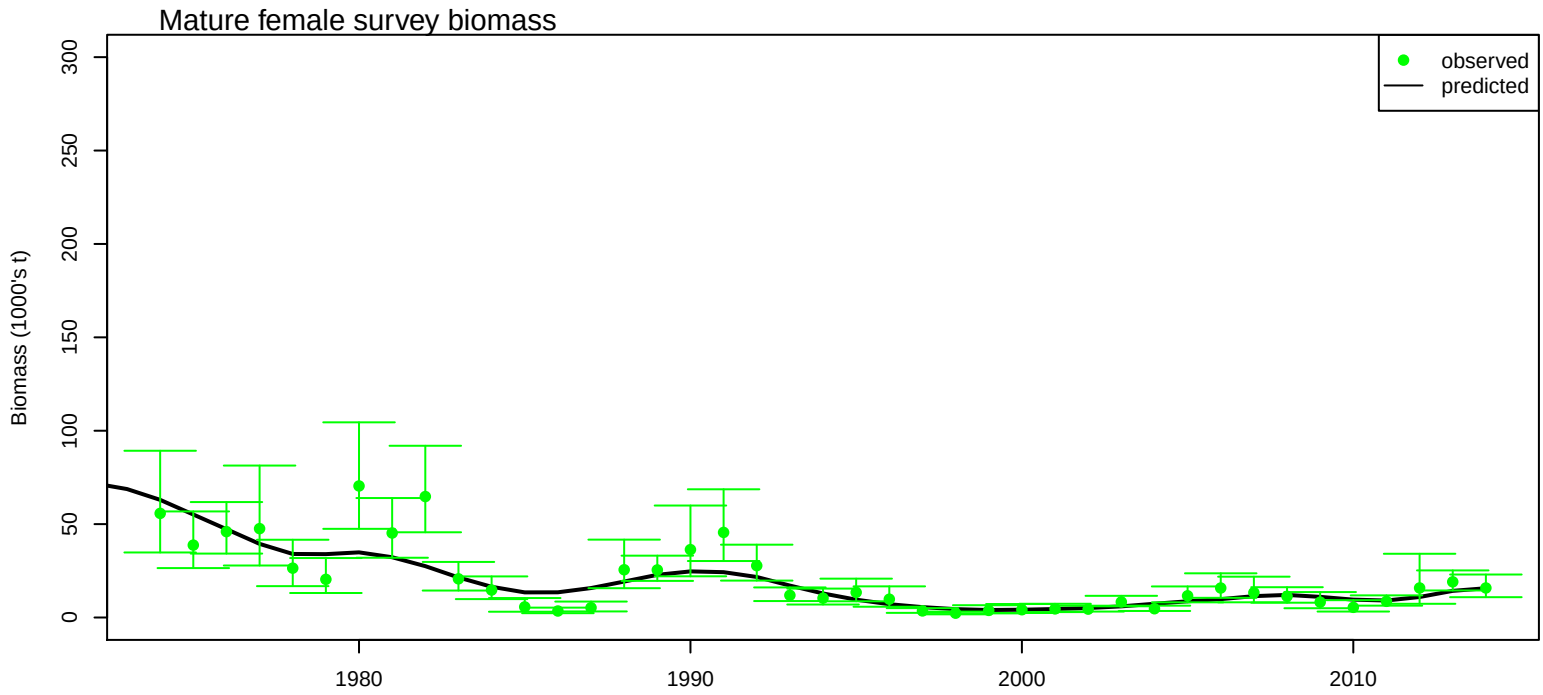

Observed total survey biomass
Biomass (1000's t)
0
100
200
300
400
1980
1990
2000
2010

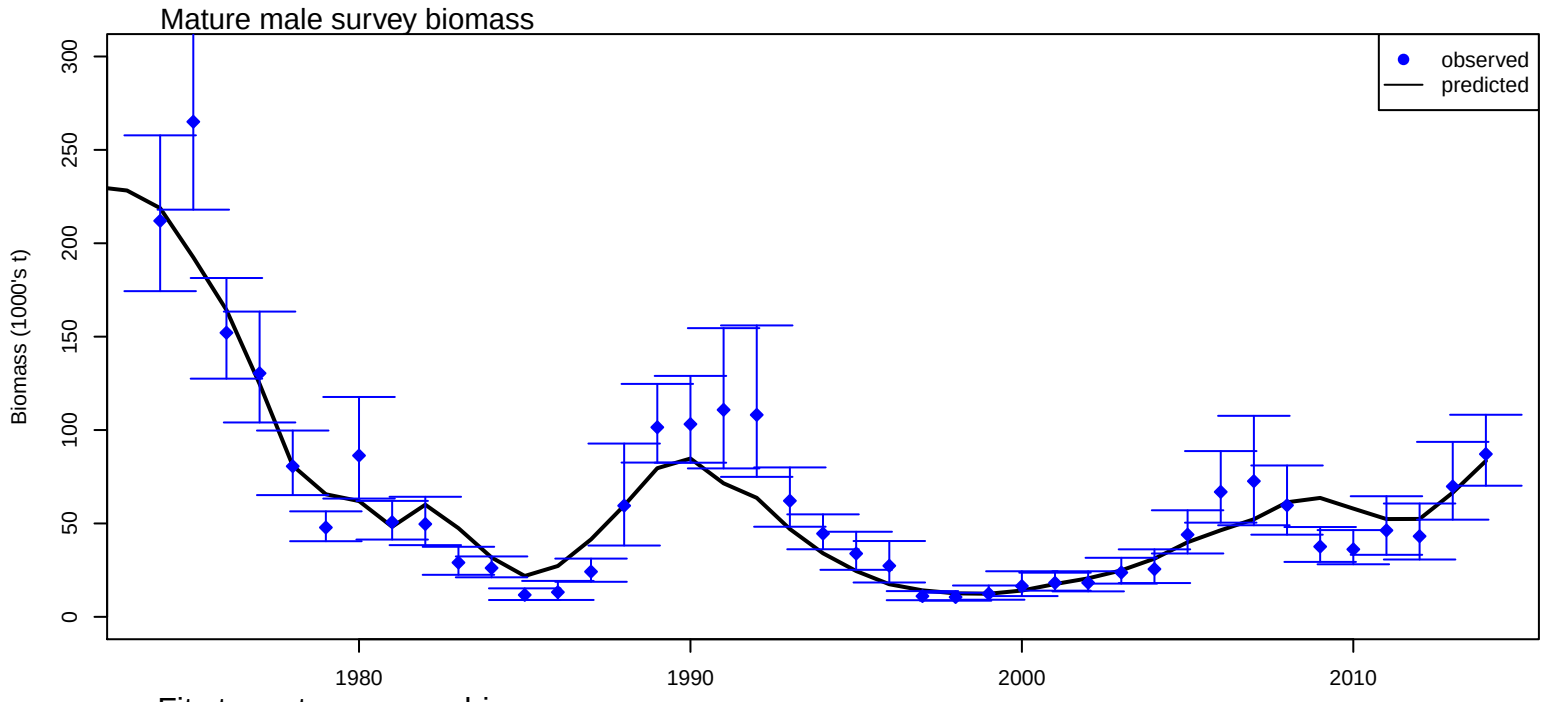

Observed total mature survey biomass
Biomass (1000's t)
0
100
200
300
400
1980
1990
2000
2010

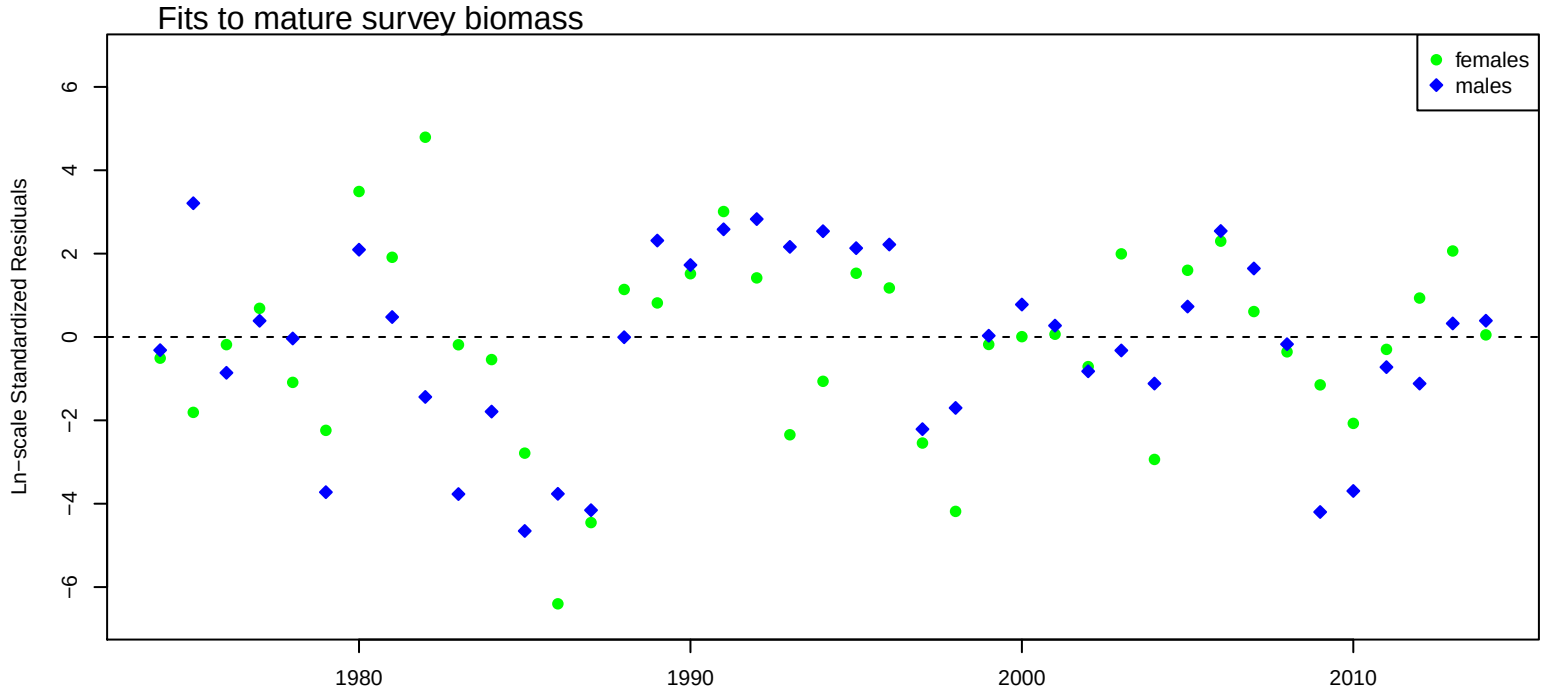

Observed mature survey biomass
females
males
Biomass (1000's t)
0
100
200
300
400
1980
1990
2000
2010

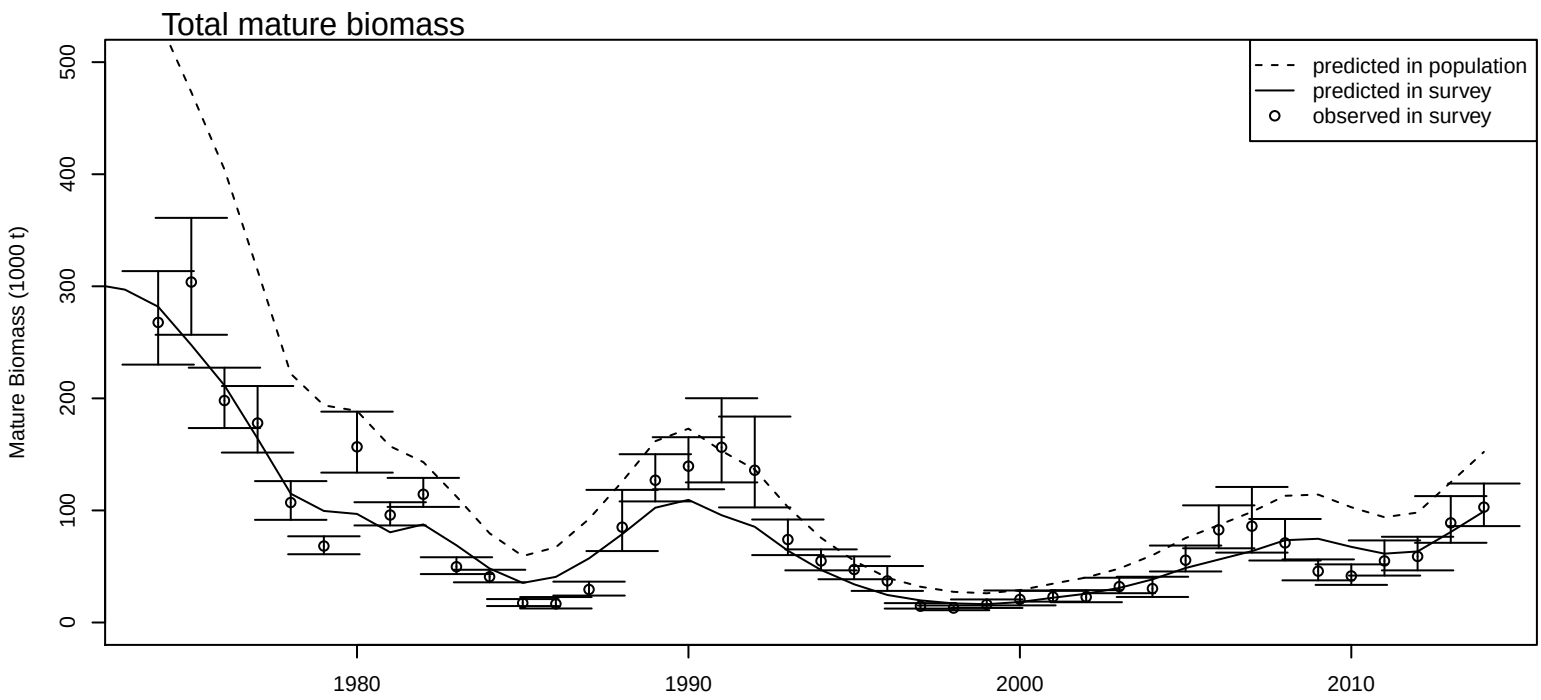

Females
immatures
new shell mature
old shell mature
mortality rate (yr−1)
0.0
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
year

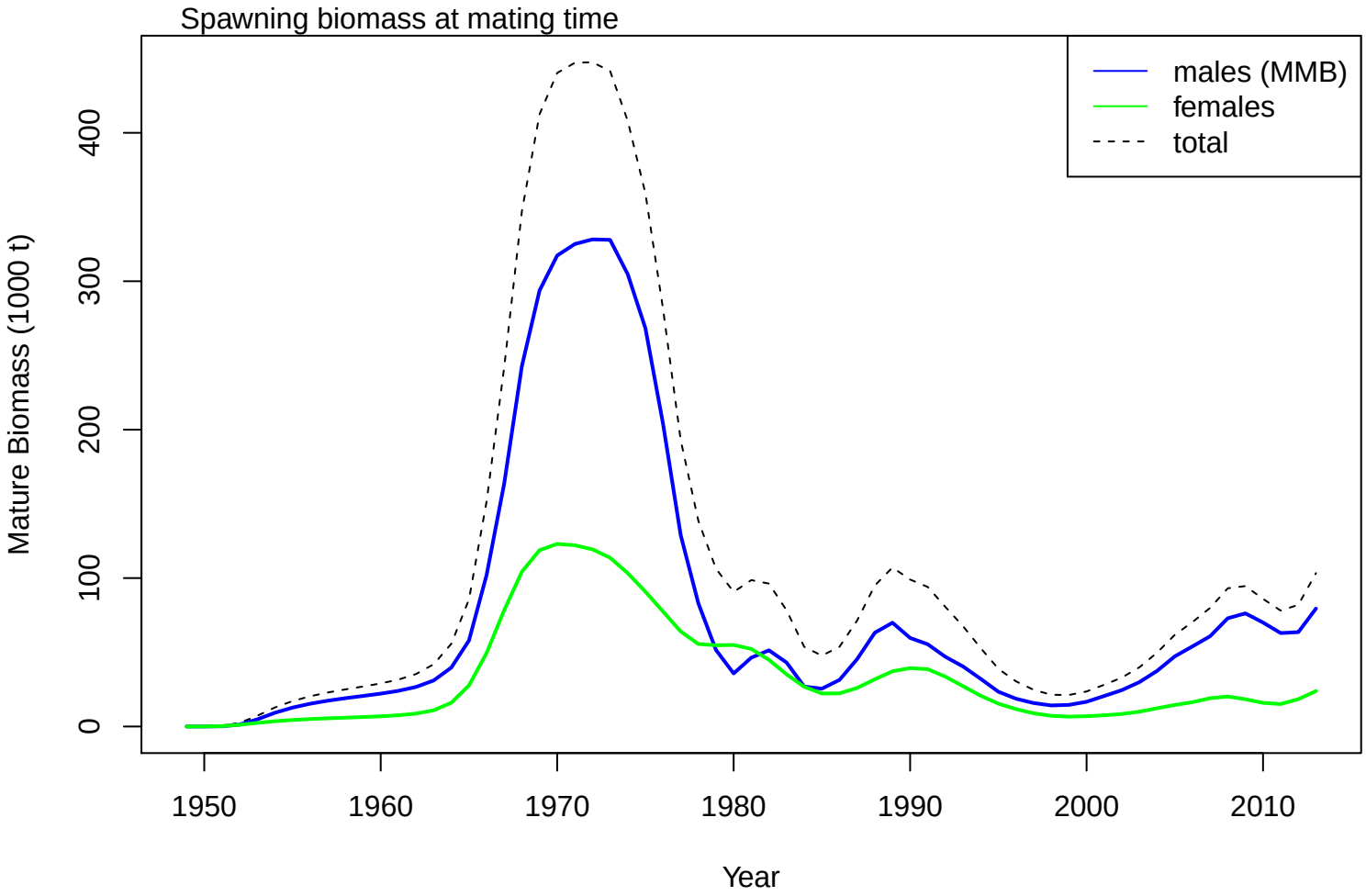

Males
immatures
new shell mature
old shell mature
mortality rate (yr−1)
0.0
0.2
0.4
0.6
0.8
1970
1980
1990
2000
2010
year

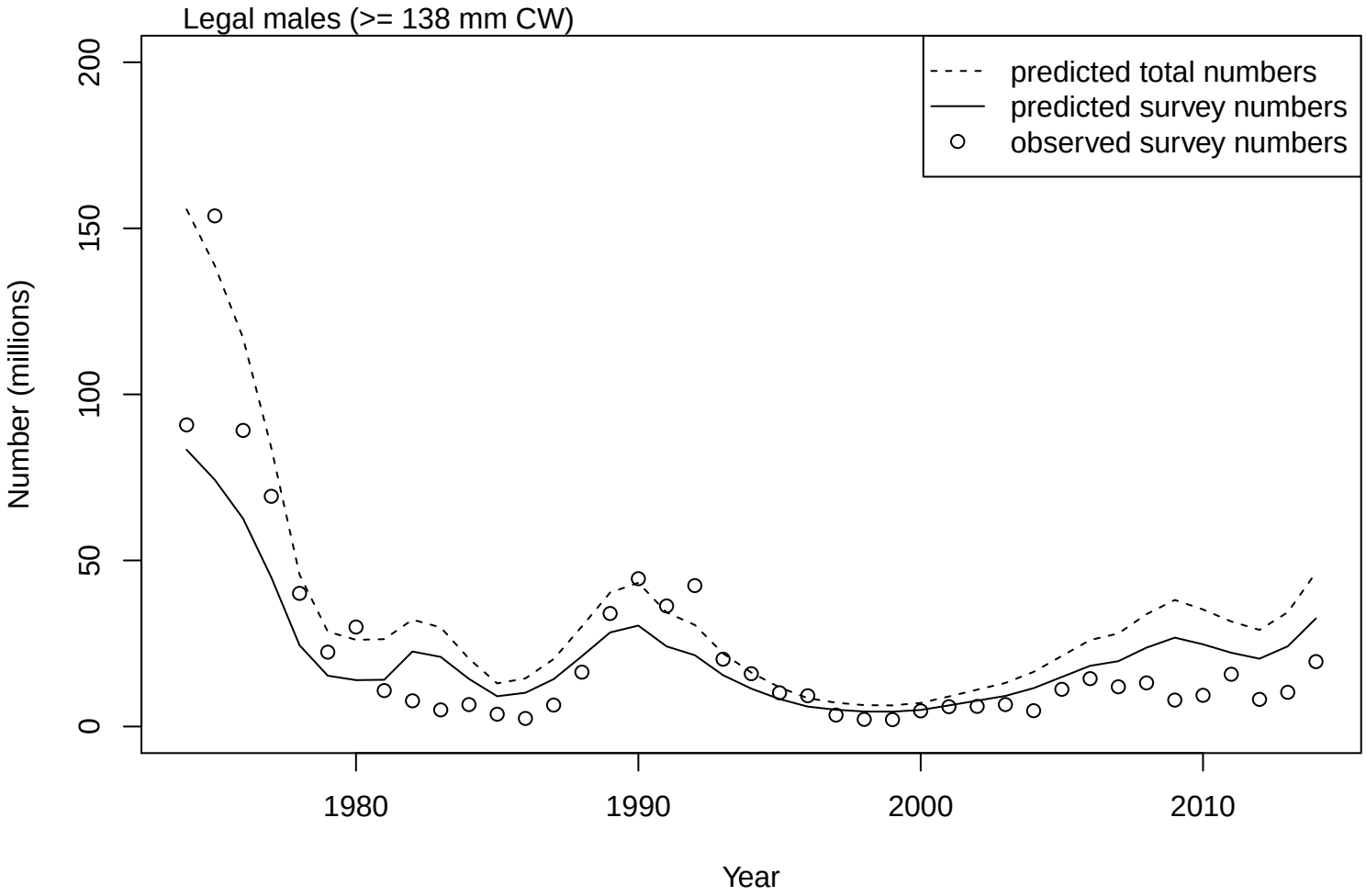

Mature female survey biomass
observed
predicted
Biomass (1000's t)
0
50
100
150
200
250
300
1980
1990
2000
2010


Mature male survey biomass
observed
predicted
Biomass (1000's t)
0
50
100
150
200
250
300
1980
1990
2000
2010

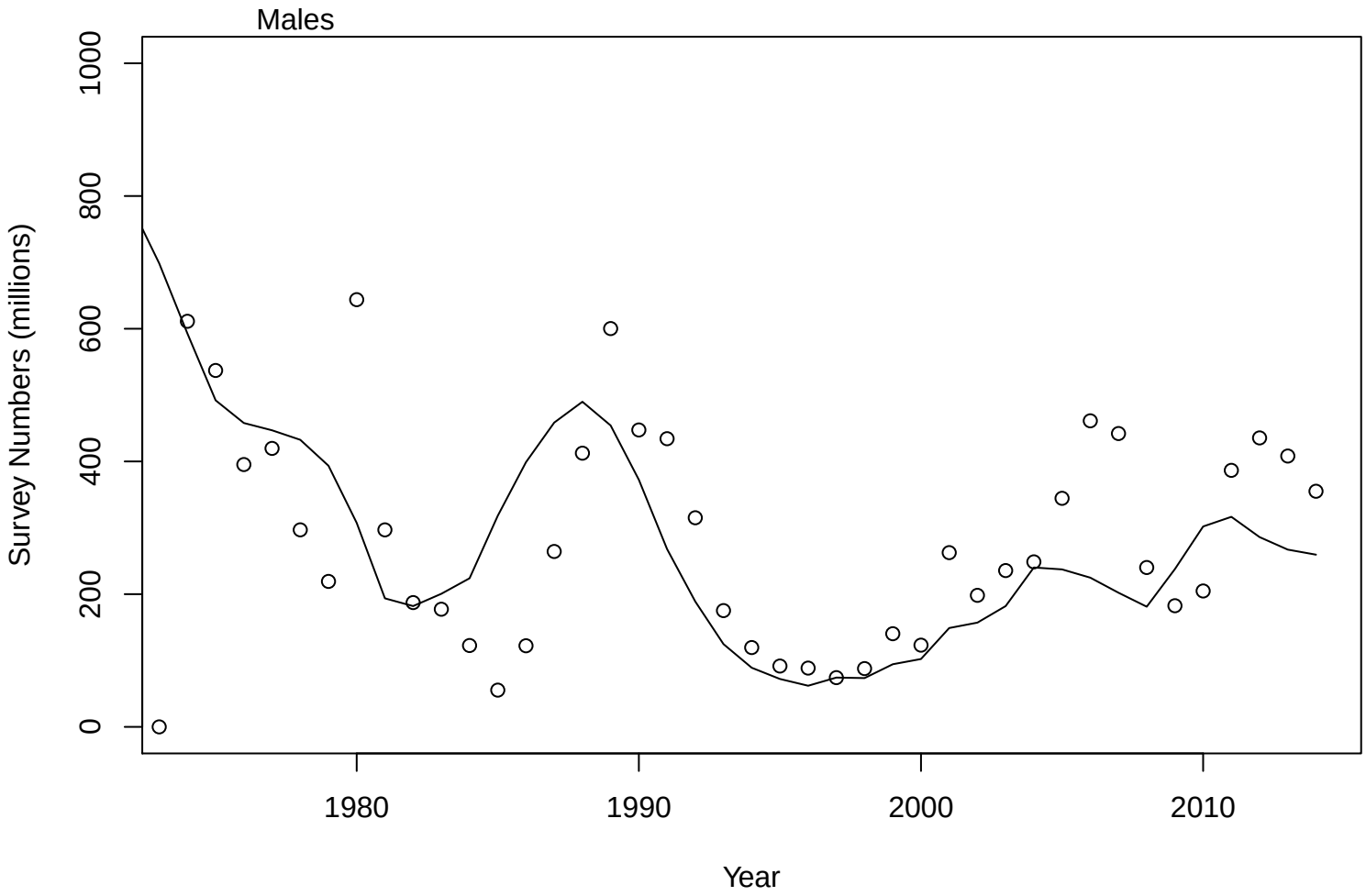

Fits to mature survey biomass
females
males
Ln−scale Standardized Residuals
−6
−4
−2
0
2
4
6
1980
1990
2000
2010

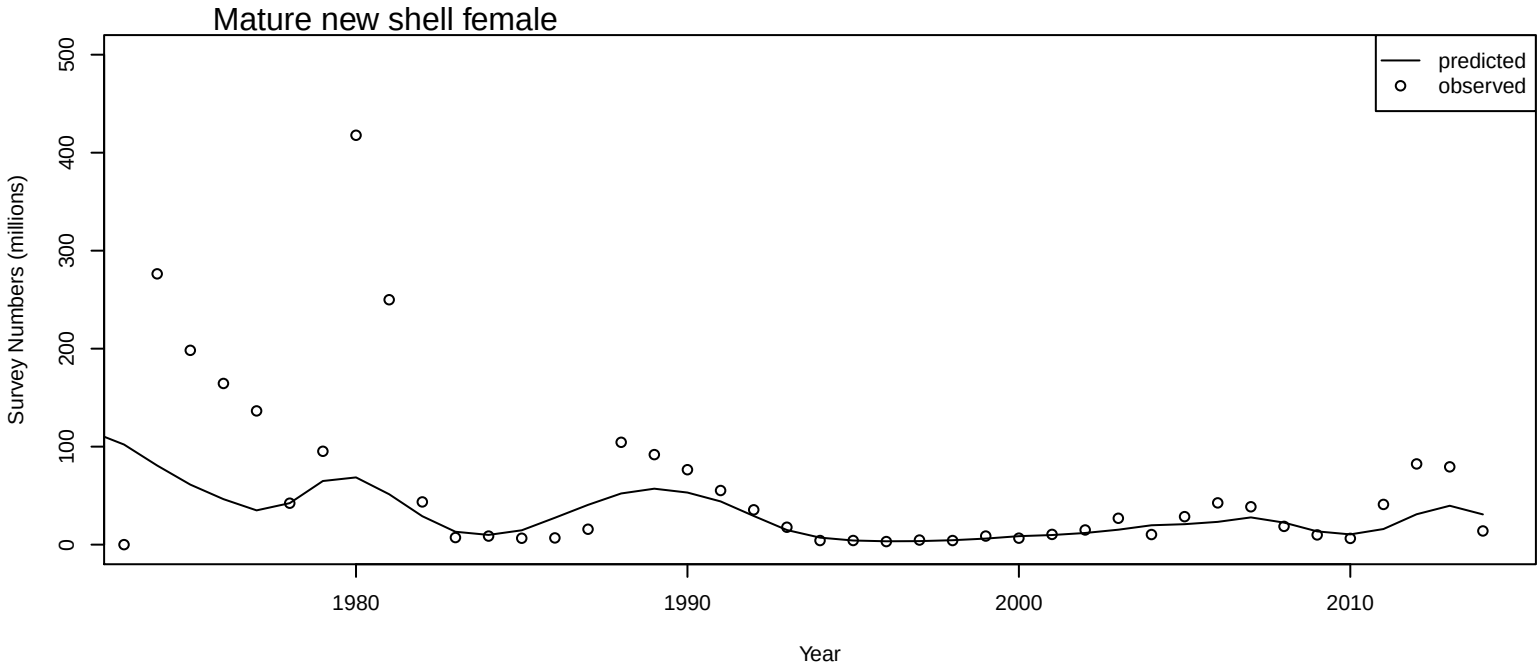

Total mature biomass
Mature Biomass (1000 t)
0
100
200
300
400
500
1980
1990
2000
2010
predicted in population
predicted in survey
observed in survey

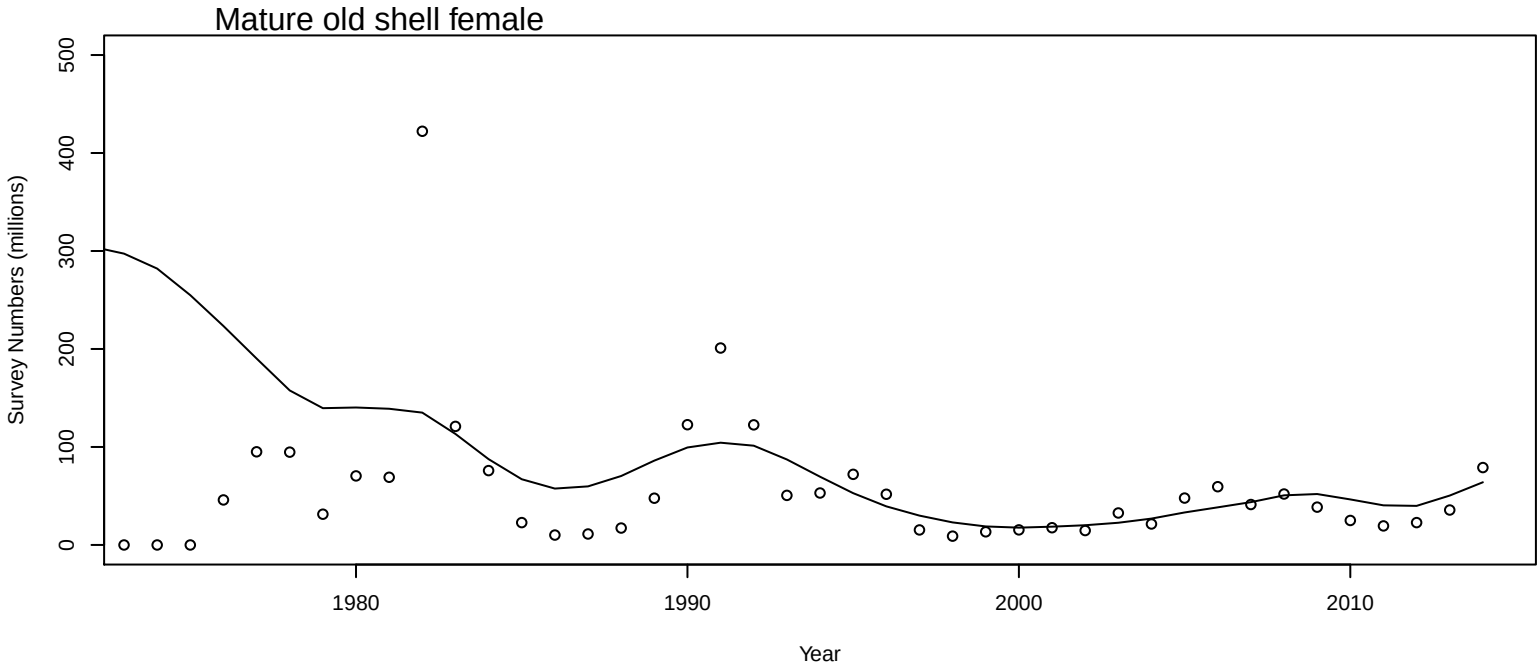

Spawning biomass at mating time
males (MMB)
females
total
Mature Biomass (1000 t)
0
100
200
300
400
1950
1960
1970
1980
1990
2000
2010
Year

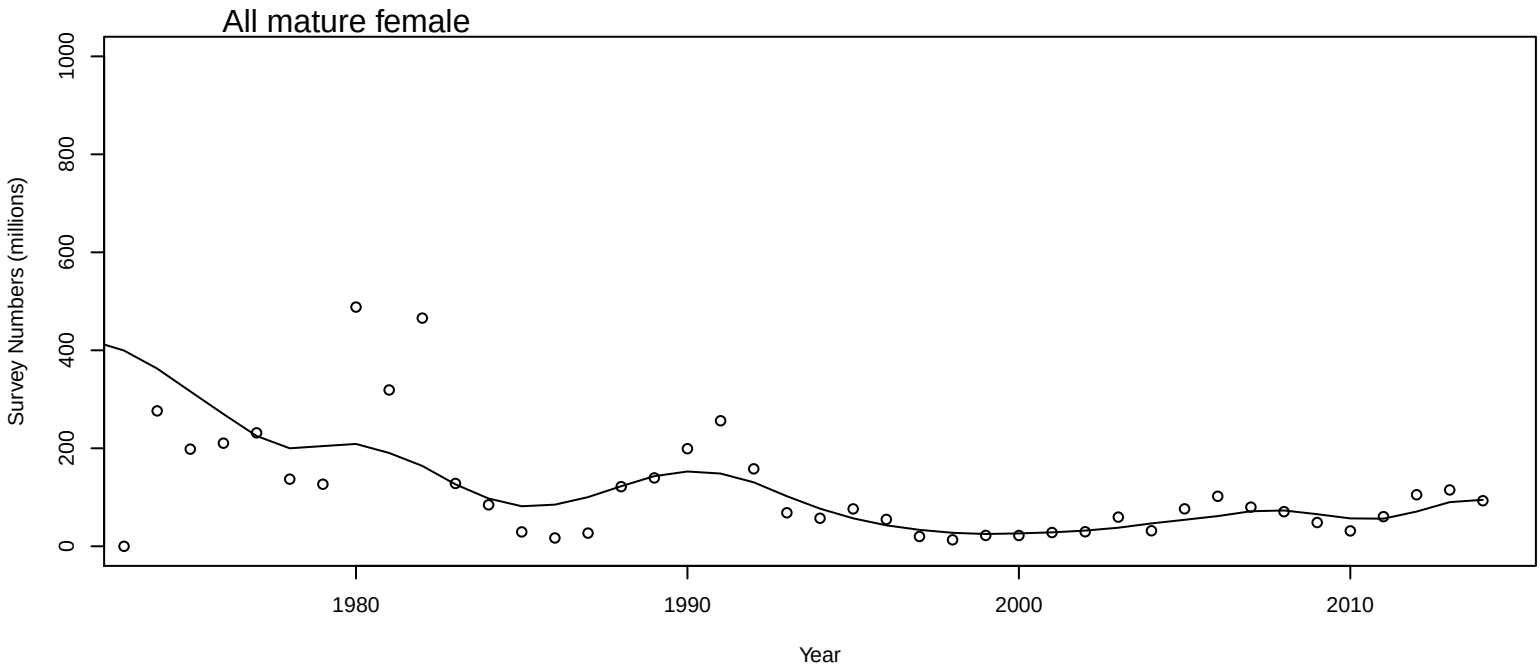

Legal males (>= 138 mm CW)
predicted total numbers
predicted survey numbers
observed survey numbers
Number (millions)
0
50
100
150
200
1980
1990
2000
2010
Year

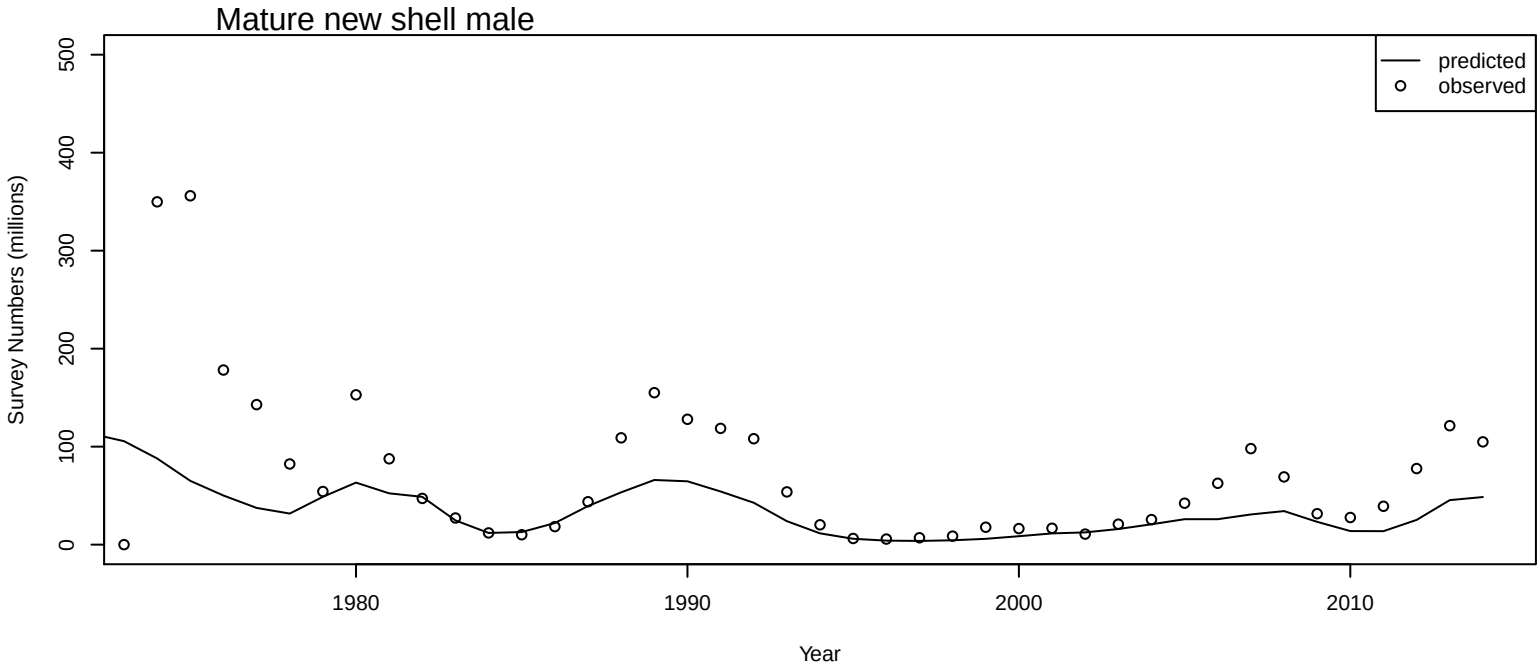
Females
predicted
observed
Survey Numbers (millions)
0
200
400
600
800
1000
1980
1990
2000
2010
Year

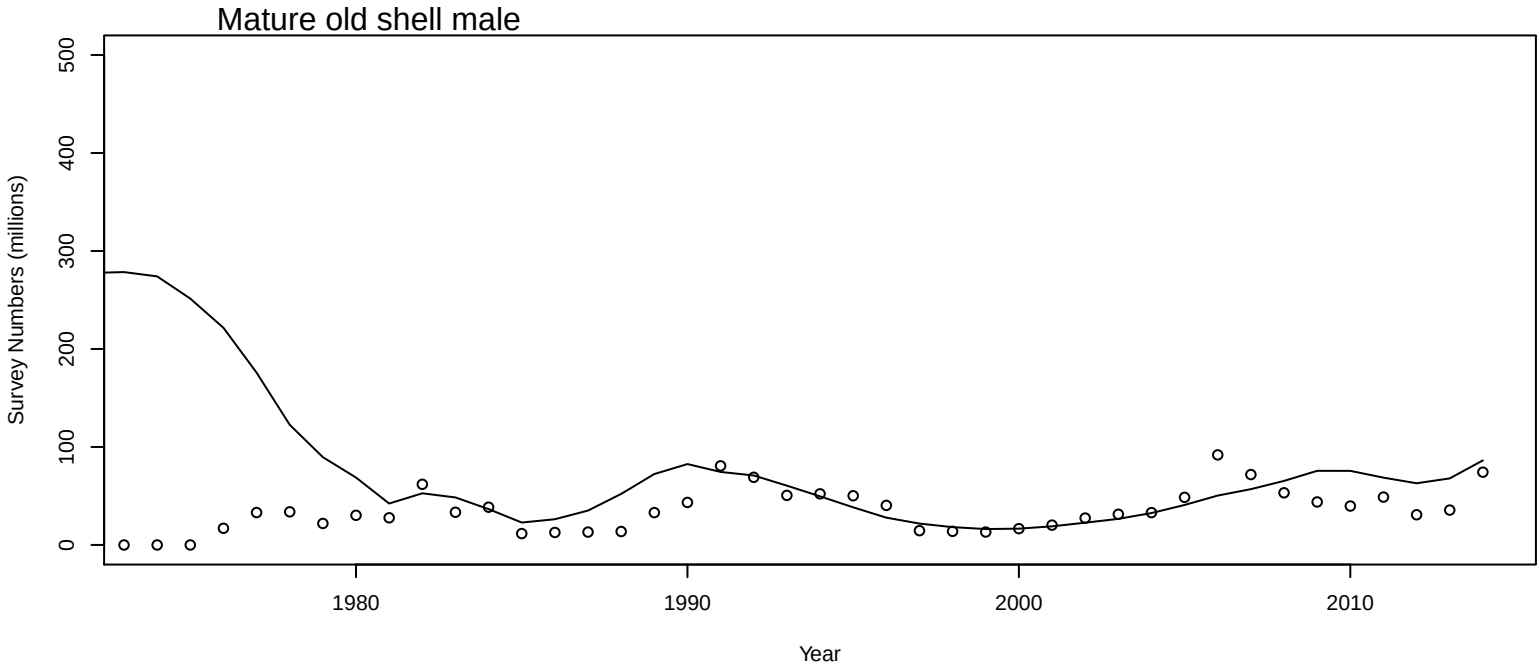

Males
Survey Numbers (millions)
0
200
400
600
800
1000
1980
1990
2000
2010
Year

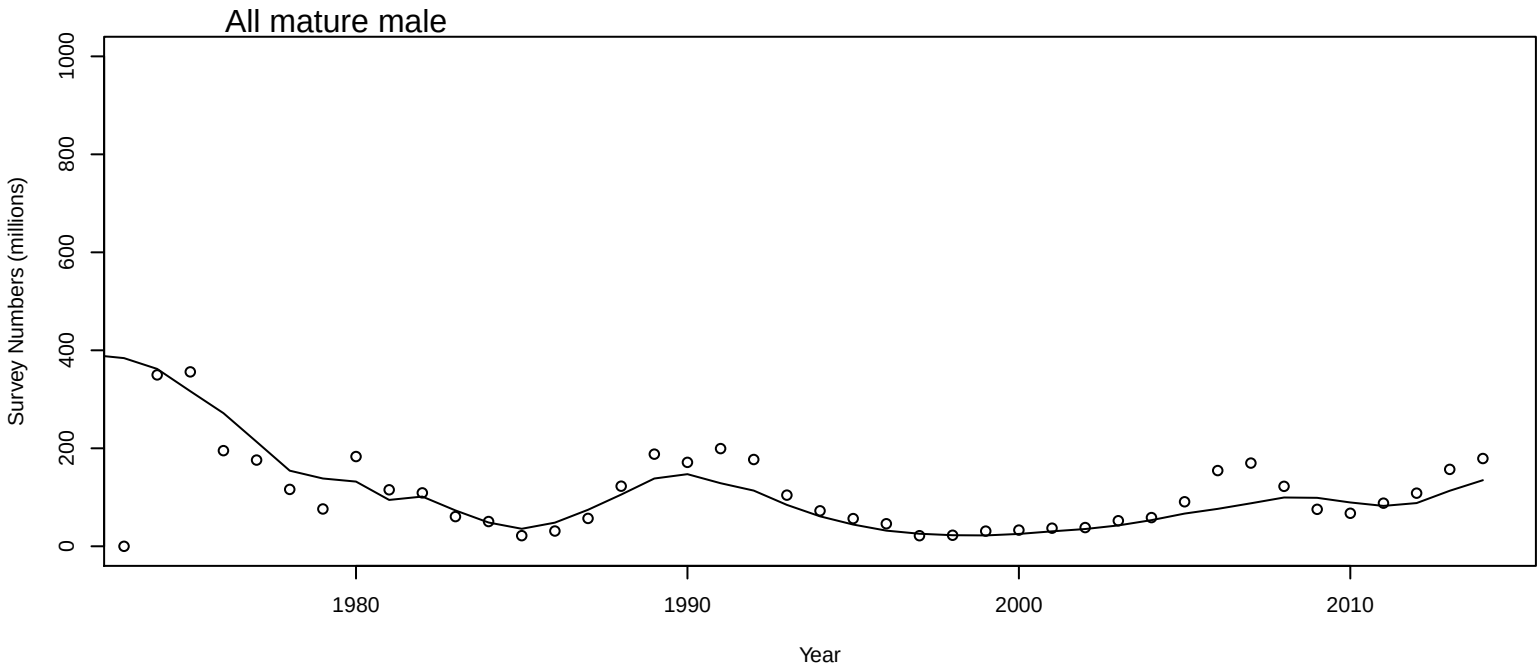

Mature new shell female
predicted
observed
Survey Numbers (millions)
0
100
200
300
400
500
1980
1990
2000
2010
Year

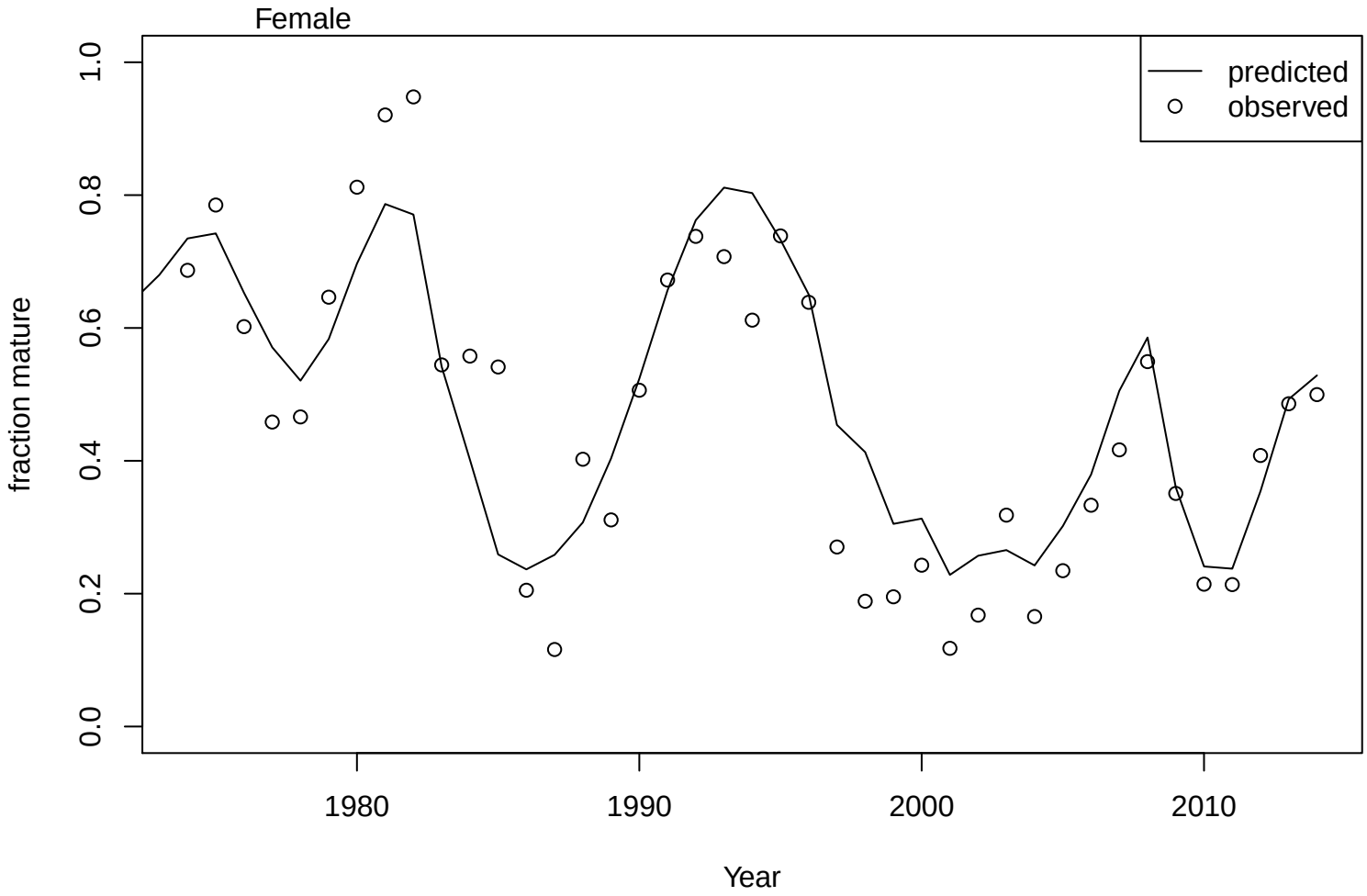

Mature old shell female
Survey Numbers (millions)
0
100
200
300
400
500
1980
1990
2000
2010
Year

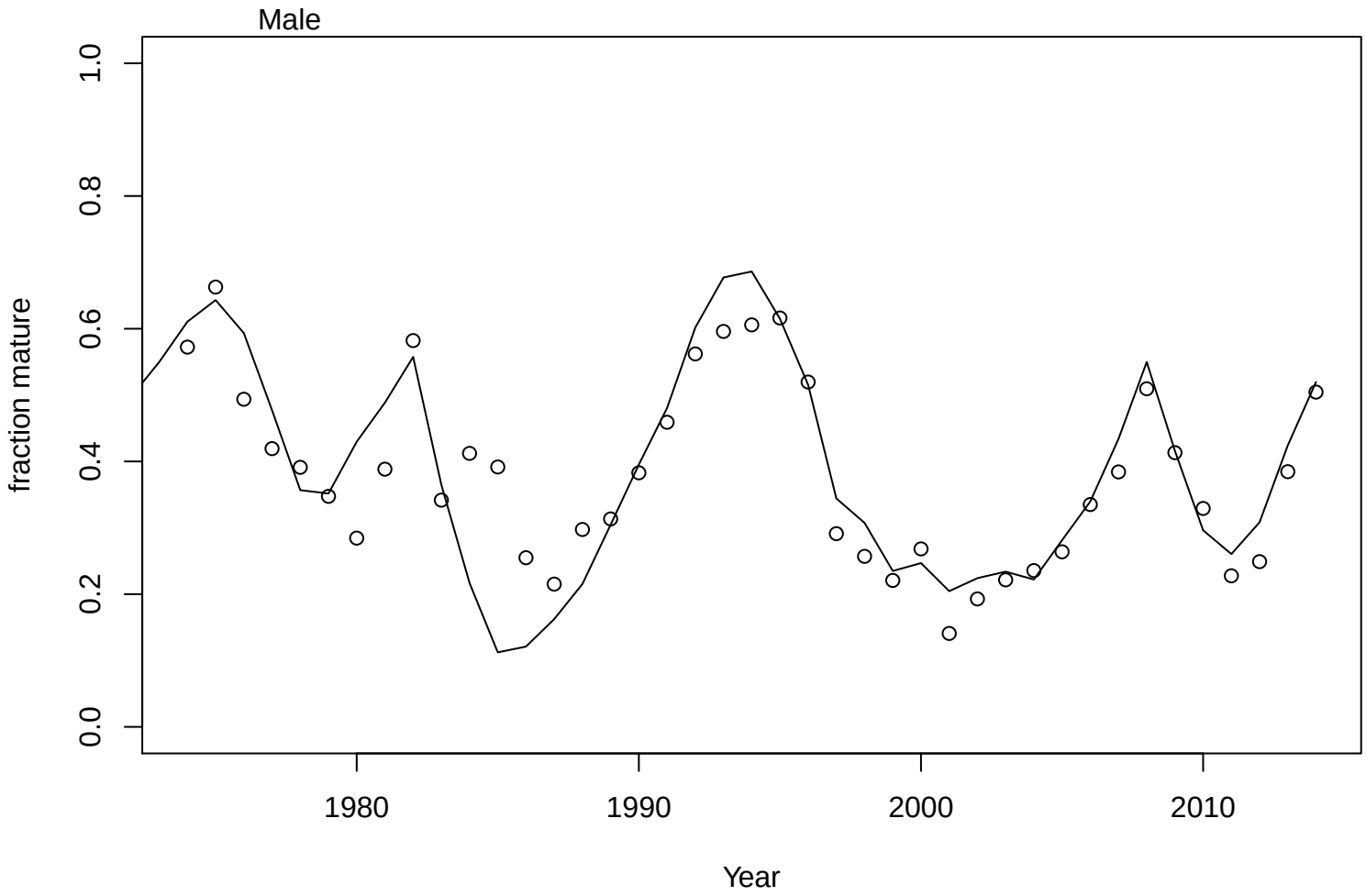

All mature female
Survey Numbers (millions)
0
200
400
600
800
1000
1980
1990
2000
2010
Year


Mature new shell male
predicted
observed
Survey Numbers (millions)
0
100
200
300
400
500
1980
1990
2000
2010
Year

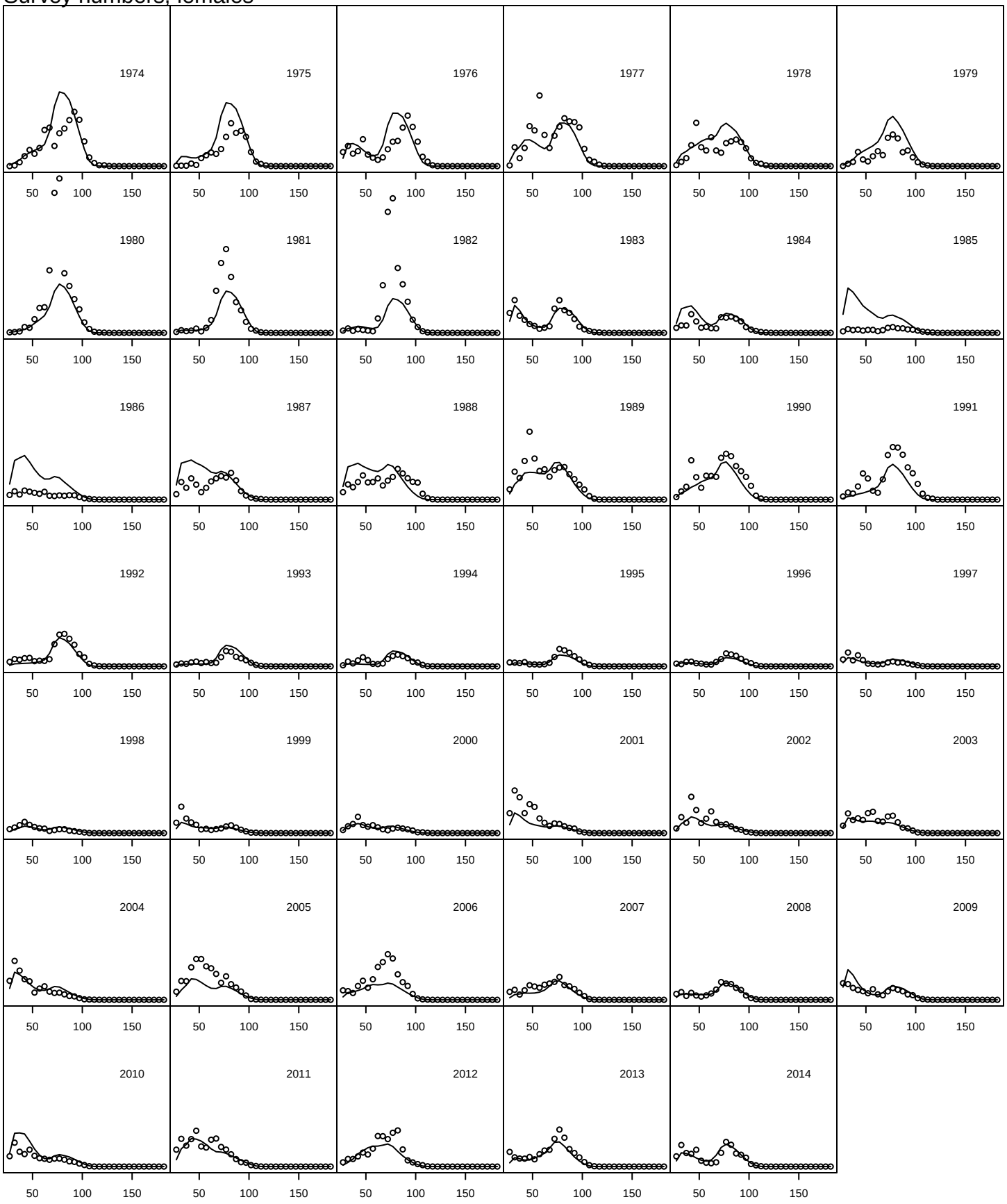

Mature old shell male
Survey Numbers (millions)
0
100
200
300
400
500
1980
1990
2000
2010
Year


All mature male
Survey Numbers (millions)
0
200
400
600
800
1000
1980
1990
2000
2010
Year

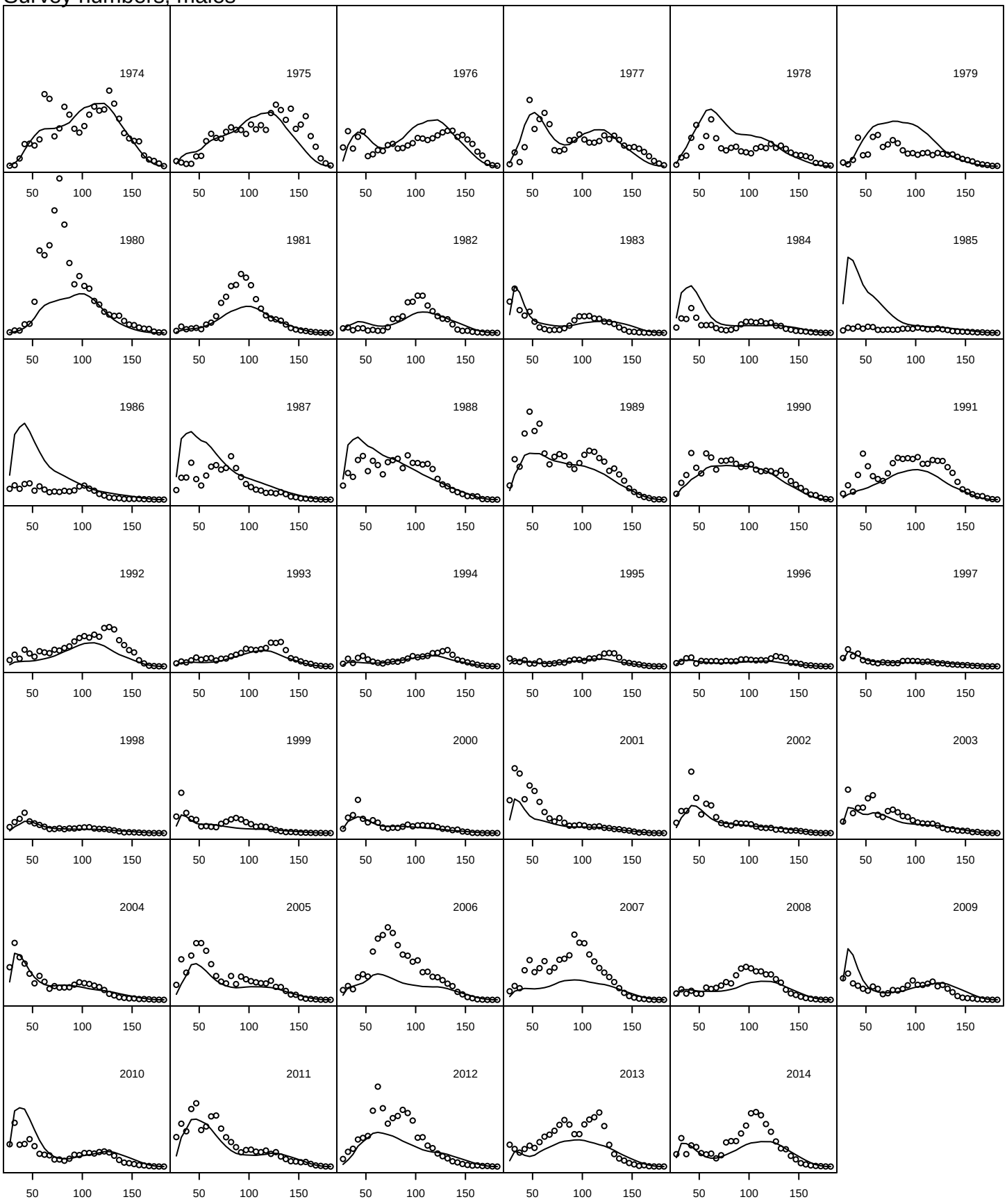

Female
predicted
observed
fraction mature
0.0
0.2
0.4
0.6
0.8
1.0
1980
1990
2000
2010
Year


Male
fraction mature
0.0
0.2
0.4
0.6
0.8
1.0
1980
1990
2000
2010
Year

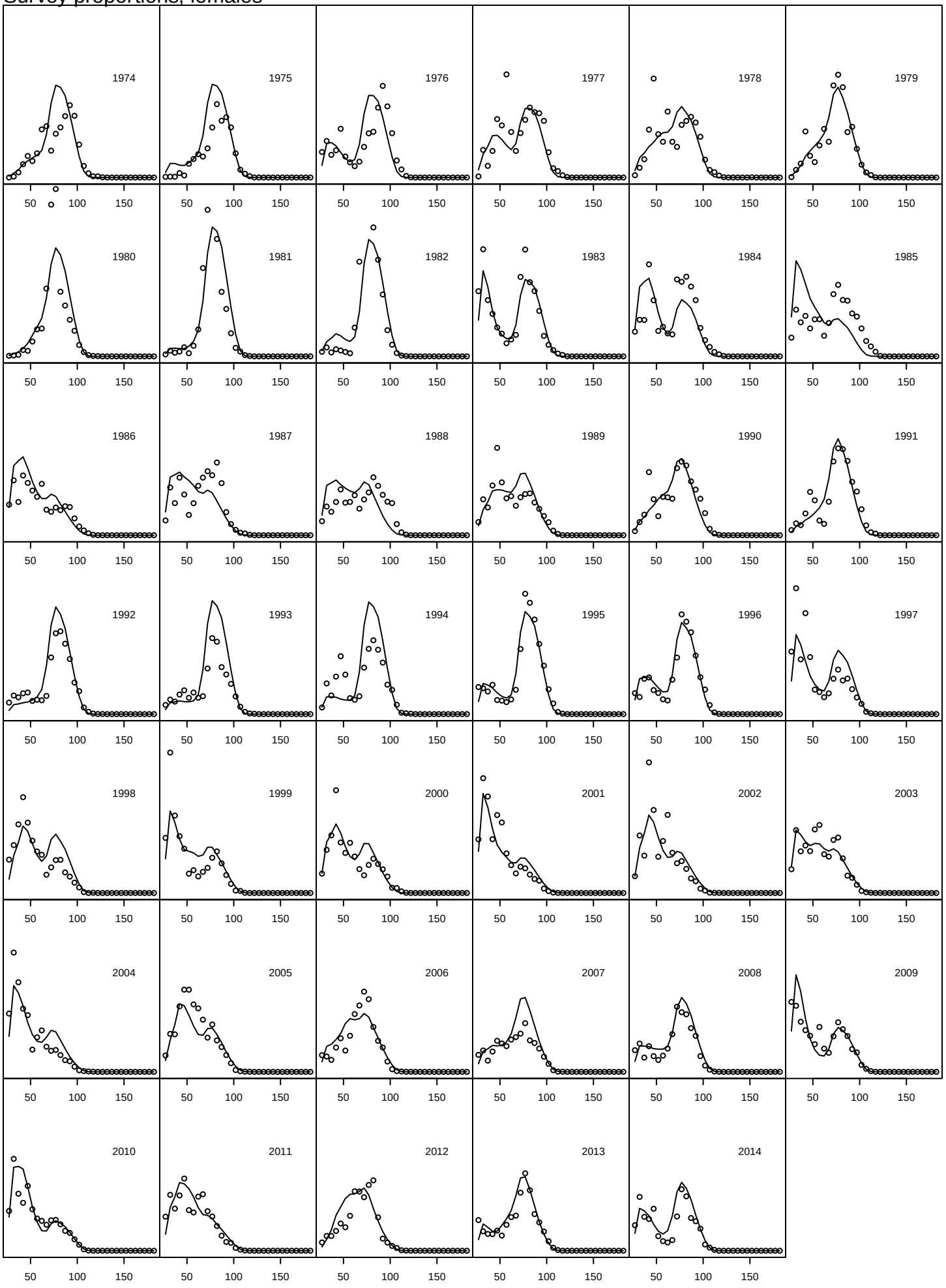
Survey numbers, females

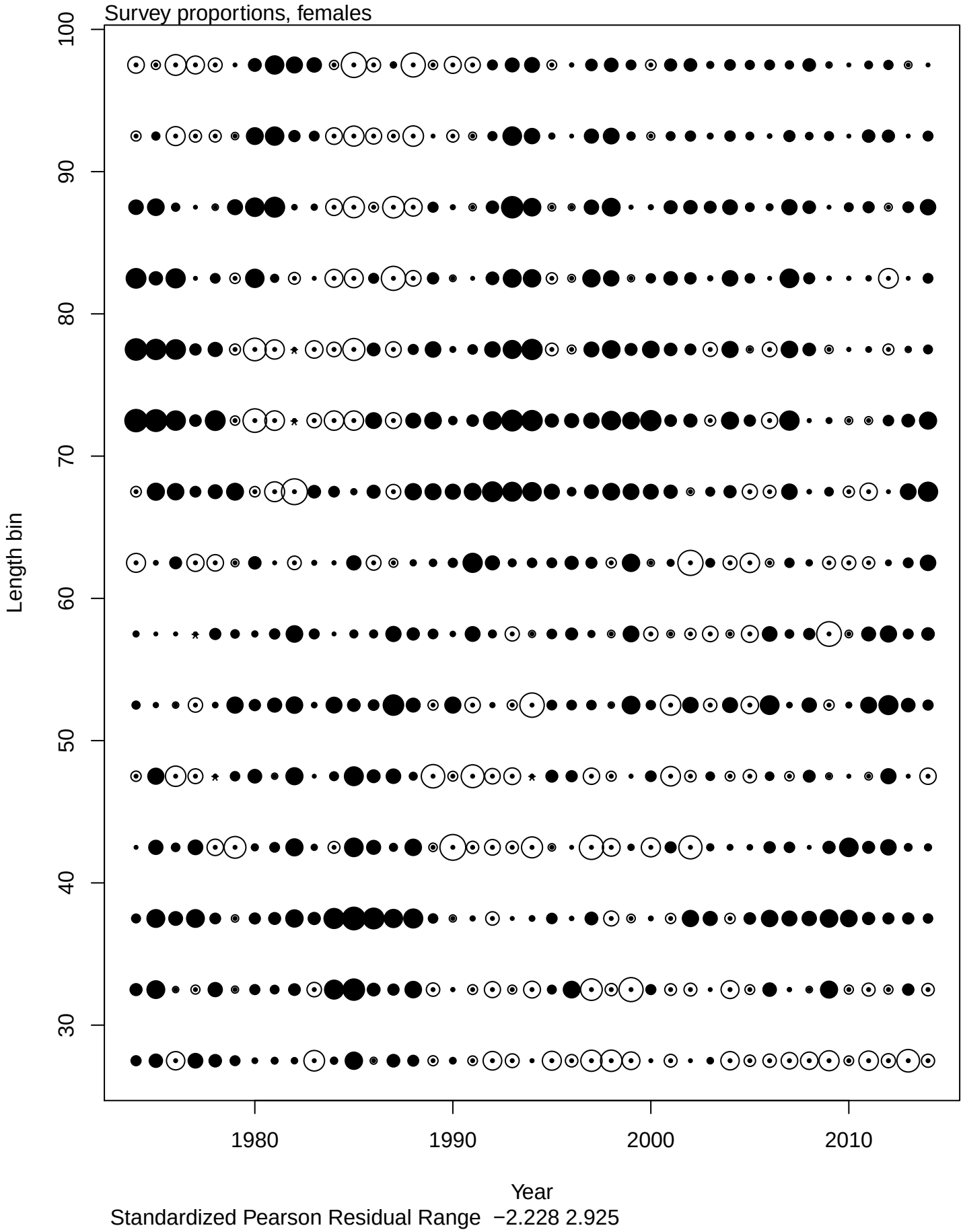


Survey numbers, males

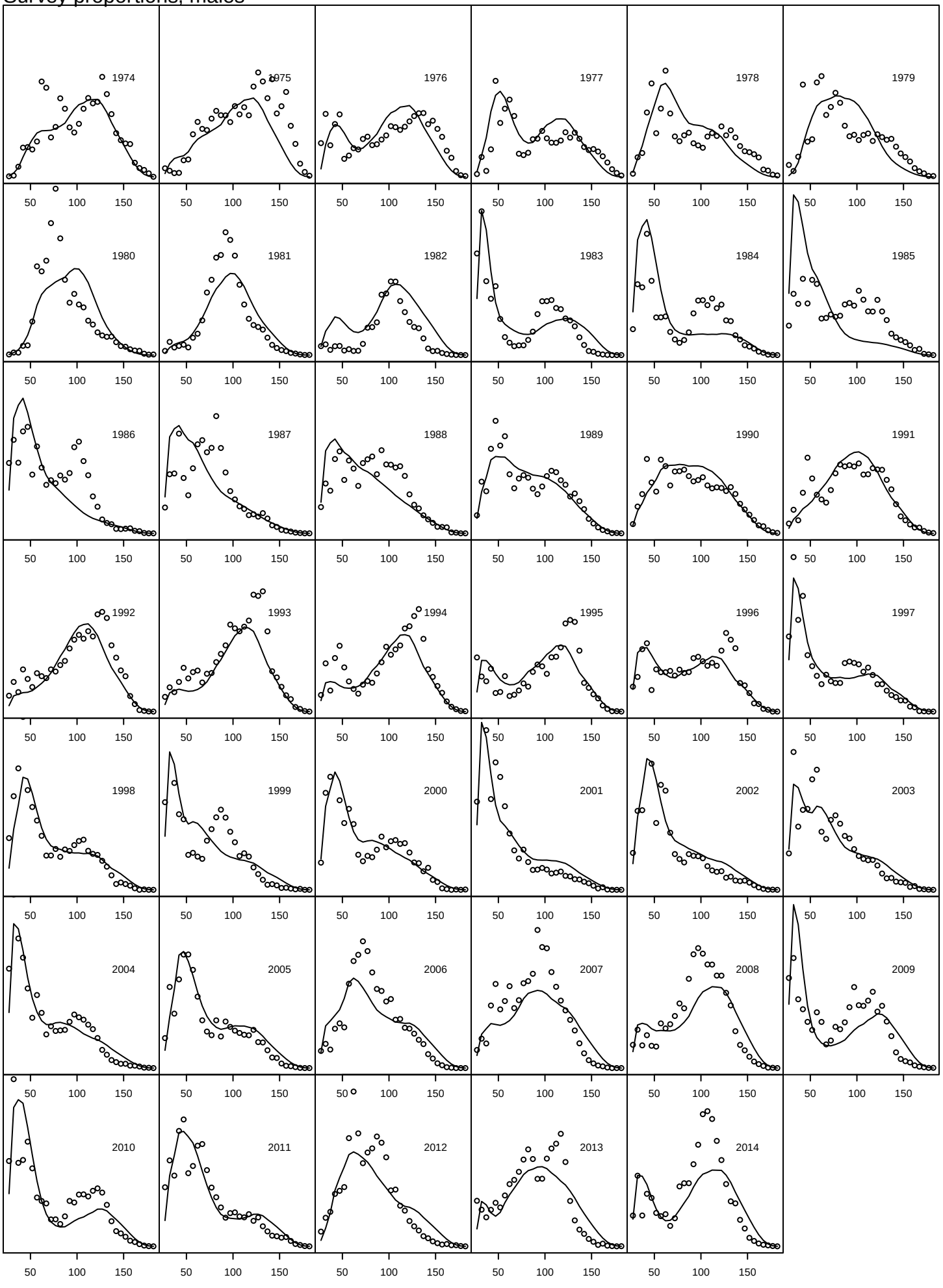


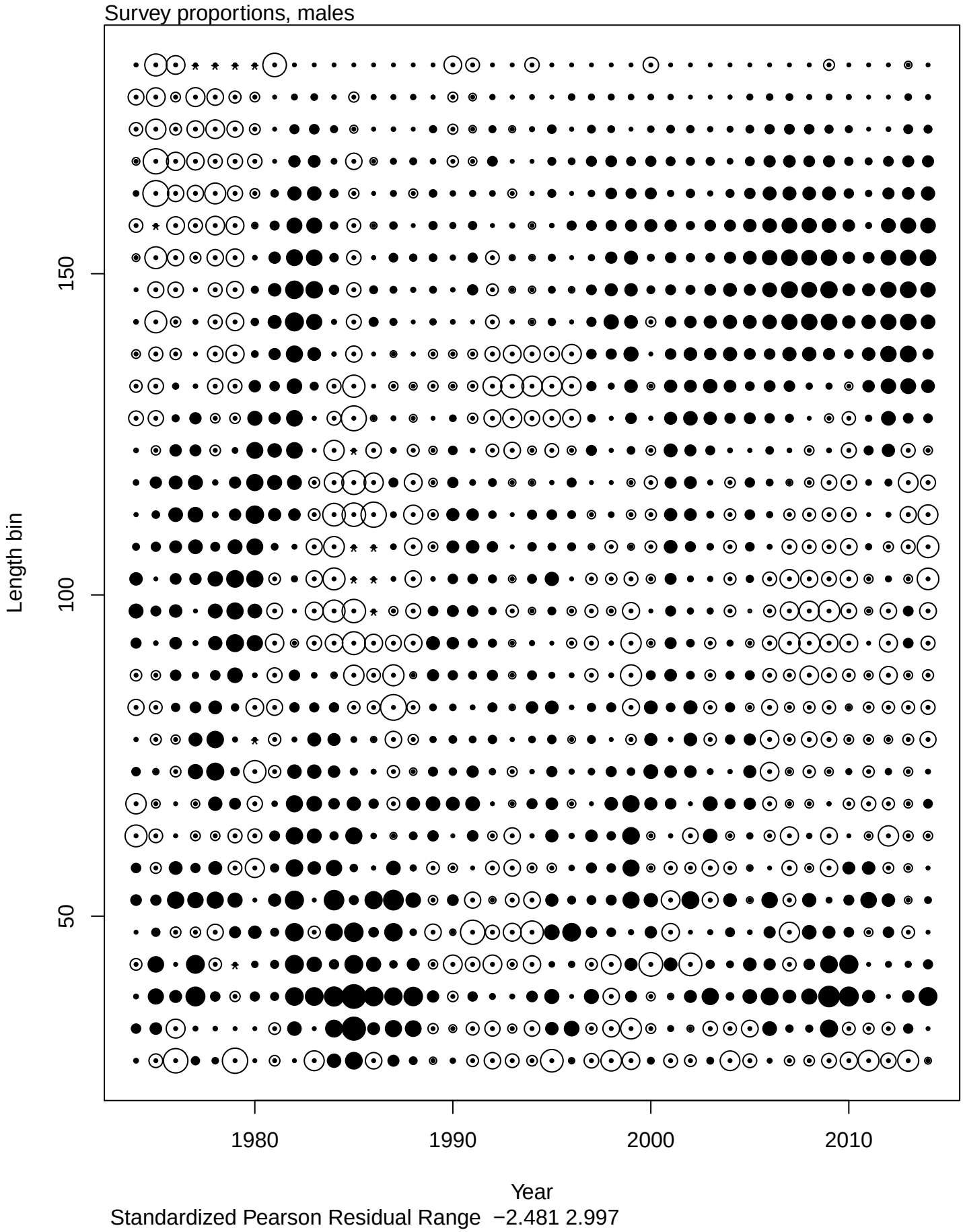
Survey proportions, females



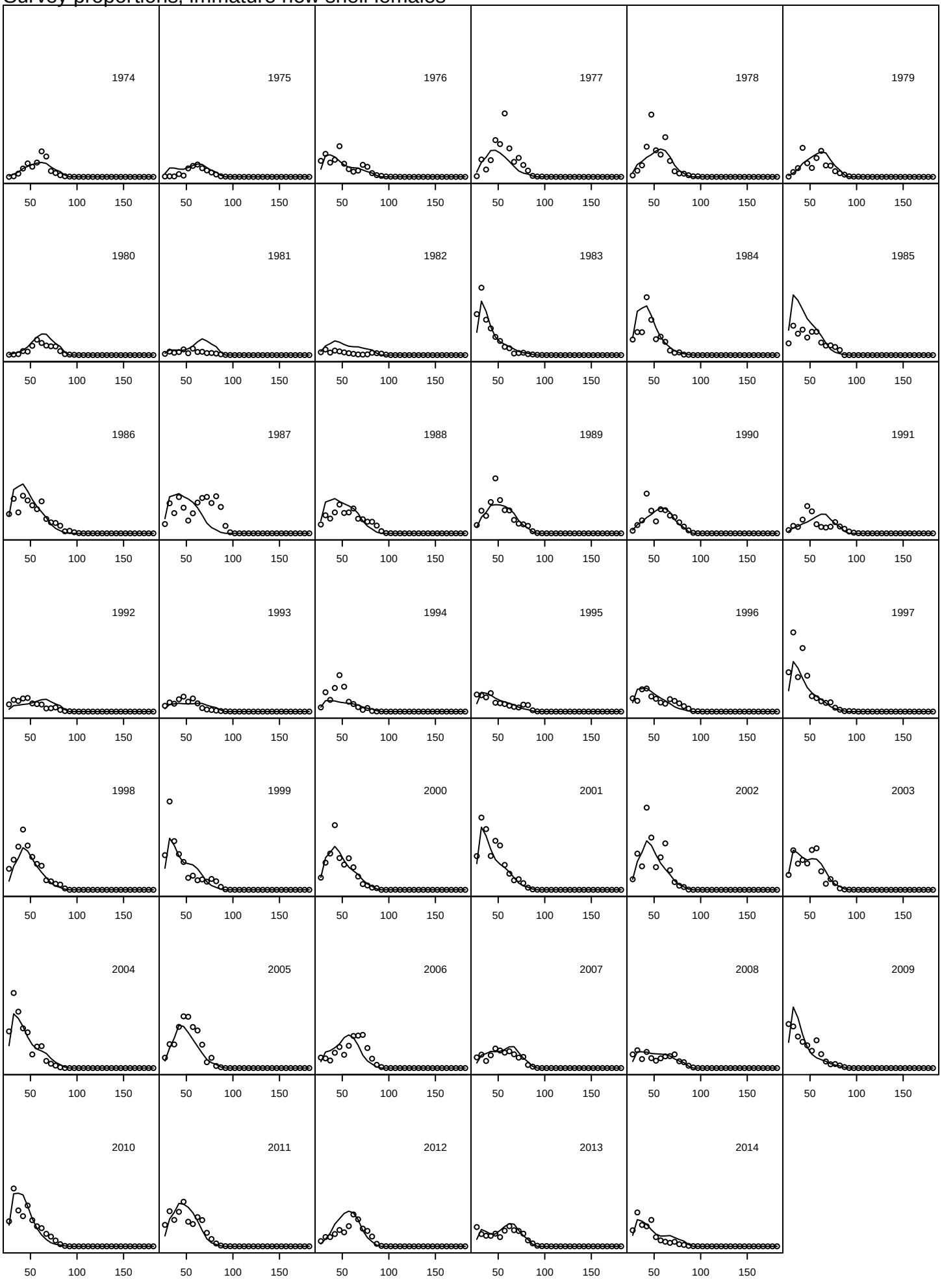

Survey proportions, females
Length bin
100
90
80
70
60
50
40
30
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −2.228 2.925

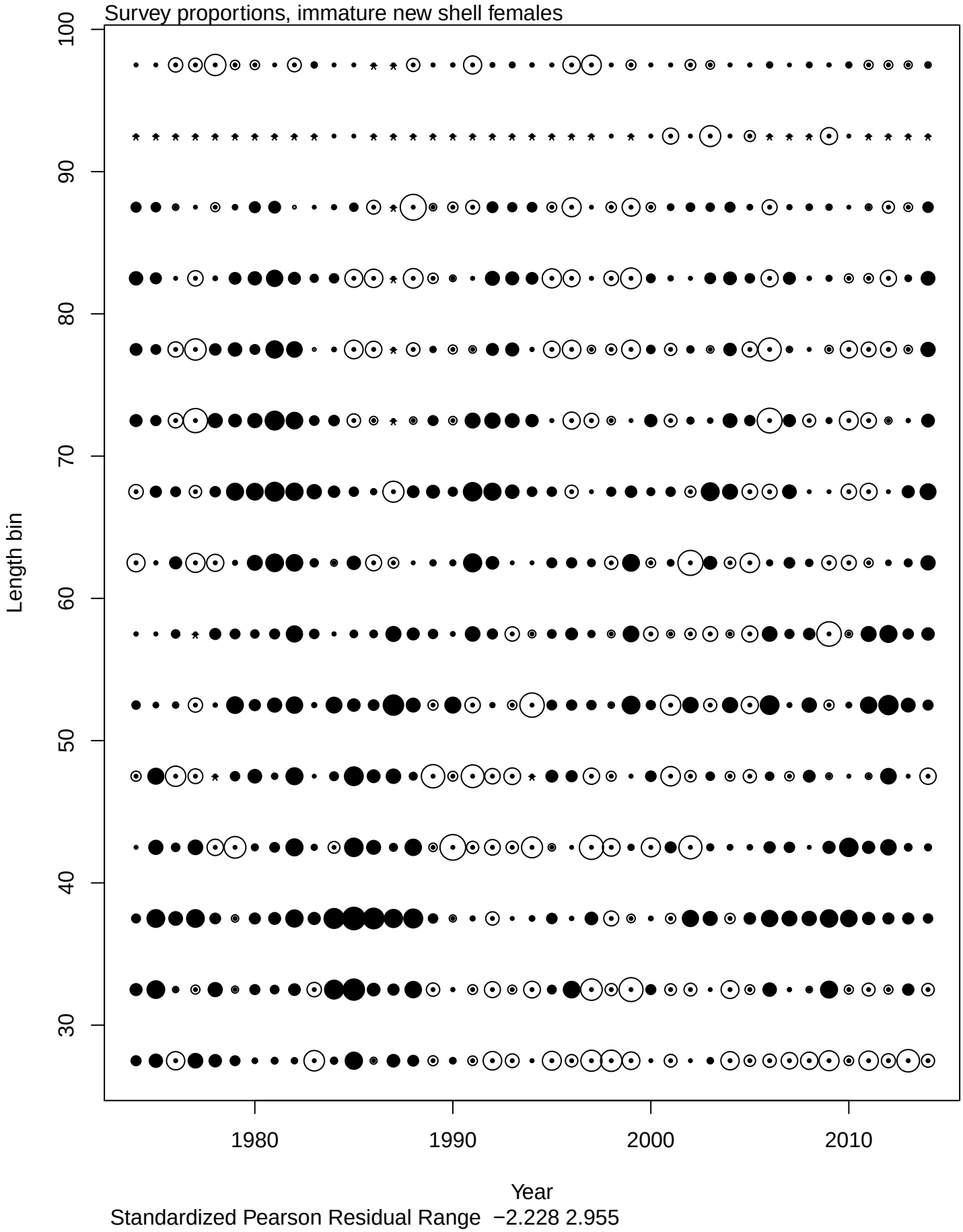
Survey proportions, males



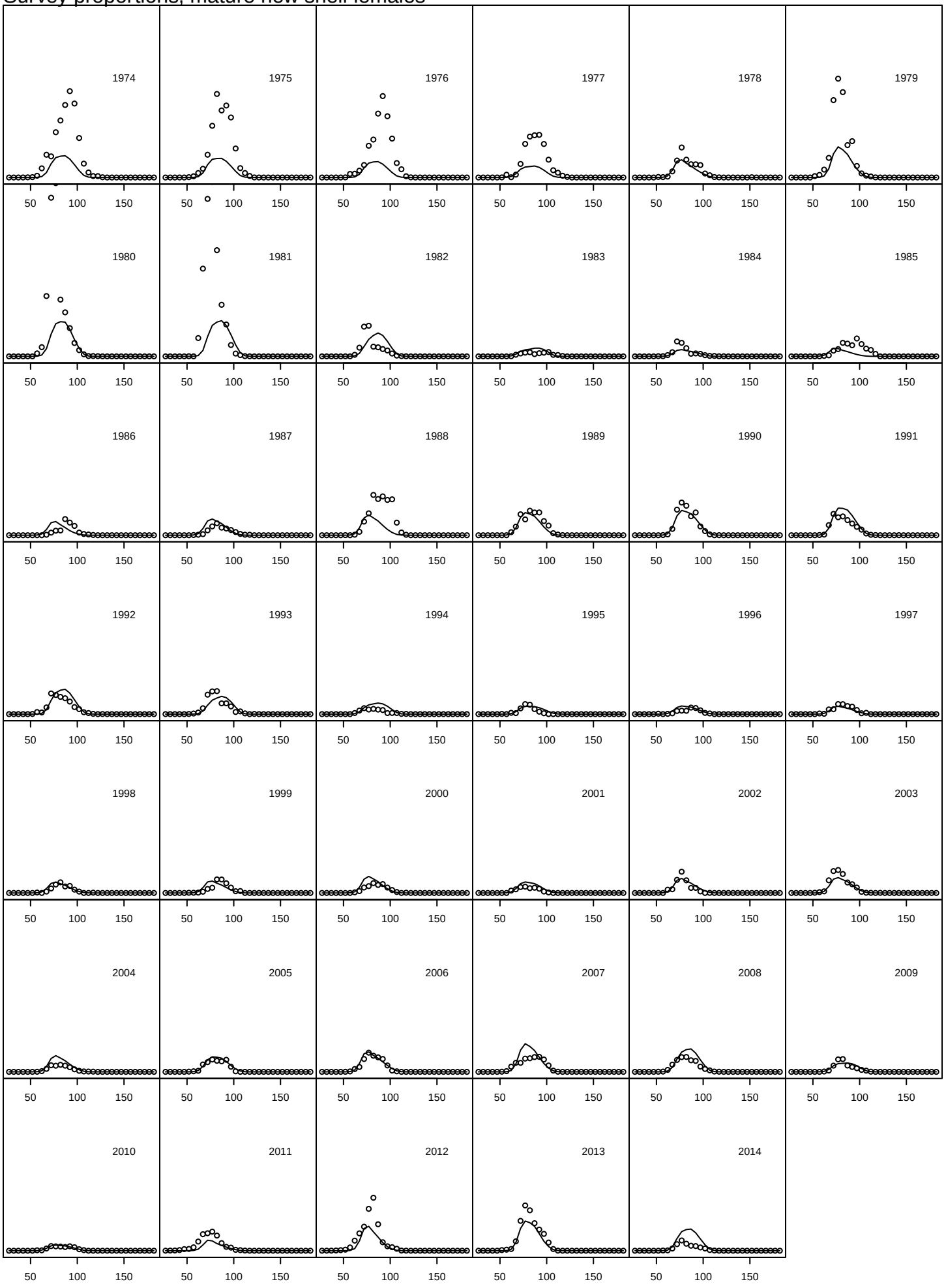

Survey proportions, males
Length bin
50
100
150
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −2.481 2.997

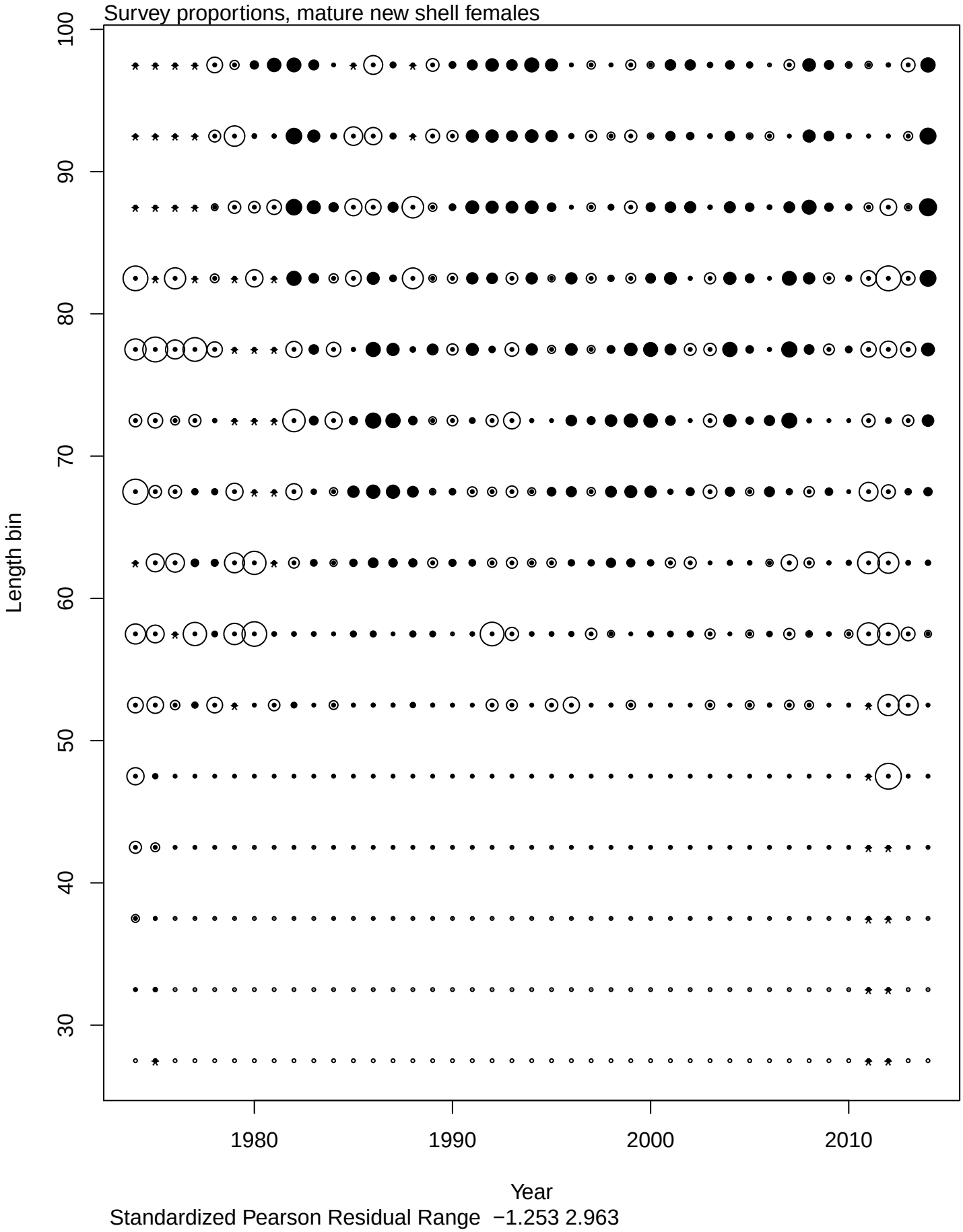
Survey proportions, immature new shell females



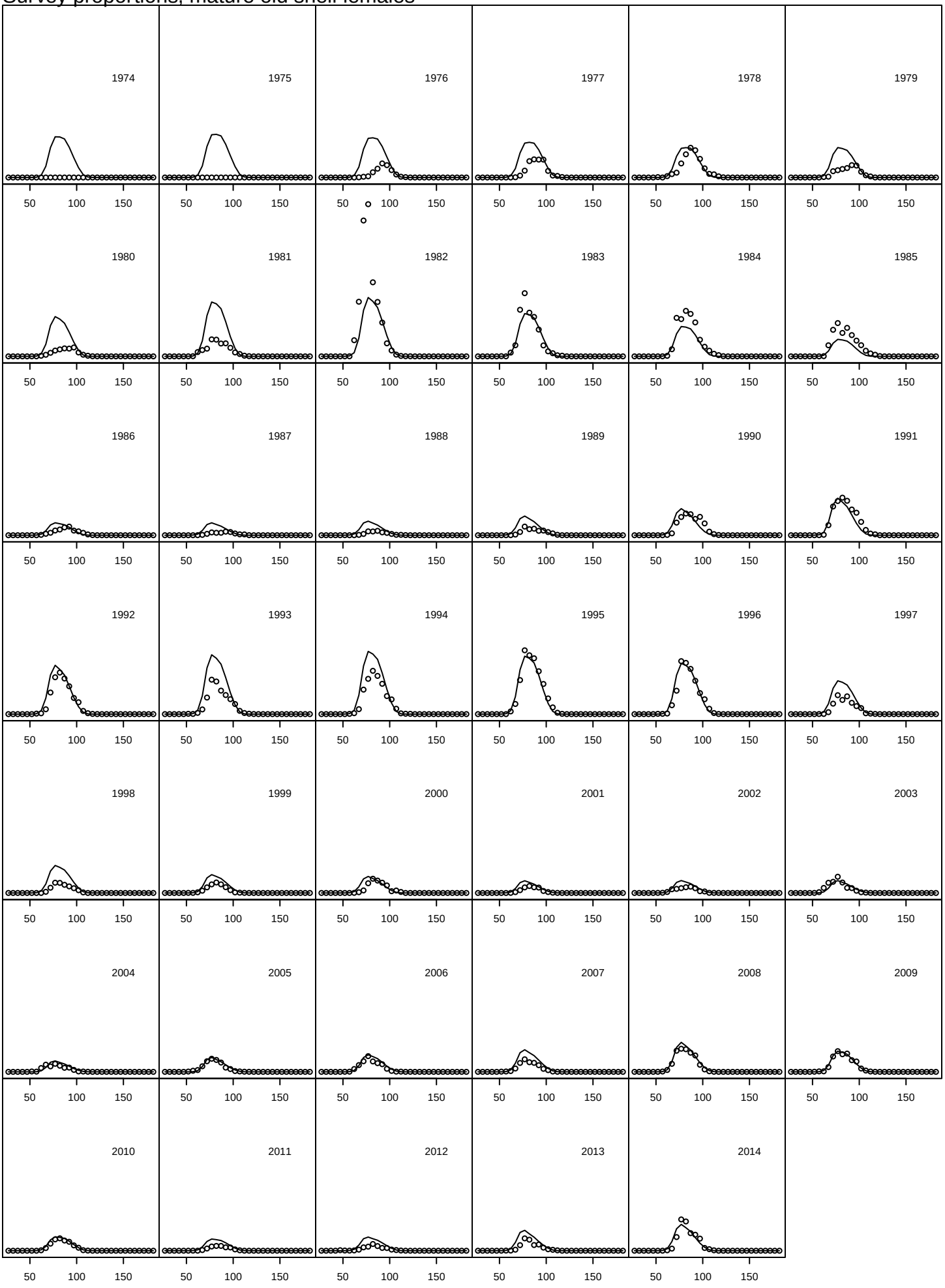

Survey proportions, immature new shell females
Length bin
100
90
80
70
60
50
40
30
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −2.228 2.955

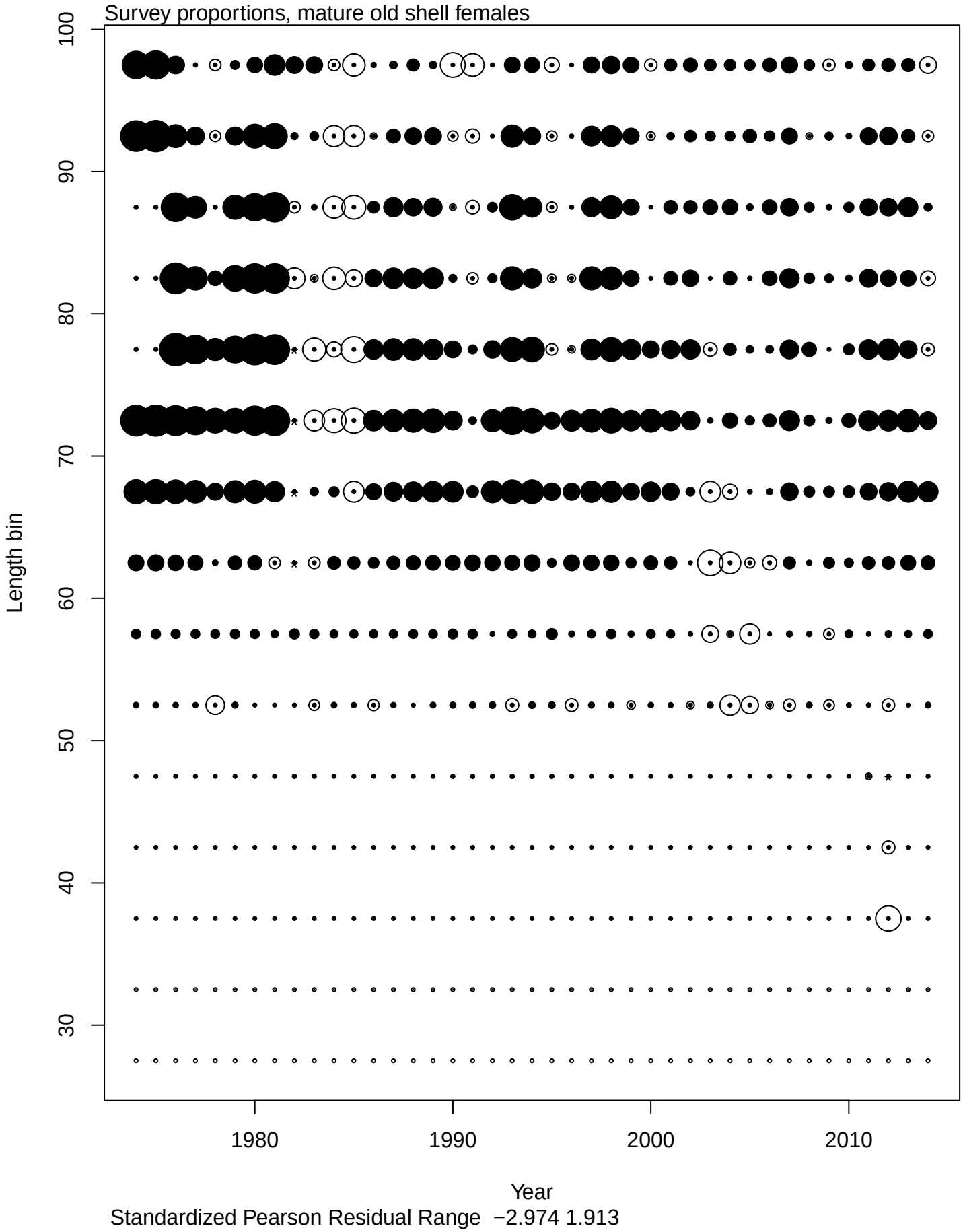
Survey proportions, mature new shell females



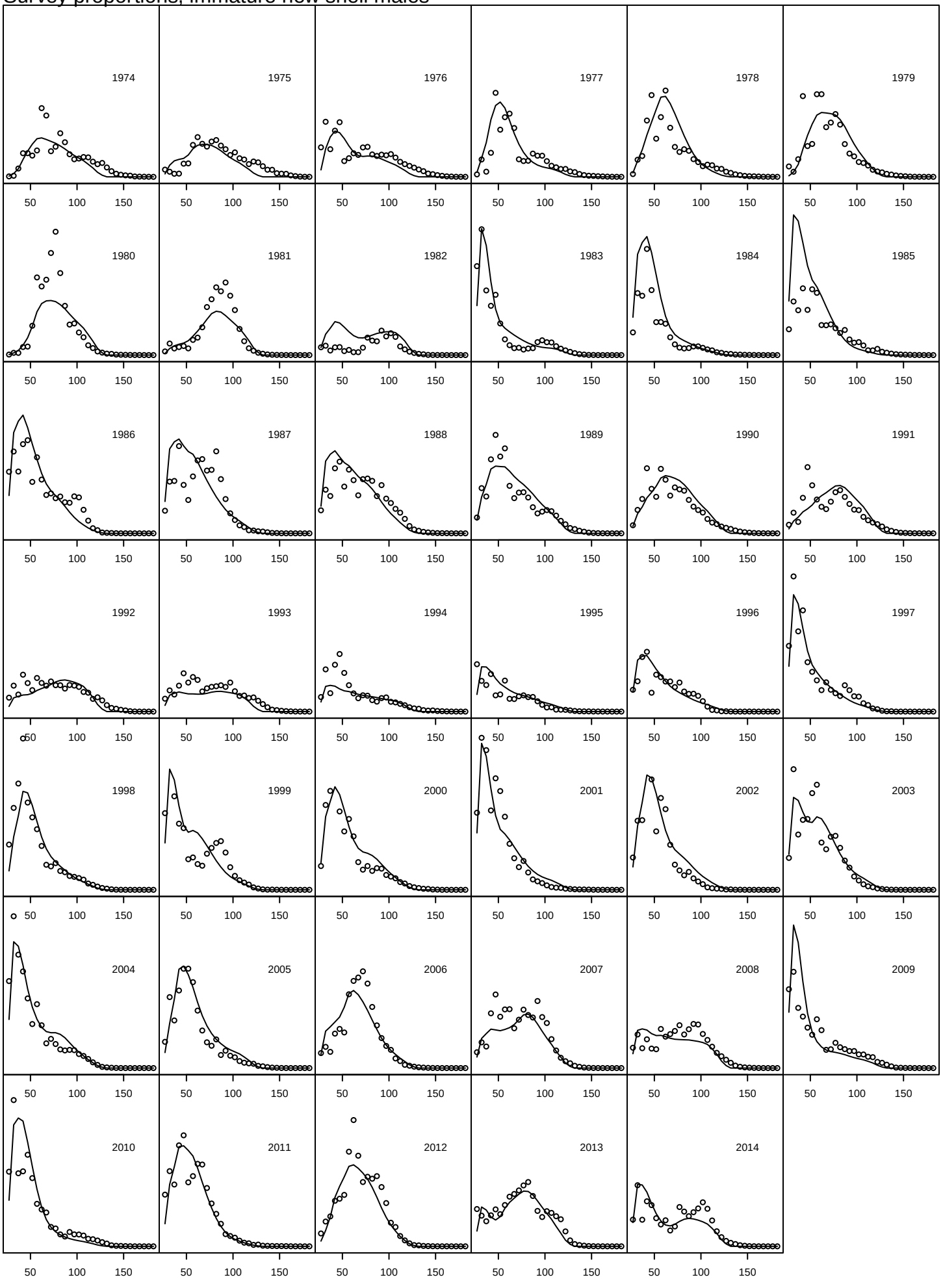

Survey proportions, mature new shell females
Length bin
100
90
80
70
60
50
40
30
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −1.253 2.963

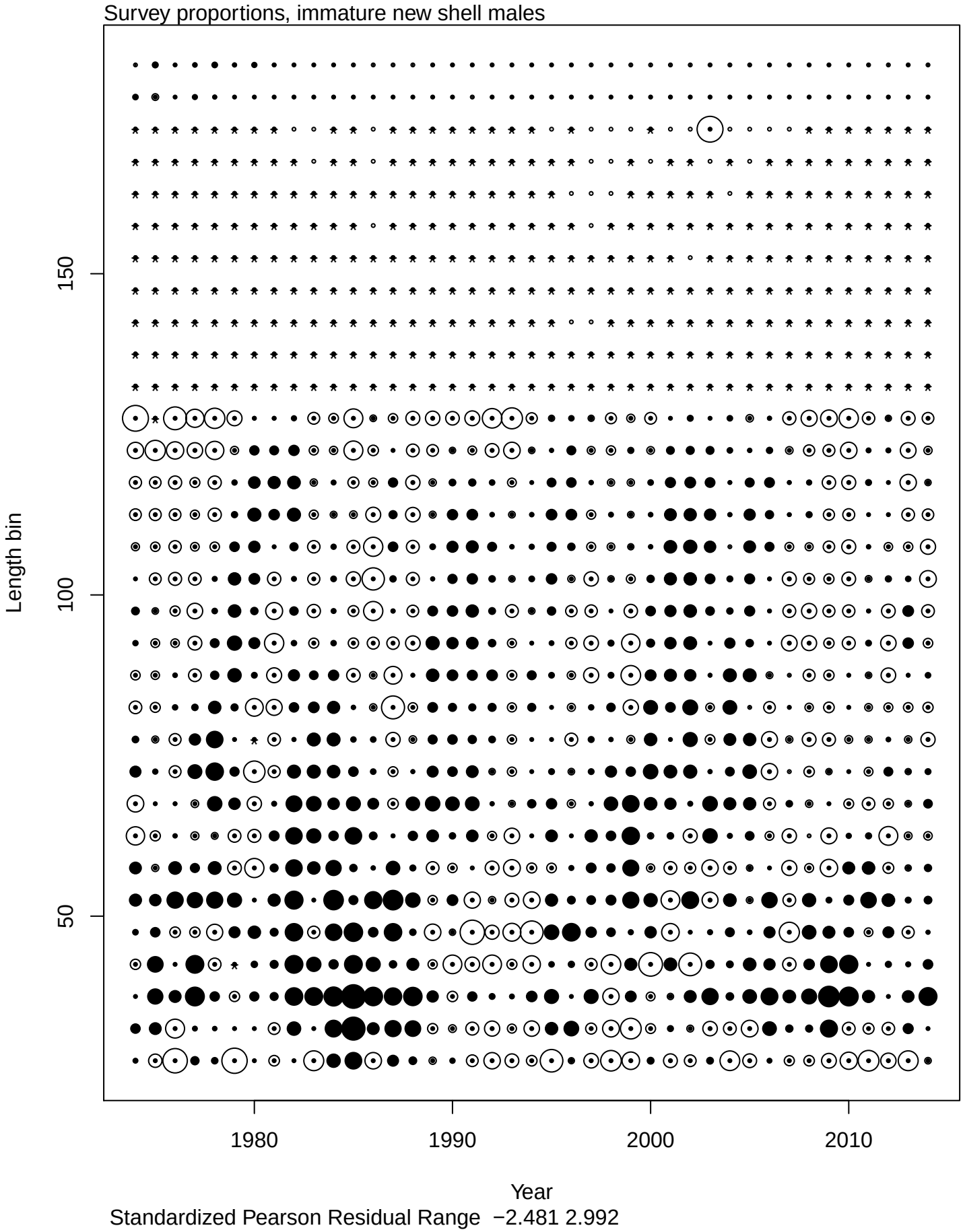
Survey proportions, mature old shell females



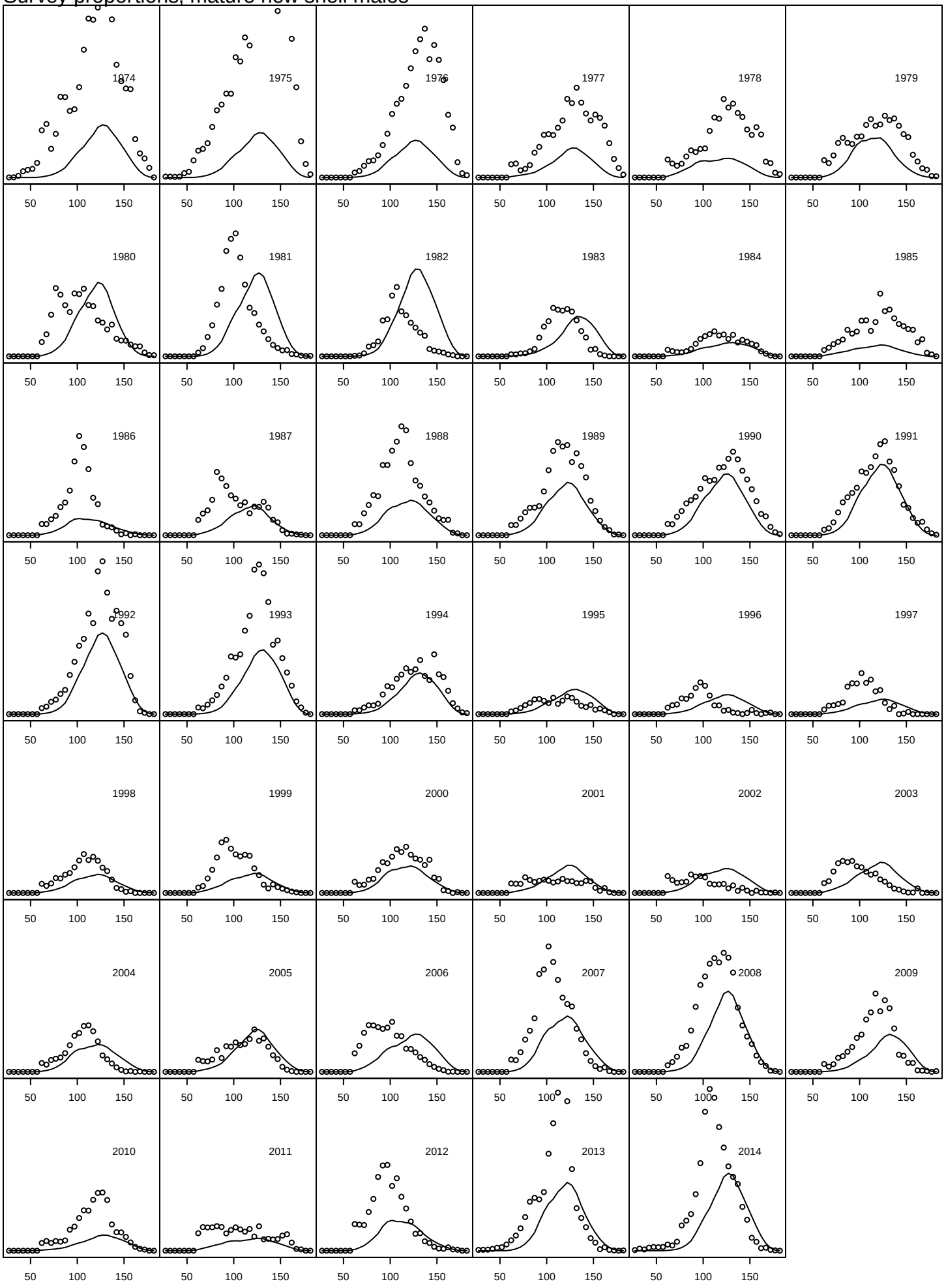

Survey proportions, mature old shell females
Length bin
100
90
80
70
60
50
40
30
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −2.974 1.913

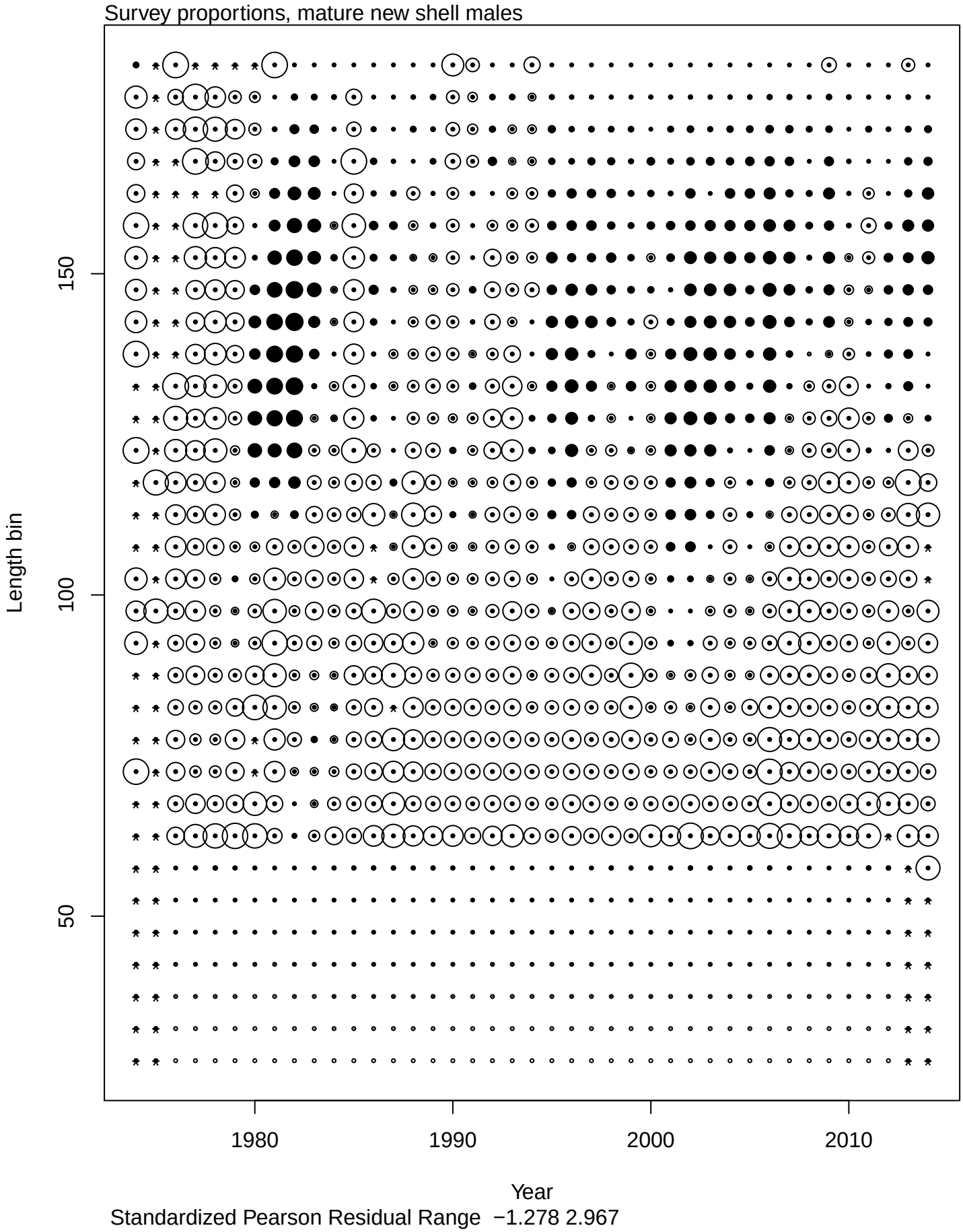
Survey proportions, immature new shell males



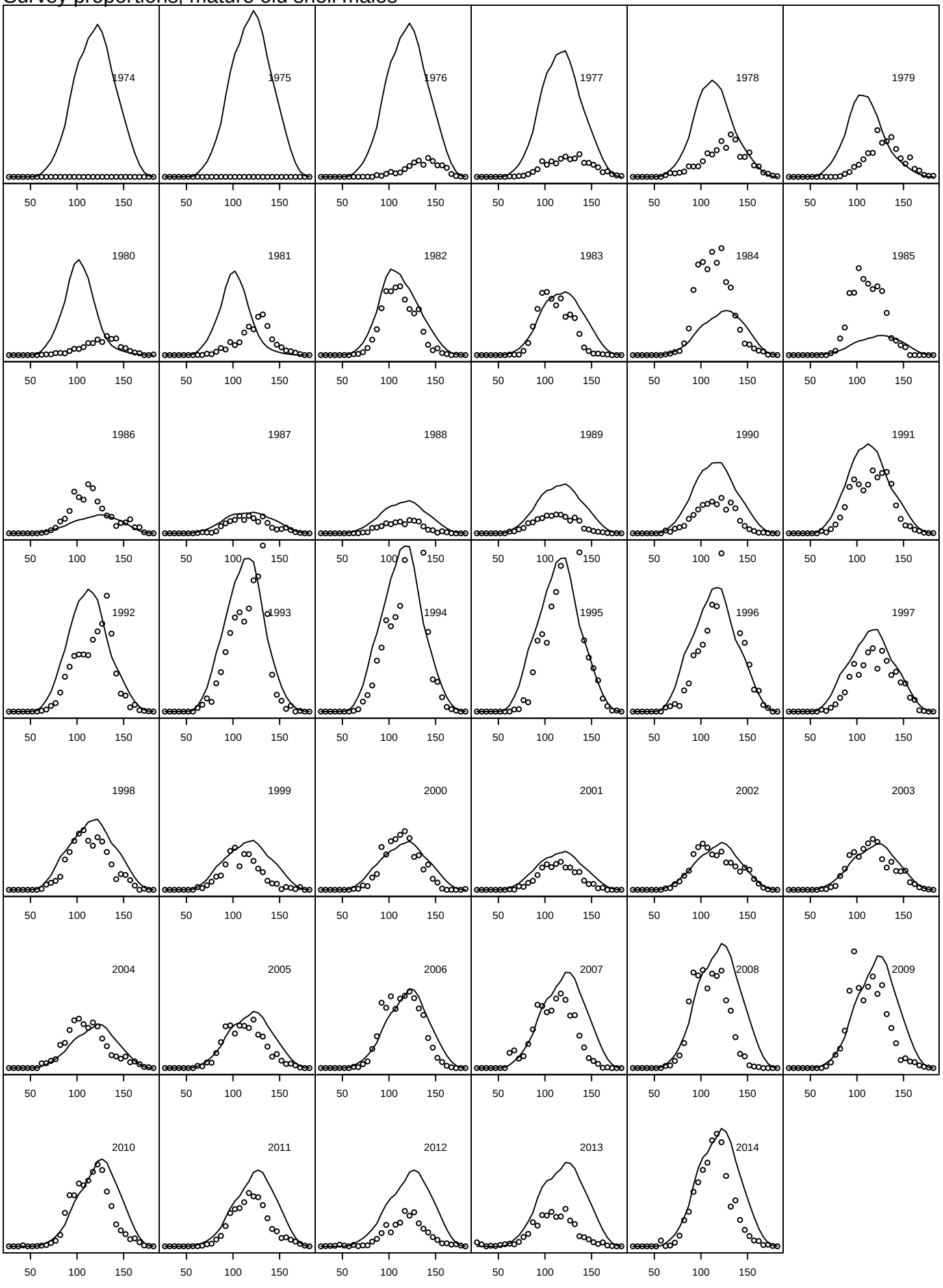

Survey proportions, immature new shell males
Length bin
50
100
150
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −2.481 2.992

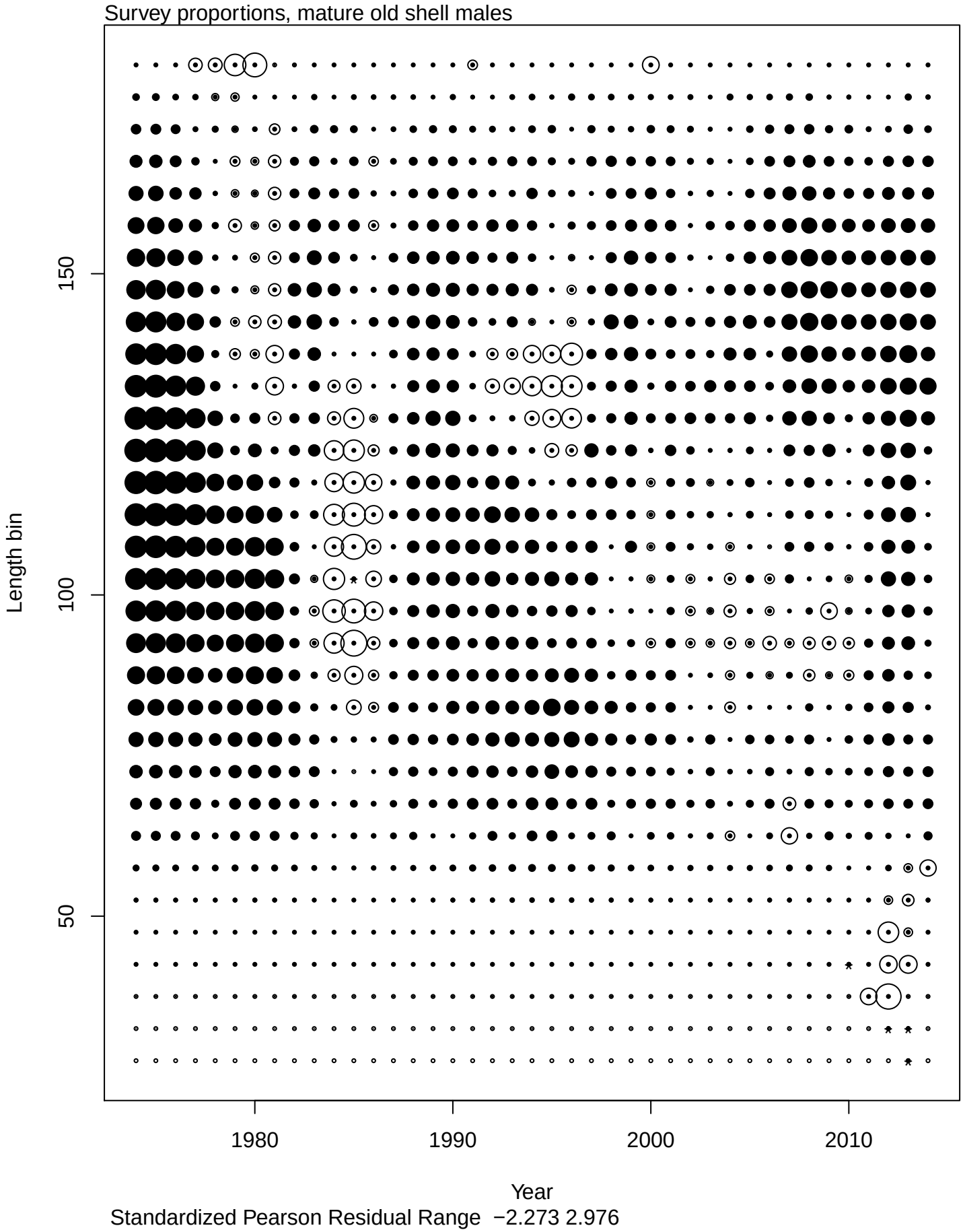
Survey proportions, mature new shell males



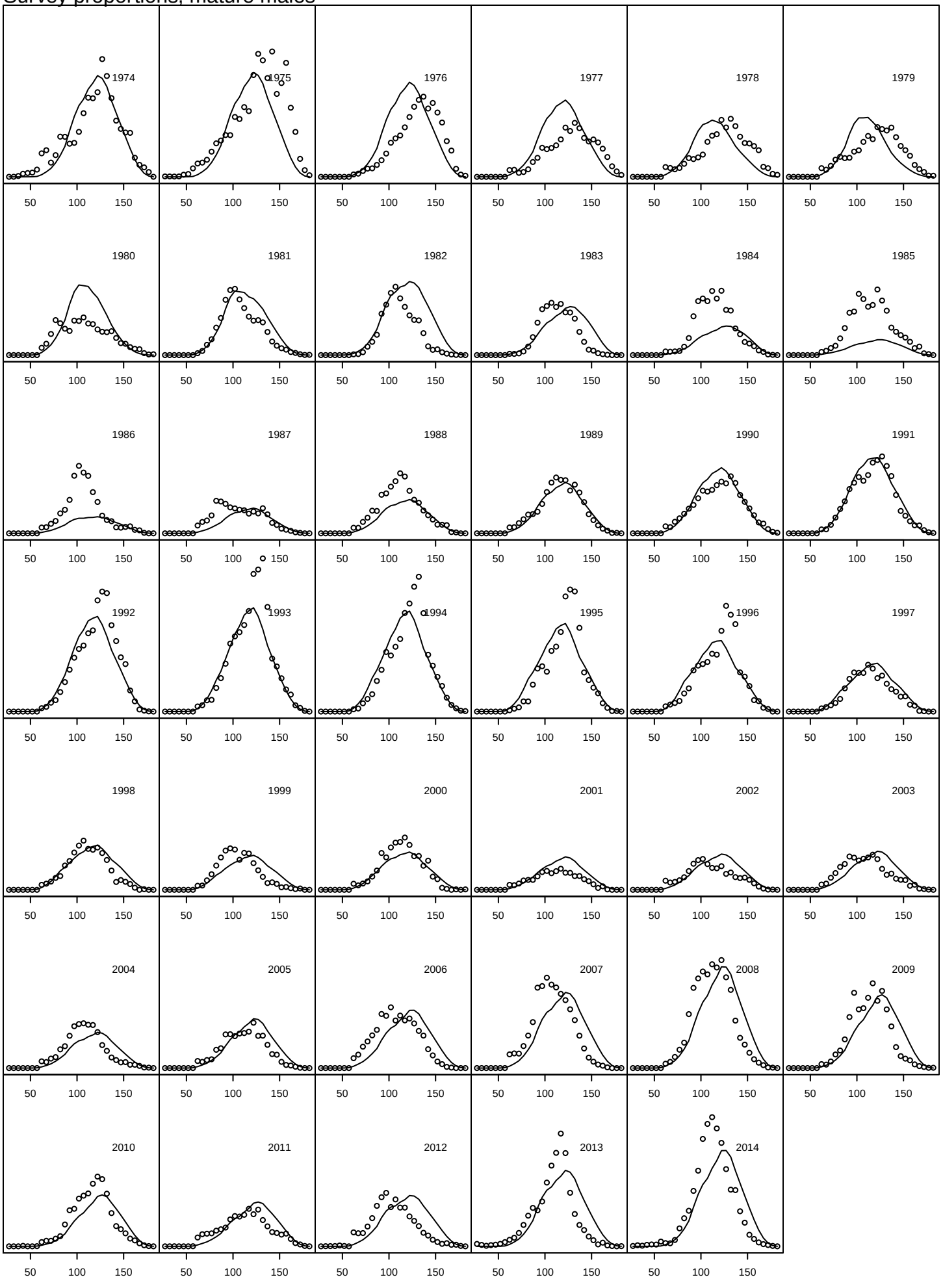

Survey proportions, mature new shell males
Length bin
50
100
150
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −1.278 2.967

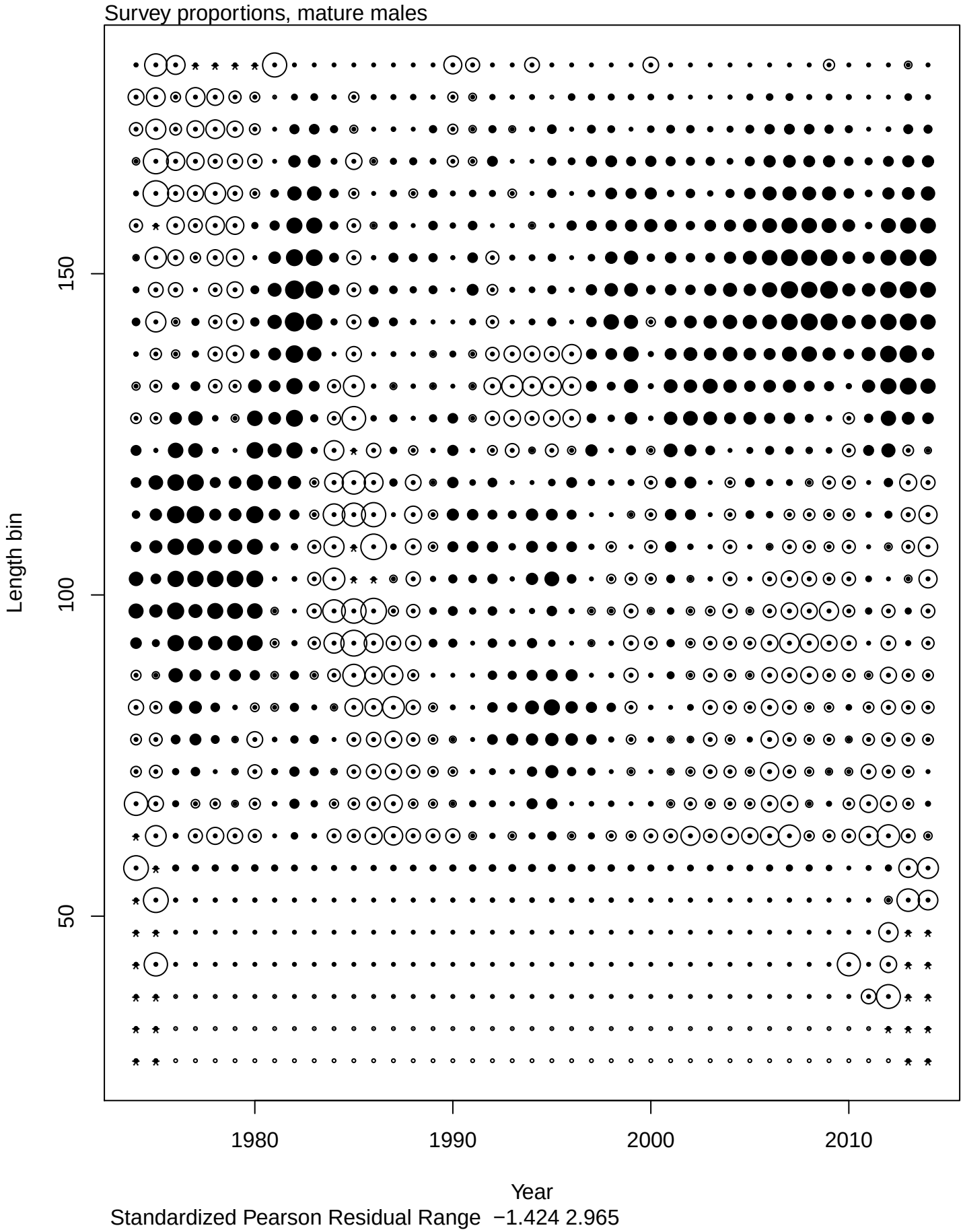
Survey proportions, mature old shell males

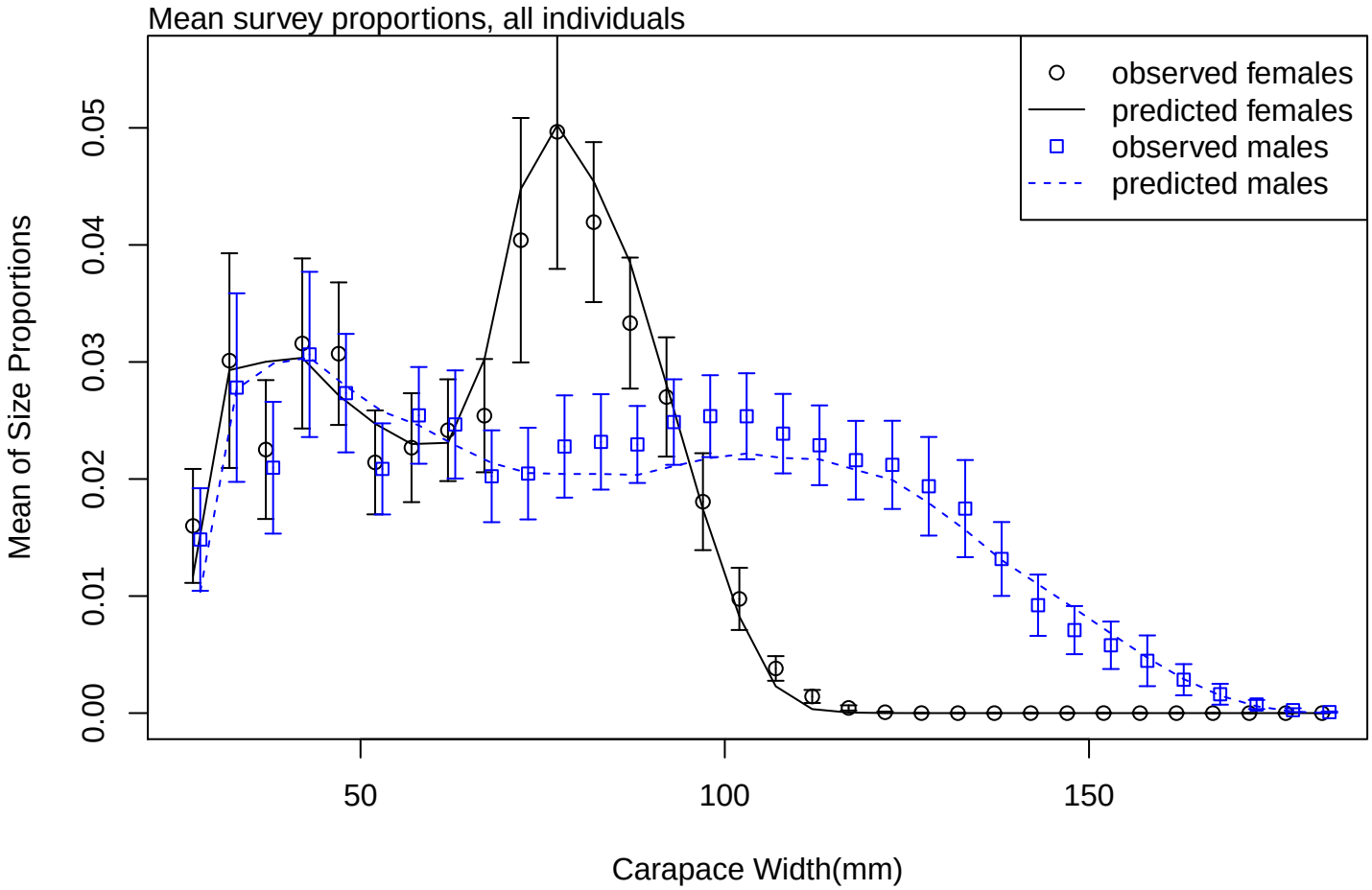


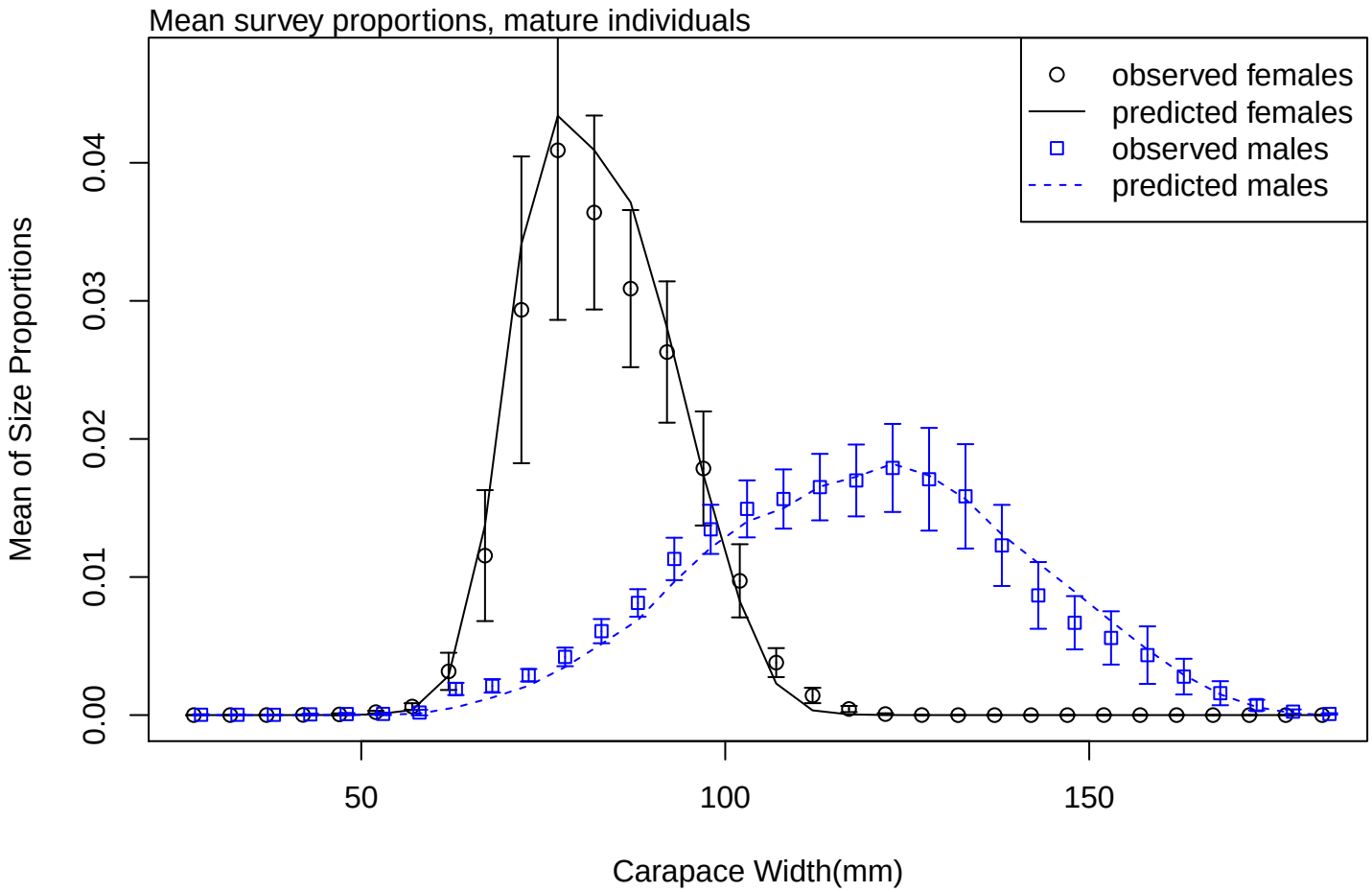

Survey proportions, mature old shell males
Length bin
150
100
50
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −2.273 2.976

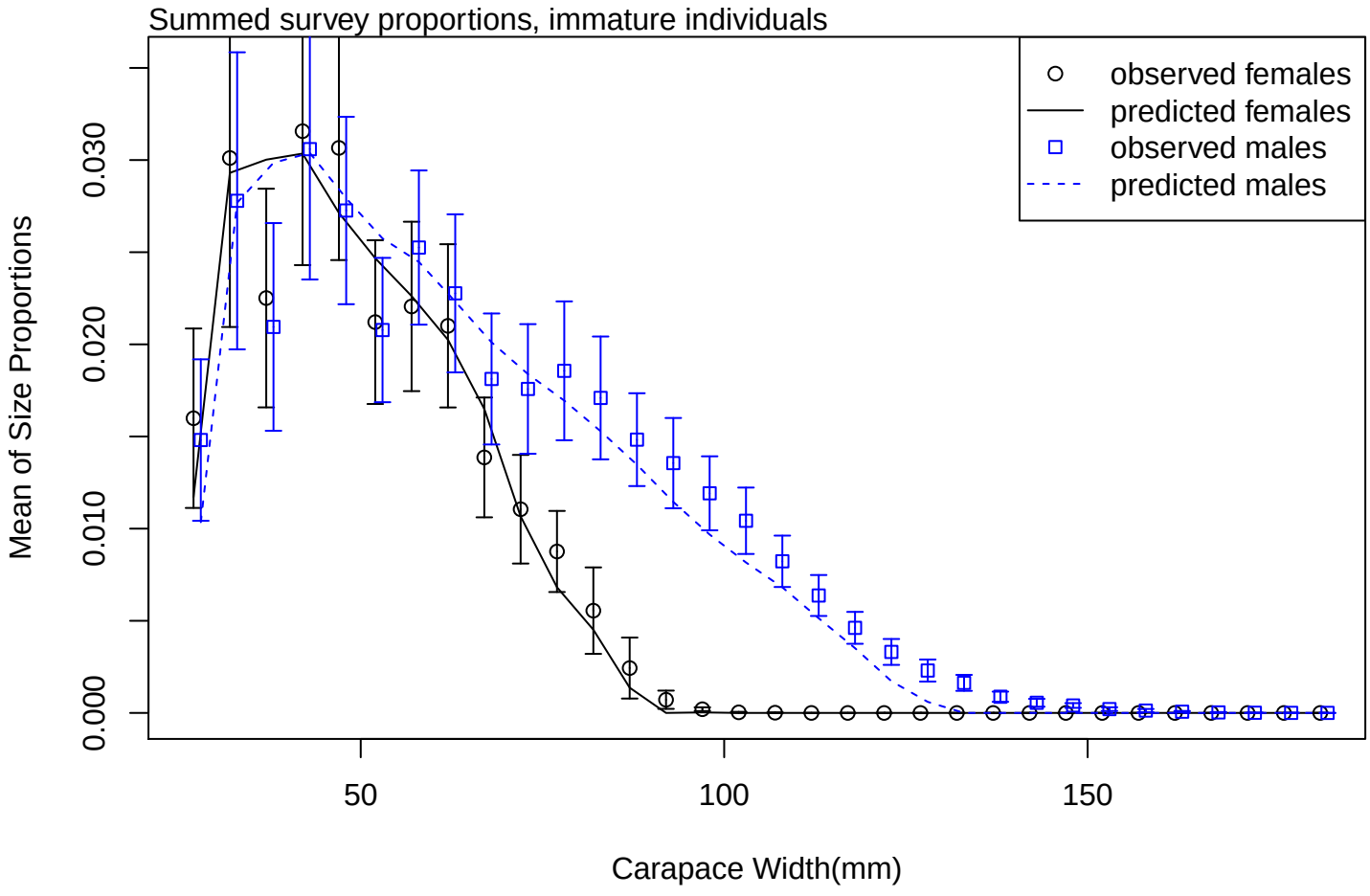
Survey proportions, mature males



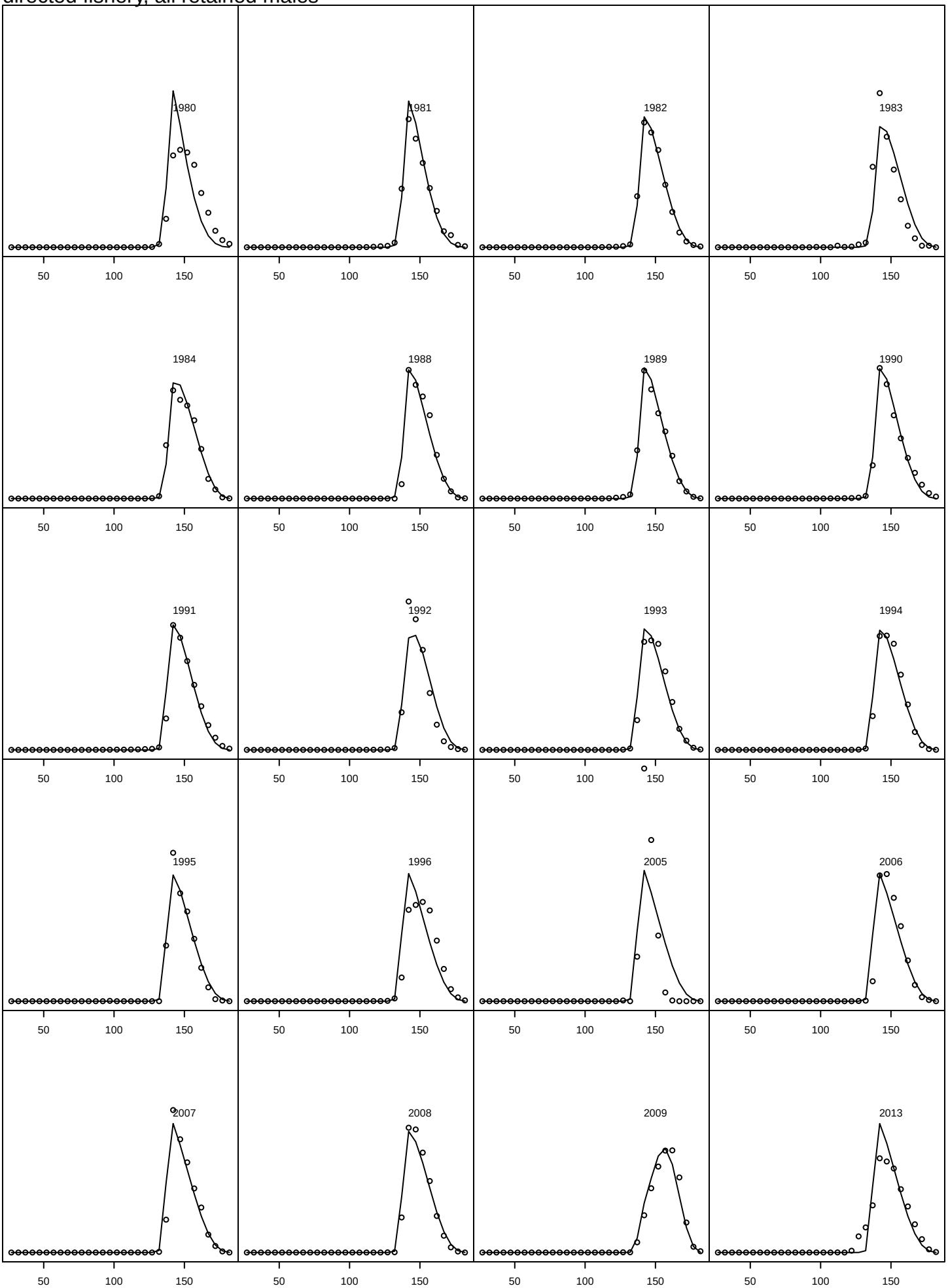

Survey proportions, mature males
Length bin
50
100
150
1980
1990
2000
2010
Year
Standardized Pearson Residual Range −1.424 2.965

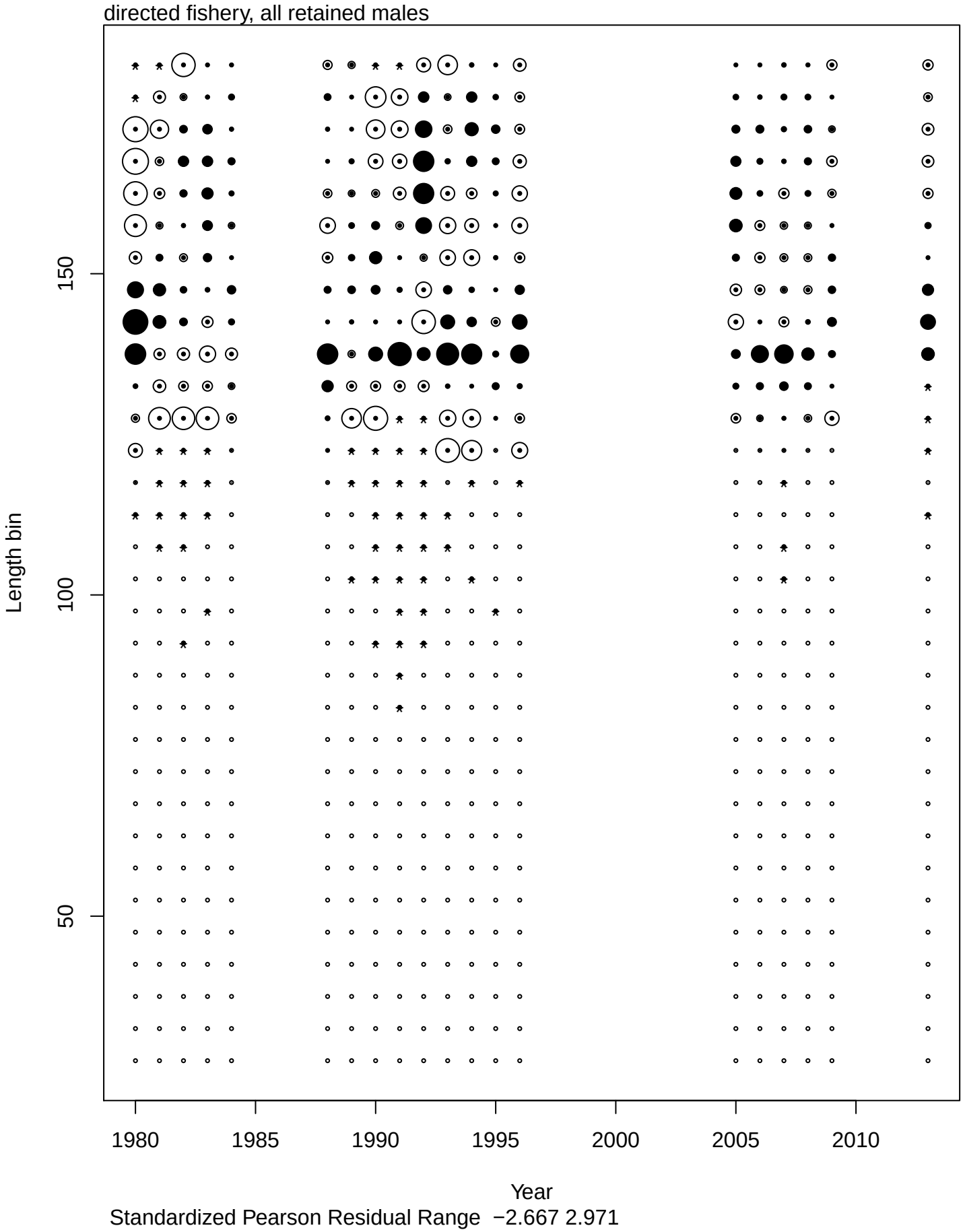

Mean survey proportions, all individuals
observed females
predicted females
observed males
predicted males
Mean of Size Proportions
0.00
0.01
0.02
0.03
0.04
0.05
50
100
150
Carapace Width(mm)

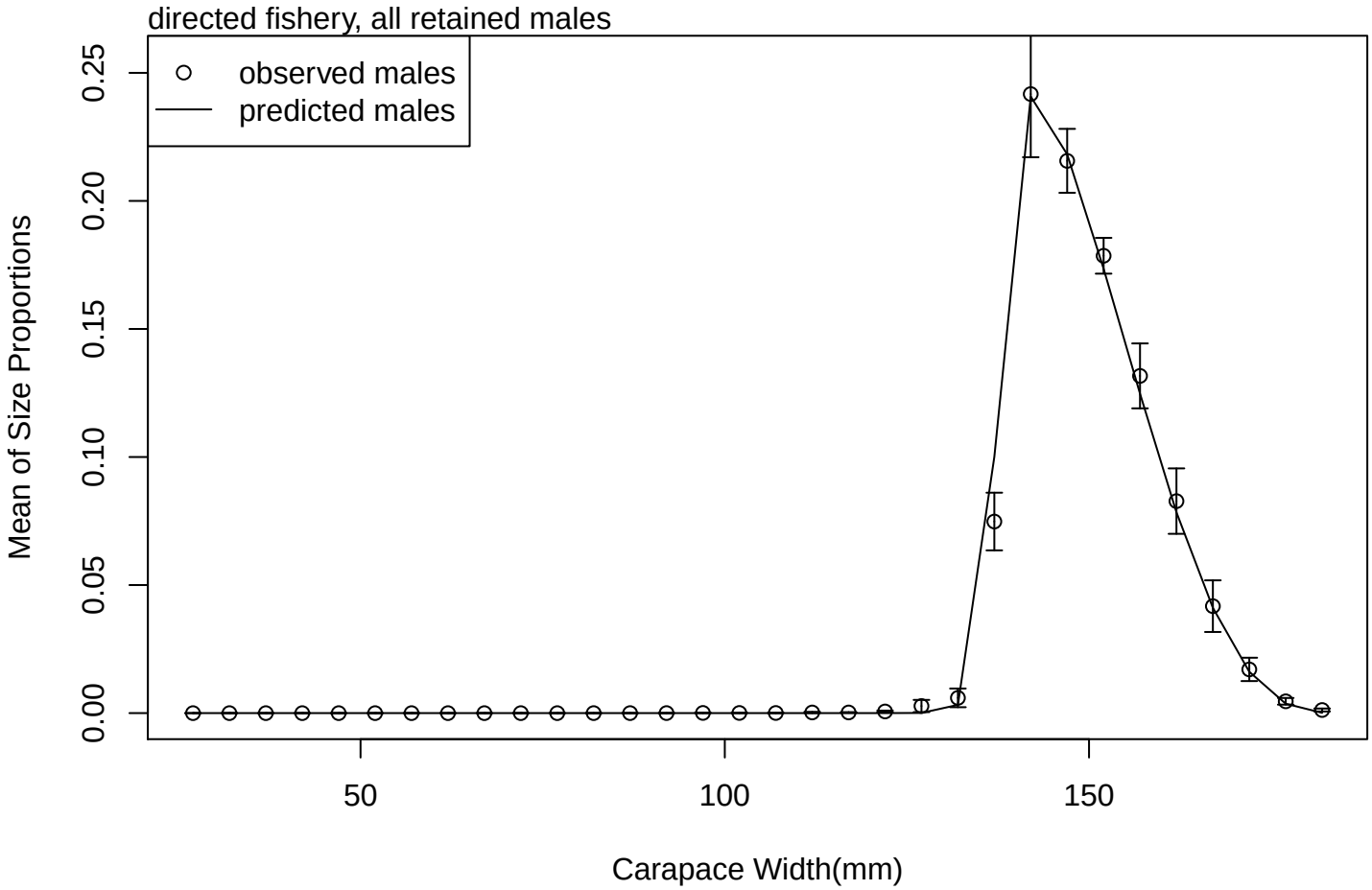

Mean survey proportions, mature individuals
observed females
predicted females
observed males
predicted males
Mean of Size Proportions
0.00
0.01
0.02
0.03
0.04
50
100
150
Carapace Width(mm)


Summed survey proportions, immature individuals
observed females
predicted females
observed males
predicted males
Mean of Size Proportions
0.000
0.010
0.020
0.030
50
100
150
Carapace Width(mm)

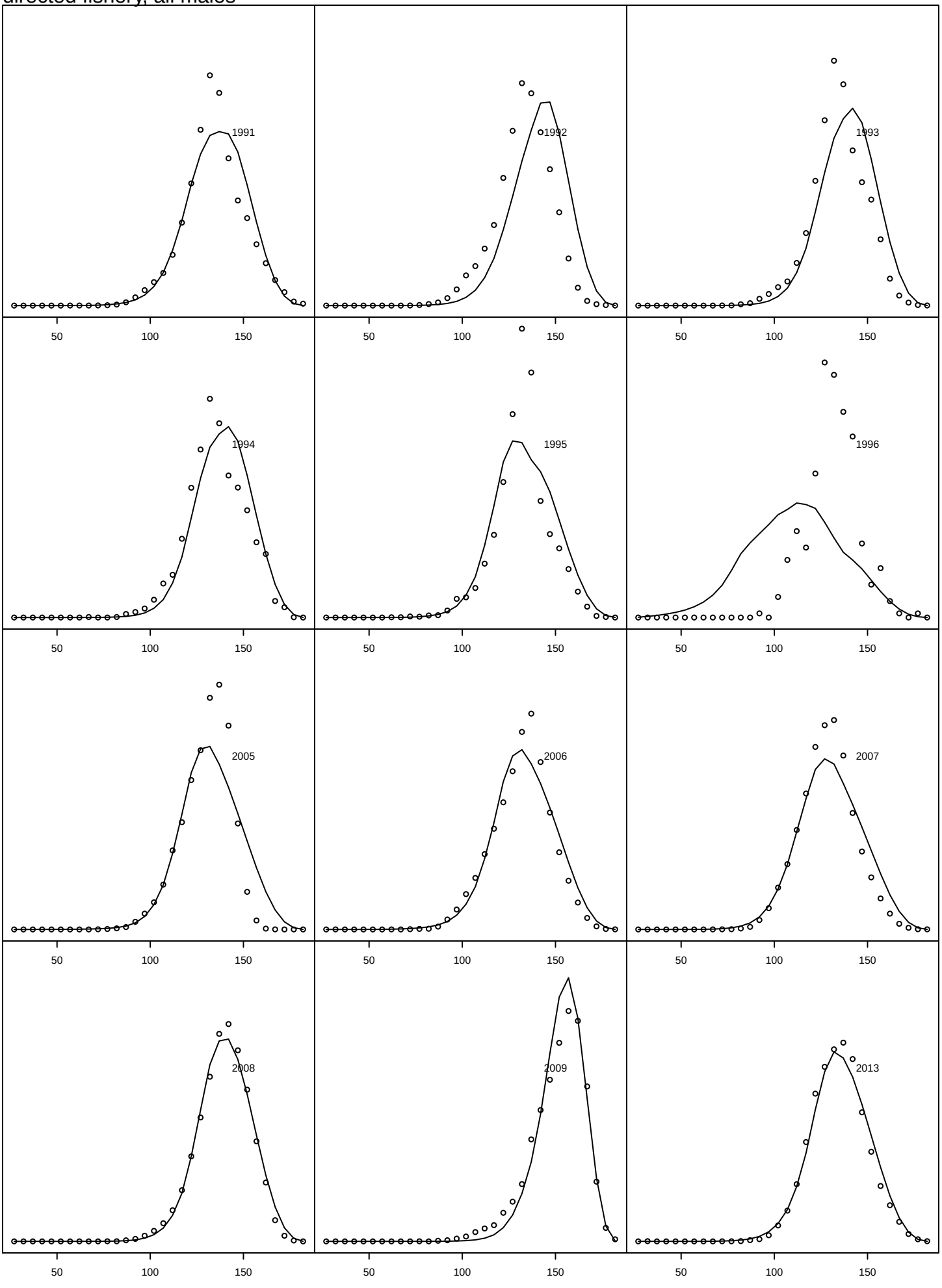
directed fishery, all retained males

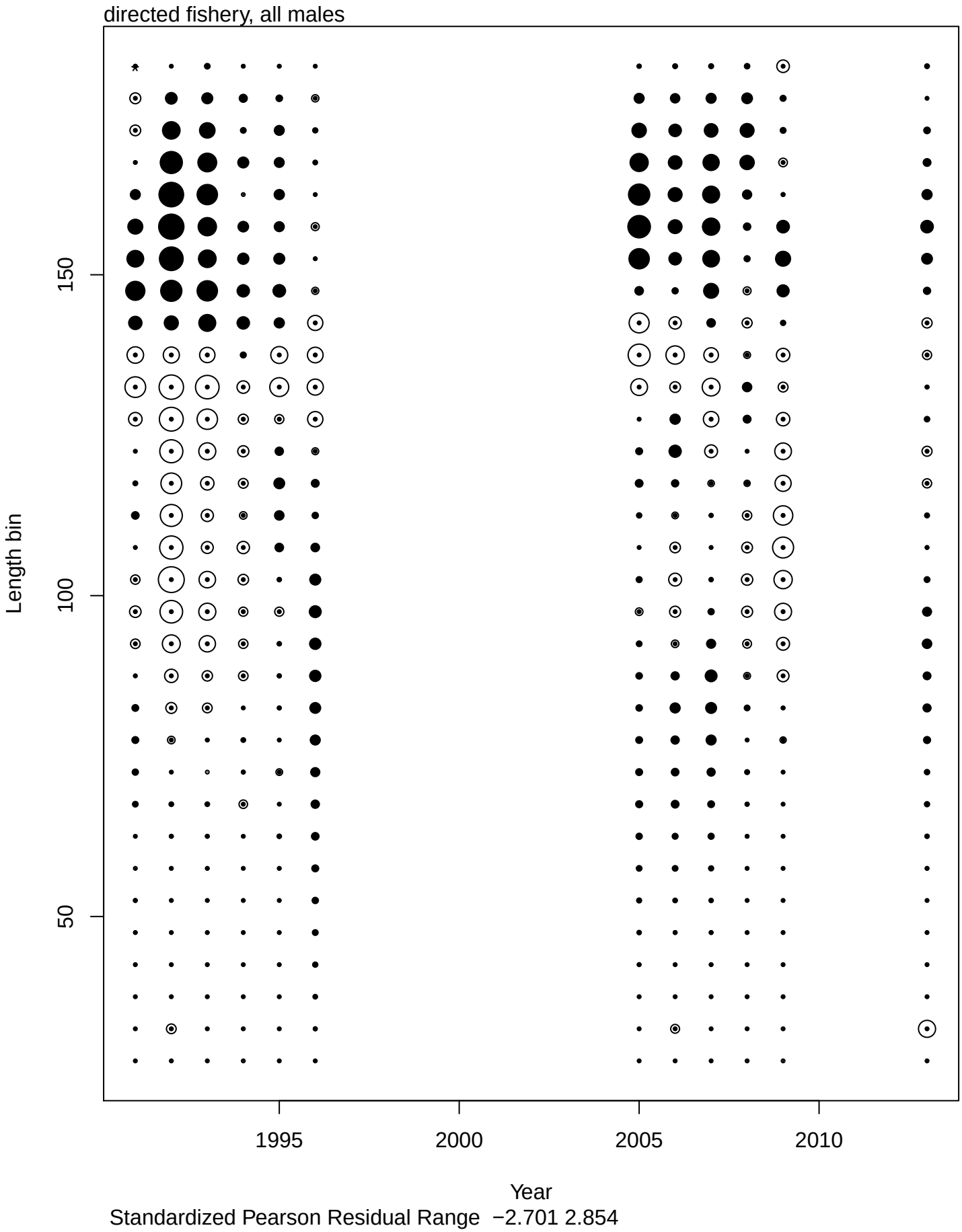


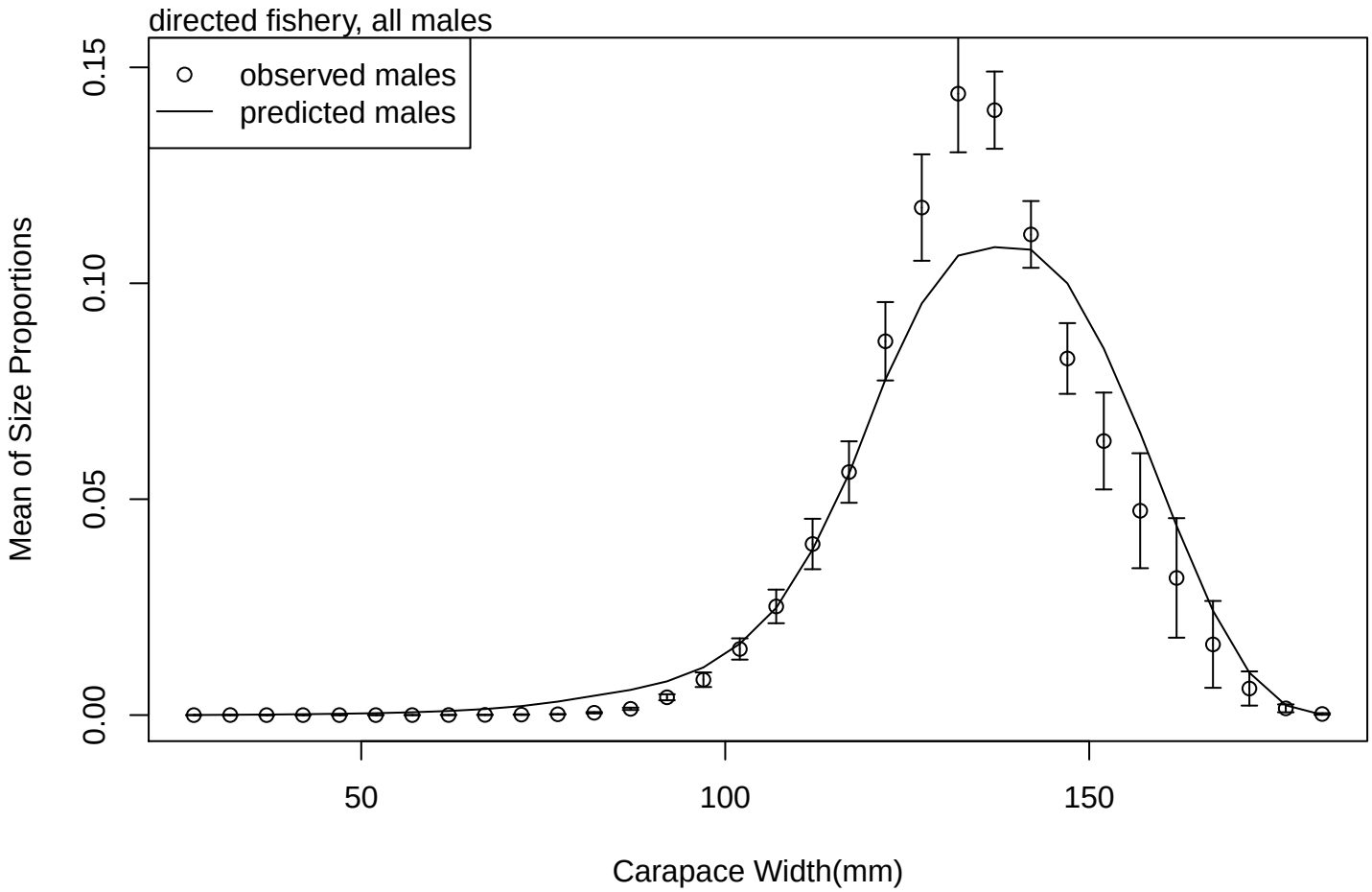

directed fishery, all retained males
Length bin
50
100
150
1980
1985
1990
1995
2000
2005
2010
Year
Standardized Pearson Residual Range −2.667 2.971


directed fishery, all retained males
observed males
predicted males
Mean of Size Proportions
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
Carapace Width(mm)

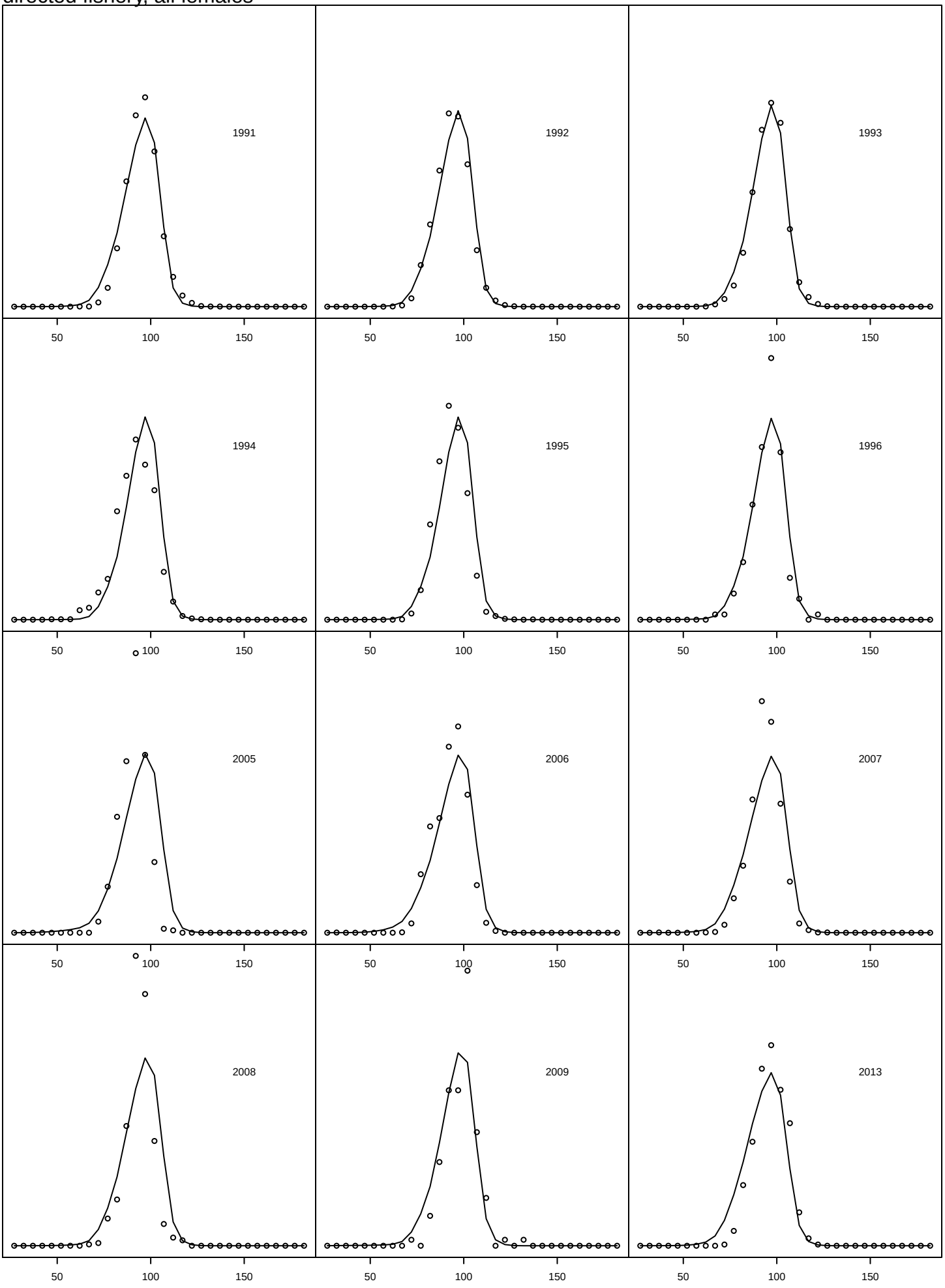
directed fishery, all males

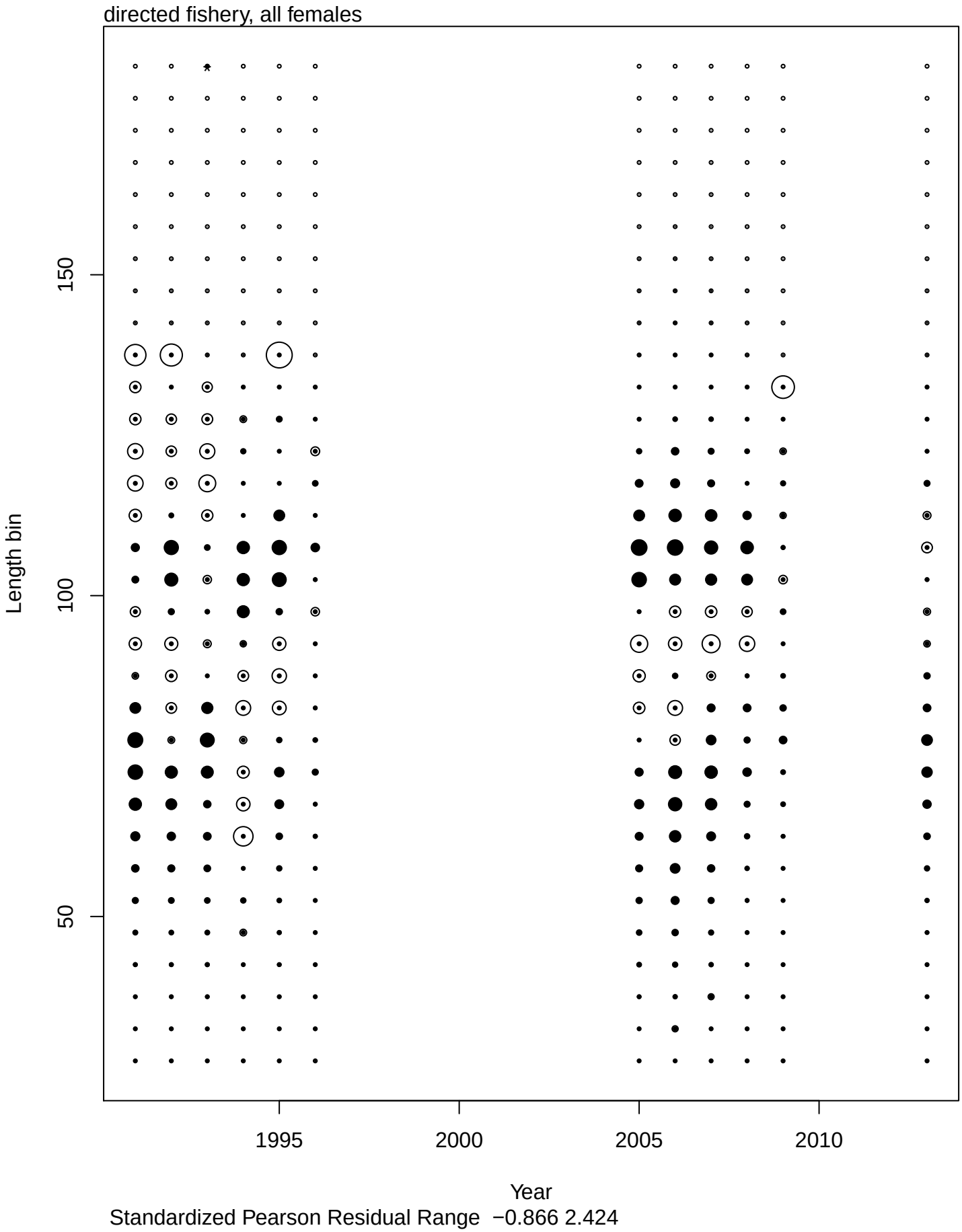


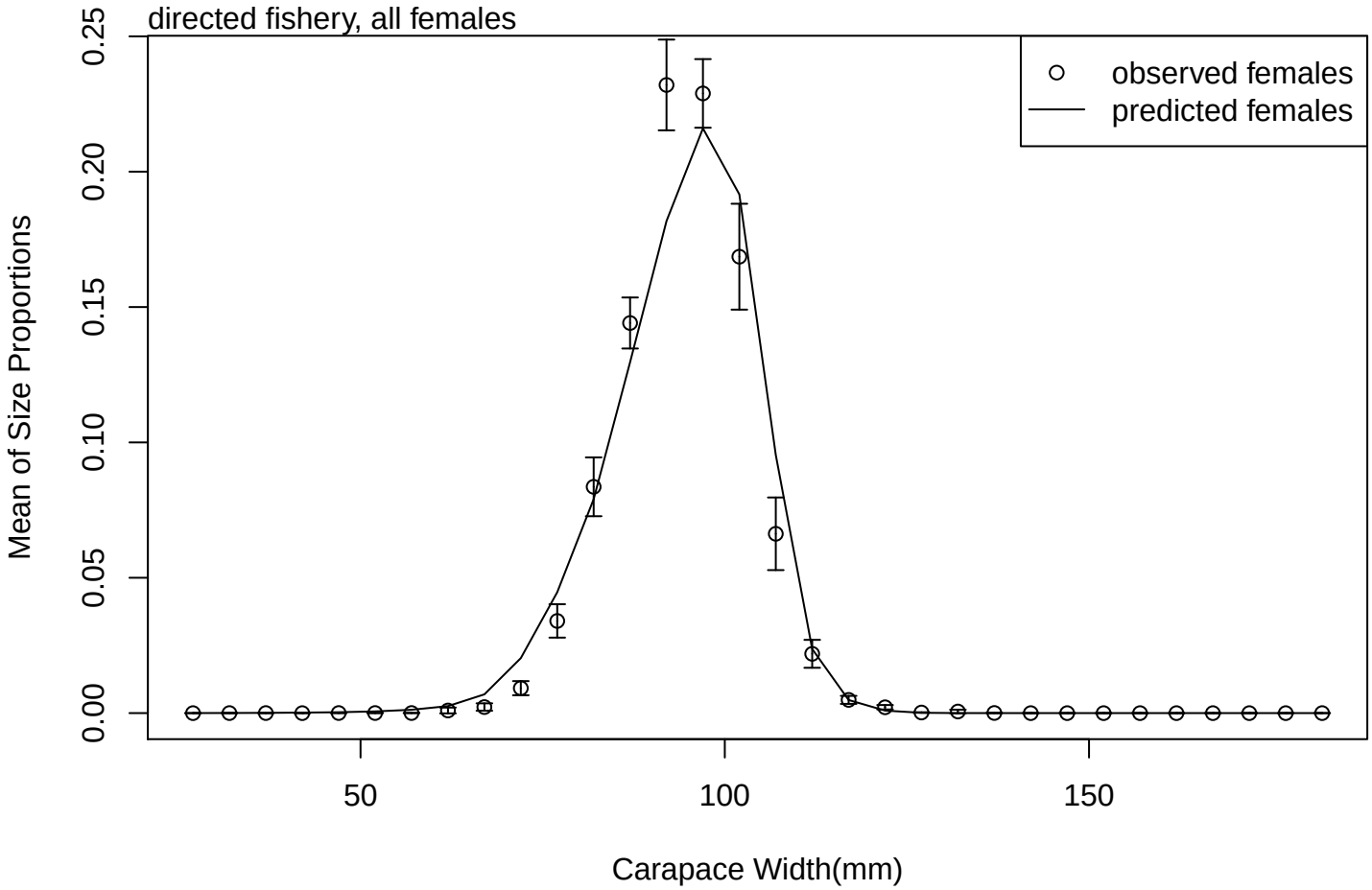

directed fishery, all males
Length bin
50
100
150
1995
2000
2005
2010
Year
Standardized Pearson Residual Range −2.701 2.854


directed fishery, all males
observed males
predicted males
Mean of Size Proportions
0.00
0.05
0.10
0.15
50
100
150
Carapace Width(mm)

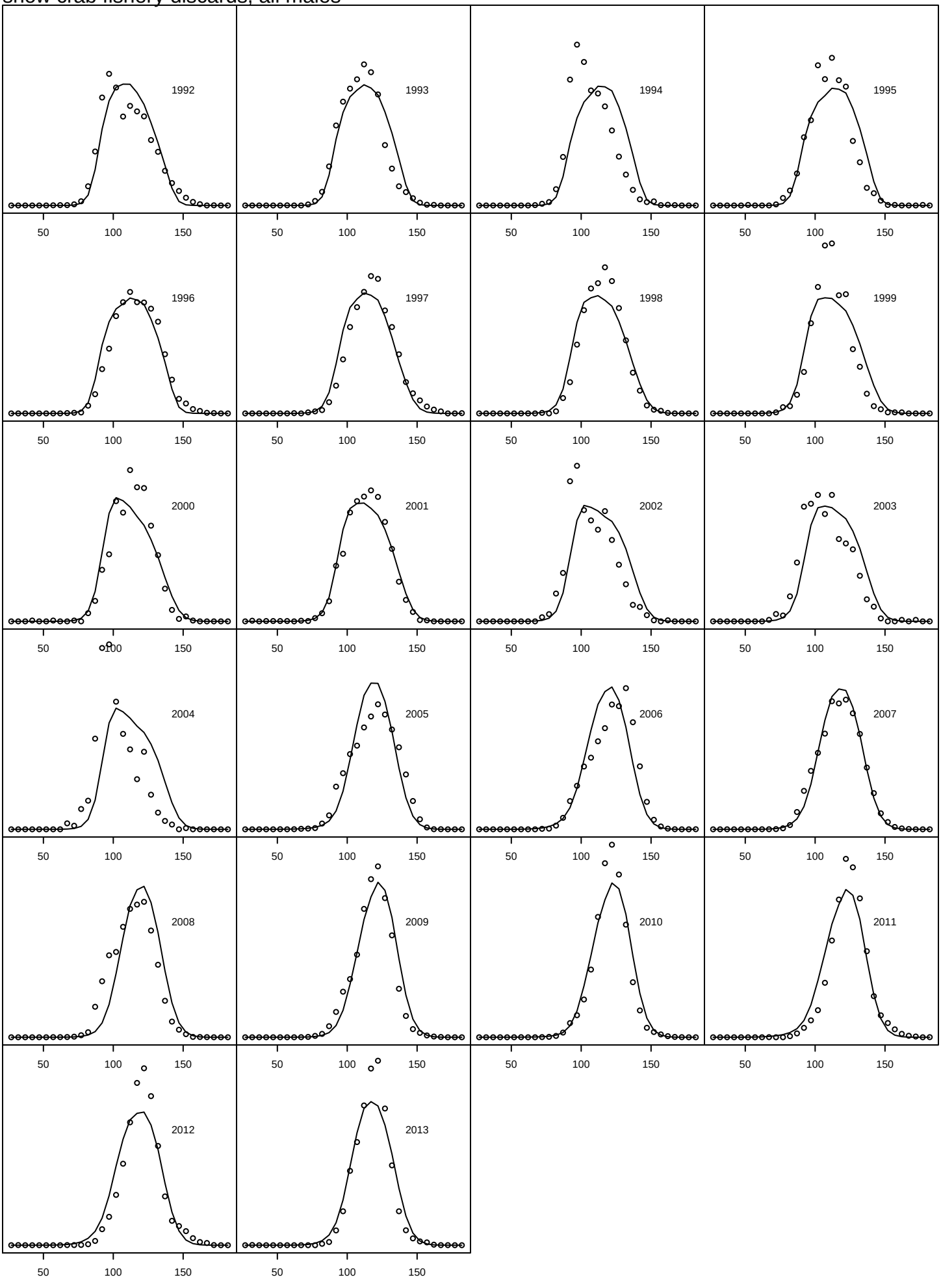
directed fishery, all females



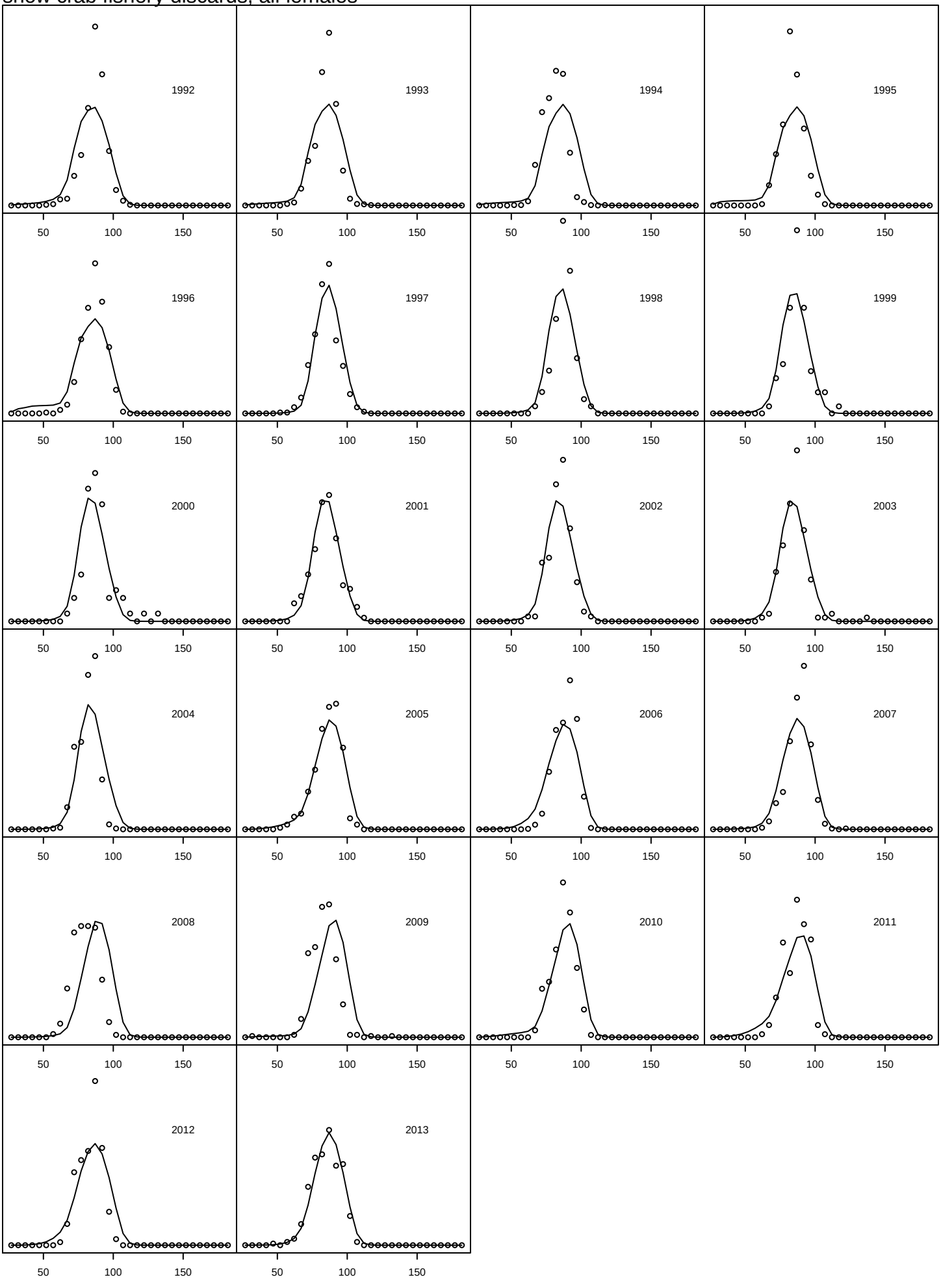

directed fishery, all females
Length bin
50
100
150
1995
2000
2005
2010
Year
Standardized Pearson Residual Range −0.866 2.424

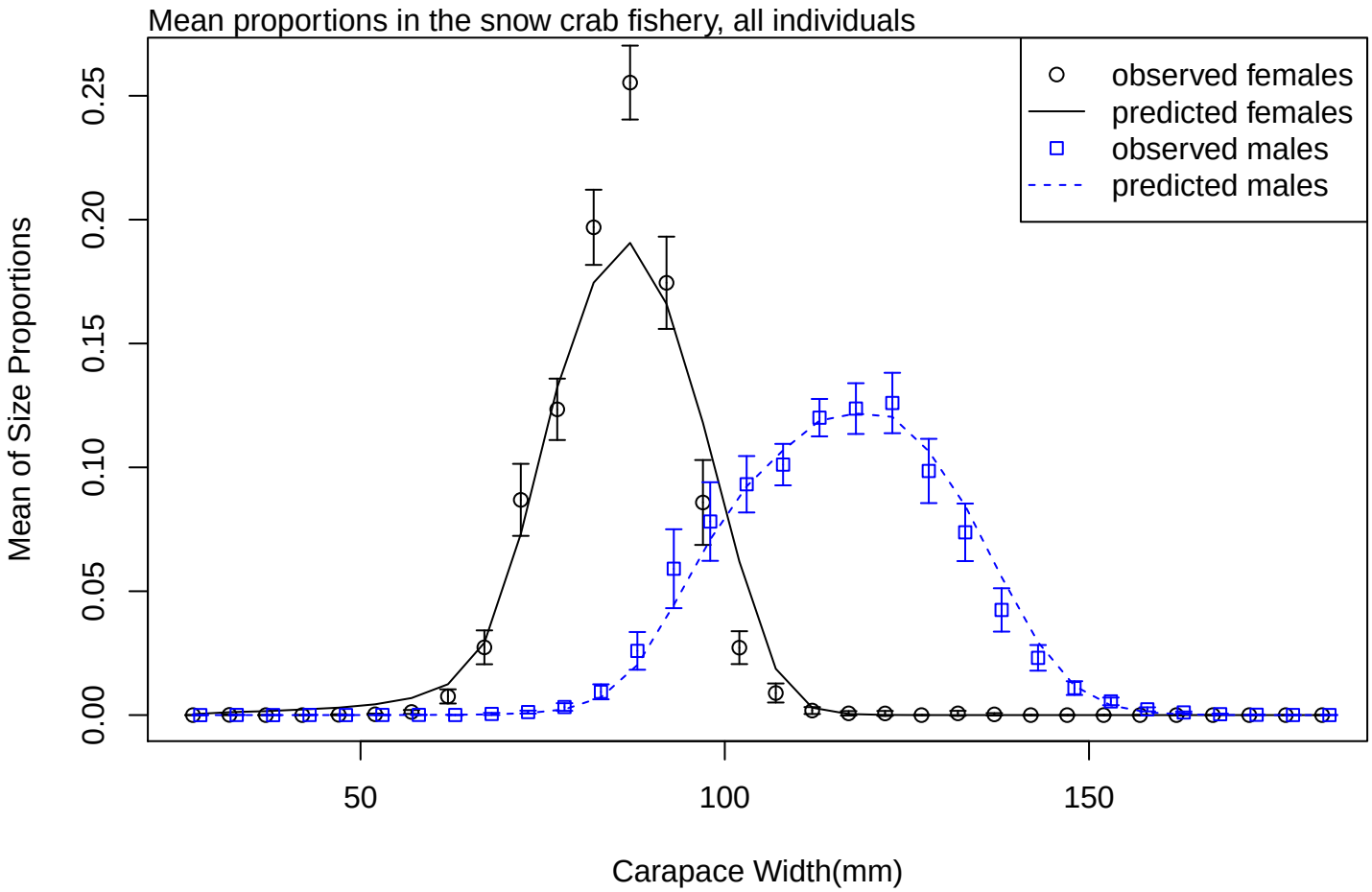

directed fishery, all females
observed females
predicted females
Mean of Size Proportions
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
Carapace Width(mm)

snow crab fishery discards, all males

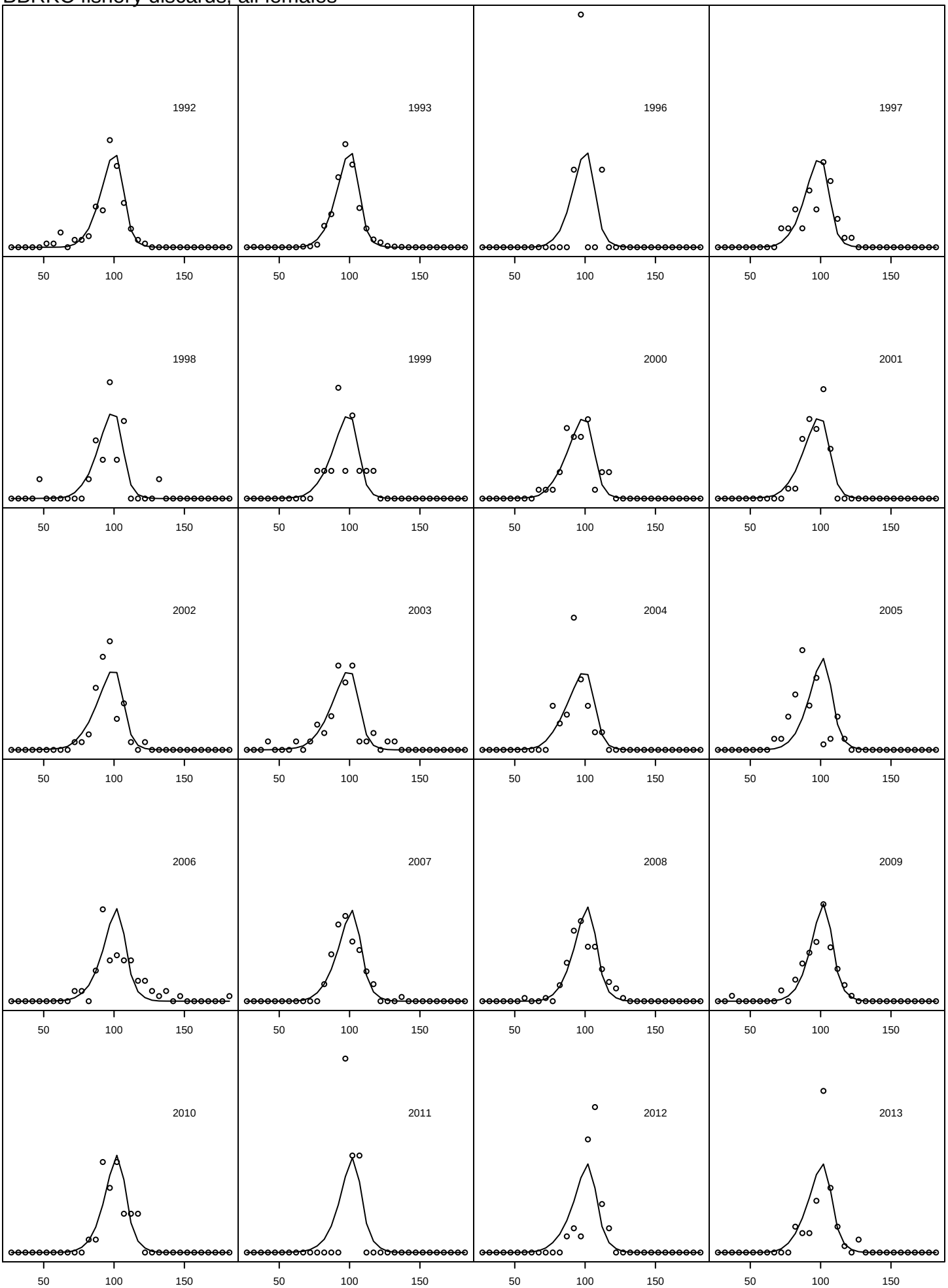


snow crab fishery discards, all females

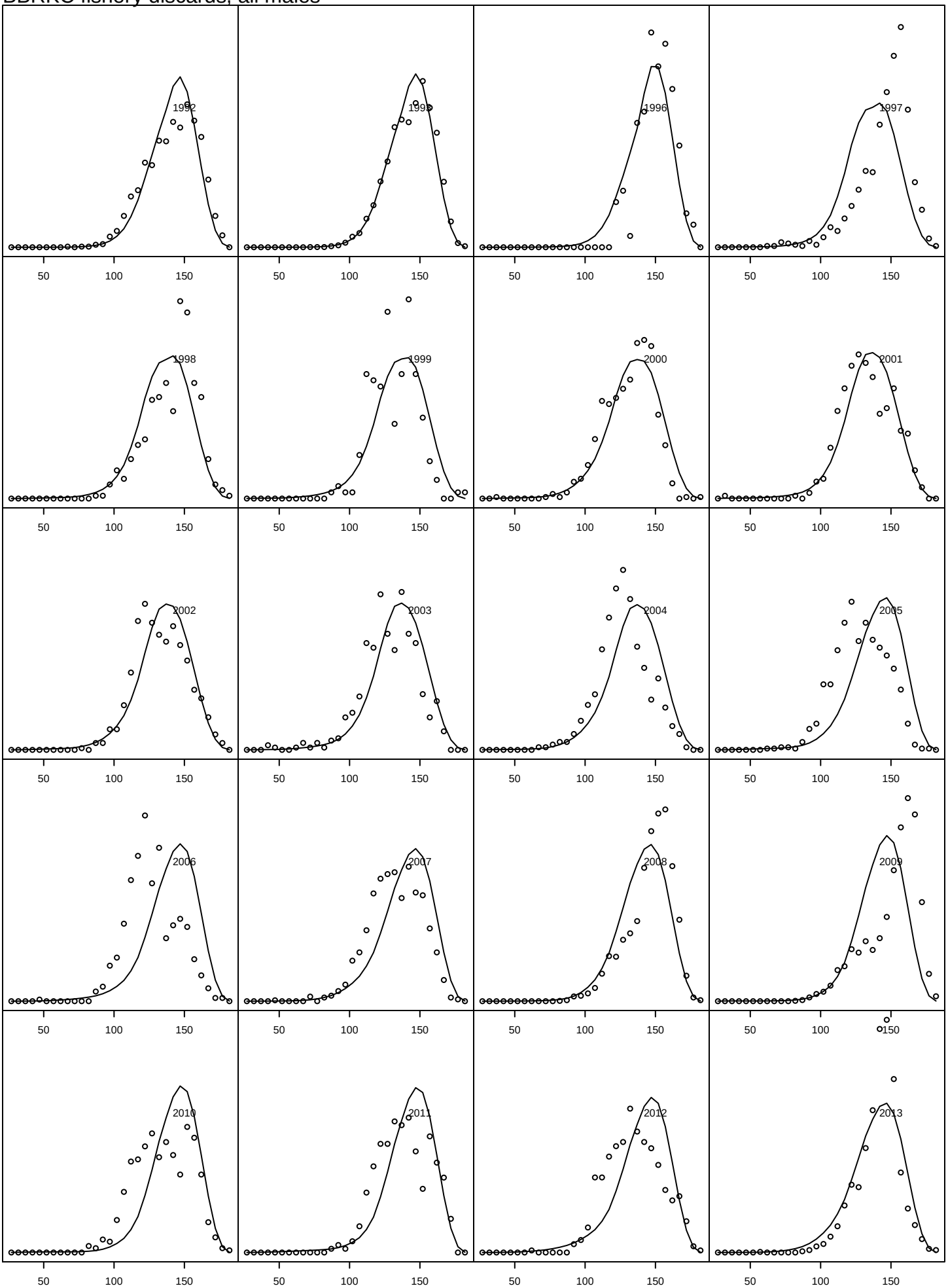


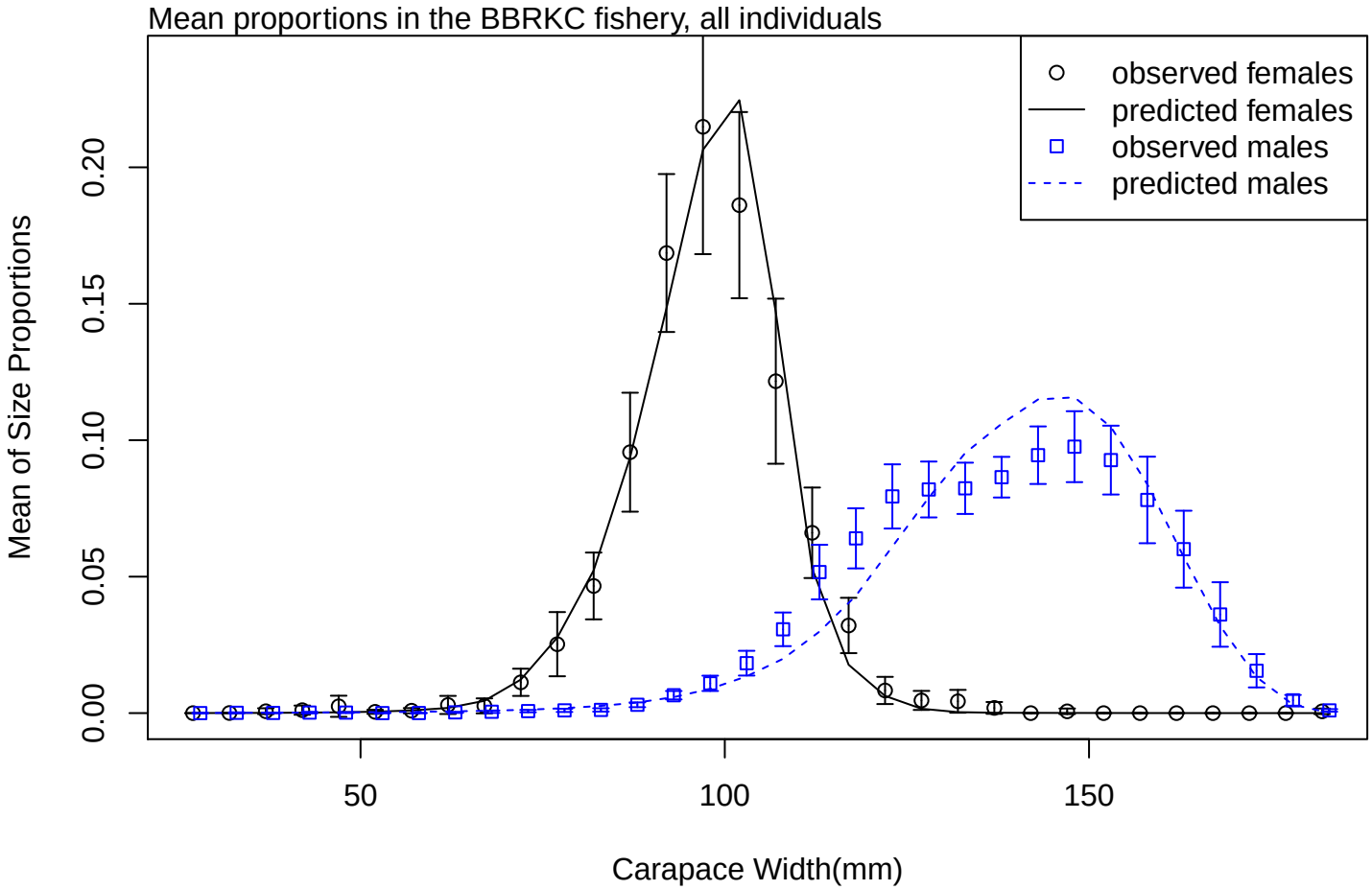

Mean proportions in the snow crab fishery, all individuals
observed females
predicted females
observed males
predicted males
Mean of Size Proportions
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
Carapace Width(mm)

BBRKC fishery discards, all females

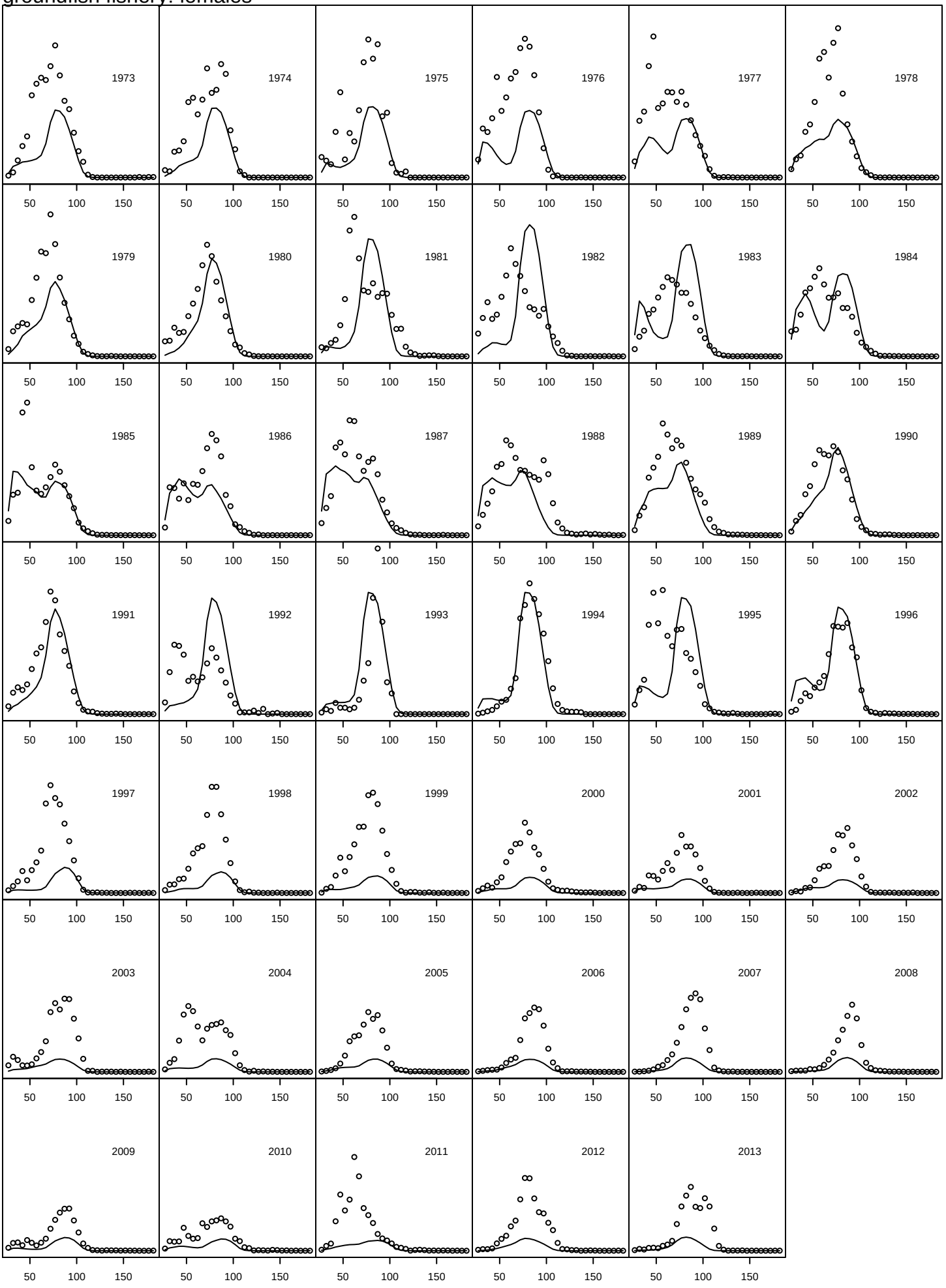


BBRKC fishery discards, all males

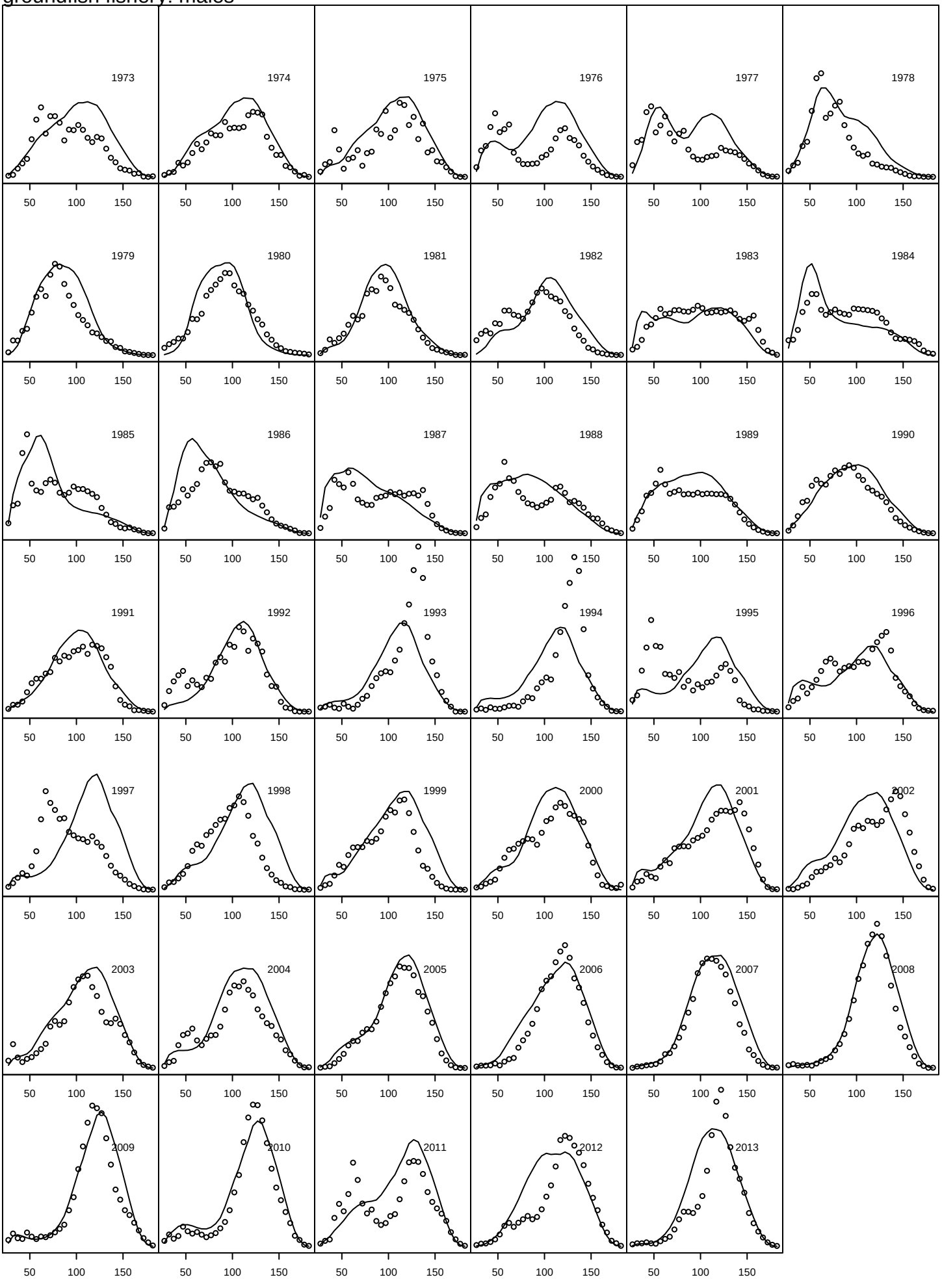


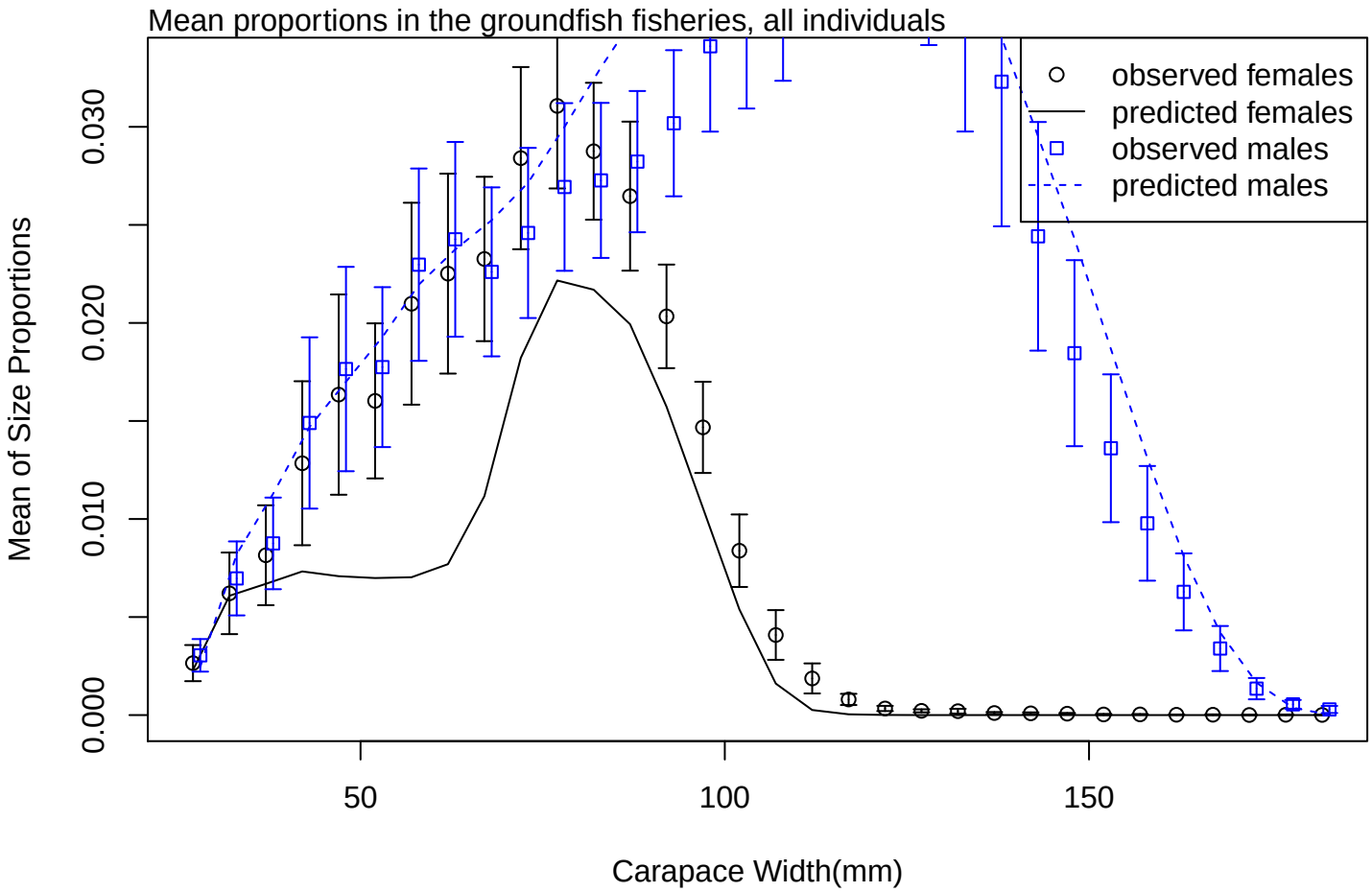

Mean proportions in the BBRKC fishery, all individuals
observed females
predicted females
observed males
predicted males
Mean of Size Proportions
0.00
0.05
0.10
0.15
0.20
50
100
150
Carapace Width(mm)

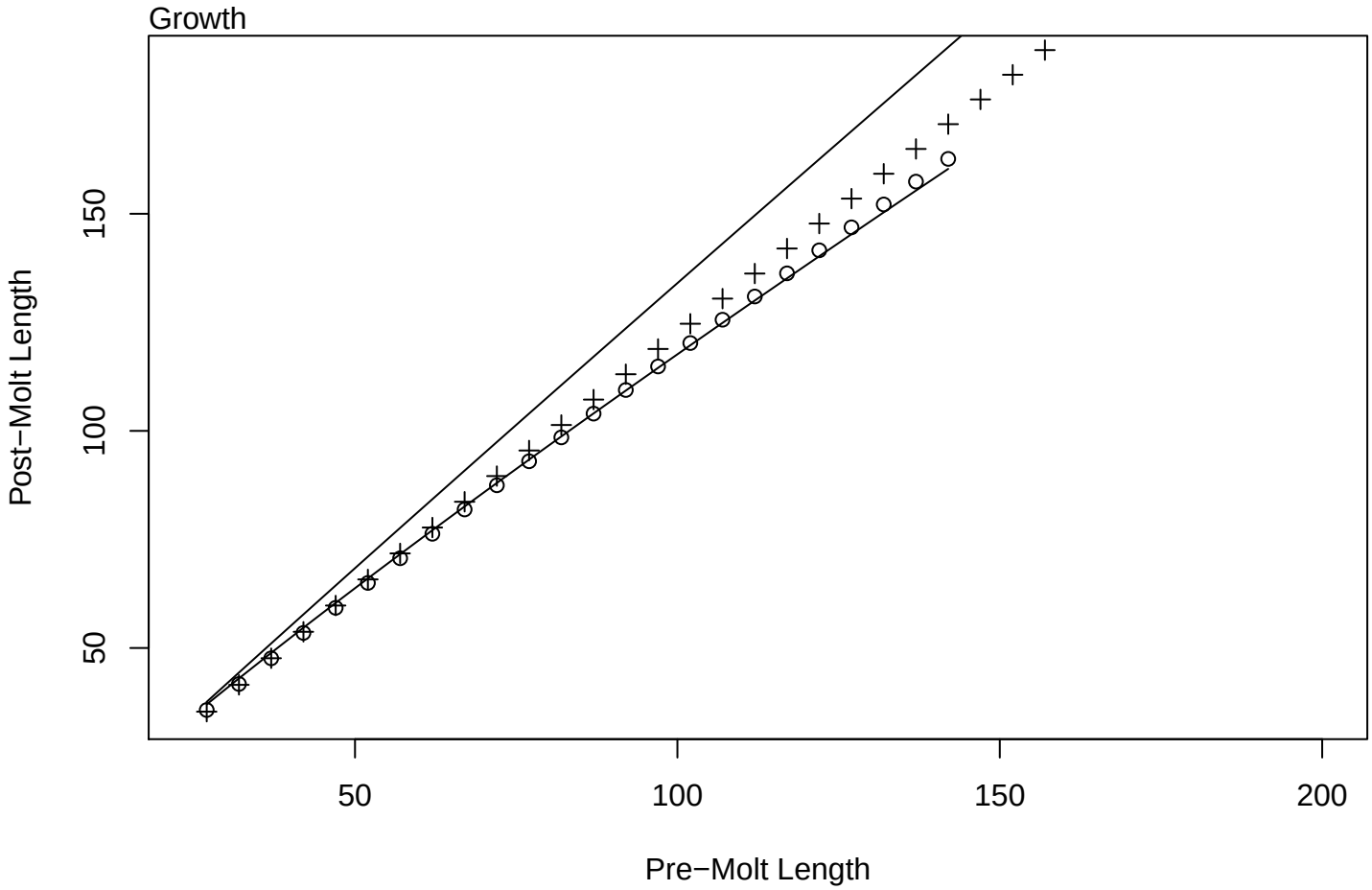
groundfish fishery: females

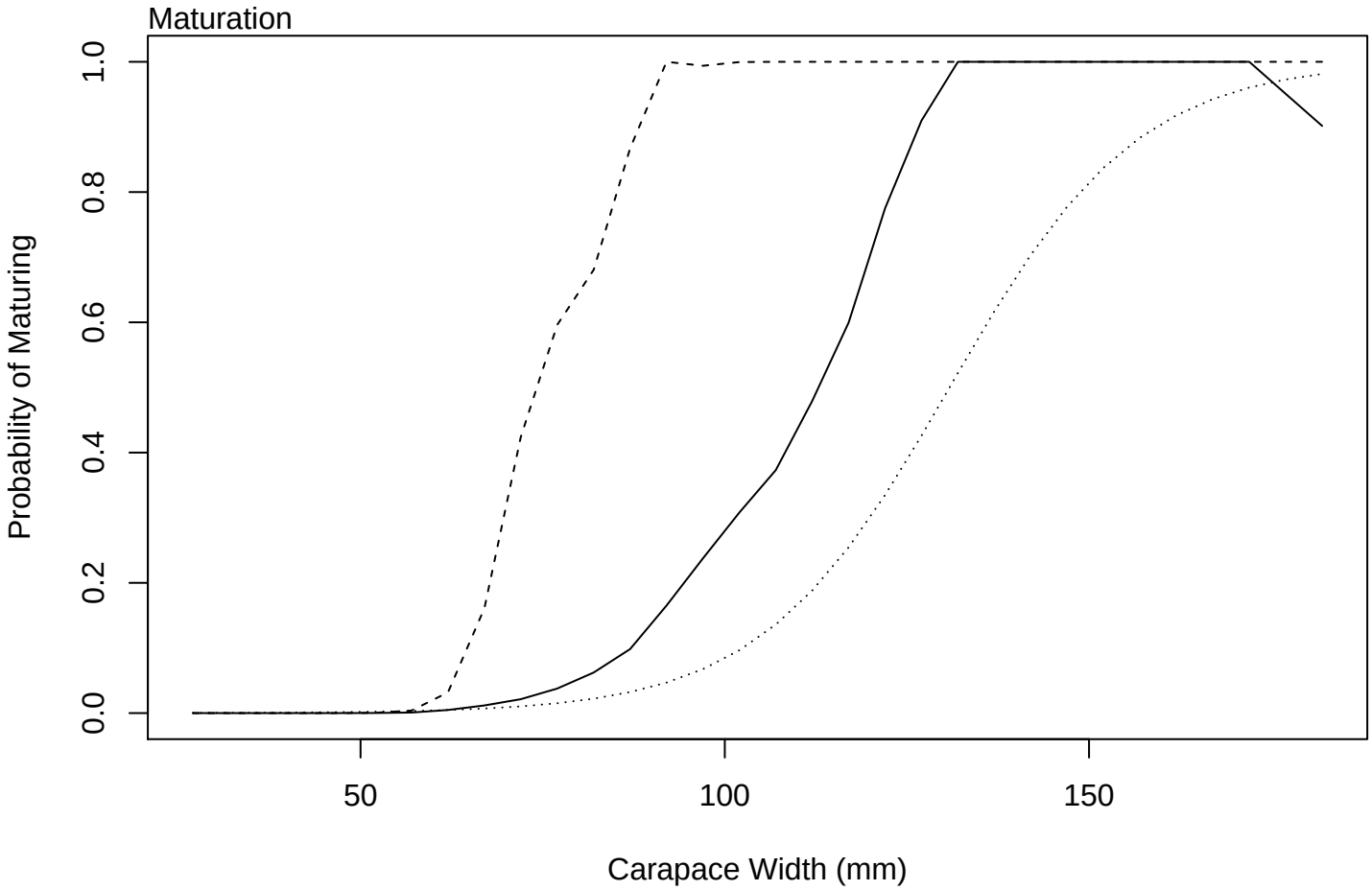


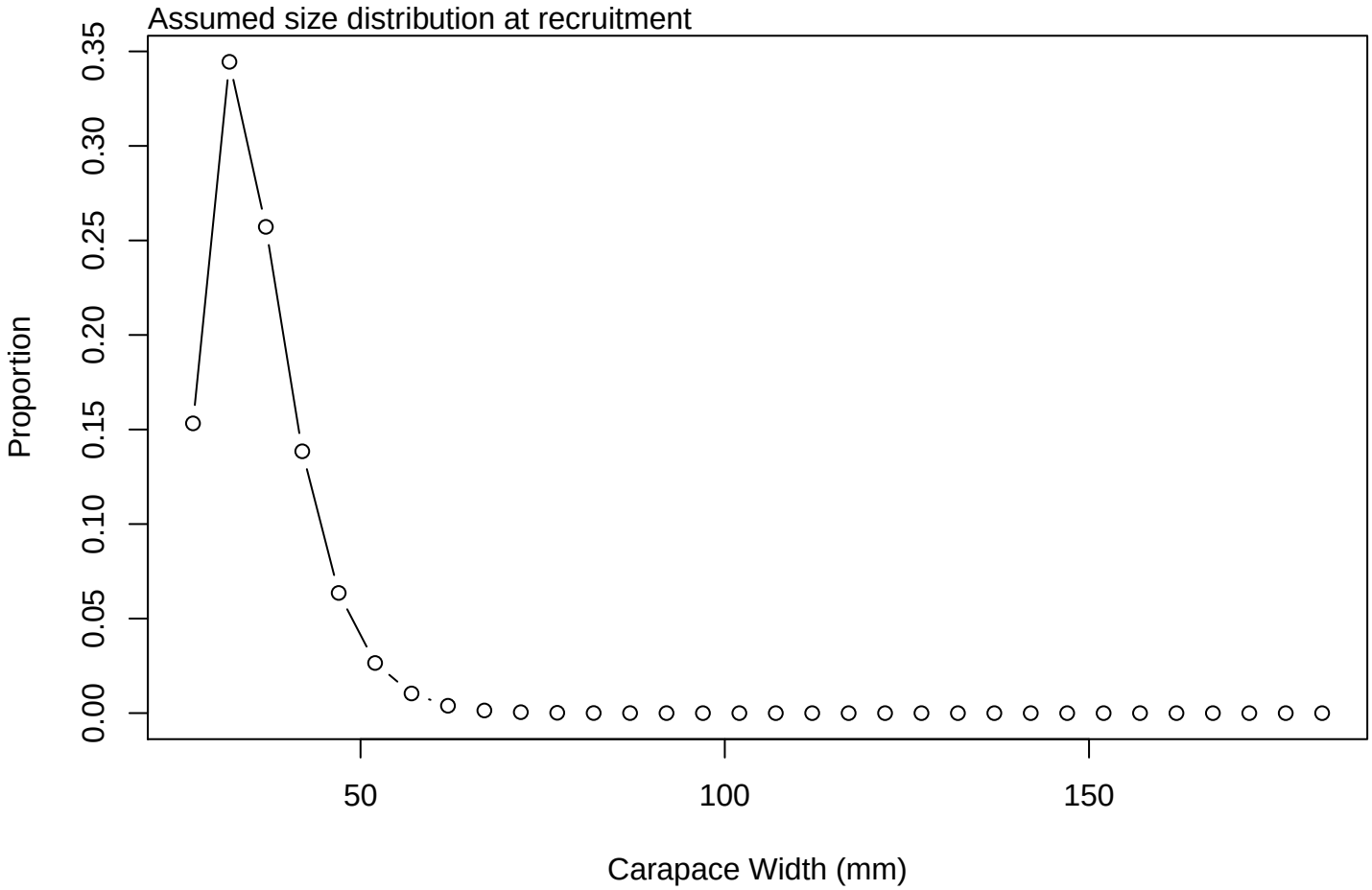
groundfish fishery: males

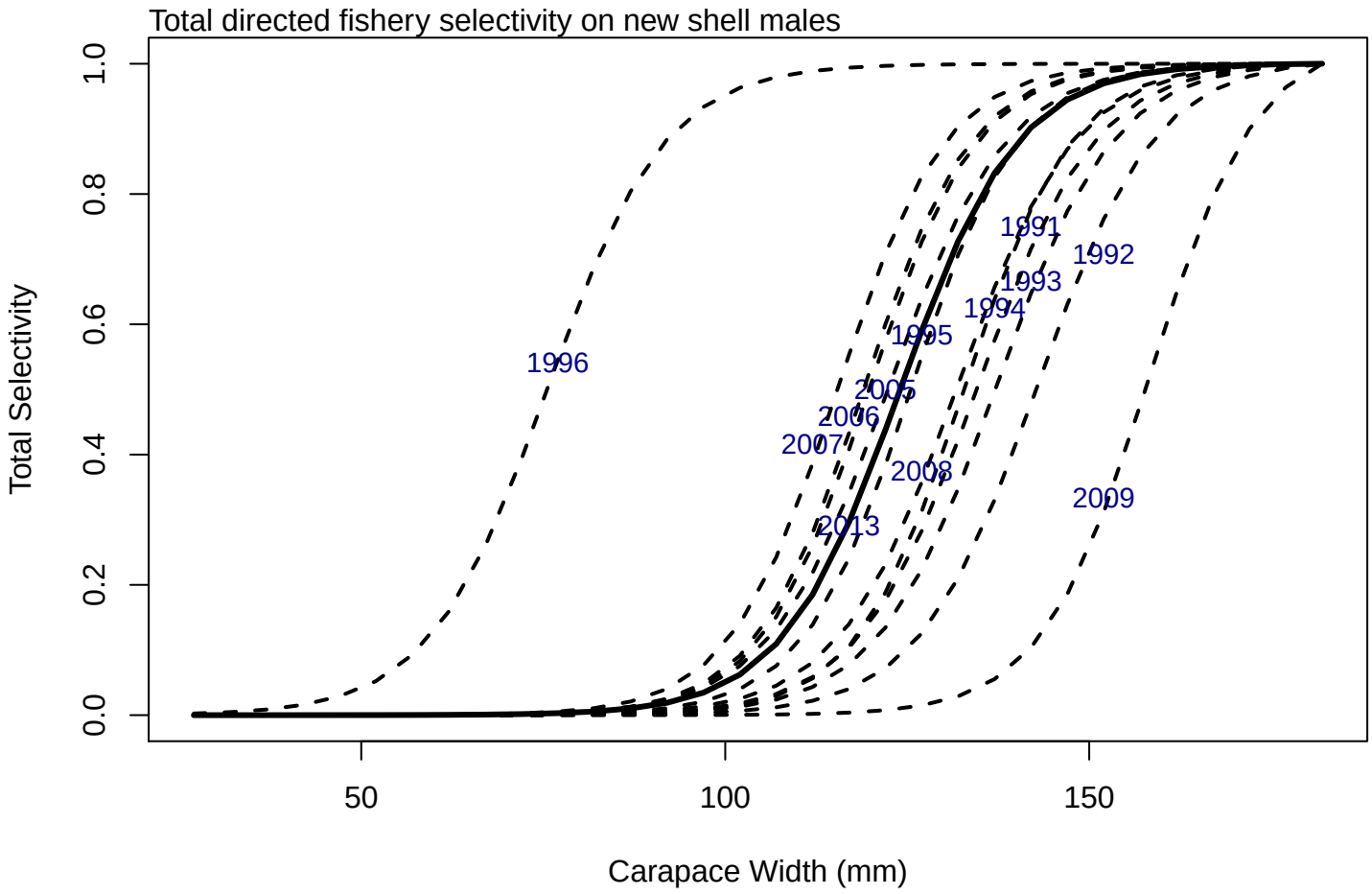


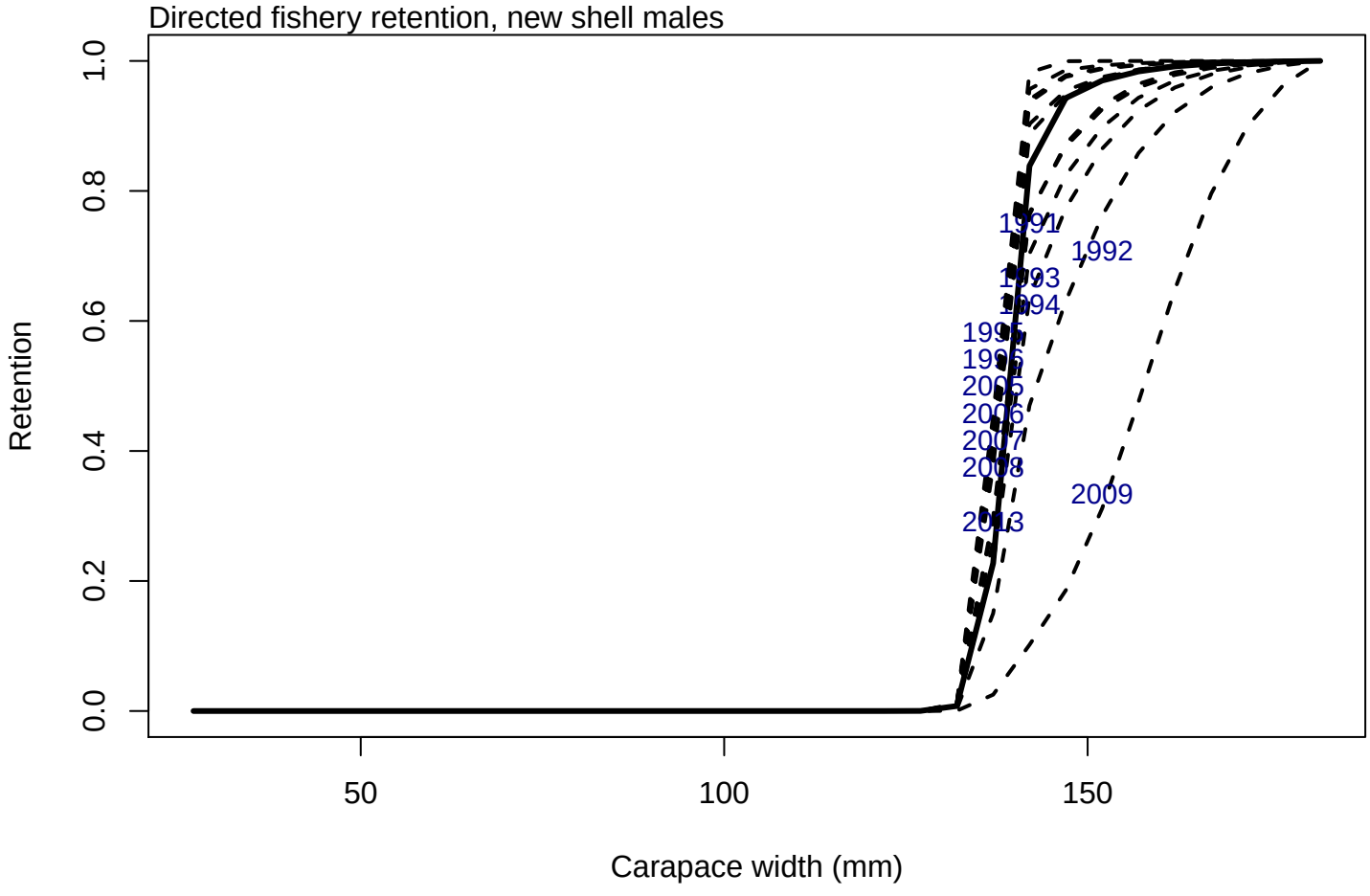

Mean proportions in the groundfish fisheries, all individuals
observed females
predicted females
observed males
predicted males
Mean of Size Proportions
0.000
0.010
0.020
0.030
50
100
150
Carapace Width(mm)

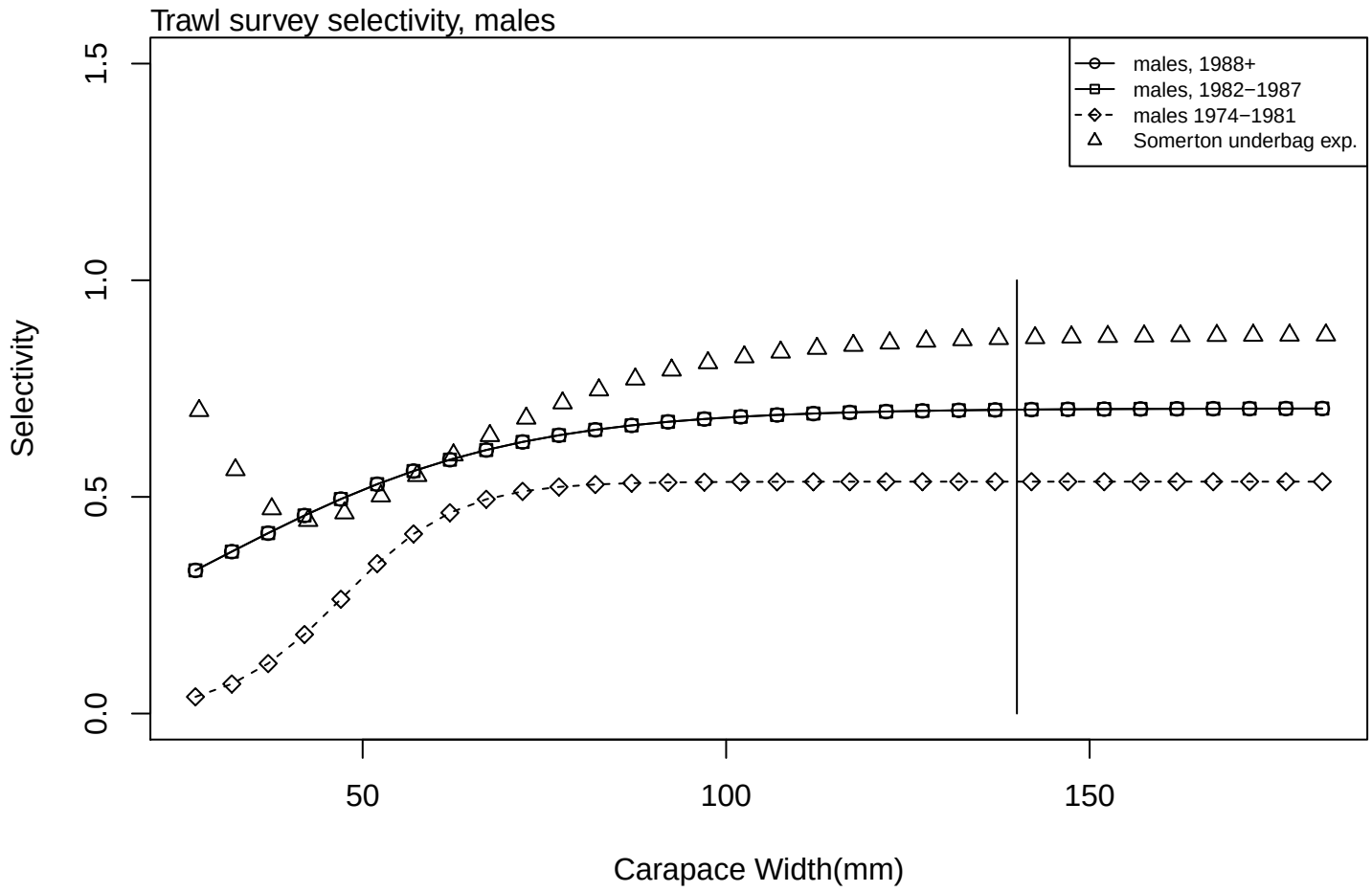

Growth
Post−Molt Length
50
100
150
50
100
150
200
Pre−Molt Length

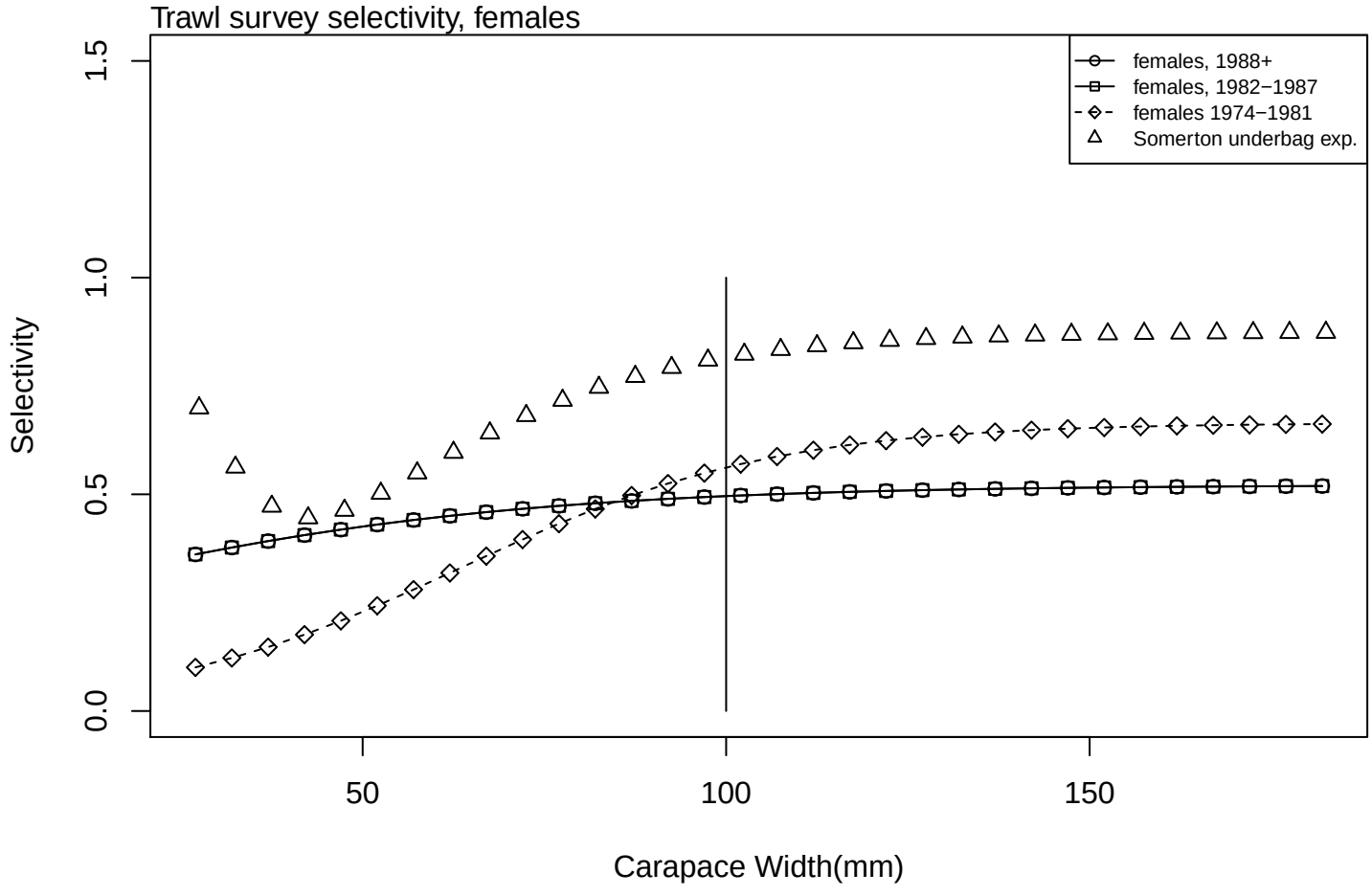

Maturation
Probability of Maturing
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Carapace Width (mm)

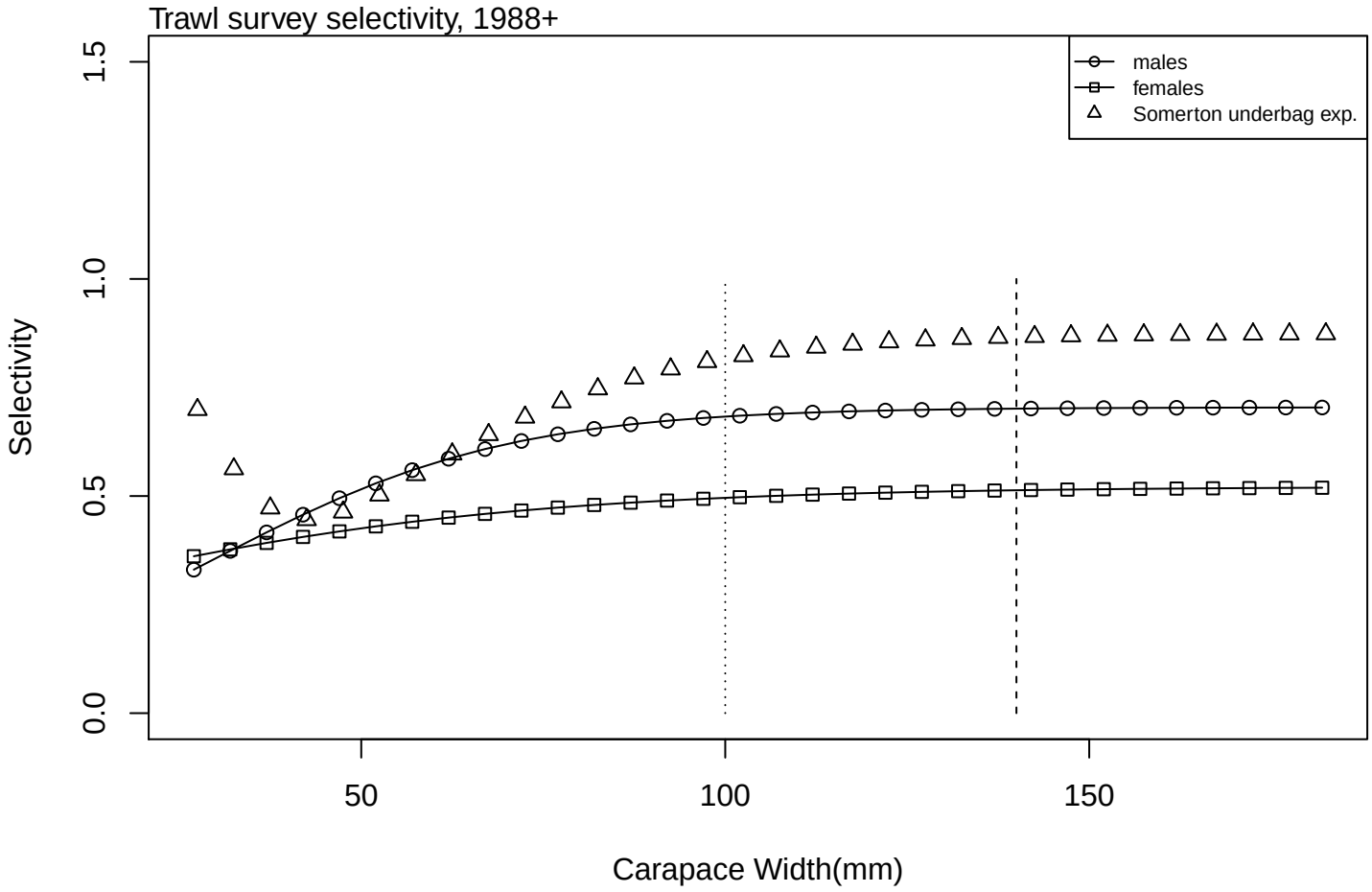

Assumed size distribution at recruitment
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
Carapace Width (mm)

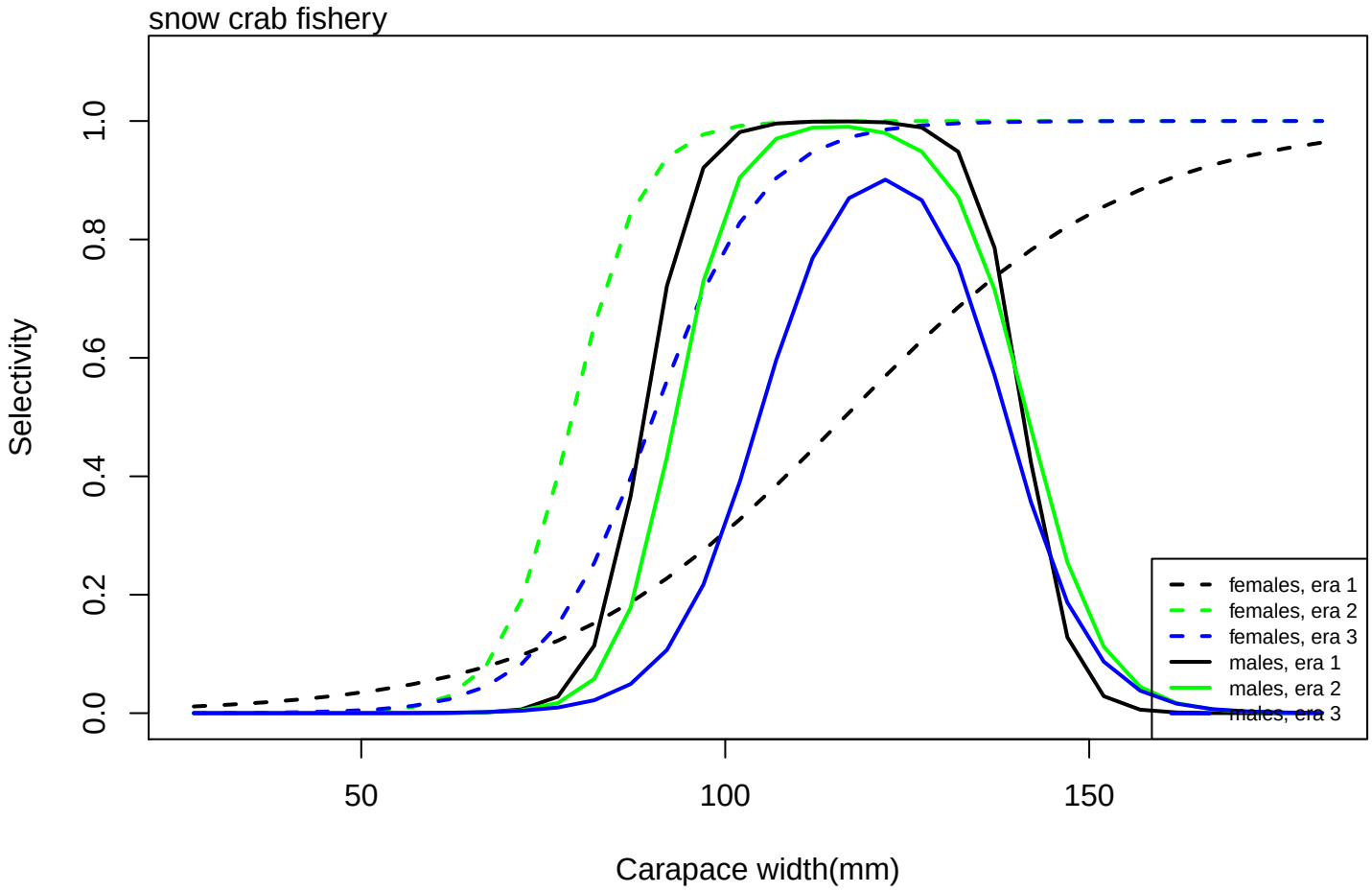

Total directed fishery selectivity on new shell males
Total Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Carapace Width (mm)
1996
1991
1992
1993
1994
1995
2005
2006
2007
2008
2009
2013

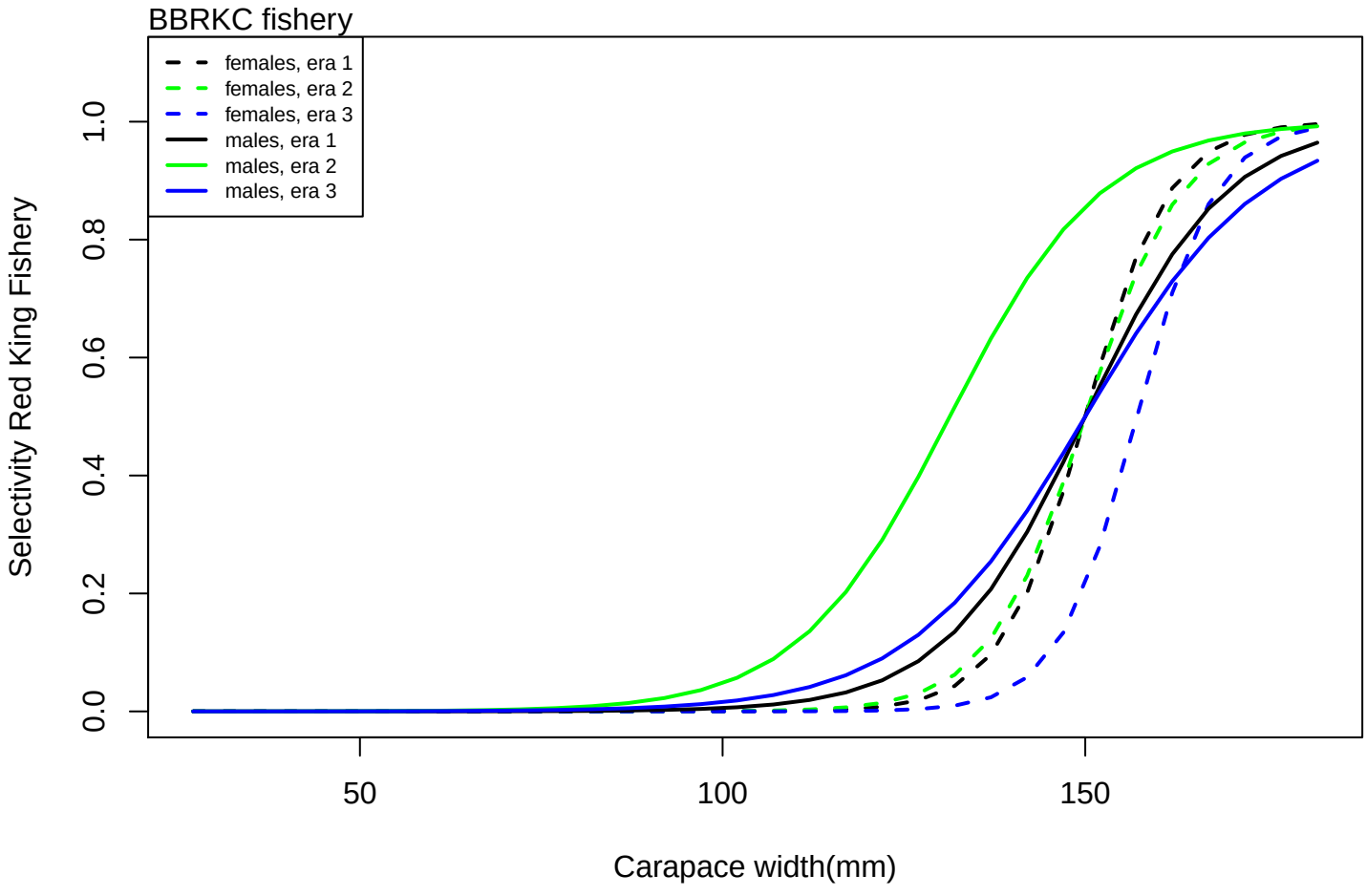

Directed fishery retention, new shell males
Retention
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Carapace width (mm)
1991
1992
1993
1994
1995
1996
2005
2006
2007
2008
2009
2013

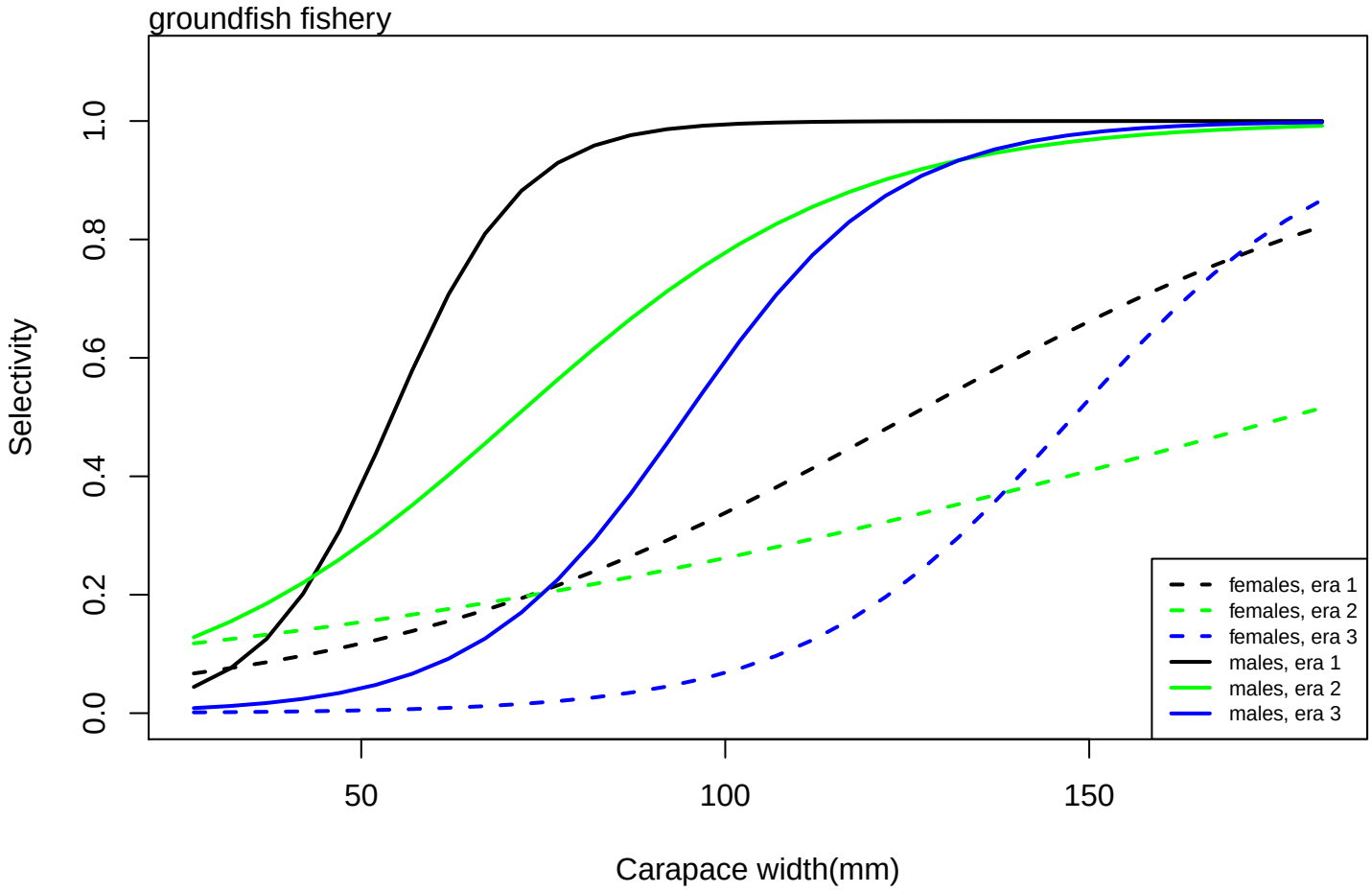

Trawl survey selectivity, males
males, 1988+
males, 1982−1987
males 1974−1981
Somerton underbag exp.
Selectivity
0.0
0.5
1.0
1.5
50
100
150
Carapace Width(mm)

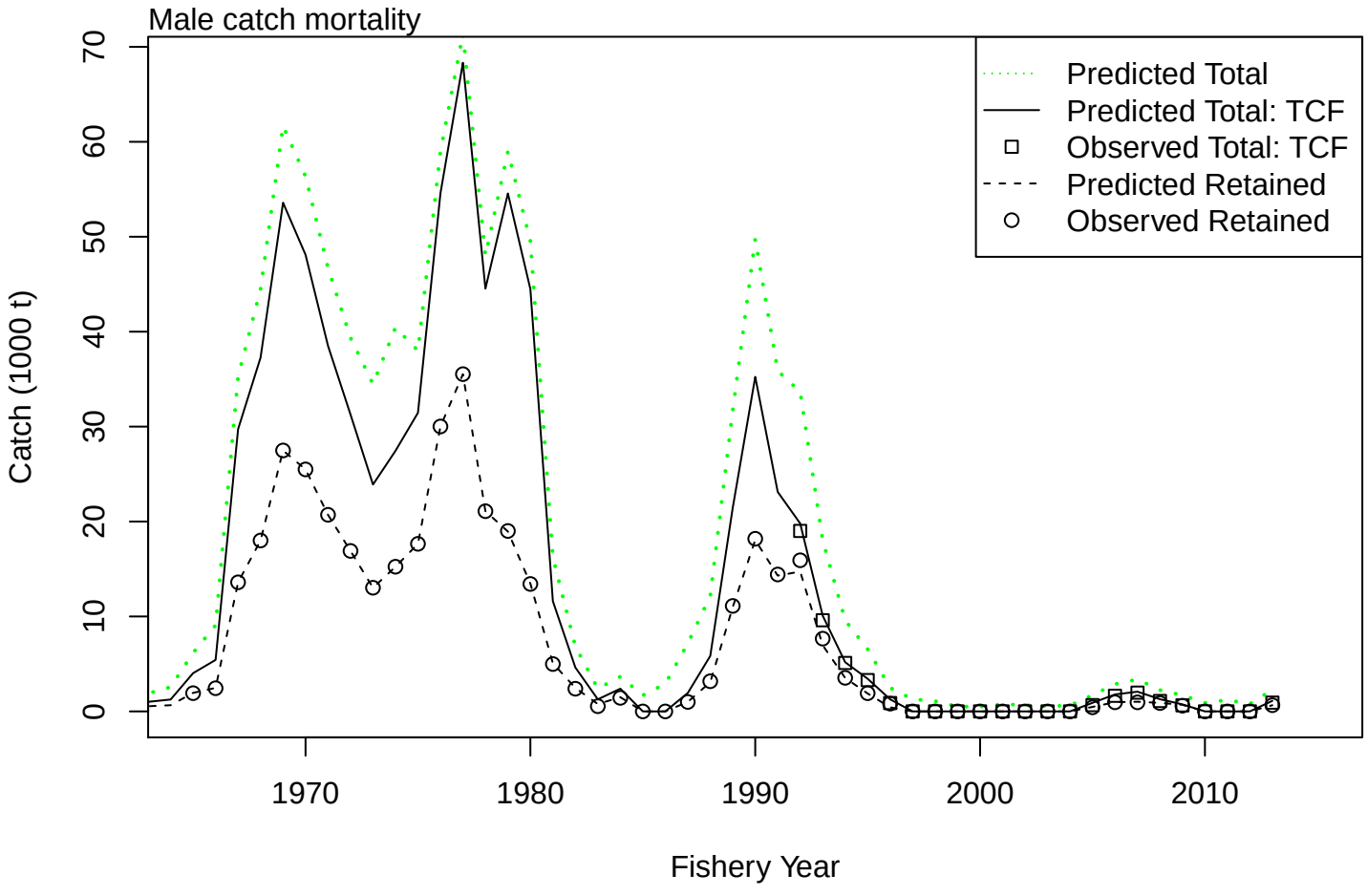

Trawl survey selectivity, females
females, 1988+
females, 1982−1987
females 1974−1981
Somerton underbag exp.
Selectivity
0.0
0.5
1.0
1.5
50
100
150
Carapace Width(mm)

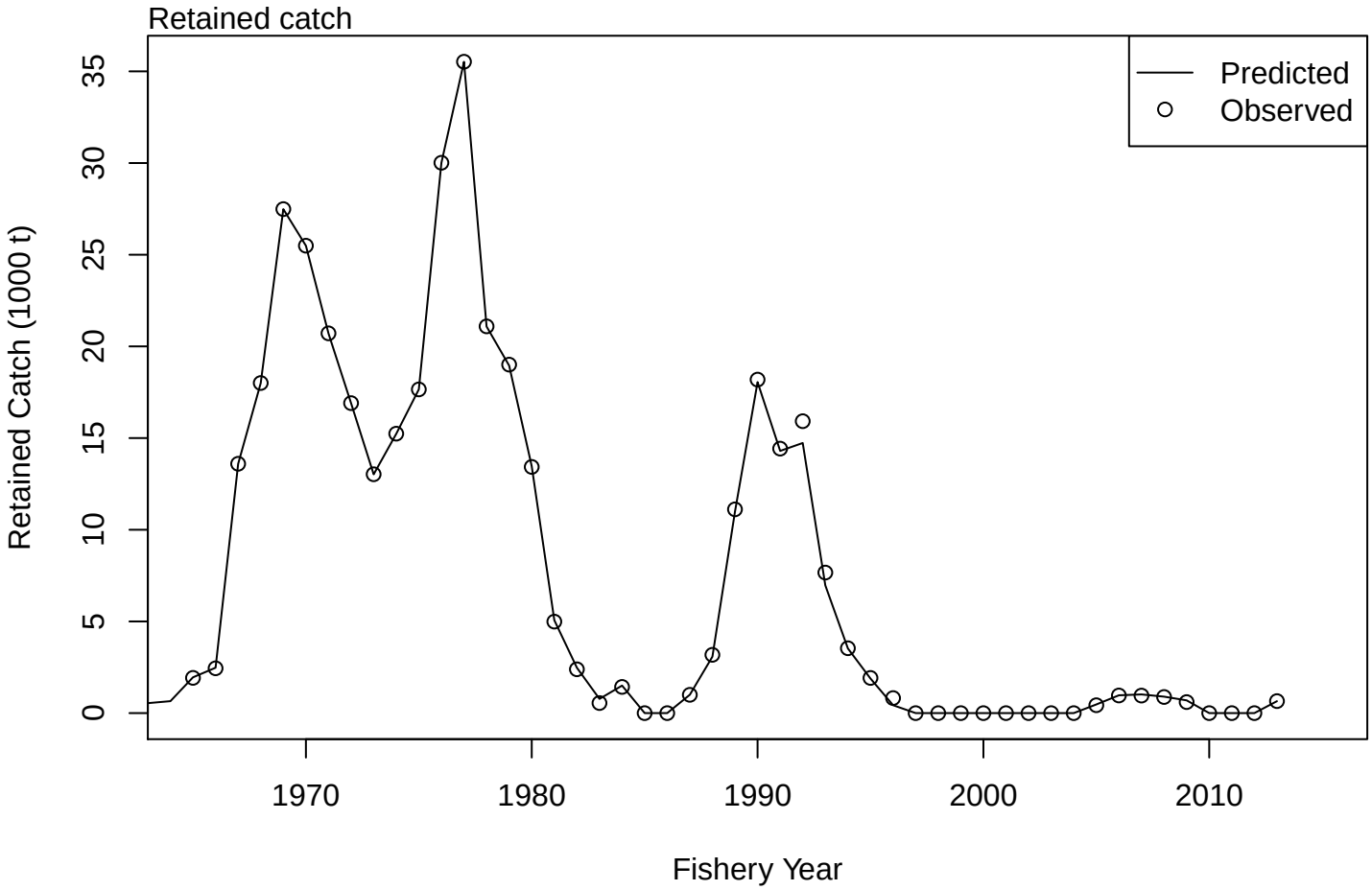

Trawl survey selectivity, 1988+
males
females
Somerton underbag exp.
Selectivity
0.0
0.5
1.0
1.5
50
100
150
Carapace Width(mm)

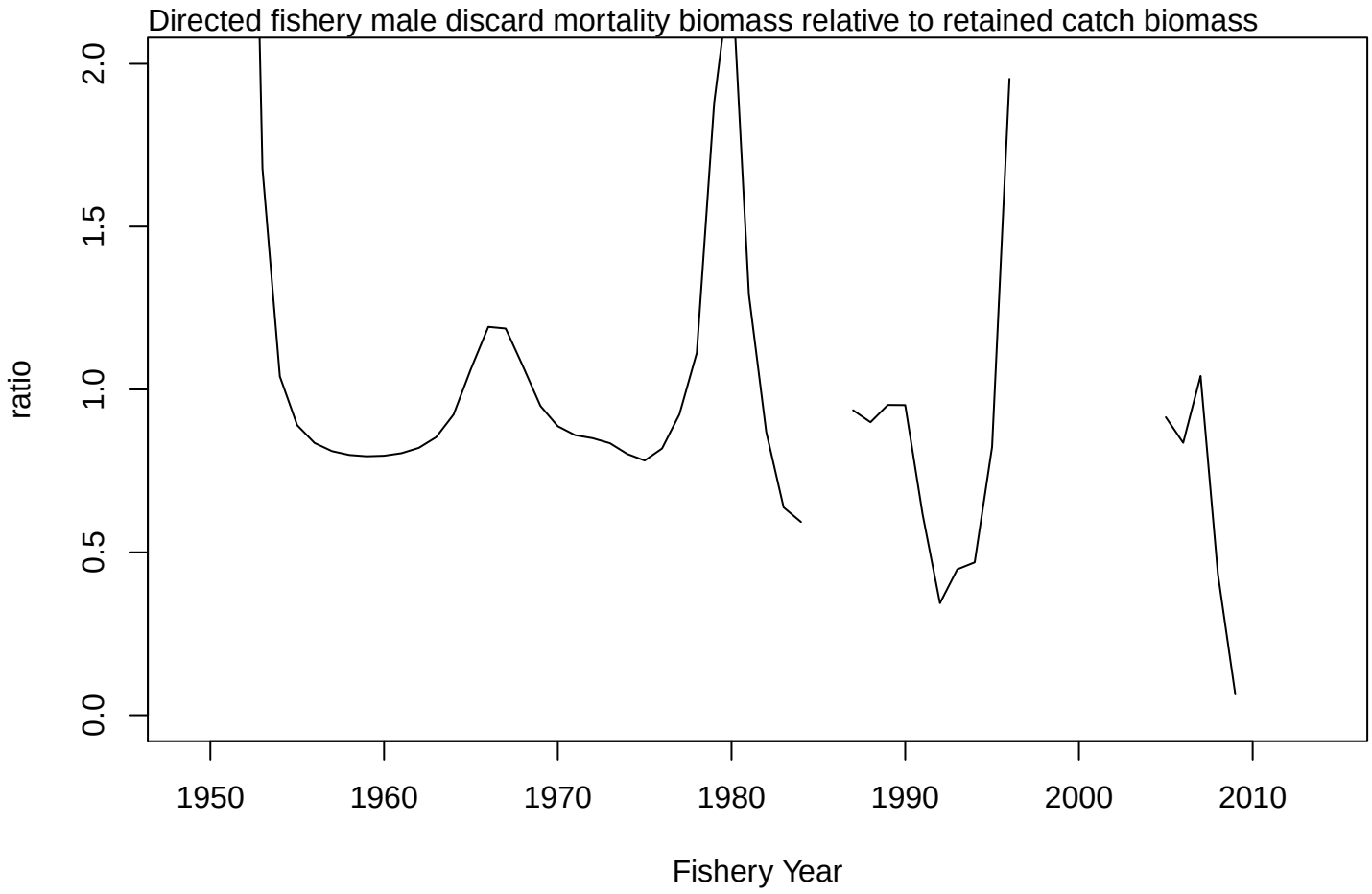

snow crab fishery
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Carapace width(mm)
females, era 1
females, era 2
females, era 3
males, era 1
males, era 2
males, era 3

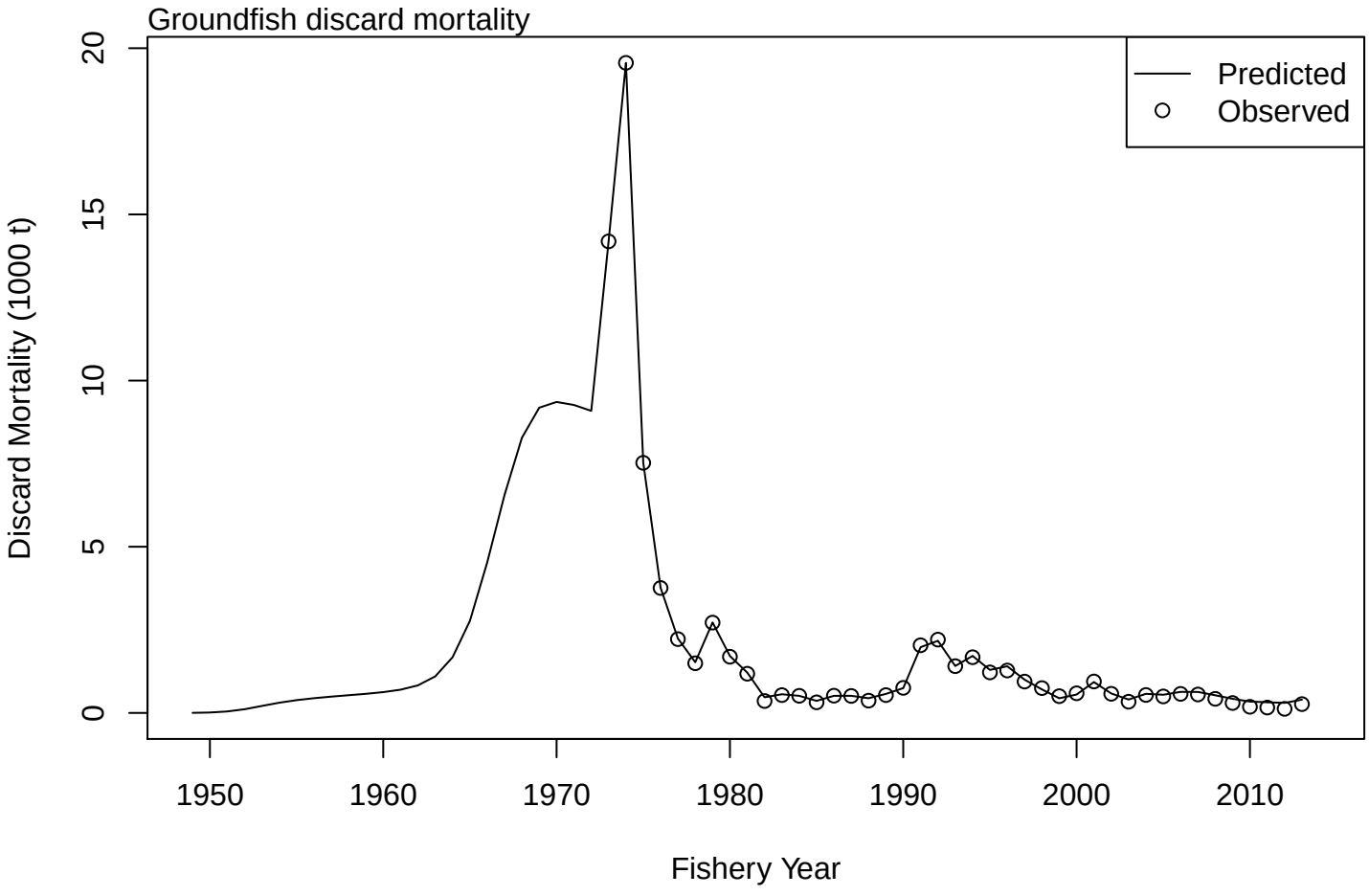

BBRKC fishery
Selectivity Red King Fishery
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Carapace width(mm)
females, era 1
females, era 2
females, era 3
males, era 1
males, era 2
males, era 3

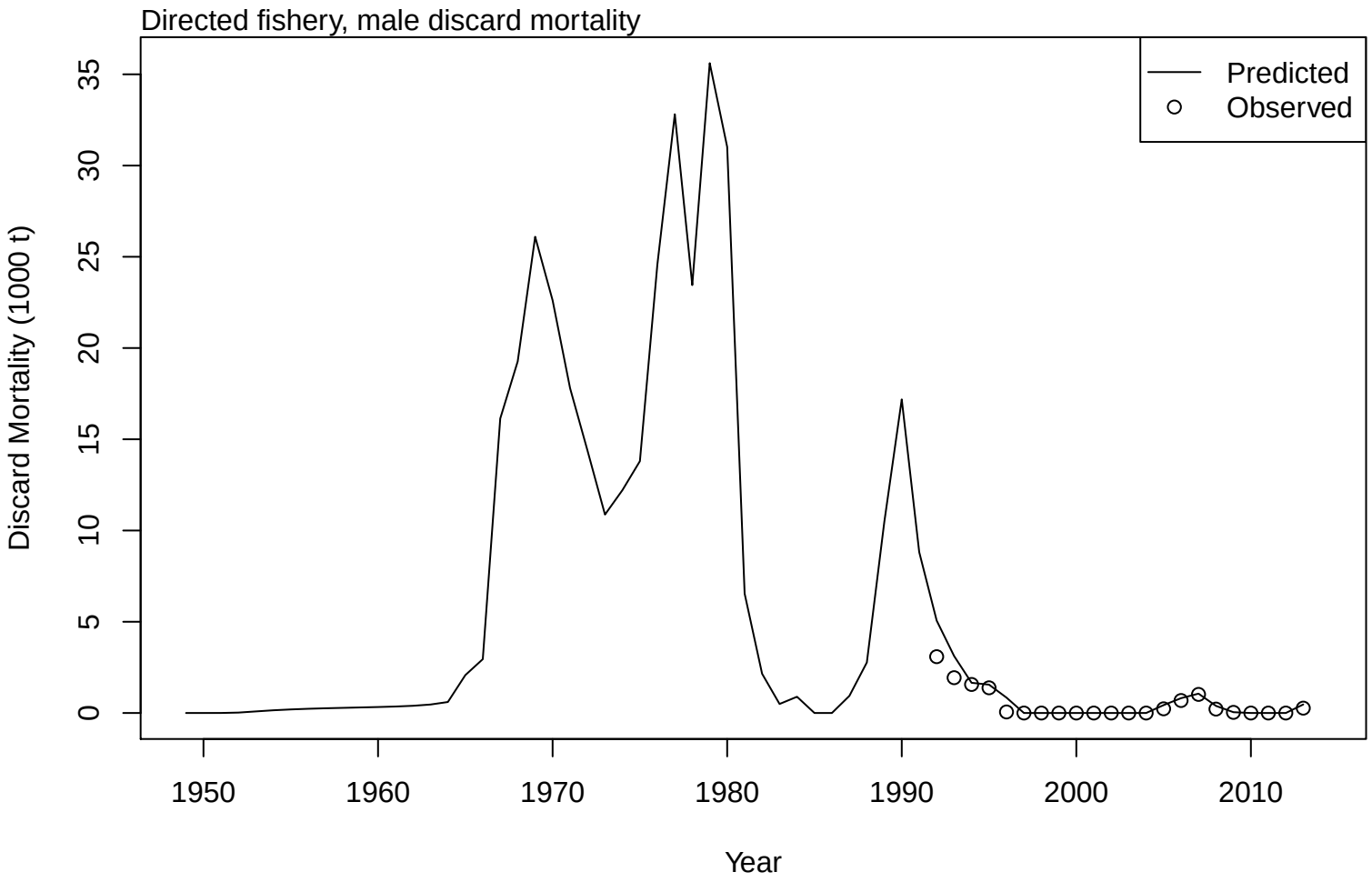

groundfish fishery
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Carapace width(mm)
females, era 1
females, era 2
females, era 3
males, era 1
males, era 2
males, era 3

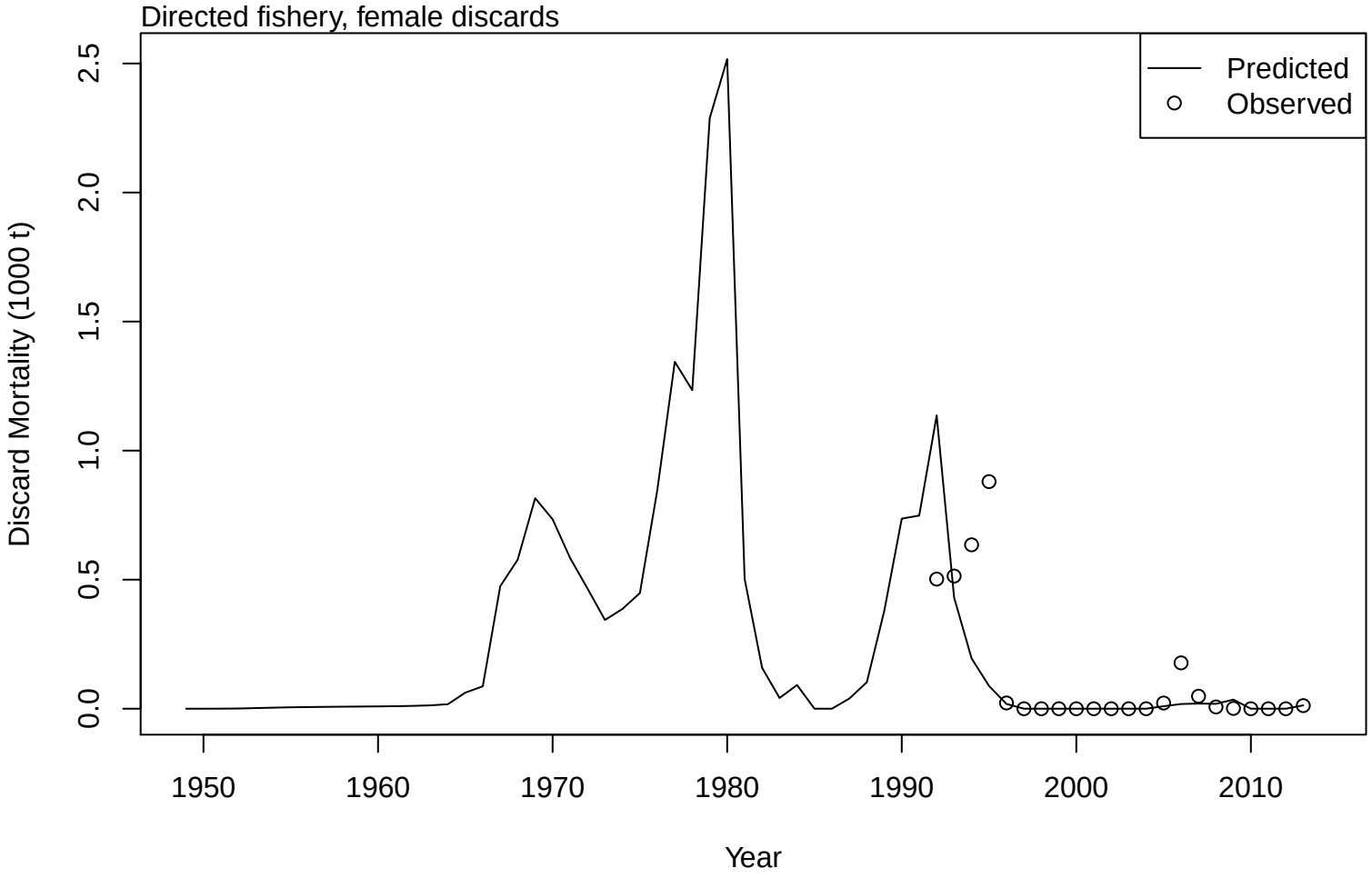

Male catch mortality
Catch (1000 t)
0
10
20
30
40
50
60
70
1970
1980
1990
2000
2010
Fishery Year
Predicted Total
Predicted Total: TCF
Observed Total: TCF
Predicted Retained
Observed Retained

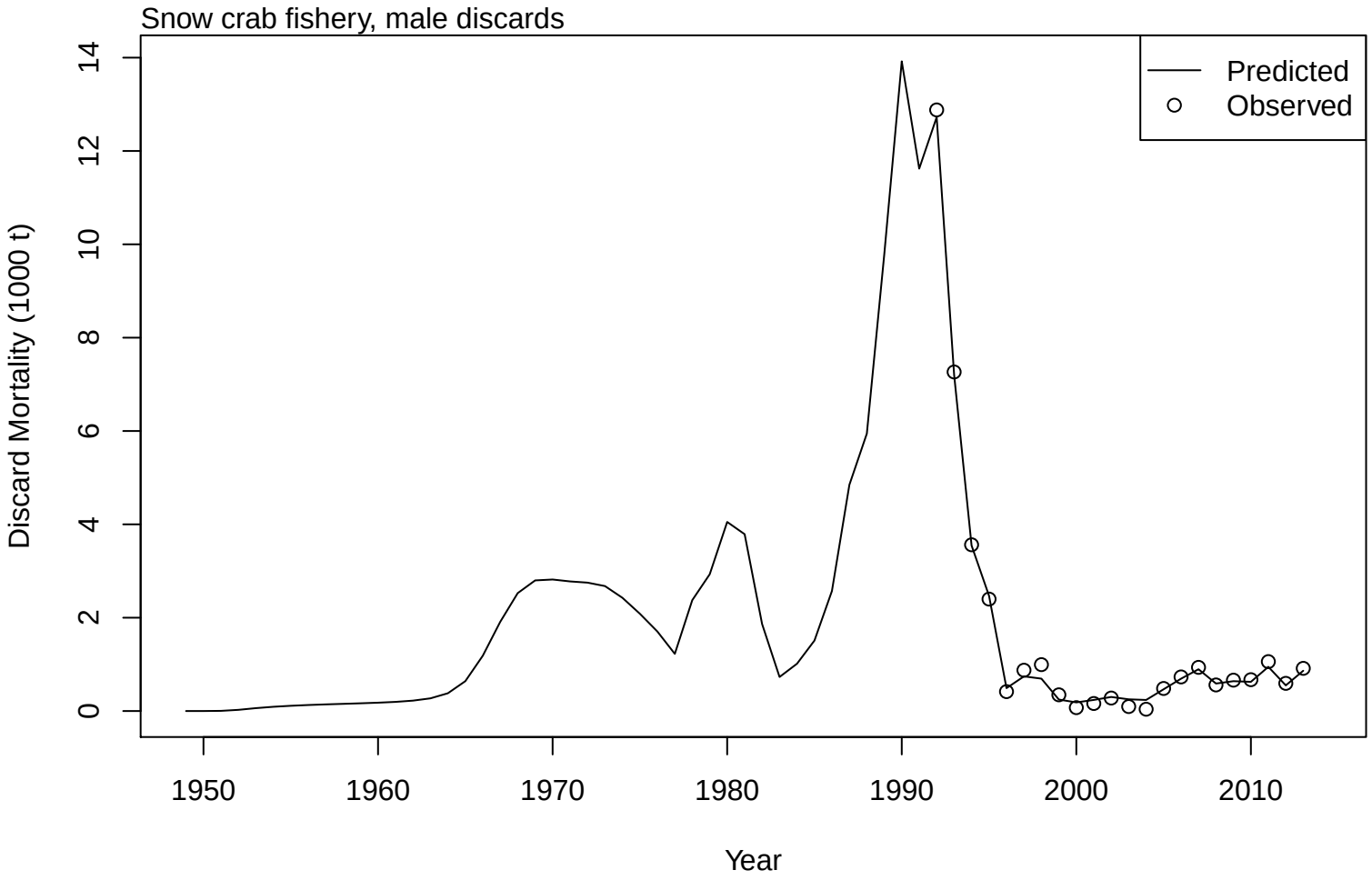

Retained catch
Predicted
Observed
Retained Catch (1000 t)
0
5
10
15
20
25
30
35
1970
1980
1990
2000
2010
Fishery Year

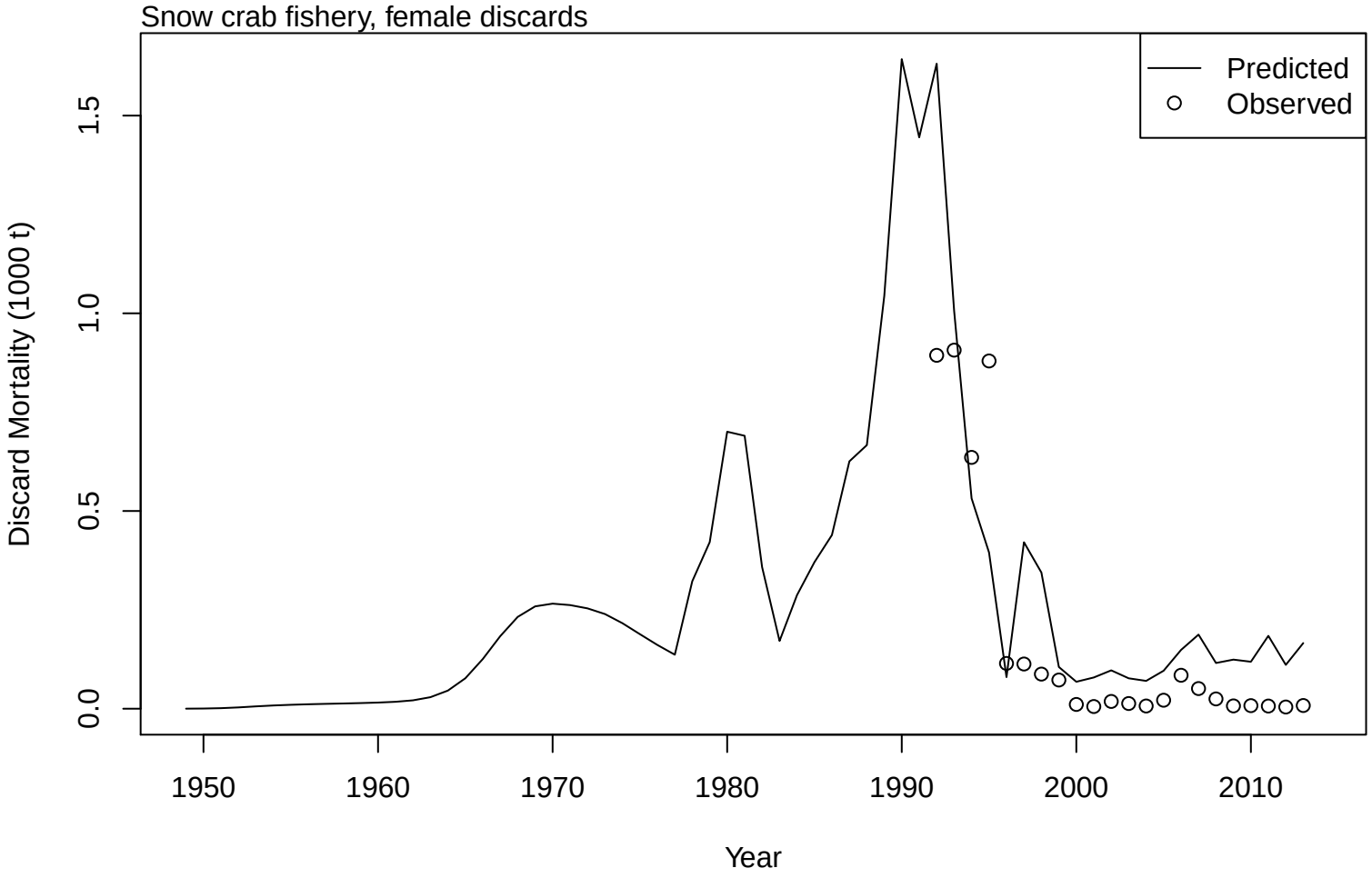

Directed fishery male discard mortality biomass relative to retained catch biomass
ratio
0.0
0.5
1.0
1.5
2.0
1950
1960
1970
1980
1990
2000
2010
Fishery Year

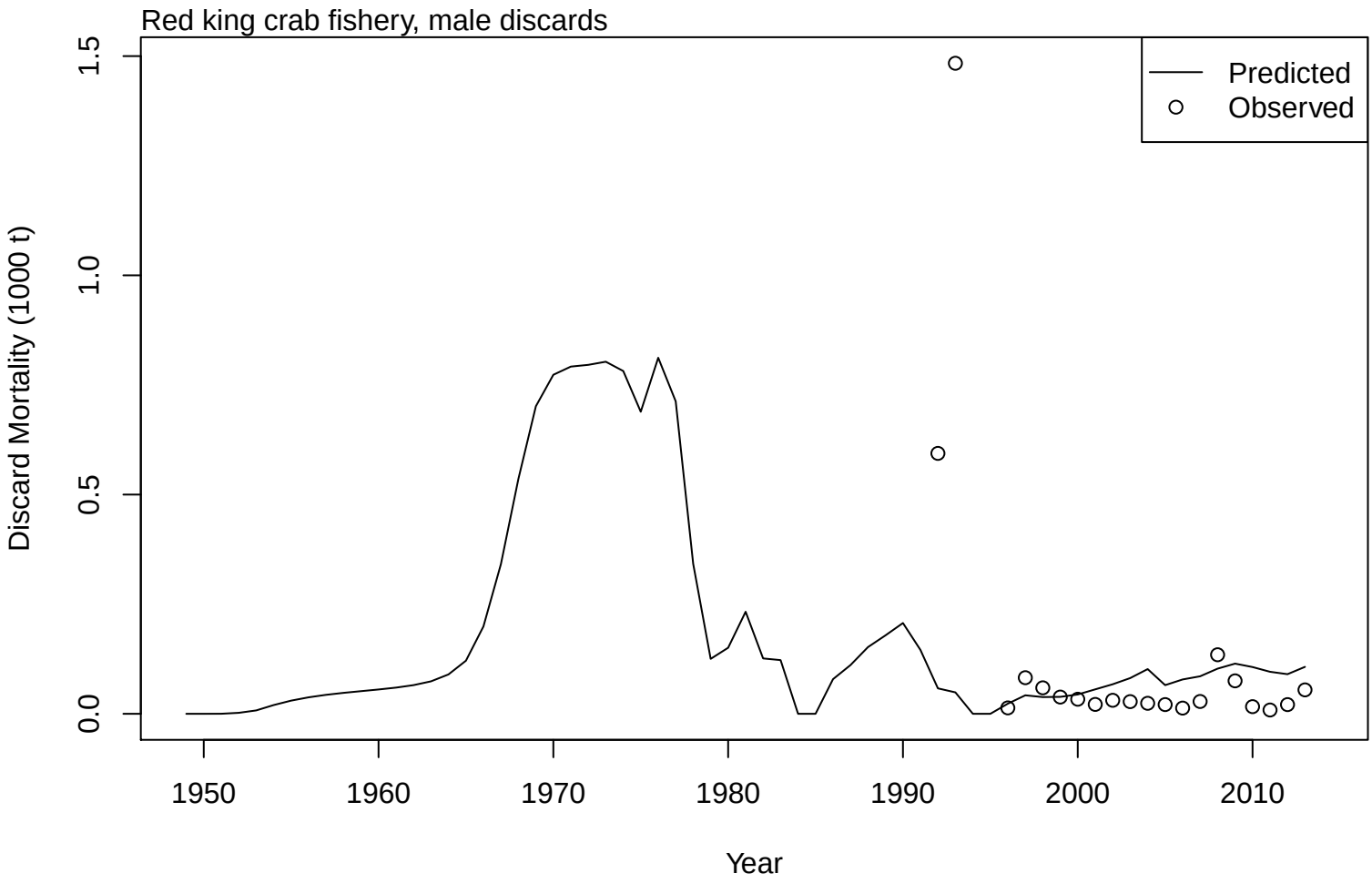

Groundfish discard mortality
Discard Mortality (1000 t)
0
5
10
15
20
Predicted
Observed
1950
1960
1970
1980
1990
2000
2010
Fishery Year


Directed fishery, male discard mortality
Predicted
Observed
Discard Mortality (1000 t)
0
5
10
15
20
25
30
35
1950
1960
1970
1980
1990
2000
2010
Year

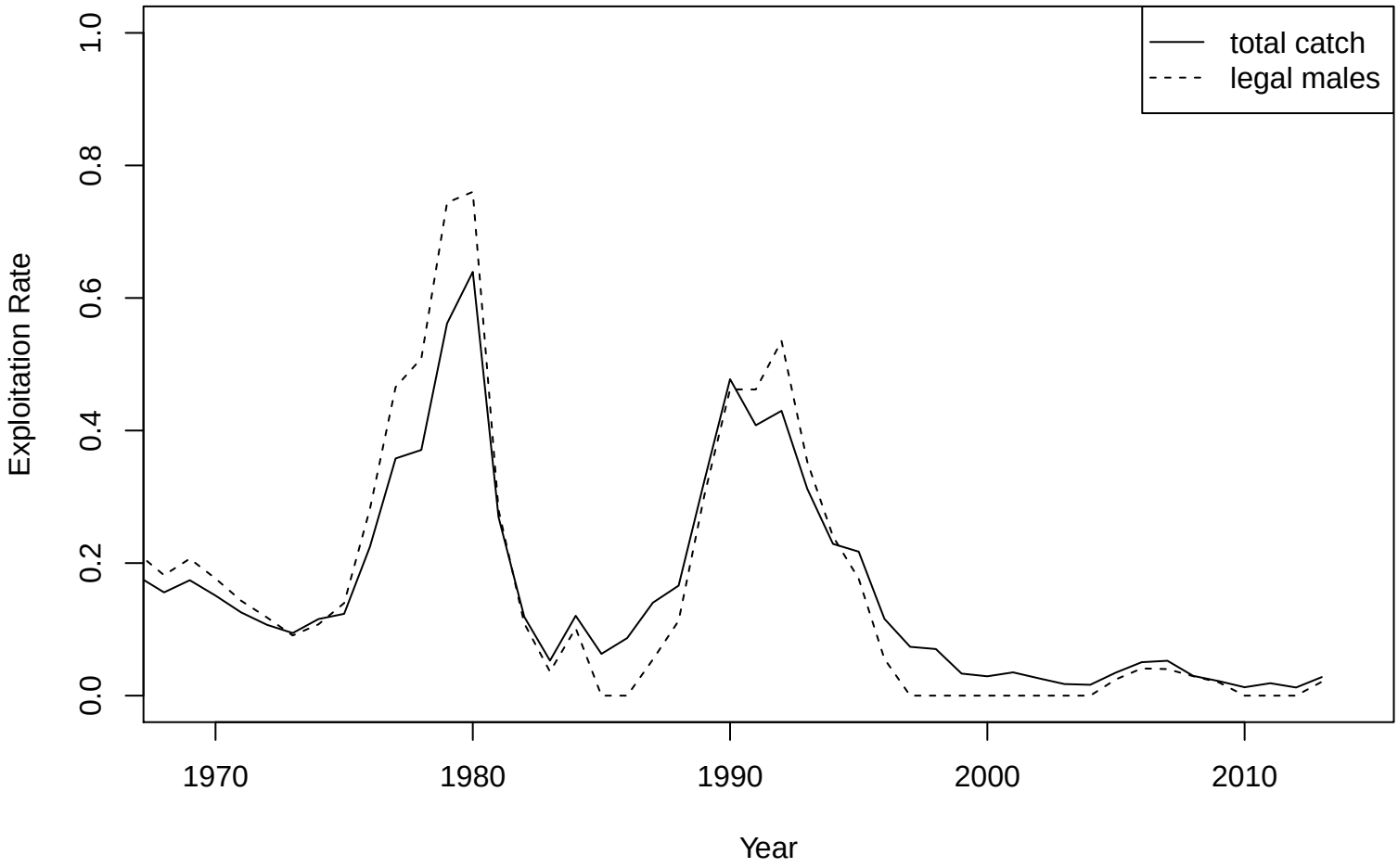

Directed fishery, female discards
Predicted
Observed
Discard Mortality (1000 t)
0.0
0.5
1.0
1.5
2.0
2.5
1950
1960
1970
1980
1990
2000
2010
Year

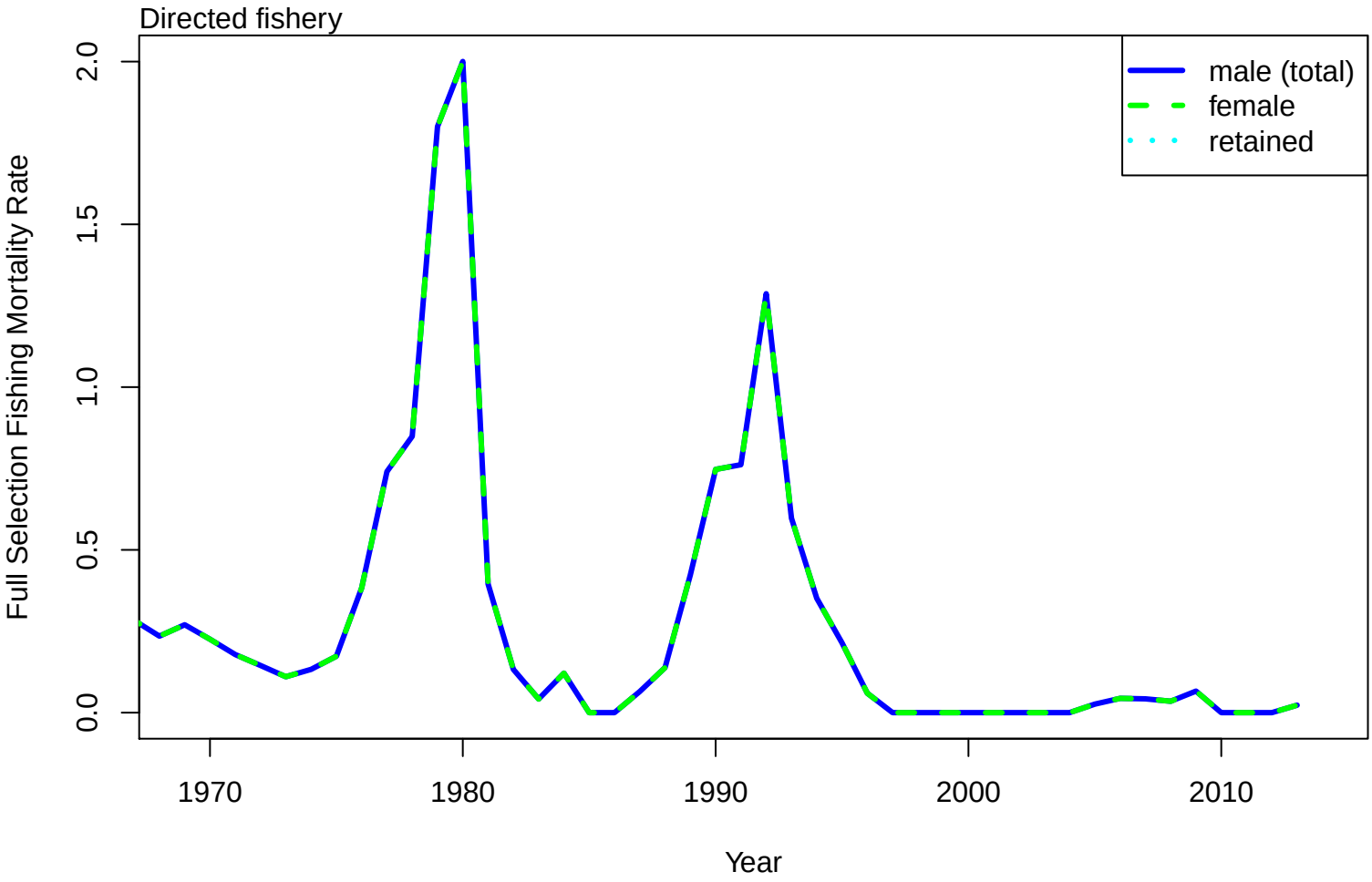

Snow crab fishery, male discards
Predicted
Observed
Discard Mortality (1000 t)
0
2
4
6
8
10
12
14
1950
1960
1970
1980
1990
2000
2010
Year

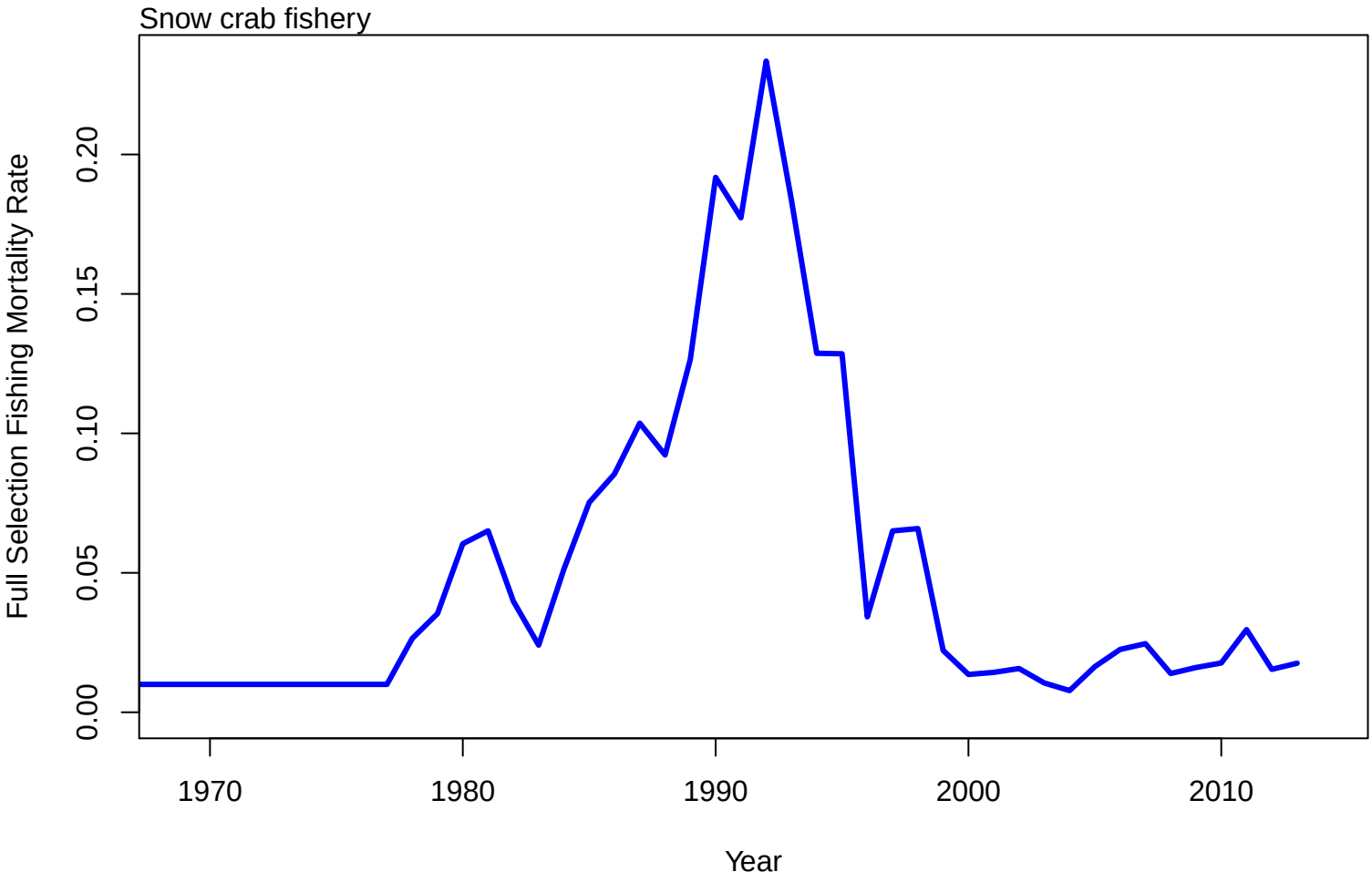

Snow crab fishery, female discards
Predicted
Observed
Discard Mortality (1000 t)
0.0
0.5
1.0
1.5
1950
1960
1970
1980
1990
2000
2010
Year

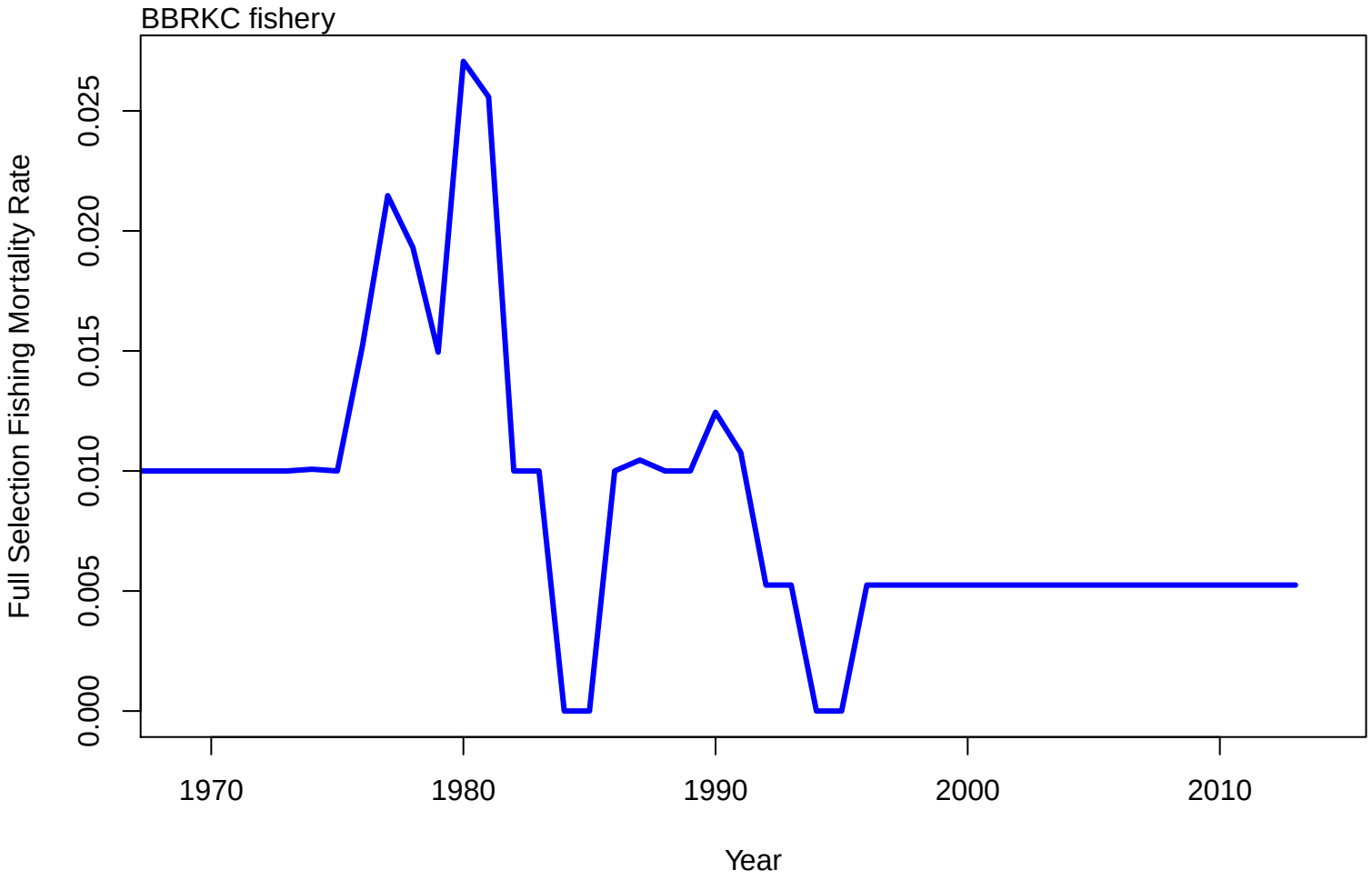

Red king crab fishery, male discards
Predicted
Observed
Discard Mortality (1000 t)
0.0
0.5
1.0
1.5
1950
1960
1970
1980
1990
2000
2010
Year

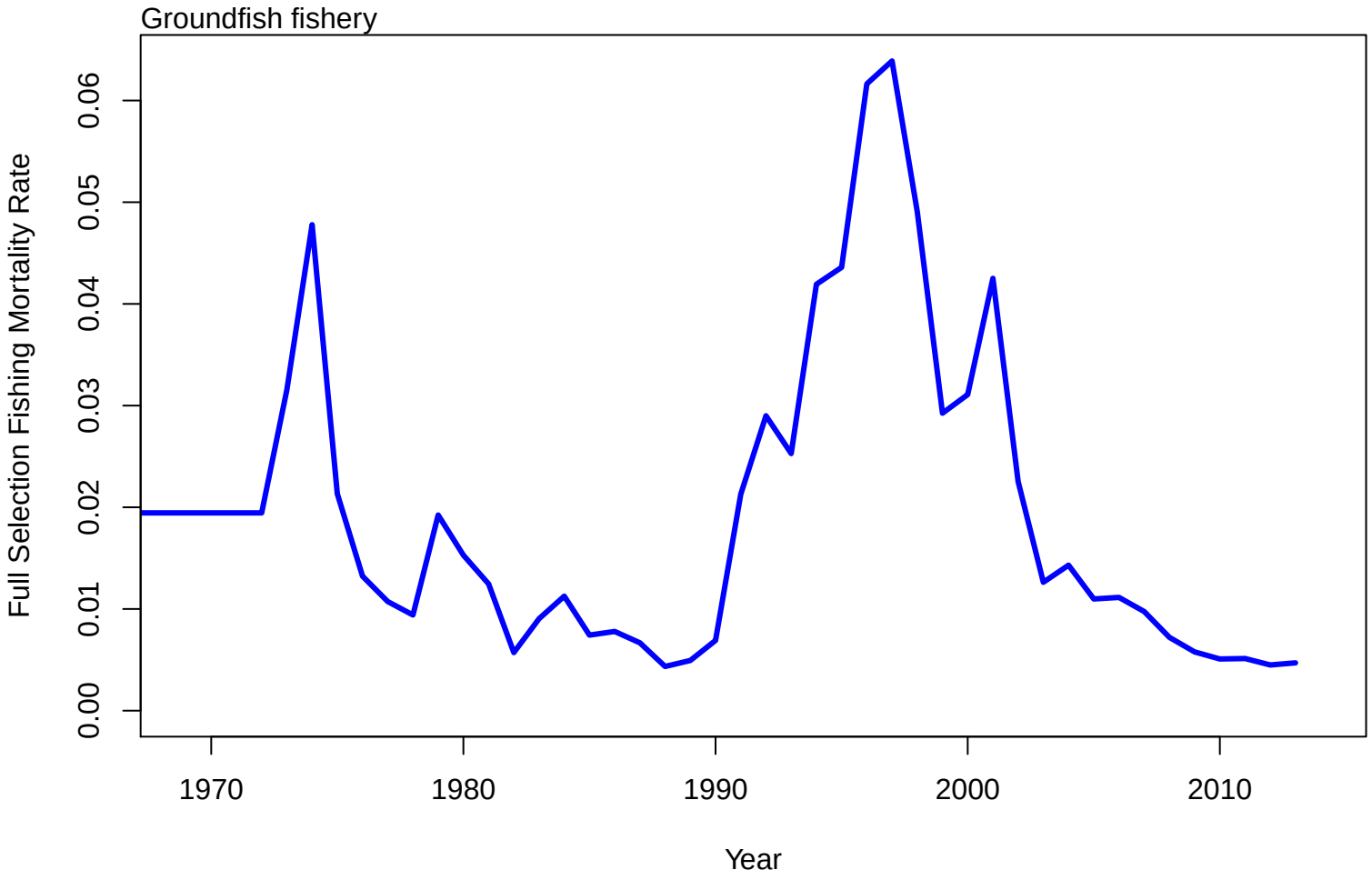
Red king crab fishery, female discards
Predicted
Observed
Discard Mortality (1000 t)
0.00
0.02
0.04
0.06
0.08
0.10
1950
1960
1970
1980
1990
2000
2010
Year

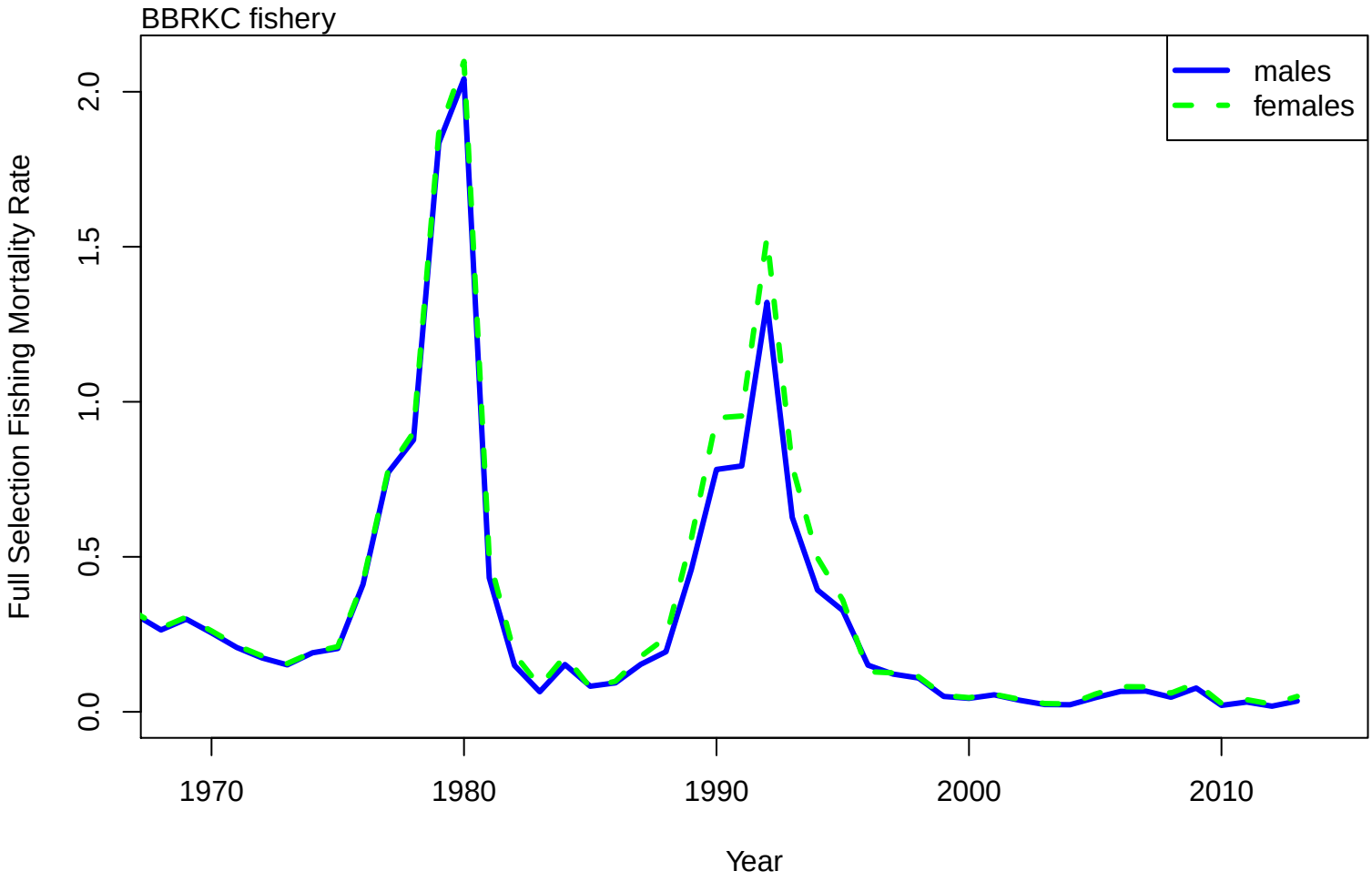

total catch
legal males
Exploitation Rate
0.0
0.2
0.4
0.6
0.8
1.0
1970
1980
1990
2000
2010
Year

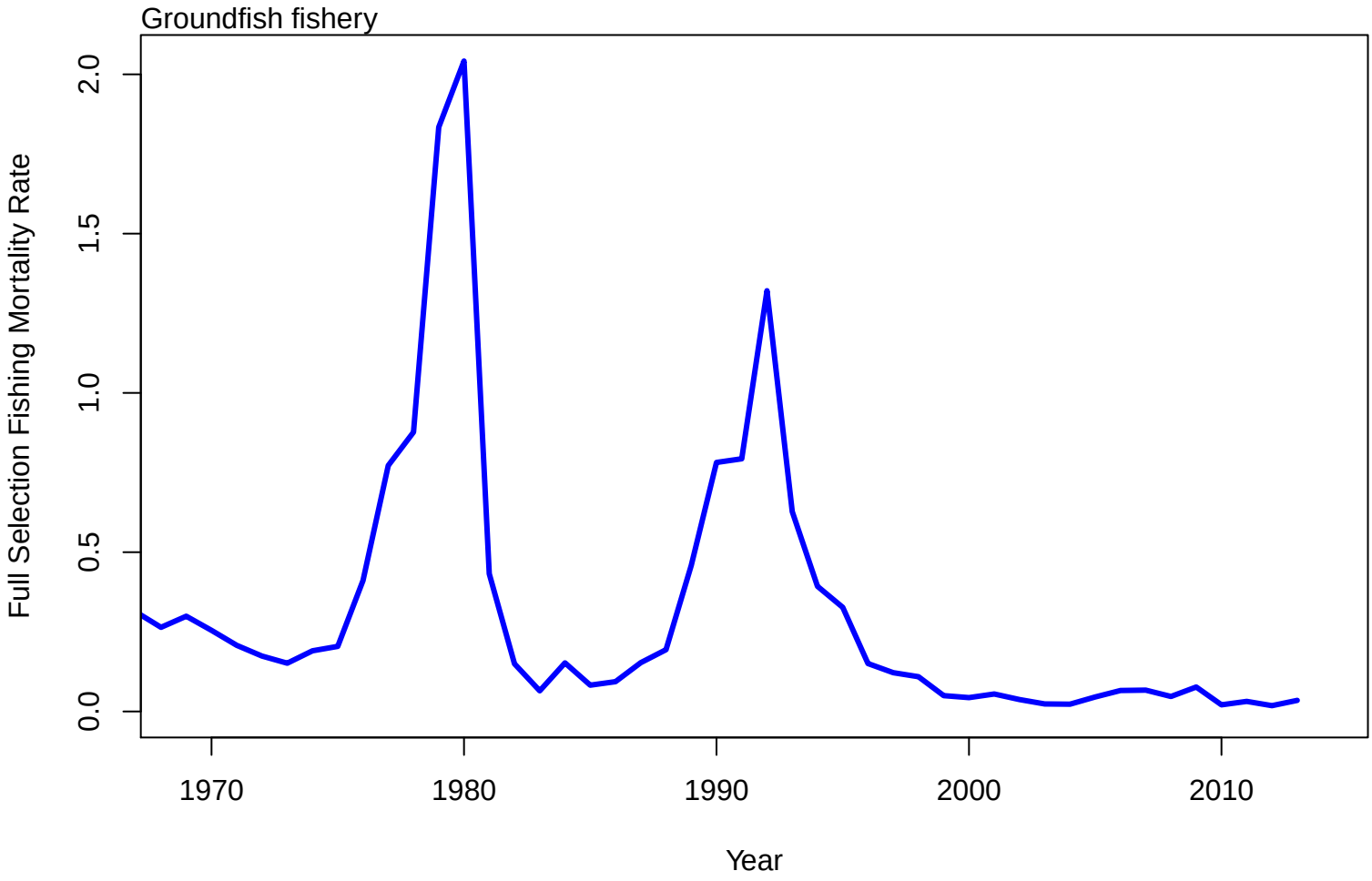

Directed fishery
male (total)
female
retained
Full Selection Fishing Mortality Rate
0.0
0.5
1.0
1.5
2.0
1970
1980
1990
2000
2010
Year

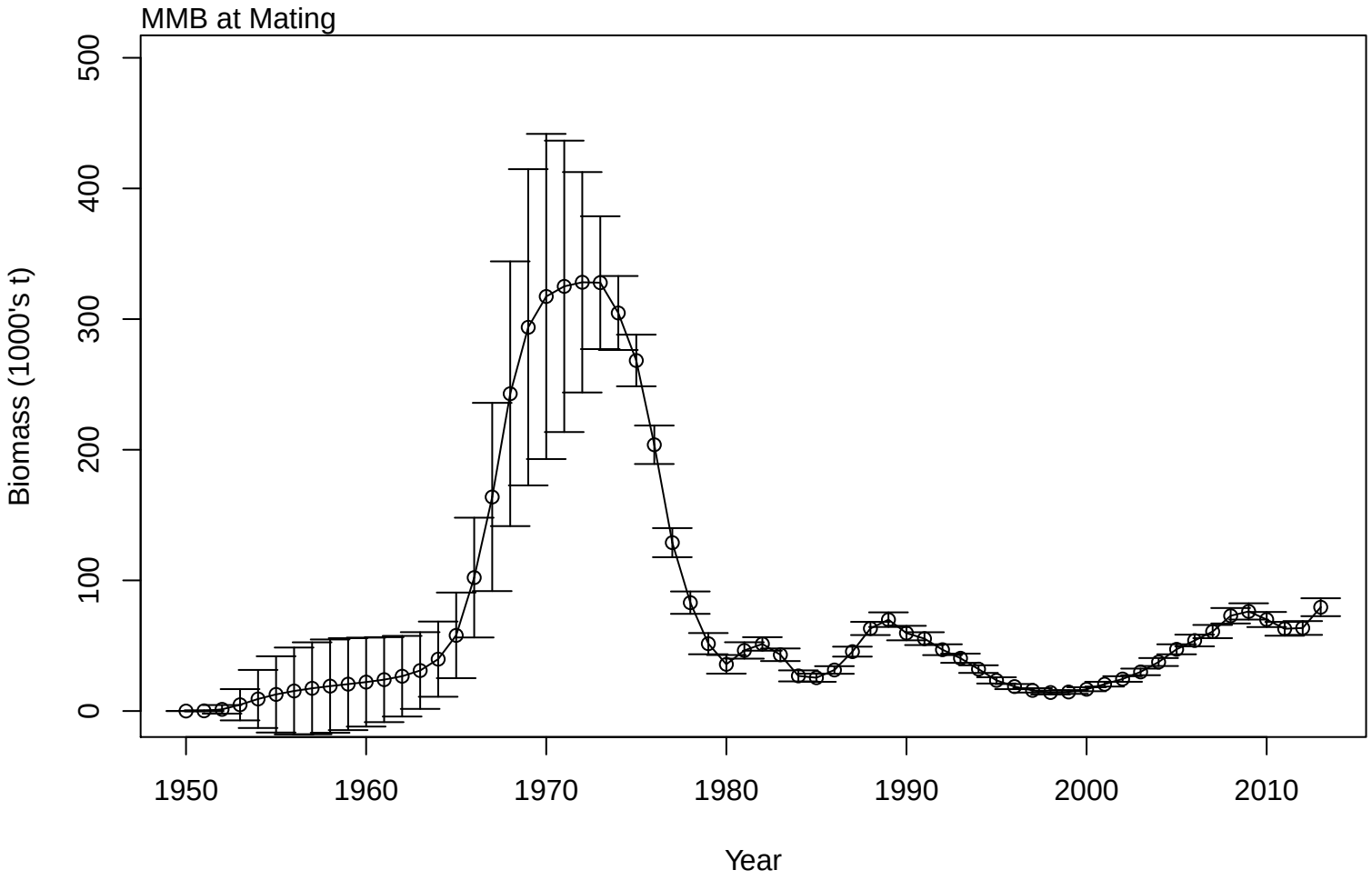

Snow crab fishery
Full Selection Fishing Mortality Rate
0.00
0.05
0.10
0.15
0.20
1970
1980
1990
2000
2010
Year

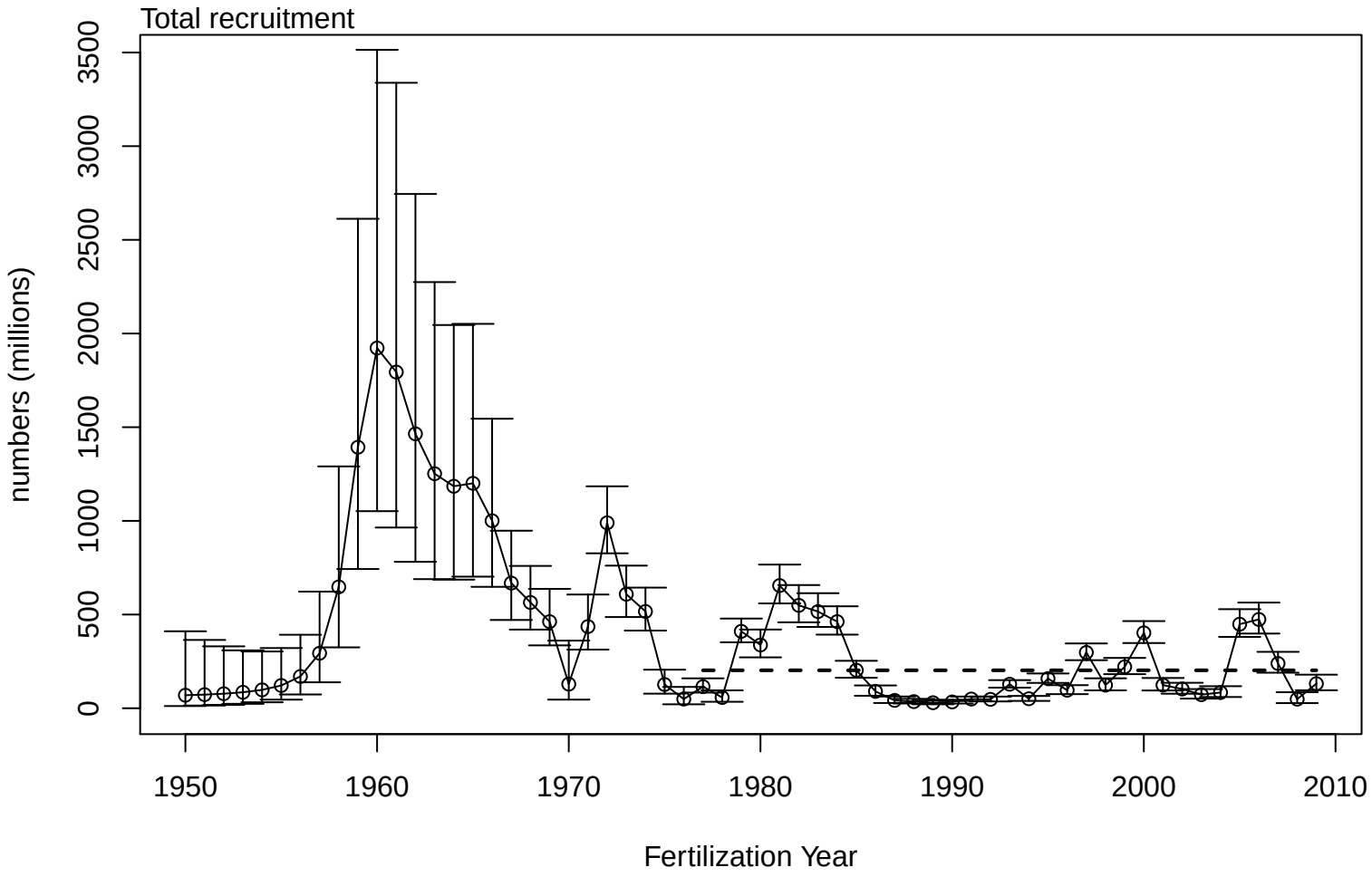

BBRKC fishery
Full Selection Fishing Mortality Rate
0.000
0.005
0.010
0.015
0.020
0.025
1970
1980
1990
2000
2010
Year

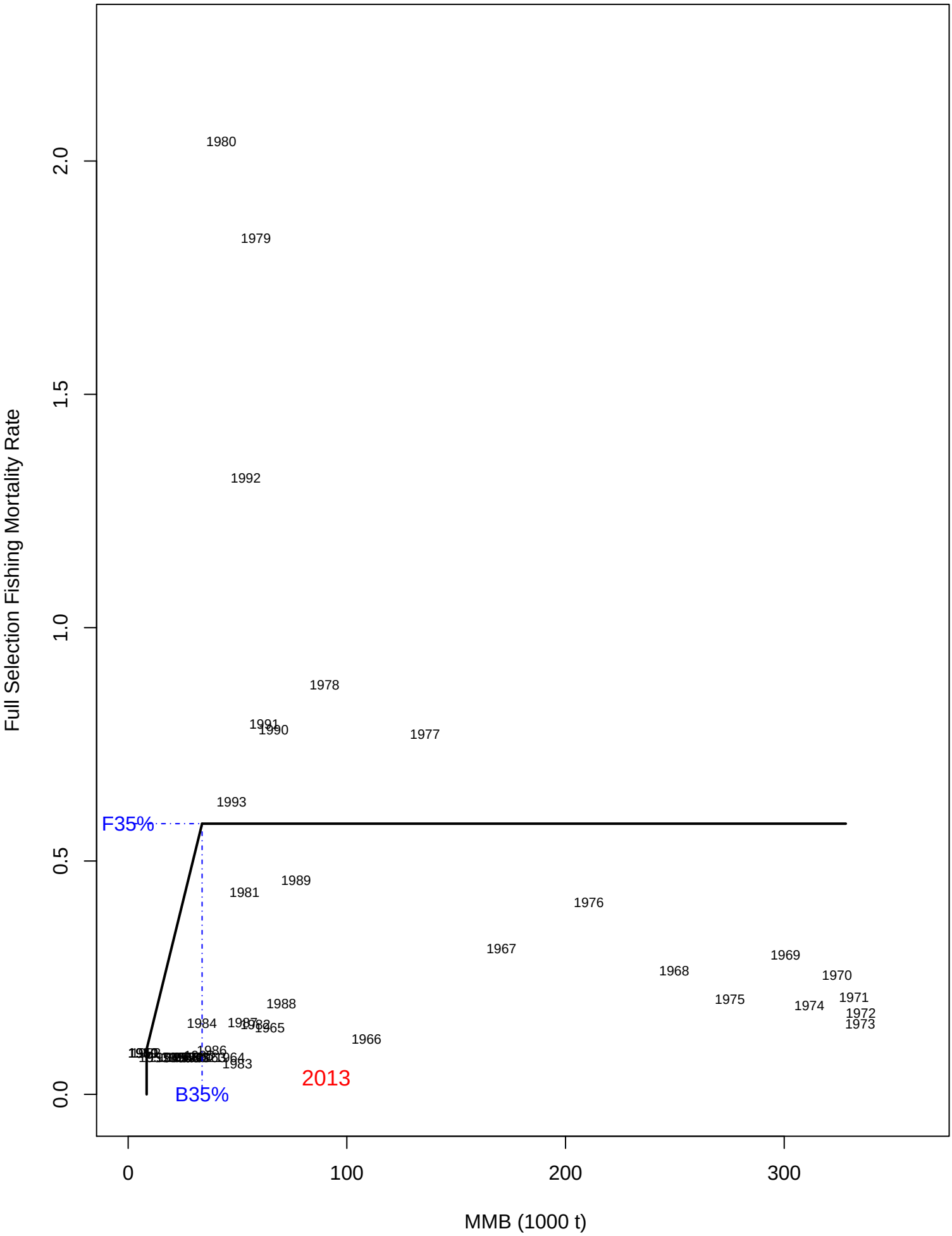

Groundfish fishery
Full Selection Fishing Mortality Rate
0.00
0.01
0.02
0.03
0.04
0.05
0.06
1970
1980
1990
2000
2010
Year

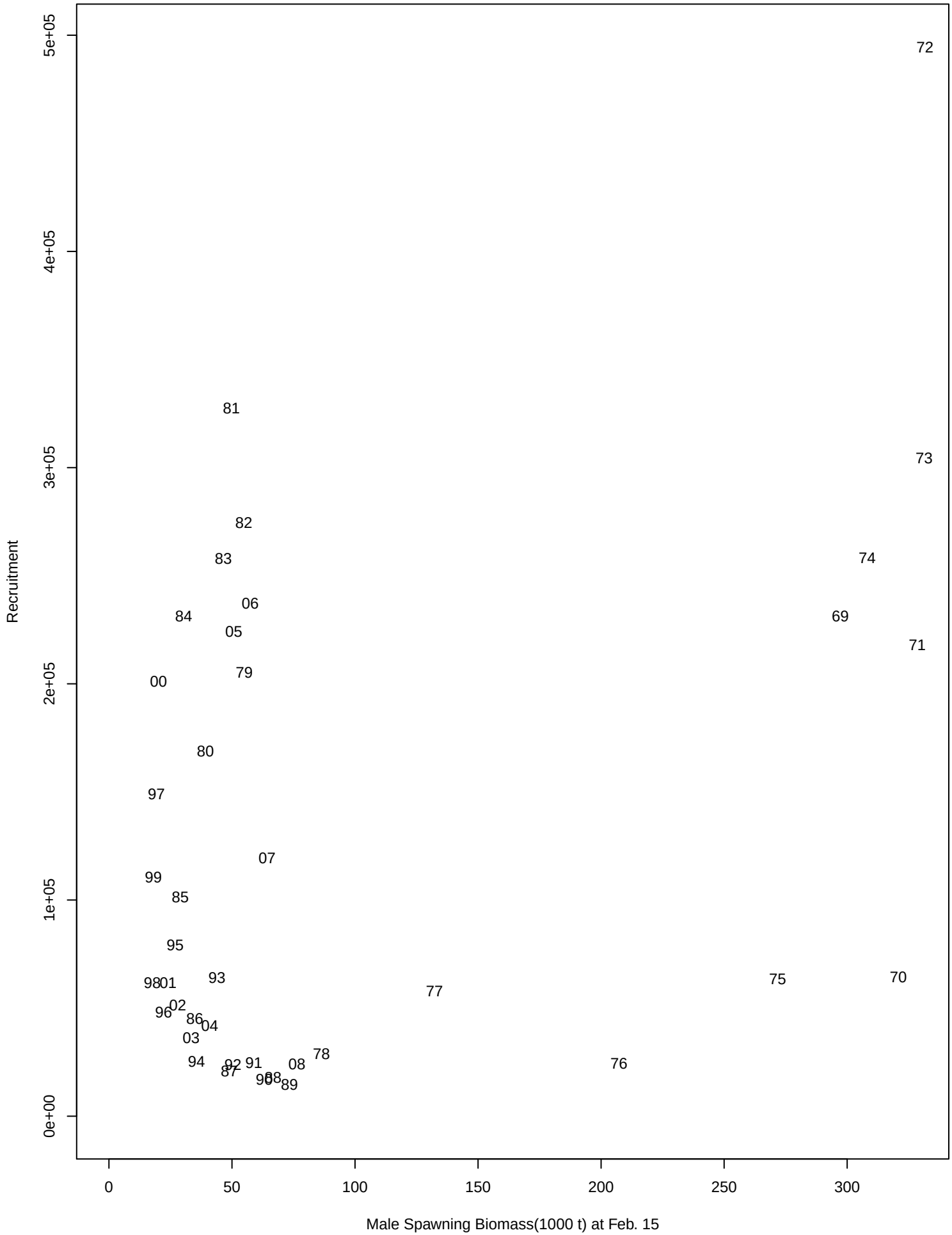

BBRKC fishery
males
females
Full Selection Fishing Mortality Rate
0.0
0.5
1.0
1.5
2.0
1970
1980
1990
2000
2010
Year


Groundfish fishery
Full Selection Fishing Mortality Rate
0.0
0.5
1.0
1.5
2.0
1970
1980
1990
2000
2010
Year


MMB at Mating
Biomass (1000's t)
0
100
200
300
400
500
1950
1960
1970
1980
1990
2000
2010
Year


Total recruitment
numbers (millions)
0
500
1000
1500
2000
2500
3000
3500
1950
1960
1970
1980
1990
2000
2010
Fertilization Year


Full Selection Fishing Mortality Rate
0.0
0.5
1.0
1.5
2.0
MMB (1000 t)
0
100
200
300
1980
1979
1992
1978
1991
1990
1977
1993
F35%
1989
1981
1976
1967
1969
1968
1970
1975
1974
1971
1972
1973
1988
1984
1965
1966
1986
1983
2013
B35%



Recruitment
5e+05
4e+05
3e+05
2e+05
1e+05
0e+00
0
50
100
150
200
250
300
Male Spawning Biomass(1000 t) at Feb. 15
72
81
73
82
83
74
06
84
69
05
71
79
00
80
97
07
99
85
95
93
75
70
98
01
77
02
96
86
04
03
78
94
92
91
08
76
87
90
88
89