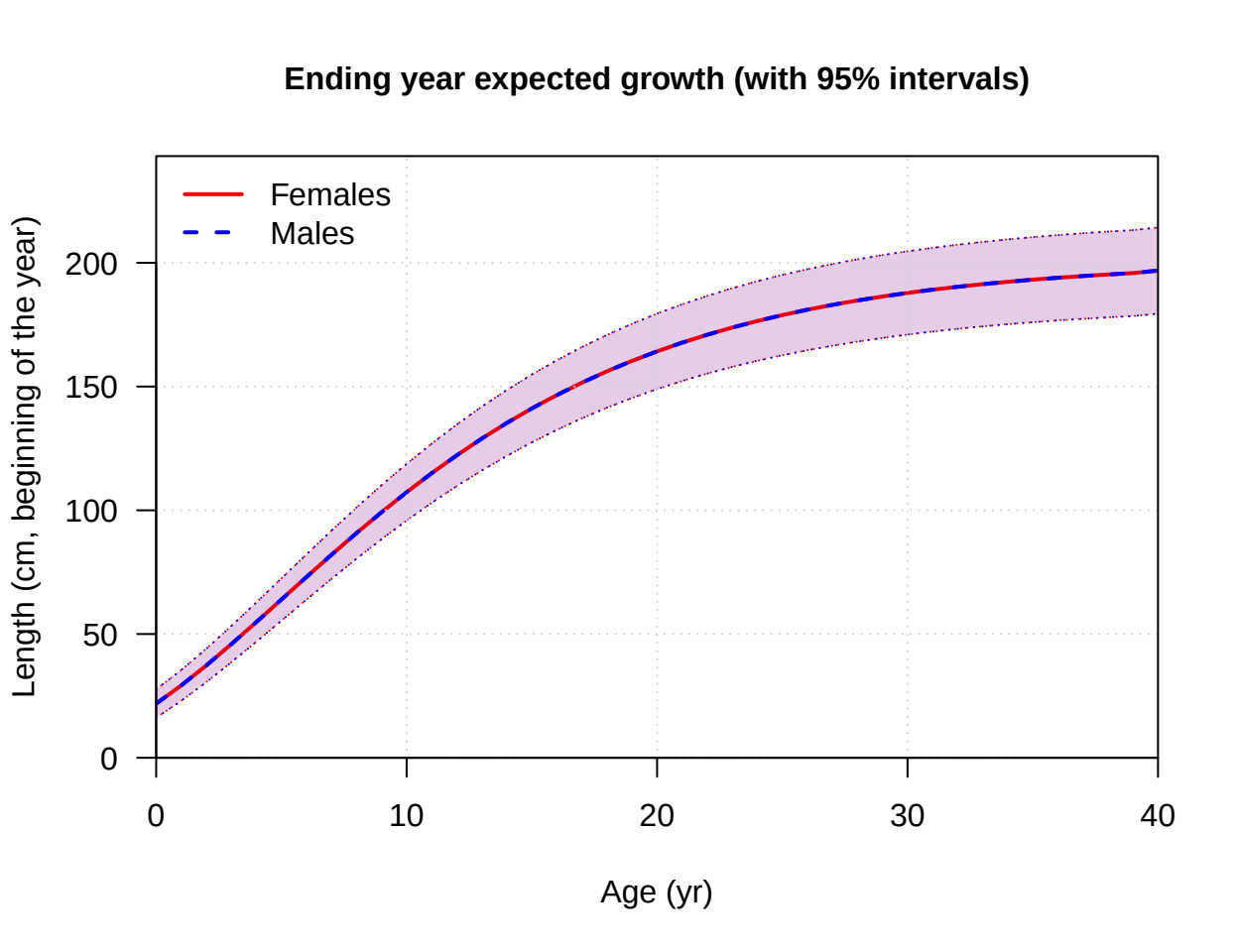
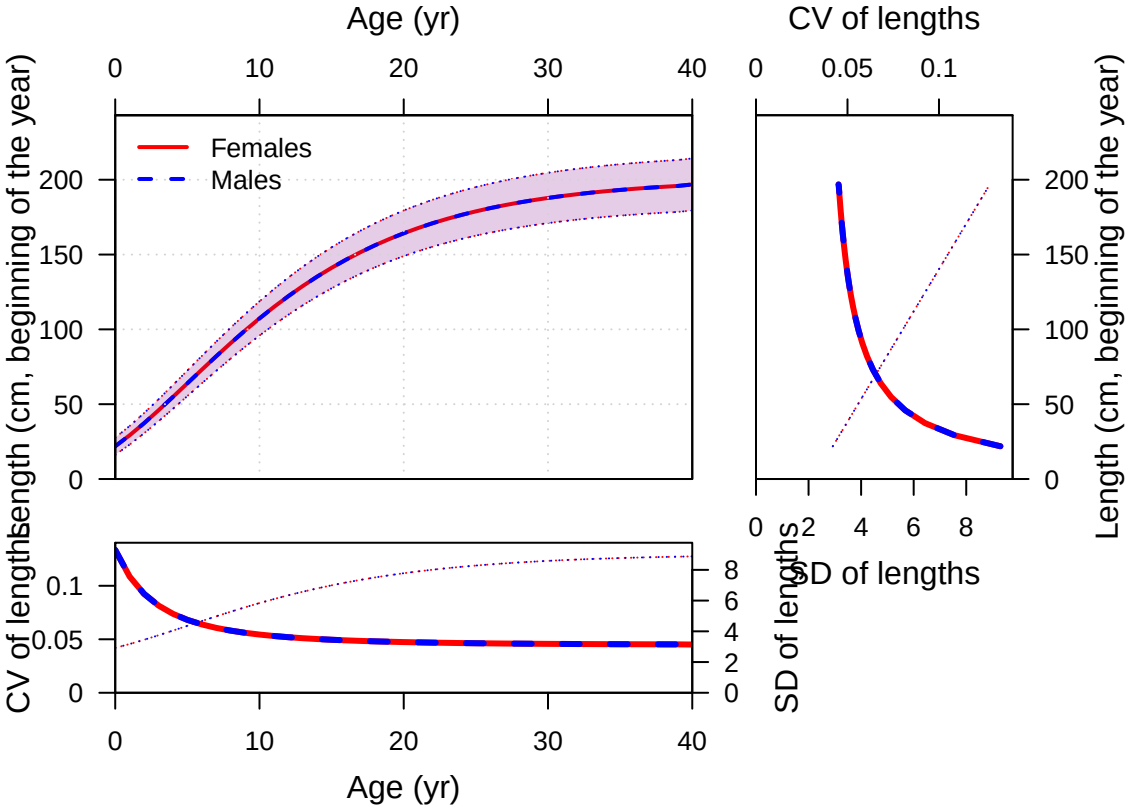
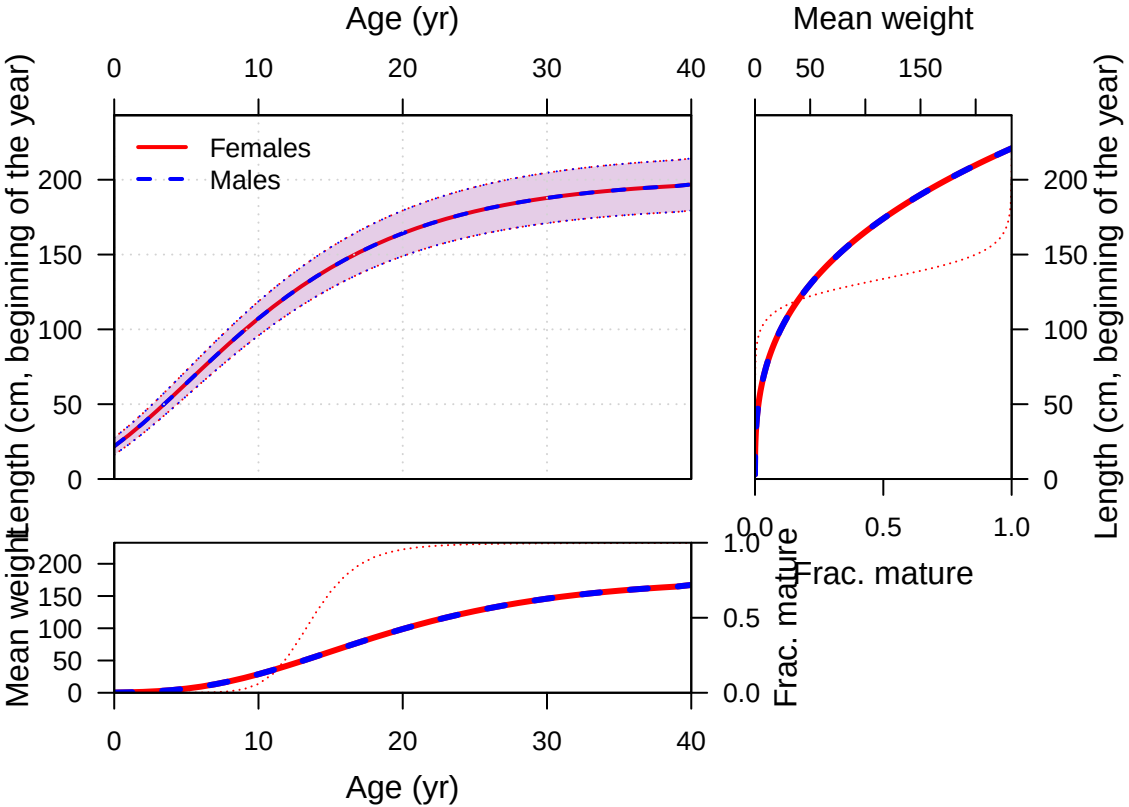
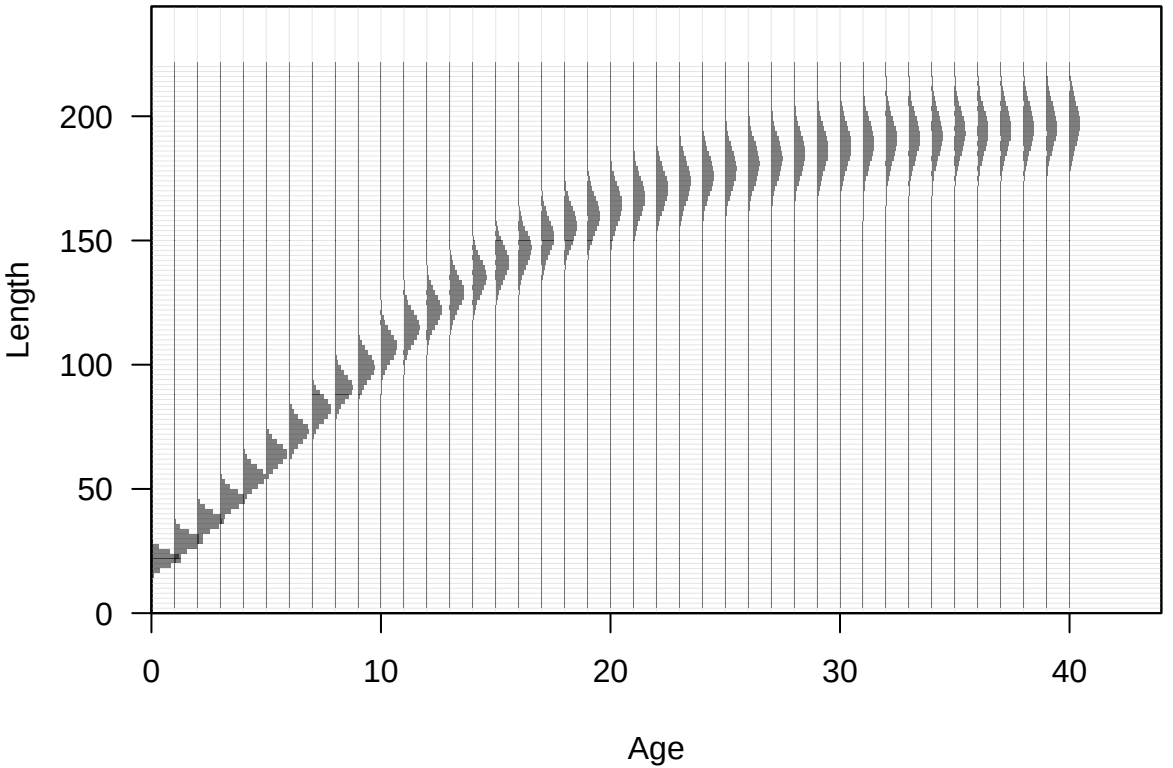
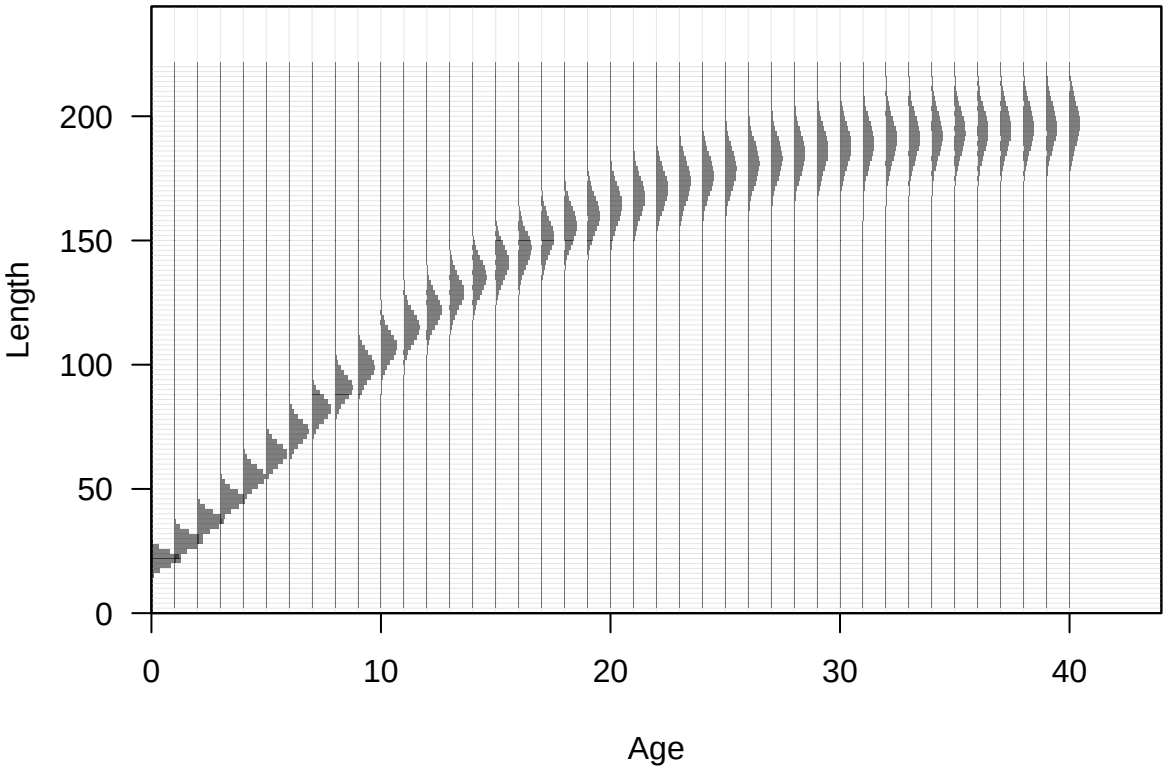
Plots created using the 'r4ss' package in R
Stock Synthesis version: 3.30.15.0
StartTime: Tue Apr 21 21:27:48 2020
Data_File: BET−EPO.dat
Control_File: BET−EPO.ctl

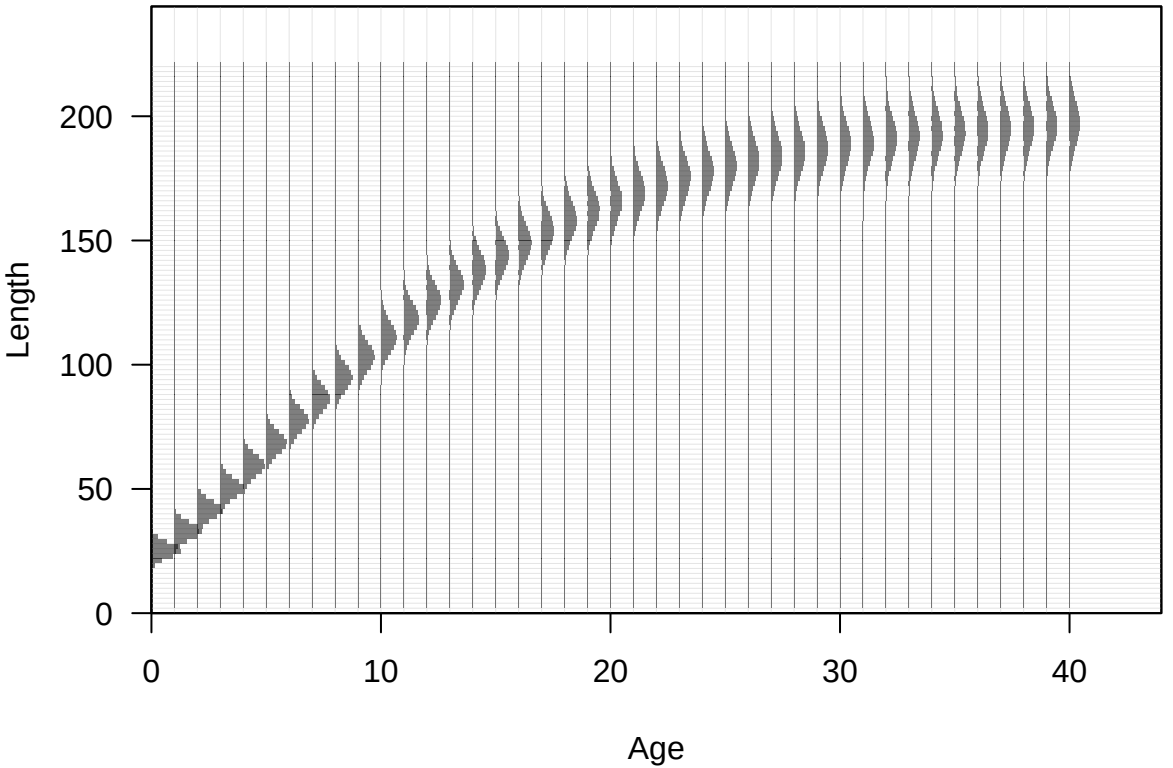

Ending year expected growth (with 95% intervals)
Females
Males
Length (cm, beginning of the year)
0
50
100
150
200
0
10
20
30
40
Age (yr)

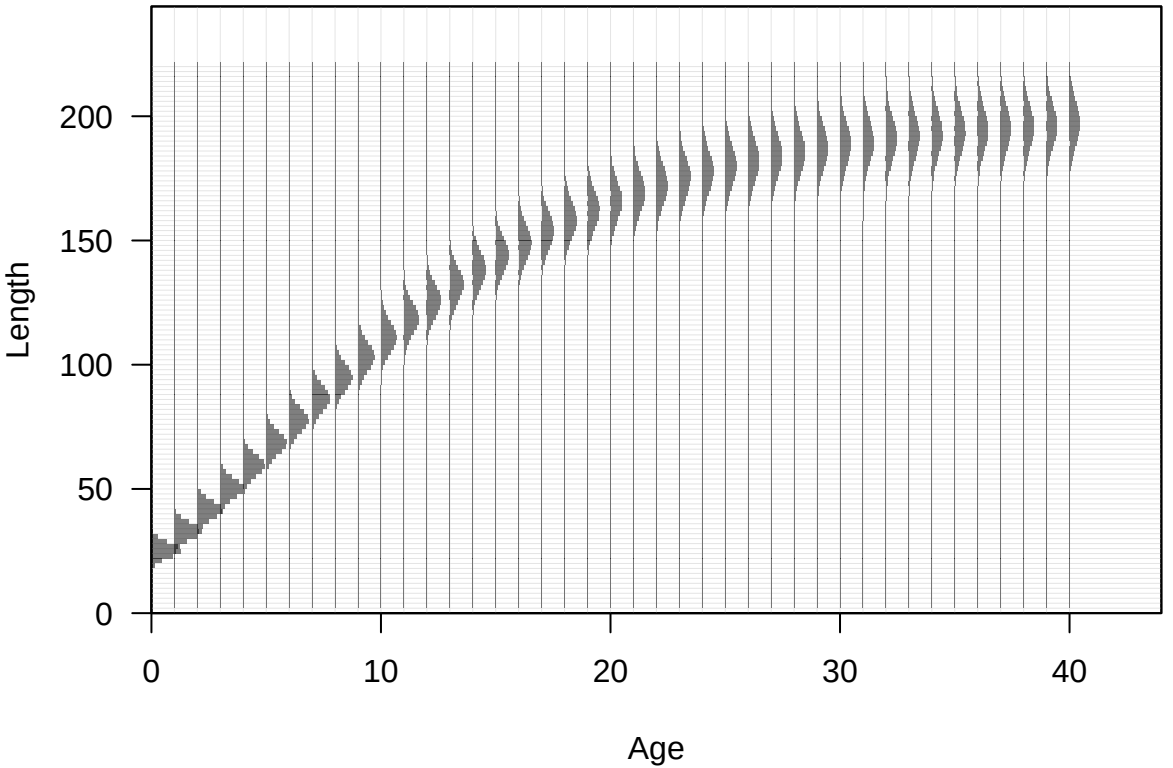

Age (yr)
0
10
20
30
40
Females
Males
Length (cm, beginning of the year)
0
50
100
150
200
CV of lengths
0
0.05
0.1
SD of lengths
0
2
4
6
8
Age (yr)

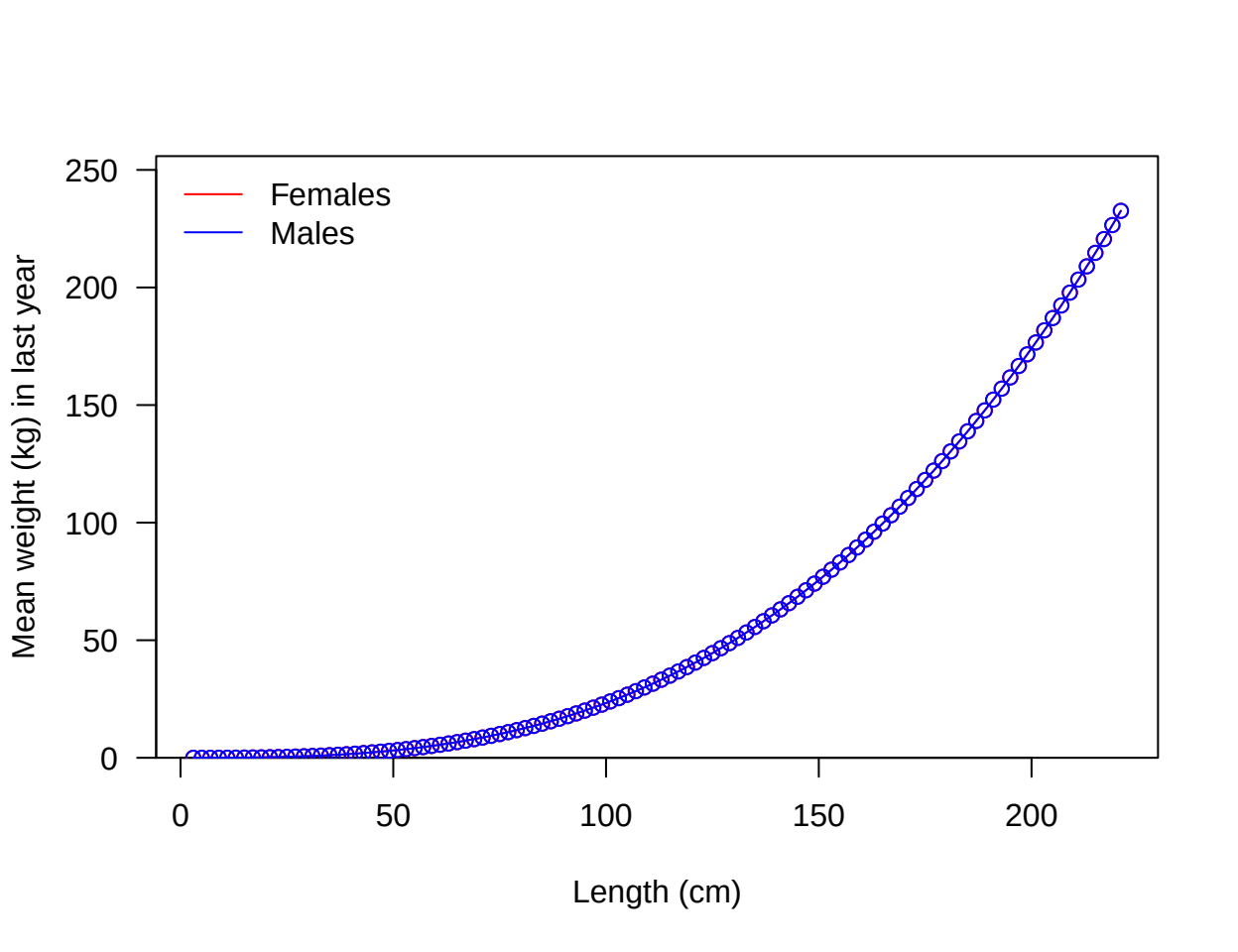

Age (yr)
Mean weight
Females
Males
Length (cm, beginning of the year)
Mean weight
Frac. mature
Age (yr)

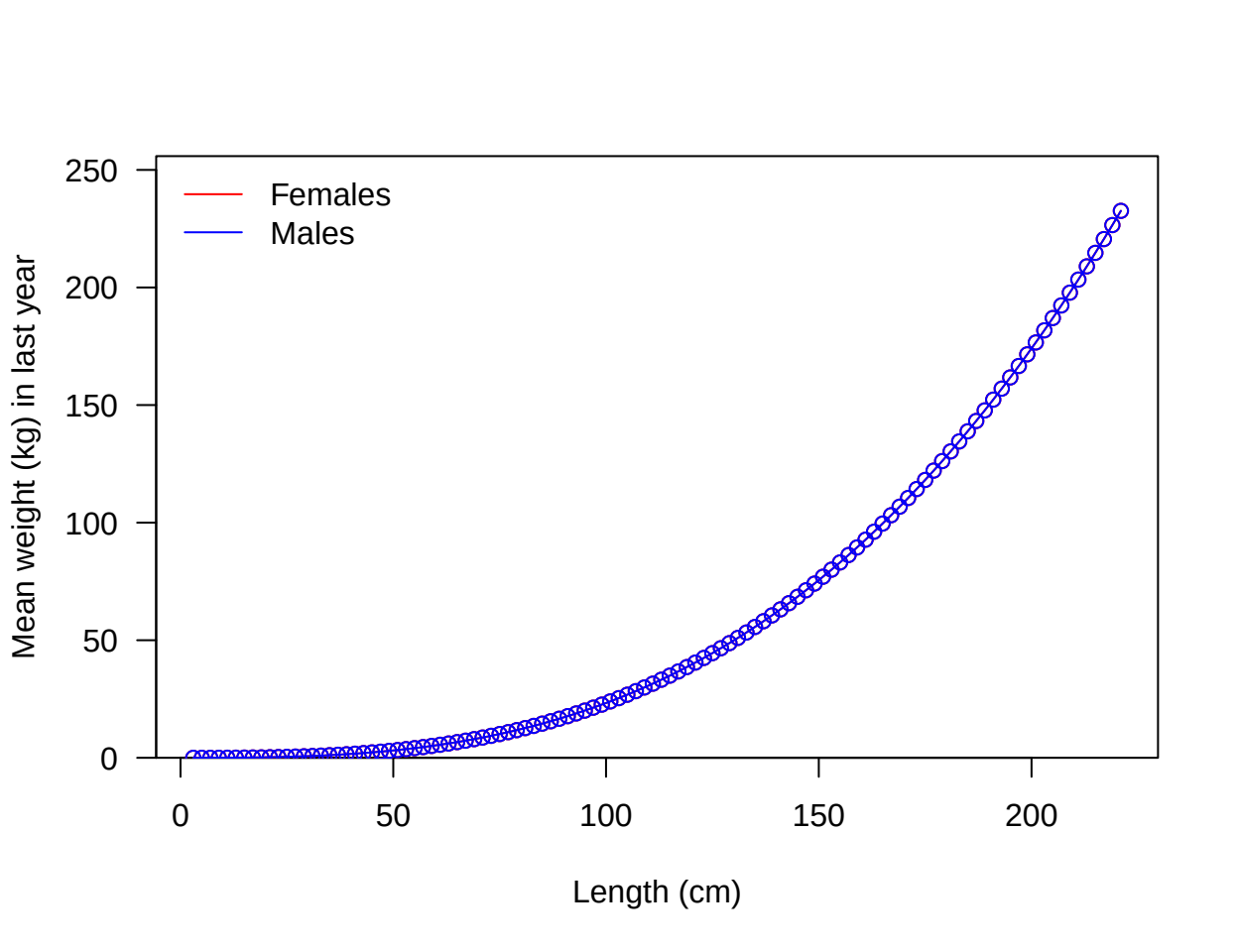

Length
200
150
100
50
0
0
10
20
30
40
Age

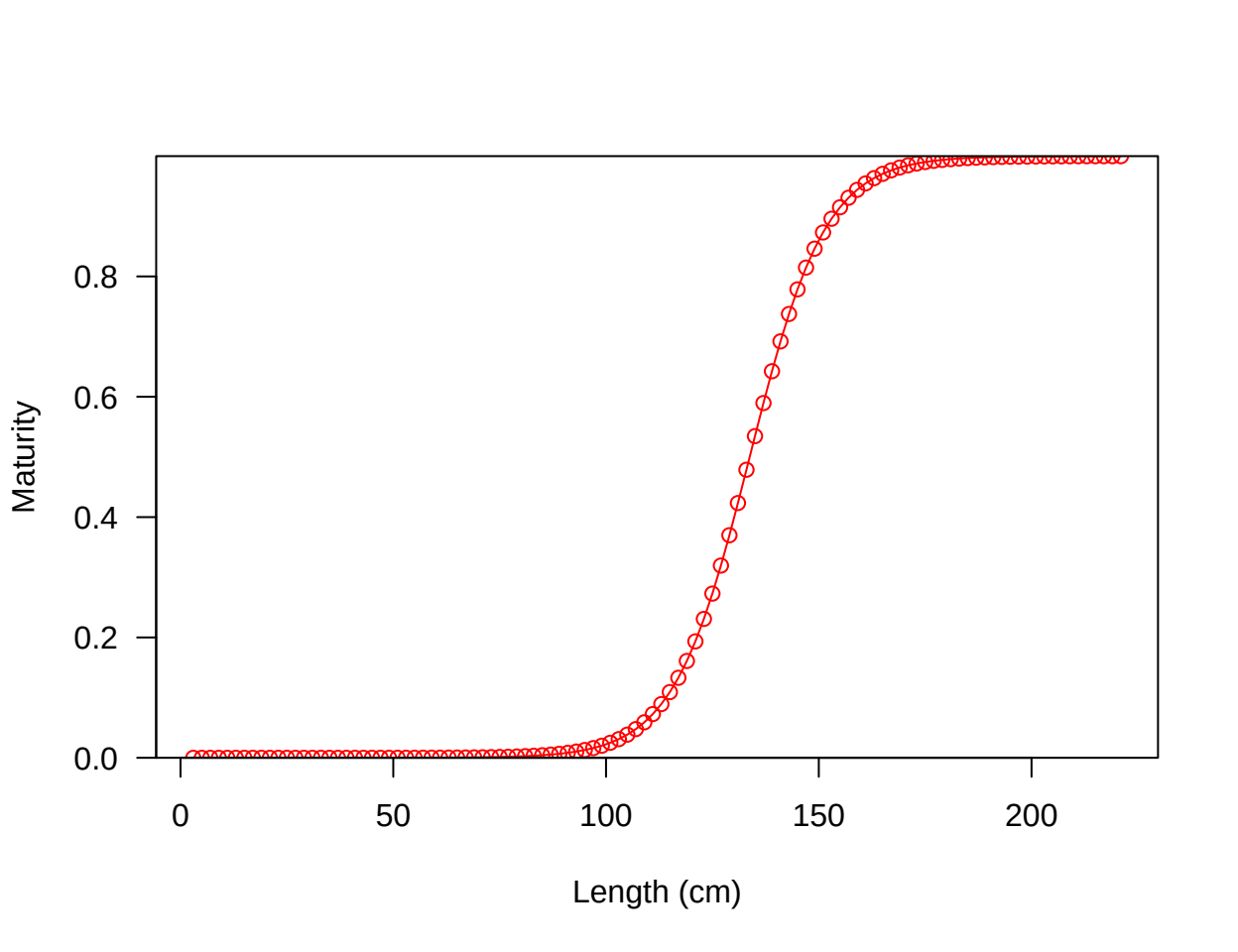

Length
200
150
100
50
0
0
10
20
30
40
Age

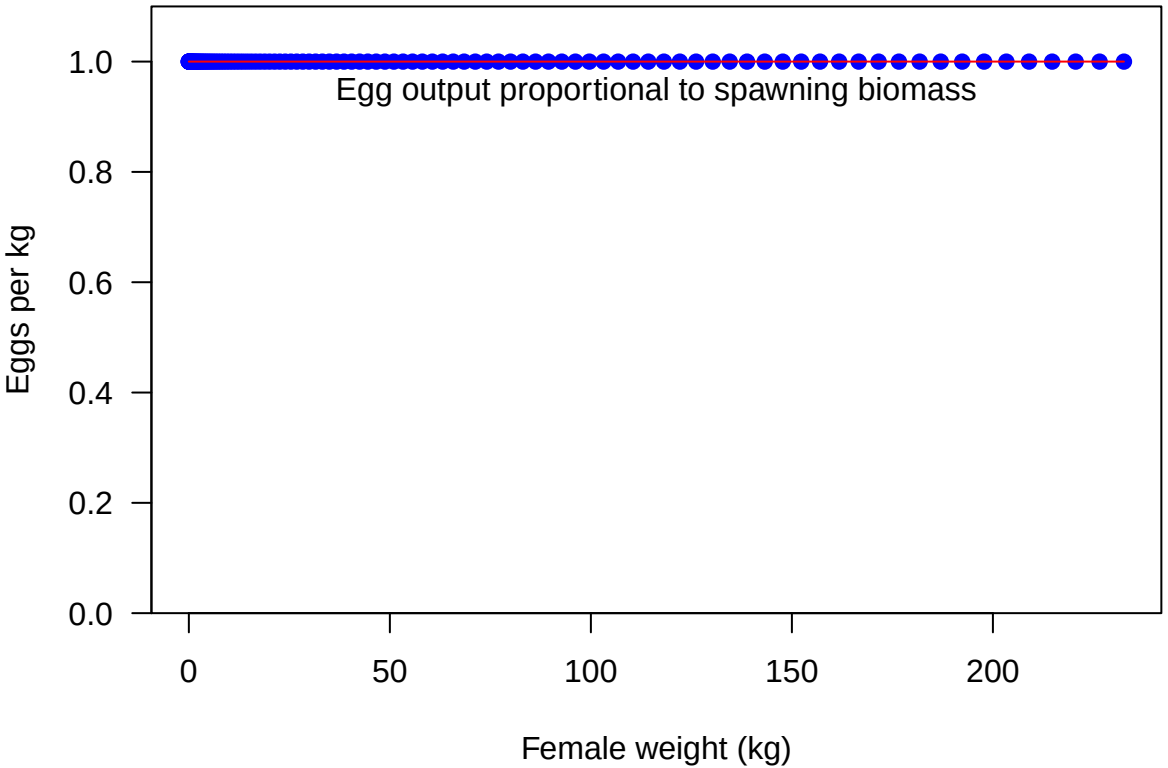

Length
200
150
100
50
0
0
10
20
30
40
Age

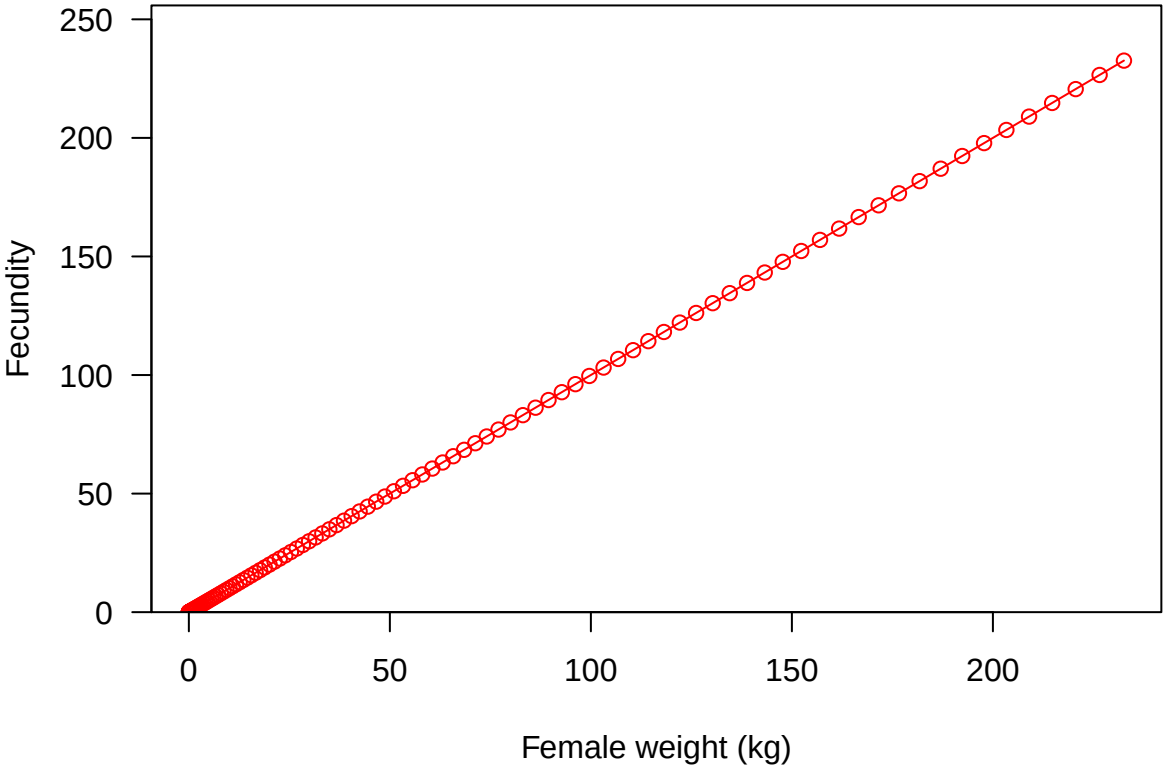

Length
200
150
100
50
0
0
10
20
30
40
Age

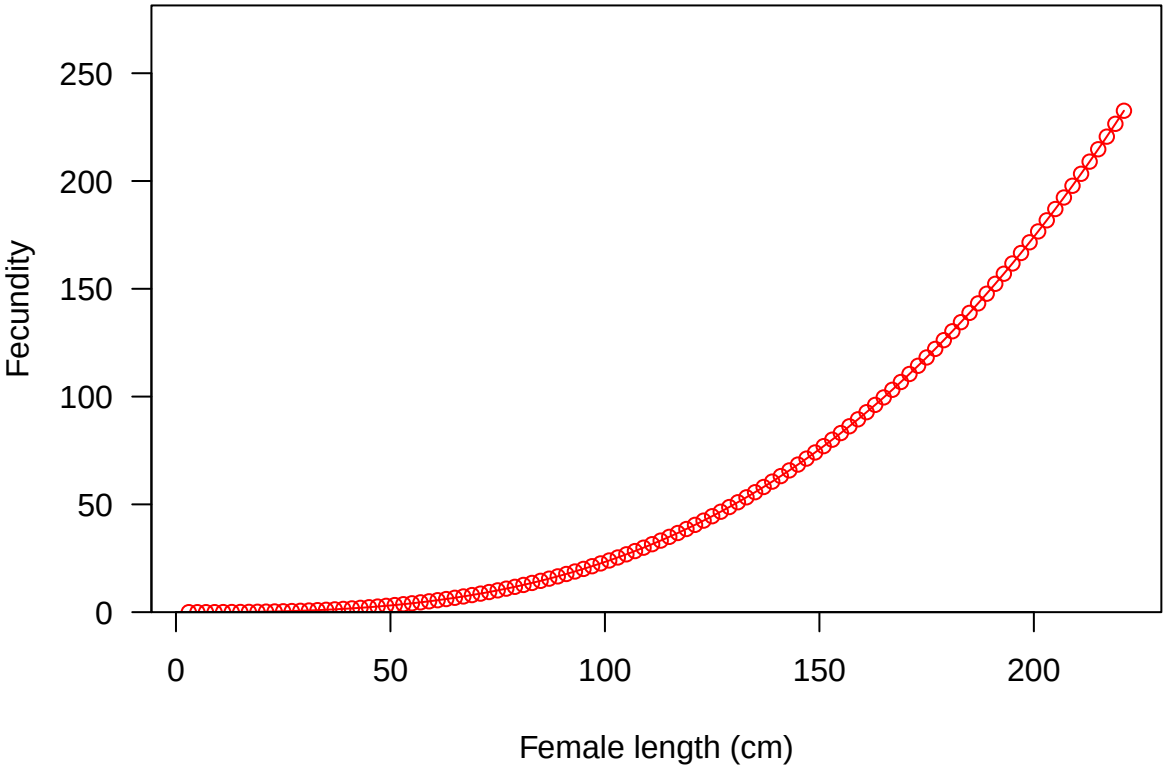

Females
Males
Mean weight (kg) in last year
Length (cm)
0
50
100
150
200
250
0
50
100
150
200

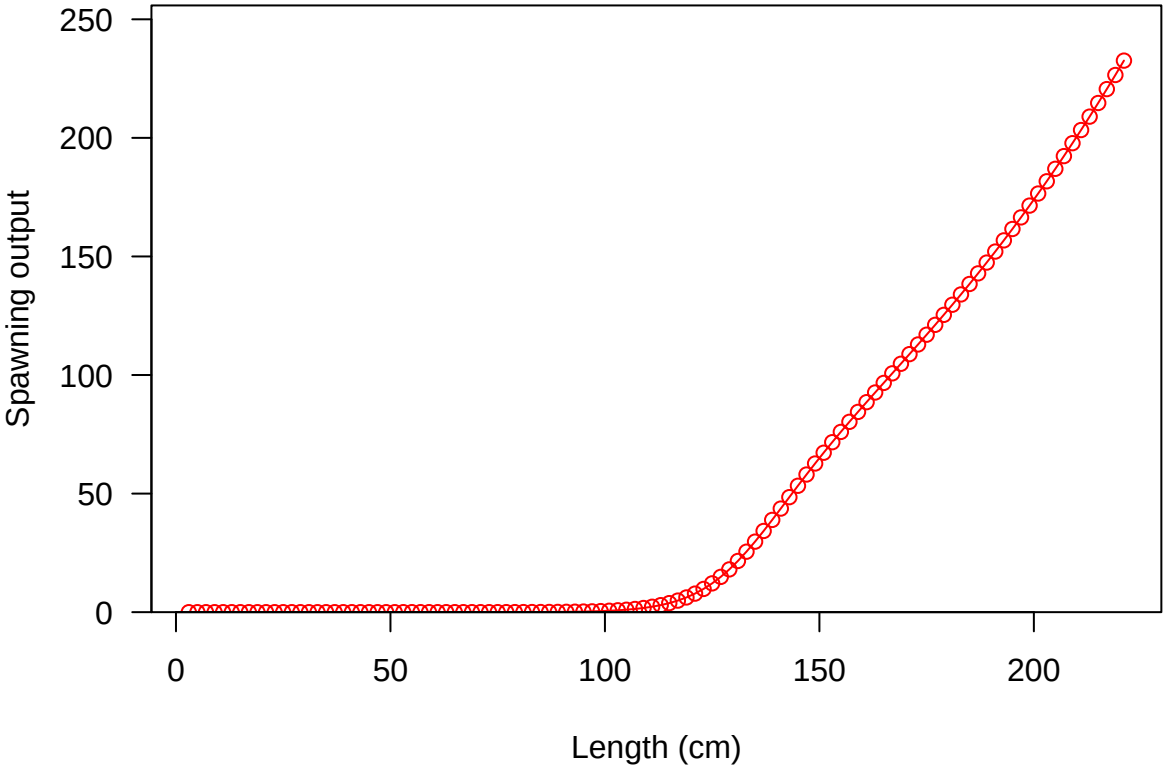

Females
Males
Mean weight (kg) in last year
Length (cm)
0
50
100
150
200
250
0
50
100
150
200

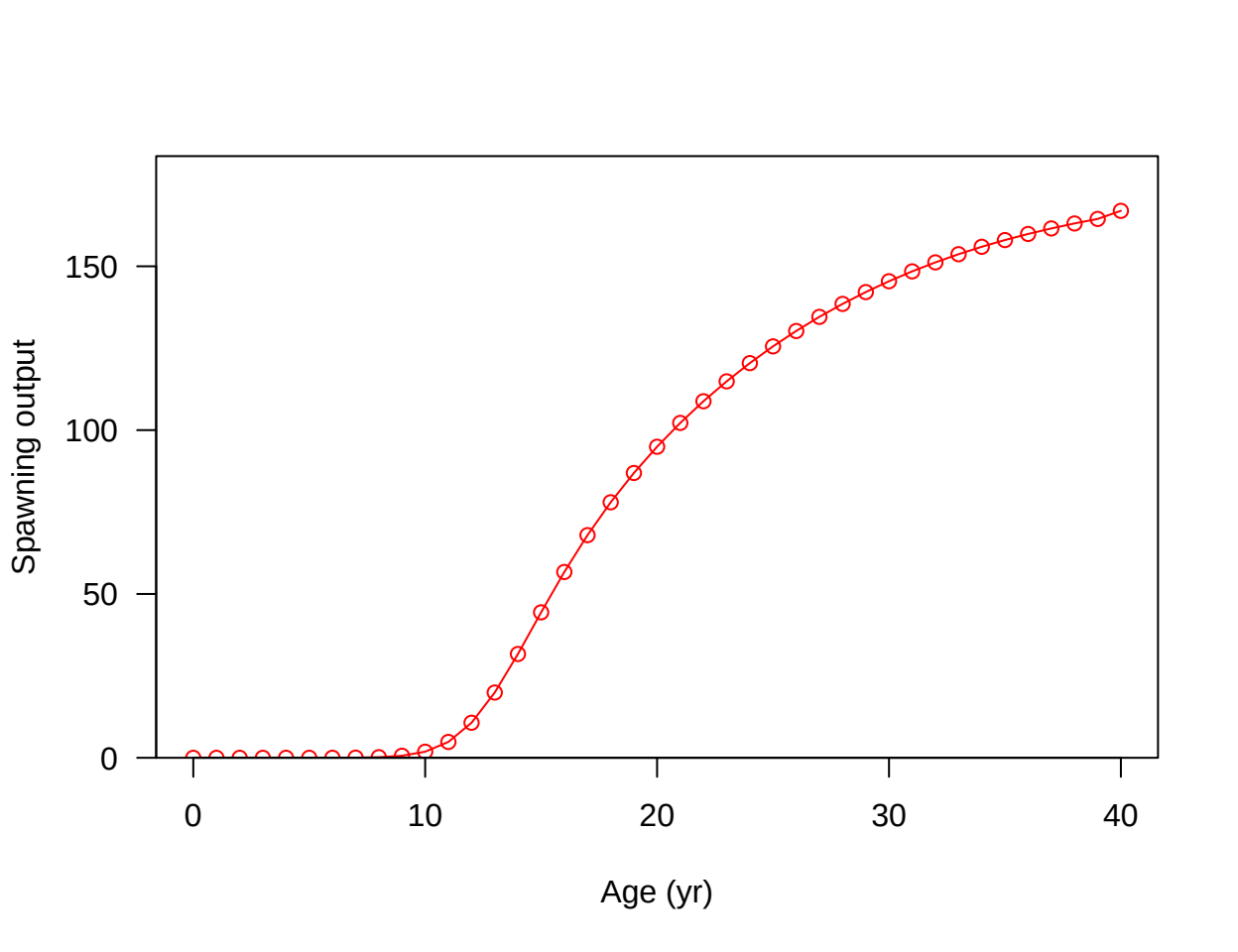

Maturity
0.0
0.2
0.4
0.6
0.8
0
50
100
150
200
Length (cm)

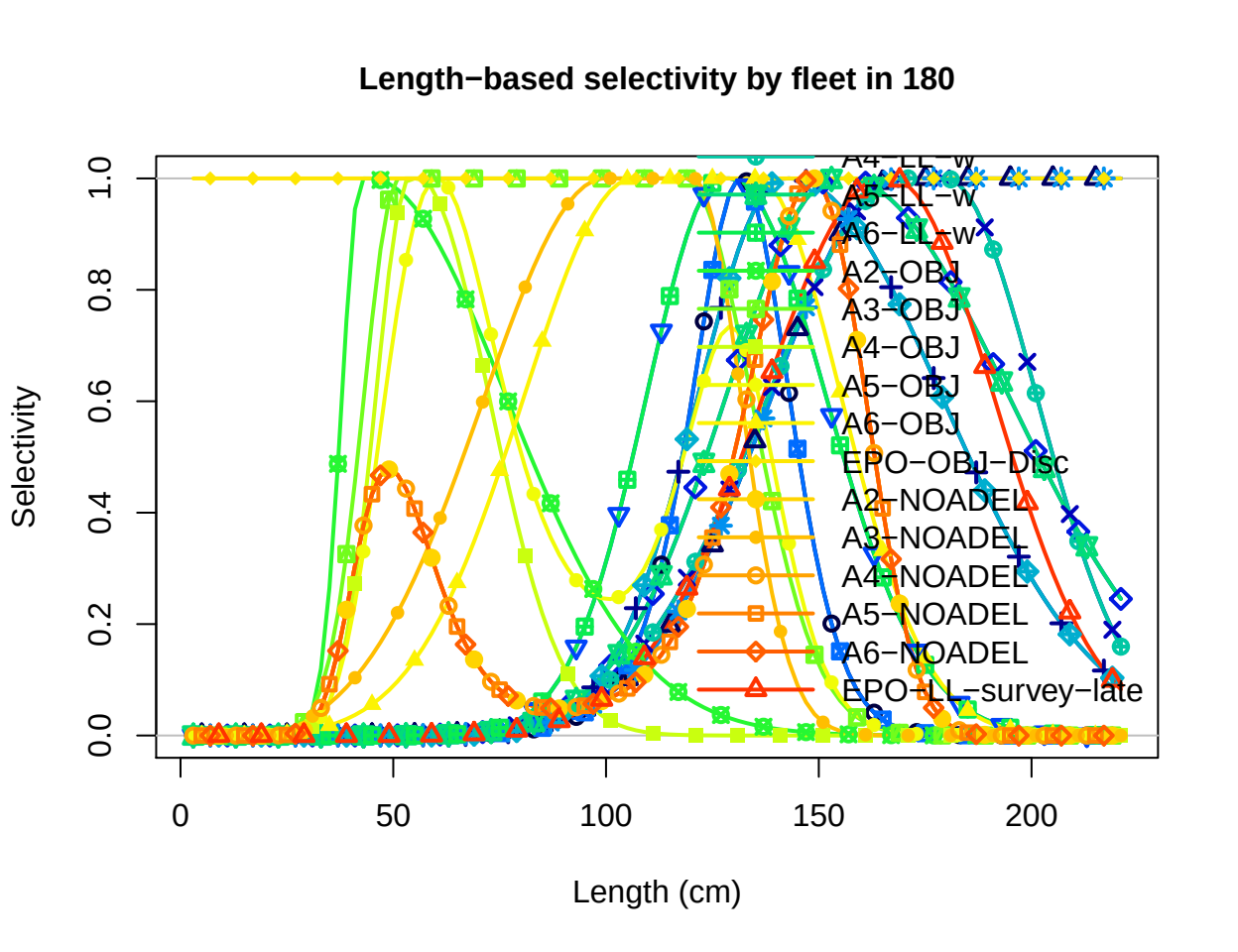

Egg output proportional to spawning biomass
Eggs per kg
1.0
0.8
0.6
0.4
0.2
0.0
0
50
100
150
200
Female weight (kg)

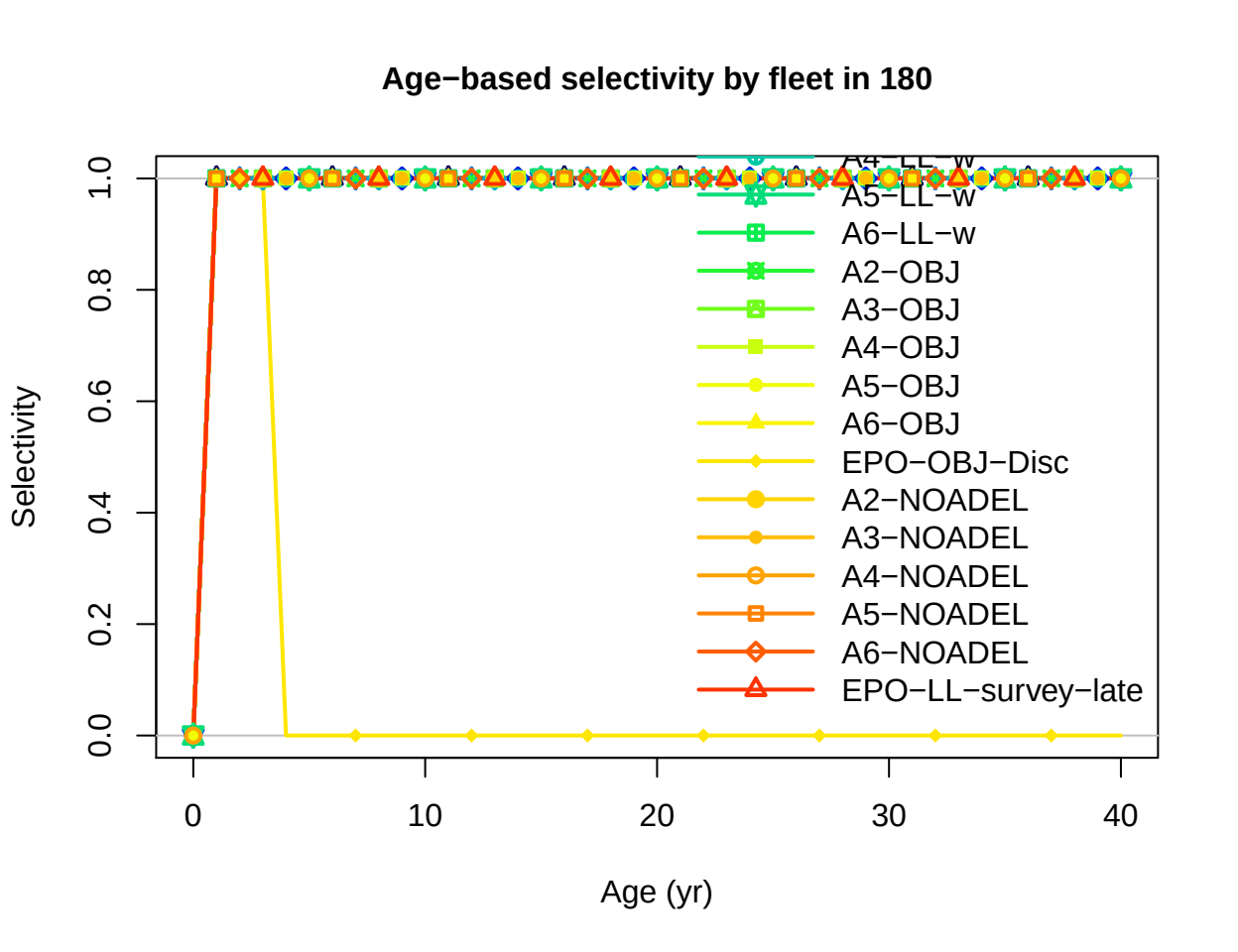

250
200
150
100
50
0
Fecundity
0
50
100
150
200
Female weight (kg)

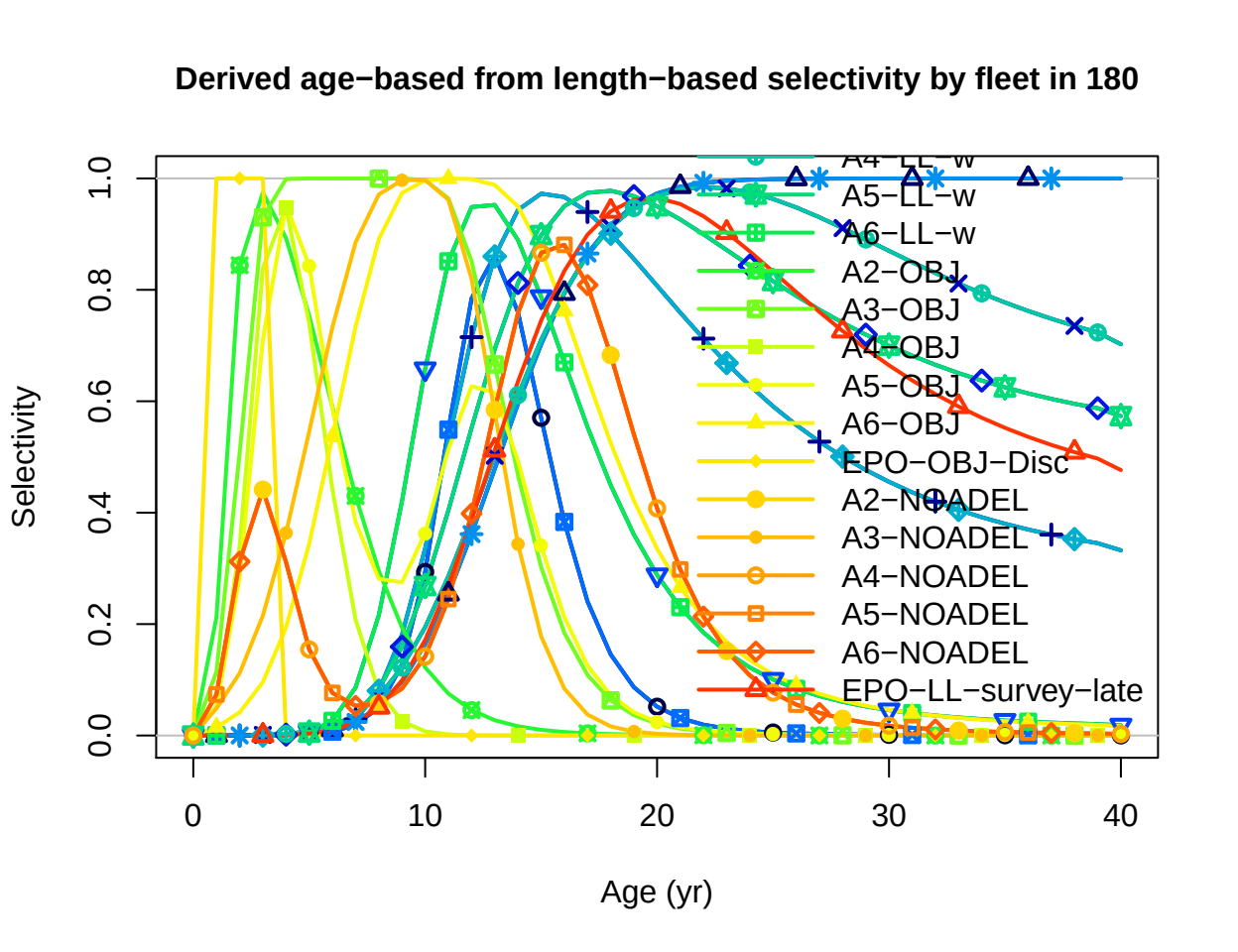

Fecundity
0
50
100
150
200
250
0
50
100
150
200
Female length (cm)

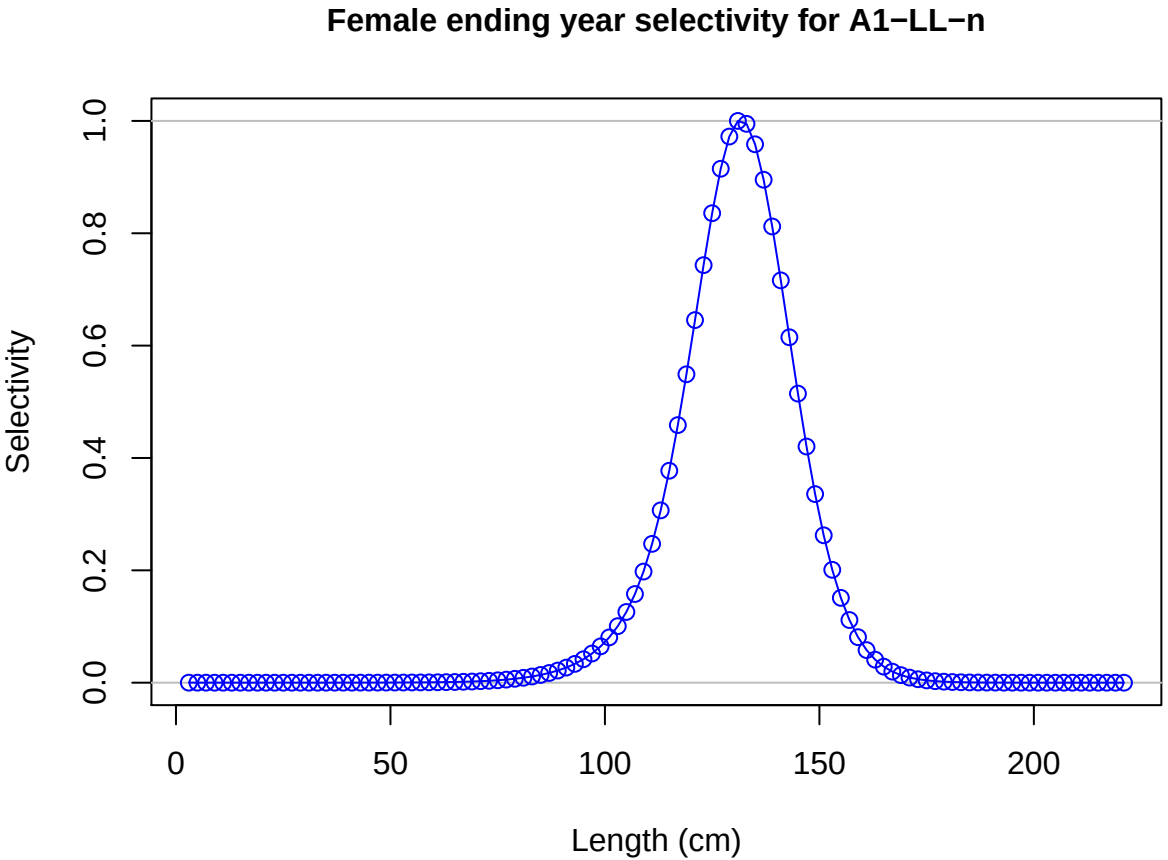

Spawning output
250
200
150
100
50
0
0
50
100
150
200
Length (cm)

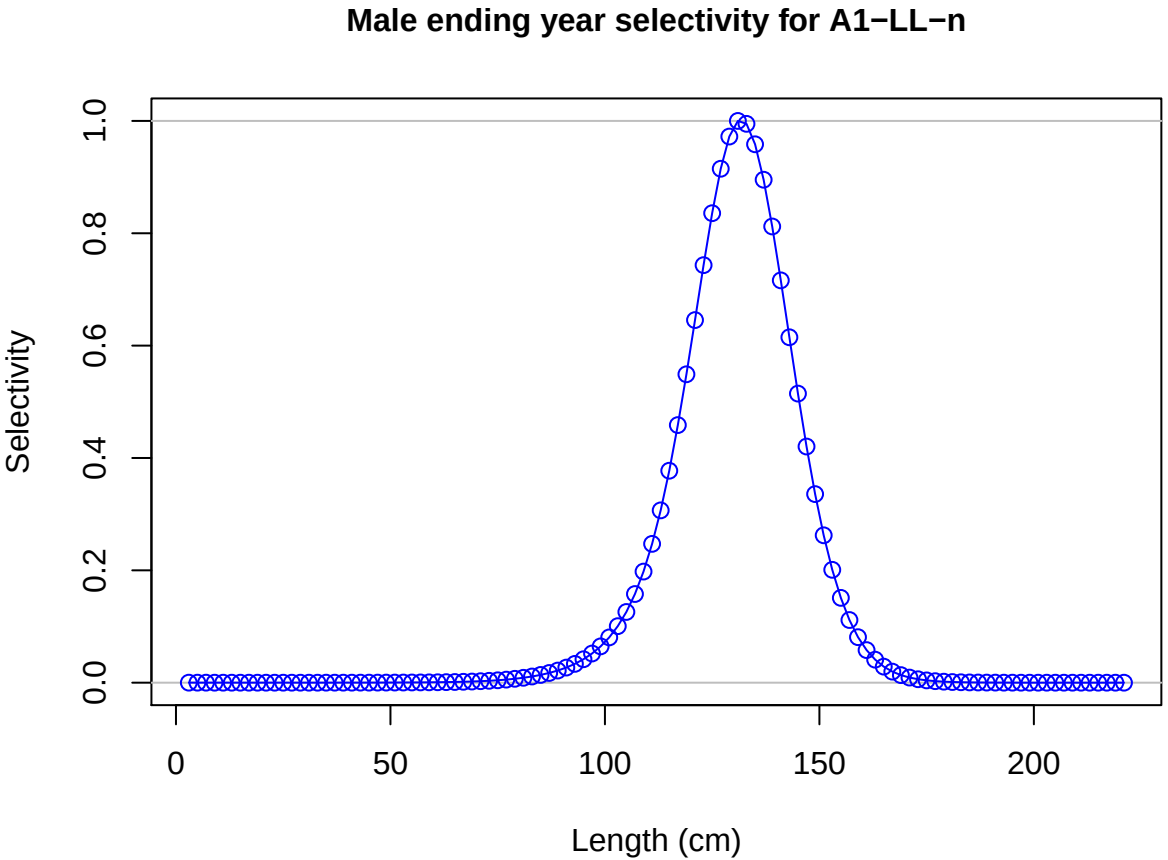

Spawning output
0
50
100
150
0
10
20
30
40
Age (yr)

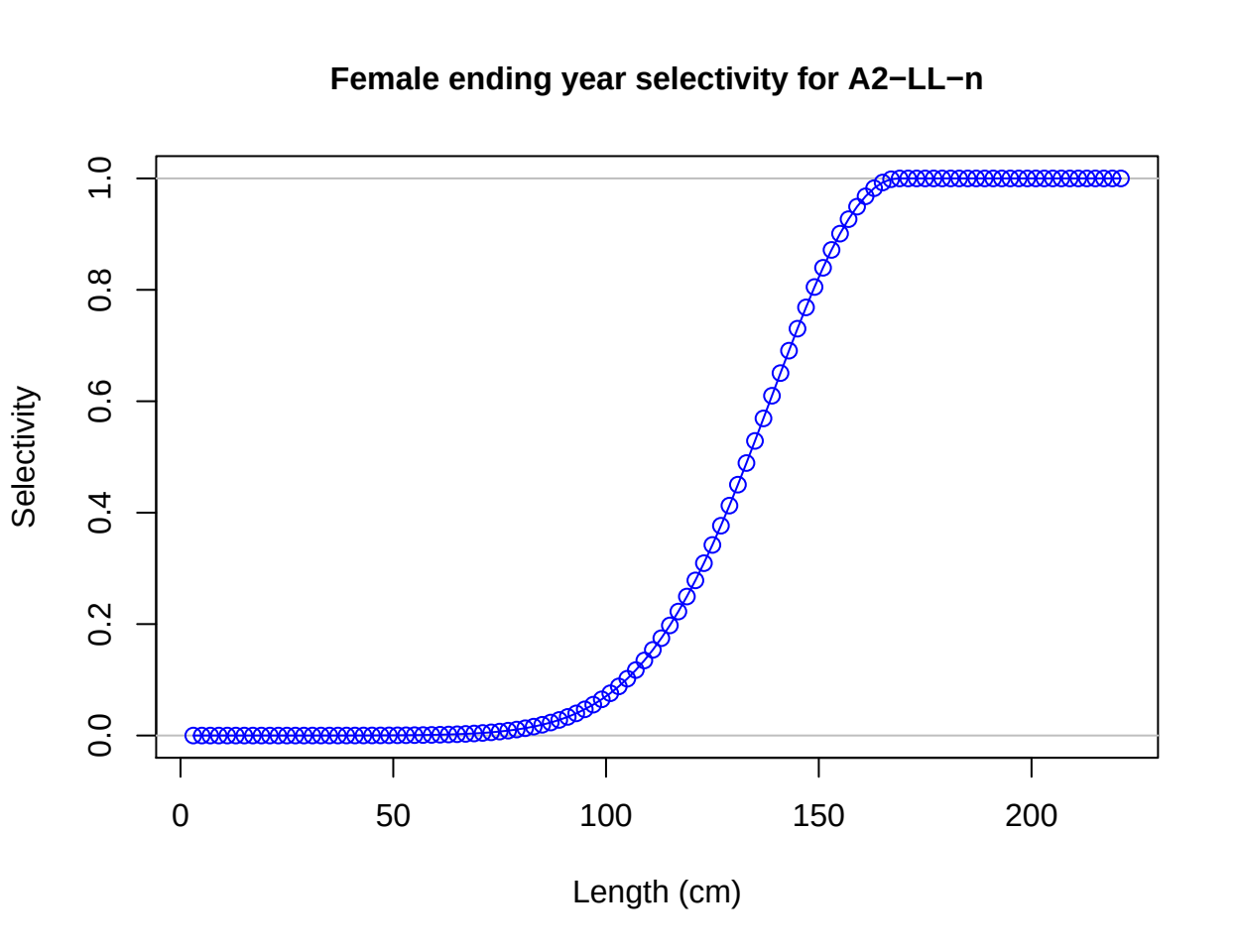

Length−based selectivity by fleet in 180
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
A3−NOADEL
A4−NOADEL
A5−NOADEL
A6−NOADEL
EPO−LL−survey−late

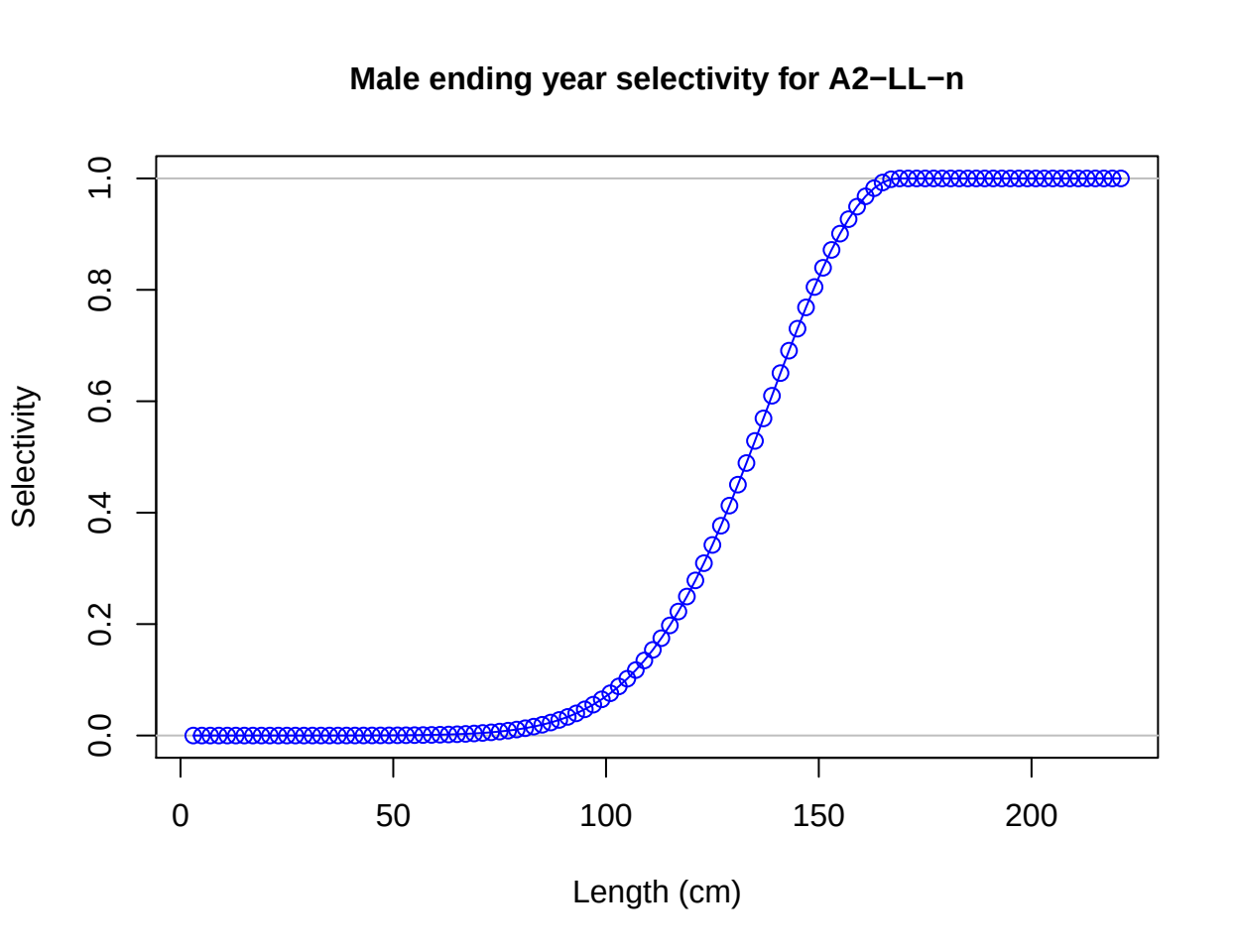

Age−based selectivity by fleet in 180
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
A3−NOADEL
A4−NOADEL
A5−NOADEL
A6−NOADEL
EPO−LL−survey−late

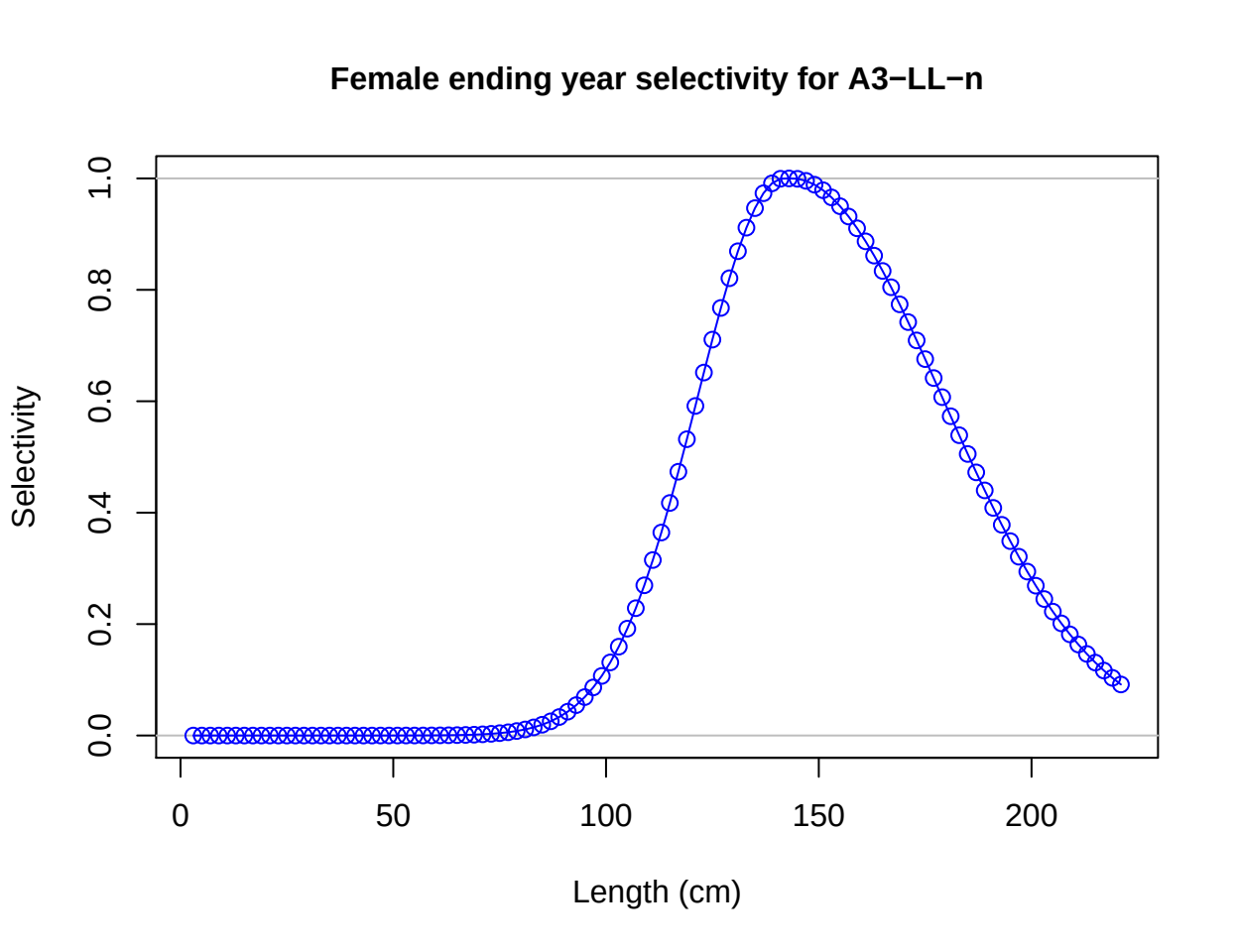

Derived age−based from length−based selectivity by fleet in 180
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
A3−NOADEL
A4−NOADEL
A5−NOADEL
A6−NOADEL
EPO−LL−survey−late

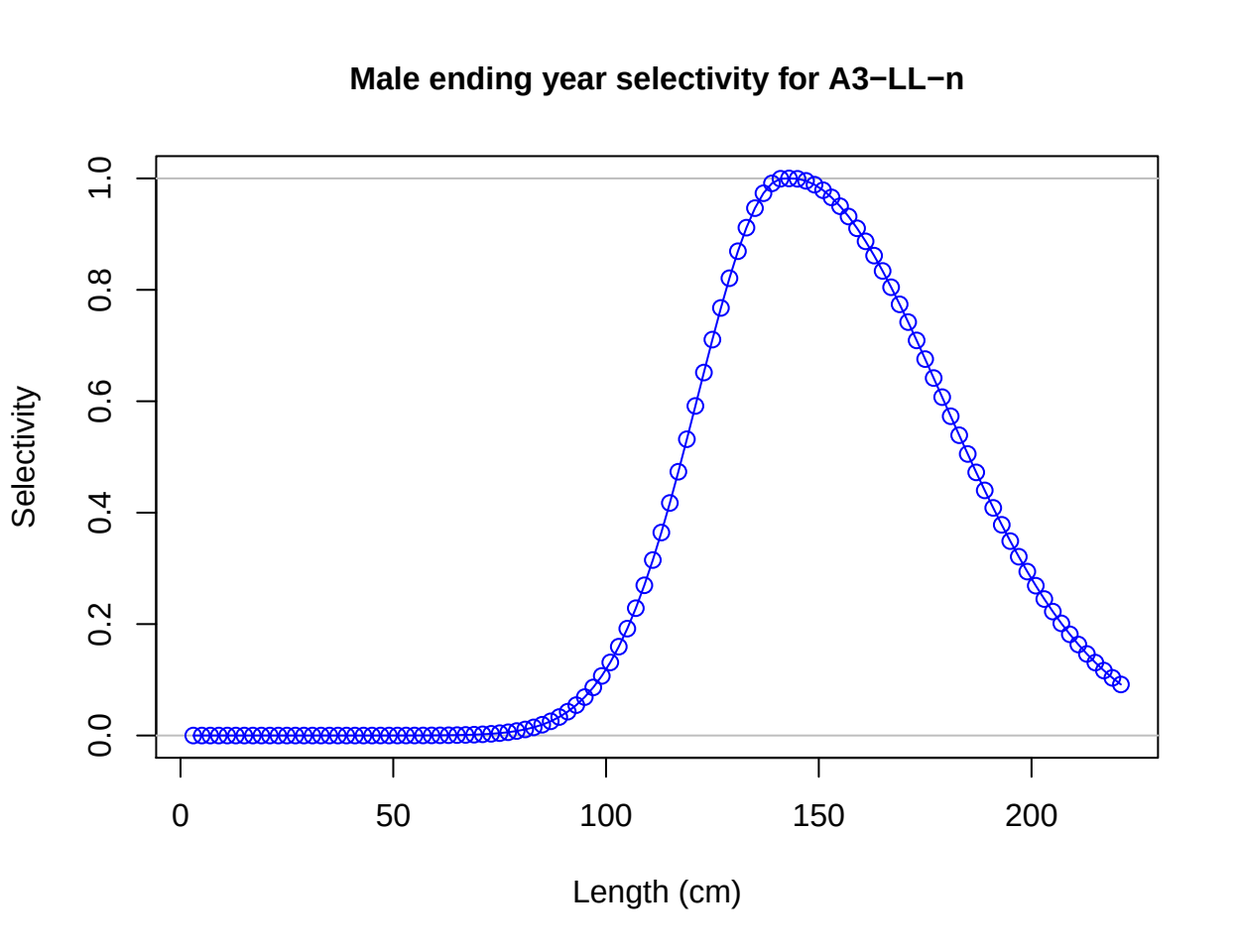

Female ending year selectivity for A1−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

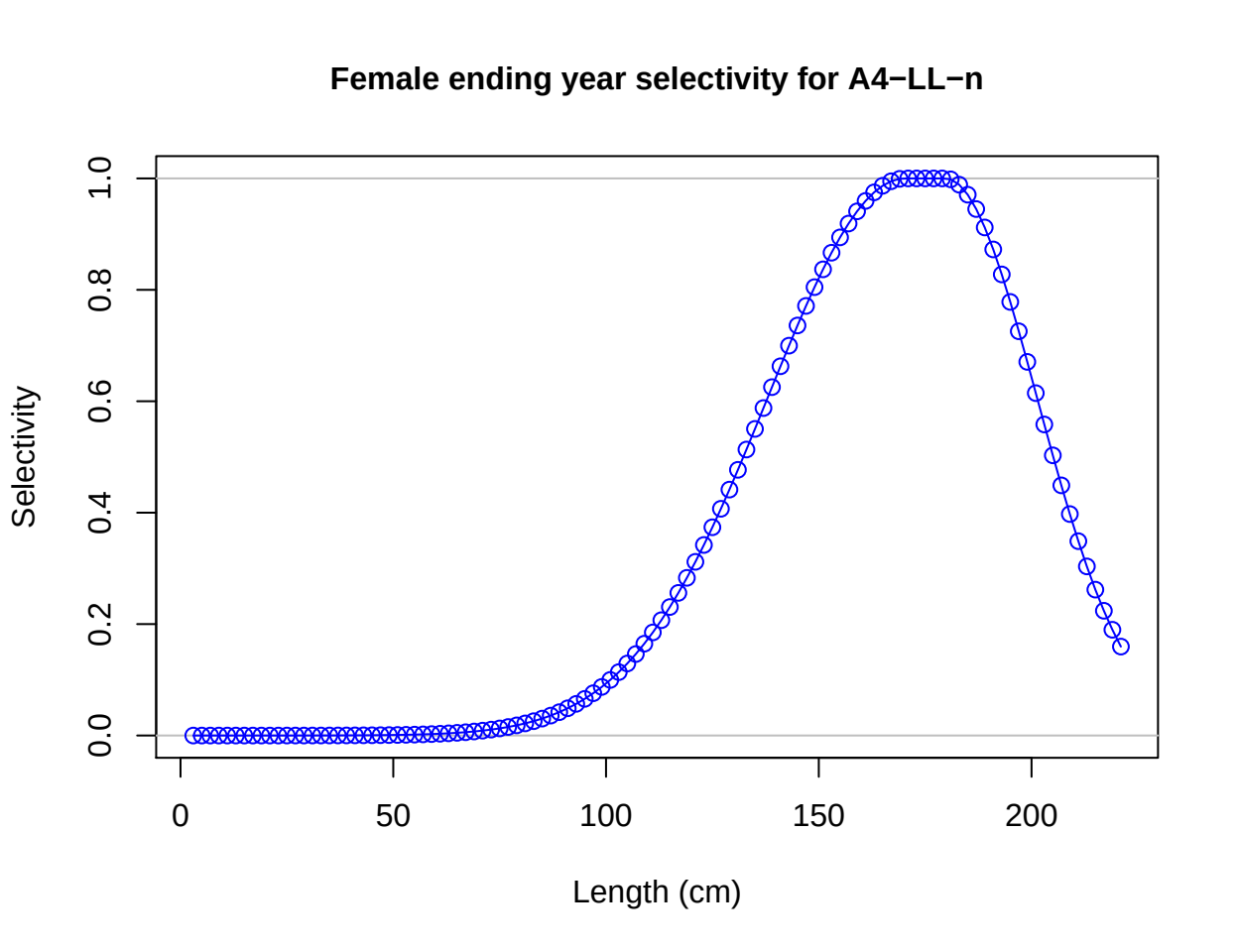

Male ending year selectivity for A1−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

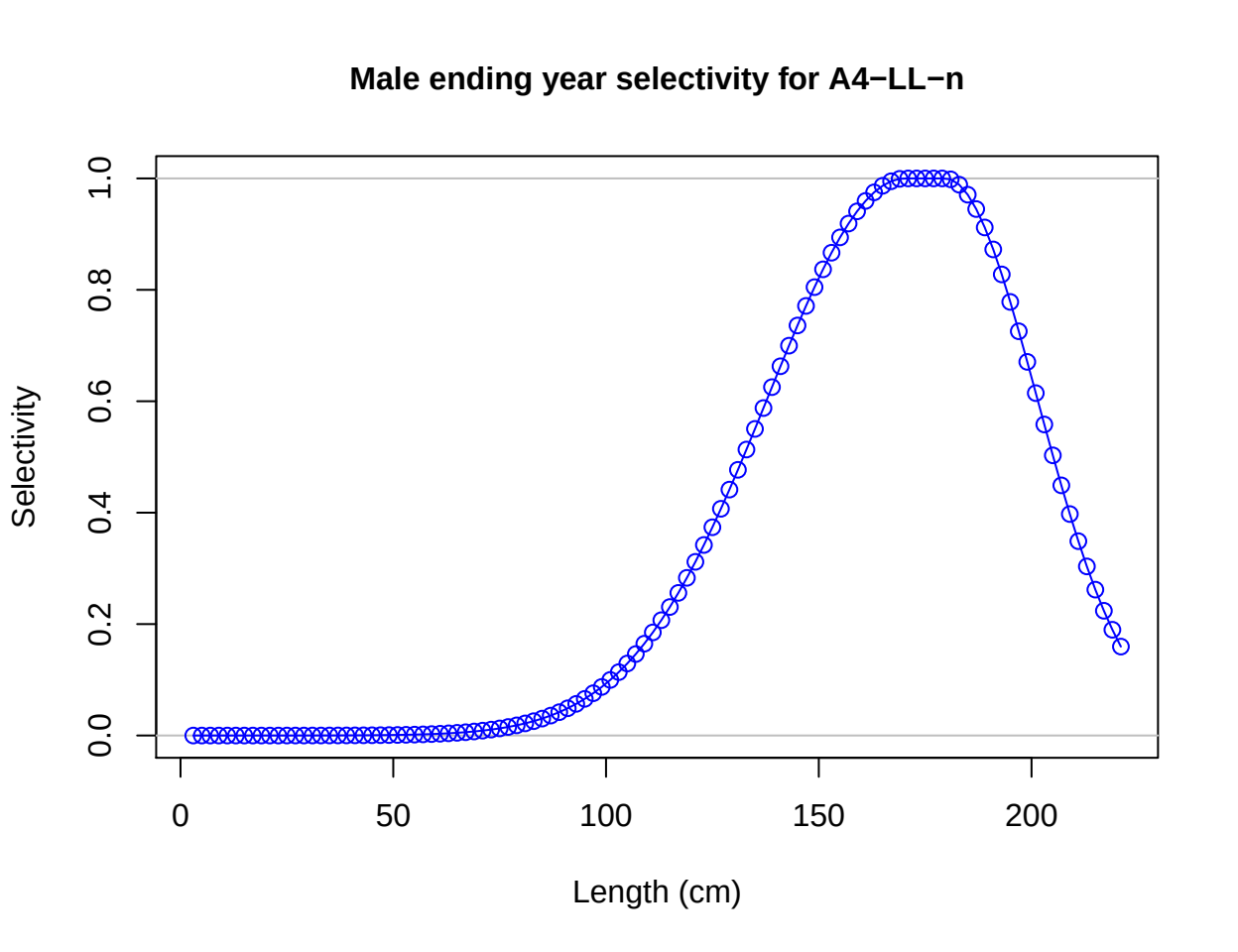

Female ending year selectivity for A2−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

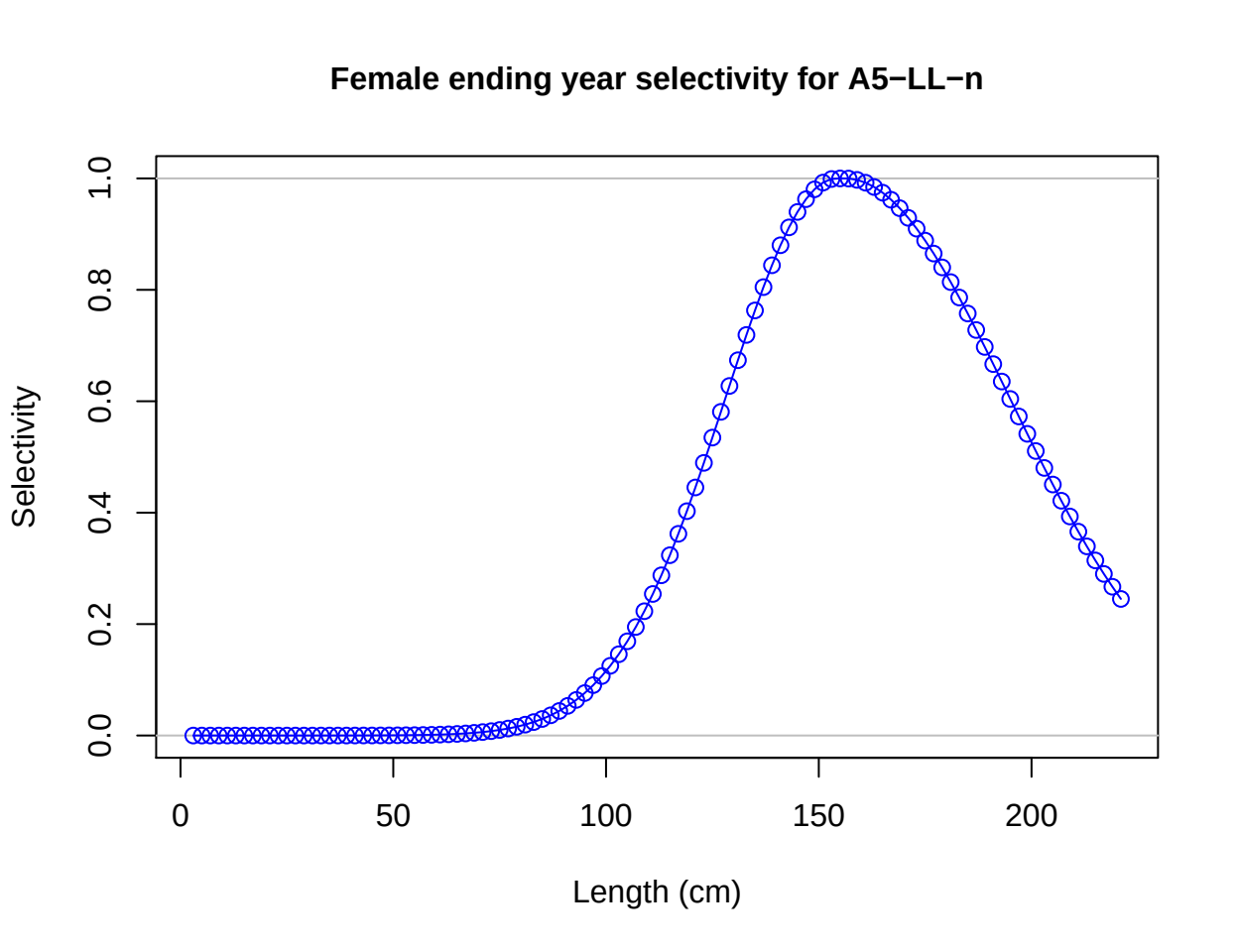

Male ending year selectivity for A2−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

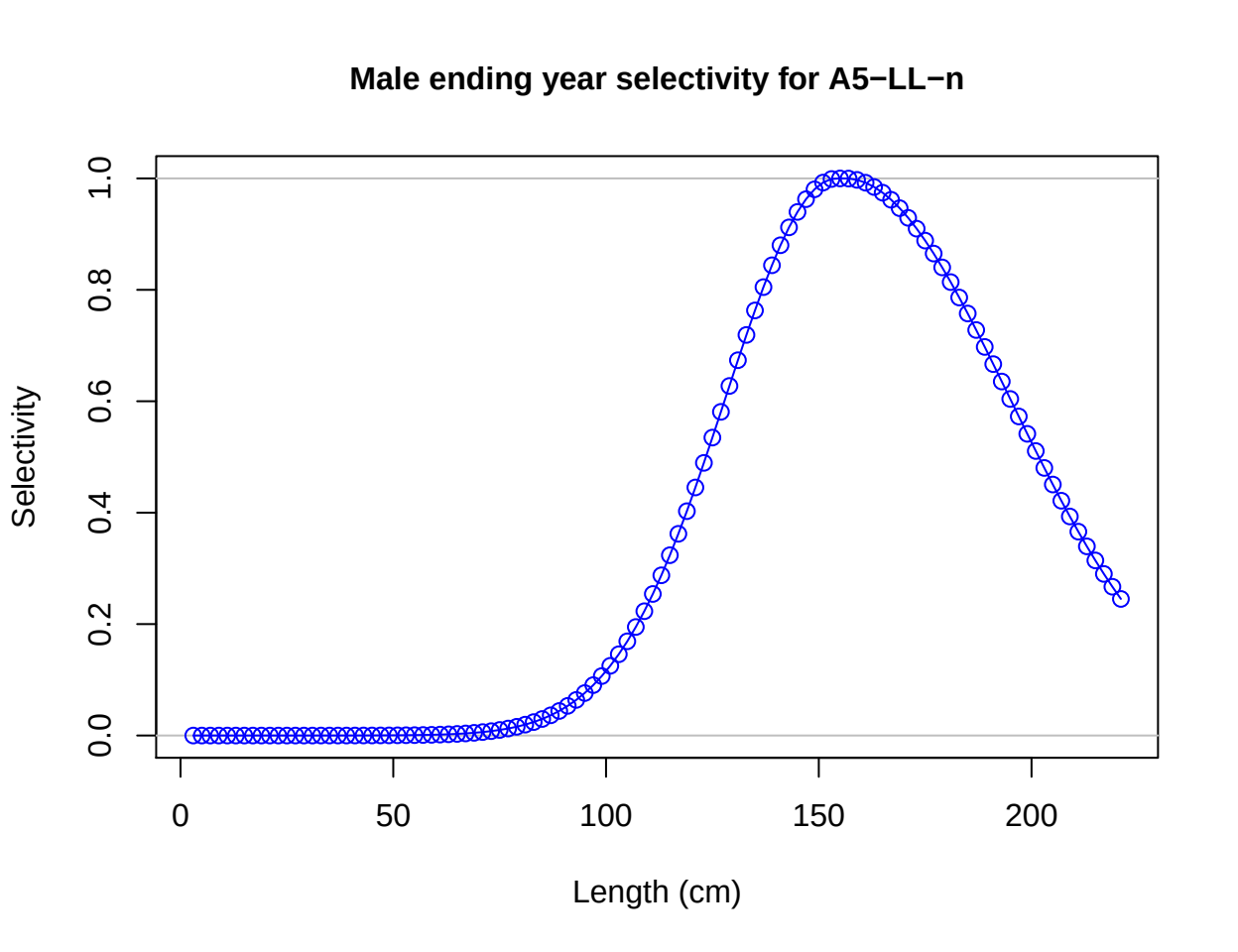

Female ending year selectivity for A3−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

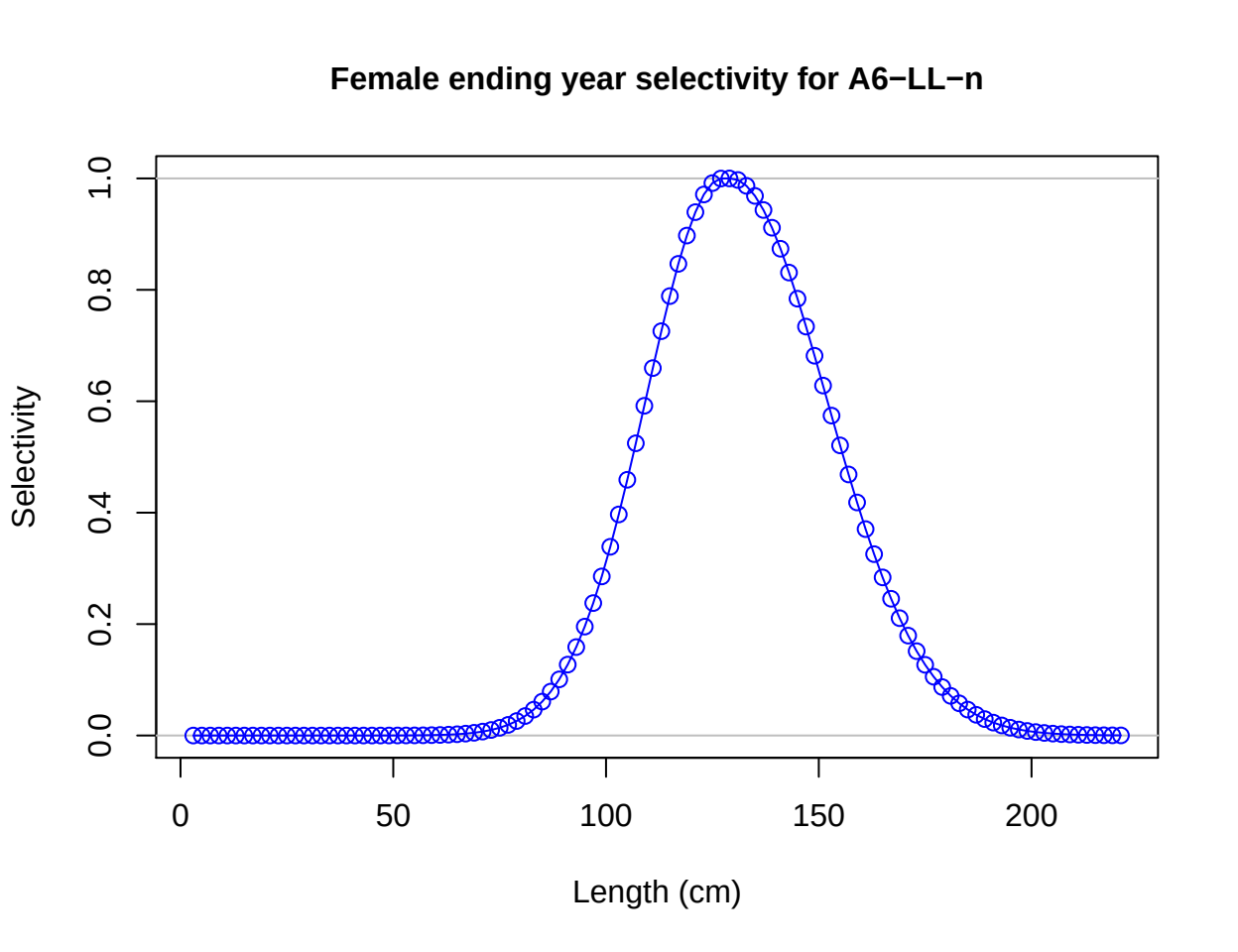

Male ending year selectivity for A3−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

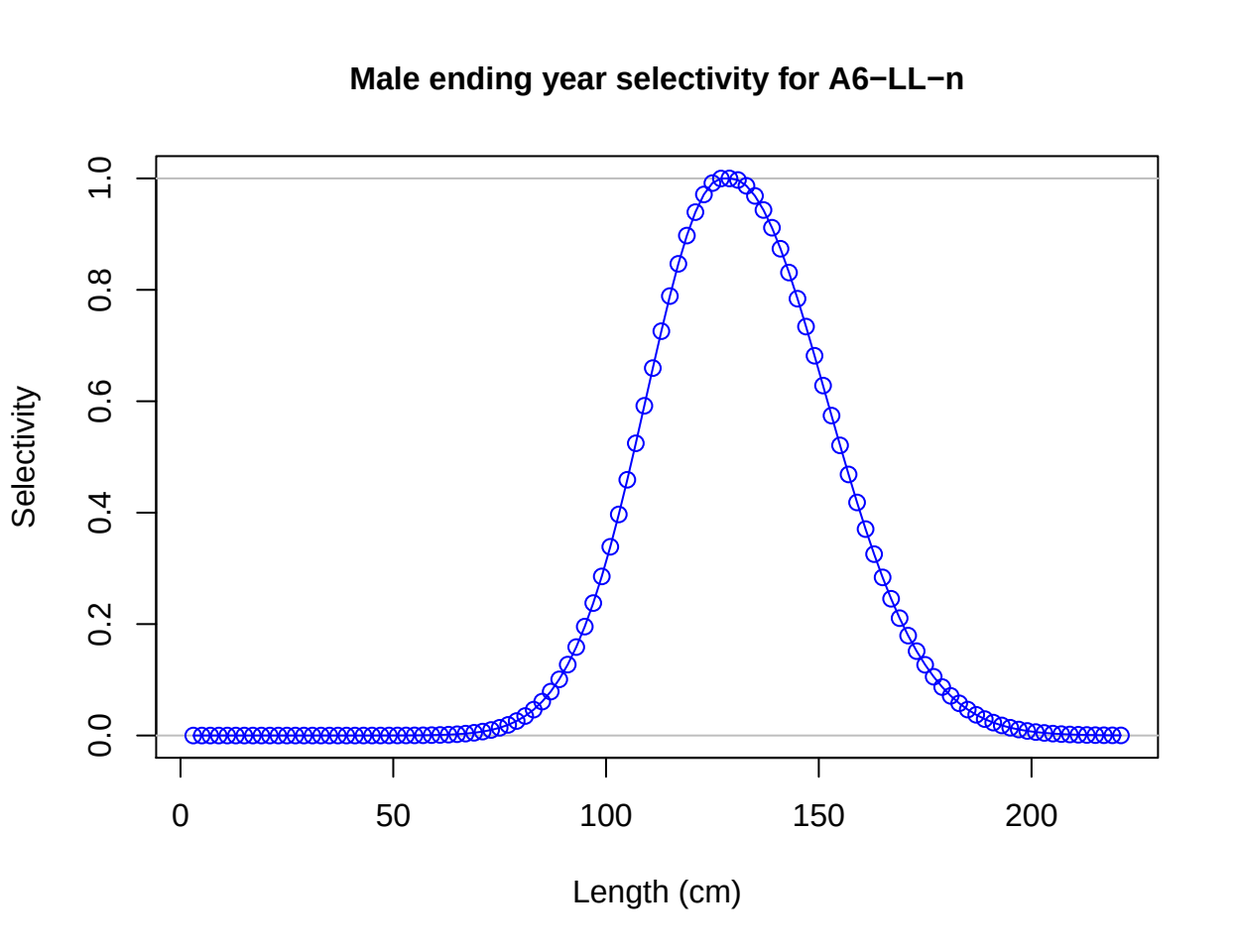

Female ending year selectivity for A4−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

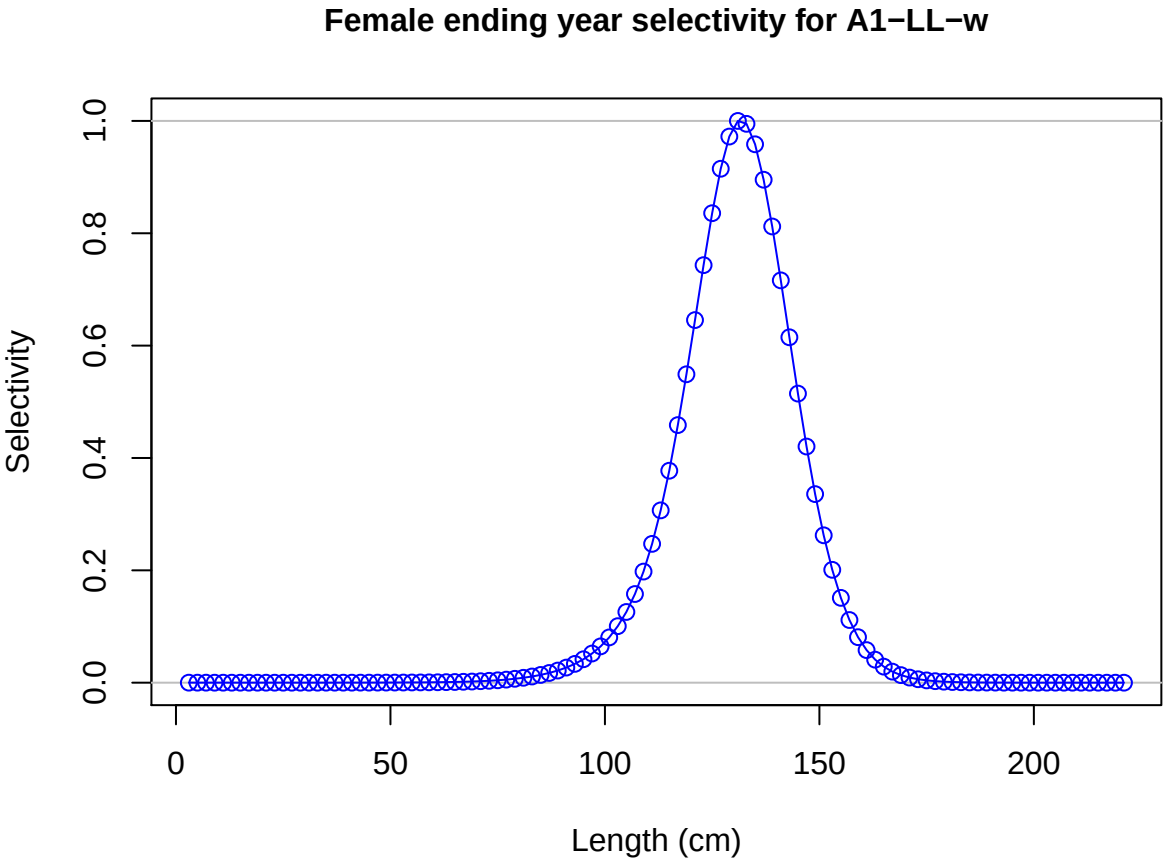

Male ending year selectivity for A4−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

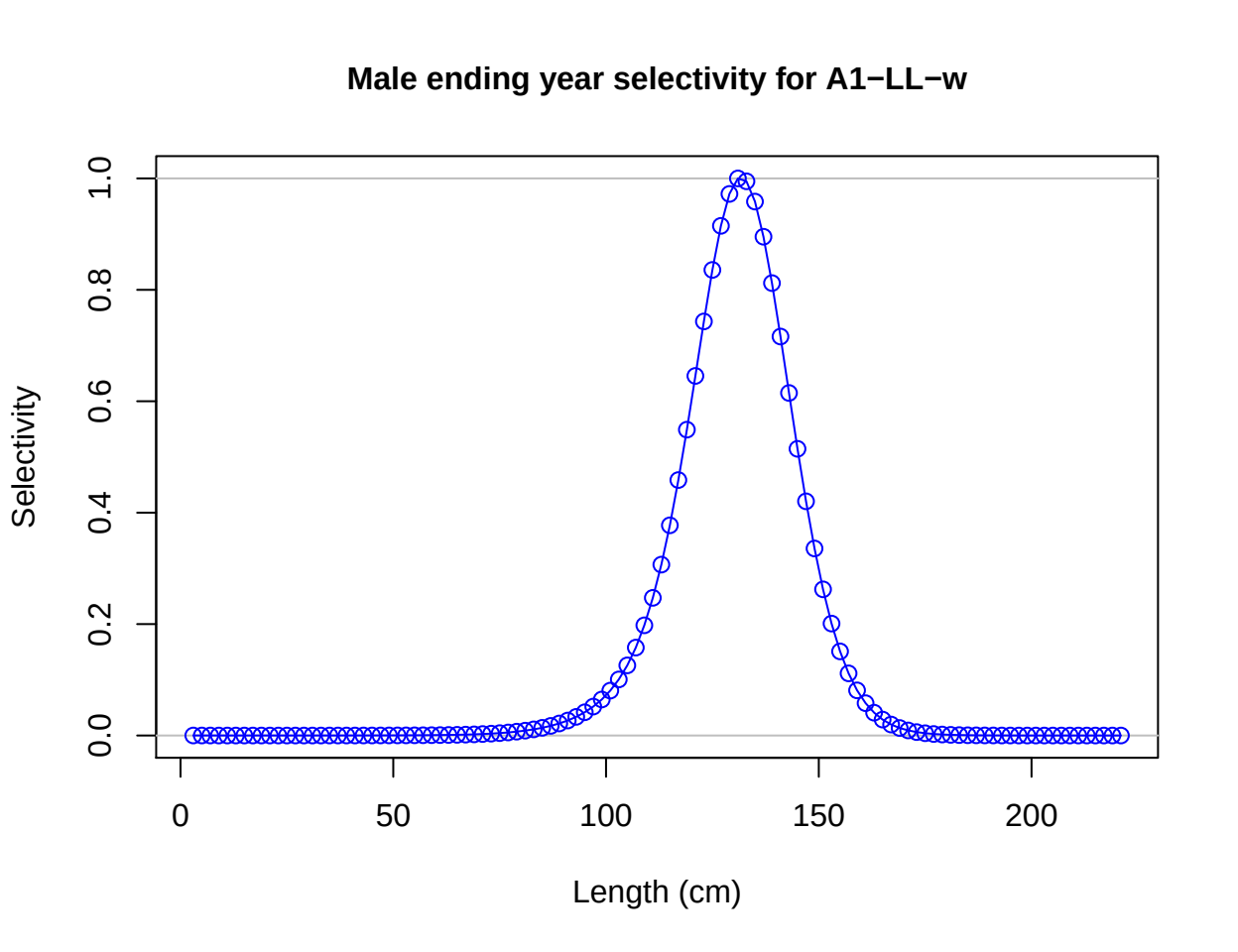

Female ending year selectivity for A5−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

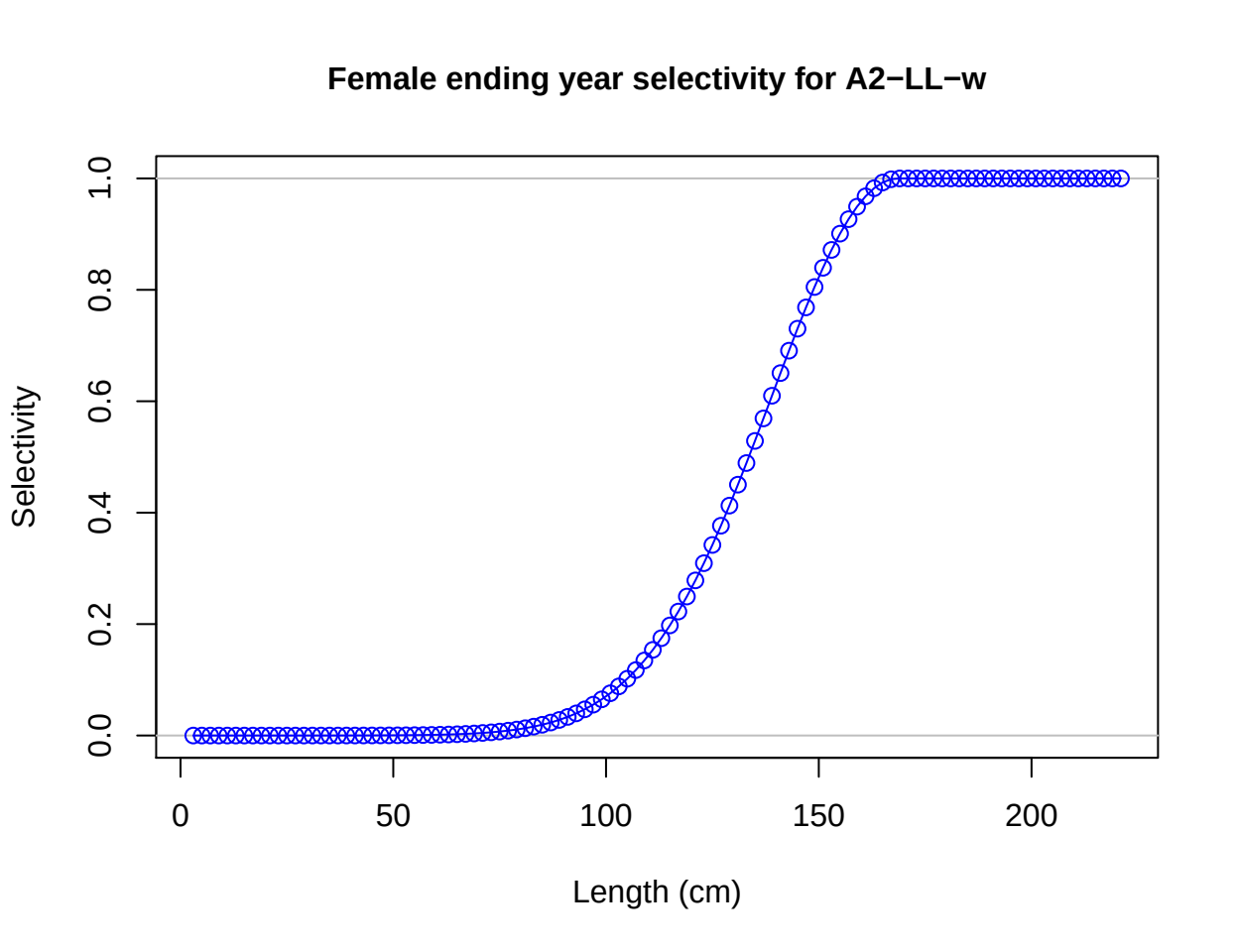

Male ending year selectivity for A5−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

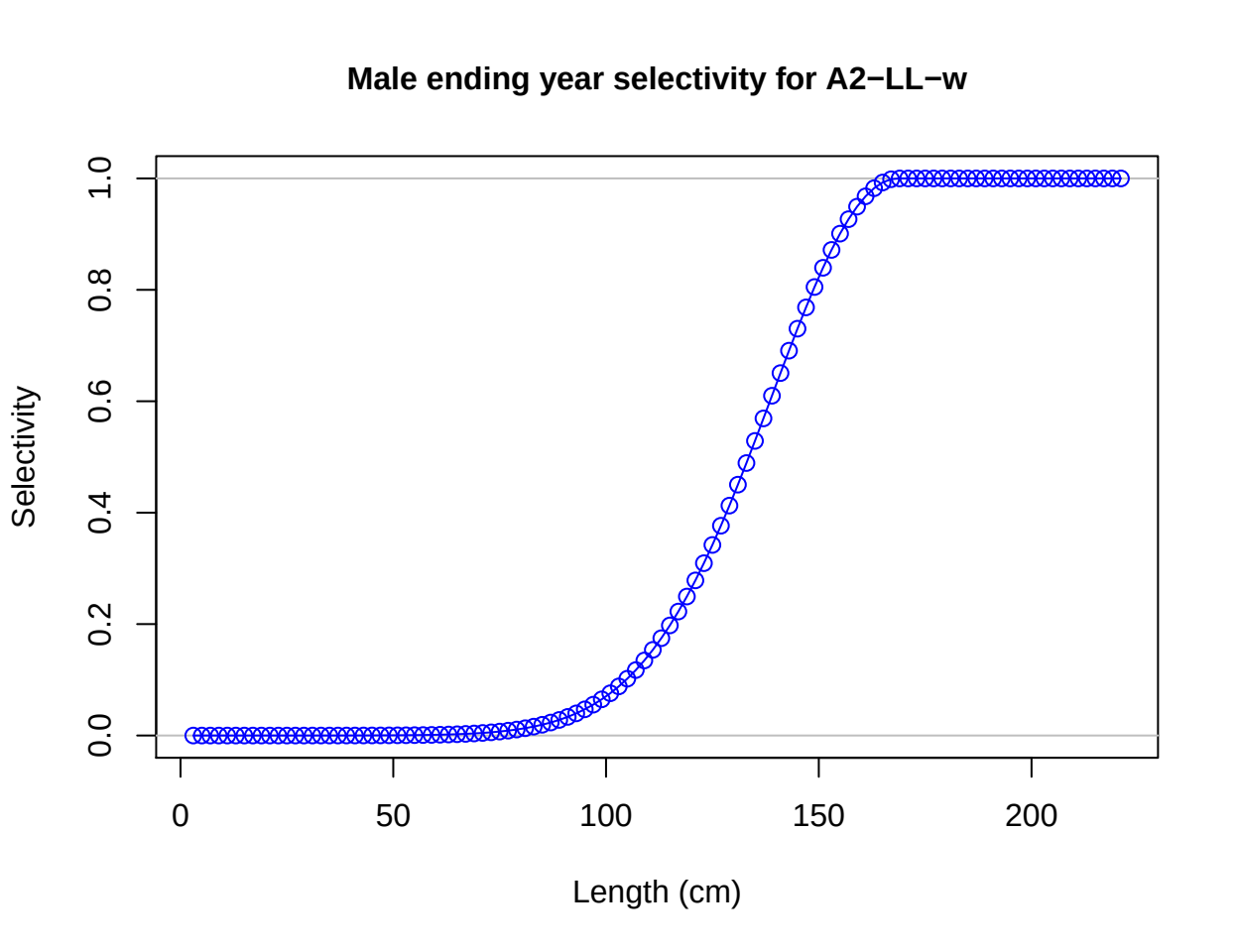

Female ending year selectivity for A6−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

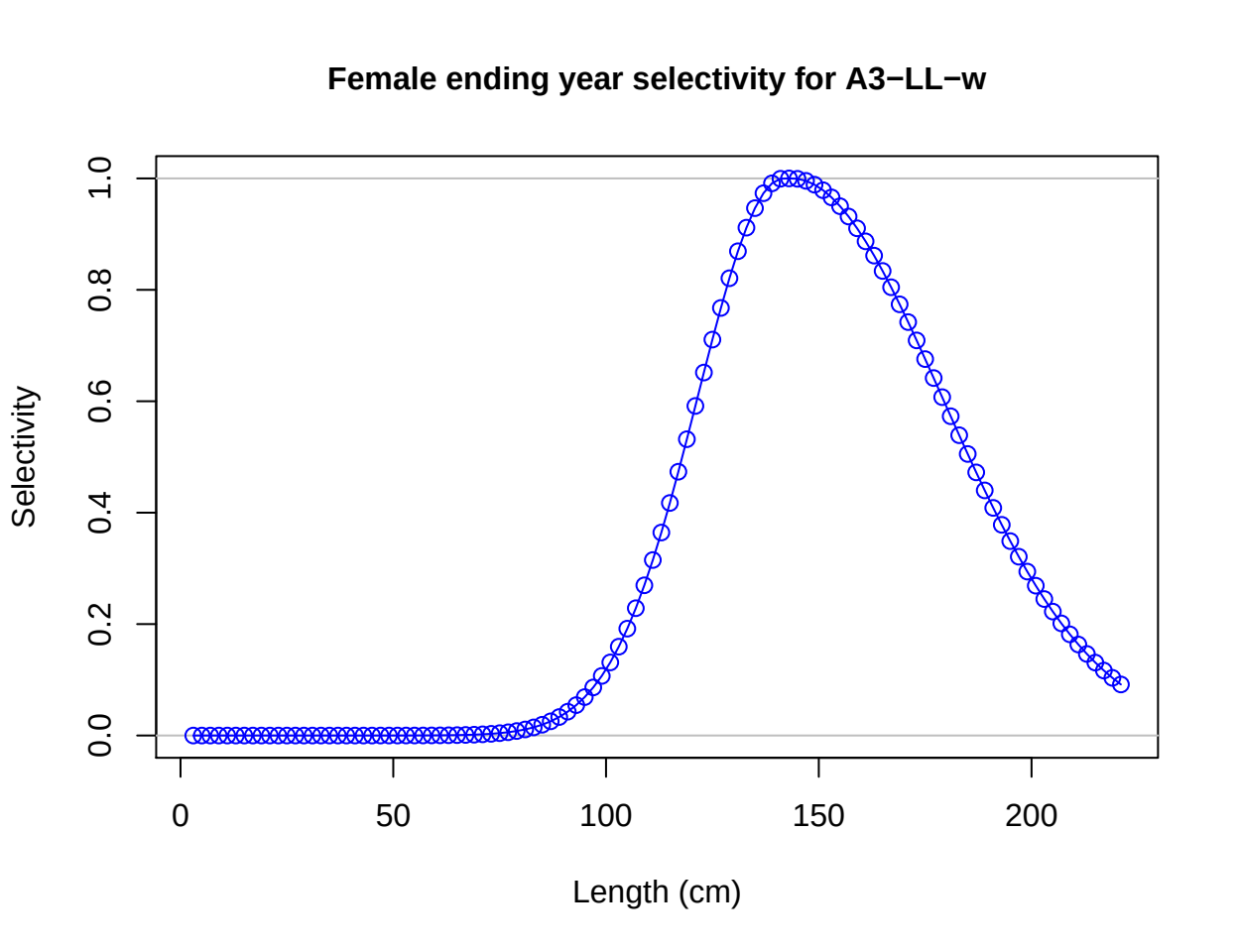

Male ending year selectivity for A6−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

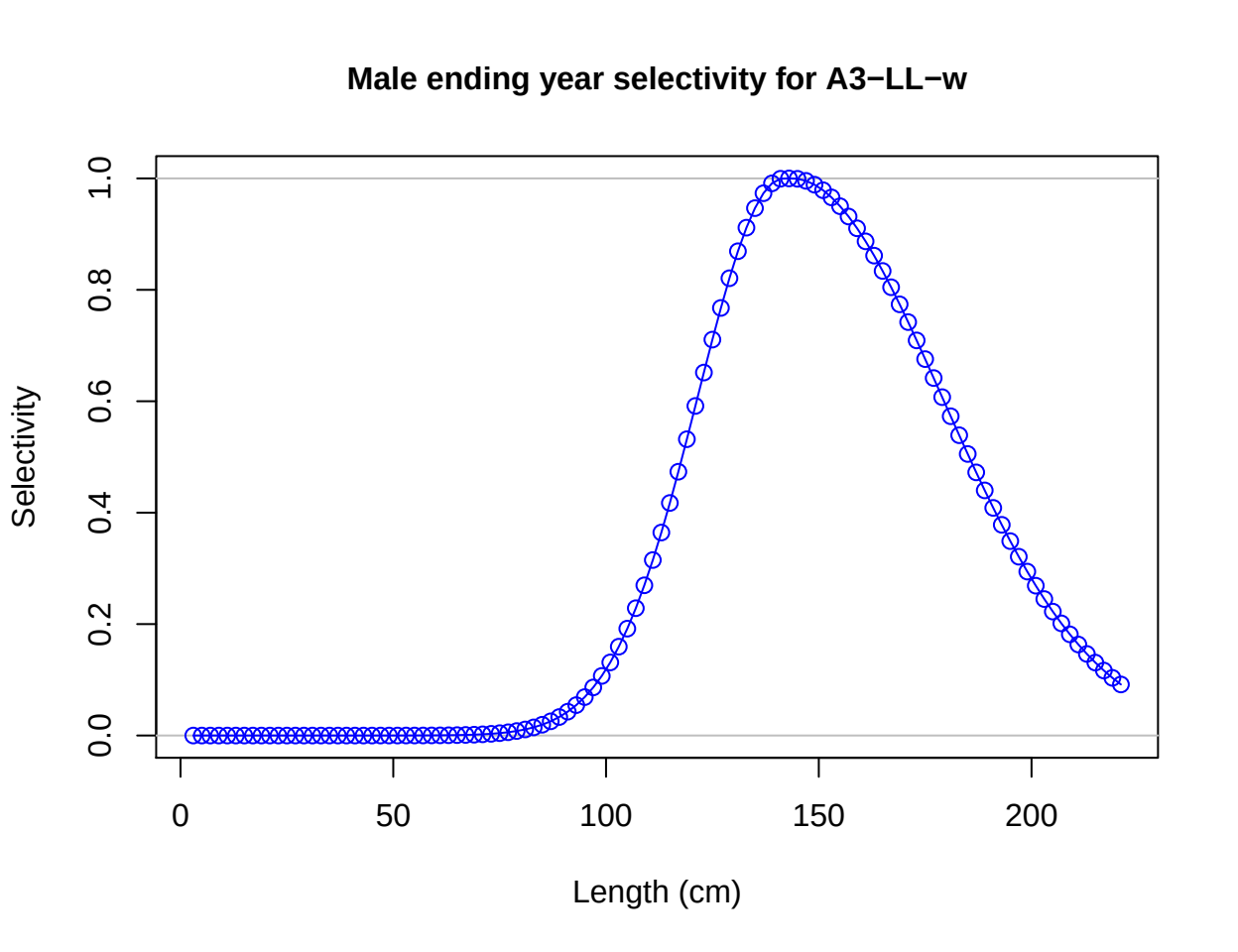

Female ending year selectivity for A1−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

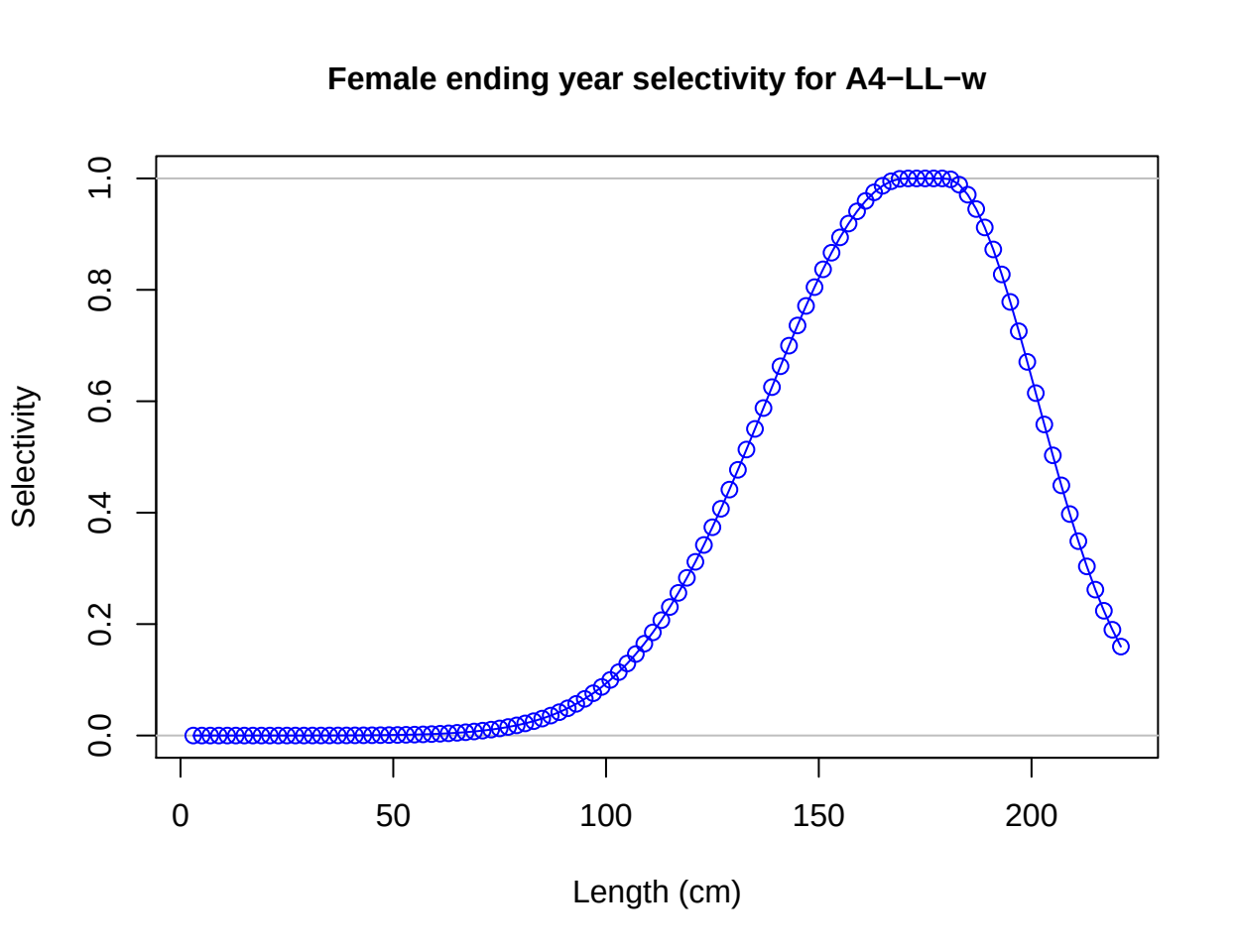

Male ending year selectivity for A1−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

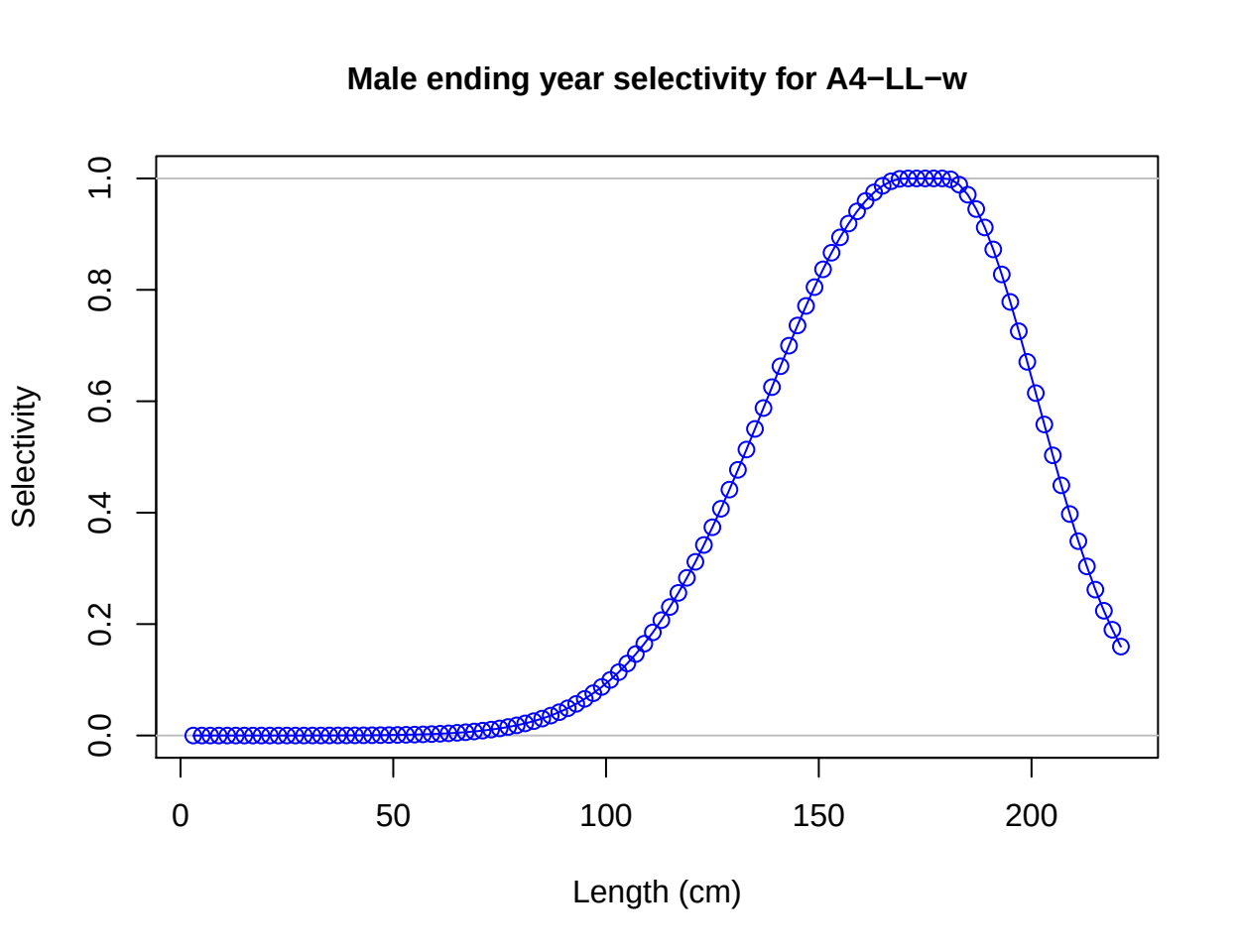

Female ending year selectivity for A2−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

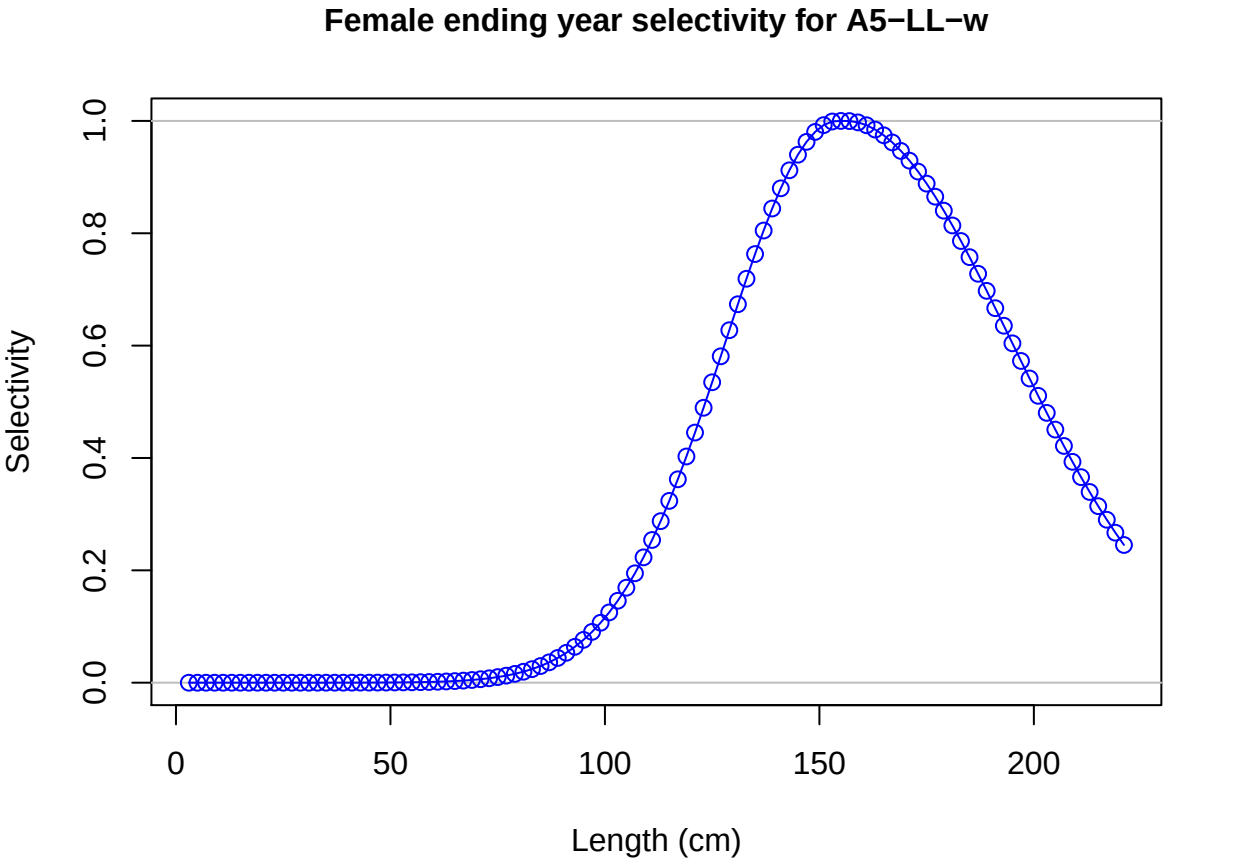

Male ending year selectivity for A2−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

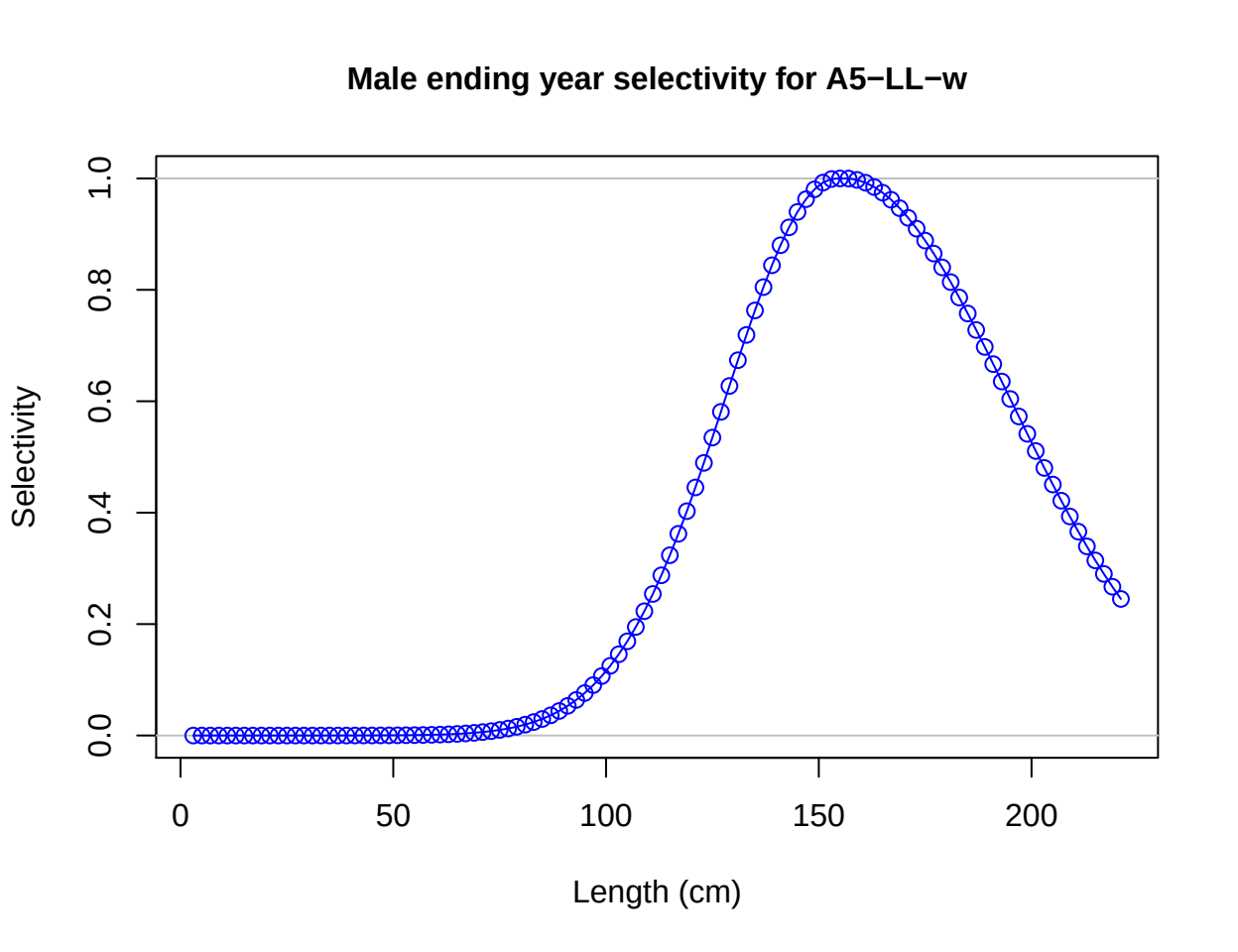

Female ending year selectivity for A3−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

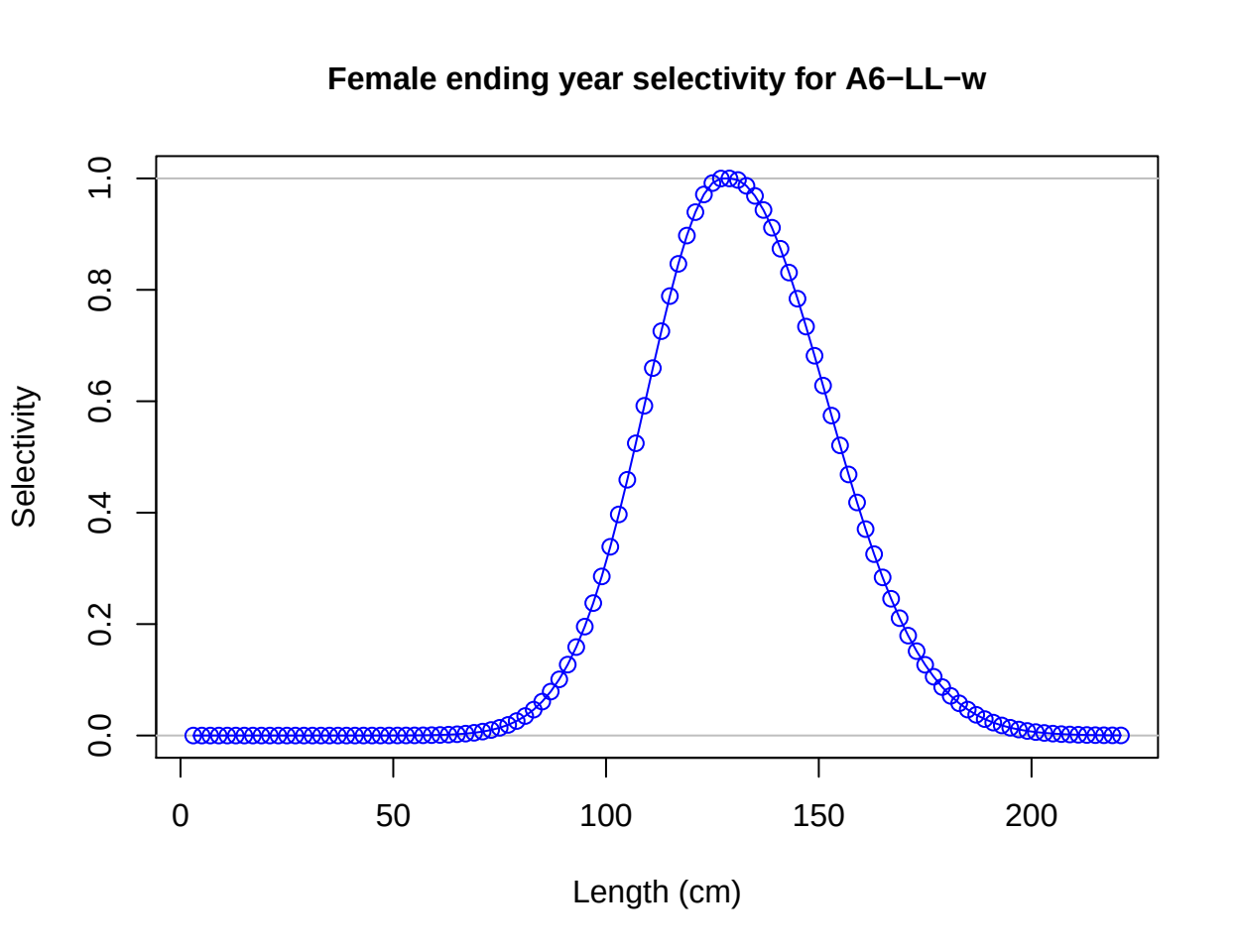

Male ending year selectivity for A3−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

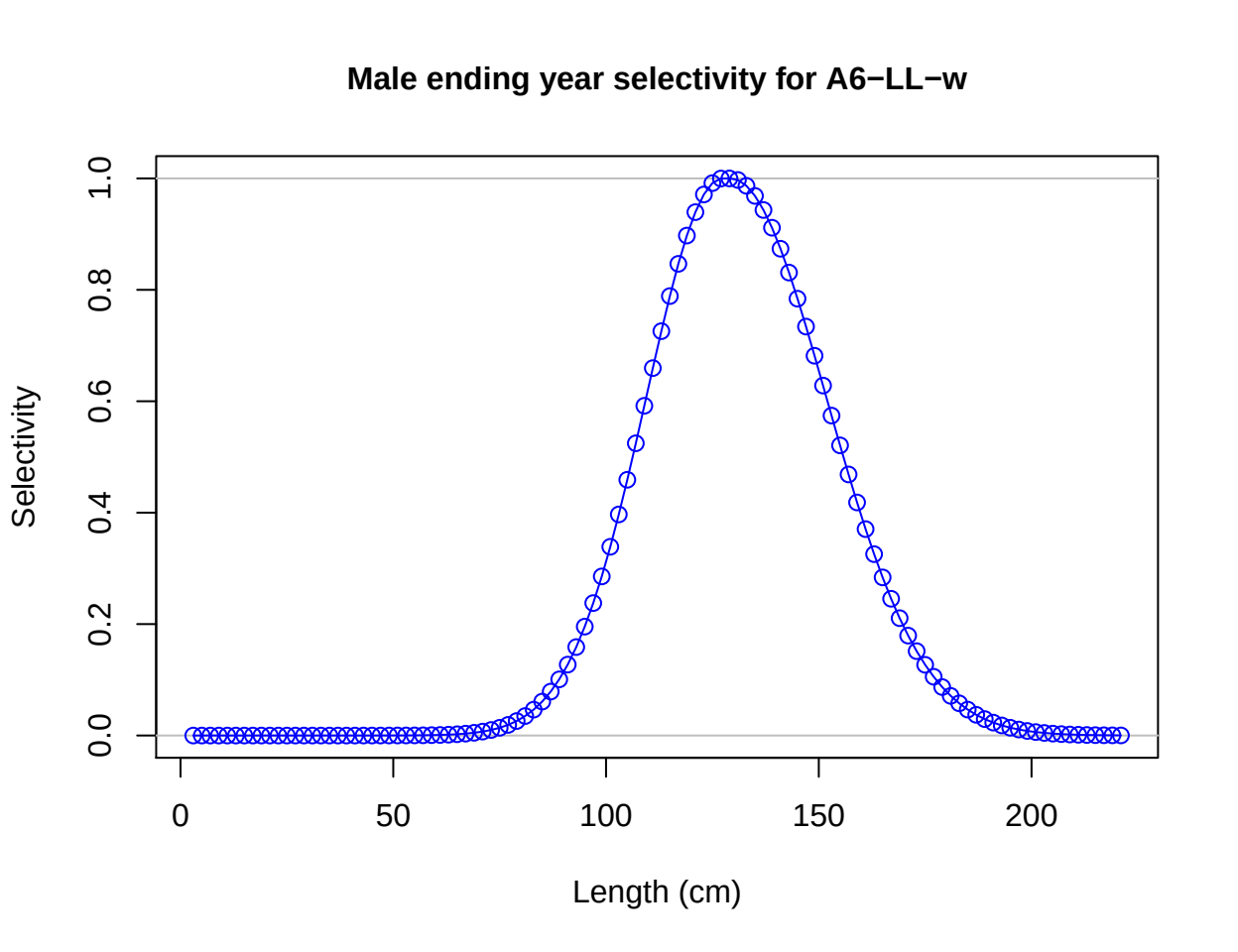

Female ending year selectivity for A4−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

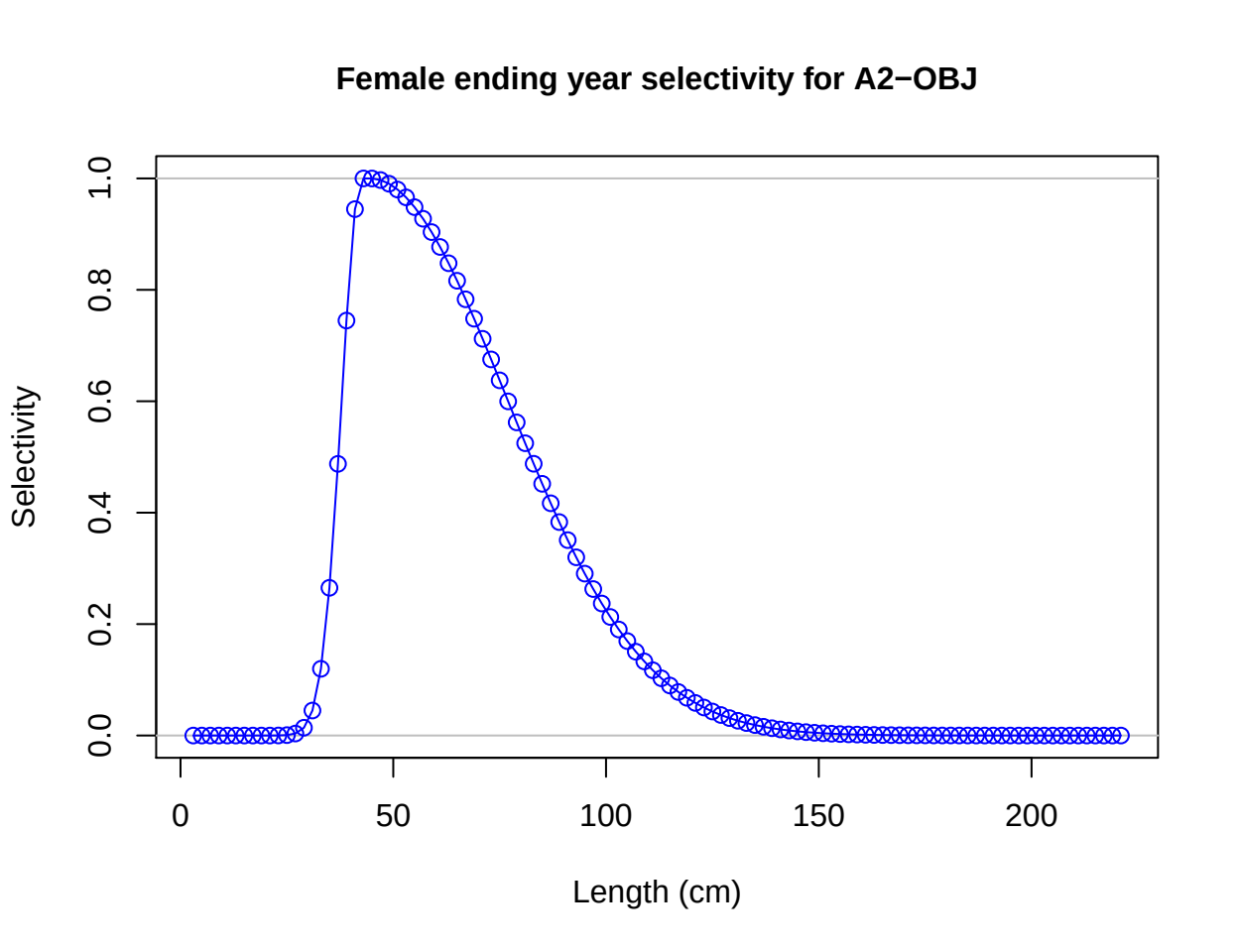

Male ending year selectivity for A4−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

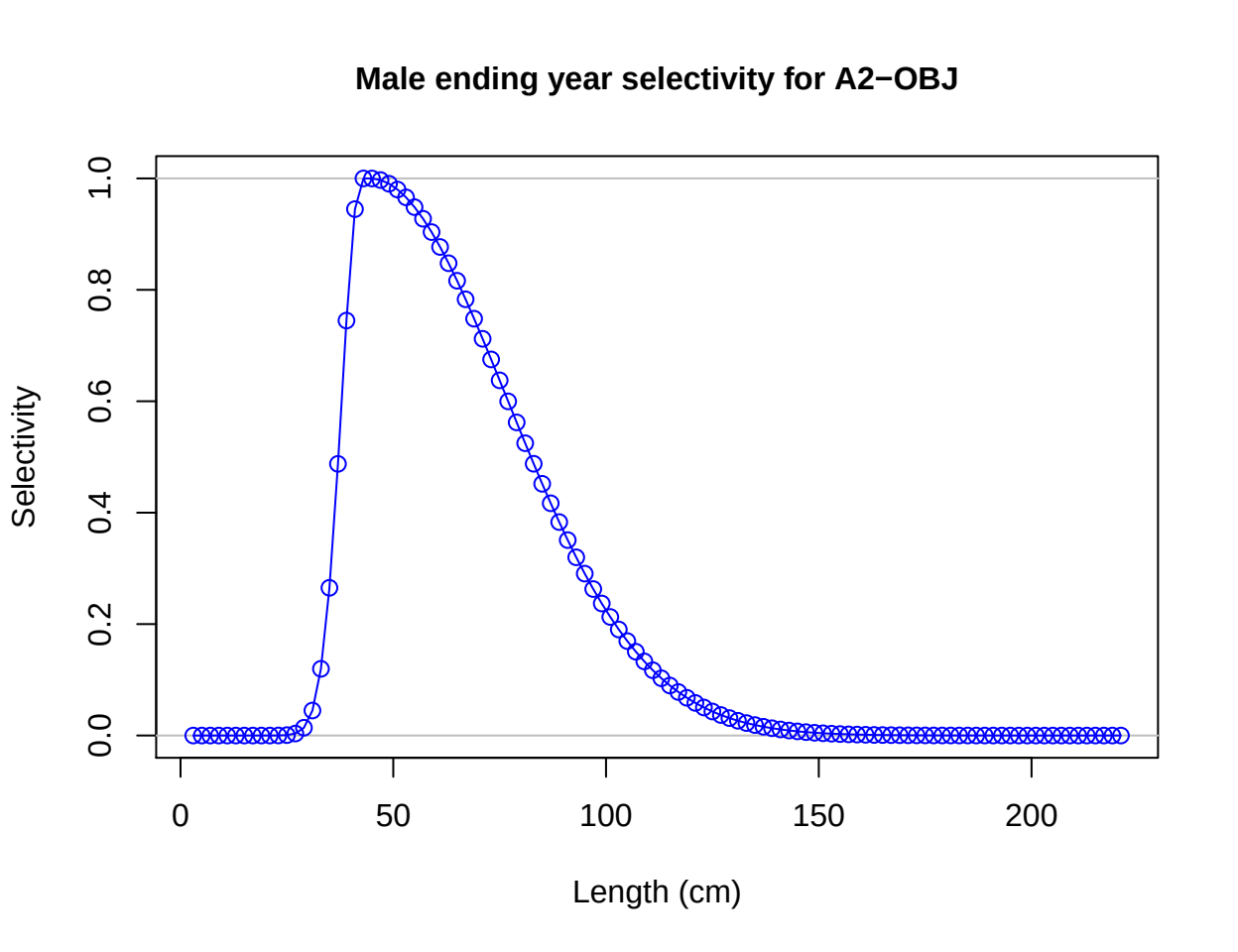

Female ending year selectivity for A5−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

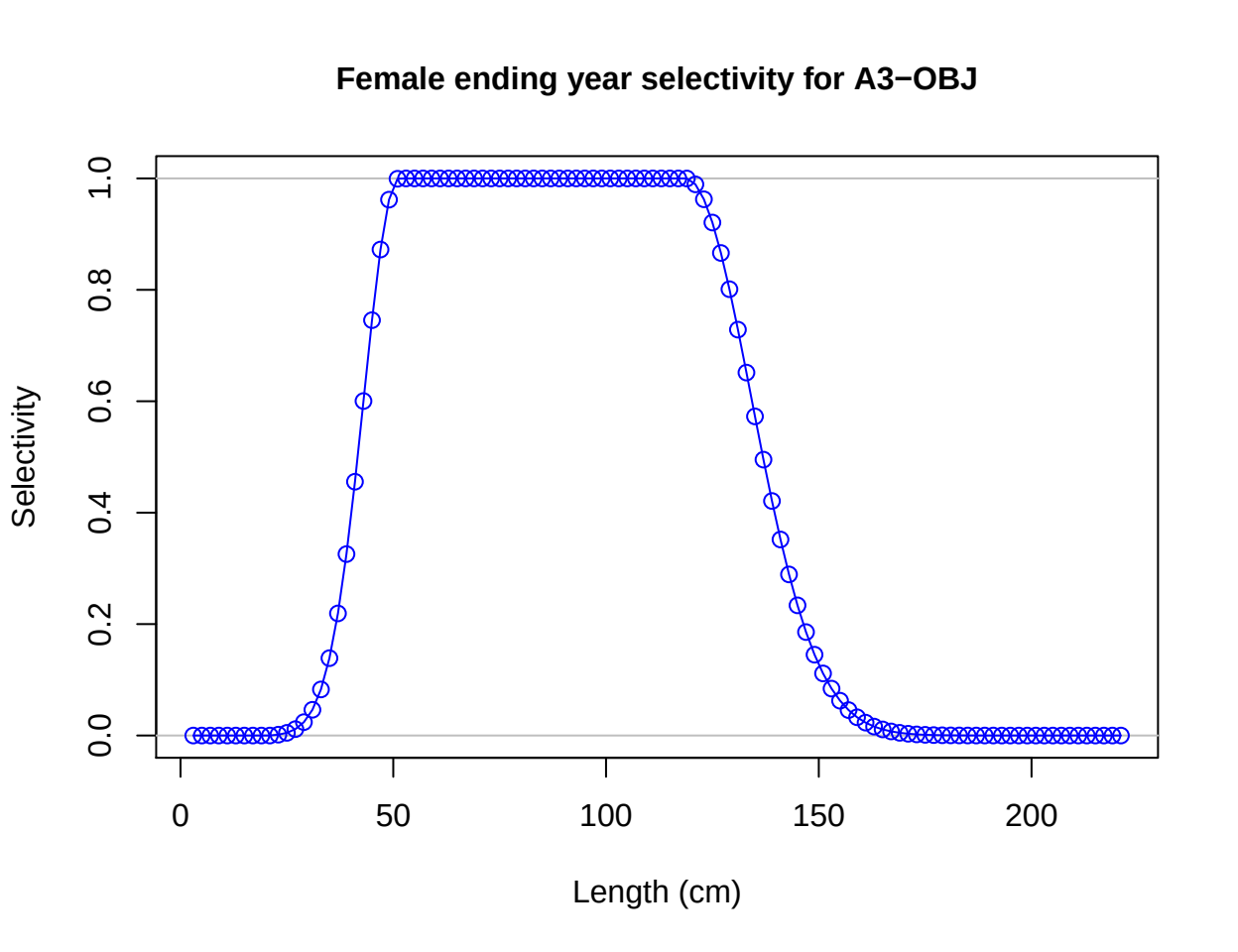

Male ending year selectivity for A5−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

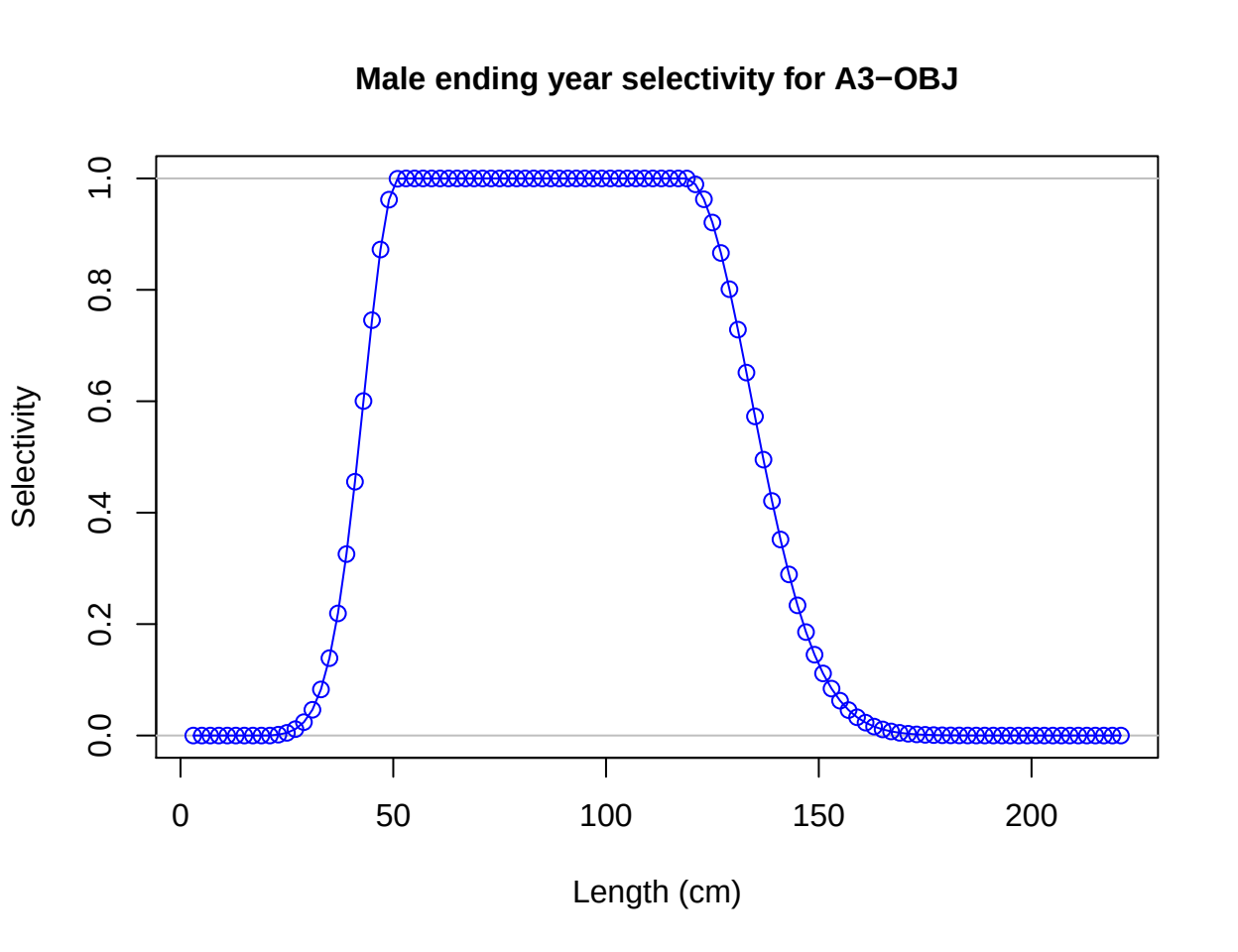

Female ending year selectivity for A6−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

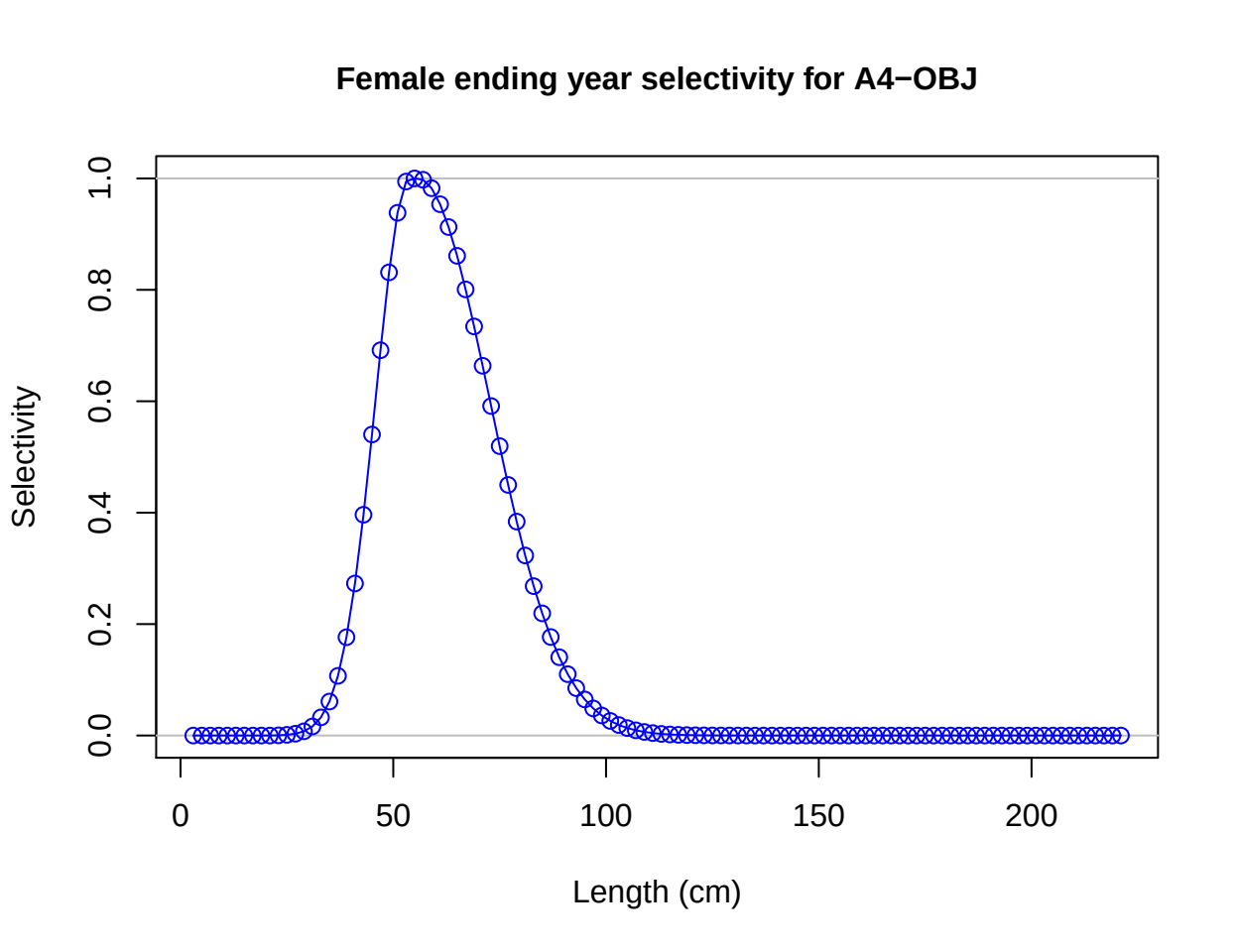

Male ending year selectivity for A6−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

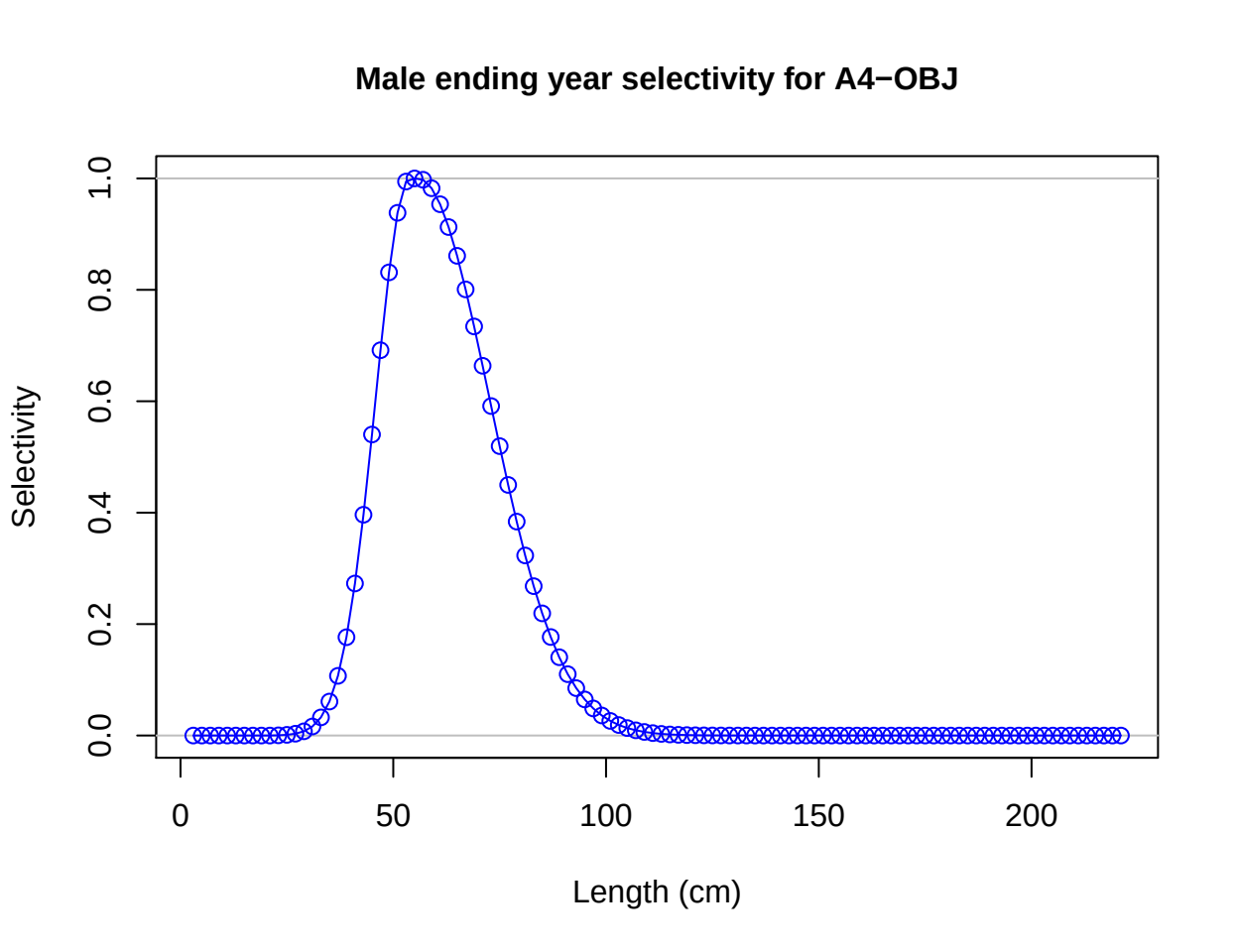

Female ending year selectivity for A2−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

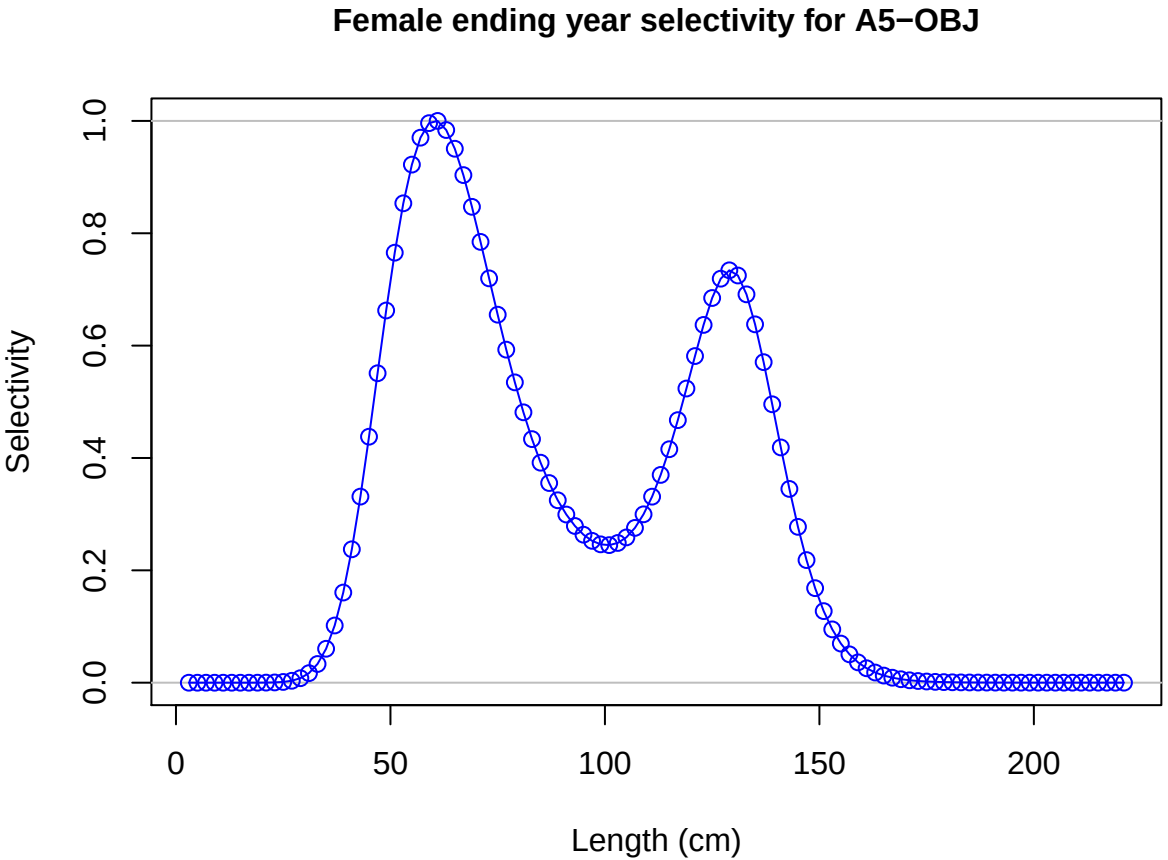

Male ending year selectivity for A2−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

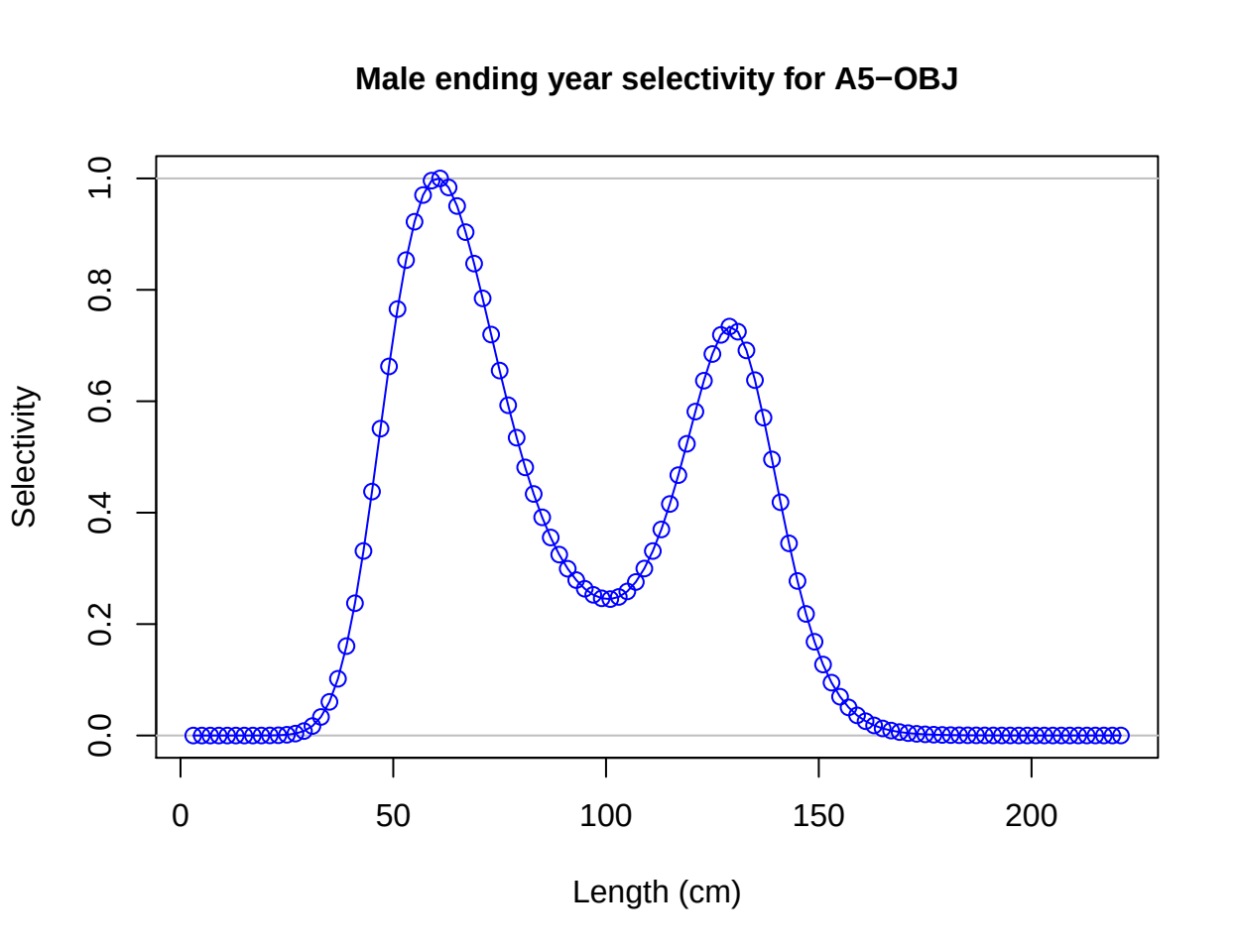

Female ending year selectivity for A3−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

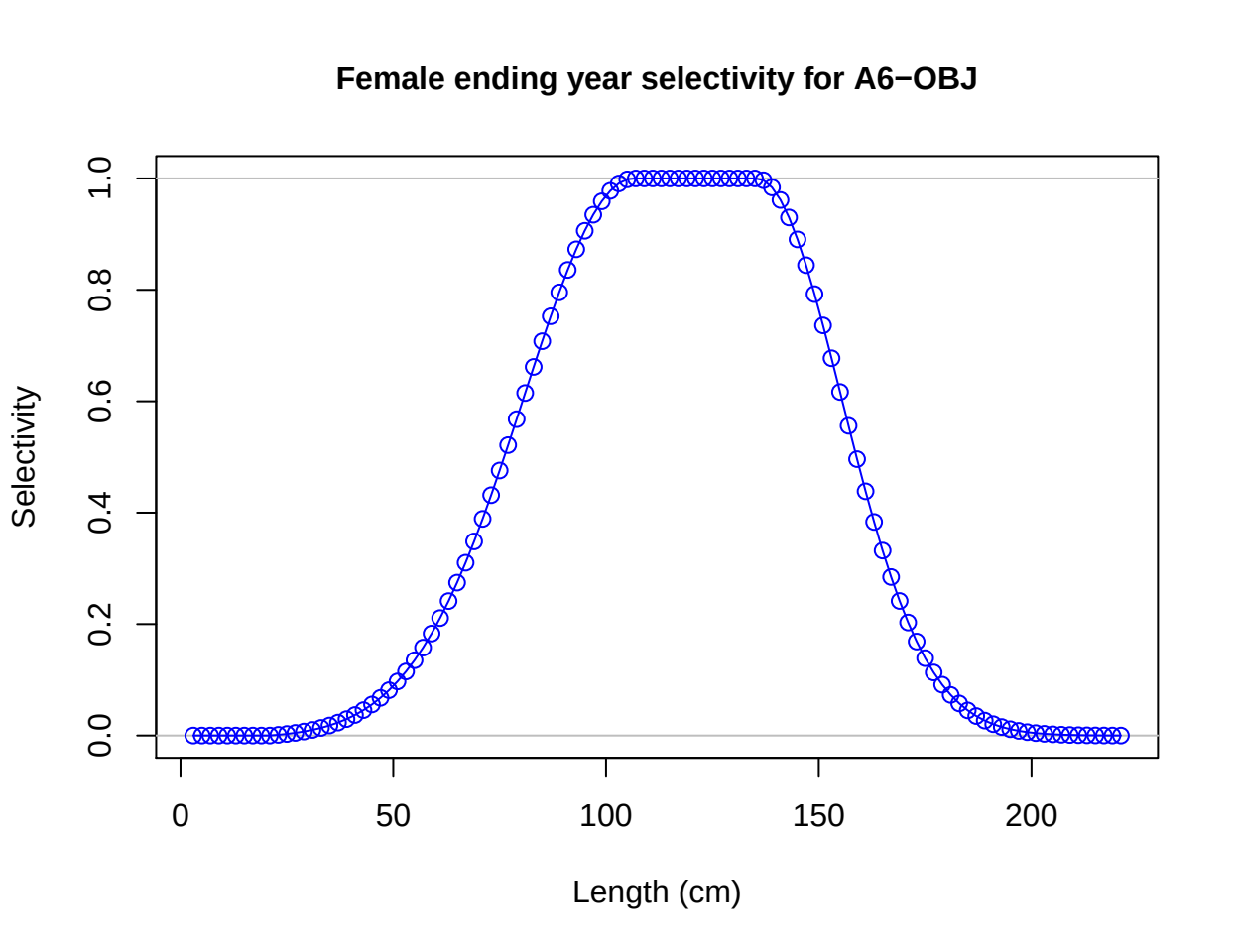

Male ending year selectivity for A3−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

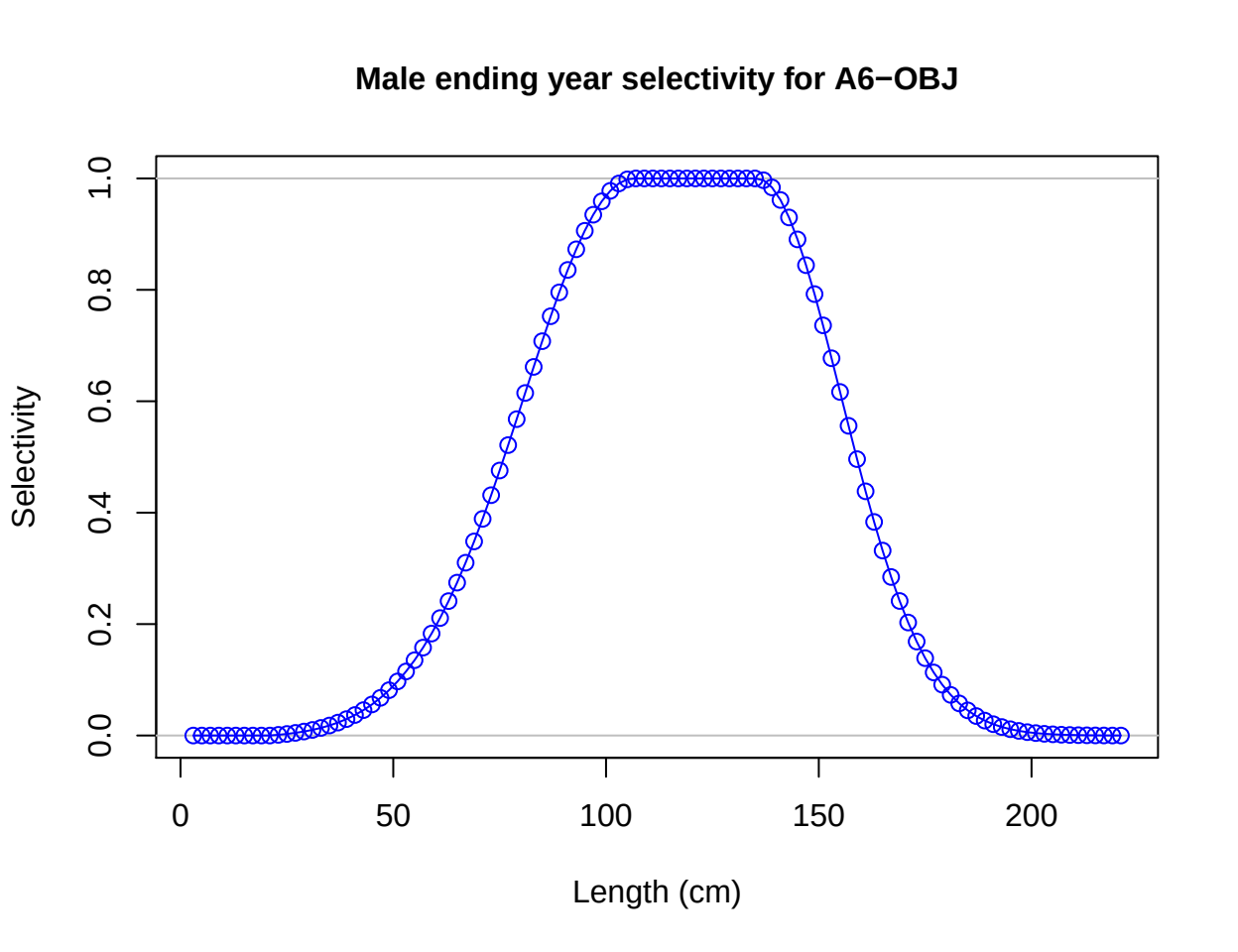

Female ending year selectivity for A4−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

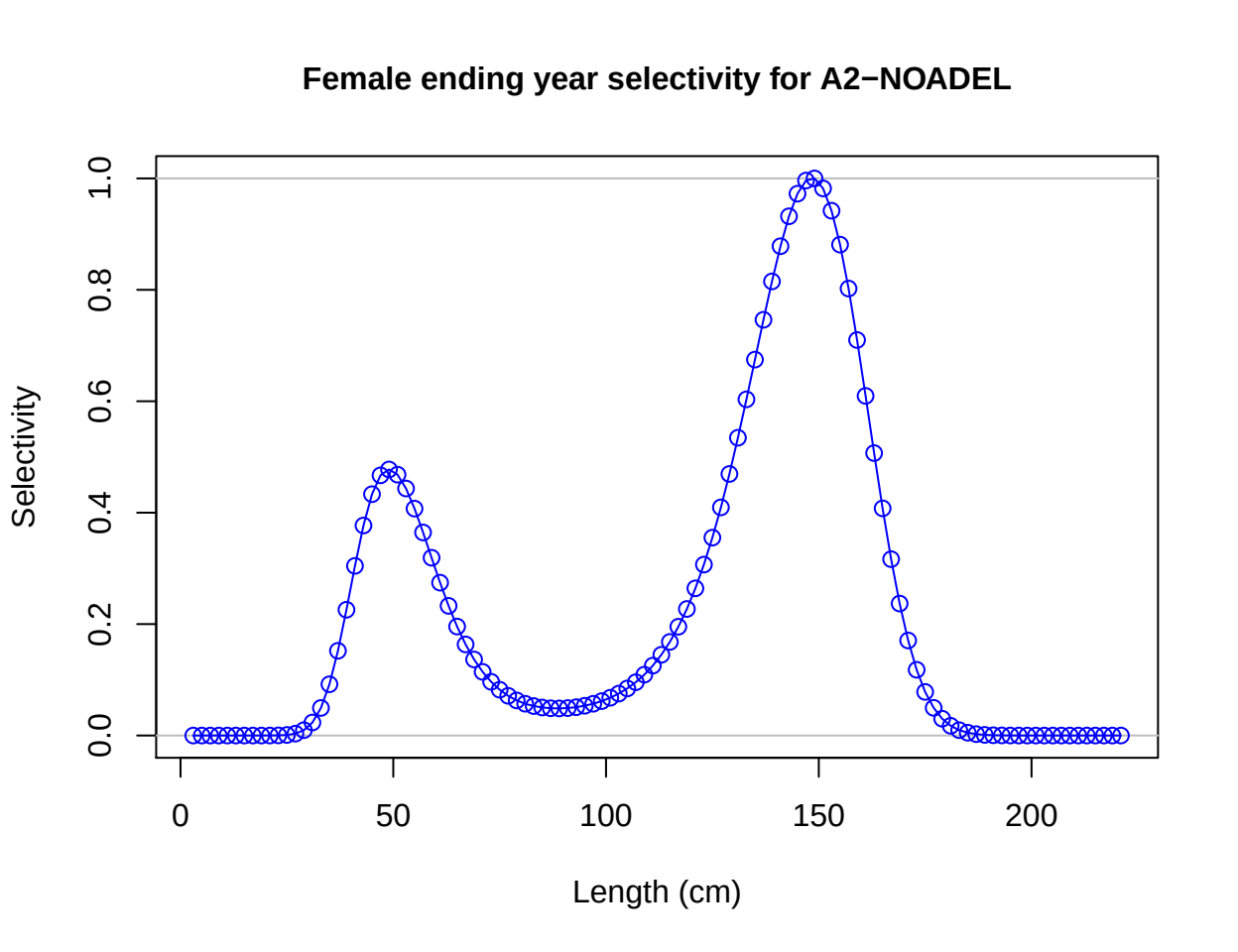

Male ending year selectivity for A4−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

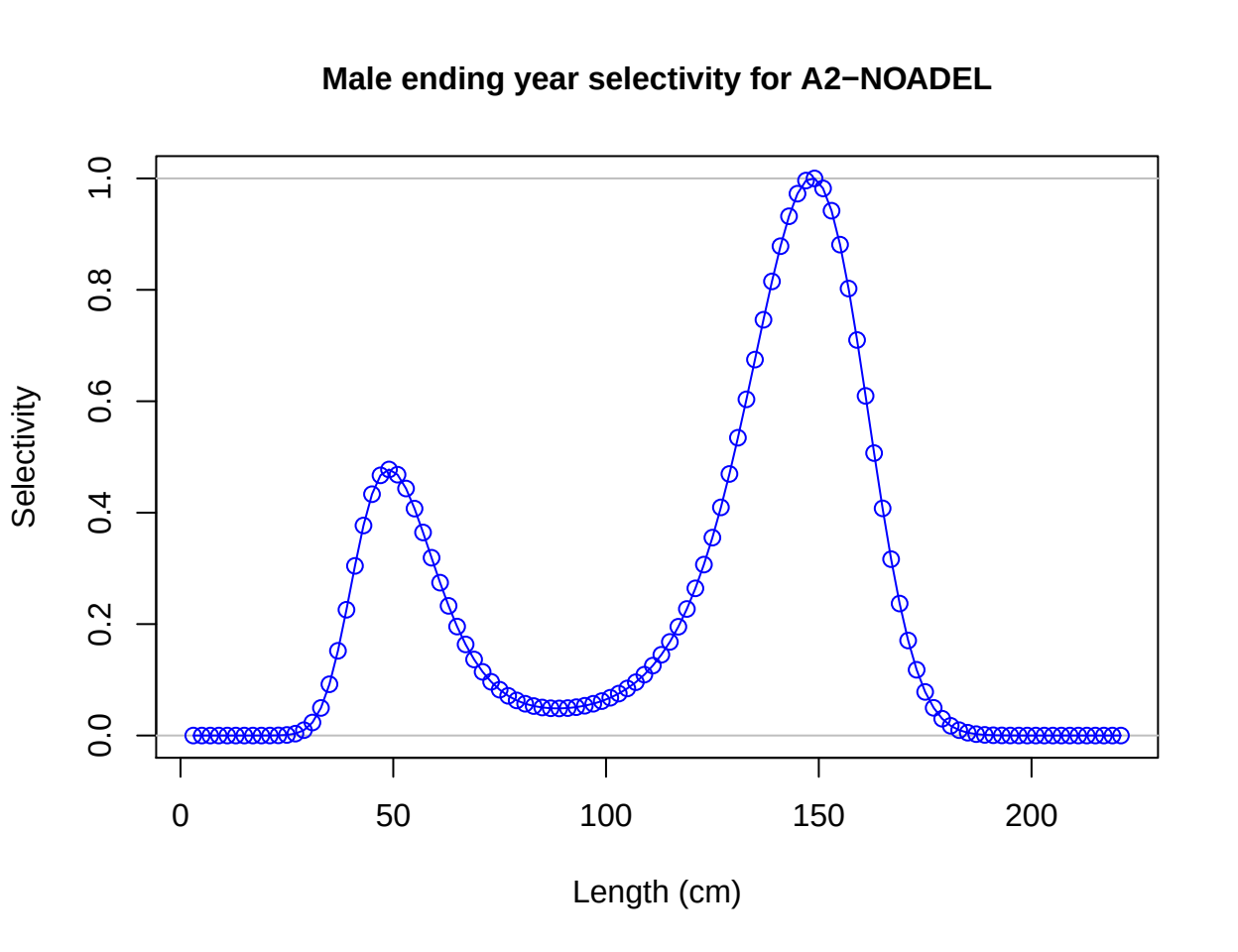

Female ending year selectivity for A5−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

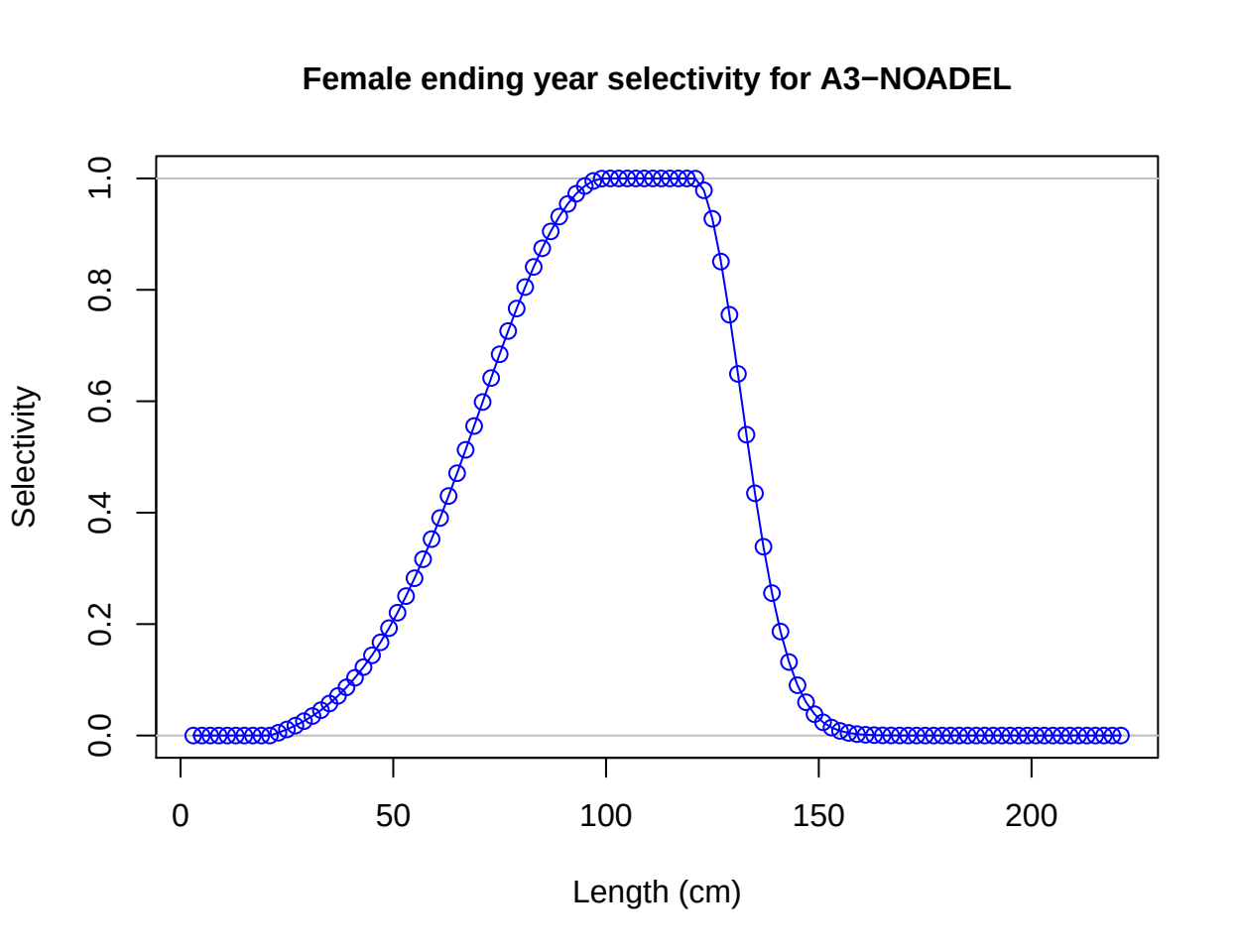

Male ending year selectivity for A5−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

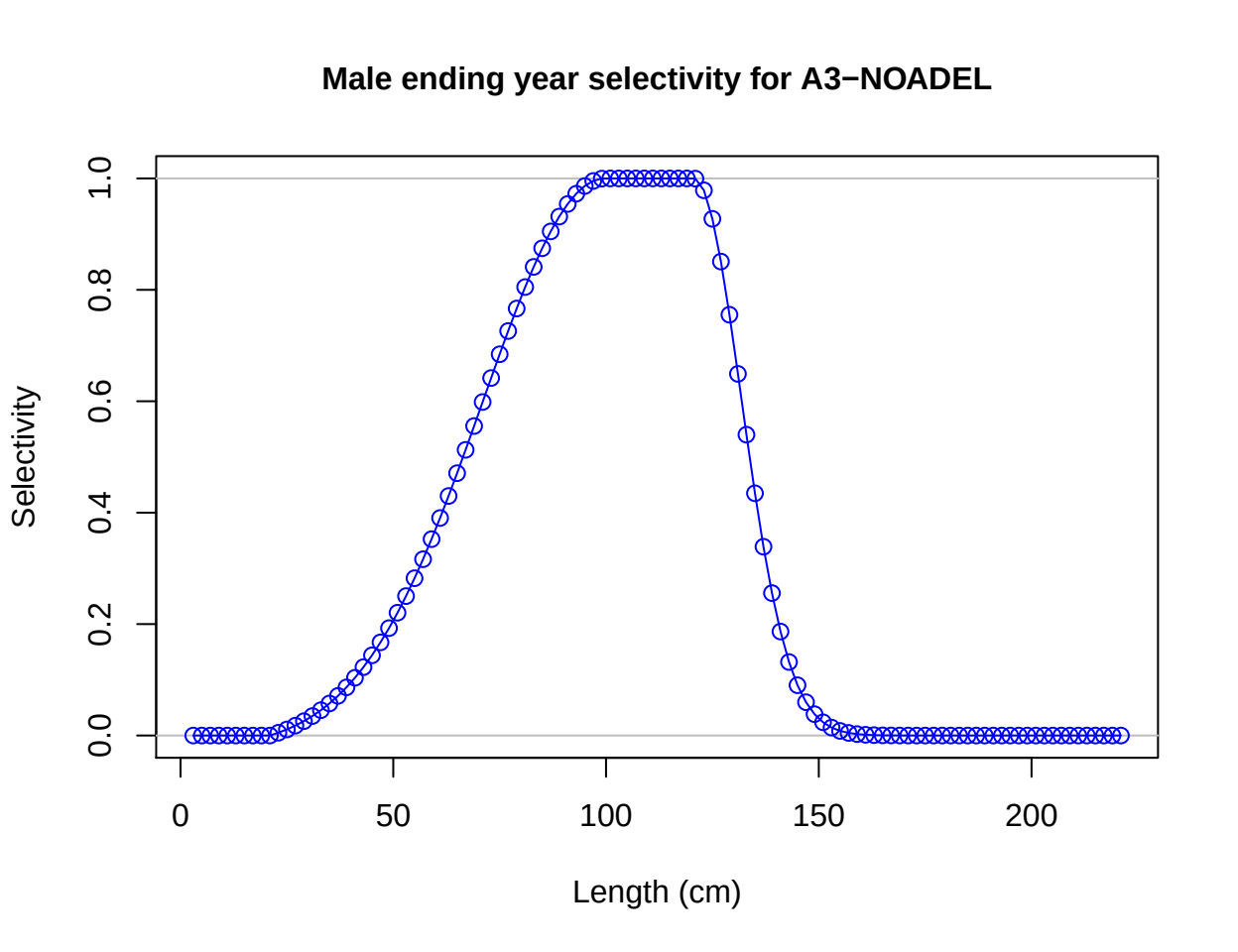

Female ending year selectivity for A6−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

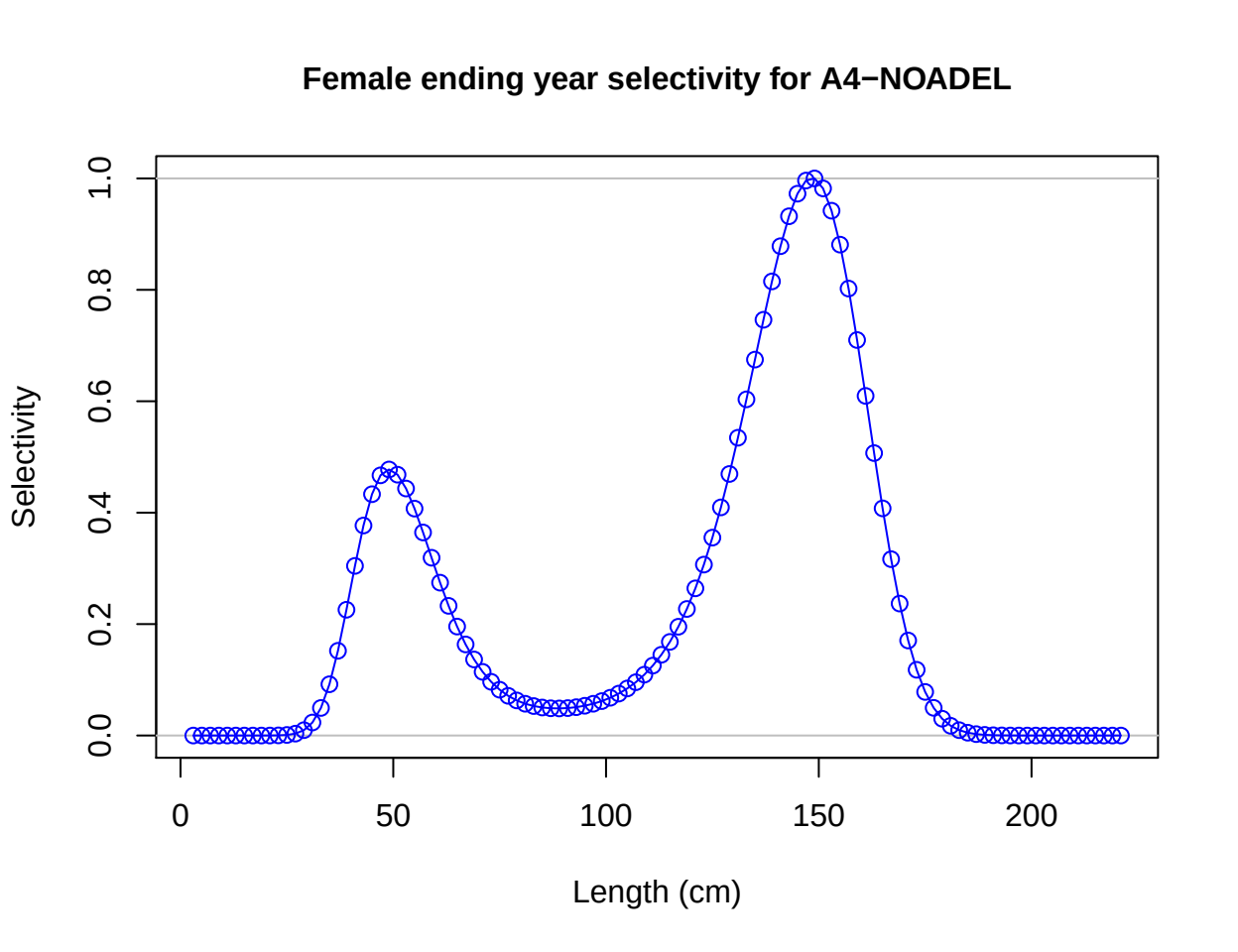

Male ending year selectivity for A6−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

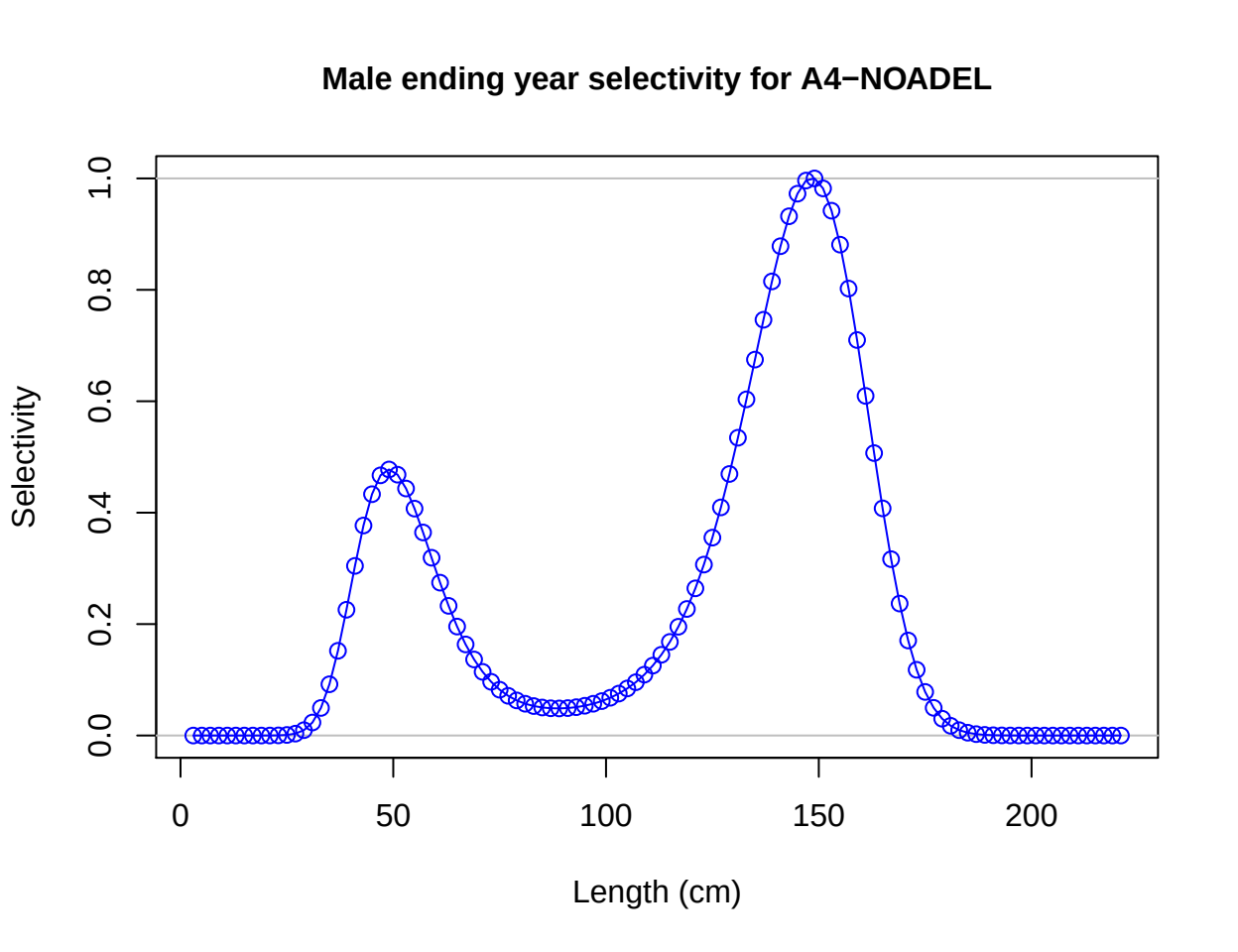

Female ending year selectivity for A2−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

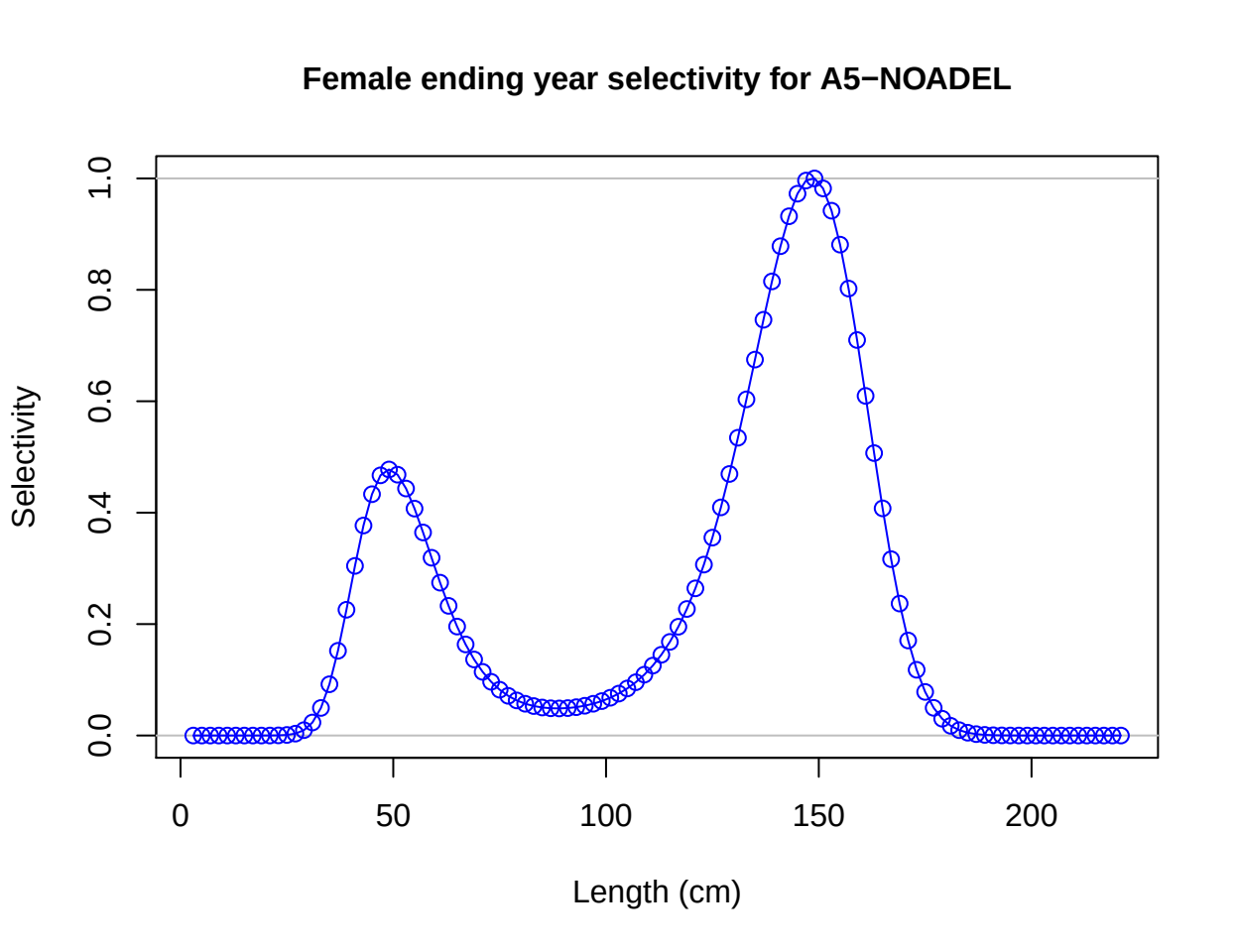

Male ending year selectivity for A2−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

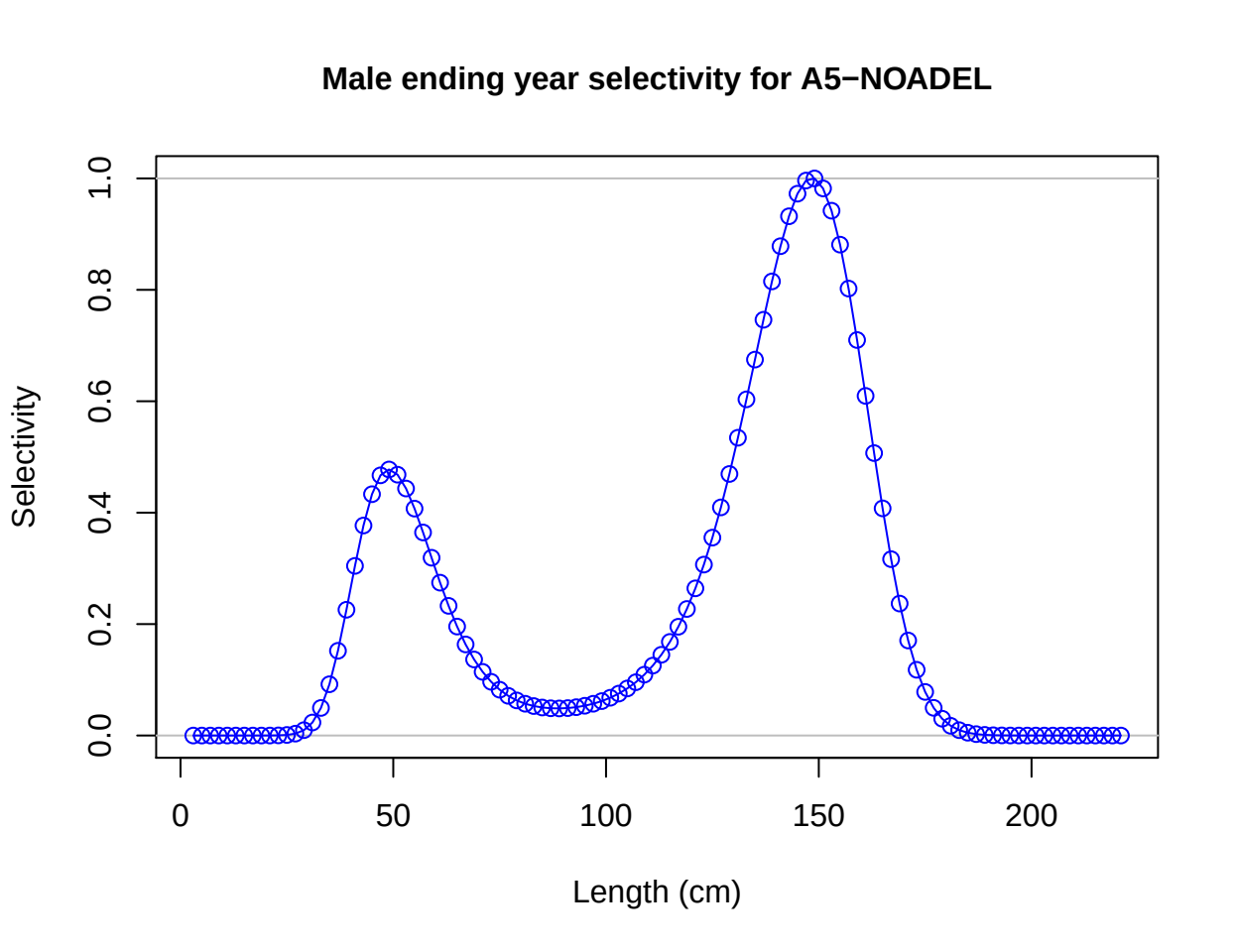

Female ending year selectivity for A3−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

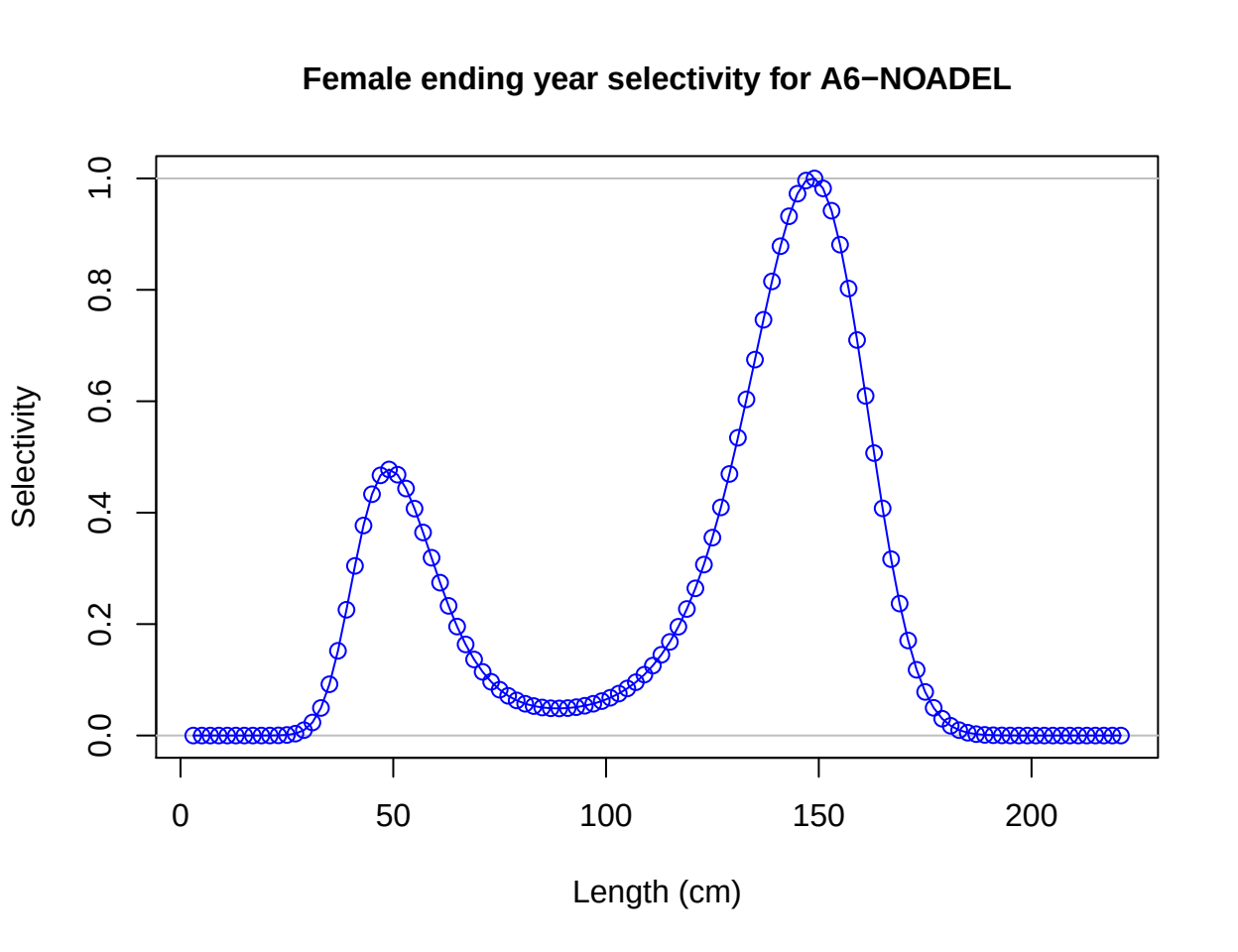

Male ending year selectivity for A3−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

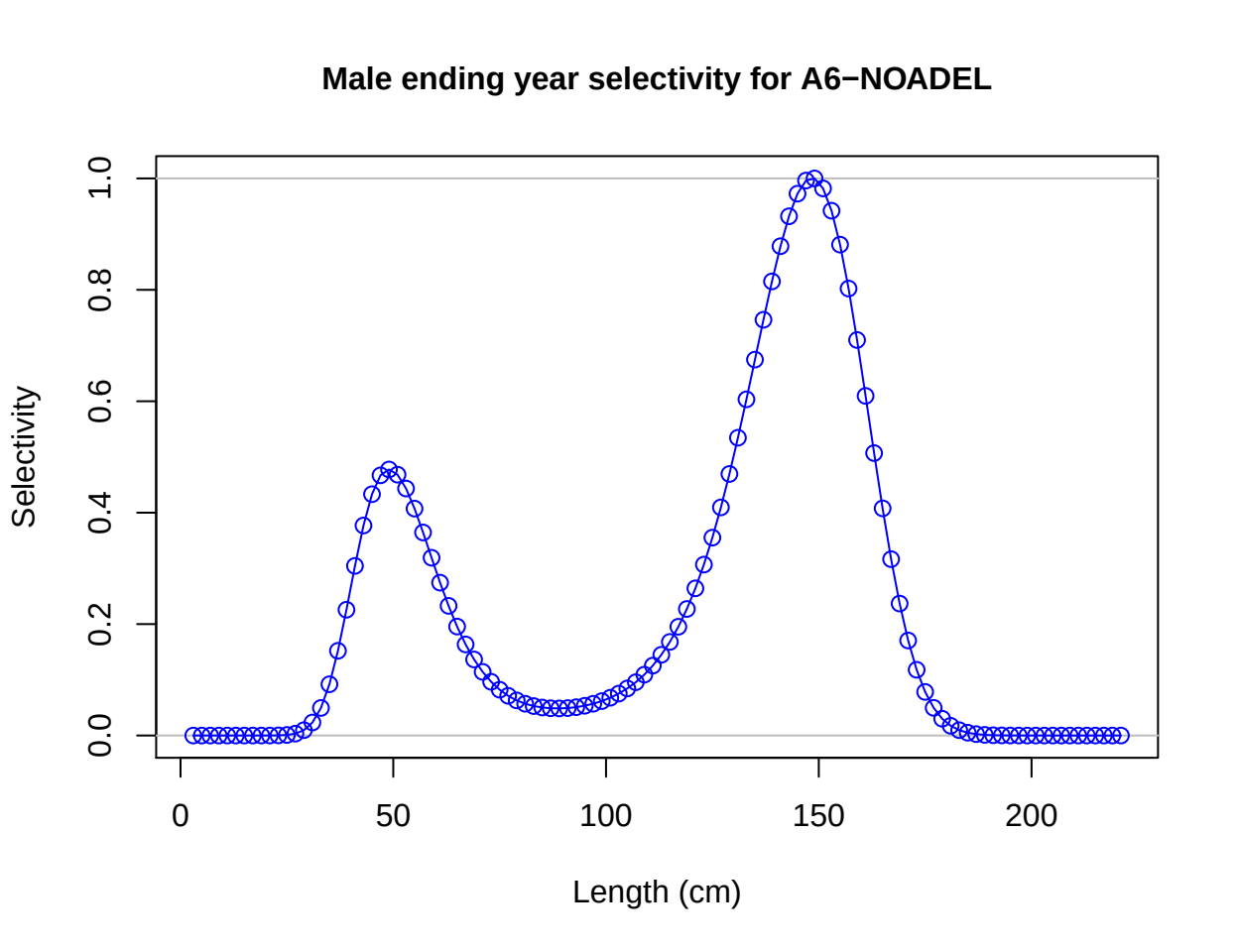

Female ending year selectivity for A4−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

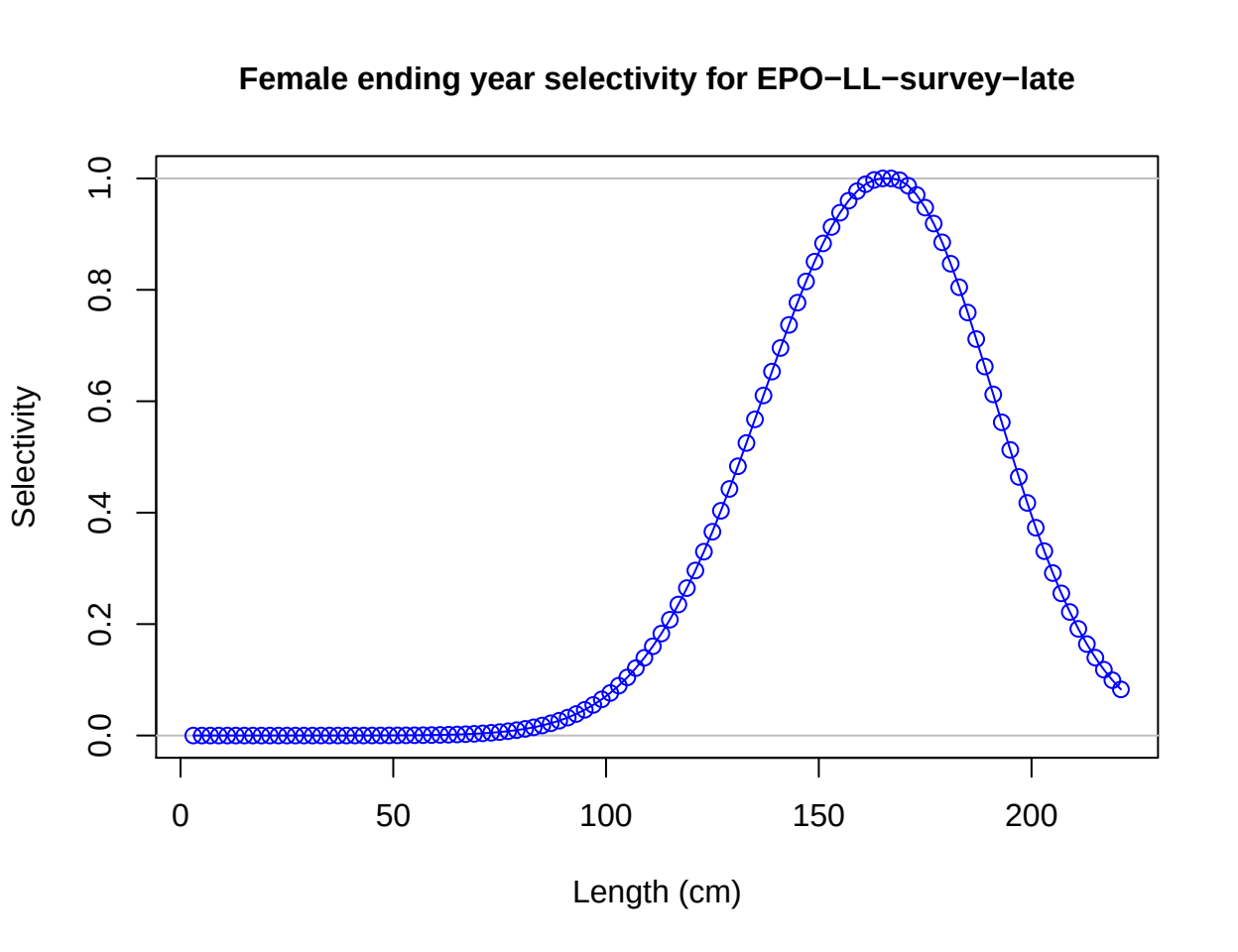

Male ending year selectivity for A4−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

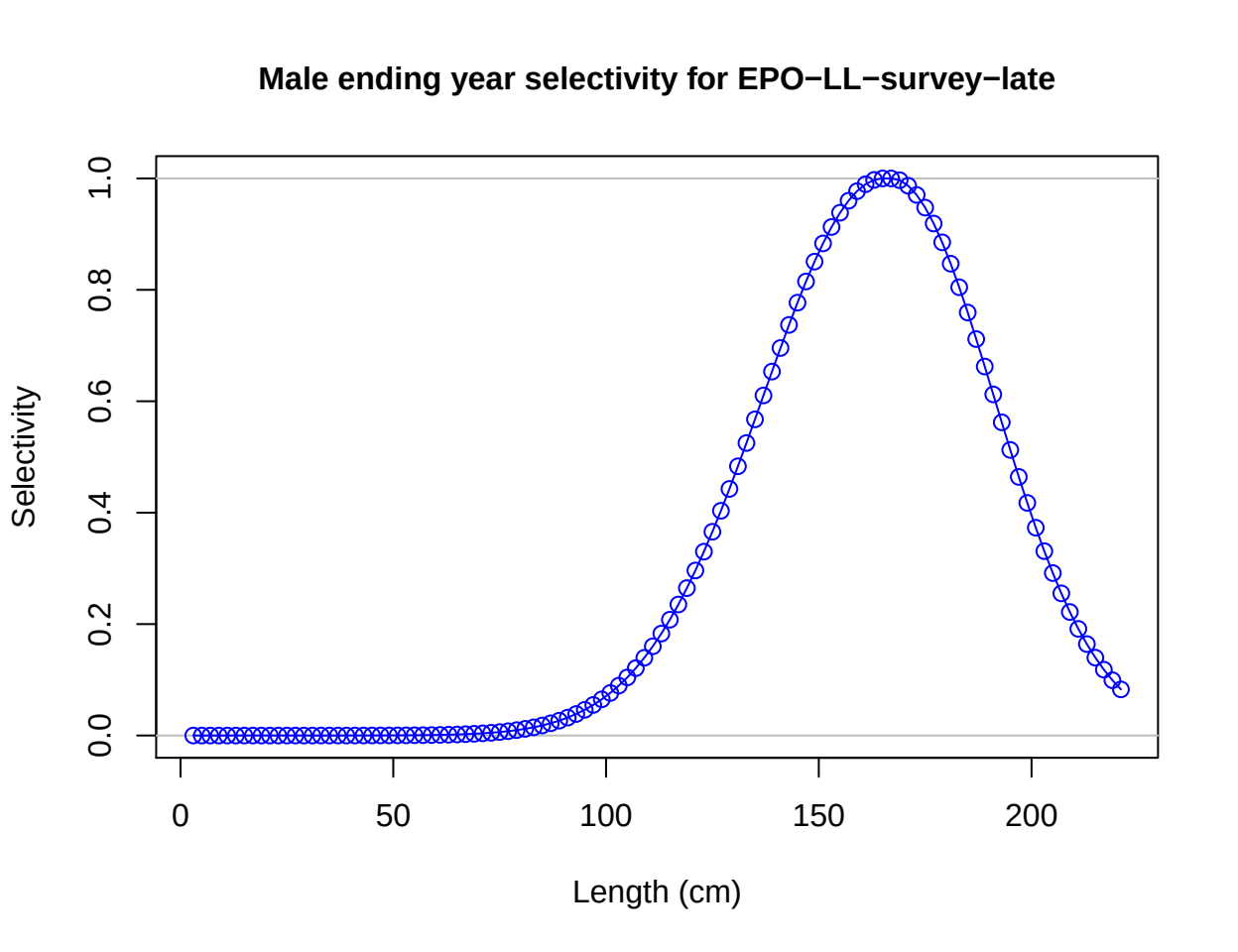

Female ending year selectivity for A5−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

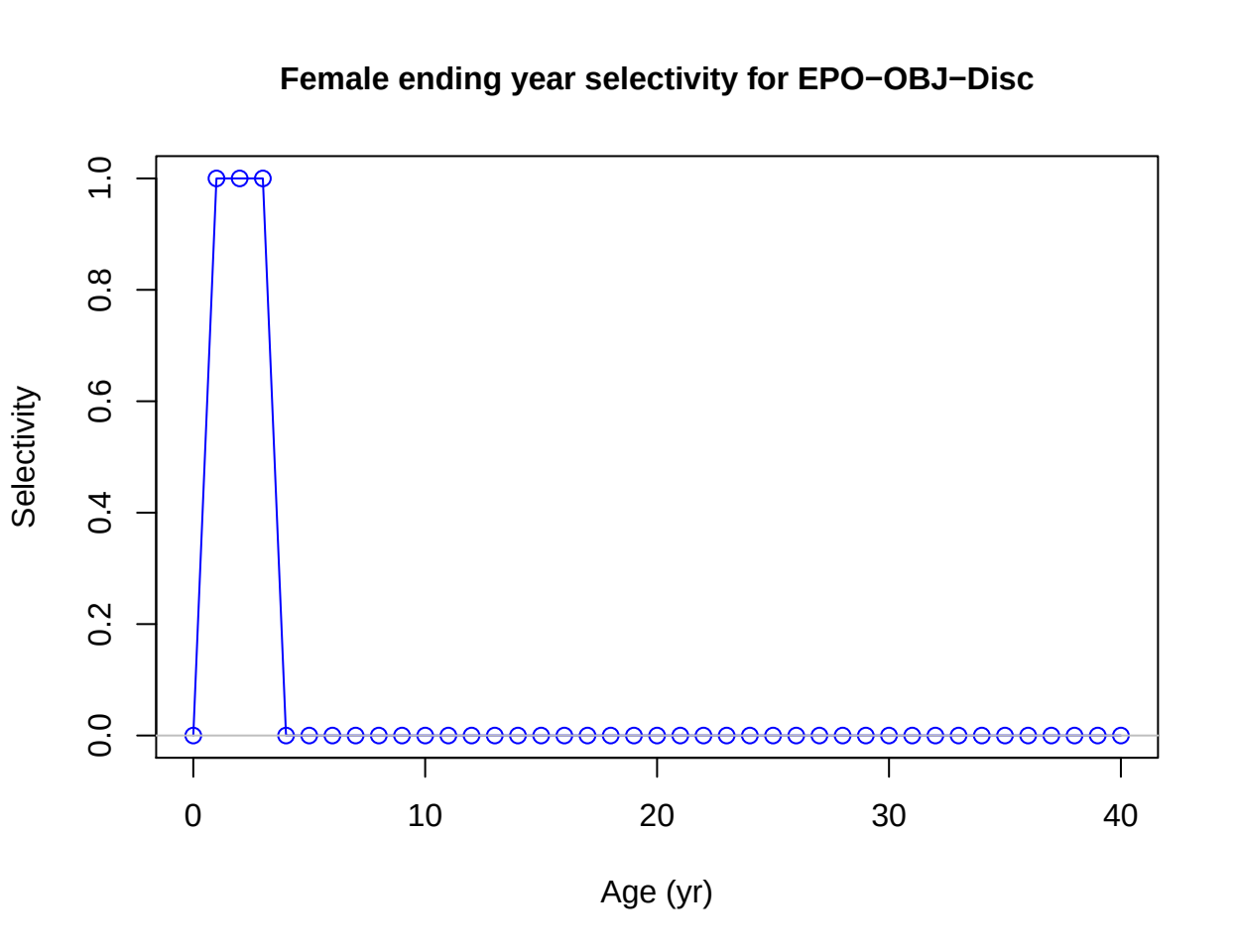

Male ending year selectivity for A5−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

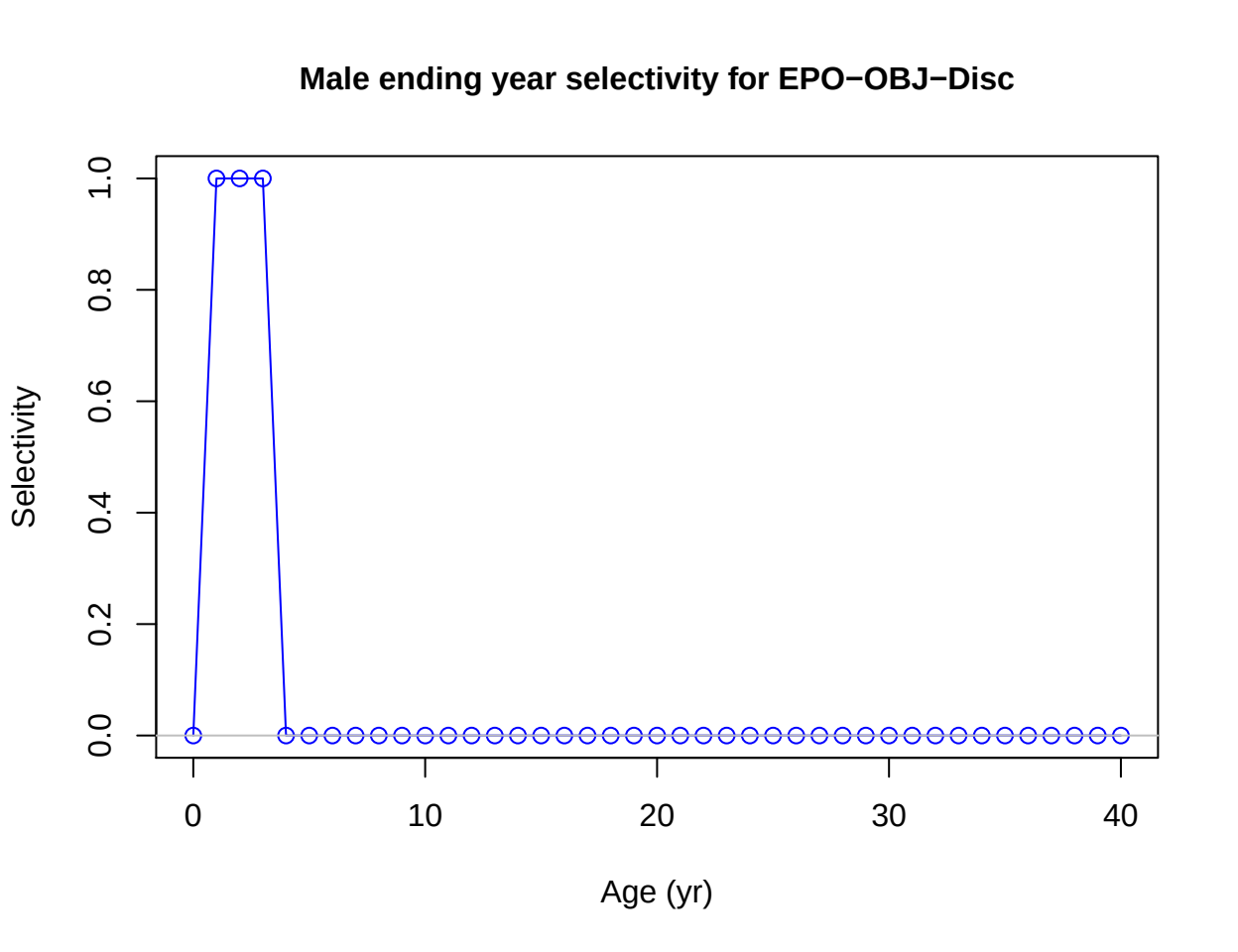

Female ending year selectivity for A6−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

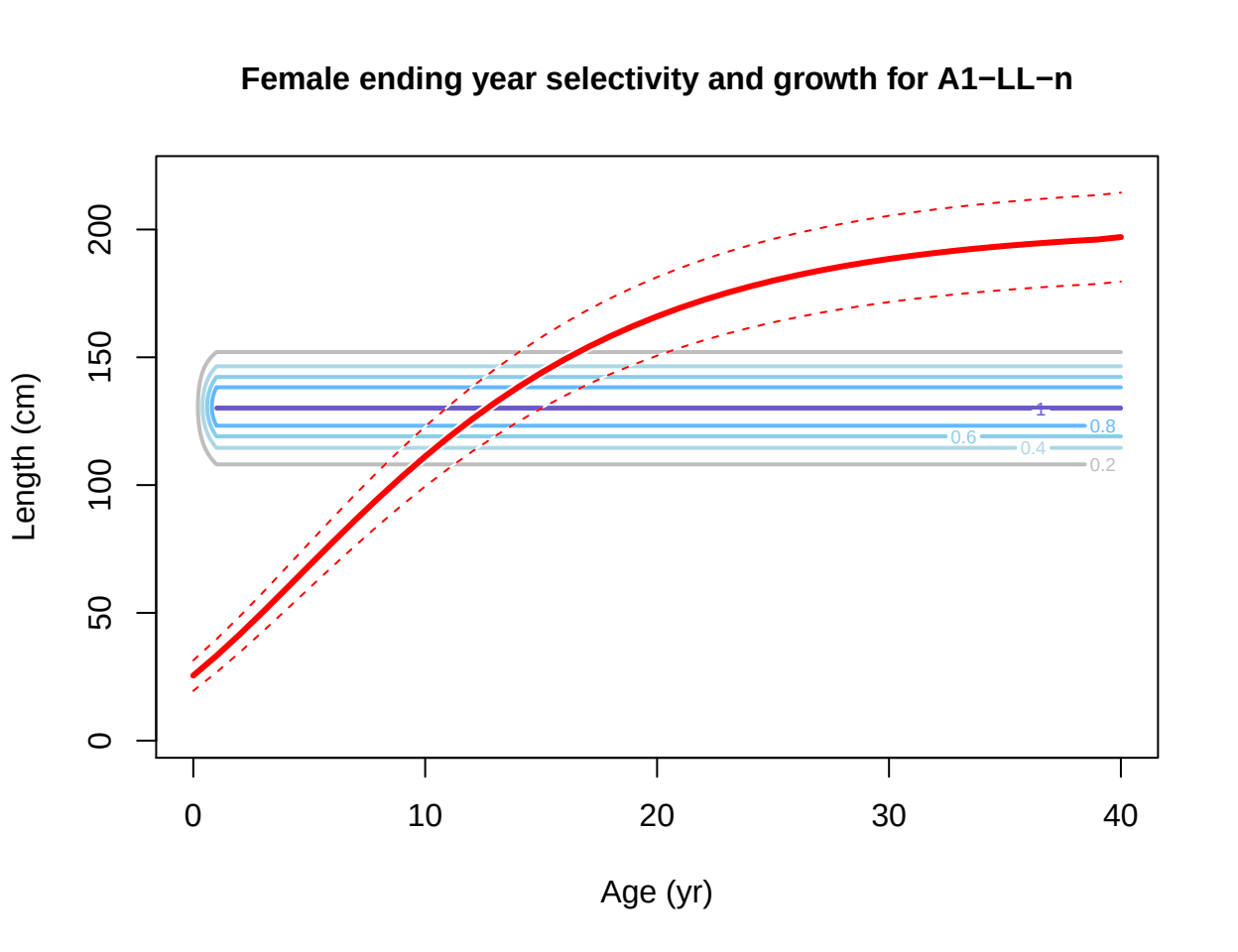

Male ending year selectivity for A6−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

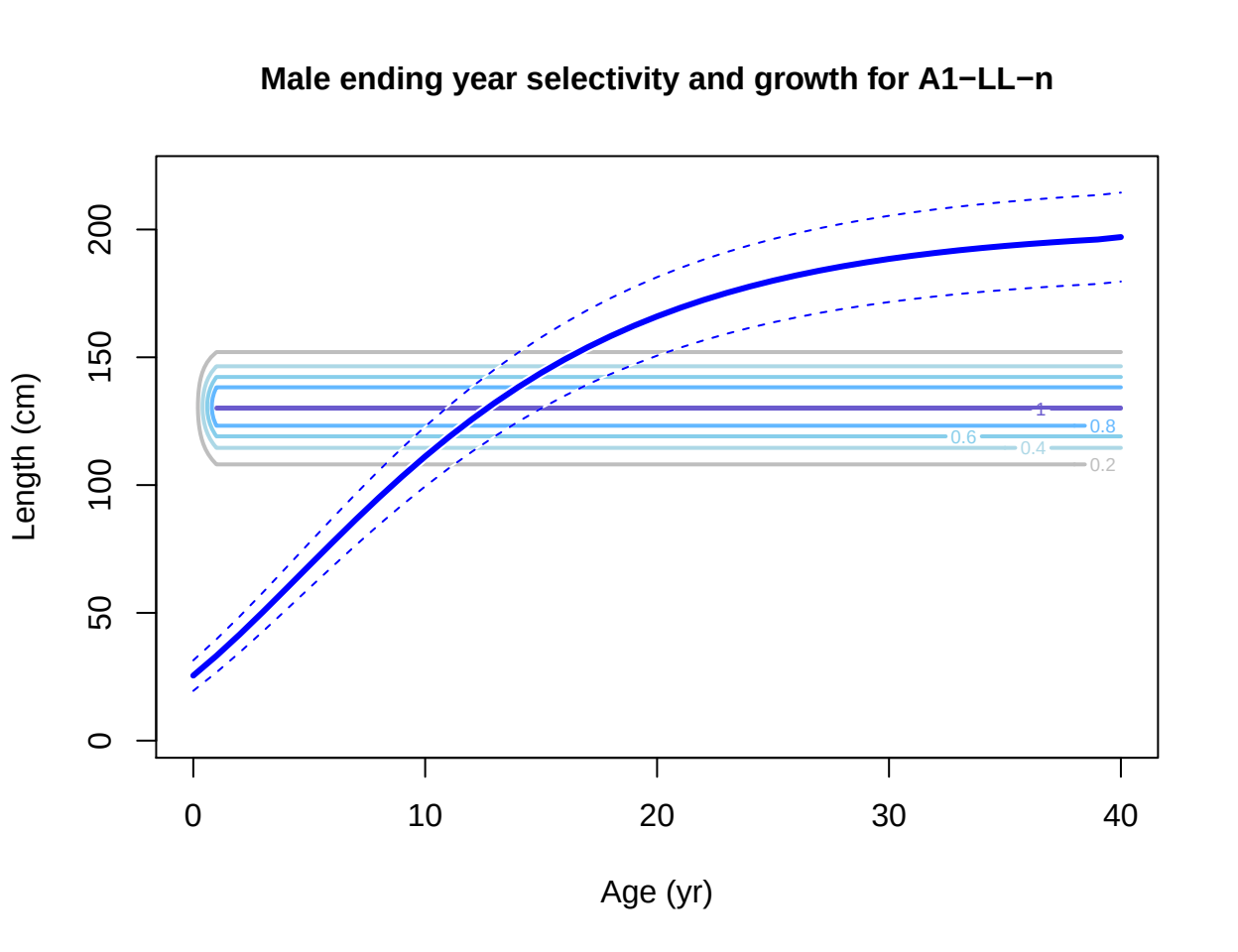

Female ending year selectivity for EPO−LL−survey−late
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

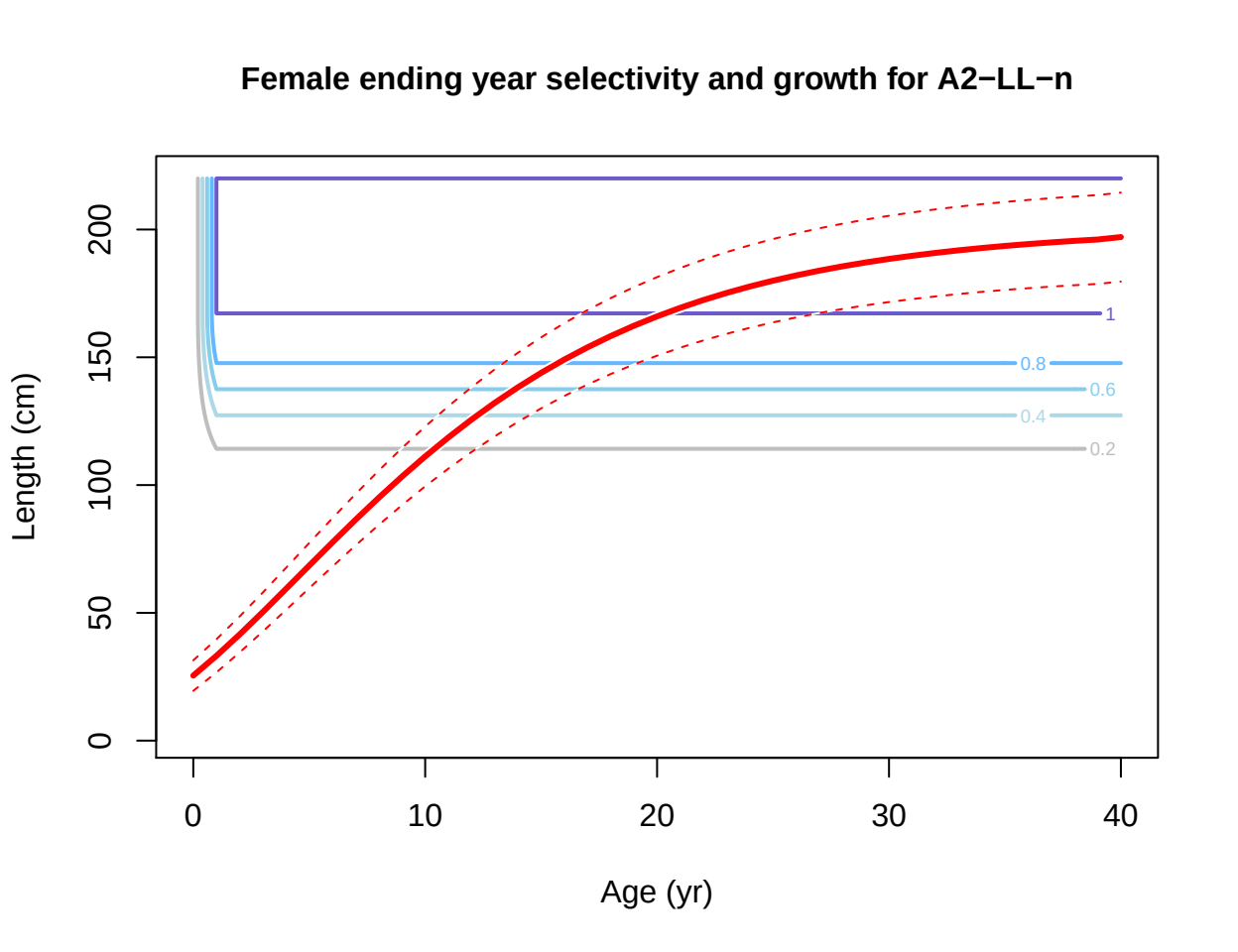

Male ending year selectivity for EPO−LL−survey−late
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

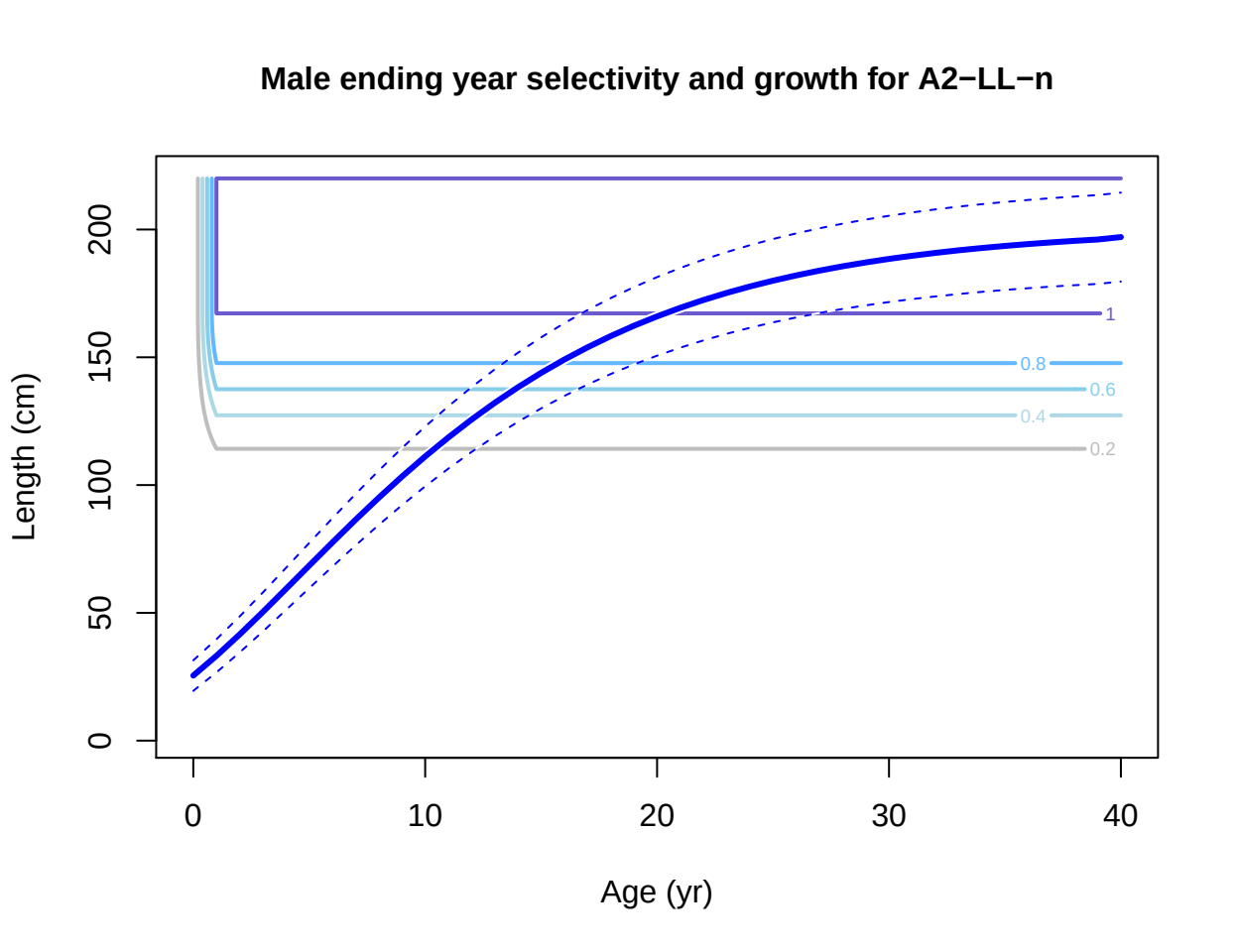

Female ending year selectivity for EPO−OBJ−Disc
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)

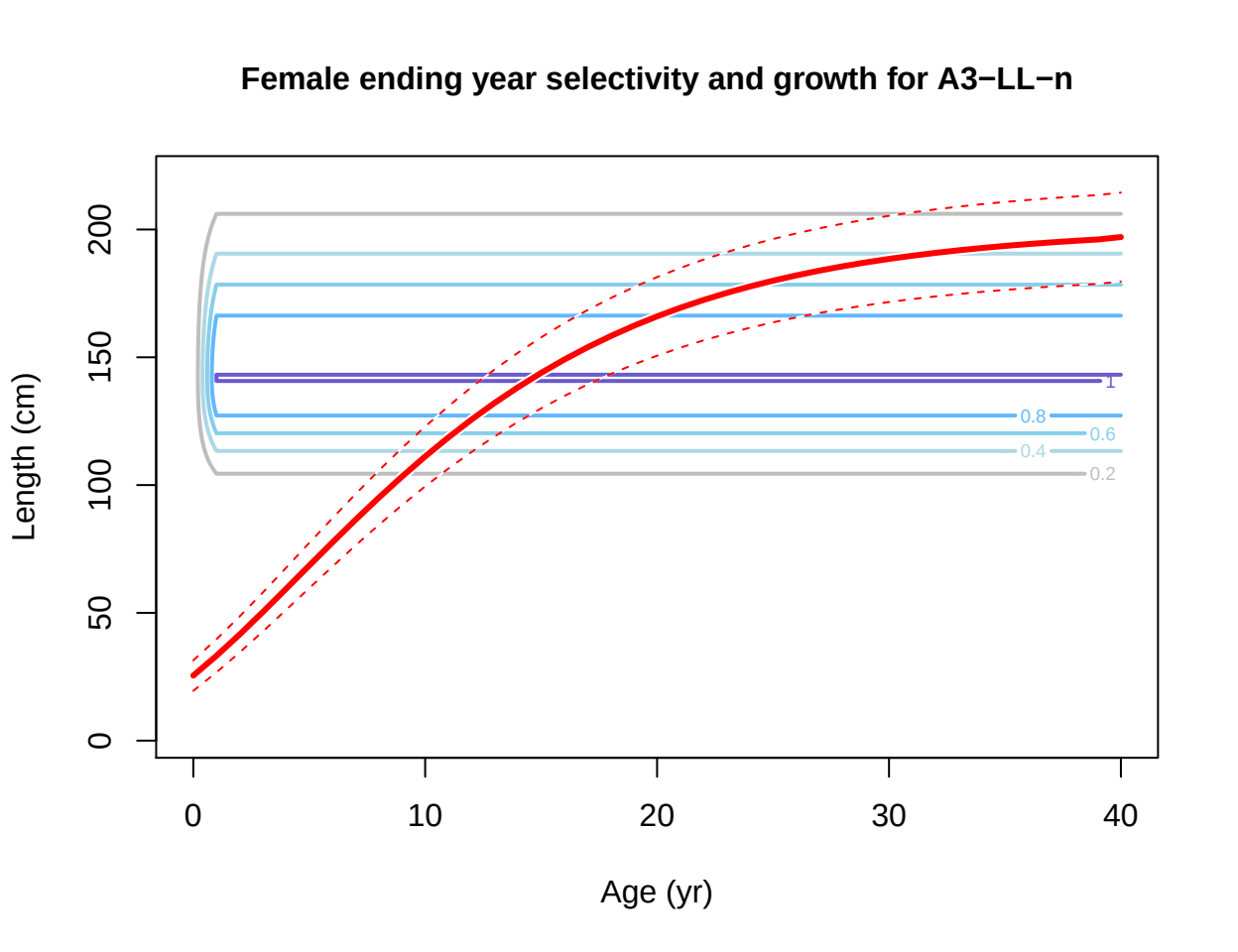

Male ending year selectivity for EPO−OBJ−Disc
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)

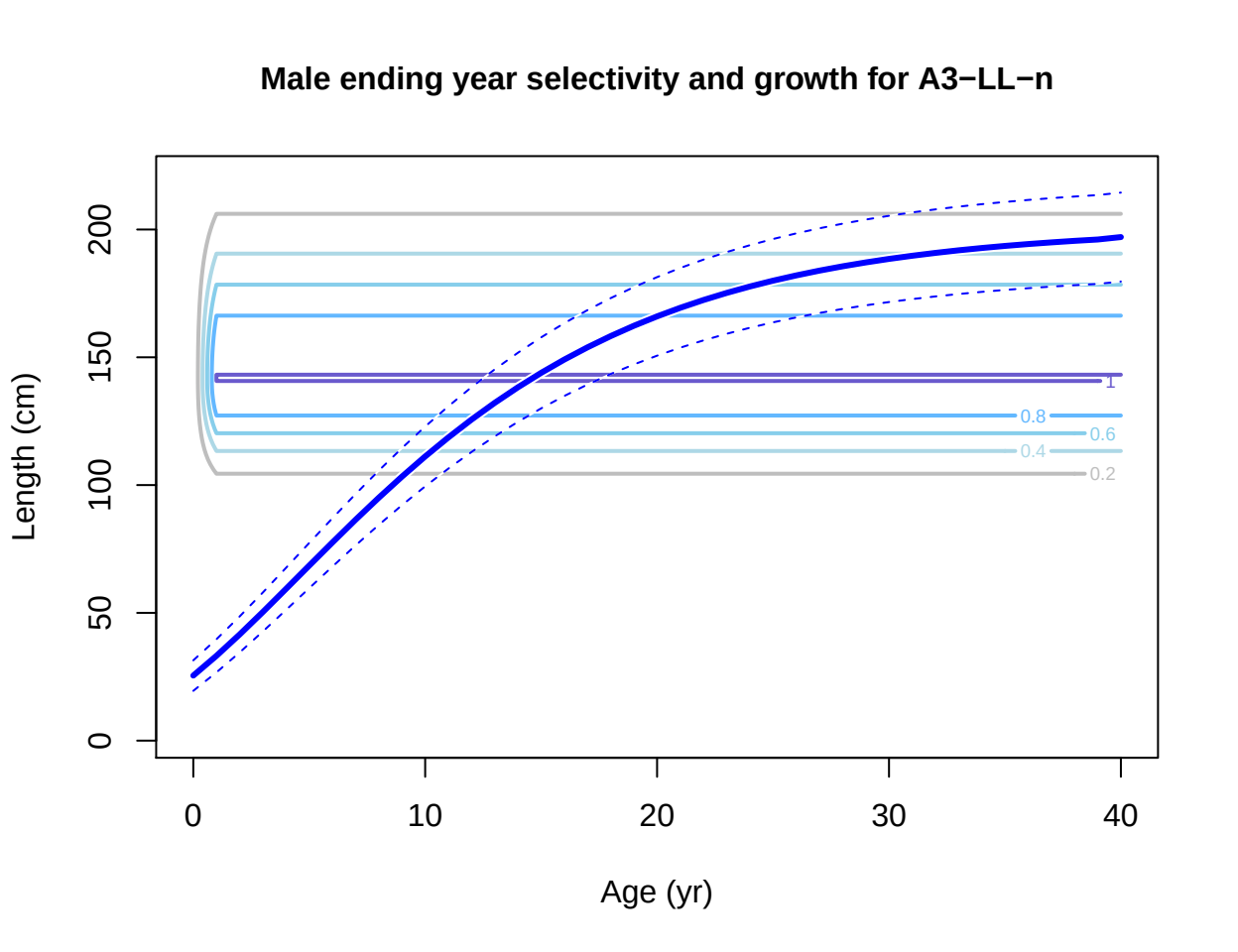

Female ending year selectivity and growth for A1−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

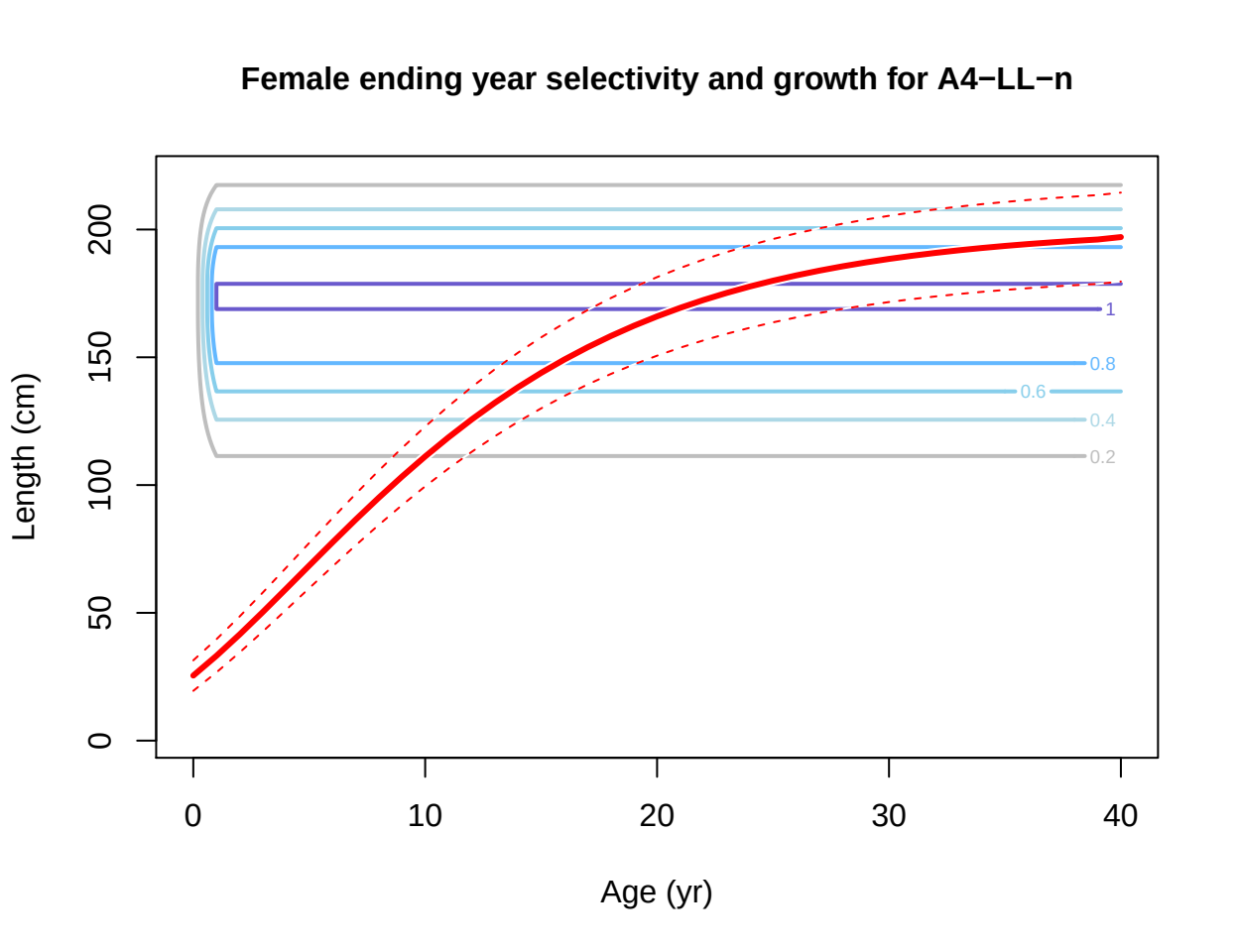

Male ending year selectivity and growth for A1−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

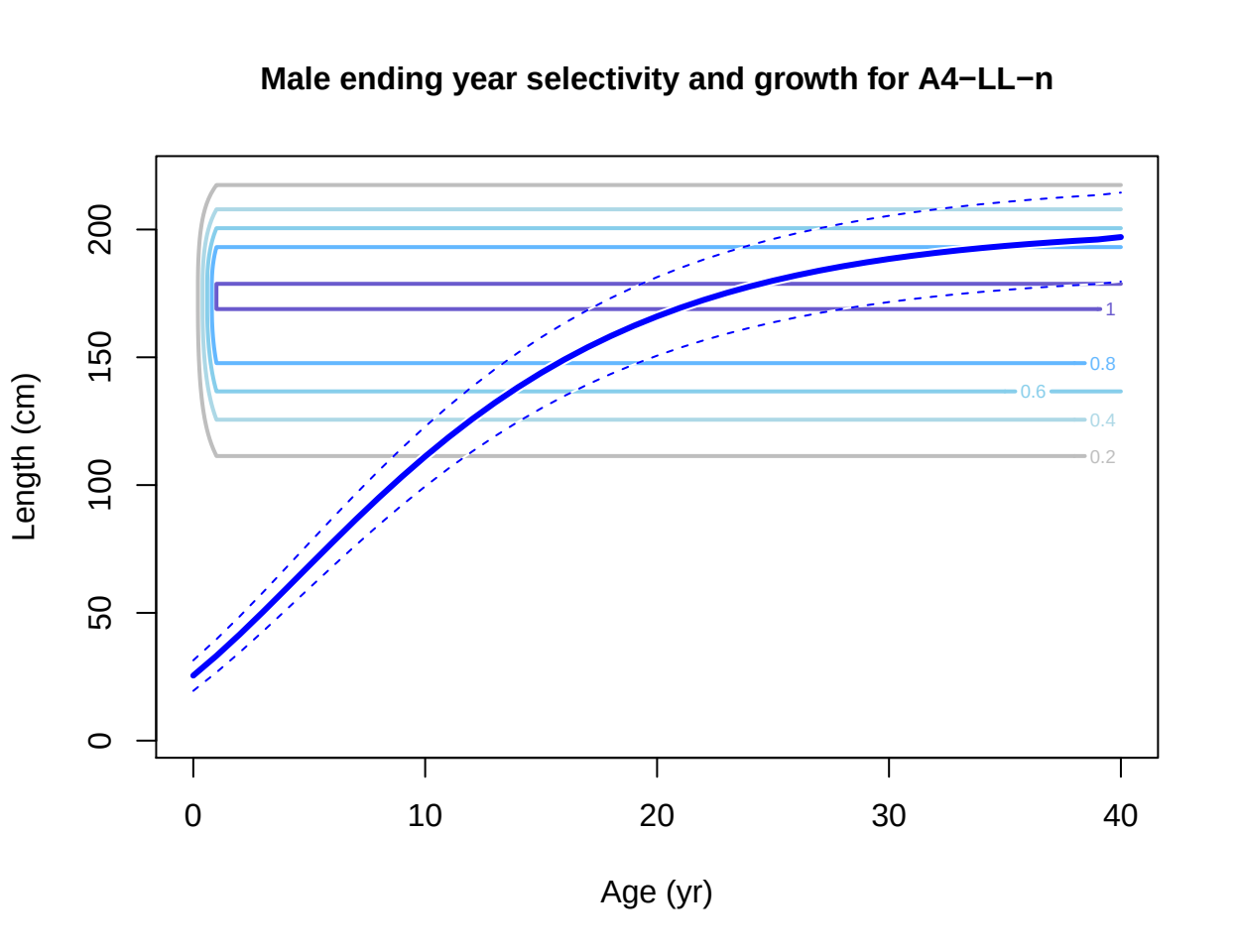

Female ending year selectivity and growth for A2−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

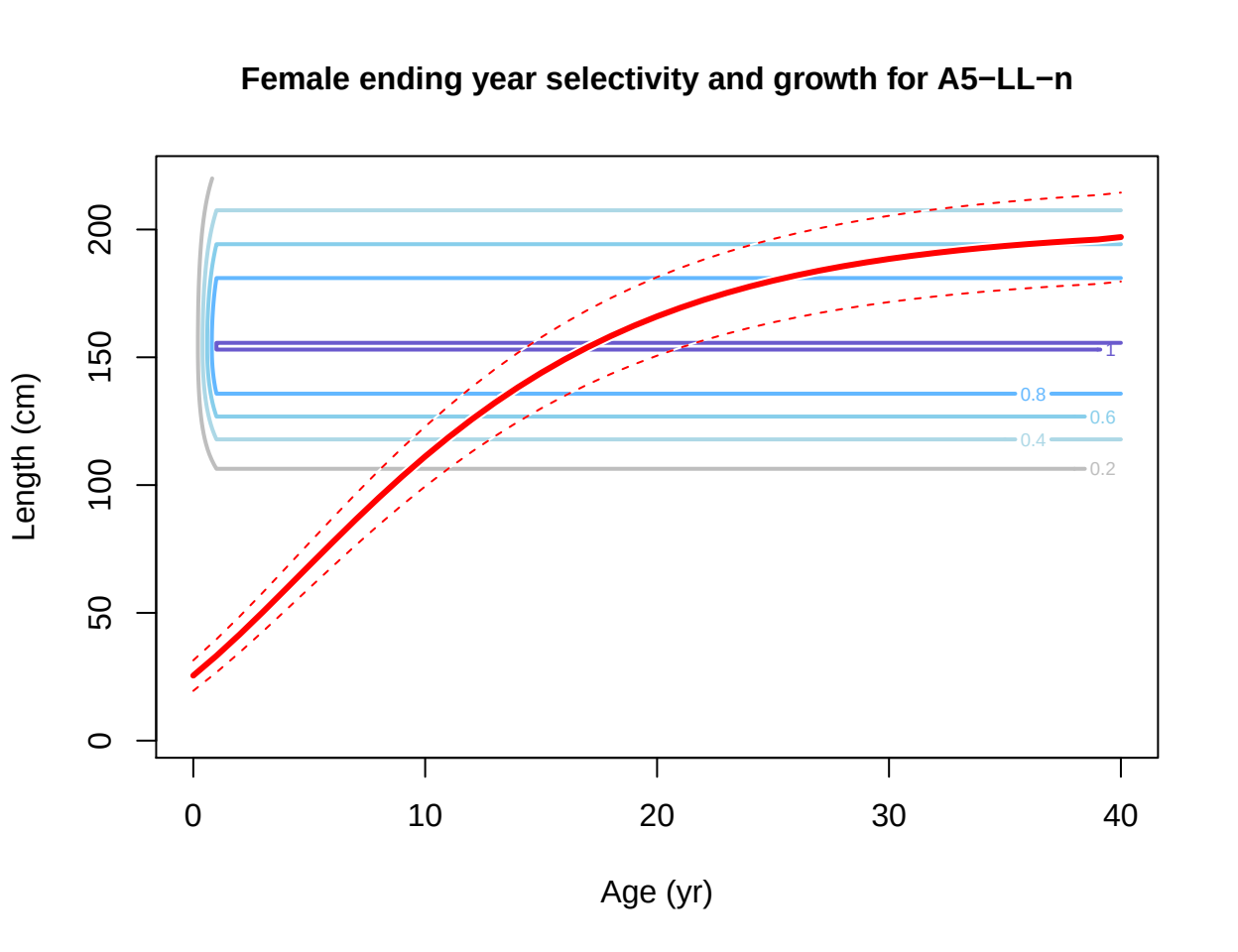

Male ending year selectivity and growth for A2−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

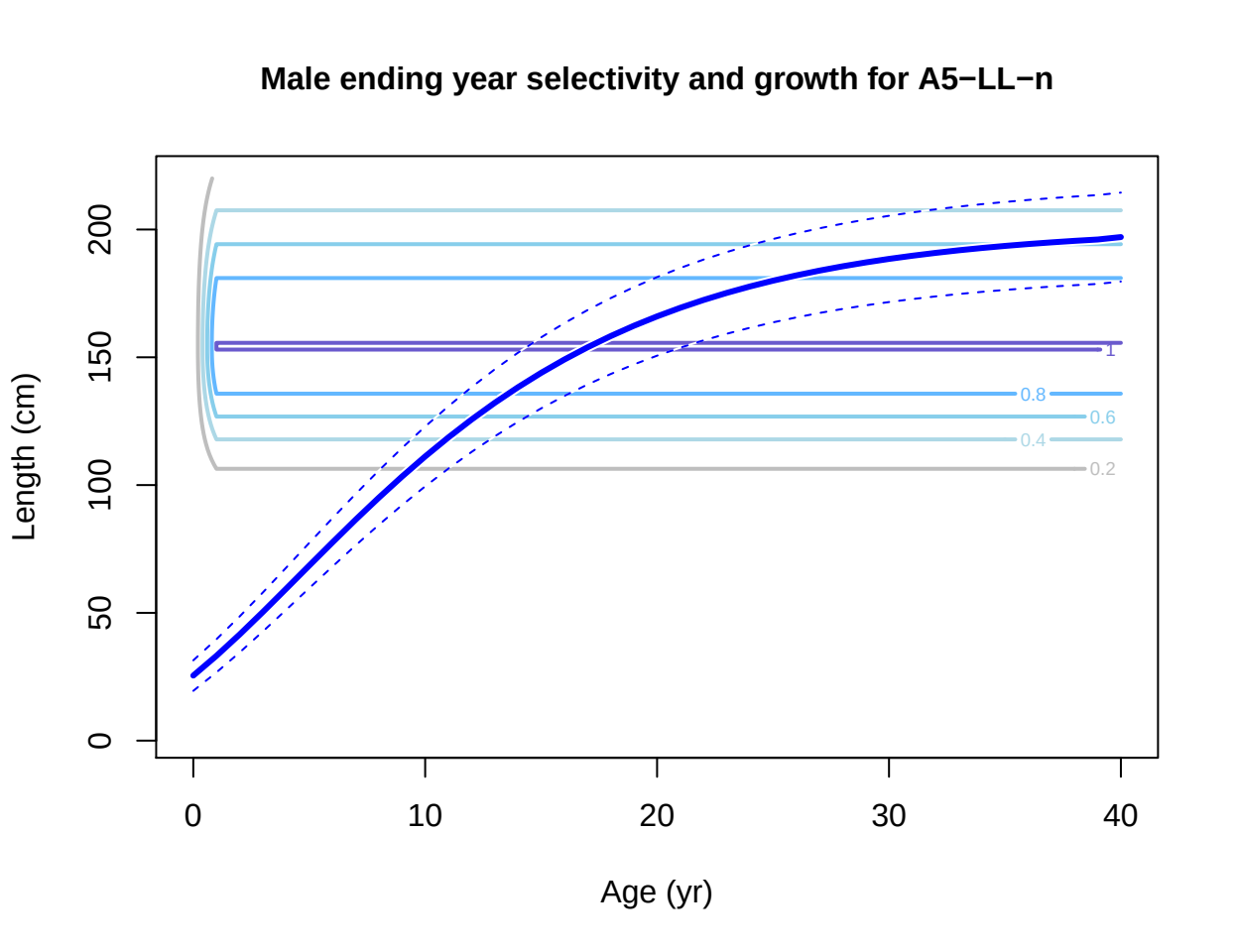

Female ending year selectivity and growth for A3−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

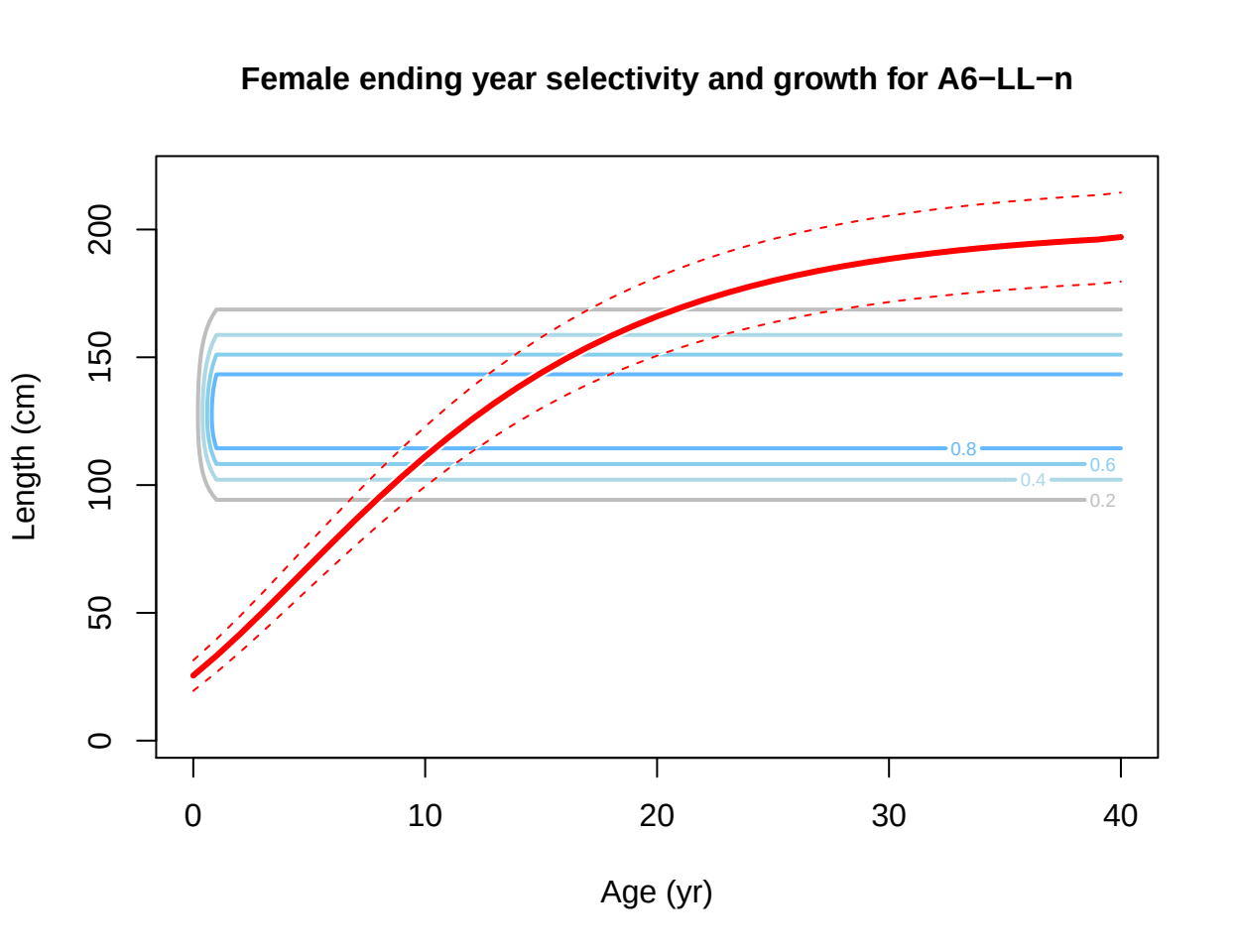

Male ending year selectivity and growth for A3−LL−n
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

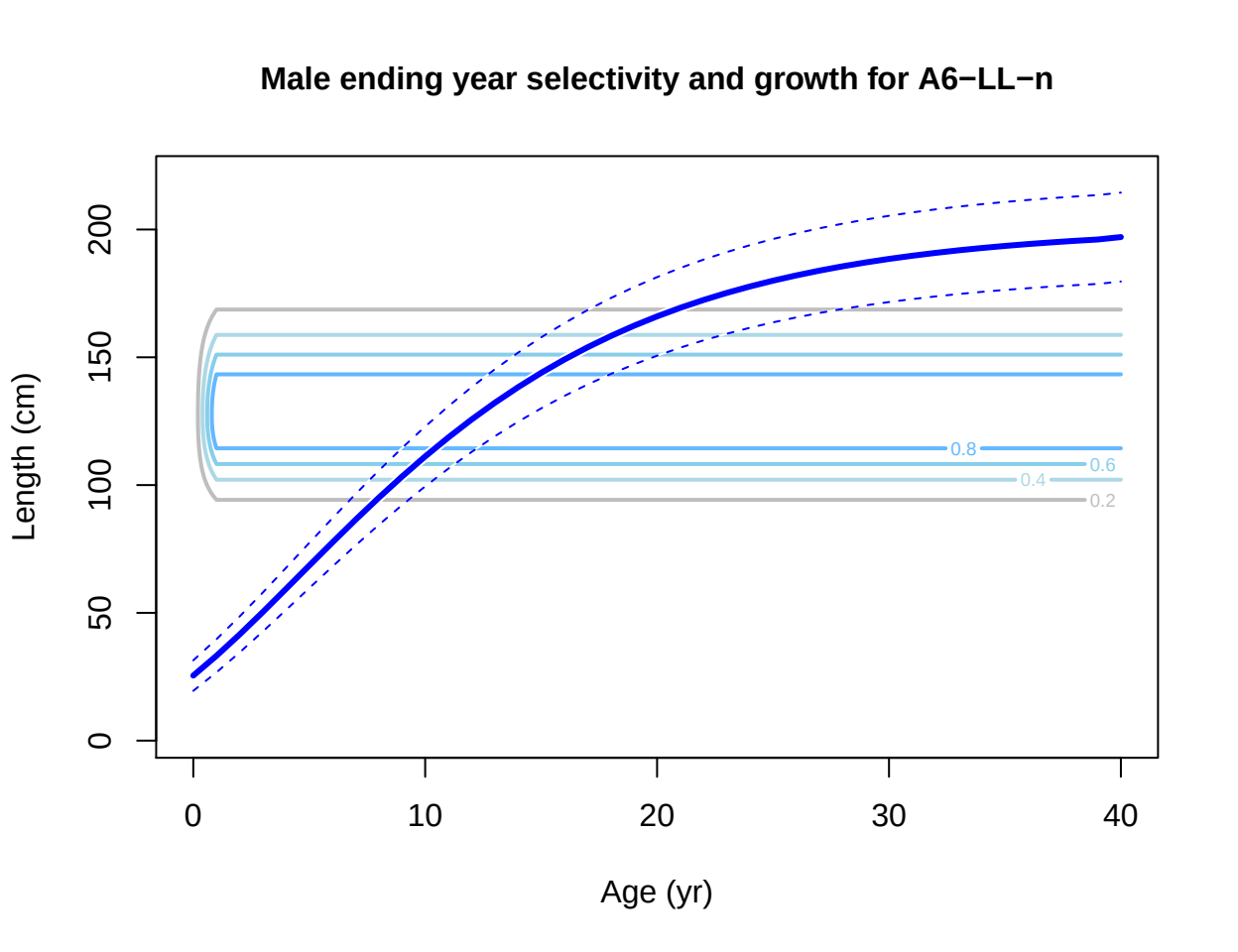

Female ending year selectivity and growth for A4−LL−n
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

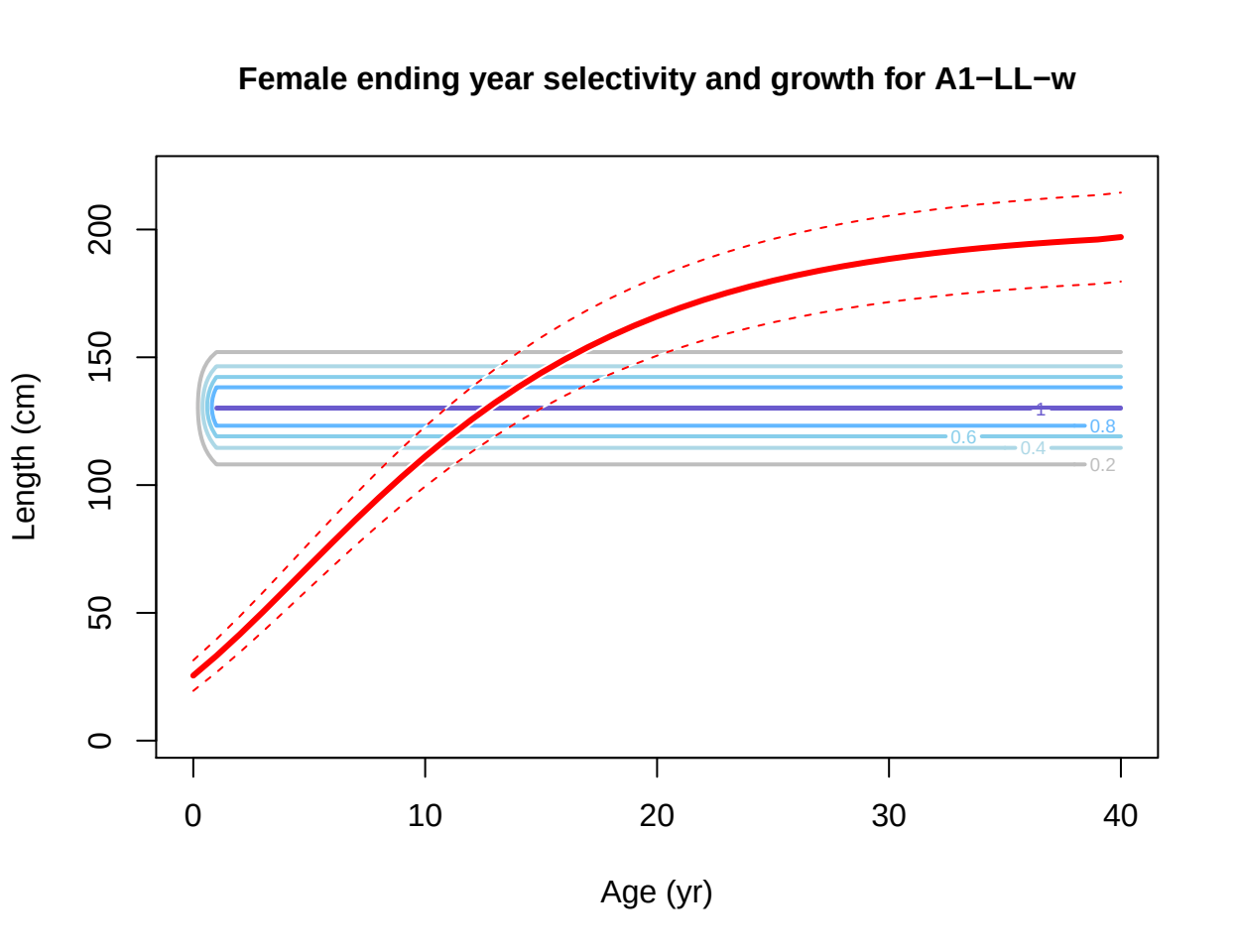

Male ending year selectivity and growth for A4−LL−n
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

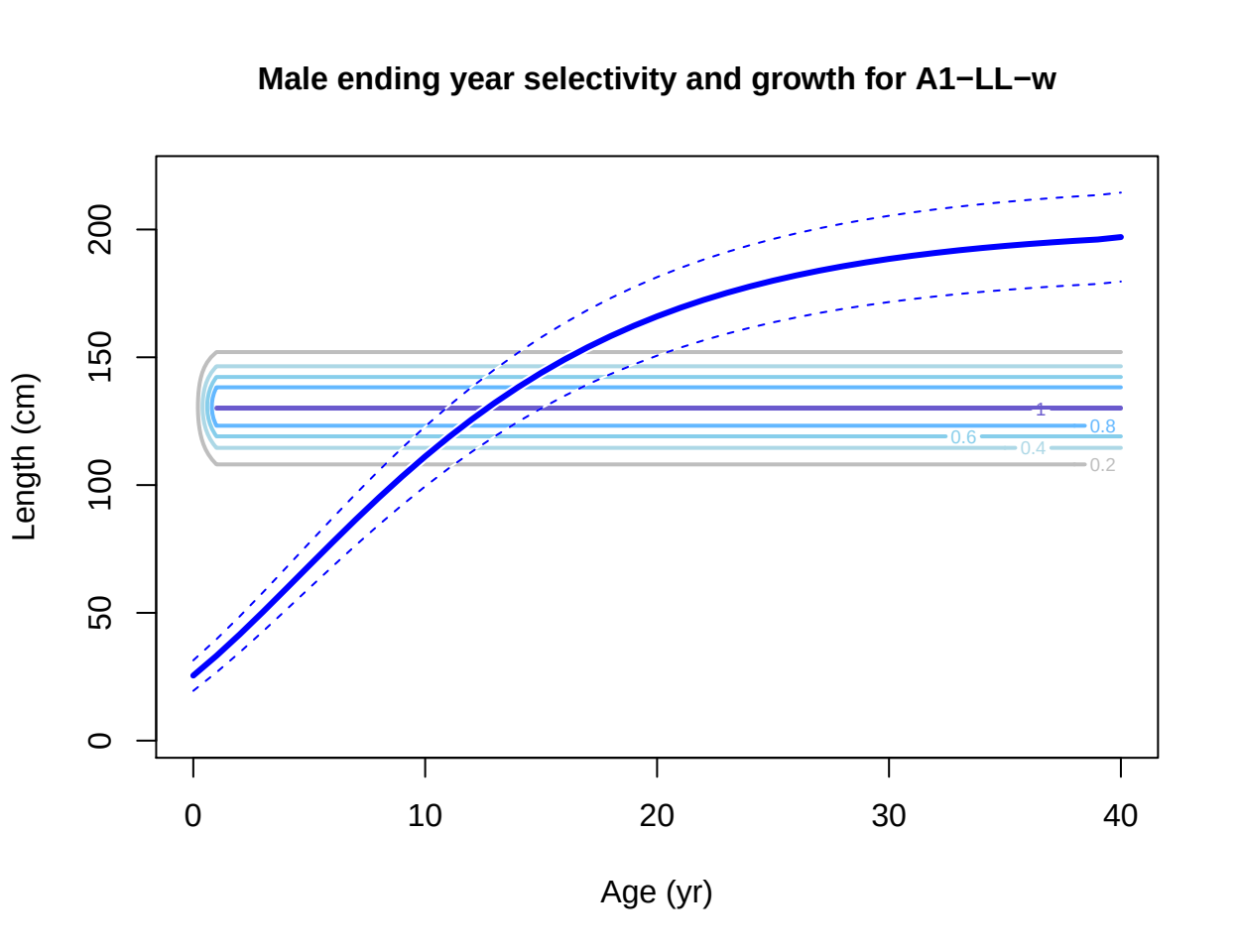

Female ending year selectivity and growth for A5−LL−n
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

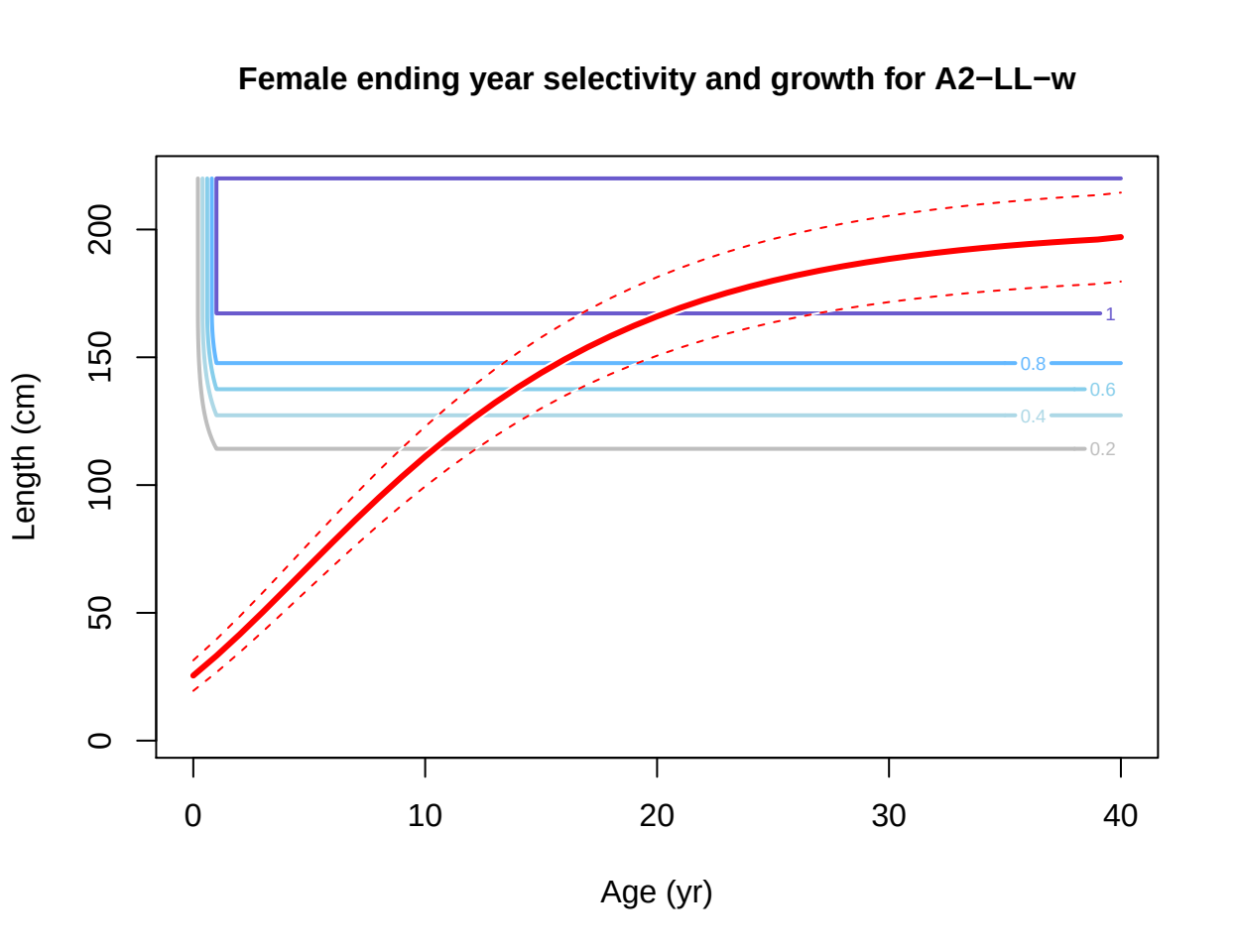

Male ending year selectivity and growth for A5−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

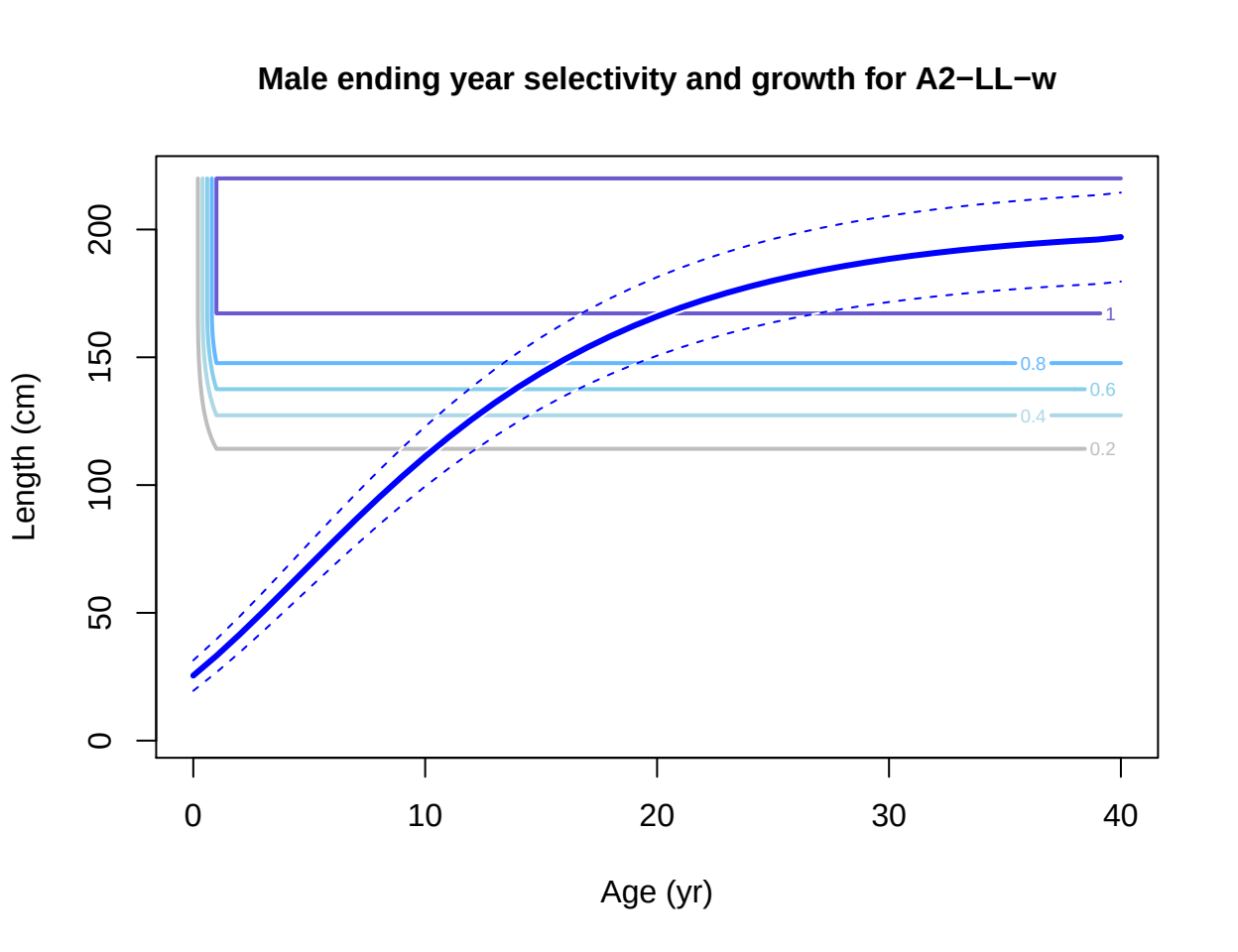

Female ending year selectivity and growth for A6−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

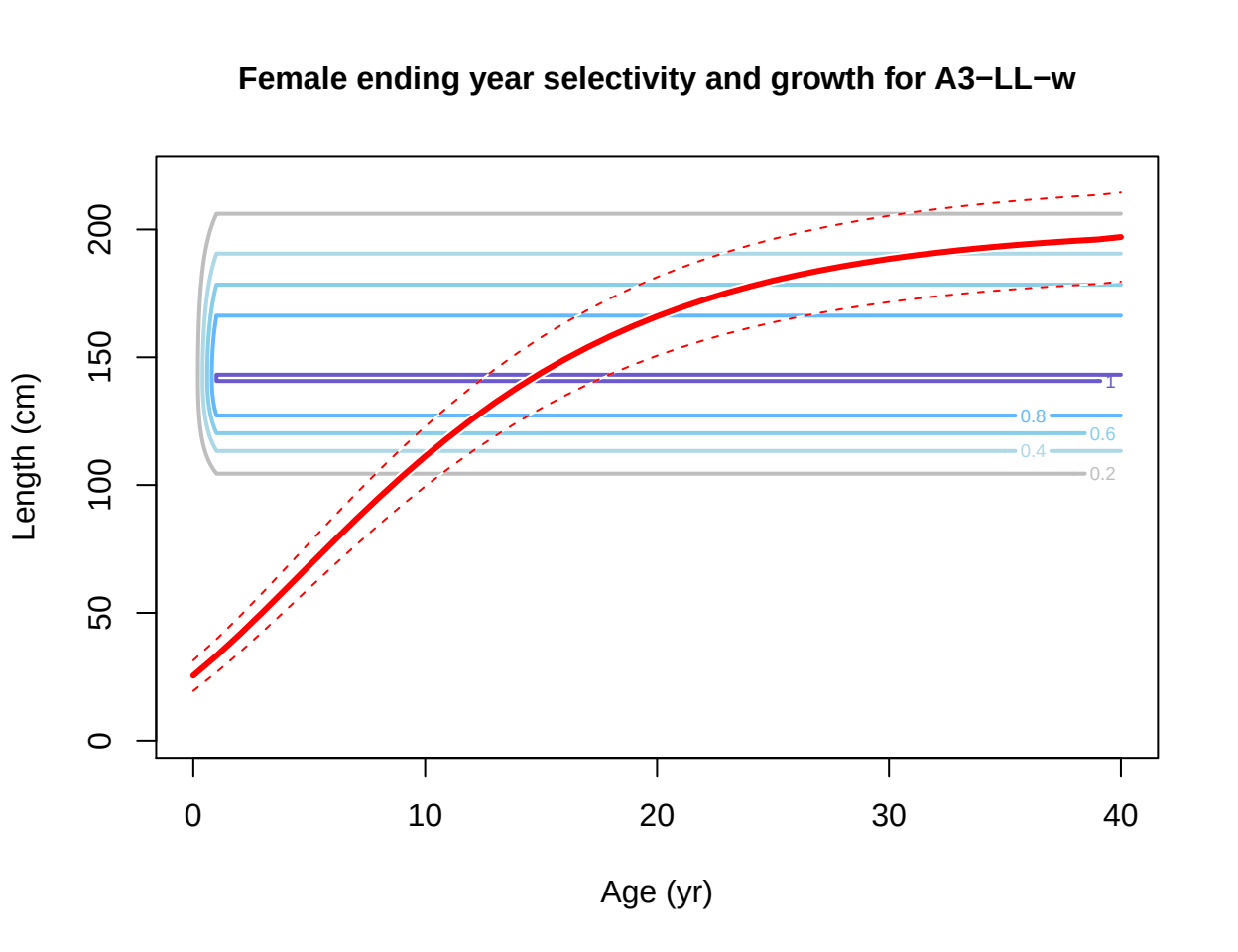

Male ending year selectivity and growth for A6−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

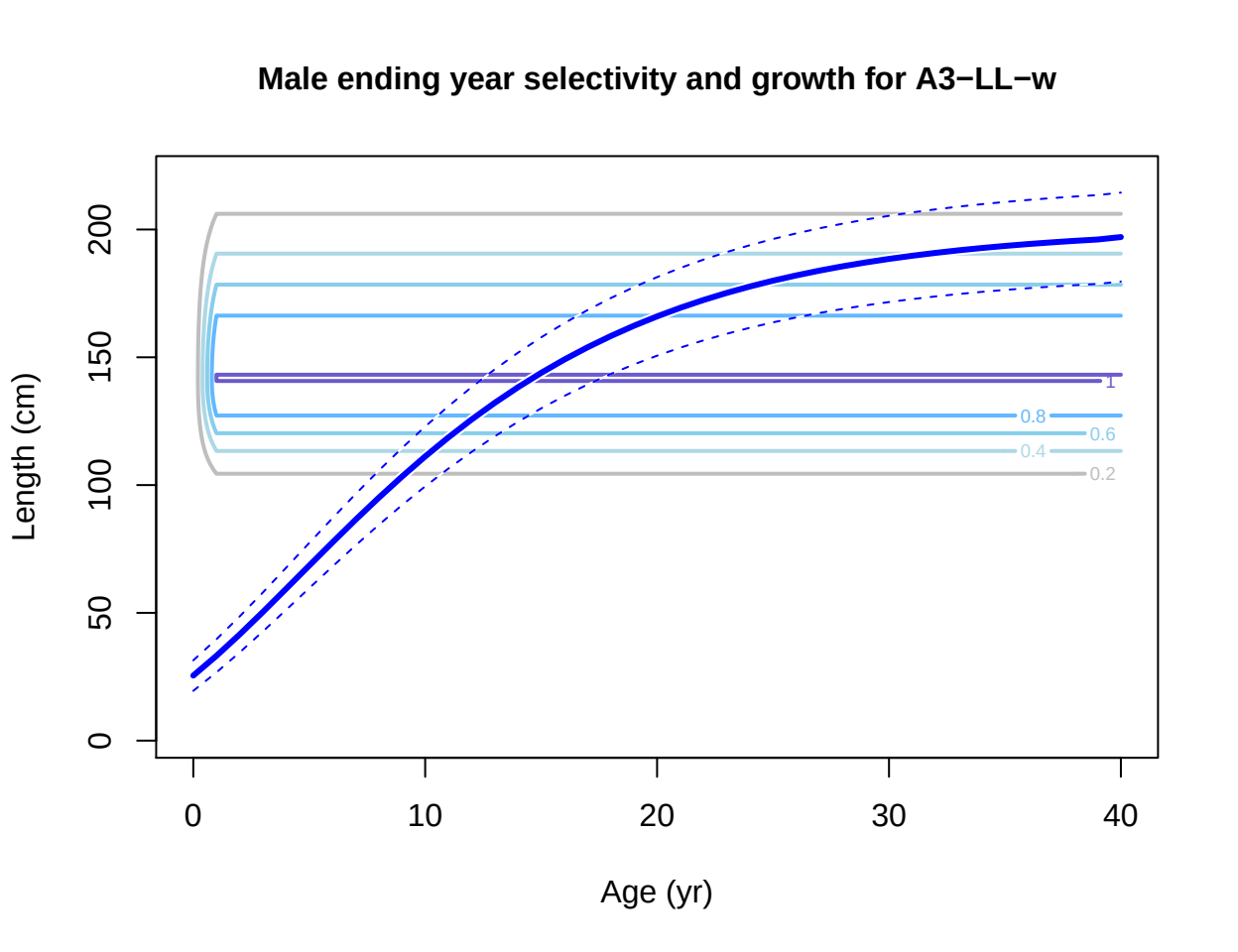

Female ending year selectivity and growth for A1−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

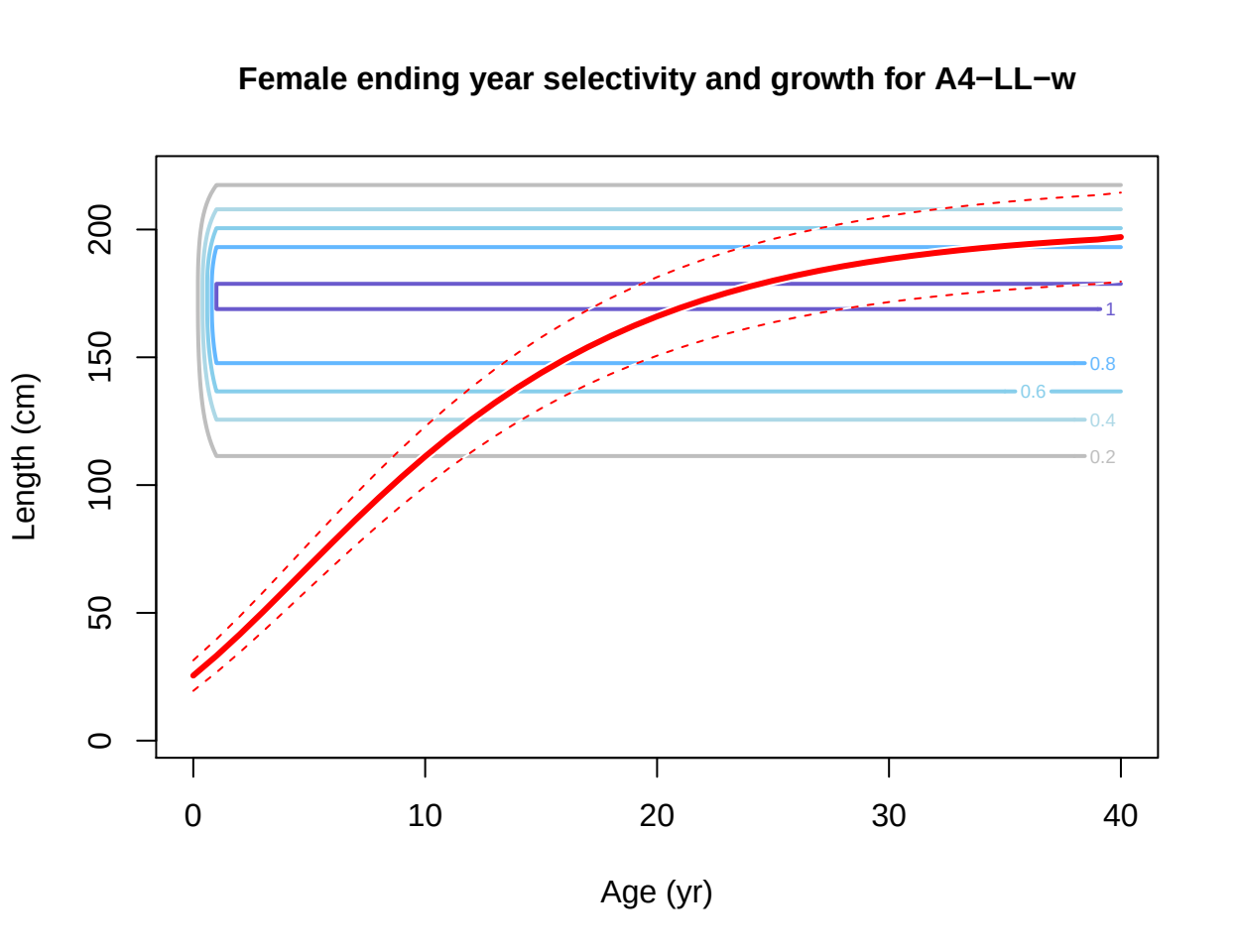

Male ending year selectivity and growth for A1−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

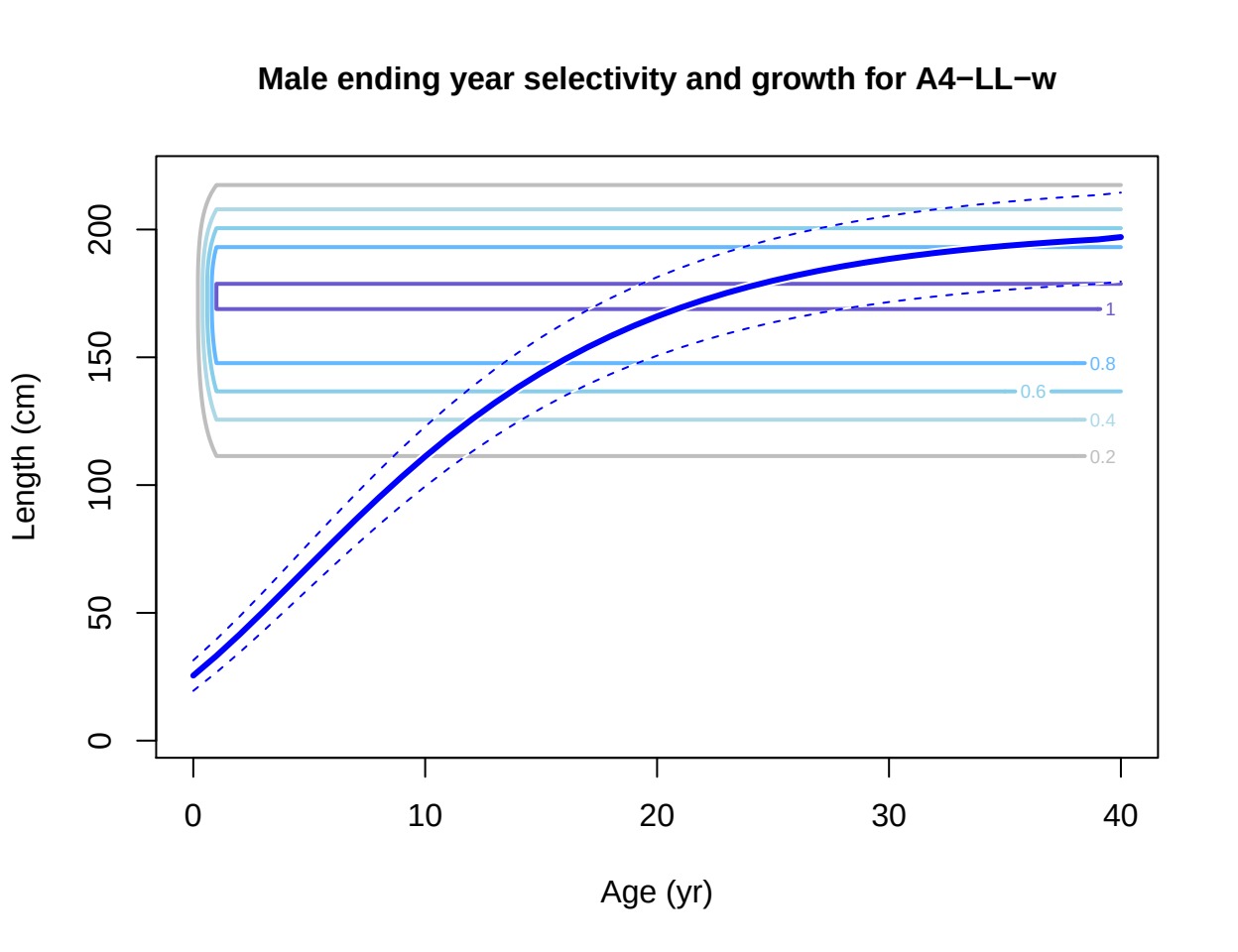

Female ending year selectivity and growth for A2−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

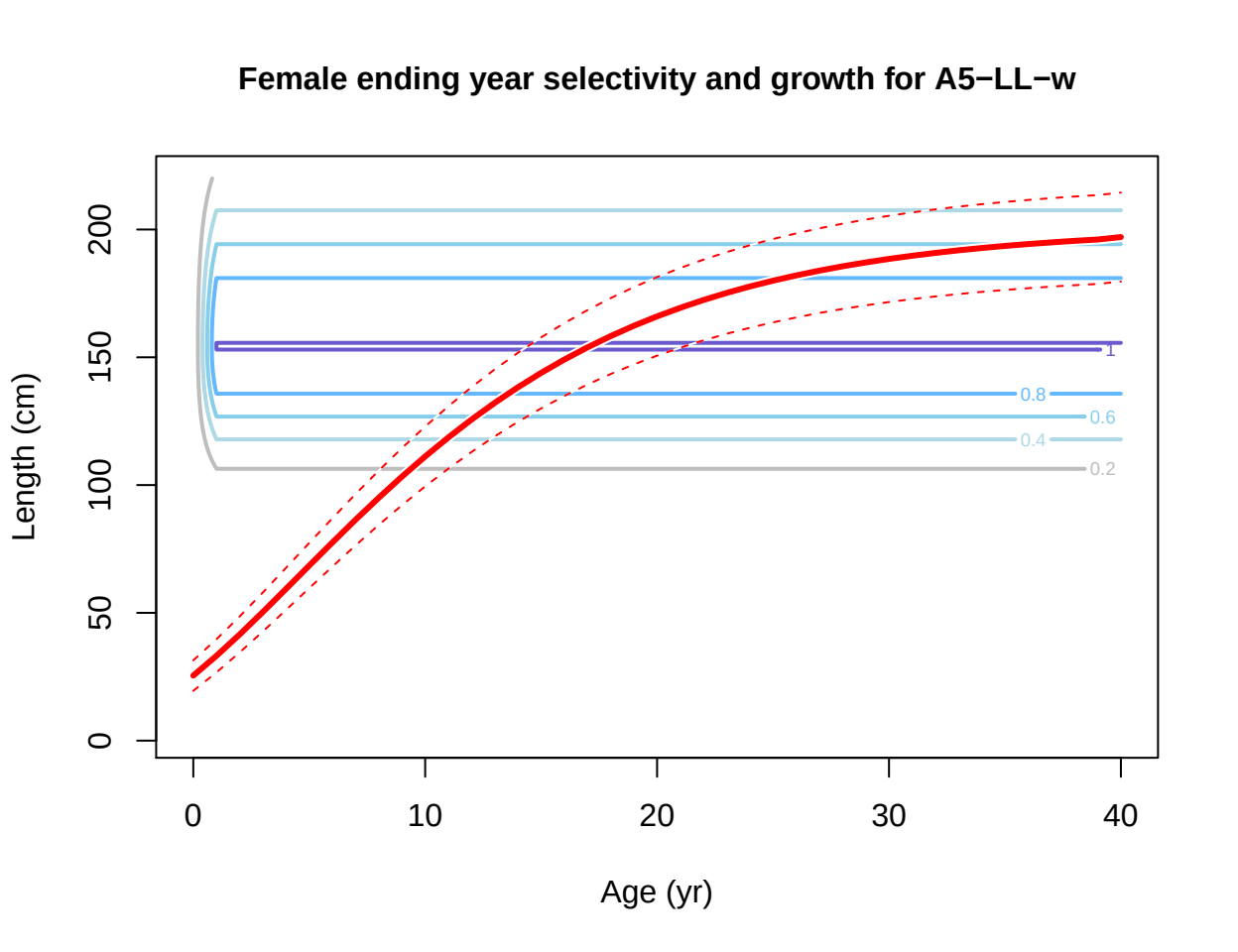

Male ending year selectivity and growth for A2−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

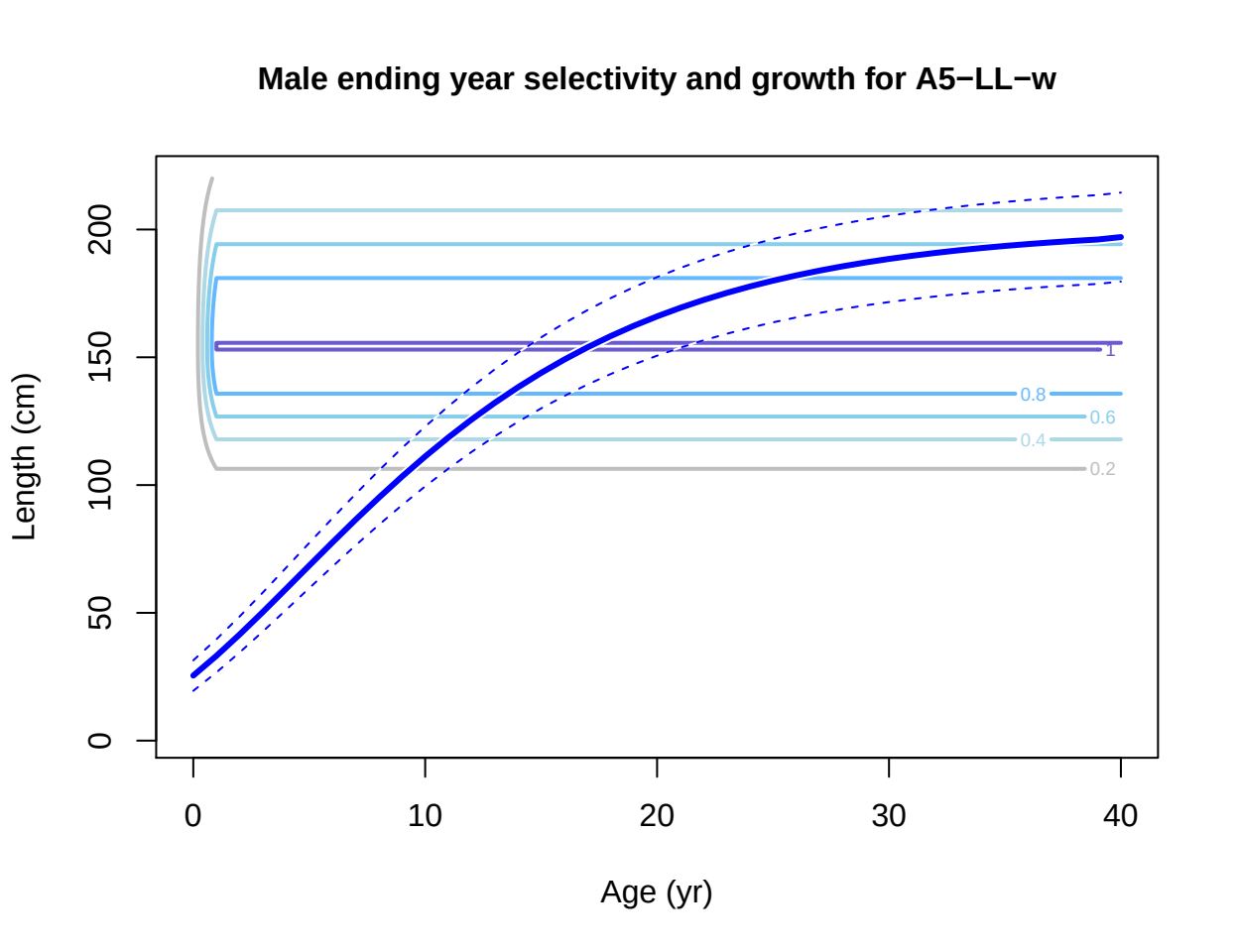

Female ending year selectivity and growth for A3−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

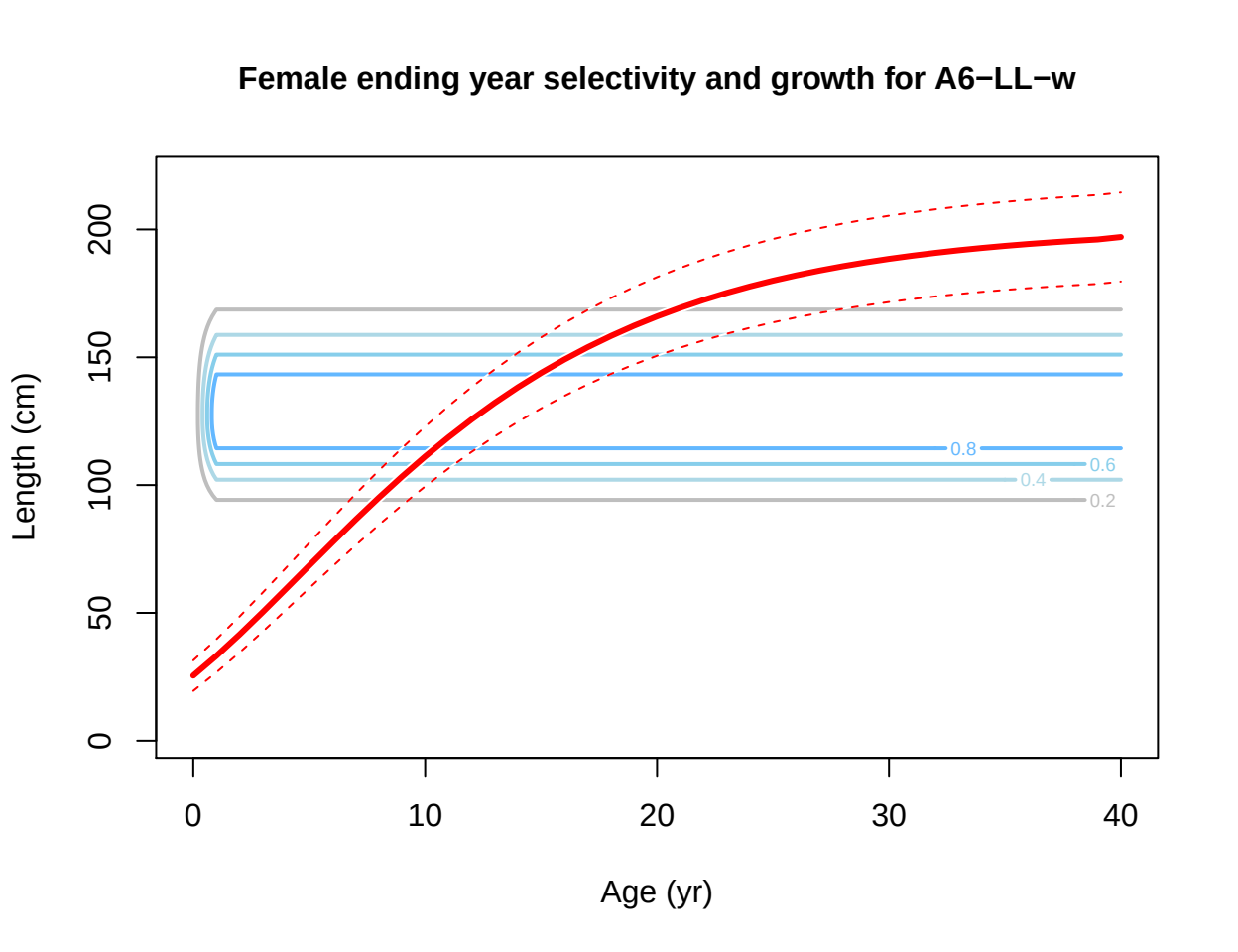

Male ending year selectivity and growth for A3−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

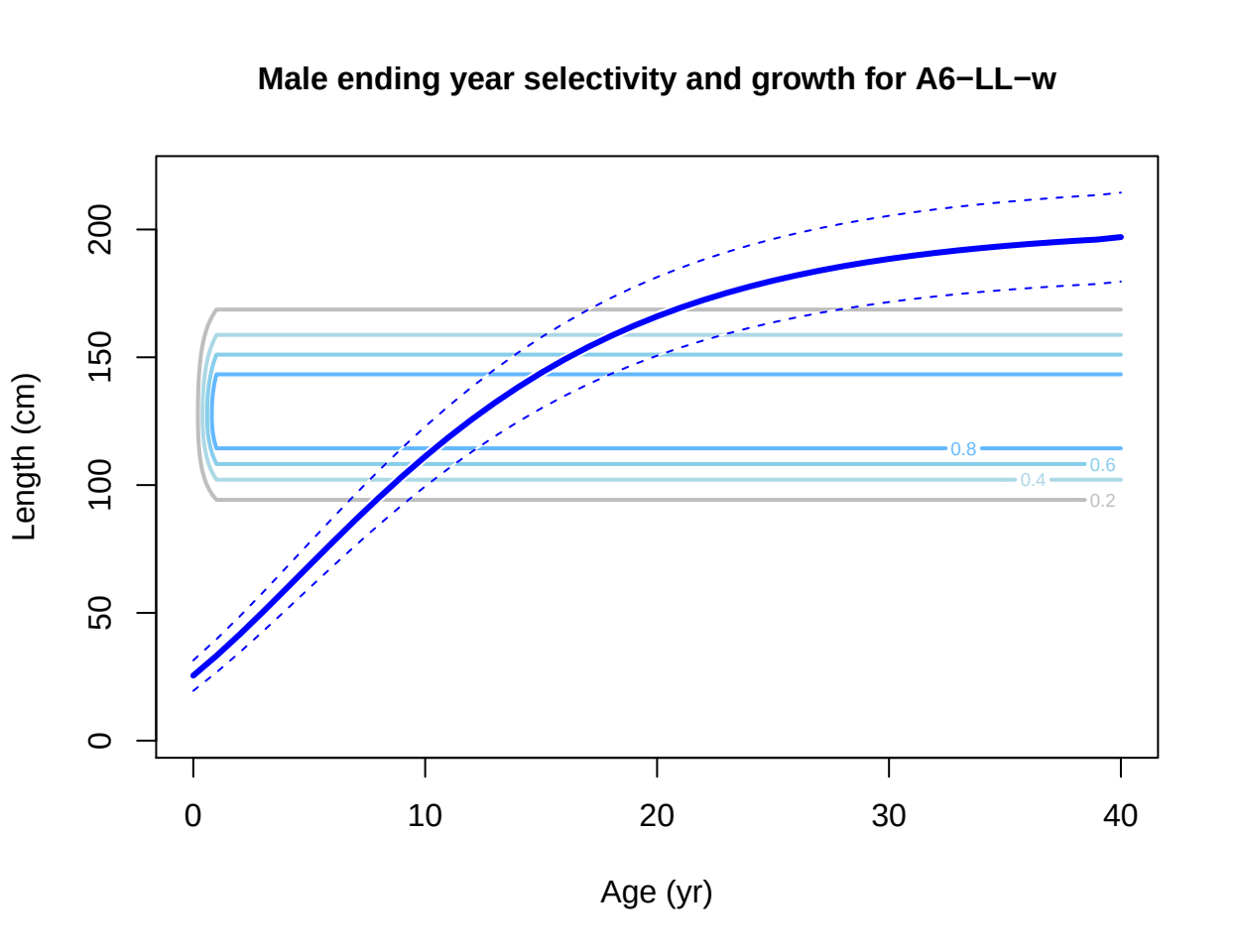

Female ending year selectivity and growth for A4−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

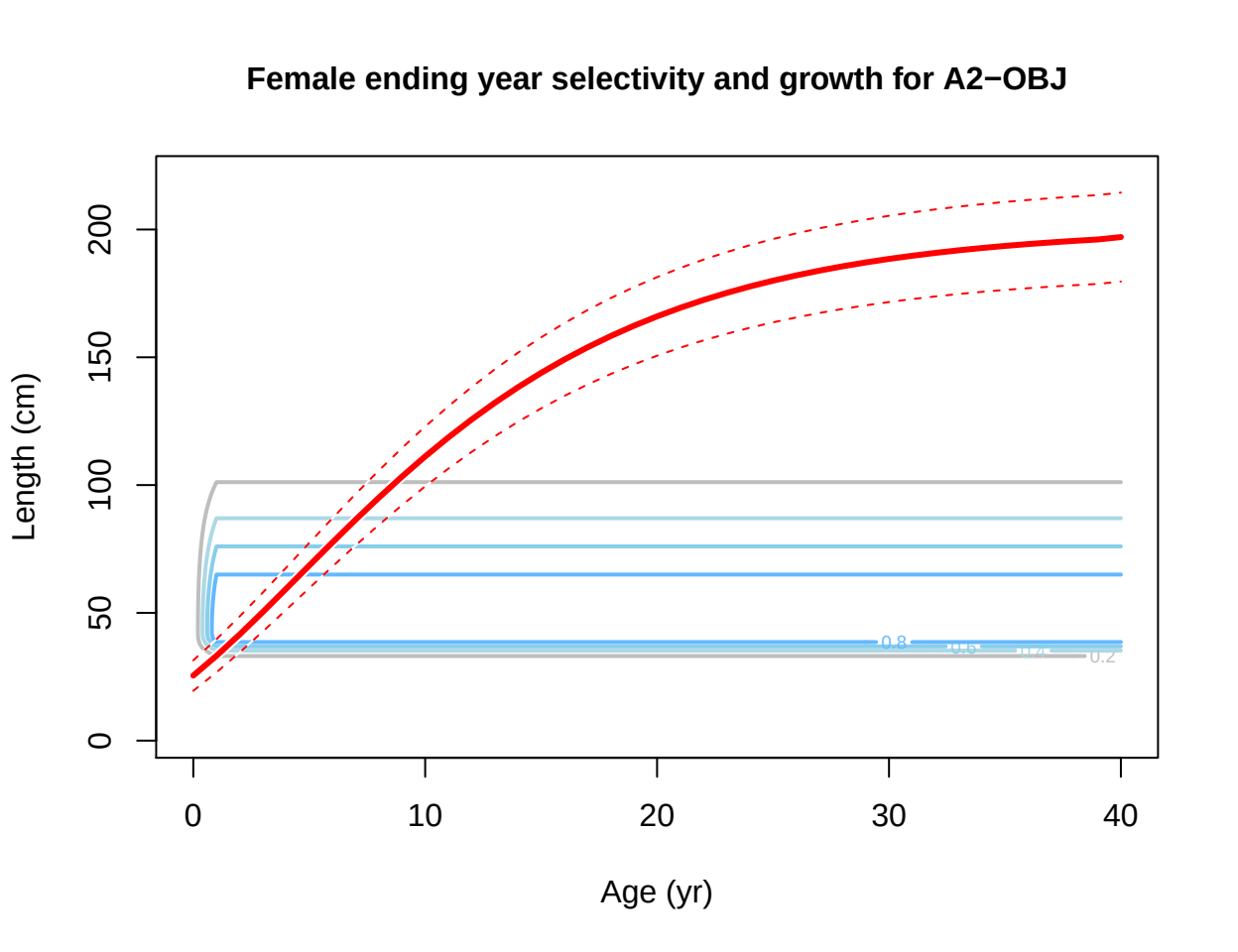

Male ending year selectivity and growth for A4−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

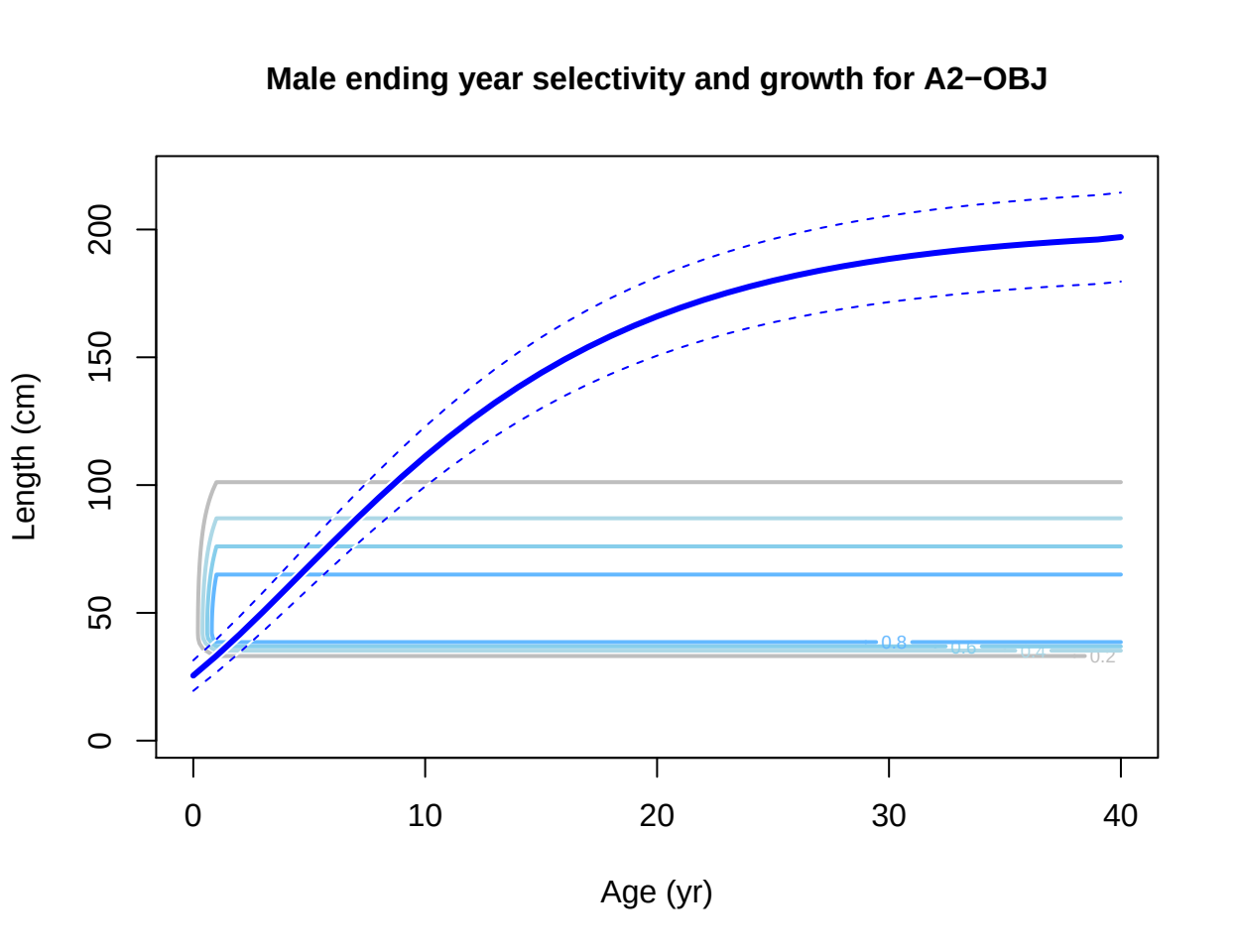

Female ending year selectivity and growth for A5−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

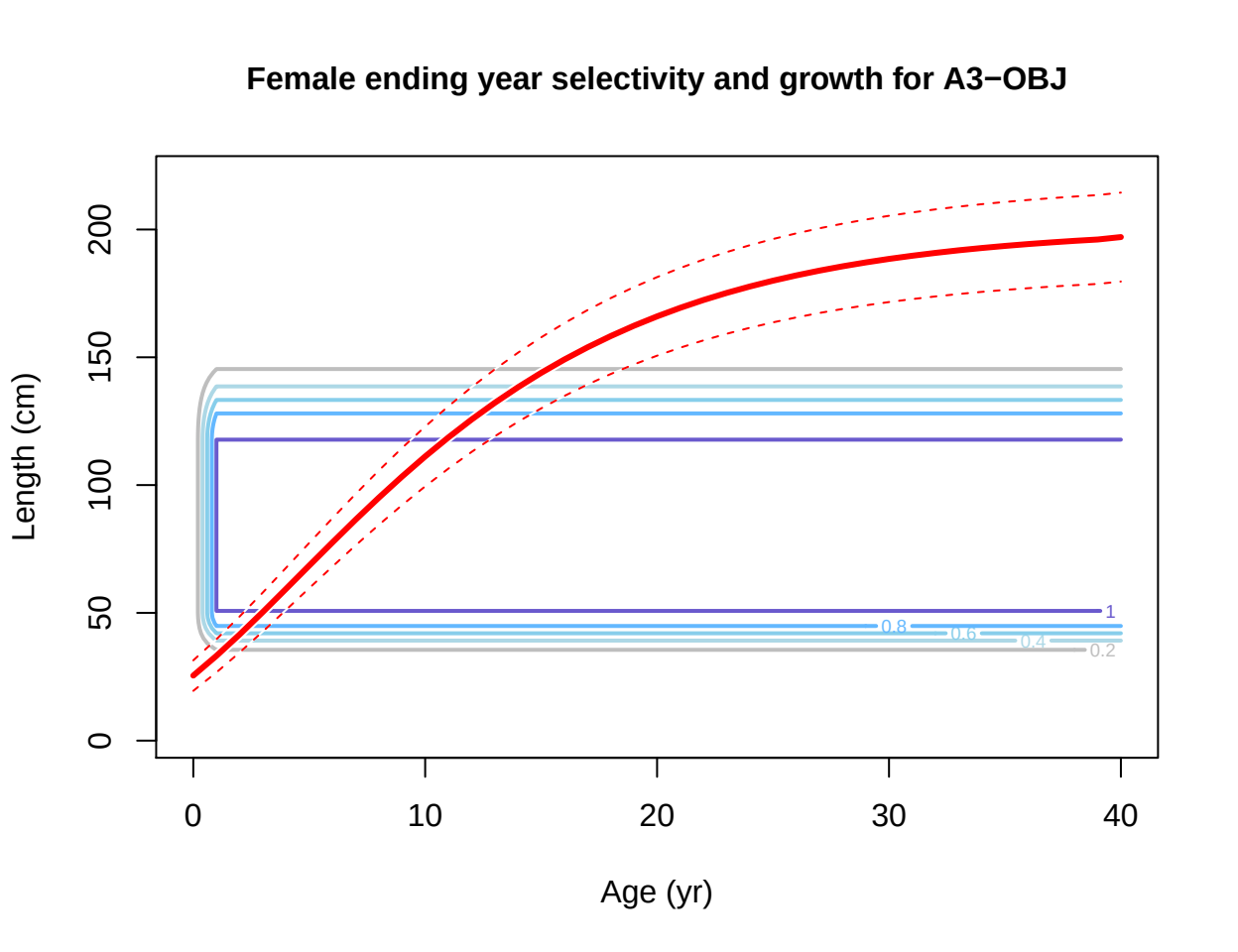

Male ending year selectivity and growth for A5−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

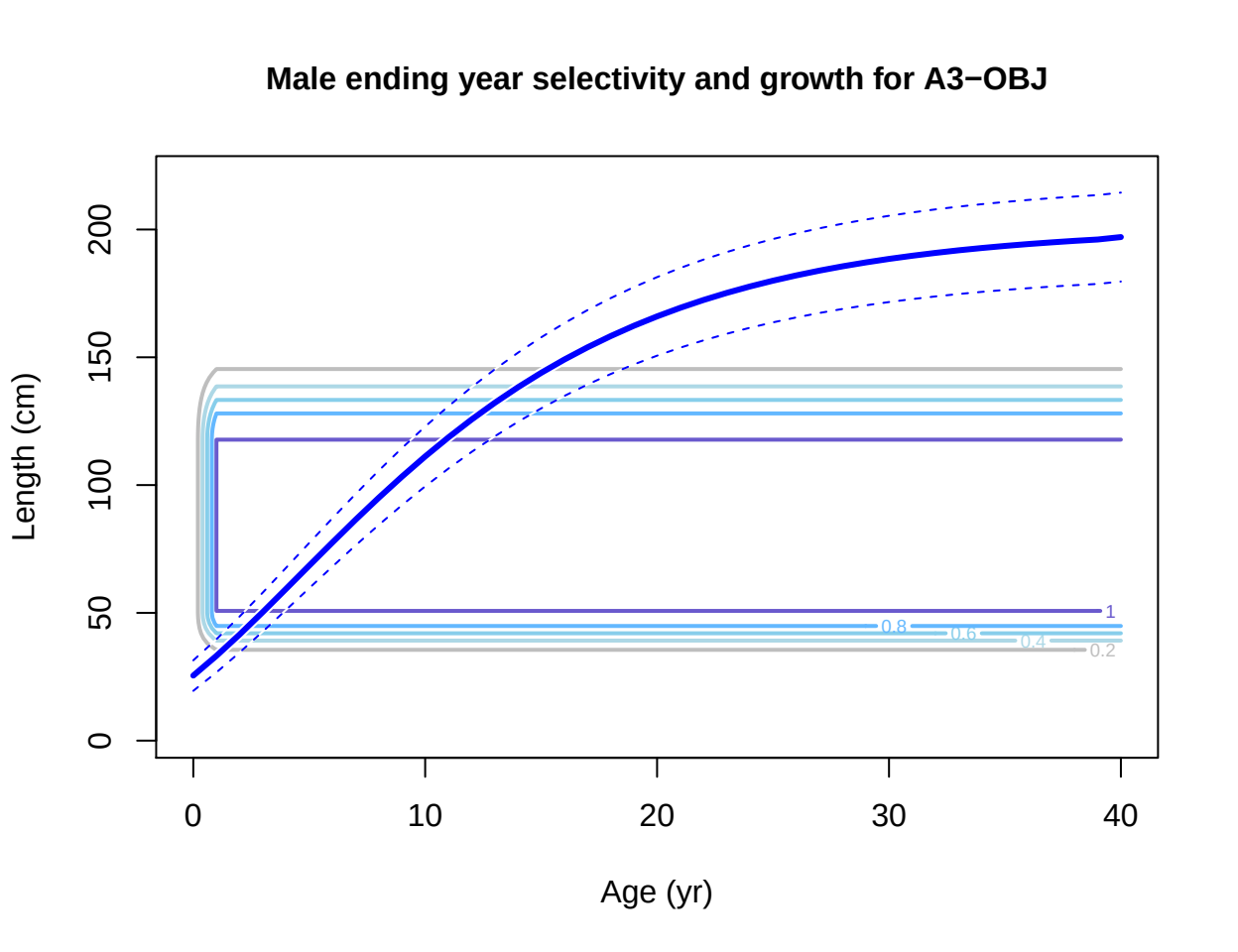

Female ending year selectivity and growth for A6−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

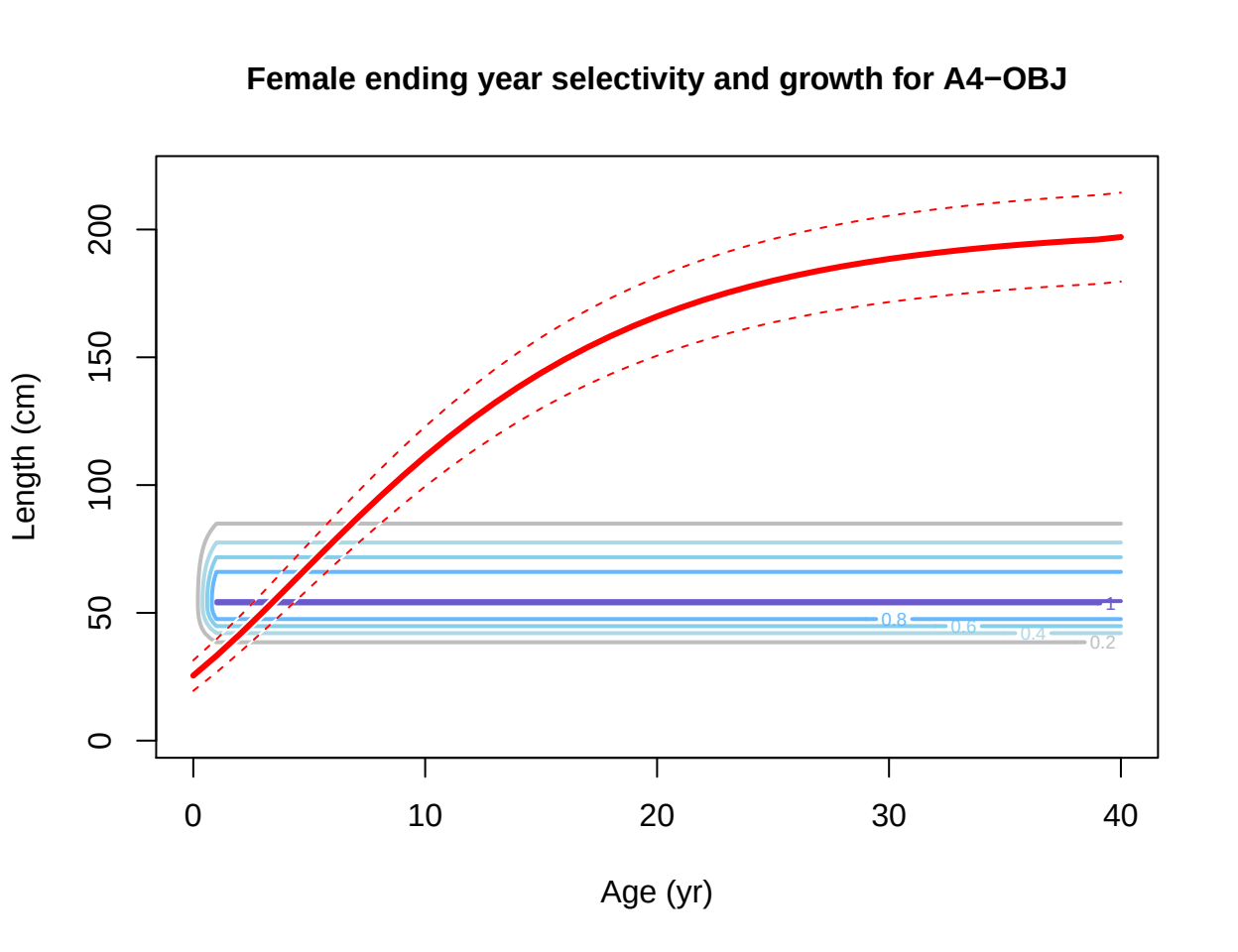

Male ending year selectivity and growth for A6−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

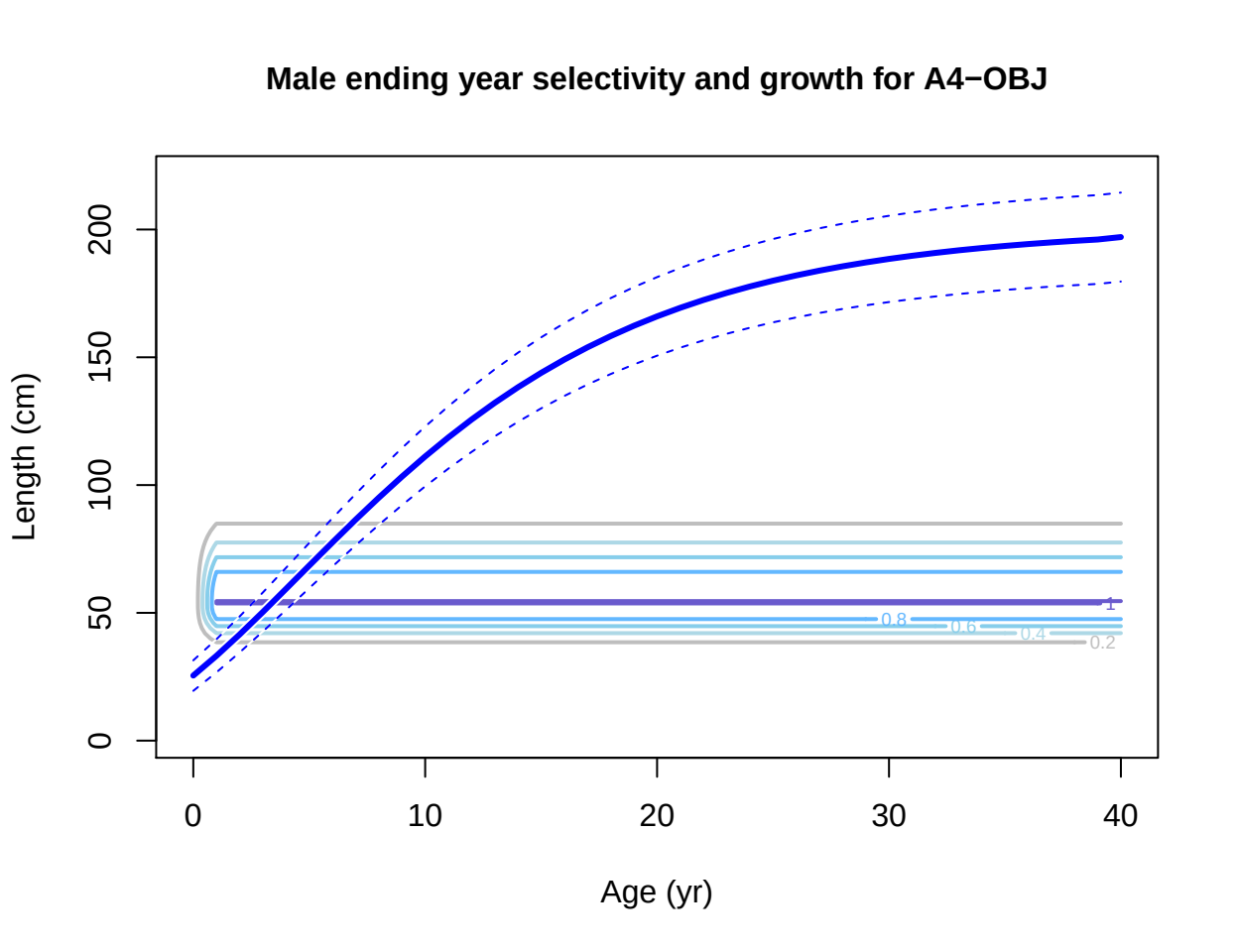

Female ending year selectivity and growth for A2−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.2

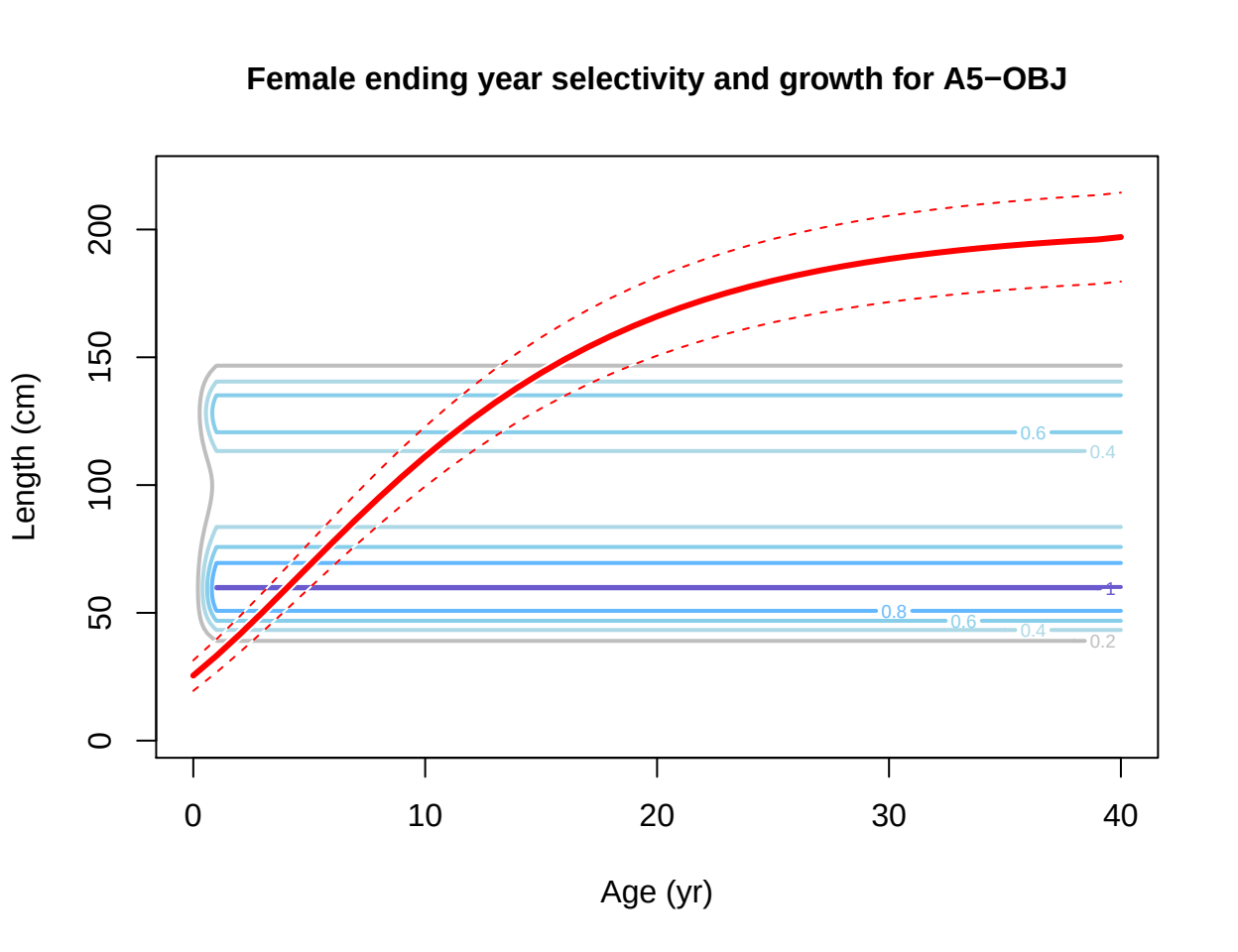

Male ending year selectivity and growth for A2−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.2

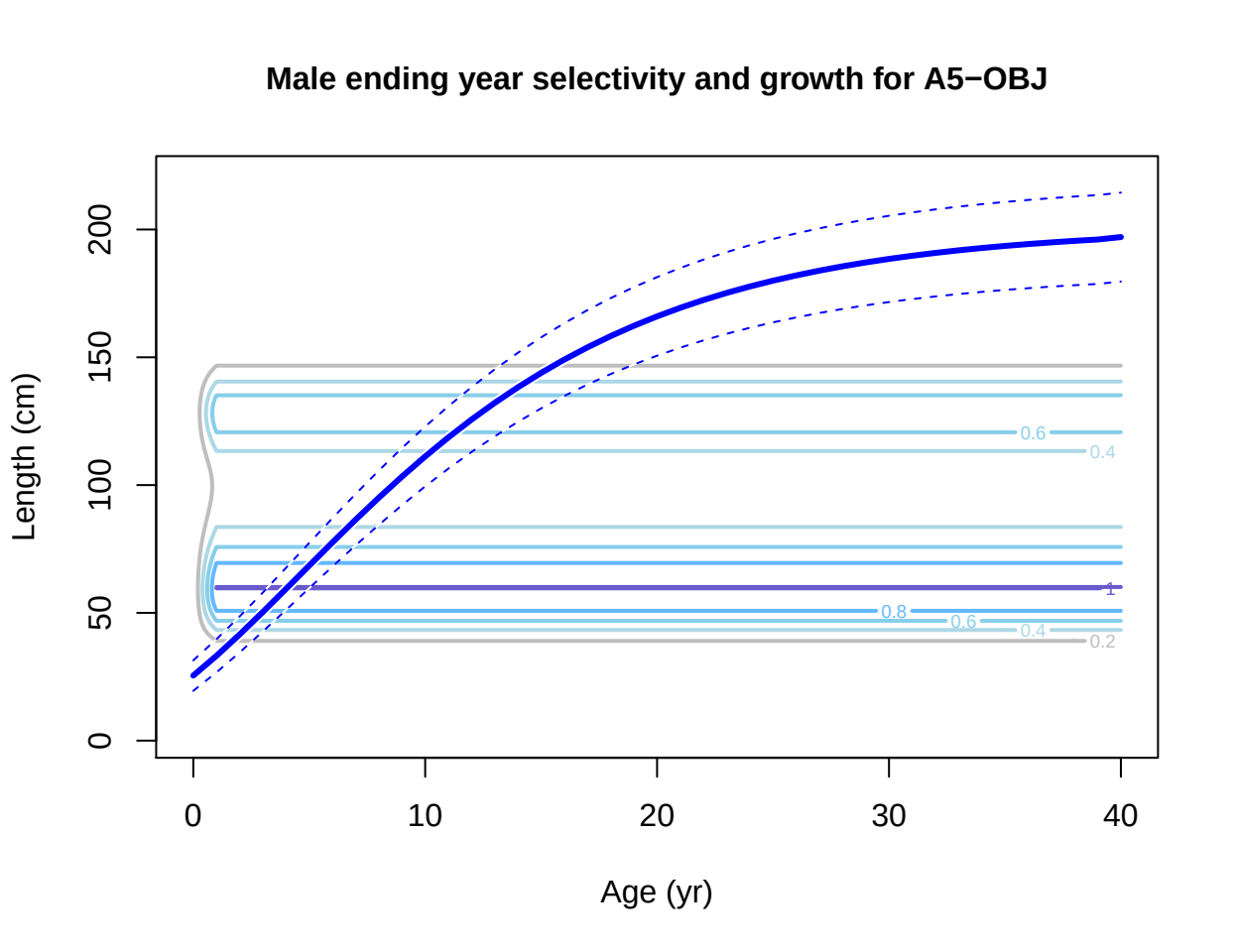

Female ending year selectivity and growth for A3−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

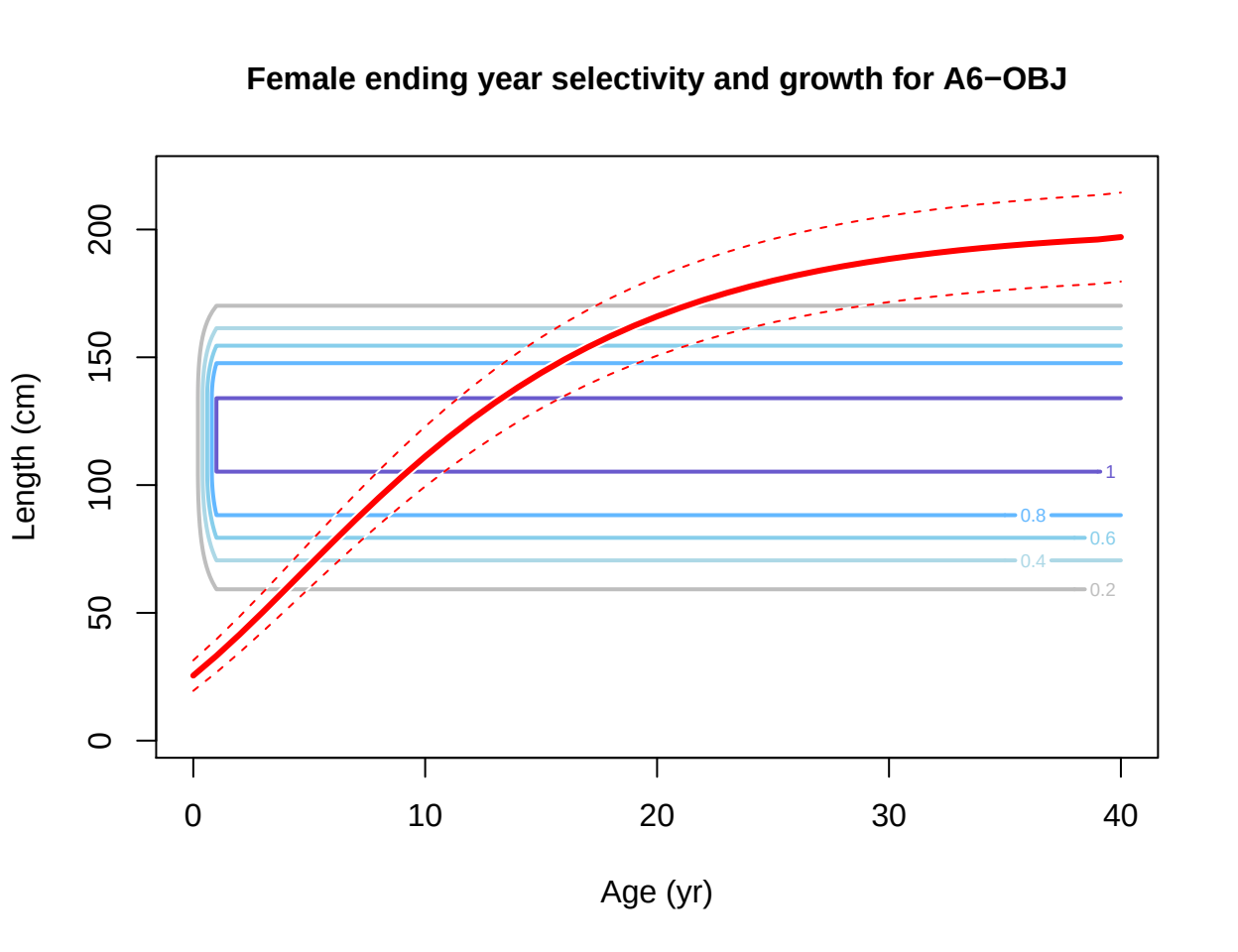

Male ending year selectivity and growth for A3−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

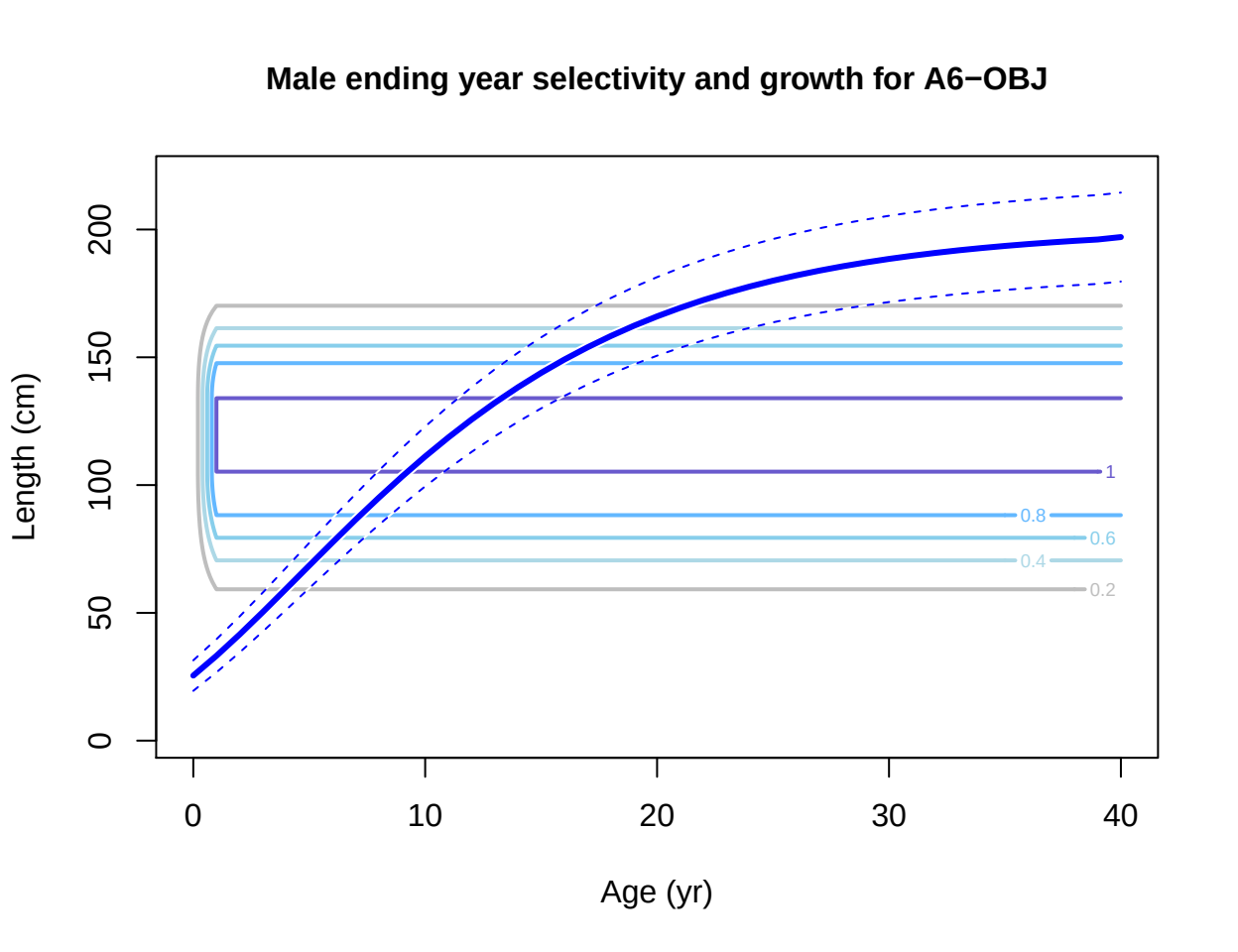

Female ending year selectivity and growth for A4−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

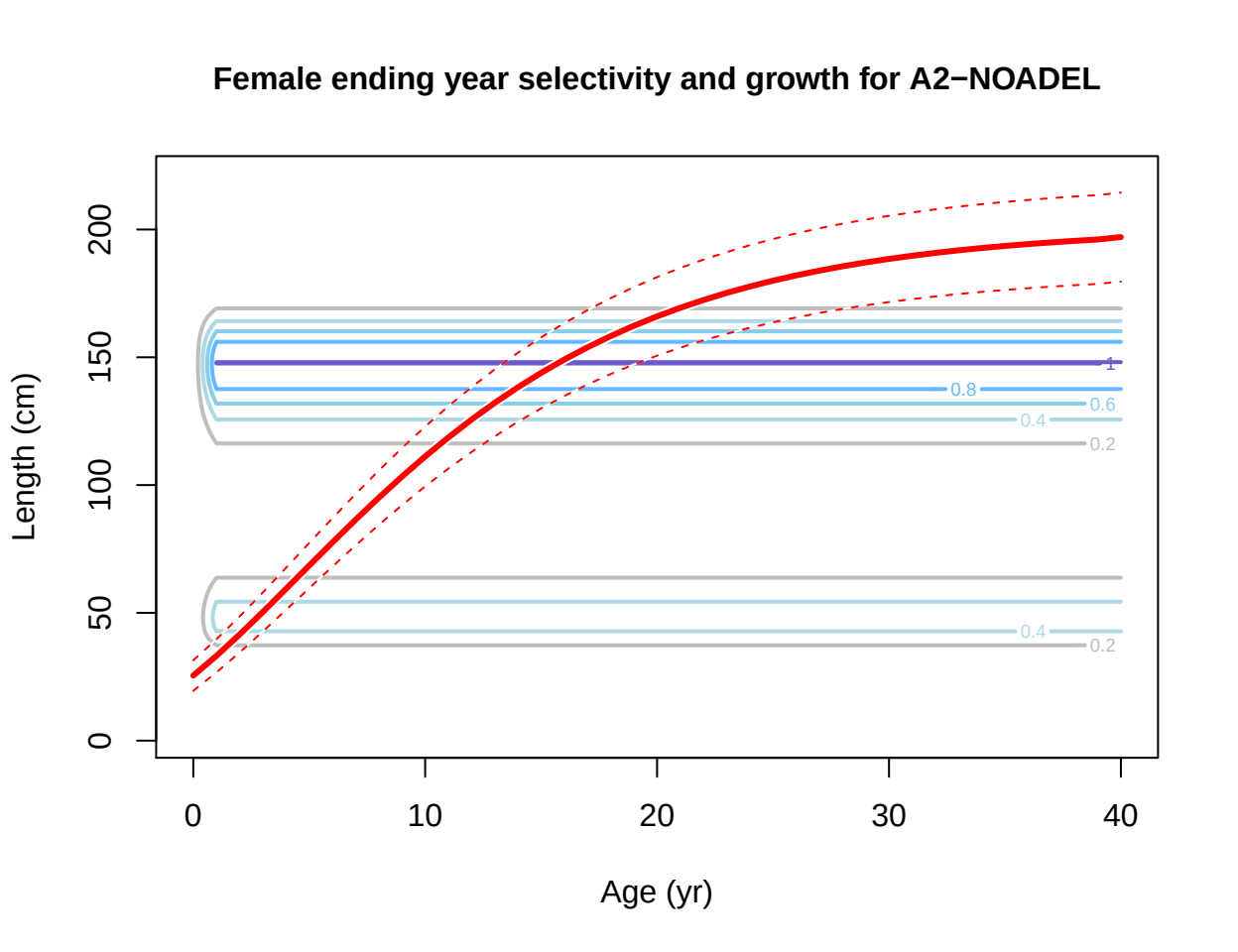

Male ending year selectivity and growth for A4−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

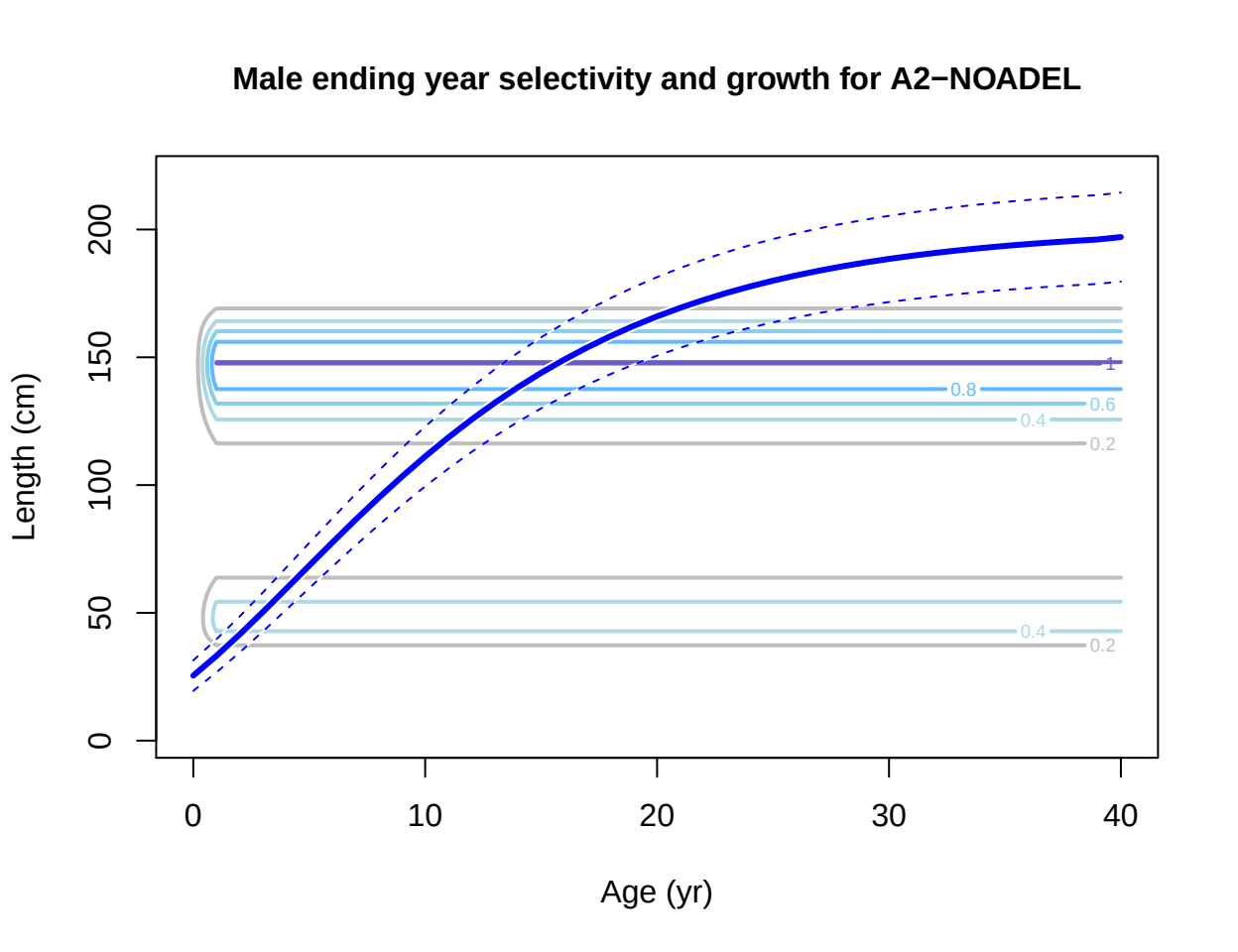

Female ending year selectivity and growth for A5−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.6
0.4
1
0.8
0.6
0.4
0.2

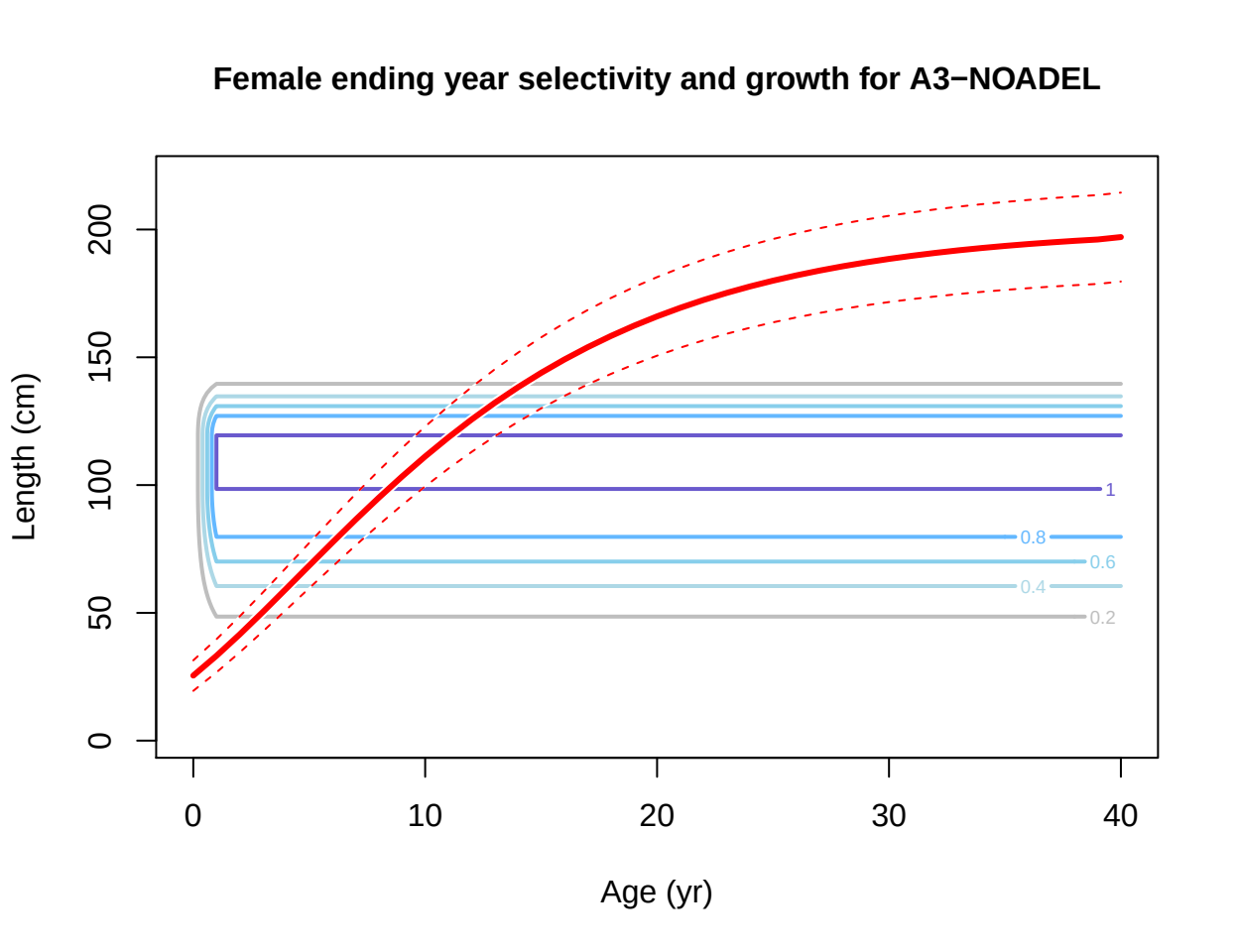

Male ending year selectivity and growth for A5−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.6
0.4
1
0.8
0.6
0.4
0.2

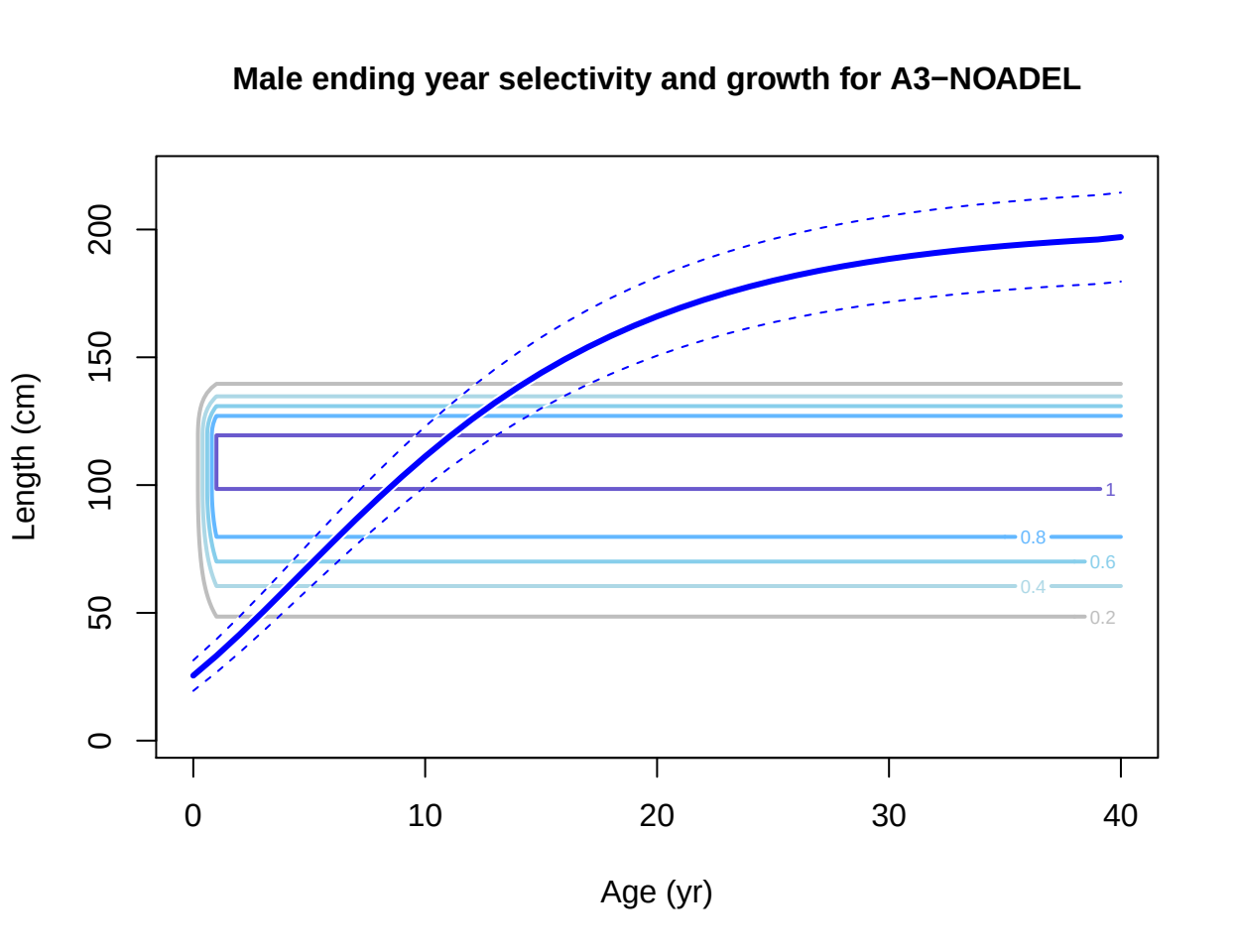

Female ending year selectivity and growth for A6−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

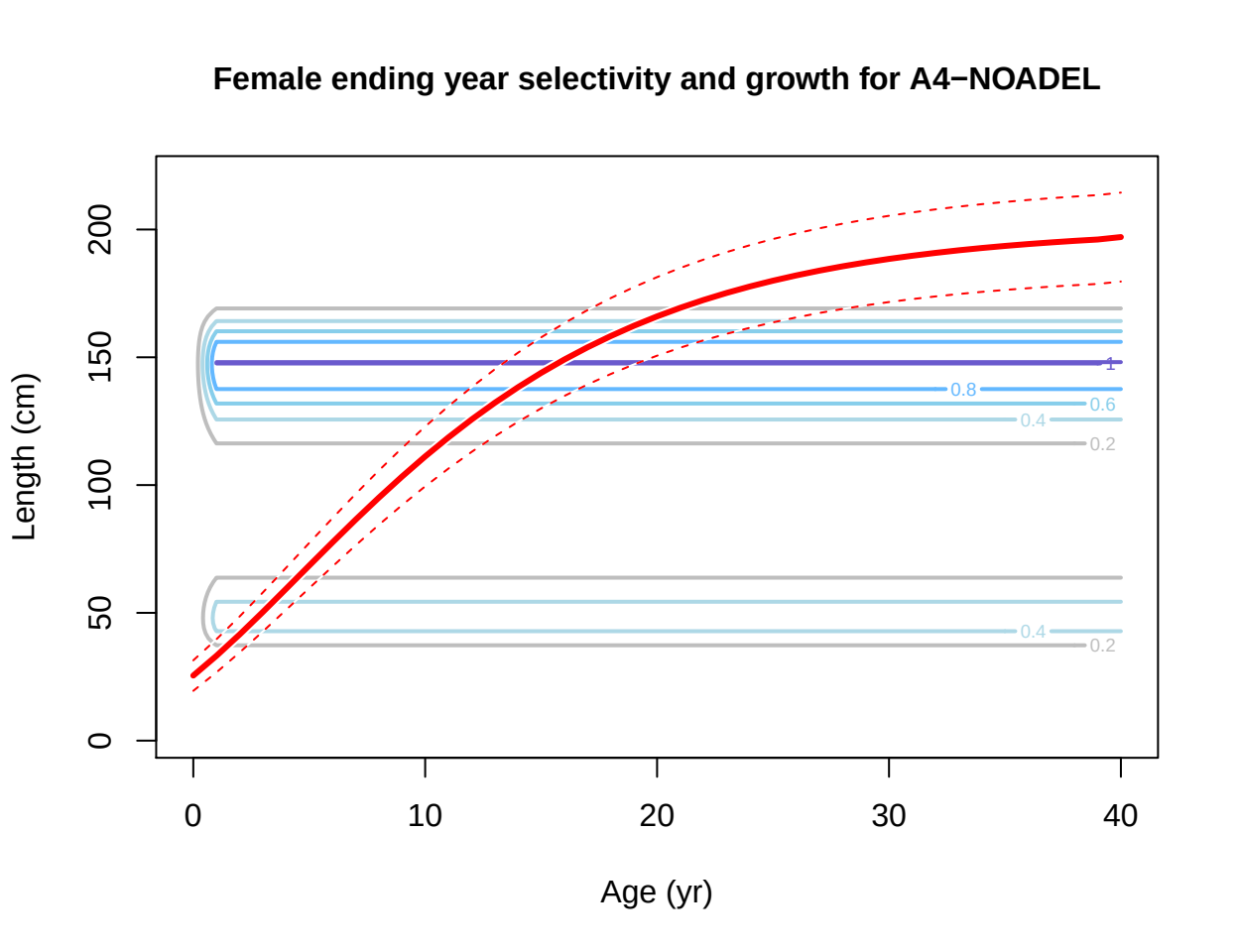

Male ending year selectivity and growth for A6−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

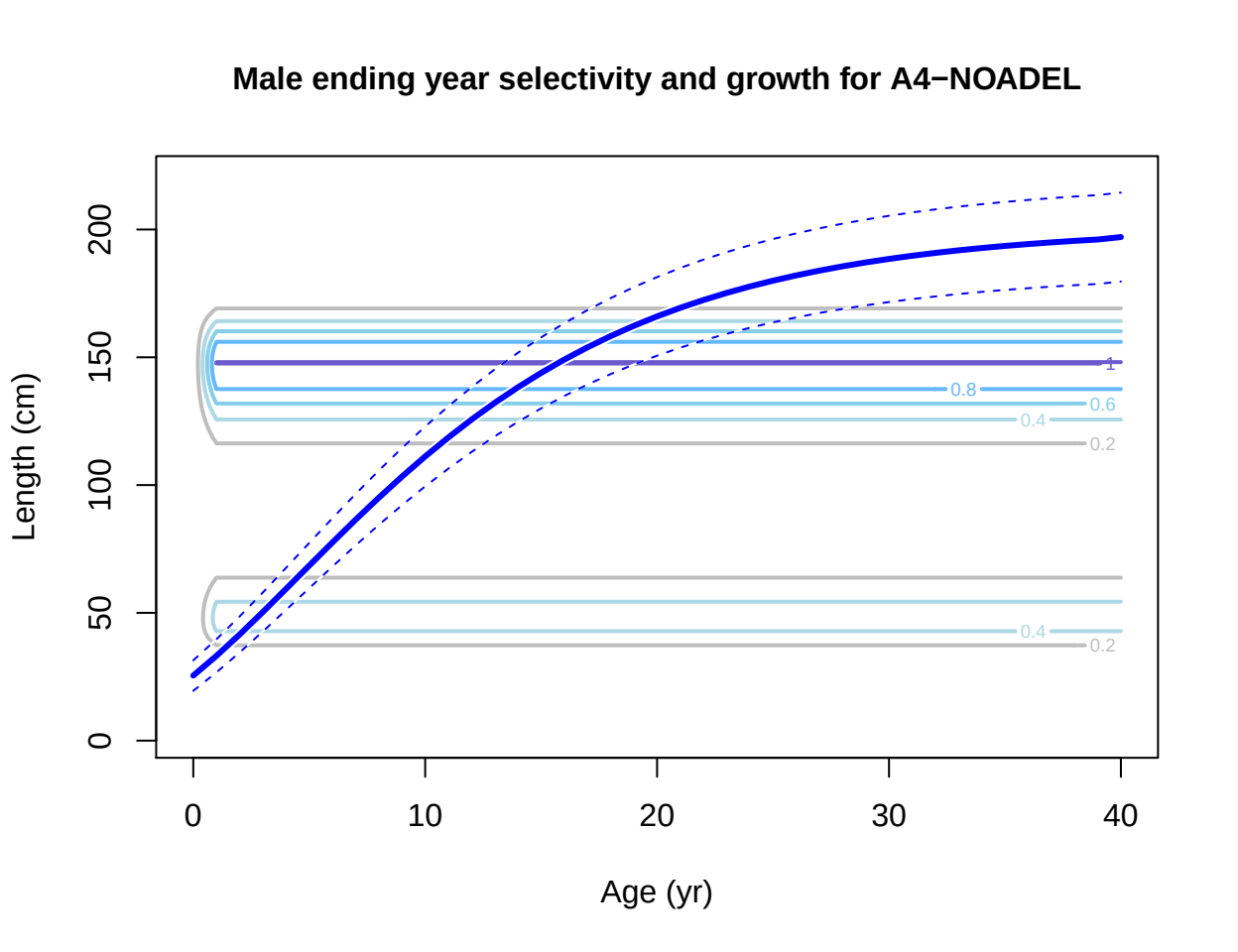

Female ending year selectivity and growth for A2−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

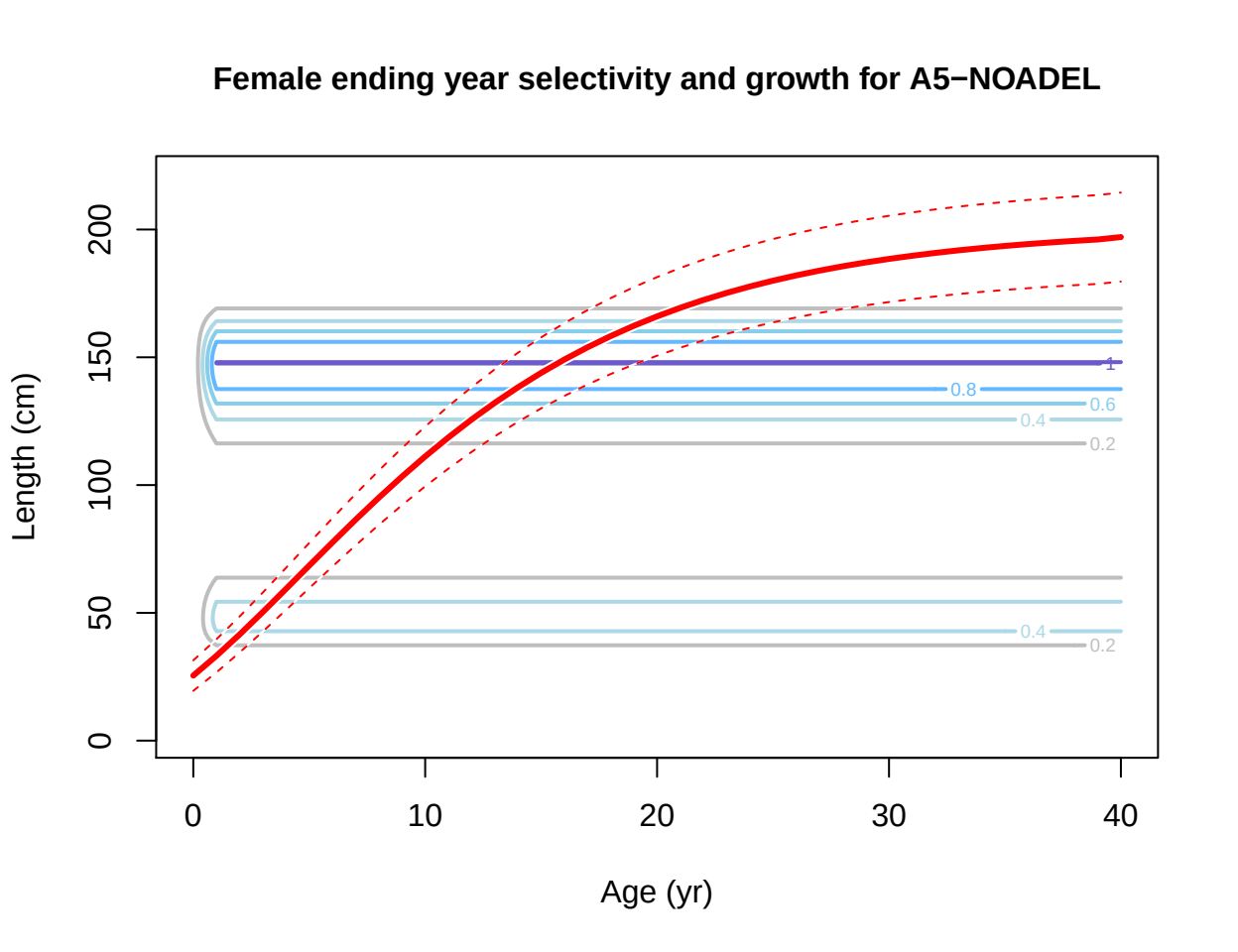

Male ending year selectivity and growth for A2−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

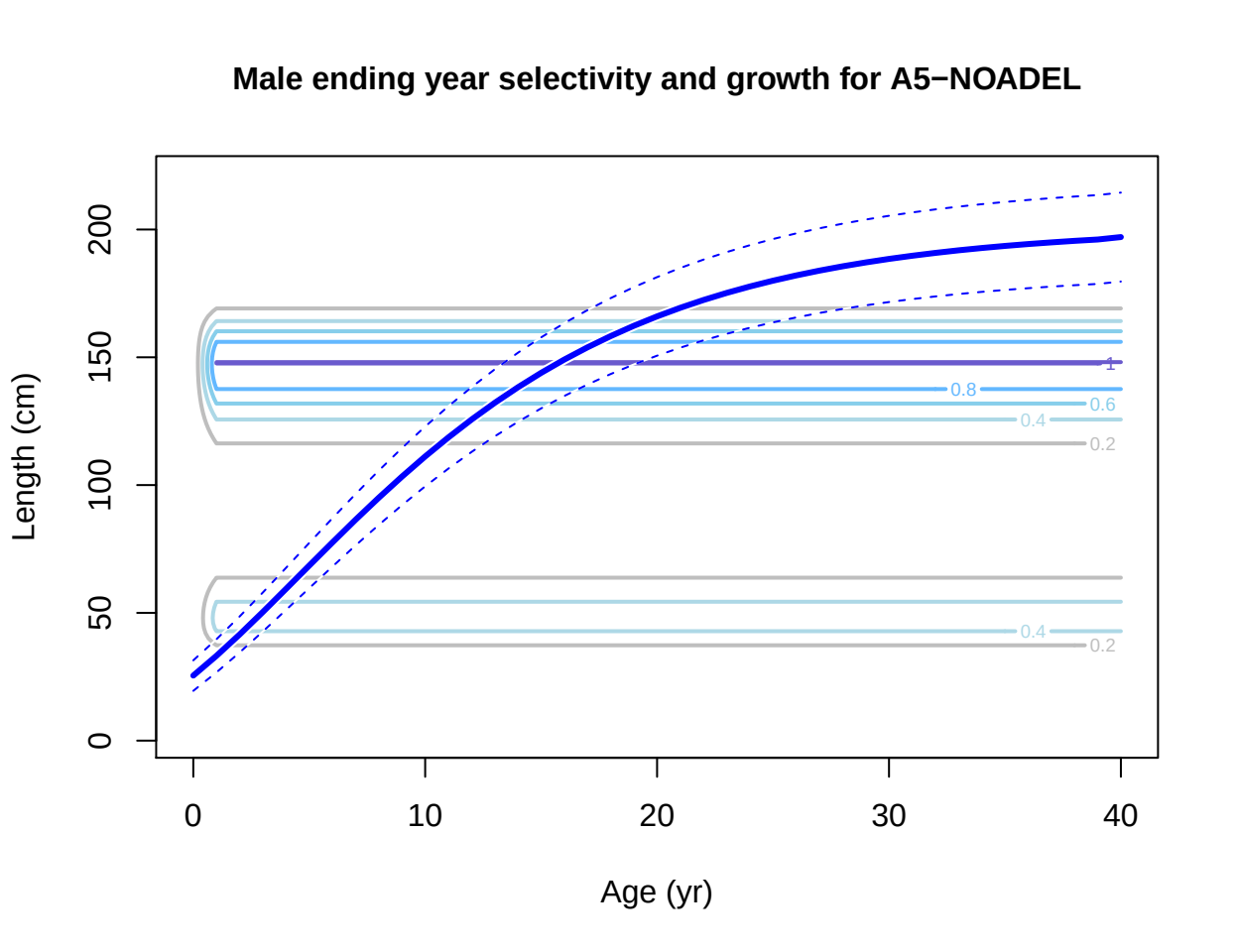

Female ending year selectivity and growth for A3−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

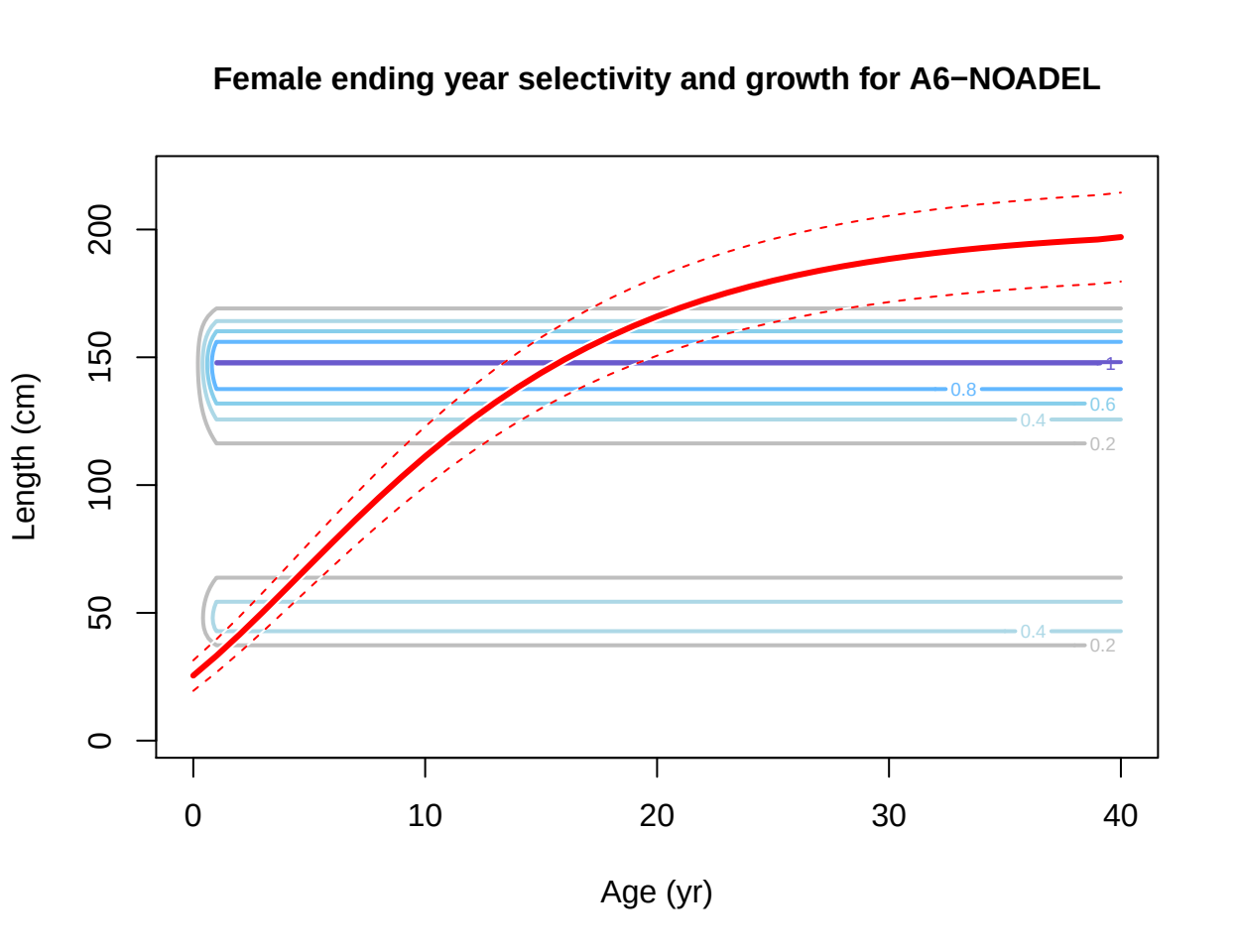

Male ending year selectivity and growth for A3−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

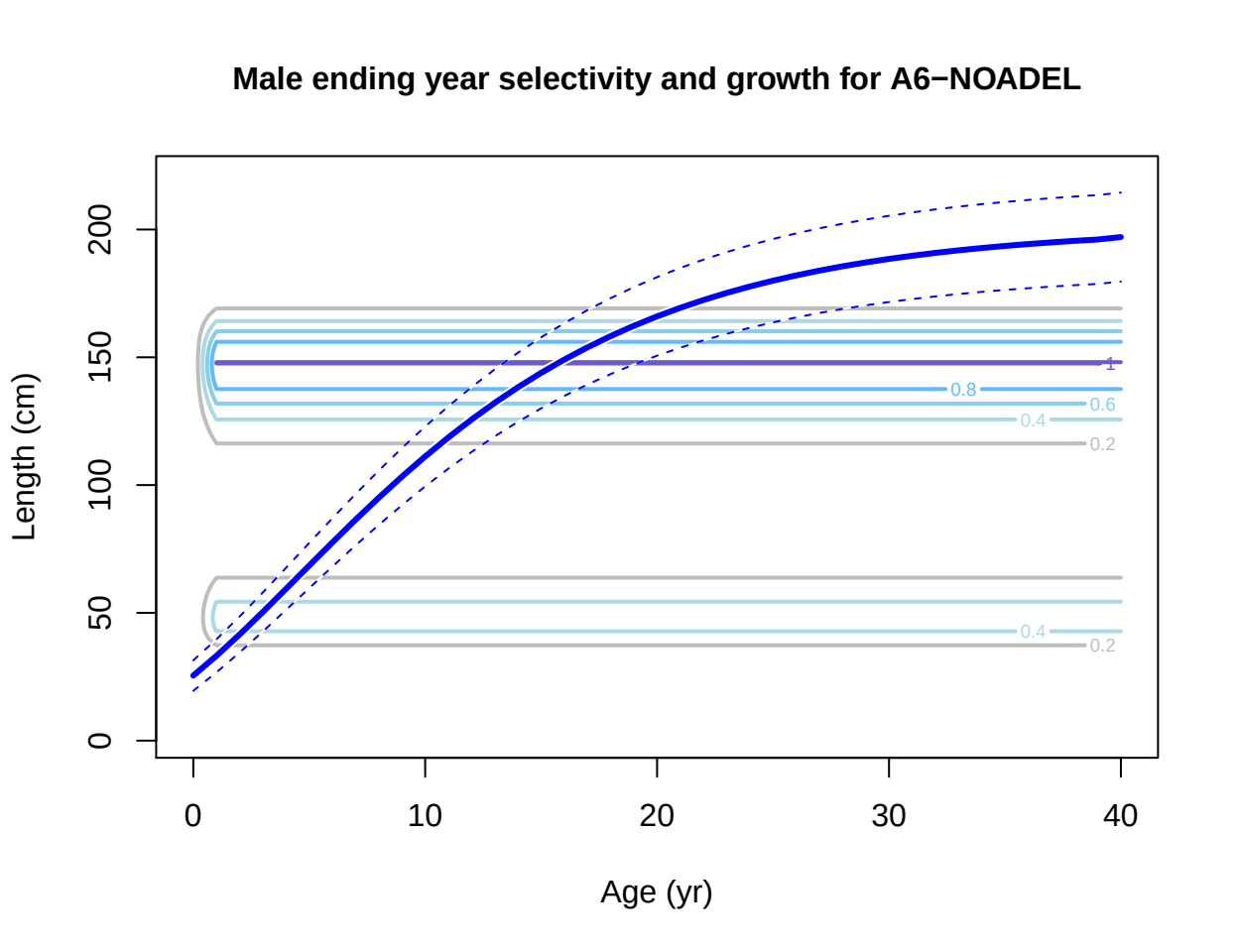

Female ending year selectivity and growth for A4−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

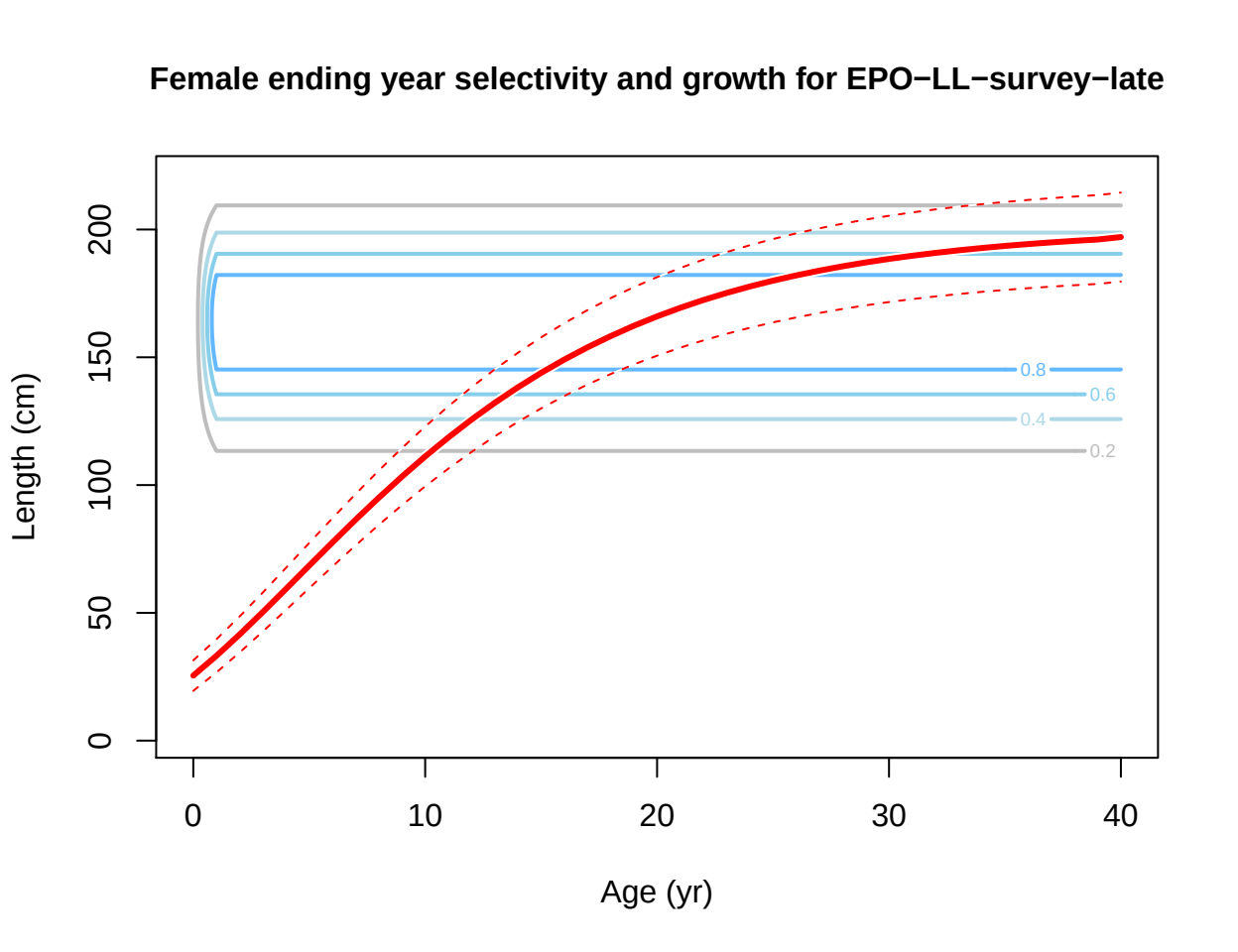

Male ending year selectivity and growth for A4−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

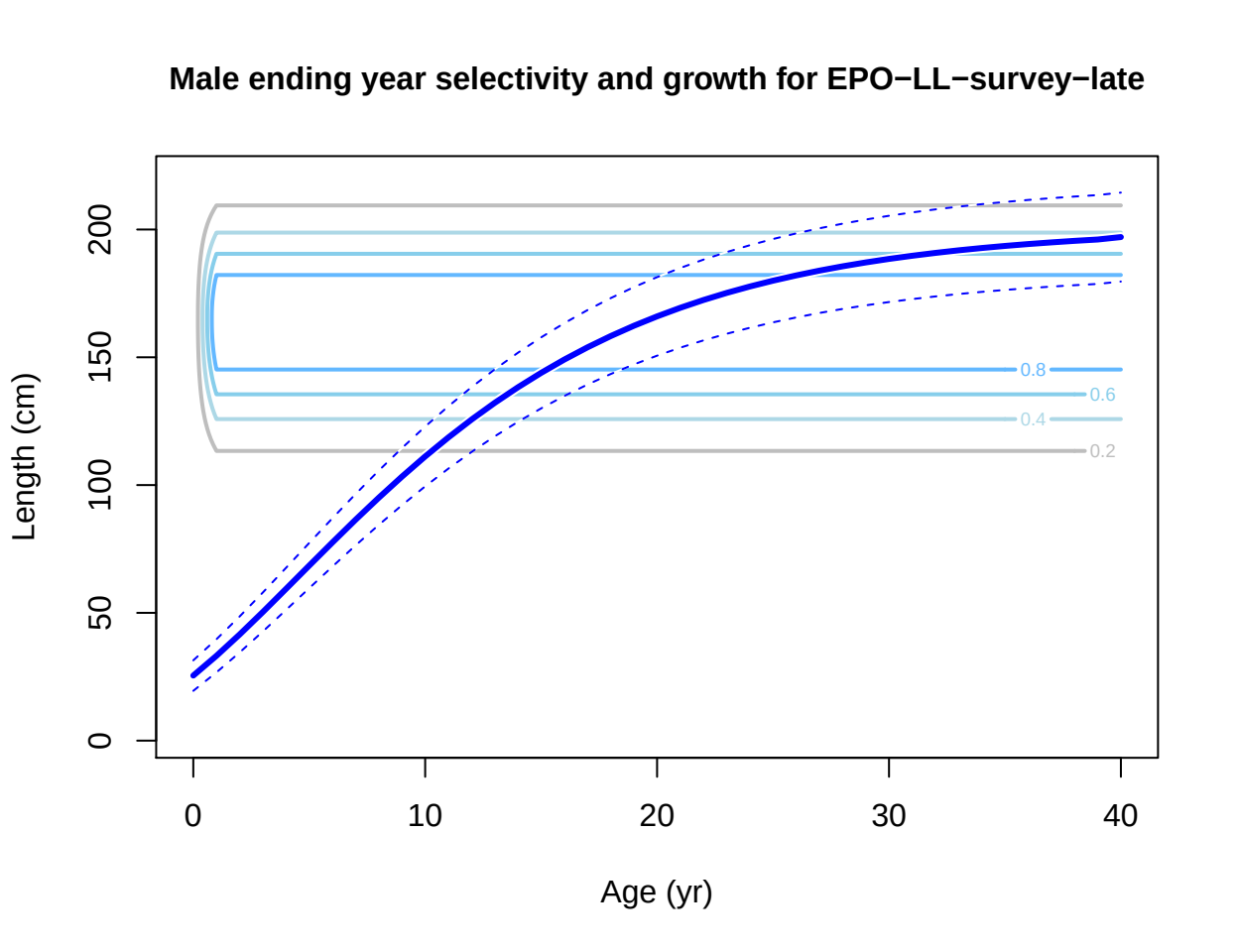

Female ending year selectivity and growth for A5−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

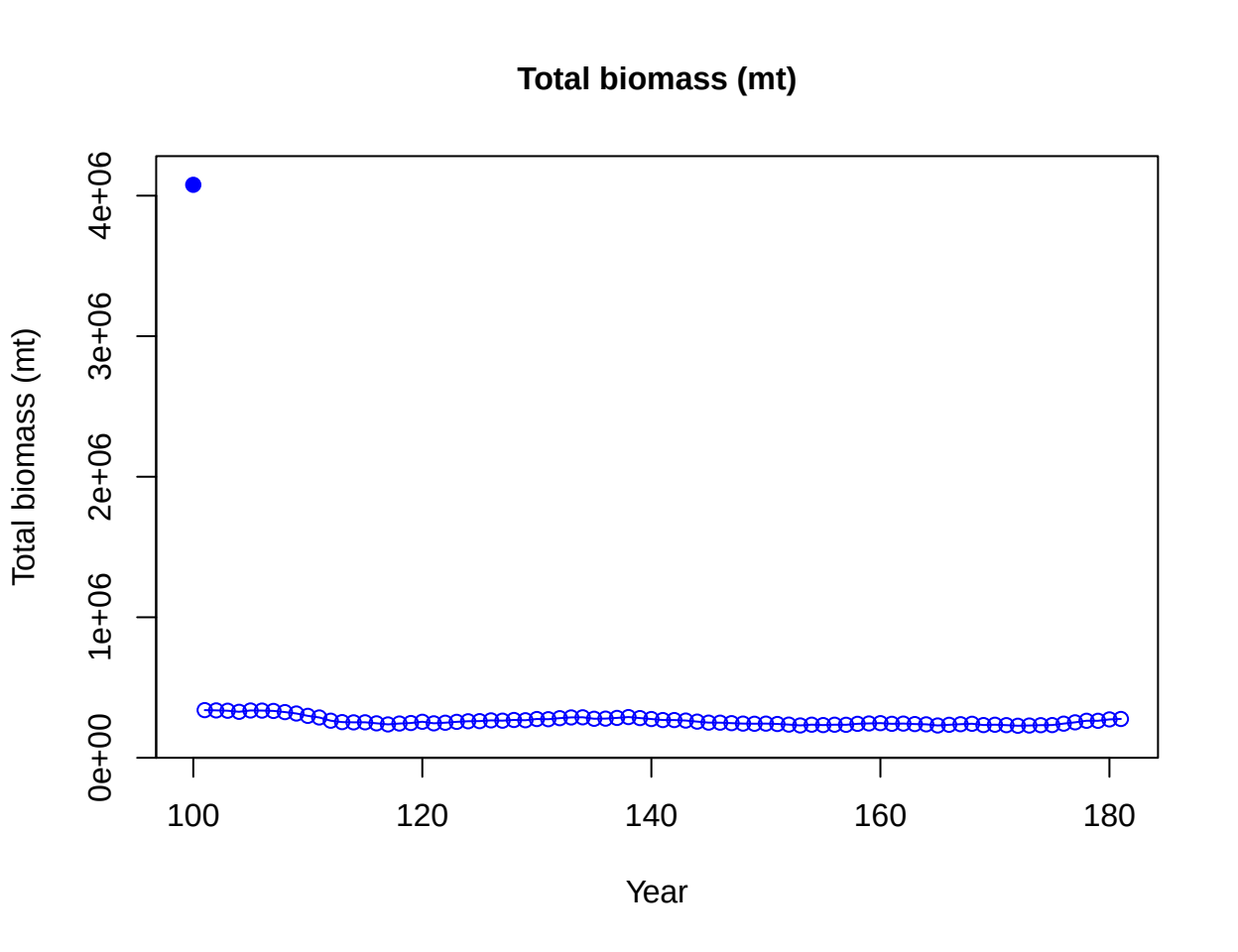

Male ending year selectivity and growth for A5−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

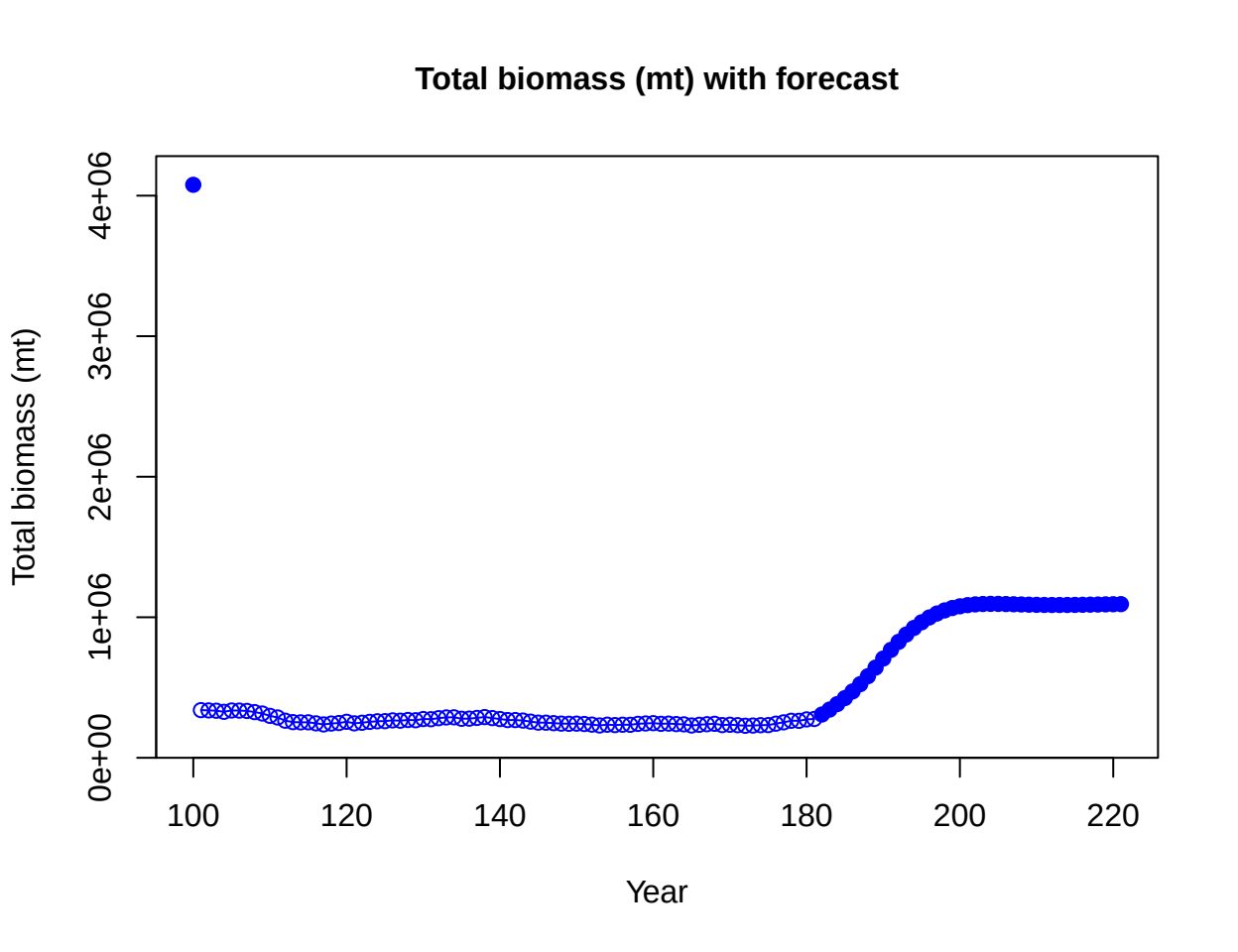

Female ending year selectivity and growth for A6−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

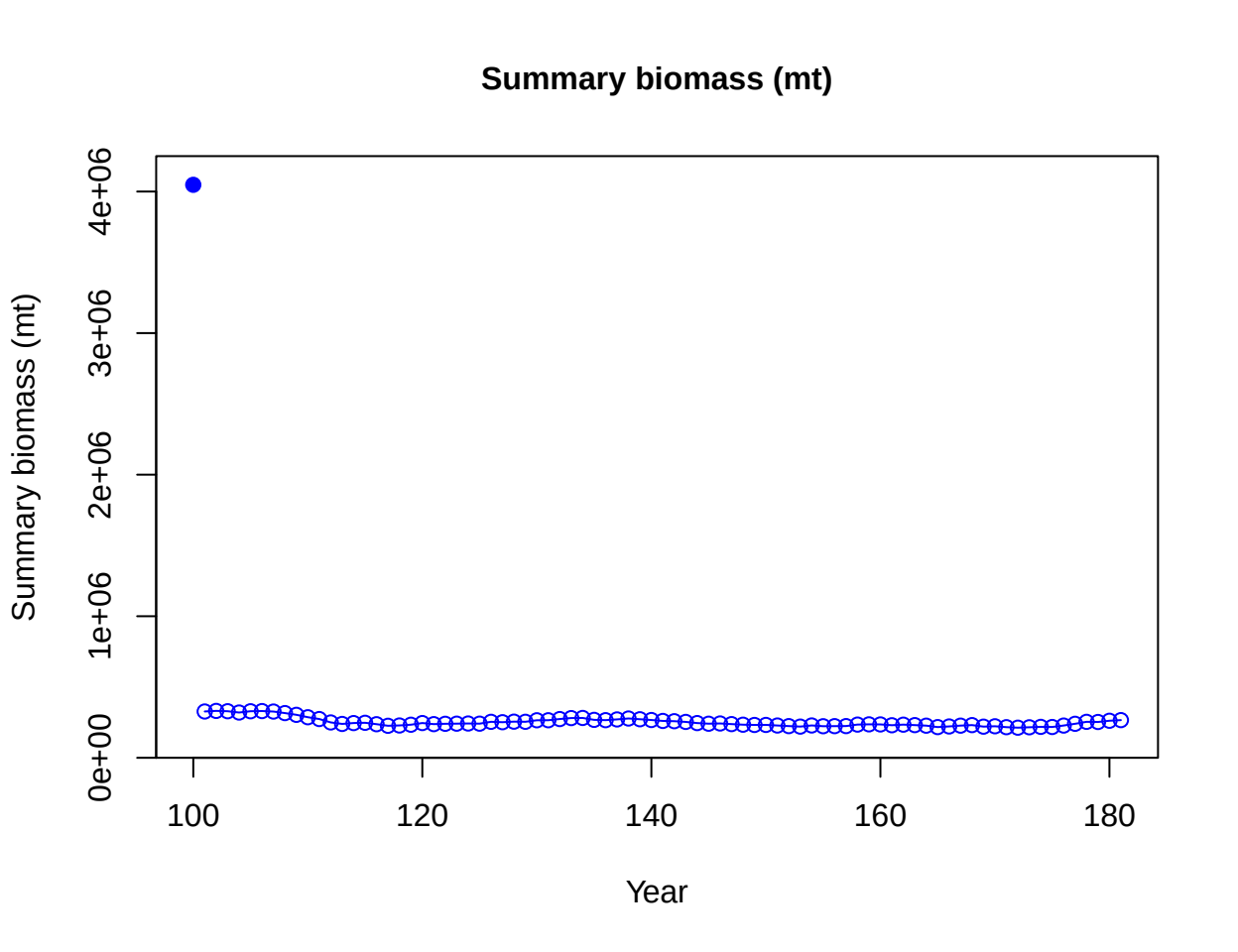

Male ending year selectivity and growth for A6−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2
0.4
0.2

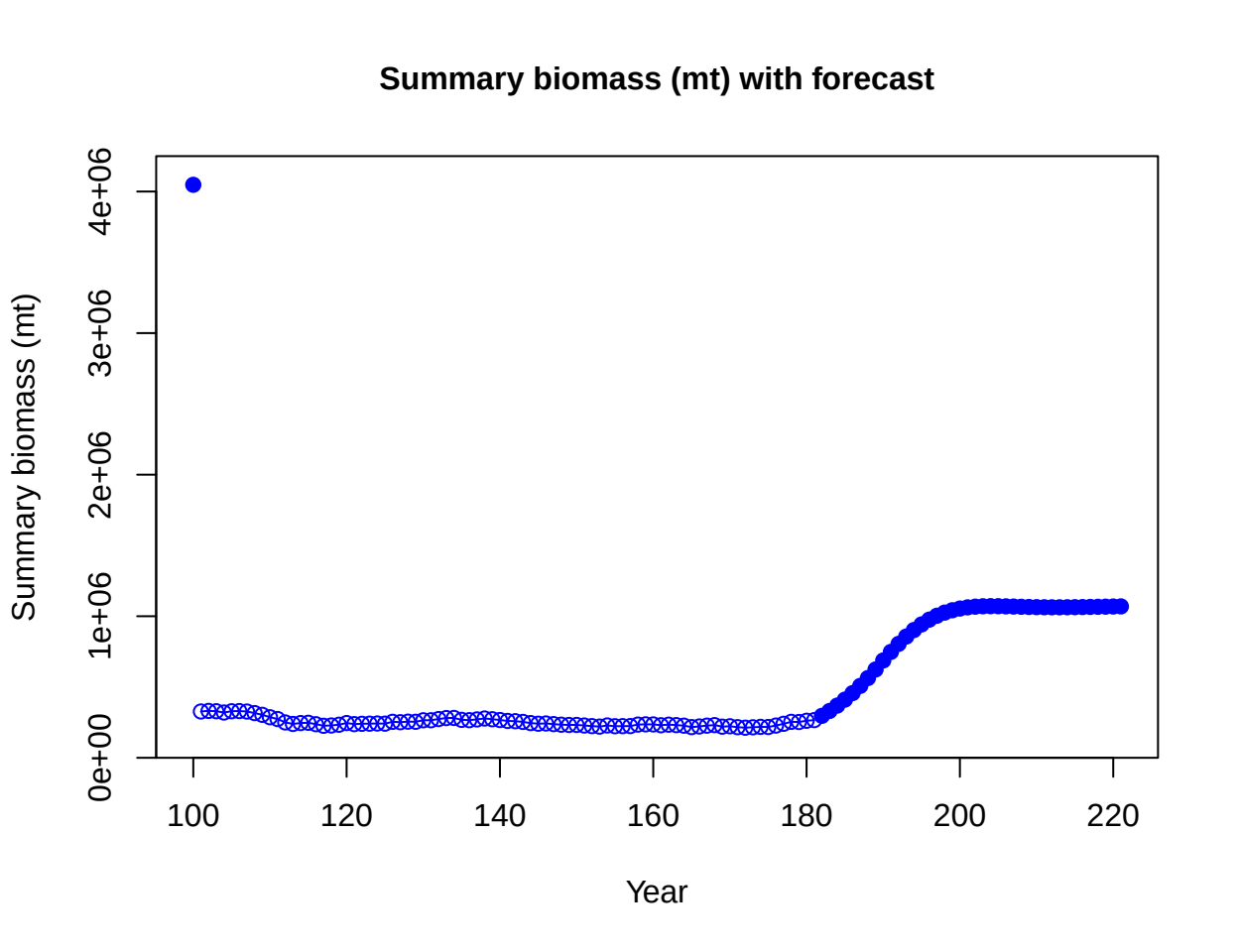

Female ending year selectivity and growth for EPO−LL−survey−late
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

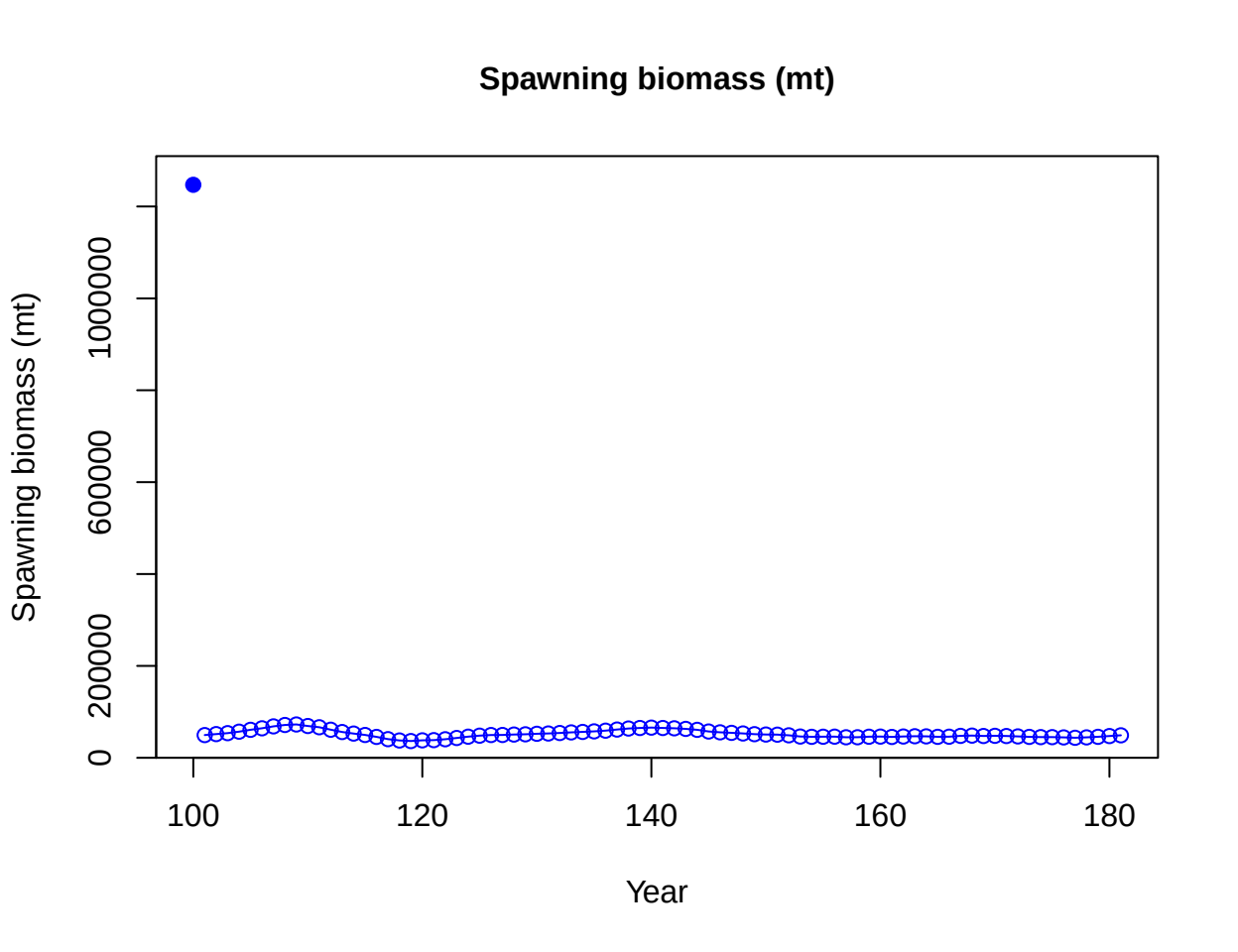

Male ending year selectivity and growth for EPO−LL−survey−late
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

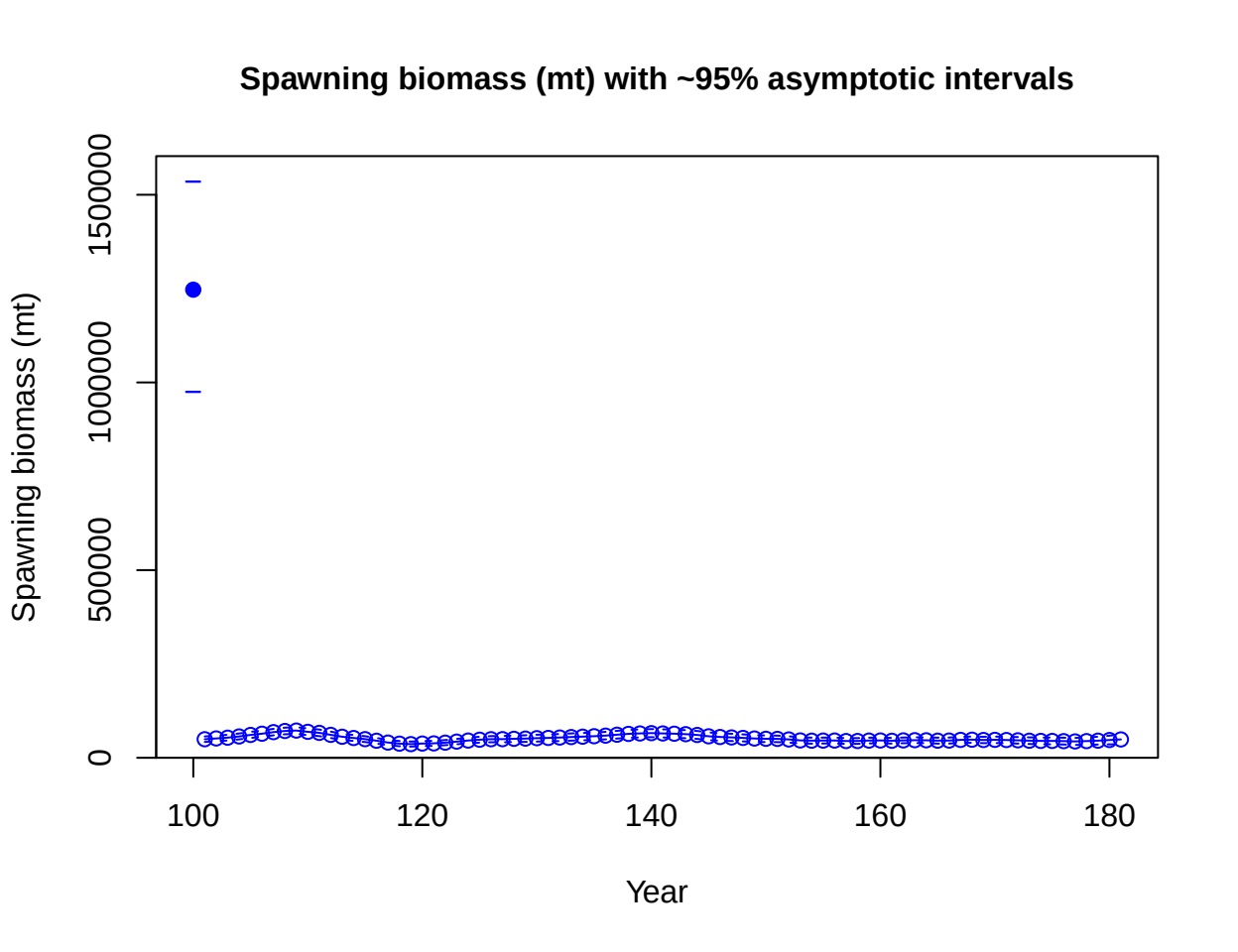

Total biomass (mt)
Total biomass (mt)
0e+00
1e+06
2e+06
3e+06
4e+06
100
120
140
160
180
Year

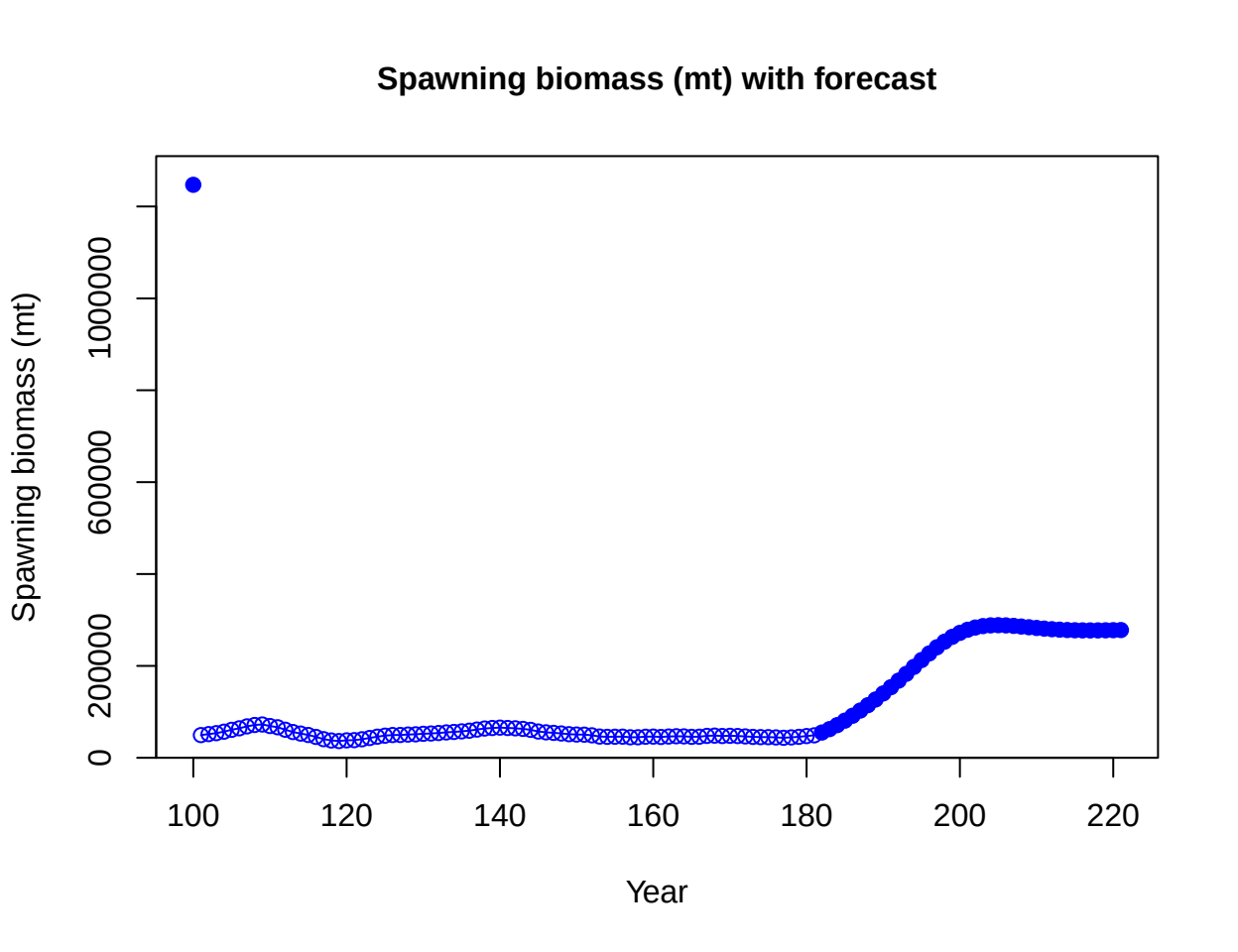

Total biomass (mt) with forecast
Total biomass (mt)
0e+00
1e+06
2e+06
3e+06
4e+06
100
120
140
160
180
200
220
Year

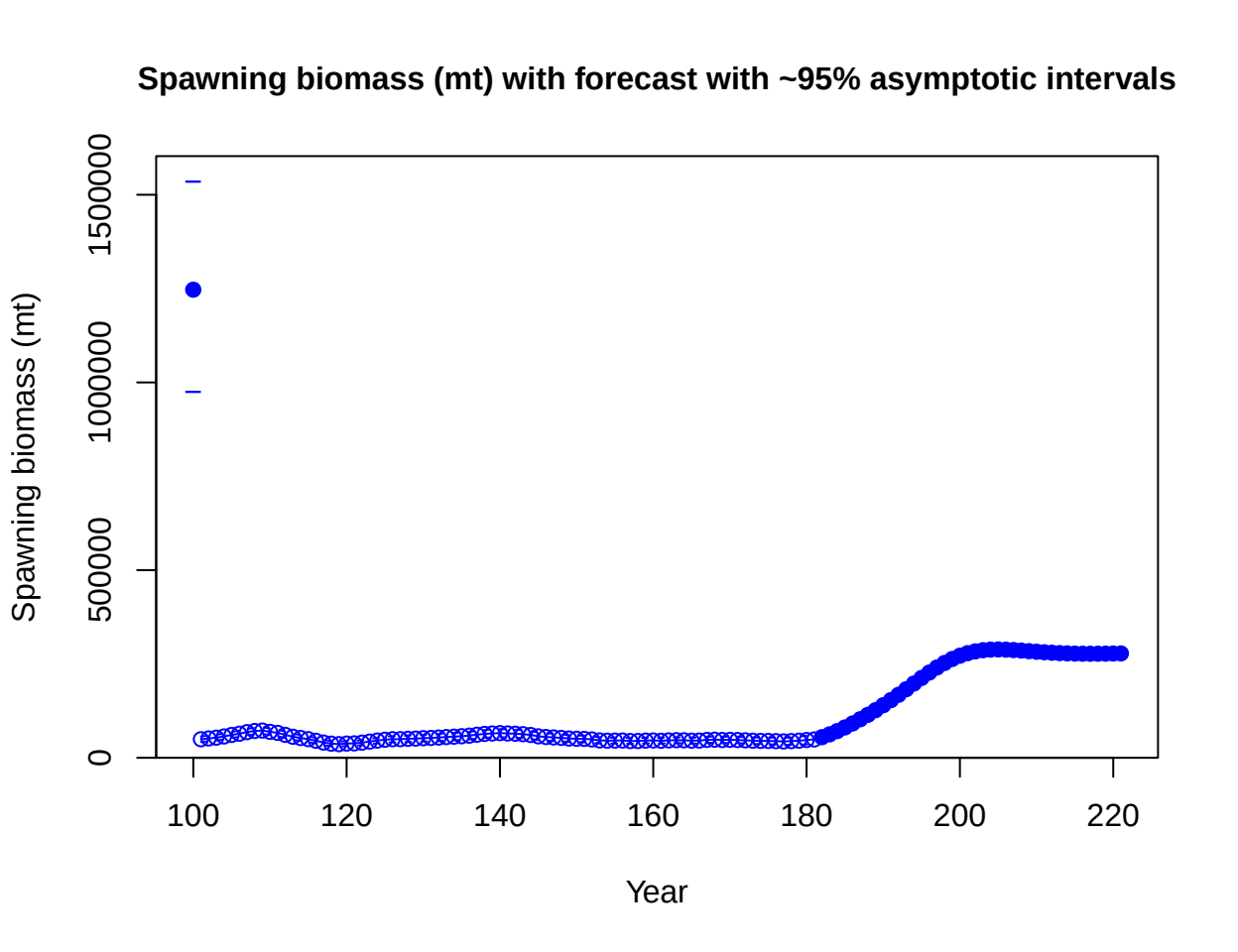

Summary biomass (mt)
Summary biomass (mt)
0e+00
1e+06
2e+06
3e+06
4e+06
100
120
140
160
180
Year

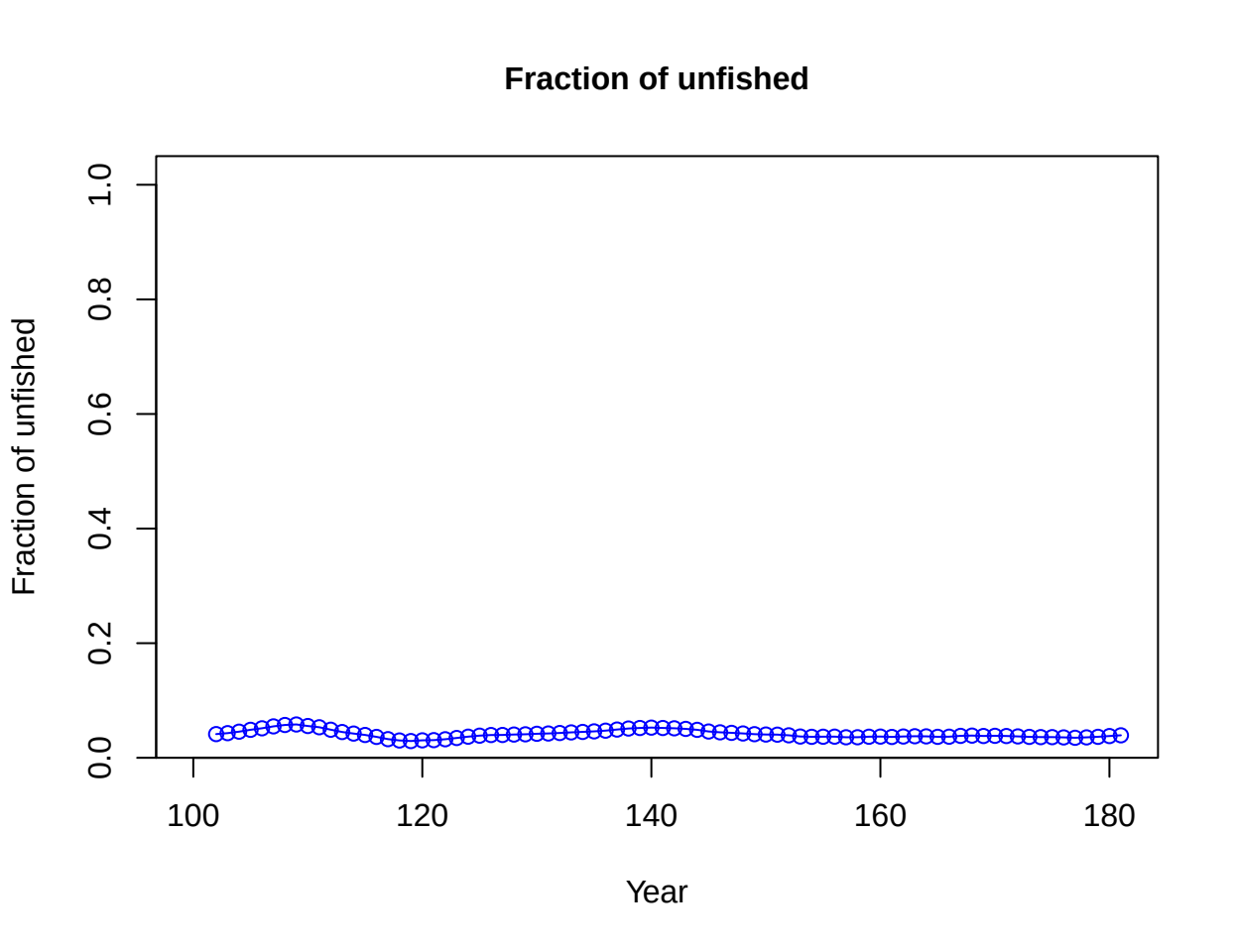

Summary biomass (mt) with forecast
Summary biomass (mt)
0e+00
1e+06
2e+06
3e+06
4e+06
100
120
140
160
180
200
220
Year

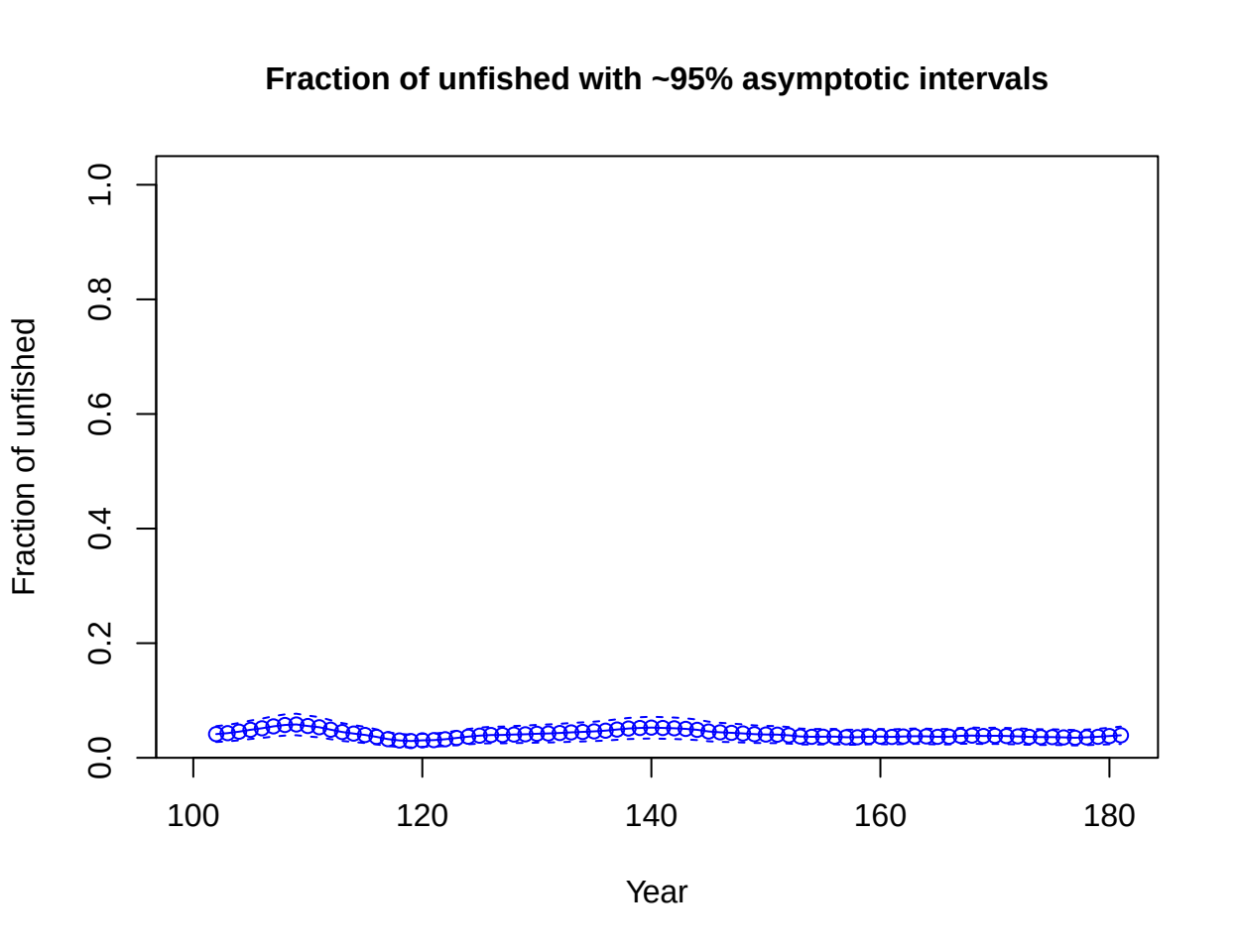

Spawning biomass (mt)
Spawning biomass (mt)
0
200000
600000
1000000
100
120
140
160
180
Year

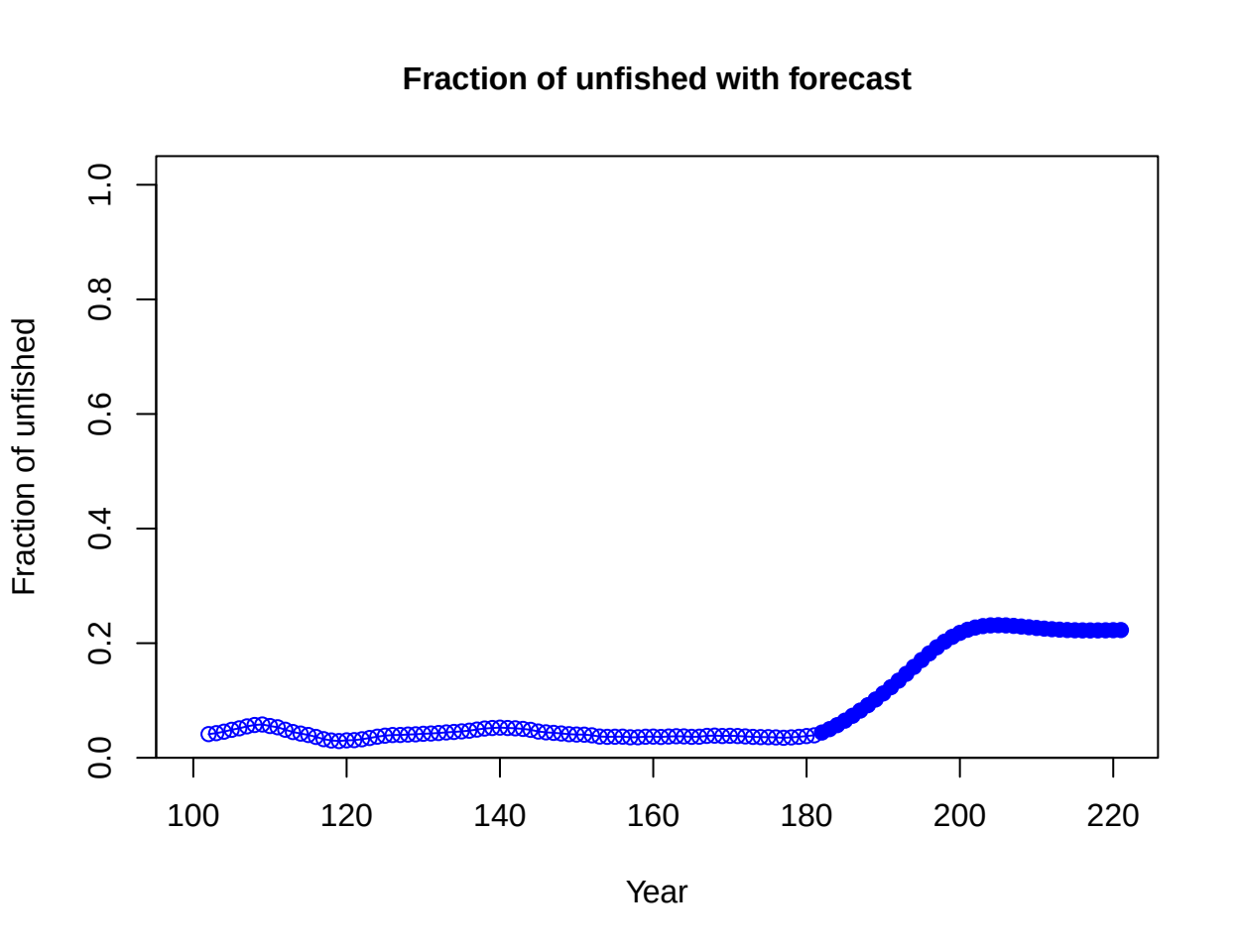

Spawning biomass (mt) with ~95% asymptotic intervals
Spawning biomass (mt)
0
500000
1000000
1500000
100
120
140
160
180
Year

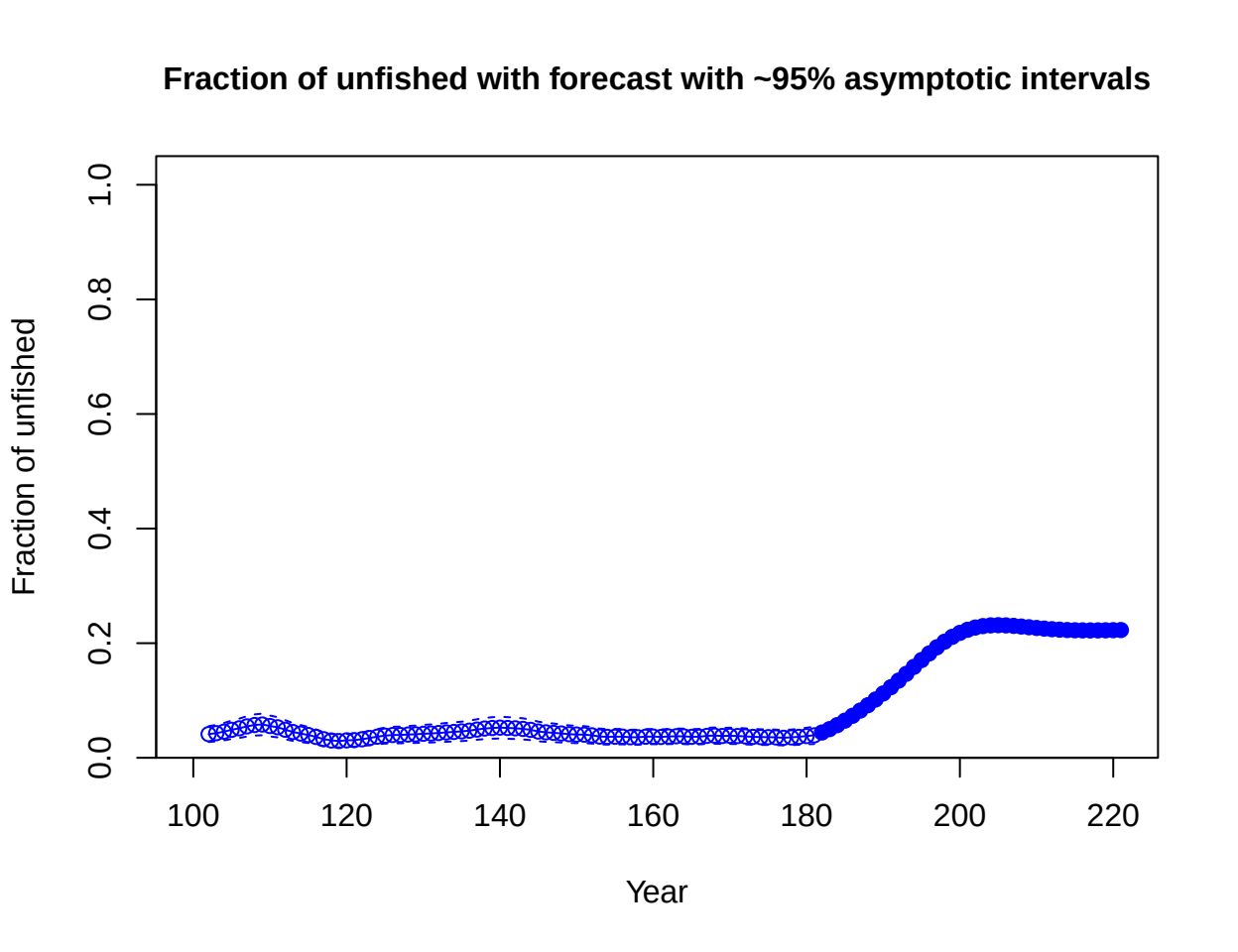

Spawning biomass (mt) with forecast
Spawning biomass (mt)
0
200000
600000
1000000
100
120
140
160
180
200
220
Year

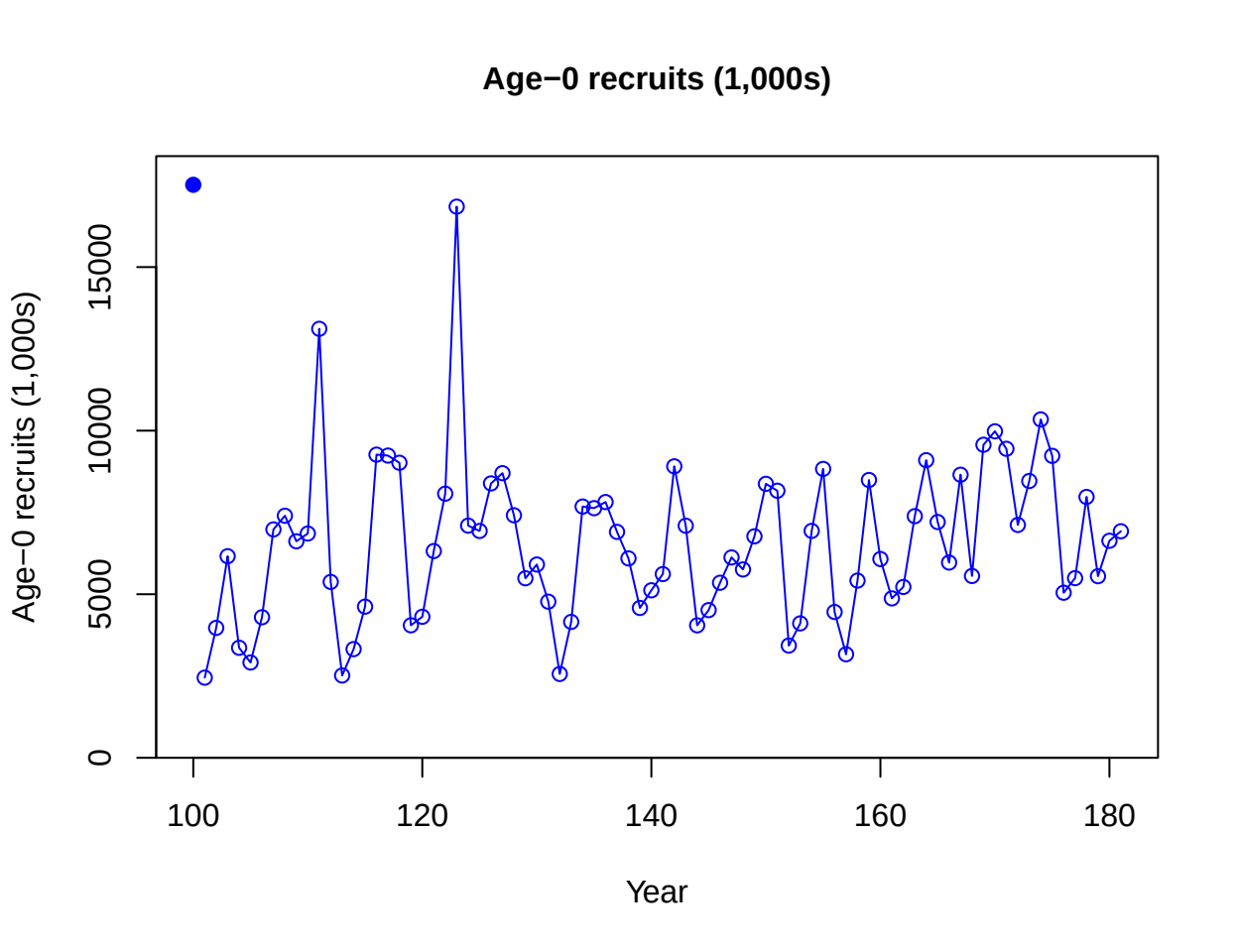

Spawning biomass (mt) with forecast with ~95% asymptotic intervals
Spawning biomass (mt)
0
500000
1000000
1500000
100
120
140
160
180
200
220
Year

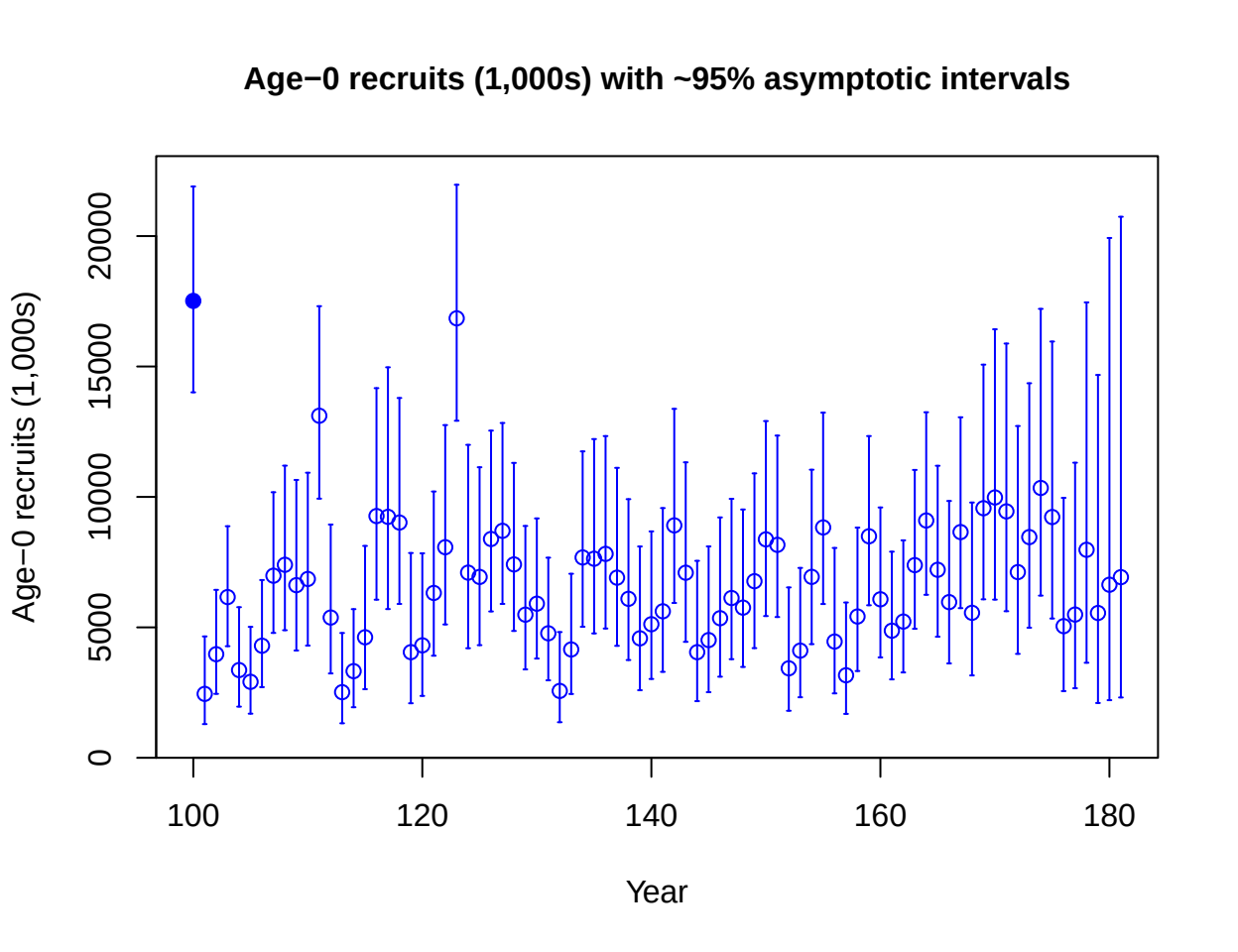

Fraction of unfished
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
100
120
140
160
180
Year

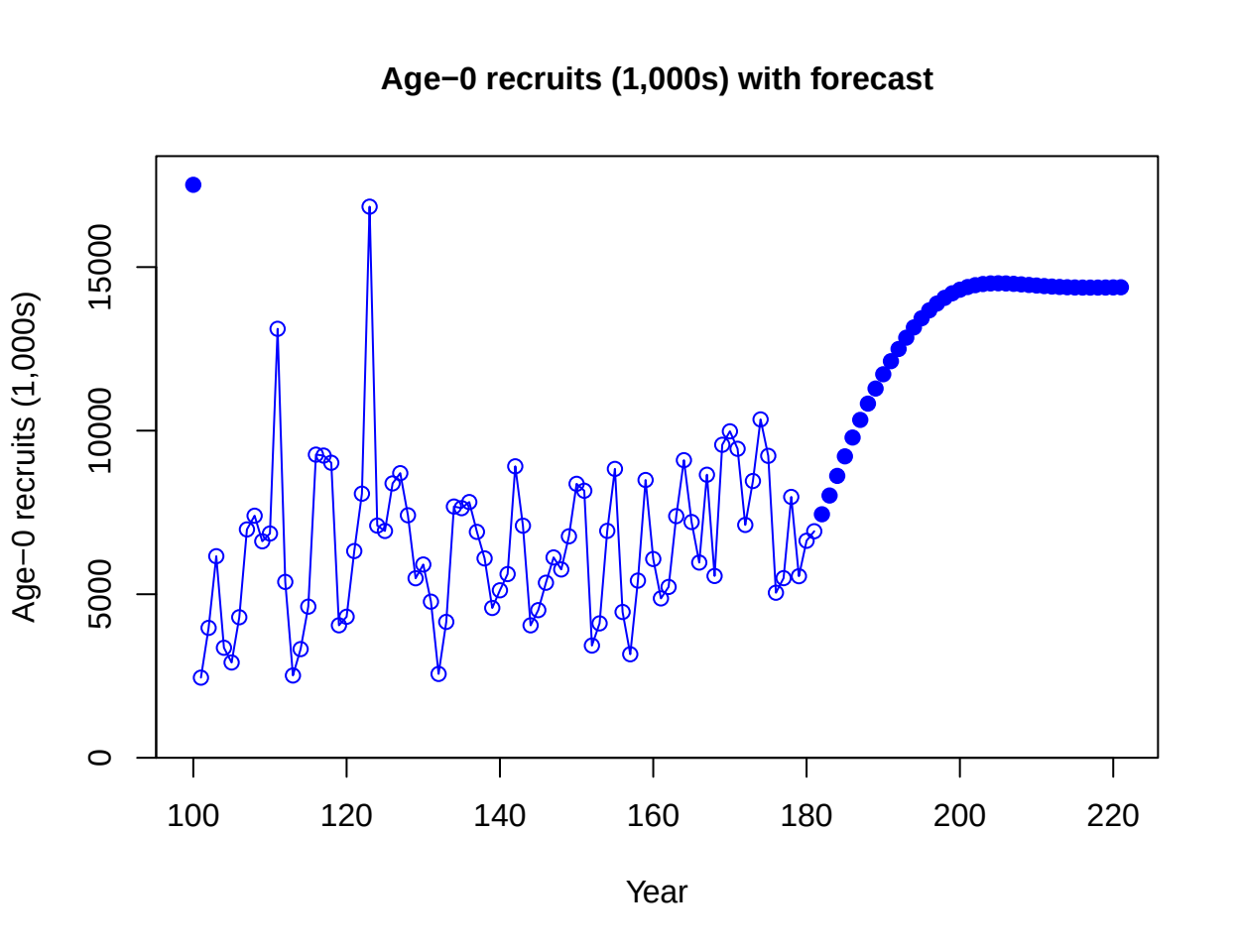

Fraction of unfished with ~95% asymptotic intervals
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
100
120
140
160
180
Year

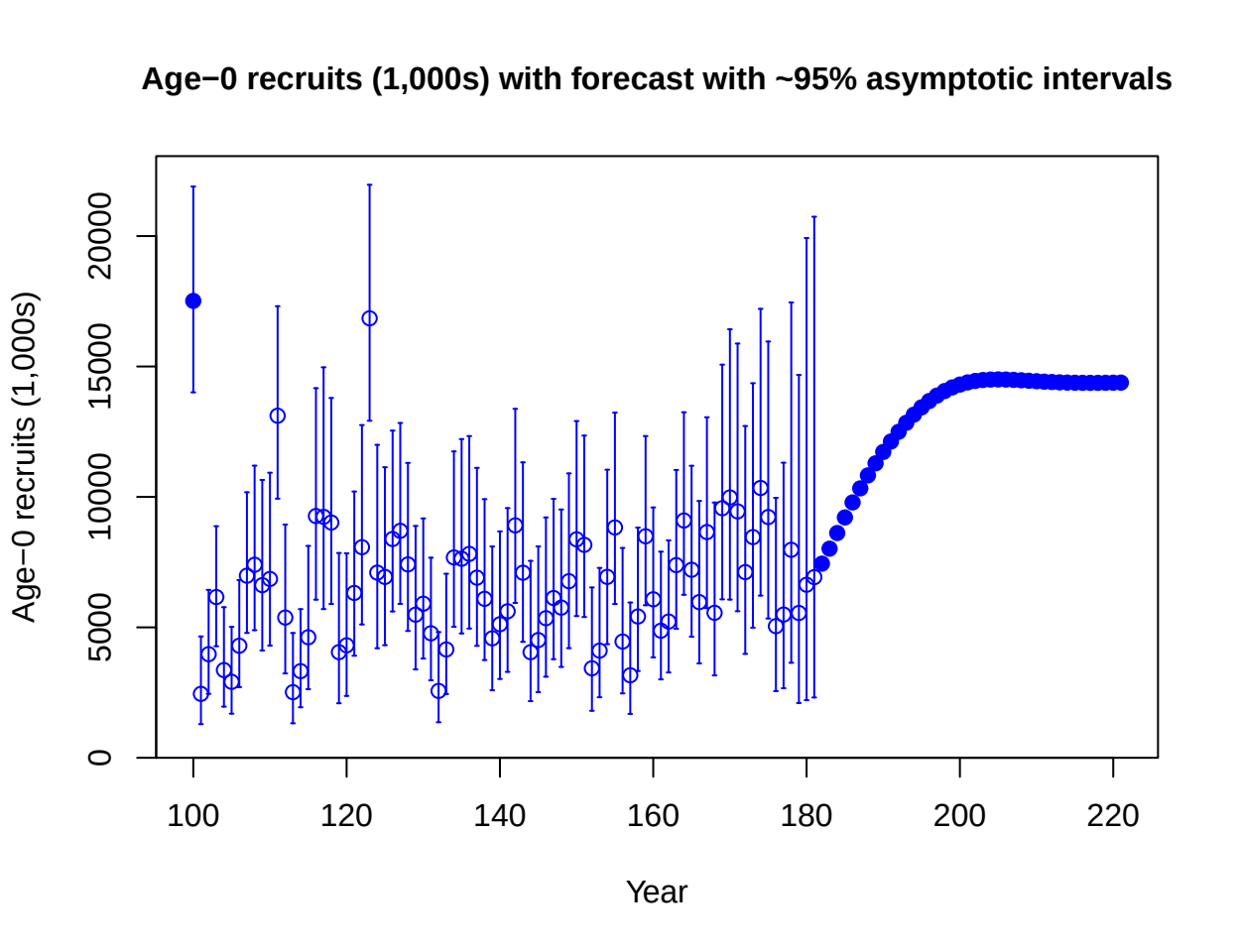

Fraction of unfished with forecast
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
100
120
140
160
180
200
220
Year

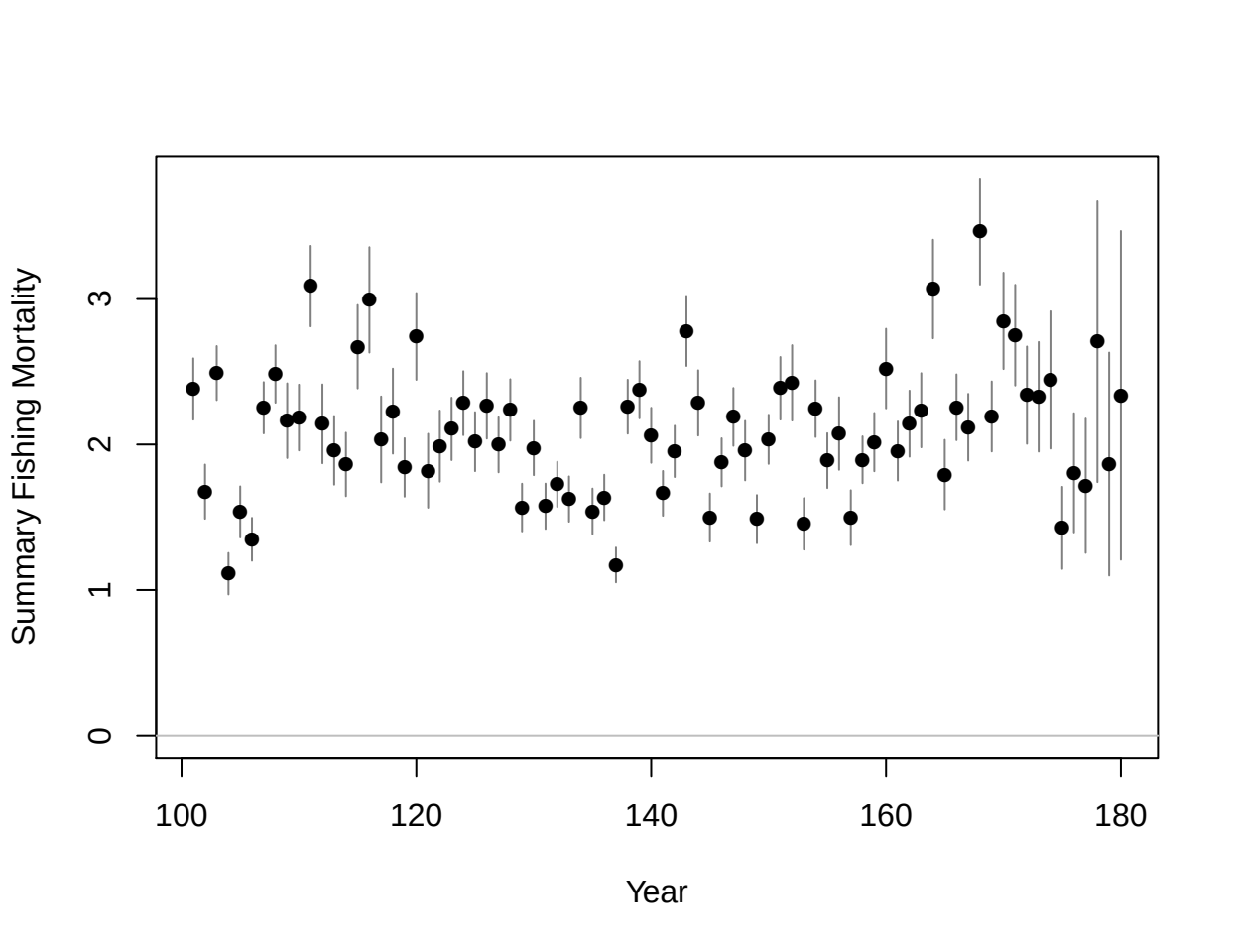

Fraction of unfished with forecast with ~95% asymptotic intervals
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
100
120
140
160
180
200
220
Year

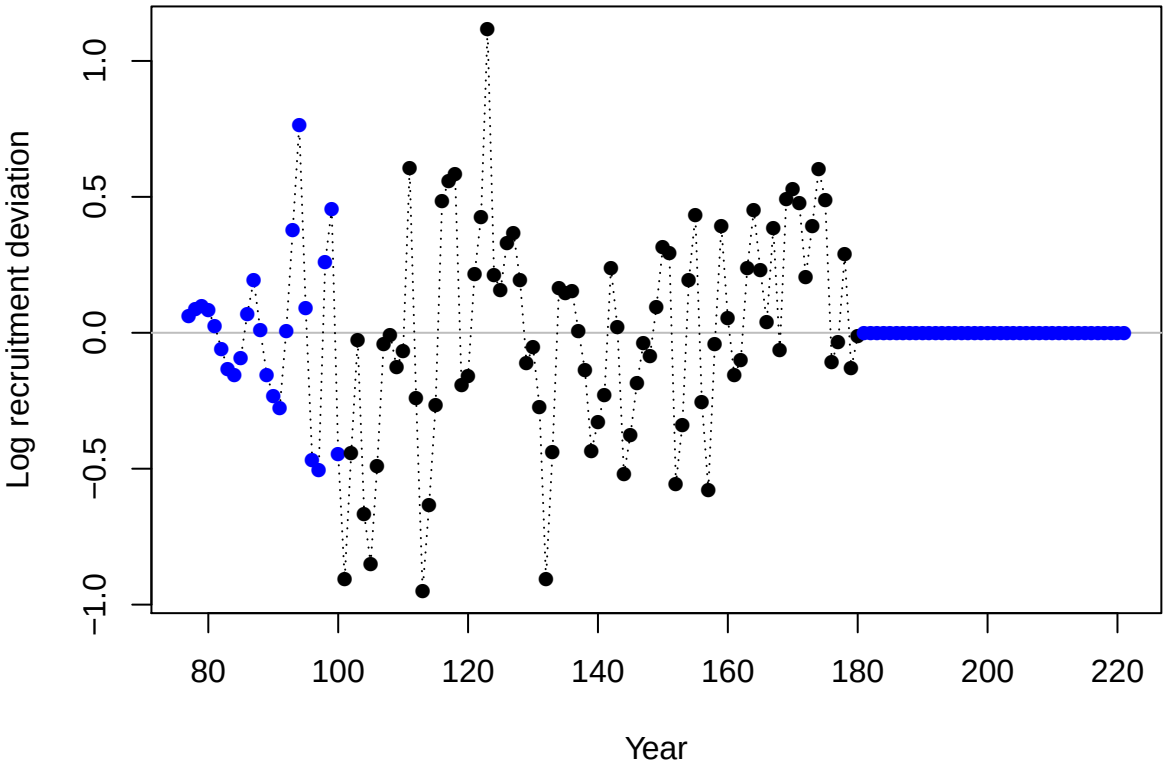

Age−0 recruits (1,000s)
Age−0 recruits (1,000s)
0
5000
10000
15000
100
120
140
160
180
Year

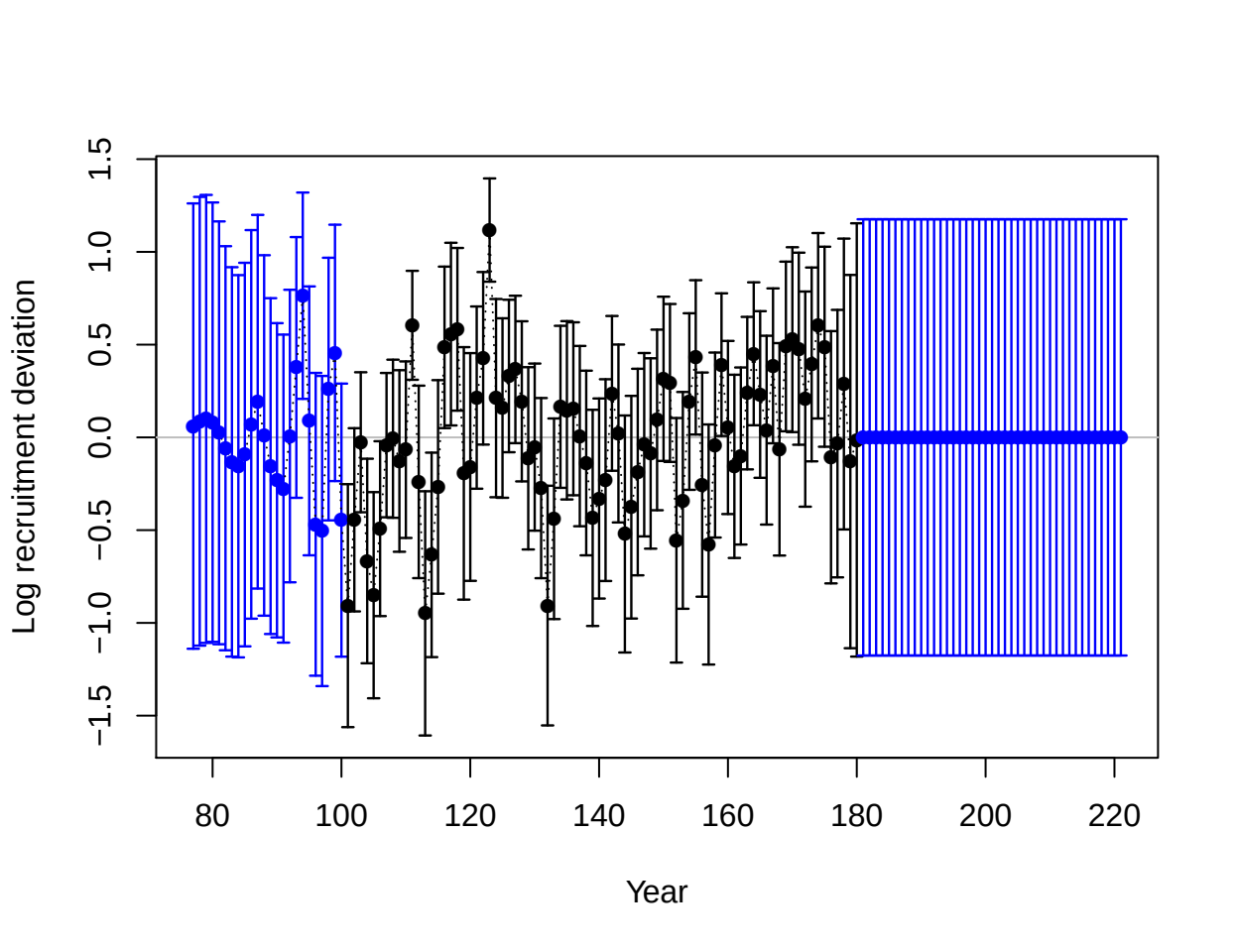

Age−0 recruits (1,000s) with ~95% asymptotic intervals
Age−0 recruits (1,000s)
0
5000
10000
15000
20000
100
120
140
160
180
Year

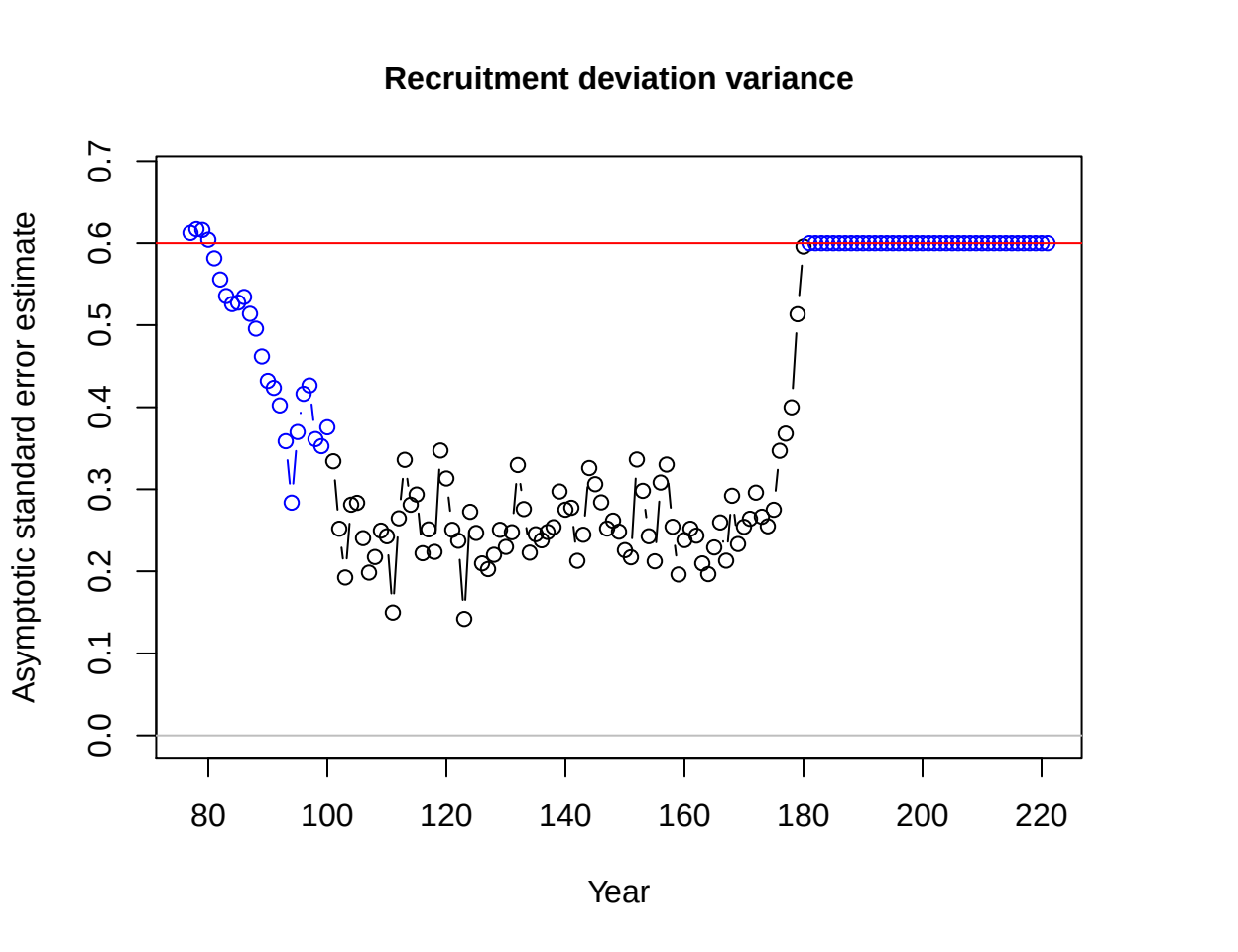

Age−0 recruits (1,000s) with forecast
Age−0 recruits (1,000s)
0
5000
10000
15000
100
120
140
160
180
200
220
Year

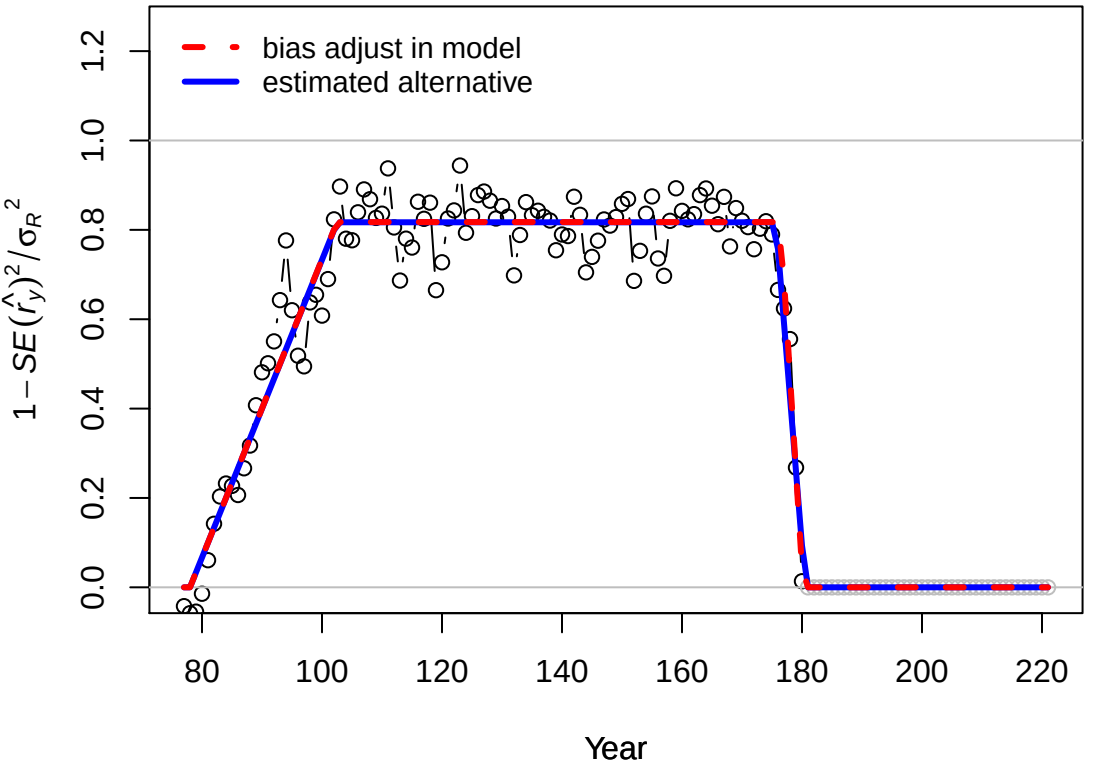

Age−0 recruits (1,000s) with forecast with ~95% asymptotic intervals
Age−0 recruits (1,000s)
0
5000
10000
15000
20000
100
120
140
160
180
200
220
Year

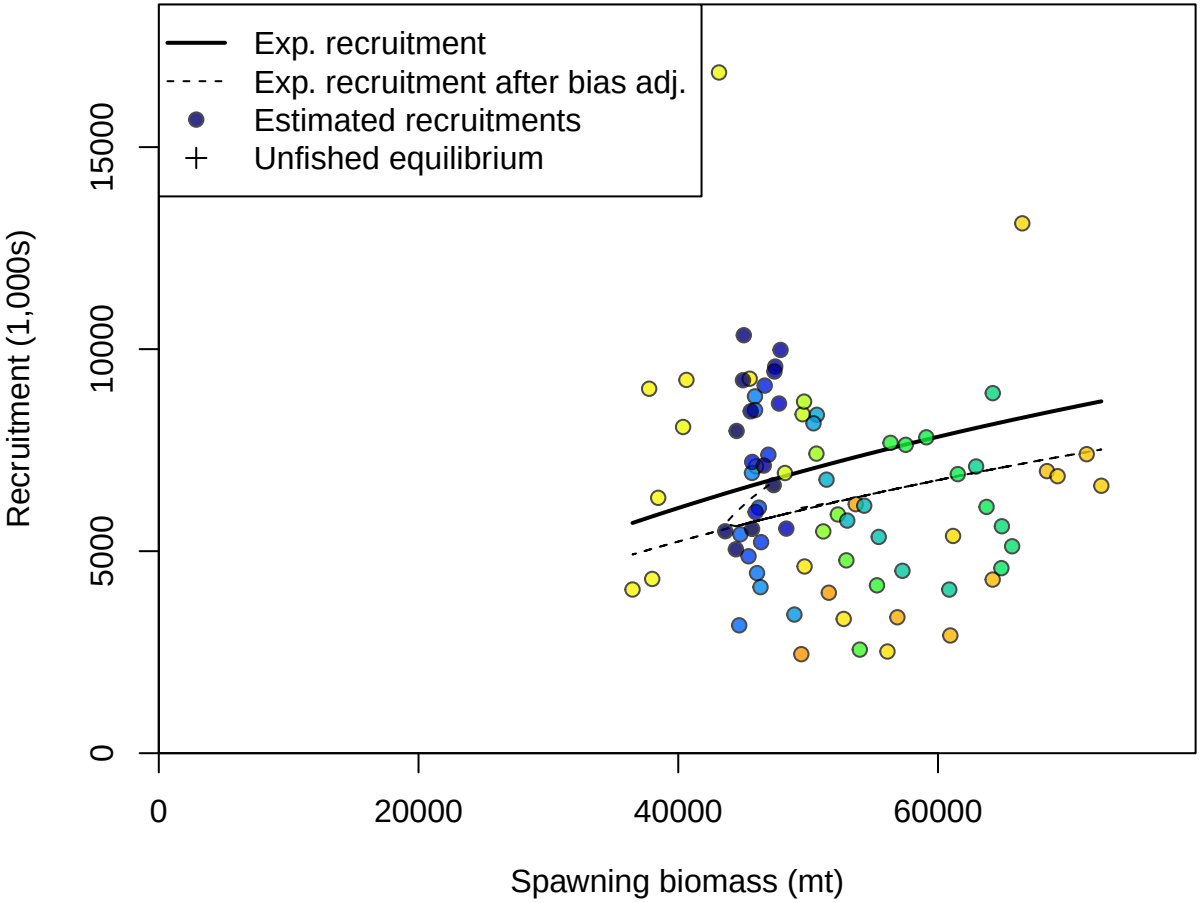

Summary Fishing Mortality
0
1
2
3
100
120
140
160
180
Year

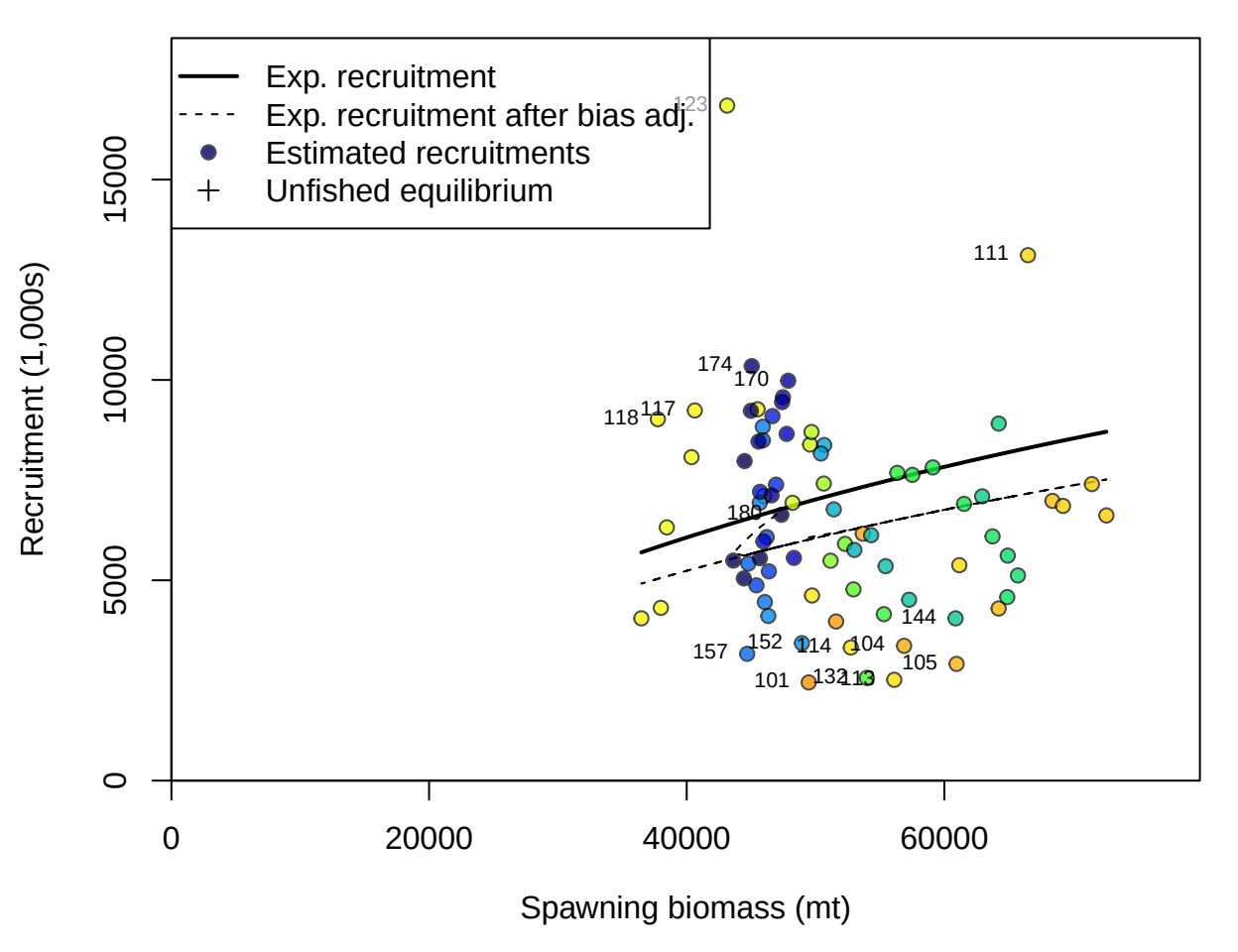

Log recruitment deviation
1.0
0.5
0.0
−0.5
−1.0
80
100
120
140
160
180
200
220
Year

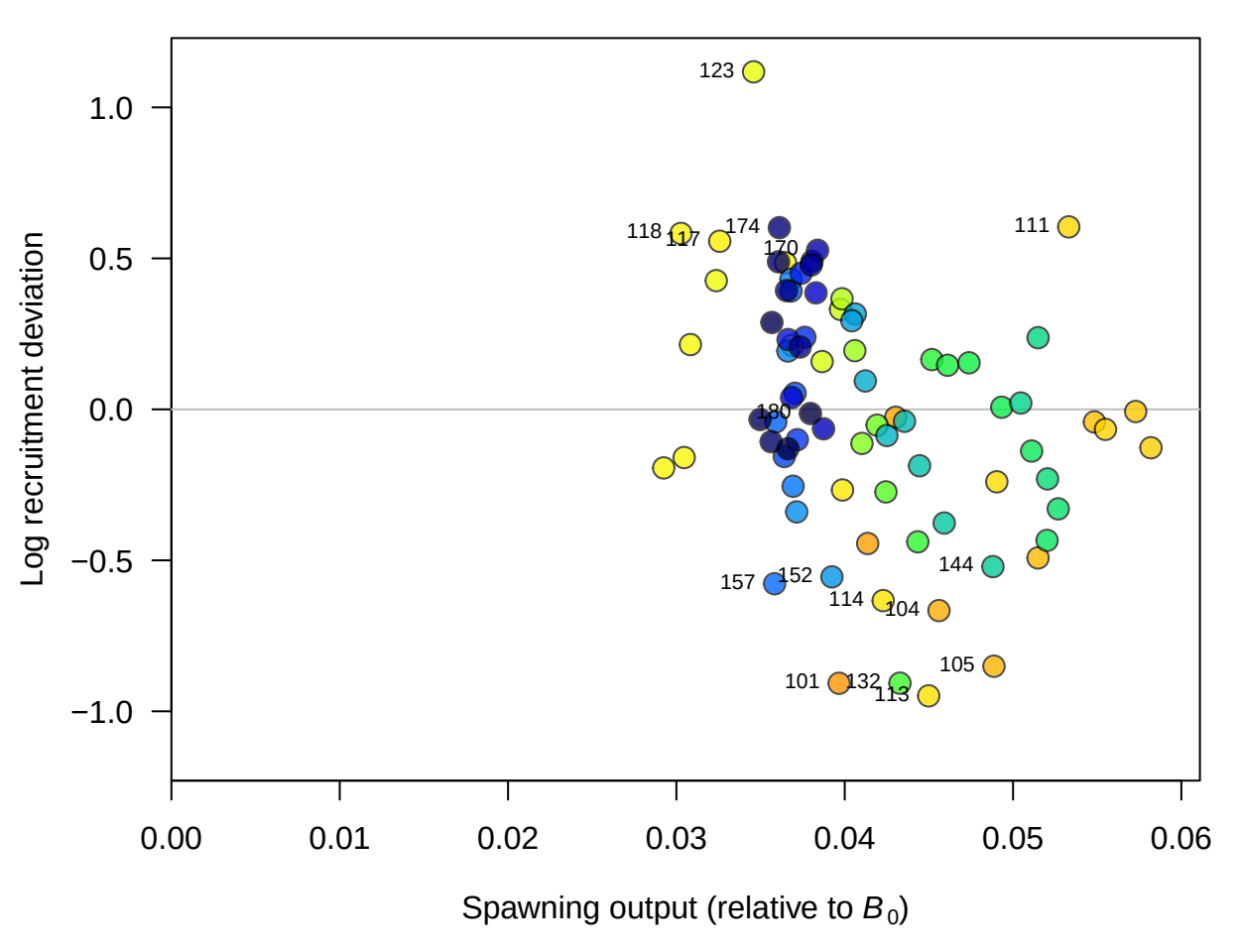

Log recruitment deviation
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
80
100
120
140
160
180
200
220
Year

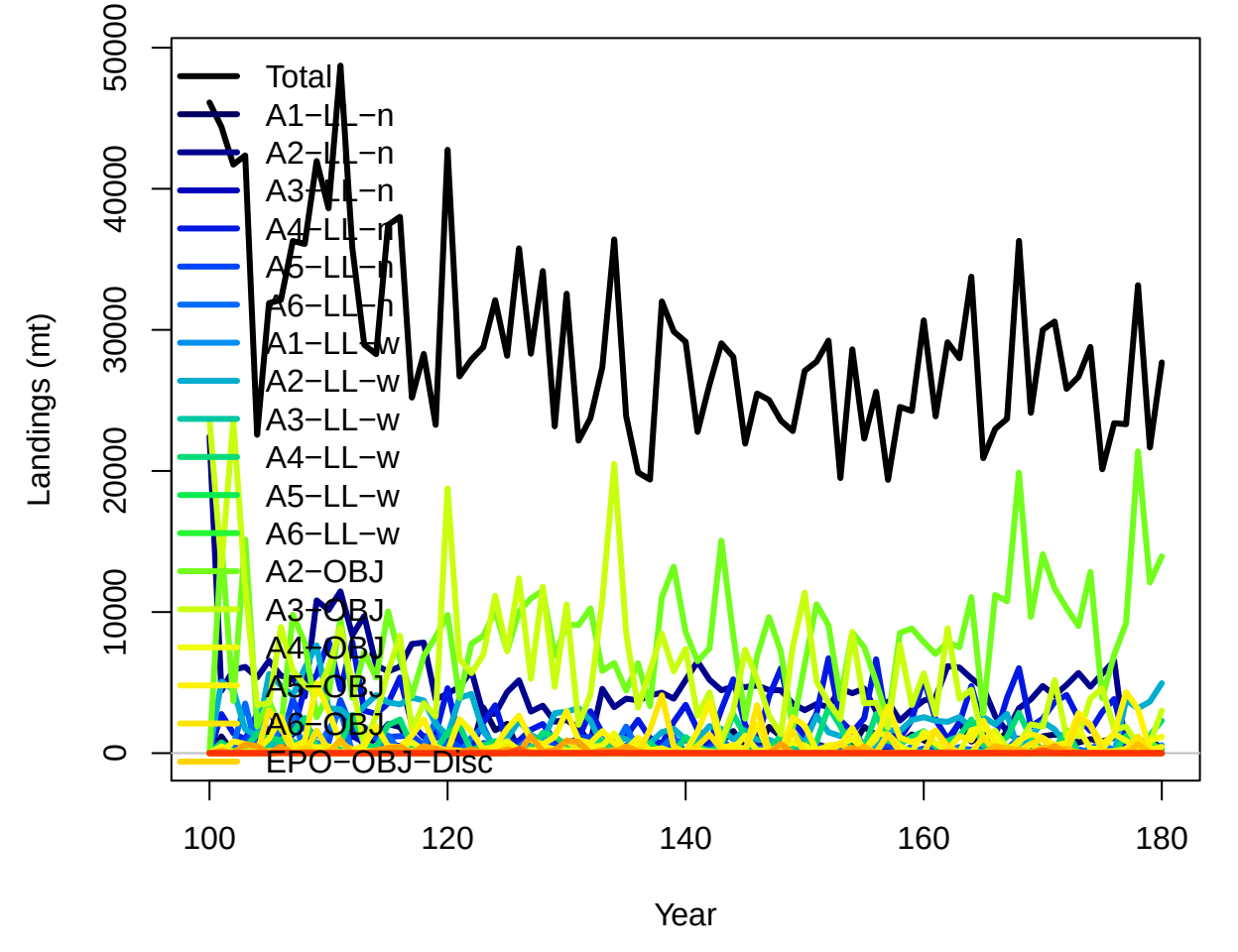

Recruitment deviation variance
Asymptotic standard error estimate
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
80
100
120
140
160
180
200
220
Year

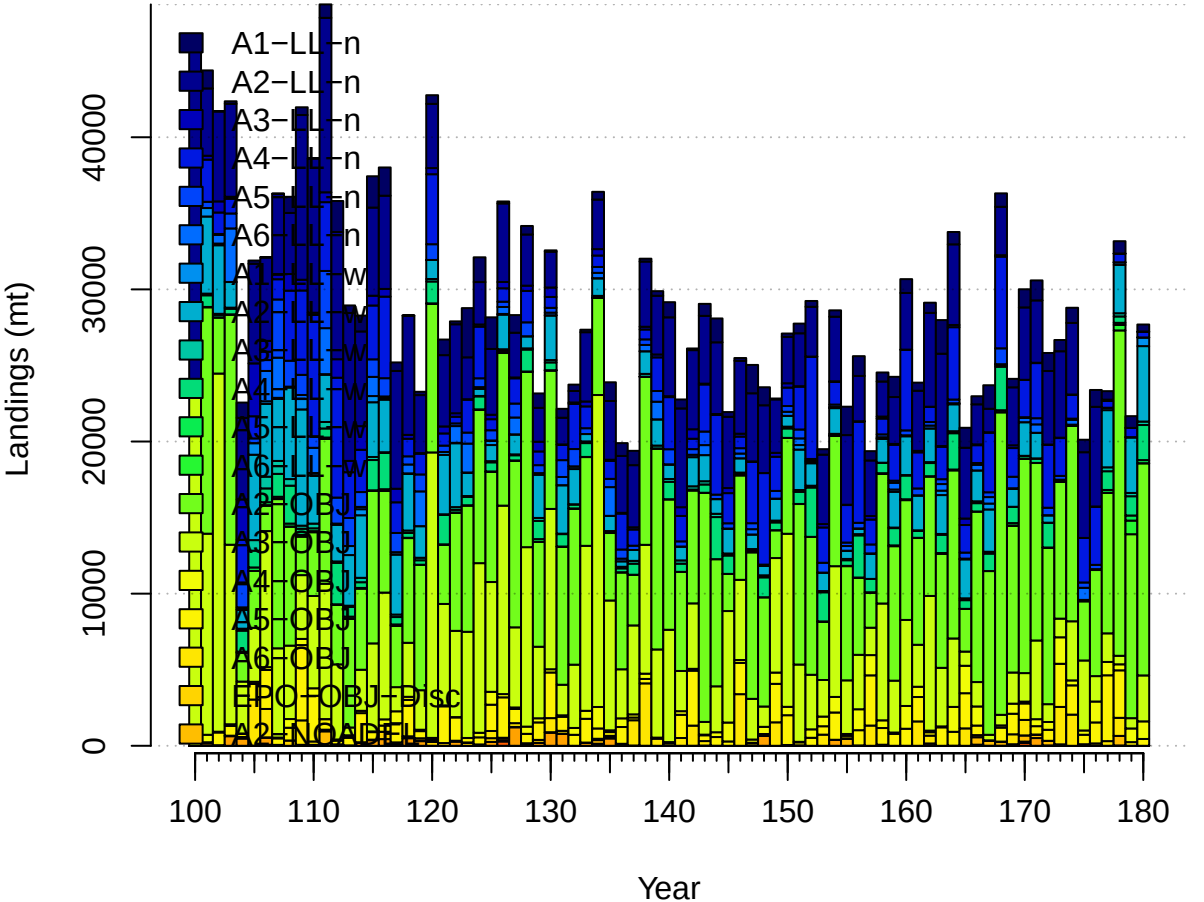

bias adjust in model
estimated alternative
$1 - SE(\hat{r}_y)^2/\sigma_R^2$
0.0
0.2
0.4
0.6
0.8
1.0
1.2
80
100
120
140
160
180
200
220
Year

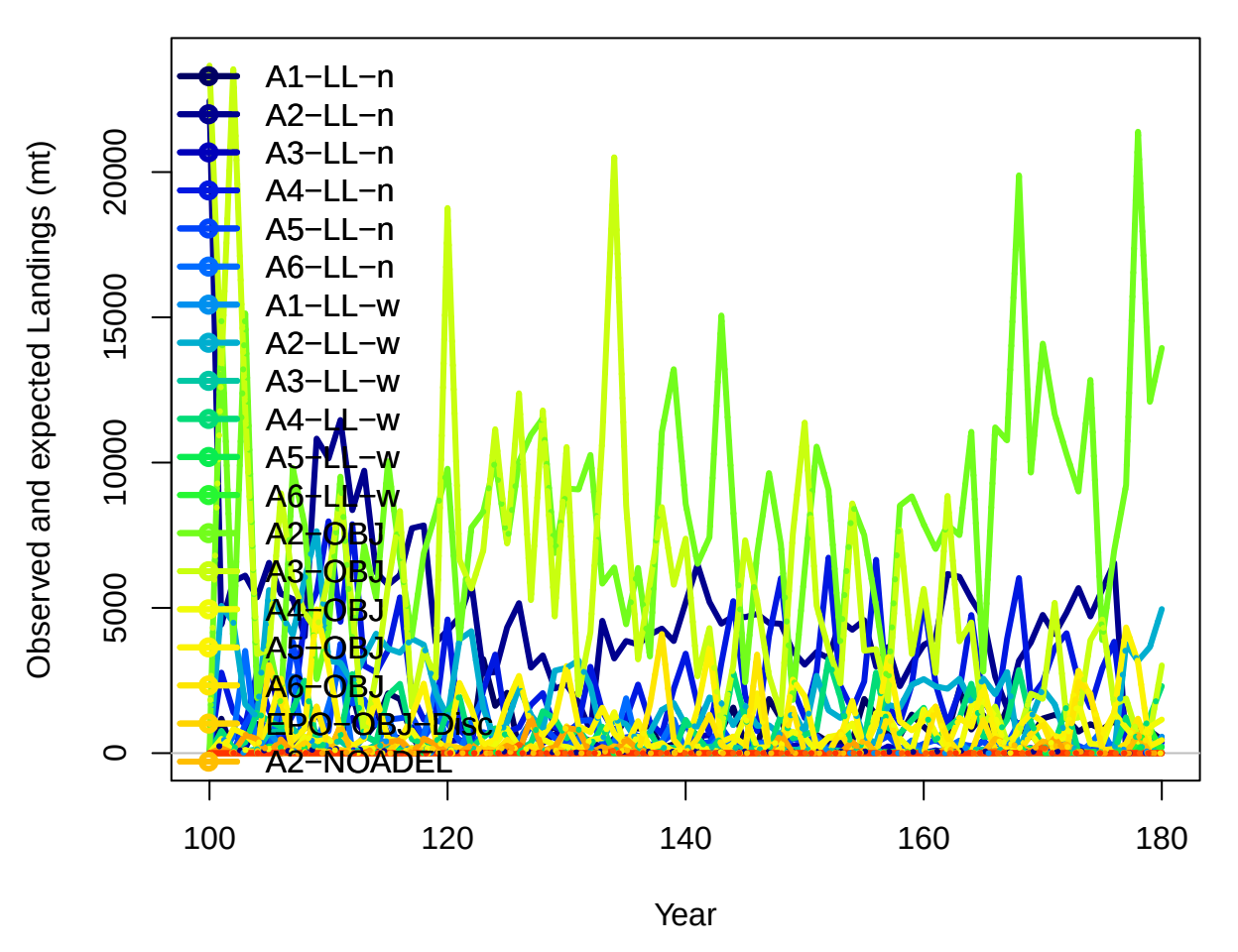

Exp. recruitment
Exp. recruitment after bias adj.
Estimated recruitments
Unfished equilibrium
Recruitment (1,000s)
0
5000
10000
15000
0
20000
40000
60000
Spawning biomass (mt)

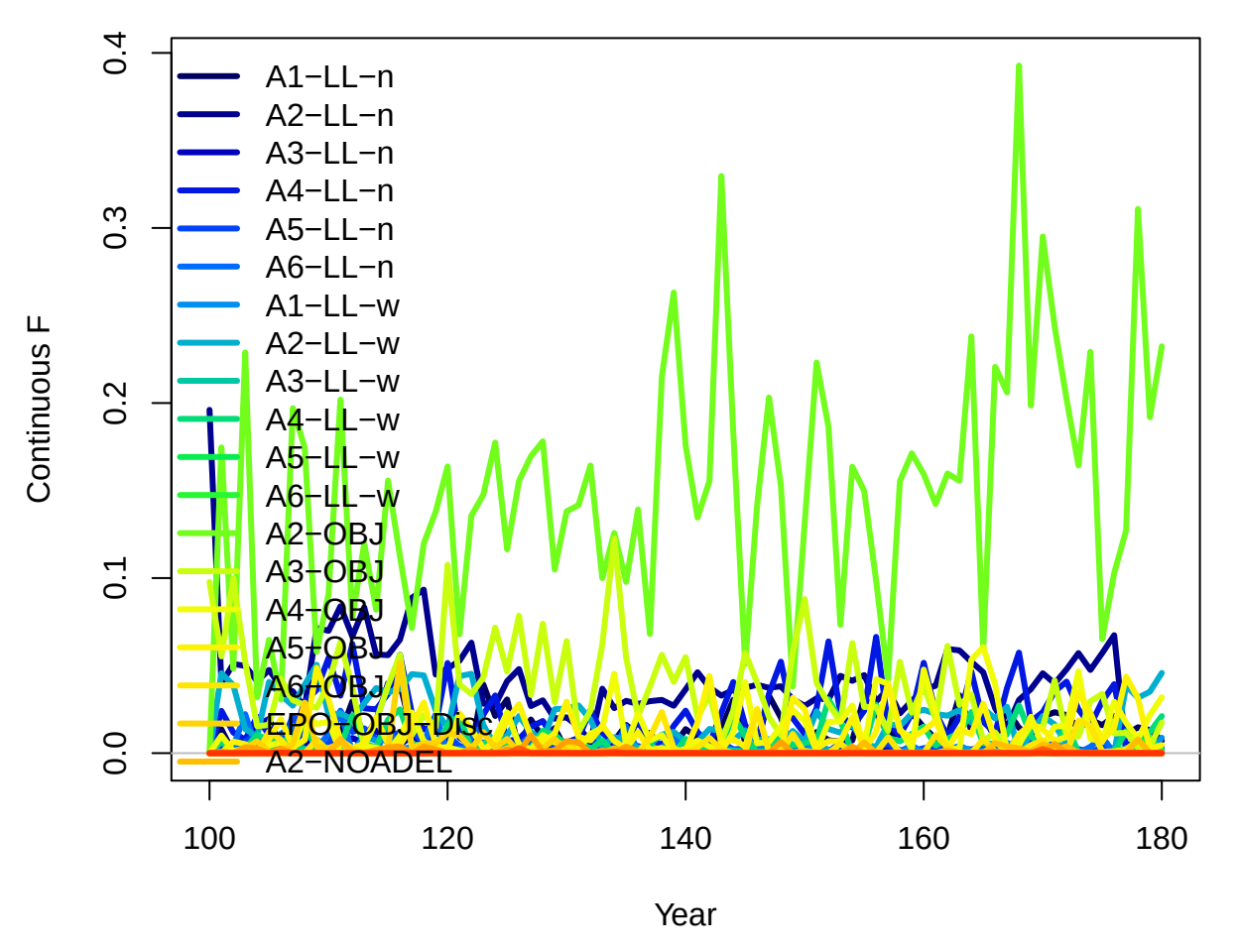

Exp. recruitment
Exp. recruitment after bias adj.
Estimated recruitments
Unfished equilibrium
Recruitment (1,000s)
0
5000
10000
15000
0
20000
40000
60000
Spawning biomass (mt)
123
111
174
170
118
117
186
144
157
152
114
104
105
101
132
113

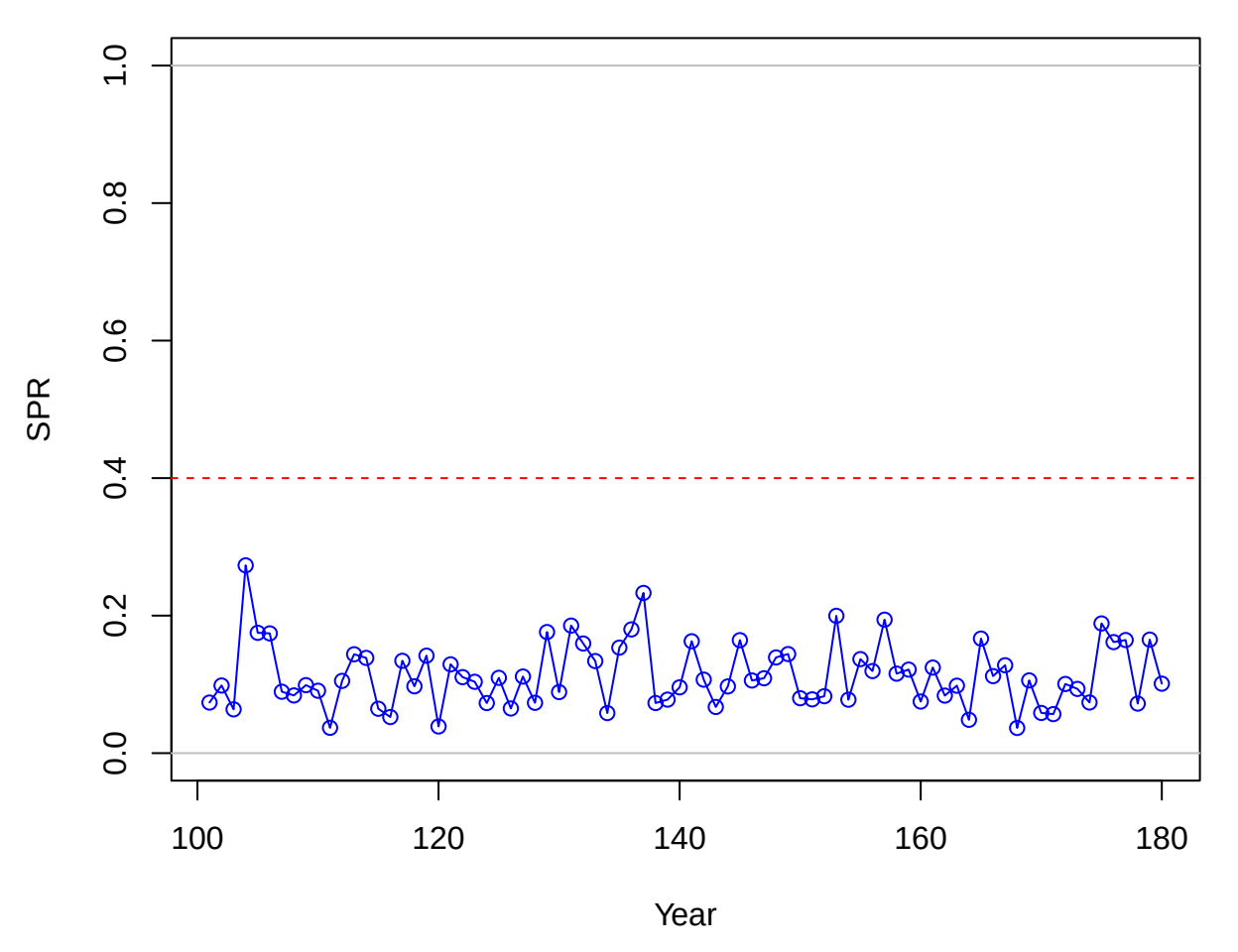

123
118
117
174
170
111
180
157
152
144
114
104
105
101
132
113
1.0
0.5
0.0
−0.5
−1.0
0.00
0.01
0.02
0.03
0.04
0.05
0.06
Log recruitment deviation
Spawning output (relative to B_0)

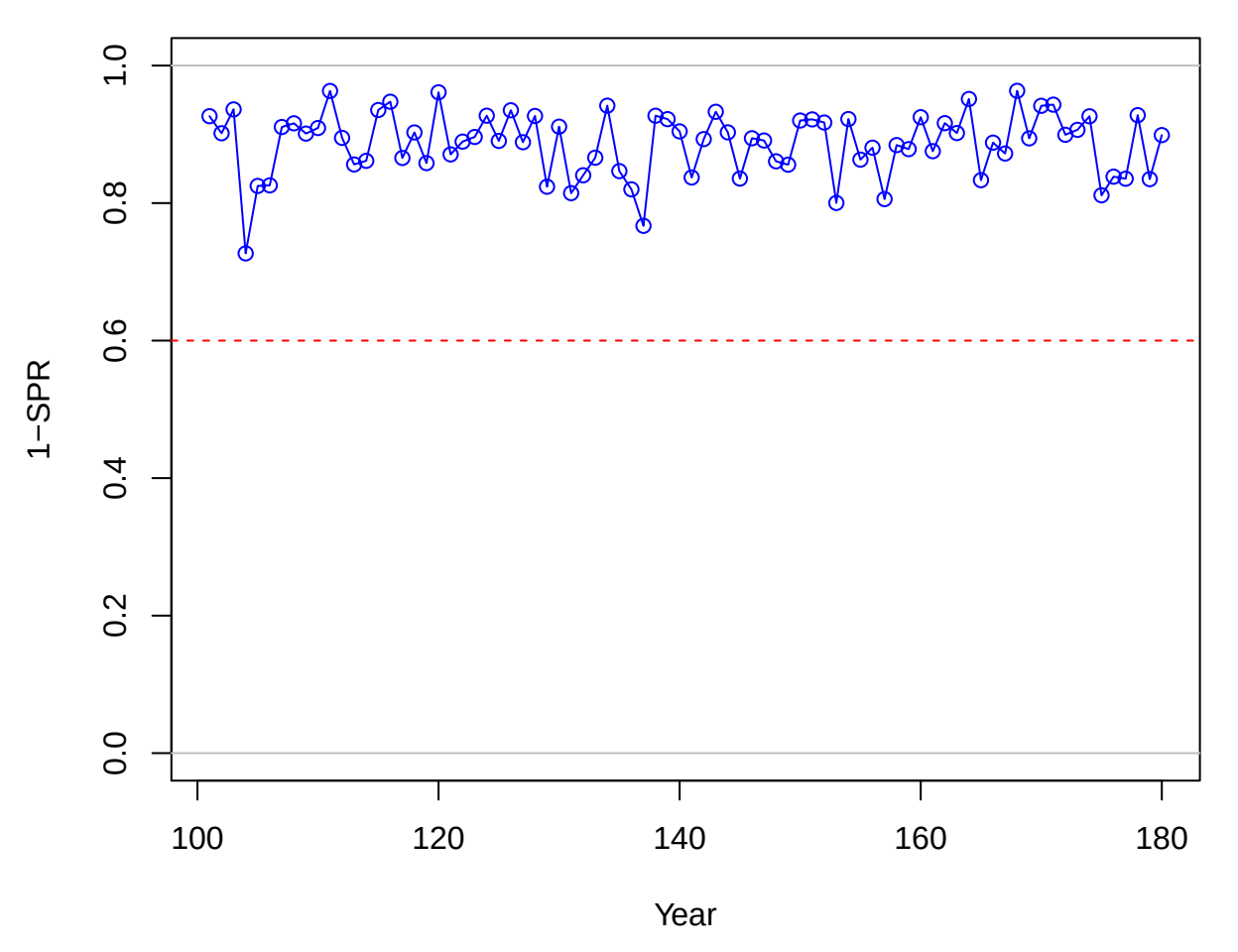

Landings (mt)
0
10000
20000
30000
40000
50000
100
120
140
160
180
Year
Total
A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc

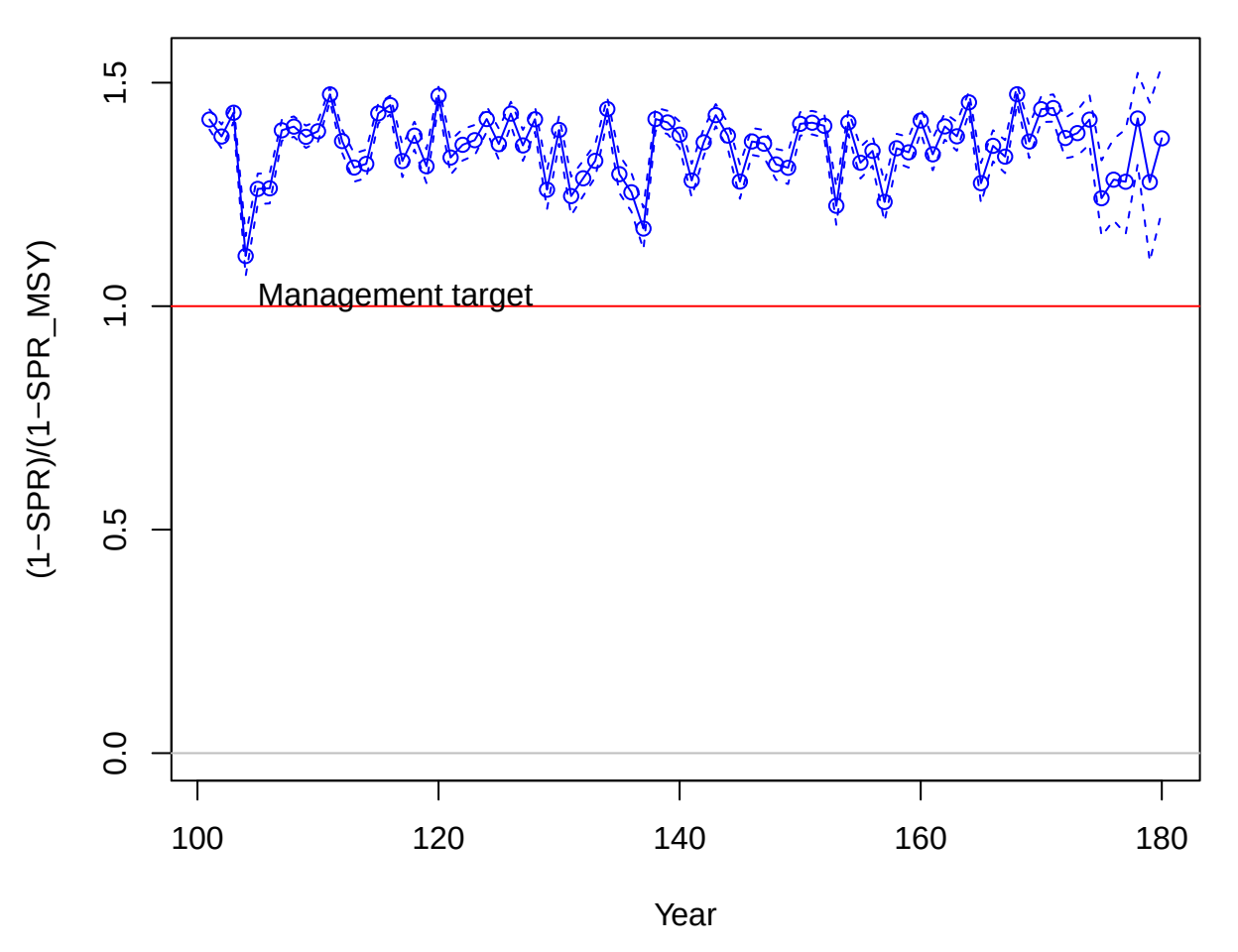

A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
Landings (mt)
0
10000
20000
30000
40000
100
110
120
130
140
150
160
170
180
Year

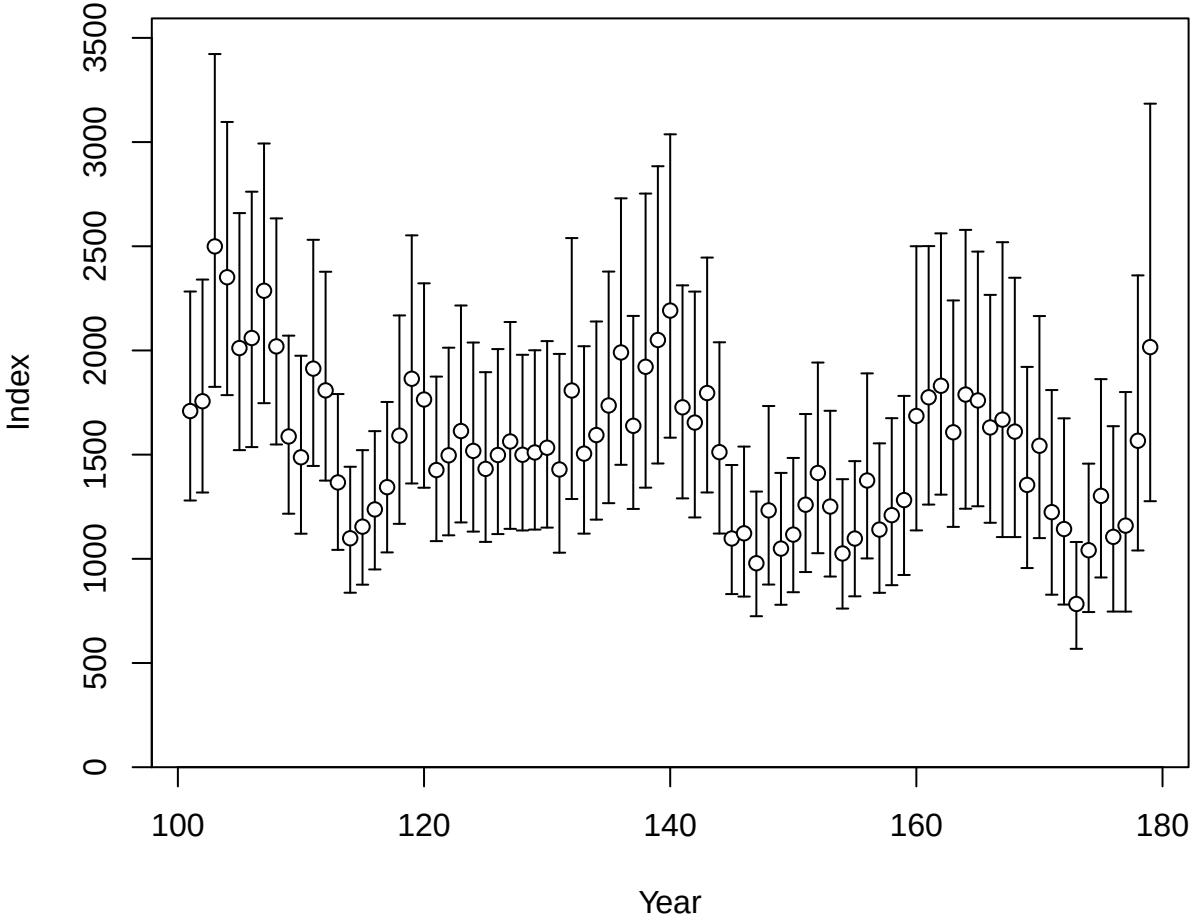

A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
Observed and expected Landings (mt)
0
5000
10000
15000
20000
100
120
140
160
180
Year

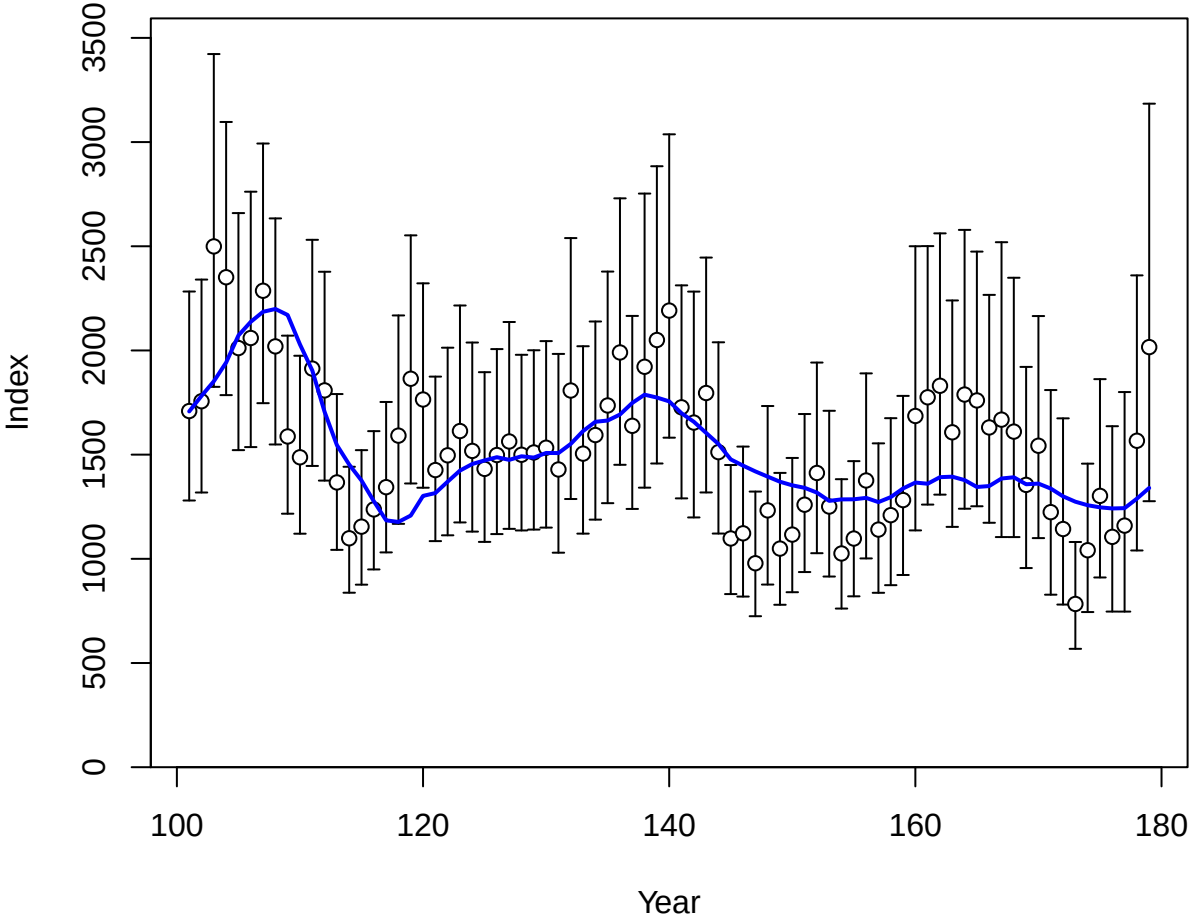

Continuous F
0.0
0.1
0.2
0.3
0.4
100
120
140
160
180
Year
A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL

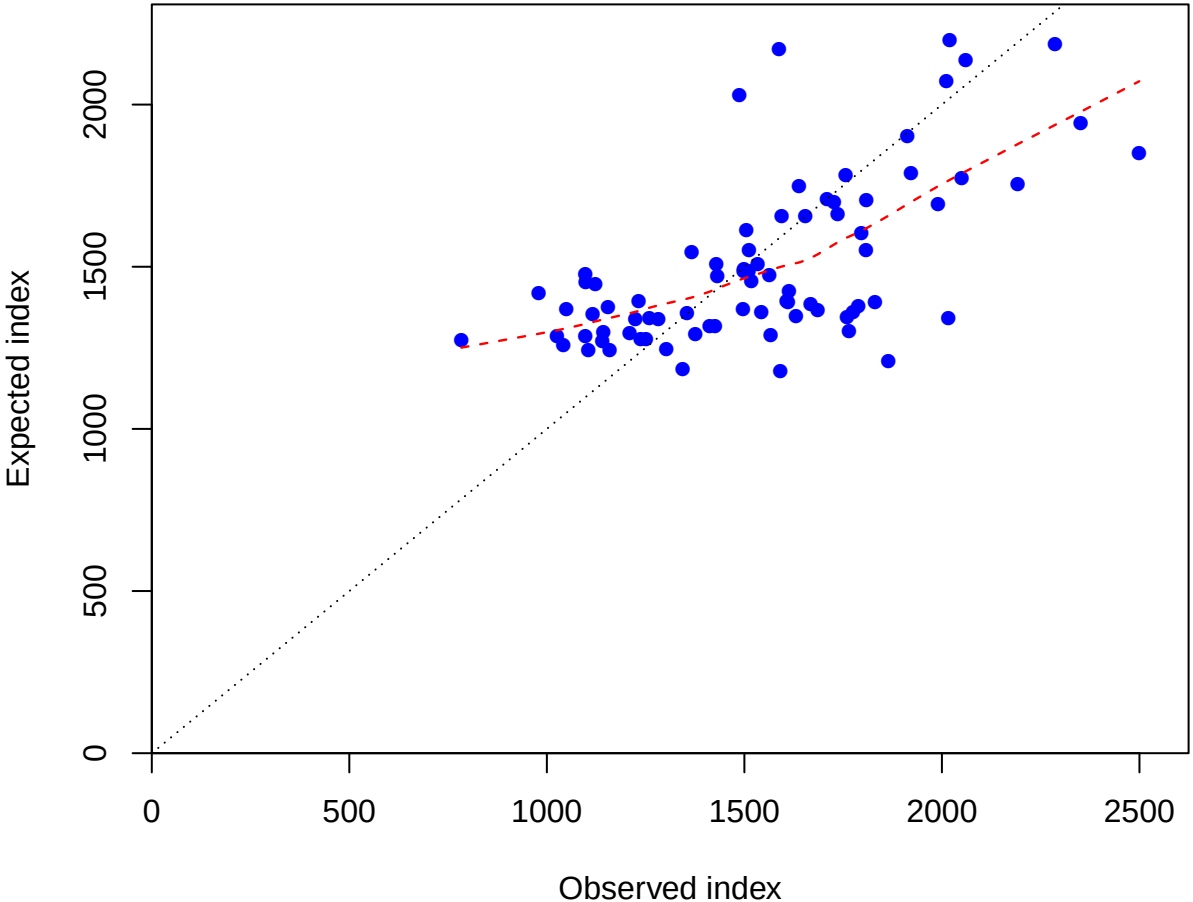

SPR
1.0
0.8
0.6
0.4
0.2
0.0
100
120
140
160
180
Year

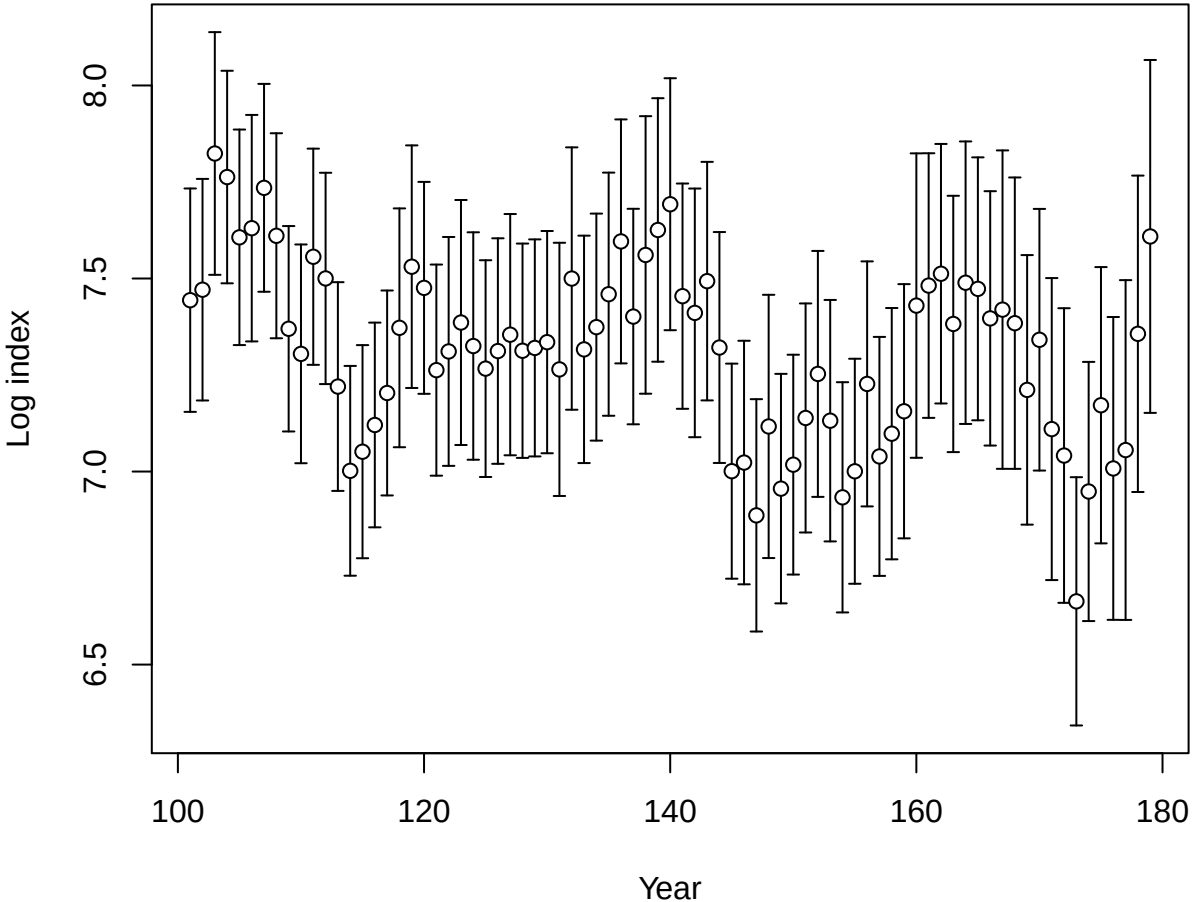

1−SPR
0.0
0.2
0.4
0.6
0.8
1.0
100
120
140
160
180
Year

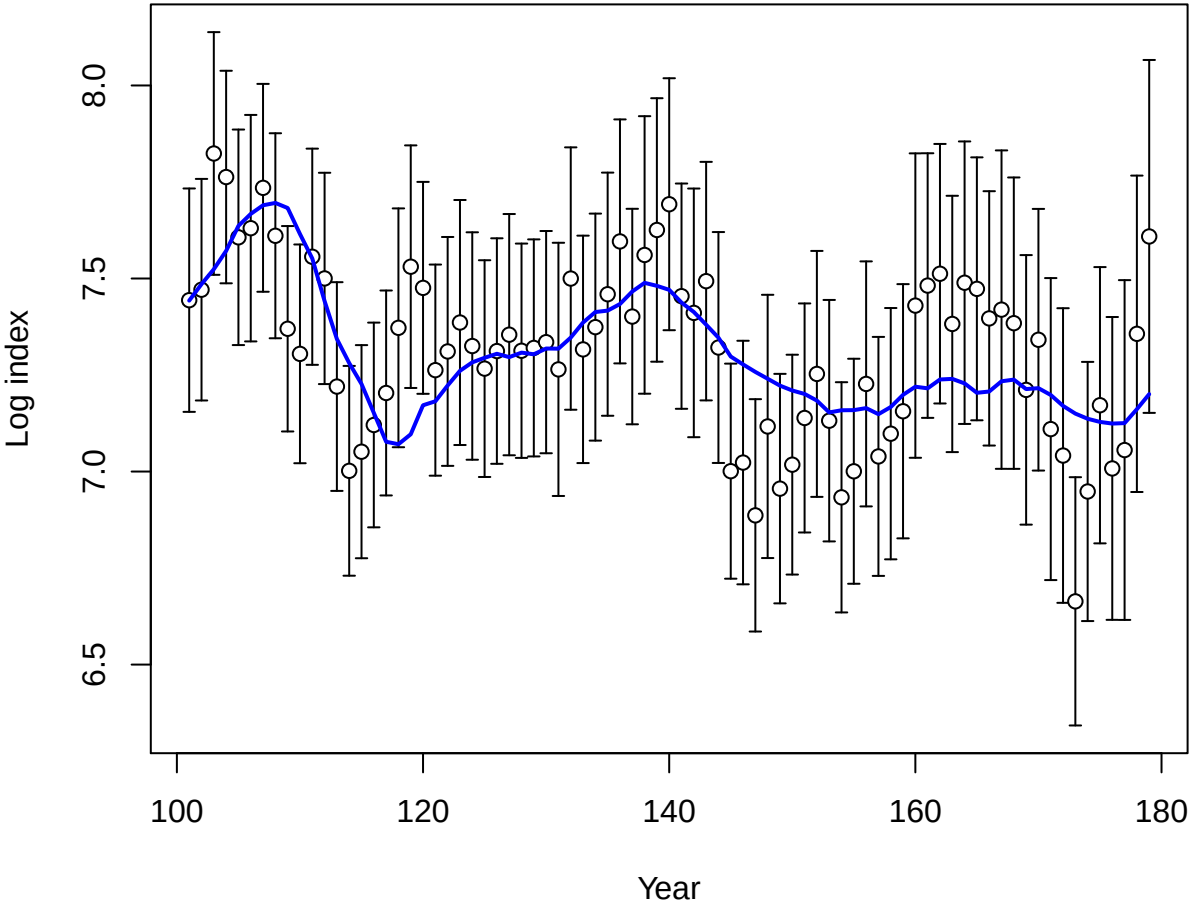

(1−SPR)/(1−SPR_MSY)
0.0
0.5
1.0
1.5
Management target
100
120
140
160
180
Year

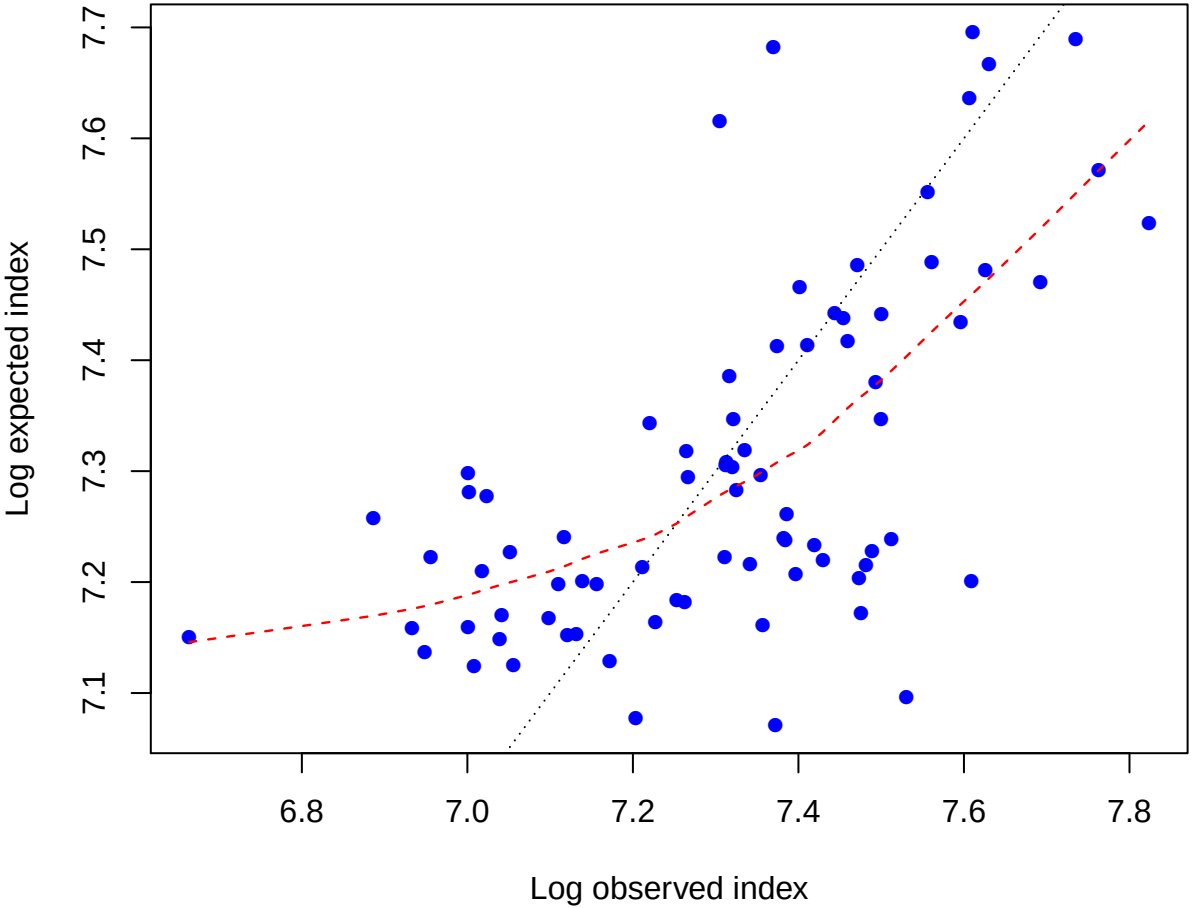

Index
0
500
1000
1500
2000
2500
3000
3500
100
120
140
160
180
Year

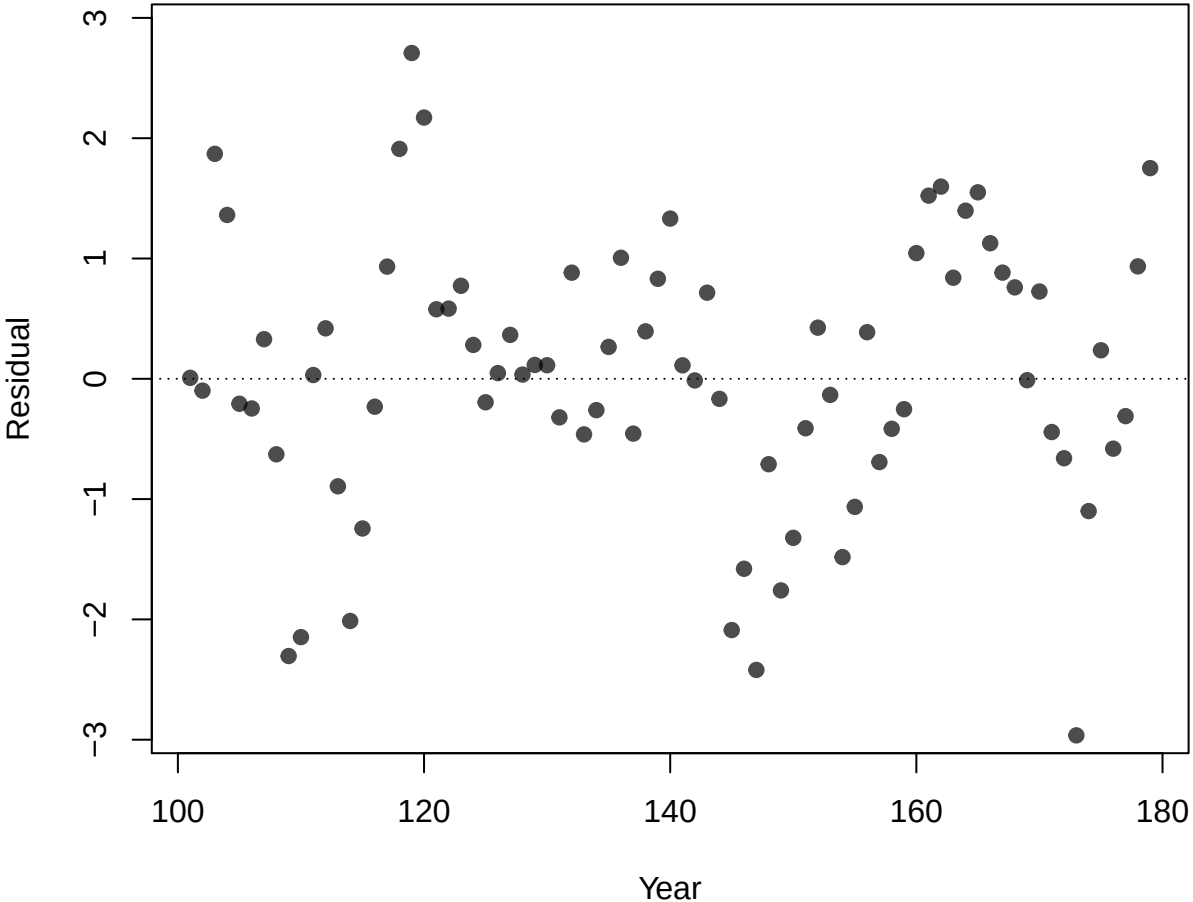

Index
0
500
1000
1500
2000
2500
3000
3500
100
120
140
160
180
Year

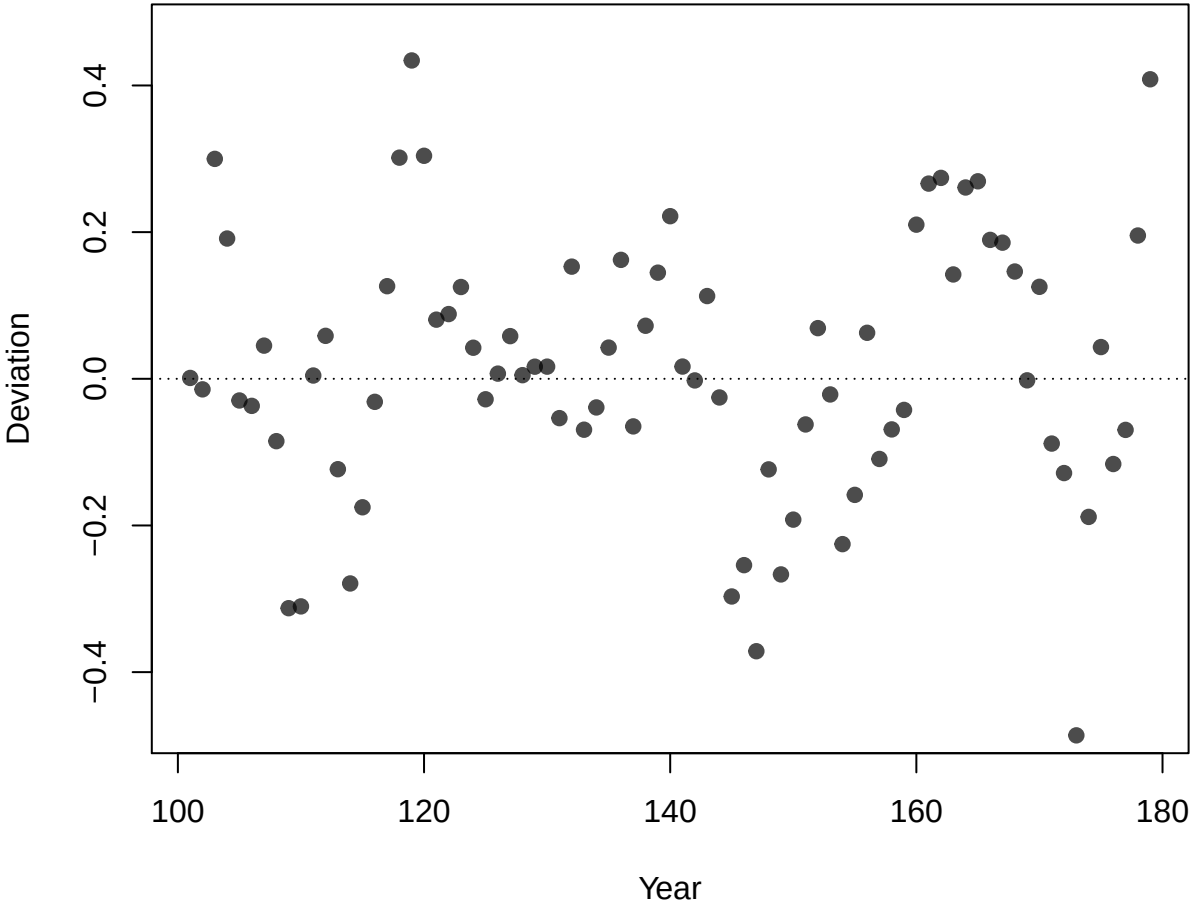

Expected index
0
500
1000
1500
2000
Observed index
0
500
1000
1500
2000
2500

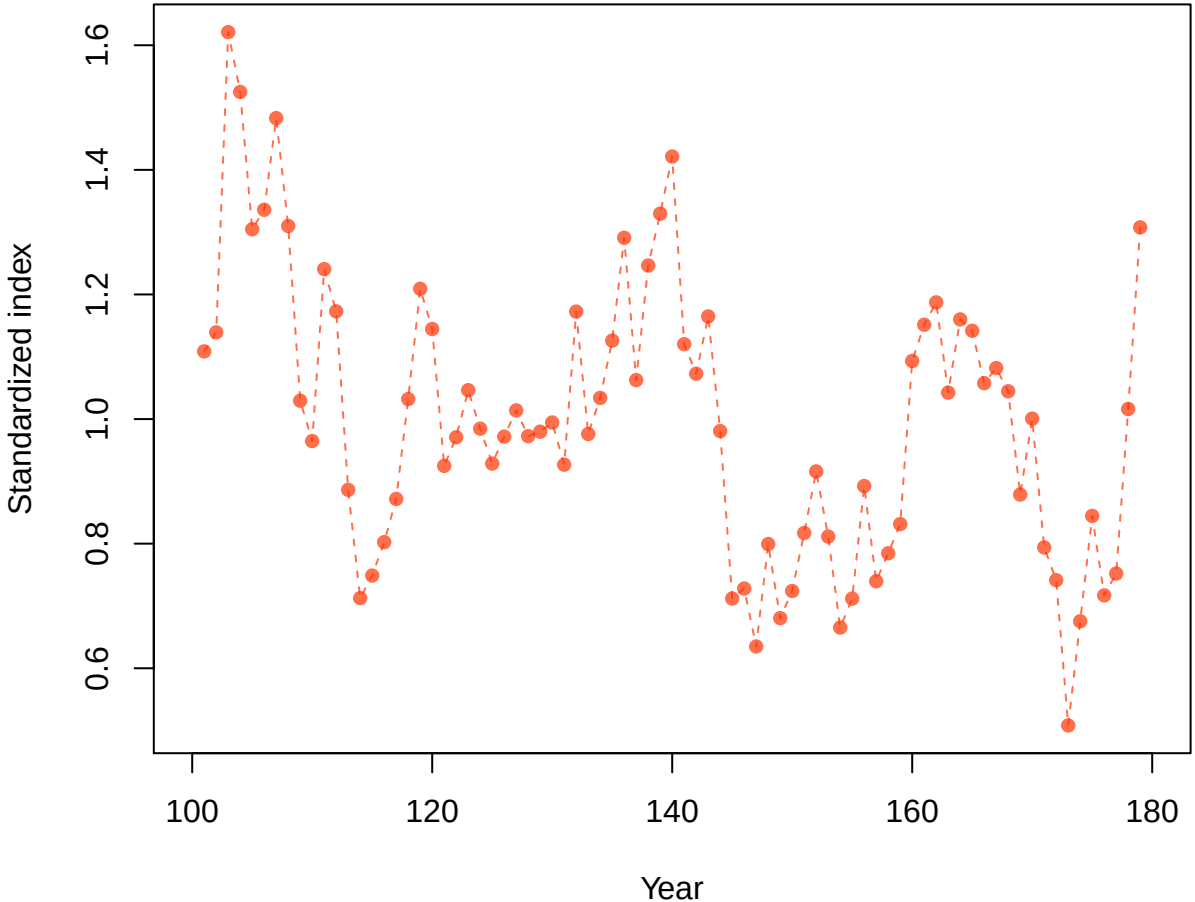

Log index
8.0
7.5
7.0
6.5
100
120
140
160
180
Year

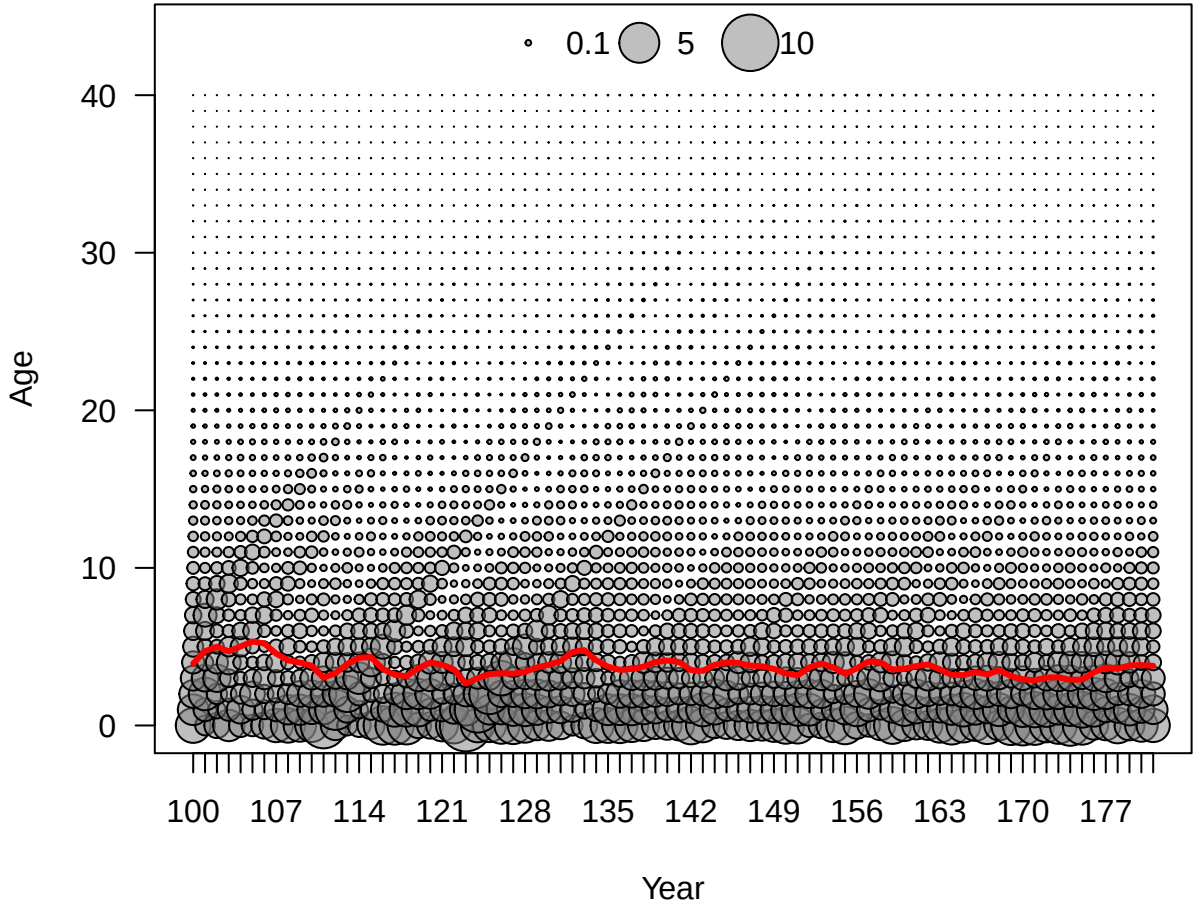

Log index
8.0
7.5
7.0
6.5
100
120
140
160
180
Year

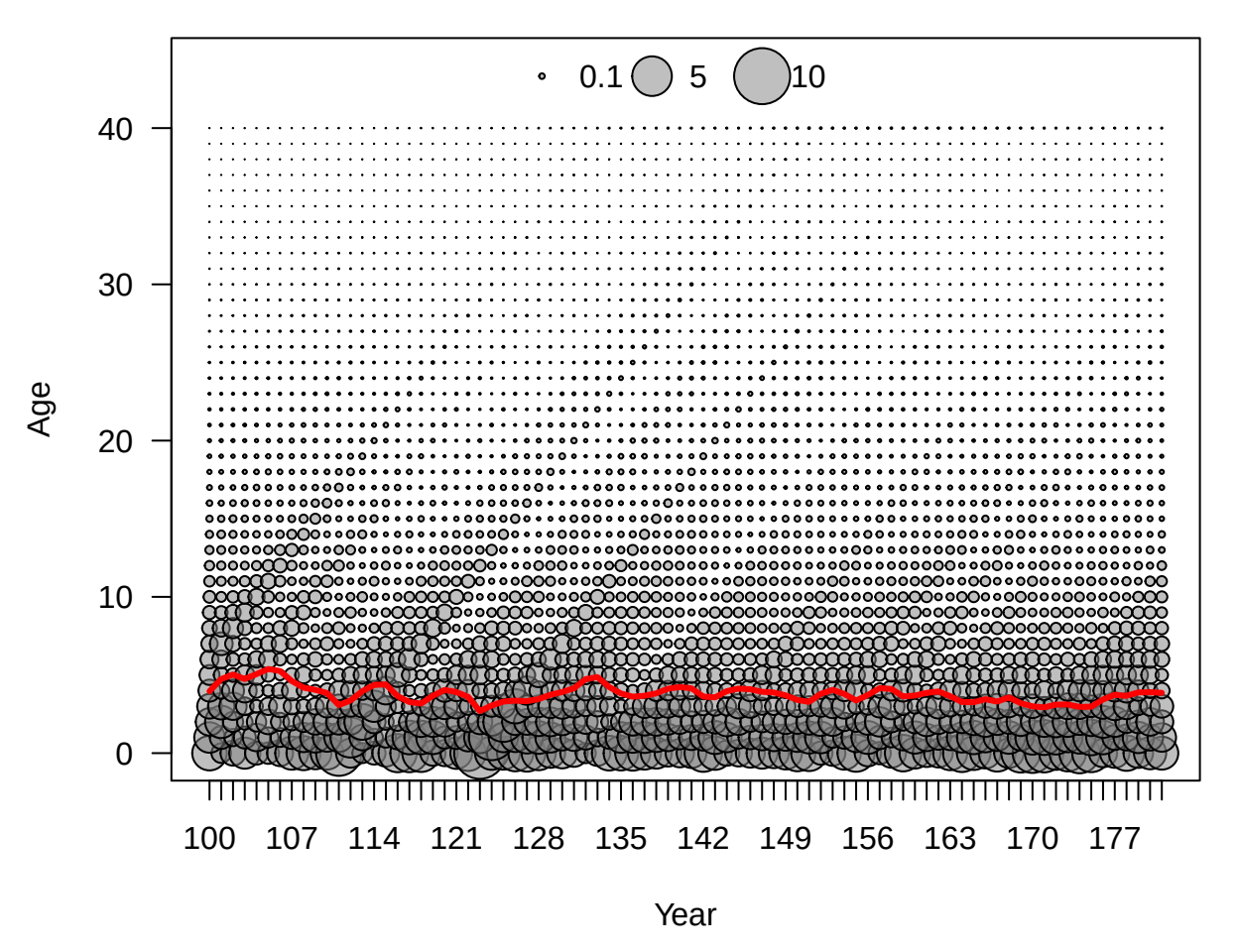

Log expected index
7.1
7.2
7.3
7.4
7.5
7.6
7.7
6.8
7.0
7.2
7.4
7.6
7.8
Log observed index

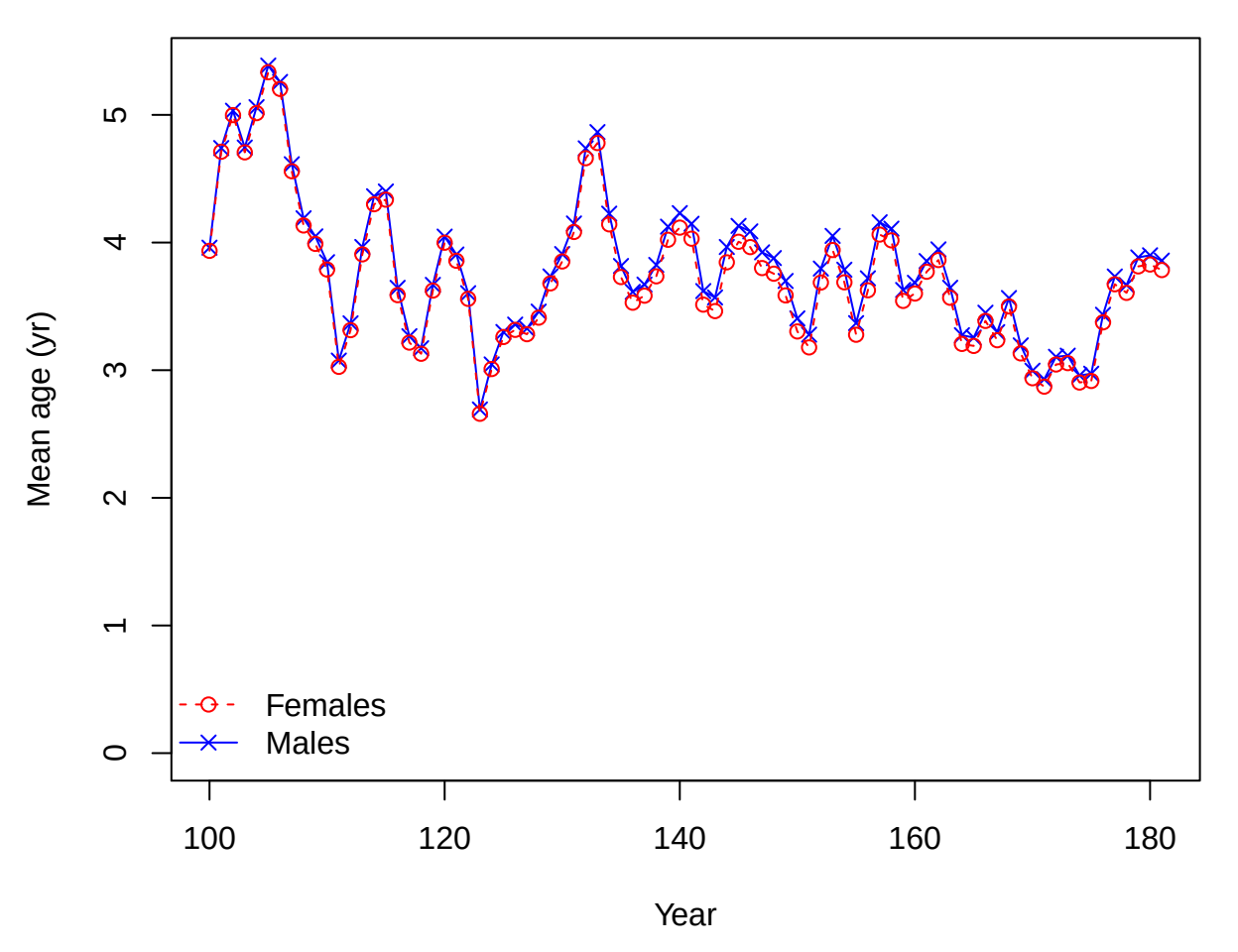

Residual
3
2
1
0
−1
−2
−3
100
120
140
160
180
Year

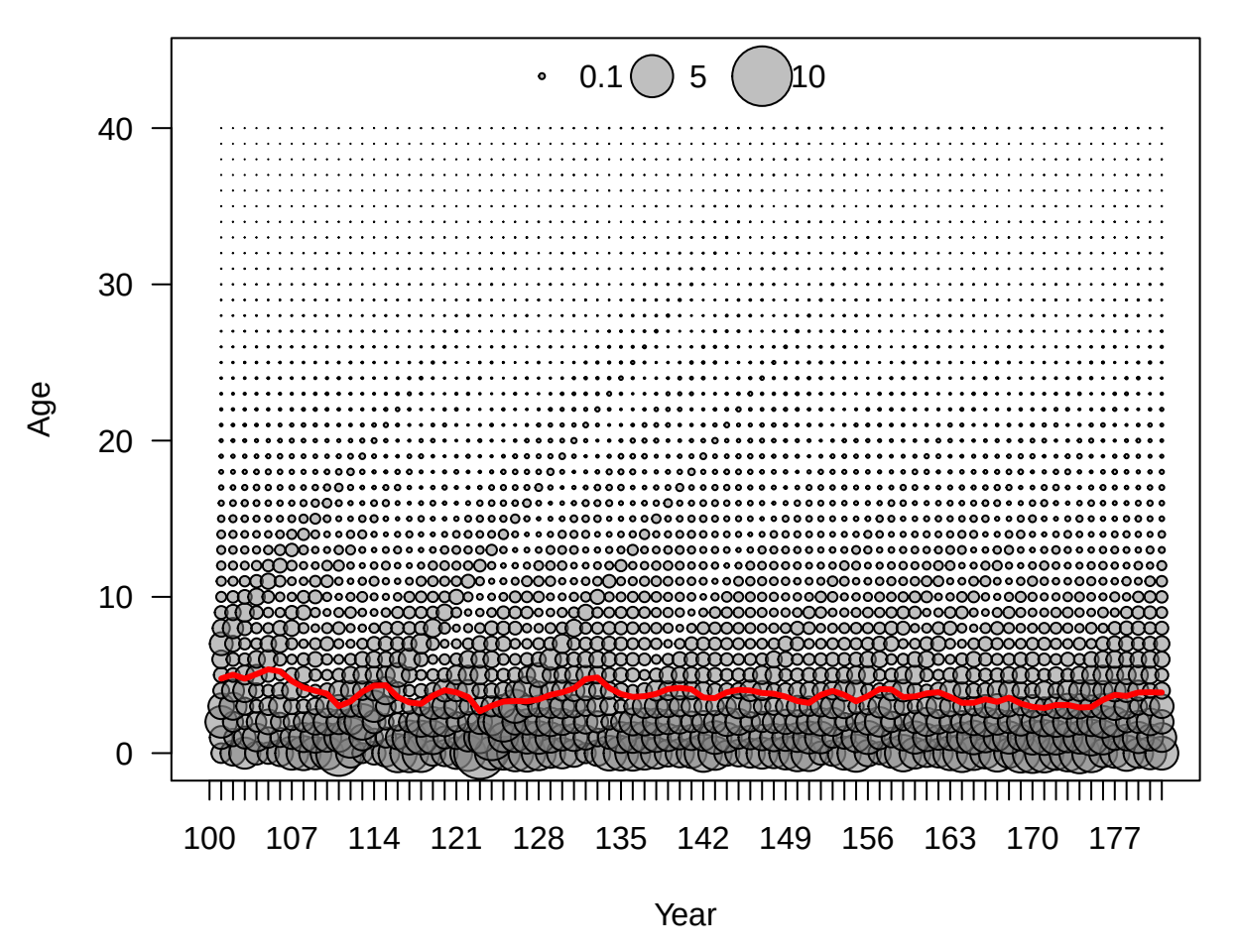

Deviation
0.4
0.2
0.0
−0.2
−0.4
100
120
140
160
180
Year

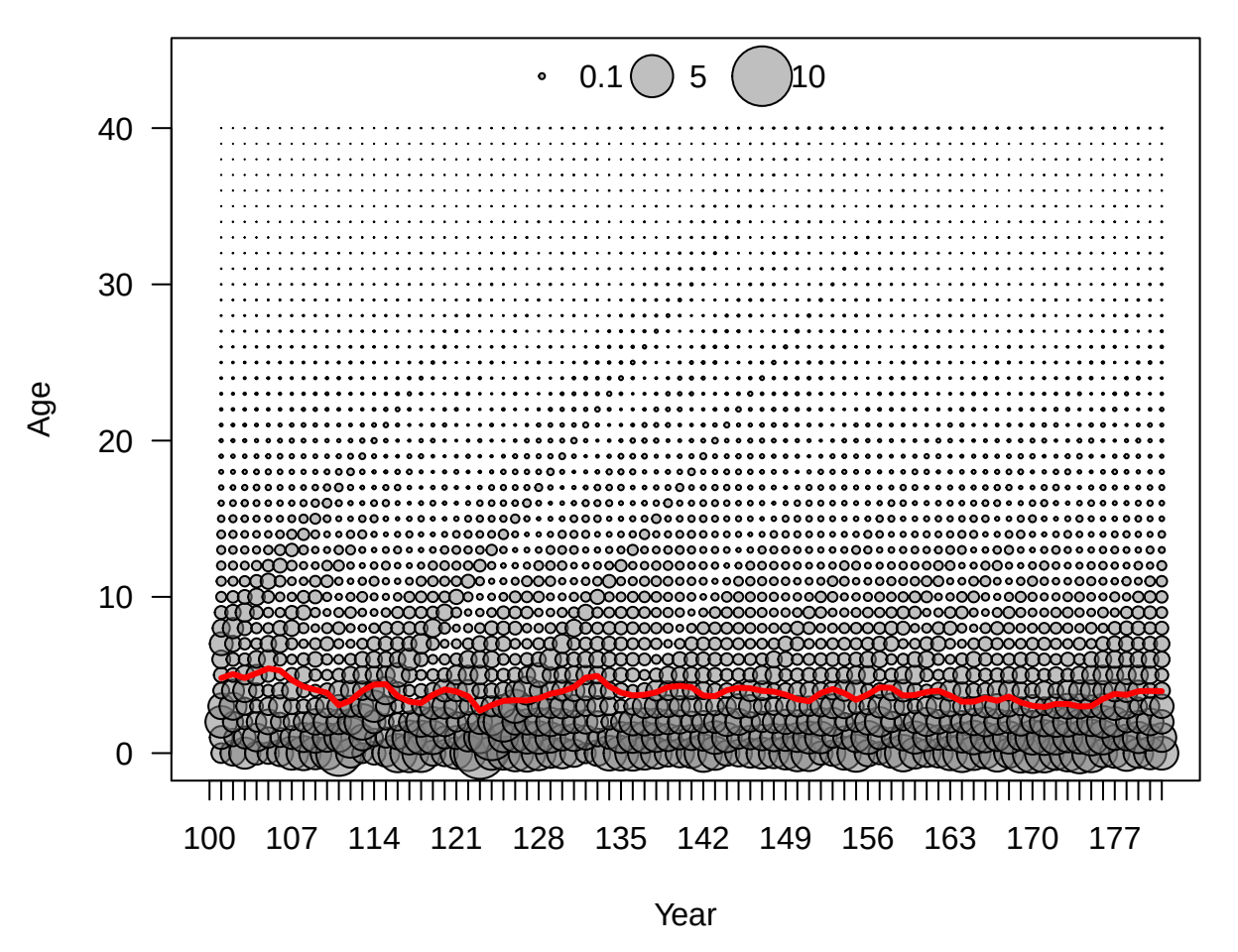

Standardized index
0.6
0.8
1.0
1.2
1.4
1.6
100
120
140
160
180
Year

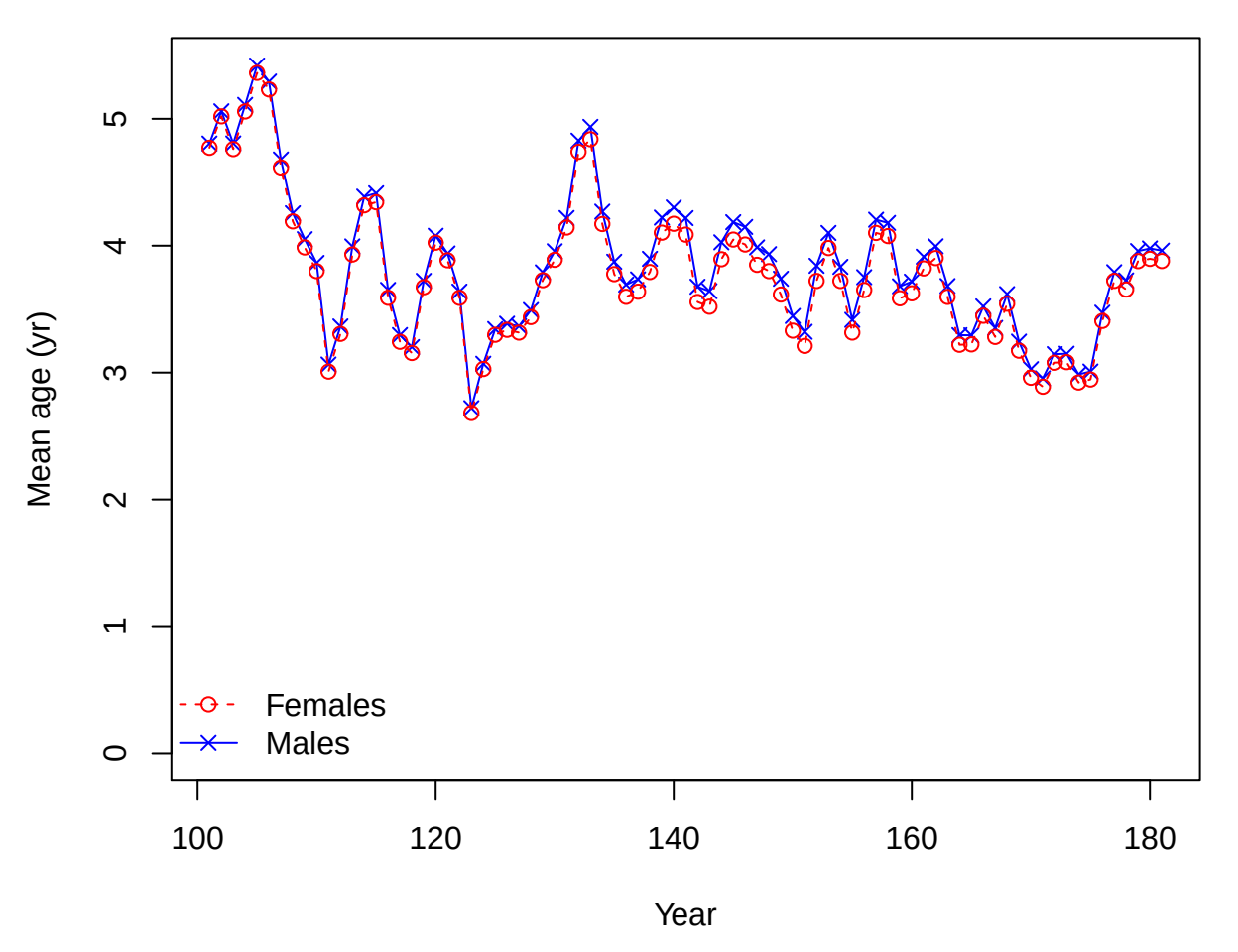

0.1
5
10
40
30
20
10
0
Age
100
107
114
121
128
135
142
149
156
163
170
177
Year

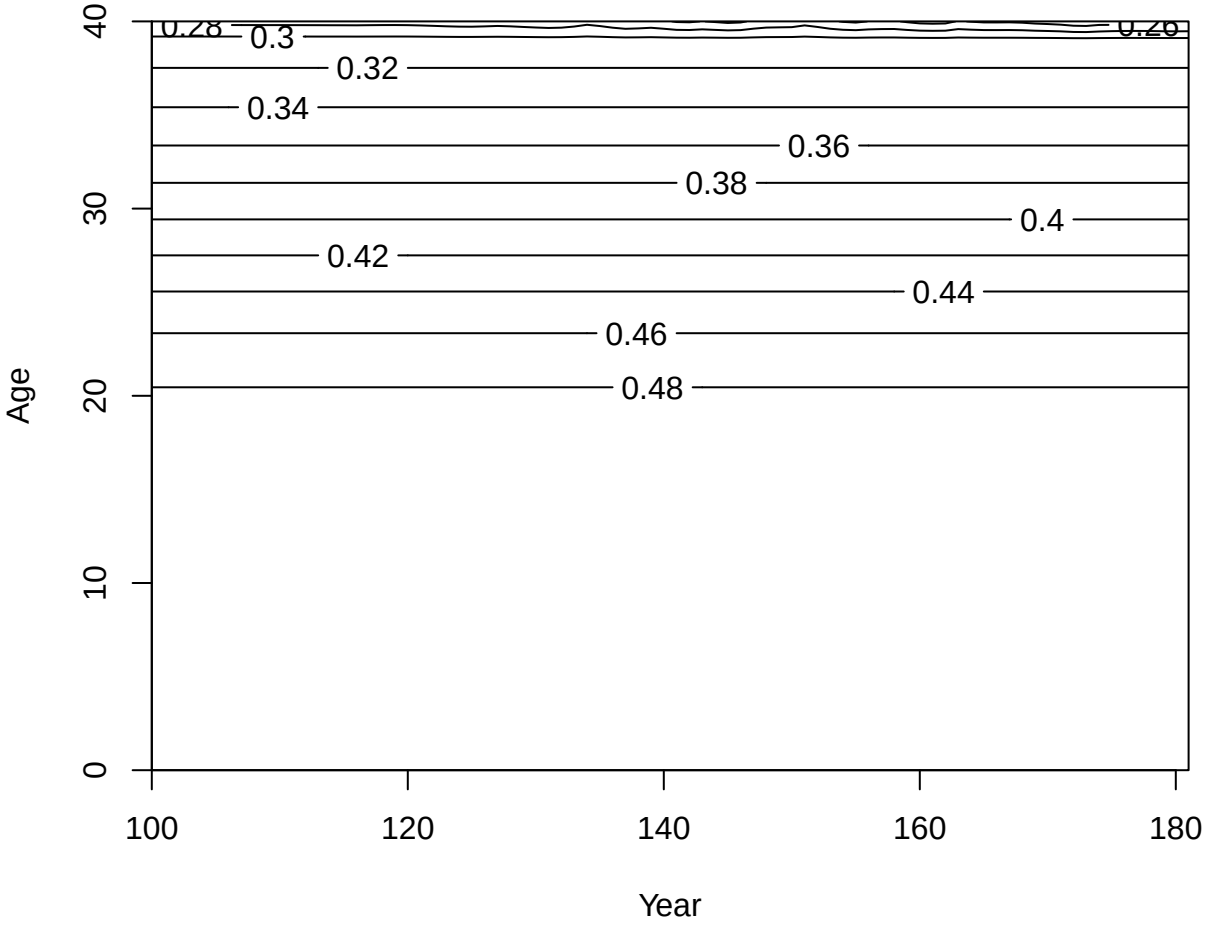

0.1
5
10
40
30
20
10
0
Age
100
107
114
121
128
135
142
149
156
163
170
177
Year

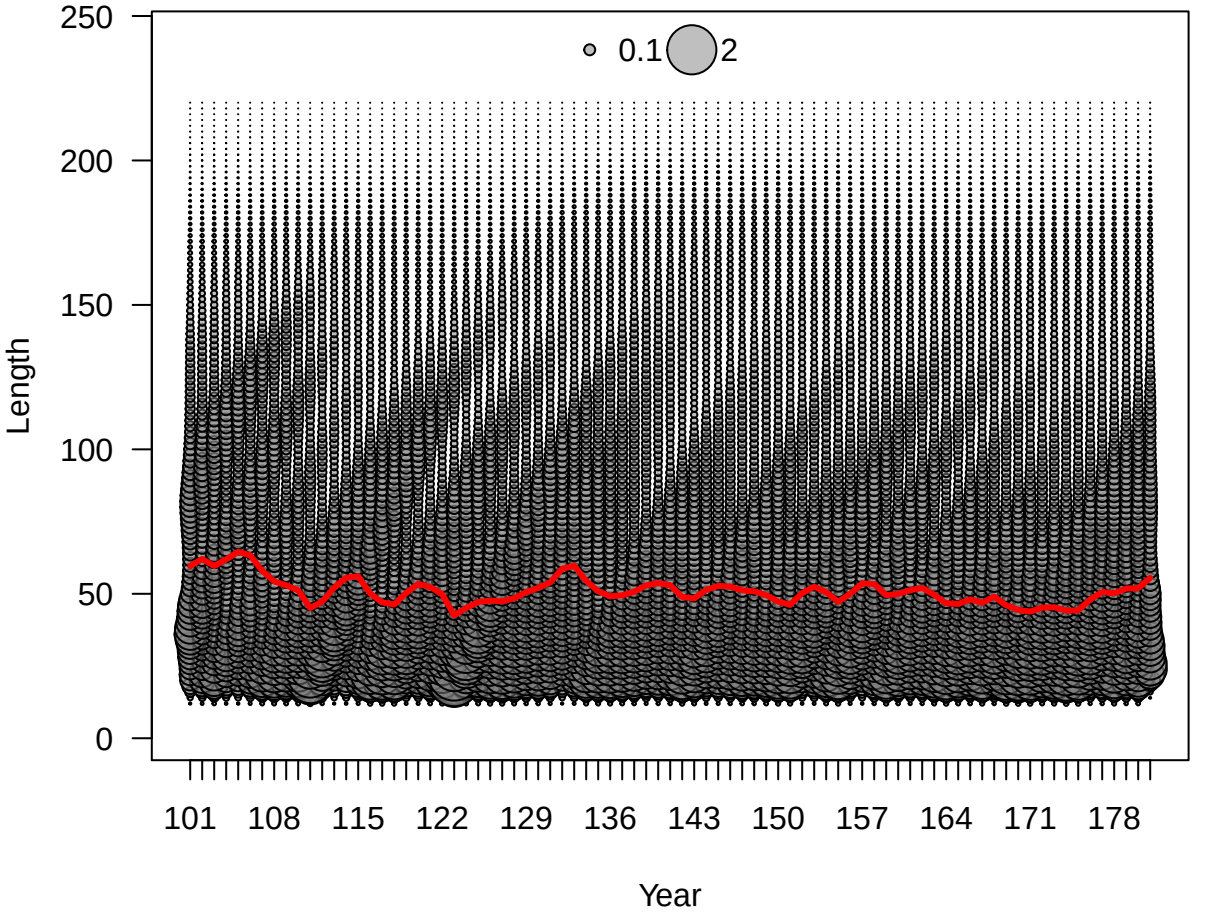

Mean age (yr)
0
1
2
3
4
5
100
120
140
160
180
Year
Females
Males

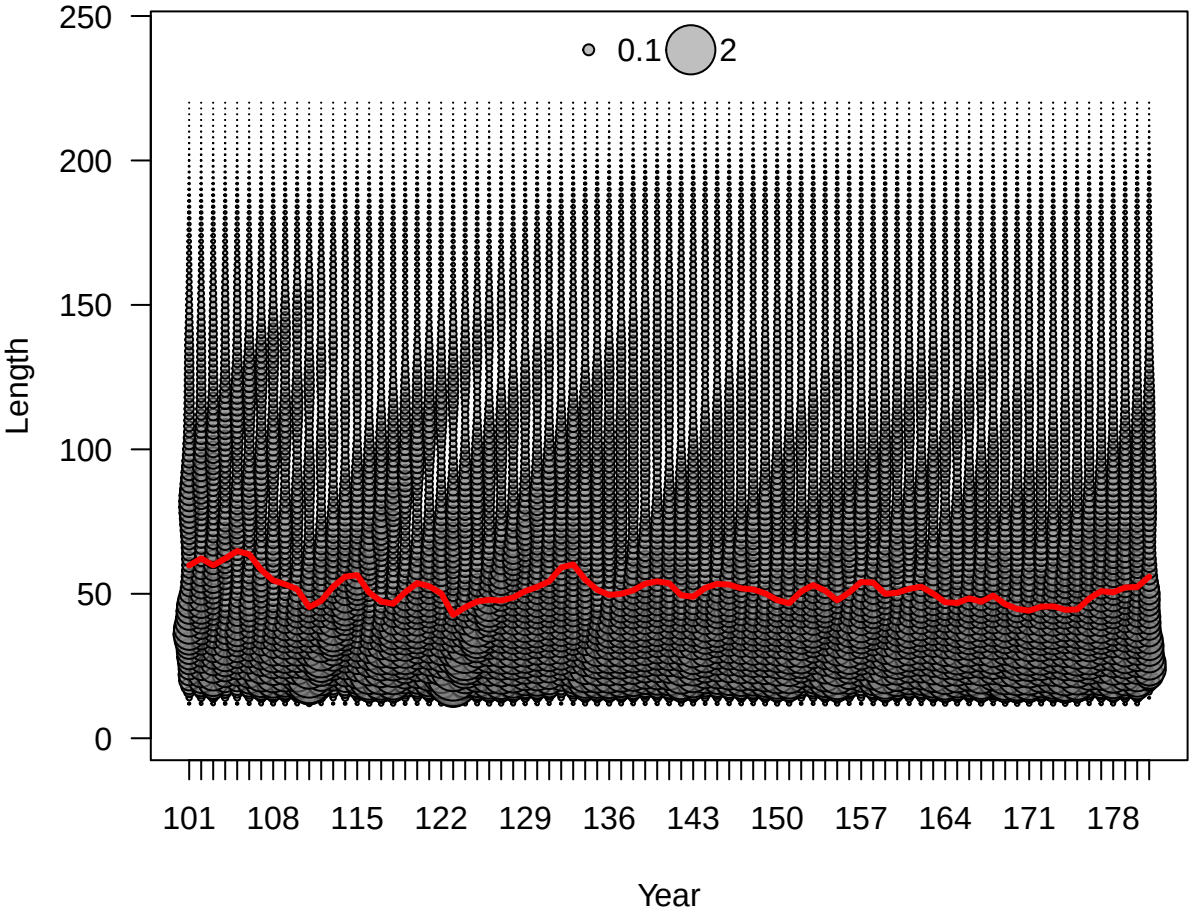

0.1
5
10
40
30
20
10
0
Age
100
107
114
121
128
135
142
149
156
163
170
177
Year

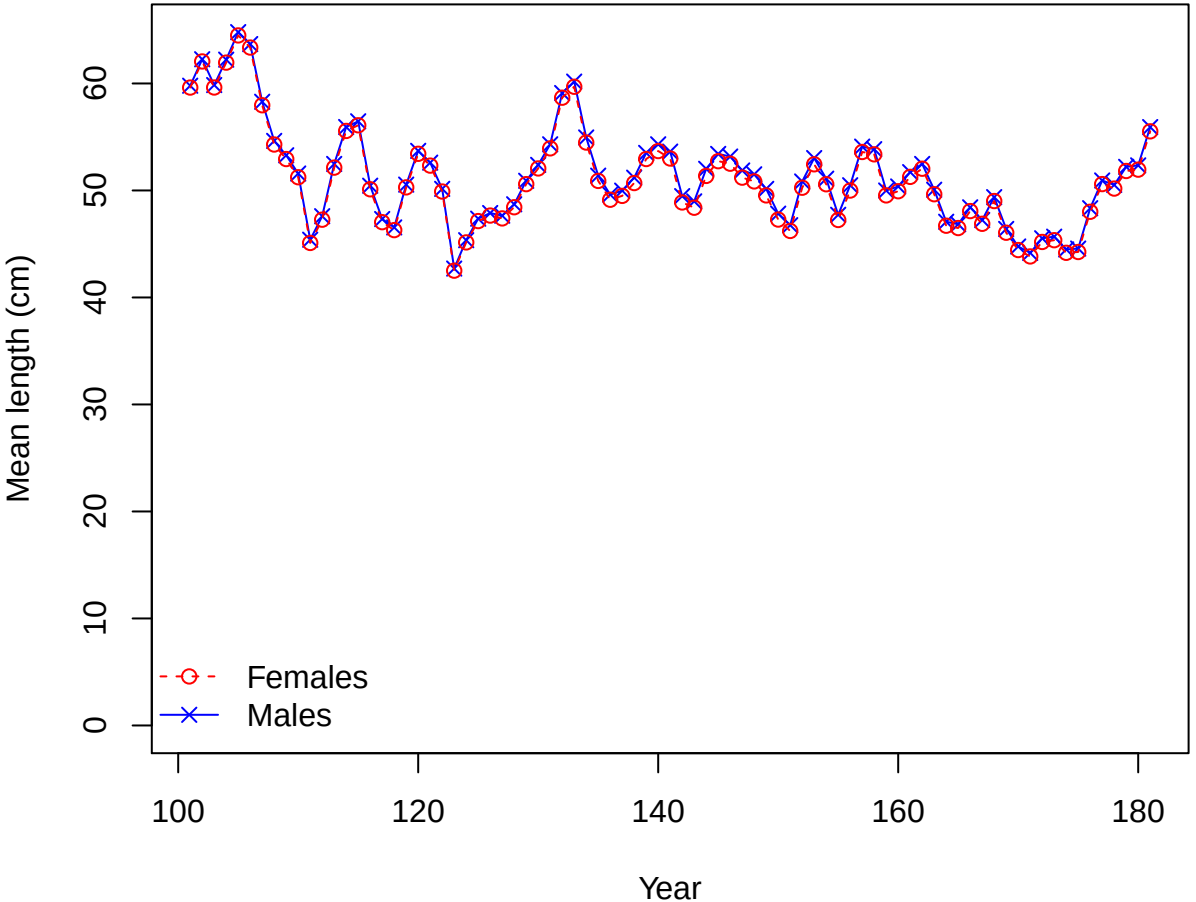

0.1
5
10
40
30
20
10
0
Age
100
107
114
121
128
135
142
149
156
163
170
177
Year

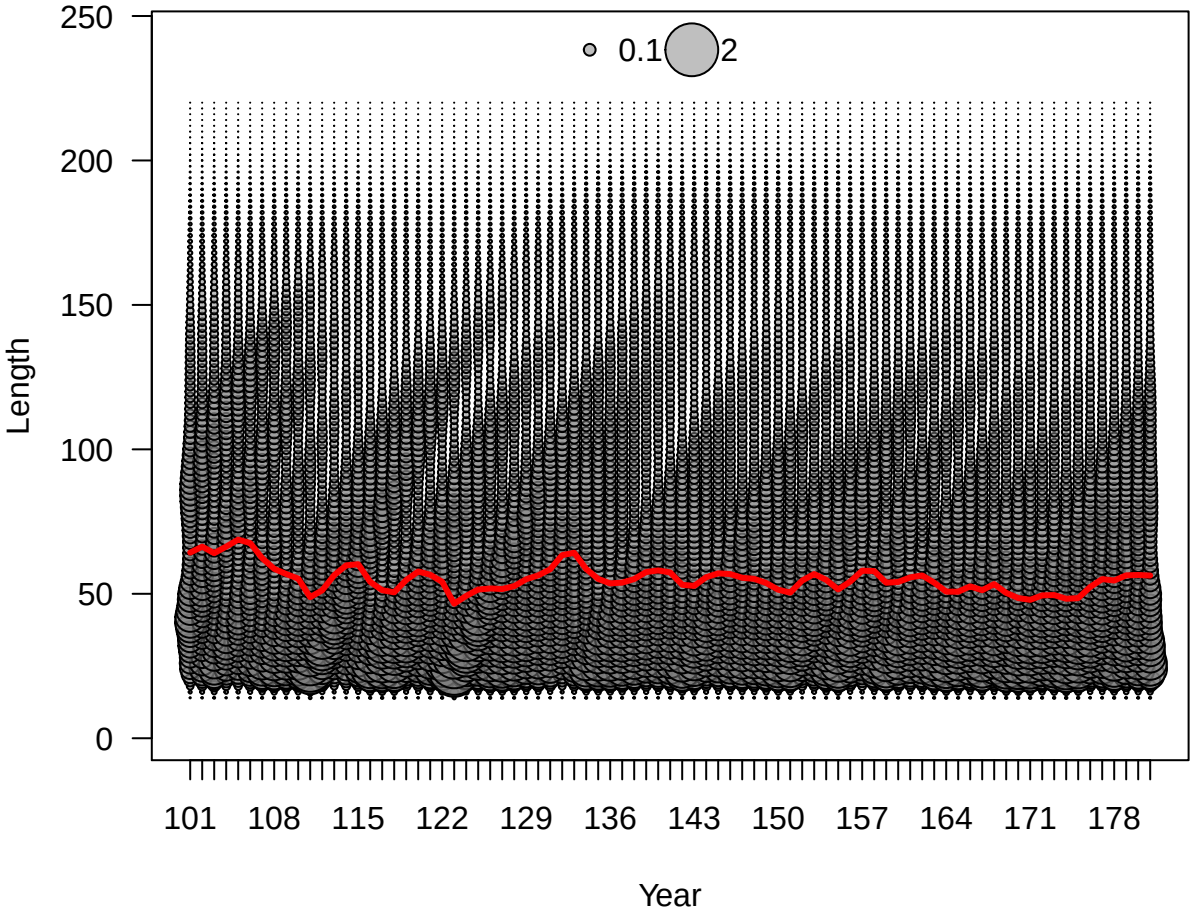

Mean age (yr)
0
1
2
3
4
5
100
120
140
160
180
Year
Females
Males

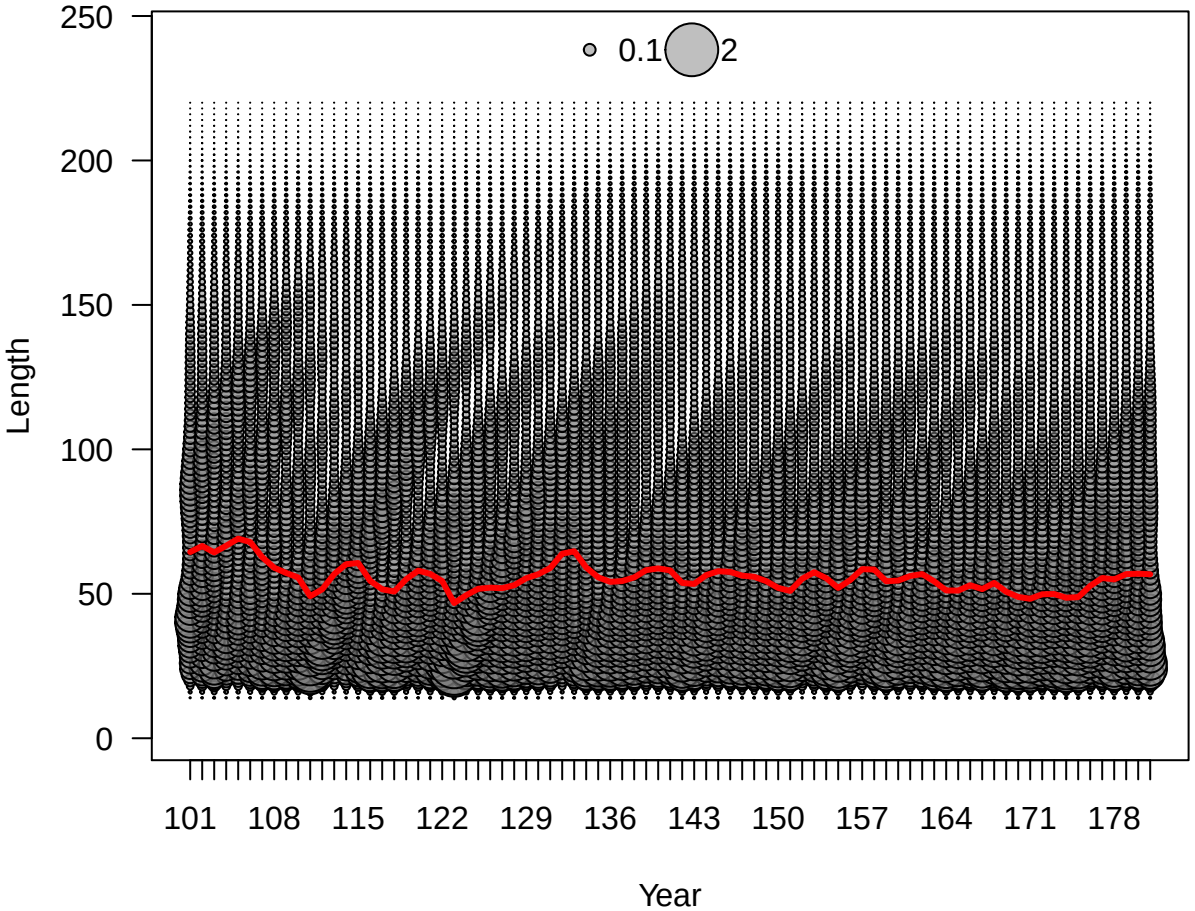

0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42
0.44
0.46
0.48
0.26
Age
0
10
20
30
40
100
120
140
160
180
Year

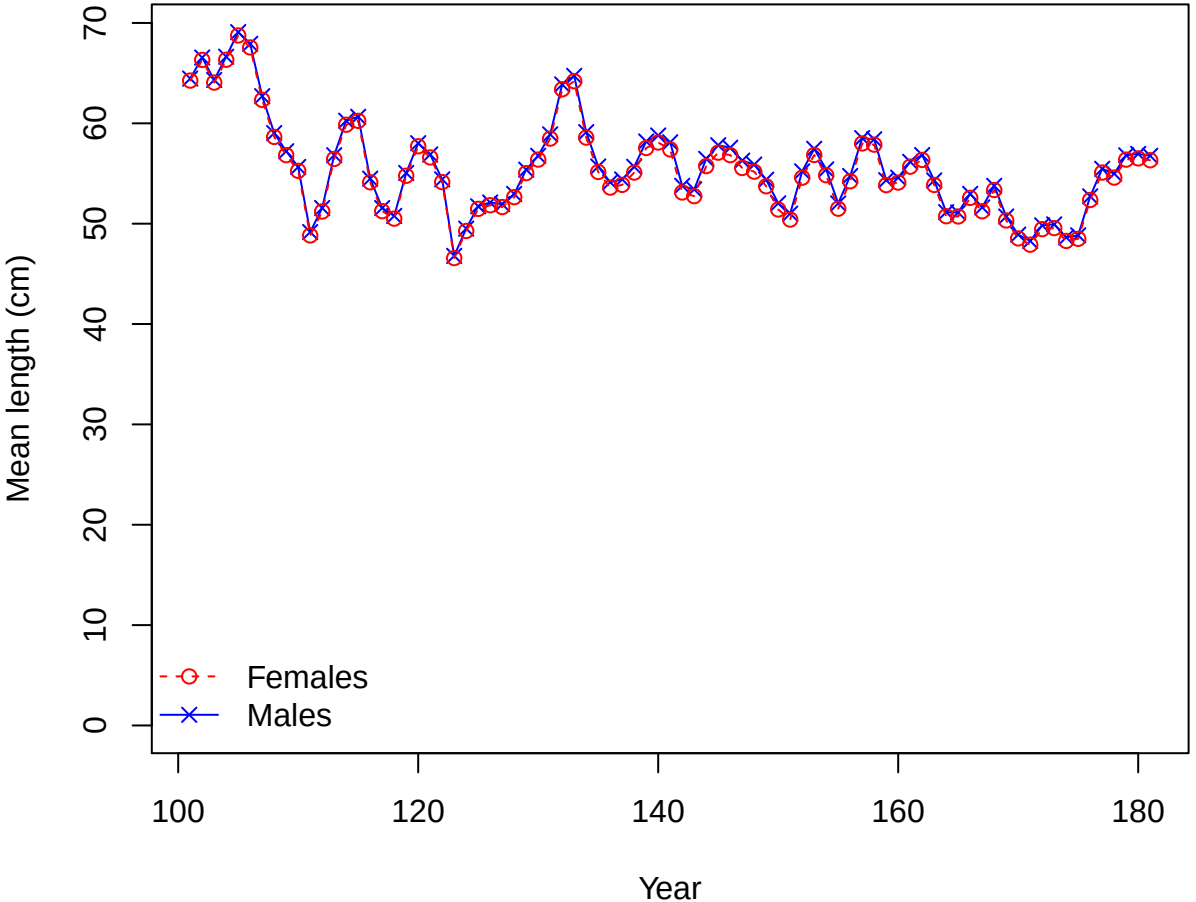

0.1
2
250
200
150
100
50
0
Length
101
108
115
122
129
136
143
150
157
164
171
178
Year

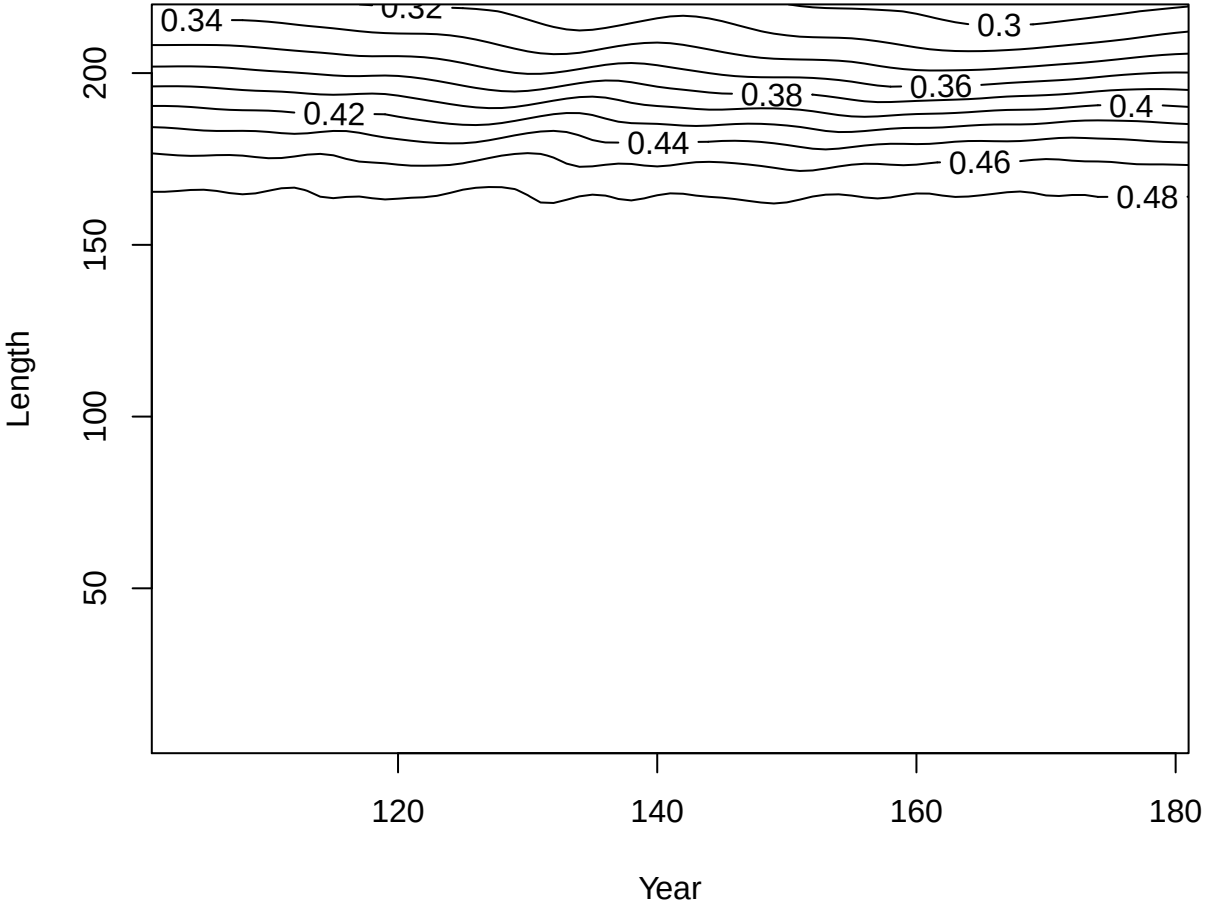

0.1
2
250
200
150
100
50
0
Length
101
108
115
122
129
136
143
150
157
164
171
178
Year

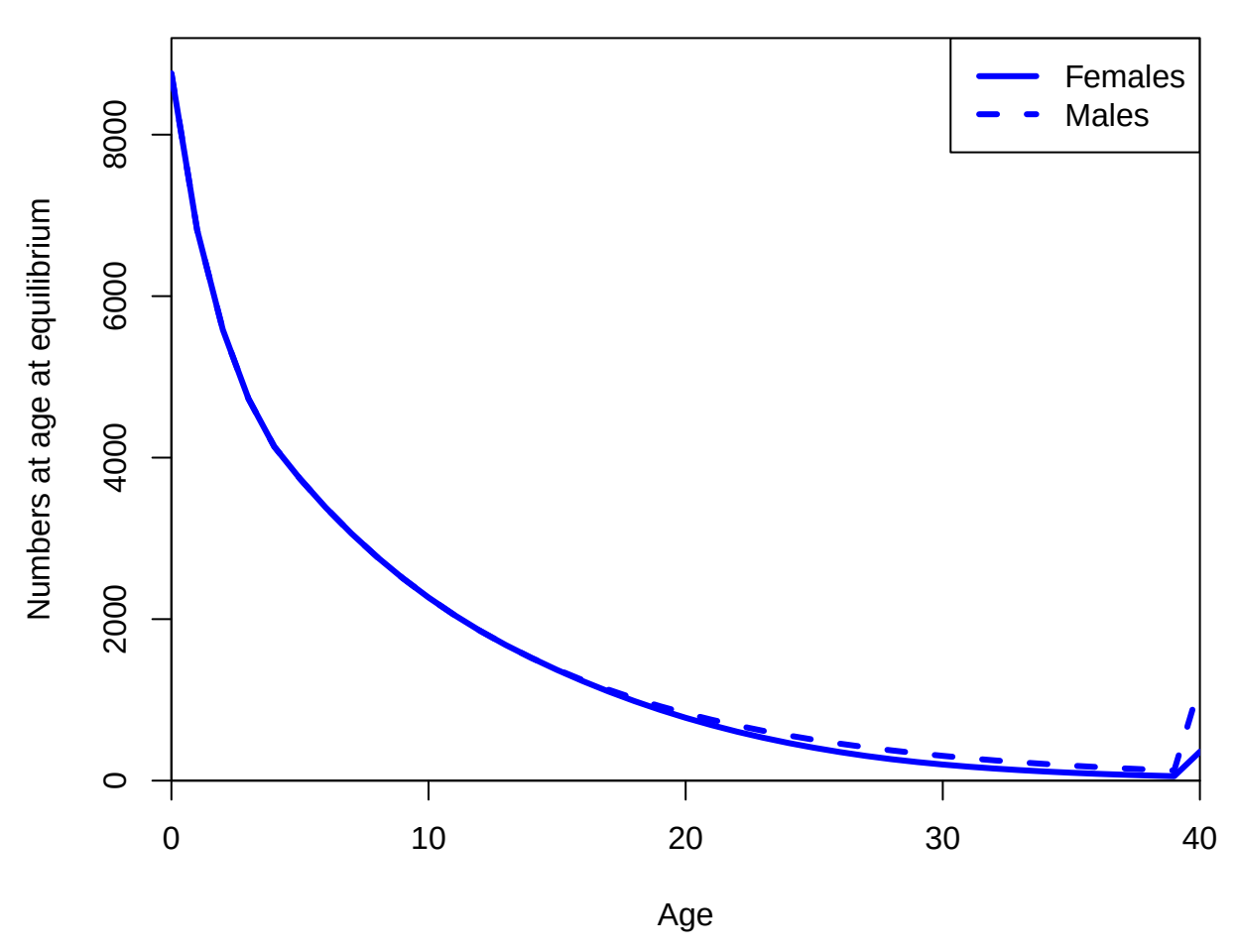

Mean length (cm)
0
10
20
30
40
50
60
100
120
140
160
180
Year
Females
Males

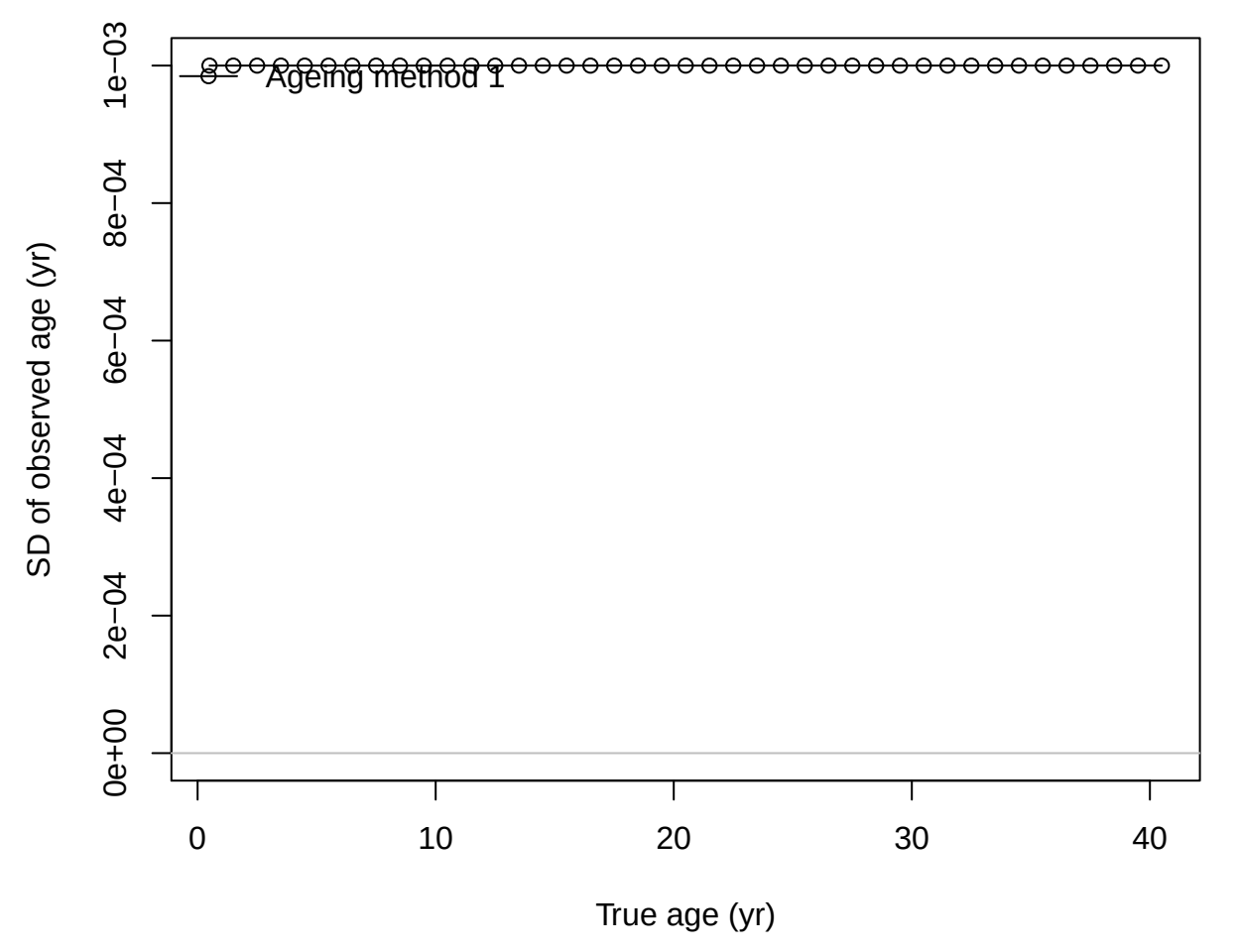

0.1
2
250
200
150
100
50
0
Length
101
108
115
122
129
136
143
150
157
164
171
178
Year

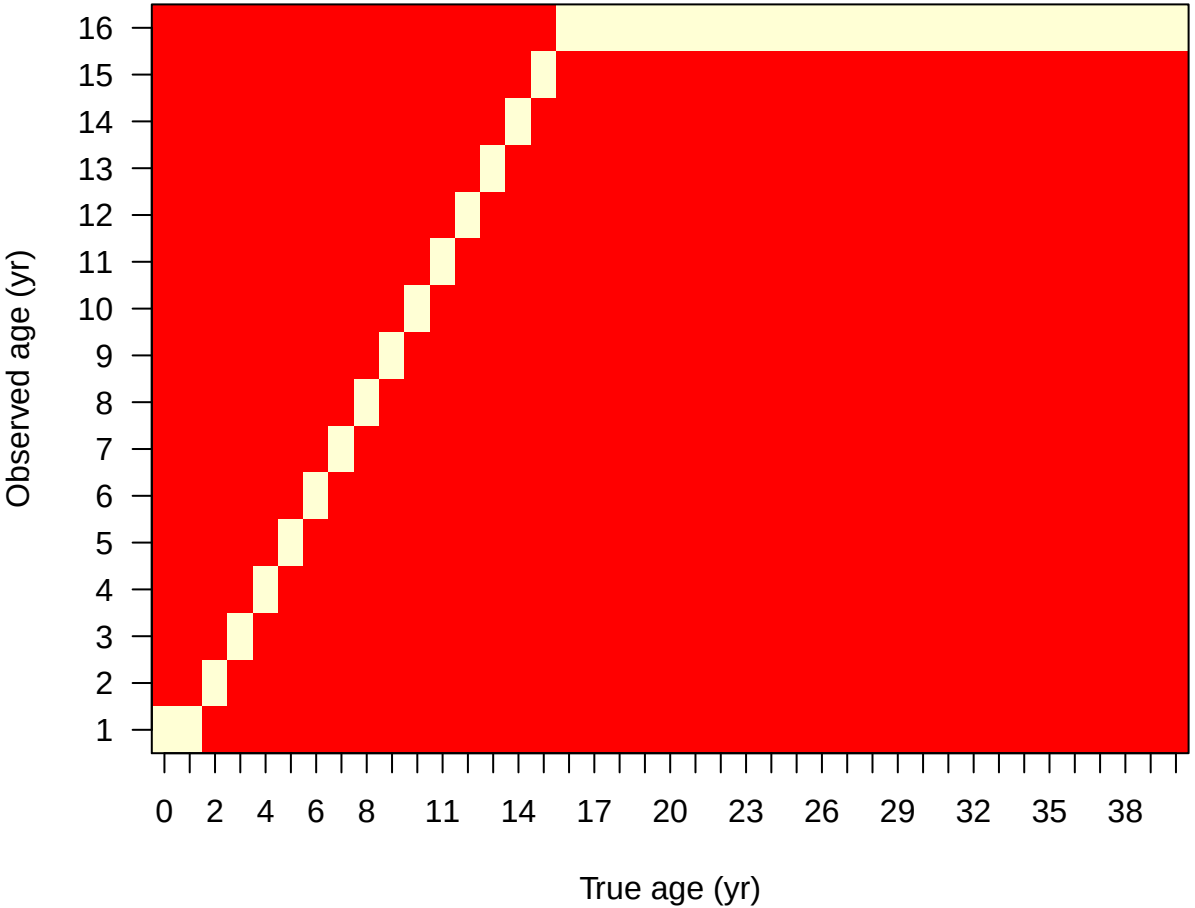

0.1
2
250
200
150
100
50
0
Length
101
108
115
122
129
136
143
150
157
164
171
178
Year

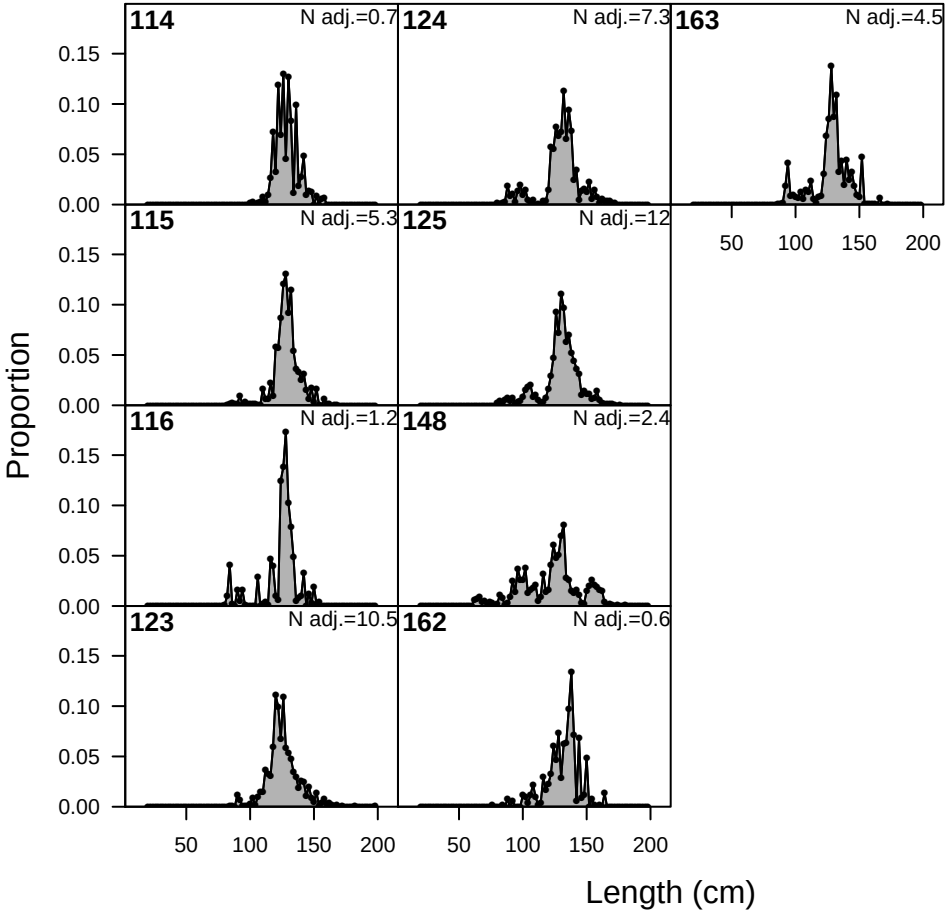

Mean length (cm)
0
10
20
30
40
50
60
70
100
120
140
160
180
Year
Females
Males

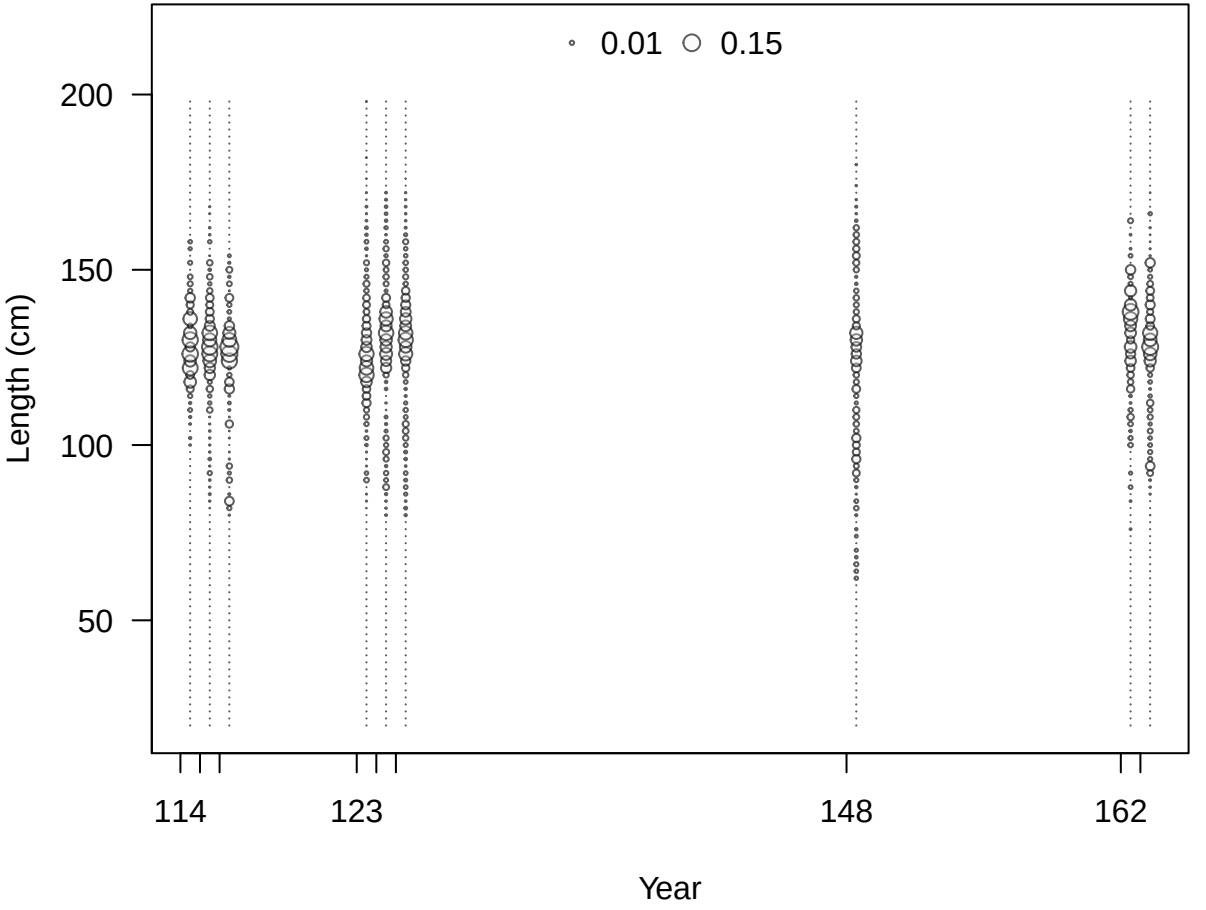

0.34
0.32
0.3
0.38
0.36
0.4
0.42
0.44
0.46
0.48
200
150
100
50
Length
120
140
160
180
Year

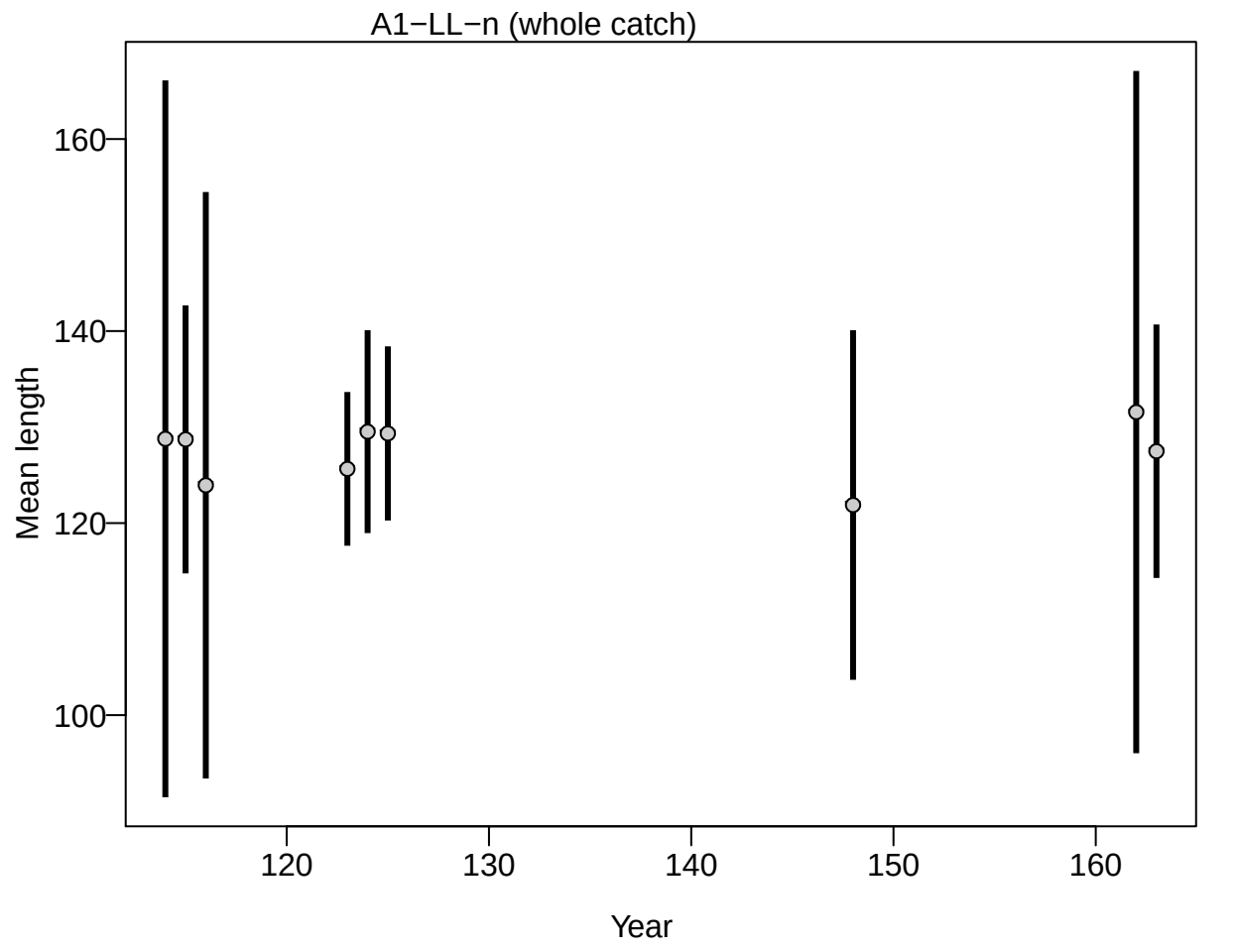

Females
Males
Numbers at age at equilibrium
0
2000
4000
6000
8000
0
10
20
30
40
Age

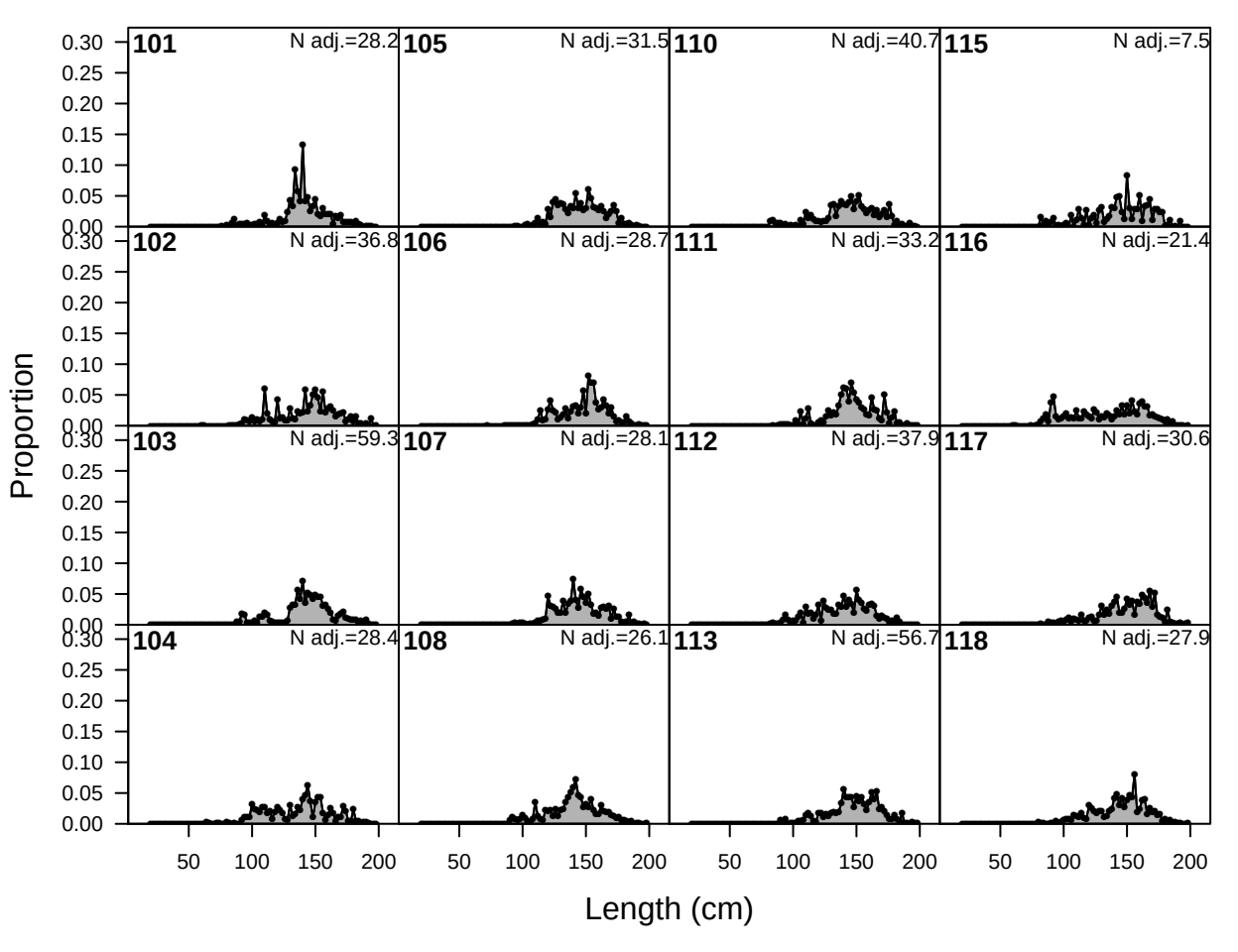

Ageing method 1
SD of observed age (yr)
0e+00
2e−04
4e−04
6e−04
8e−04
1e−03
0
10
20
30
40
True age (yr)

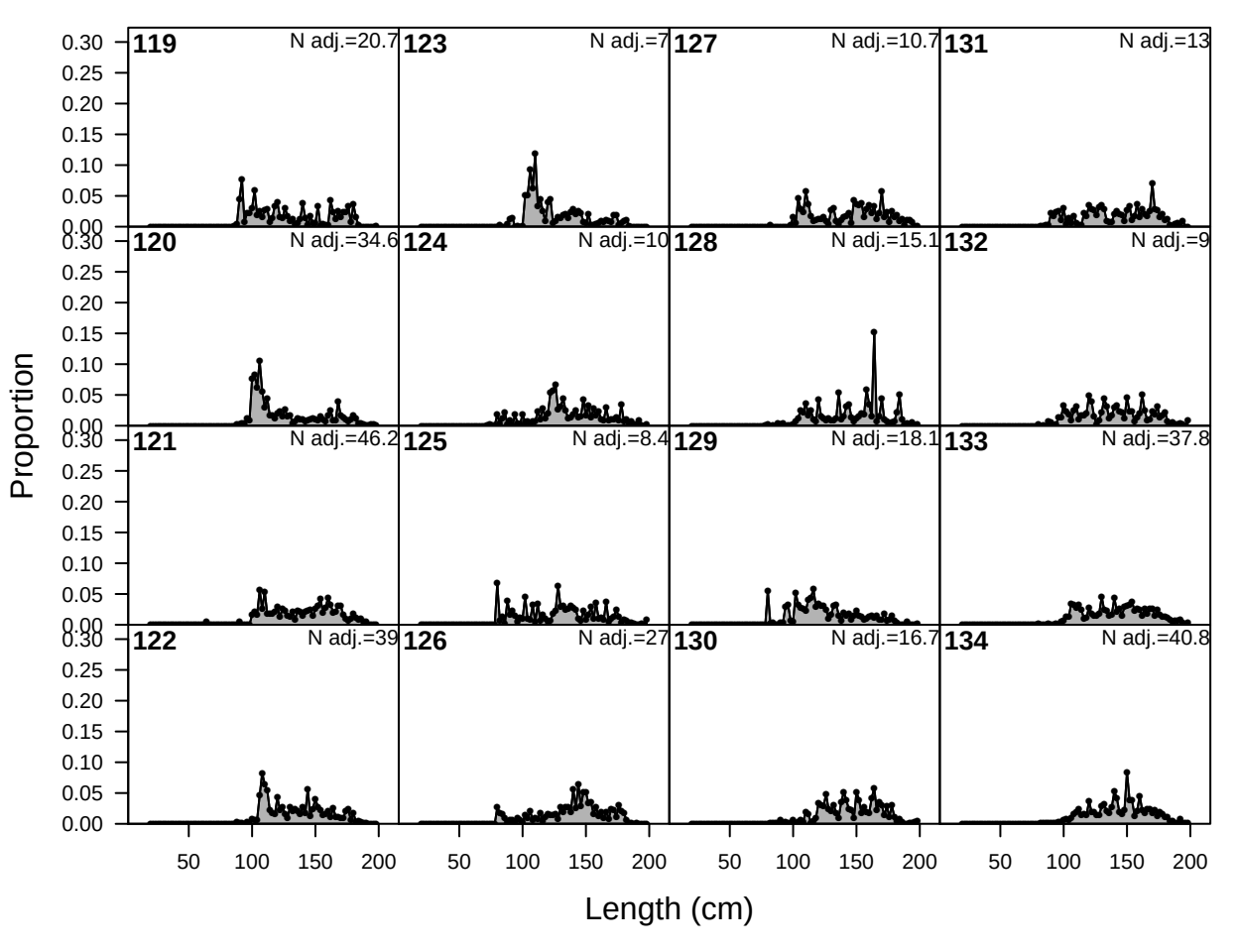

Observed age (yr)
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
2
4
6
8
11
14
17
20
23
26
29
32
35
38
True age (yr)

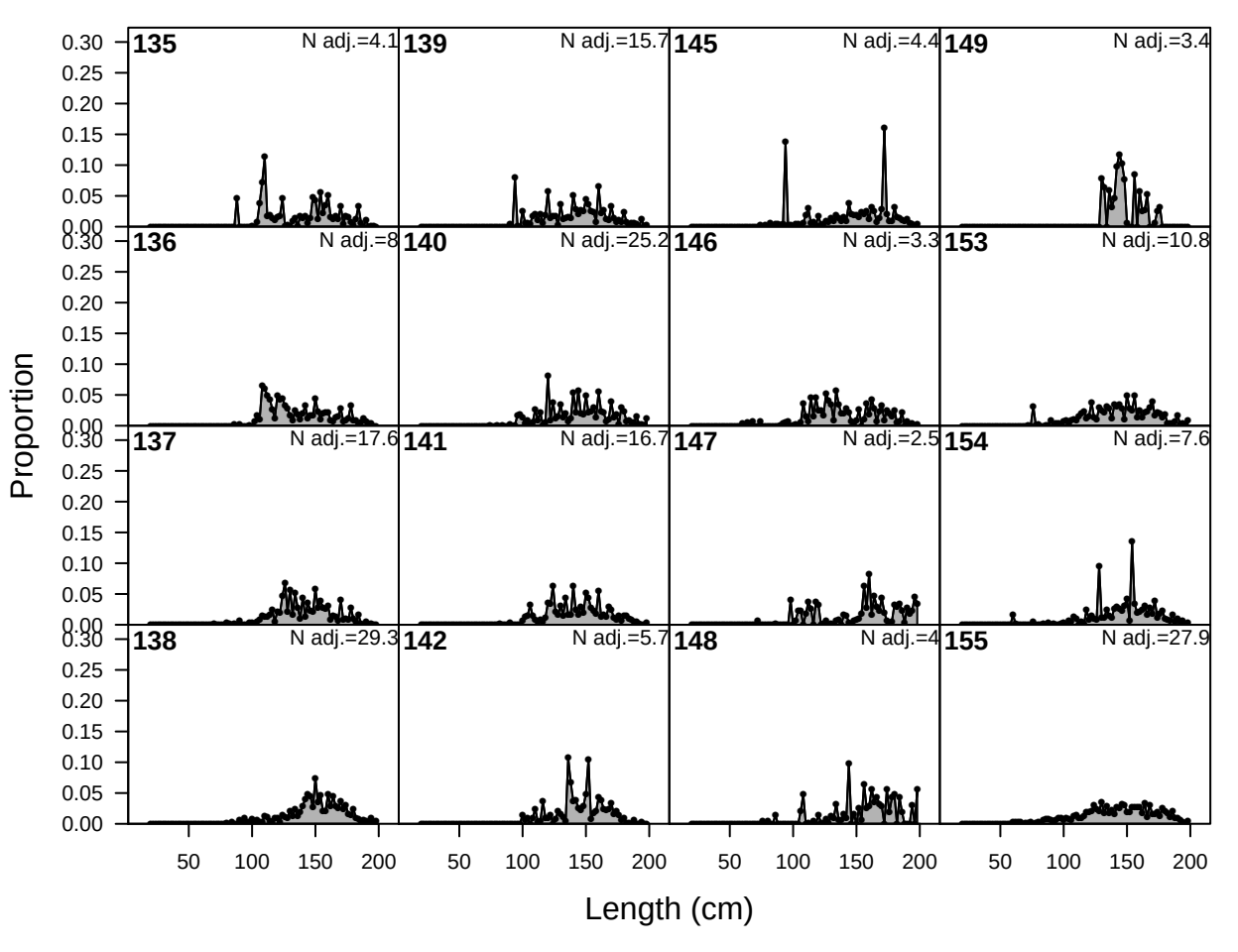

114
N adj.=0.7
124
N adj.=7.3
163
N adj.=4.5
115
N adj.=5.3
125
N adj.=12
116
N adj.=1.2
148
N adj.=2.4
123
N adj.=10.5
162
N adj.=0.6
0.00
0.05
0.10
0.15
50
100
150
200
Proportion
Length (cm)

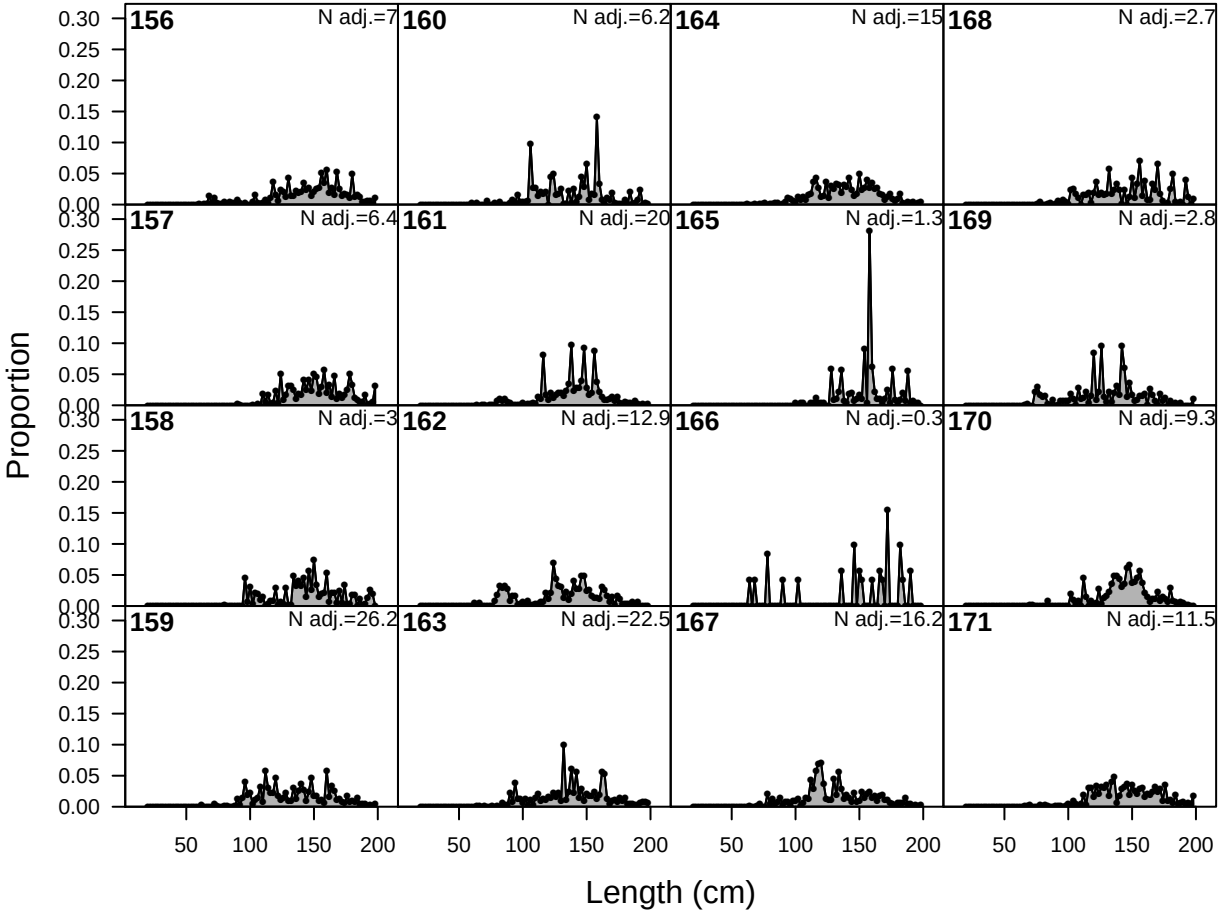

0.01
0.15
200
150
100
50
Length (cm)
114
123
148
162
Year

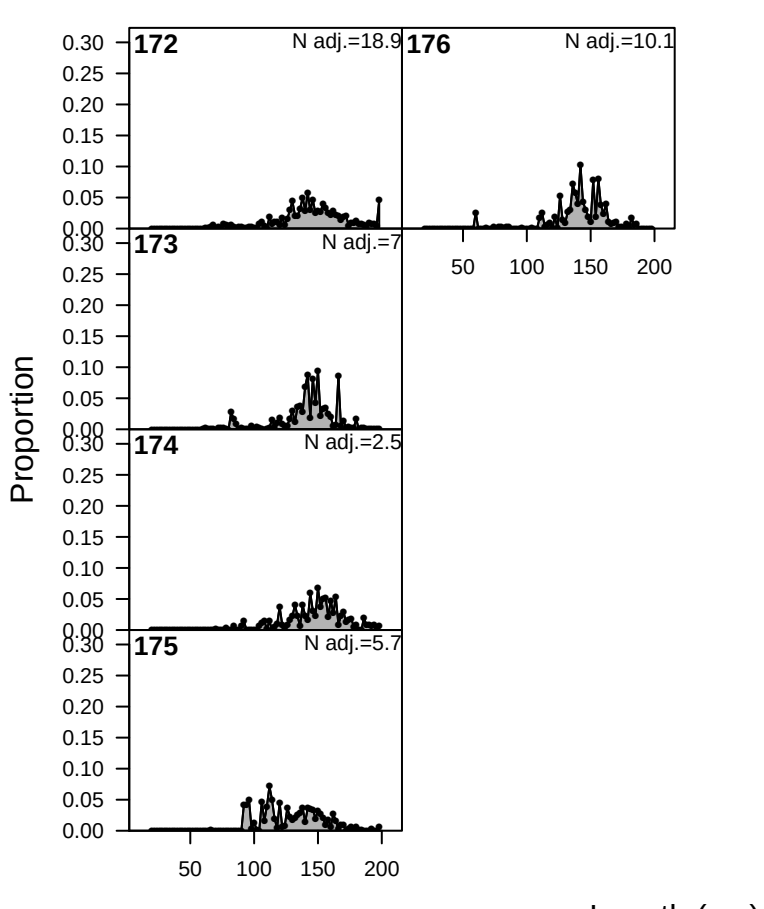

A1−LL−n (whole catch)
Mean length
160
140
120
100
120
130
140
150
160
Year

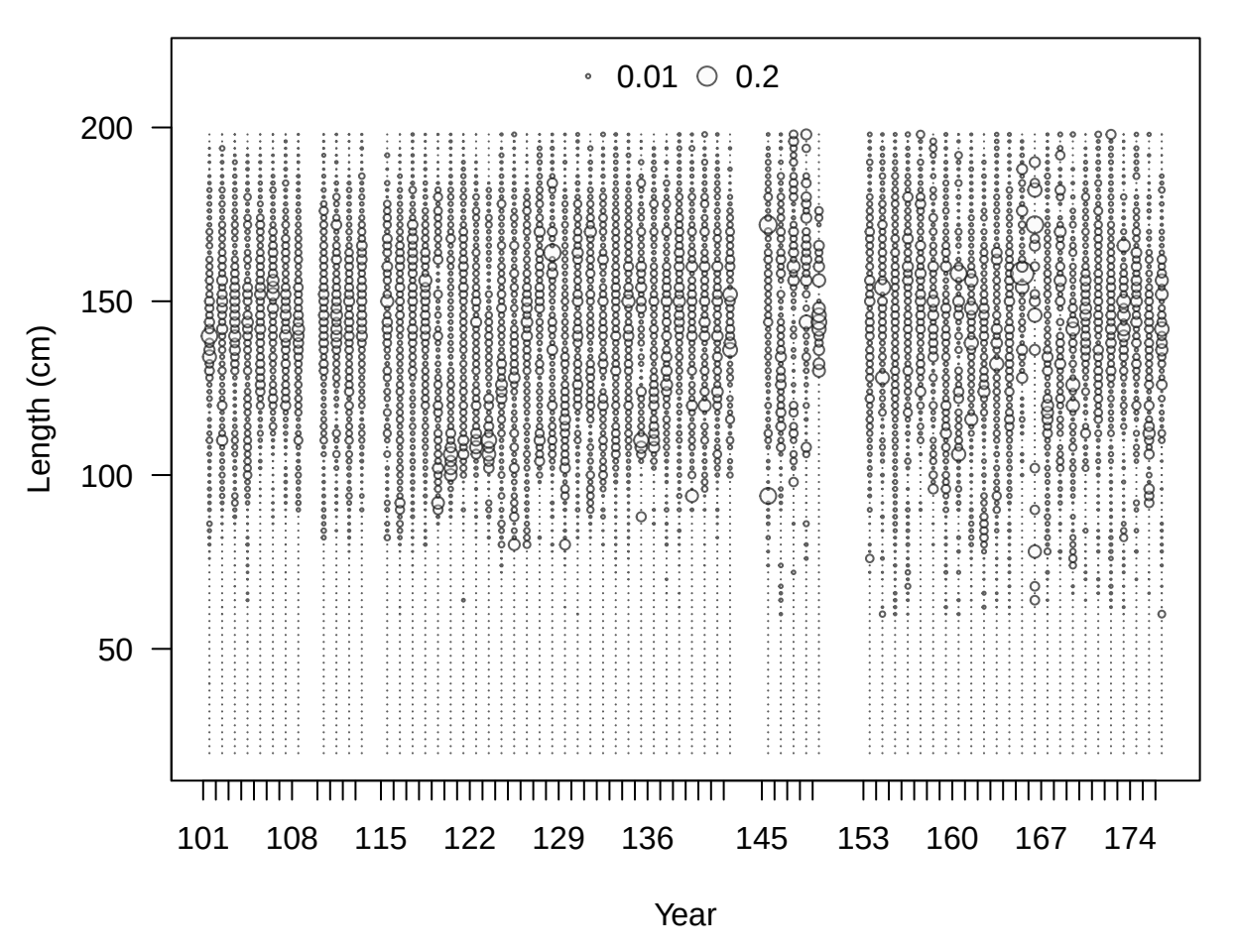

101
N adj.=28.2
105
N adj.=31.5
110
N adj.=40.7
115
N adj.=7.5
102
N adj.=36.8
106
N adj.=28.7
111
N adj.=33.2
116
N adj.=21.4
103
N adj.=59.3
107
N adj.=28.1
112
N adj.=37.9
117
N adj.=30.6
104
N adj.=28.4
108
N adj.=26.1
113
N adj.=56.7
118
N adj.=27.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

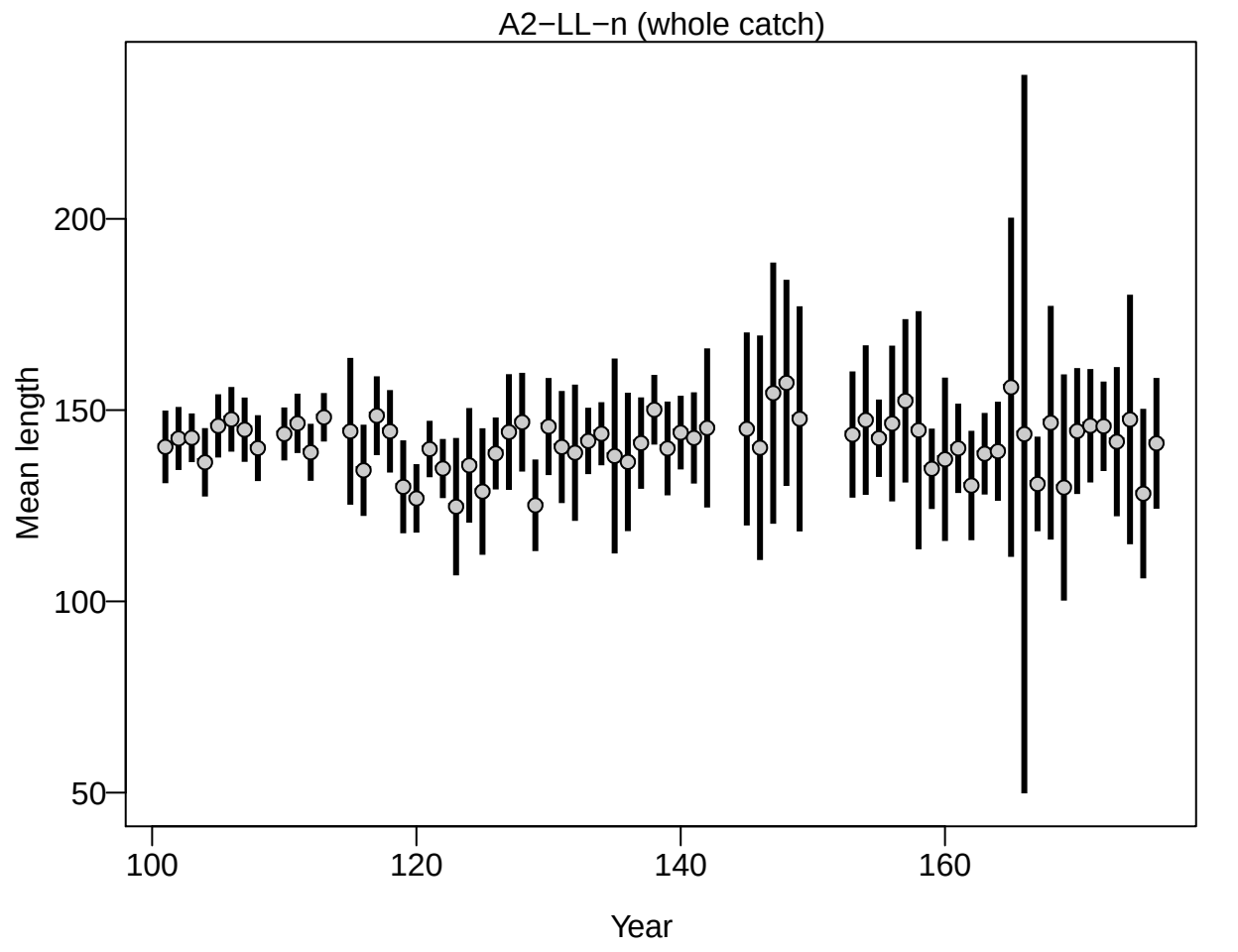

119
N adj.=20.7
123
N adj.=7
127
N adj.=10.7
131
N adj.=13
120
N adj.=34.6
124
N adj.=10
128
N adj.=15.1
132
N adj.=9
121
N adj.=46.2
125
N adj.=8.4
129
N adj.=18.1
133
N adj.=37.8
122
N adj.=39
126
N adj.=27
130
N adj.=16.7
134
N adj.=40.8
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)

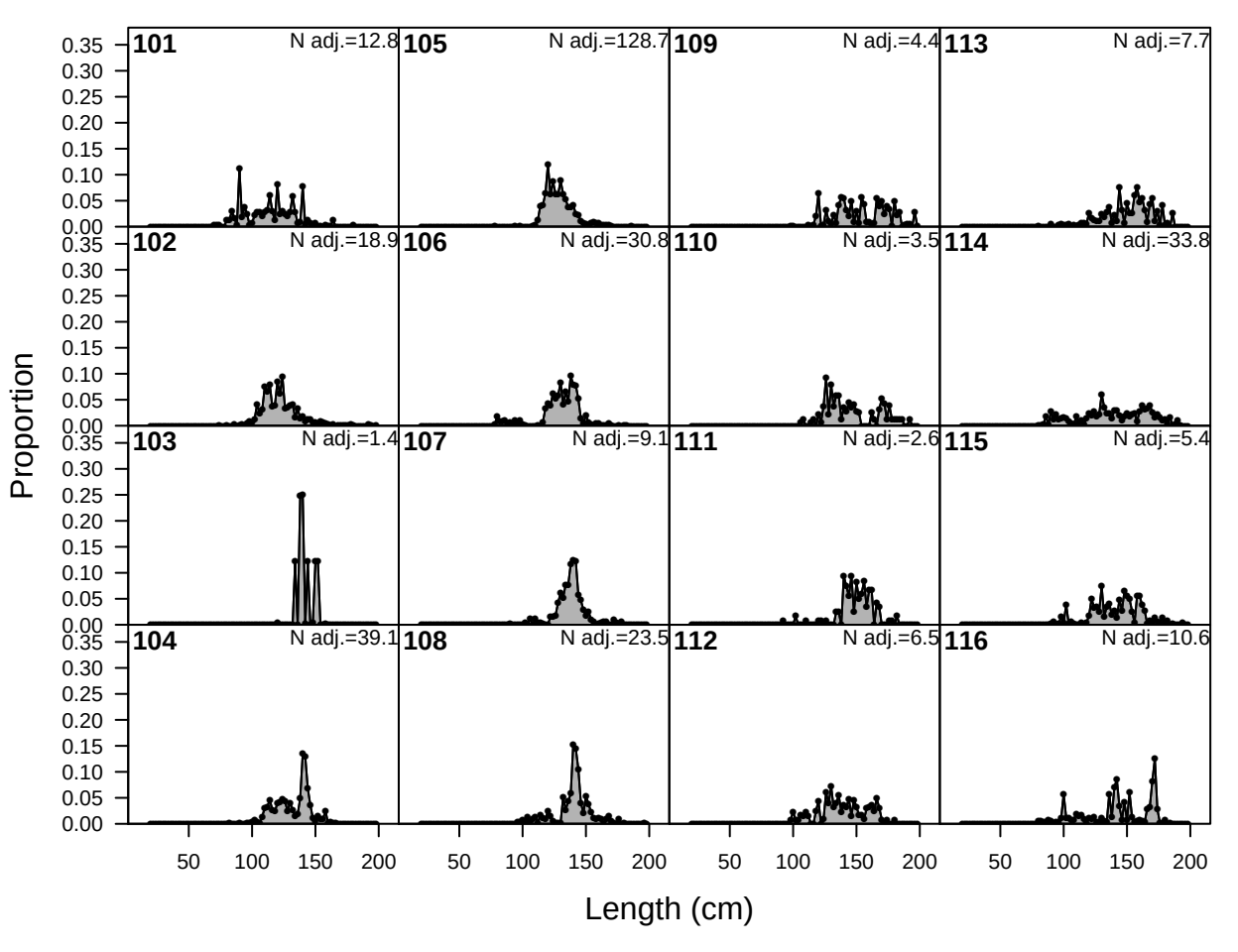

135 N adj.=4.1
139 N adj.=15.7
145 N adj.=4.4
149 N adj.=3.4
136 N adj.=8
140 N adj.=25.2
146 N adj.=3.3
153 N adj.=10.8
137 N adj.=17.6
141 N adj.=16.7
147 N adj.=2.5
154 N adj.=7.6
138 N adj.=29.3
142 N adj.=5.7
148 N adj.=4
155 N adj.=27.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

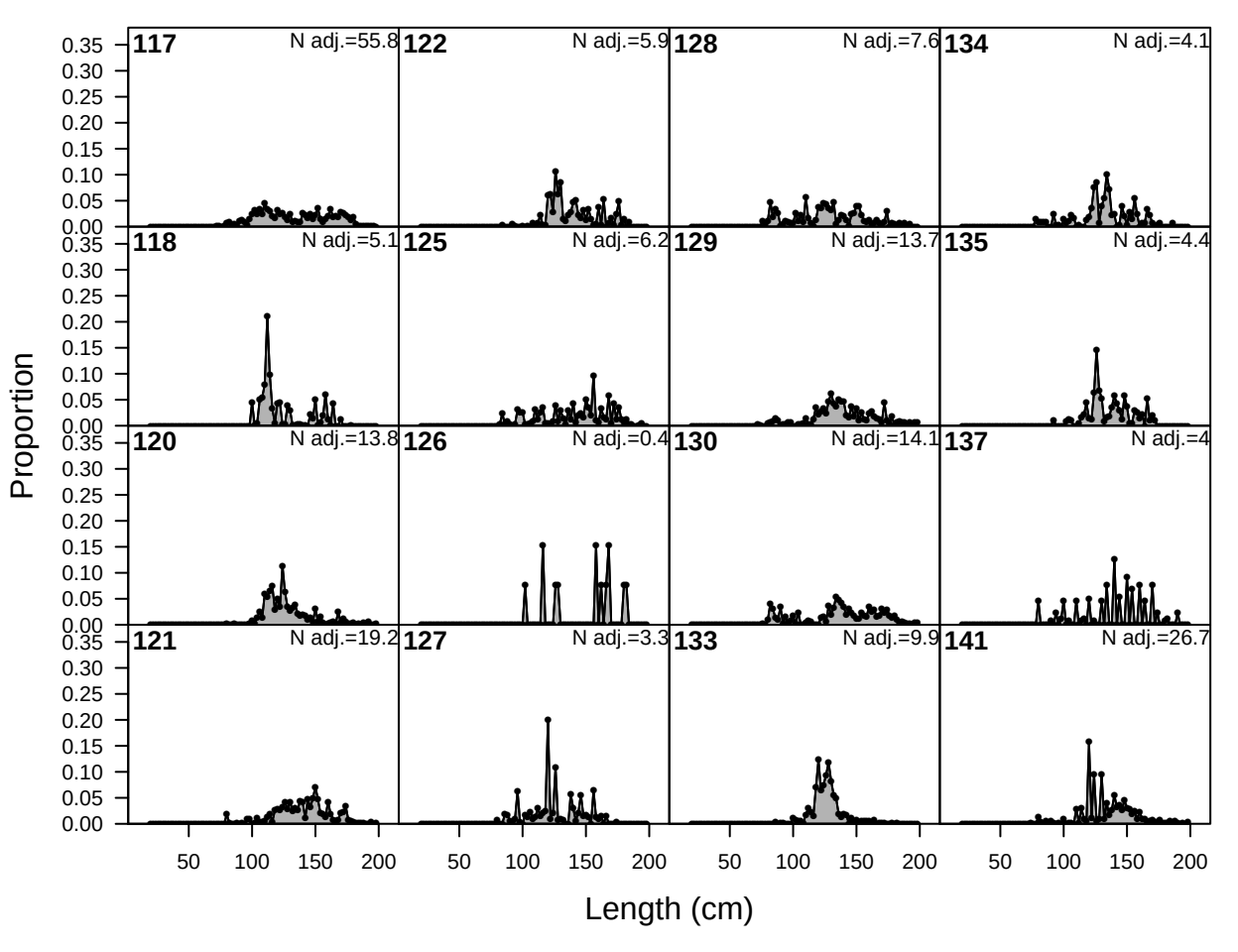

156
N adj.=7
160
N adj.=6.2
164
N adj.=15
168
N adj.=2.7
157
N adj.=6.4
161
N adj.=20
165
N adj.=1.3
169
N adj.=2.8
158
N adj.=3
162
N adj.=12.9
166
N adj.=0.3
170
N adj.=9.3
159
N adj.=26.2
163
N adj.=22.5
167
N adj.=16.2
171
N adj.=11.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

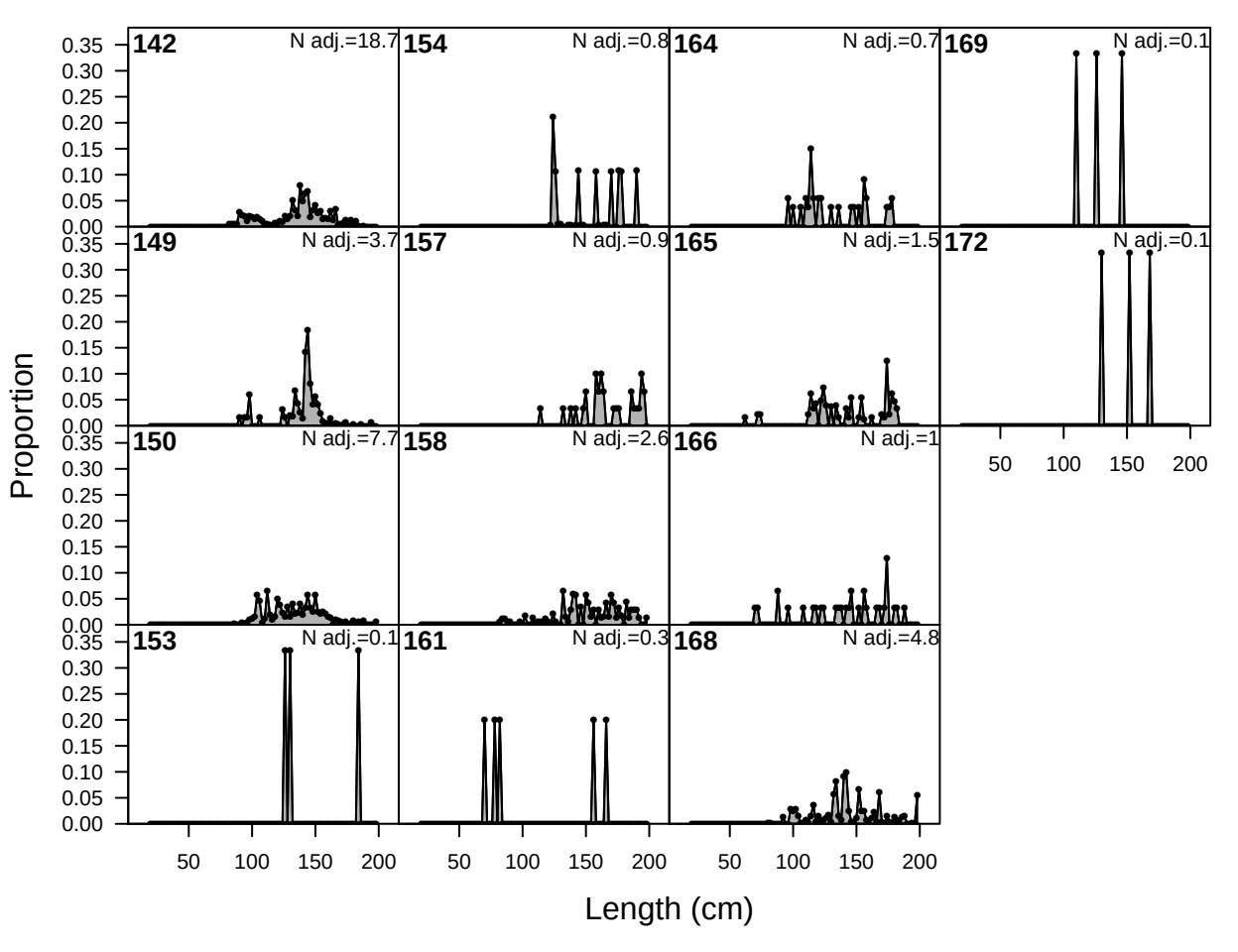

172
N adj.=18.9
176
N adj.=10.1
173
N adj.=7
174
N adj.=2.5
175
N adj.=5.7
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)

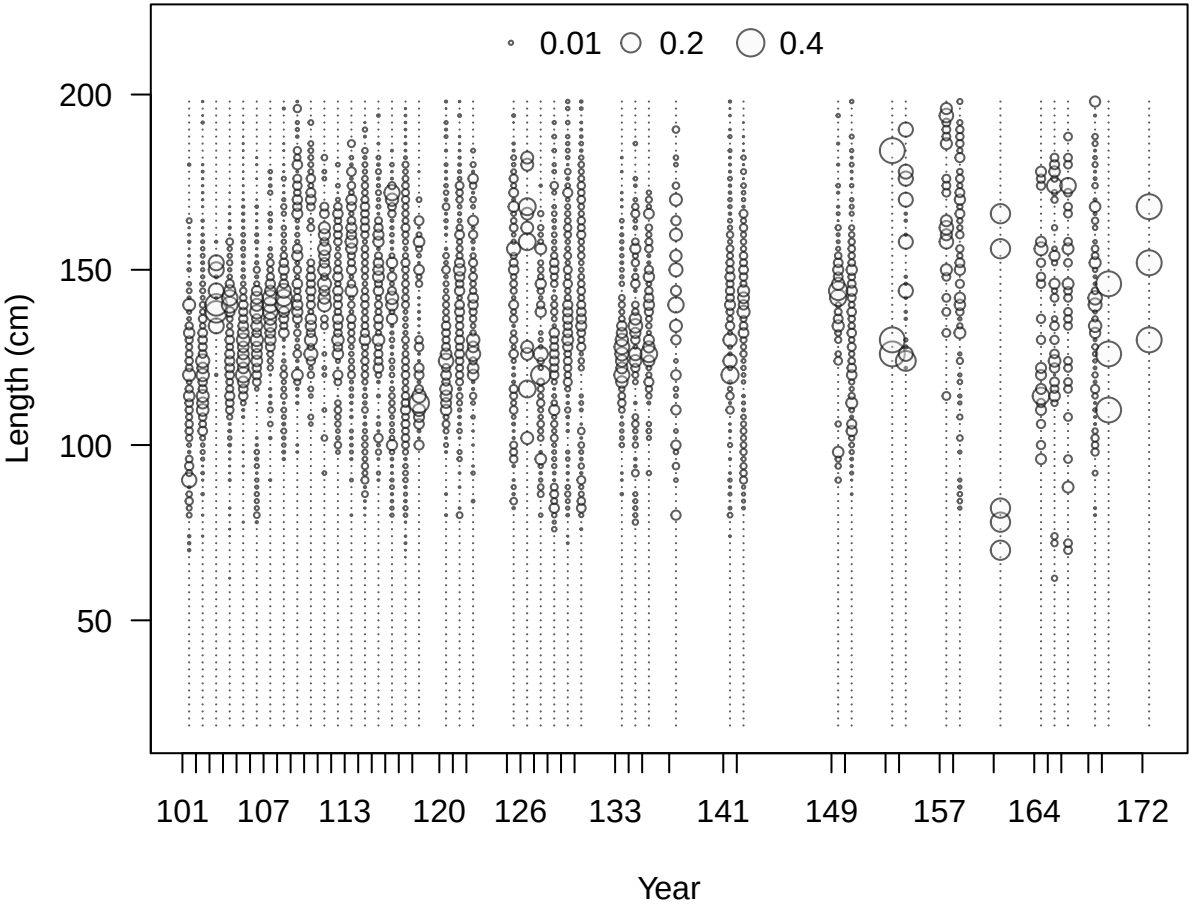

0.01
0.2
200
150
100
50
Length (cm)
101
108
115
122
129
136
145
153
160
167
174
Year

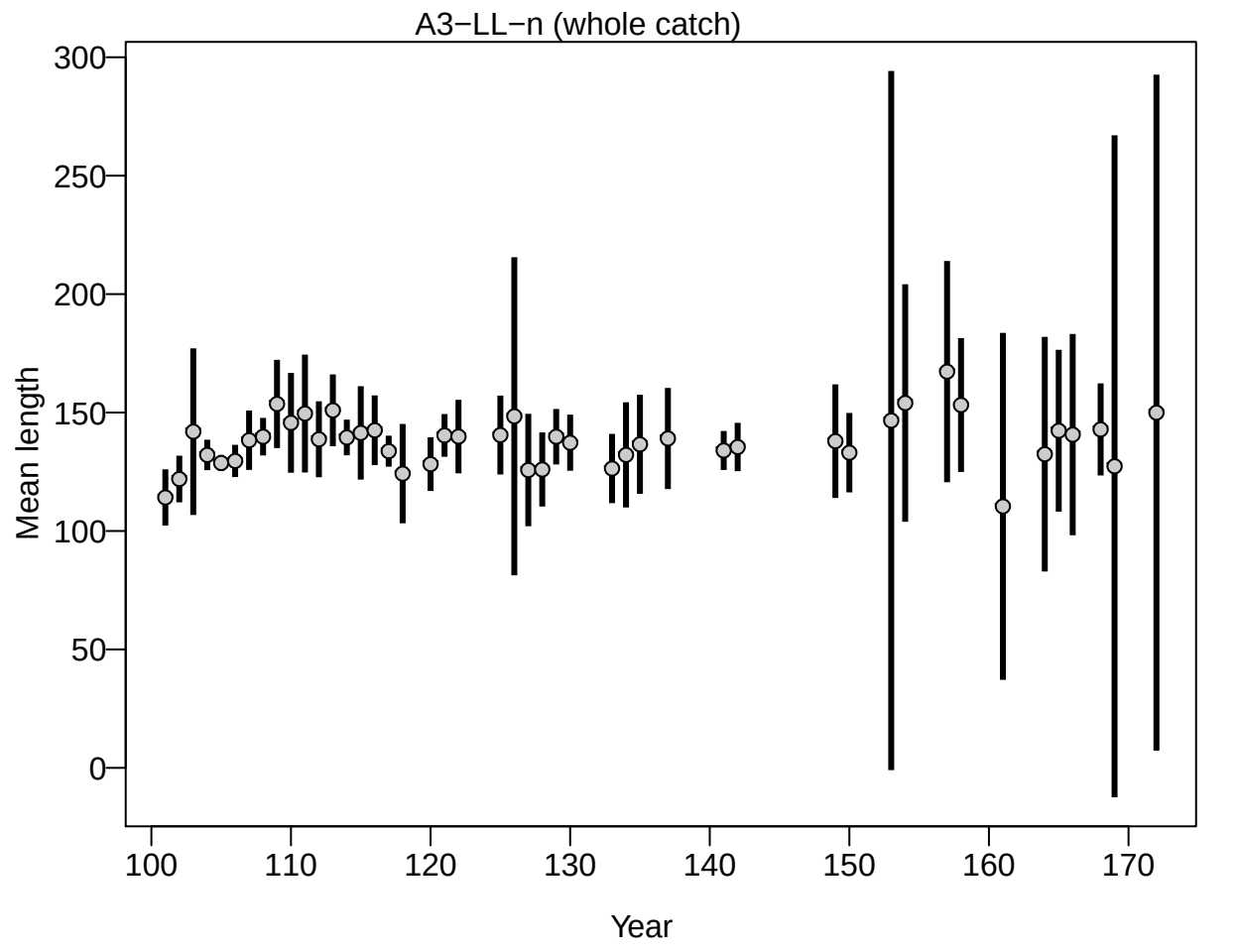

A2−LL−n (whole catch)
Mean length
200
150
100
50
100
120
140
160
Year

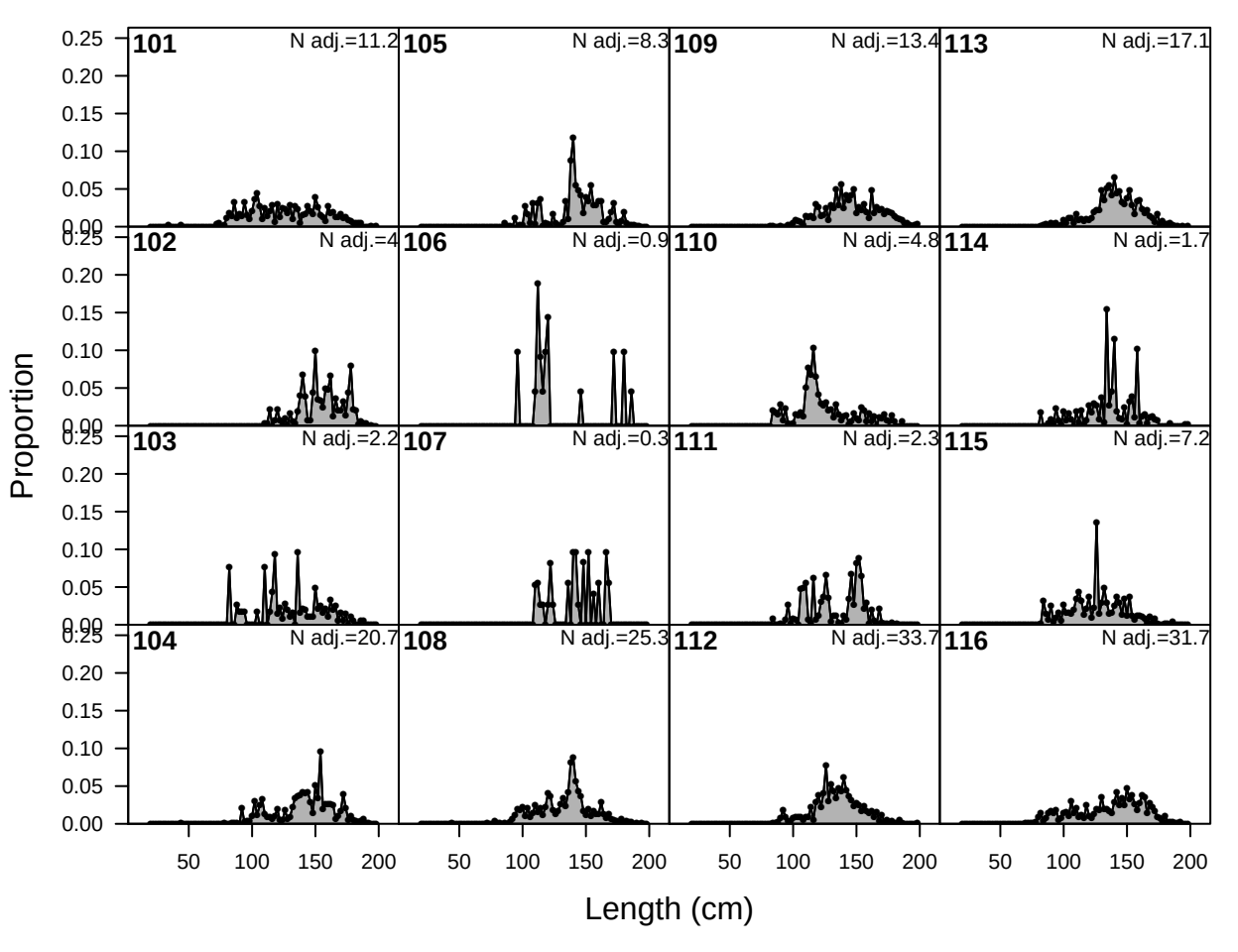

101
N adj.=12.8
105
N adj.=128.7
109
N adj.=4.4
113
N adj.=7.7
102
N adj.=18.9
106
N adj.=30.8
110
N adj.=3.5
114
N adj.=33.8
103
N adj.=1.4
107
N adj.=9.1
111
N adj.=2.6
115
N adj.=5.4
104
N adj.=39.1
108
N adj.=23.5
112
N adj.=6.5
116
N adj.=10.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


117
N adj.=55.8
122
N adj.=5.9
128
N adj.=7.6
134
N adj.=4.1
118
N adj.=5.1
125
N adj.=6.2
129
N adj.=13.7
135
N adj.=4.4
120
N adj.=13.8
126
N adj.=0.4
130
N adj.=14.1
137
N adj.=4
121
N adj.=19.2
127
N adj.=3.3
133
N adj.=9.9
141
N adj.=26.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


142
N adj.=18.7
154
N adj.=0.8
164
N adj.=0.7
169
N adj.=0.1
149
N adj.=3.7
157
N adj.=0.9
165
N adj.=1.5
172
N adj.=0.1
150
N adj.=7.7
158
N adj.=2.6
166
N adj.=1
153
N adj.=0.1
161
N adj.=0.3
168
N adj.=4.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


0.01
0.2
0.4
200
150
100
50
Length (cm)
101
107
113
120
126
133
141
149
157
164
172
Year


A3−LL−n (whole catch)
Mean length
300
250
200
150
100
50
0
100
110
120
130
140
150
160
170
Year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N adj.=8.3
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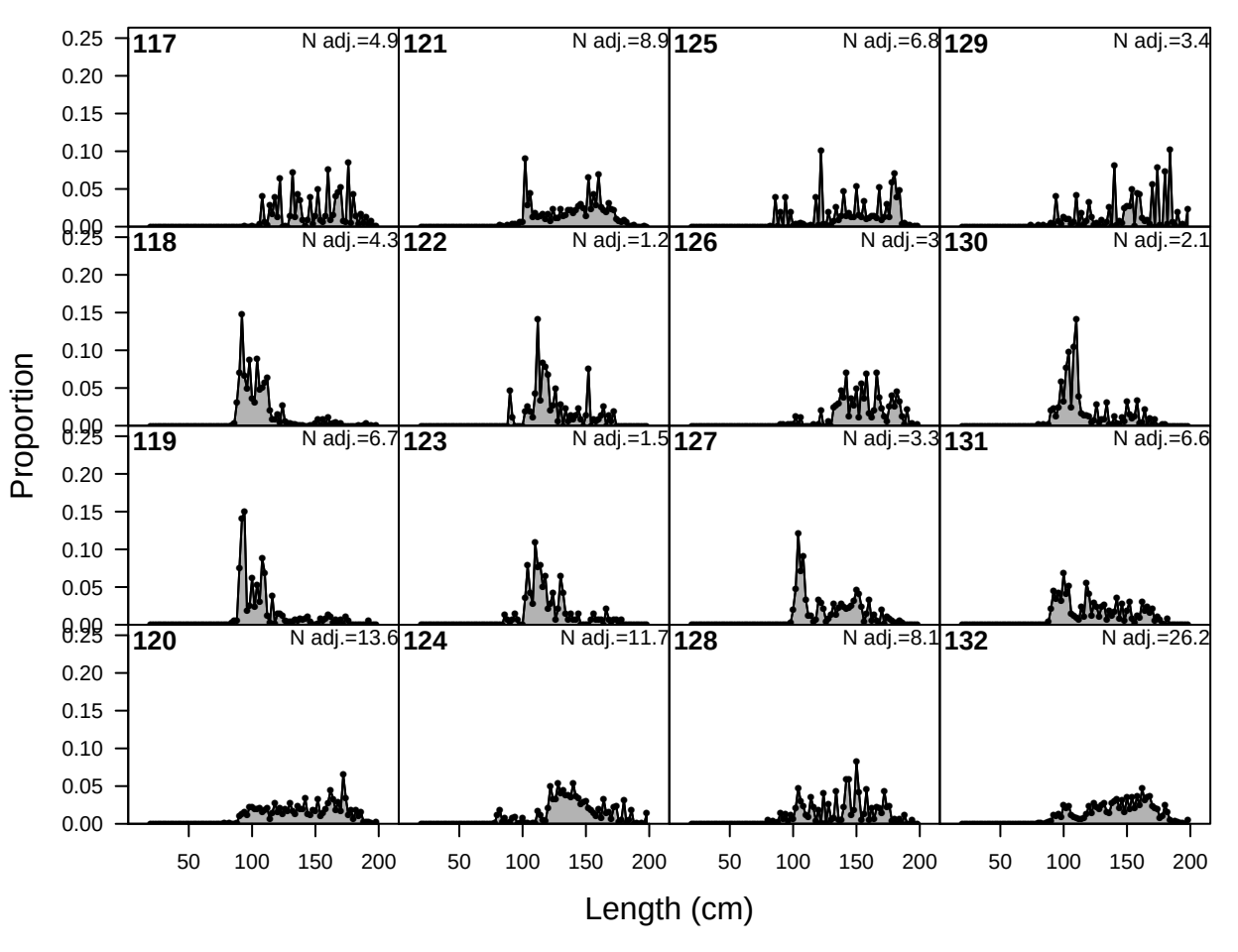
N adj.=13.4
113
N adj.=17.1
102
N adj.=4
106
N adj.=0.9
110
N adj.=4.8
114
N adj.=1.7
103
N adj.=2.2
107
N adj.=0.3
111
N adj.=2.3
115
N adj.=7.2
104
N adj.=20.7
108
N adj.=25.3
112
N adj.=33.7
116
N adj.=31.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


117
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N adj.=8.9
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N adj.=6.8
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N adj.=3.4
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N adj.=4.3
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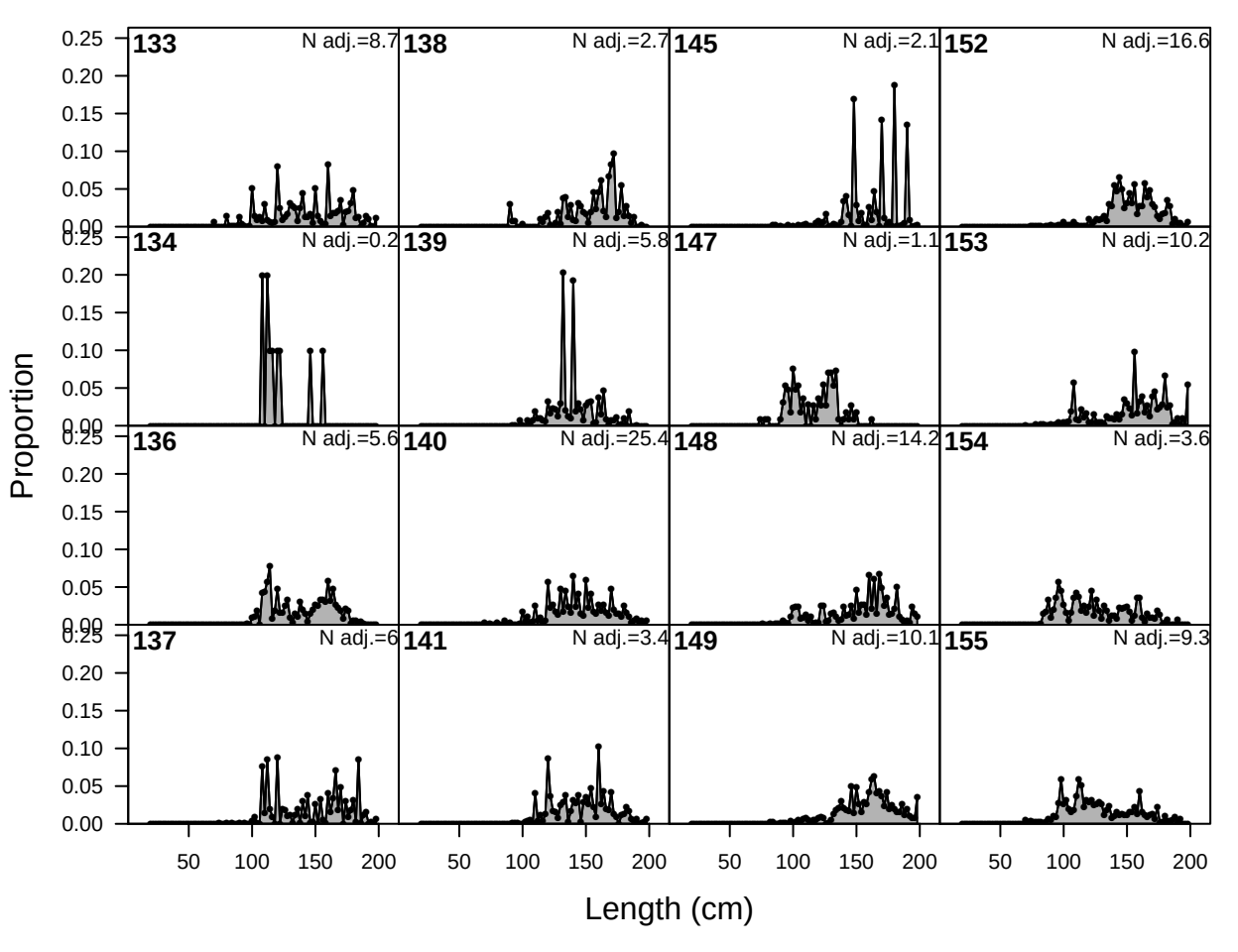
N adj.=1.2
126
N adj.=3
130
N adj.=2.1
119
N adj.=6.7
123
N adj.=1.5
127
N adj.=3.3
131
N adj.=6.6
120
N adj.=13.6
124
N adj.=11.7
128
N adj.=8.1
132
N adj.=26.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N adj.=2.7
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N adj.=2.1
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N adj.=16.6
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N adj.=0.2
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N adj.=5.8
147
N adj.=1.1
153
N adj.=10.2
136
N adj.=5.6
140
N adj.=25.4
148
N adj.=14.2
154
N adj.=3.6
137
N adj.=6
141
N adj.=3.4
149
N adj.=10.1
155
N adj.=9.3
Proportion
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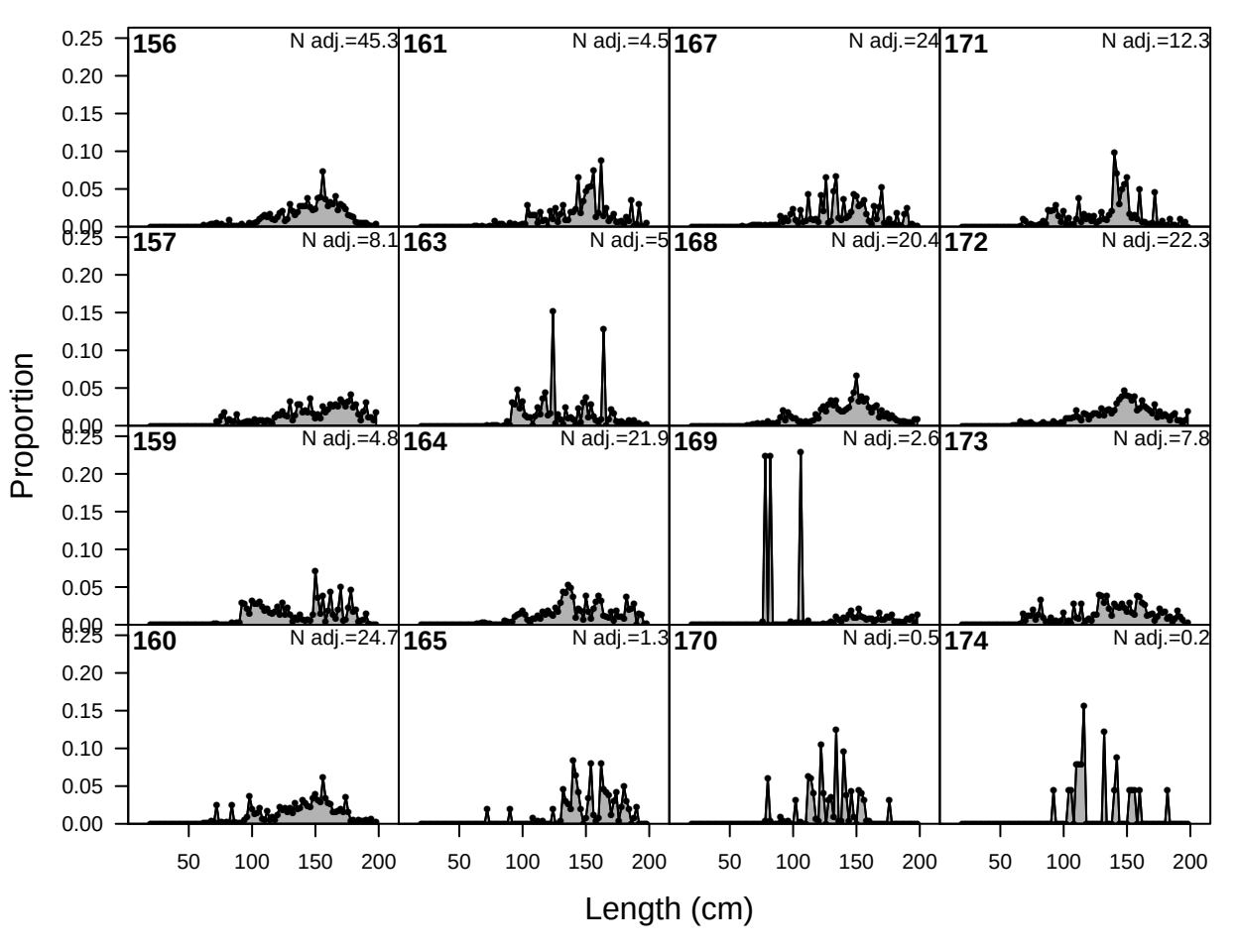
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


156
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N adj.=4.5
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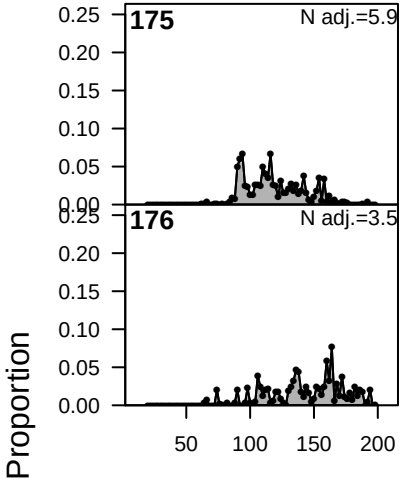
N adj.=24
171
N adj.=12.3
157
N adj.=8.1
163
N adj.=5
168
N adj.=20.4
172
N adj.=22.3
159
N adj.=4.8
164
N adj.=21.9
169
N adj.=2.6
173
N adj.=7.8
160
N adj.=24.7
165
N adj.=1.3
170
N adj.=0.5
174
N adj.=0.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


175
N adj.=5.9
176
N adj.=3.5
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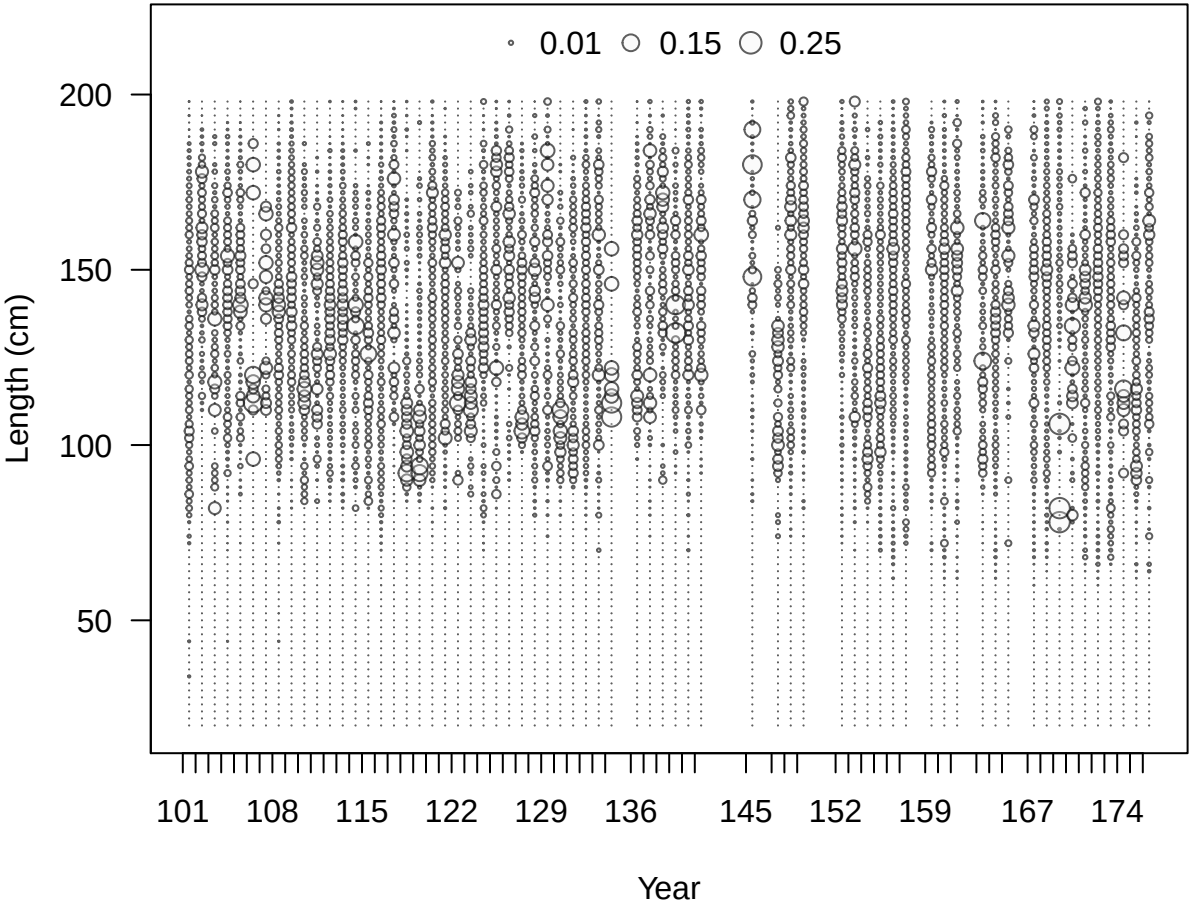
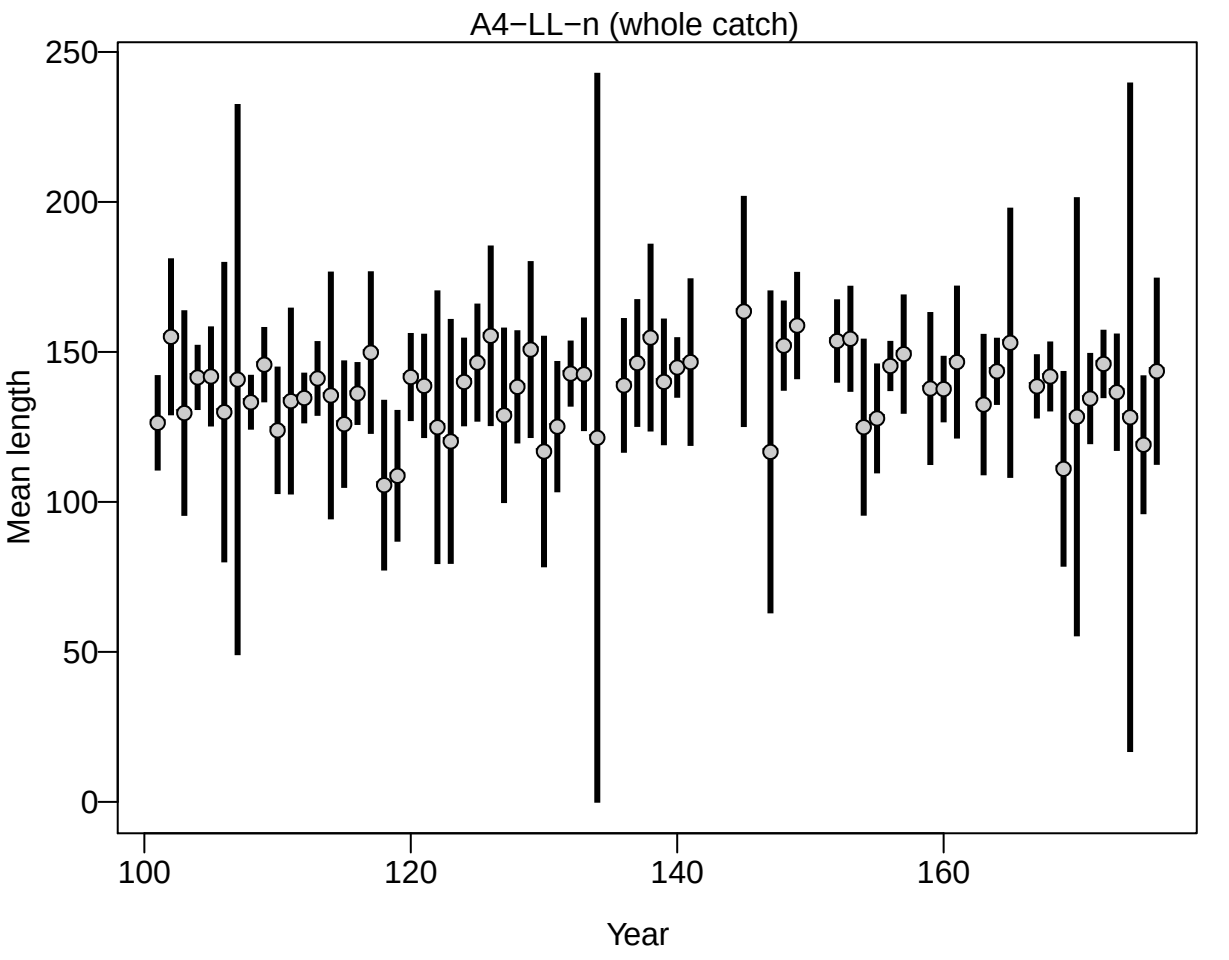
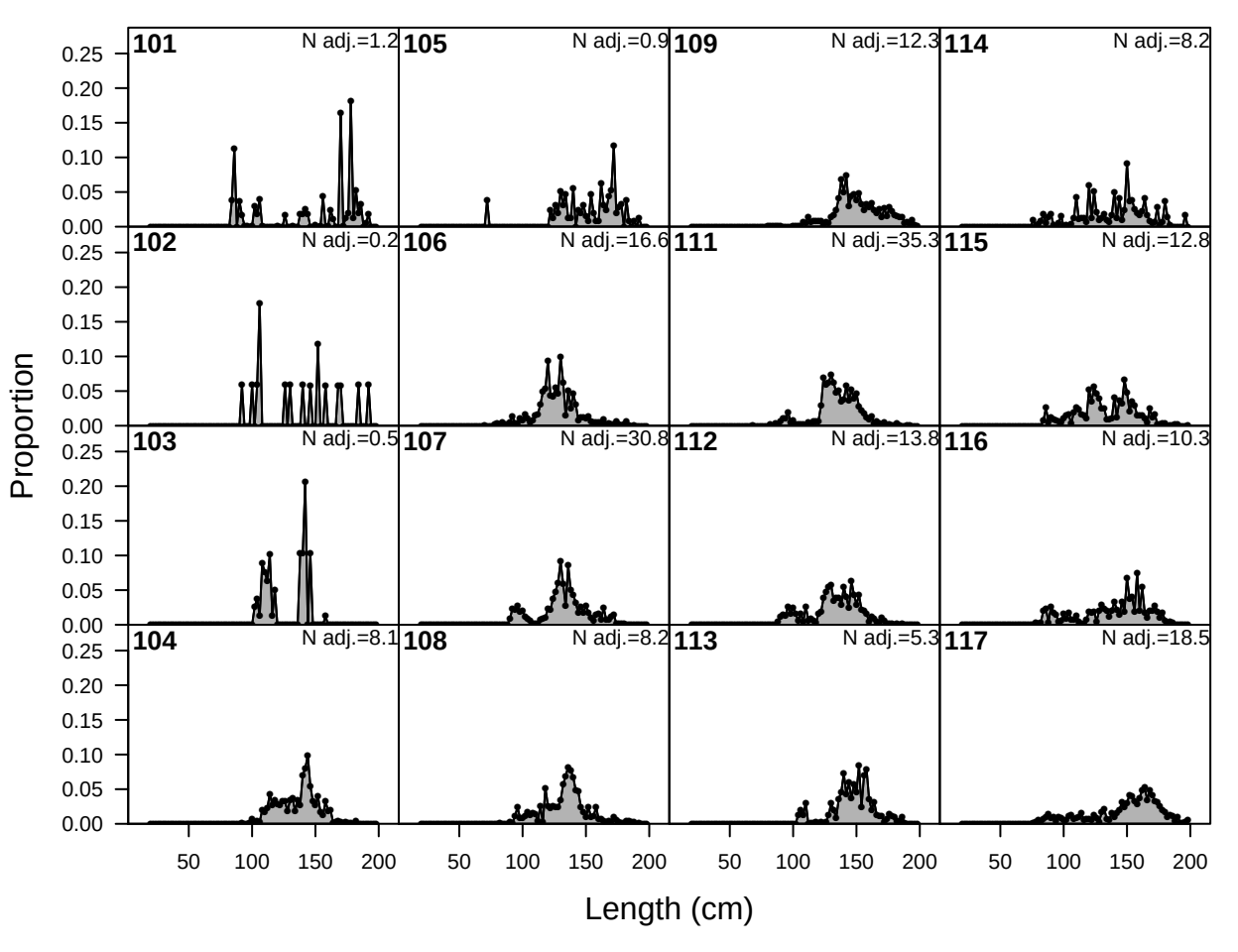
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)


0.01
0.15
0.25
200
150
100
50
Length (cm)
101
108
115
122
129
136
145
152
159
167
174
Year


A4−LL−n (whole catch)
Mean length
250
200
150
100
50
0
100
120
140
160
Year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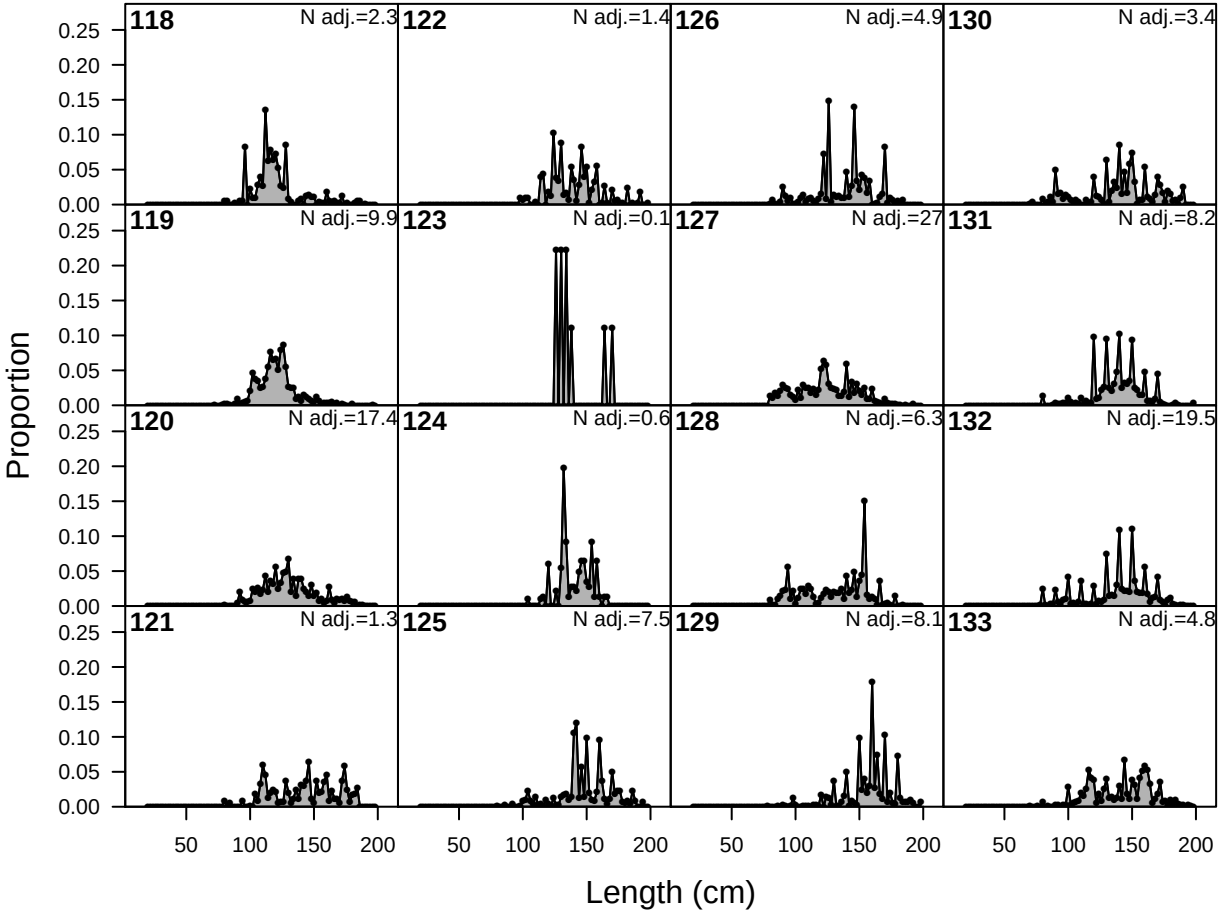
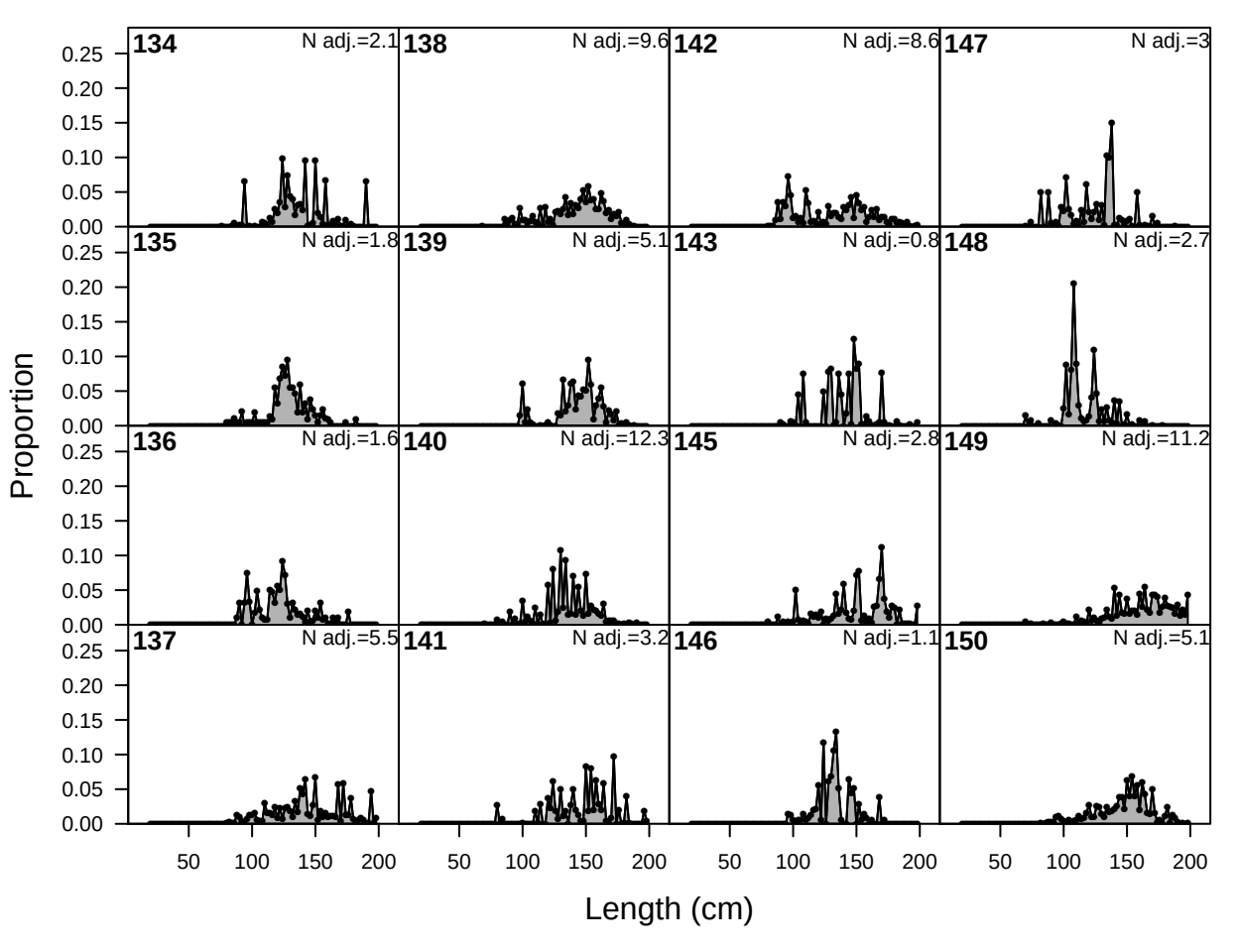
N adj.=1.2
105
N adj.=0.9
109
N adj.=12.3
114
N adj.=8.2
102
N adj.=0.2
106
N adj.=16.6
111
N adj.=35.3
115
N adj.=12.8
103
N adj.=0.5
107
N adj.=30.8
112
N adj.=13.8
116
N adj.=10.3
104
N adj.=8.1
108
N adj.=8.2
113
N adj.=5.3
117
N adj.=18.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


118
N adj.=2.3
122
N adj.=1.4
126
N adj.=4.9
130
N adj.=3.4
119
N adj.=9.9
123
N adj.=0.1
127
N adj.=27
131
N adj.=8.2
120
N adj.=17.4
124
N adj.=0.6
128
N adj.=6.3
132
N adj.=19.5
121
N adj.=1.3
125
N adj.=7.5
129
N adj.=8.1
133
N adj.=4.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


134
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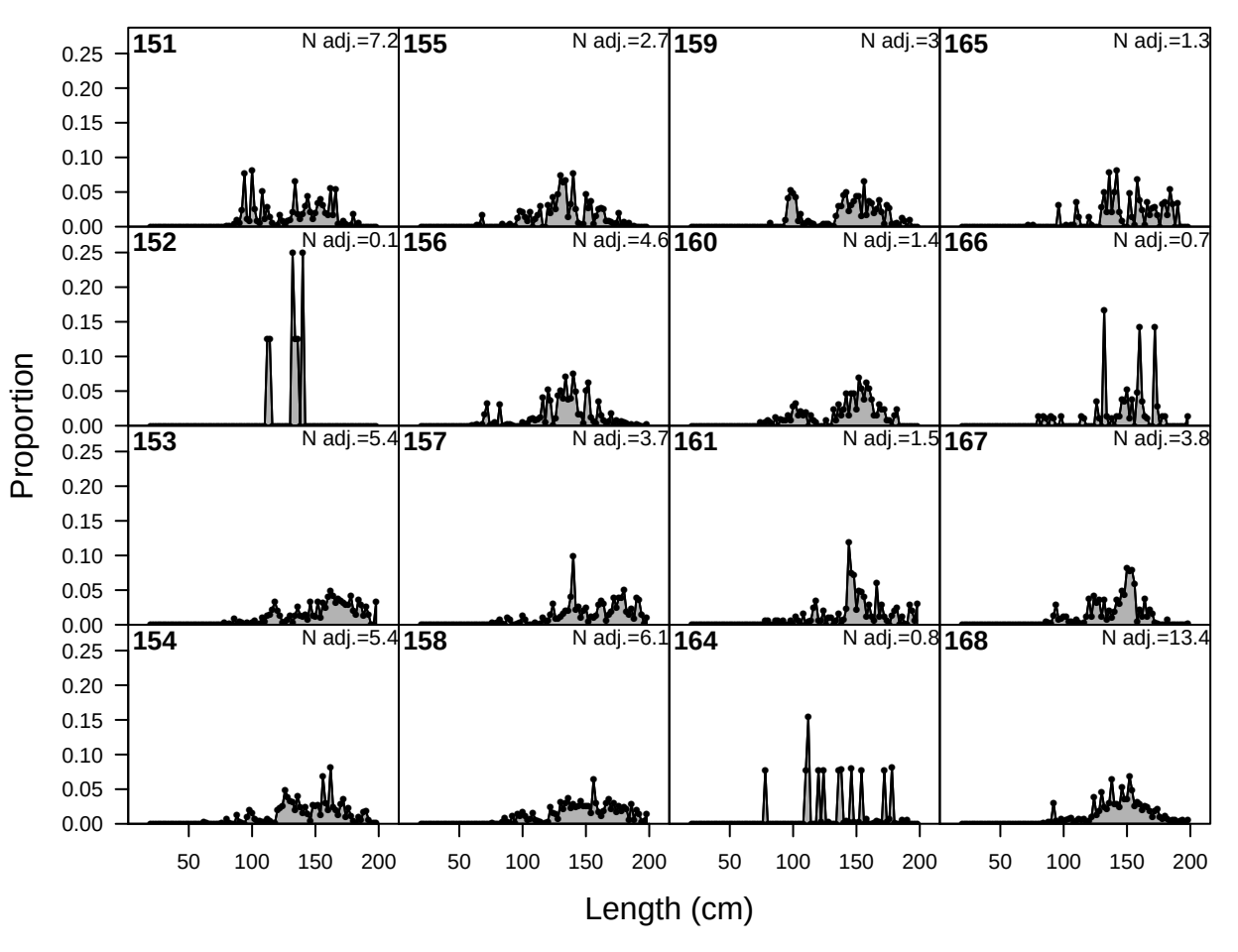
138
N adj.=9.6
142
N adj.=8.6
147
N adj.=3
135
N adj.=1.8
139
N adj.=5.1
143
N adj.=0.8
148
N adj.=2.7
136
N adj.=1.6
140
N adj.=12.3
145
N adj.=2.8
149
N adj.=11.2
137
N adj.=5.5
141
N adj.=3.2
146
N adj.=1.1
150
N adj.=5.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


151
N adj.=7.2
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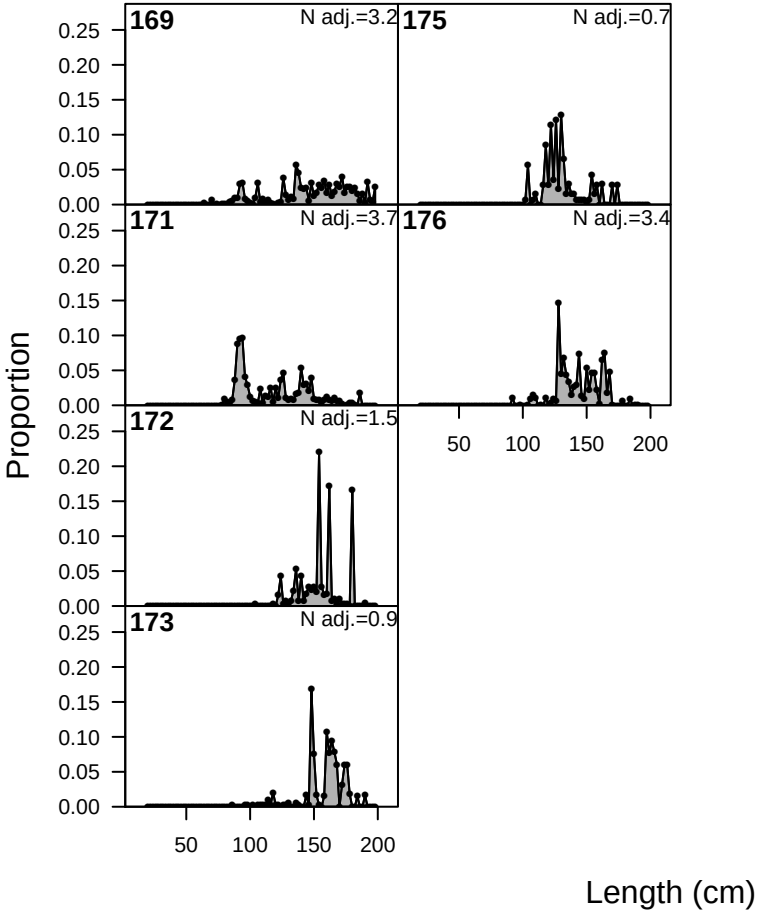
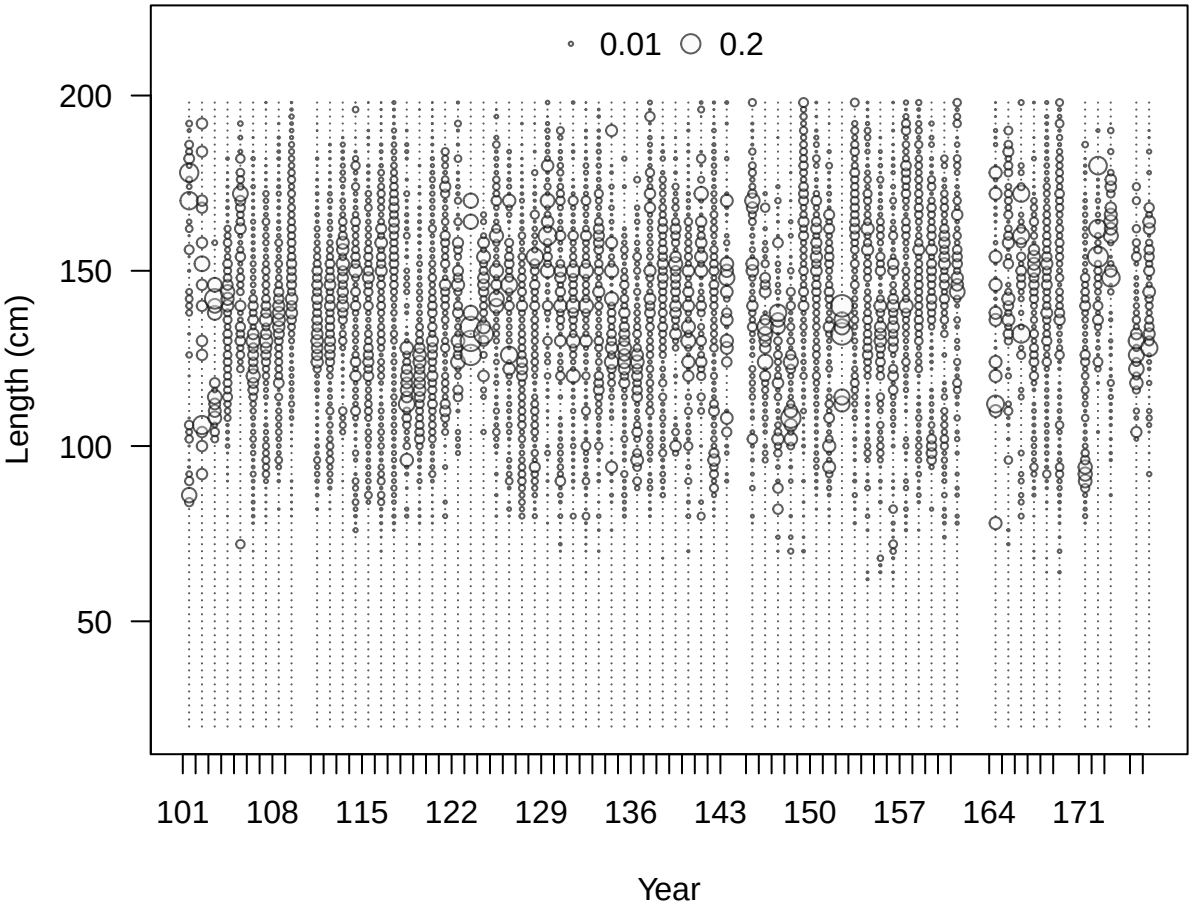
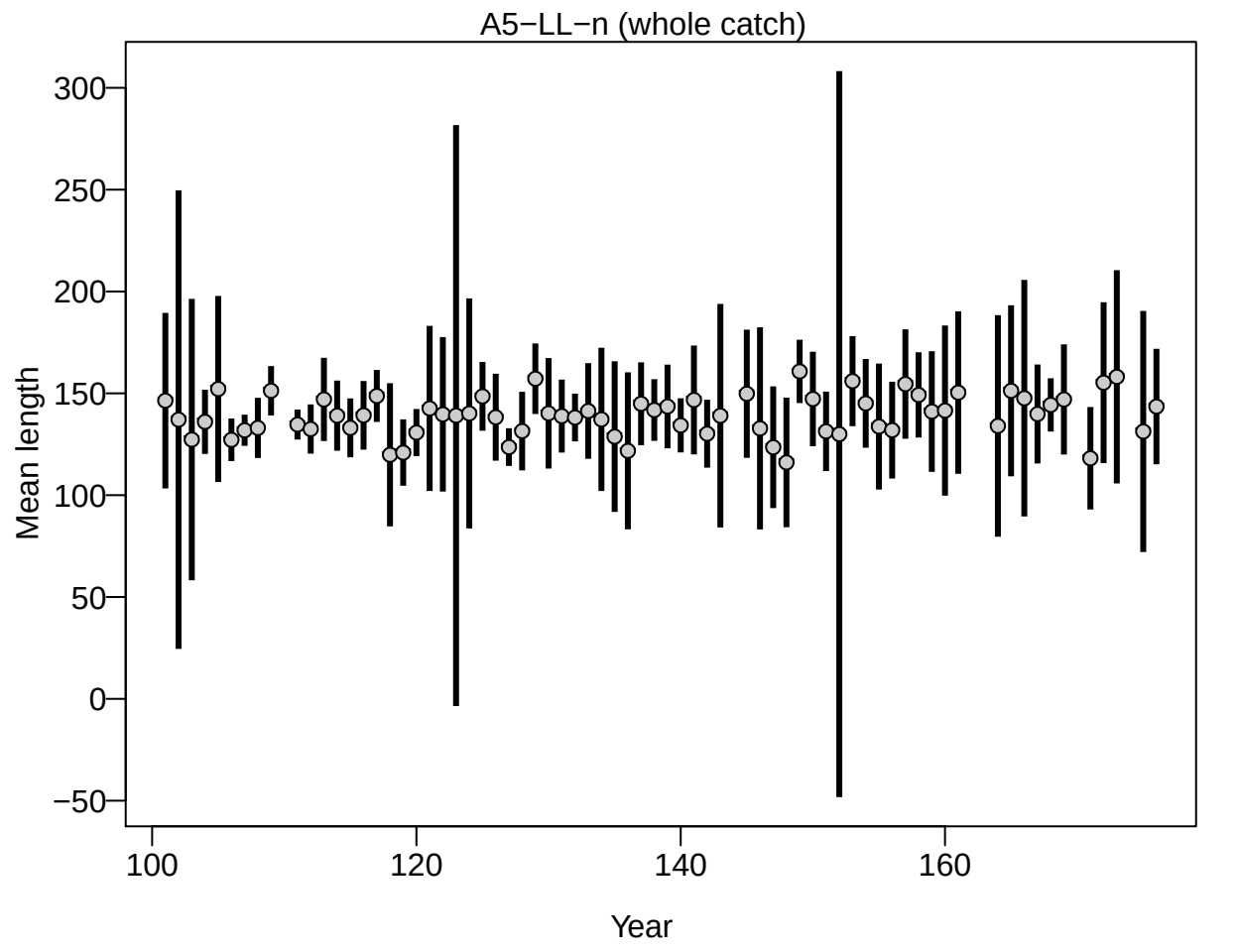
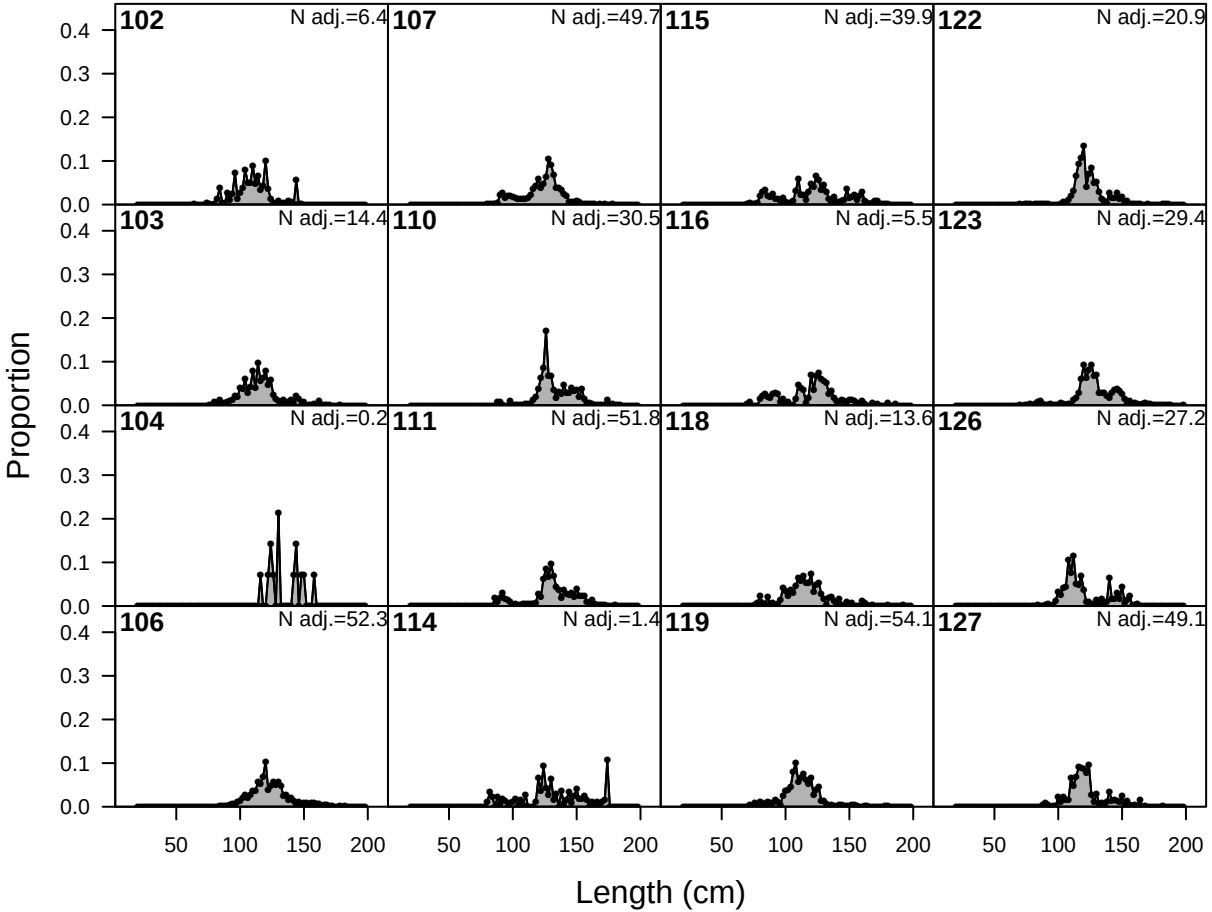
N adj.=2.7
159
N adj.=3
165
N adj.=1.3
152
N adj.=0.1
156
N adj.=4.6
160
N adj.=1.4
166
N adj.=0.7
153
N adj.=5.4
157
N adj.=3.7
161
N adj.=1.5
167
N adj.=3.8
154
N adj.=5.4
158
N adj.=6.1
164
N adj.=0.8
168
N adj.=13.4
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


169
N adj.=3.2
175
N adj.=0.7
171
N adj.=3.7
176
N adj.=3.4
172
N adj.=1.5
173
N adj.=0.9
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)


0.01
0.2
200
150
100
50
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
Year


A5−LL−n (whole catch)
Mean length
300
250
200
150
100
50
0
−50
100
120
140
160
Year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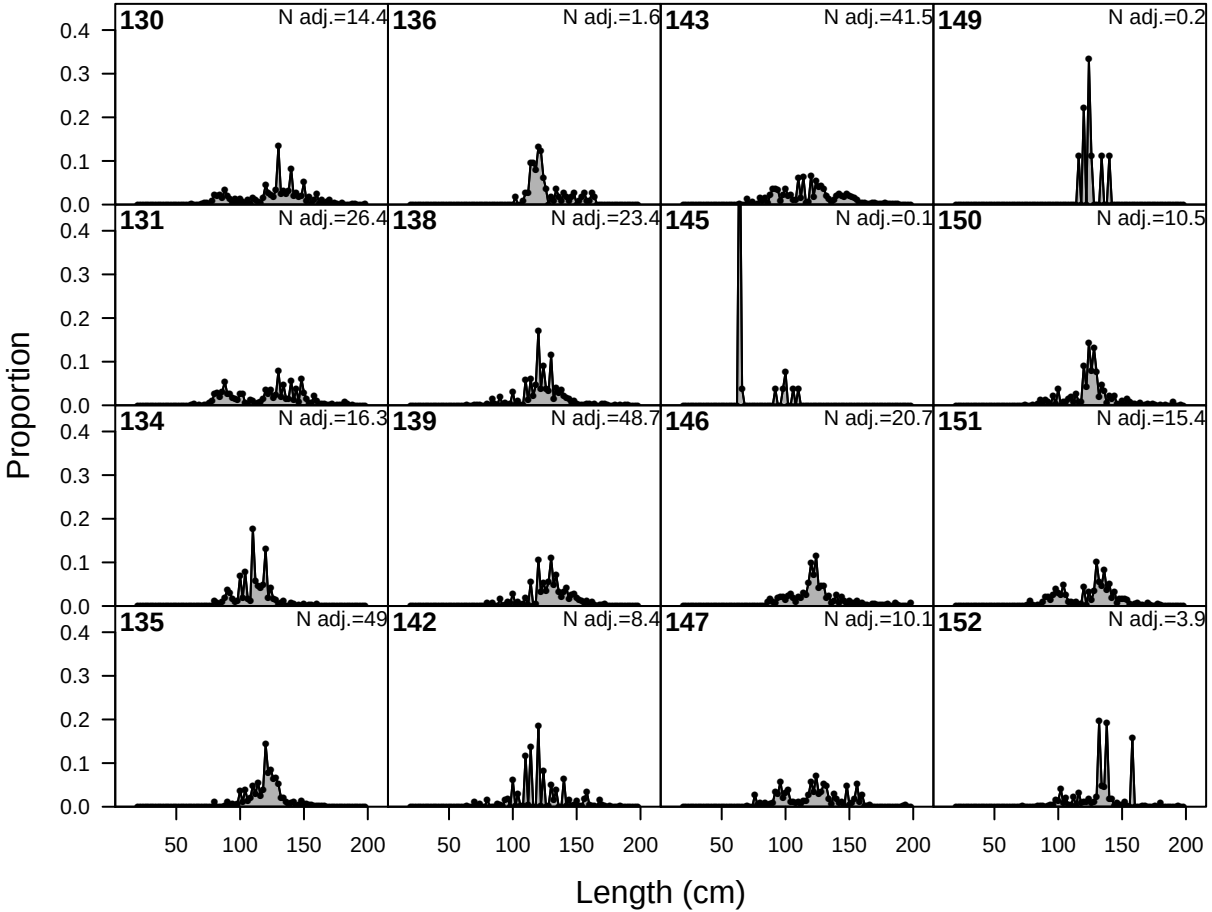
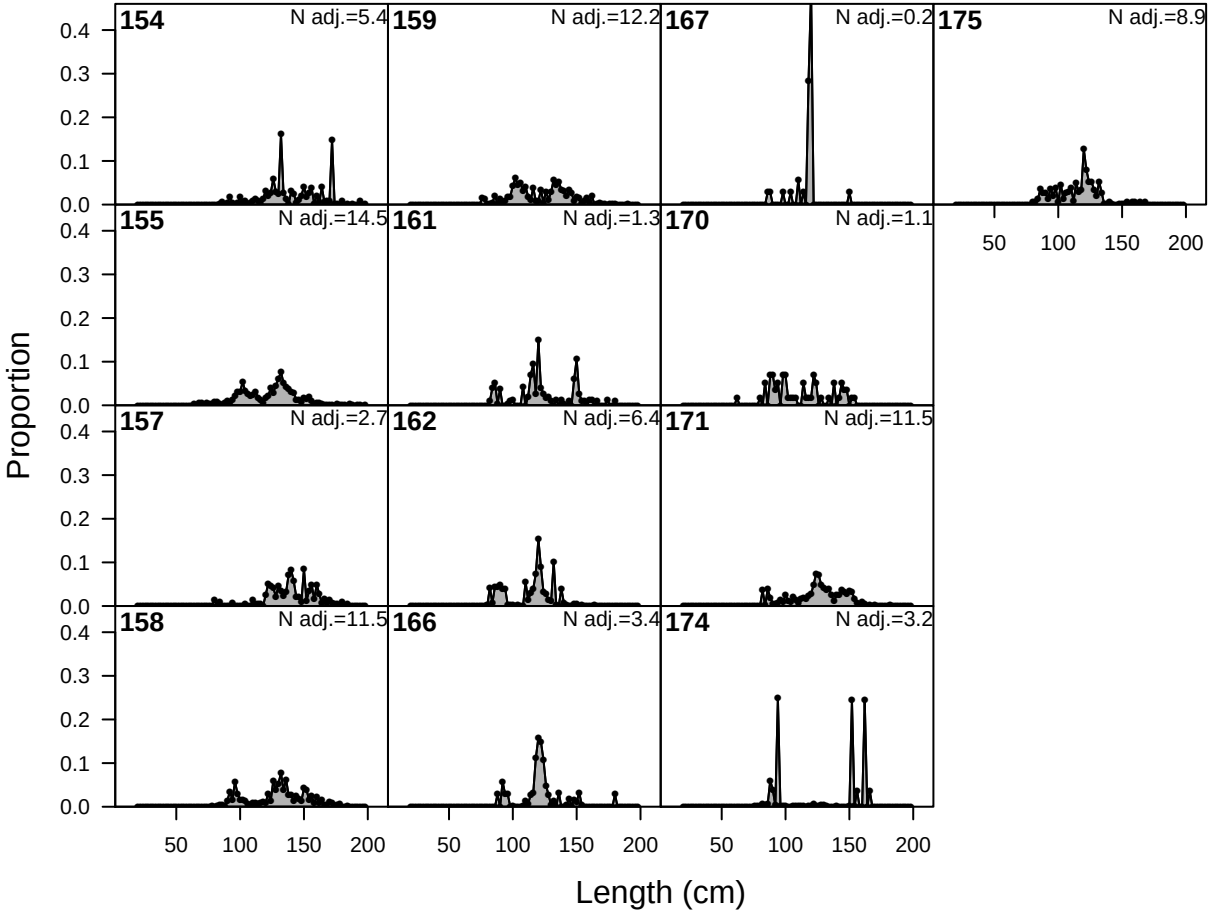
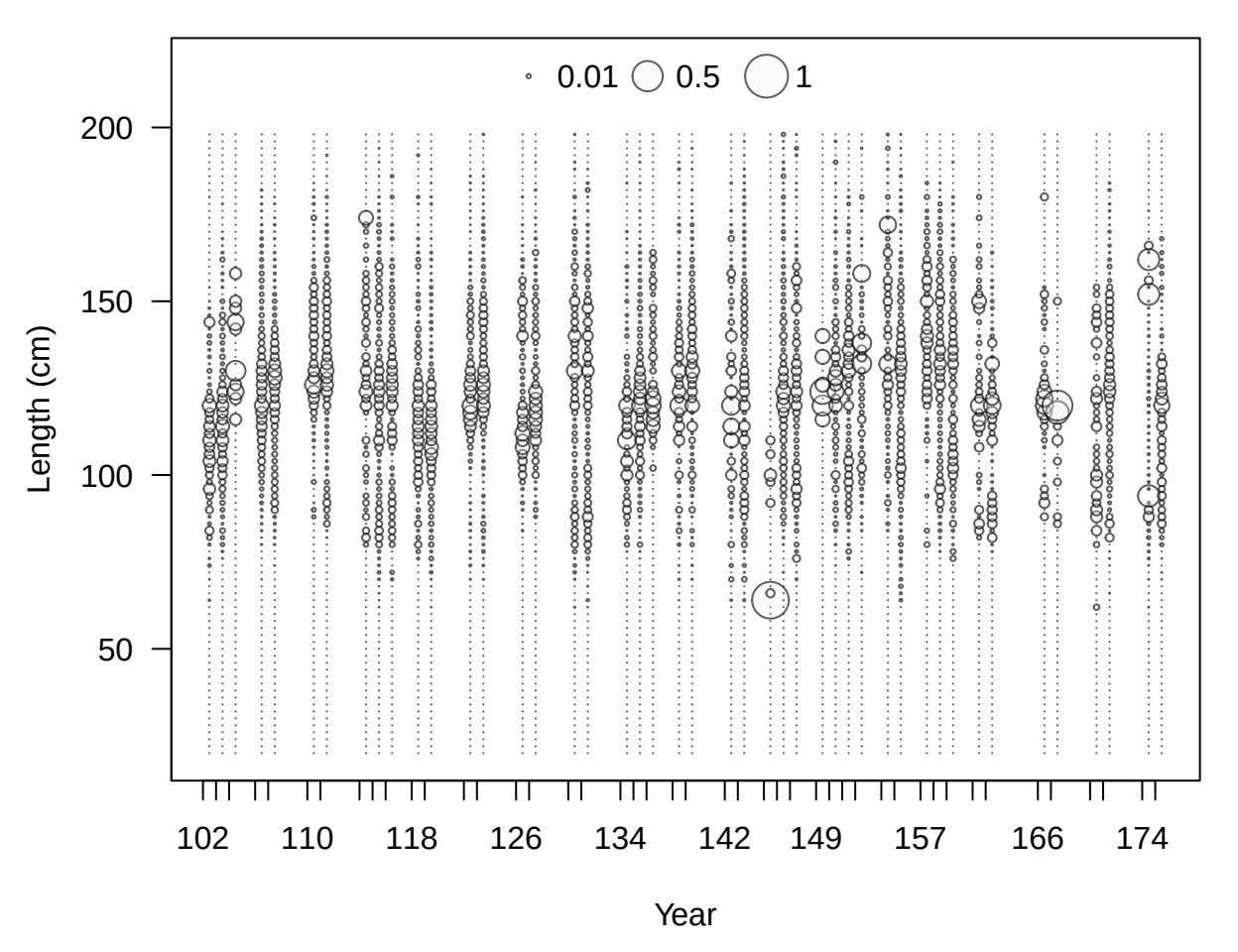
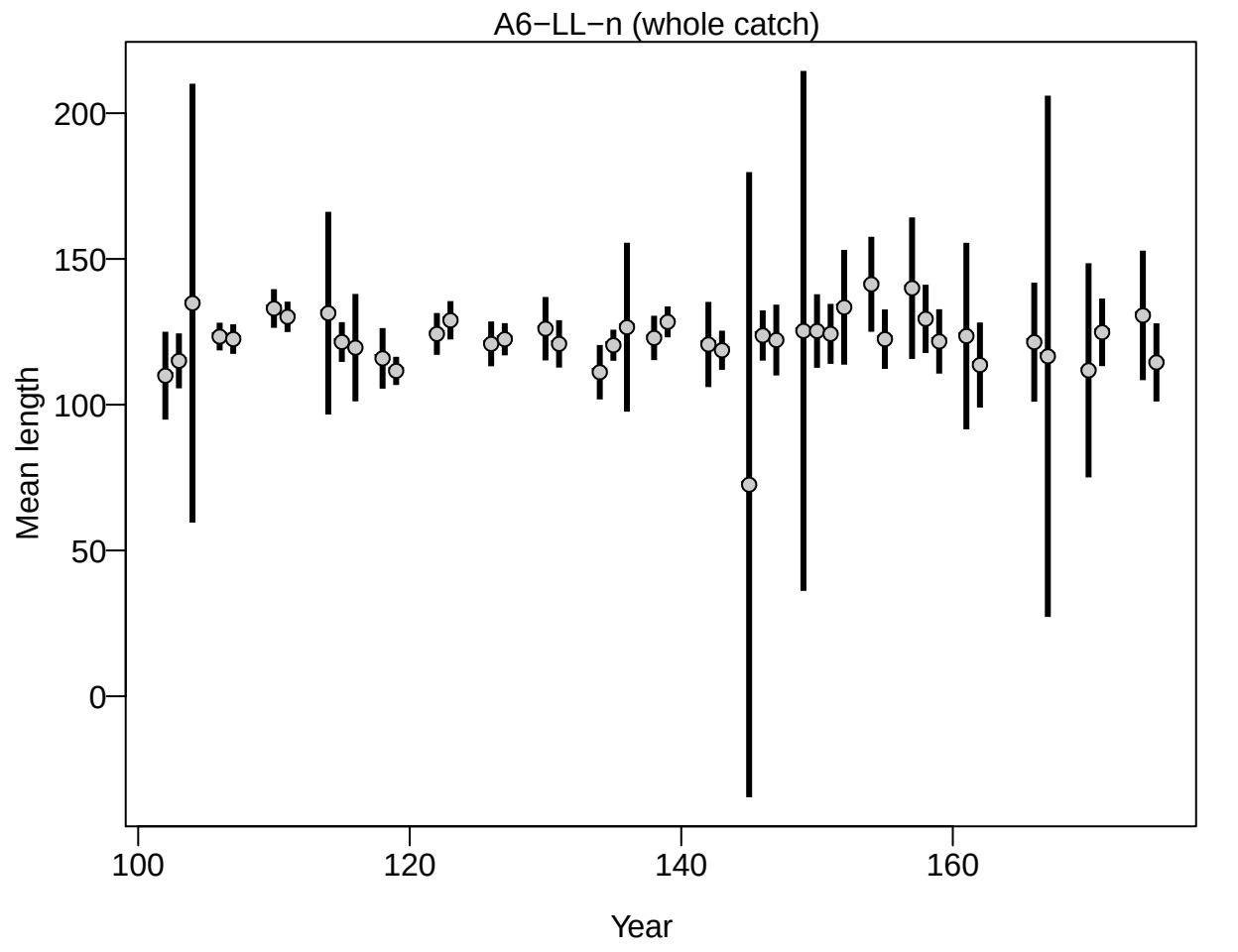
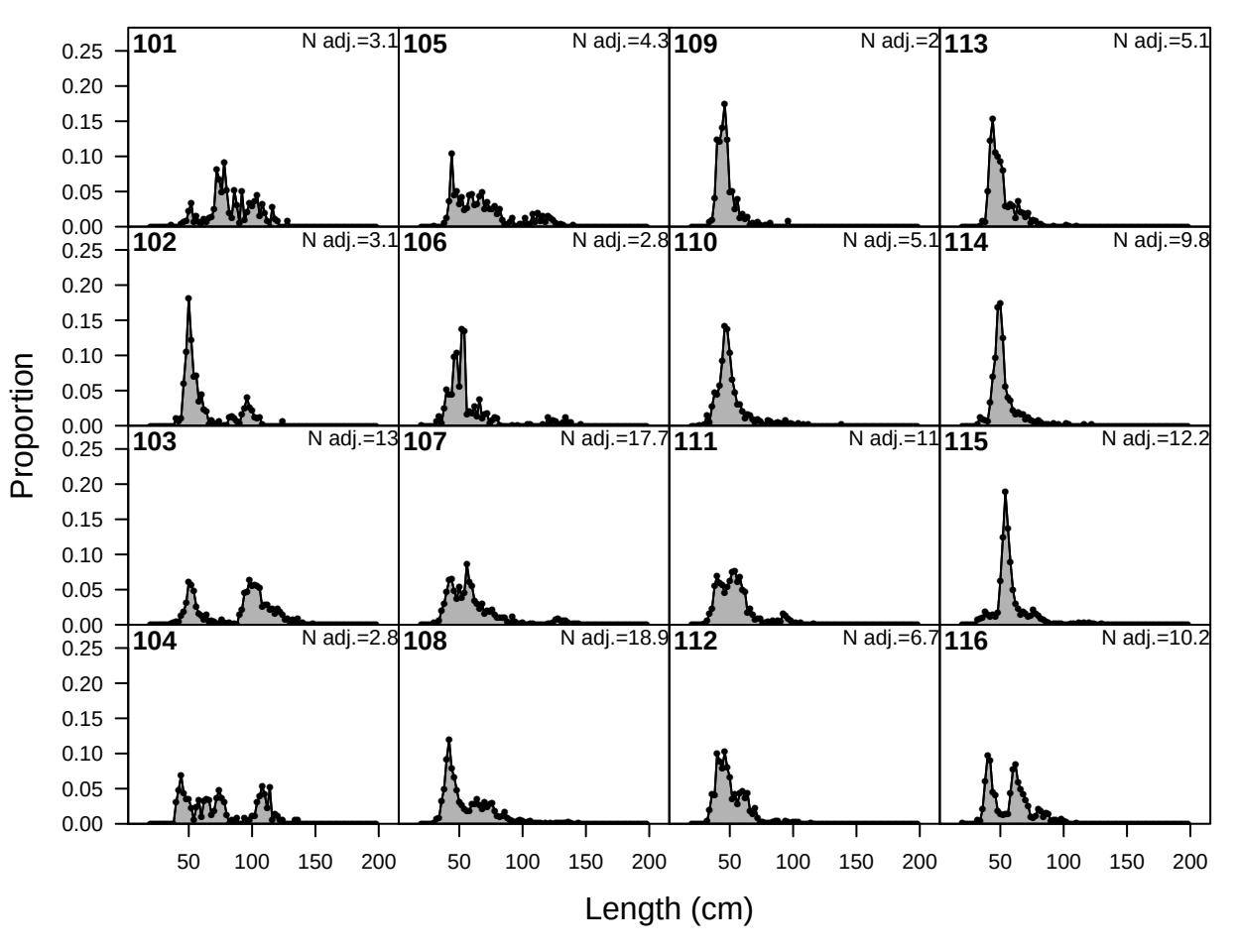
N adj.=6.4
107
N adj.=49.7
115
N adj.=39.9
122
N adj.=20.9
103
N adj.=14.4
110
N adj.=30.5
116
N adj.=5.5
123
N adj.=29.4
104
N adj.=0.2
111
N adj.=51.8
118
N adj.=13.6
126
N adj.=27.2
106
N adj.=52.3
114
N adj.=1.4
119
N adj.=54.1
127
N adj.=49.1
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


130
N adj.=14.4
136
N adj.=1.6
143
N adj.=41.5
149
N adj.=0.2
131
N adj.=26.4
138
N adj.=23.4
145
N adj.=0.1
150
N adj.=10.5
134
N adj.=16.3
139
N adj.=48.7
146
N adj.=20.7
151
N adj.=15.4
135
N adj.=49
142
N adj.=8.4
147
N adj.=10.1
152
N adj.=3.9
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


154
N adj.=5.4
159
N adj.=12.2
167
N adj.=0.2
175
N adj.=8.9
155
N adj.=14.5
161
N adj.=1.3
170
N adj.=1.1
157
N adj.=2.7
162
N adj.=6.4
171
N adj.=11.5
158
N adj.=11.5
166
N adj.=3.4
174
N adj.=3.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


0.01
0.5
1
200
150
100
50
Length (cm)
102
110
118
126
134
142
149
157
166
174
Year


A6−LL−n (whole catch)
Mean length
200
150
100
50
0
100
120
140
160
Year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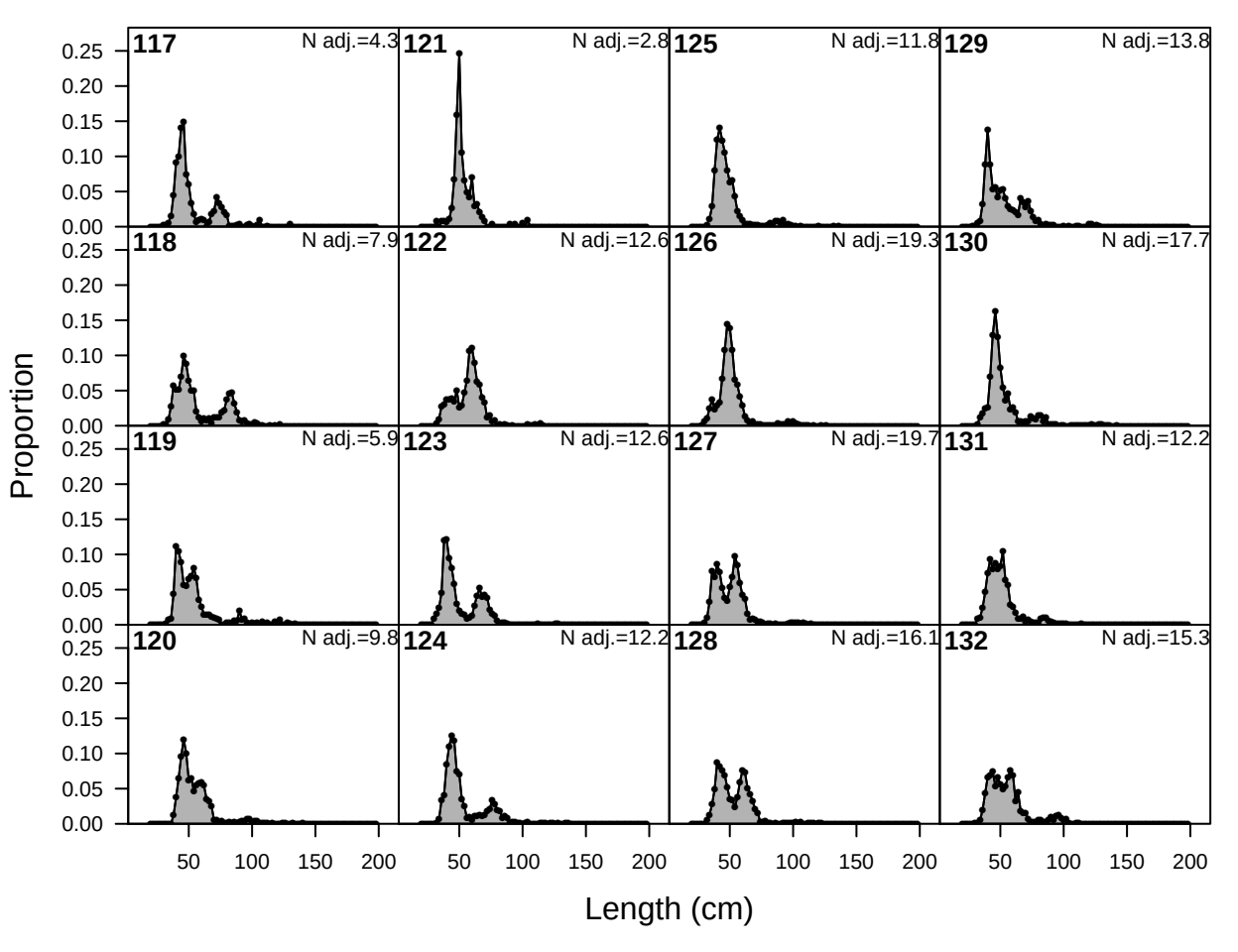
105 N adj.=4.3
109 N adj.=2
113 N adj.=5.1
102 N adj.=3.1
106 N adj.=2.8
110 N adj.=5.1
114 N adj.=9.8
103 N adj.=13
107 N adj.=17.7
111 N adj.=11
115 N adj.=12.2
104 N adj.=2.8
108 N adj.=18.9
112 N adj.=6.7
116 N adj.=10.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


117
N adj.=4.3
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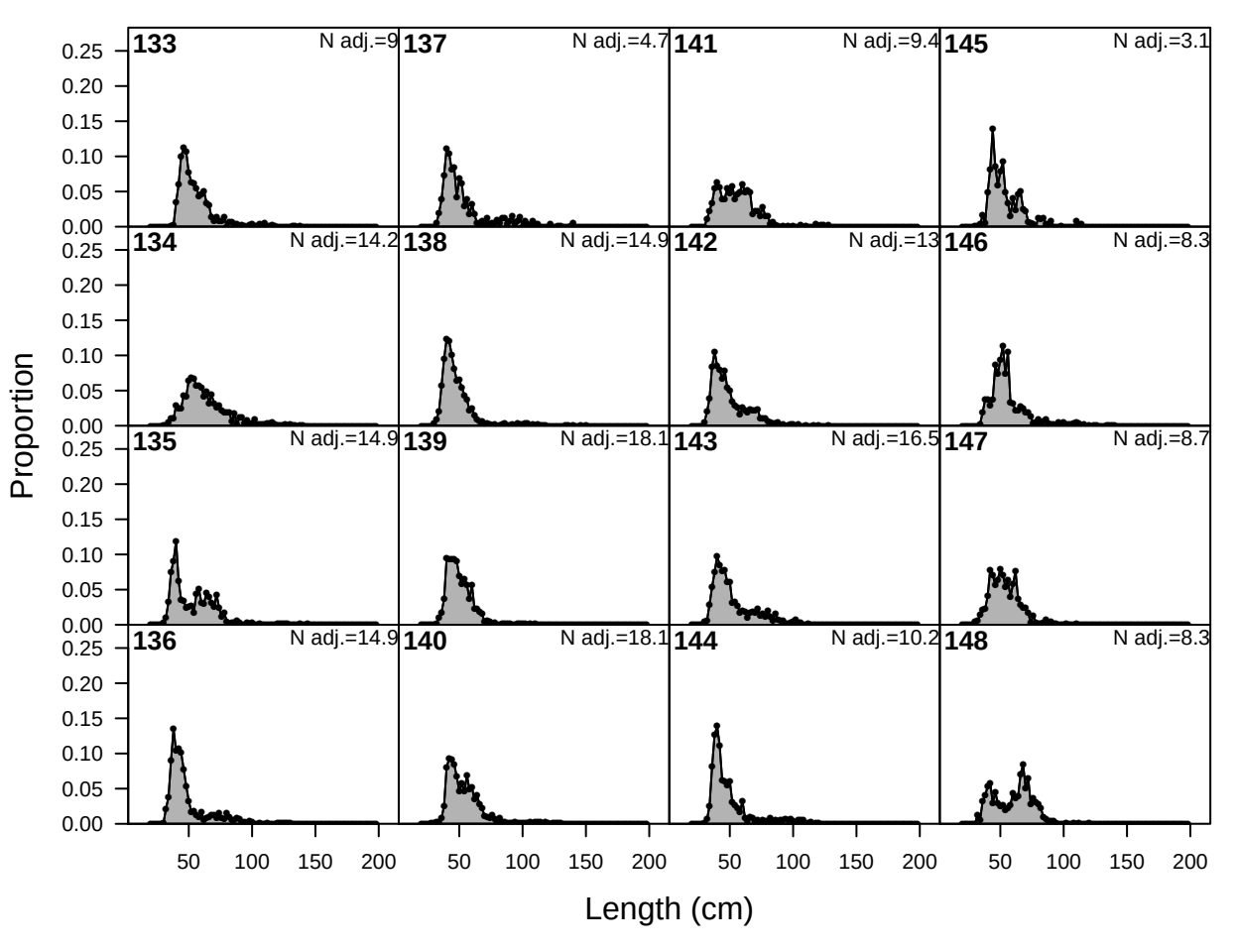
N adj.=2.8
125
N adj.=11.8
129
N adj.=13.8
118
N adj.=7.9
122
N adj.=12.6
126
N adj.=19.3
130
N adj.=17.7
119
N adj.=5.9
123
N adj.=12.6
127
N adj.=19.7
131
N adj.=12.2
120
N adj.=9.8
124
N adj.=12.2
128
N adj.=16.1
132
N adj.=15.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


133
N adj.=9
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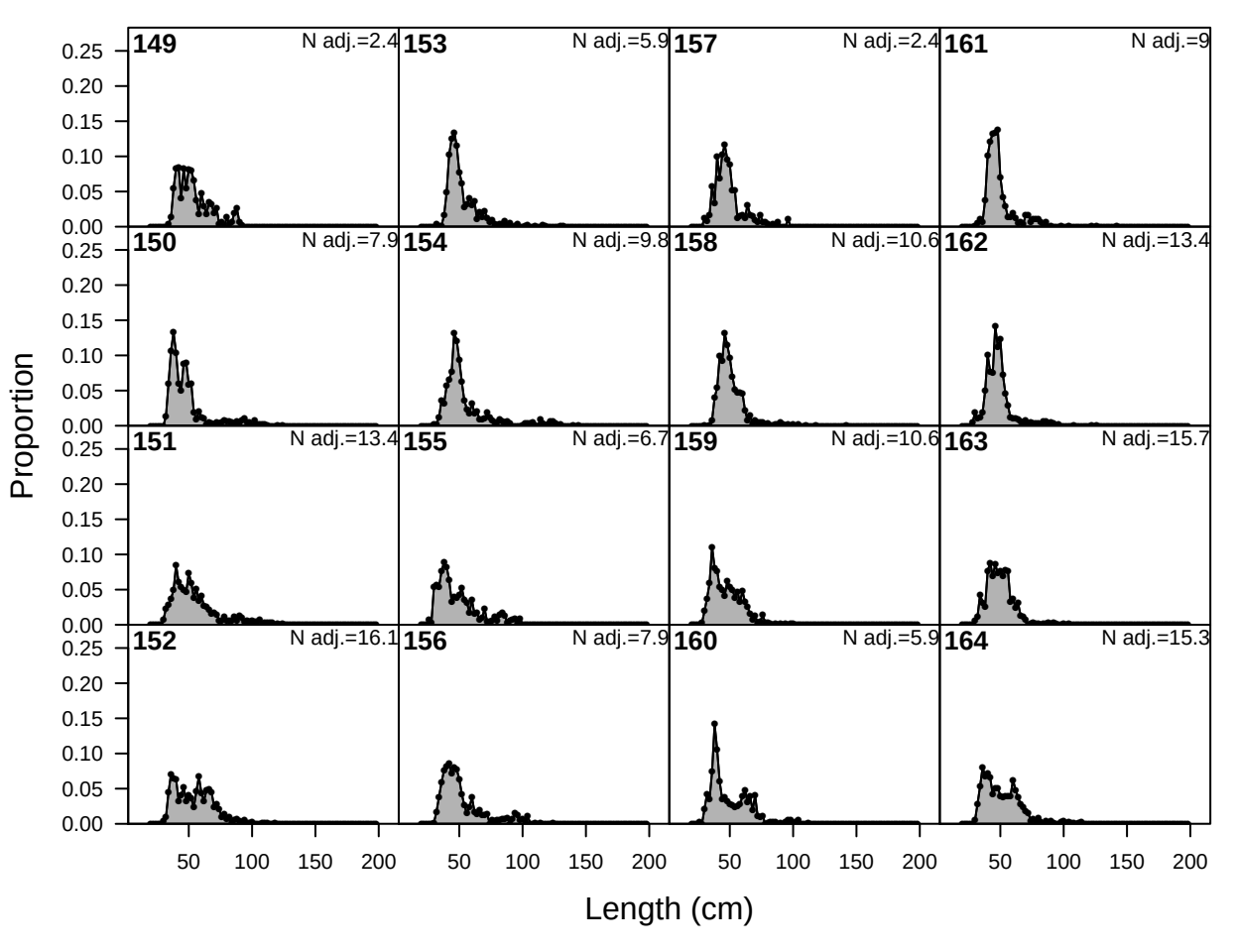
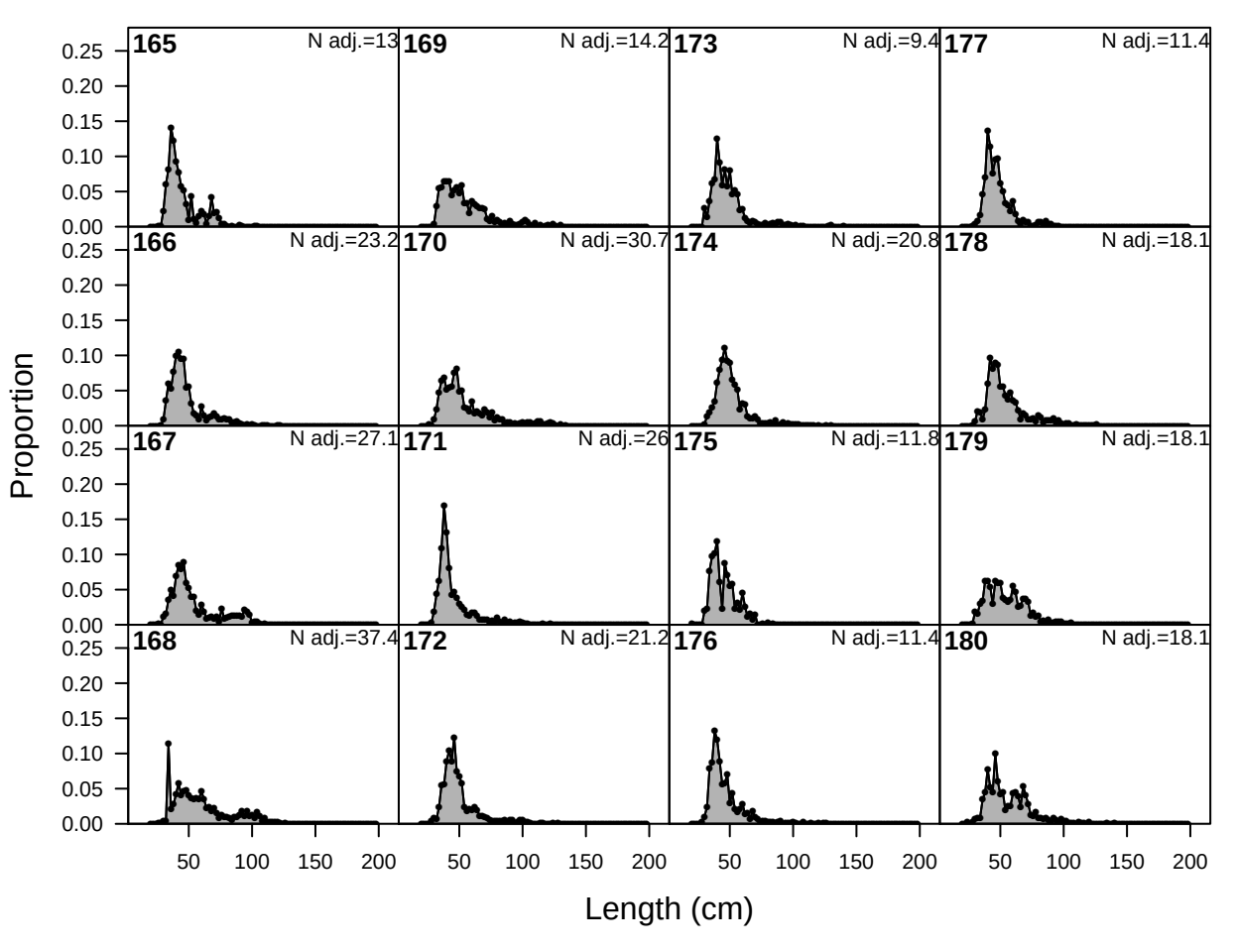
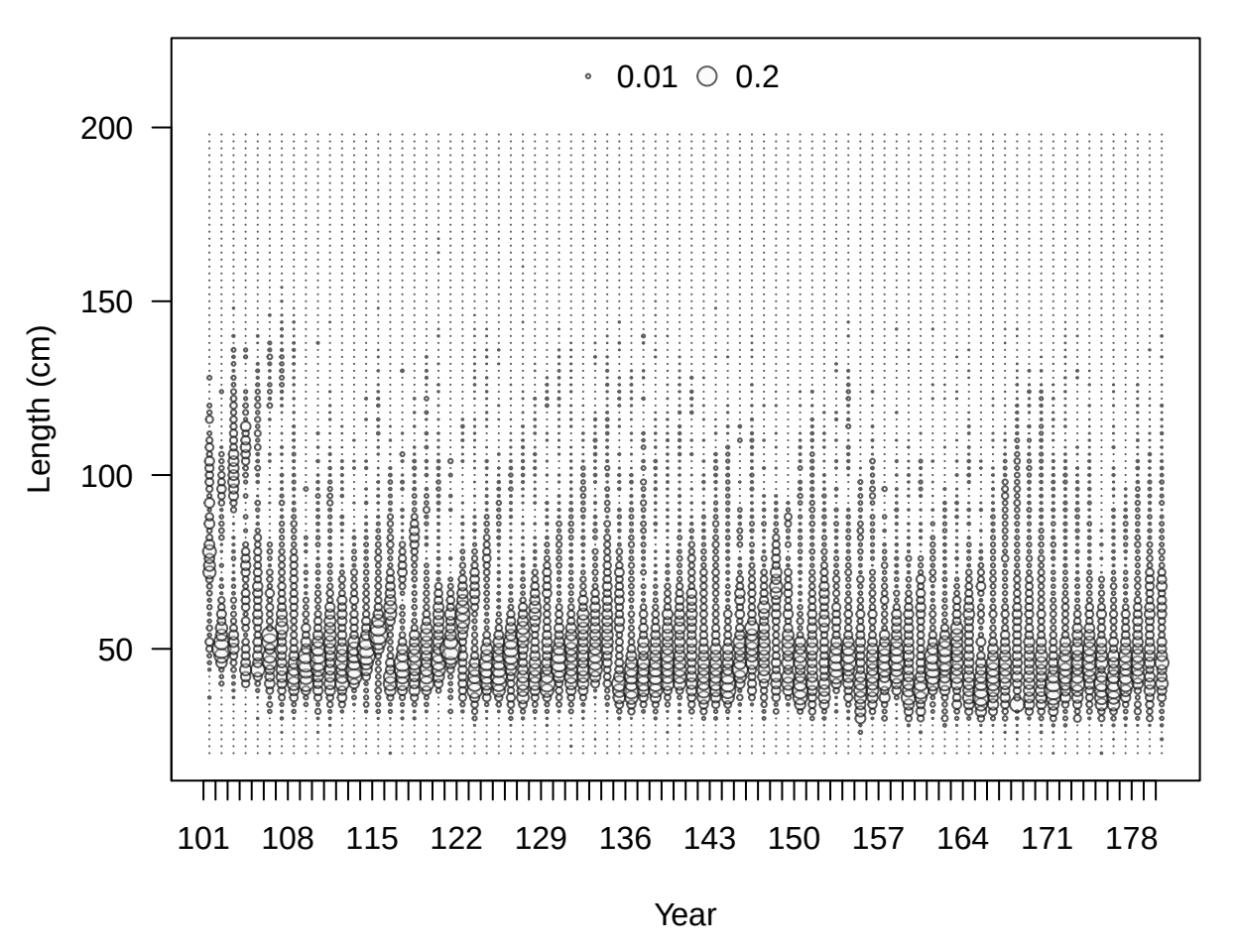
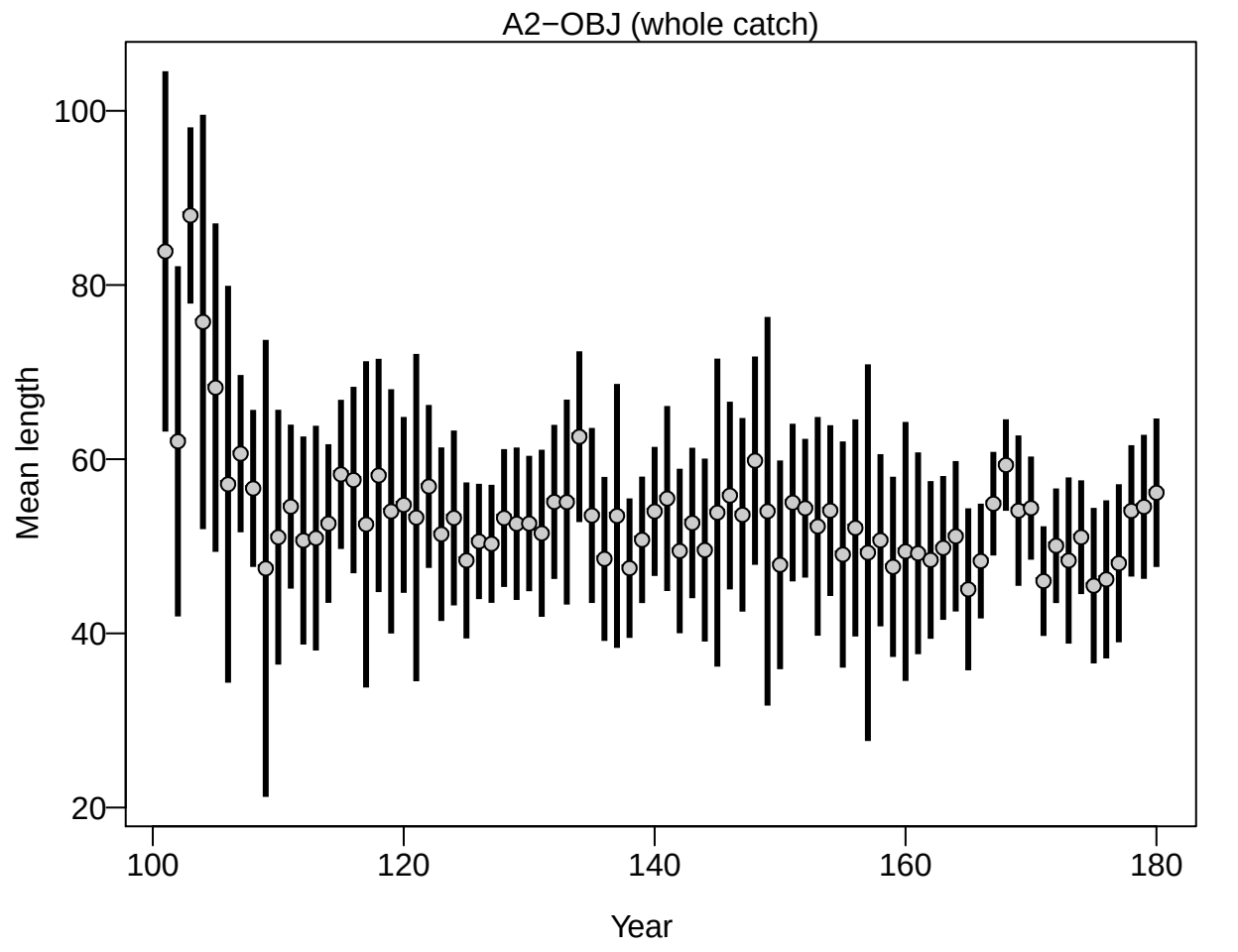
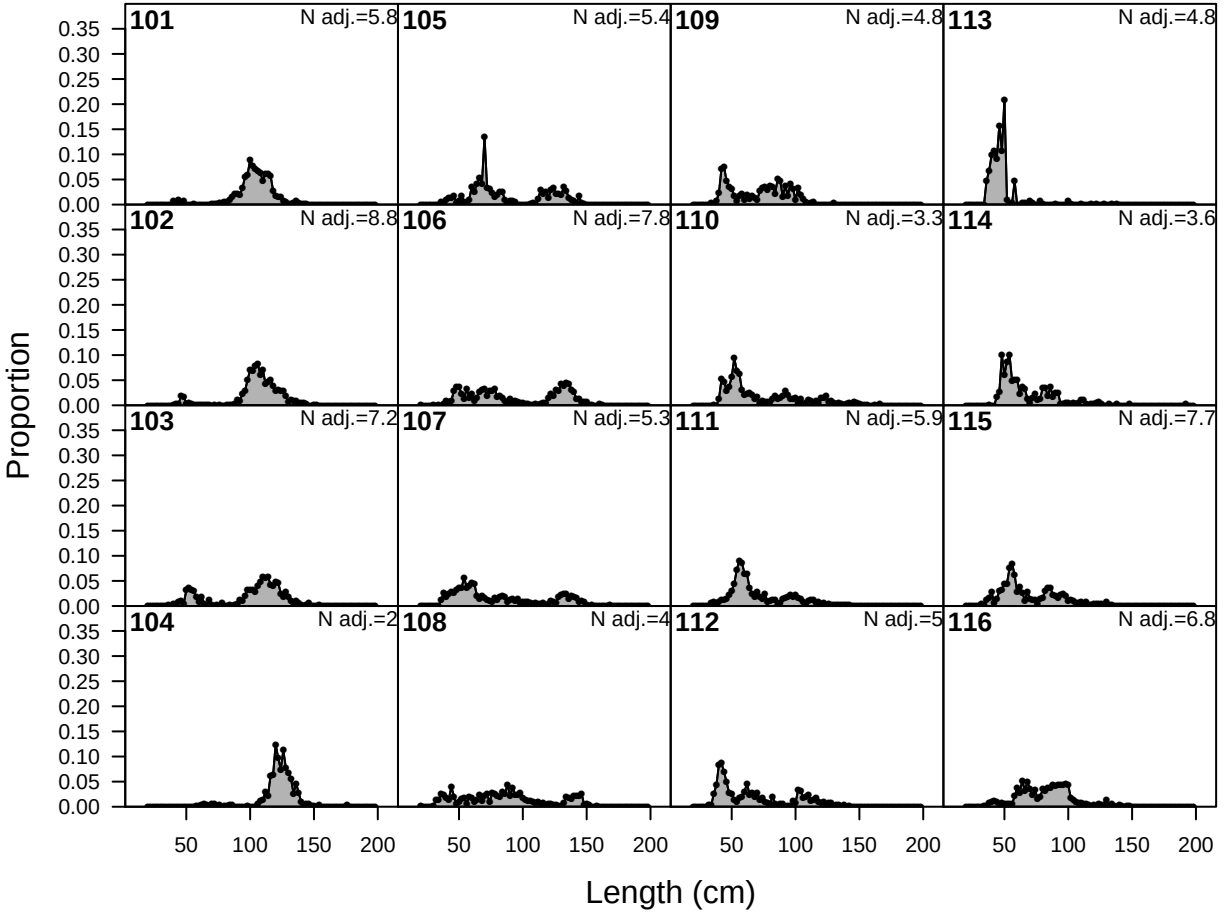
N adj.=4.7
141
N adj.=9.4
145
N adj.=3.1
134
N adj.=14.2
138
N adj.=14.9
142
N adj.=13
146
N adj.=8.3
135
N adj.=14.9
139
N adj.=18.1
143
N adj.=16.5
147
N adj.=8.7
136
N adj.=14.9
140
N adj.=18.1
144
N adj.=10.2
148
N adj.=8.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


149
N adj.=2.4
153
N adj.=5.9
157
N adj.=2.4
161
N adj.=9
150
N adj.=7.9
154
N adj.=9.8
158
N adj.=10.6
162
N adj.=13.4
151
N adj.=13.4
155
N adj.=6.7
159
N adj.=10.6
163
N adj.=15.7
152
N adj.=16.1
156
N adj.=7.9
160
N adj.=5.9
164
N adj.=15.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


165
N adj.=13
169
N adj.=14.2
173
N adj.=9.4
177
N adj.=11.4
166
N adj.=23.2
170
N adj.=30.7
174
N adj.=20.8
178
N adj.=18.1
167
N adj.=27.1
171
N adj.=26
175
N adj.=11.8
179
N adj.=18.1
168
N adj.=37.4
172
N adj.=21.2
176
N adj.=11.4
180
N adj.=18.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


0.01
0.2
200
150
100
50
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
178
Year


A2−OBJ (whole catch)
Mean length
100
80
60
40
20
100
120
140
160
180
Year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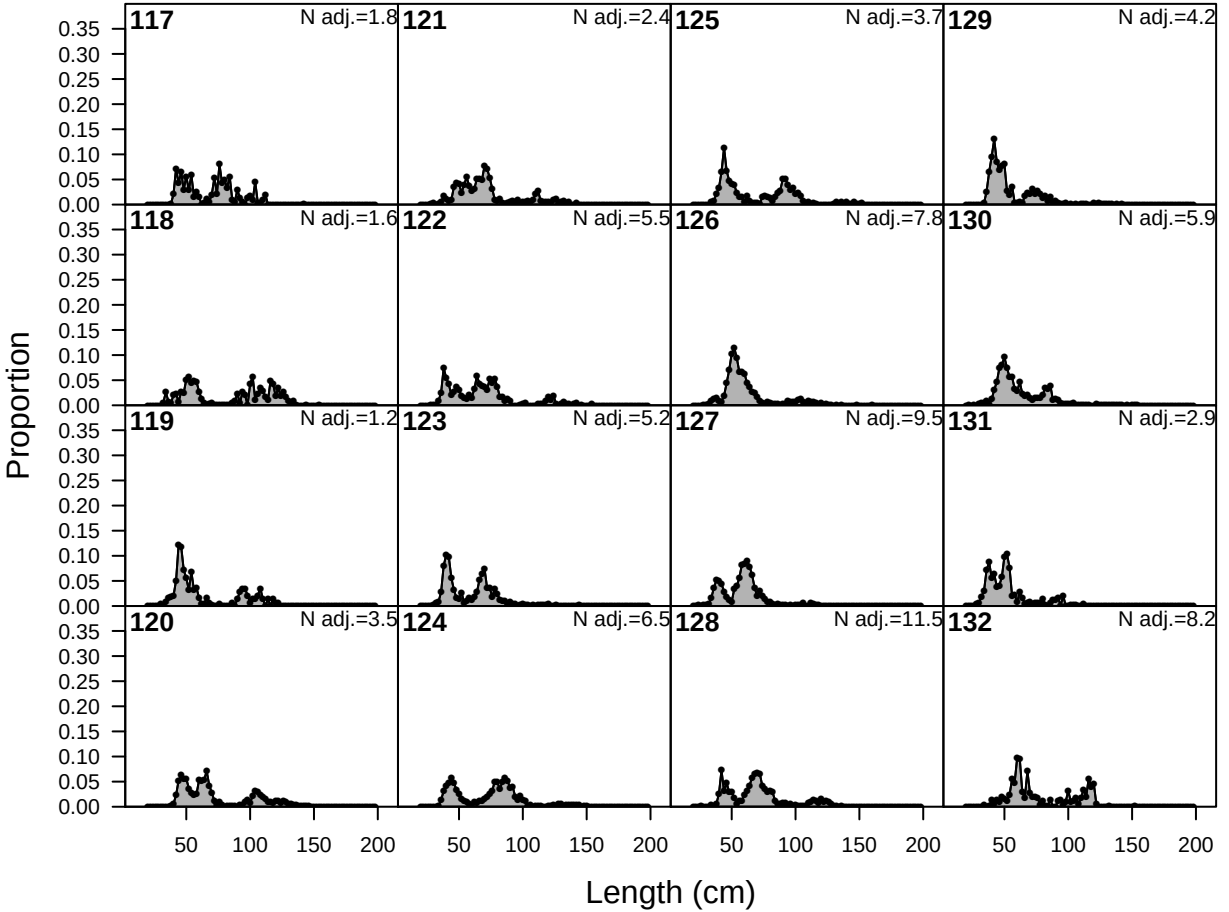
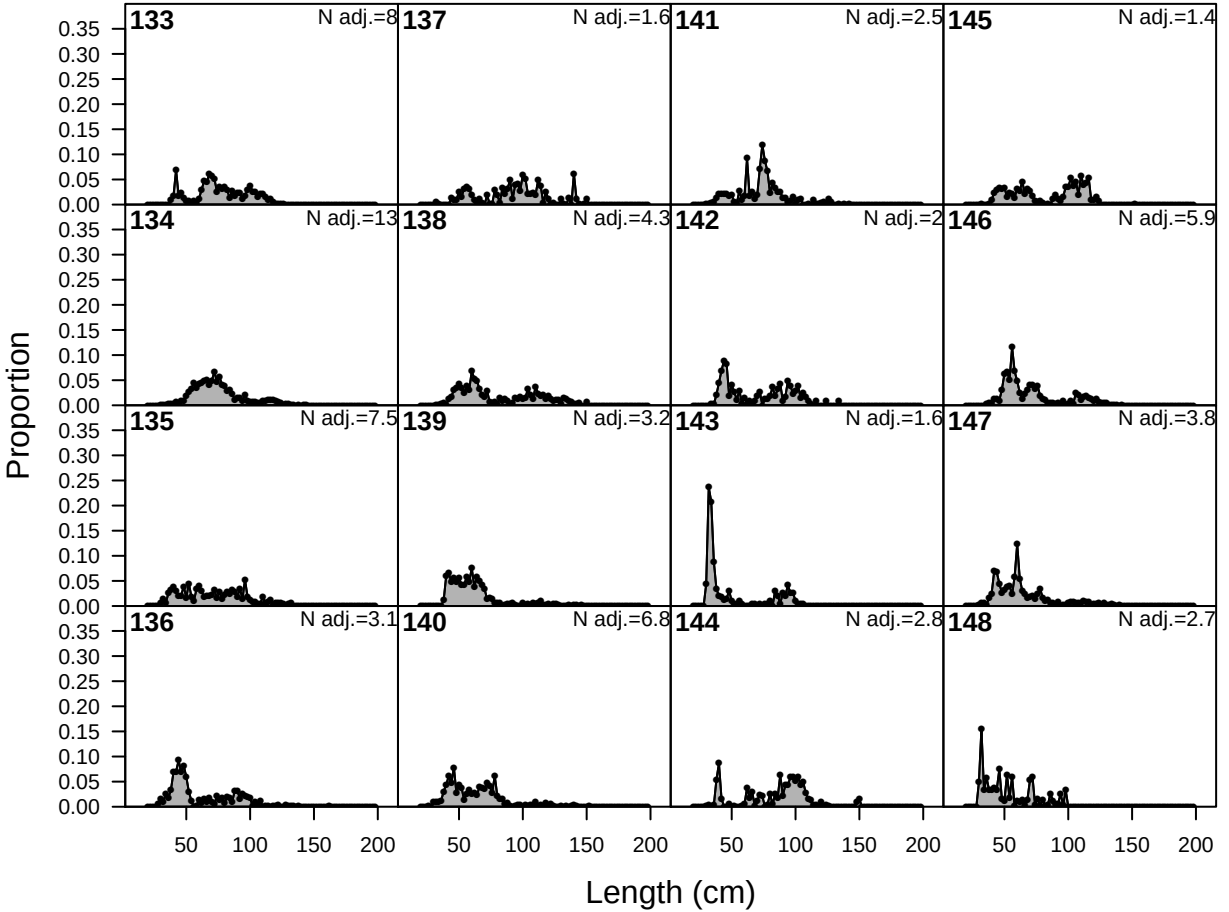
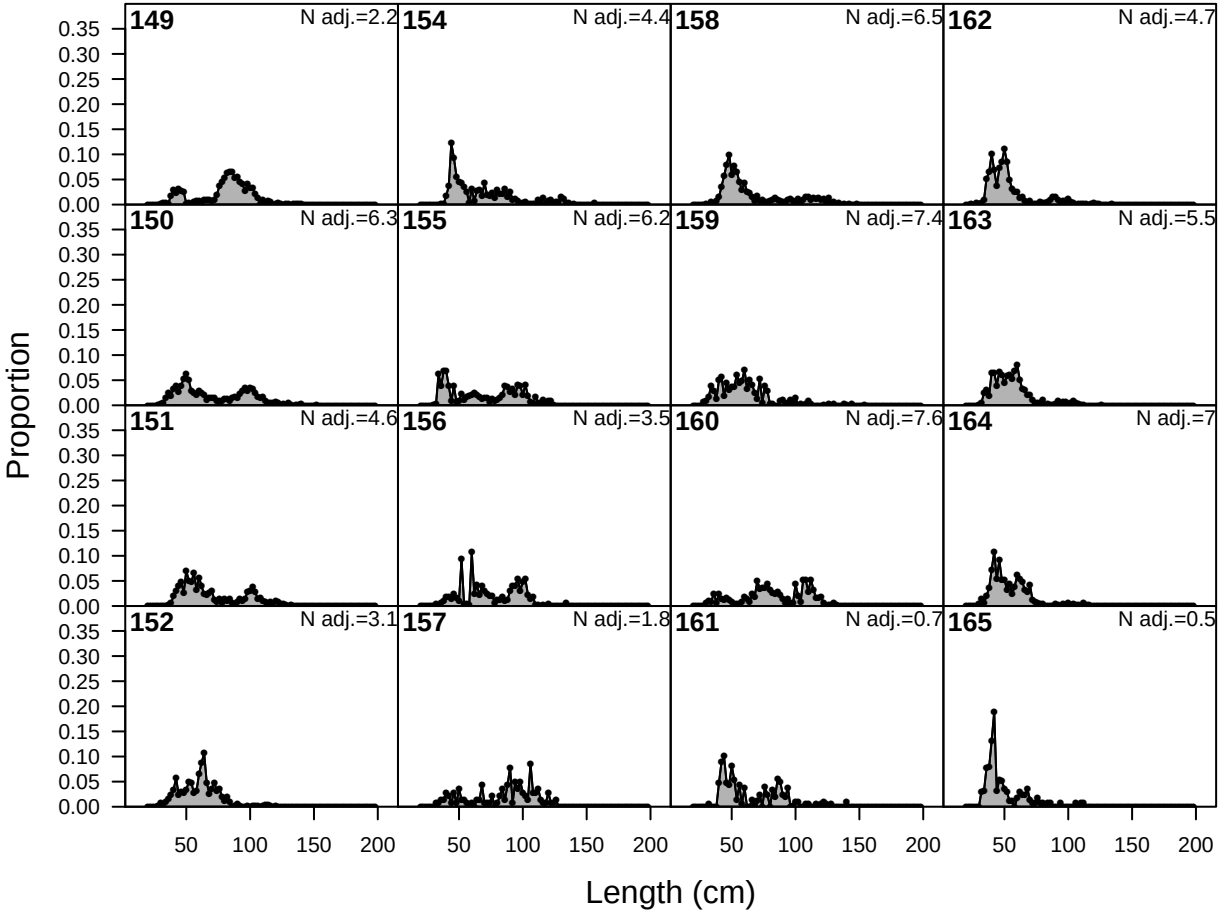
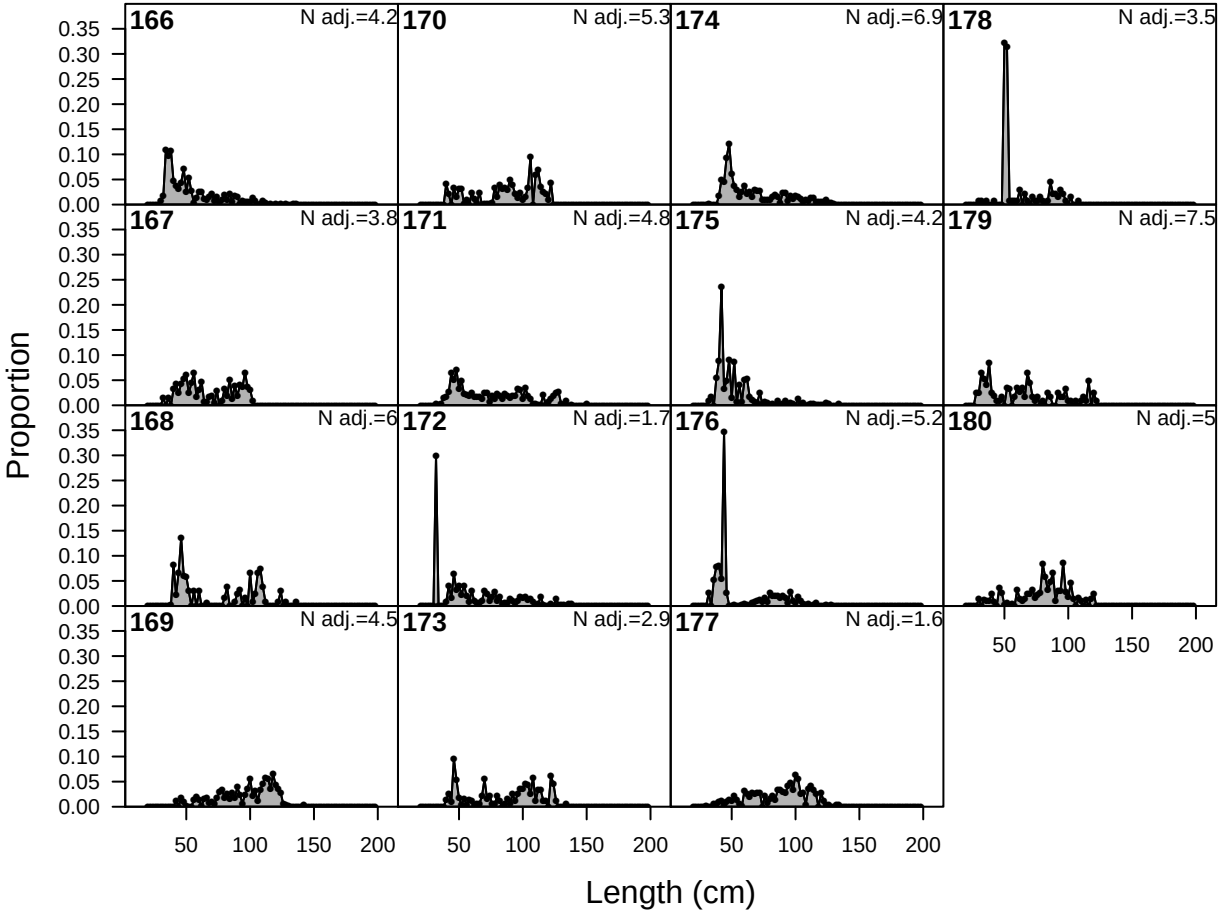
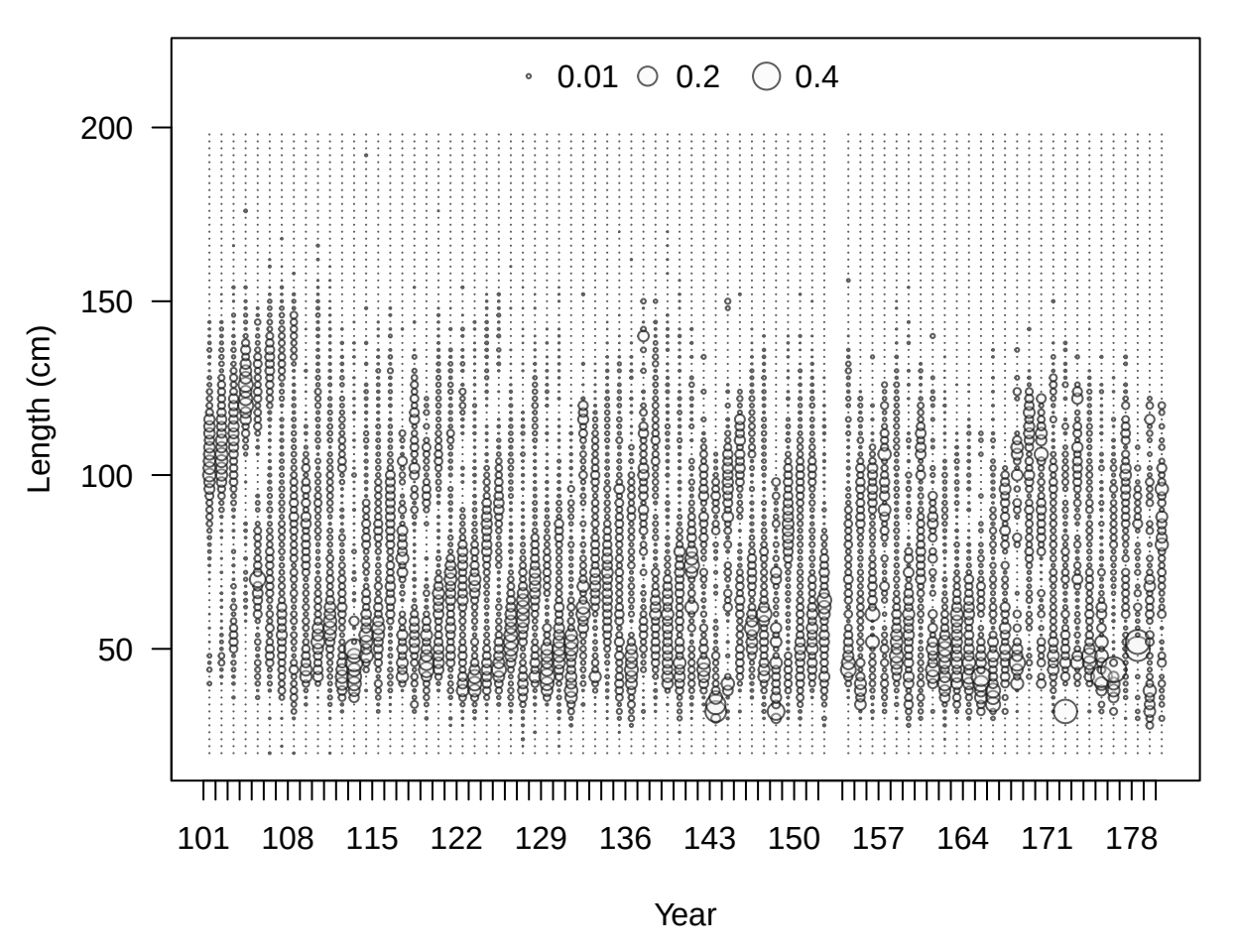
N adj.=5.8
105
N adj.=5.4
109
N adj.=4.8
113
N adj.=4.8
102
N adj.=8.8
106
N adj.=7.8
110
N adj.=3.3
114
N adj.=3.6
103
N adj.=7.2
107
N adj.=5.3
111
N adj.=5.9
115
N adj.=7.7
104
N adj.=2
108
N adj.=4
112
N adj.=5
116
N adj.=6.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

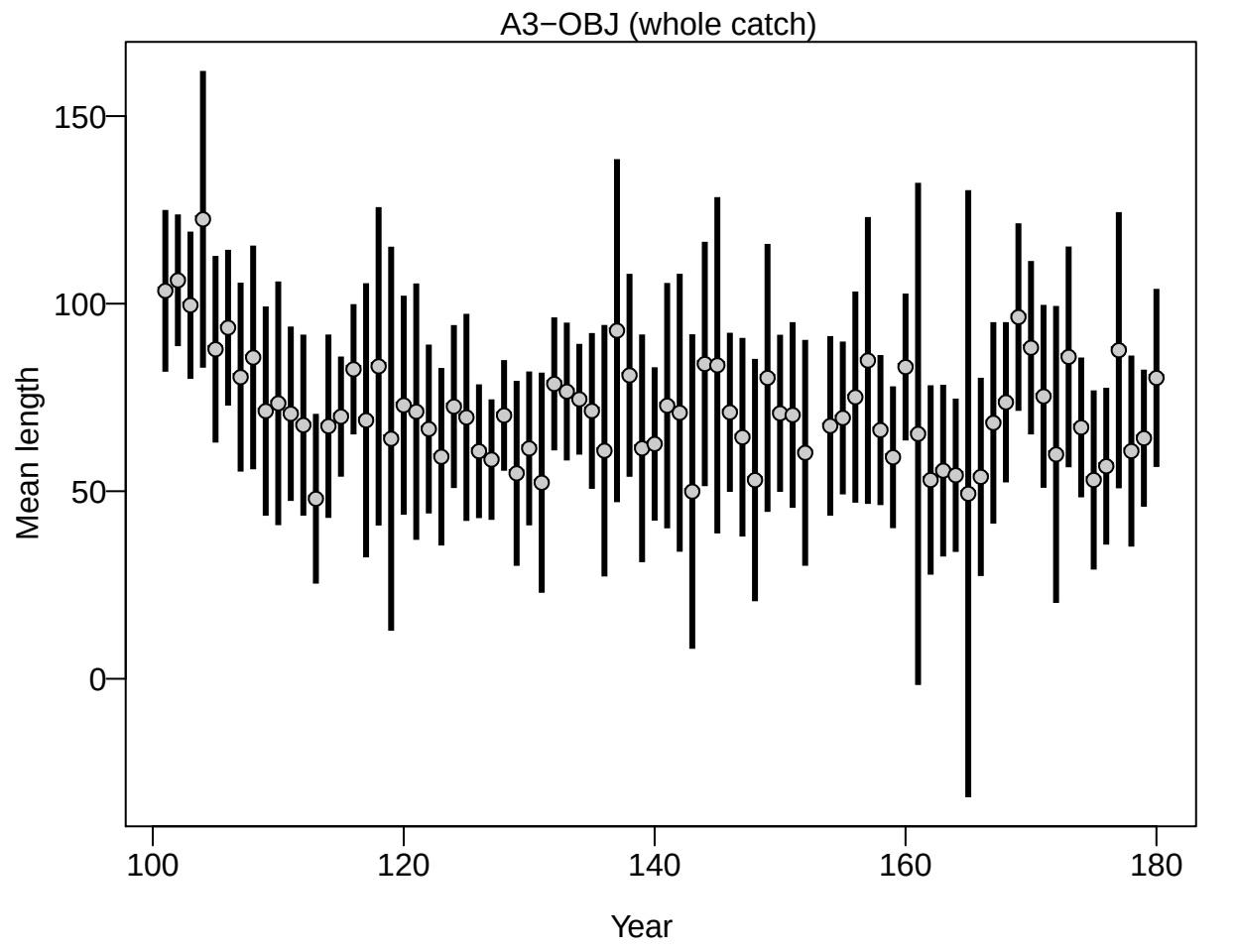

117
N adj.=1.8
121
N adj.=2.4
125
N adj.=3.7
129
N adj.=4.2
118
N adj.=1.6
122
N adj.=5.5
126
N adj.=7.8
130
N adj.=5.9
119
N adj.=1.2
123
N adj.=5.2
127
N adj.=9.5
131
N adj.=2.9
120
N adj.=3.5
124
N adj.=6.5
128
N adj.=11.5
132
N adj.=8.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

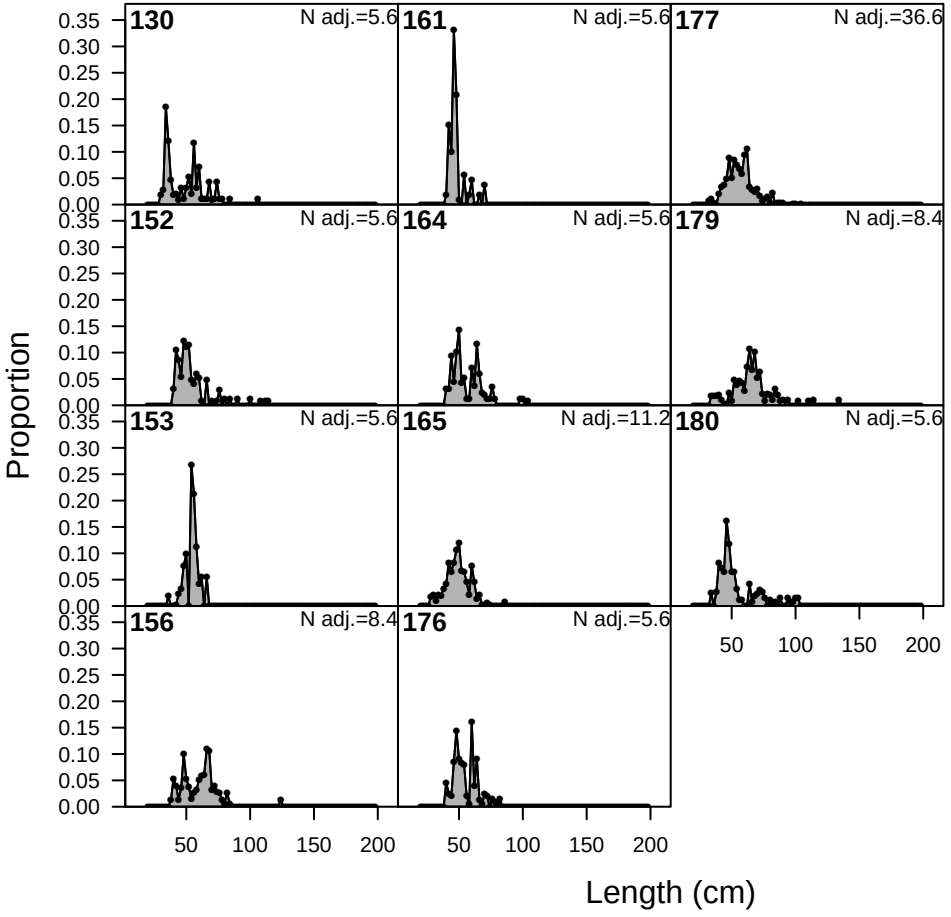

133
N adj.=8
137
N adj.=1.6
141
N adj.=2.5
145
N adj.=1.4
134
N adj.=13
138
N adj.=4.3
142
N adj.=2
146
N adj.=5.9
135
N adj.=7.5
139
N adj.=3.2
143
N adj.=1.6
147
N adj.=3.8
136
N adj.=3.1
140
N adj.=6.8
144
N adj.=2.8
148
N adj.=2.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

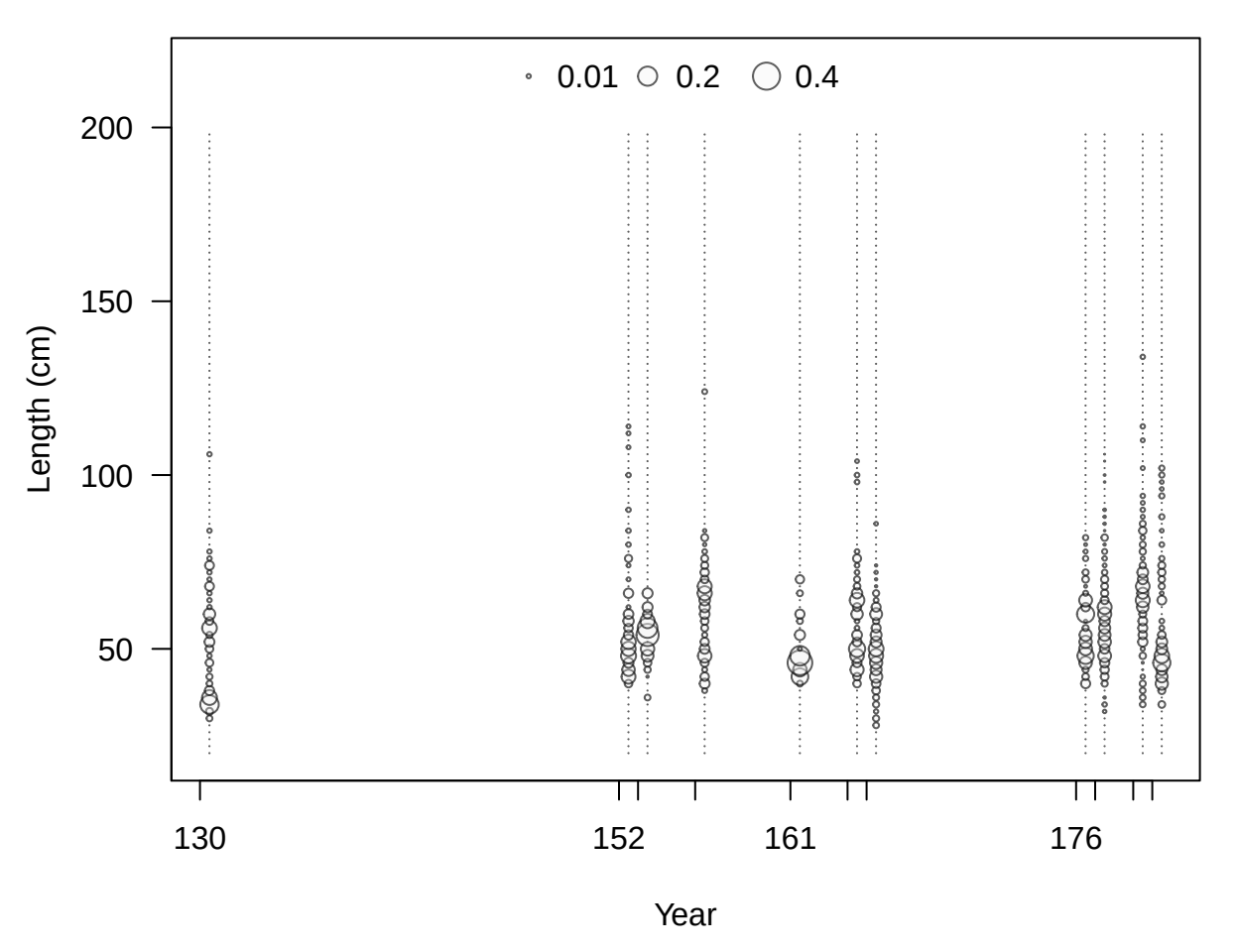

149
N adj.=2.2
154
N adj.=4.4
158
N adj.=6.5
162
N adj.=4.7
150
N adj.=6.3
155
N adj.=6.2
159
N adj.=7.4
163
N adj.=5.5
151
N adj.=4.6
156
N adj.=3.5
160
N adj.=7.6
164
N adj.=7
152
N adj.=3.1
157
N adj.=1.8
161
N adj.=0.7
165
N adj.=0.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

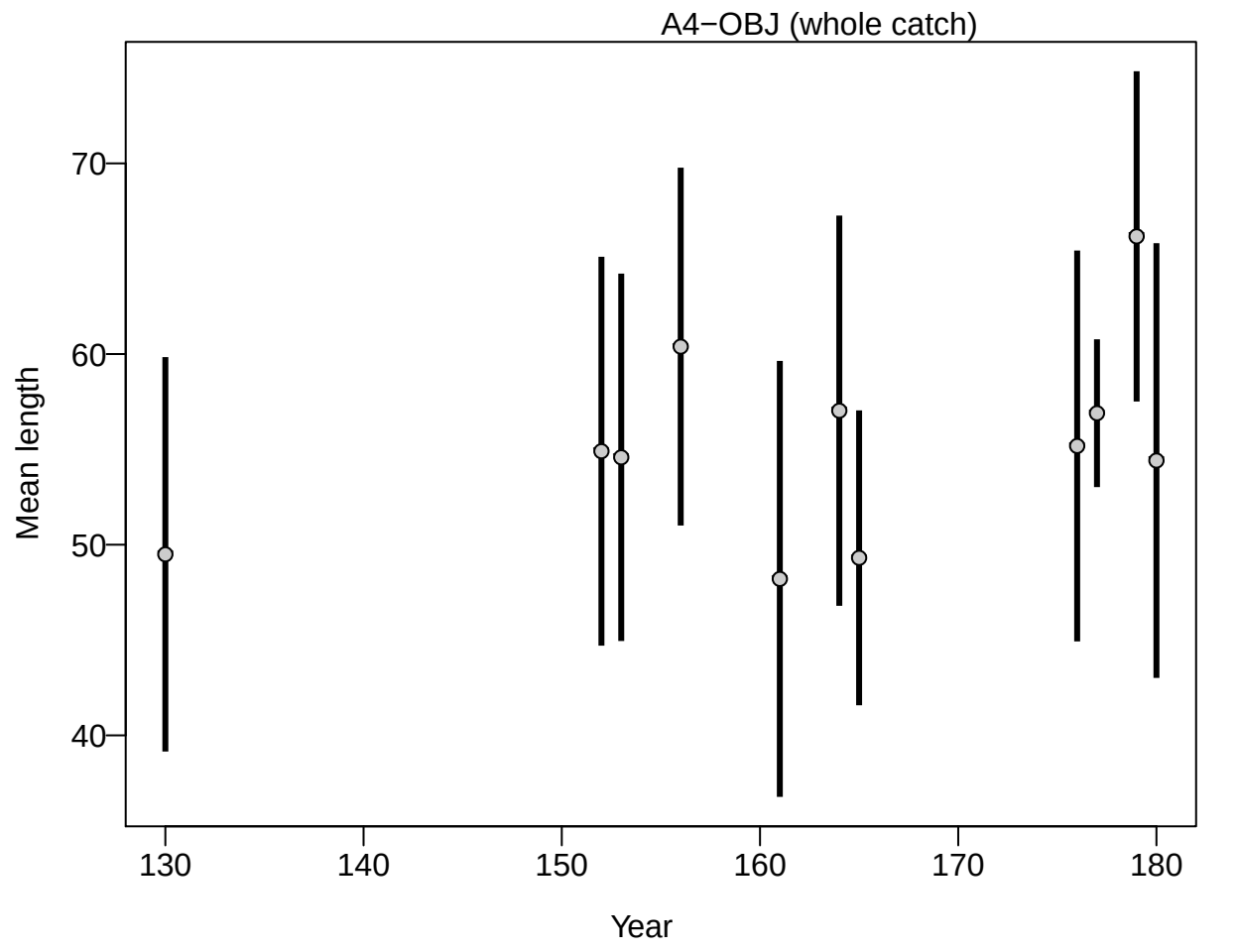

166
N adj.=4.2
170
N adj.=5.3
174
N adj.=6.9
178
N adj.=3.5
167
N adj.=3.8
171
N adj.=4.8
175
N adj.=4.2
179
N adj.=7.5
168
N adj.=6
172
N adj.=1.7
176
N adj.=5.2
180
N adj.=5
169
N adj.=4.5
173
N adj.=2.9
177
N adj.=1.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

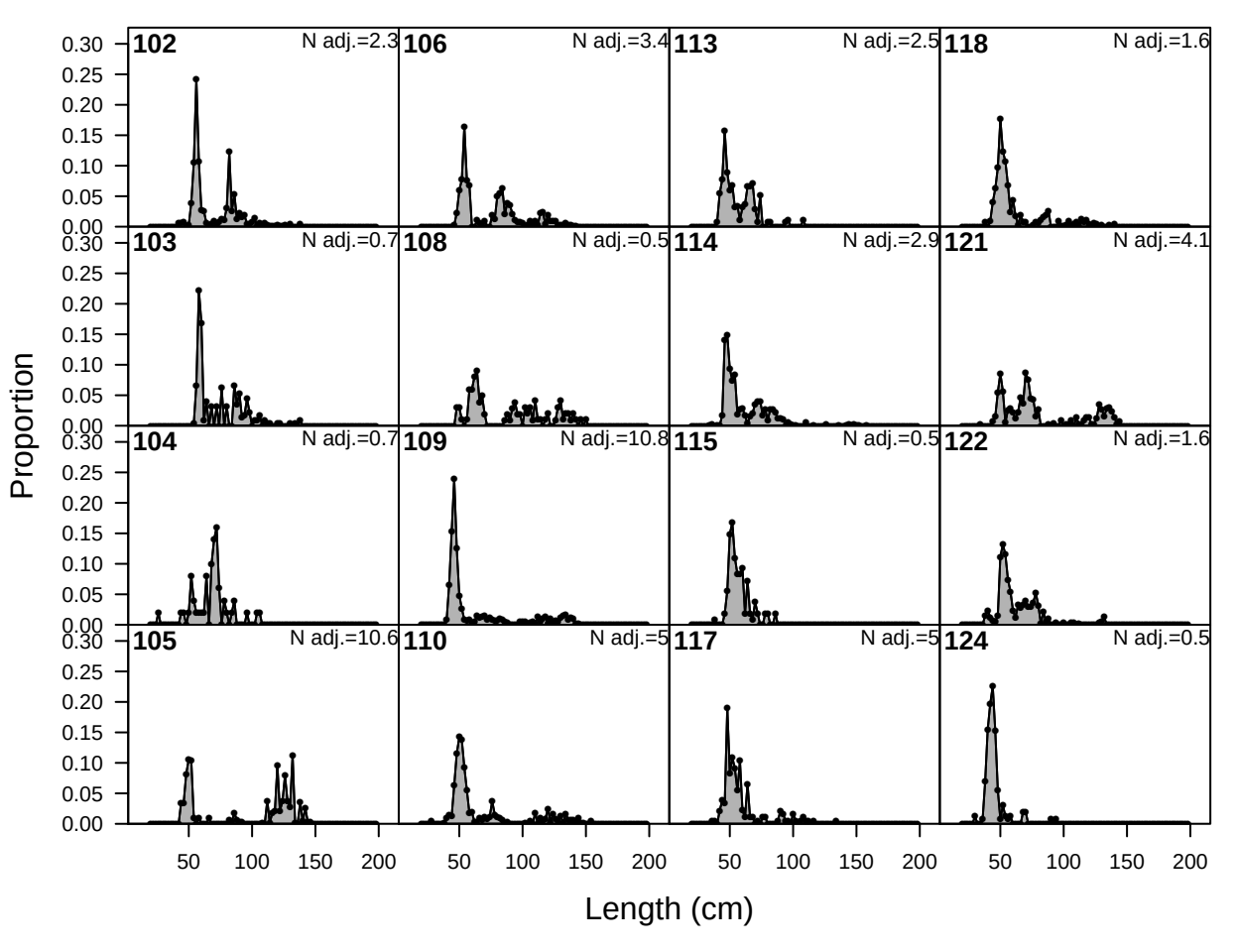

0.01
0.2
0.4
200
150
100
50
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
178
Year

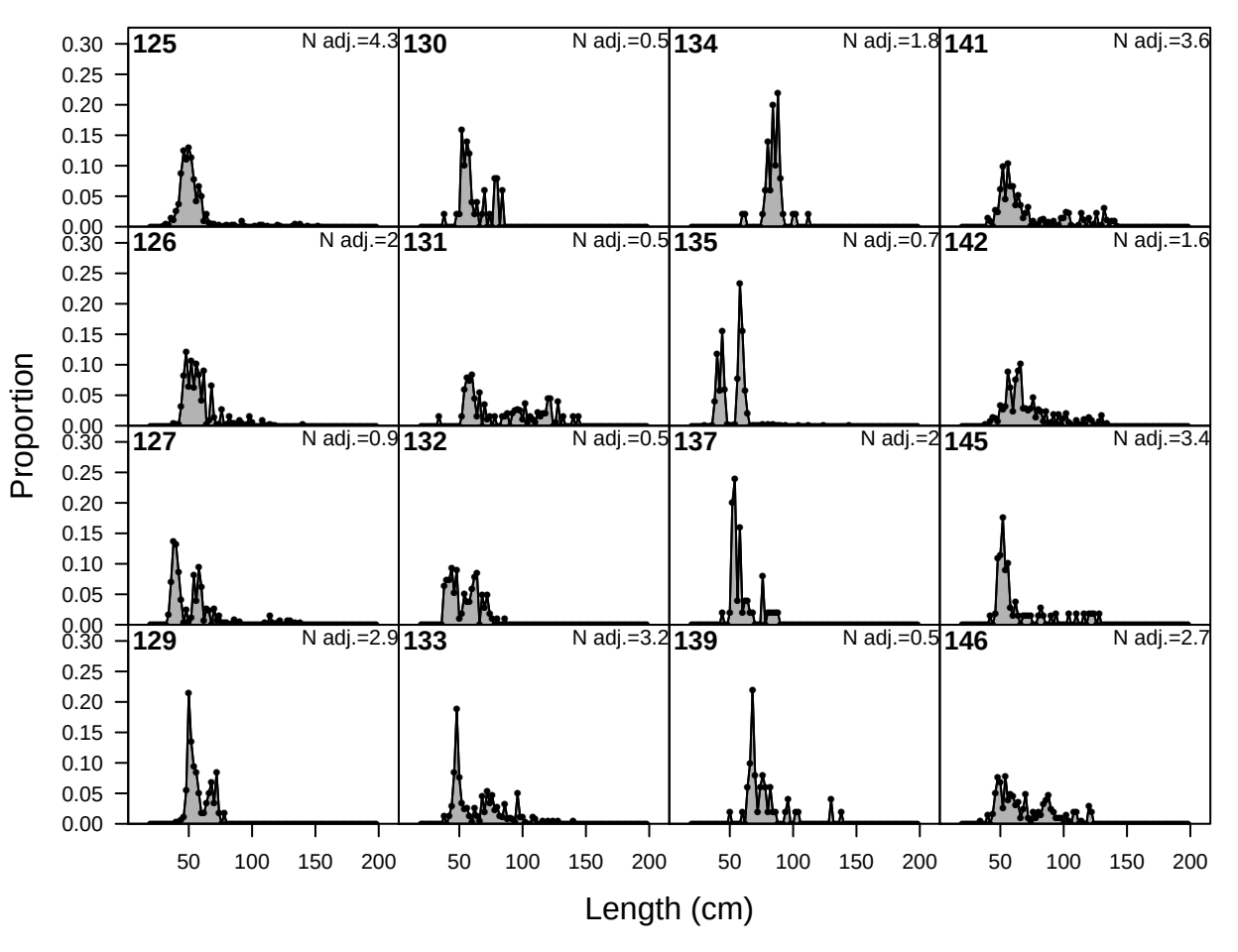

A3−OBJ (whole catch)
150
100
50
0
Mean length
100
120
140
160
180
Year

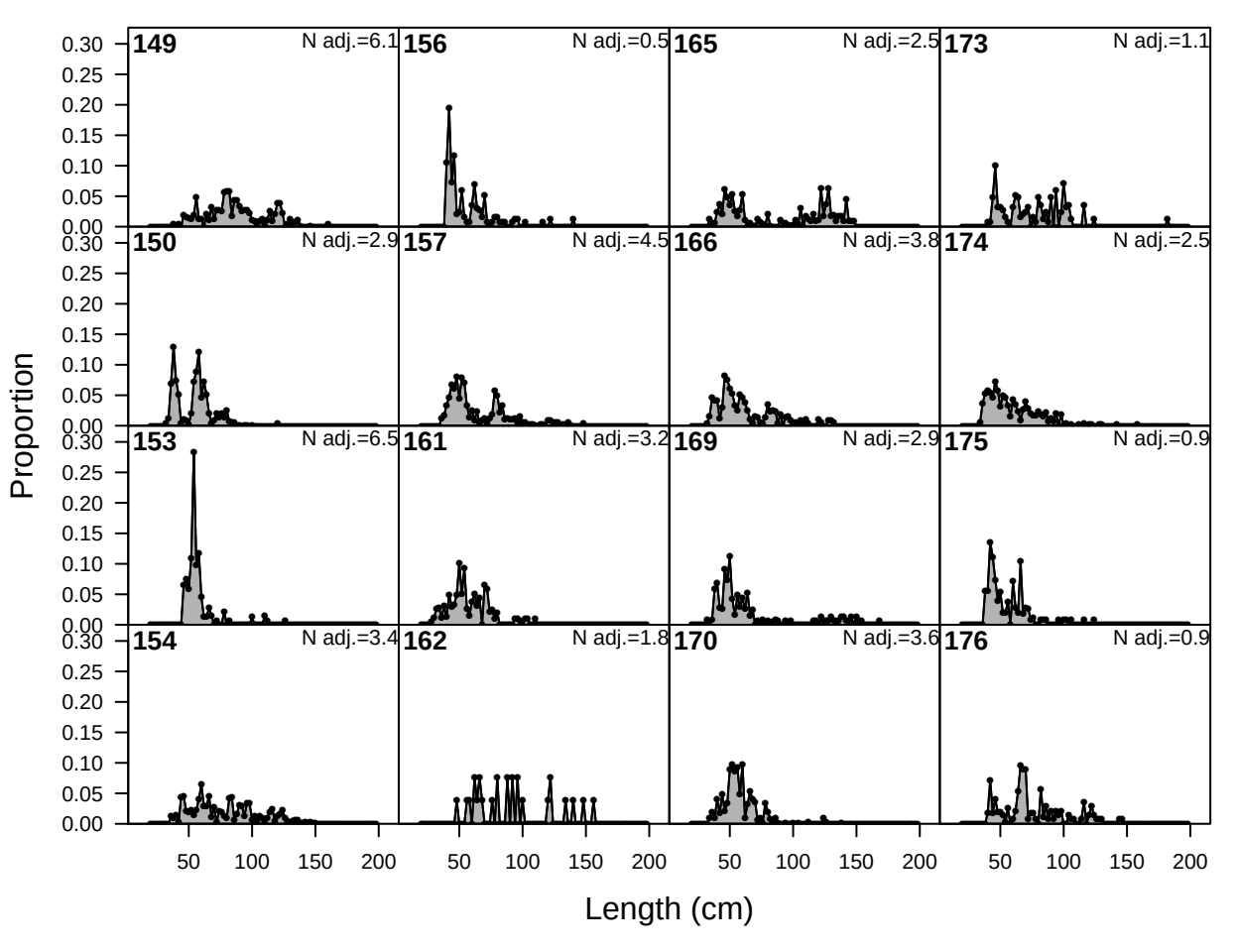

130
N adj.=5.6
161
N adj.=5.6
177
N adj.=36.6
152
N adj.=5.6
164
N adj.=5.6
179
N adj.=8.4
153
N adj.=5.6
165
N adj.=11.2
180
N adj.=5.6
156
N adj.=8.4
176
N adj.=5.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

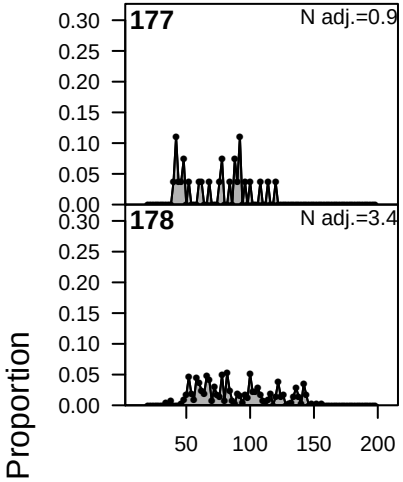

0.01
0.2
0.4
200
150
100
50
Length (cm)
130
152
161
176
Year

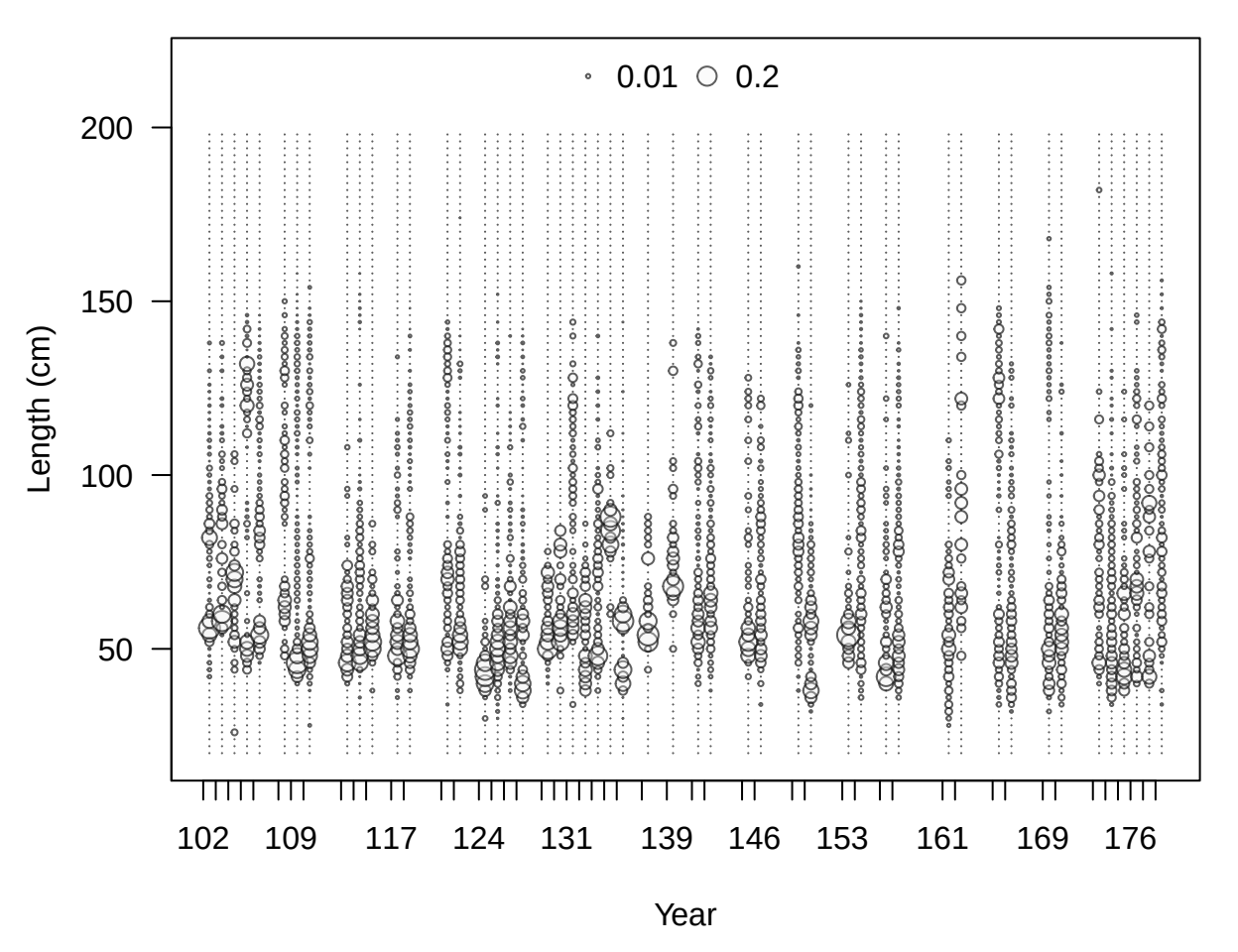

A4−OBJ (whole catch)
Mean length
70
60
50
40
130
140
150
160
170
180
Year

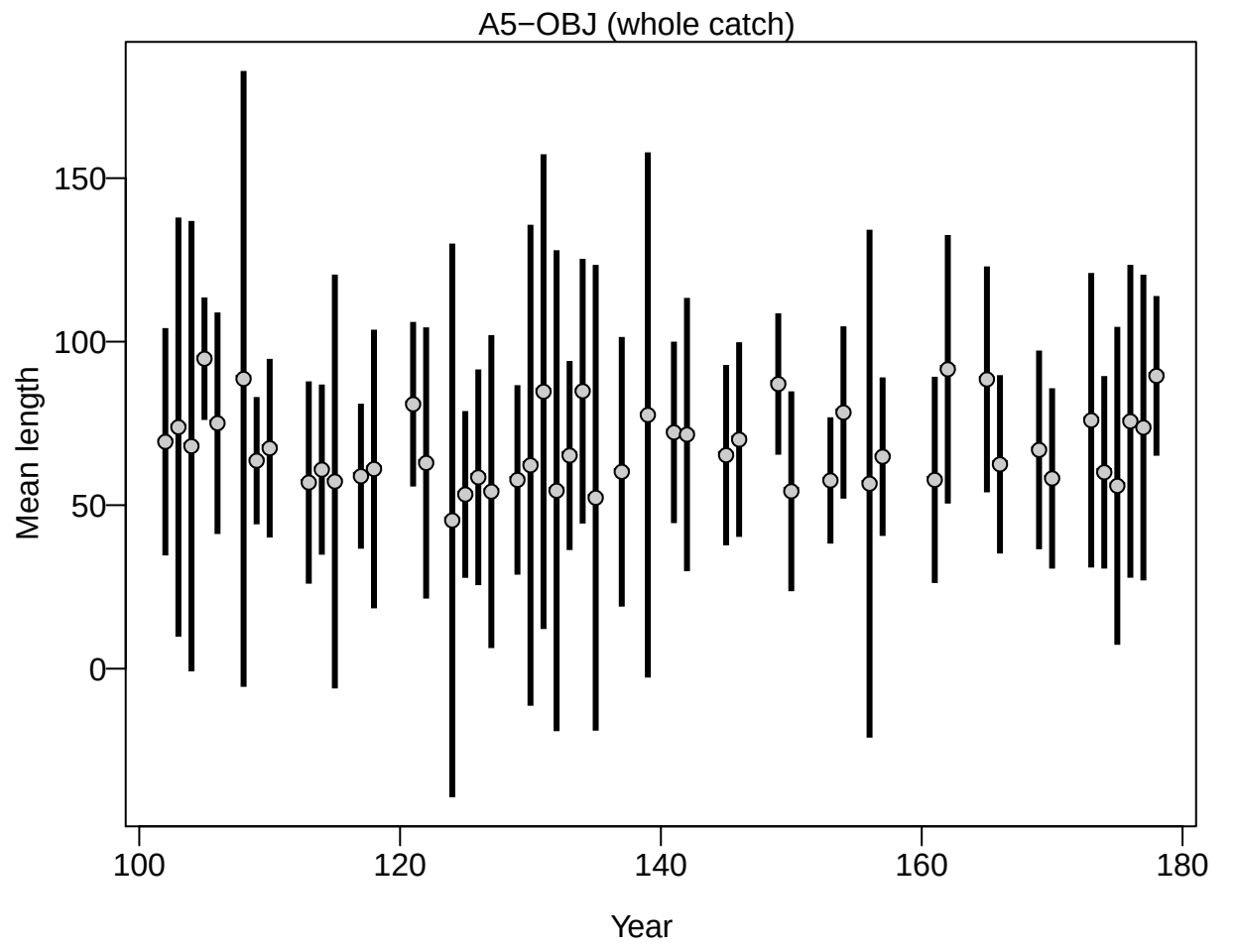

102
N adj.=2.3
106
N adj.=3.4
113
N adj.=2.5
118
N adj.=1.6
103
N adj.=0.7
108
N adj.=0.5
114
N adj.=2.9
121
N adj.=4.1
104
N adj.=0.7
109
N adj.=10.8
115
N adj.=0.5
122
N adj.=1.6
105
N adj.=10.6
110
N adj.=5
117
N adj.=5
124
N adj.=0.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

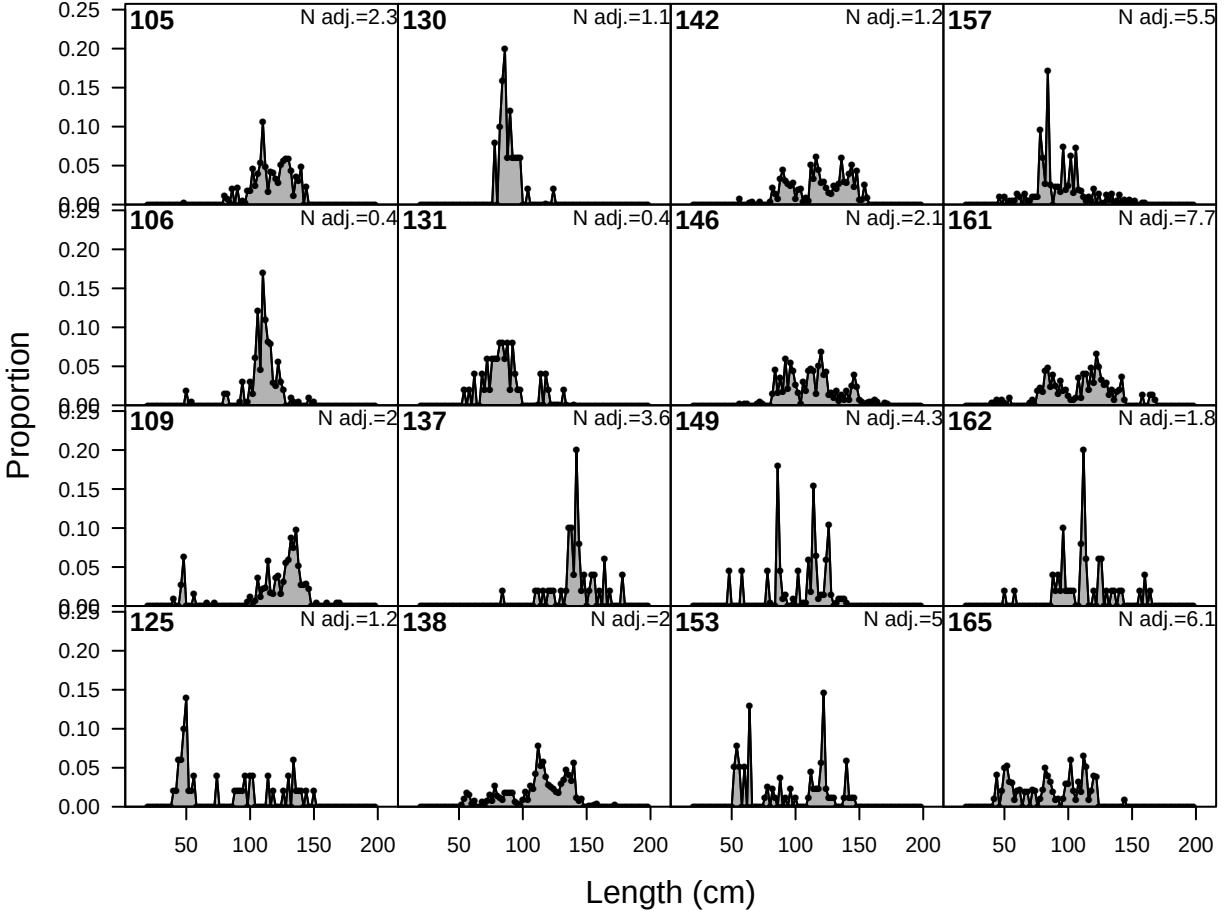

125
N adj.=4.3
130
N adj.=0.5
134
N adj.=1.8
141
N adj.=3.6
126
N adj.=2
131
N adj.=0.5
135
N adj.=0.7
142
N adj.=1.6
127
N adj.=0.9
132
N adj.=0.5
137
N adj.=2
145
N adj.=3.4
129
N adj.=2.9
133
N adj.=3.2
139
N adj.=0.5
146
N adj.=2.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

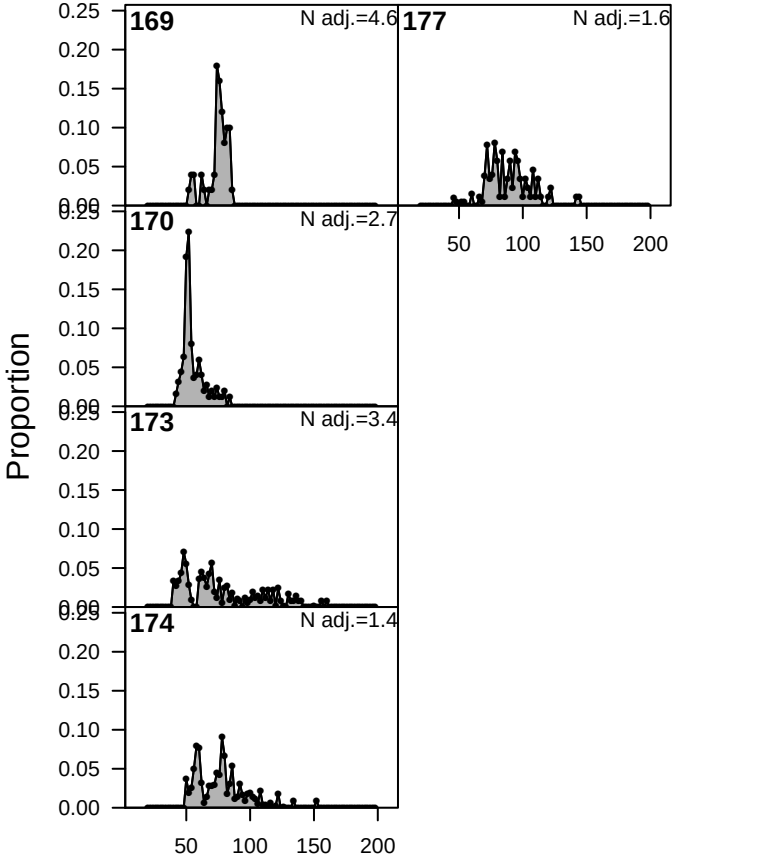

149
N adj.=6.1
156
N adj.=0.5
165
N adj.=2.5
173
N adj.=1.1
150
N adj.=2.9
157
N adj.=4.5
166
N adj.=3.8
174
N adj.=2.5
153
N adj.=6.5
161
N adj.=3.2
169
N adj.=2.9
175
N adj.=0.9
154
N adj.=3.4
162
N adj.=1.8
170
N adj.=3.6
176
N adj.=0.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

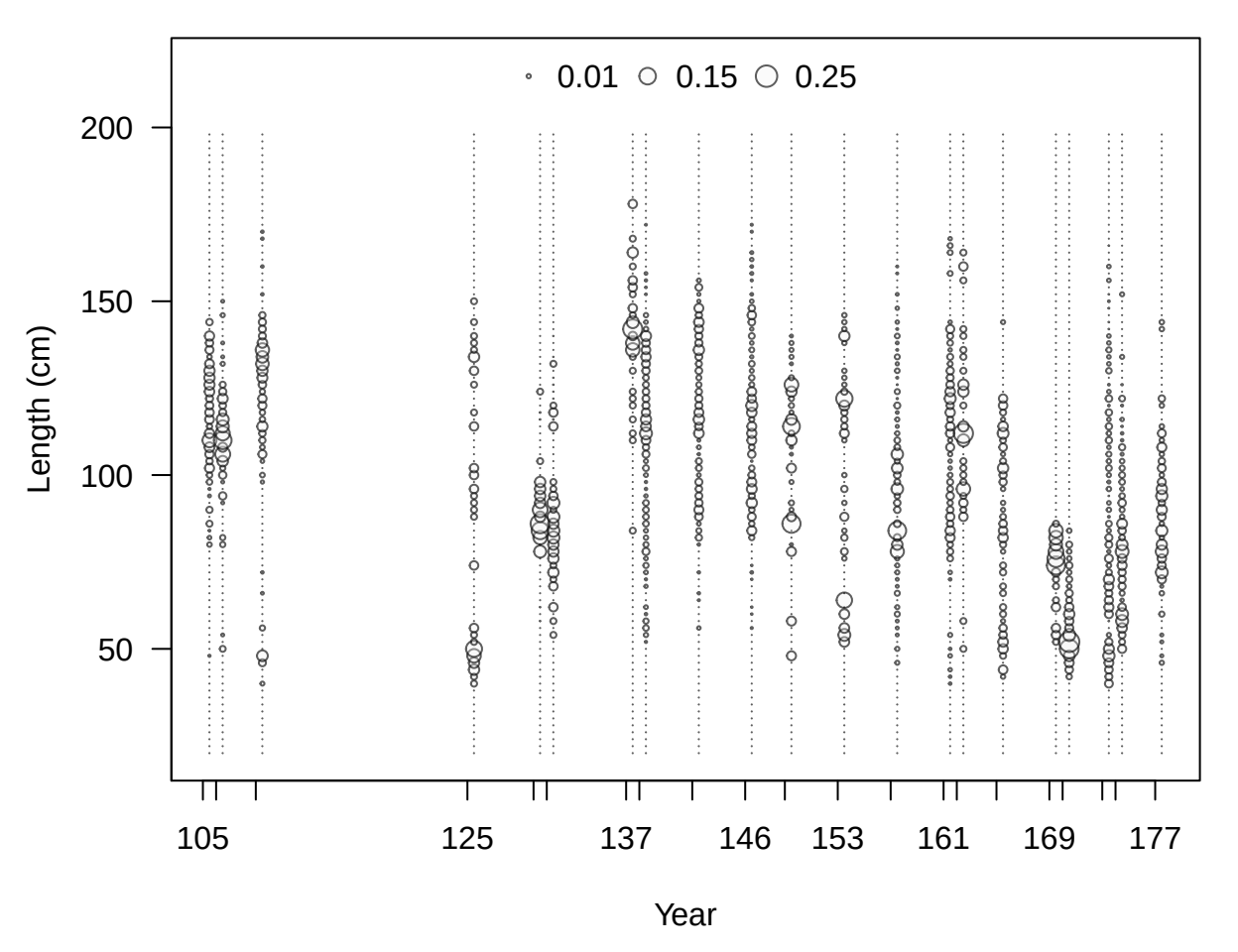

177
N adj.=0.9
178
N adj.=3.4
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)

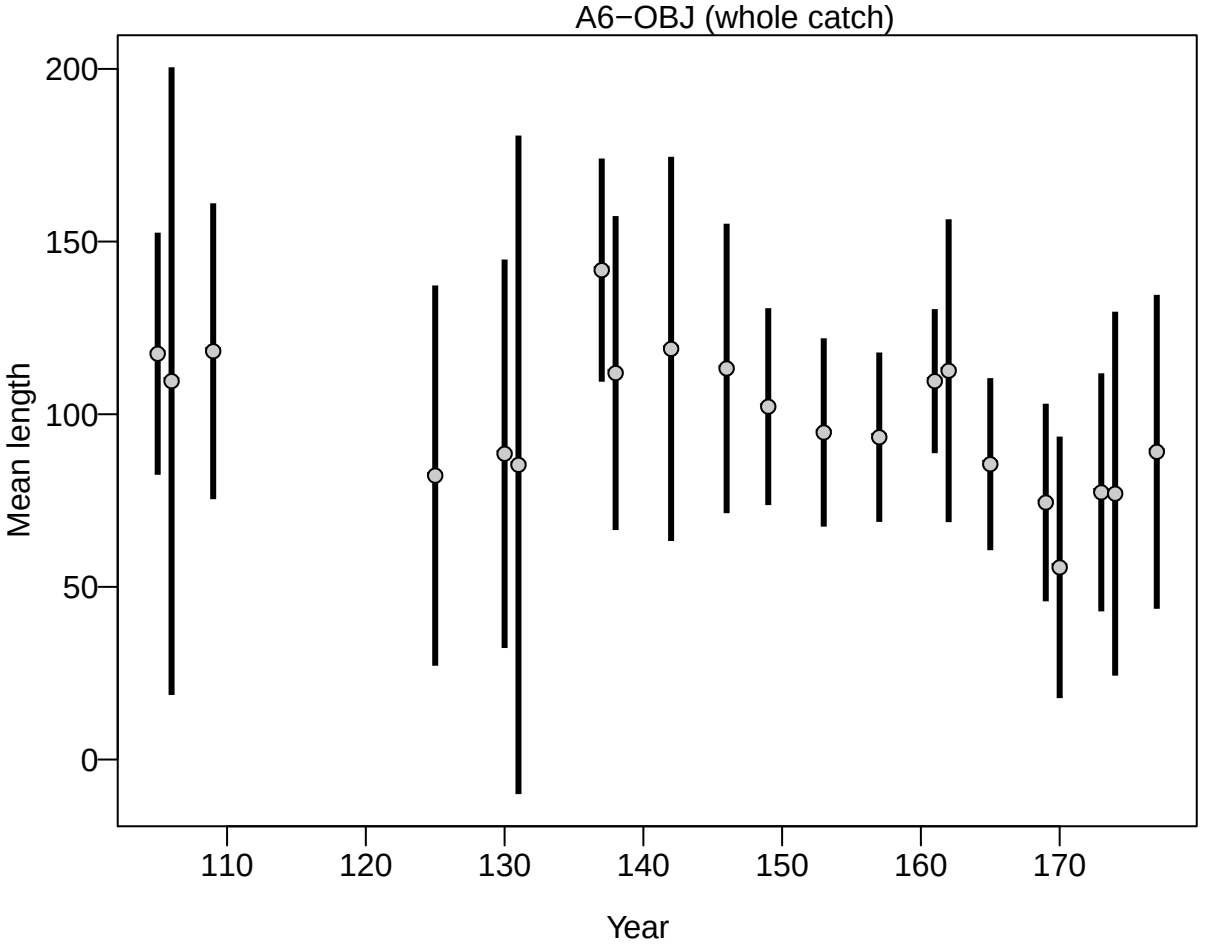

0.01
0.2
200
150
100
50
Length (cm)
102
109
117
124
131
139
146
153
161
169
176
Year

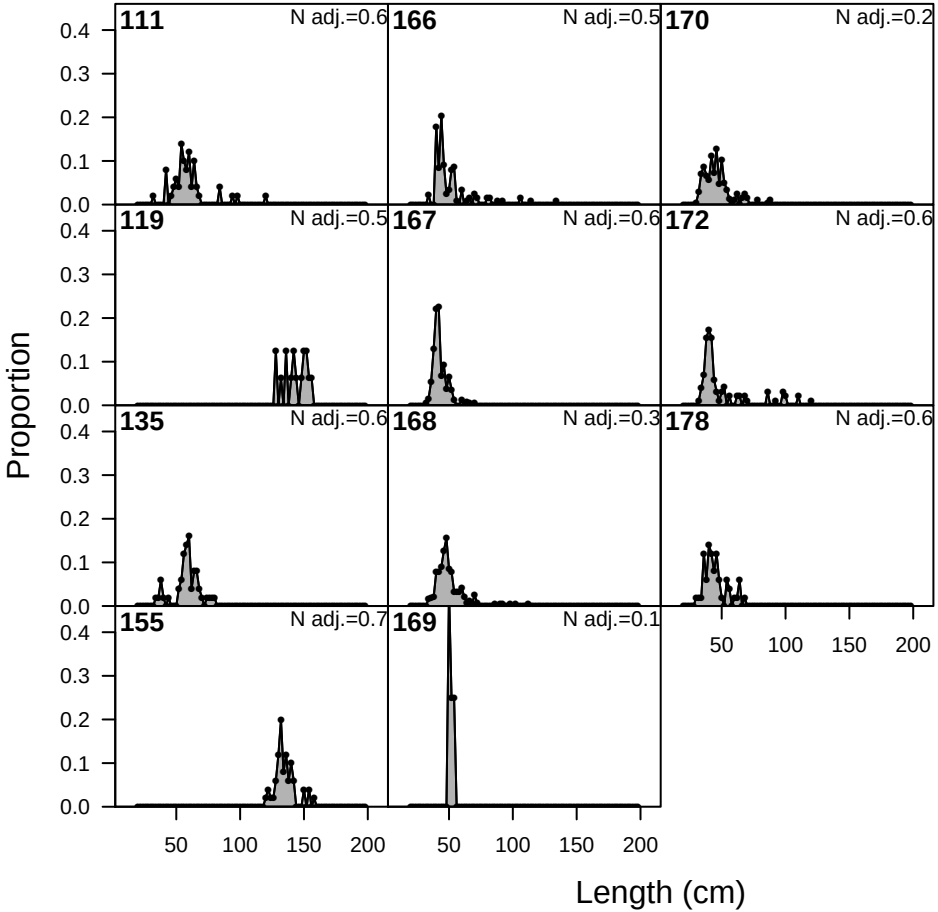

A5−OBJ (whole catch)
Mean length
150
100
50
0
100
120
140
160
180
Year

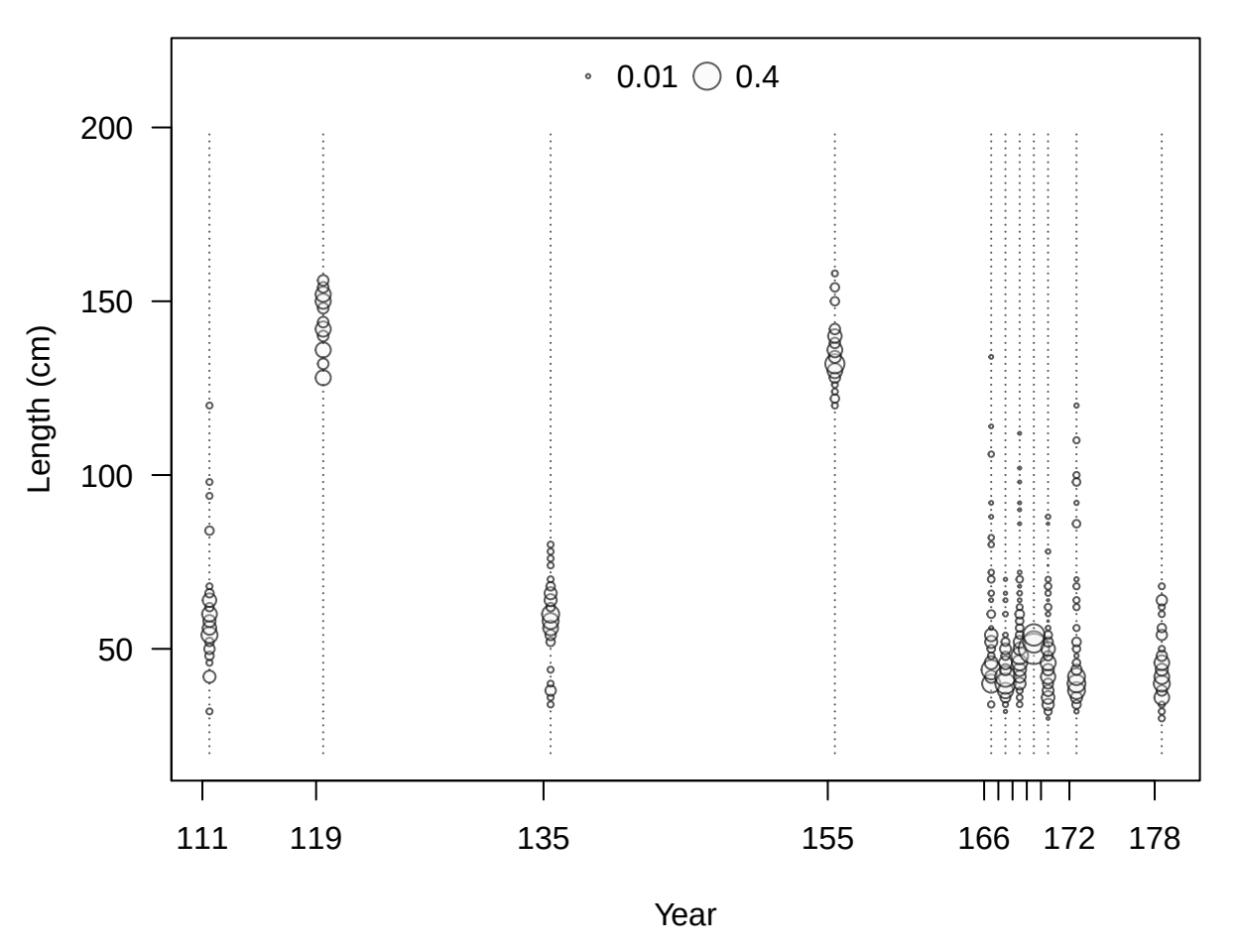

105
N adj.=2.3
130
N adj.=1.1
142
N adj.=1.2
157
N adj.=5.5
106
N adj.=0.4
131
N adj.=0.4
146
N adj.=2.1
161
N adj.=7.7
109
N adj.=2
137
N adj.=3.6
149
N adj.=4.3
162
N adj.=1.8
125
N adj.=1.2
138
N adj.=2
153
N adj.=5
165
N adj.=6.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

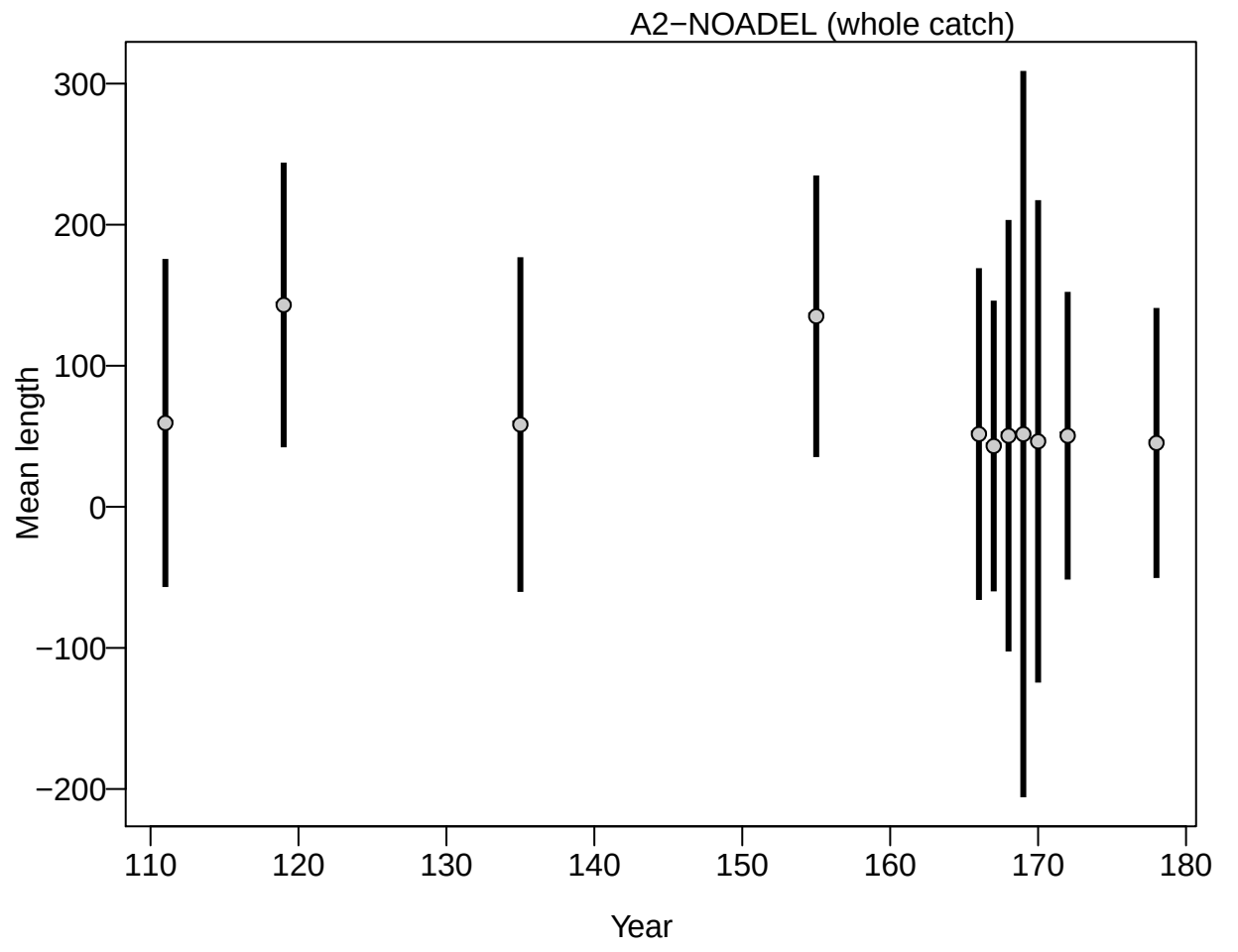

169
N adj.=4.6
177
N adj.=1.6
170
N adj.=2.7
173
N adj.=3.4
174
N adj.=1.4
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

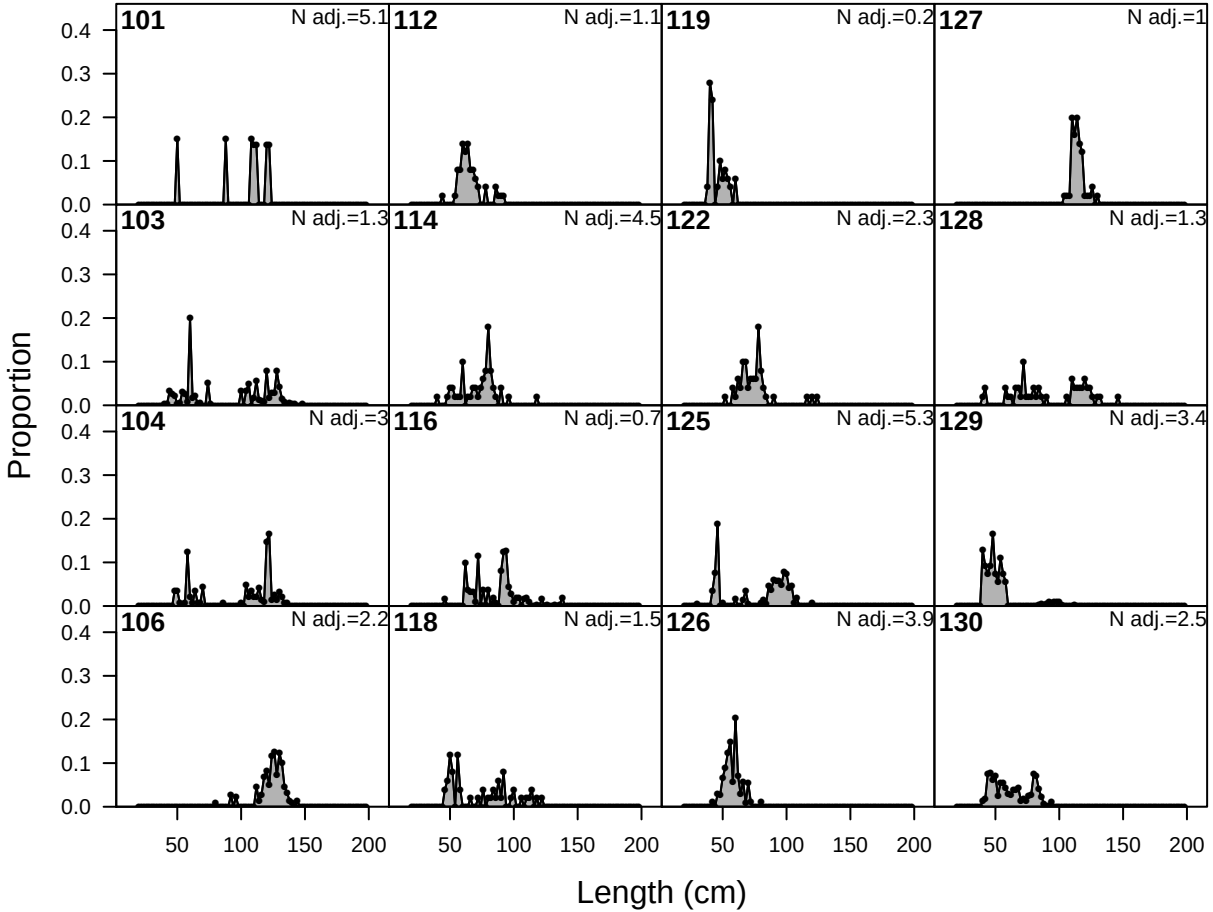

0.01
0.15
0.25
200
150
100
50
Length (cm)
105
125
137
146
153
161
169
177
Year

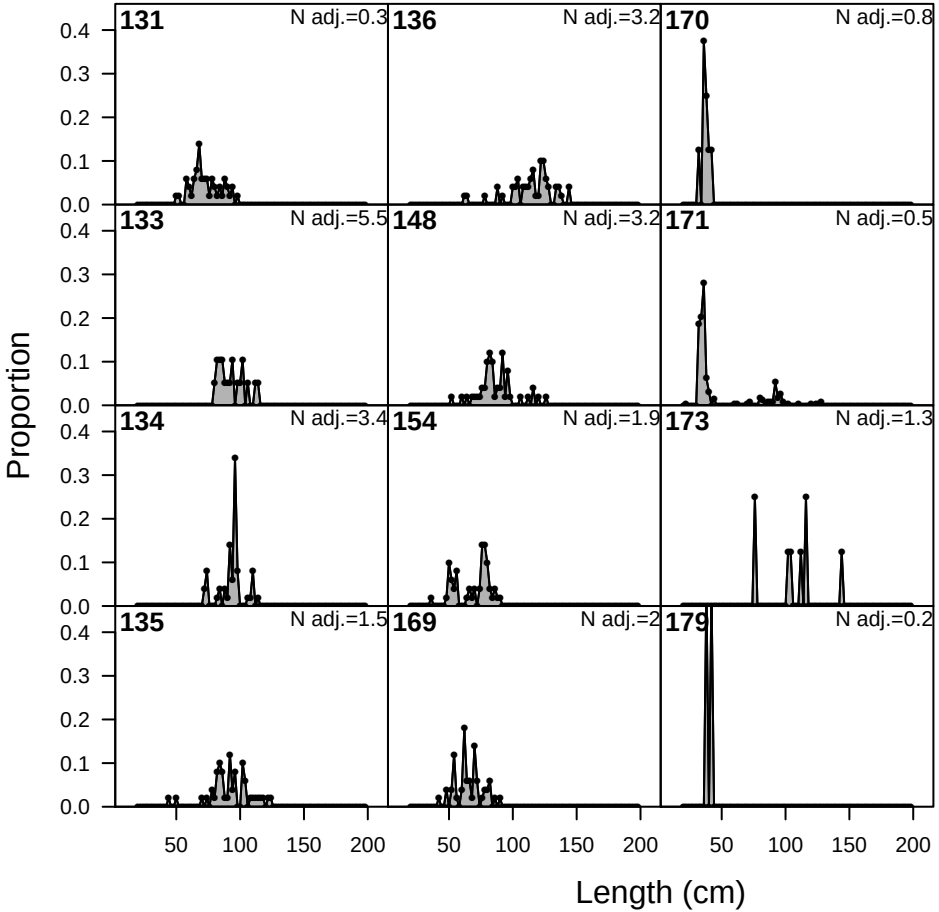

A6−OBJ (whole catch)
200
150
100
50
0
Mean length
110
120
130
140
150
160
170
Year

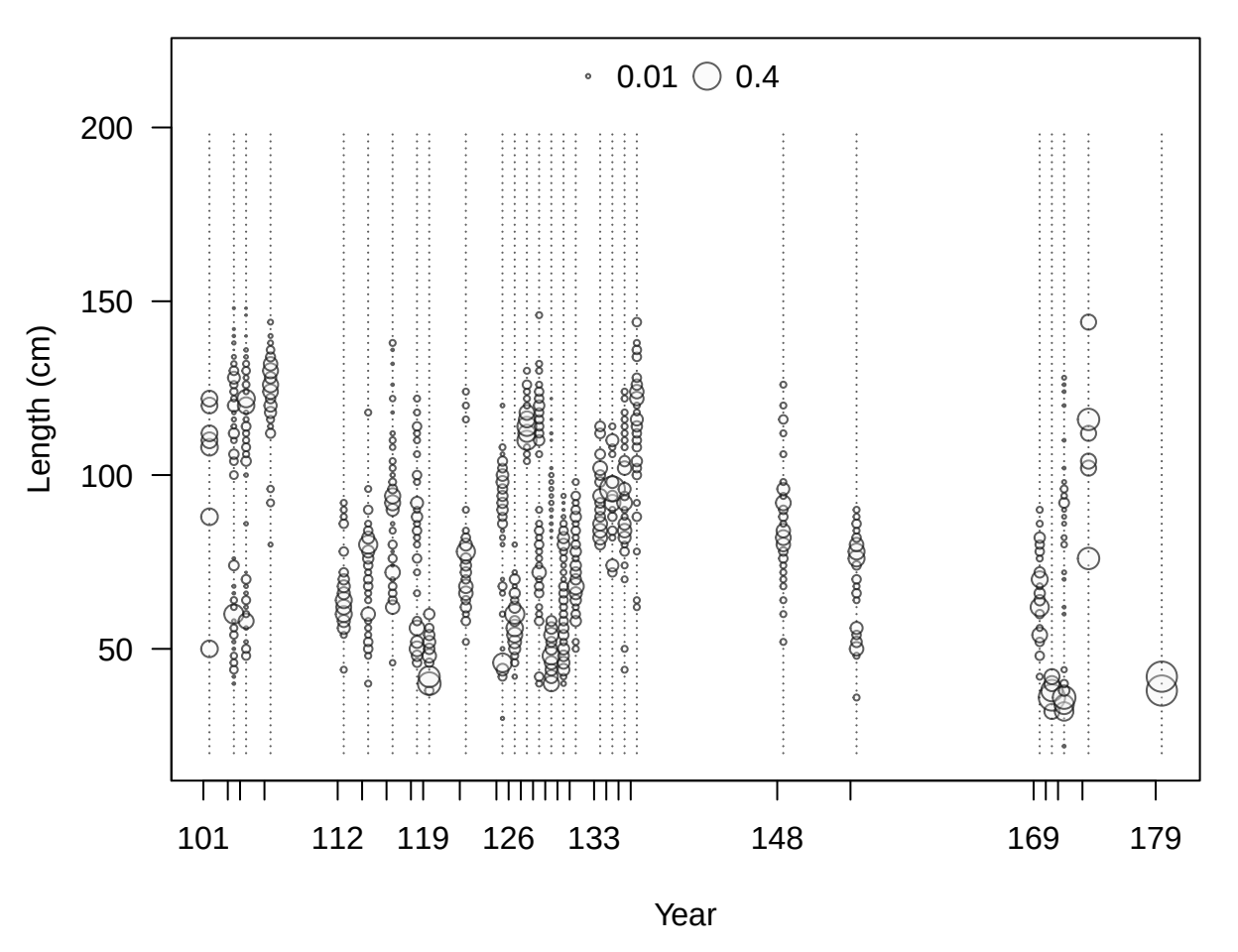

111
N adj.=0.6
166
N adj.=0.5
170
N adj.=0.2
119
N adj.=0.5
167
N adj.=0.6
172
N adj.=0.6
135
N adj.=0.6
168
N adj.=0.3
178
N adj.=0.6
155
N adj.=0.7
169
N adj.=0.1
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

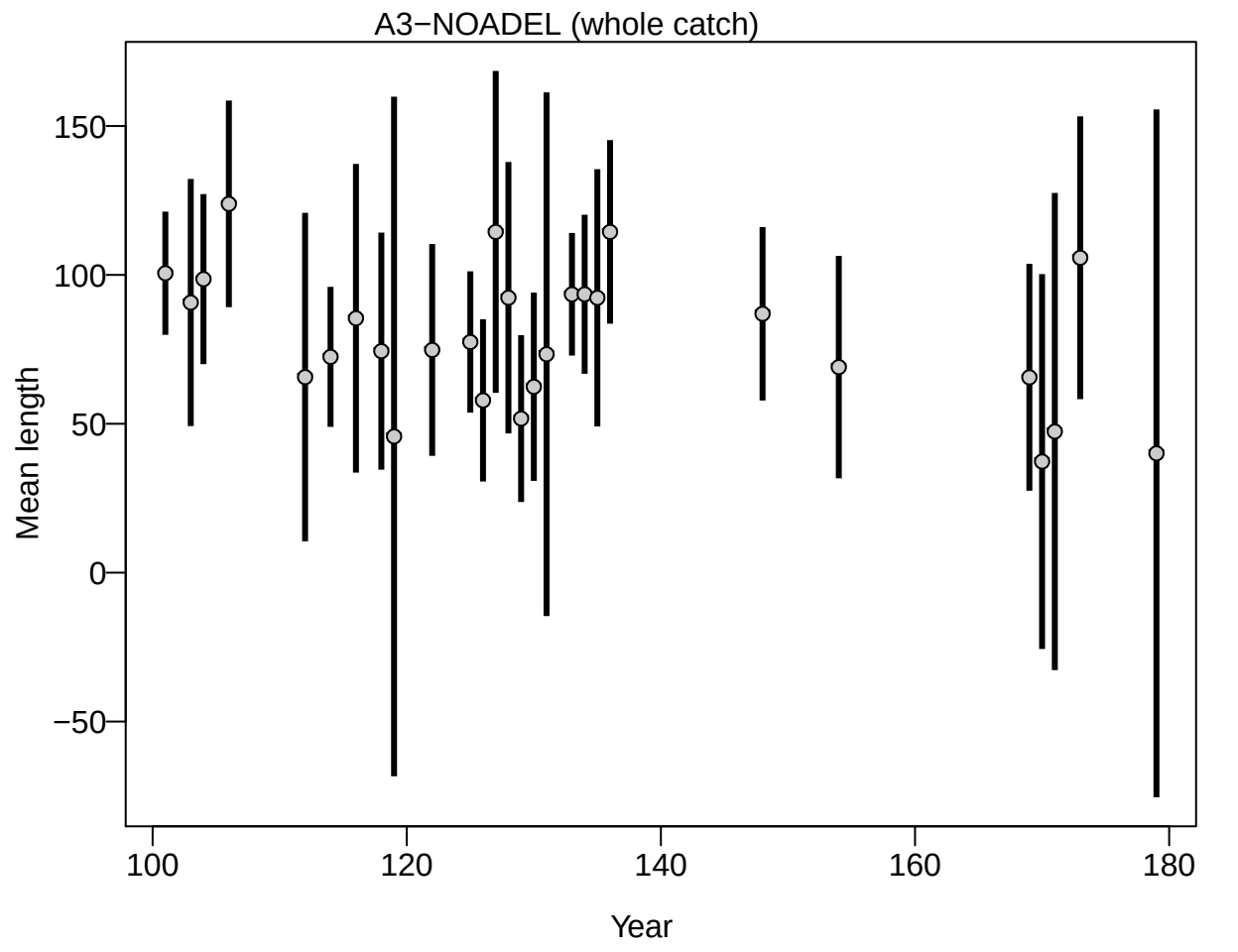

0.01
0.4
200
150
100
50
Length (cm)
111
119
135
155
166
172
178
Year

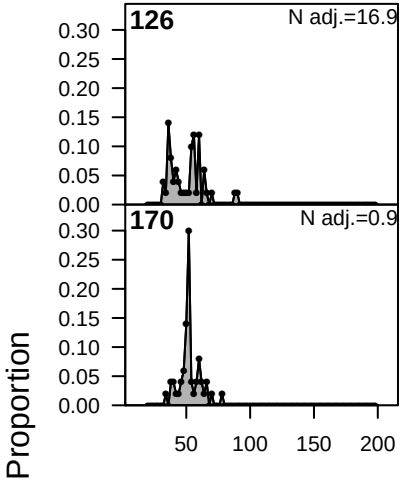

A2−NOADEL (whole catch)
300
200
100
0
−100
−200
Mean length
110
120
130
140
150
160
170
180
Year

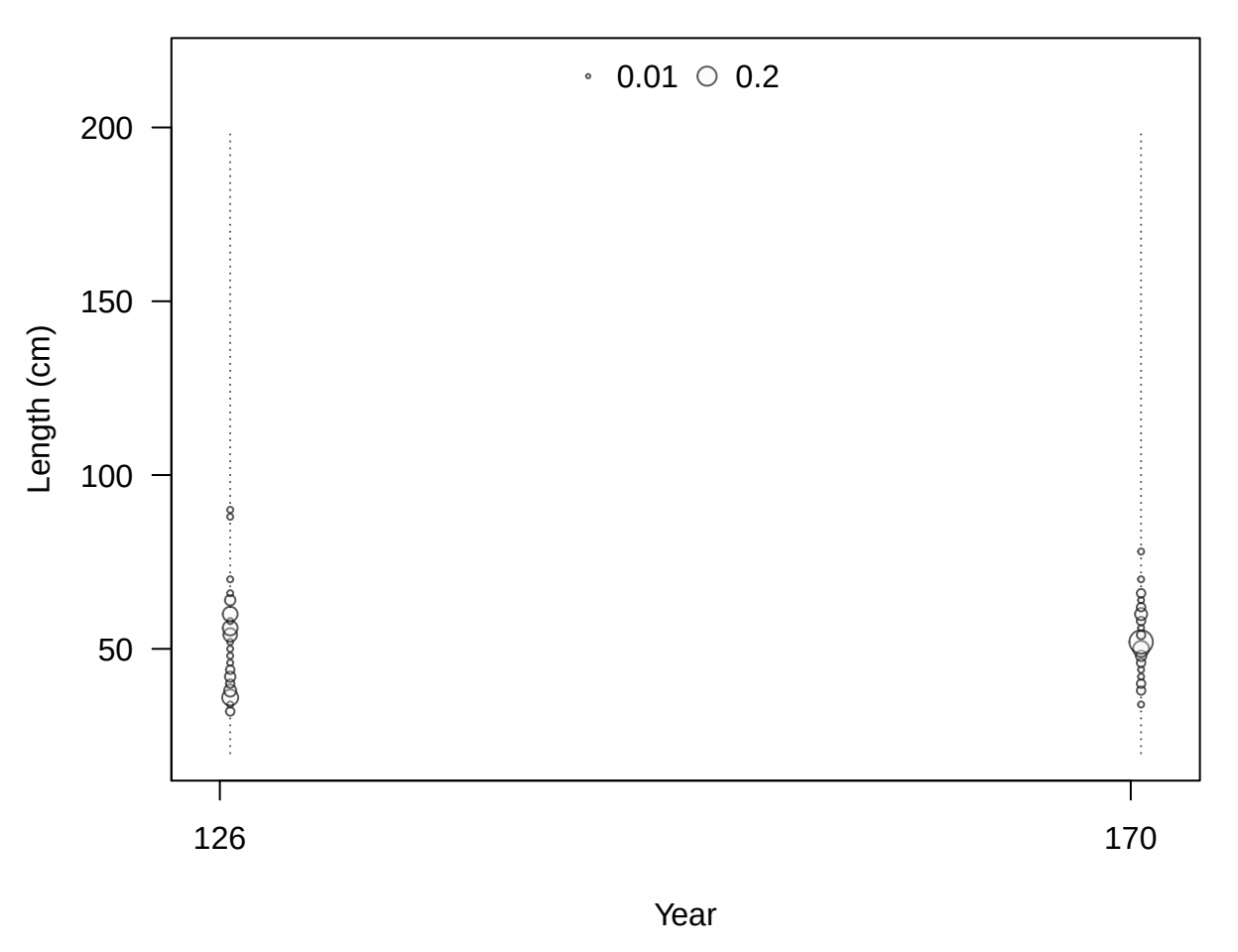

101
N adj.=5.1
112
N adj.=1.1
119
N adj.=0.2
127
N adj.=1
103
N adj.=1.3
114
N adj.=4.5
122
N adj.=2.3
128
N adj.=1.3
104
N adj.=3
116
N adj.=0.7
125
N adj.=5.3
129
N adj.=3.4
106
N adj.=2.2
118
N adj.=1.5
126
N adj.=3.9
130
N adj.=2.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

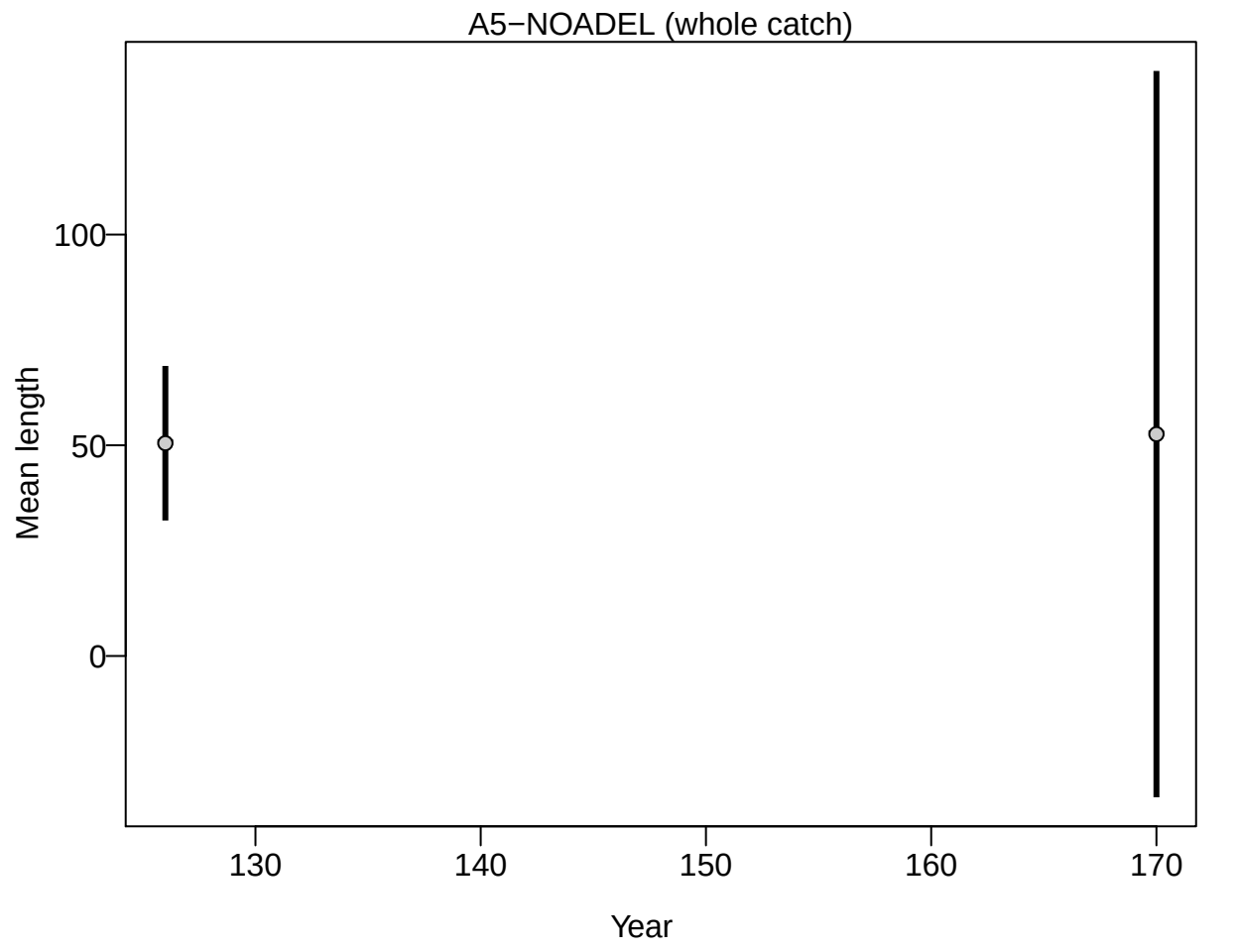

131
N adj.=0.3
136
N adj.=3.2
170
N adj.=0.8
133
N adj.=5.5
148
N adj.=3.2
171
N adj.=0.5
134
N adj.=3.4
154
N adj.=1.9
173
N adj.=1.3
135
N adj.=1.5
169
N adj.=2
179
N adj.=0.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

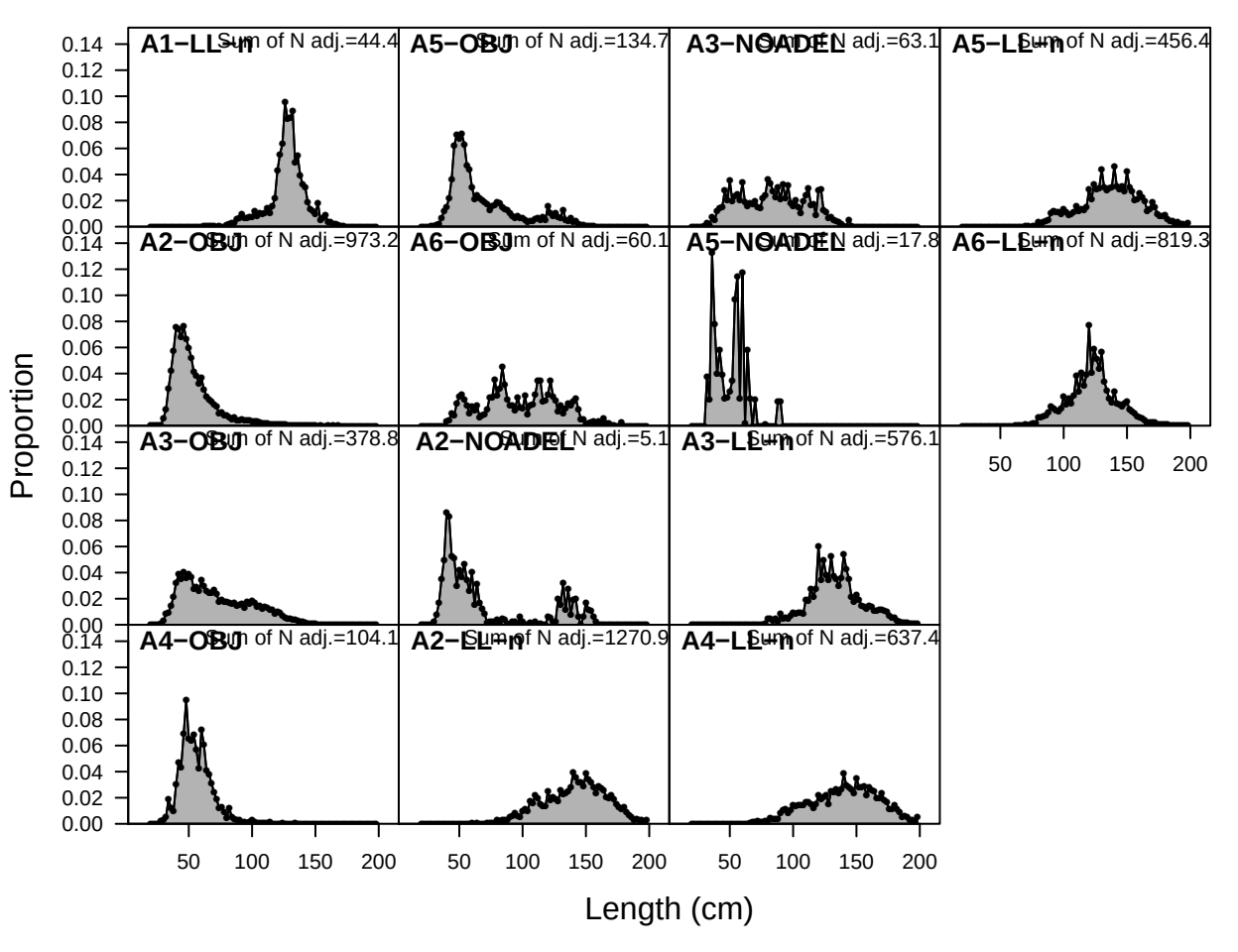

0.01
0.4
200
150
100
50
Length (cm)
101
112
119
126
133
148
169
179
Year

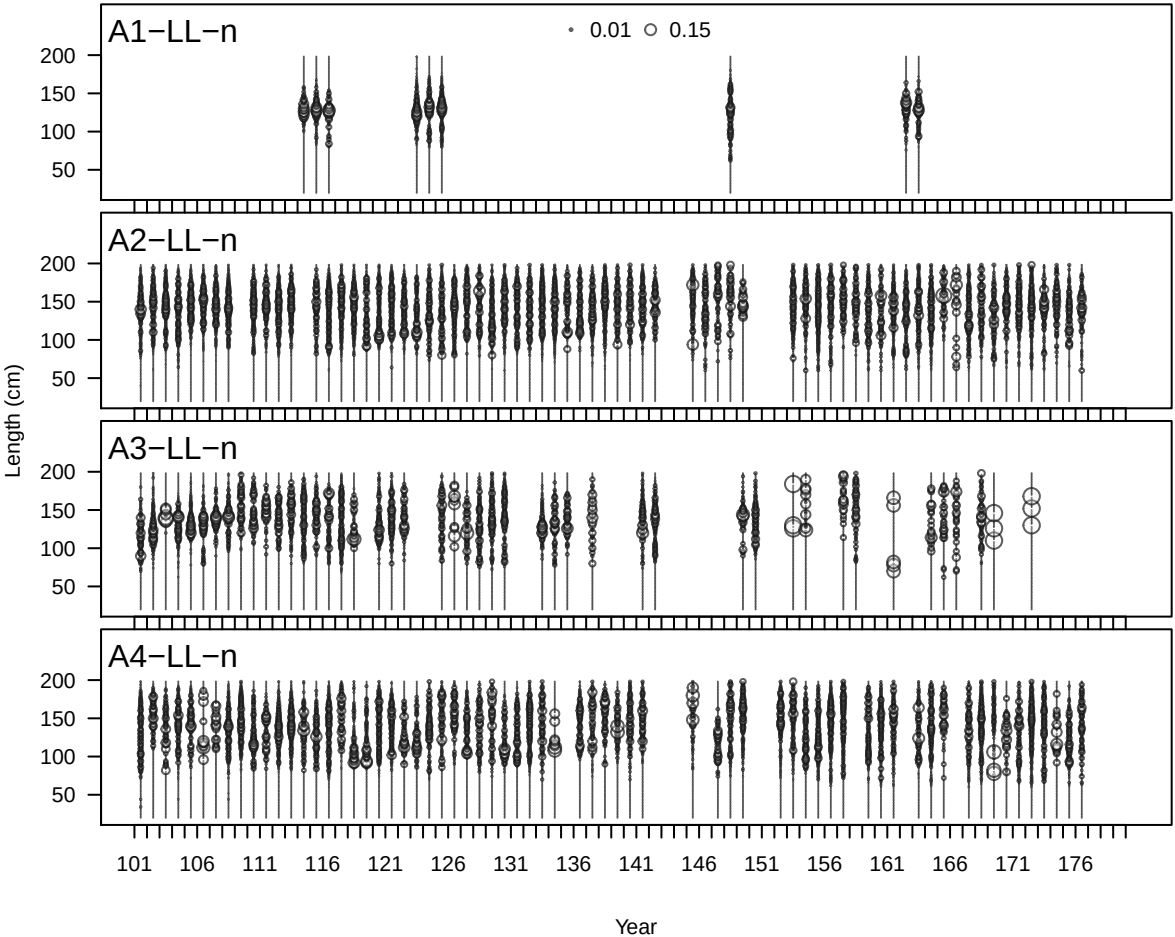

A3−NOADEL (whole catch)
Mean length
150
100
50
0
−50
100
120
140
160
180
Year

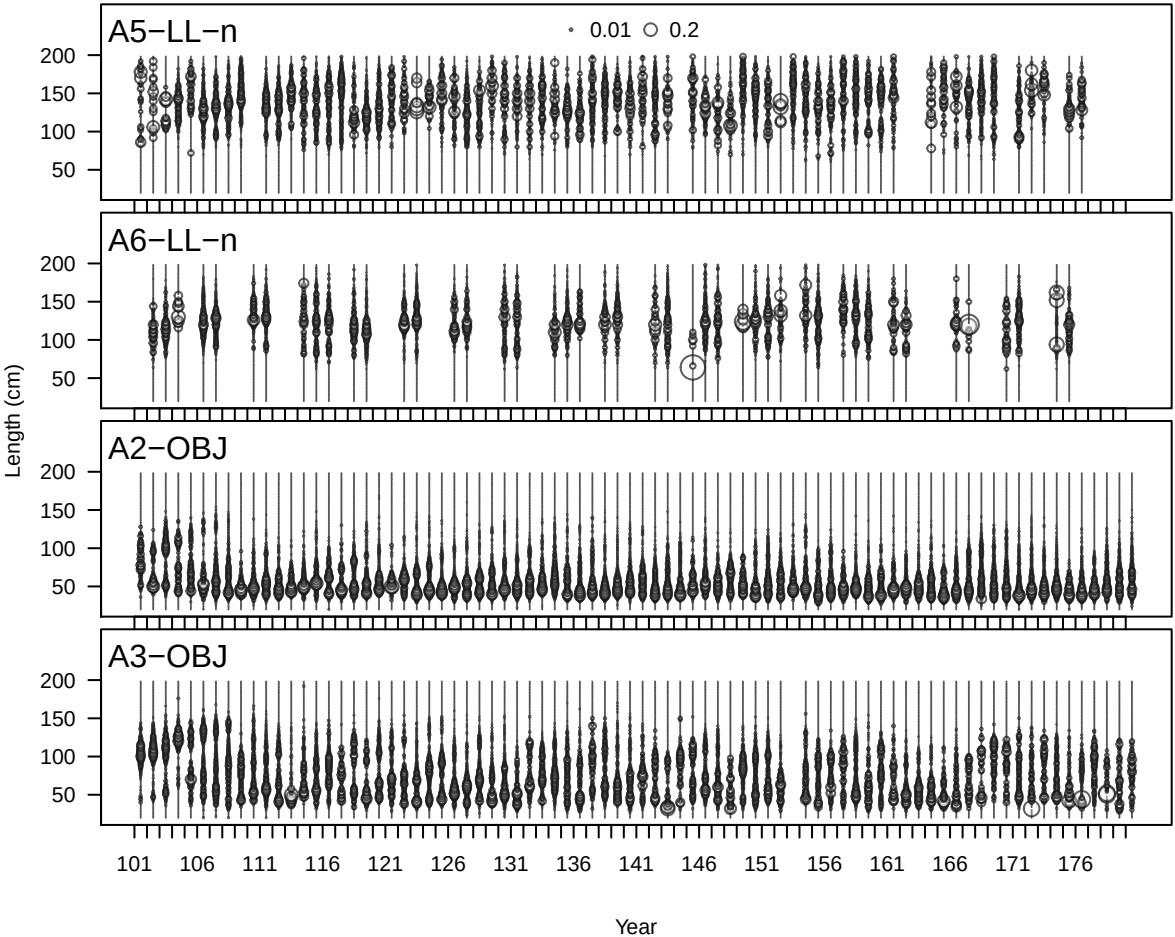

126
N adj.=16.9
170
N adj.=0.9
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)

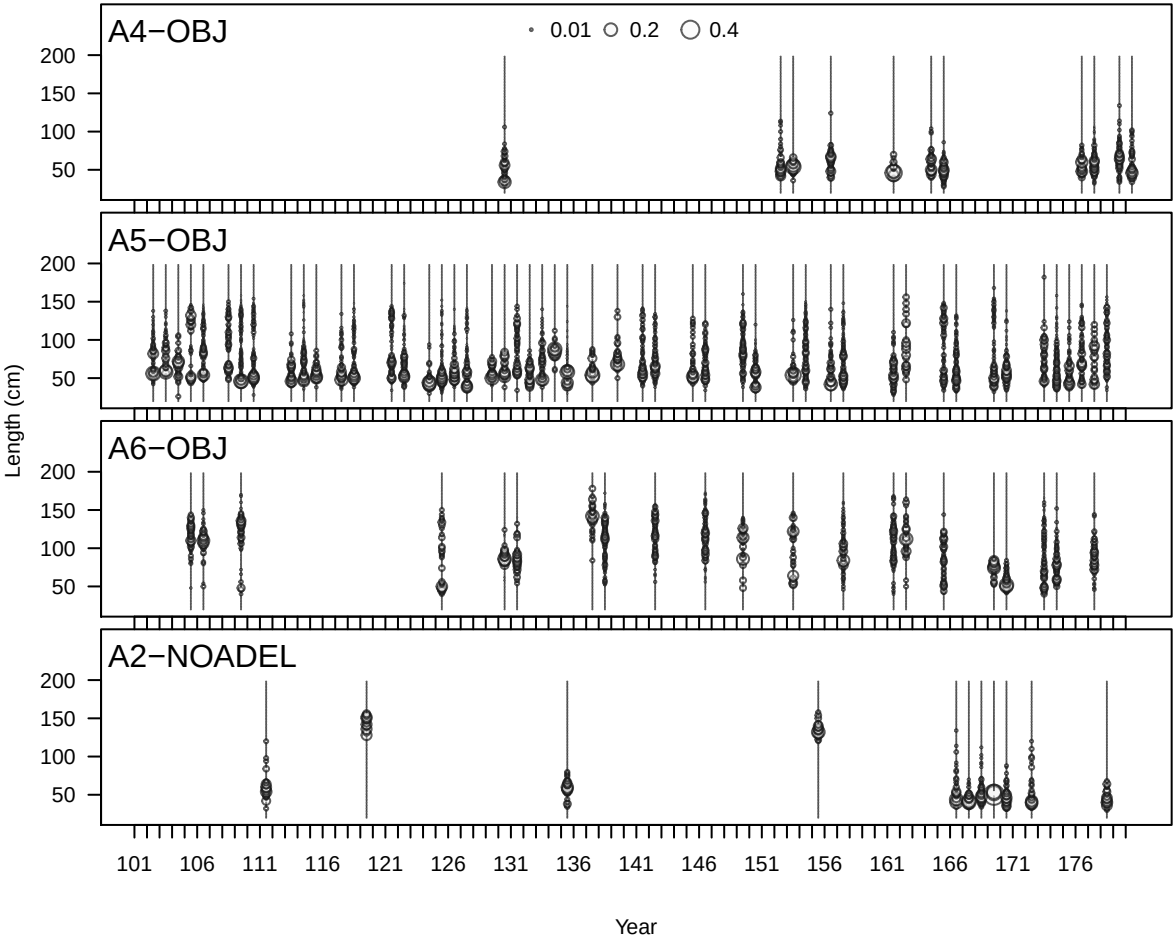

0.01
0.2
200
150
100
50
Length (cm)
126
170
Year

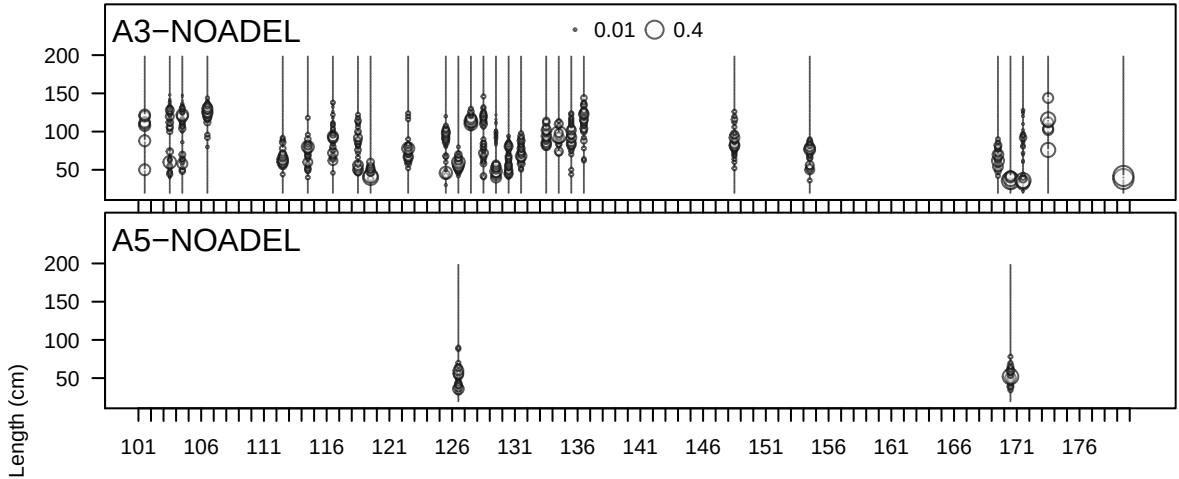

A5−NOADEL (whole catch)
Mean length
100
50
0
130
140
150
160
170
Year

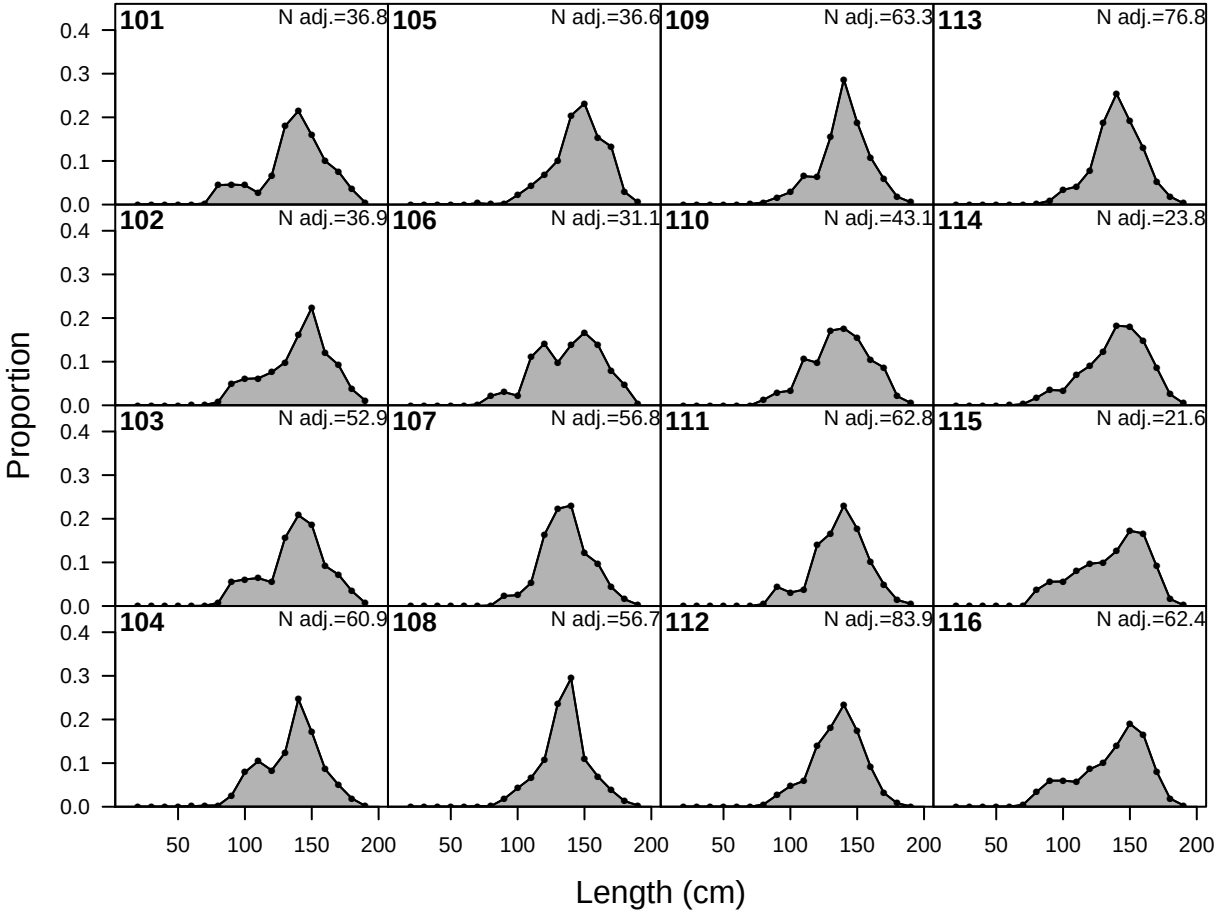

A1−LL−m
Sum of N adj.=44.4
A5−OBJ
Sum of N adj.=134.7
A3−NOADEL
Sum of N adj.=63.1
A5−LL−m
Sum of N adj.=456.4
A2−OBJ
Sum of N adj.=973.2
A6−OBJ
Sum of N adj.=60.1
A5−NOADEL
Sum of N adj.=17.8
A6−LL−m
Sum of N adj.=819.3
A3−OBJ
Sum of N adj.=378.8
A2−NOADEL
Sum of N adj.=5.1
A3−LL−m
Sum of N adj.=576.1
A4−OBJ
Sum of N adj.=104.1
A2−LL−m
Sum of N adj.=1270.9
A4−LL−m
Sum of N adj.=637.4
Proportion
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
50
100
150
200
Length (cm)

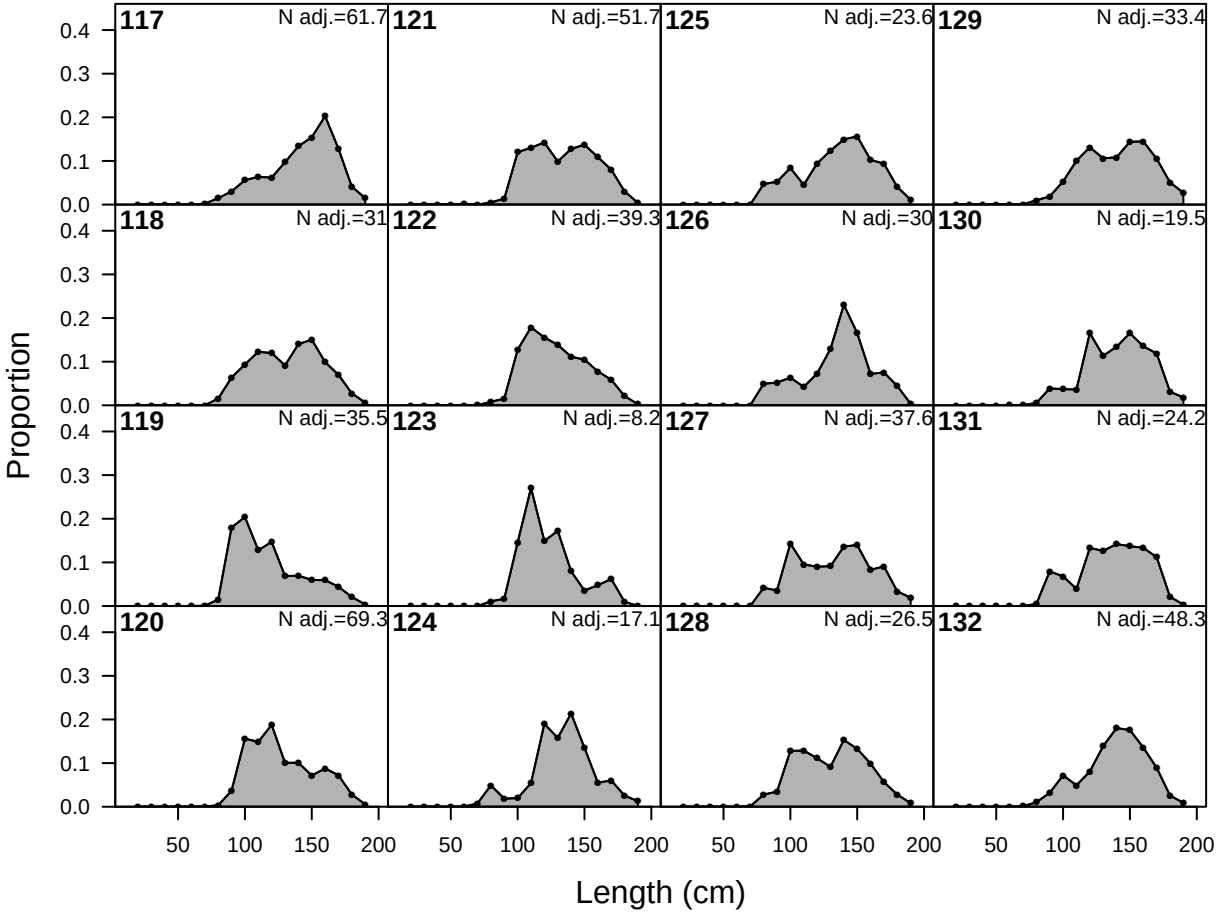

A1−LL−n
0.01
0.15
A2−LL−n
A3−LL−n
A4−LL−n
Length (cm)
50
100
150
200
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

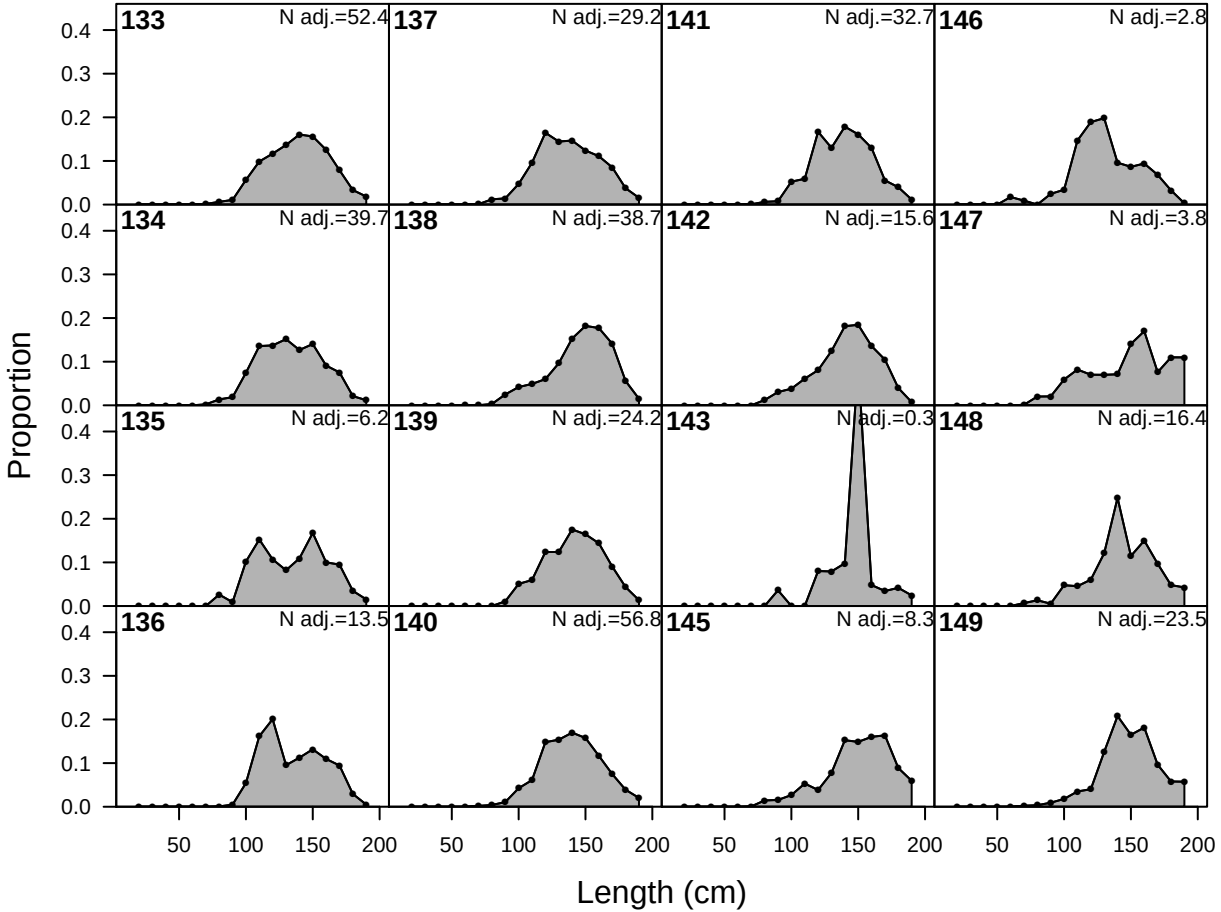

A5−LL−n
0.01
0.2
A6−LL−n
A2−OBJ
A3−OBJ
Length (cm)
50
100
150
200
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

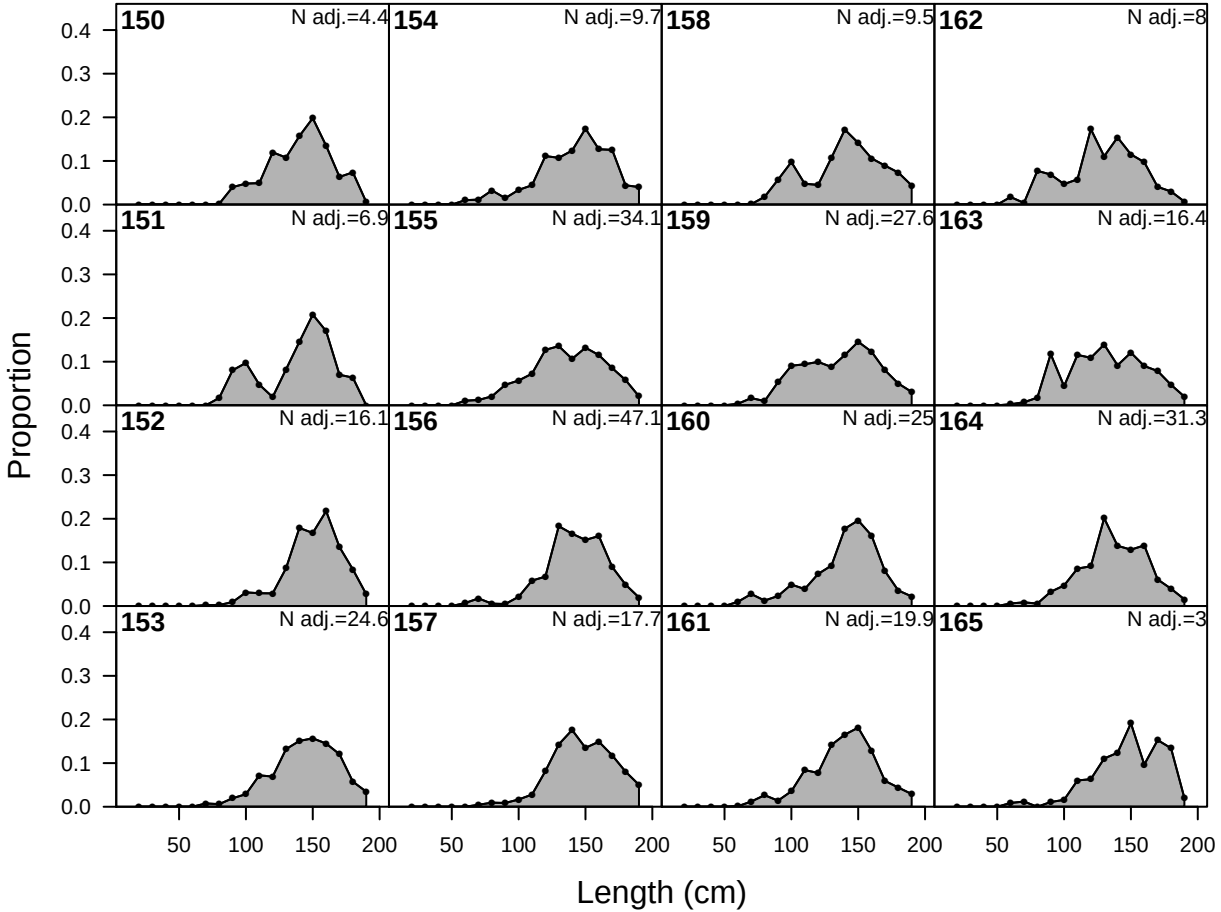

A4−OBJ
0.01
0.2
0.4
A5−OBJ
A6−OBJ
A2−NOADEL
Length (cm)
200
150
100
50
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

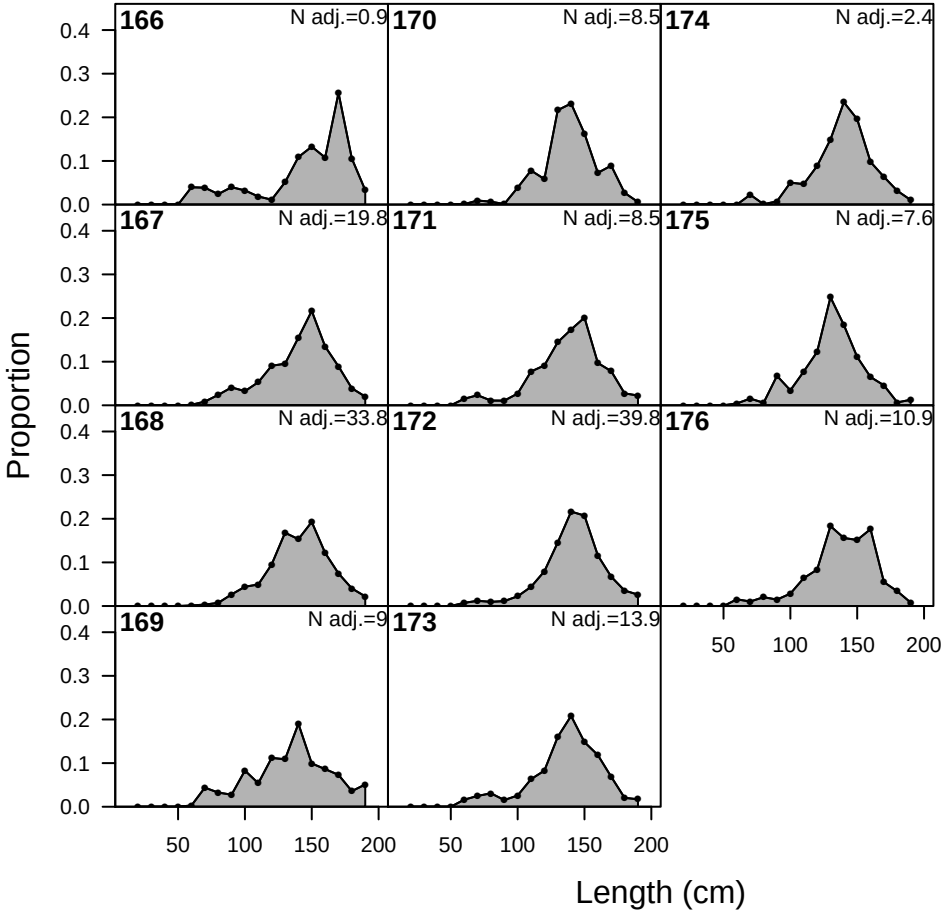

A3−NOADEL
0.01
0.4
200
150
100
50
A5−NOADEL
200
150
100
50
Length (cm)
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

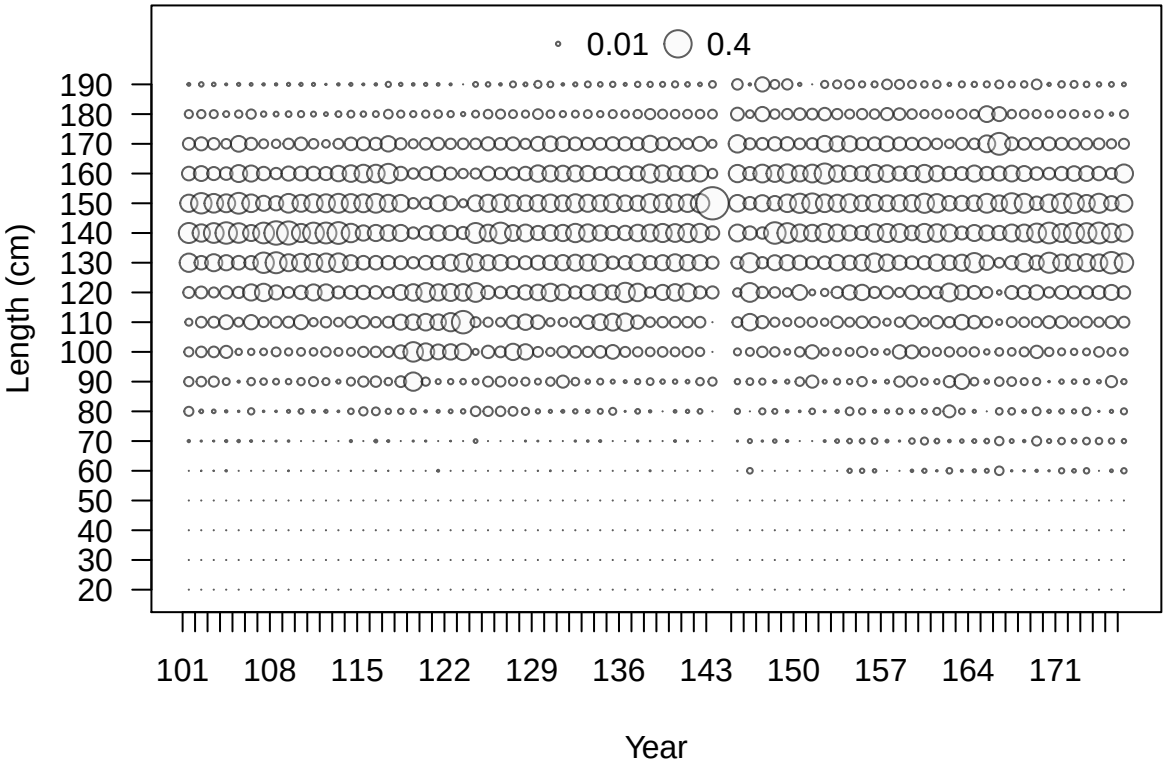

101
N adj.=36.8
105
N adj.=36.6
109
N adj.=63.3
113
N adj.=76.8
102
N adj.=36.9
106
N adj.=31.1
110
N adj.=43.1
114
N adj.=23.8
103
N adj.=52.9
107
N adj.=56.8
111
N adj.=62.8
115
N adj.=21.6
104
N adj.=60.9
108
N adj.=56.7
112
N adj.=83.9
116
N adj.=62.4
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

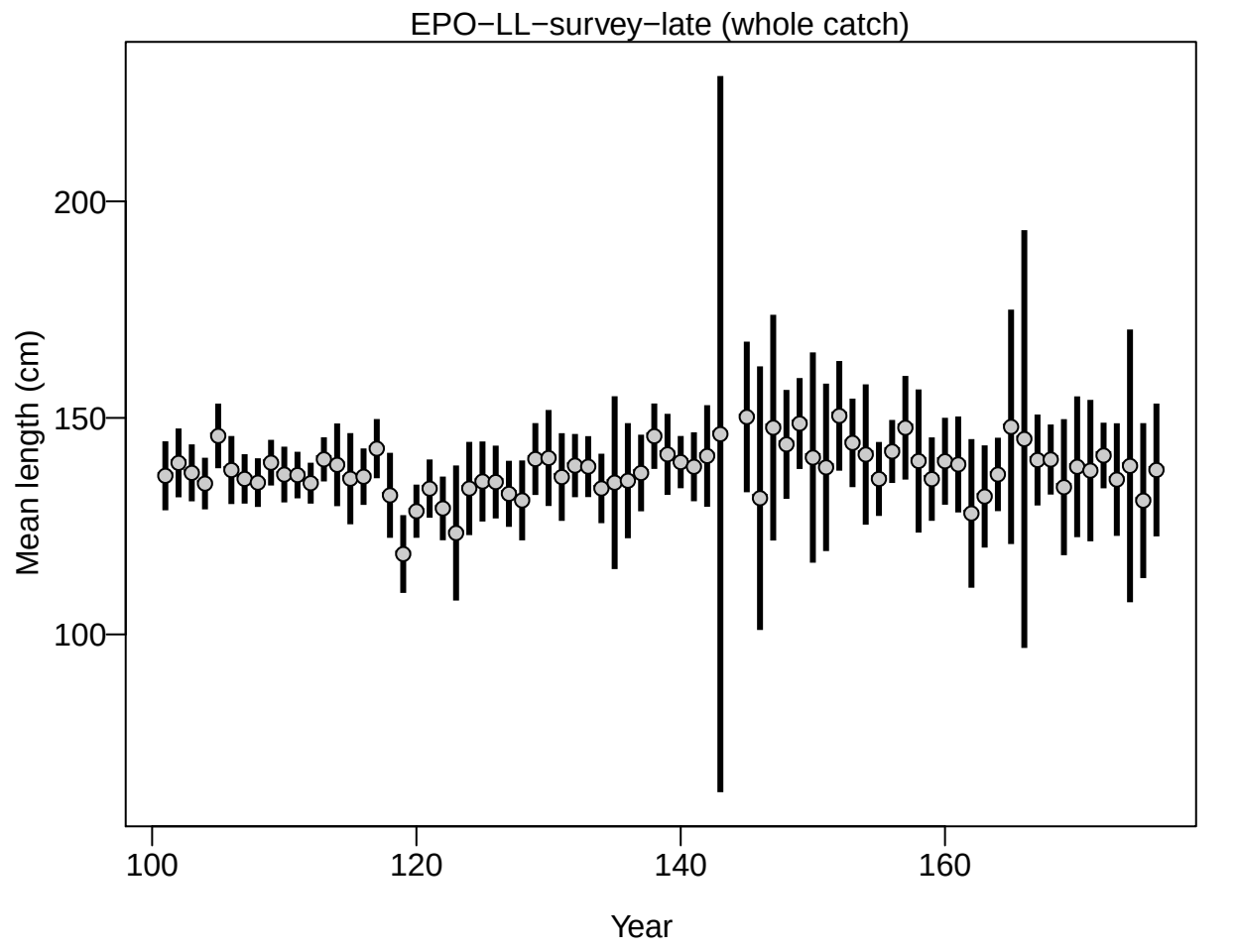

117
N adj.=61.7
121
N adj.=51.7
125
N adj.=23.6
129
N adj.=33.4
118
N adj.=31
122
N adj.=39.3
126
N adj.=30
130
N adj.=19.5
119
N adj.=35.5
123
N adj.=8.2
127
N adj.=37.6
131
N adj.=24.2
120
N adj.=69.3
124
N adj.=17.1
128
N adj.=26.5
132
N adj.=48.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

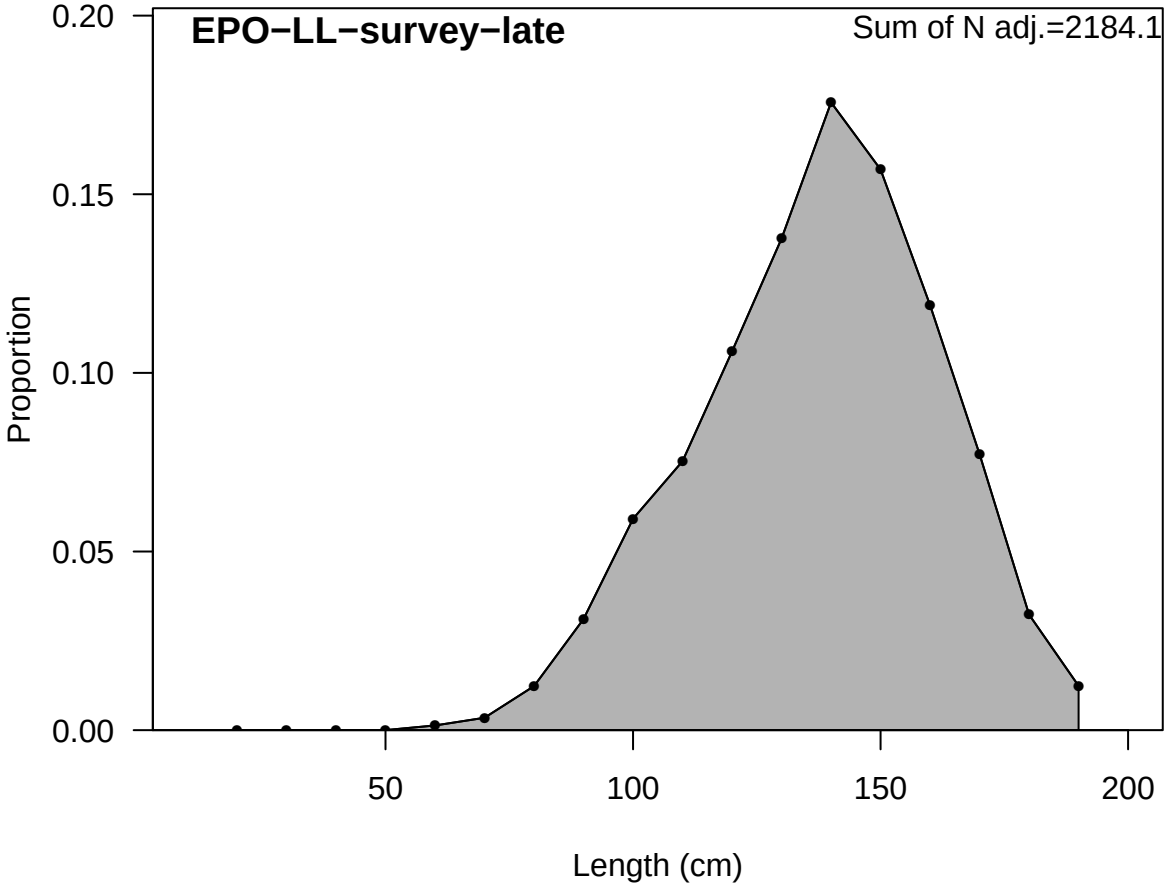

133
N adj.=52.4
137
N adj.=29.2
141
N adj.=32.7
146
N adj.=2.8
134
N adj.=39.7
138
N adj.=38.7
142
N adj.=15.6
147
N adj.=3.8
135
N adj.=6.2
139
N adj.=24.2
143
N adj.=0.3
148
N adj.=16.4
136
N adj.=13.5
140
N adj.=56.8
145
N adj.=8.3
149
N adj.=23.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

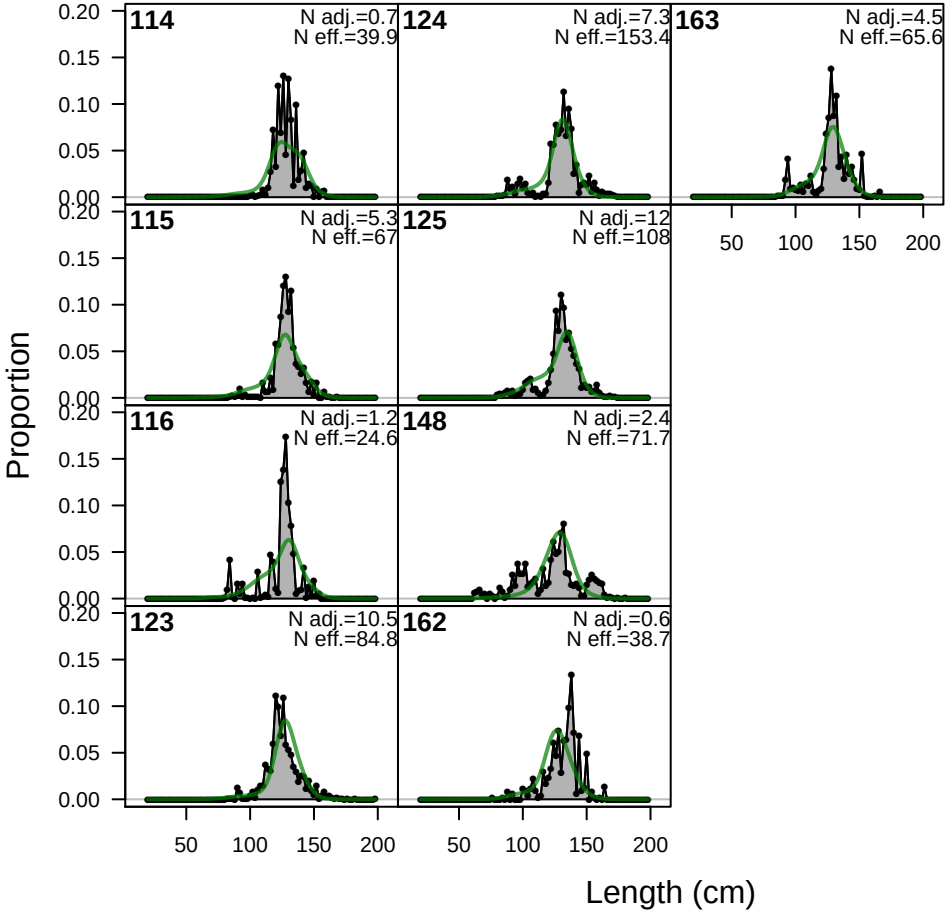

150
N adj.=4.4
154
N adj.=9.7
158
N adj.=9.5
162
N adj.=8
151
N adj.=6.9
155
N adj.=34.1
159
N adj.=27.6
163
N adj.=16.4
152
N adj.=16.1
156
N adj.=47.1
160
N adj.=25
164
N adj.=31.3
153
N adj.=24.6
157
N adj.=17.7
161
N adj.=19.9
165
N adj.=3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

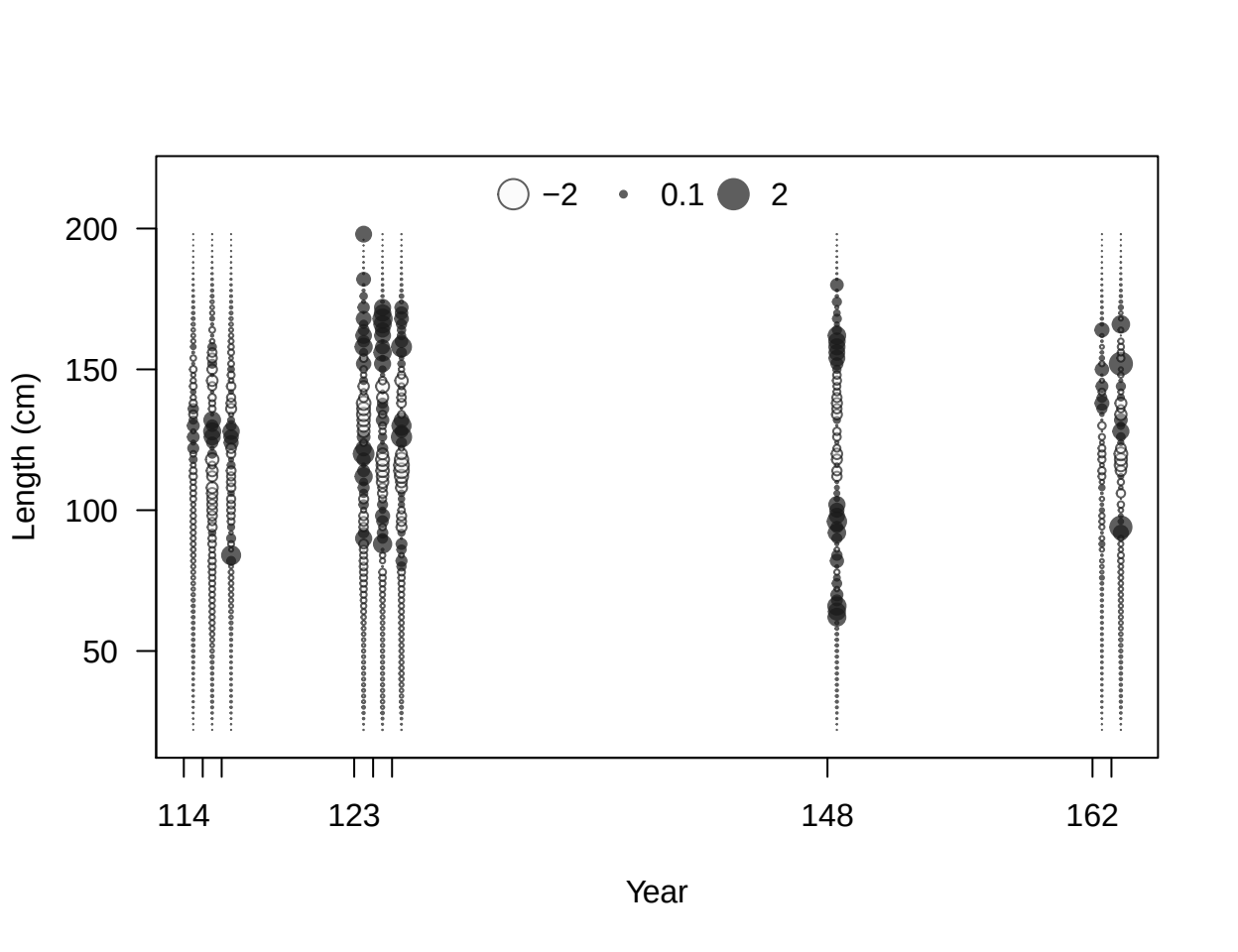

166
N adj.=0.9
170
N adj.=8.5
174
N adj.=2.4
167
N adj.=19.8
171
N adj.=8.5
175
N adj.=7.6
168
N adj.=33.8
172
N adj.=39.8
176
N adj.=10.9
169
N adj.=9
173
N adj.=13.9
Proportion
Length (cm)
0.0
0.1
0.2
0.3
0.4
50
100
150
200

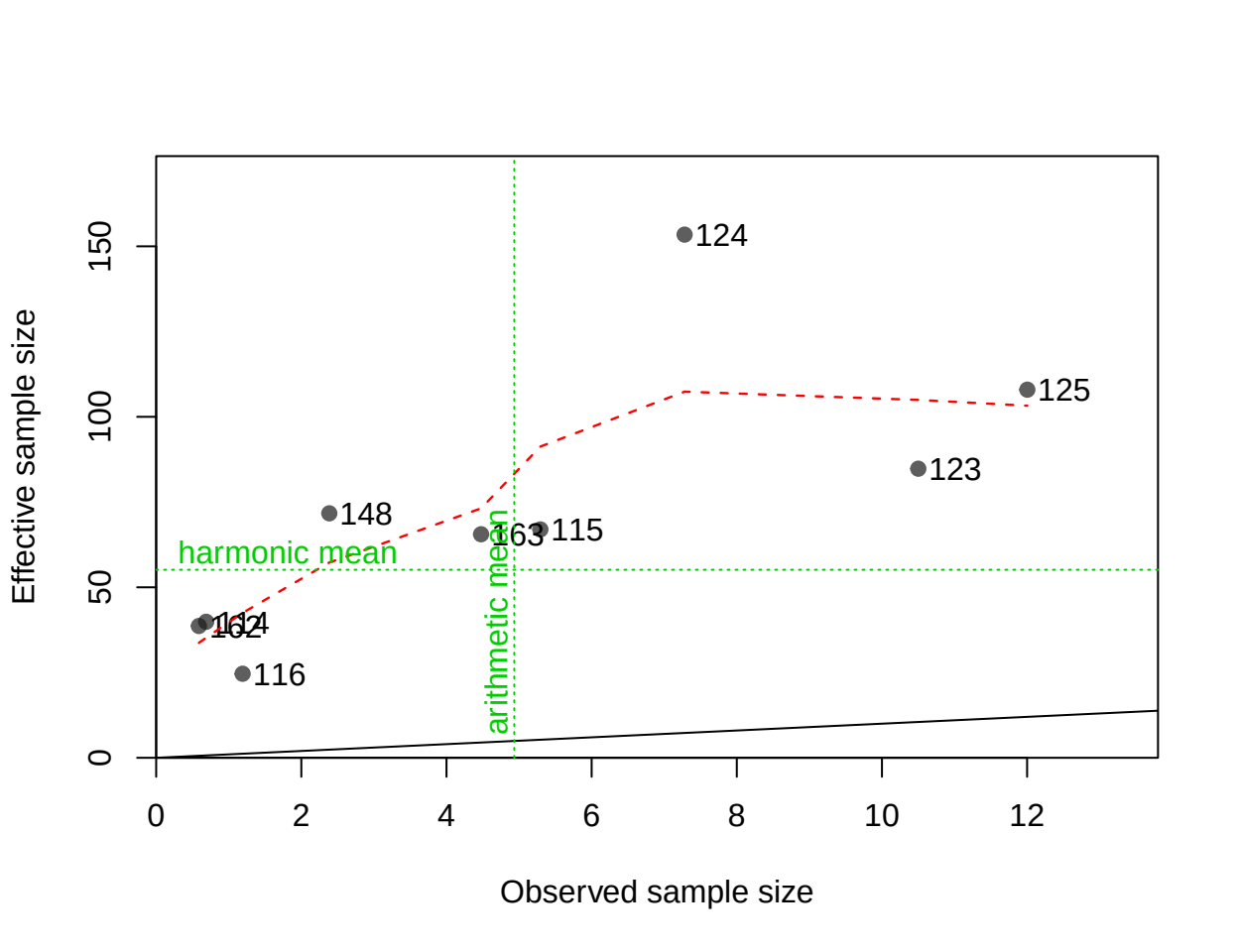

0.01
0.4
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
Year

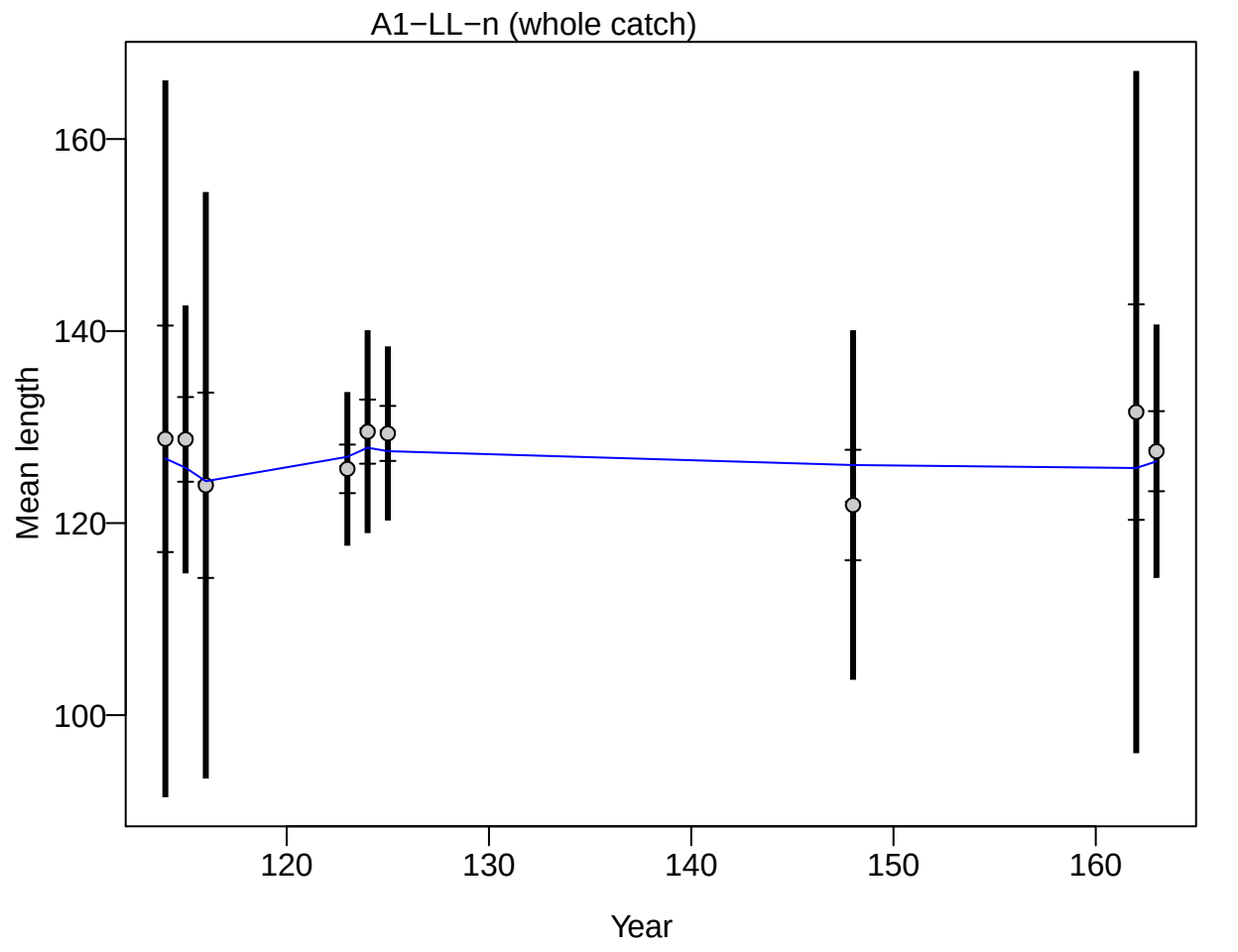

EPO−LL−survey−late (whole catch)
Mean length (cm)
200
150
100
100
120
140
160
Year

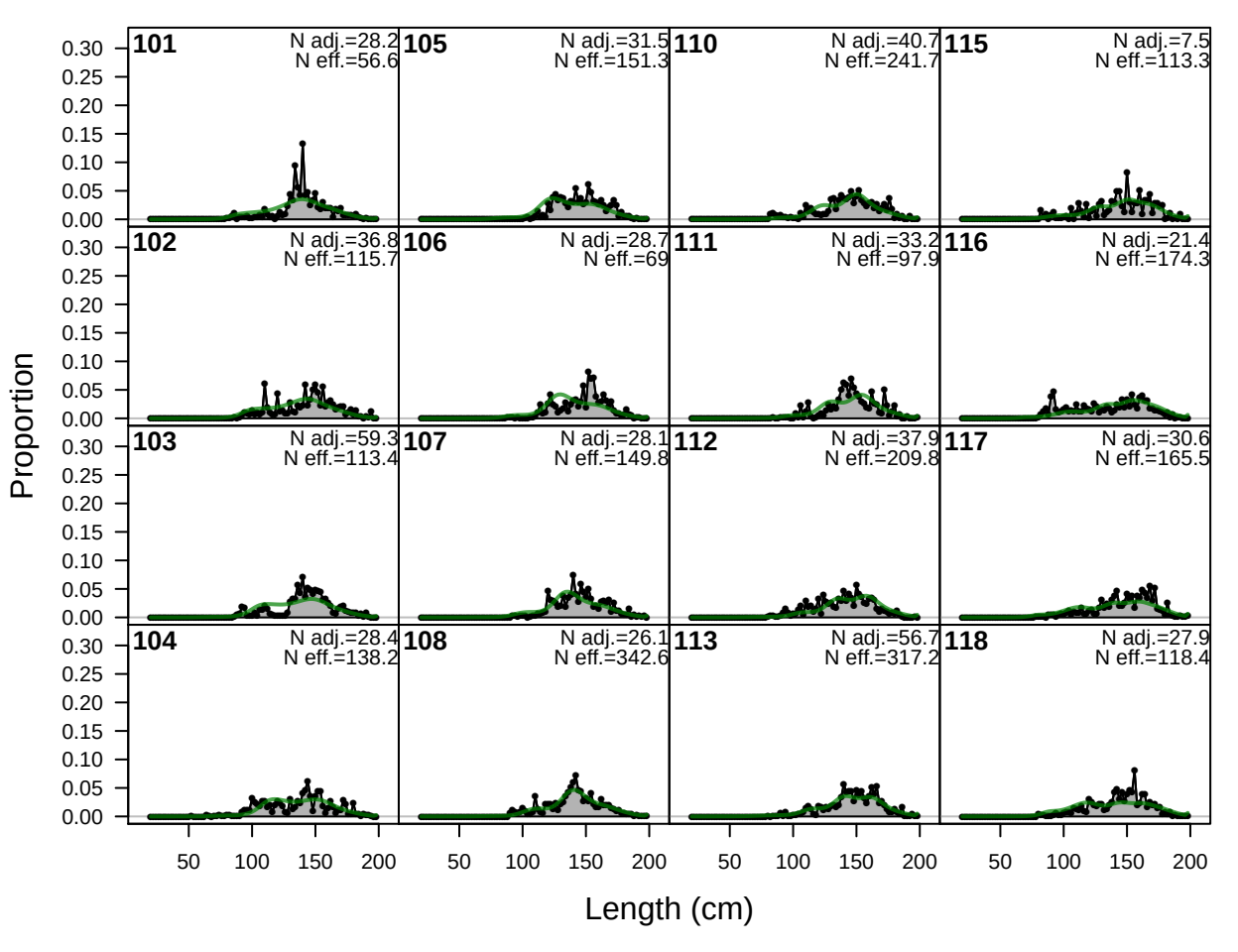

EPO−LL−survey−late
Sum of N adj.=2184.1
0.20
0.15
0.10
0.05
0.00
Proportion
50
100
150
200
Length (cm)

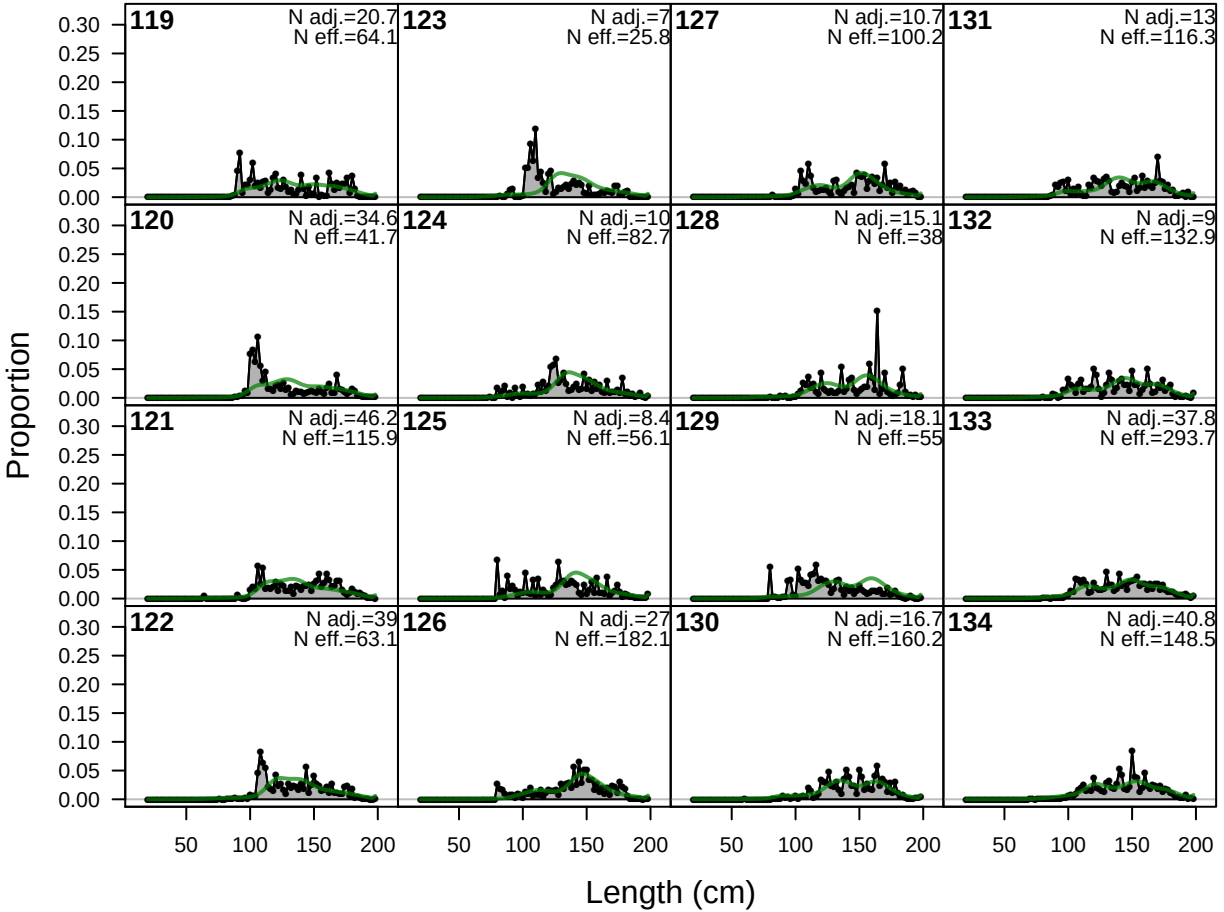

114
N adj.=0.7
N eff.=39.9
124
N adj.=7.3
N eff.=153.4
163
N adj.=4.5
N eff.=65.6
115
N adj.=5.3
N eff.=67
125
N adj.=12
N eff.=108
116
N adj.=1.2
N eff.=24.6
148
N adj.=2.4
N eff.=71.7
123
N adj.=10.5
N eff.=84.8
162
N adj.=0.6
N eff.=38.7
Proportion
0.00
0.05
0.10
0.15
0.20
50
100
150
200
Length (cm)

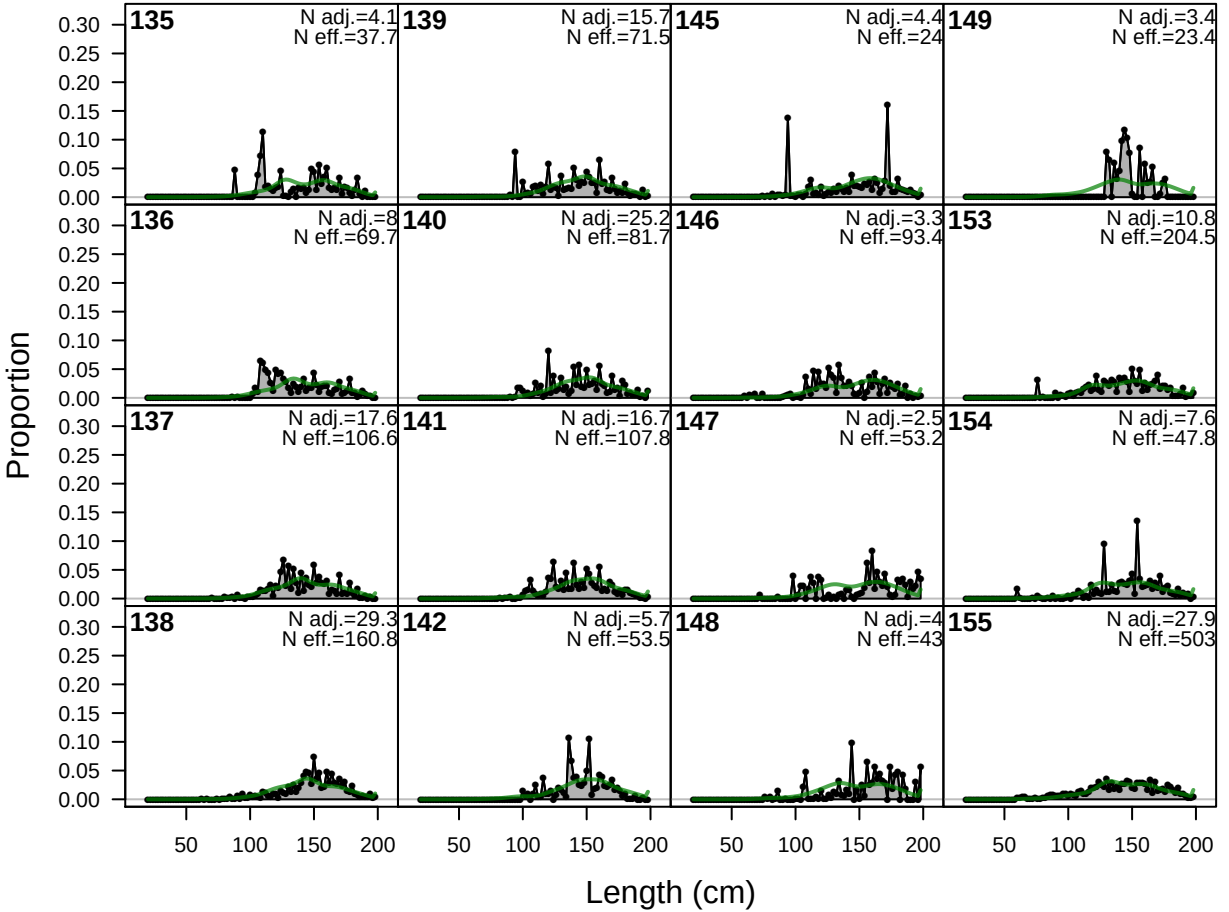

−2
0.1
2
200
150
100
50
Length (cm)
114
123
148
162
Year

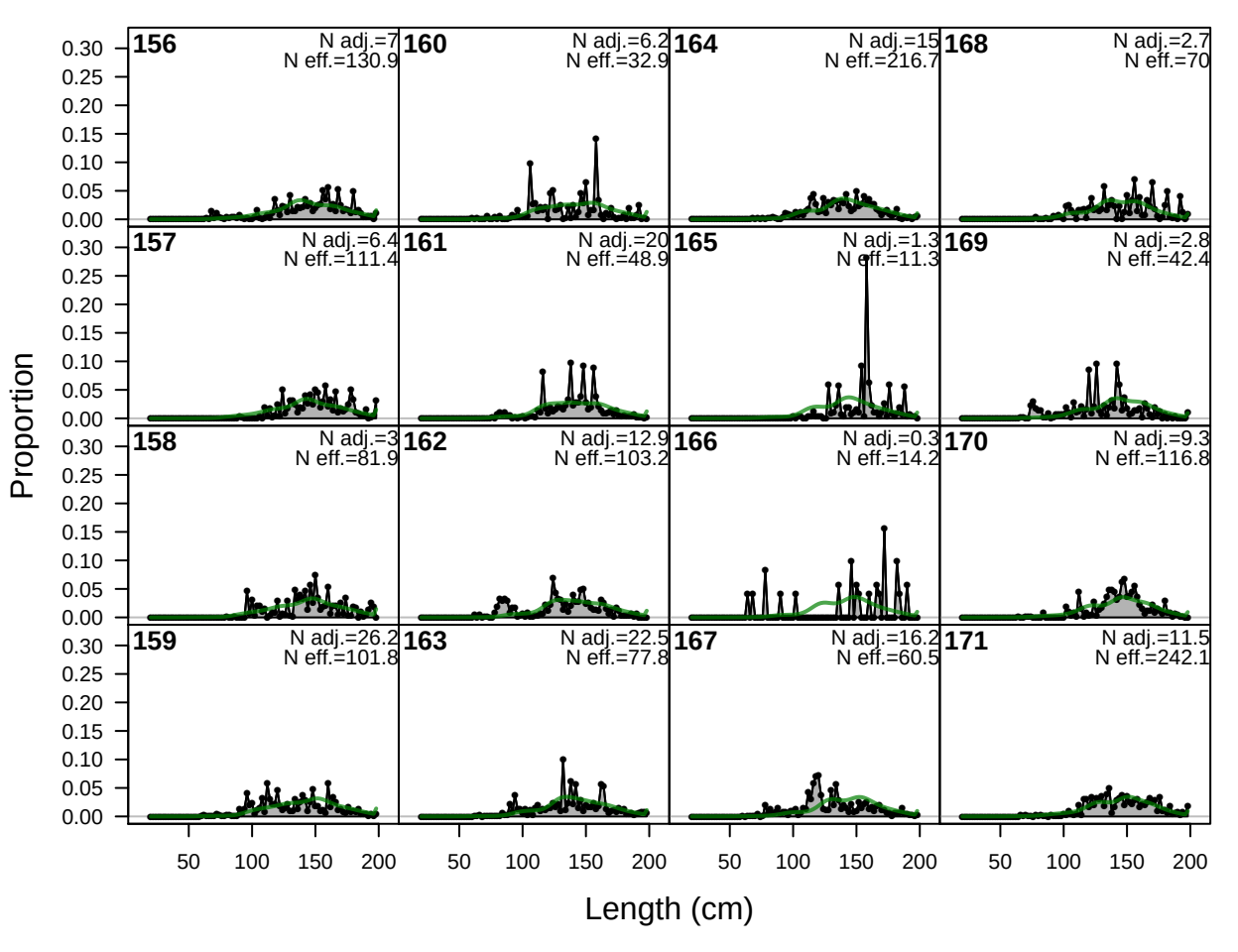

Effective sample size
Observed sample size
0
50
100
150
0
2
4
6
8
10
12
124
125
123
148
115
116
harmonic mean
arithmetic mean

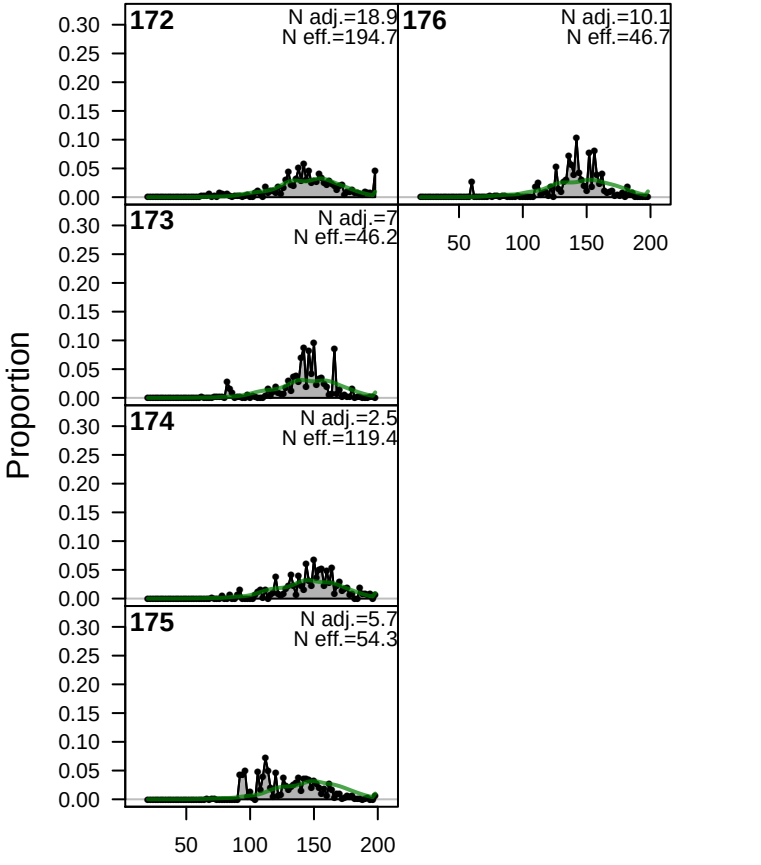

A1−LL−n (whole catch)
Mean length
160
140
120
100
120
130
140
150
160
Year

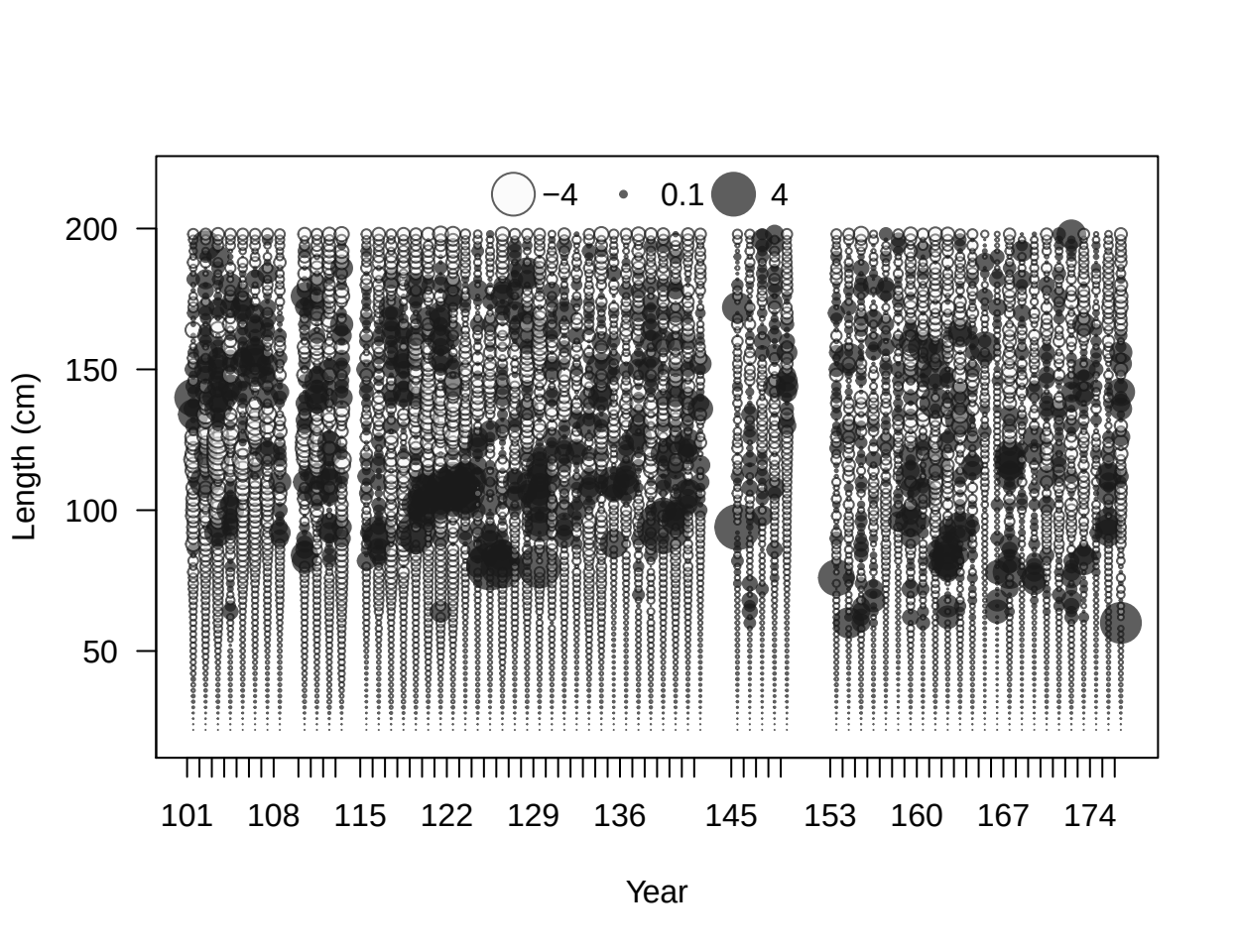

101
N adj.=28.2
N eff.=56.6
105
N adj.=31.5
N eff.=151.3
110
N adj.=40.7
N eff.=241.7
115
N adj.=7.5
N eff.=113.3
102
N adj.=36.8
N eff.=115.7
106
N adj.=28.7
N eff.=69
111
N adj.=33.2
N eff.=97.9
116
N adj.=21.4
N eff.=174.3
103
N adj.=59.3
N eff.=113.4
107
N adj.=28.1
N eff.=149.8
112
N adj.=37.9
N eff.=209.8
117
N adj.=30.6
N eff.=165.5
104
N adj.=28.4
N eff.=138.2
108
N adj.=26.1
N eff.=342.6
113
N adj.=56.7
N eff.=317.2
118
N adj.=27.9
N eff.=118.4
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

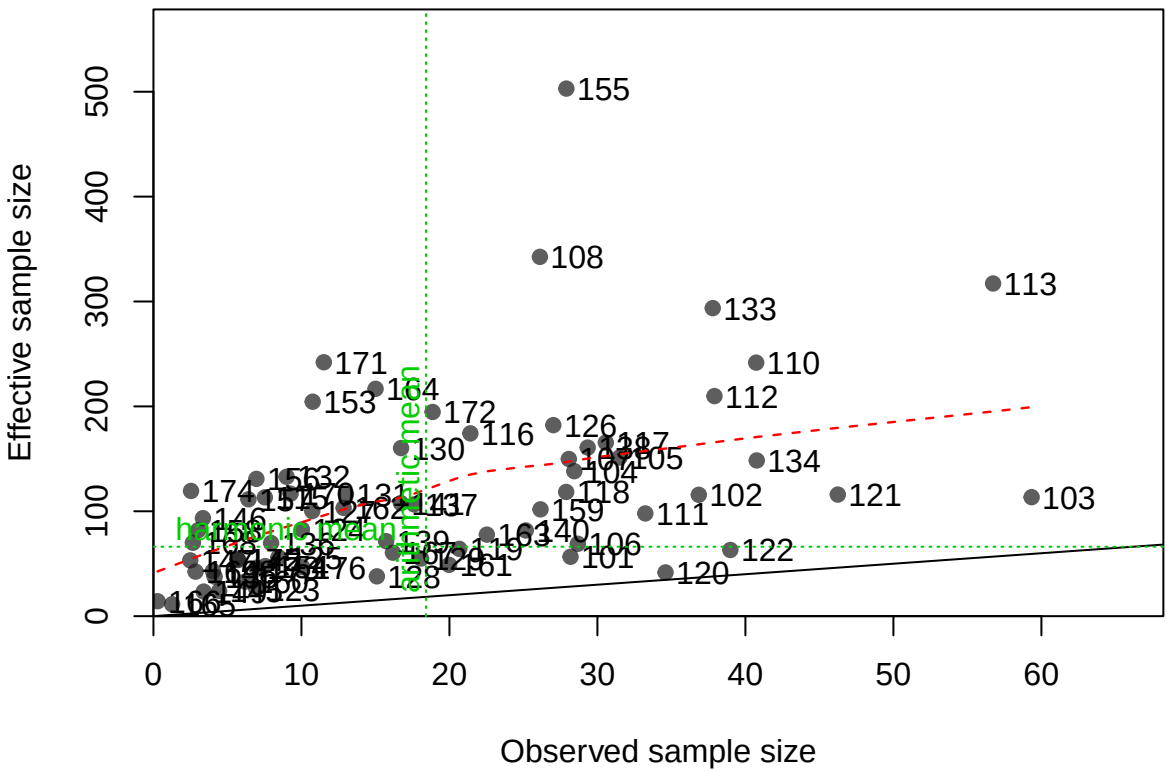

119
N adj.=20.7
N eff.=64.1
123
N adj.=7
N eff.=25.8
127
N adj.=10.7
N eff.=100.2
131
N adj.=13
N eff.=116.3
120
N adj.=34.6
N eff.=41.7
124
N adj.=10
N eff.=82.7
128
N adj.=15.1
N eff.=38
132
N adj.=9
N eff.=132.9
121
N adj.=46.2
N eff.=115.9
125
N adj.=8.4
N eff.=56.1
129
N adj.=18.1
N eff.=55
133
N adj.=37.8
N eff.=293.7
122
N adj.=39
N eff.=63.1
126
N adj.=27
N eff.=182.1
130
N adj.=16.7
N eff.=160.2
134
N adj.=40.8
N eff.=148.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


135
N adj.=4.1
N eff.=37.7
139
N adj.=15.7
N eff.=71.5
145
N adj.=4.4
N eff.=24
149
N adj.=3.4
N eff.=23.4
136
N adj.=8
N eff.=69.7
140
N adj.=25.2
N eff.=81.7
146
N adj.=3.3
N eff.=93.4
153
N adj.=10.8
N eff.=204.5
137
N adj.=17.6
N eff.=106.6
141
N adj.=16.7
N eff.=107.8
147
N adj.=2.5
N eff.=53.2
154
N adj.=7.6
N eff.=47.8
138
N adj.=29.3
N eff.=160.8
142
N adj.=5.7
N eff.=53.5
148
N adj.=4
N eff.=43
155
N adj.=27.9
N eff.=503
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

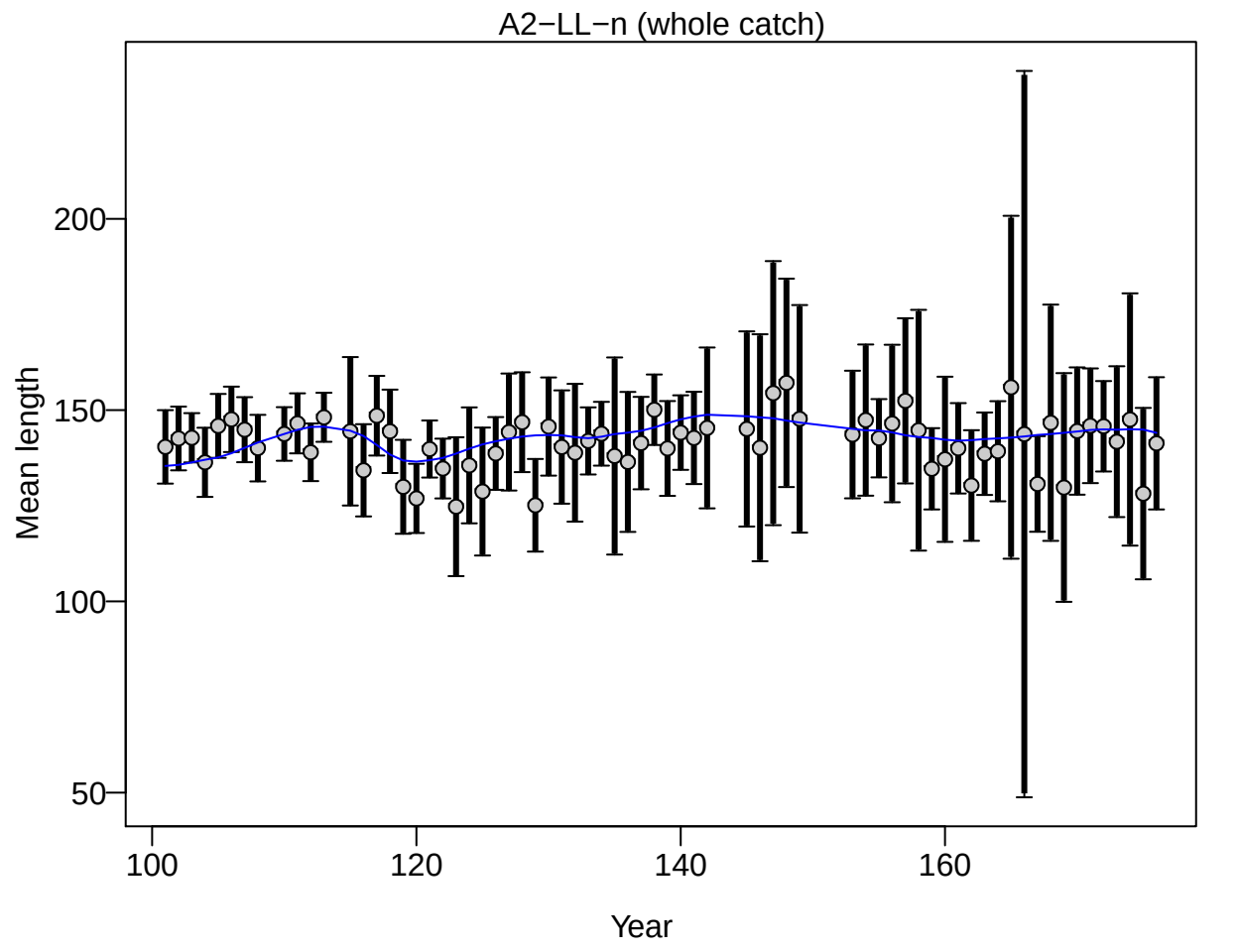

156
N adj.=7
N eff.=130.9
160
N adj.=6.2
N eff.=32.9
164
N adj.=15
N eff.=216.7
168
N adj.=2.7
N eff.=70
157
N adj.=6.4
N eff.=111.4
161
N adj.=20
N eff.=48.9
165
N adj.=1.3
N eff.=11.3
169
N adj.=2.8
N eff.=42.4
158
N adj.=3
N eff.=81.9
162
N adj.=12.9
N eff.=103.2
166
N adj.=0.3
N eff.=14.2
170
N adj.=9.3
N eff.=116.8
159
N adj.=26.2
N eff.=101.8
163
N adj.=22.5
N eff.=77.8
167
N adj.=16.2
N eff.=60.5
171
N adj.=11.5
N eff.=242.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

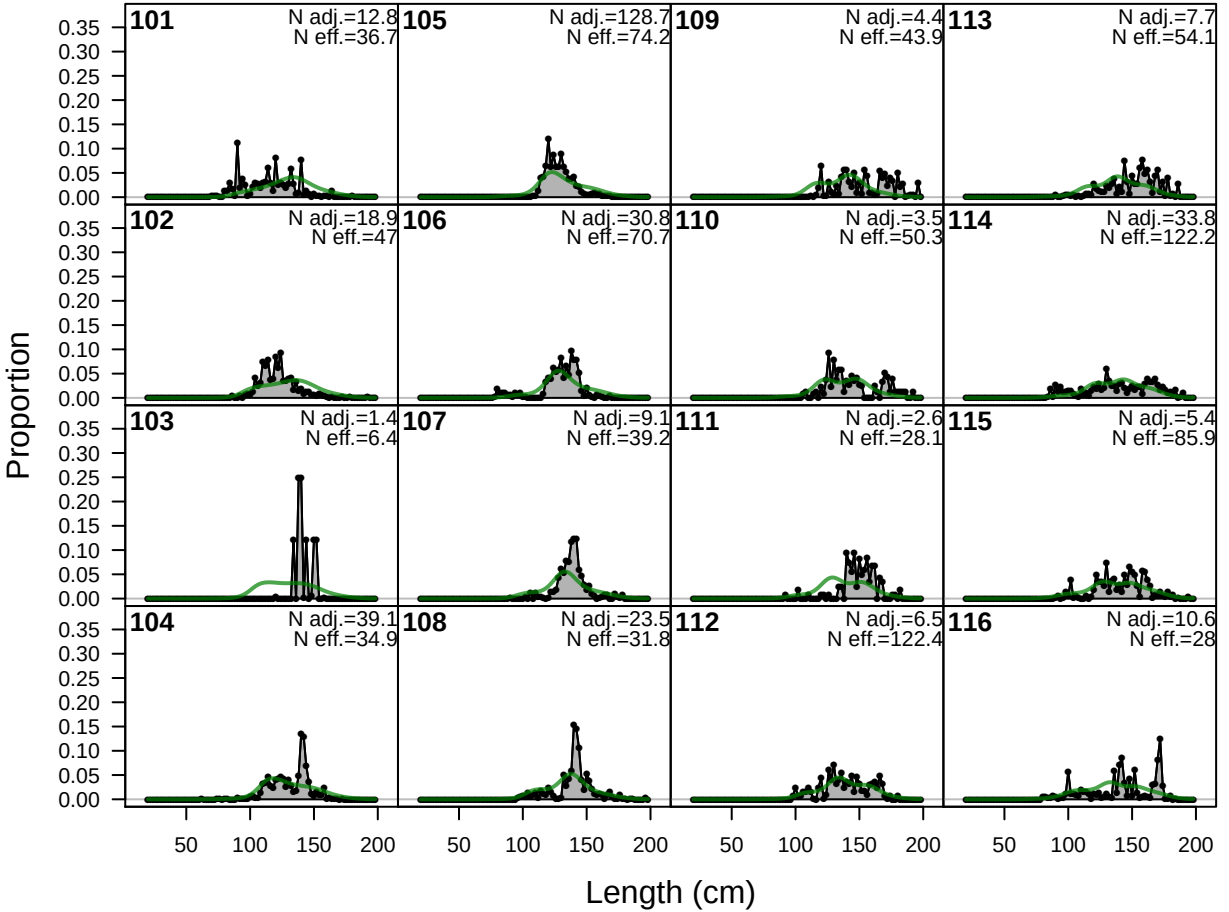

172
N adj.=18.9
N eff.=194.7
176
N adj.=10.1
N eff.=46.7
173
N adj.=7
N eff.=46.2
174
N adj.=2.5
N eff.=119.4
175
N adj.=5.7
N eff.=54.3
Proportion
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

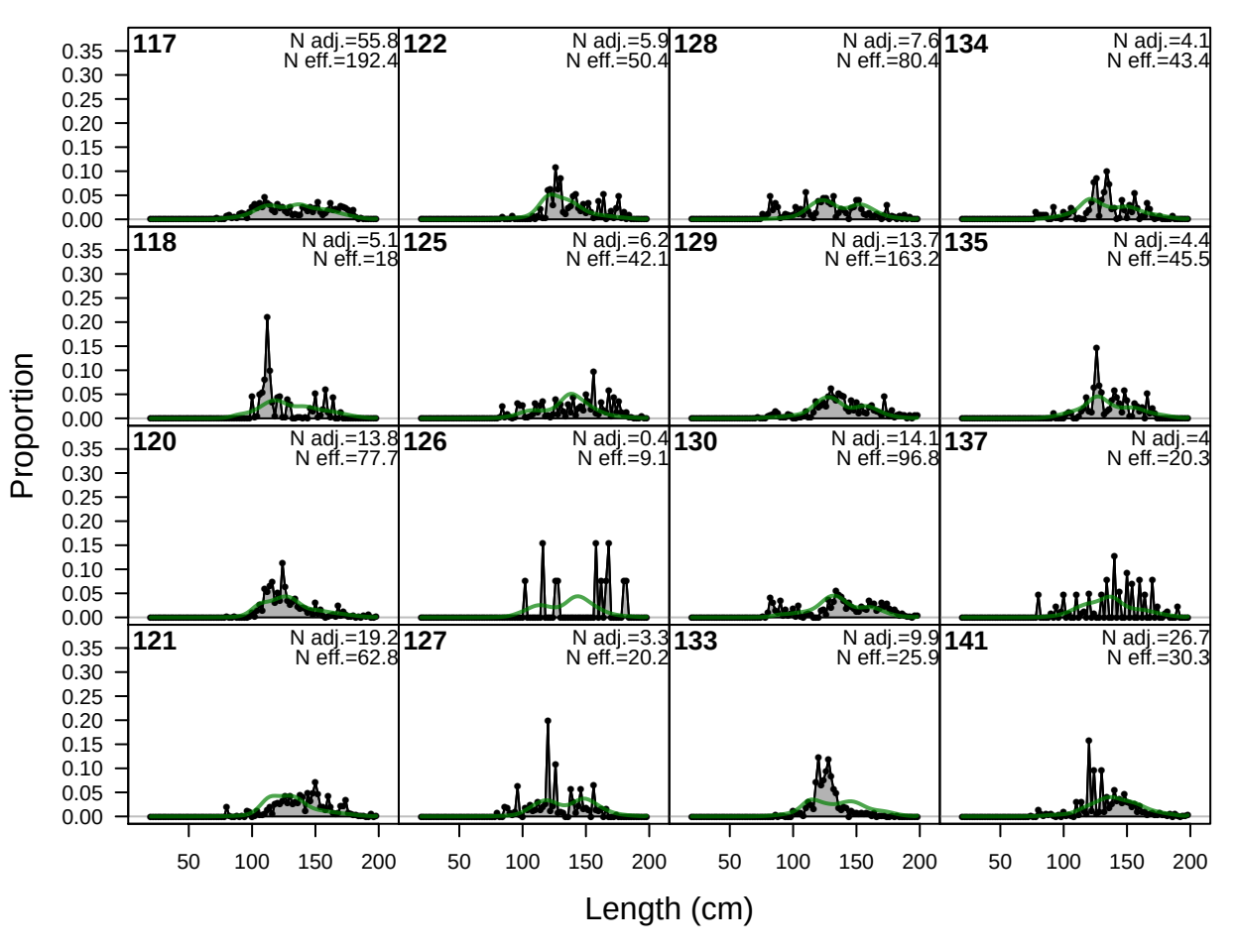

−4
0.1
4
200
150
100
50
Length (cm)
101
108
115
122
129
136
145
153
160
167
174
Year

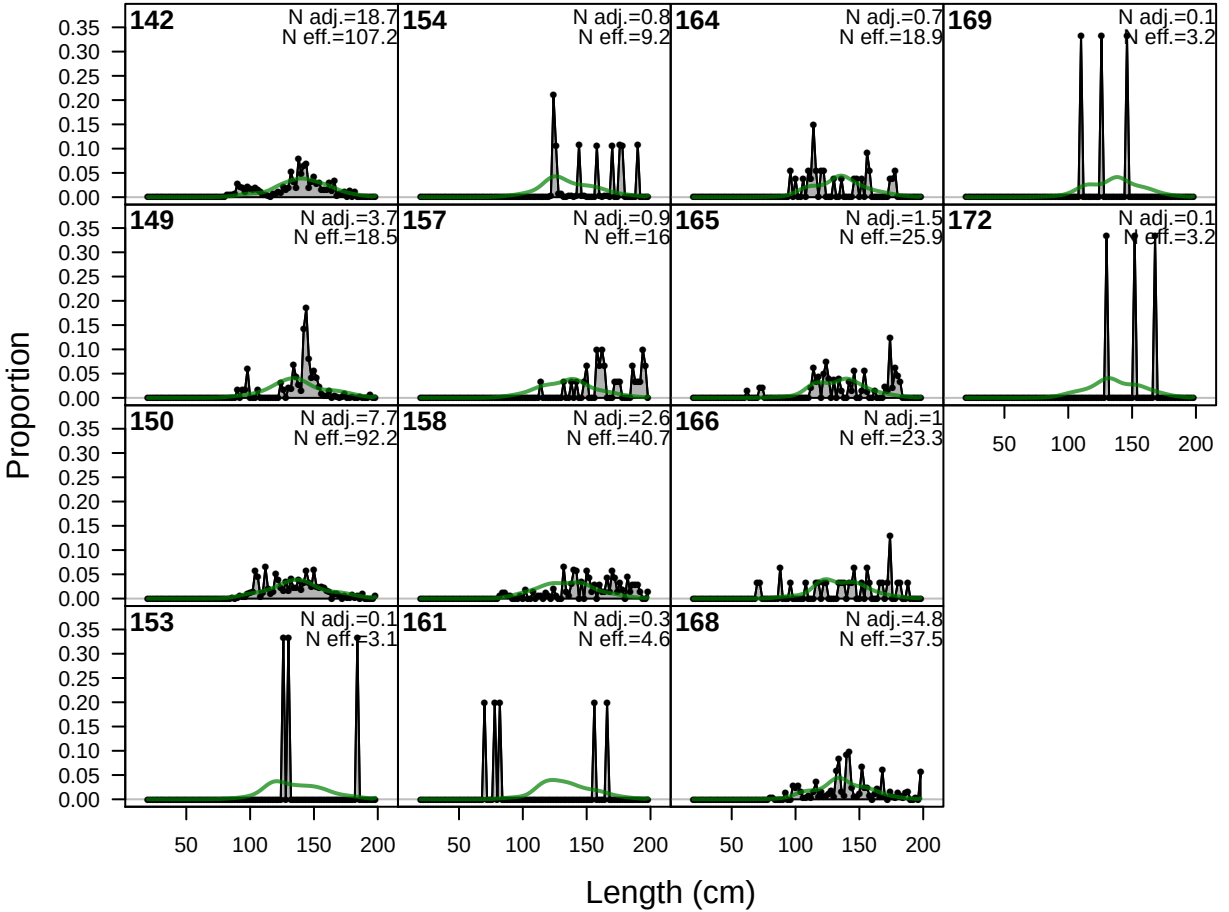


Effective sample size
Observed sample size
0
100
200
300
400
500
0
10
20
30
40
50
60
155
108
113
133
110
112
171
153
172
116
126
130
134
102
121
103
111
122
120
101
106
159
118
104
105
174
146


A2−LL−n (whole catch)
Mean length
200
150
100
50
100
120
140
160
Year


101
N adj.=12.8
N eff.=36.7
105
N adj.=128.7
N eff.=74.2
109
N adj.=4.4
N eff.=43.9
113
N adj.=7.7
N eff.=54.1
102
N adj.=18.9
N eff.=47
106
N adj.=30.8
N eff.=70.7
110
N adj.=3.5
N eff.=50.3
114
N adj.=33.8
N eff.=122.2
103
N adj.=1.4
N eff.=6.4
107
N adj.=9.1
N eff.=39.2
111
N adj.=2.6
N eff.=28.1
115
N adj.=5.4
N eff.=85.9
104
N adj.=39.1
N eff.=34.9
108
N adj.=23.5
N eff.=31.8
112
N adj.=6.5
N eff.=122.4
116
N adj.=10.6
N eff.=28
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


117
N adj.=55.8
N eff.=192.4
122
N adj.=5.9
N eff.=50.4
128
N adj.=7.6
N eff.=80.4
134
N adj.=4.1
N eff.=43.4
118
N adj.=5.1
N eff.=18
125
N adj.=6.2
N eff.=42.1
129
N adj.=13.7
N eff.=163.2
135
N adj.=4.4
N eff.=45.5
120
N adj.=13.8
N eff.=77.7
126
N adj.=0.4
N eff.=9.1
130
N adj.=14.1
N eff.=96.8
137
N adj.=4
N eff.=20.3
121
N adj.=19.2
N eff.=62.8
127
N adj.=3.3
N eff.=20.2
133
N adj.=9.9
N eff.=25.9
141
N adj.=26.7
N eff.=30.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)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N adj.=18.7
N eff.=107.2
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N eff.=9.2
164
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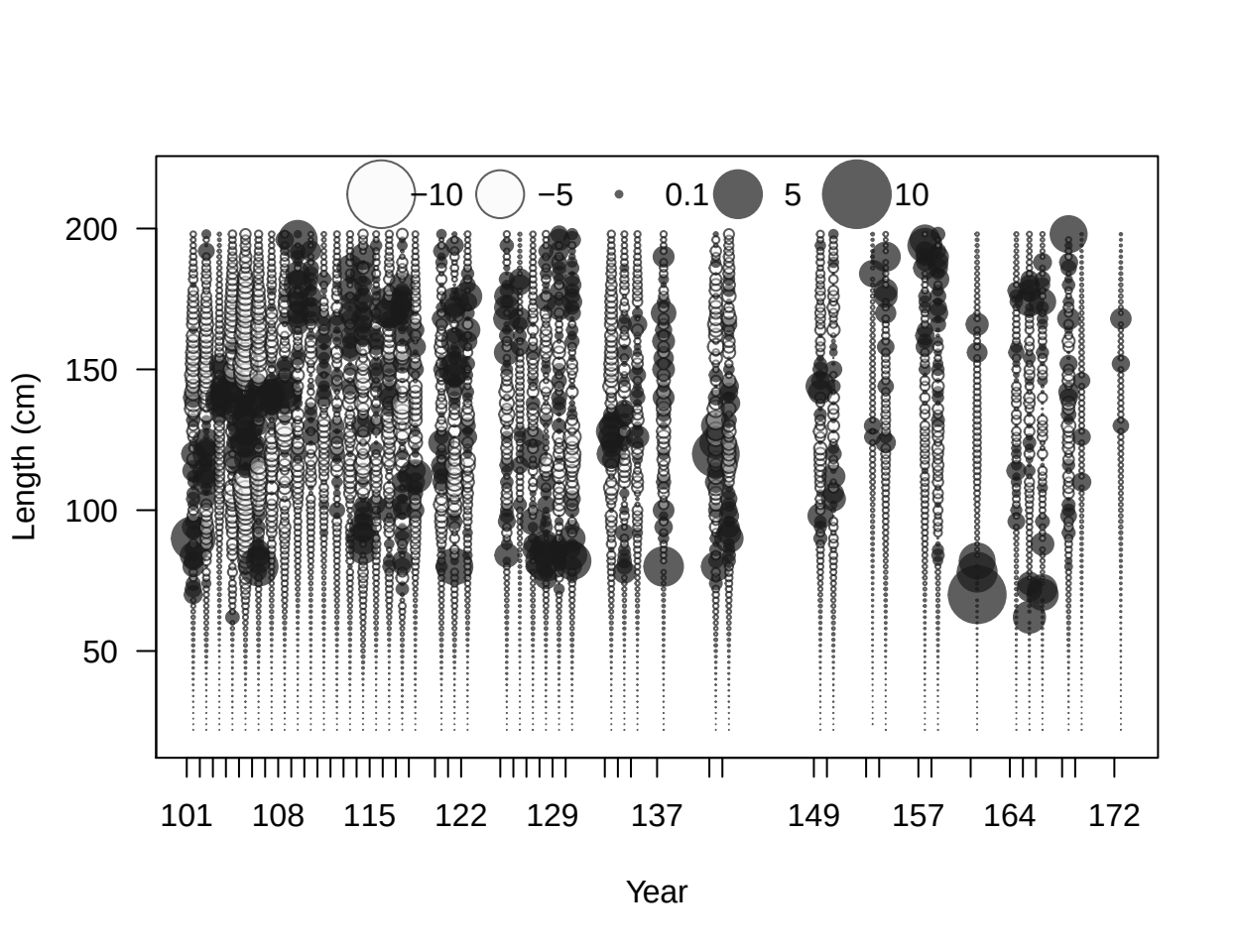
N eff.=18.9
169
N adj.=0.1
N eff.=3.2
149
N adj.=3.7
N eff.=18.5
157
N adj.=0.9
N eff.=16
165
N adj.=1.5
N eff.=25.9
172
N adj.=0.1
N eff.=3.2
150
N adj.=7.7
N eff.=92.2
158
N adj.=2.6
N eff.=40.7
166
N adj.=1
N eff.=23.3
153
N adj.=0.1
N eff.=3.1
161
N adj.=0.3
N eff.=4.6
168
N adj.=4.8
N eff.=37.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


−10
−5
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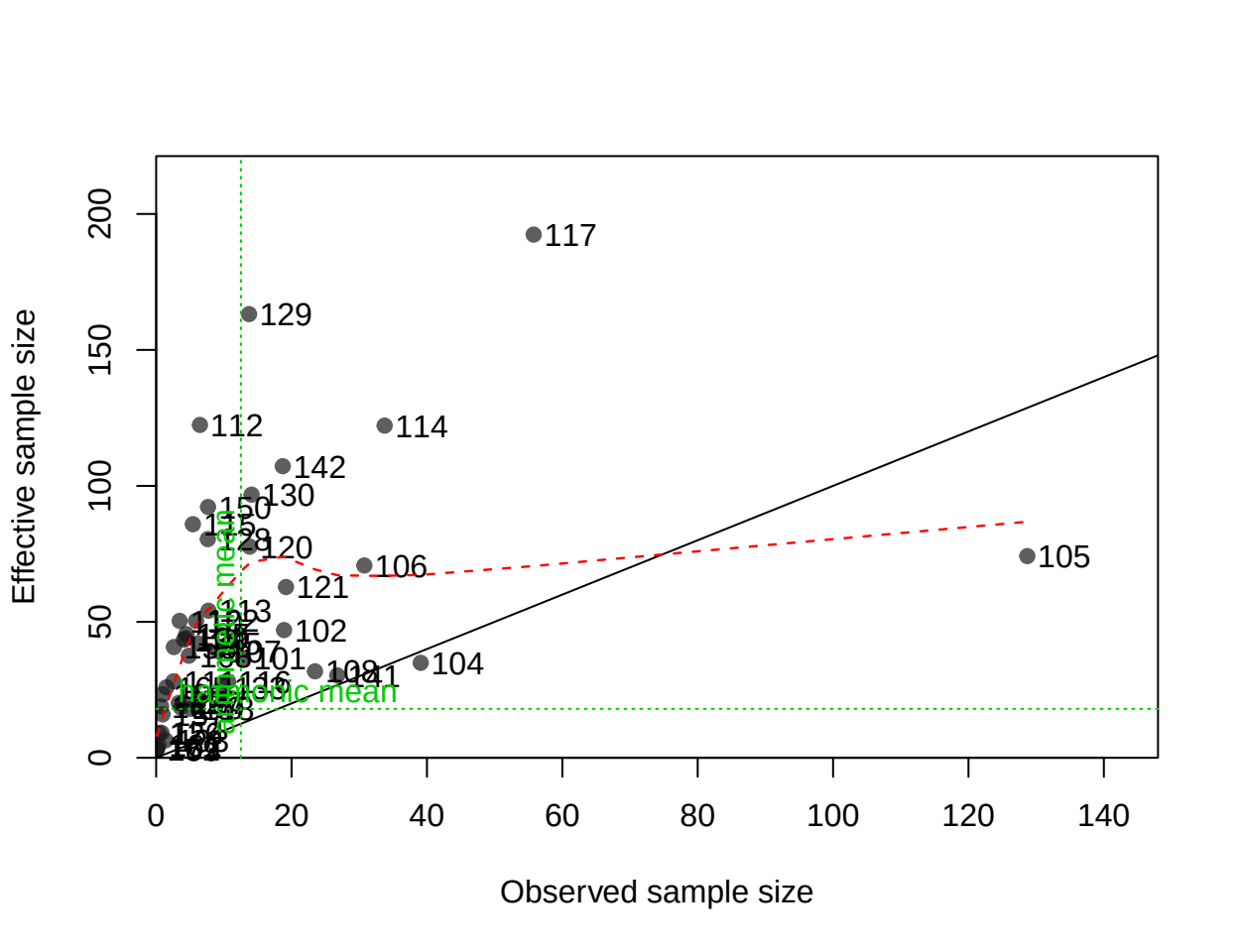
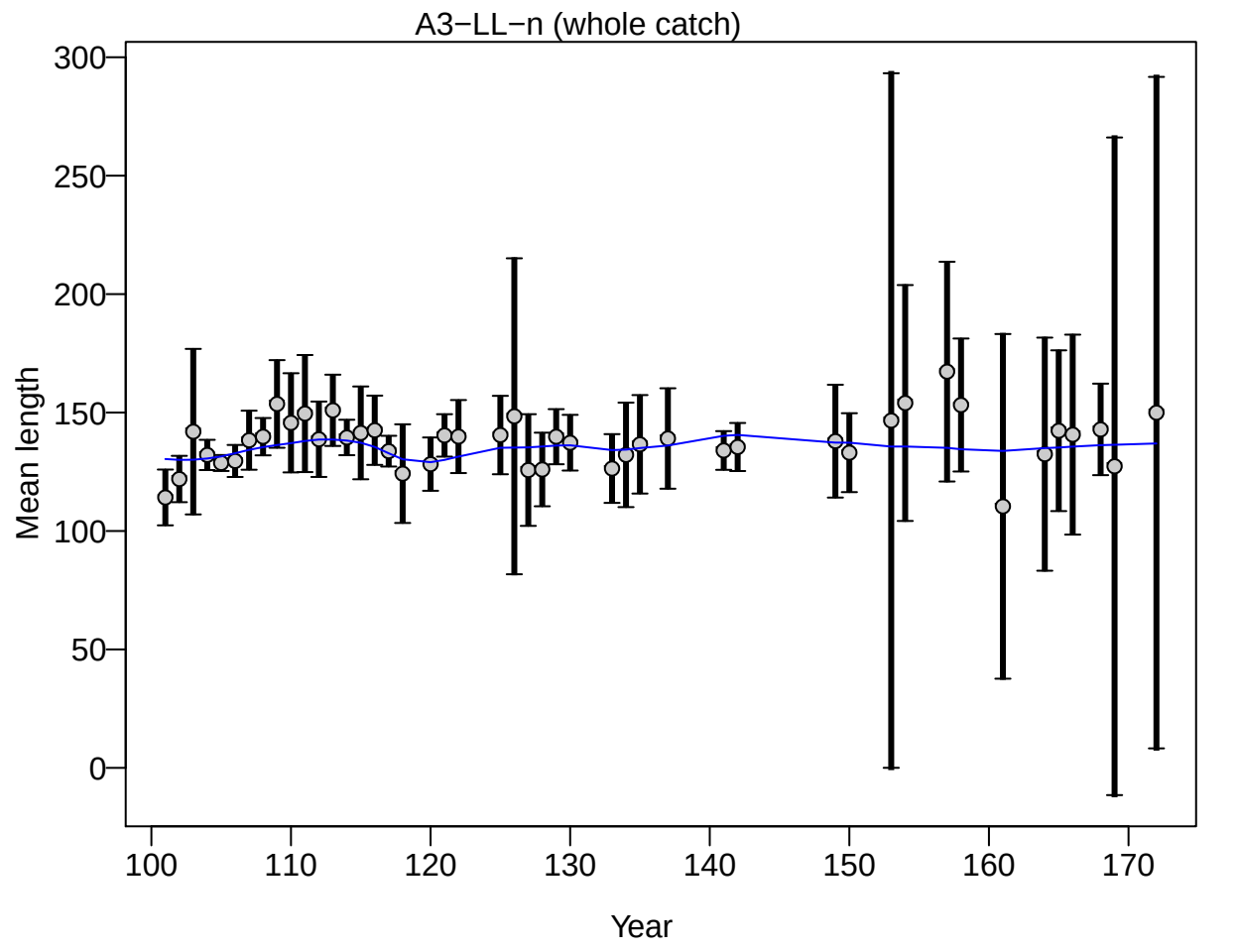
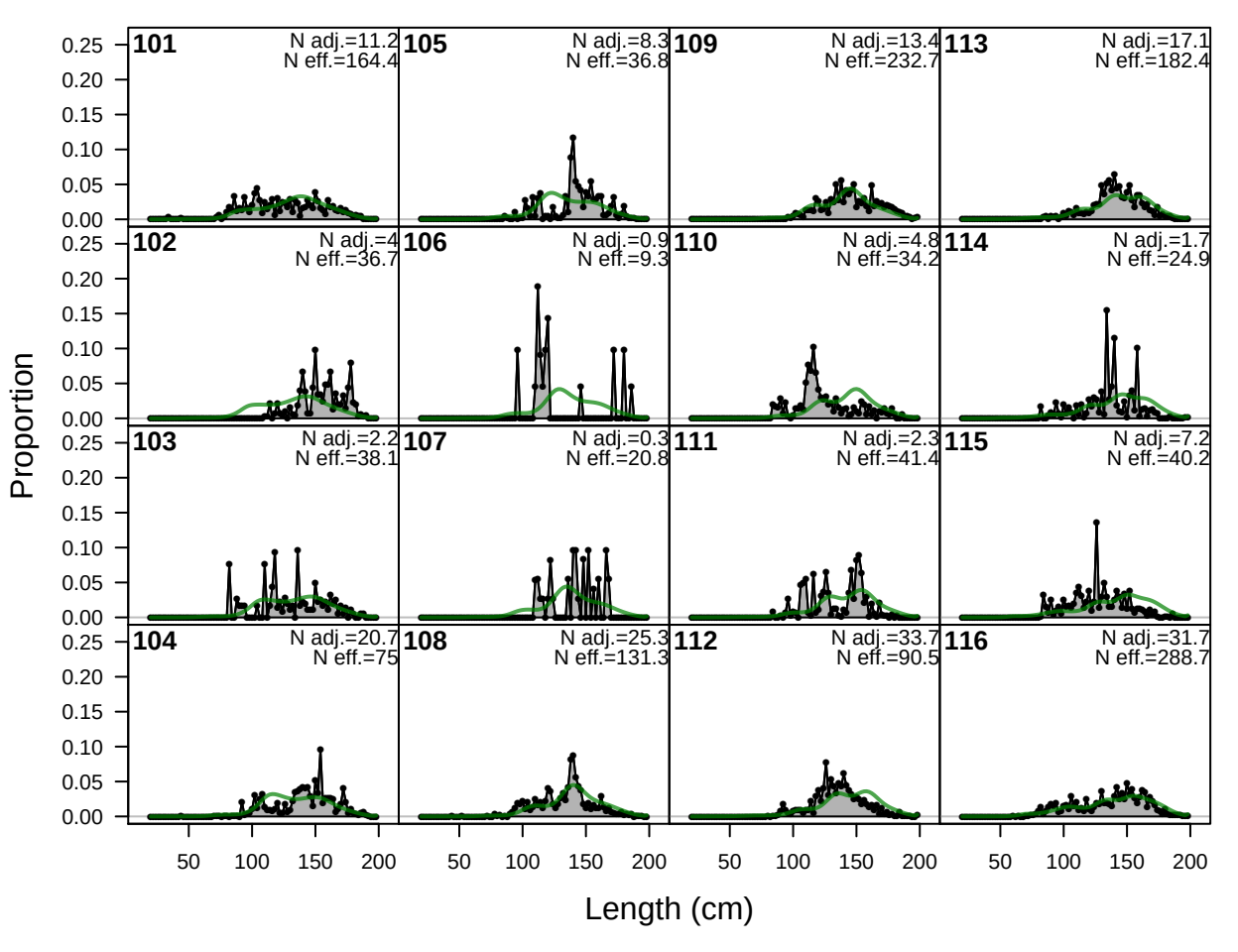
5
10
200
150
100
50
Length (cm)
101
108
115
122
129
137
149
157
164
172
Year


Effective sample size
Observed sample size
0
50
100
150
200
0
20
40
60
80
100
120
140
117
129
112
114
142
130
150
120
106
105
121
102
104
harmonic mean
harmonic mean


A3−LL−n (whole catch)
Mean length
Year
300
250
200
150
100
50
0
100
110
120
130
140
150
160
170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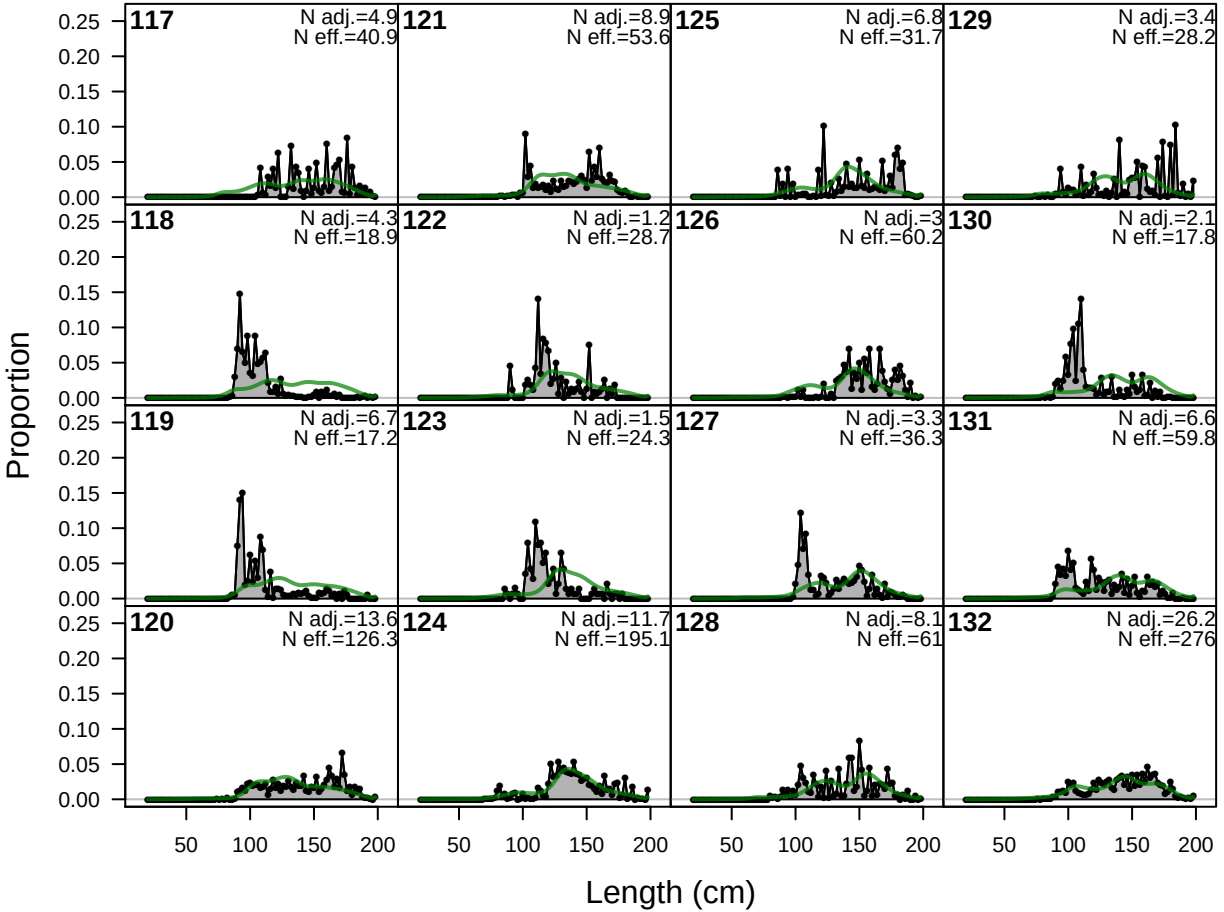
N eff.=36.8
109
N adj.=13.4
N eff.=232.7
113
N adj.=17.1
N eff.=182.4
102
N adj.=4
N eff.=36.7
106
N adj.=0.9
N eff.=9.3
110
N adj.=4.8
N eff.=34.2
114
N adj.=1.7
N eff.=24.9
103
N adj.=2.2
N eff.=38.1
107
N adj.=0.3
N eff.=20.8
111
N adj.=2.3
N eff.=41.4
115
N adj.=7.2
N eff.=40.2
104
N adj.=20.7
N eff.=75
108
N adj.=25.3
N eff.=131.3
112
N adj.=33.7
N eff.=90.5
116
N adj.=31.7
N eff.=288.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


117
N adj.=4.9
N eff.=40.9
121
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N eff.=53.6
125
N adj.=6.8
N eff.=31.7
129
N adj.=3.4
N eff.=28.2
118
N adj.=4.3
N eff.=18.9
122
N adj.=1.2
N eff.=28.7
126
N adj.=3
N eff.=60.2
130
N adj.=2.1
N eff.=17.8
119
N adj.=6.7
N eff.=17.2
123
N adj.=1.5
N eff.=24.3
127
N adj.=3.3
N eff.=36.3
131
N adj.=6.6
N eff.=59.8
120
N adj.=13.6
N eff.=126.3
124
N adj.=11.7
N eff.=195.1
128
N adj.=8.1
N eff.=61
132
N adj.=26.2
N eff.=276
Proportion
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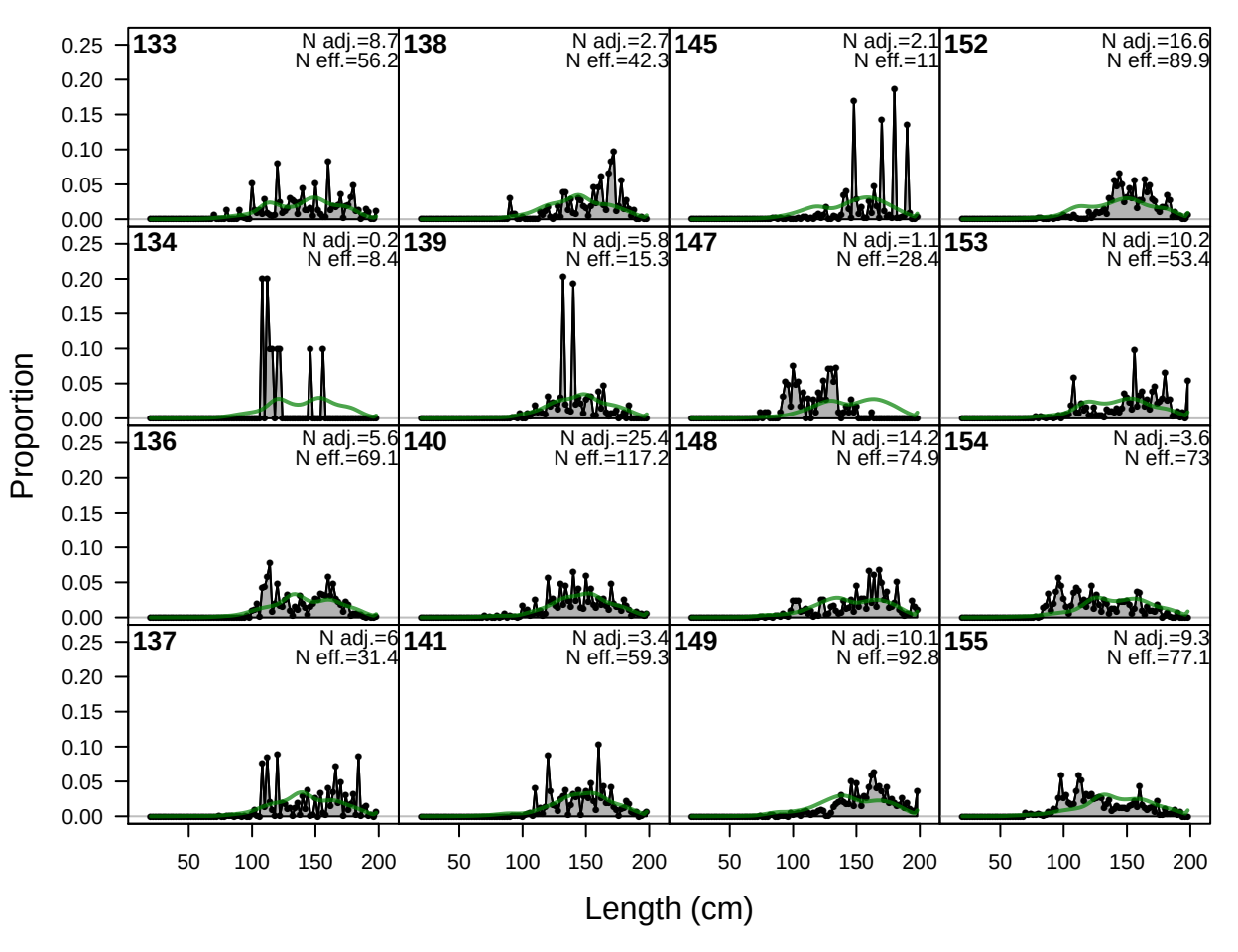
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)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N eff.=56.2
138
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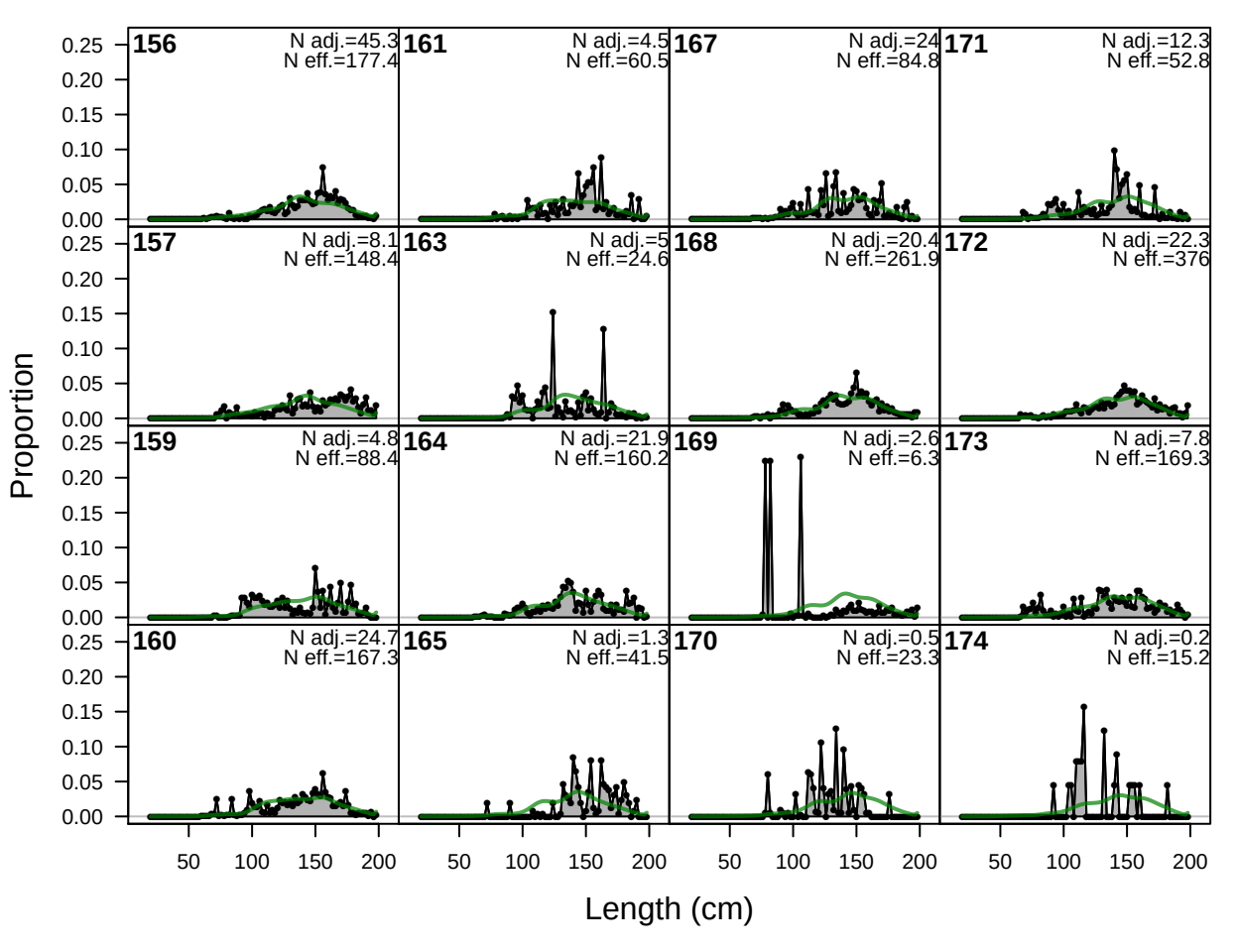
N eff.=42.3
145
N adj.=2.1
N eff.=11
152
N adj.=16.6
N eff.=89.9
134
N adj.=0.2
N eff.=8.4
139
N adj.=5.8
N eff.=15.3
147
N adj.=1.1
N eff.=28.4
153
N adj.=10.2
N eff.=53.4
136
N adj.=5.6
N eff.=69.1
140
N adj.=25.4
N eff.=117.2
148
N adj.=14.2
N eff.=74.9
154
N adj.=3.6
N eff.=73
137
N adj.=6
N eff.=31.4
141
N adj.=3.4
N eff.=59.3
149
N adj.=10.1
N eff.=92.8
155
N adj.=9.3
N eff.=77.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


156
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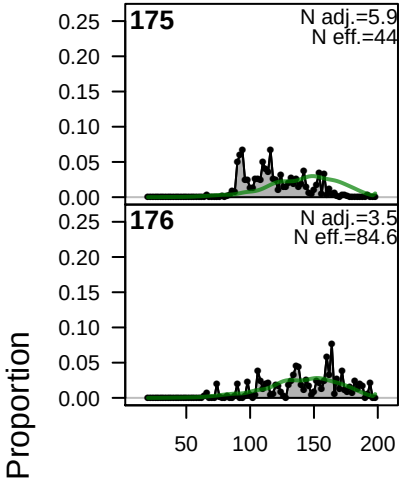
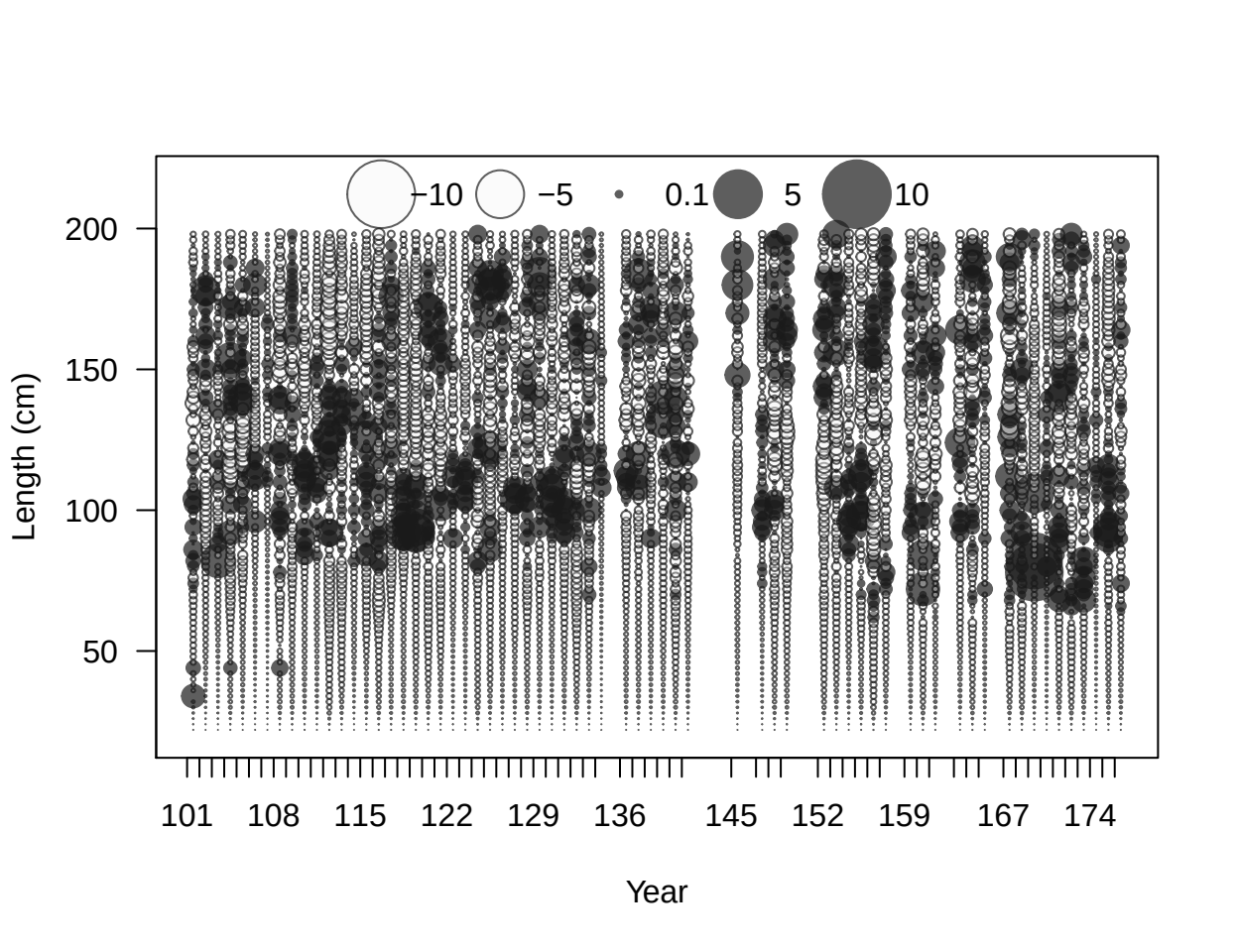
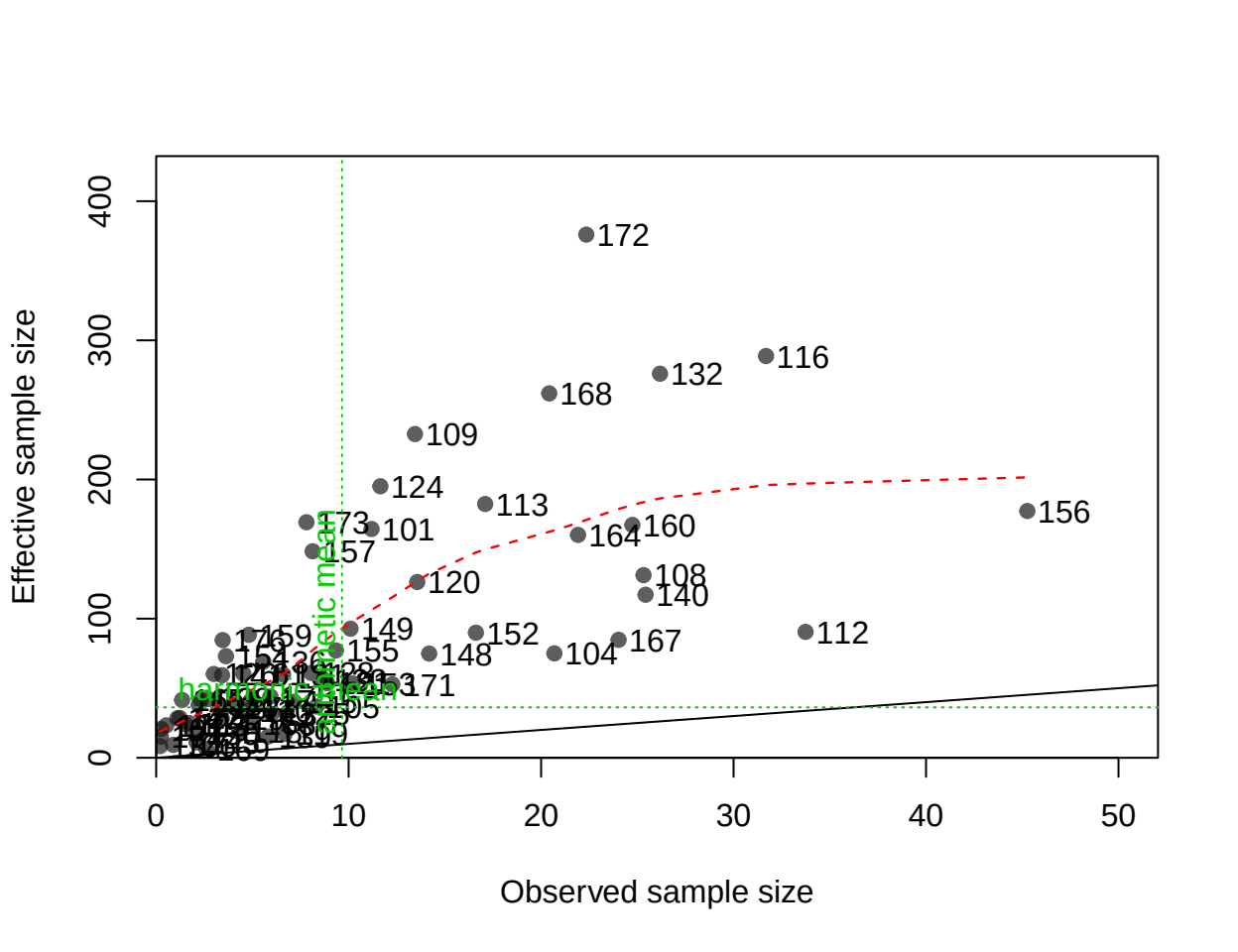
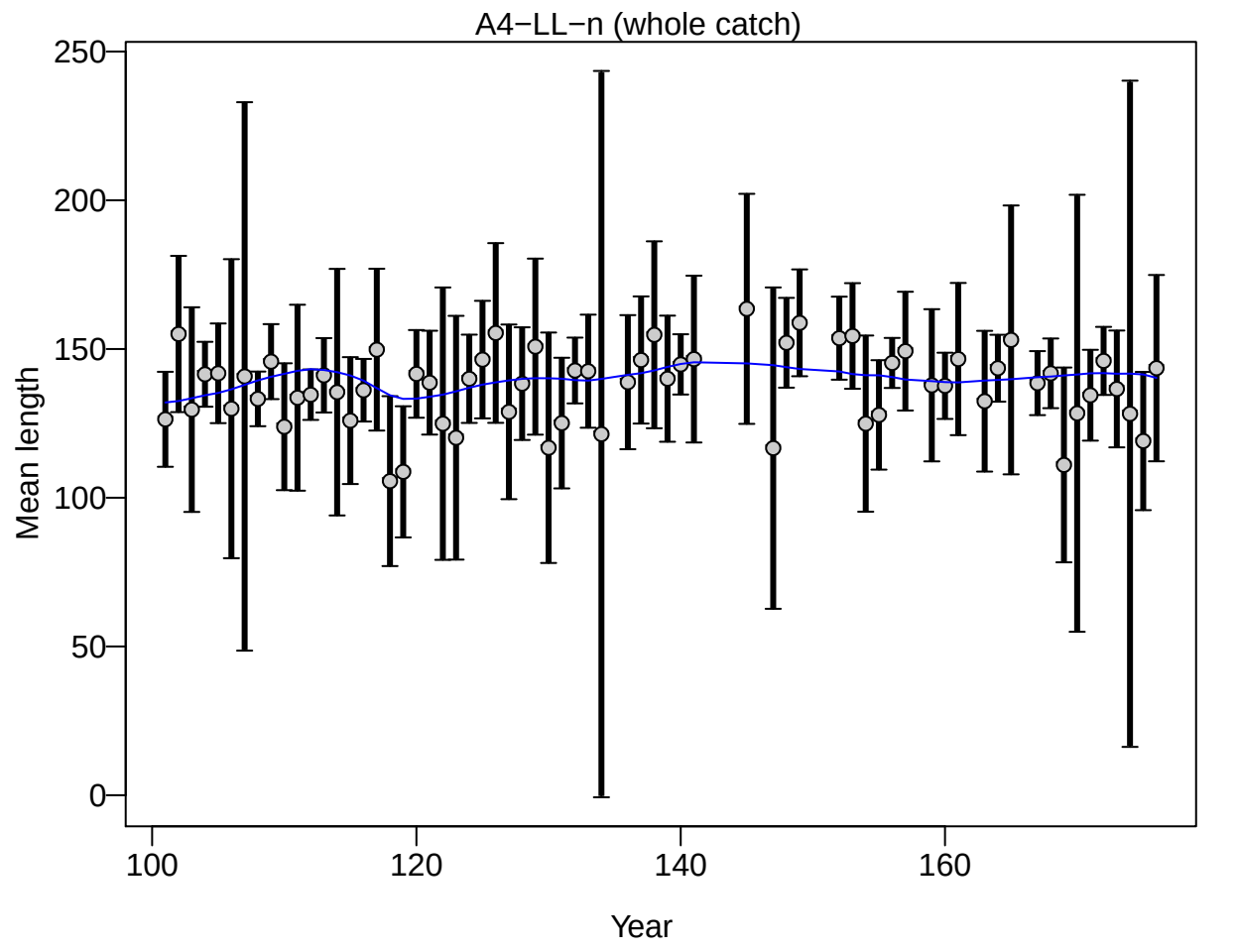
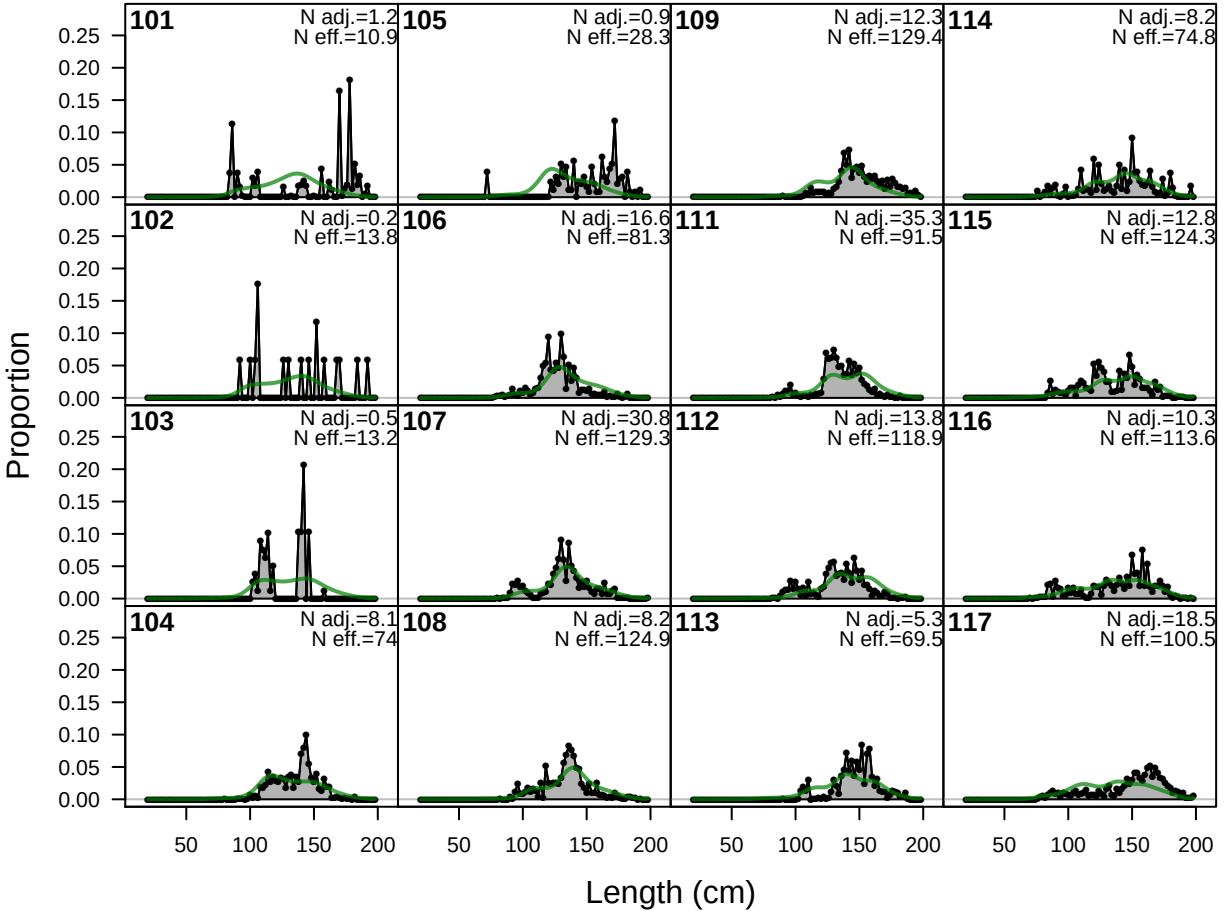
N eff.=177.4
161
N adj.=4.5
N eff.=60.5
167
N adj.=24
N eff.=84.8
171
N adj.=12.3
N eff.=52.8
157
N adj.=8.1
N eff.=148.4
163
N adj.=5
N eff.=24.6
168
N adj.=20.4
N eff.=261.9
172
N adj.=22.3
N eff.=376
159
N adj.=4.8
N eff.=88.4
164
N adj.=21.9
N eff.=160.2
169
N adj.=2.6
N eff.=6.3
173
N adj.=7.8
N eff.=169.3
160
N adj.=24.7
N eff.=167.3
165
N adj.=1.3
N eff.=41.5
170
N adj.=0.5
N eff.=23.3
174
N adj.=0.2
N eff.=15.2
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)


175
N adj.=5.9
N eff.=44
176
N adj.=3.5
N eff.=84.6
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)


−10
−5
0.1
5
10
200
150
100
50
Length (cm)
101
108
115
122
129
136
145
152
159
167
174
Year


Effective sample size
Observed sample size
0
100
200
300
400
0
10
20
30
40
50
172
116
132
168
109
124
113
156
73
101
160
164
157
120
108
140
159
149
152
112
155
148
104
167
171
harmonic mean
geometric mean
arithmetic mean


A4−LL−n (whole catch)
Mean length
250
200
150
100
50
0
100
120
140
160
Year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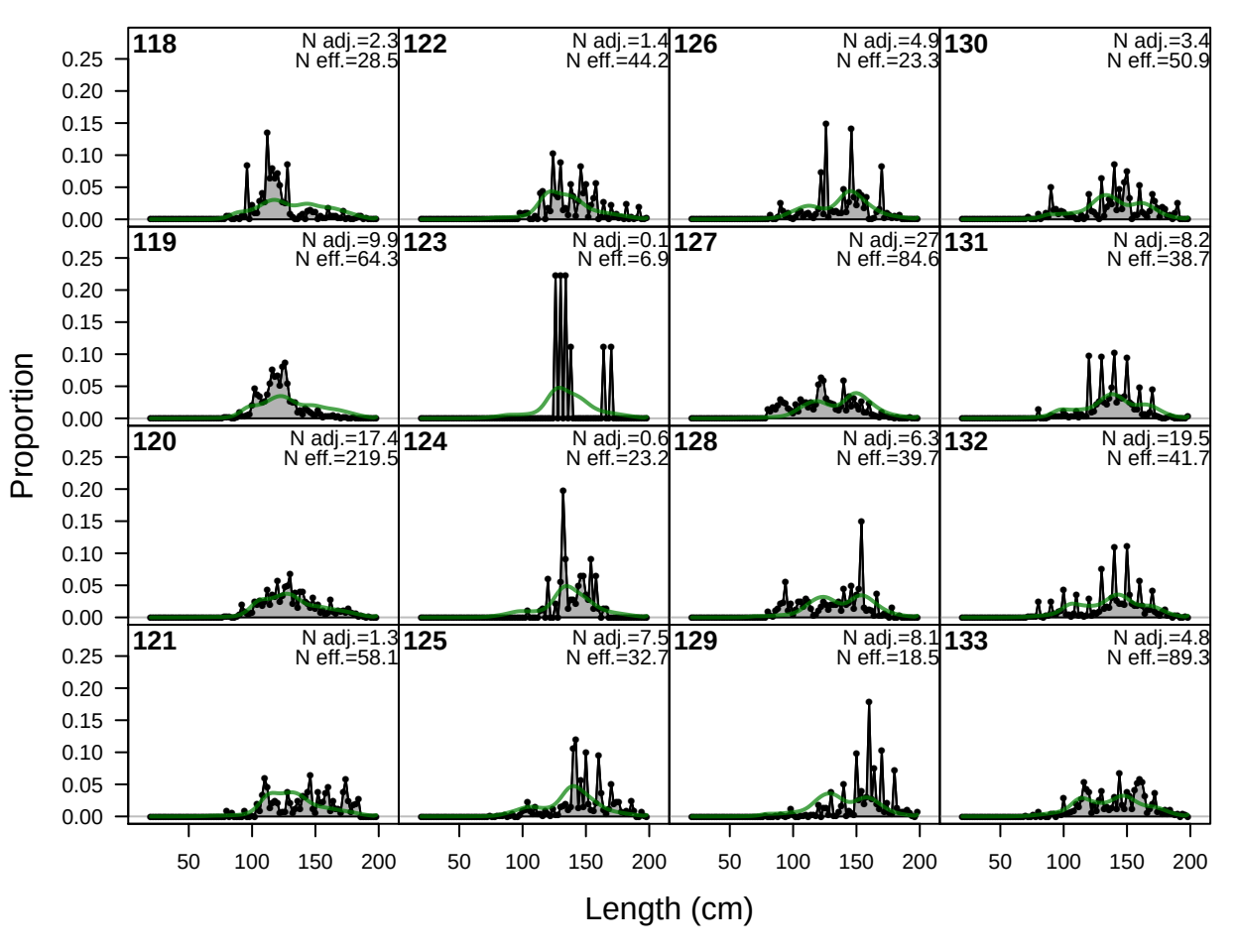
N eff.=10.9
105
N adj.=0.9
N eff.=28.3
109
N adj.=12.3
N eff.=129.4
114
N adj.=8.2
N eff.=74.8
102
N adj.=0.2
N eff.=13.8
106
N adj.=16.6
N eff.=81.3
111
N adj.=35.3
N eff.=91.5
115
N adj.=12.8
N eff.=124.3
103
N adj.=0.5
N eff.=13.2
107
N adj.=30.8
N eff.=129.3
112
N adj.=13.8
N eff.=118.9
116
N adj.=10.3
N eff.=113.6
104
N adj.=8.1
N eff.=74
108
N adj.=8.2
N eff.=124.9
113
N adj.=5.3
N eff.=69.5
117
N adj.=18.5
N eff.=100.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


118
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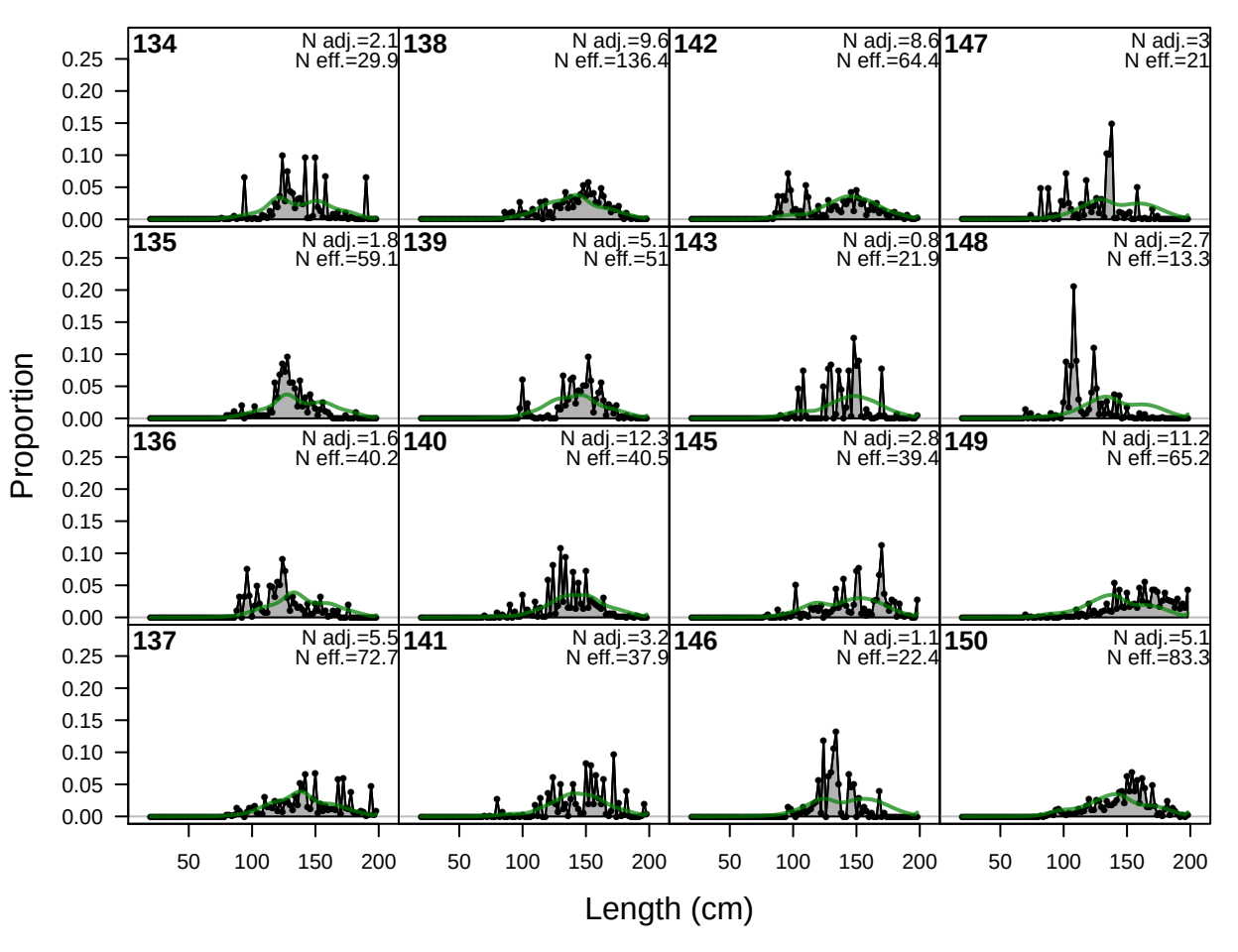
N eff.=28.5
122
N adj.=1.4
N eff.=44.2
126
N adj.=4.9
N eff.=23.3
130
N adj.=3.4
N eff.=50.9
119
N adj.=9.9
N eff.=64.3
123
N adj.=0.1
N eff.=6.9
127
N adj.=27
N eff.=84.6
131
N adj.=8.2
N eff.=38.7
120
N adj.=17.4
N eff.=219.5
124
N adj.=0.6
N eff.=23.2
128
N adj.=6.3
N eff.=39.7
132
N adj.=19.5
N eff.=41.7
121
N adj.=1.3
N eff.=58.1
125
N adj.=7.5
N eff.=32.7
129
N adj.=8.1
N eff.=18.5
133
N adj.=4.8
N eff.=89.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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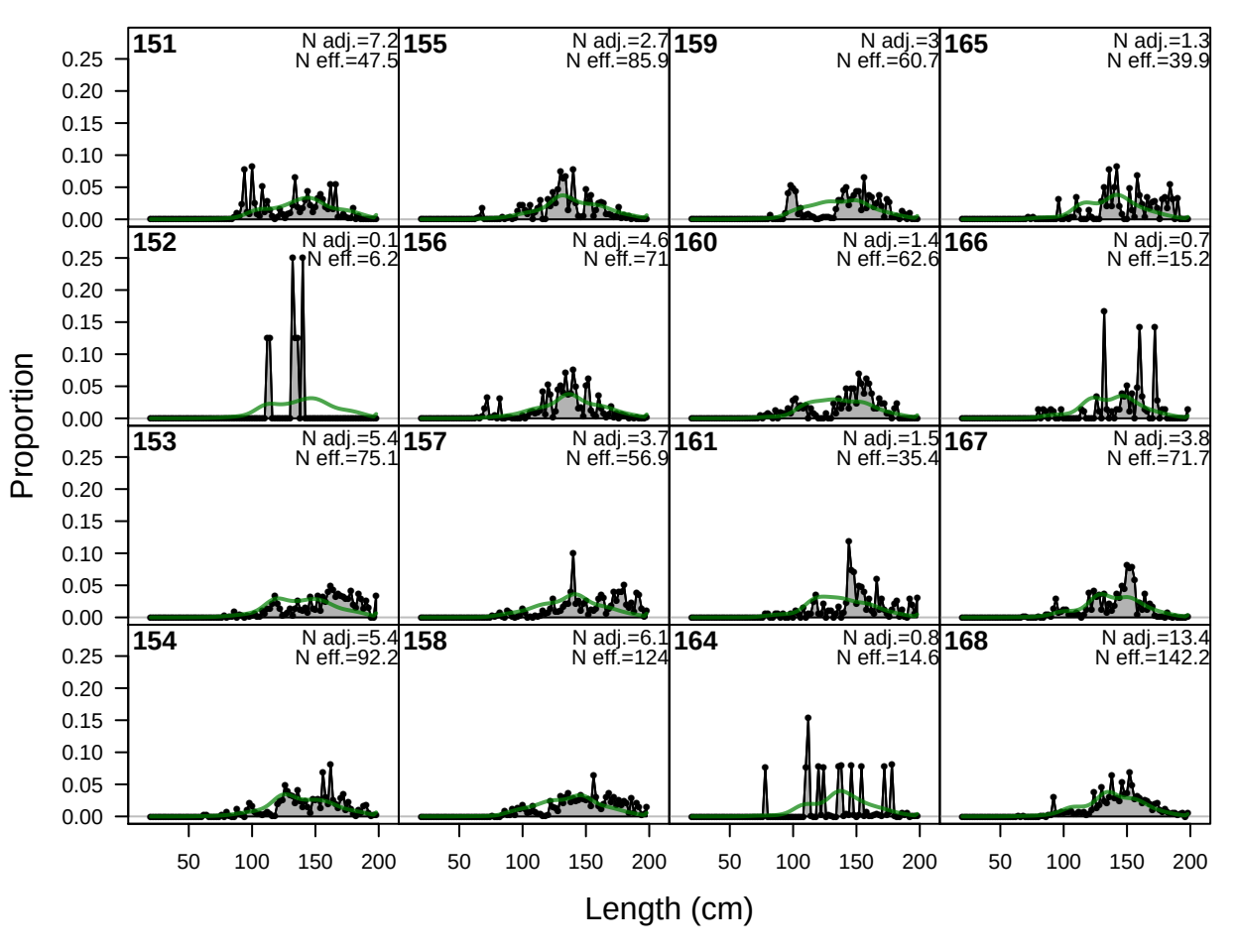
N eff.=29.9
138
N adj.=9.6
N eff.=136.4
142
N adj.=8.6
N eff.=64.4
147
N adj.=3
N eff.=21
135
N adj.=1.8
N eff.=59.1
139
N adj.=5.1
N eff.=51
143
N adj.=0.8
N eff.=21.9
148
N adj.=2.7
N eff.=13.3
136
N adj.=1.6
N eff.=40.2
140
N adj.=12.3
N eff.=40.5
145
N adj.=2.8
N eff.=39.4
149
N adj.=11.2
N eff.=65.2
137
N adj.=5.5
N eff.=72.7
141
N adj.=3.2
N eff.=37.9
146
N adj.=1.1
N eff.=22.4
150
N adj.=5.1
N eff.=83.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=47.5
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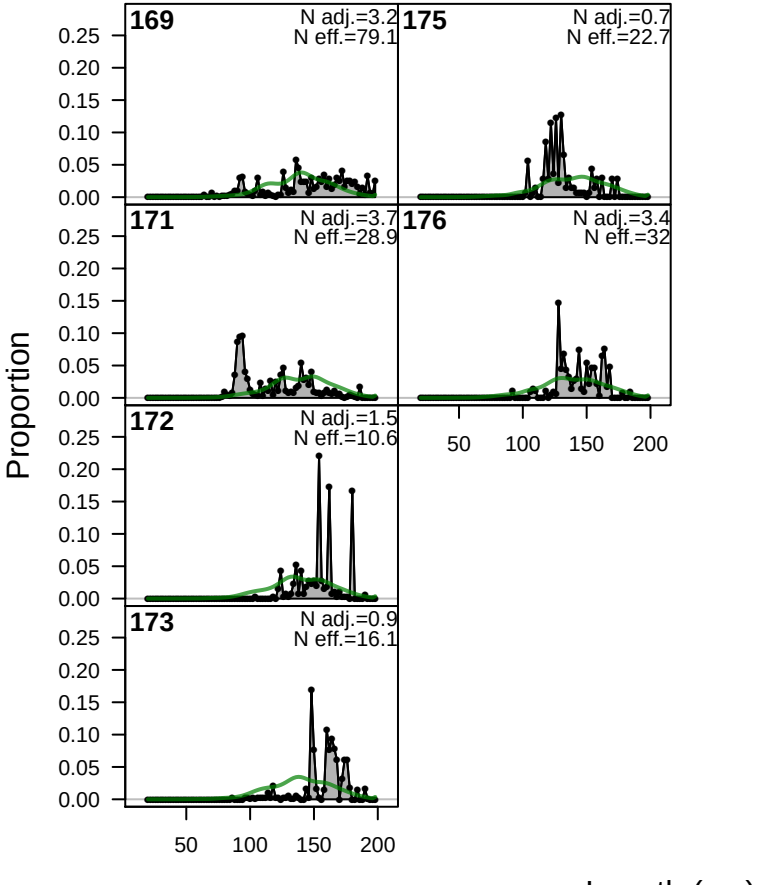
N adj.=2.7
N eff.=85.9
159
N adj.=3
N eff.=60.7
165
N adj.=1.3
N eff.=39.9
152
N adj.=0.1
N eff.=6.2
156
N adj.=4.6
N eff.=71
160
N adj.=1.4
N eff.=62.6
166
N adj.=0.7
N eff.=15.2
153
N adj.=5.4
N eff.=75.1
157
N adj.=3.7
N eff.=56.9
161
N adj.=1.5
N eff.=35.4
167
N adj.=3.8
N eff.=71.7
154
N adj.=5.4
N eff.=92.2
158
N adj.=6.1
N eff.=124
164
N adj.=0.8
N eff.=14.6
168
N adj.=13.4
N eff.=142.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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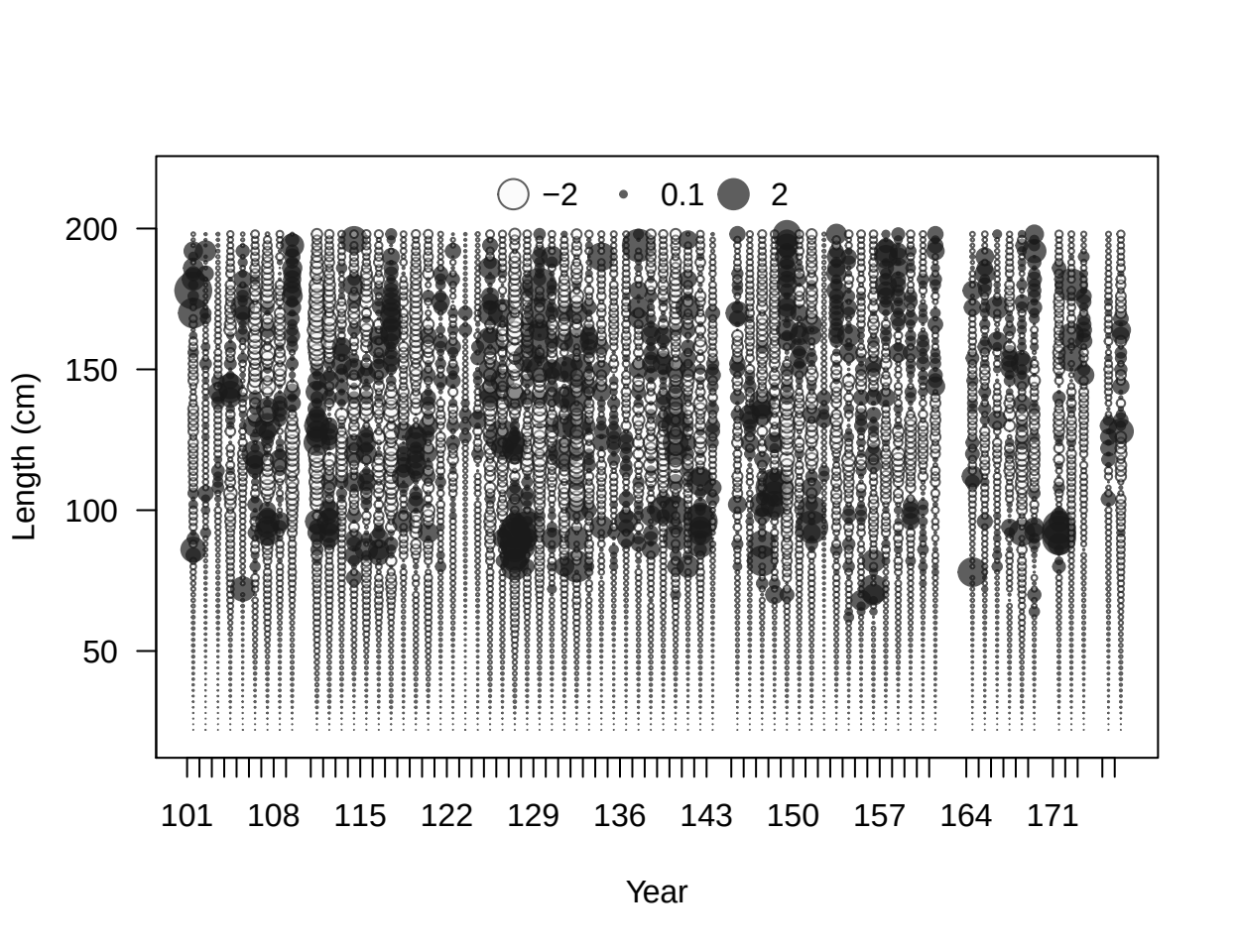
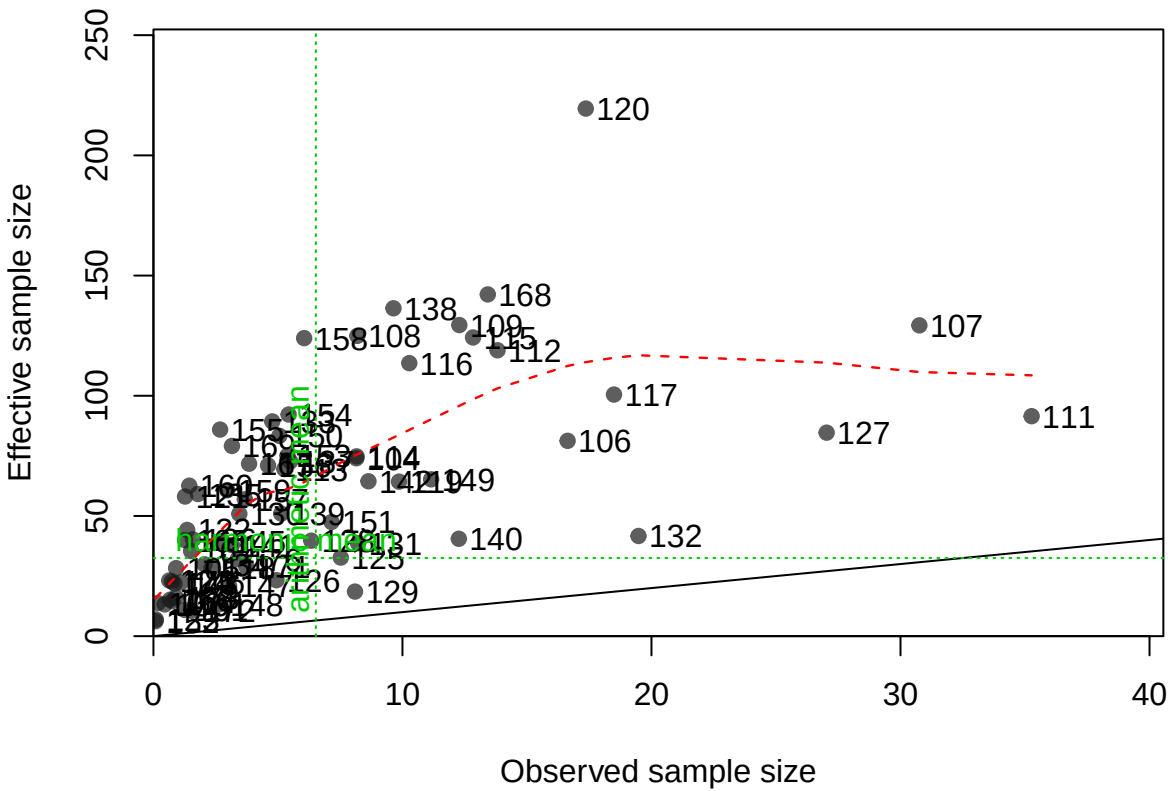
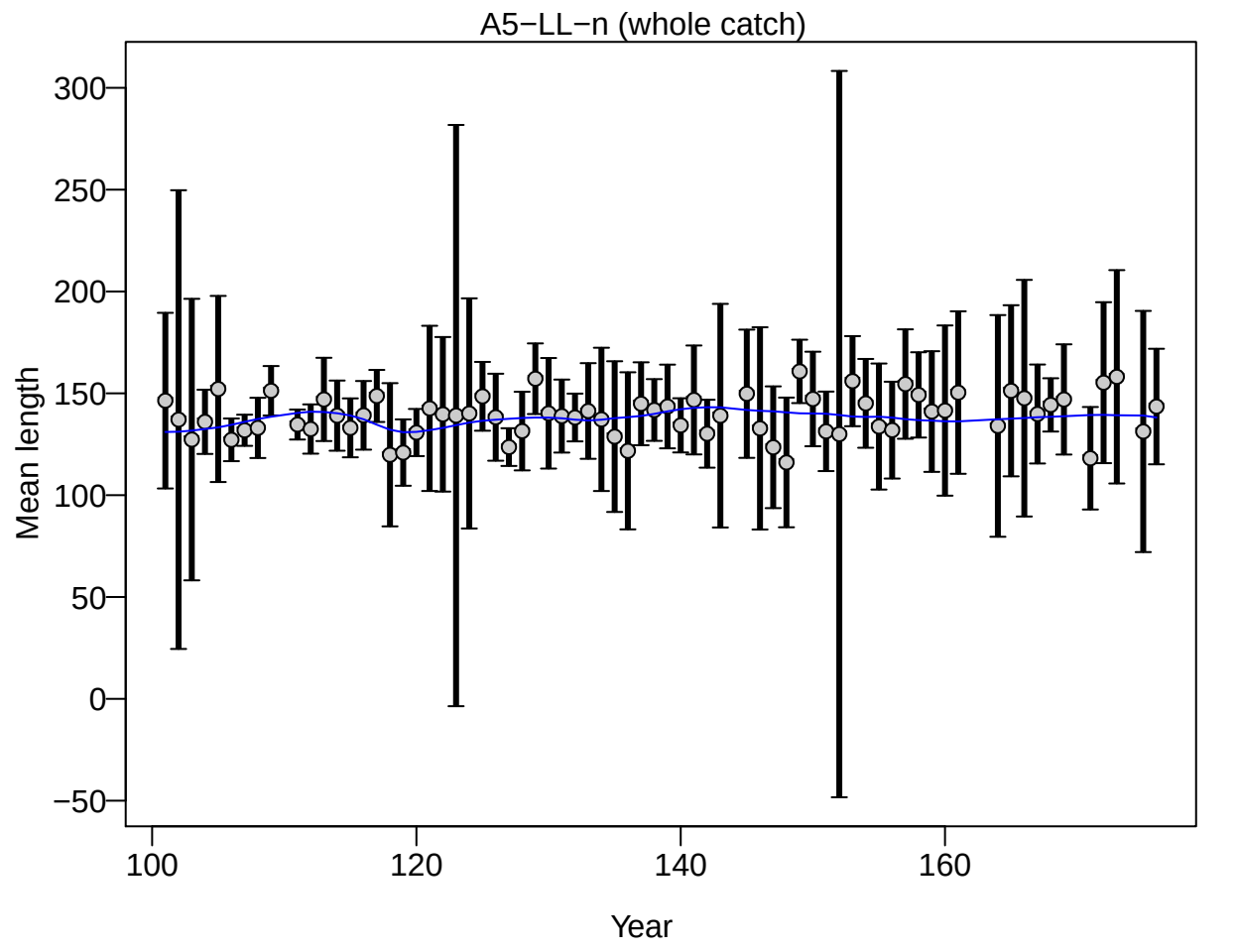
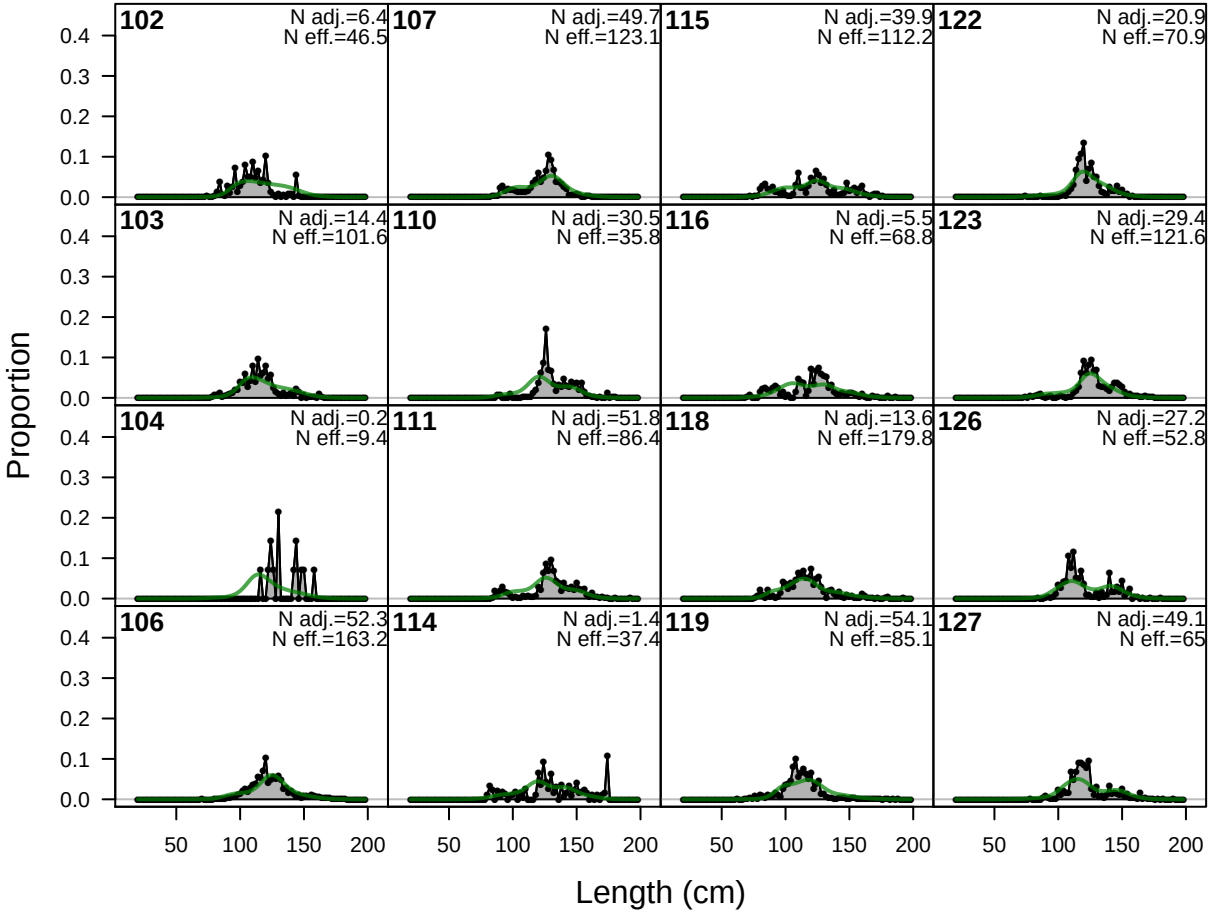
N adj.=3.2
N eff.=79.1
175
N adj.=0.7
N eff.=22.7
171
N adj.=3.7
N eff.=28.9
176
N adj.=3.4
N eff.=32
172
N adj.=1.5
N eff.=10.6
173
N adj.=0.9
N eff.=16.1
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
Year



Effective sample size
Observed sample size
0
50
100
150
200
250
0
10
20
30
40
120
168
138
109
107
158
108
115
112
116
117
111
127
106
104
149
140
132
151
125
129


A5−LL−n (whole catch)
Mean length
300
250
200
150
100
50
0
−50
100
120
140
160
Year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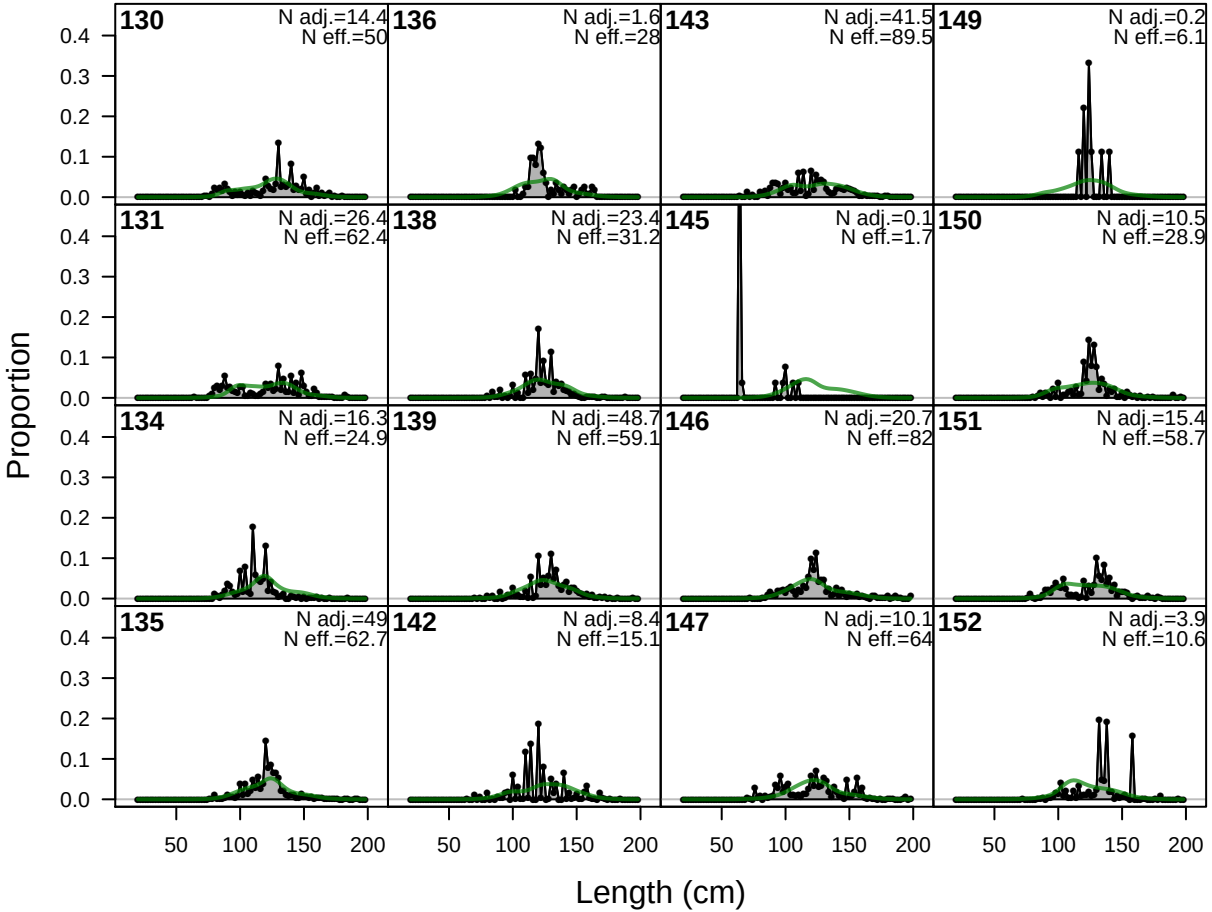
N adj.=6.4
N eff.=46.5
107
N adj.=49.7
N eff.=123.1
115
N adj.=39.9
N eff.=112.2
122
N adj.=20.9
N eff.=70.9
103
N adj.=14.4
N eff.=101.6
110
N adj.=30.5
N eff.=35.8
116
N adj.=5.5
N eff.=68.8
123
N adj.=29.4
N eff.=121.6
104
N adj.=0.2
N eff.=9.4
111
N adj.=51.8
N eff.=86.4
118
N adj.=13.6
N eff.=179.8
126
N adj.=27.2
N eff.=52.8
106
N adj.=52.3
N eff.=163.2
114
N adj.=1.4
N eff.=37.4
119
N adj.=54.1
N eff.=85.1
127
N adj.=49.1
N eff.=65
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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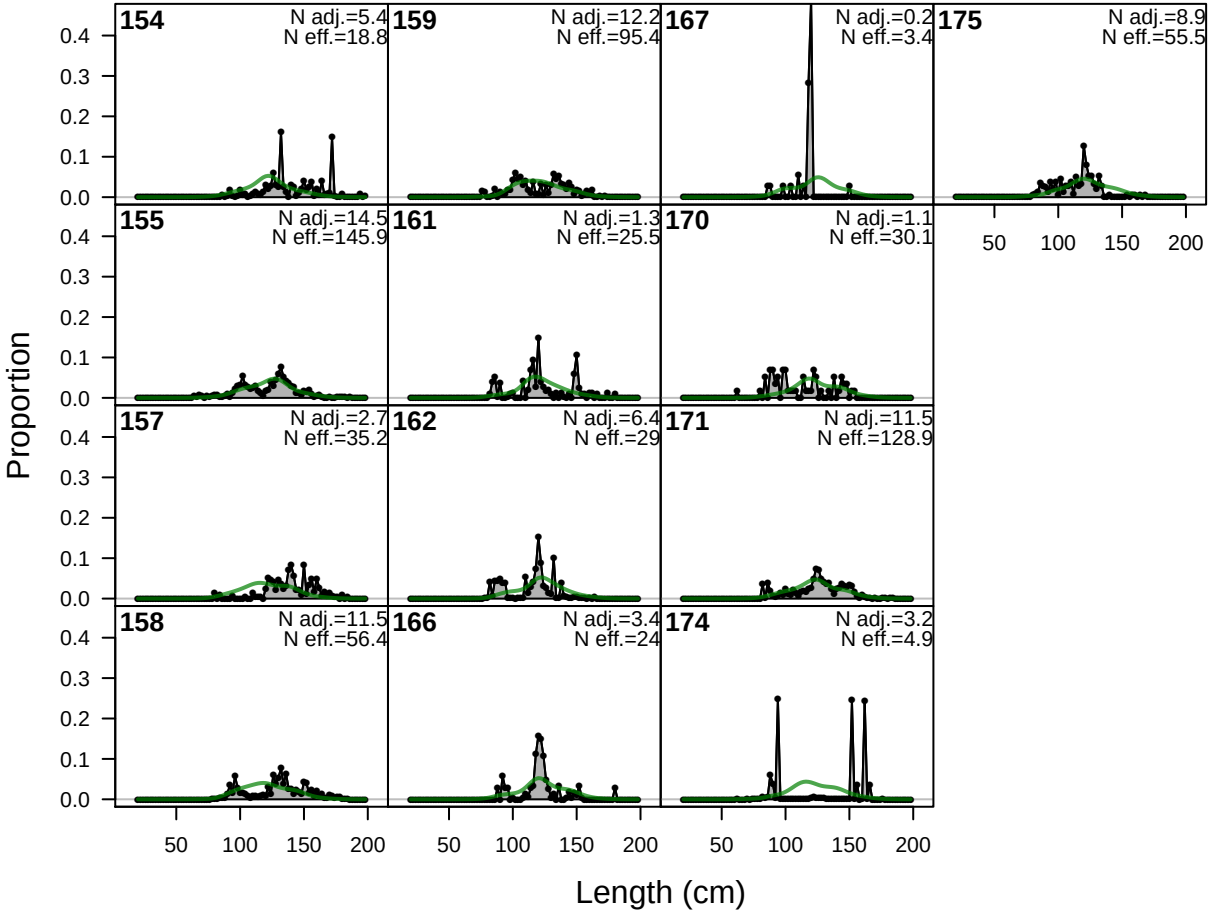
N eff.=50
136
N adj.=1.6
N eff.=28
143
N adj.=41.5
N eff.=89.5
149
N adj.=0.2
N eff.=6.1
131
N adj.=26.4
N eff.=62.4
138
N adj.=23.4
N eff.=31.2
145
N adj.=0.1
N eff.=1.7
150
N adj.=10.5
N eff.=28.9
134
N adj.=16.3
N eff.=24.9
139
N adj.=48.7
N eff.=59.1
146
N adj.=20.7
N eff.=82
151
N adj.=15.4
N eff.=58.7
135
N adj.=49
N eff.=62.7
142
N adj.=8.4
N eff.=15.1
147
N adj.=10.1
N eff.=64
152
N adj.=3.9
N eff.=10.6
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


154
N adj.=5.4
N eff.=18.8
159
N adj.=12.2
N eff.=95.4
167
N adj.=0.2
N eff.=3.4
175
N adj.=8.9
N eff.=55.5
155
N adj.=14.5
N eff.=145.9
161
N adj.=1.3
N eff.=25.5
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N adj.=1.1
N eff.=30.1
157
N adj.=2.7
N eff.=35.2
162
N adj.=6.4
N eff.=29
171
N adj.=11.5
N eff.=128.9
158
N adj.=11.5
N eff.=56.4
166
N adj.=3.4
N eff.=24
174
N adj.=3.2
N eff.=4.9
Proportion
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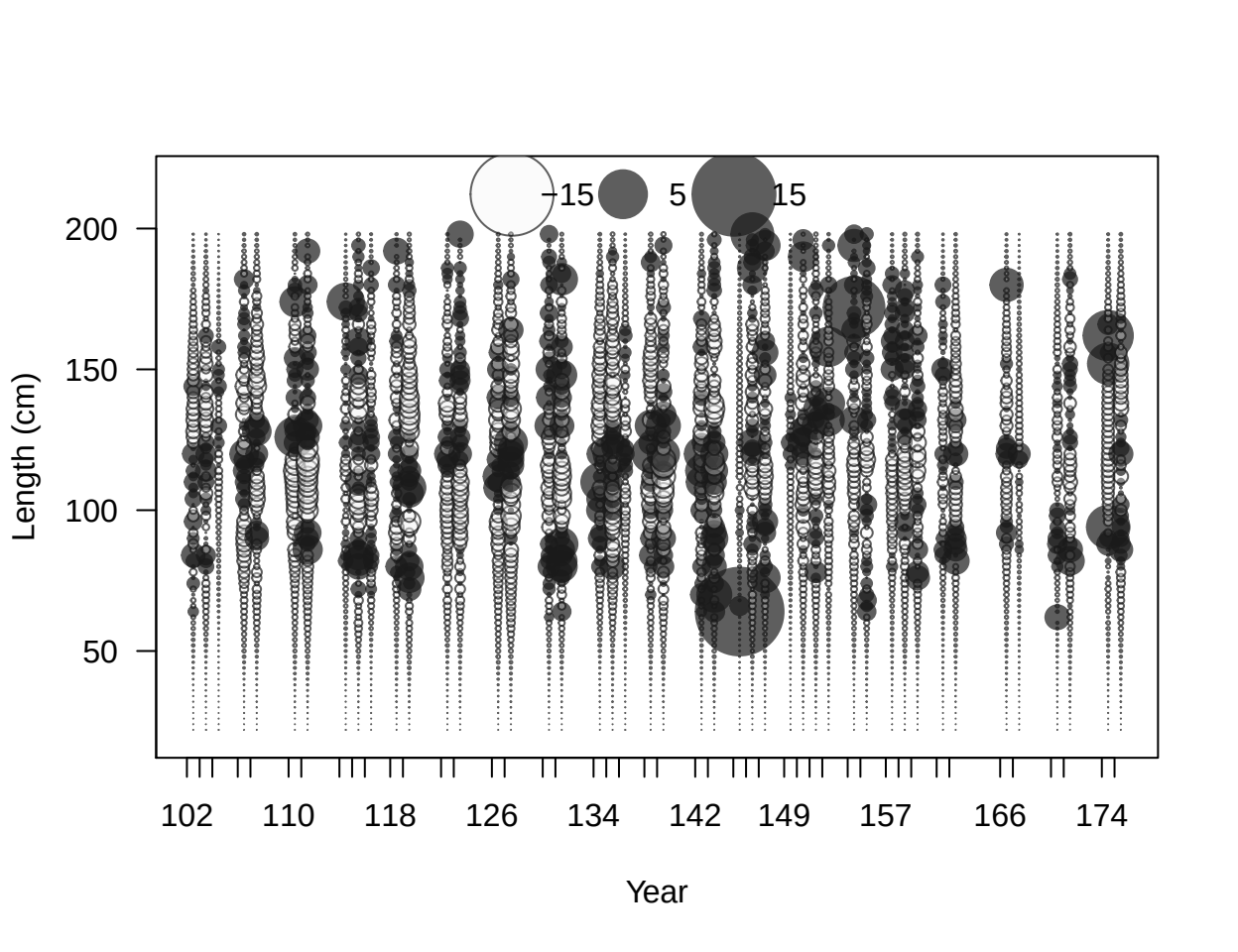
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


15
5
15
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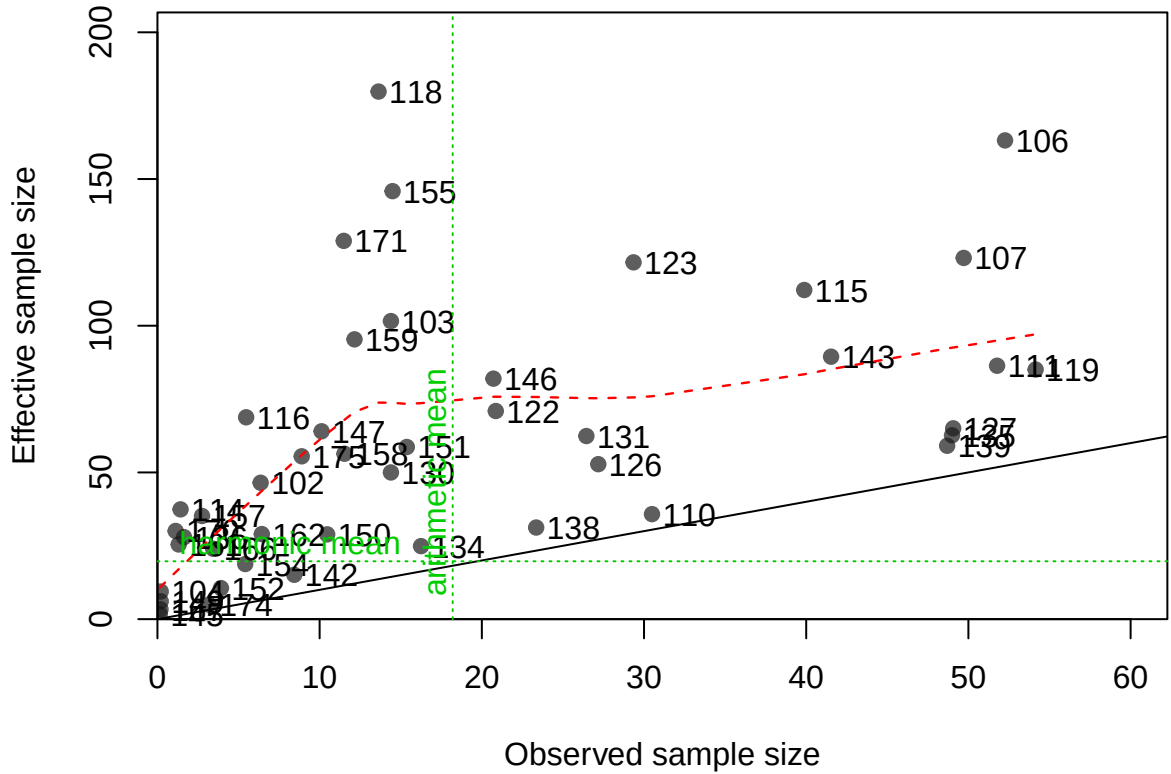
150
100
50
Length (cm)
102
110
118
126
134
142
149
157
166
174
Year



Effective sample size
Observed sample size
0
50
100
150
200
0
10
20
30
40
50
60
118
106
155
171
123
107
115
103
159
143
146
122
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147
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102
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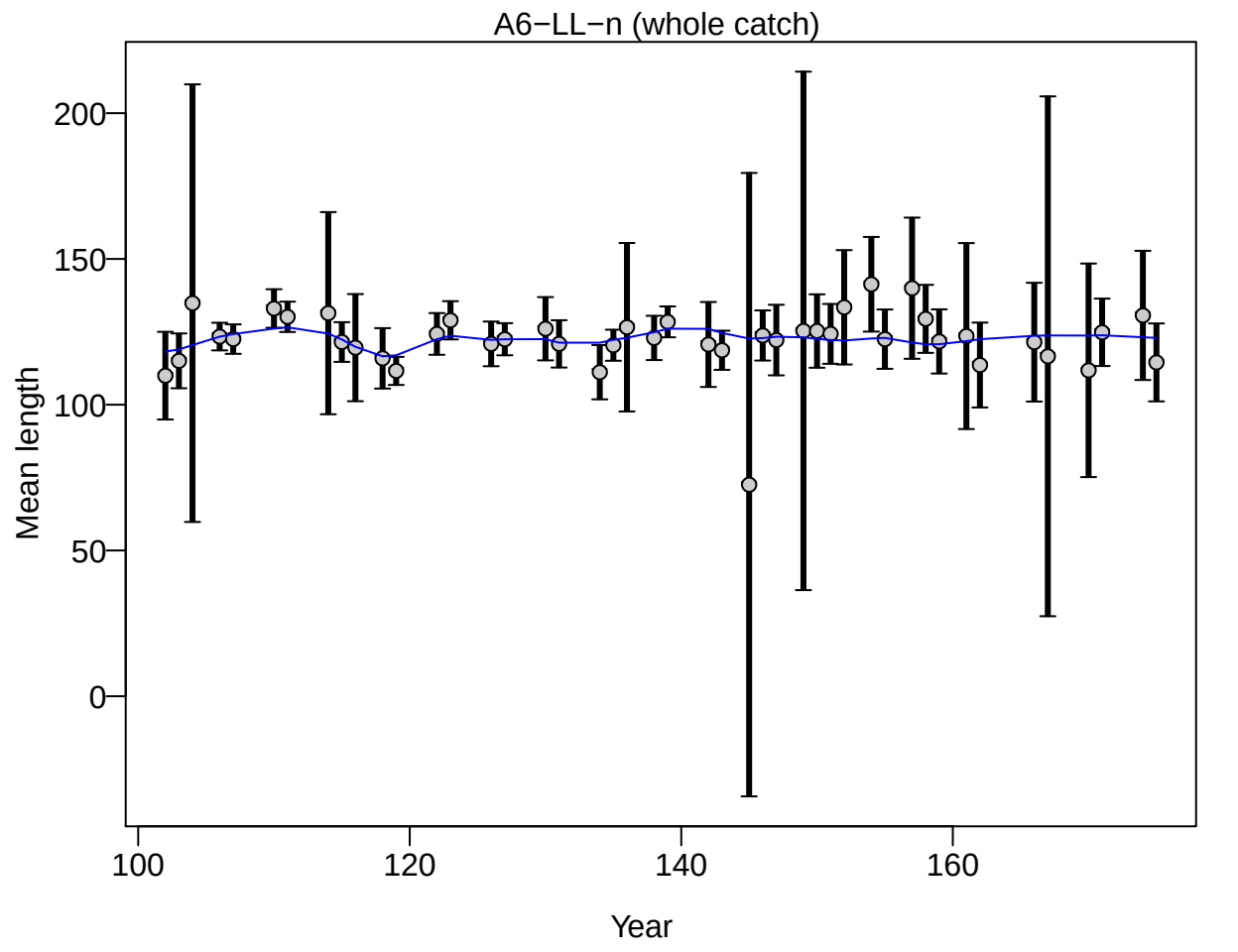
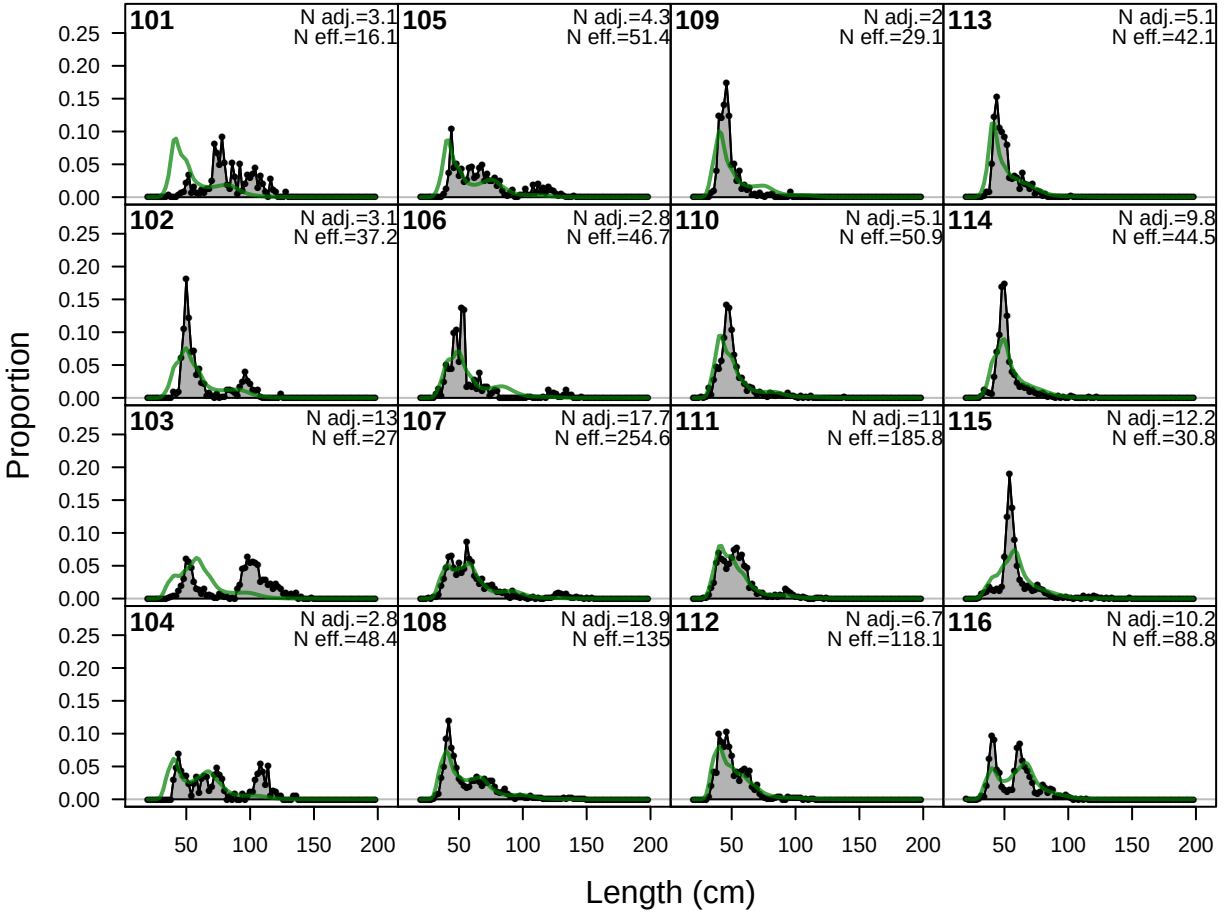
138
134
142
152
174
162
150
154
151
158
130
139
119


A6−LL−n (whole catch)
Mean length
200
150
100
50
0
100
120
140
160
Year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N eff.=51.4
109
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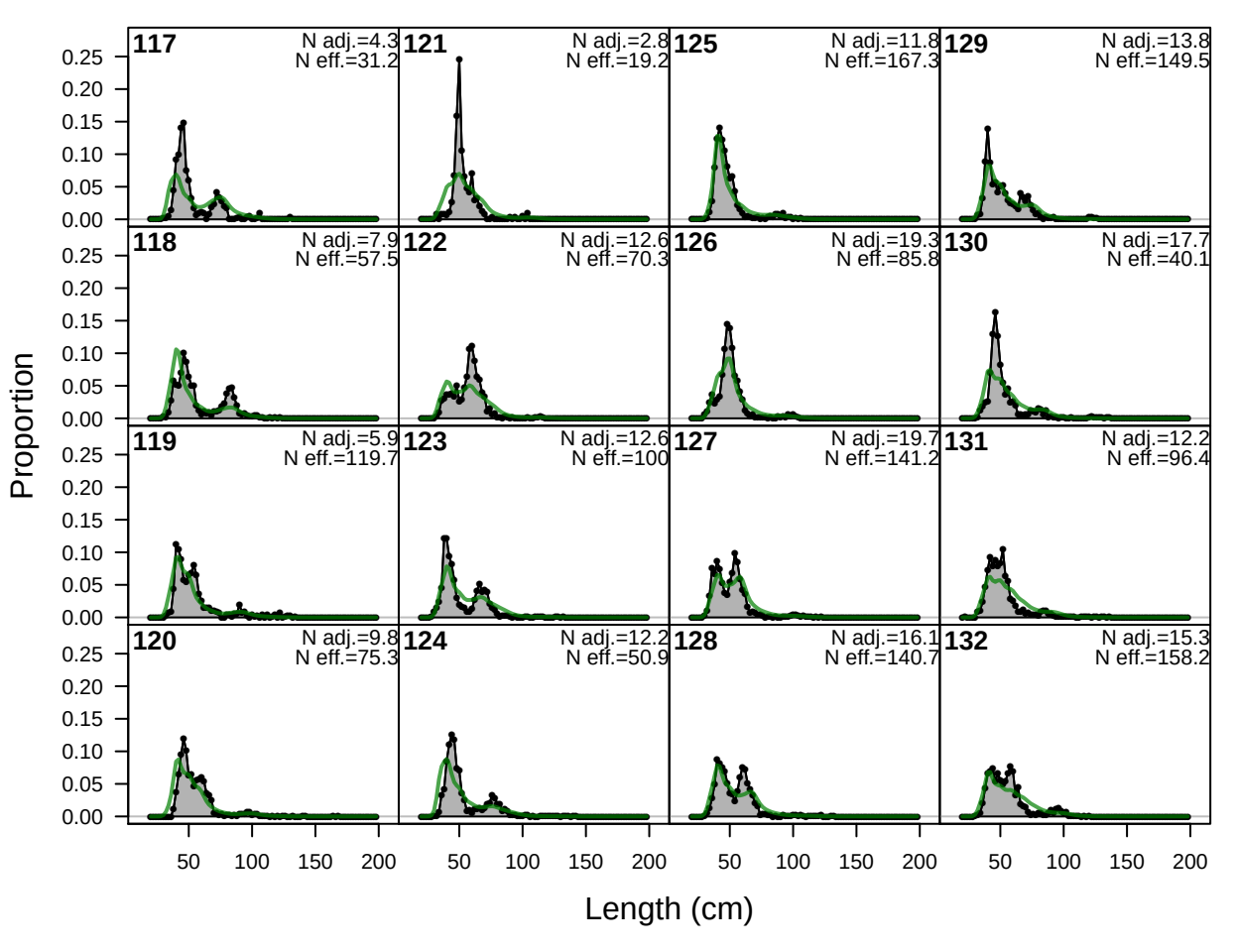
N eff.=29.1
113
N adj.=5.1
N eff.=42.1
102
N adj.=3.1
N eff.=37.2
106
N adj.=2.8
N eff.=46.7
110
N adj.=5.1
N eff.=50.9
114
N adj.=9.8
N eff.=44.5
103
N adj.=13
N eff.=27
107
N adj.=17.7
N eff.=254.6
111
N adj.=11
N eff.=185.8
115
N adj.=12.2
N eff.=30.8
104
N adj.=2.8
N eff.=48.4
108
N adj.=18.9
N eff.=135
112
N adj.=6.7
N eff.=118.1
116
N adj.=10.2
N eff.=88.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=19.2
125
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N eff.=167.3
129
N adj.=13.8
N eff.=149.5
118
N adj.=7.9
N eff.=57.5
122
N adj.=12.6
N eff.=70.3
126
N adj.=19.3
N eff.=85.8
130
N adj.=17.7
N eff.=40.1
119
N adj.=5.9
N eff.=119.7
123
N adj.=12.6
N eff.=100
127
N adj.=19.7
N eff.=141.2
131
N adj.=12.2
N eff.=96.4
120
N adj.=9.8
N eff.=75.3
124
N adj.=12.2
N eff.=50.9
128
N adj.=16.1
N eff.=140.7
132
N adj.=15.3
N eff.=158.2
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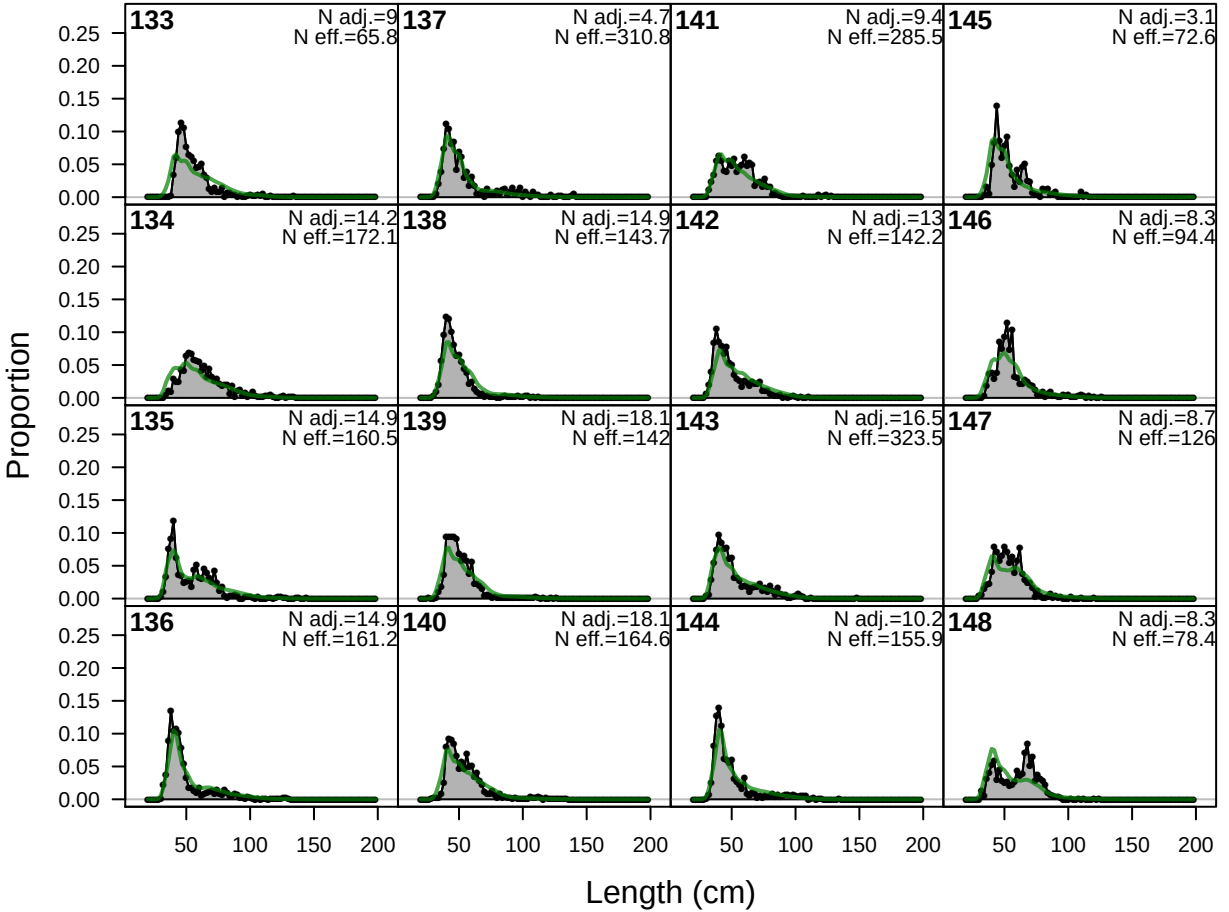
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=65.8
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N eff.=310.8
141
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N eff.=285.5
145
N adj.=3.1
N eff.=72.6
134
N adj.=14.2
N eff.=172.1
138
N adj.=14.9
N eff.=143.7
142
N adj.=13
N eff.=142.2
146
N adj.=8.3
N eff.=94.4
135
N adj.=14.9
N eff.=160.5
139
N adj.=18.1
N eff.=142
143
N adj.=16.5
N eff.=323.5
147
N adj.=8.7
N eff.=126
136
N adj.=14.9
N eff.=161.2
140
N adj.=18.1
N eff.=164.6
144
N adj.=10.2
N eff.=155.9
148
N adj.=8.3
N eff.=78.4
Proportion
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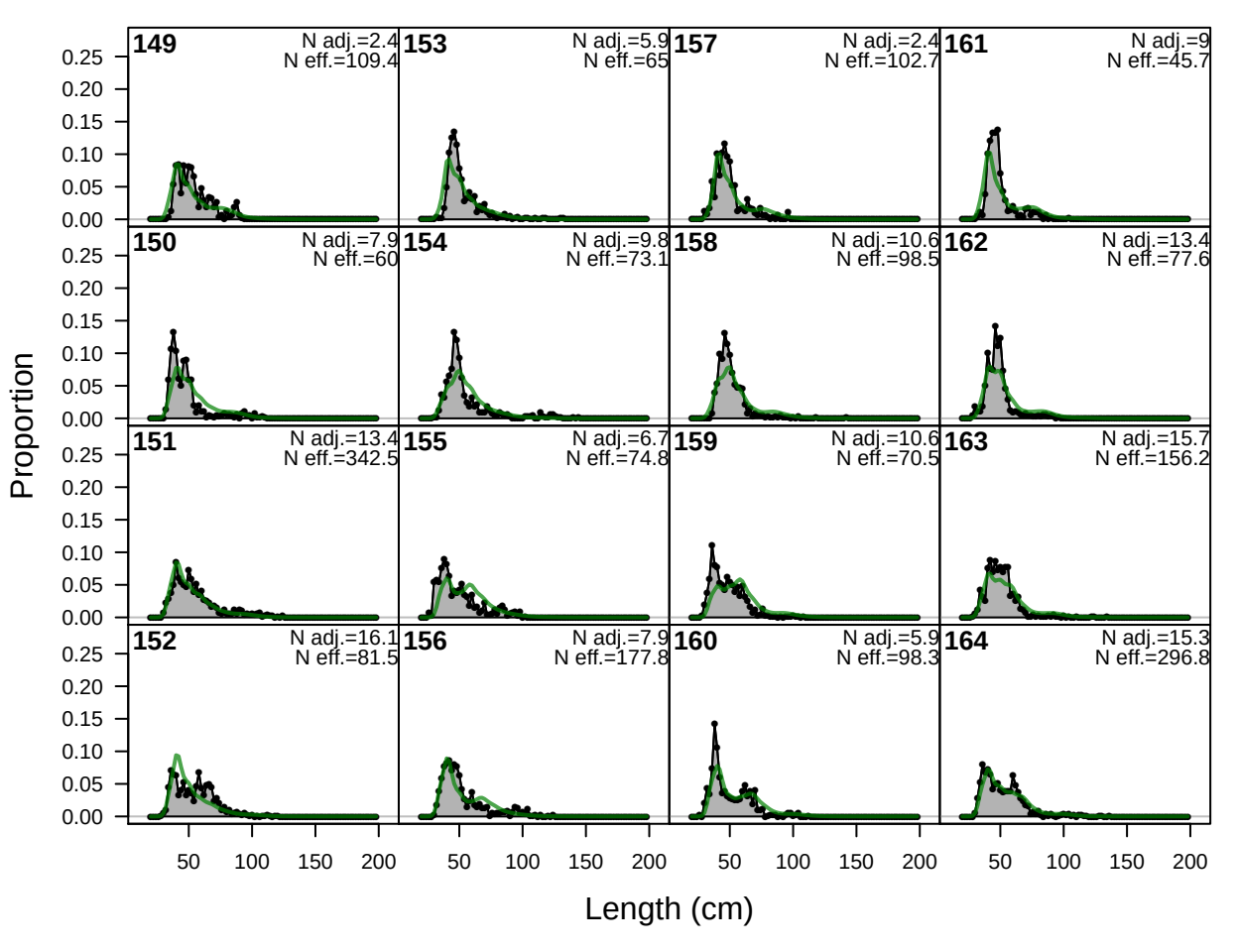
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=109.4
153
N adj.=5.9
N eff.=65
157
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N eff.=102.7
161
N adj.=9
N eff.=45.7
150
N adj.=7.9
N eff.=60
154
N adj.=9.8
N eff.=73.1
158
N adj.=10.6
N eff.=98.5
162
N adj.=13.4
N eff.=77.6
151
N adj.=13.4
N eff.=342.5
155
N adj.=6.7
N eff.=74.8
159
N adj.=10.6
N eff.=70.5
163
N adj.=15.7
N eff.=156.2
152
N adj.=16.1
N eff.=81.5
156
N adj.=7.9
N eff.=177.8
160
N adj.=5.9
N eff.=98.3
164
N adj.=15.3
N eff.=296.8
Proportion
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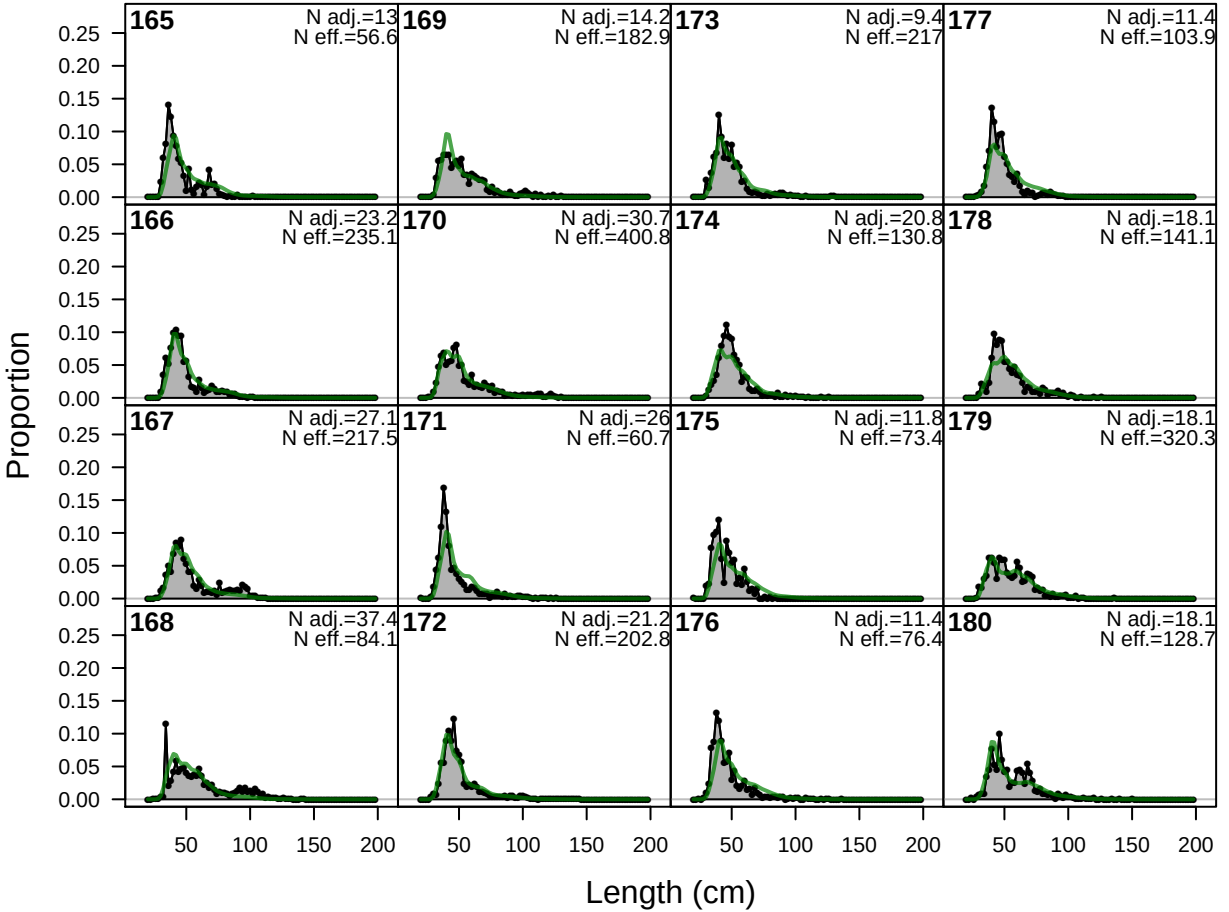
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


165
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N eff.=56.6
169
N adj.=14.2
N eff.=182.9
173
N adj.=9.4
N eff.=217
177
N adj.=11.4
N eff.=103.9
166
N adj.=23.2
N eff.=235.1
170
N adj.=30.7
N eff.=400.8
174
N adj.=20.8
N eff.=130.8
178
N adj.=18.1
N eff.=141.1
167
N adj.=27.1
N eff.=217.5
171
N adj.=26
N eff.=60.7
175
N adj.=11.8
N eff.=73.4
179
N adj.=18.1
N eff.=320.3
168
N adj.=37.4
N eff.=84.1
172
N adj.=21.2
N eff.=202.8
176
N adj.=11.4
N eff.=76.4
180
N adj.=18.1
N eff.=128.7
Proportion
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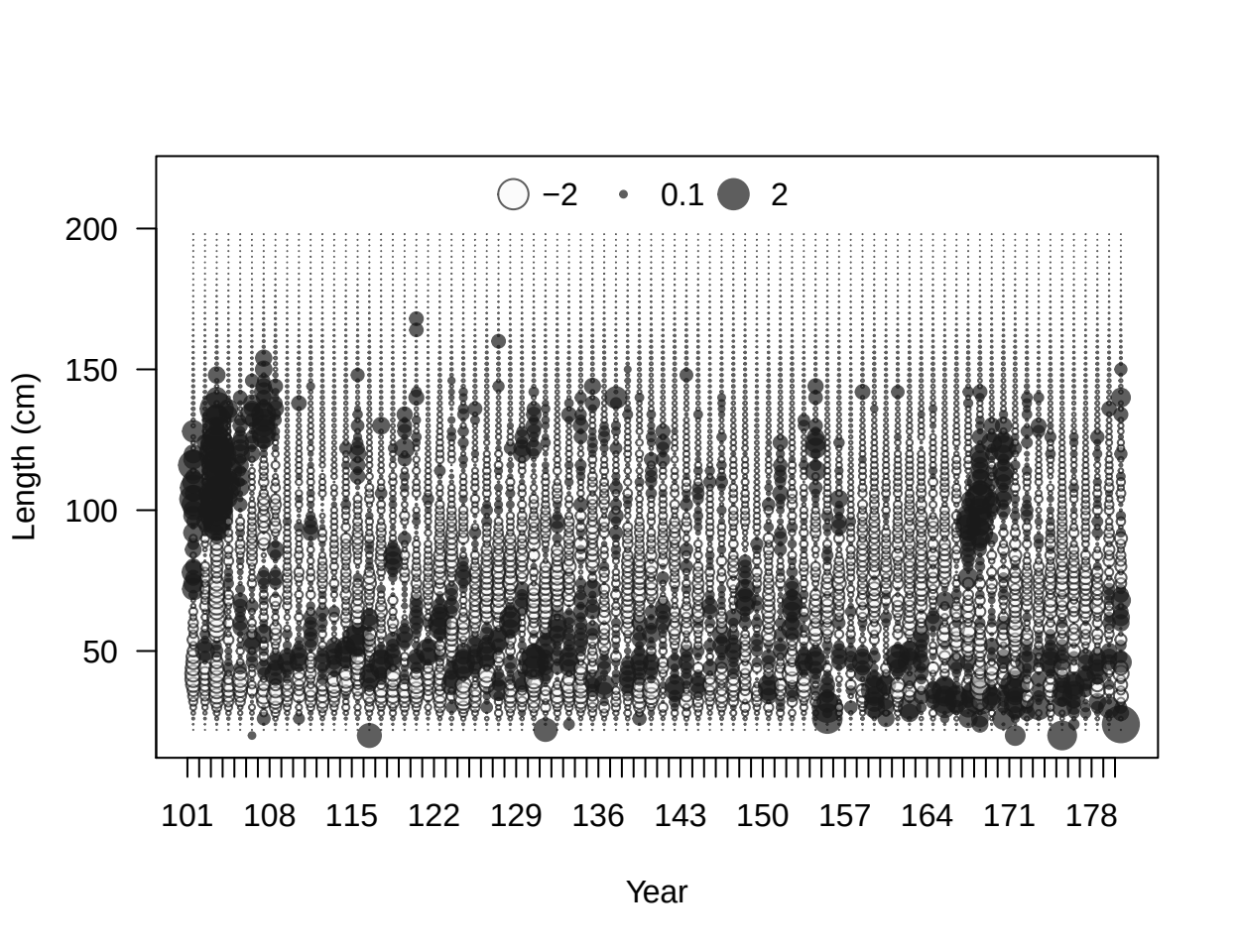
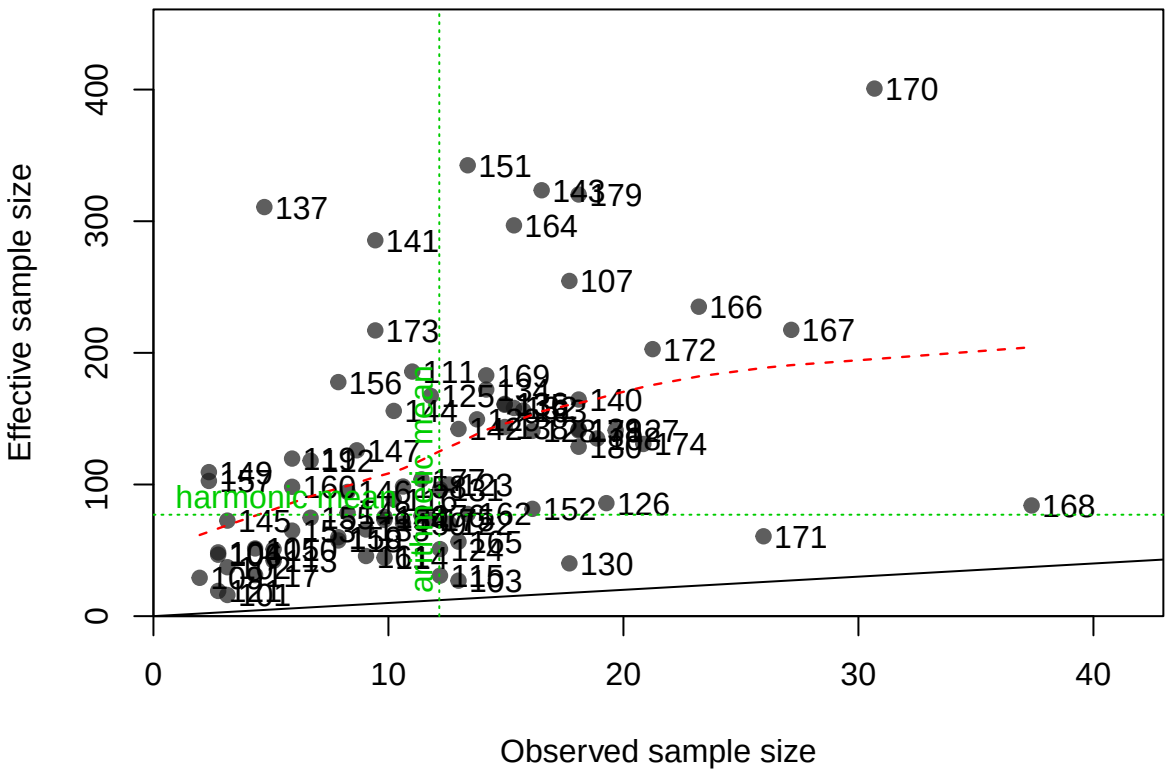
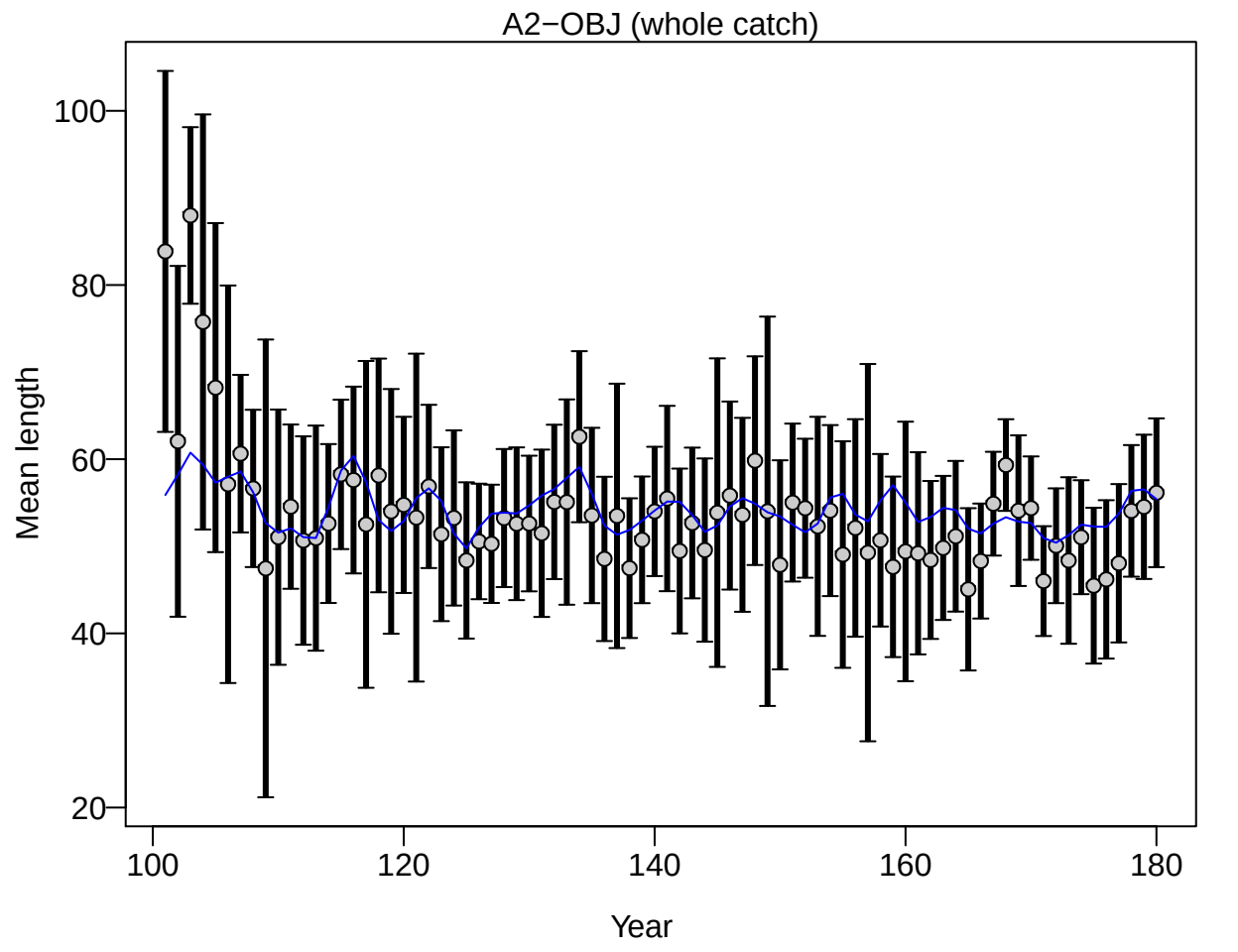
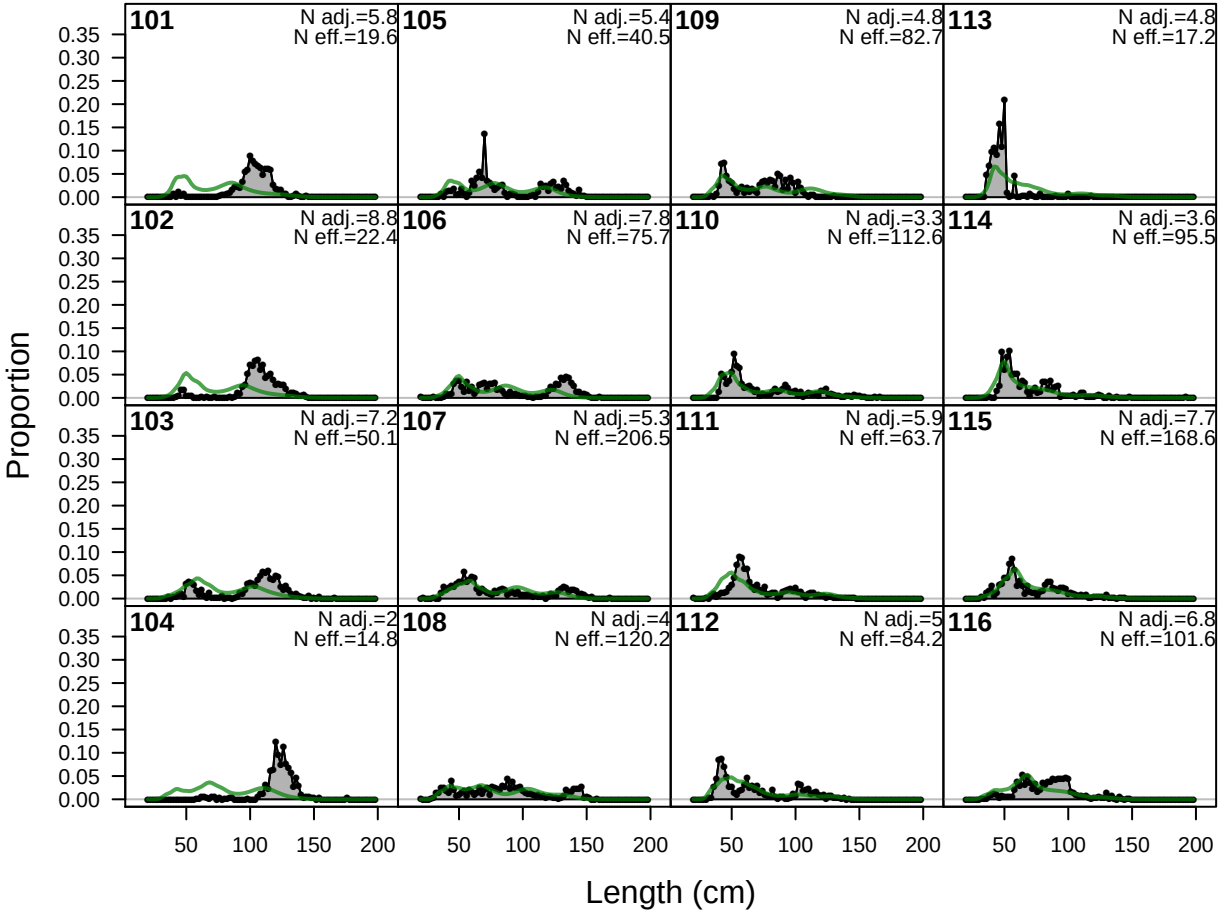
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
178
Year



Effective sample size
Observed sample size
0
100
200
300
400
0
10
20
30
40
harmonic mean
arithmetic mean
170
151
143
179
137
164
141
107
166
167
173
172
156
111
169
140
174
147
149
145
152
126
168
171
130
103


A2−OBJ (whole catch)
Mean length
Year
100
80
60
40
20
100
120
140
160
180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N eff.=19.6
105
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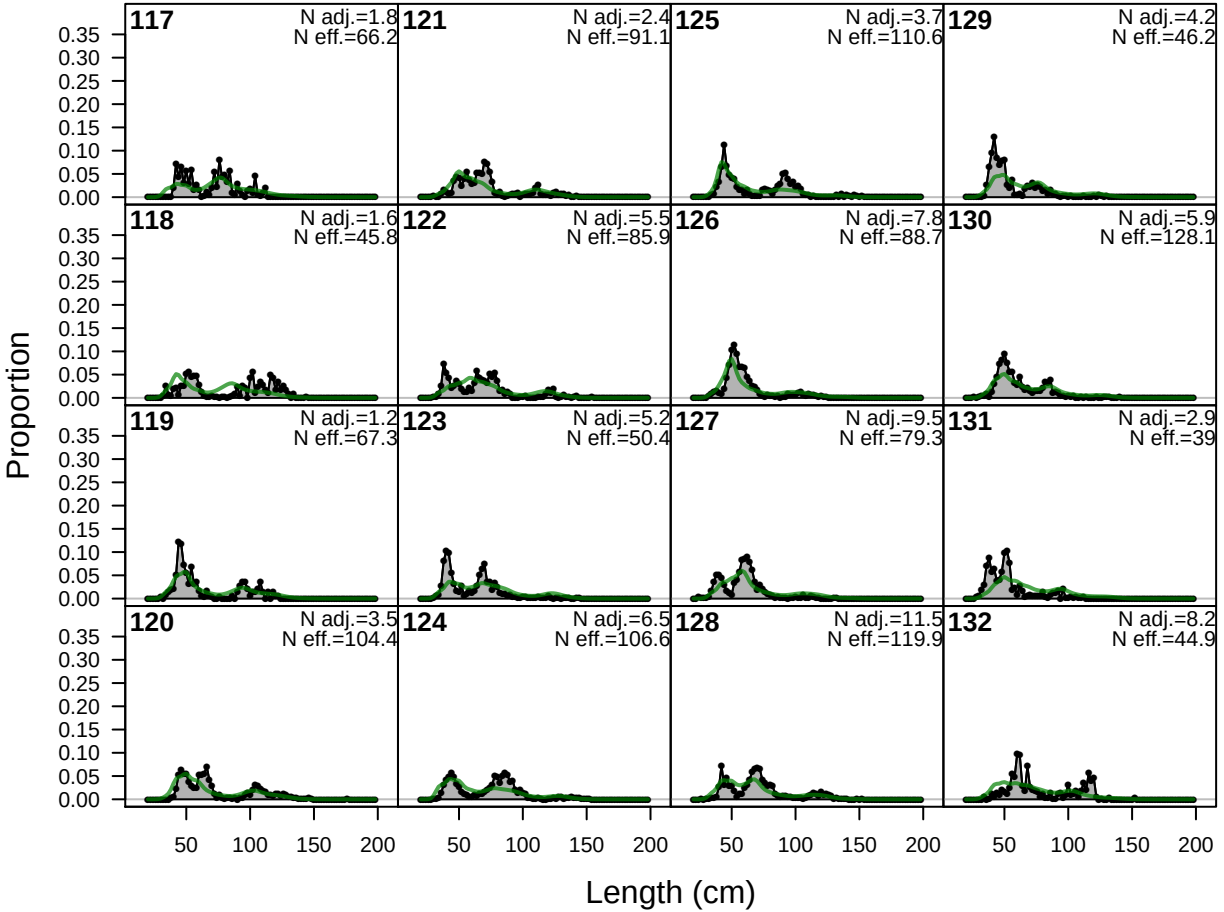
N eff.=40.5
109
N adj.=4.8
N eff.=82.7
113
N adj.=4.8
N eff.=17.2
102
N adj.=8.8
N eff.=22.4
106
N adj.=7.8
N eff.=75.7
110
N adj.=3.3
N eff.=112.6
114
N adj.=3.6
N eff.=95.5
103
N adj.=7.2
N eff.=50.1
107
N adj.=5.3
N eff.=206.5
111
N adj.=5.9
N eff.=63.7
115
N adj.=7.7
N eff.=168.6
104
N adj.=2
N eff.=14.8
108
N adj.=4
N eff.=120.2
112
N adj.=5
N eff.=84.2
116
N adj.=6.8
N eff.=101.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)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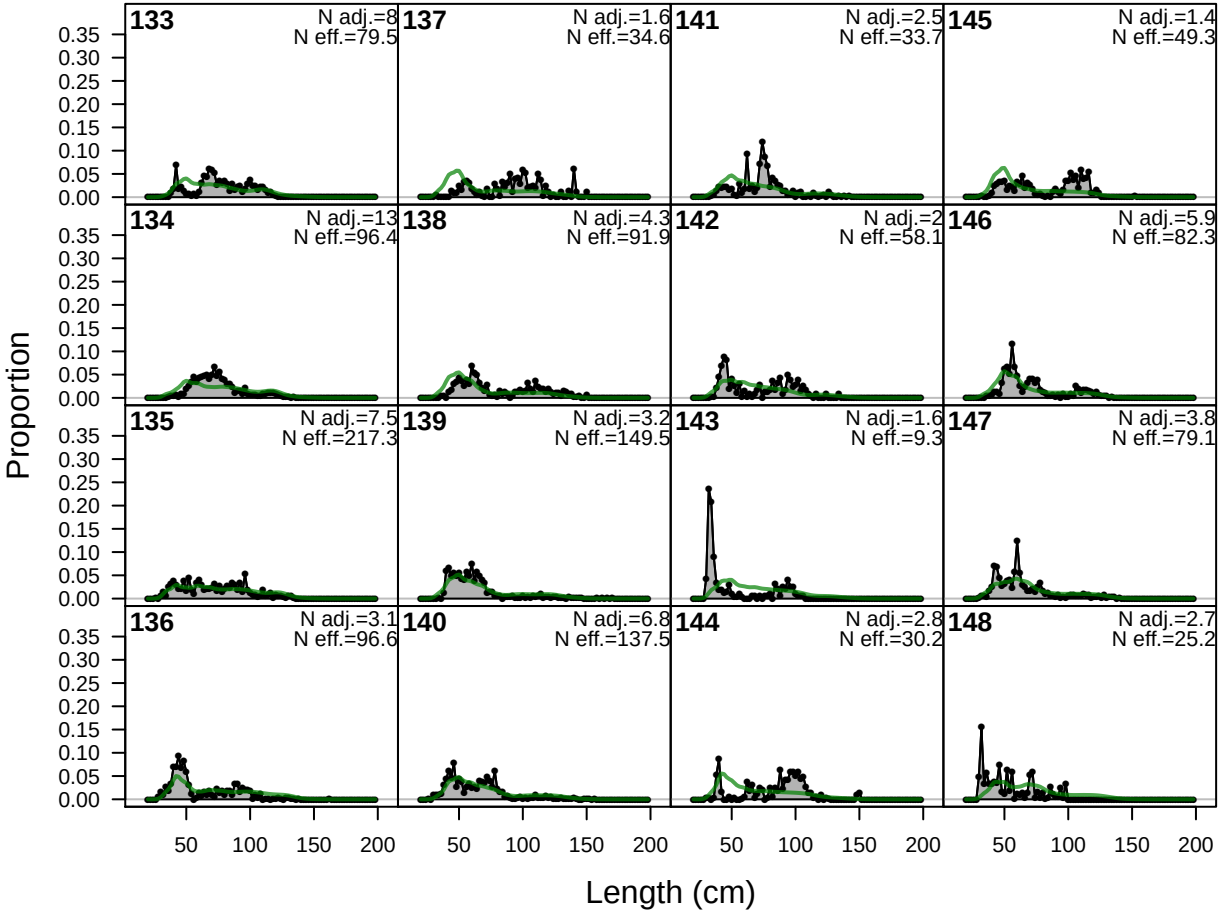
N eff.=66.2
121
N adj.=2.4
N eff.=91.1
125
N adj.=3.7
N eff.=110.6
129
N adj.=4.2
N eff.=46.2
118
N adj.=1.6
N eff.=45.8
122
N adj.=5.5
N eff.=85.9
126
N adj.=7.8
N eff.=88.7
130
N adj.=5.9
N eff.=128.1
119
N adj.=1.2
N eff.=67.3
123
N adj.=5.2
N eff.=50.4
127
N adj.=9.5
N eff.=79.3
131
N adj.=2.9
N eff.=39
120
N adj.=3.5
N eff.=104.4
124
N adj.=6.5
N eff.=106.6
128
N adj.=11.5
N eff.=119.9
132
N adj.=8.2
N eff.=44.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)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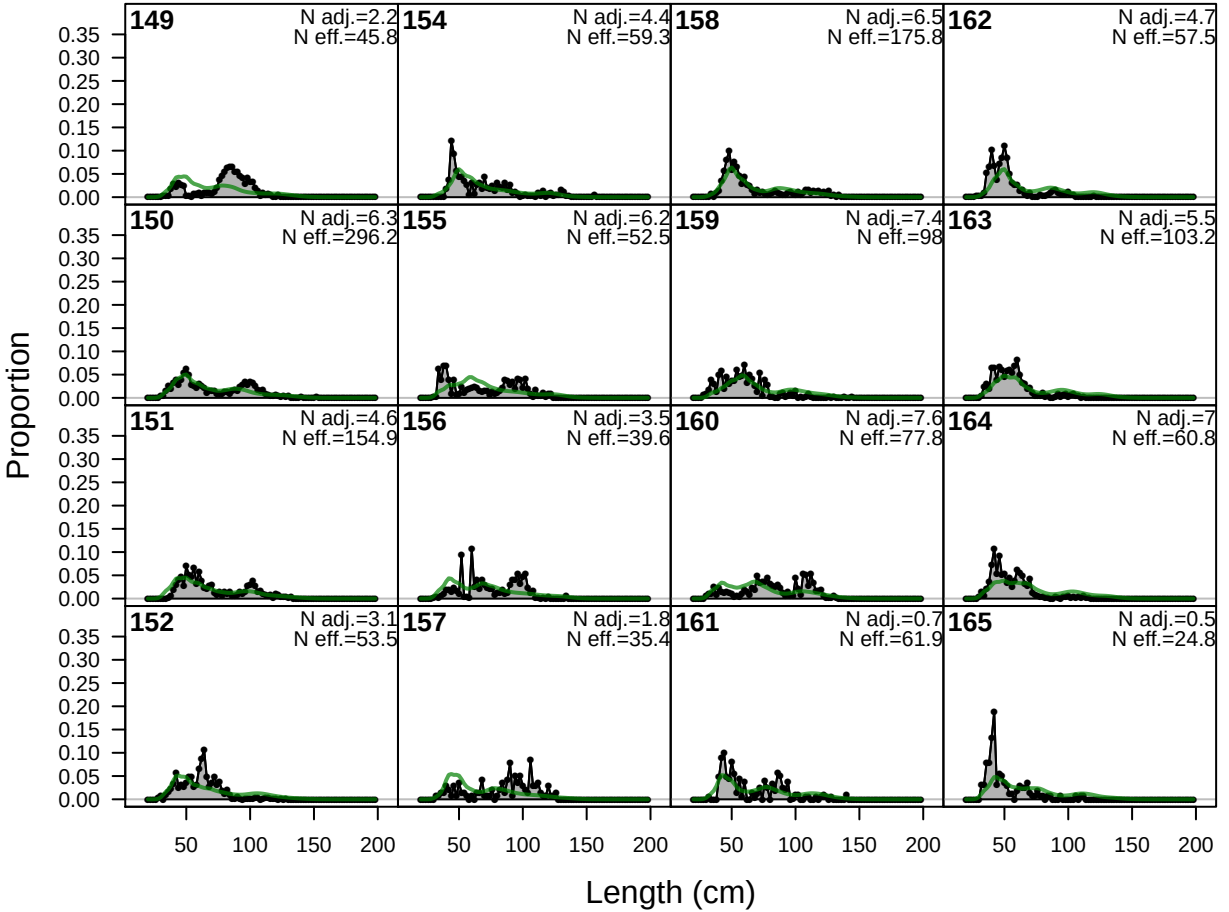
N adj.=8
N eff.=79.5
137
N adj.=1.6
N eff.=34.6
141
N adj.=2.5
N eff.=33.7
145
N adj.=1.4
N eff.=49.3
134
N adj.=13
N eff.=96.4
138
N adj.=4.3
N eff.=91.9
142
N adj.=2
N eff.=58.1
146
N adj.=5.9
N eff.=82.3
135
N adj.=7.5
N eff.=217.3
139
N adj.=3.2
N eff.=149.5
143
N adj.=1.6
N eff.=9.3
147
N adj.=3.8
N eff.=79.1
136
N adj.=3.1
N eff.=96.6
140
N adj.=6.8
N eff.=137.5
144
N adj.=2.8
N eff.=30.2
148
N adj.=2.7
N eff.=25.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)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N eff.=45.8
154
N adj.=4.4
N eff.=59.3
158
N adj.=6.5
N eff.=175.8
162
N adj.=4.7
N eff.=57.5
150
N adj.=6.3
N eff.=296.2
155
N adj.=6.2
N eff.=52.5
159
N adj.=7.4
N eff.=98
163
N adj.=5.5
N eff.=103.2
151
N adj.=4.6
N eff.=154.9
156
N adj.=3.5
N eff.=39.6
160
N adj.=7.6
N eff.=77.8
164
N adj.=7
N eff.=60.8
152
N adj.=3.1
N eff.=53.5
157
N adj.=1.8
N eff.=35.4
161
N adj.=0.7
N eff.=61.9
165
N adj.=0.5
N eff.=24.8
Proportion
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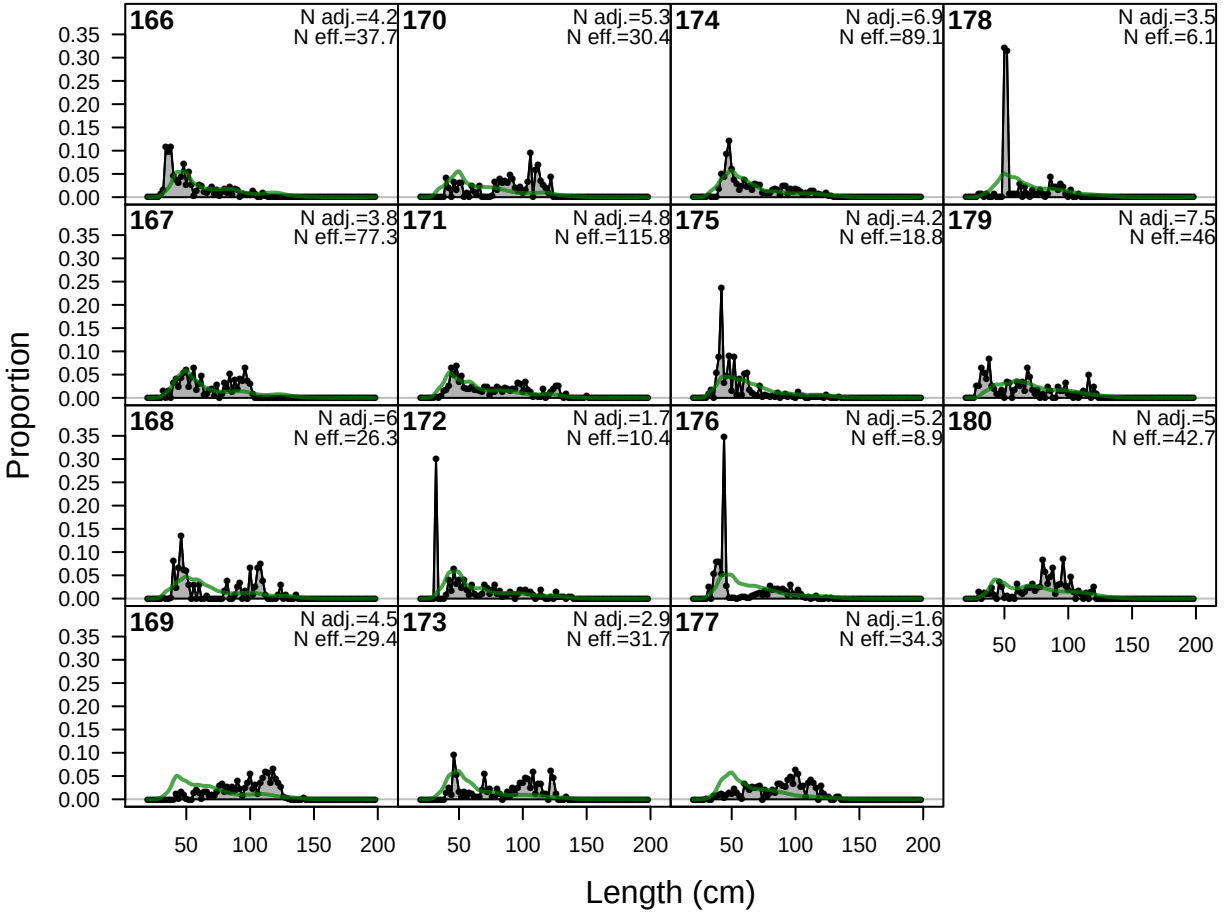
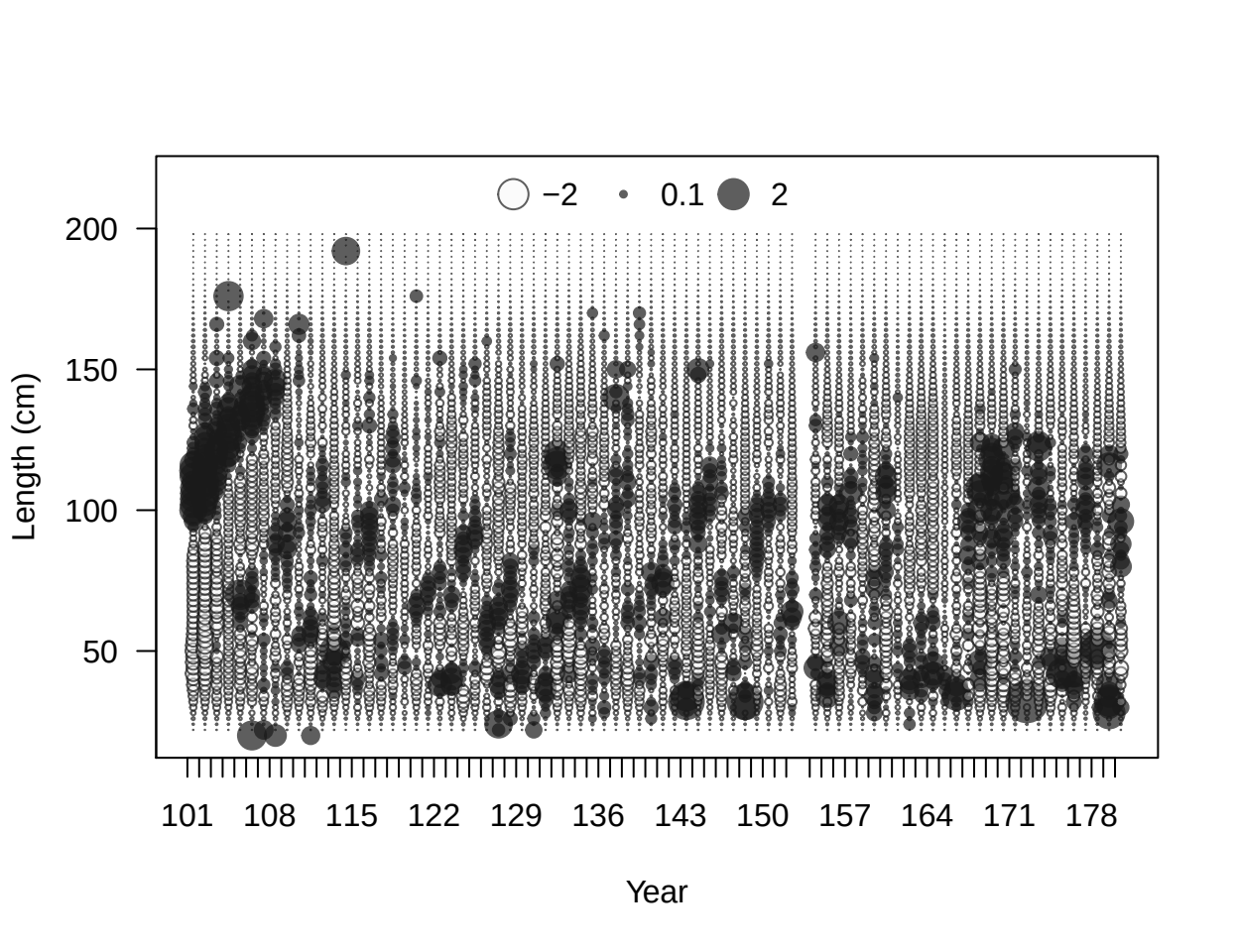
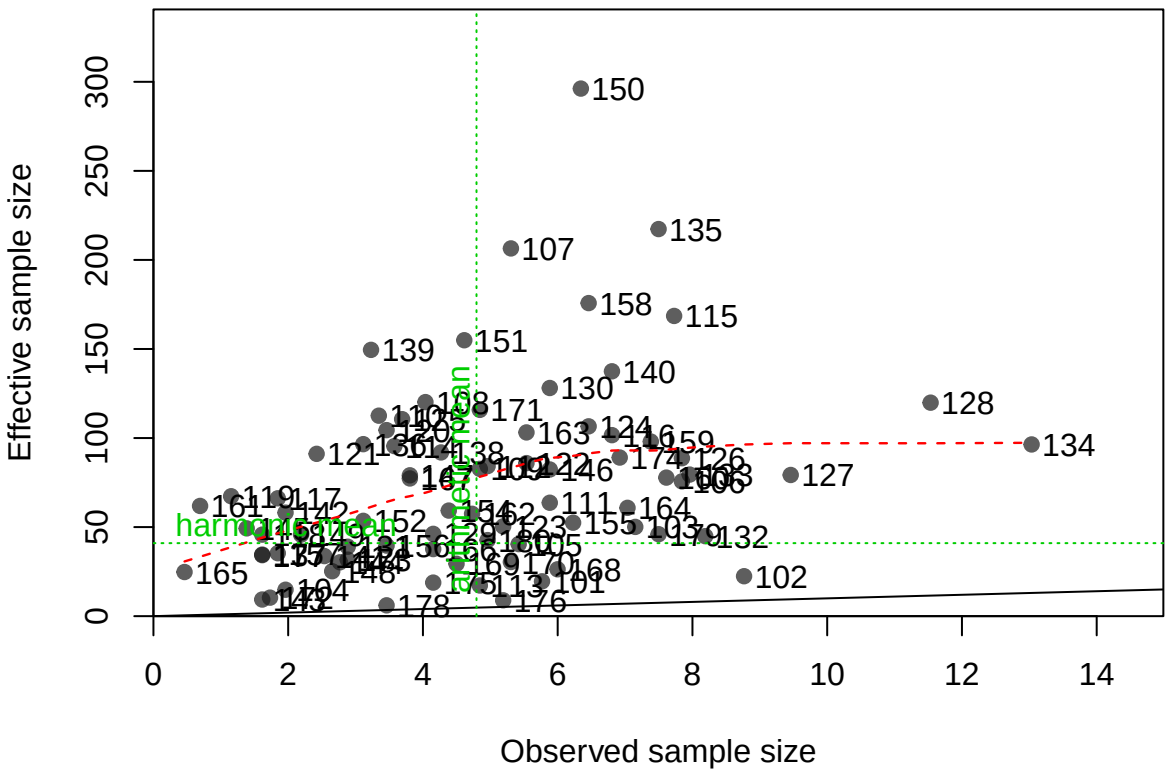
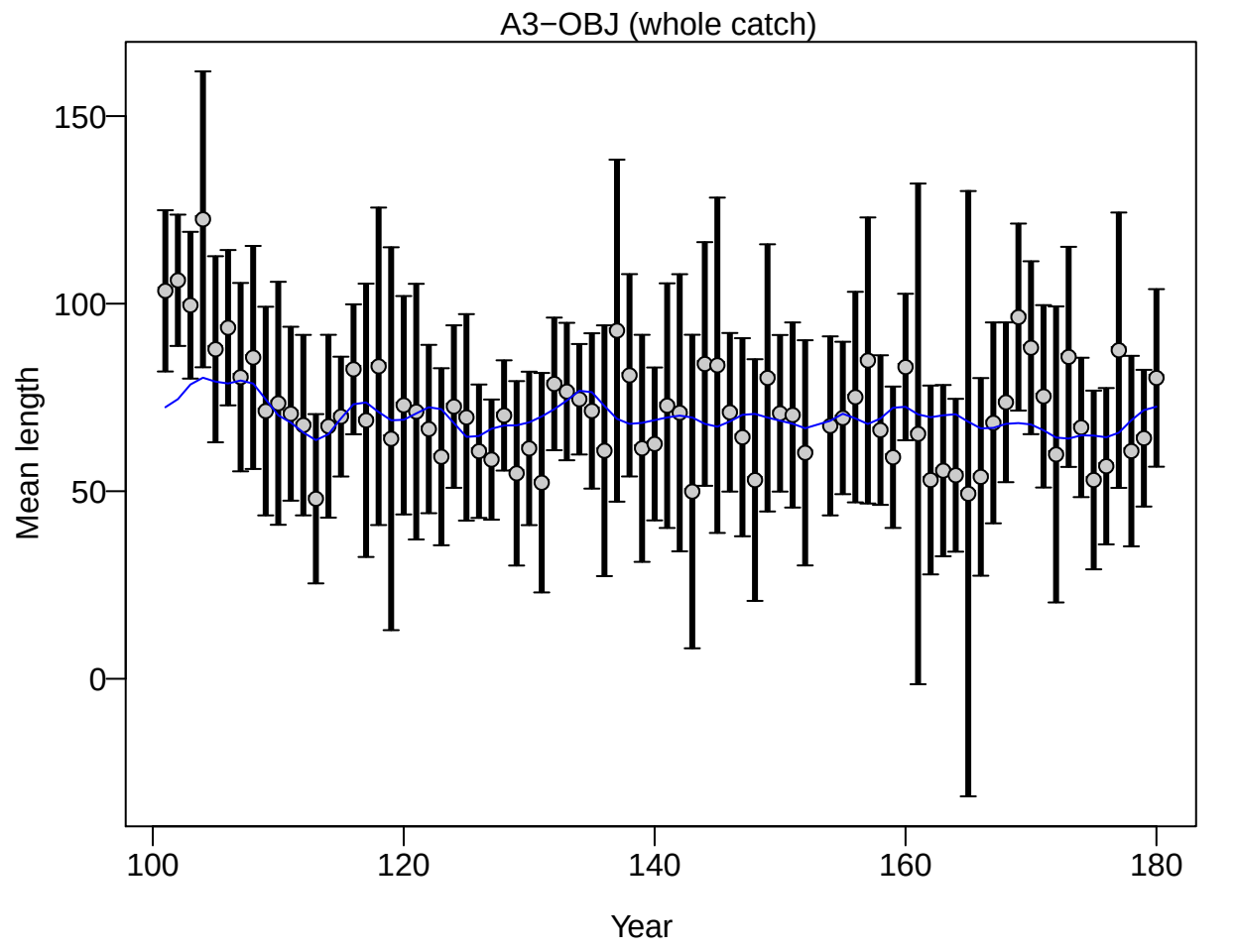
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

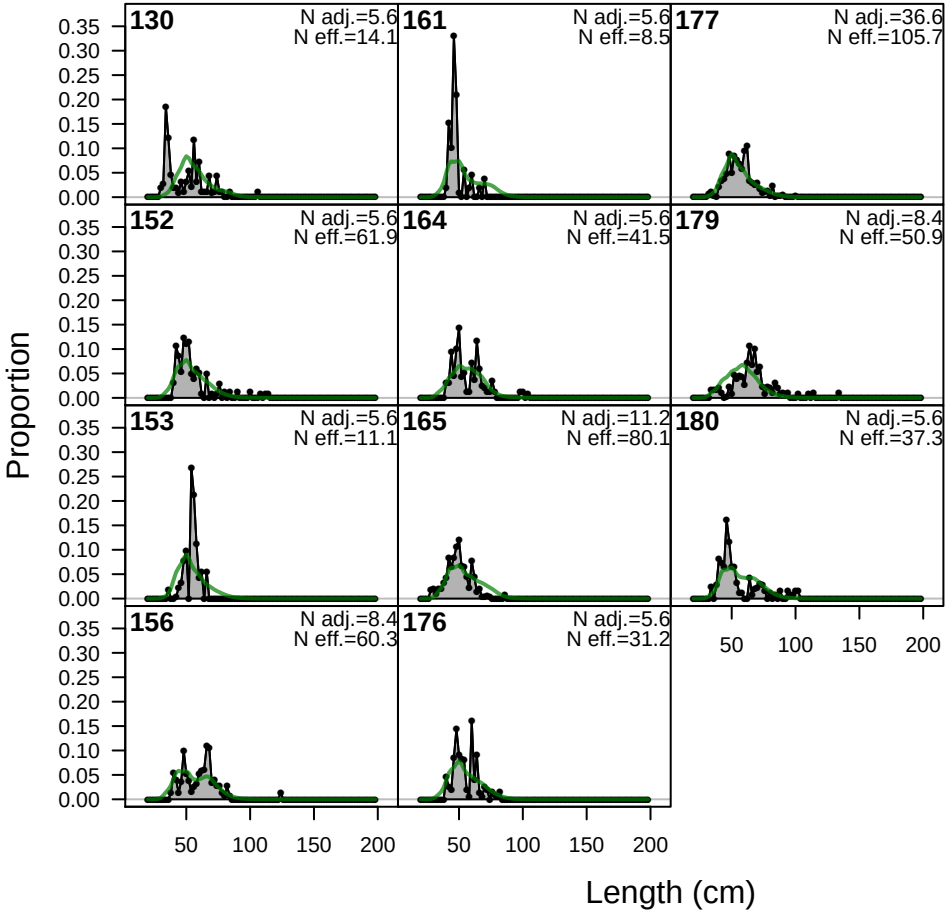

166
N adj.=4.2
N eff.=37.7
170
N adj.=5.3
N eff.=30.4
174
N adj.=6.9
N eff.=89.1
178
N adj.=3.5
N eff.=6.1
167
N adj.=3.8
N eff.=77.3
171
N adj.=4.8
N eff.=115.8
175
N adj.=4.2
N eff.=18.8
179
N adj.=7.5
N eff.=46
168
N adj.=6
N eff.=26.3
172
N adj.=1.7
N eff.=10.4
176
N adj.=5.2
N eff.=8.9
180
N adj.=5
N eff.=42.7
169
N adj.=4.5
N eff.=29.4
173
N adj.=2.9
N eff.=31.7
177
N adj.=1.6
N eff.=34.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
178
Year



Effective sample size
Observed sample size
0
50
100
150
200
250
300
0
2
4
6
8
10
12
14
150
135
107
158
115
139
151
140
130
128
134
127
102
165
178
176


A3−OBJ (whole catch)
150
100
50
0
Mean length
100
120
140
160
180
Year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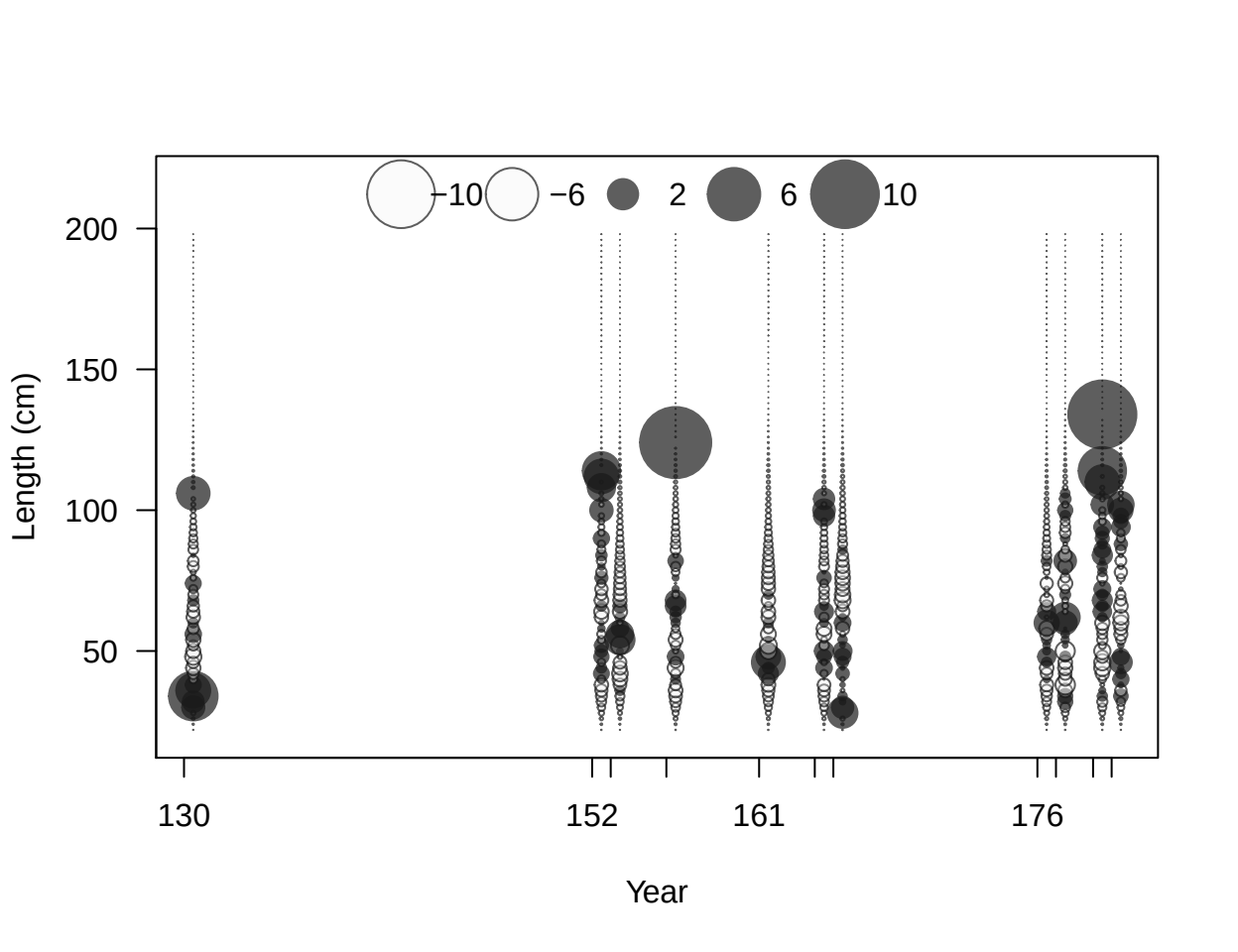
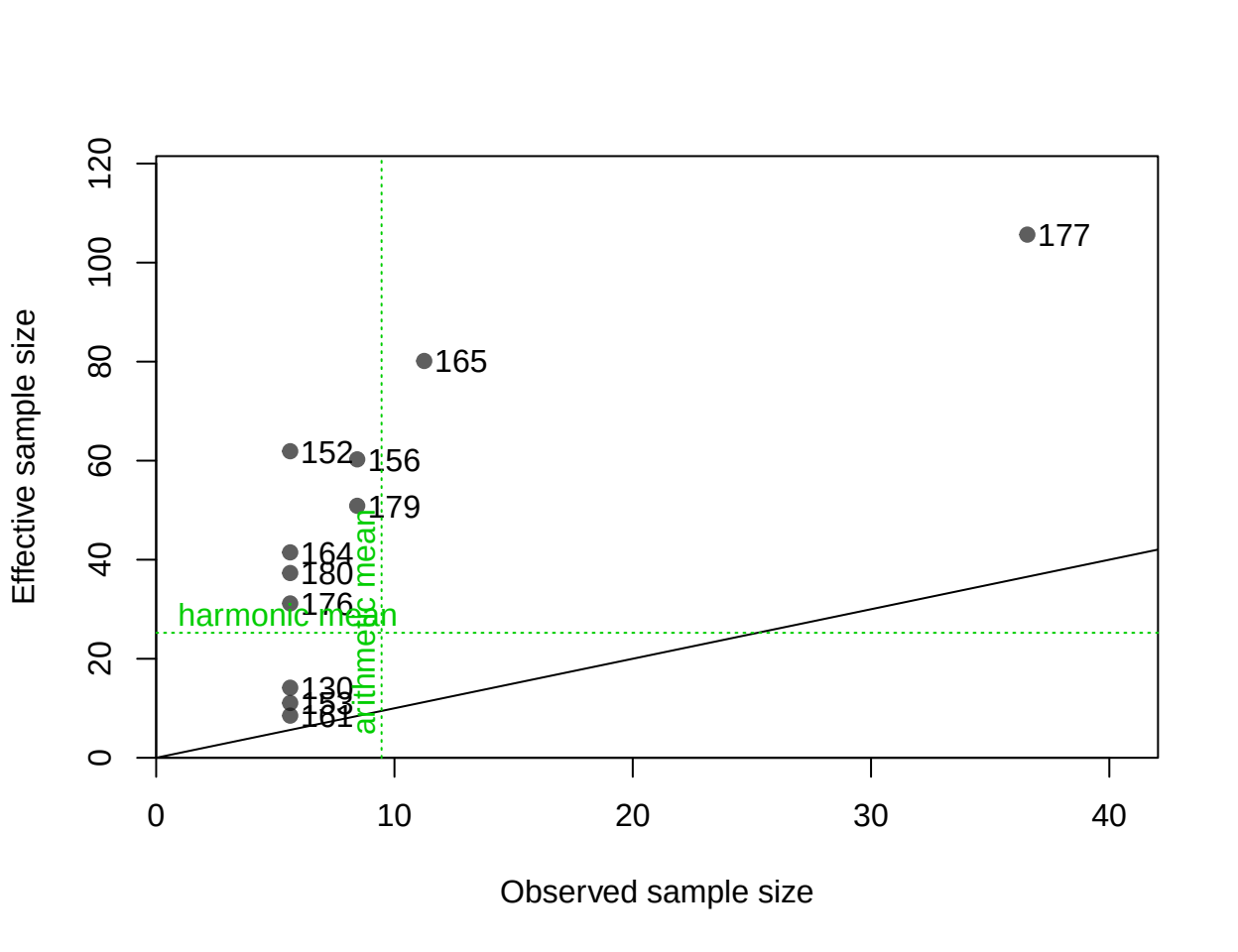
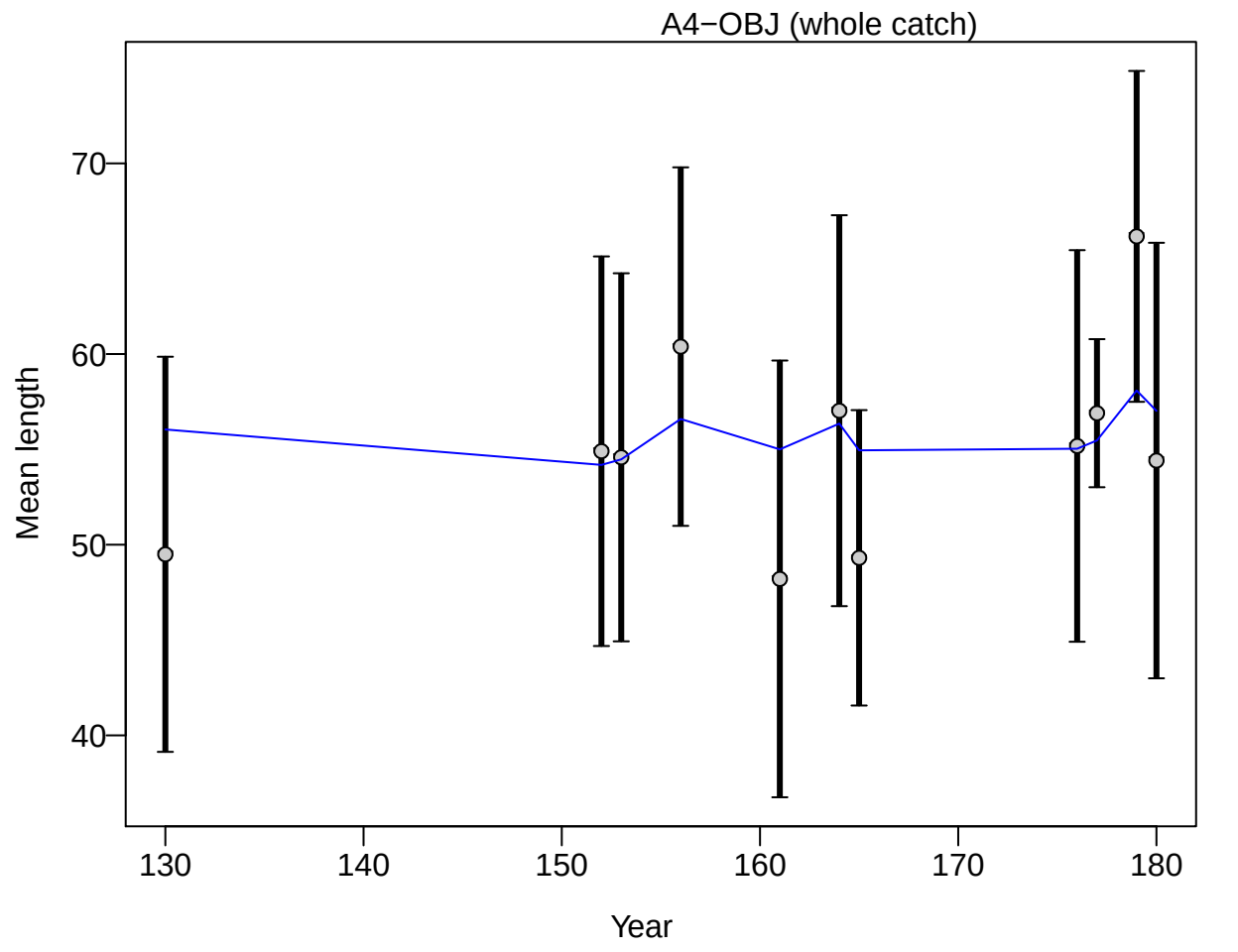
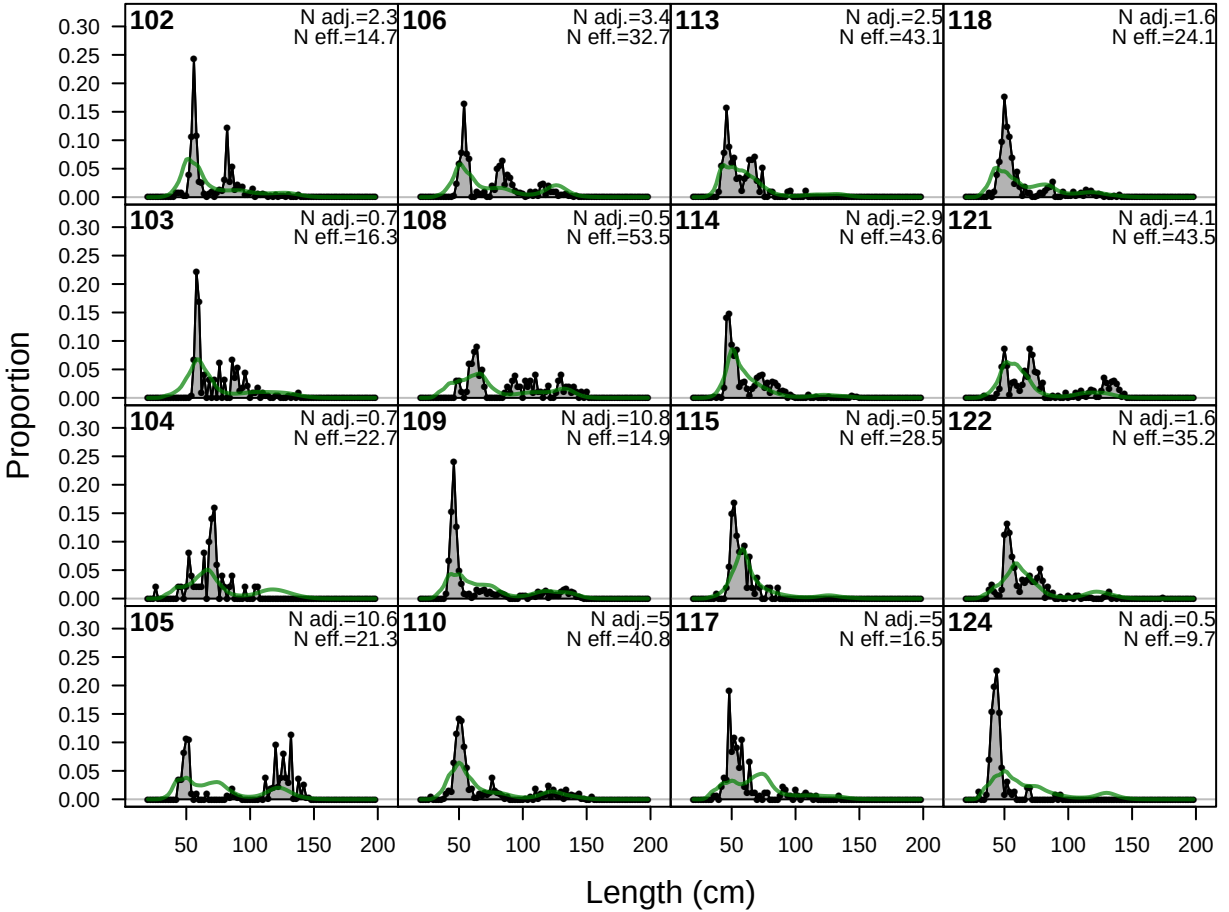
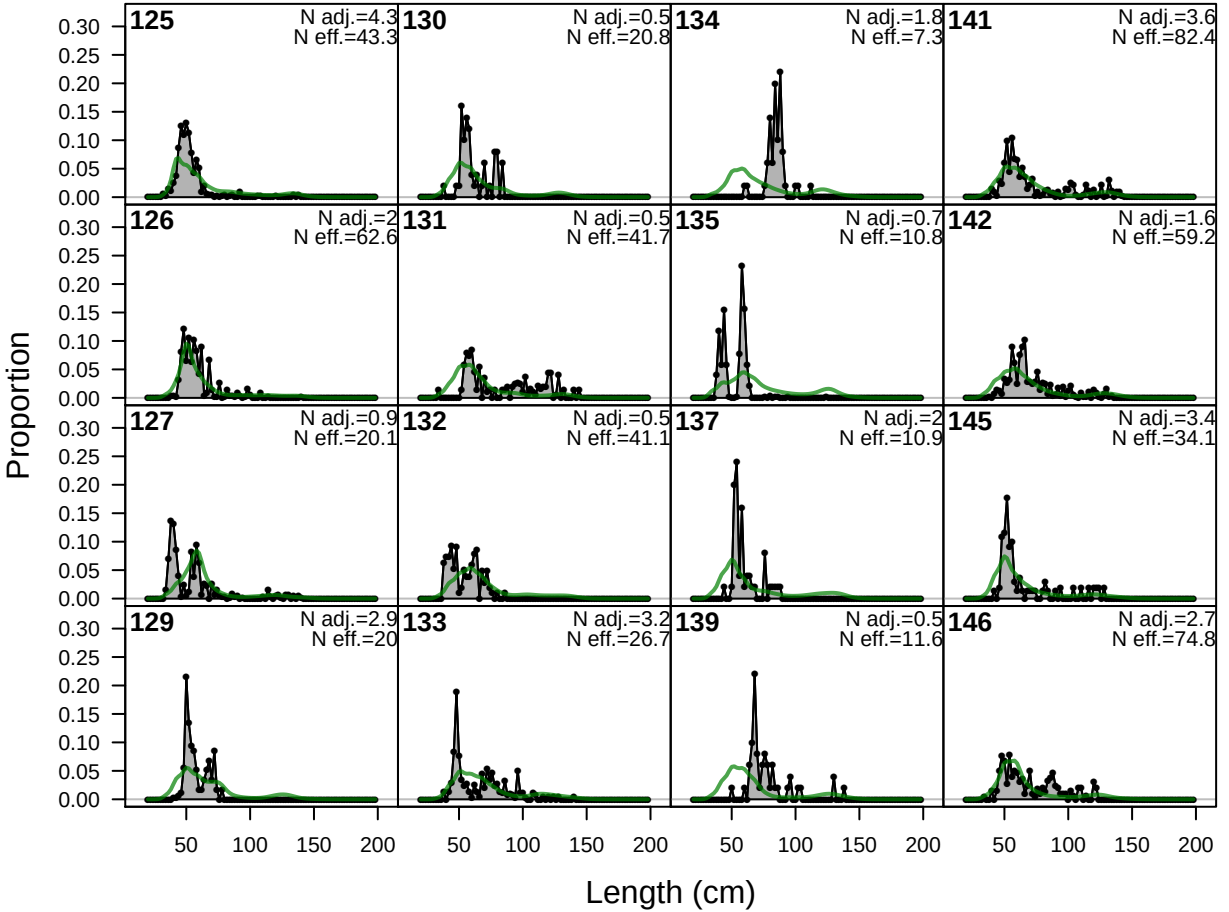
N eff.=14.1
161
N adj.=5.6
N eff.=8.5
177
N adj.=36.6
N eff.=105.7
152
N adj.=5.6
N eff.=61.9
164
N adj.=5.6
N eff.=41.5
179
N adj.=8.4
N eff.=50.9
153
N adj.=5.6
N eff.=11.1
165
N adj.=11.2
N eff.=80.1
180
N adj.=5.6
N eff.=37.3
156
N adj.=8.4
N eff.=60.3
176
N adj.=5.6
N eff.=31.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

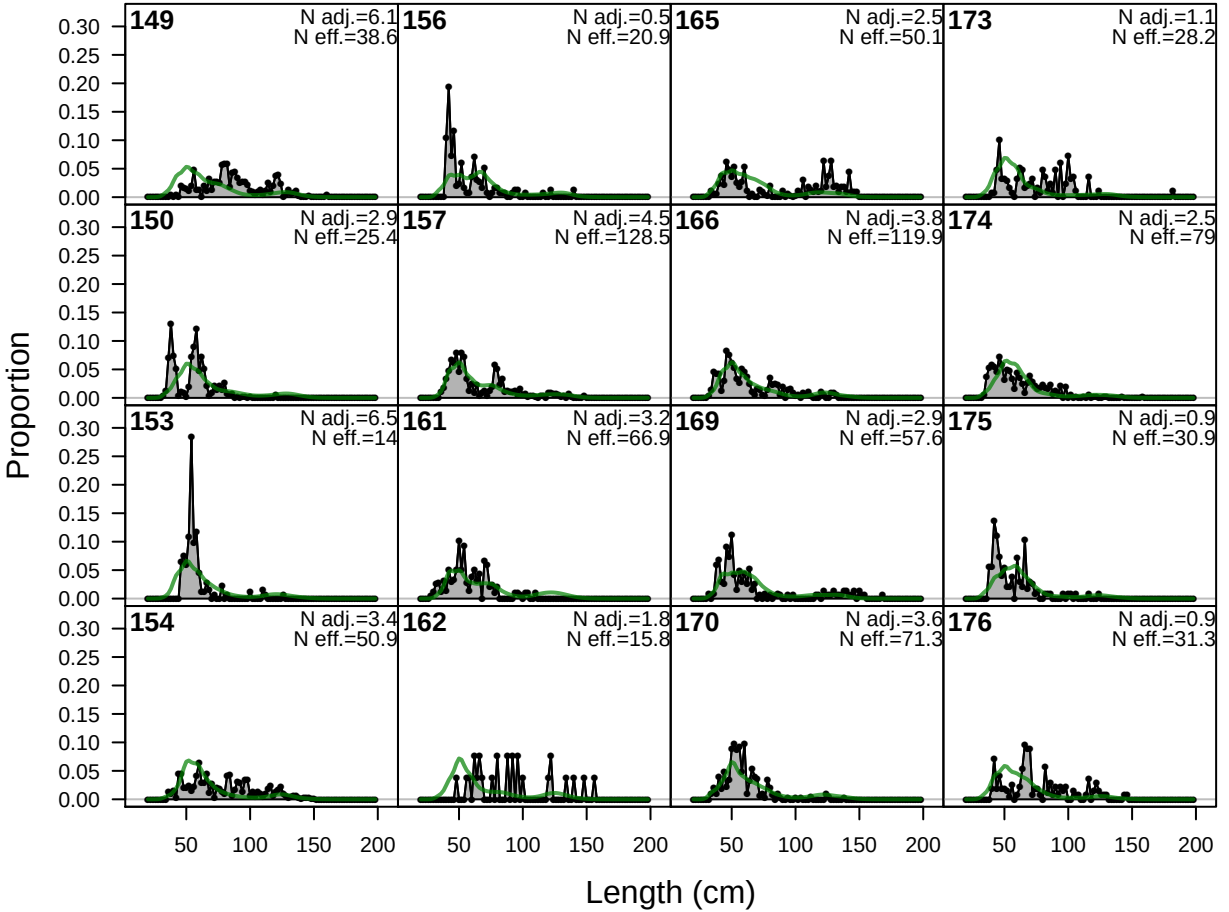

−10
−6
2
6
10
200
150
100
50
Length (cm)
130
152
161
176
Year

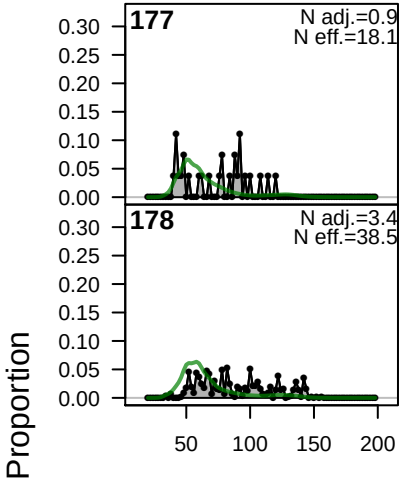

Effective sample size
Observed sample size
0
20
40
60
80
100
120
0
10
20
30
40
177
165
152
156
179
164
180
176
130
harmonic mean
arithmetic mean


A4−OBJ (whole catch)
Mean length
70
60
50
40
130
140
150
160
170
180
Year

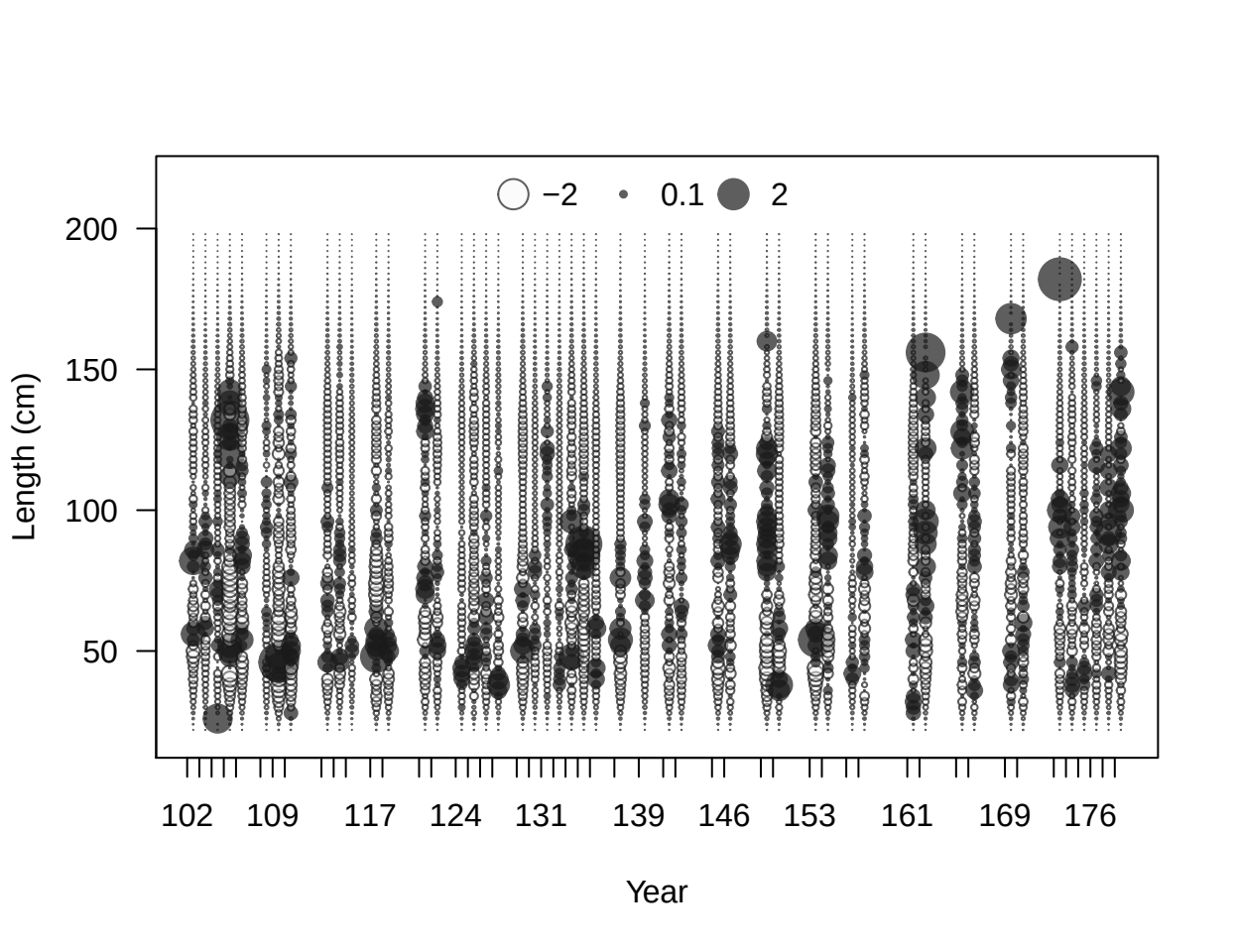

102
N adj.=2.3
N eff.=14.7
106
N adj.=3.4
N eff.=32.7
113
N adj.=2.5
N eff.=43.1
118
N adj.=1.6
N eff.=24.1
103
N adj.=0.7
N eff.=16.3
108
N adj.=0.5
N eff.=53.5
114
N adj.=2.9
N eff.=43.6
121
N adj.=4.1
N eff.=43.5
104
N adj.=0.7
N eff.=22.7
109
N adj.=10.8
N eff.=14.9
115
N adj.=0.5
N eff.=28.5
122
N adj.=1.6
N eff.=35.2
105
N adj.=10.6
N eff.=21.3
110
N adj.=5
N eff.=40.8
117
N adj.=5
N eff.=16.5
124
N adj.=0.5
N eff.=9.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

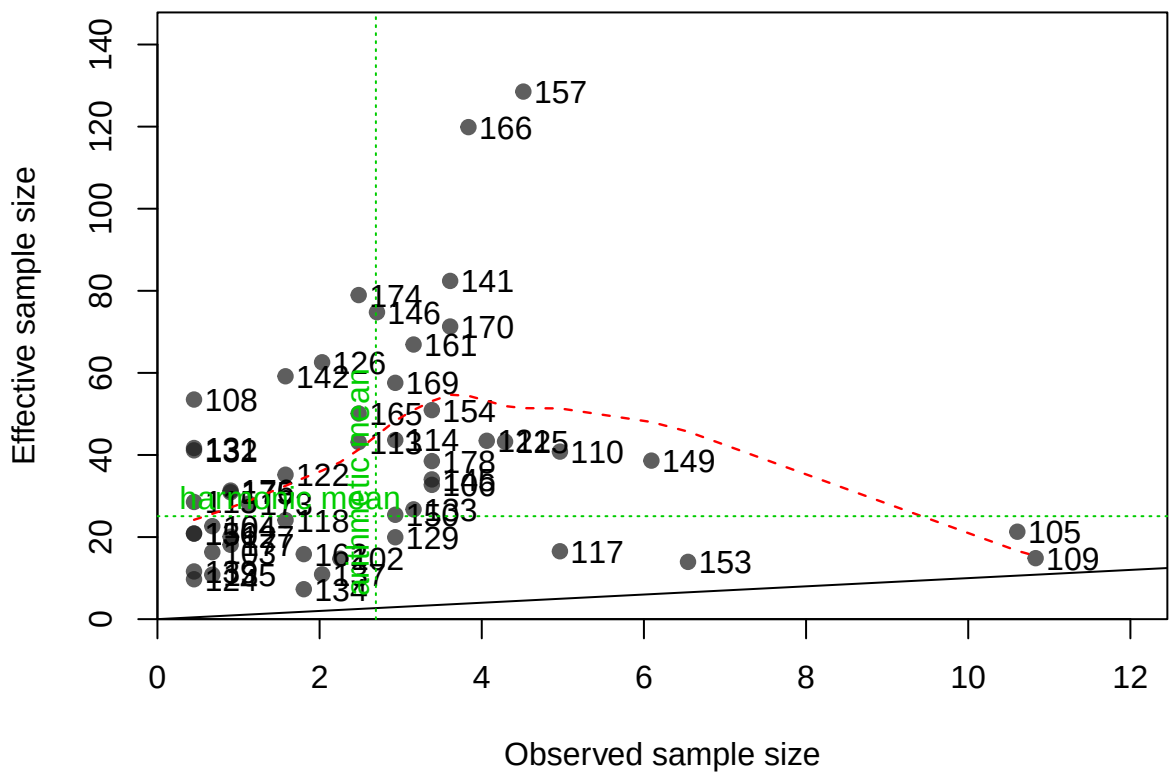

125
N adj.=4.3
N eff.=43.3
130
N adj.=0.5
N eff.=20.8
134
N adj.=1.8
N eff.=7.3
141
N adj.=3.6
N eff.=82.4
126
N adj.=2
N eff.=62.6
131
N adj.=0.5
N eff.=41.7
135
N adj.=0.7
N eff.=10.8
142
N adj.=1.6
N eff.=59.2
127
N adj.=0.9
N eff.=20.1
132
N adj.=0.5
N eff.=41.1
137
N adj.=2
N eff.=10.9
145
N adj.=3.4
N eff.=34.1
129
N adj.=2.9
N eff.=20
133
N adj.=3.2
N eff.=26.7
139
N adj.=0.5
N eff.=11.6
146
N adj.=2.7
N eff.=74.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


149
N adj.=6.1
N eff.=38.6
156
N adj.=0.5
N eff.=20.9
165
N adj.=2.5
N eff.=50.1
173
N adj.=1.1
N eff.=28.2
150
N adj.=2.9
N eff.=25.4
157
N adj.=4.5
N eff.=128.5
166
N adj.=3.8
N eff.=119.9
174
N adj.=2.5
N eff.=79
153
N adj.=6.5
N eff.=14
161
N adj.=3.2
N eff.=66.9
169
N adj.=2.9
N eff.=57.6
175
N adj.=0.9
N eff.=30.9
154
N adj.=3.4
N eff.=50.9
162
N adj.=1.8
N eff.=15.8
170
N adj.=3.6
N eff.=71.3
176
N adj.=0.9
N eff.=31.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

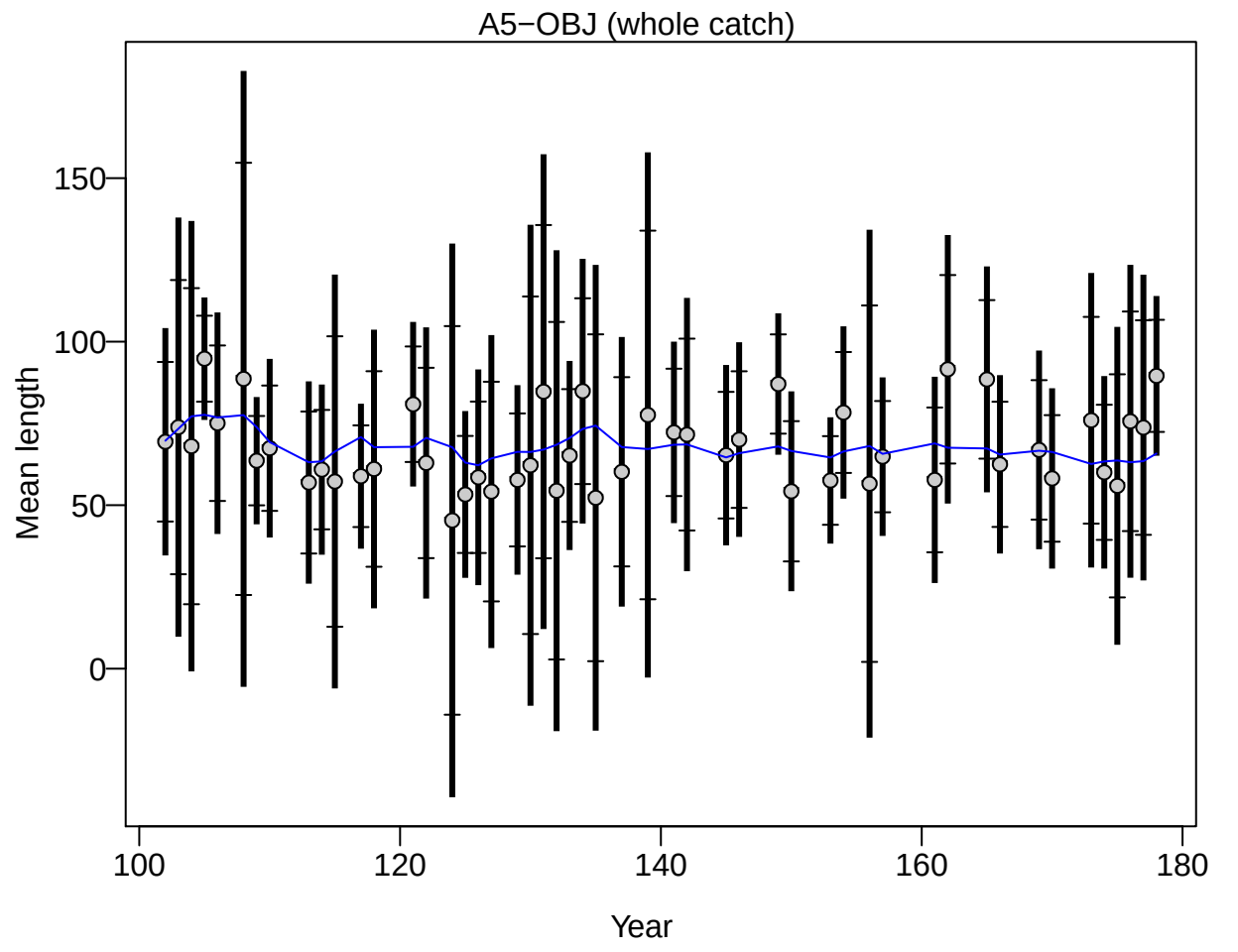

177
N adj.=0.9
N eff.=18.1
178
N adj.=3.4
N eff.=38.5
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion

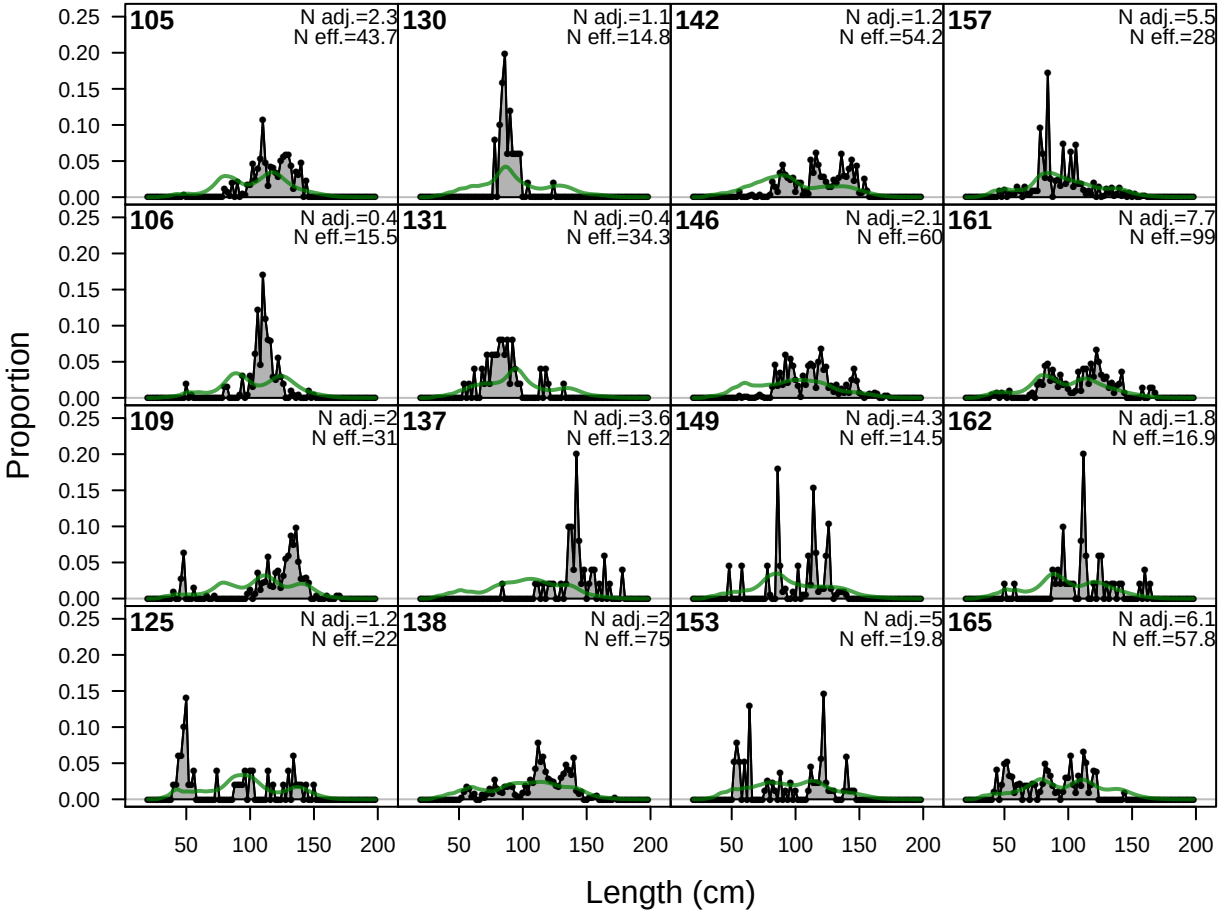
Length (cm)

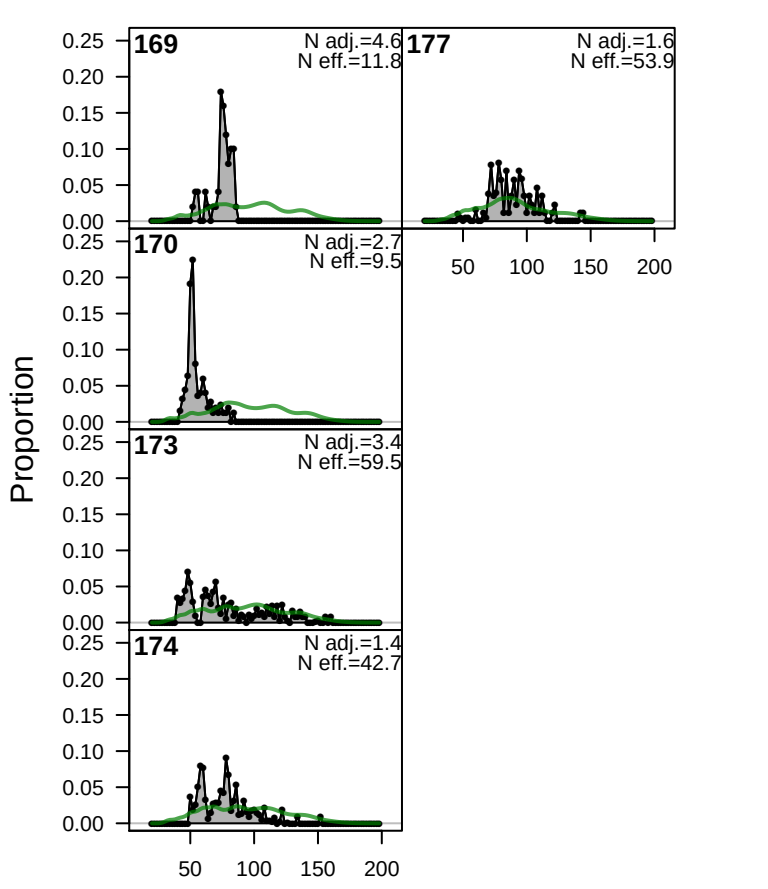

−2
0.1
2
200
150
100
50
Length (cm)
102
109
117
124
131
139
146
153
161
169
176
Year

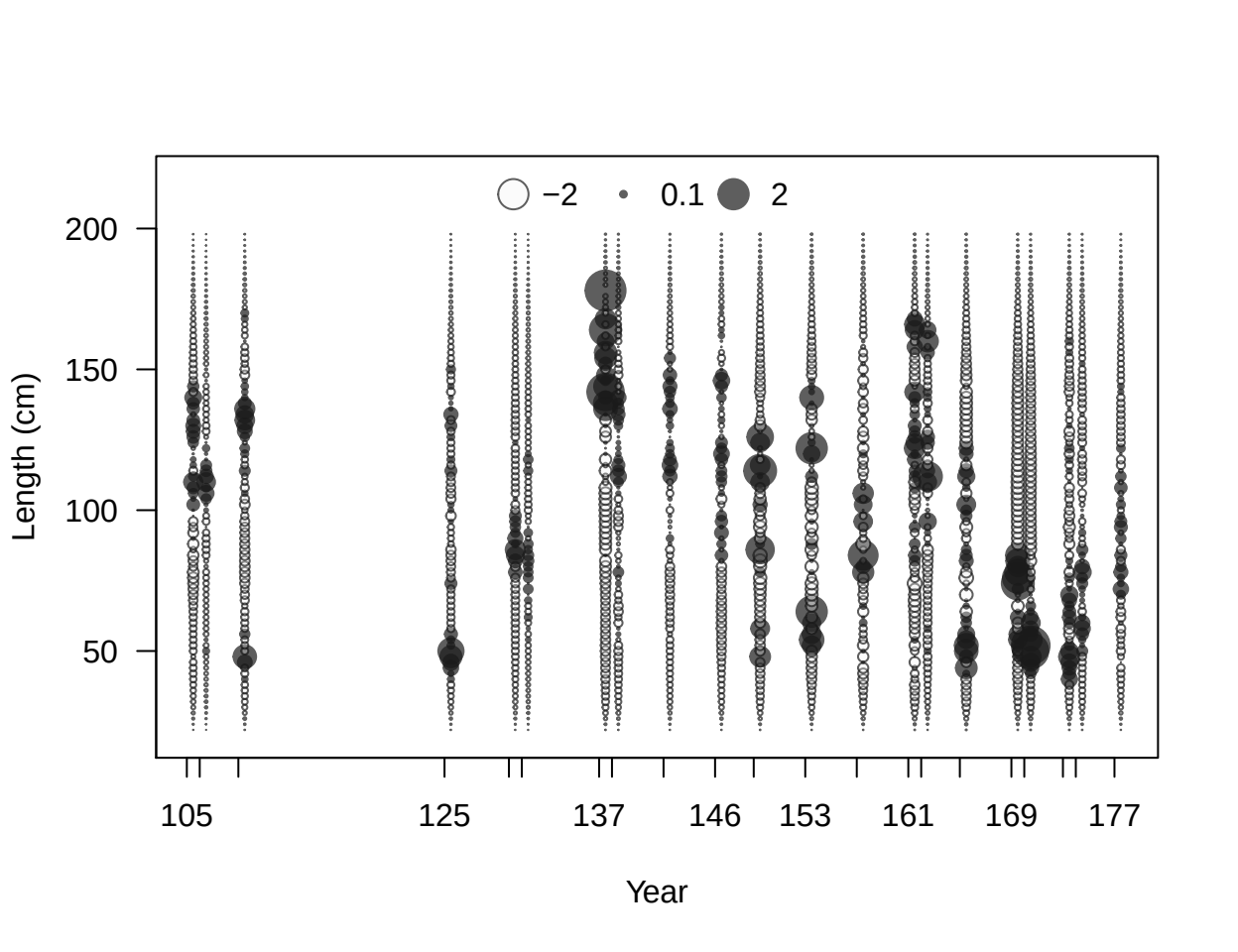


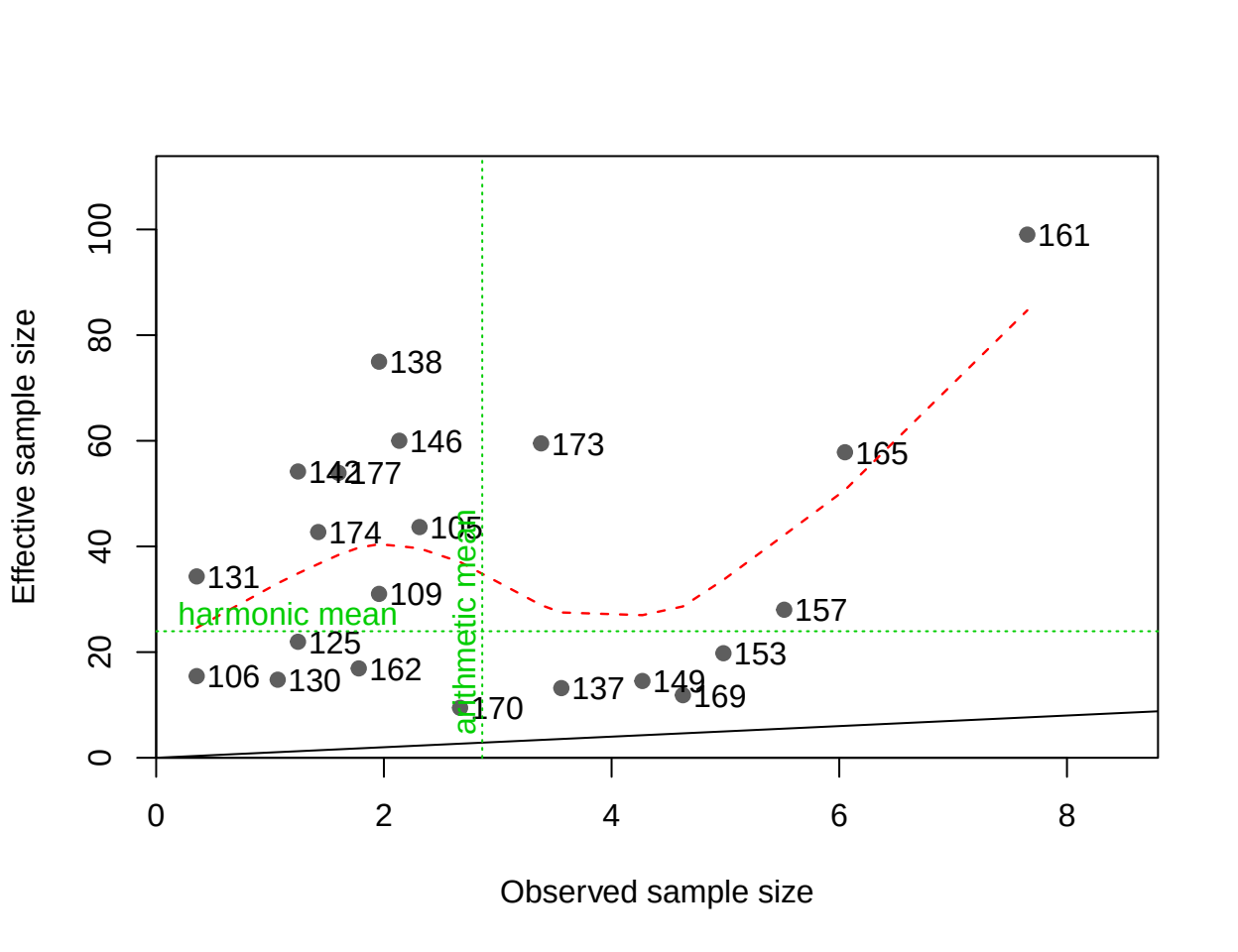
Effective sample size
Observed sample size
0
20
40
60
80
100
120
140
0
2
4
6
8
10
12
157
166
141
174
146
170
161
126
142
169
108
165
154
110
149
178
122
118
129
117
153
105
109
134
harmonic mean
arithmetic mean

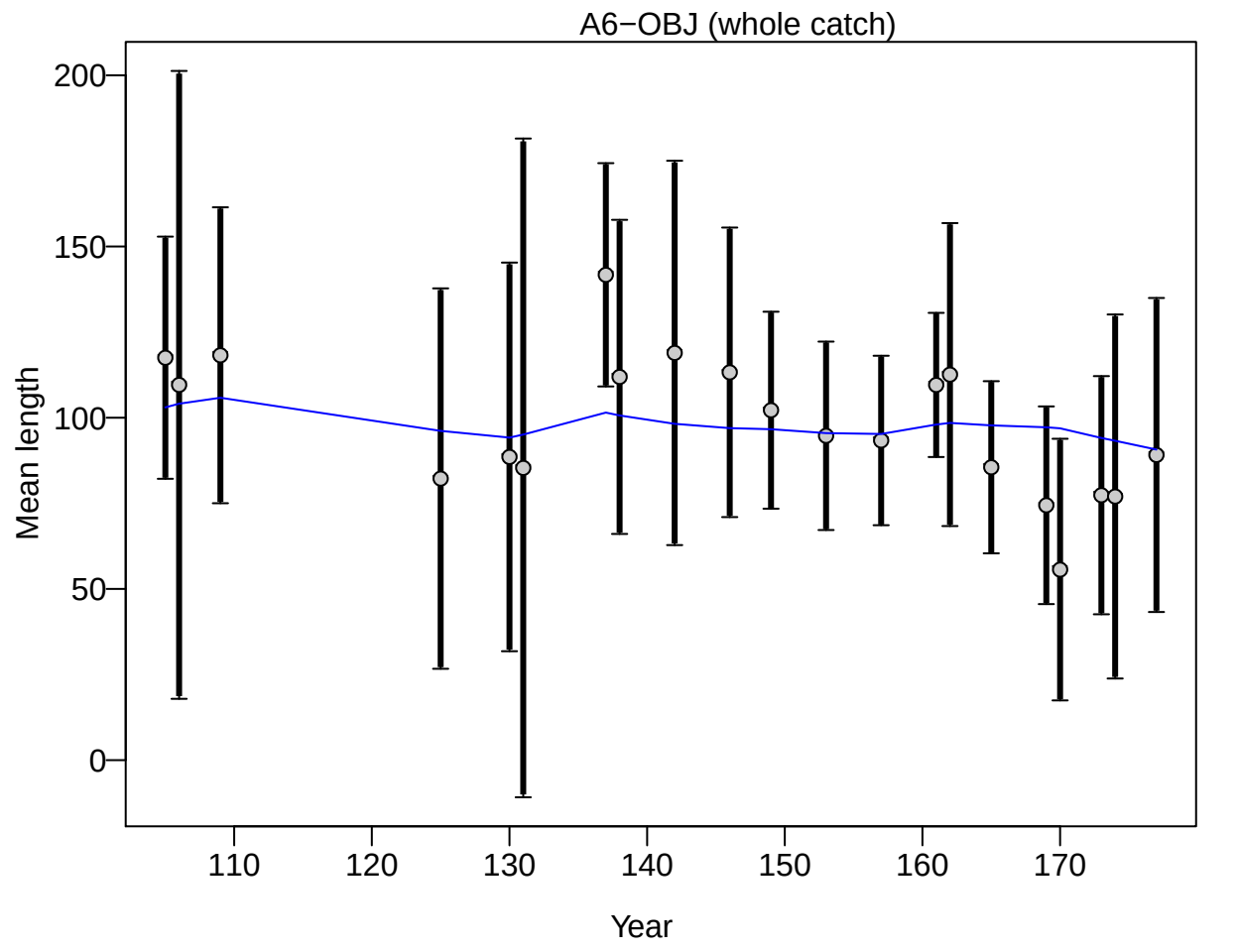

A5−OBJ (whole catch)
Mean length
150
100
50
0
100
120
140
160
180
Year

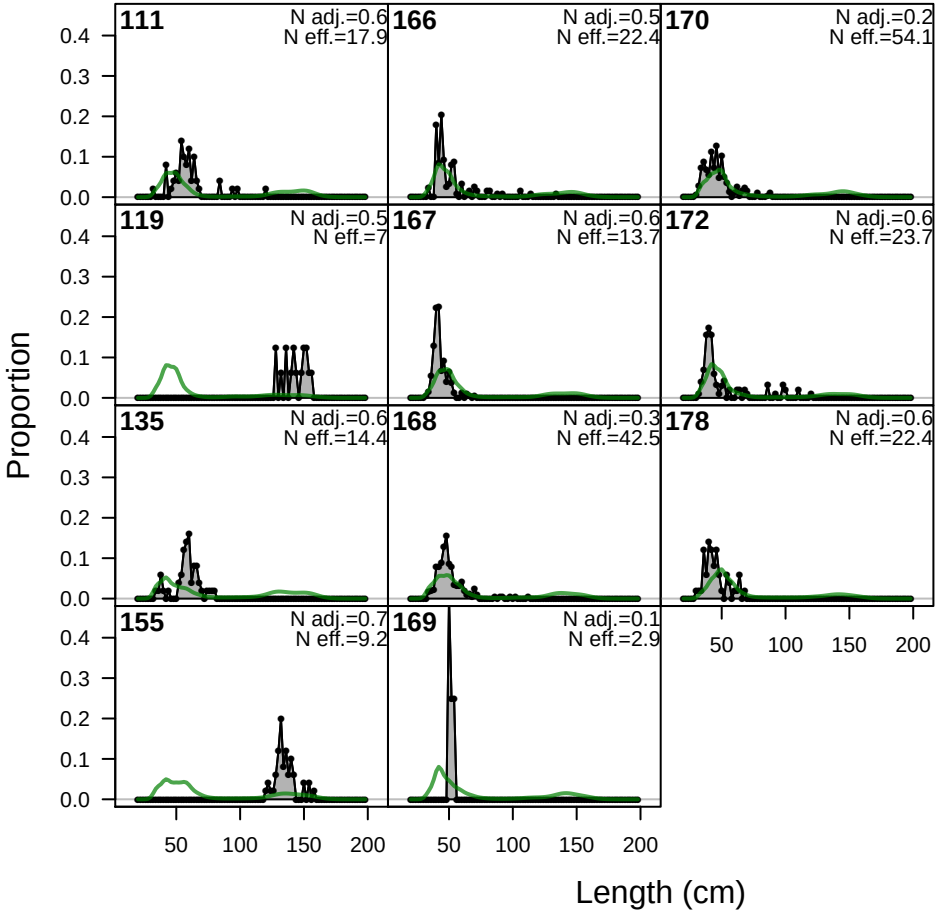

105
N adj.=2.3
N eff.=43.7
130
N adj.=1.1
N eff.=14.8
142
N adj.=1.2
N eff.=54.2
157
N adj.=5.5
N eff.=28
106
N adj.=0.4
N eff.=15.5
131
N adj.=0.4
N eff.=34.3
146
N adj.=2.1
N eff.=60
161
N adj.=7.7
N eff.=99
109
N adj.=2
N eff.=31
137
N adj.=3.6
N eff.=13.2
149
N adj.=4.3
N eff.=14.5
162
N adj.=1.8
N eff.=16.9
125
N adj.=1.2
N eff.=22
138
N adj.=2
N eff.=75
153
N adj.=5
N eff.=19.8
165
N adj.=6.1
N eff.=57.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

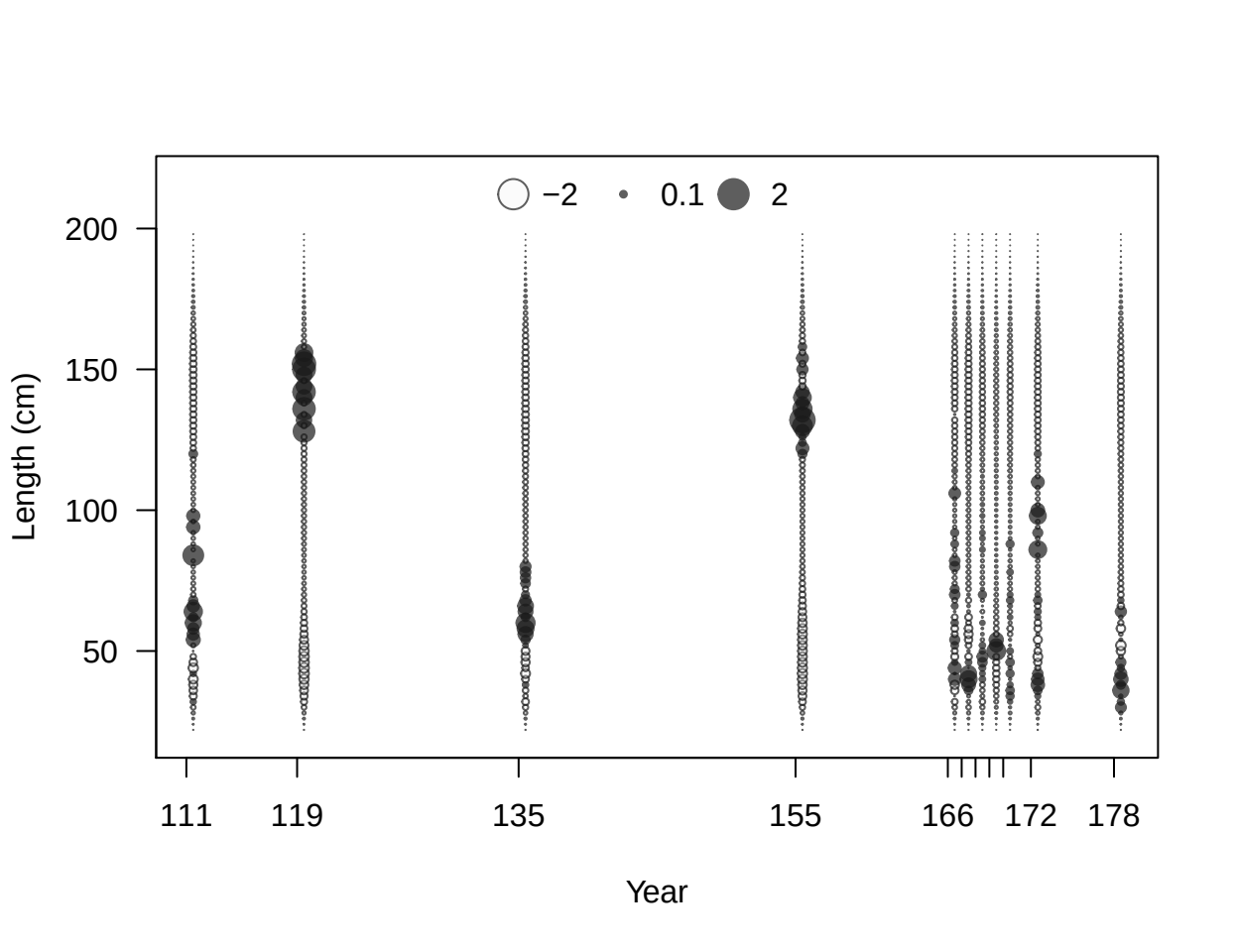

169
N adj.=4.6
N eff.=11.8
177
N adj.=1.6
N eff.=53.9
170
N adj.=2.7
N eff.=9.5
173
N adj.=3.4
N eff.=59.5
174
N adj.=1.4
N eff.=42.7
Proportion
Length (cm)
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200

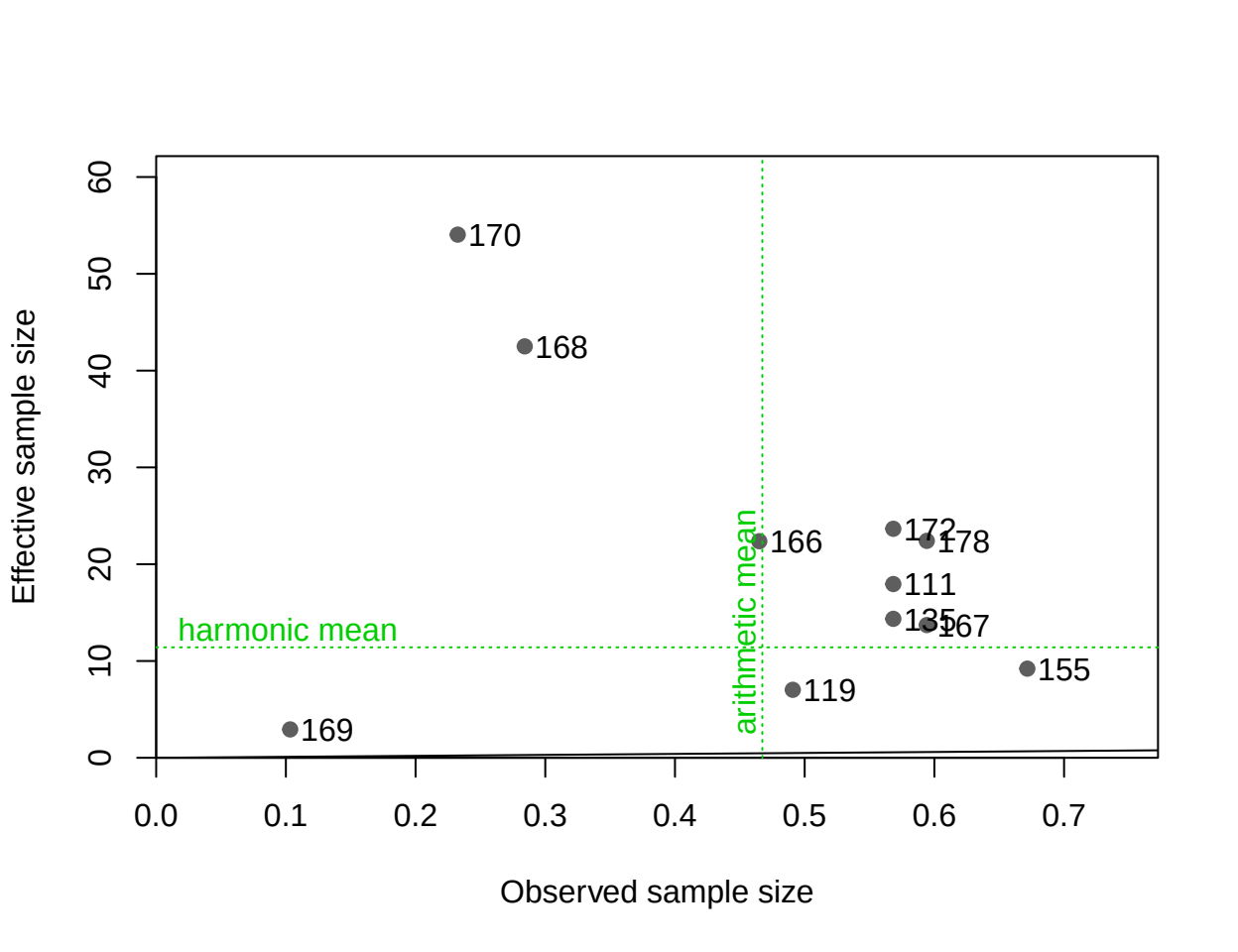

−2
0.1
2
200
150
100
50
Length (cm)
105
125
137
146
153
161
169
177
Year

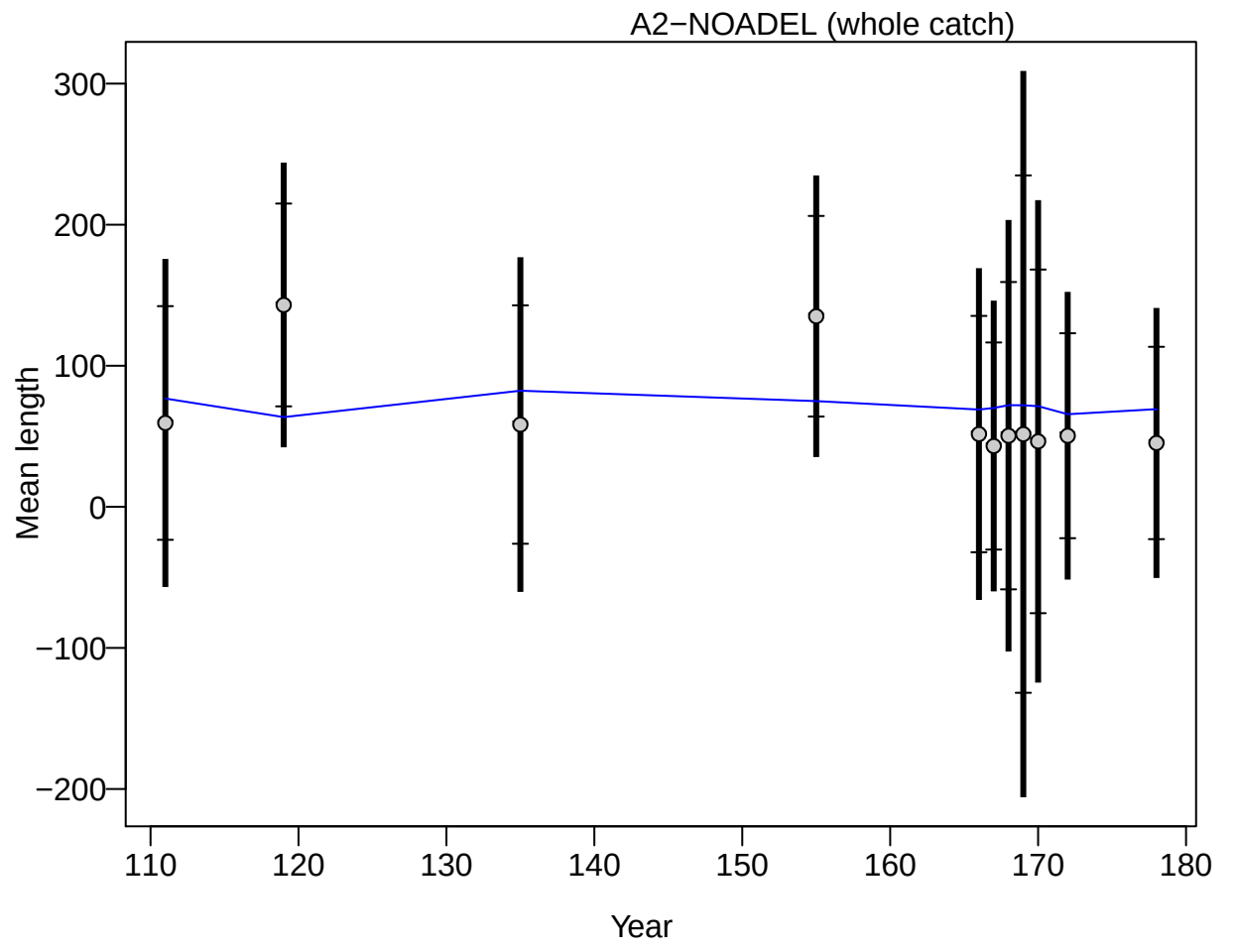

Effective sample size
Observed sample size
0
20
40
60
80
100
0
2
4
6
8
harmonic mean
arithmetic mean
161
138
146
173
165
142
177
174
105
131
109
157
125
153
106
130
162
137
149
169
170

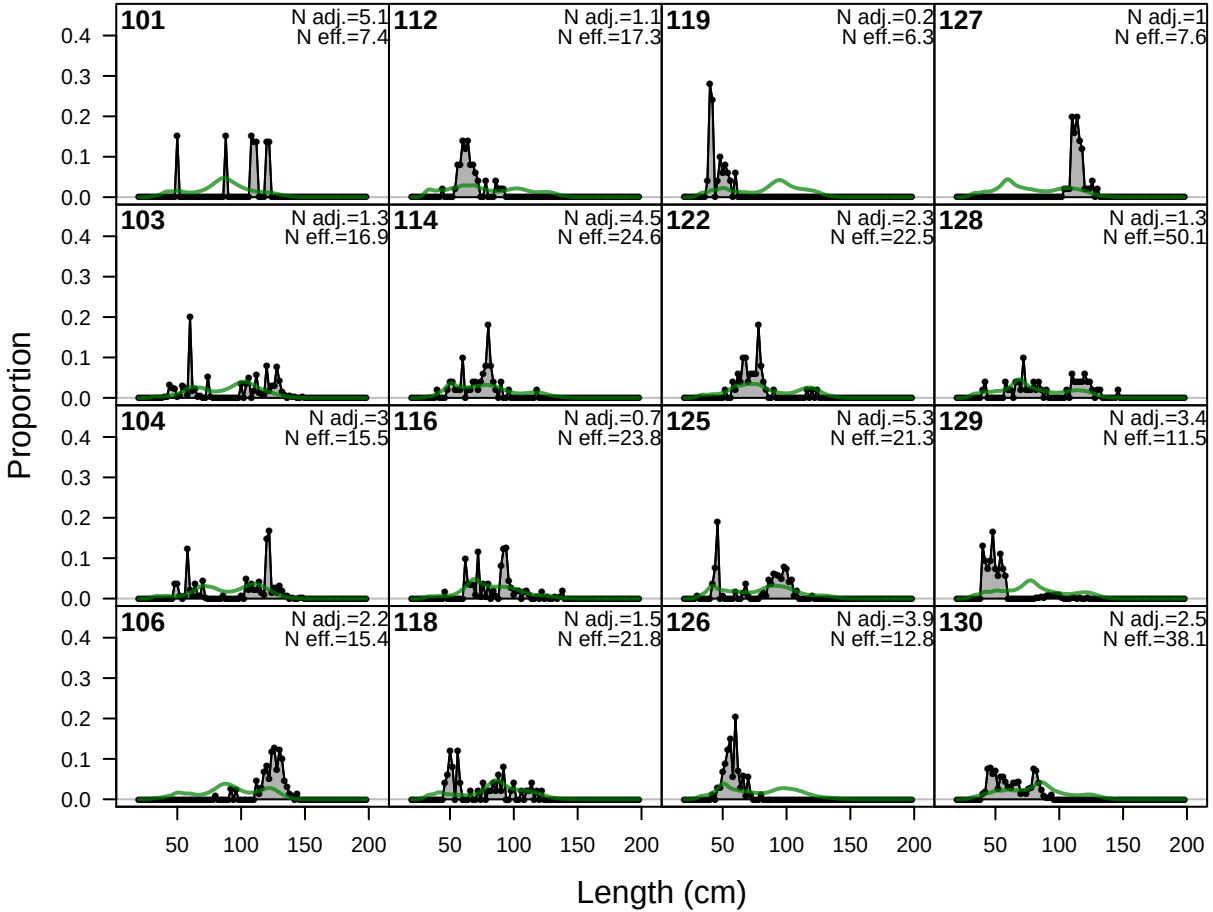

A6−OBJ (whole catch)
Mean length
200
150
100
50
0
110
120
130
140
150
160
170
Year

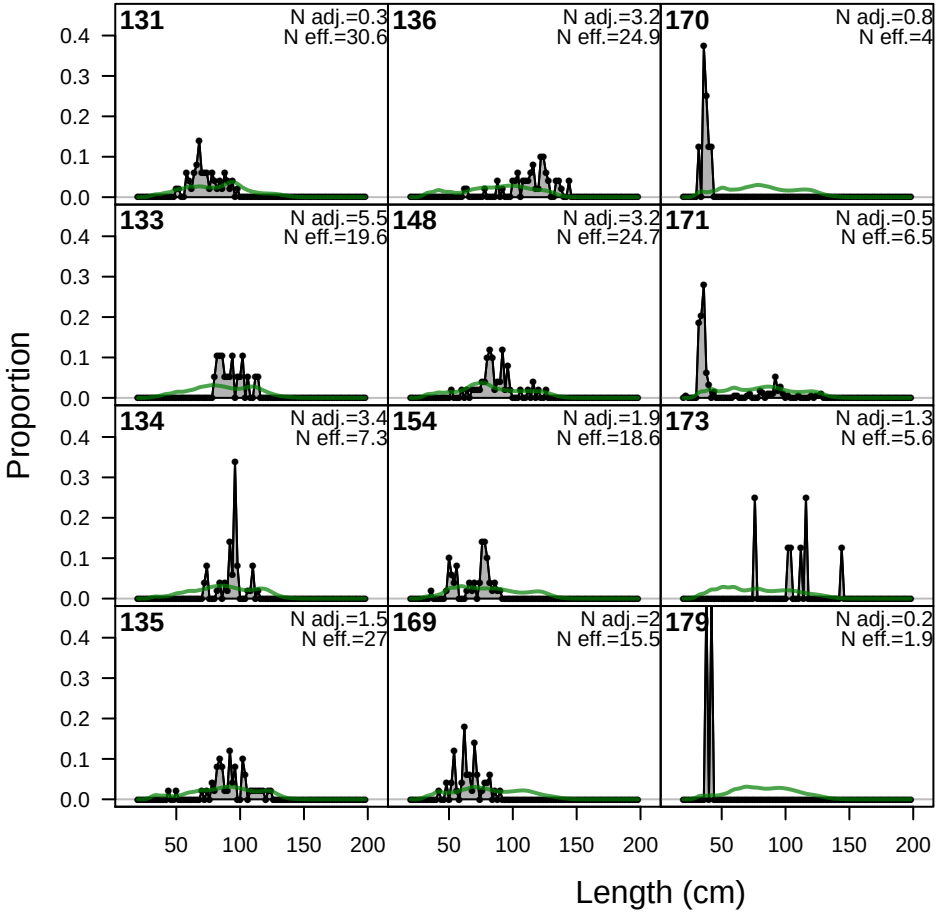

111
N adj.=0.6
N eff.=17.9
166
N adj.=0.5
N eff.=22.4
170
N adj.=0.2
N eff.=54.1
119
N adj.=0.5
N eff.=7
167
N adj.=0.6
N eff.=13.7
172
N adj.=0.6
N eff.=23.7
135
N adj.=0.6
N eff.=14.4
168
N adj.=0.3
N eff.=42.5
178
N adj.=0.6
N eff.=22.4
155
N adj.=0.7
N eff.=9.2
169
N adj.=0.1
N eff.=2.9
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

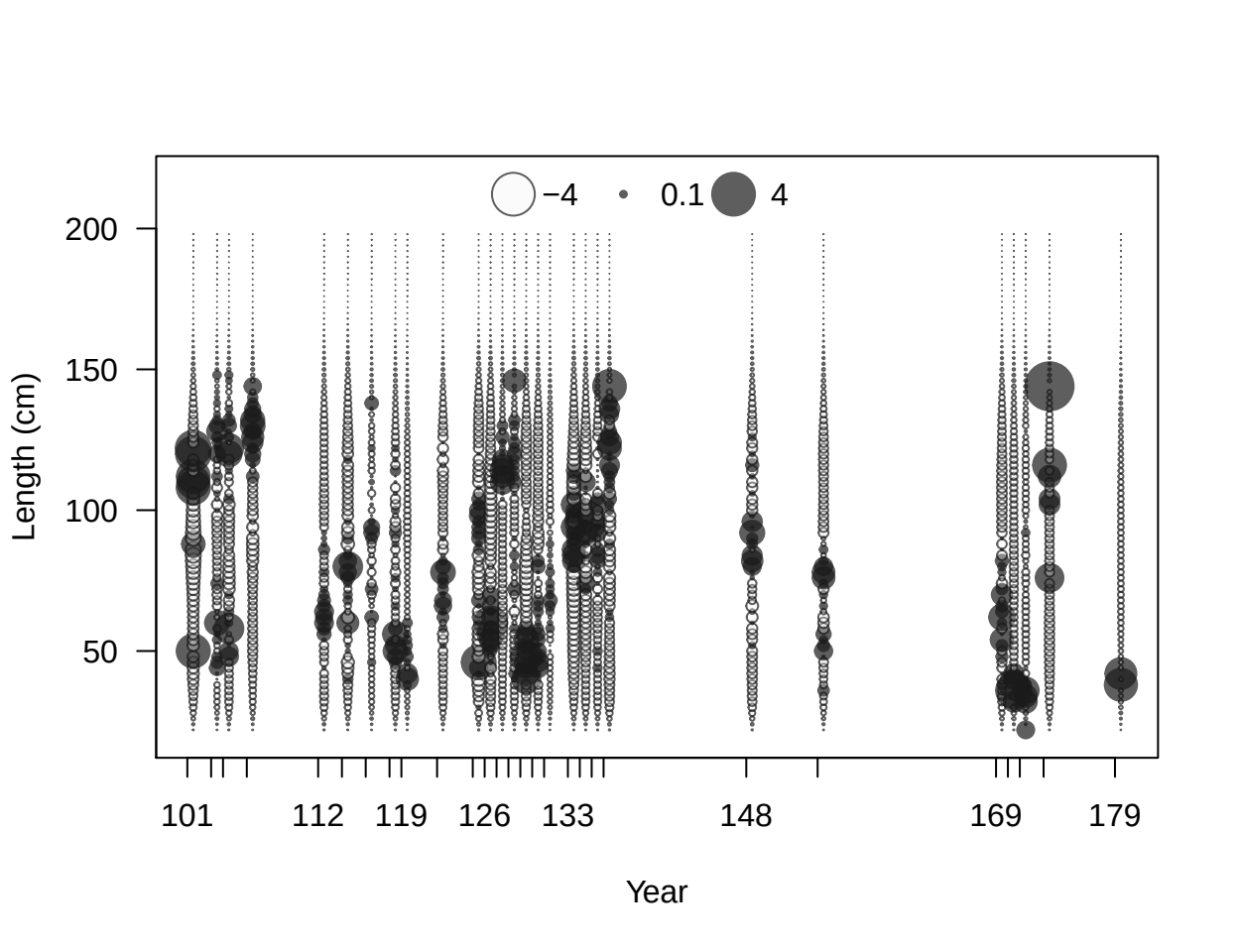

−2
0.1
2
200
150
100
50
Length (cm)
111
119
135
155
166
172
178
Year

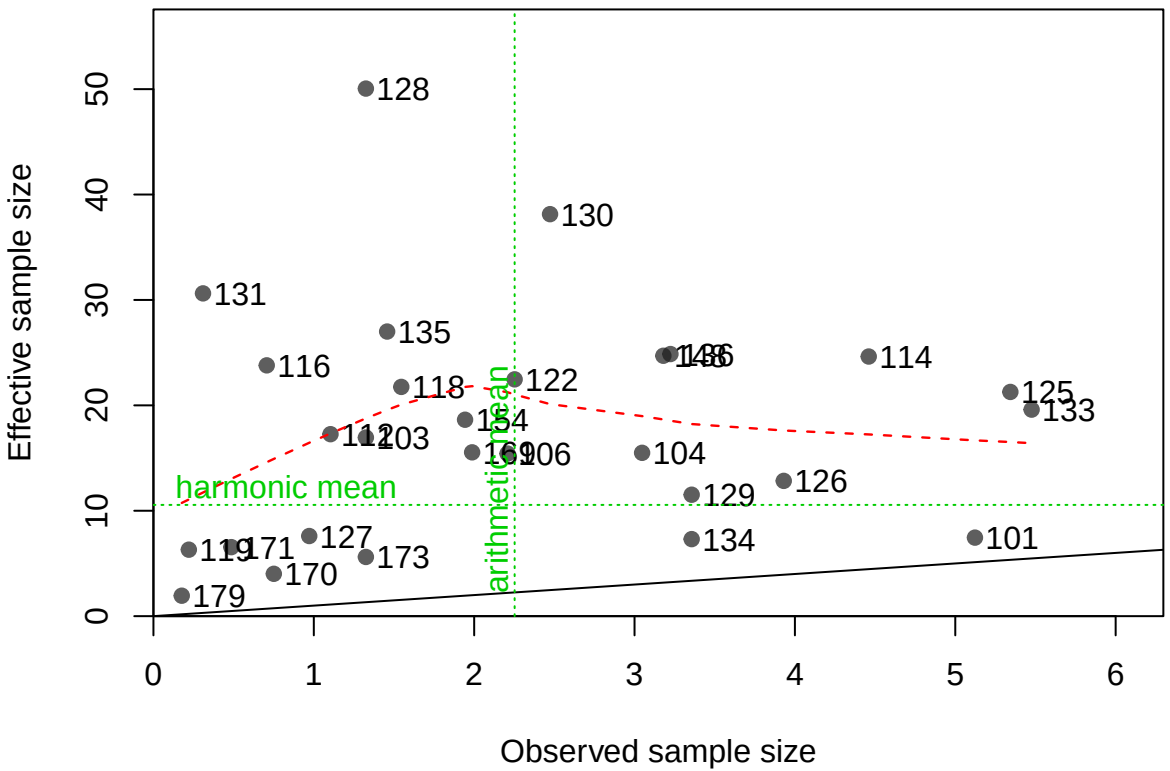

Effective sample size
0
10
20
30
40
50
60
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Observed sample size
harmonic mean
arithmetic mean
170
168
166
172
178
111
135
167
155
119
169


A2−NOADEL (whole catch)
Mean length
300
200
100
0
−100
−200
110
120
130
140
150
160
170
180
Year

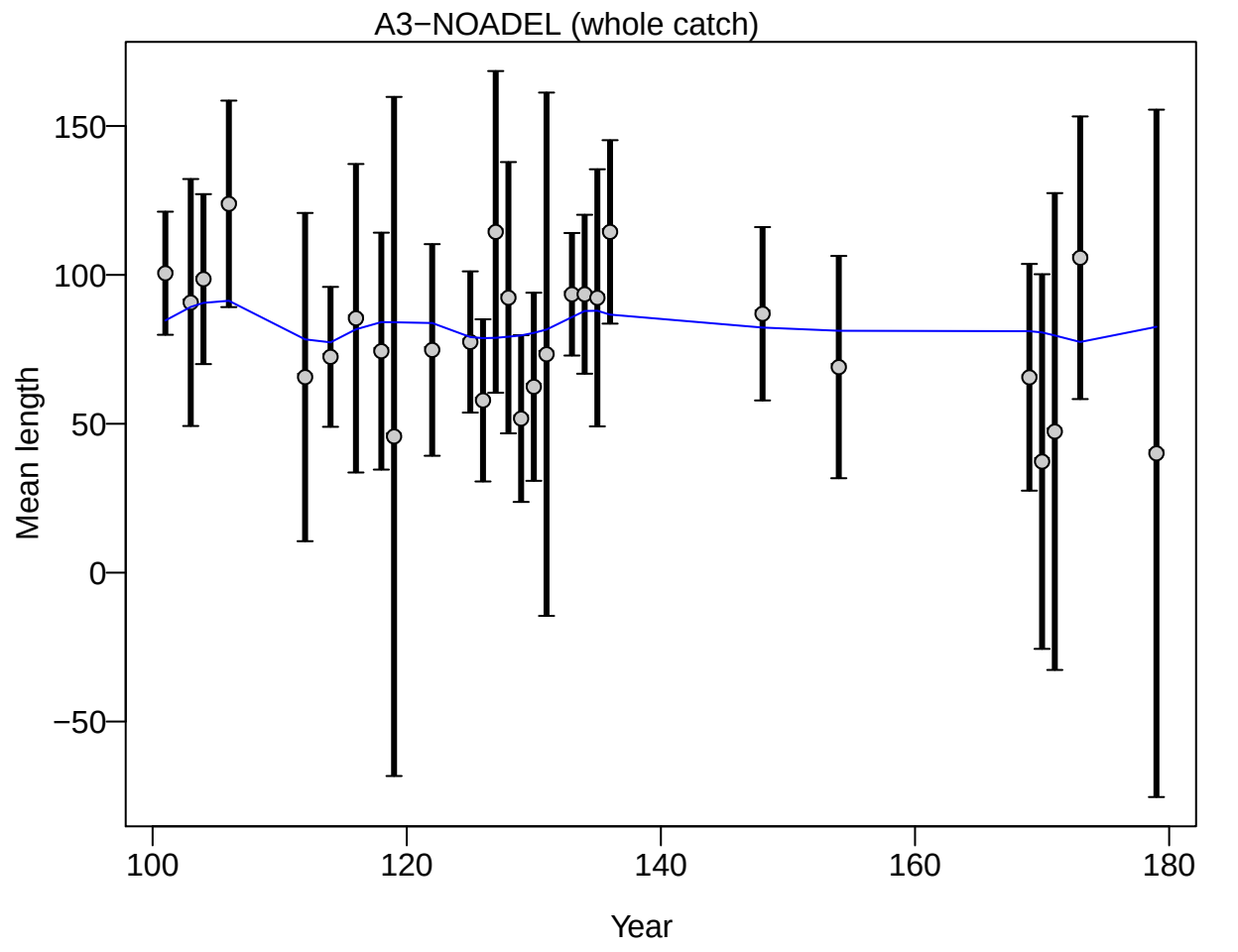

101
N adj.=5.1
N eff.=7.4
112
N adj.=1.1
N eff.=17.3
119
N adj.=0.2
N eff.=6.3
127
N adj.=1
N eff.=7.6
103
N adj.=1.3
N eff.=16.9
114
N adj.=4.5
N eff.=24.6
122
N adj.=2.3
N eff.=22.5
128
N adj.=1.3
N eff.=50.1
104
N adj.=3
N eff.=15.5
116
N adj.=0.7
N eff.=23.8
125
N adj.=5.3
N eff.=21.3
129
N adj.=3.4
N eff.=11.5
106
N adj.=2.2
N eff.=15.4
118
N adj.=1.5
N eff.=21.8
126
N adj.=3.9
N eff.=12.8
130
N adj.=2.5
N eff.=38.1
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

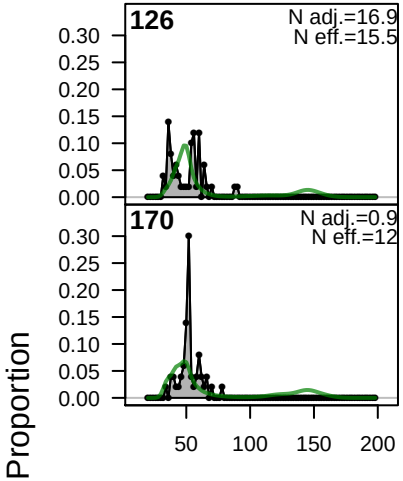

131
N adj.=0.3
N eff.=30.6
136
N adj.=3.2
N eff.=24.9
170
N adj.=0.8
N eff.=4
133
N adj.=5.5
N eff.=19.6
148
N adj.=3.2
N eff.=24.7
171
N adj.=0.5
N eff.=6.5
134
N adj.=3.4
N eff.=7.3
154
N adj.=1.9
N eff.=18.6
173
N adj.=1.3
N eff.=5.6
135
N adj.=1.5
N eff.=27
169
N adj.=2
N eff.=15.5
179
N adj.=0.2
N eff.=1.9
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

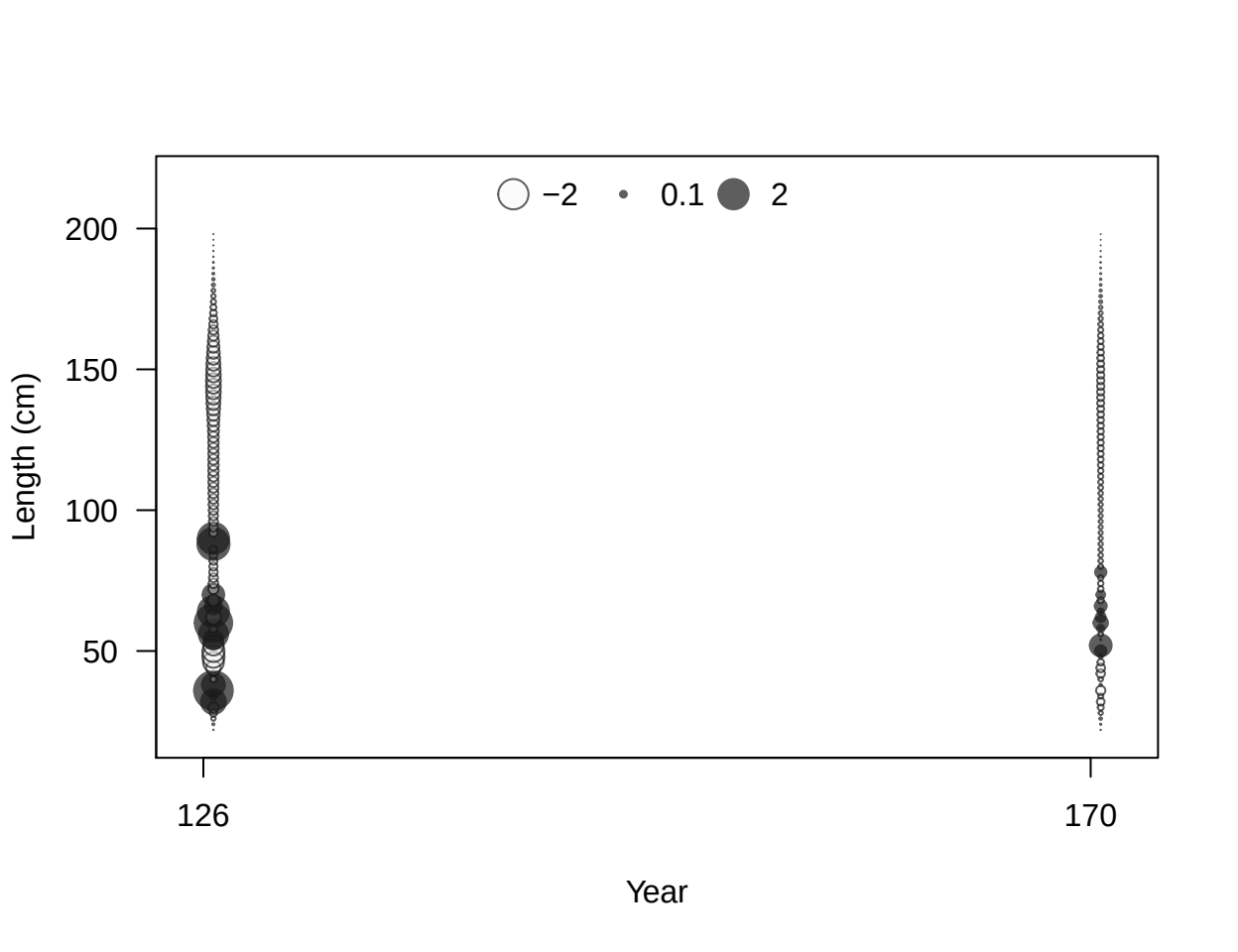

−4
0.1
4
200
150
100
50
Length (cm)
101
112
119
126
133
148
169
179
Year

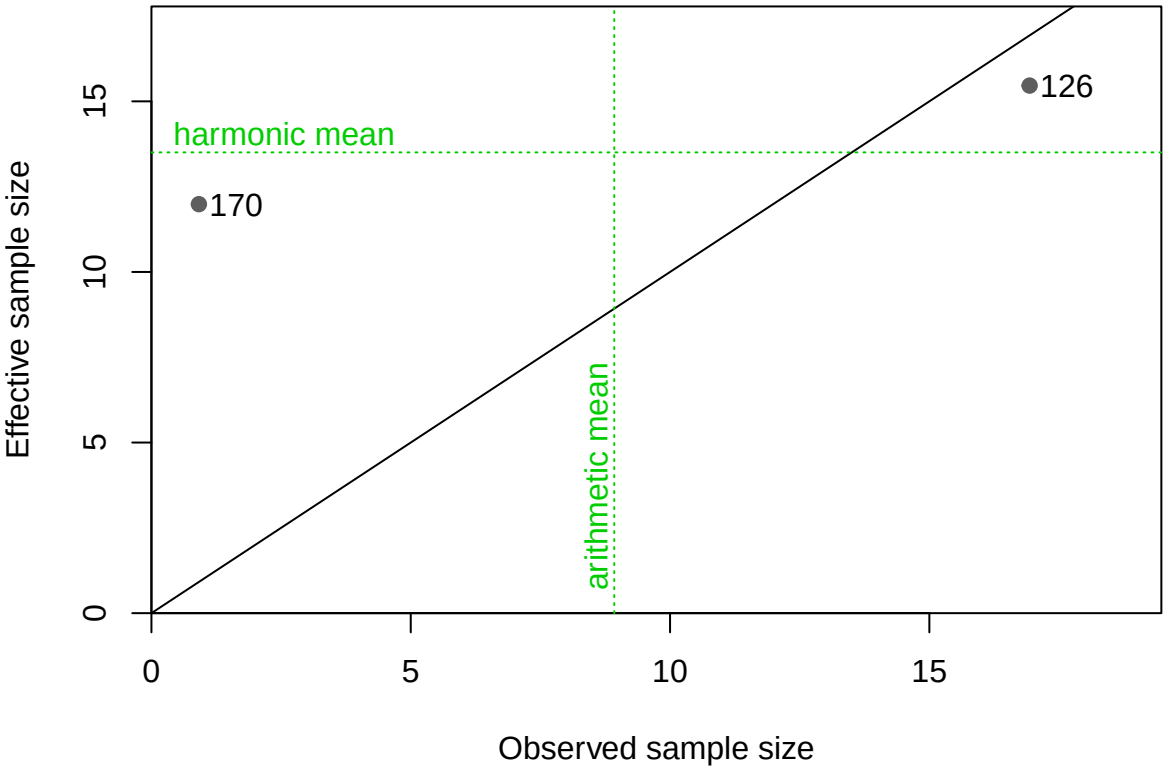


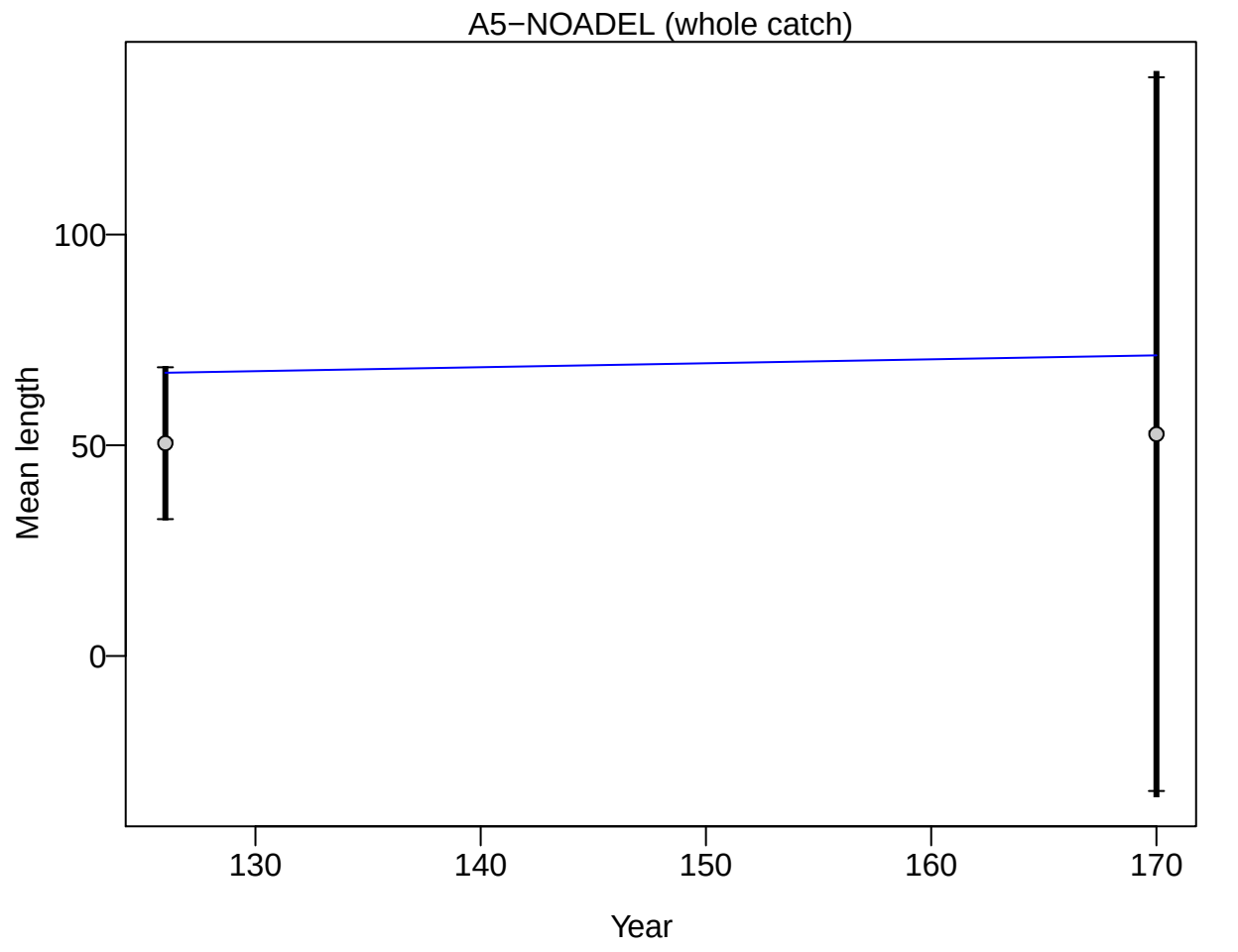
Effective sample size
Observed sample size
harmonic mean
arithmetic mean
0
10
20
30
40
50
0
1
2
3
4
5
6
128
130
131
135
116
118
122
114
125
133
154
104
126
129
134
101
127
173
170
179

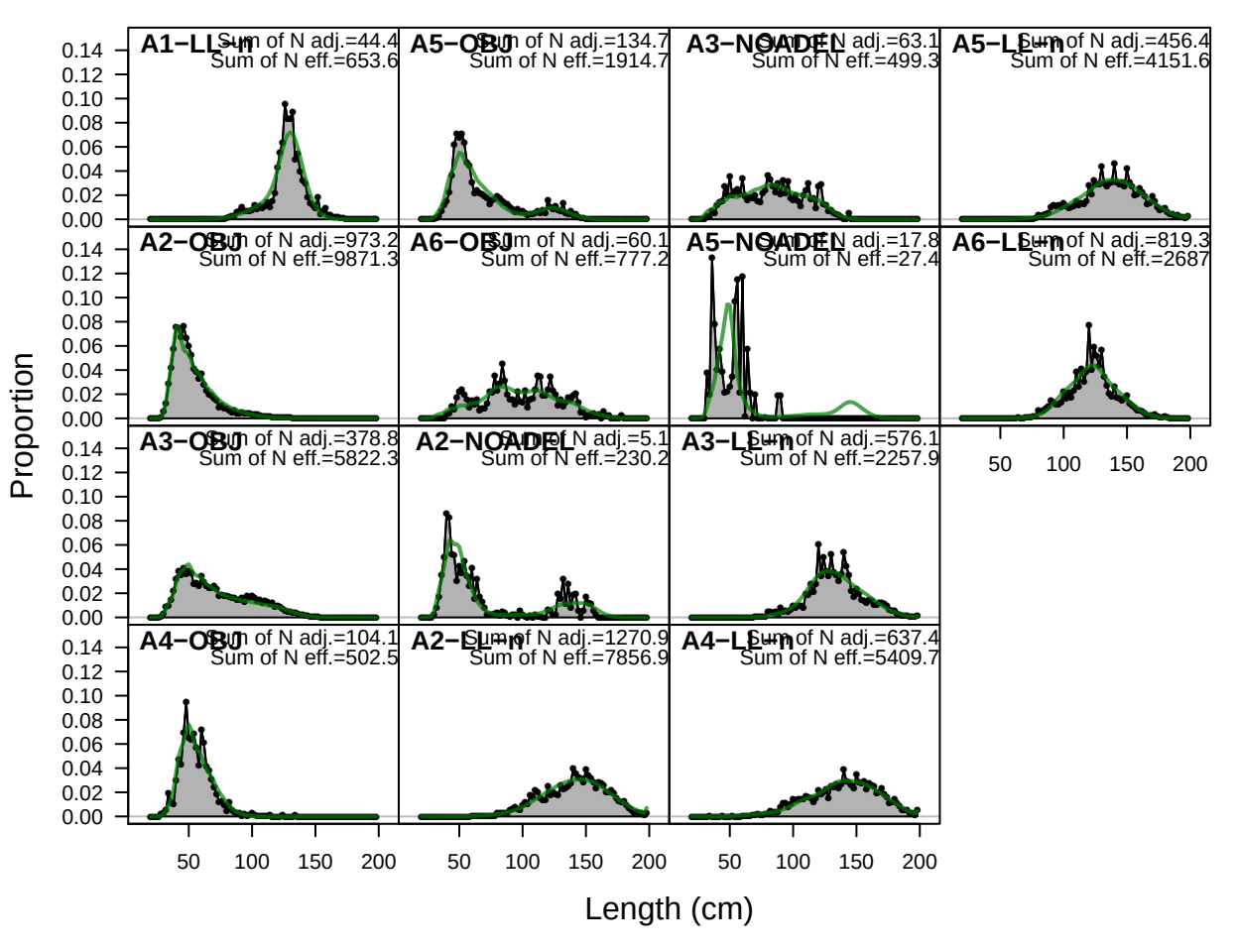

A3−NOADEL (whole catch)
Mean length
150
100
50
0
−50
100
120
140
160
180
Year

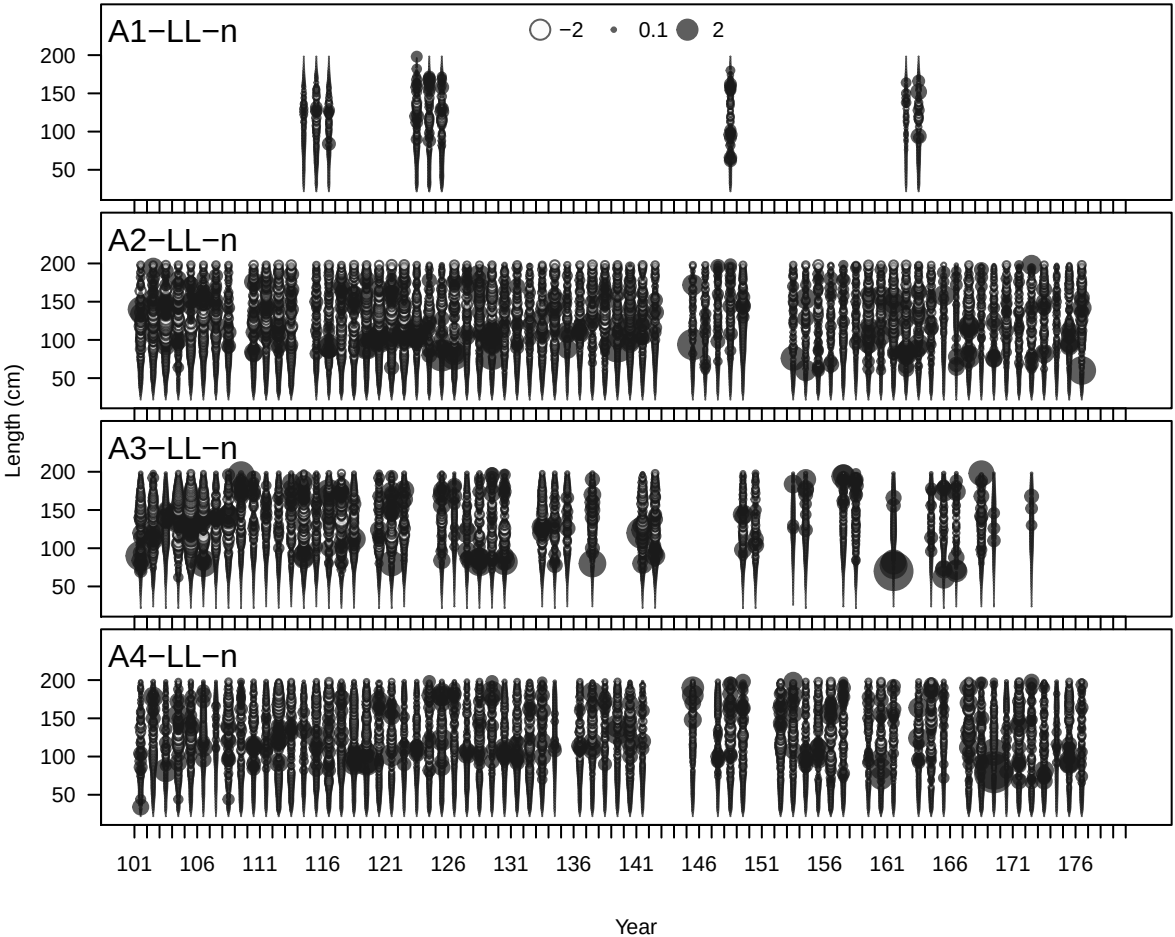

126
N adj.=16.9
N eff.=15.5
170
N adj.=0.9
N eff.=12
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)

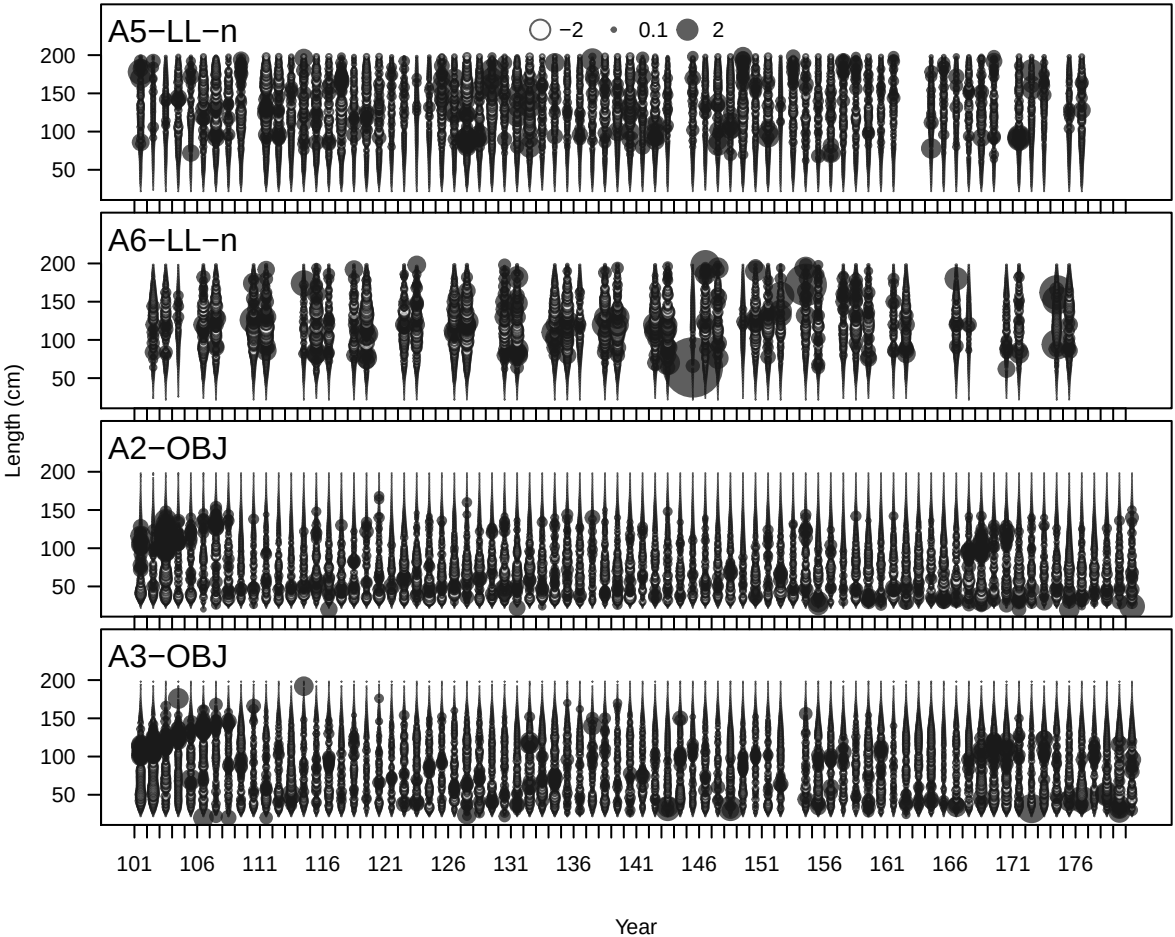

−2
0.1
2
200
150
100
50
Length (cm)
126
170
Year

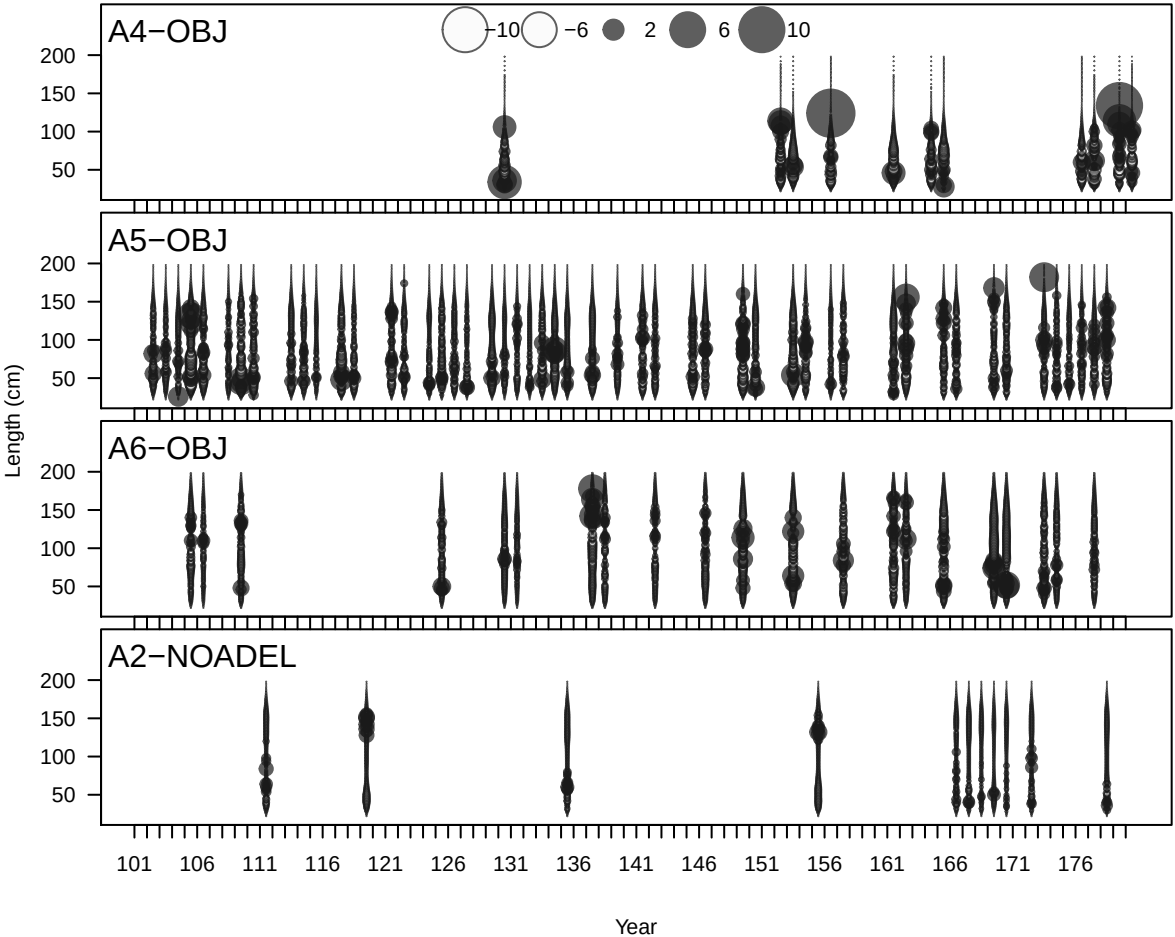

harmonic mean
arithmetic mean
126
170
Effective sample size
Observed sample size
0
5
10
15
0
5
10
15

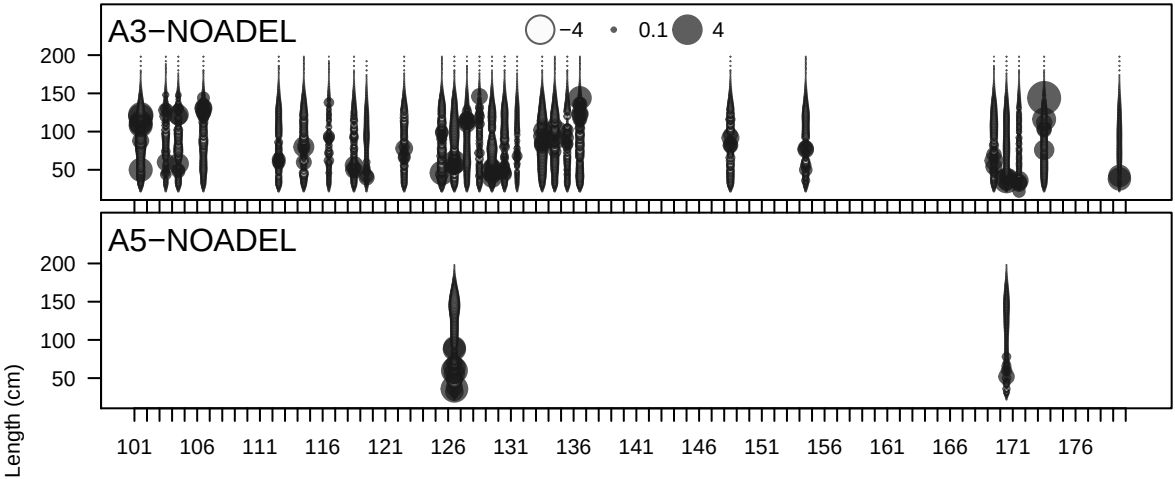

A5−NOADEL (whole catch)
100
50
0
Mean length
130
140
150
160
170
Year

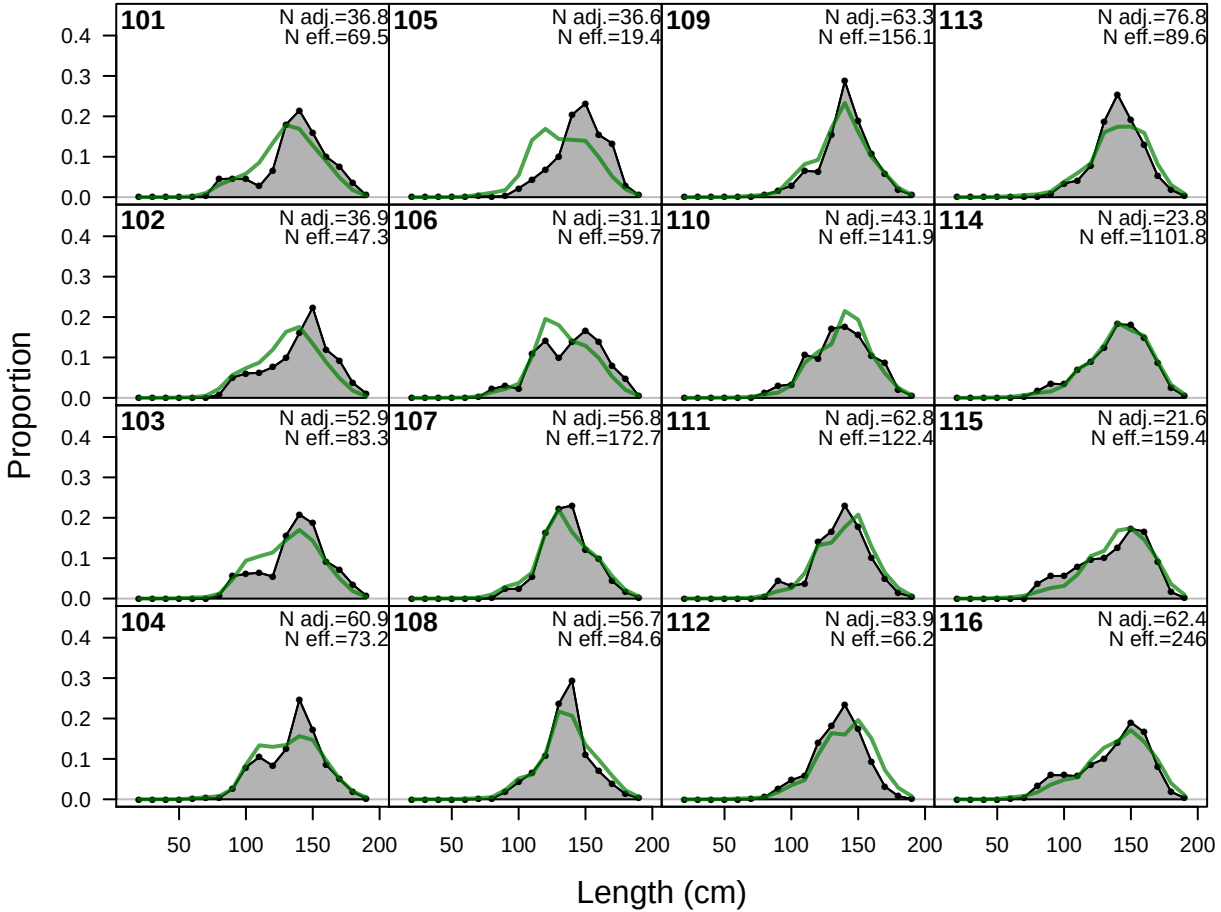

A1−LL−n
Sum of N adj.=44.4
Sum of N eff.=653.6
A5−OBJ
Sum of N adj.=134.7
Sum of N eff.=1914.7
A3−NOADEL
Sum of N adj.=63.1
Sum of N eff.=499.3
A5−LL−n
Sum of N adj.=456.4
Sum of N eff.=4151.6
A2−OBJ
Sum of N adj.=973.2
Sum of N eff.=9871.3
A6−OBJ
Sum of N adj.=60.1
Sum of N eff.=777.2
A5−NOADEL
Sum of N adj.=17.8
Sum of N eff.=27.4
A6−LL−n
Sum of N adj.=819.3
Sum of N eff.=2687
A3−OBJ
Sum of N adj.=378.8
Sum of N eff.=5822.3
A2−NOADEL
Sum of N adj.=5.1
Sum of N eff.=230.2
A3−LL−n
Sum of N adj.=576.1
Sum of N eff.=2257.9
A4−OBJ
Sum of N adj.=104.1
Sum of N eff.=502.5
A2−LL−n
Sum of N adj.=1270.9
Sum of N eff.=7856.9
A4−LL−n
Sum of N adj.=637.4
Sum of N eff.=5409.7
Proportion
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
50
100
150
200
Length (cm)

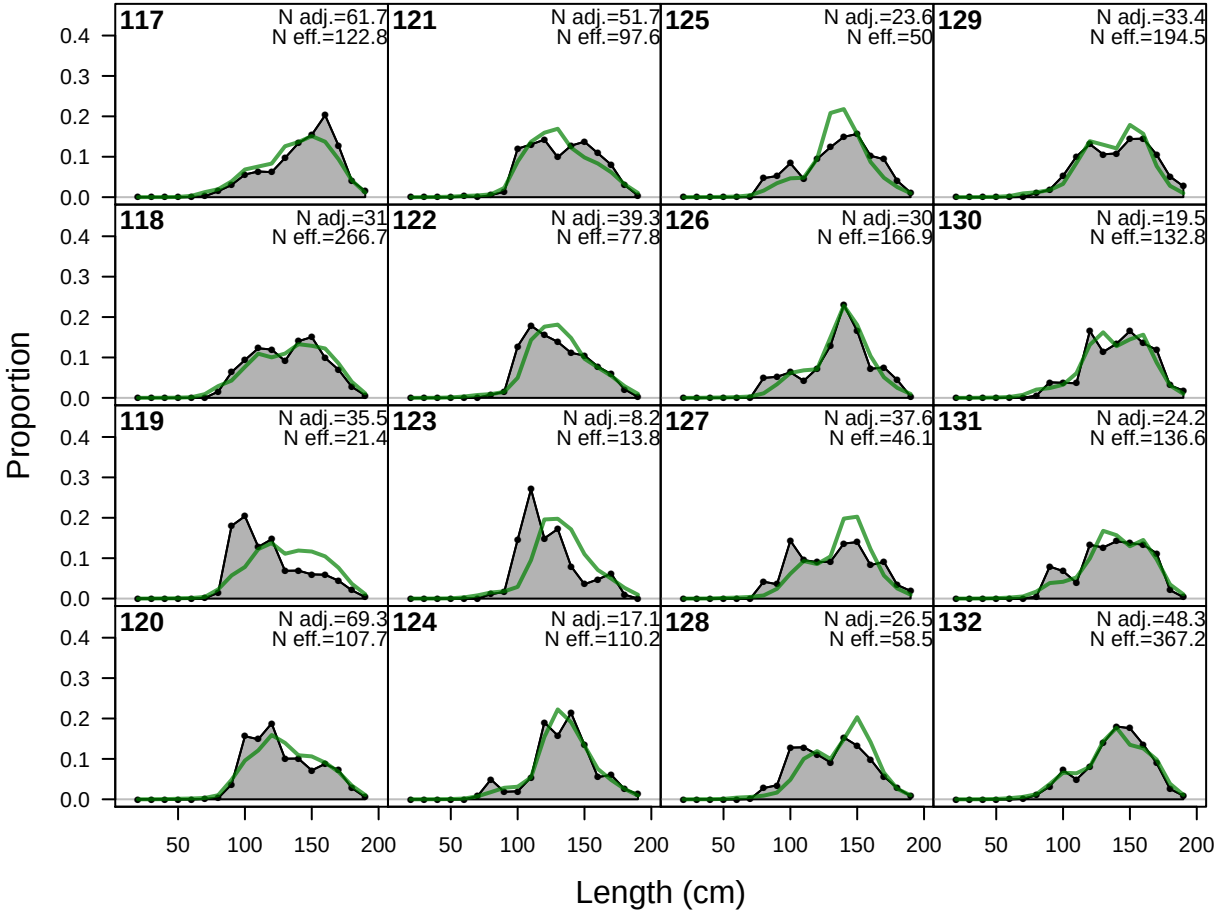

A1−LL−n
−2
0.1
2
A2−LL−n
A3−LL−n
A4−LL−n
Length (cm)
200
150
100
50
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

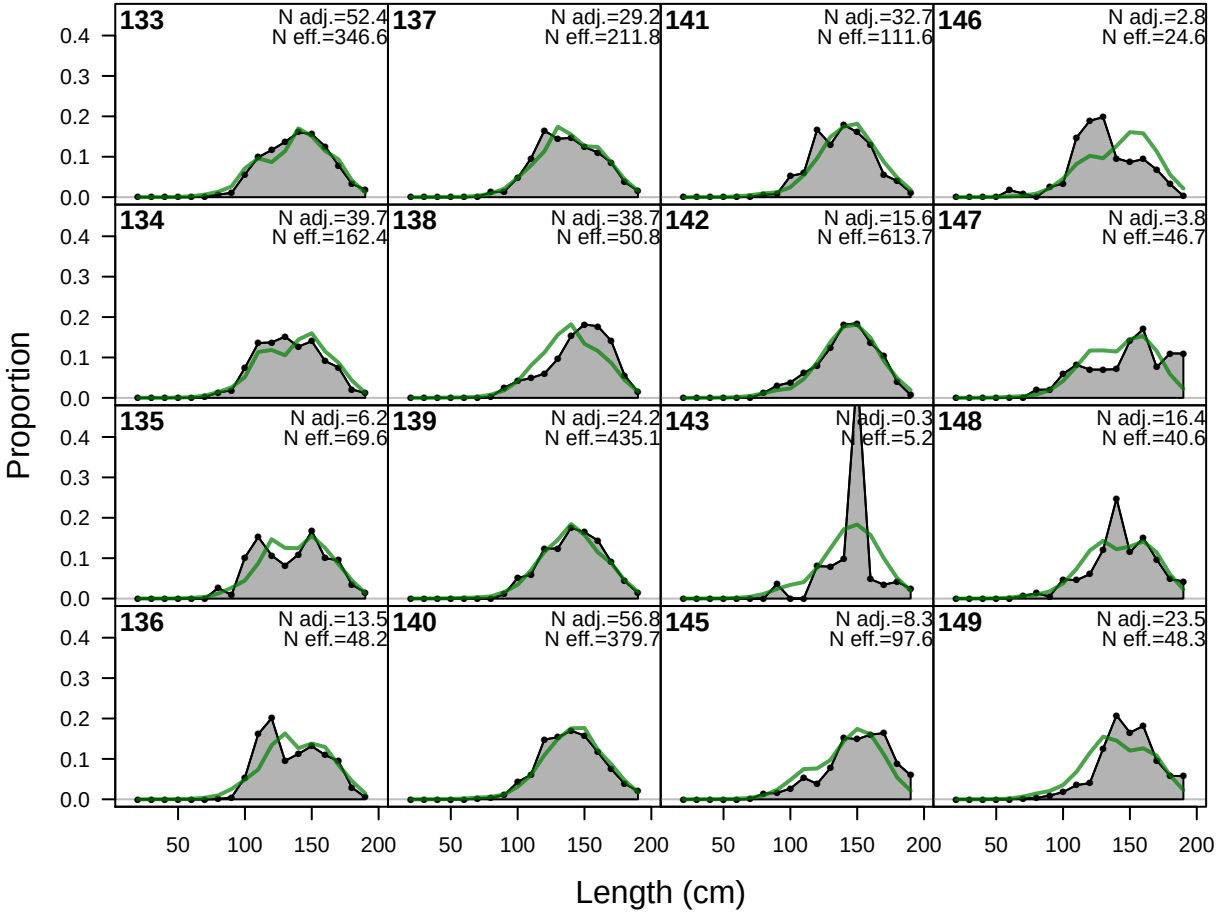

A5−LL−n
−2
0.1
2
A6−LL−n
A2−OBJ
A3−OBJ
200
150
100
50
Length (cm)
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

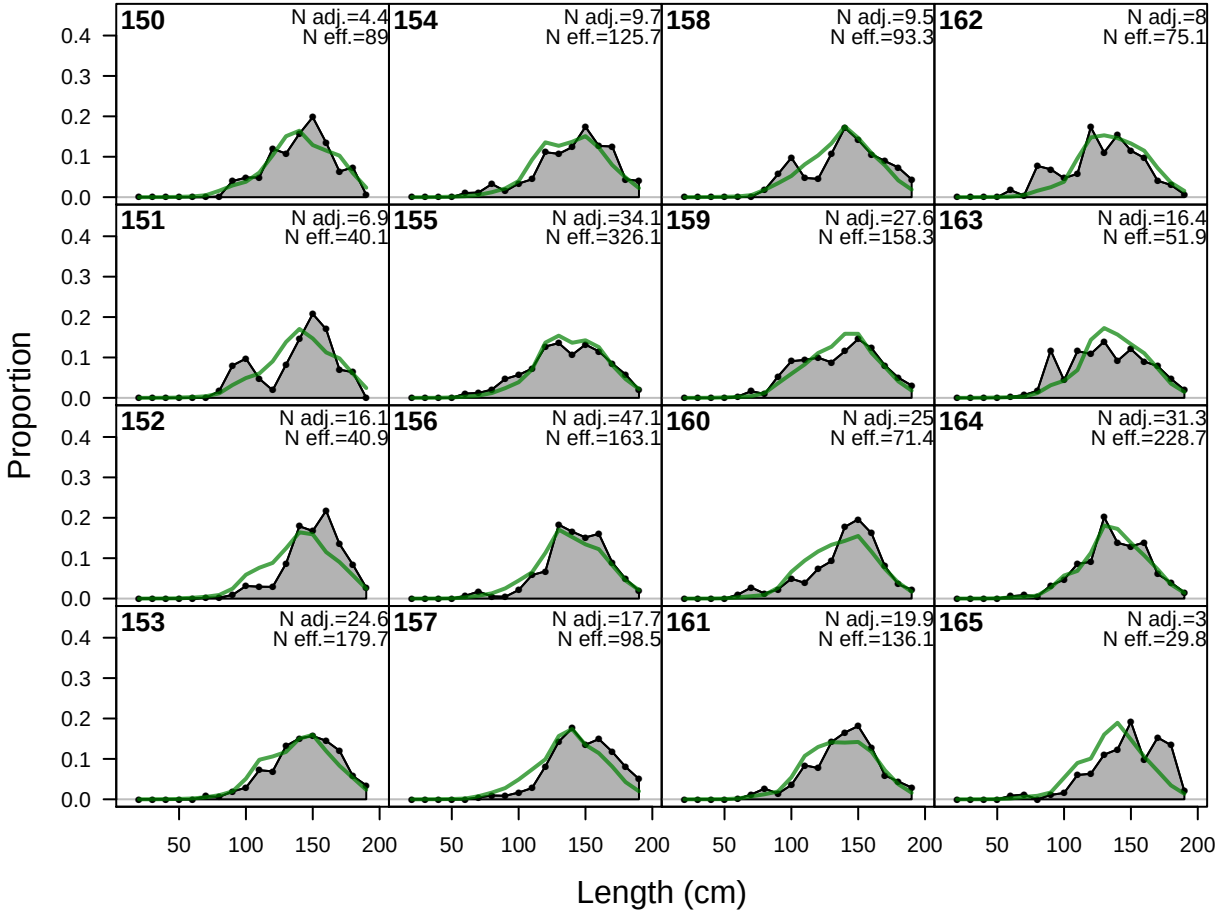

A4−OBJ
A5−OBJ
A6−OBJ
A2−NOADEL
−10
−6
2
6
10
Length (cm)
50
100
150
200
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

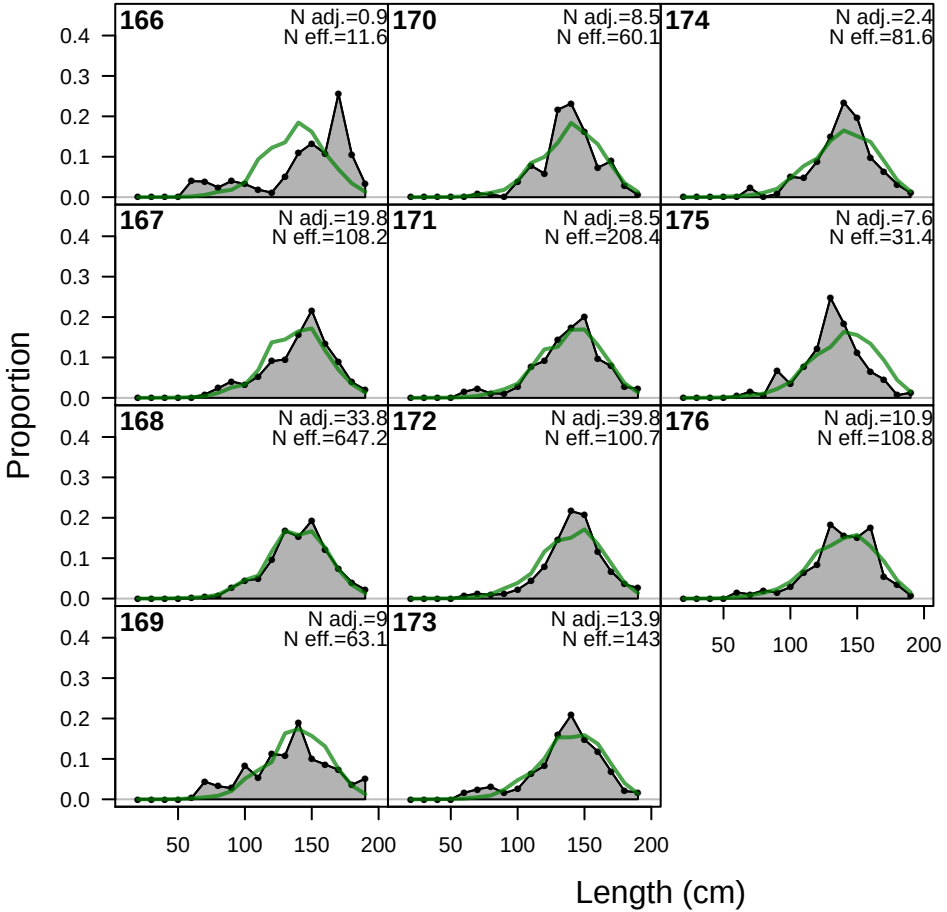

A3−NOADEL
−4
0.1
4
200
150
100
50
A5−NOADEL
200
150
100
50
Length (cm)
101
106
111
116
121
126
131
136
141
146
151
156
161
166
171
176
Year

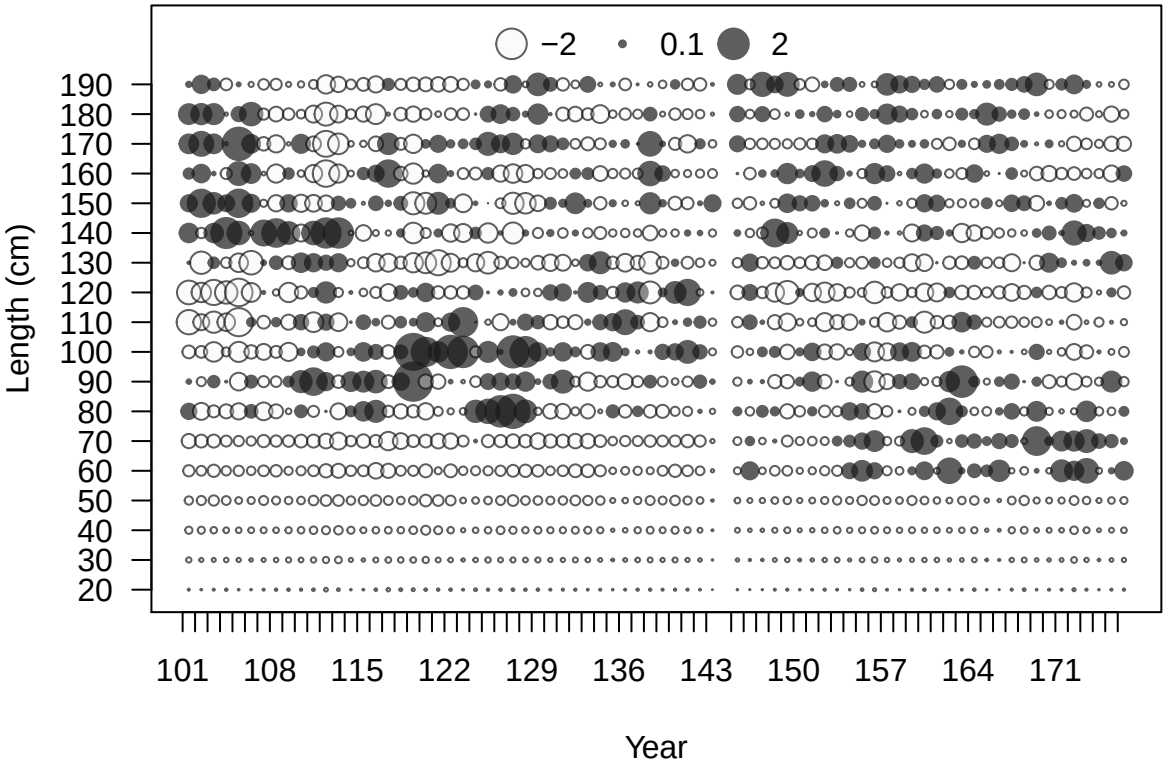

101
N adj.=36.8
N eff.=69.5
105
N adj.=36.6
N eff.=19.4
109
N adj.=63.3
N eff.=156.1
113
N adj.=76.8
N eff.=89.6
102
N adj.=36.9
N eff.=47.3
106
N adj.=31.1
N eff.=59.7
110
N adj.=43.1
N eff.=141.9
114
N adj.=23.8
N eff.=1101.8
103
N adj.=52.9
N eff.=83.3
107
N adj.=56.8
N eff.=172.7
111
N adj.=62.8
N eff.=122.4
115
N adj.=21.6
N eff.=159.4
104
N adj.=60.9
N eff.=73.2
108
N adj.=56.7
N eff.=84.6
112
N adj.=83.9
N eff.=66.2
116
N adj.=62.4
N eff.=246
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

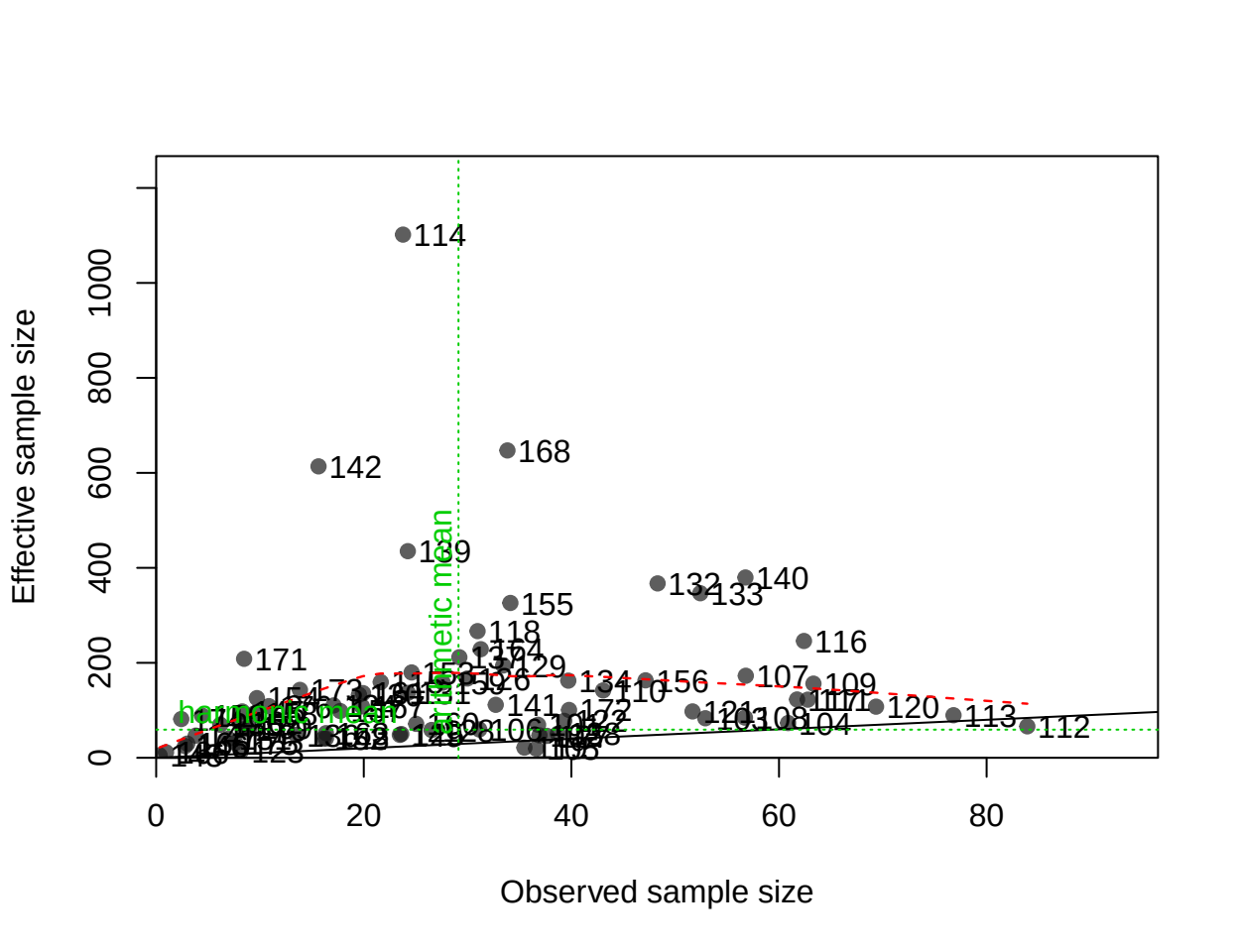

117
N adj.=61.7
N eff.=122.8
121
N adj.=51.7
N eff.=97.6
125
N adj.=23.6
N eff.=50
129
N adj.=33.4
N eff.=194.5
118
N adj.=31
N eff.=266.7
122
N adj.=39.3
N eff.=77.8
126
N adj.=30
N eff.=166.9
130
N adj.=19.5
N eff.=132.8
119
N adj.=35.5
N eff.=21.4
123
N adj.=8.2
N eff.=13.8
127
N adj.=37.6
N eff.=46.1
131
N adj.=24.2
N eff.=136.6
120
N adj.=69.3
N eff.=107.7
124
N adj.=17.1
N eff.=110.2
128
N adj.=26.5
N eff.=58.5
132
N adj.=48.3
N eff.=367.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

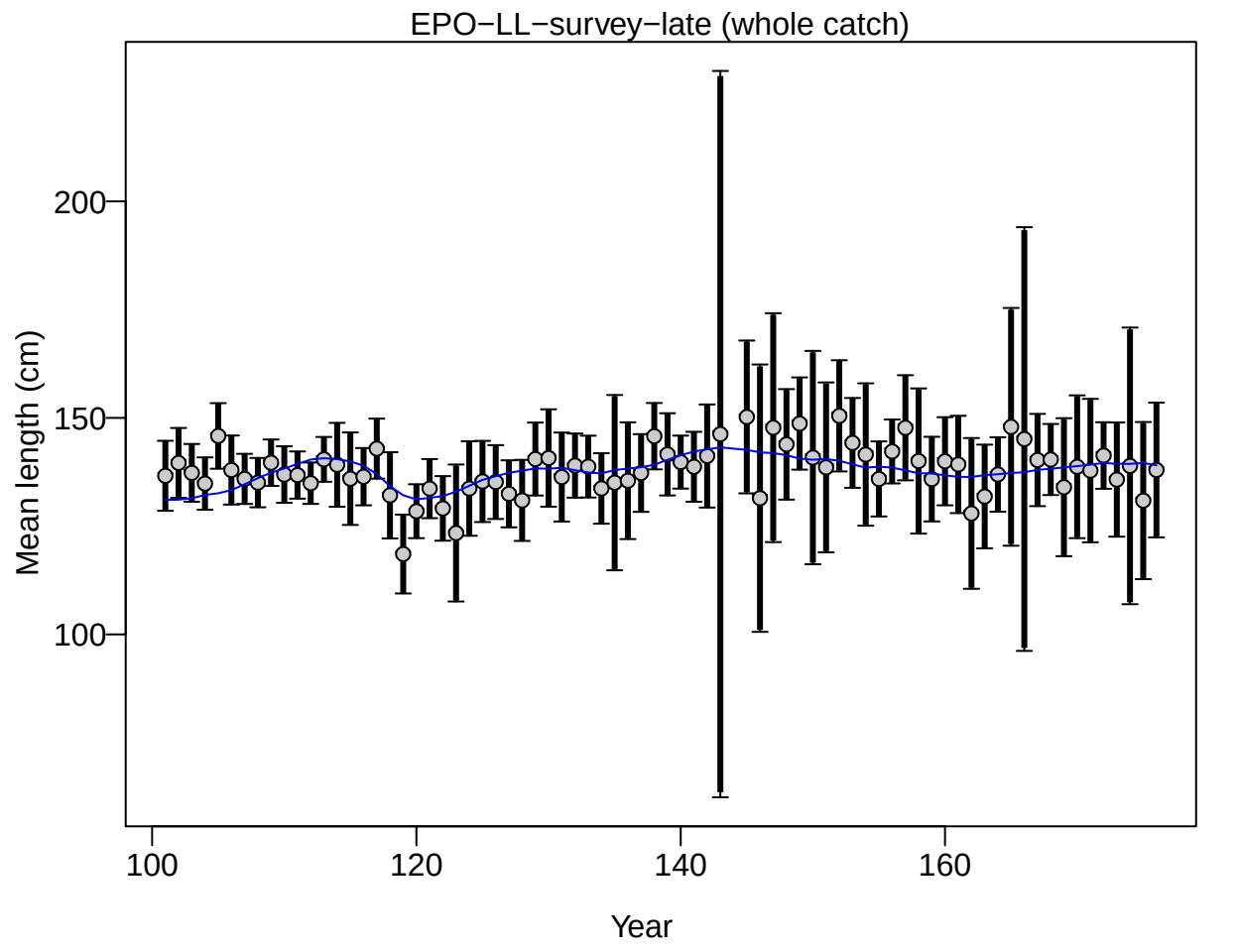

133
N adj.=52.4
N eff.=346.6
137
N adj.=29.2
N eff.=211.8
141
N adj.=32.7
N eff.=111.6
146
N adj.=2.8
N eff.=24.6
134
N adj.=39.7
N eff.=162.4
138
N adj.=38.7
N eff.=50.8
142
N adj.=15.6
N eff.=613.7
147
N adj.=3.8
N eff.=46.7
135
N adj.=6.2
N eff.=69.6
139
N adj.=24.2
N eff.=435.1
143
N adj.=0.3
N eff.=5.2
148
N adj.=16.4
N eff.=40.6
136
N adj.=13.5
N eff.=48.2
140
N adj.=56.8
N eff.=379.7
145
N adj.=8.3
N eff.=97.6
149
N adj.=23.5
N eff.=48.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

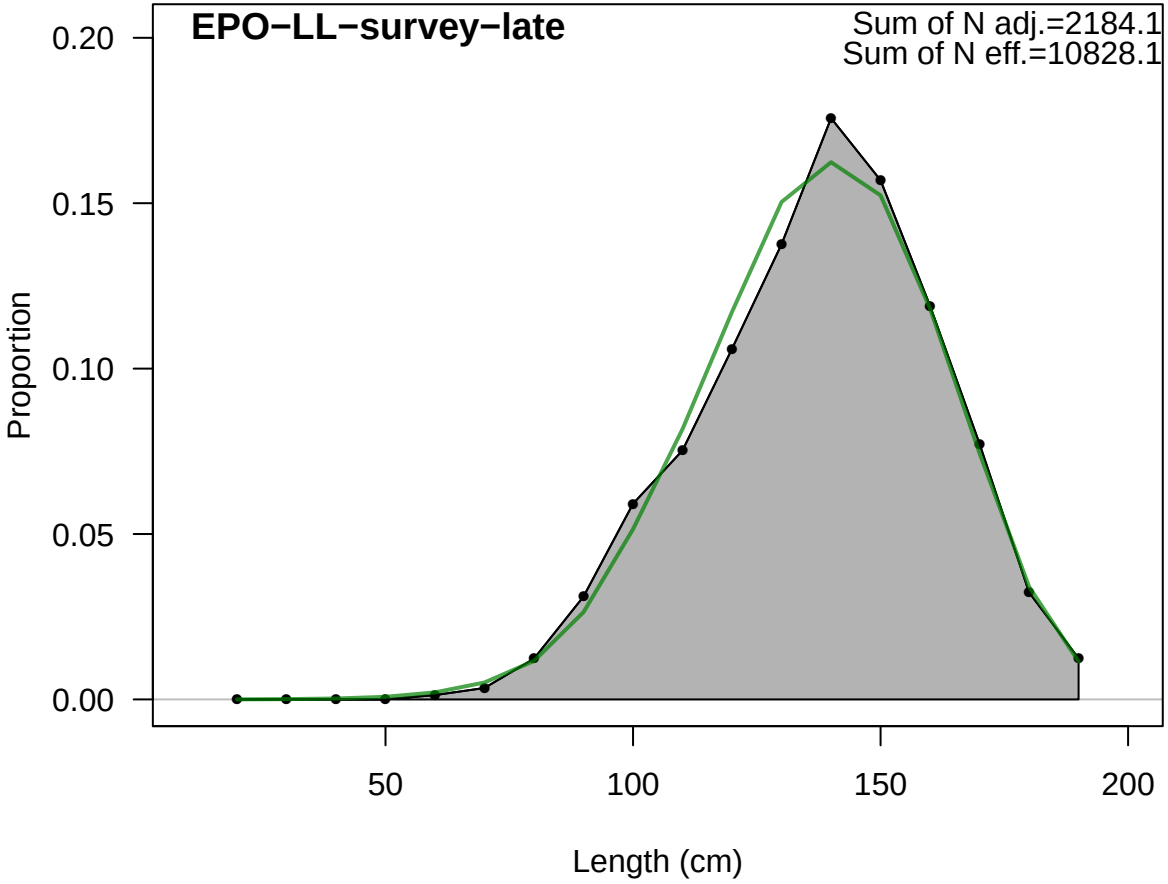

150
N adj.=4.4
N eff.=89
154
N adj.=9.7
N eff.=125.7
158
N adj.=9.5
N eff.=93.3
162
N adj.=8
N eff.=75.1
151
N adj.=6.9
N eff.=40.1
155
N adj.=34.1
N eff.=326.1
159
N adj.=27.6
N eff.=158.3
163
N adj.=16.4
N eff.=51.9
152
N adj.=16.1
N eff.=40.9
156
N adj.=47.1
N eff.=163.1
160
N adj.=25
N eff.=71.4
164
N adj.=31.3
N eff.=228.7
153
N adj.=24.6
N eff.=179.7
157
N adj.=17.7
N eff.=98.5
161
N adj.=19.9
N eff.=136.1
165
N adj.=3
N eff.=29.8
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

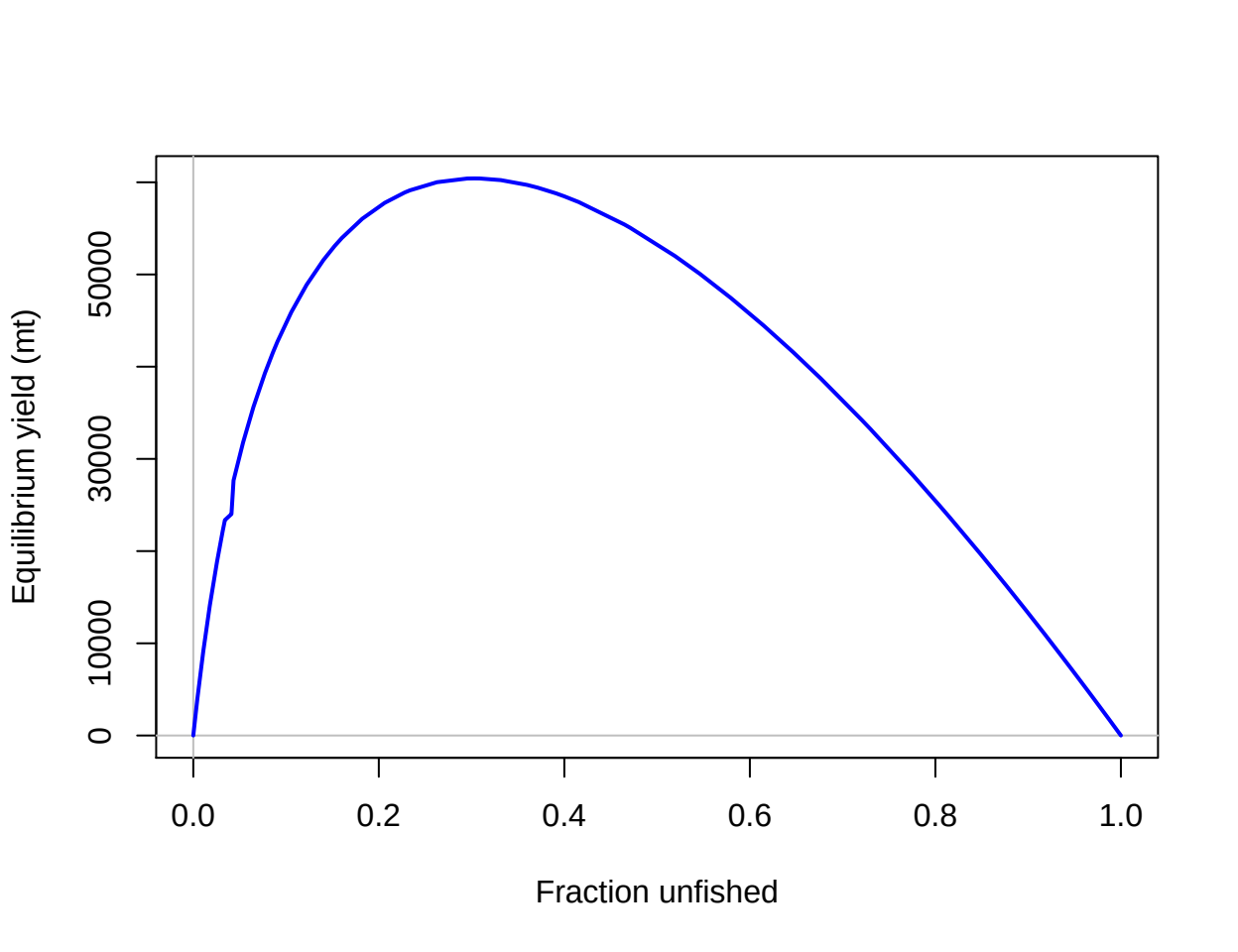

166
N adj.=0.9
N eff.=11.6
170
N adj.=8.5
N eff.=60.1
174
N adj.=2.4
N eff.=81.6
167
N adj.=19.8
N eff.=108.2
171
N adj.=8.5
N eff.=208.4
175
N adj.=7.6
N eff.=31.4
168
N adj.=33.8
N eff.=647.2
172
N adj.=39.8
N eff.=100.7
176
N adj.=10.9
N eff.=108.8
169
N adj.=9
N eff.=63.1
173
N adj.=13.9
N eff.=143
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

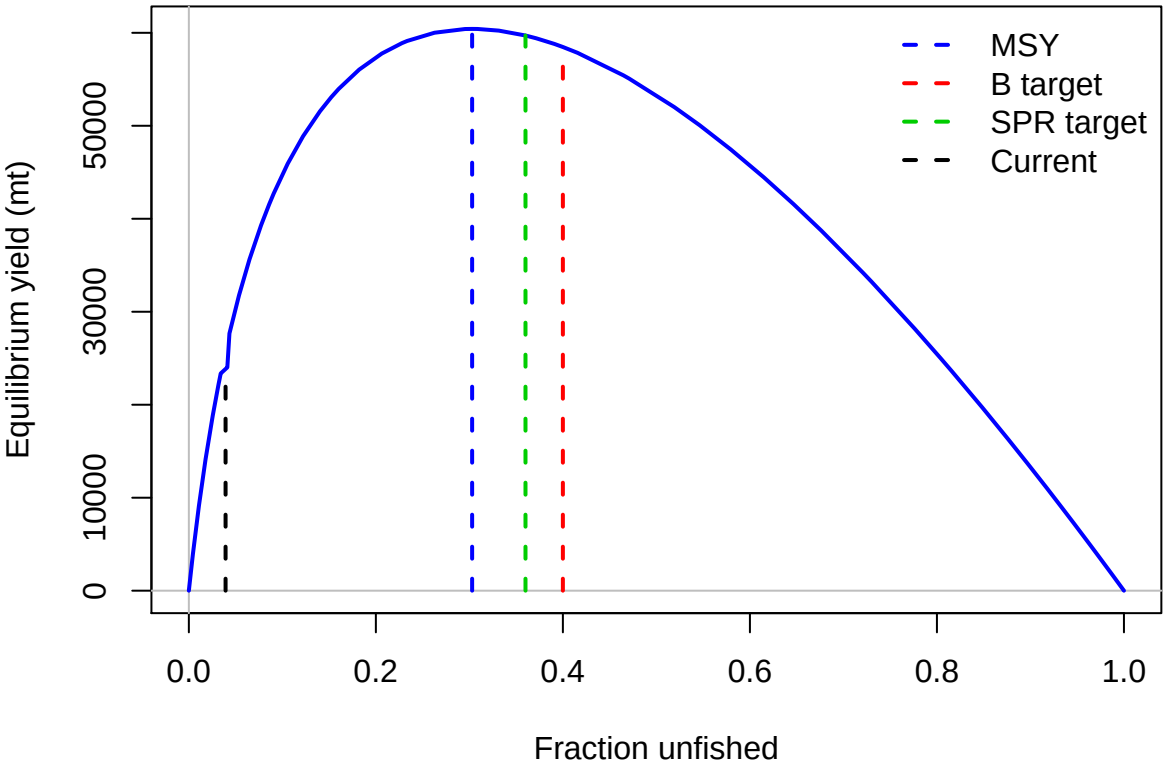

−2
0.1
2
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
Length (cm)
101
108
115
122
129
136
143
150
157
164
171
Year

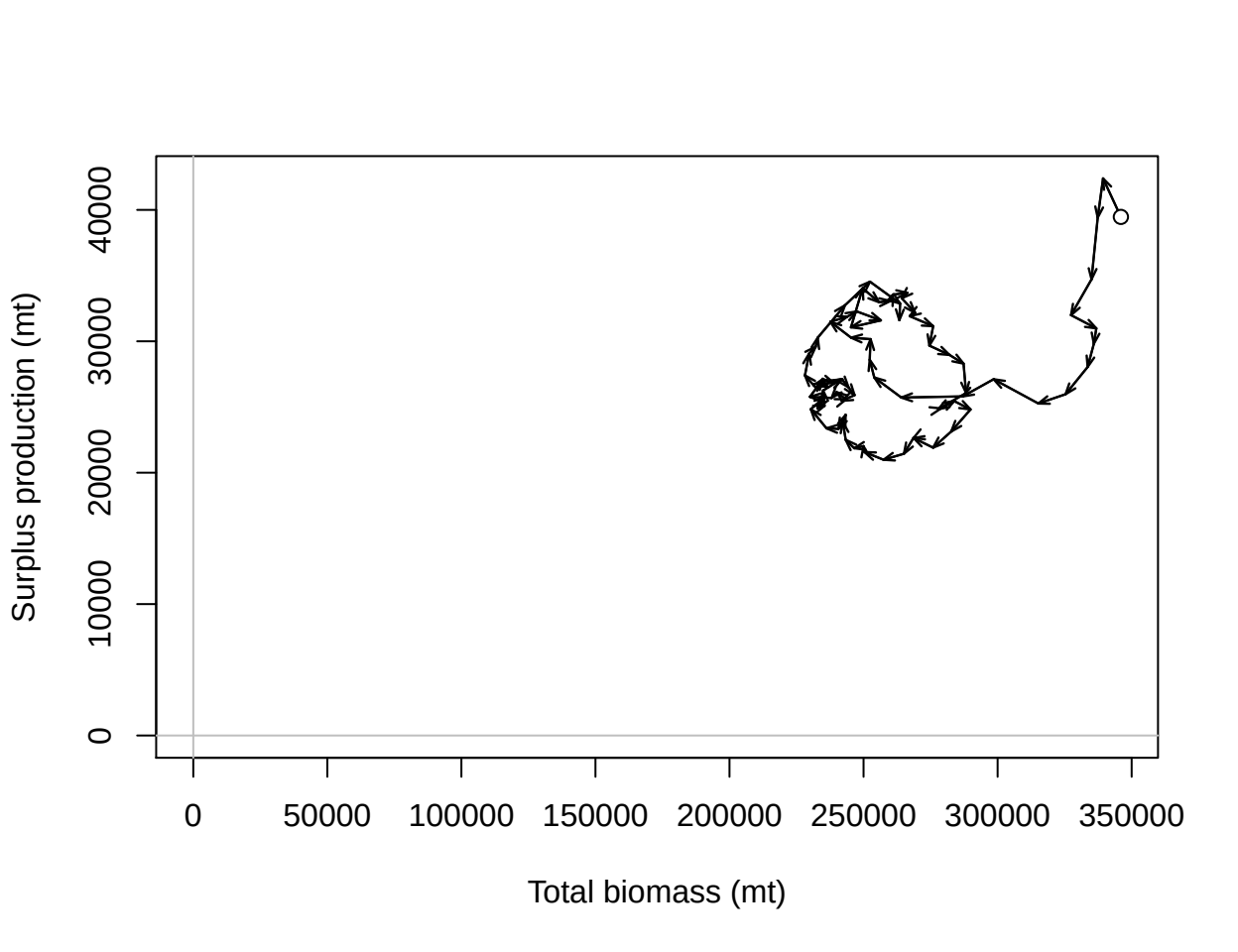

Effective sample size
Observed sample size
0
200
400
600
800
1000
0
20
40
60
80
arithmetic mean
harmonic mean
114
142
168
139
132
140
133
155
118
116
171
107
109
120
113
112
104

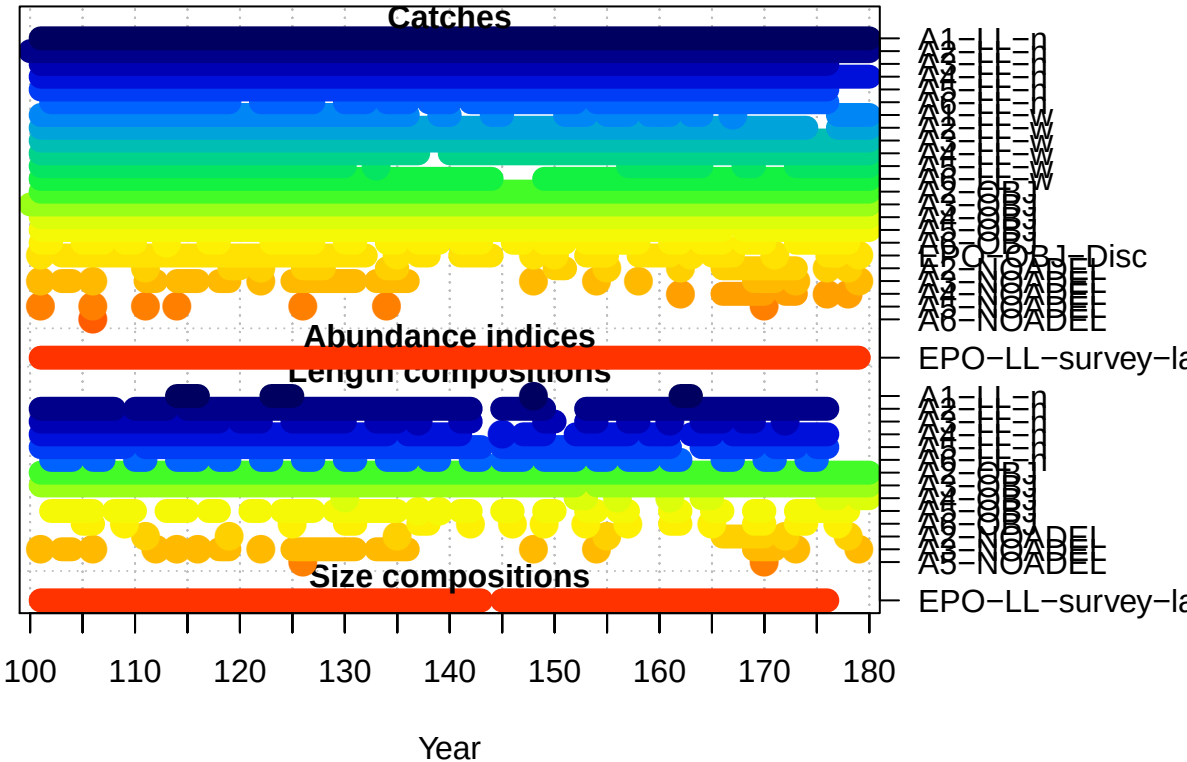

EPO−LL−survey−late (whole catch)
Mean length (cm)
200
150
100
100
120
140
160
Year

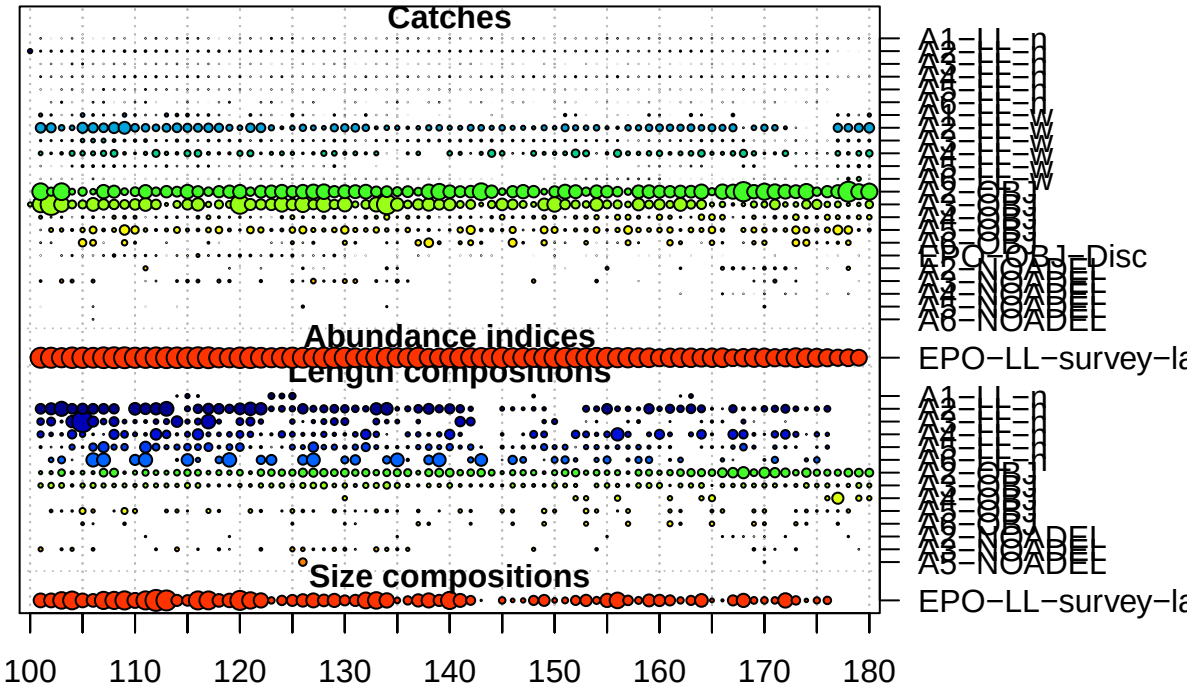

EPO−LL−survey−late
Sum of N adj.=2184.1
Sum of N eff.=10828.1
Proportion
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

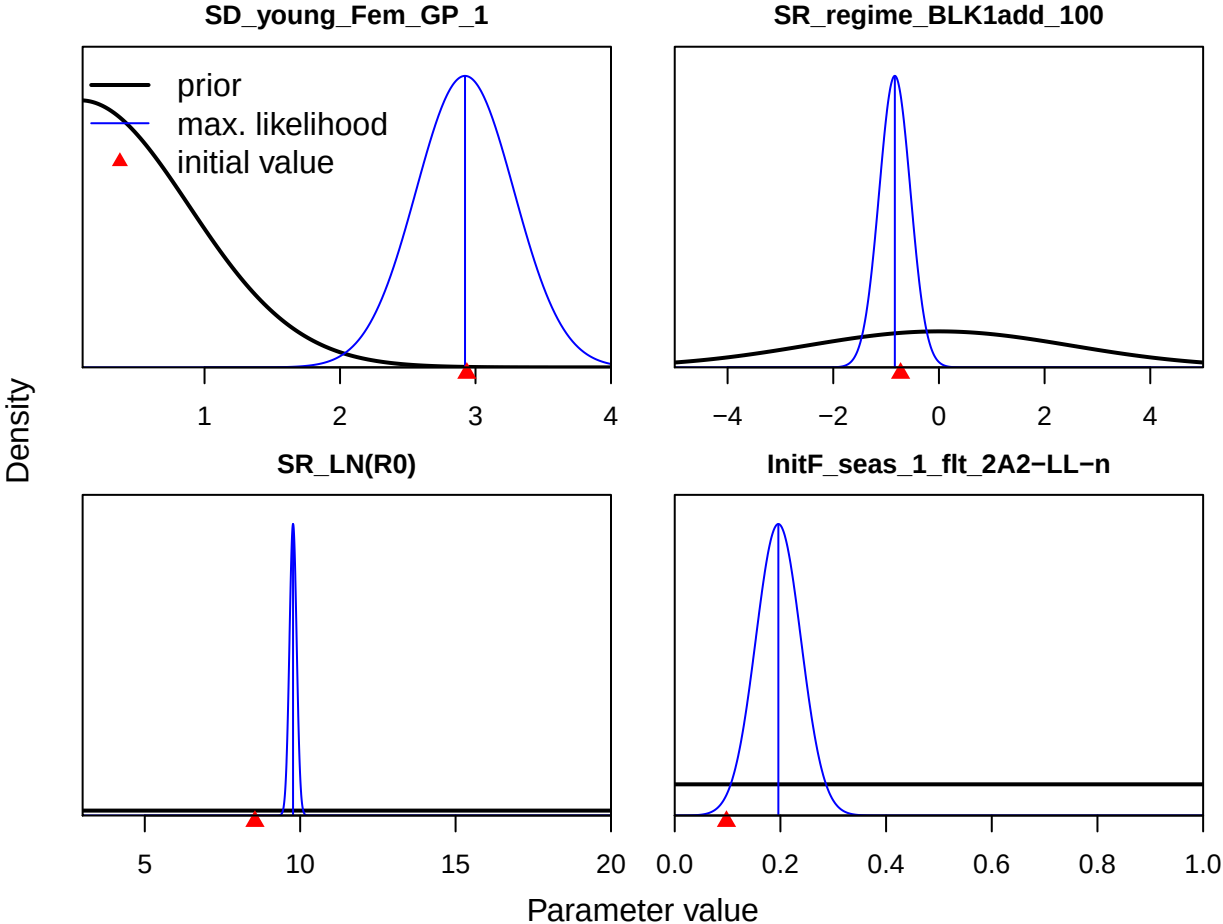

Equilibrium yield (mt)
0
10000
30000
50000
0.0
0.2
0.4
0.6
0.8
1.0
Fraction unfished

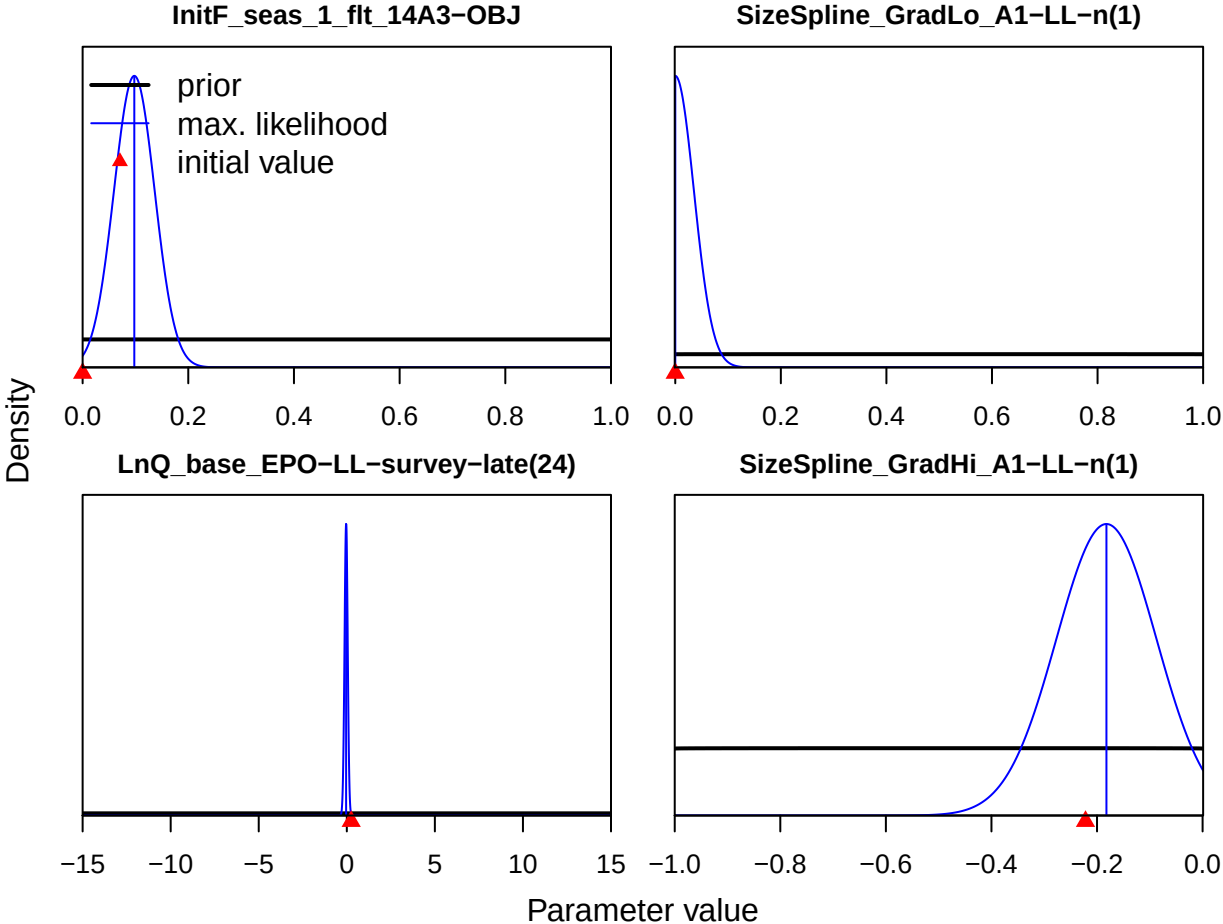

MSY
B target
SPR target
Current
Equilibrium yield (mt)
0
10000
30000
50000
0.0
0.2
0.4
0.6
0.8
1.0
Fraction unfished

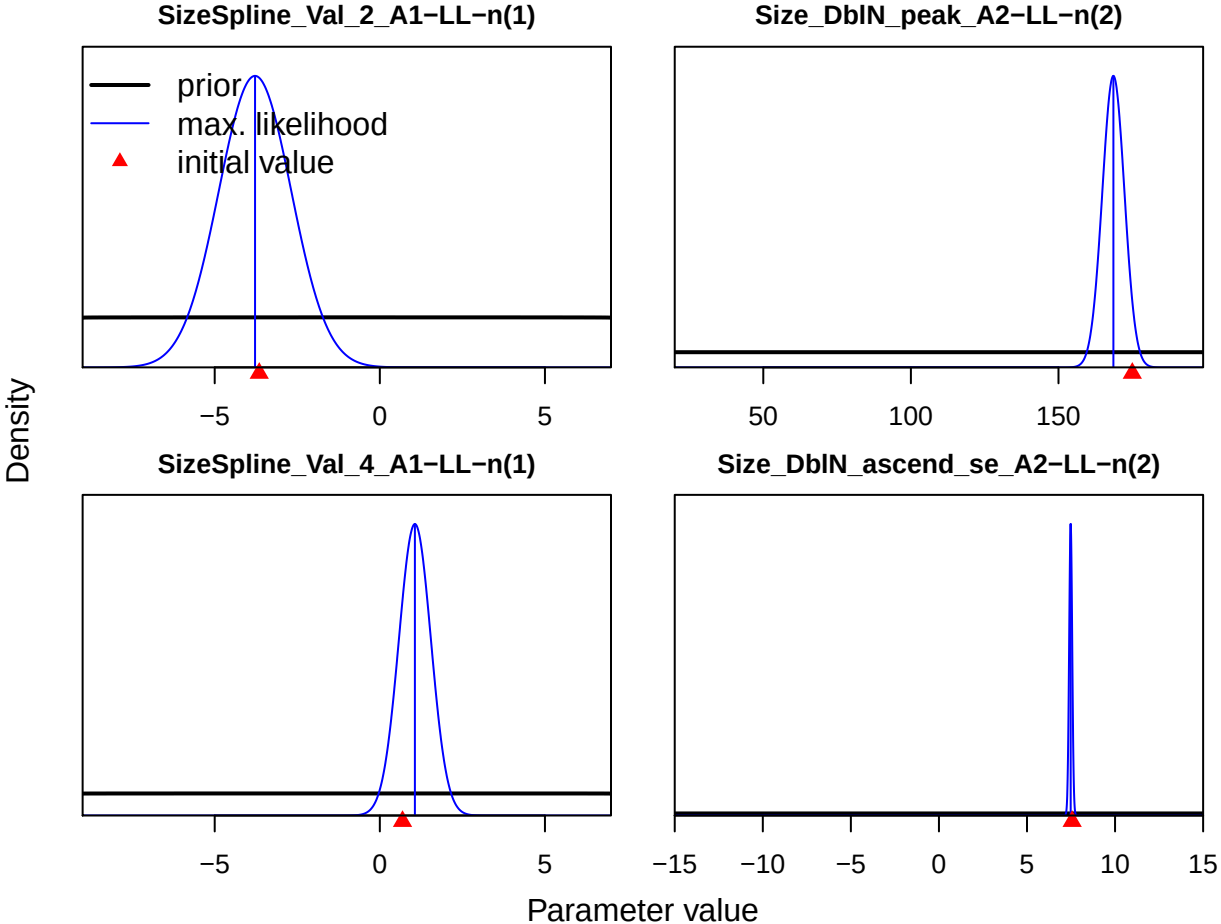

Surplus production (mt)
0
10000
20000
30000
40000
0
50000
100000
150000
200000
250000
300000
350000
Total biomass (mt)

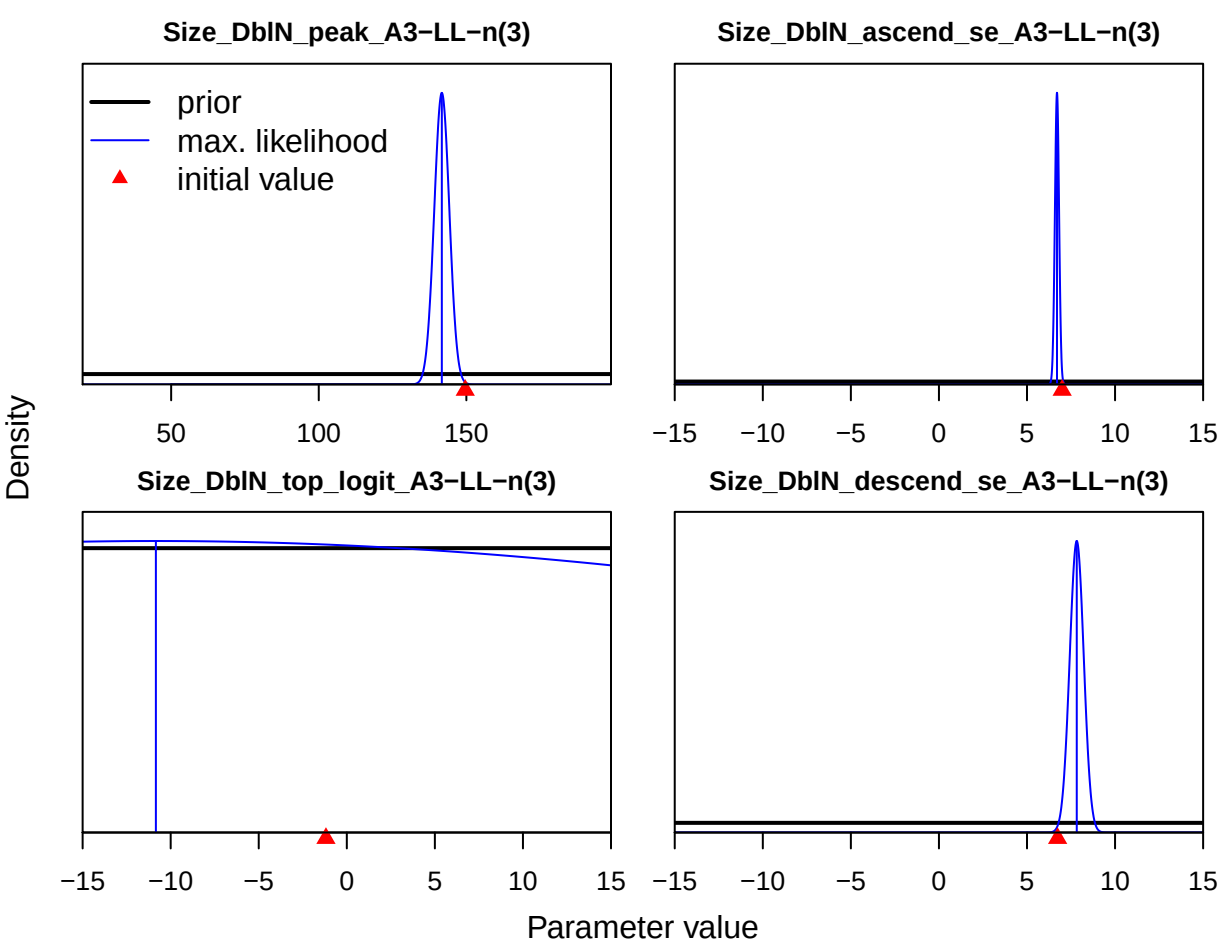

Catches
Abundance indices
Length compositions
Size compositions
A1-LL-n
A5-NOABEL
EPO-LL-survey-la
EPO-LL-survey-la
100
110
120
130
140
150
160
170
180
Year

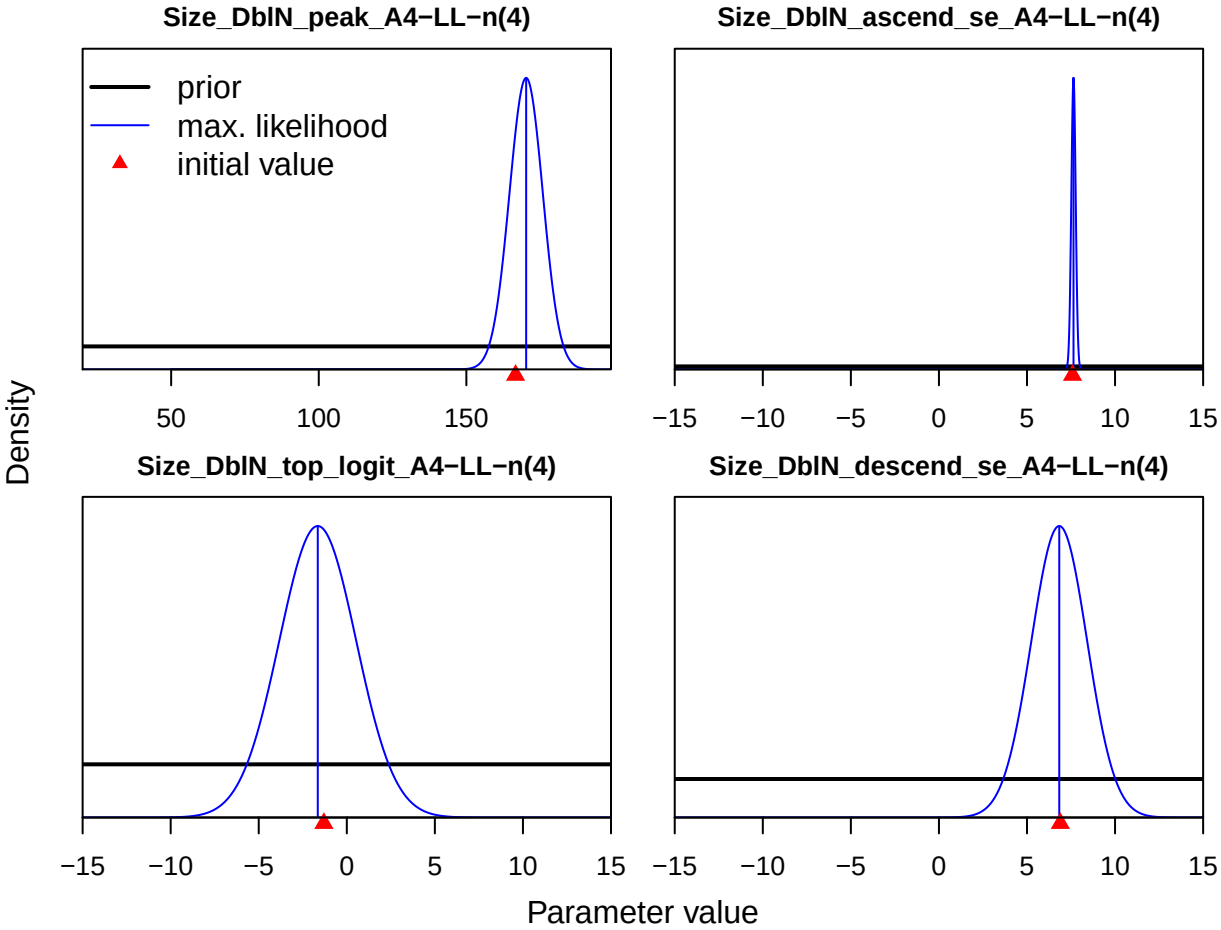

Catches
Abundance indices
Length compositions
Size compositions
A1-LL-n
A2-LL-n
A3-LL-n
A4-LL-n
A5-LL-n
A6-LL-n
A1-LL-w
A2-LL-w
A3-LL-w
A4-LL-w
A5-LL-w
A6-LL-w
A1-GB-J
A2-GB-J
A3-GB-J
A4-GB-J
A5-GB-J
A6-GB-J
EPO-OBJ-Disc
A1-NOABEL
A2-NOABEL
A3-NOABEL
A4-NOABEL
A5-NOABEL
A6-NOABEL
EPO-LL-survey-la
A1-LL-n
A2-LL-n
A3-LL-n
A4-LL-n
A5-LL-n
A6-LL-n
A1-GB-J
A2-GB-J
A3-GB-J
A4-GB-J
A5-GB-J
A6-GB-J
A1-NOABEL
A2-NOABEL
A3-NOABEL
A4-NOABEL
A5-NOABEL
EPO-LL-survey-la
100
110
120
130
140
150
160
170
180
Year

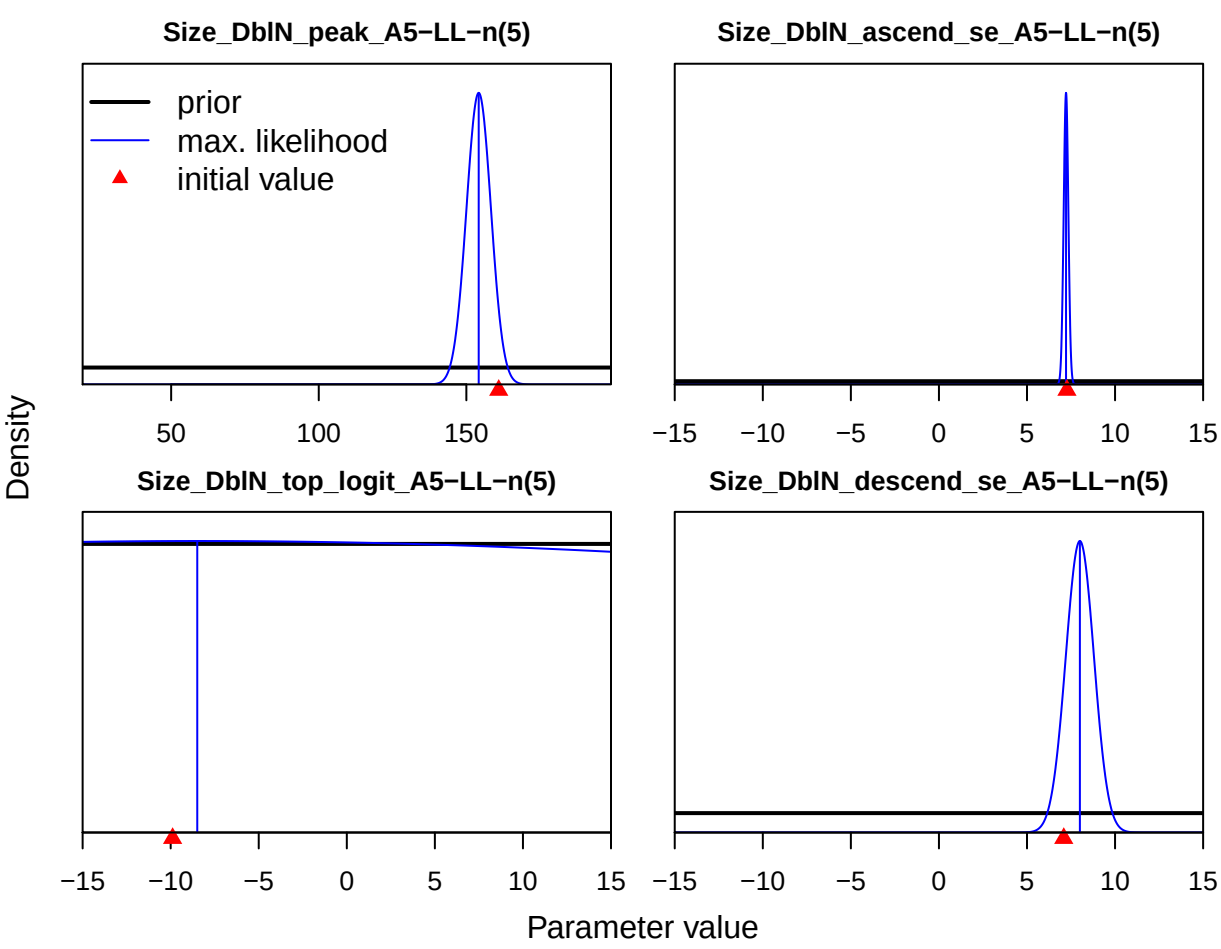

SD_young_Fem_GP_1
SR_regime_BLK1add_100
prior
max. likelihood
initial value
Density
1
2
3
4
−4
−2
0
2
4
SR_LN(R0)
InitF_seas_1_flt_2A2−LL−n
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
Parameter value

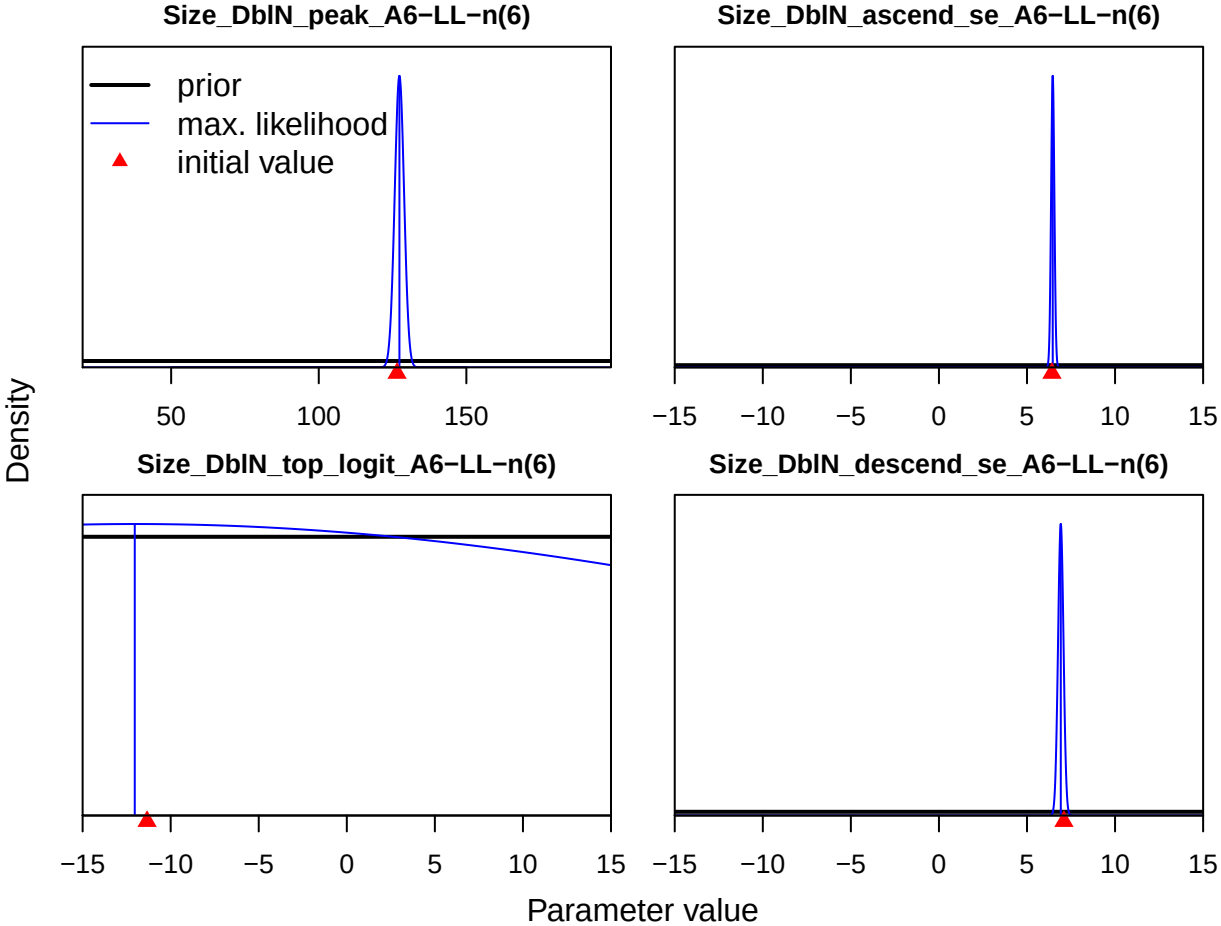

InitF_seas_1_flt_14A3−OBJ
SizeSpline_GradLo_A1−LL−n(1)
LnQ_base_EPO−LL−survey−late(24)
SizeSpline_GradHi_A1−LL−n(1)
prior
max. likelihood
initial value
Density
Parameter value
0.0
0.2
0.4
0.6
0.8
1.0
−15
−10
−5
0
5
10
15
−1.0
−0.8
−0.6
−0.4
−0.2
0.0

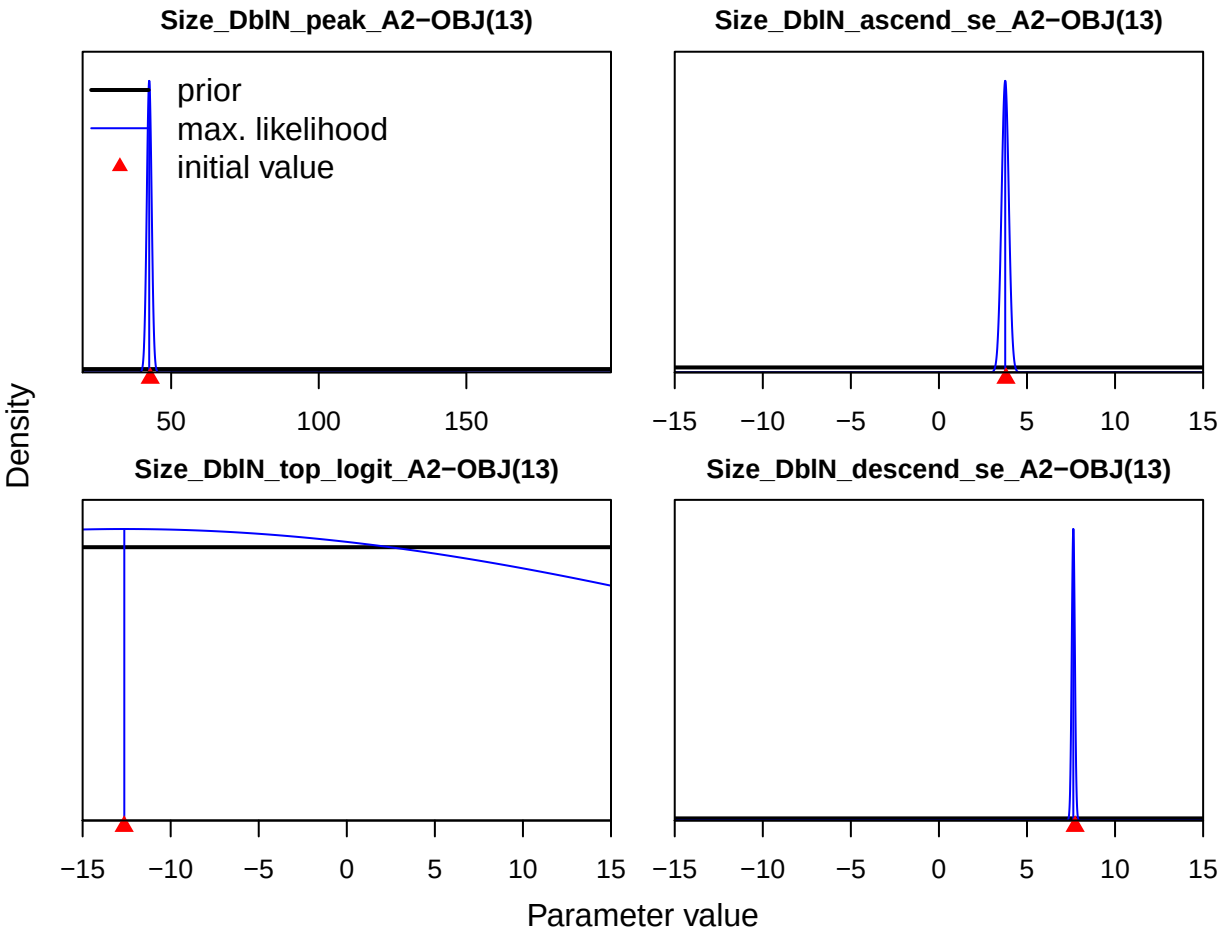

SizeSpline_Val_2_A1−LL−n(1)
Size_DblN_peak_A2−LL−n(2)
SizeSpline_Val_4_A1−LL−n(1)
Size_DblN_ascend_se_A2−LL−n(2)
prior
max. likelihood
initial value
Density
Parameter value
−5
0
5
50
100
150
−15
−10
10
15

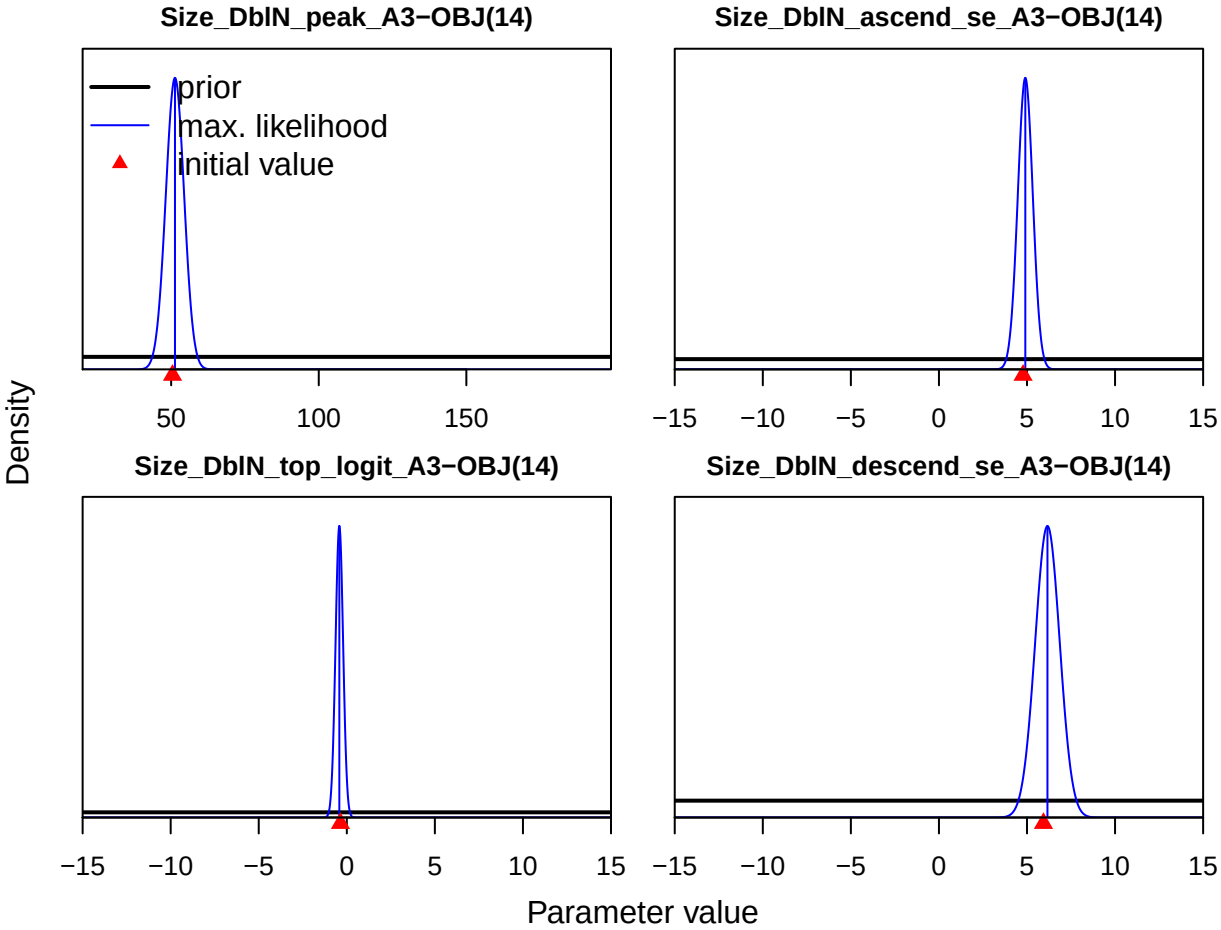

Size_DblN_peak_A3−LL−n(3)
Size_DblN_ascend_se_A3−LL−n(3)
Size_DblN_top_logit_A3−LL−n(3)
Size_DblN_descend_se_A3−LL−n(3)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15

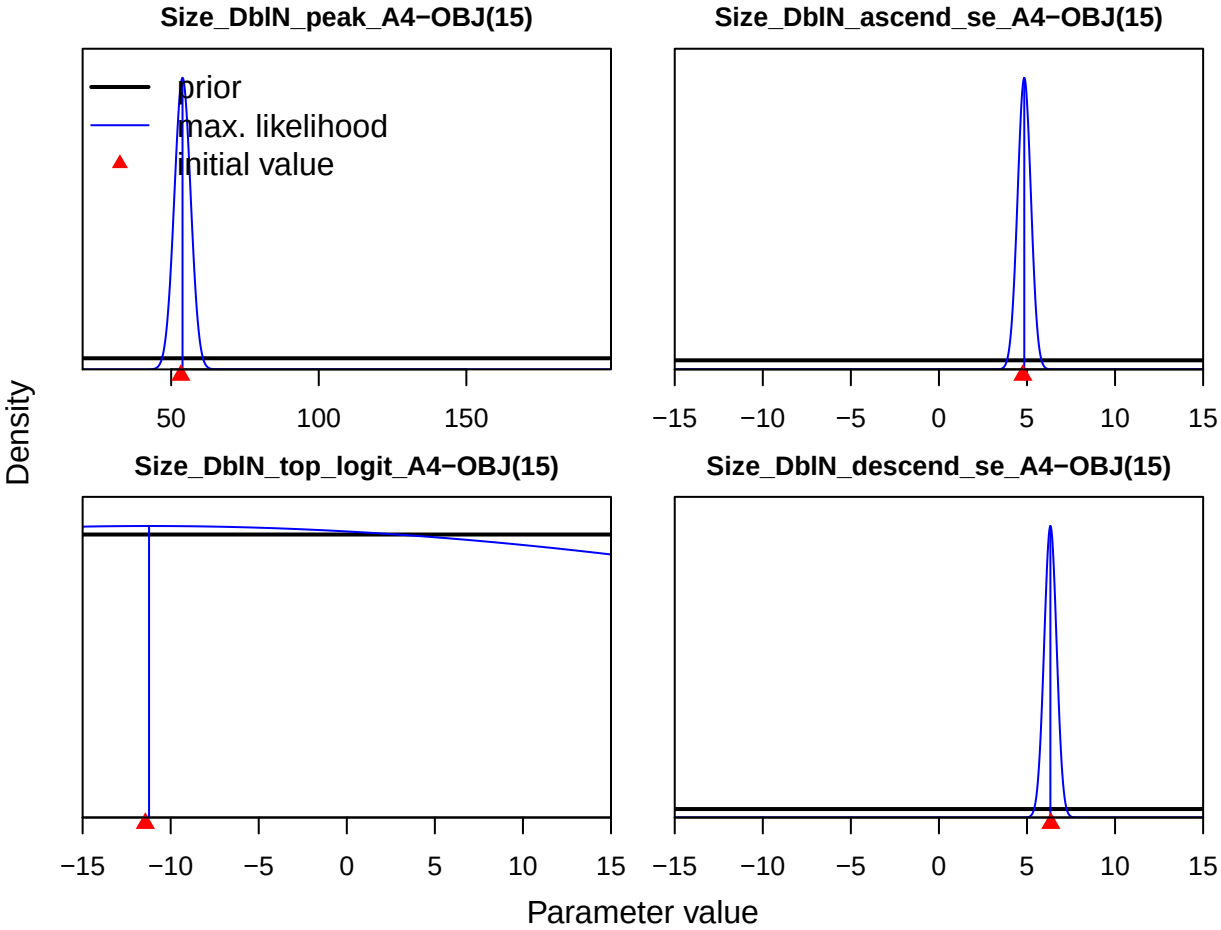

Size_DblN_peak_A4−LL−n(4)
Size_DblN_ascend_se_A4−LL−n(4)
Size_DblN_top_logit_A4−LL−n(4)
Size_DblN_descend_se_A4−LL−n(4)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15

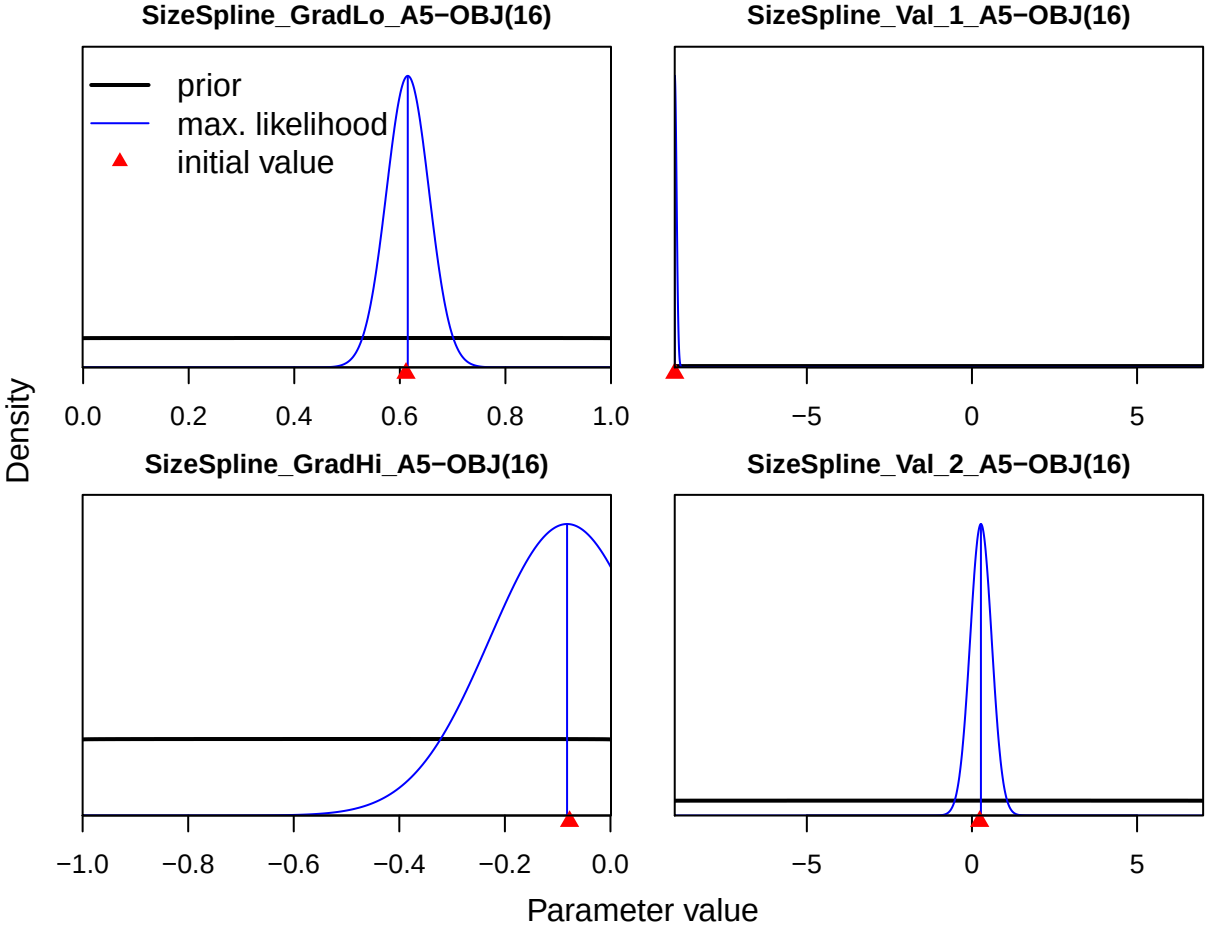

Size_DblN_peak_A5−LL−n(5)
Size_DblN_ascend_se_A5−LL−n(5)
Size_DblN_top_logit_A5−LL−n(5)
Size_DblN_descend_se_A5−LL−n(5)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15


Size_DblN_peak_A6−LL−n(6)
Size_DblN_ascend_se_A6−LL−n(6)
Size_DblN_top_logit_A6−LL−n(6)
Size_DblN_descend_se_A6−LL−n(6)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15


Size_DblN_peak_A2−OBJ(13)
Size_DblN_ascend_se_A2−OBJ(13)
Size_DblN_top_logit_A2−OBJ(13)
Size_DblN_descend_se_A2−OBJ(13)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15


Size_DblN_peak_A3−OBJ(14)
Size_DblN_ascend_se_A3−OBJ(14)
Size_DblN_top_logit_A3−OBJ(14)
Size_DblN_descend_se_A3−OBJ(14)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15


Size_DblN_peak_A4−OBJ(15)
Size_DblN_ascend_se_A4−OBJ(15)
Size_DblN_top_logit_A4−OBJ(15)
Size_DblN_descend_se_A4−OBJ(15)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15


SizeSpline_GradLo_A5−OBJ(16)
SizeSpline_Val_1_A5−OBJ(16)
SizeSpline_GradHi_A5−OBJ(16)
SizeSpline_Val_2_A5−OBJ(16)
prior
max. likelihood
initial value
Density
Parameter value
0.0
0.2
0.4
0.6
0.8
1.0
−5
0
5
−1.0
−0.8
−0.6
−0.4
−0.2
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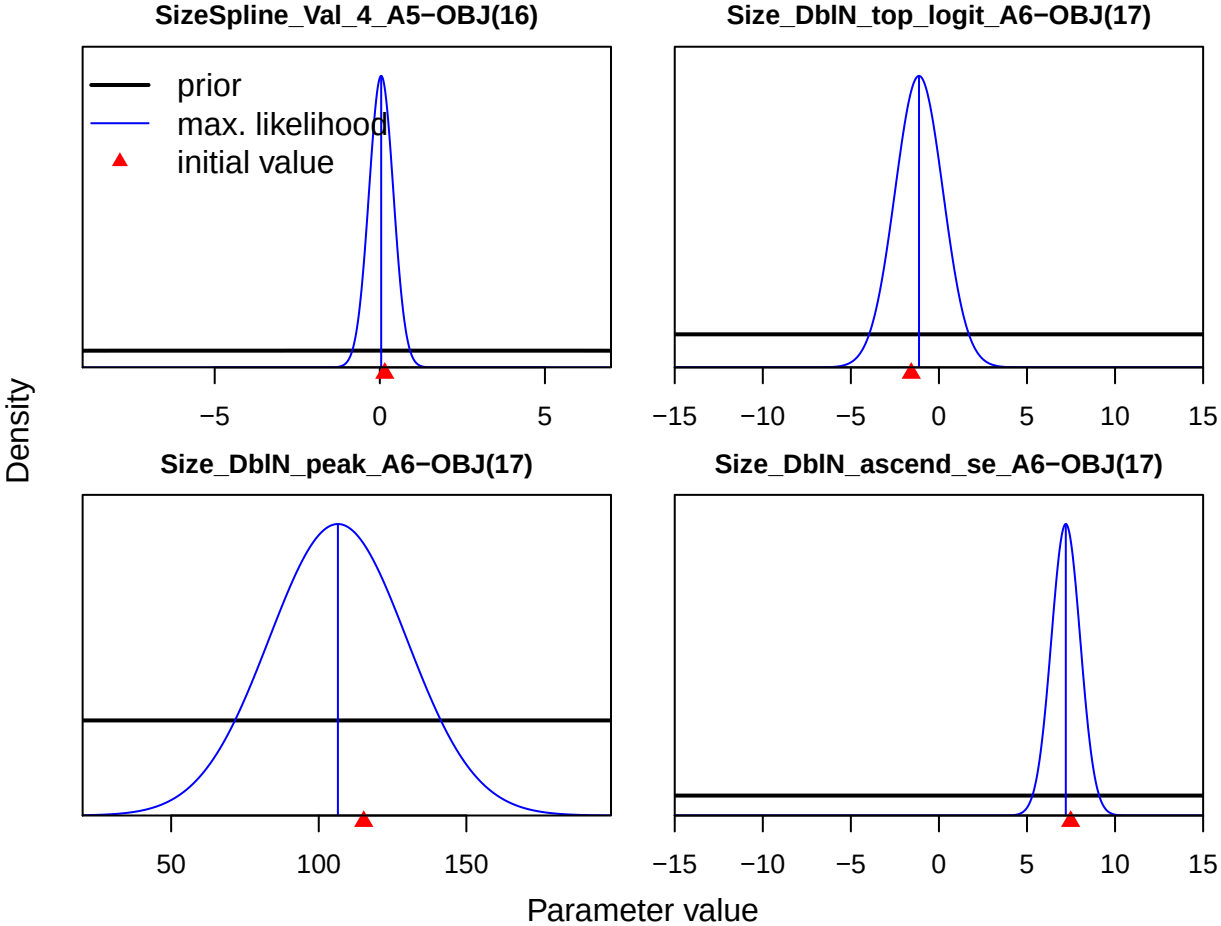
SizeSpline_Val_4_A5−OBJ(16)
Size_DblN_top_logit_A6−OBJ(17)
Size_DblN_peak_A6−OBJ(17)
Size_DblN_ascend_se_A6−OBJ(17)
prior
max. likelihood
initial value
Density
Parameter value
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−15
−10
−5
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15
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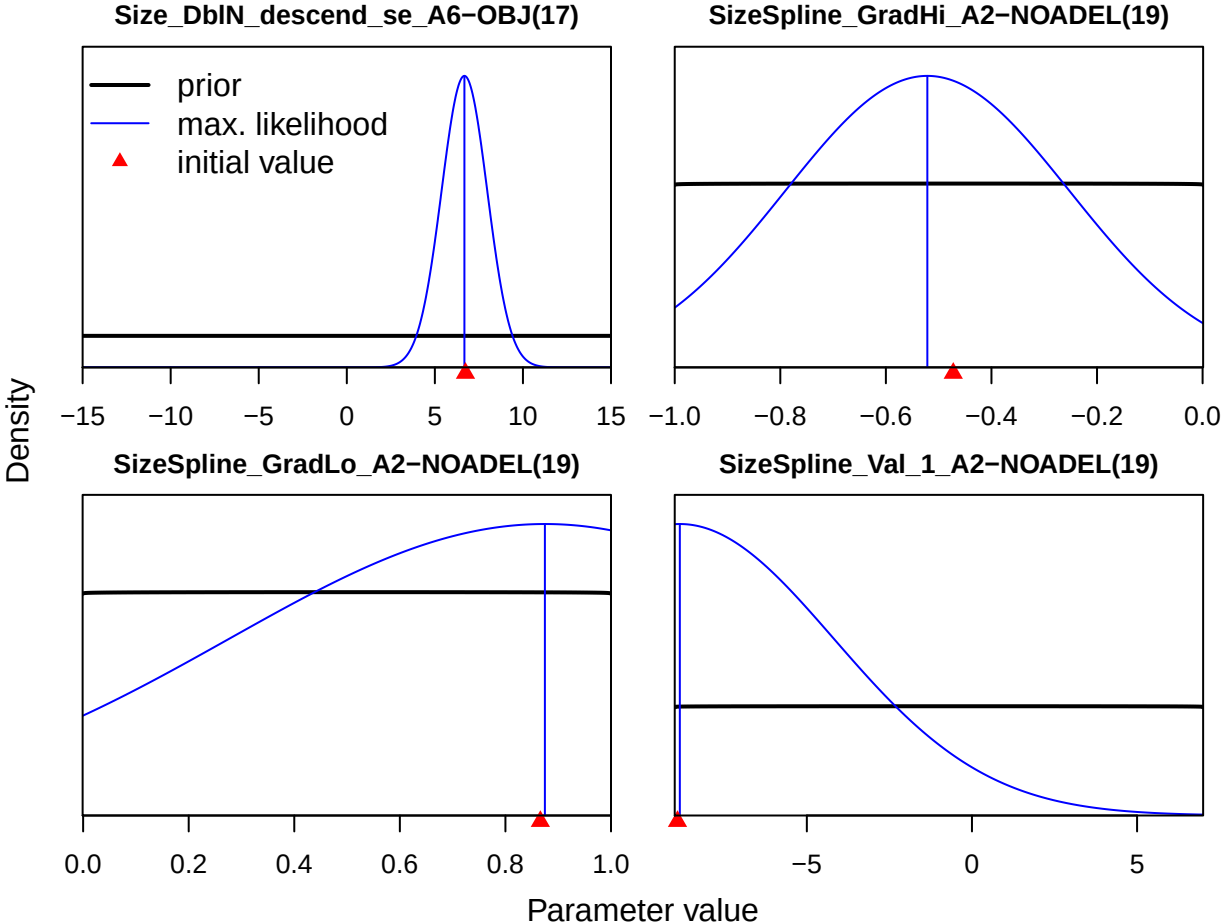
150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SizeSpline_GradHi_A2−NOADEL(19)
SizeSpline_GradLo_A2−NOADEL(19)
SizeSpline_Val_1_A2−NOADEL(19)
prior
max. likelihood
initial value
Density
Parameter value
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−10
−5
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5
10
15
−1.0
−0.8
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0.2
0.4
0.6
0.8
1.0
−5
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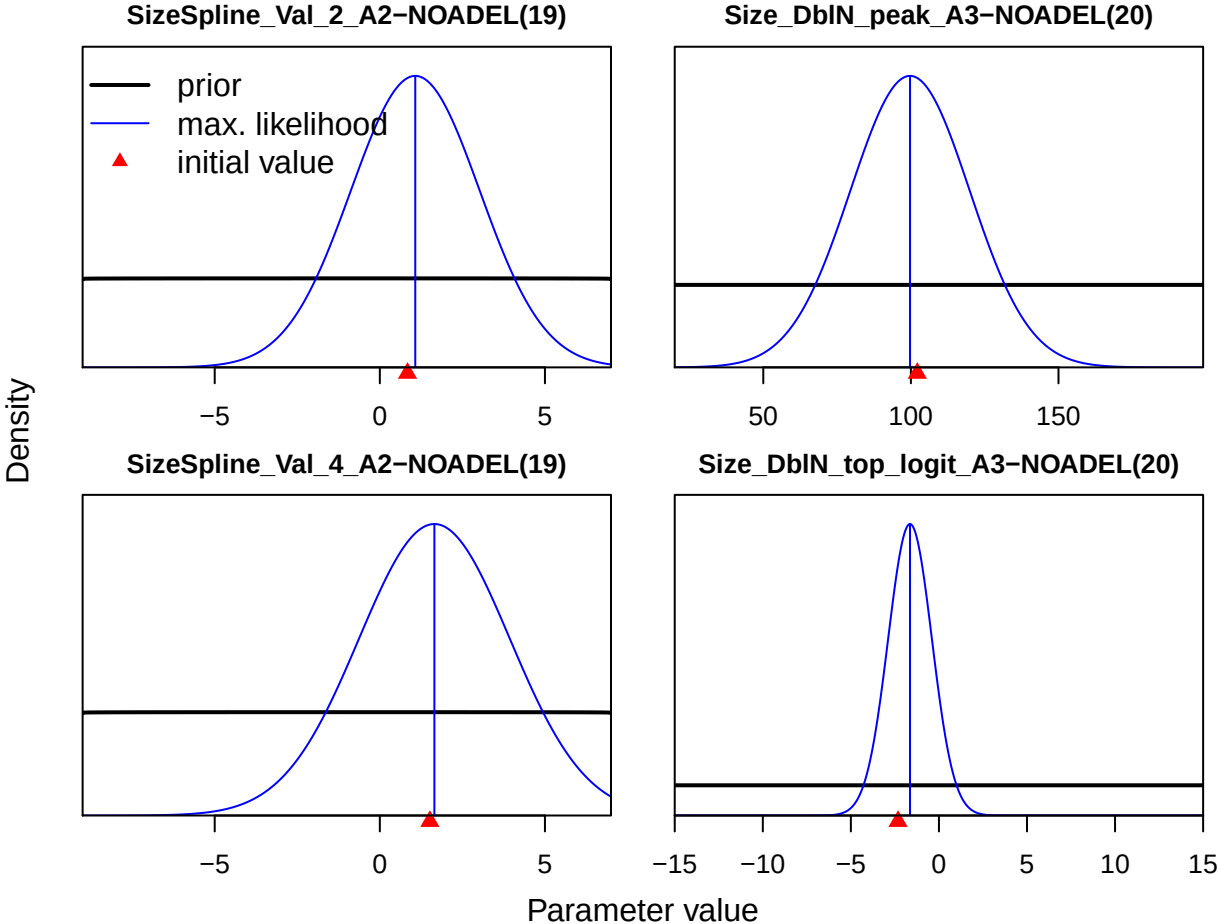
SizeSpline_Val_2_A2−NOADEL(19)
Size_DblN_peak_A3−NOADEL(20)
SizeSpline_Val_4_A2−NOADEL(19)
Size_DblN_top_logit_A3−NOADEL(20)
prior
max. likelihood
initial value
Density
Parameter value
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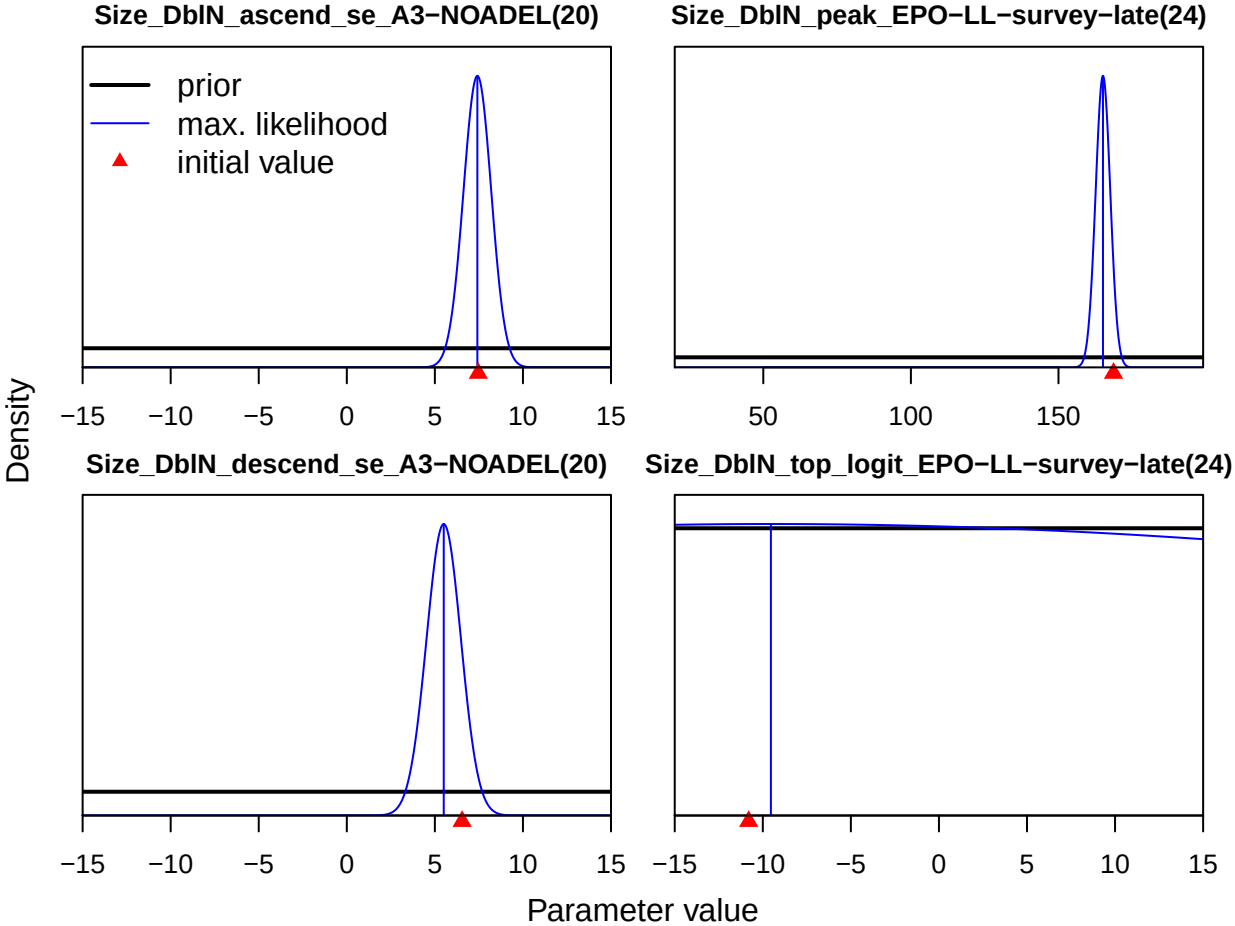
0
5
50
100
150
−15
−10
10
15


Size_DblN_ascend_se_A3−NOADEL(20)
Size_DblN_peak_EPO−LL−survey−late(24)
Size_DblN_descend_se_A3−NOADEL(20)
Size_DblN_top_logit_EPO−LL−survey−late(24)
prior
max. likelihood
initial value
Density
Parameter value
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−10
−5
0
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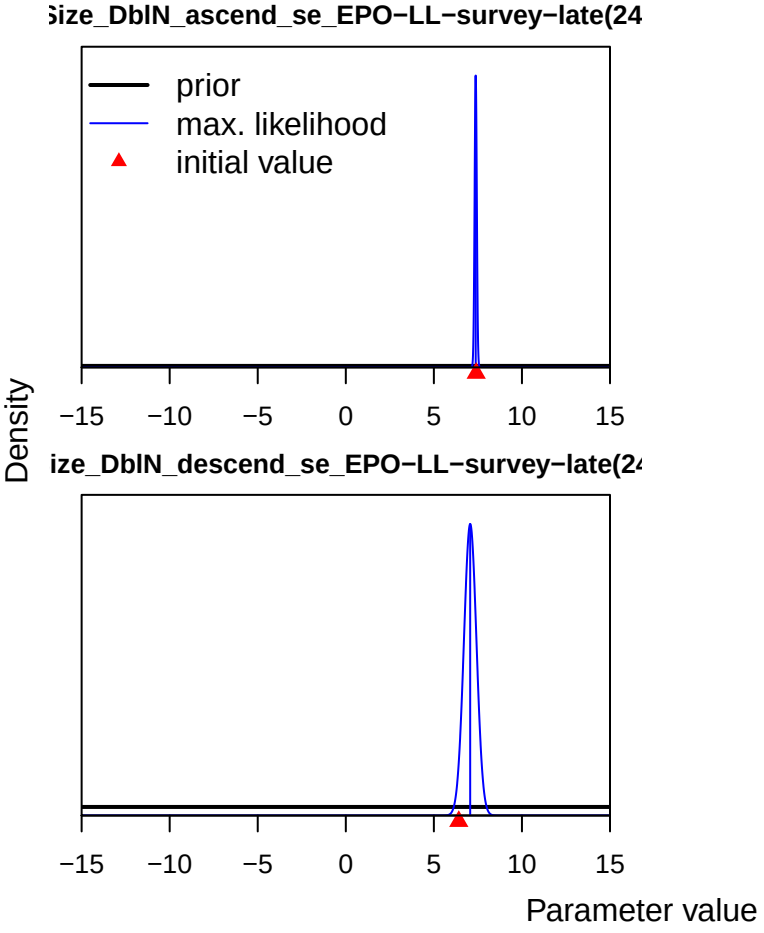
10
15
50
100
150


Size_DblN_ascend_se_EPO−LL−survey−late(24
prior
max. likelihood
initial value
Density
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−10
−5
0
5
10
15
ize_DblN_descend_se_EPO−LL−survey−late(2
−15
−10
−5
0
5
10
15
Parameter value