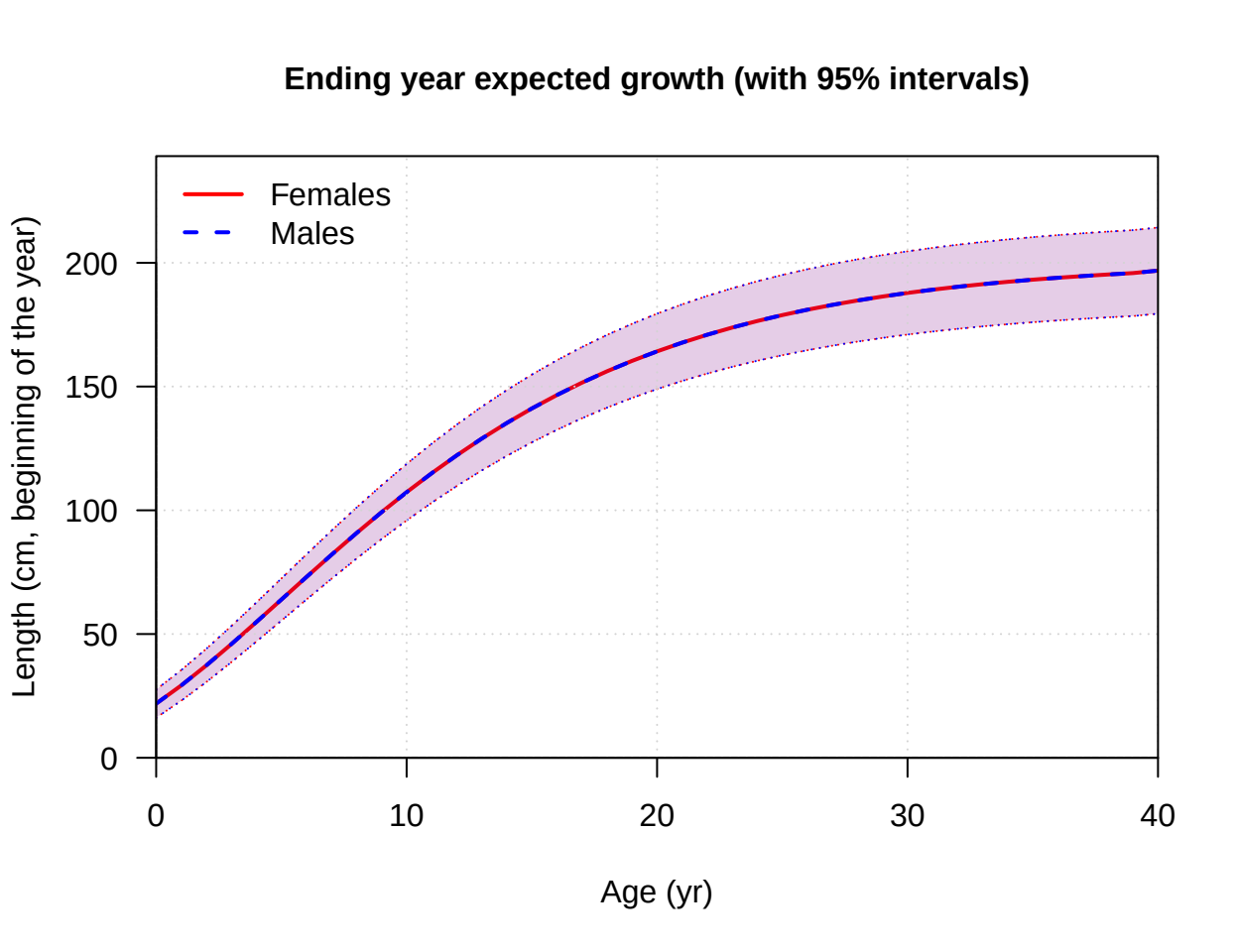
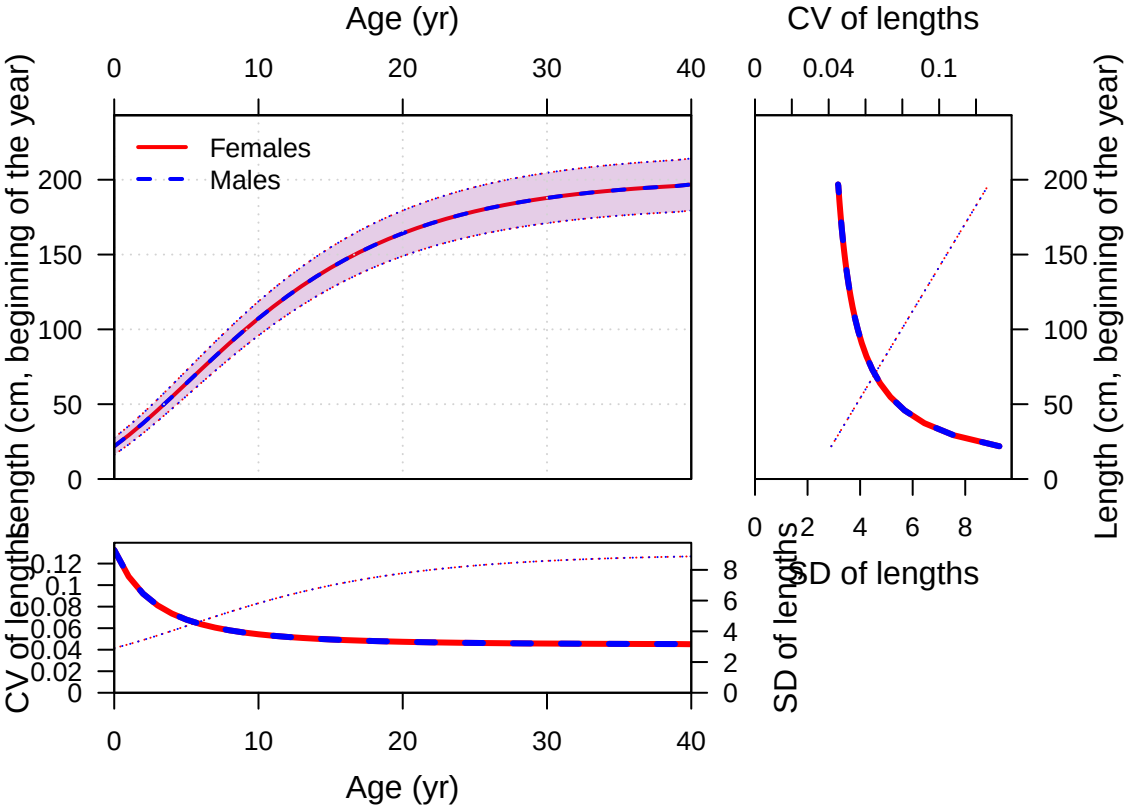
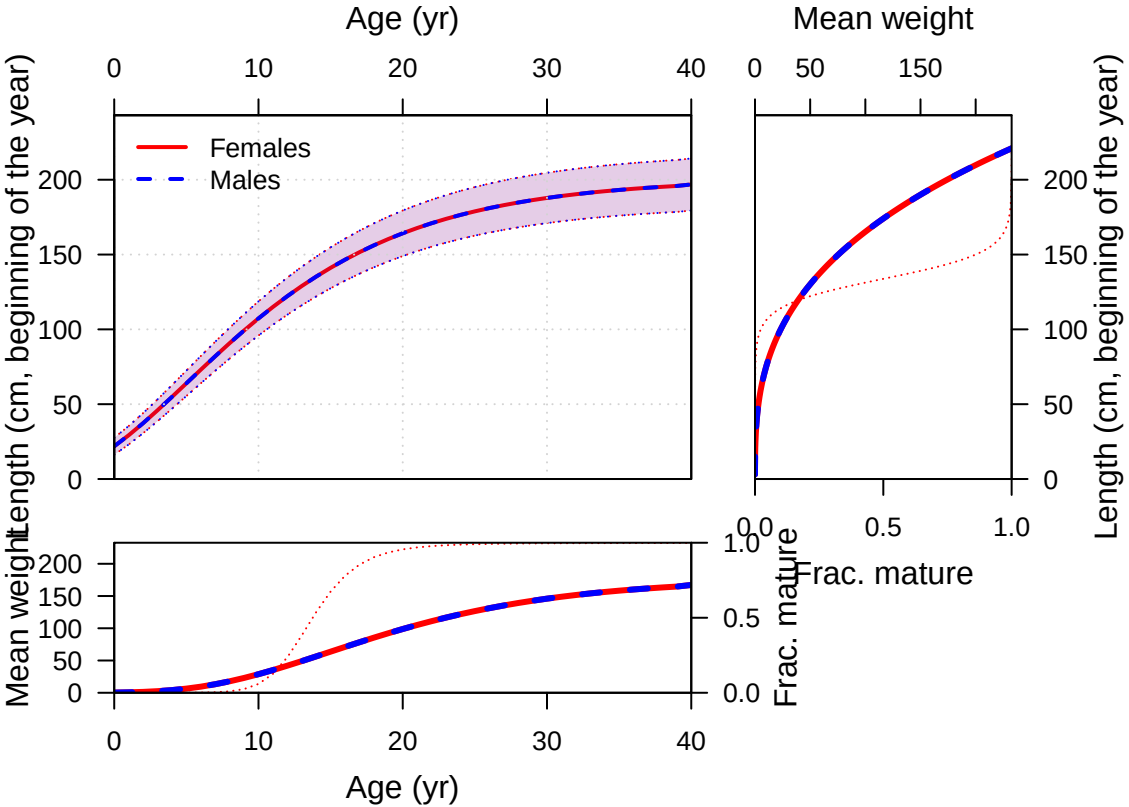
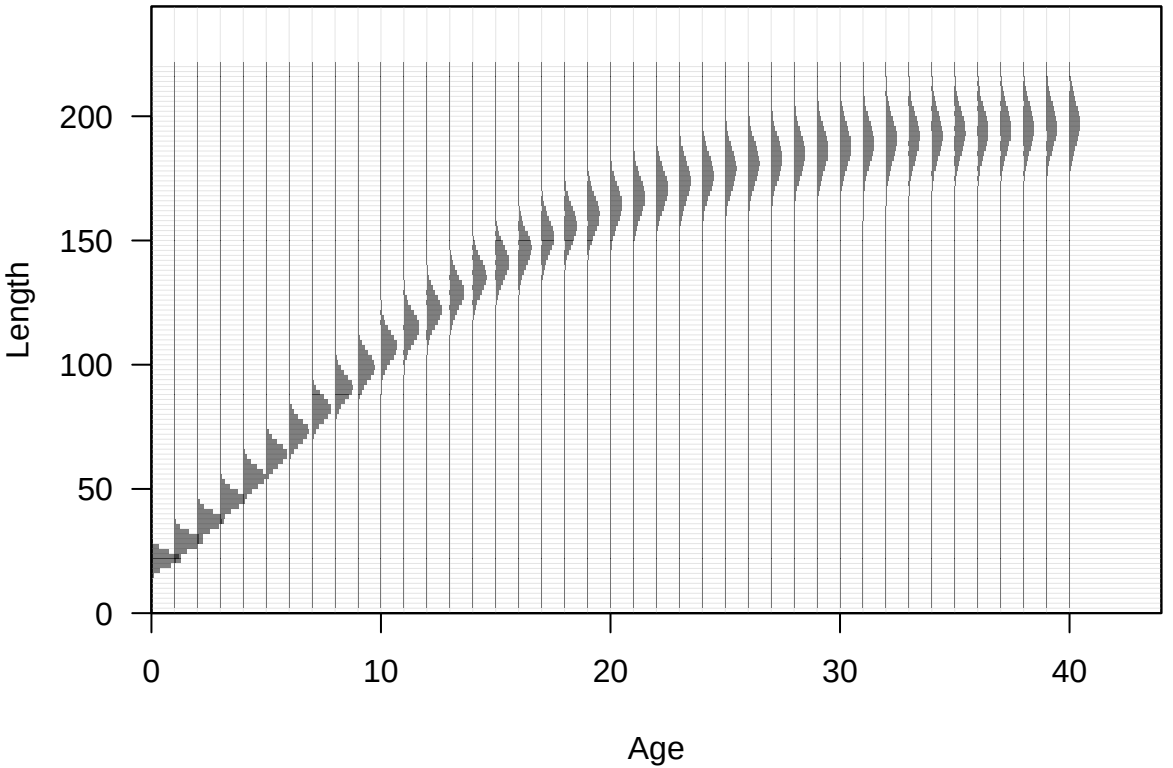
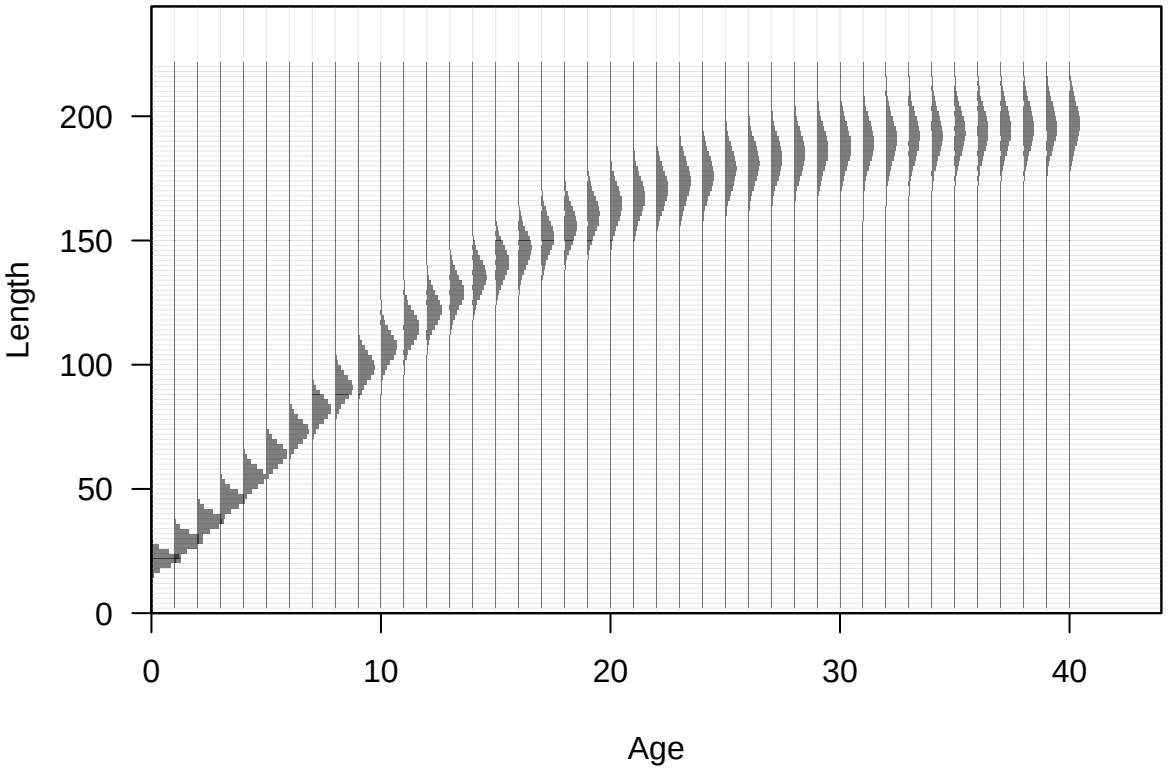
Plots created using the 'r4ss' package in R
Stock Synthesis version: 3.30.15.0
StartTime: Sun Apr 05 21:50:34 2020
Data_File: BET−EPO.dat
Control_File: BET−EPO.ctl

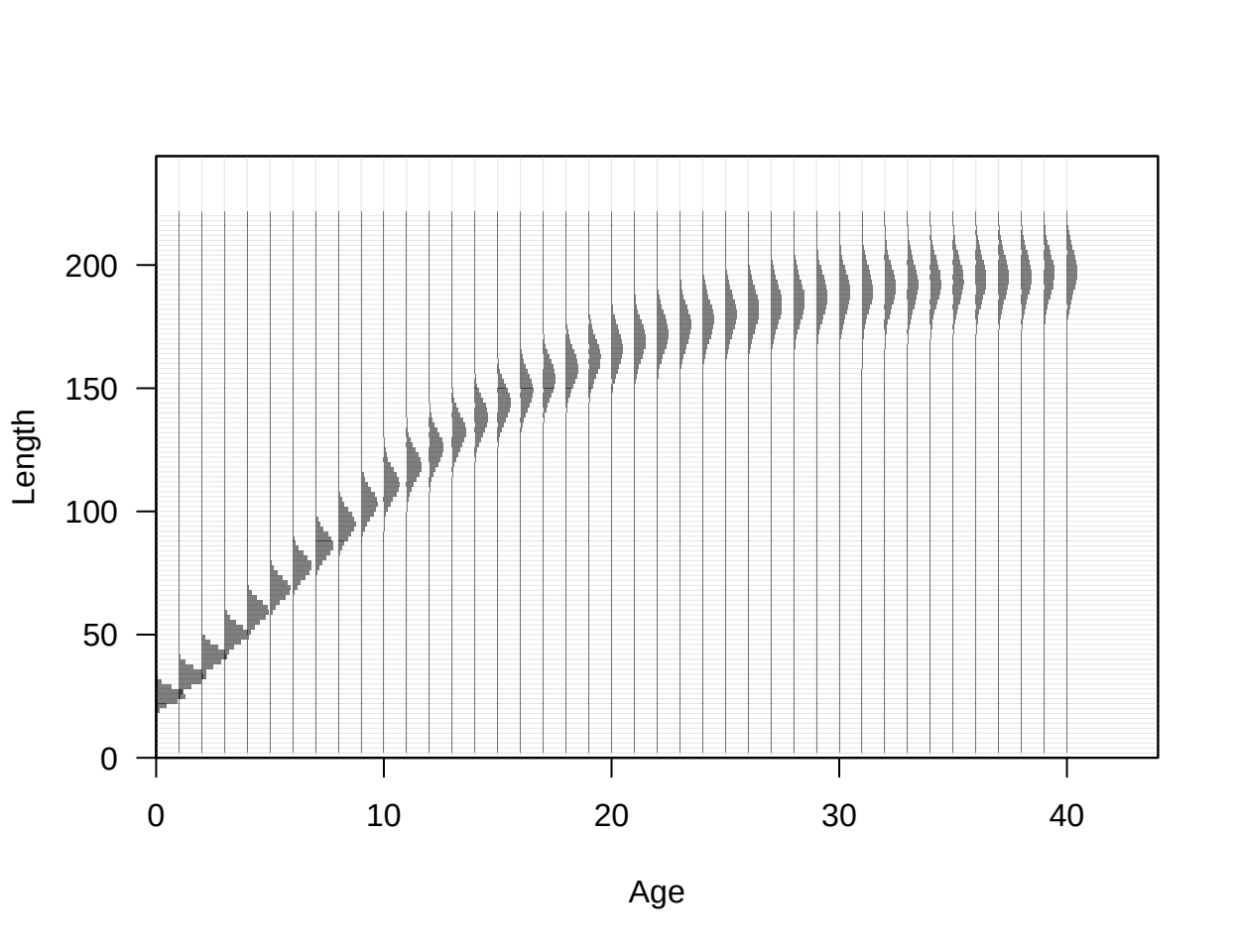

Ending year expected growth (with 95% intervals)
Females
Males
Length (cm, beginning of the year)
0
50
100
150
200
0
10
20
30
40
Age (yr)

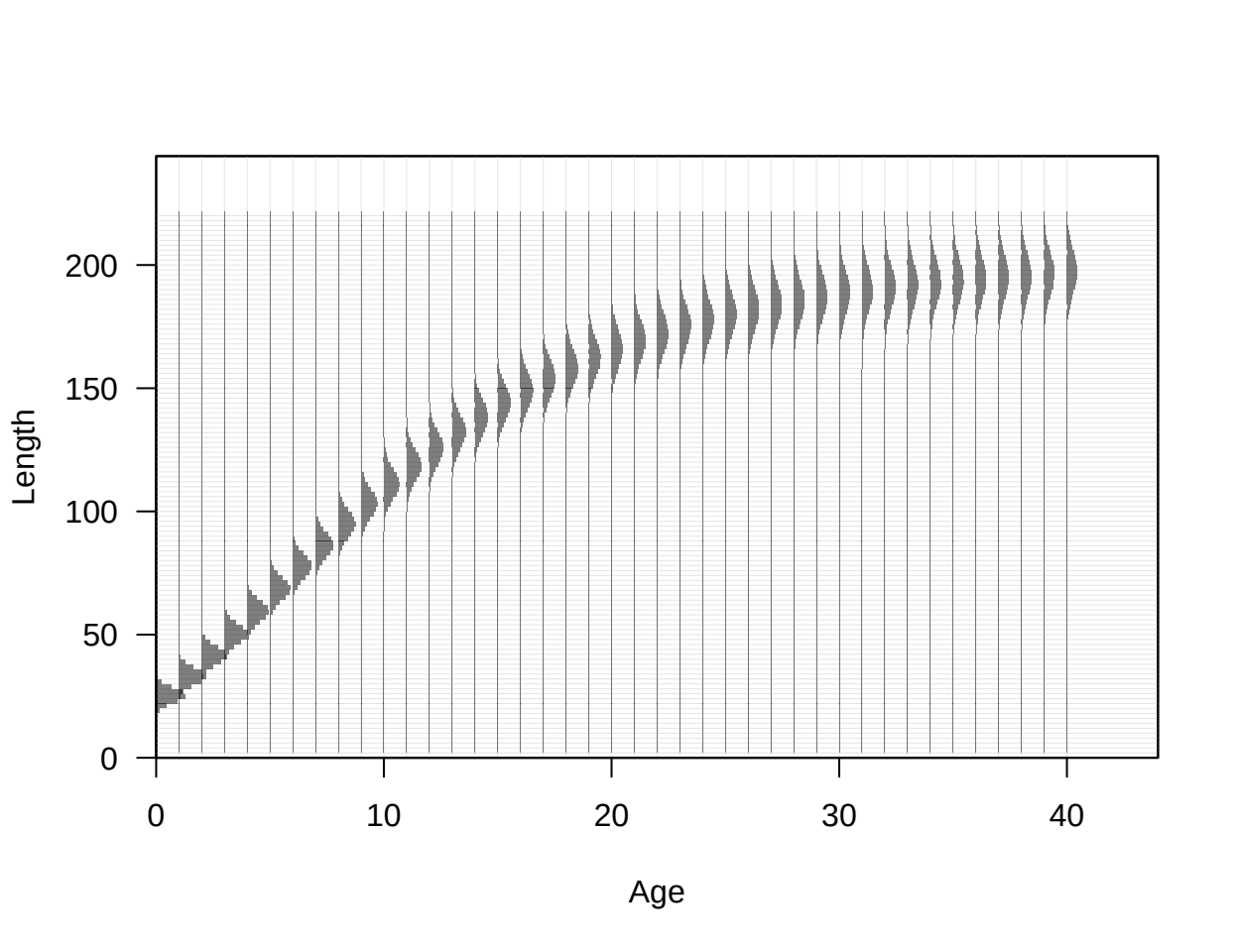

Age (yr)
CV of lengths
Females
Males
Length (cm, beginning of the year)
SD of lengths
CV of lengths
Age (yr)

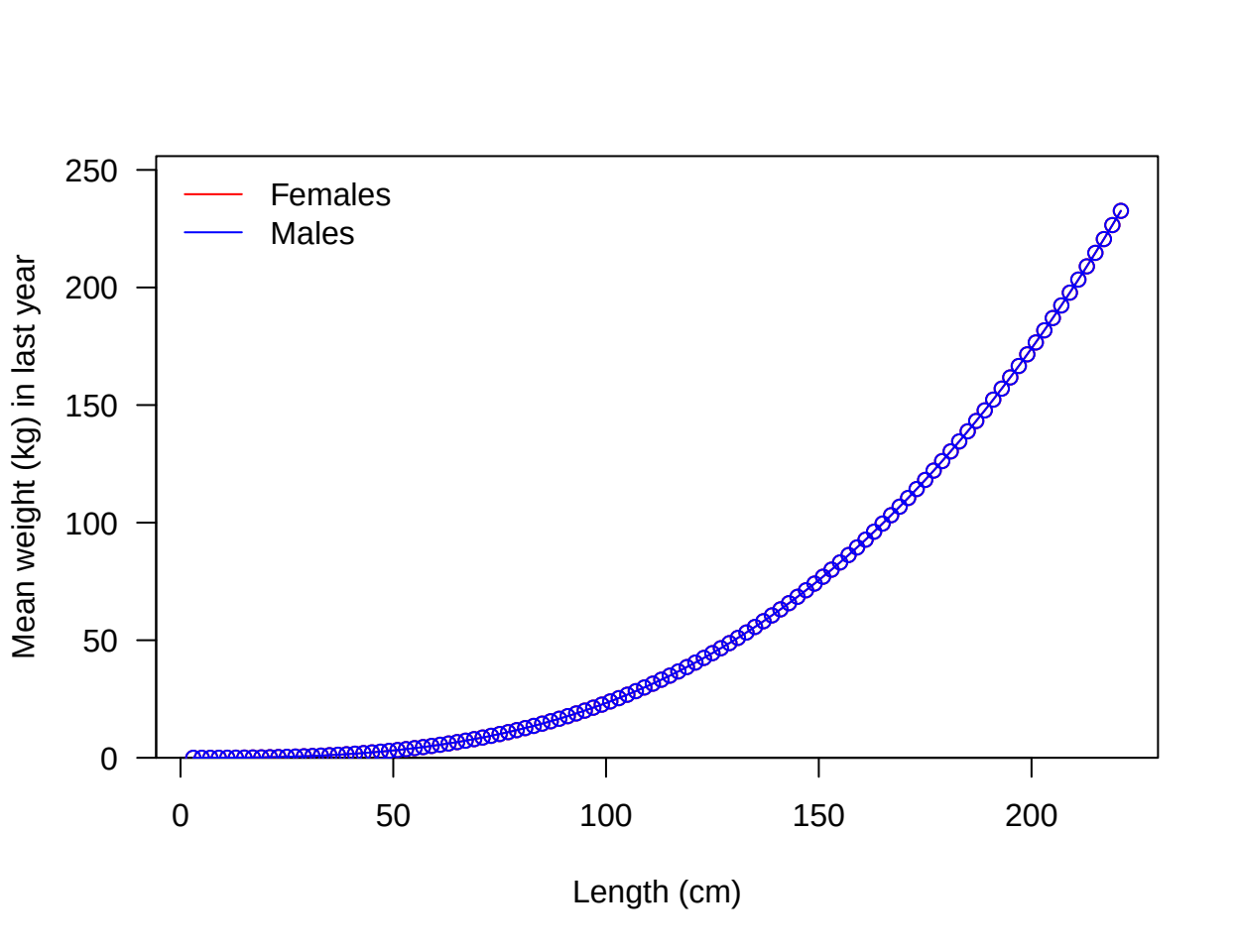

Age (yr)
Mean weight
Females
Males
Length (cm, beginning of the year)
Mean weight
Frac. mature
Age (yr)

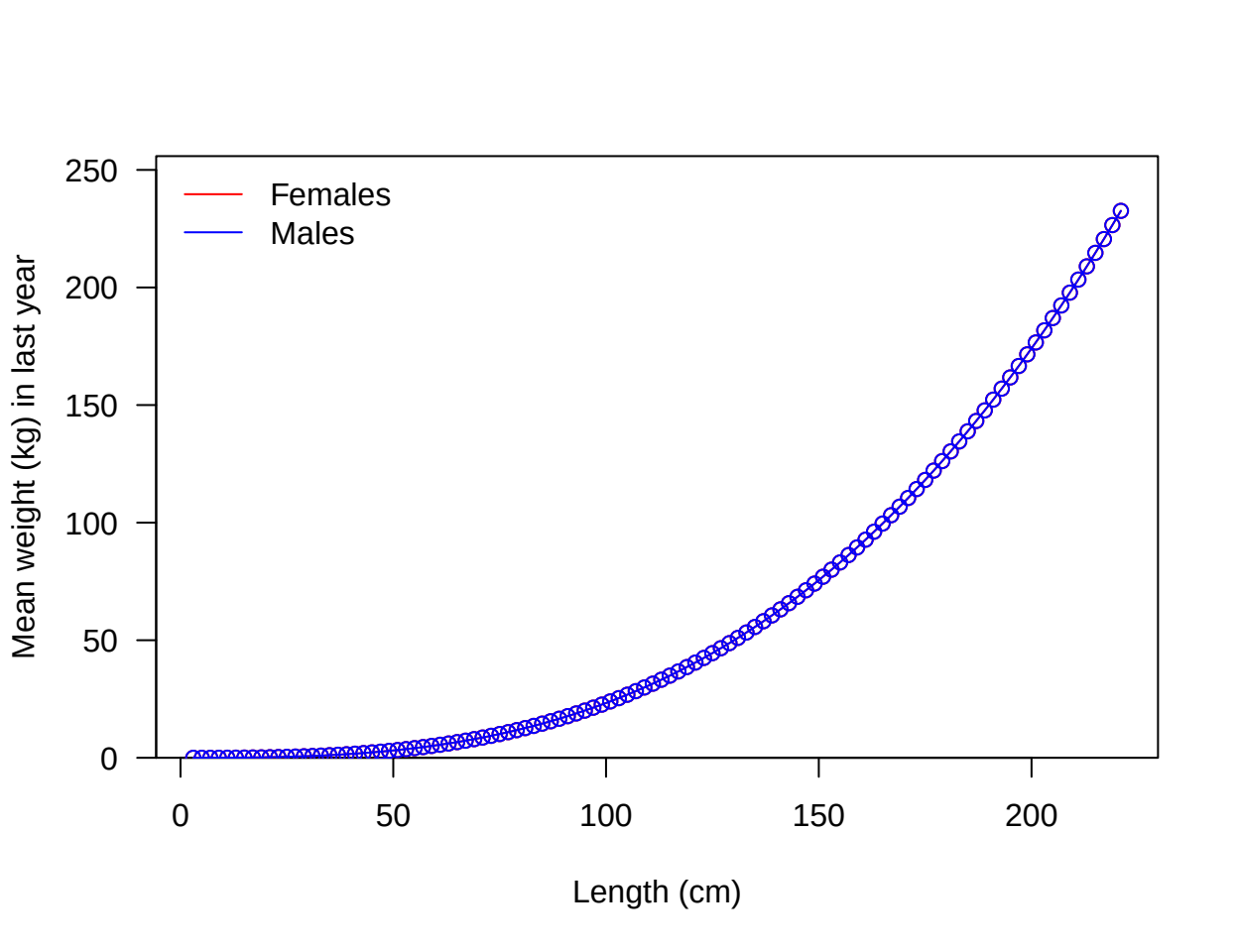

Length
200
150
100
50
0
0
10
20
30
40
Age

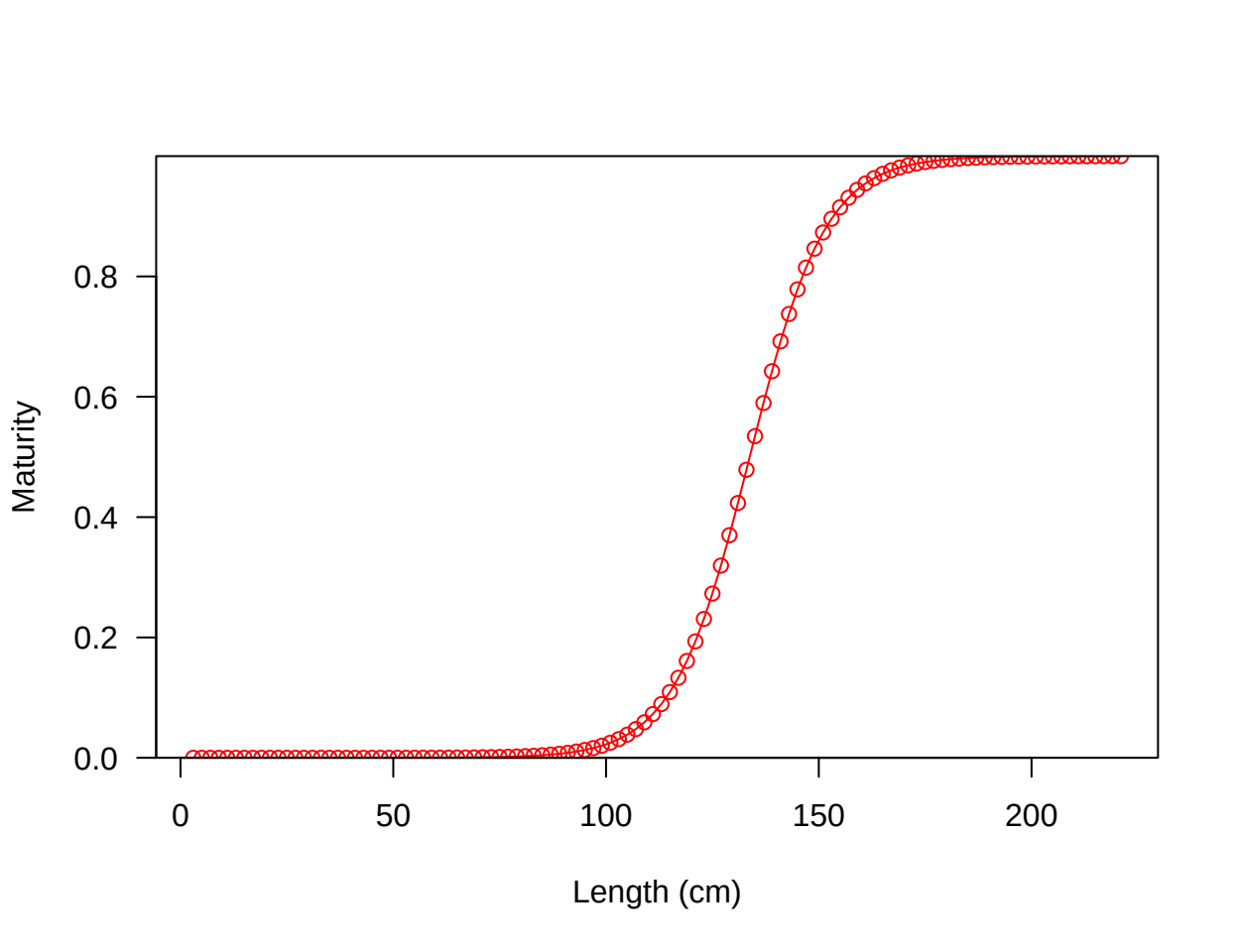

Length
200
150
100
50
0
0
10
20
30
40
Age

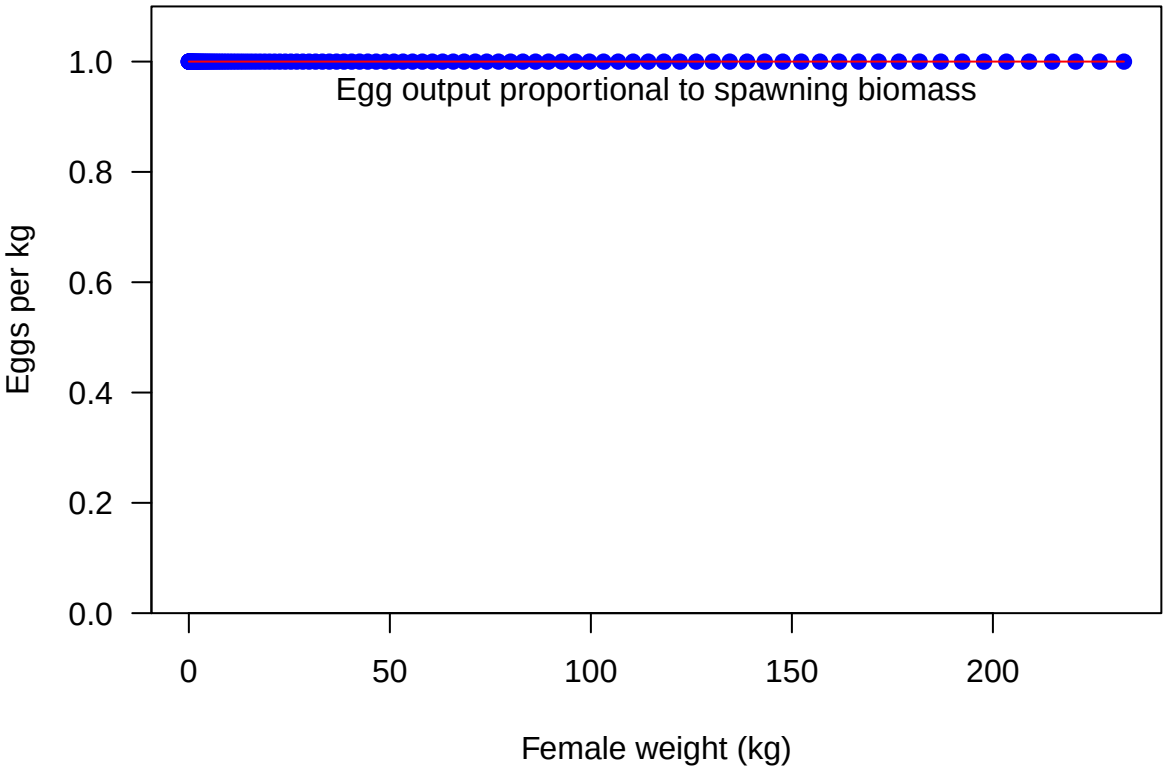

Length
0
50
100
150
200
0
10
20
30
40
Age

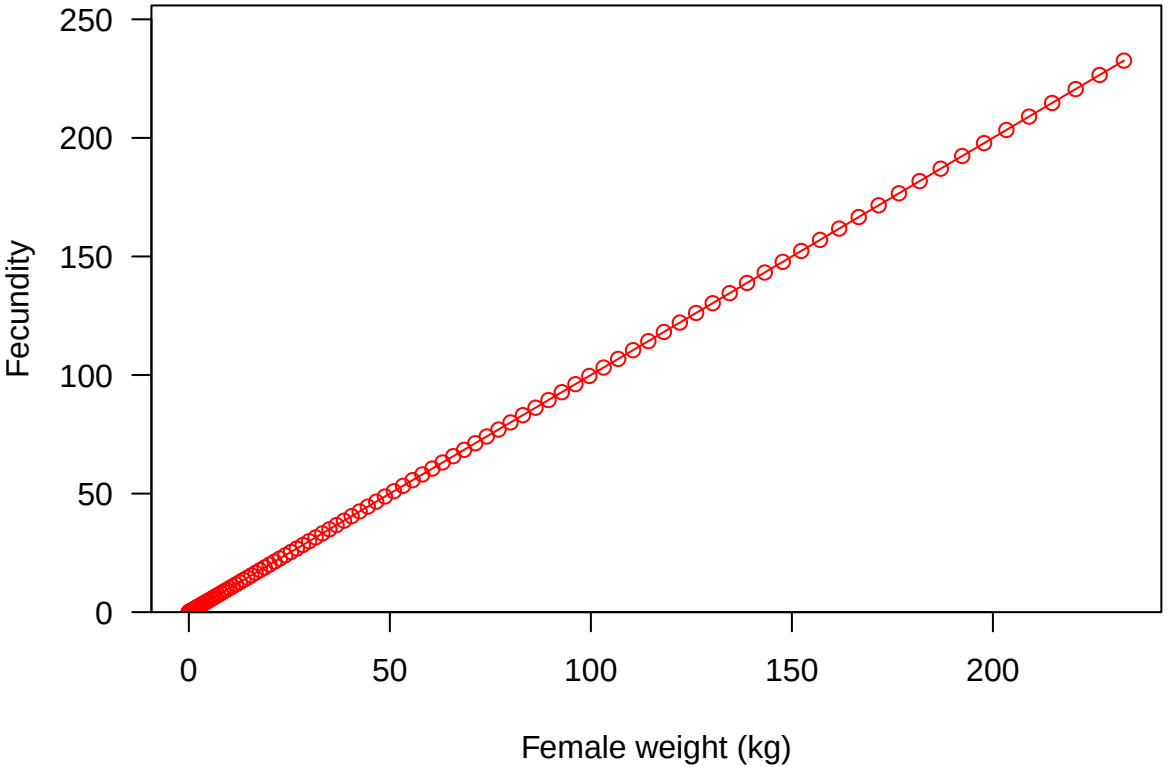

Length
0
50
100
150
200
0
10
20
30
40
Age

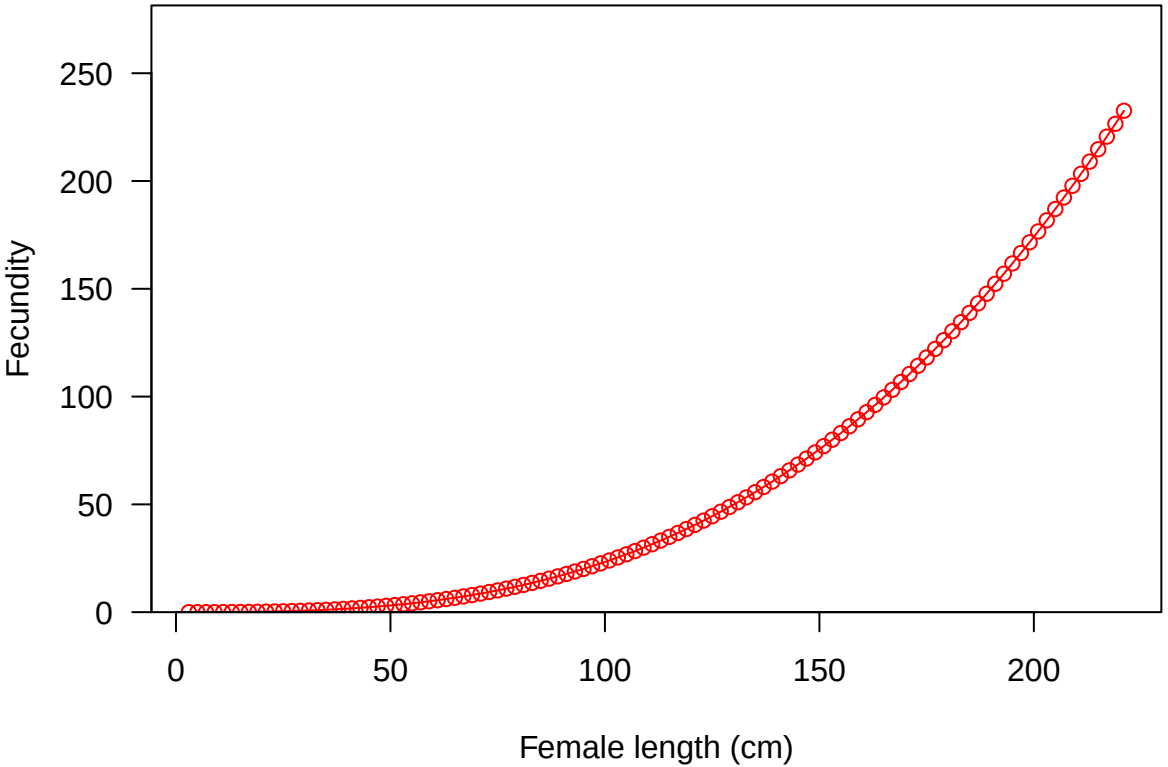

Females
Males
Mean weight (kg) in last year
Length (cm)
0
50
100
150
200
250
0
50
100
150
200

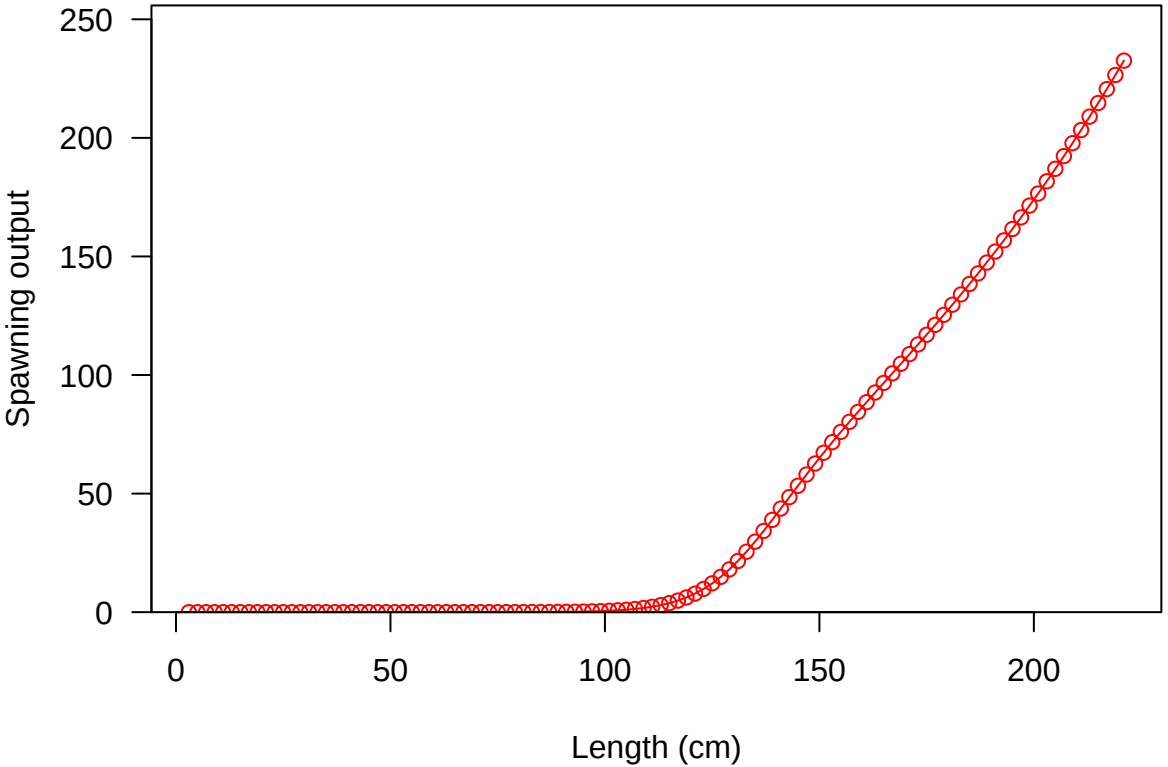

Females
Males
Mean weight (kg) in last year
Length (cm)
0
50
100
150
200
250
0
50
100
150
200

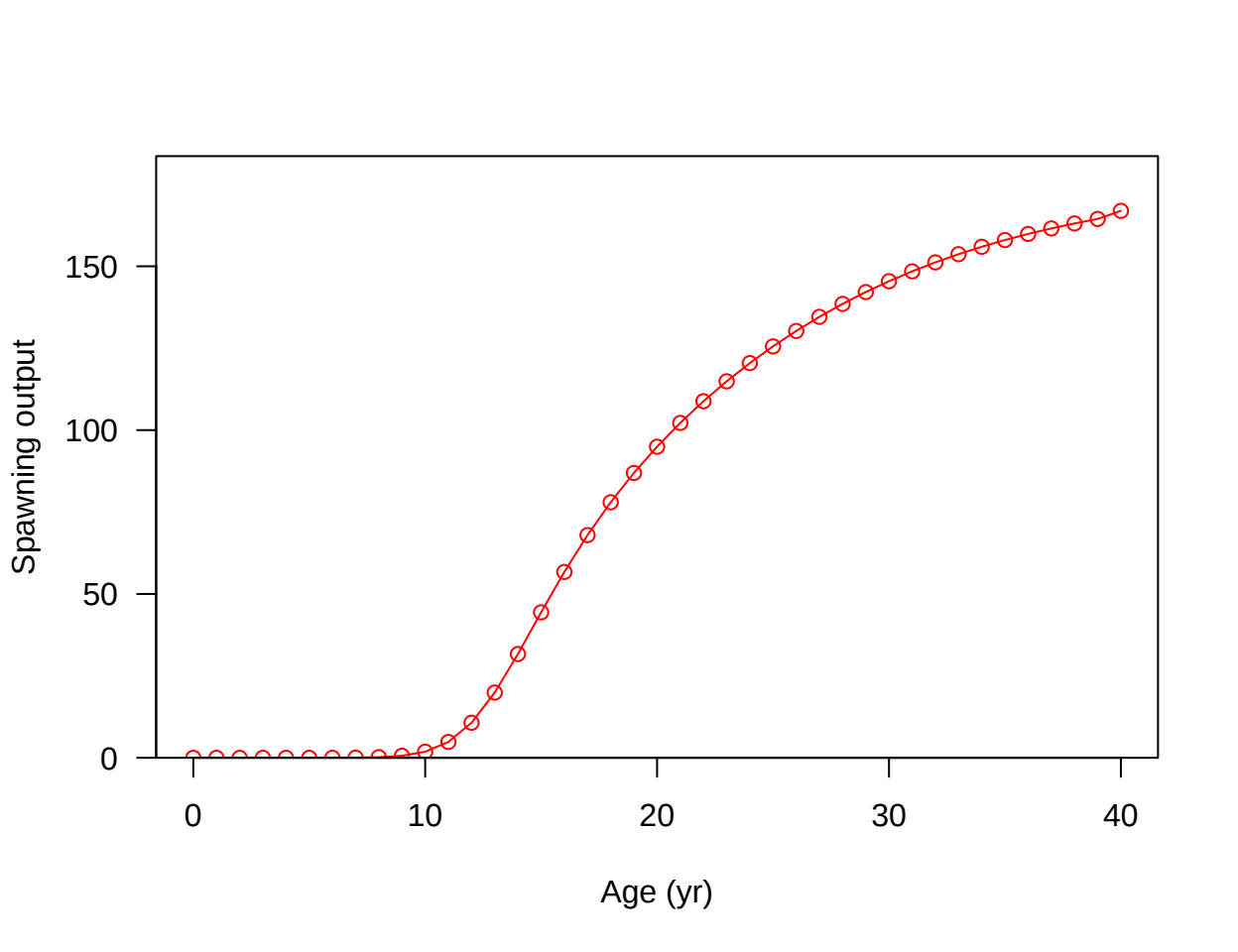

Maturity
0.0
0.2
0.4
0.6
0.8
0
50
100
150
200
Length (cm)

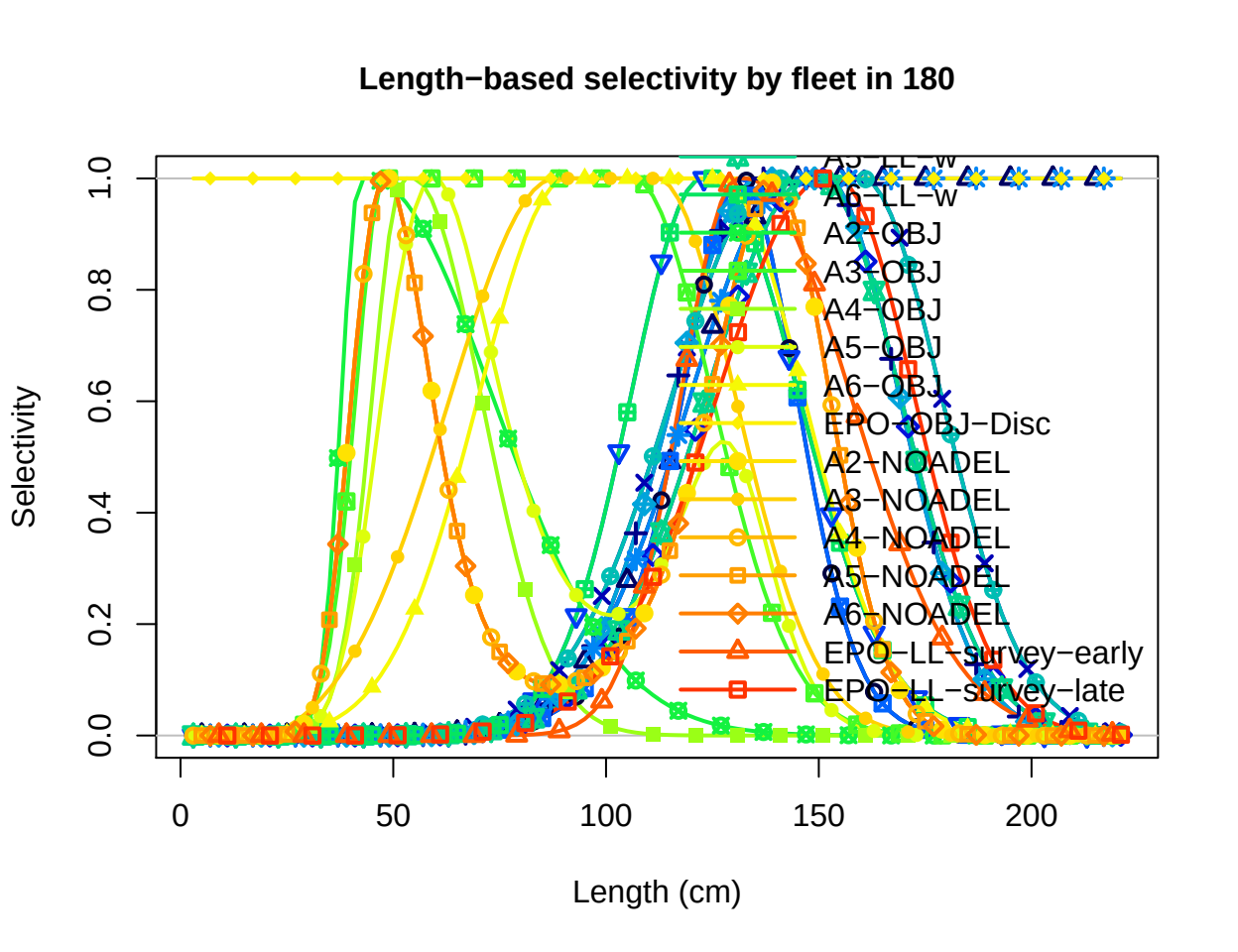

Egg output proportional to spawning biomass
Eggs per kg
1.0
0.8
0.6
0.4
0.2
0.0
0
50
100
150
200
Female weight (kg)

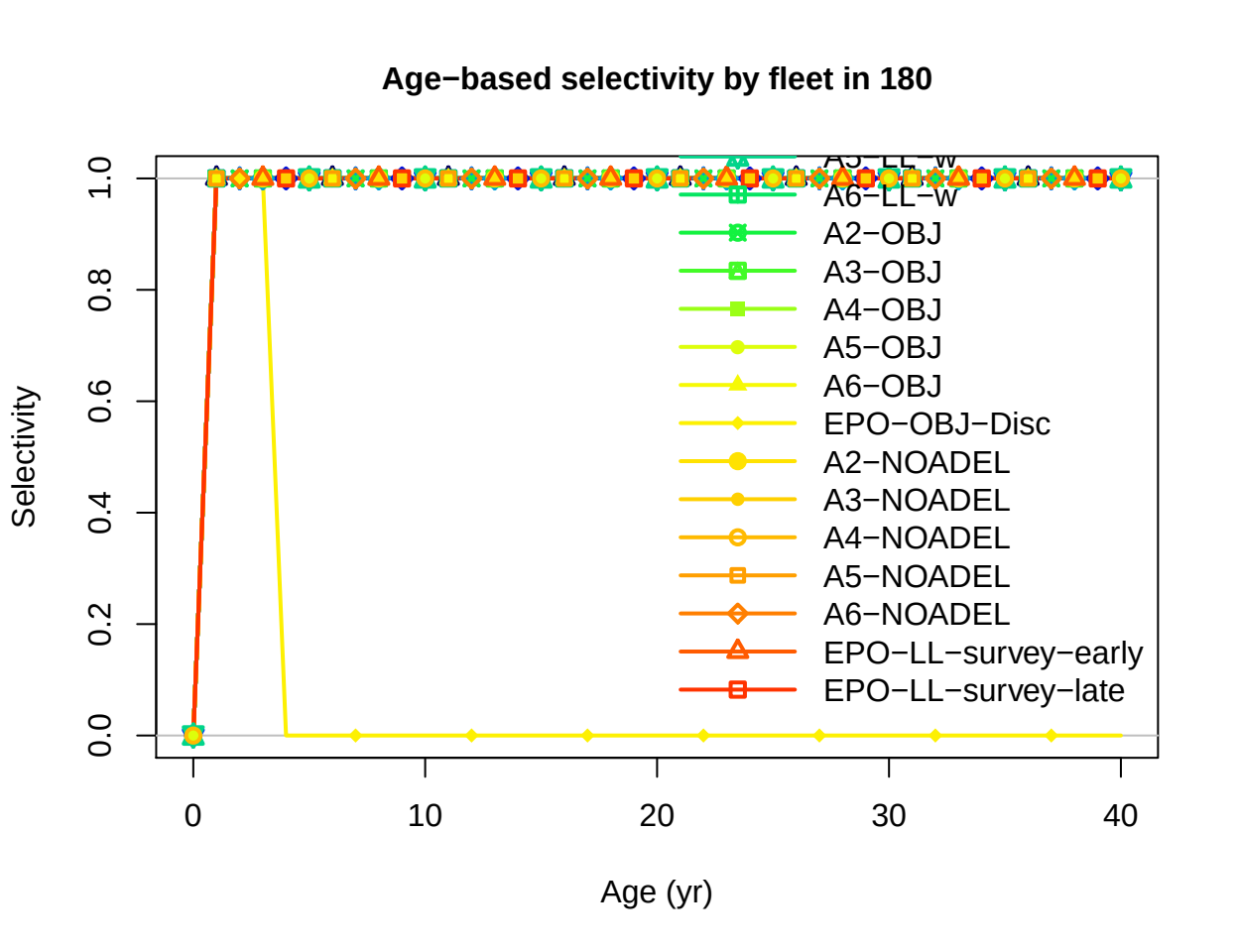

250
200
150
100
50
0
Fecundity
0
50
100
150
200
Female weight (kg)

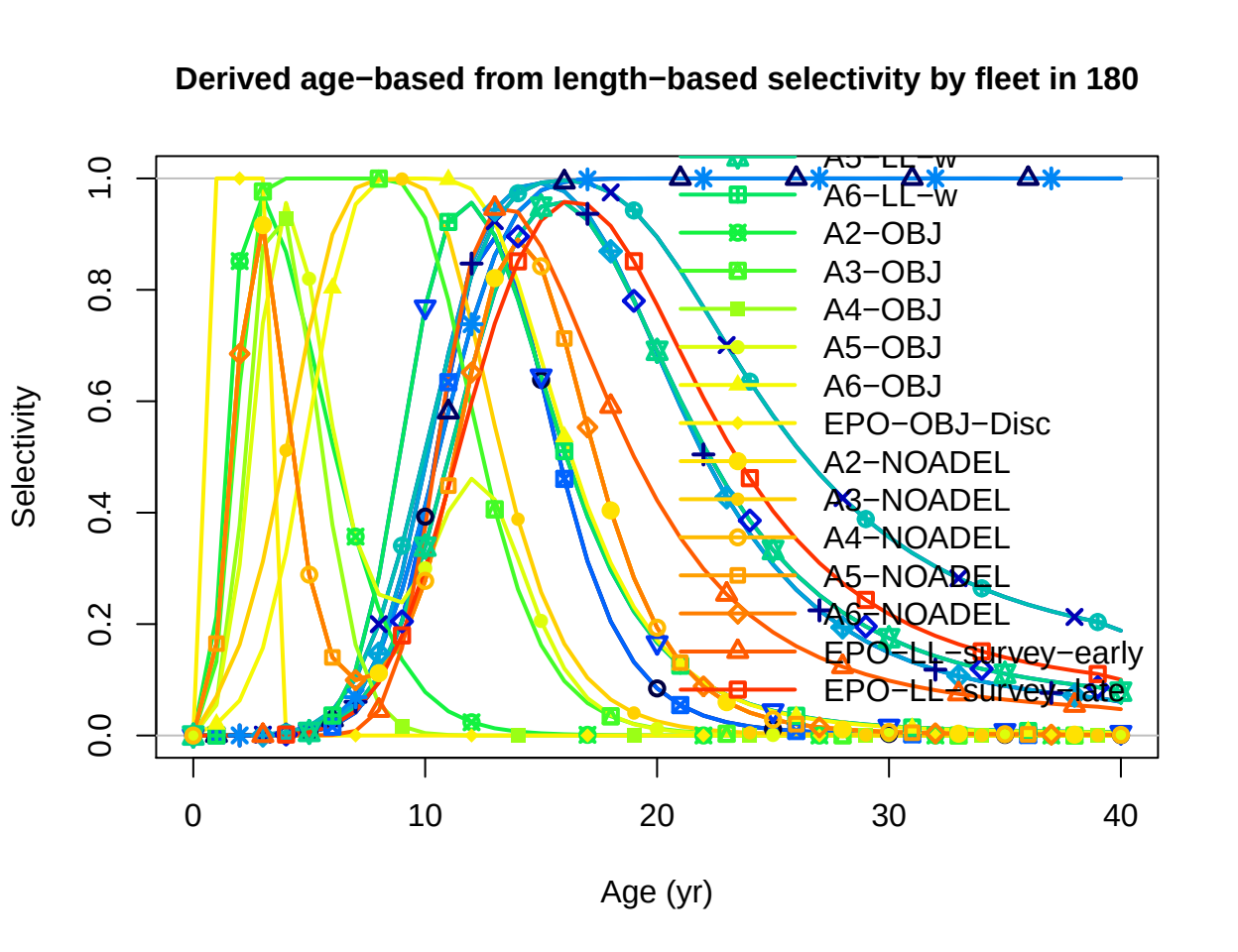

Fecundity
0
50
100
150
200
250
0
50
100
150
200
Female length (cm)

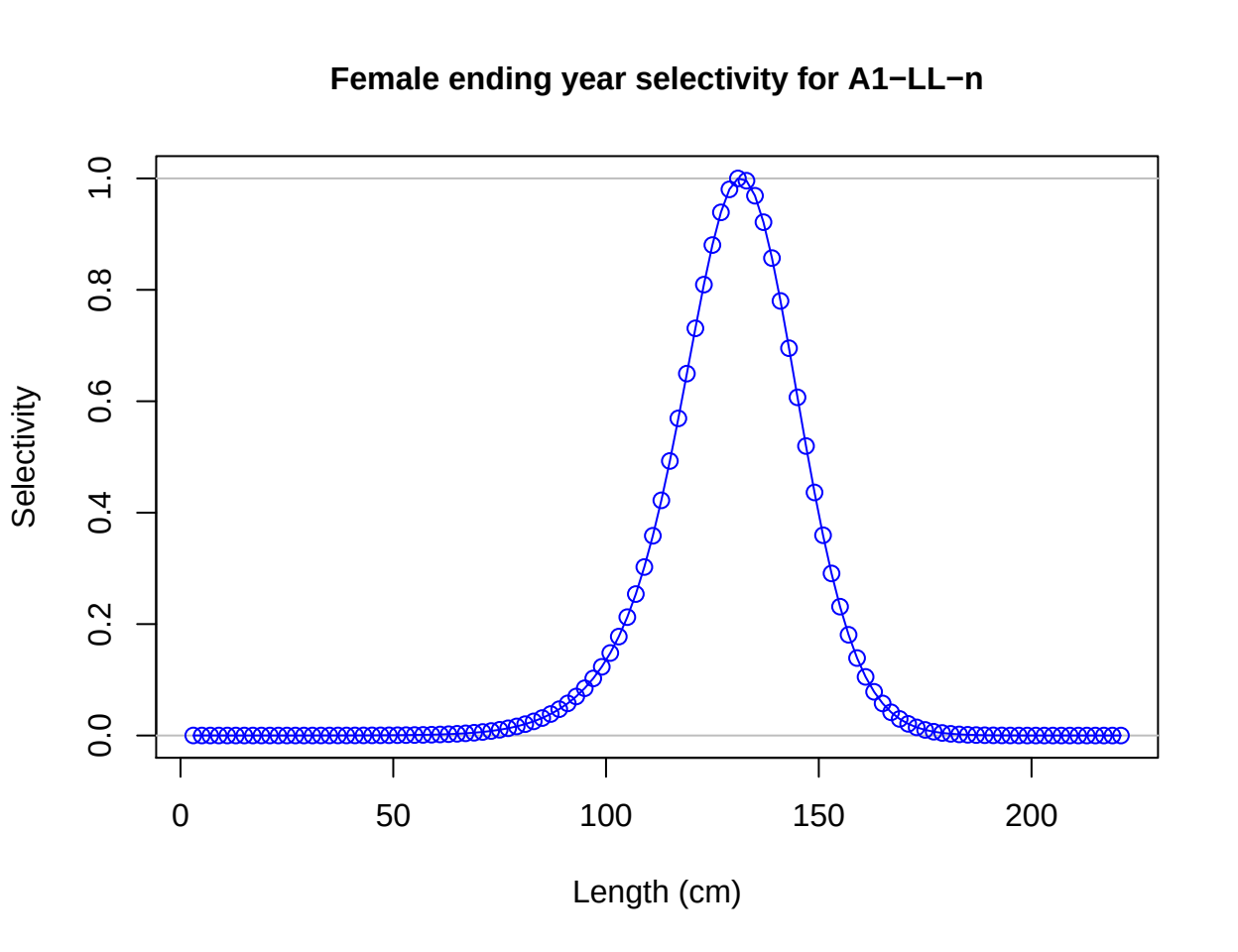

Spawning output
250
200
150
100
50
0
0
50
100
150
200
Length (cm)

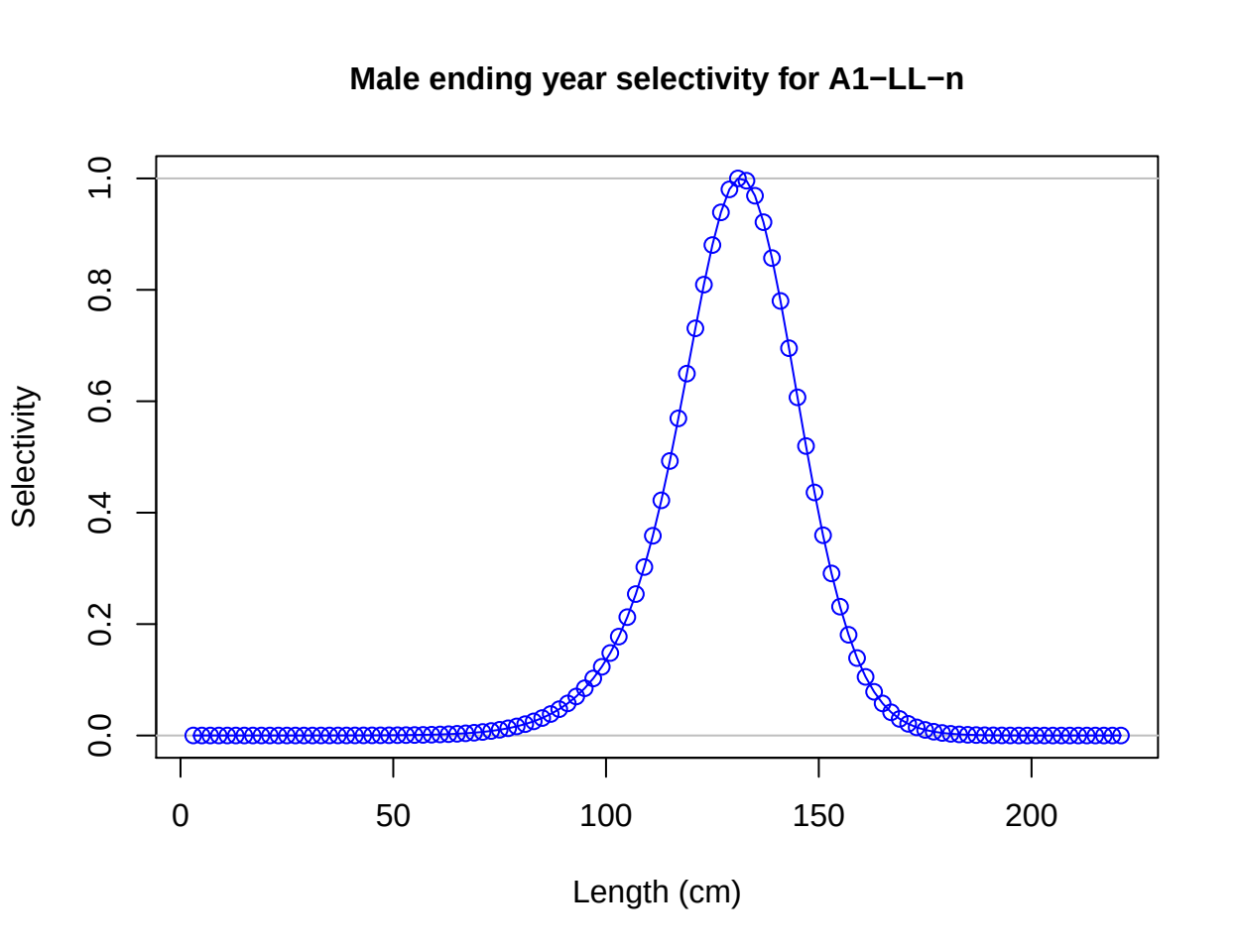

Spawning output
0
50
100
150
0
10
20
30
40
Age (yr)


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)
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−early
EPO−LL−survey−late

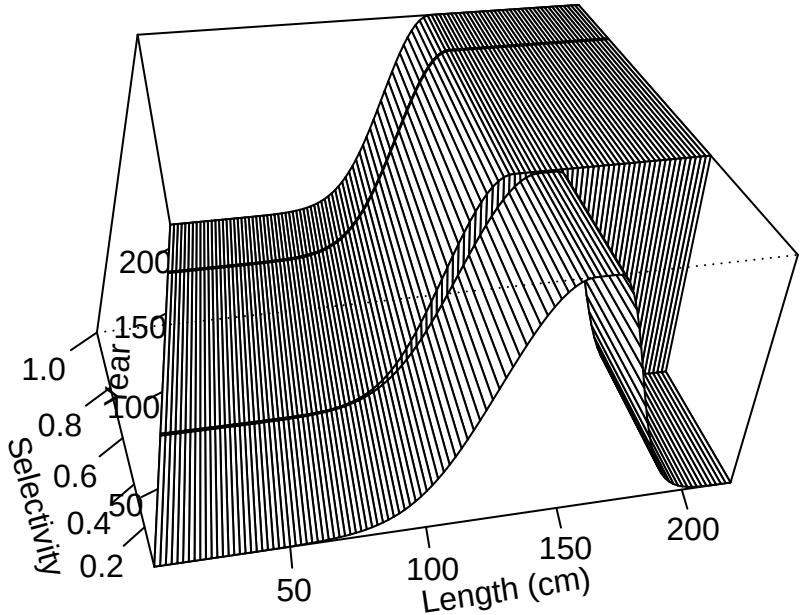

Age−based selectivity by fleet in 180
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
A3−NOADEL
A4−NOADEL
A5−NOADEL
A6−NOADEL
EPO−LL−survey−early
EPO−LL−survey−late

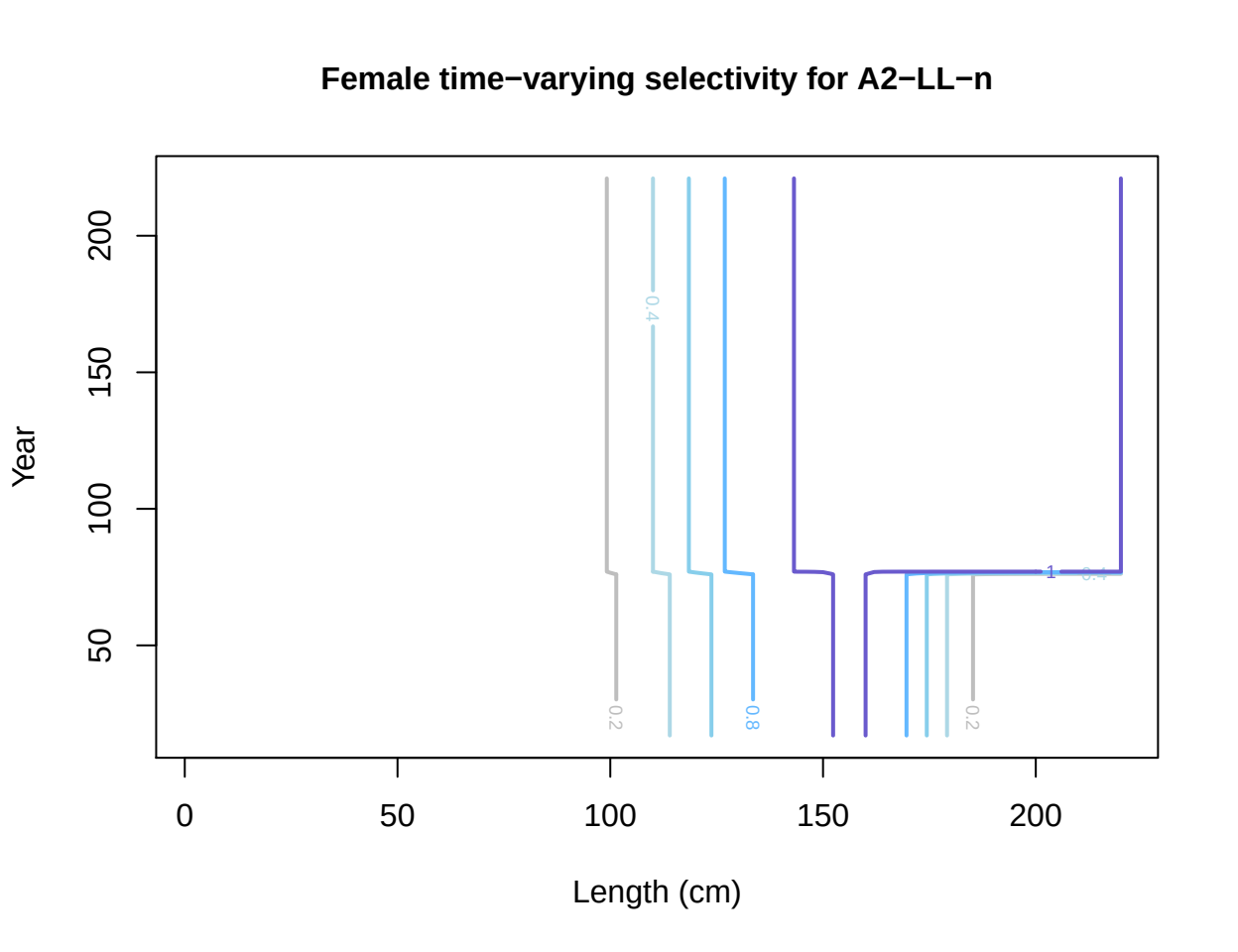

Derived age−based from length−based selectivity by fleet in 180
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
A3−NOADEL
A4−NOADEL
A5−NOADEL
A6−NOADEL
EPO−LL−survey−early
EPO−LL−survey−late

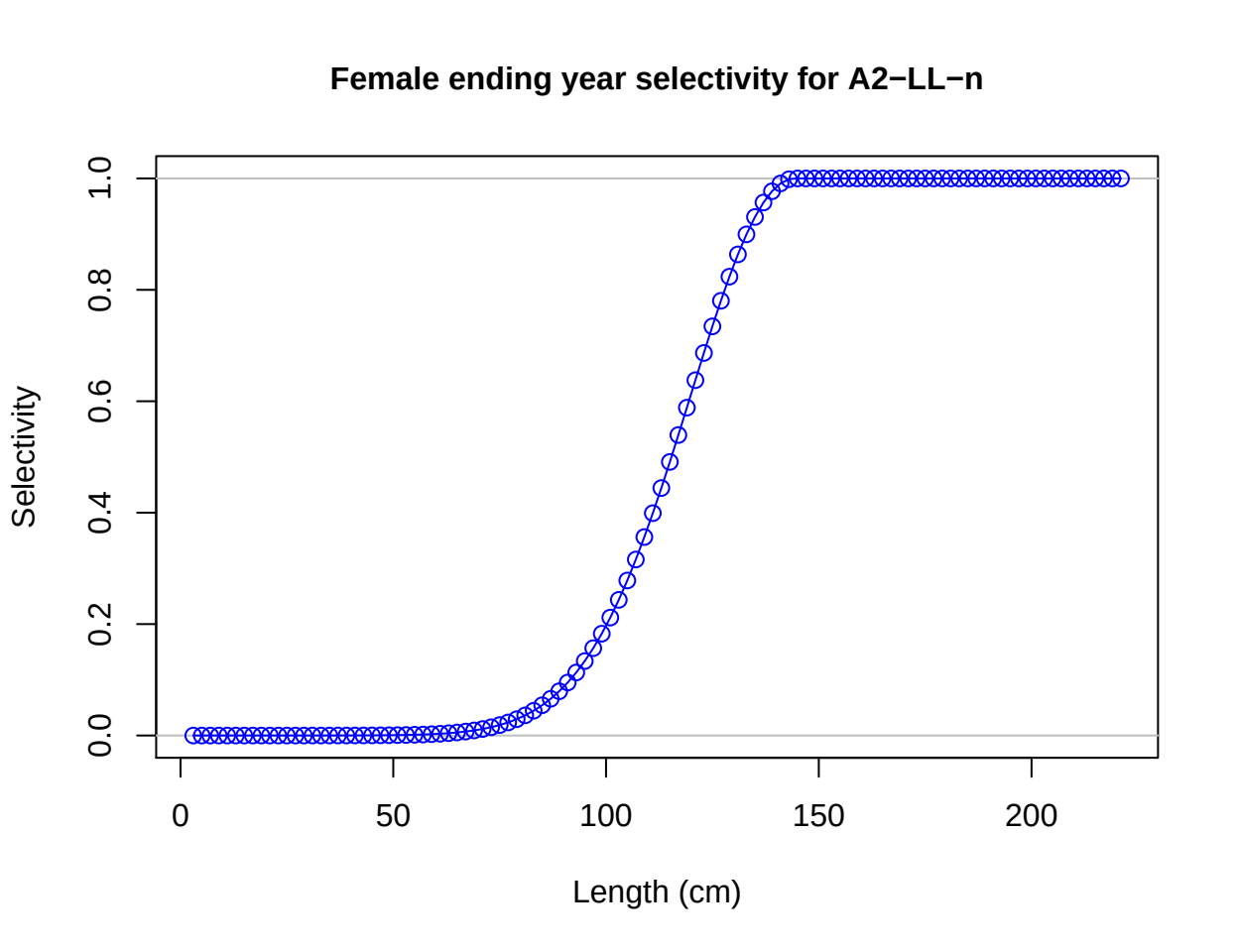

Female ending year selectivity for A1−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)


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)

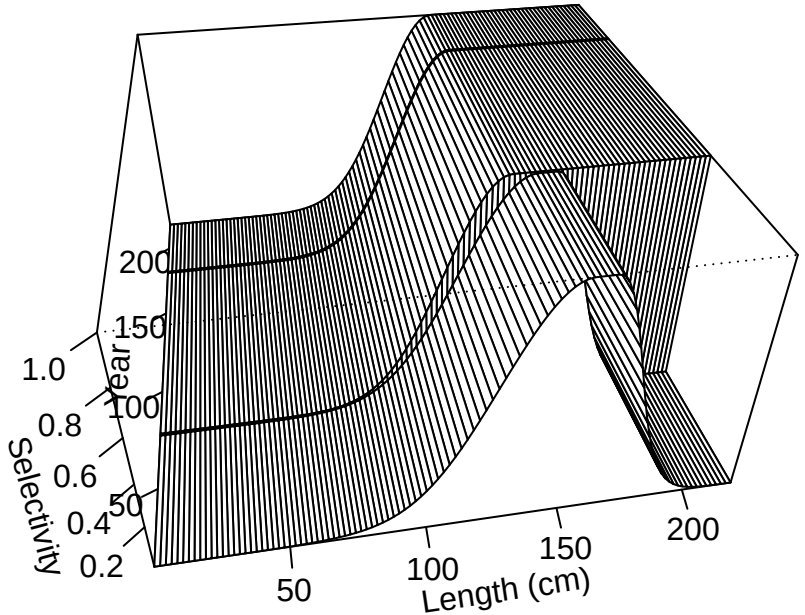
Female time−varying selectivity for A2−LL−n

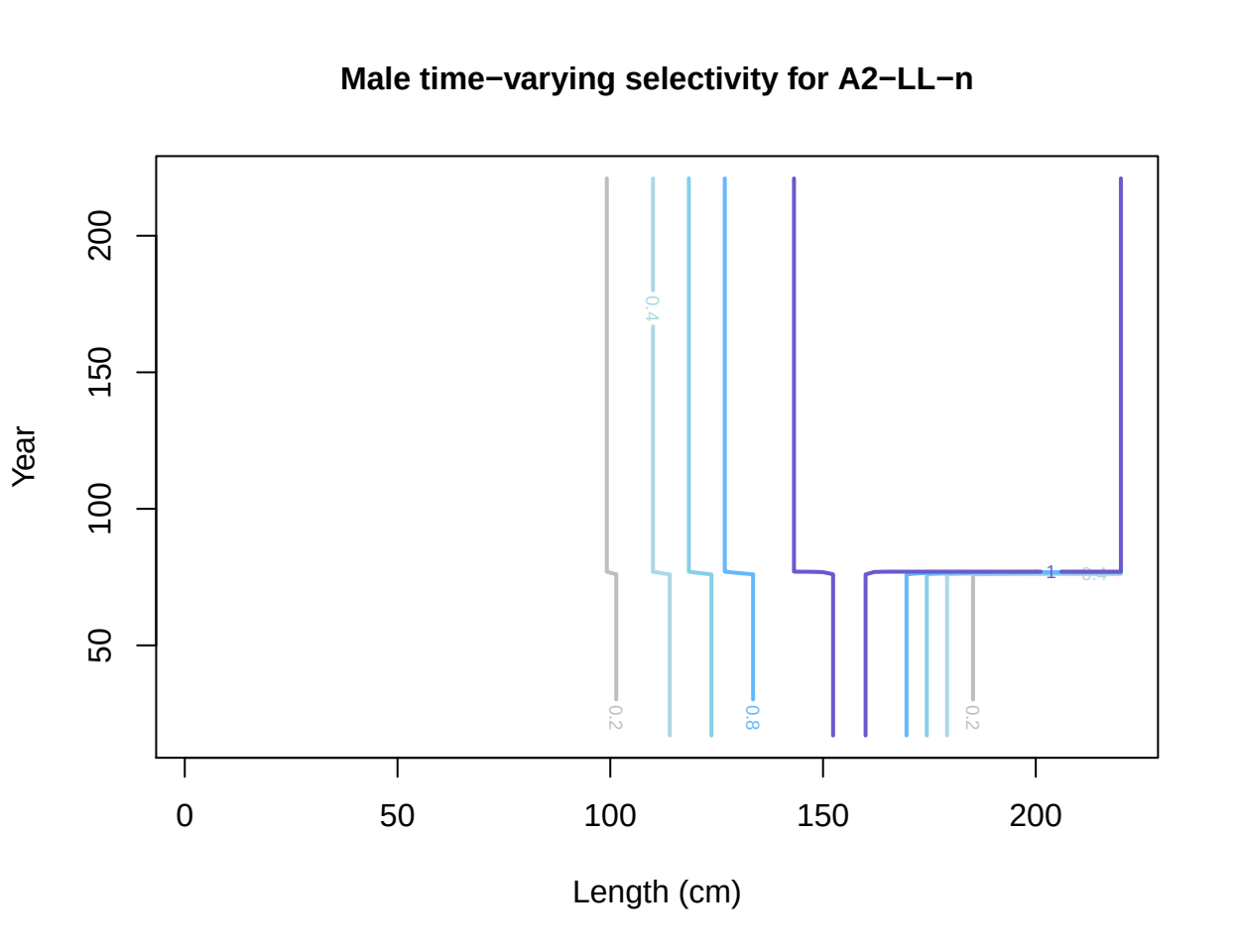


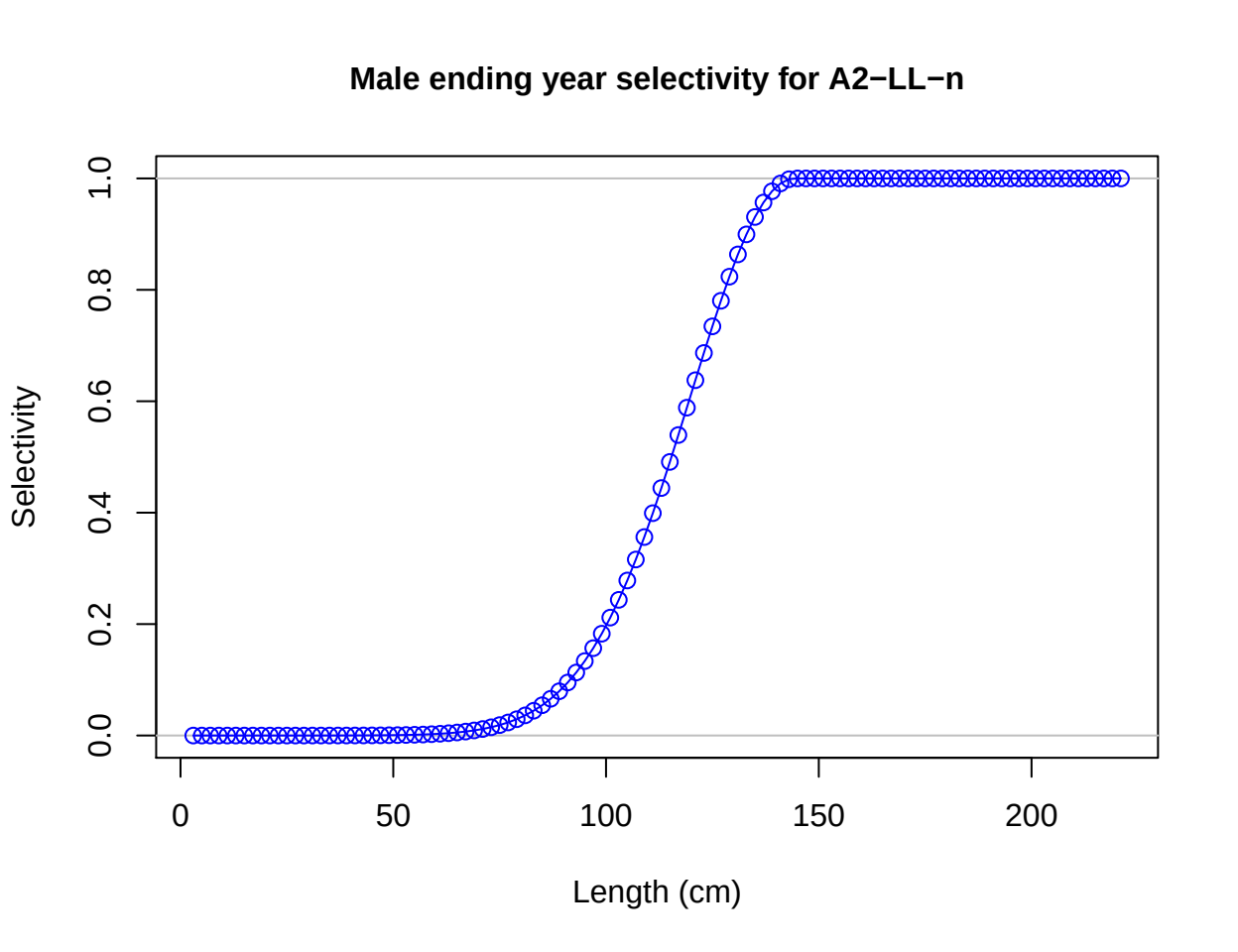

Female time−varying selectivity for A2−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
0.8
1
0.4
0.2


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)

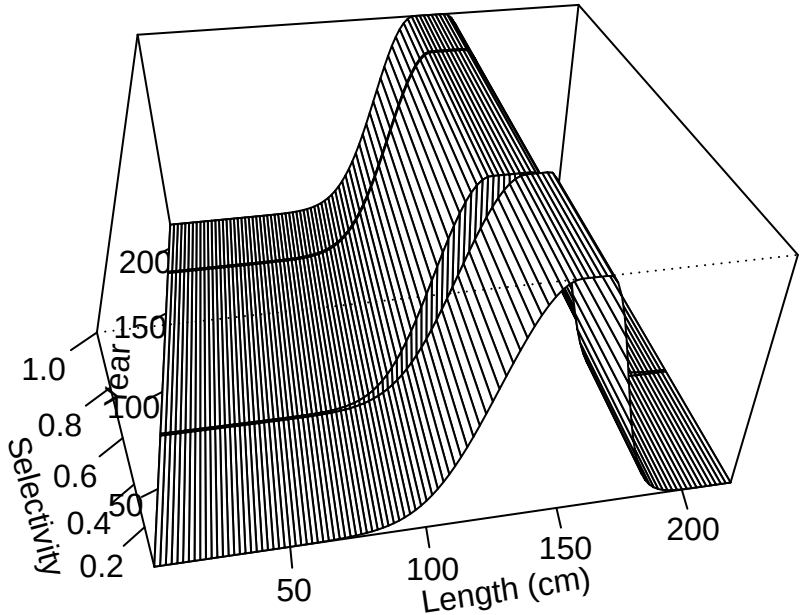
Male time−varying selectivity for A2−LL−n

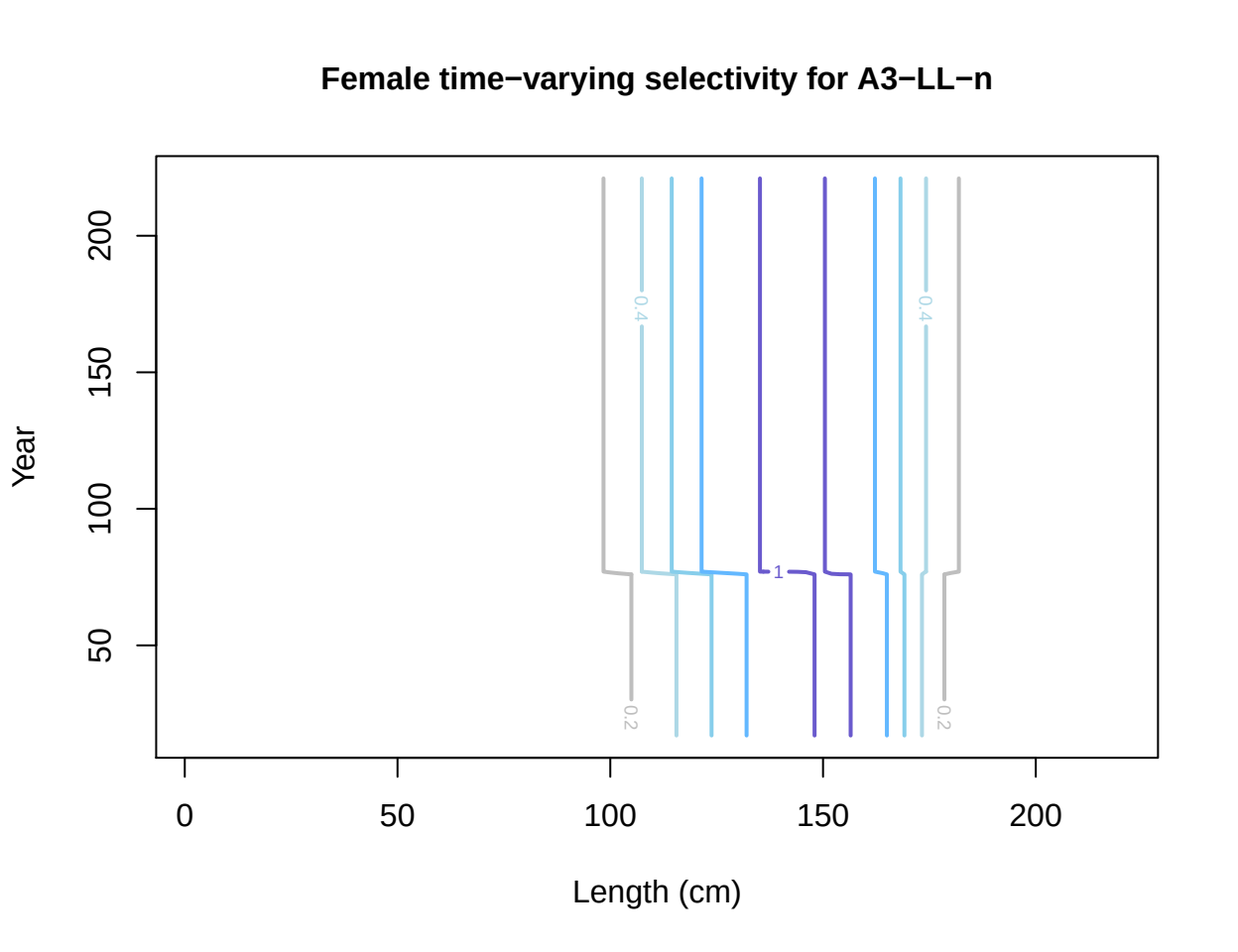


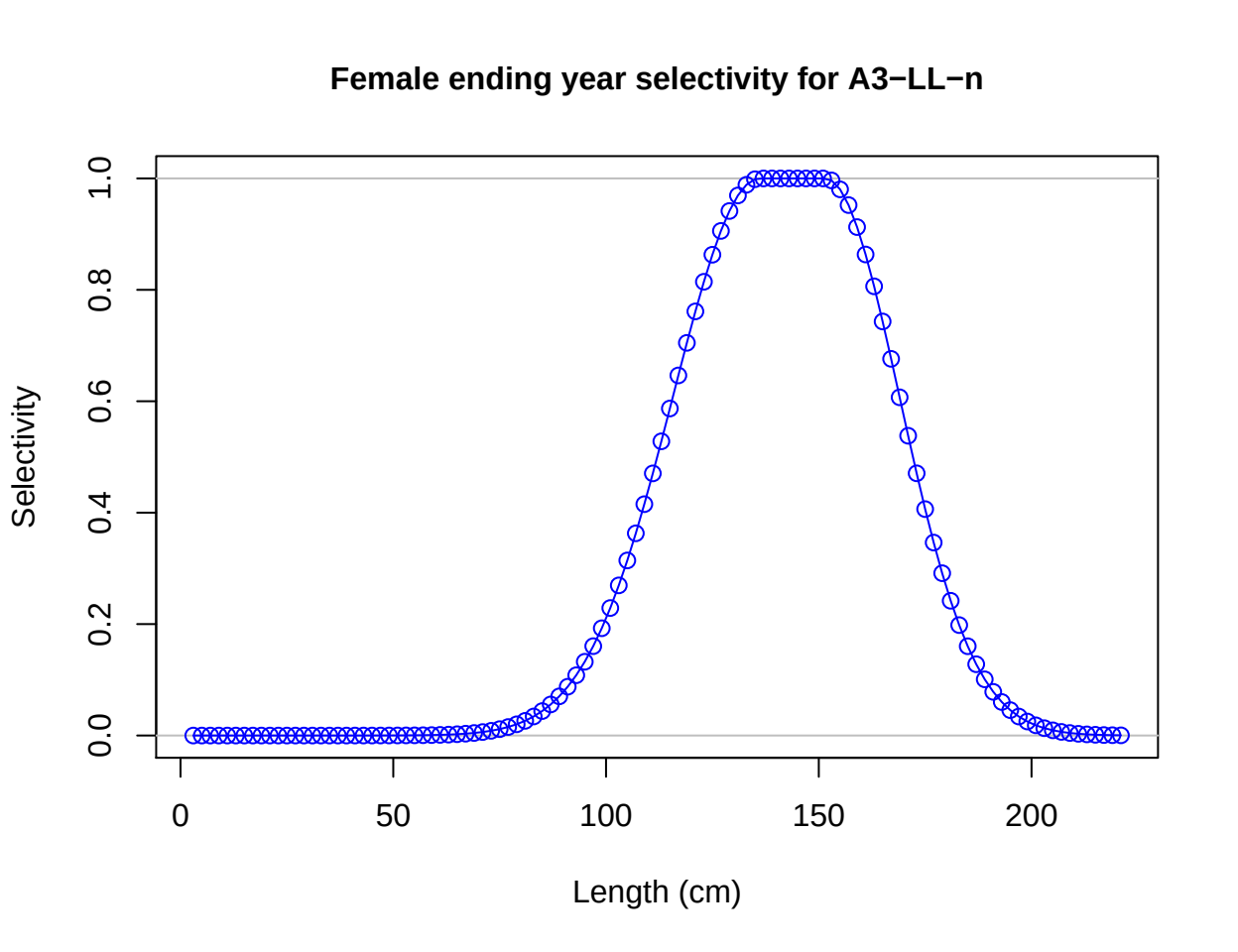

Male time−varying selectivity for A2−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
0.8
1
0.4
0.2


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)

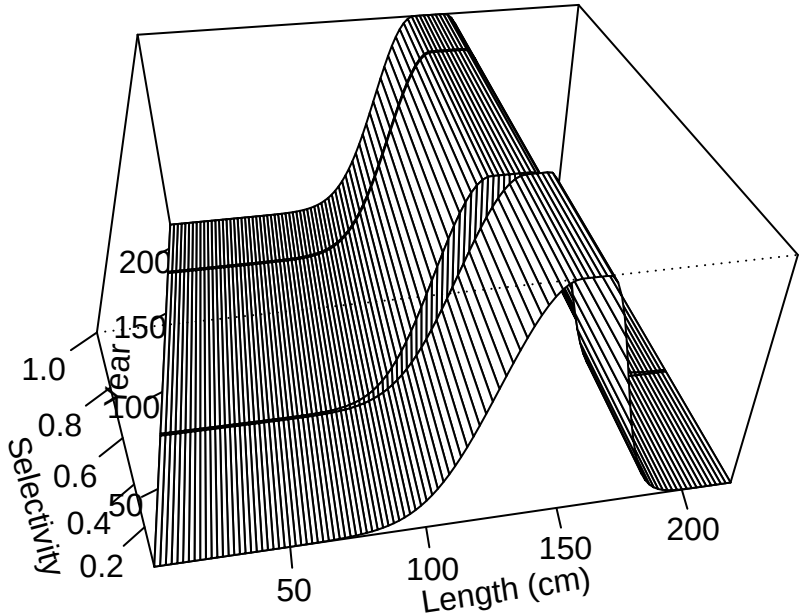
Female time−varying selectivity for A3−LL−n

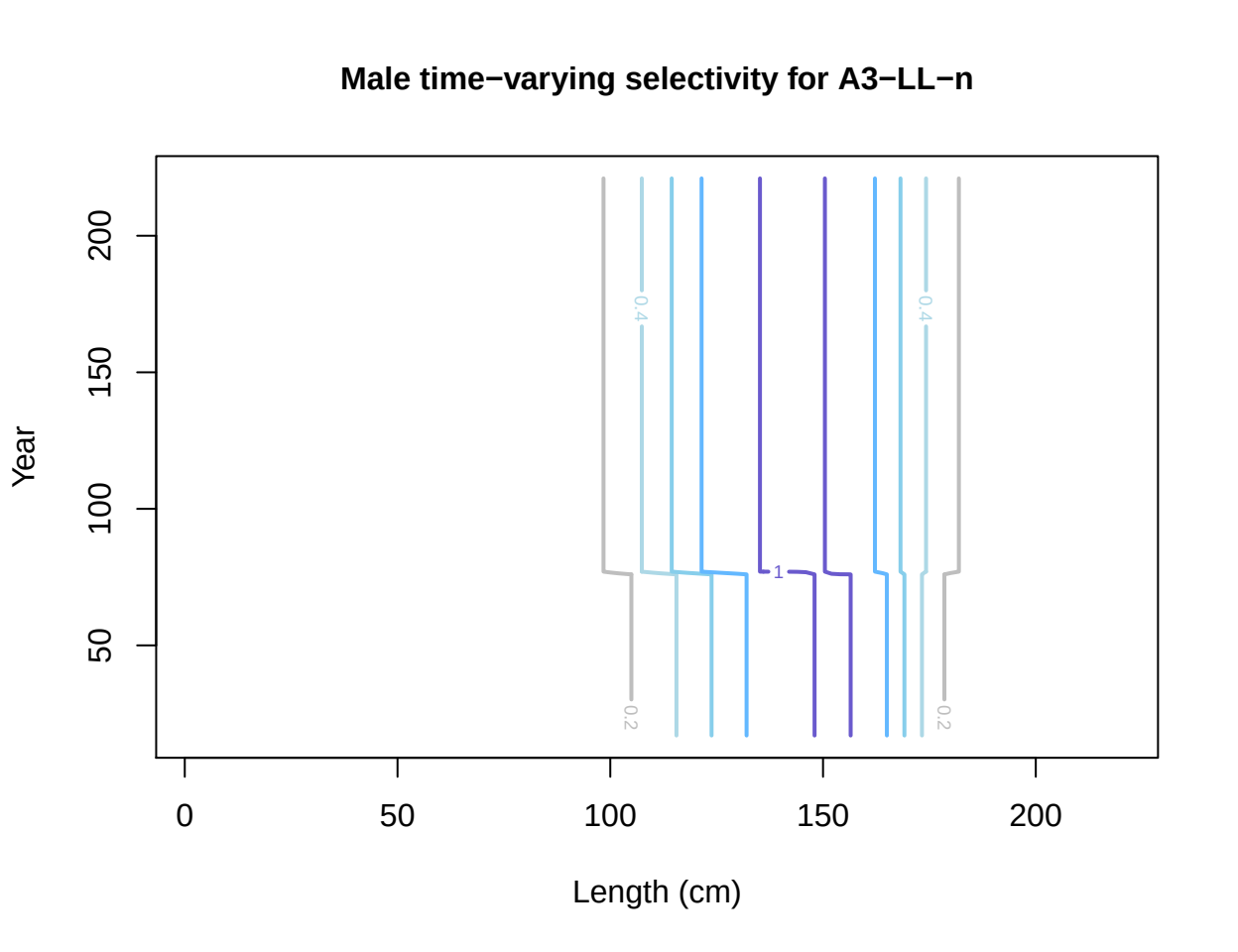


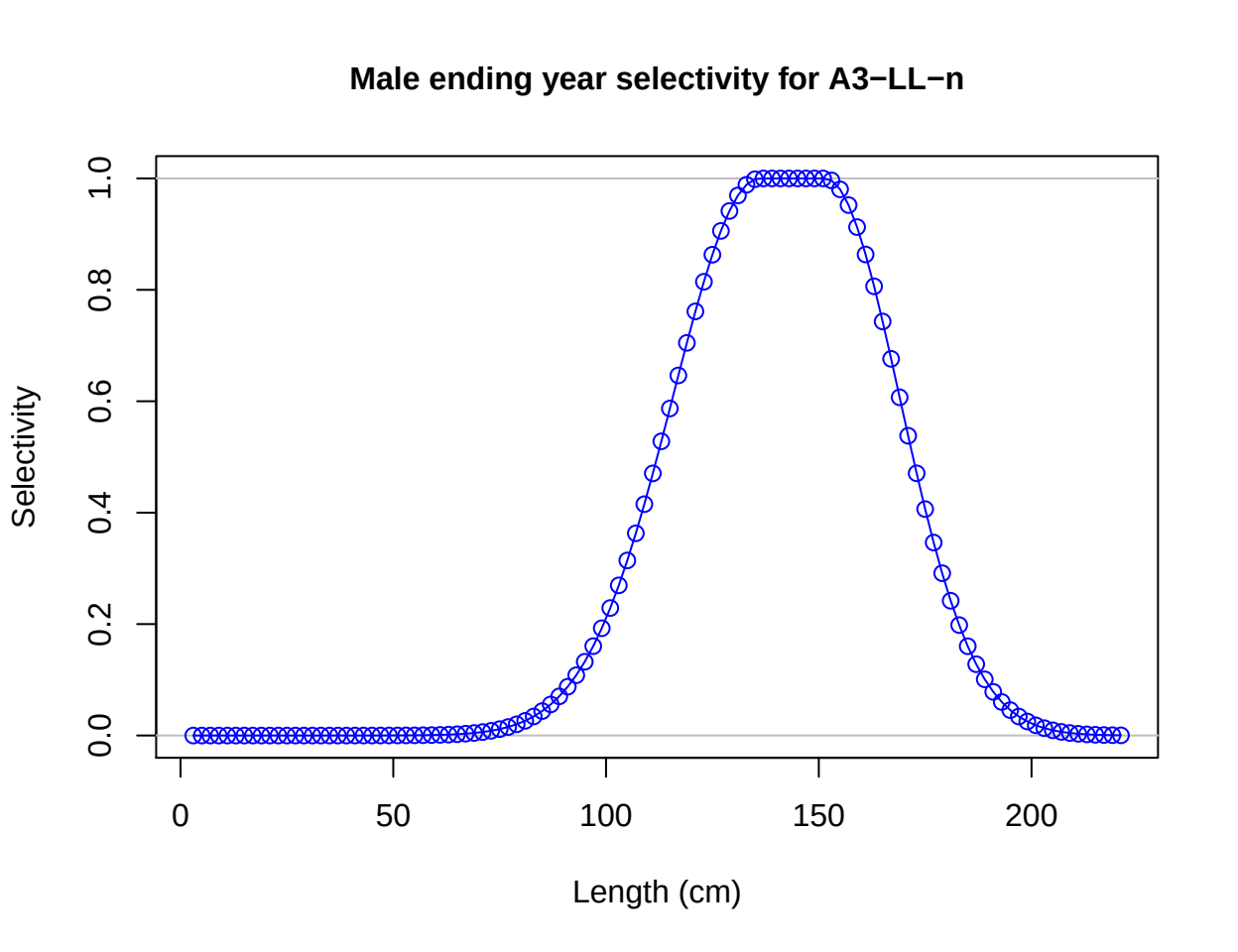

Female time−varying selectivity for A3−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
1
0.2
0.2


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)

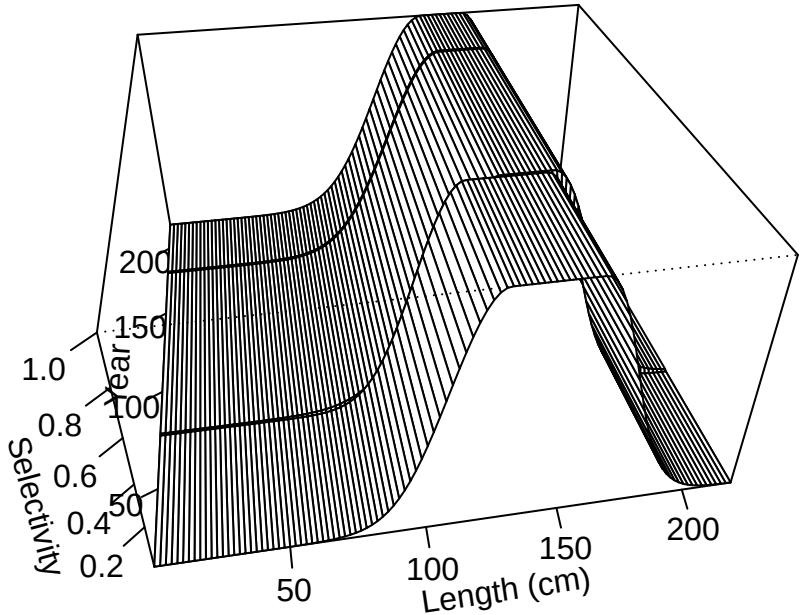
Male time−varying selectivity for A3−LL−n

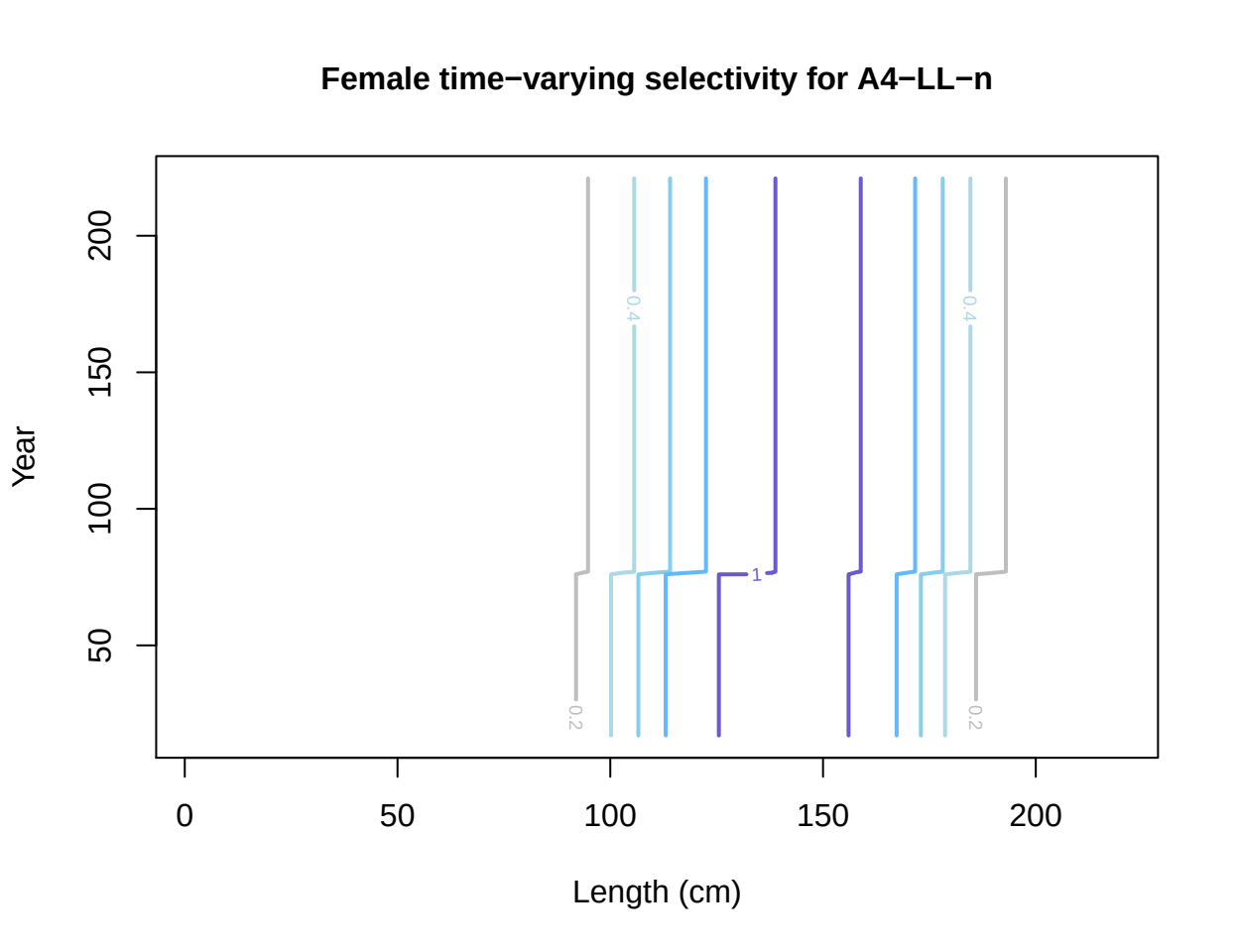


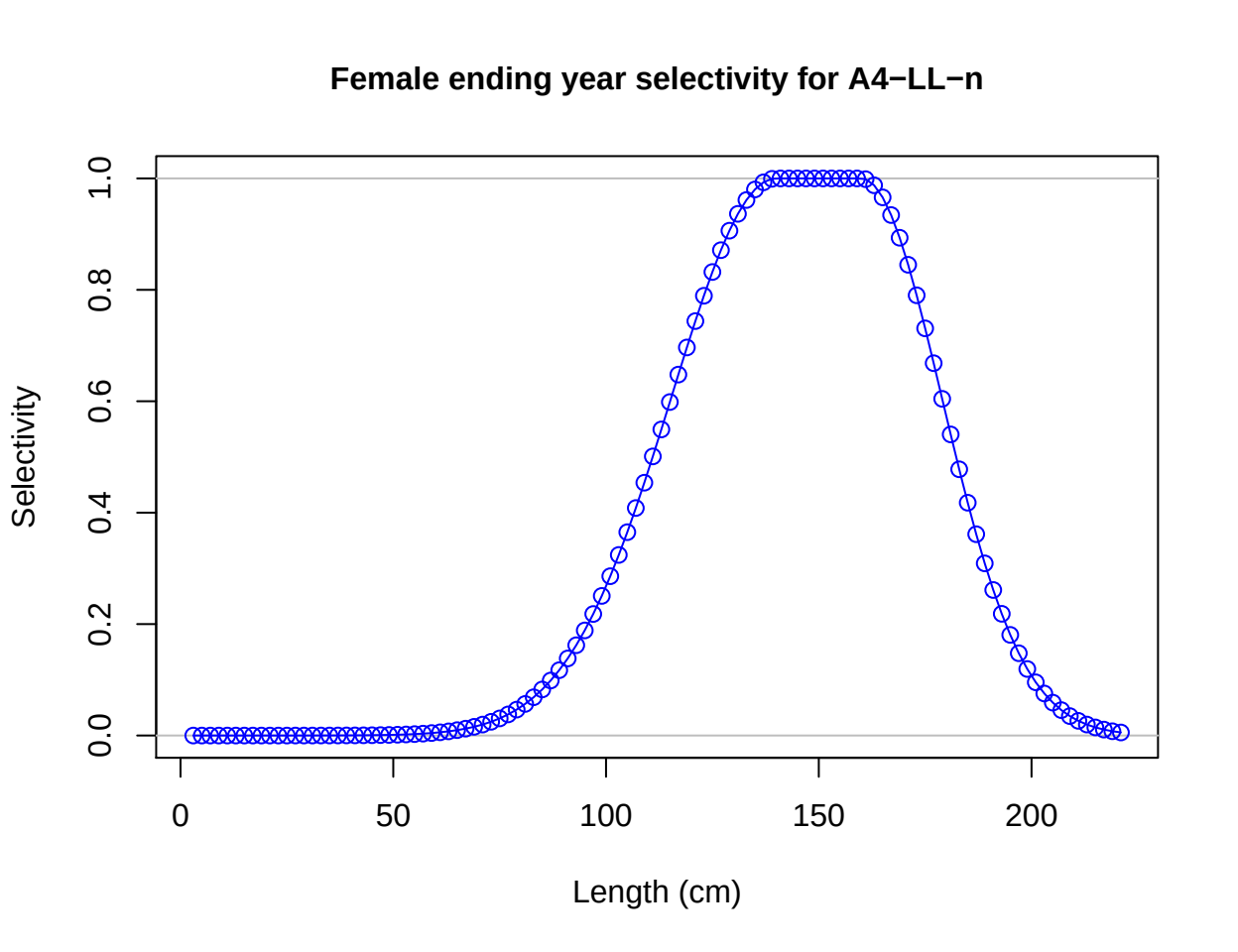

Male time−varying selectivity for A3−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
1
0.2
0.2

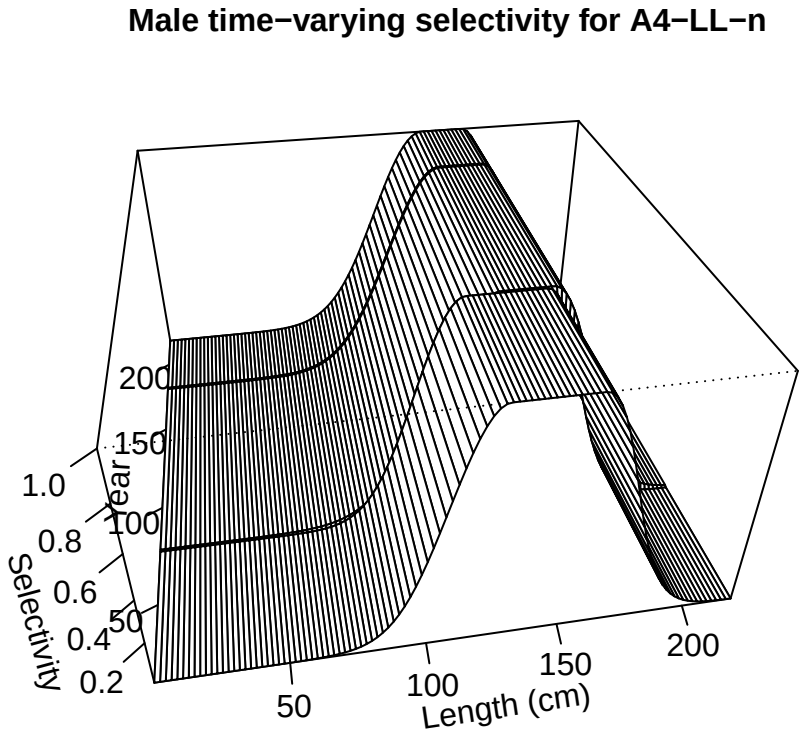

Male ending year selectivity for A3−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

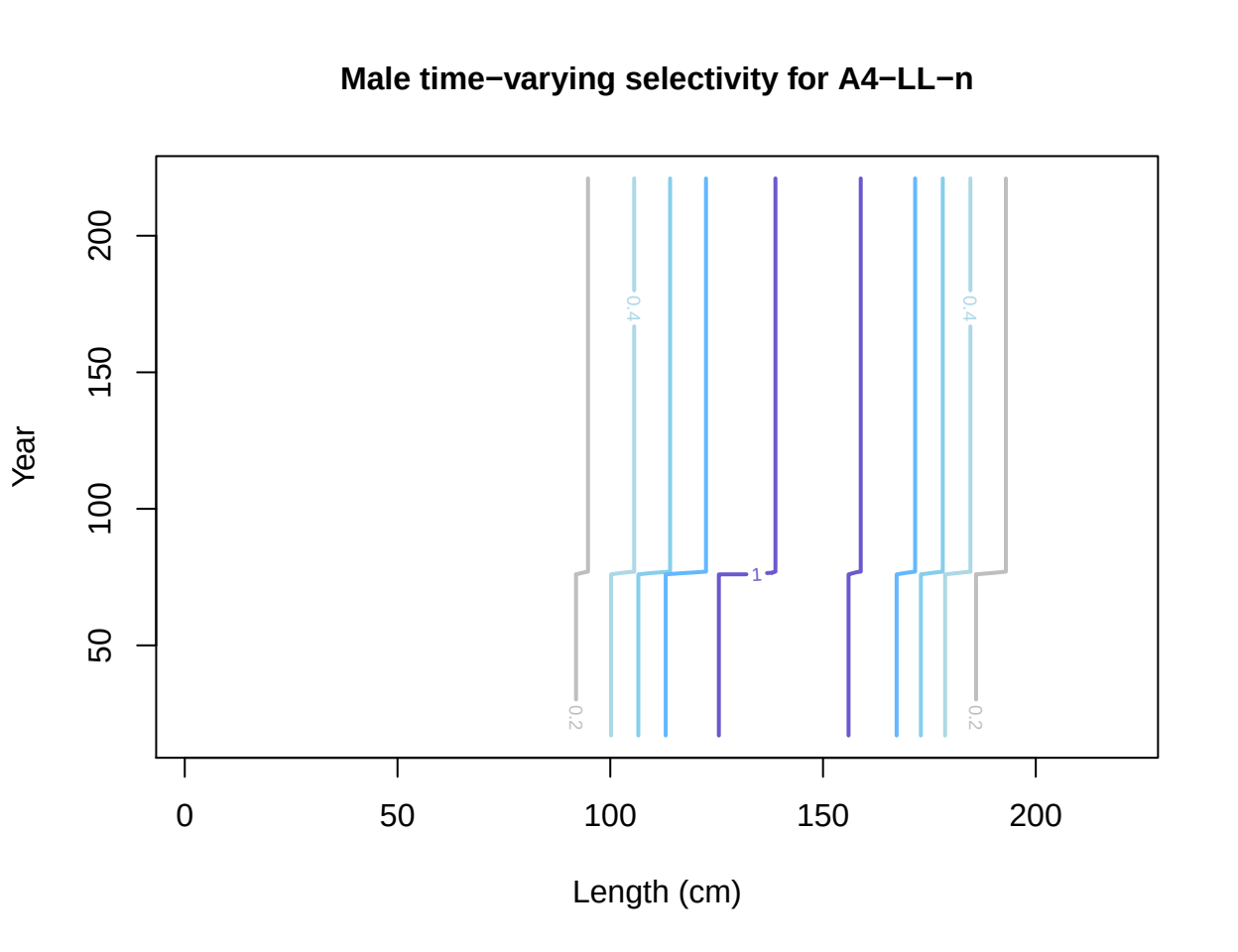
Female time−varying selectivity for A4−LL−n

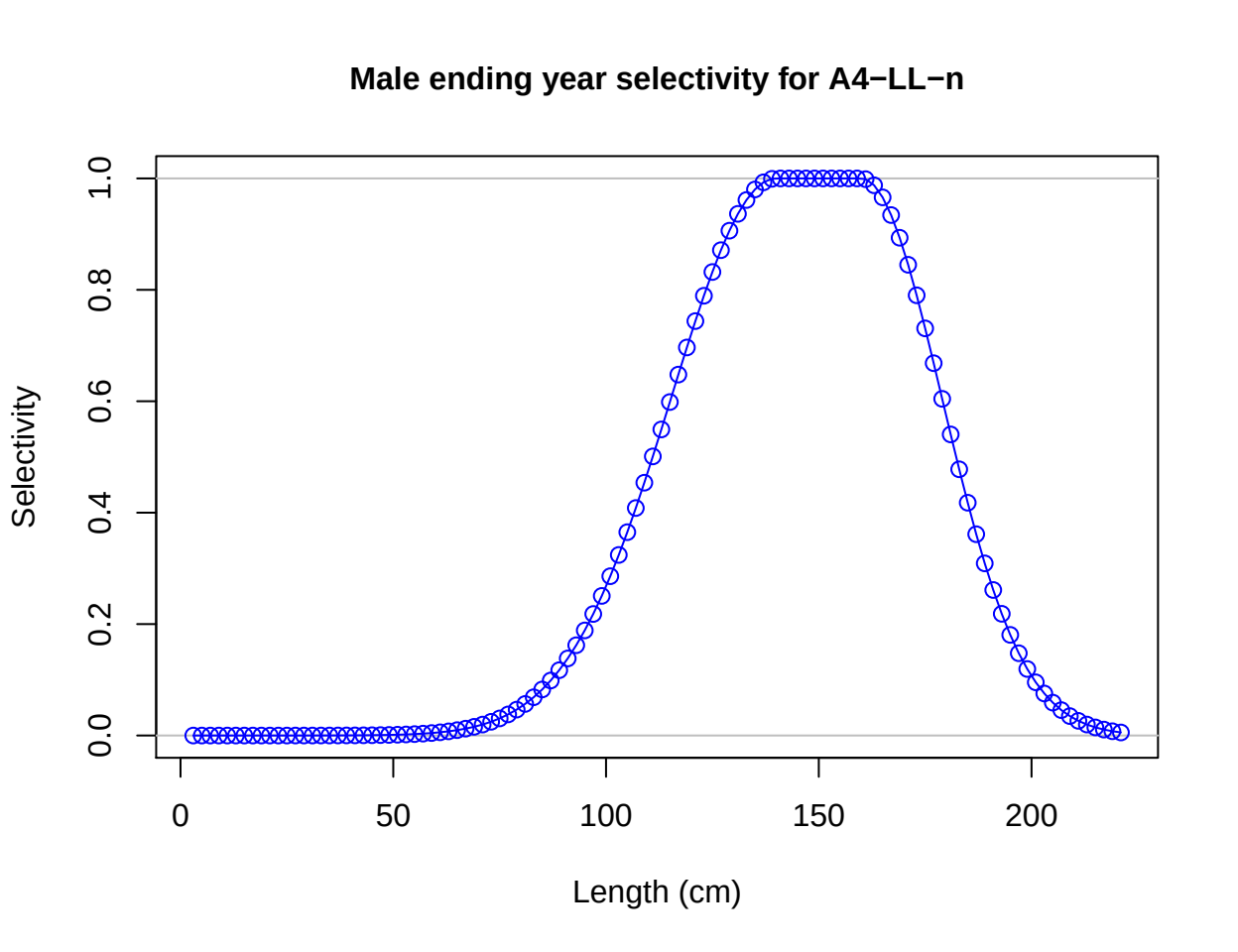



Female time−varying selectivity for A4−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
1
0.4
0.2

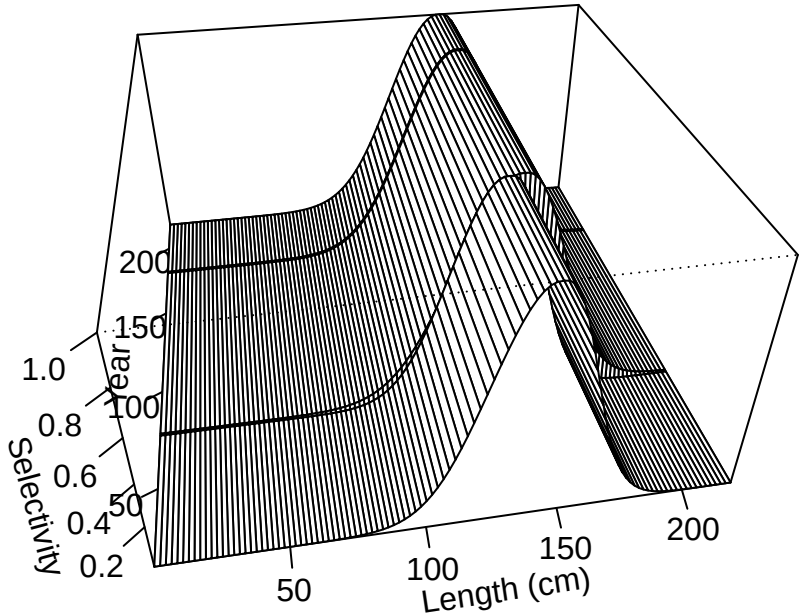

Female ending year selectivity for A4−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

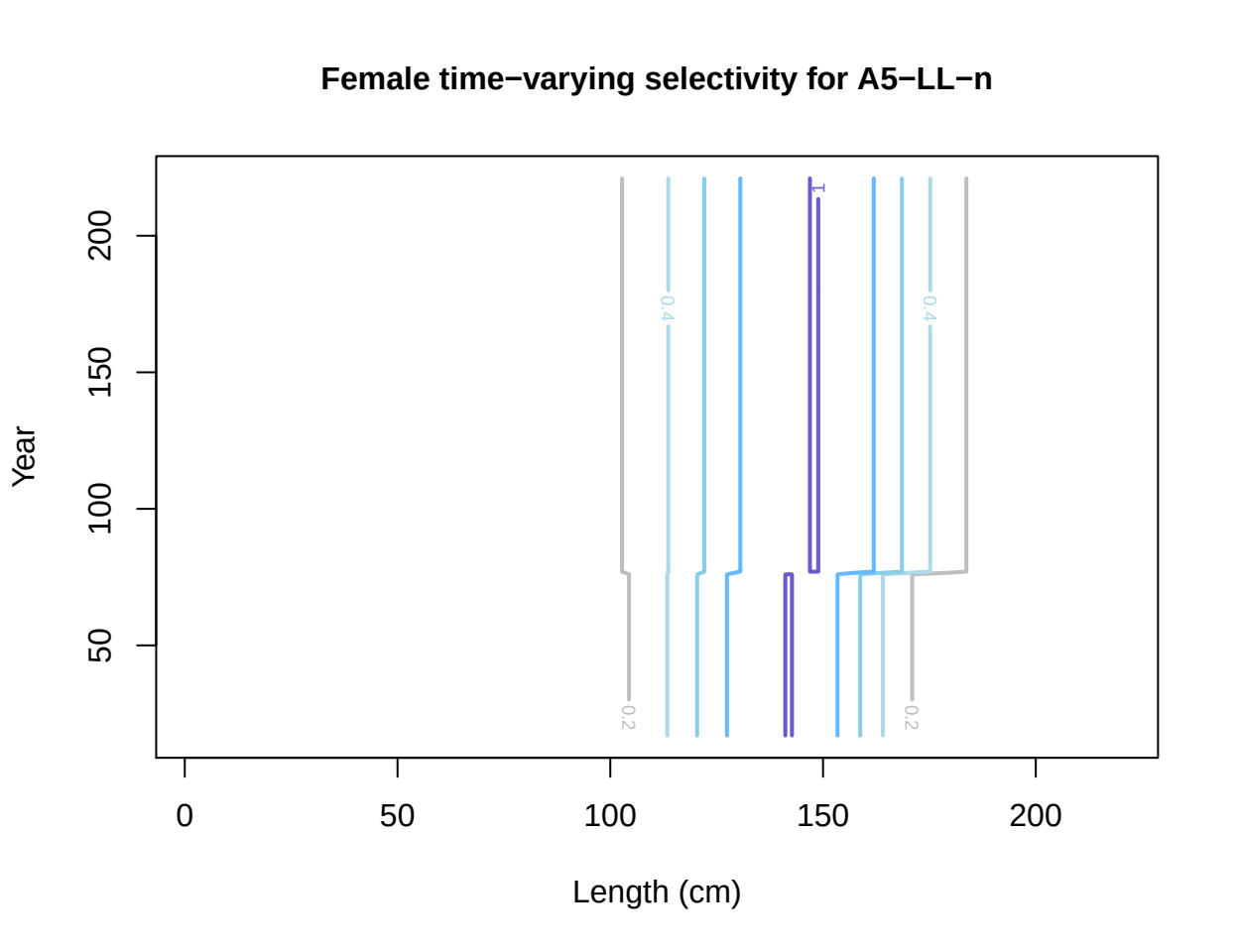

Male time−varying selectivity for A4−LL−n
Selectivity
1.0
0.8
0.6
0.4
0.2
Year
200
150
100
50
Length (cm)
50
100
150
200

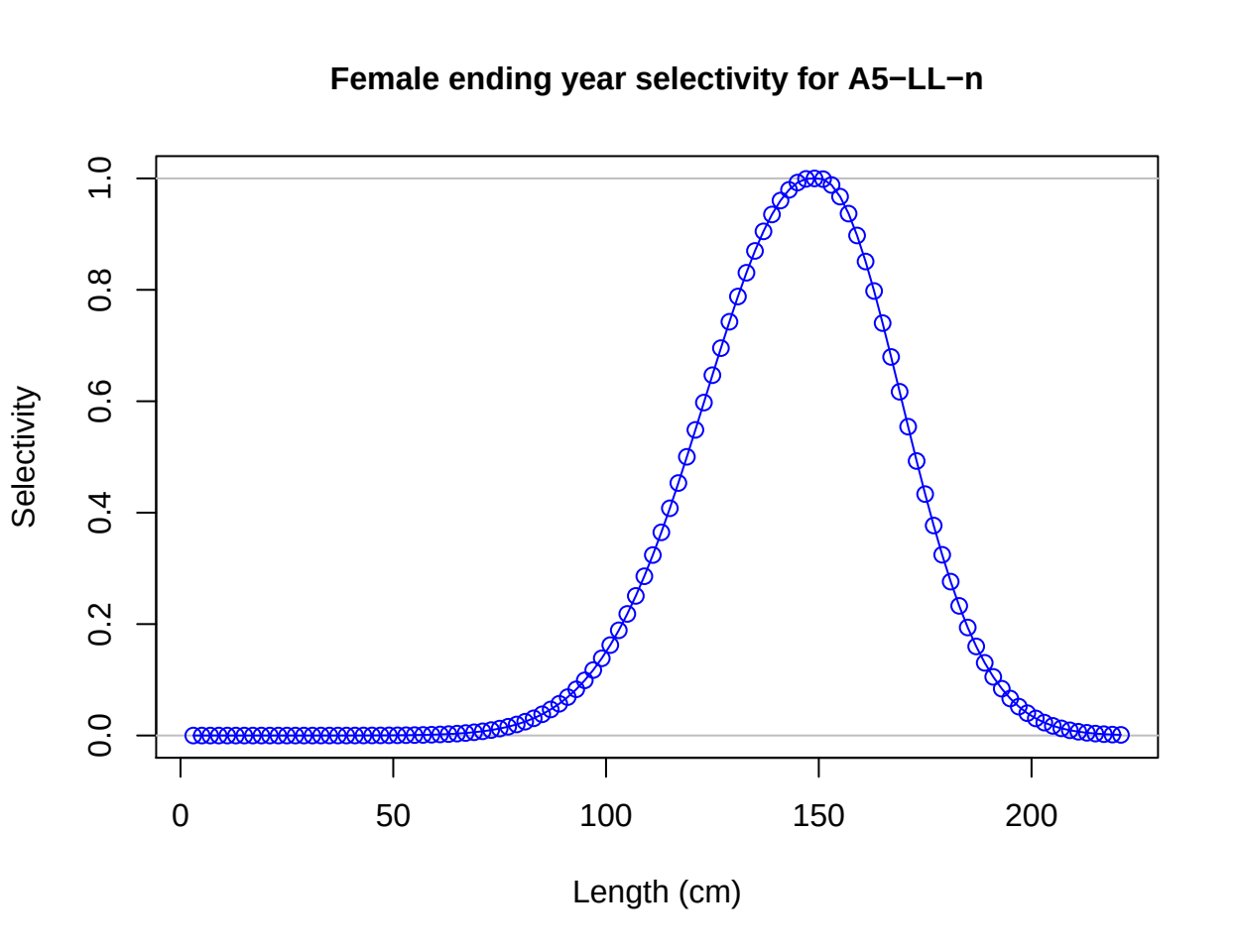

Male time−varying selectivity for A4−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
1
0.4
0.2

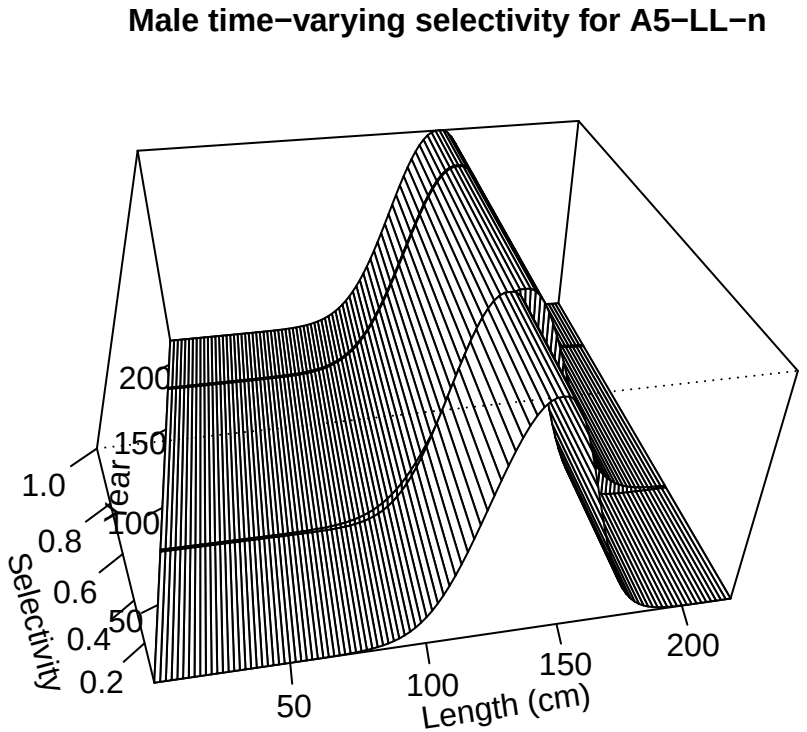

Male ending year selectivity for A4−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

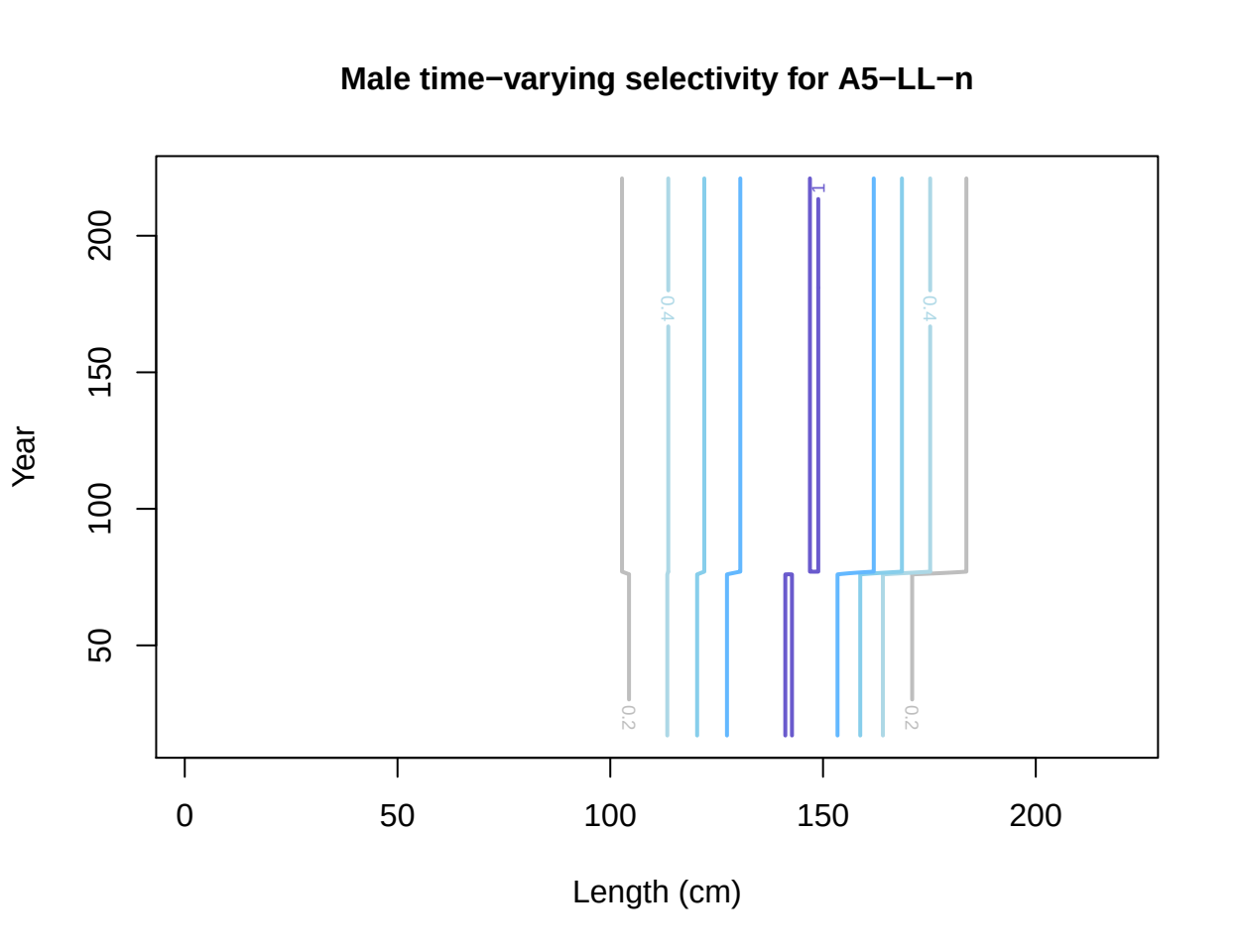
Female time−varying selectivity for A5−LL−n

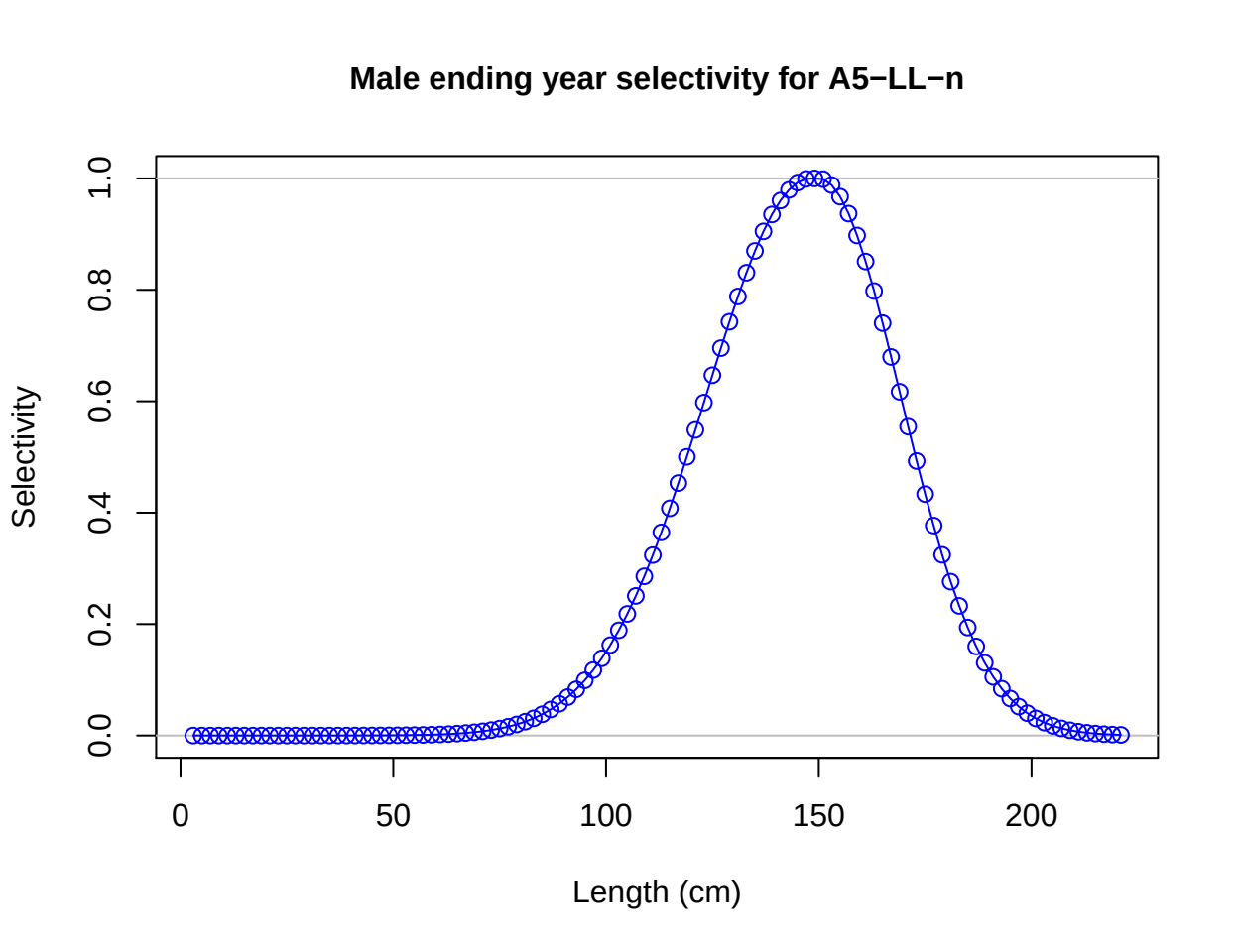



Female time−varying selectivity for A5−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
1
0.4
0.4
0.2
0.2

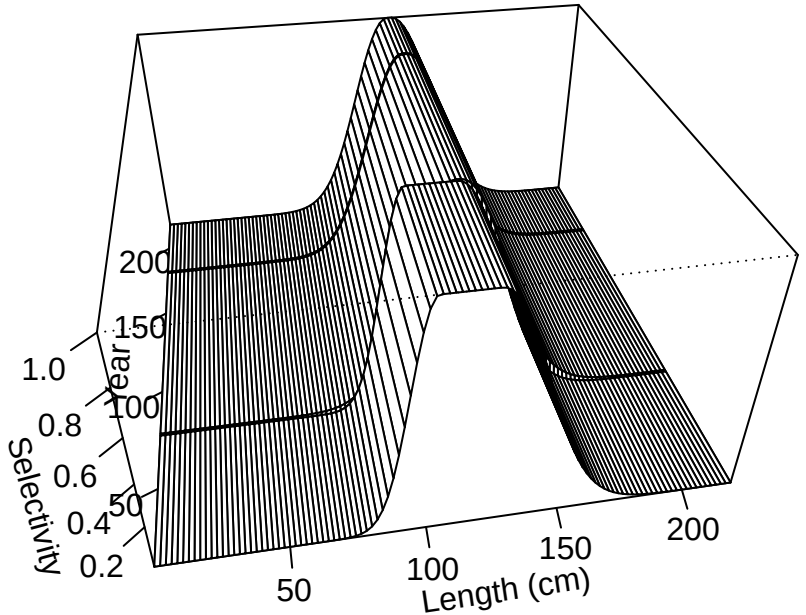

Female ending year selectivity for A5−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

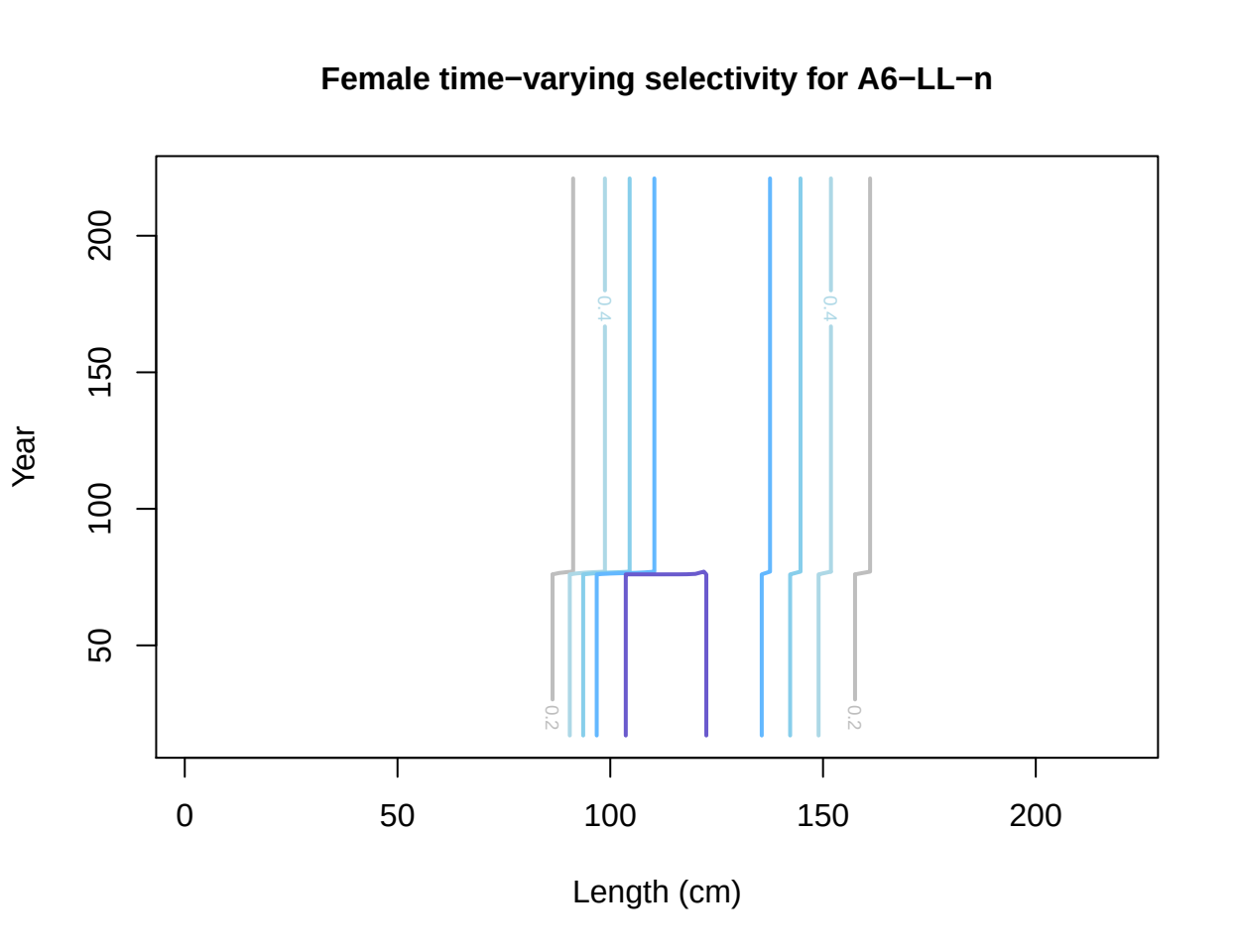

Male time−varying selectivity for A5−LL−n
Selectivity
1.0
0.8
0.6
0.4
0.2
Year
200
150
100
50
Length (cm)
50
100
150
200

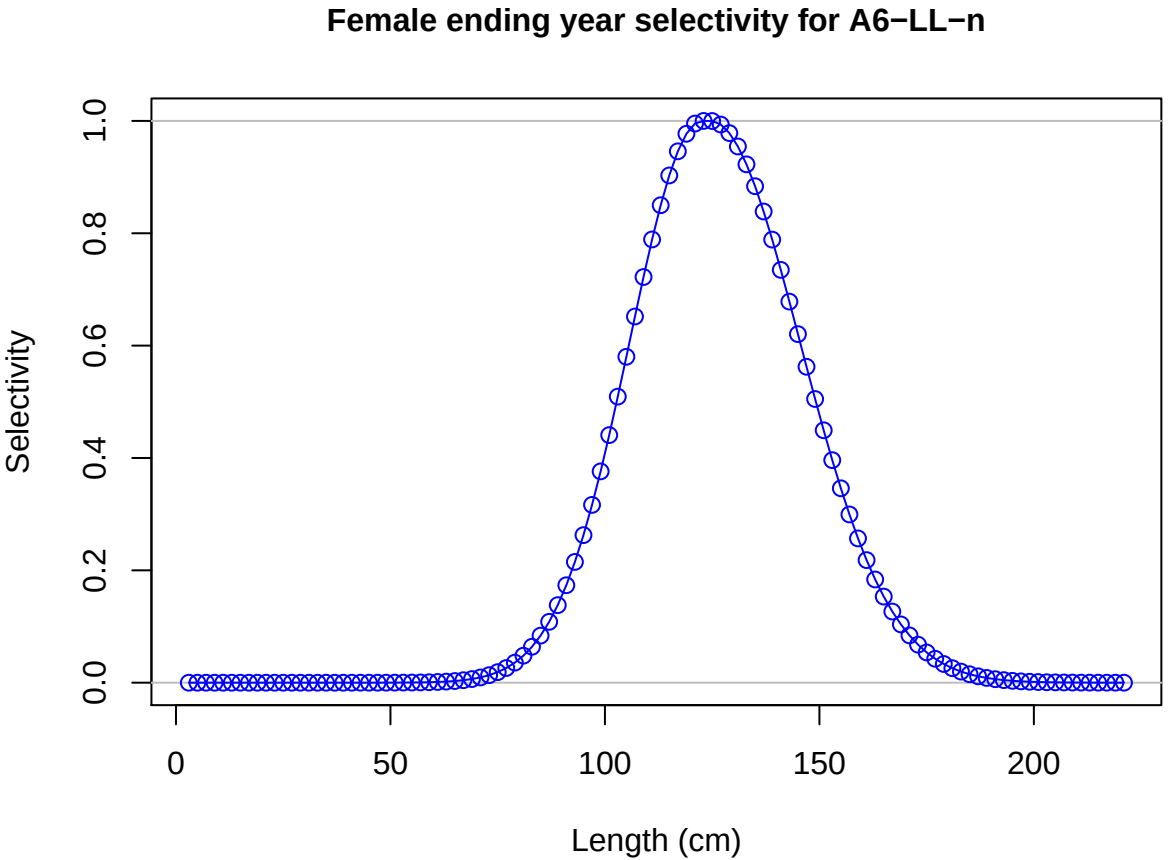

Male time−varying selectivity for A5−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
1
0.4
0.4
0.2
0.2


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)

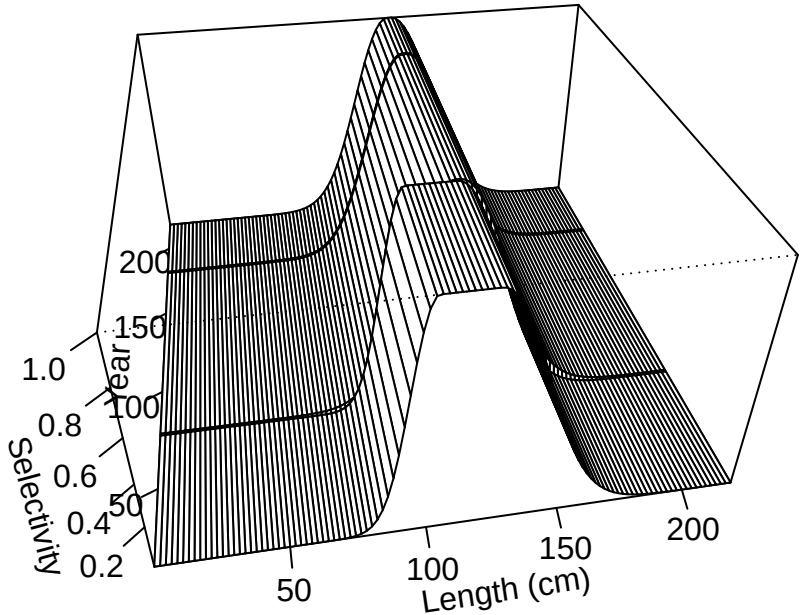
Female time−varying selectivity for A6−LL−n

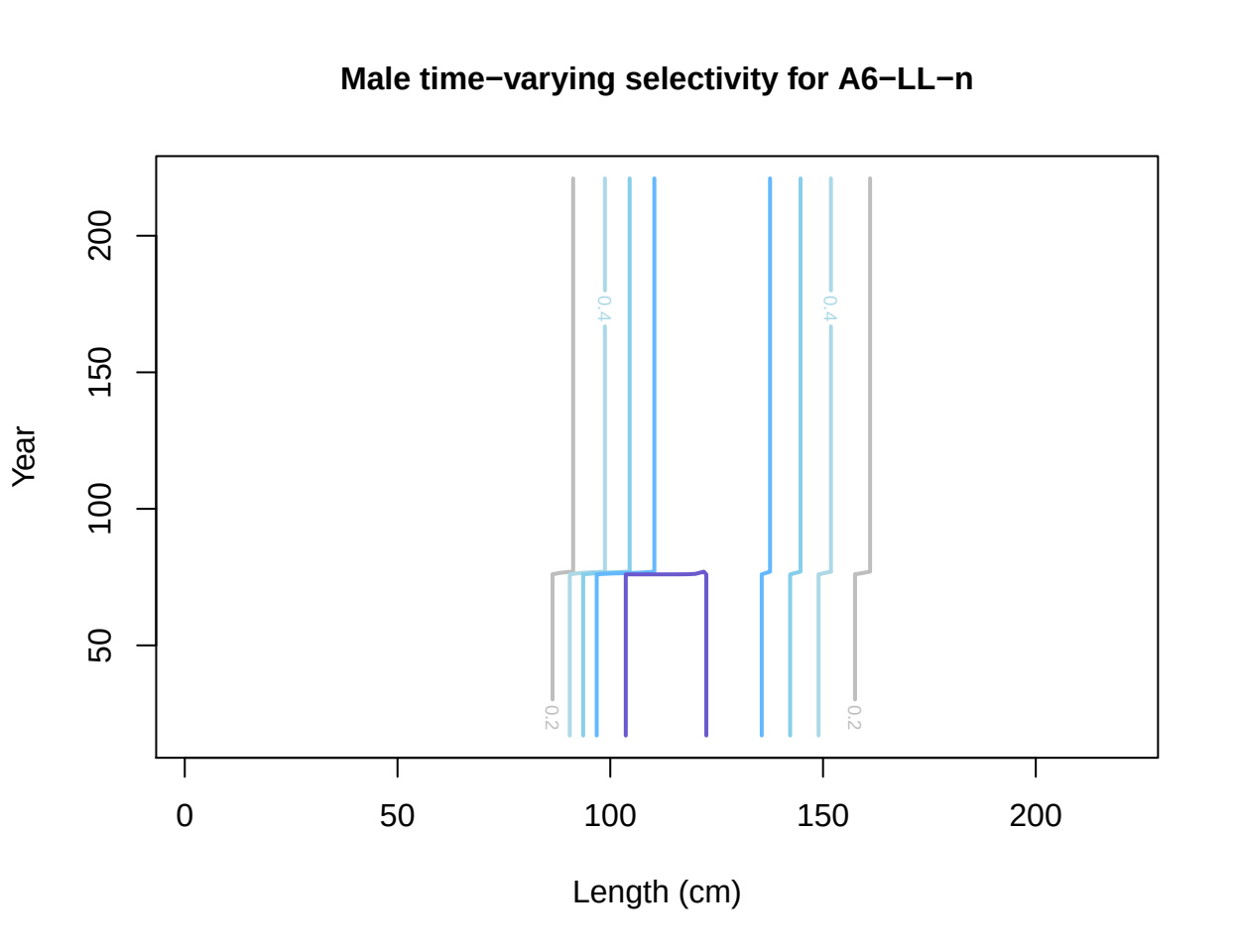


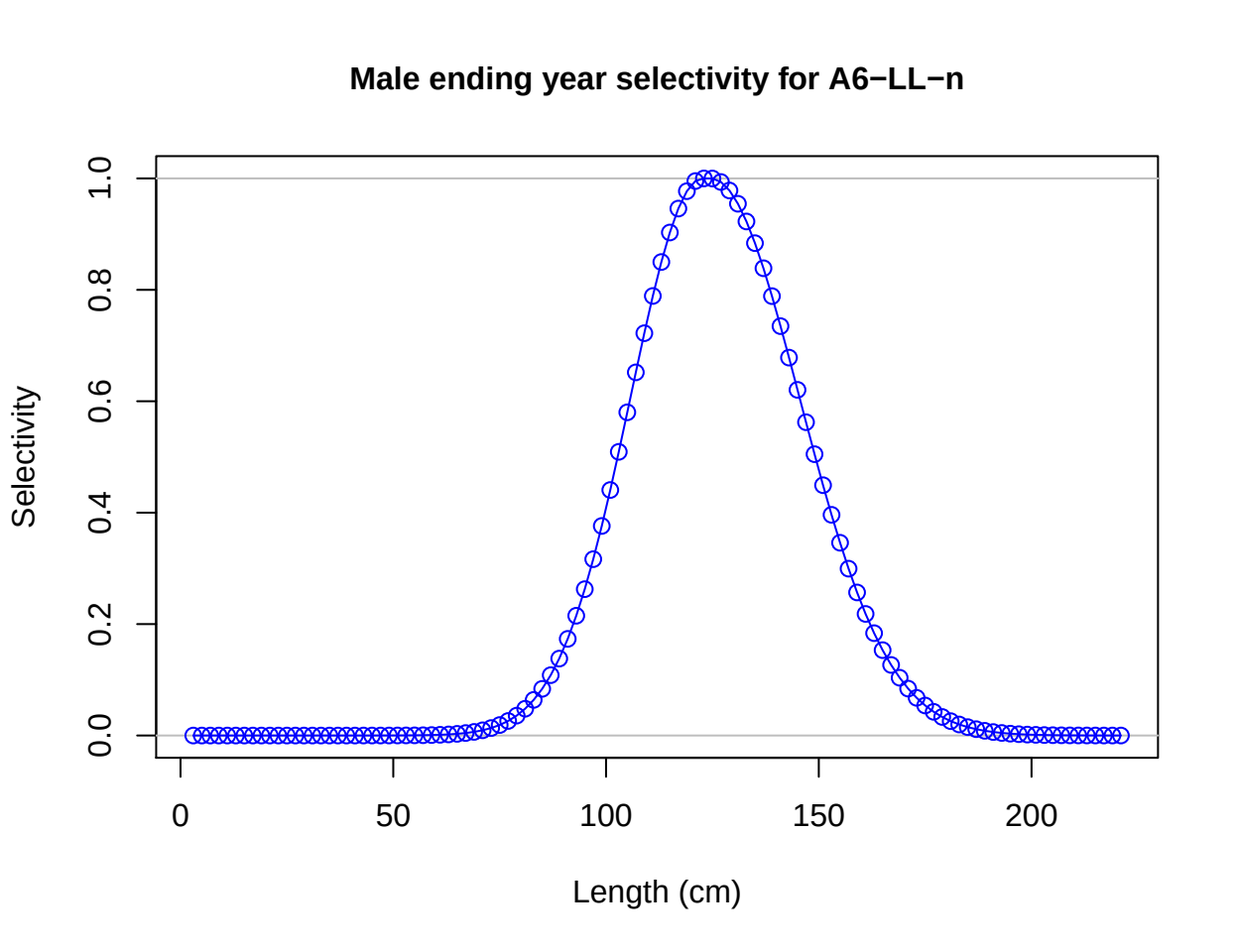

Female time−varying selectivity for A6−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
0.2
0.2

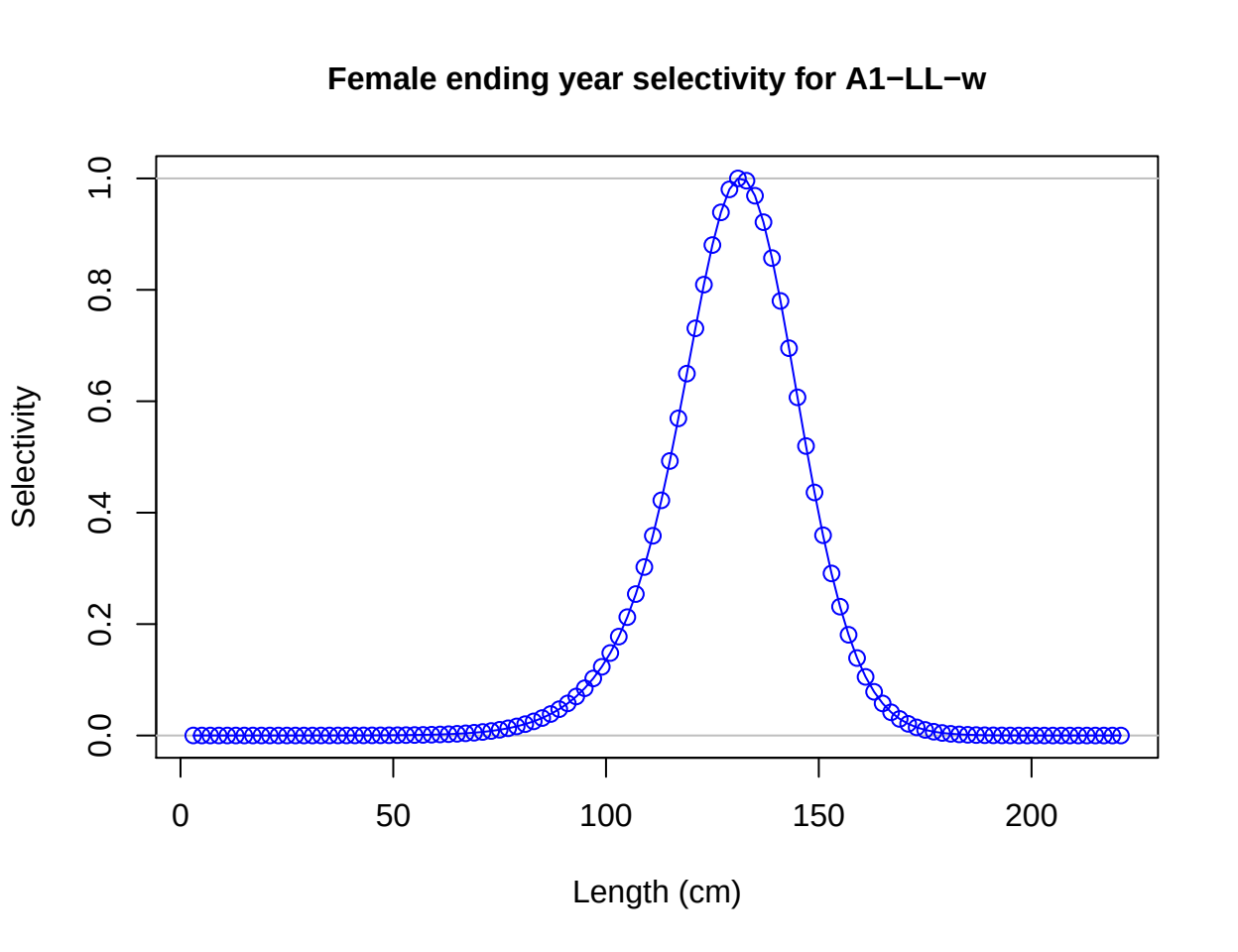

Female ending year selectivity for A6−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

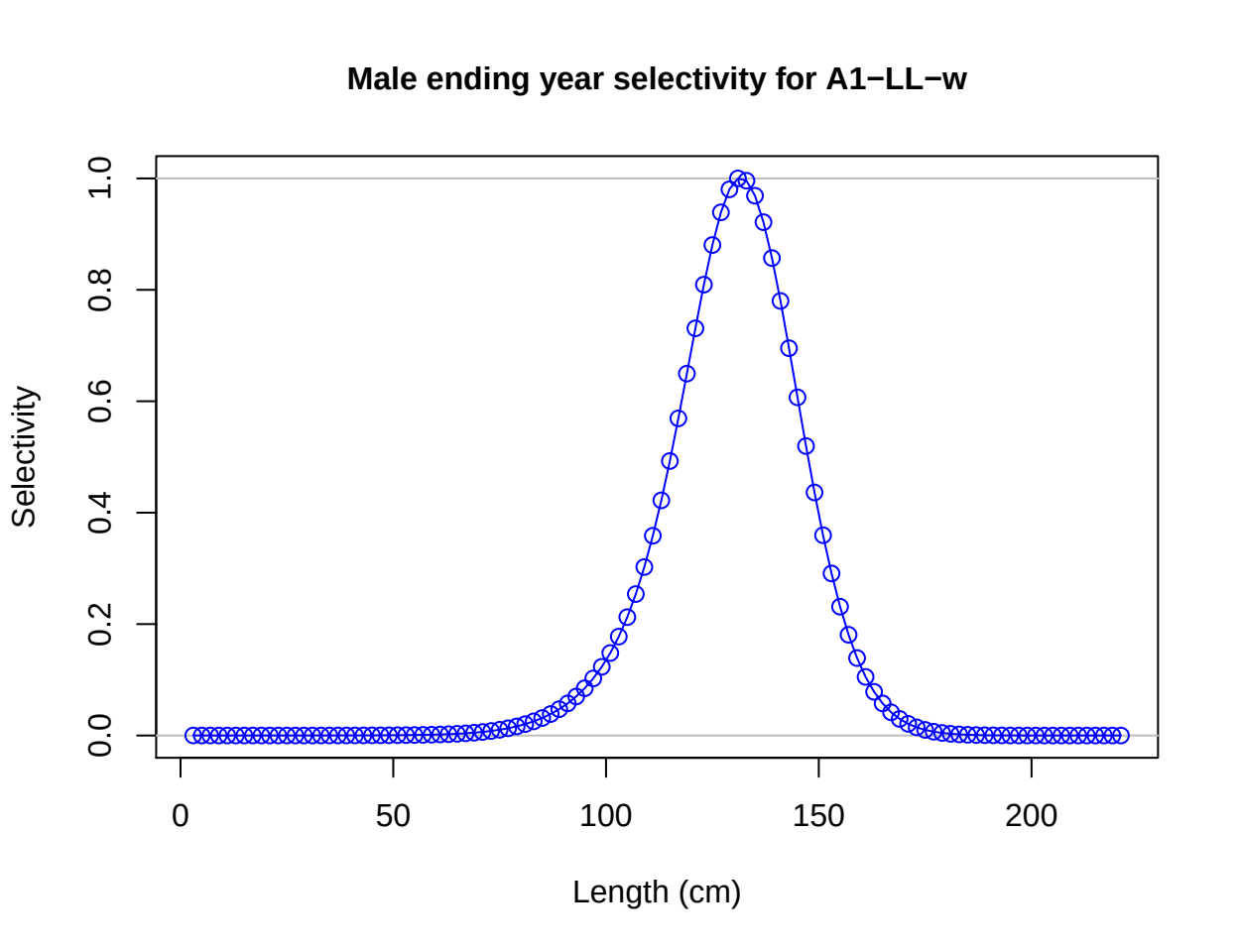
Male time−varying selectivity for A6−LL−n



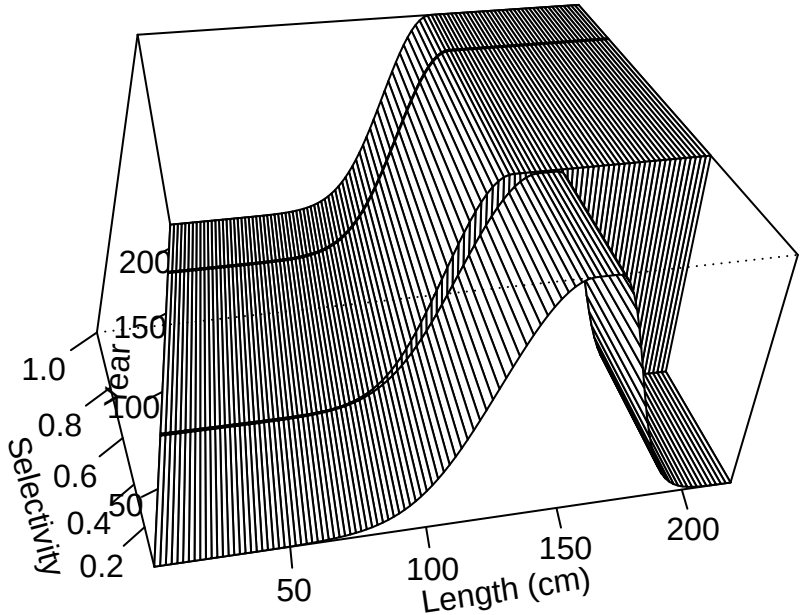

Male time−varying selectivity for A6−LL−n
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
0.2
0.2

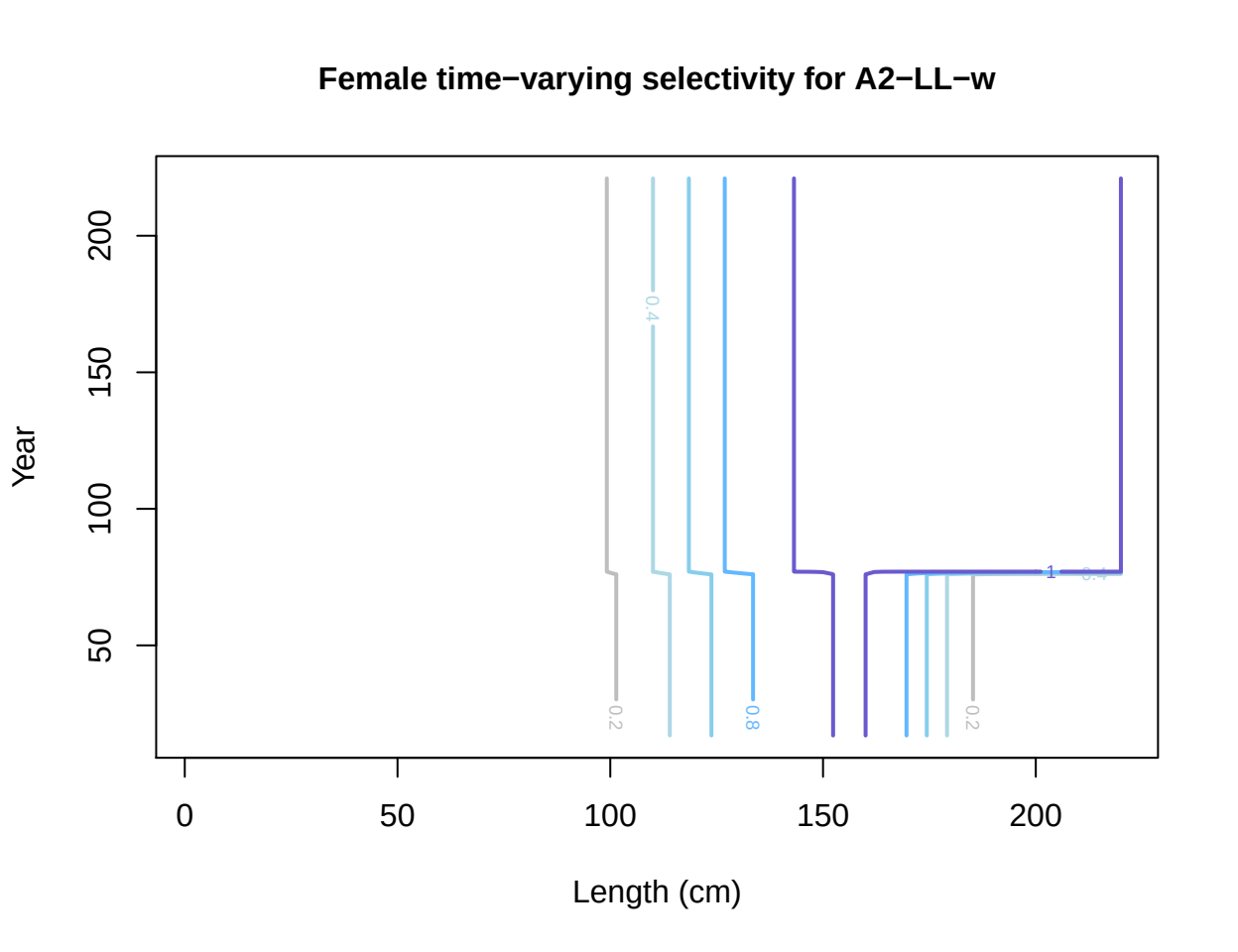

Male ending year selectivity for A6−LL−n
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

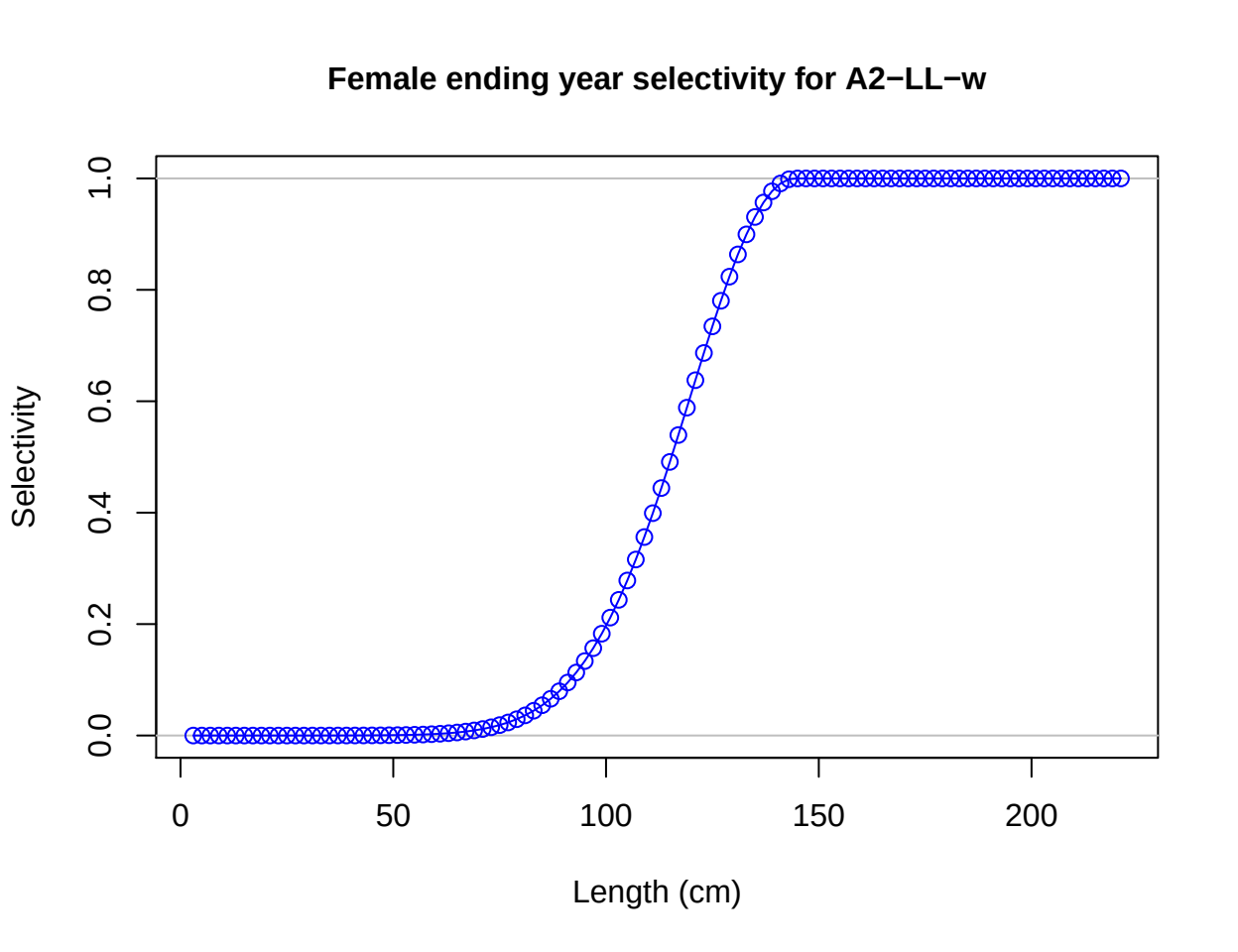

Female ending year selectivity for A1−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)


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)

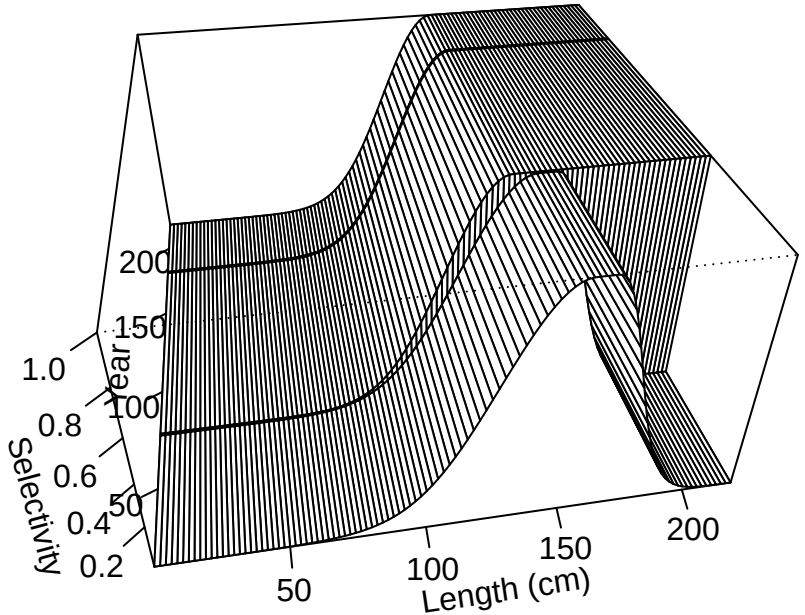
Female time−varying selectivity for A2−LL−w

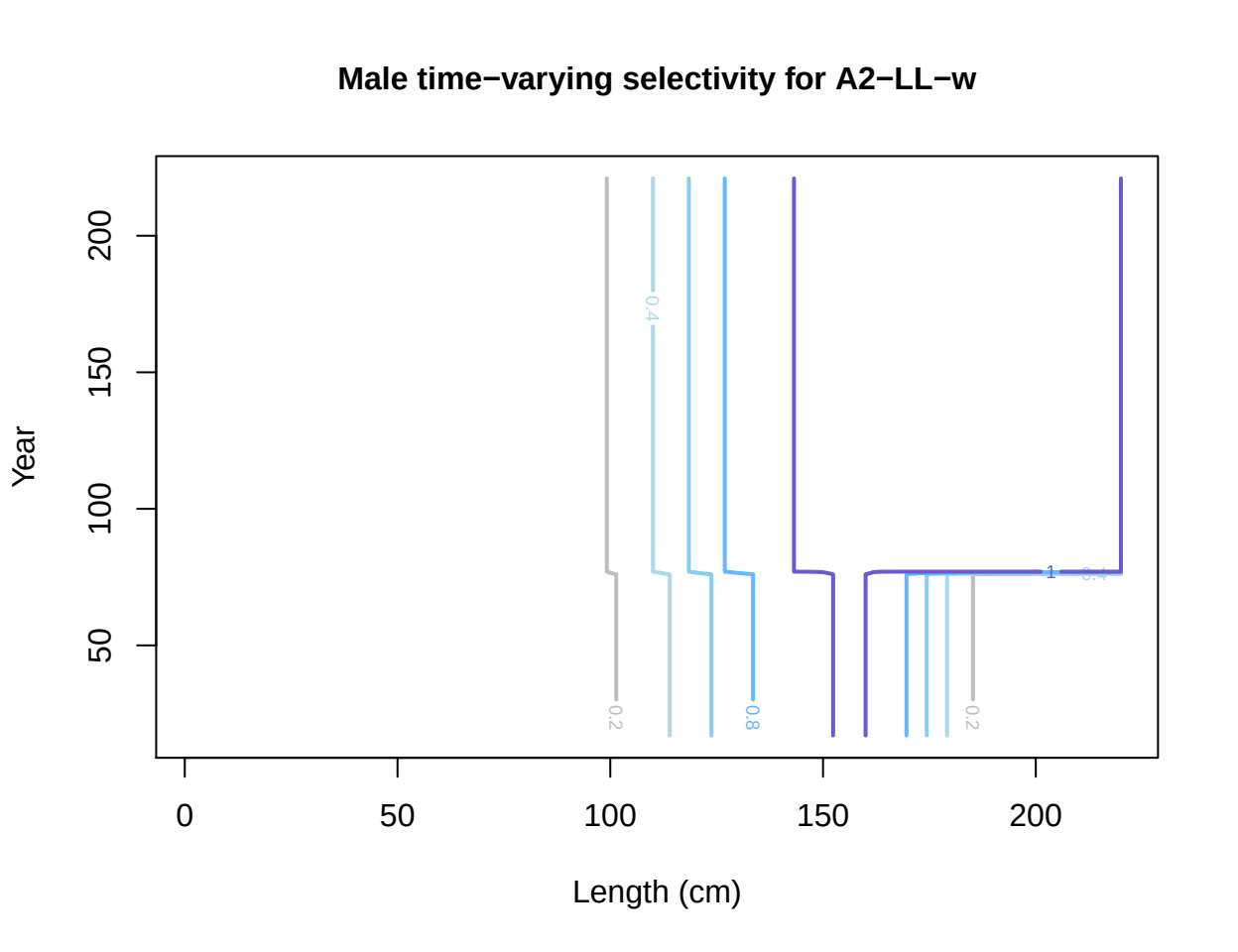


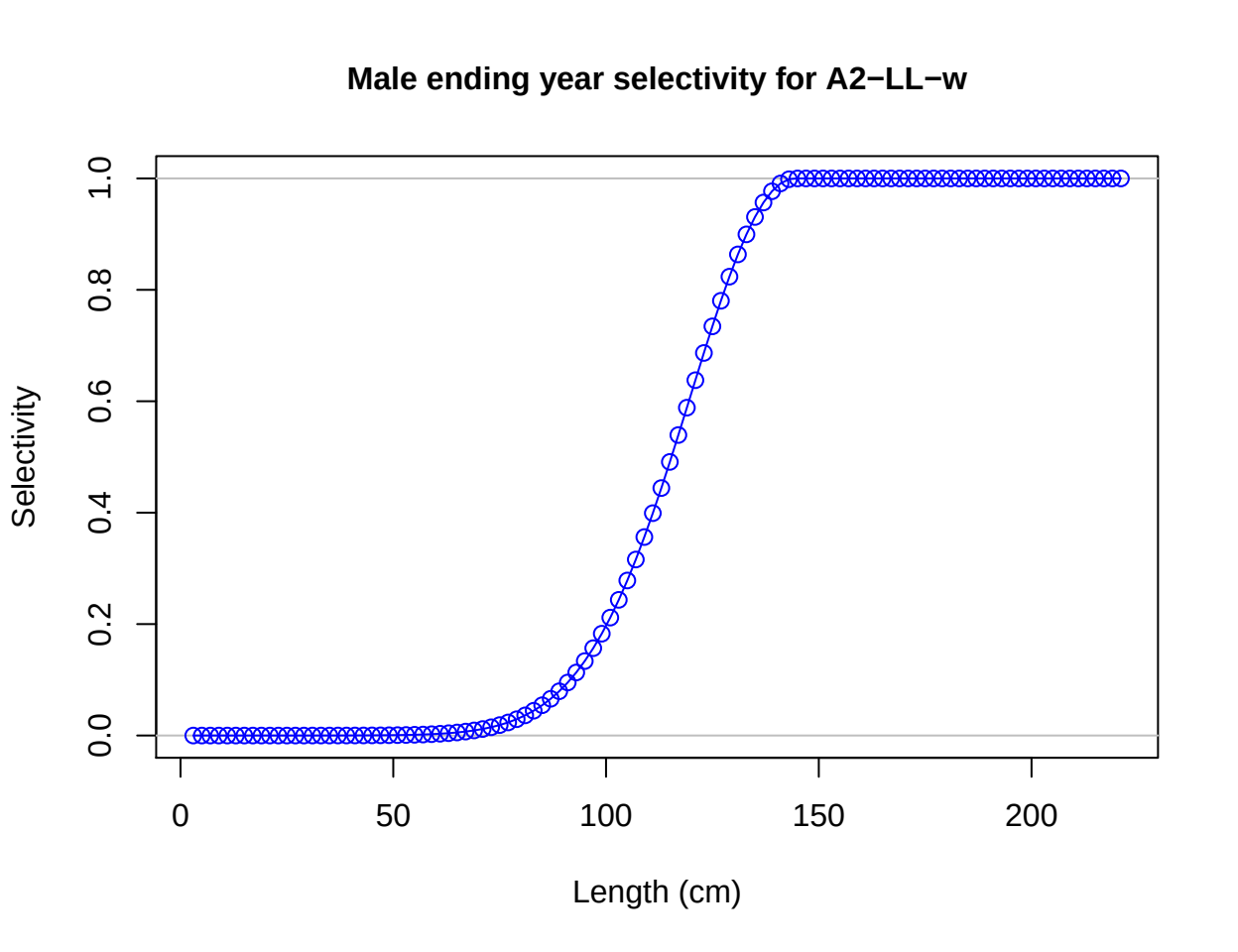

Female time−varying selectivity for A2−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
0.8
1
0.4
0.2


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)

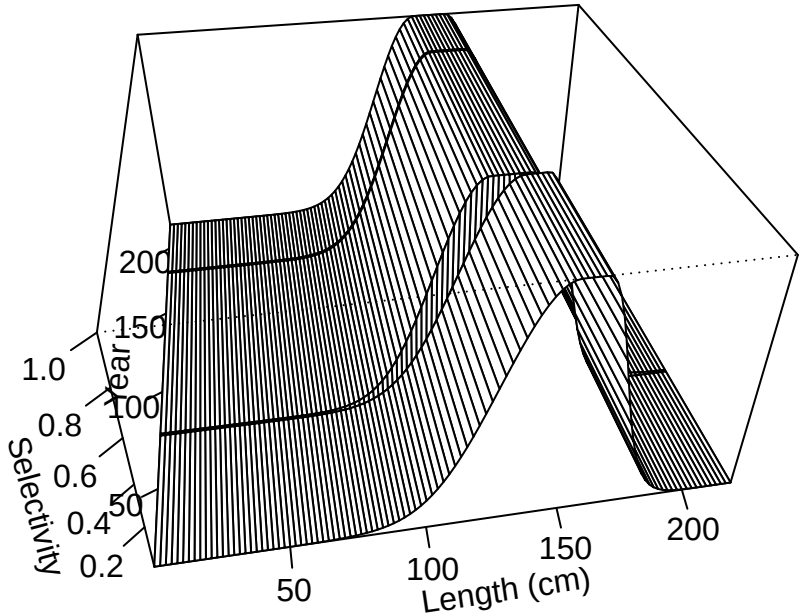
Male time−varying selectivity for A2−LL−w

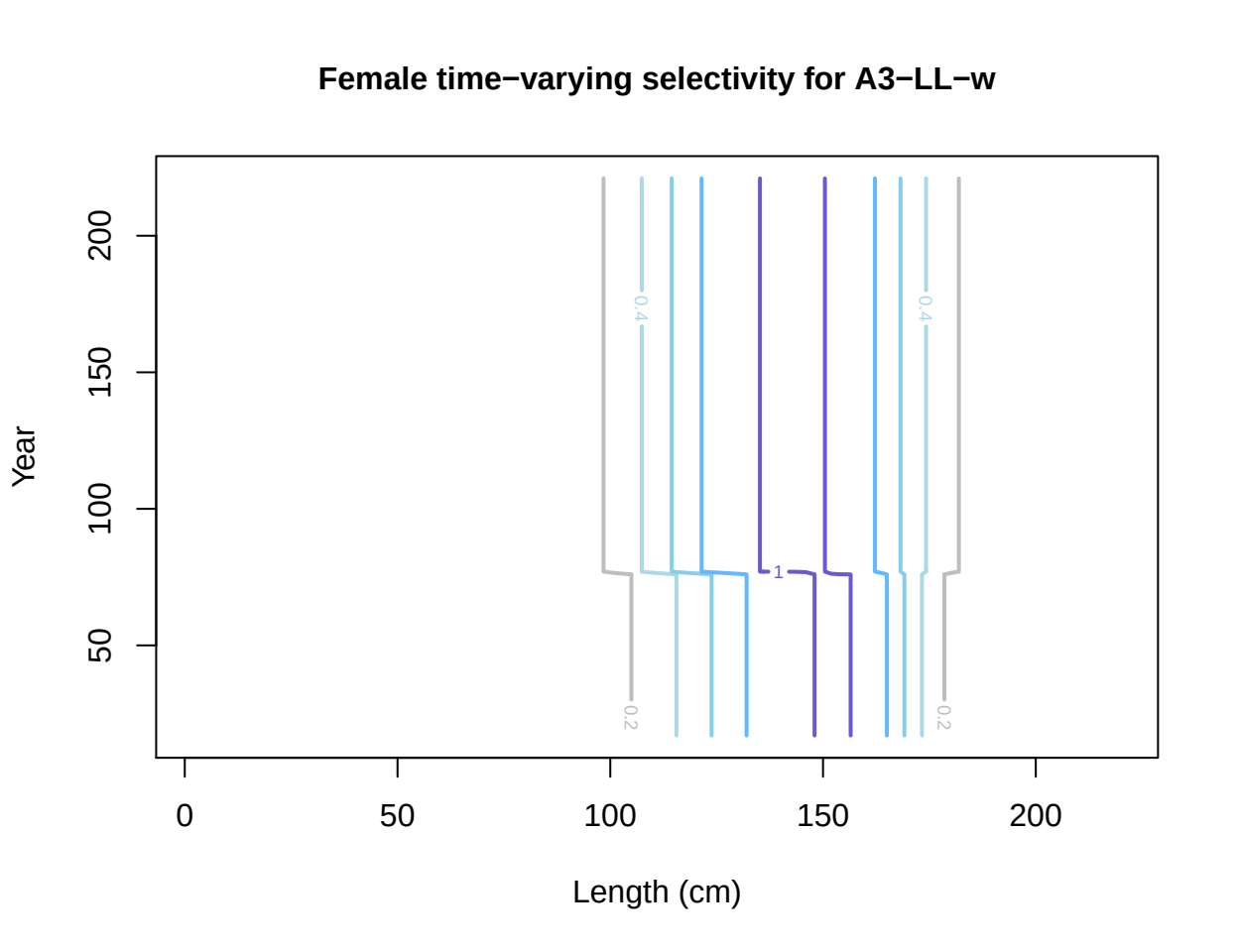


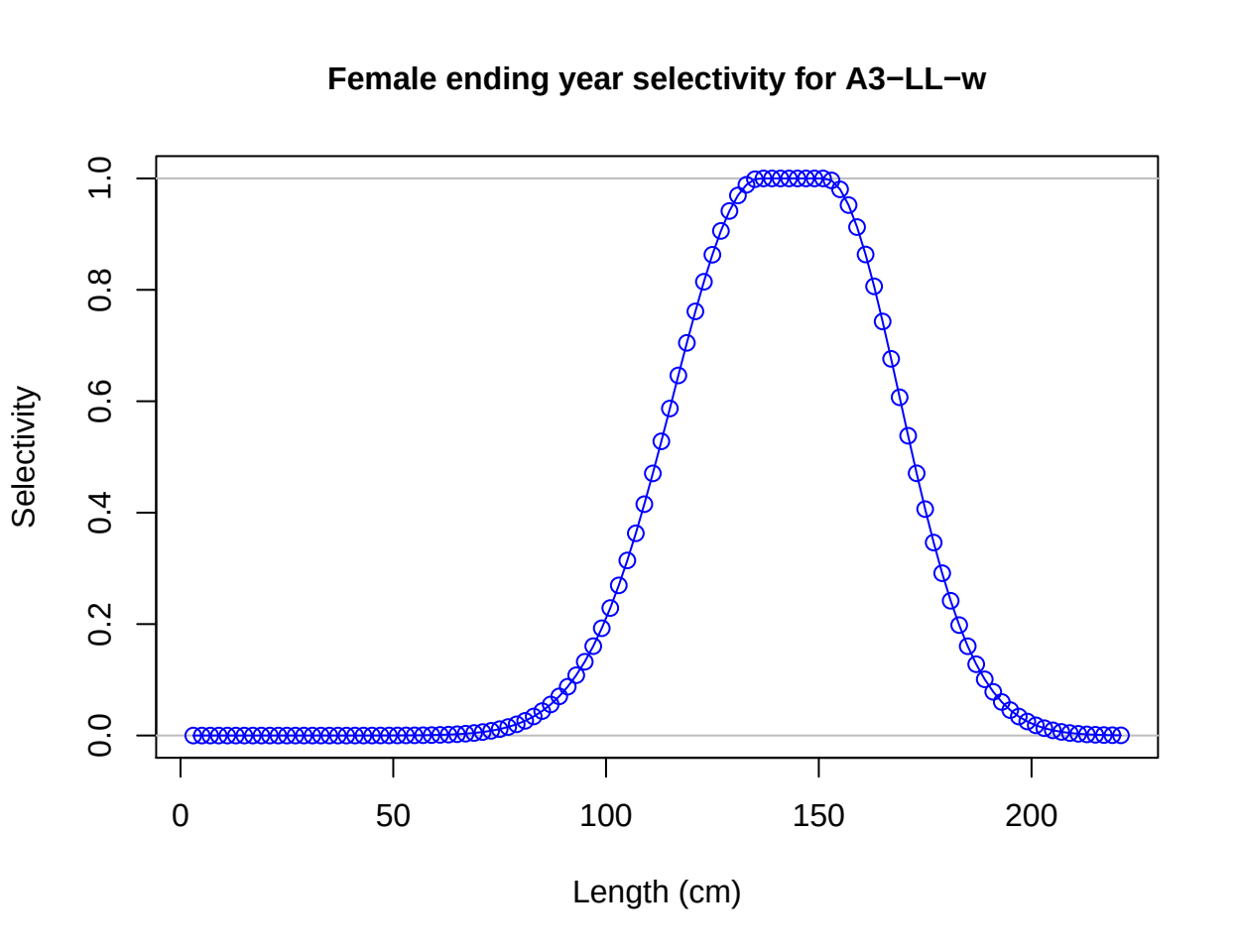

Male time−varying selectivity for A2−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
0.8
1
0.4
0.2

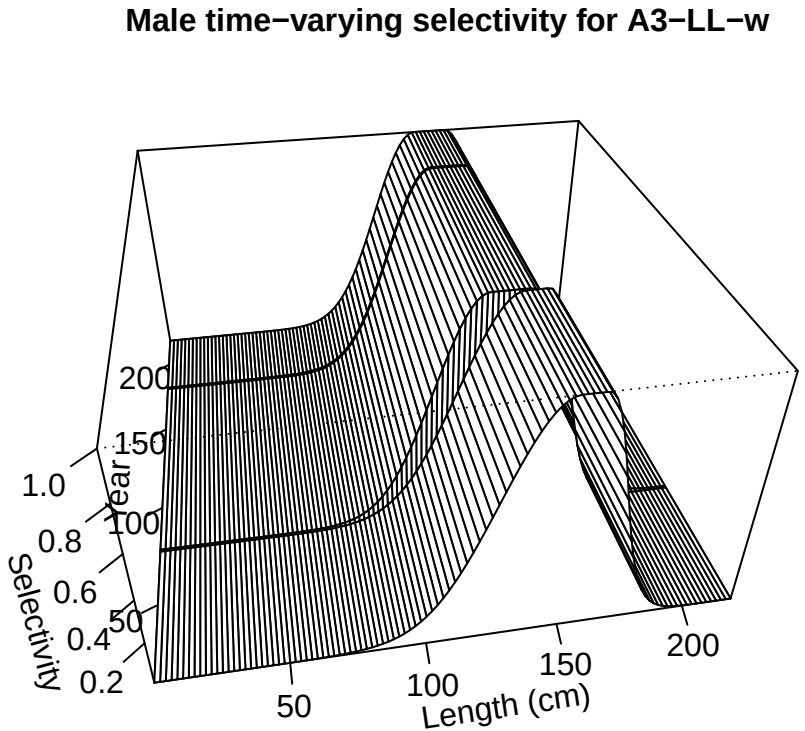

Male ending year selectivity for A2−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

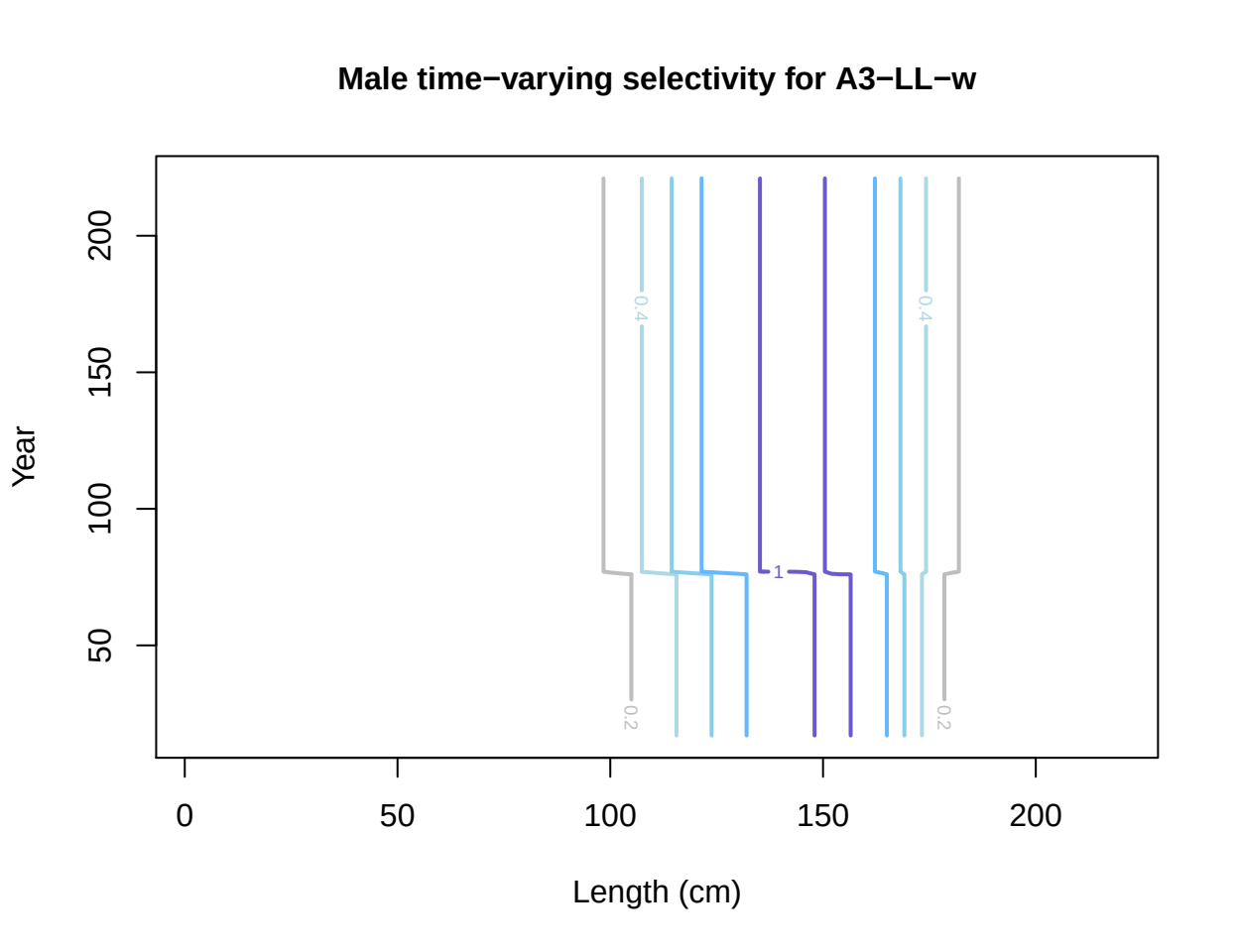
Female time−varying selectivity for A3−LL−w

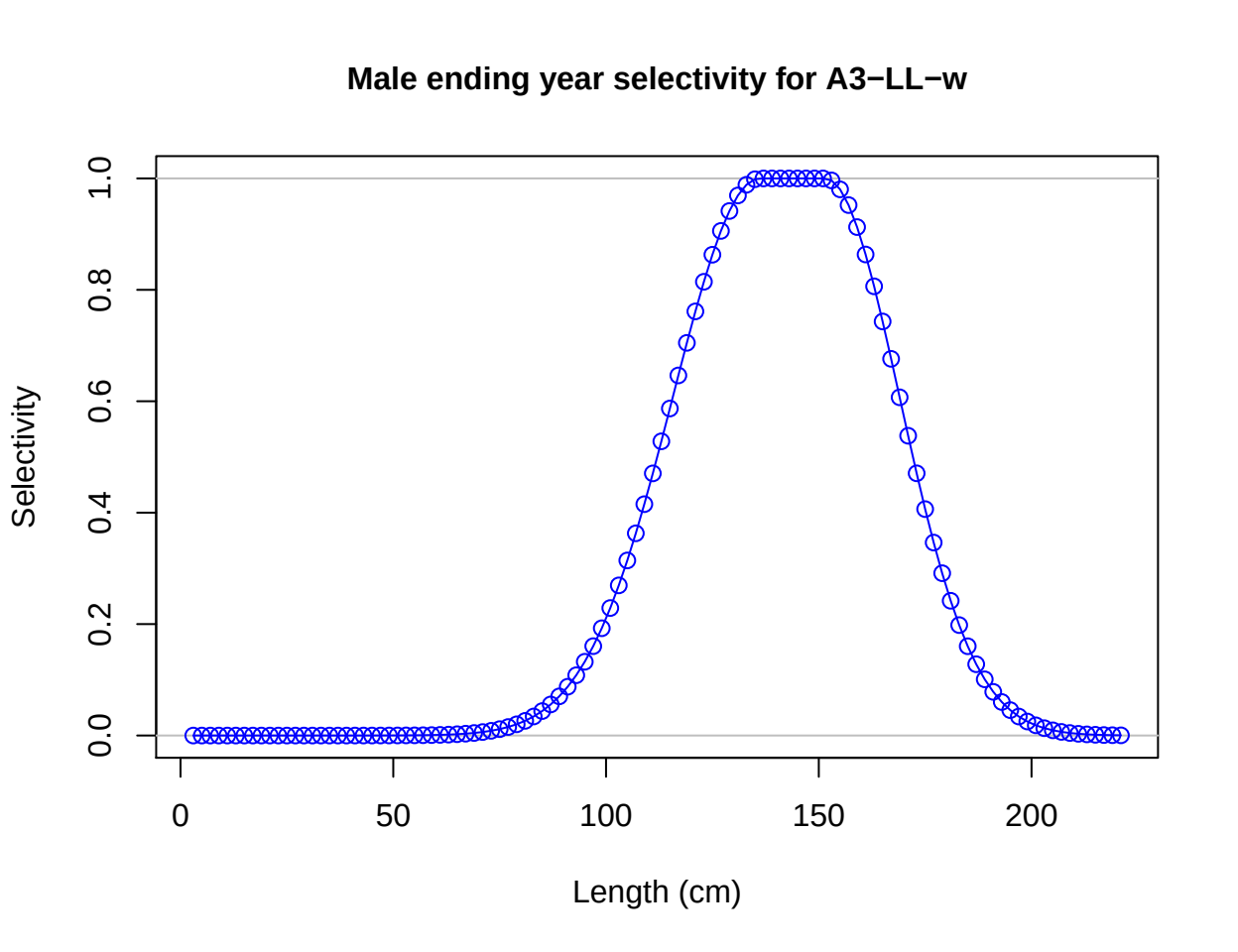



Female time−varying selectivity for A3−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
1
0.2
0.2

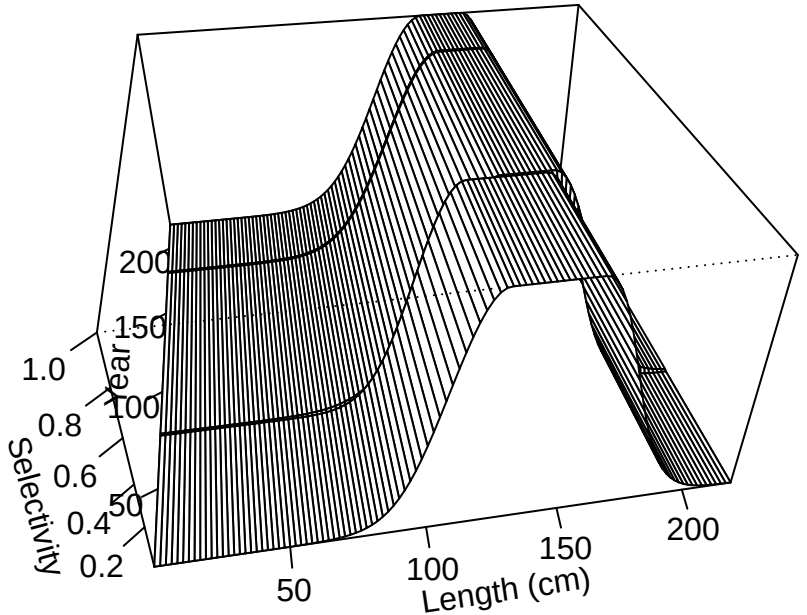

Female ending year selectivity for A3−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

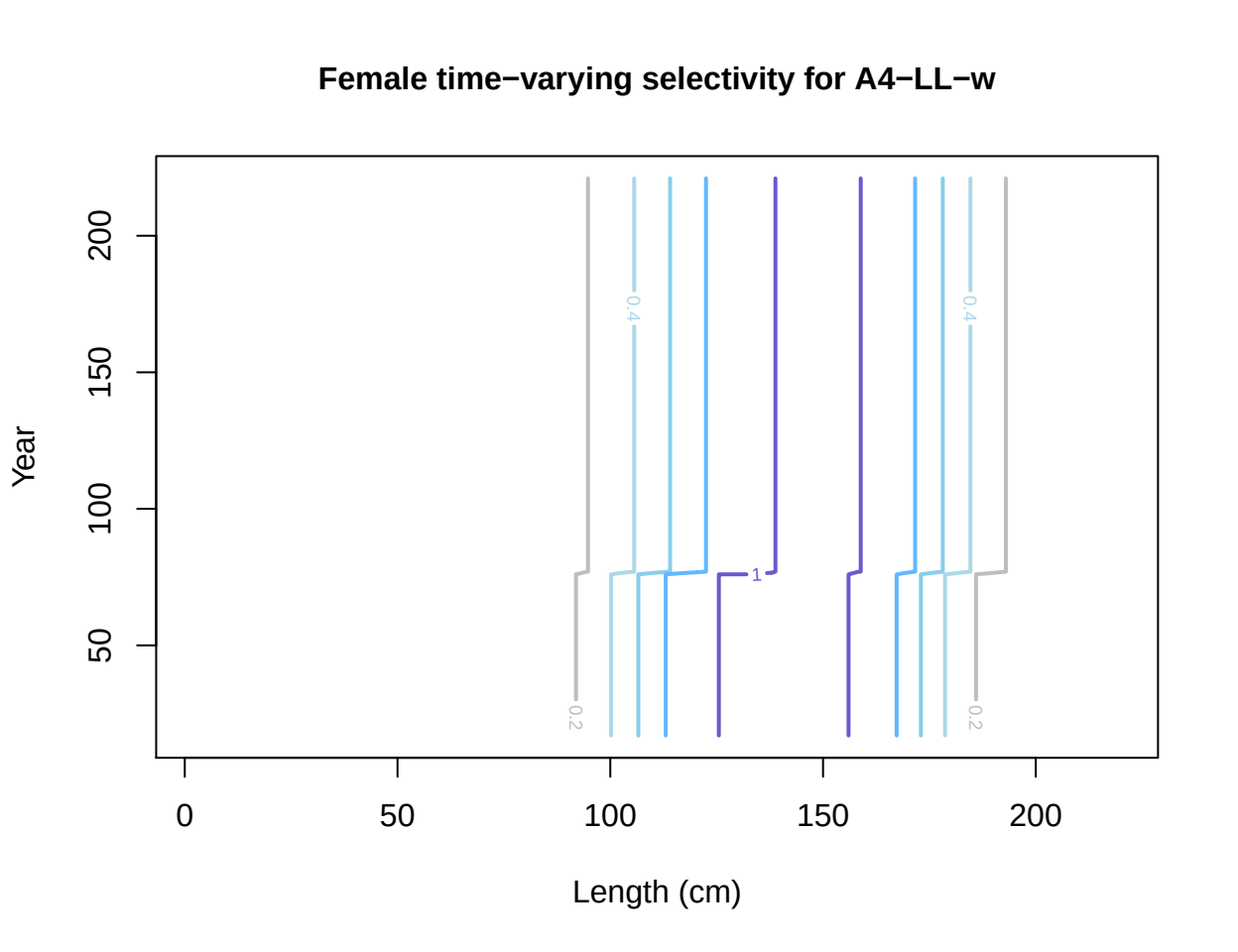

Male time−varying selectivity for A3−LL−w
Selectivity
1.0
0.8
0.6
0.4
0.2
Year
200
150
100
50
Length (cm)
50
100
150
200

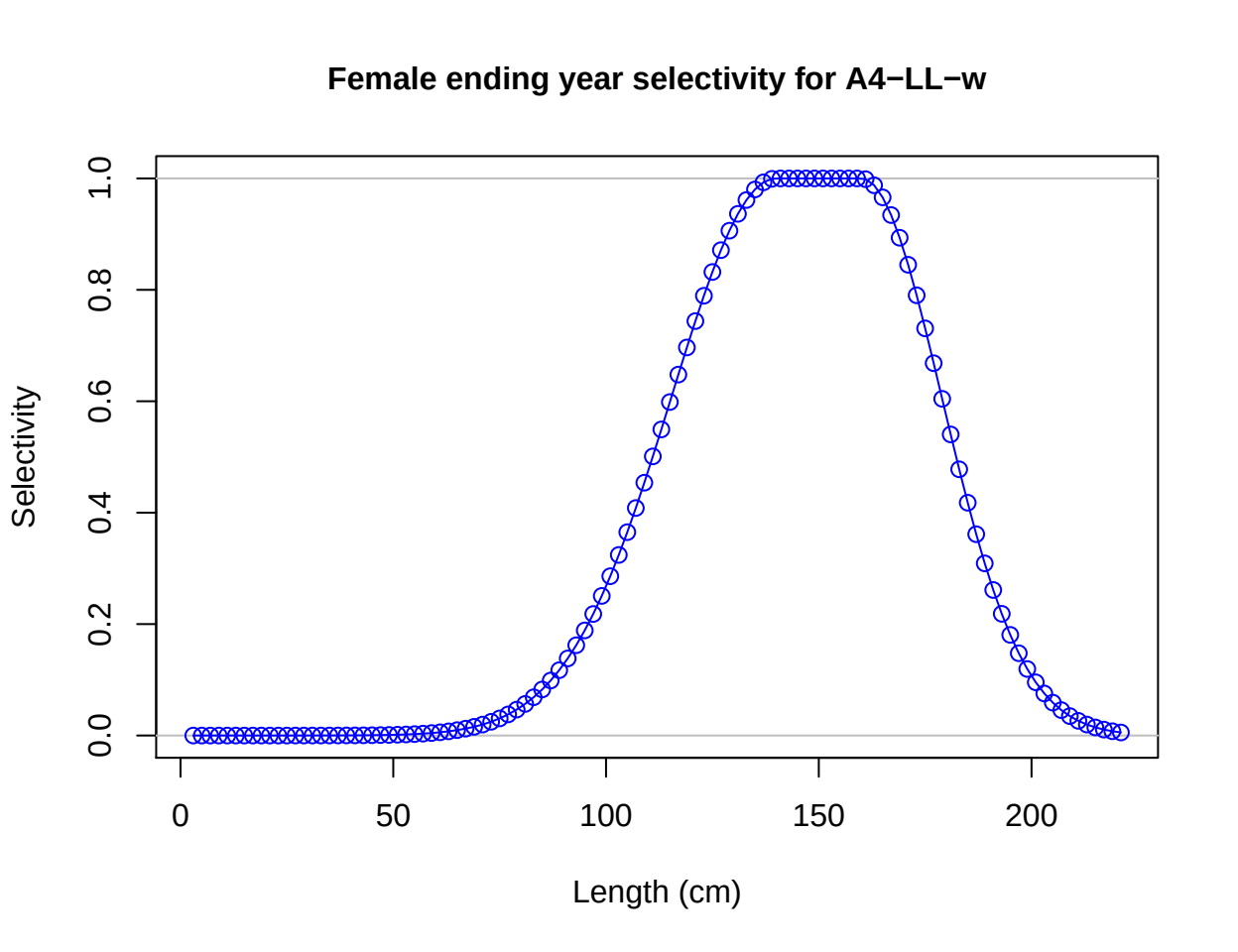

Male time−varying selectivity for A3−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
1
0.2
0.2

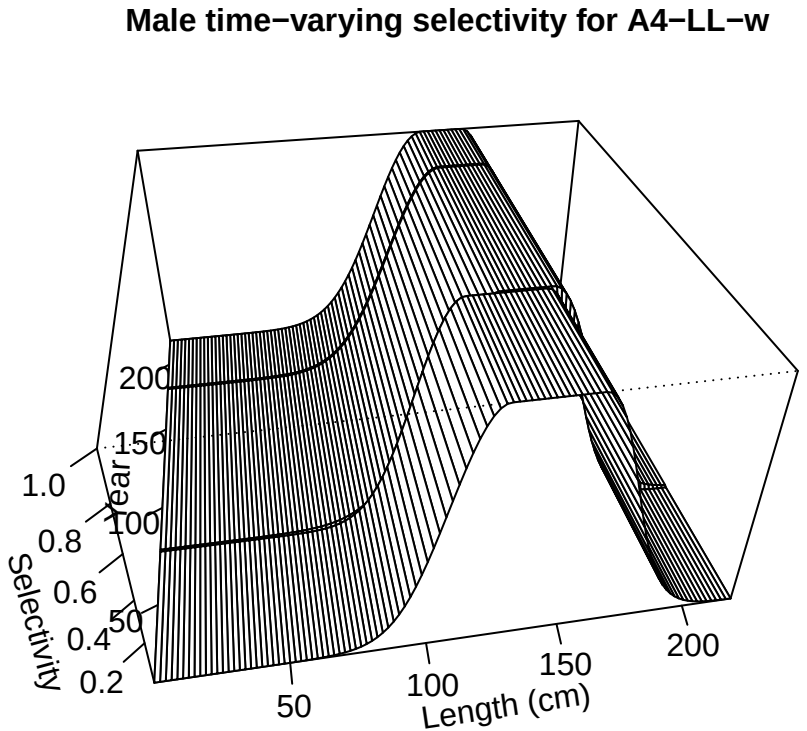

Male ending year selectivity for A3−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

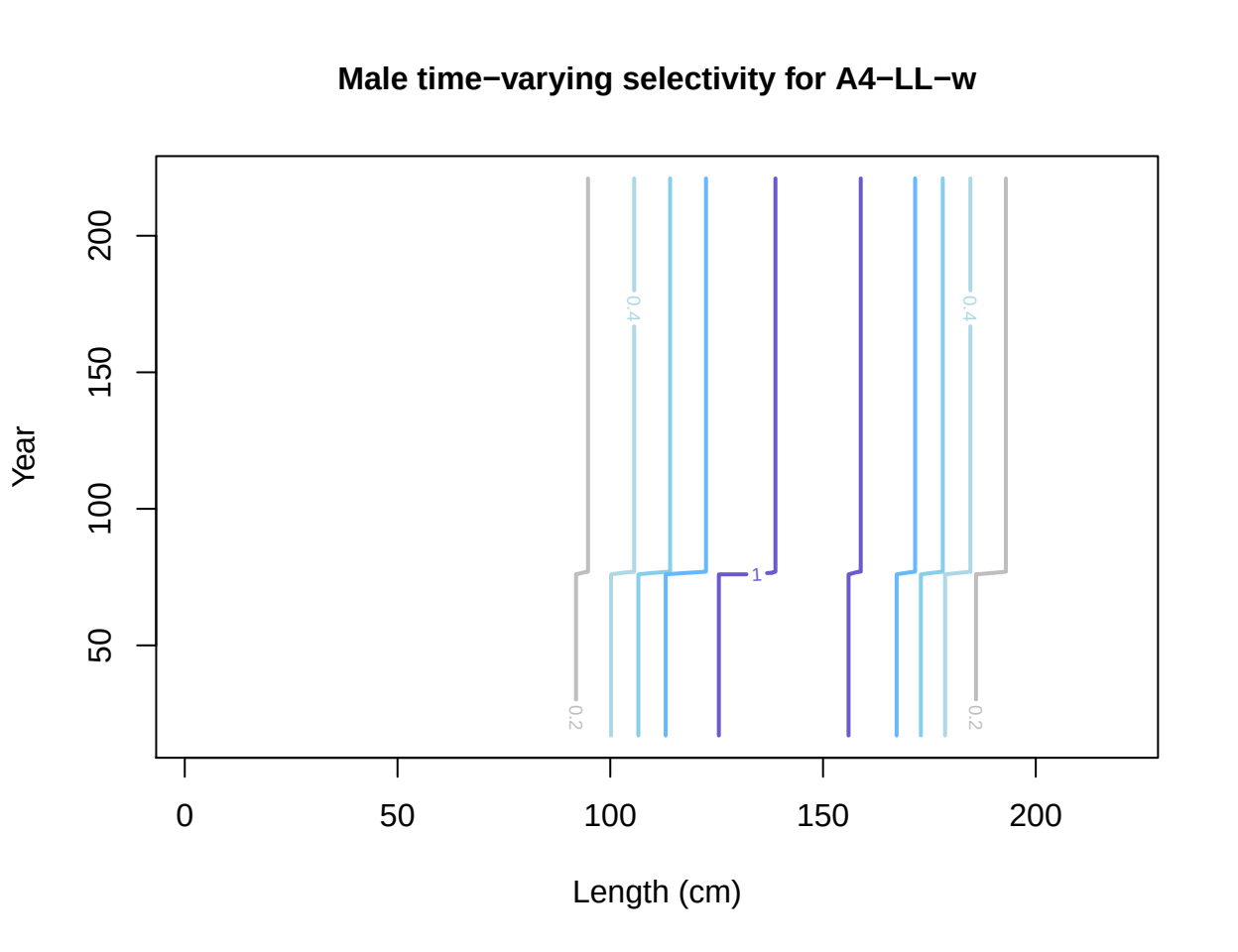
Female time−varying selectivity for A4−LL−w

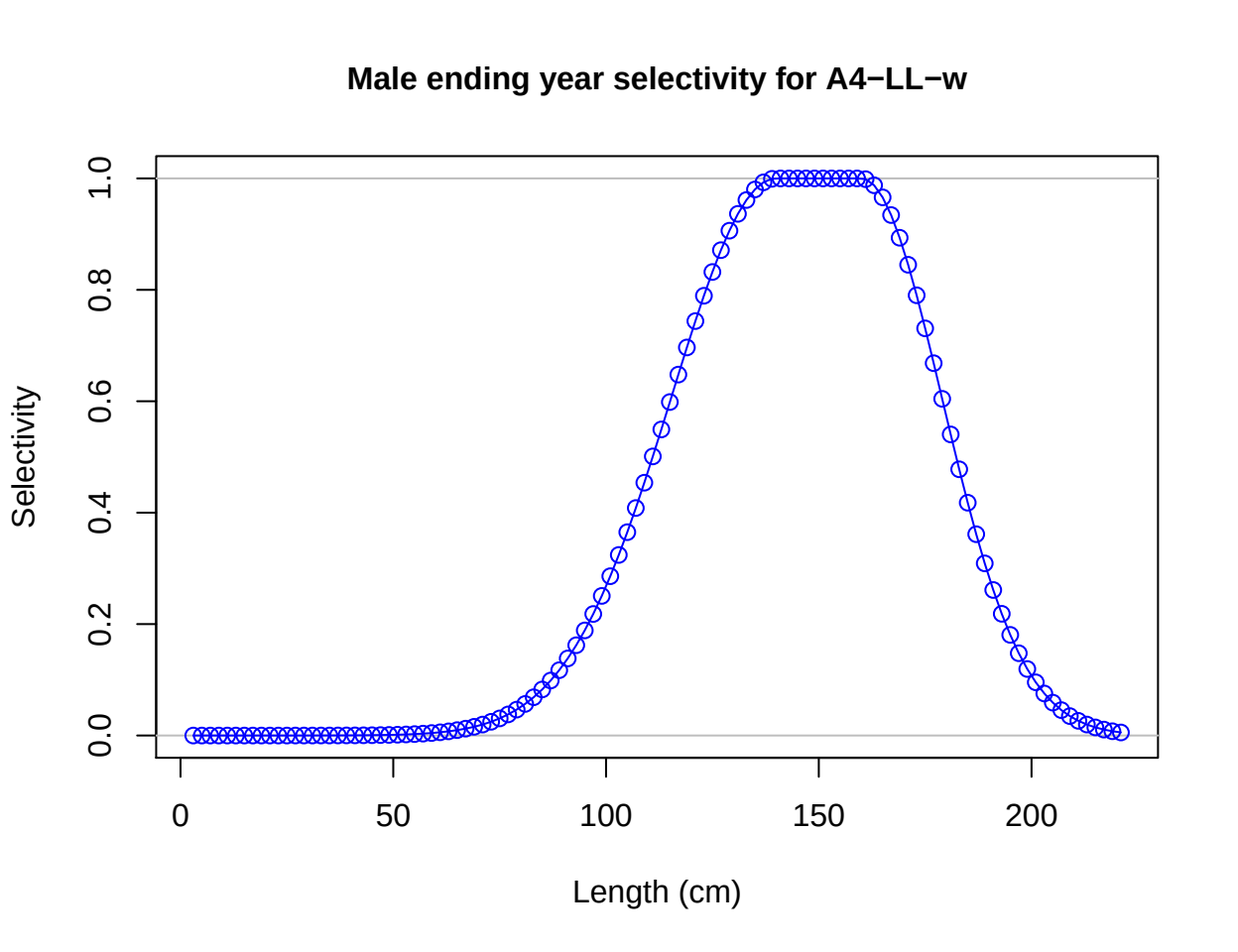



Female time−varying selectivity for A4−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
1
0.4
0.2

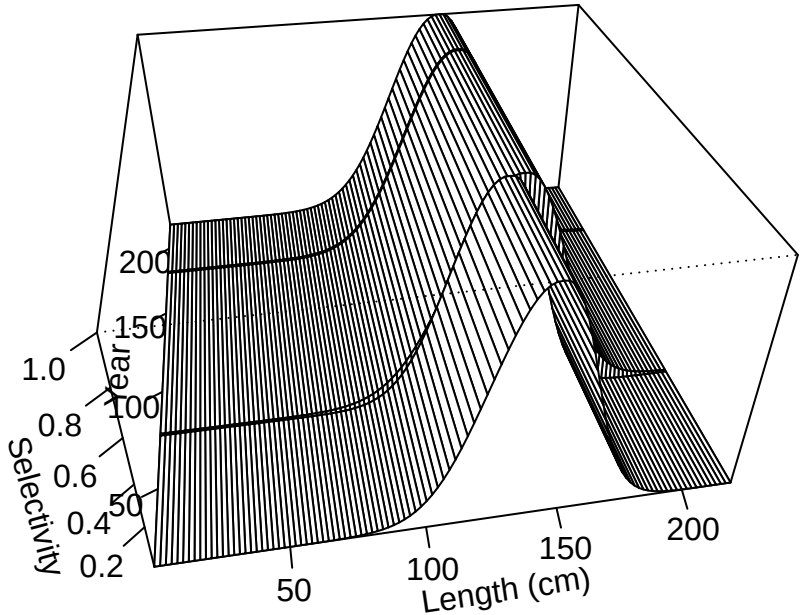

Female ending year selectivity for A4−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

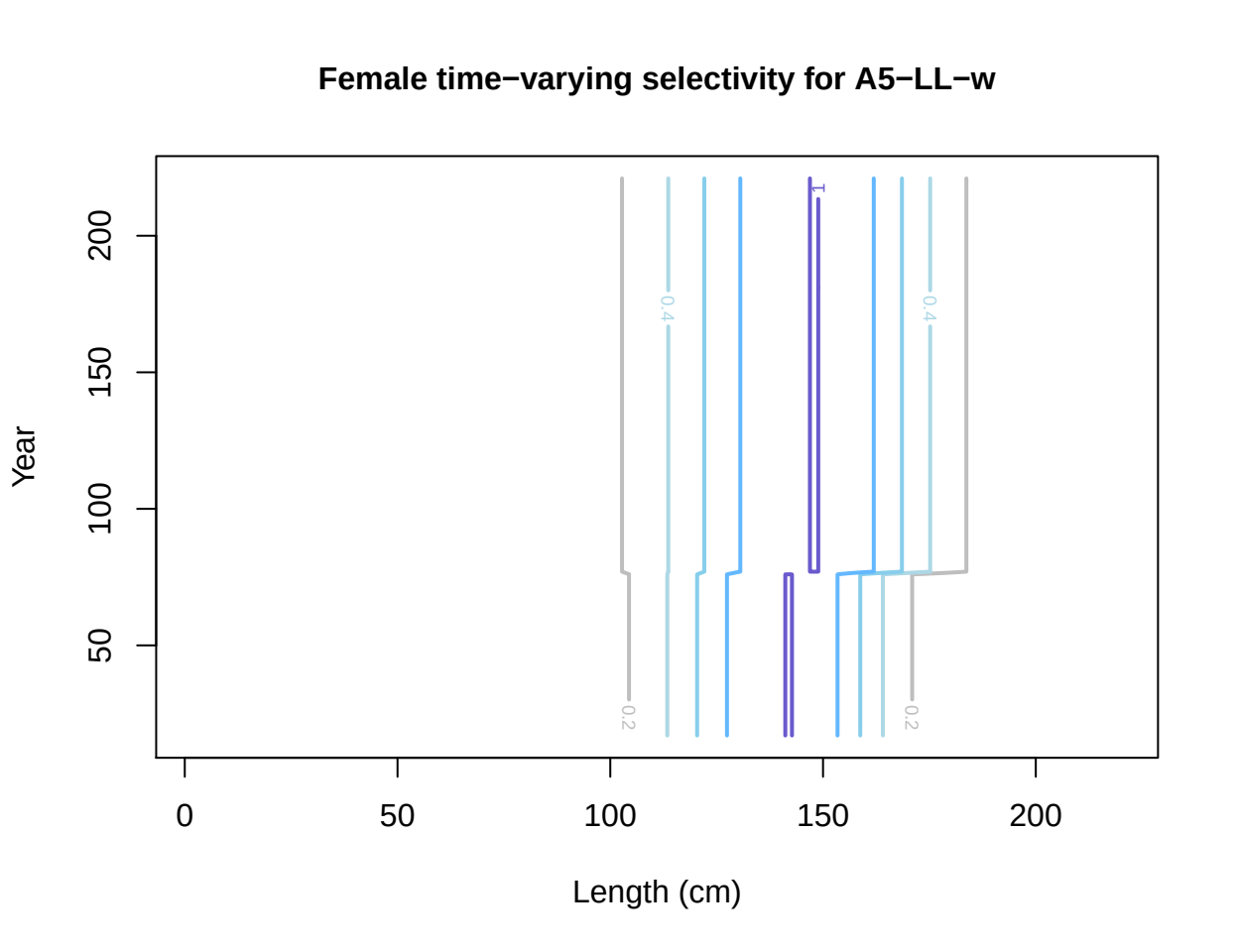

Male time−varying selectivity for A4−LL−w
Selectivity
1.0
0.8
0.6
0.4
0.2
Year
200
150
100
50
Length (cm)
50
100
150
200

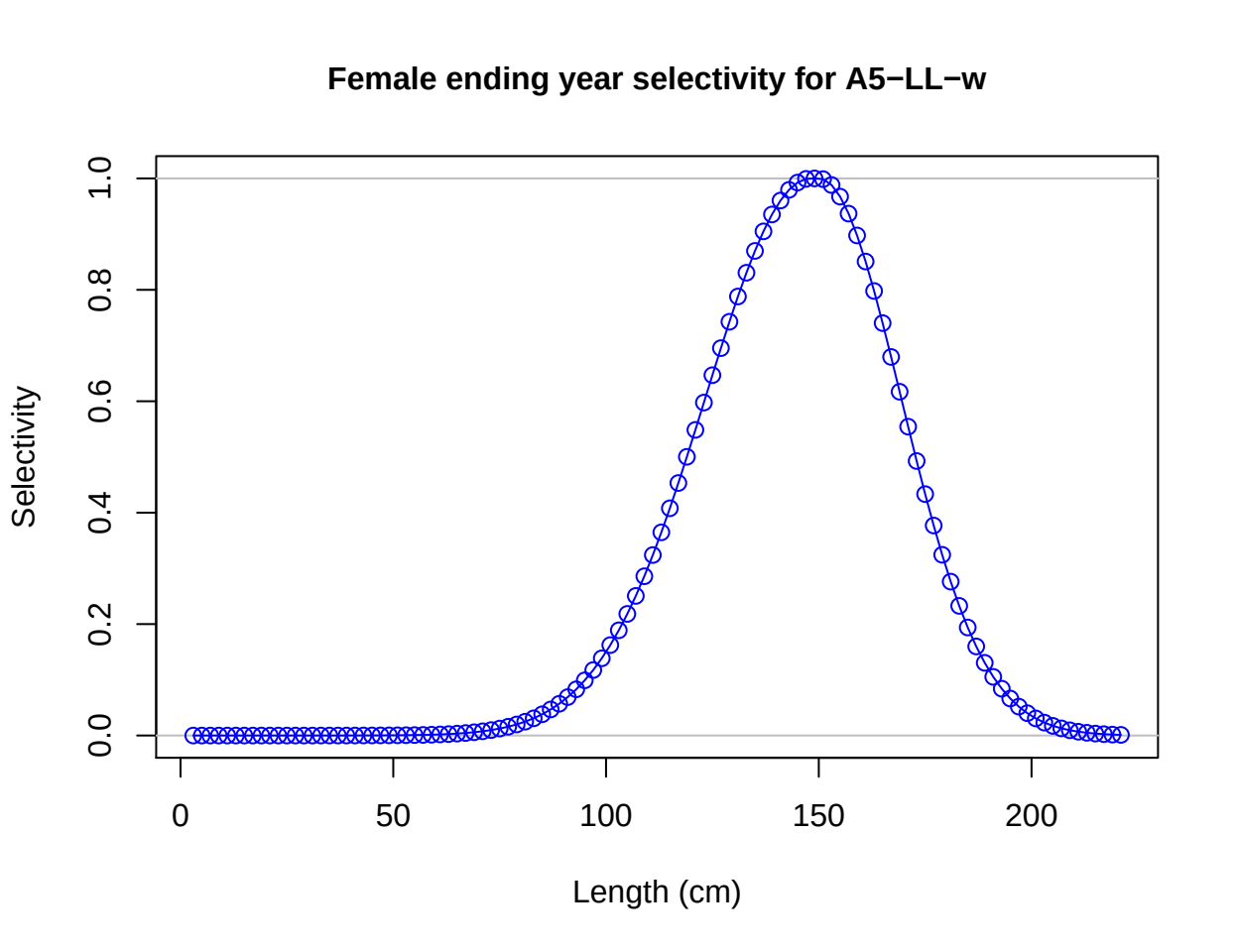

Male time−varying selectivity for A4−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.2
0.4
1
0.4
0.2

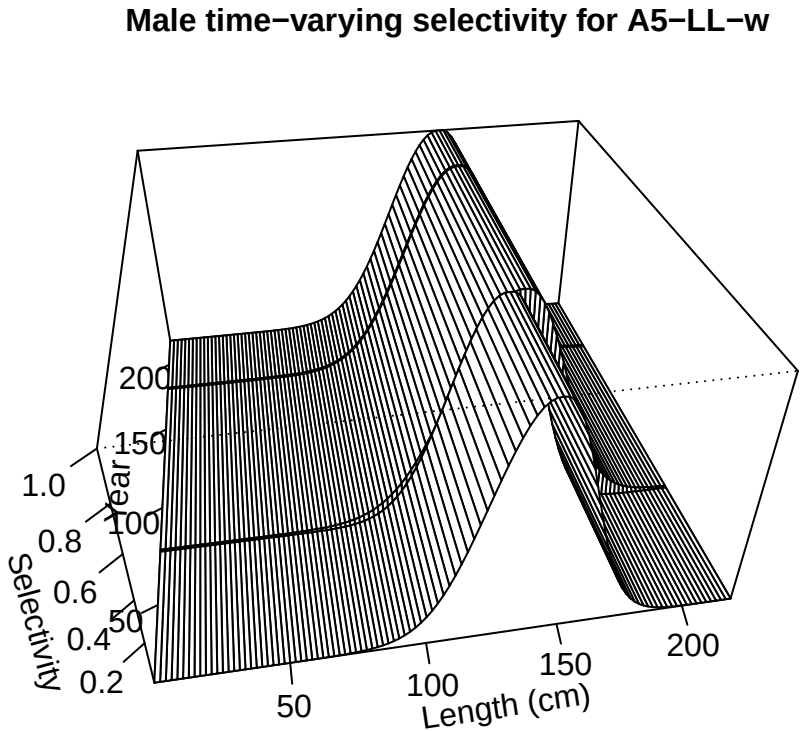

Male ending year selectivity for A4−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

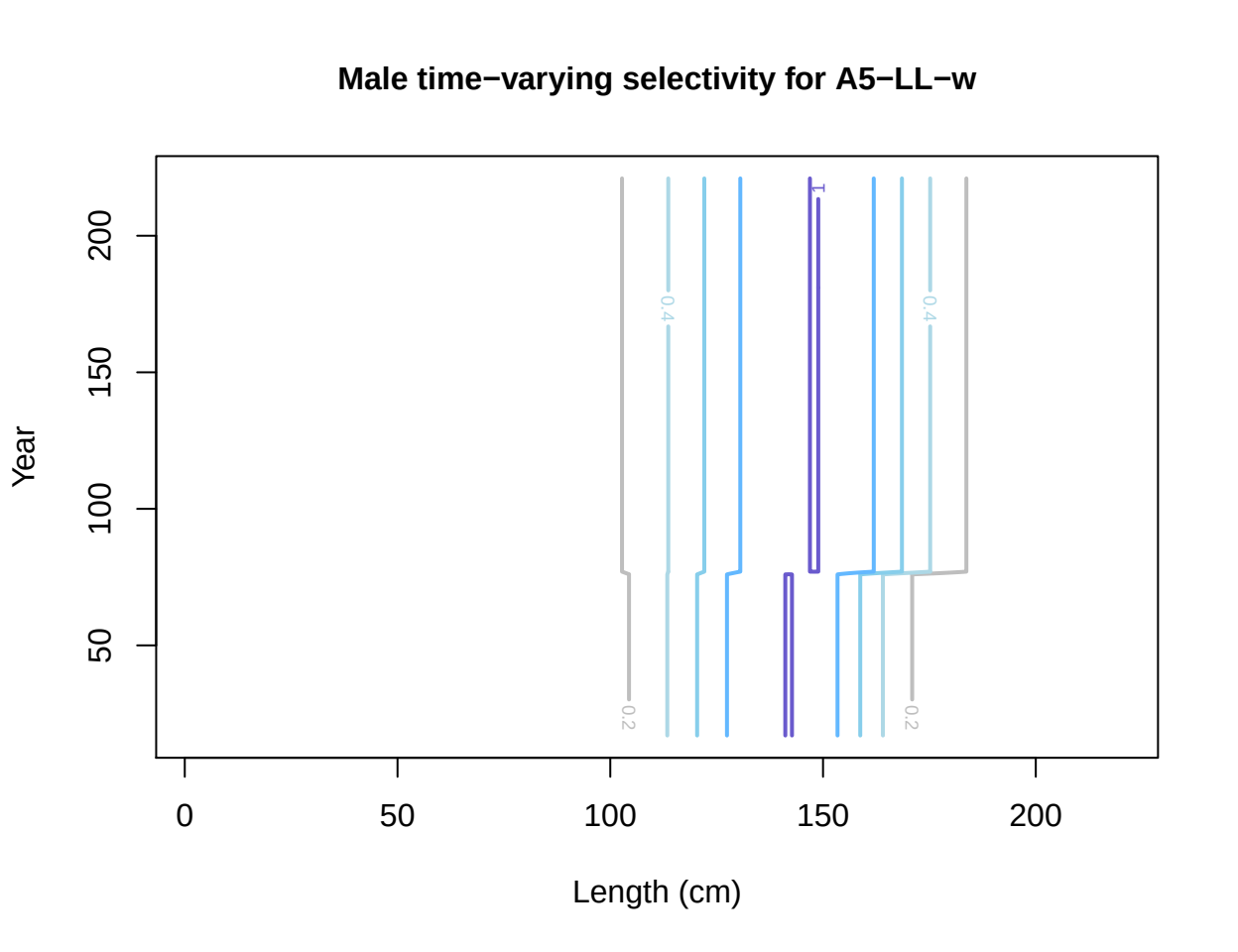
Female time−varying selectivity for A5−LL−w

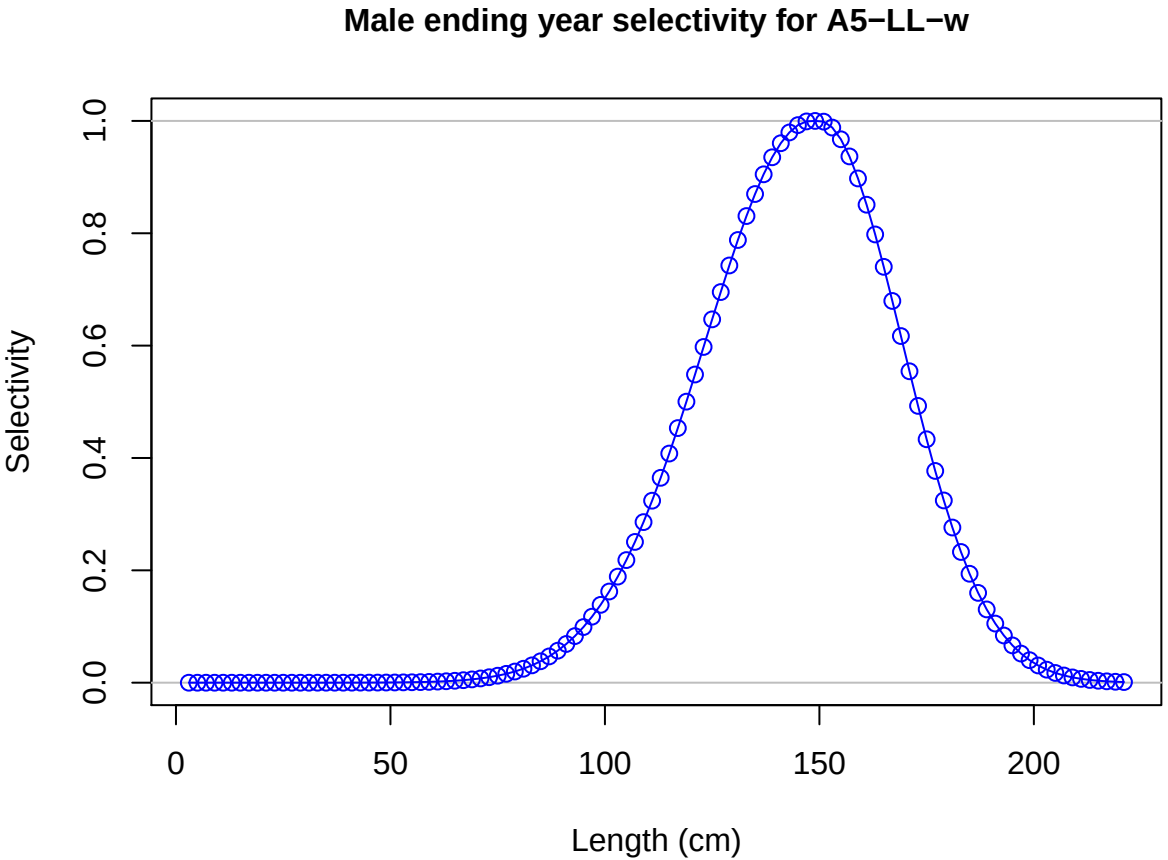



Female time−varying selectivity for A5−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
1
0.4
0.4
0.2
0.2

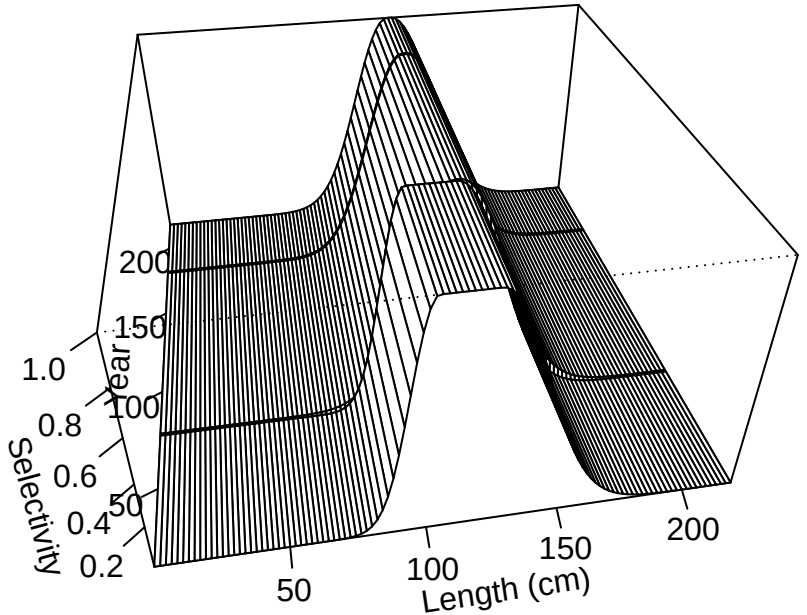

Female ending year selectivity for A5−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

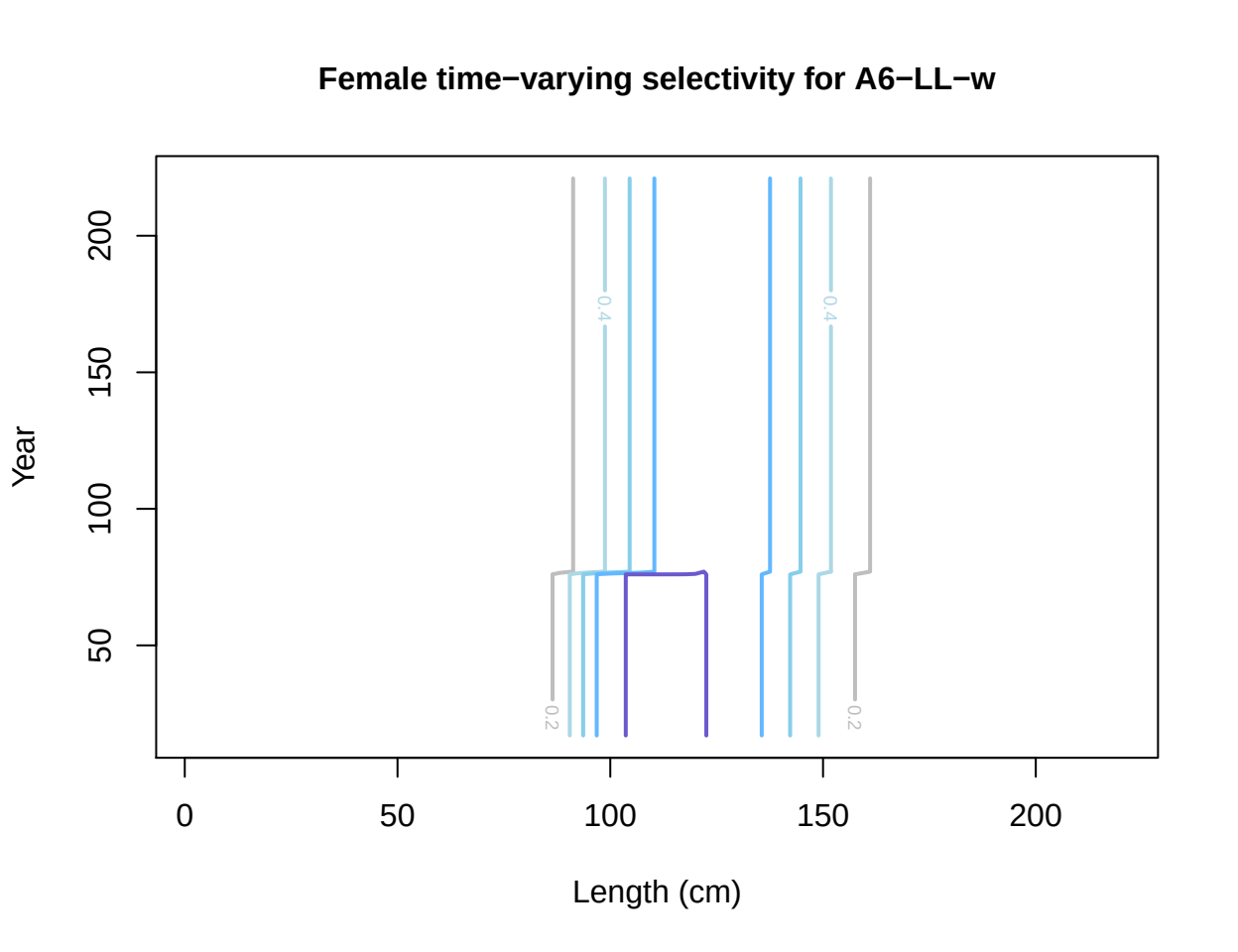

Male time−varying selectivity for A5−LL−w
Selectivity
1.0
0.8
0.6
0.4
0.2
Year
200
150
100
50
Length (cm)
50
100
150
200

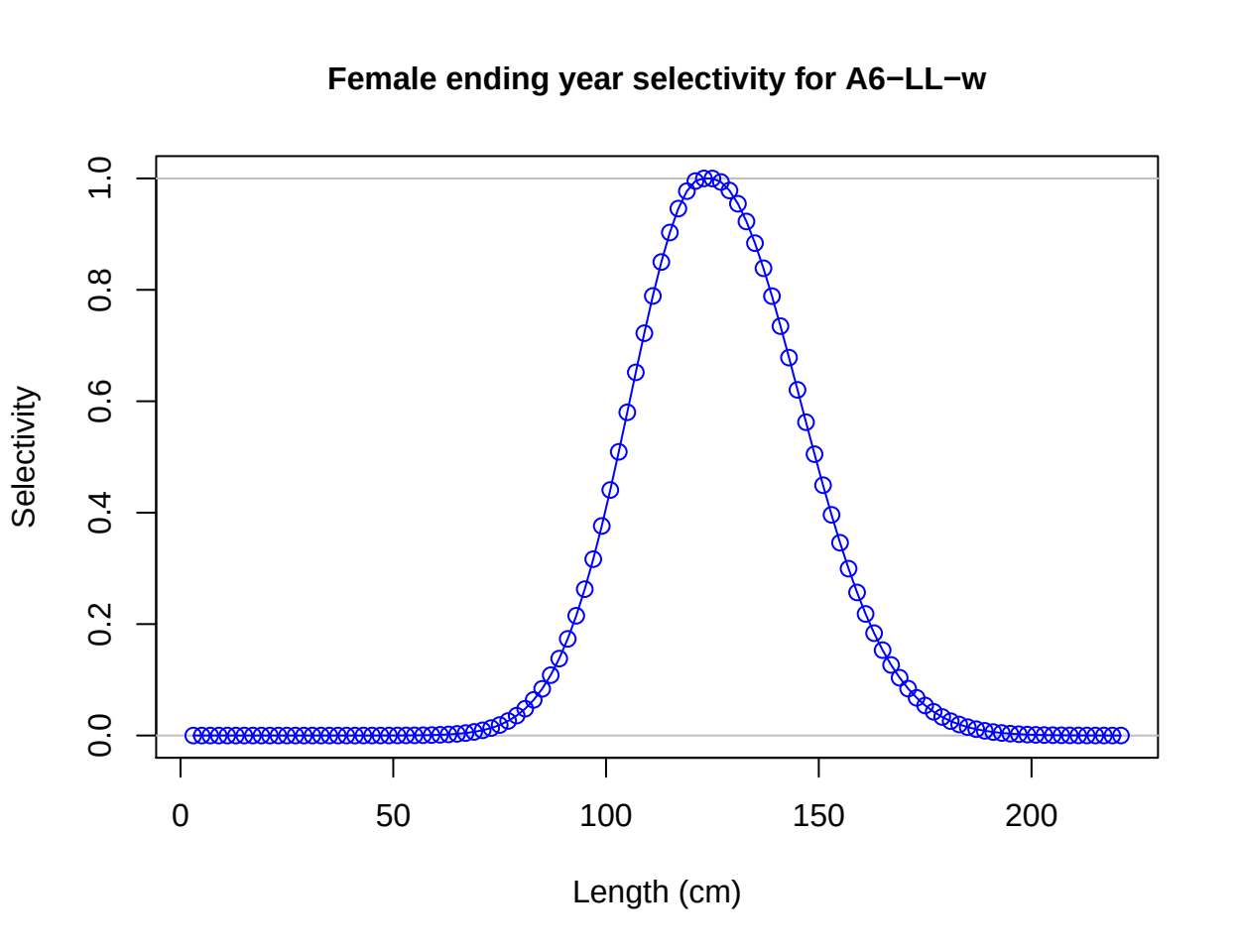

Male time−varying selectivity for A5−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
1
0.4
0.4
0.2
0.2


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)

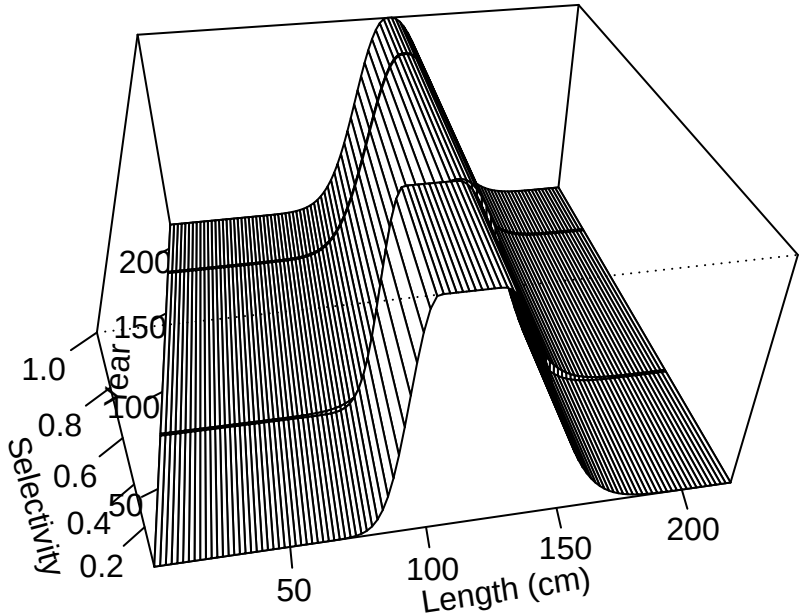
Female time−varying selectivity for A6−LL−w

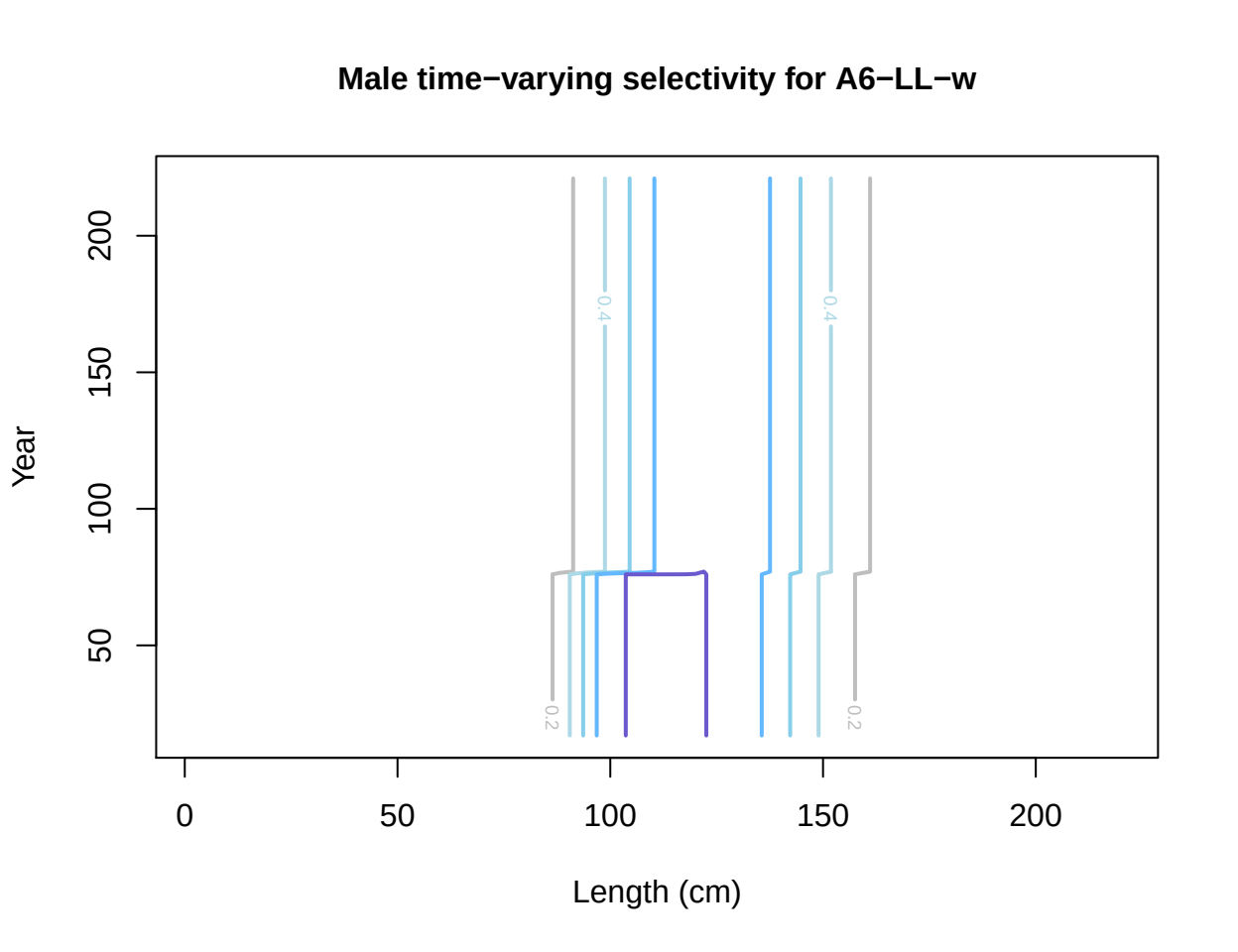


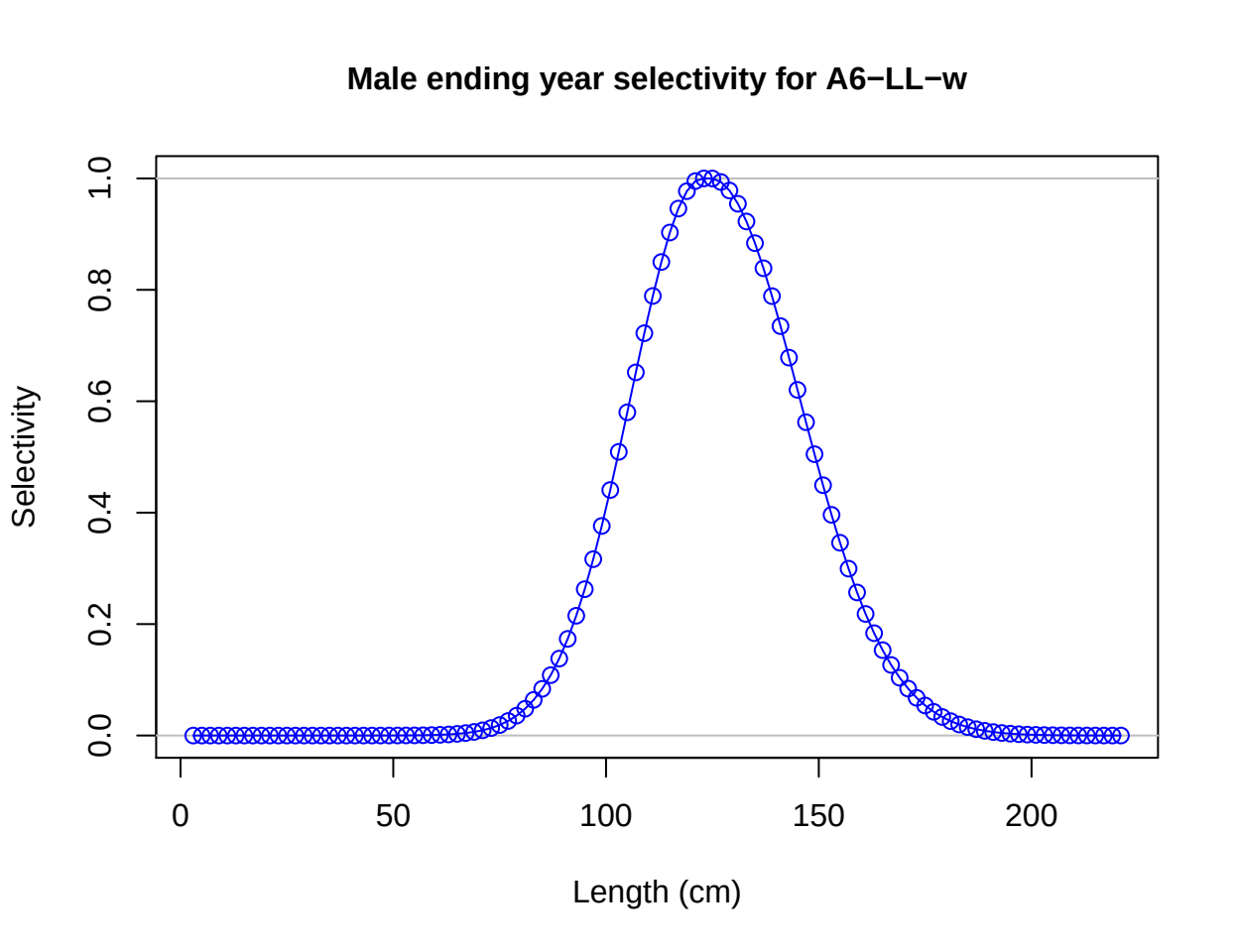

Female time−varying selectivity for A6−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
0.2
0.2

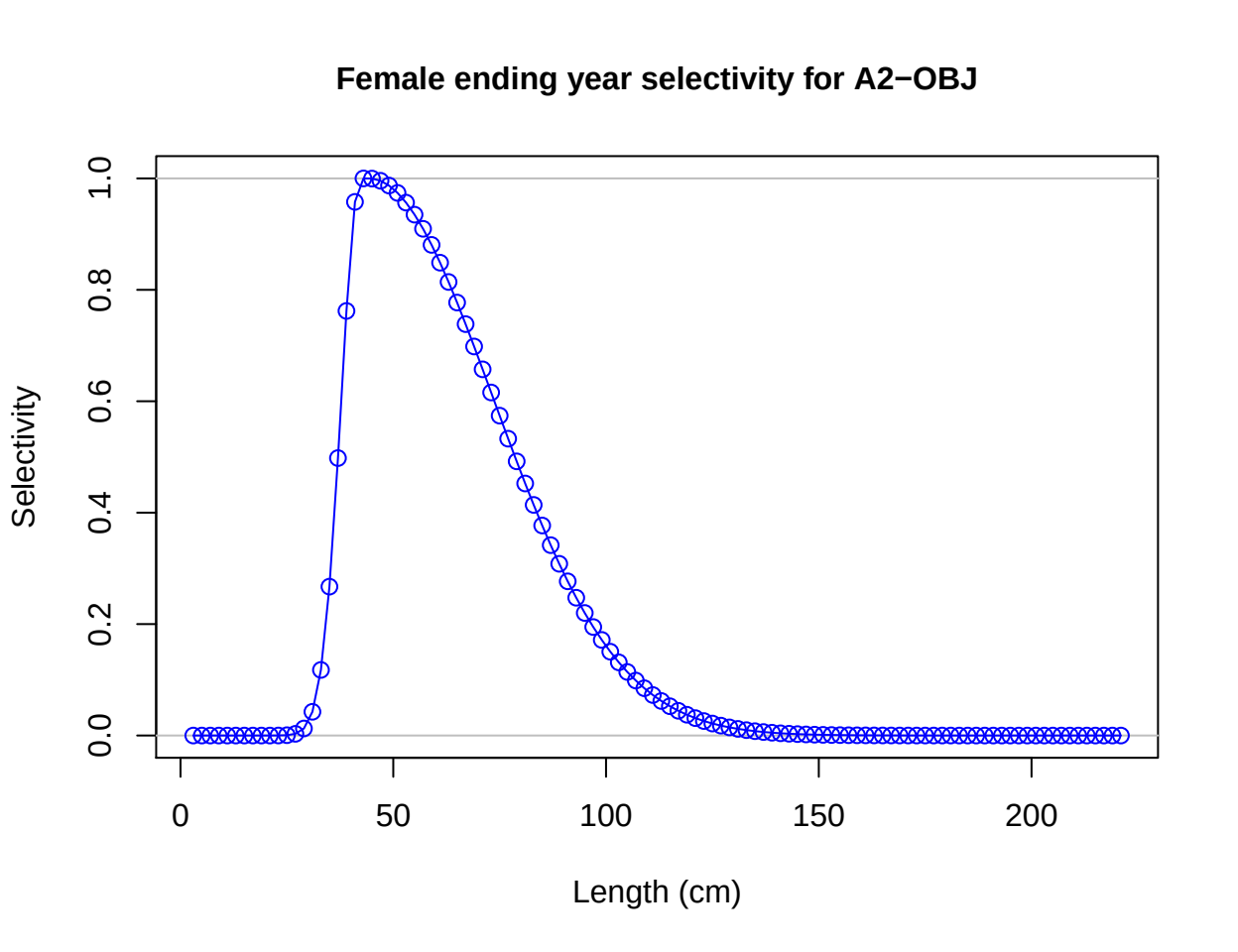

Female ending year selectivity for A6−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

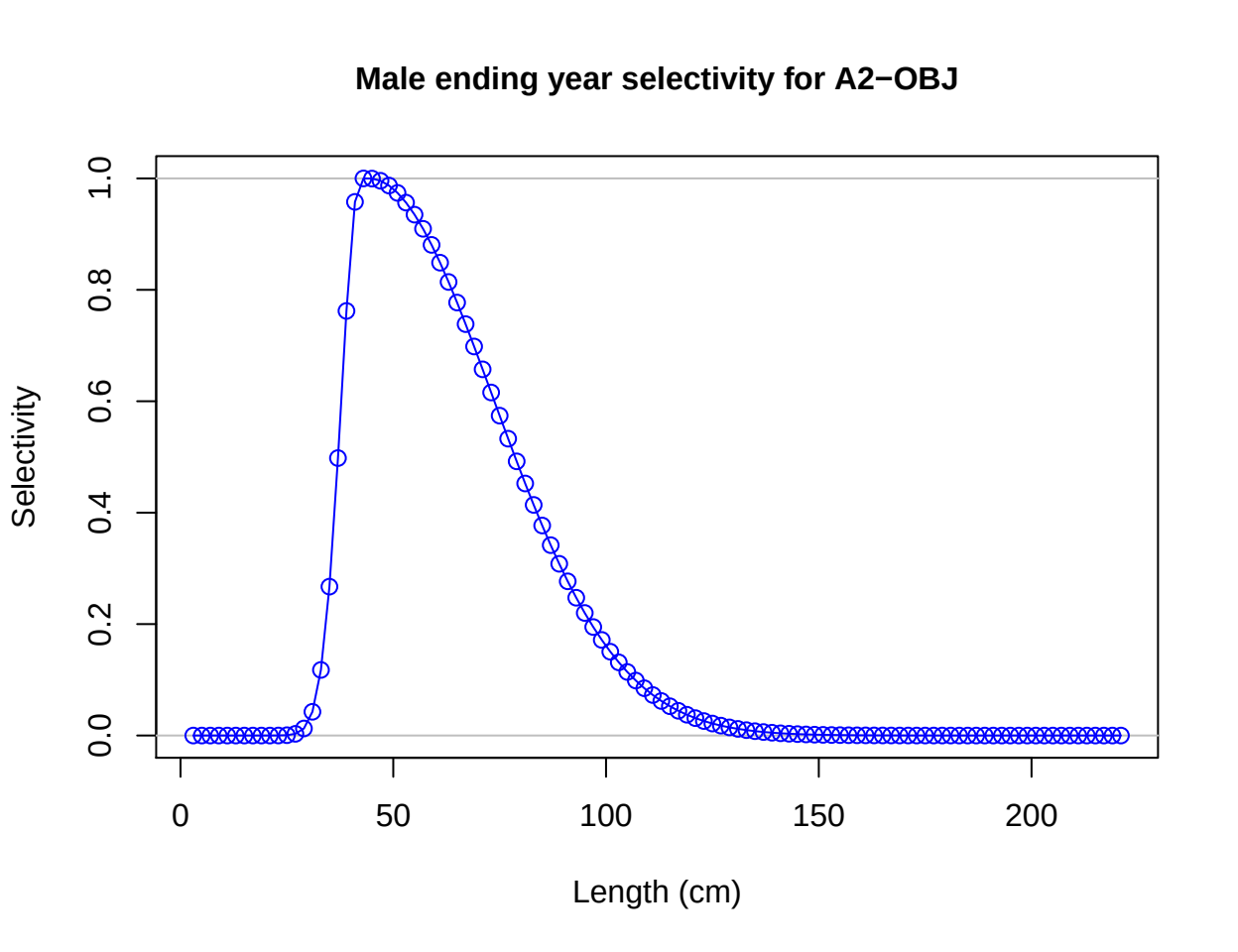
Male time−varying selectivity for A6−LL−w

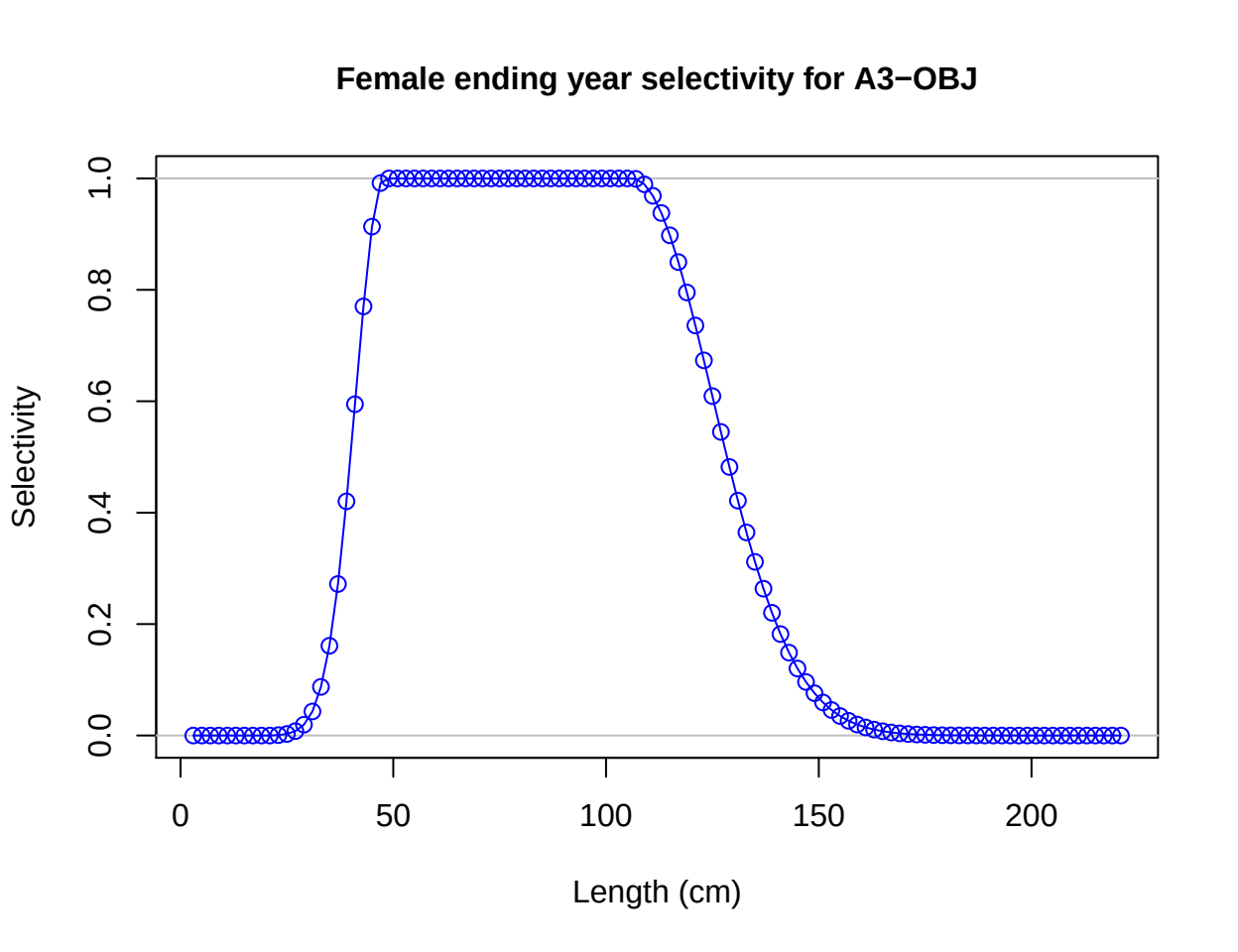


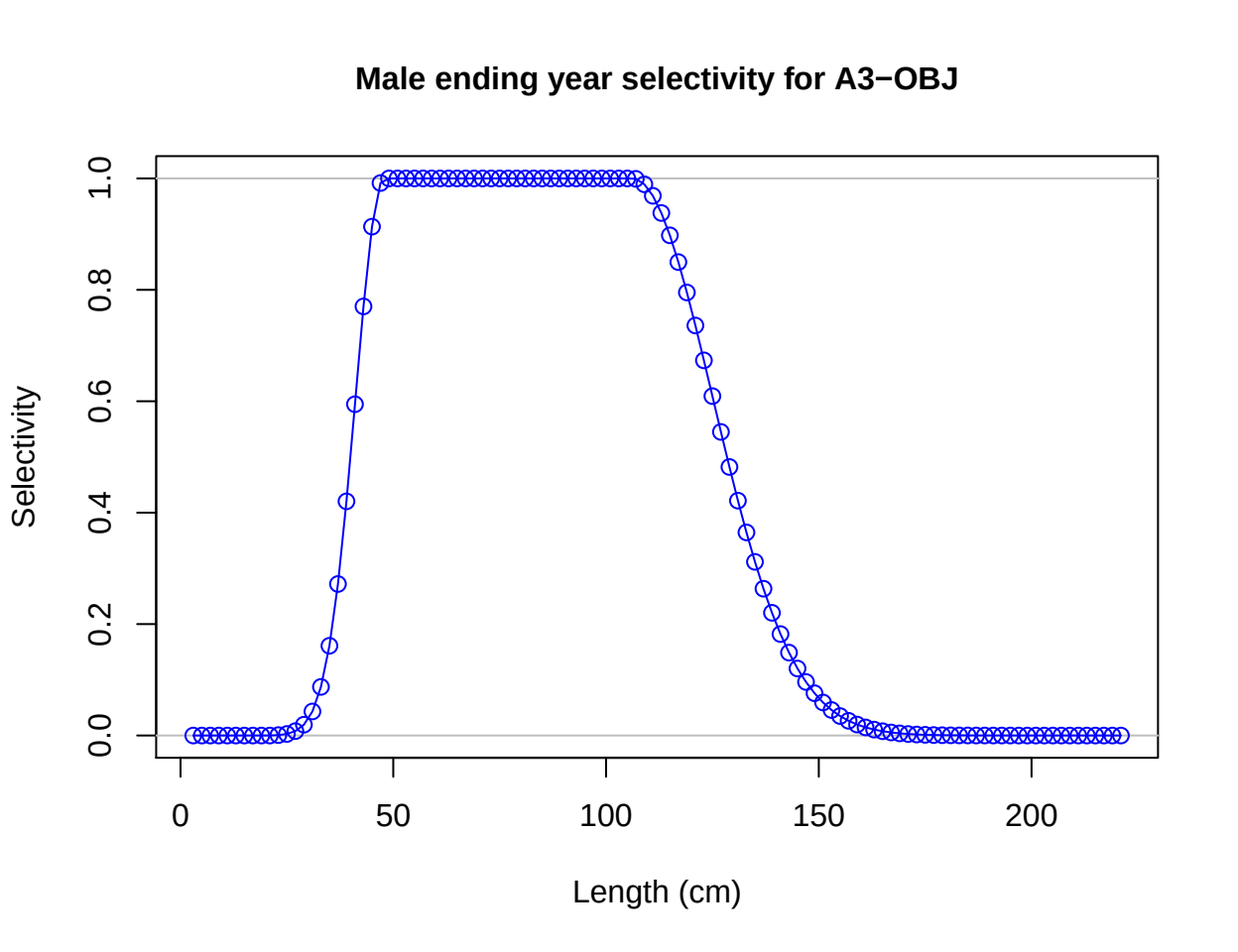

Male time−varying selectivity for A6−LL−w
Year
50
100
150
200
0
50
100
150
200
Length (cm)
0.4
0.4
0.2
0.2

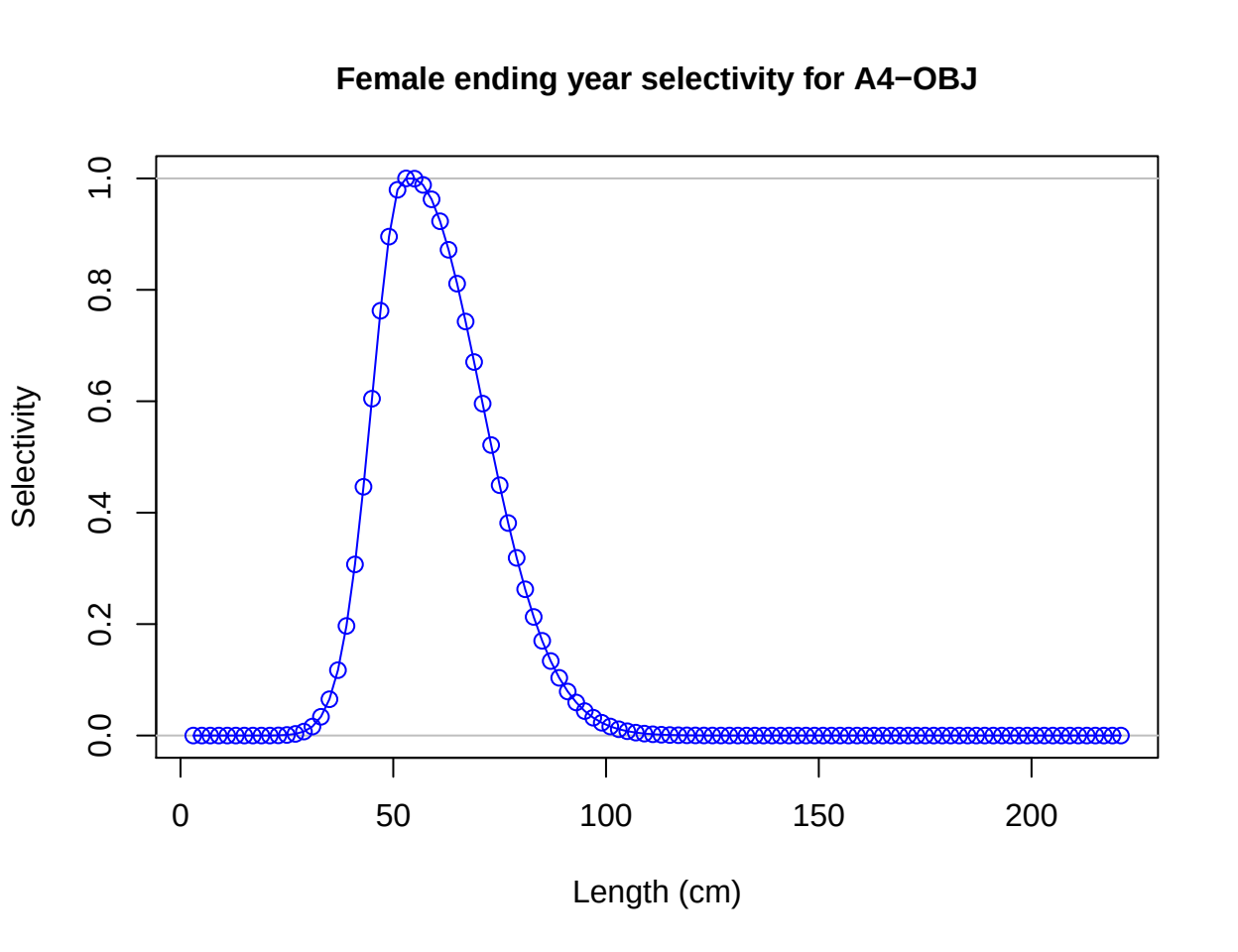

Male ending year selectivity for A6−LL−w
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

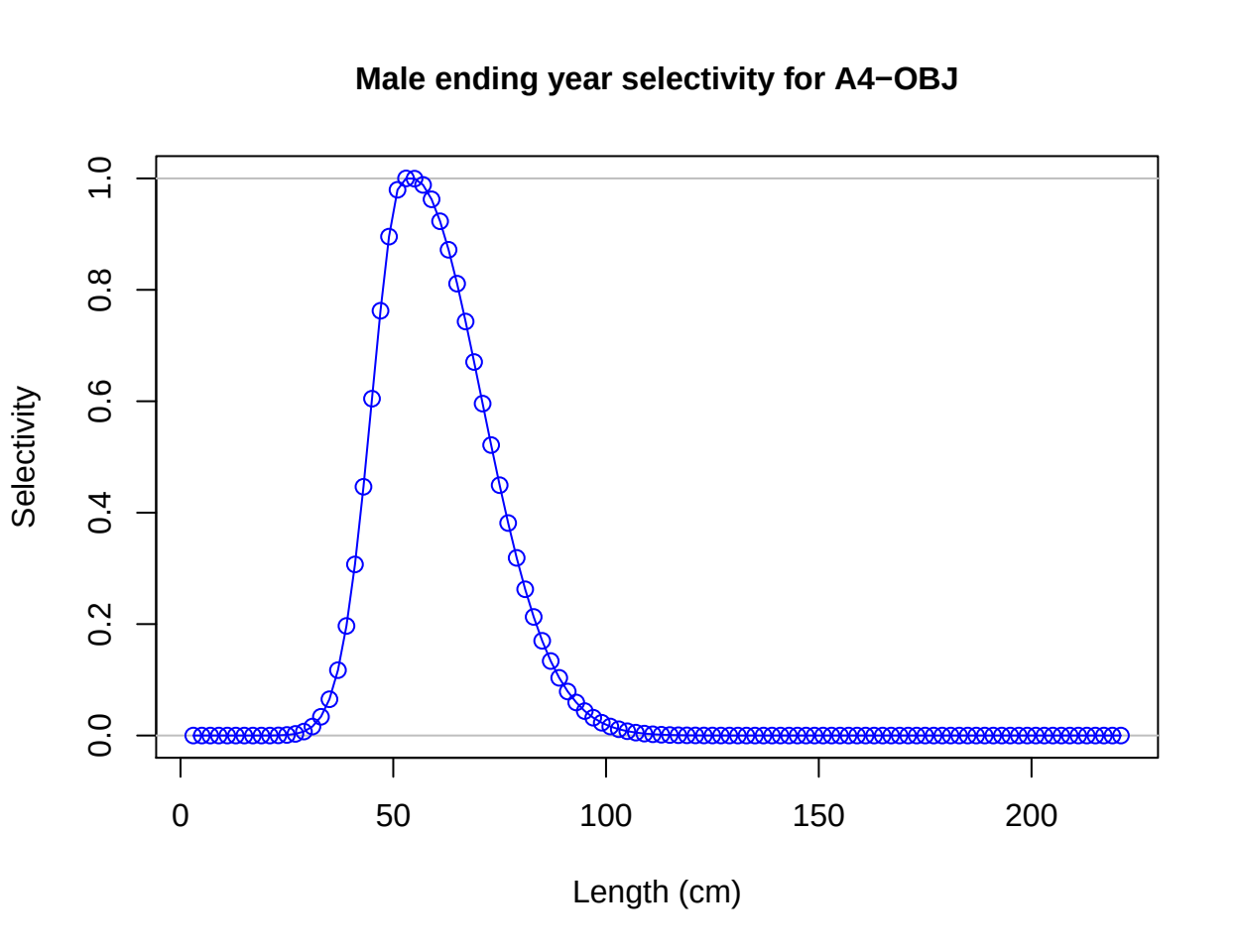

Female ending year selectivity for A2−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

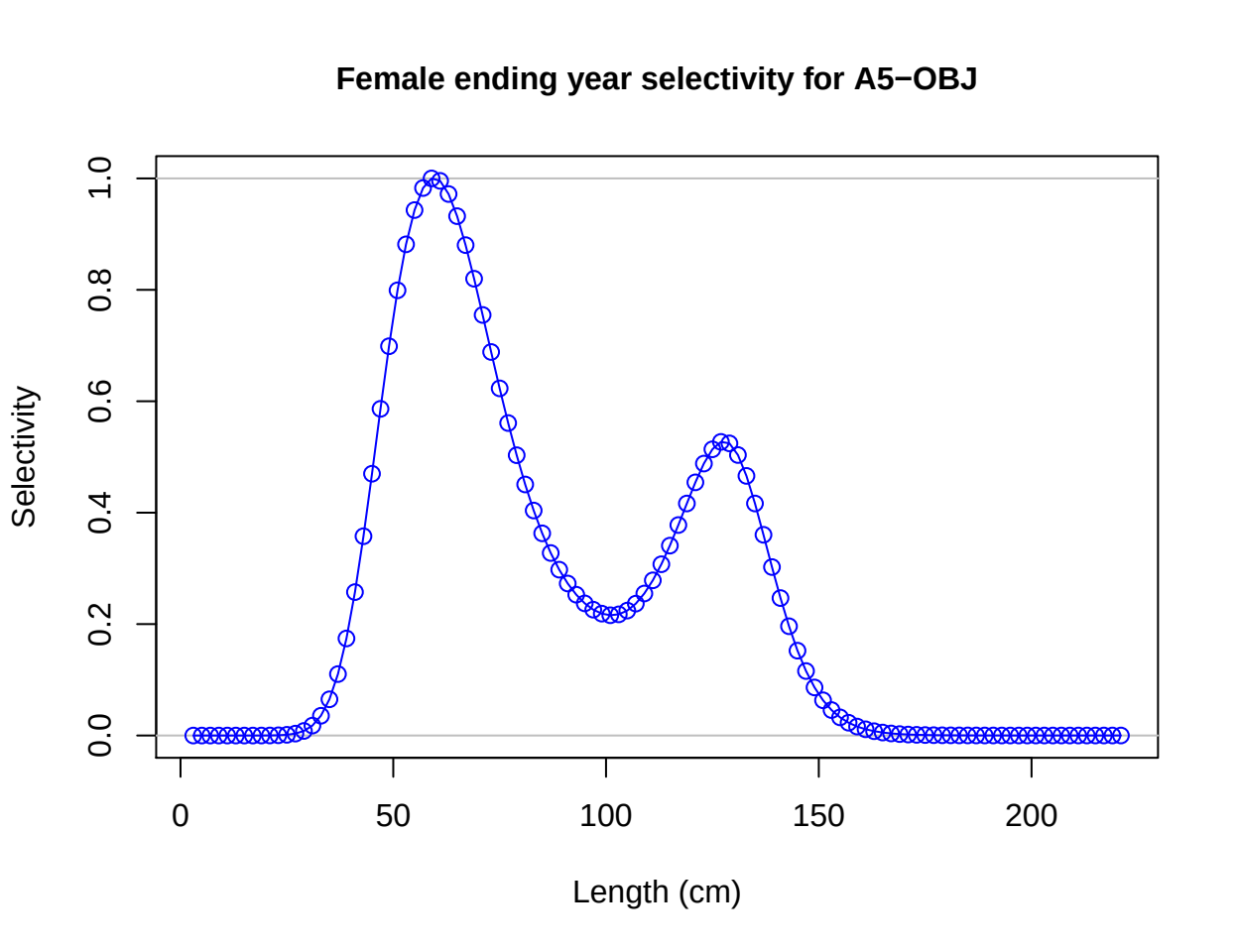

Male ending year selectivity for A2−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

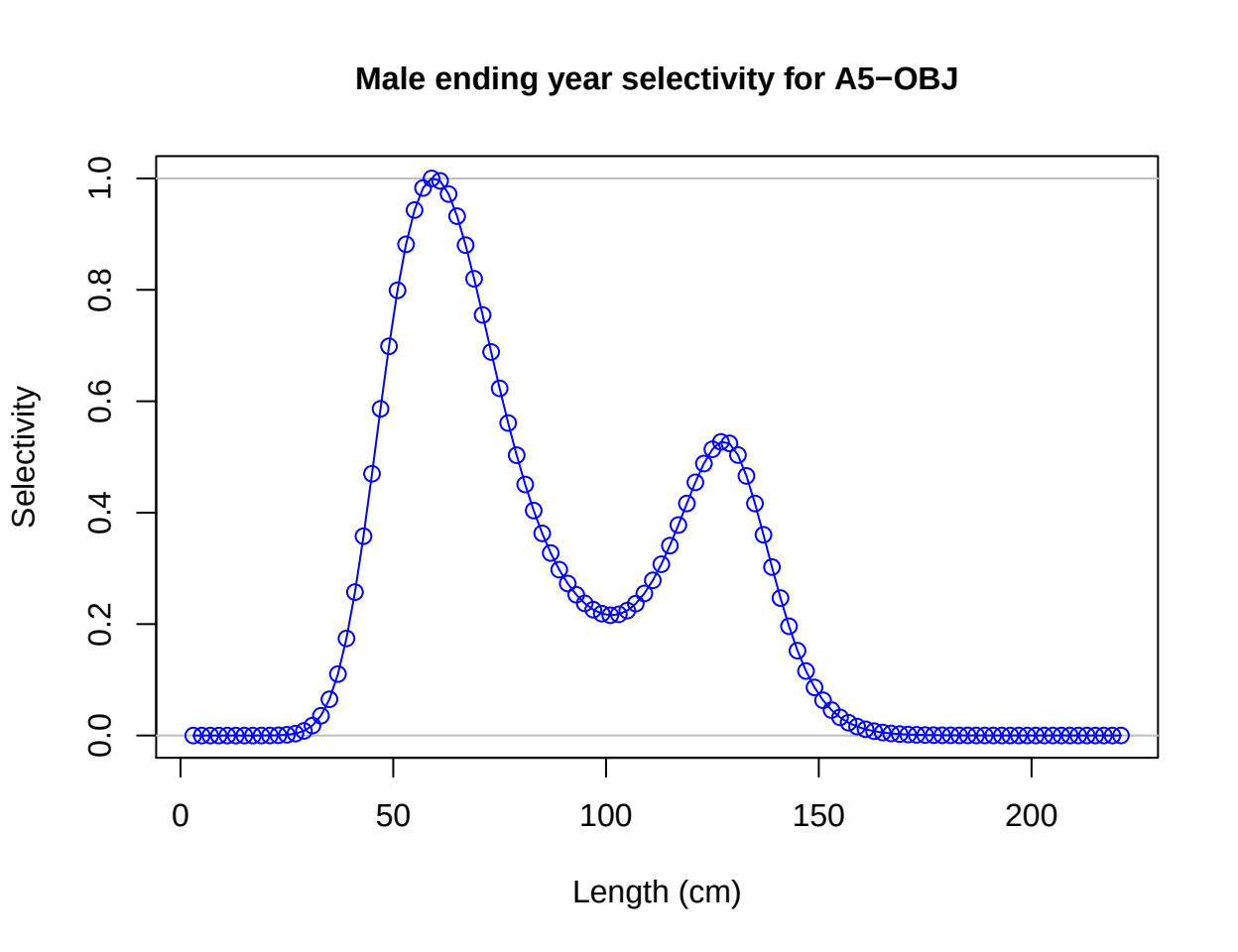

Female ending year selectivity for A3−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

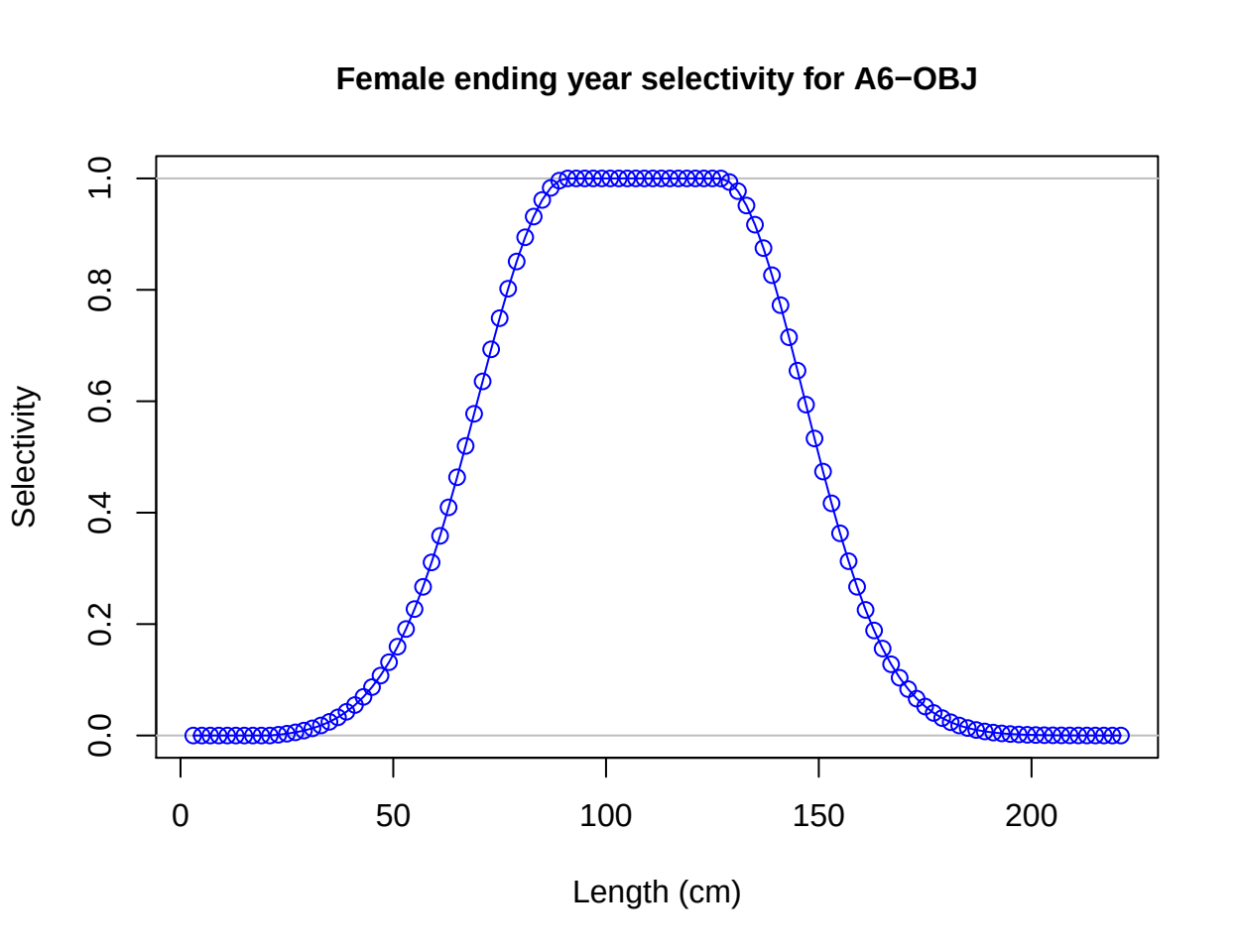

Male ending year selectivity for A3−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

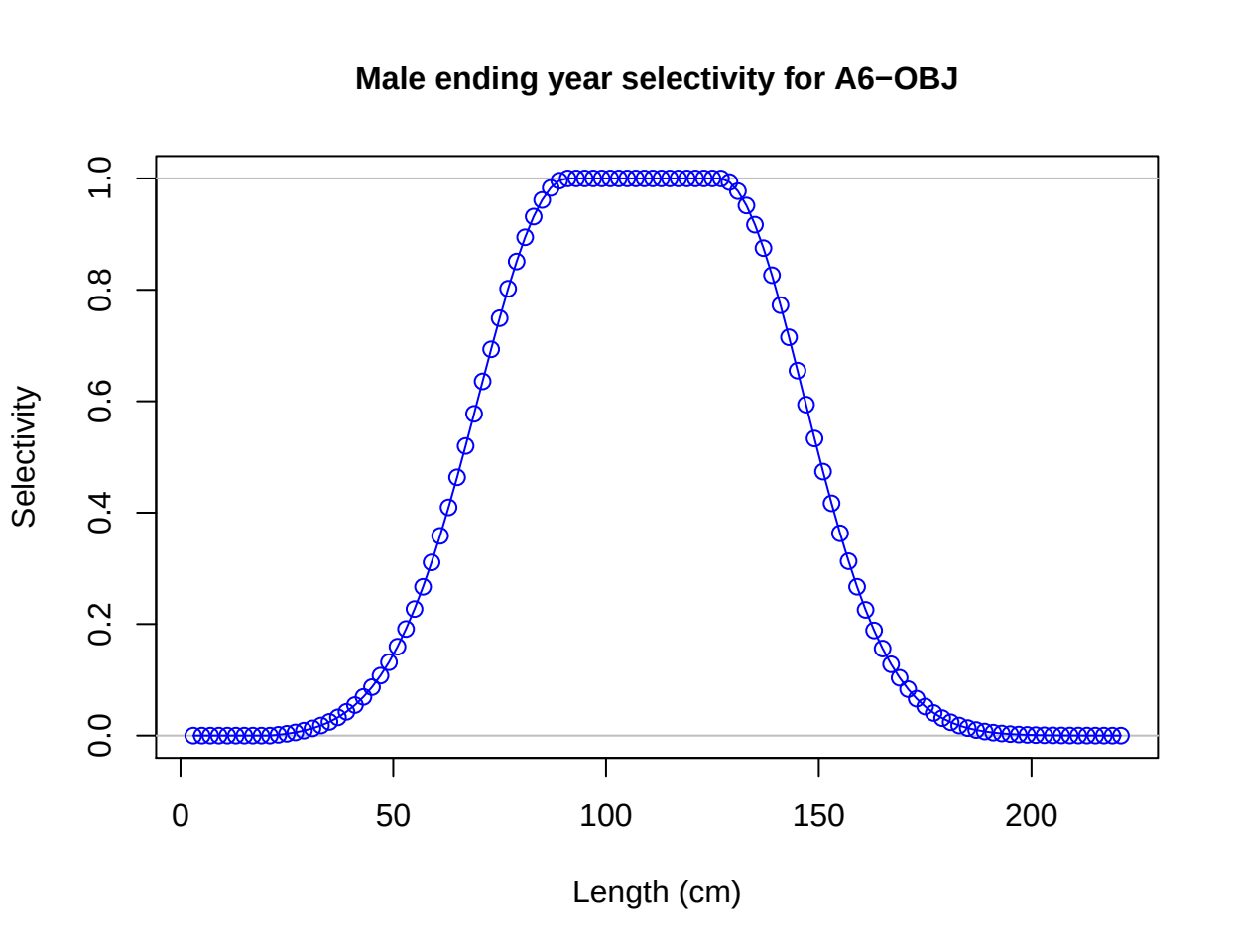

Female ending year selectivity for A4−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

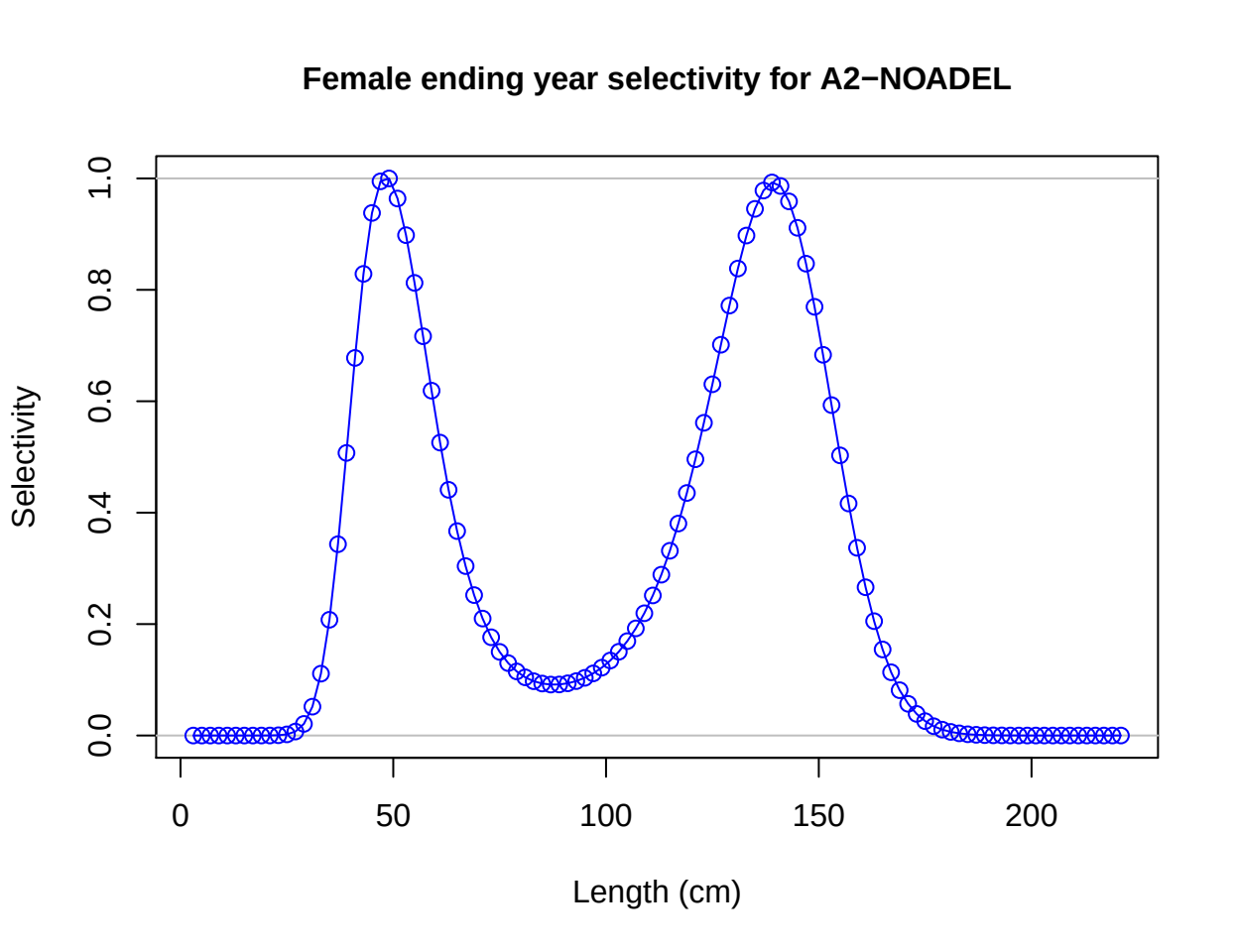

Male ending year selectivity for A4−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

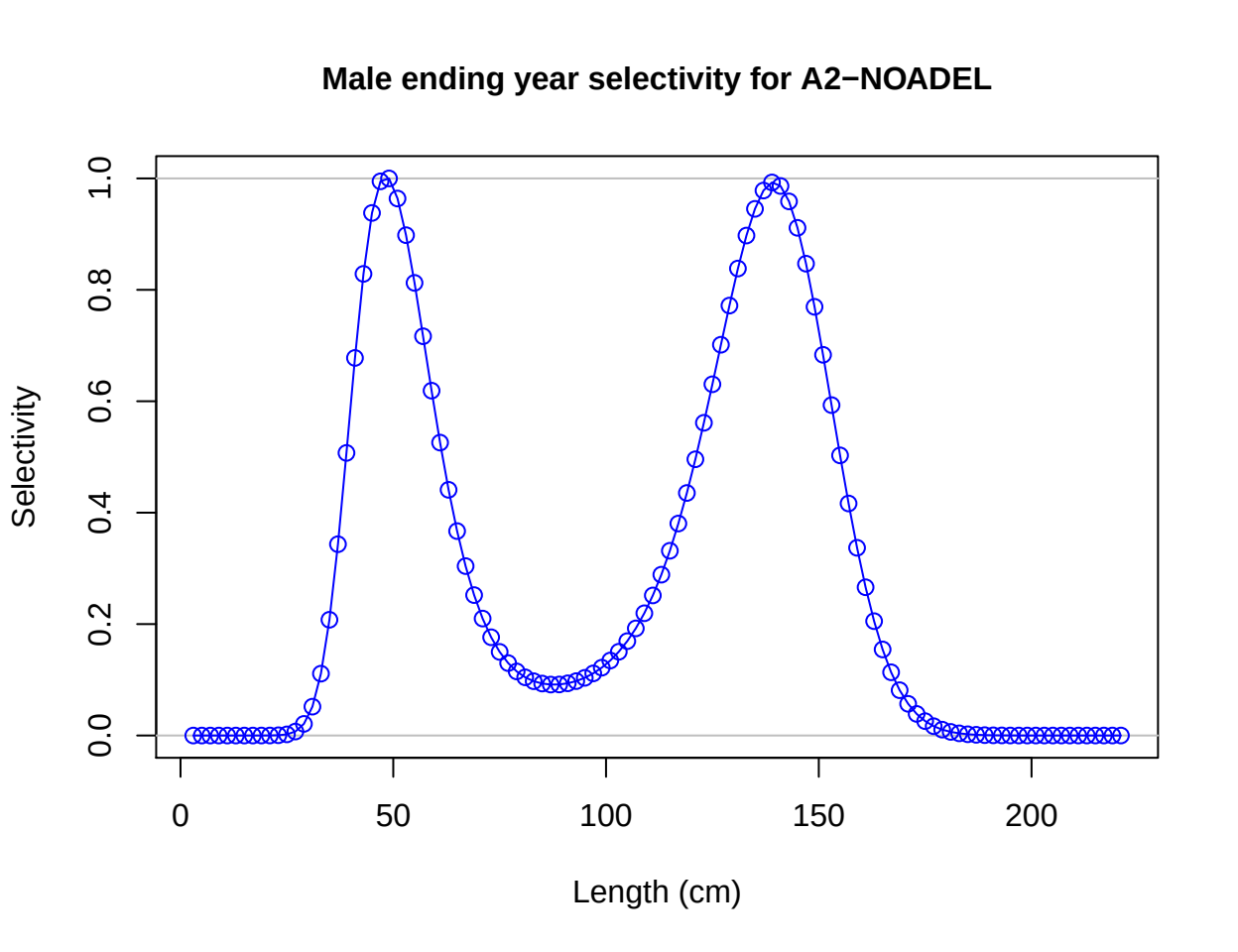

Female ending year selectivity for A5−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

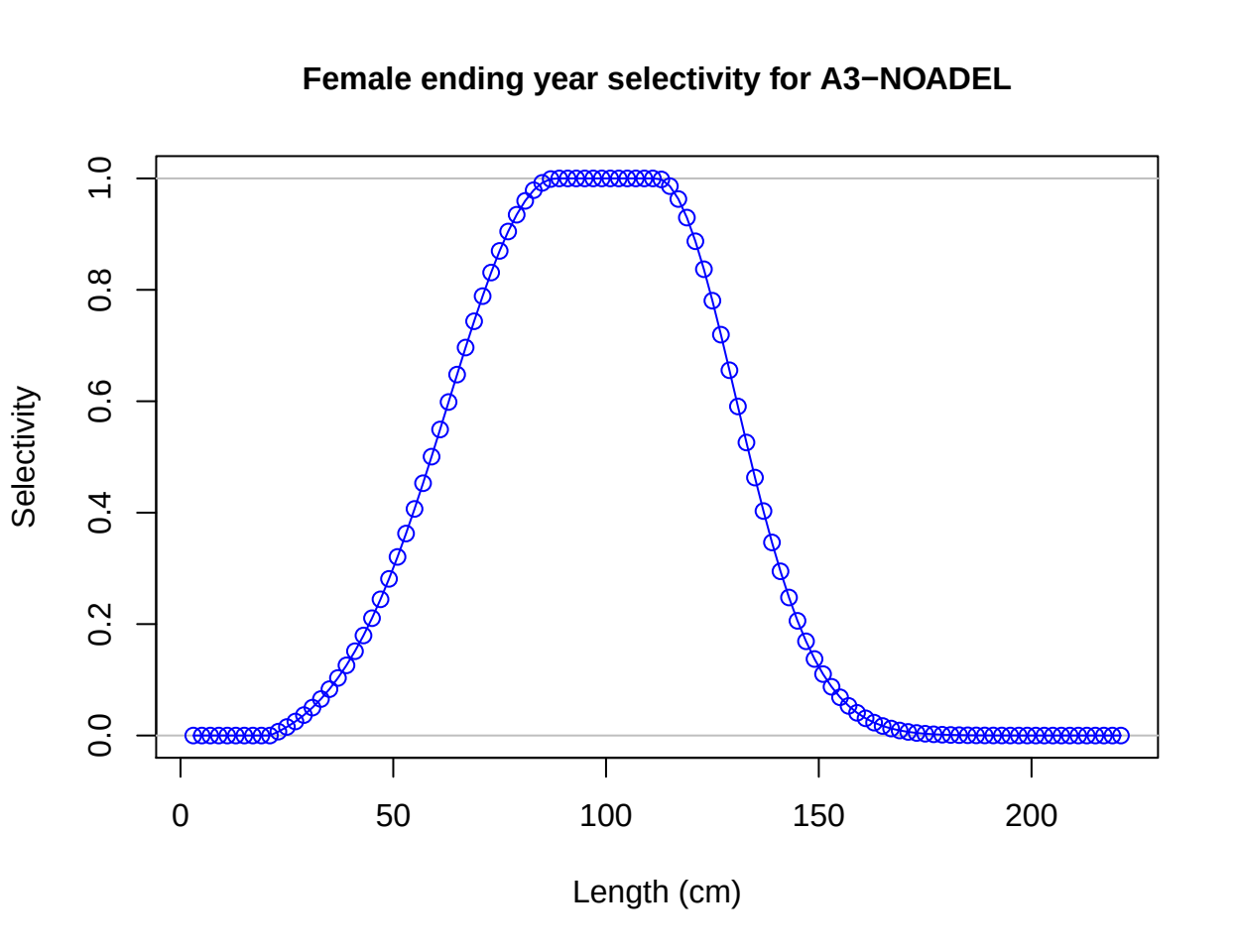

Male ending year selectivity for A5−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

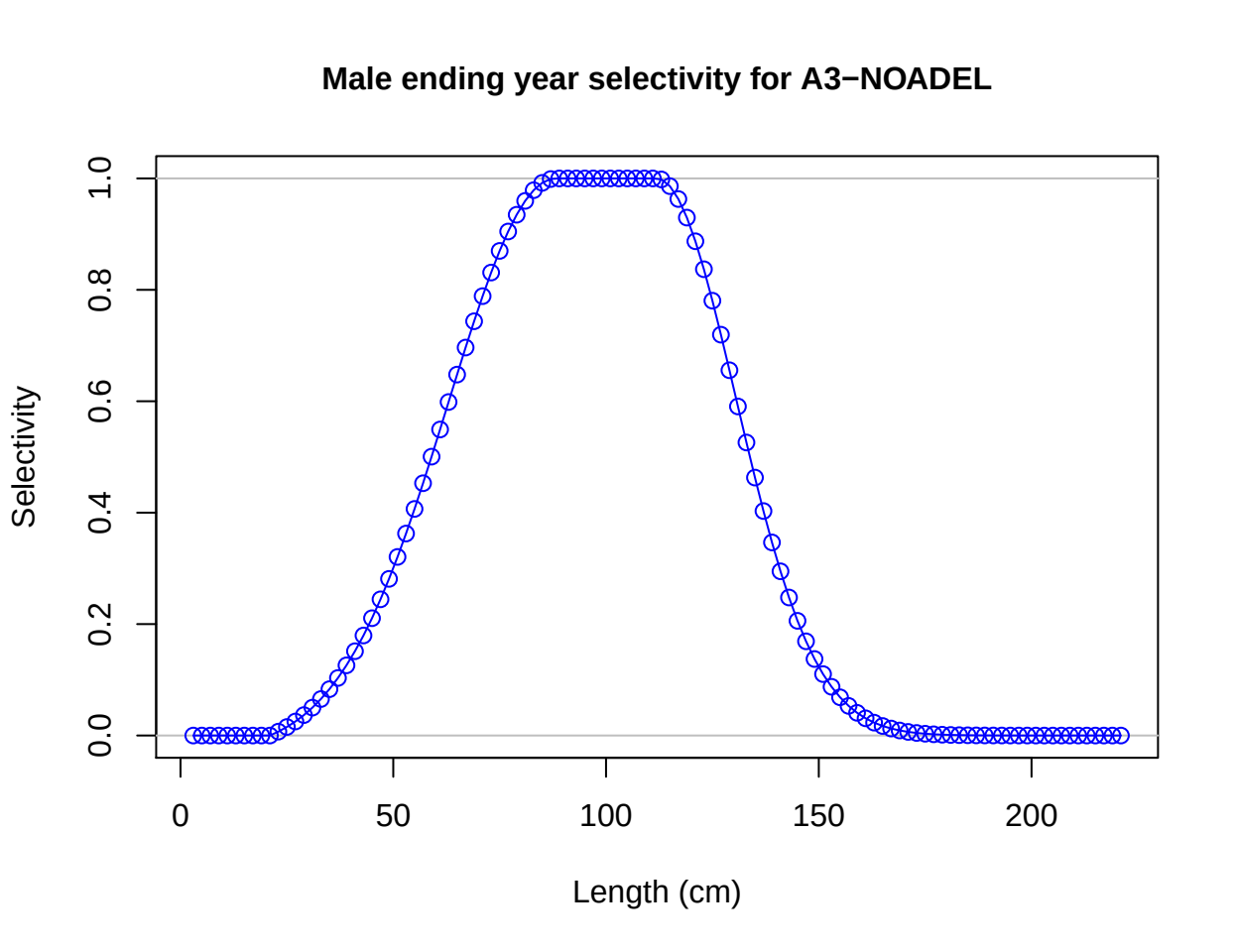

Female ending year selectivity for A6−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

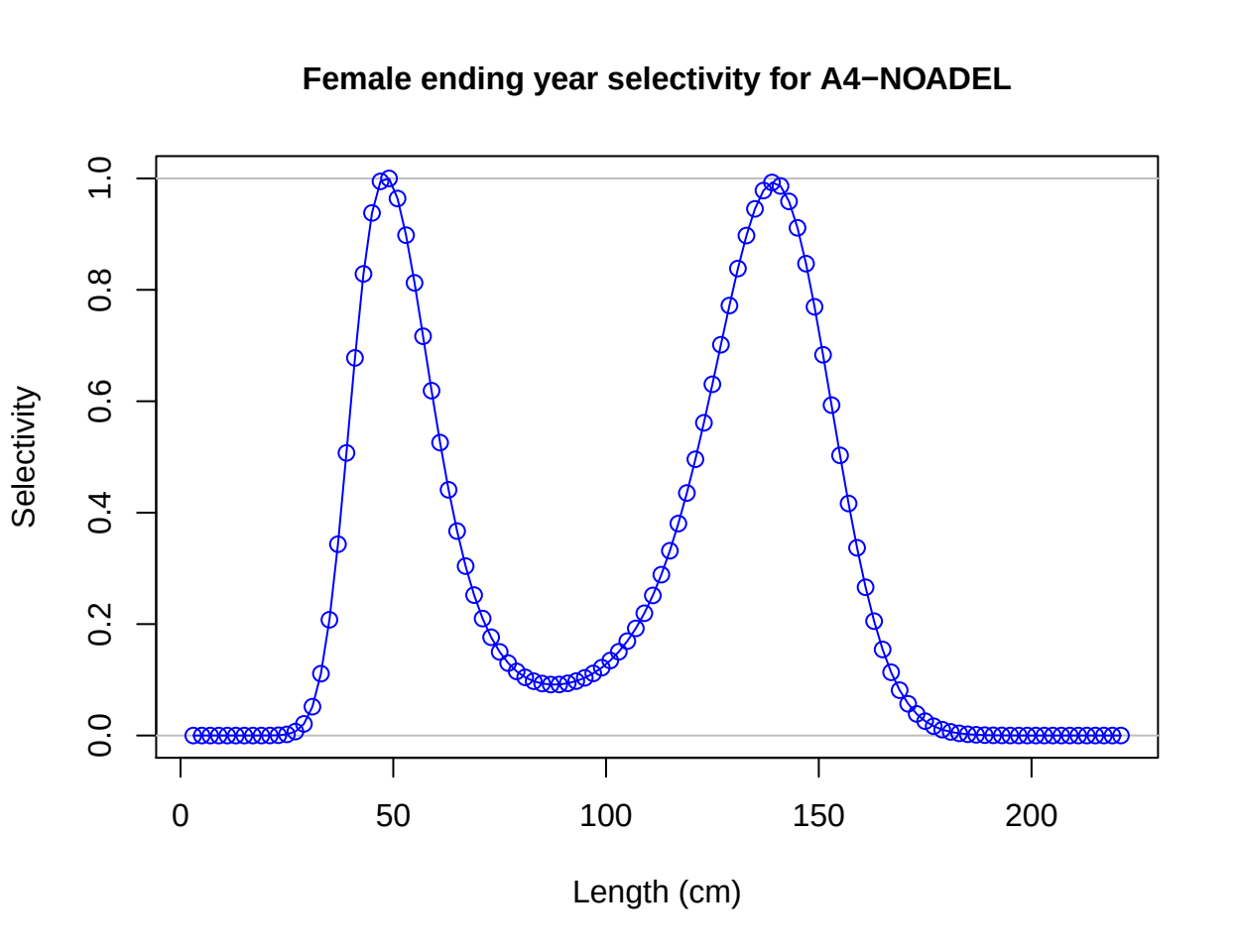

Male ending year selectivity for A6−OBJ
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

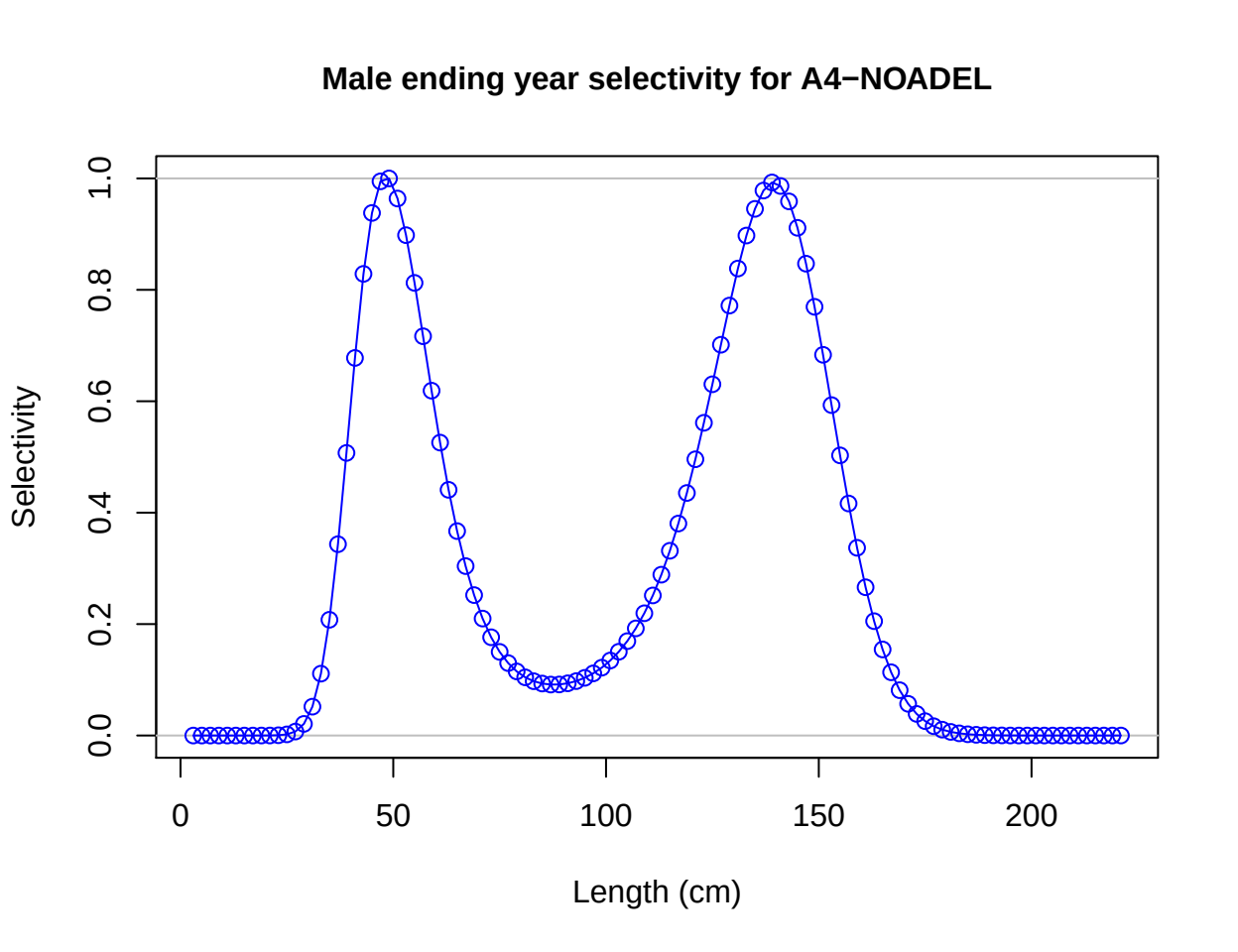

Female ending year selectivity for A2−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

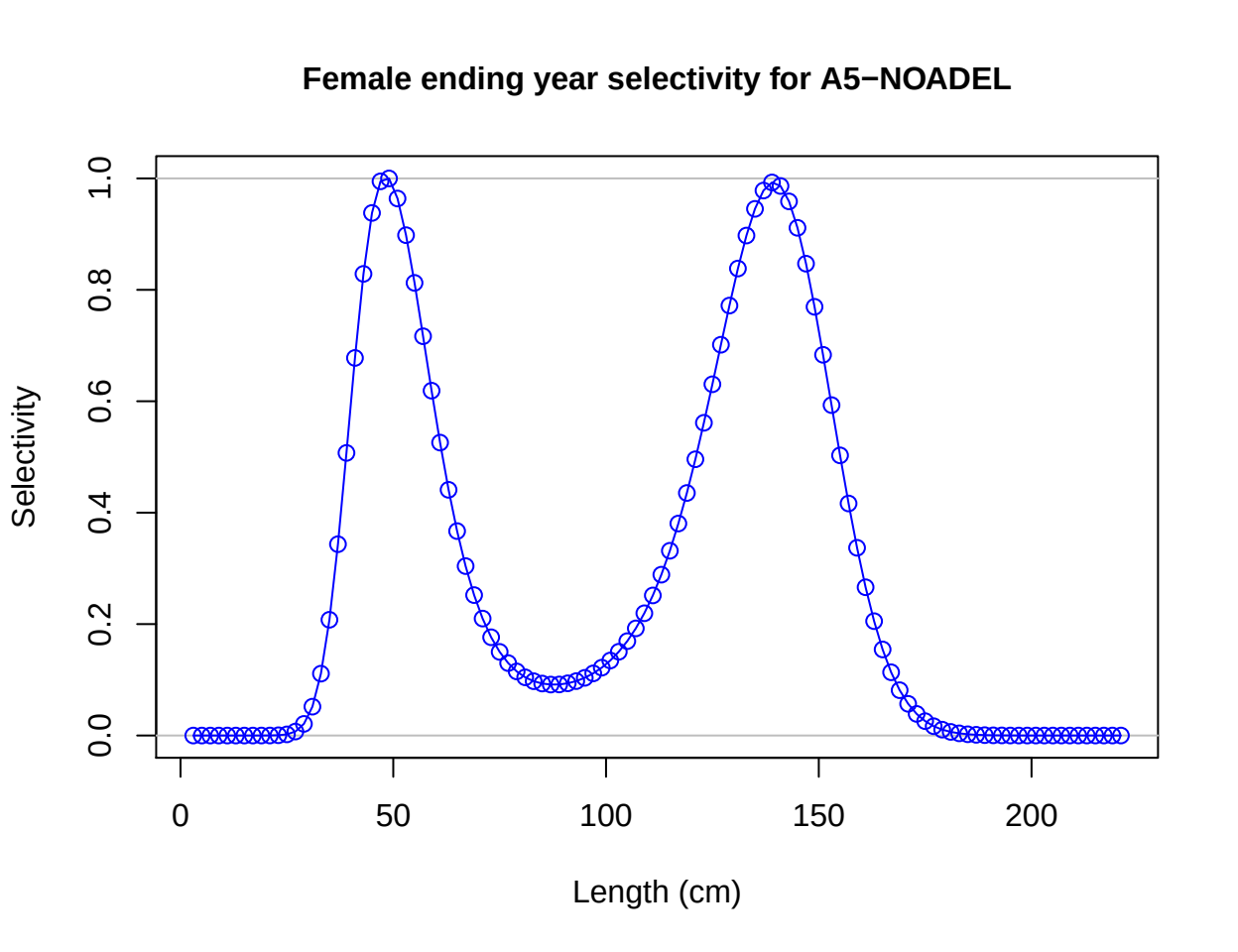

Male ending year selectivity for A2−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

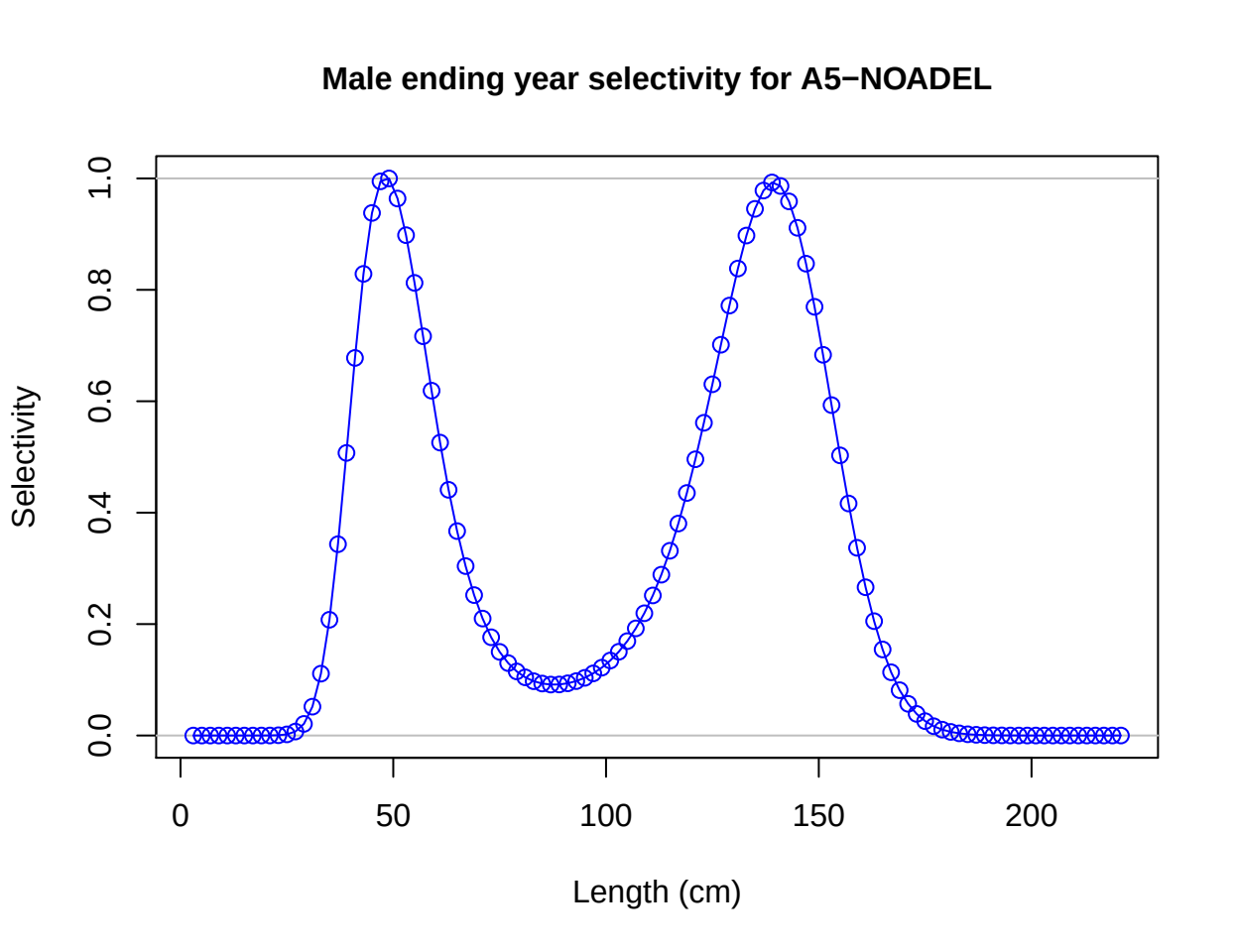

Female ending year selectivity for A3−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

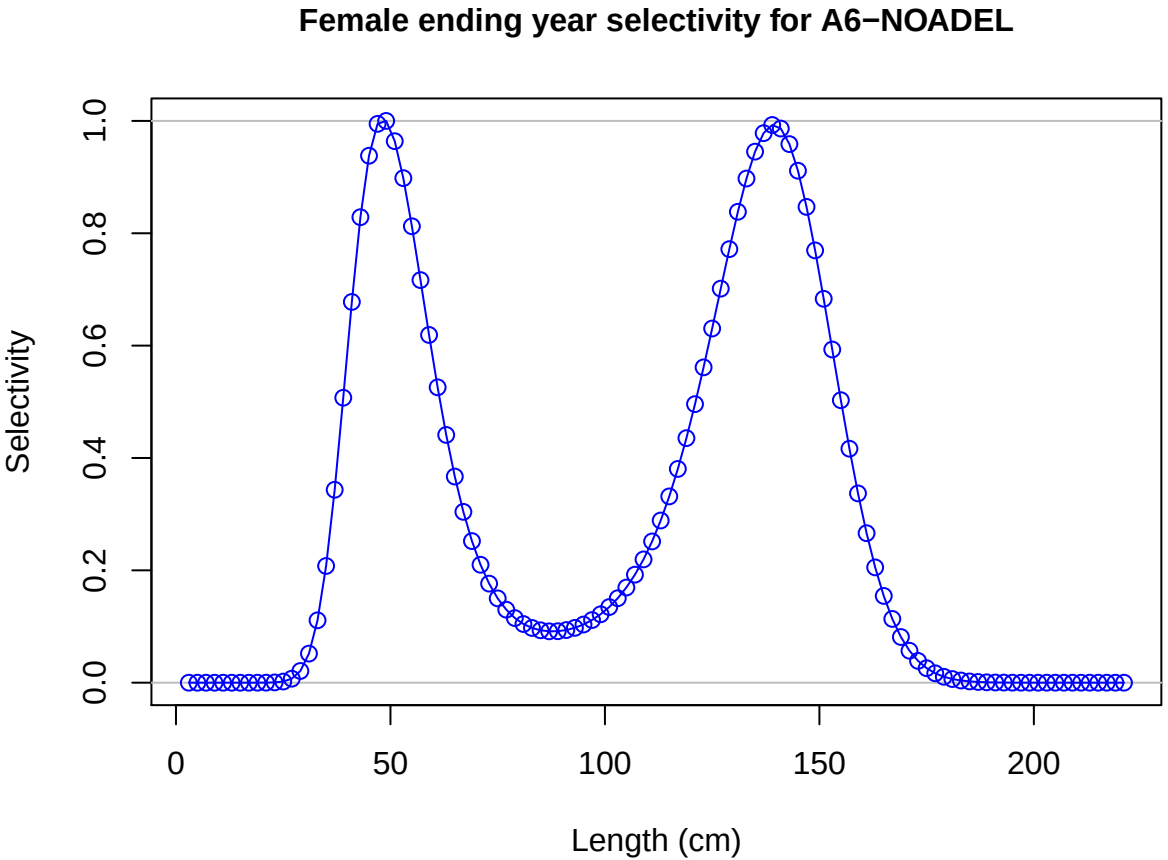

Male ending year selectivity for A3−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

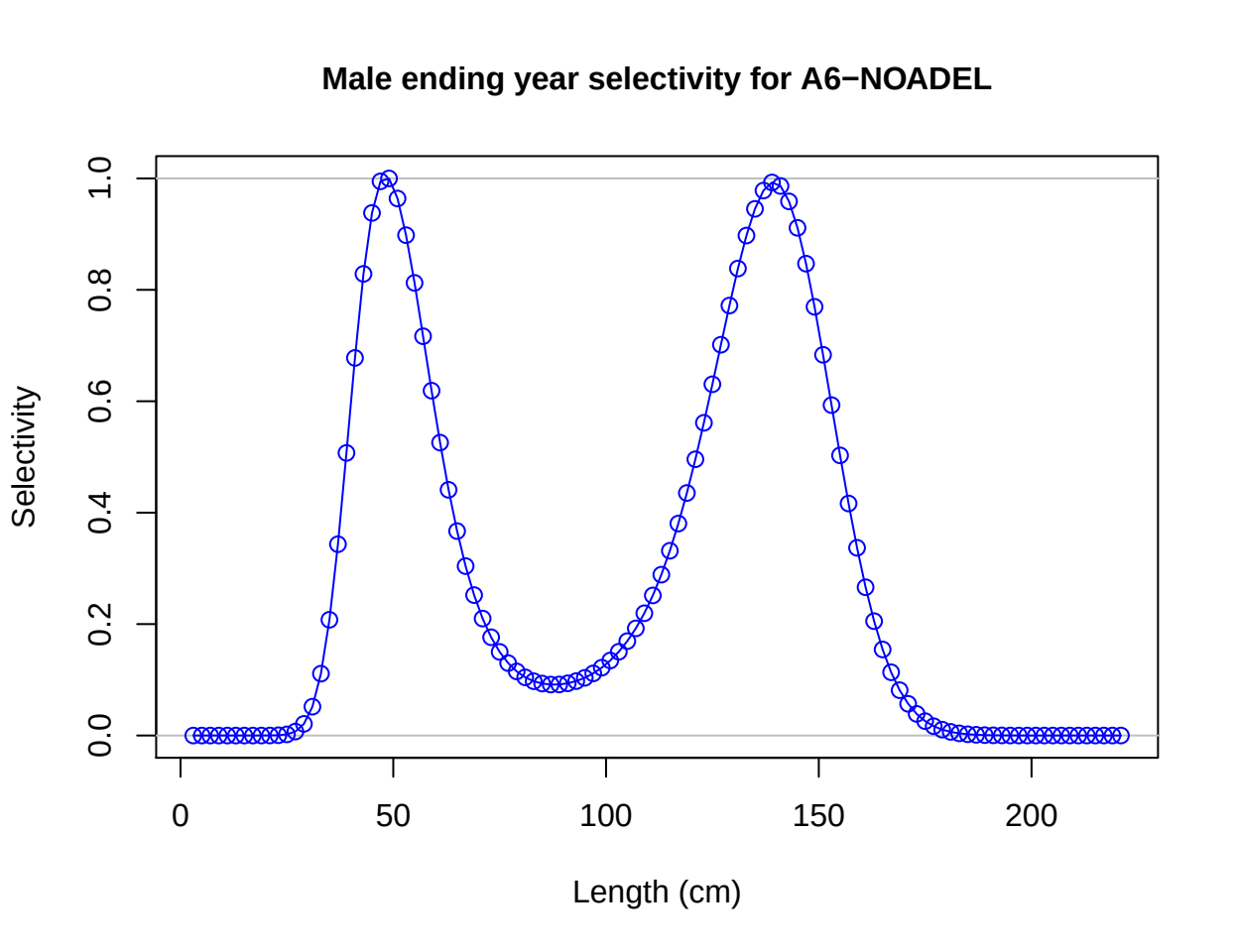

Female ending year selectivity for A4−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

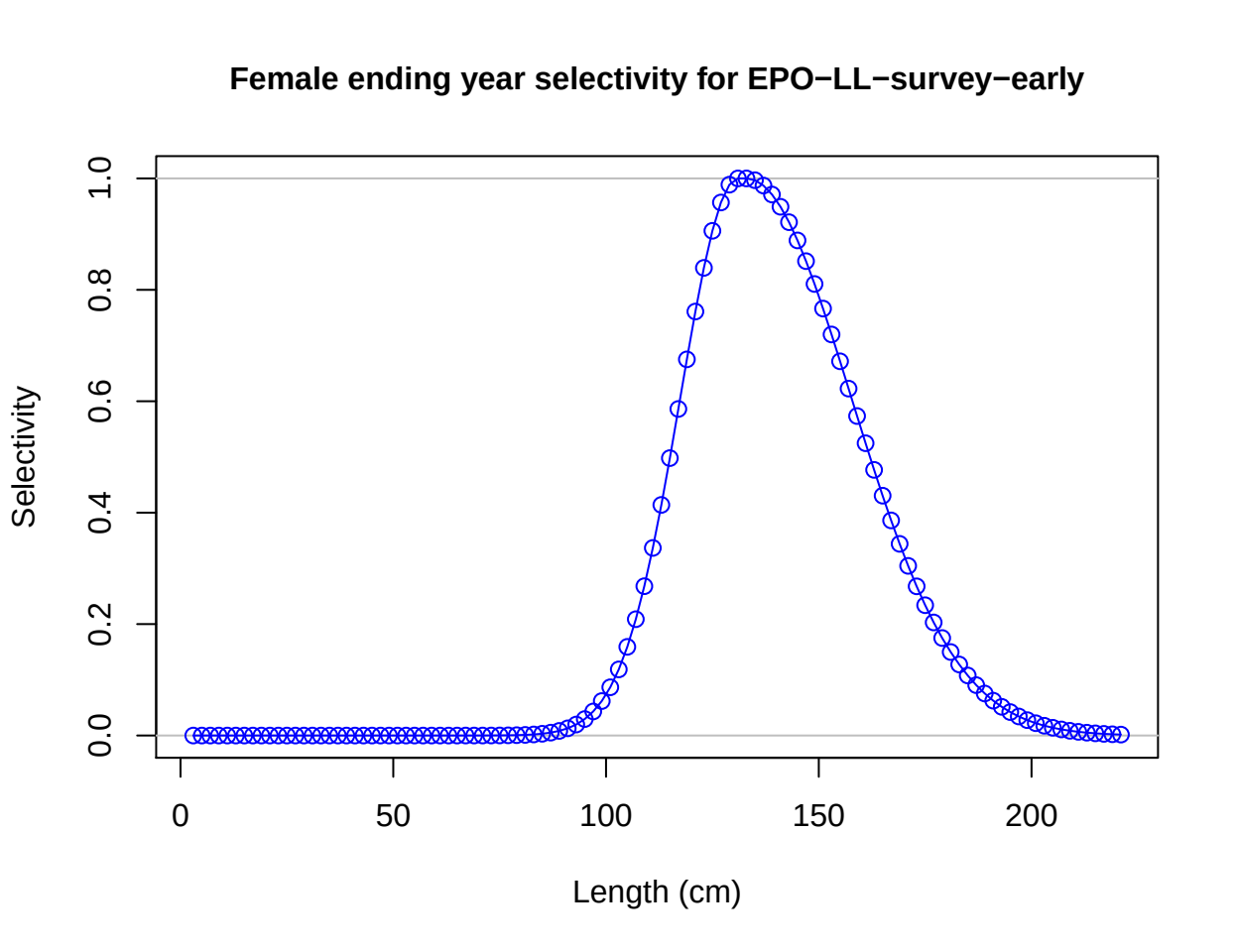

Male ending year selectivity for A4−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

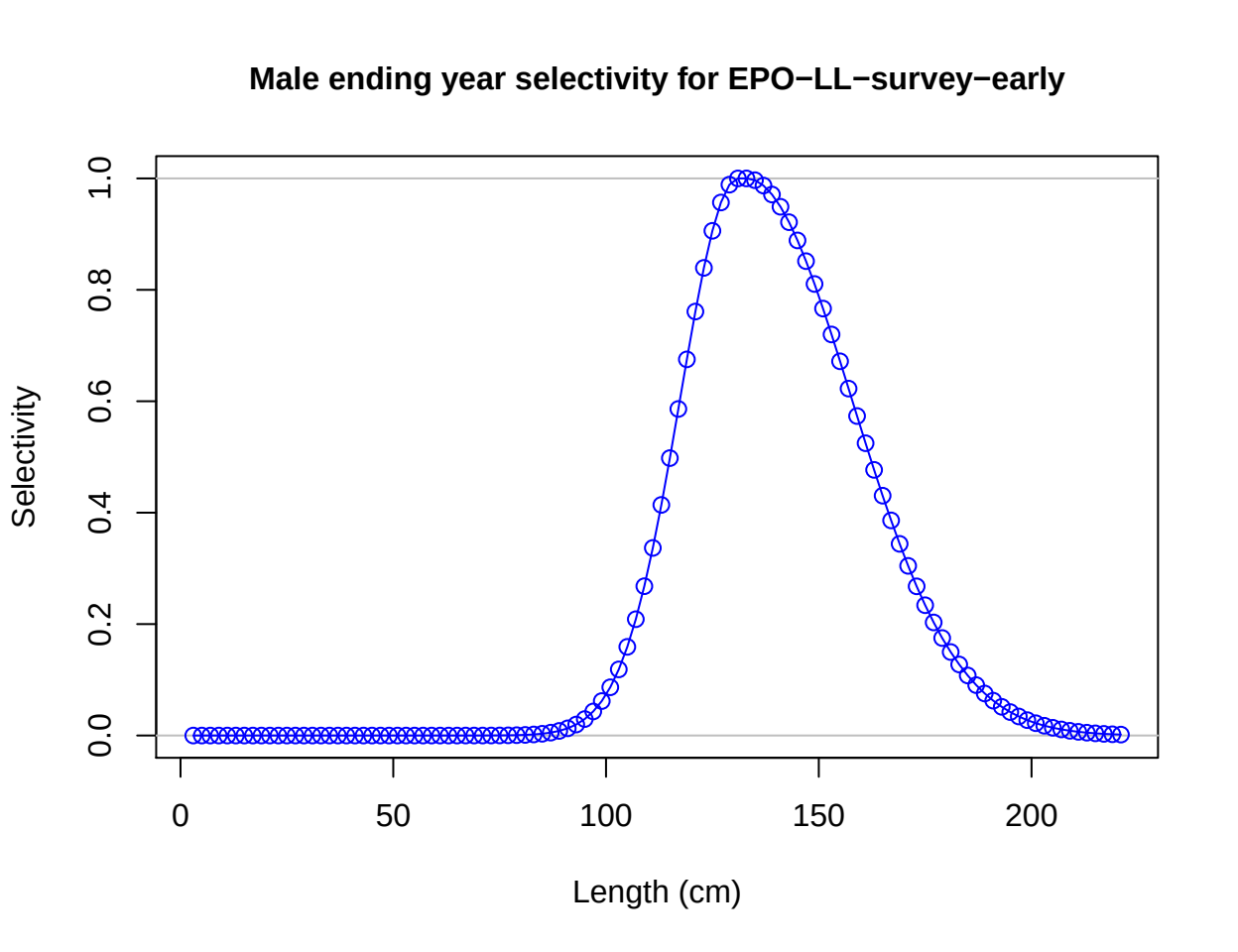

Female ending year selectivity for A5−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

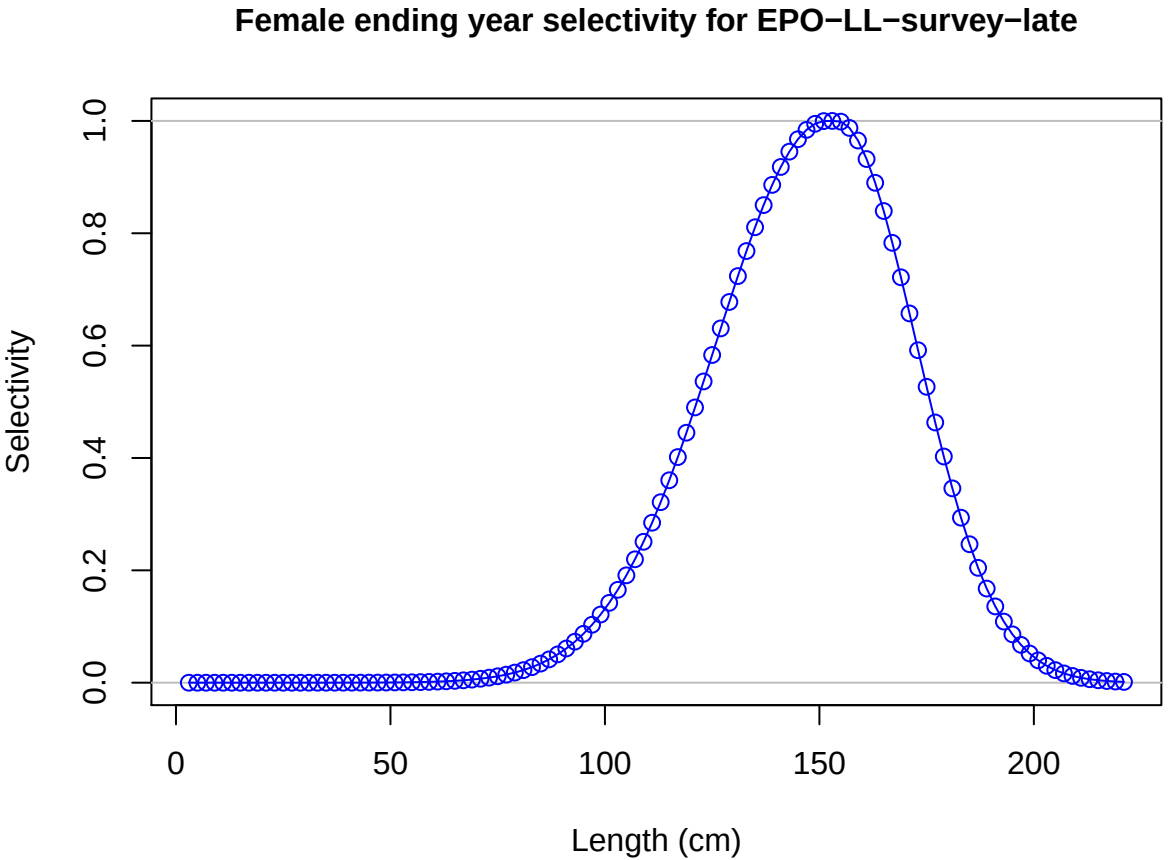

Male ending year selectivity for A5−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

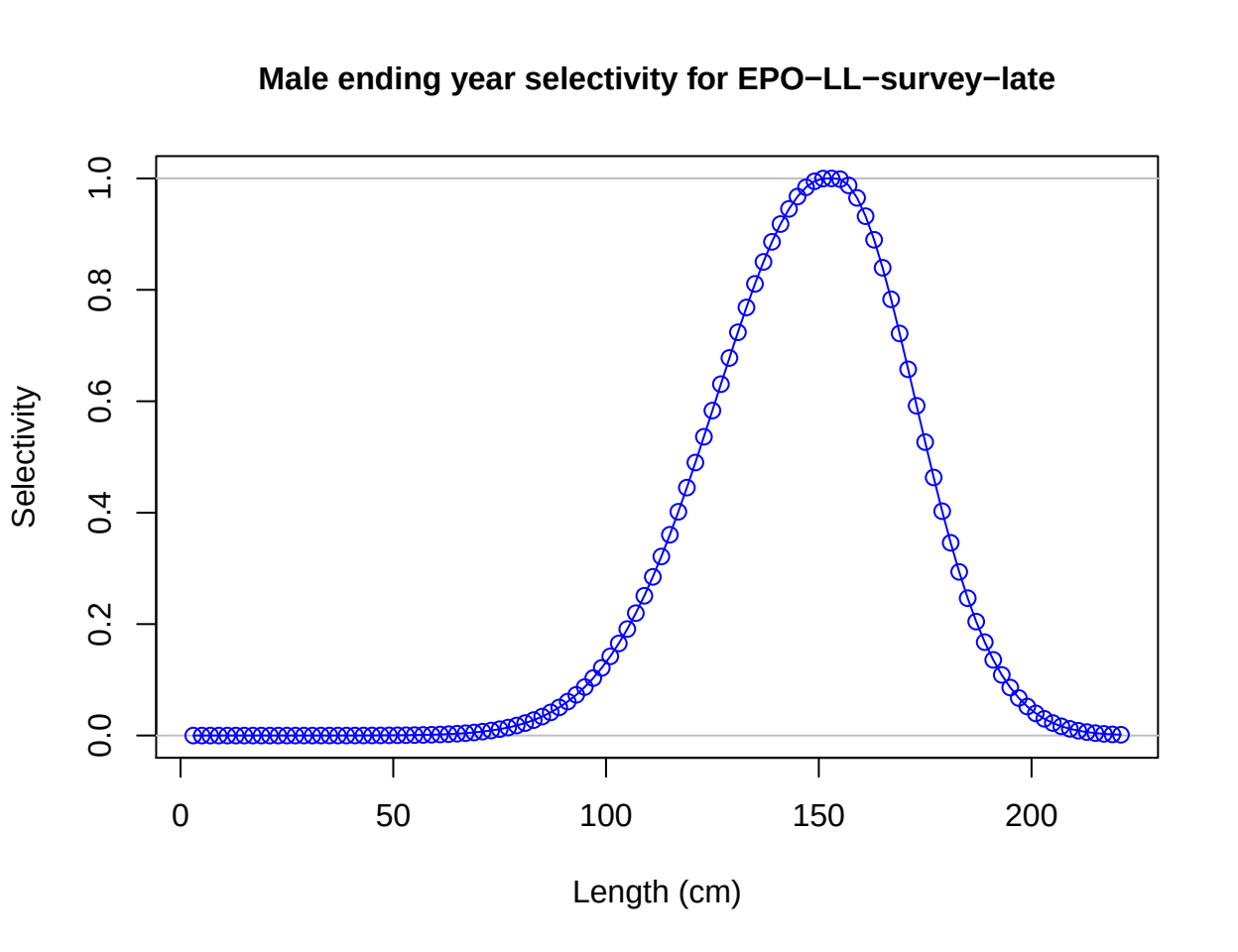

Female ending year selectivity for A6−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

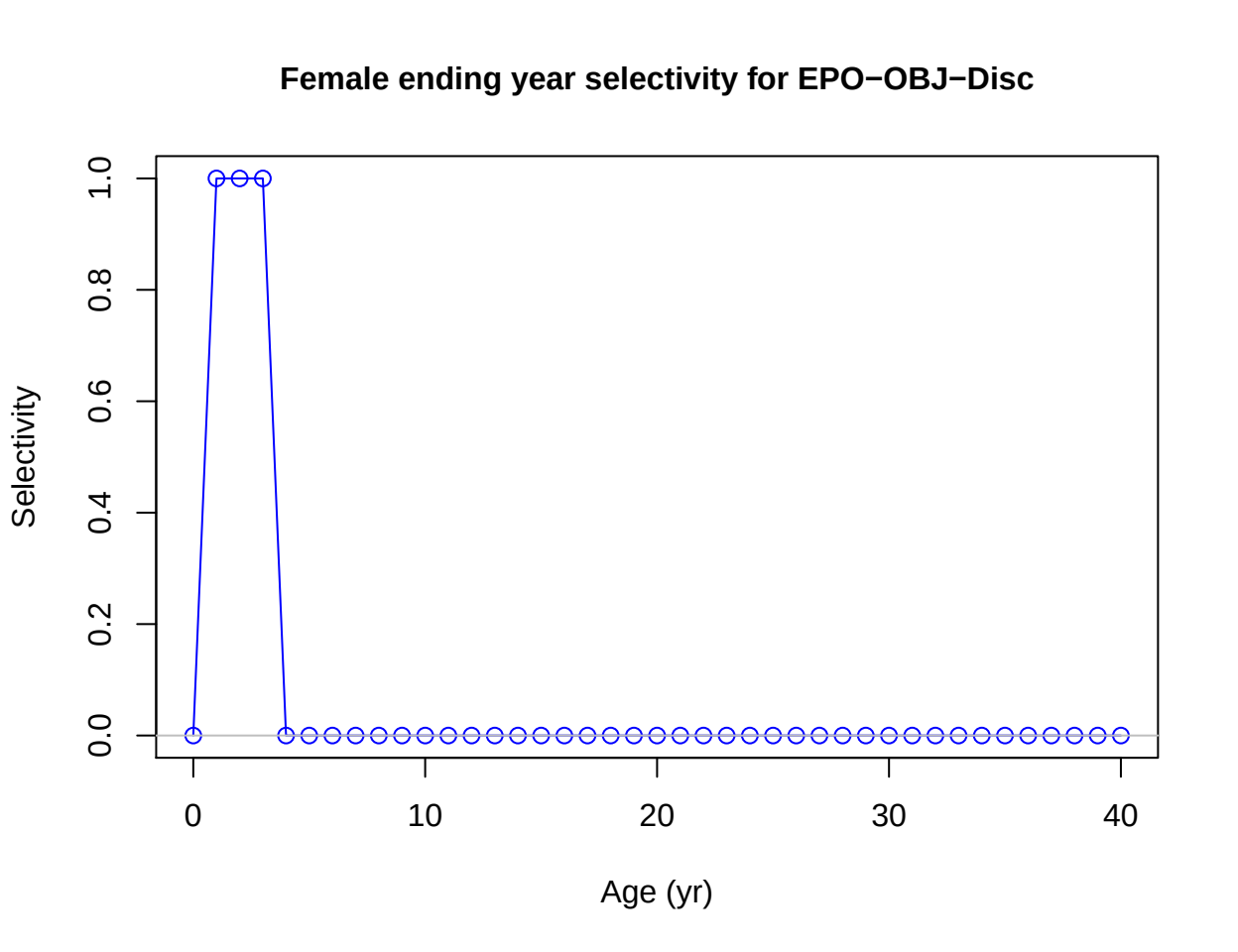

Male ending year selectivity for A6−NOADEL
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

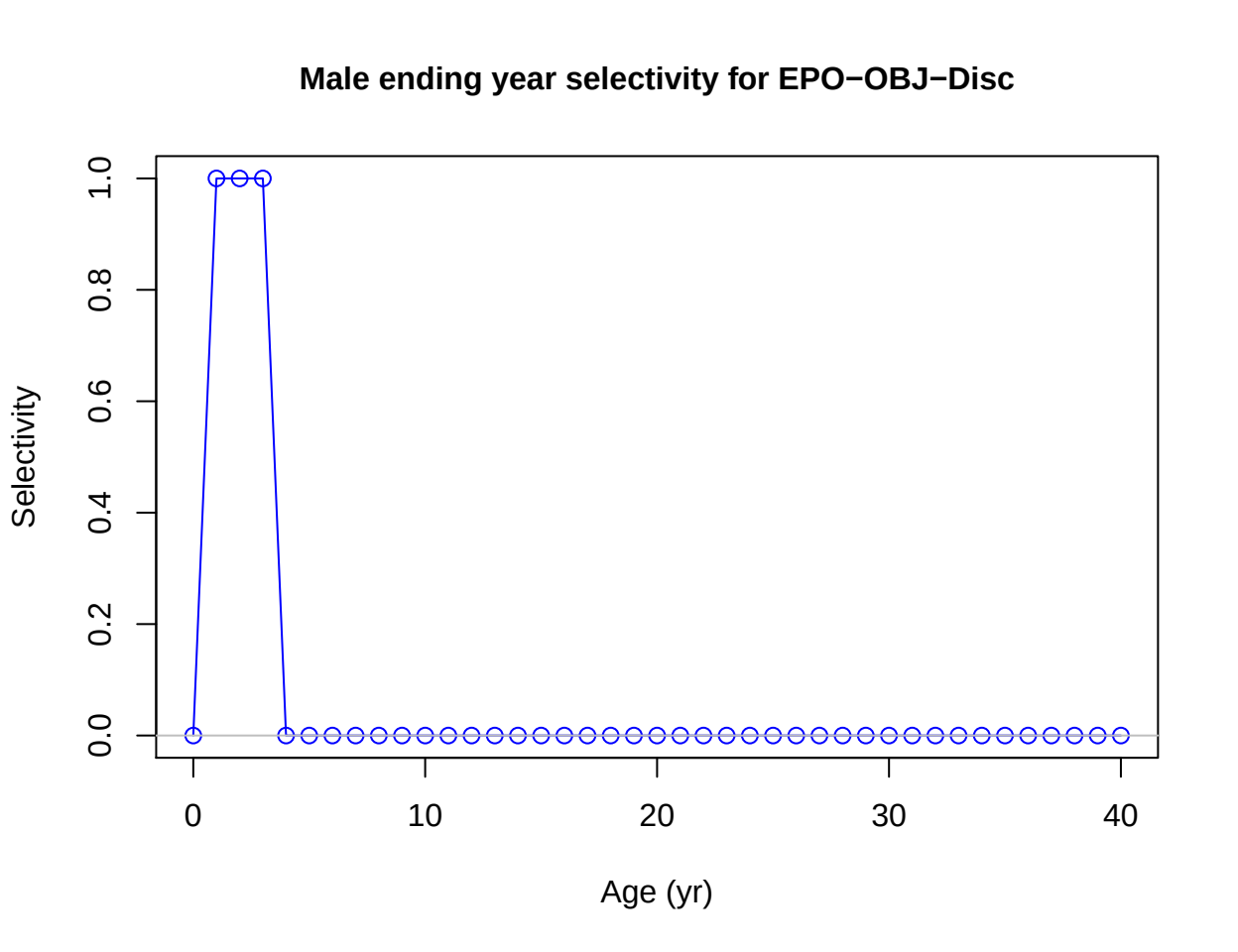

Female ending year selectivity for EPO−LL−survey−early
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

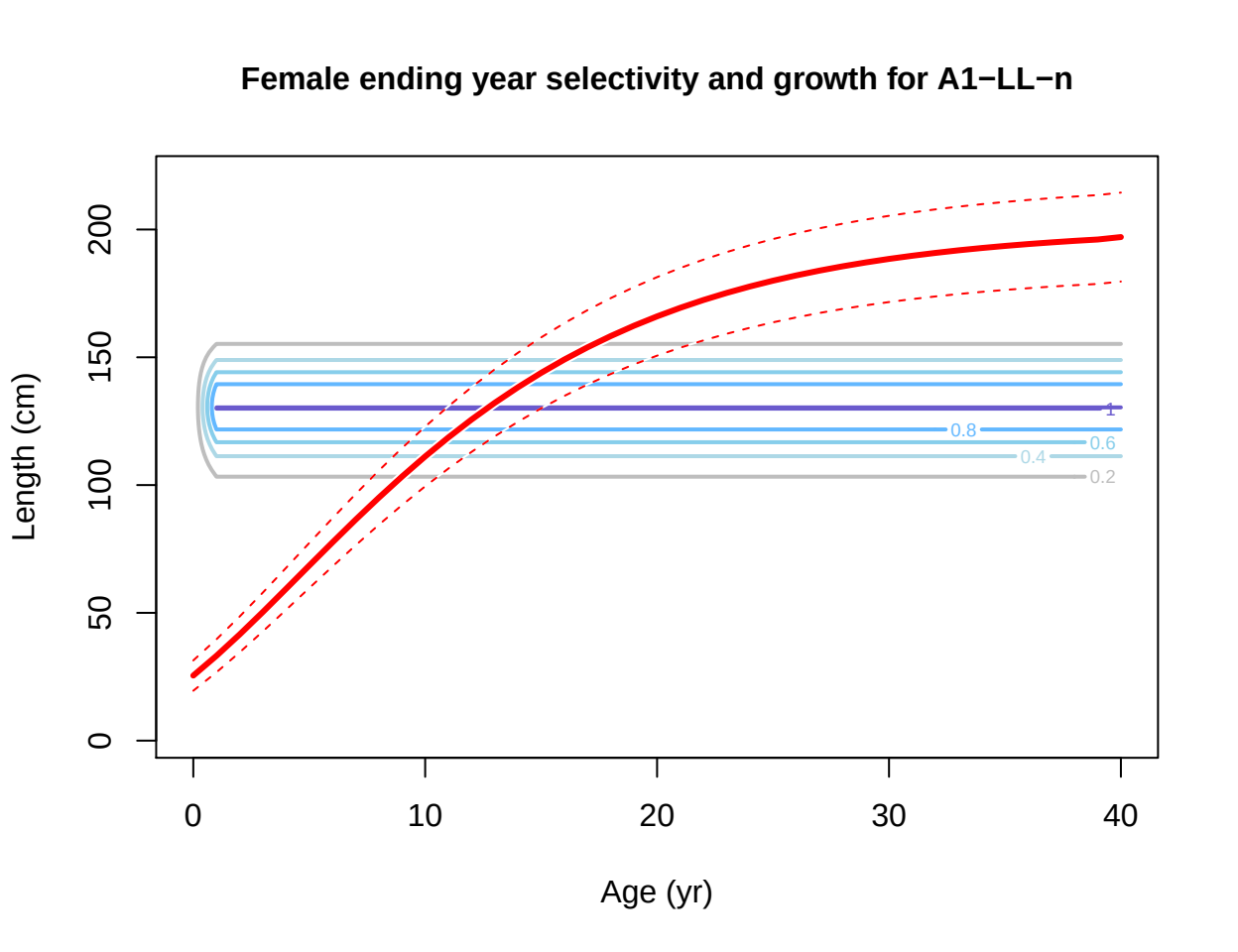

Male ending year selectivity for EPO−LL−survey−early
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

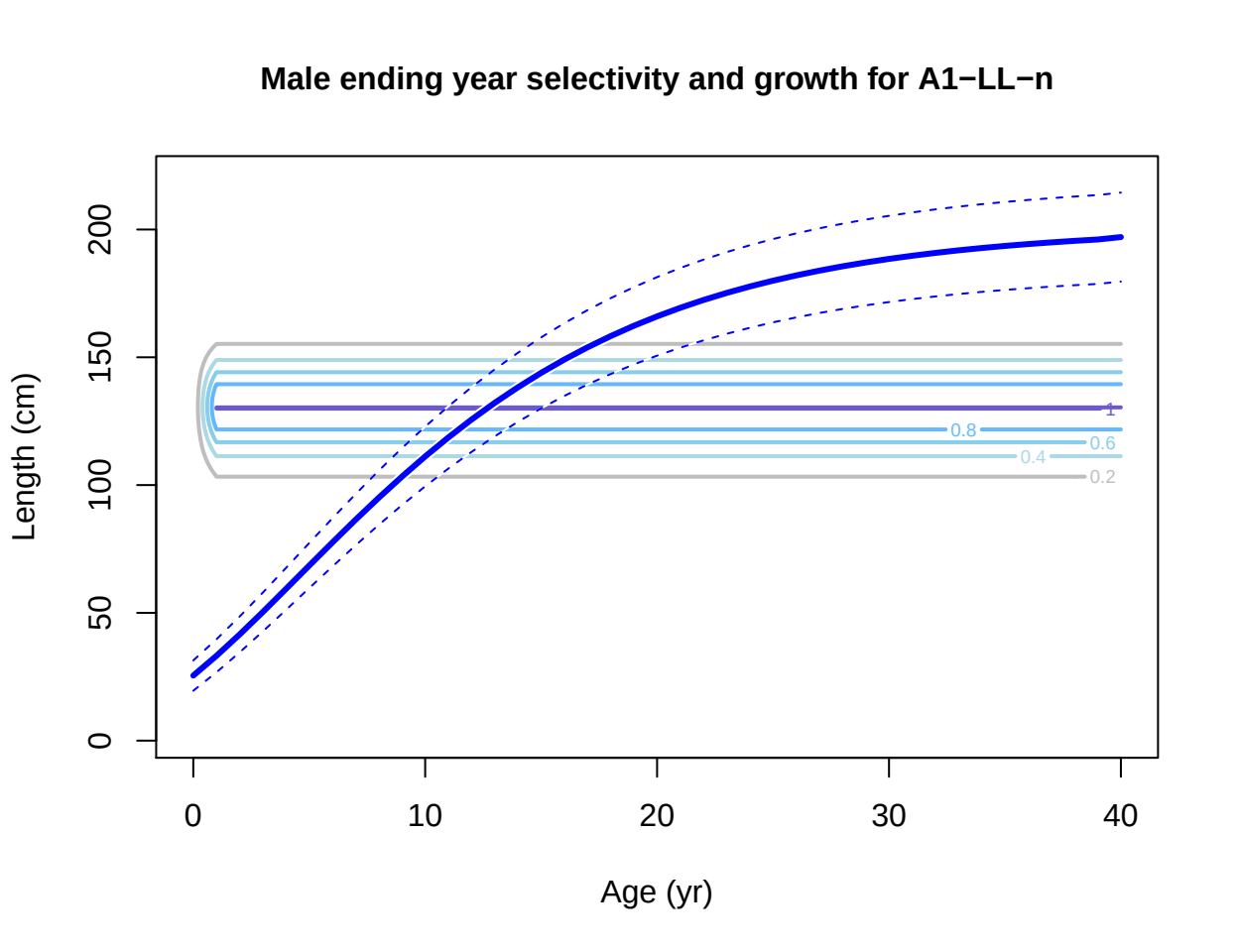

Female ending year selectivity for EPO−LL−survey−late
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

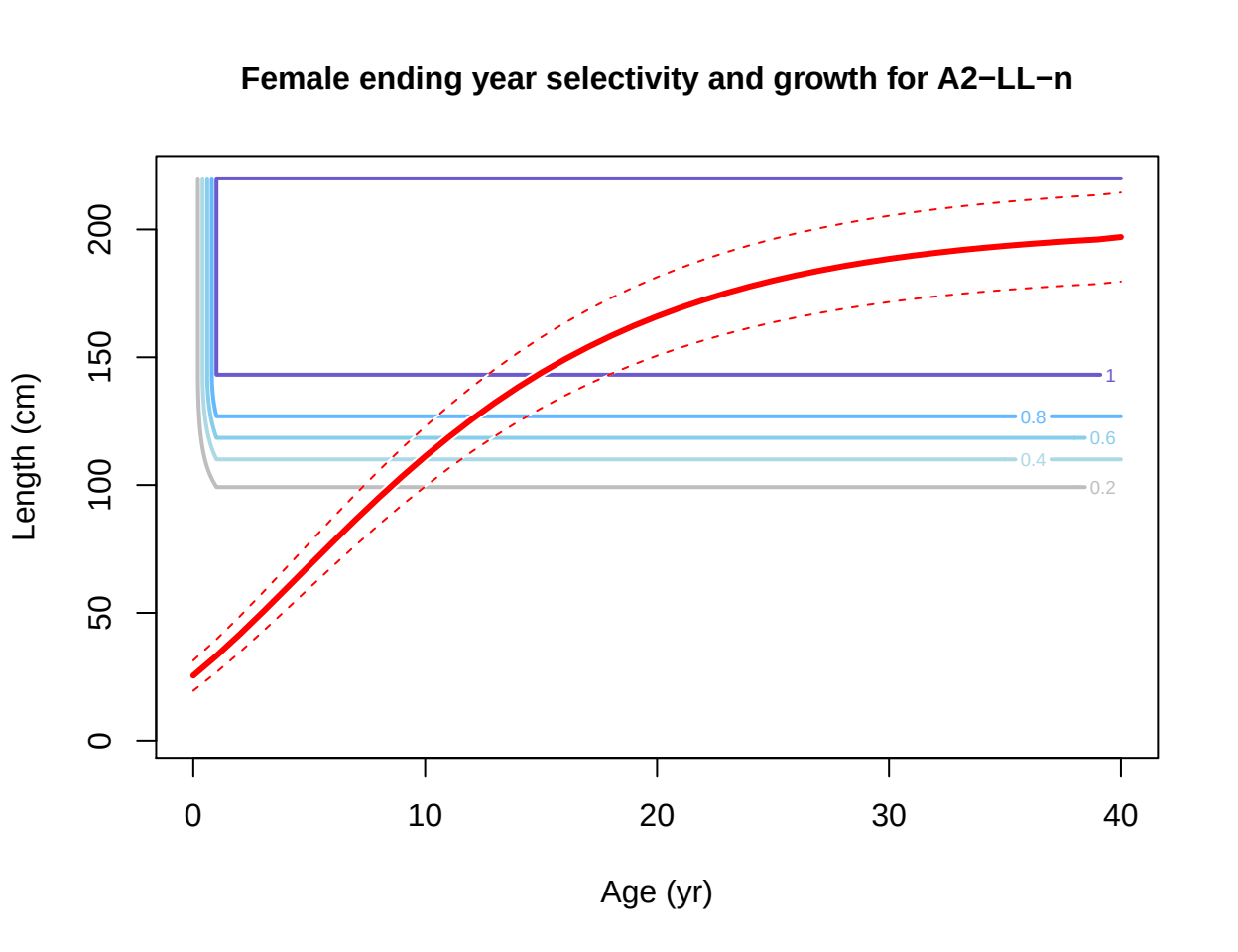

Male ending year selectivity for EPO−LL−survey−late
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Length (cm)

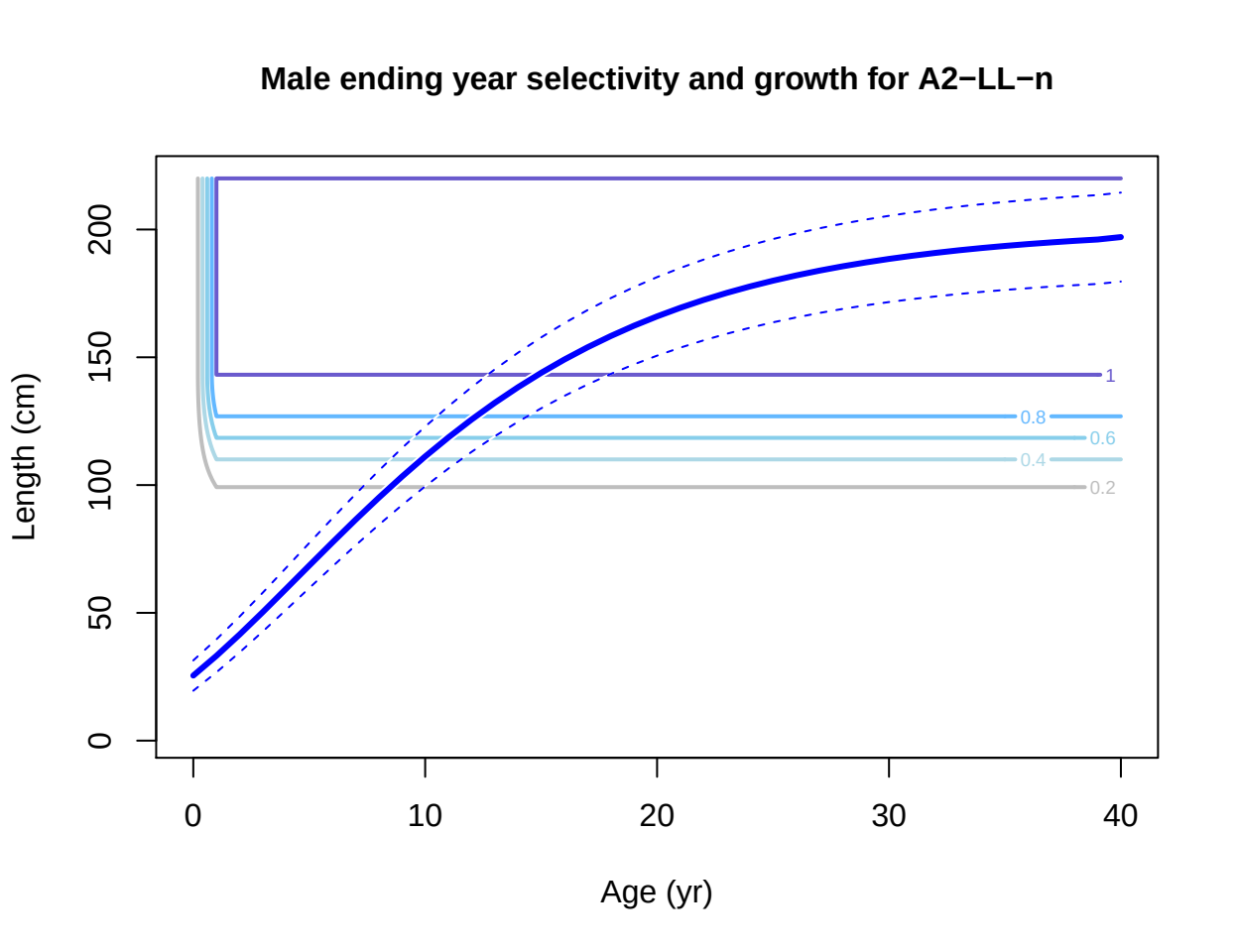

Female ending year selectivity for EPO−OBJ−Disc
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)

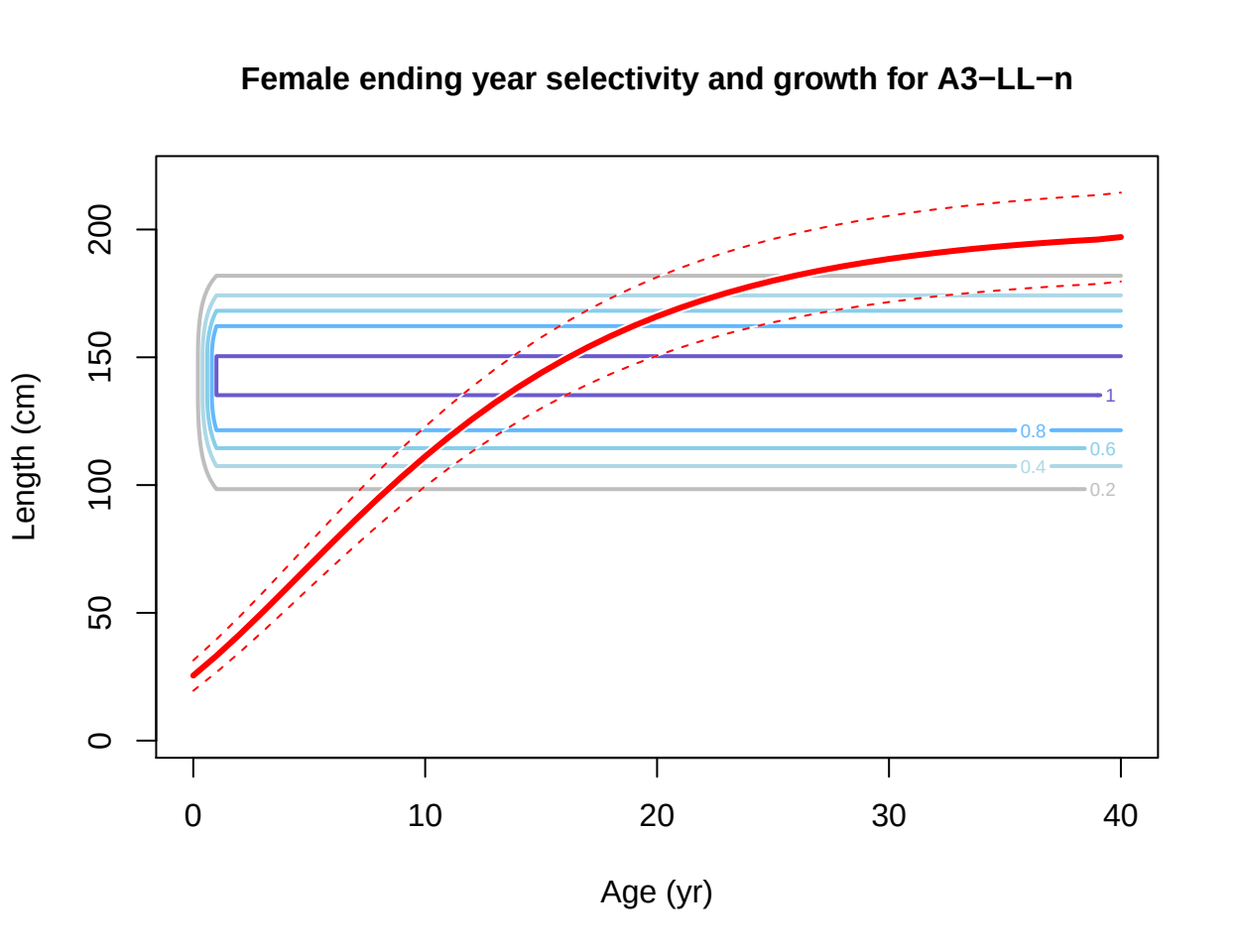

Male ending year selectivity for EPO−OBJ−Disc
Selectivity
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
Age (yr)

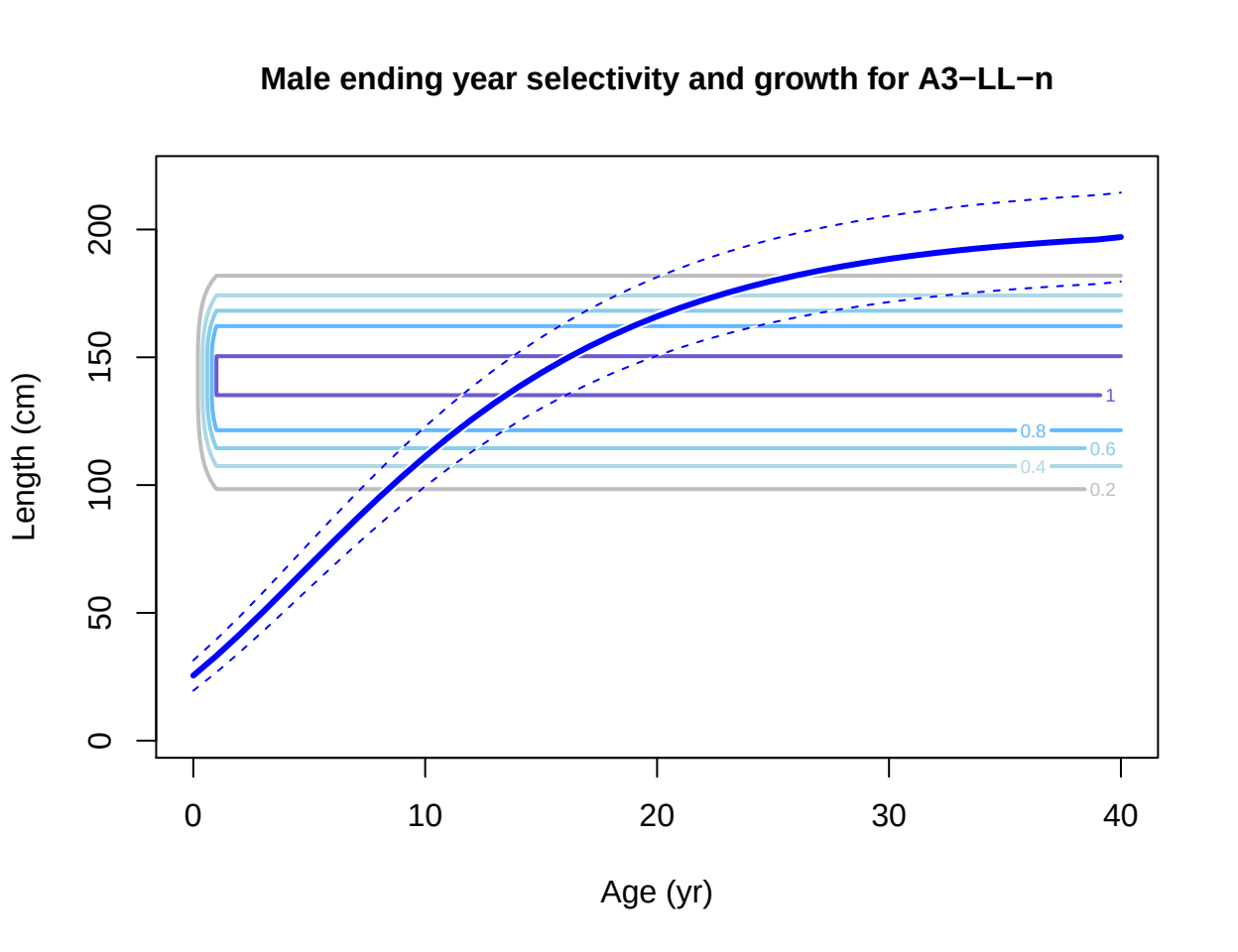

Female ending year selectivity and growth for A1−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

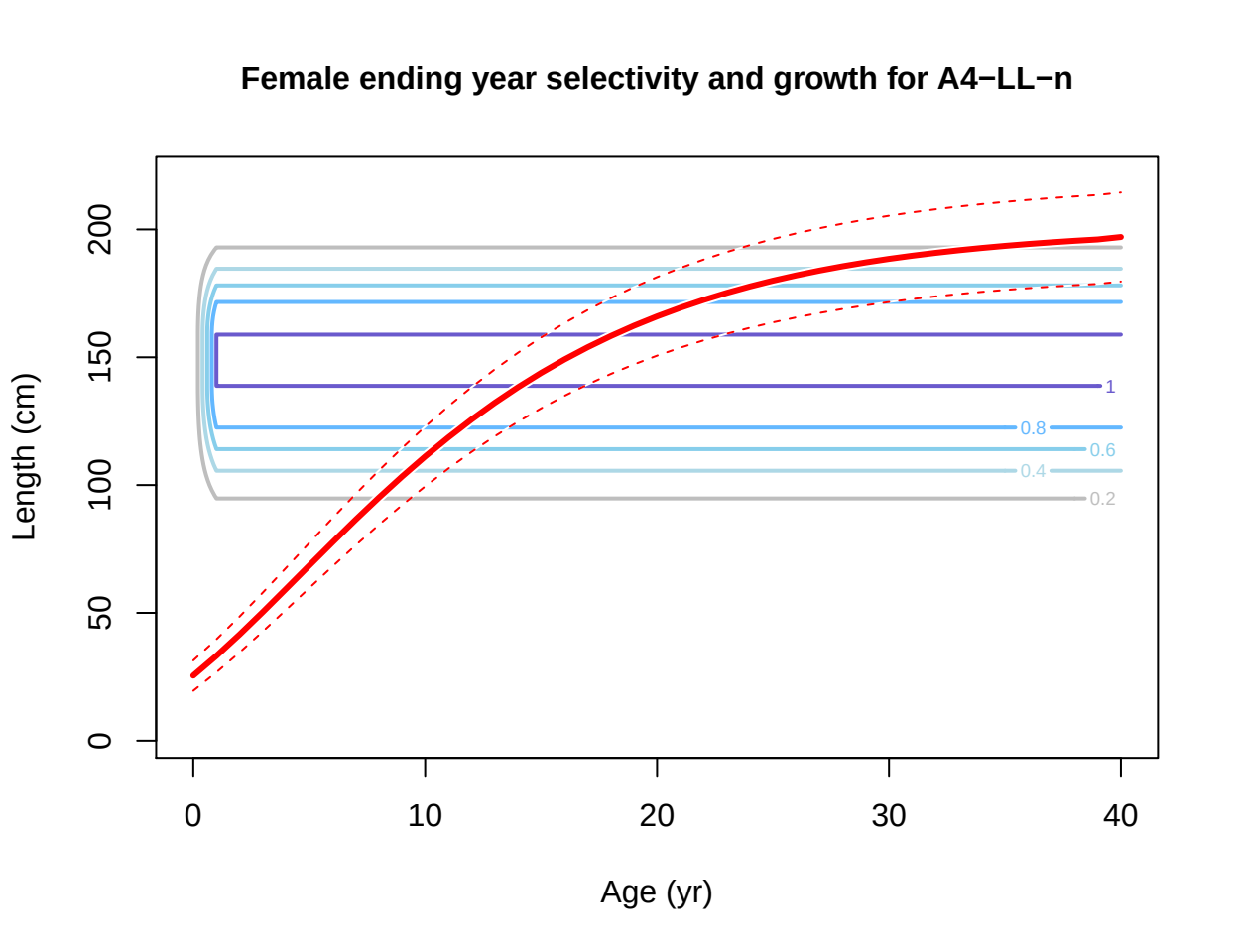

Male ending year selectivity and growth for A1−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

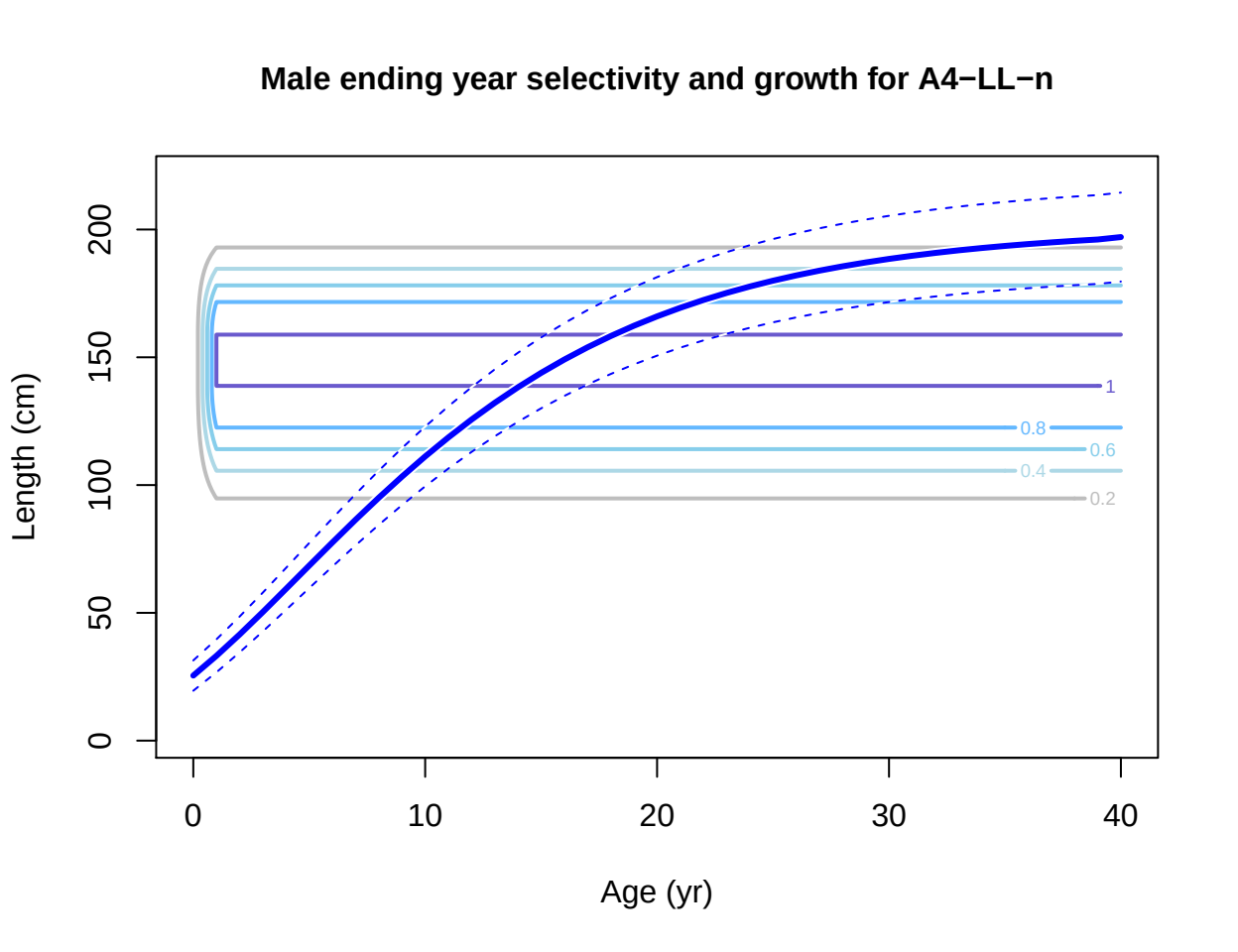

Female ending year selectivity and growth for A2−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

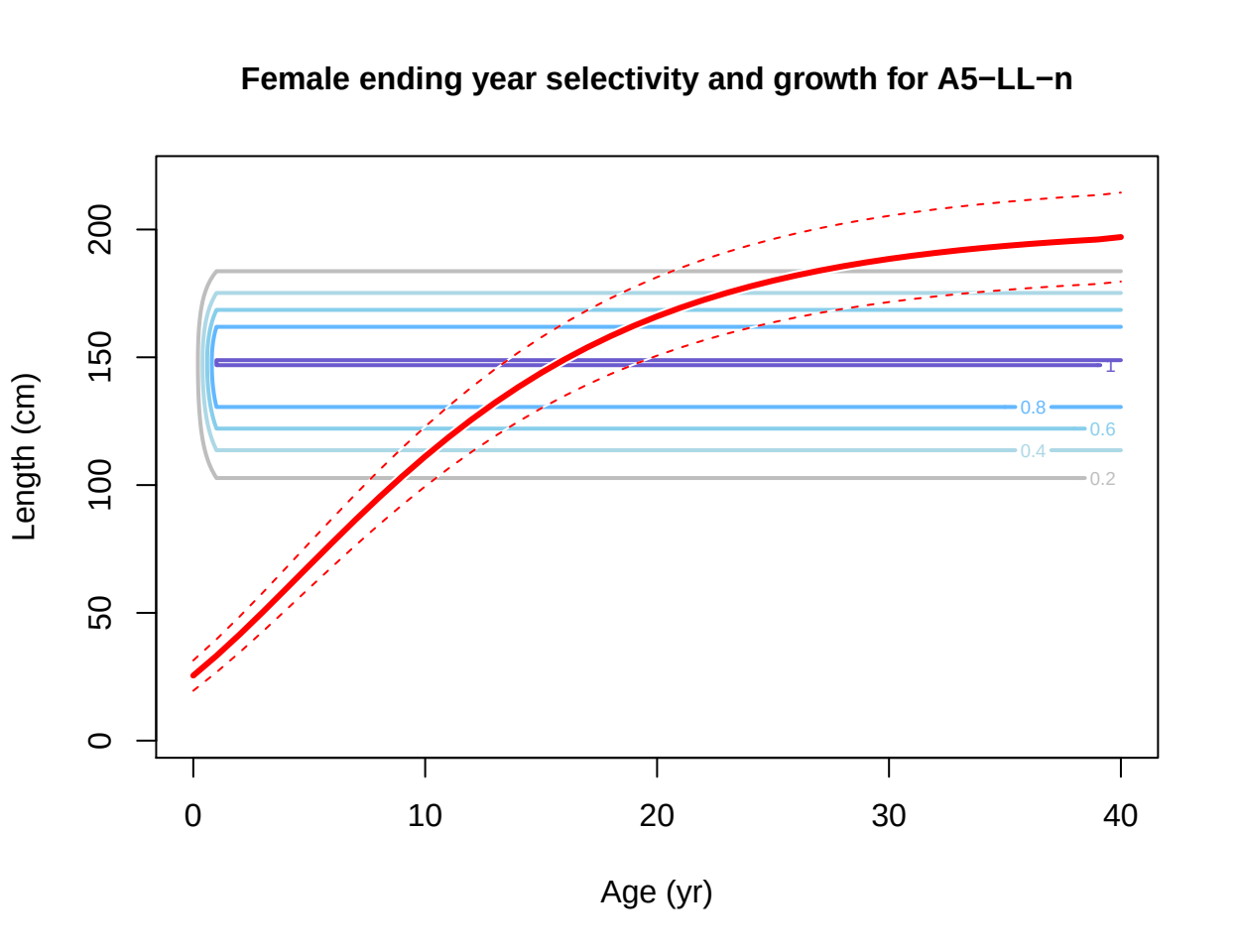

Male ending year selectivity and growth for A2−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

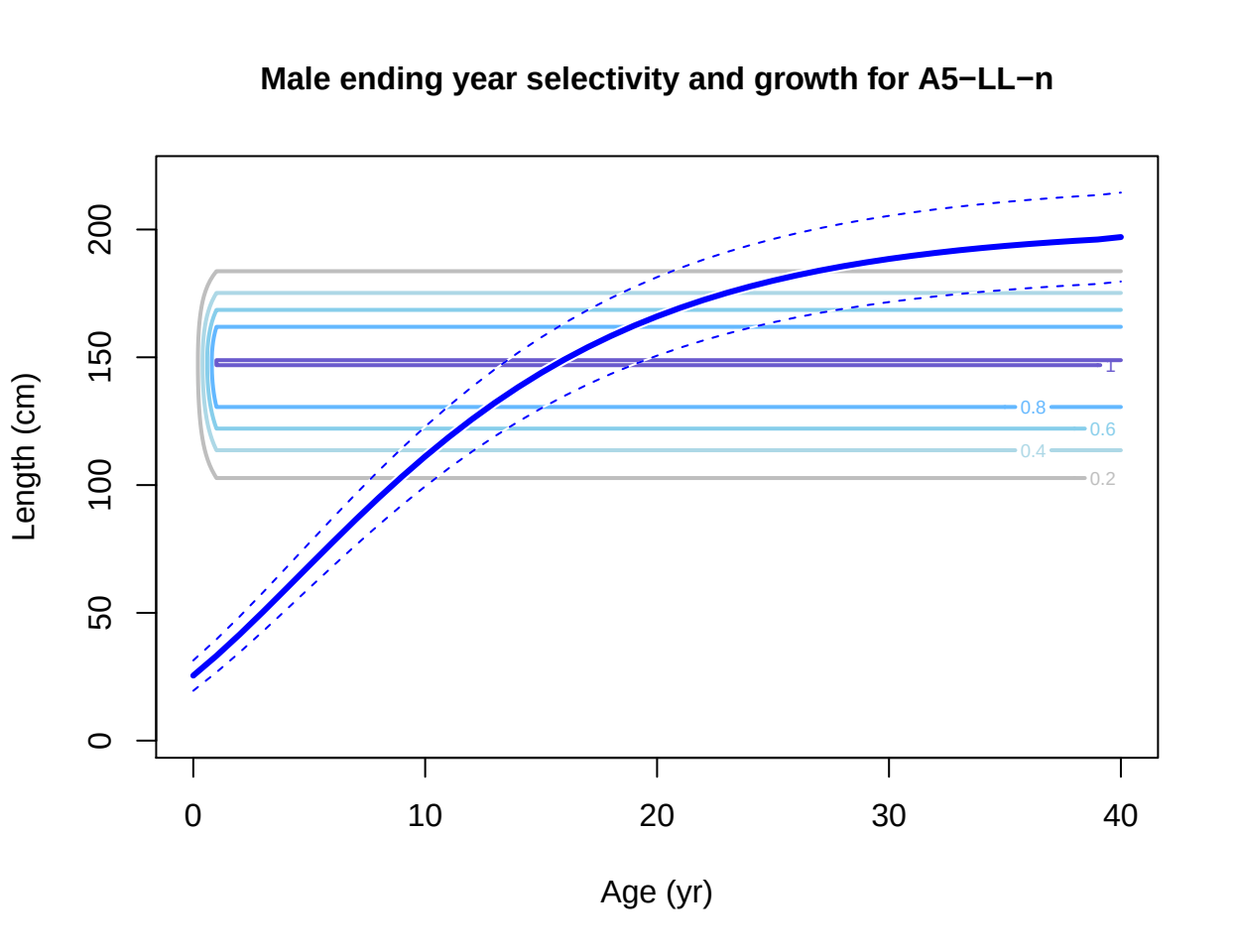

Female ending year selectivity and growth for A3−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

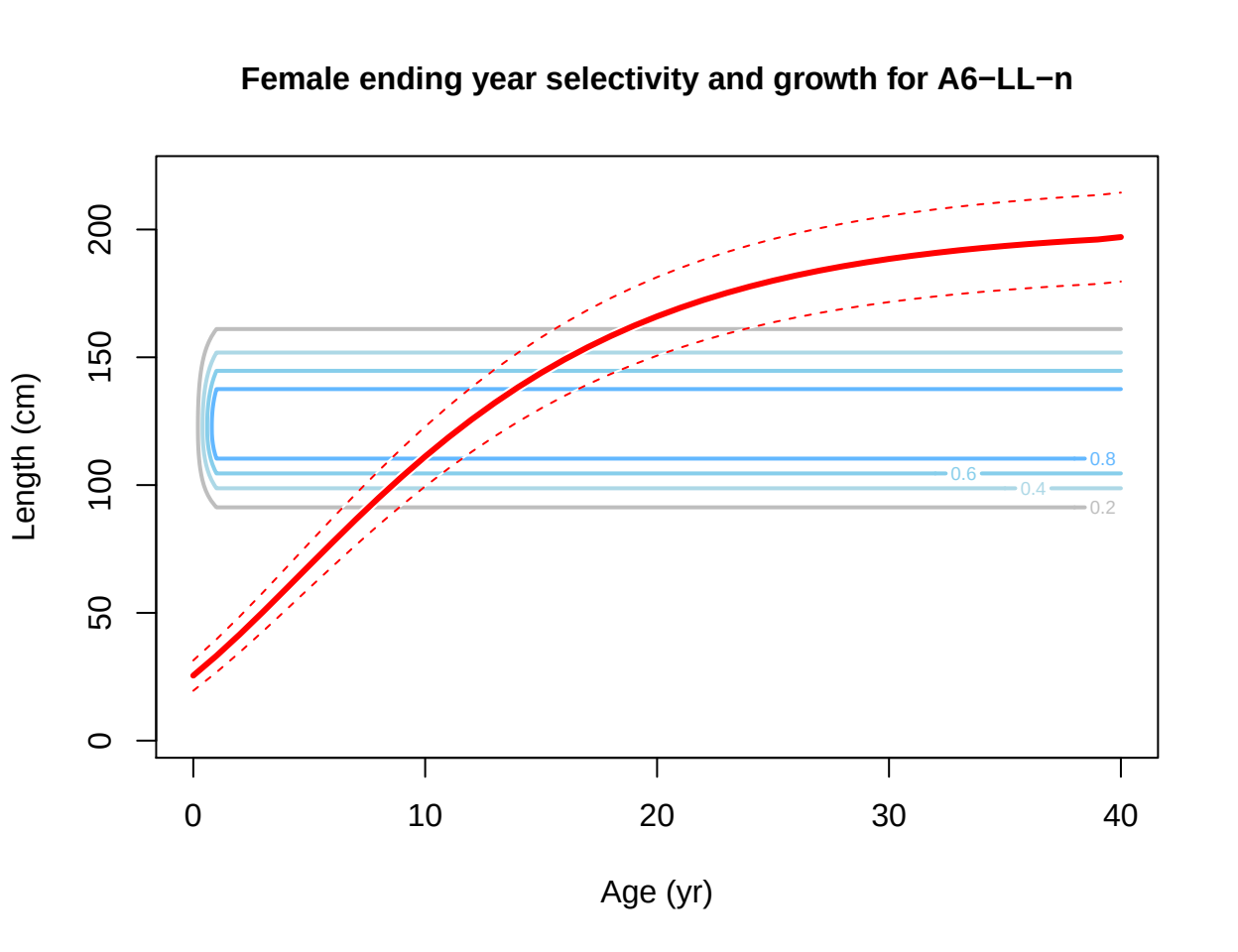

Male ending year selectivity and growth for A3−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

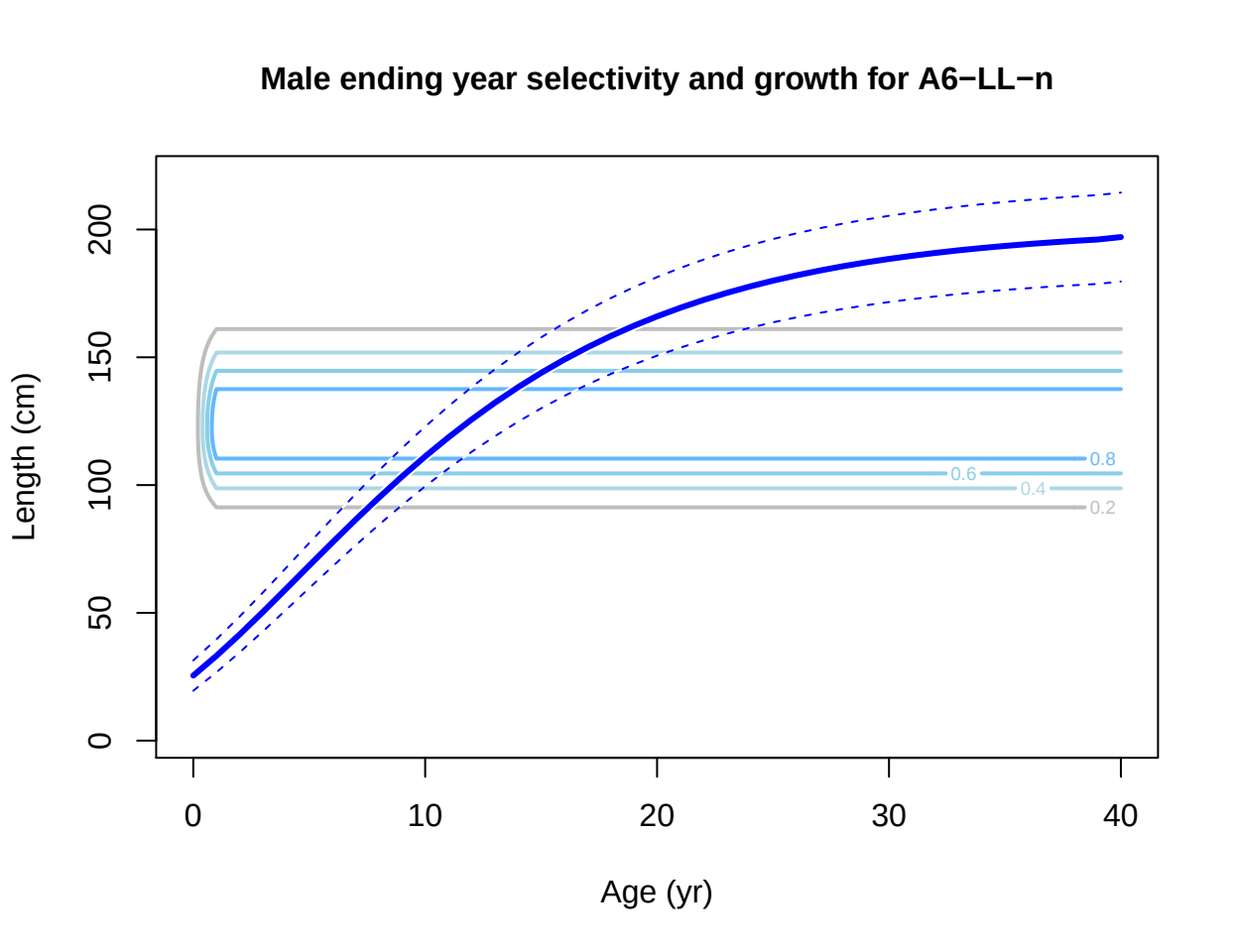

Female ending year selectivity and growth for A4−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

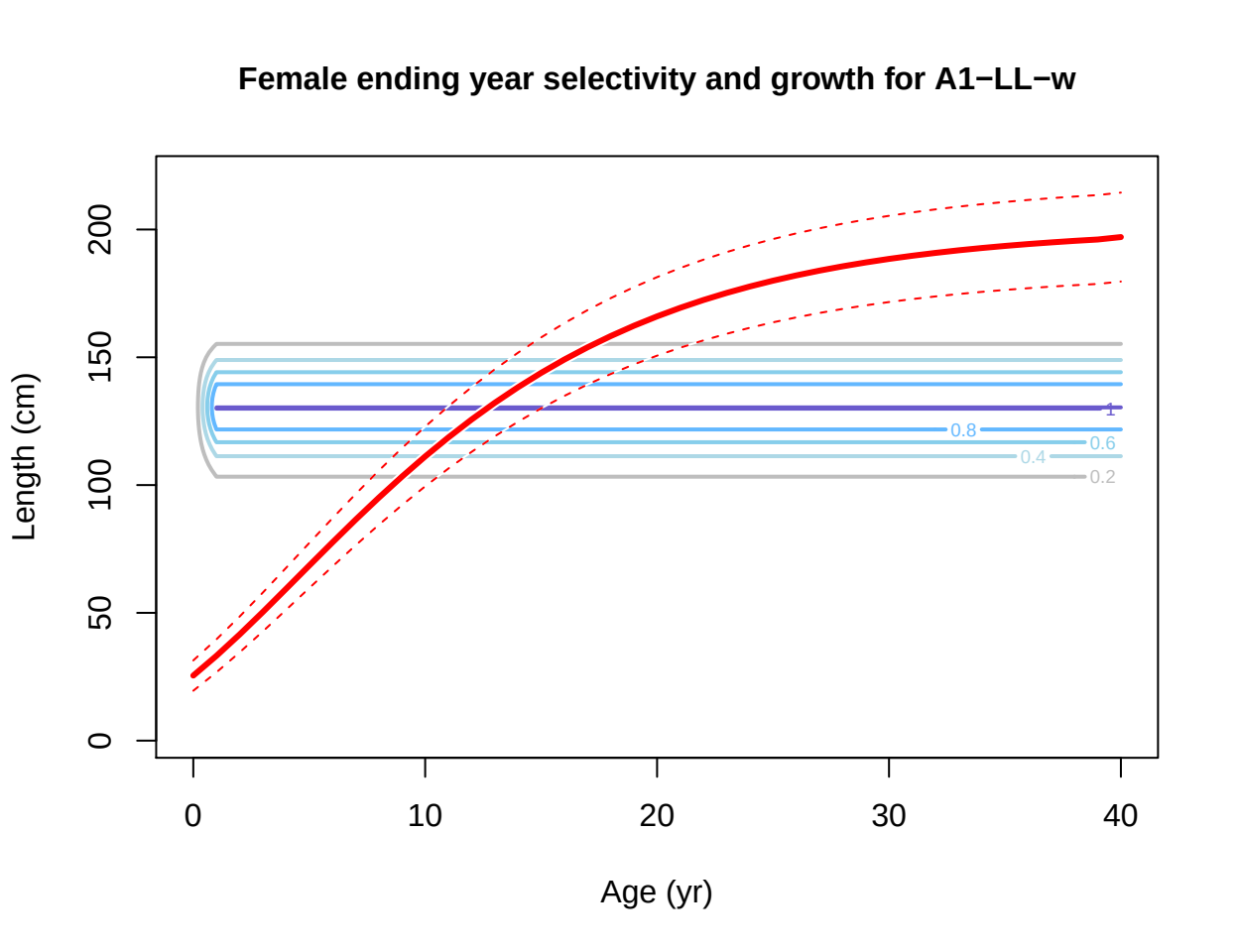

Male ending year selectivity and growth for A4−LL−n
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

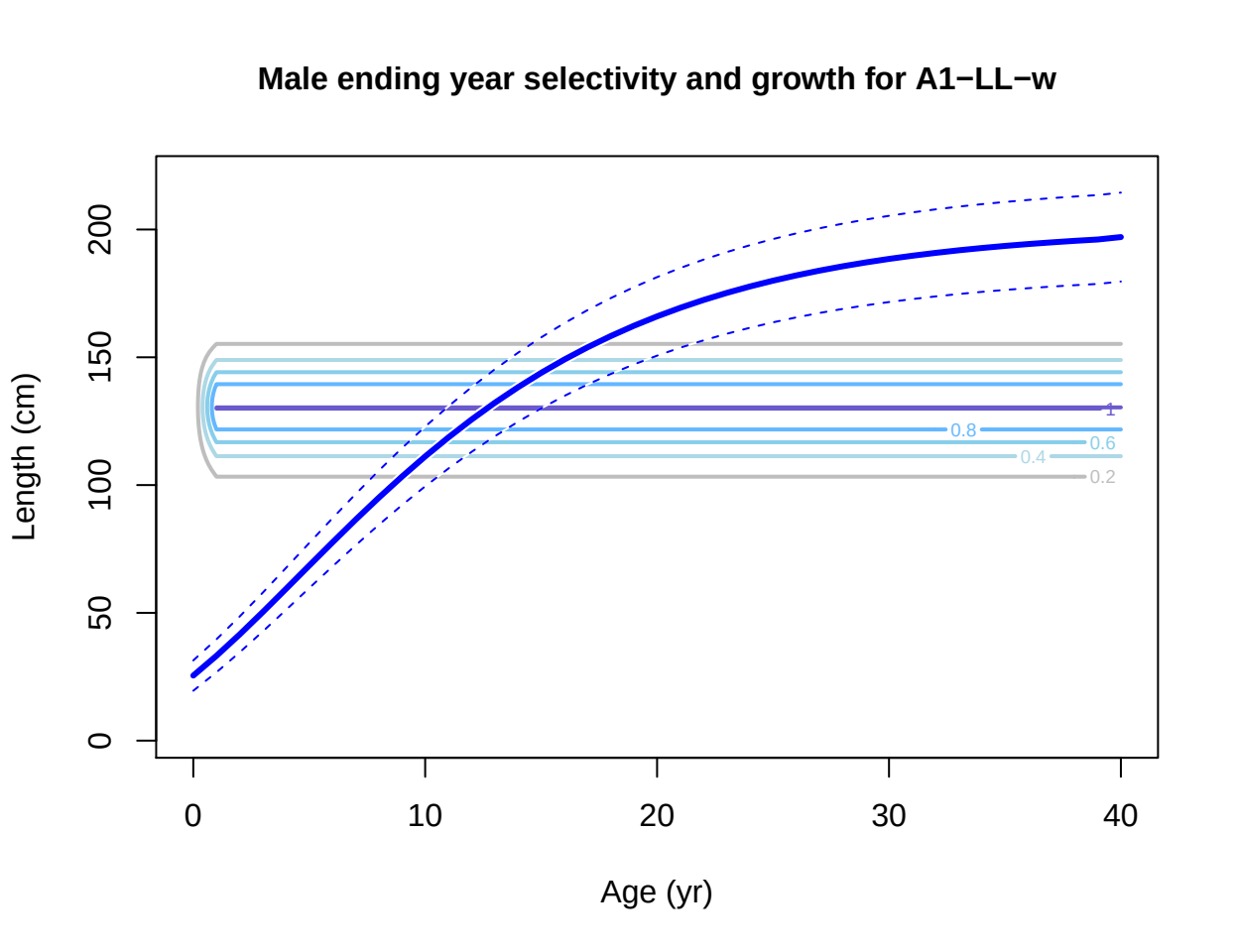

Female ending year selectivity and growth for A5−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

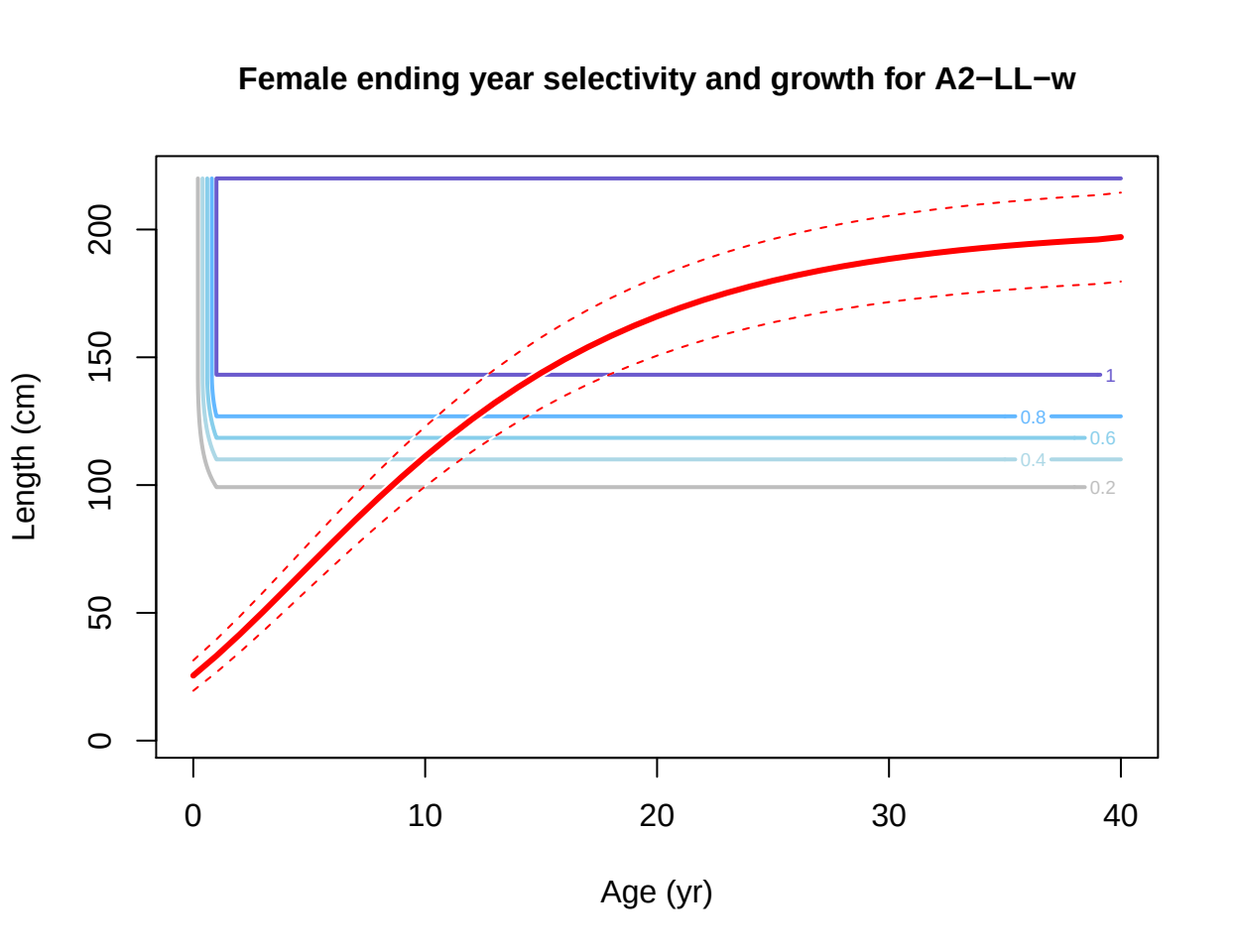

Male ending year selectivity and growth for A5−LL−n
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

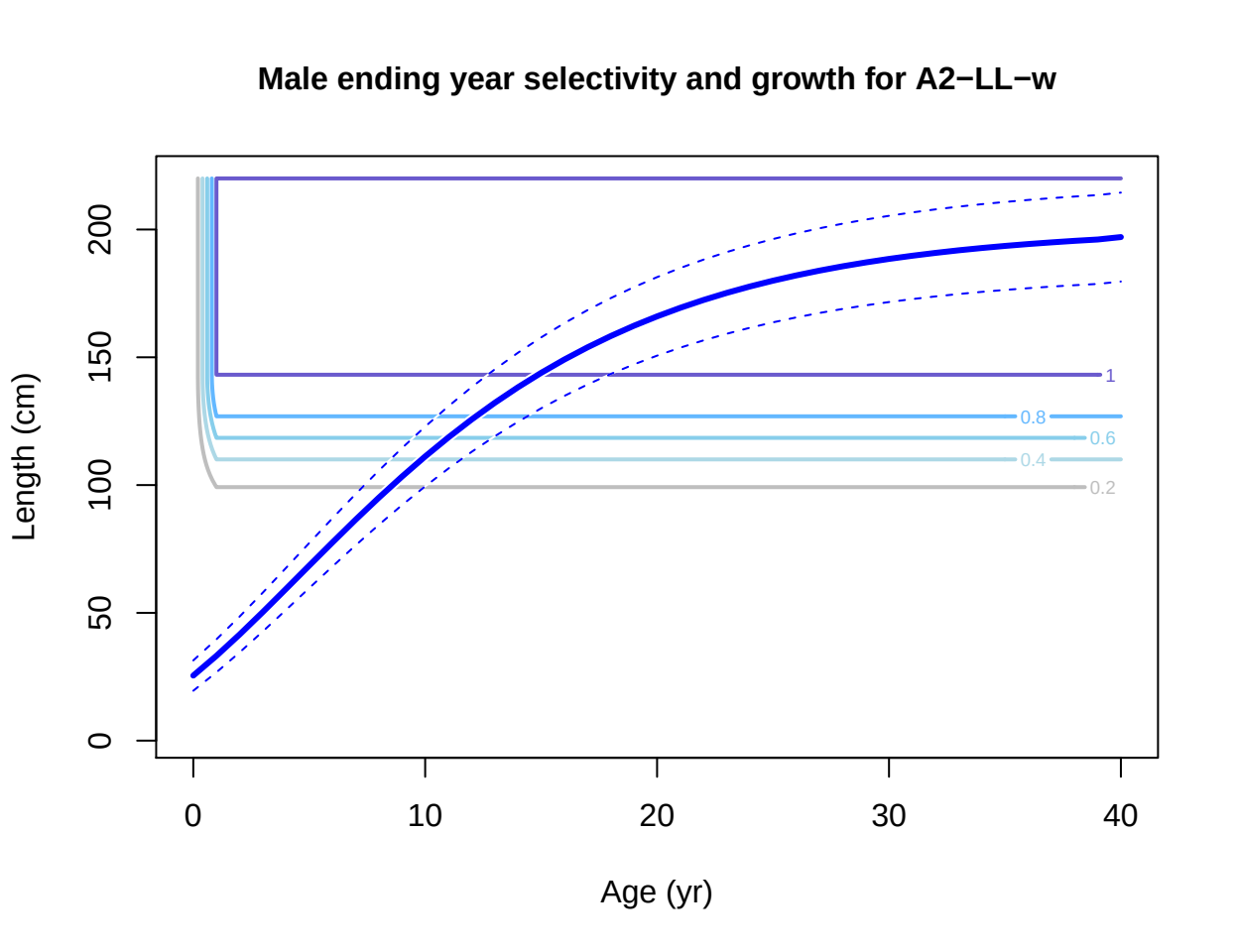

Female ending year selectivity and growth for A6−LL−n
Length (cm)
0
50
100
150
200
0.8
0.6
0.4
0.2
0
10
20
30
40
Age (yr)

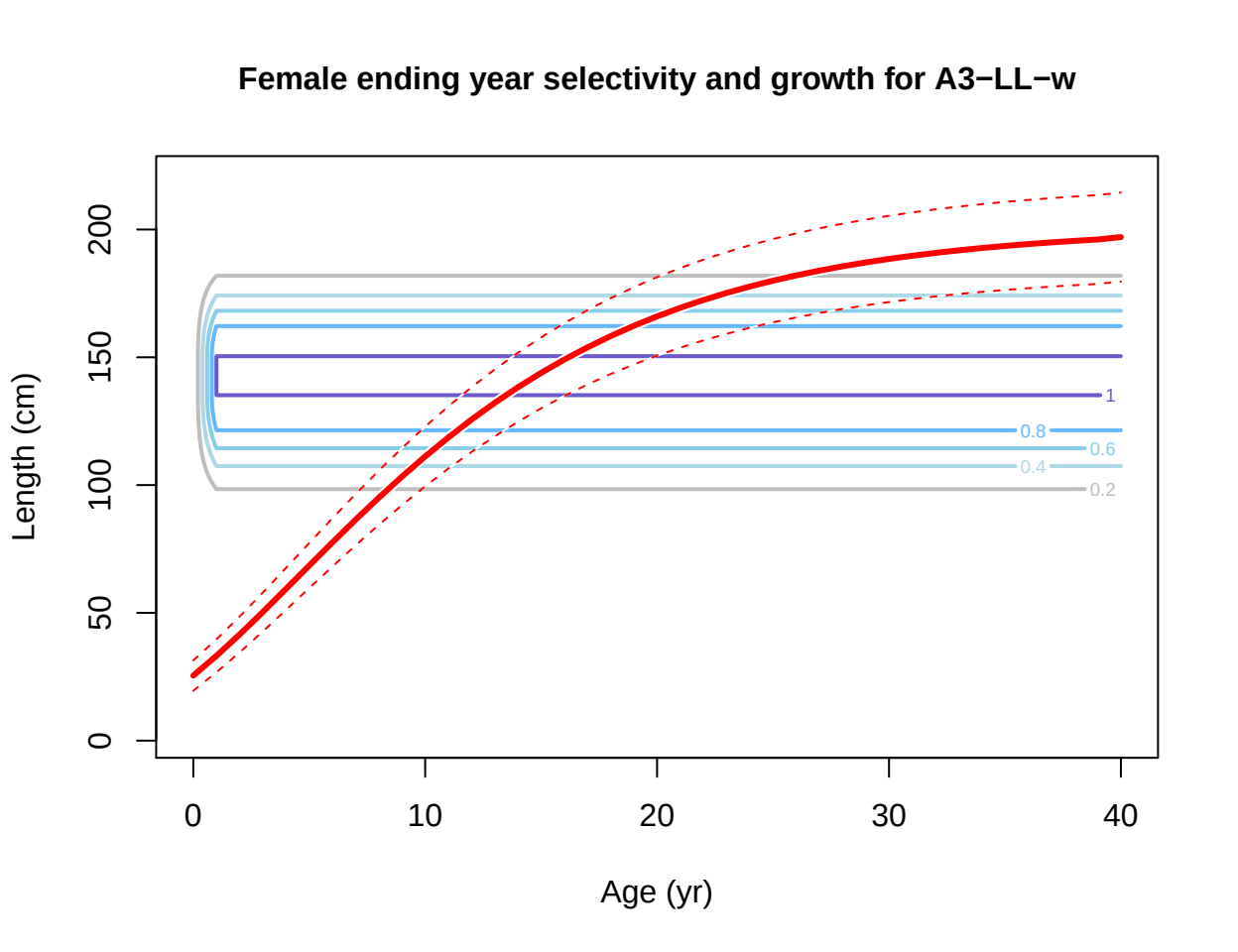

Male ending year selectivity and growth for A6−LL−n
Length (cm)
0
50
100
150
200
0.8
0.6
0.4
0.2
0
10
20
30
40
Age (yr)

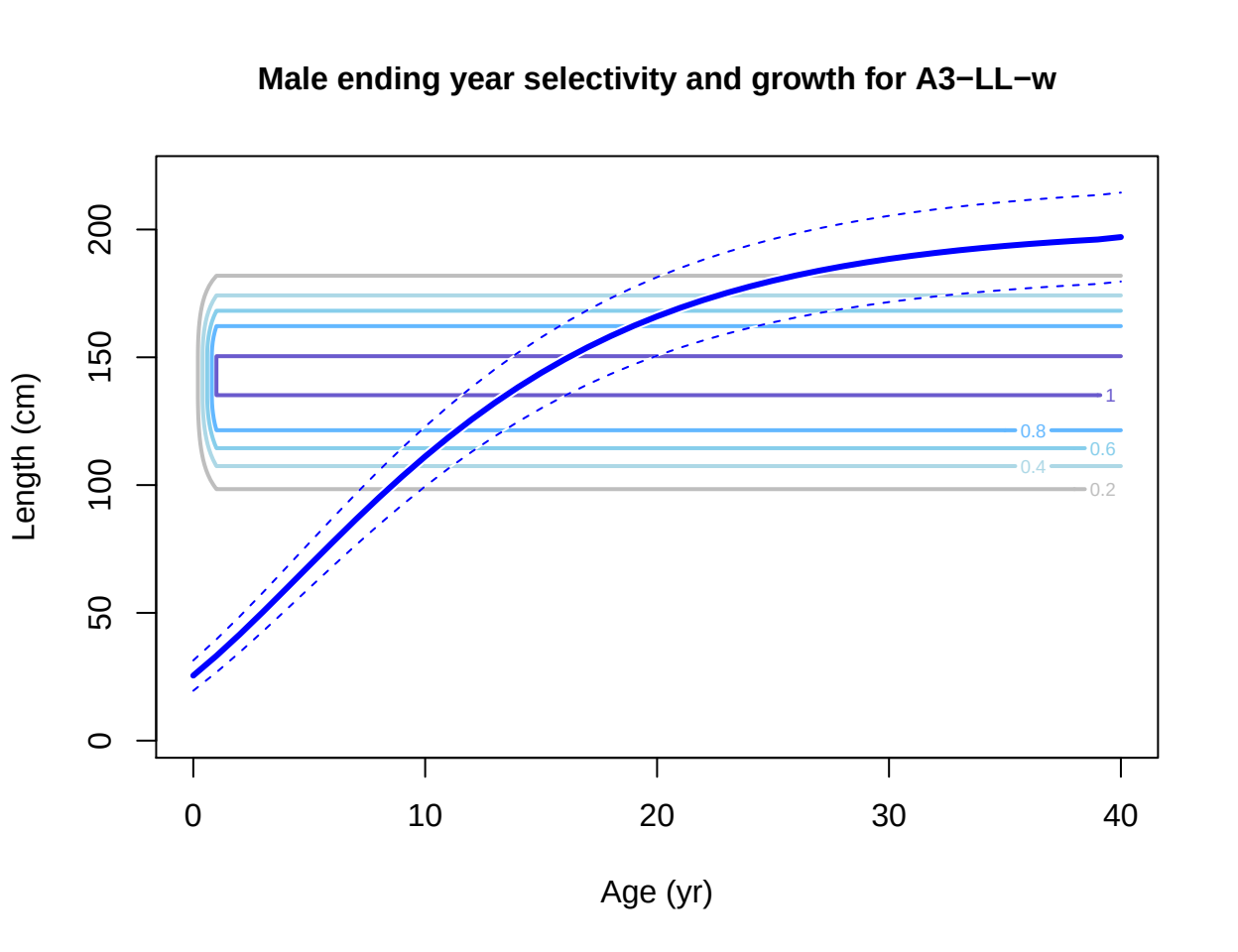

Female ending year selectivity and growth for A1−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

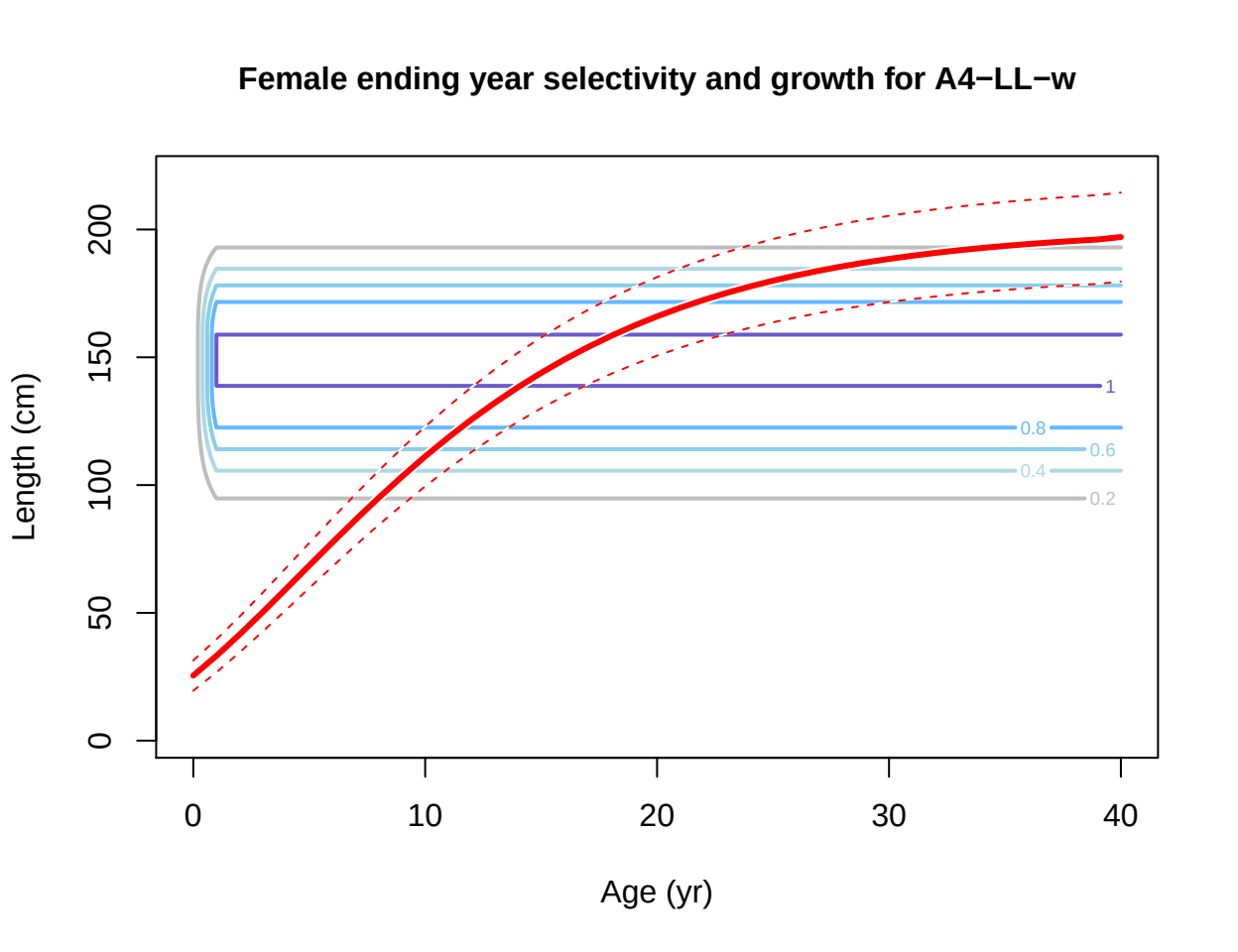

Male ending year selectivity and growth for A1−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

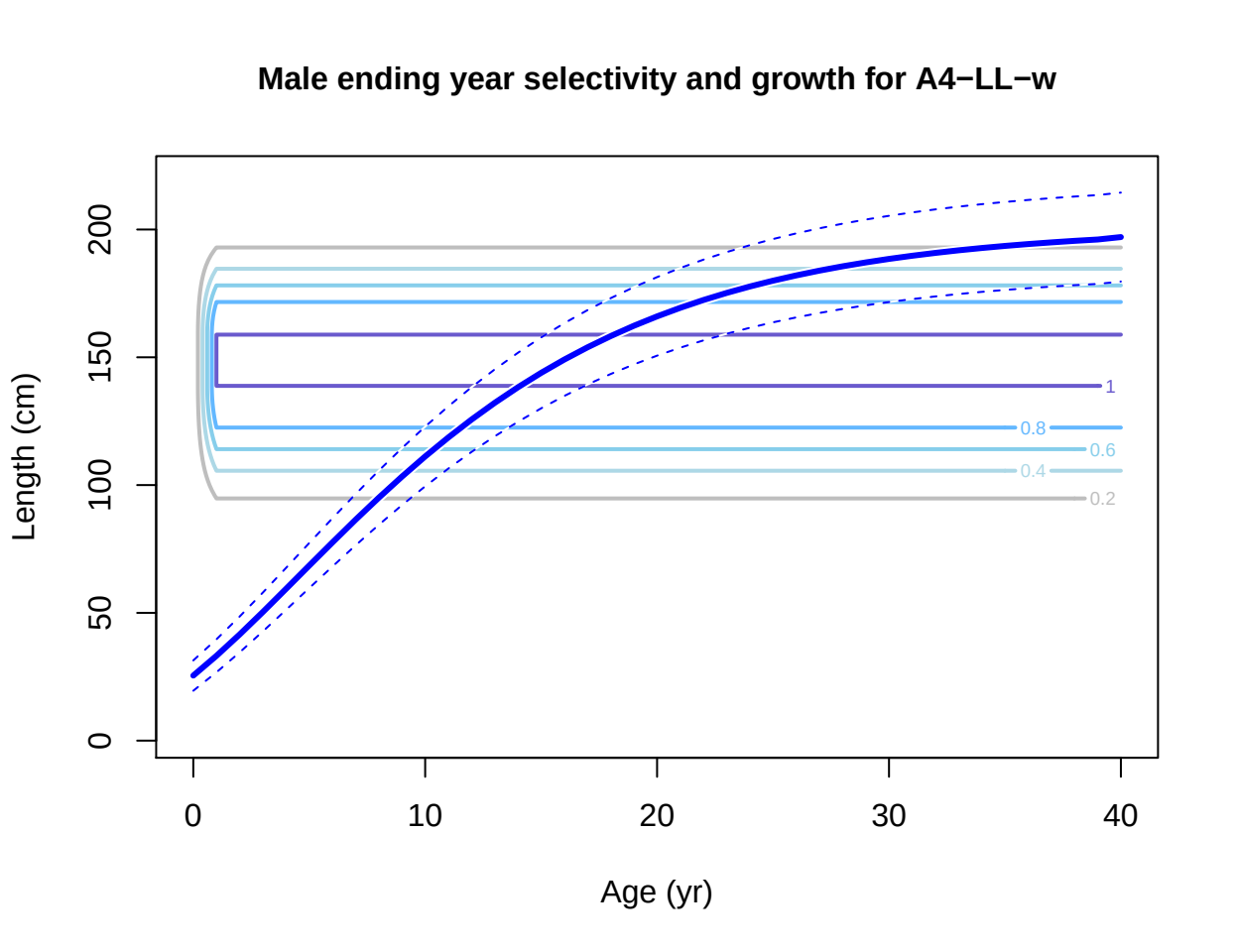

Female ending year selectivity and growth for A2−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

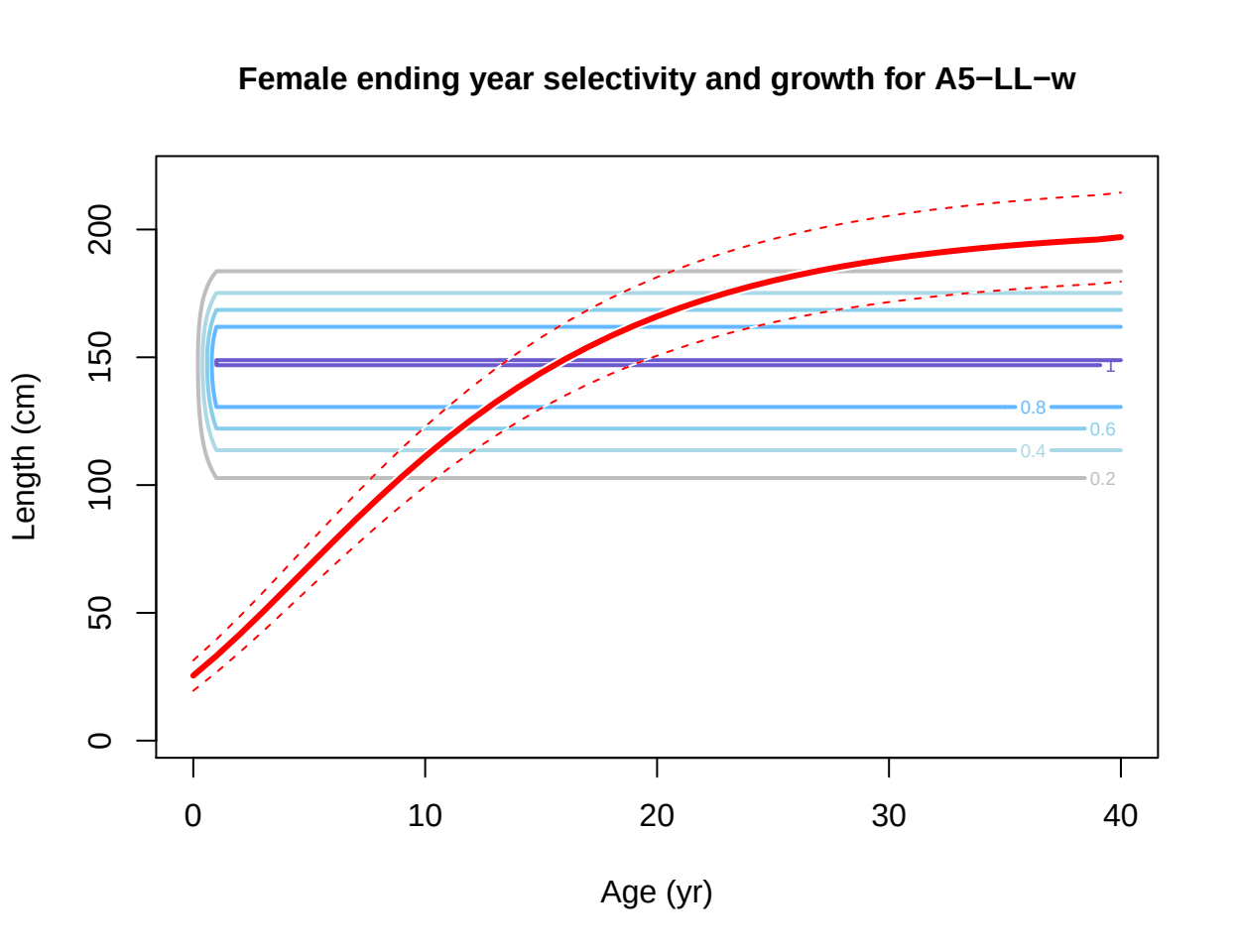

Male ending year selectivity and growth for A2−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

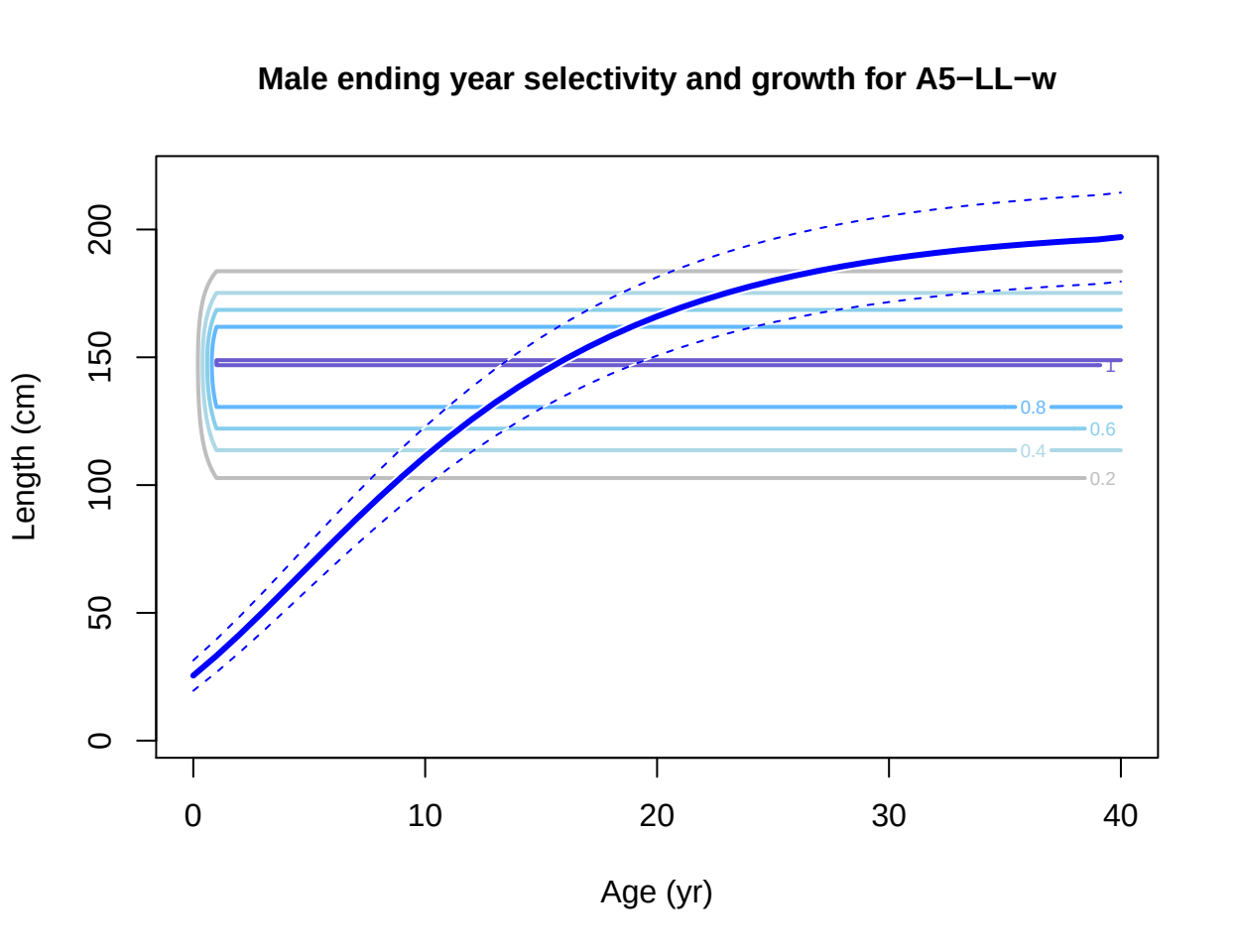

Female ending year selectivity and growth for A3−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

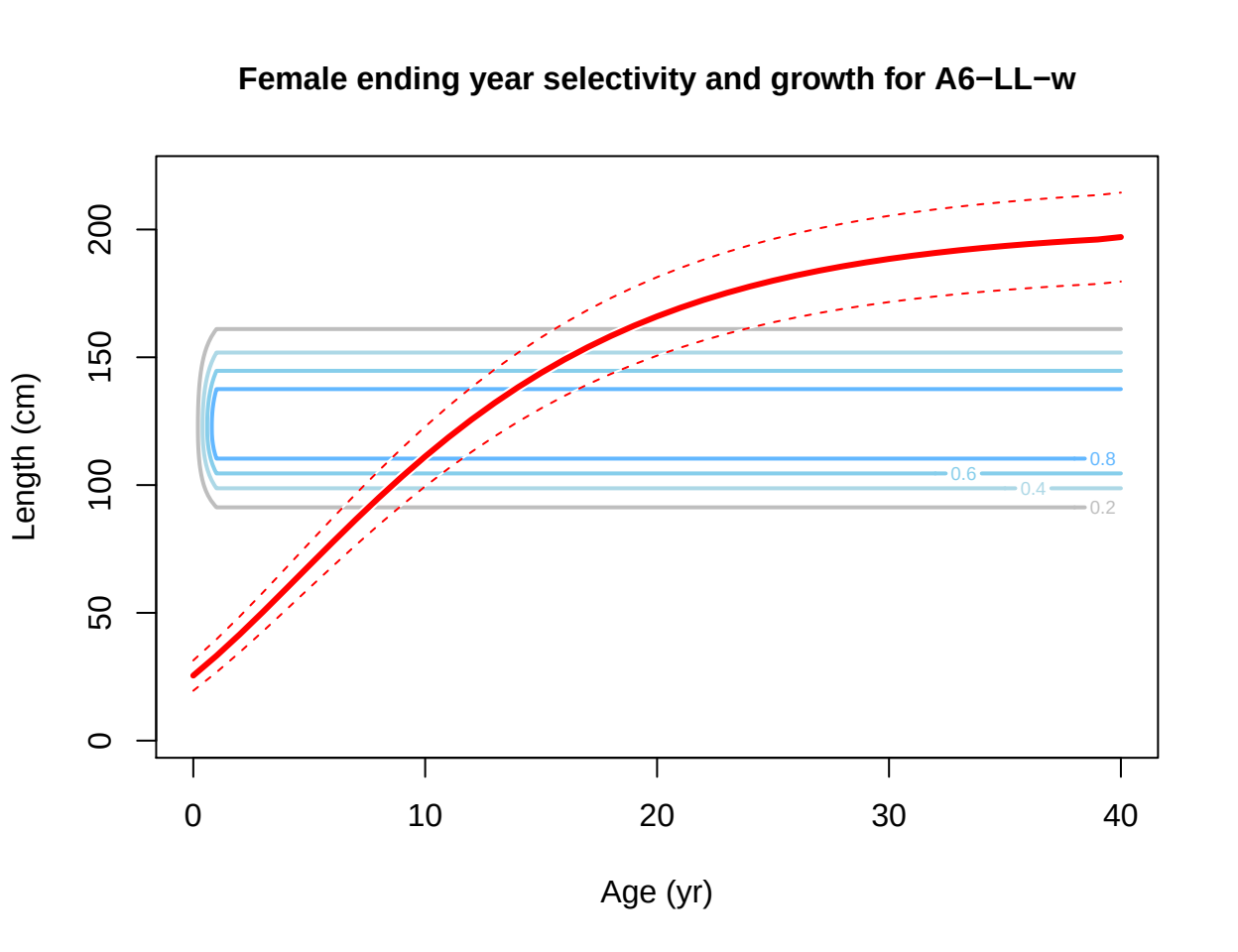

Male ending year selectivity and growth for A3−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

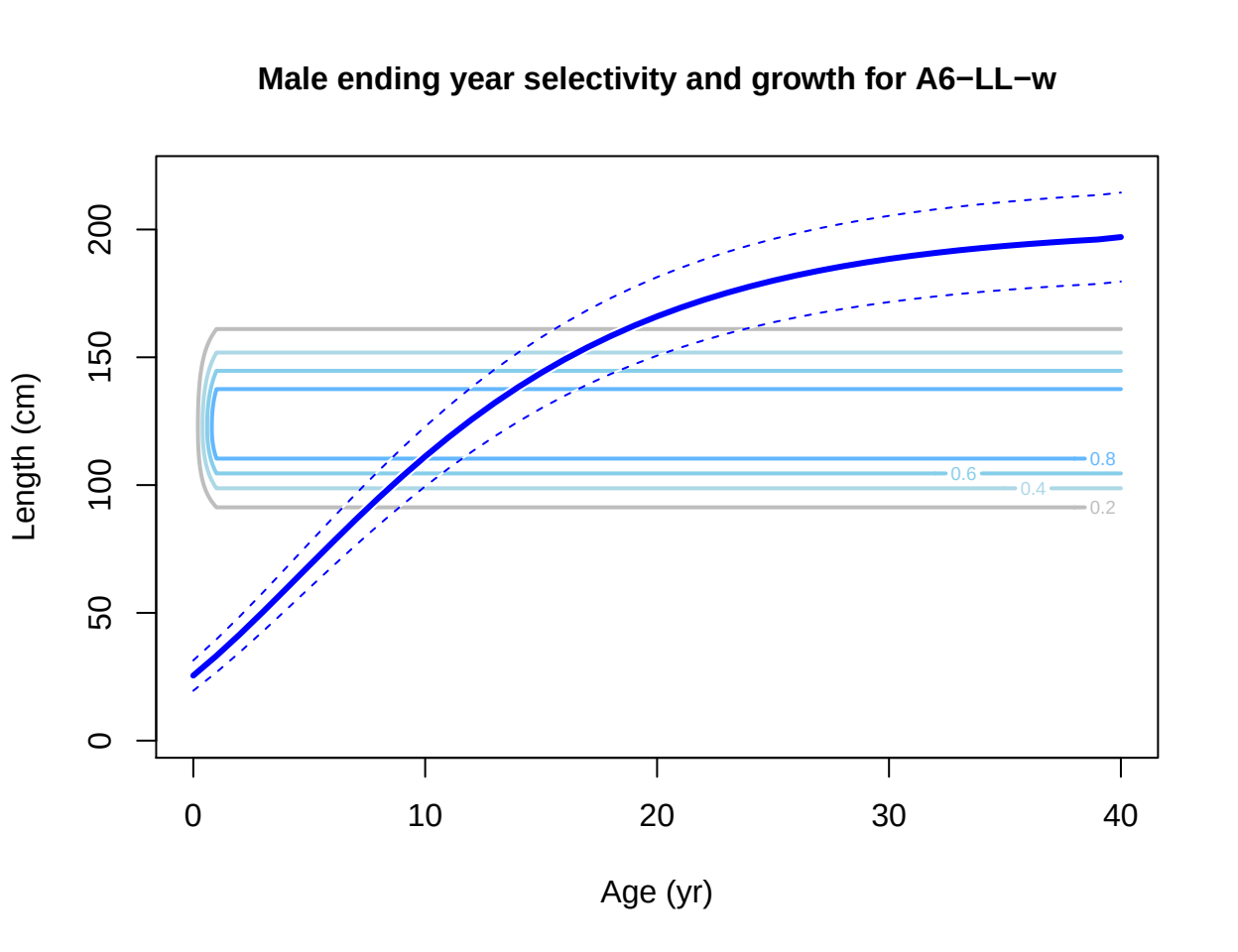

Female ending year selectivity and growth for A4−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

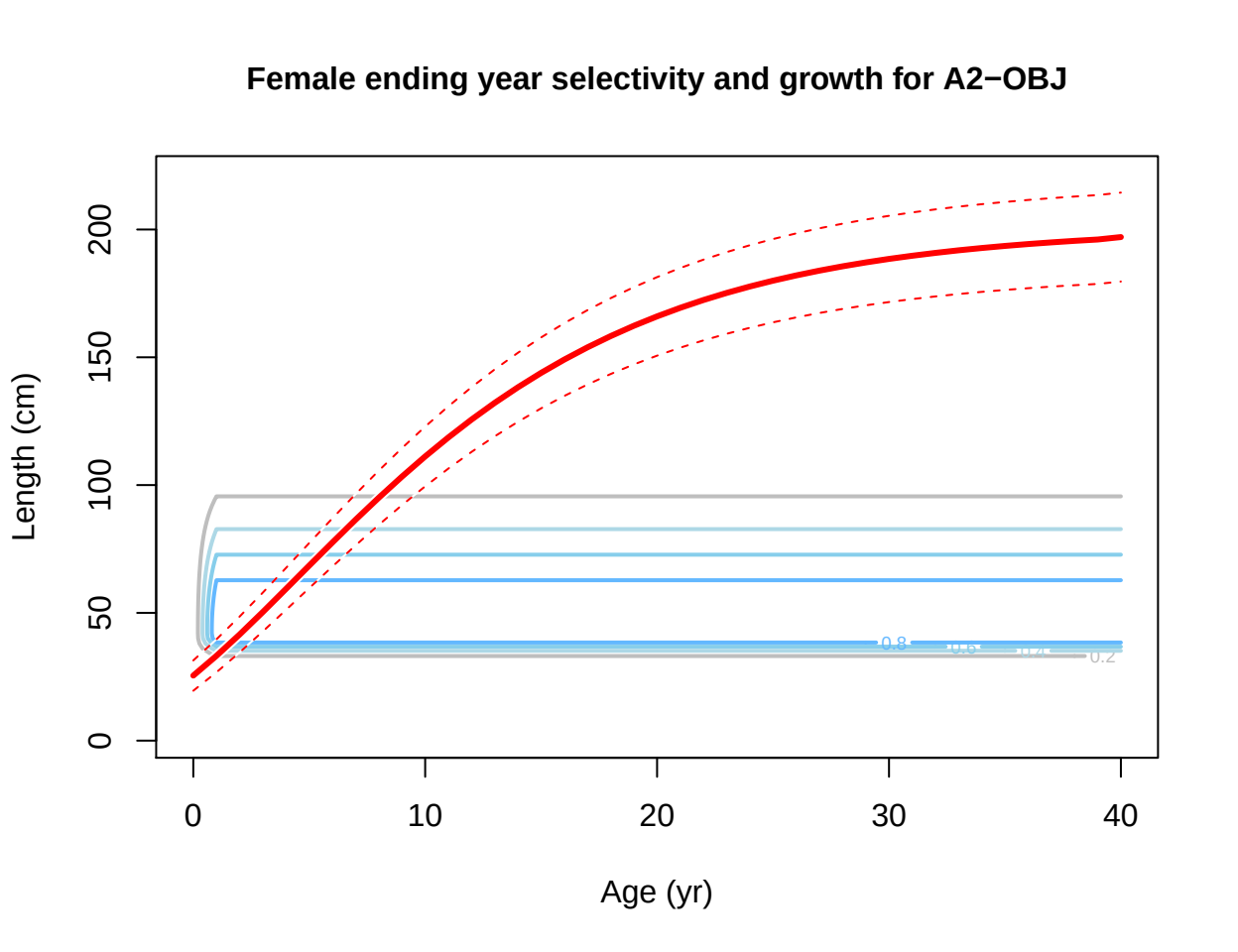

Male ending year selectivity and growth for A4−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

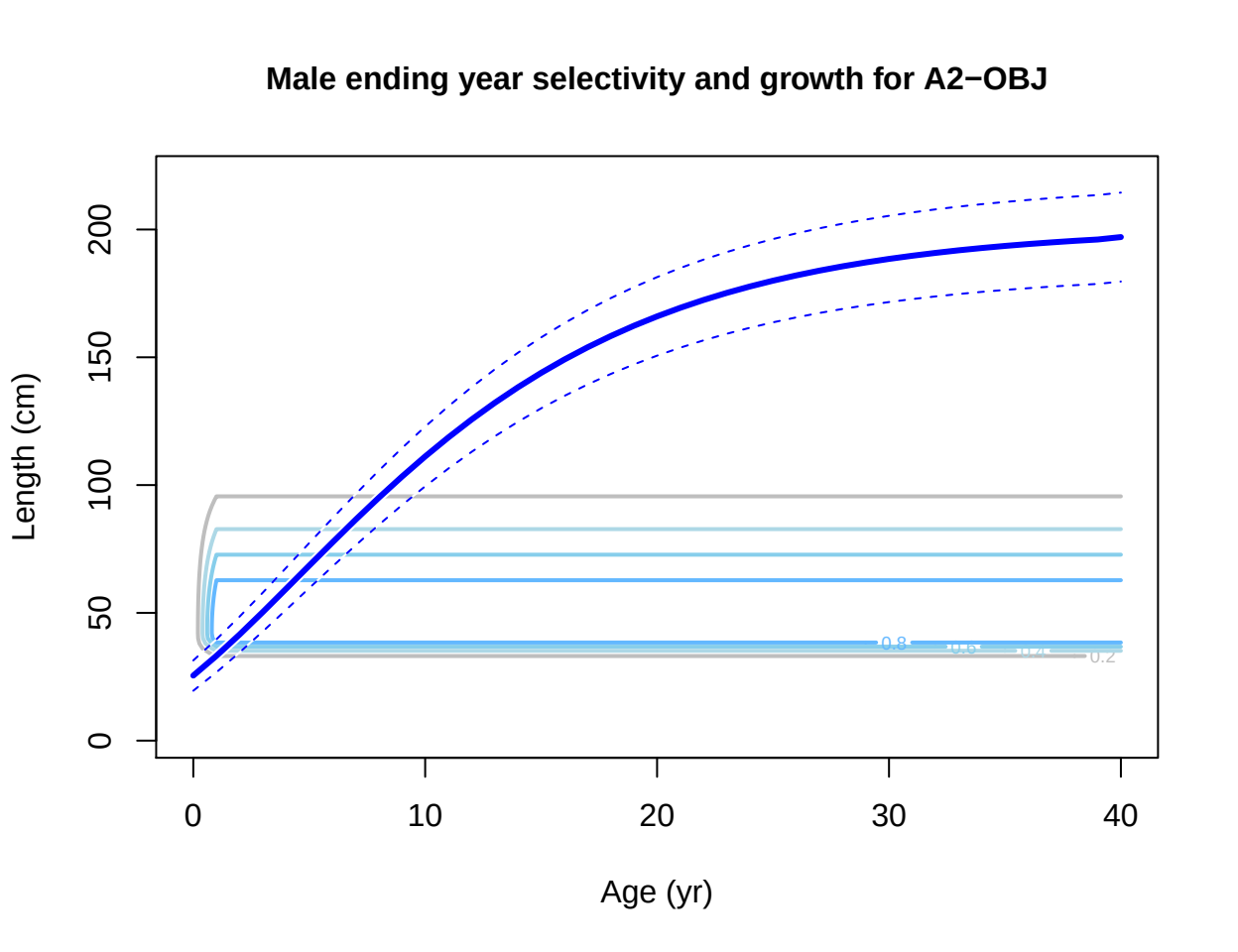

Female ending year selectivity and growth for A5−LL−w
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

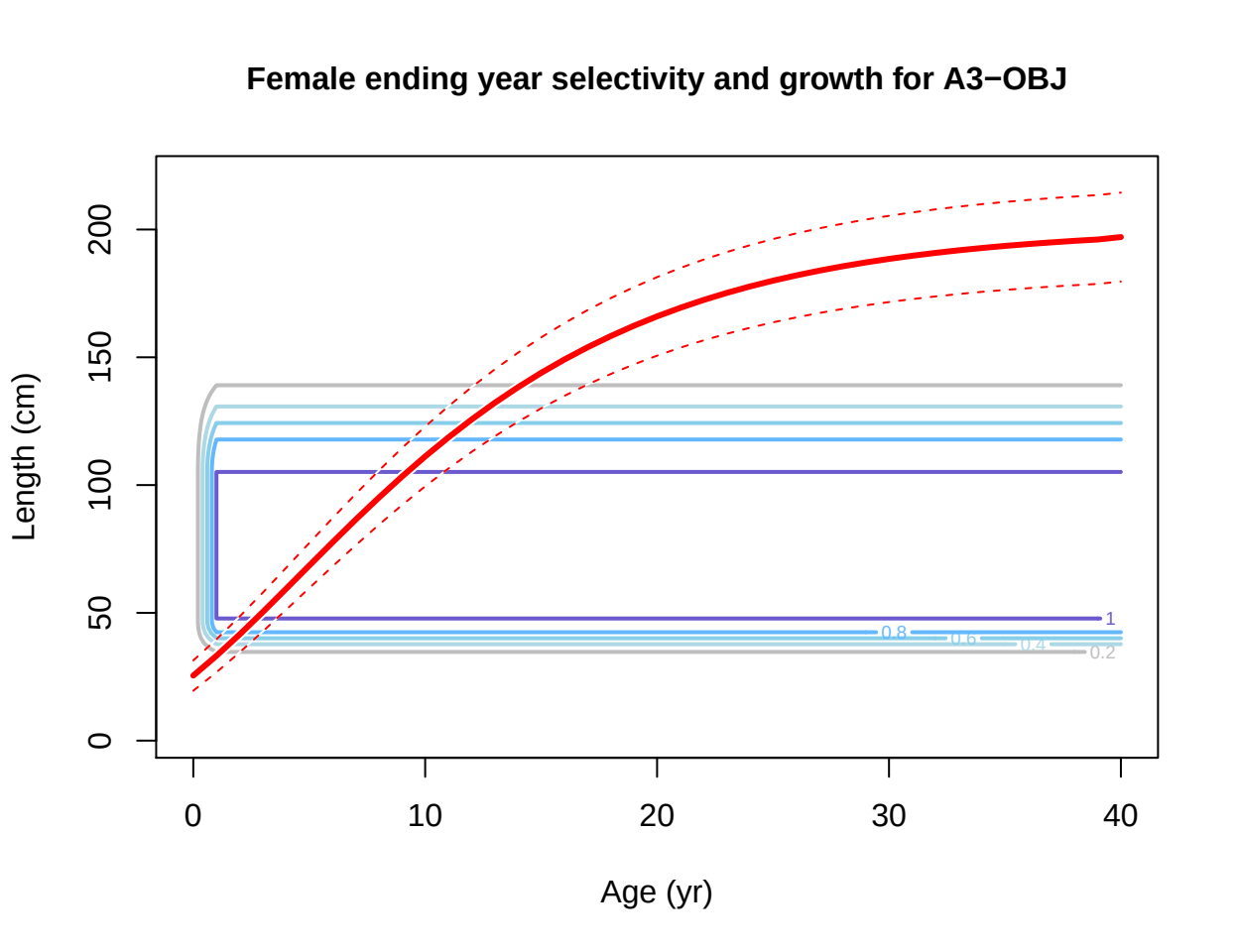

Male ending year selectivity and growth for A5−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

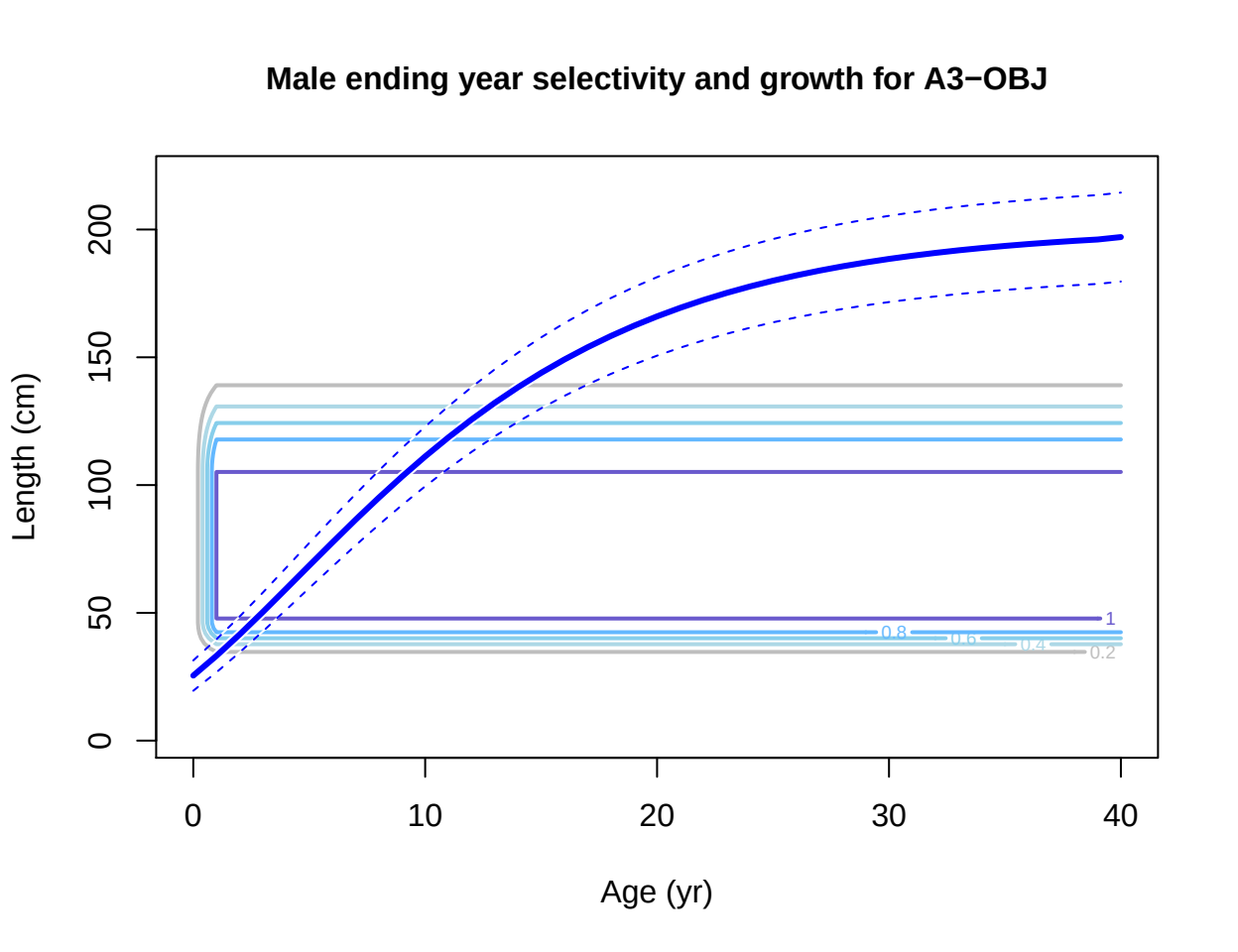

Female ending year selectivity and growth for A6−LL−w
Length (cm)
0
50
100
150
200
0.8
0.6
0.4
0.2
0
10
20
30
40
Age (yr)

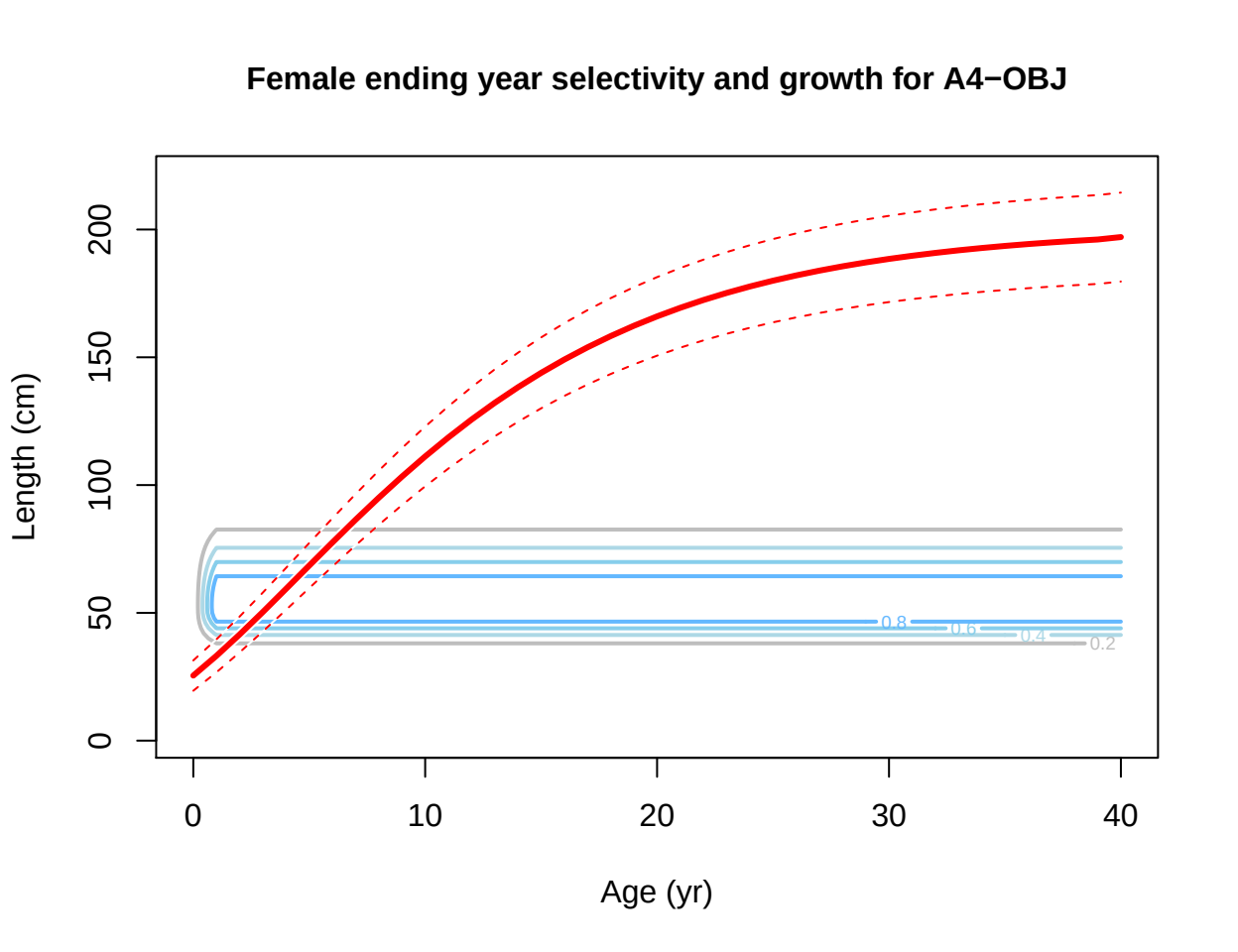

Male ending year selectivity and growth for A6−LL−w
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

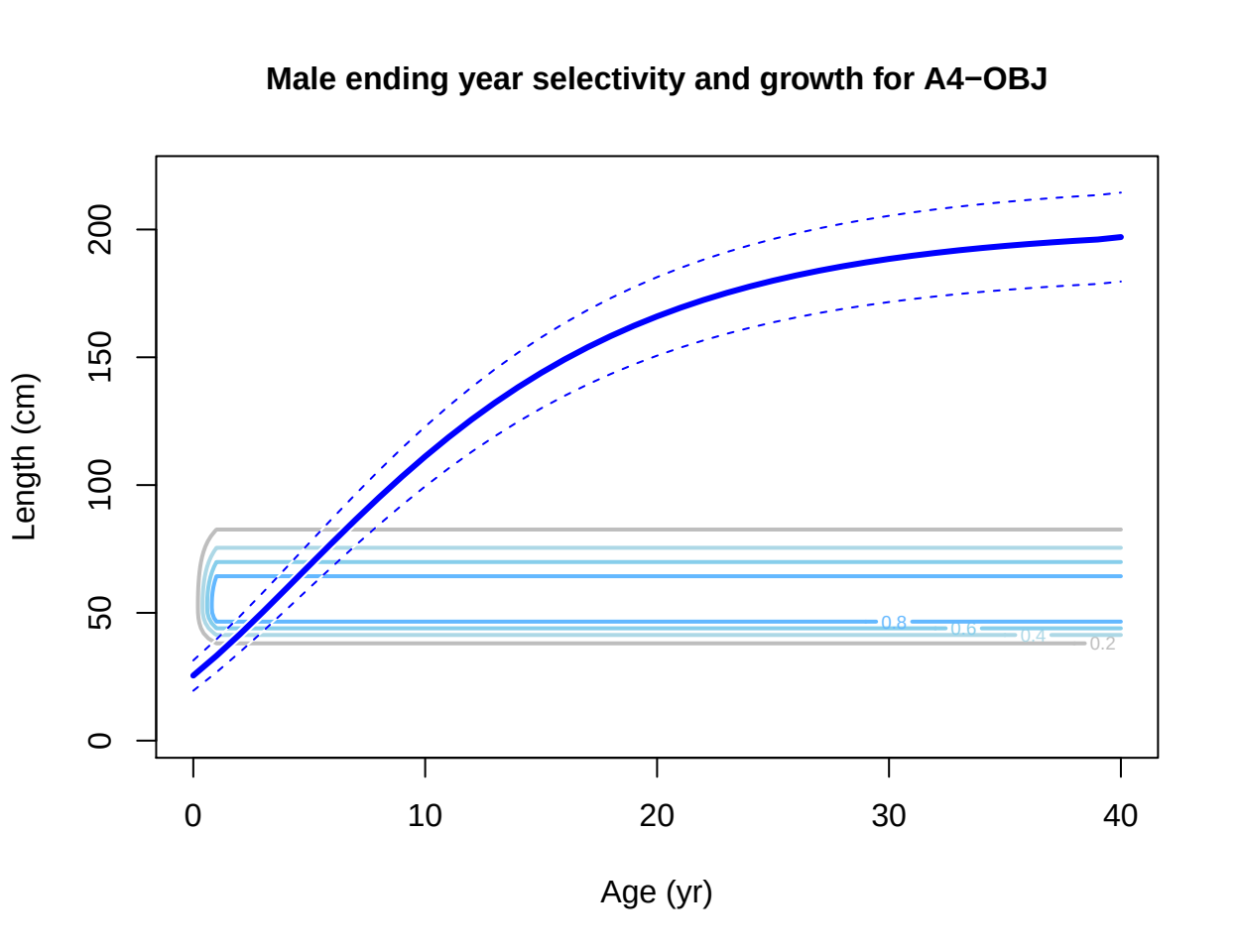

Female ending year selectivity and growth for A2−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.2

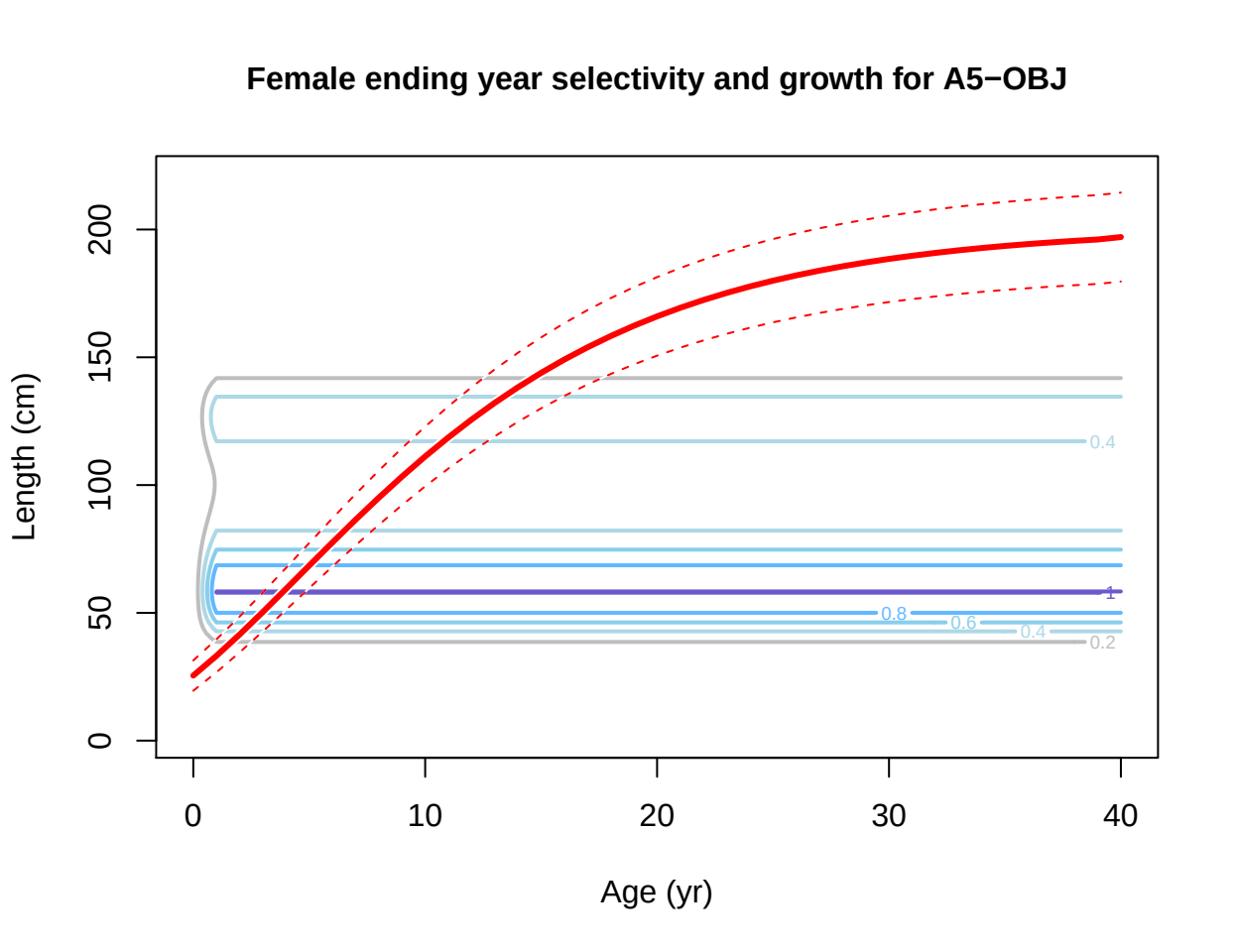

Male ending year selectivity and growth for A2−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.2

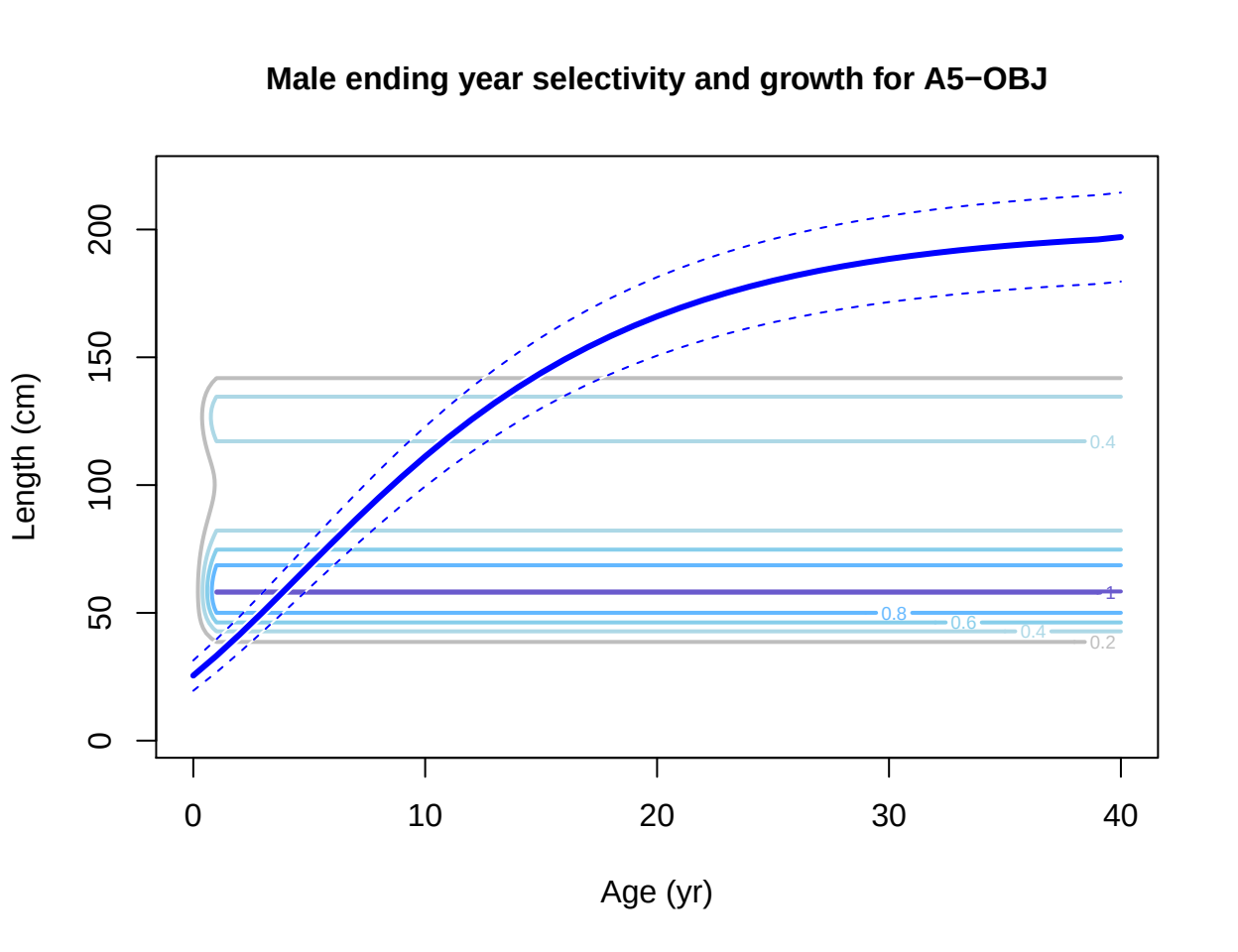

Female ending year selectivity and growth for A3−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

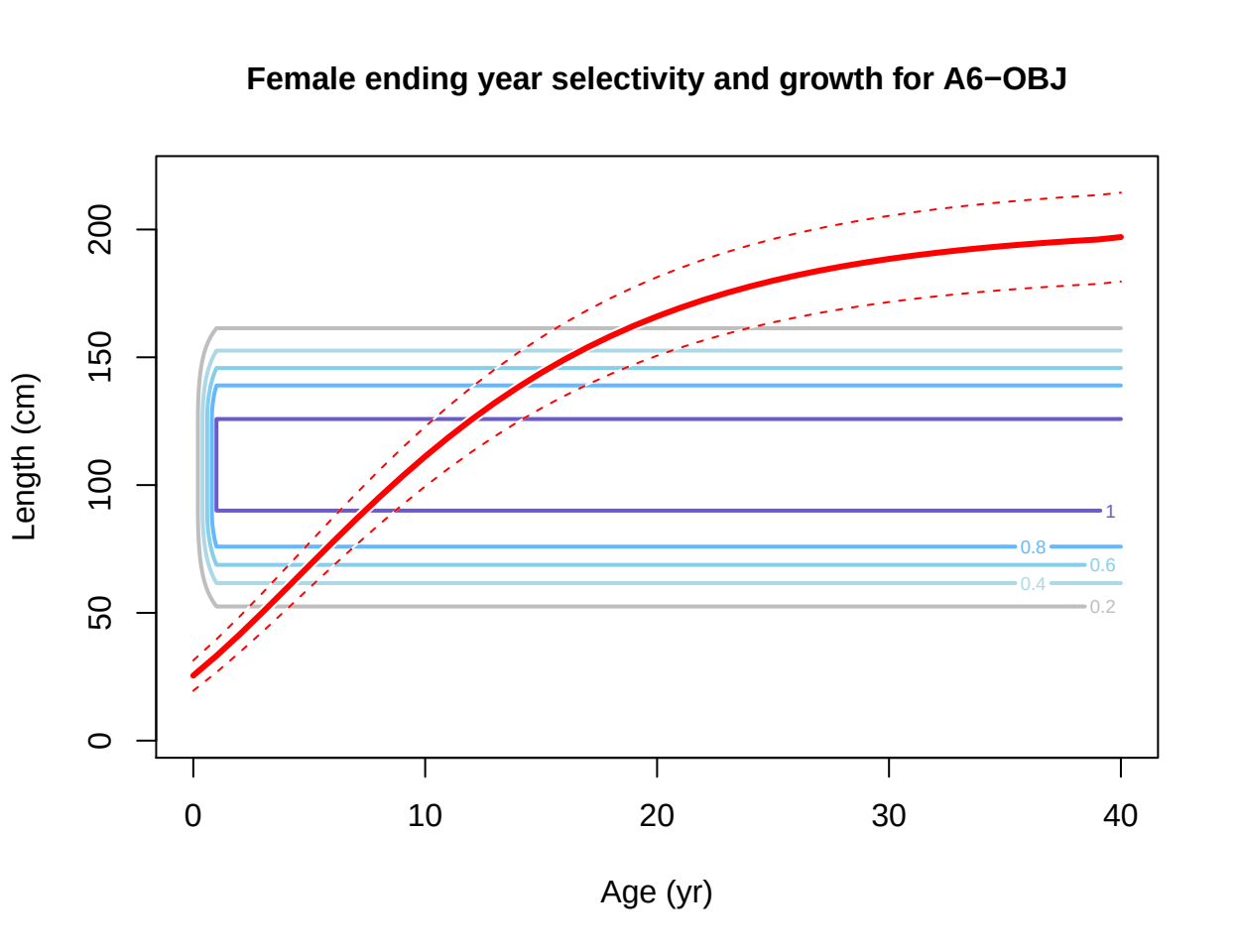

Male ending year selectivity and growth for A3−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

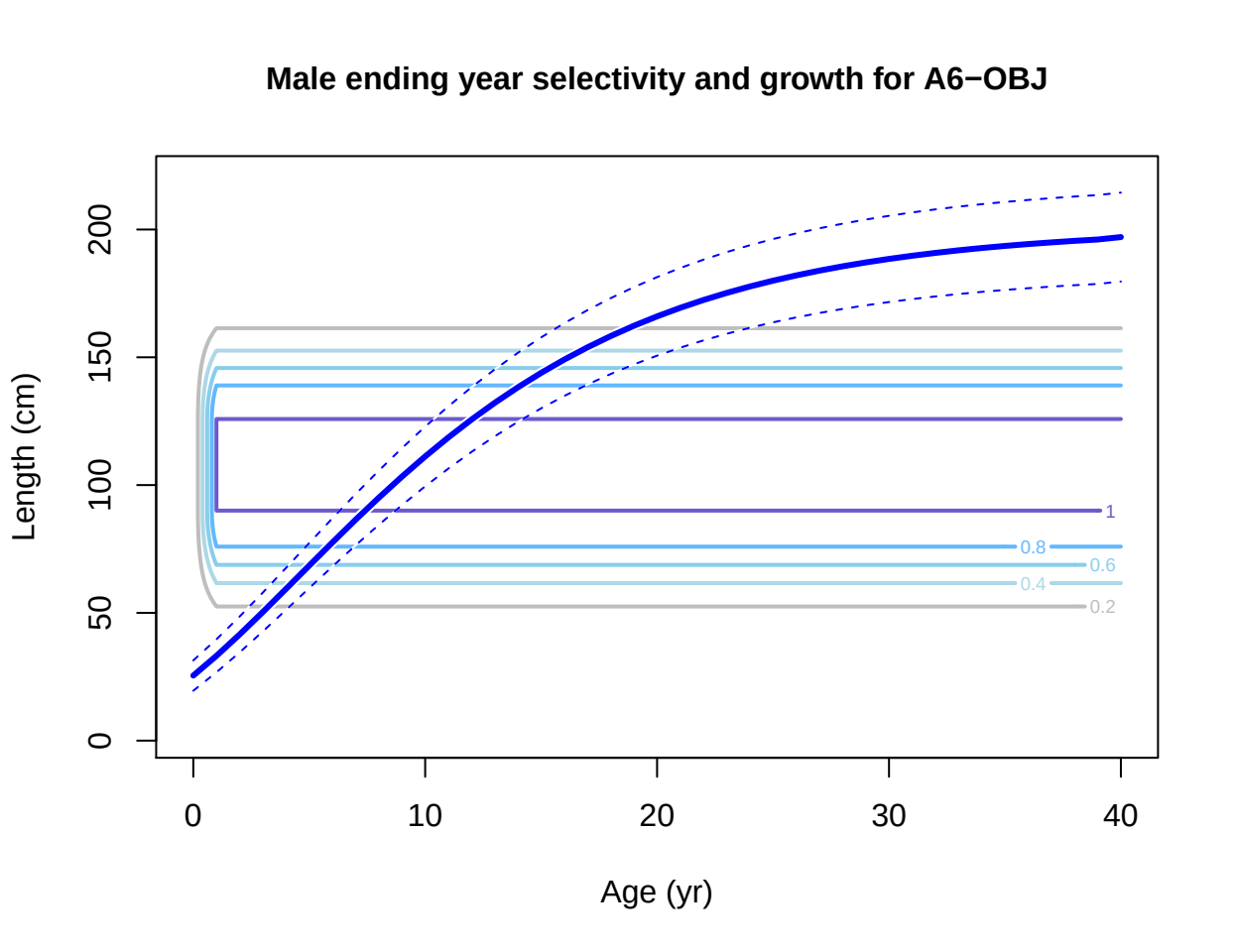

Female ending year selectivity and growth for A4−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

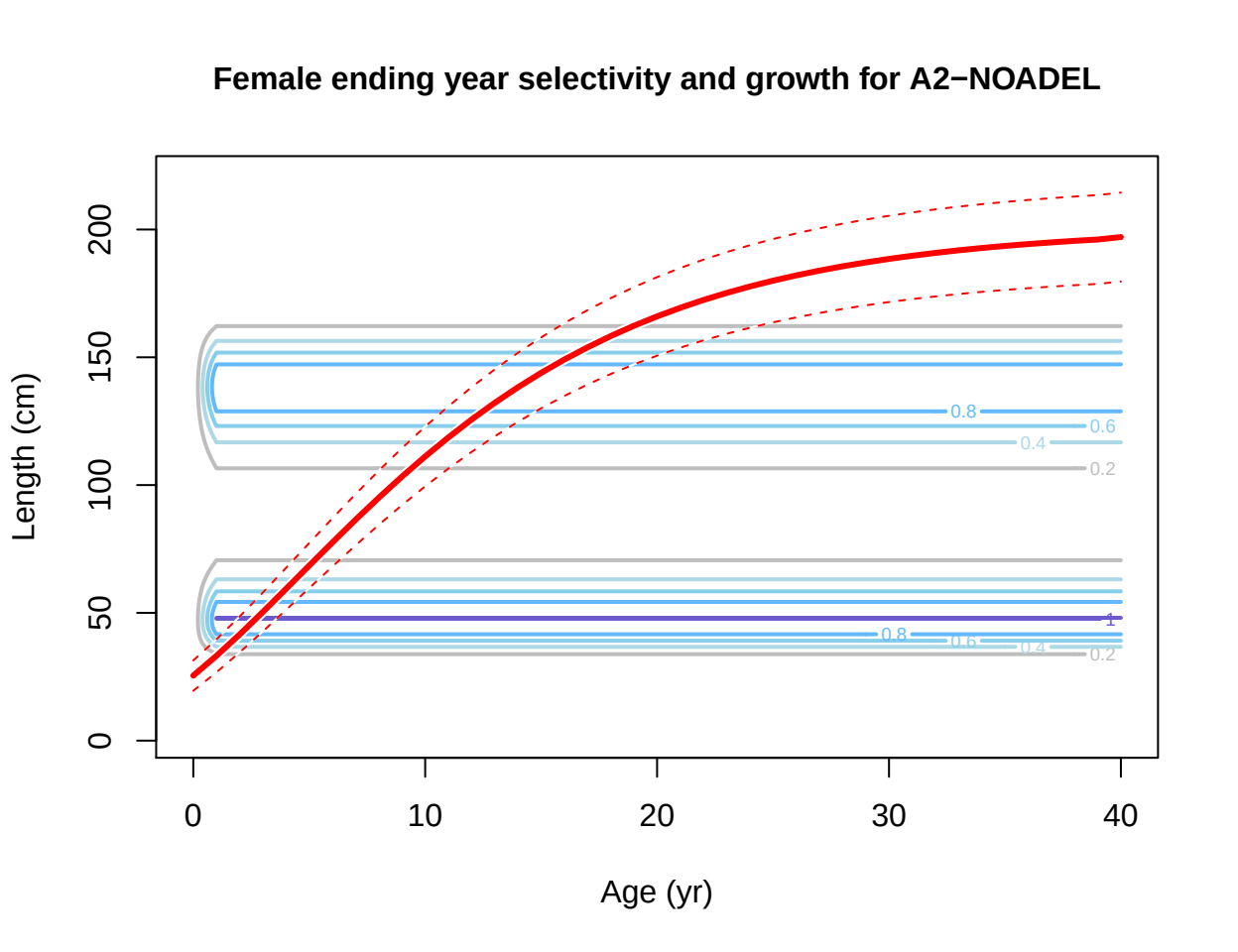

Male ending year selectivity and growth for A4−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2

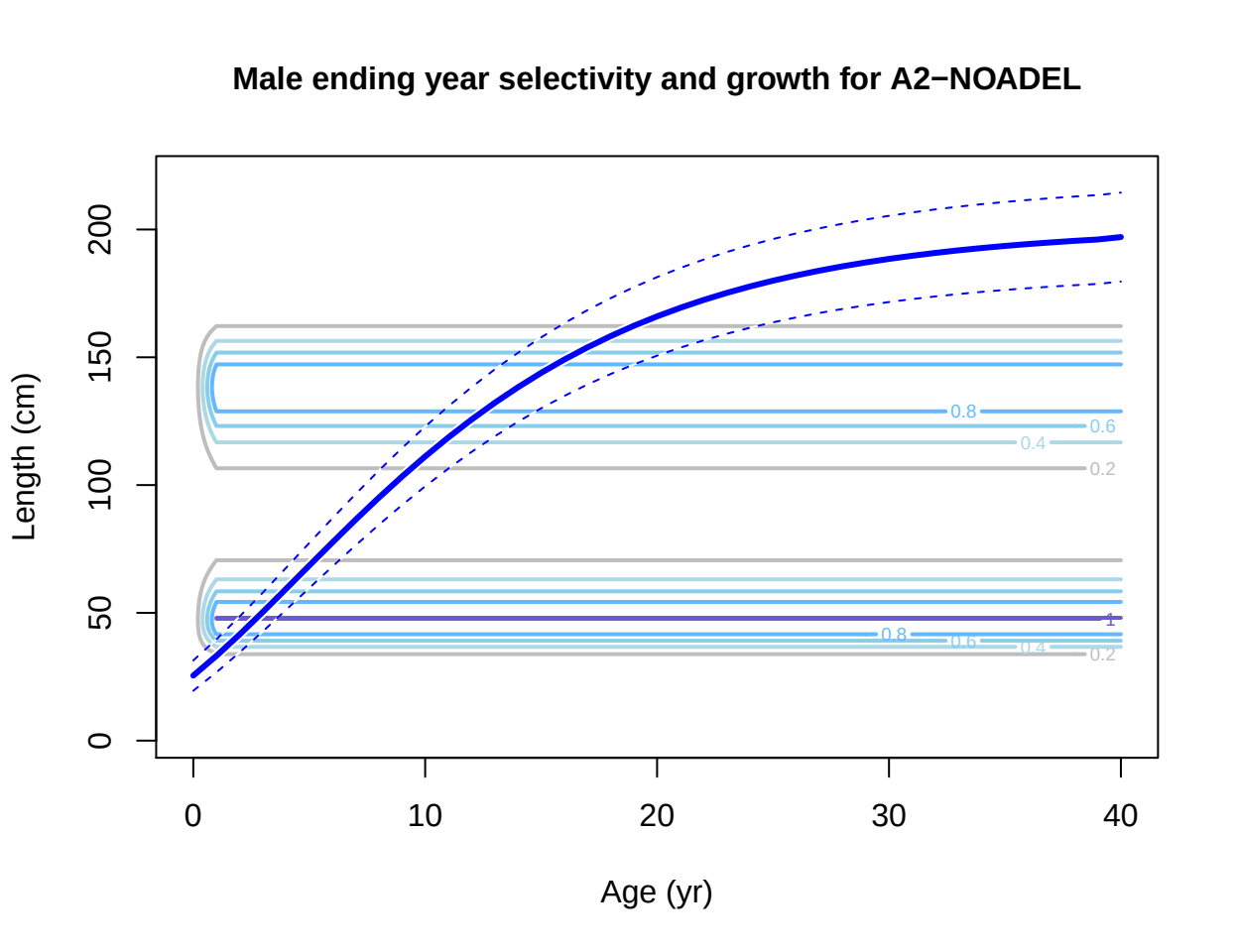

Female ending year selectivity and growth for A5−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.4
1
0.8
0.6
0.4
0.2

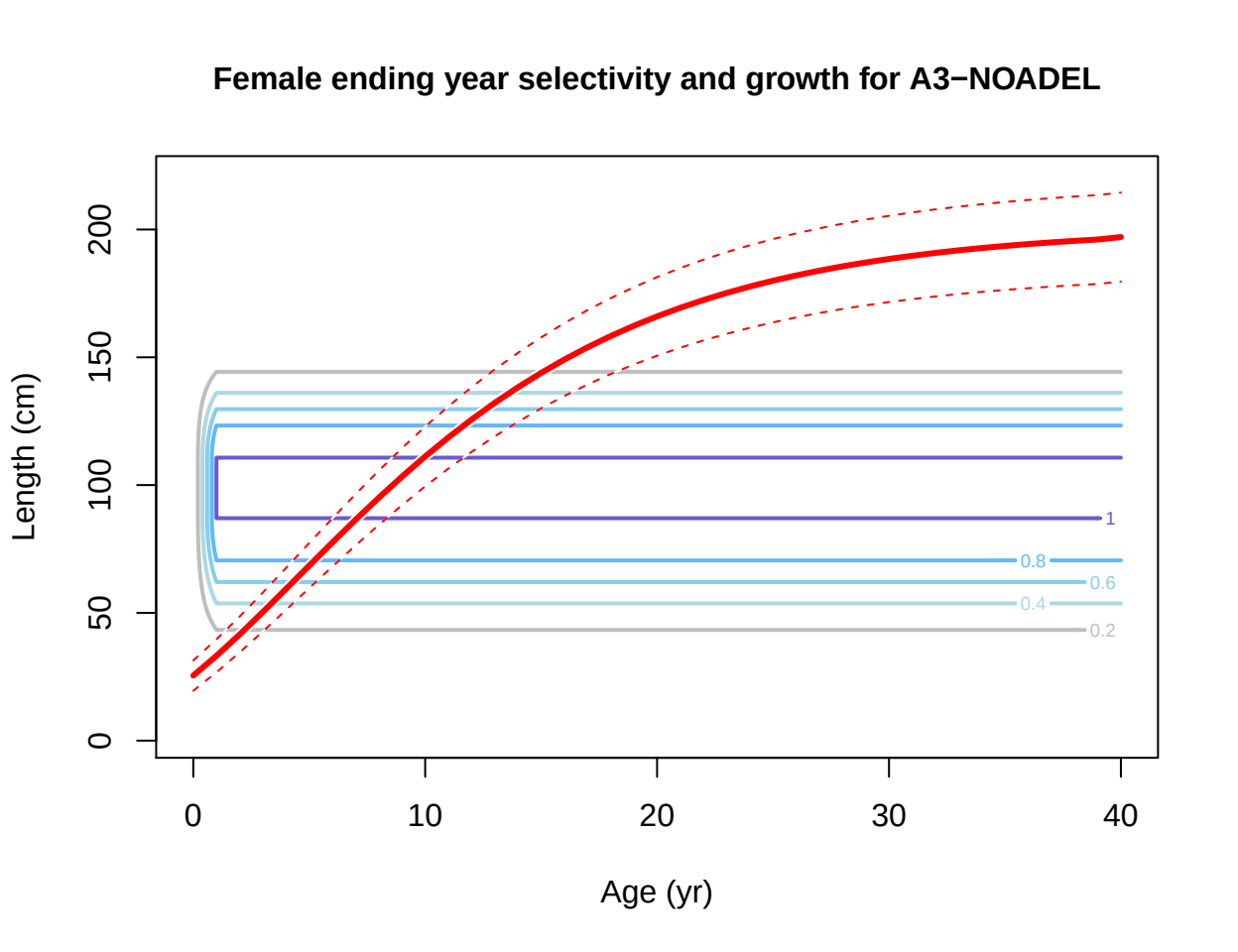

Male ending year selectivity and growth for A5−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.4
1
0.8
0.6
0.4
0.2

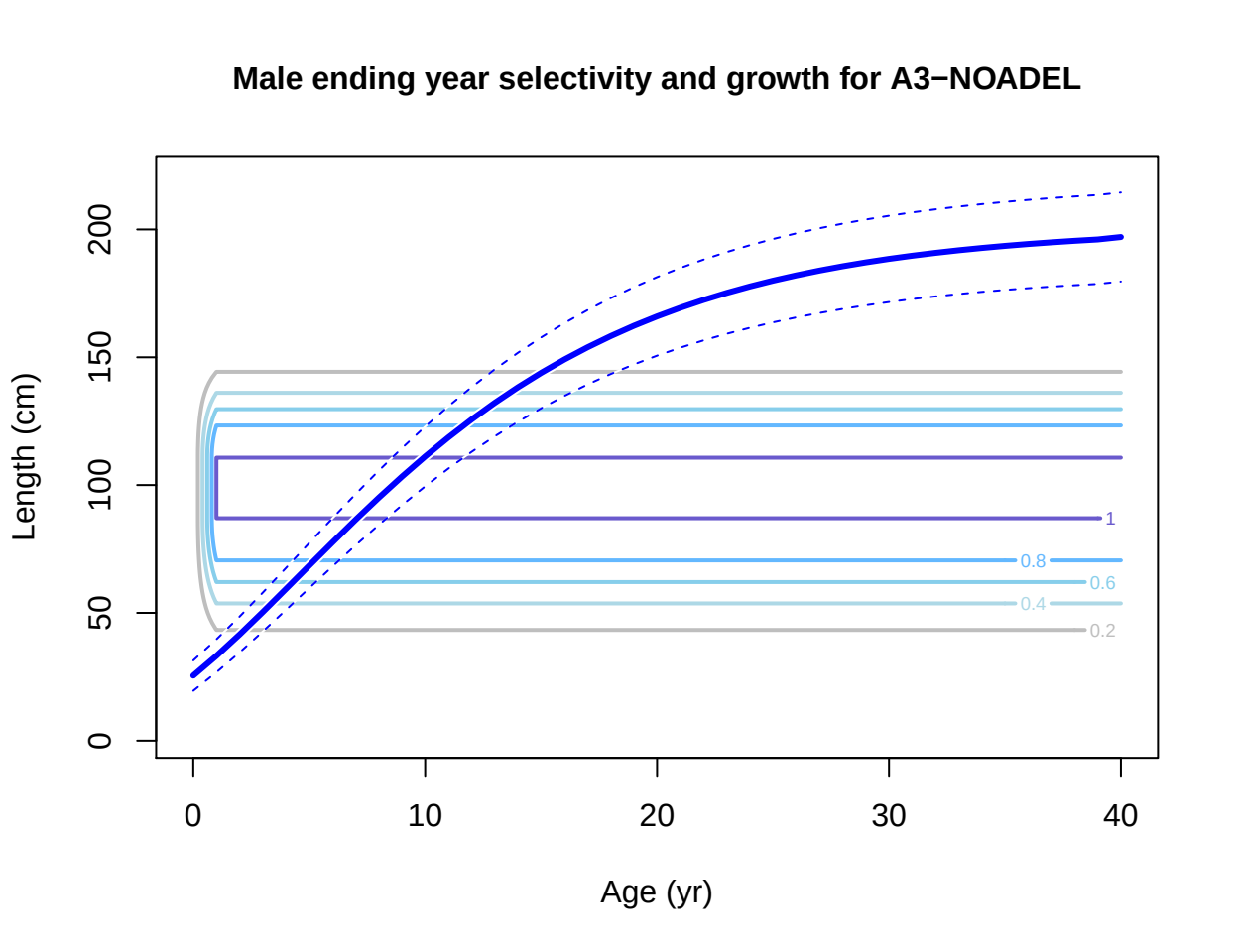

Female ending year selectivity and growth for A6−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

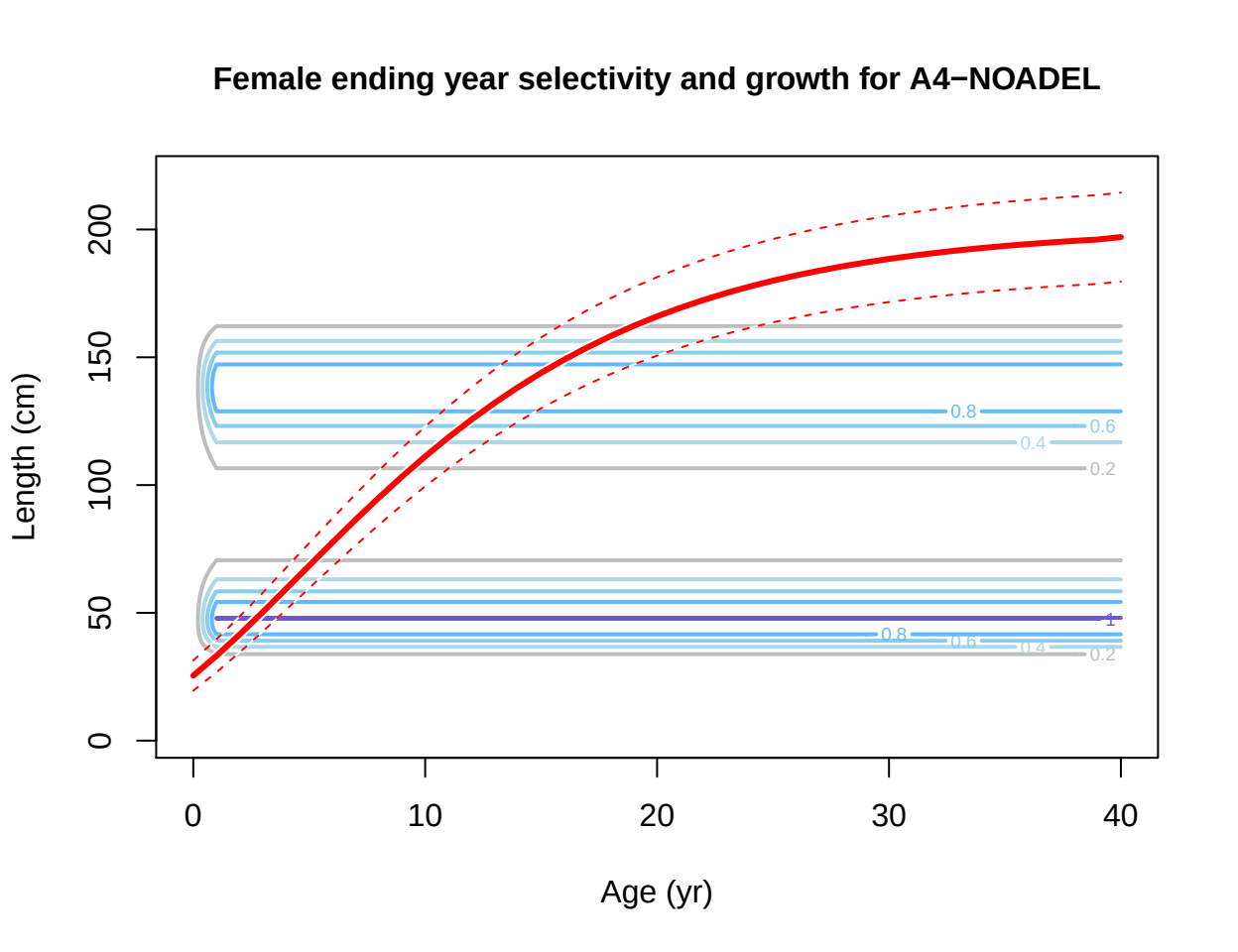

Male ending year selectivity and growth for A6−OBJ
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

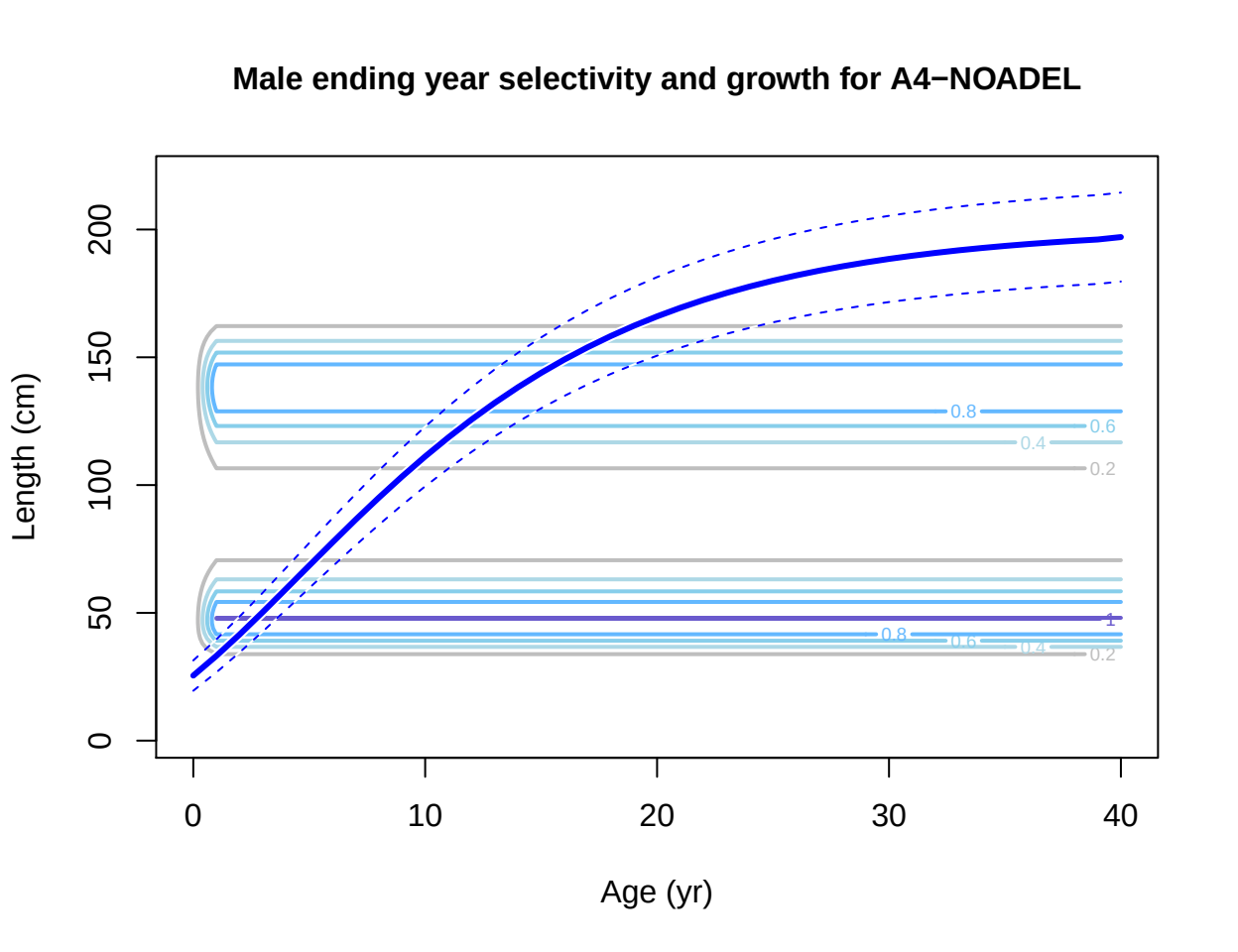

Female ending year selectivity and growth for A2−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

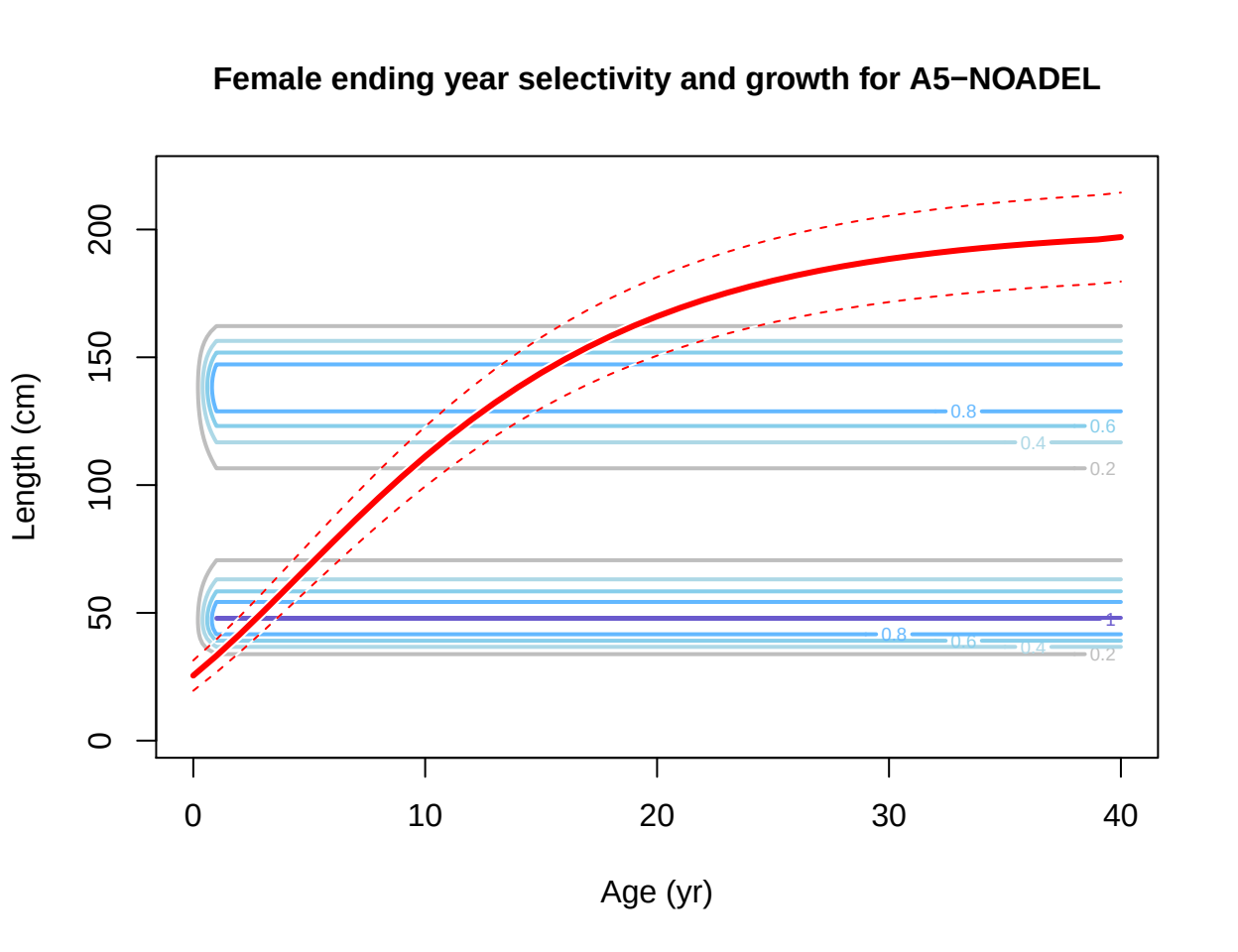

Male ending year selectivity and growth for A2−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

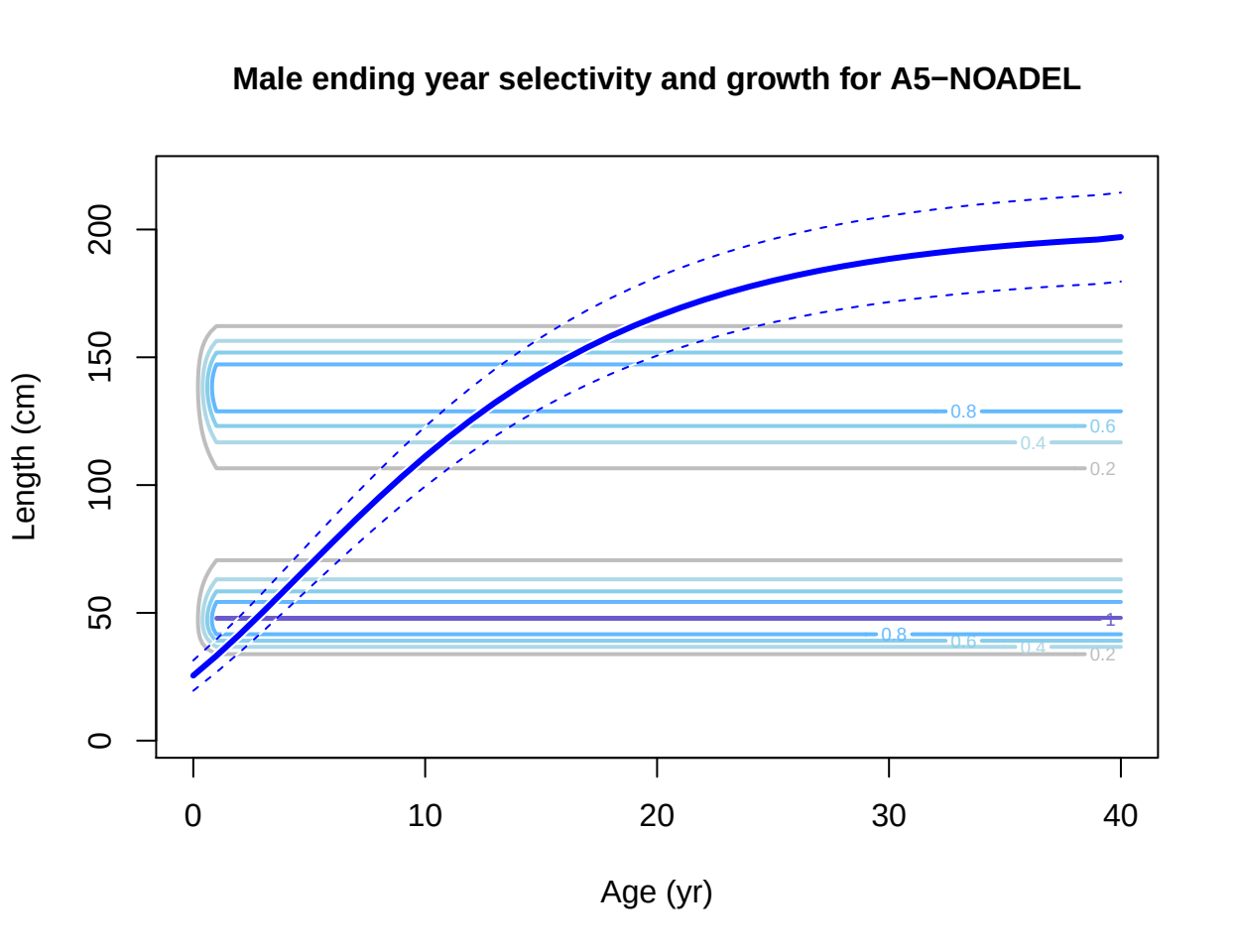

Female ending year selectivity and growth for A3−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

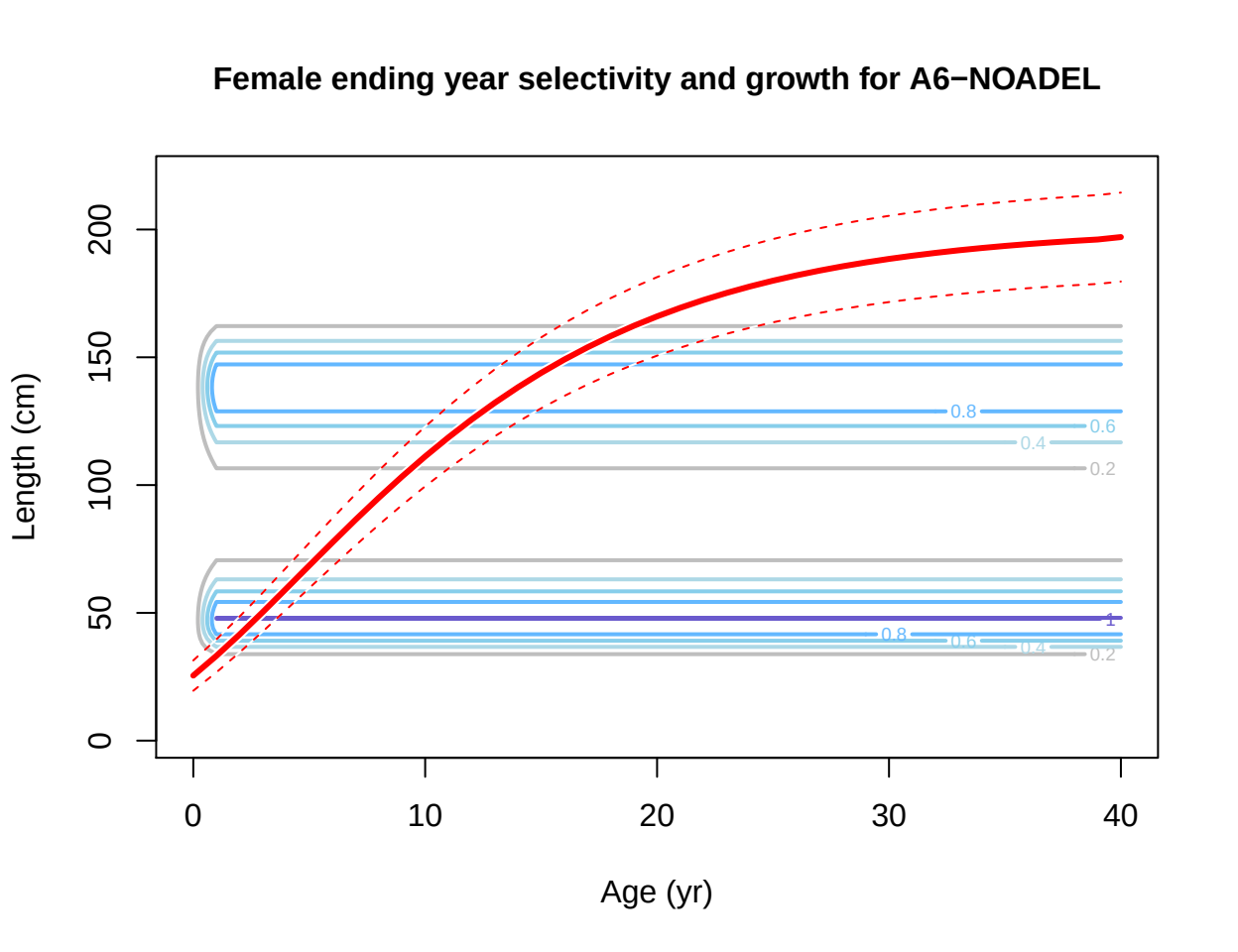

Male ending year selectivity and growth for A3−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

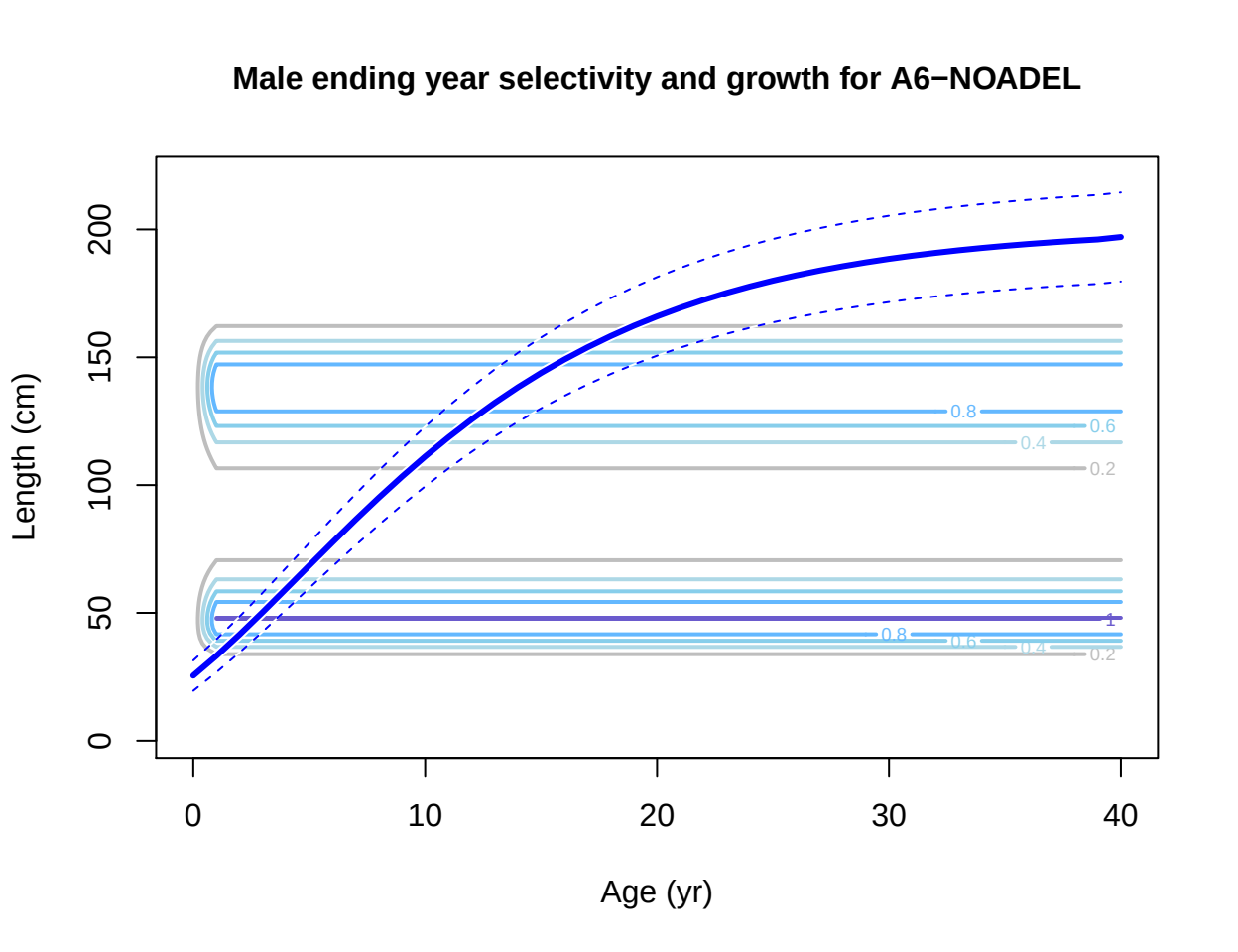

Female ending year selectivity and growth for A4−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

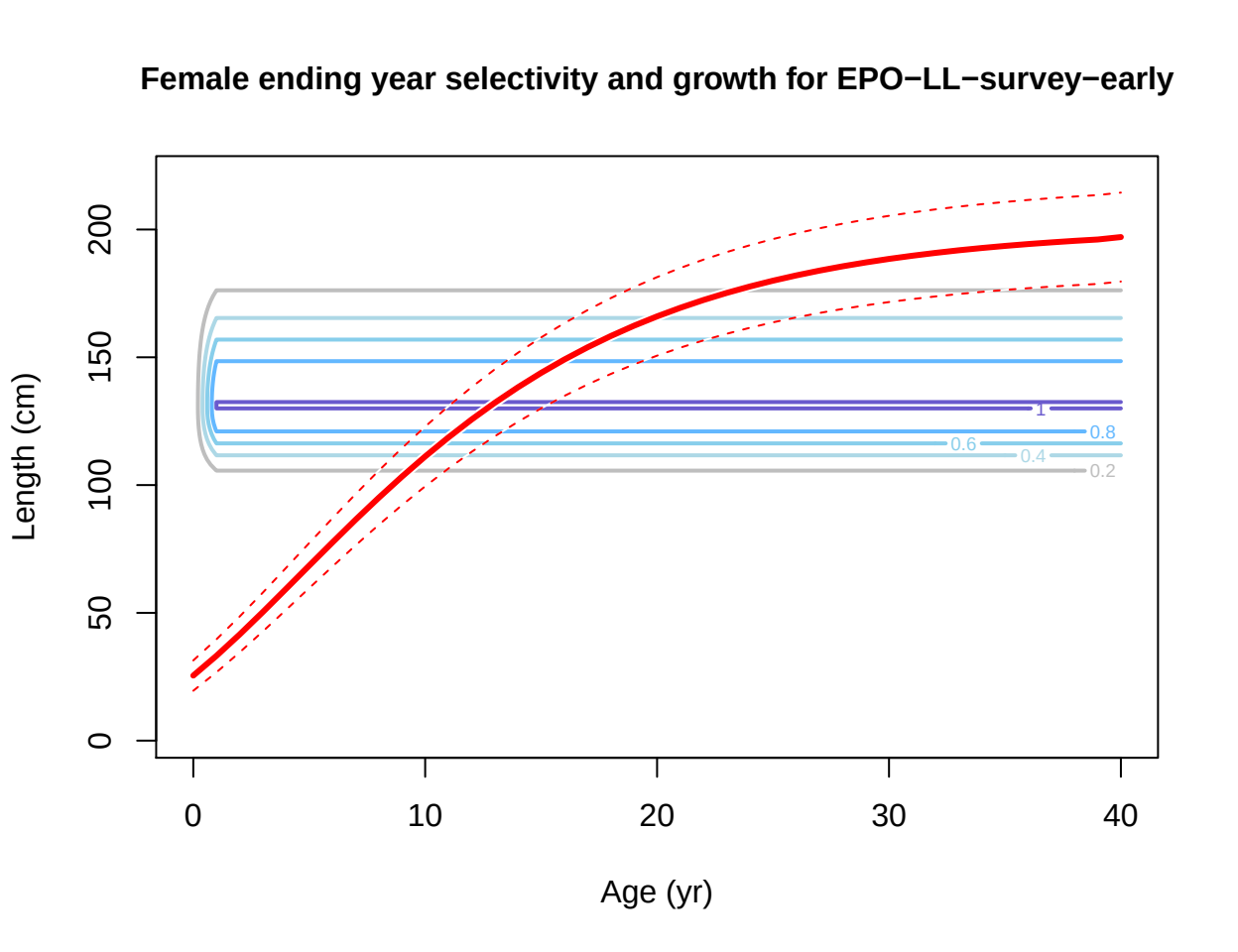

Male ending year selectivity and growth for A4−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

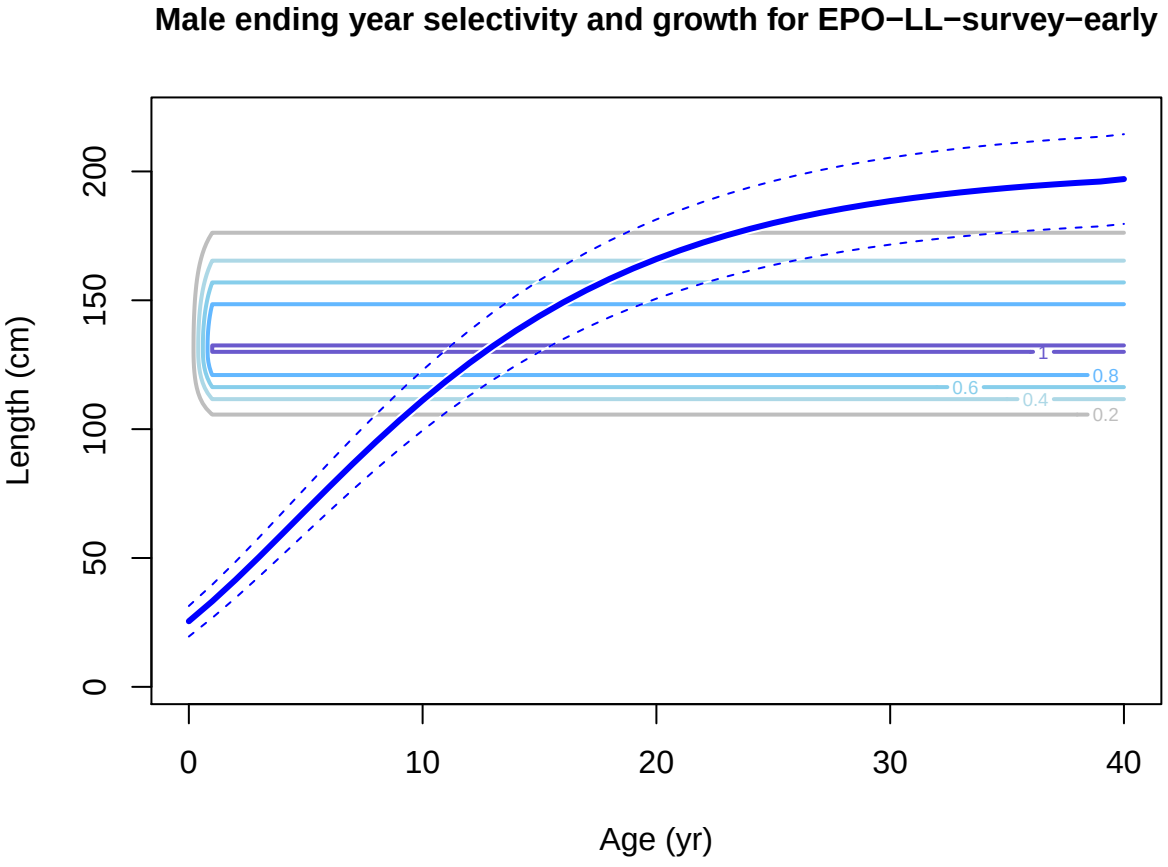

Female ending year selectivity and growth for A5−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

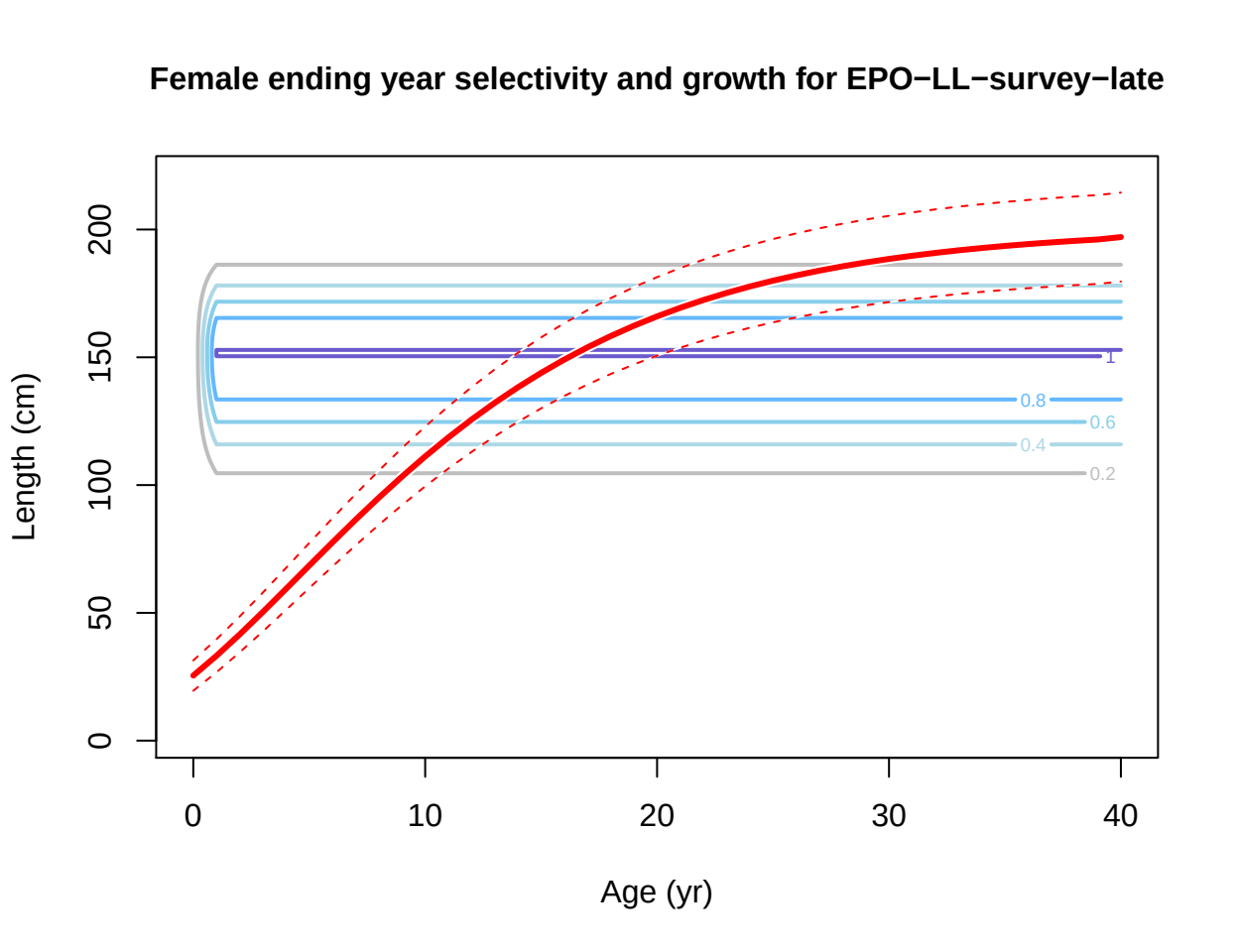

Male ending year selectivity and growth for A5−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

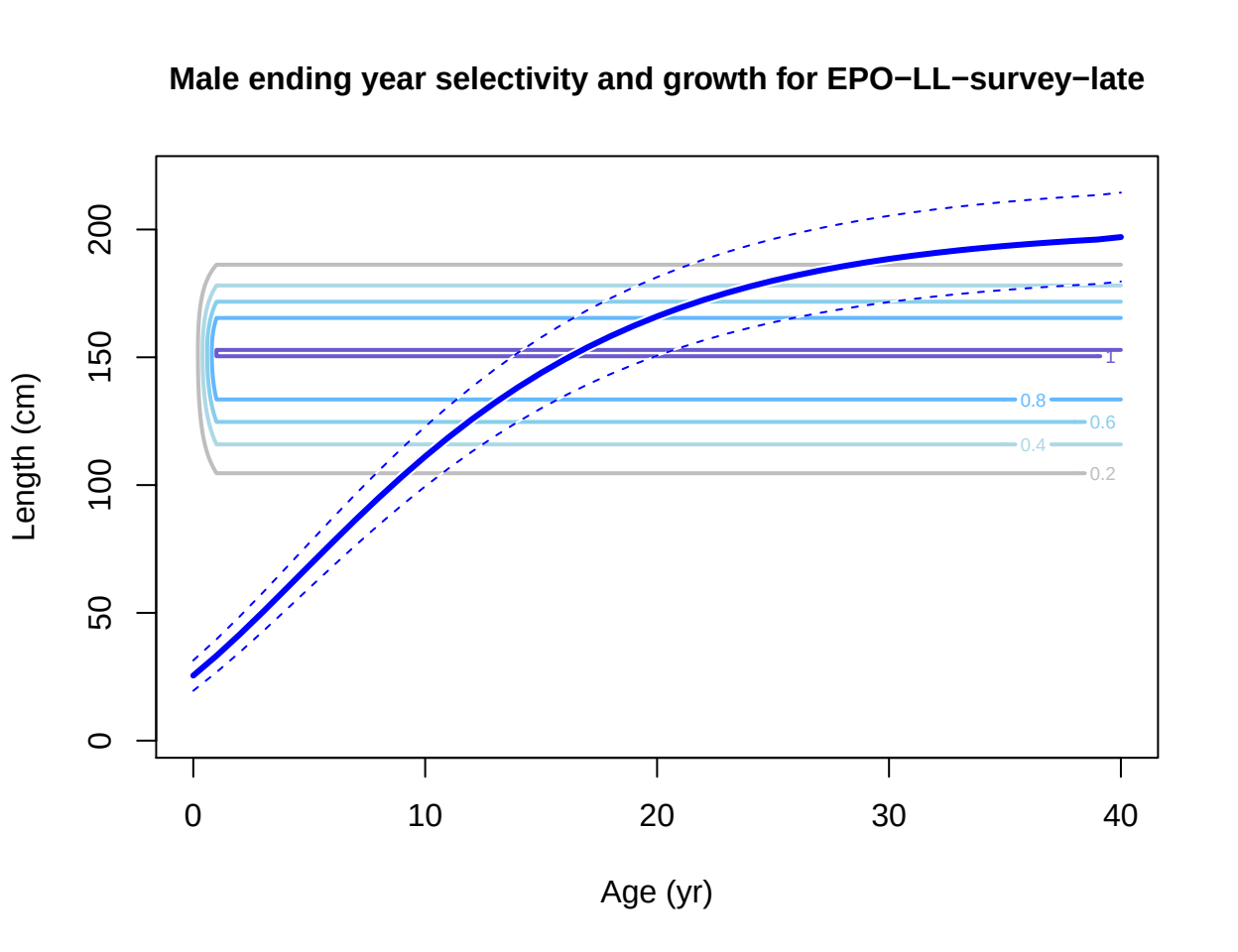

Female ending year selectivity and growth for A6−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

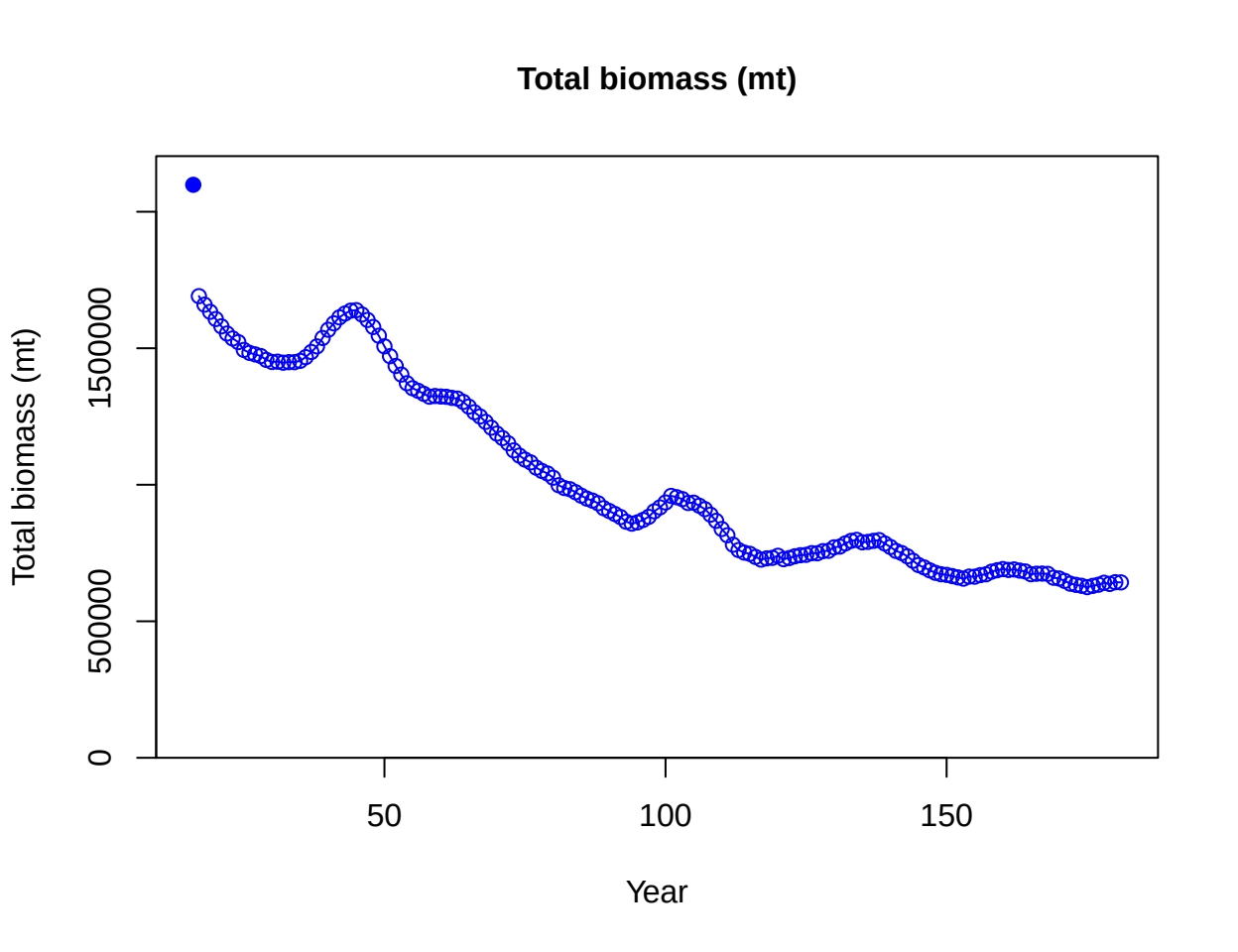

Male ending year selectivity and growth for A6−NOADEL
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
0.8
0.6
0.4
0.2
1
0.8
0.6
0.4
0.2

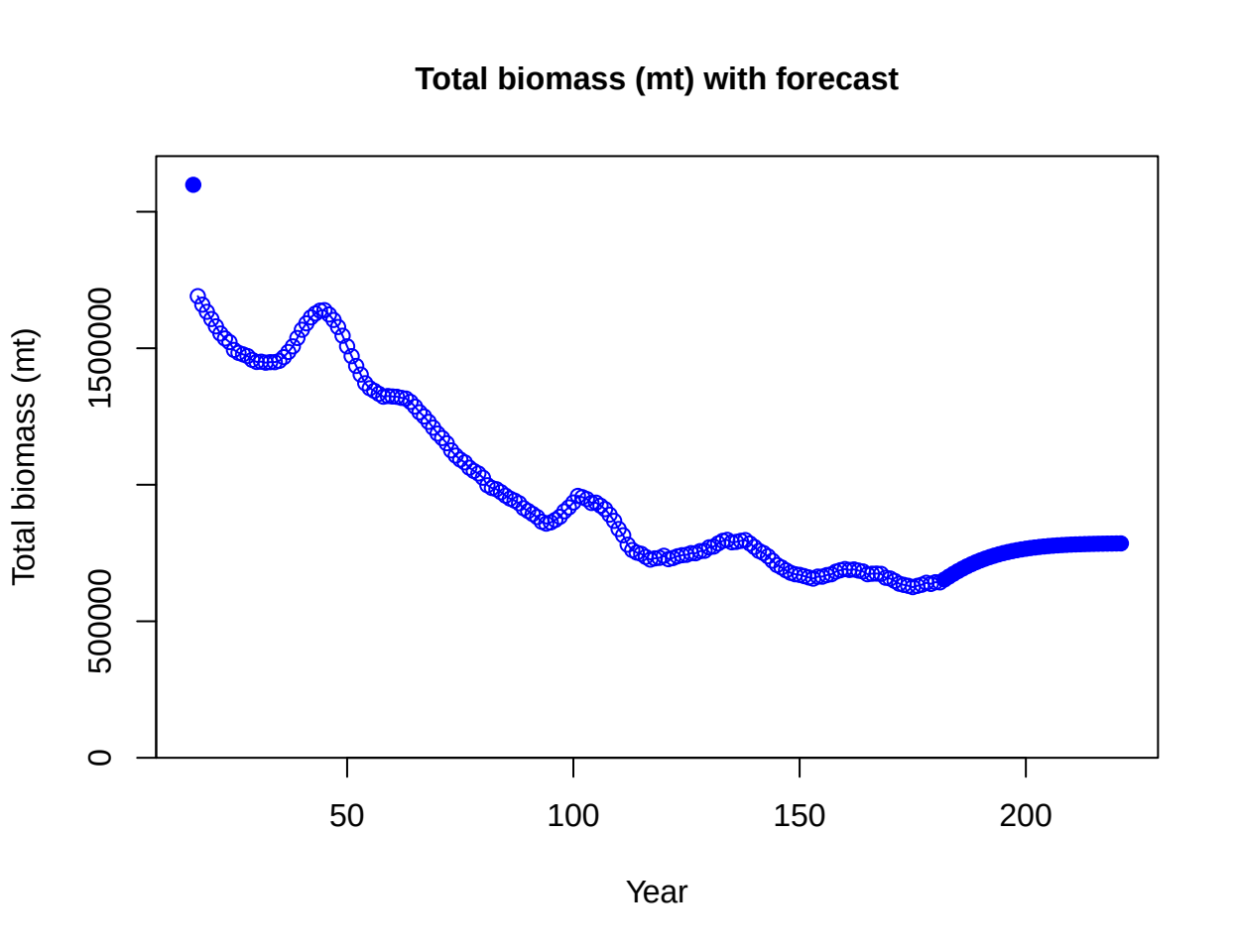

Female ending year selectivity and growth for EPO−LL−survey−early
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

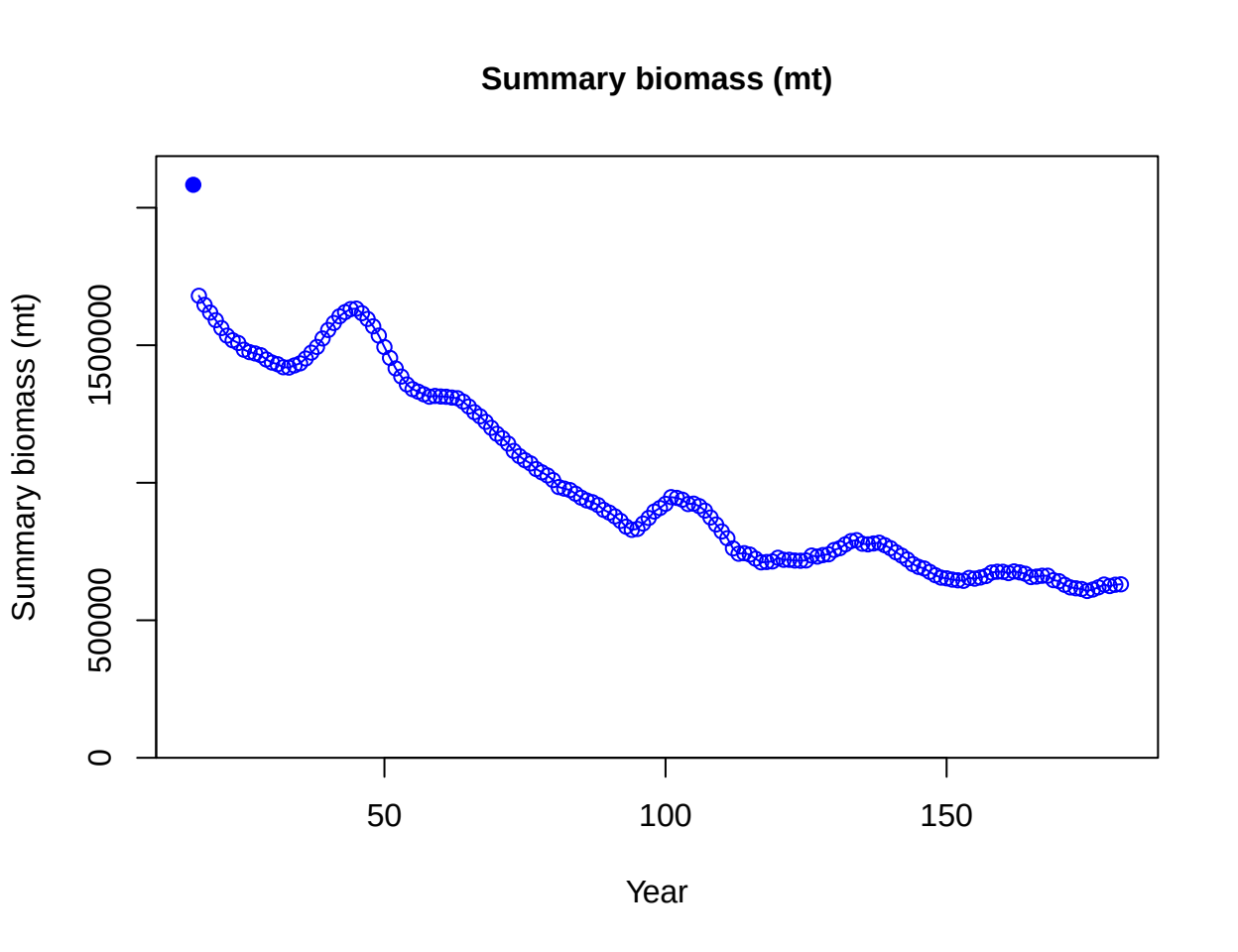

Male ending year selectivity and growth for EPO−LL−survey−early
Length (cm)
0
50
100
150
200
0
10
20
30
40
Age (yr)
1
0.8
0.6
0.4
0.2

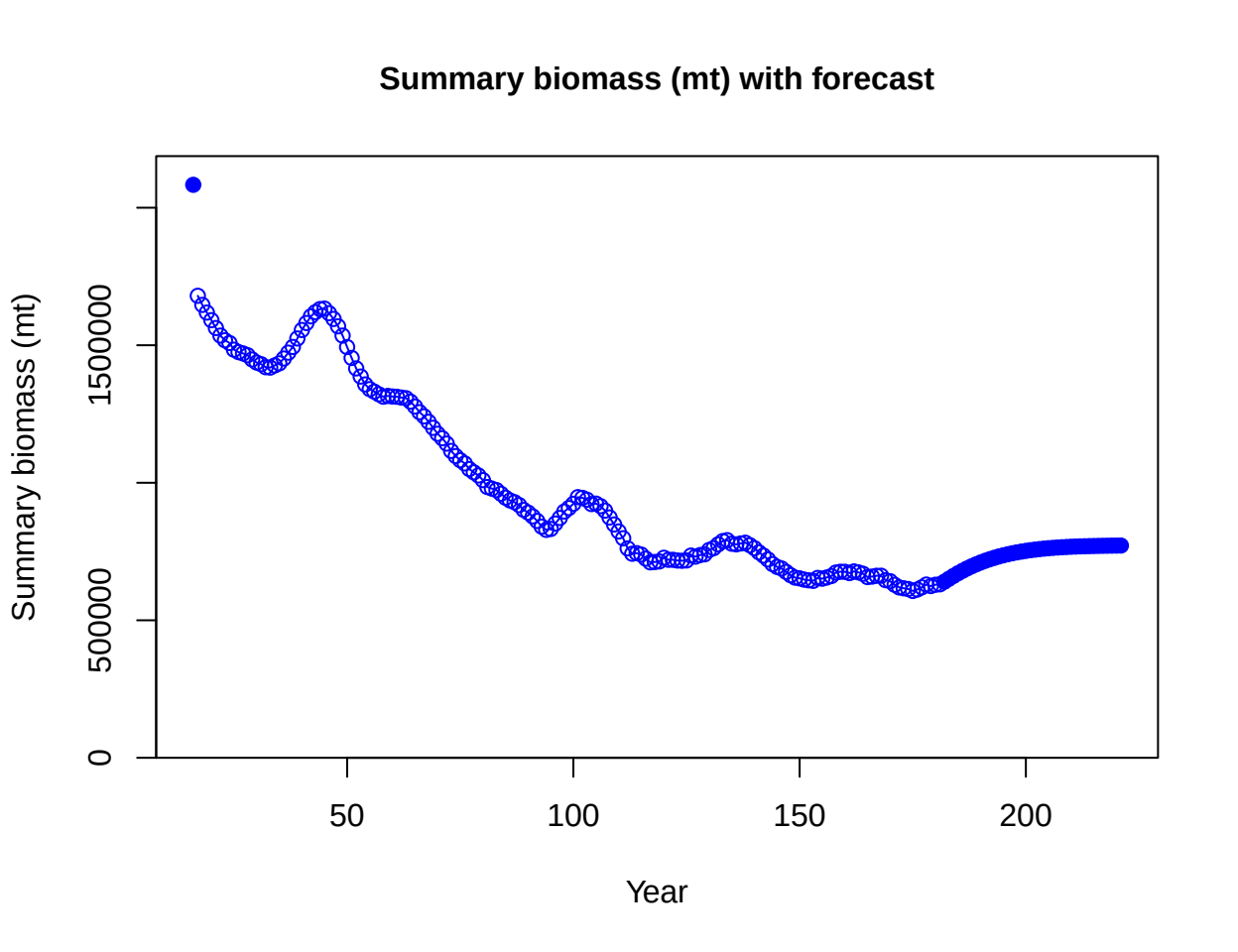

Female ending year selectivity and growth for EPO−LL−survey−late
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

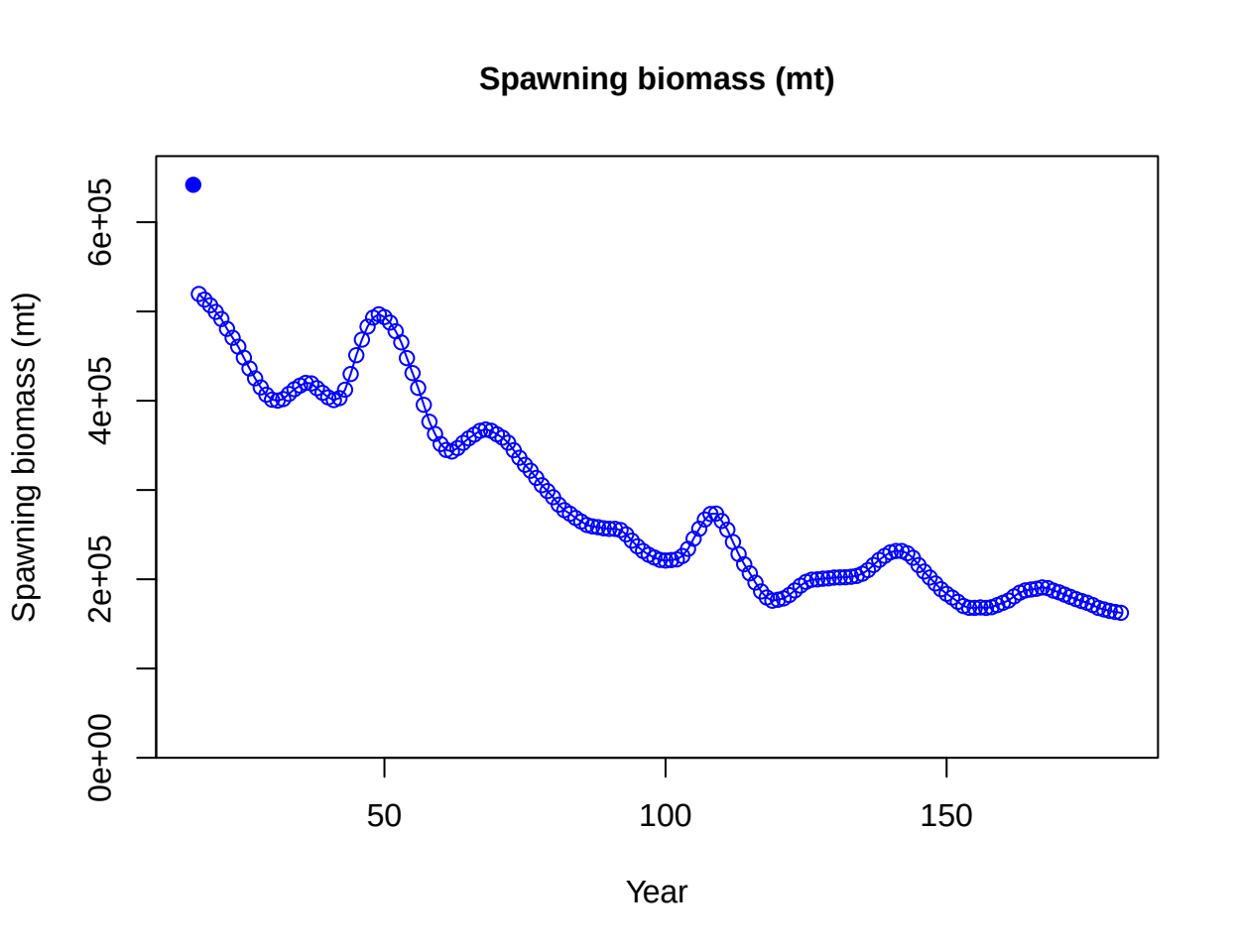

Male ending year selectivity and growth for EPO−LL−survey−late
Length (cm)
0
50
100
150
200
Age (yr)
0
10
20
30
40
1
0.8
0.6
0.4
0.2

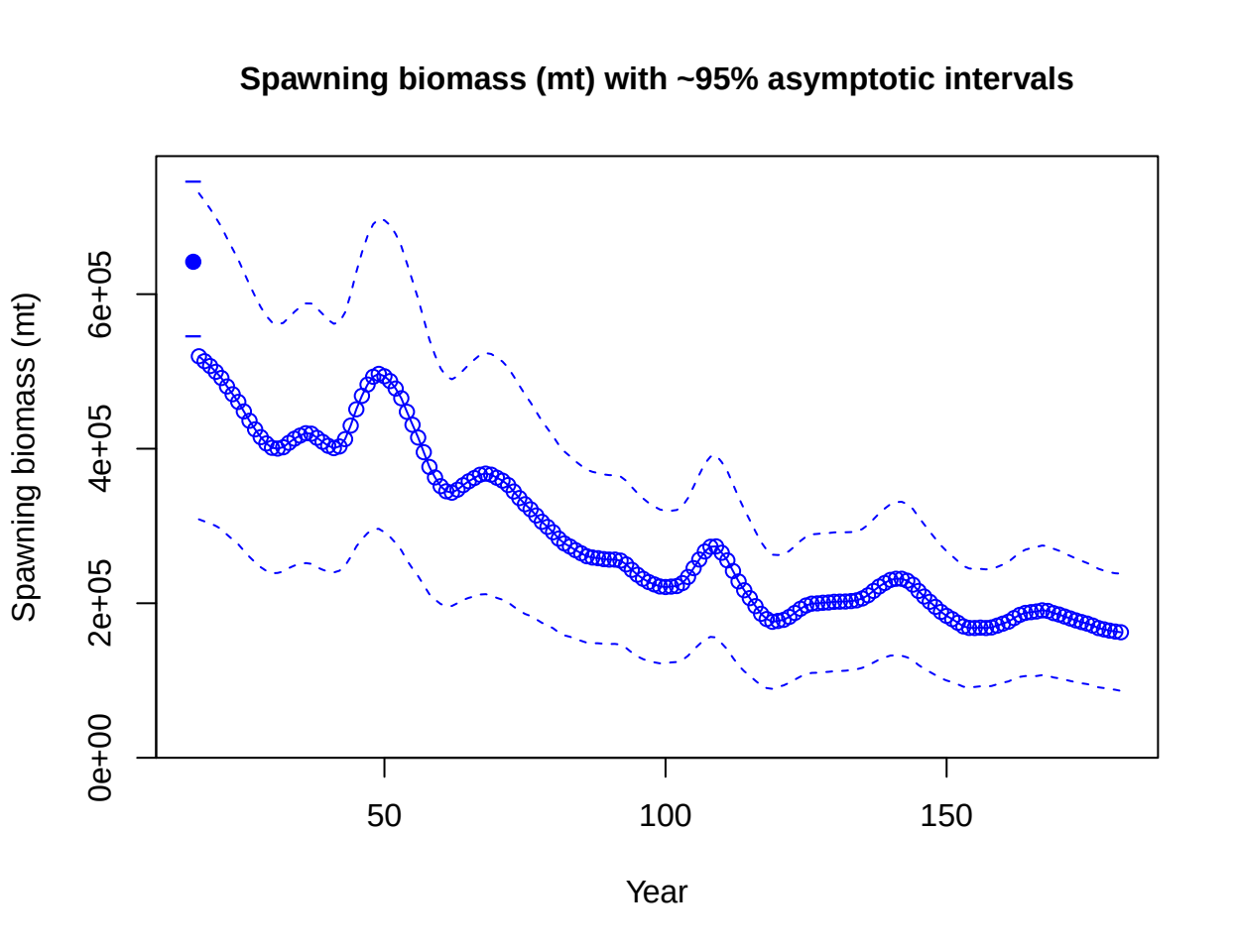

Total biomass (mt)
Total biomass (mt)
0
500000
1500000
50
100
150
Year

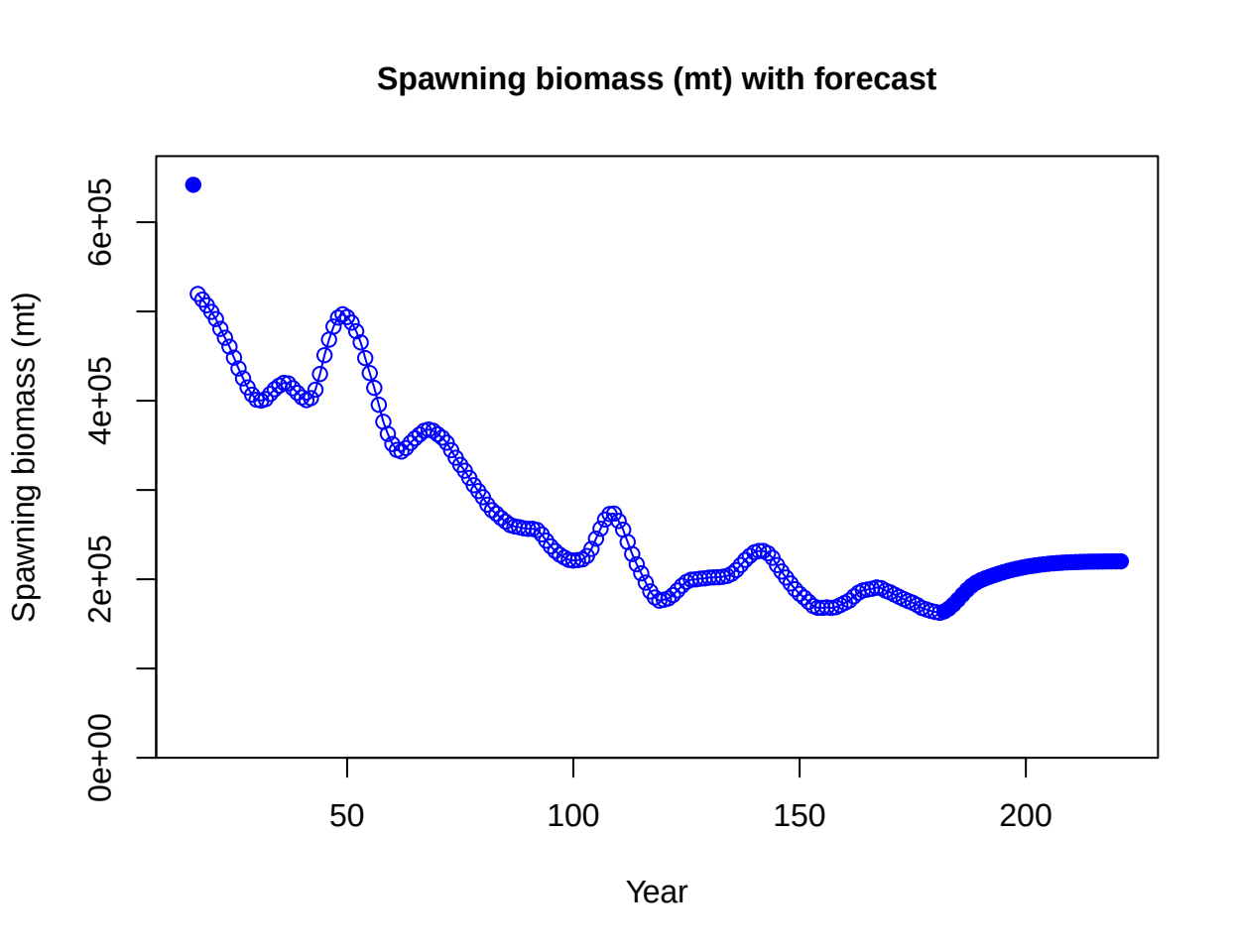

Total biomass (mt) with forecast
Total biomass (mt)
0
500000
1500000
50
100
150
200
Year

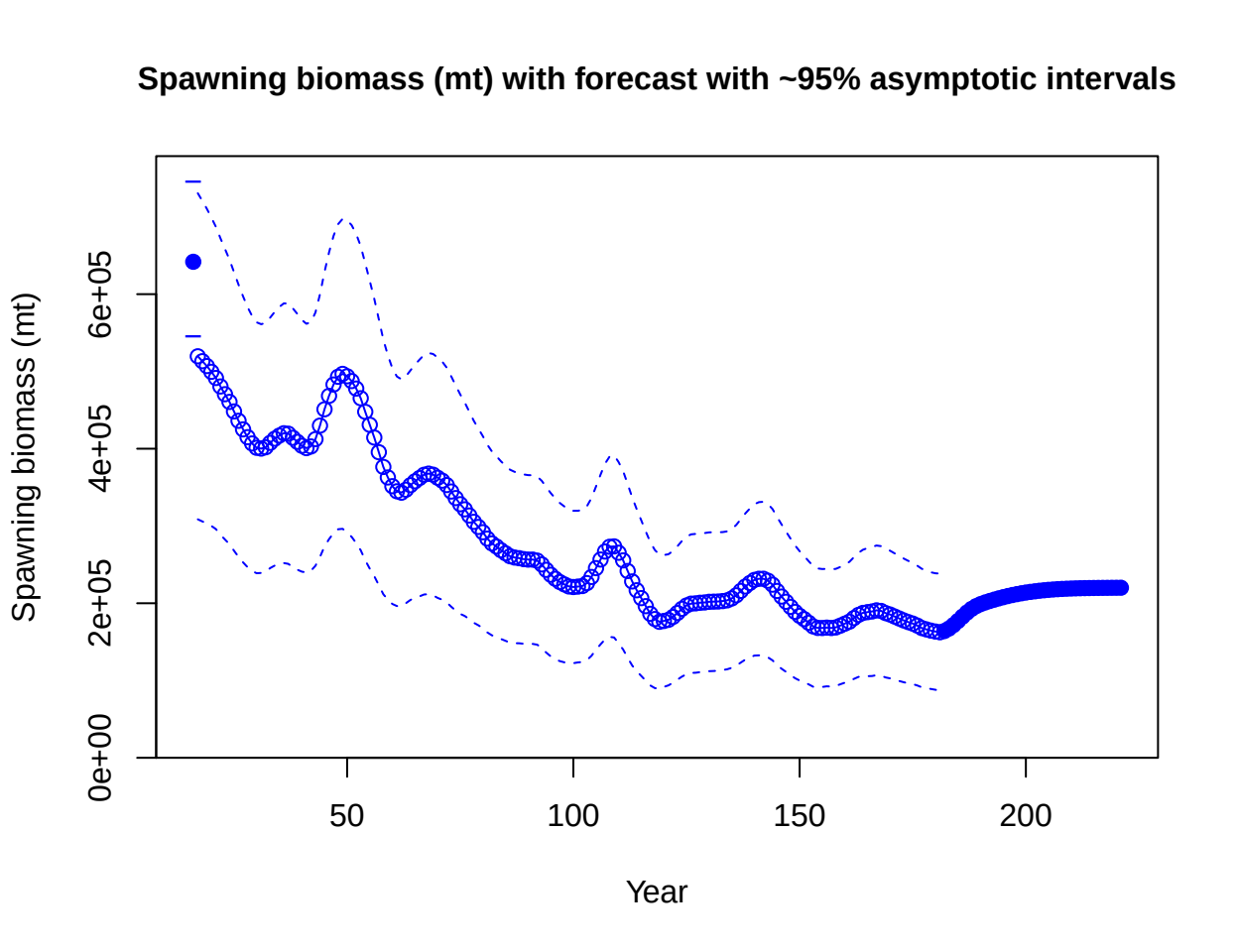

Summary biomass (mt)
Summary biomass (mt)
0
500000
1500000
50
100
150
Year

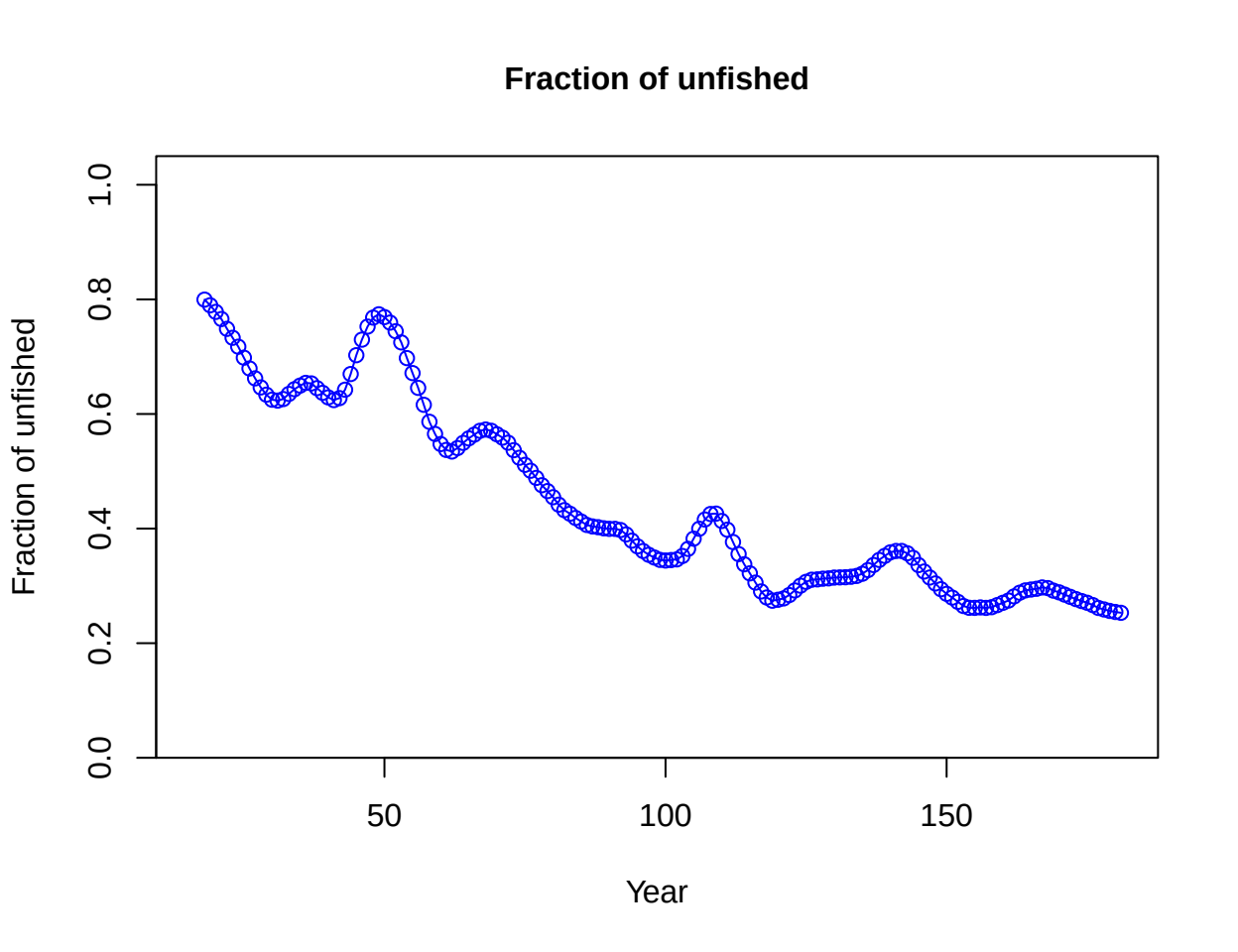

Summary biomass (mt) with forecast
Summary biomass (mt)
0
500000
1500000
50
100
150
200
Year

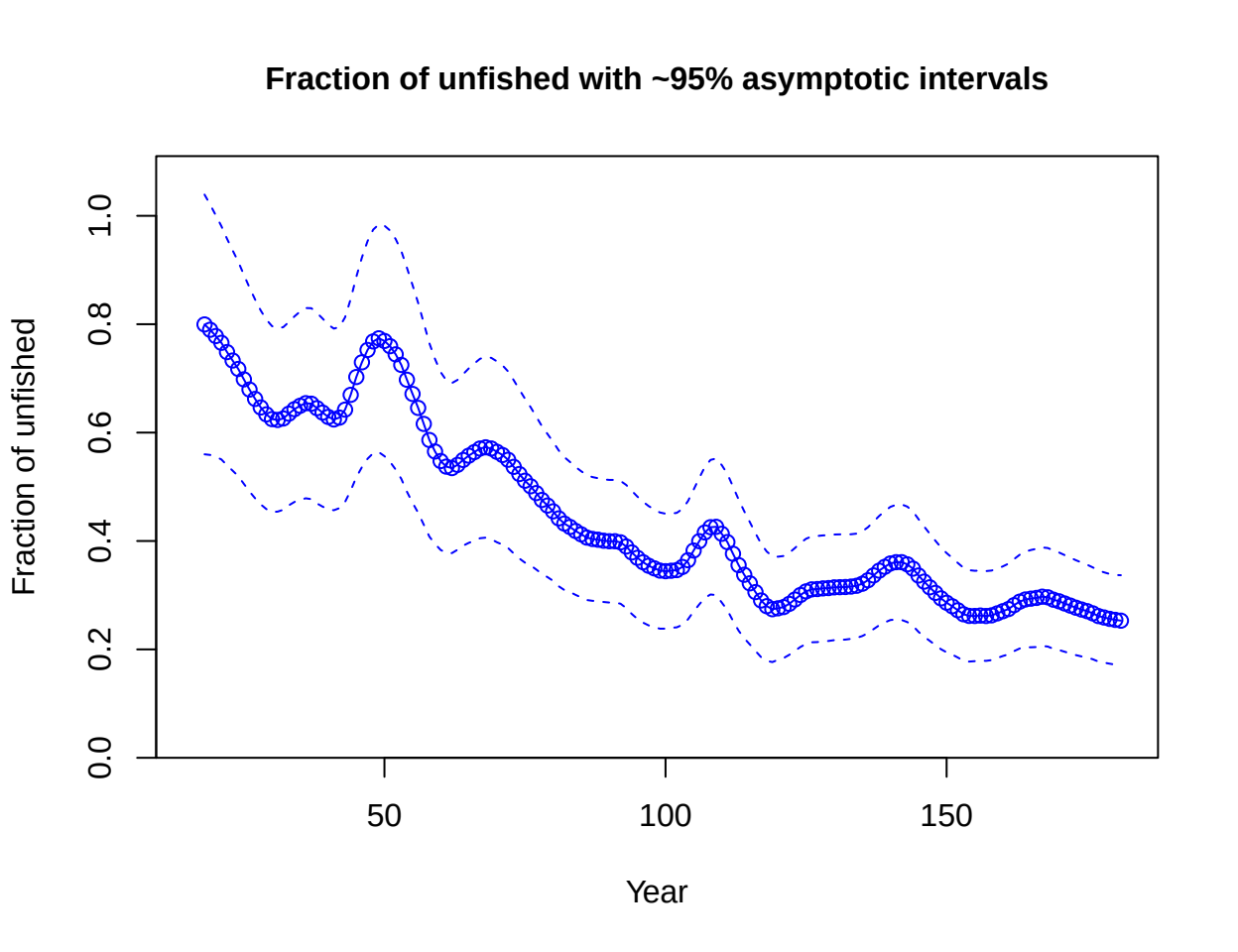

Spawning biomass (mt)
Spawning biomass (mt)
0e+00
2e+05
4e+05
6e+05
50
100
150
Year

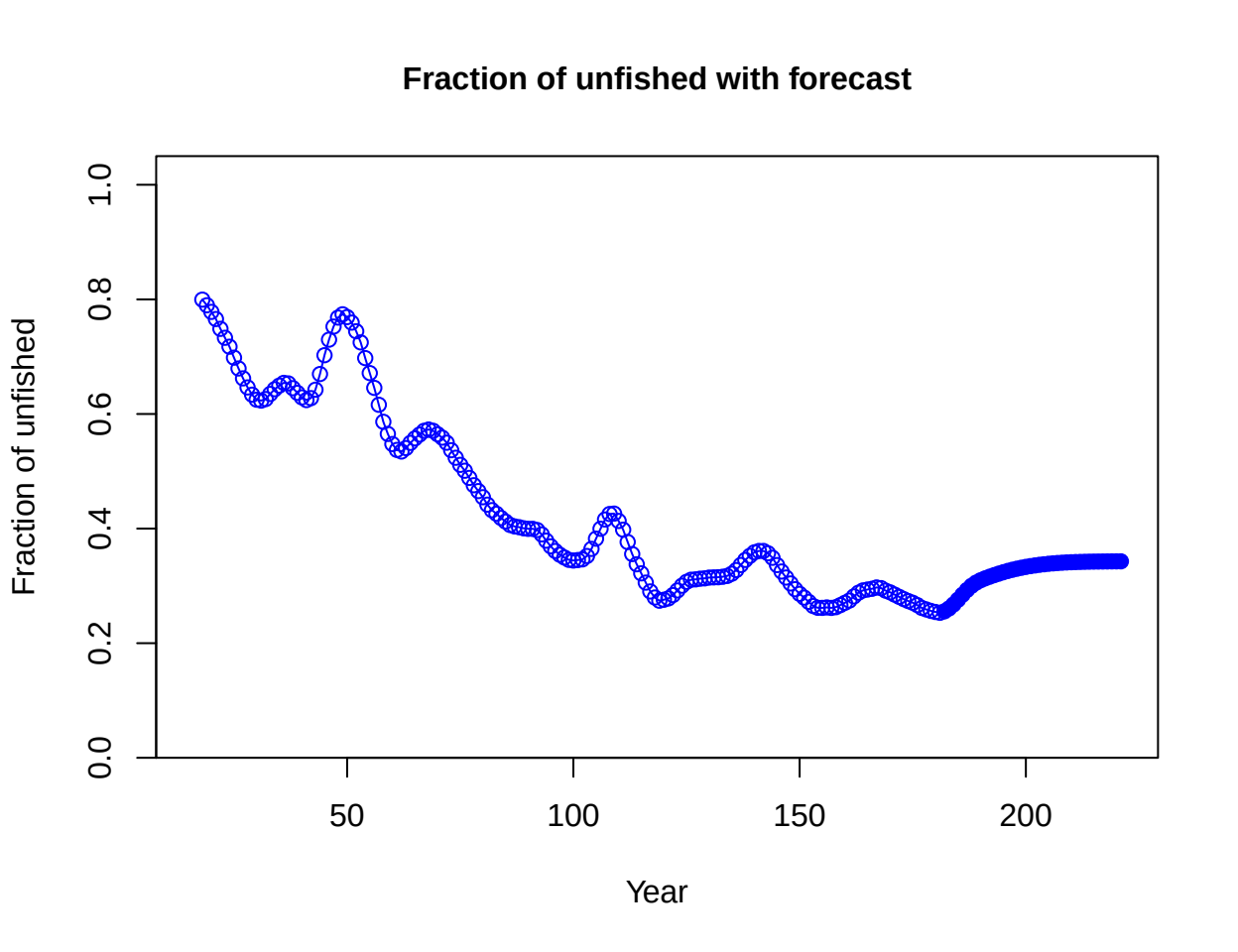

Spawning biomass (mt) with ~95% asymptotic intervals
Spawning biomass (mt)
0e+00
2e+05
4e+05
6e+05
50
100
150
Year

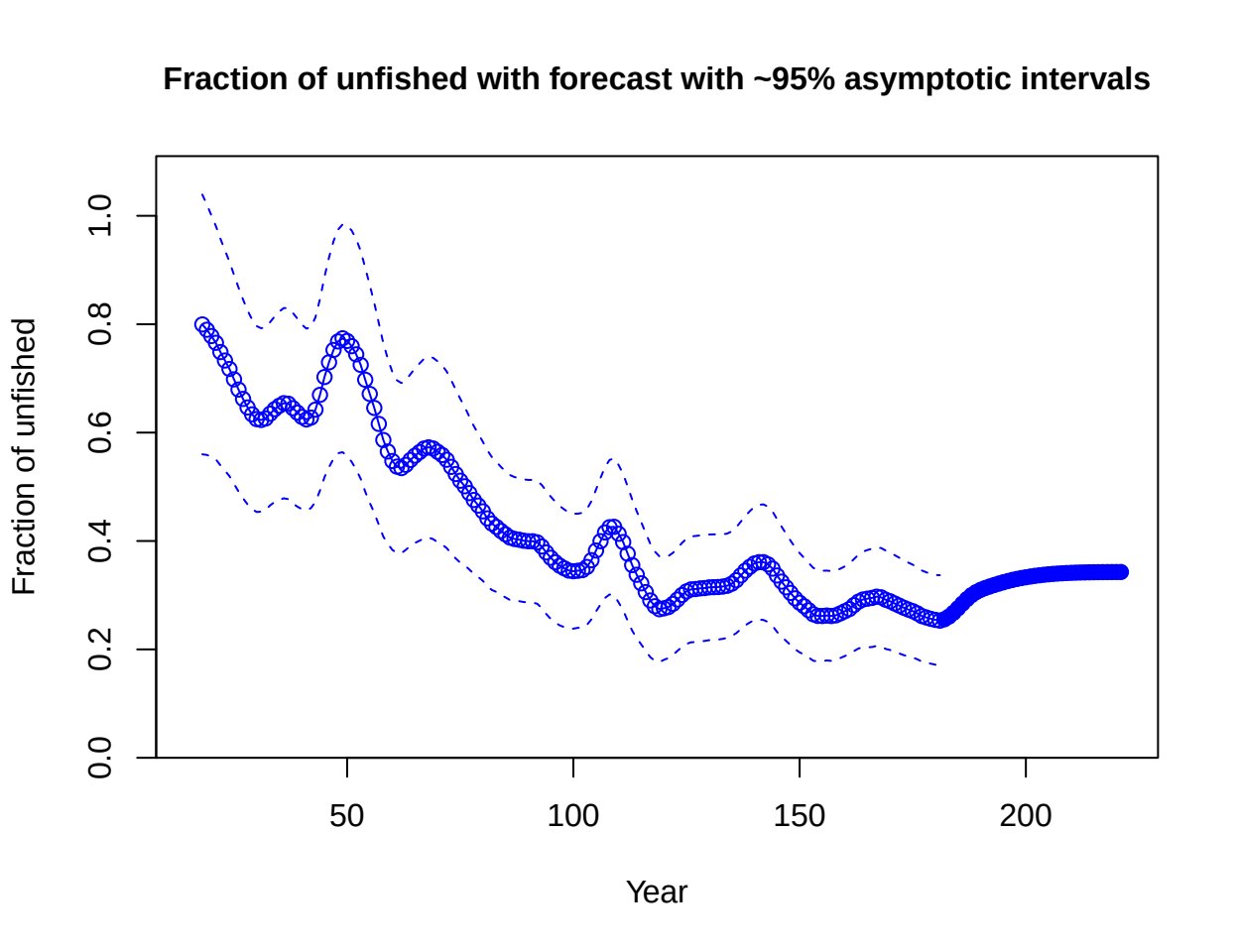

Spawning biomass (mt) with forecast
Spawning biomass (mt)
0e+00
2e+05
4e+05
6e+05
50
100
150
200
Year

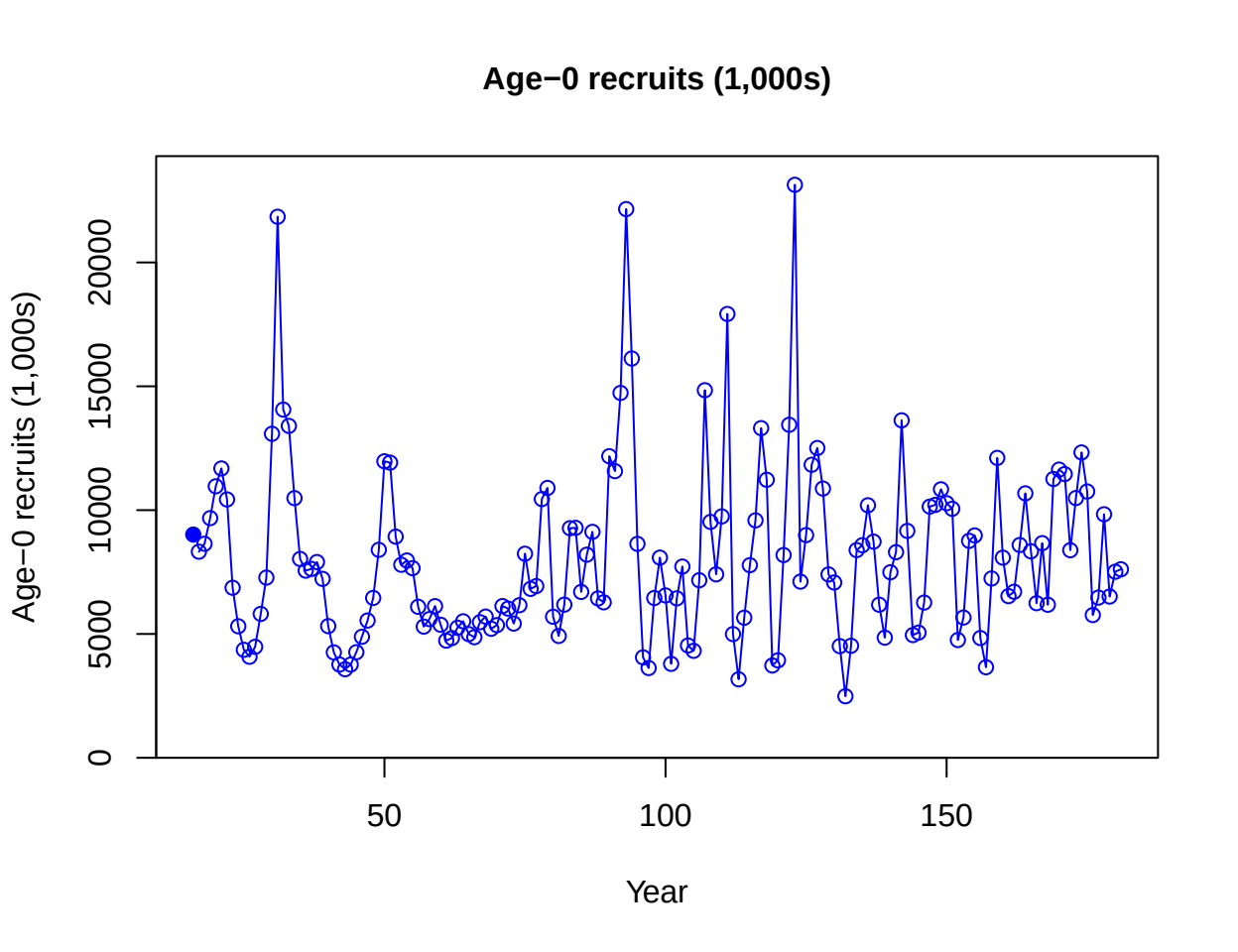

Spawning biomass (mt) with forecast with ~95% asymptotic intervals
Spawning biomass (mt)
0e+00
2e+05
4e+05
6e+05
50
100
150
200
Year

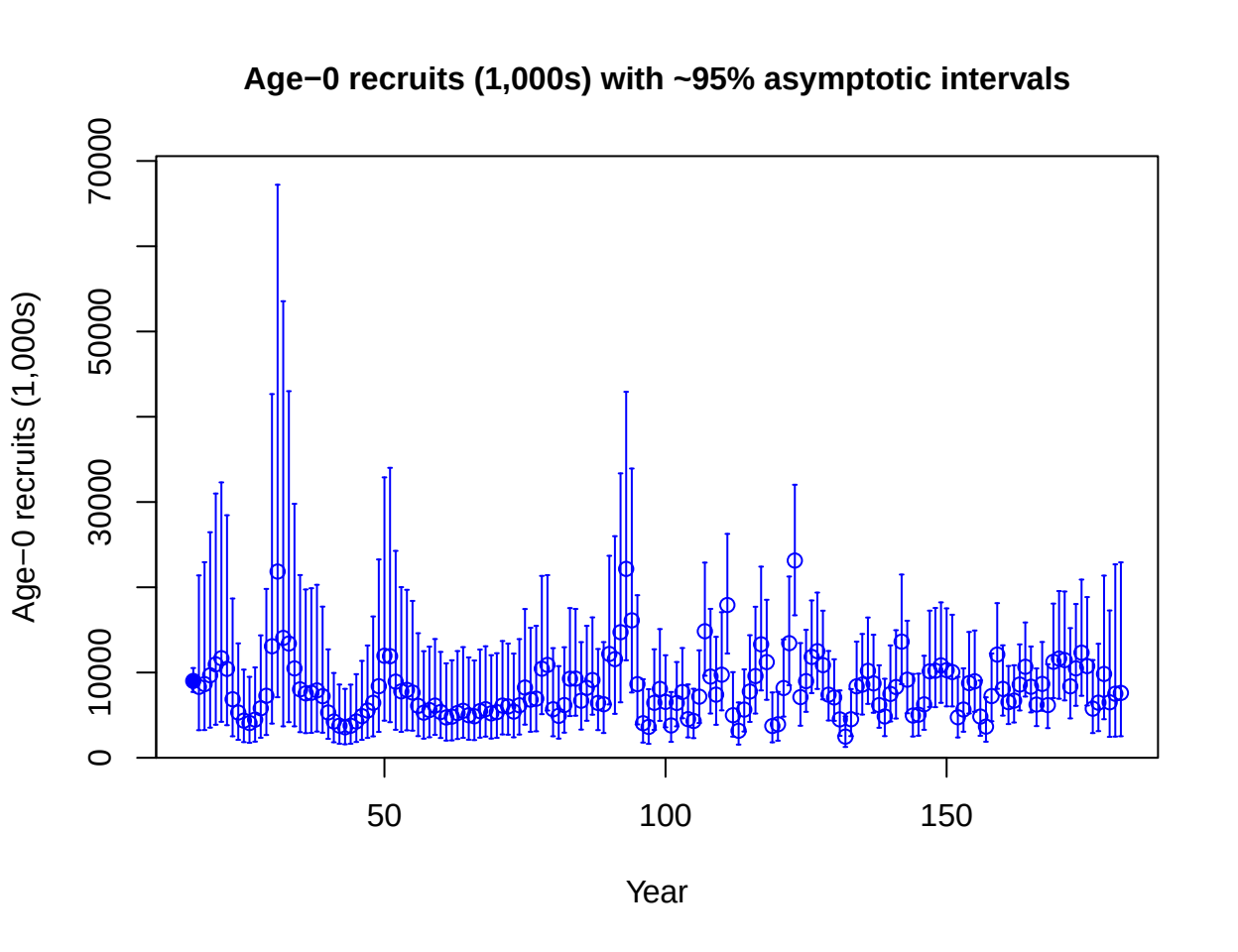

Fraction of unfished
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Year

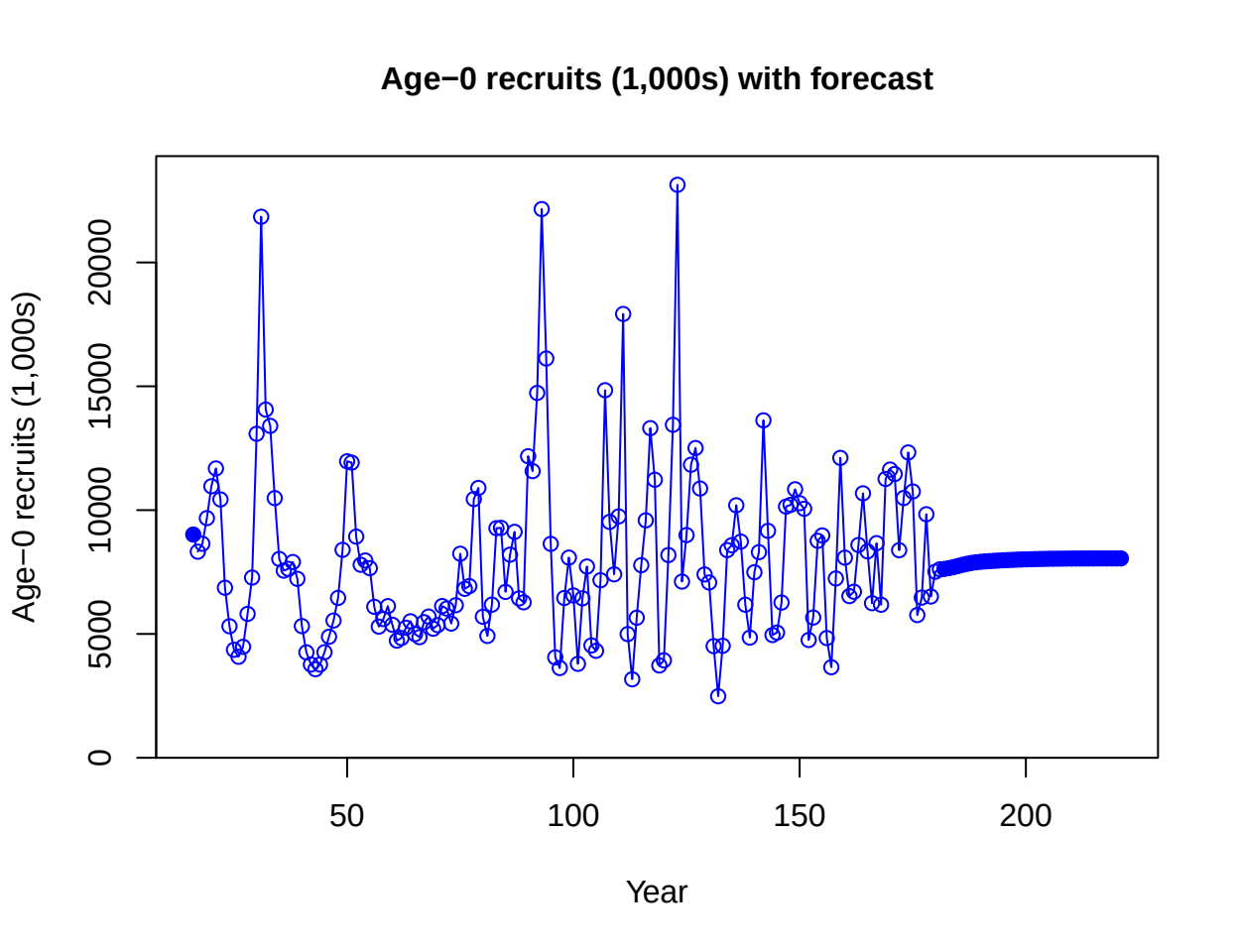

Fraction of unfished with ~95% asymptotic intervals
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Year

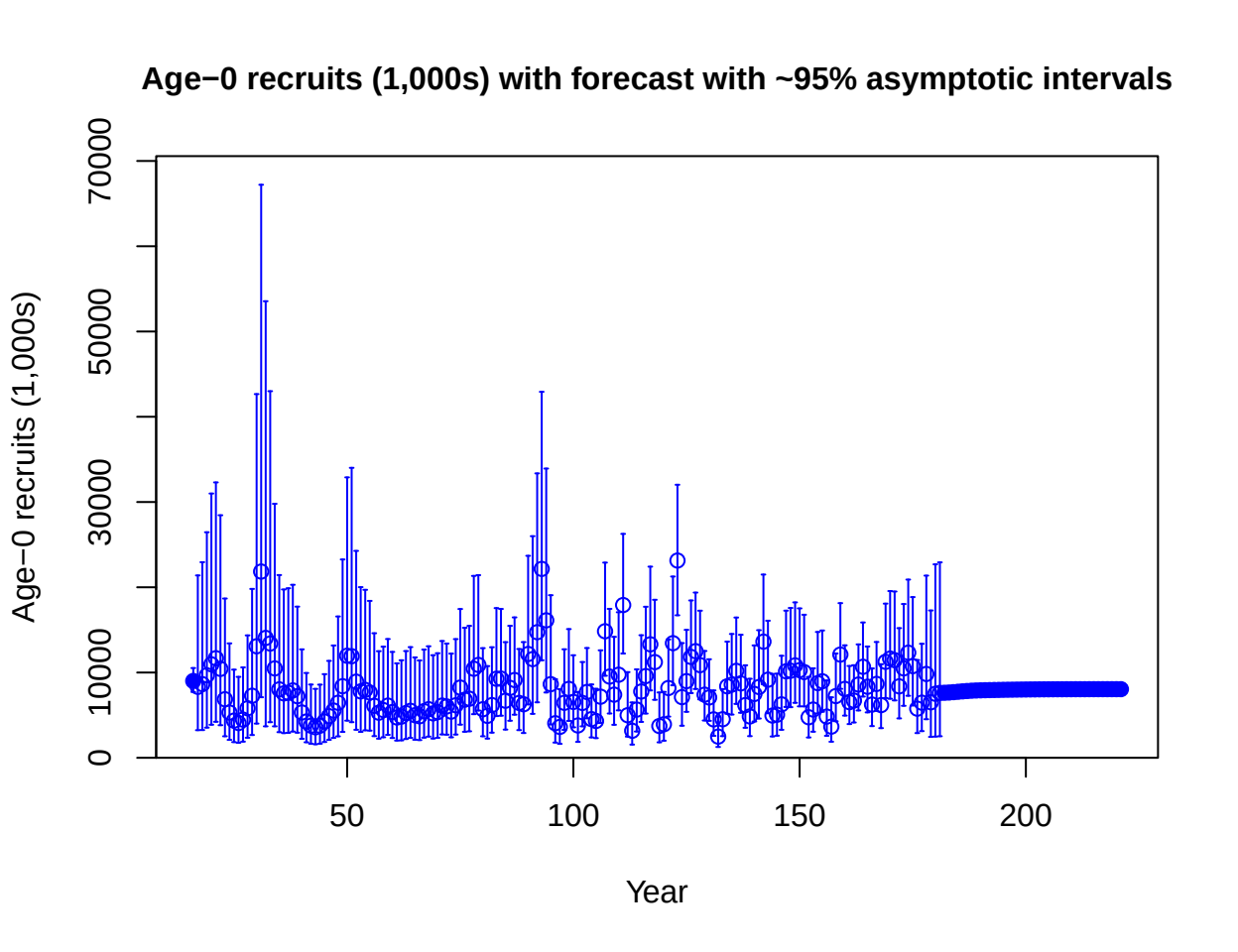

Fraction of unfished with forecast
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
200
Year

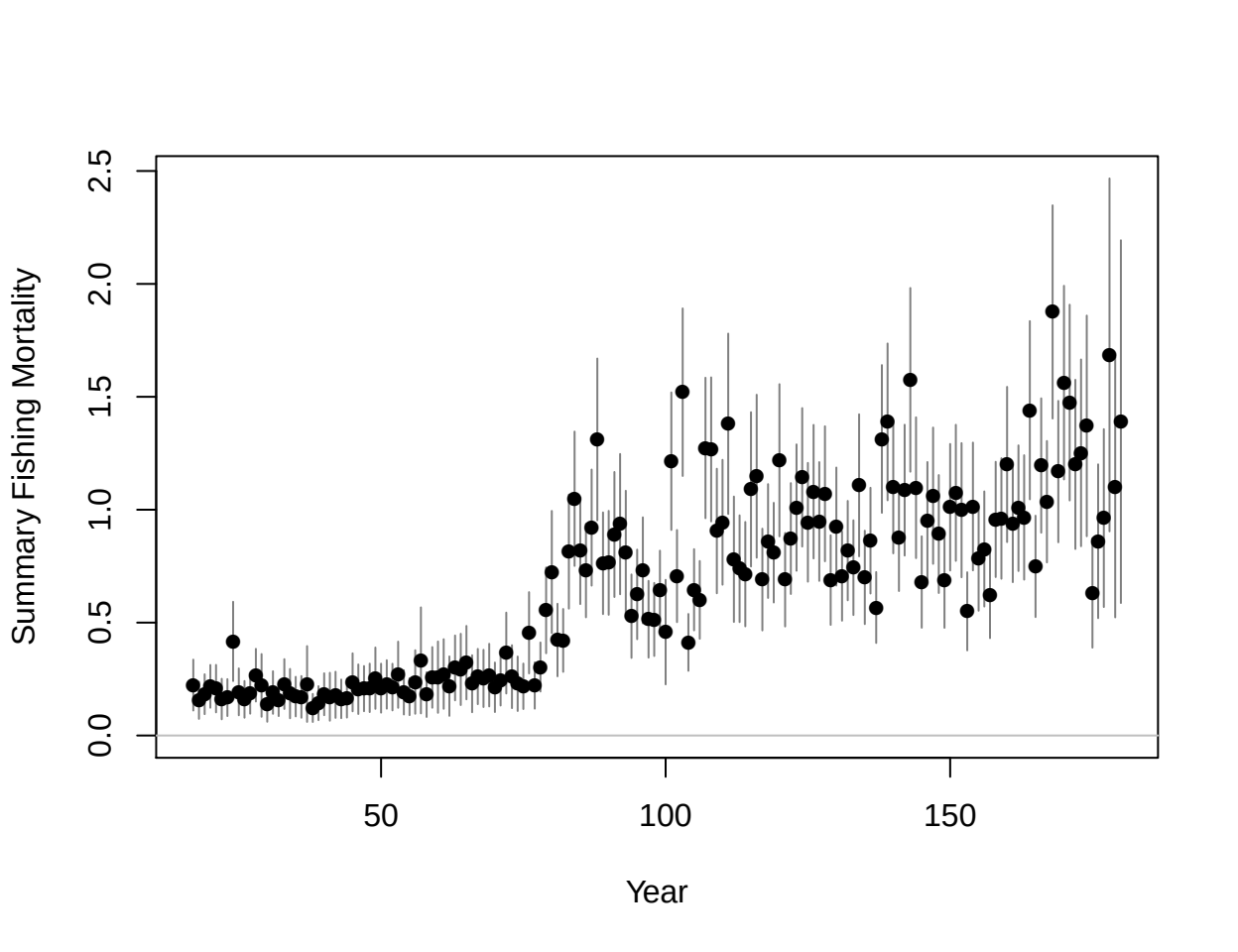

Fraction of unfished with forecast with ~95% asymptotic intervals
Fraction of unfished
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
200
Year

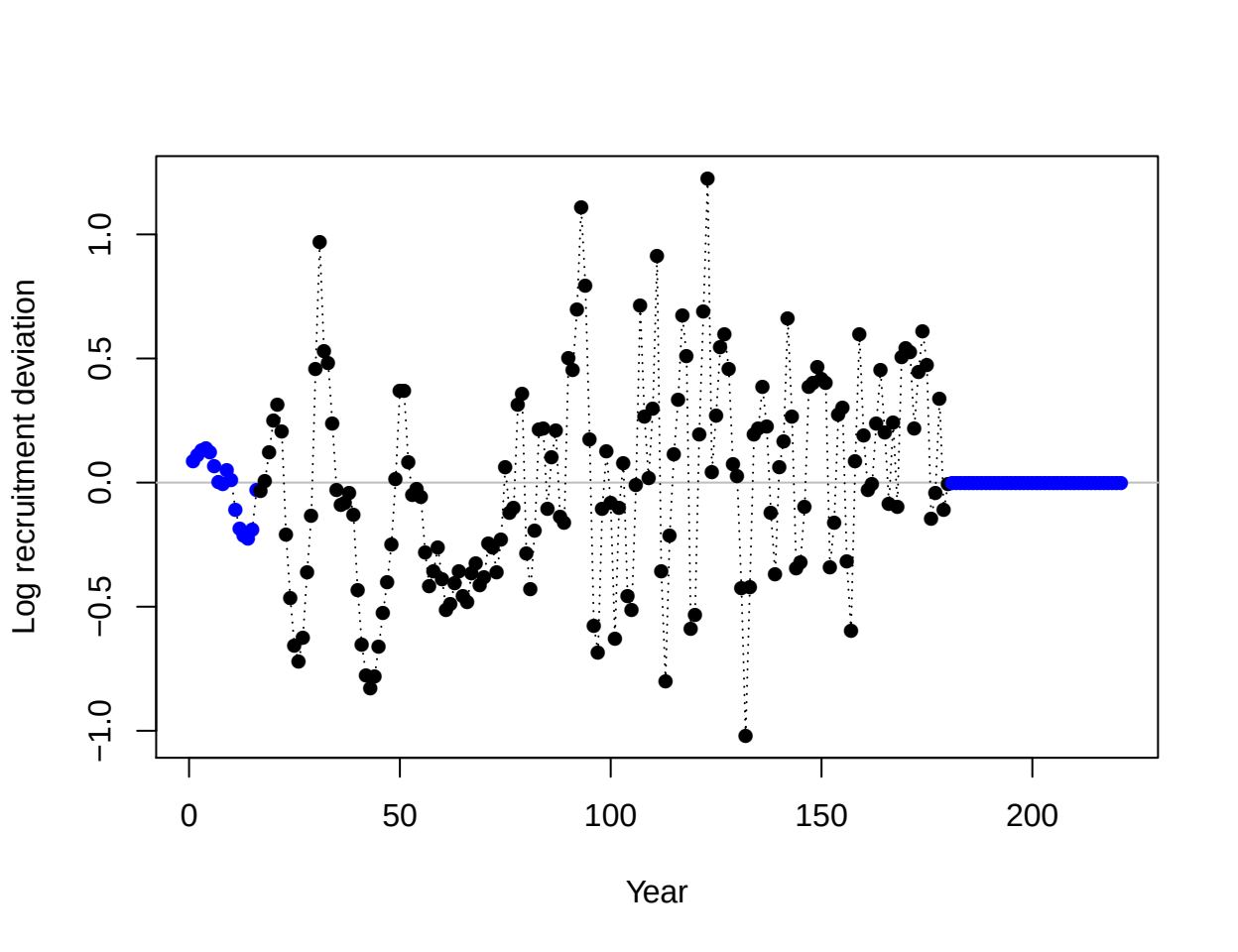

Age−0 recruits (1,000s)
Age−0 recruits (1,000s)
0
5000
10000
15000
20000
50
100
150
Year

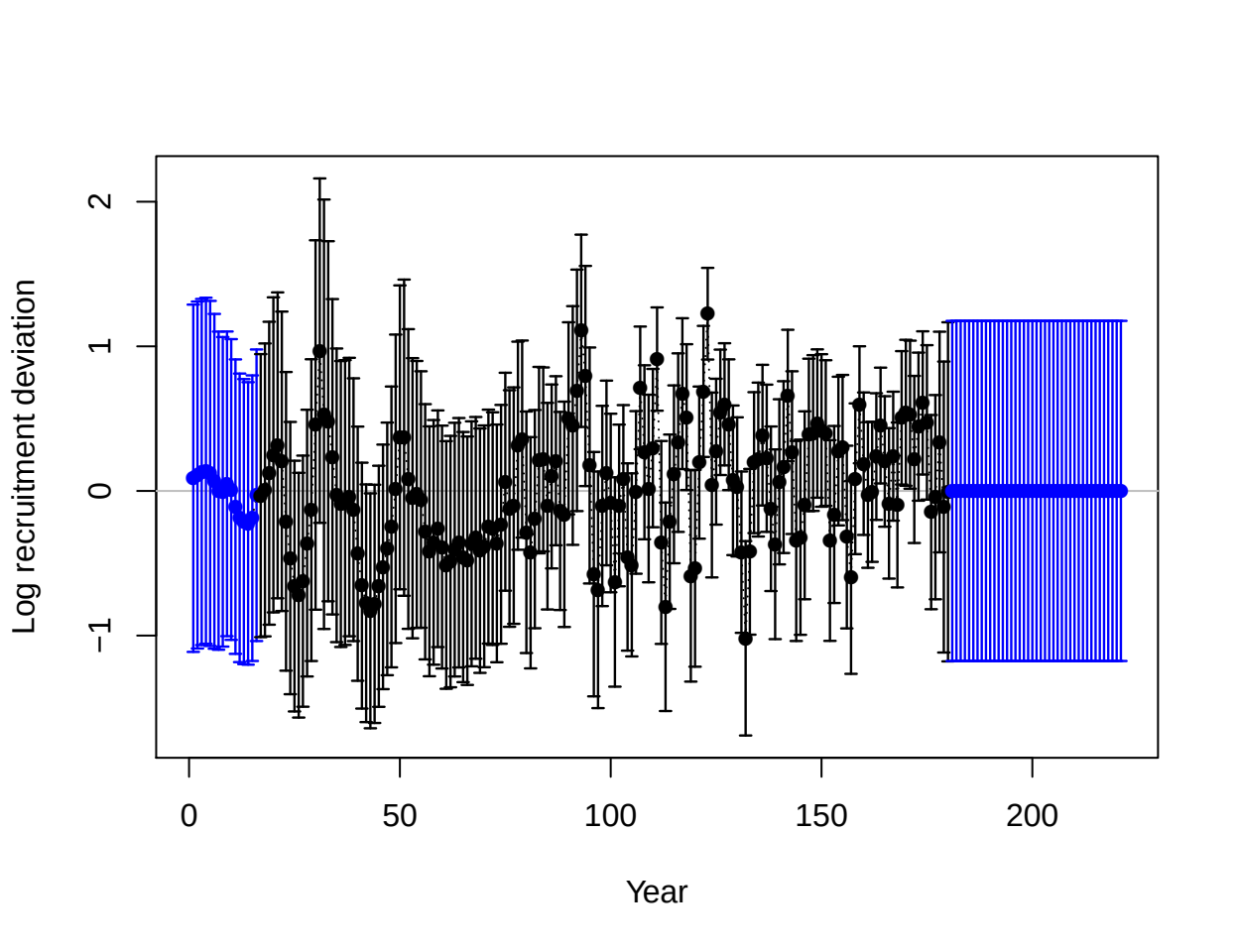

Age−0 recruits (1,000s) with ~95% asymptotic intervals
Age−0 recruits (1,000s)
0
10000
30000
50000
70000
50
100
150
Year

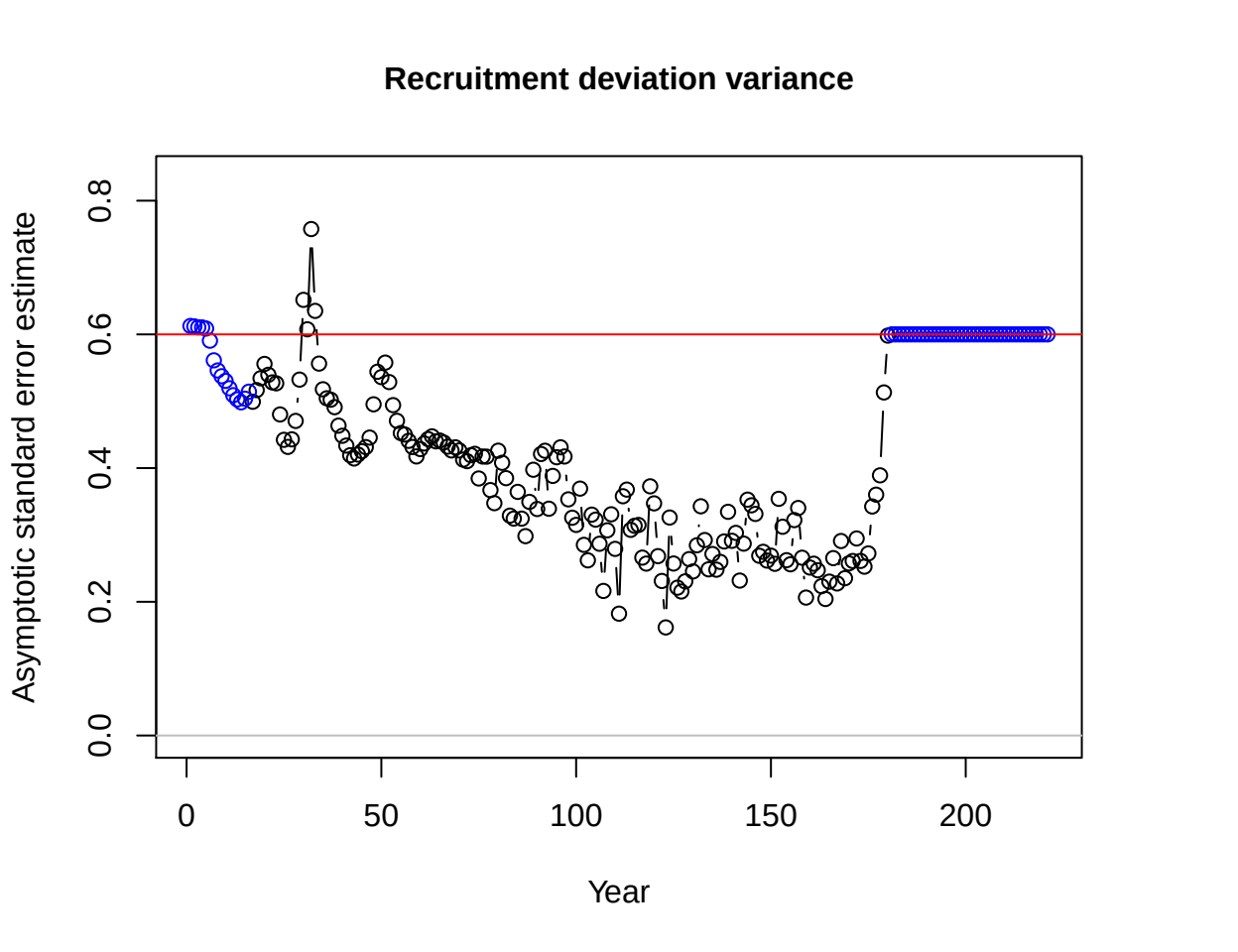

Age−0 recruits (1,000s) with forecast
Age−0 recruits (1,000s)
0
5000
10000
15000
20000
50
100
150
200
Year

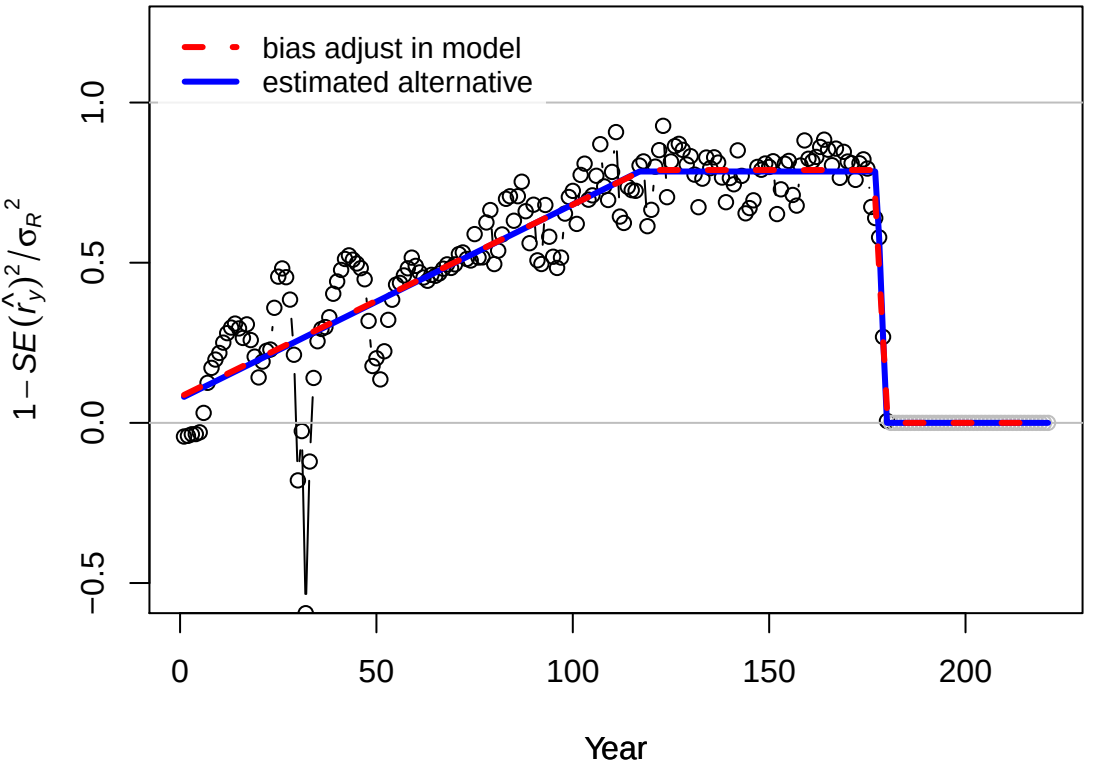

Age−0 recruits (1,000s) with forecast with ~95% asymptotic intervals
Age−0 recruits (1,000s)
0
10000
30000
50000
70000
50
100
150
200
Year

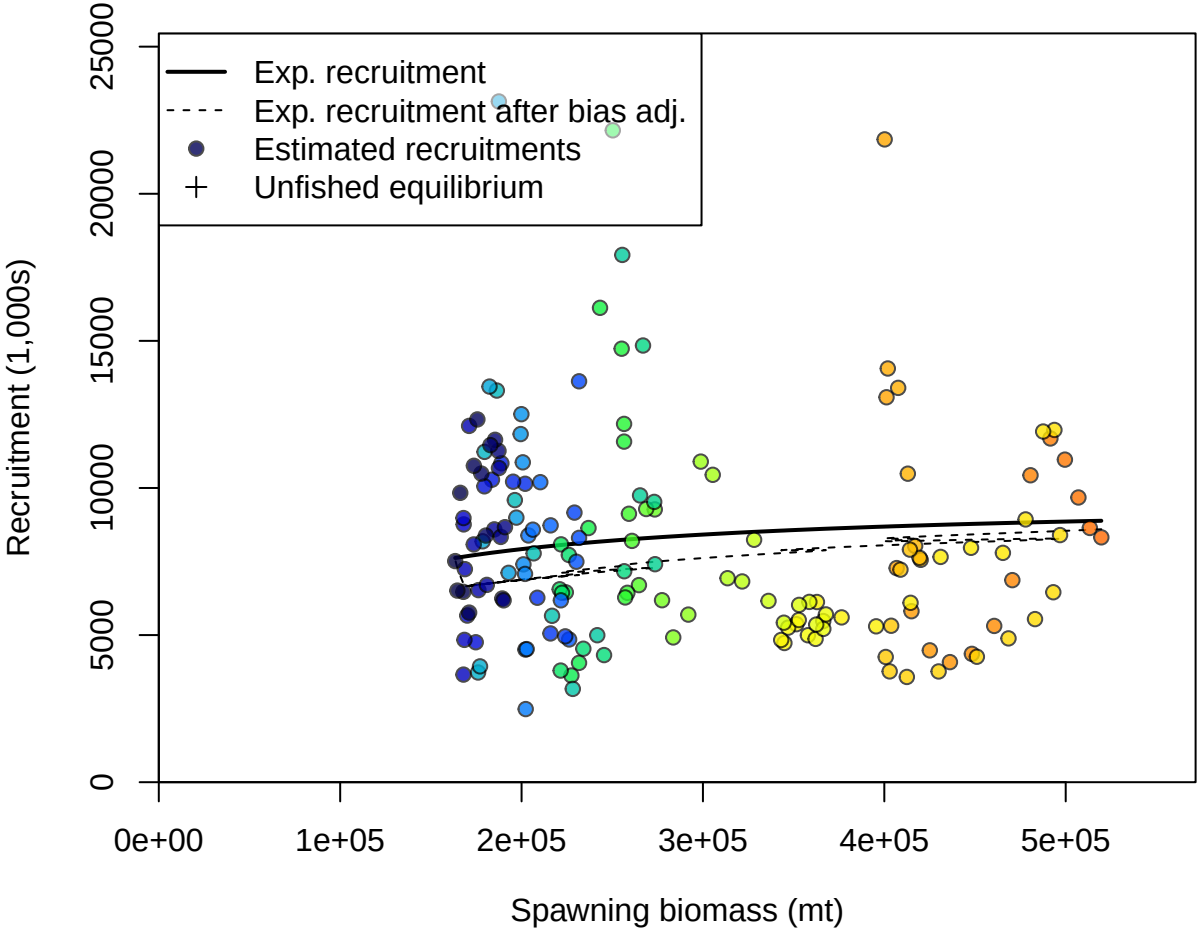

Summary Fishing Mortality
0.0
0.5
1.0
1.5
2.0
2.5
50
100
150
Year

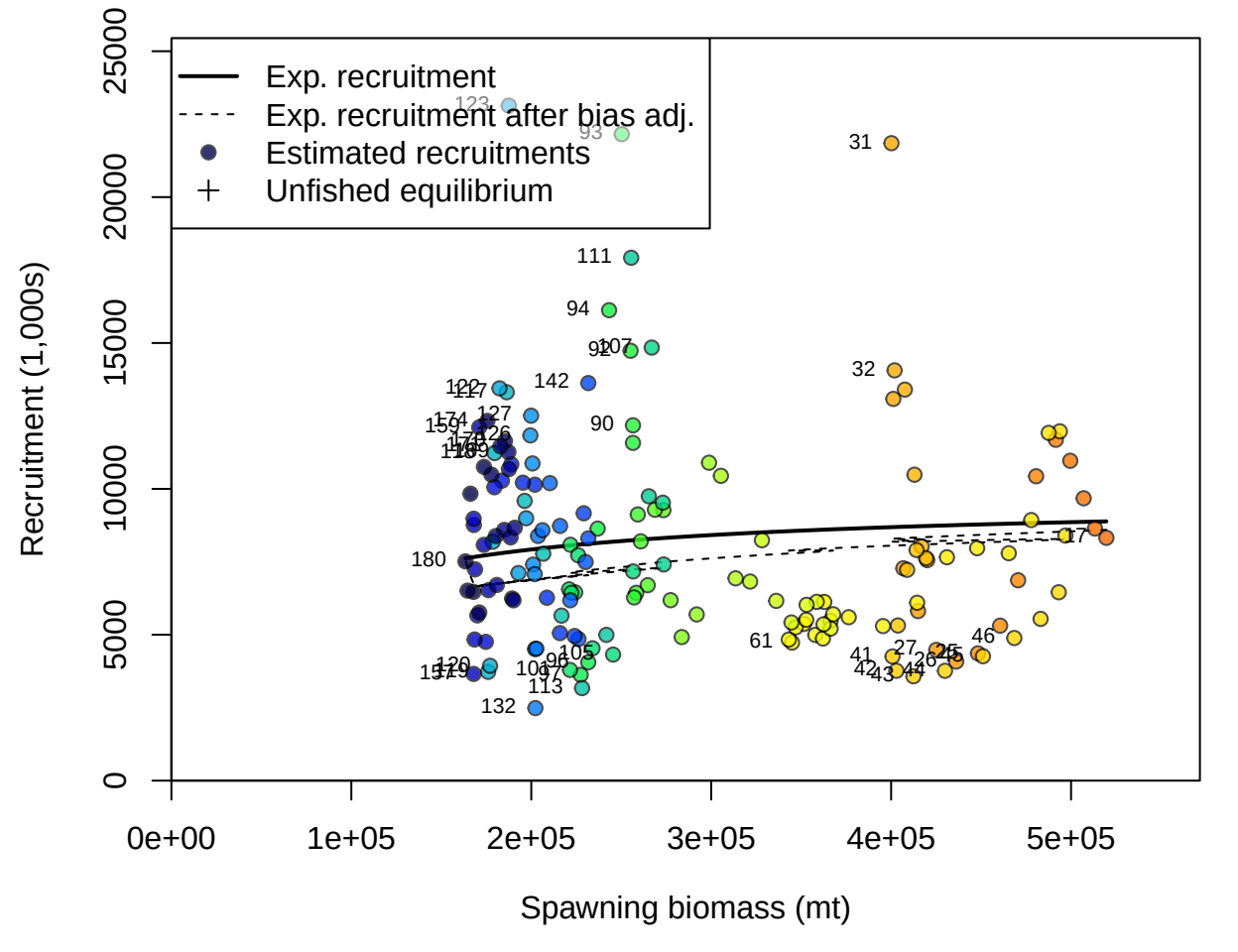

Log recruitment deviation
1.0
0.5
0.0
−0.5
−1.0
0
50
100
150
200
Year

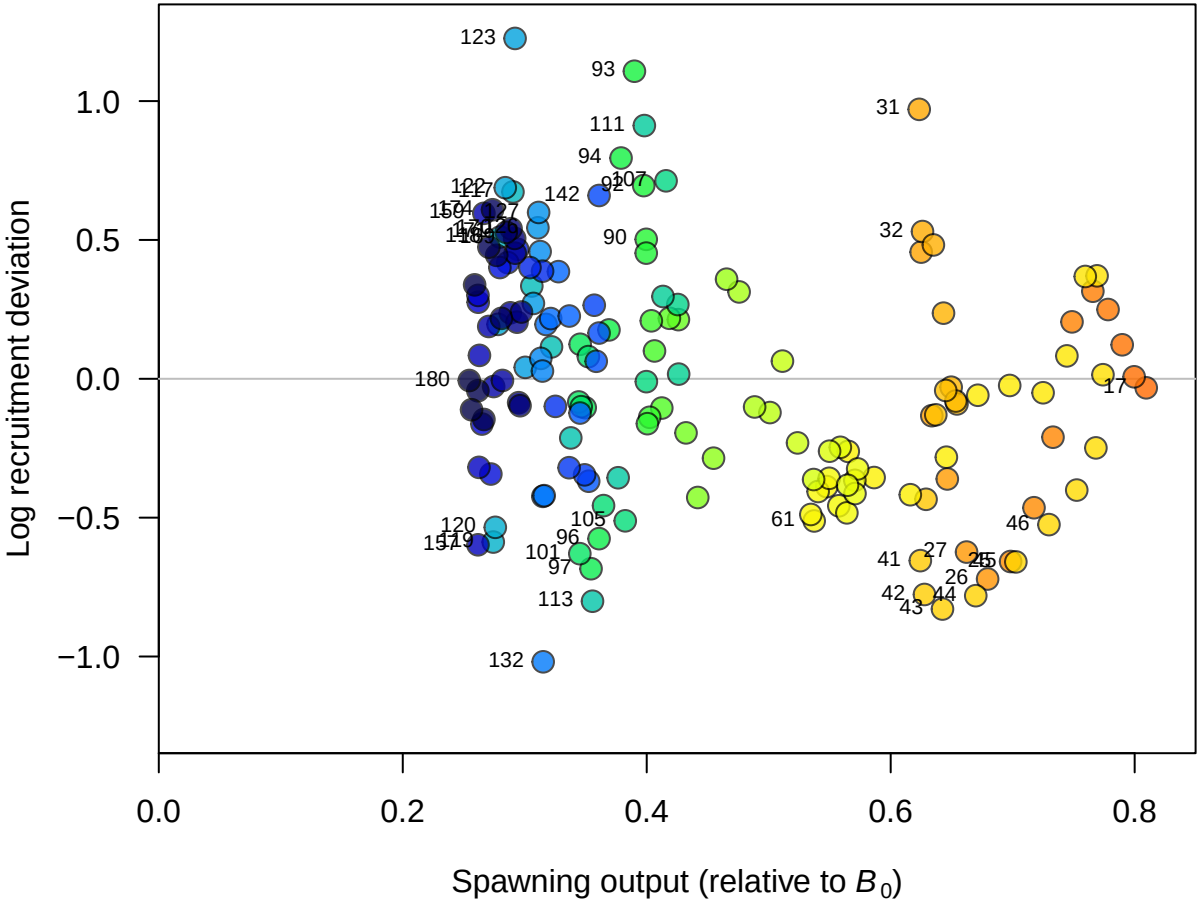

Log recruitment deviation
2
1
0
−1
0
50
100
150
200
Year

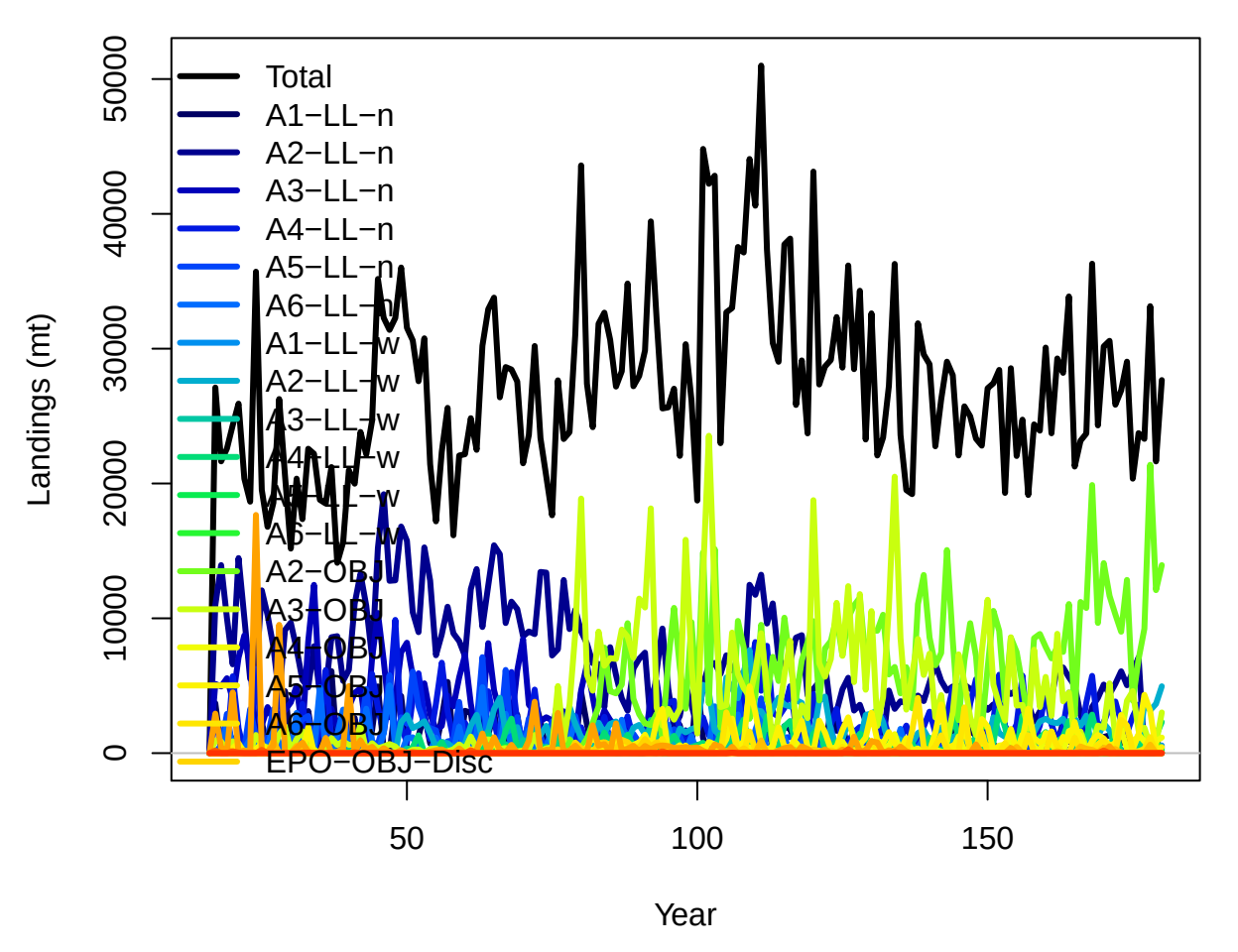

Recruitment deviation variance
Asymptotic standard error estimate
0.0
0.2
0.4
0.6
0.8
0
50
100
150
200
Year

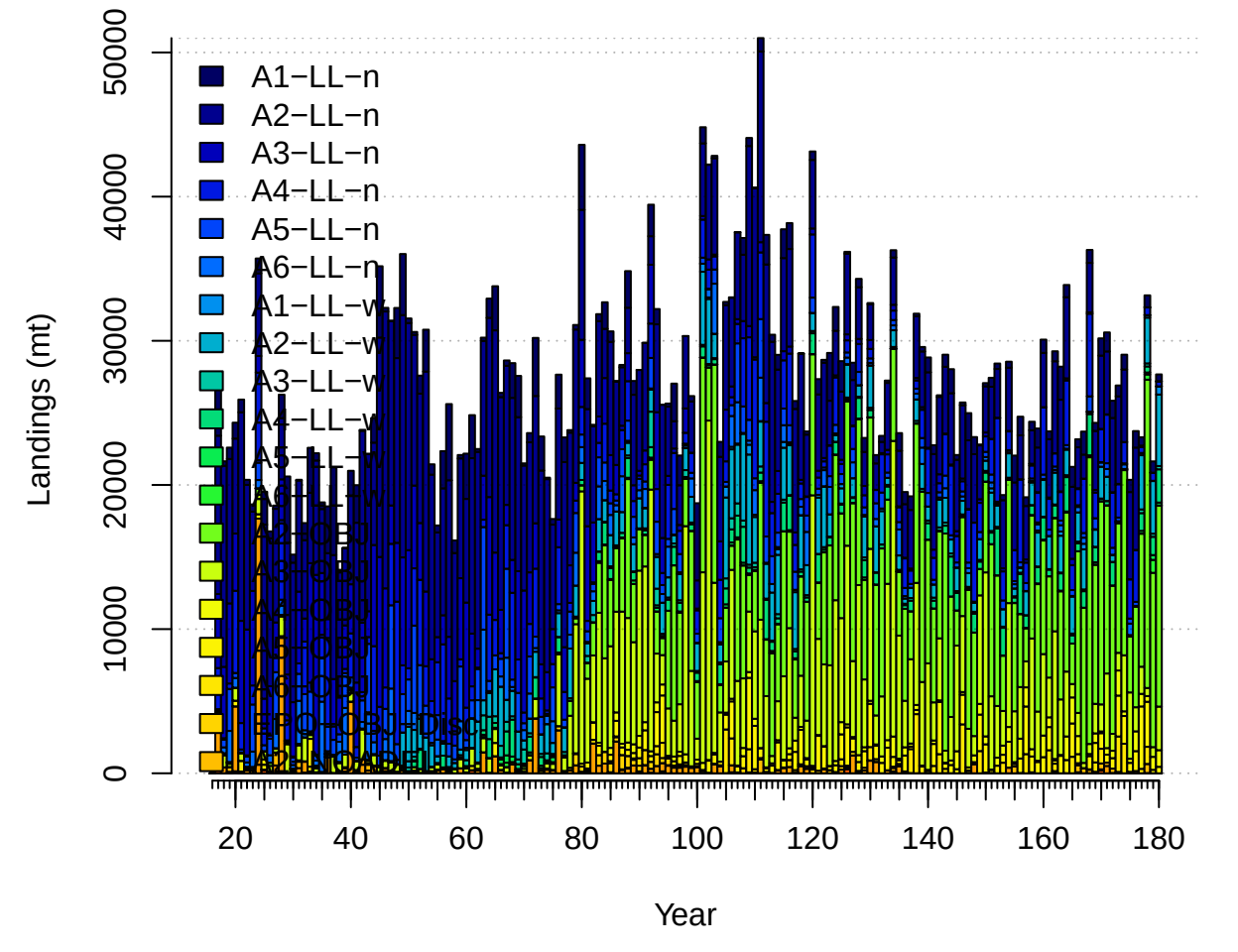

bias adjust in model
estimated alternative
$1 - SE(\hat{r}_y)^2/\sigma_R^2$
1.0
0.5
0.0
−0.5
0
50
100
150
200
Year

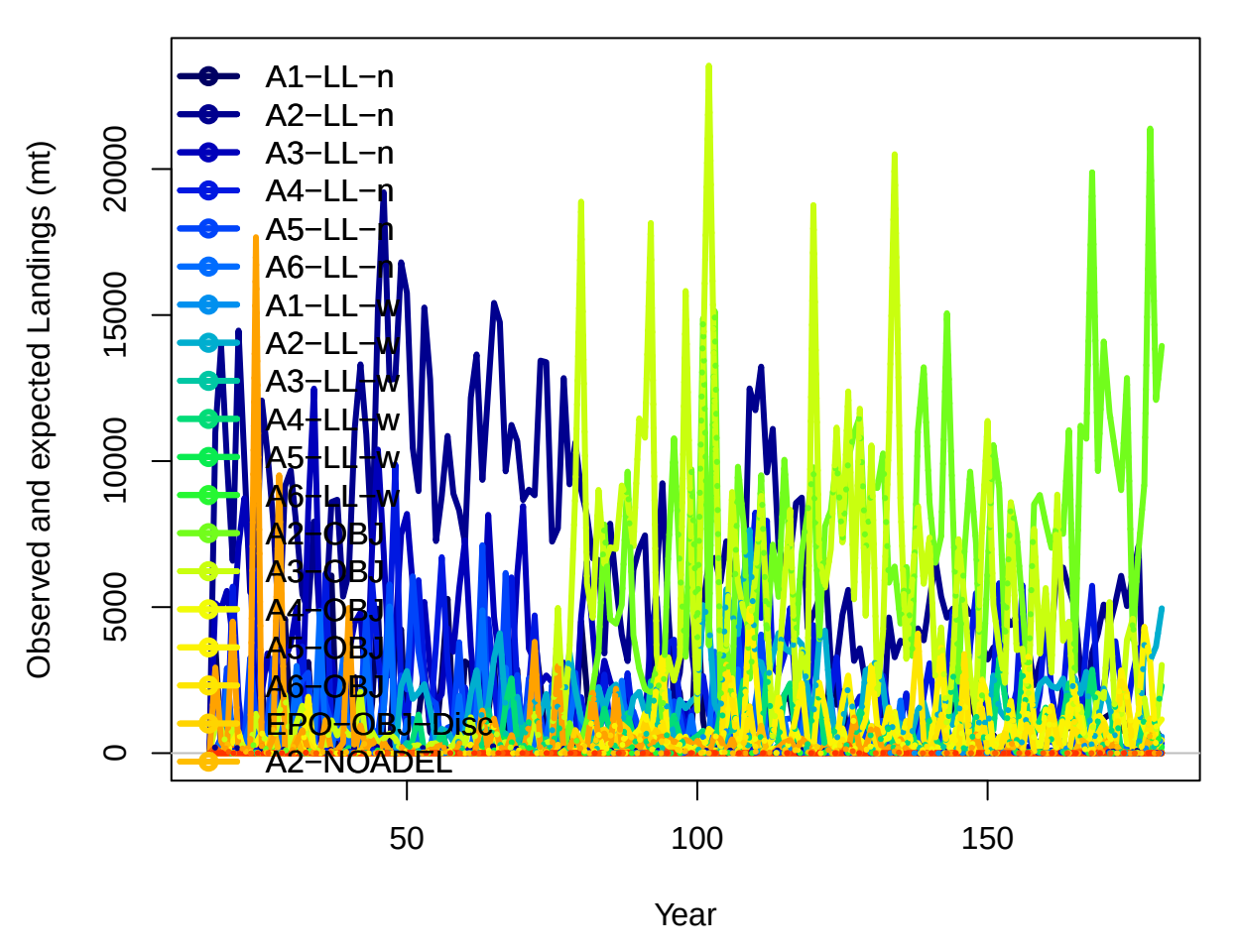

Exp. recruitment
Exp. recruitment after bias adj.
Estimated recruitments
Unfished equilibrium
Recruitment (1,000s)
0
5000
10000
15000
20000
25000
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning biomass (mt)

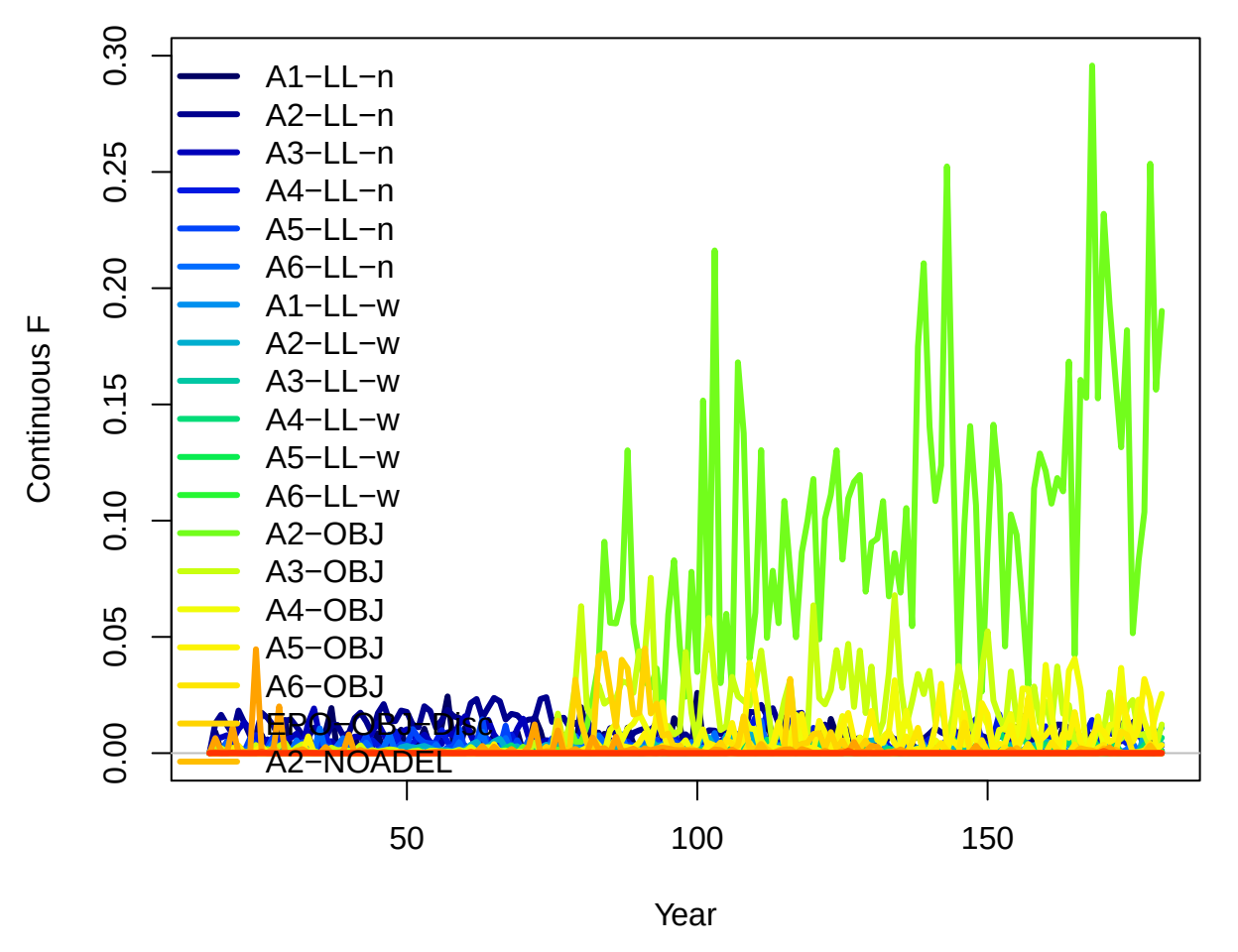

Exp. recruitment
Exp. recruitment after bias adj.
Estimated recruitments
Unfished equilibrium
Recruitment (1,000s)
0
5000
10000
15000
20000
25000
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning biomass (mt)

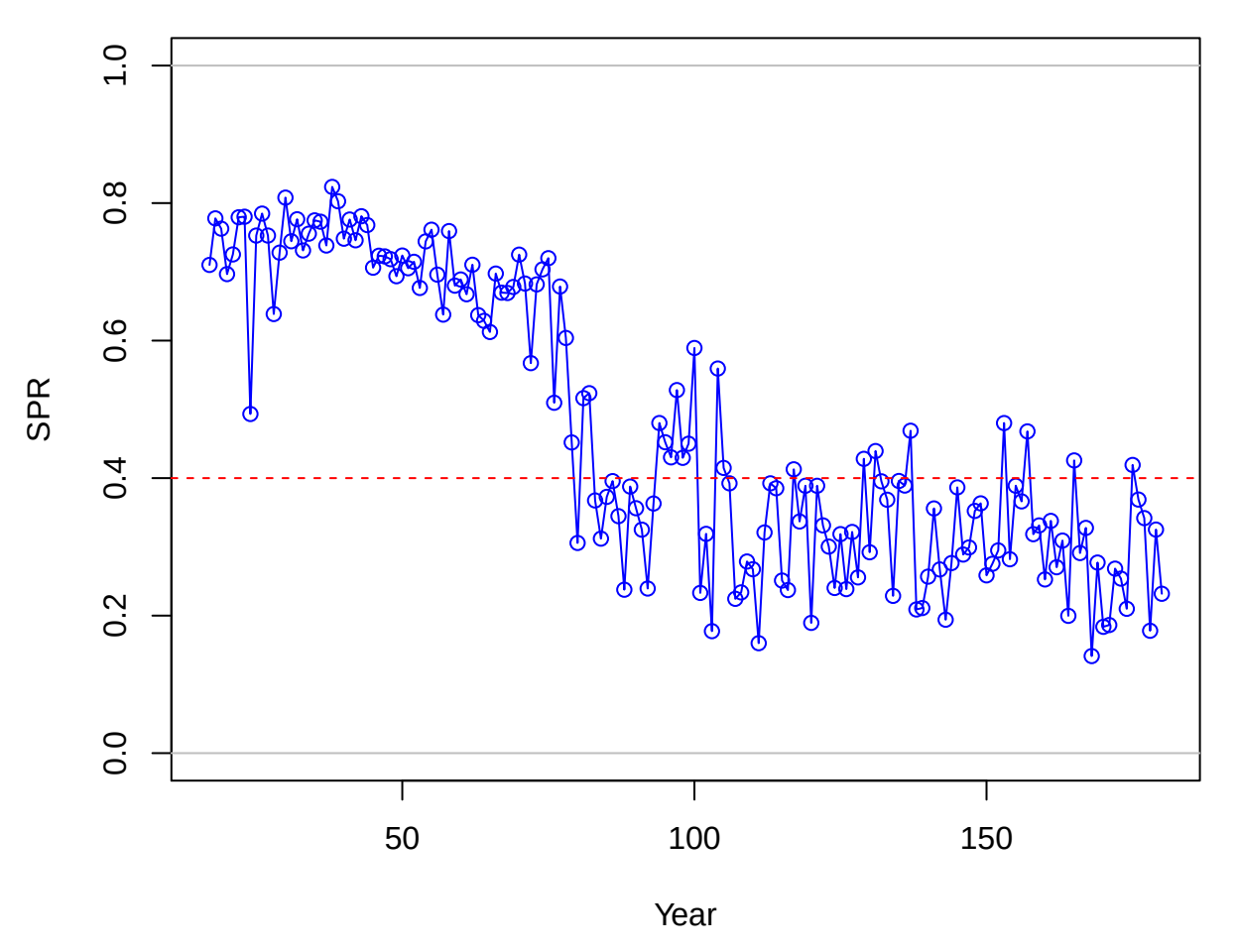

Log recruitment deviation
1.0
0.5
0.0
−0.5
−1.0
0.0
0.2
0.4
0.6
0.8
Spawning output (relative to B_0)
123
93
111
94
142
90
180
120
105
96
101
97
113
132
31
32
61
46
41
27
26
42
44
43
17

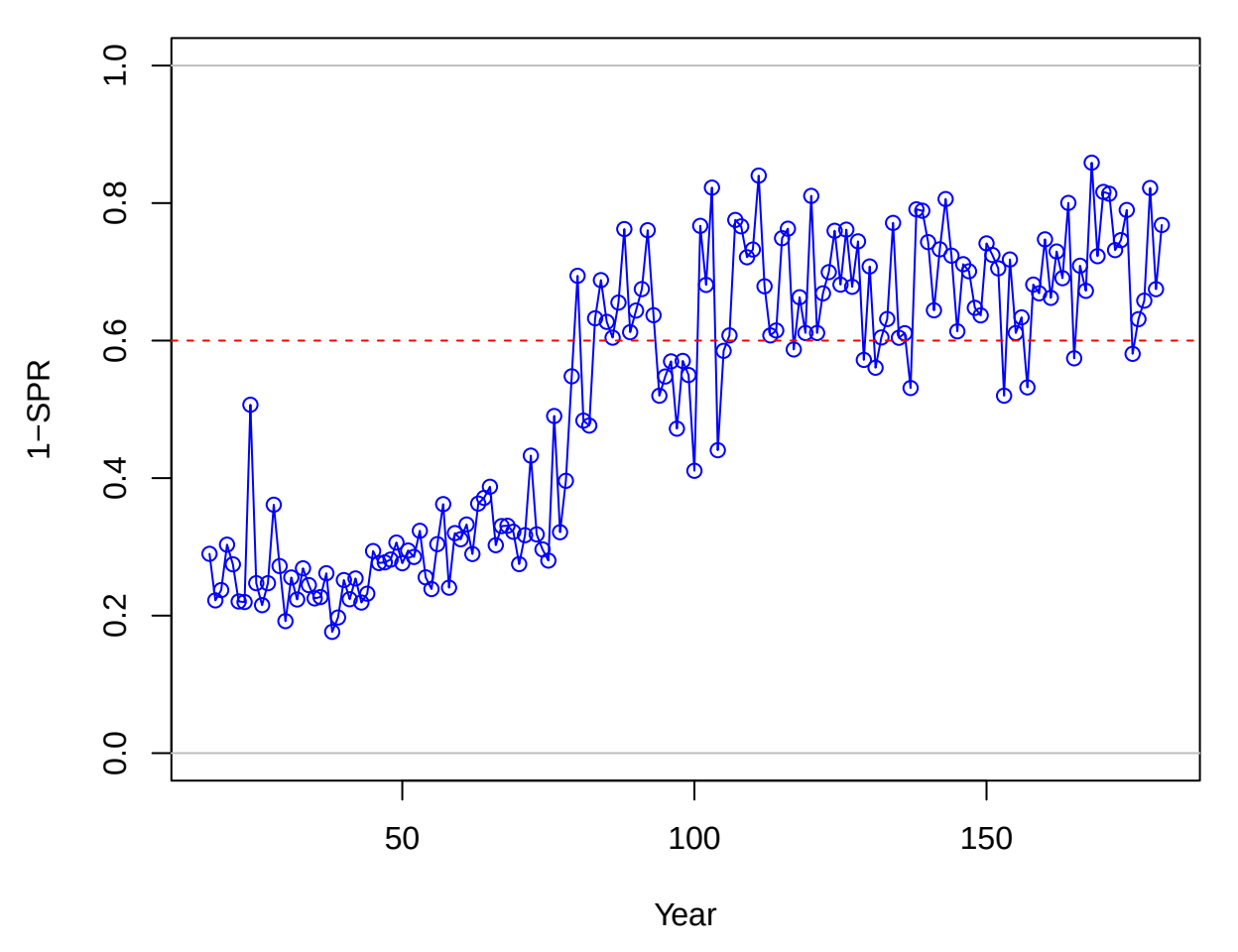

Total
A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
Landings (mt)
0
10000
20000
30000
40000
50000
50
100
150
Year

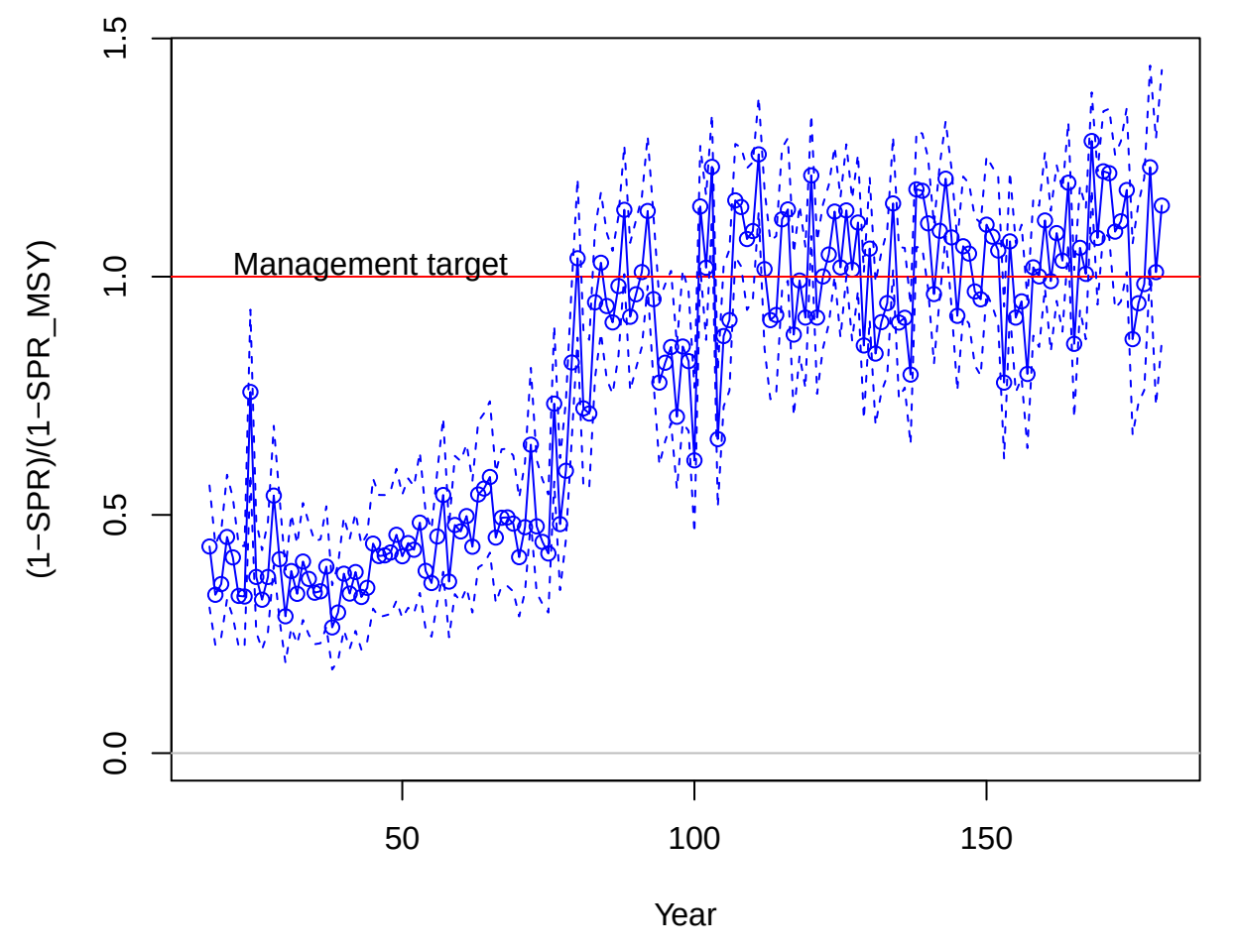

A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OB
A3−OB
A4−OB
A5−OB
A6−OB
Landings (mt)
0
10000
20000
30000
40000
50000
20
40
60
80
100
120
140
160
180
Year

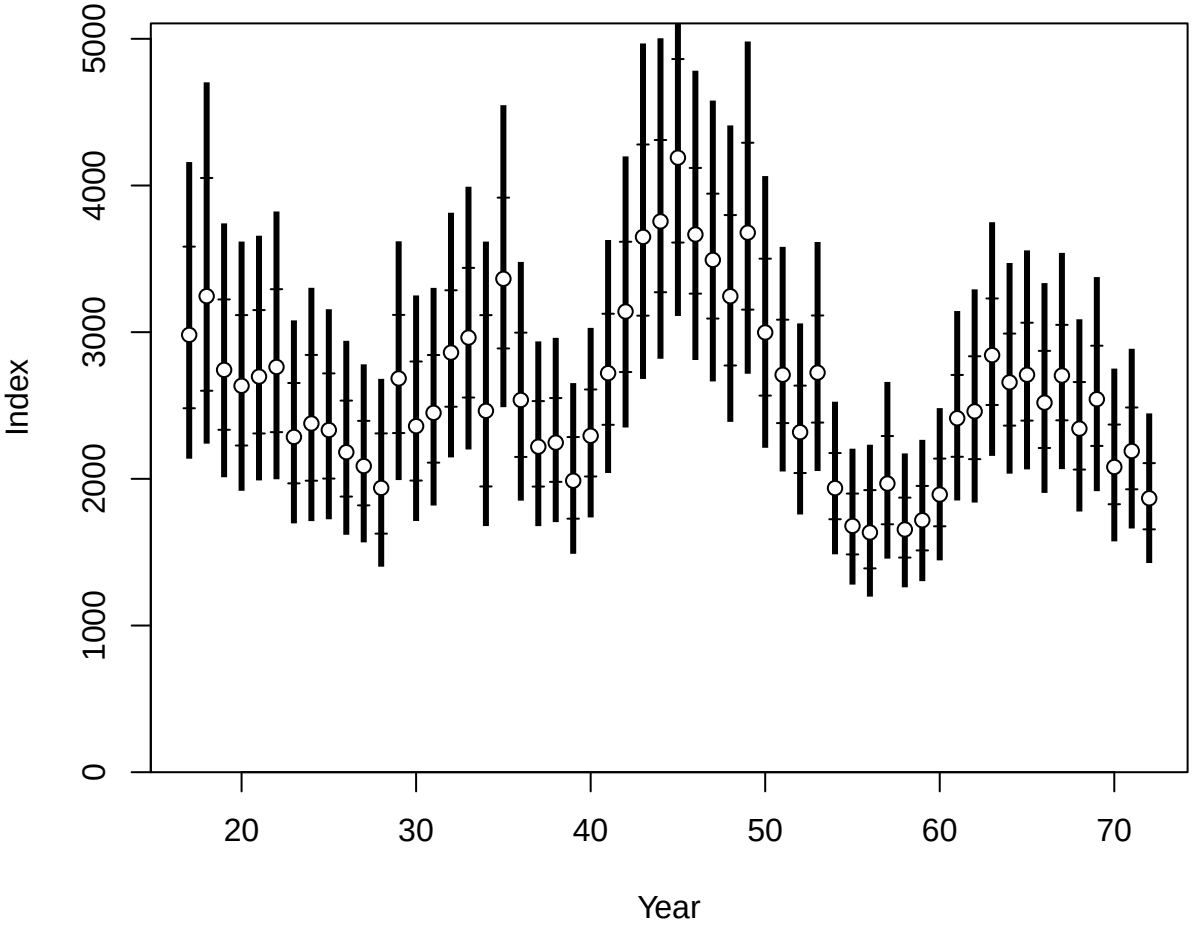

A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
Observed and expected Landings (mt)
0
5000
10000
15000
20000
50
100
150
Year

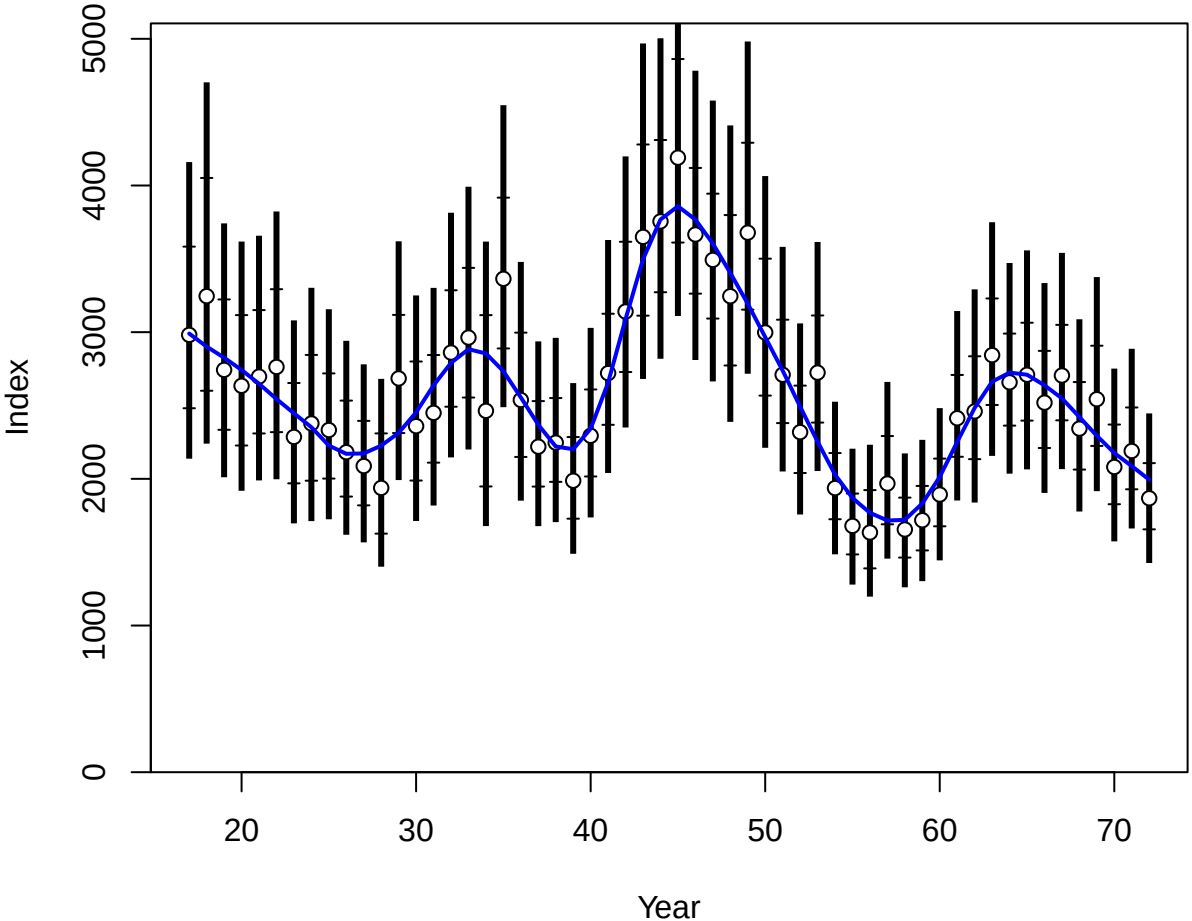

Continuous F
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
Year
A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
A2−NOADEL

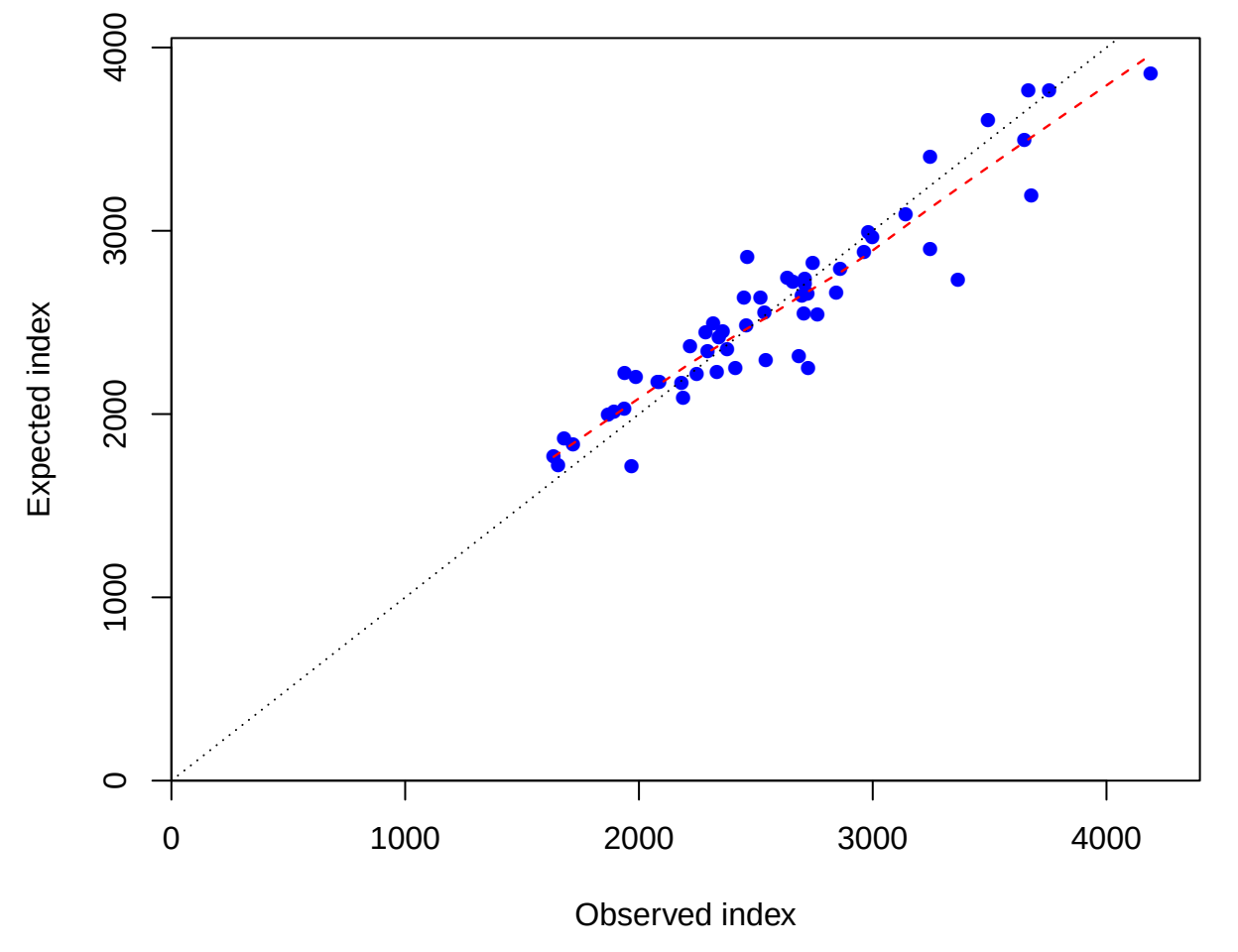

SPR
1.0
0.8
0.6
0.4
0.2
0.0
50
100
150
Year

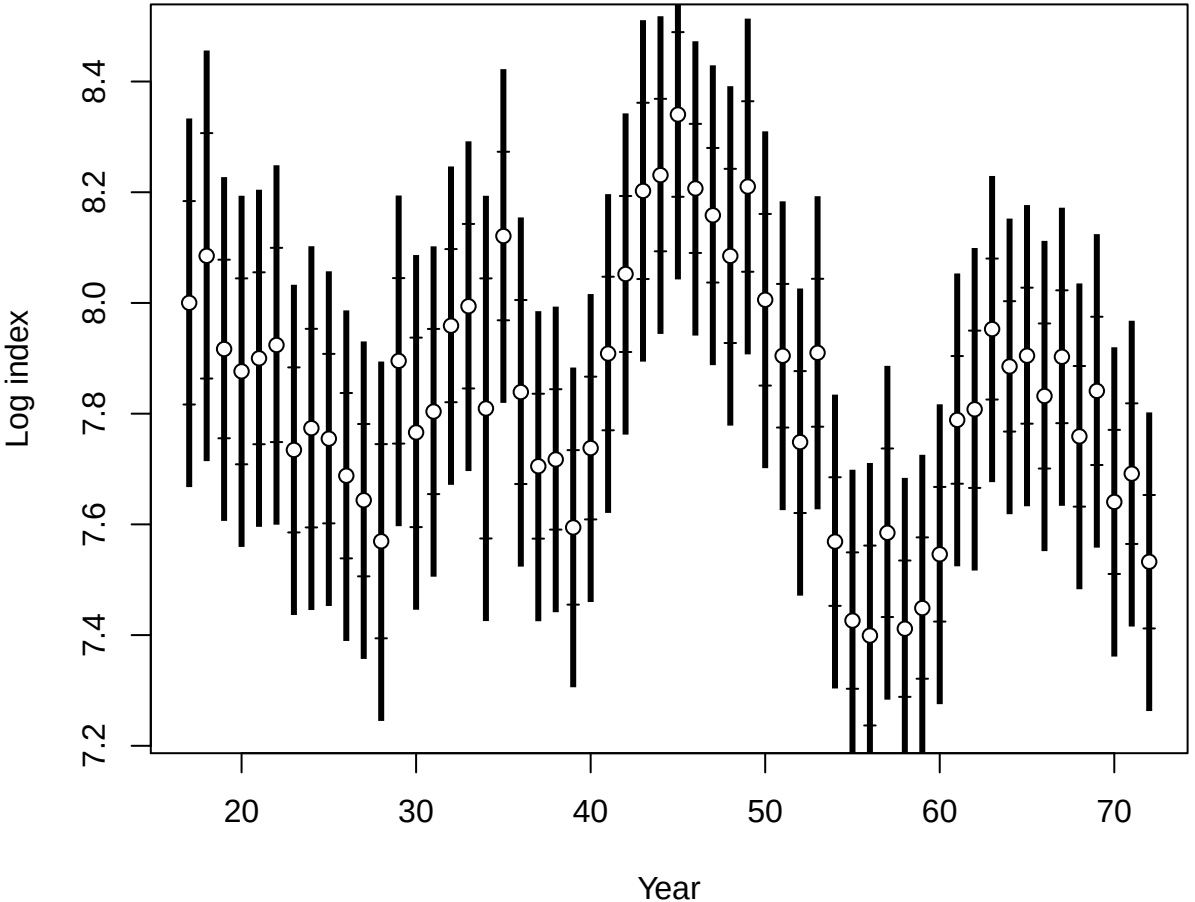

1−SPR
0.0
0.2
0.4
0.6
0.8
1.0
50
100
150
Year

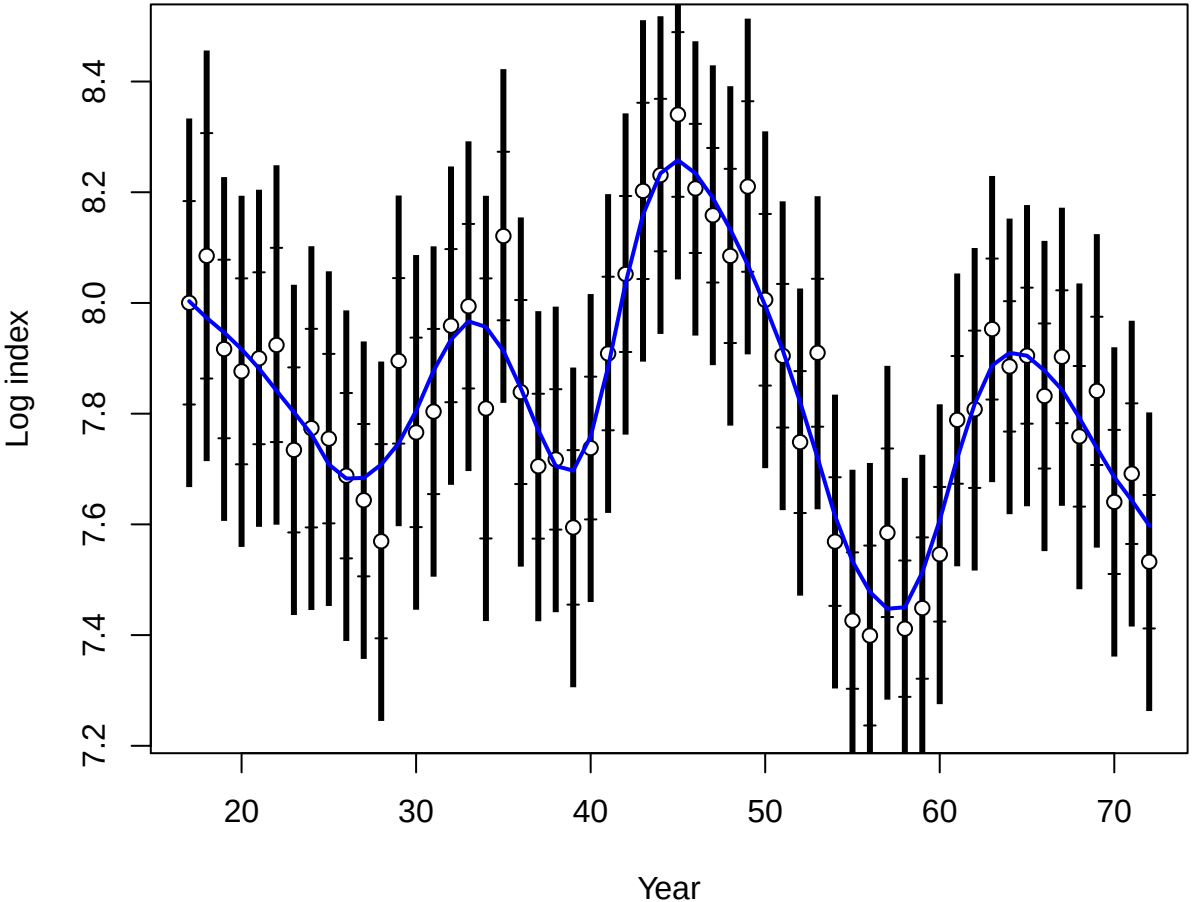

(1−SPR)/(1−SPR_MSY)
0.0
0.5
1.0
1.5
Management target
50
100
150
Year

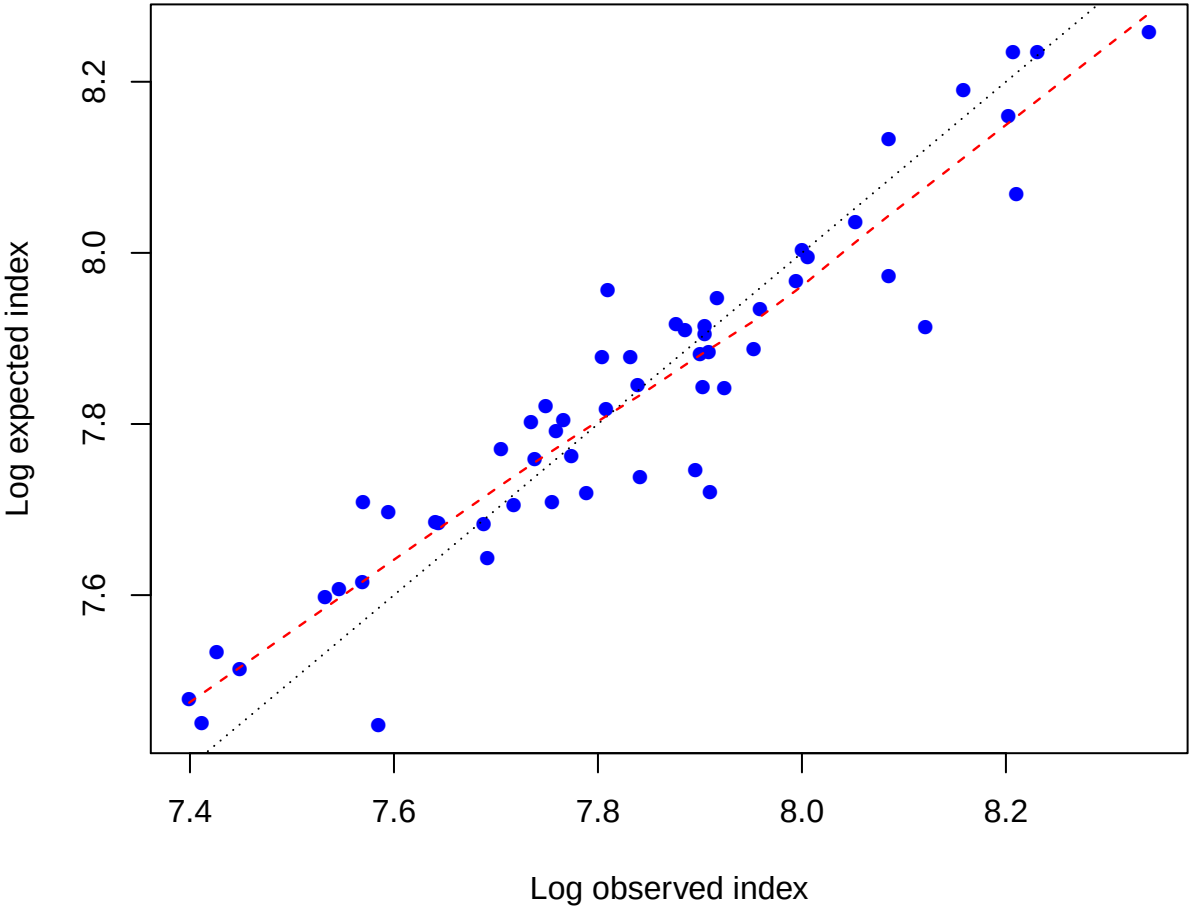

Index
0
1000
2000
3000
4000
5000
20
30
40
50
60
70
Year

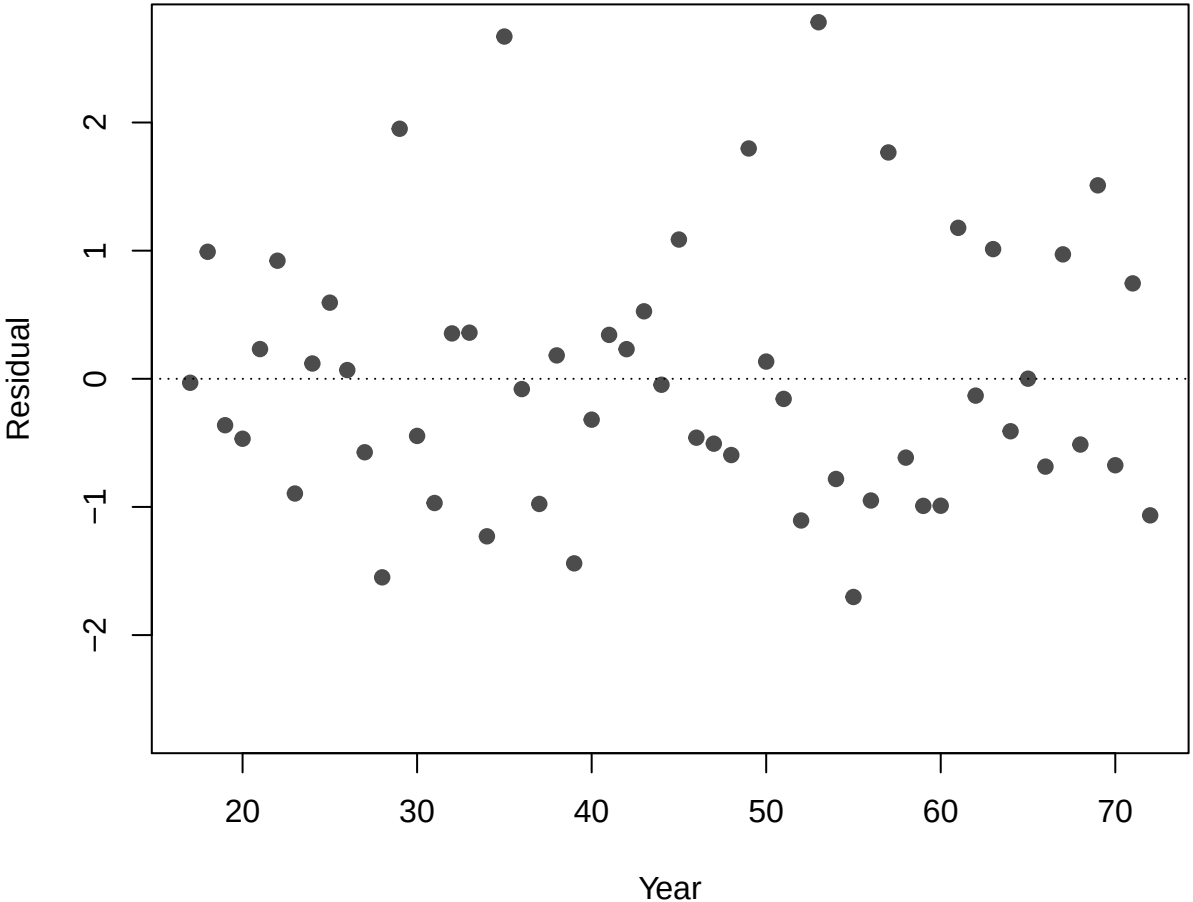

Index
0
1000
2000
3000
4000
5000
20
30
40
50
60
70
Year

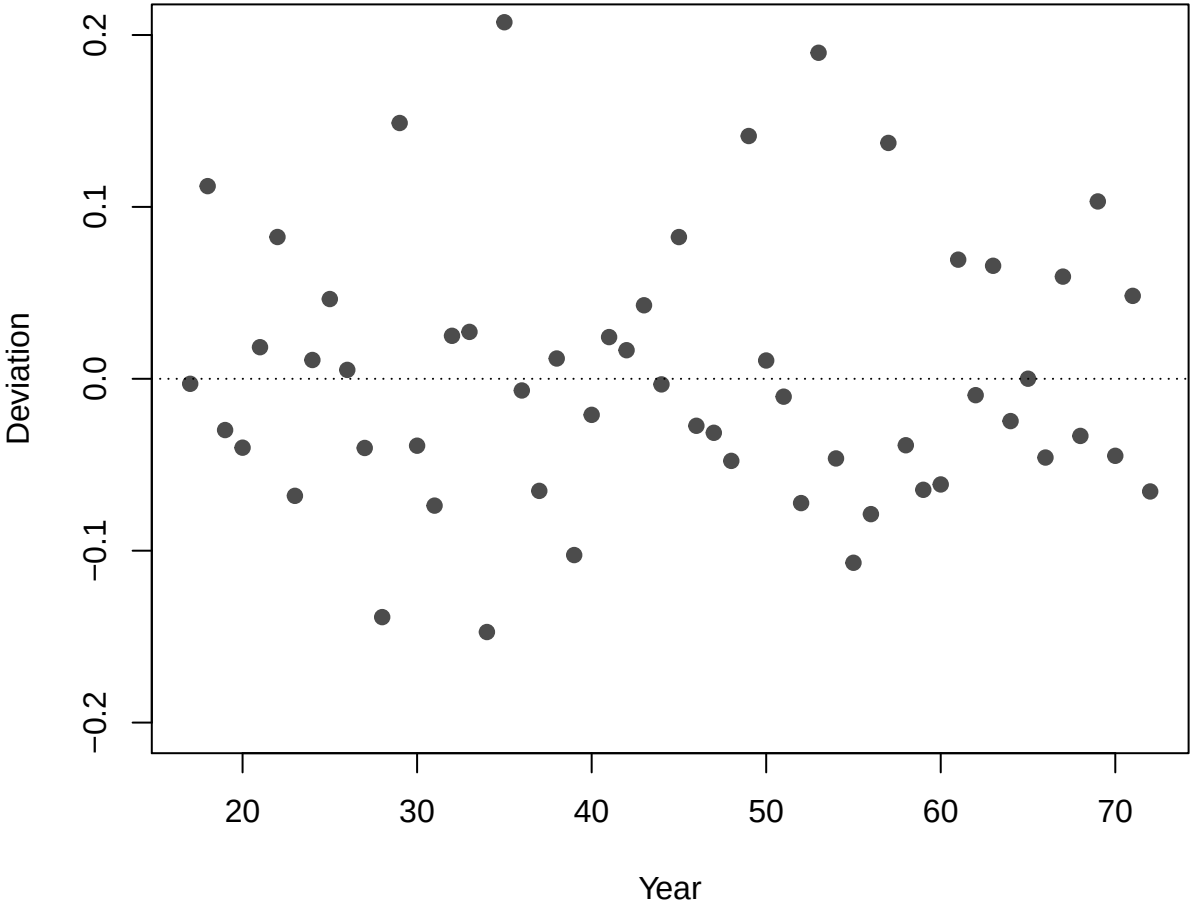

Expected index
Observed index
0
1000
2000
3000
4000

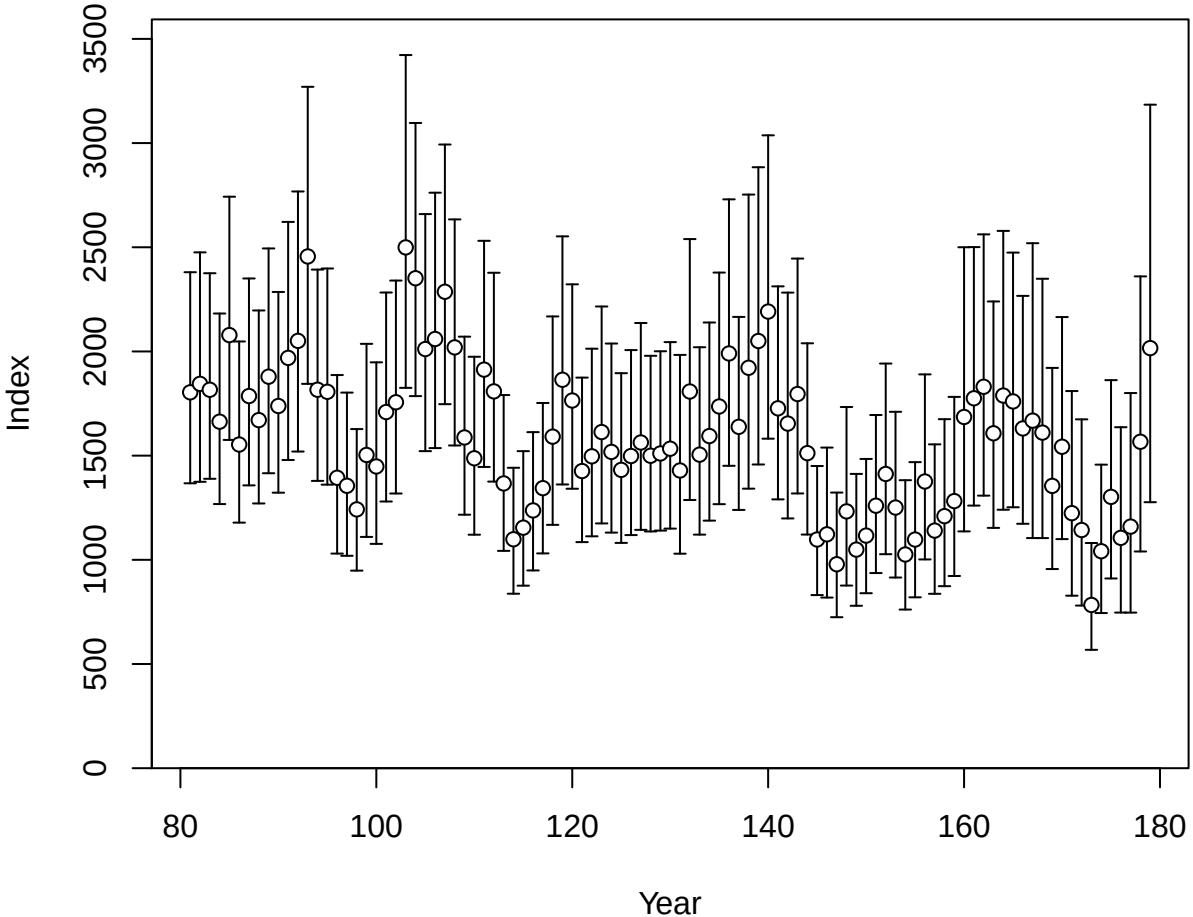

Log index
7.2
7.4
7.6
7.8
8.0
8.2
8.4
20
30
40
50
60
70
Year

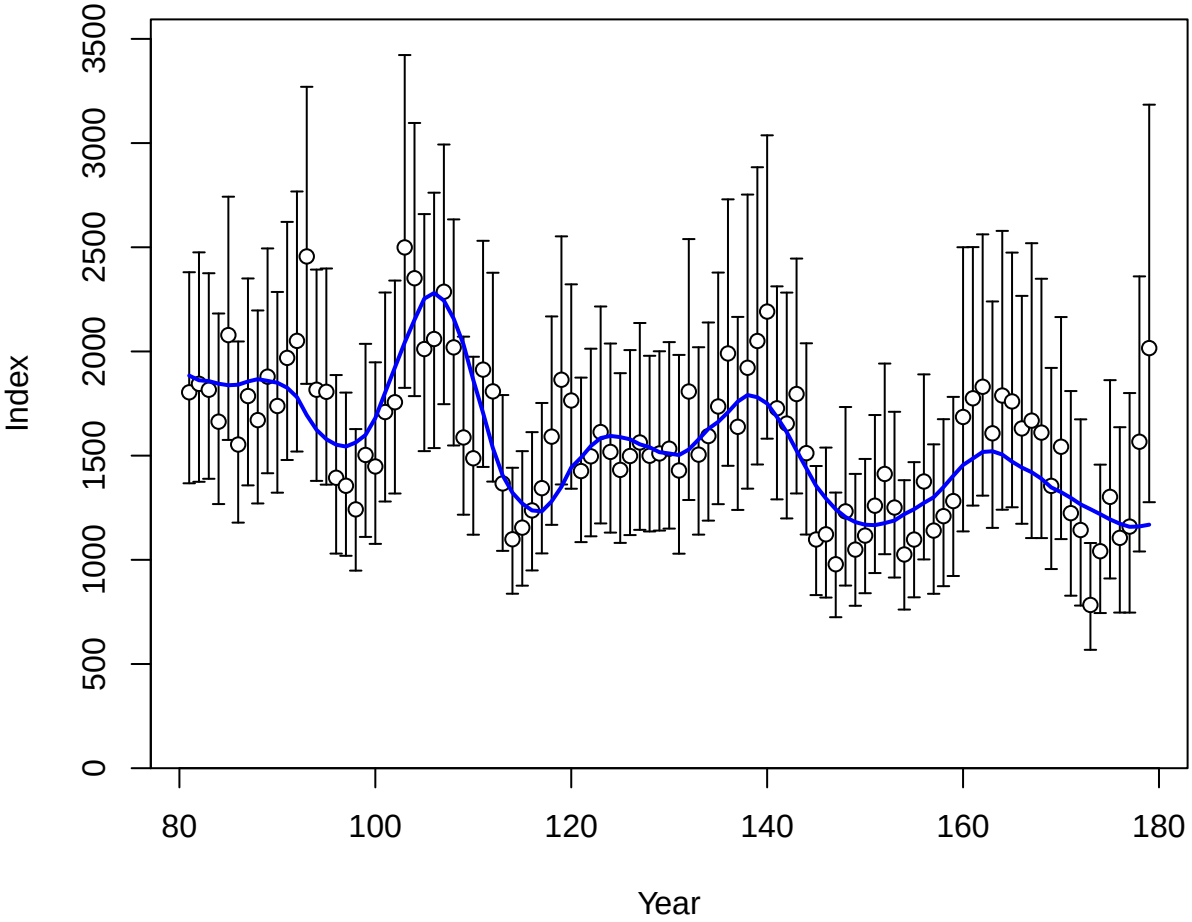

Log index
7.2
7.4
7.6
7.8
8.0
8.2
8.4
20
30
40
50
60
70
Year

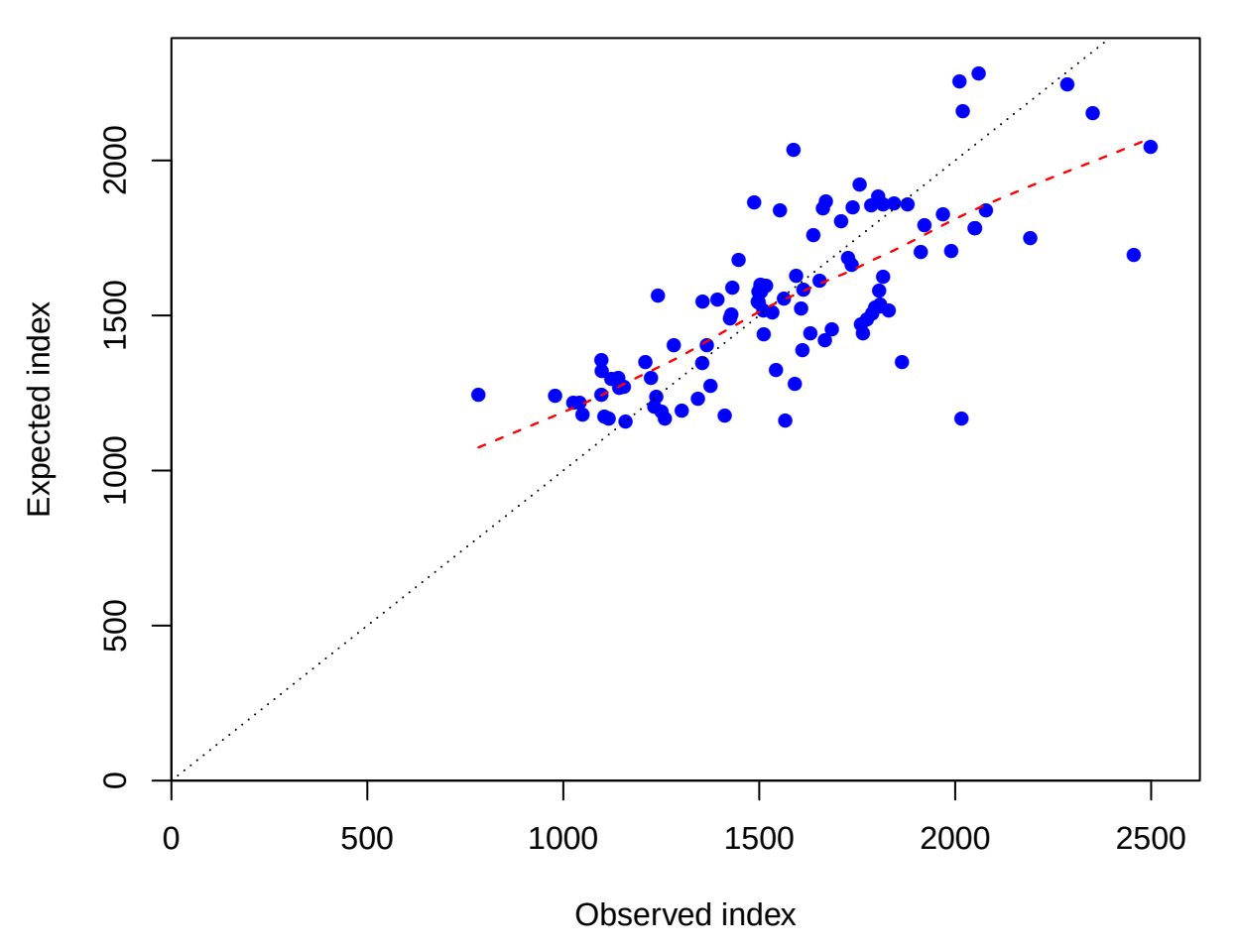

Log expected index
7.6
7.8
8.0
8.2
7.4
7.6
7.8
8.0
8.2
Log observed index

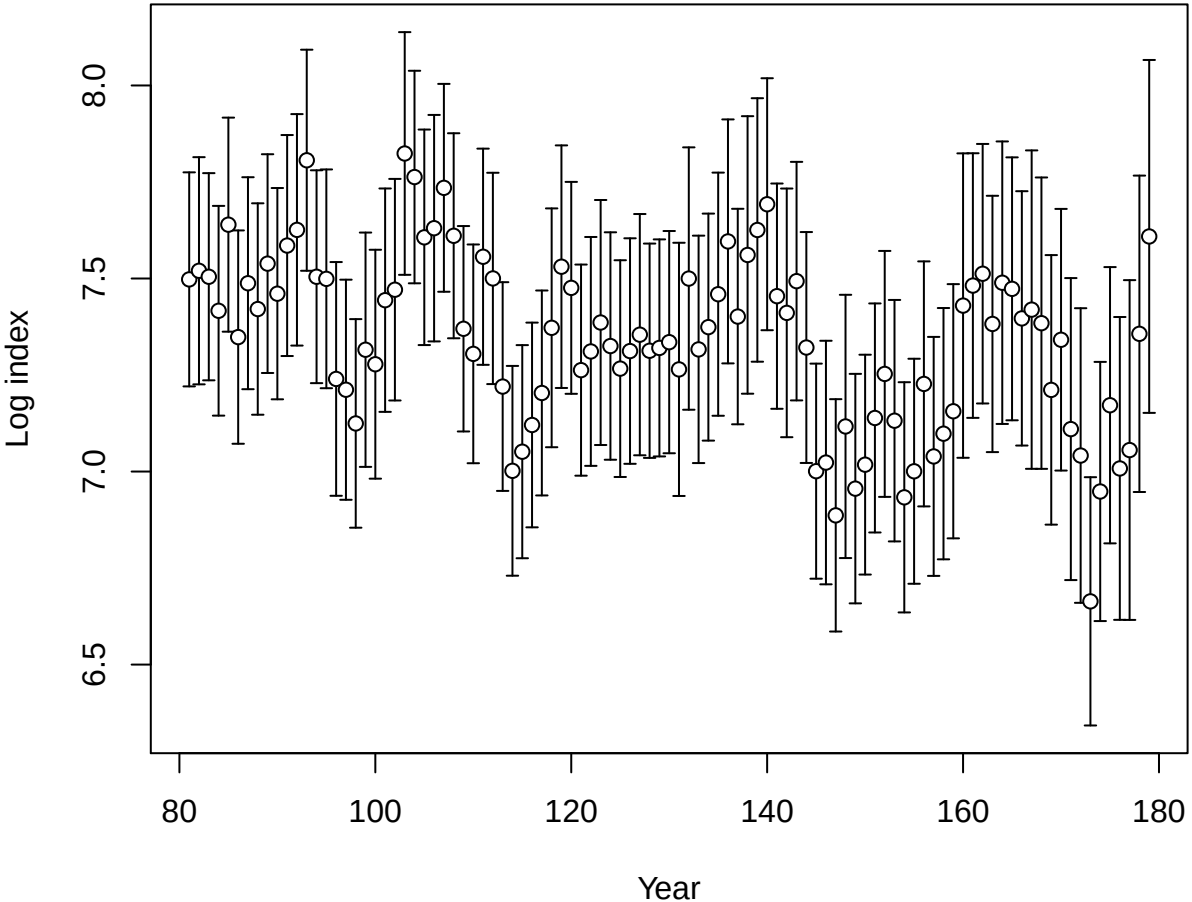

Residual
2
1
0
−1
−2
20
30
40
50
60
70
Year

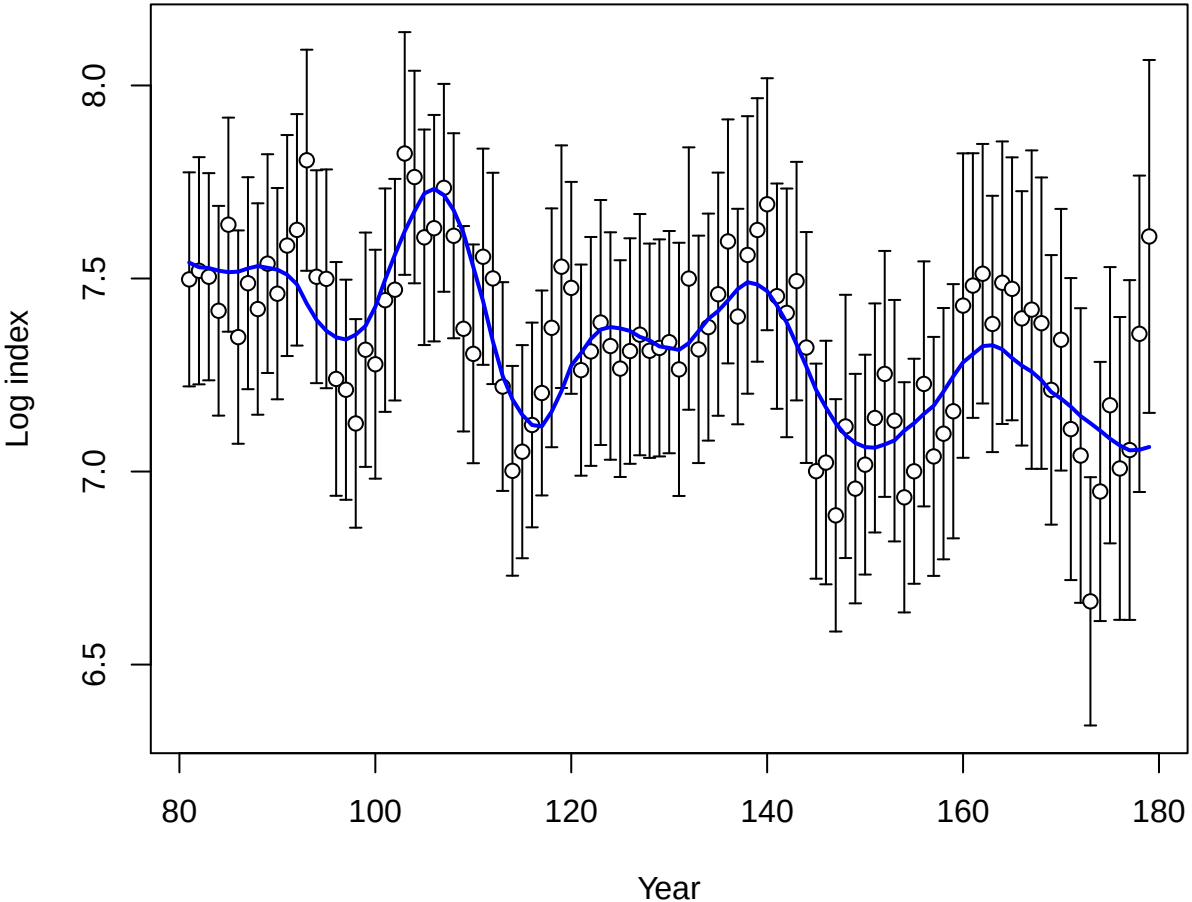

Deviation
0.2
0.1
0.0
−0.1
−0.2
20
30
40
50
60
70
Year

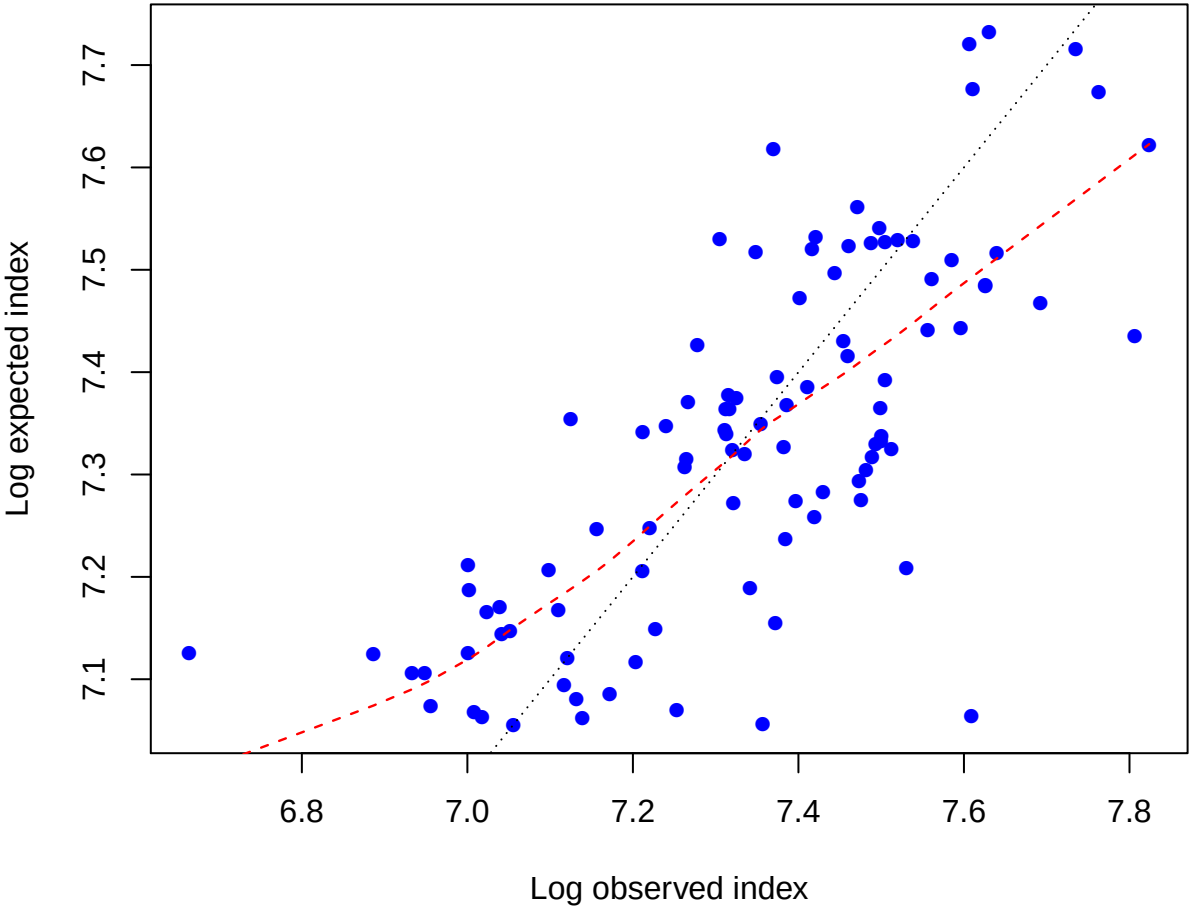

Index
0
500
1000
1500
2000
2500
3000
3500
80
100
120
140
160
180
Year

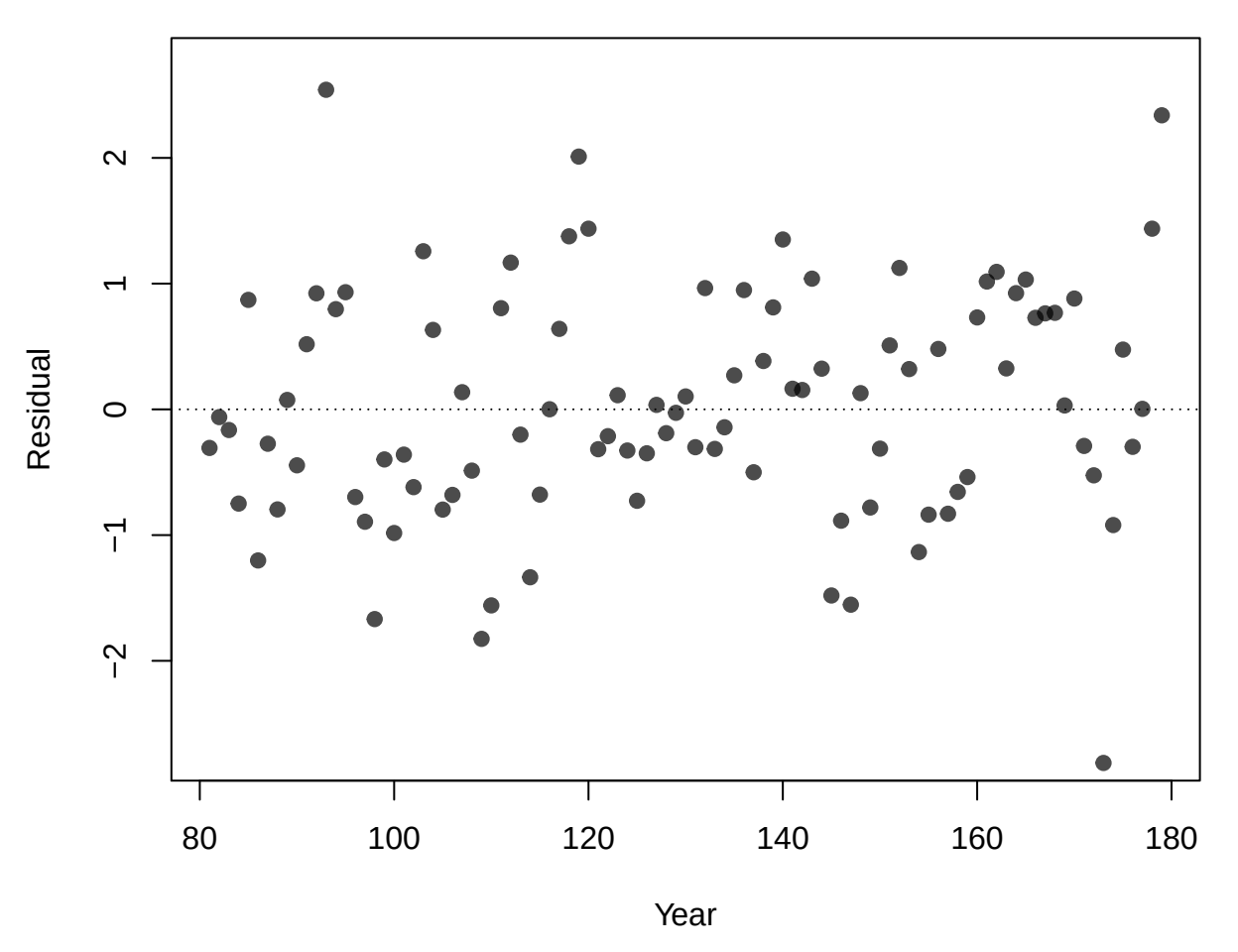

Index
0
500
1000
1500
2000
2500
3000
3500
80
100
120
140
160
180
Year

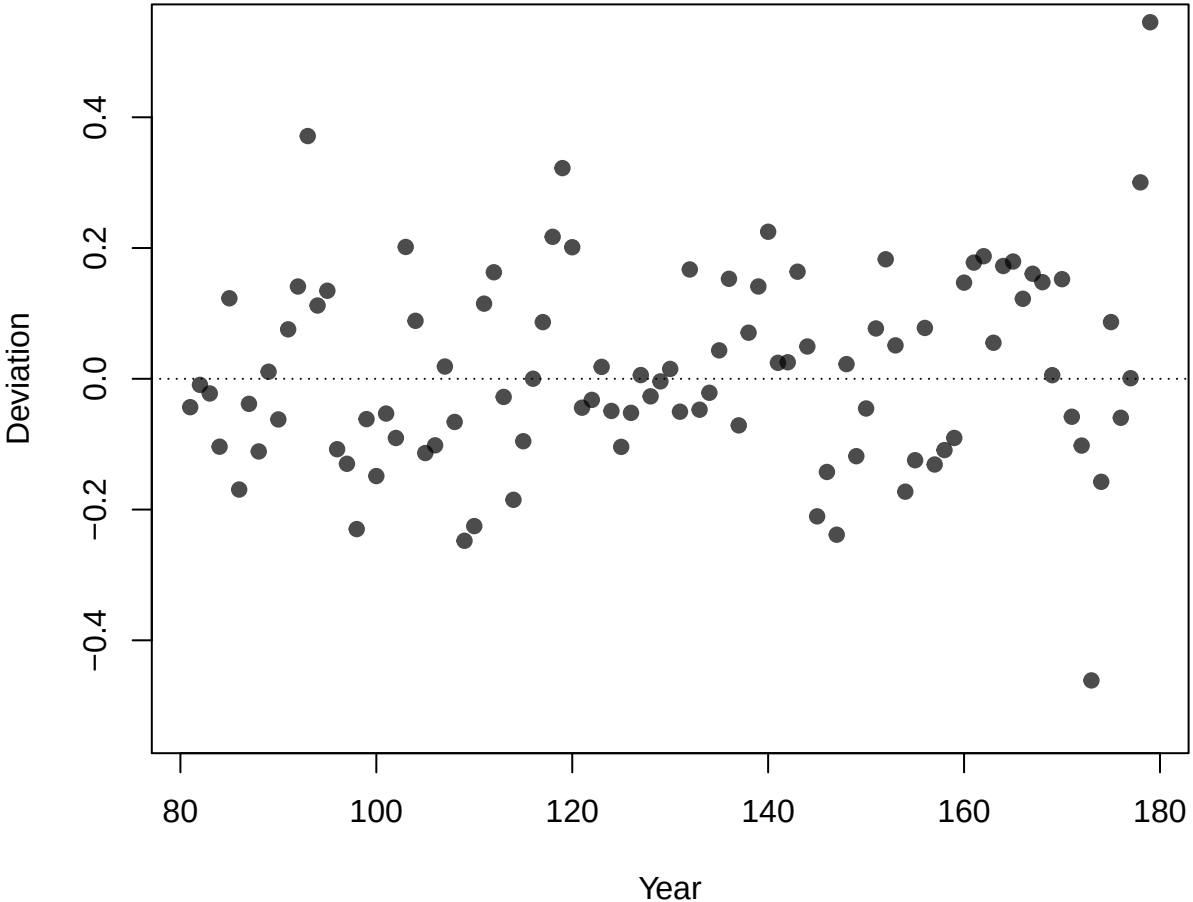

Expected index
0
500
1000
1500
2000
Observed index
0
500
1000
1500
2000
2500

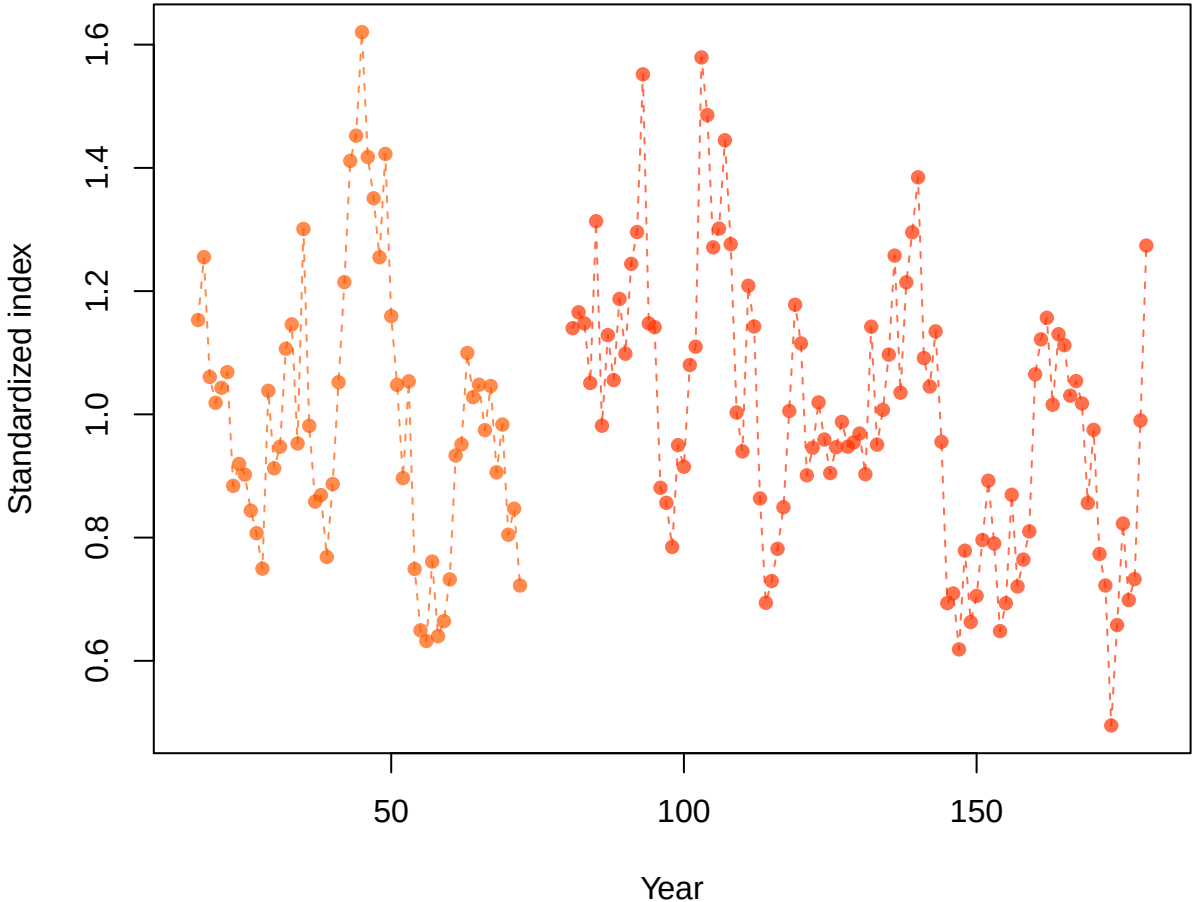

Log index
8.0
7.5
7.0
6.5
80
100
120
140
160
180
Year

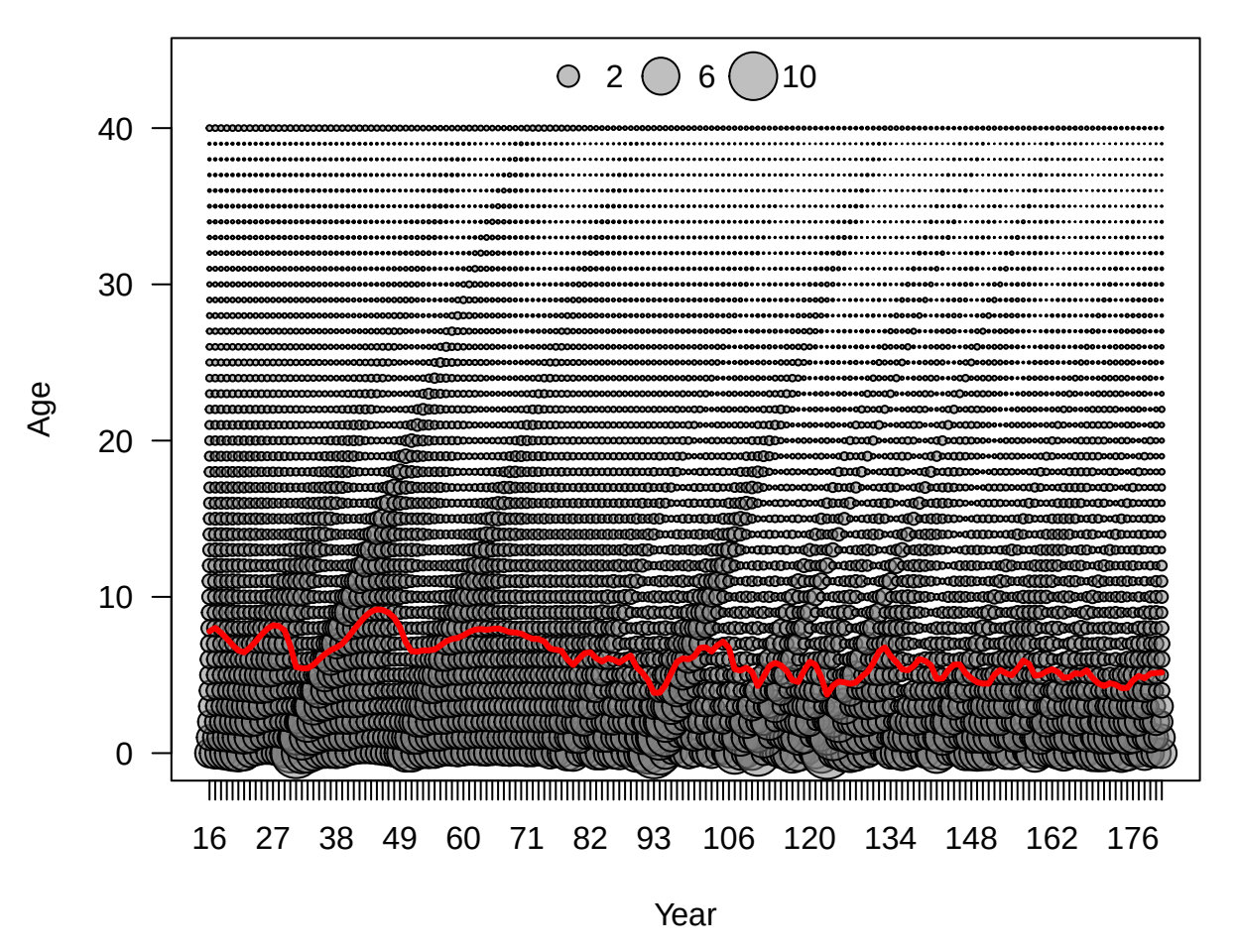

Log index
8.0
7.5
7.0
6.5
80
100
120
140
160
180
Year

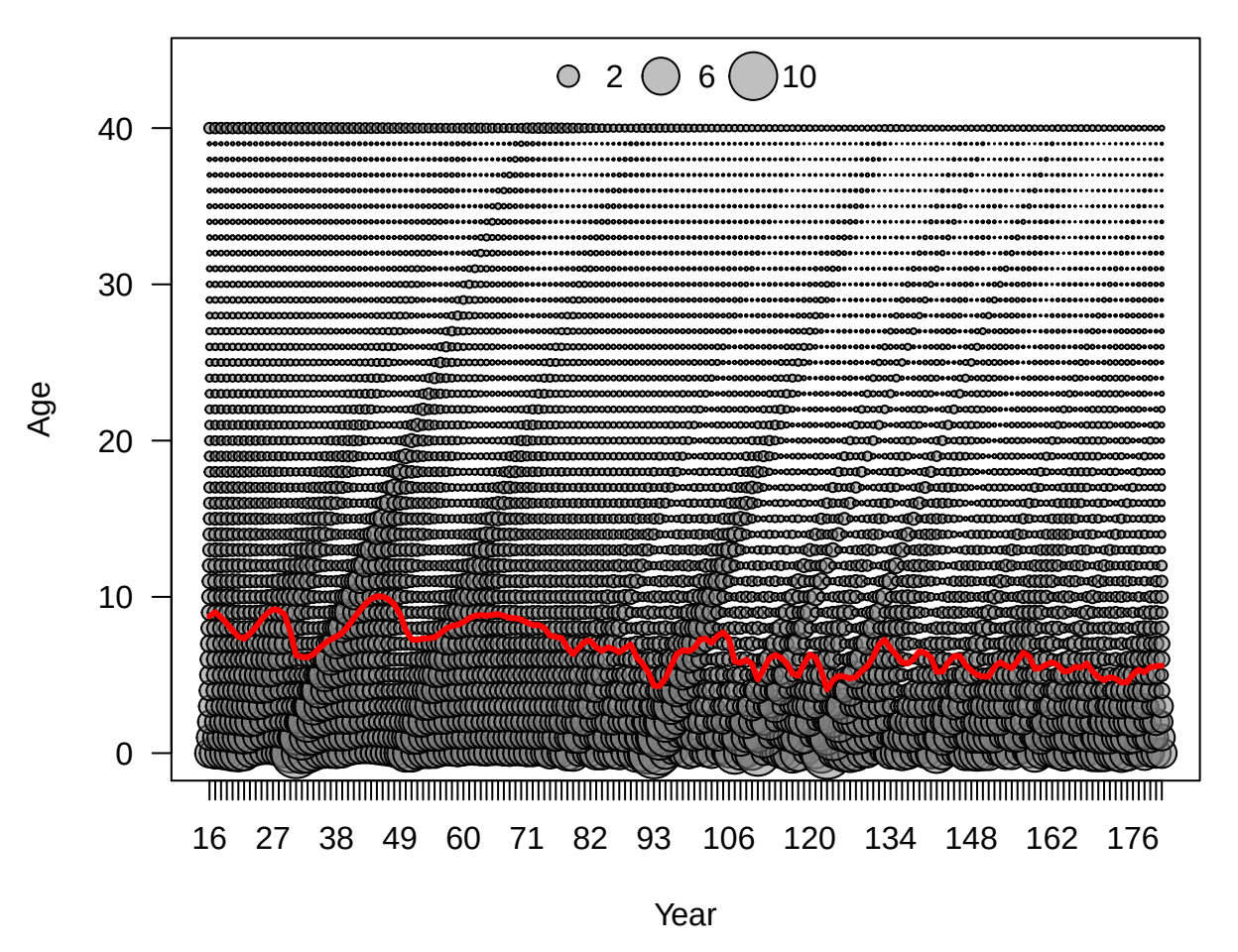

Log expected index
7.1
7.2
7.3
7.4
7.5
7.6
7.7
6.8
7.0
7.2
7.4
7.6
7.8
Log observed index

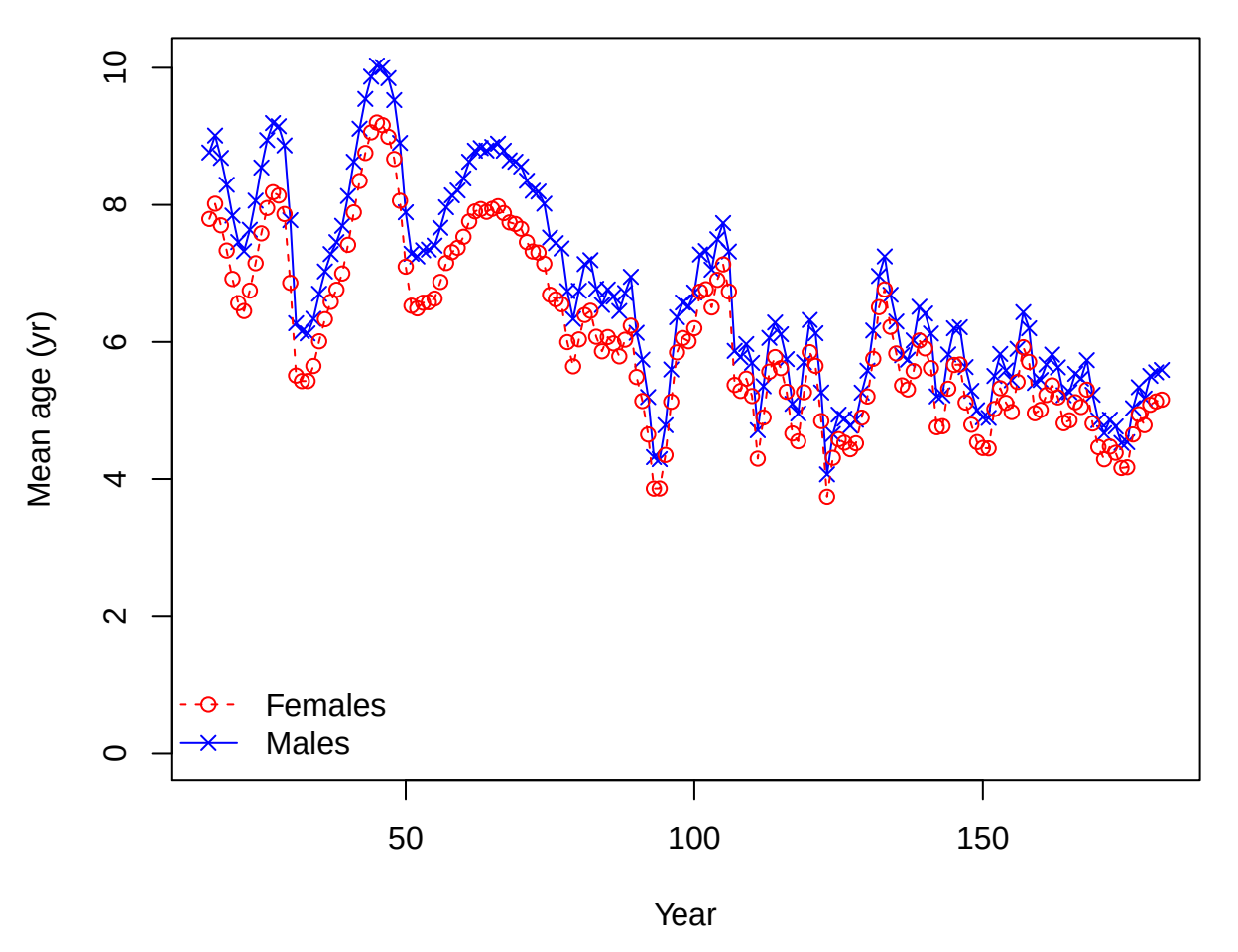

Residual
2
1
0
−1
−2
80
100
120
140
160
180
Year

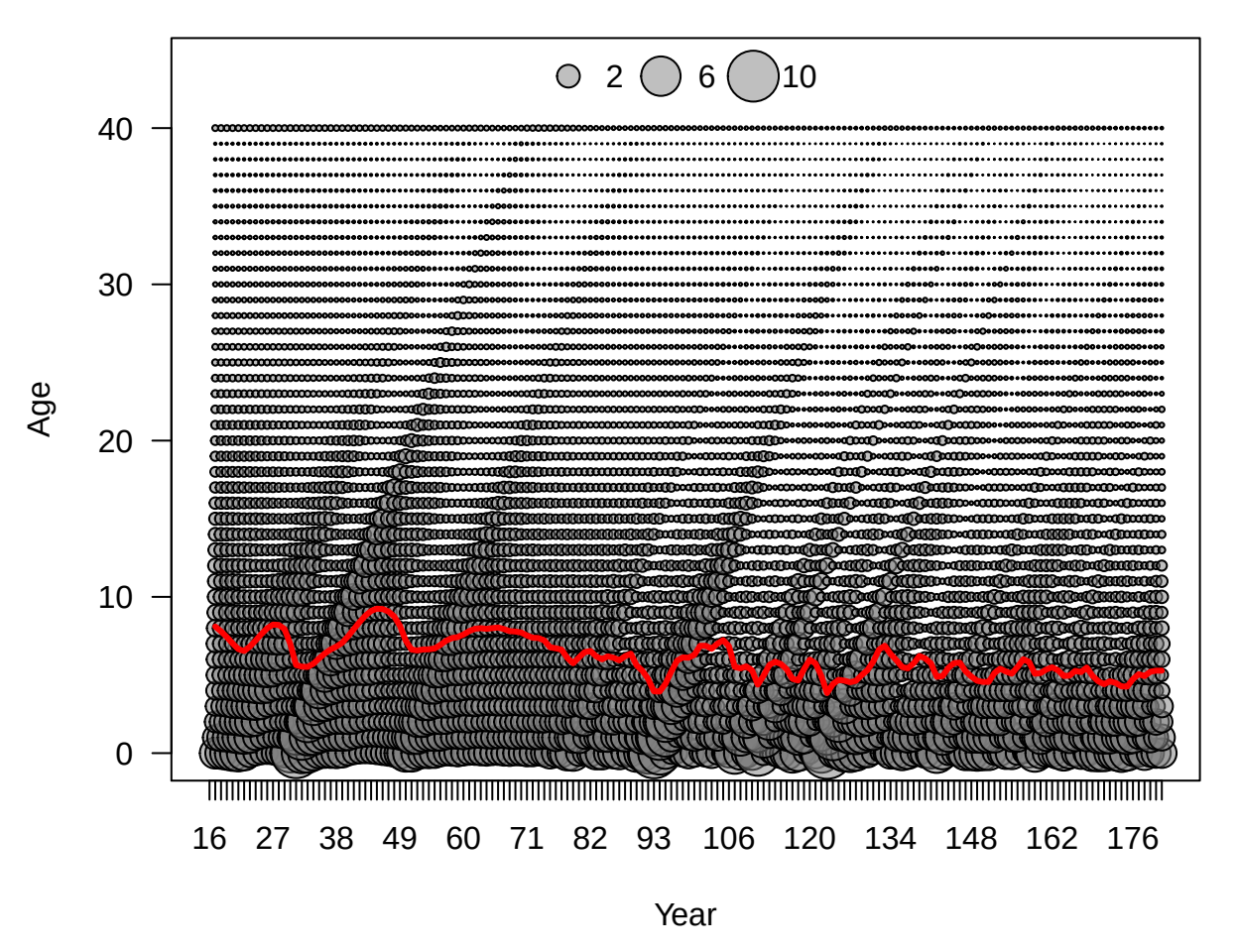

Deviation
0.4
0.2
0.0
−0.2
−0.4
80
100
120
140
160
180
Year

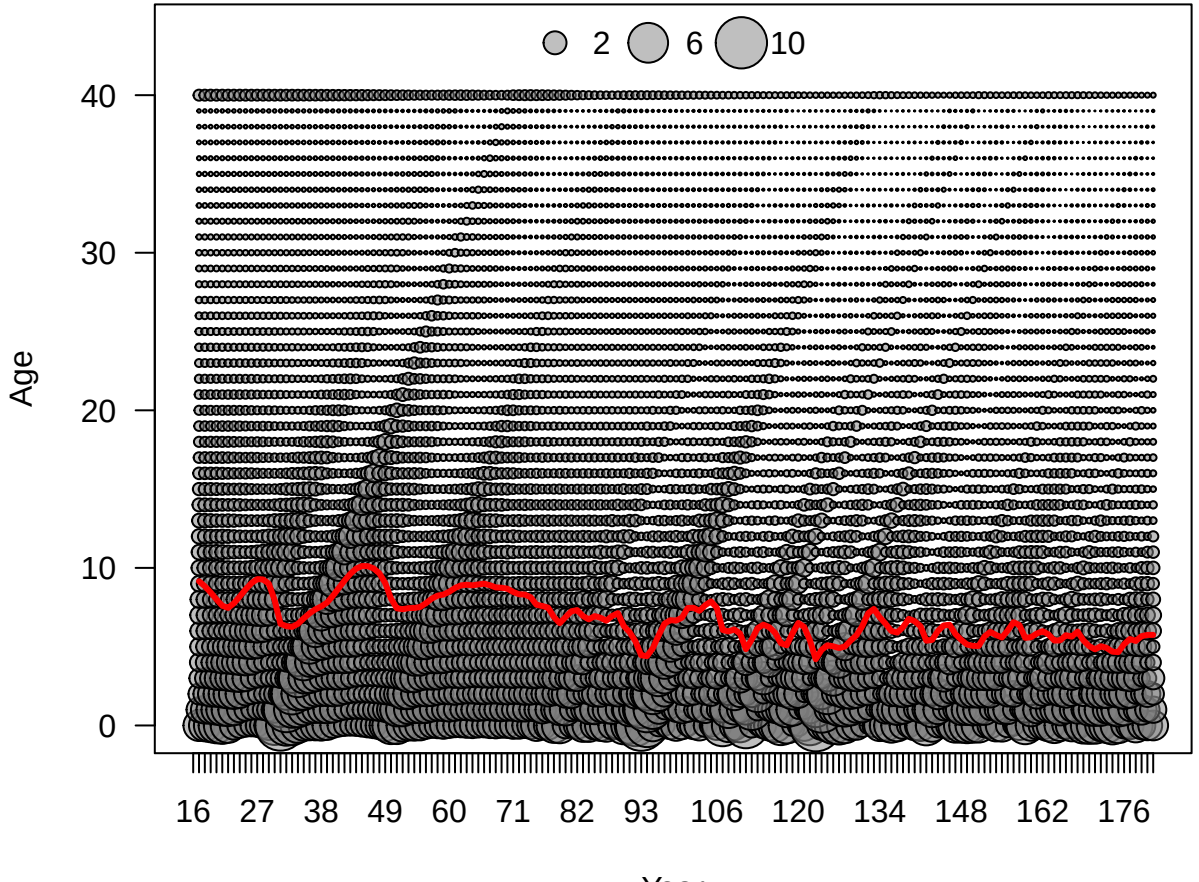

Standardized index
0.6
0.8
1.0
1.2
1.4
1.6
50
100
150
Year

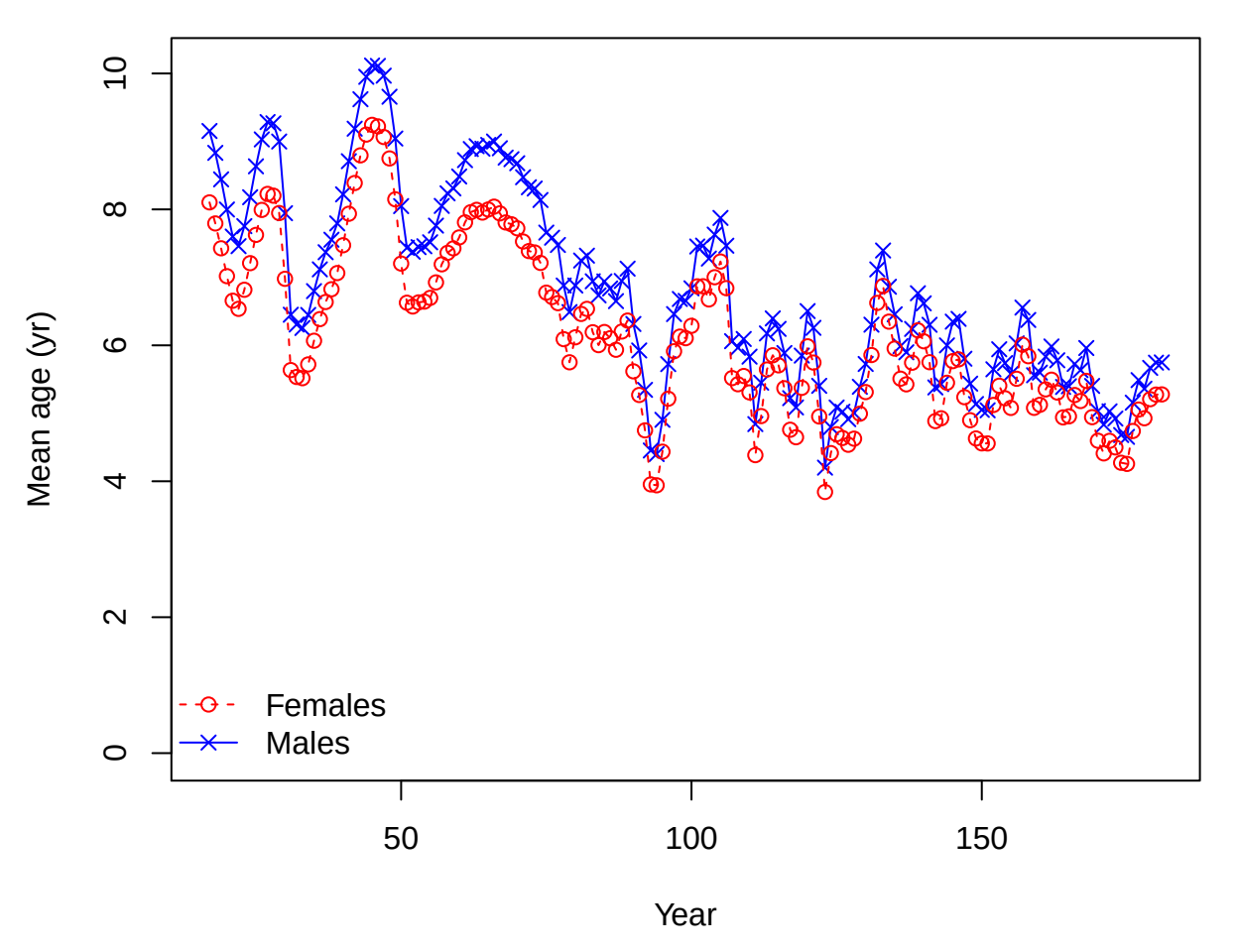

2
6
10
40
30
20
10
0
Age
16
27
38
49
60
71
82
93
106
120
134
148
162
176
Year

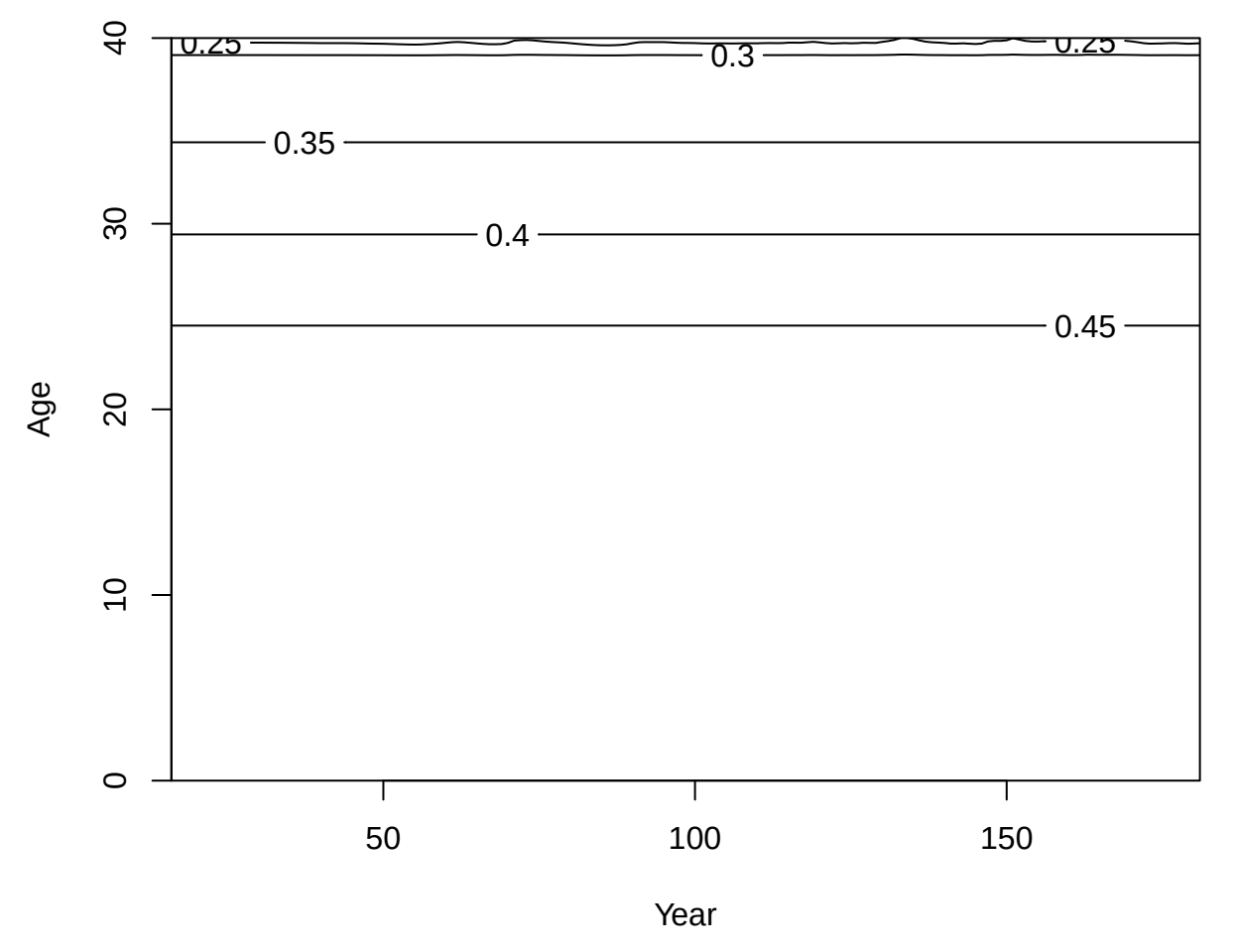

2
6
10
40
30
20
10
0
Age
16
27
38
49
60
71
82
93
106
120
134
148
162
176
Year

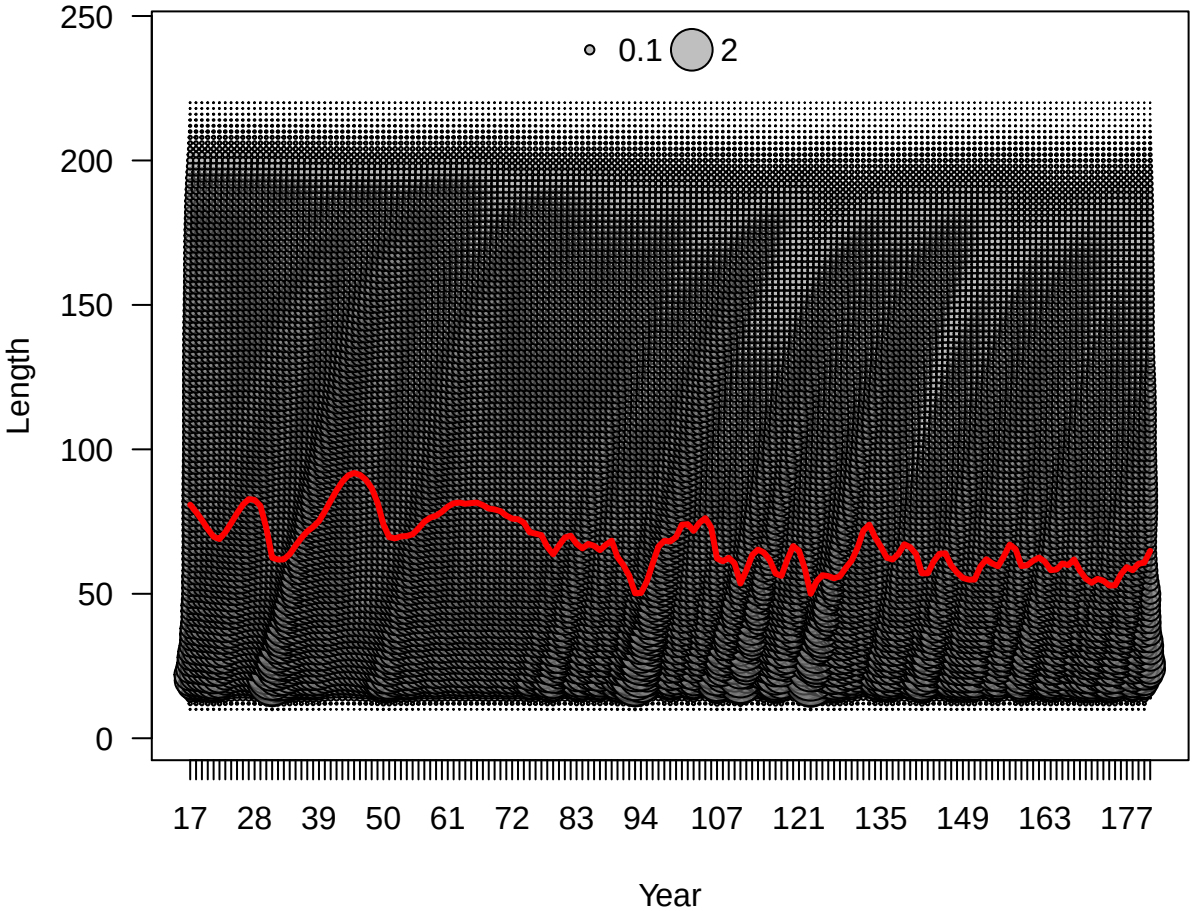

Mean age (yr)
0
2
4
6
8
10
50
100
150
Year
Females
Males

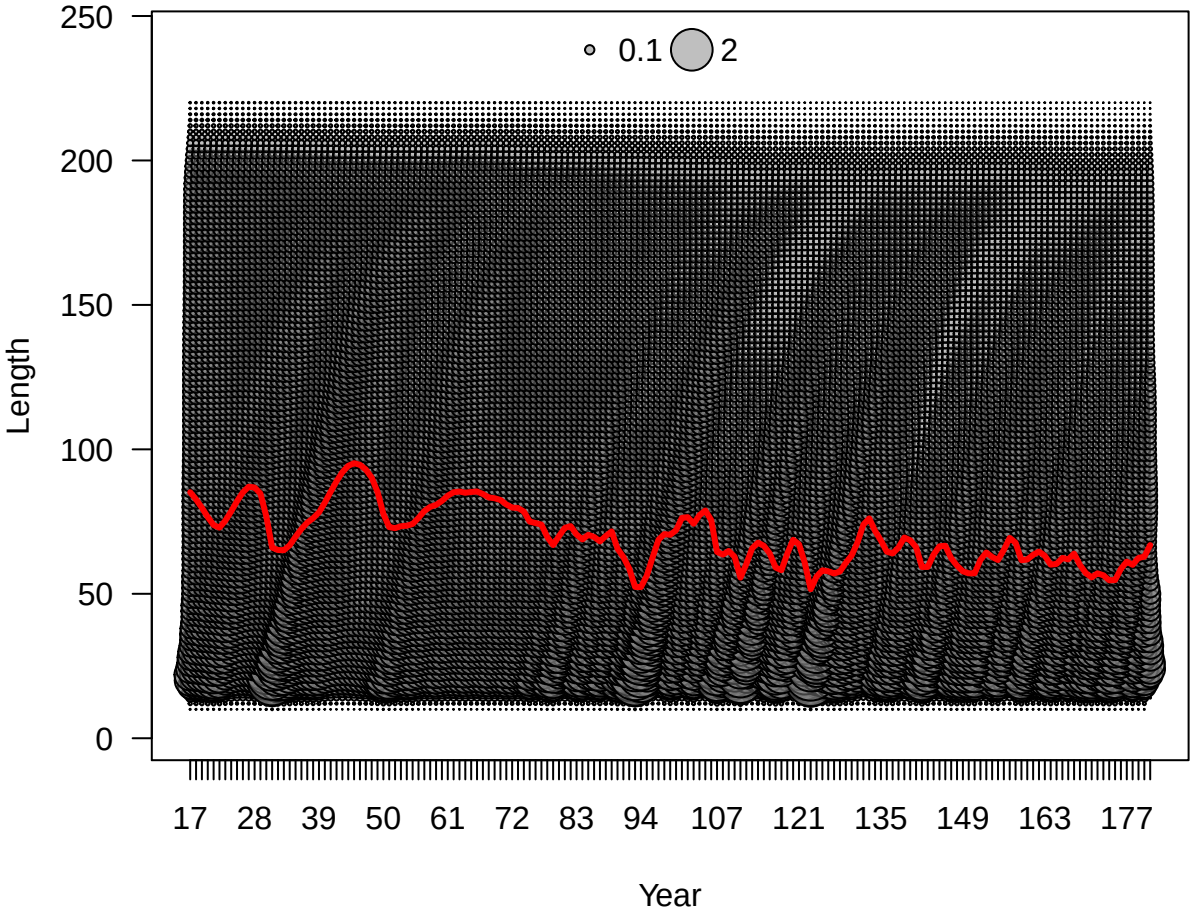

2
6
10
40
30
20
10
0
Age
16
27
38
49
60
71
82
93
106
120
134
148
162
176
Year

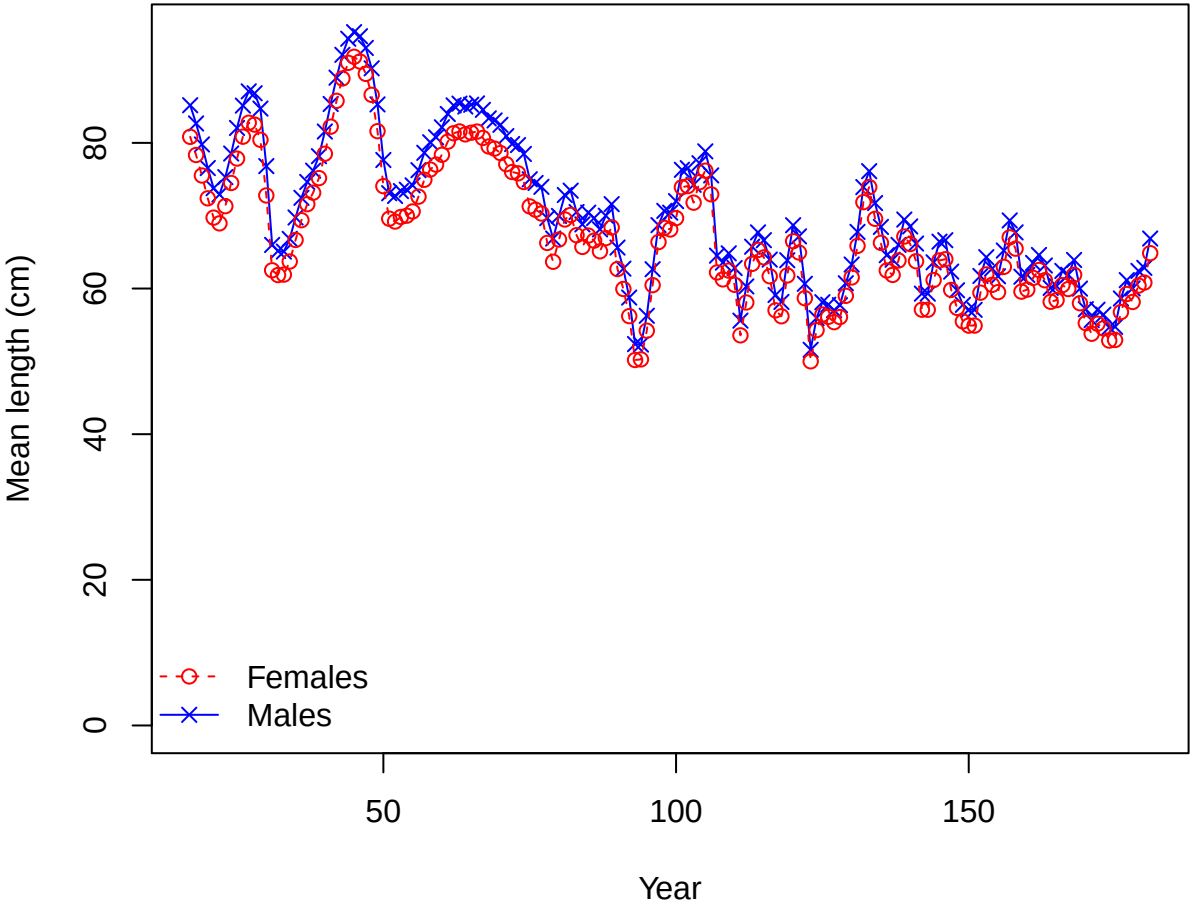

2
6
10
40
30
20
10
0
Age
16
27
38
49
60
71
82
93
106
120
134
148
162
176
Year

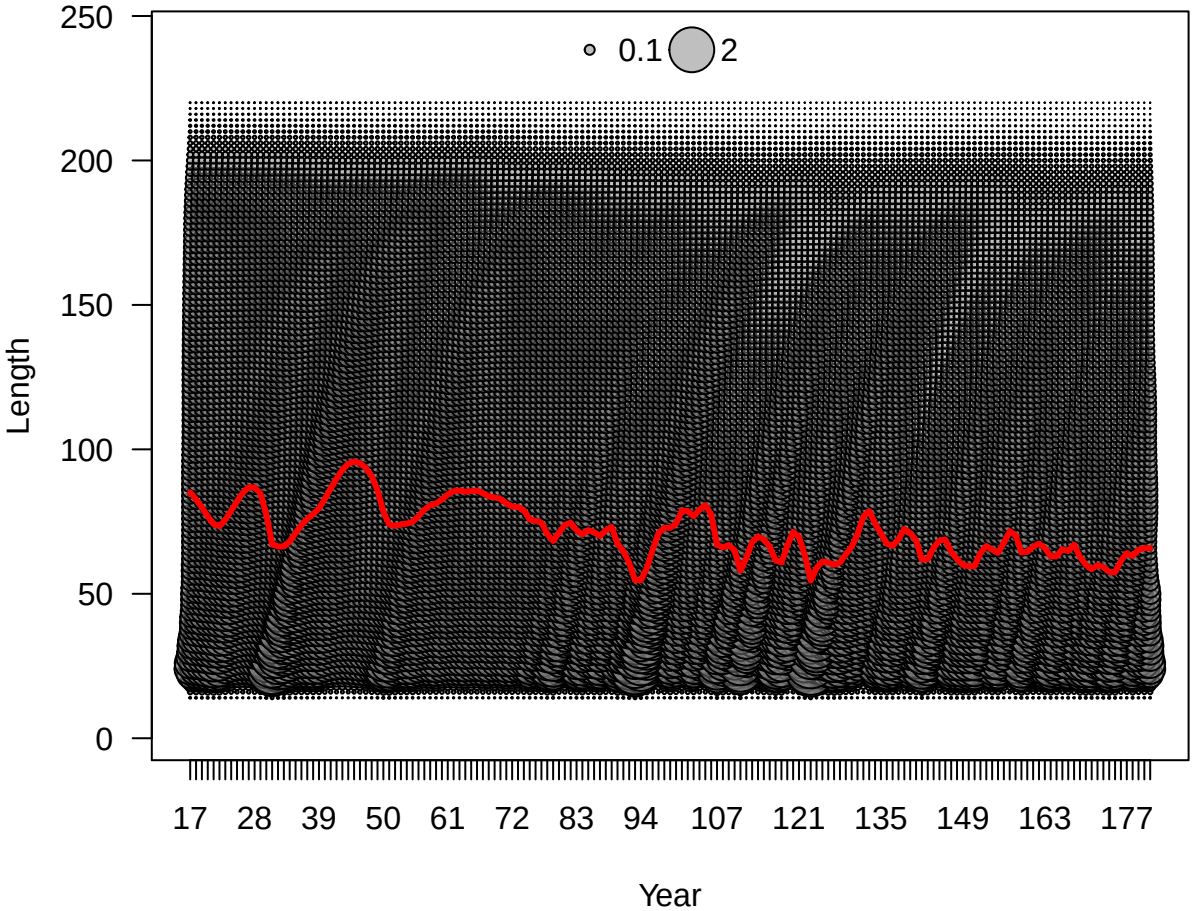

Mean age (yr)
0
2
4
6
8
10
50
100
150
Year
Females
Males

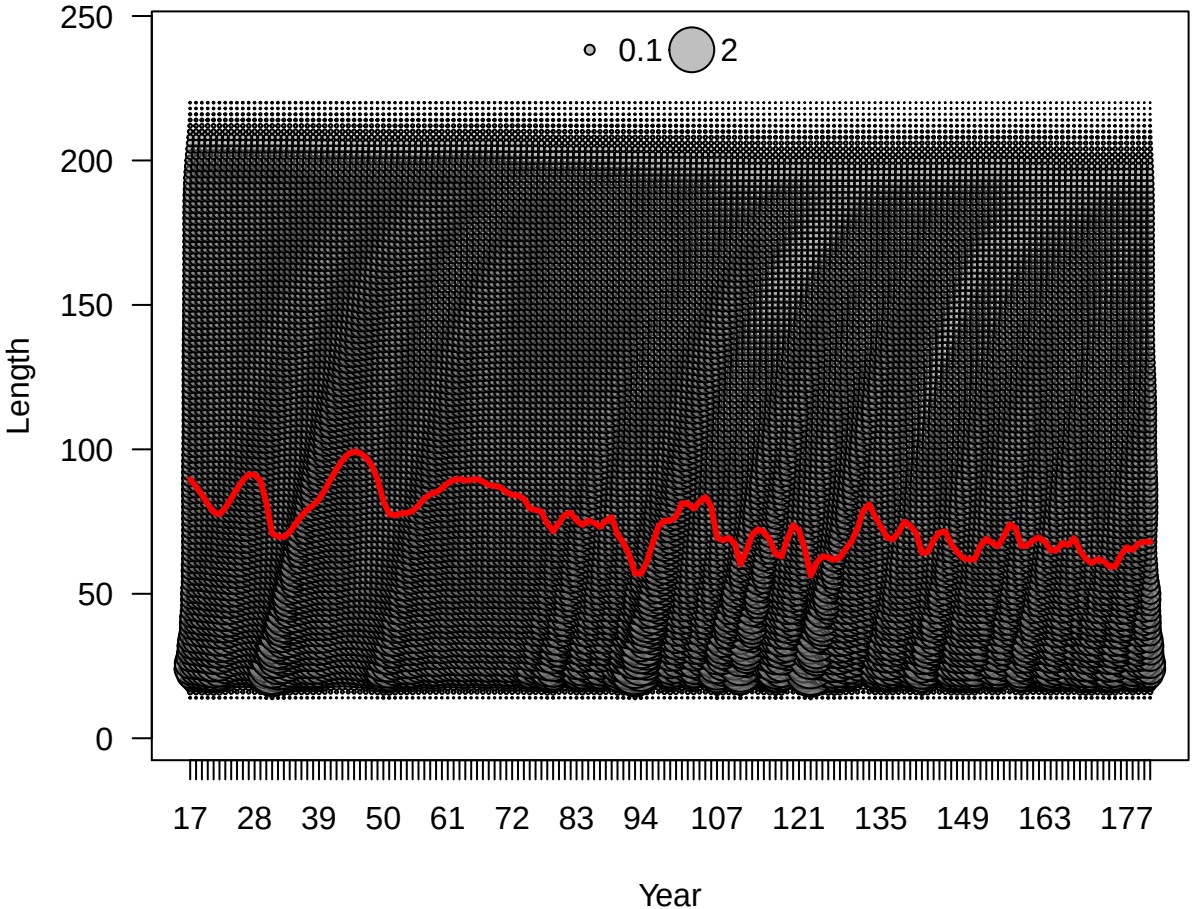

0.25
0.3
0.25
0.35
0.4
0.45
Age
0
10
20
30
40
50
100
150
Year

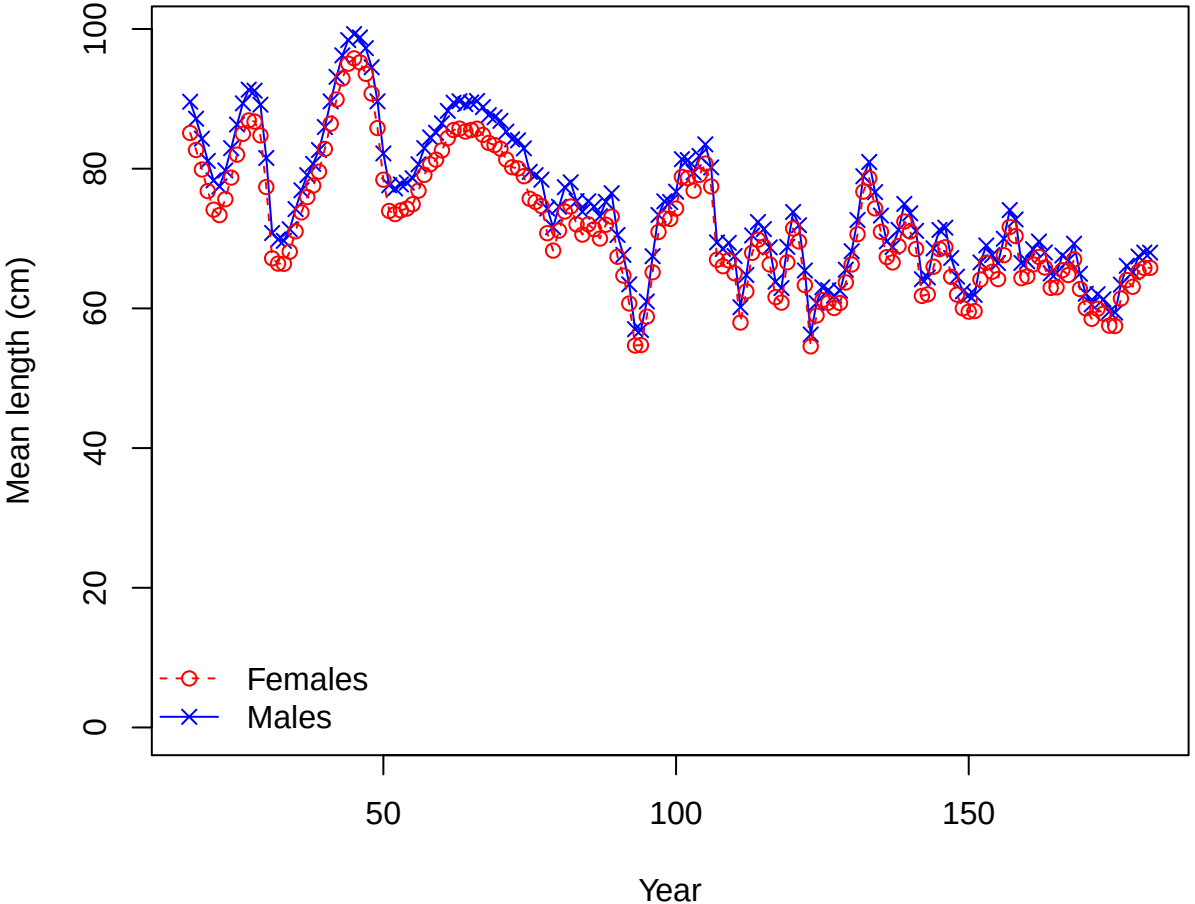

0.1
2
250
200
150
100
50
0
Length
17
28
39
50
61
72
83
94
107
121
135
149
163
177
Year

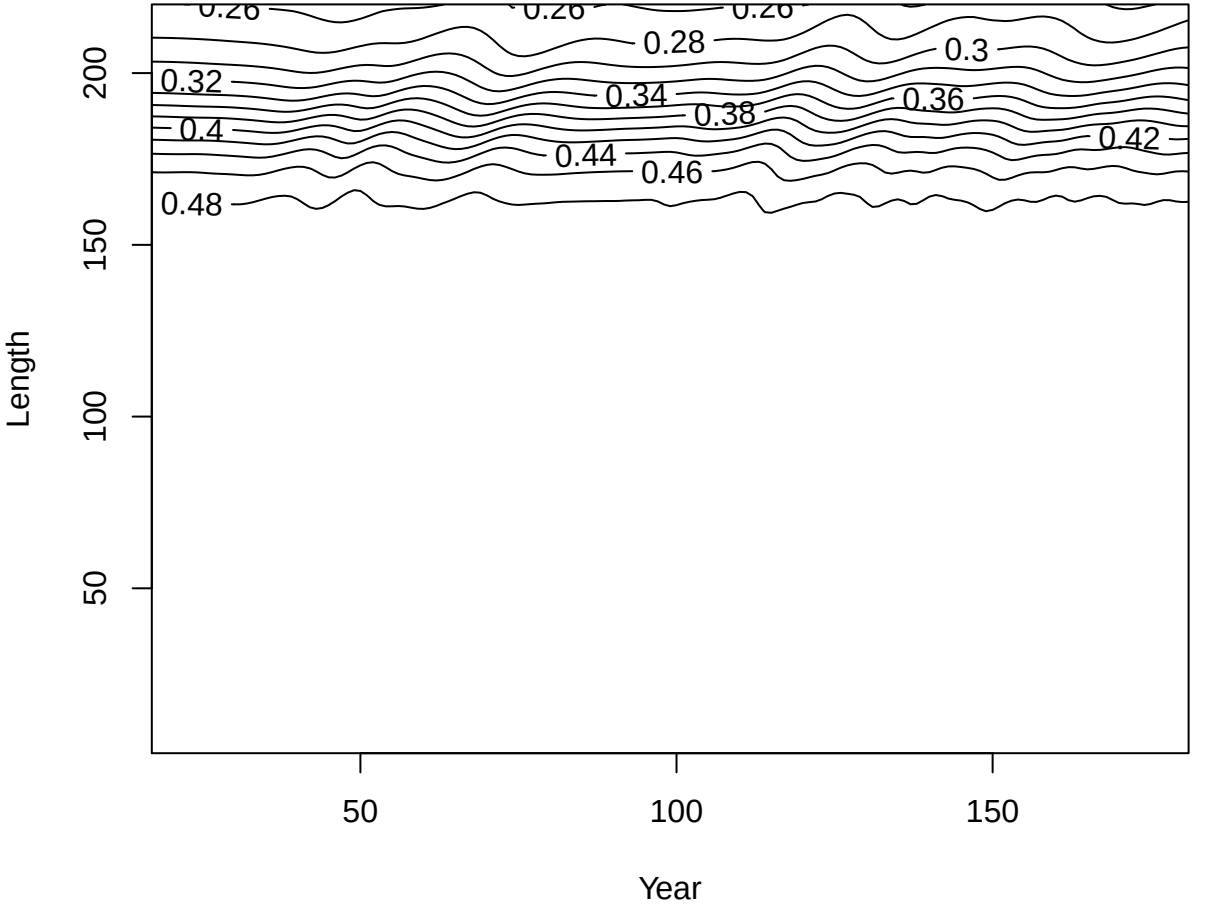

0.1
2
250
200
150
100
50
0
Length
17
28
39
50
61
72
83
94
107
121
135
149
163
177
Year

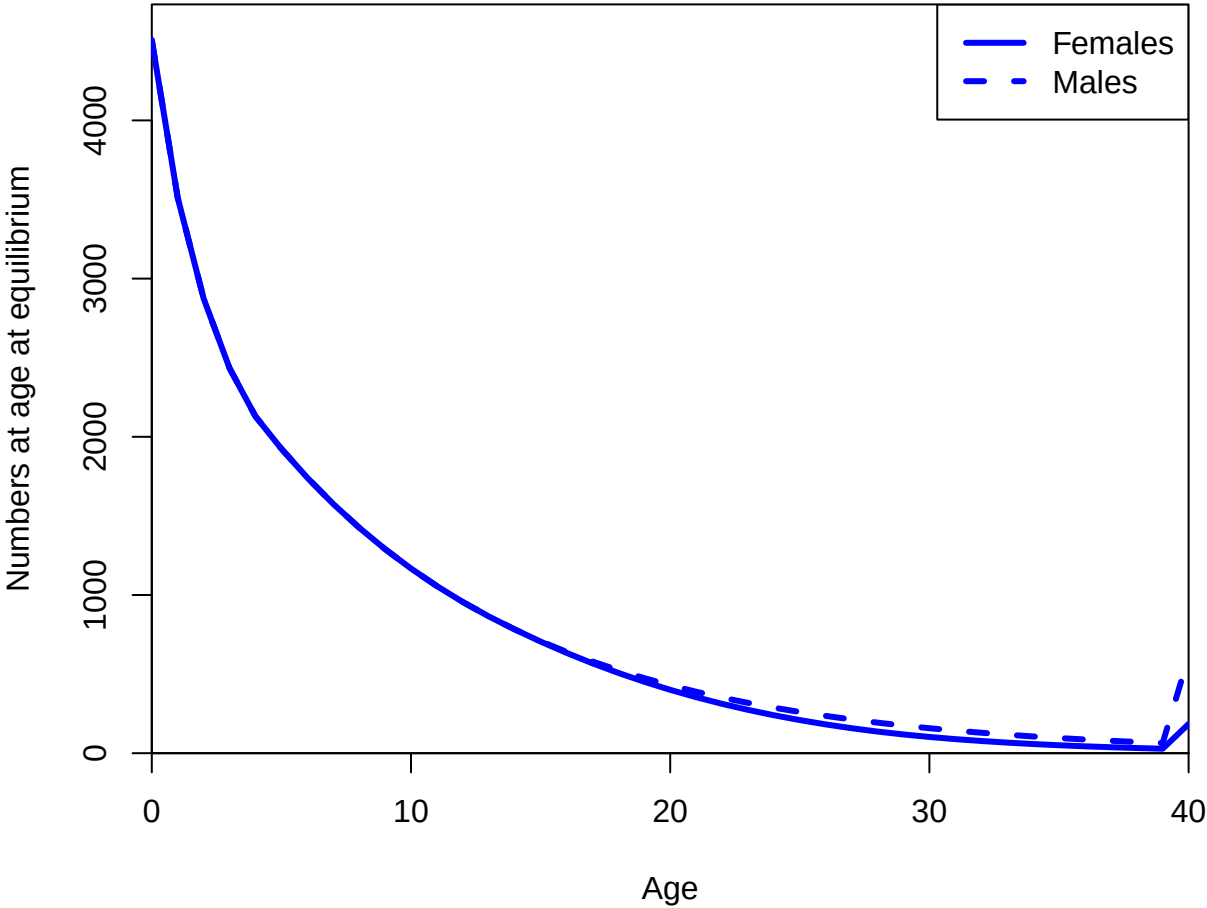

Mean length (cm)
0
20
40
60
80
50
100
150
Year
Females
Males

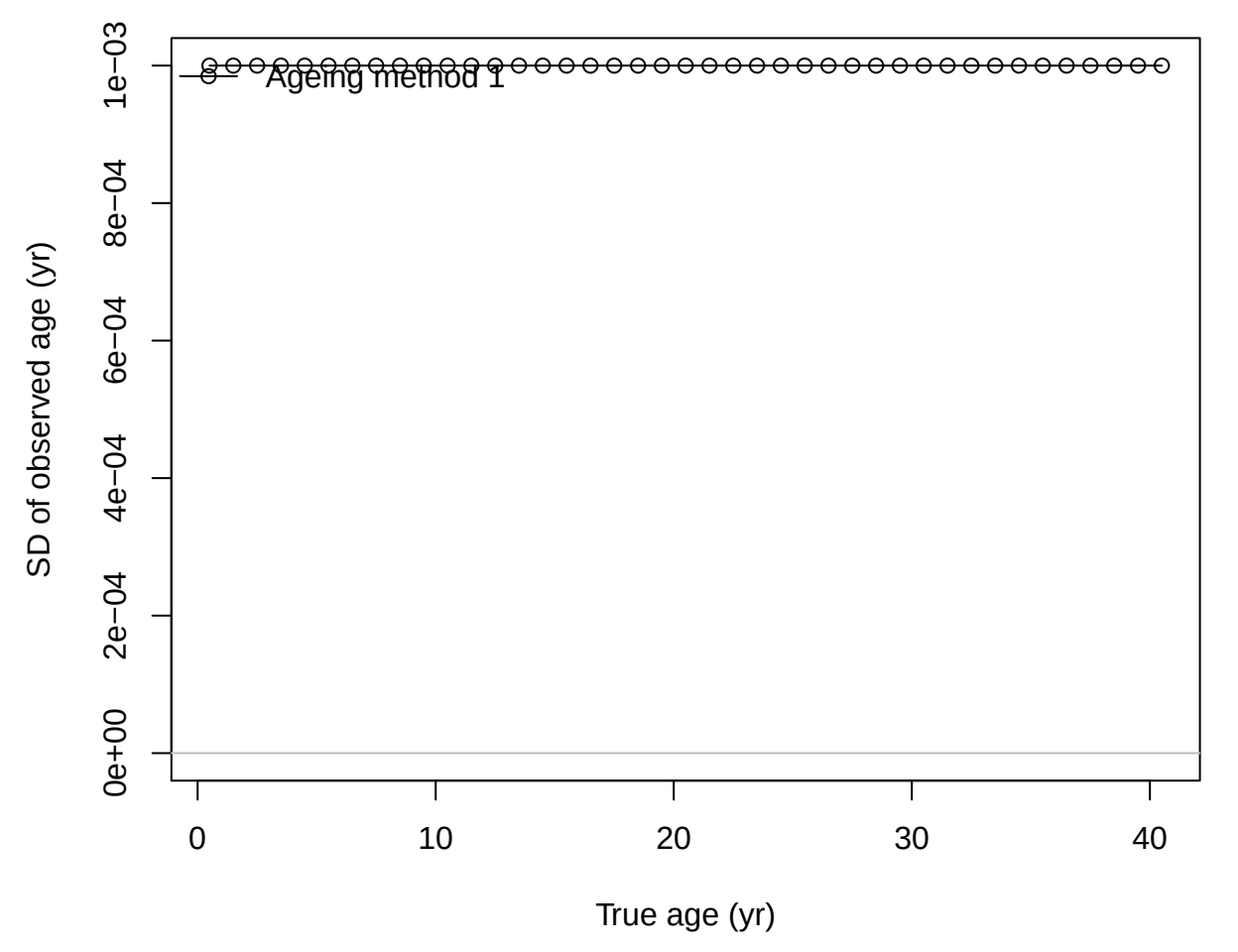

0.1
2
250
200
150
100
50
0
Length
17
28
39
50
61
72
83
94
107
121
135
149
163
177
Year

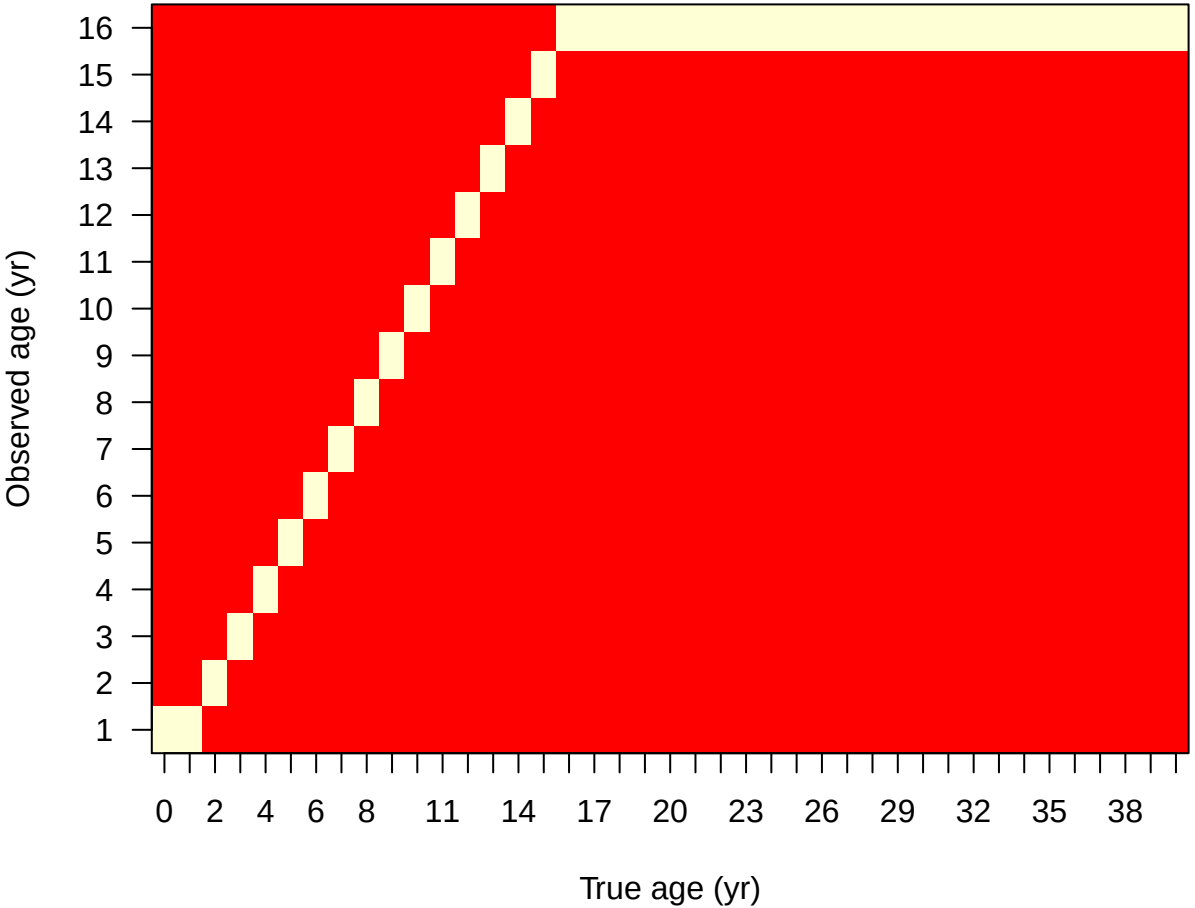

0.1
2
250
200
150
100
50
0
Length
17
28
39
50
61
72
83
94
107
121
135
149
163
177
Year

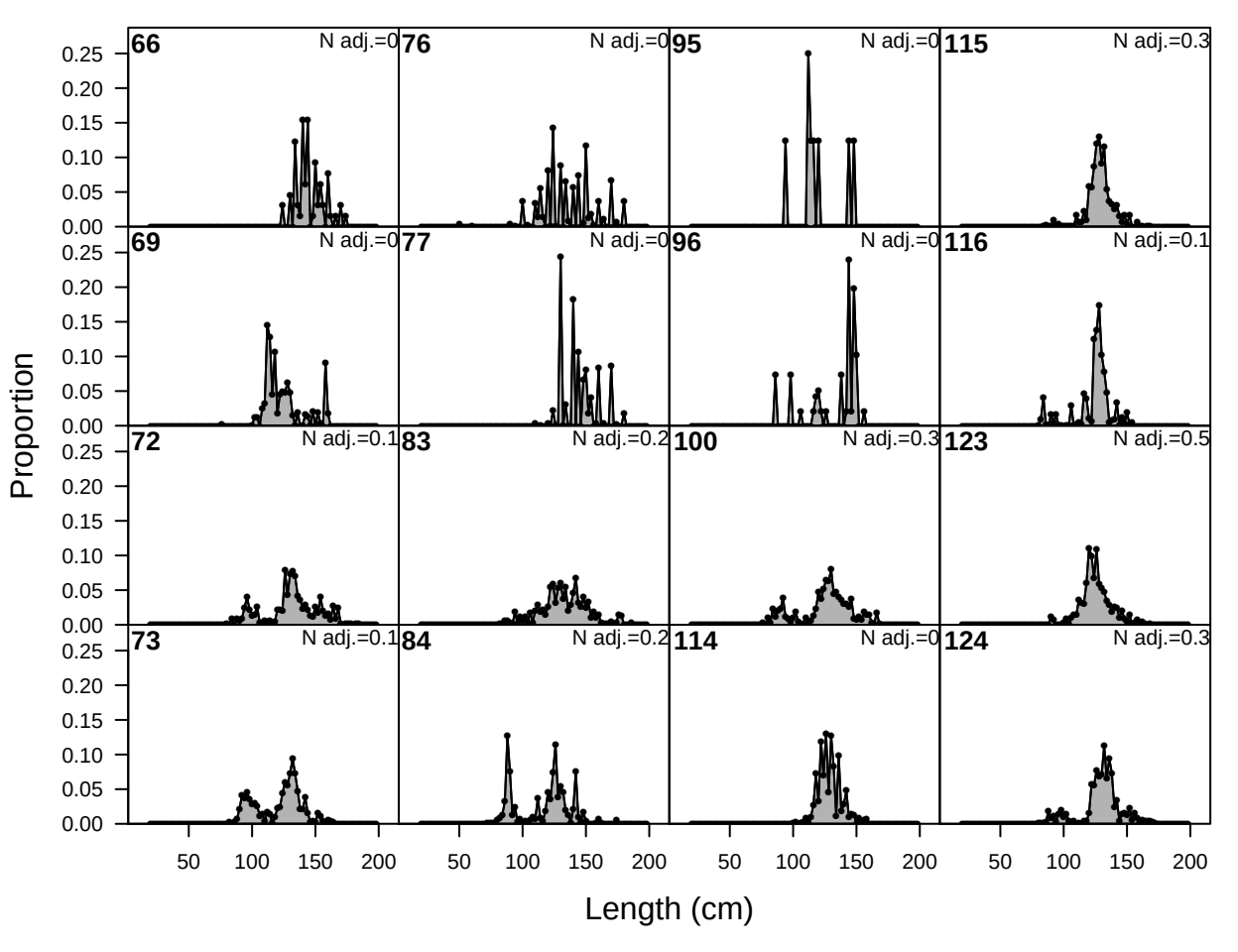

Mean length (cm)
0
20
40
60
80
100
50
100
150
Year
Females
Males

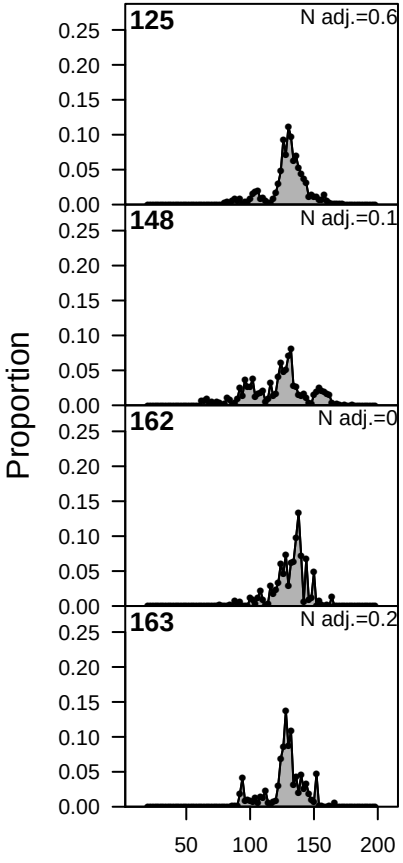

0.26
0.26
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42
0.44
0.46
0.48
Length
50
100
150
200
50
100
150
Year

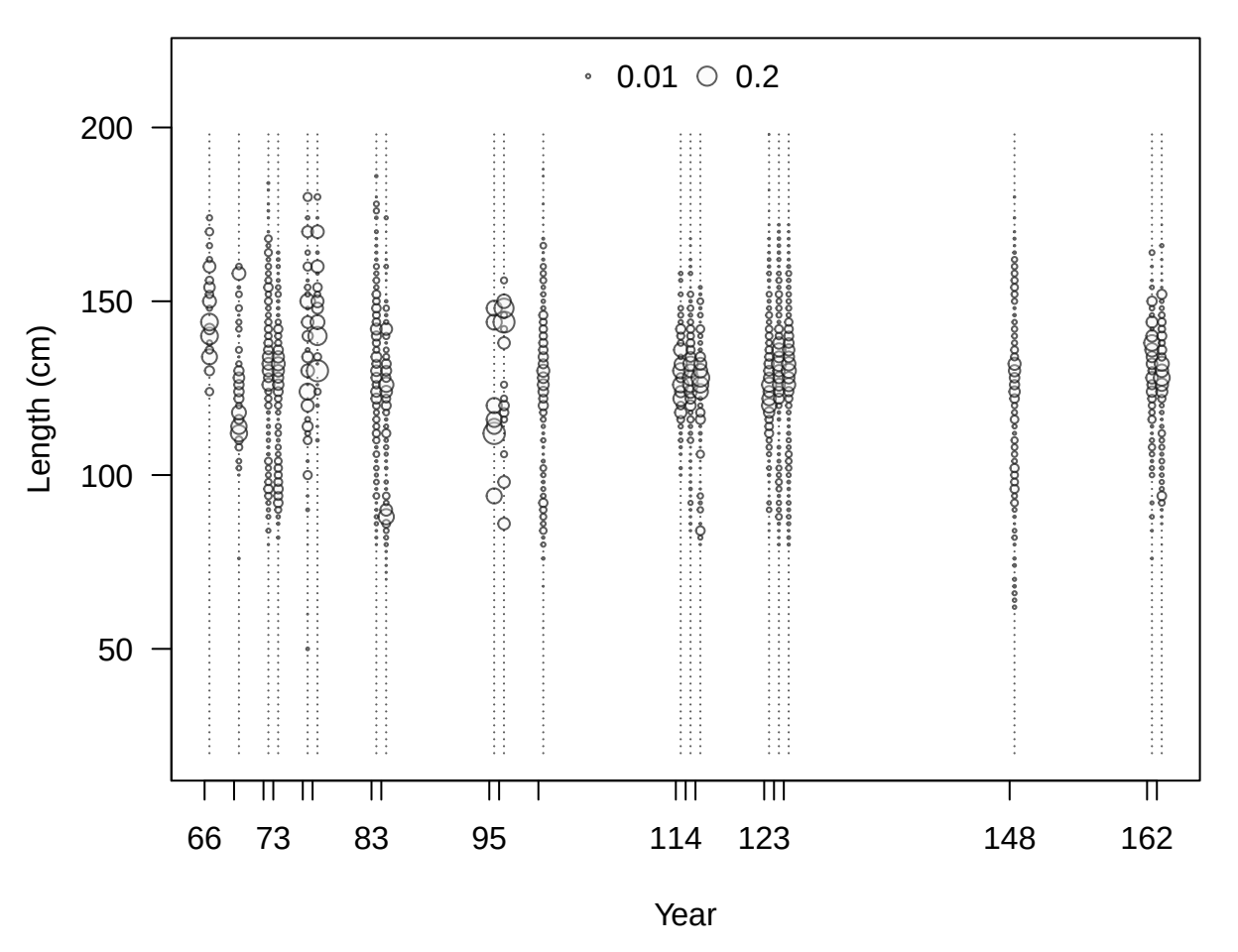

Females
Males
Numbers at age at equilibrium
0
1000
2000
3000
4000
0
10
20
30
40
Age

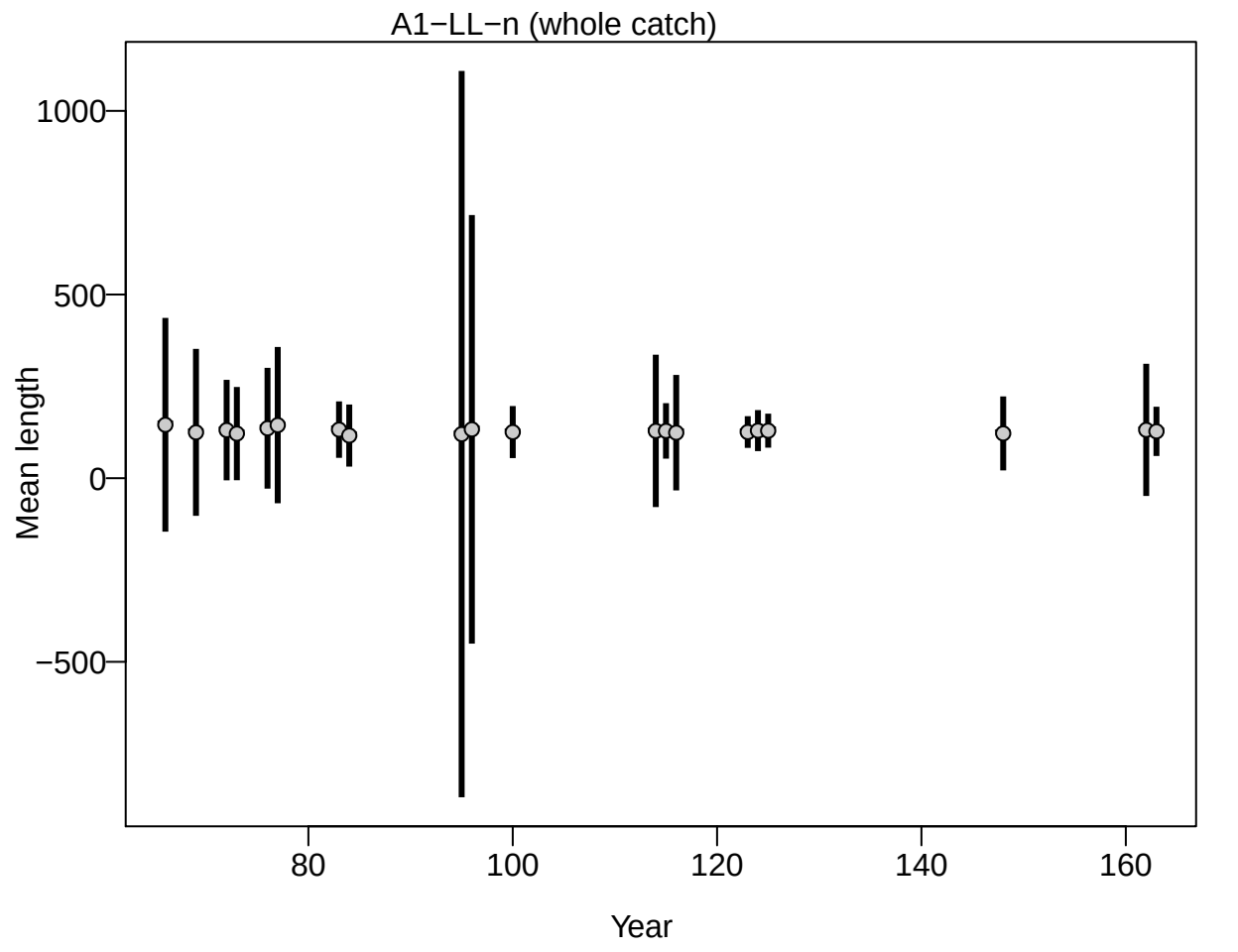

Ageing method 1
SD of observed age (yr)
0e+00
2e−04
4e−04
6e−04
8e−04
1e−03
0
10
20
30
40
True age (yr)

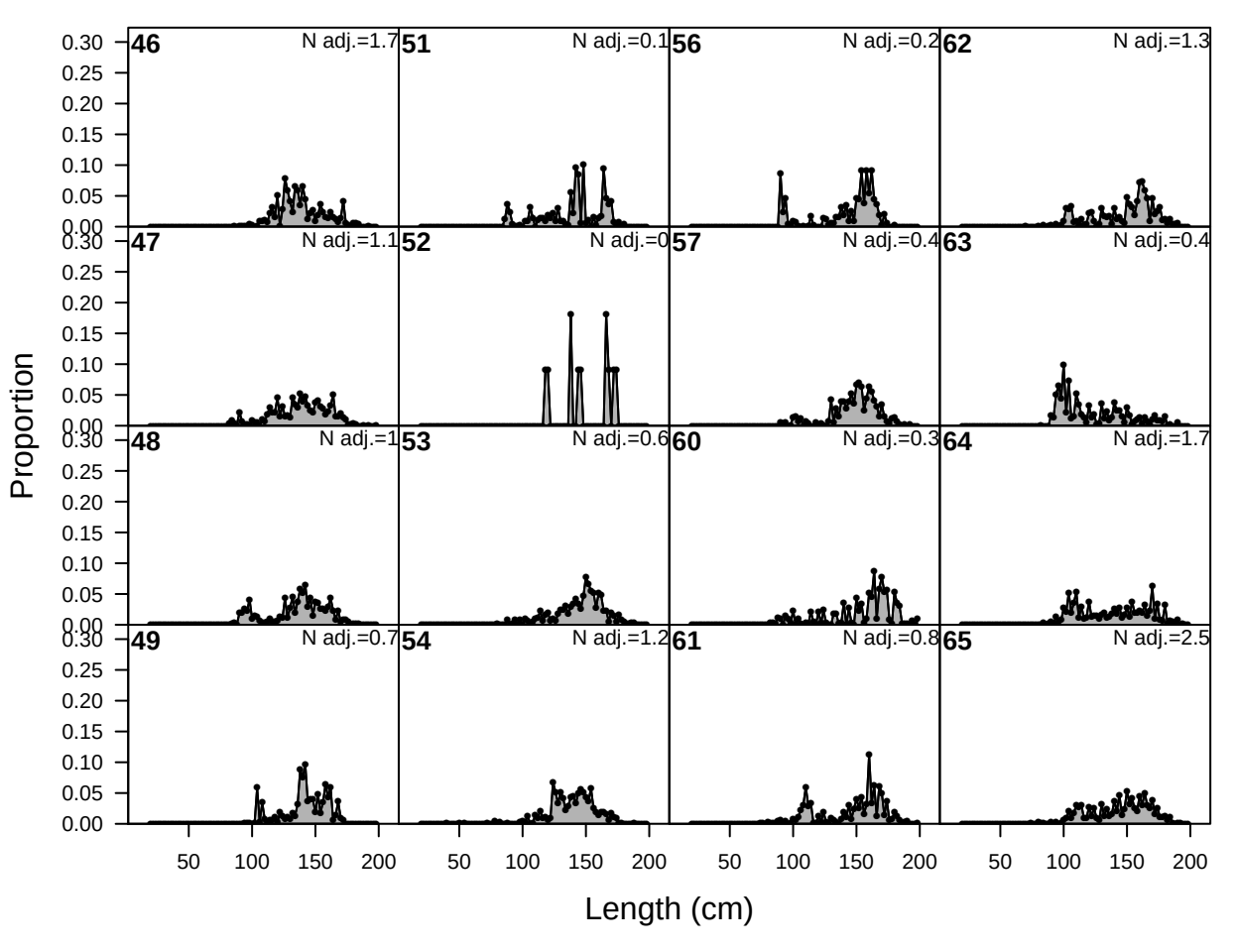

Observed age (yr)
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
2
4
6
8
11
14
17
20
23
26
29
32
35
38
True age (yr)

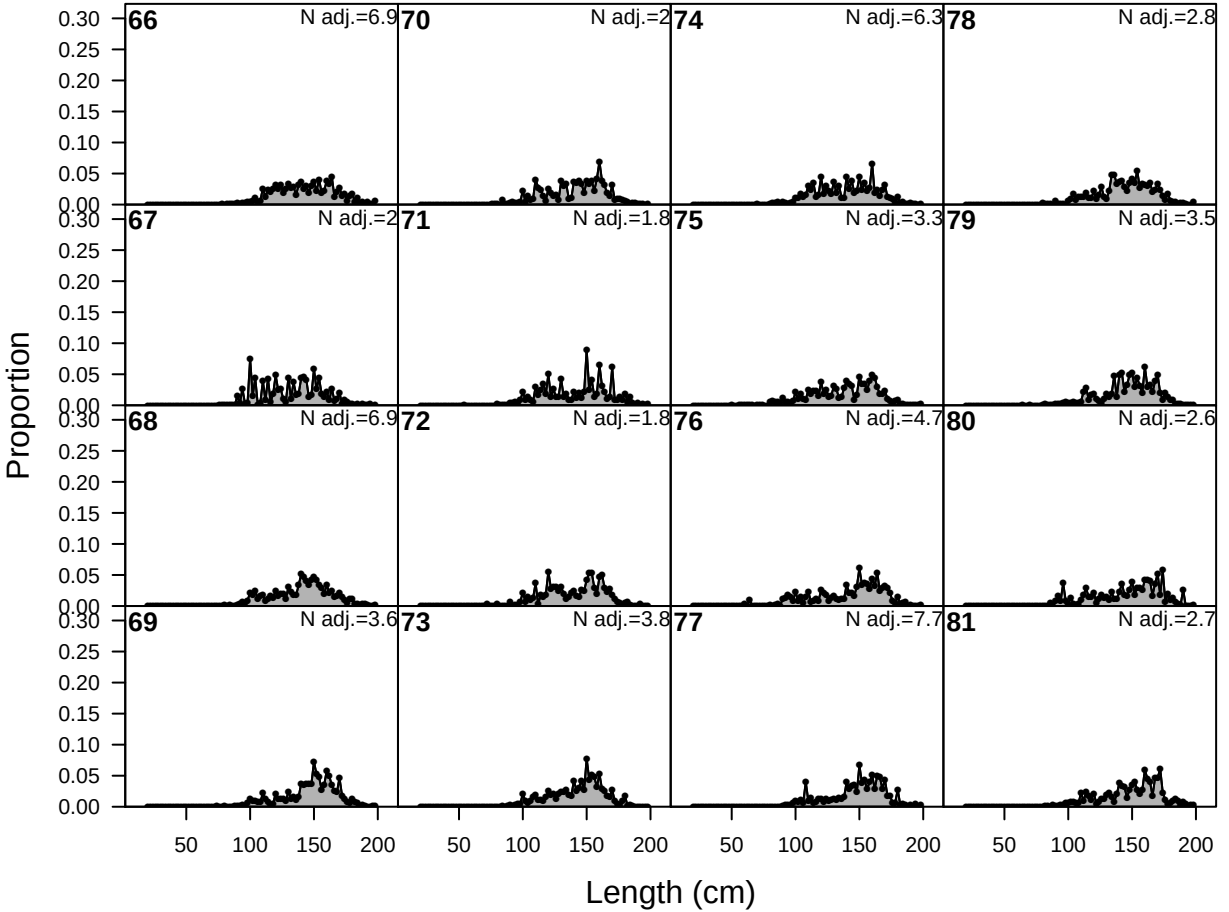

66
N adj.=0
76
N adj.=0
95
N adj.=0
115
N adj.=0.3
69
N adj.=0
77
N adj.=0
96
N adj.=0
116
N adj.=0.1
72
N adj.=0.1
83
N adj.=0.2
100
N adj.=0.3
123
N adj.=0.5
73
N adj.=0.1
84
N adj.=0.2
114
N adj.=0
124
N adj.=0.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

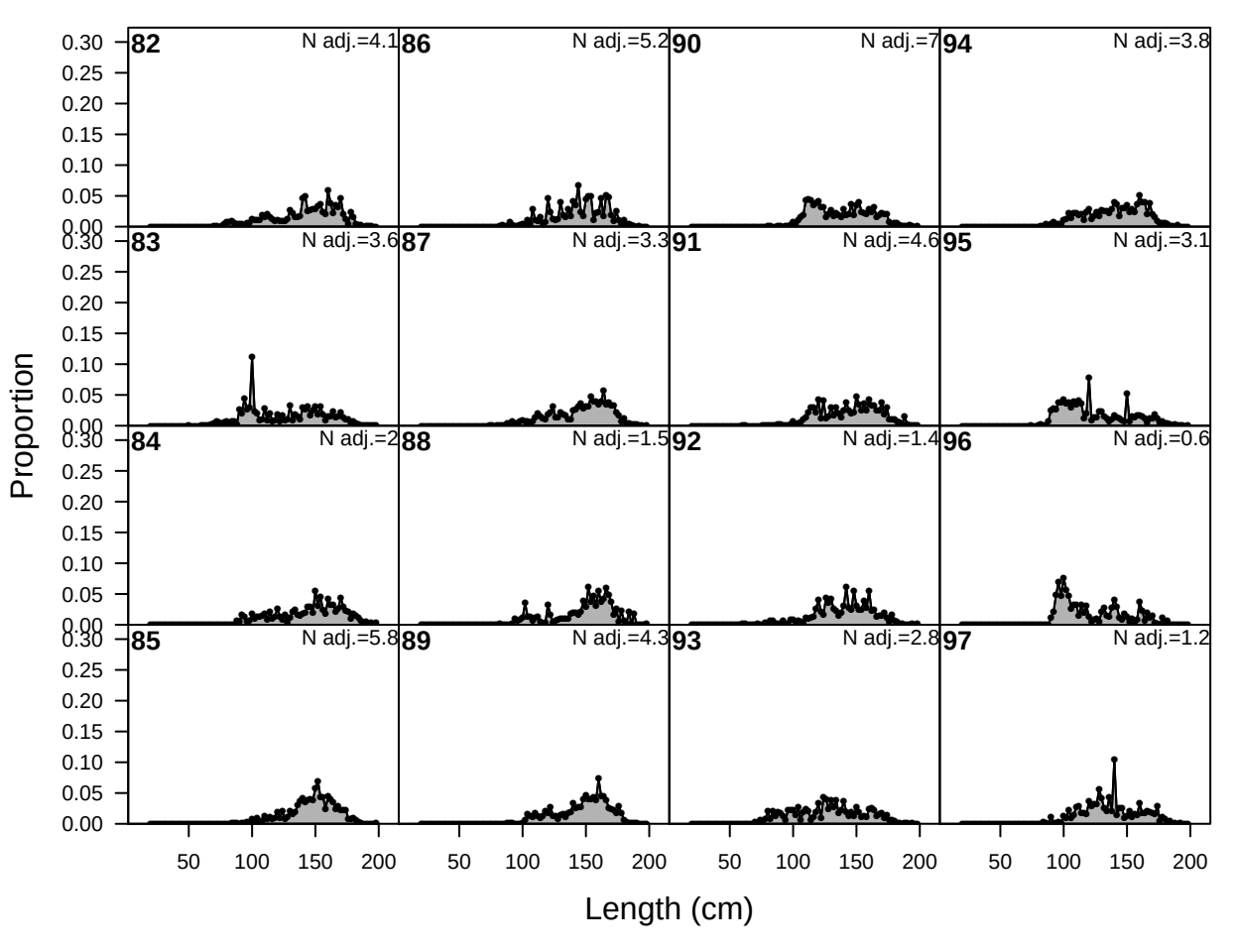

125
N adj.=0.6
148
N adj.=0.1
162
N adj.=0
163
N adj.=0.2
0.25
0.20
0.15
0.10
0.05
0.00
Proportion
50
100
150
200
Length (cm)

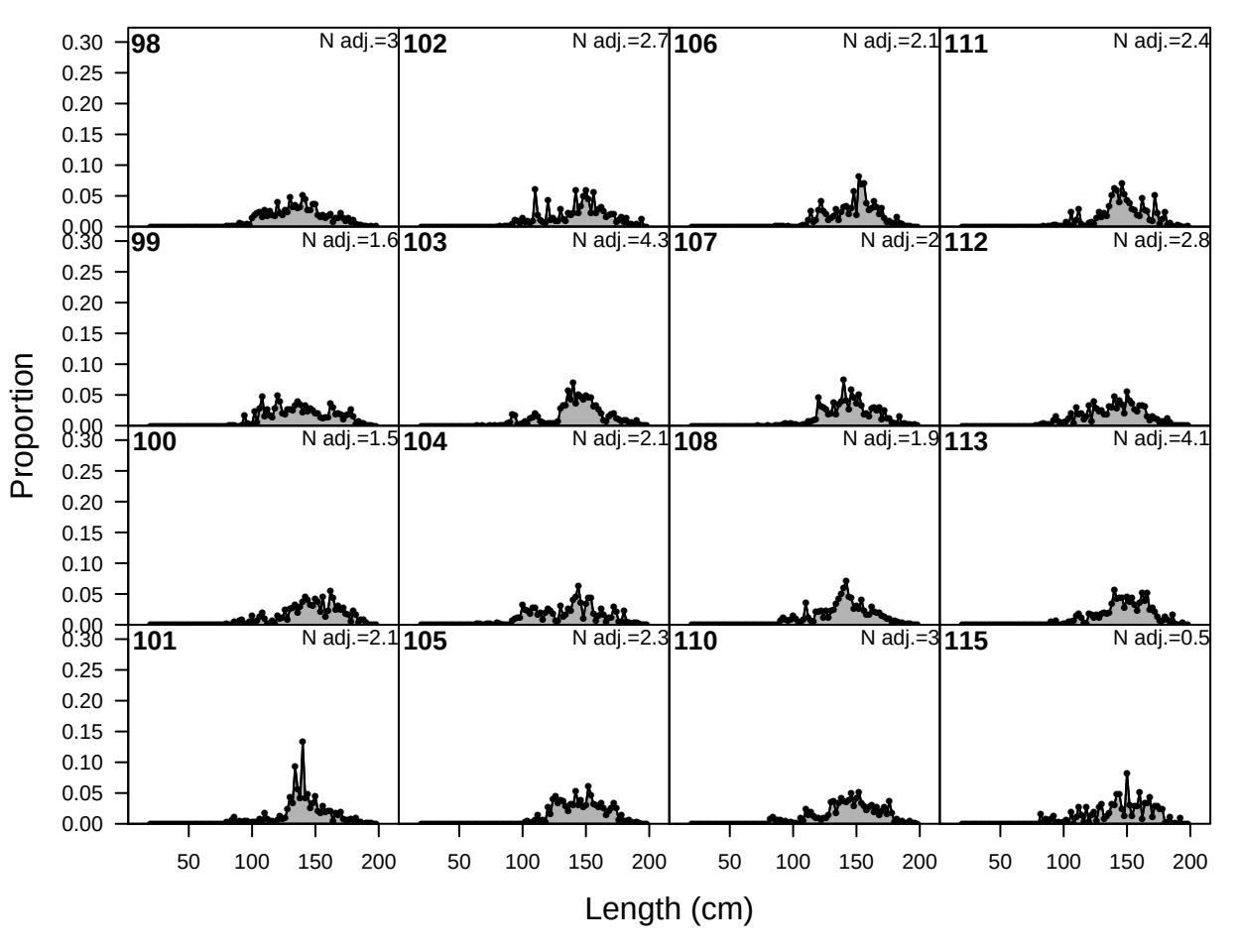

0.01
0.2
200
150
100
50
Length (cm)
66
73
83
95
114
123
148
162
Year

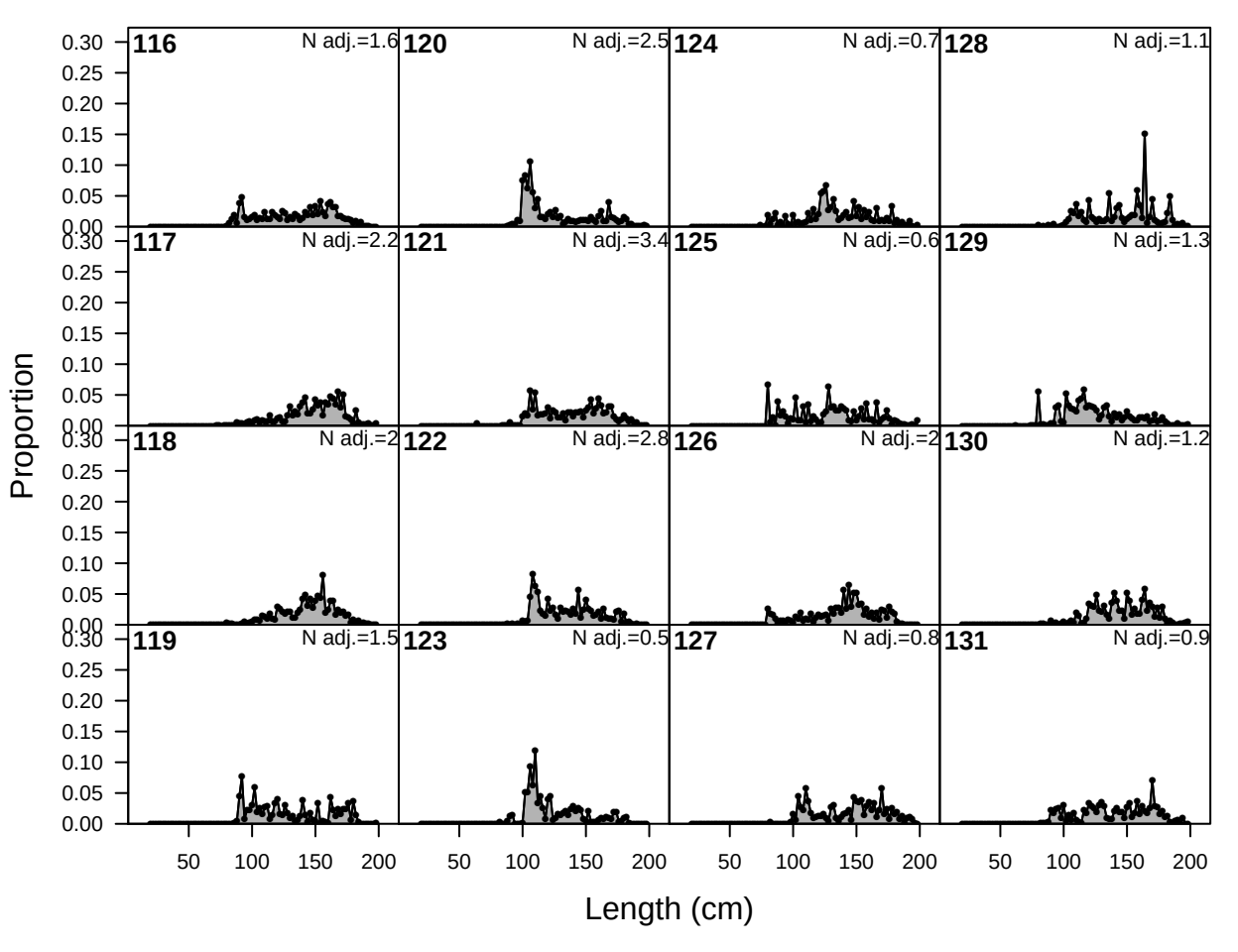

A1−LL−n (whole catch)
1000
500
0
−500
Mean length
80
100
120
140
160
Year


46
N adj.=1.7
51
N adj.=0.1
56
N adj.=0.2
62
N adj.=1.3
47
N adj.=1.1
52
N adj.=0
57
N adj.=0.4
63
N adj.=0.4
48
N adj.=1
53
N adj.=0.6
60
N adj.=0.3
64
N adj.=1.7
49
N adj.=0.7
54
N adj.=1.2
61
N adj.=0.8
65
N adj.=2.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


66
N adj.=6.9
70
N adj.=2
74
N adj.=6.3
78
N adj.=2.8
67
N adj.=2
71
N adj.=1.8
75
N adj.=3.3
79
N adj.=3.5
68
N adj.=6.9
72
N adj.=1.8
76
N adj.=4.7
80
N adj.=2.6
69
N adj.=3.6
73
N adj.=3.8
77
N adj.=7.7
81
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)


82
N adj.=4.1
86
N adj.=5.2
90
N adj.=7
94
N adj.=3.8
83
N adj.=3.6
87
N adj.=3.3
91
N adj.=4.6
95
N adj.=3.1
84
N adj.=2
88
N adj.=1.5
92
N adj.=1.4
96
N adj.=0.6
85
N adj.=5.8
89
N adj.=4.3
93
N adj.=2.8
97
N adj.=1.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


98
N adj.=3
102
N adj.=2.7
106
N adj.=2.1
111
N adj.=2.4
99
N adj.=1.6
103
N adj.=4.3
107
N adj.=2
112
N adj.=2.8
100
N adj.=1.5
104
N adj.=2.1
108
N adj.=1.9
113
N adj.=4.1
101
N adj.=2.1
105
N adj.=2.3
110
N adj.=3
115
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)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N adj.=3.4
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N adj.=0.6
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N adj.=1.3
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N adj.=2
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N adj.=2.8
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N adj.=2
130
N adj.=1.2
119
N adj.=1.5
123
N adj.=0.5
127
N adj.=0.8
131
N adj.=0.9
Proportion
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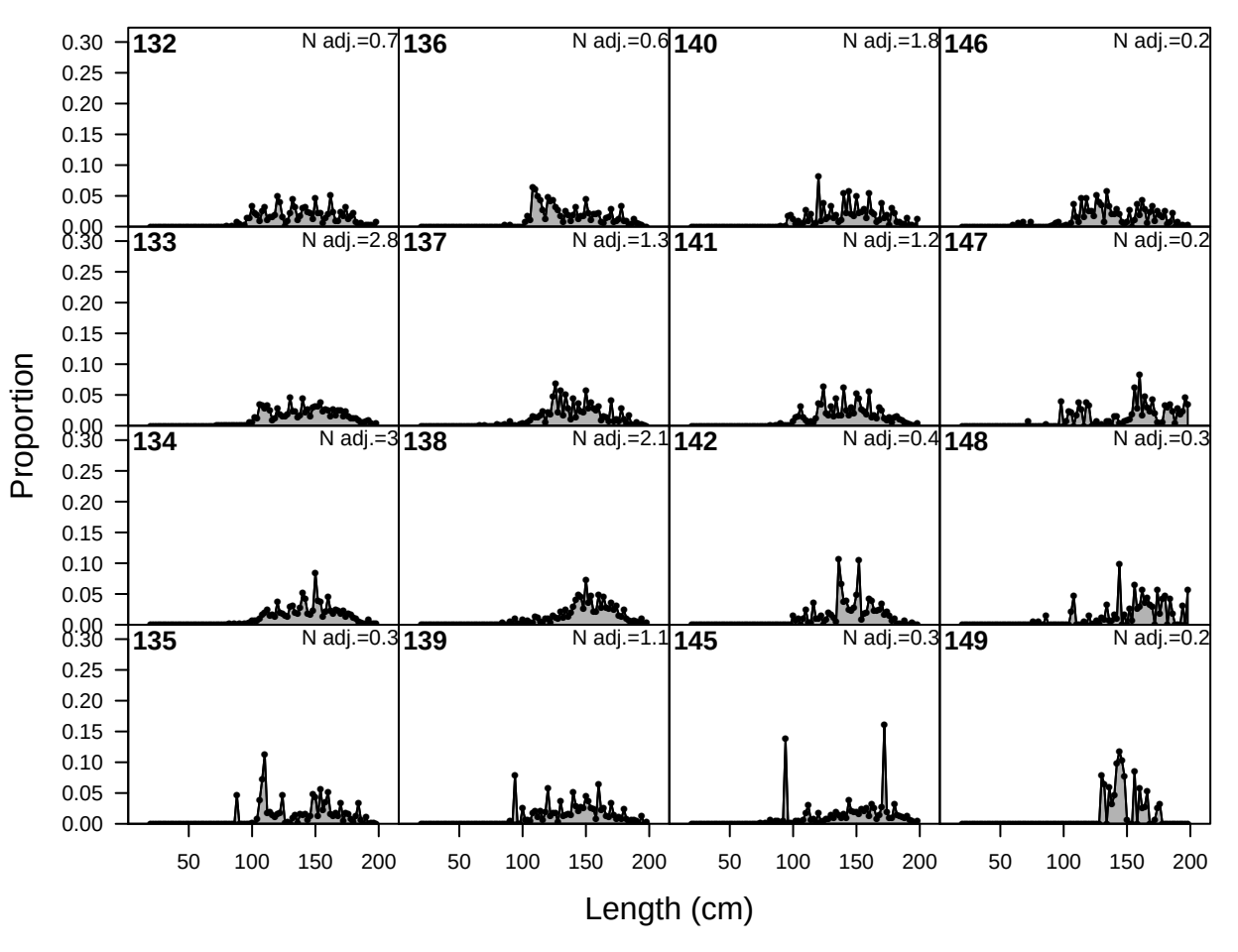
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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141
N adj.=1.2
147
N adj.=0.2
134
N adj.=3
138
N adj.=2.1
142
N adj.=0.4
148
N adj.=0.3
135
N adj.=0.3
139
N adj.=1.1
145
N adj.=0.3
149
N adj.=0.2
Proportion
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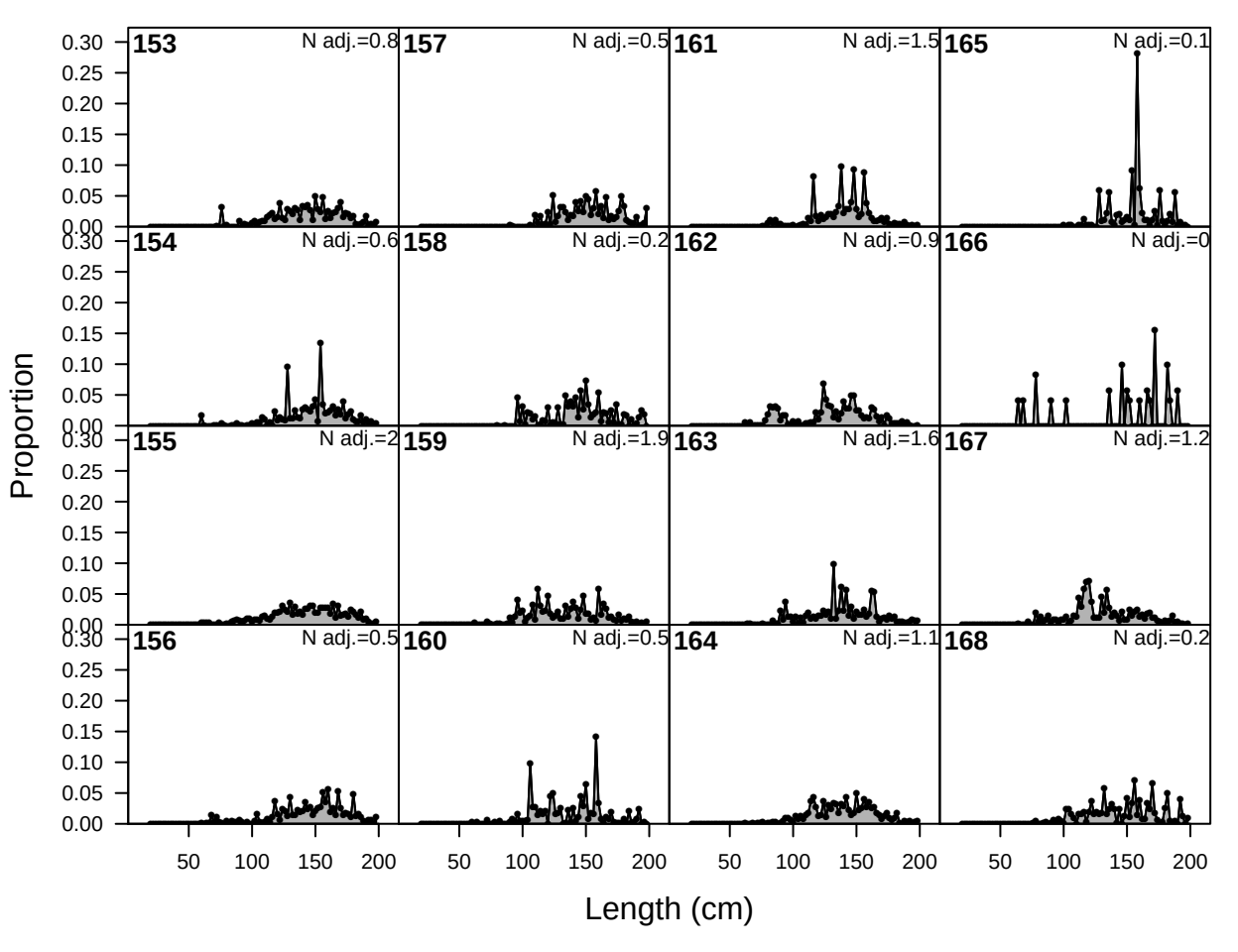
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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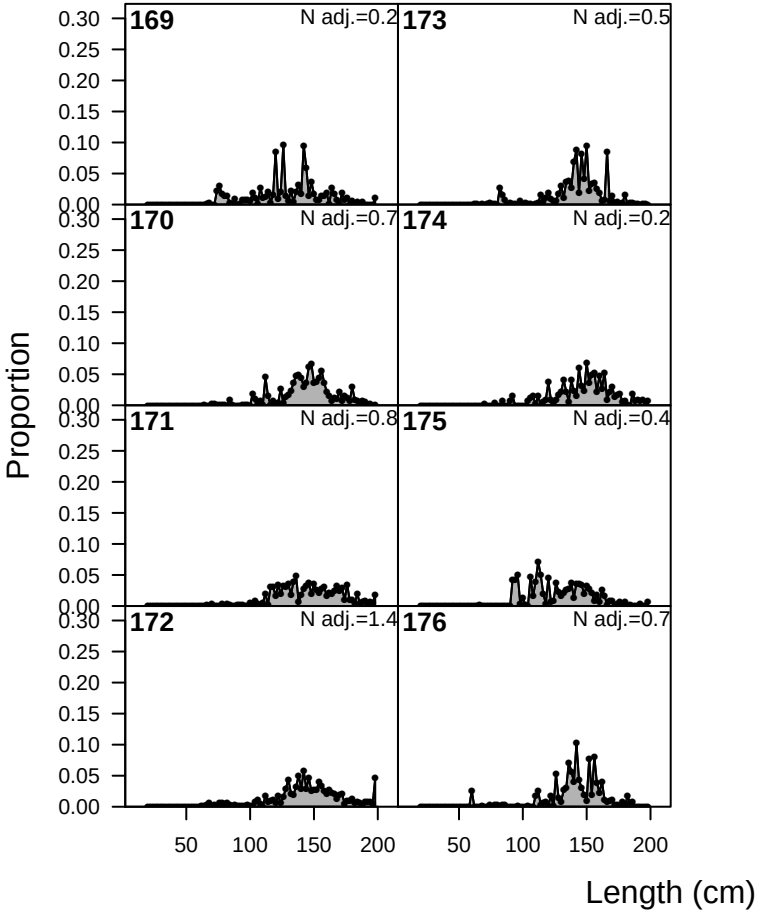
N adj.=0.2
162
N adj.=0.9
166
N adj.=0
155
N adj.=2
159
N adj.=1.9
163
N adj.=1.6
167
N adj.=1.2
156
N adj.=0.5
160
N adj.=0.5
164
N adj.=1.1
168
N adj.=0.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


169
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N adj.=0.5
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N adj.=0.7
174
N adj.=0.2
171
N adj.=0.8
175
N adj.=0.4
172
N adj.=1.4
176
N adj.=0.7
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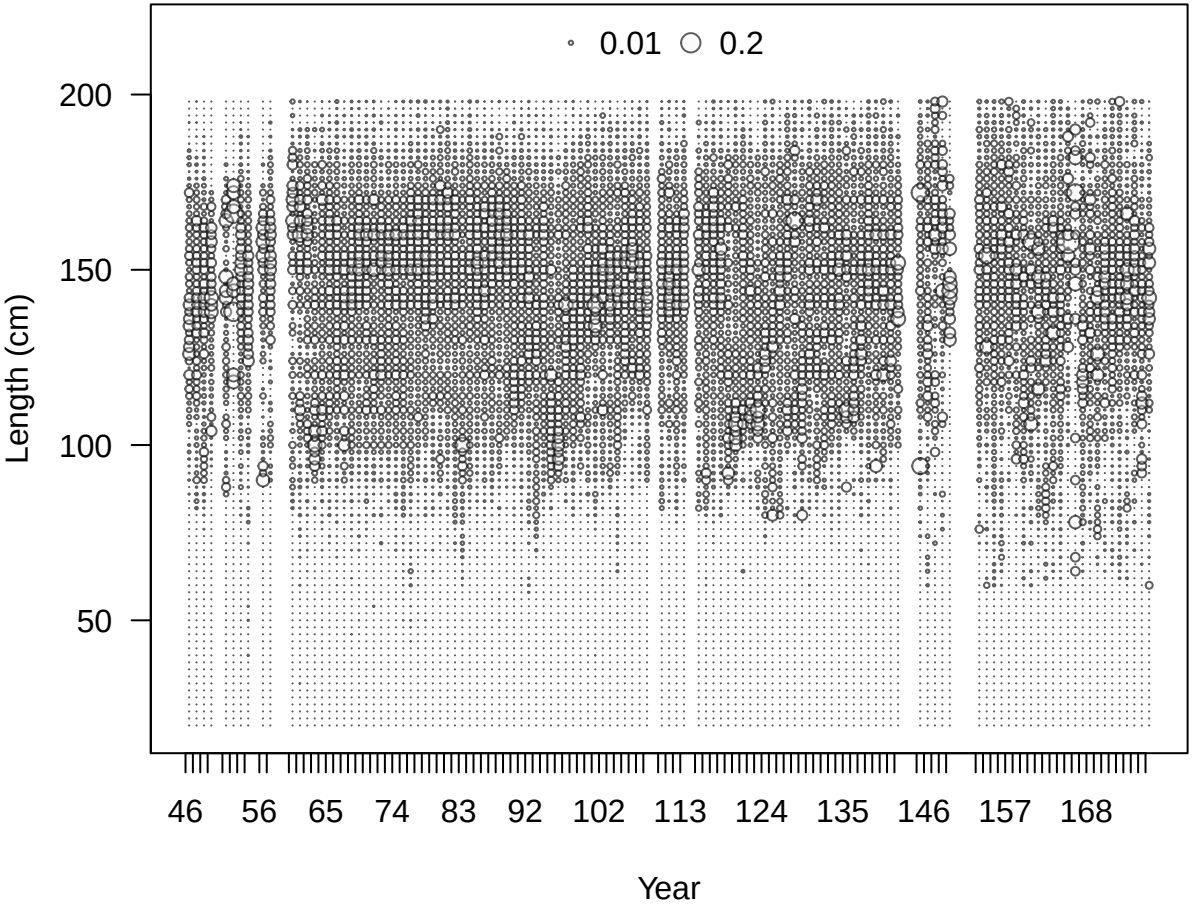
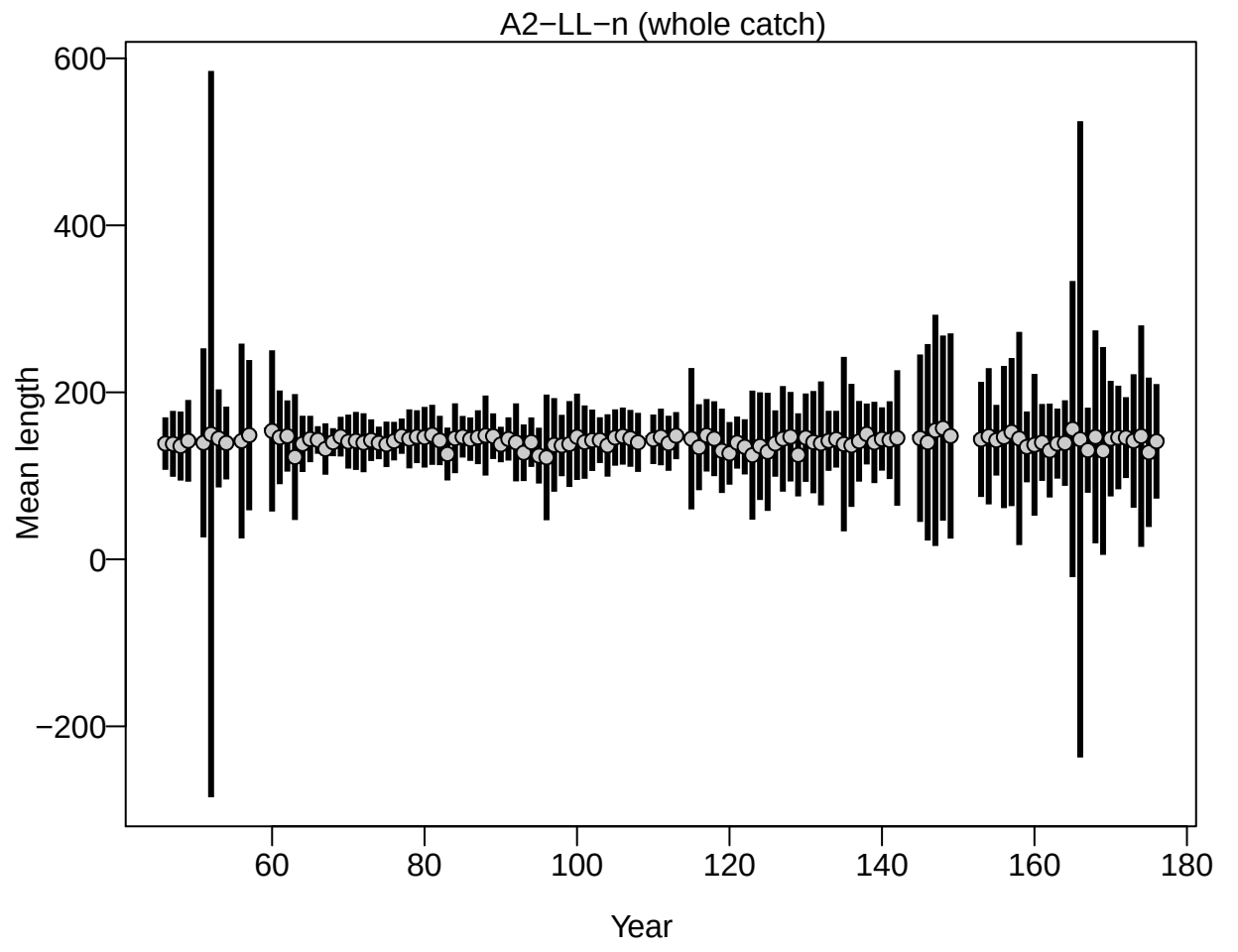
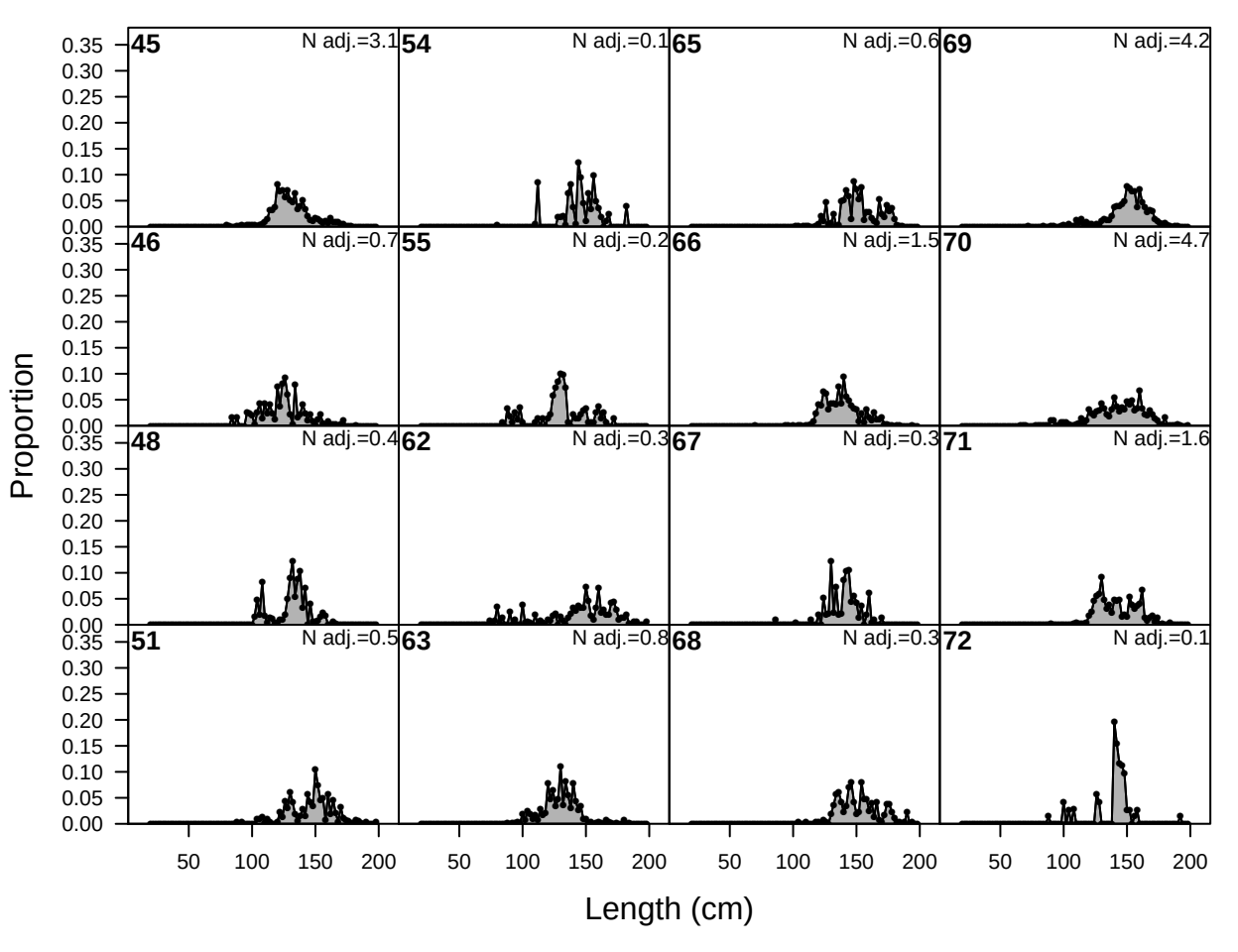
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)


0.01
0.2
200
150
100
50
Length (cm)
46
56
65
74
83
92
102
113
124
135
146
157
168
Year


A2−LL−n (whole catch)
600
400
200
0
−200
Mean length
60
80
100
120
140
160
180
Year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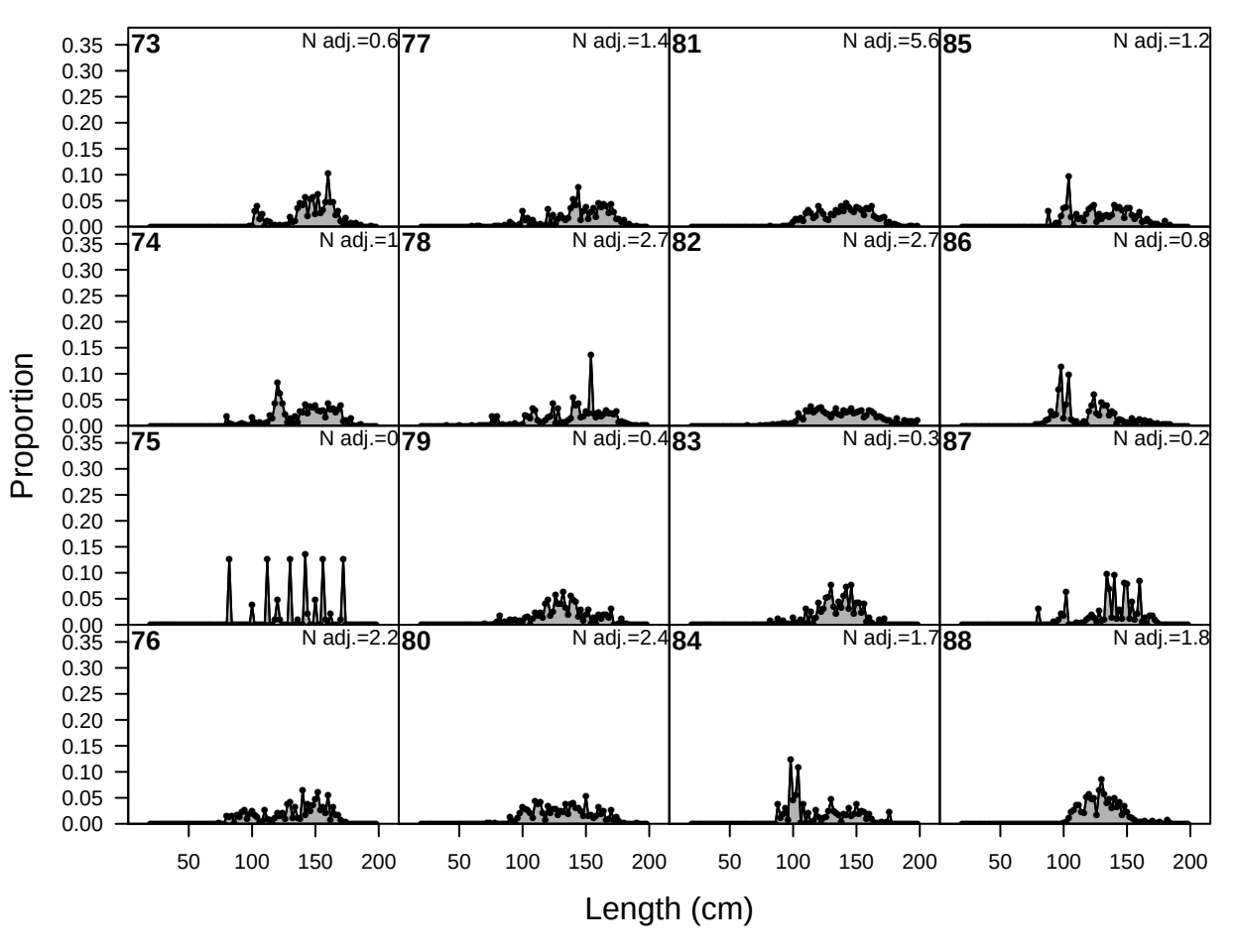
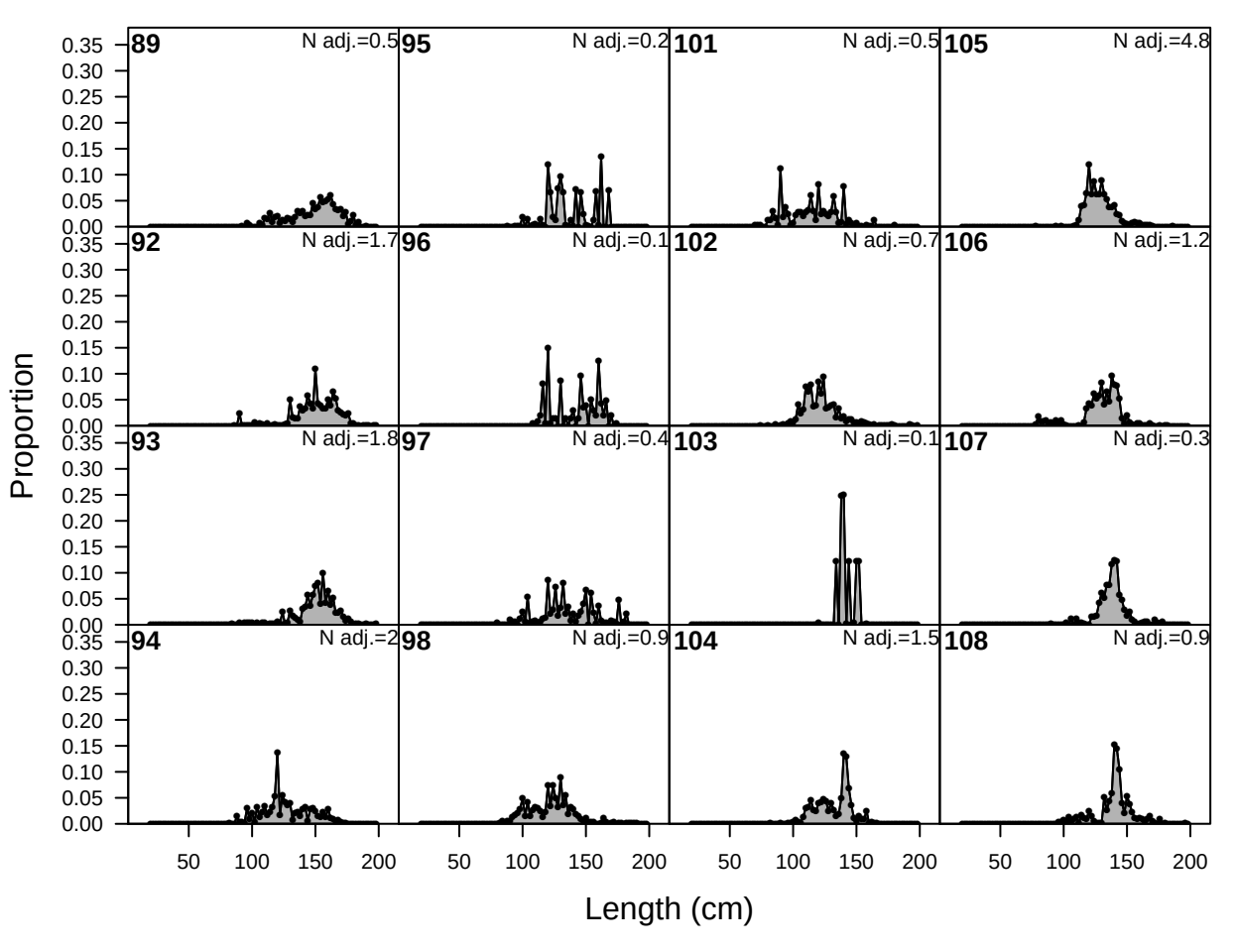
N adj.=3.1
54
N adj.=0.1
65
N adj.=0.6
69
N adj.=4.2
46
N adj.=0.7
55
N adj.=0.2
66
N adj.=1.5
70
N adj.=4.7
48
N adj.=0.4
62
N adj.=0.3
67
N adj.=0.3
71
N adj.=1.6
51
N adj.=0.5
63
N adj.=0.8
68
N adj.=0.3
72
N adj.=0.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


73
N adj.=0.6
77
N adj.=1.4
81
N adj.=5.6
85
N adj.=1.2
74
N adj.=1
78
N adj.=2.7
82
N adj.=2.7
86
N adj.=0.8
75
N adj.=0
79
N adj.=0.4
83
N adj.=0.3
87
N adj.=0.2
76
N adj.=2.2
80
N adj.=2.4
84
N adj.=1.7
88
N adj.=1.8
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)


89
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N adj.=0.2
101
N adj.=0.5
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N adj.=4.8
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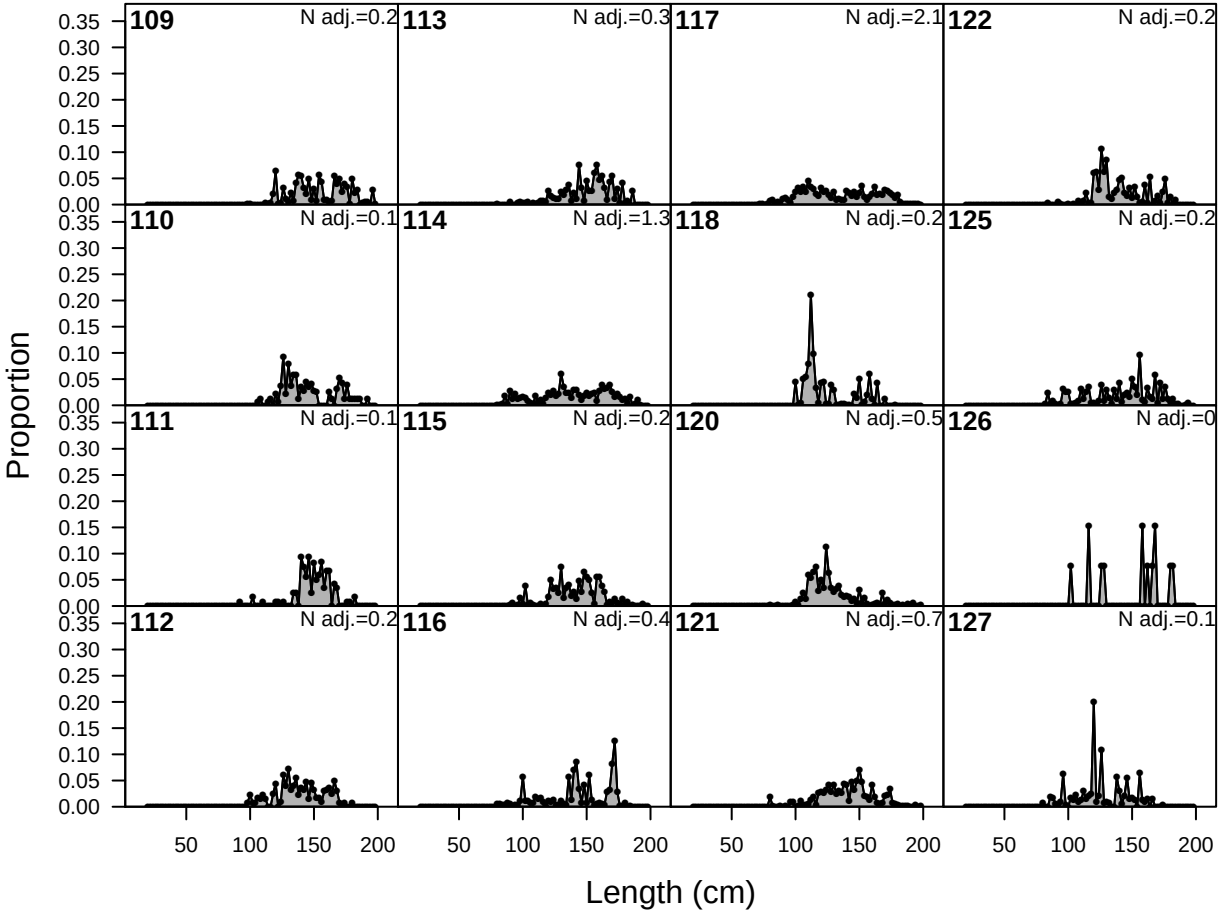
N adj.=1.7
96
N adj.=0.1
102
N adj.=0.7
106
N adj.=1.2
93
N adj.=1.8
97
N adj.=0.4
103
N adj.=0.1
107
N adj.=0.3
94
N adj.=2
98
N adj.=0.9
104
N adj.=1.5
108
N adj.=0.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)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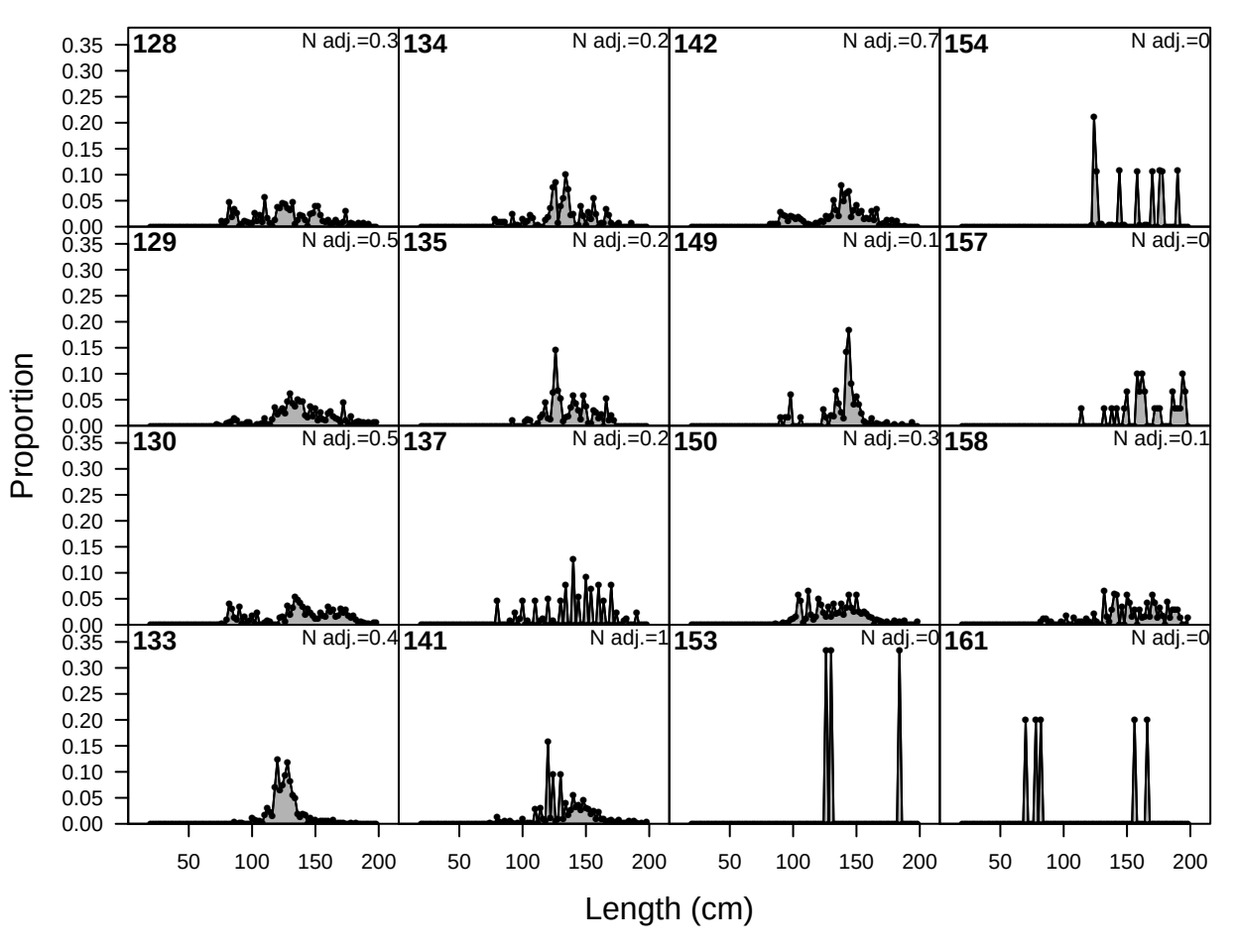
N adj.=0.2
113
N adj.=0.3
117
N adj.=2.1
122
N adj.=0.2
110
N adj.=0.1
114
N adj.=1.3
118
N adj.=0.2
125
N adj.=0.2
111
N adj.=0.1
115
N adj.=0.2
120
N adj.=0.5
126
N adj.=0
112
N adj.=0.2
116
N adj.=0.4
121
N adj.=0.7
127
N adj.=0.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


128
N adj.=0.3
134
N adj.=0.2
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N adj.=0.7
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N adj.=0
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N adj.=0.5
135
N adj.=0.2
149
N adj.=0.1
157
N adj.=0
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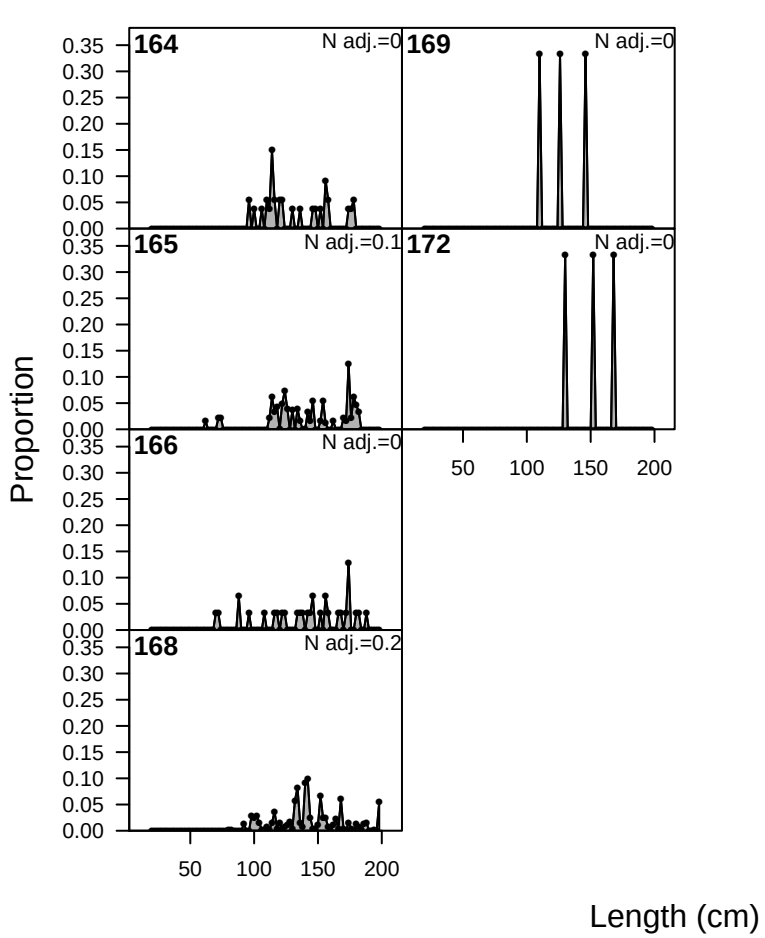
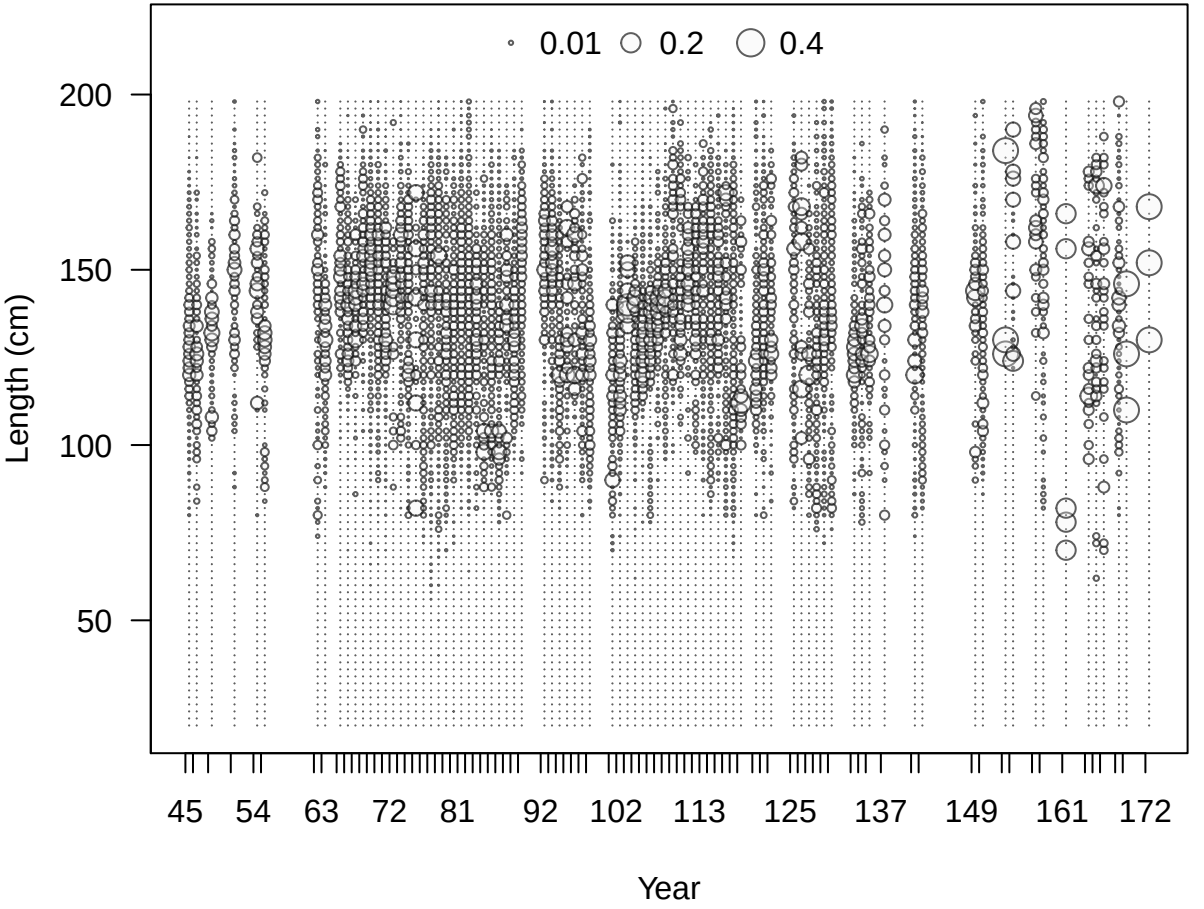
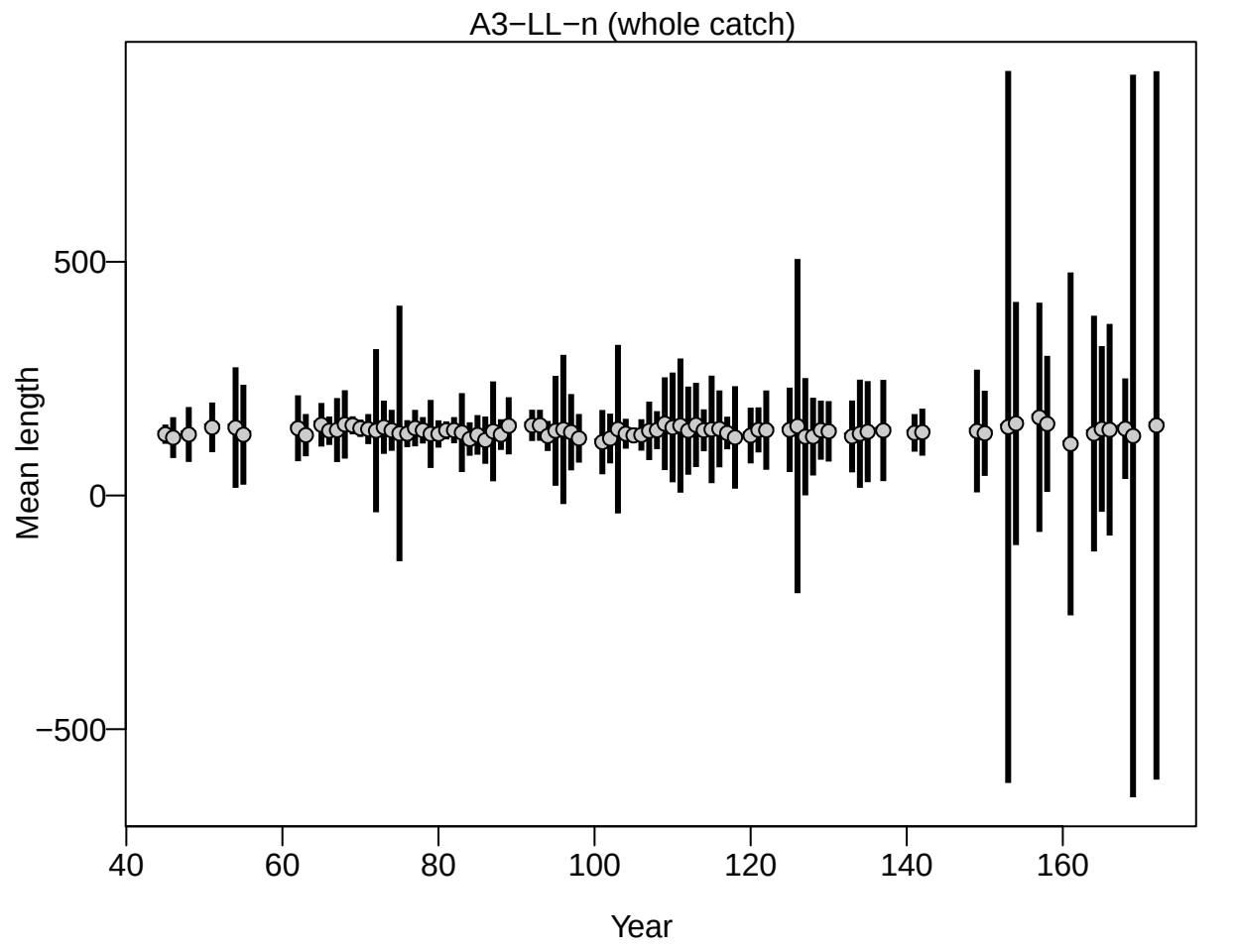
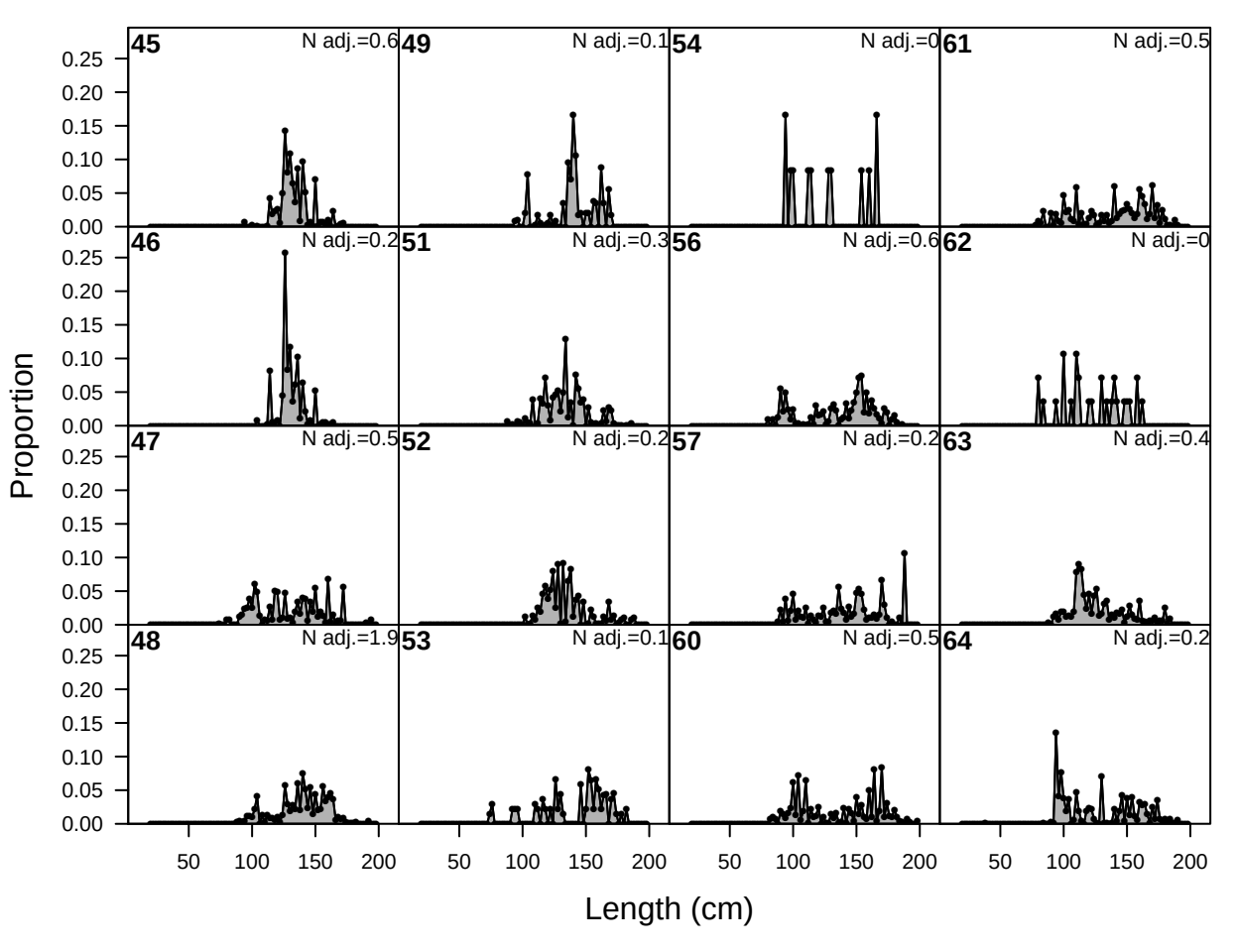
N adj.=0.5
137
N adj.=0.2
150
N adj.=0.3
158
N adj.=0.1
133
N adj.=0.4
141
N adj.=1
153
N adj.=0
161
N adj.=0
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


164
N adj.=0
169
N adj.=0
165
N adj.=0.1
172
N adj.=0
166
N adj.=0
168
N adj.=0.2
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)
45
54
63
72
81
92
102
113
125
137
149
161
172
Year


A3−LL−n (whole catch)
Mean length
500
0
−500
40
60
80
100
120
140
160
Year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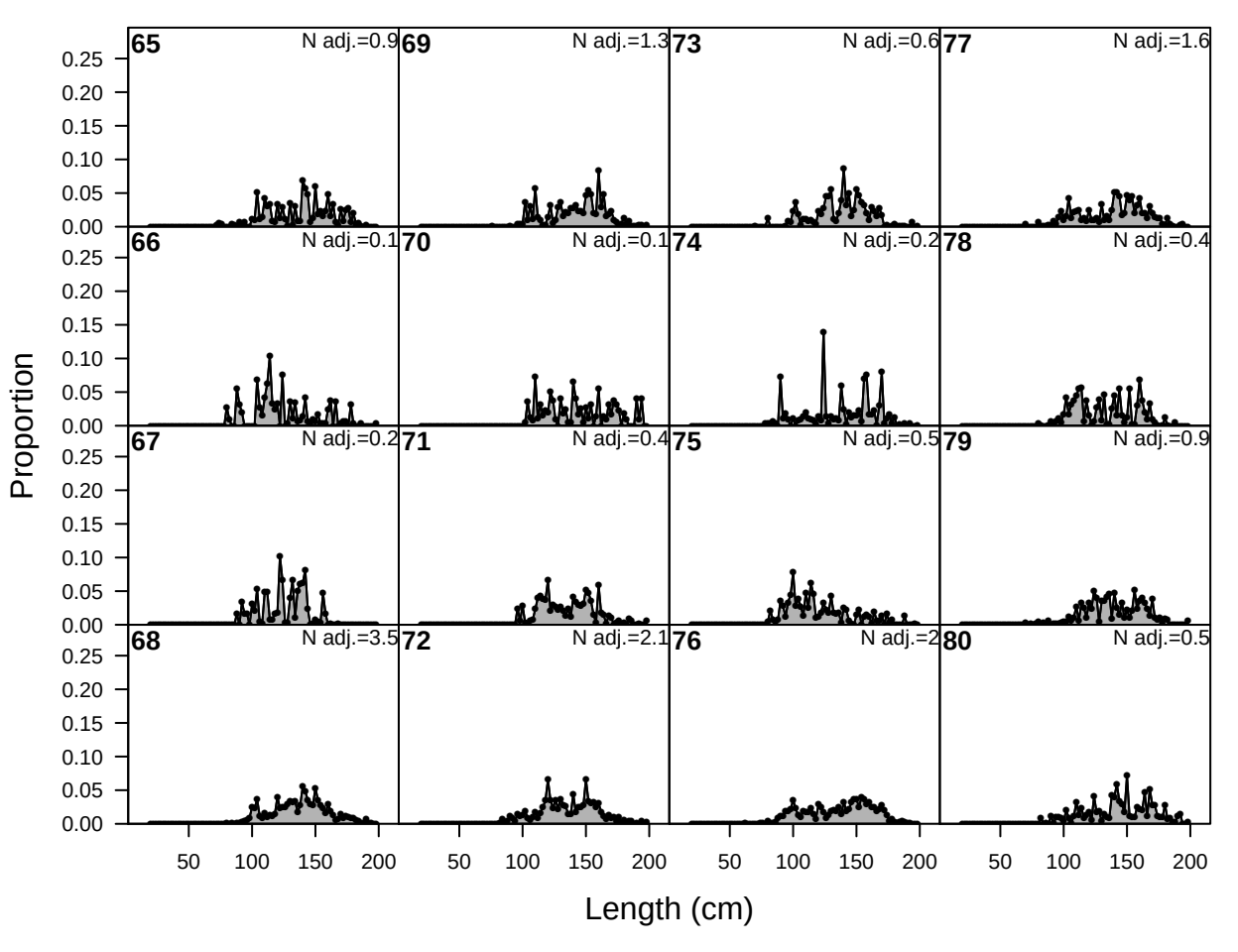
N adj.=0.1
54
N adj.=0
61
N adj.=0.5
46
N adj.=0.2
51
N adj.=0.3
56
N adj.=0.6
62
N adj.=0
47
N adj.=0.5
52
N adj.=0.2
57
N adj.=0.2
63
N adj.=0.4
48
N adj.=1.9
53
N adj.=0.1
60
N adj.=0.5
64
N adj.=0.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N adj.=1.3
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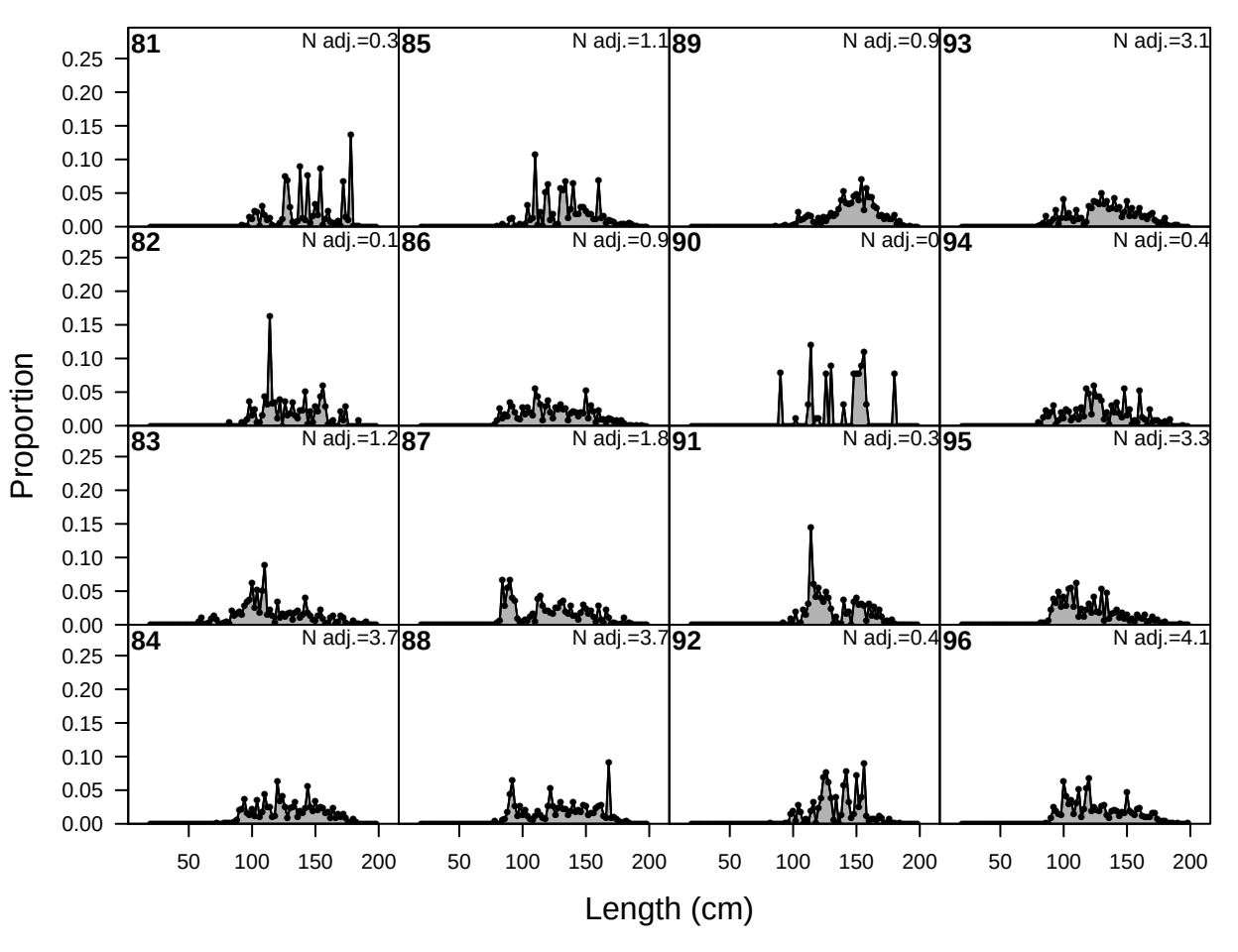
N adj.=0.6
77
N adj.=1.6
66
N adj.=0.1
70
N adj.=0.1
74
N adj.=0.2
78
N adj.=0.4
67
N adj.=0.2
71
N adj.=0.4
75
N adj.=0.5
79
N adj.=0.9
68
N adj.=3.5
72
N adj.=2.1
76
N adj.=2
80
N adj.=0.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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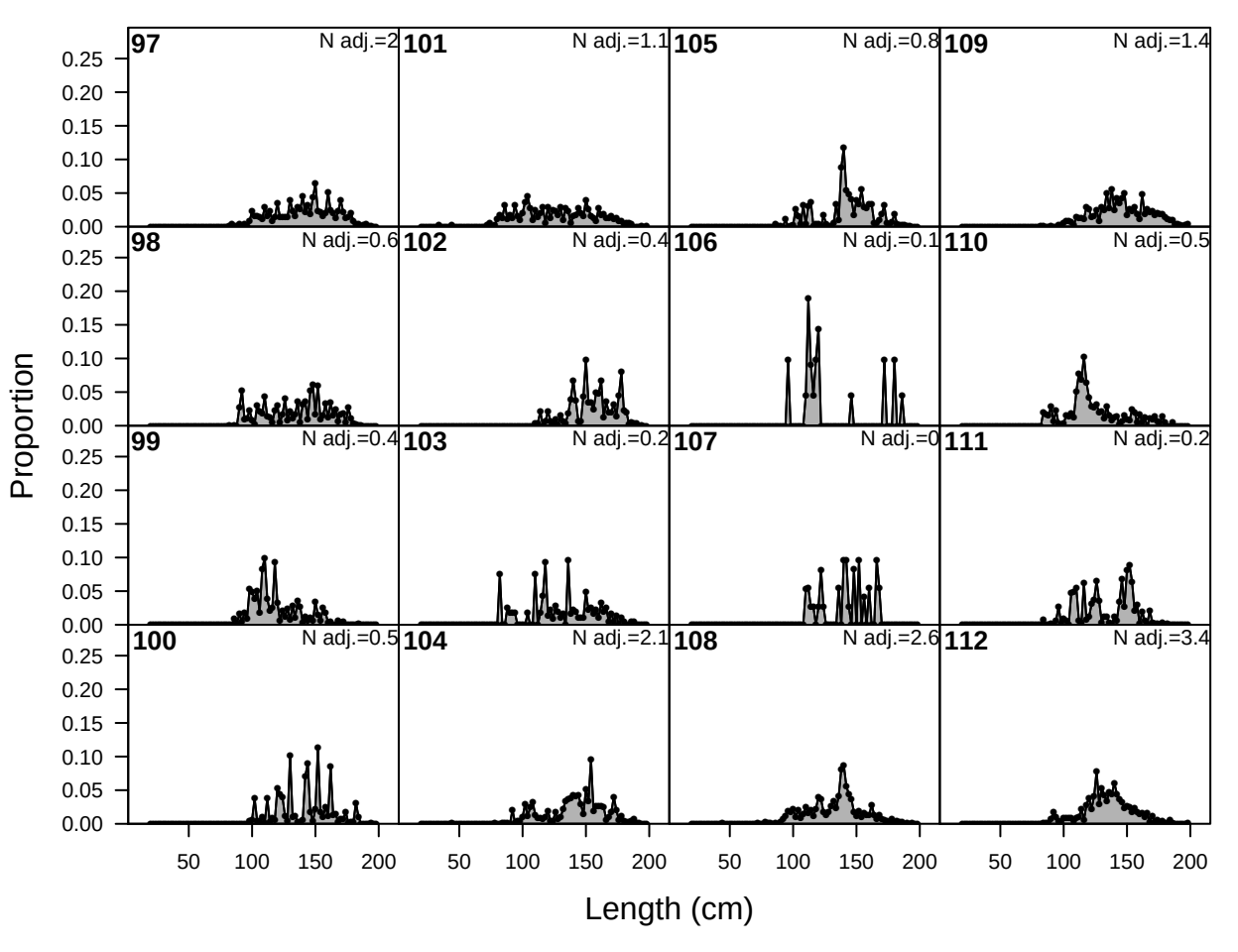
N adj.=3.1
82
N adj.=0.1
86
N adj.=0.9
90
N adj.=0
94
N adj.=0.4
83
N adj.=1.2
87
N adj.=1.8
91
N adj.=0.3
95
N adj.=3.3
84
N adj.=3.7
88
N adj.=3.7
92
N adj.=0.4
96
N adj.=4.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


97
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N adj.=1.1
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N adj.=0.8
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N adj.=1.4
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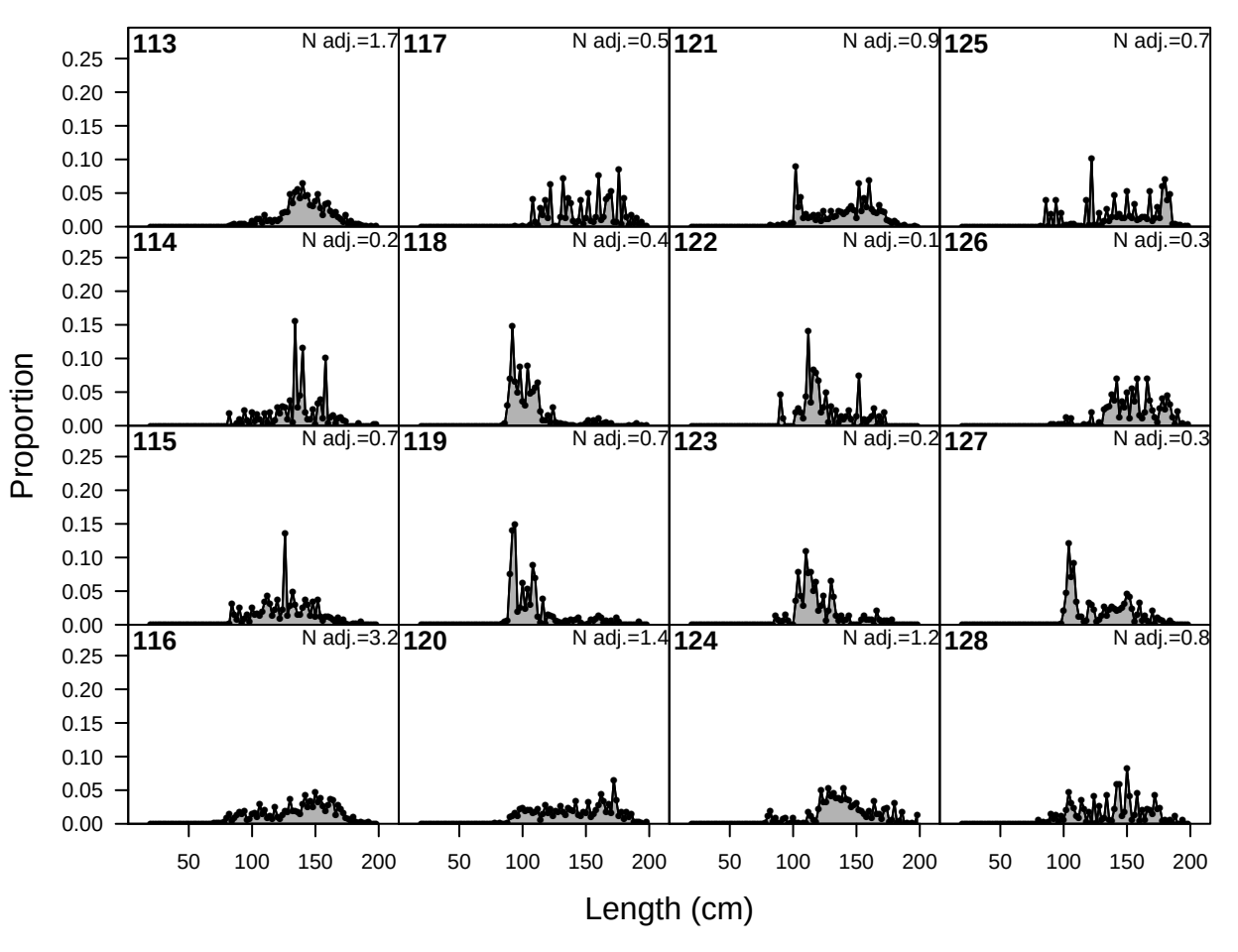
N adj.=0.6
102
N adj.=0.4
106
N adj.=0.1
110
N adj.=0.5
99
N adj.=0.4
103
N adj.=0.2
107
N adj.=0
111
N adj.=0.2
100
N adj.=0.5
104
N adj.=2.1
108
N adj.=2.6
112
N adj.=3.4
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


113
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N adj.=0.5
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N adj.=0.7
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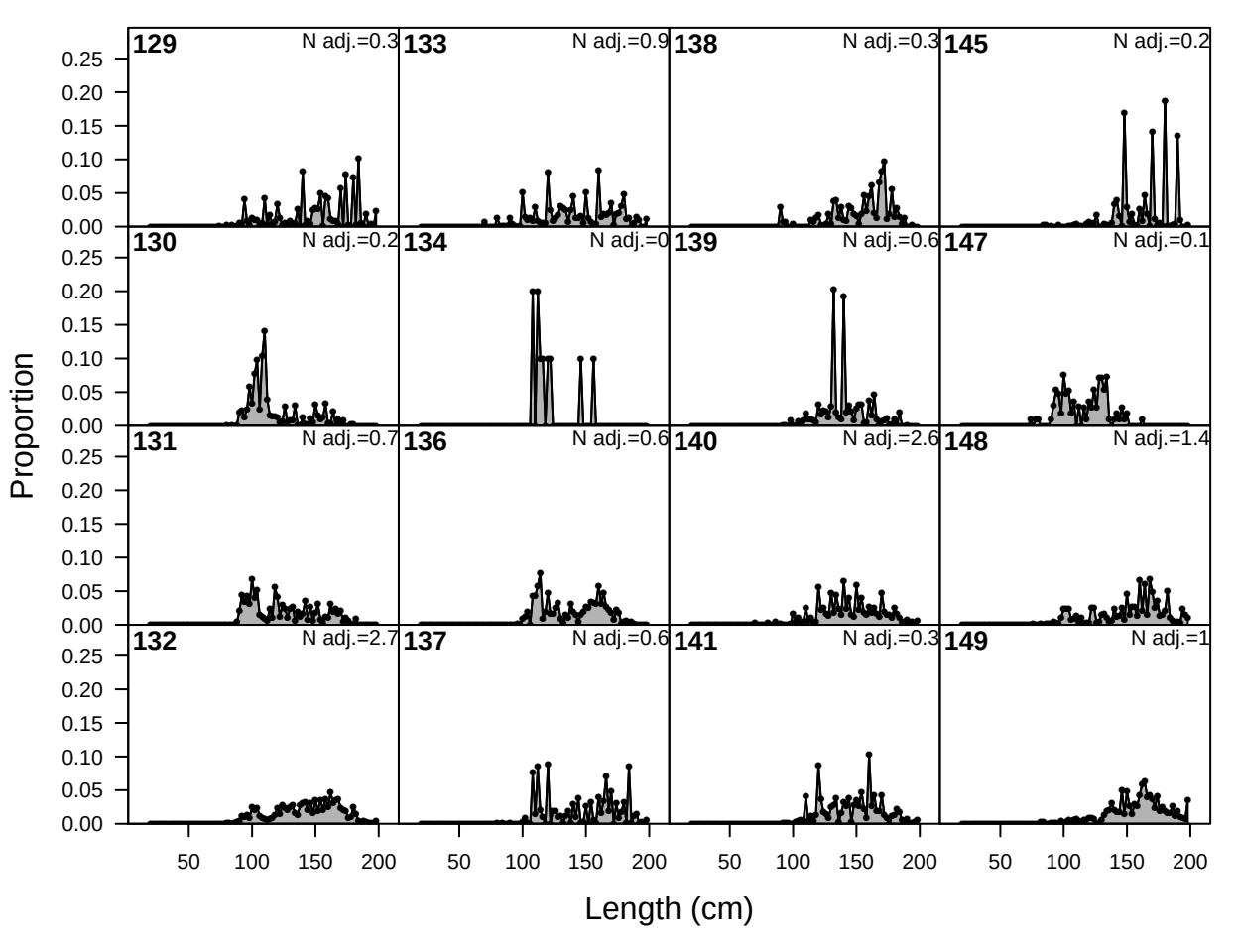
N adj.=0.2
118
N adj.=0.4
122
N adj.=0.1
126
N adj.=0.3
115
N adj.=0.7
119
N adj.=0.7
123
N adj.=0.2
127
N adj.=0.3
116
N adj.=3.2
120
N adj.=1.4
124
N adj.=1.2
128
N adj.=0.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N adj.=0.9
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N adj.=0.3
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N adj.=0.2
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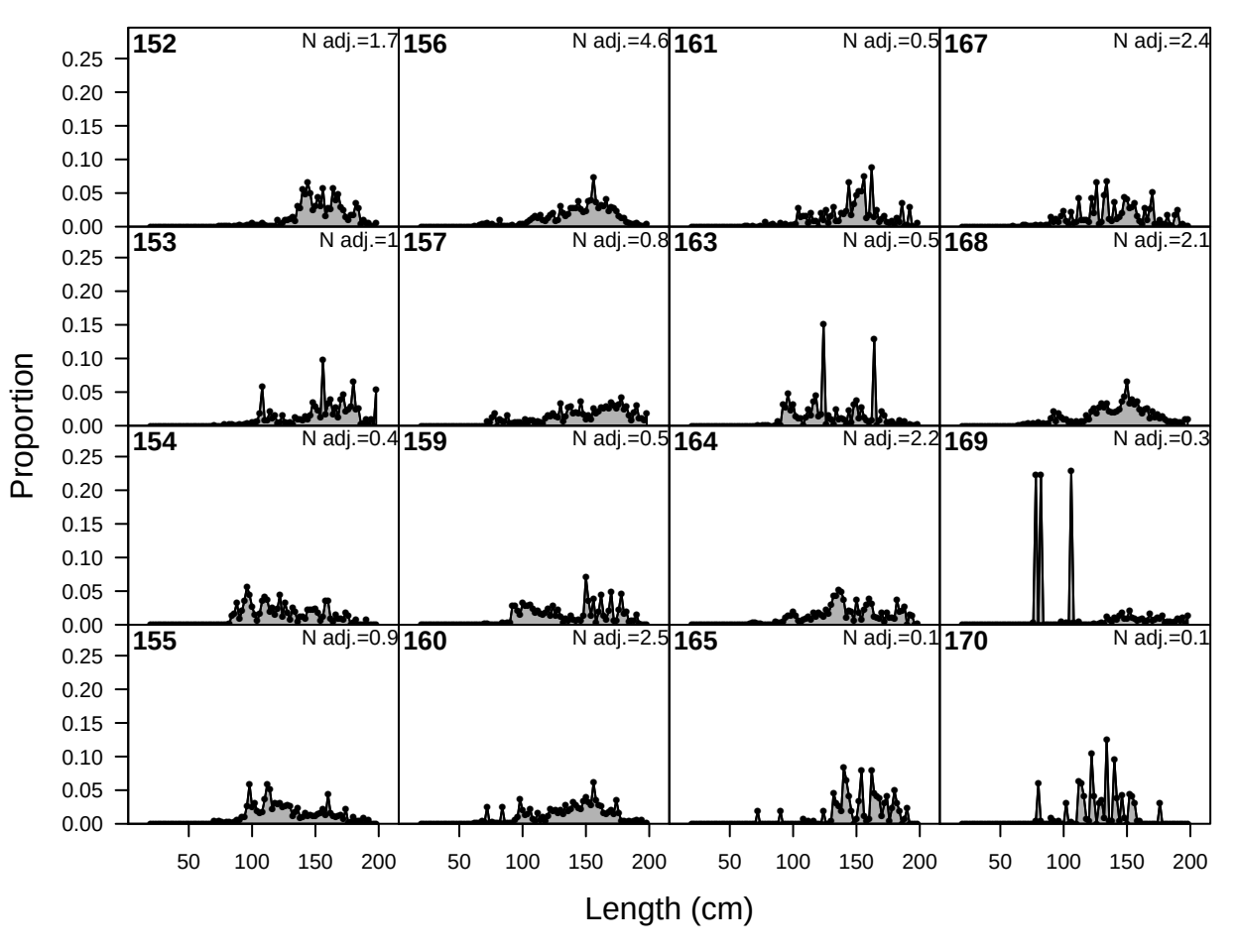
N adj.=0.2
134
N adj.=0
139
N adj.=0.6
147
N adj.=0.1
131
N adj.=0.7
136
N adj.=0.6
140
N adj.=2.6
148
N adj.=1.4
132
N adj.=2.7
137
N adj.=0.6
141
N adj.=0.3
149
N adj.=1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


152
N adj.=1.7
156
N adj.=4.6
161
N adj.=0.5
167
N adj.=2.4
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N adj.=1
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N adj.=0.8
163
N adj.=0.5
168
N adj.=2.1
154
N adj.=0.4
159
N adj.=0.5
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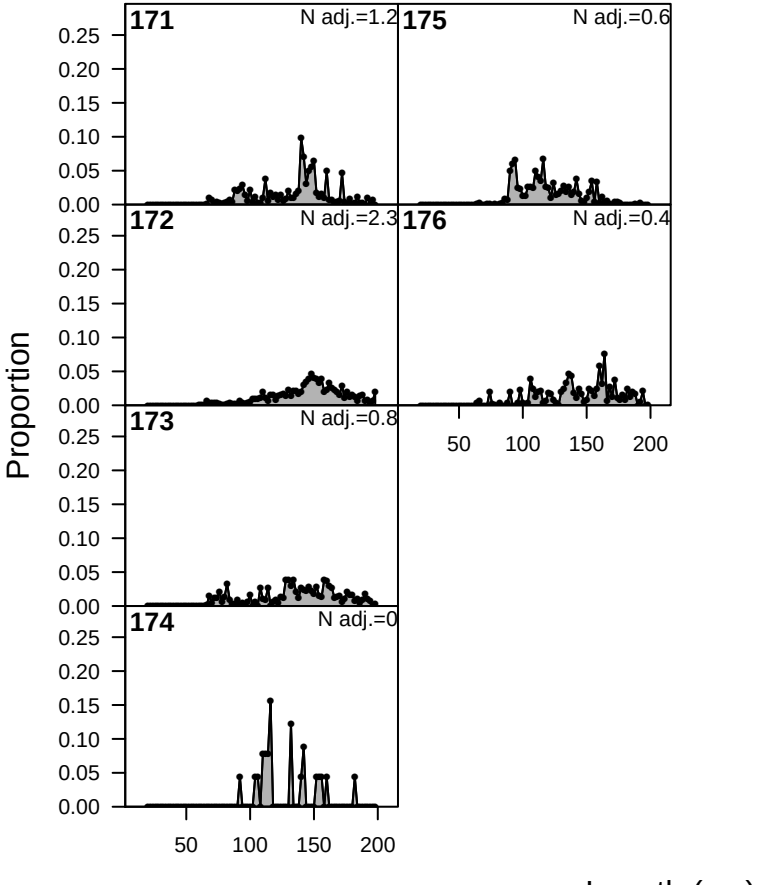
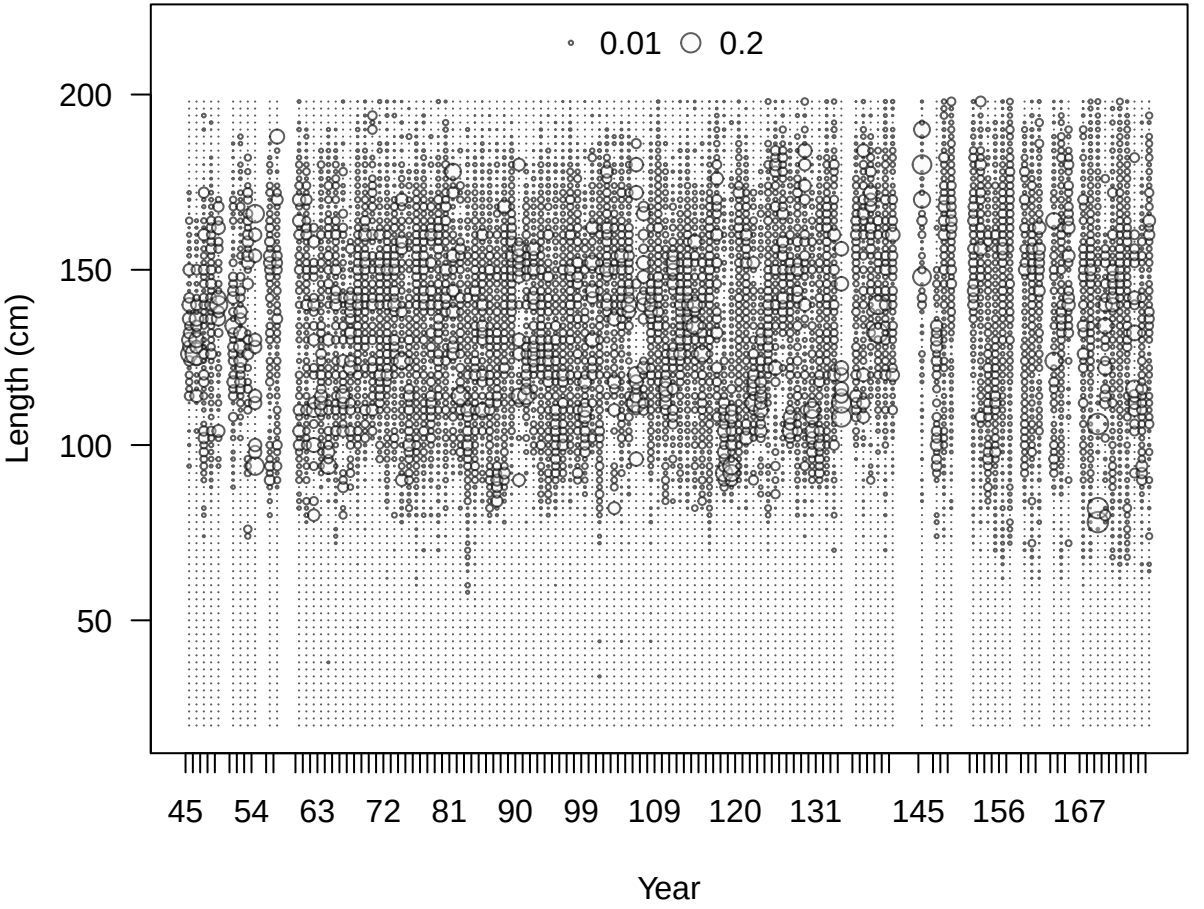
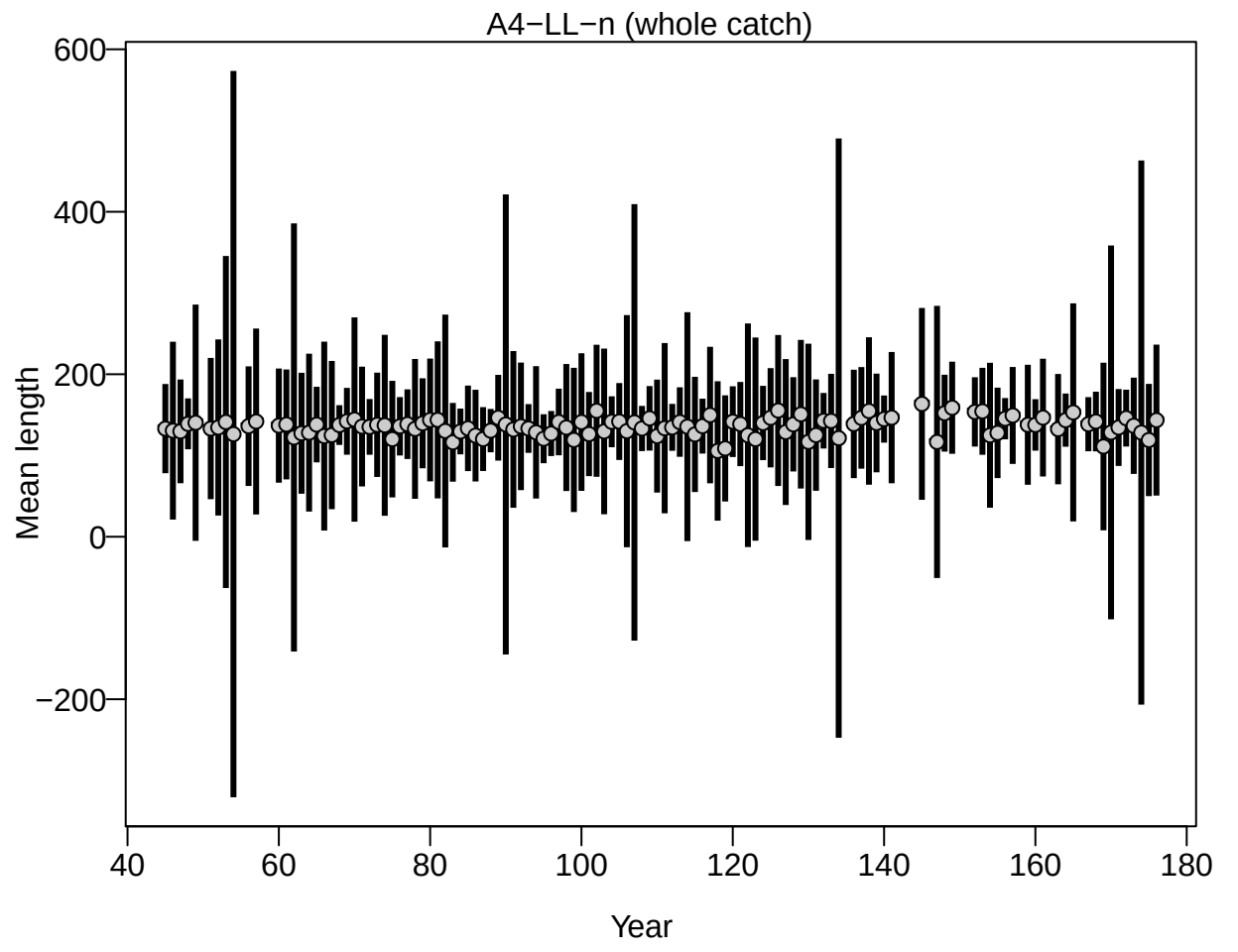
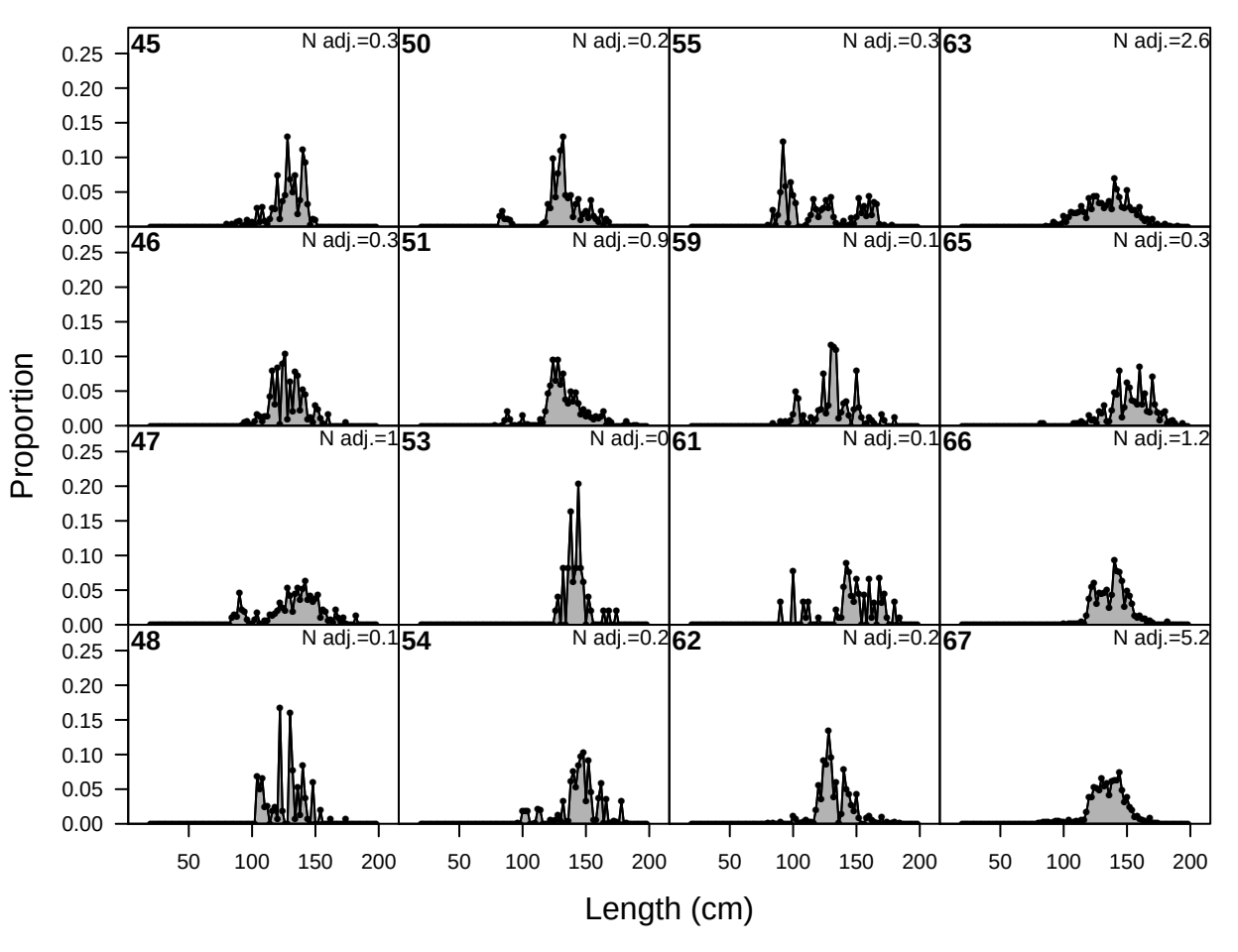
N adj.=2.2
169
N adj.=0.3
155
N adj.=0.9
160
N adj.=2.5
165
N adj.=0.1
170
N adj.=0.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


171
N adj.=1.2
175
N adj.=0.6
172
N adj.=2.3
176
N adj.=0.4
173
N adj.=0.8
174
N adj.=0
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)
45
54
63
72
81
90
99
109
120
131
145
156
167
Year


A4−LL−n (whole catch)
600
400
200
0
−200
Mean length
40
60
80
100
120
140
160
180
Year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N adj.=0.3
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N adj.=0.2
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N adj.=0.3
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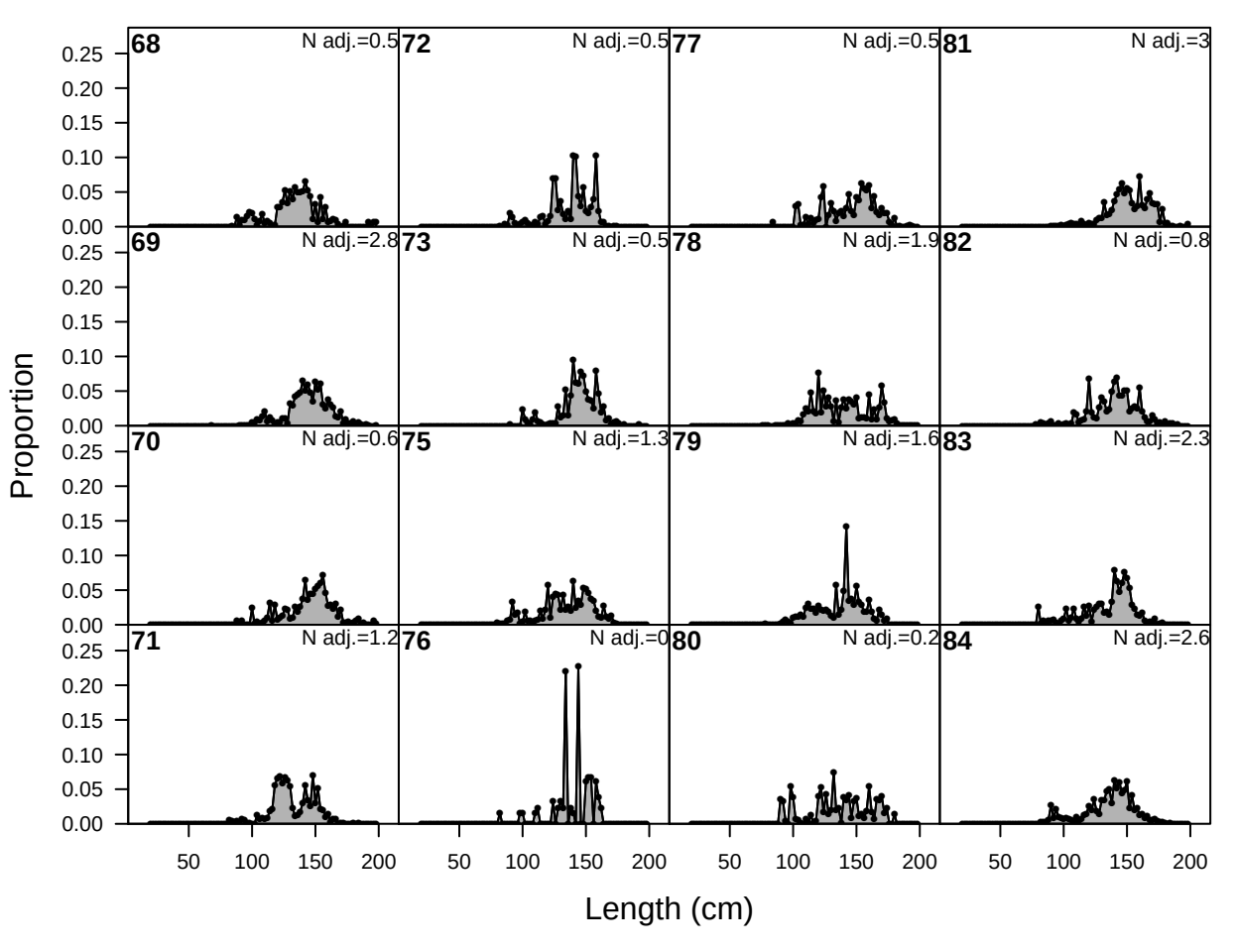
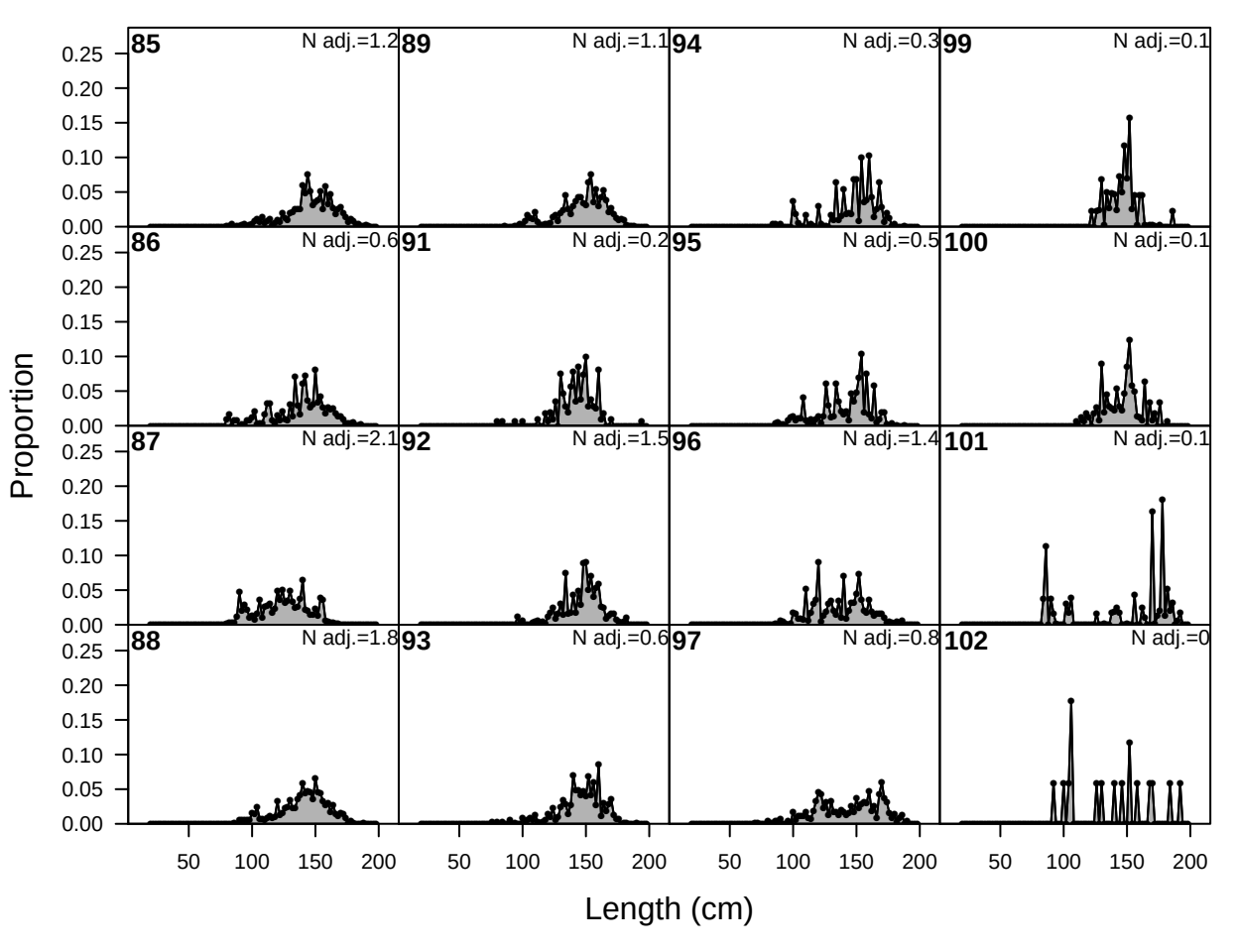
N adj.=2.6
46
N adj.=0.3
51
N adj.=0.9
59
N adj.=0.1
65
N adj.=0.3
47
N adj.=1
53
N adj.=0
61
N adj.=0.1
66
N adj.=1.2
48
N adj.=0.1
54
N adj.=0.2
62
N adj.=0.2
67
N adj.=5.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


68
N adj.=0.5
72
N adj.=0.5
77
N adj.=0.5
81
N adj.=3
69
N adj.=2.8
73
N adj.=0.5
78
N adj.=1.9
82
N adj.=0.8
70
N adj.=0.6
75
N adj.=1.3
79
N adj.=1.6
83
N adj.=2.3
71
N adj.=1.2
76
N adj.=0
80
N adj.=0.2
84
N adj.=2.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


85
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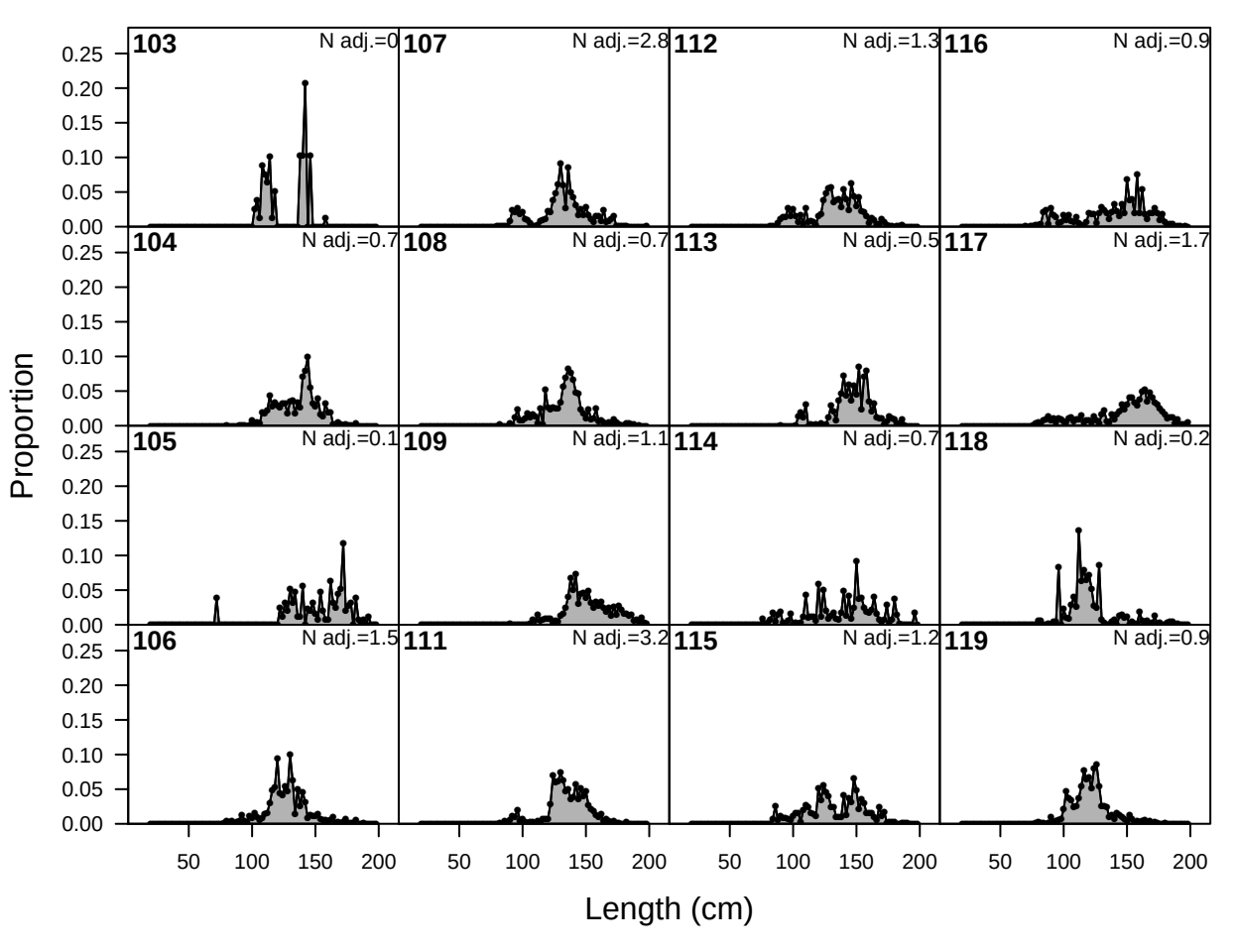
N adj.=1.1
94
N adj.=0.3
99
N adj.=0.1
86
N adj.=0.6
91
N adj.=0.2
95
N adj.=0.5
100
N adj.=0.1
87
N adj.=2.1
92
N adj.=1.5
96
N adj.=1.4
101
N adj.=0.1
88
N adj.=1.8
93
N adj.=0.6
97
N adj.=0.8
102
N adj.=0
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


103
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N adj.=2.8
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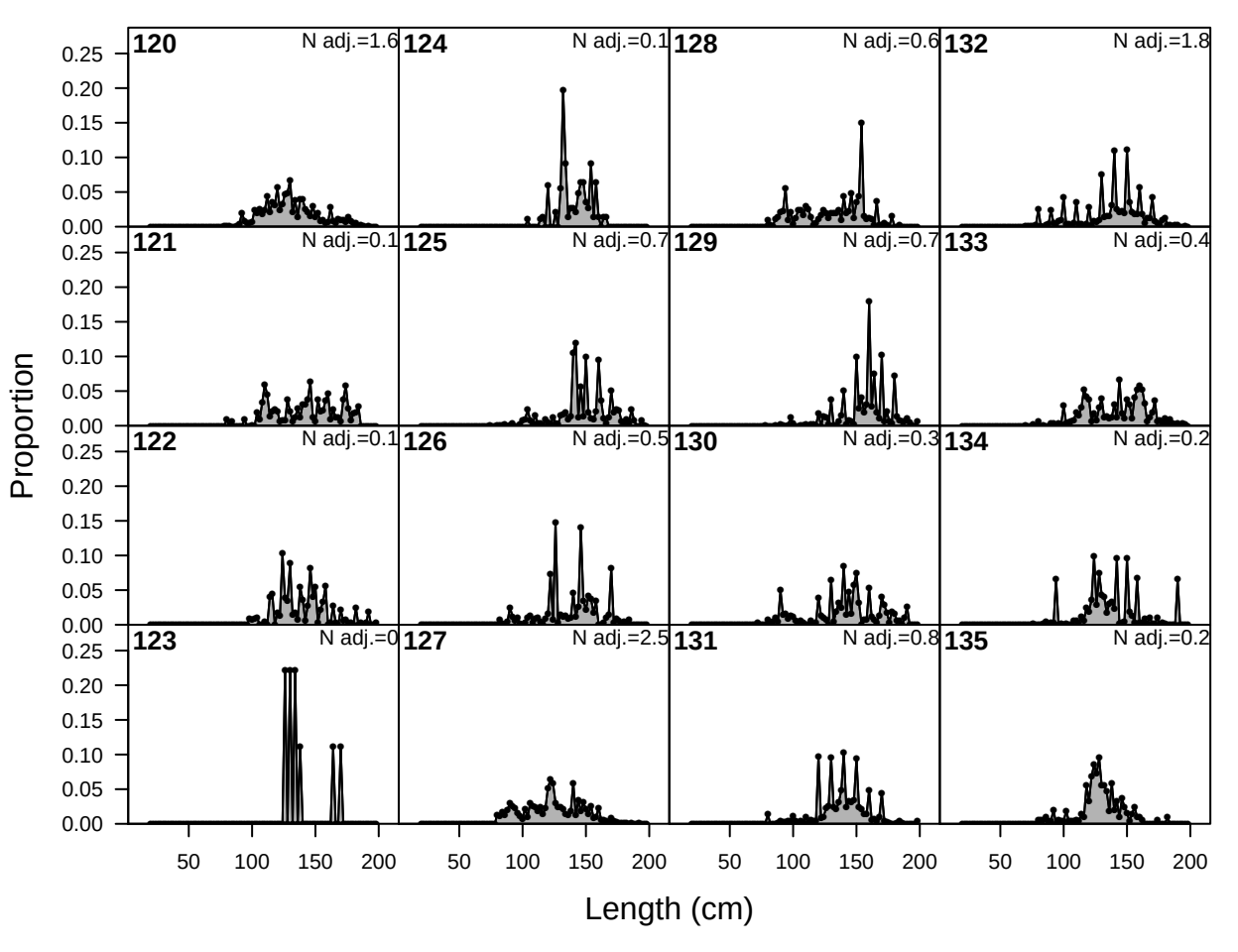
N adj.=1.3
116
N adj.=0.9
104
N adj.=0.7
108
N adj.=0.7
113
N adj.=0.5
117
N adj.=1.7
105
N adj.=0.1
109
N adj.=1.1
114
N adj.=0.7
118
N adj.=0.2
106
N adj.=1.5
111
N adj.=3.2
115
N adj.=1.2
119
N adj.=0.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


120
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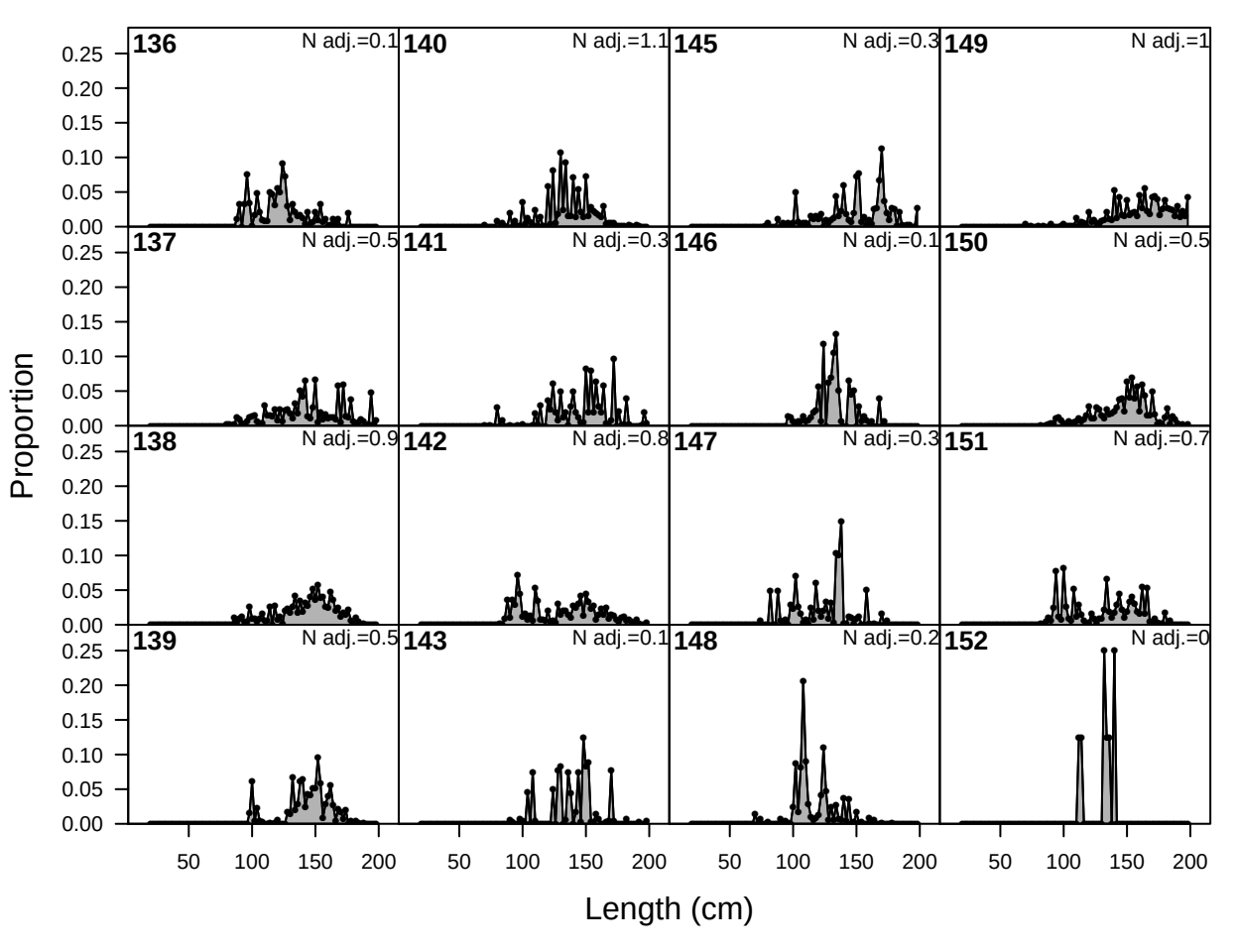
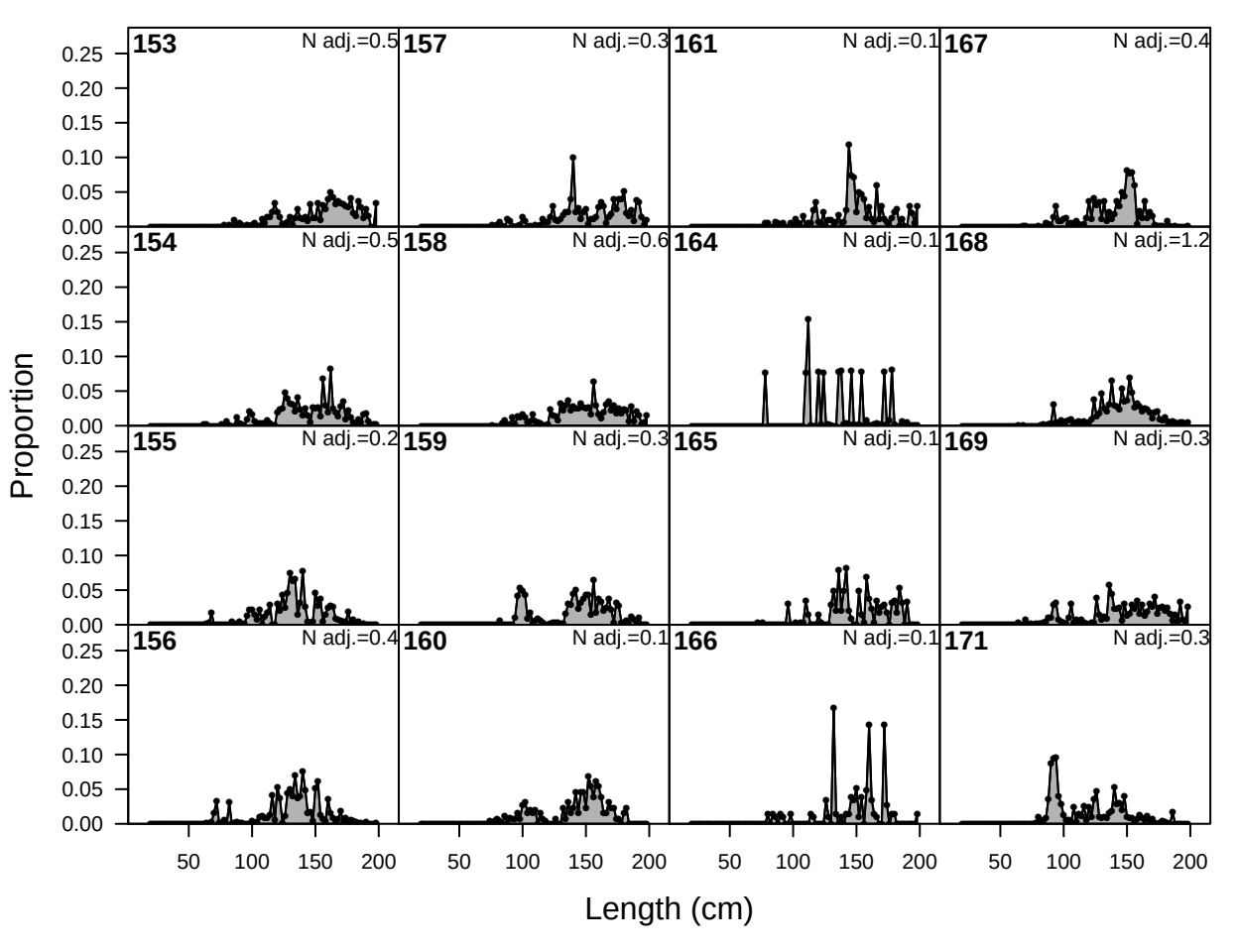
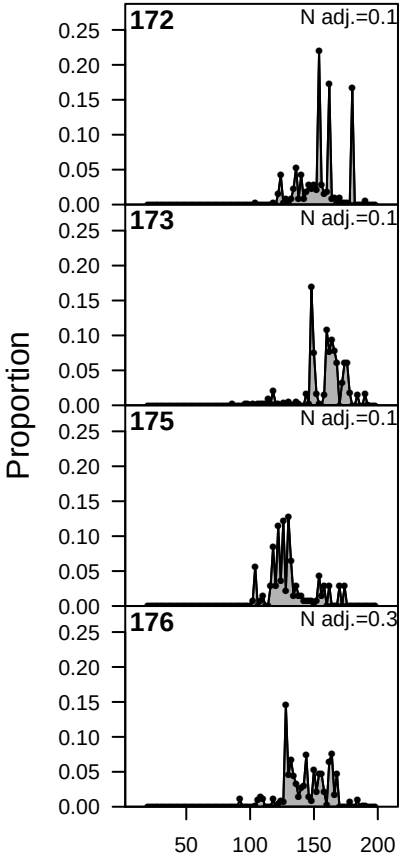
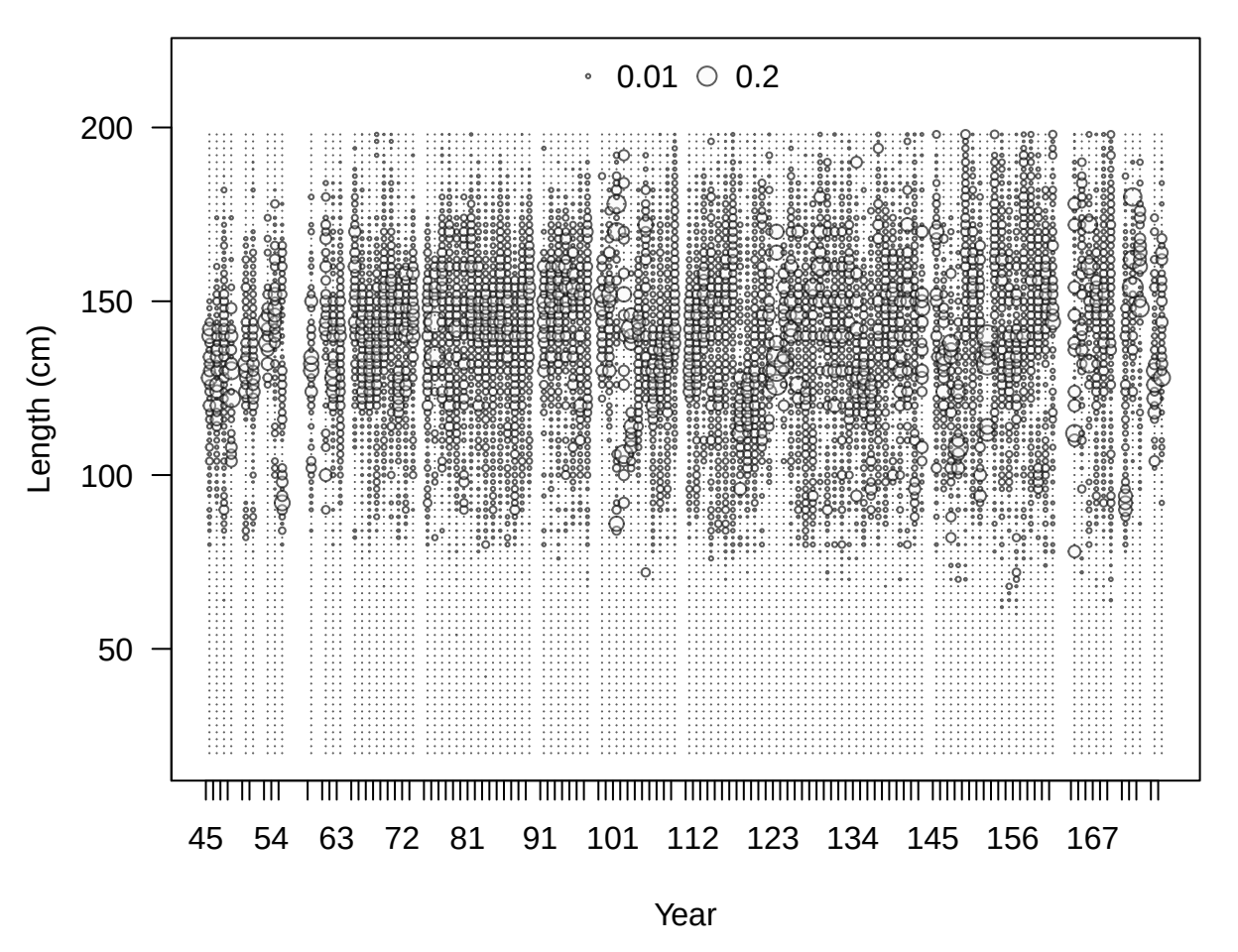
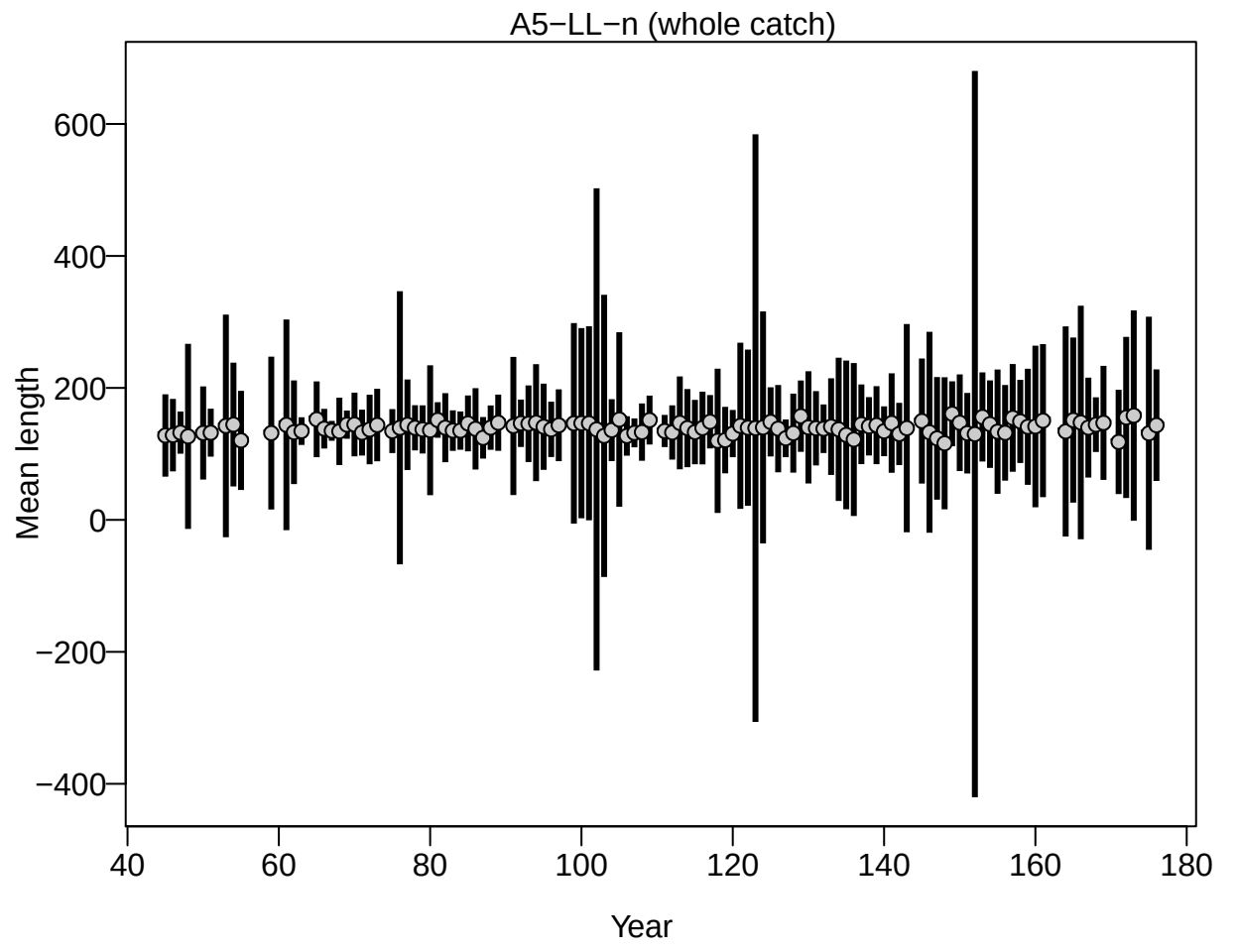
N adj.=0.1
128
N adj.=0.6
132
N adj.=1.8
121
N adj.=0.1
125
N adj.=0.7
129
N adj.=0.7
133
N adj.=0.4
122
N adj.=0.1
126
N adj.=0.5
130
N adj.=0.3
134
N adj.=0.2
123
N adj.=0
127
N adj.=2.5
131
N adj.=0.8
135
N adj.=0.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

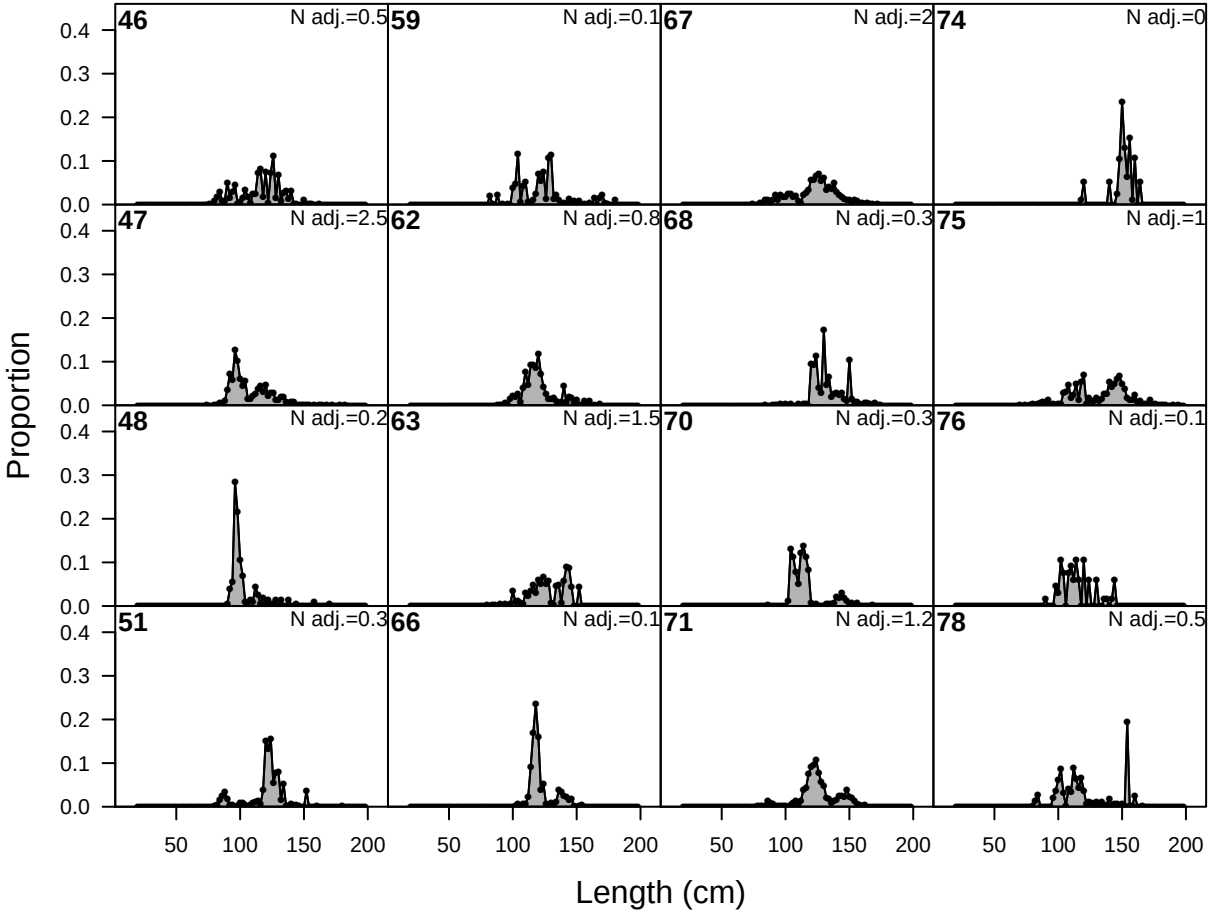

136
N adj.=0.1
140
N adj.=1.1
145
N adj.=0.3
149
N adj.=1
137
N adj.=0.5
141
N adj.=0.3
146
N adj.=0.1
150
N adj.=0.5
138
N adj.=0.9
142
N adj.=0.8
147
N adj.=0.3
151
N adj.=0.7
139
N adj.=0.5
143
N adj.=0.1
148
N adj.=0.2
152
N adj.=0
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

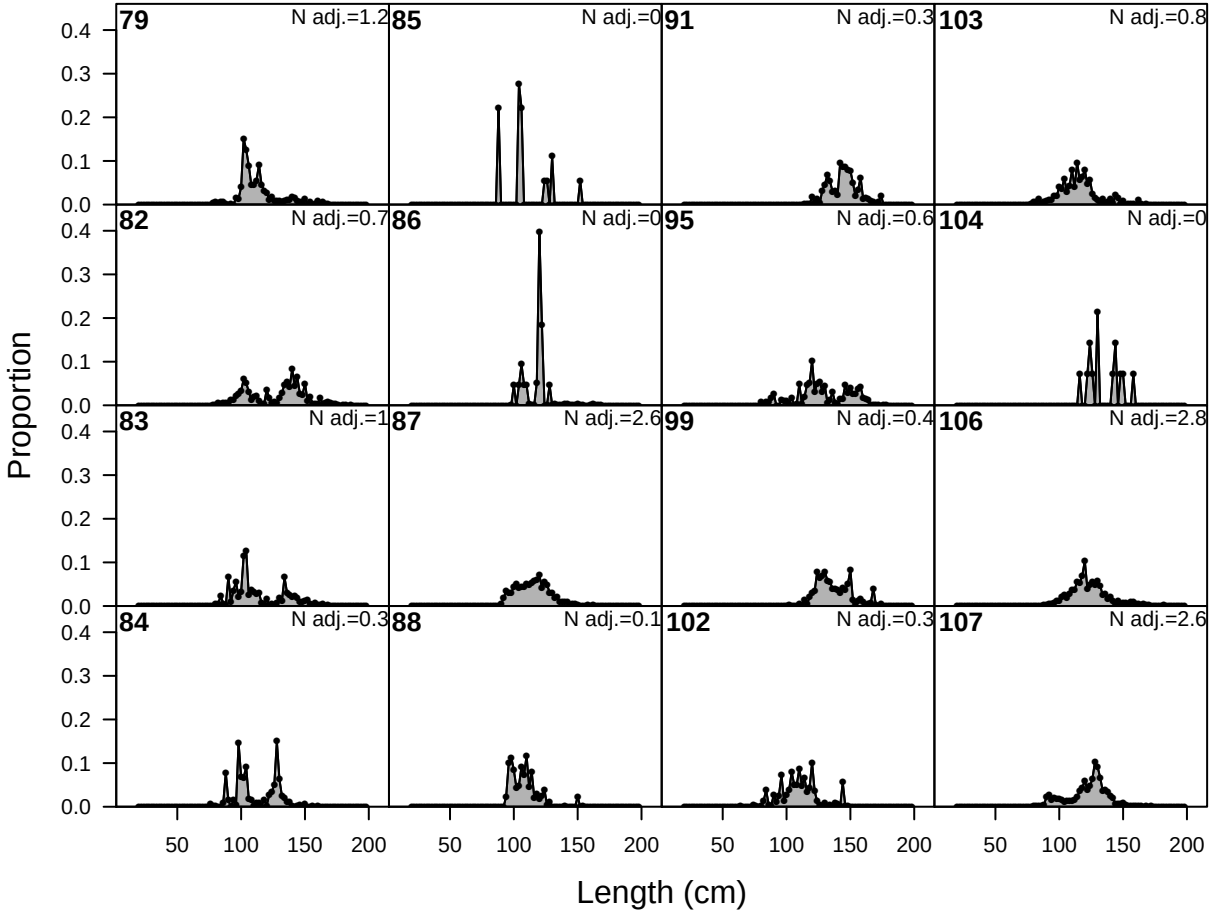

153
N adj.=0.5
157
N adj.=0.3
161
N adj.=0.1
167
N adj.=0.4
154
N adj.=0.5
158
N adj.=0.6
164
N adj.=0.1
168
N adj.=1.2
155
N adj.=0.2
159
N adj.=0.3
165
N adj.=0.1
169
N adj.=0.3
156
N adj.=0.4
160
N adj.=0.1
166
N adj.=0.1
171
N adj.=0.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

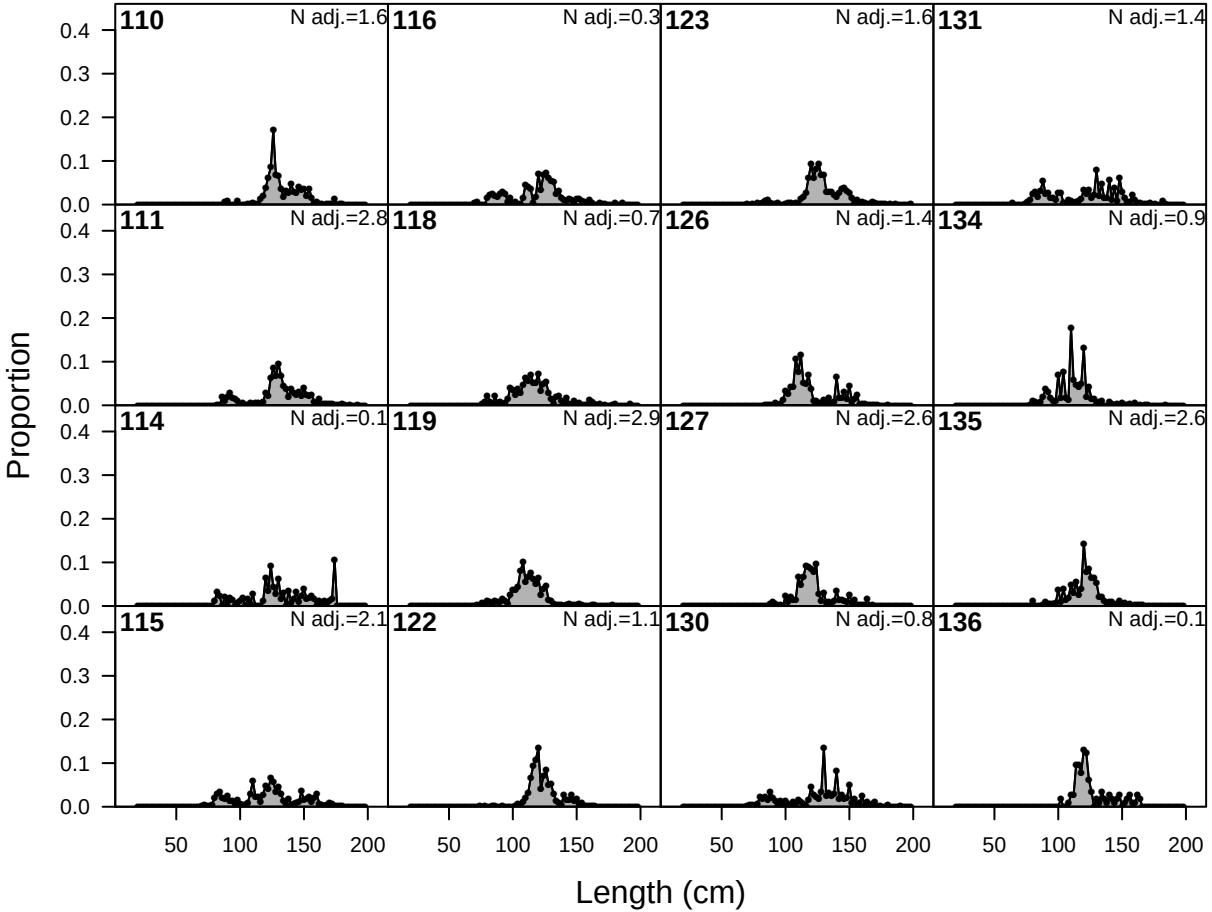

172
N adj.=0.1
173
N adj.=0.1
175
N adj.=0.1
176
N adj.=0.3
0.25
0.20
0.15
0.10
0.05
0.00
Proportion
50
100
150
200
Length (cm)

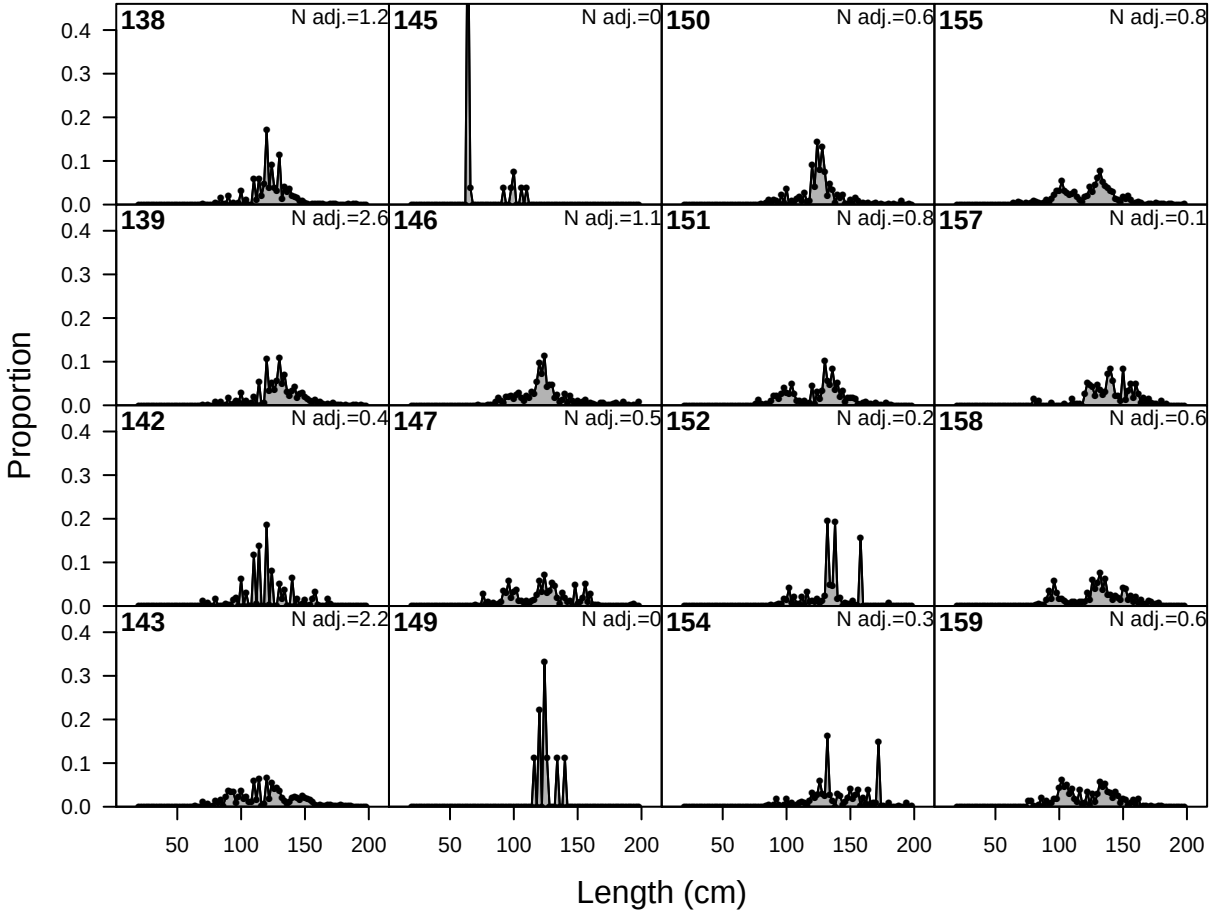

0.01
0.2
200
150
100
50
Length (cm)
45
54
63
72
81
91
101
112
123
134
145
156
167
Year

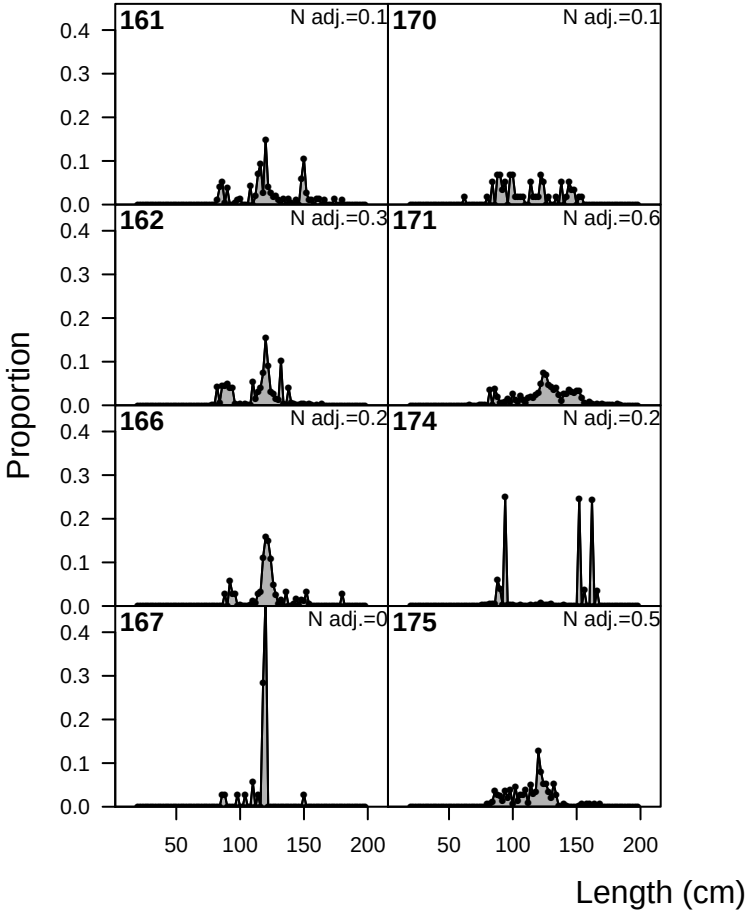

A5−LL−n (whole catch)
Mean length
600
400
200
0
−200
−400
40
60
80
100
120
140
160
180
Year

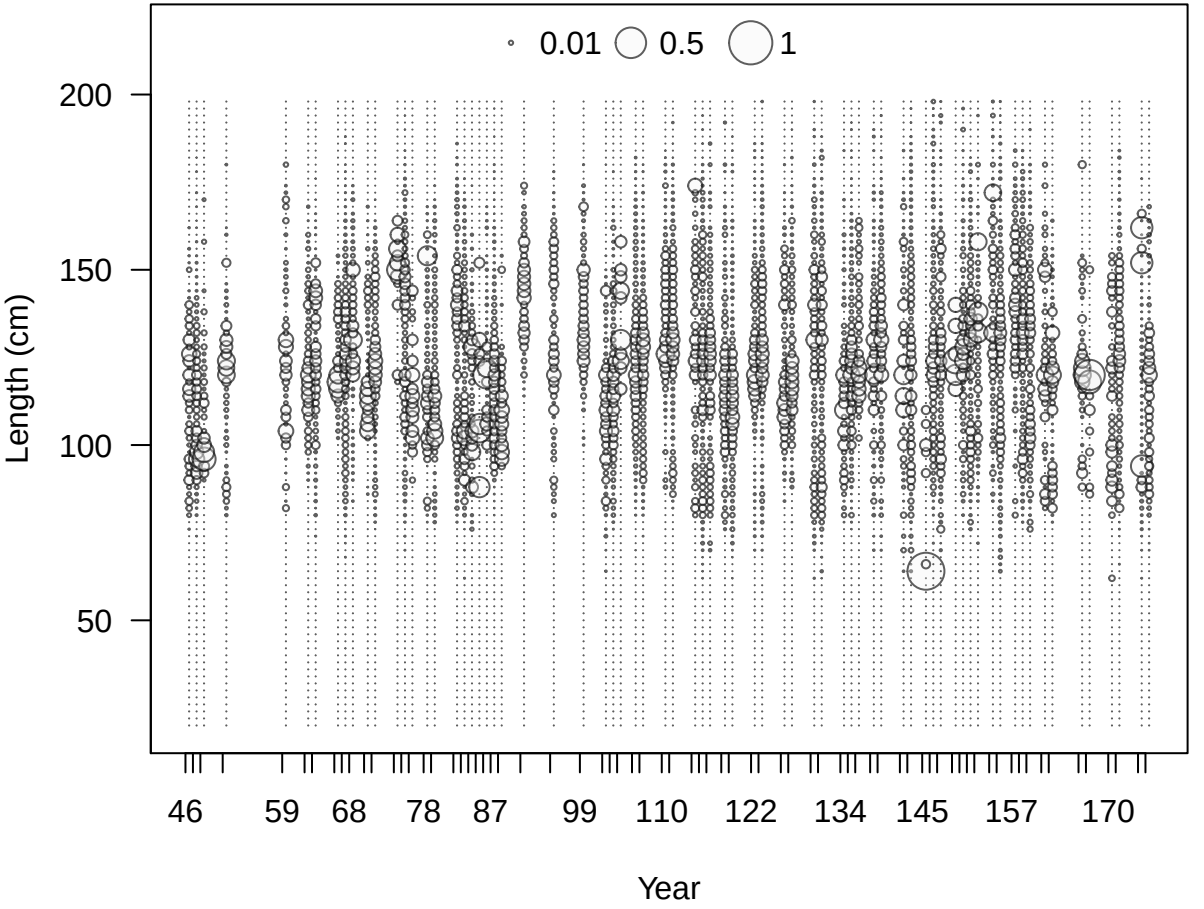

46
N adj.=0.5
59
N adj.=0.1
67
N adj.=2
74
N adj.=0
47
N adj.=2.5
62
N adj.=0.8
68
N adj.=0.3
75
N adj.=1
48
N adj.=0.2
63
N adj.=1.5
70
N adj.=0.3
76
N adj.=0.1
51
N adj.=0.3
66
N adj.=0.1
71
N adj.=1.2
78
N adj.=0.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

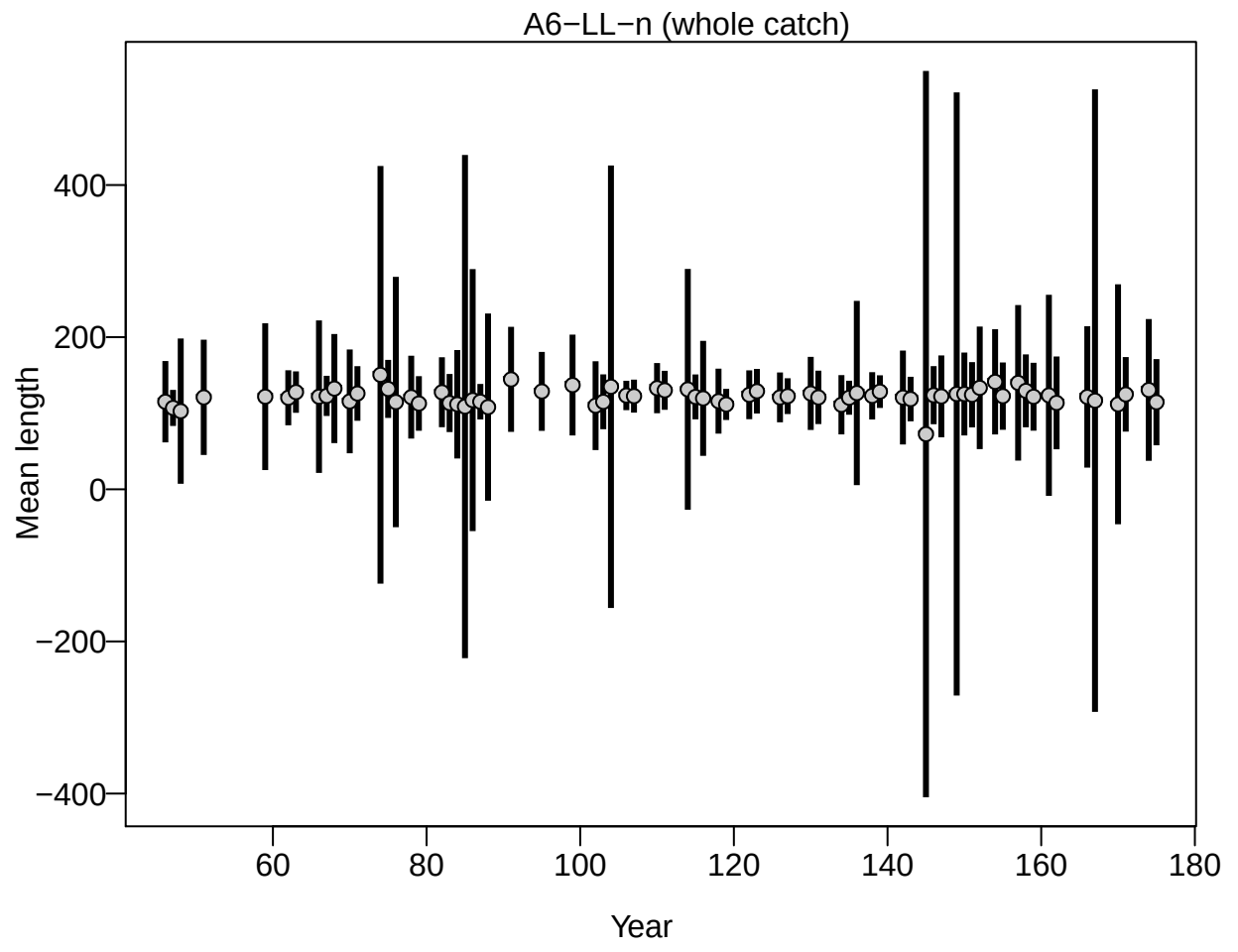

79
N adj.=1.2
85
N adj.=0
91
N adj.=0.3
103
N adj.=0.8
82
N adj.=0.7
86
N adj.=0
95
N adj.=0.6
104
N adj.=0
83
N adj.=1
87
N adj.=2.6
99
N adj.=0.4
106
N adj.=2.8
84
N adj.=0.3
88
N adj.=0.1
102
N adj.=0.3
107
N adj.=2.6
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

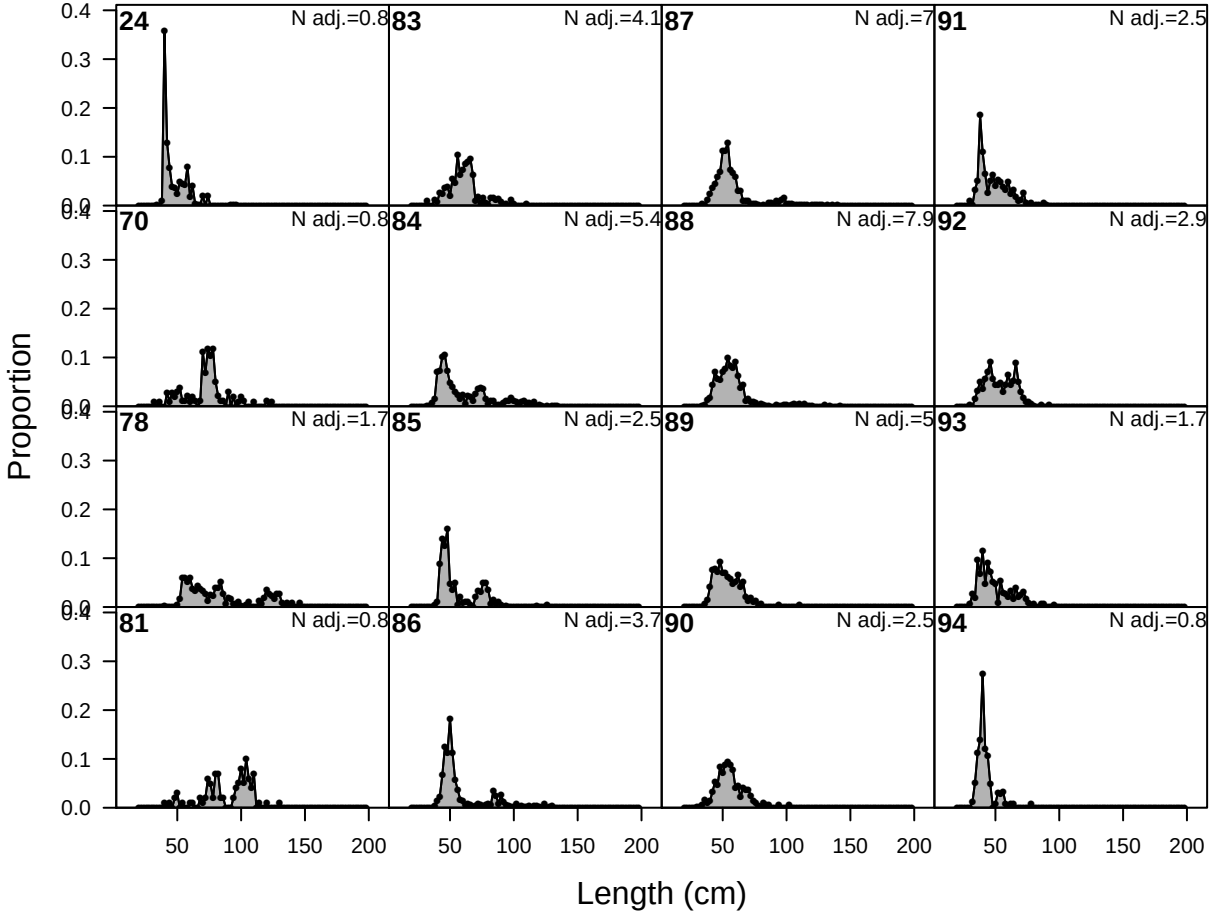

110
N adj.=1.6
116
N adj.=0.3
123
N adj.=1.6
131
N adj.=1.4
111
N adj.=2.8
118
N adj.=0.7
126
N adj.=1.4
134
N adj.=0.9
114
N adj.=0.1
119
N adj.=2.9
127
N adj.=2.6
135
N adj.=2.6
115
N adj.=2.1
122
N adj.=1.1
130
N adj.=0.8
136
N adj.=0.1
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

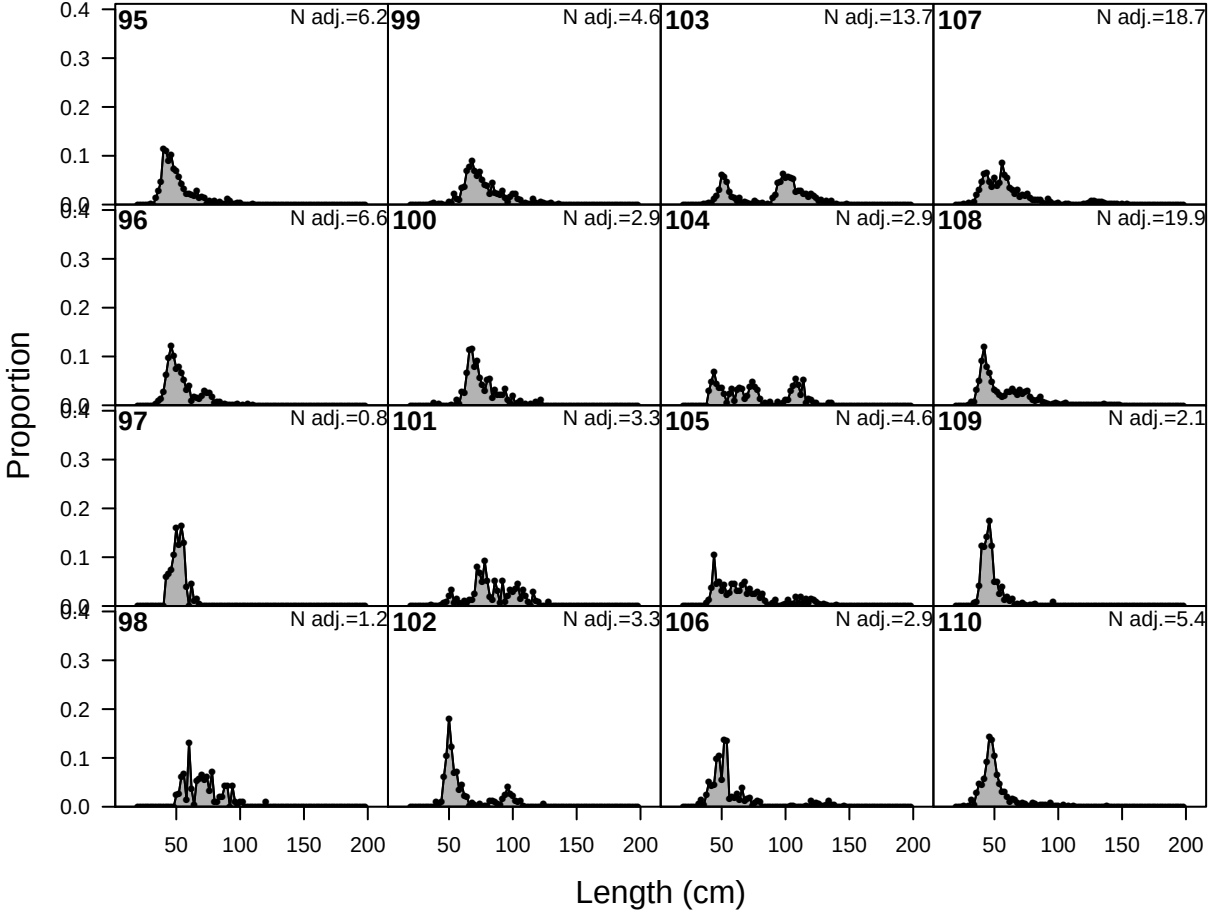

138
N adj.=1.2
145
N adj.=0
150
N adj.=0.6
155
N adj.=0.8
139
N adj.=2.6
146
N adj.=1.1
151
N adj.=0.8
157
N adj.=0.1
142
N adj.=0.4
147
N adj.=0.5
152
N adj.=0.2
158
N adj.=0.6
143
N adj.=2.2
149
N adj.=0
154
N adj.=0.3
159
N adj.=0.6
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

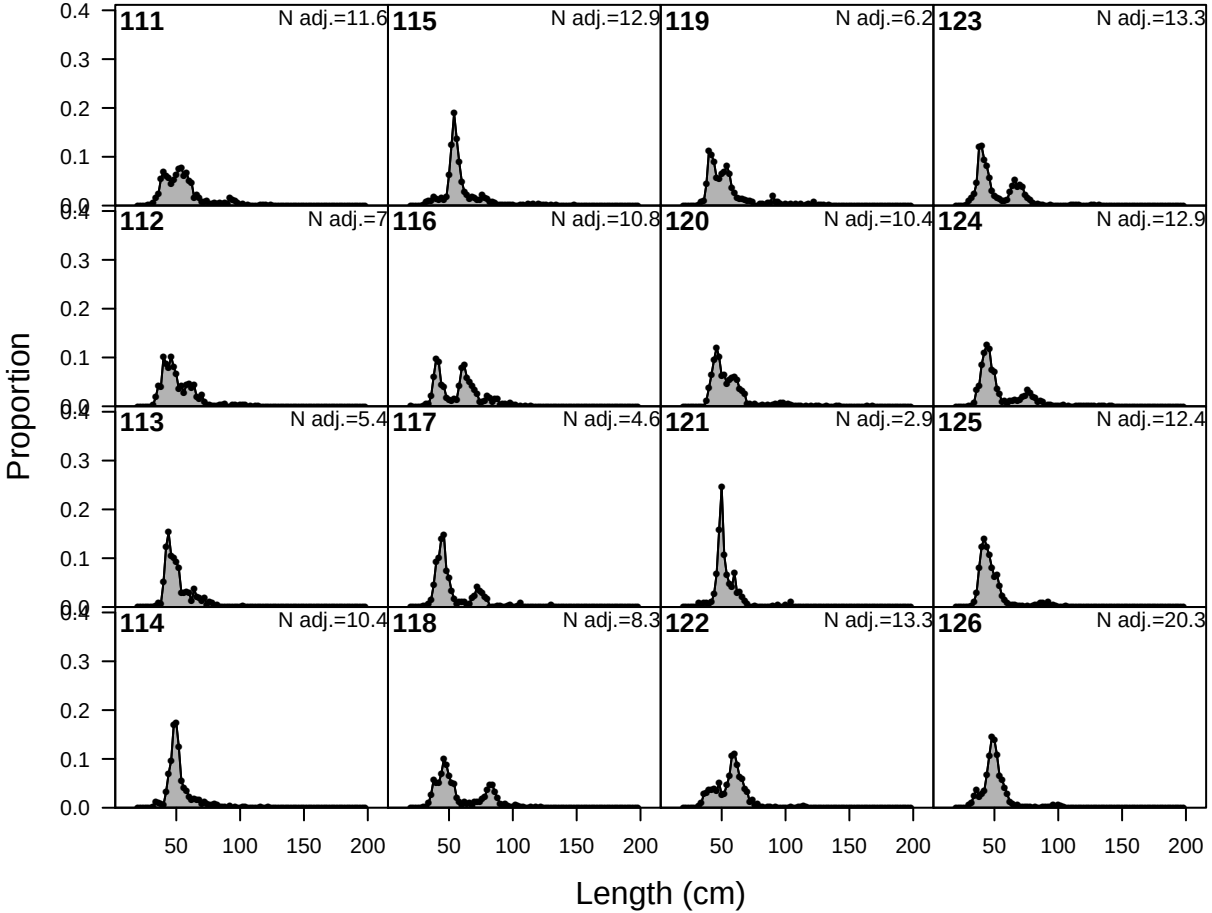

161
N adj.=0.1
170
N adj.=0.1
162
N adj.=0.3
171
N adj.=0.6
166
N adj.=0.2
174
N adj.=0.2
167
N adj.=0
175
N adj.=0.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

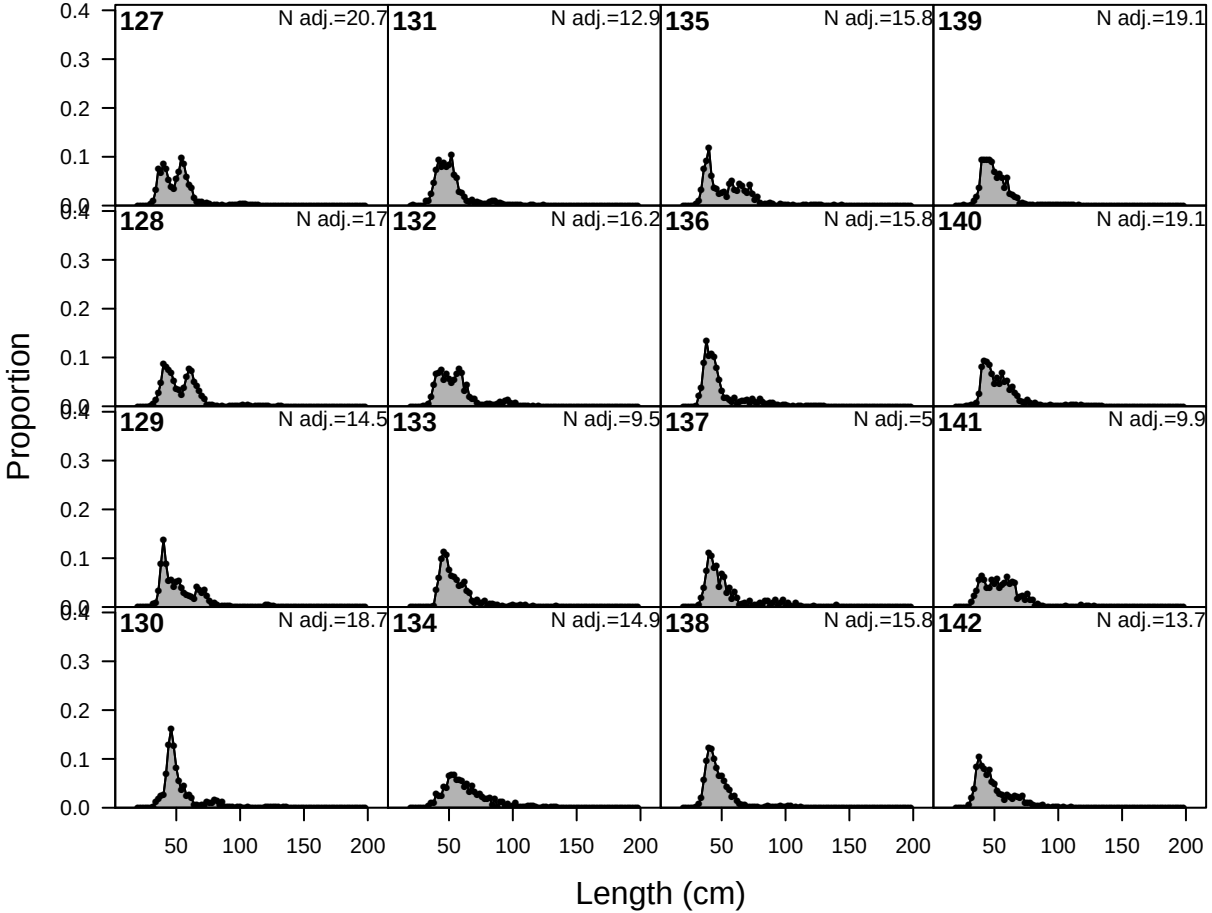

0.01
0.5
1
200
150
100
50
Length (cm)
46
59
68
78
87
99
110
122
134
145
157
170
Year

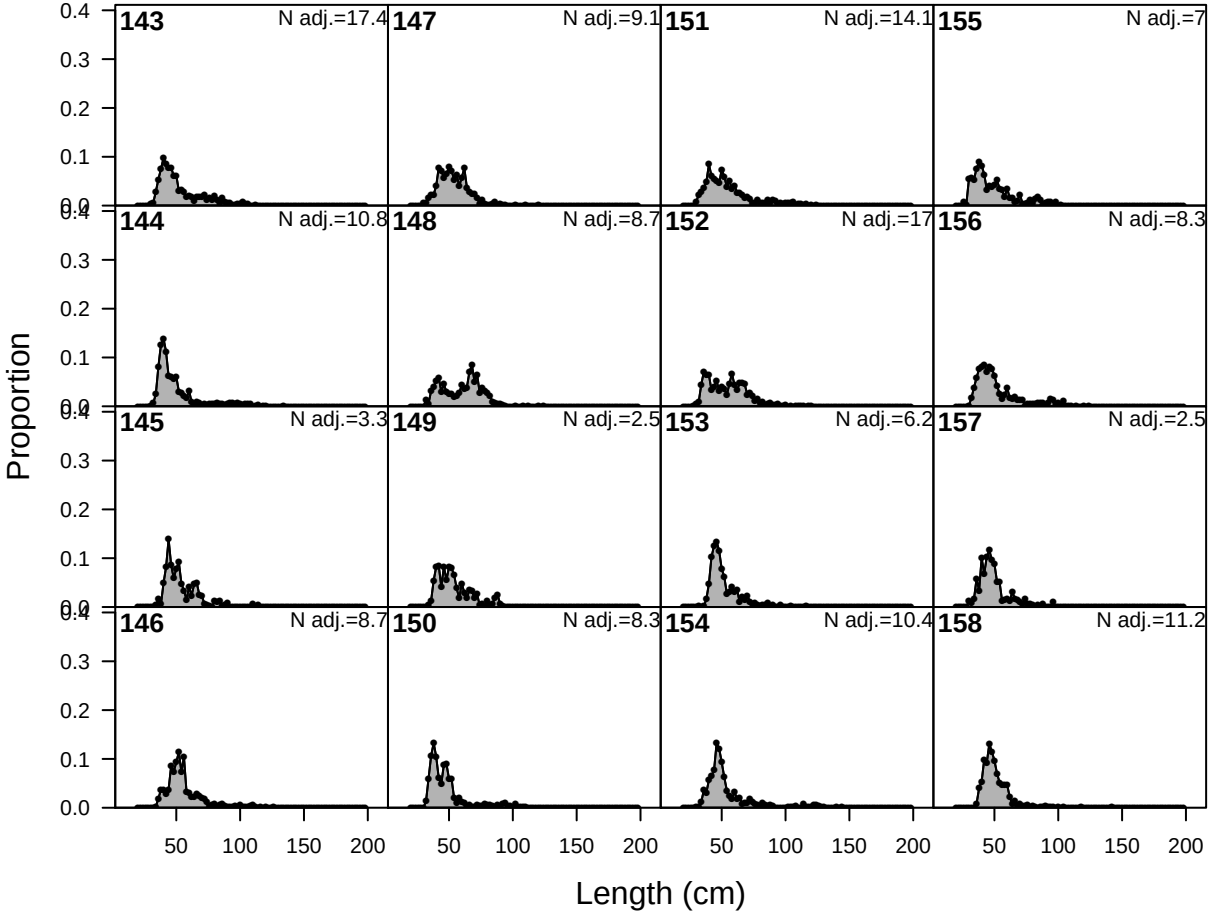

A6−LL−n (whole catch)
Mean length
400
200
0
−200
−400
60
80
100
120
140
160
180
Year

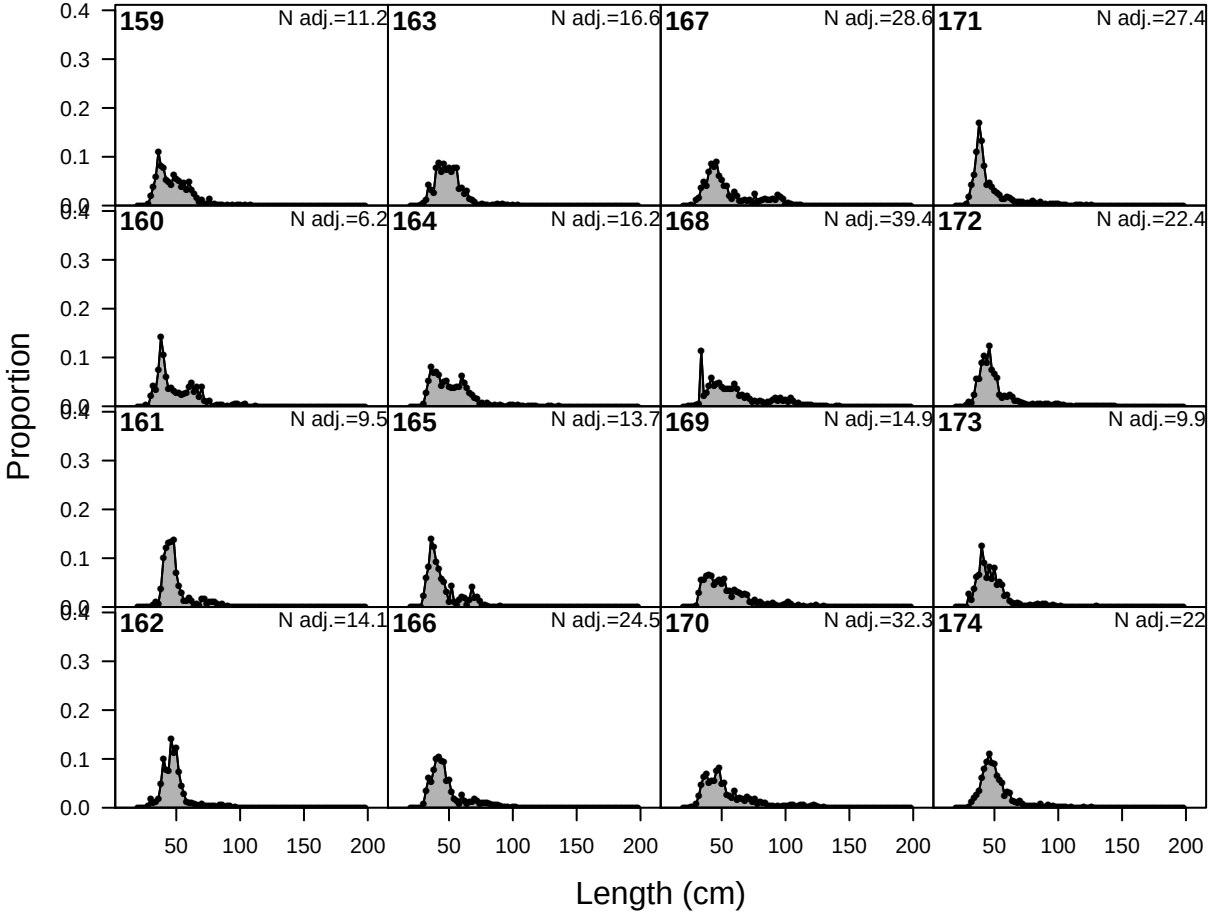

24
N adj.=0.8
83
N adj.=4.1
87
N adj.=7
91
N adj.=2.5
70
N adj.=0.8
84
N adj.=5.4
88
N adj.=7.9
92
N adj.=2.9
78
N adj.=1.7
85
N adj.=2.5
89
N adj.=5
93
N adj.=1.7
81
N adj.=0.8
86
N adj.=3.7
90
N adj.=2.5
94
N adj.=0.8
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

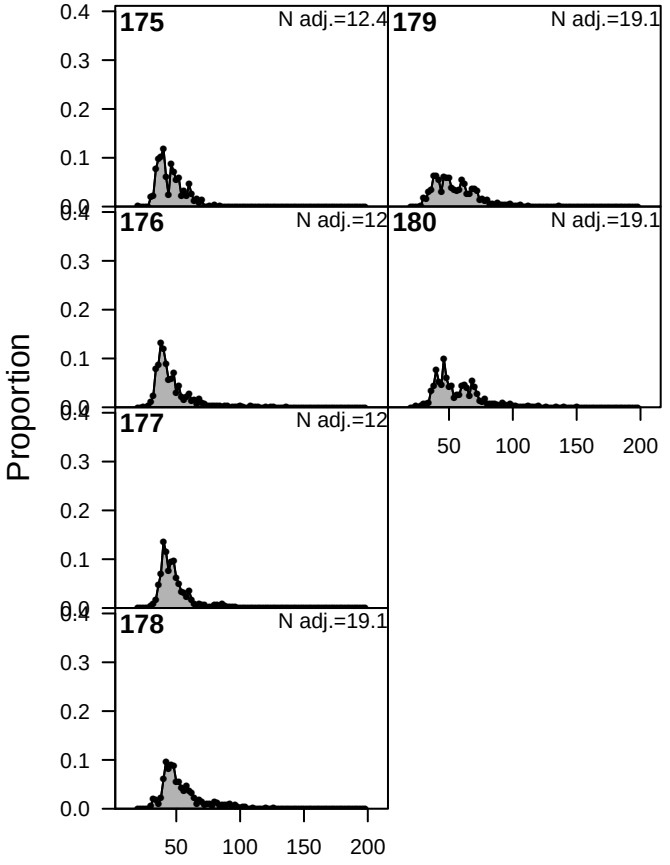

95
N adj.=6.2
99
N adj.=4.6
103
N adj.=13.7
107
N adj.=18.7
96
N adj.=6.6
100
N adj.=2.9
104
N adj.=2.9
108
N adj.=19.9
97
N adj.=0.8
101
N adj.=3.3
105
N adj.=4.6
109
N adj.=2.1
98
N adj.=1.2
102
N adj.=3.3
106
N adj.=2.9
110
N adj.=5.4
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

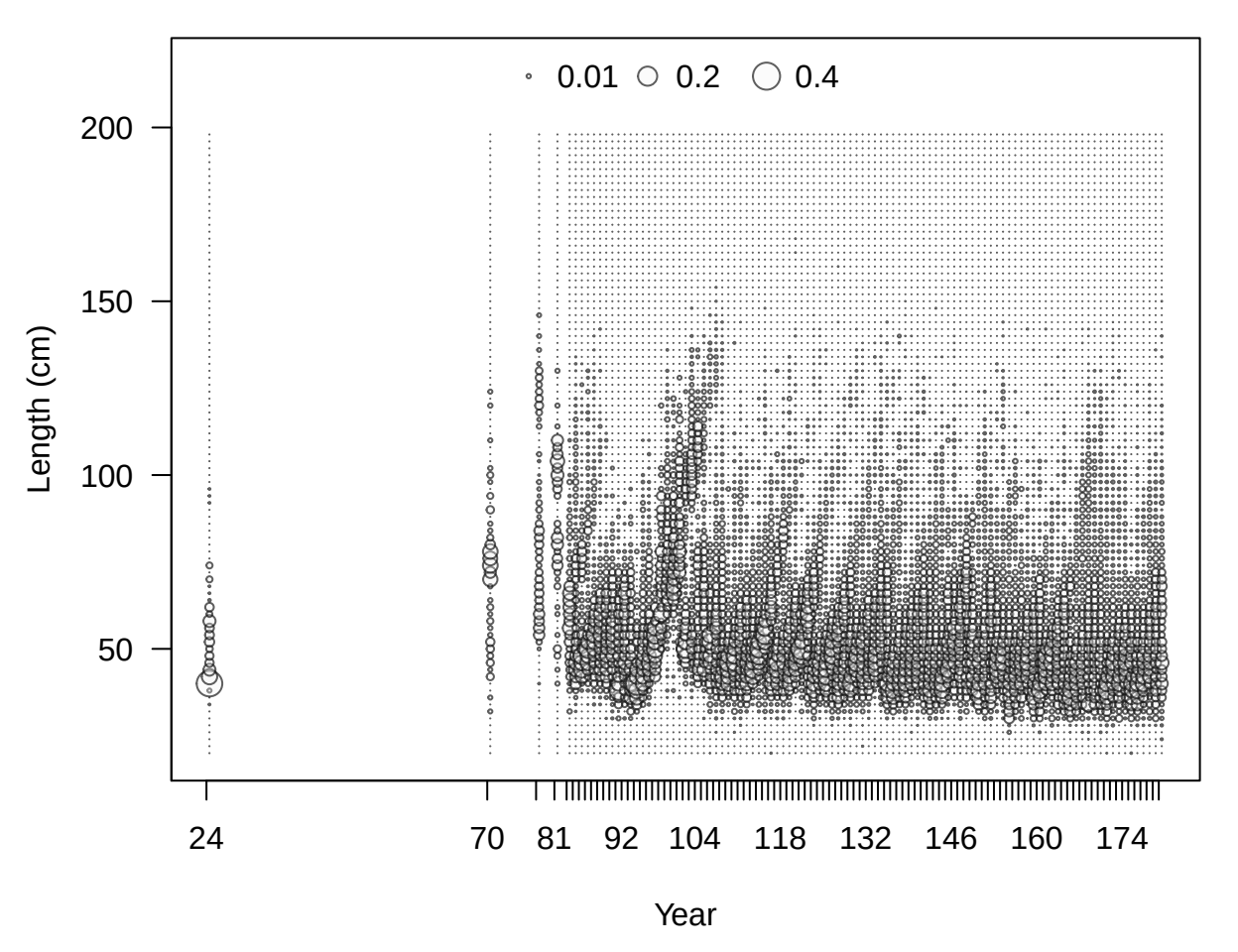

111
N adj.=11.6
115
N adj.=12.9
119
N adj.=6.2
123
N adj.=13.3
112
N adj.=7
116
N adj.=10.8
120
N adj.=10.4
124
N adj.=12.9
113
N adj.=5.4
117
N adj.=4.6
121
N adj.=2.9
125
N adj.=12.4
114
N adj.=10.4
118
N adj.=8.3
122
N adj.=13.3
126
N adj.=20.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

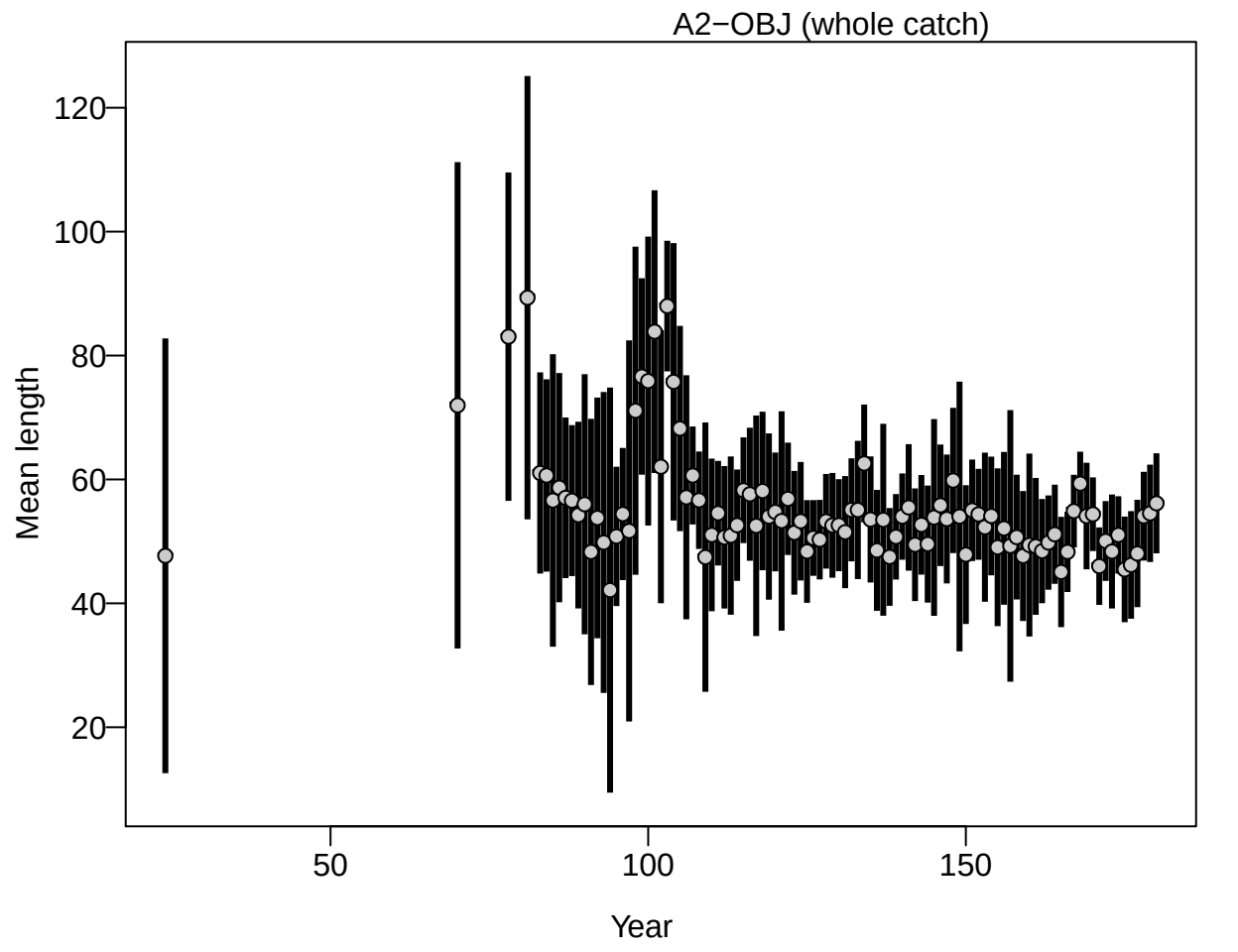

127
N adj.=20.7
131
N adj.=12.9
135
N adj.=15.8
139
N adj.=19.1
128
N adj.=17
132
N adj.=16.2
136
N adj.=15.8
140
N adj.=19.1
129
N adj.=14.5
133
N adj.=9.5
137
N adj.=5
141
N adj.=9.9
130
N adj.=18.7
134
N adj.=14.9
138
N adj.=15.8
142
N adj.=13.7
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

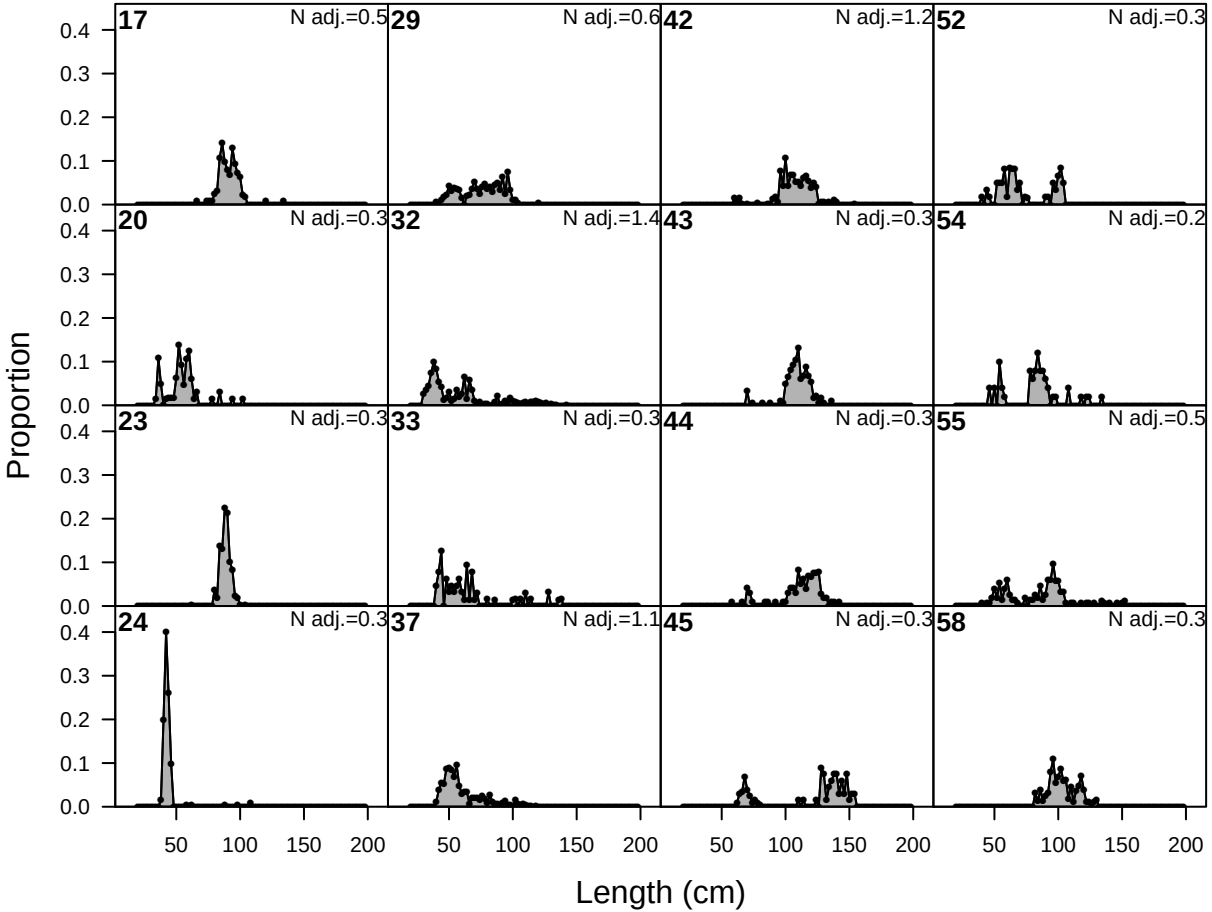

143
N adj.=17.4
147
N adj.=9.1
151
N adj.=14.1
155
N adj.=7
144
N adj.=10.8
148
N adj.=8.7
152
N adj.=17
156
N adj.=8.3
145
N adj.=3.3
149
N adj.=2.5
153
N adj.=6.2
157
N adj.=2.5
146
N adj.=8.7
150
N adj.=8.3
154
N adj.=10.4
158
N adj.=11.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

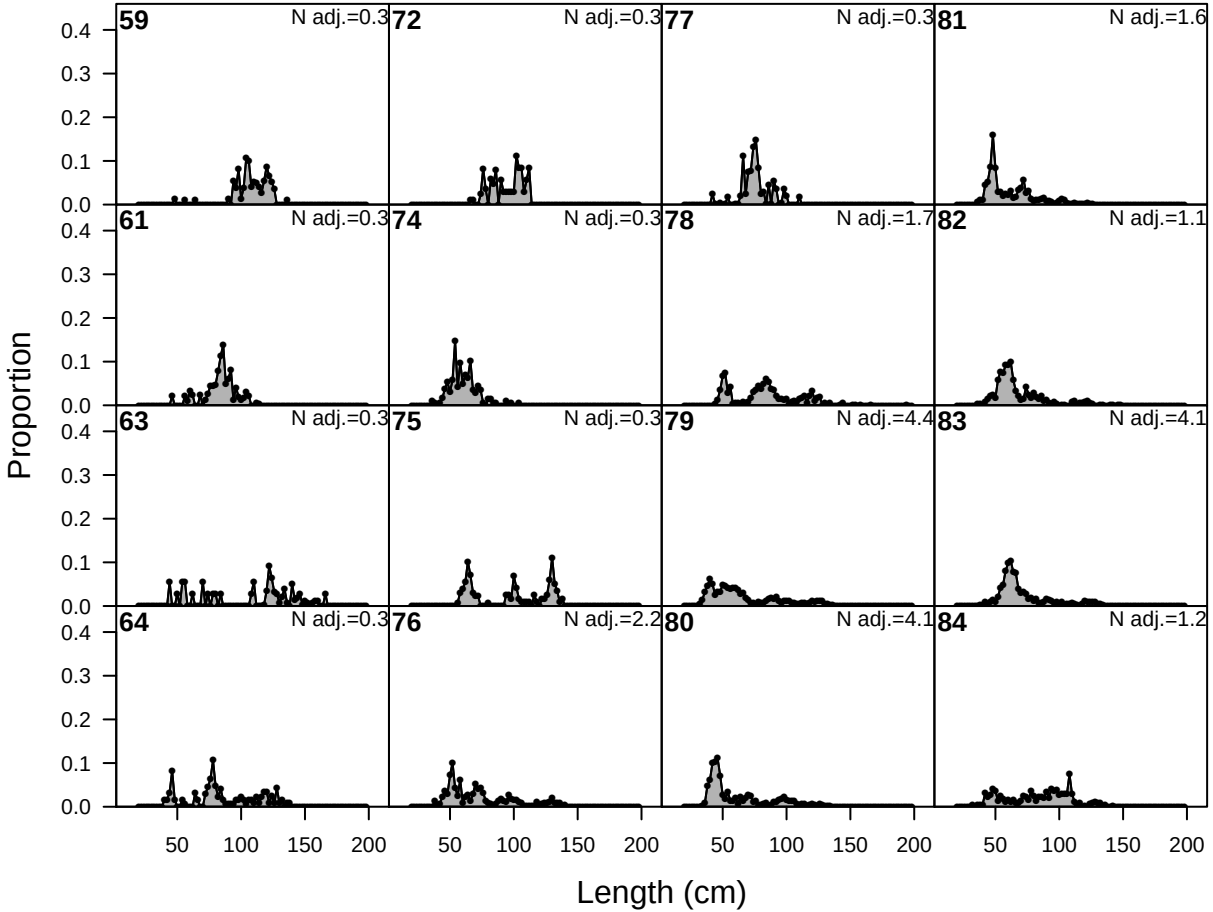

159
N adj.=11.2
163
N adj.=16.6
167
N adj.=28.6
171
N adj.=27.4
160
N adj.=6.2
164
N adj.=16.2
168
N adj.=39.4
172
N adj.=22.4
161
N adj.=9.5
165
N adj.=13.7
169
N adj.=14.9
173
N adj.=9.9
162
N adj.=14.1
166
N adj.=24.5
170
N adj.=32.3
174
N adj.=22
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

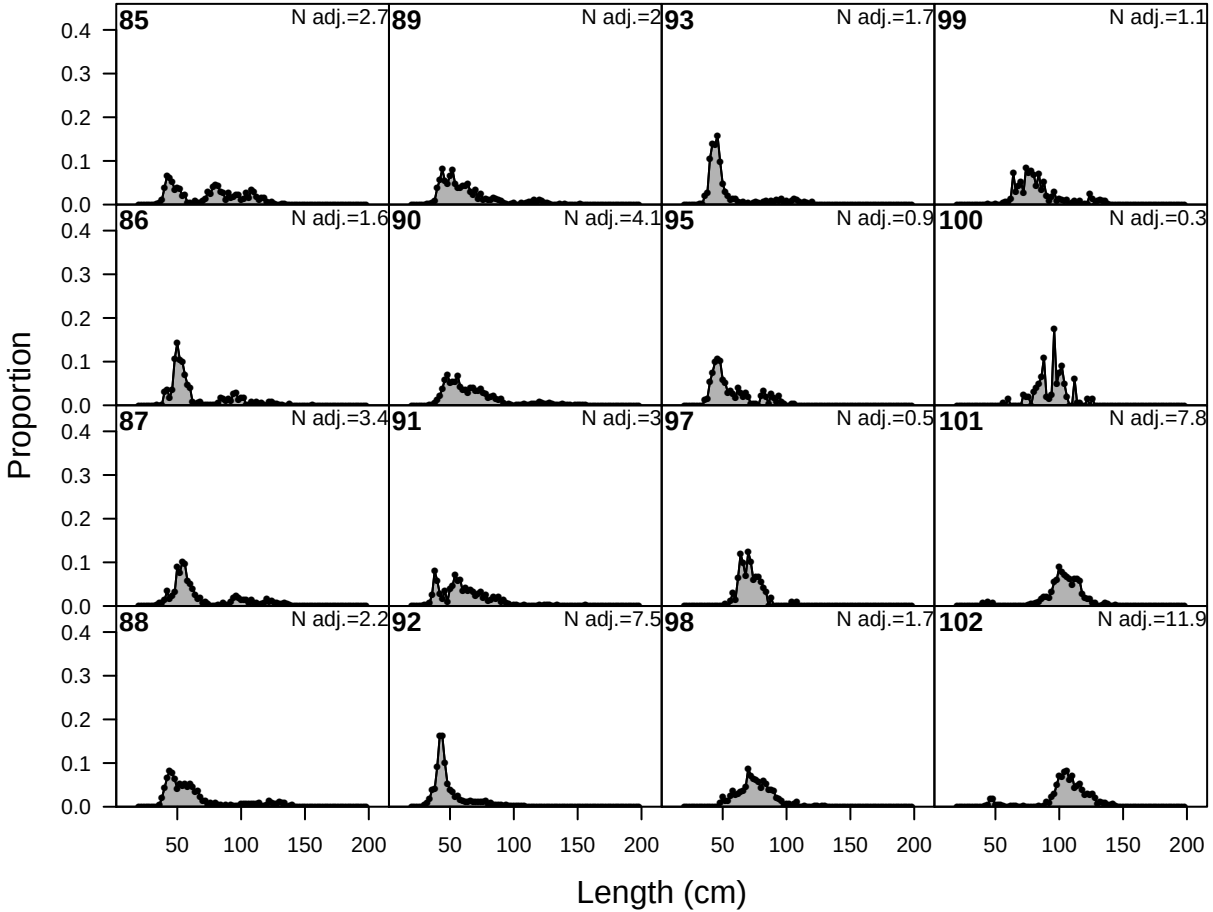

175
N adj.=12.4
179
N adj.=19.1
176
N adj.=12
180
N adj.=19.1
177
N adj.=12
178
N adj.=19.1
Proportion
Length (cm)
0.0
0.1
0.2
0.3
0.4
50
100
150
200

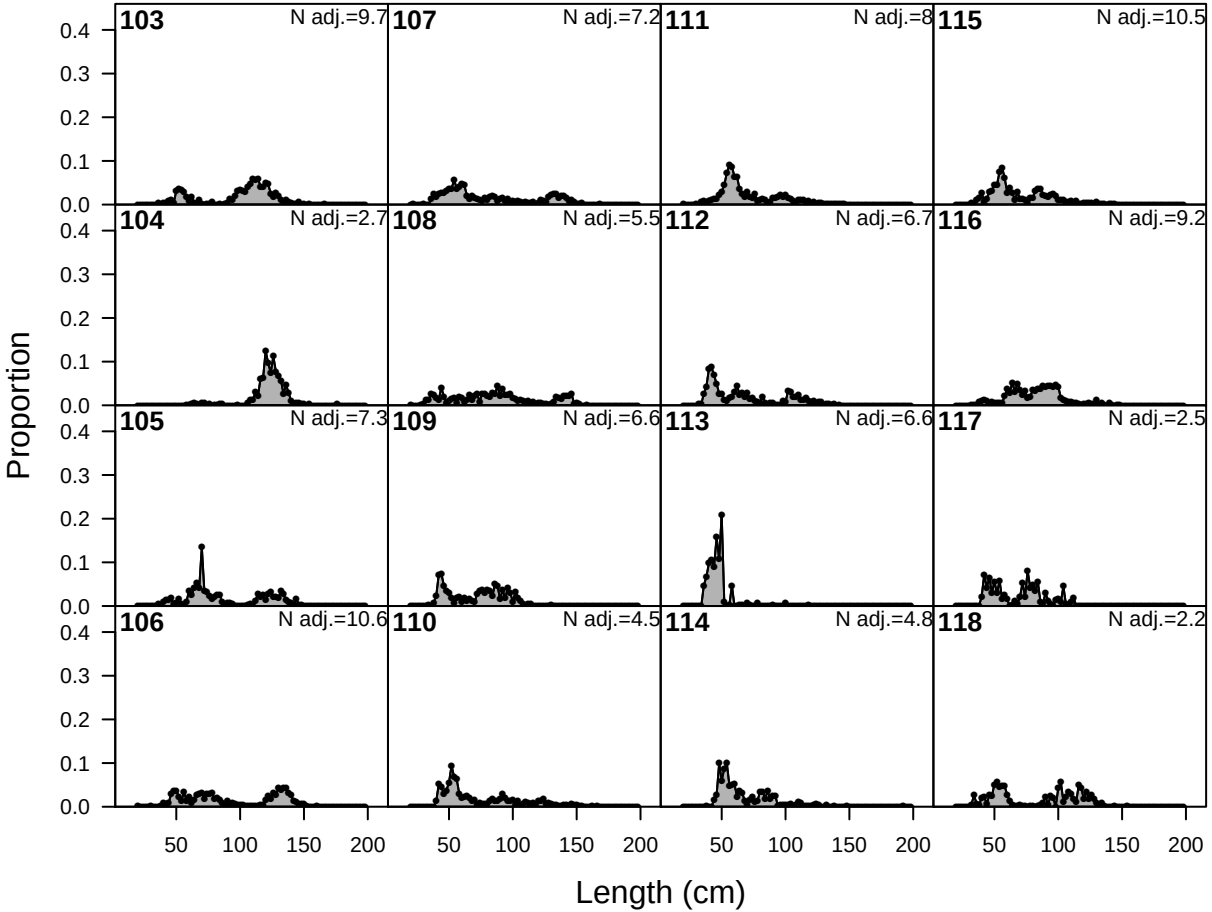

0.01
0.2
0.4
200
150
100
50
Length (cm)
24
70
81
92
104
118
132
146
160
174
Year

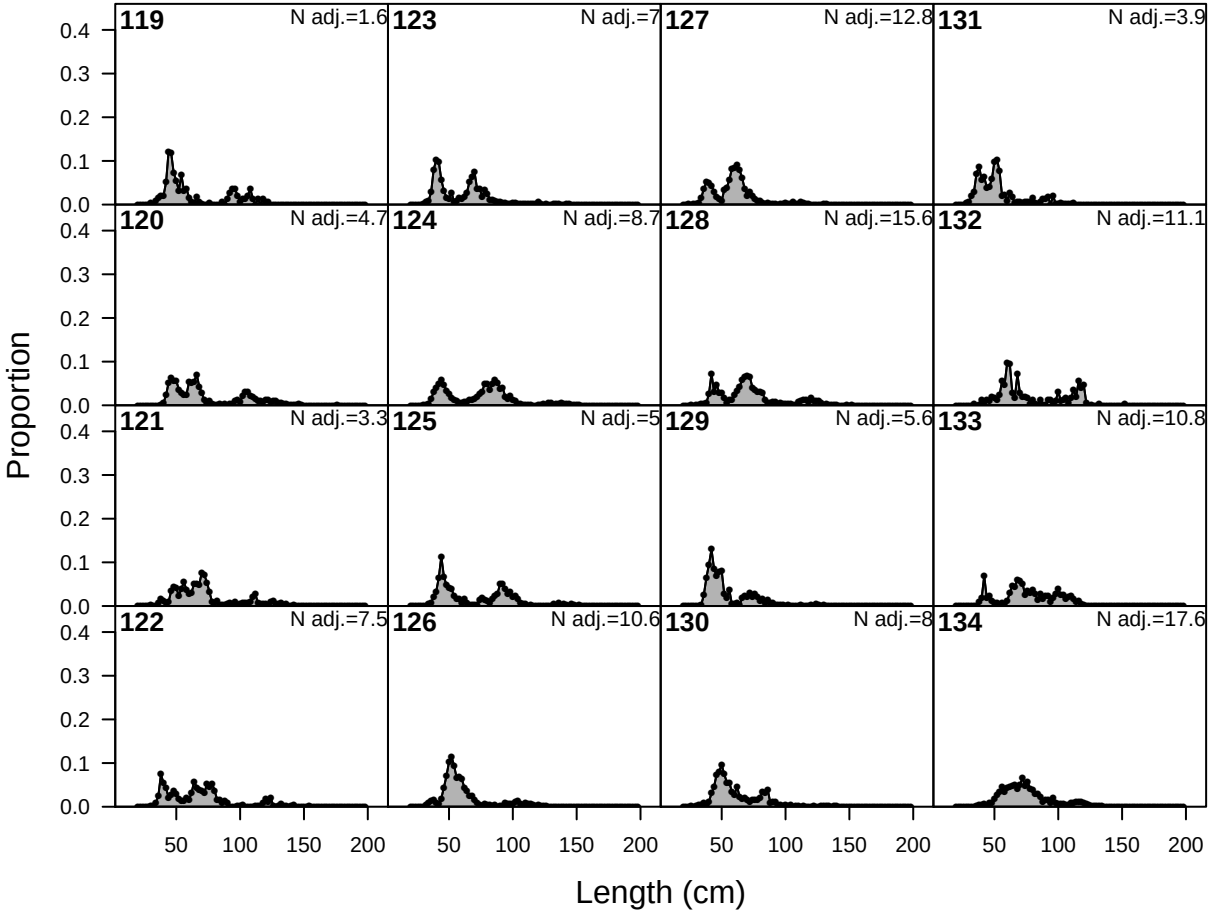

A2−OBJ (whole catch)
Mean length
120
100
80
60
40
20
50
100
150
Year

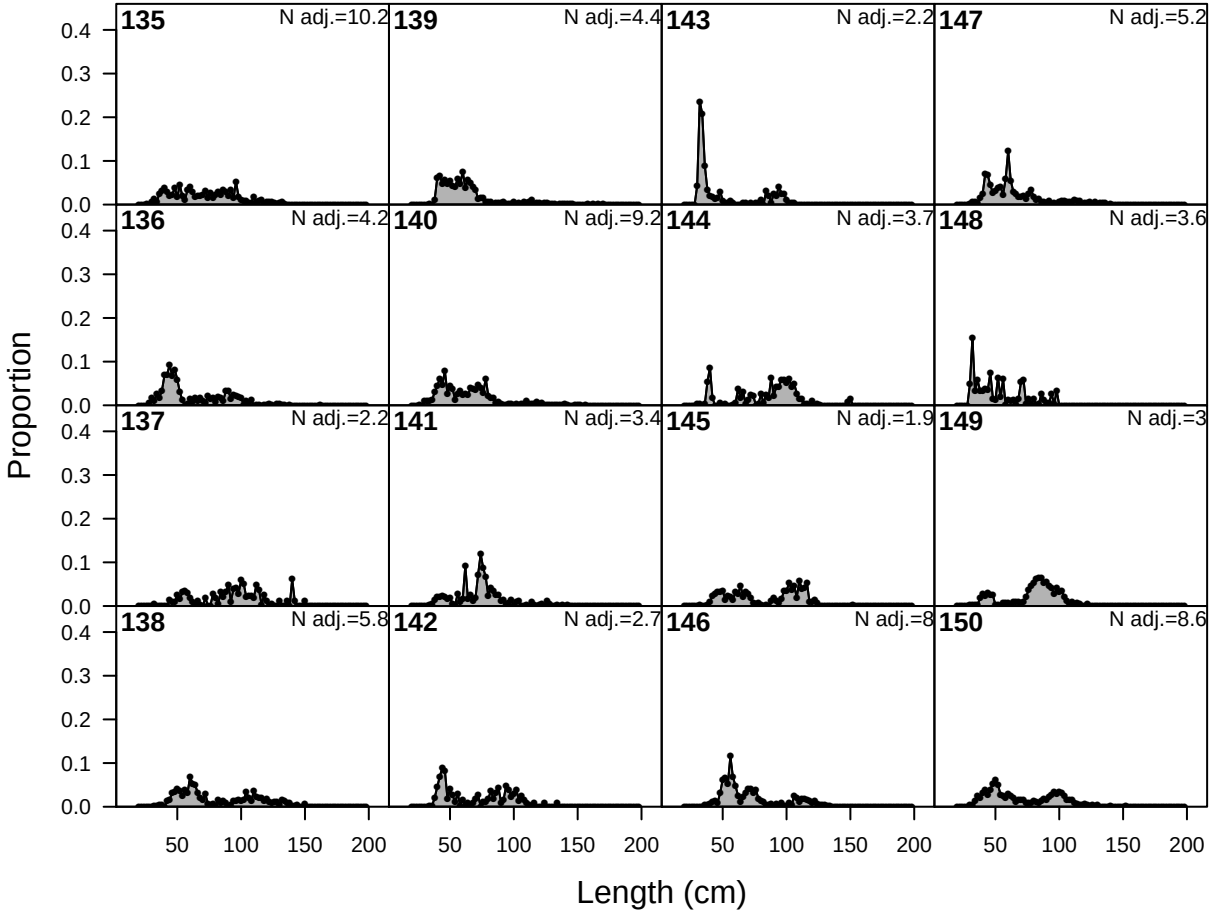

17
N adj.=0.5
29
N adj.=0.6
42
N adj.=1.2
52
N adj.=0.3
20
N adj.=0.3
32
N adj.=1.4
43
N adj.=0.3
54
N adj.=0.2
23
N adj.=0.3
33
N adj.=0.3
44
N adj.=0.3
55
N adj.=0.5
24
N adj.=0.3
37
N adj.=1.1
45
N adj.=0.3
58
N adj.=0.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

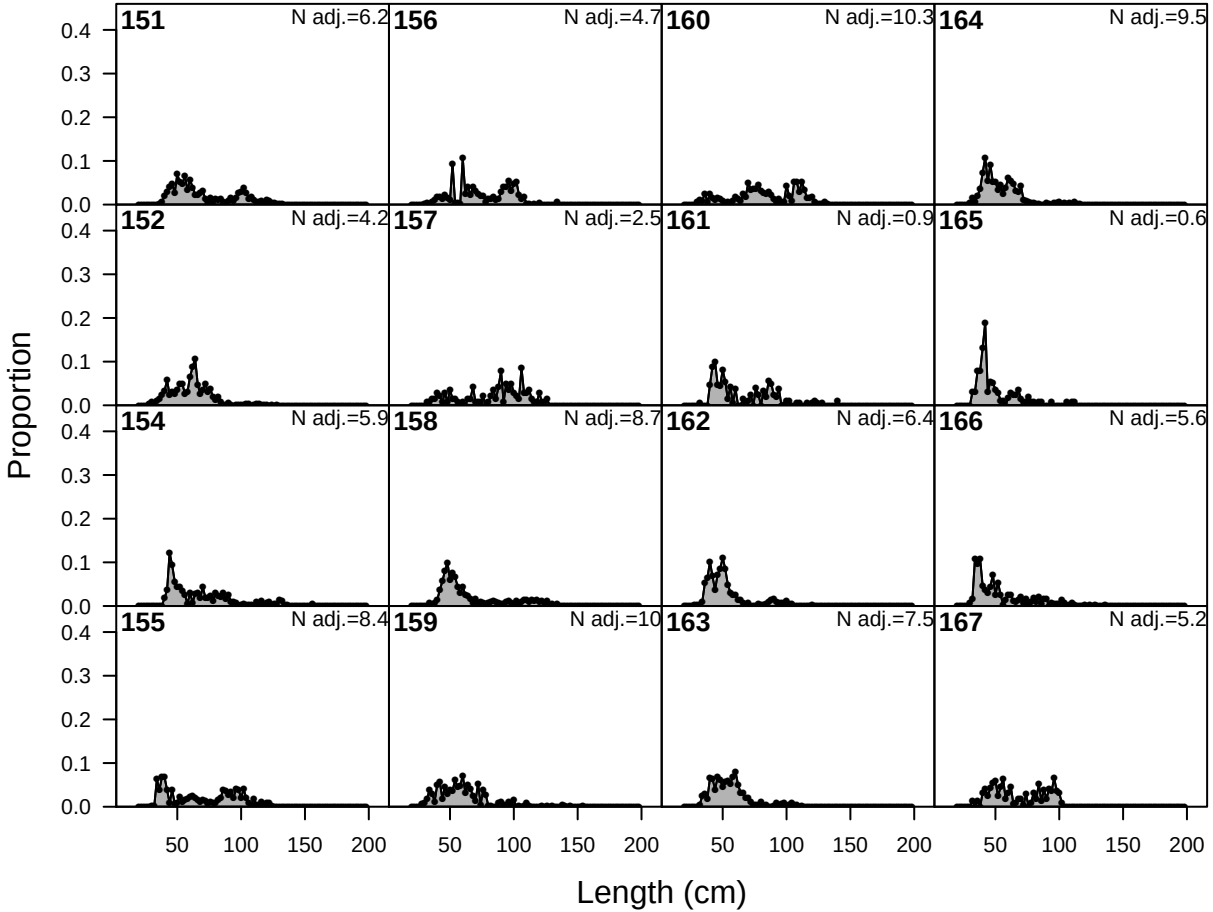

59
N adj.=0.3
72
N adj.=0.3
77
N adj.=0.3
81
N adj.=1.6
61
N adj.=0.3
74
N adj.=0.3
78
N adj.=1.7
82
N adj.=1.1
63
N adj.=0.3
75
N adj.=0.3
79
N adj.=4.4
83
N adj.=4.1
64
N adj.=0.3
76
N adj.=2.2
80
N adj.=4.1
84
N adj.=1.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

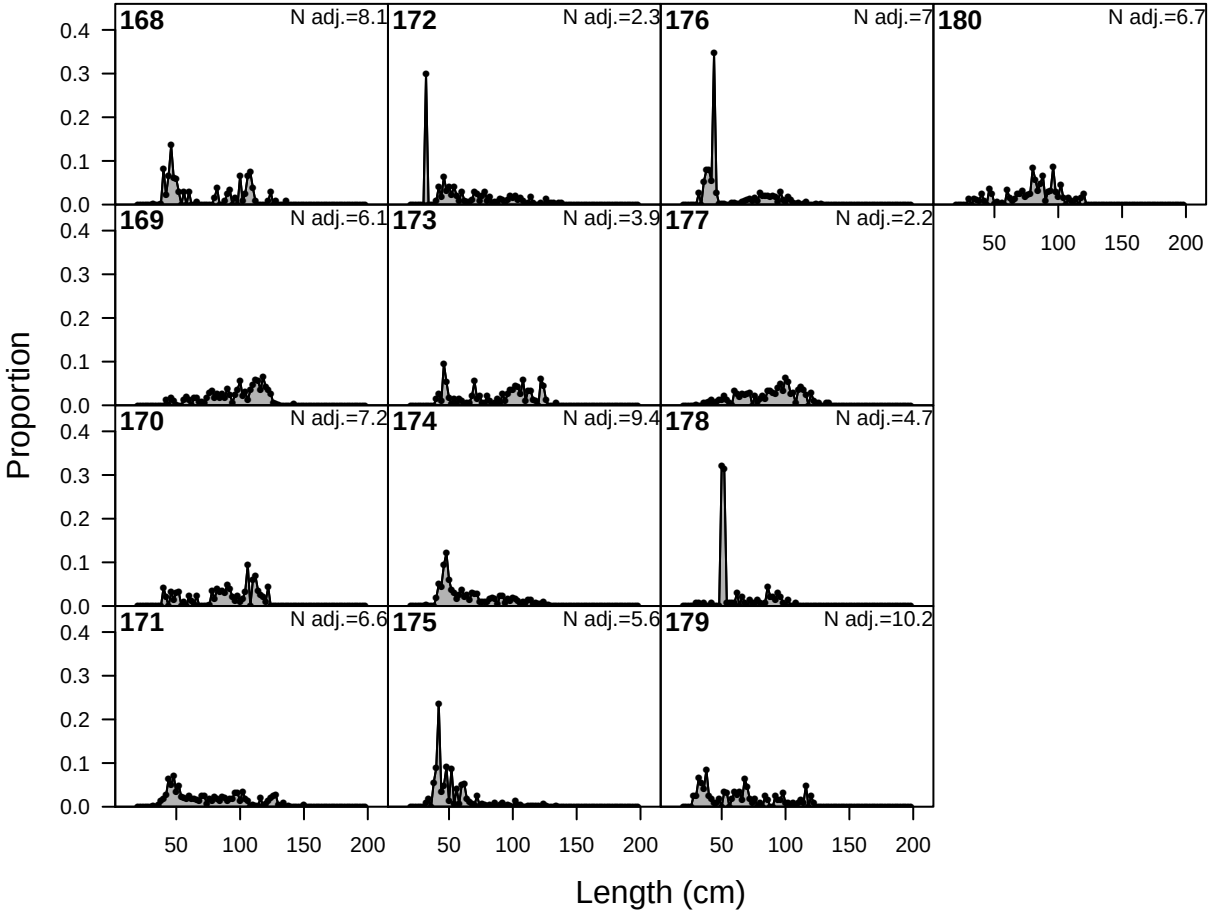

85
N adj.=2.7
89
N adj.=2
93
N adj.=1.7
99
N adj.=1.1
86
N adj.=1.6
90
N adj.=4.1
95
N adj.=0.9
100
N adj.=0.3
87
N adj.=3.4
91
N adj.=3
97
N adj.=0.5
101
N adj.=7.8
88
N adj.=2.2
92
N adj.=7.5
98
N adj.=1.7
102
N adj.=11.9
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

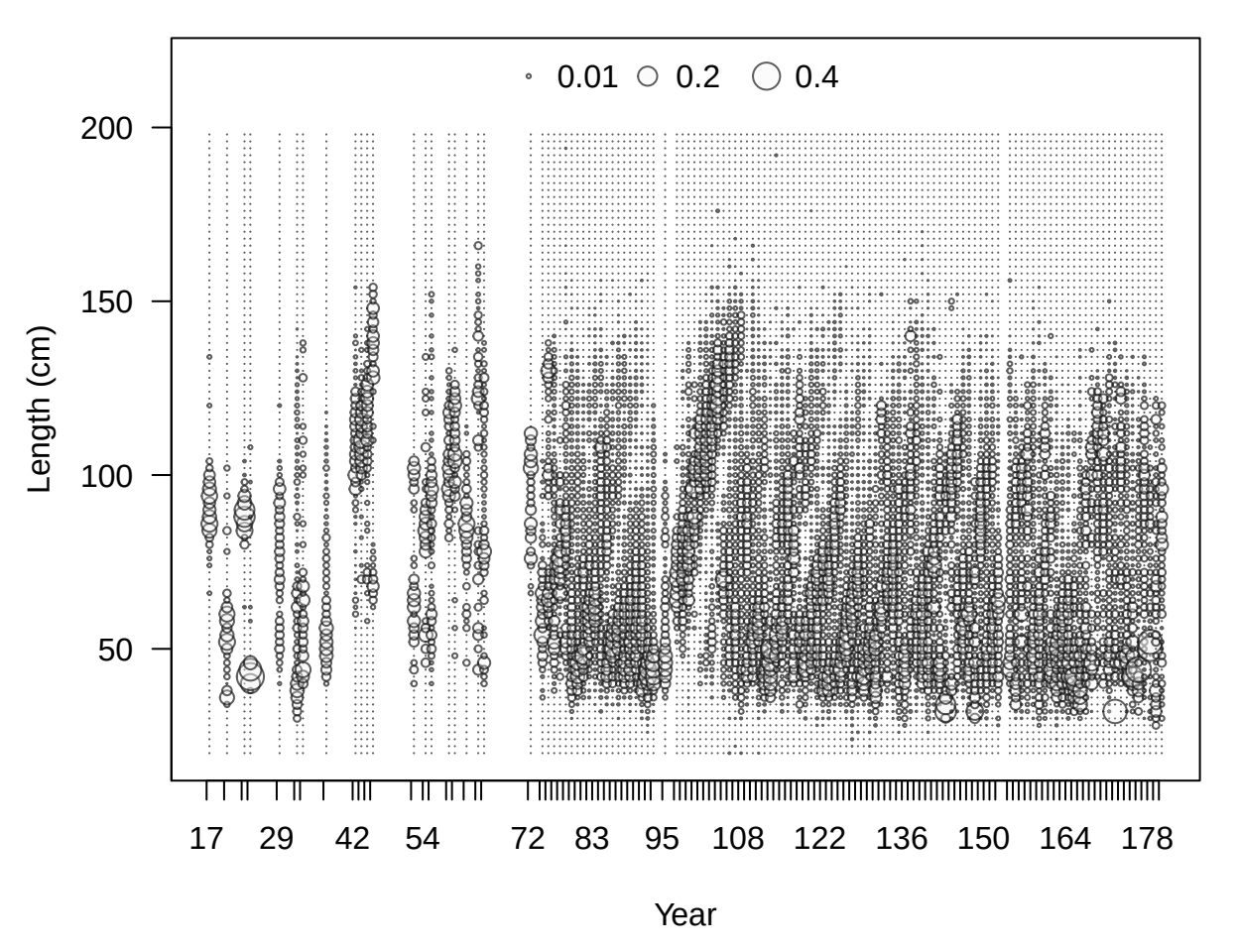

103
N adj.=9.7
107
N adj.=7.2
111
N adj.=8
115
N adj.=10.5
104
N adj.=2.7
108
N adj.=5.5
112
N adj.=6.7
116
N adj.=9.2
105
N adj.=7.3
109
N adj.=6.6
113
N adj.=6.6
117
N adj.=2.5
106
N adj.=10.6
110
N adj.=4.5
114
N adj.=4.8
118
N adj.=2.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

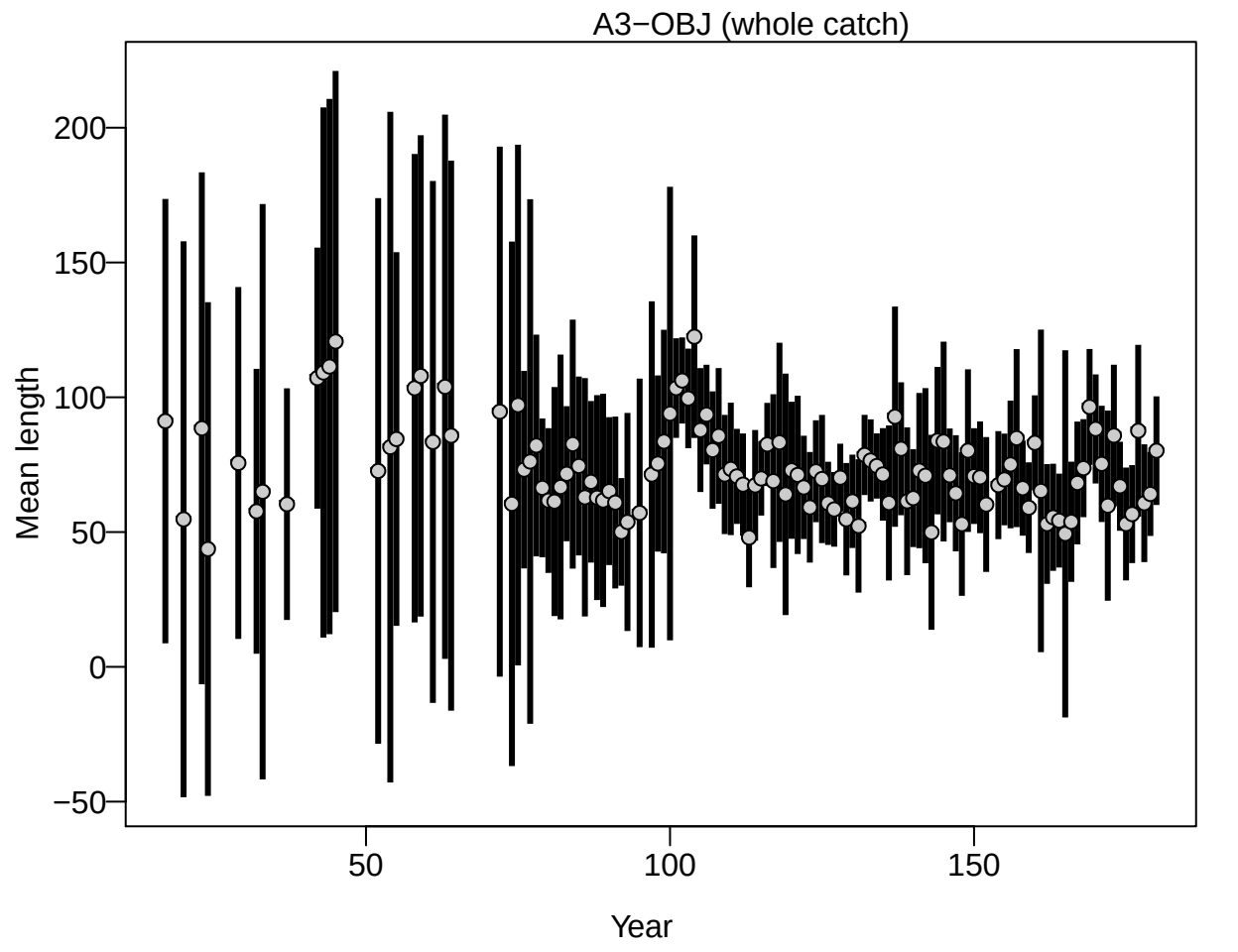

119
N adj.=1.6
123
N adj.=7
127
N adj.=12.8
131
N adj.=3.9
120
N adj.=4.7
124
N adj.=8.7
128
N adj.=15.6
132
N adj.=11.1
121
N adj.=3.3
125
N adj.=5
129
N adj.=5.6
133
N adj.=10.8
122
N adj.=7.5
126
N adj.=10.6
130
N adj.=8
134
N adj.=17.6
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

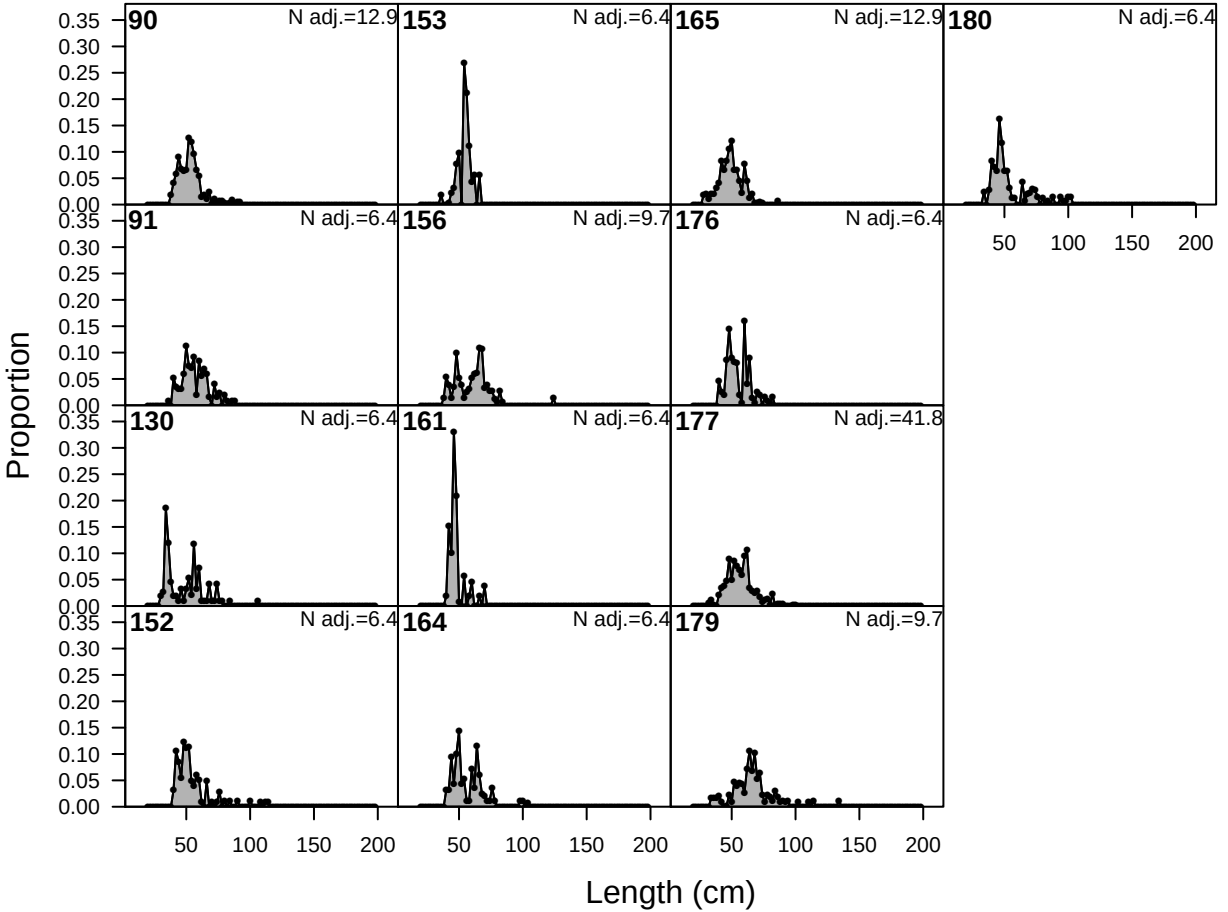

135
N adj.=10.2
139
N adj.=4.4
143
N adj.=2.2
147
N adj.=5.2
136
N adj.=4.2
140
N adj.=9.2
144
N adj.=3.7
148
N adj.=3.6
137
N adj.=2.2
141
N adj.=3.4
145
N adj.=1.9
149
N adj.=3
138
N adj.=5.8
142
N adj.=2.7
146
N adj.=8
150
N adj.=8.6
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

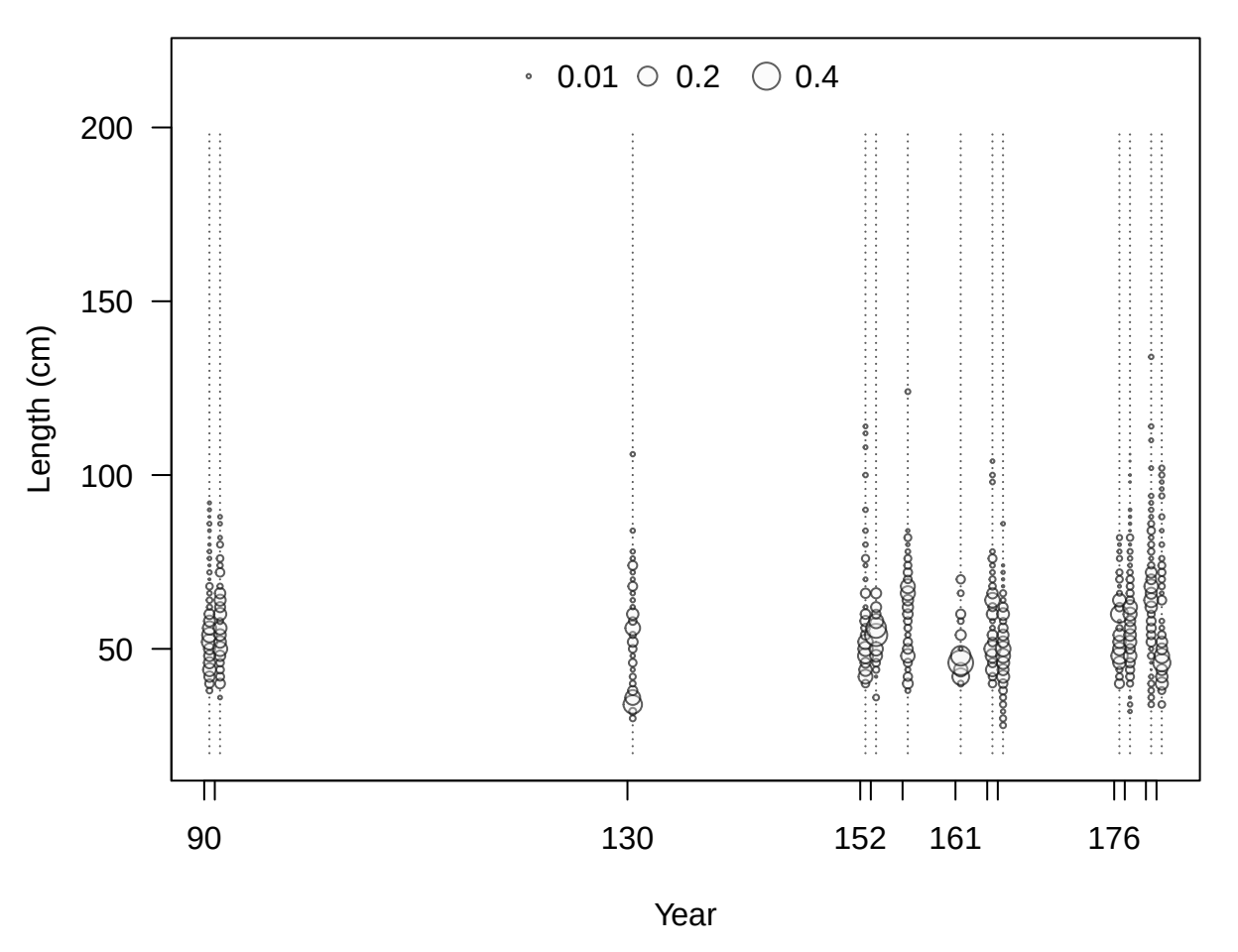

151
N adj.=6.2
156
N adj.=4.7
160
N adj.=10.3
164
N adj.=9.5
152
N adj.=4.2
157
N adj.=2.5
161
N adj.=0.9
165
N adj.=0.6
154
N adj.=5.9
158
N adj.=8.7
162
N adj.=6.4
166
N adj.=5.6
155
N adj.=8.4
159
N adj.=10
163
N adj.=7.5
167
N adj.=5.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

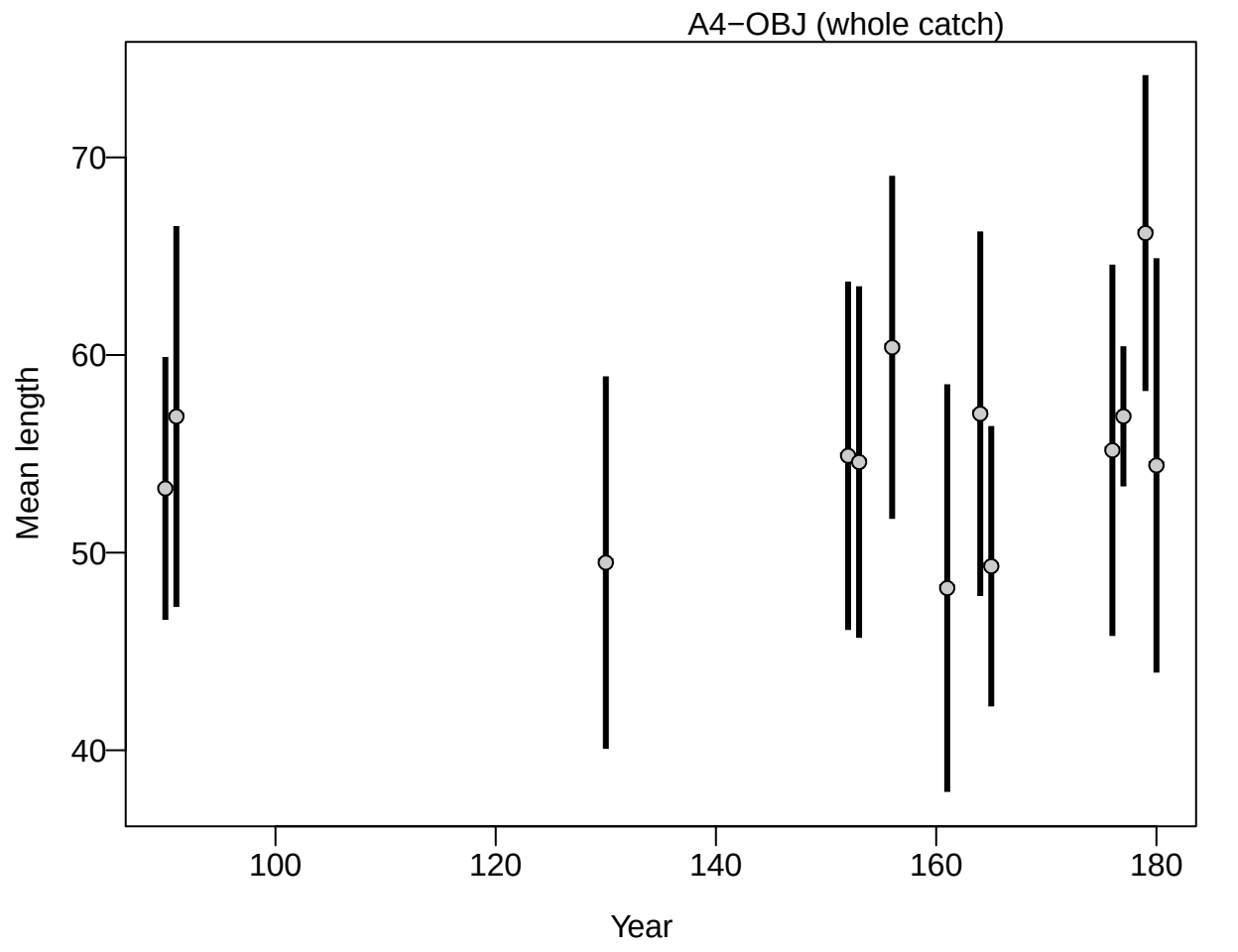

168
N adj.=8.1
172
N adj.=2.3
176
N adj.=7
180
N adj.=6.7
169
N adj.=6.1
173
N adj.=3.9
177
N adj.=2.2
170
N adj.=7.2
174
N adj.=9.4
178
N adj.=4.7
171
N adj.=6.6
175
N adj.=5.6
179
N adj.=10.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

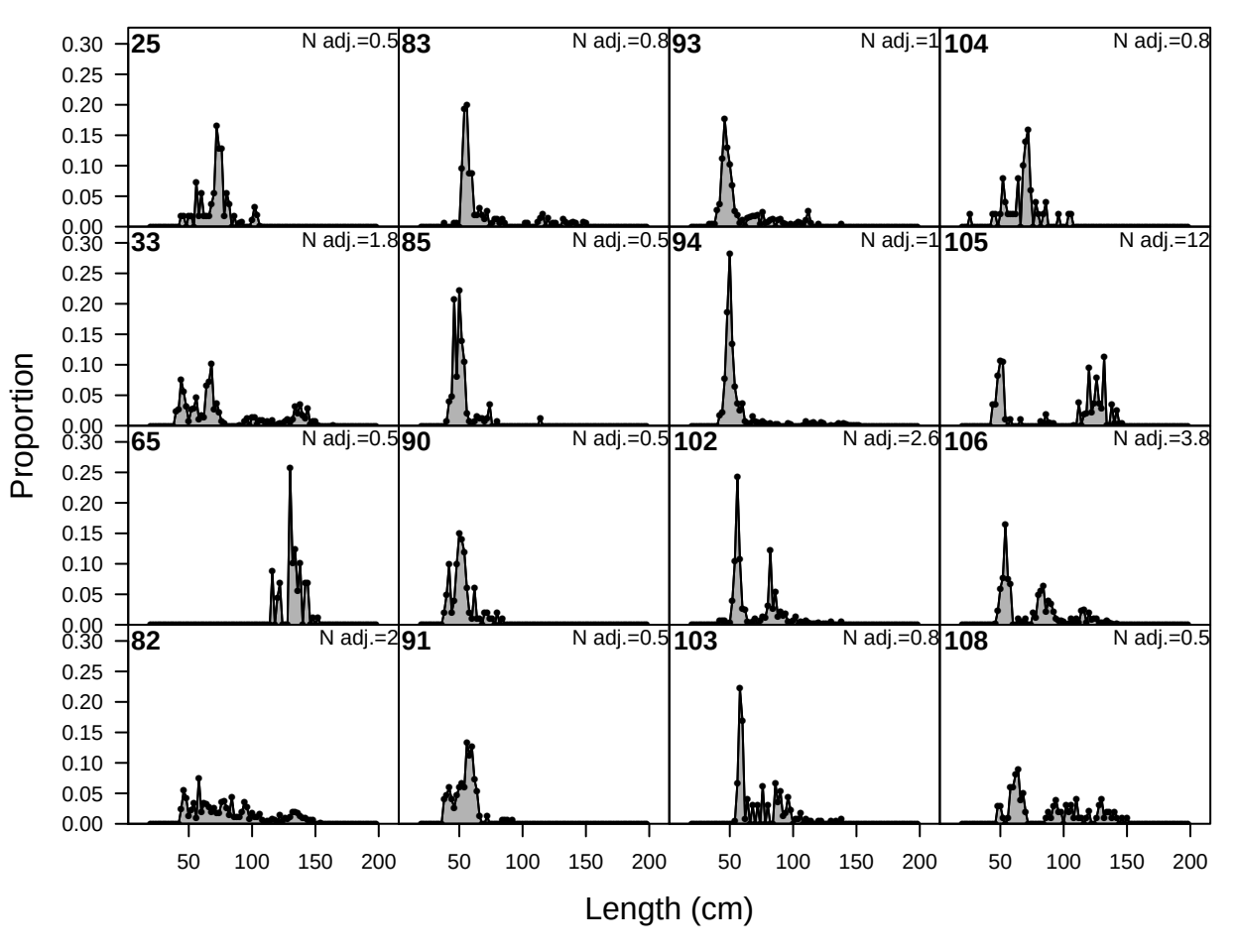

0.01
0.2
0.4
200
150
100
50
Length (cm)
17
29
42
54
72
83
95
108
122
136
150
164
178
Year

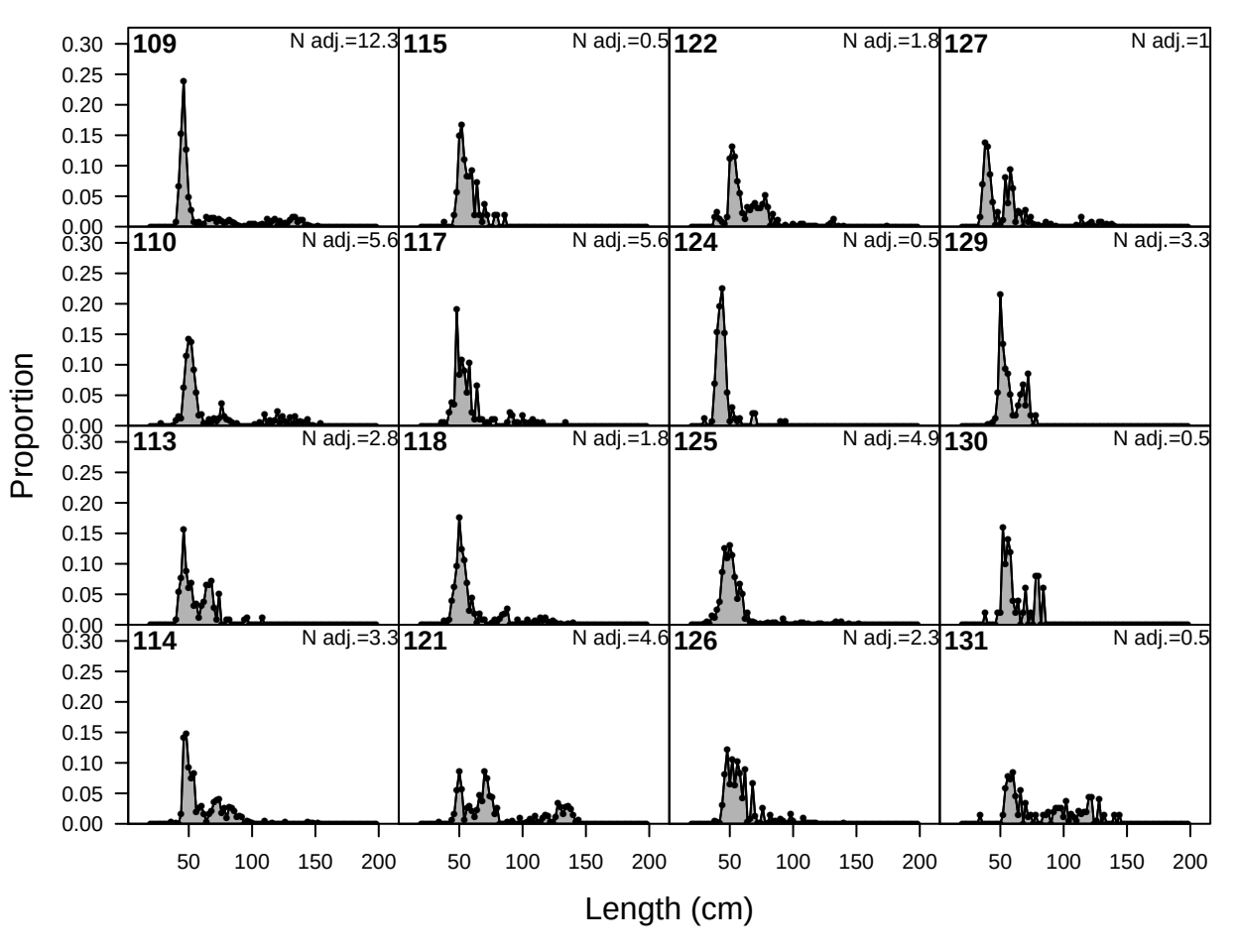

A3−OBJ (whole catch)
Mean length
200
150
100
50
0
−50
50
100
150
Year

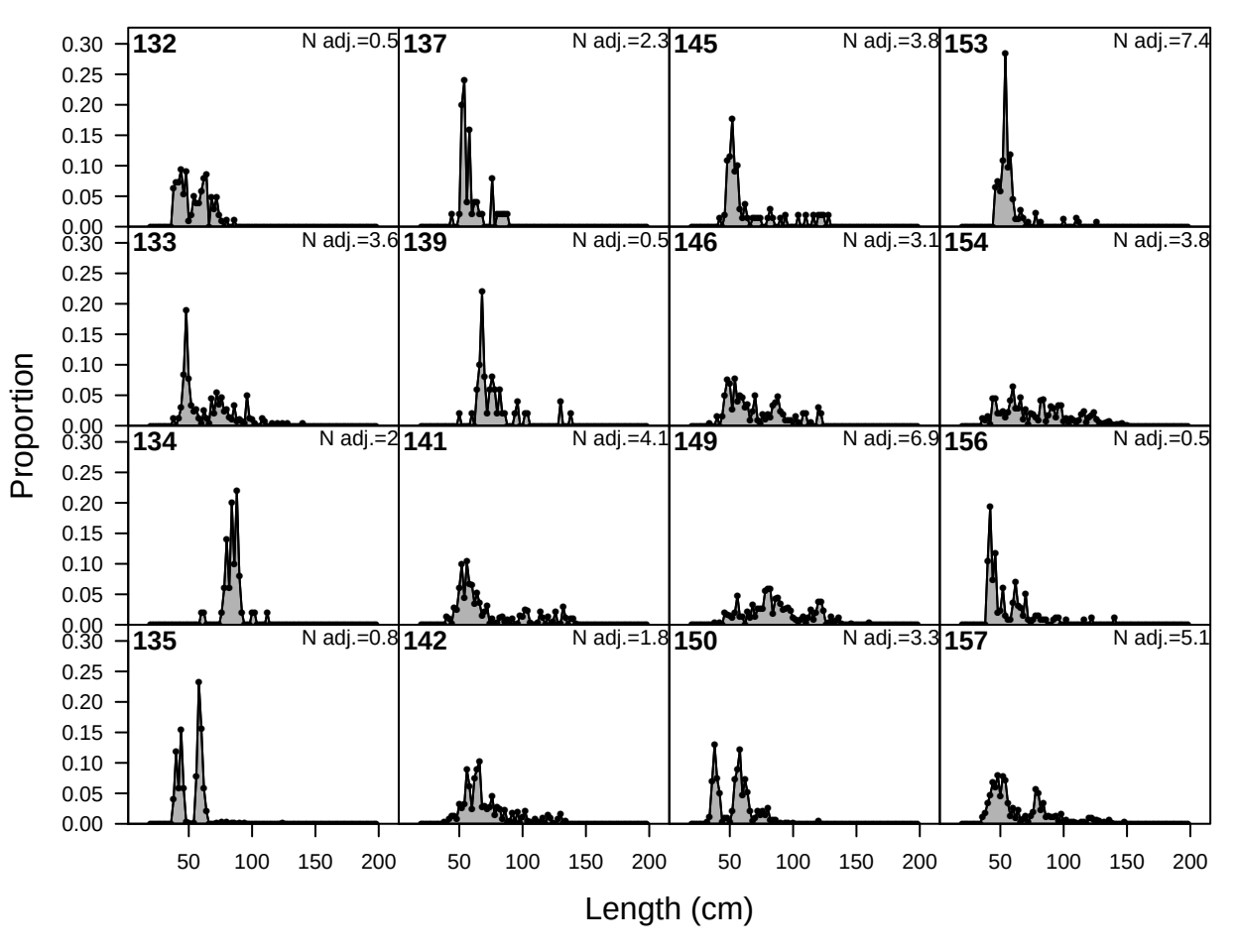

90
N adj.=12.9
153
N adj.=6.4
165
N adj.=12.9
180
N adj.=6.4
91
N adj.=6.4
156
N adj.=9.7
176
N adj.=6.4
130
N adj.=6.4
161
N adj.=6.4
177
N adj.=41.8
152
N adj.=6.4
164
N adj.=6.4
179
N adj.=9.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

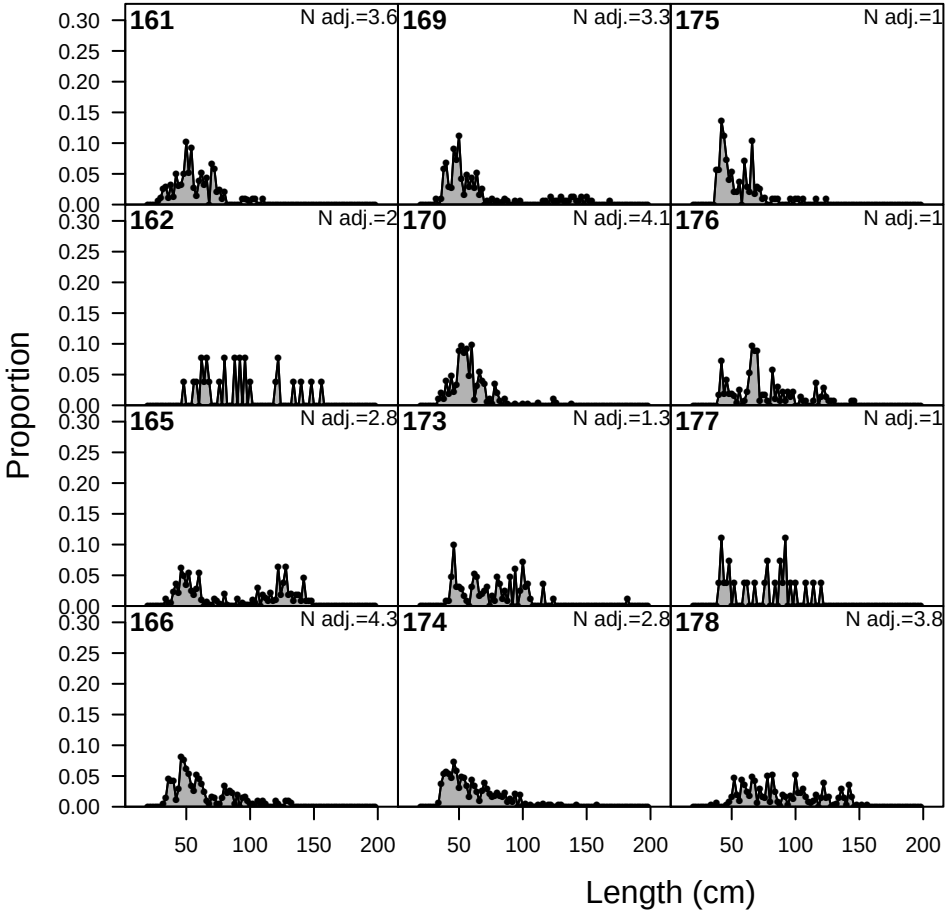

0.01
0.2
0.4
200
150
100
50
Length (cm)
90
130
152
161
176
Year

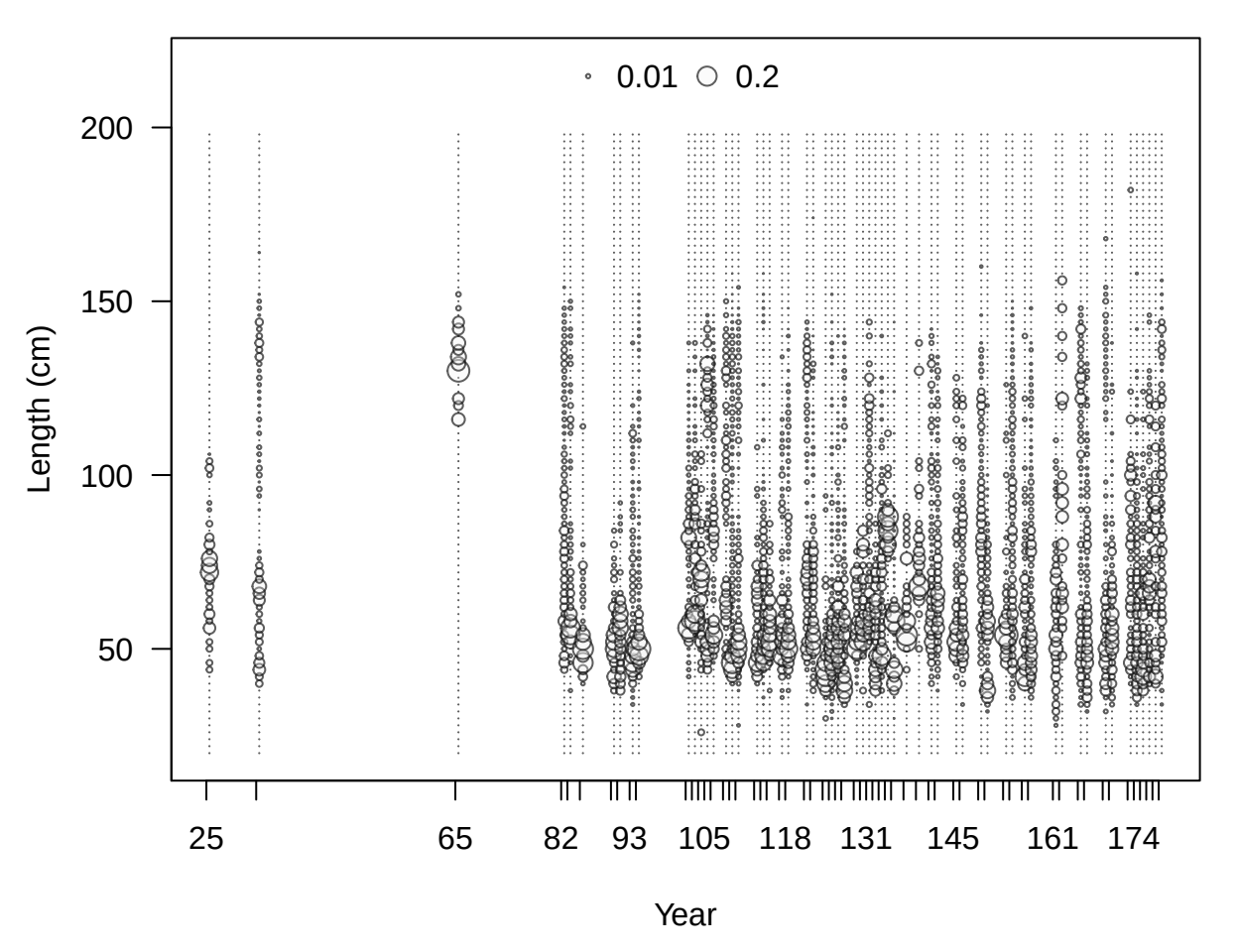

A4−OBJ (whole catch)
Mean length
70
60
50
40
100
120
140
160
180
Year

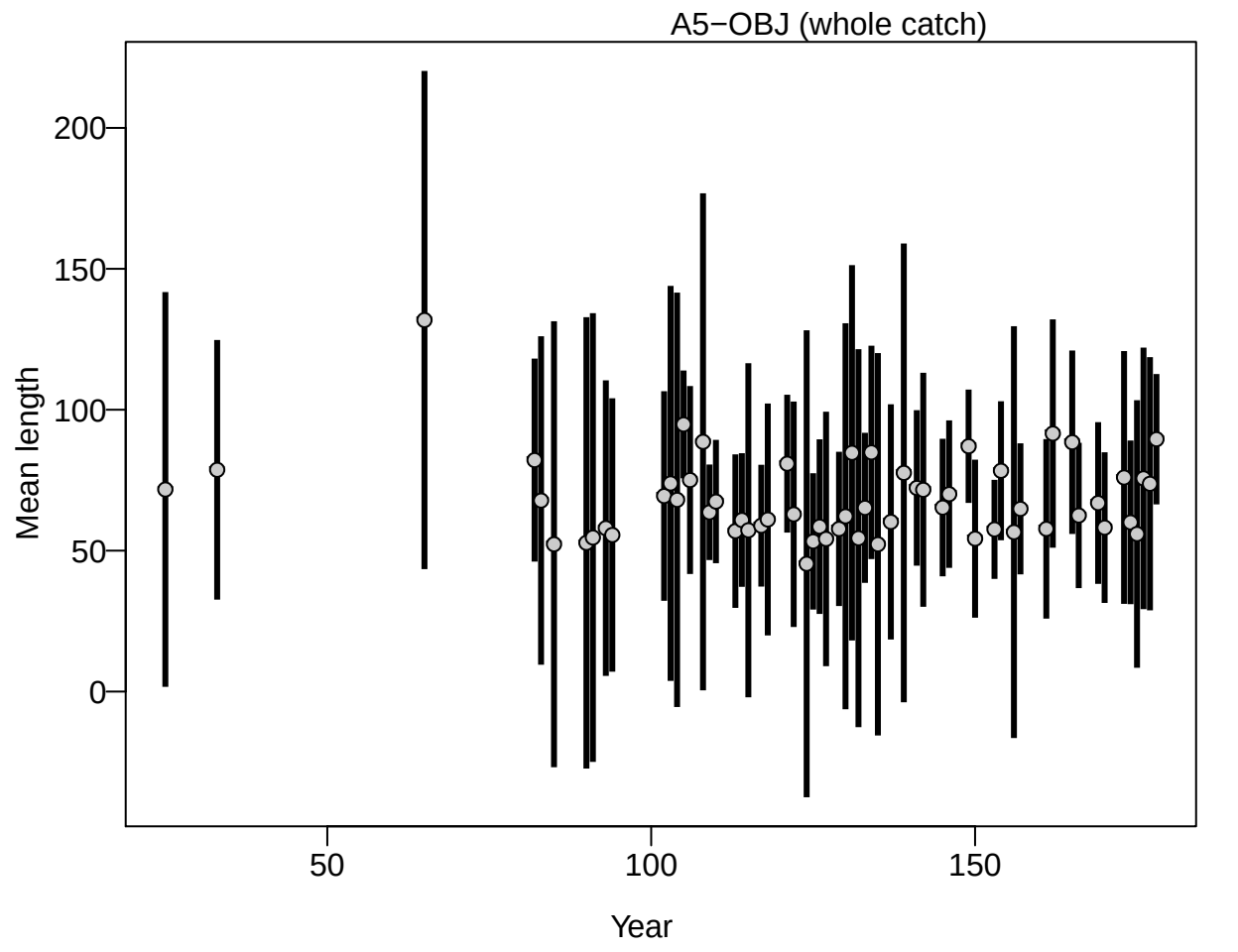

25
N adj.=0.5
83
N adj.=0.8
93
N adj.=1
104
N adj.=0.8
33
N adj.=1.8
85
N adj.=0.5
94
N adj.=1
105
N adj.=12
65
N adj.=0.5
90
N adj.=0.5
102
N adj.=2.6
106
N adj.=3.8
82
N adj.=2
91
N adj.=0.5
103
N adj.=0.8
108
N adj.=0.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

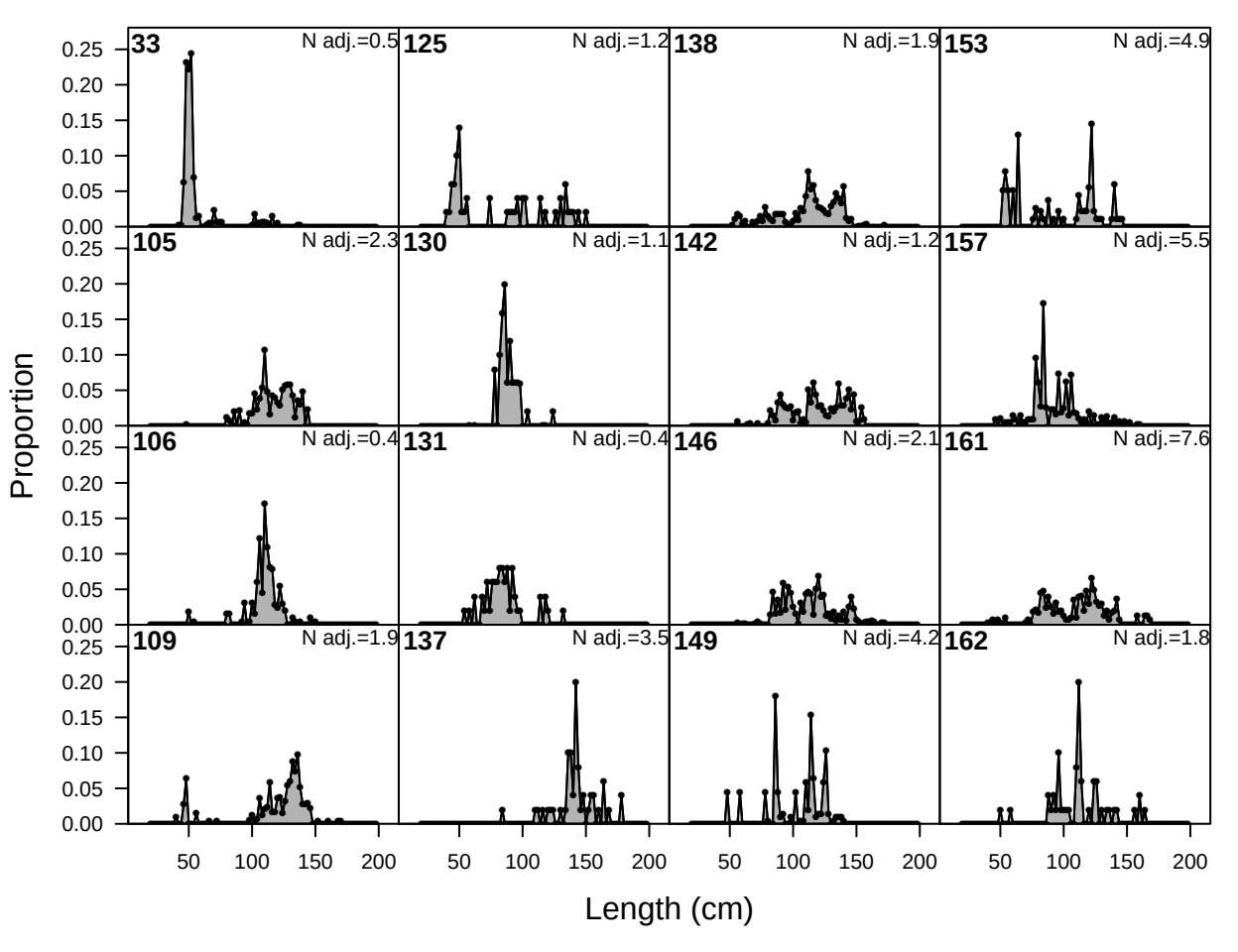

109
N adj.=12.3
115
N adj.=0.5
122
N adj.=1.8
127
N adj.=1
110
N adj.=5.6
117
N adj.=5.6
124
N adj.=0.5
129
N adj.=3.3
113
N adj.=2.8
118
N adj.=1.8
125
N adj.=4.9
130
N adj.=0.5
114
N adj.=3.3
121
N adj.=4.6
126
N adj.=2.3
131
N adj.=0.5
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

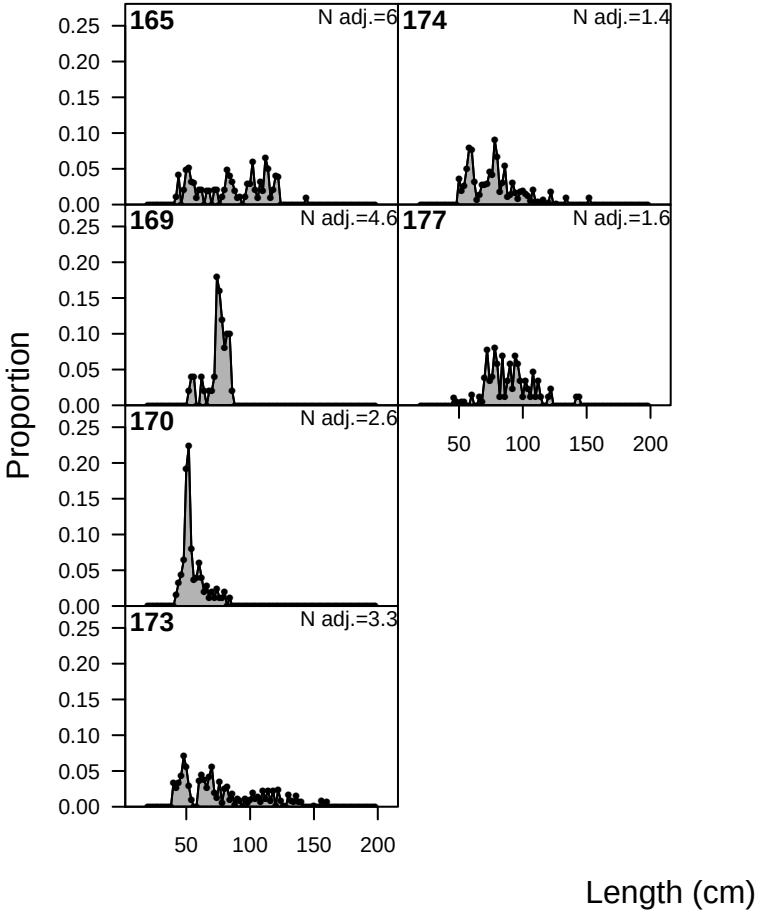

132
N adj.=0.5
137
N adj.=2.3
145
N adj.=3.8
153
N adj.=7.4
133
N adj.=3.6
139
N adj.=0.5
146
N adj.=3.1
154
N adj.=3.8
134
N adj.=2
141
N adj.=4.1
149
N adj.=6.9
156
N adj.=0.5
135
N adj.=0.8
142
N adj.=1.8
150
N adj.=3.3
157
N adj.=5.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

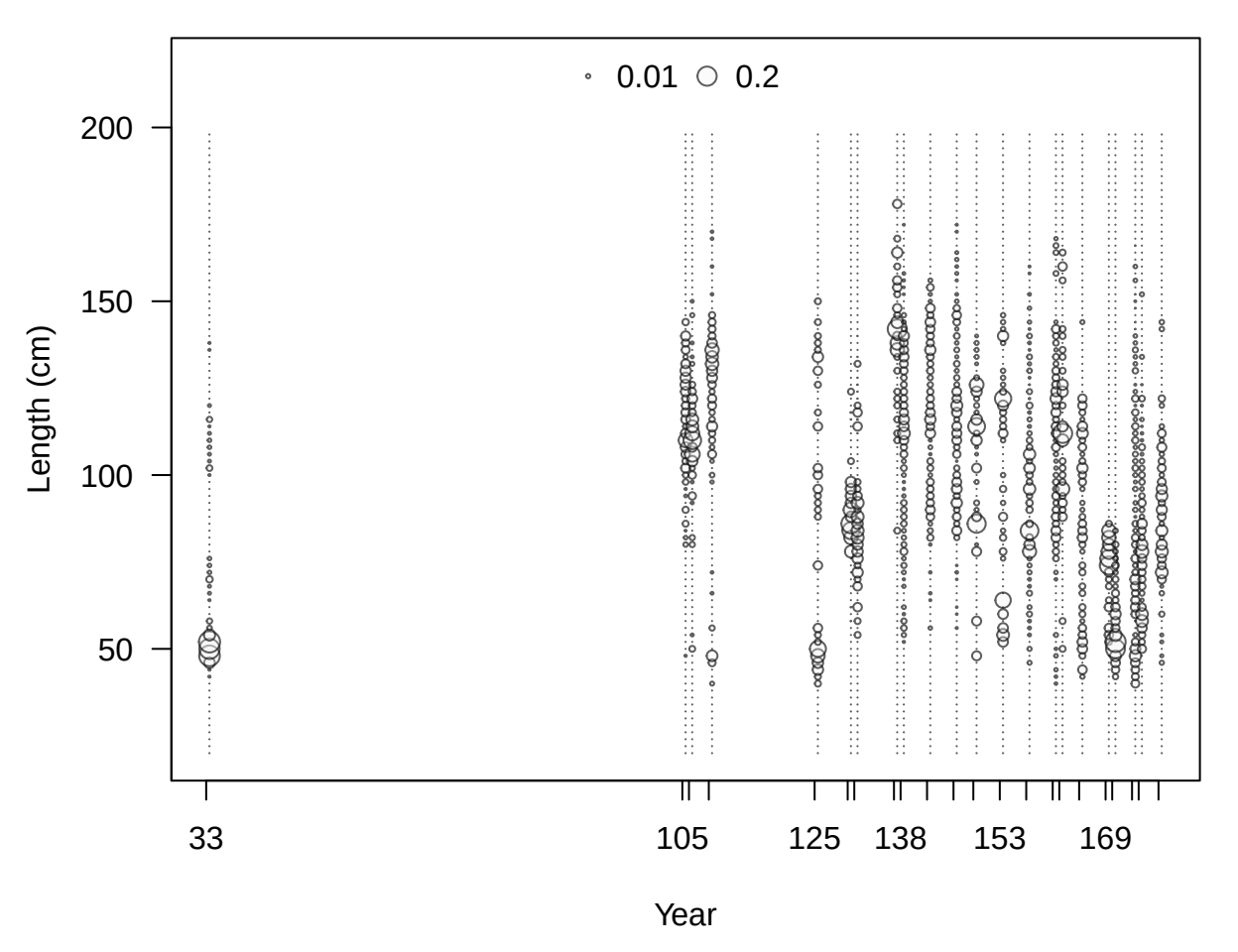

161
N adj.=3.6
169
N adj.=3.3
175
N adj.=1
162
N adj.=2
170
N adj.=4.1
176
N adj.=1
165
N adj.=2.8
173
N adj.=1.3
177
N adj.=1
166
N adj.=4.3
174
N adj.=2.8
178
N adj.=3.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)

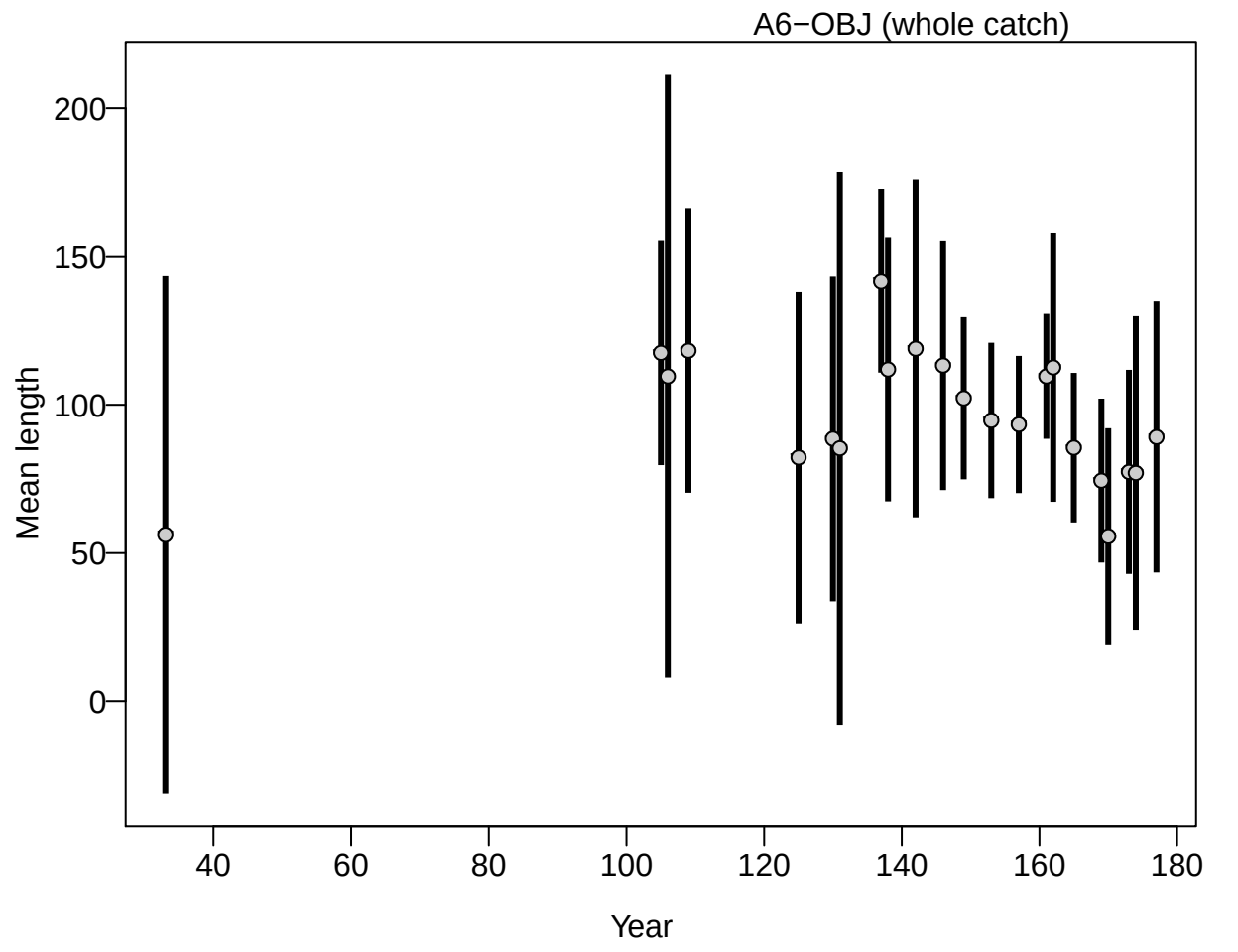

0.01
0.2
200
150
100
50
Length (cm)
25
65
82
93
105
118
131
145
161
174
Year

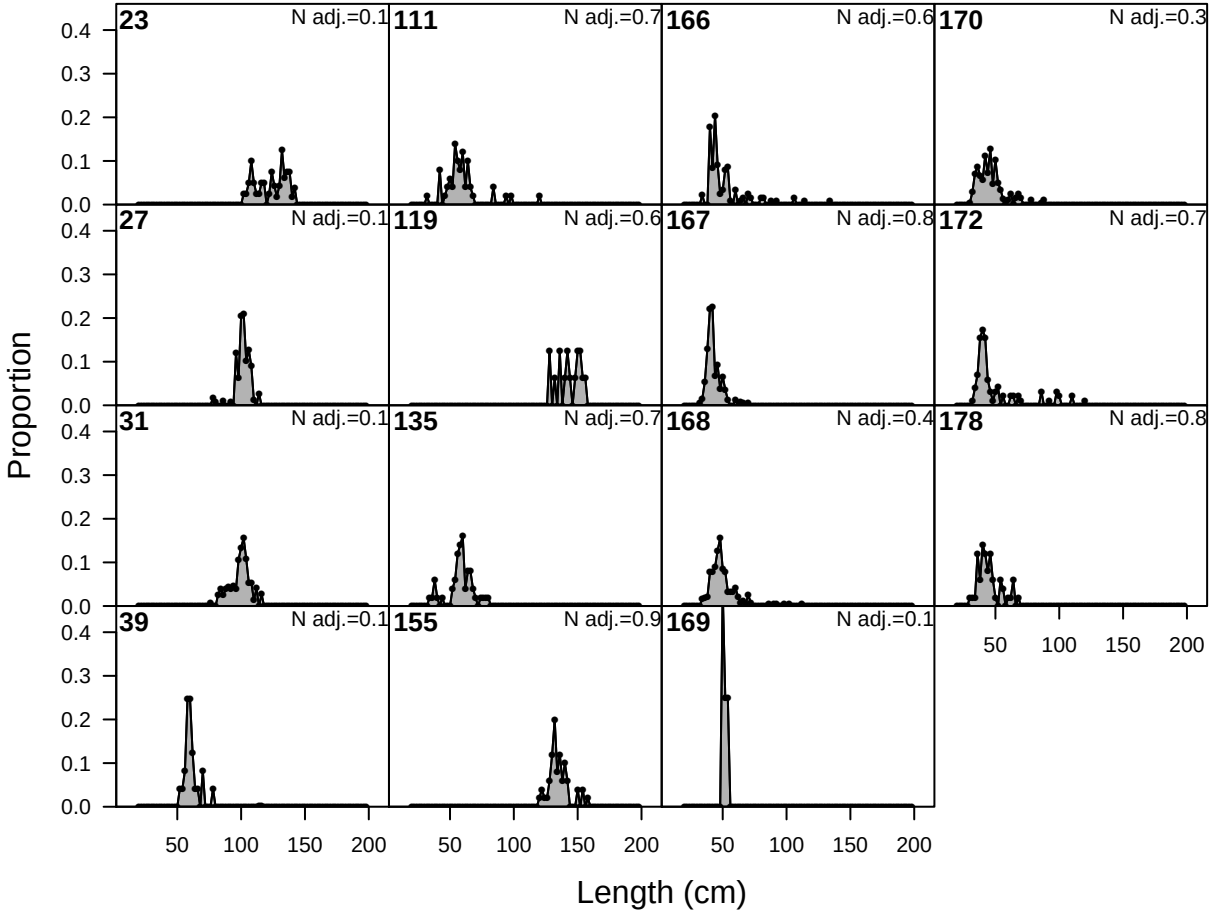

A5−OBJ (whole catch)
Mean length
200
150
100
50
0
50
100
150
Year

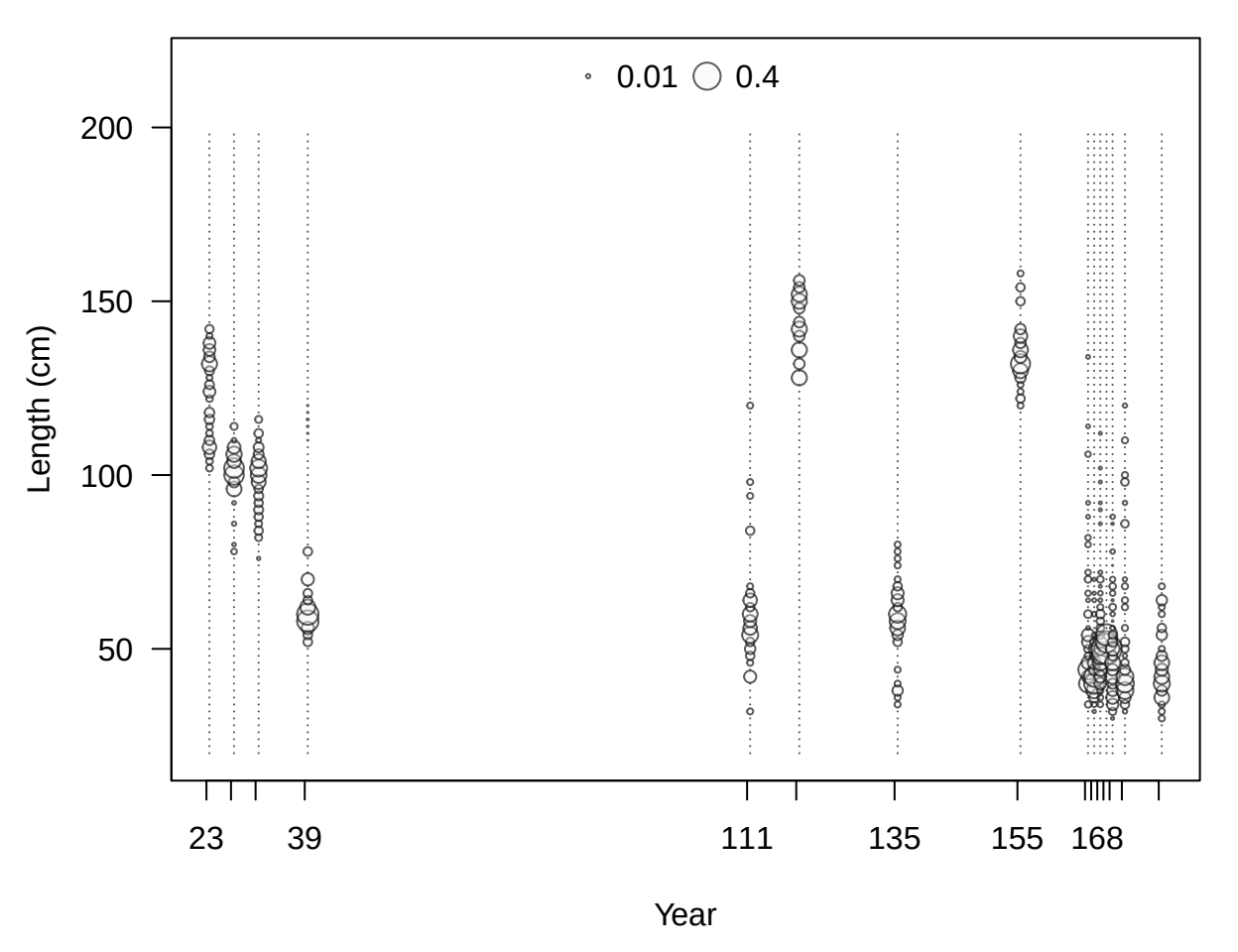

33
N adj.=0.5
125
N adj.=1.2
138
N adj.=1.9
153
N adj.=4.9
105
N adj.=2.3
130
N adj.=1.1
142
N adj.=1.2
157
N adj.=5.5
106
N adj.=0.4
131
N adj.=0.4
146
N adj.=2.1
161
N adj.=7.6
109
N adj.=1.9
137
N adj.=3.5
149
N adj.=4.2
162
N adj.=1.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)

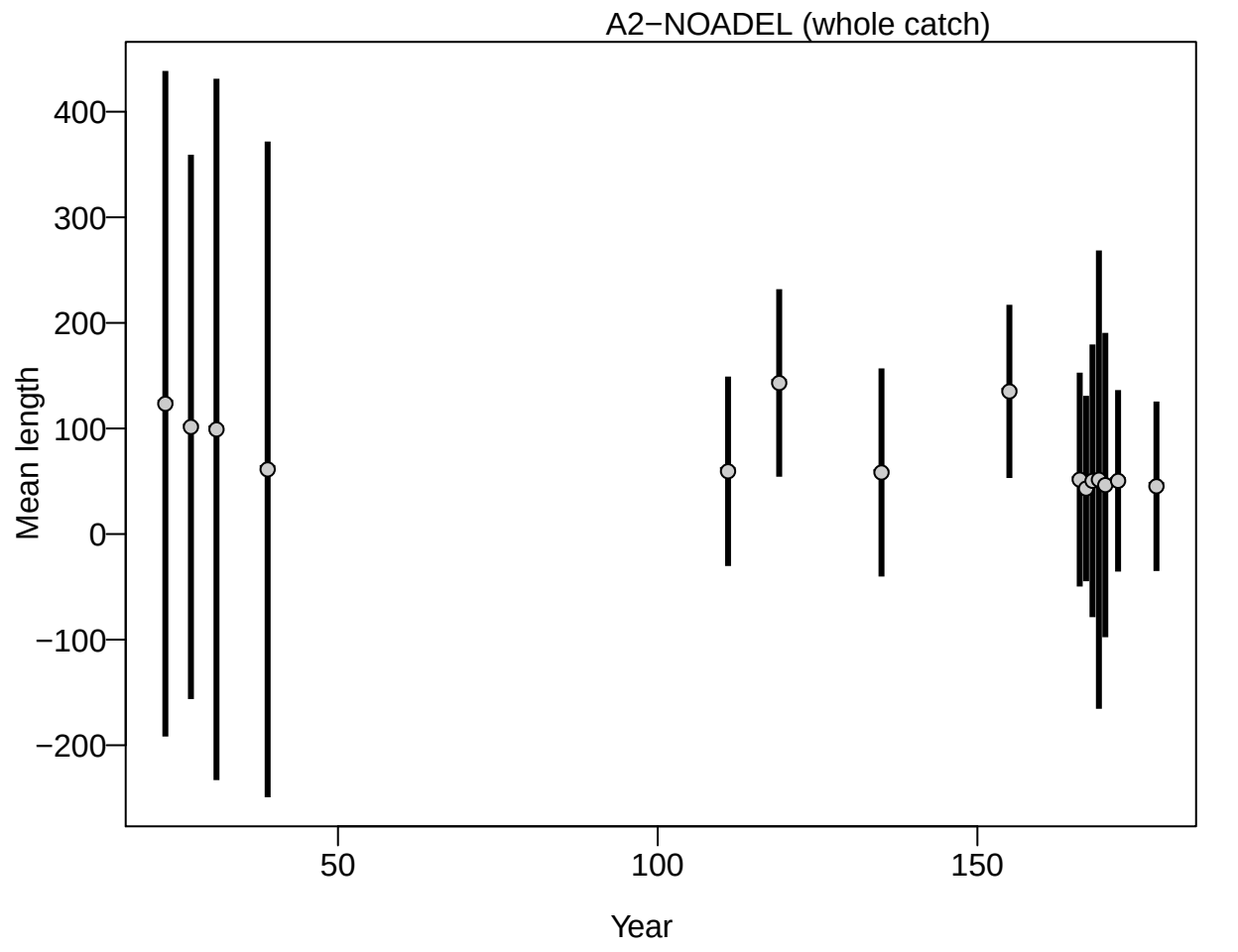

165
N adj.=6
174
N adj.=1.4
169
N adj.=4.6
177
N adj.=1.6
170
N adj.=2.6
173
N adj.=3.3
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

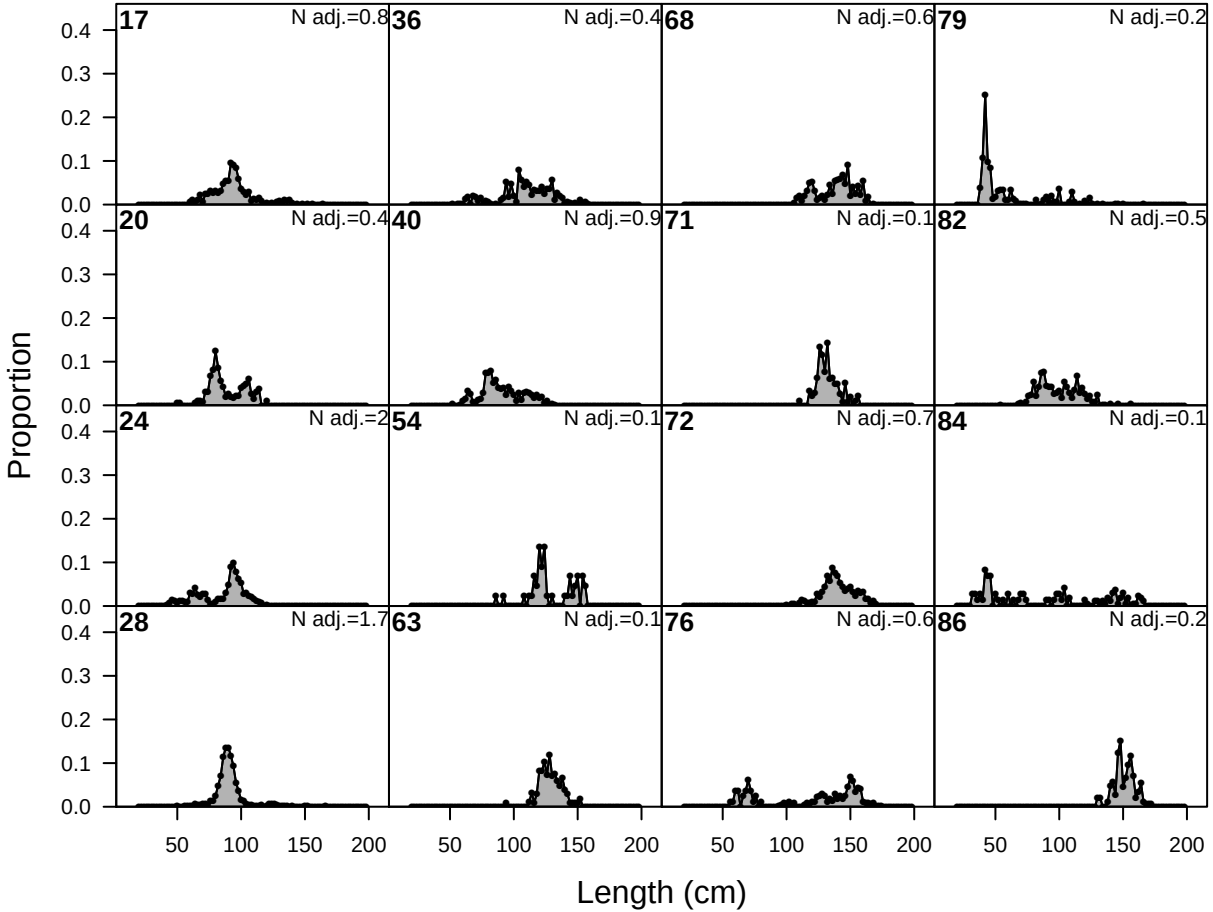

0.01
0.2
200
150
100
50
Length (cm)
33
105
125
138
153
169
Year

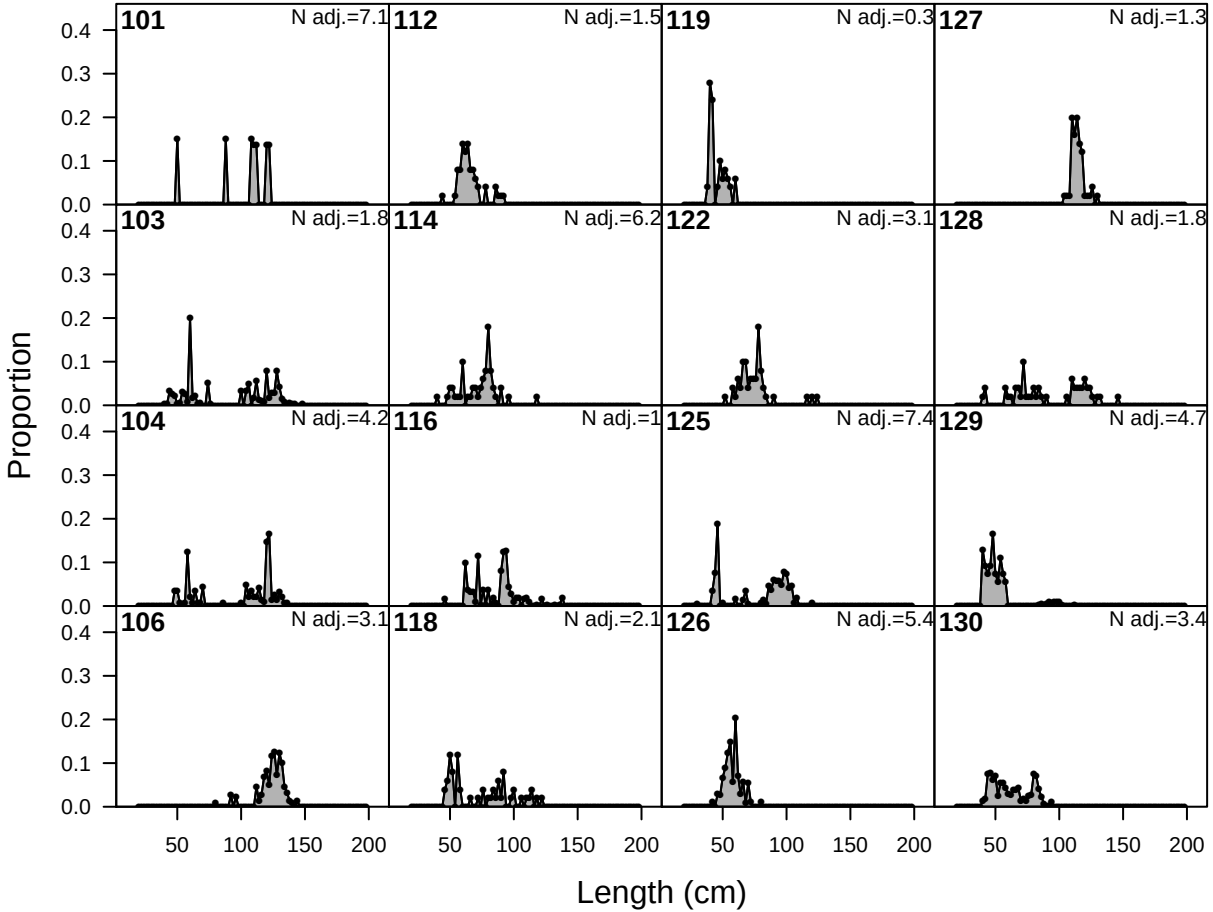

A6−OBJ (whole catch)
Mean length
200
150
100
50
0
40
60
80
100
120
140
160
180
Year

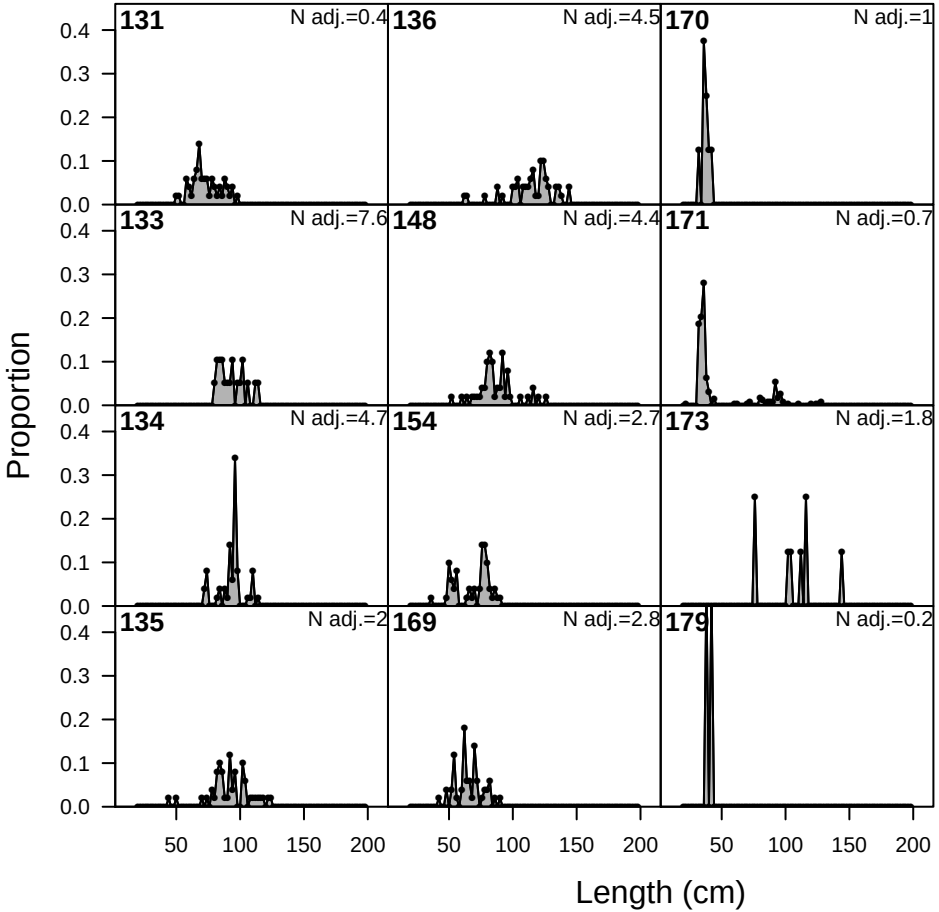

23
N adj.=0.1
111
N adj.=0.7
166
N adj.=0.6
170
N adj.=0.3
27
N adj.=0.1
119
N adj.=0.6
167
N adj.=0.8
172
N adj.=0.7
31
N adj.=0.1
135
N adj.=0.7
168
N adj.=0.4
178
N adj.=0.8
39
N adj.=0.1
155
N adj.=0.9
169
N adj.=0.1
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

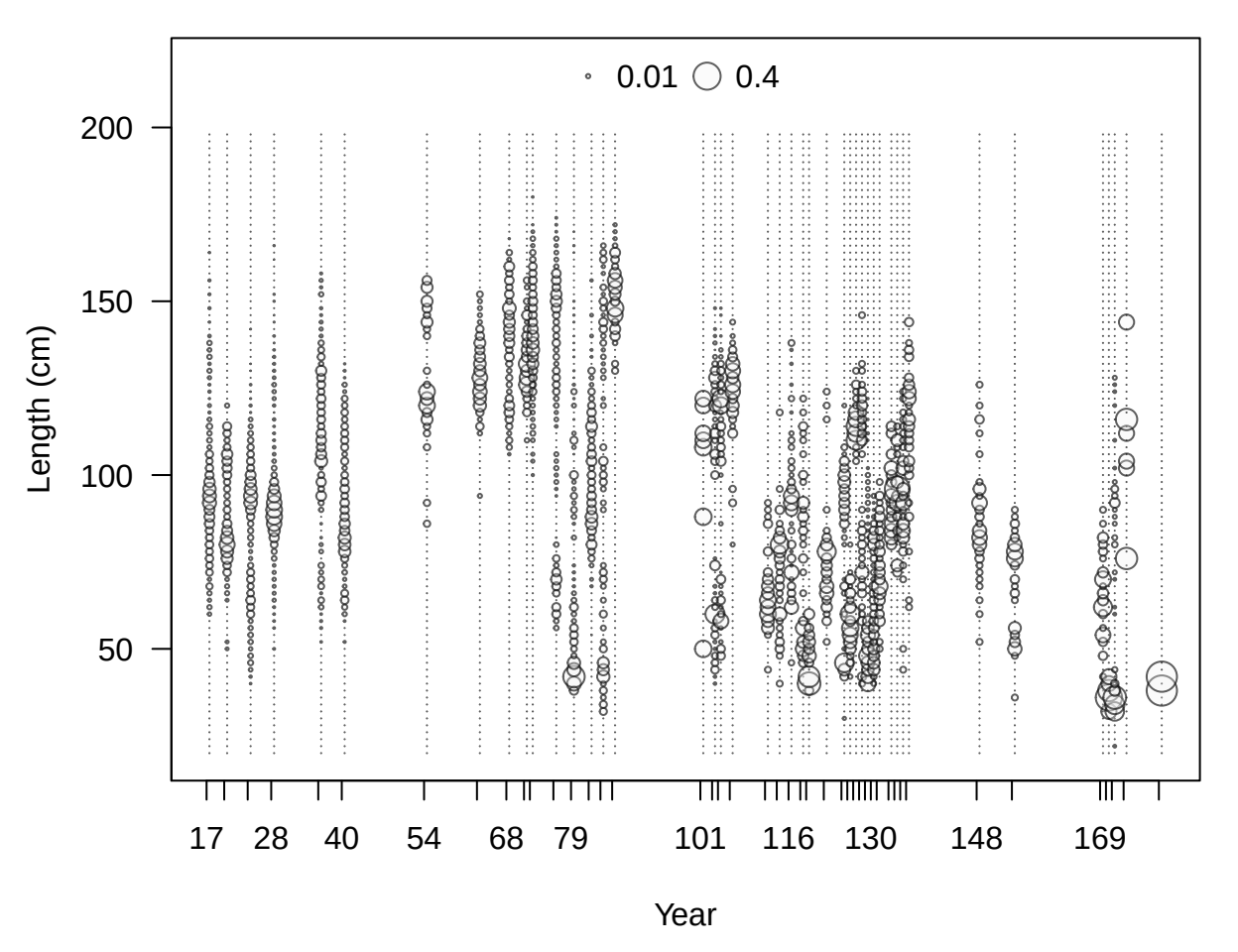

0.01
0.4
200
150
100
50
Length (cm)
23
39
111
135
155
168
Year

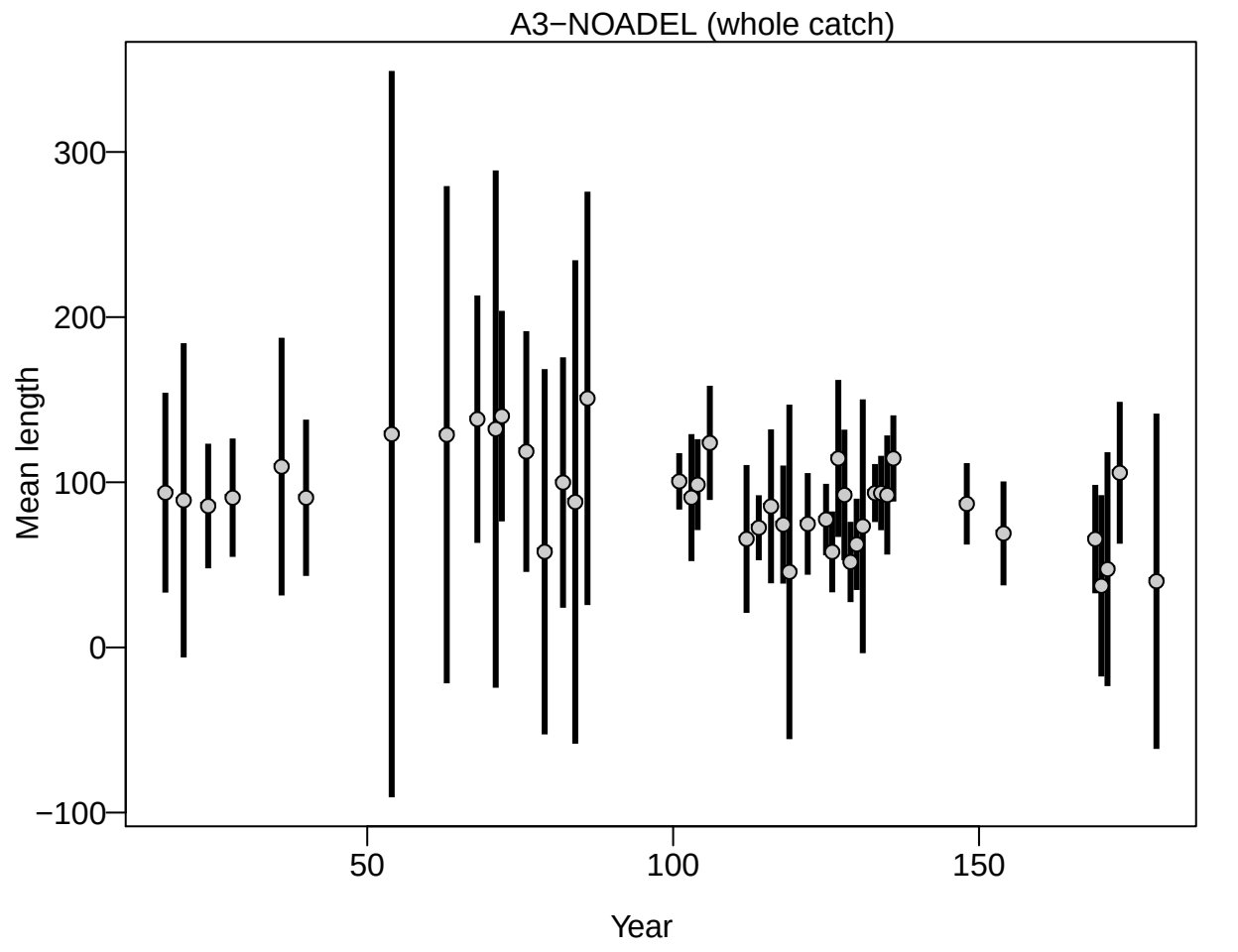

A2−NOADEL (whole catch)
Mean length
400
300
200
100
0
−100
−200
50
100
150
Year

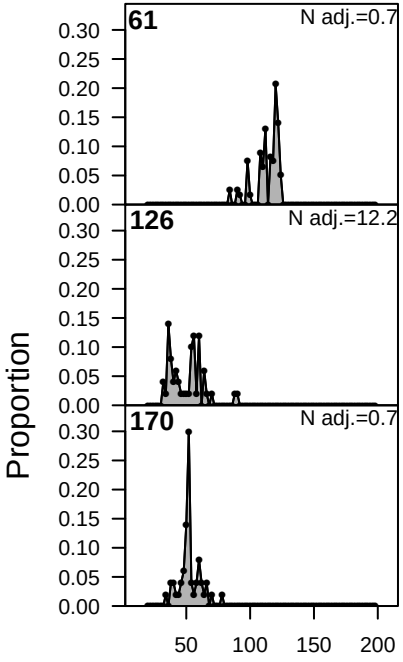

17
N adj.=0.8
36
N adj.=0.4
68
N adj.=0.6
79
N adj.=0.2
20
N adj.=0.4
40
N adj.=0.9
71
N adj.=0.1
82
N adj.=0.5
24
N adj.=2
54
N adj.=0.1
72
N adj.=0.7
84
N adj.=0.1
28
N adj.=1.7
63
N adj.=0.1
76
N adj.=0.6
86
N adj.=0.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

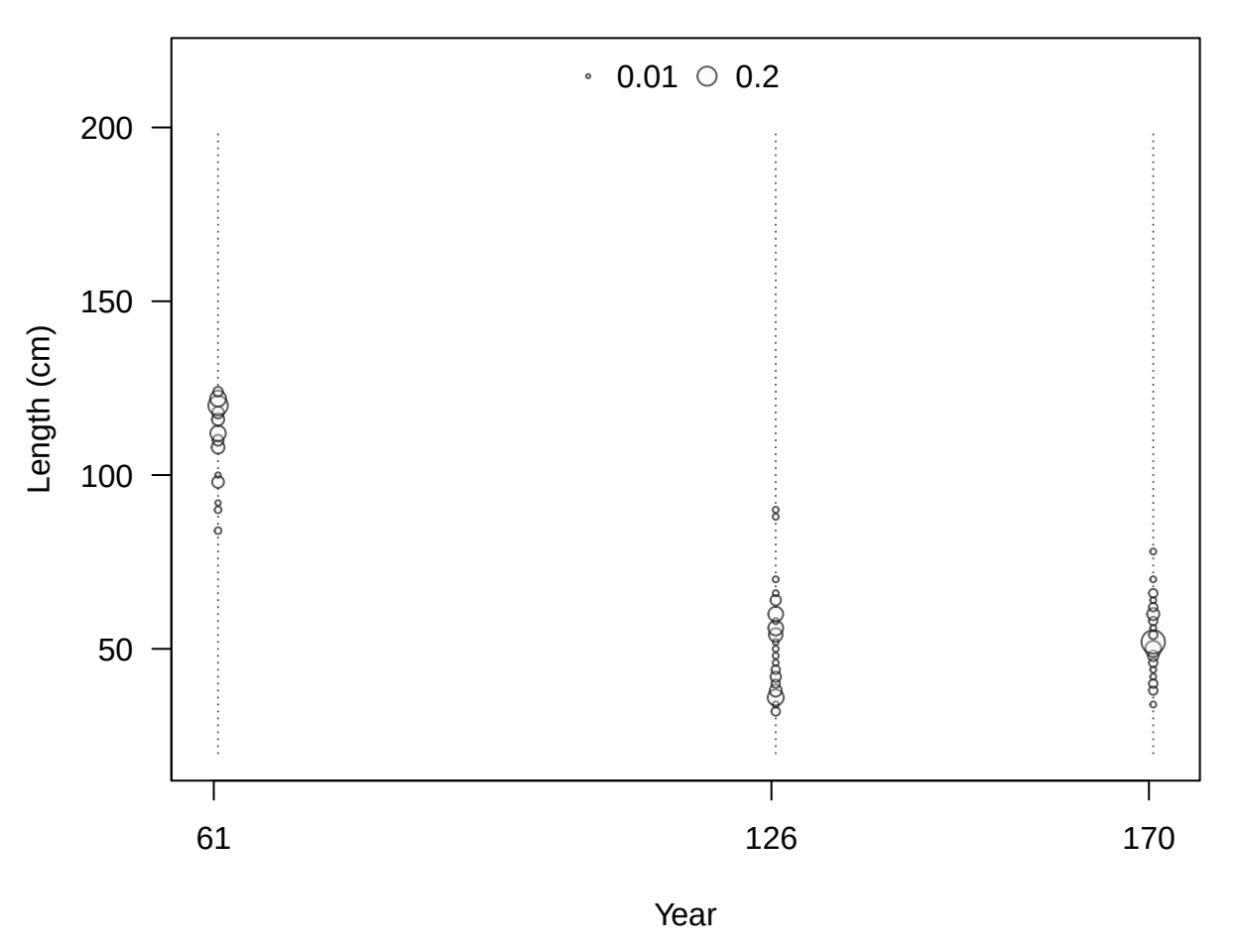

101
N adj.=7.1
112
N adj.=1.5
119
N adj.=0.3
127
N adj.=1.3
103
N adj.=1.8
114
N adj.=6.2
122
N adj.=3.1
128
N adj.=1.8
104
N adj.=4.2
116
N adj.=1
125
N adj.=7.4
129
N adj.=4.7
106
N adj.=3.1
118
N adj.=2.1
126
N adj.=5.4
130
N adj.=3.4
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

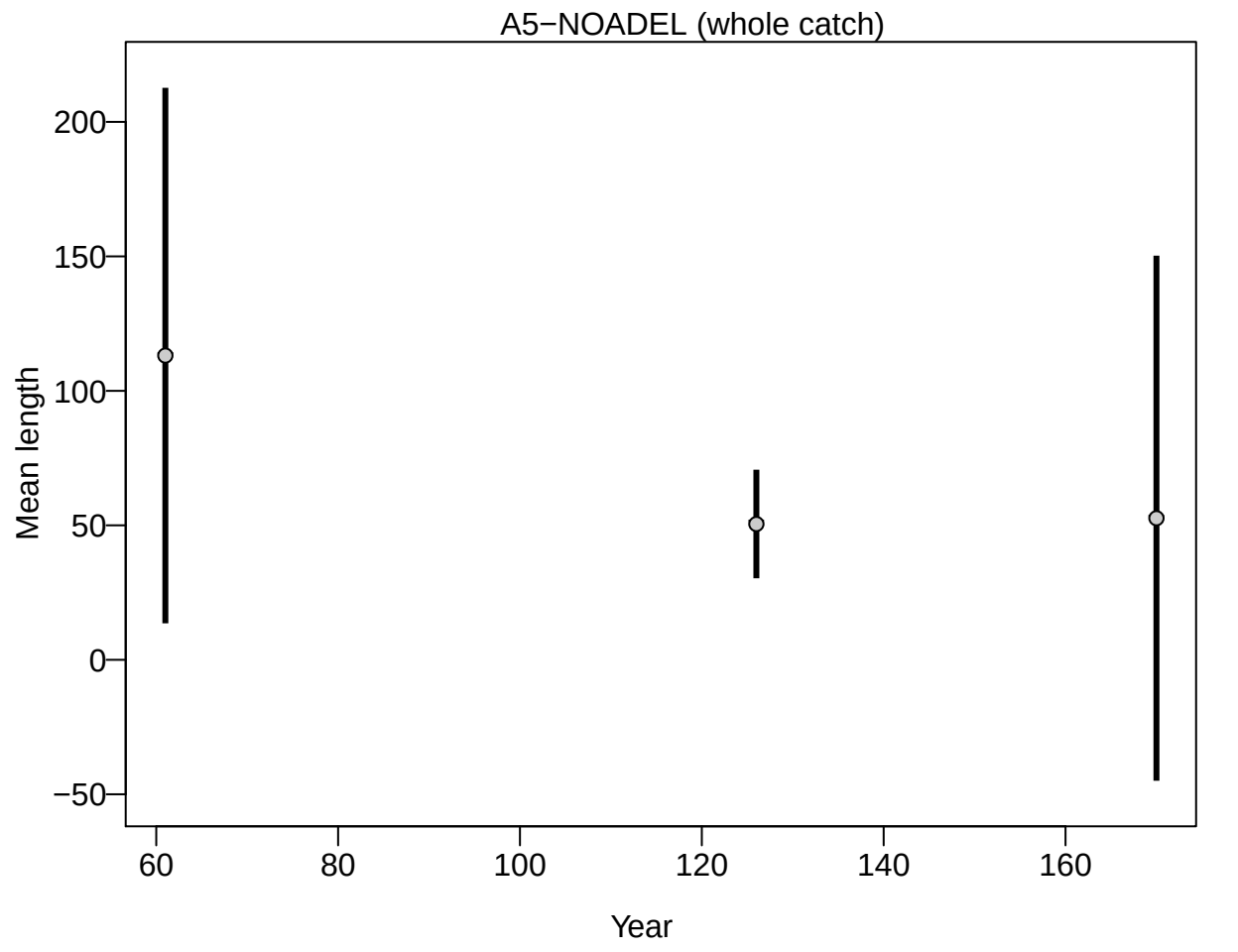

131
N adj.=0.4
136
N adj.=4.5
170
N adj.=1
133
N adj.=7.6
148
N adj.=4.4
171
N adj.=0.7
134
N adj.=4.7
154
N adj.=2.7
173
N adj.=1.8
135
N adj.=2
169
N adj.=2.8
179
N adj.=0.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

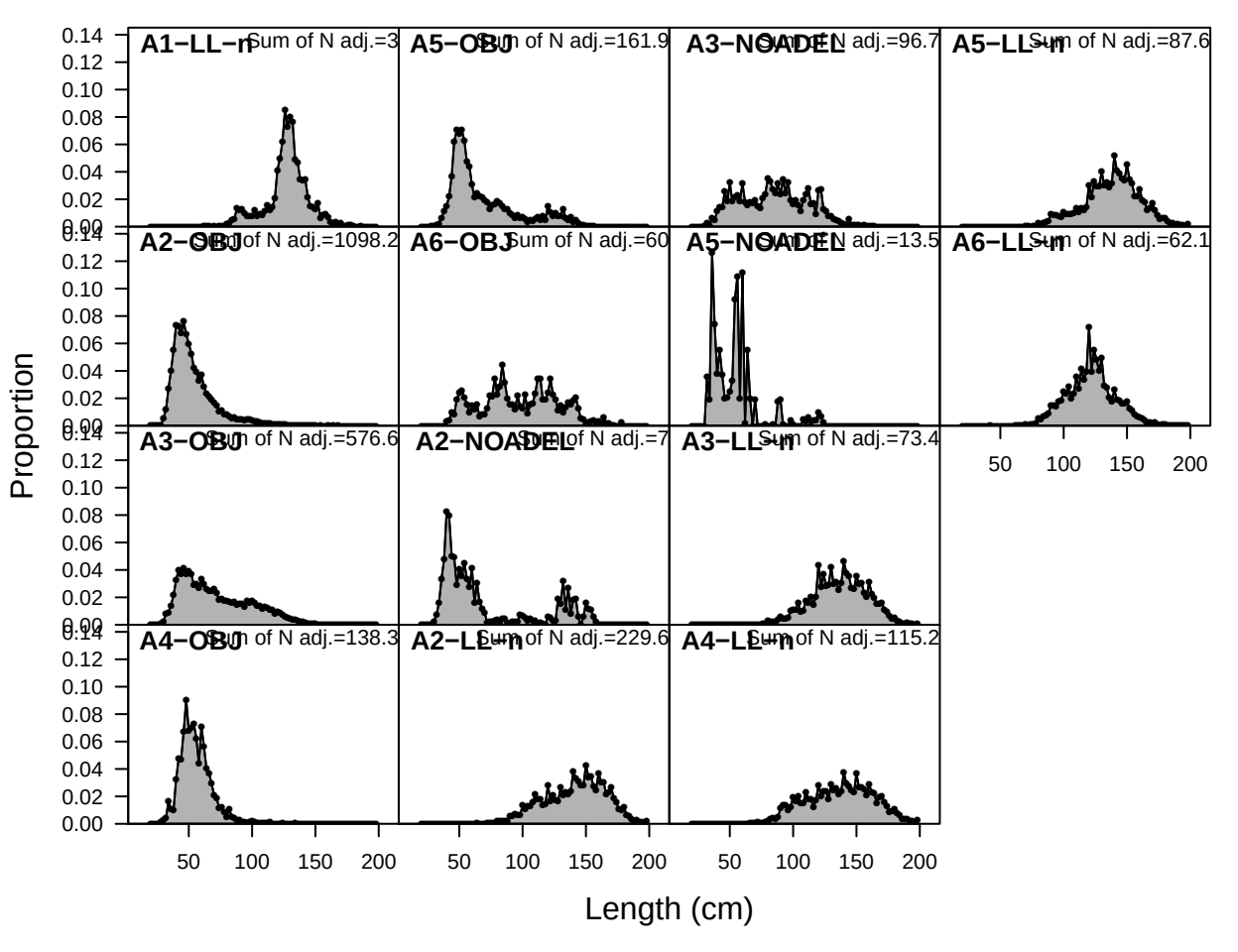

0.01
0.4
200
150
100
50
Length (cm)
17
28
40
54
68
79
101
116
130
148
169
Year

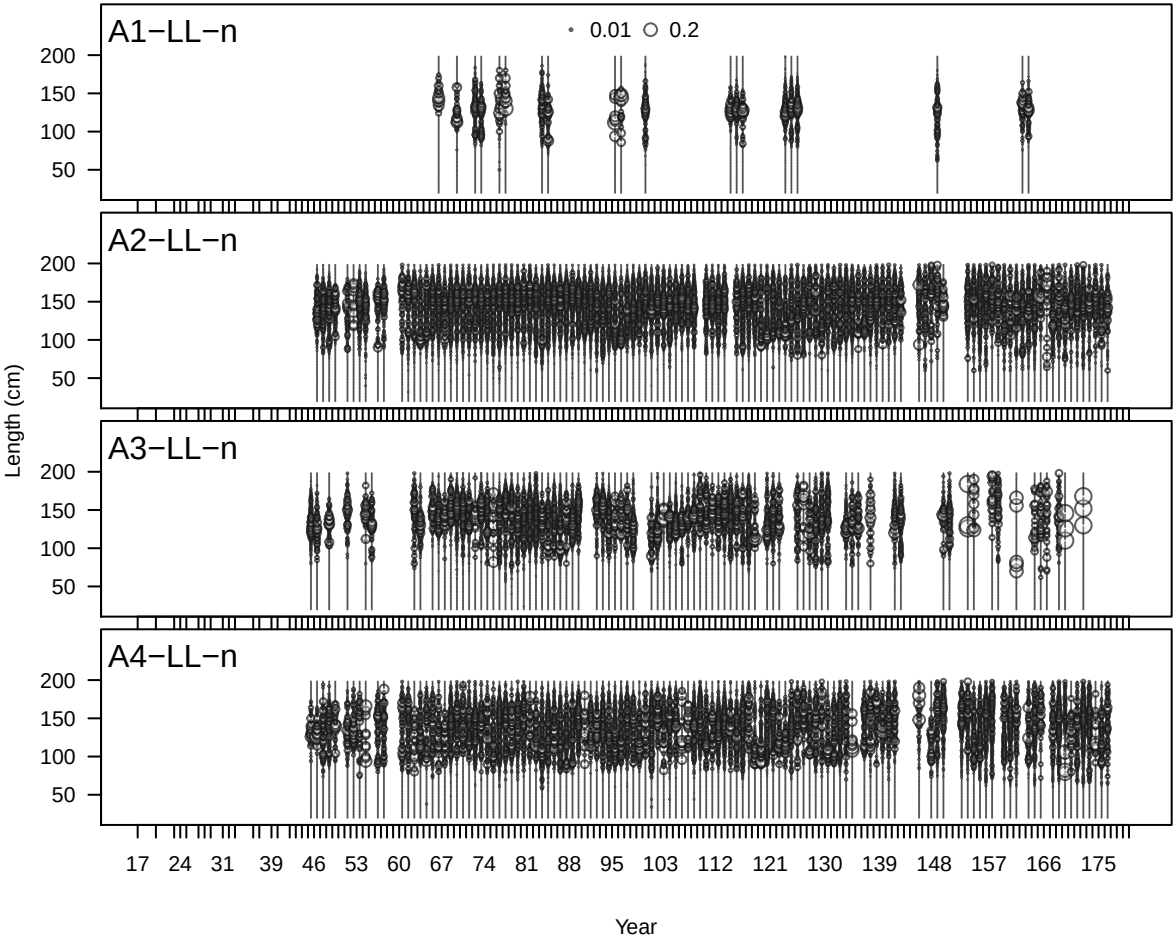

A3−NOADEL (whole catch)
Mean length
300
200
100
0
−100
50
100
150
Year

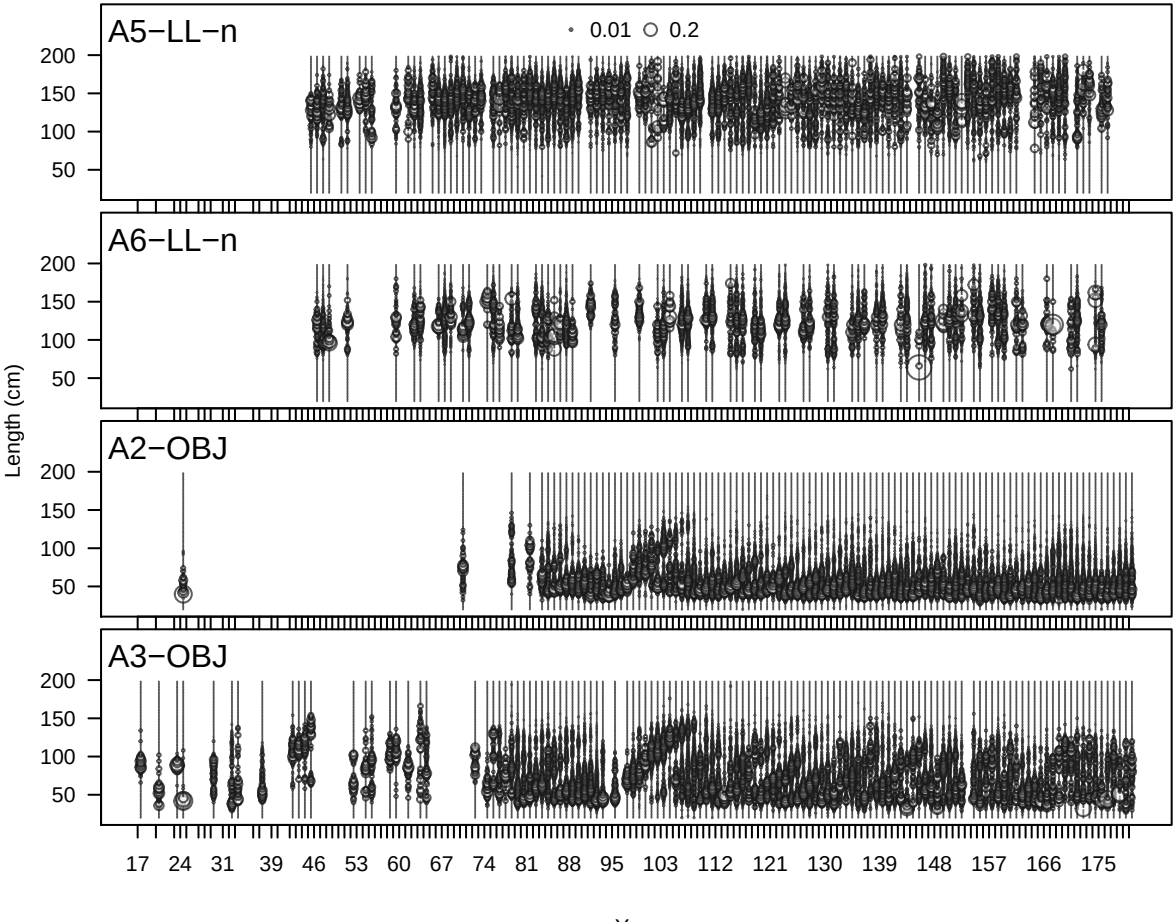

61
N adj.=0.7
126
N adj.=12.2
170
N adj.=0.7
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)

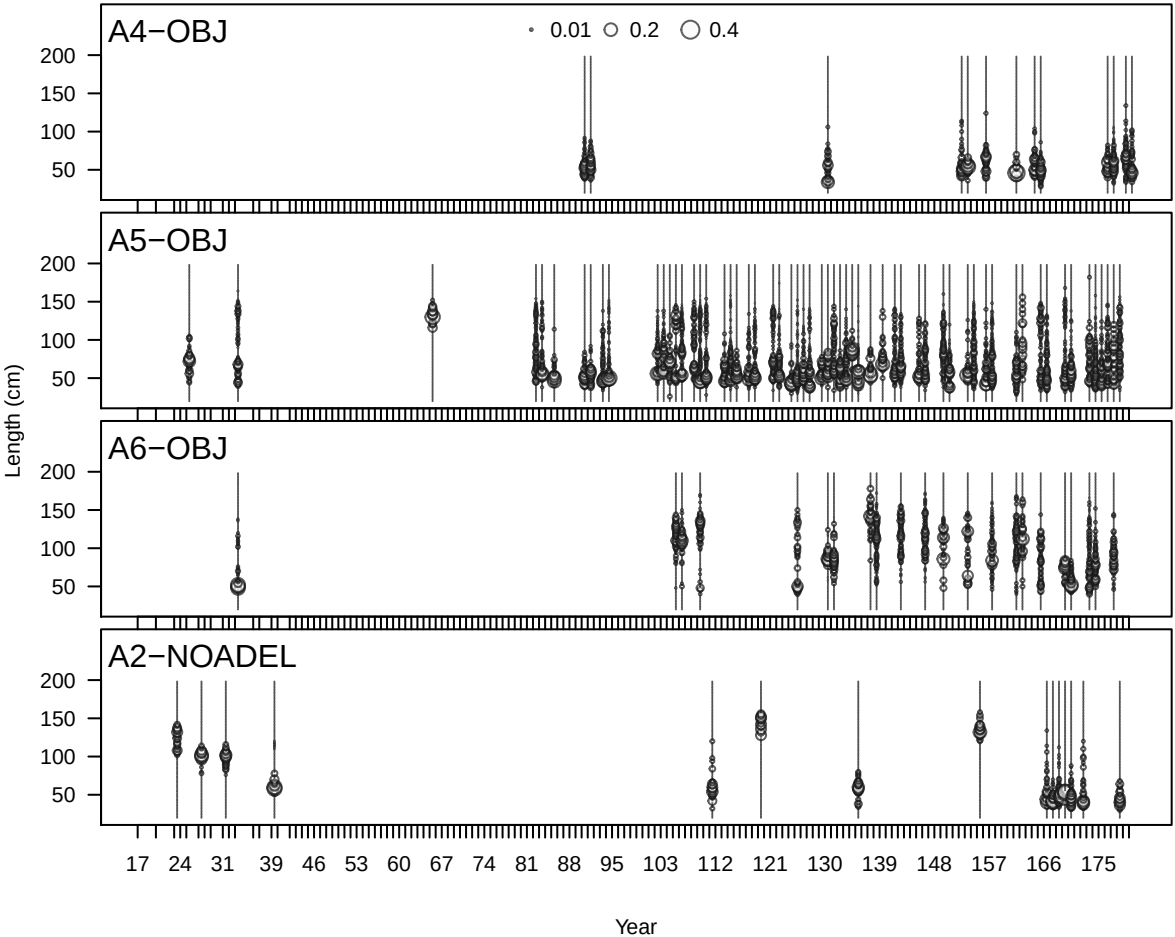

0.01
0.2
200
150
100
50
Length (cm)
61
126
170
Year

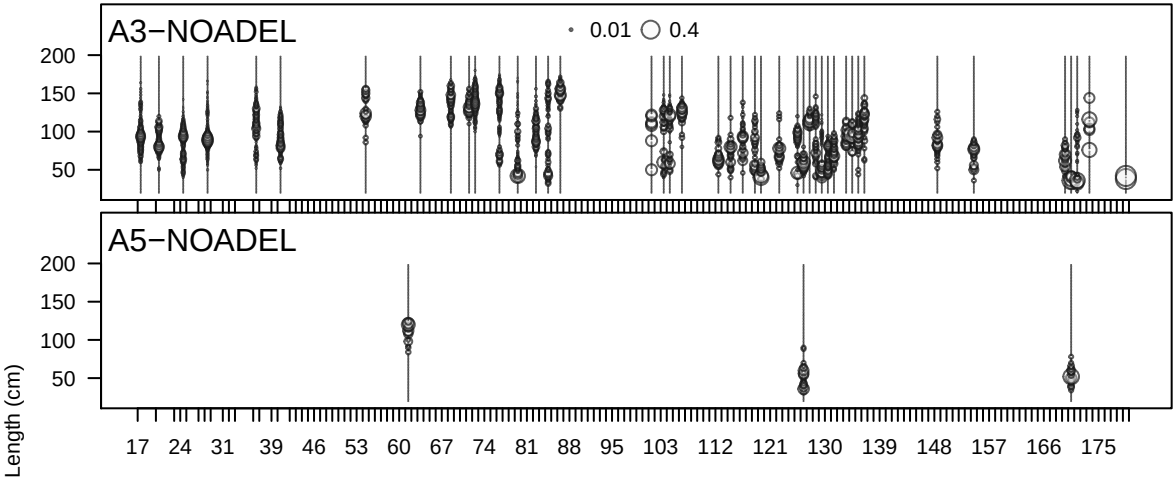

A5−NOADEL (whole catch)
Mean length
200
150
100
50
0
−50
60
80
100
120
140
160
Year

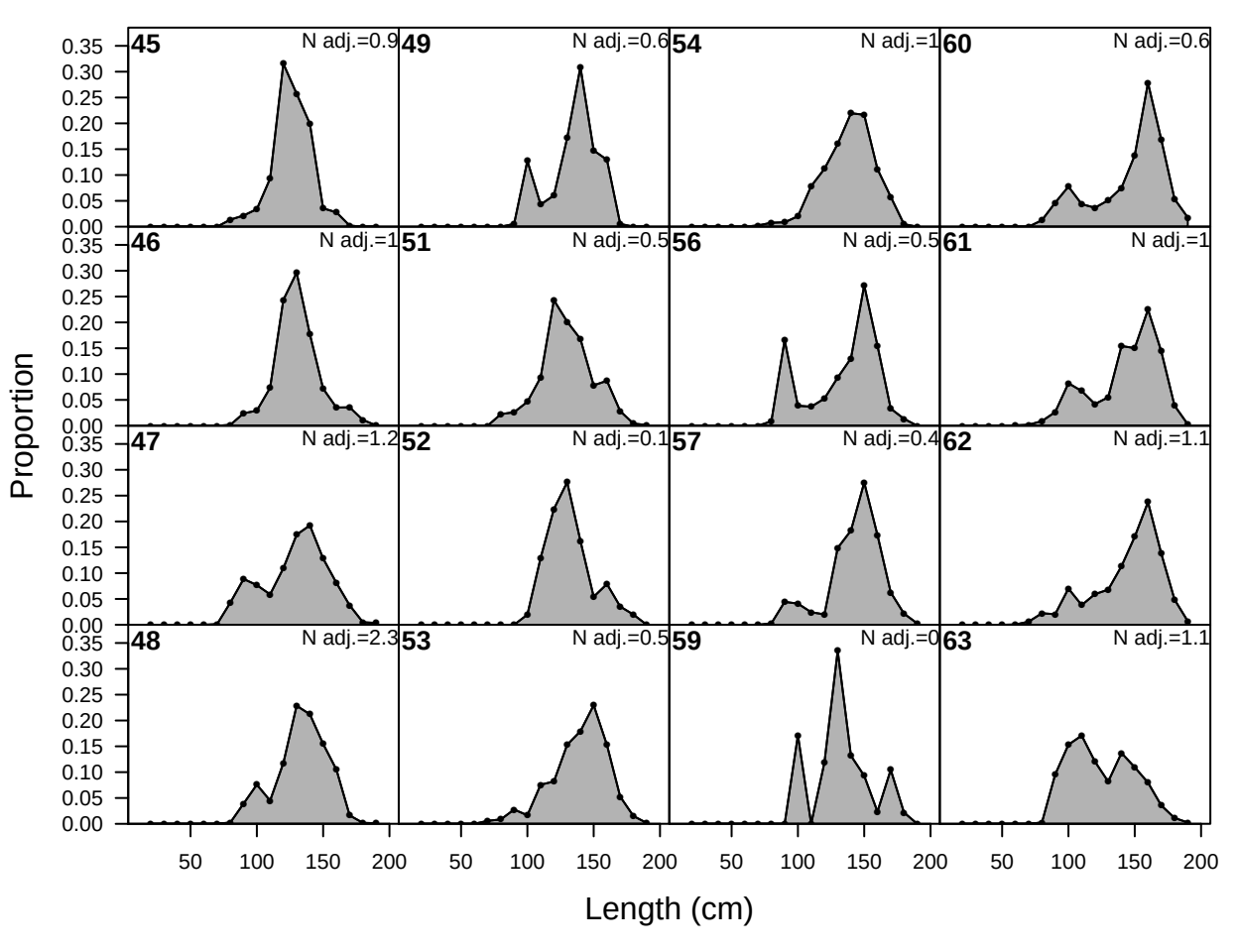

A1−LL−n
Sum of N adj.=3
A5−OBJ
Sum of N adj.=161.9
A3−NOADEL
Sum of N adj.=96.7
A5−LL−n
Sum of N adj.=87.6
A2−OBJ
Sum of N adj.=1098.2
A6−OBJ
Sum of N adj.=60
A5−NOADEL
Sum of N adj.=13.5
A6−LL−n
Sum of N adj.=62.1
A3−OBJ
Sum of N adj.=576.6
A2−NOADEL
Sum of N adj.=7
A3−LL−n
Sum of N adj.=73.4
A4−OBJ
Sum of N adj.=138.3
A2−LL−n
Sum of N adj.=229.6
A4−LL−n
Sum of N adj.=115.2
Proportion
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
50
100
150
200
Length (cm)

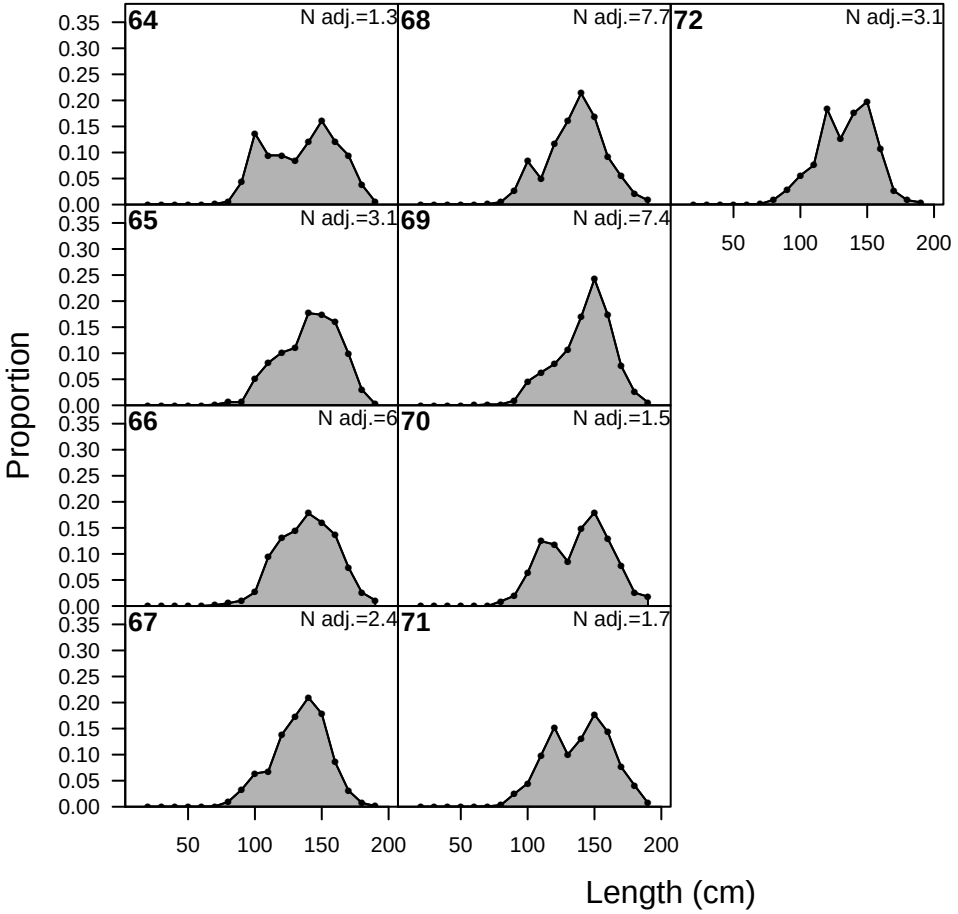

A1−LL−n
0.01
0.2
A2−LL−n
A3−LL−n
A4−LL−n
Length (cm)
200
150
100
50
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

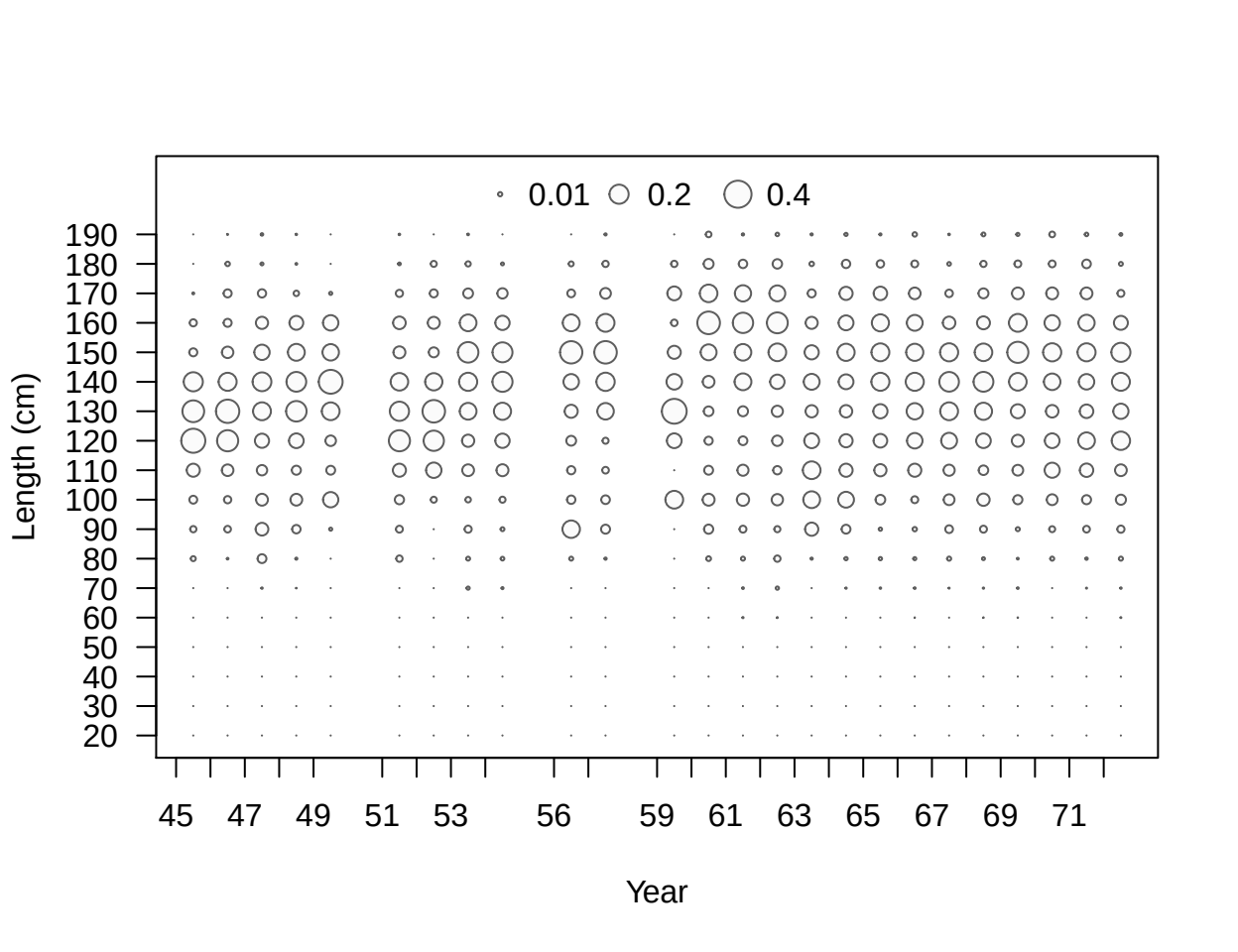

A5−LL−n
0.01
0.2
A6−LL−n
A2−OBJ
A3−OBJ
Length (cm)
200
150
100
50
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

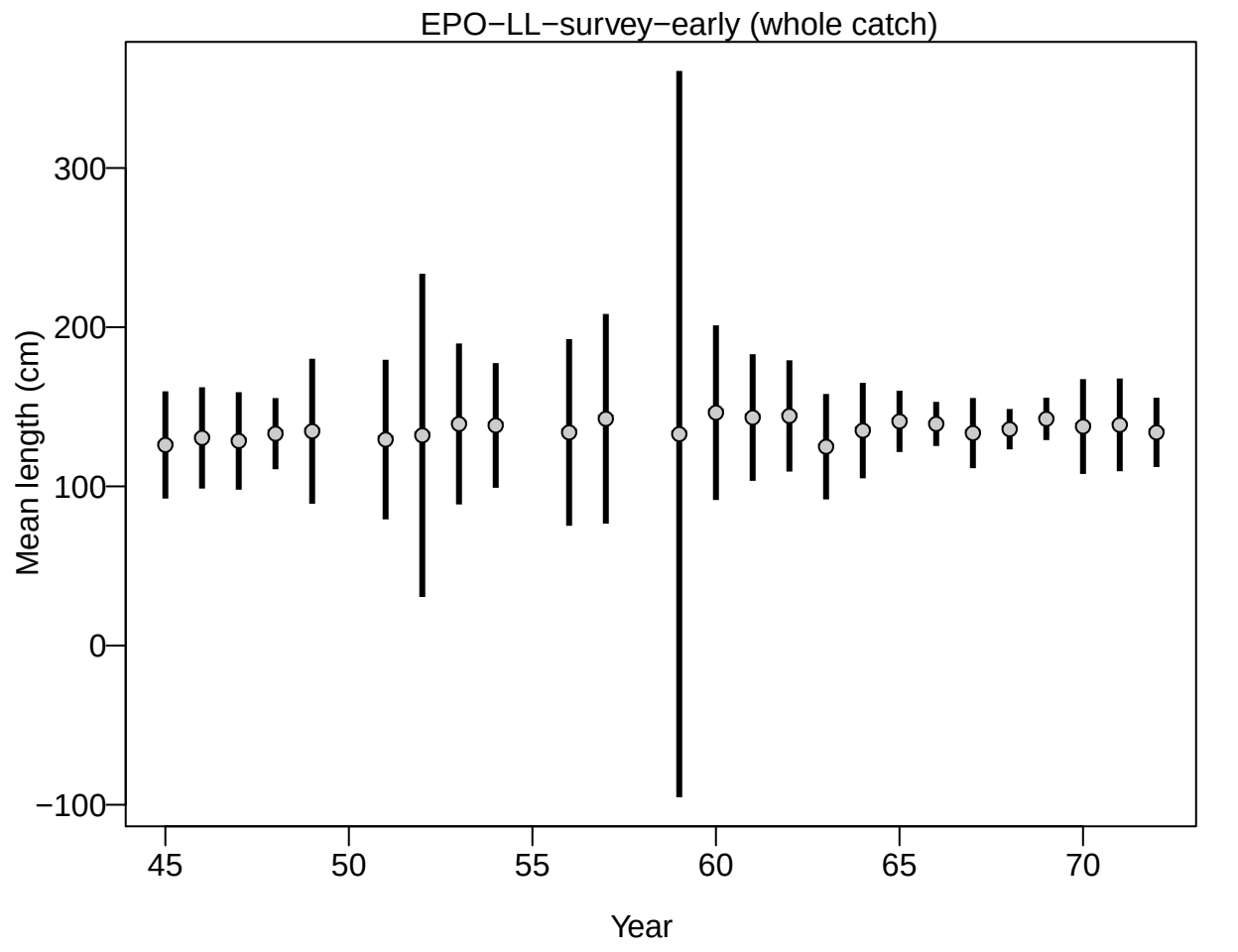

A4−OBJ
0.01
0.2
0.4
A5−OBJ
A6−OBJ
A2−NOADEL
Length (cm)
200
150
100
50
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

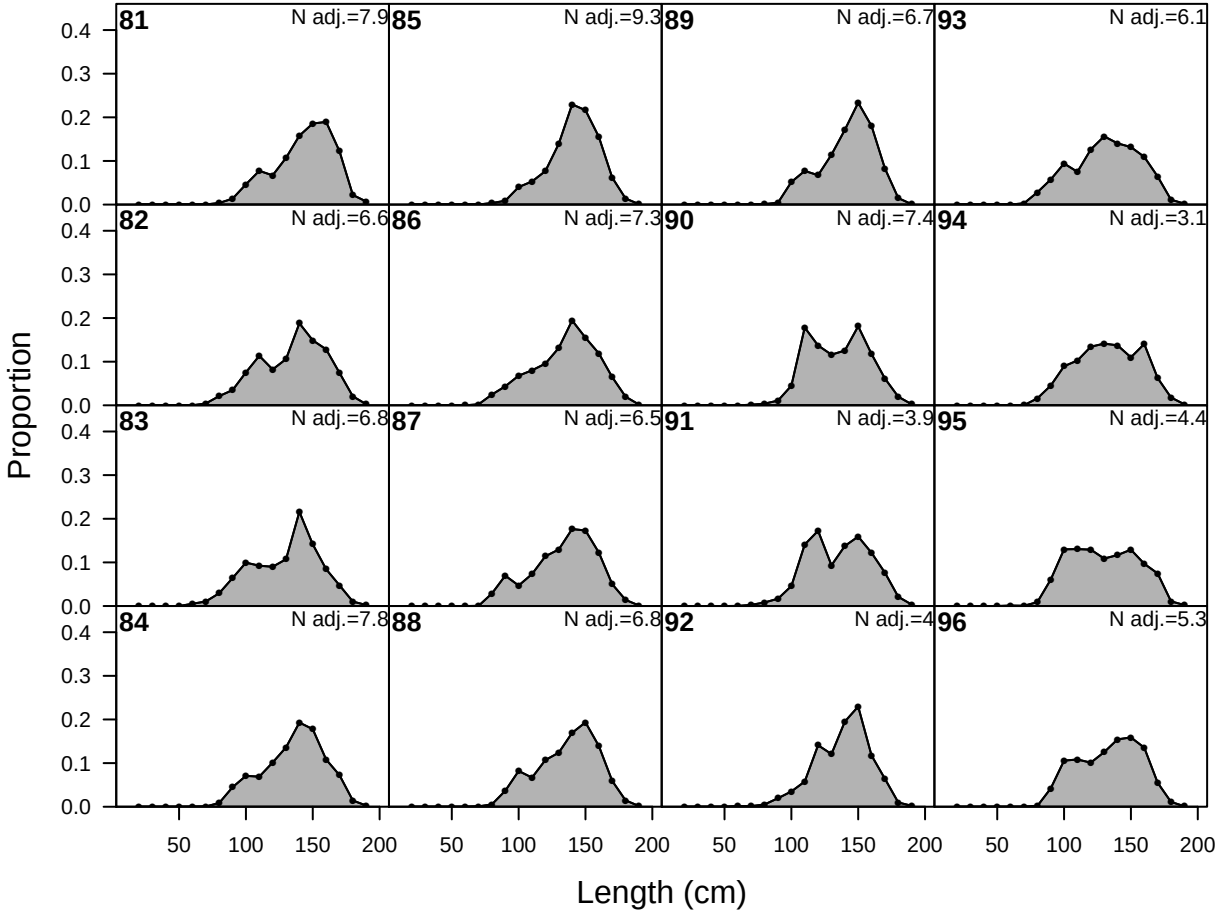

A3−NOADEL
0.01
0.4
200
150
100
50
A5−NOADEL
200
150
100
50
Length (cm)
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

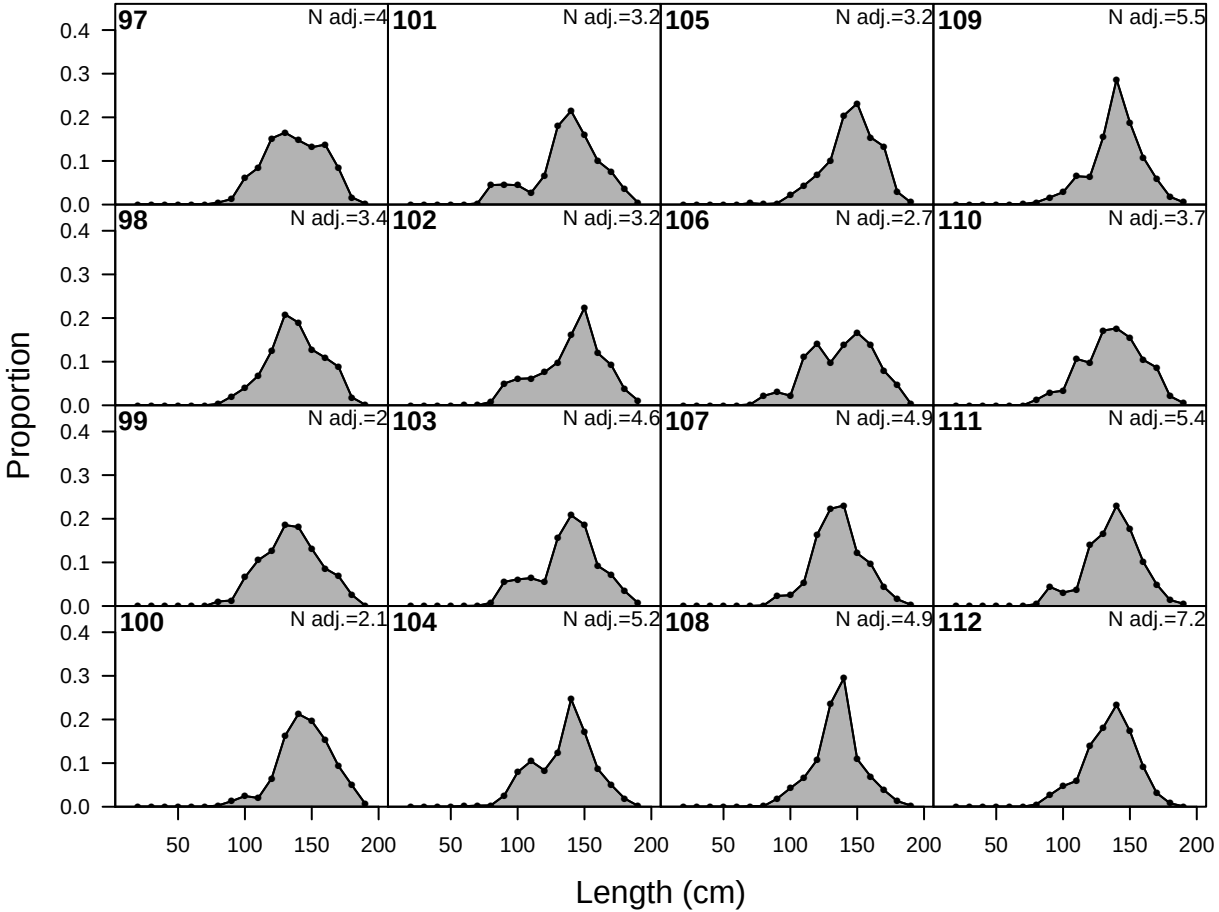

45
N adj.=0.9
49
N adj.=0.6
54
N adj.=1
60
N adj.=0.6
46
N adj.=1
51
N adj.=0.5
56
N adj.=0.5
61
N adj.=1
47
N adj.=1.2
52
N adj.=0.1
57
N adj.=0.4
62
N adj.=1.1
48
N adj.=2.3
53
N adj.=0.5
59
N adj.=0
63
N adj.=1.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

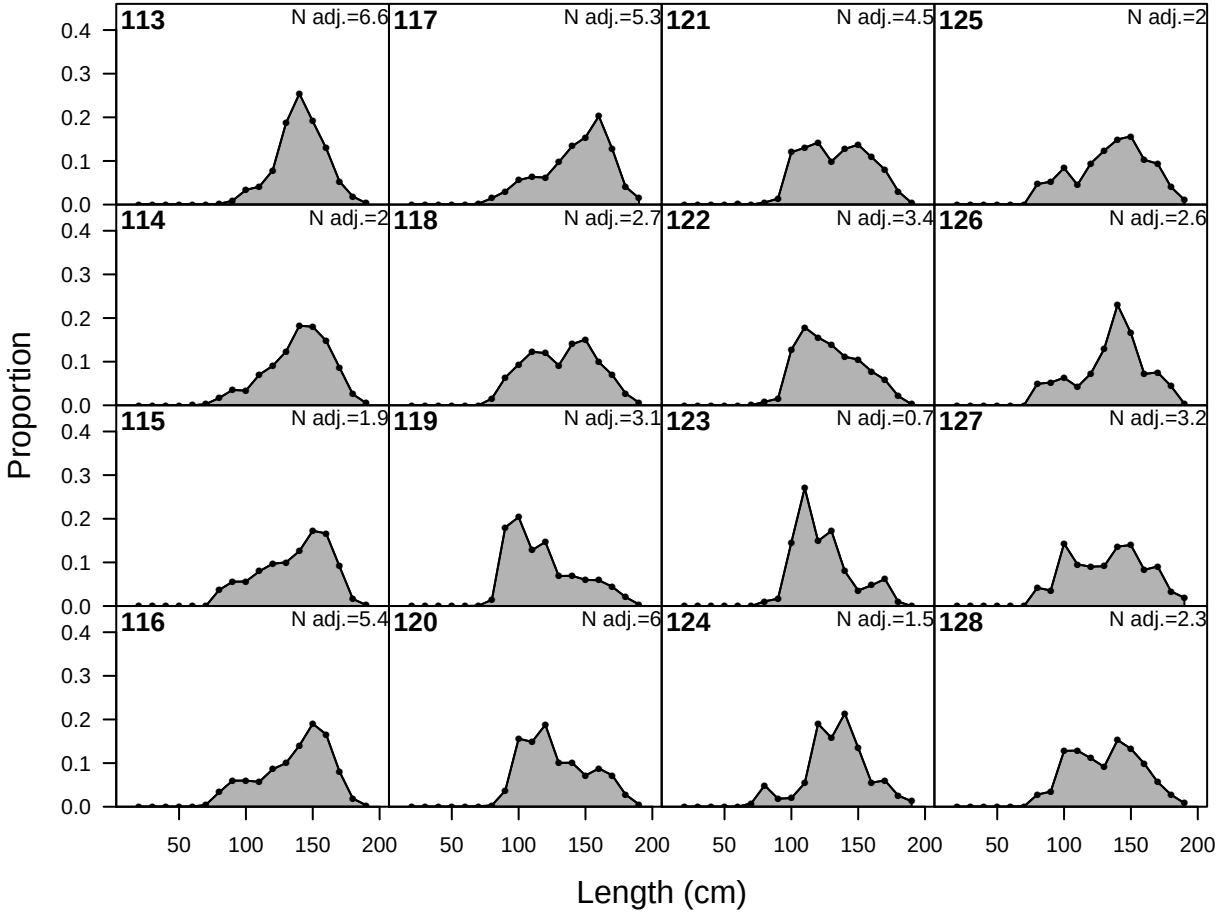

64
N adj.=1.3
68
N adj.=7.7
72
N adj.=3.1
65
N adj.=3.1
69
N adj.=7.4
66
N adj.=6
70
N adj.=1.5
67
N adj.=2.4
71
N adj.=1.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

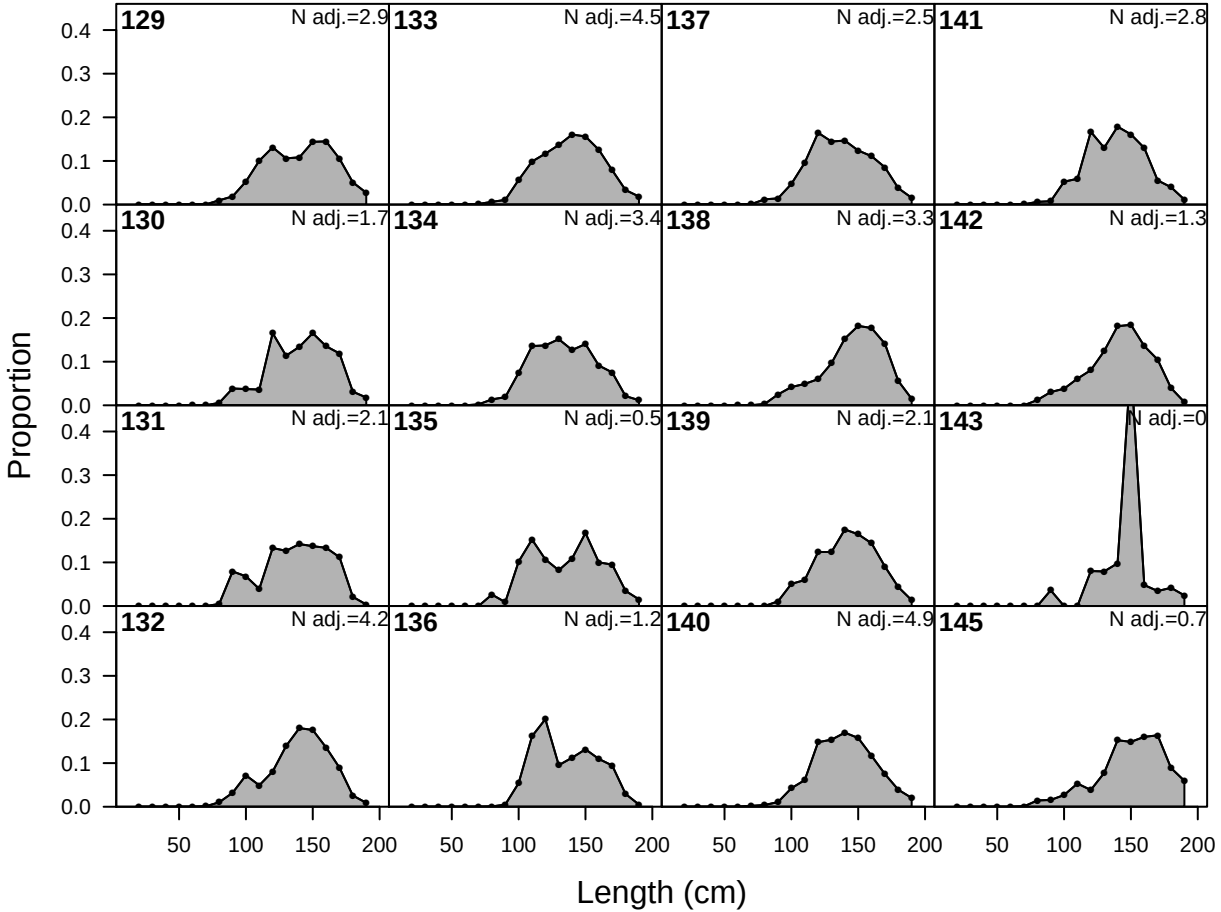

0.01
0.2
0.4
Length (cm)
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
45
47
49
51
53
56
59
61
63
65
67
69
71
Year

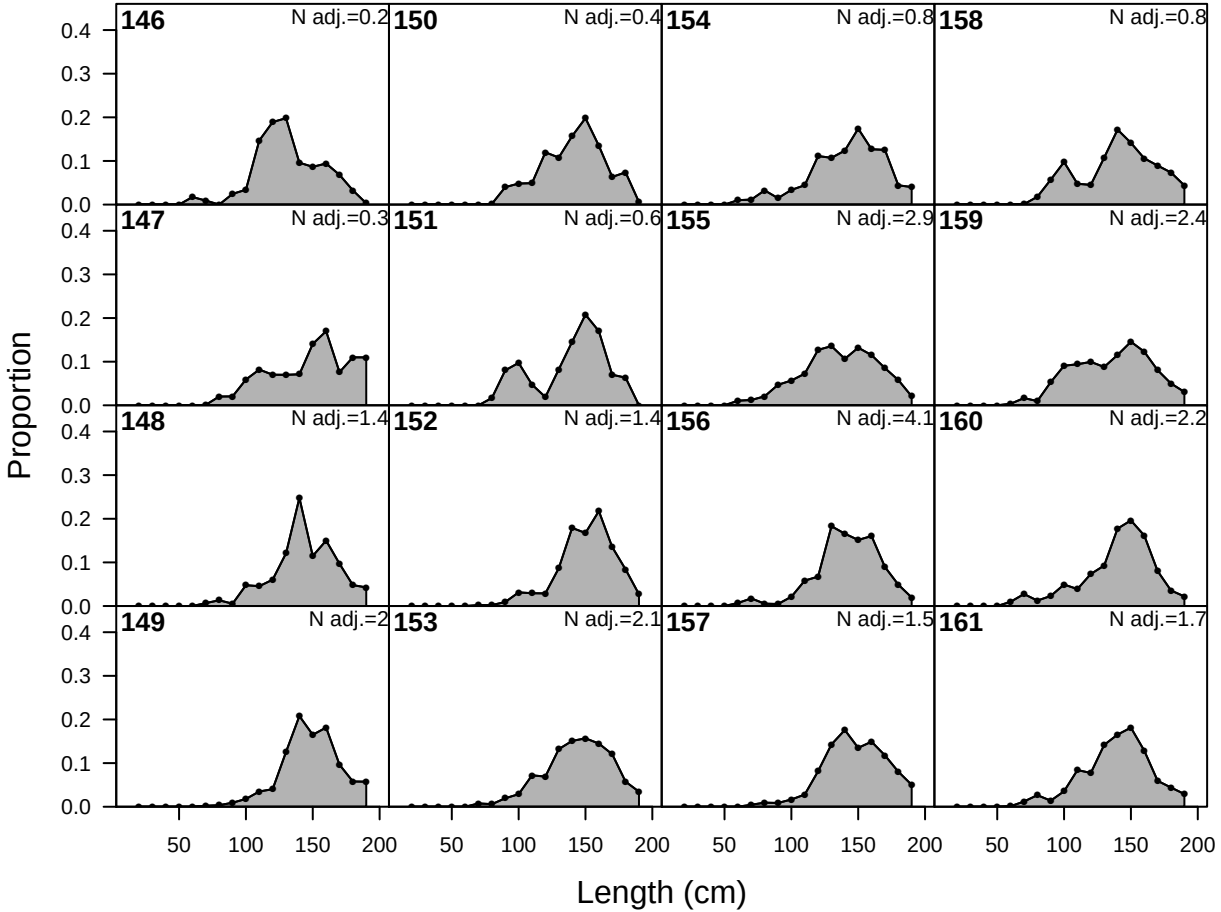

EPO−LL−survey−early (whole catch)
Mean length (cm)
300
200
100
0
−100
45
50
55
60
65
70
Year

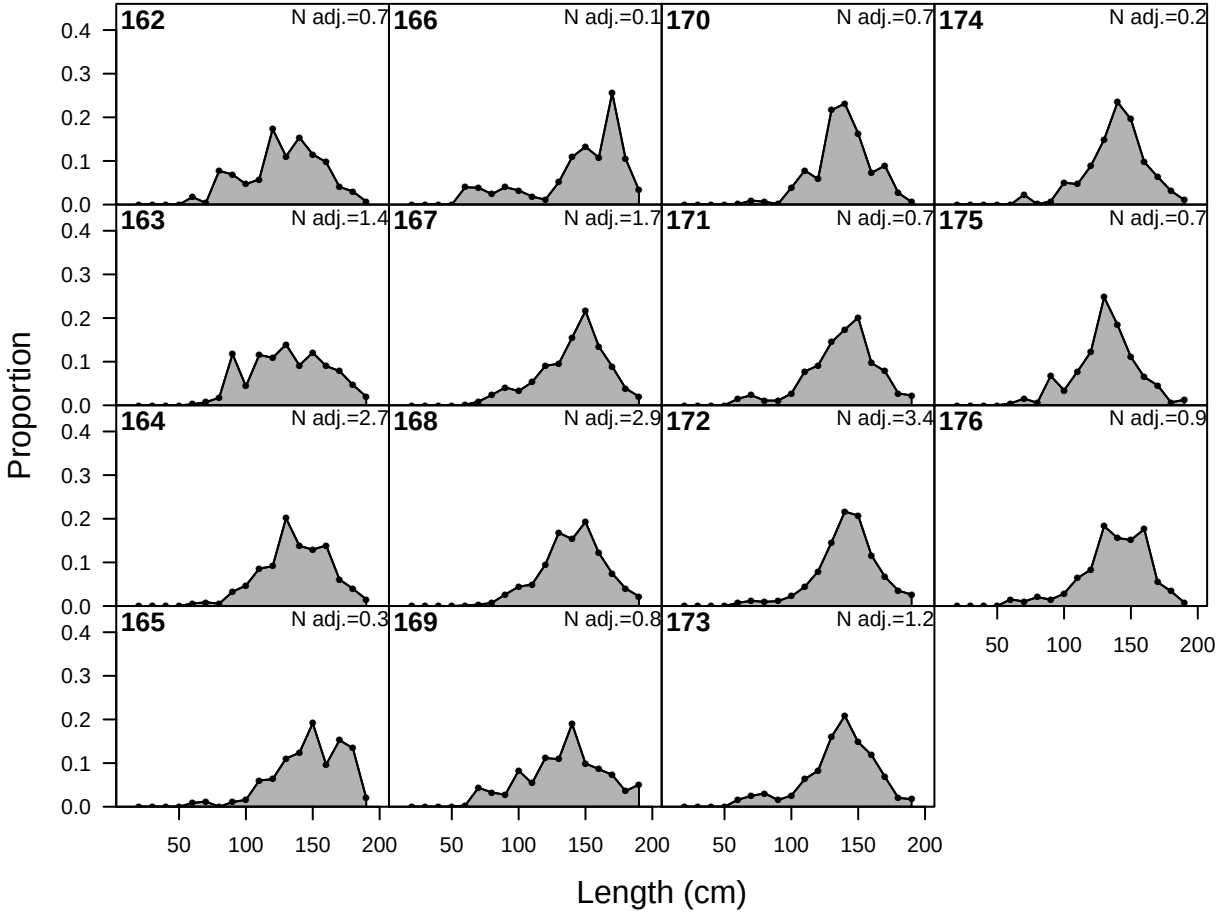

81
N adj.=7.9
85
N adj.=9.3
89
N adj.=6.7
93
N adj.=6.1
82
N adj.=6.6
86
N adj.=7.3
90
N adj.=7.4
94
N adj.=3.1
83
N adj.=6.8
87
N adj.=6.5
91
N adj.=3.9
95
N adj.=4.4
84
N adj.=7.8
88
N adj.=6.8
92
N adj.=4
96
N adj.=5.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

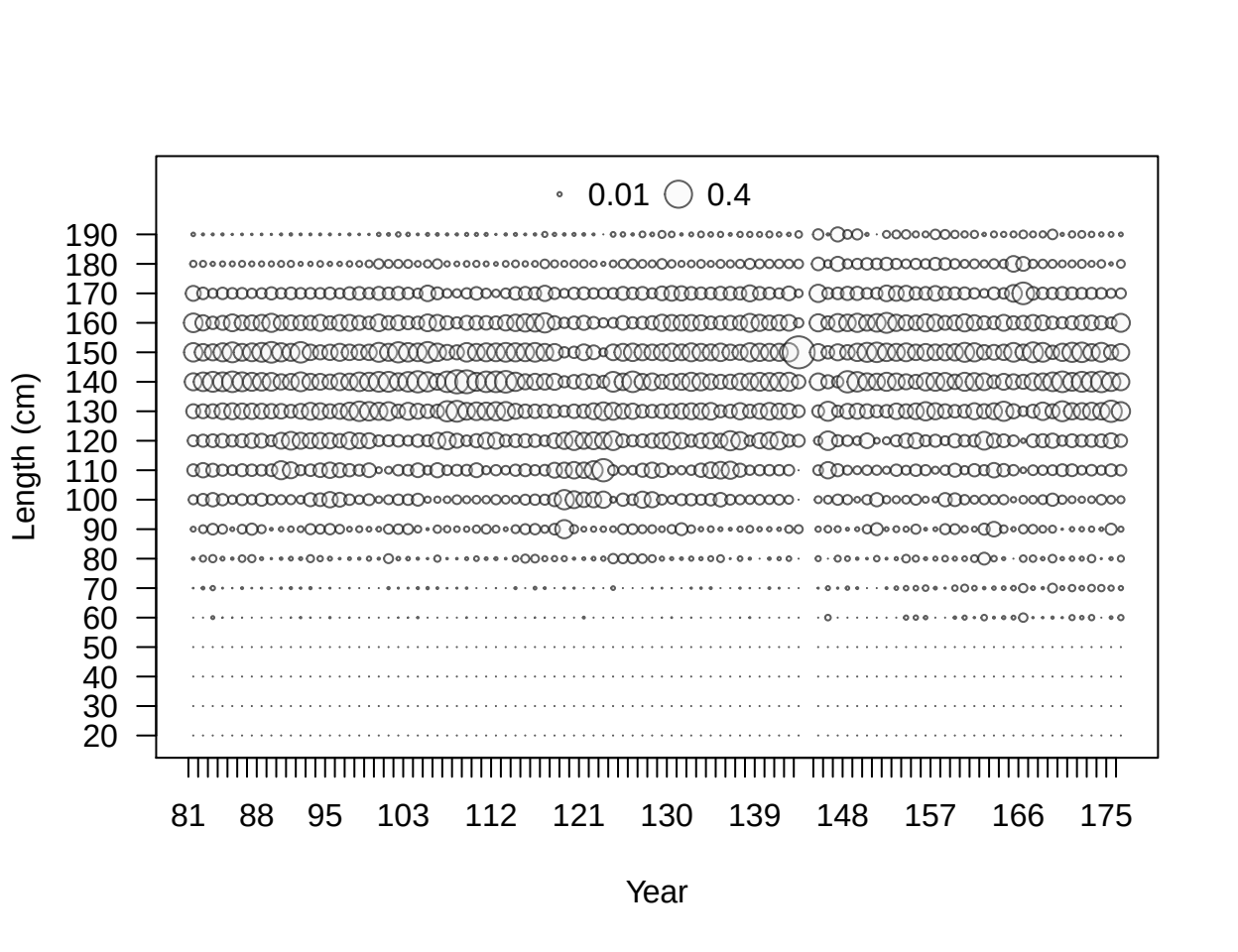

97
N adj.=4
101
N adj.=3.2
105
N adj.=3.2
109
N adj.=5.5
98
N adj.=3.4
102
N adj.=3.2
106
N adj.=2.7
110
N adj.=3.7
99
N adj.=2
103
N adj.=4.6
107
N adj.=4.9
111
N adj.=5.4
100
N adj.=2.1
104
N adj.=5.2
108
N adj.=4.9
112
N adj.=7.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

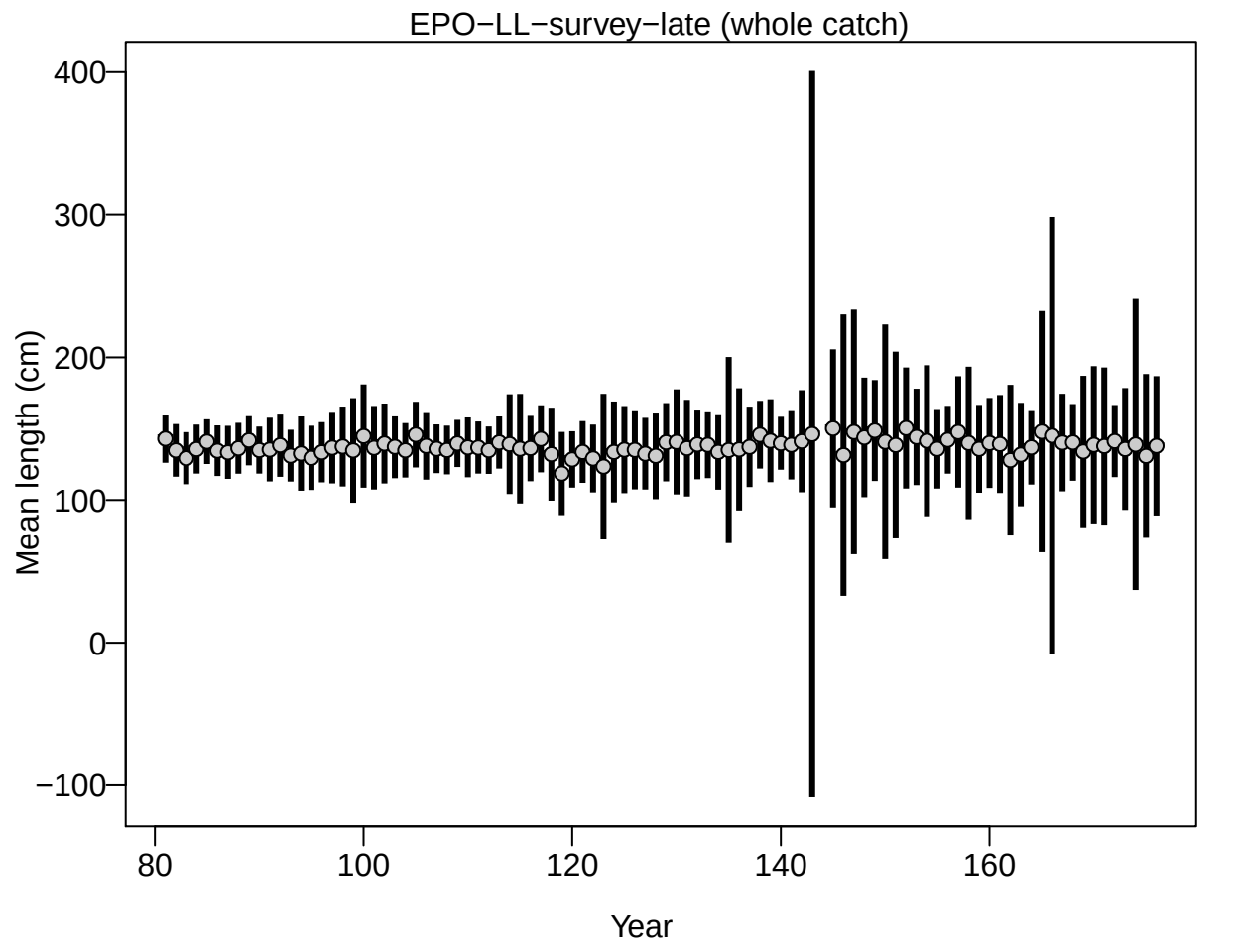

113
N adj.=6.6
117
N adj.=5.3
121
N adj.=4.5
125
N adj.=2
114
N adj.=2
118
N adj.=2.7
122
N adj.=3.4
126
N adj.=2.6
115
N adj.=1.9
119
N adj.=3.1
123
N adj.=0.7
127
N adj.=3.2
116
N adj.=5.4
120
N adj.=6
124
N adj.=1.5
128
N adj.=2.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

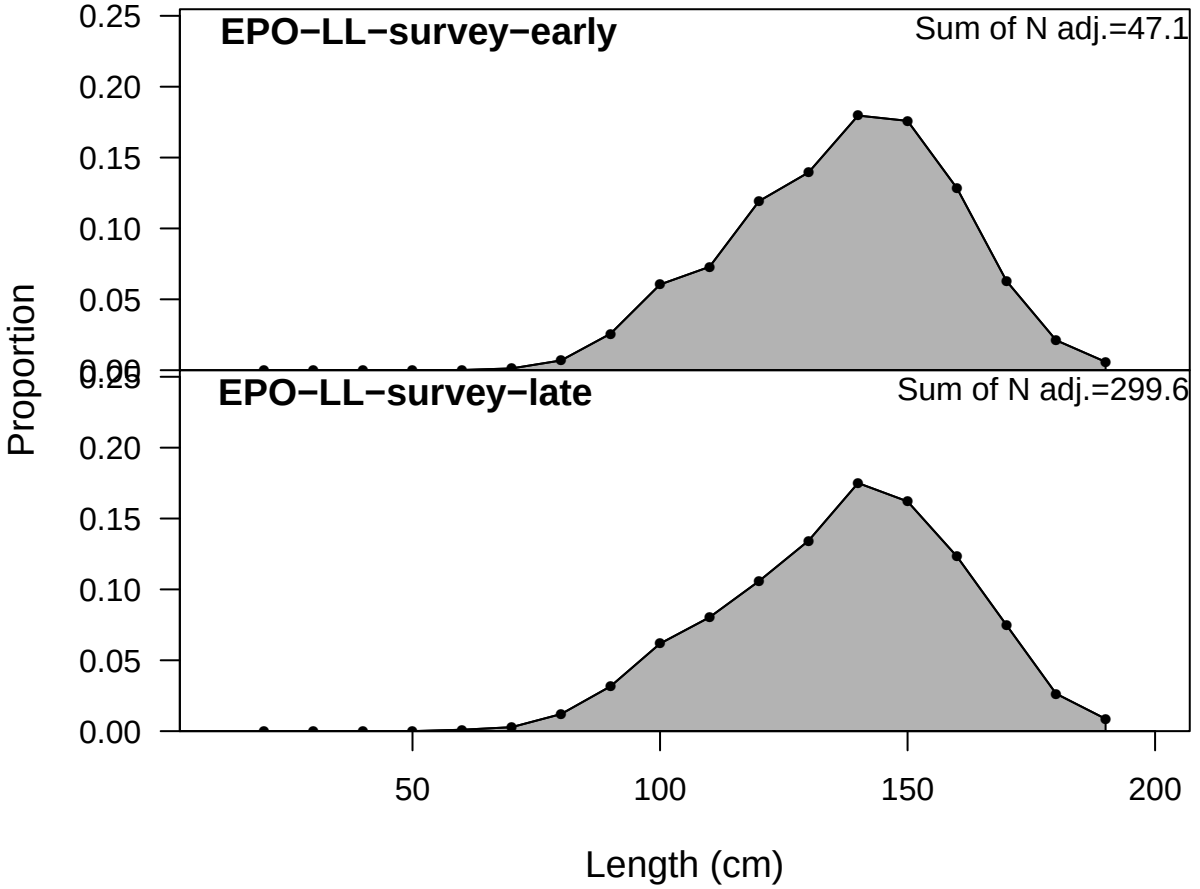

129
N adj.=2.9
133
N adj.=4.5
137
N adj.=2.5
141
N adj.=2.8
130
N adj.=1.7
134
N adj.=3.4
138
N adj.=3.3
142
N adj.=1.3
131
N adj.=2.1
135
N adj.=0.5
139
N adj.=2.1
143
N adj.=0
132
N adj.=4.2
136
N adj.=1.2
140
N adj.=4.9
145
N adj.=0.7
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

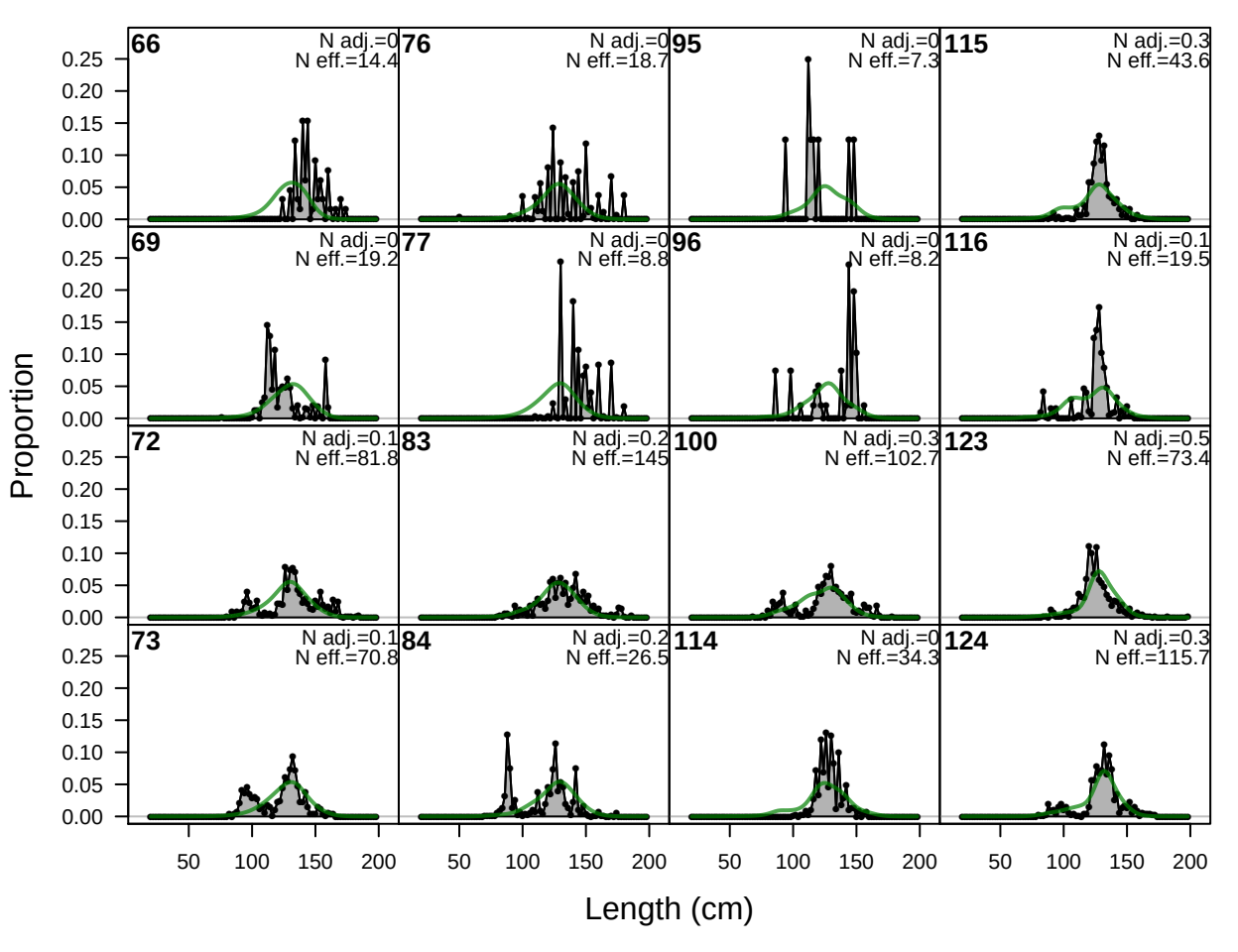

146
N adj.=0.2
150
N adj.=0.4
154
N adj.=0.8
158
N adj.=0.8
147
N adj.=0.3
151
N adj.=0.6
155
N adj.=2.9
159
N adj.=2.4
148
N adj.=1.4
152
N adj.=1.4
156
N adj.=4.1
160
N adj.=2.2
149
N adj.=2
153
N adj.=2.1
157
N adj.=1.5
161
N adj.=1.7
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

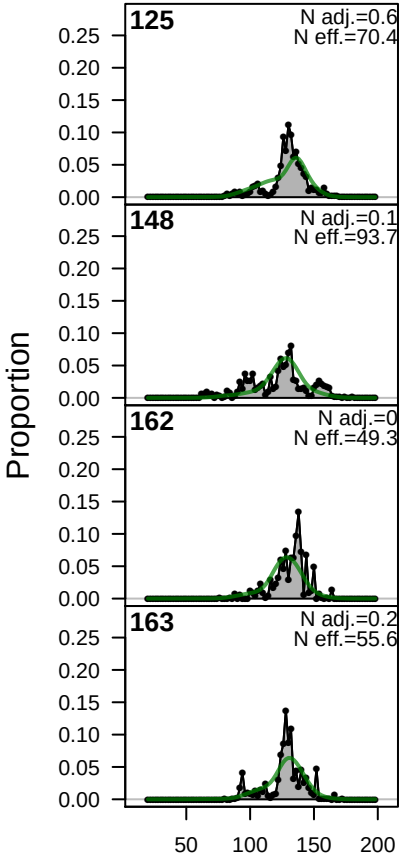

162
N adj.=0.7
166
N adj.=0.1
170
N adj.=0.7
174
N adj.=0.2
163
N adj.=1.4
167
N adj.=1.7
171
N adj.=0.7
175
N adj.=0.7
164
N adj.=2.7
168
N adj.=2.9
172
N adj.=3.4
176
N adj.=0.9
165
N adj.=0.3
169
N adj.=0.8
173
N adj.=1.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

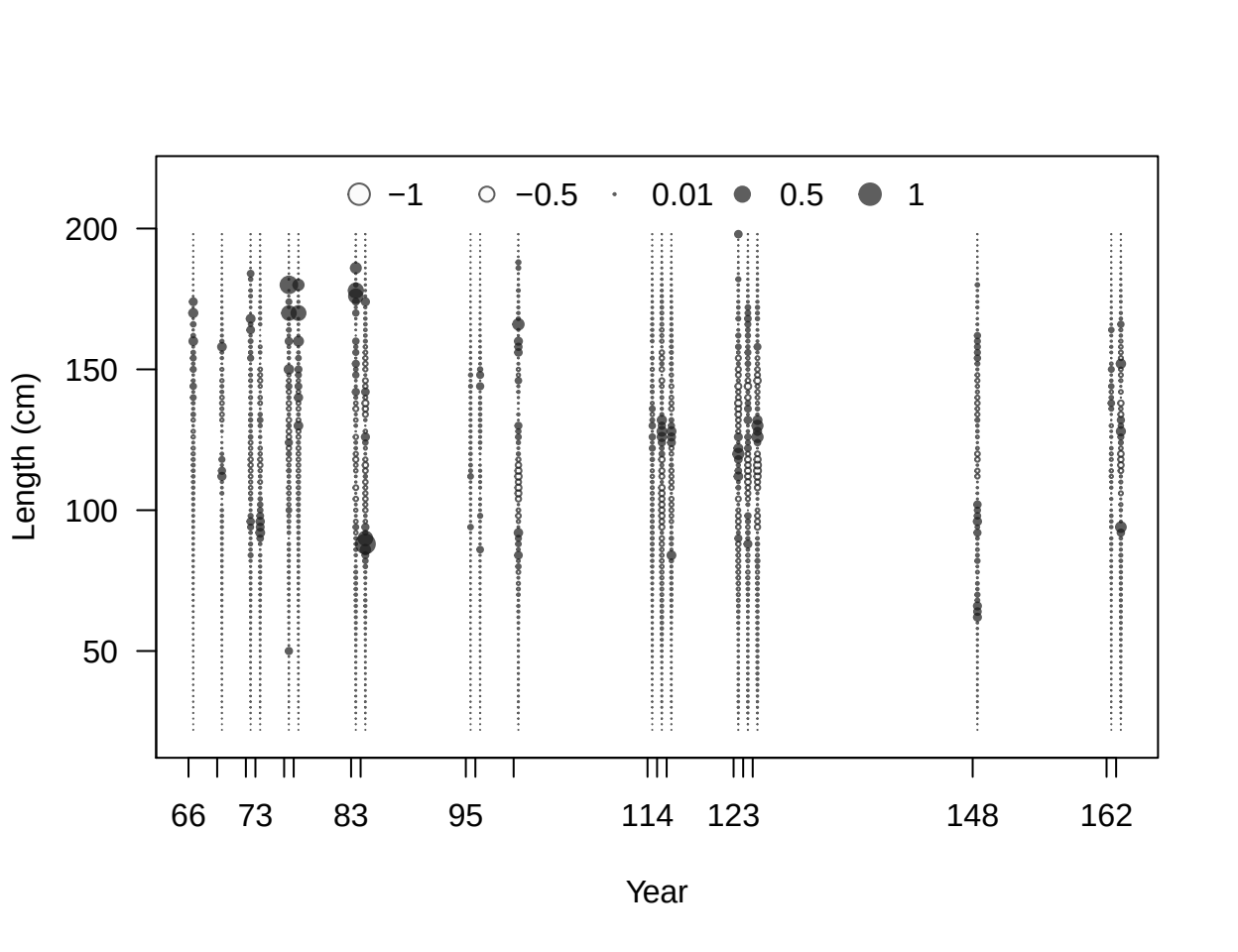

0.01
0.4
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
Length (cm)
81
88
95
103
112
121
130
139
148
157
166
175
Year

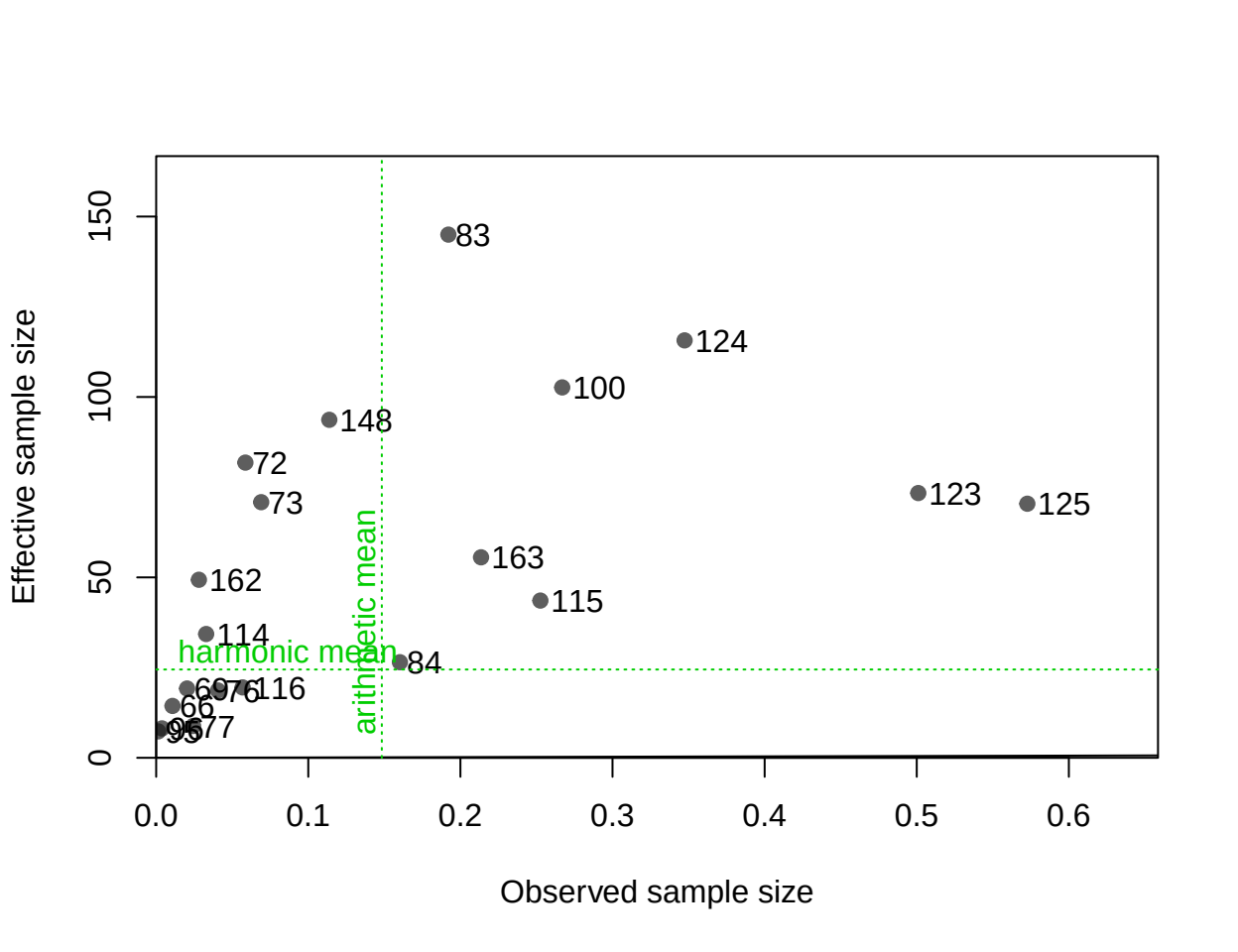

EPO−LL−survey−late (whole catch)
Mean length (cm)
400
300
200
100
0
−100
80
100
120
140
160
Year

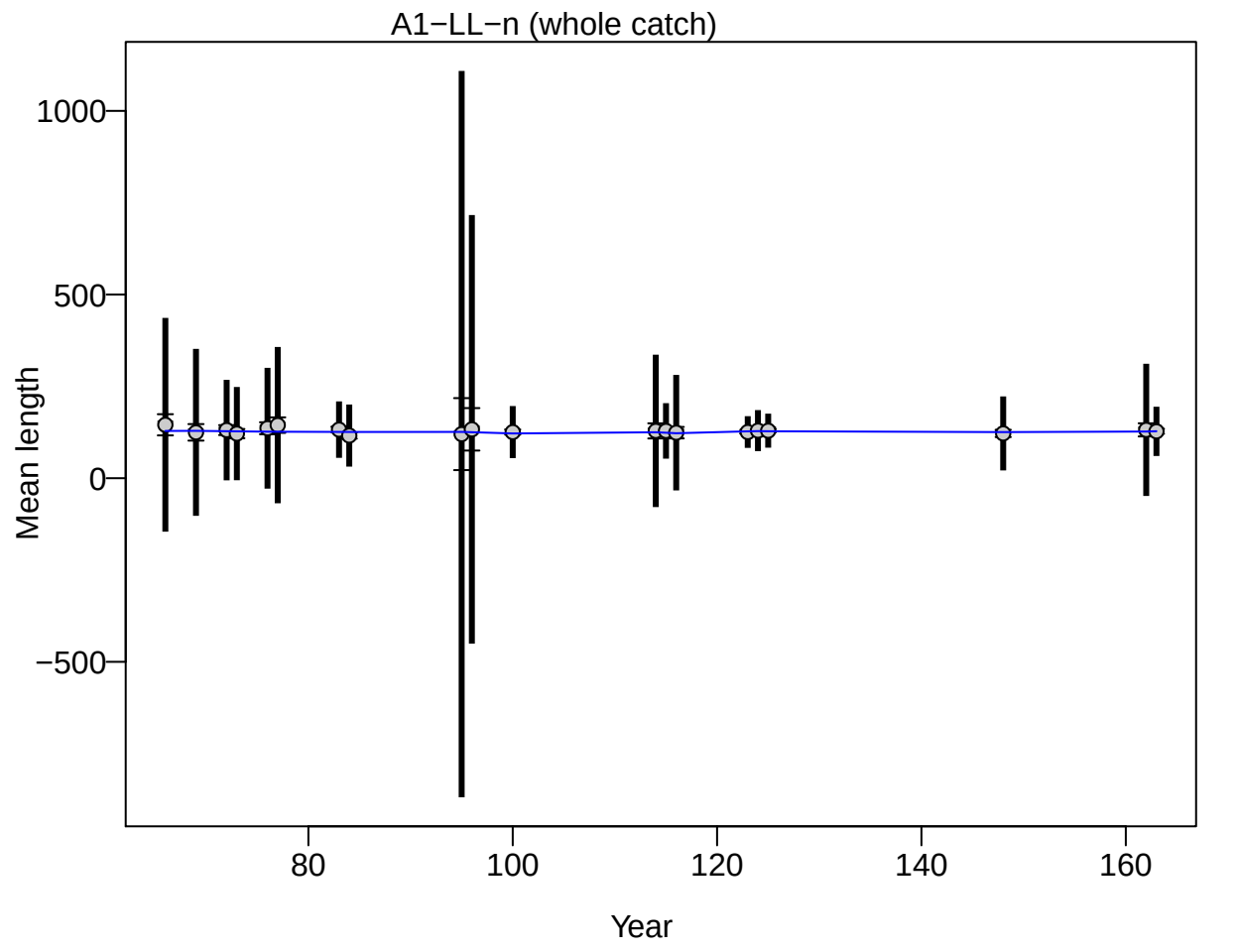

EPO−LL−survey−early
Sum of N adj.=47.1
EPO−LL−survey−late
Sum of N adj.=299.6
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

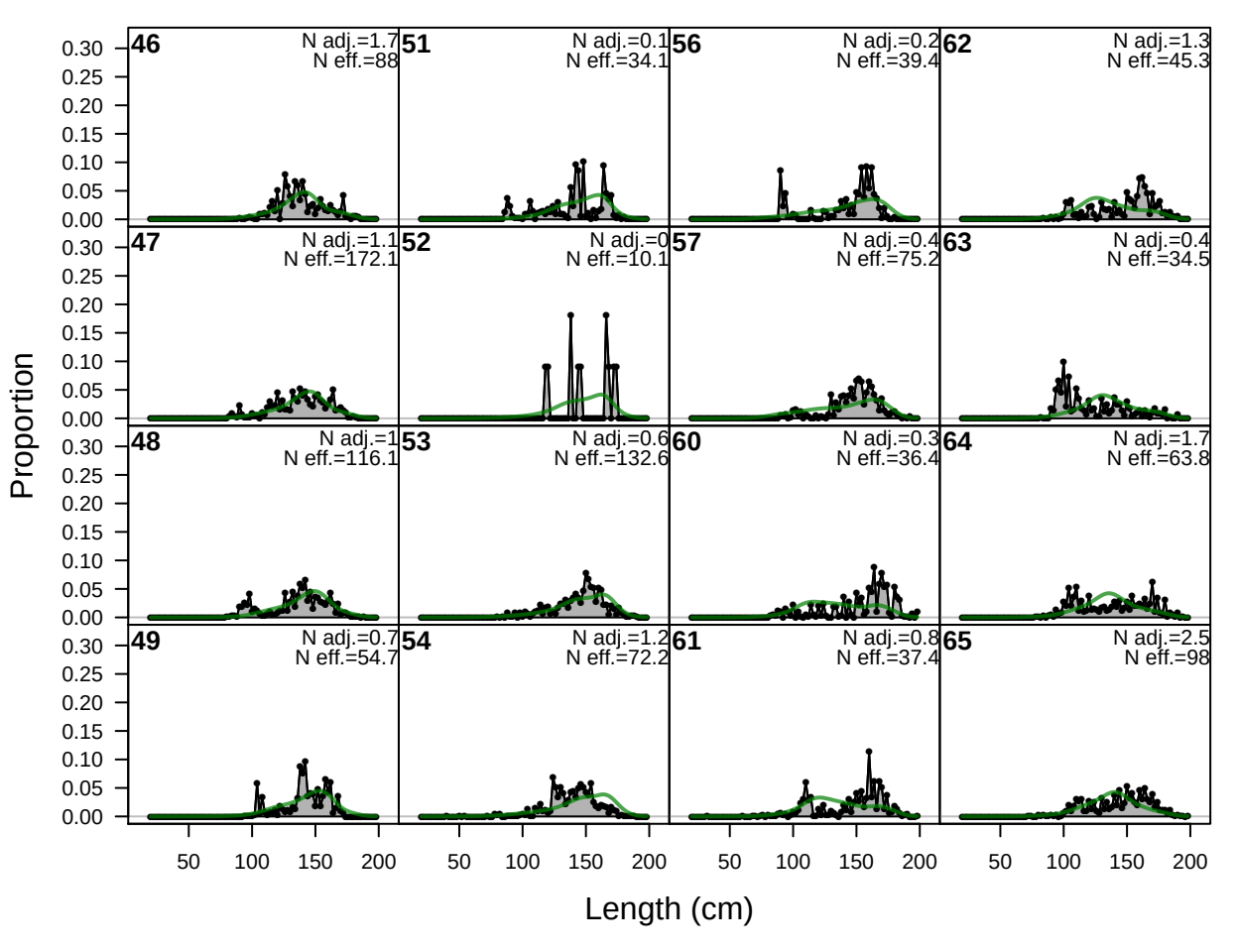

66
N adj.=0
N eff.=14.4
76
N adj.=0
N eff.=18.7
95
N adj.=0
N eff.=7.3
115
N adj.=0.3
N eff.=43.6
69
N adj.=0
N eff.=19.2
77
N adj.=0
N eff.=8.8
96
N adj.=0
N eff.=8.2
116
N adj.=0.1
N eff.=19.5
72
N adj.=0.1
N eff.=81.8
83
N adj.=0.2
N eff.=145
100
N adj.=0.3
N eff.=102.7
123
N adj.=0.5
N eff.=73.4
73
N adj.=0.1
N eff.=70.8
84
N adj.=0.2
N eff.=26.5
114
N adj.=0
N eff.=34.3
124
N adj.=0.3
N eff.=115.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


125
N adj.=0.6
N eff.=70.4
148
N adj.=0.1
N eff.=93.7
162
N adj.=0
N eff.=49.3
163
N adj.=0.2
N eff.=55.6
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Proportion
Length (cm)


−1
−0.5
0.01
0.5
1
200
150
100
50
Length (cm)
66
73
83
95
114
123
148
162
Year


Effective sample size
Observed sample size
0
50
100
150
0.0
0.1
0.2
0.3
0.4
0.5
0.6
83
124
100
148
72
73
123
125
163
162
115
114
84
harmonic mean
arithmetic mean
69
76
116
66
77


A1−LL−n (whole catch)
1000
500
0
−500
Mean length
80
100
120
140
160
Year


46
N adj.=1.7
N eff.=88
51
N adj.=0.1
N eff.=34.1
56
N adj.=0.2
N eff.=39.4
62
N adj.=1.3
N eff.=45.3
47
N adj.=1.1
N eff.=172.1
52
N adj.=0
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N adj.=1.7
N eff.=63.8
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N adj.=0.7
N eff.=54.7
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N adj.=1.2
N eff.=72.2
61
N adj.=0.8
N eff.=37.4
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N adj.=2.5
N eff.=98
Proportion
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0.05
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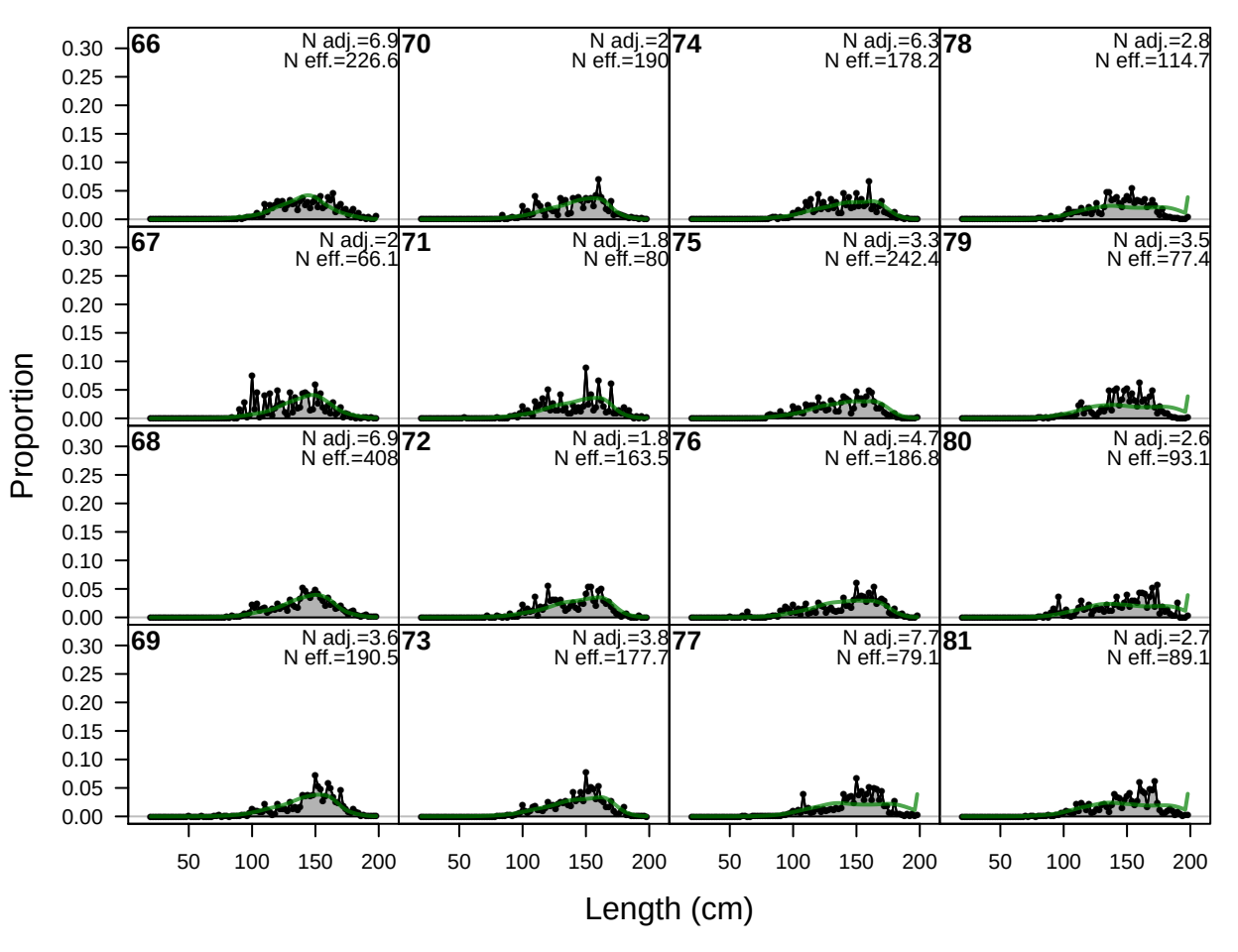
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N adj.=3.5
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N adj.=1.8
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N adj.=4.7
N eff.=186.8
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N adj.=2.6
N eff.=93.1
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N adj.=3.6
N eff.=190.5
73
N adj.=3.8
N eff.=177.7
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N adj.=7.7
N eff.=79.1
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N adj.=2.7
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Proportion
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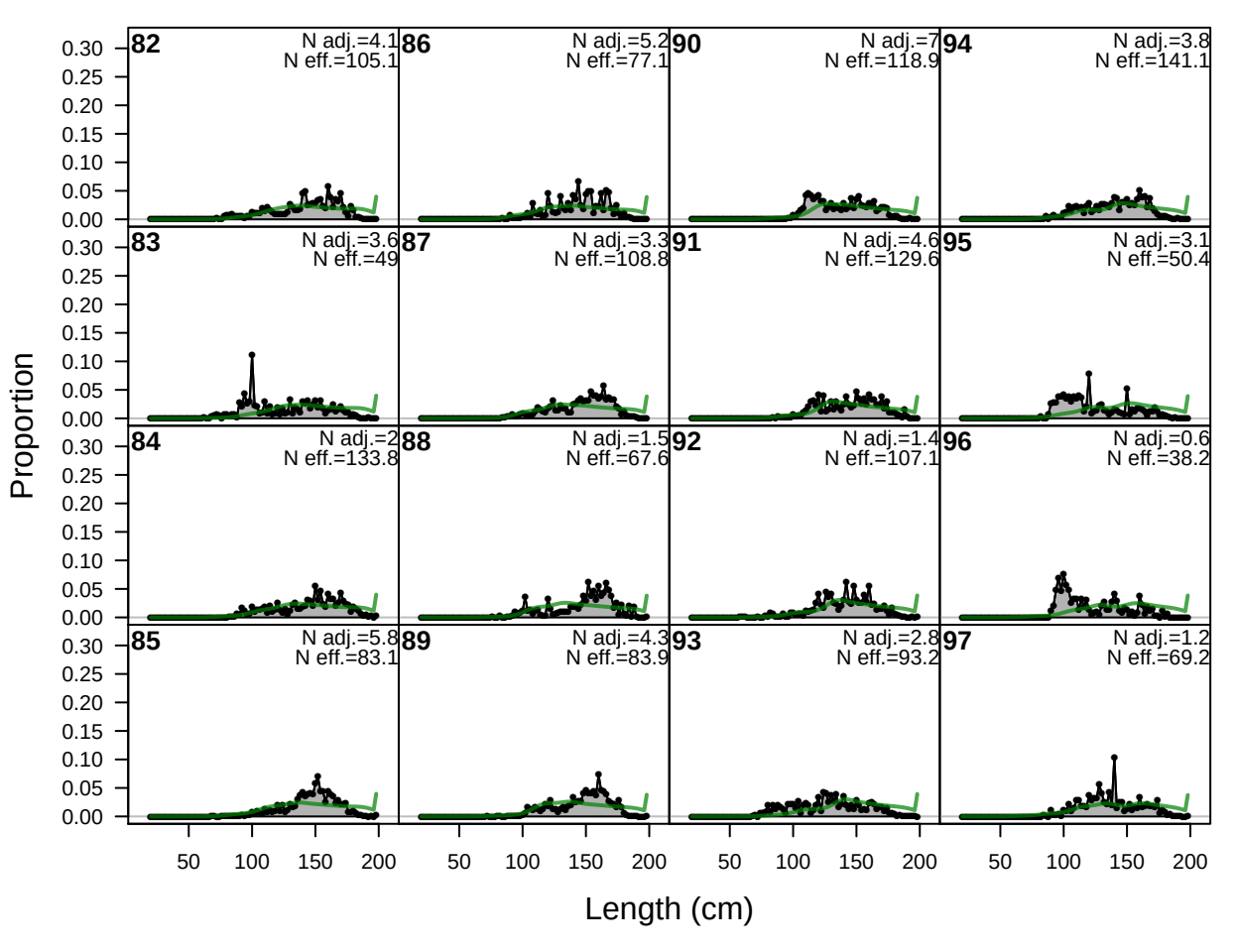
0.30
50
100
150
200
Length (cm)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N adj.=3.6
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92
N adj.=1.4
N eff.=107.1
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N eff.=38.2
85
N adj.=5.8
N eff.=83.1
89
N adj.=4.3
N eff.=83.9
93
N adj.=2.8
N eff.=93.2
97
N adj.=1.2
N eff.=69.2
Proportion
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0.05
0.10
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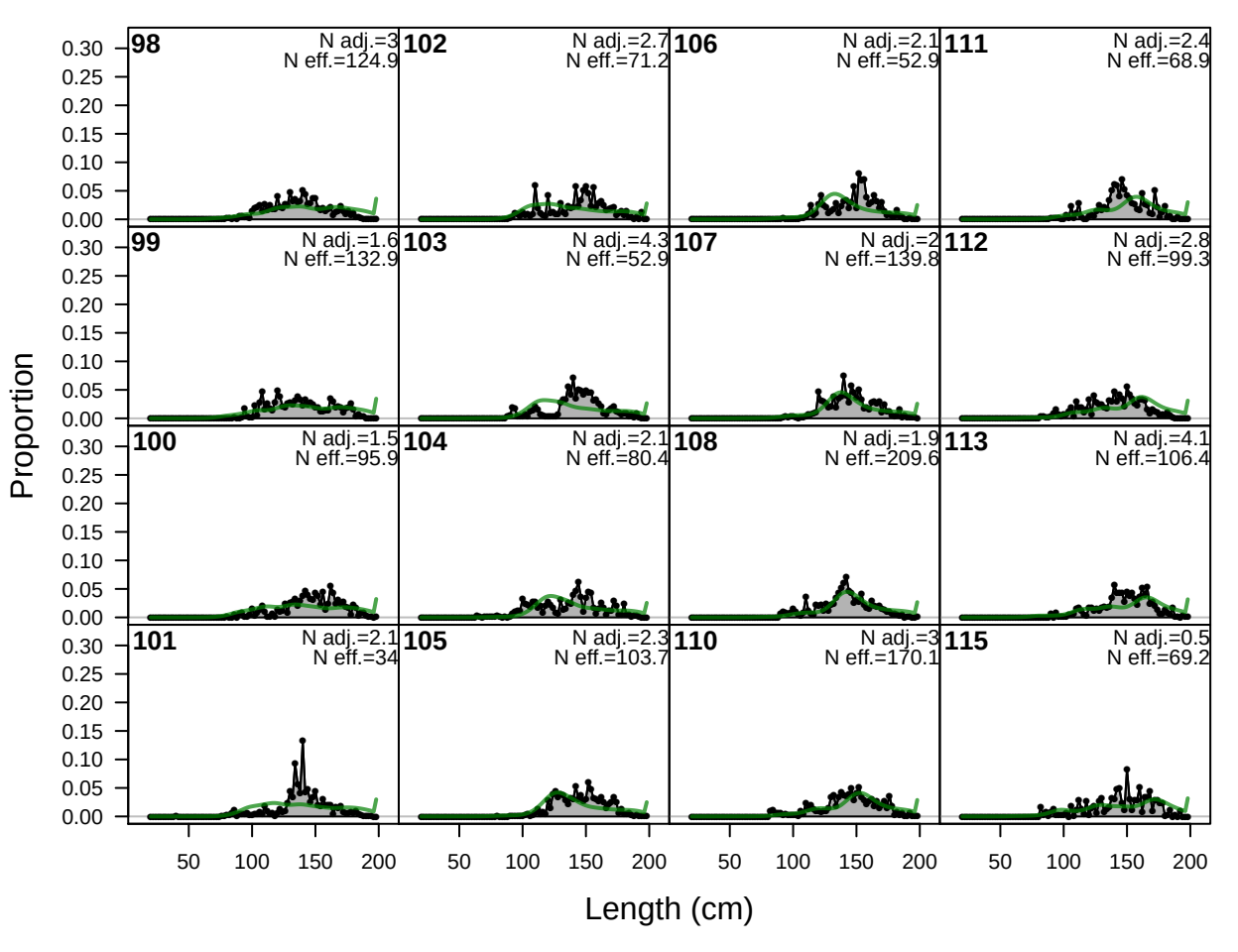
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=132.9
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N eff.=52.9
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N adj.=2
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N adj.=2.8
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N adj.=1.9
N eff.=209.6
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N adj.=4.1
N eff.=106.4
101
N adj.=2.1
N eff.=34
105
N adj.=2.3
N eff.=103.7
110
N adj.=3
N eff.=170.1
115
N adj.=0.5
N eff.=69.2
Proportion
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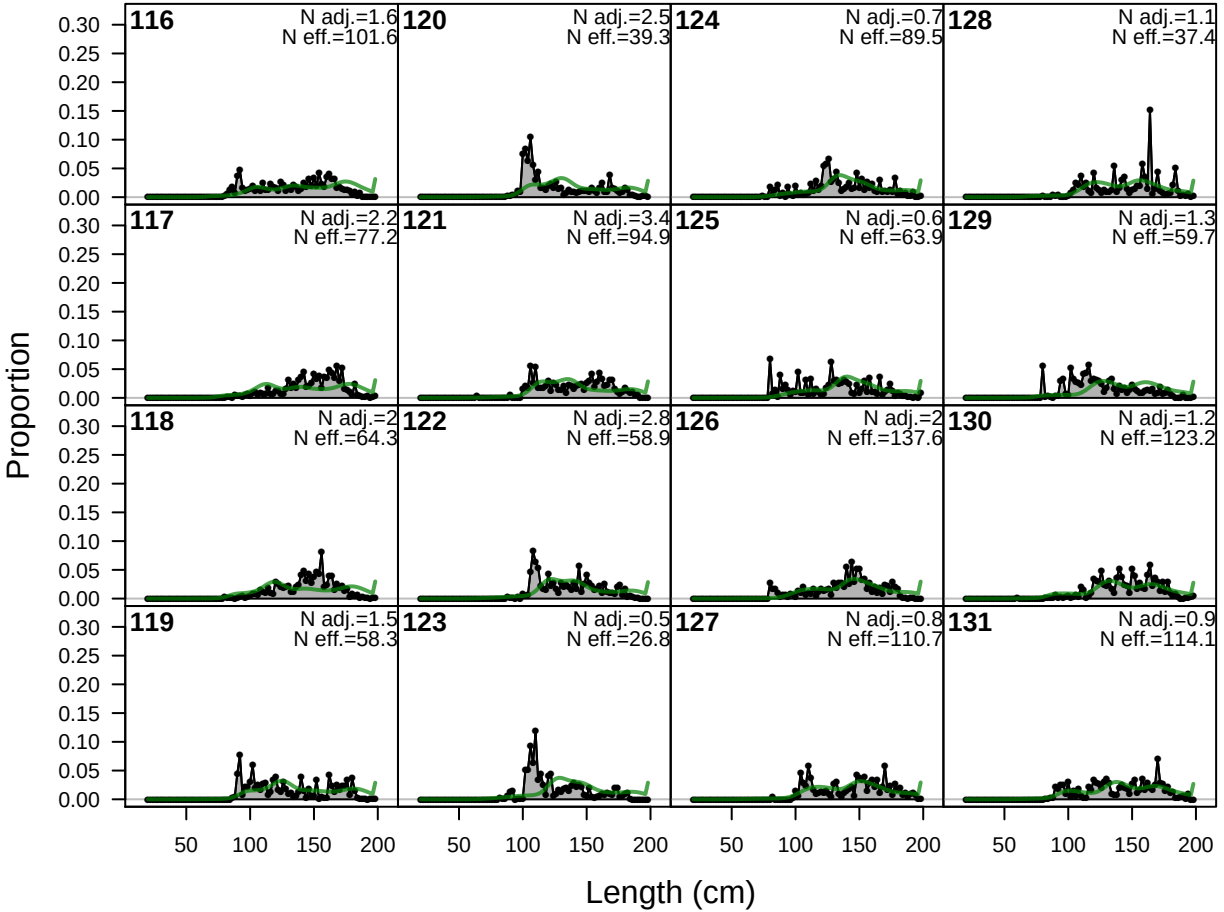
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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117
N adj.=2.2
N eff.=77.2
121
N adj.=3.4
N eff.=94.9
125
N adj.=0.6
N eff.=63.9
129
N adj.=1.3
N eff.=59.7
118
N adj.=2
N eff.=64.3
122
N adj.=2.8
N eff.=58.9
126
N adj.=2
N eff.=137.6
130
N adj.=1.2
N eff.=123.2
119
N adj.=1.5
N eff.=58.3
123
N adj.=0.5
N eff.=26.8
127
N adj.=0.8
N eff.=110.7
131
N adj.=0.9
N eff.=114.1
Proportion
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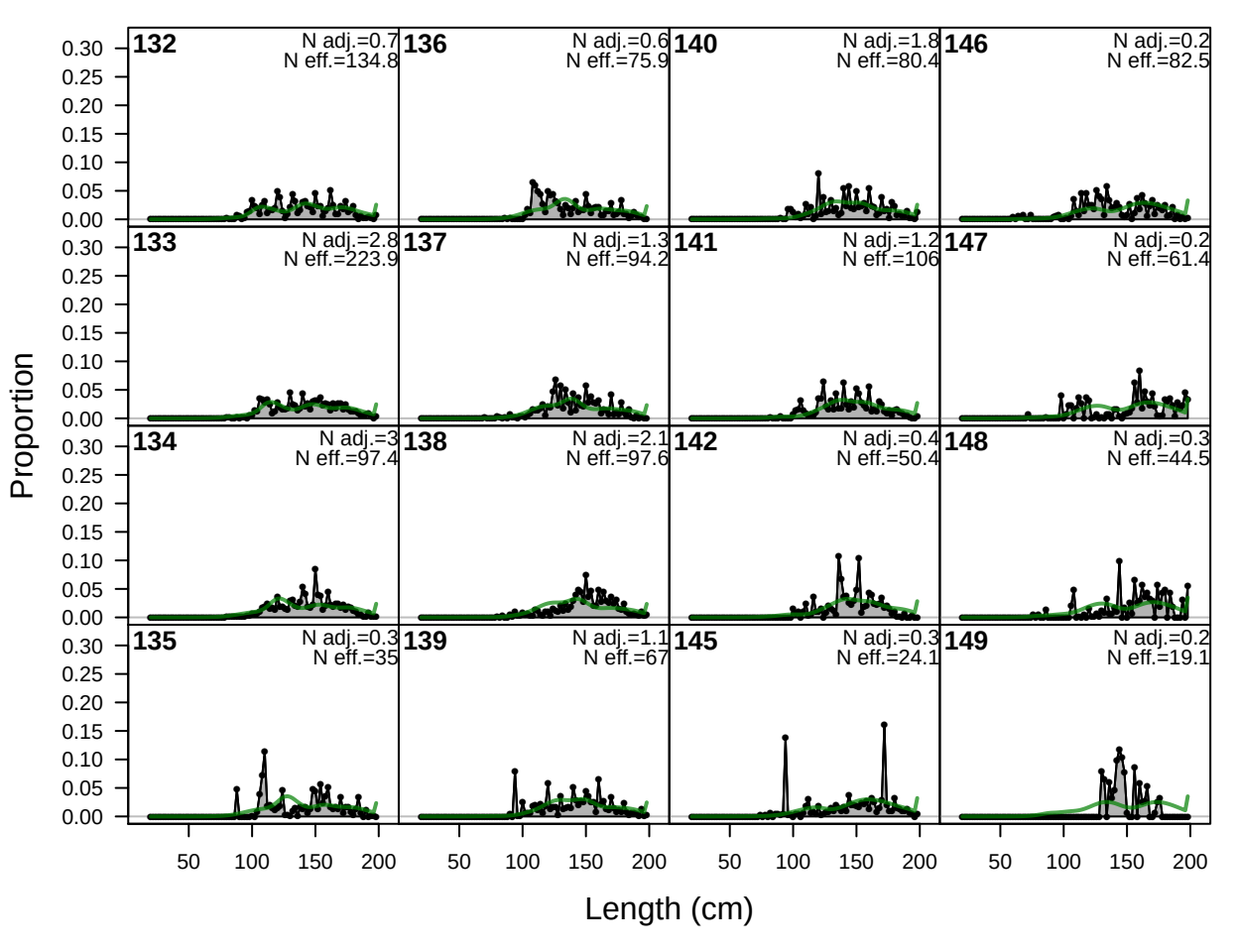
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=134.8
136
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N eff.=75.9
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N eff.=80.4
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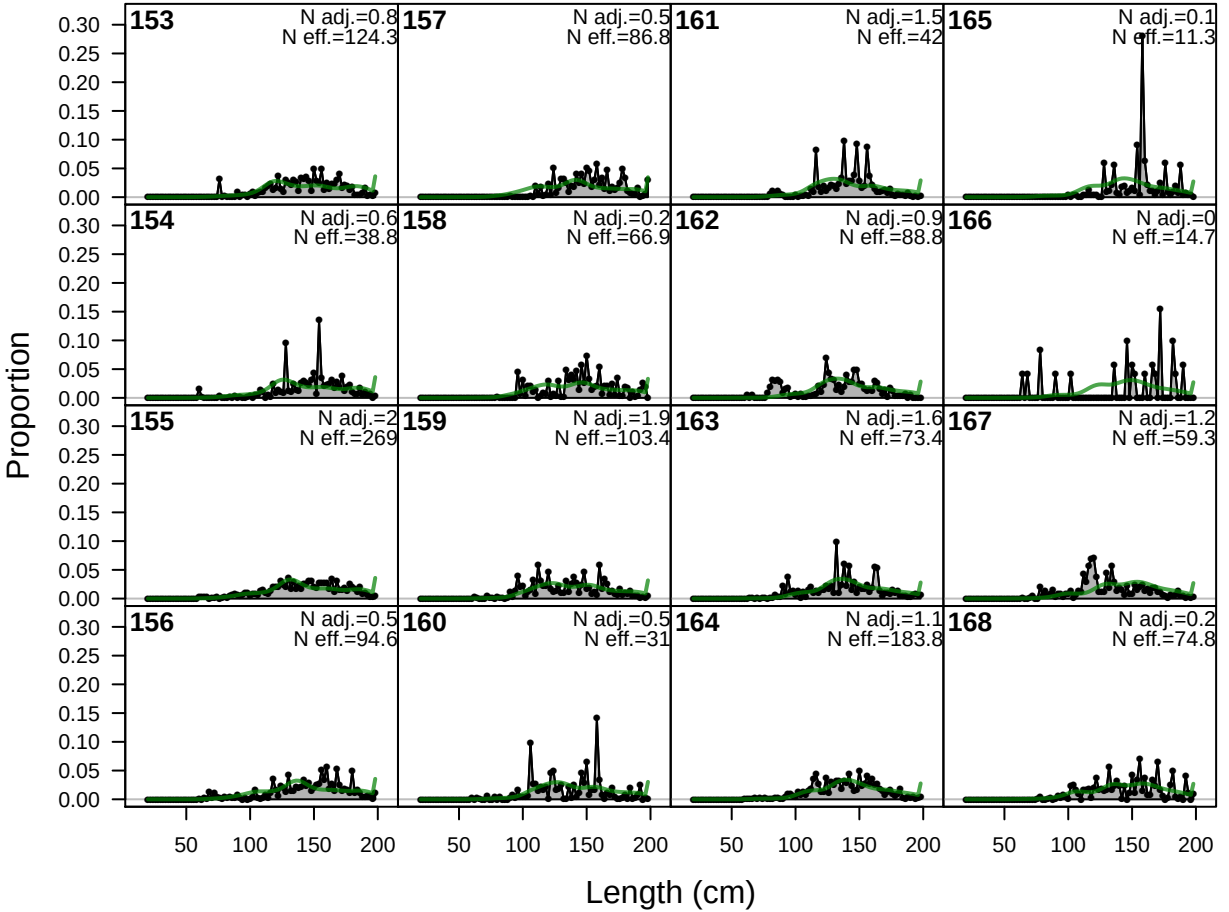
N adj.=0.2
N eff.=82.5
133
N adj.=2.8
N eff.=223.9
137
N adj.=1.3
N eff.=94.2
141
N adj.=1.2
N eff.=106
147
N adj.=0.2
N eff.=61.4
134
N adj.=3
N eff.=97.4
138
N adj.=2.1
N eff.=97.6
142
N adj.=0.4
N eff.=50.4
148
N adj.=0.3
N eff.=44.5
135
N adj.=0.3
N eff.=35
139
N adj.=1.1
N eff.=67
145
N adj.=0.3
N eff.=24.1
149
N adj.=0.2
N eff.=19.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=124.3
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N eff.=42
165
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N eff.=11.3
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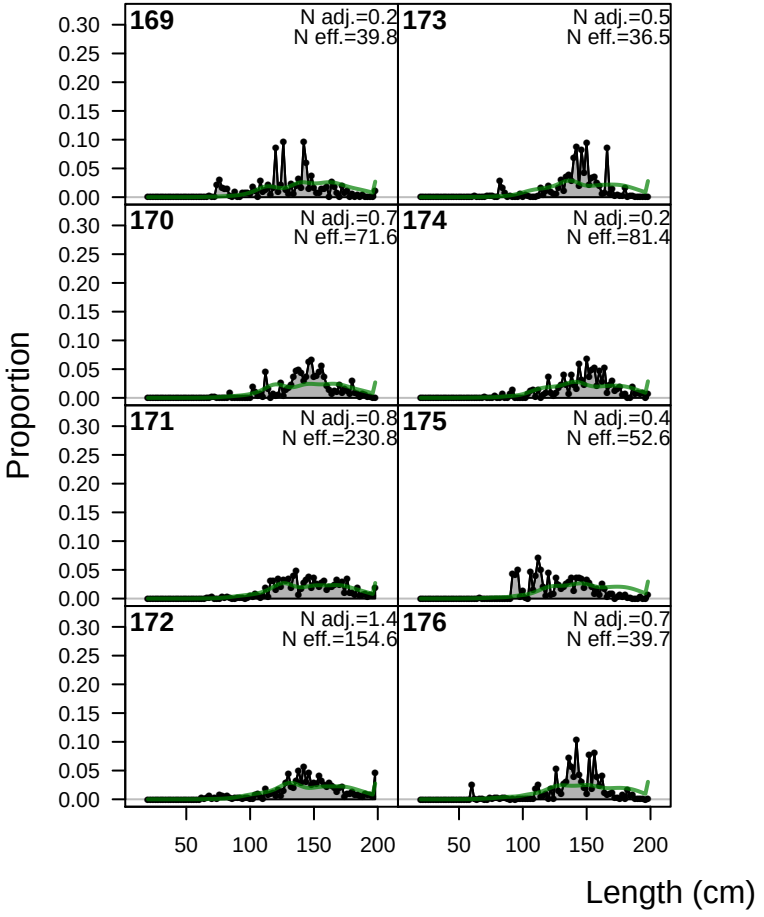
N adj.=0.6
N eff.=38.8
158
N adj.=0.2
N eff.=66.9
162
N adj.=0.9
N eff.=88.8
166
N adj.=0
N eff.=14.7
155
N adj.=2
N eff.=269
159
N adj.=1.9
N eff.=103.4
163
N adj.=1.6
N eff.=73.4
167
N adj.=1.2
N eff.=59.3
156
N adj.=0.5
N eff.=94.6
160
N adj.=0.5
N eff.=31
164
N adj.=1.1
N eff.=183.8
168
N adj.=0.2
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)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173
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N eff.=36.5
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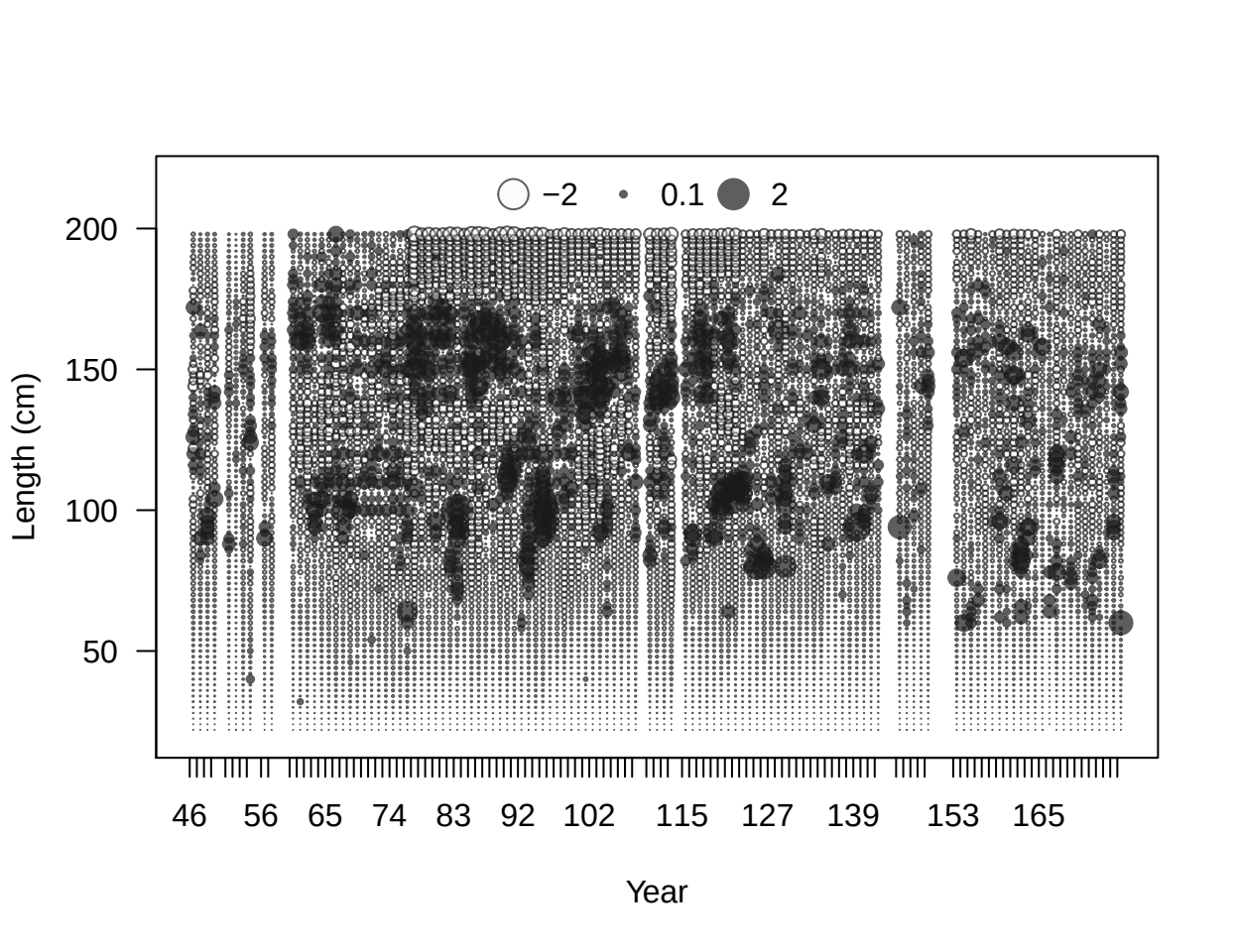
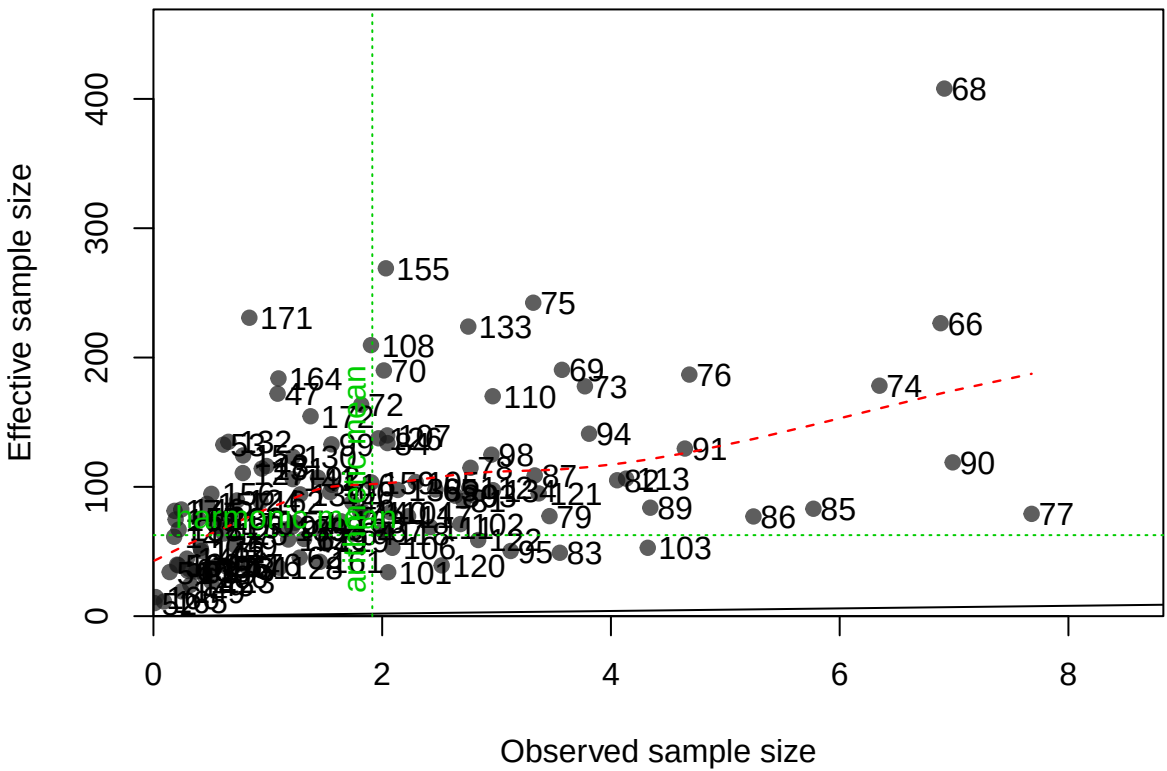
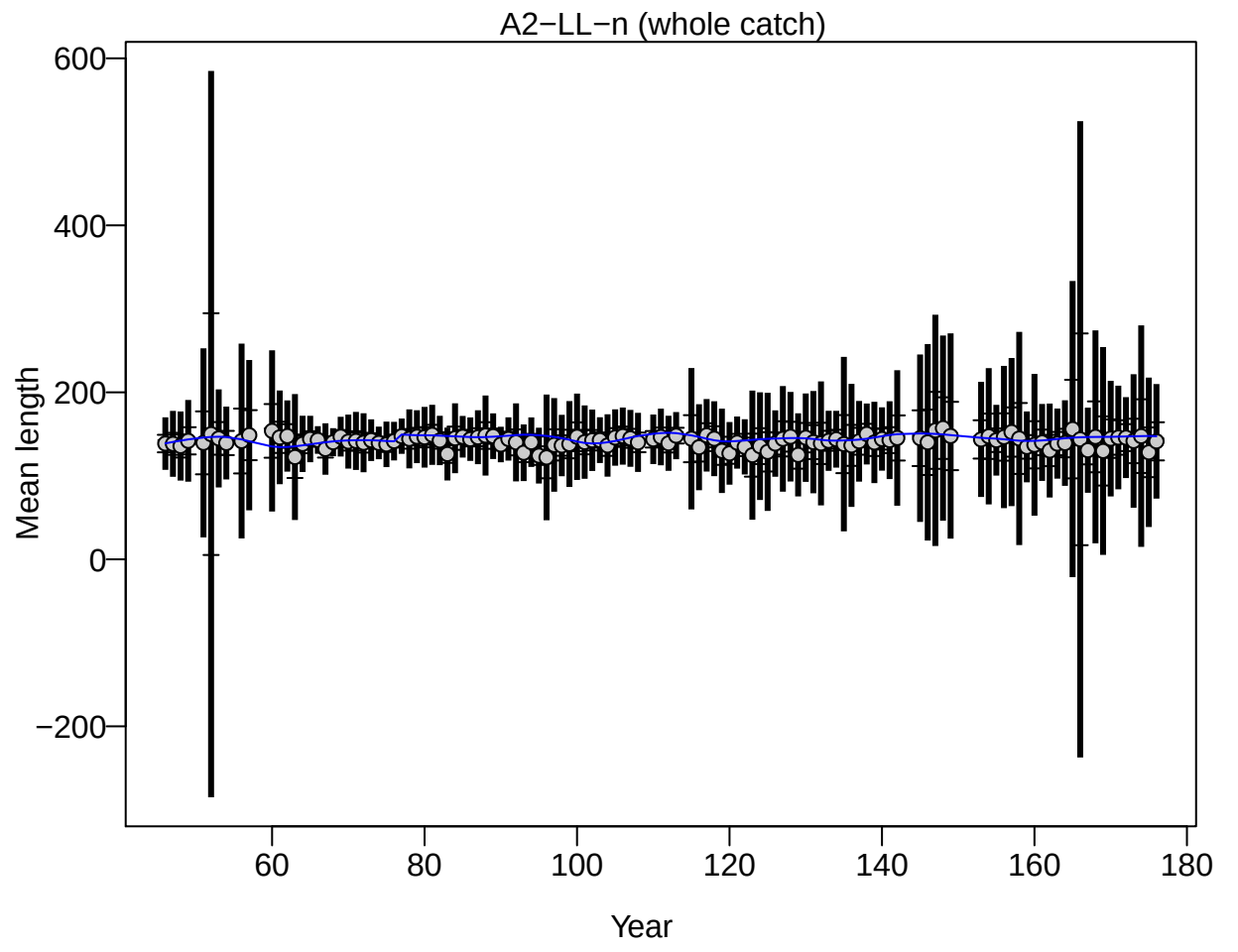
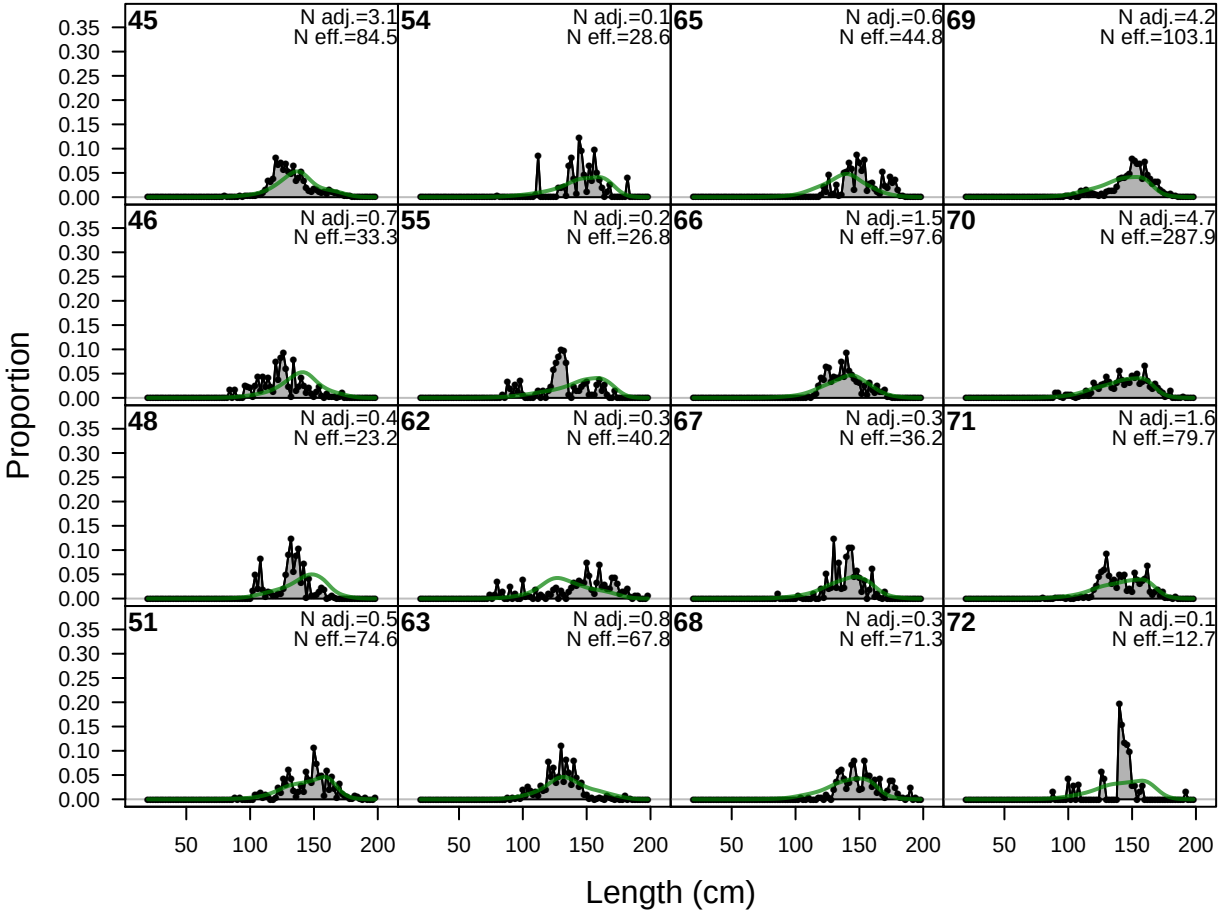
N eff.=71.6
174
N adj.=0.2
N eff.=81.4
171
N adj.=0.8
N eff.=230.8
175
N adj.=0.4
N eff.=52.6
172
N adj.=1.4
N eff.=154.6
176
N adj.=0.7
N eff.=39.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
46
56
65
74
83
92
102
115
127
139
153
165
Year



Effective sample size
Observed sample size
0
100
200
300
400
0
2
4
6
8
68
155
75
171
133
66
108
70
69
76
164
73
74
47
110
72
94
91
90
98
87
89
86
85
77
79
103
83
95
120
101
106


A2−LL−n (whole catch)
600
400
200
0
−200
Mean length
60
80
100
120
140
160
180
Year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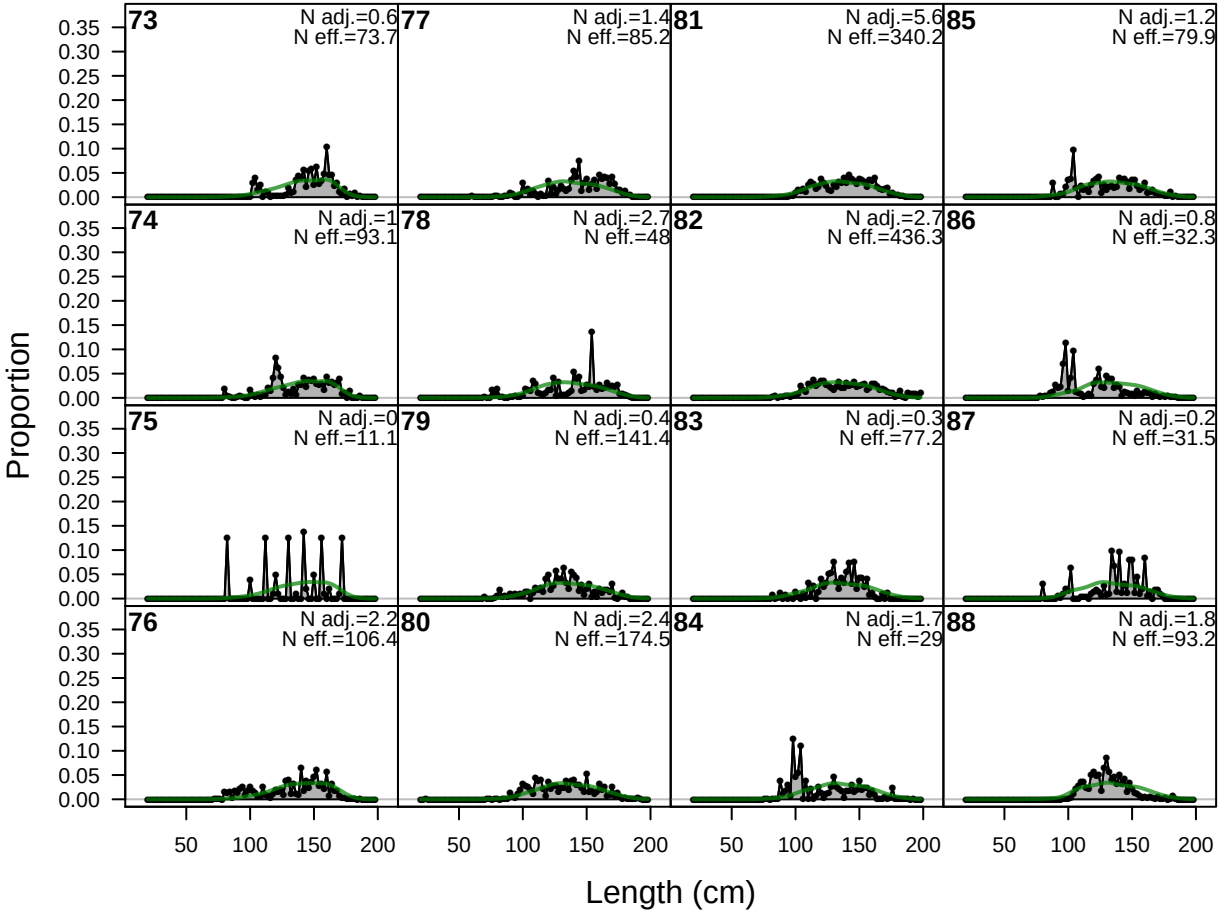
N adj.=3.1
N eff.=84.5
54
N adj.=0.1
N eff.=28.6
65
N adj.=0.6
N eff.=44.8
69
N adj.=4.2
N eff.=103.1
46
N adj.=0.7
N eff.=33.3
55
N adj.=0.2
N eff.=26.8
66
N adj.=1.5
N eff.=97.6
70
N adj.=4.7
N eff.=287.9
48
N adj.=0.4
N eff.=23.2
62
N adj.=0.3
N eff.=40.2
67
N adj.=0.3
N eff.=36.2
71
N adj.=1.6
N eff.=79.7
51
N adj.=0.5
N eff.=74.6
63
N adj.=0.8
N eff.=67.8
68
N adj.=0.3
N eff.=71.3
72
N adj.=0.1
N eff.=12.7
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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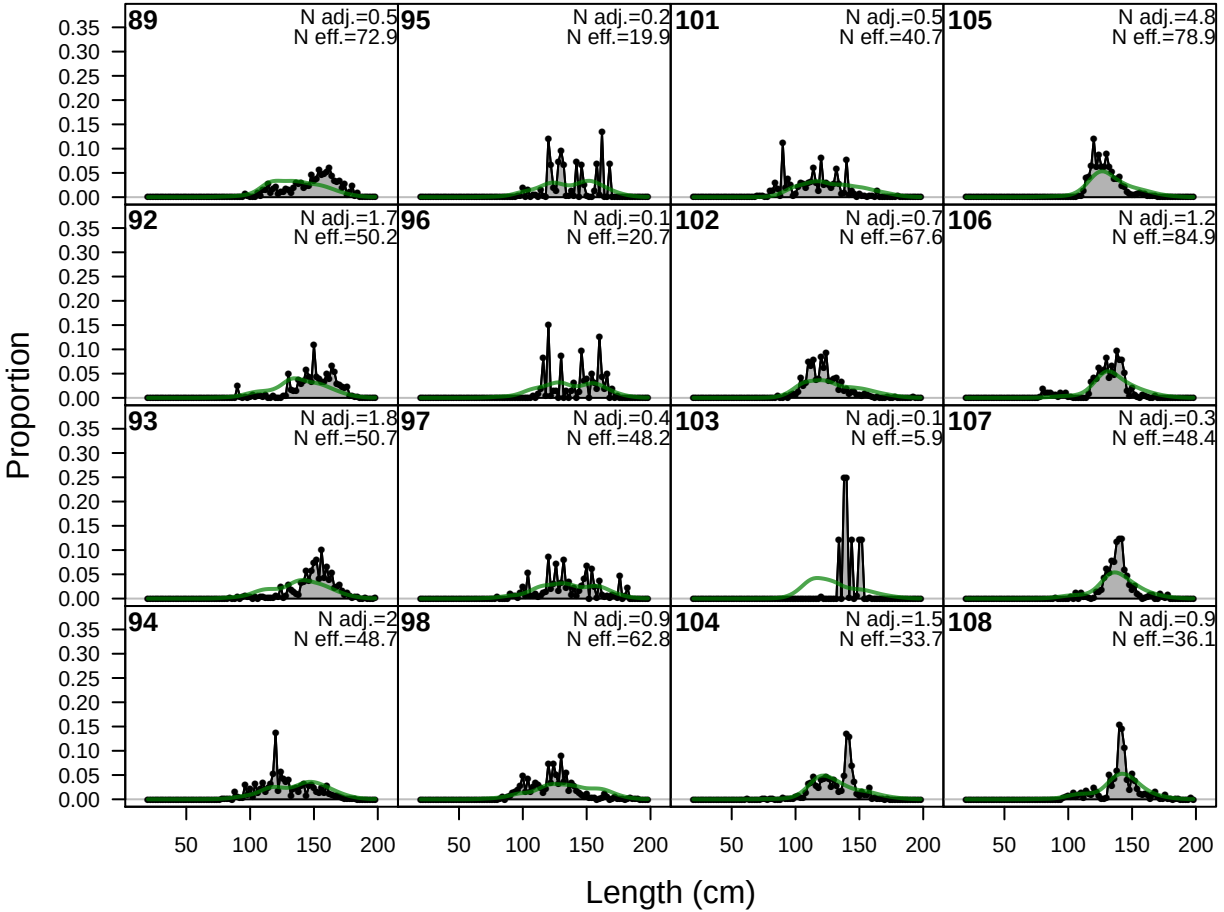
N eff.=73.7
77
N adj.=1.4
N eff.=85.2
81
N adj.=5.6
N eff.=340.2
85
N adj.=1.2
N eff.=79.9
74
N adj.=1
N eff.=93.1
78
N adj.=2.7
N eff.=48
82
N adj.=2.7
N eff.=436.3
86
N adj.=0.8
N eff.=32.3
75
N adj.=0
N eff.=11.1
79
N adj.=0.4
N eff.=141.4
83
N adj.=0.3
N eff.=77.2
87
N adj.=0.2
N eff.=31.5
76
N adj.=2.2
N eff.=106.4
80
N adj.=2.4
N eff.=174.5
84
N adj.=1.7
N eff.=29
88
N adj.=1.8
N eff.=93.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


89
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N eff.=72.9
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N adj.=0.2
N eff.=19.9
101
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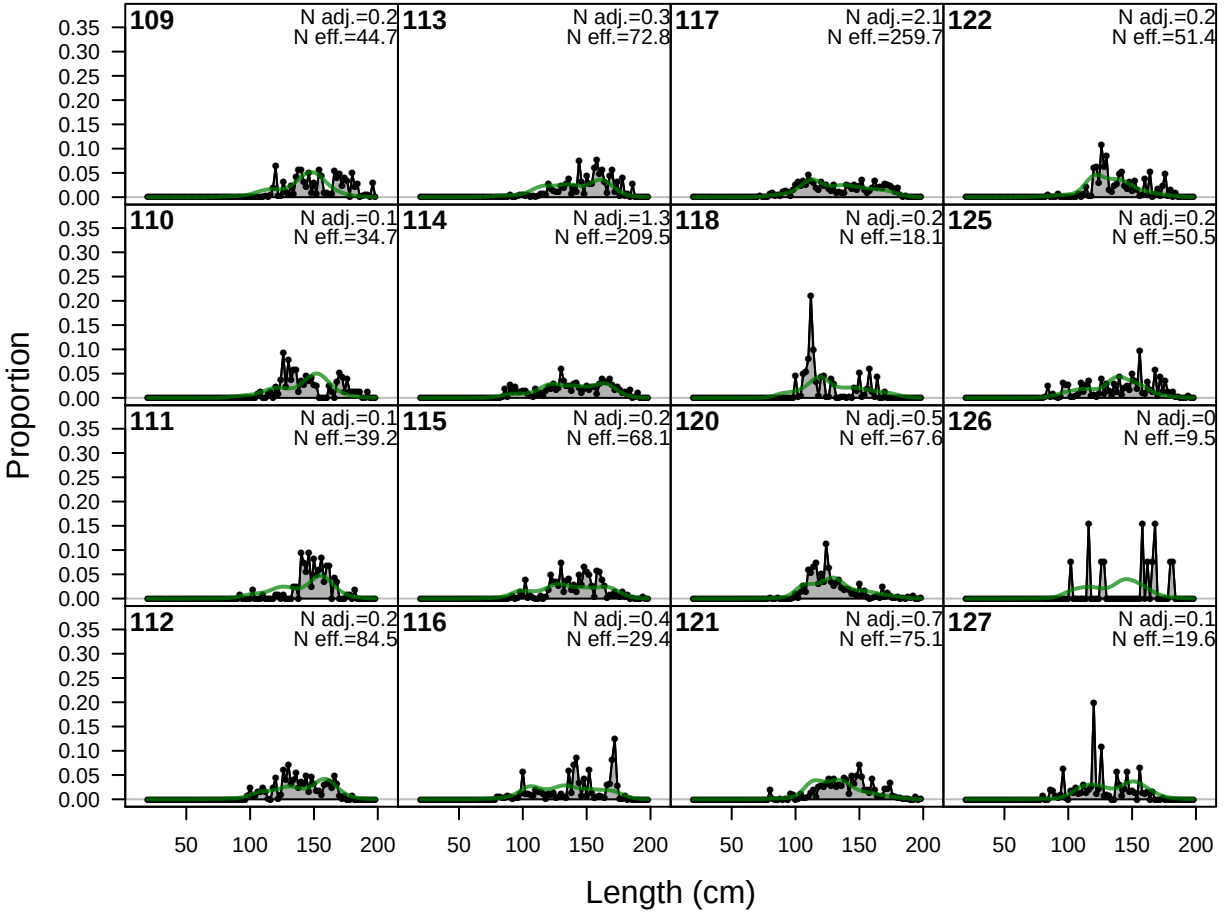
N eff.=40.7
105
N adj.=4.8
N eff.=78.9
92
N adj.=1.7
N eff.=50.2
96
N adj.=0.1
N eff.=20.7
102
N adj.=0.7
N eff.=67.6
106
N adj.=1.2
N eff.=84.9
93
N adj.=1.8
N eff.=50.7
97
N adj.=0.4
N eff.=48.2
103
N adj.=0.1
N eff.=5.9
107
N adj.=0.3
N eff.=48.4
94
N adj.=2
N eff.=48.7
98
N adj.=0.9
N eff.=62.8
104
N adj.=1.5
N eff.=33.7
108
N adj.=0.9
N eff.=36.1
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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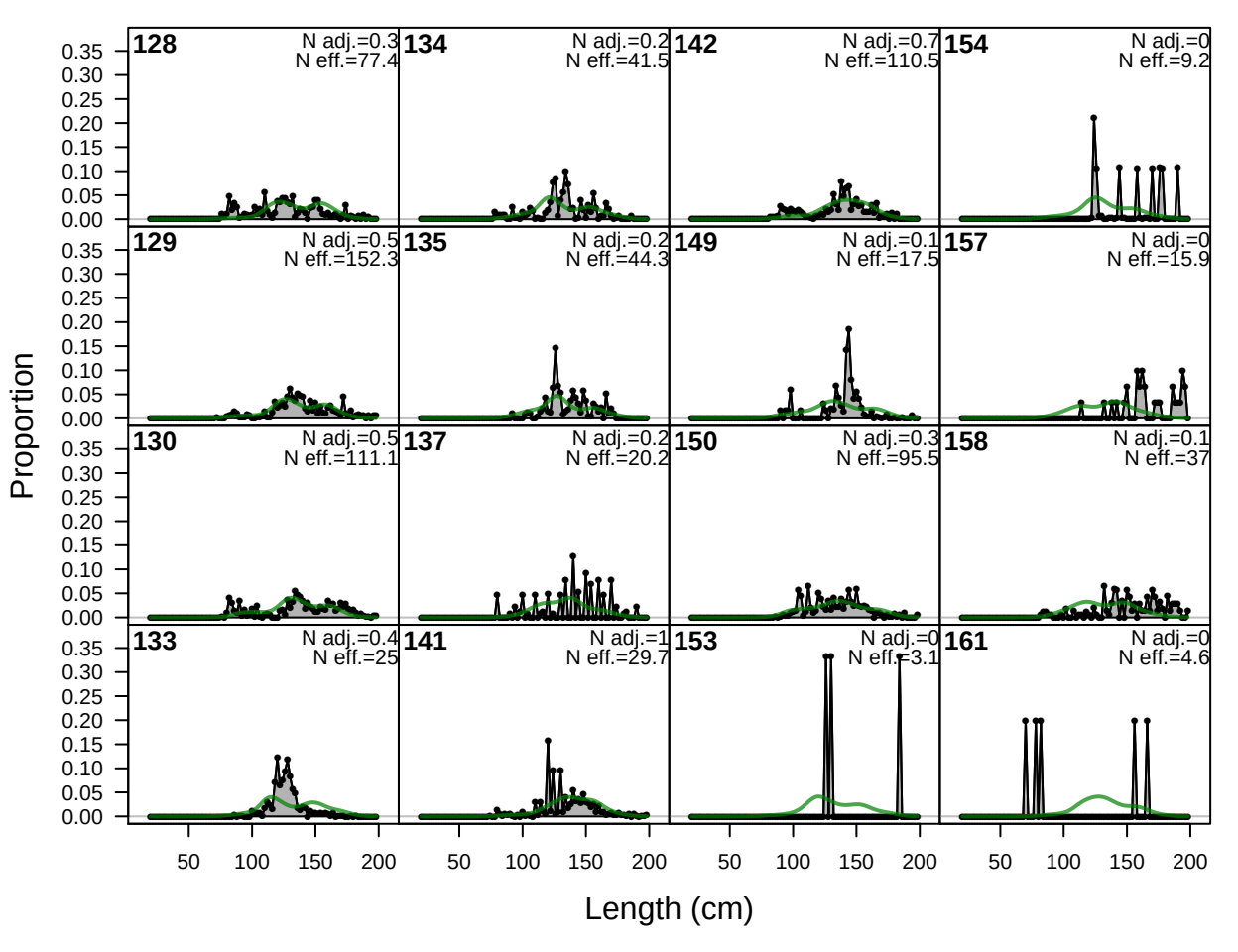
N eff.=44.7
113
N adj.=0.3
N eff.=72.8
117
N adj.=2.1
N eff.=259.7
122
N adj.=0.2
N eff.=51.4
110
N adj.=0.1
N eff.=34.7
114
N adj.=1.3
N eff.=209.5
118
N adj.=0.2
N eff.=18.1
125
N adj.=0.2
N eff.=50.5
111
N adj.=0.1
N eff.=39.2
115
N adj.=0.2
N eff.=68.1
120
N adj.=0.5
N eff.=67.6
126
N adj.=0
N eff.=9.5
112
N adj.=0.2
N eff.=84.5
116
N adj.=0.4
N eff.=29.4
121
N adj.=0.7
N eff.=75.1
127
N adj.=0.1
N eff.=19.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


128
N adj.=0.3
N eff.=77.4
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N adj.=0.2
N eff.=41.5
142
N adj.=0.7
N eff.=110.5
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N adj.=0
N eff.=9.2
129
N adj.=0.5
N eff.=152.3
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N adj.=0.2
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N adj.=0.1
N eff.=17.5
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N adj.=0.2
N eff.=20.2
150
N adj.=0.3
N eff.=95.5
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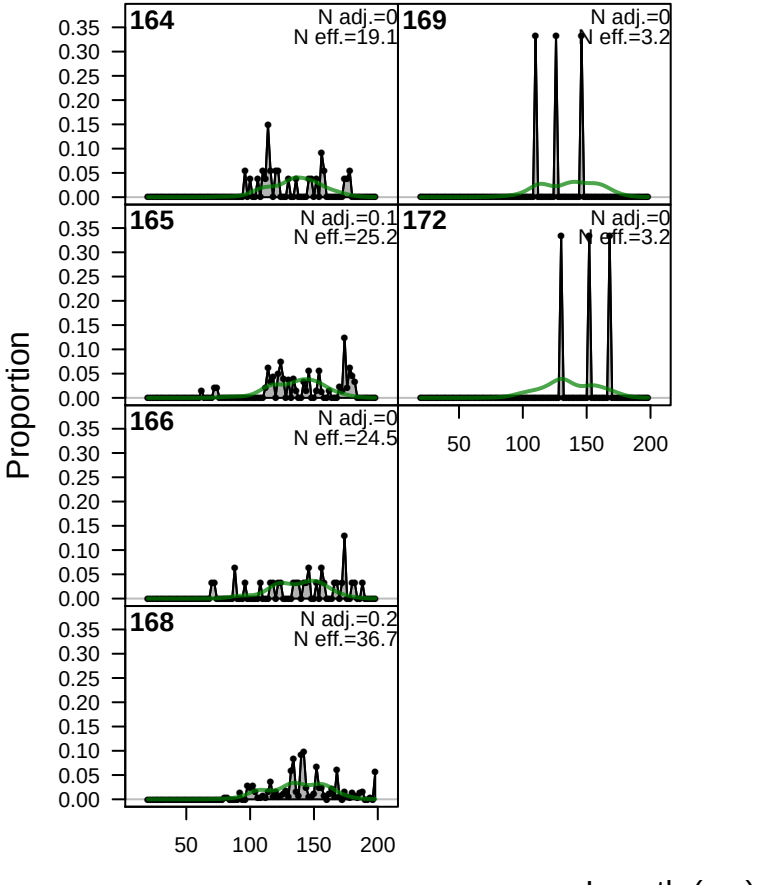
N adj.=0.1
N eff.=37
133
N adj.=0.4
N eff.=25
141
N adj.=1
N eff.=29.7
153
N adj.=0
N eff.=3.1
161
N adj.=0
N eff.=4.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


164
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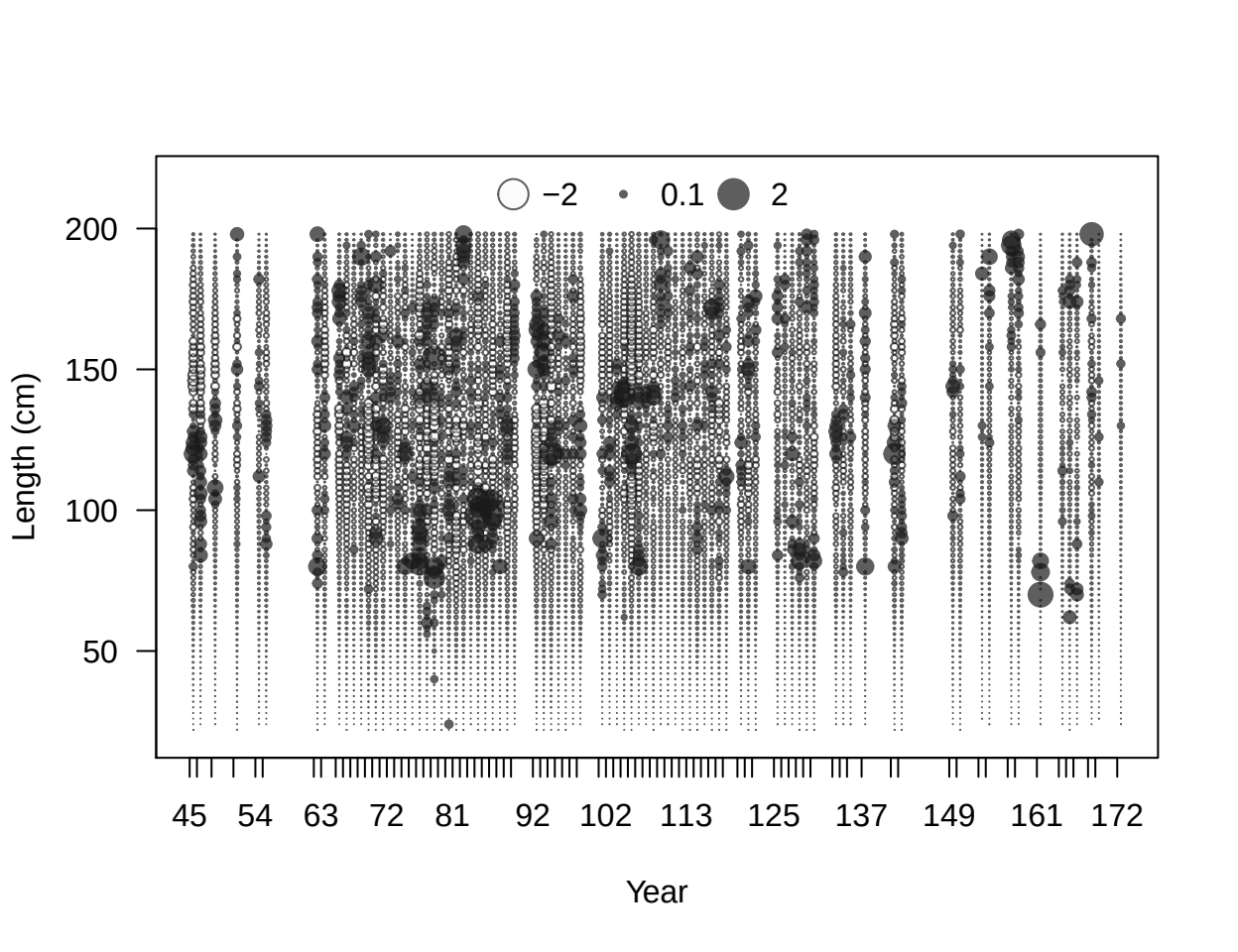
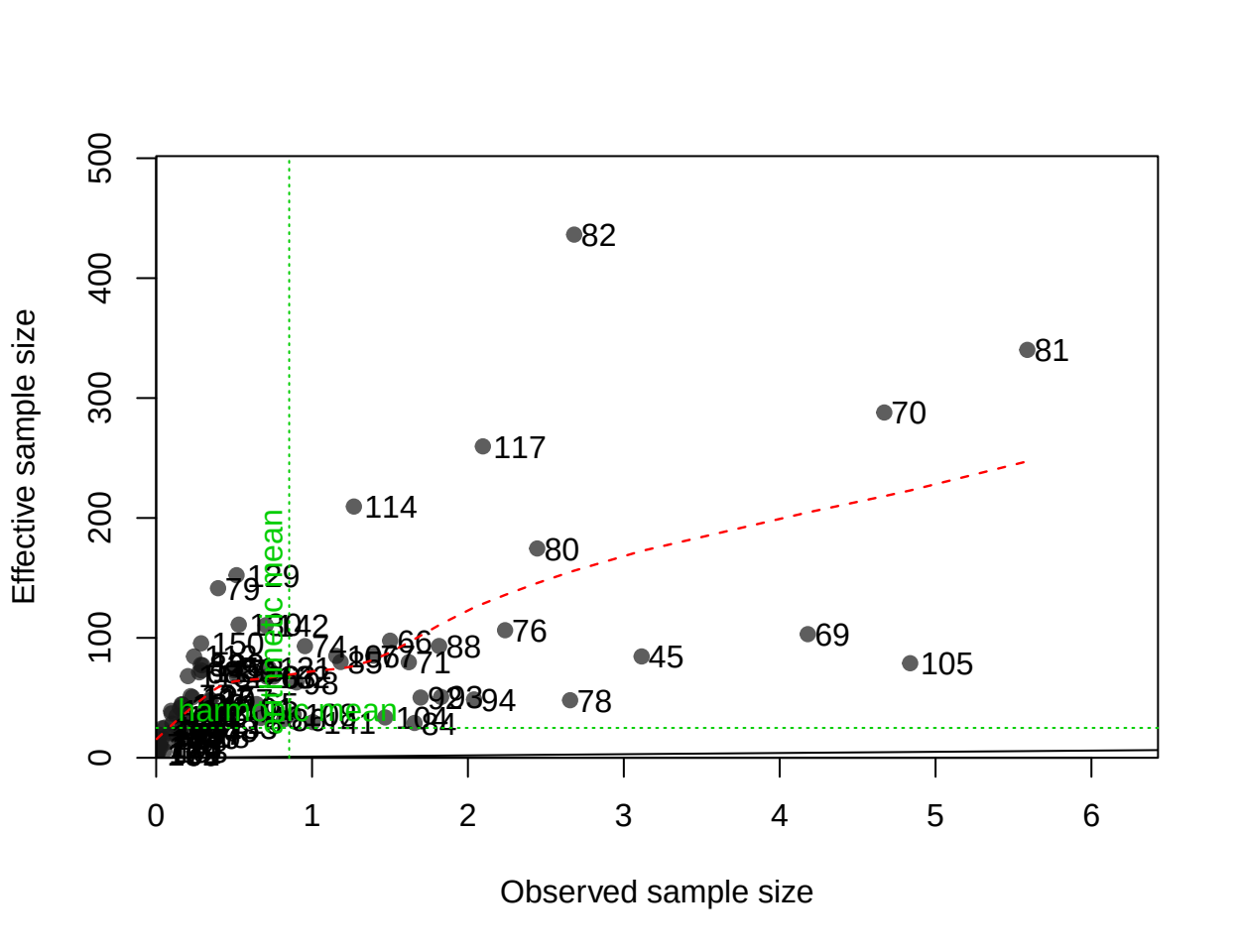
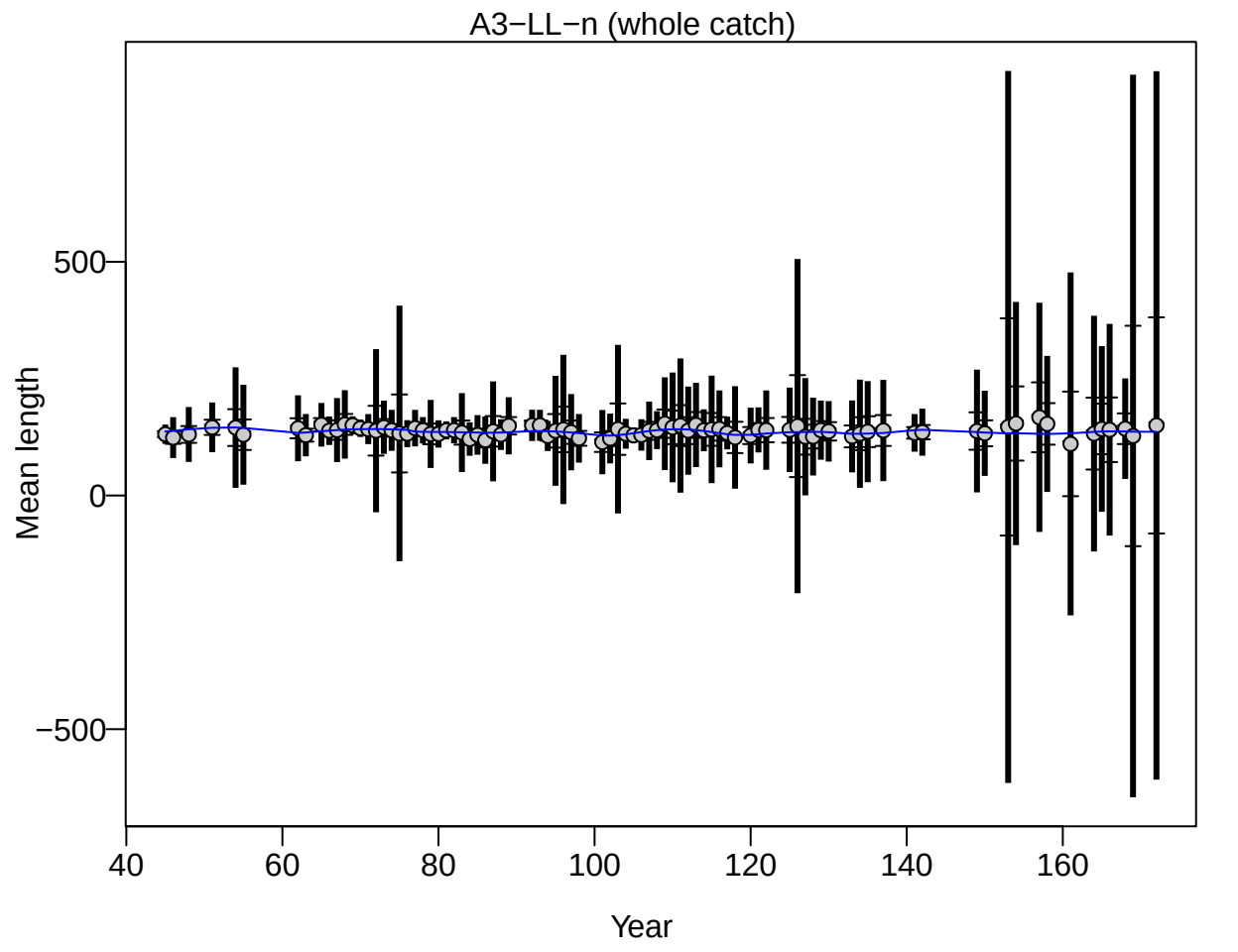
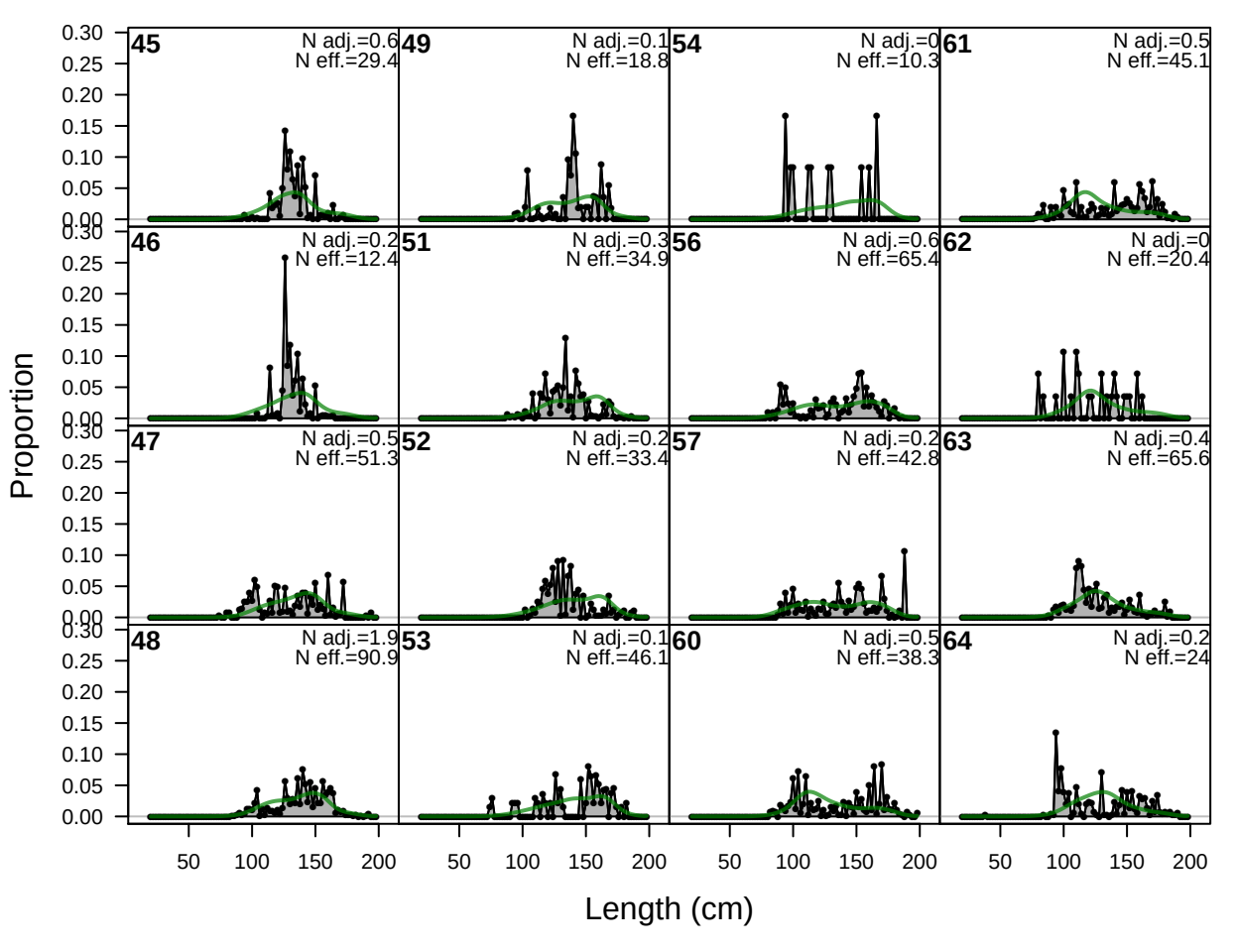
N eff.=19.1
169
N adj.=0
N eff.=3.2
165
N adj.=0.1
N eff.=25.2
172
N adj.=0
N eff.=3.2
166
N adj.=0
N eff.=24.5
168
N adj.=0.2
N eff.=36.7
Proportion
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
45
54
63
72
81
92
102
113
125
137
149
161
172
Year


Effective sample size
Observed sample size
0
100
200
300
400
500
0
1
2
3
4
5
6
82
81
70
117
114
80
129
79
76
69
105
45
78
arithmetic mean
harmonic mean


A3−LL−n (whole catch)
500
0
−500
Mean length
40
60
80
100
120
140
160
Year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N adj.=0.6
N eff.=29.4
49
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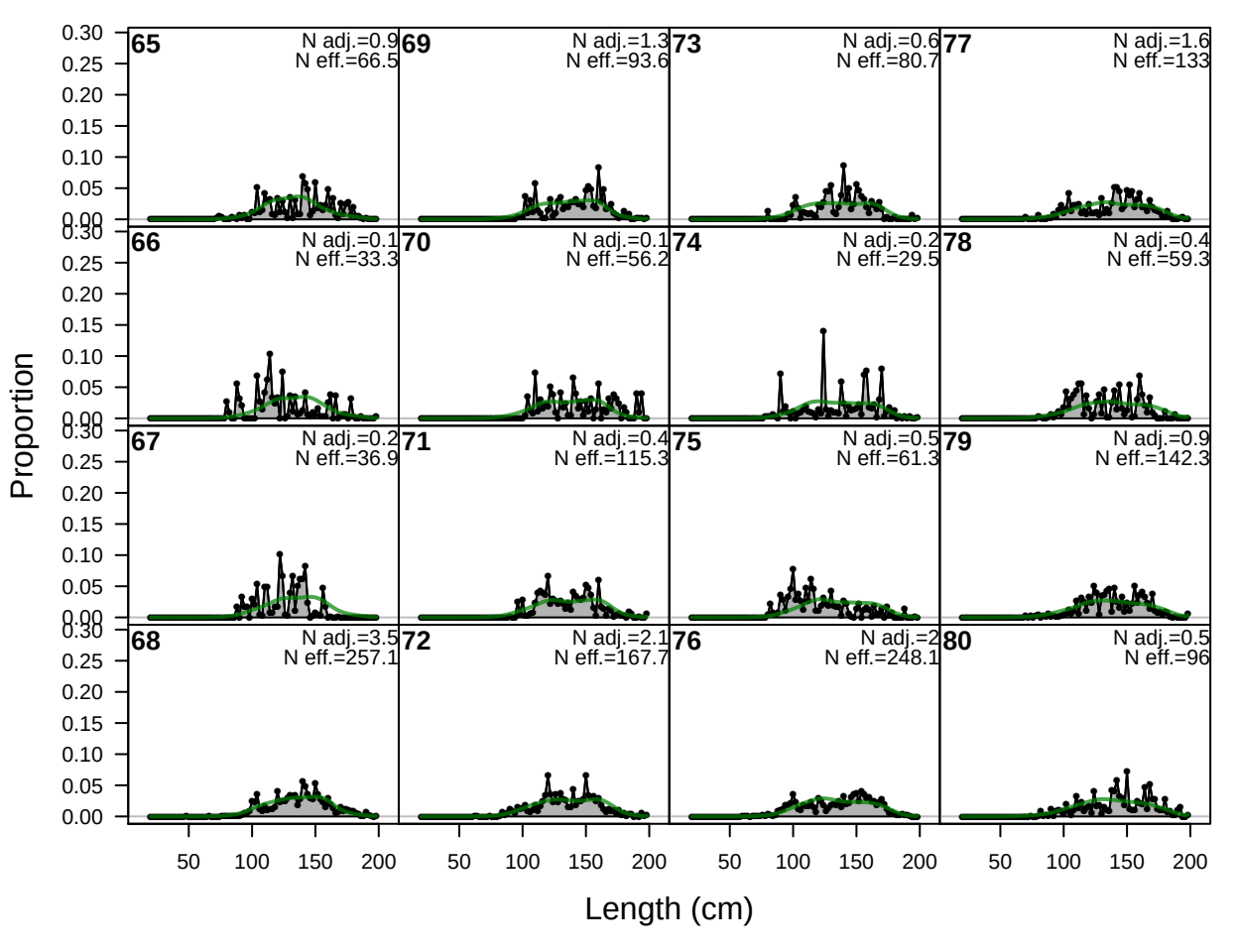
N eff.=18.8
54
N adj.=0
N eff.=10.3
61
N adj.=0.5
N eff.=45.1
46
N adj.=0.2
N eff.=12.4
51
N adj.=0.3
N eff.=34.9
56
N adj.=0.6
N eff.=65.4
62
N adj.=0
N eff.=20.4
47
N adj.=0.5
N eff.=51.3
52
N adj.=0.2
N eff.=33.4
57
N adj.=0.2
N eff.=42.8
63
N adj.=0.4
N eff.=65.6
48
N adj.=1.9
N eff.=90.9
53
N adj.=0.1
N eff.=46.1
60
N adj.=0.5
N eff.=38.3
64
N adj.=0.2
N eff.=24
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=56.2
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N eff.=29.5
78
N adj.=0.4
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N eff.=36.9
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N adj.=0.4
N eff.=115.3
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N adj.=0.9
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N eff.=257.1
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N adj.=2.1
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76
N adj.=2
N eff.=248.1
80
N adj.=0.5
N eff.=96
Proportion
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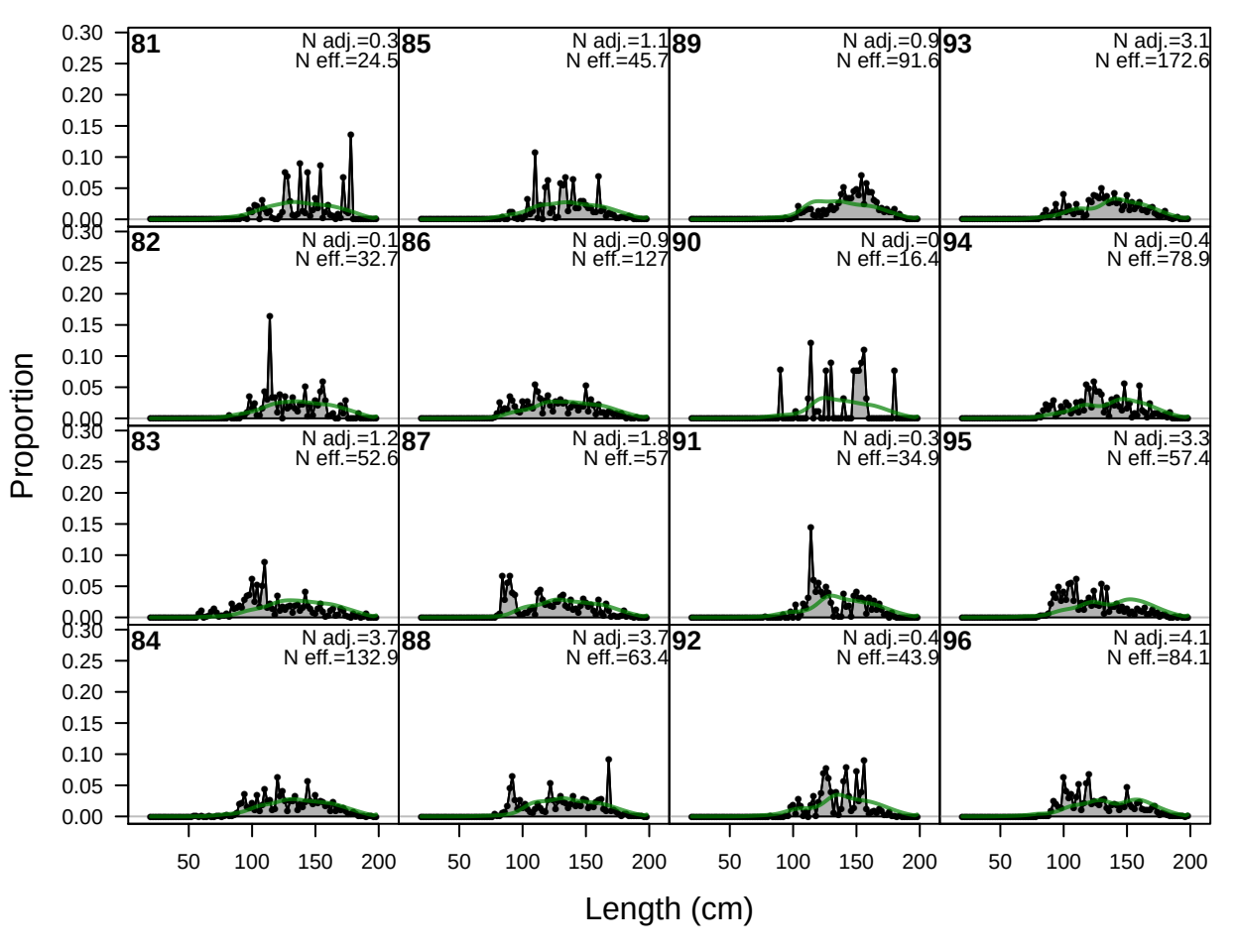
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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87
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N eff.=57
91
N adj.=0.3
N eff.=34.9
95
N adj.=3.3
N eff.=57.4
84
N adj.=3.7
N eff.=132.9
88
N adj.=3.7
N eff.=63.4
92
N adj.=0.4
N eff.=43.9
96
N adj.=4.1
N eff.=84.1
Proportion
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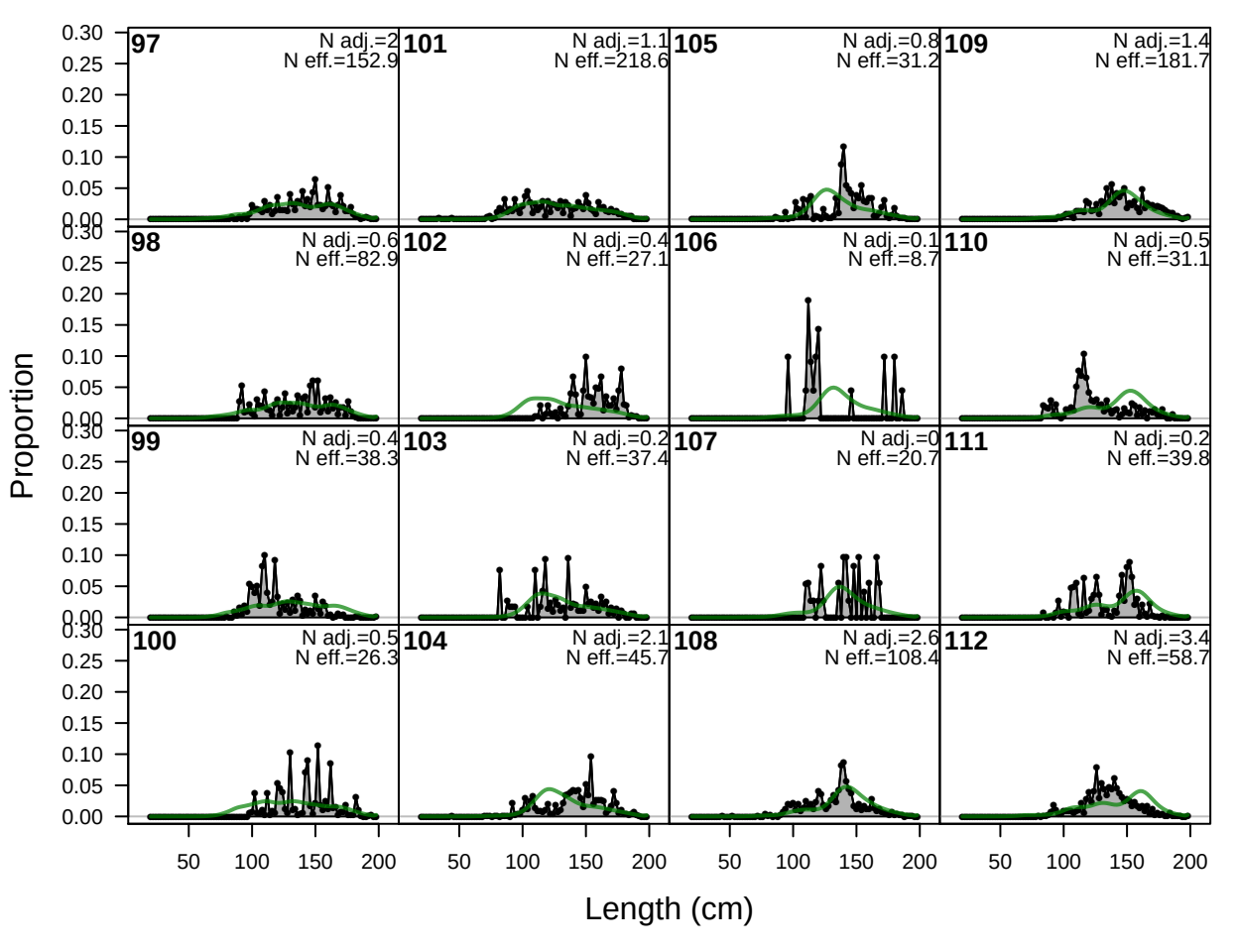
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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102
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N adj.=0.1
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N adj.=0.5
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N adj.=0.4
N eff.=38.3
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N eff.=37.4
107
N adj.=0
N eff.=20.7
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N adj.=0.2
N eff.=39.8
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N adj.=0.5
N eff.=26.3
104
N adj.=2.1
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N adj.=2.6
N eff.=108.4
112
N adj.=3.4
N eff.=58.7
Proportion
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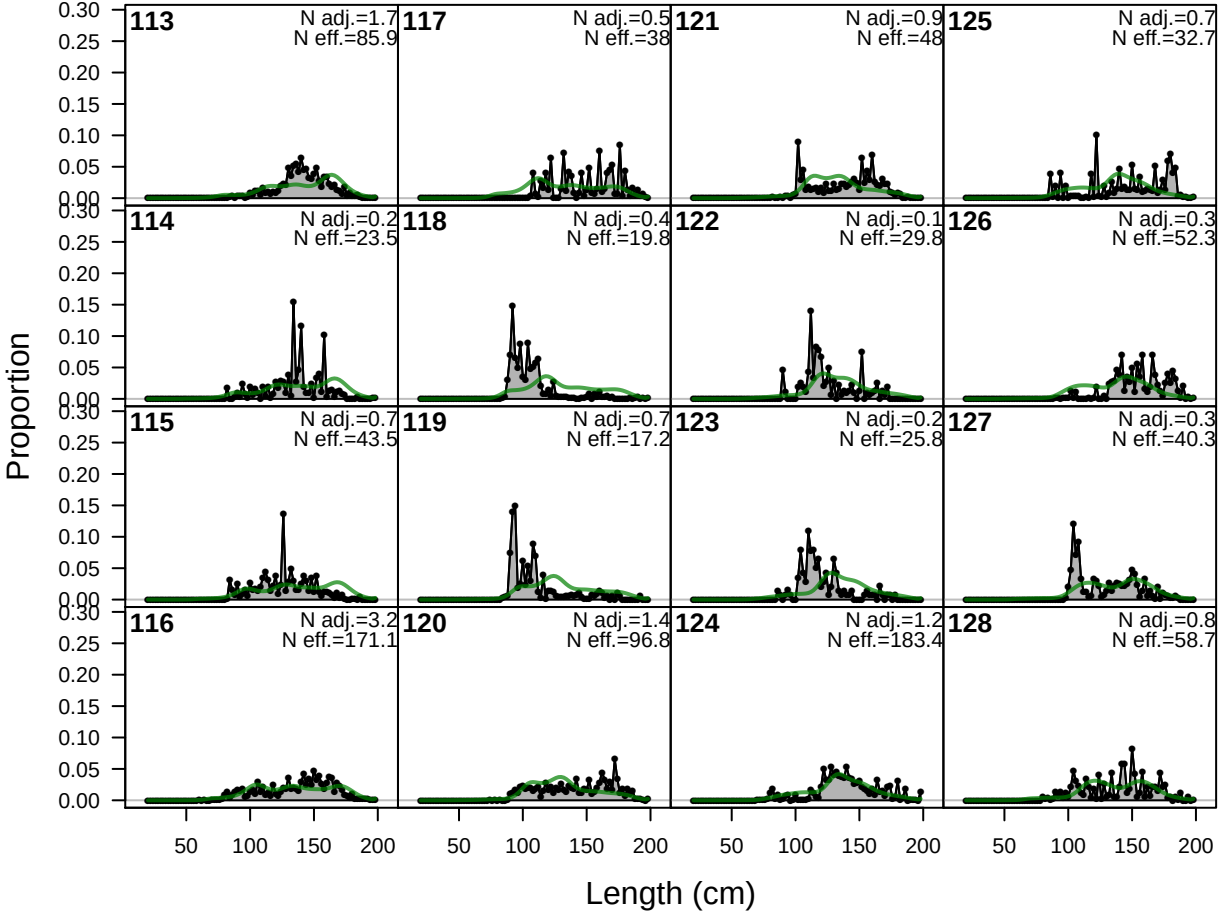
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=32.7
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N eff.=23.5
118
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N eff.=19.8
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126
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N adj.=0.7
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N eff.=183.4
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N adj.=0.8
N eff.=58.7
Proportion
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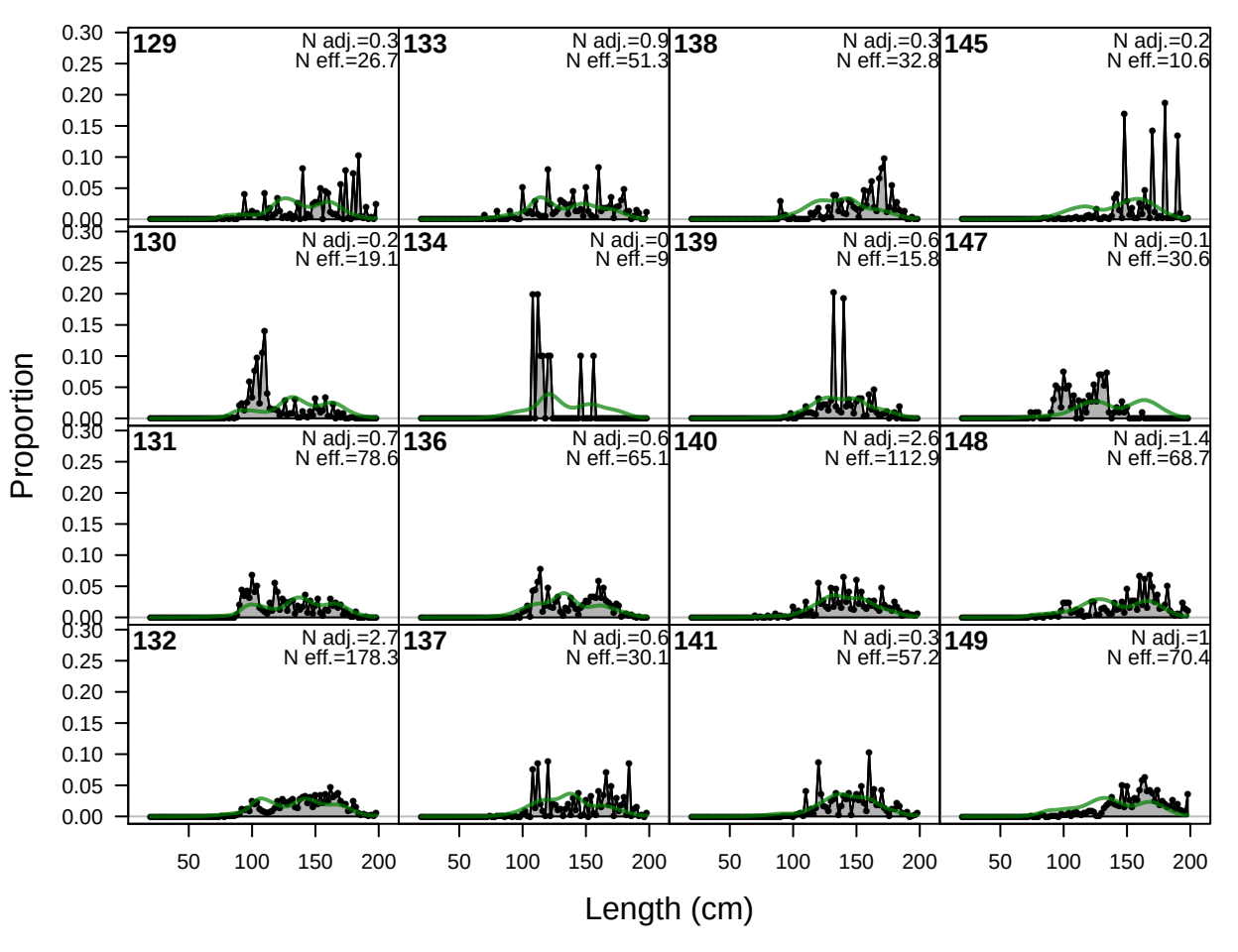
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=19.1
134
N adj.=0
N eff.=9
139
N adj.=0.6
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147
N adj.=0.1
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131
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136
N adj.=0.6
N eff.=65.1
140
N adj.=2.6
N eff.=112.9
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N adj.=1.4
N eff.=68.7
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N adj.=2.7
N eff.=178.3
137
N adj.=0.6
N eff.=30.1
141
N adj.=0.3
N eff.=57.2
149
N adj.=1
N eff.=70.4
Proportion
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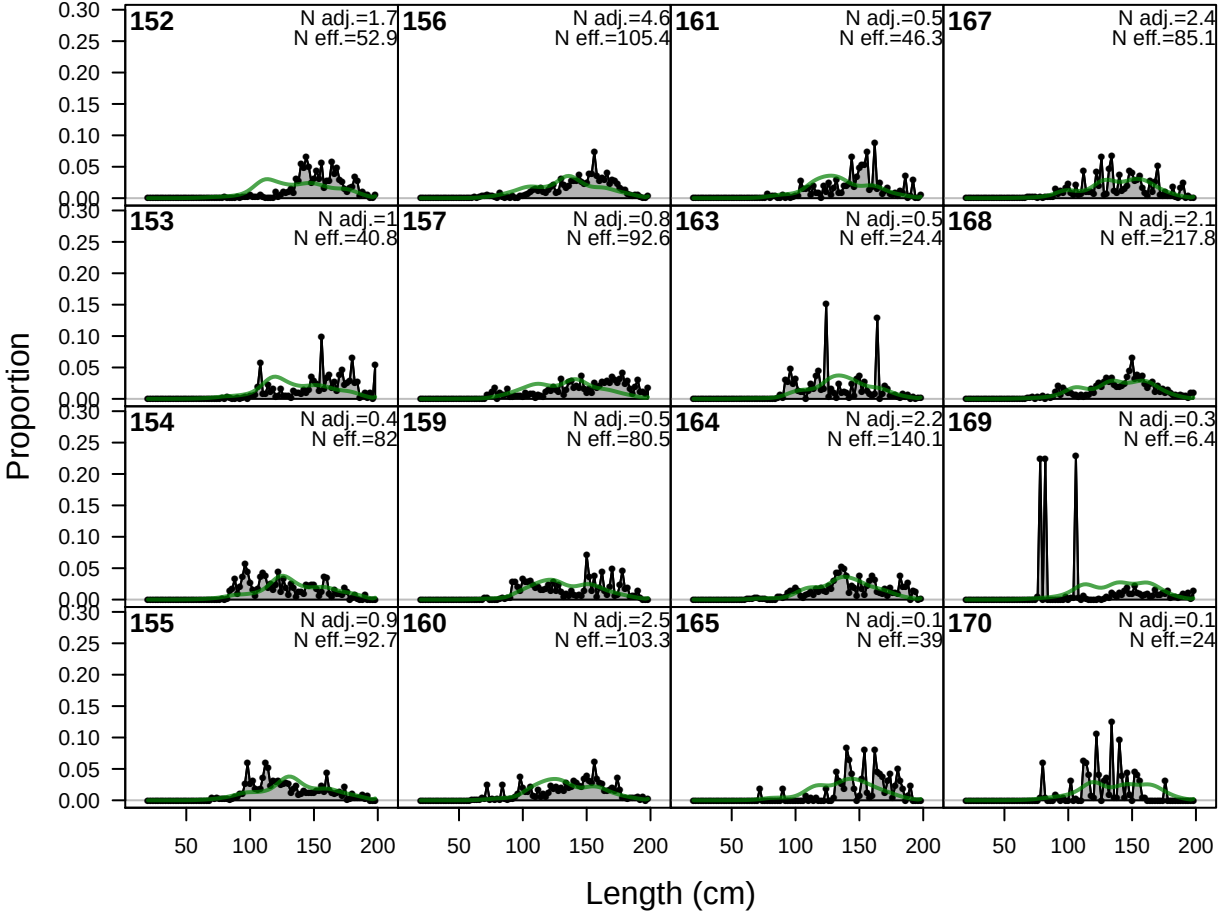
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=52.9
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N eff.=105.4
161
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N eff.=46.3
167
N adj.=2.4
N eff.=85.1
153
N adj.=1
N eff.=40.8
157
N adj.=0.8
N eff.=92.6
163
N adj.=0.5
N eff.=24.4
168
N adj.=2.1
N eff.=217.8
154
N adj.=0.4
N eff.=82
159
N adj.=0.5
N eff.=80.5
164
N adj.=2.2
N eff.=140.1
169
N adj.=0.3
N eff.=6.4
155
N adj.=0.9
N eff.=92.7
160
N adj.=2.5
N eff.=103.3
165
N adj.=0.1
N eff.=39
170
N adj.=0.1
N eff.=24
Proportion
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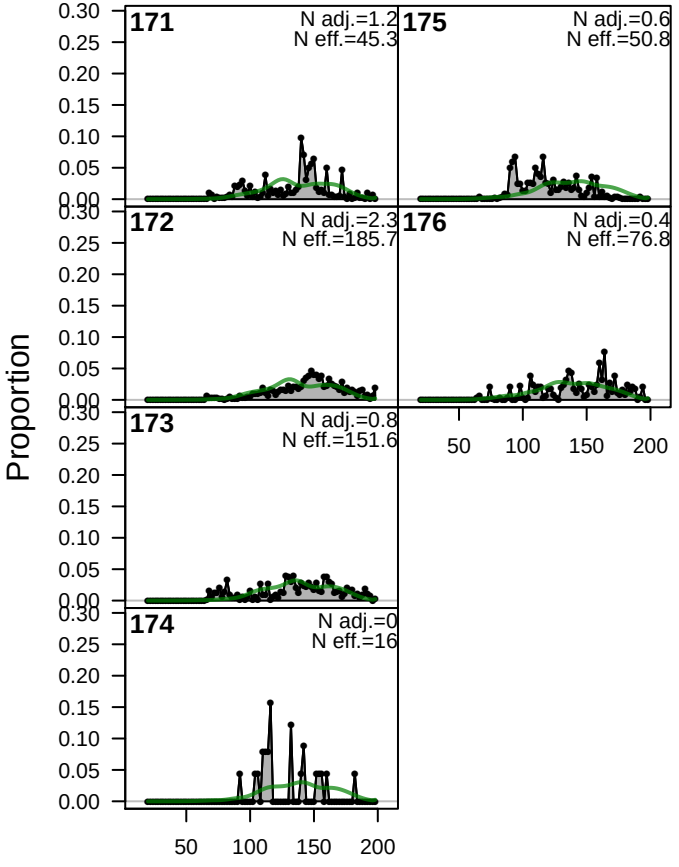
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=50.8
172
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N eff.=185.7
176
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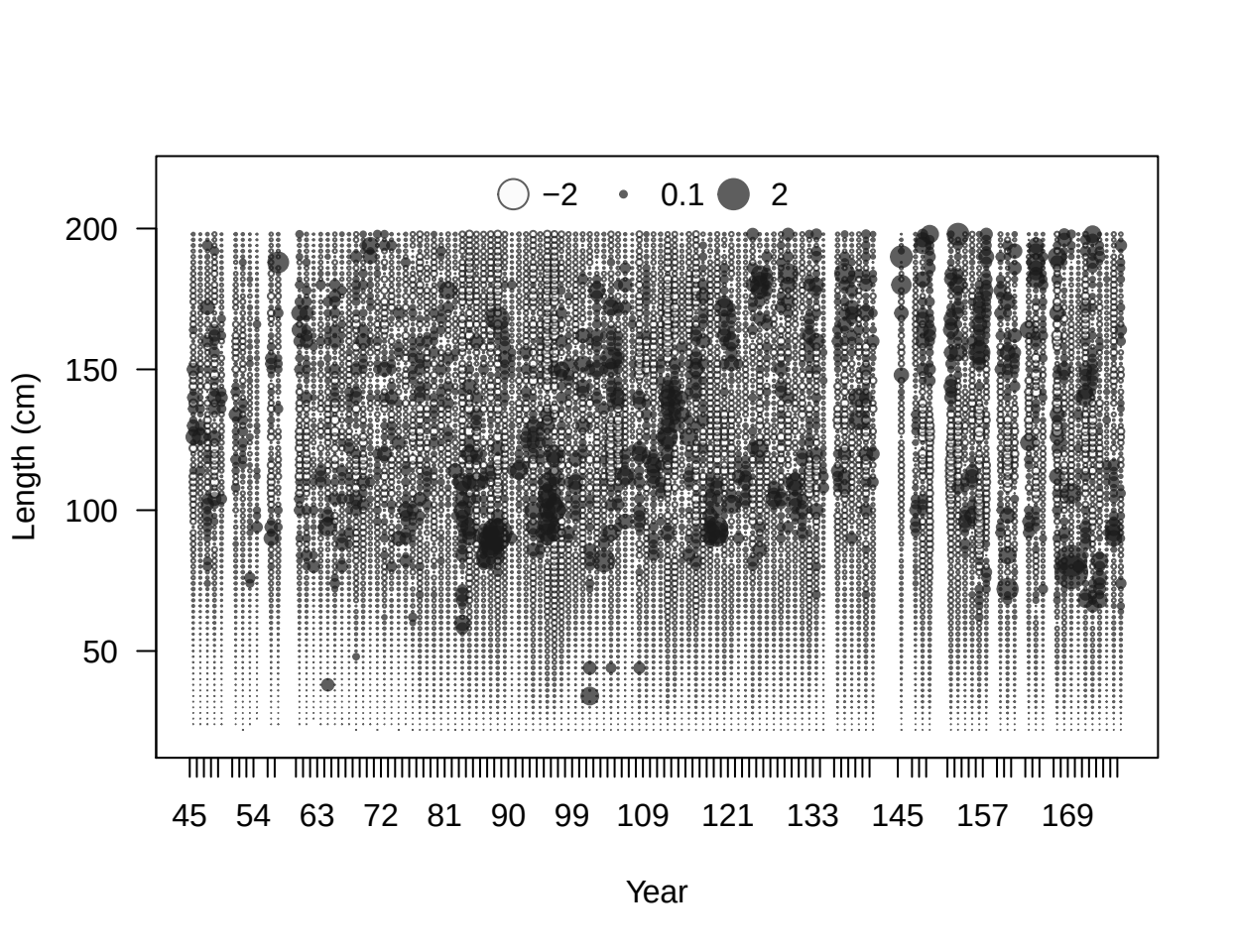
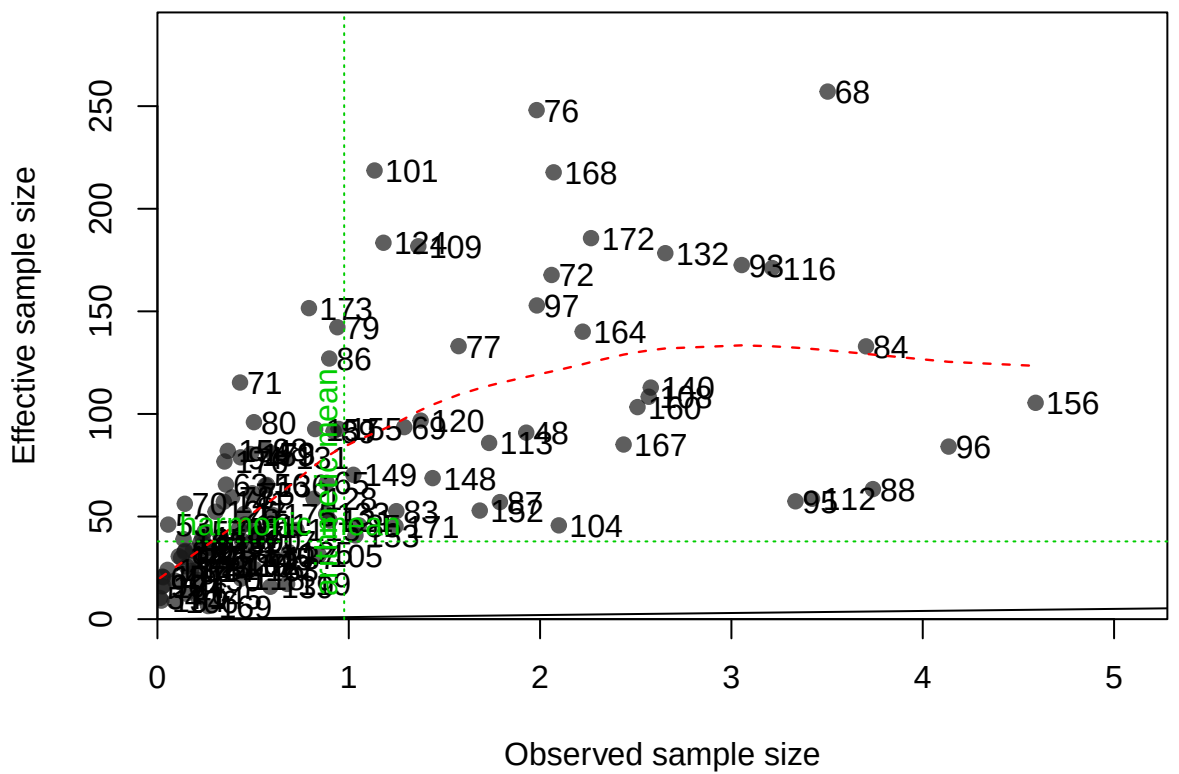
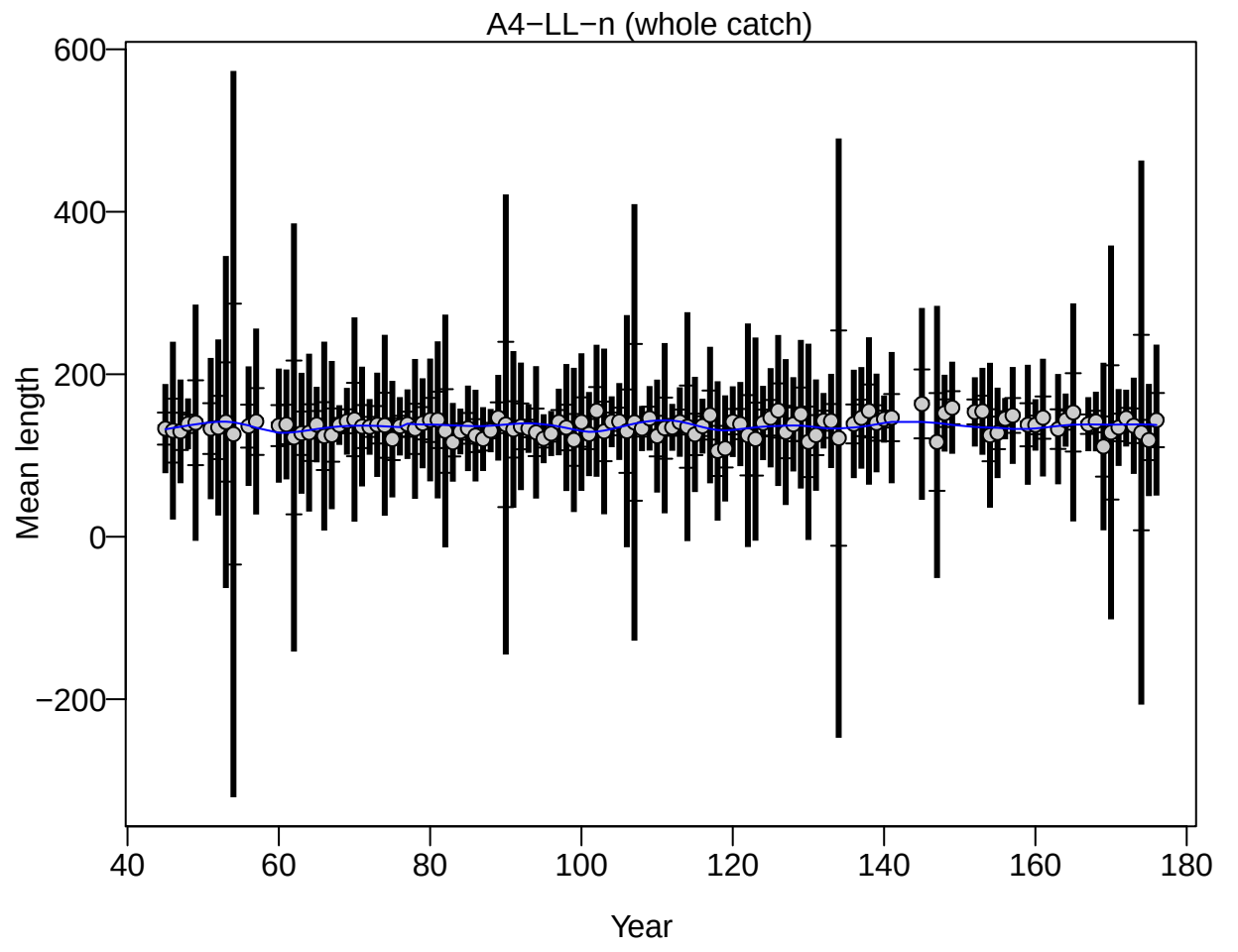
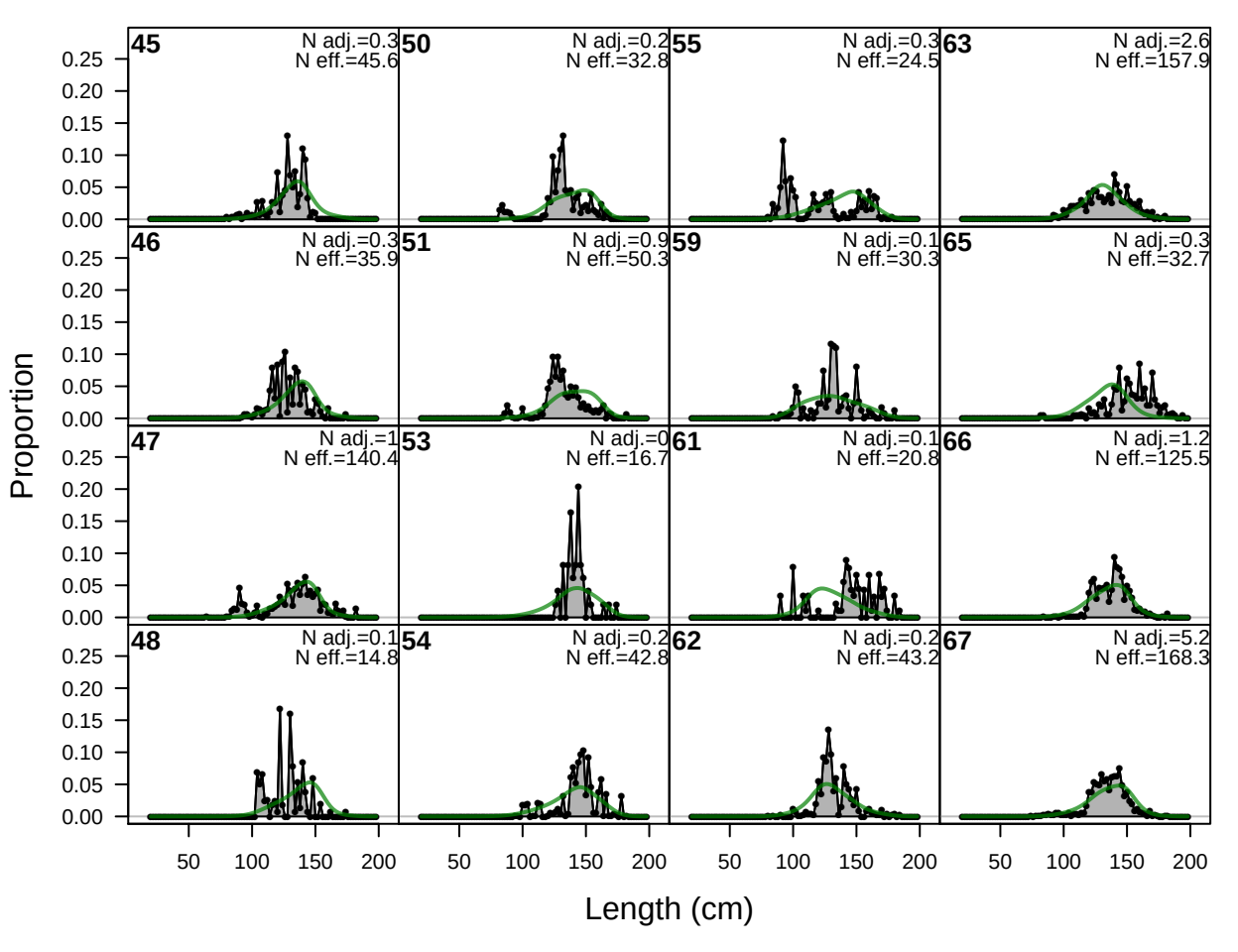
N eff.=76.8
173
N adj.=0.8
N eff.=151.6
174
N adj.=0
N eff.=16
Proportion
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
45
54
63
72
81
90
99
109
121
133
145
157
169
Year



Effective sample size
Observed sample size
0
50
100
150
200
250
0
1
2
3
4
5
68
76
101
168
172
132
93
116
72
97
164
84
173
79
77
86
71
80
156
96
167
113
48
120
149
148
88
112
104
105
171


A4−LL−n (whole catch)
600
400
200
0
−200
Mean length
40
60
80
100
120
140
160
180
Year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63
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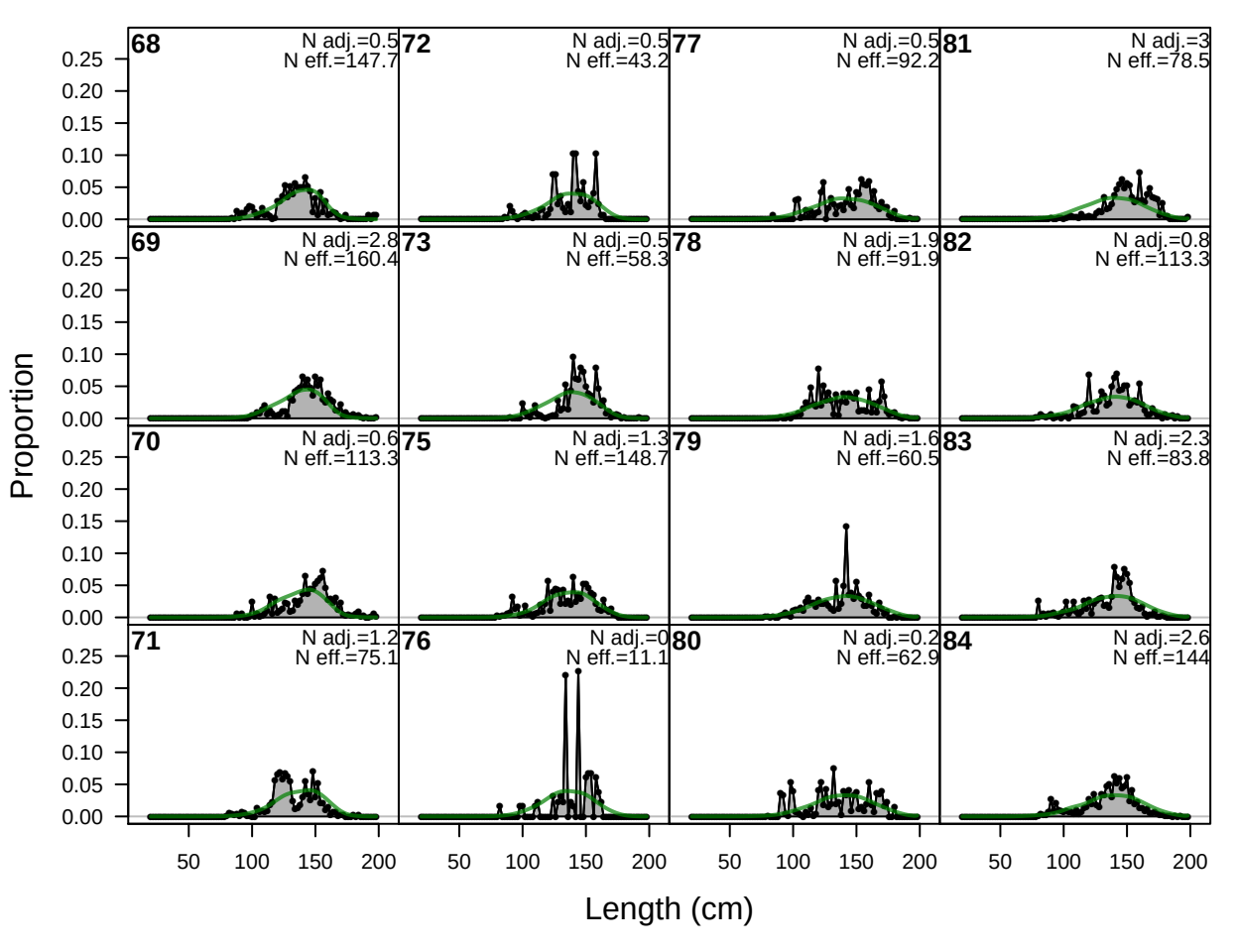
N eff.=157.9
46
N adj.=0.3
N eff.=35.9
51
N adj.=0.9
N eff.=50.3
59
N adj.=0.1
N eff.=30.3
65
N adj.=0.3
N eff.=32.7
47
N adj.=1
N eff.=140.4
53
N adj.=0
N eff.=16.7
61
N adj.=0.1
N eff.=20.8
66
N adj.=1.2
N eff.=125.5
48
N adj.=0.1
N eff.=14.8
54
N adj.=0.2
N eff.=42.8
62
N adj.=0.2
N eff.=43.2
67
N adj.=5.2
N eff.=168.3
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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77
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N eff.=78.5
69
N adj.=2.8
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73
N adj.=0.5
N eff.=58.3
78
N adj.=1.9
N eff.=91.9
82
N adj.=0.8
N eff.=113.3
70
N adj.=0.6
N eff.=113.3
75
N adj.=1.3
N eff.=148.7
79
N adj.=1.6
N eff.=60.5
83
N adj.=2.3
N eff.=83.8
71
N adj.=1.2
N eff.=75.1
76
N adj.=0
N eff.=11.1
80
N adj.=0.2
N eff.=62.9
84
N adj.=2.6
N eff.=144
Proportion
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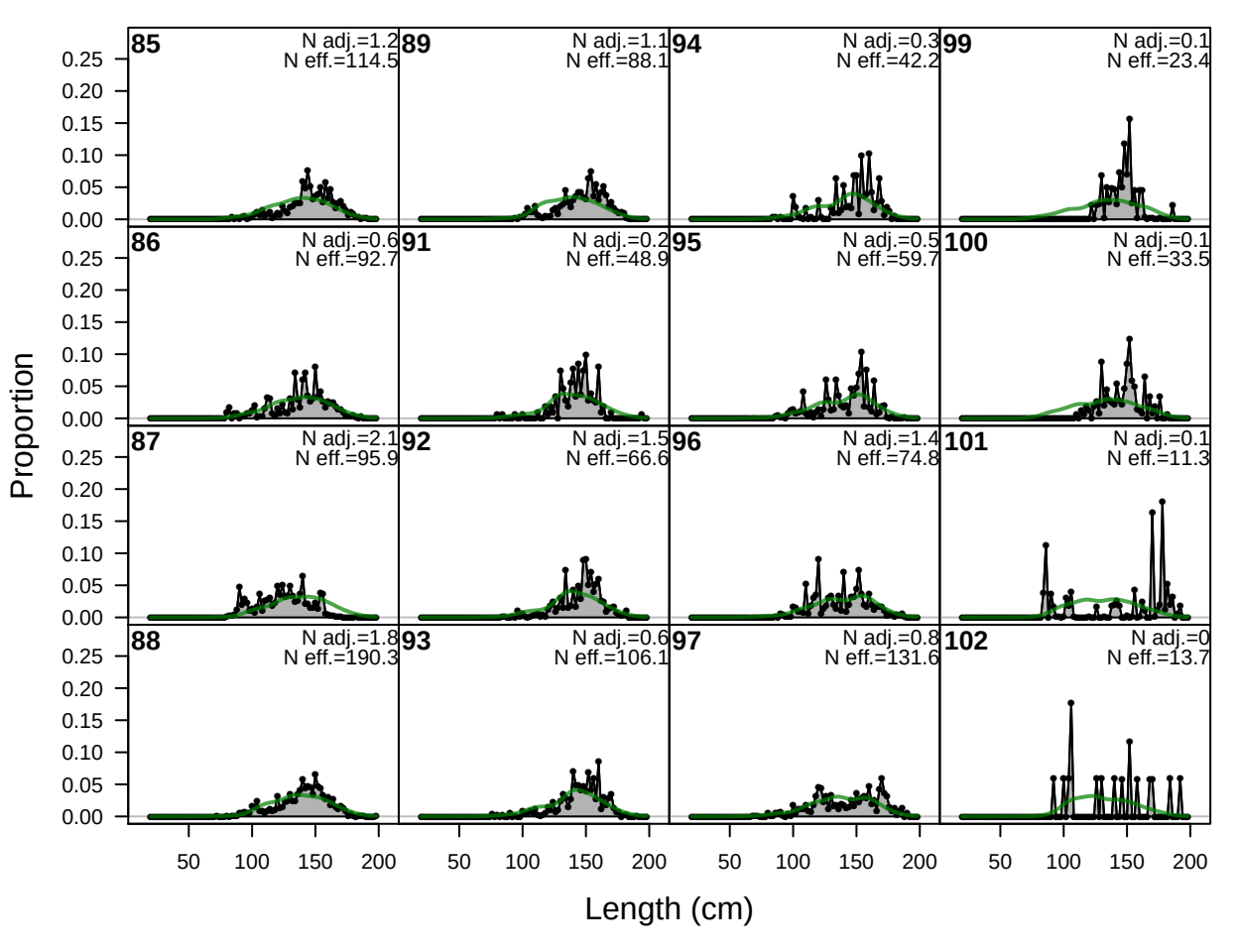
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N adj.=0.1
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86
N adj.=0.6
N eff.=92.7
91
N adj.=0.2
N eff.=48.9
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N adj.=0.5
N eff.=59.7
100
N adj.=0.1
N eff.=33.5
87
N adj.=2.1
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N adj.=1.5
N eff.=66.6
96
N adj.=1.4
N eff.=74.8
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N adj.=0.1
N eff.=11.3
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N adj.=1.8
N eff.=190.3
93
N adj.=0.6
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97
N adj.=0.8
N eff.=131.6
102
N adj.=0
N eff.=13.7
Proportion
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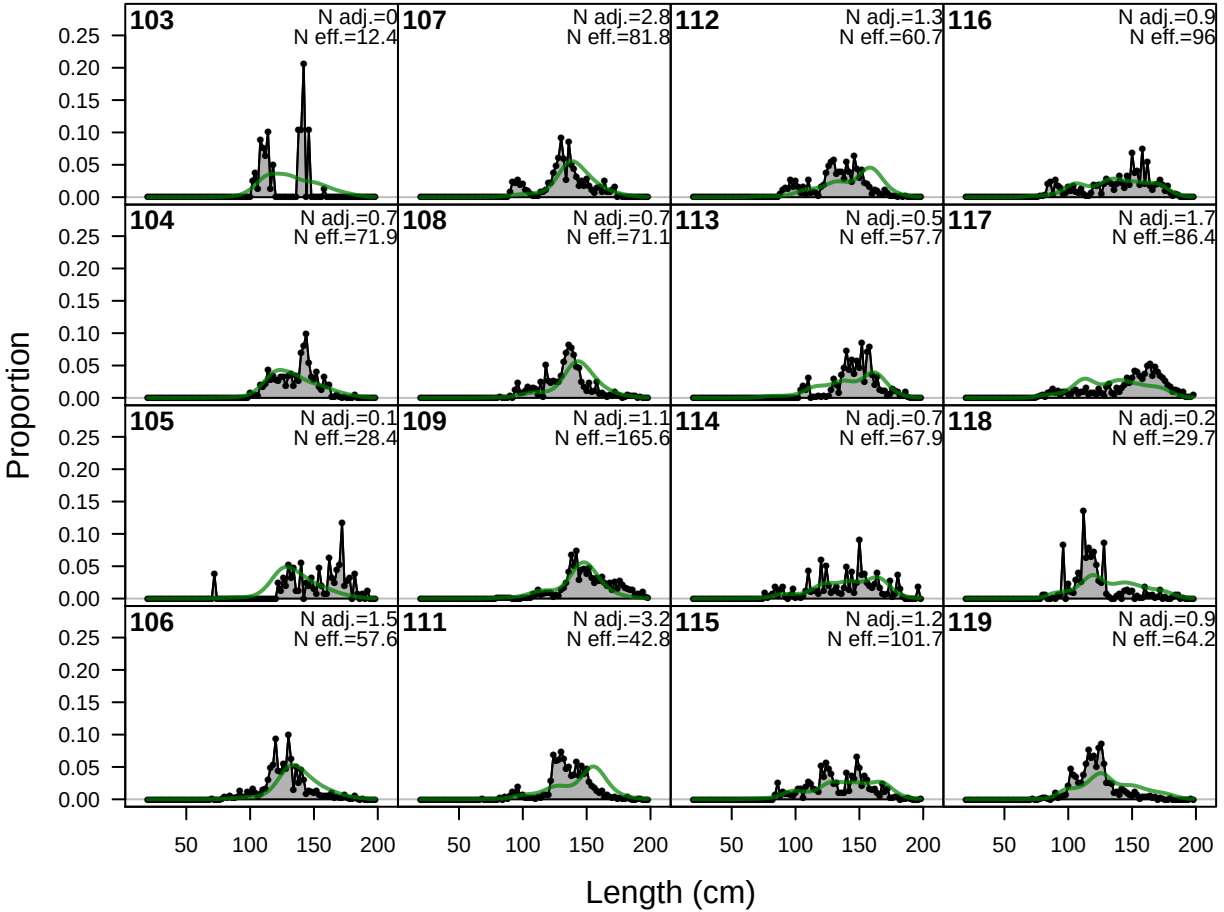
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=67.9
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N adj.=0.2
N eff.=29.7
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N eff.=57.6
111
N adj.=3.2
N eff.=42.8
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N adj.=1.2
N eff.=101.7
119
N adj.=0.9
N eff.=64.2
Proportion
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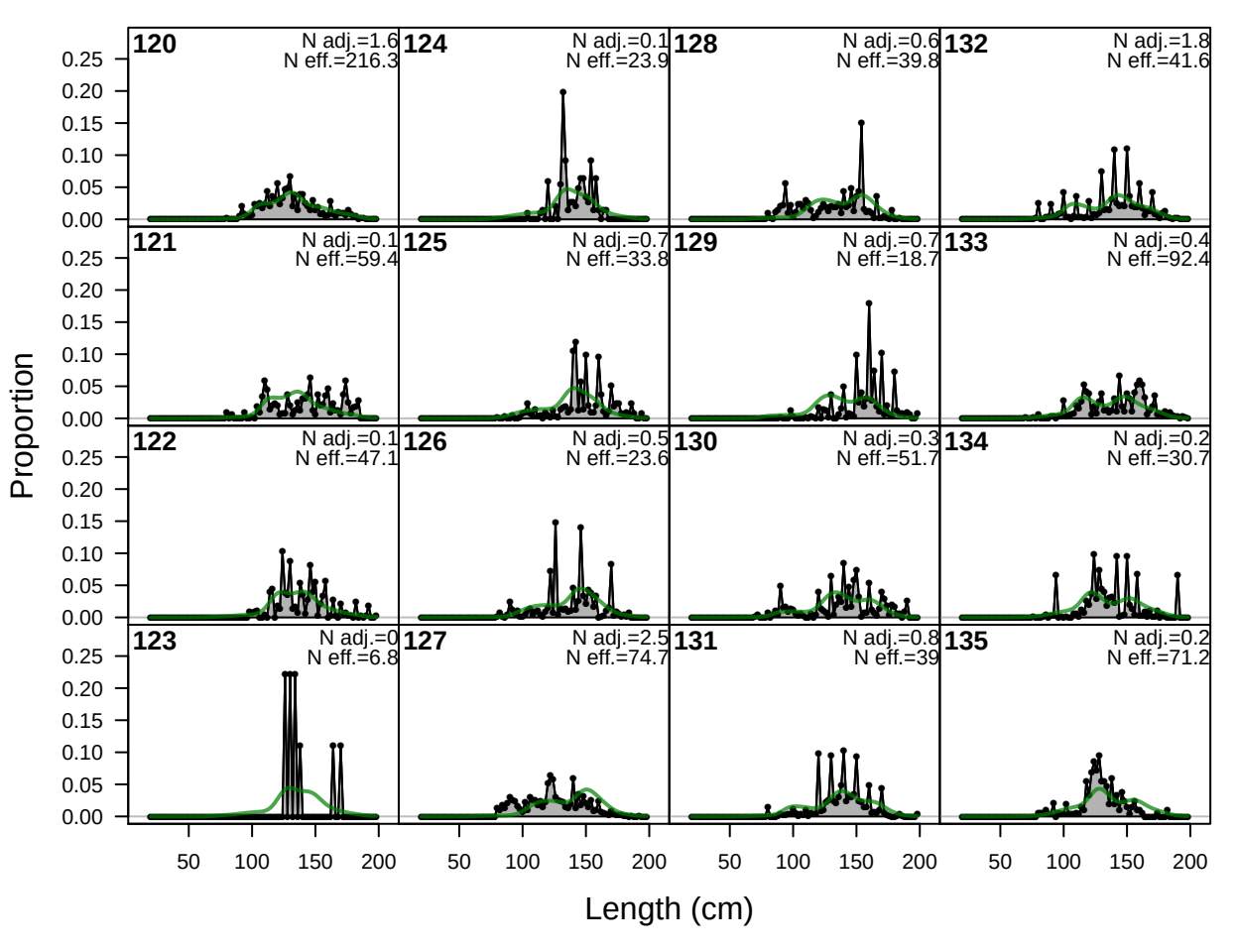
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=41.6
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N adj.=0.7
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N adj.=0.3
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N adj.=0.2
N eff.=30.7
123
N adj.=0
N eff.=6.8
127
N adj.=2.5
N eff.=74.7
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N eff.=39
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N adj.=0.2
N eff.=71.2
Proportion
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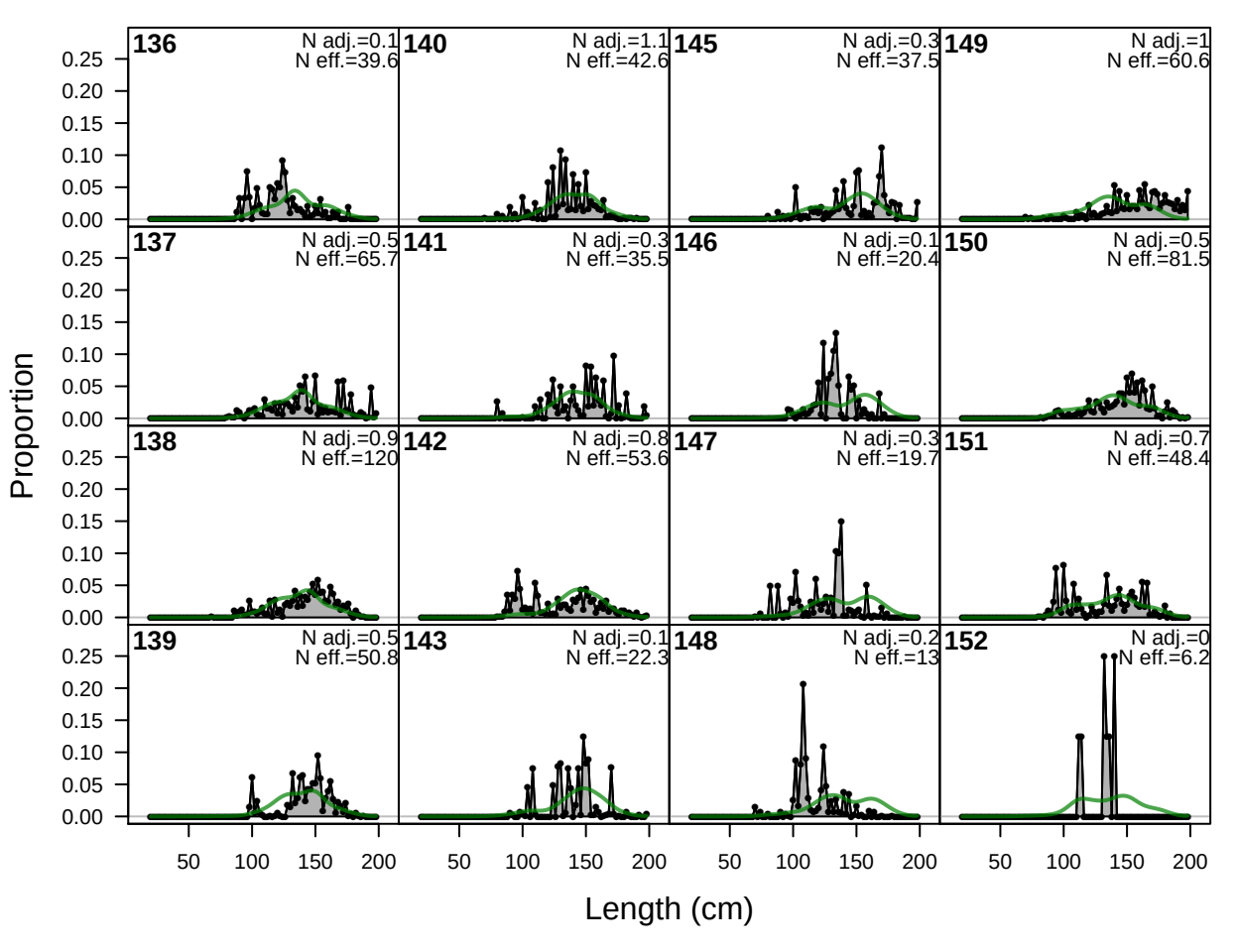
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N eff.=37.5
149
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N eff.=60.6
137
N adj.=0.5
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141
N adj.=0.3
N eff.=35.5
146
N adj.=0.1
N eff.=20.4
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N adj.=0.5
N eff.=81.5
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N adj.=0.9
N eff.=120
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N adj.=0.8
N eff.=53.6
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N adj.=0.3
N eff.=19.7
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N adj.=0.7
N eff.=48.4
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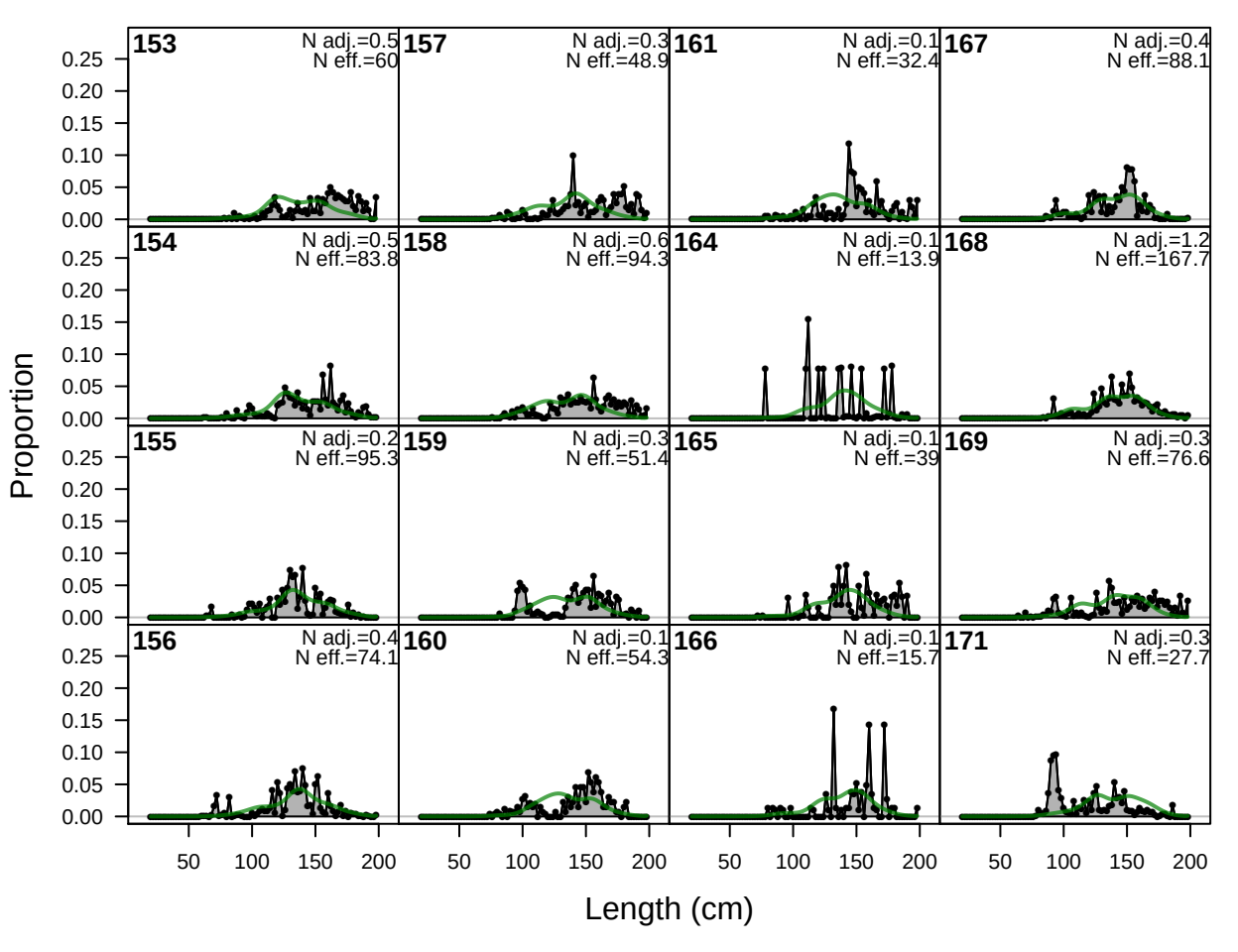
N eff.=50.8
143
N adj.=0.1
N eff.=22.3
148
N adj.=0.2
N eff.=13
152
N adj.=0
N eff.=6.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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N adj.=0.5
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N adj.=0.6
N eff.=94.3
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N adj.=0.1
N eff.=13.9
168
N adj.=1.2
N eff.=167.7
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N adj.=0.2
N eff.=95.3
159
N adj.=0.3
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N adj.=0.1
N eff.=39
169
N adj.=0.3
N eff.=76.6
156
N adj.=0.4
N eff.=74.1
160
N adj.=0.1
N eff.=54.3
166
N adj.=0.1
N eff.=15.7
171
N adj.=0.3
N eff.=27.7
Proportion
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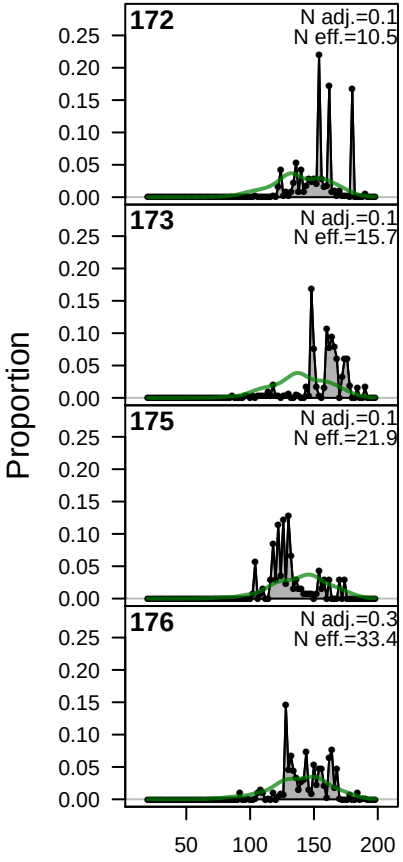
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)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173
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175
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N eff.=21.9
176
N adj.=0.3
N eff.=33.4
Proportion
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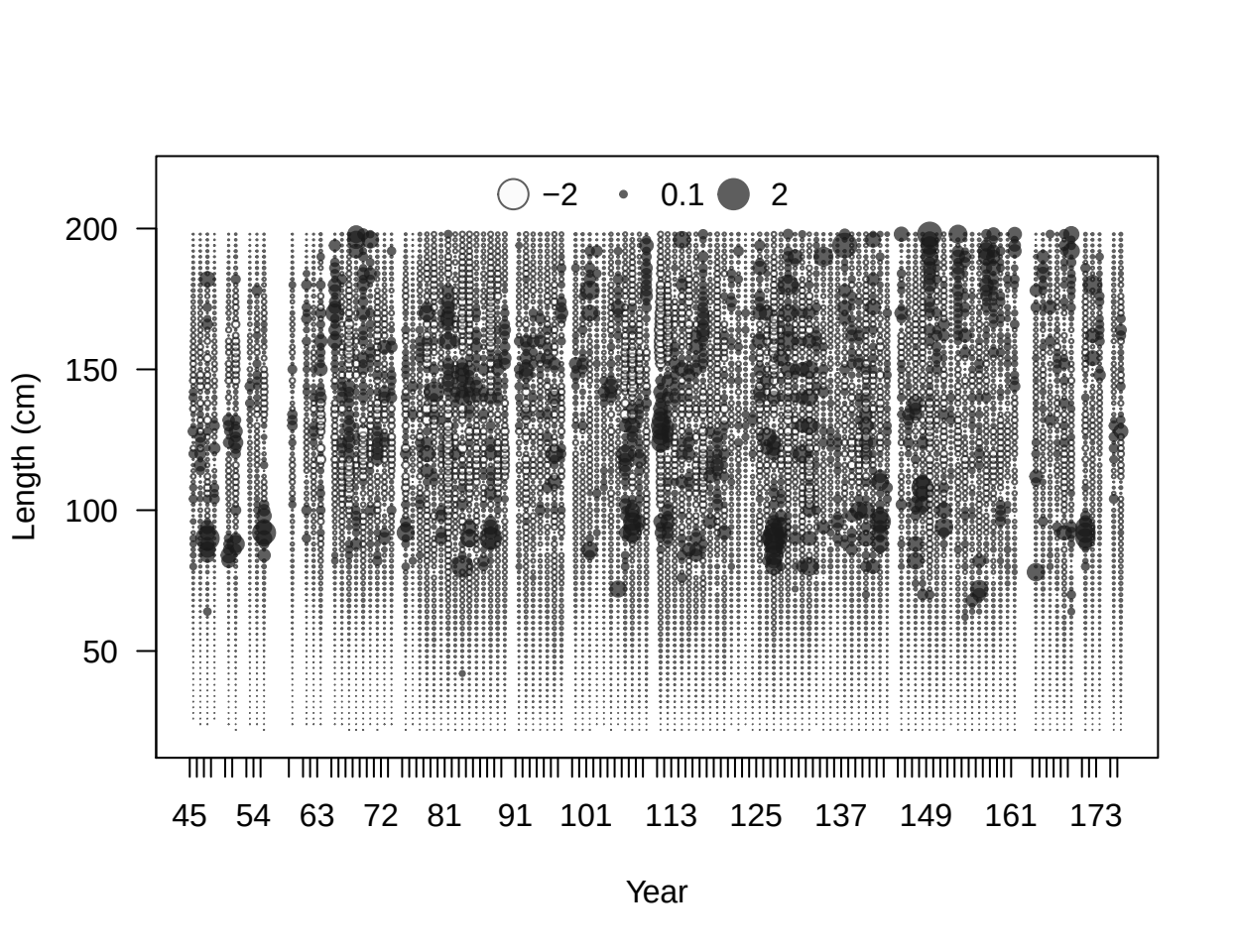
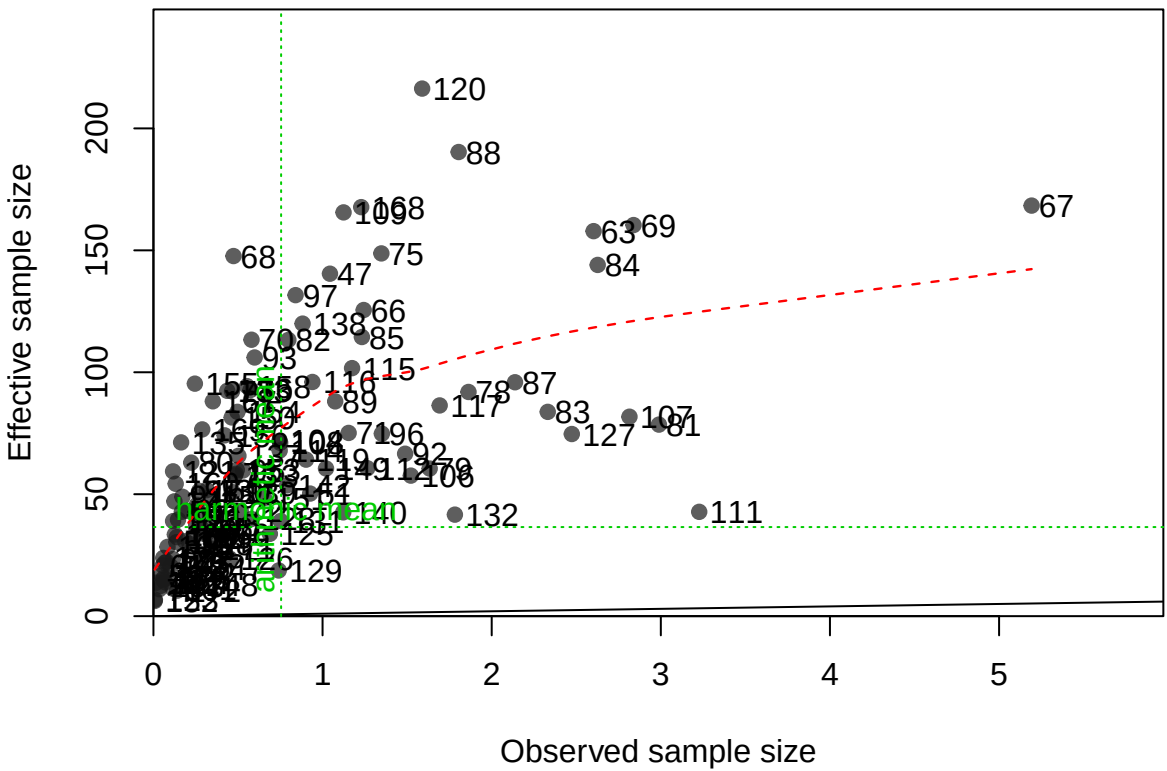
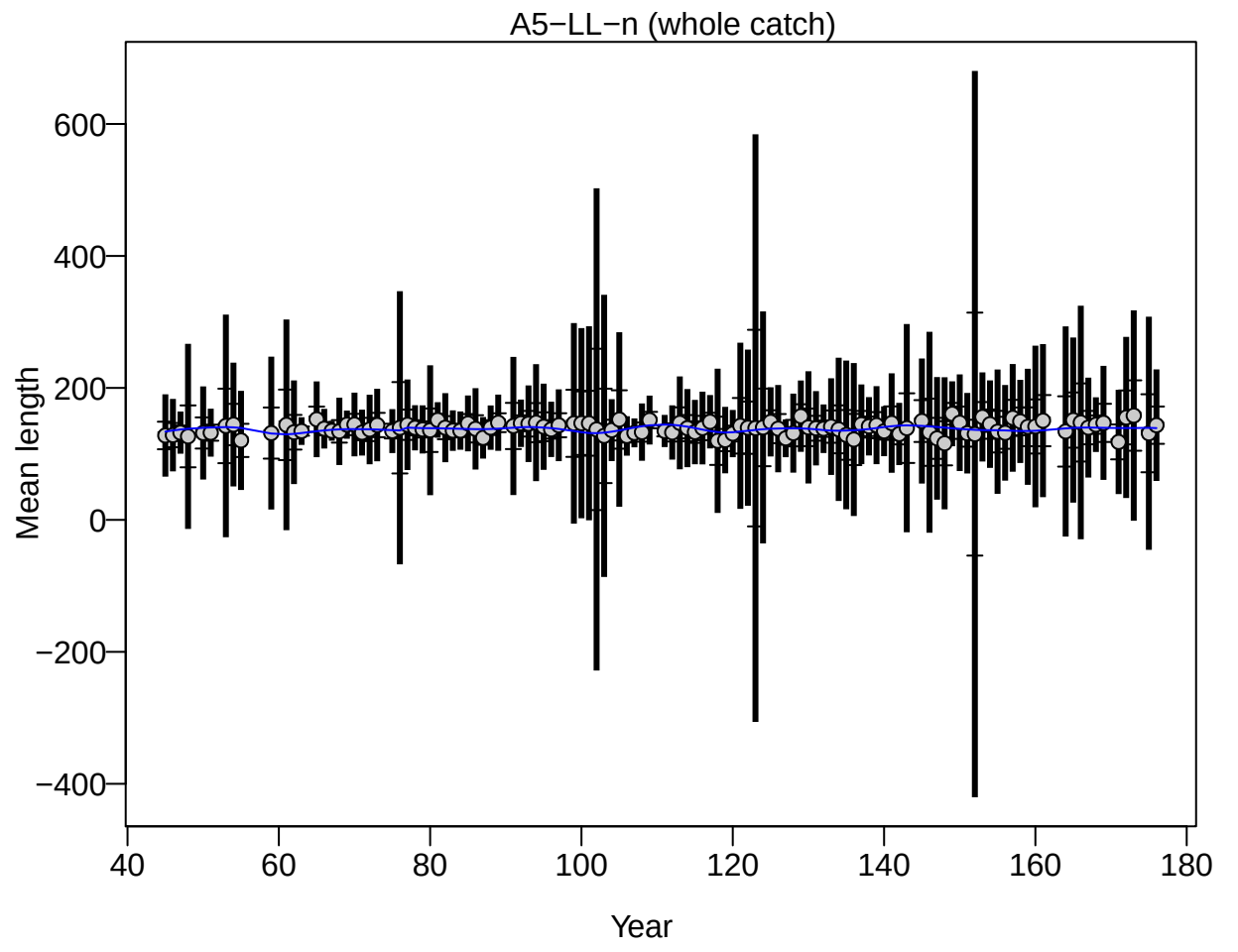
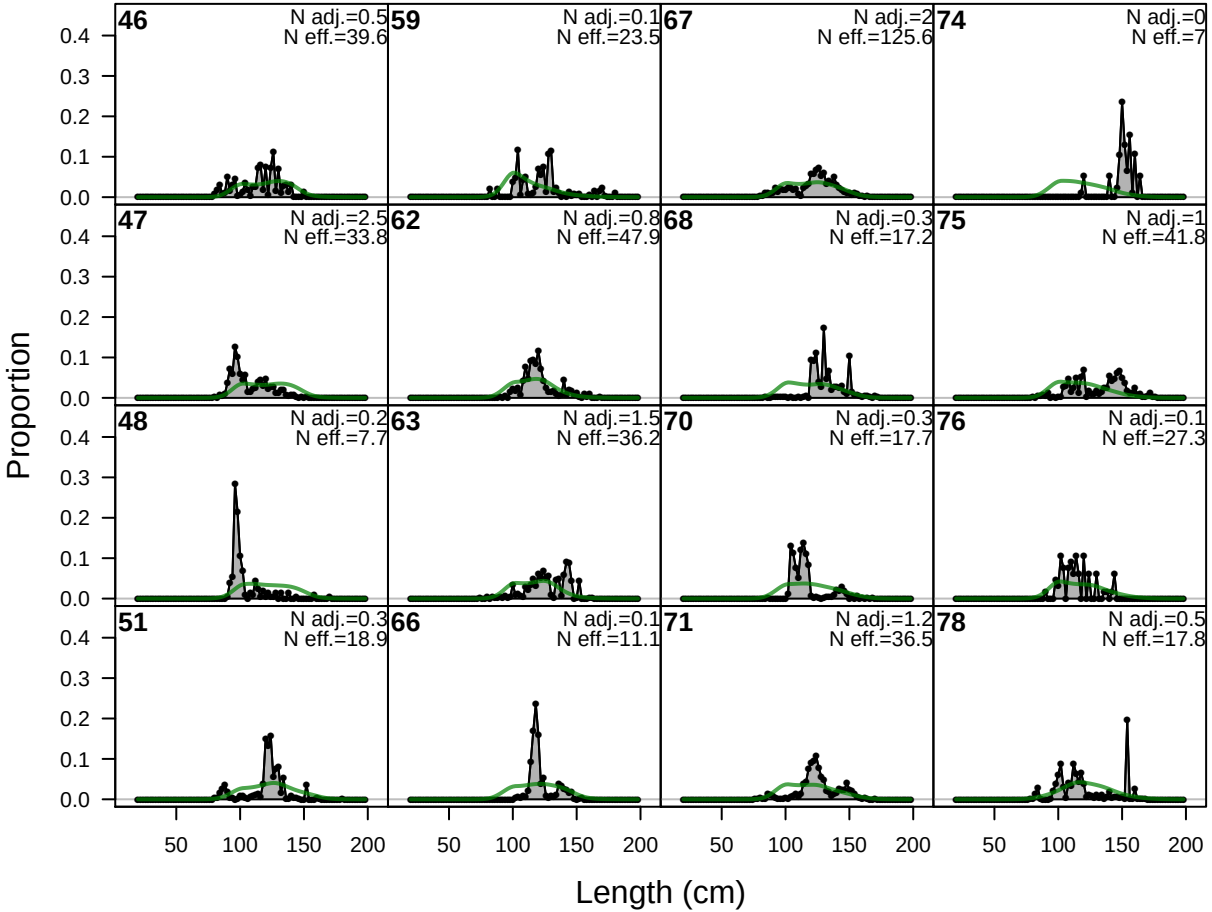
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
45
54
63
72
81
91
101
113
125
137
149
161
173
Year



Effective sample size
Observed sample size
0
50
100
150
200
0
1
2
3
4
5
120
88
67
63
69
84
68
75
47
97
66
138
85
115
87
83
127
111
132
129


A5−LL−n (whole catch)
600
400
200
0
−200
−400
Mean length
40
60
80
100
120
140
160
180
Year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N eff.=125.6
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N eff.=7
47
N adj.=2.5
N eff.=33.8
62
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N eff.=47.9
68
N adj.=0.3
N eff.=17.2
75
N adj.=1
N eff.=41.8
48
N adj.=0.2
N eff.=7.7
63
N adj.=1.5
N eff.=36.2
70
N adj.=0.3
N eff.=17.7
76
N adj.=0.1
N eff.=27.3
51
N adj.=0.3
N eff.=18.9
66
N adj.=0.1
N eff.=11.1
71
N adj.=1.2
N eff.=36.5
78
N adj.=0.5
N eff.=17.8
Proportion
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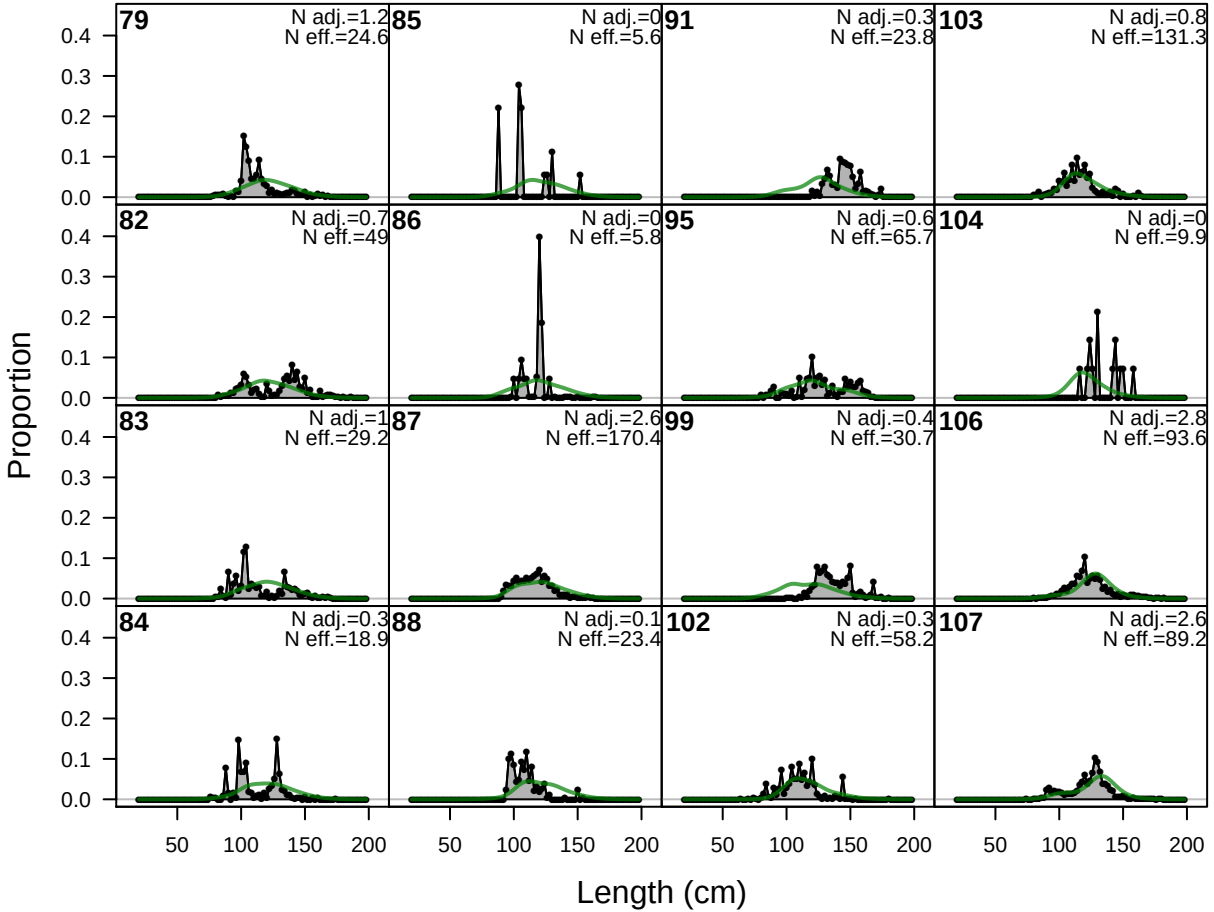
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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95
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N eff.=65.7
104
N adj.=0
N eff.=9.9
83
N adj.=1
N eff.=29.2
87
N adj.=2.6
N eff.=170.4
99
N adj.=0.4
N eff.=30.7
106
N adj.=2.8
N eff.=93.6
84
N adj.=0.3
N eff.=18.9
88
N adj.=0.1
N eff.=23.4
102
N adj.=0.3
N eff.=58.2
107
N adj.=2.6
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Proportion
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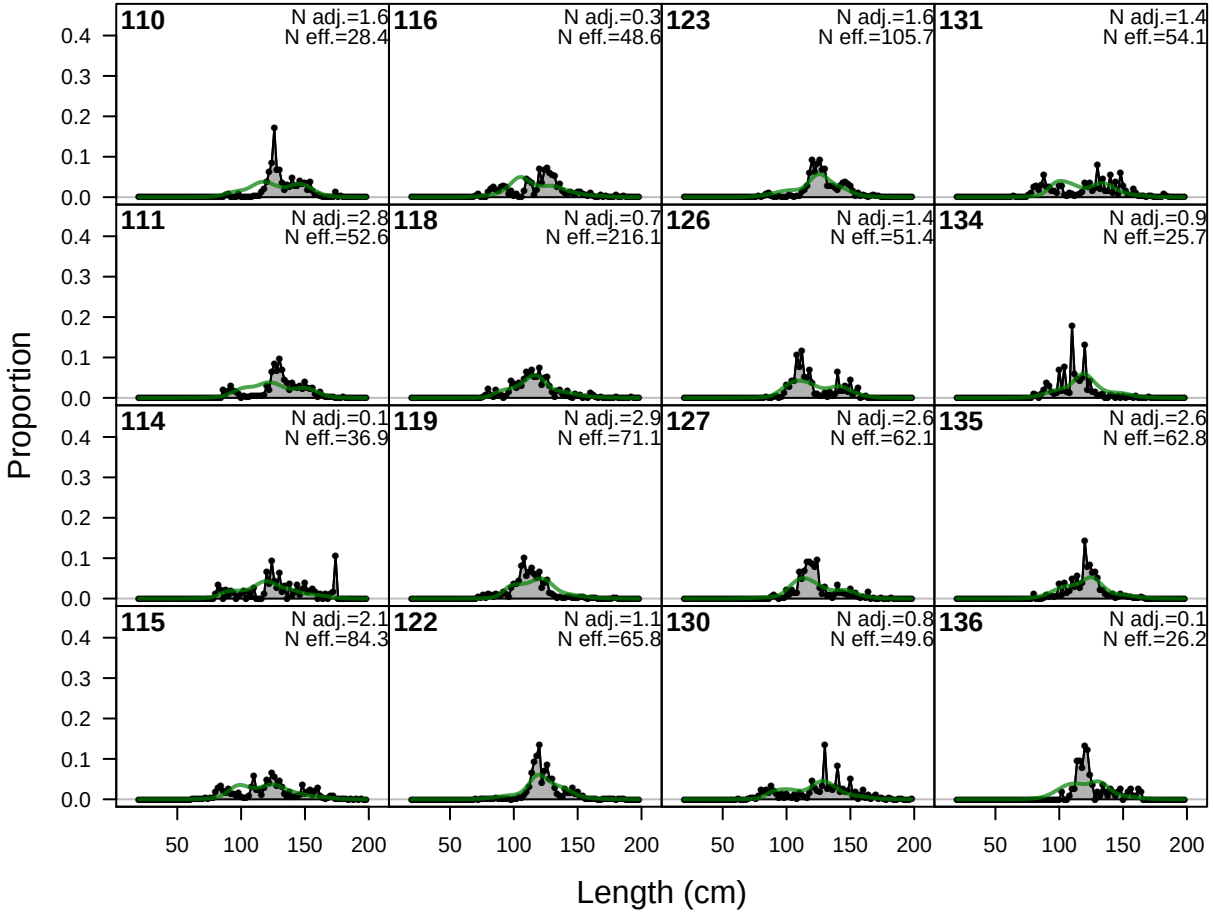
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=105.7
131
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N eff.=54.1
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N adj.=2.8
N eff.=52.6
118
N adj.=0.7
N eff.=216.1
126
N adj.=1.4
N eff.=51.4
134
N adj.=0.9
N eff.=25.7
114
N adj.=0.1
N eff.=36.9
119
N adj.=2.9
N eff.=71.1
127
N adj.=2.6
N eff.=62.1
135
N adj.=2.6
N eff.=62.8
115
N adj.=2.1
N eff.=84.3
122
N adj.=1.1
N eff.=65.8
130
N adj.=0.8
N eff.=49.6
136
N adj.=0.1
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Proportion
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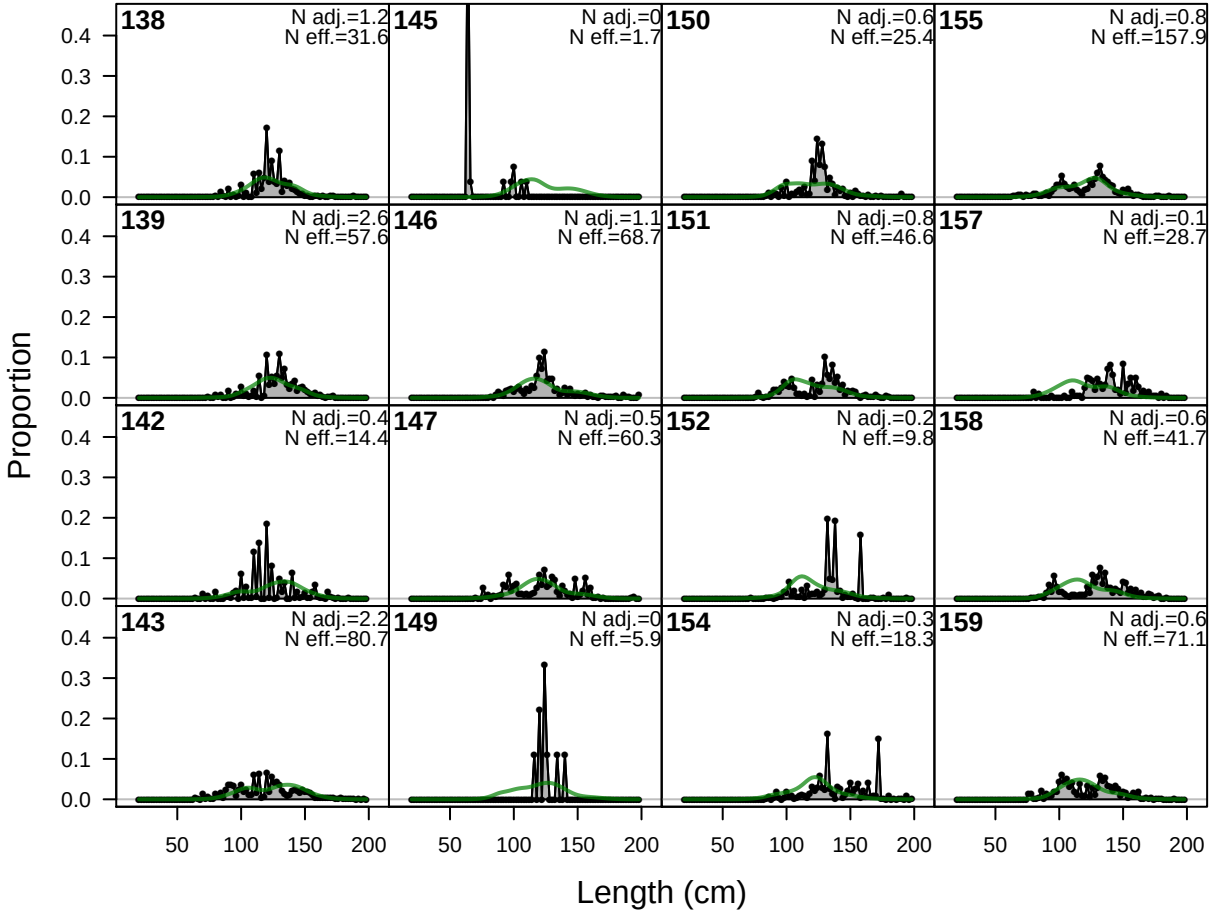
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N adj.=2.6
N eff.=57.6
146
N adj.=1.1
N eff.=68.7
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N eff.=46.6
157
N adj.=0.1
N eff.=28.7
142
N adj.=0.4
N eff.=14.4
147
N adj.=0.5
N eff.=60.3
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N eff.=9.8
158
N adj.=0.6
N eff.=41.7
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N adj.=2.2
N eff.=80.7
149
N adj.=0
N eff.=5.9
154
N adj.=0.3
N eff.=18.3
159
N adj.=0.6
N eff.=71.1
Proportion
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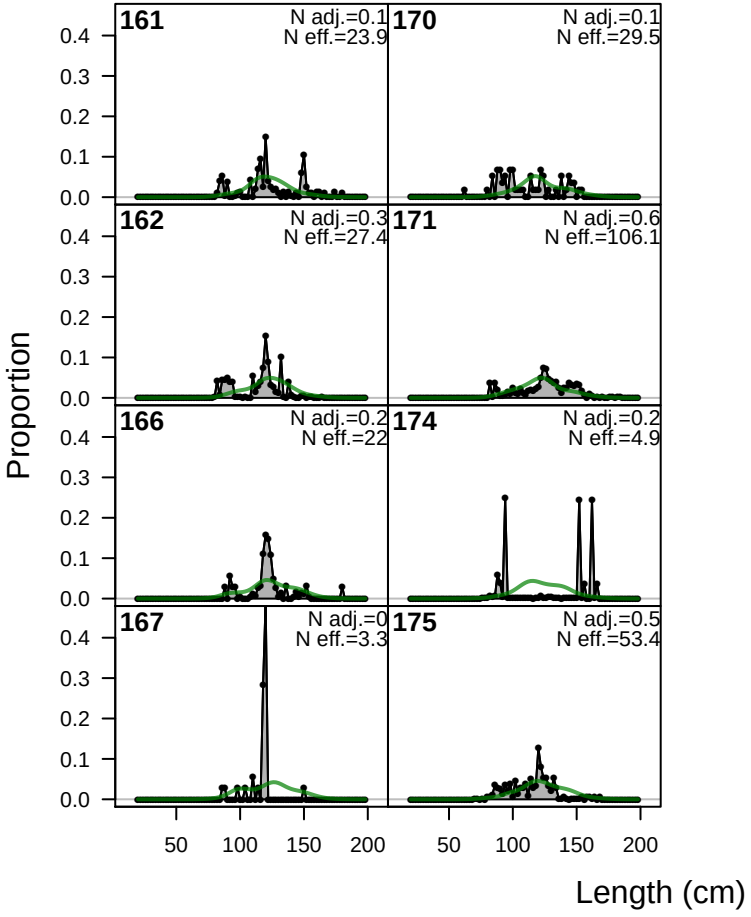
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=23.9
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N eff.=29.5
162
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171
N adj.=0.6
N eff.=106.1
166
N adj.=0.2
N eff.=22
174
N adj.=0.2
N eff.=4.9
167
N adj.=0
N eff.=3.3
175
N adj.=0.5
N eff.=53.4
Proportion
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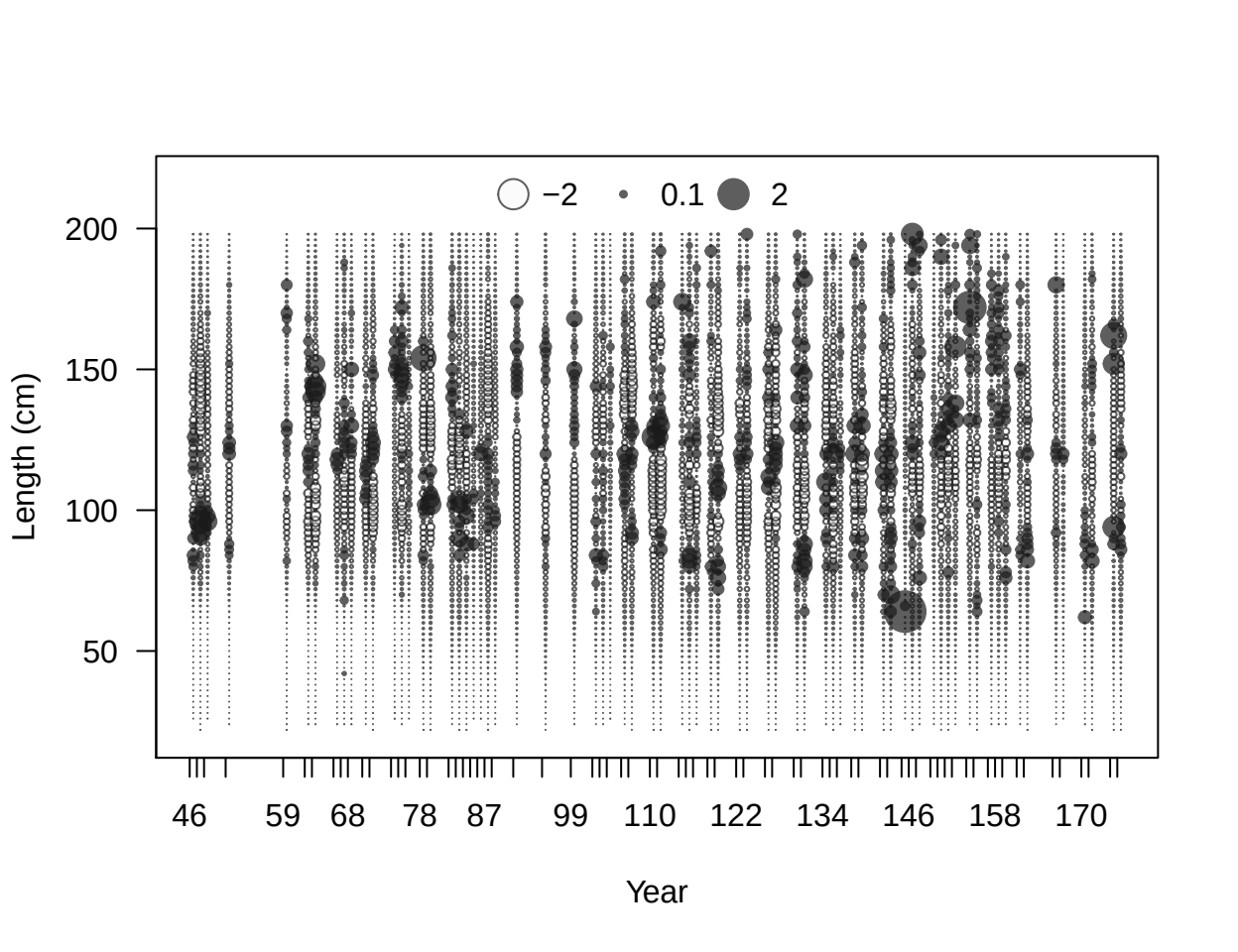
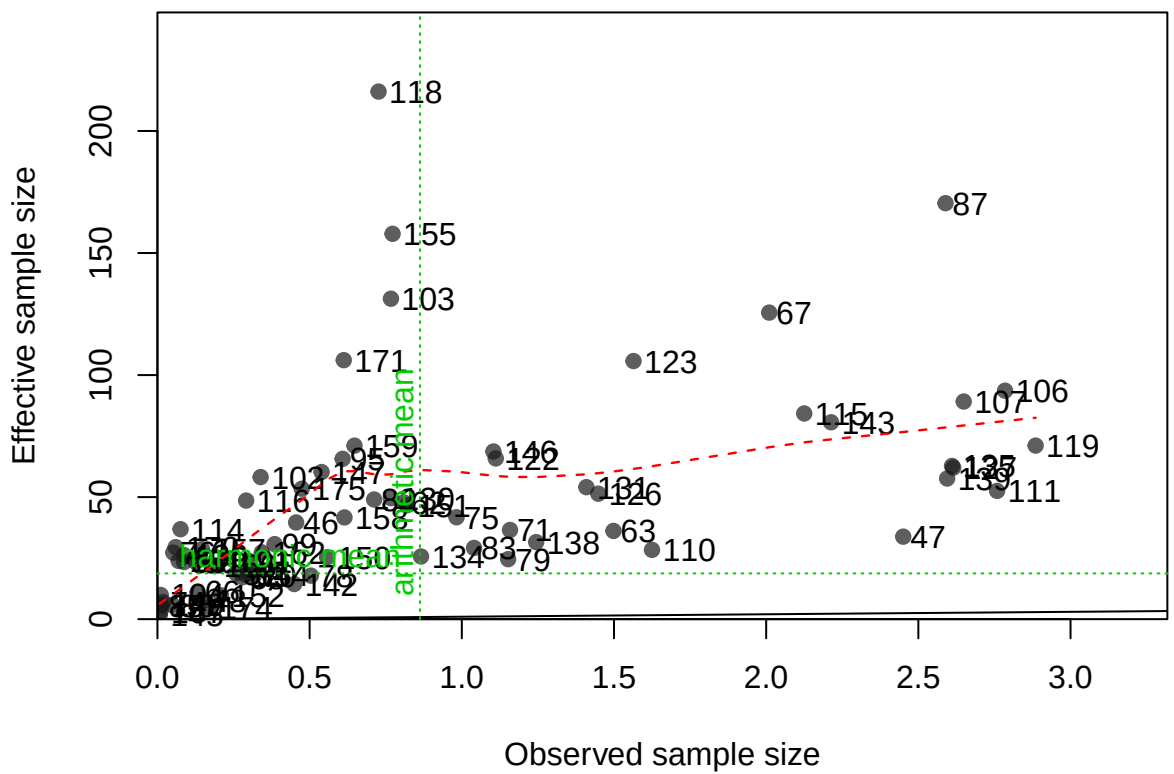
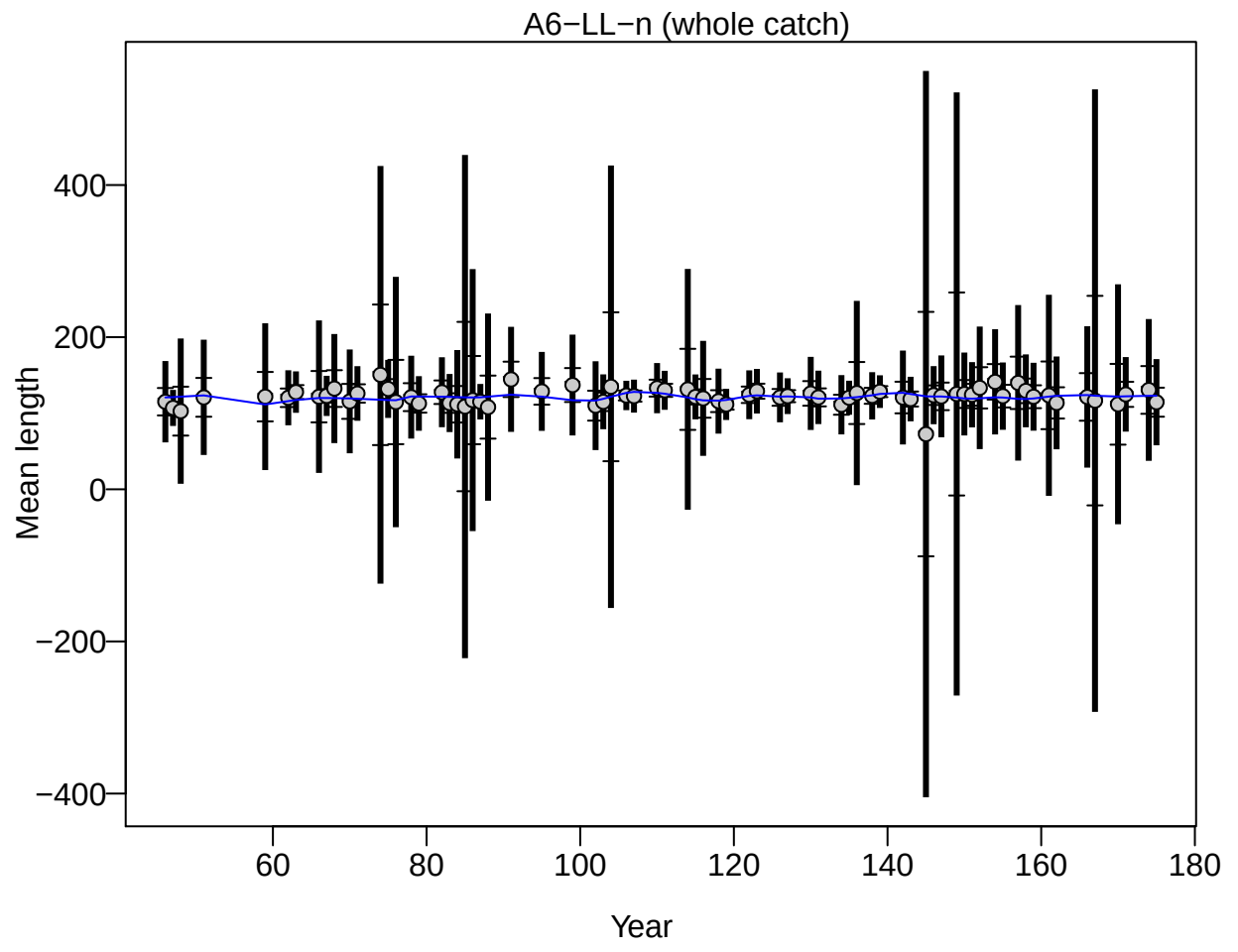
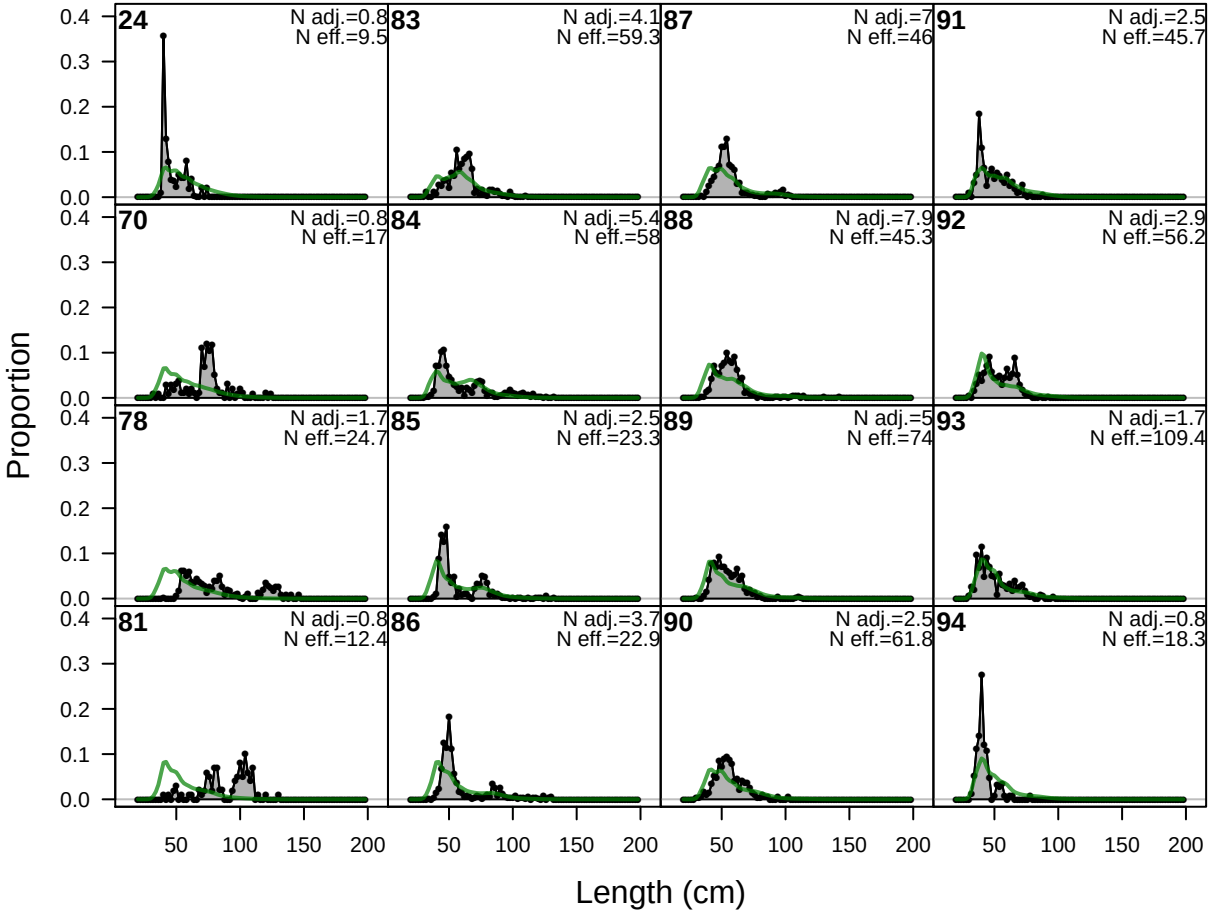
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
46
59
68
78
87
99
110
122
134
146
158
170
Year



Effective sample size
Observed sample size
0
50
100
150
200
0.0
0.5
1.0
1.5
2.0
2.5
3.0
arithmetic mean
harmonic mean
118
155
103
171
87
67
123
106
107
115
143
119
159
146
122
102
116
175
131
126
111
114
46
158
75
71
63
47
99
83
138
110
134
79
142


A6−LL−n (whole catch)
Mean length
400
200
0
−200
−400
60
80
100
120
140
160
180
Year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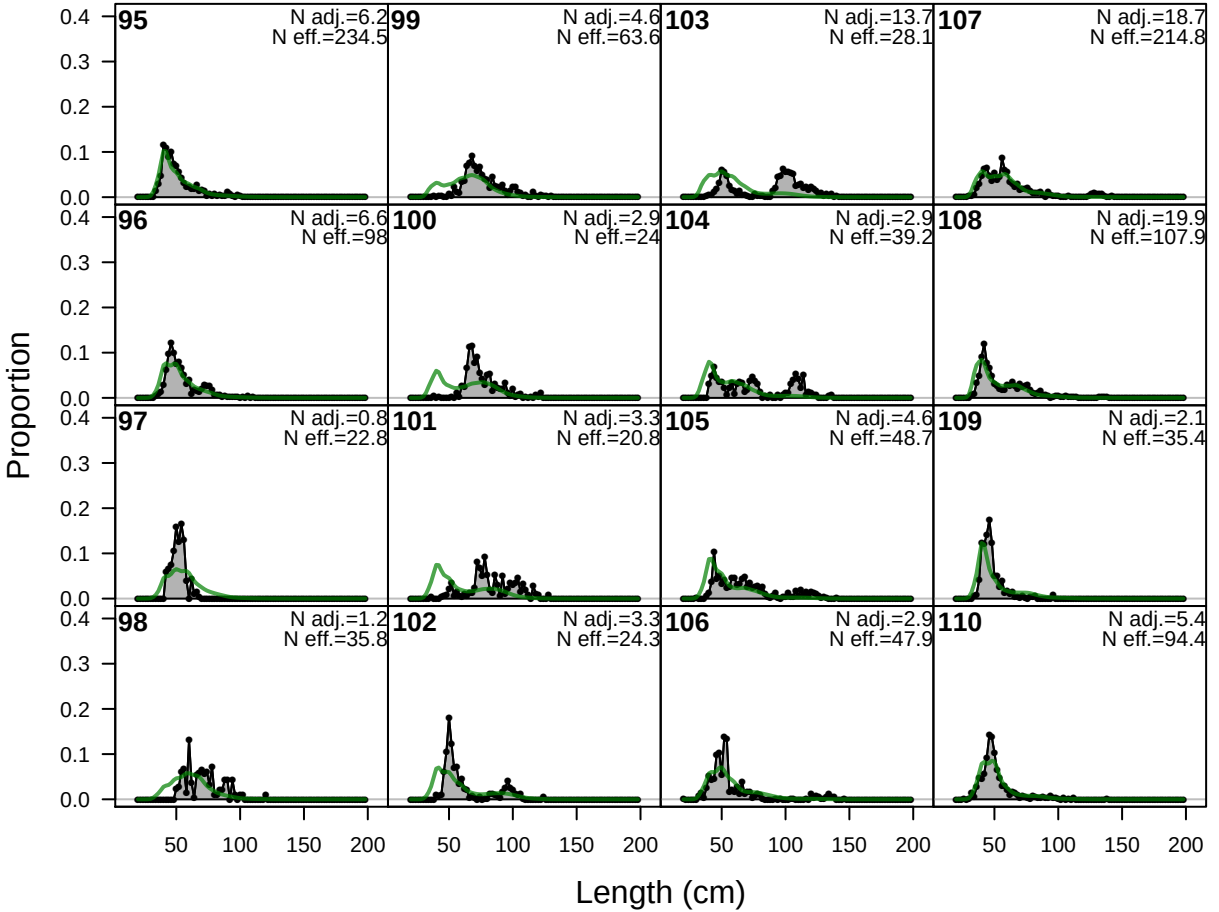
N eff.=59.3
87
N adj.=7
N eff.=46
91
N adj.=2.5
N eff.=45.7
70
N adj.=0.8
N eff.=17
84
N adj.=5.4
N eff.=58
88
N adj.=7.9
N eff.=45.3
92
N adj.=2.9
N eff.=56.2
78
N adj.=1.7
N eff.=24.7
85
N adj.=2.5
N eff.=23.3
89
N adj.=5
N eff.=74
93
N adj.=1.7
N eff.=109.4
81
N adj.=0.8
N eff.=12.4
86
N adj.=3.7
N eff.=22.9
90
N adj.=2.5
N eff.=61.8
94
N adj.=0.8
N eff.=18.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=63.6
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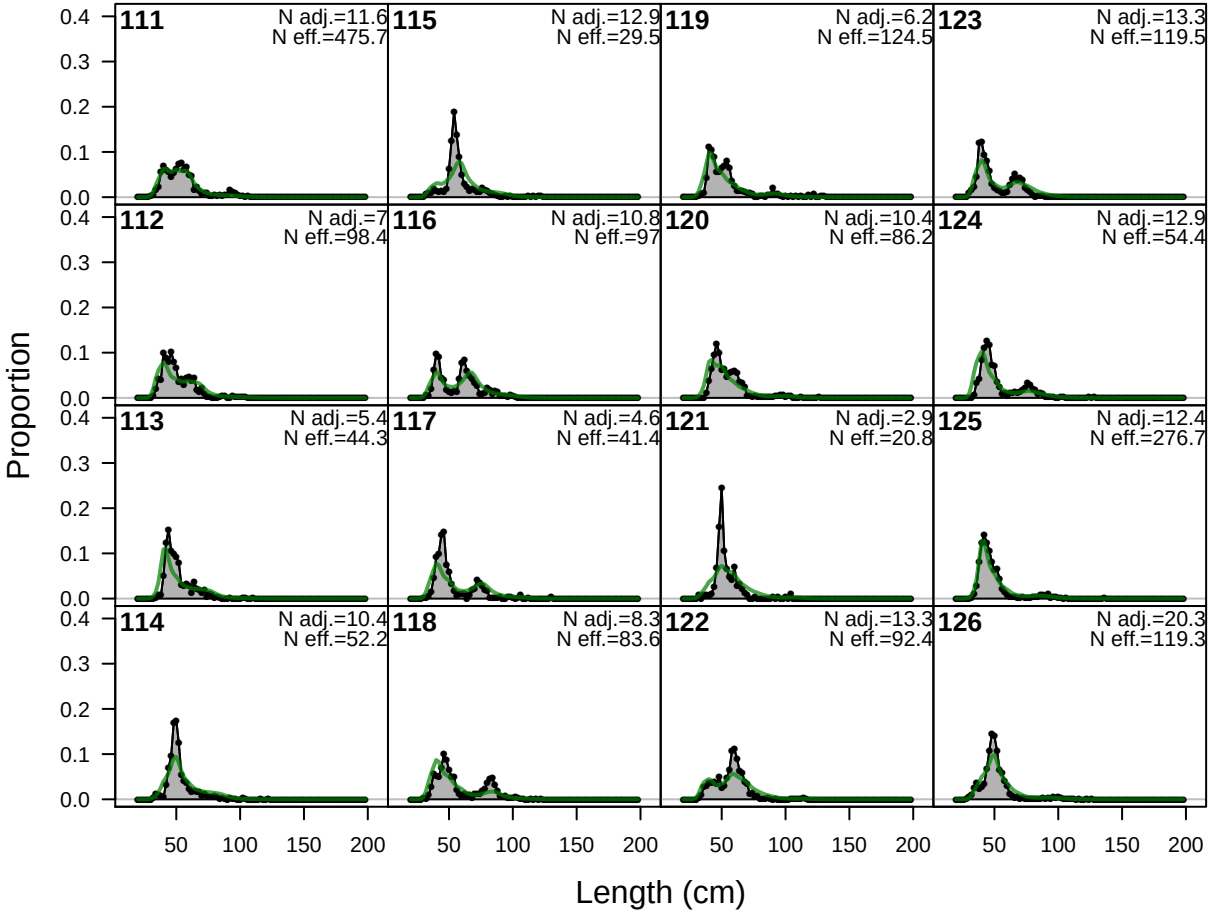
N eff.=28.1
107
N adj.=18.7
N eff.=214.8
96
N adj.=6.6
N eff.=98
100
N adj.=2.9
N eff.=24
104
N adj.=2.9
N eff.=39.2
108
N adj.=19.9
N eff.=107.9
97
N adj.=0.8
N eff.=22.8
101
N adj.=3.3
N eff.=20.8
105
N adj.=4.6
N eff.=48.7
109
N adj.=2.1
N eff.=35.4
98
N adj.=1.2
N eff.=35.8
102
N adj.=3.3
N eff.=24.3
106
N adj.=2.9
N eff.=47.9
110
N adj.=5.4
N eff.=94.4
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=29.5
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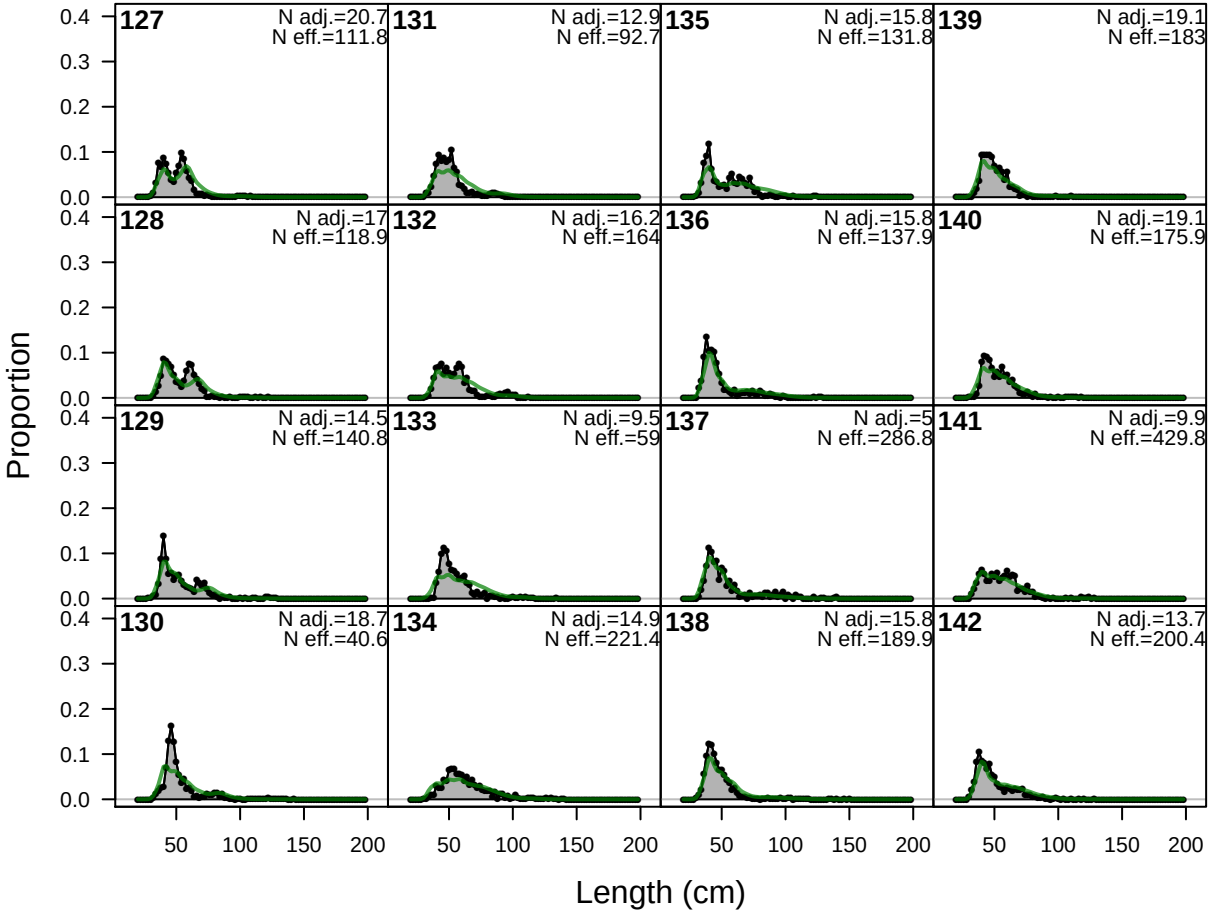
N eff.=124.5
123
N adj.=13.3
N eff.=119.5
112
N adj.=7
N eff.=98.4
116
N adj.=10.8
N eff.=97
120
N adj.=10.4
N eff.=86.2
124
N adj.=12.9
N eff.=54.4
113
N adj.=5.4
N eff.=44.3
117
N adj.=4.6
N eff.=41.4
121
N adj.=2.9
N eff.=20.8
125
N adj.=12.4
N eff.=276.7
114
N adj.=10.4
N eff.=52.2
118
N adj.=8.3
N eff.=83.6
122
N adj.=13.3
N eff.=92.4
126
N adj.=20.3
N eff.=119.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=111.8
131
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135
N adj.=15.8
N eff.=131.8
139
N adj.=19.1
N eff.=183
128
N adj.=17
N eff.=118.9
132
N adj.=16.2
N eff.=164
136
N adj.=15.8
N eff.=137.9
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N adj.=19.1
N eff.=175.9
129
N adj.=14.5
N eff.=140.8
133
N adj.=9.5
N eff.=59
137
N adj.=5
N eff.=286.8
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N adj.=9.9
N eff.=429.8
130
N adj.=18.7
N eff.=40.6
134
N adj.=14.9
N eff.=221.4
138
N adj.=15.8
N eff.=189.9
142
N adj.=13.7
N eff.=200.4
Proportion
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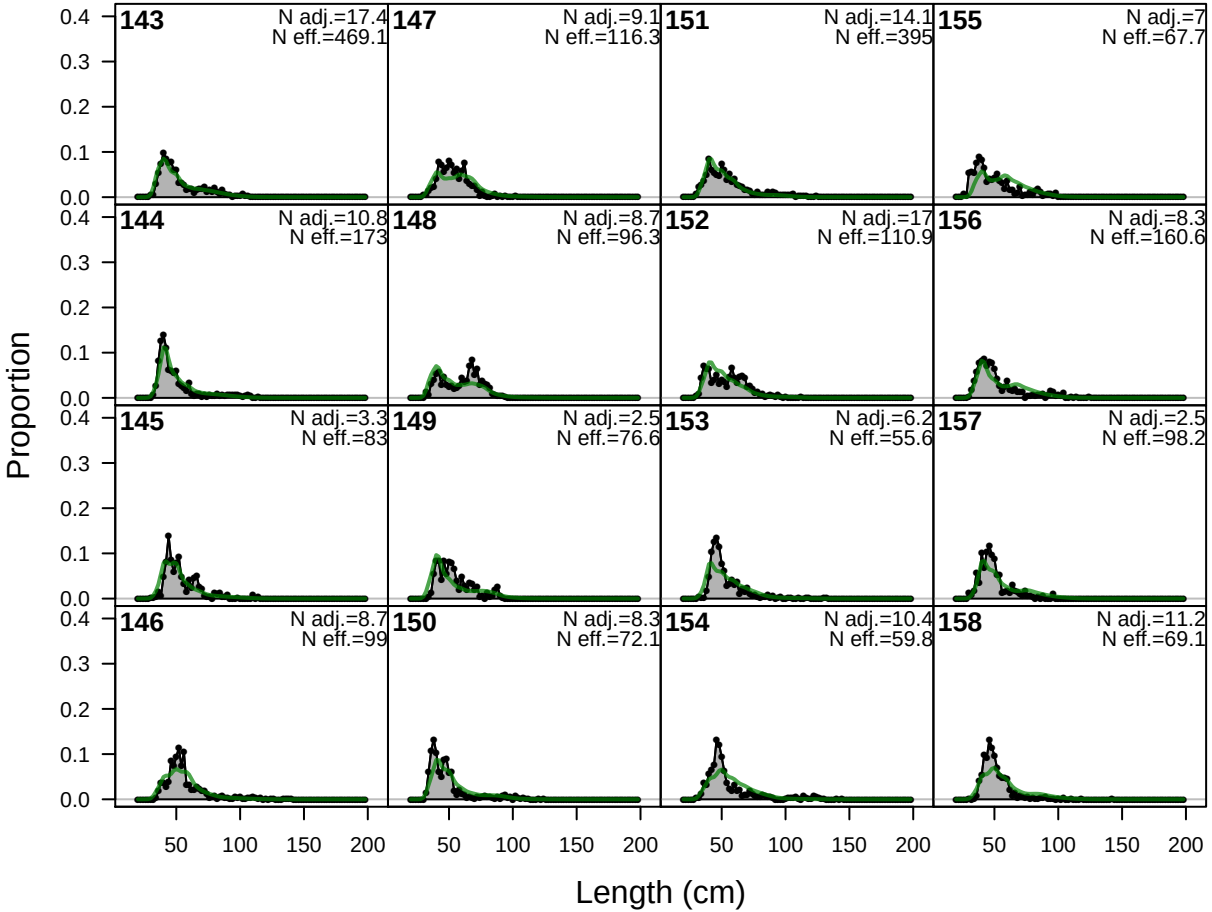
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=116.3
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N eff.=395
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N adj.=7
N eff.=67.7
144
N adj.=10.8
N eff.=173
148
N adj.=8.7
N eff.=96.3
152
N adj.=17
N eff.=110.9
156
N adj.=8.3
N eff.=160.6
145
N adj.=3.3
N eff.=83
149
N adj.=2.5
N eff.=76.6
153
N adj.=6.2
N eff.=55.6
157
N adj.=2.5
N eff.=98.2
146
N adj.=8.7
N eff.=99
150
N adj.=8.3
N eff.=72.1
154
N adj.=10.4
N eff.=59.8
158
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N eff.=69.1
Proportion
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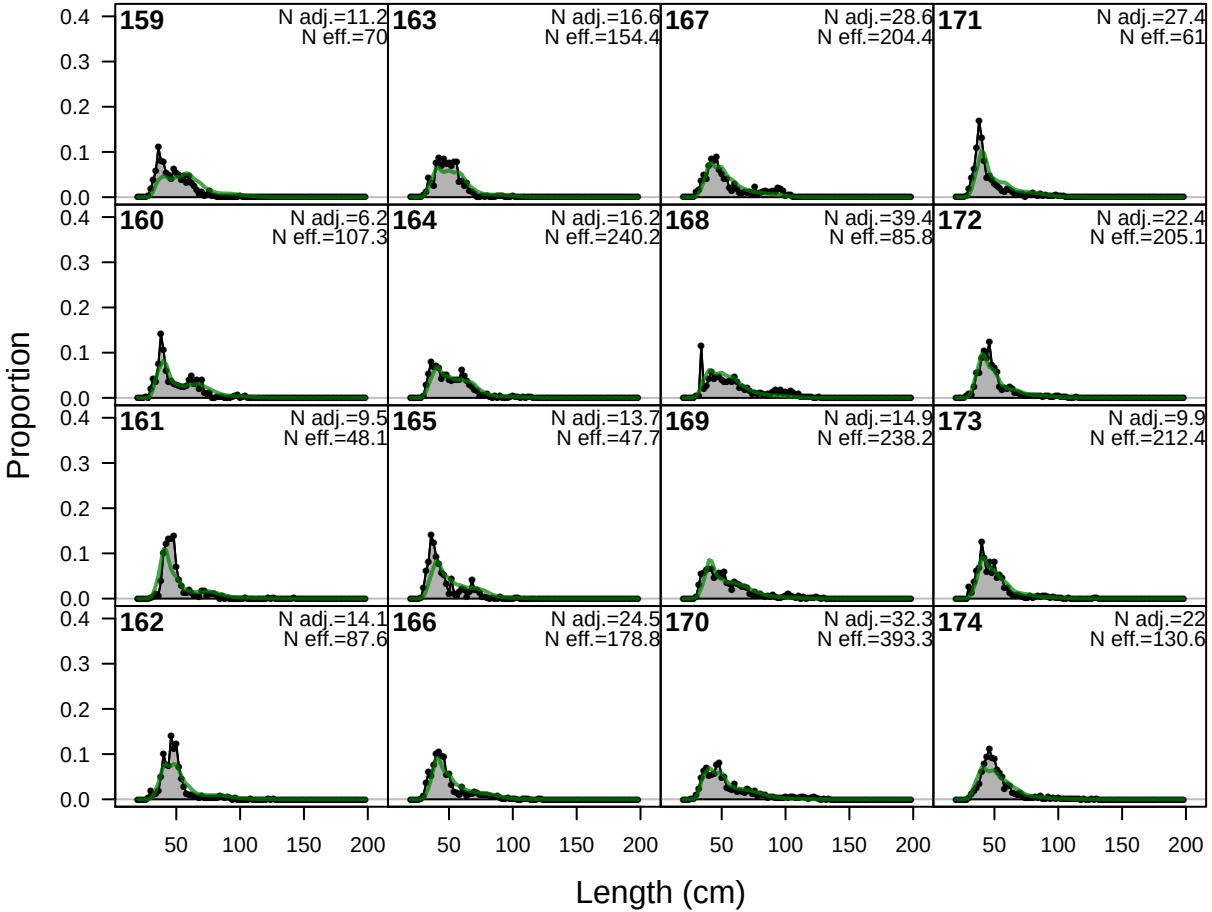
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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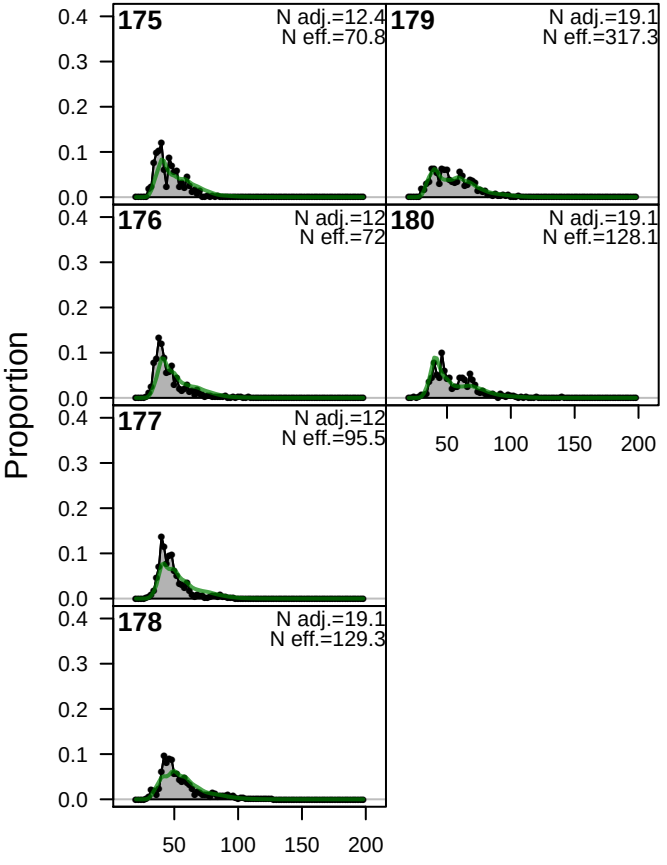
N eff.=154.4
167
N adj.=28.6
N eff.=204.4
171
N adj.=27.4
N eff.=61
160
N adj.=6.2
N eff.=107.3
164
N adj.=16.2
N eff.=240.2
168
N adj.=39.4
N eff.=85.8
172
N adj.=22.4
N eff.=205.1
161
N adj.=9.5
N eff.=48.1
165
N adj.=13.7
N eff.=47.7
169
N adj.=14.9
N eff.=238.2
173
N adj.=9.9
N eff.=212.4
162
N adj.=14.1
N eff.=87.6
166
N adj.=24.5
N eff.=178.8
170
N adj.=32.3
N eff.=393.3
174
N adj.=22
N eff.=130.6
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=70.8
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N eff.=317.3
176
N adj.=12
N eff.=72
180
N adj.=19.1
N eff.=128.1
177
N adj.=12
N eff.=95.5
178
N adj.=19.1
N eff.=129.3
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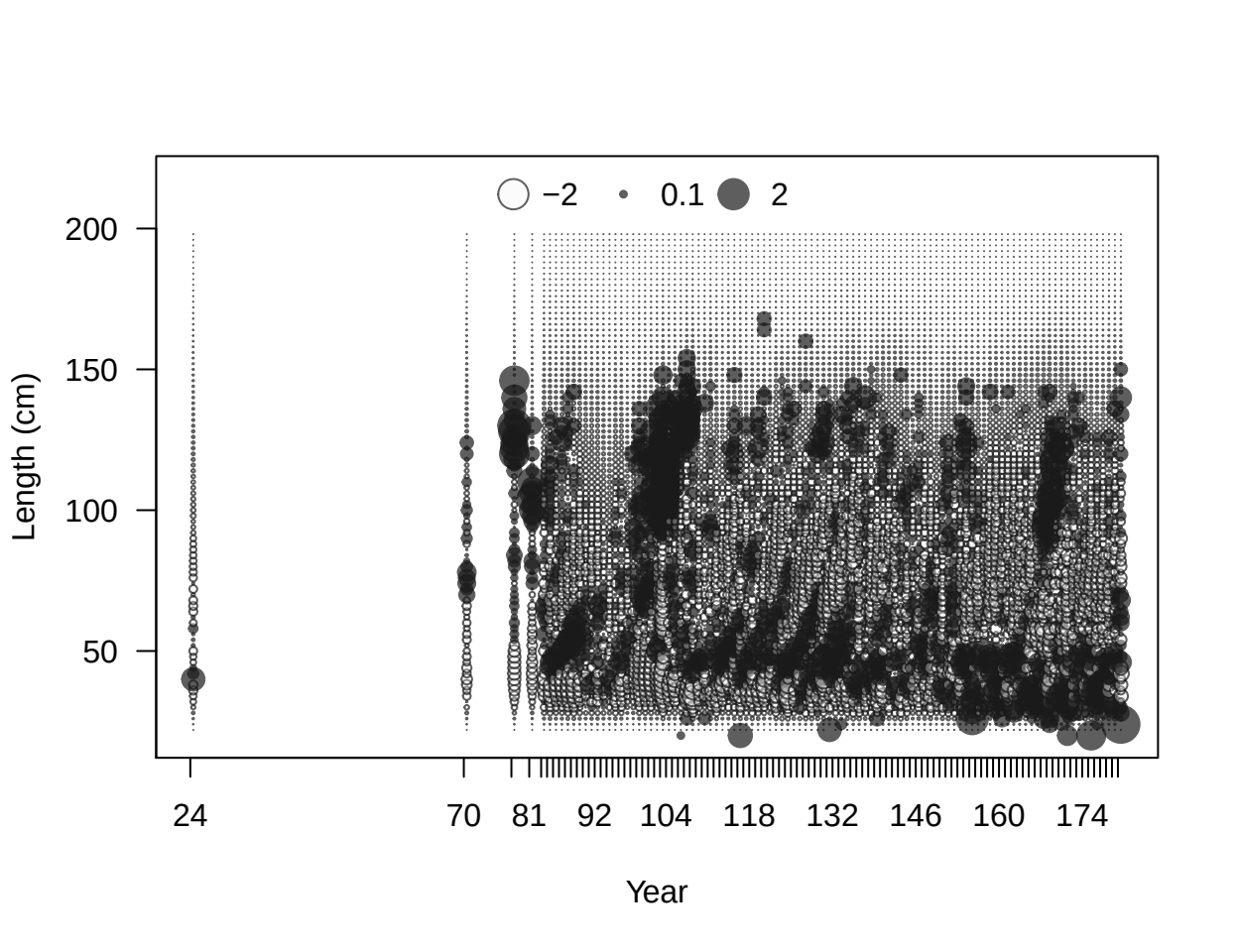
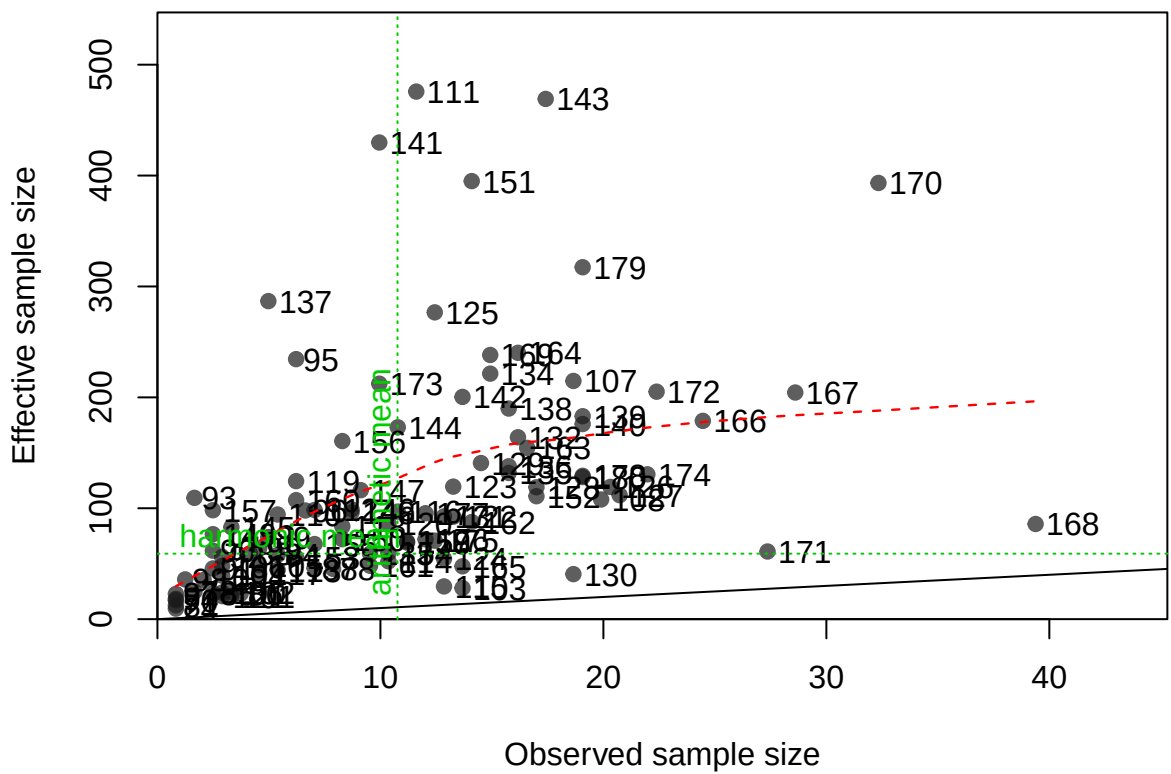
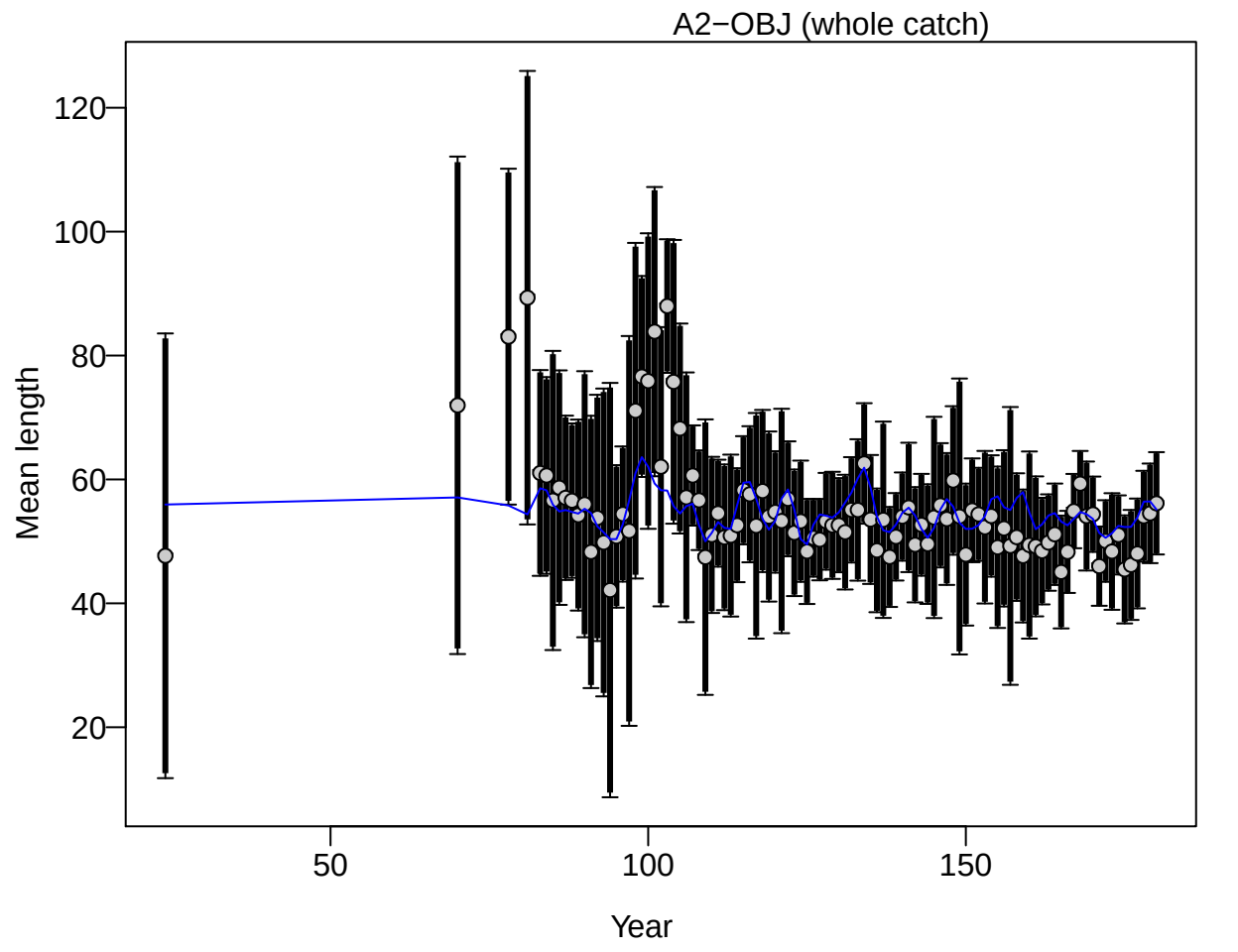
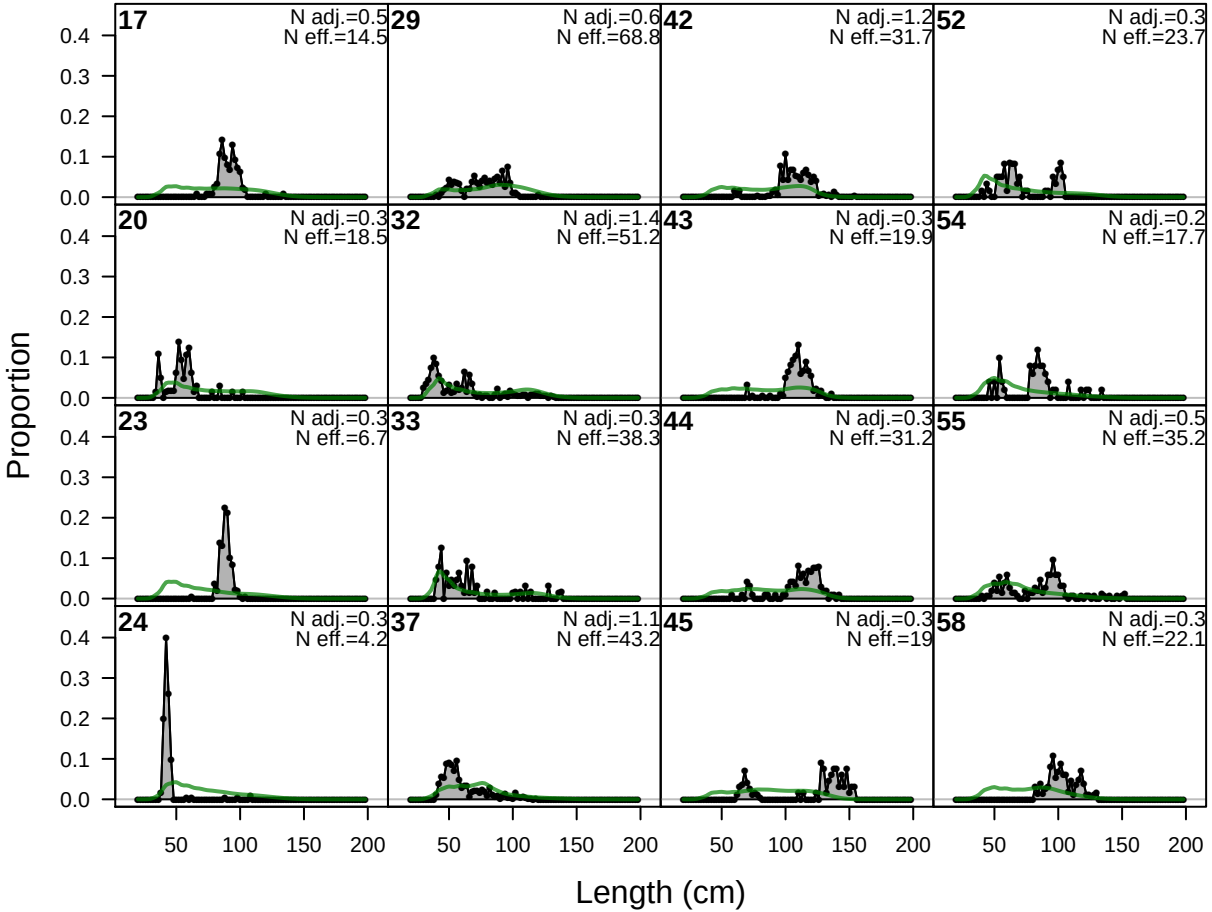
0.1
0.2
0.3
0.4
50
100
150
200
Proportion
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
24
70
81
92
104
118
132
146
160
174
Year



Effective sample size
Observed sample size
0
100
200
300
400
500
0
10
20
30
40
111
143
141
151
170
179
137
125
95
173
107
172
167
166
144
156
174
168
171
130


A2−OBJ (whole catch)
Mean length
120
100
80
60
40
20
50
100
150
Year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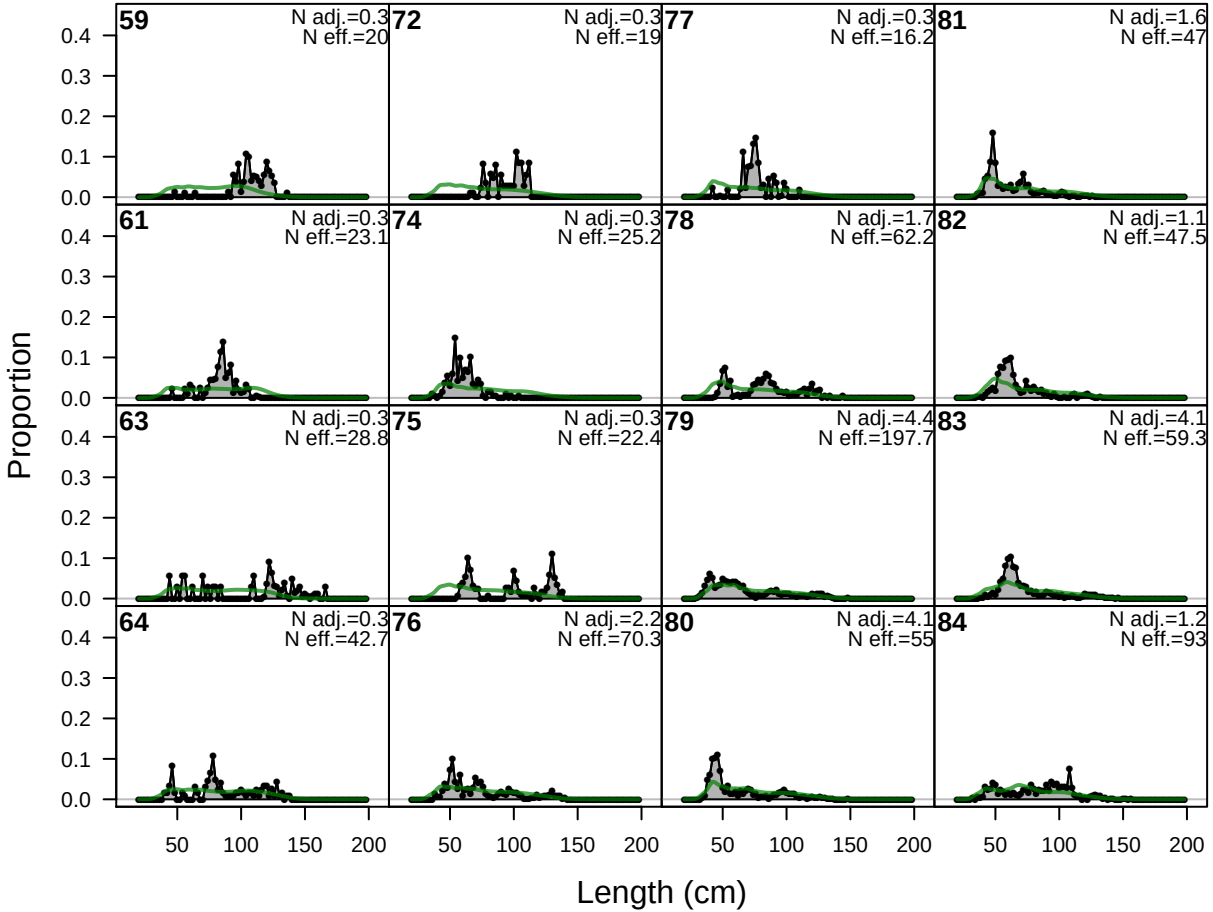
29
N adj.=0.6
N eff.=68.8
42
N adj.=1.2
N eff.=31.7
52
N adj.=0.3
N eff.=23.7
20
N adj.=0.3
N eff.=18.5
32
N adj.=1.4
N eff.=51.2
43
N adj.=0.3
N eff.=19.9
54
N adj.=0.2
N eff.=17.7
23
N adj.=0.3
N eff.=6.7
33
N adj.=0.3
N eff.=38.3
44
N adj.=0.3
N eff.=31.2
55
N adj.=0.5
N eff.=35.2
24
N adj.=0.3
N eff.=4.2
37
N adj.=1.1
N eff.=43.2
45
N adj.=0.3
N eff.=19
58
N adj.=0.3
N eff.=22.1
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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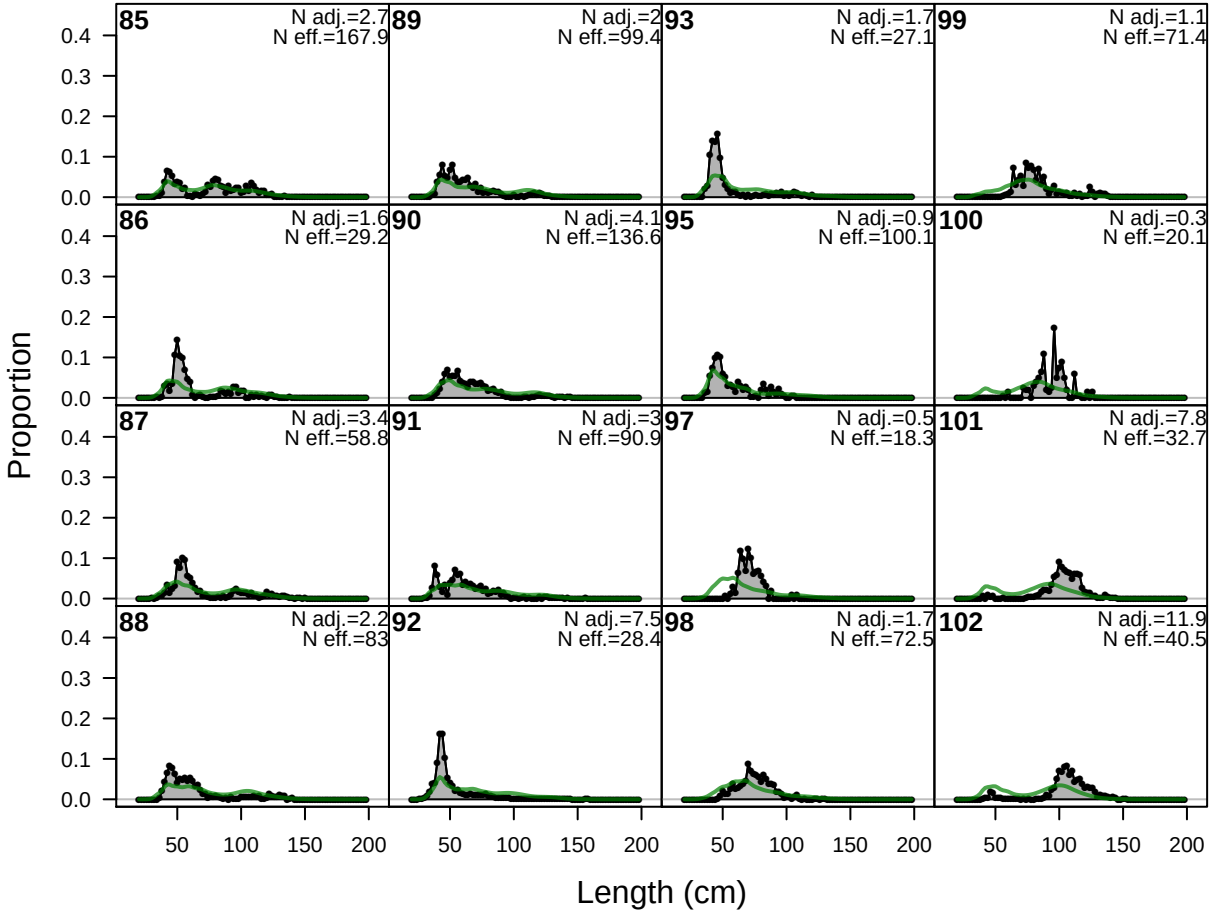
N eff.=20
72
N adj.=0.3
N eff.=19
77
N adj.=0.3
N eff.=16.2
81
N adj.=1.6
N eff.=47
61
N adj.=0.3
N eff.=23.1
74
N adj.=0.3
N eff.=25.2
78
N adj.=1.7
N eff.=62.2
82
N adj.=1.1
N eff.=47.5
63
N adj.=0.3
N eff.=28.8
75
N adj.=0.3
N eff.=22.4
79
N adj.=4.4
N eff.=197.7
83
N adj.=4.1
N eff.=59.3
64
N adj.=0.3
N eff.=42.7
76
N adj.=2.2
N eff.=70.3
80
N adj.=4.1
N eff.=55
84
N adj.=1.2
N eff.=93
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N adj.=2.7
N eff.=167.9
89
N adj.=2
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93
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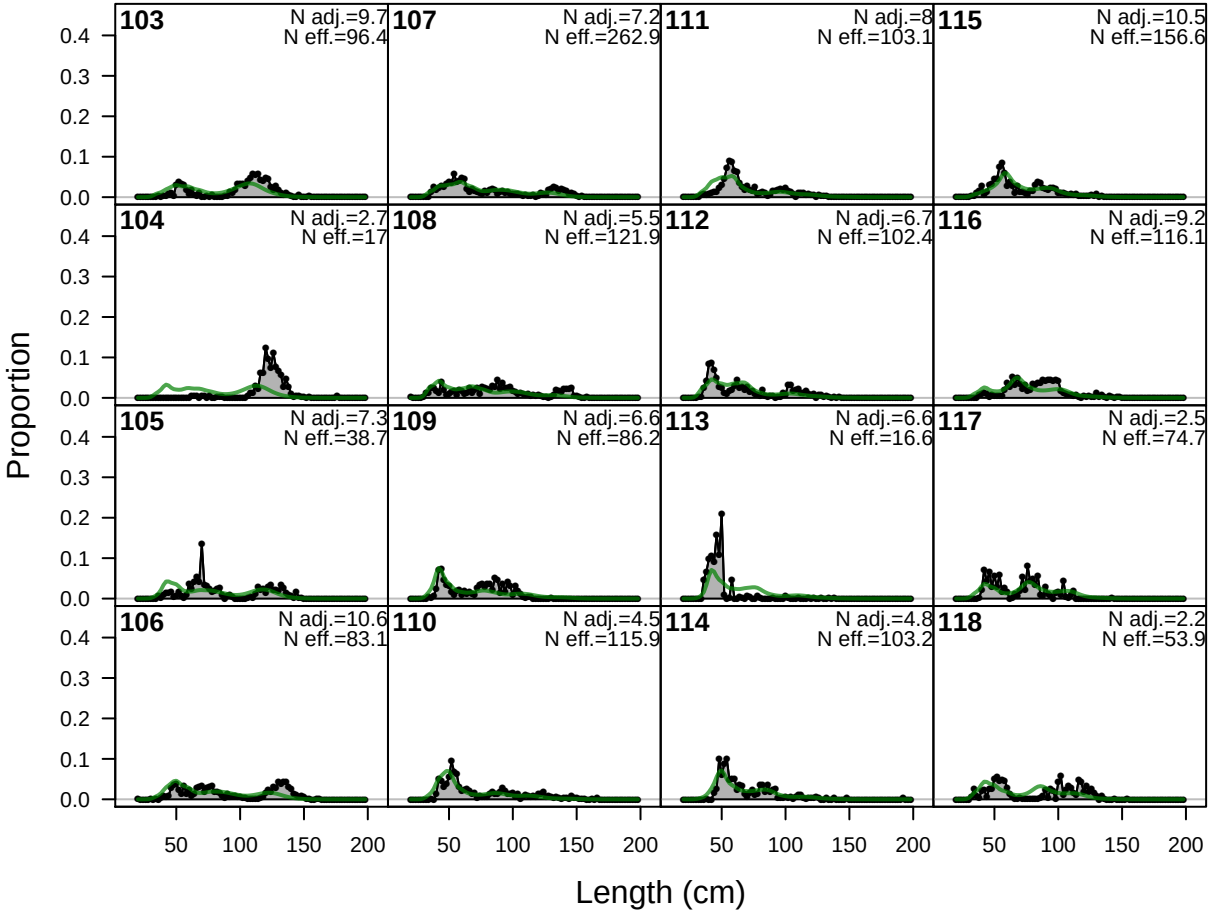
N eff.=27.1
99
N adj.=1.1
N eff.=71.4
86
N adj.=1.6
N eff.=29.2
90
N adj.=4.1
N eff.=136.6
95
N adj.=0.9
N eff.=100.1
100
N adj.=0.3
N eff.=20.1
87
N adj.=3.4
N eff.=58.8
91
N adj.=3
N eff.=90.9
97
N adj.=0.5
N eff.=18.3
101
N adj.=7.8
N eff.=32.7
88
N adj.=2.2
N eff.=83
92
N adj.=7.5
N eff.=28.4
98
N adj.=1.7
N eff.=72.5
102
N adj.=11.9
N eff.=40.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=96.4
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N eff.=103.1
115
N adj.=10.5
N eff.=156.6
104
N adj.=2.7
N eff.=17
108
N adj.=5.5
N eff.=121.9
112
N adj.=6.7
N eff.=102.4
116
N adj.=9.2
N eff.=116.1
105
N adj.=7.3
N eff.=38.7
109
N adj.=6.6
N eff.=86.2
113
N adj.=6.6
N eff.=16.6
117
N adj.=2.5
N eff.=74.7
106
N adj.=10.6
N eff.=83.1
110
N adj.=4.5
N eff.=115.9
114
N adj.=4.8
N eff.=103.2
118
N adj.=2.2
N eff.=53.9
Proportion
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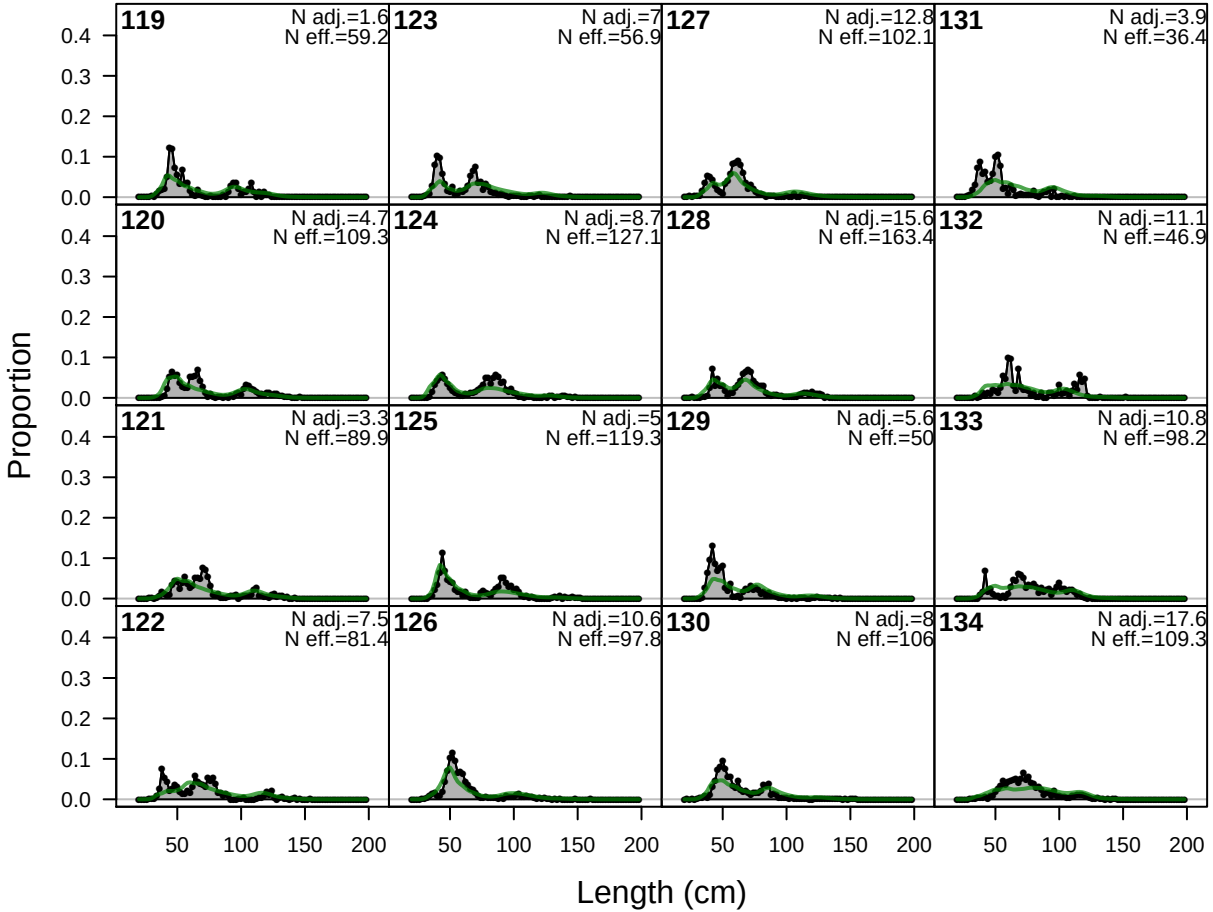
0.2
0.3
0.4
50
100
150
200
Length (cm)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123
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N eff.=56.9
127
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N eff.=102.1
131
N adj.=3.9
N eff.=36.4
120
N adj.=4.7
N eff.=109.3
124
N adj.=8.7
N eff.=127.1
128
N adj.=15.6
N eff.=163.4
132
N adj.=11.1
N eff.=46.9
121
N adj.=3.3
N eff.=89.9
125
N adj.=5
N eff.=119.3
129
N adj.=5.6
N eff.=50
133
N adj.=10.8
N eff.=98.2
122
N adj.=7.5
N eff.=81.4
126
N adj.=10.6
N eff.=97.8
130
N adj.=8
N eff.=106
134
N adj.=17.6
N eff.=109.3
Proportion
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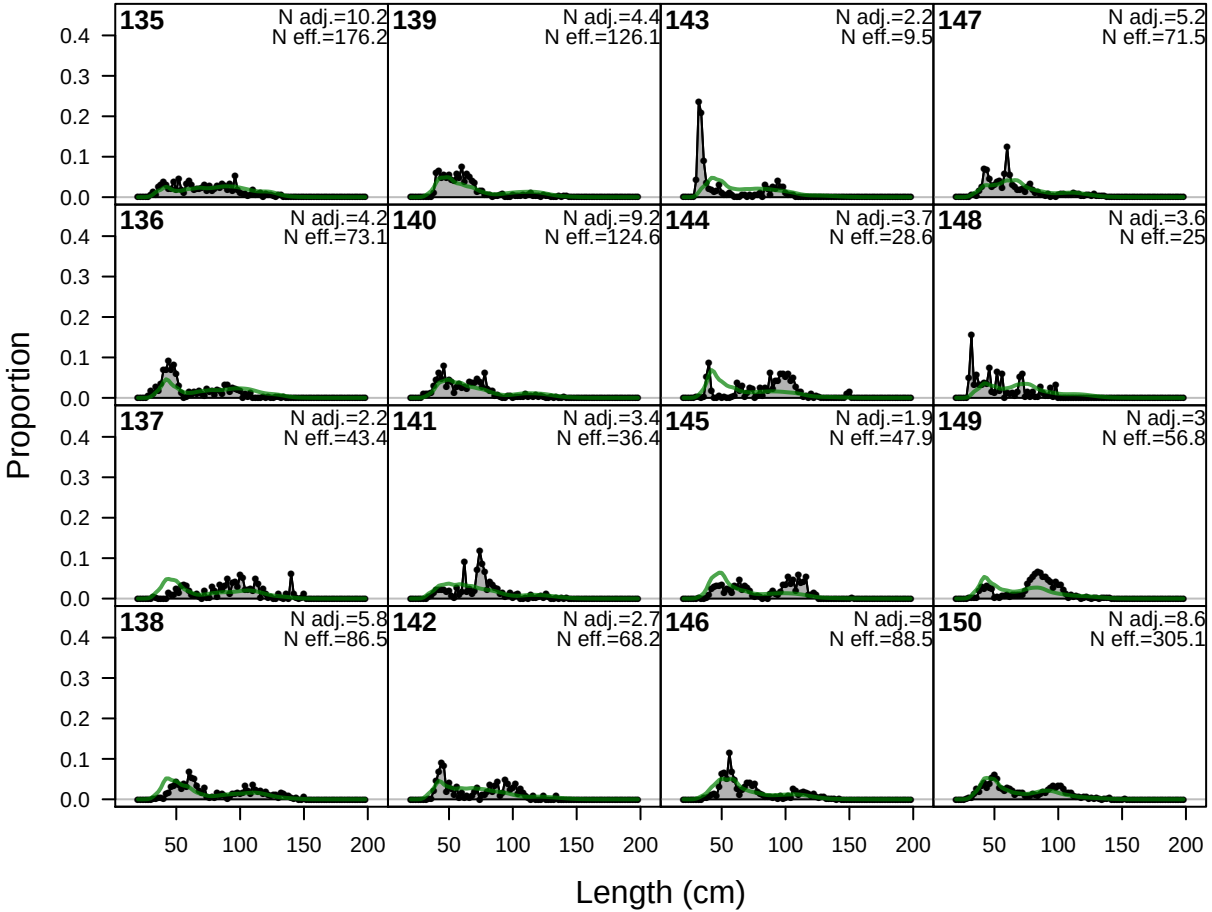
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=176.2
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N eff.=126.1
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N eff.=9.5
147
N adj.=5.2
N eff.=71.5
136
N adj.=4.2
N eff.=73.1
140
N adj.=9.2
N eff.=124.6
144
N adj.=3.7
N eff.=28.6
148
N adj.=3.6
N eff.=25
137
N adj.=2.2
N eff.=43.4
141
N adj.=3.4
N eff.=36.4
145
N adj.=1.9
N eff.=47.9
149
N adj.=3
N eff.=56.8
138
N adj.=5.8
N eff.=86.5
142
N adj.=2.7
N eff.=68.2
146
N adj.=8
N eff.=88.5
150
N adj.=8.6
N eff.=305.1
Proportion
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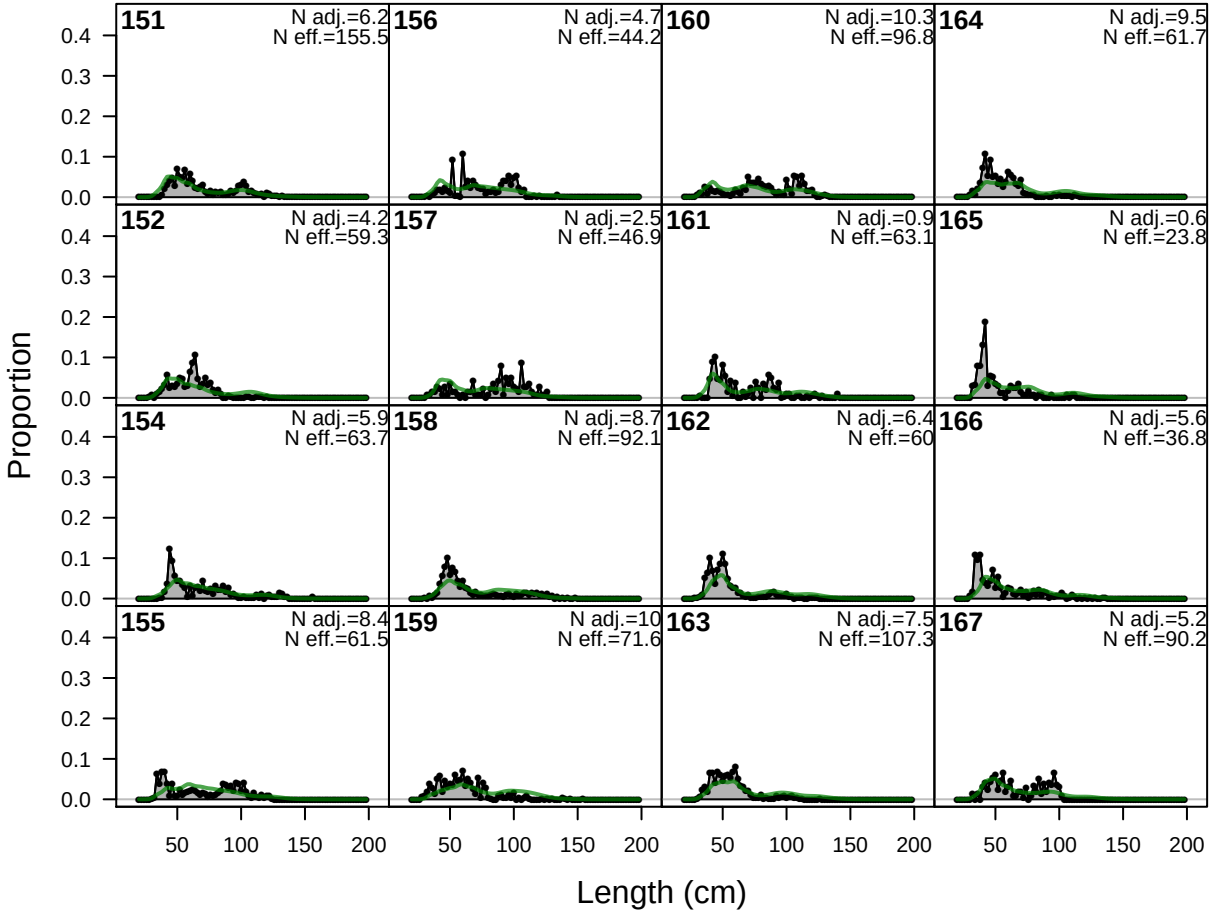
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)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N eff.=44.2
160
N adj.=10.3
N eff.=96.8
164
N adj.=9.5
N eff.=61.7
152
N adj.=4.2
N eff.=59.3
157
N adj.=2.5
N eff.=46.9
161
N adj.=0.9
N eff.=63.1
165
N adj.=0.6
N eff.=23.8
154
N adj.=5.9
N eff.=63.7
158
N adj.=8.7
N eff.=92.1
162
N adj.=6.4
N eff.=60
166
N adj.=5.6
N eff.=36.8
155
N adj.=8.4
N eff.=61.5
159
N adj.=10
N eff.=71.6
163
N adj.=7.5
N eff.=107.3
167
N adj.=5.2
N eff.=90.2
Proportion
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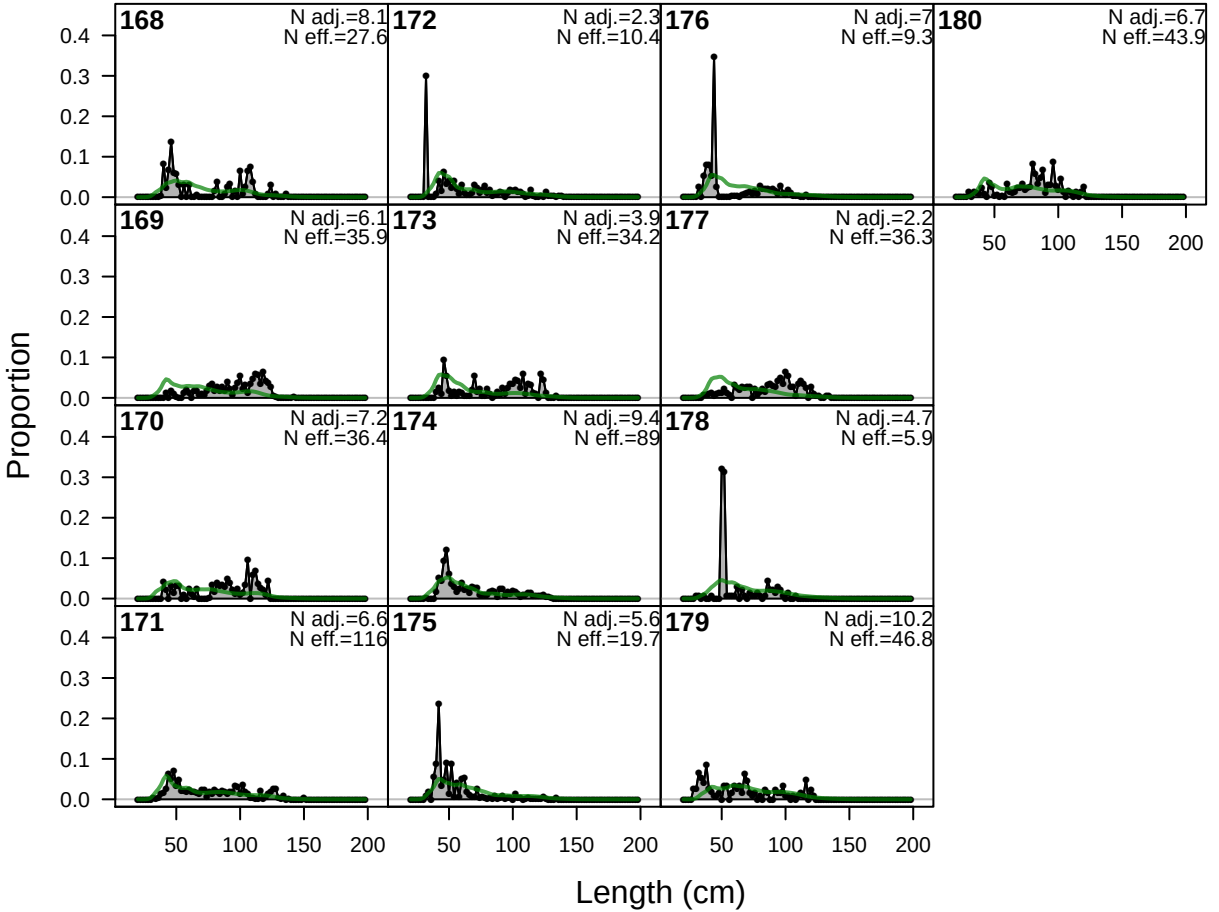
0.2
0.3
0.4
50
100
150
200
Length (cm)


168
N adj.=8.1
N eff.=27.6
172
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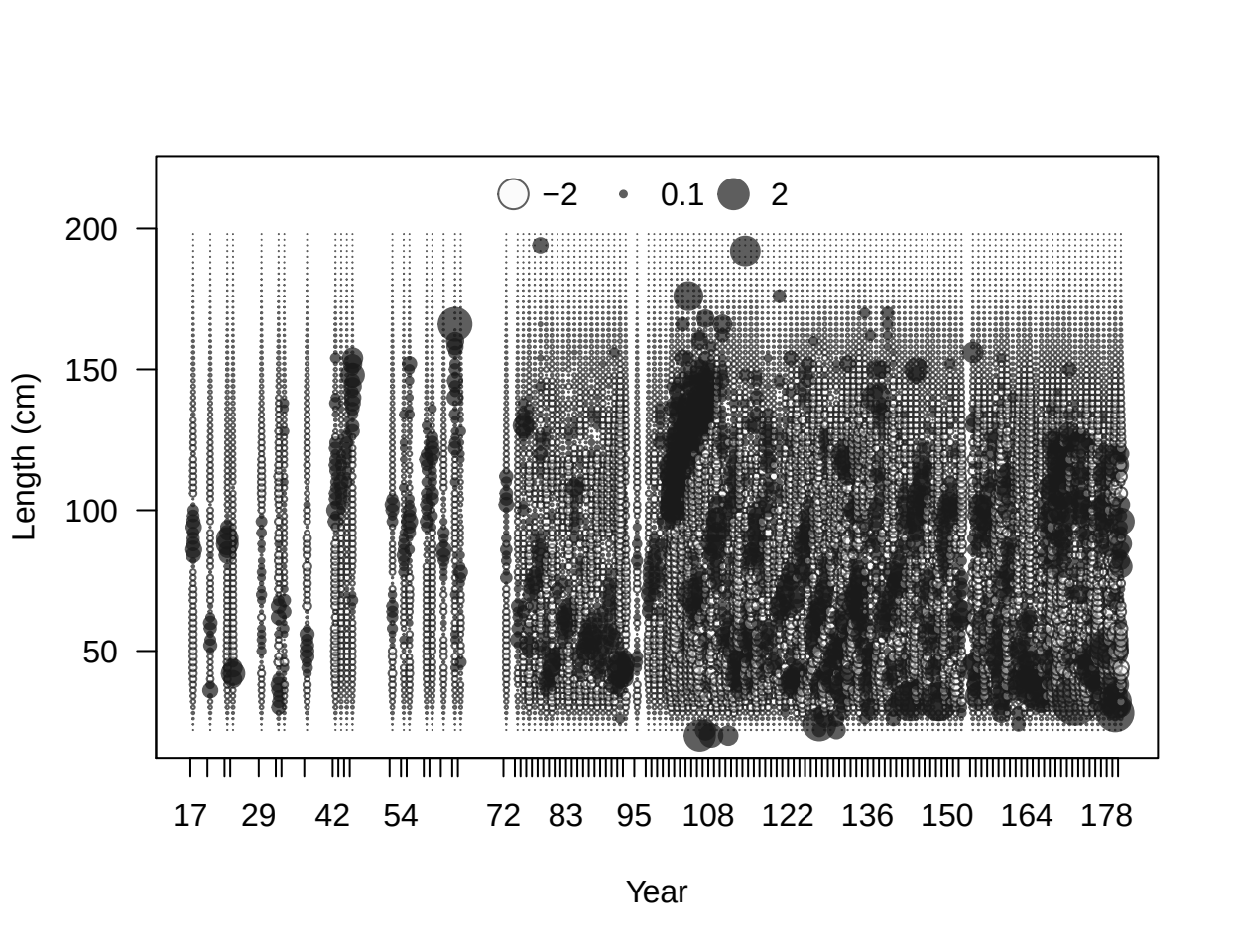
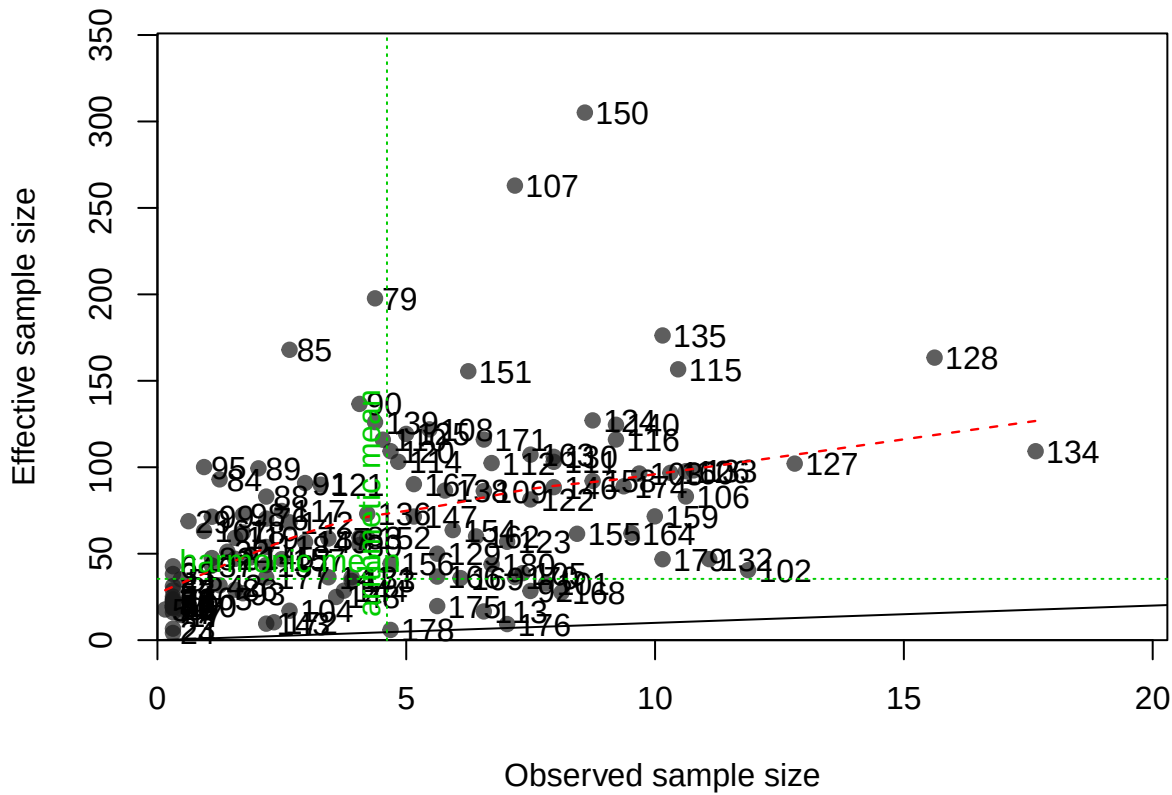
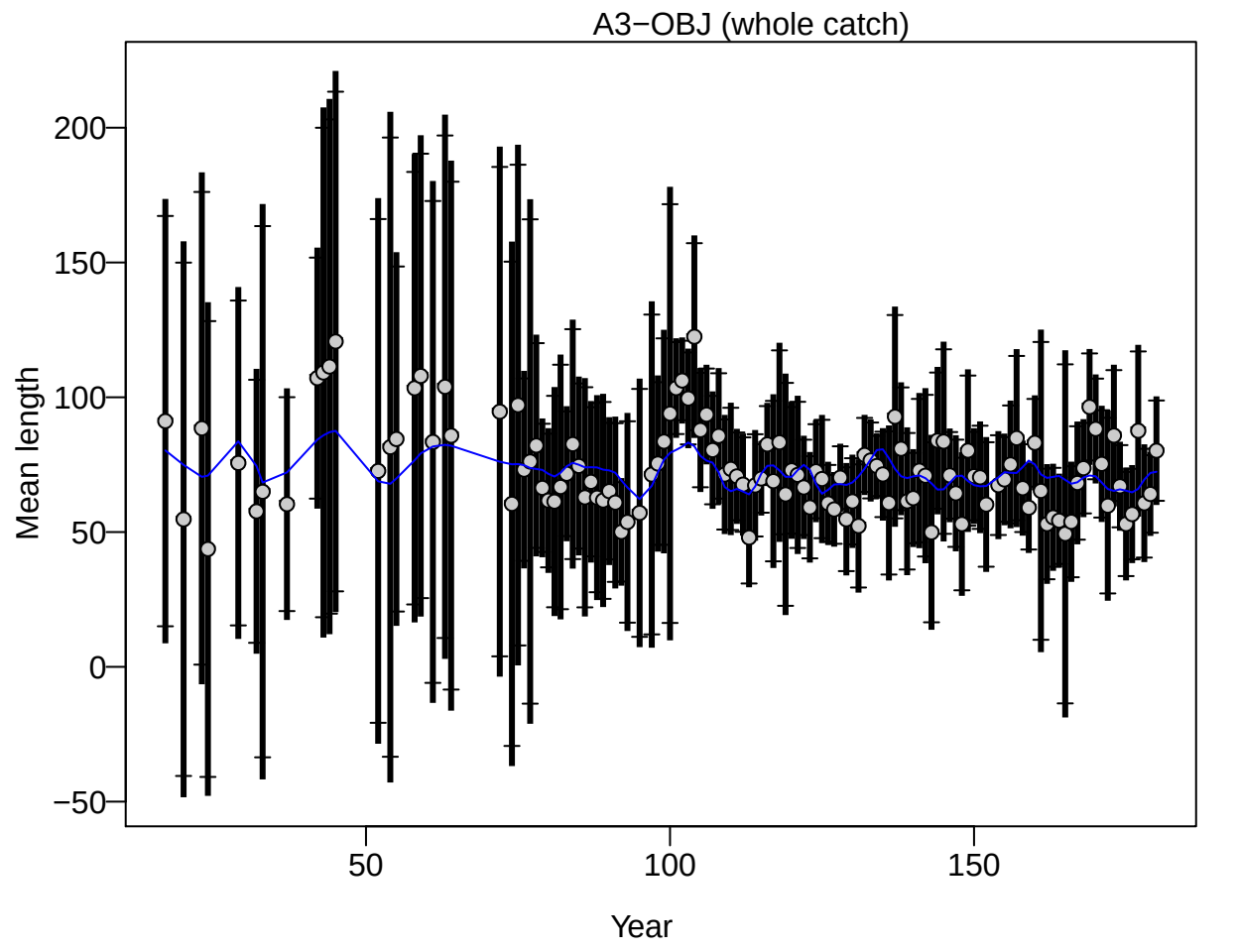
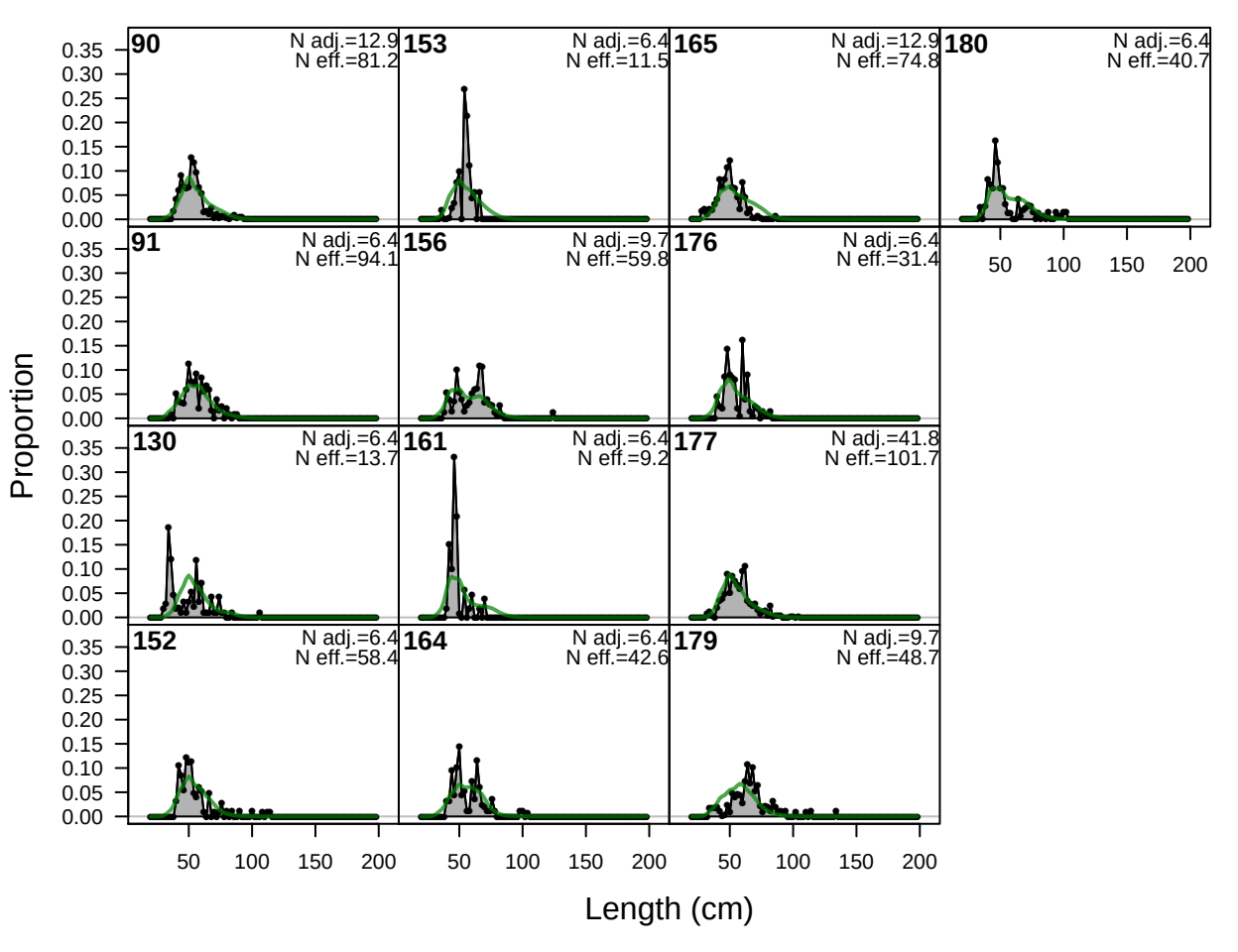
N eff.=10.4
176
N adj.=7
N eff.=9.3
180
N adj.=6.7
N eff.=43.9
169
N adj.=6.1
N eff.=35.9
173
N adj.=3.9
N eff.=34.2
177
N adj.=2.2
N eff.=36.3
170
N adj.=7.2
N eff.=36.4
174
N adj.=9.4
N eff.=89
178
N adj.=4.7
N eff.=5.9
171
N adj.=6.6
N eff.=116
175
N adj.=5.6
N eff.=19.7
179
N adj.=10.2
N eff.=46.8
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

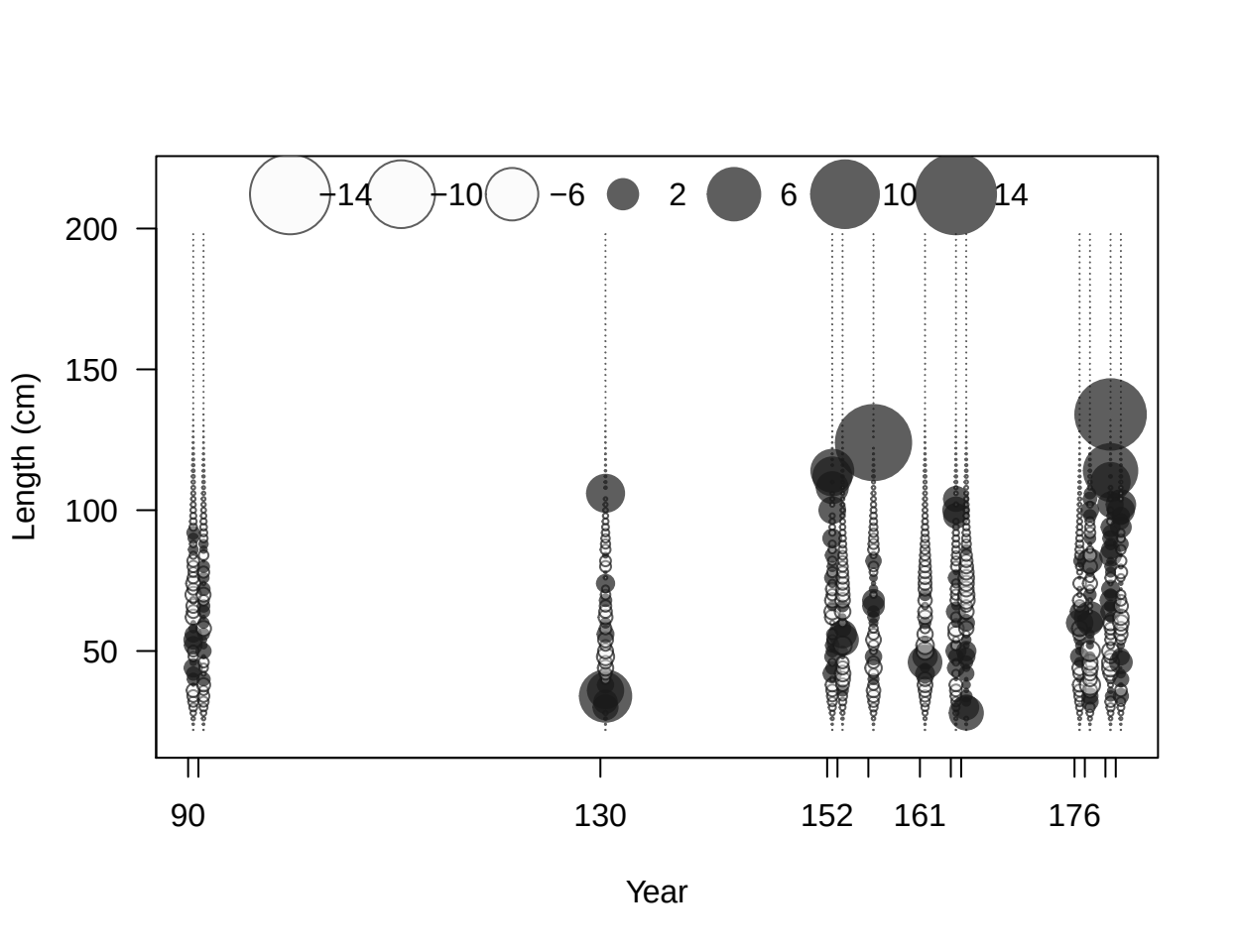

−2
0.1
2
200
150
100
50
Length (cm)
17
29
42
54
72
83
95
108
122
136
150
164
178
Year

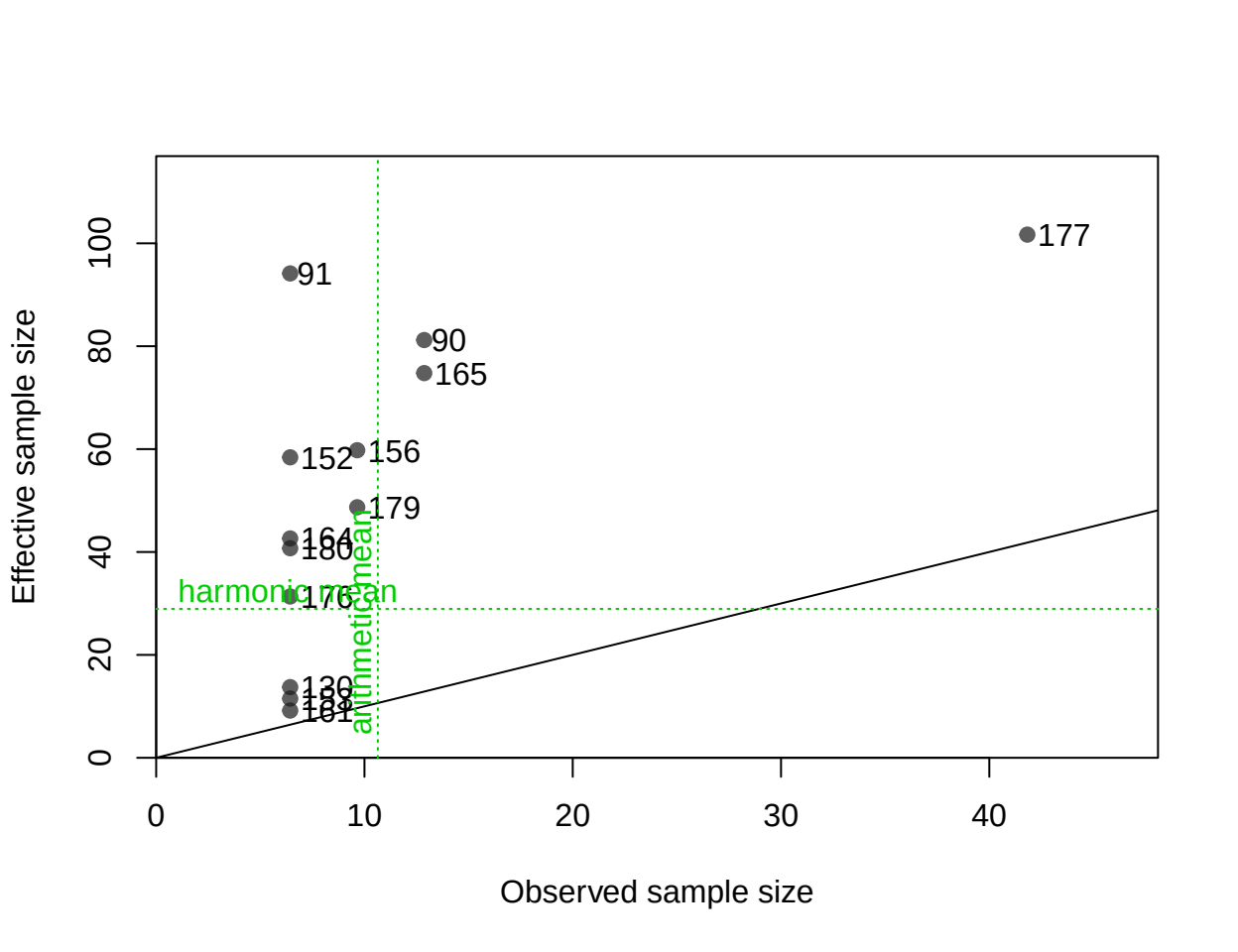


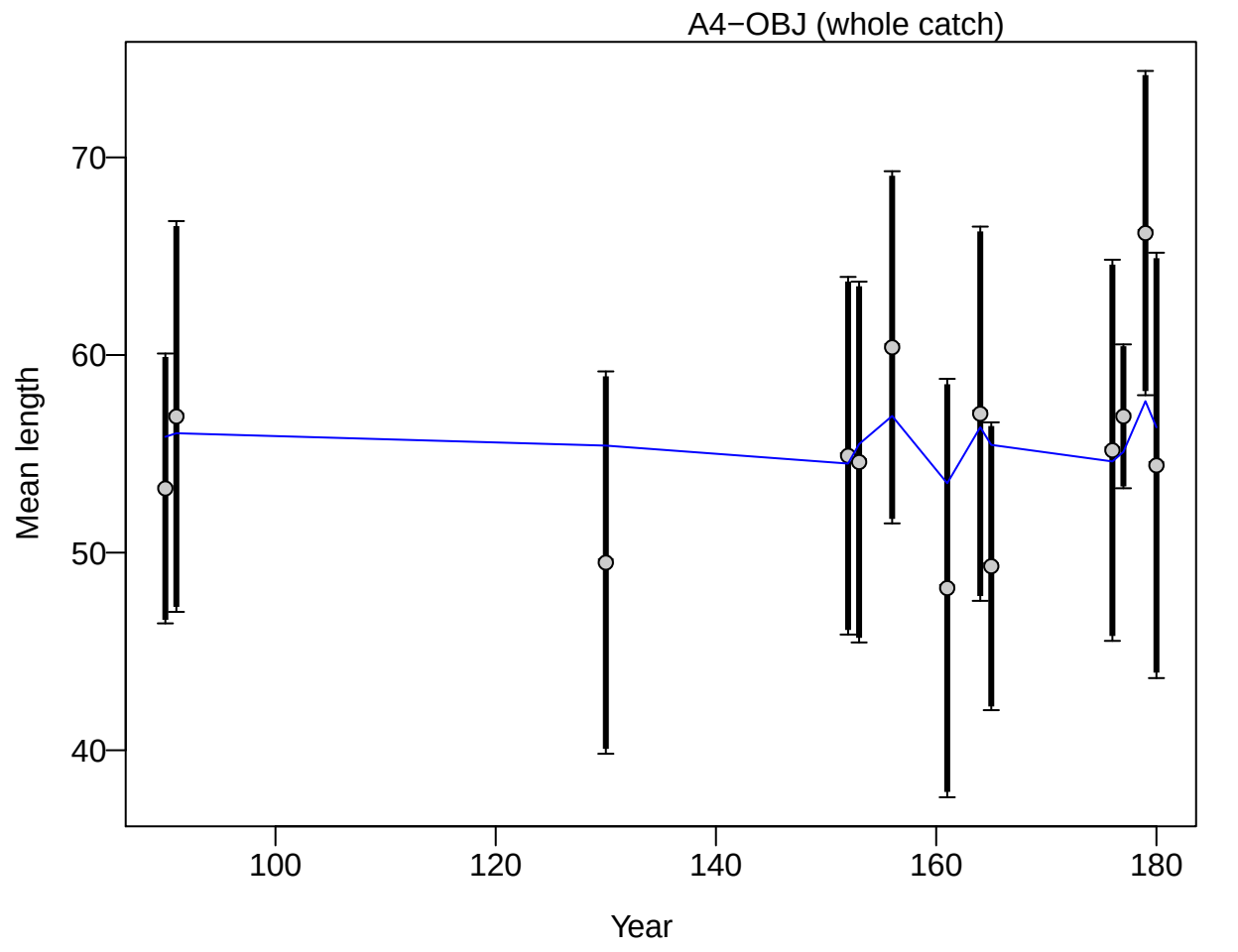
Effective sample size
Observed sample size
0
50
100
150
200
250
300
350
0
5
10
15
20
150
107
79
85
135
115
128
151
134
127
106
159
102
178
176

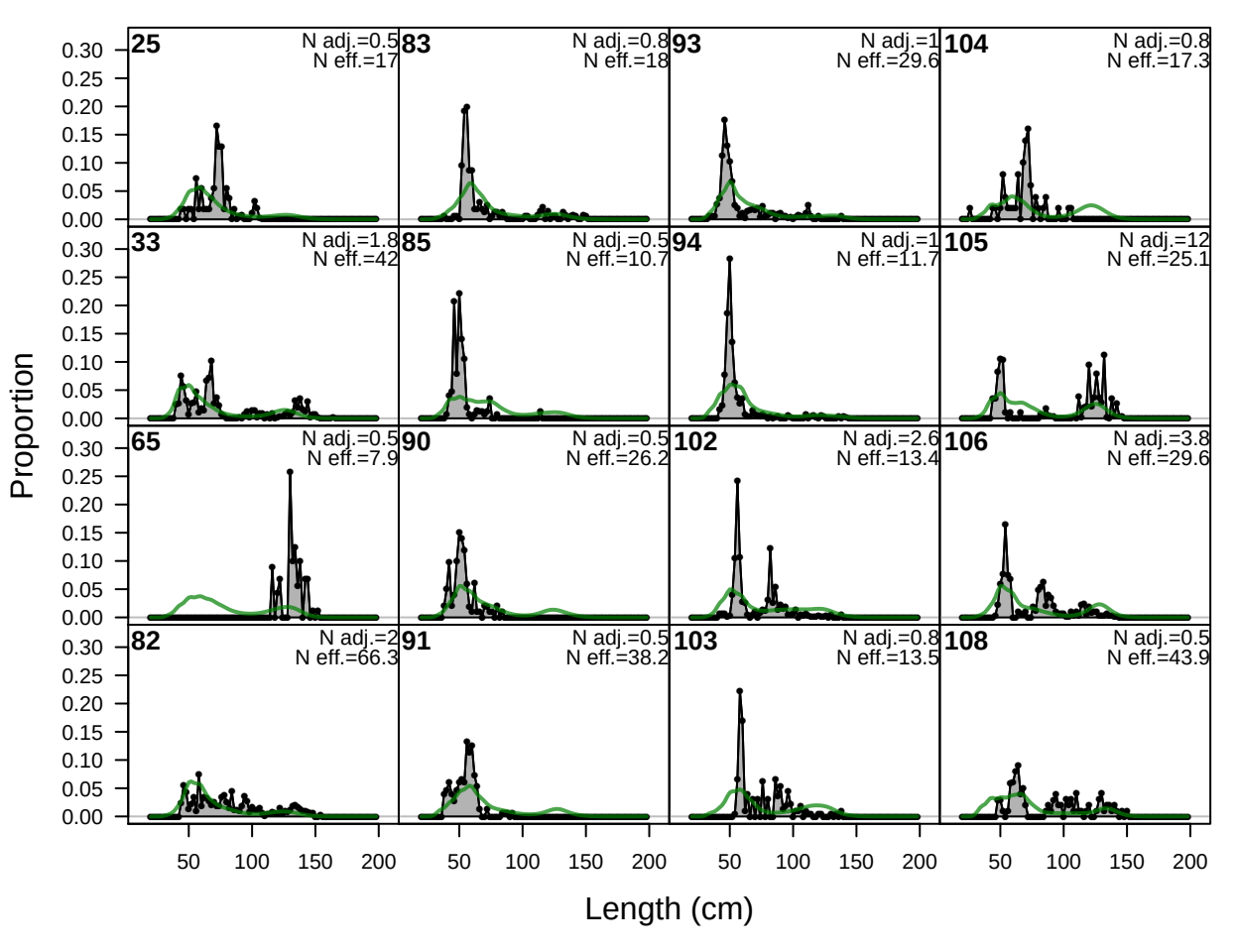

A3−OBJ (whole catch)
Mean length
200
150
100
50
0
−50
50
100
150
Year

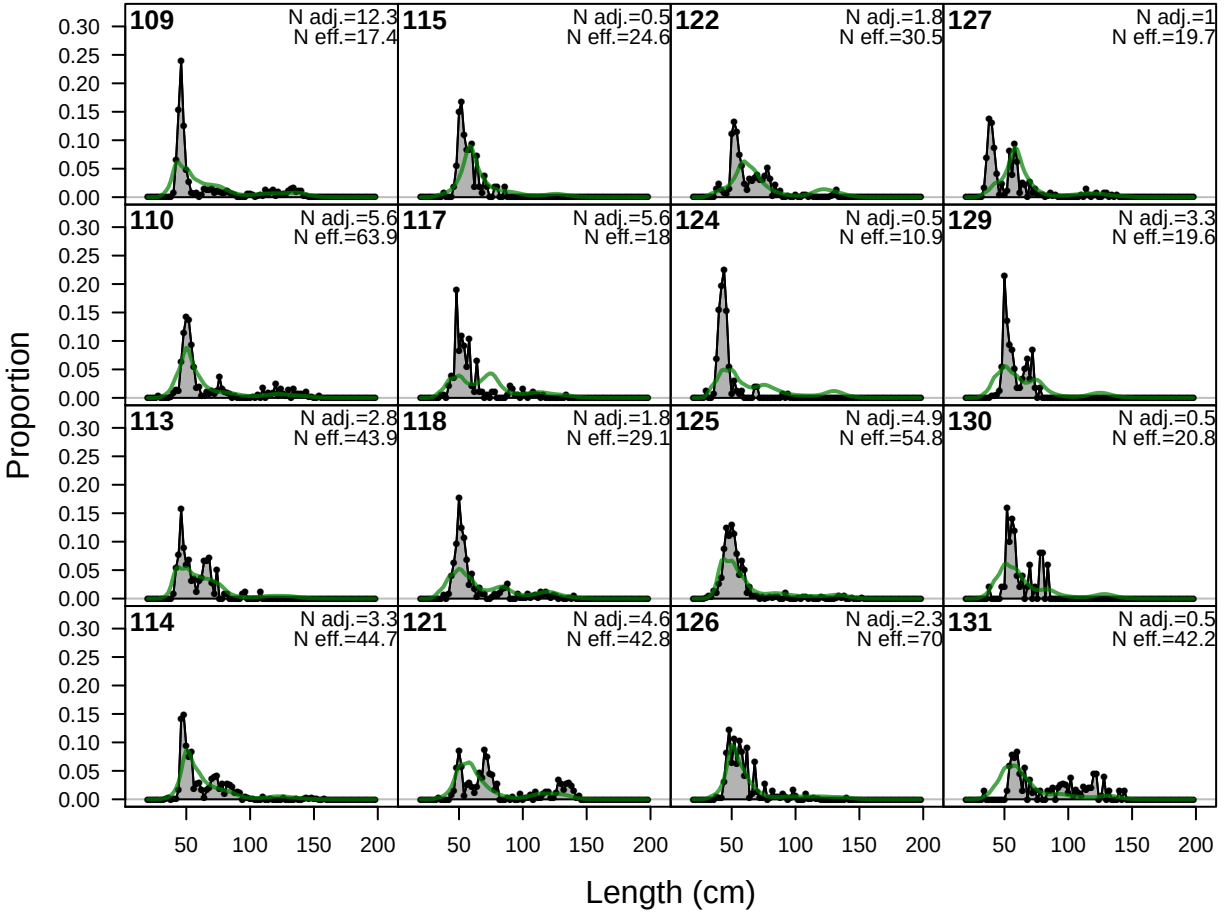

90
N adj.=12.9
N eff.=81.2
153
N adj.=6.4
N eff.=11.5
165
N adj.=12.9
N eff.=74.8
180
N adj.=6.4
N eff.=40.7
91
N adj.=6.4
N eff.=94.1
156
N adj.=9.7
N eff.=59.8
176
N adj.=6.4
N eff.=31.4
130
N adj.=6.4
N eff.=13.7
161
N adj.=6.4
N eff.=9.2
177
N adj.=41.8
N eff.=101.7
152
N adj.=6.4
N eff.=58.4
164
N adj.=6.4
N eff.=42.6
179
N adj.=9.7
N eff.=48.7
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)


−14
−10
−6
2
6
10
14
200
150
100
50
Length (cm)
90
130
152
161
176
Year


Effective sample size
Observed sample size
0
20
40
60
80
100
0
10
20
30
40
177
91
90
165
152
156
179
164
180
176
130
harmonic mean
arithmetic mean


A4−OBJ (whole catch)
Mean length
70
60
50
40
100
120
140
160
180
Year


25
N adj.=0.5
N eff.=17
83
N adj.=0.8
N eff.=18
93
N adj.=1
N eff.=29.6
104
N adj.=0.8
N eff.=17.3
33
N adj.=1.8
N eff.=42
85
N adj.=0.5
N eff.=10.7
94
N adj.=1
N eff.=11.7
105
N adj.=12
N eff.=25.1
65
N adj.=0.5
N eff.=7.9
90
N adj.=0.5
N eff.=26.2
102
N adj.=2.6
N eff.=13.4
106
N adj.=3.8
N eff.=29.6
82
N adj.=2
N eff.=66.3
91
N adj.=0.5
N eff.=38.2
103
N adj.=0.8
N eff.=13.5
108
N adj.=0.5
N eff.=43.9
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)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N eff.=17.4
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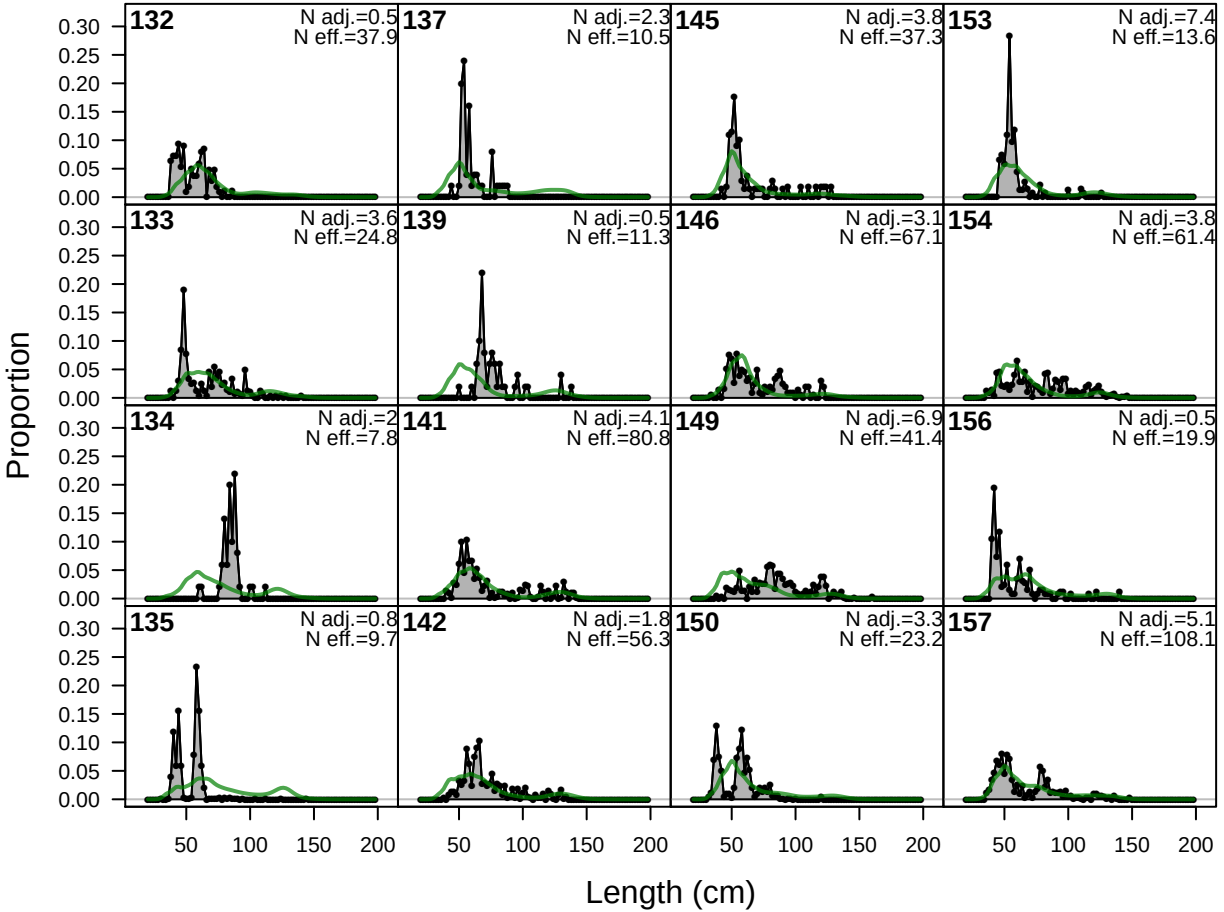
N eff.=24.6
122
N adj.=1.8
N eff.=30.5
127
N adj.=1
N eff.=19.7
110
N adj.=5.6
N eff.=63.9
117
N adj.=5.6
N eff.=18
124
N adj.=0.5
N eff.=10.9
129
N adj.=3.3
N eff.=19.6
113
N adj.=2.8
N eff.=43.9
118
N adj.=1.8
N eff.=29.1
125
N adj.=4.9
N eff.=54.8
130
N adj.=0.5
N eff.=20.8
114
N adj.=3.3
N eff.=44.7
121
N adj.=4.6
N eff.=42.8
126
N adj.=2.3
N eff.=70
131
N adj.=0.5
N eff.=42.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


132
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N eff.=37.9
137
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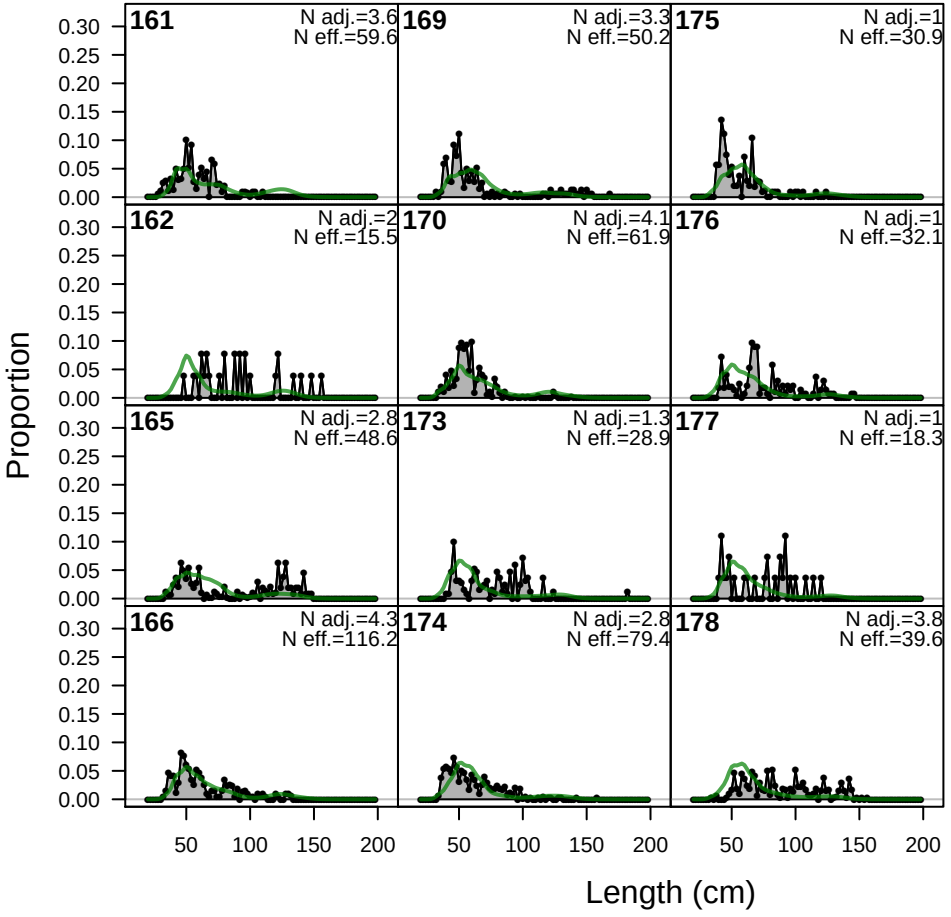
N eff.=10.5
145
N adj.=3.8
N eff.=37.3
153
N adj.=7.4
N eff.=13.6
133
N adj.=3.6
N eff.=24.8
139
N adj.=0.5
N eff.=11.3
146
N adj.=3.1
N eff.=67.1
154
N adj.=3.8
N eff.=61.4
134
N adj.=2
N eff.=7.8
141
N adj.=4.1
N eff.=80.8
149
N adj.=6.9
N eff.=41.4
156
N adj.=0.5
N eff.=19.9
135
N adj.=0.8
N eff.=9.7
142
N adj.=1.8
N eff.=56.3
150
N adj.=3.3
N eff.=23.2
157
N adj.=5.1
N eff.=108.1
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


161
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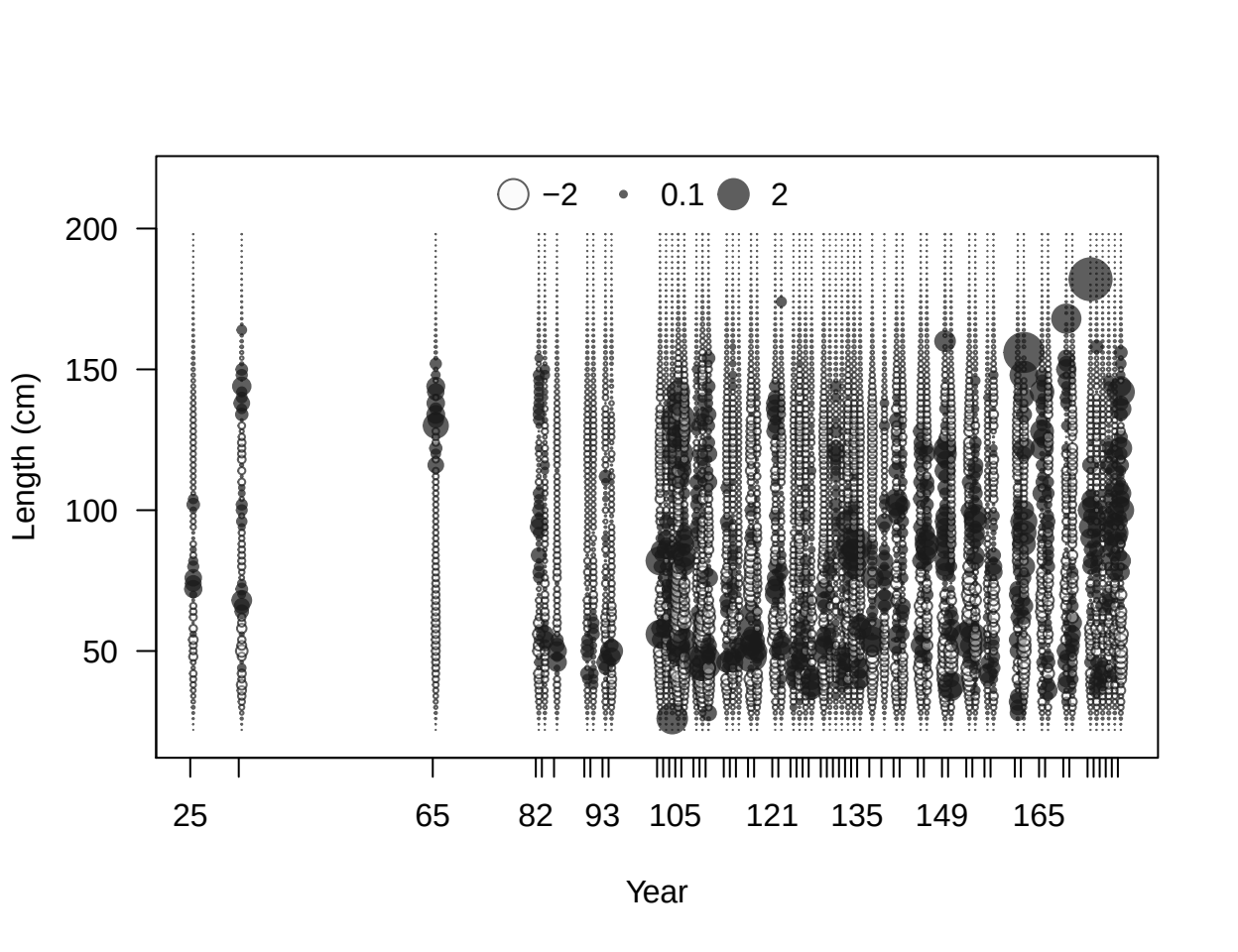
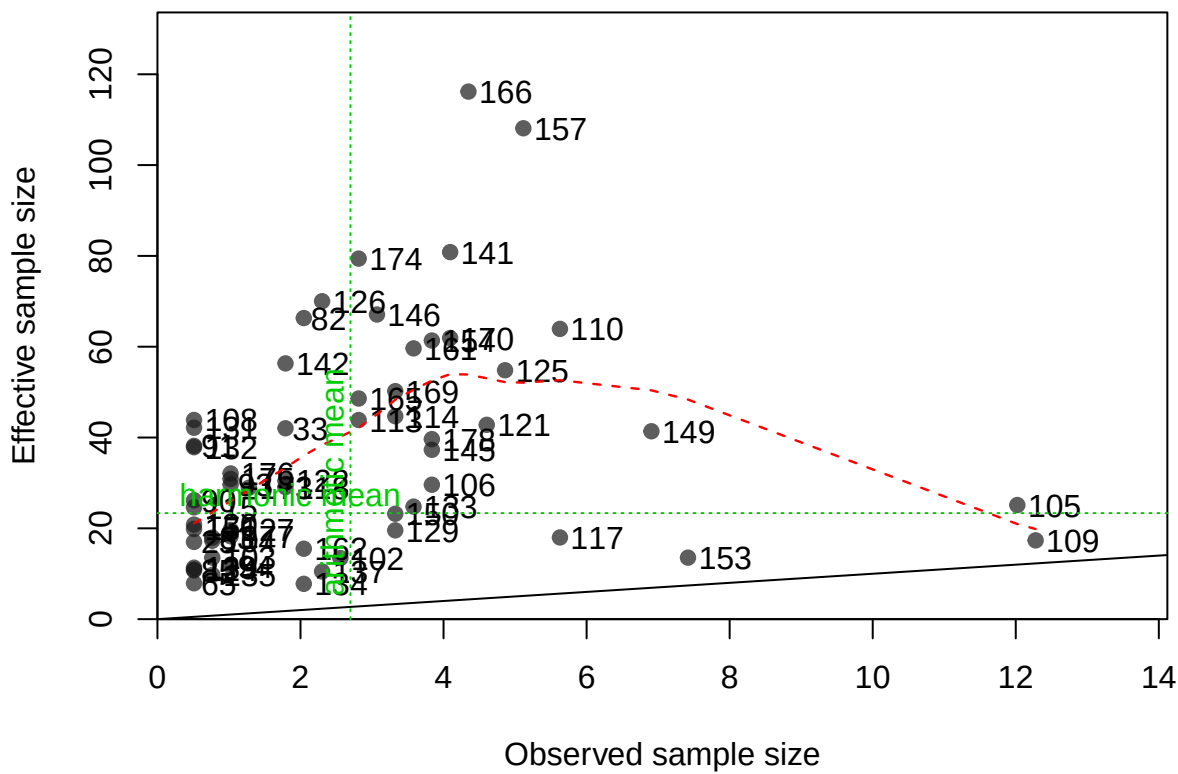
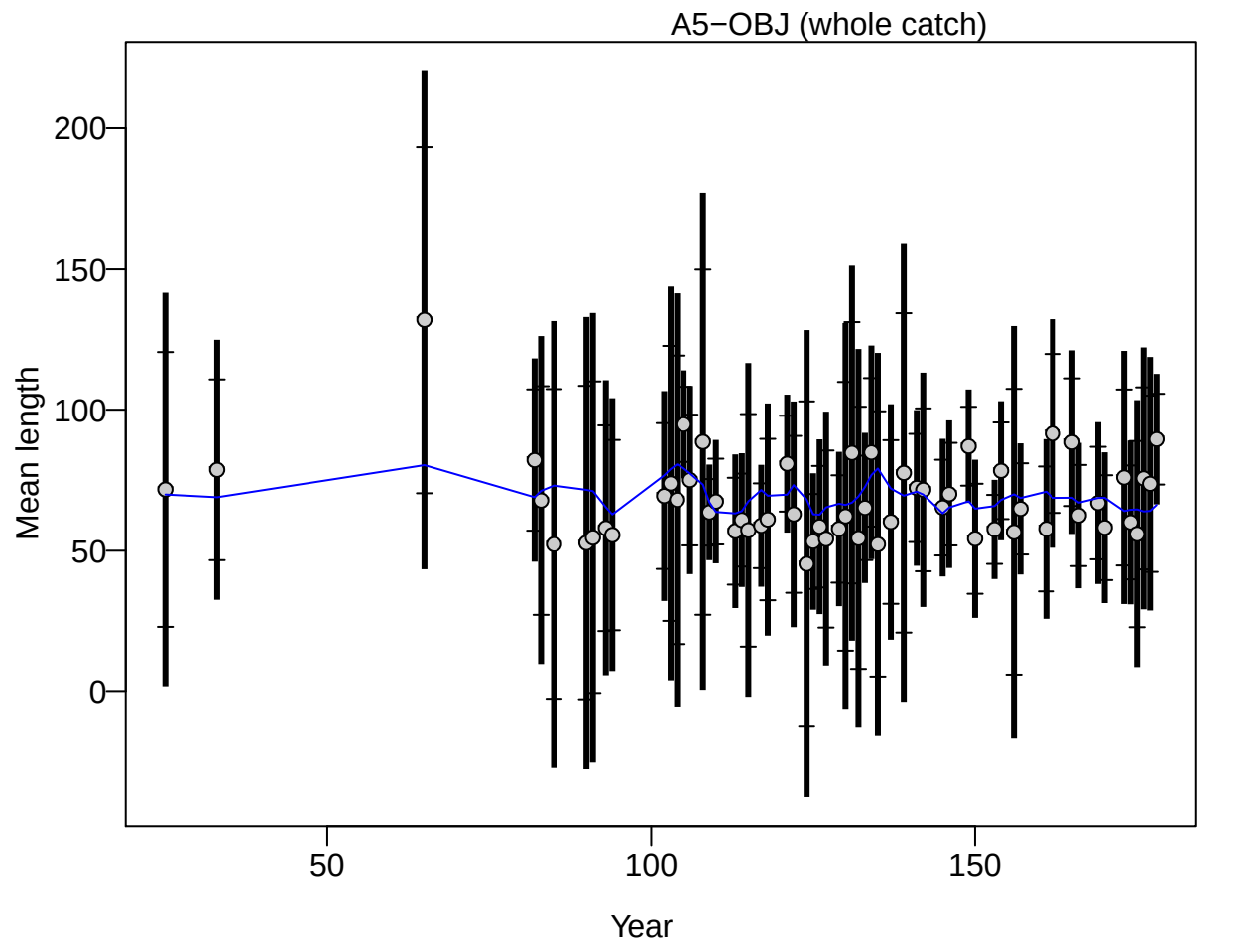
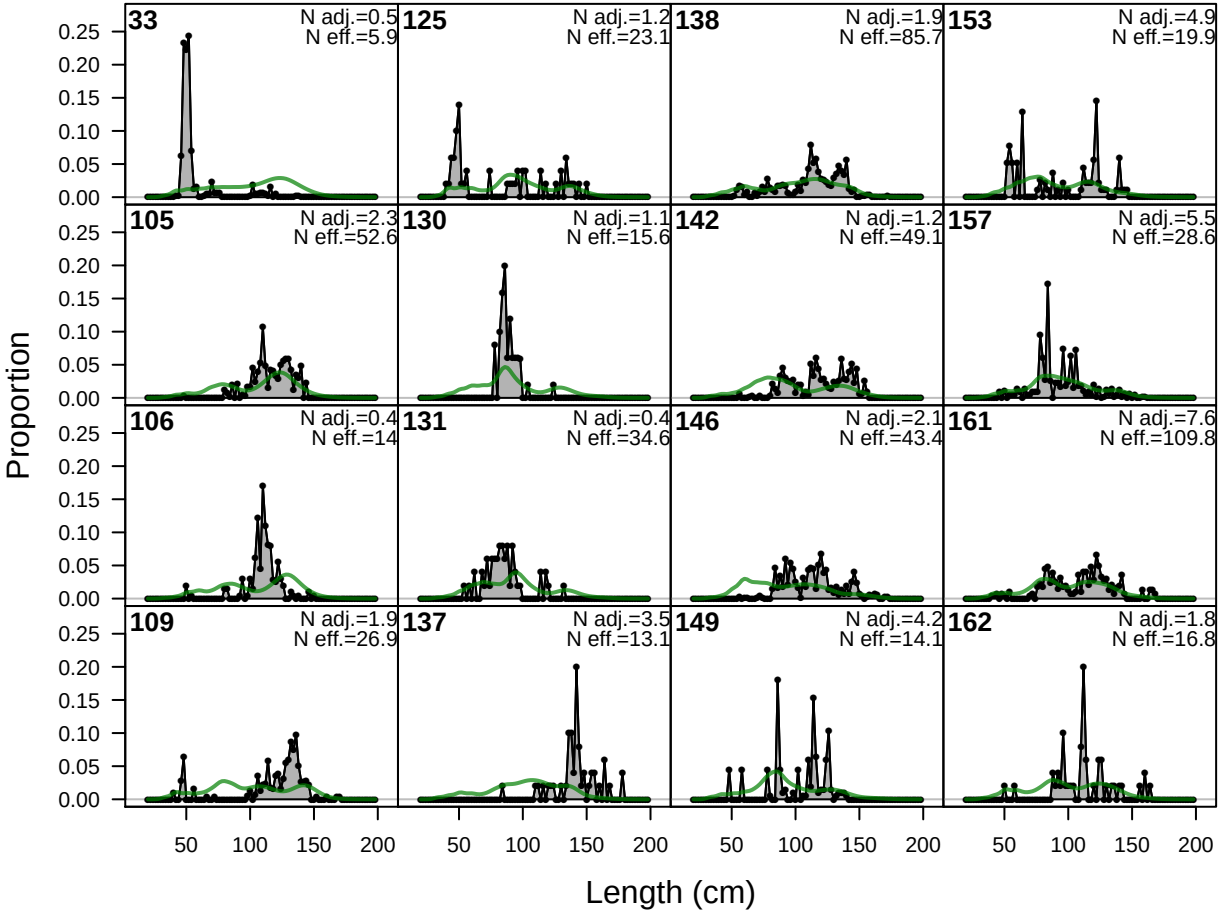
N eff.=59.6
169
N adj.=3.3
N eff.=50.2
175
N adj.=1
N eff.=30.9
162
N adj.=2
N eff.=15.5
170
N adj.=4.1
N eff.=61.9
176
N adj.=1
N eff.=32.1
165
N adj.=2.8
N eff.=48.6
173
N adj.=1.3
N eff.=28.9
177
N adj.=1
N eff.=18.3
166
N adj.=4.3
N eff.=116.2
174
N adj.=2.8
N eff.=79.4
178
N adj.=3.8
N eff.=39.6
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
50
100
150
200
Length (cm)


−2
0.1
2
200
150
100
50
Length (cm)
25
65
82
93
105
121
135
149
165
Year



Effective sample size
Observed sample size
0
20
40
60
80
100
120
0
2
4
6
8
10
12
14
166
157
174
141
126
82
146
110
142
125
169
108
33
121
149
106
105
109
117
153
129
102


A5−OBJ (whole catch)
Mean length
200
150
100
50
0
50
100
150
Year


33
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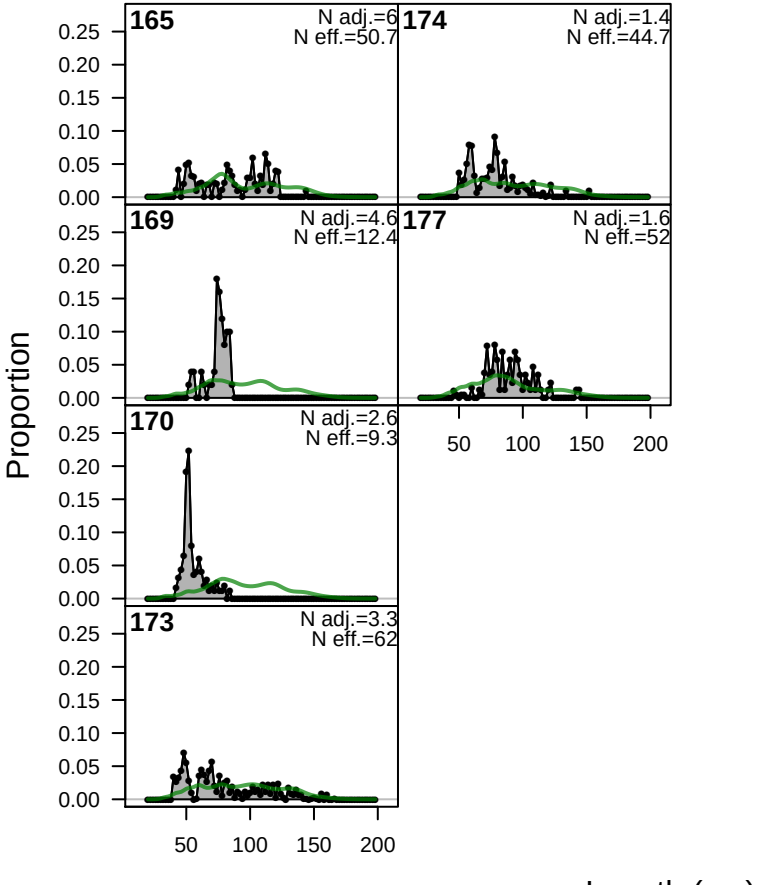
N eff.=5.9
125
N adj.=1.2
N eff.=23.1
138
N adj.=1.9
N eff.=85.7
153
N adj.=4.9
N eff.=19.9
105
N adj.=2.3
N eff.=52.6
130
N adj.=1.1
N eff.=15.6
142
N adj.=1.2
N eff.=49.1
157
N adj.=5.5
N eff.=28.6
106
N adj.=0.4
N eff.=14
131
N adj.=0.4
N eff.=34.6
146
N adj.=2.1
N eff.=43.4
161
N adj.=7.6
N eff.=109.8
109
N adj.=1.9
N eff.=26.9
137
N adj.=3.5
N eff.=13.1
149
N adj.=4.2
N eff.=14.1
162
N adj.=1.8
N eff.=16.8
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
50
100
150
200
Length (cm)


165
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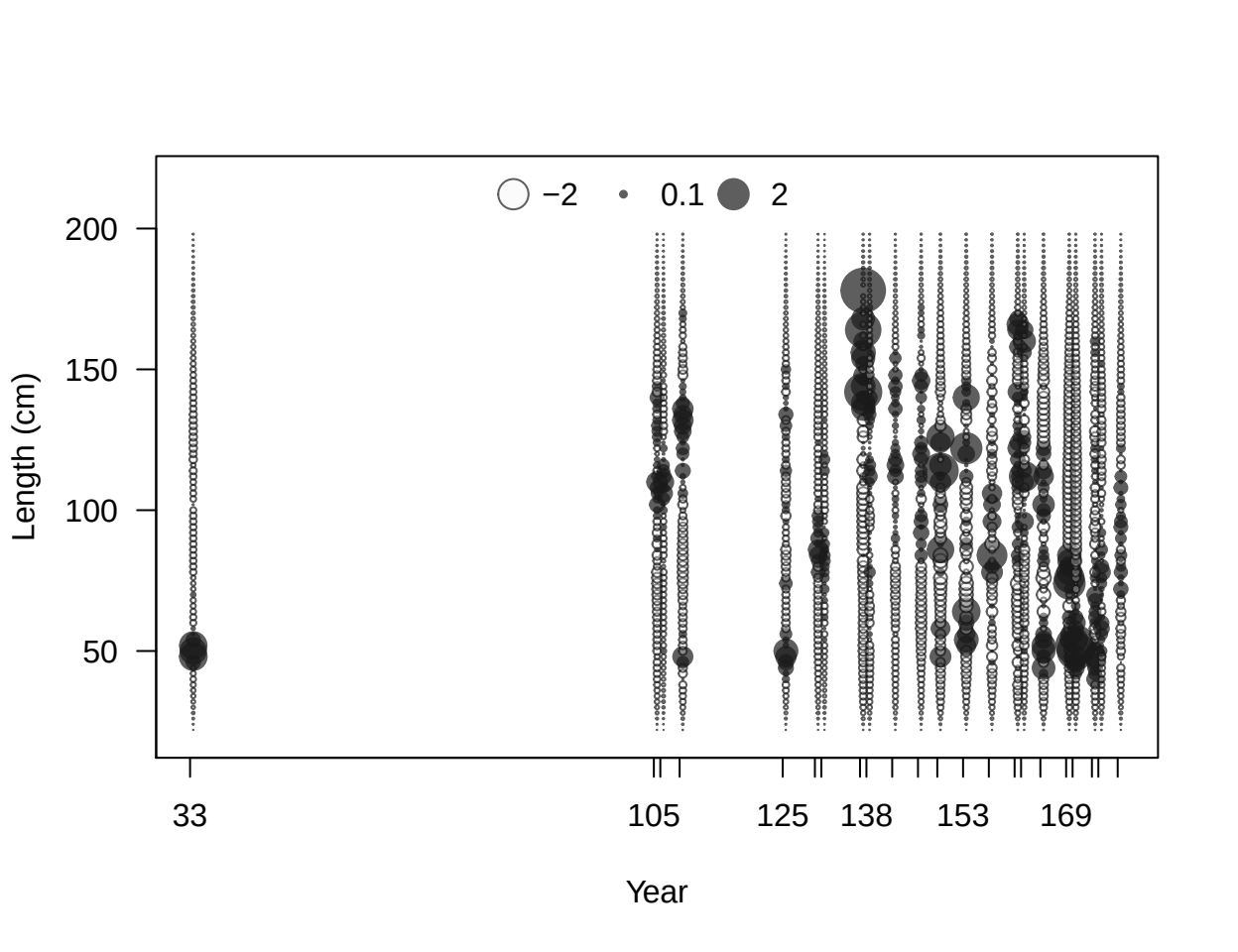
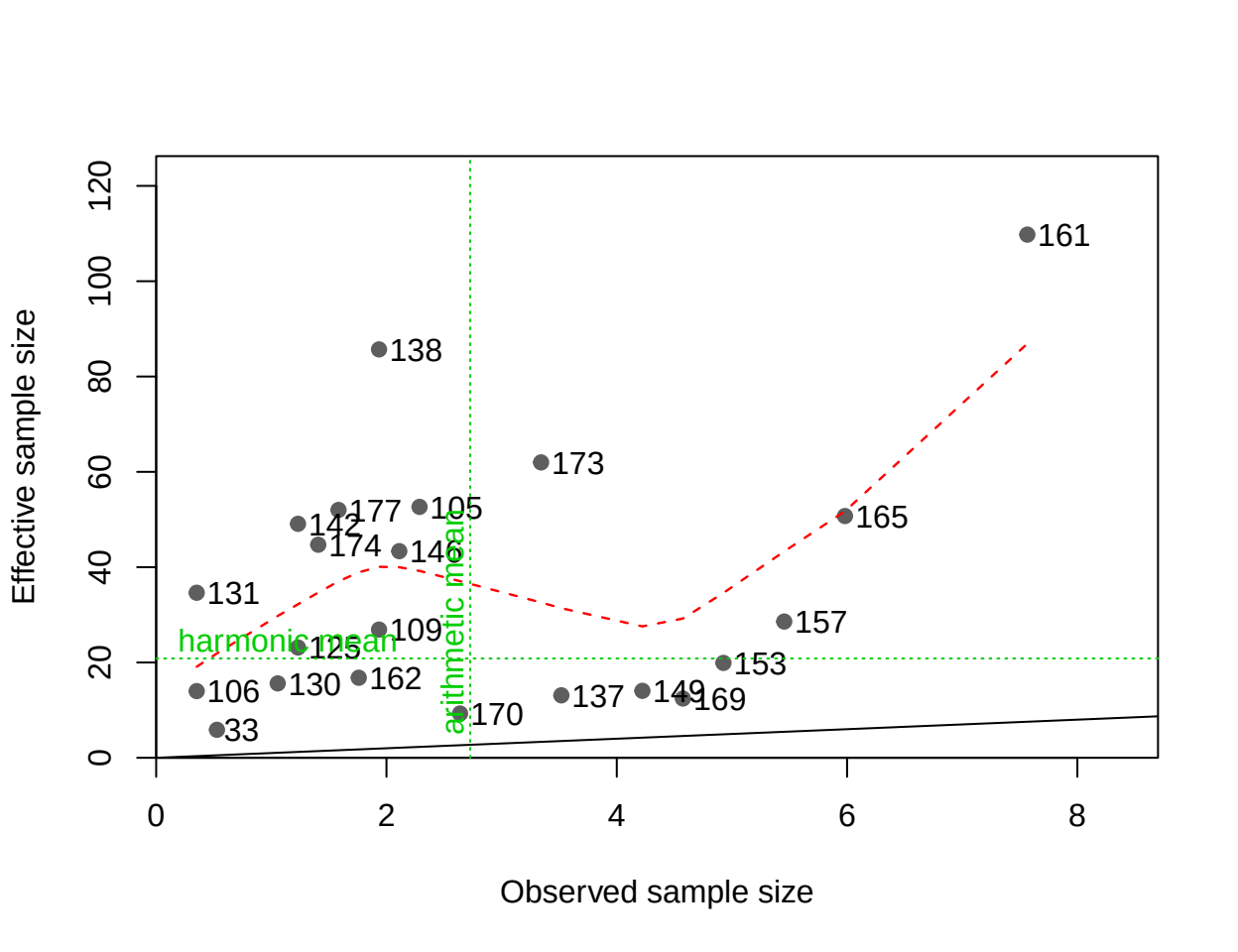
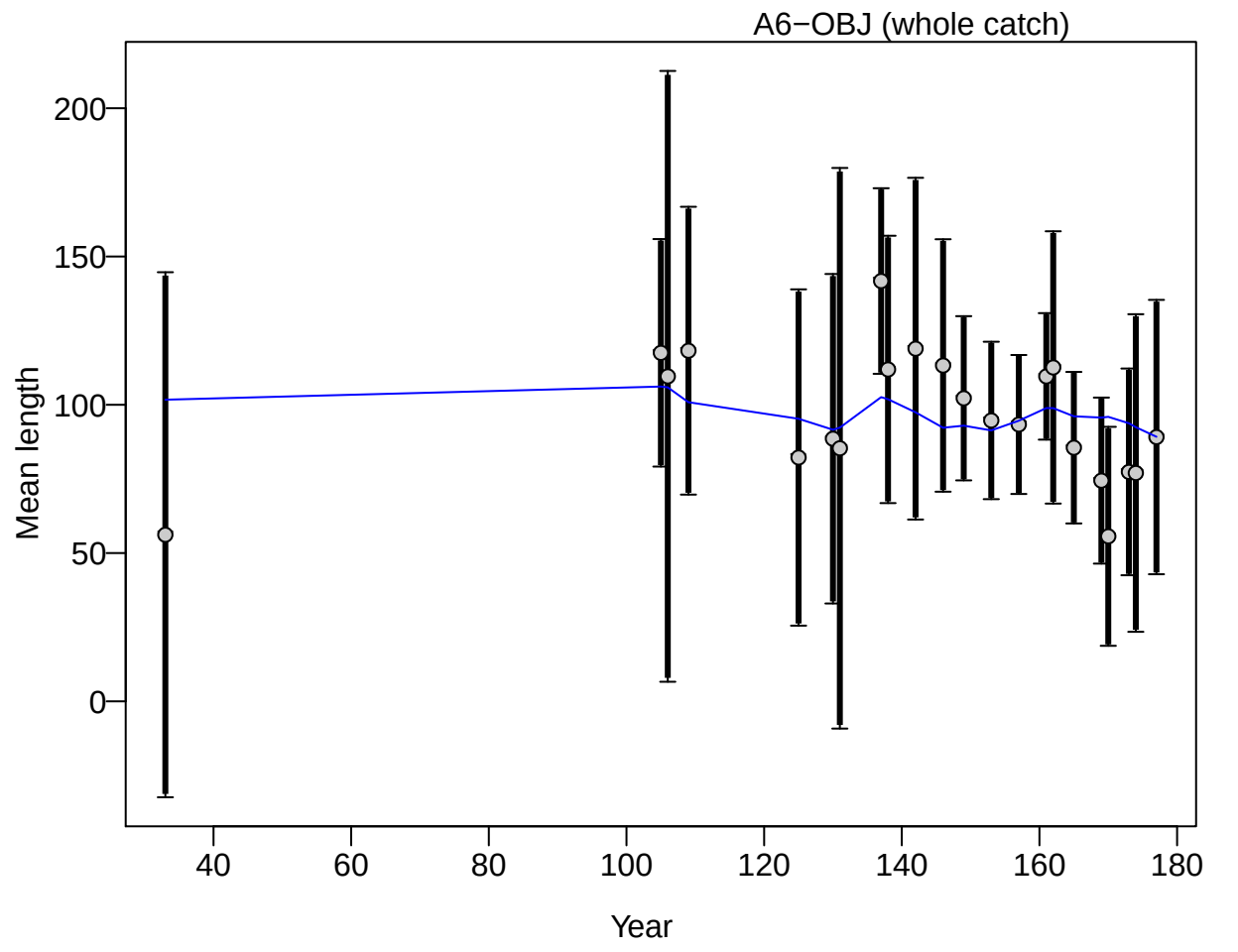
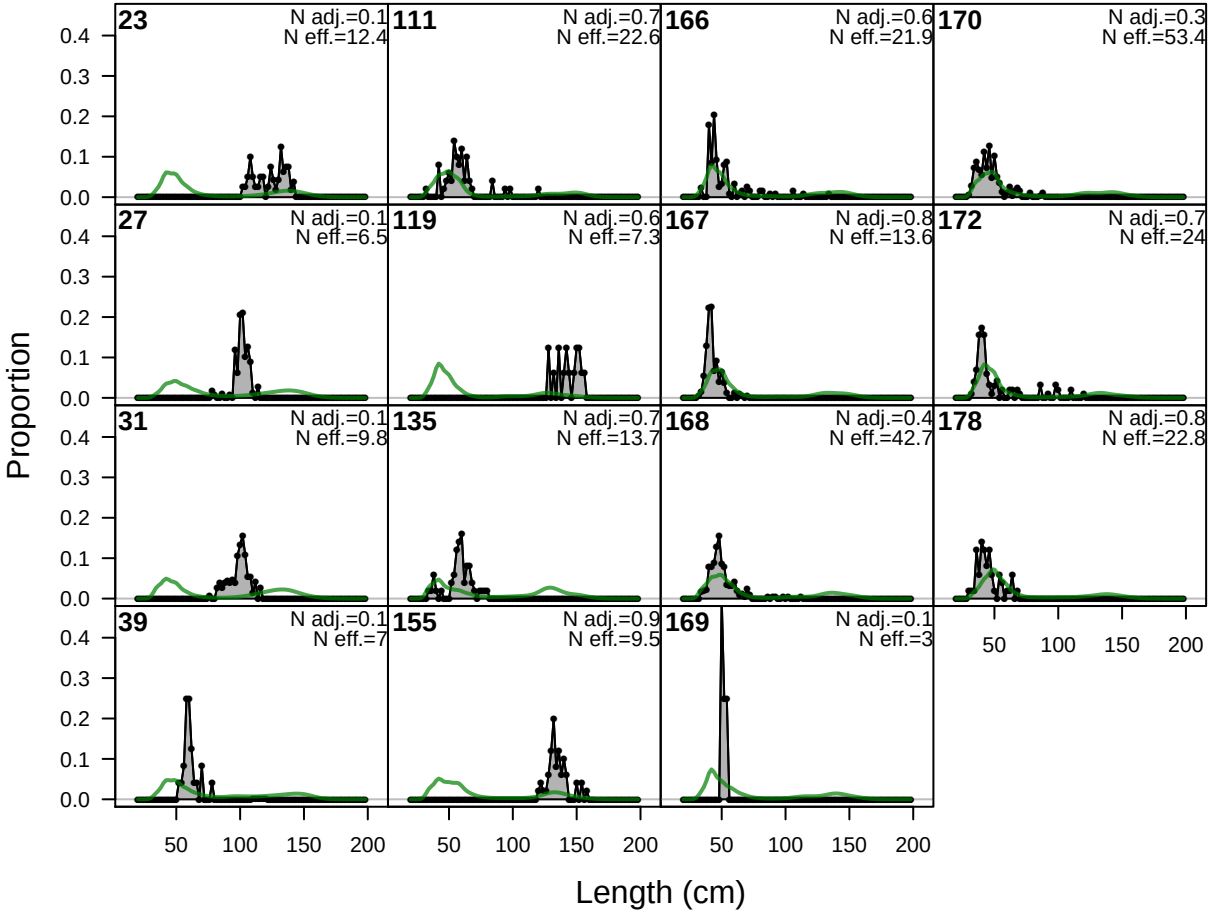
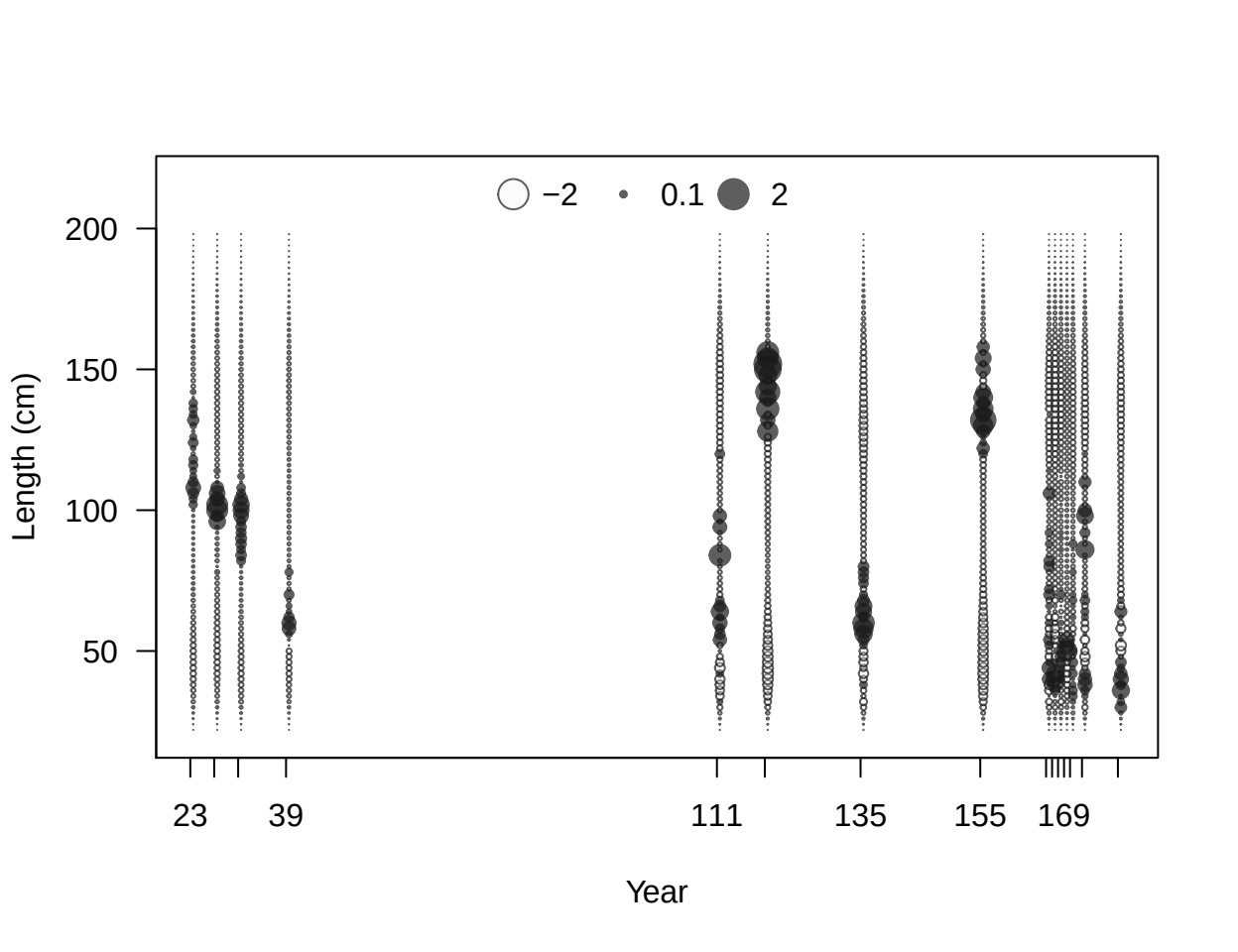
N eff.=50.7
174
N adj.=1.4
N eff.=44.7
169
N adj.=4.6
N eff.=12.4
177
N adj.=1.6
N eff.=52
170
N adj.=2.6
N eff.=9.3
173
N adj.=3.3
N eff.=62
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

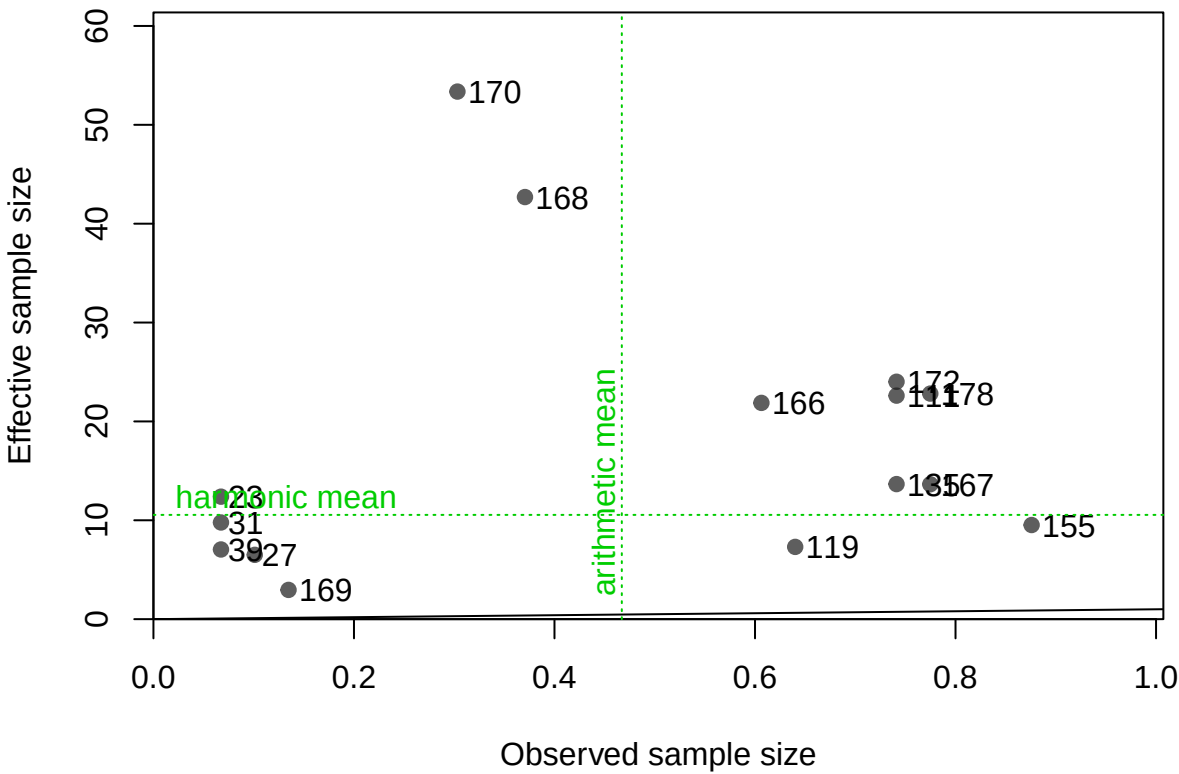

−2
0.1
2
200
150
100
50
Length (cm)
33
105
125
138
153
169
Year


Effective sample size
Observed sample size
0
20
40
60
80
100
120
0
2
4
6
8
161
138
173
177
105
142
165
174
146
131
157
109
harmonic mean
125
153
106
130
162
137
149
169
170
33
arithmetic mean

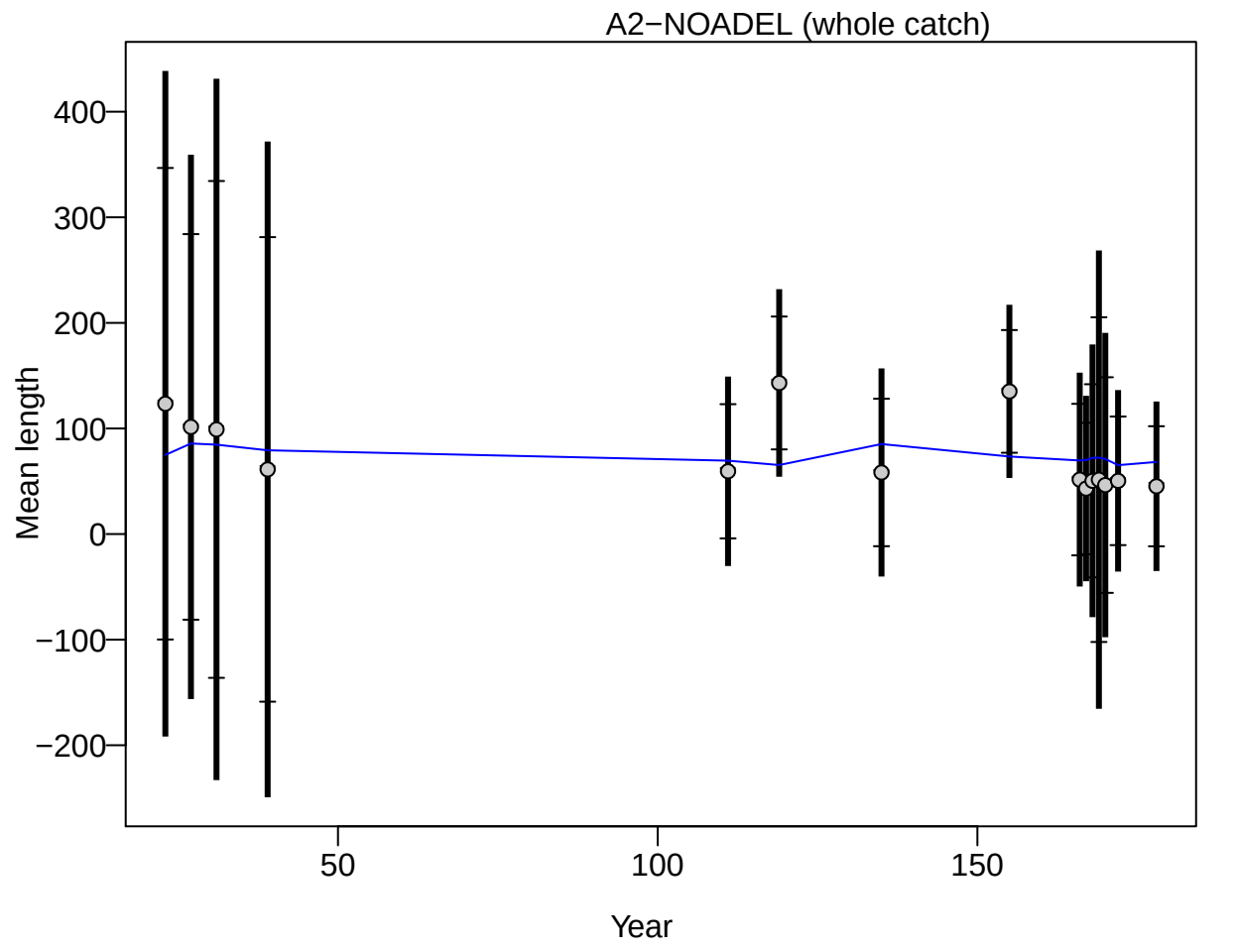

A6−OBJ (whole catch)
Mean length
200
150
100
50
0
40
60
80
100
120
140
160
180
Year

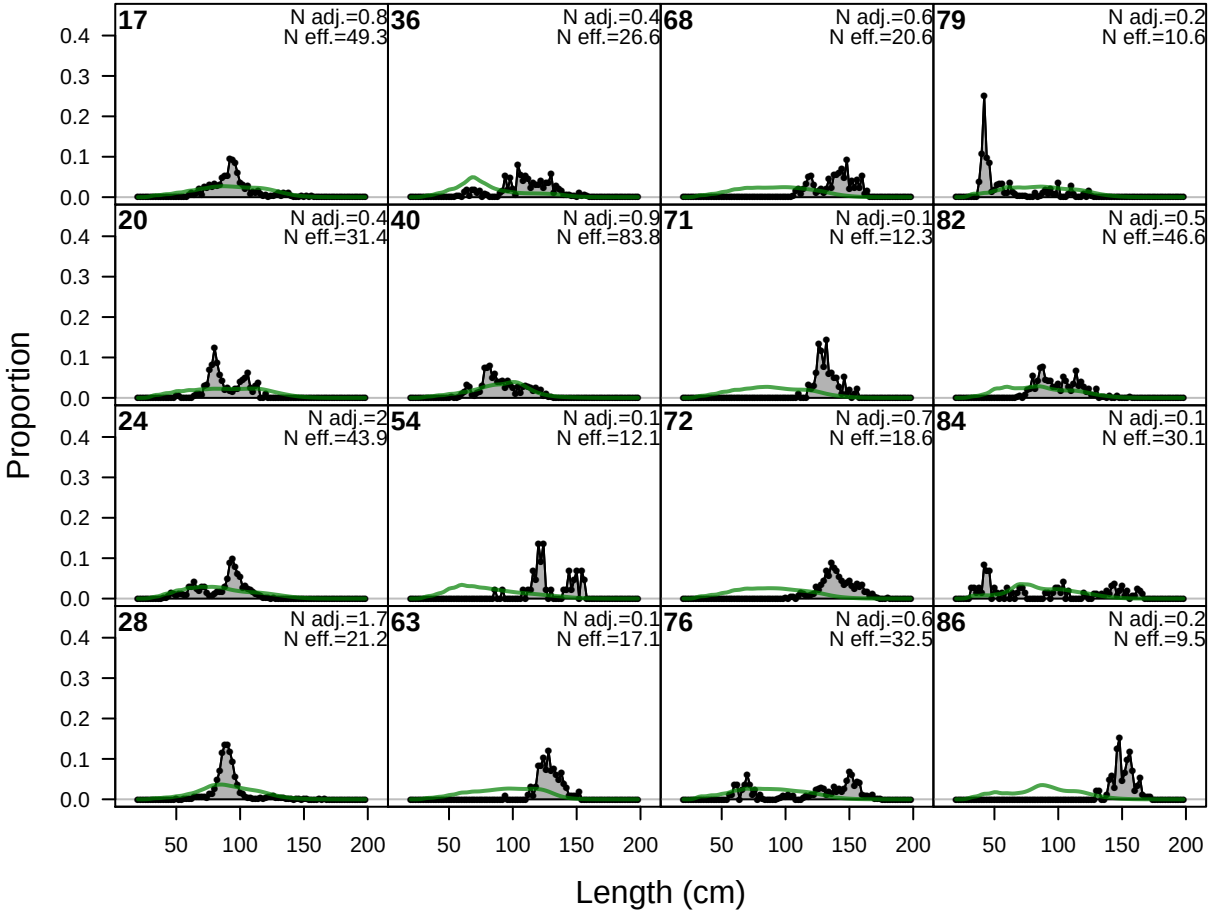

23
N adj.=0.1
N eff.=12.4
111
N adj.=0.7
N eff.=22.6
166
N adj.=0.6
N eff.=21.9
170
N adj.=0.3
N eff.=53.4
27
N adj.=0.1
N eff.=6.5
119
N adj.=0.6
N eff.=7.3
167
N adj.=0.8
N eff.=13.6
172
N adj.=0.7
N eff.=24
31
N adj.=0.1
N eff.=9.8
135
N adj.=0.7
N eff.=13.7
168
N adj.=0.4
N eff.=42.7
178
N adj.=0.8
N eff.=22.8
39
N adj.=0.1
N eff.=7
155
N adj.=0.9
N eff.=9.5
169
N adj.=0.1
N eff.=3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

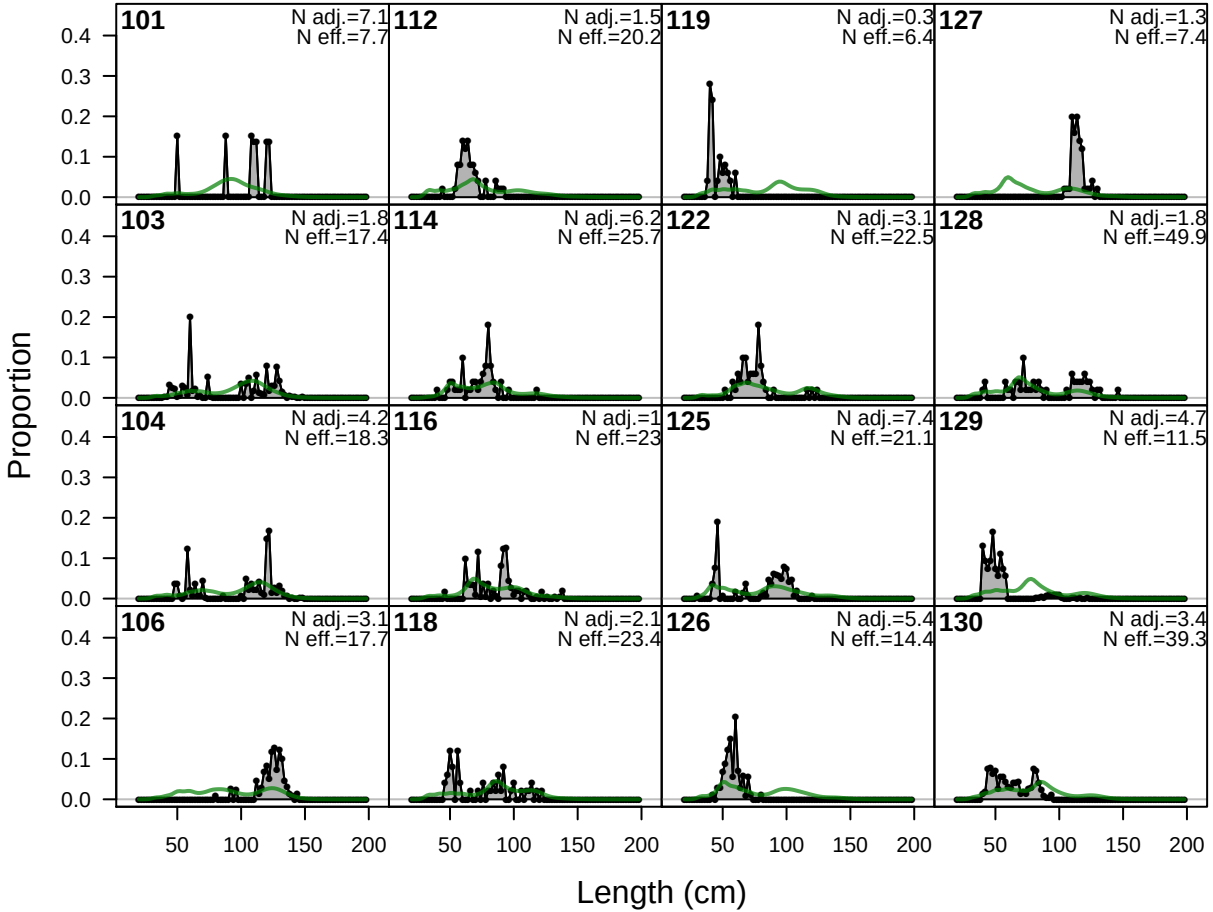

−2
0.1
2
200
150
100
50
Length (cm)
23
39
111
135
155
169
Year

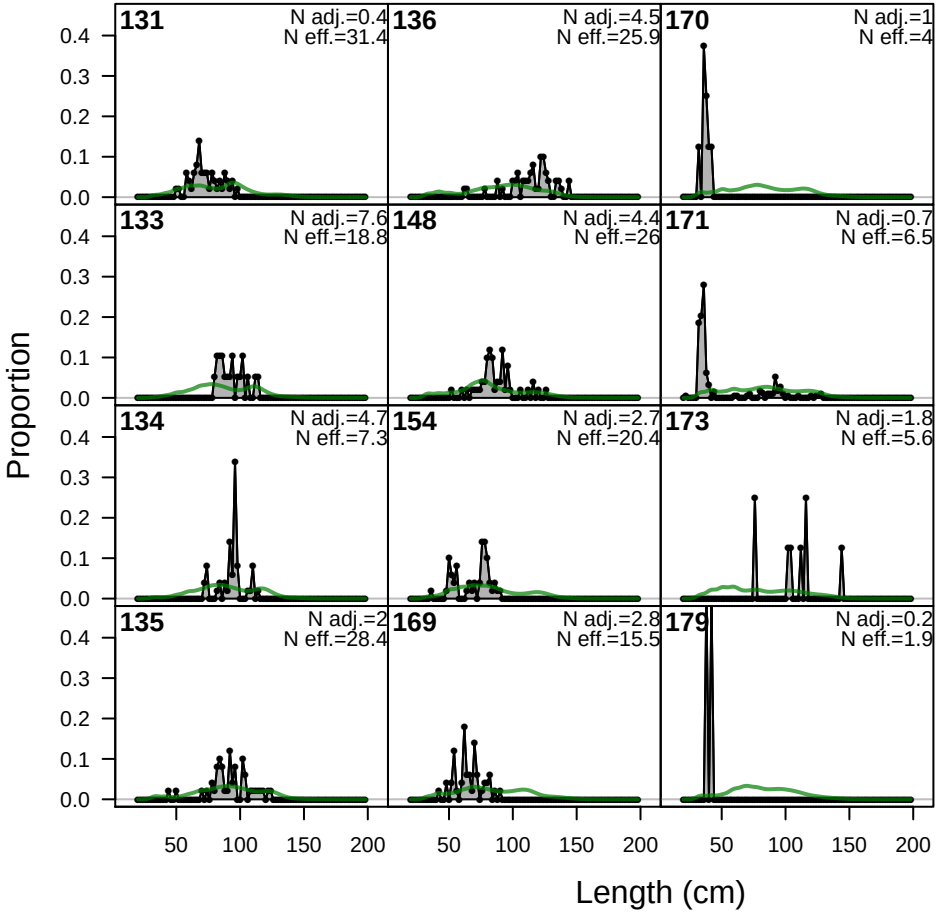


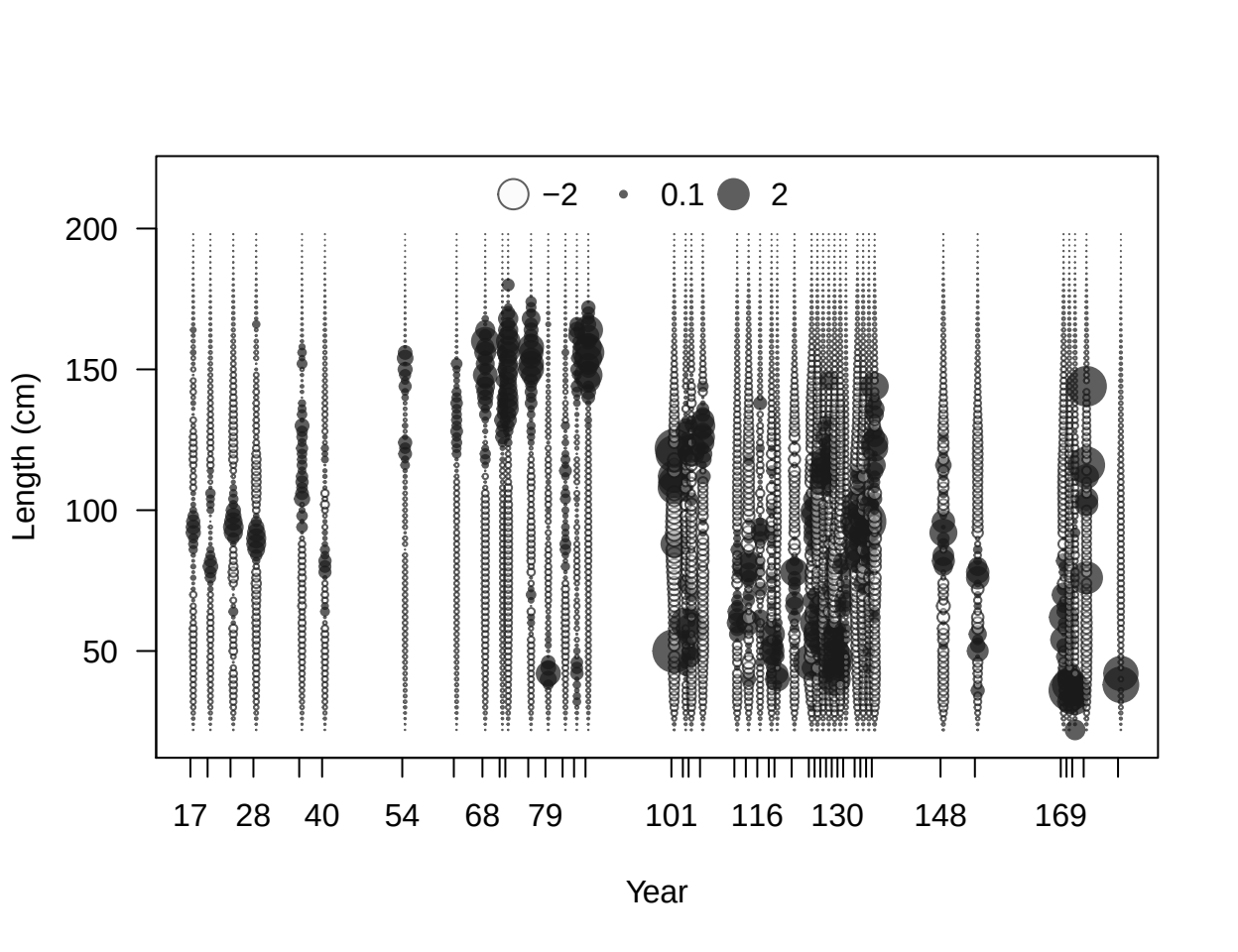
Effective sample size
Observed sample size
0
10
20
30
40
50
60
0.0
0.2
0.4
0.6
0.8
1.0
harmonic mean
arithmetic mean
170
168
166
172
111
178
135
167
155
119
23
31
39
27
169

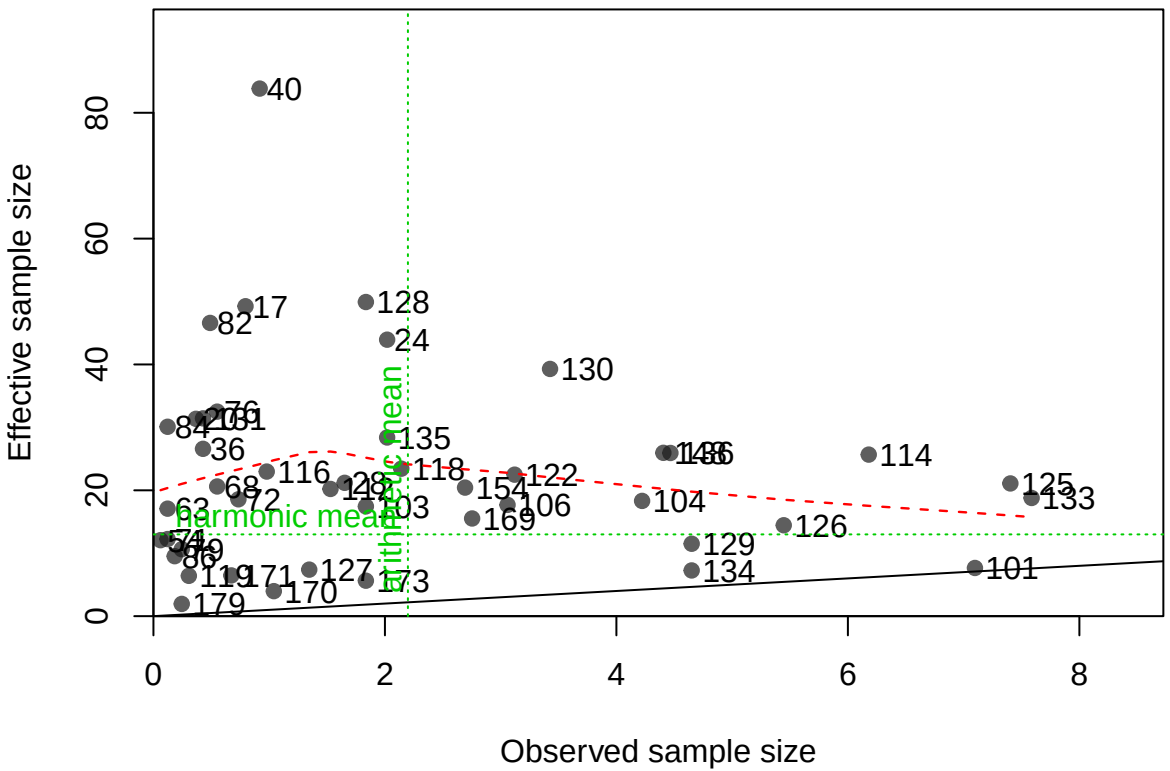

A2−NOADEL (whole catch)
Mean length
400
300
200
100
0
−100
−200
50
100
150
Year


17
N adj.=0.8
N eff.=49.3
36
N adj.=0.4
N eff.=26.6
68
N adj.=0.6
N eff.=20.6
79
N adj.=0.2
N eff.=10.6
20
N adj.=0.4
N eff.=31.4
40
N adj.=0.9
N eff.=83.8
71
N adj.=0.1
N eff.=12.3
82
N adj.=0.5
N eff.=46.6
24
N adj.=2
N eff.=43.9
54
N adj.=0.1
N eff.=12.1
72
N adj.=0.7
N eff.=18.6
84
N adj.=0.1
N eff.=30.1
28
N adj.=1.7
N eff.=21.2
63
N adj.=0.1
N eff.=17.1
76
N adj.=0.6
N eff.=32.5
86
N adj.=0.2
N eff.=9.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

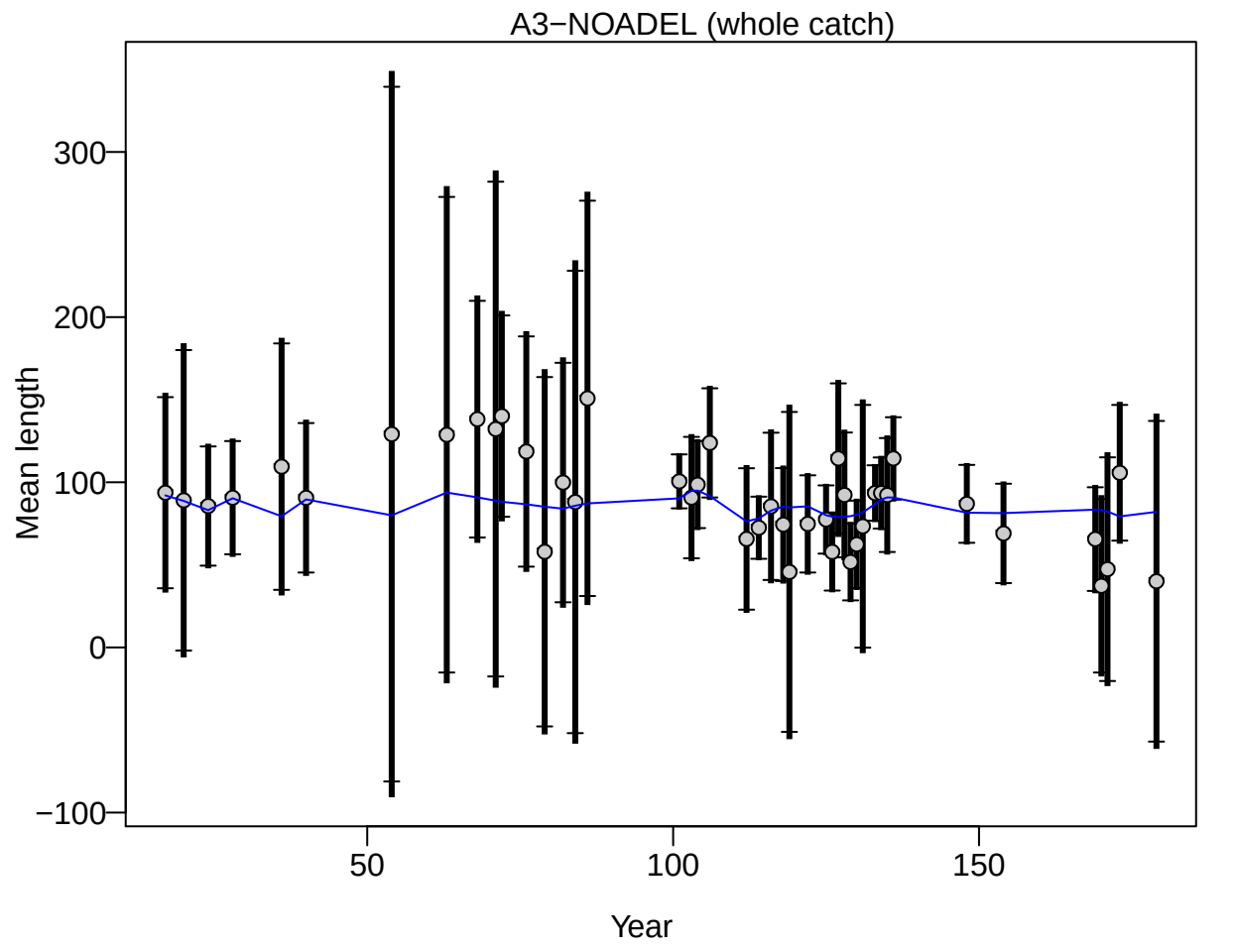

101
N adj.=7.1
N eff.=7.7
112
N adj.=1.5
N eff.=20.2
119
N adj.=0.3
N eff.=6.4
127
N adj.=1.3
N eff.=7.4
103
N adj.=1.8
N eff.=17.4
114
N adj.=6.2
N eff.=25.7
122
N adj.=3.1
N eff.=22.5
128
N adj.=1.8
N eff.=49.9
104
N adj.=4.2
N eff.=18.3
116
N adj.=1
N eff.=23
125
N adj.=7.4
N eff.=21.1
129
N adj.=4.7
N eff.=11.5
106
N adj.=3.1
N eff.=17.7
118
N adj.=2.1
N eff.=23.4
126
N adj.=5.4
N eff.=14.4
130
N adj.=3.4
N eff.=39.3
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

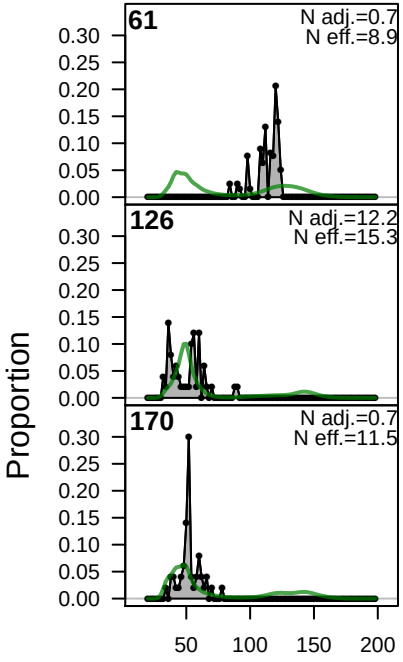

131
N adj.=0.4
N eff.=31.4
136
N adj.=4.5
N eff.=25.9
170
N adj.=1
N eff.=4
133
N adj.=7.6
N eff.=18.8
148
N adj.=4.4
N eff.=26
171
N adj.=0.7
N eff.=6.5
134
N adj.=4.7
N eff.=7.3
154
N adj.=2.7
N eff.=20.4
173
N adj.=1.8
N eff.=5.6
135
N adj.=2
N eff.=28.4
169
N adj.=2.8
N eff.=15.5
179
N adj.=0.2
N eff.=1.9
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

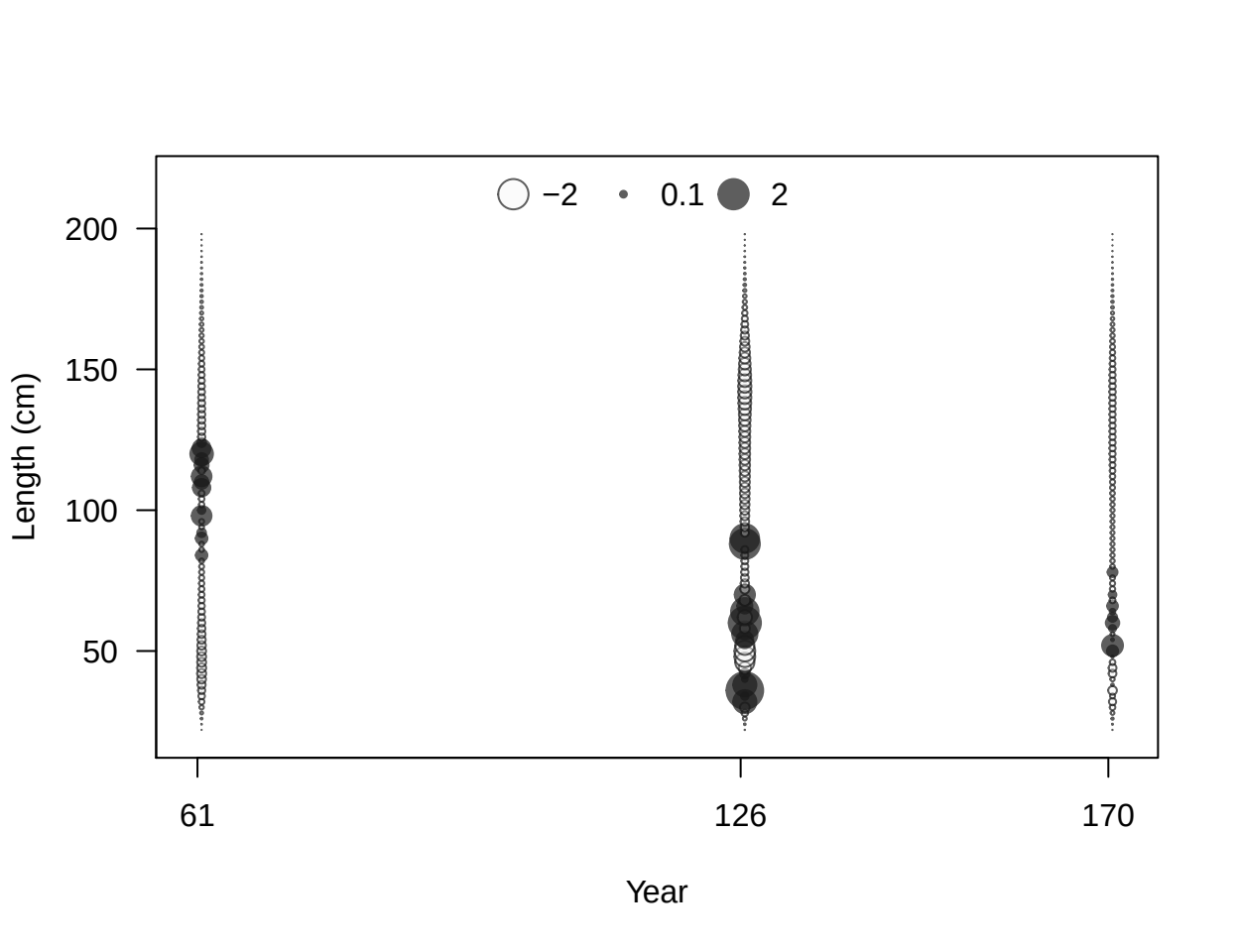

−2
0.1
2
200
150
100
50
Length (cm)
17
28
40
54
68
79
101
116
130
148
169
Year

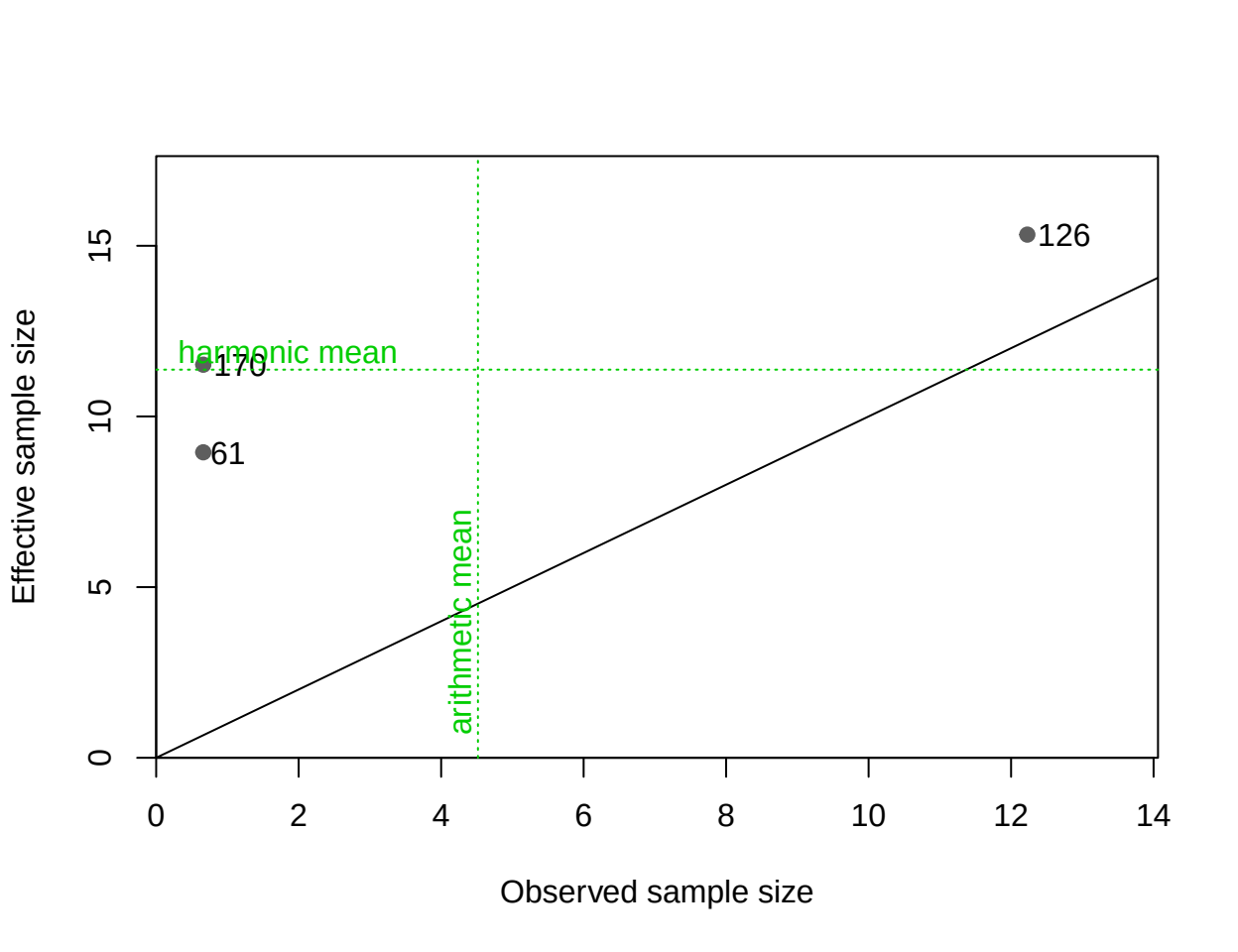


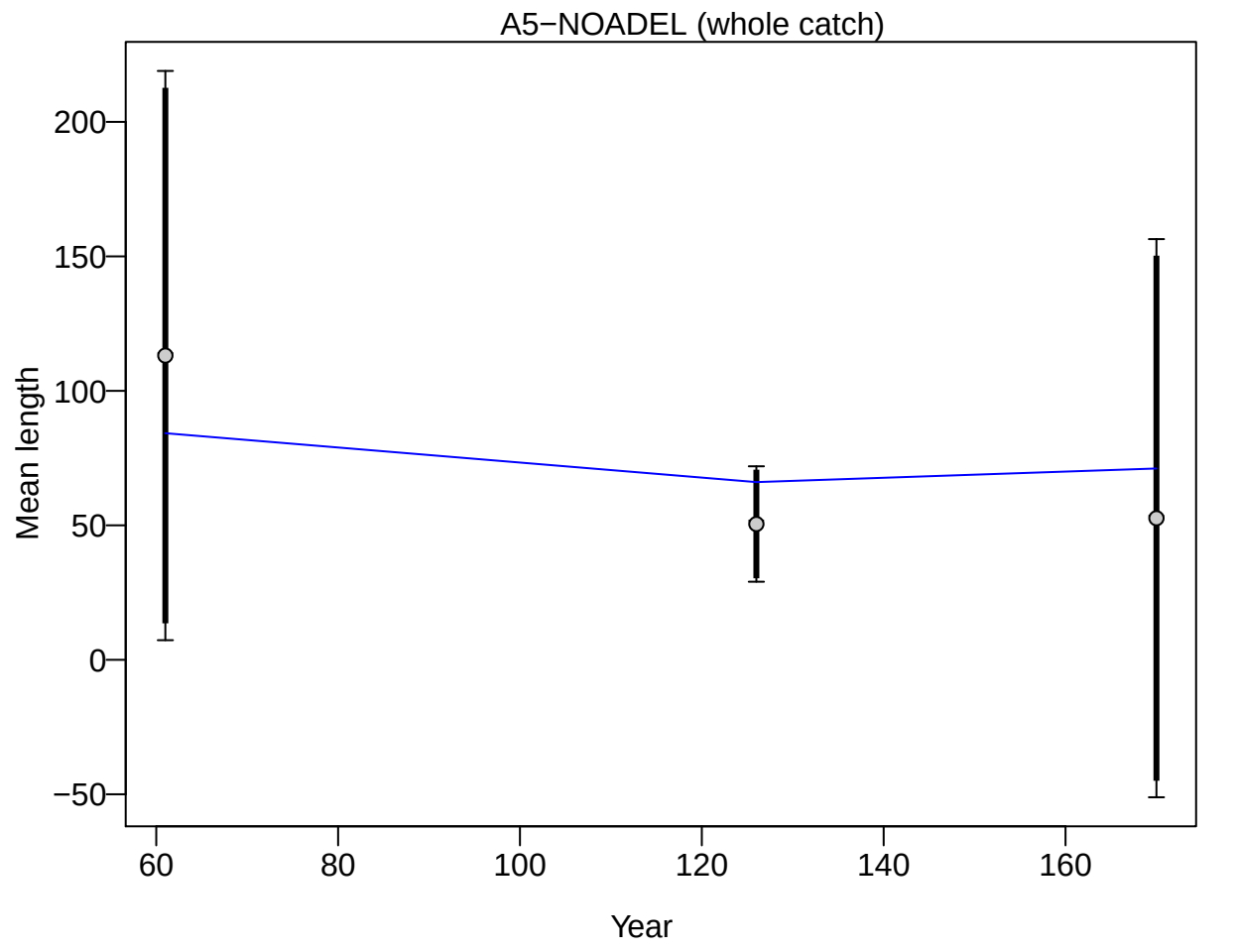
Effective sample size
Observed sample size
0
20
40
60
80
0
2
4
6
8
harmonic mean
arithmetic mean
40
17
82
128
24
130
135
36
116
118
122
114
125
133
68
72
154
106
104
63
103
169
126
129
134
101
127
173
170
179

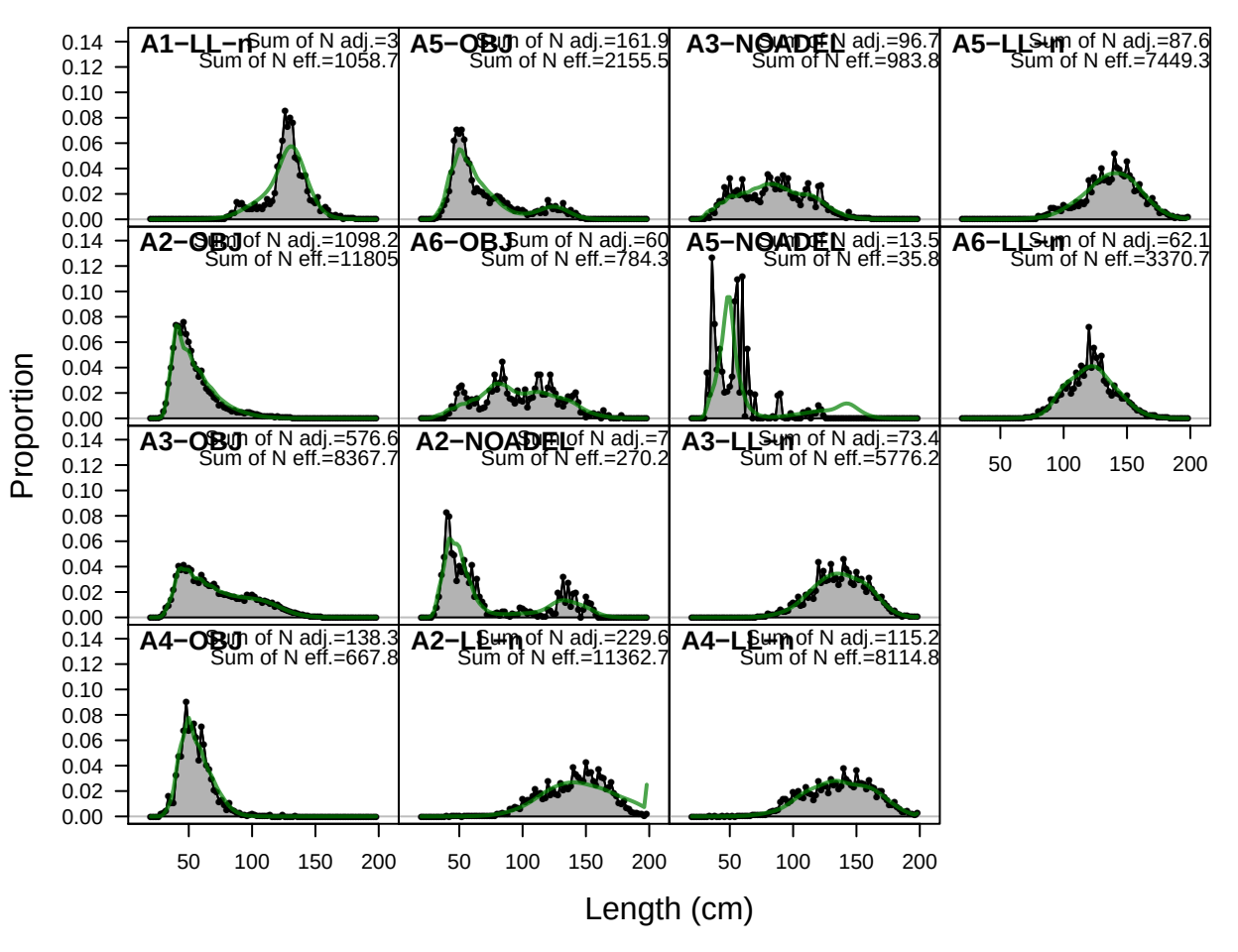

A3−NOADEL (whole catch)
Mean length
300
200
100
0
−100
50
100
150
Year

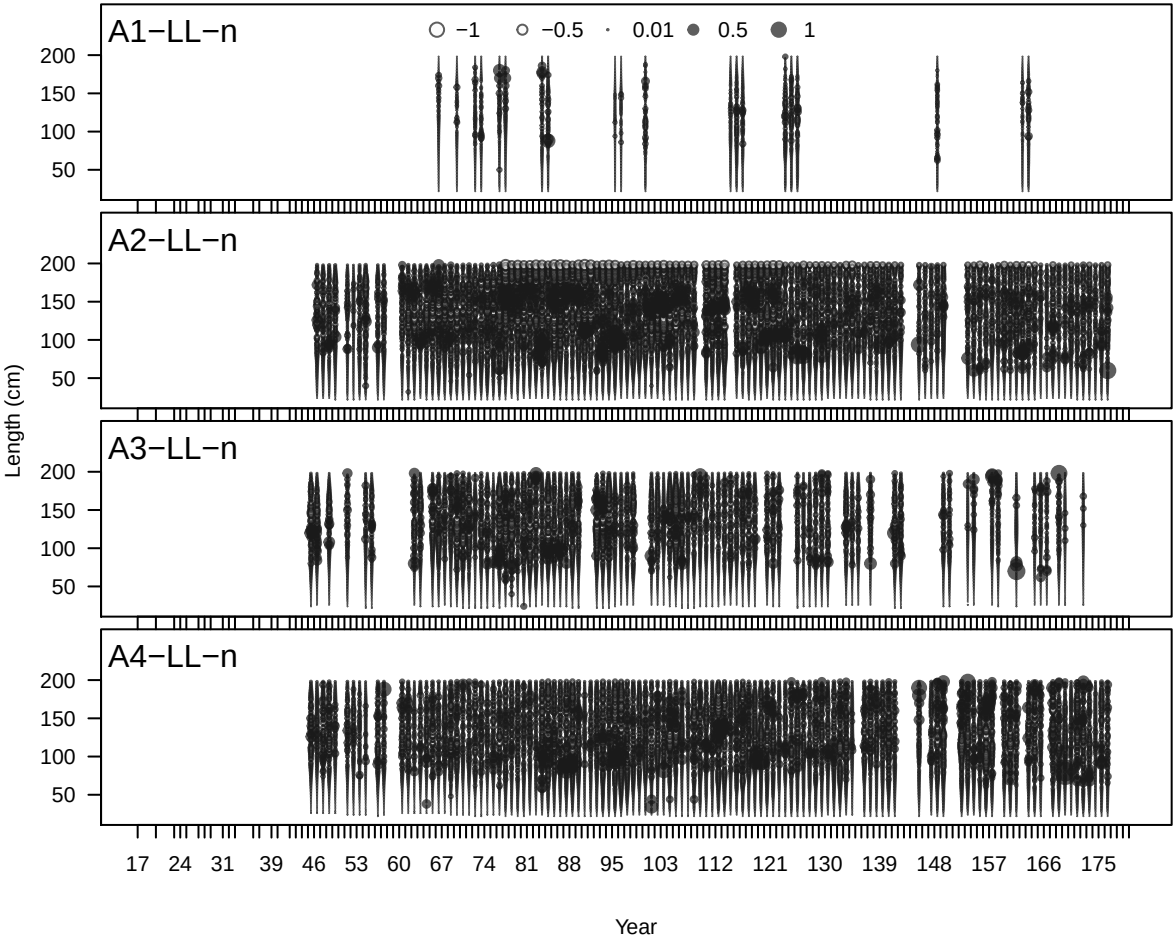

61
N adj.=0.7
N eff.=8.9
126
N adj.=12.2
N eff.=15.3
170
N adj.=0.7
N eff.=11.5
Proportion
0.30
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)

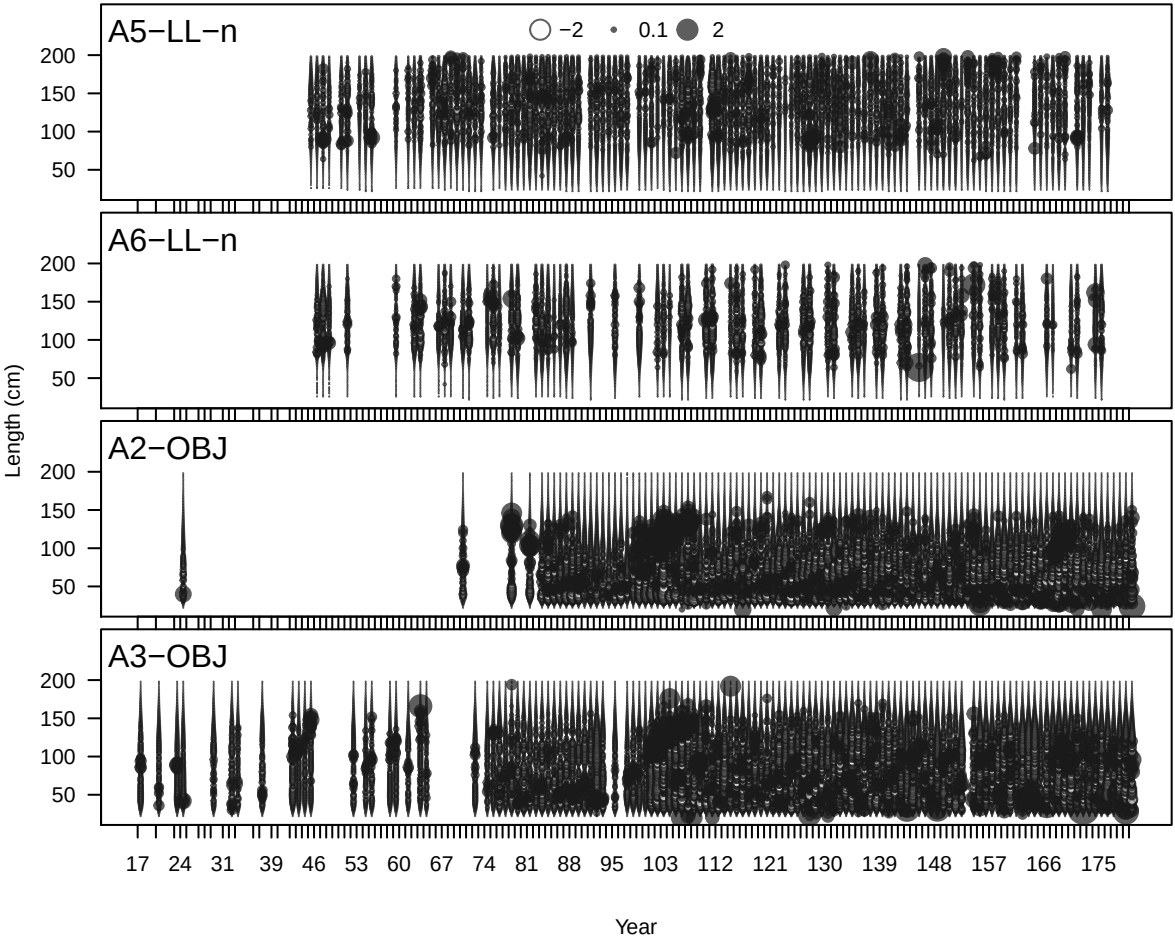

−2
0.1
2
200
150
100
50
Length (cm)
61
126
170
Year

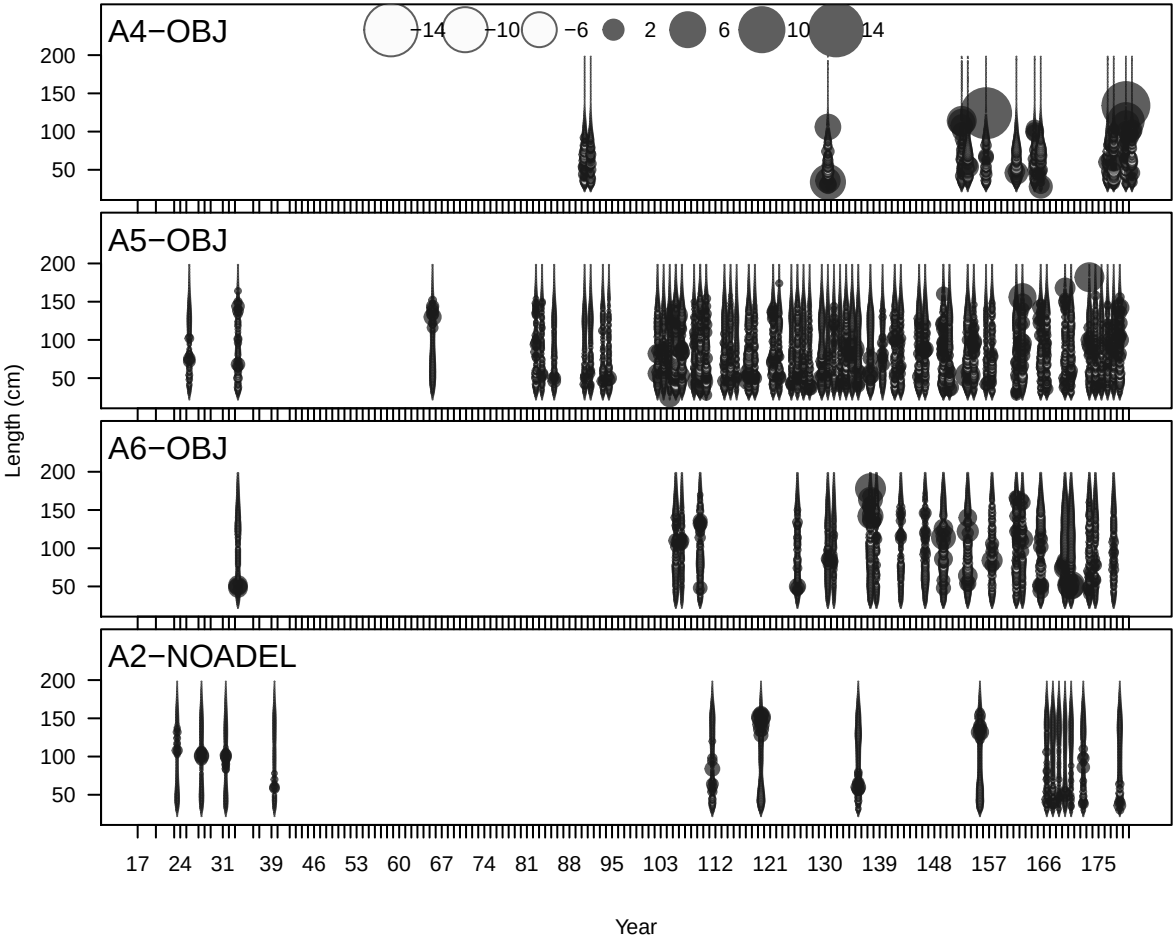

Effective sample size
Observed sample size
0
5
10
15
0
2
4
6
8
10
12
14
126
170
61
harmonic mean
arithmetic mean

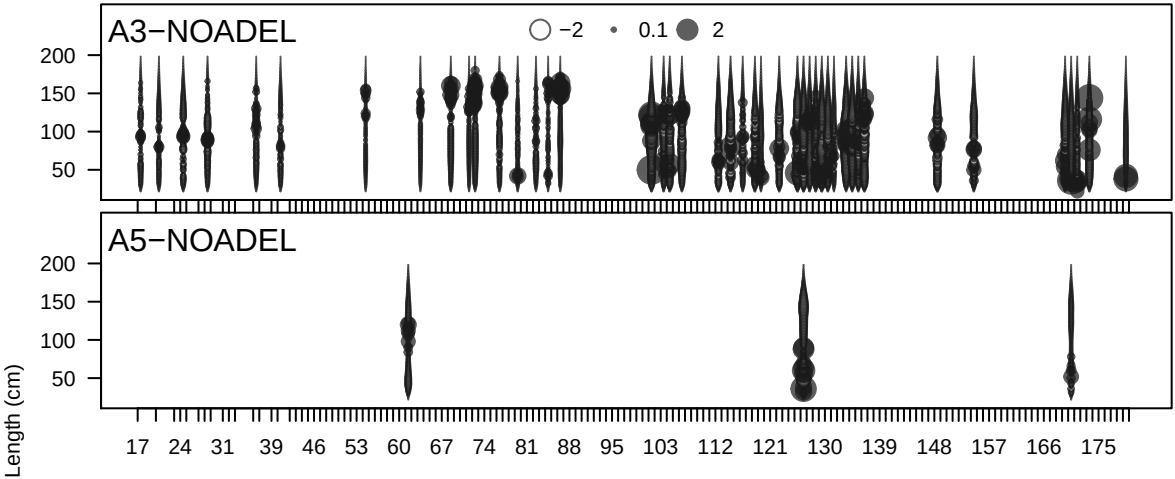

A5−NOADEL (whole catch)
Mean length
200
150
100
50
0
−50
60
80
100
120
140
160
Year


A1−LL−n
Sum of N adj.=3
Sum of N eff.=1058.7
A5−OBJ
Sum of N adj.=161.9
Sum of N eff.=2155.5
A3−NOADEL
Sum of N adj.=96.7
Sum of N eff.=983.8
A5−LL−n
Sum of N adj.=87.6
Sum of N eff.=7449.3
A2−OBJ
Sum of N adj.=1098.2
Sum of N eff.=11805
A6−OBJ
Sum of N adj.=60
Sum of N eff.=784.3
A5−NOADEL
Sum of N adj.=13.5
Sum of N eff.=35.8
A6−LL−n
Sum of N adj.=62.1
Sum of N eff.=3370.7
A3−OBJ
Sum of N adj.=576.6
Sum of N eff.=8367.7
A2−NOADEL
Sum of N adj.=7
Sum of N eff.=270.2
A3−LL−n
Sum of N adj.=73.4
Sum of N eff.=5776.2
A4−OBJ
Sum of N adj.=138.3
Sum of N eff.=667.8
A2−LL−n
Sum of N adj.=229.6
Sum of N eff.=11362.7
A4−LL−n
Sum of N adj.=115.2
Sum of N eff.=8114.8
Proportion
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
50
100
150
200
Length (cm)

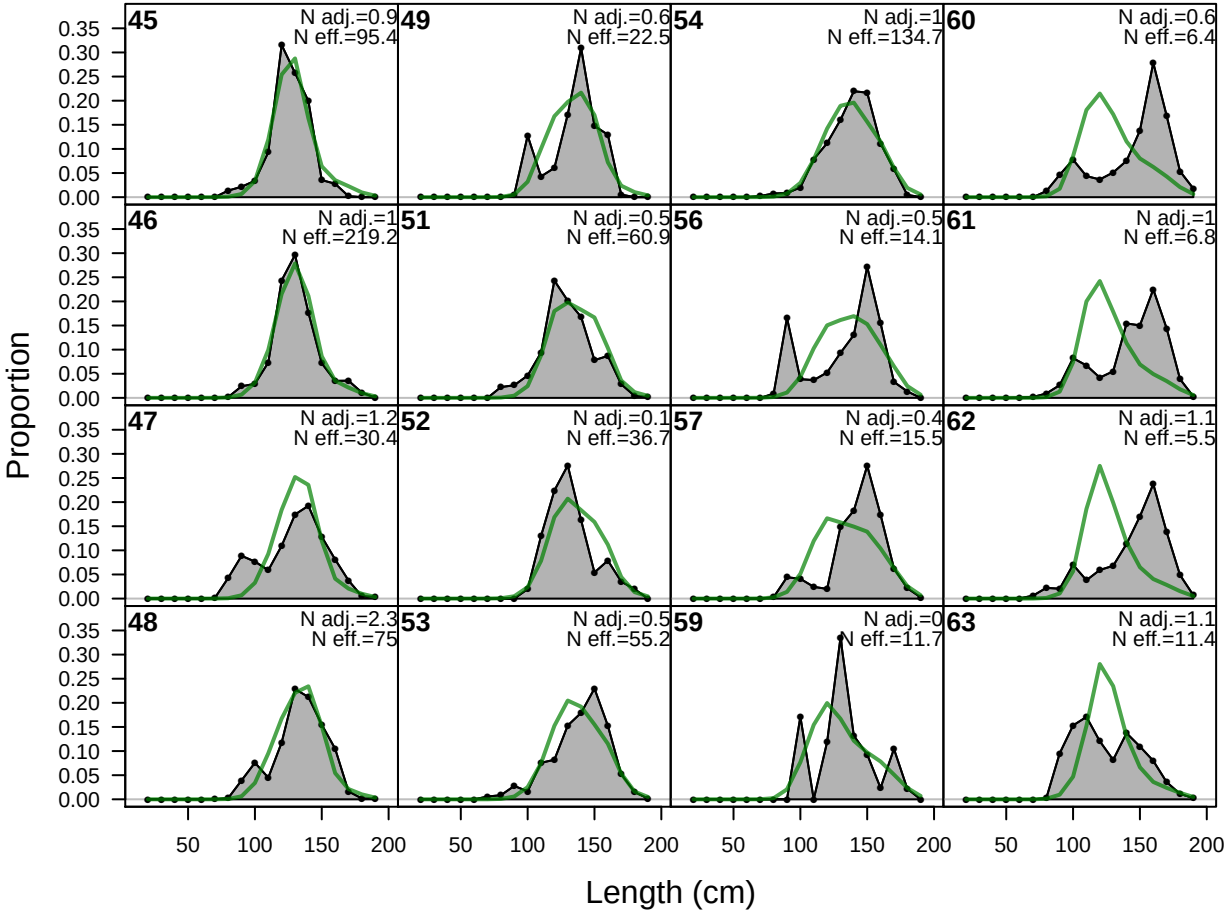

A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
−1
−0.5
0.01
0.5
1
200
150
100
50
Length (cm)
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

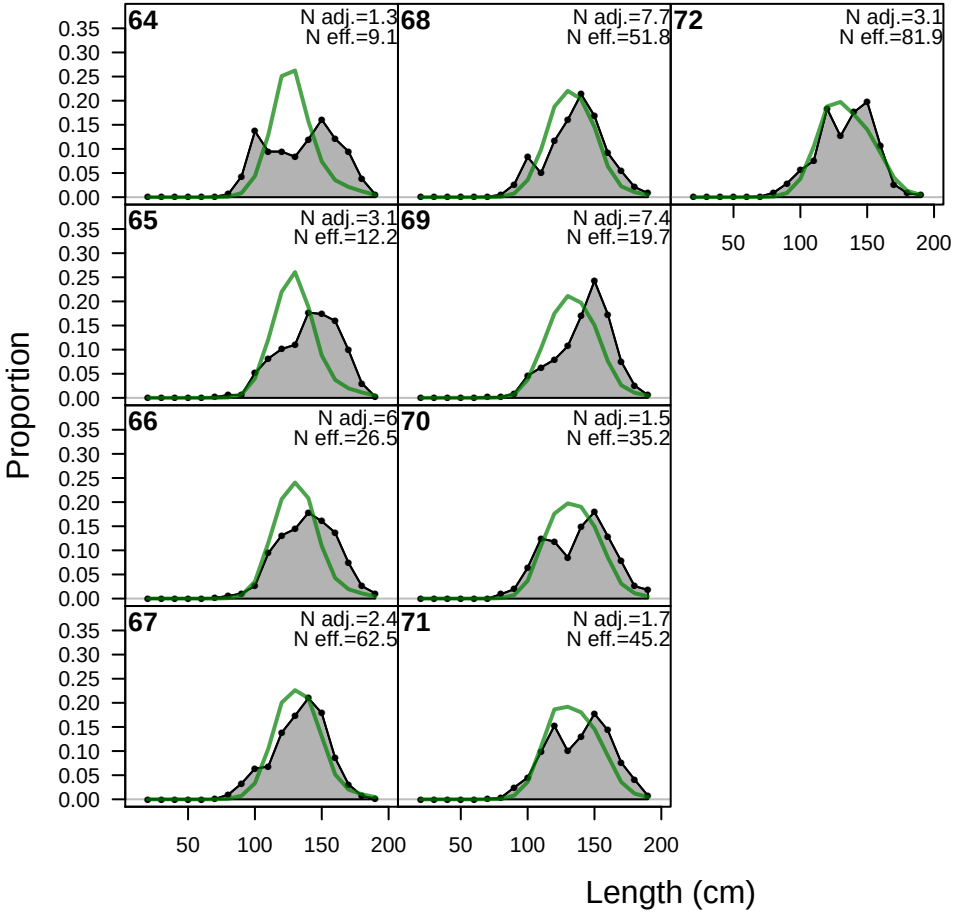

A5−LL−n
−2
0.1
2
A6−LL−n
A2−OBJ
A3−OBJ
Length (cm)
200
150
100
50
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

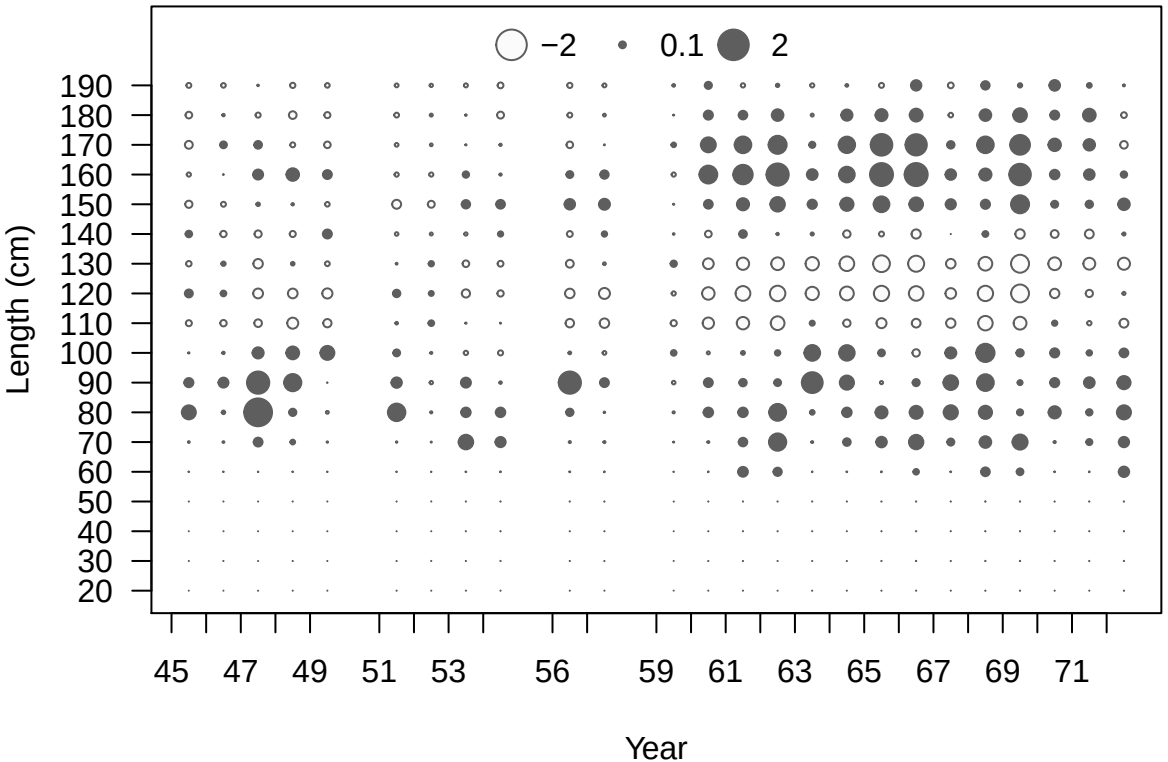

A4−OBJ
A5−OBJ
A6−OBJ
A2−NOADEL
−14
−10
−6
2
6
10
14
Length (cm)
200
150
100
50
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175
Year

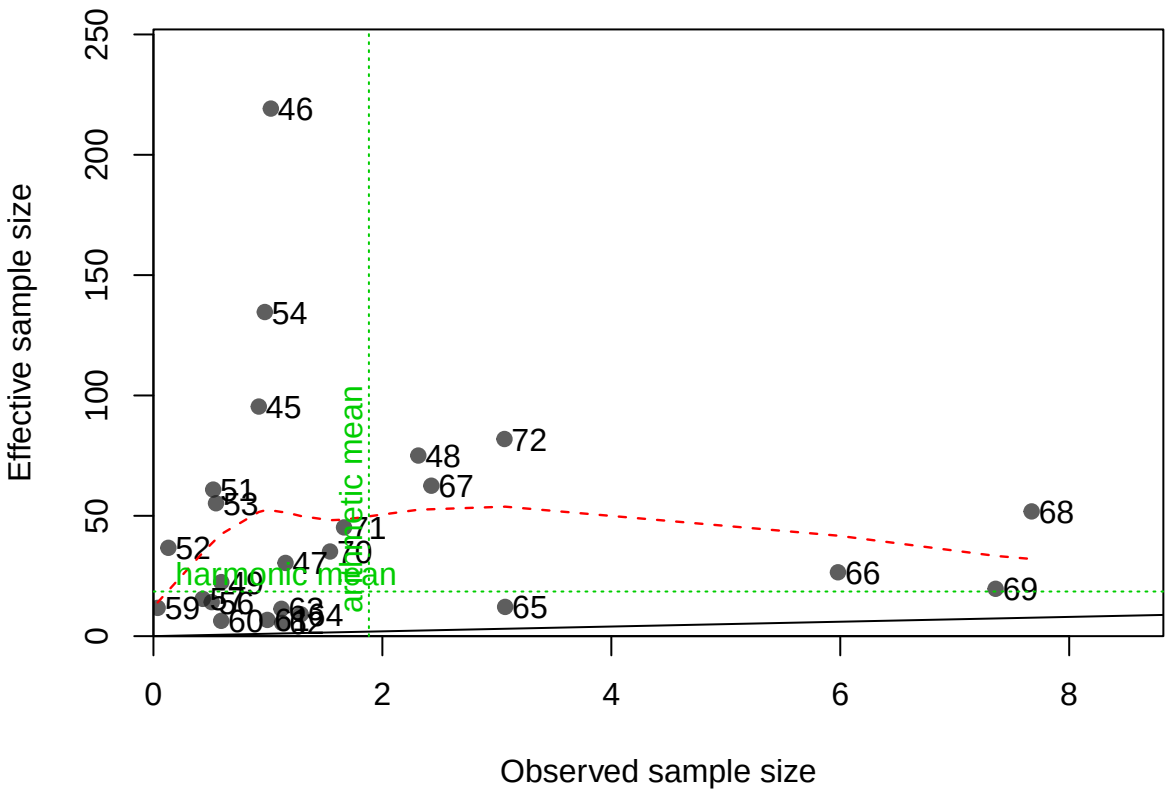

A3−NOADEL
−2
0.1
2
200
150
100
50
A5−NOADEL
200
150
100
50
Length (cm)
17
24
31
39
46
53
60
67
74
81
88
95
103
112
121
130
139
148
157
166
175

Year

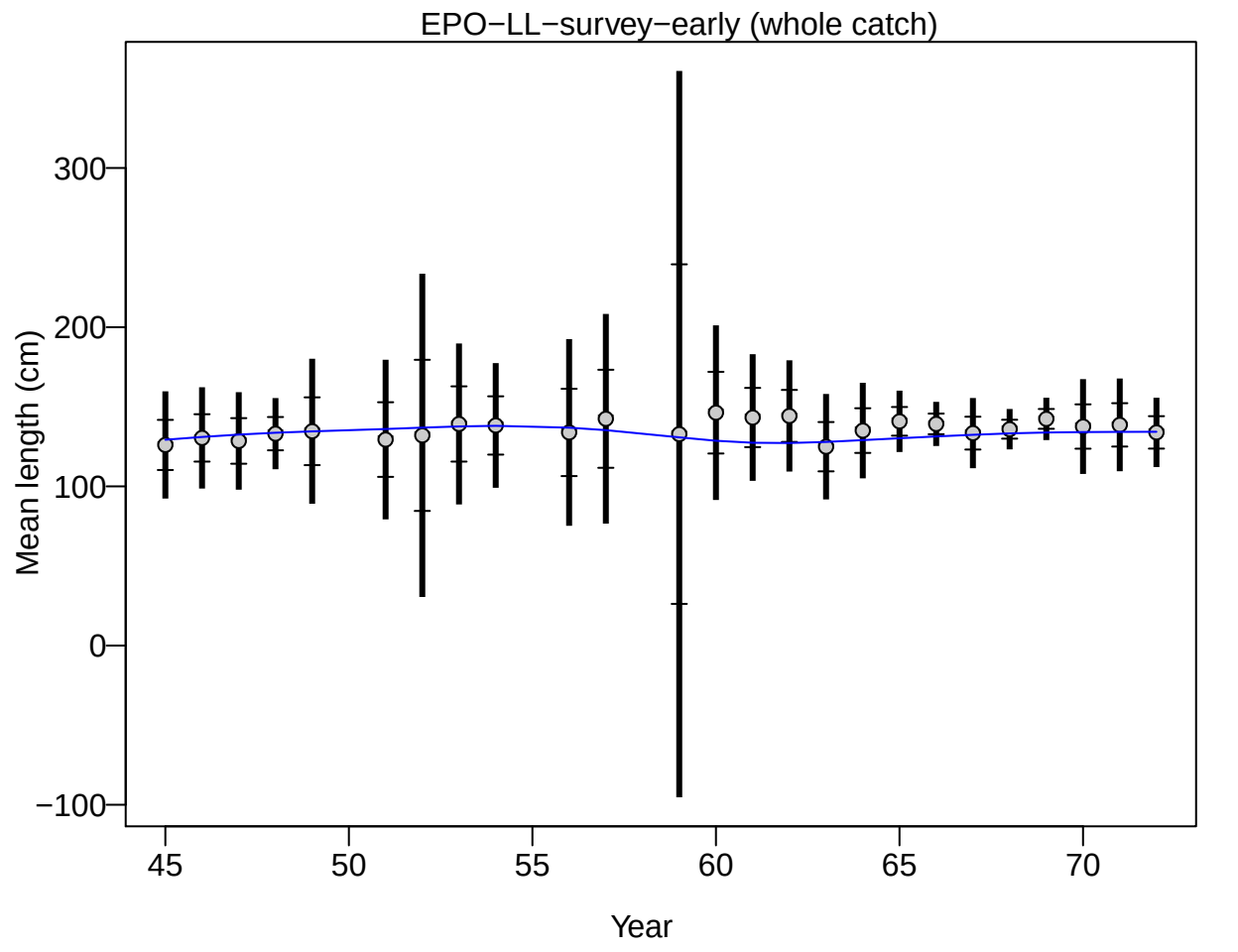

45
N adj.=0.9
N eff.=95.4
49
N adj.=0.6
N eff.=22.5
54
N adj.=1
N eff.=134.7
60
N adj.=0.6
N eff.=6.4
46
N adj.=1
N eff.=219.2
51
N adj.=0.5
N eff.=60.9
56
N adj.=0.5
N eff.=14.1
61
N adj.=1
N eff.=6.8
47
N adj.=1.2
N eff.=30.4
52
N adj.=0.1
N eff.=36.7
57
N adj.=0.4
N eff.=15.5
62
N adj.=1.1
N eff.=5.5
48
N adj.=2.3
N eff.=75
53
N adj.=0.5
N eff.=55.2
59
N adj.=0
N eff.=11.7
63
N adj.=1.1
N eff.=11.4
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

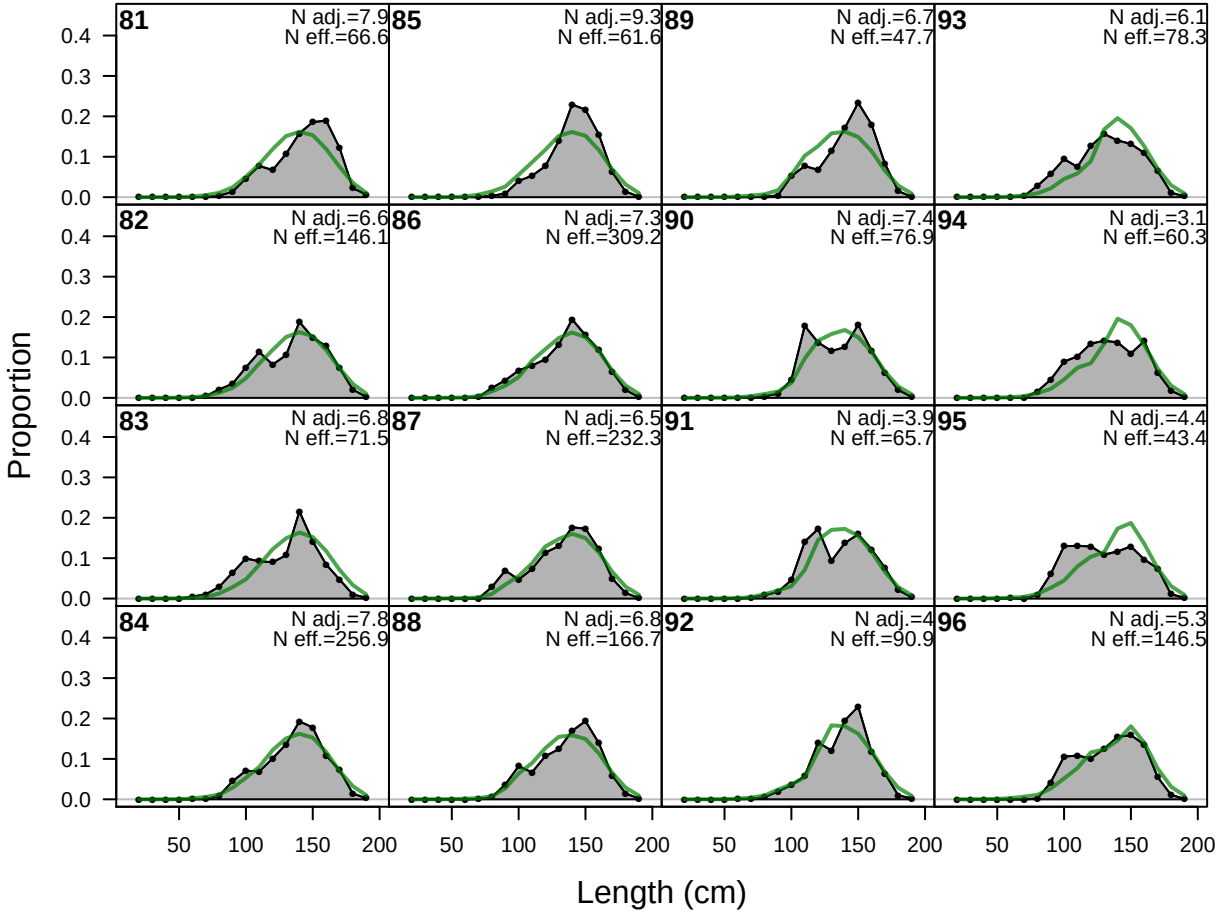

64
N adj.=1.3
N eff.=9.1
68
N adj.=7.7
N eff.=51.8
72
N adj.=3.1
N eff.=81.9
65
N adj.=3.1
N eff.=12.2
69
N adj.=7.4
N eff.=19.7
66
N adj.=6
N eff.=26.5
70
N adj.=1.5
N eff.=35.2
67
N adj.=2.4
N eff.=62.5
71
N adj.=1.7
N eff.=45.2
Proportion
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
50
100
150
200
Length (cm)

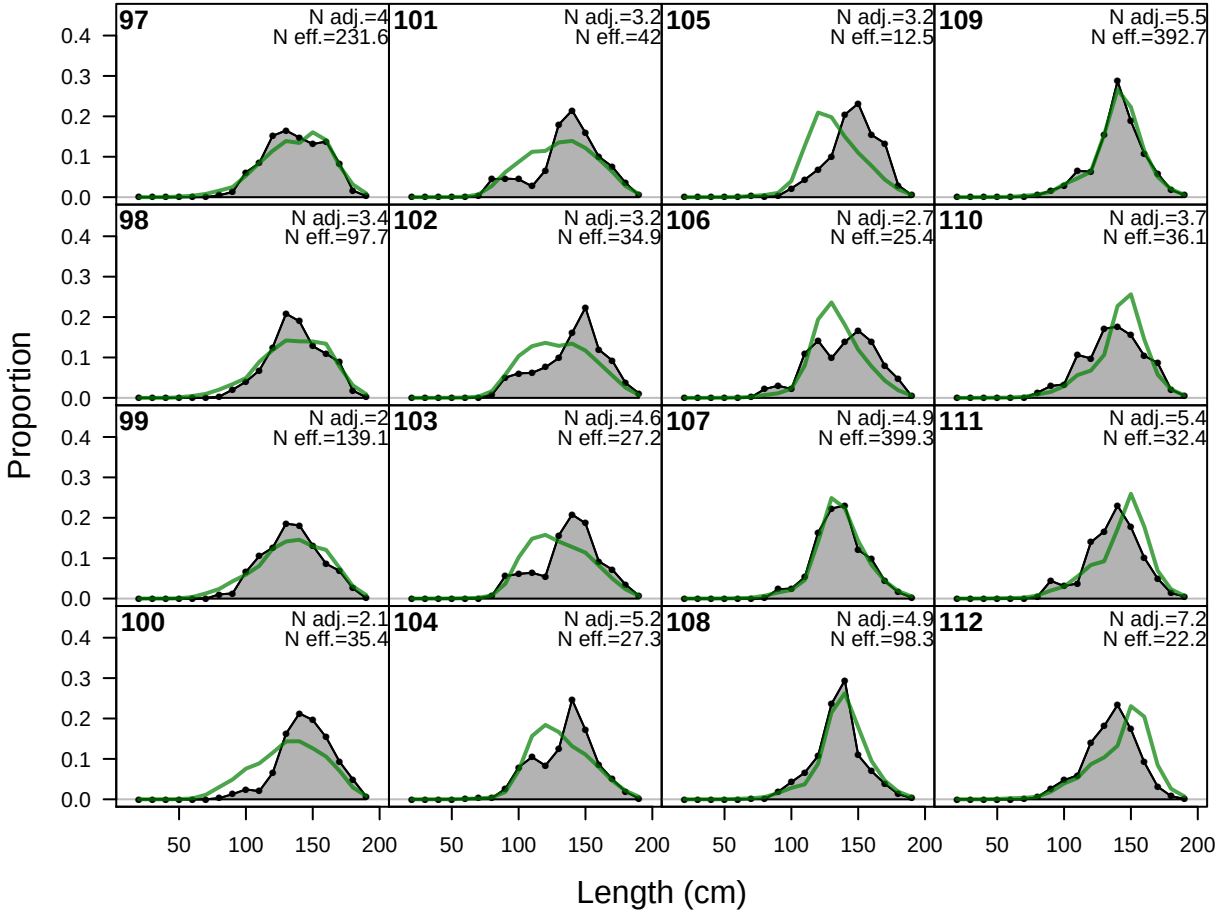

−2
0.1
2
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
Length (cm)
45
47
49
51
53
56
59
61
63
65
67
69
71
Year

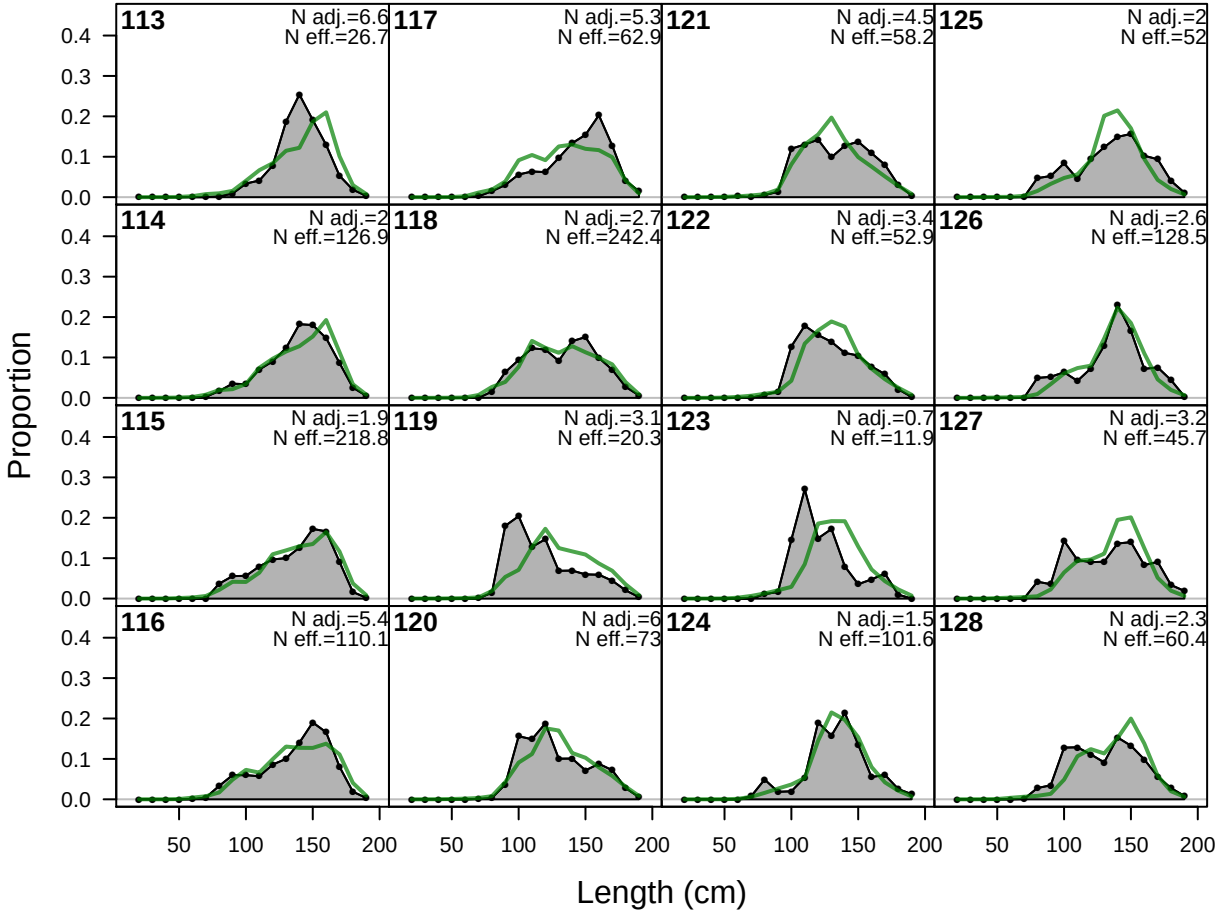


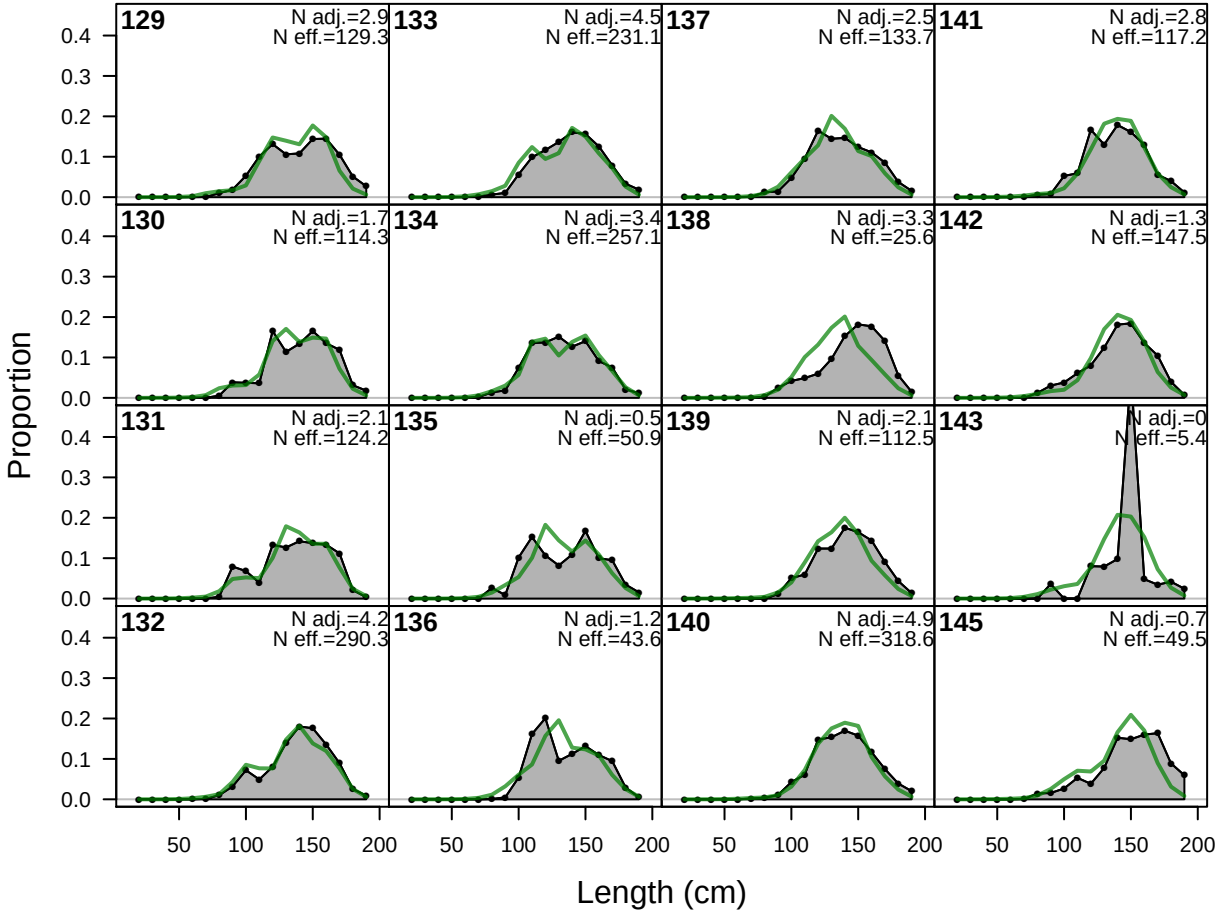
Effective sample size
Observed sample size
0
50
100
150
200
250
0
2
4
6
8
46
54
45
72
48
67
51
53
68
71
52
70
47
49
66
69
59
56
65
60
63
64
arithmetic mean
harmonic mean

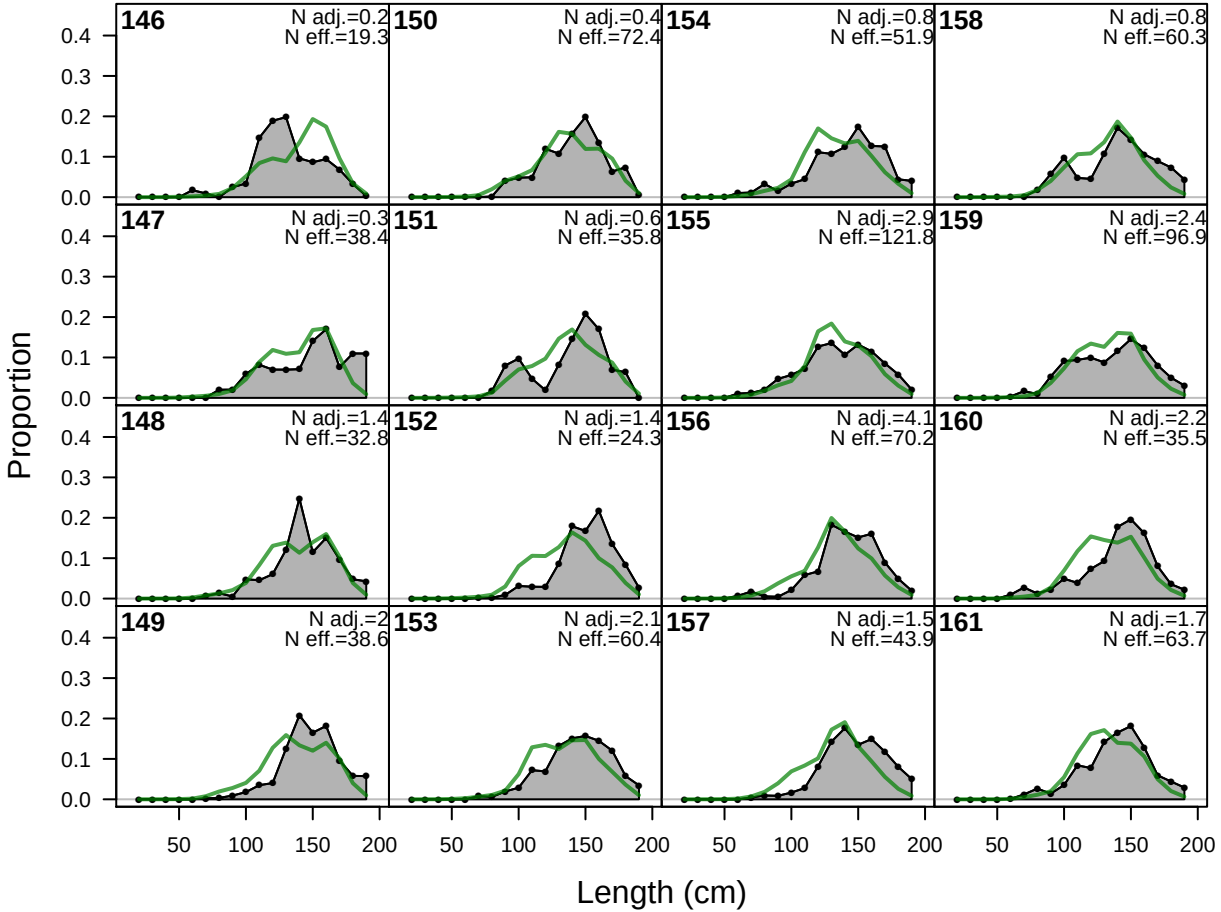

EPO−LL−survey−early (whole catch)
Mean length (cm)
300
200
100
0
−100
45
50
55
60
65
70
Year

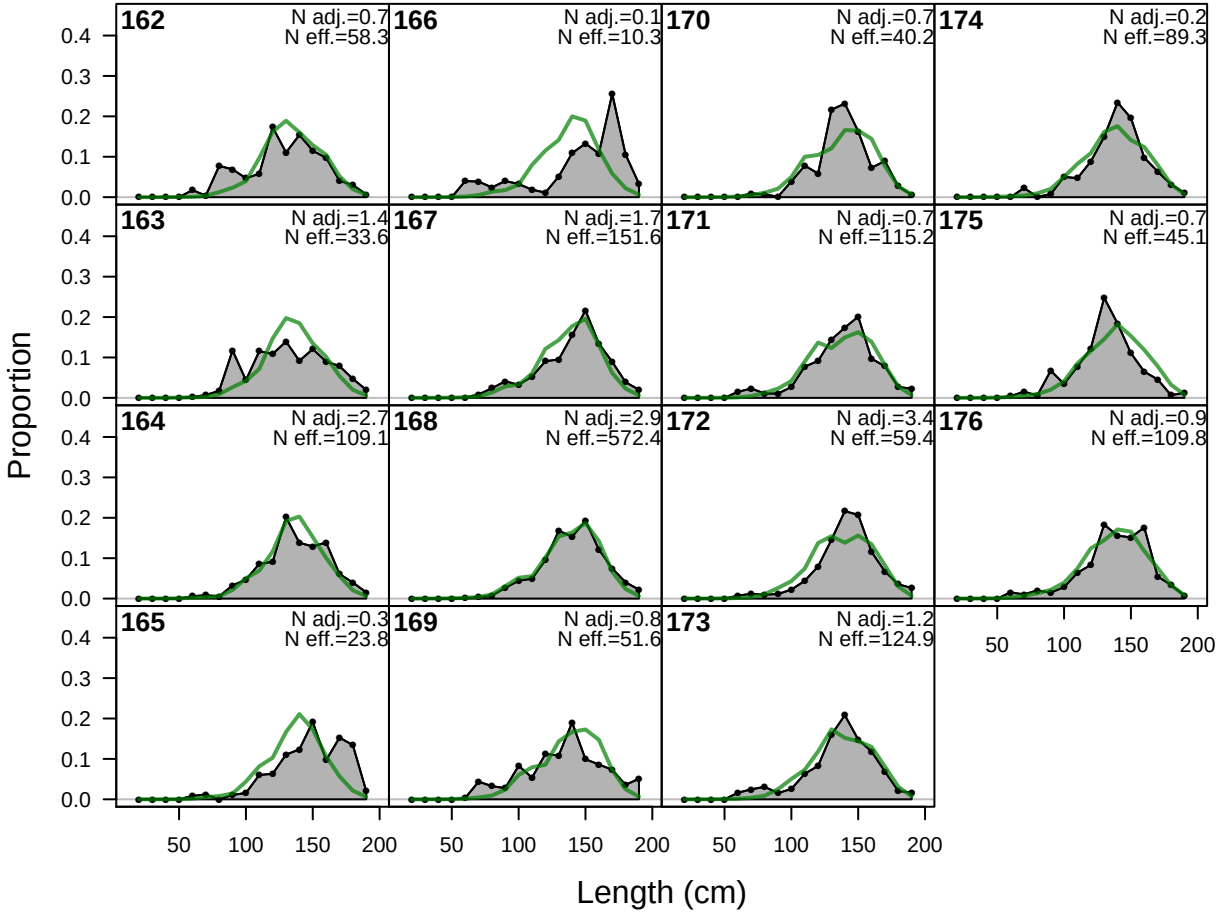

81
N adj.=7.9
N eff.=66.6
85
N adj.=9.3
N eff.=61.6
89
N adj.=6.7
N eff.=47.7
93
N adj.=6.1
N eff.=78.3
82
N adj.=6.6
N eff.=146.1
86
N adj.=7.3
N eff.=309.2
90
N adj.=7.4
N eff.=76.9
94
N adj.=3.1
N eff.=60.3
83
N adj.=6.8
N eff.=71.5
87
N adj.=6.5
N eff.=232.3
91
N adj.=3.9
N eff.=65.7
95
N adj.=4.4
N eff.=43.4
84
N adj.=7.8
N eff.=256.9
88
N adj.=6.8
N eff.=166.7
92
N adj.=4
N eff.=90.9
96
N adj.=5.3
N eff.=146.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

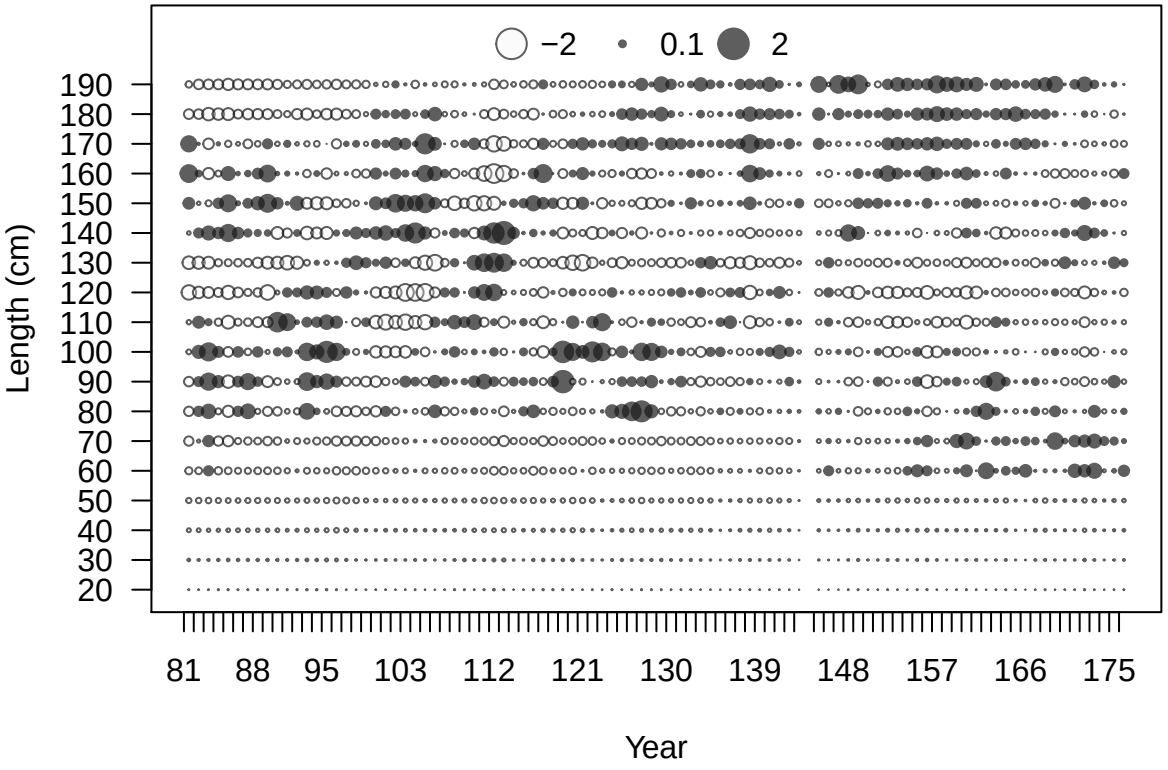

97
N adj.=4
N eff.=231.6
101
N adj.=3.2
N eff.=42
105
N adj.=3.2
N eff.=12.5
109
N adj.=5.5
N eff.=392.7
98
N adj.=3.4
N eff.=97.7
102
N adj.=3.2
N eff.=34.9
106
N adj.=2.7
N eff.=25.4
110
N adj.=3.7
N eff.=36.1
99
N adj.=2
N eff.=139.1
103
N adj.=4.6
N eff.=27.2
107
N adj.=4.9
N eff.=399.3
111
N adj.=5.4
N eff.=32.4
100
N adj.=2.1
N eff.=35.4
104
N adj.=5.2
N eff.=27.3
108
N adj.=4.9
N eff.=98.3
112
N adj.=7.2
N eff.=22.2
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

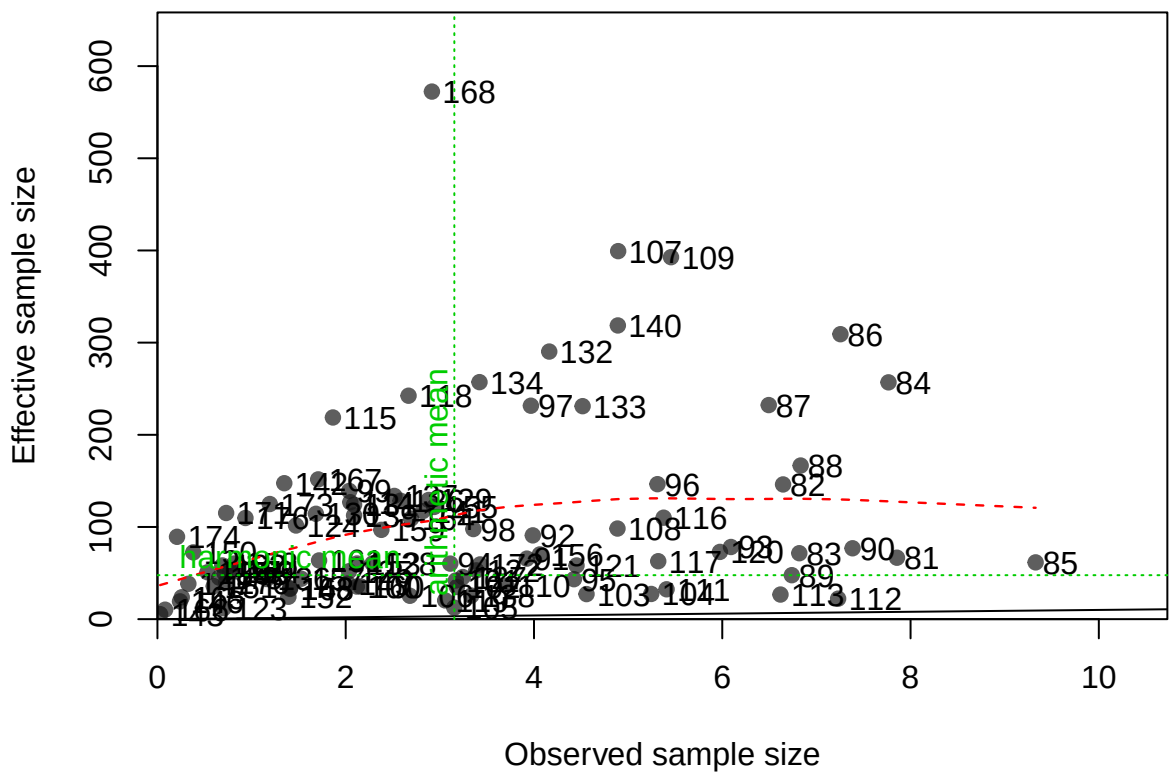

113
N adj.=6.6
N eff.=26.7
117
N adj.=5.3
N eff.=62.9
121
N adj.=4.5
N eff.=58.2
125
N adj.=2
N eff.=52
114
N adj.=2
N eff.=126.9
118
N adj.=2.7
N eff.=242.4
122
N adj.=3.4
N eff.=52.9
126
N adj.=2.6
N eff.=128.5
115
N adj.=1.9
N eff.=218.8
119
N adj.=3.1
N eff.=20.3
123
N adj.=0.7
N eff.=11.9
127
N adj.=3.2
N eff.=45.7
116
N adj.=5.4
N eff.=110.1
120
N adj.=6
N eff.=73
124
N adj.=1.5
N eff.=101.6
128
N adj.=2.3
N eff.=60.4
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)


129
N adj.=2.9
N eff.=129.3
133
N adj.=4.5
N eff.=231.1
137
N adj.=2.5
N eff.=133.7
141
N adj.=2.8
N eff.=117.2
130
N adj.=1.7
N eff.=114.3
134
N adj.=3.4
N eff.=257.1
138
N adj.=3.3
N eff.=25.6
142
N adj.=1.3
N eff.=147.5
131
N adj.=2.1
N eff.=124.2
135
N adj.=0.5
N eff.=50.9
139
N adj.=2.1
N eff.=112.5
143
N adj.=0
N eff.=5.4
132
N adj.=4.2
N eff.=290.3
136
N adj.=1.2
N eff.=43.6
140
N adj.=4.9
N eff.=318.6
145
N adj.=0.7
N eff.=49.5
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

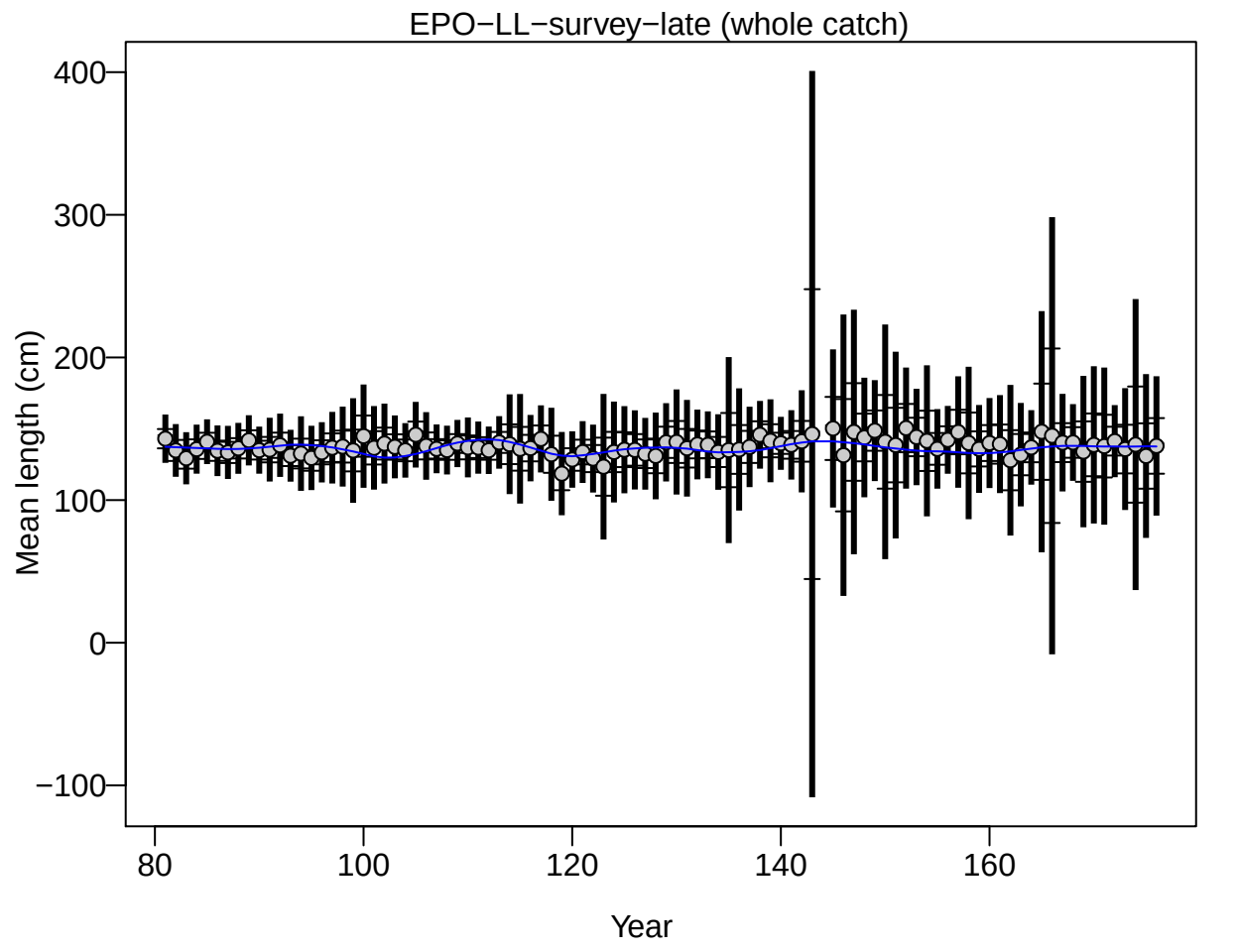

146
N adj.=0.2
N eff.=19.3
150
N adj.=0.4
N eff.=72.4
154
N adj.=0.8
N eff.=51.9
158
N adj.=0.8
N eff.=60.3
147
N adj.=0.3
N eff.=38.4
151
N adj.=0.6
N eff.=35.8
155
N adj.=2.9
N eff.=121.8
159
N adj.=2.4
N eff.=96.9
148
N adj.=1.4
N eff.=32.8
152
N adj.=1.4
N eff.=24.3
156
N adj.=4.1
N eff.=70.2
160
N adj.=2.2
N eff.=35.5
149
N adj.=2
N eff.=38.6
153
N adj.=2.1
N eff.=60.4
157
N adj.=1.5
N eff.=43.9
161
N adj.=1.7
N eff.=63.7
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

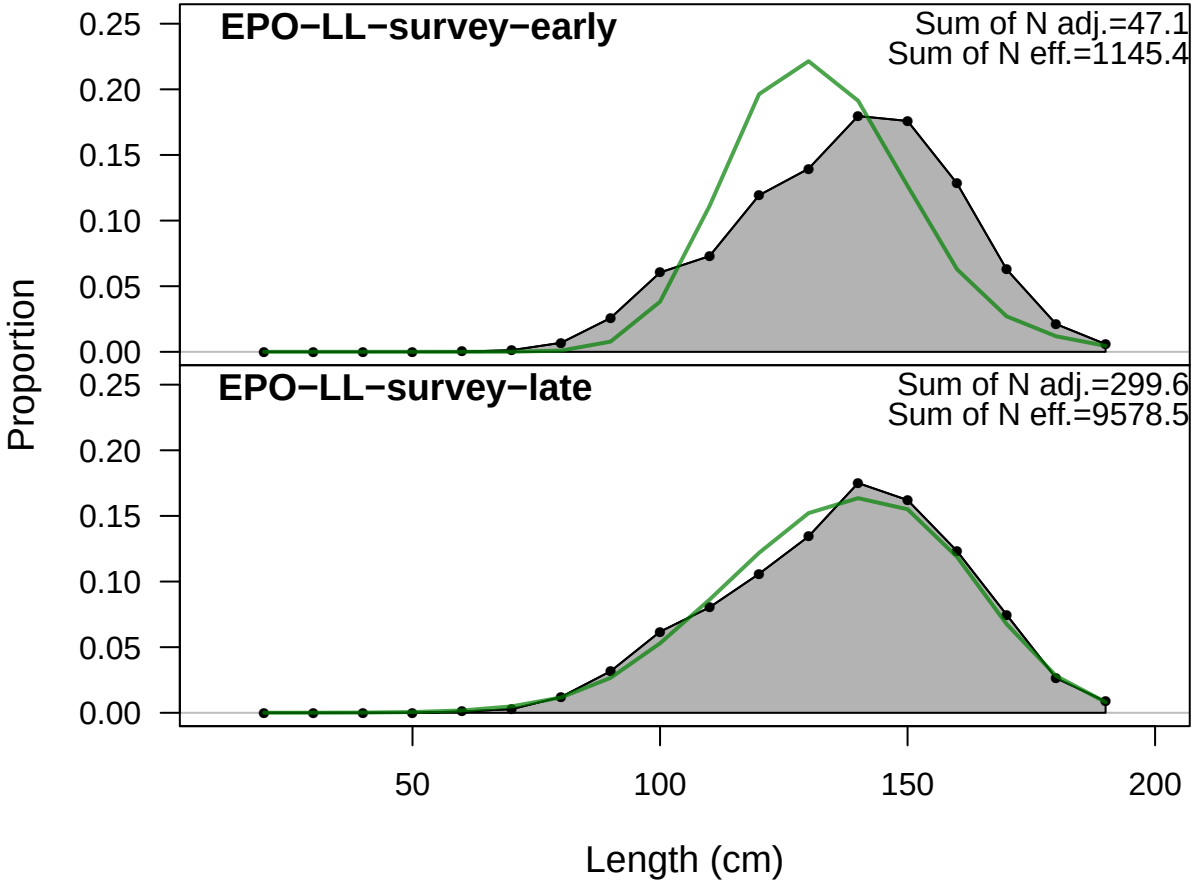

162
N adj.=0.7
N eff.=58.3
166
N adj.=0.1
N eff.=10.3
170
N adj.=0.7
N eff.=40.2
174
N adj.=0.2
N eff.=89.3
163
N adj.=1.4
N eff.=33.6
167
N adj.=1.7
N eff.=151.6
171
N adj.=0.7
N eff.=115.2
175
N adj.=0.7
N eff.=45.1
164
N adj.=2.7
N eff.=109.1
168
N adj.=2.9
N eff.=572.4
172
N adj.=3.4
N eff.=59.4
176
N adj.=0.9
N eff.=109.8
165
N adj.=0.3
N eff.=23.8
169
N adj.=0.8
N eff.=51.6
173
N adj.=1.2
N eff.=124.9
Proportion
0.0
0.1
0.2
0.3
0.4
50
100
150
200
Length (cm)

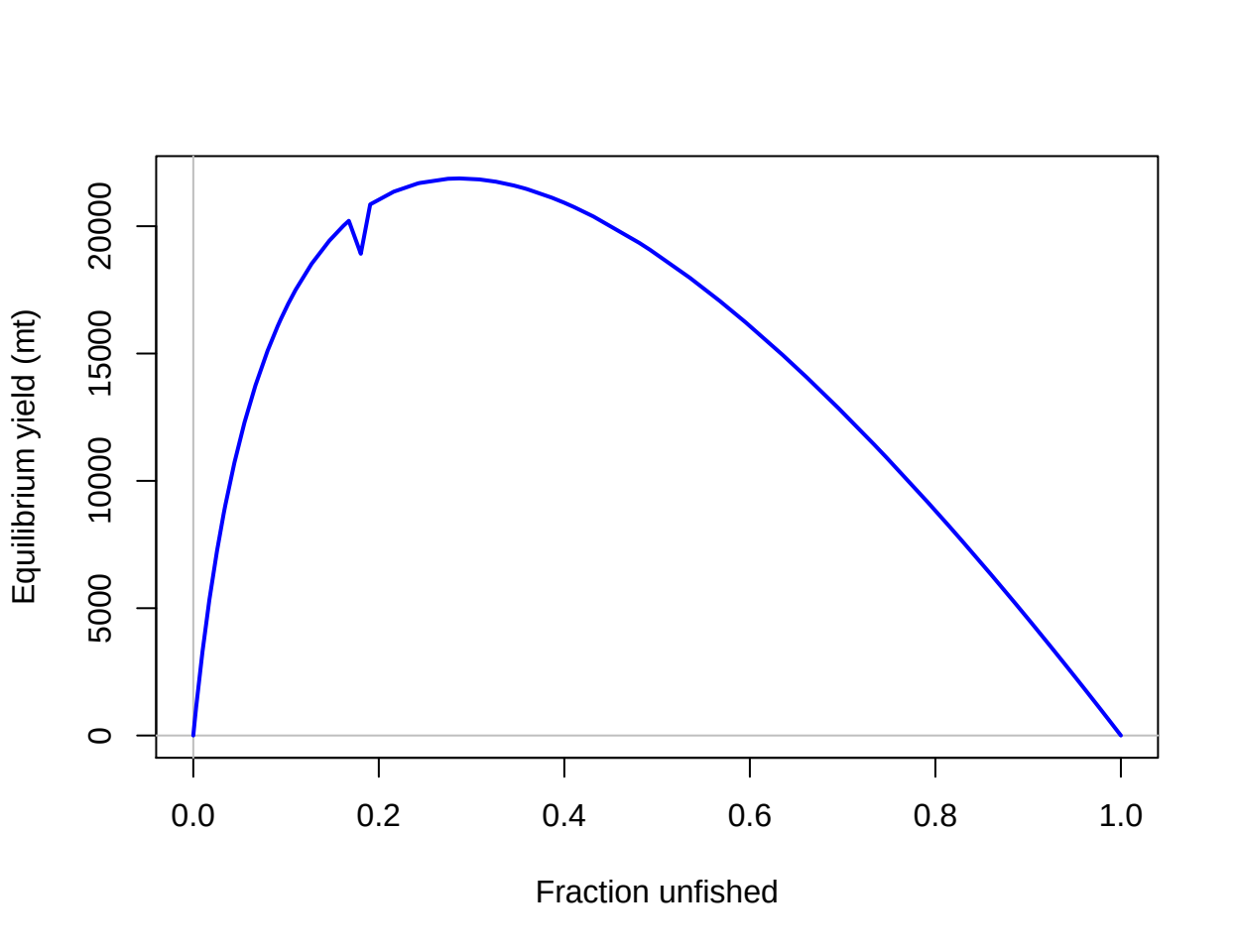

−2
0.1
2
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
Length (cm)
81
88
95
103
112
121
130
139
148
157
166
175
Year

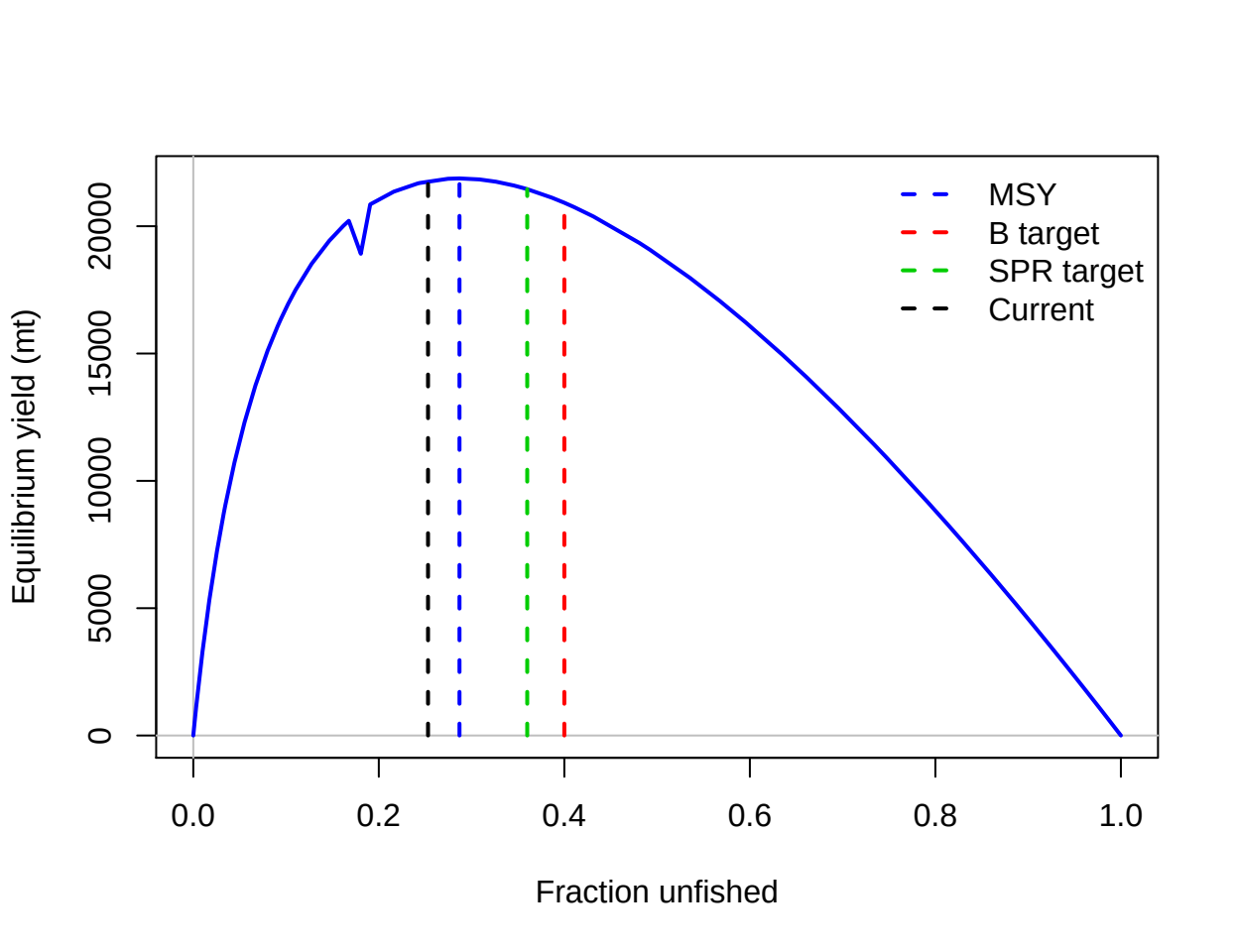


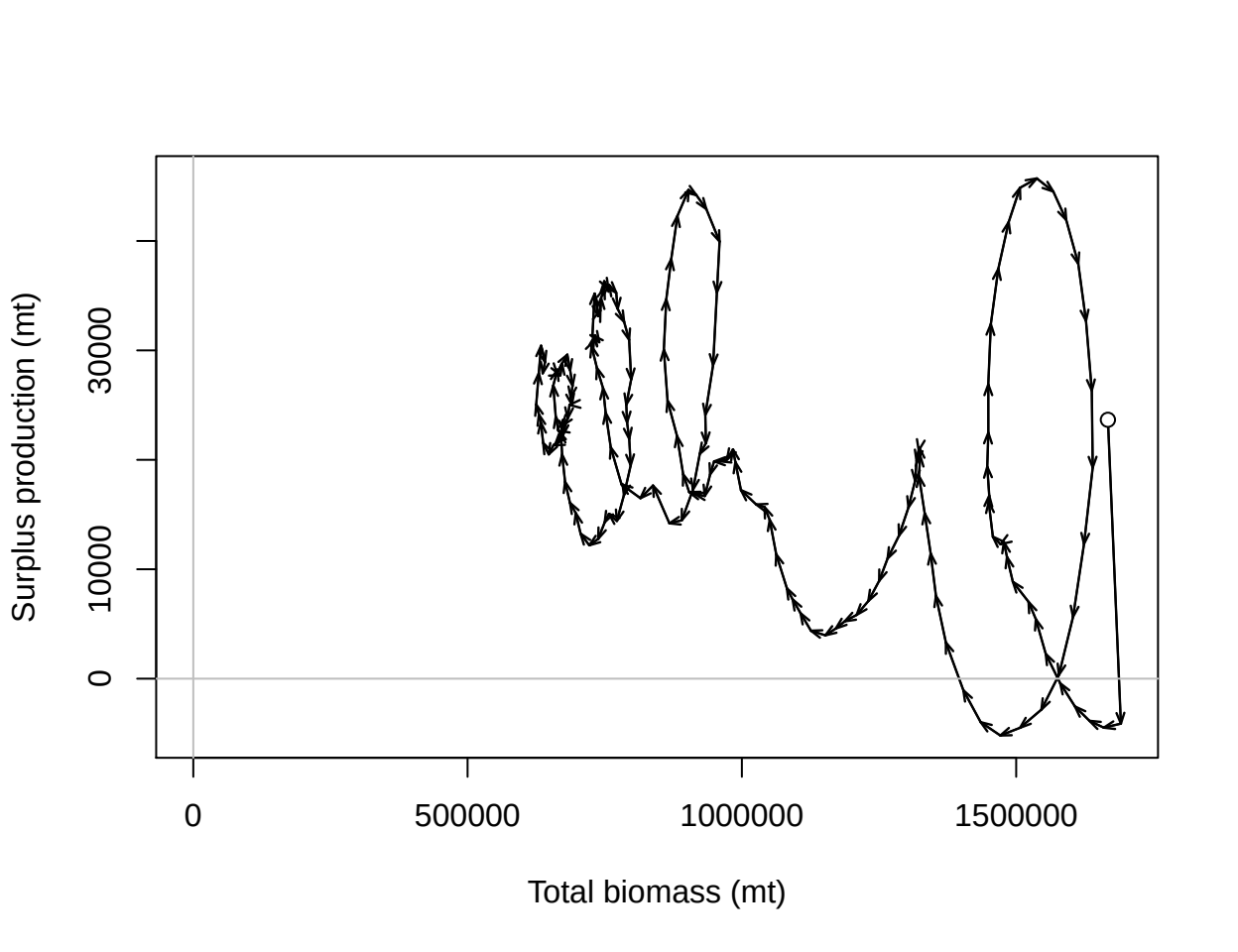
Effective sample size
Observed sample size
0
100
200
300
400
500
600
0
2
4
6
8
10
168
107
109
140
132
86
84
134
97
133
87
115
88
82
96
116
108
92
98
174
83
90
81
85
89
112
103
104
117
121
95

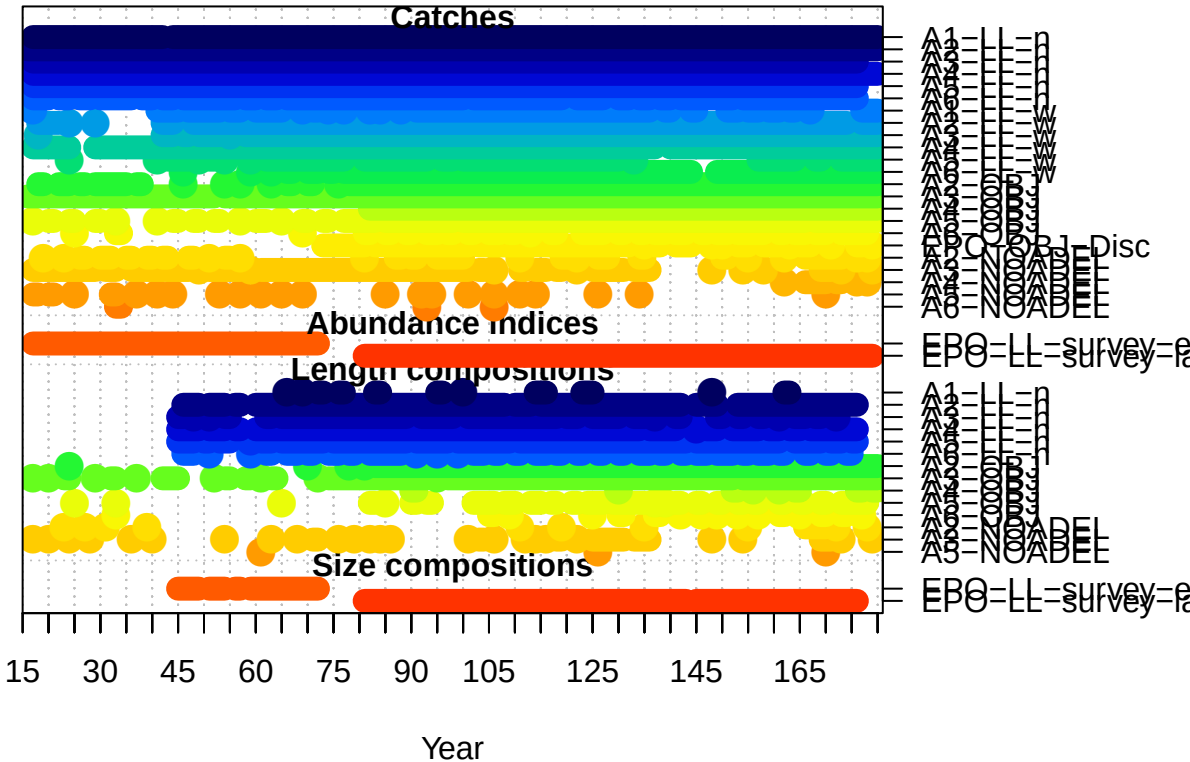

EPO−LL−survey−late (whole catch)
Mean length (cm)
400
300
200
100
0
−100
80
100
120
140
160
Year

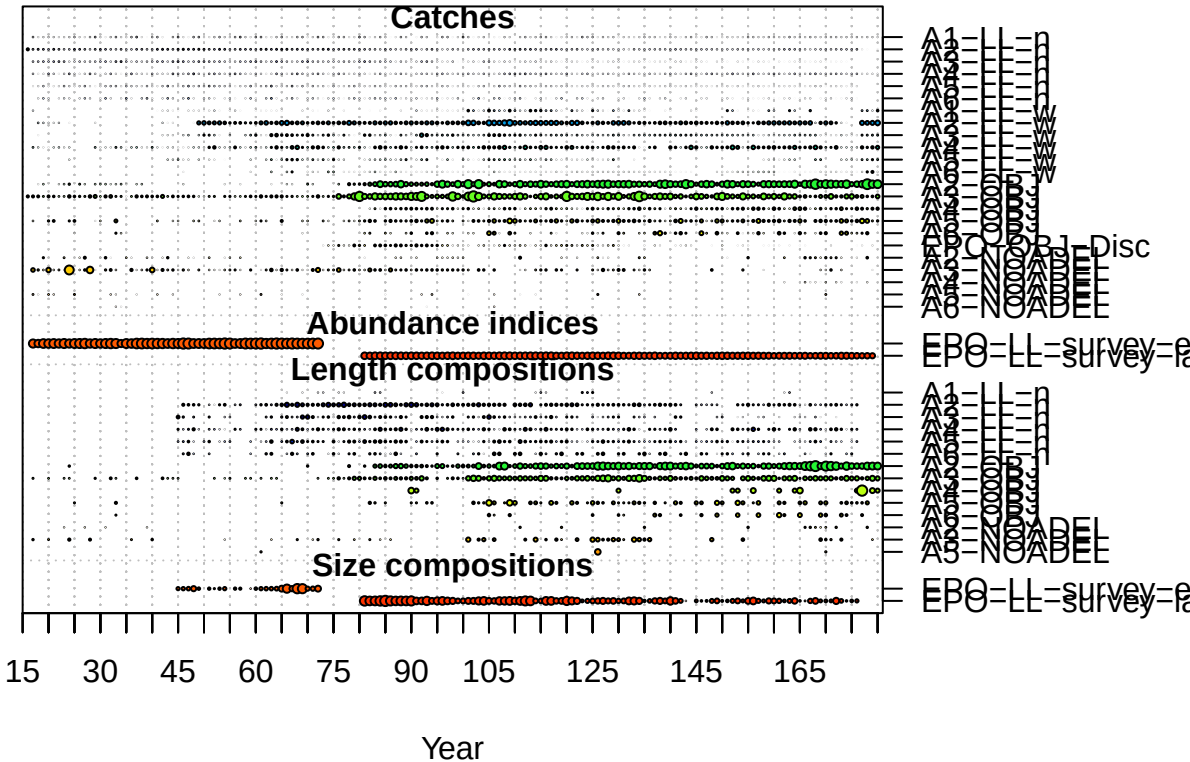

EPO−LL−survey−early
Sum of N adj.=47.1
Sum of N eff.=1145.4
EPO−LL−survey−late
Sum of N adj.=299.6
Sum of N eff.=9578.5
Proportion
0.25
0.20
0.15
0.10
0.05
0.00
50
100
150
200
Length (cm)


Equilibrium yield (mt)
0
5000
10000
15000
20000
0.0
0.2
0.4
0.6
0.8
1.0
Fraction unfished

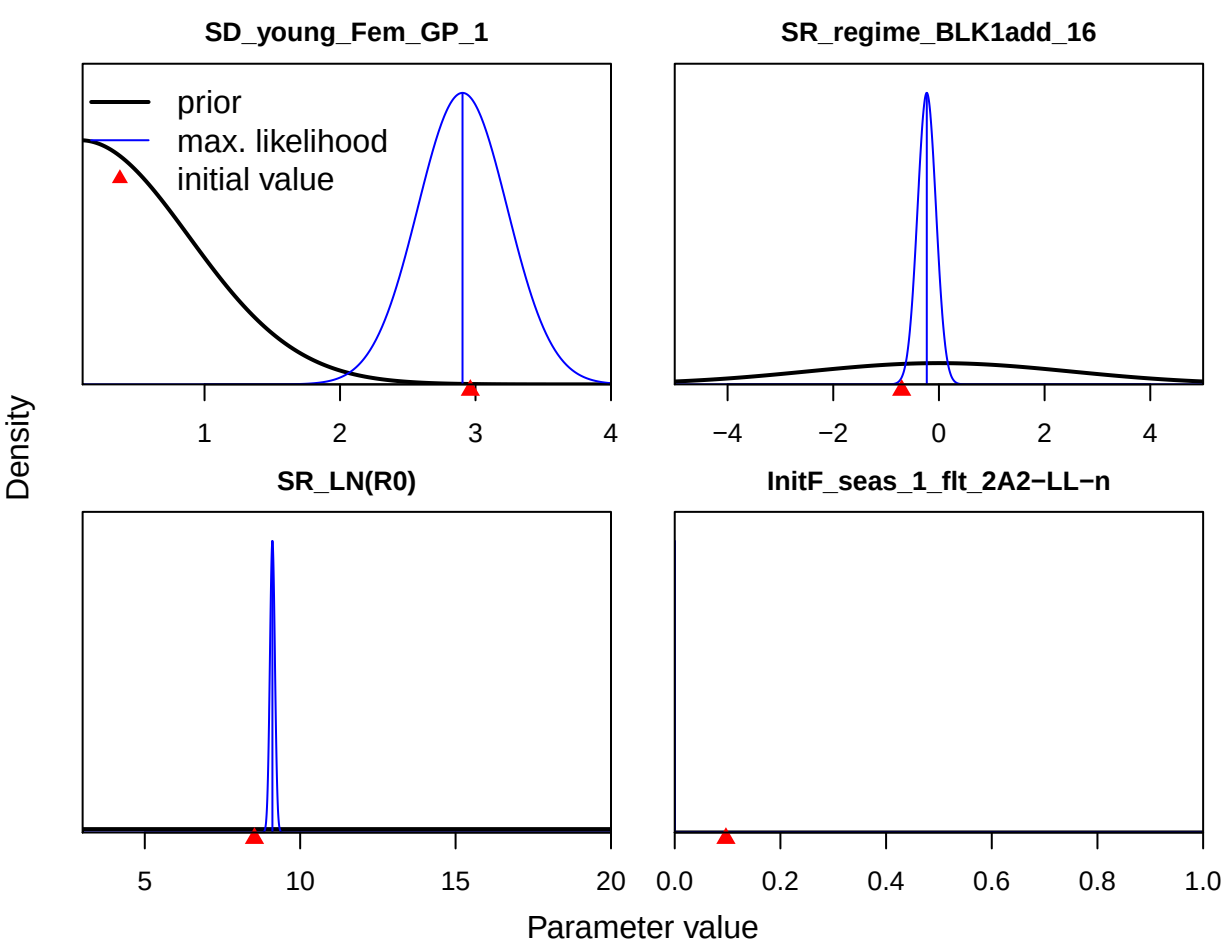

Equilibrium yield (mt)
0
5000
10000
15000
20000
0.0
0.2
0.4
0.6
0.8
1.0
Fraction unfished
MSY
B target
SPR target
Current

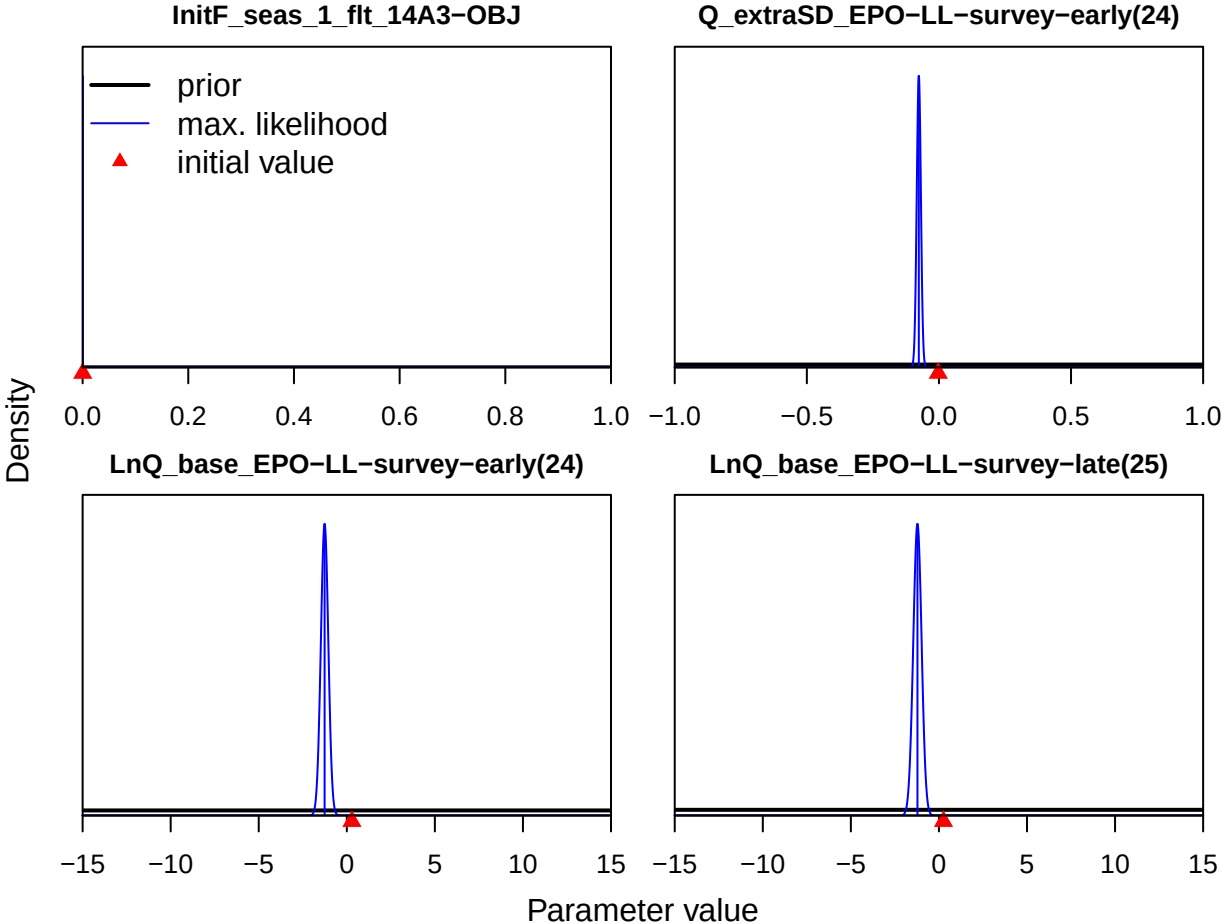

Surplus production (mt)
0
10000
30000
0
500000
1000000
1500000
Total biomass (mt)

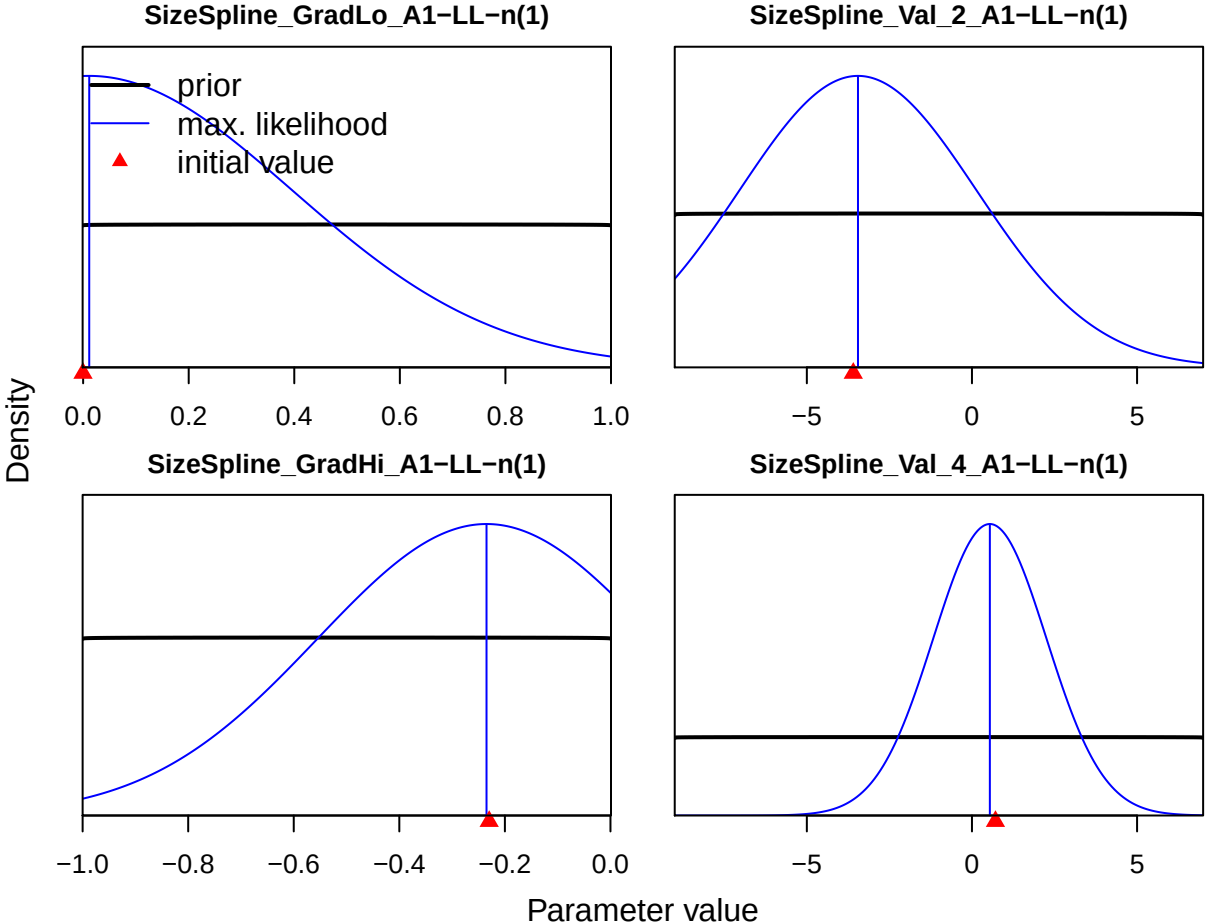

Catches
Abundance indices
Length compositions
Size compositions
A1-LL-n
A1-LL-w
A1-OBJ
A1-NOADEL
EPO-OBJ-Disc
EPO-LL-survey-a
EPO-LL-survey-n
15
30
45
60
75
90
105
125
145
165
Year

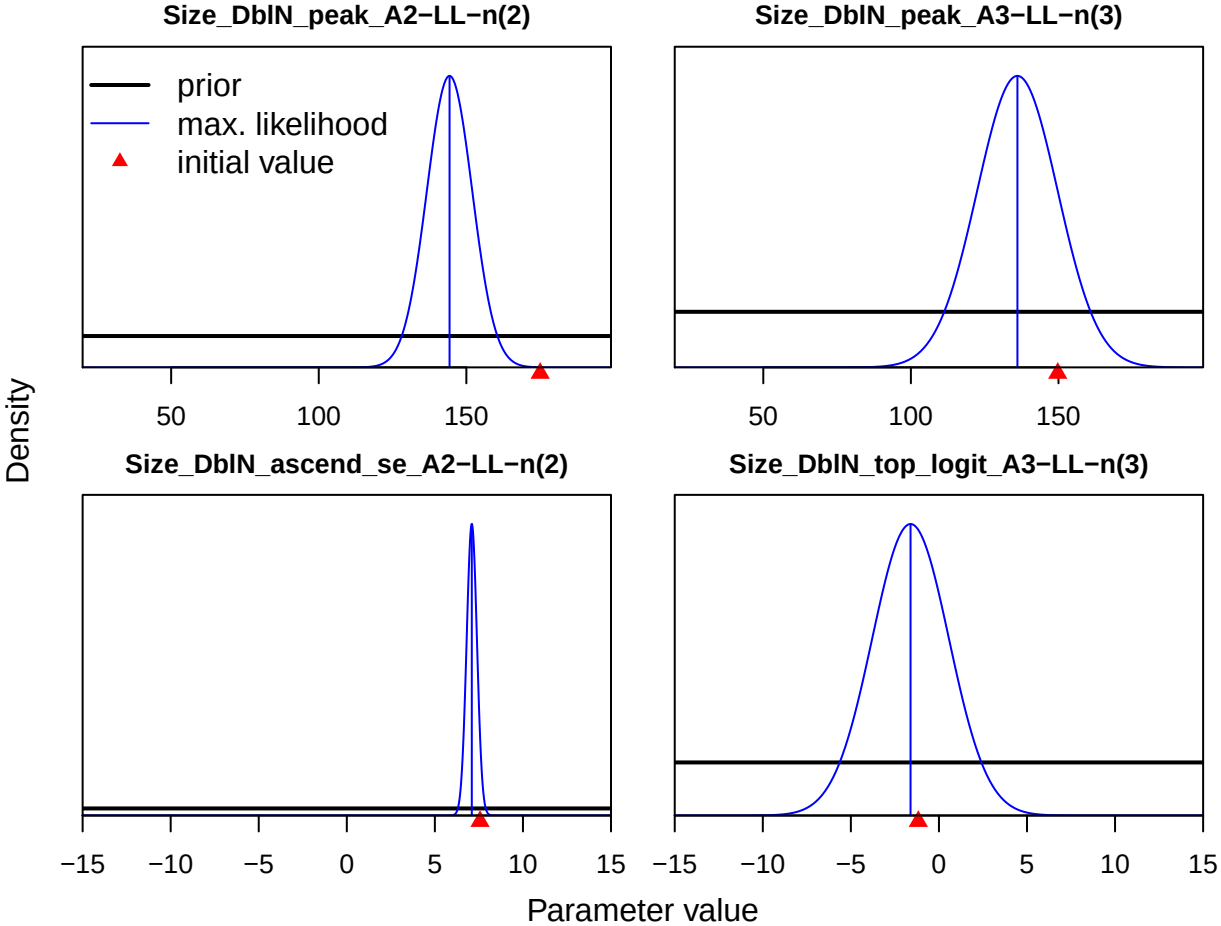


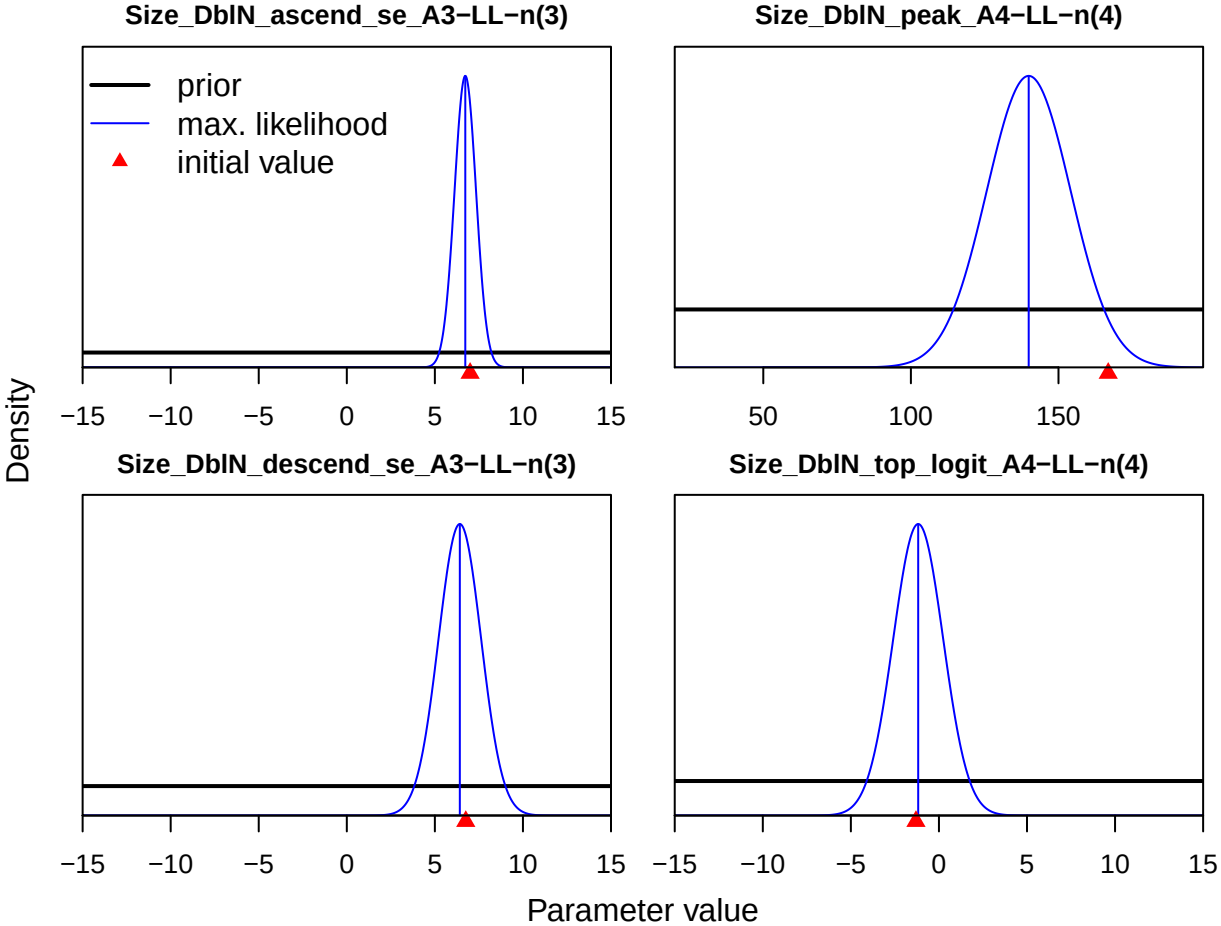
Catches
Abundance indices
Length compositions
Size compositions
A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A1−LL−w
A2−LL−w
A3−LL−w
A4−LL−w
A5−LL−w
A6−LL−w
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
EPO−OBJ−Disc
A2−NOADEL
A3−NOADEL
A4−NOADEL
A5−NOADEL
A6−NOADEL
EPO−LL−survey−e
EPO−LL−survey−la
A1−LL−n
A2−LL−n
A3−LL−n
A4−LL−n
A5−LL−n
A6−LL−n
A2−OBJ
A3−OBJ
A4−OBJ
A5−OBJ
A6−OBJ
A2−NOADEL
A3−NOADEL
A5−NOADEL
EPO−LL−survey−e
EPO−LL−survey−la
15
30
45
60
75
90
105
125
145
165
Year

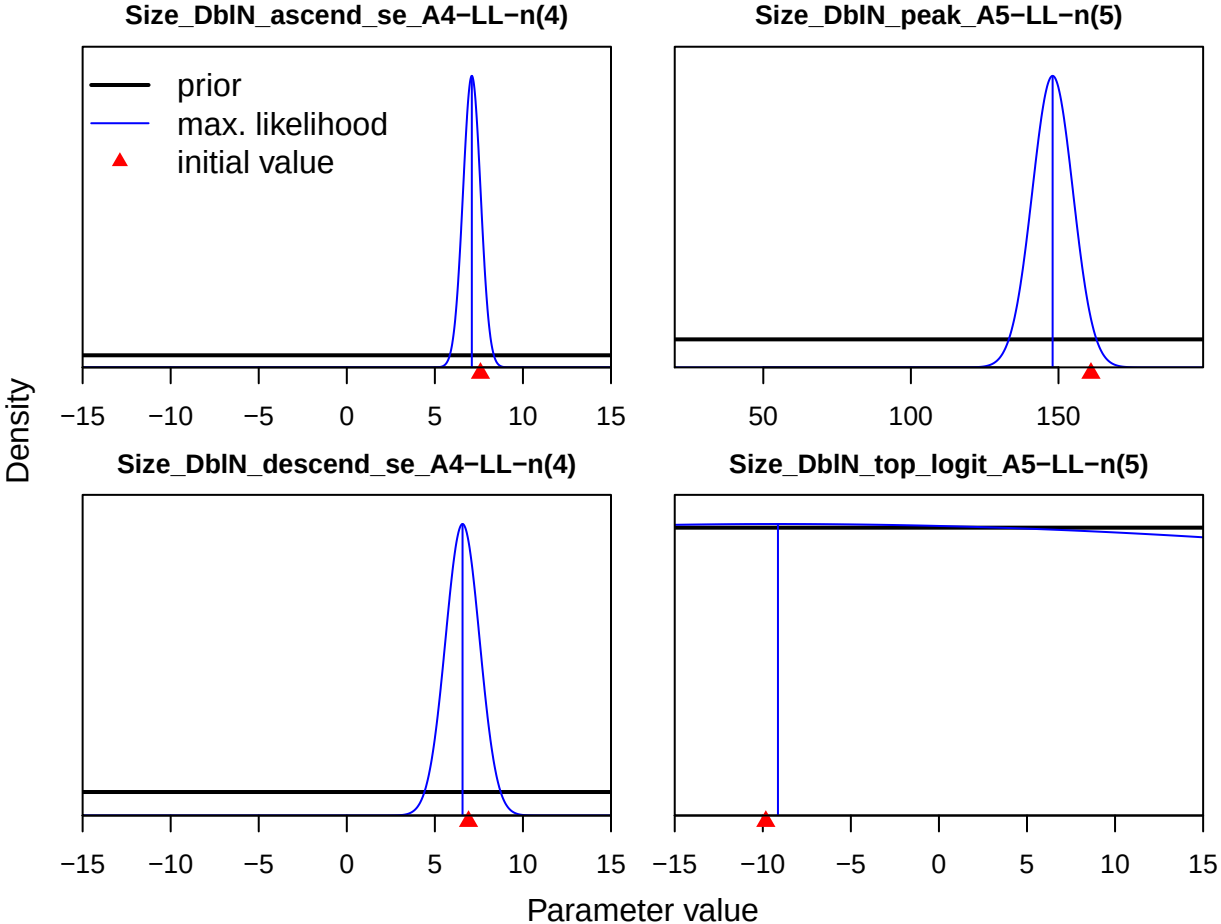

SD_young_Fem_GP_1
SR_regime_BLK1add_16
prior
max. likelihood
initial value
Density
1
2
3
4
−4
−2
0
2
4
SR_LN(R0)
InitF_seas_1_flt_2A2−LL−n
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
Parameter value

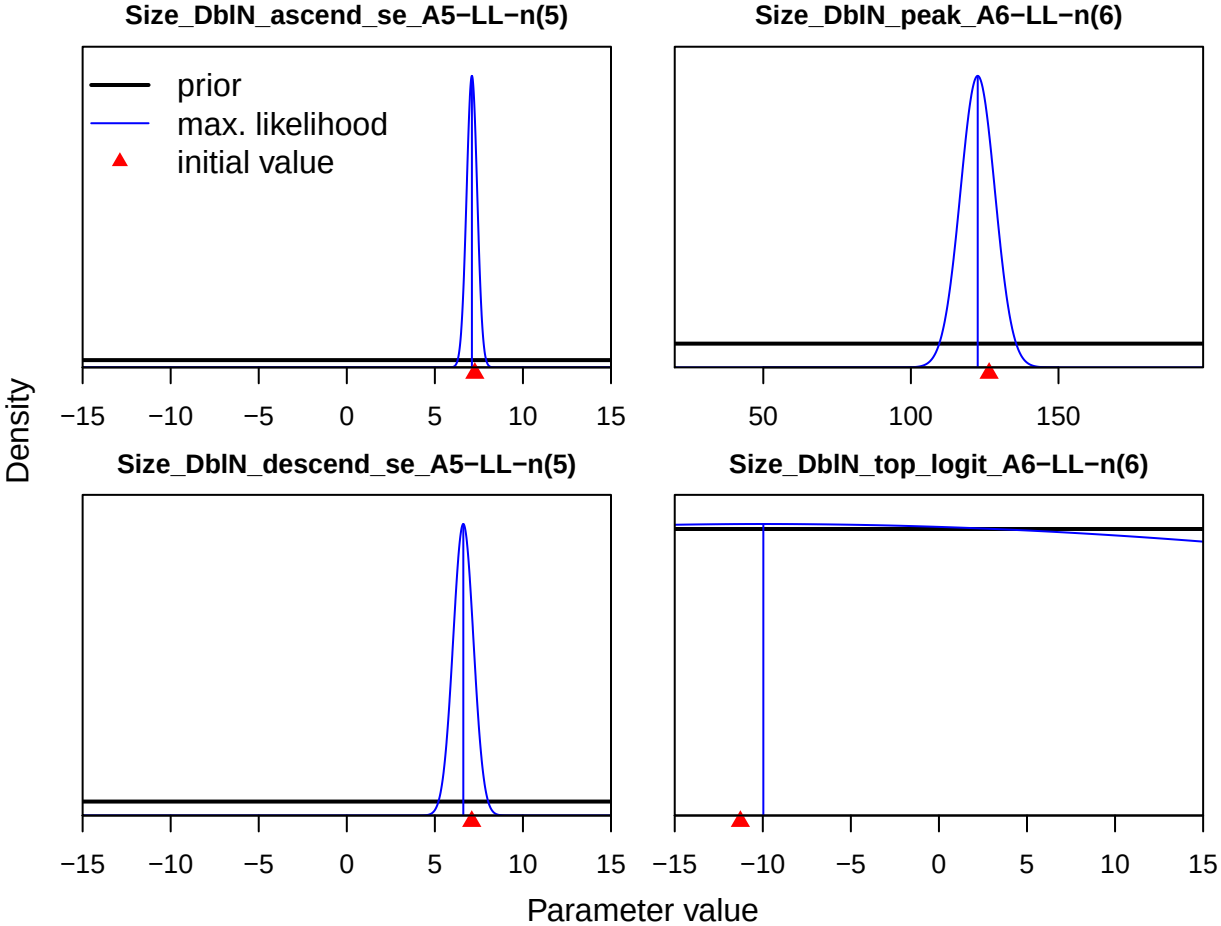

InitF_seas_1_flt_14A3−OBJ
Q_extraSD_EPO−LL−survey−early(24)
prior
max. likelihood
initial value
Density
0.0
0.2
0.4
0.6
0.8
1.0
−1.0
−0.5
0.0
0.5
1.0
LnQ_base_EPO−LL−survey−early(24)
LnQ_base_EPO−LL−survey−late(25)
−15
−10
−5
0
5
10
15
Parameter value

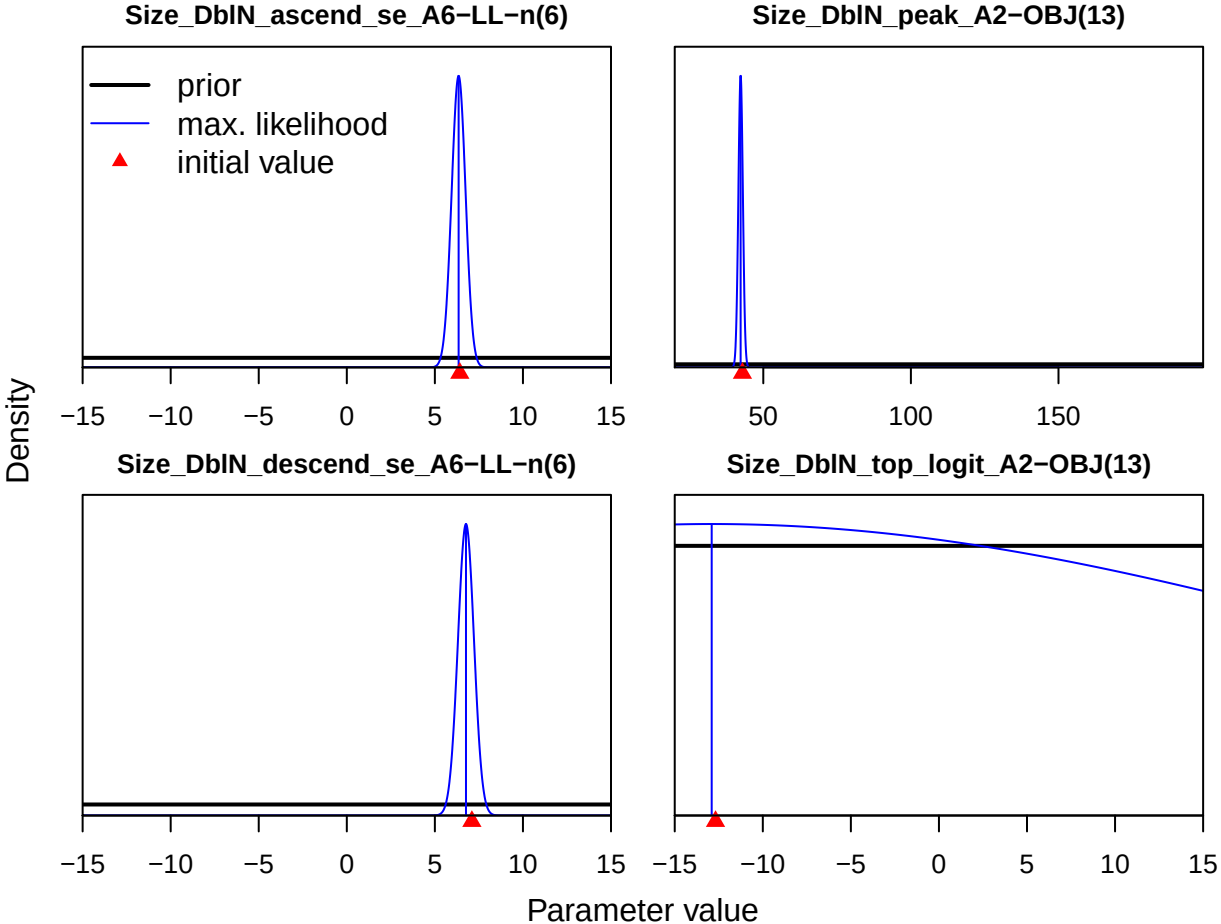

SizeSpline_GradLo_A1−LL−n(1)
SizeSpline_Val_2_A1−LL−n(1)
SizeSpline_GradHi_A1−LL−n(1)
SizeSpline_Val_4_A1−LL−n(1)
prior
max. likelihood
initial value
Density
Parameter value
0.0
0.2
0.4
0.6
0.8
1.0
−5
0
5
−1.0
−0.8
−0.6
−0.4
−0.2
0.0

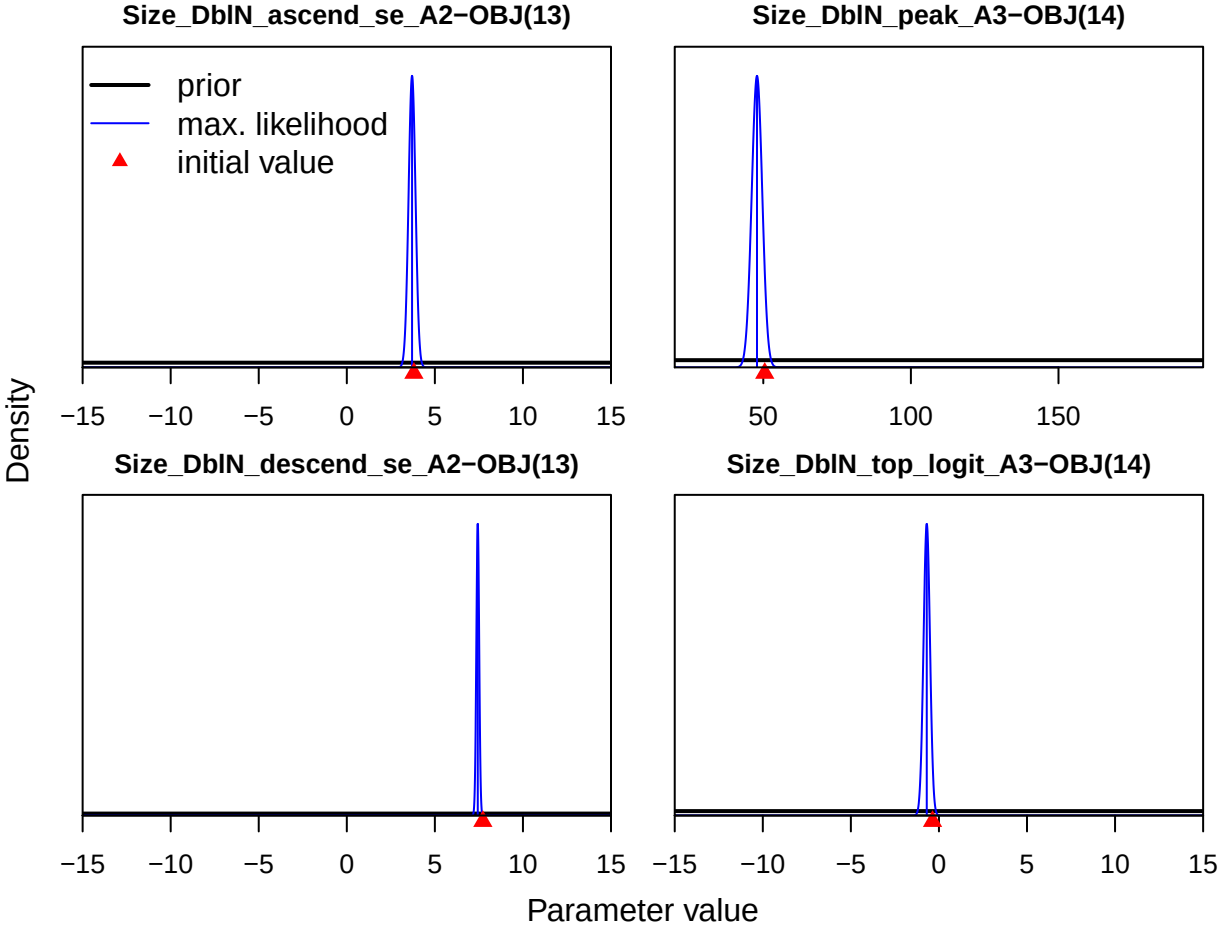

Size_DblN_peak_A2−LL−n(2)
Size_DblN_peak_A3−LL−n(3)
Size_DblN_ascend_se_A2−LL−n(2)
Size_DblN_top_logit_A3−LL−n(3)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15

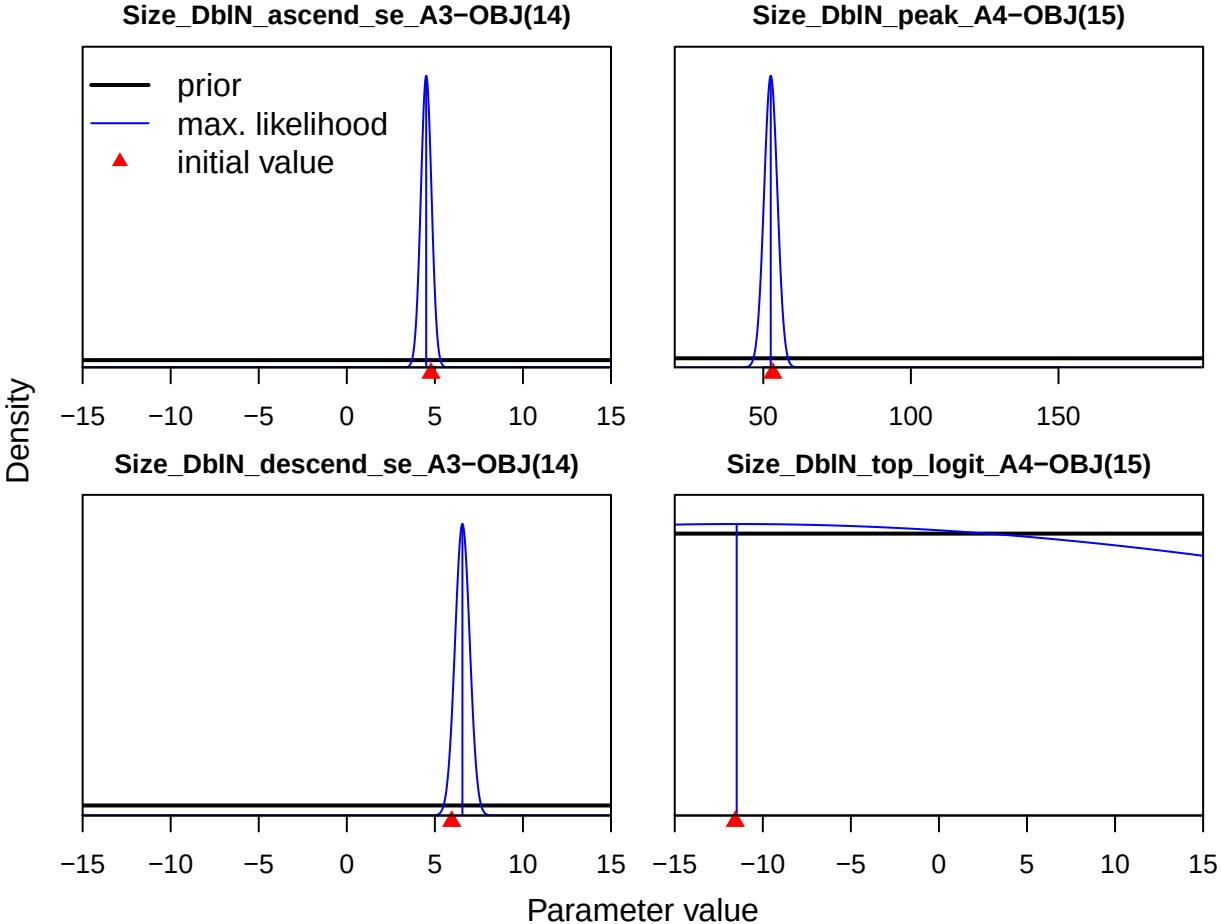

Size_DblN_ascend_se_A3−LL−n(3)
Size_DblN_peak_A4−LL−n(4)
Size_DblN_descend_se_A3−LL−n(3)
Size_DblN_top_logit_A4−LL−n(4)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
50
100
150

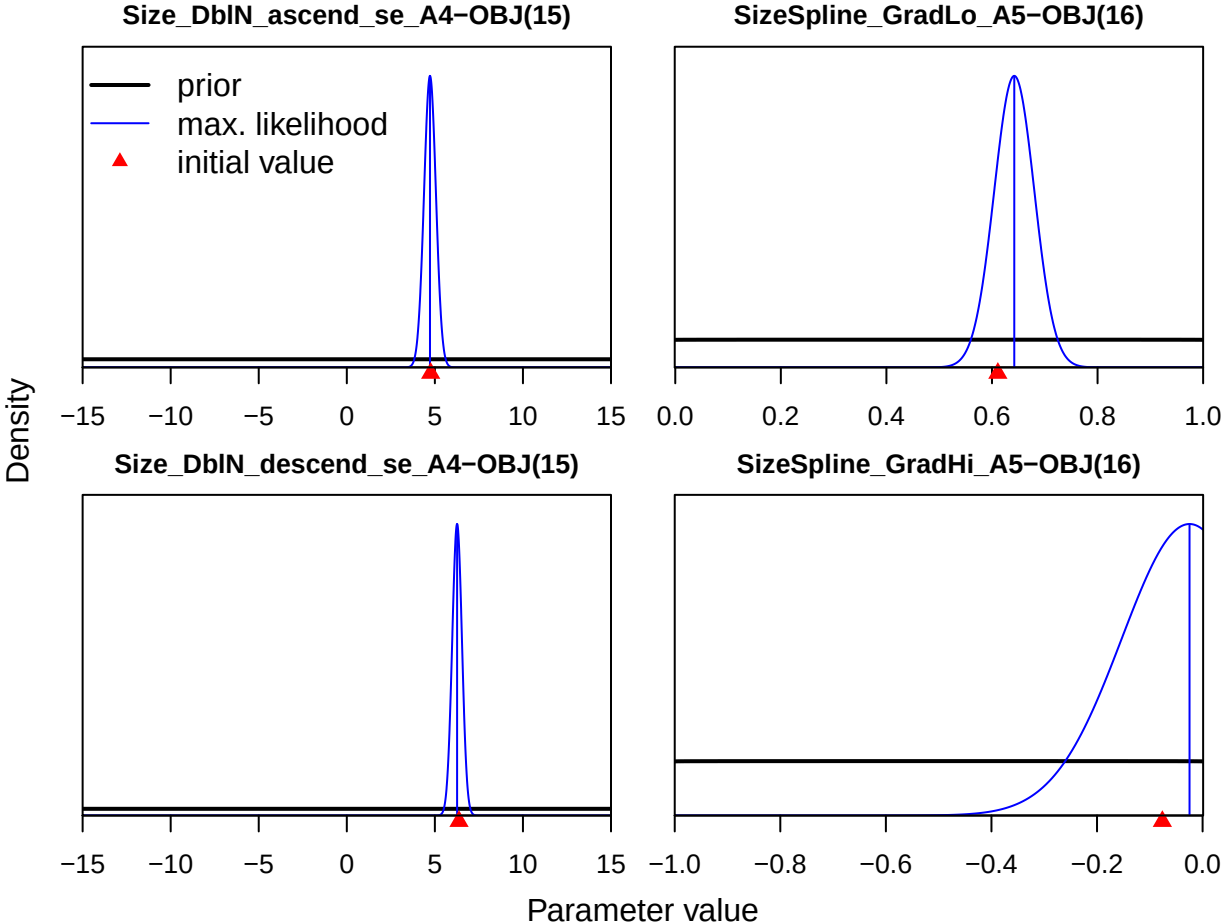

Size_DblN_ascend_se_A4−LL−n(4)
Size_DblN_peak_A5−LL−n(5)
Size_DblN_descend_se_A4−LL−n(4)
Size_DblN_top_logit_A5−LL−n(5)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
50
100
150

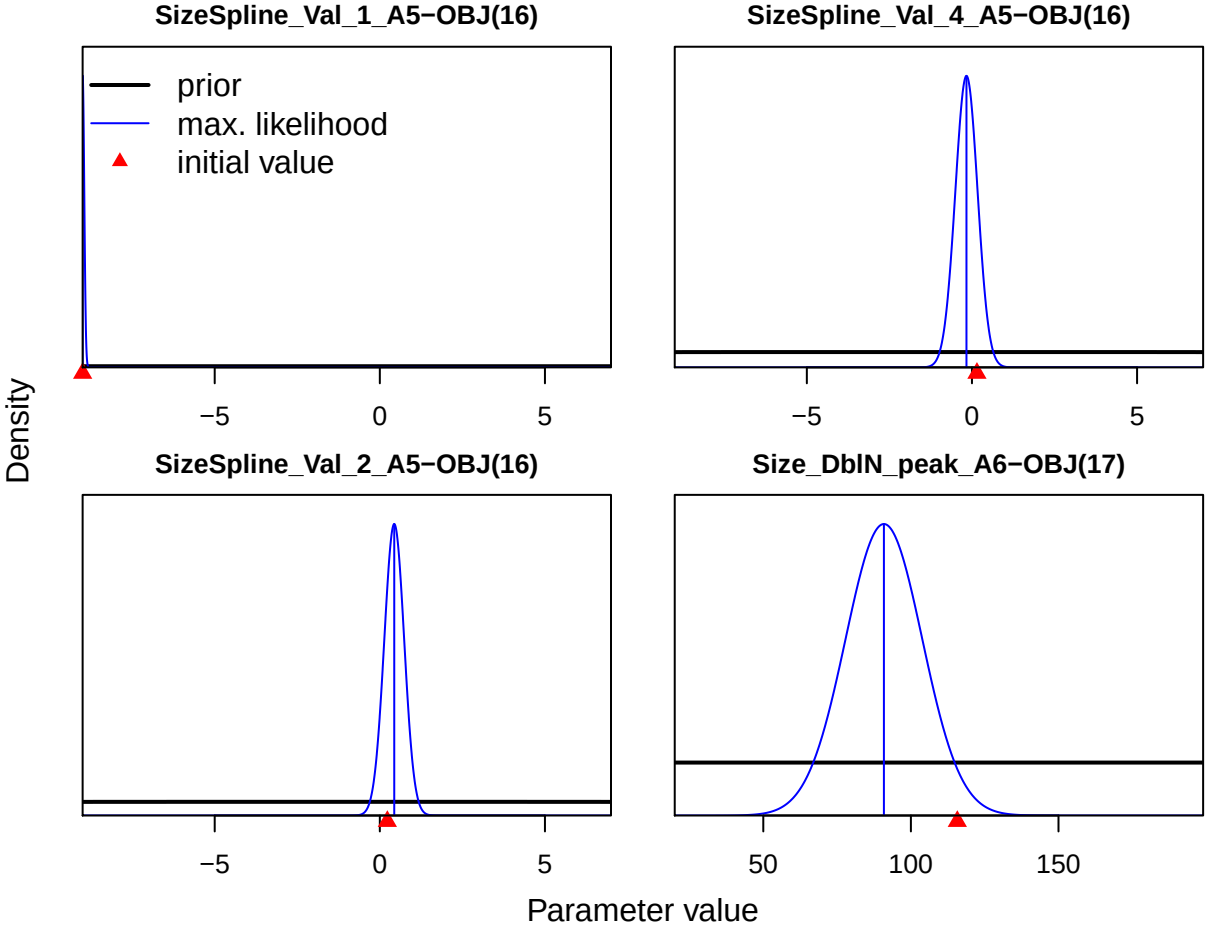

Size_DblN_ascend_se_A5−LL−n(5)
Size_DblN_peak_A6−LL−n(6)
Size_DblN_descend_se_A5−LL−n(5)
Size_DblN_top_logit_A6−LL−n(6)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
50
100
150

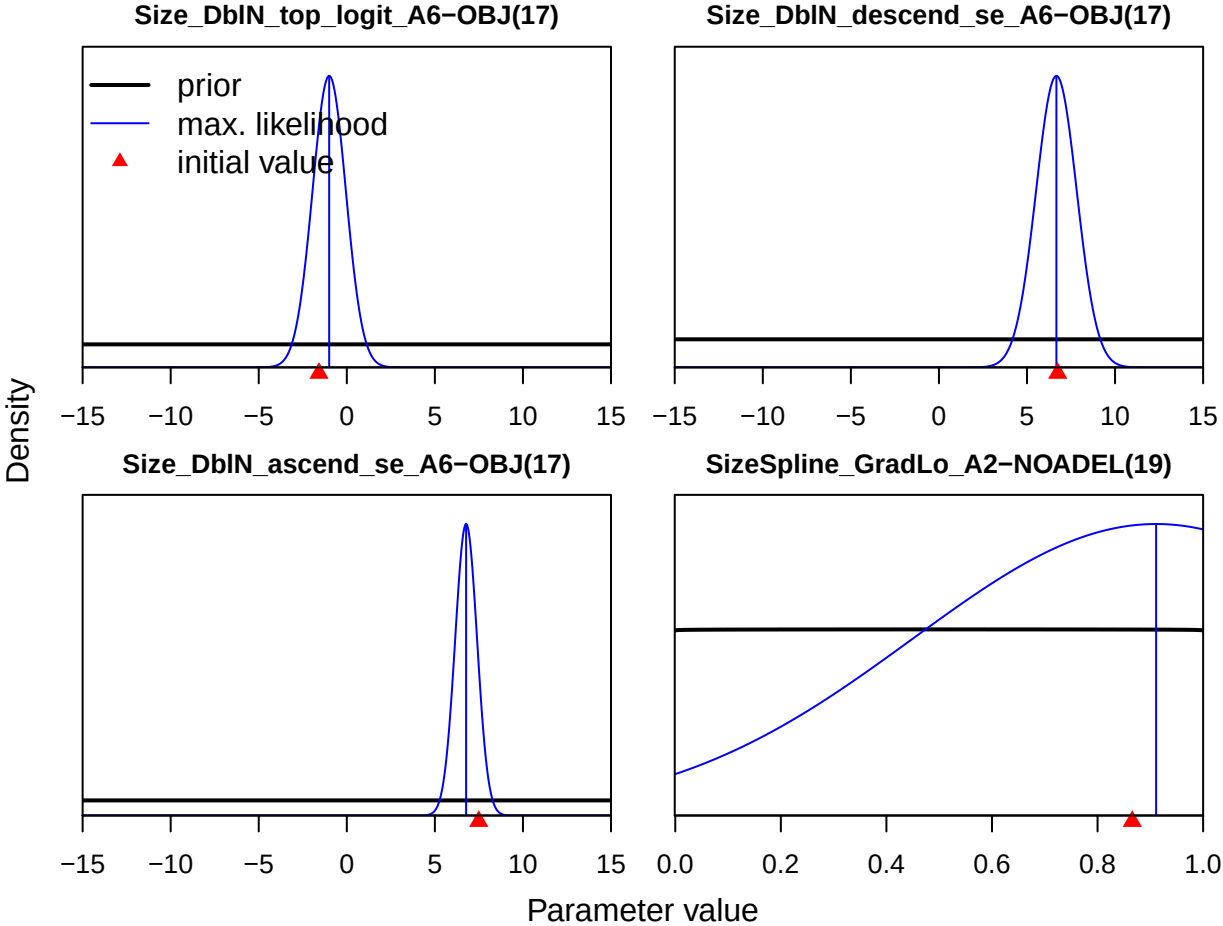

Size_DblN_ascend_se_A6−LL−n(6)
Size_DblN_peak_A2−OBJ(13)
Size_DblN_descend_se_A6−LL−n(6)
Size_DblN_top_logit_A2−OBJ(13)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
50
100
150

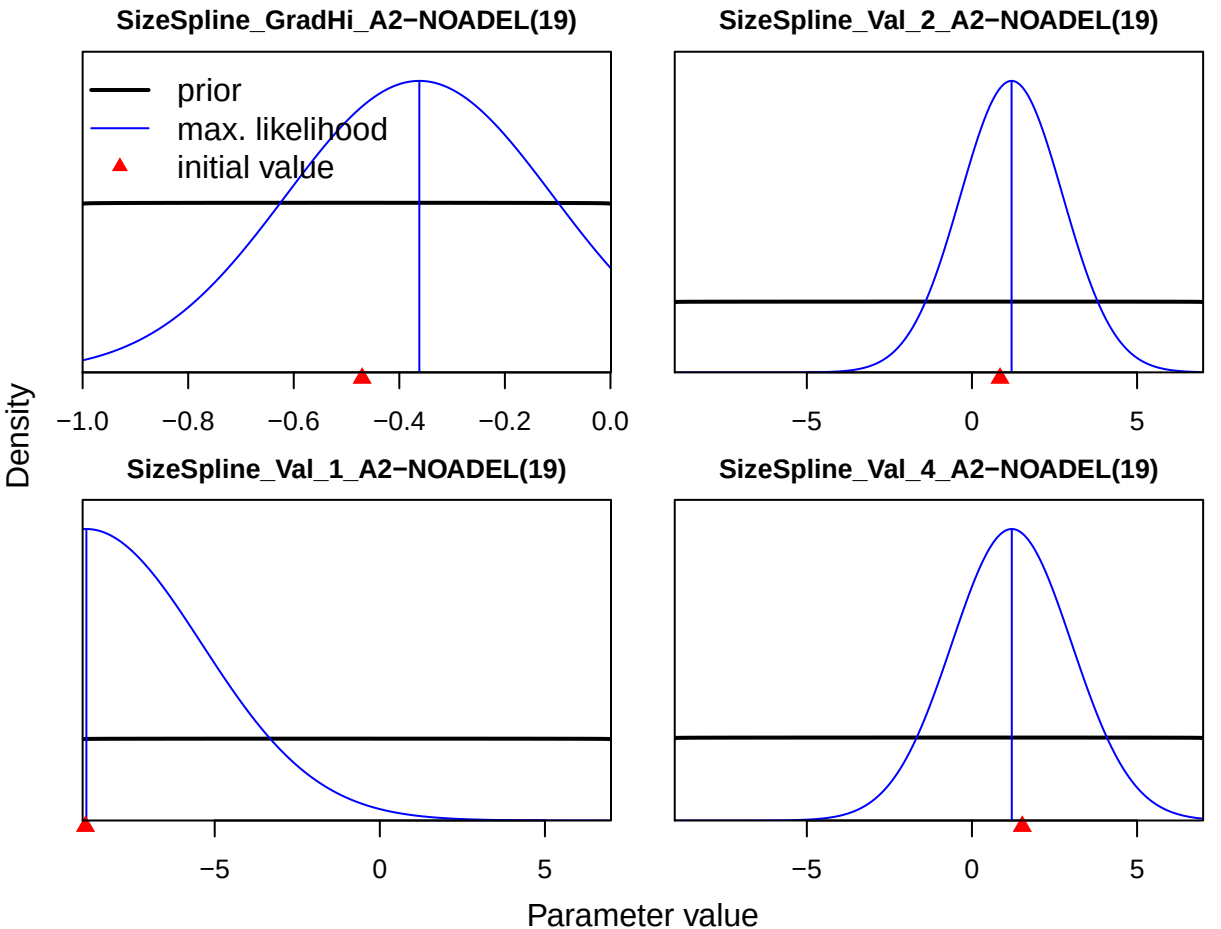

Size_DblN_ascend_se_A2−OBJ(13)
Size_DblN_peak_A3−OBJ(14)
Size_DblN_descend_se_A2−OBJ(13)
Size_DblN_top_logit_A3−OBJ(14)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
50
100
150

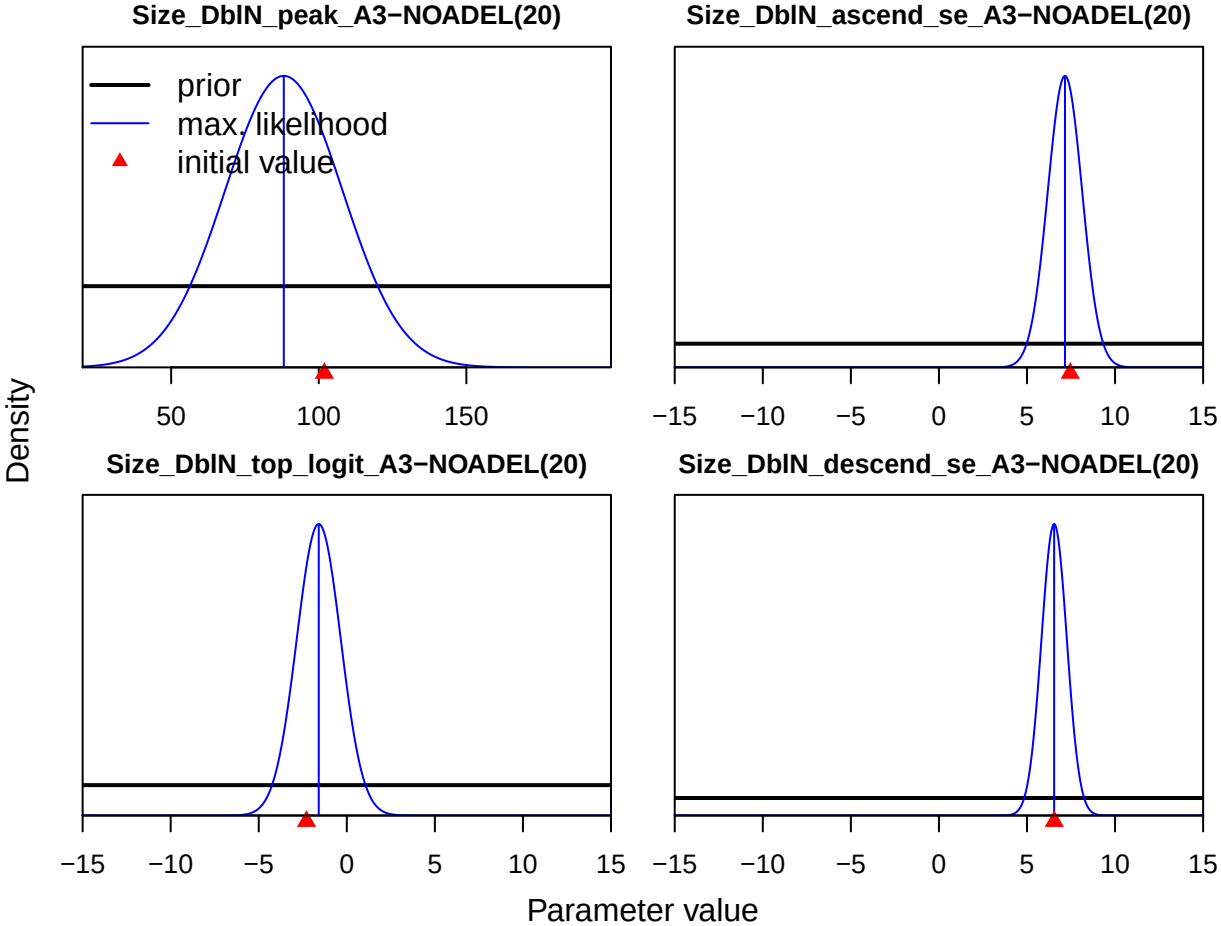

Size_DblN_ascend_se_A3−OBJ(14)
Size_DblN_peak_A4−OBJ(15)
Size_DblN_descend_se_A3−OBJ(14)
Size_DblN_top_logit_A4−OBJ(15)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
50
100
150

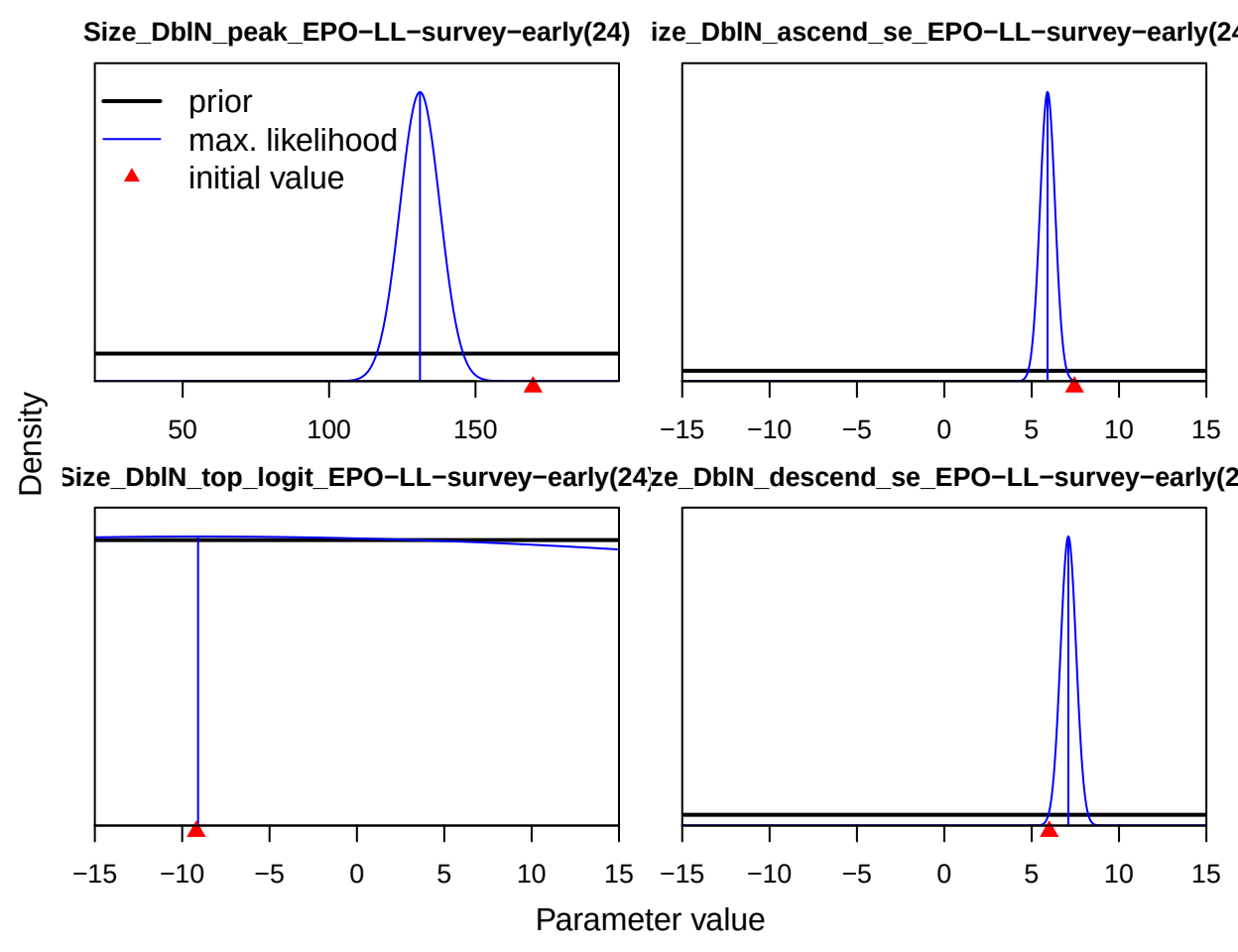

Size_DblN_ascend_se_A4−OBJ(15)
SizeSpline_GradLo_A5−OBJ(16)
Size_DblN_descend_se_A4−OBJ(15)
SizeSpline_GradHi_A5−OBJ(16)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0
−1.0
−0.8
−0.6
−0.4
−0.2
0.0

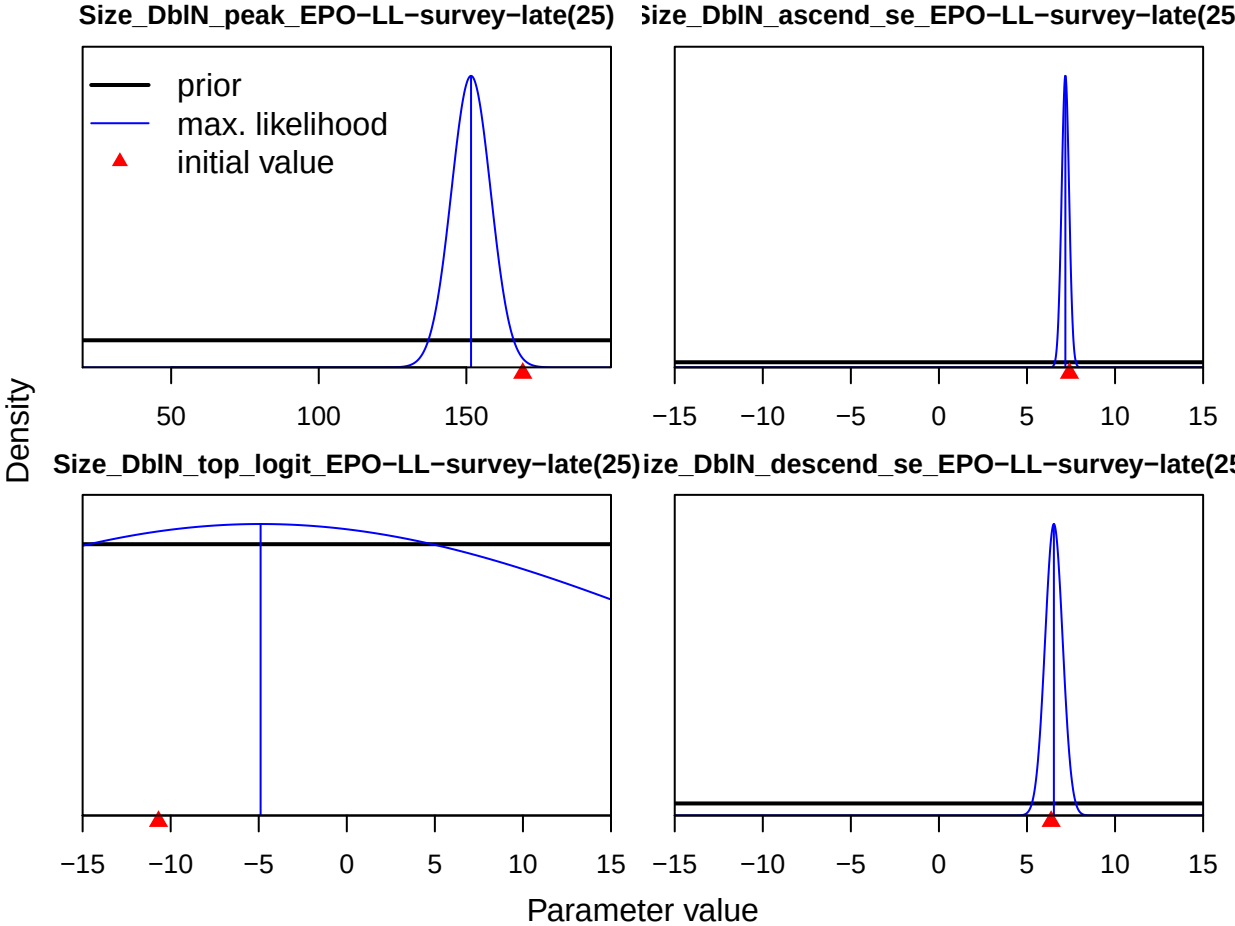

SizeSpline_Val_1_A5−OBJ(16)
SizeSpline_Val_4_A5−OBJ(16)
SizeSpline_Val_2_A5−OBJ(16)
Size_DblN_peak_A6−OBJ(17)
prior
max. likelihood
initial value
Density
Parameter value
−5
0
5
50
100
150

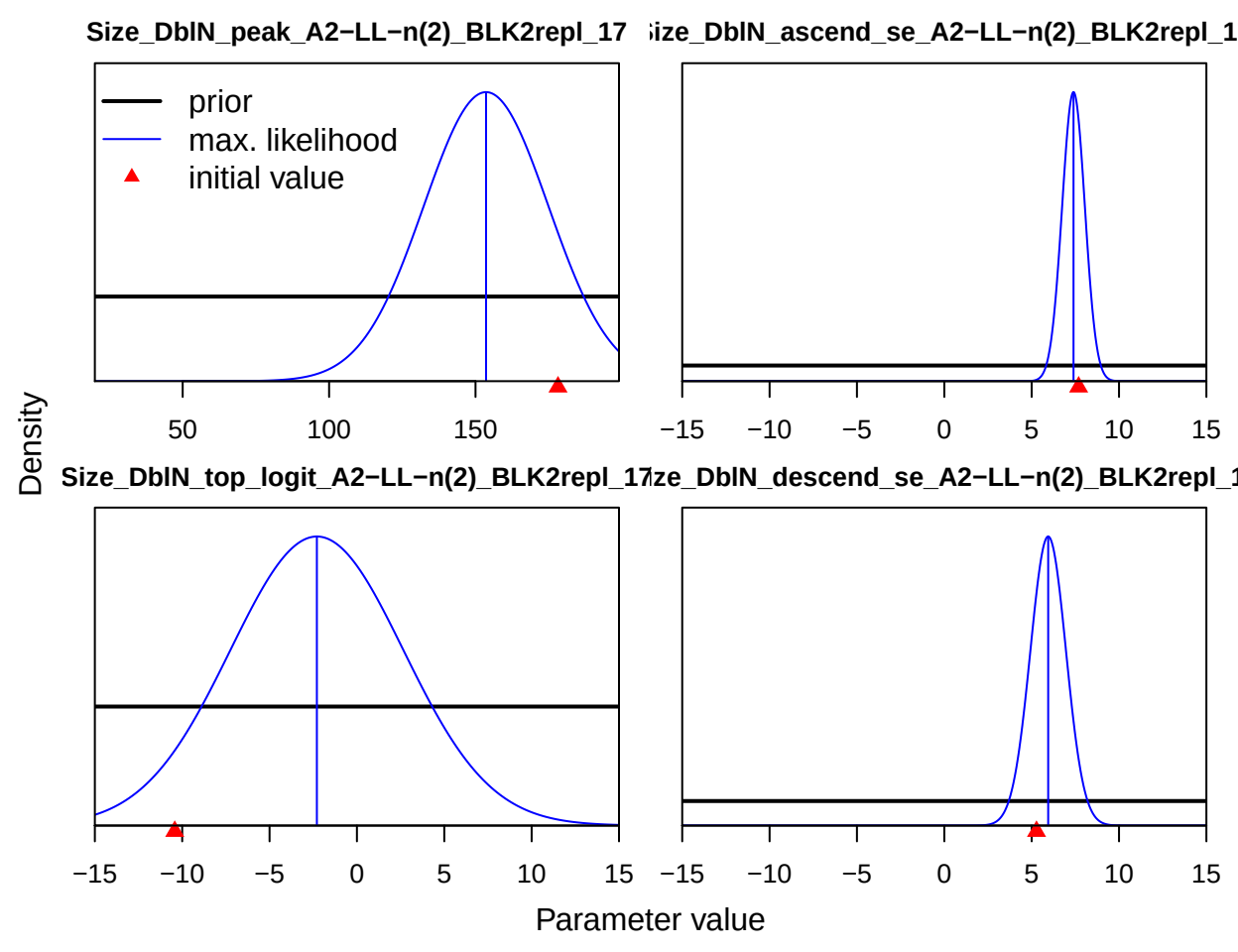

Size_DblN_top_logit_A6−OBJ(17)
Size_DblN_descend_se_A6−OBJ(17)
Size_DblN_ascend_se_A6−OBJ(17)
SizeSpline_GradLo_A2−NOADEL(19)
prior
max. likelihood
initial value
Density
Parameter value
−15
−10
−5
0
5
10
15
0.0
0.2
0.4
0.6
0.8
1.0

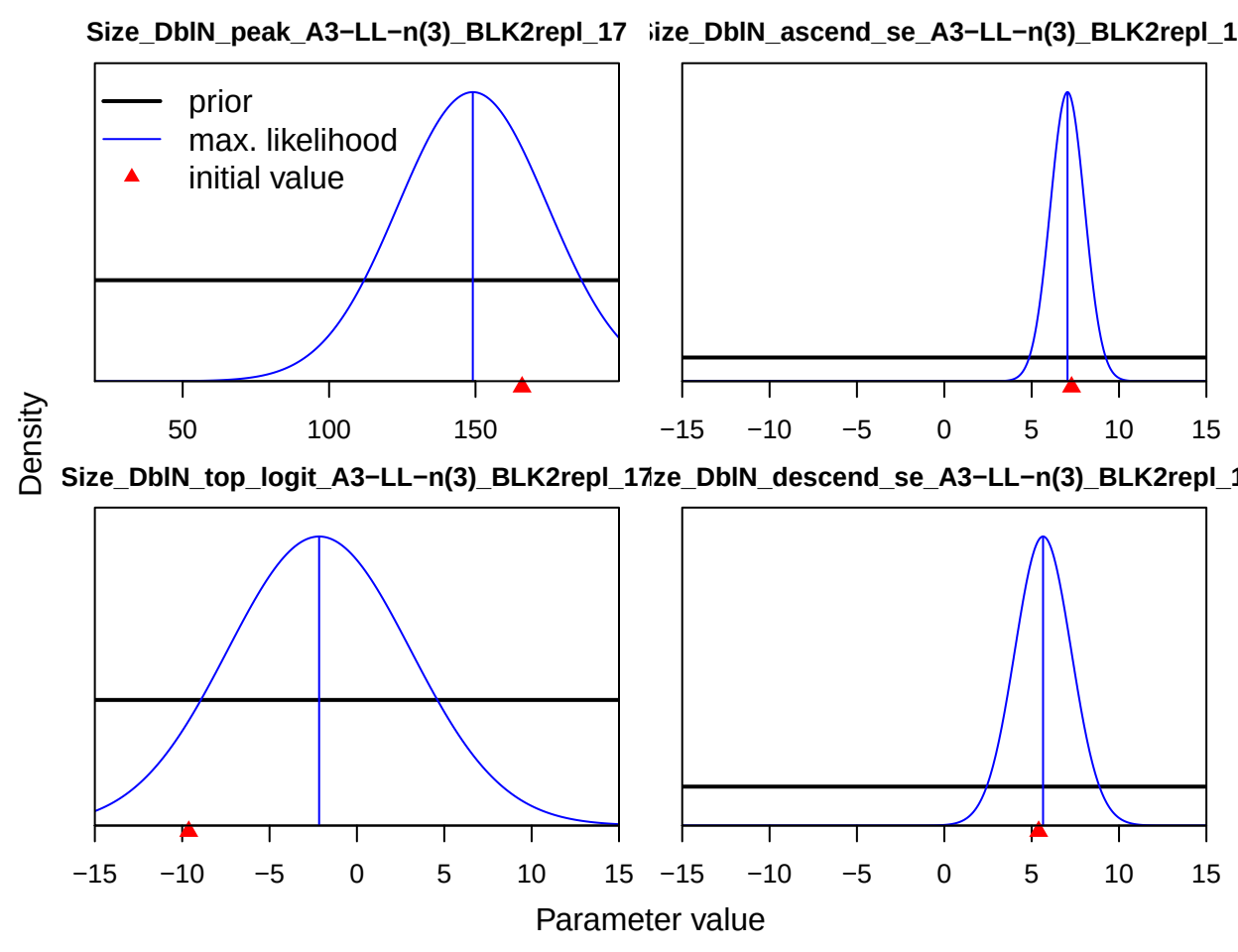

SizeSpline_GradHi_A2−NOADEL(19)
SizeSpline_Val_2_A2−NOADEL(19)
SizeSpline_Val_1_A2−NOADEL(19)
SizeSpline_Val_4_A2−NOADEL(19)
prior
max. likelihood
initial value
Density
Parameter value
−1.0
−0.8
−0.6
−0.4
−0.2
0.0
−5
0
5

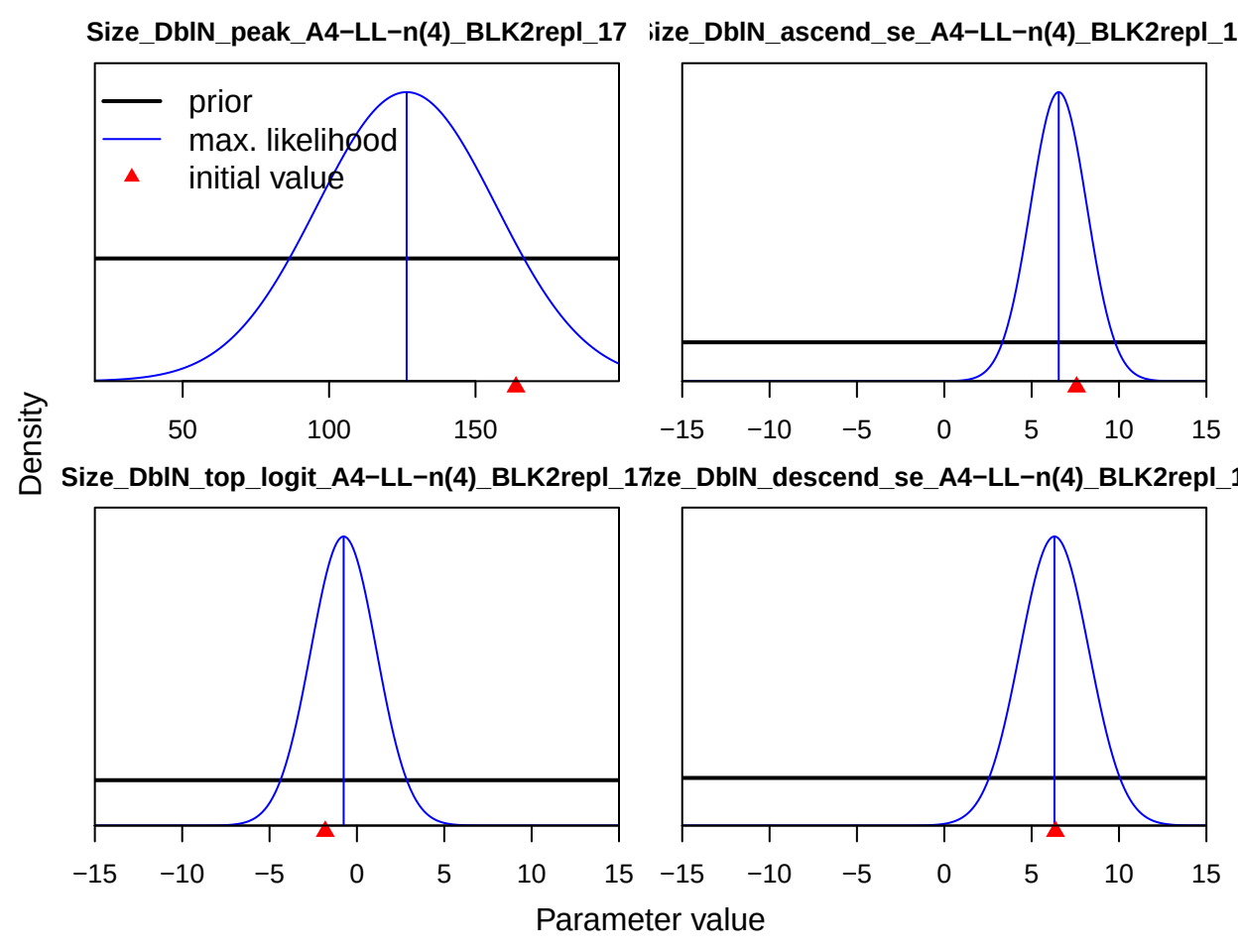

Size_DblN_peak_A3−NOADEL(20)
Size_DblN_ascend_se_A3−NOADEL(20)
Size_DblN_top_logit_A3−NOADEL(20)
Size_DblN_descend_se_A3−NOADEL(20)
prior
max. likelihood
initial value
Density
Parameter value
50
100
150
−15
−10
−5
0
5
10
15

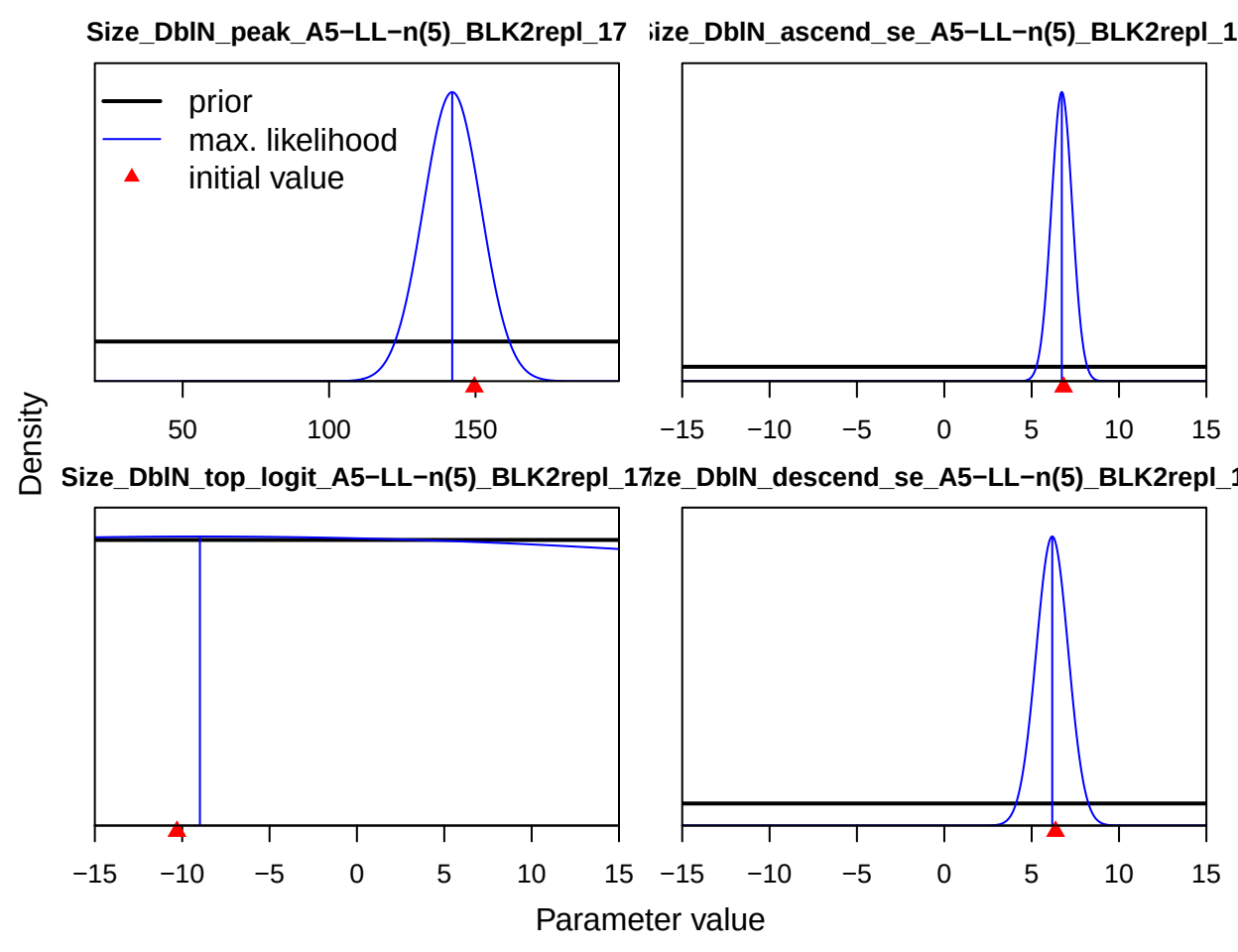

Size_DblN_peak_EPO−LL−survey−early(24)
ize_DblN_ascend_se_EPO−LL−survey−early(24
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_EPO−LL−survey−early(24
ze_DblN_descend_se_EPO−LL−survey−early(2
Parameter value

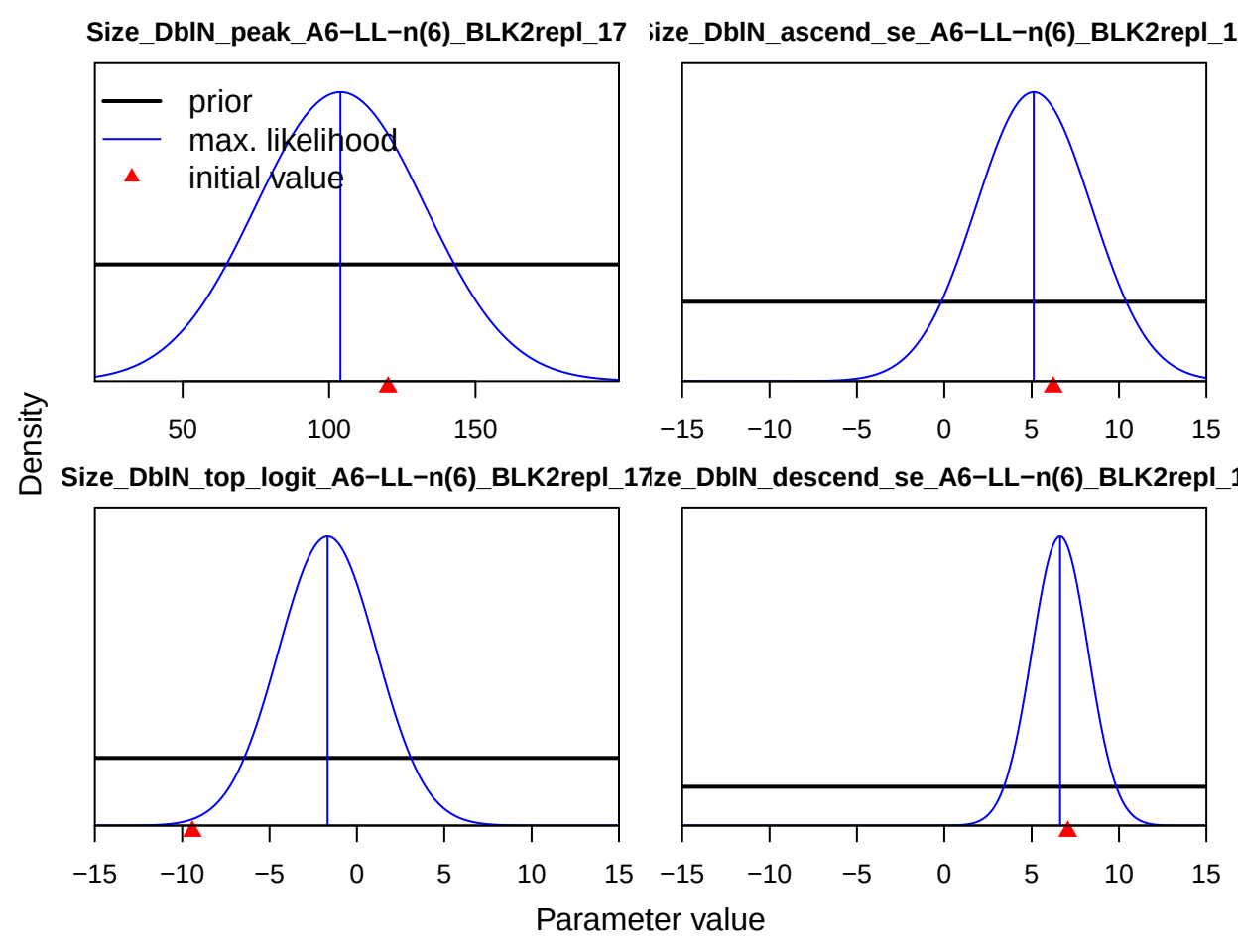

Size_DblN_peak_EPO−LL−survey−late(25)
ize_DblN_ascend_se_EPO−LL−survey−late(25
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_EPO−LL−survey−late(25)
ize_DblN_descend_se_EPO−LL−survey−late(25
Parameter value


Size_DblN_peak_A2−LL−n(2)_BLK2repl_17
ize_DblN_ascend_se_A2−LL−n(2)_BLK2repl_1
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_A2−LL−n(2)_BLK2repl_17
ze_DblN_descend_se_A2−LL−n(2)_BLK2repl_1
Parameter value


Size_DblN_peak_A3−LL−n(3)_BLK2repl_17
ize_DblN_ascend_se_A3−LL−n(3)_BLK2repl_1
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_A3−LL−n(3)_BLK2repl_17
ze_DblN_descend_se_A3−LL−n(3)_BLK2repl_1
Parameter value


Size_DblN_peak_A4−LL−n(4)_BLK2repl_17
ize_DblN_ascend_se_A4−LL−n(4)_BLK2repl_1
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_A4−LL−n(4)_BLK2repl_17
ze_DblN_descend_se_A4−LL−n(4)_BLK2repl_1
Parameter value


Size_DblN_peak_A5−LL−n(5)_BLK2repl_17
ize_DblN_ascend_se_A5−LL−n(5)_BLK2repl_1
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_A5−LL−n(5)_BLK2repl_17
ze_DblN_descend_se_A5−LL−n(5)_BLK2repl_1
Parameter value


Size_DblN_peak_A6−LL−n(6)_BLK2repl_17
ize_DblN_ascend_se_A6−LL−n(6)_BLK2repl_1
prior
max. likelihood
initial value
Density
50
100
150
−15
−10
−5
0
5
10
15
Size_DblN_top_logit_A6−LL−n(6)_BLK2repl_17
ze_DblN_descend_se_A6−LL−n(6)_BLK2repl_1
Parameter value