

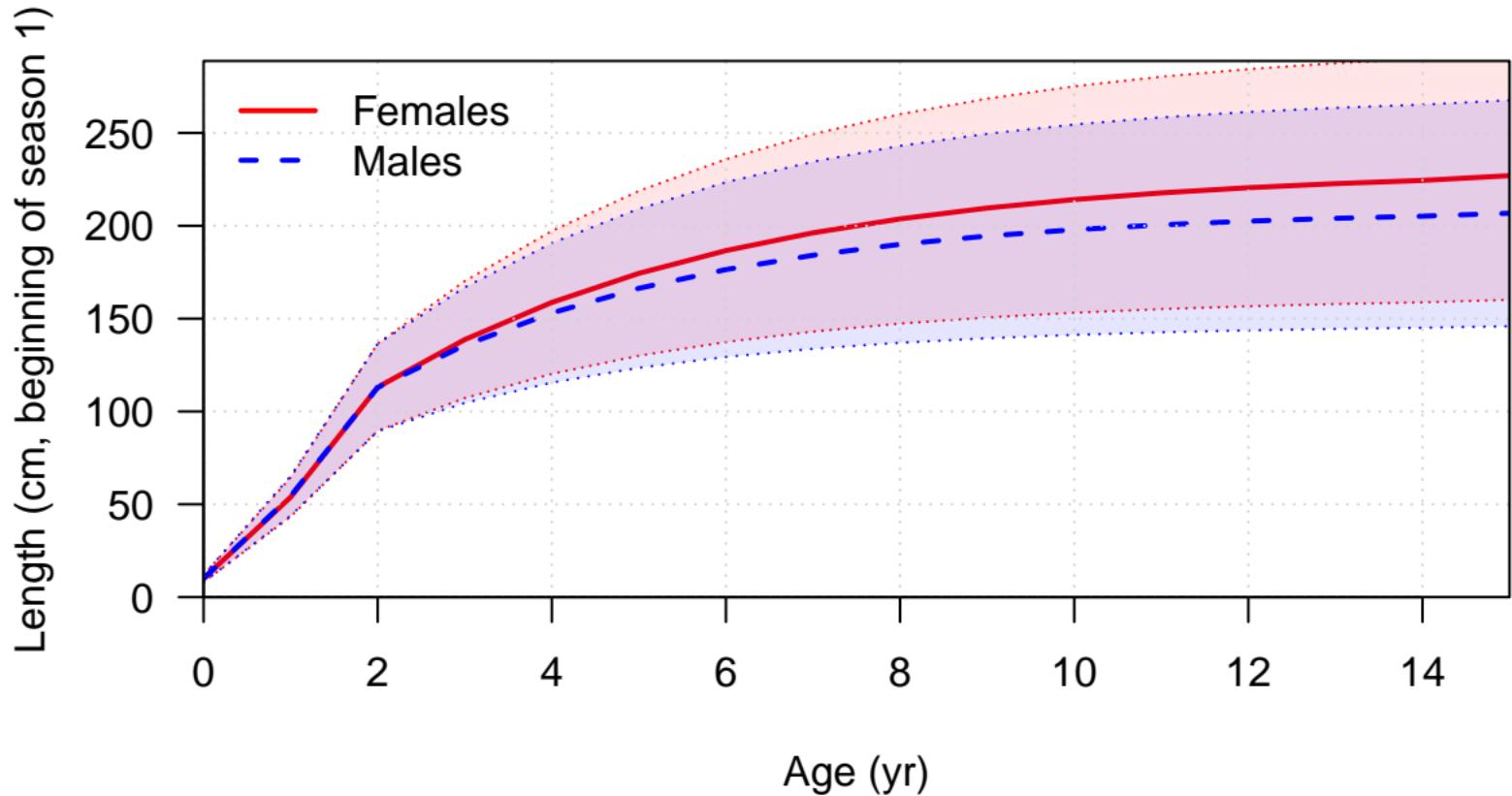
Plots created using the 'r4ss' package in R

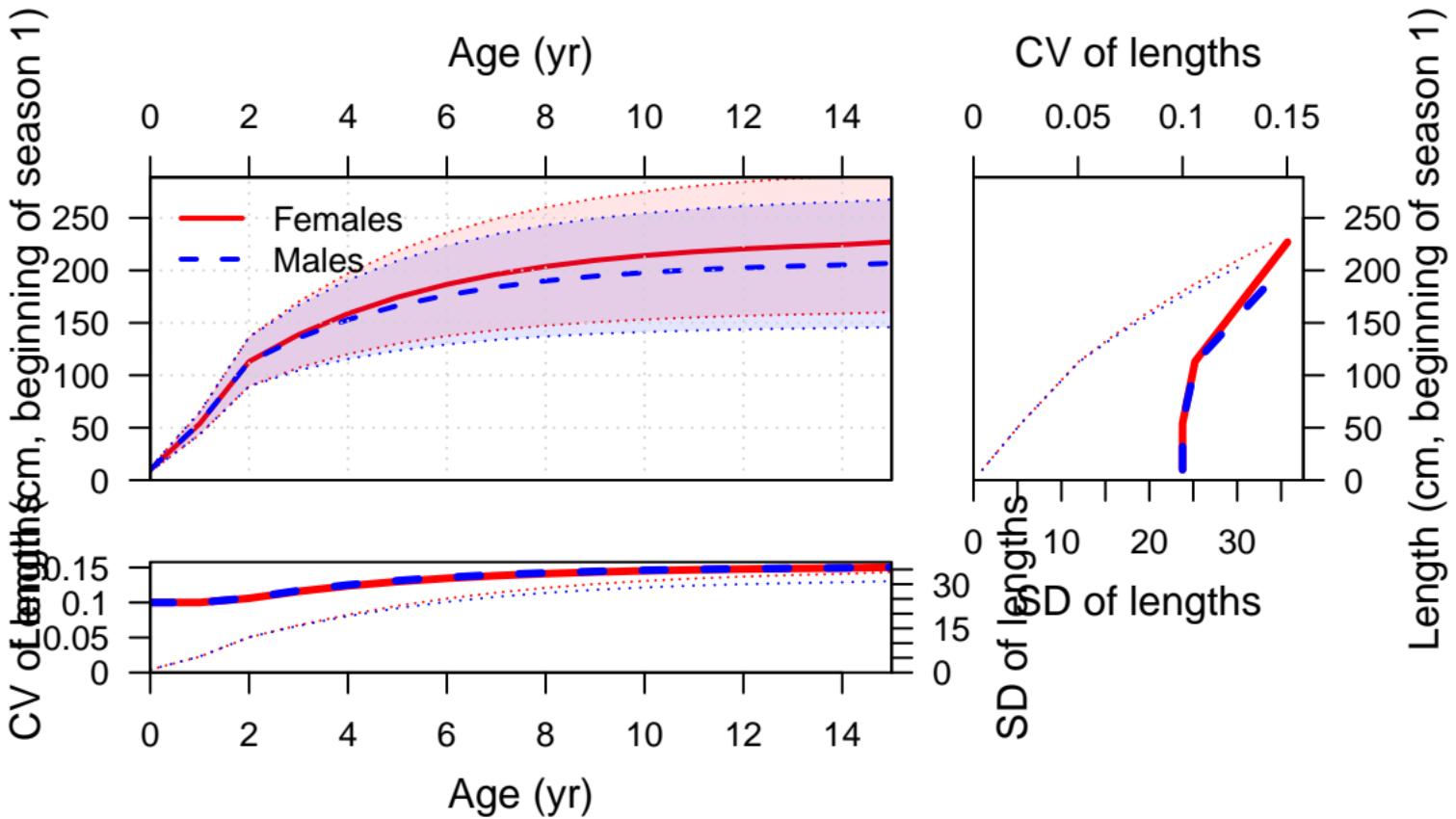
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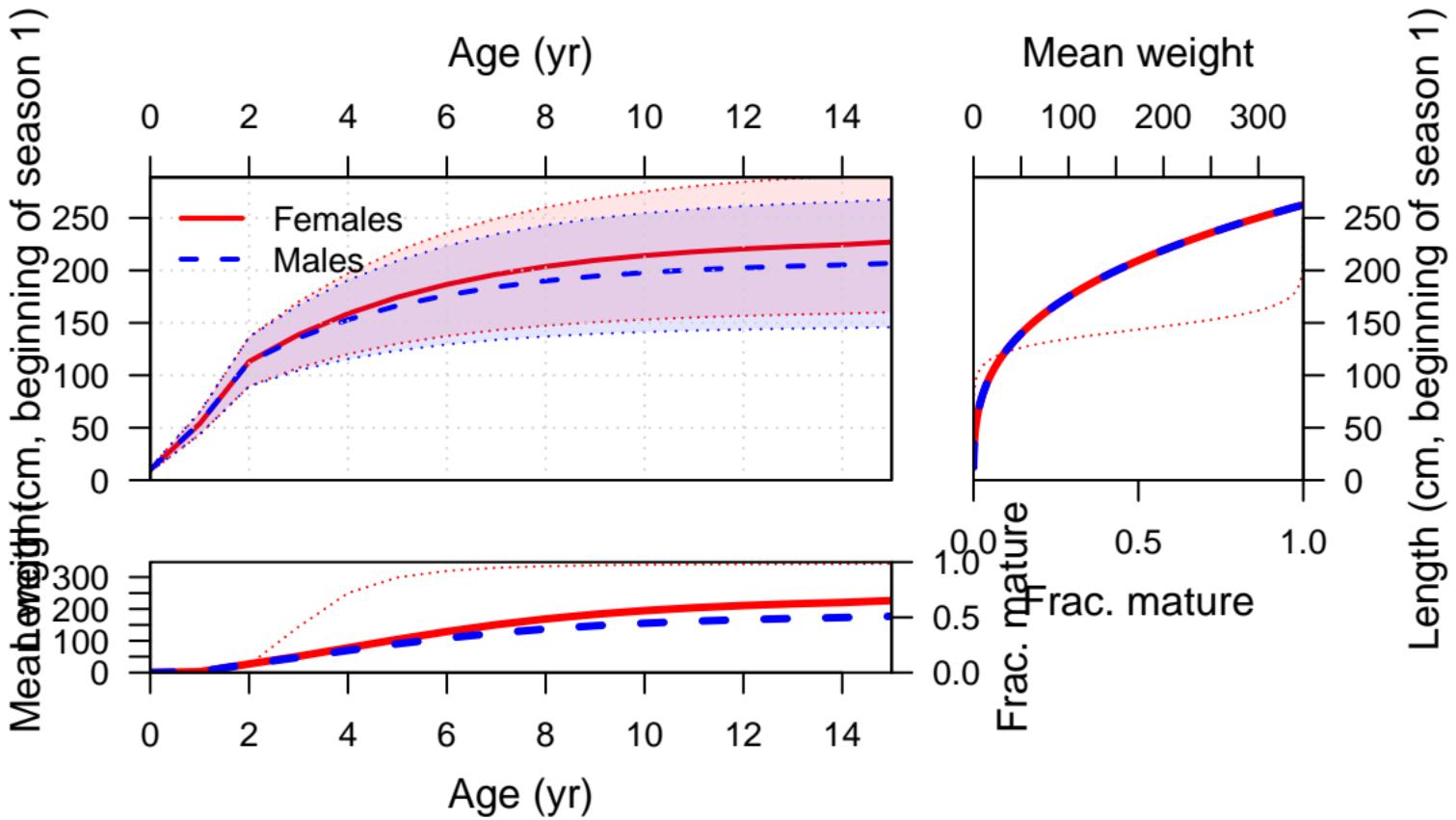
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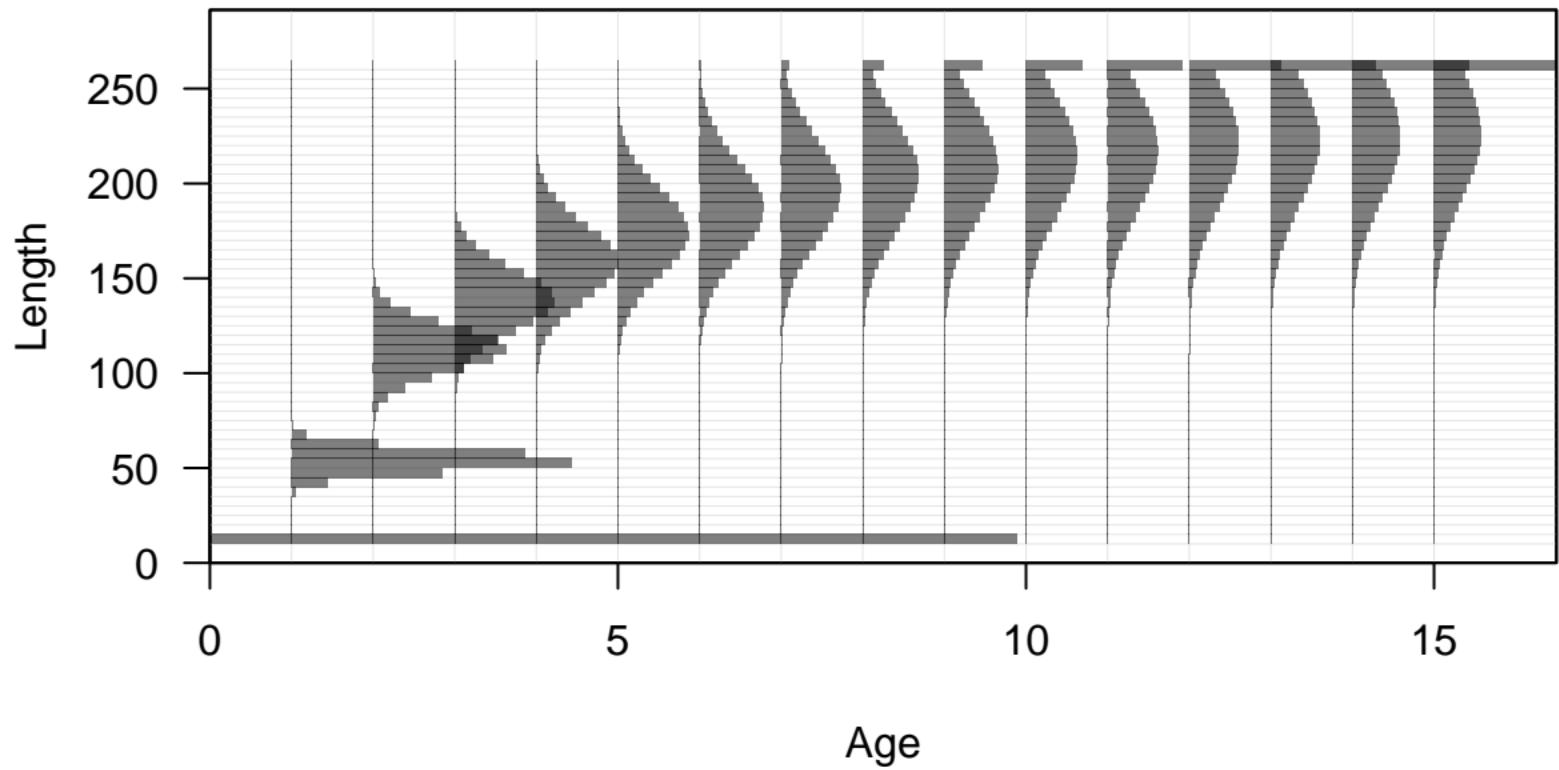
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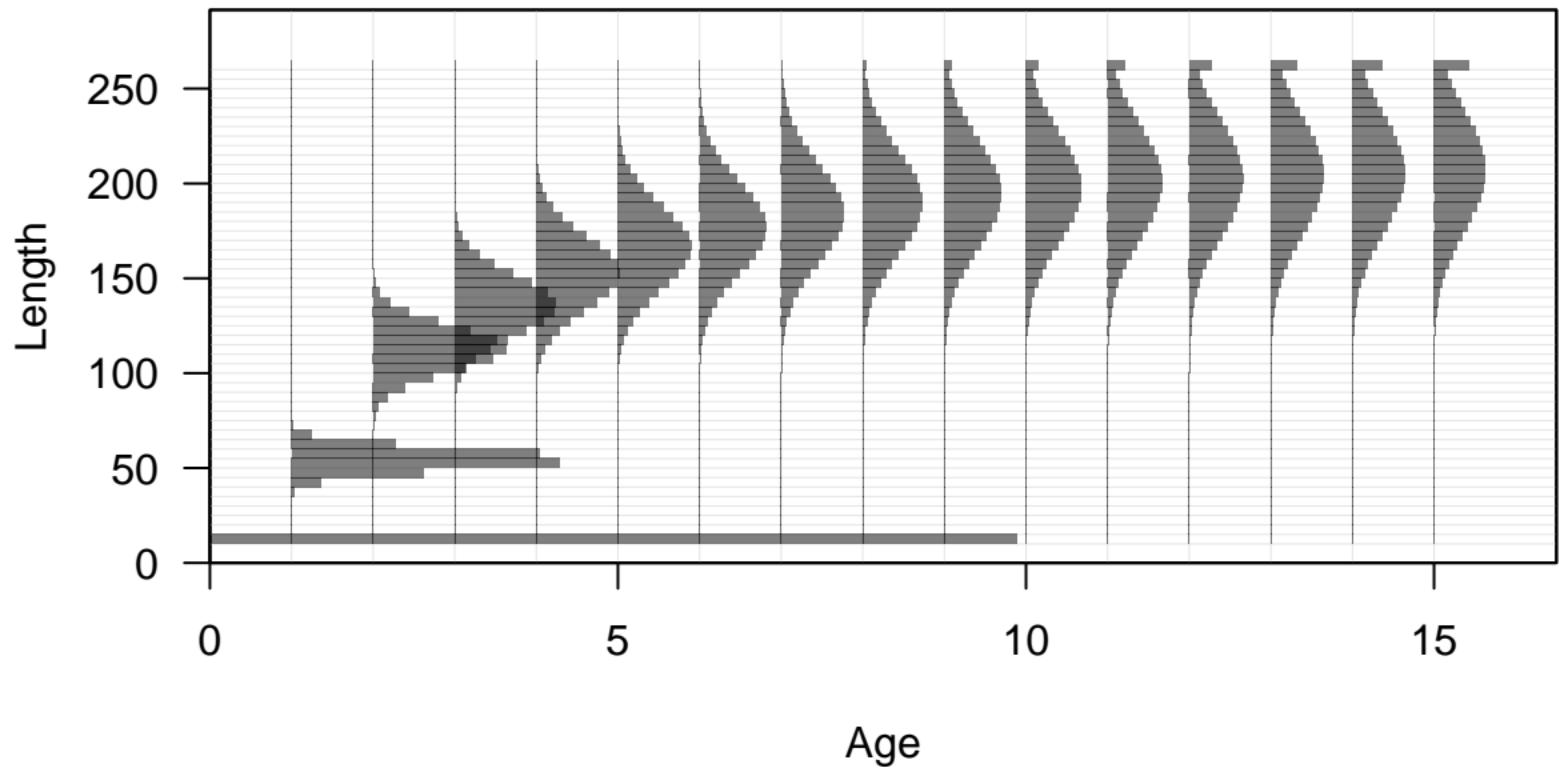
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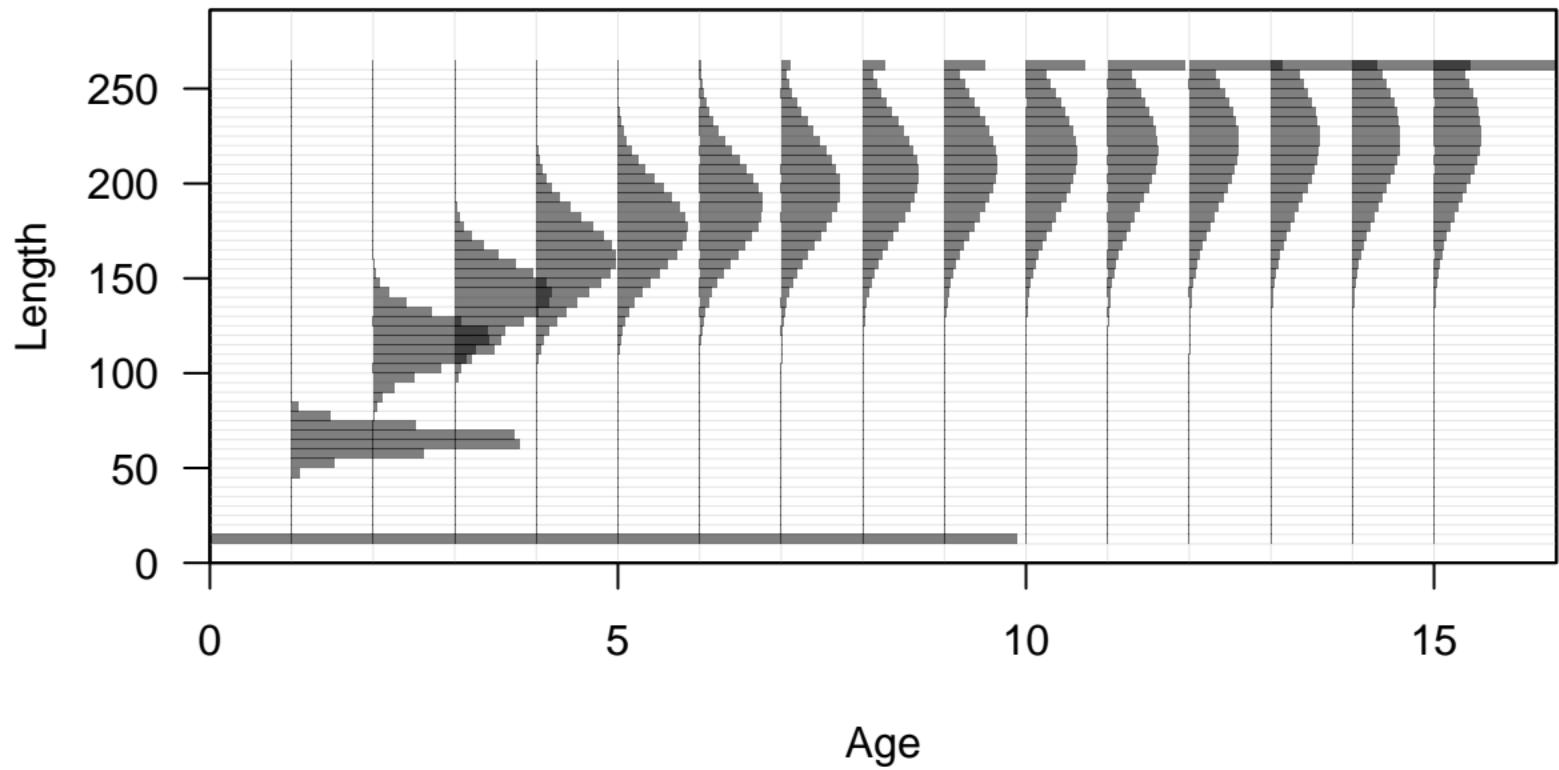


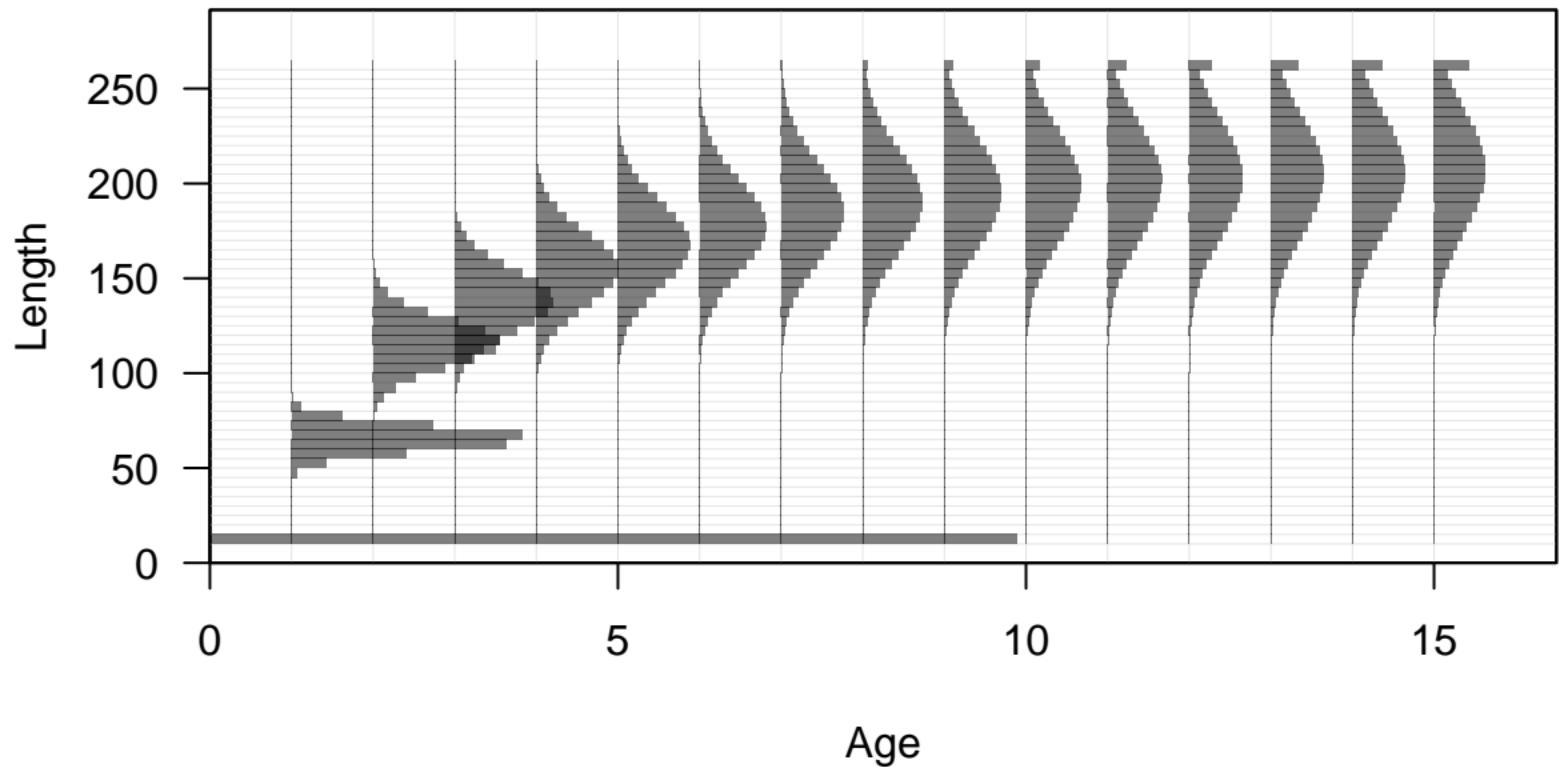


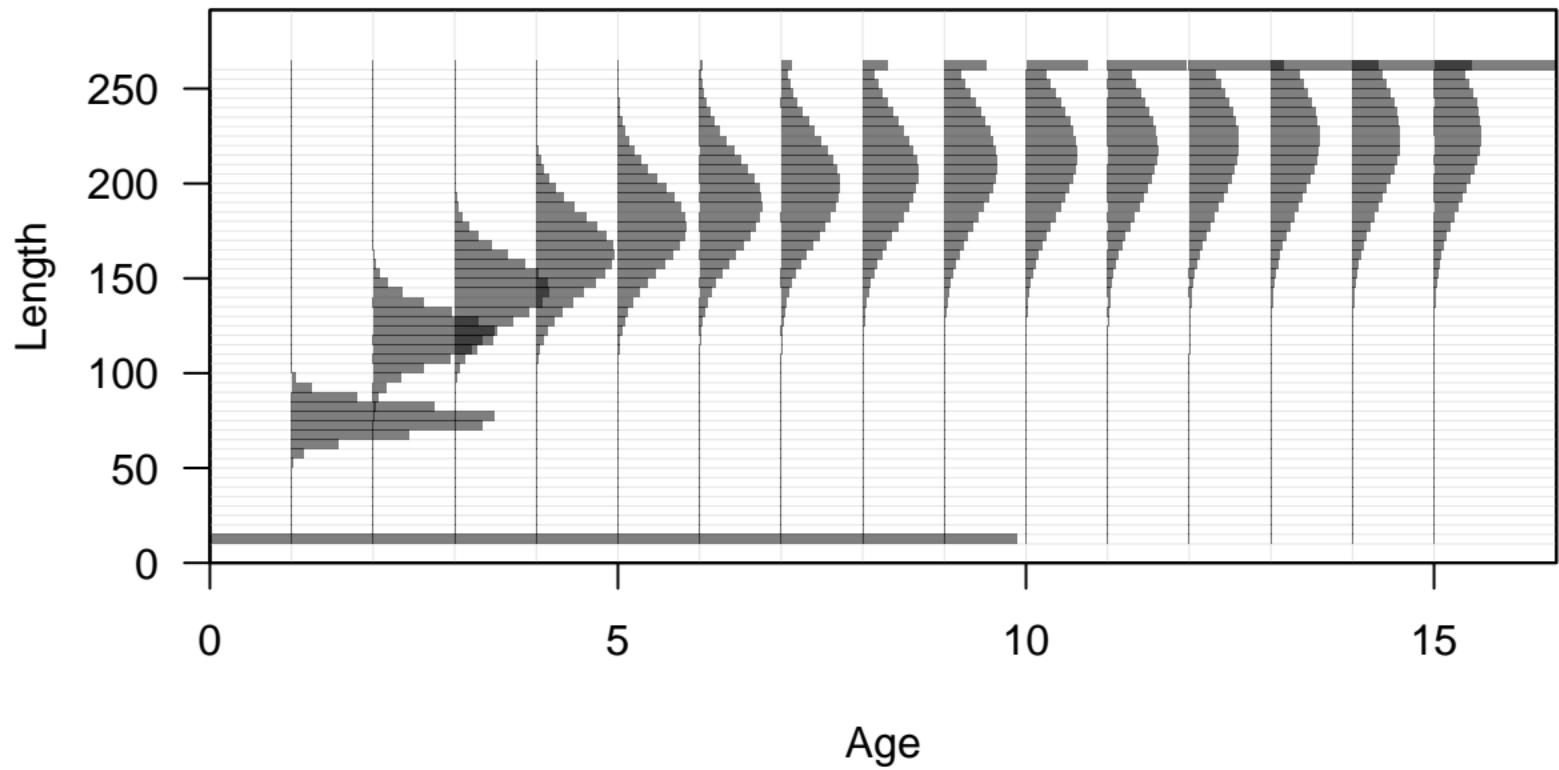


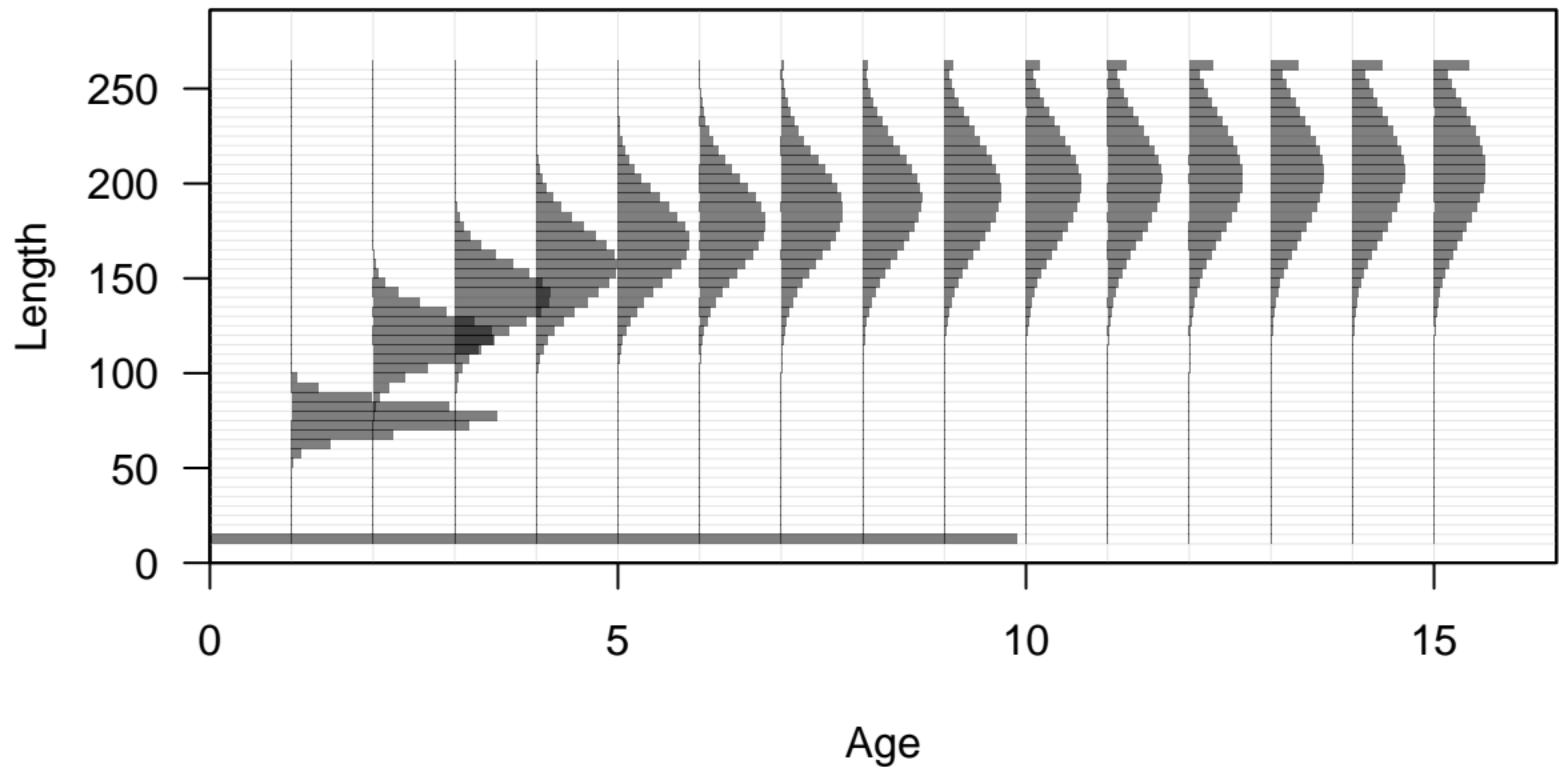


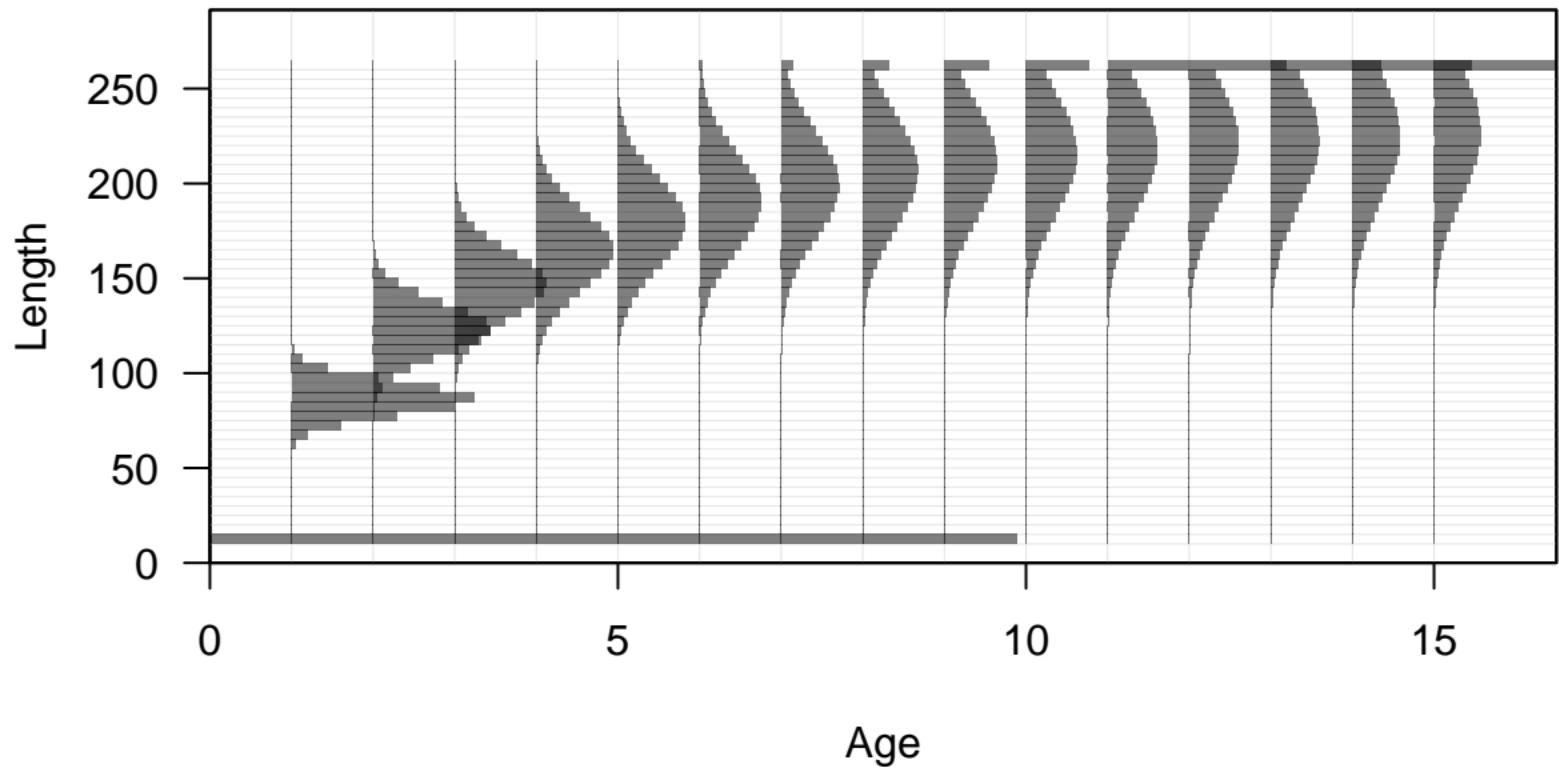


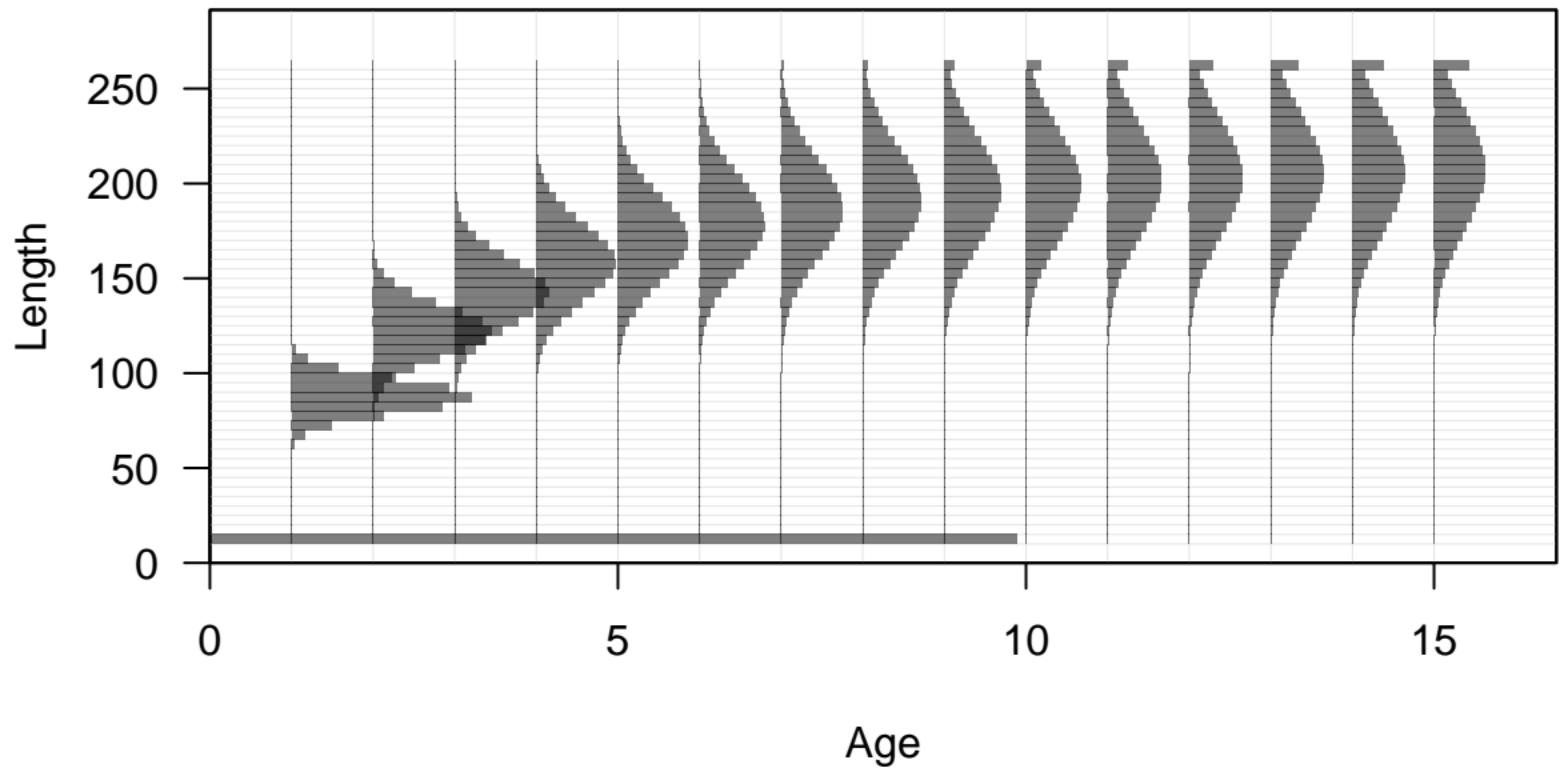


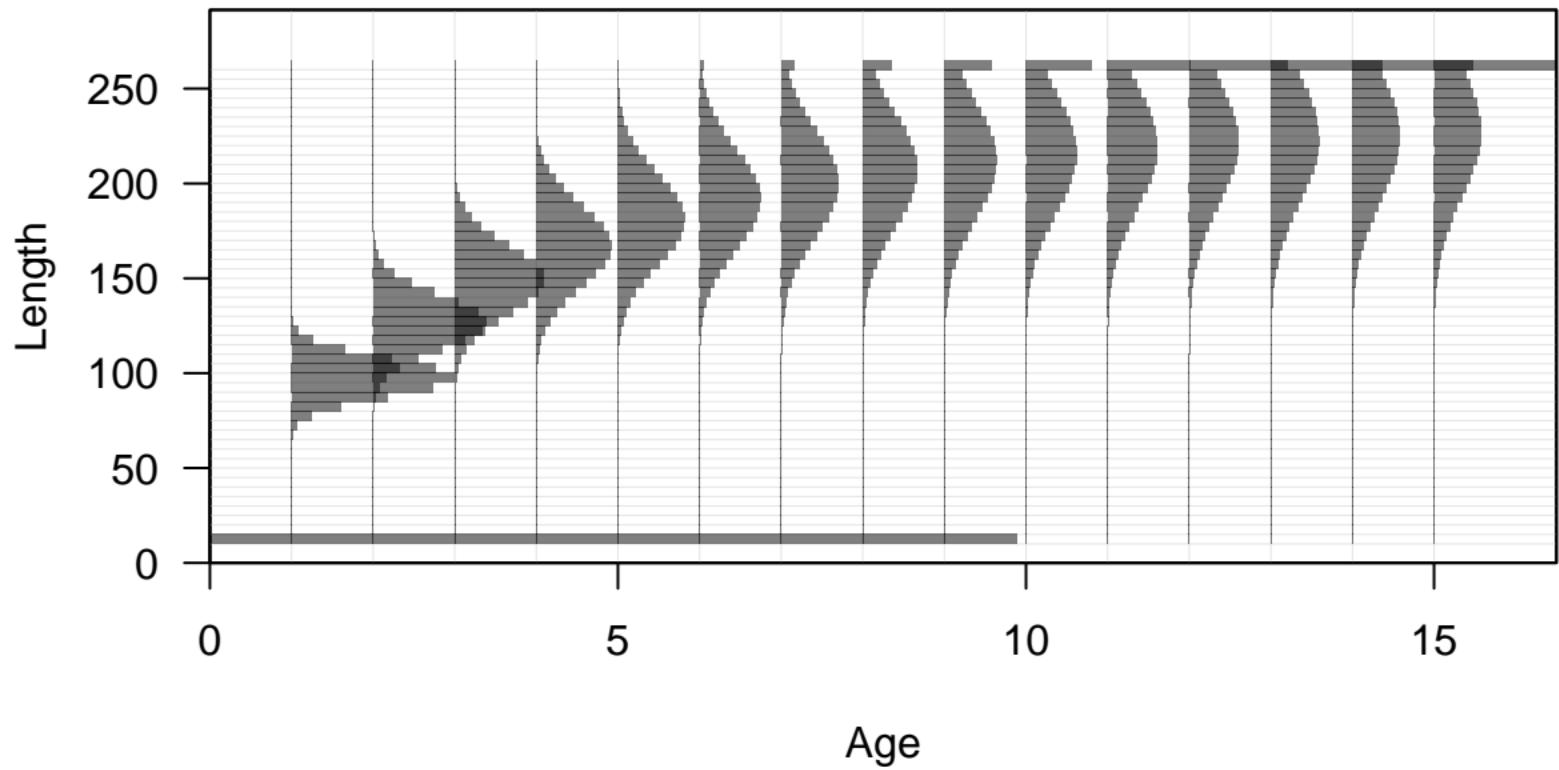


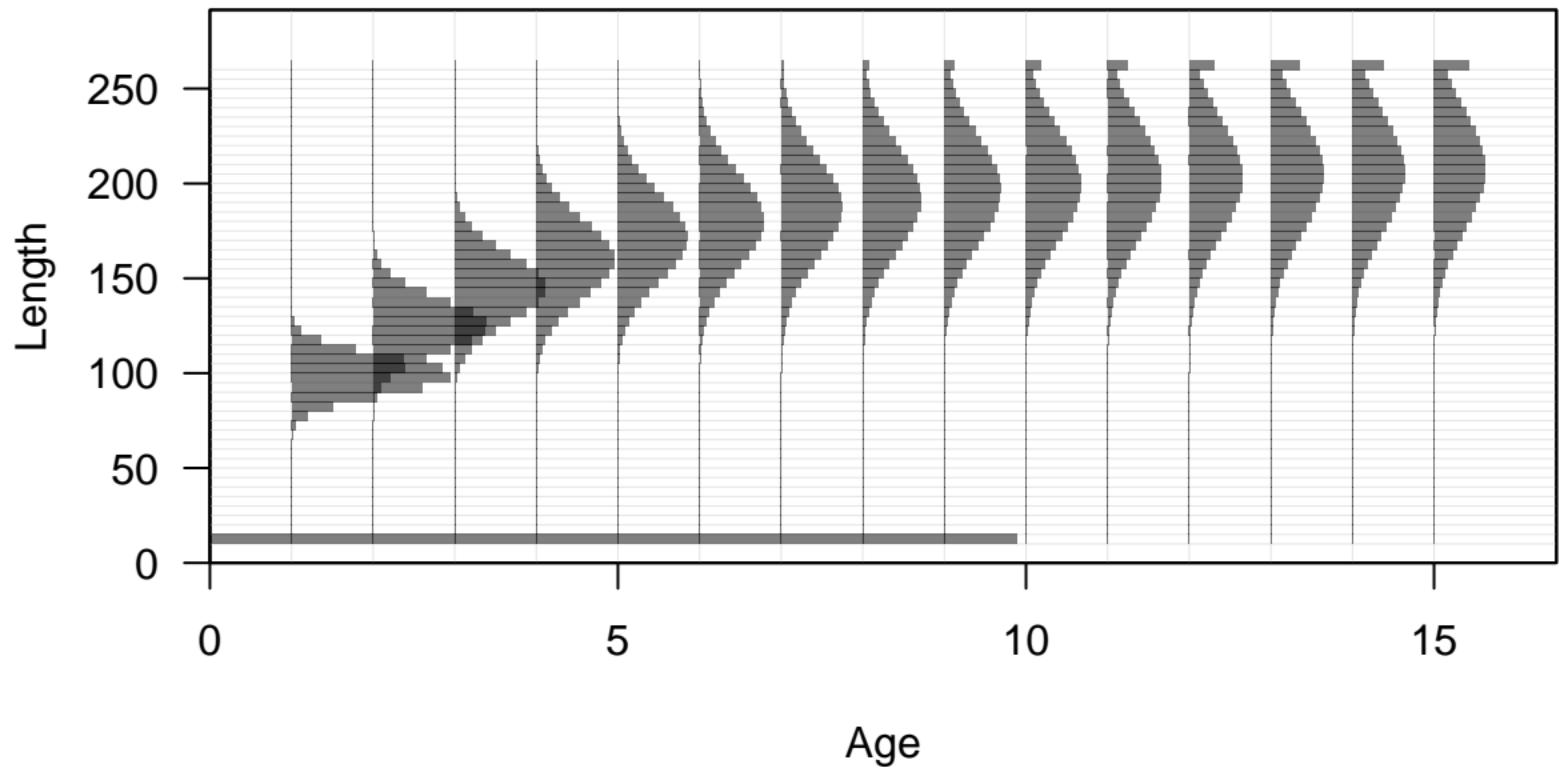


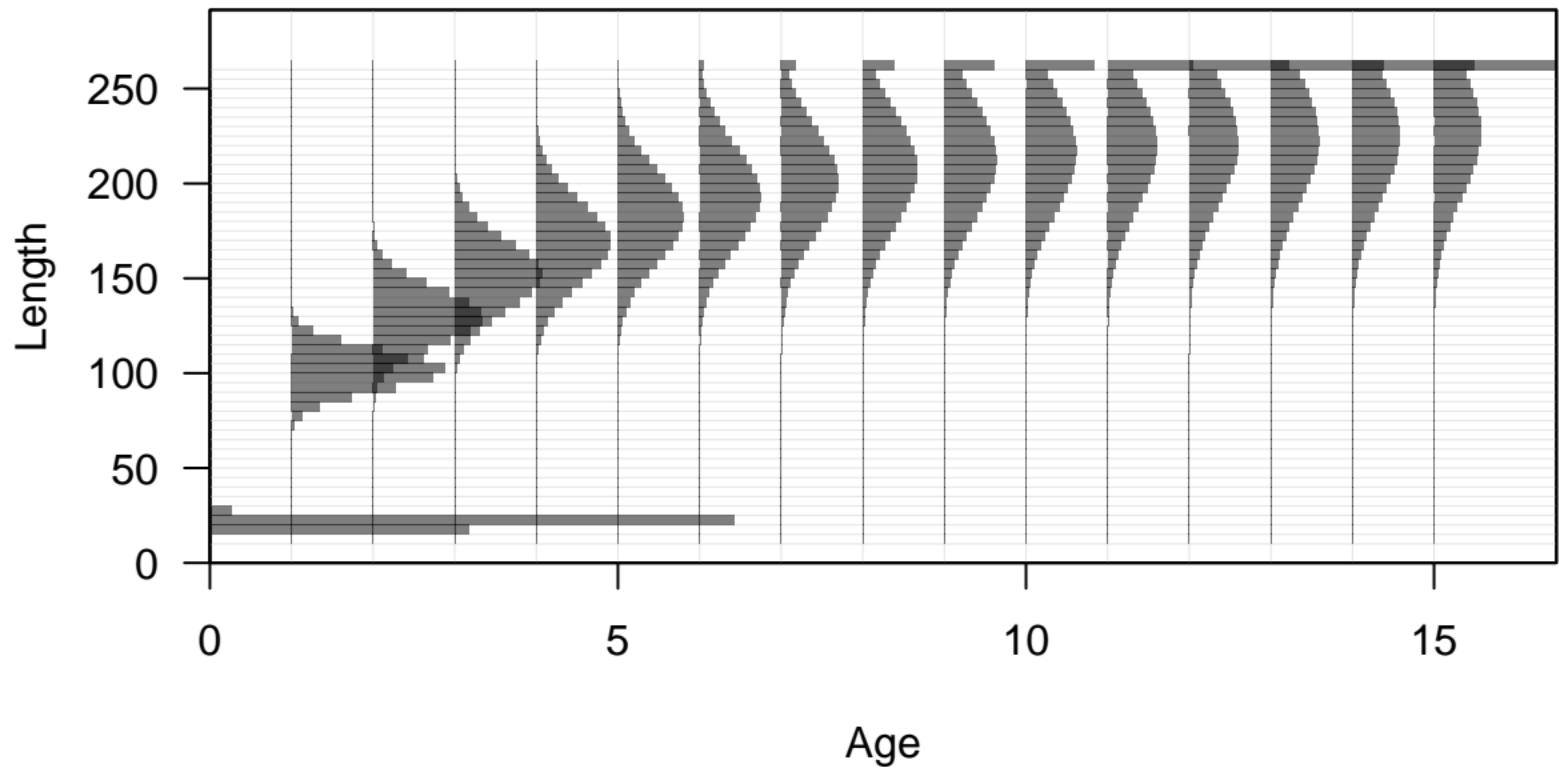


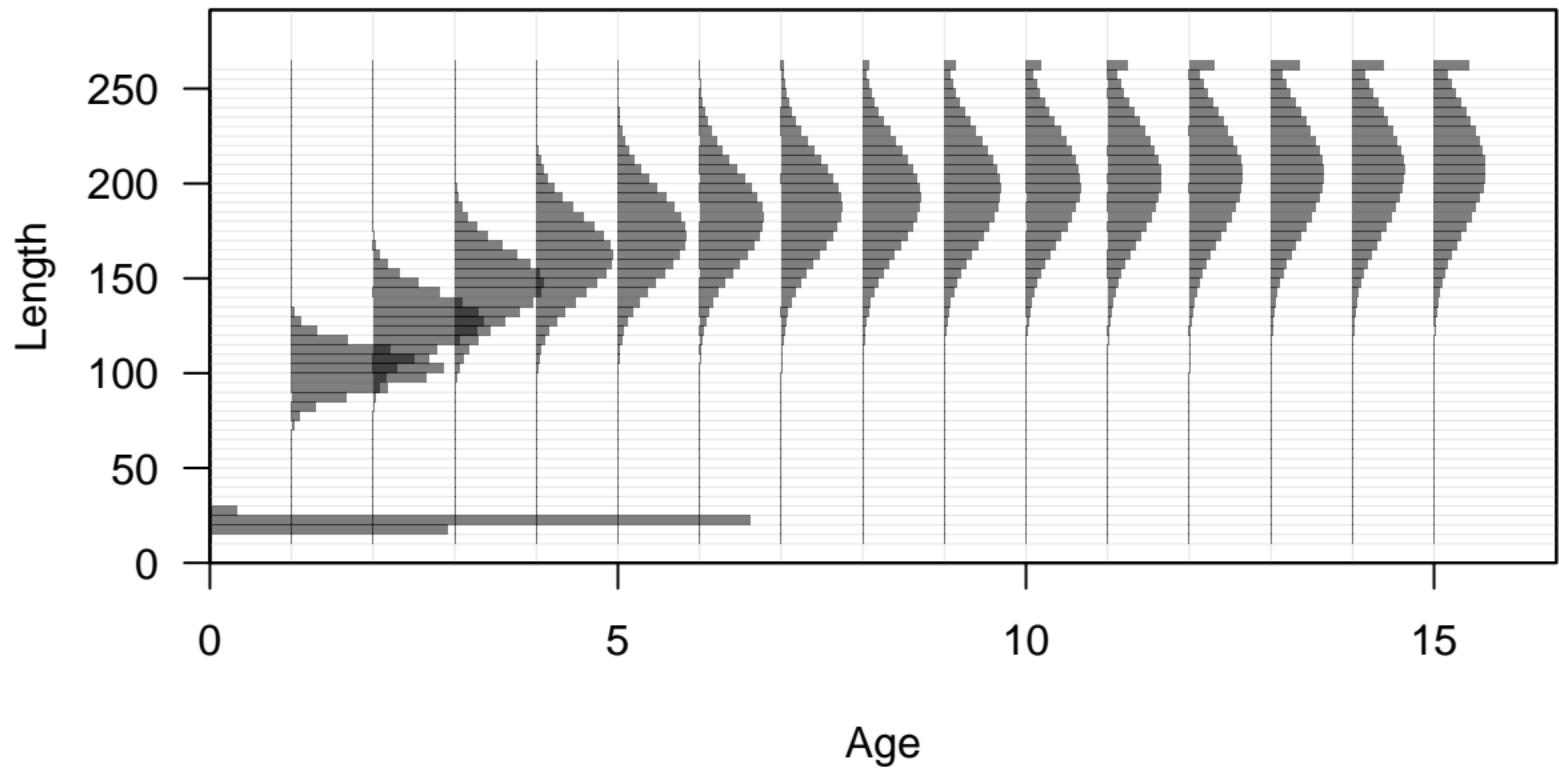


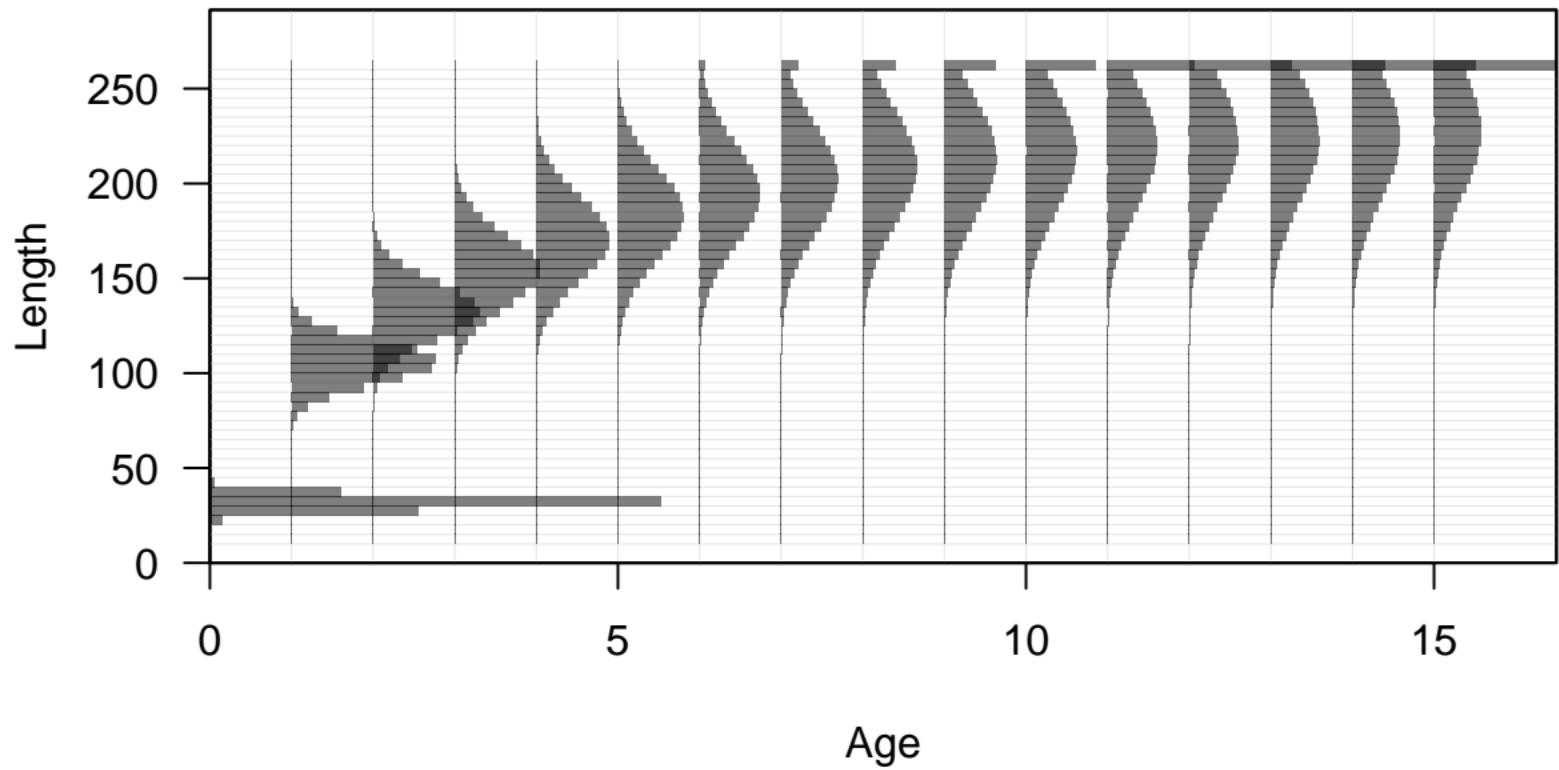


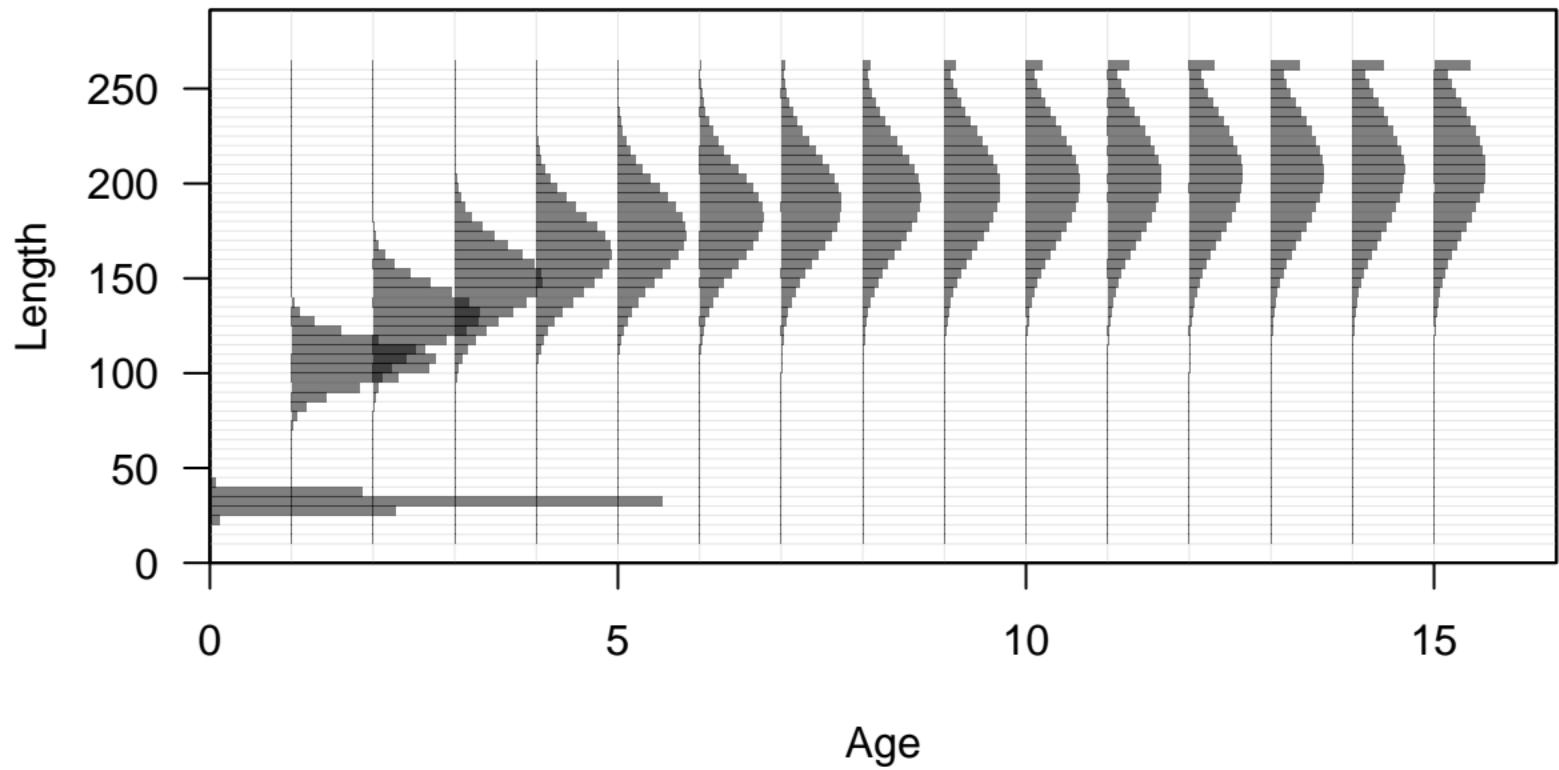


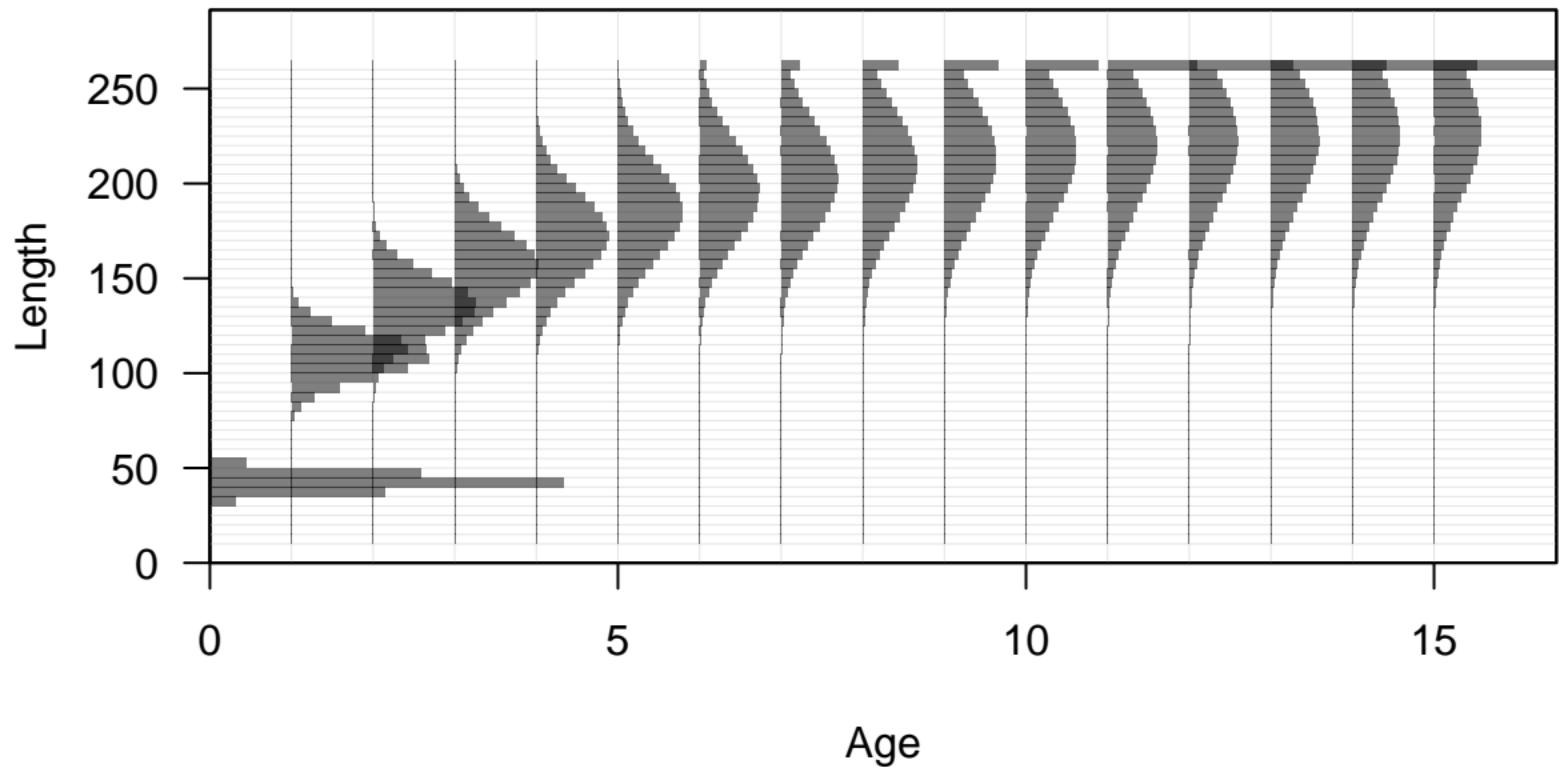


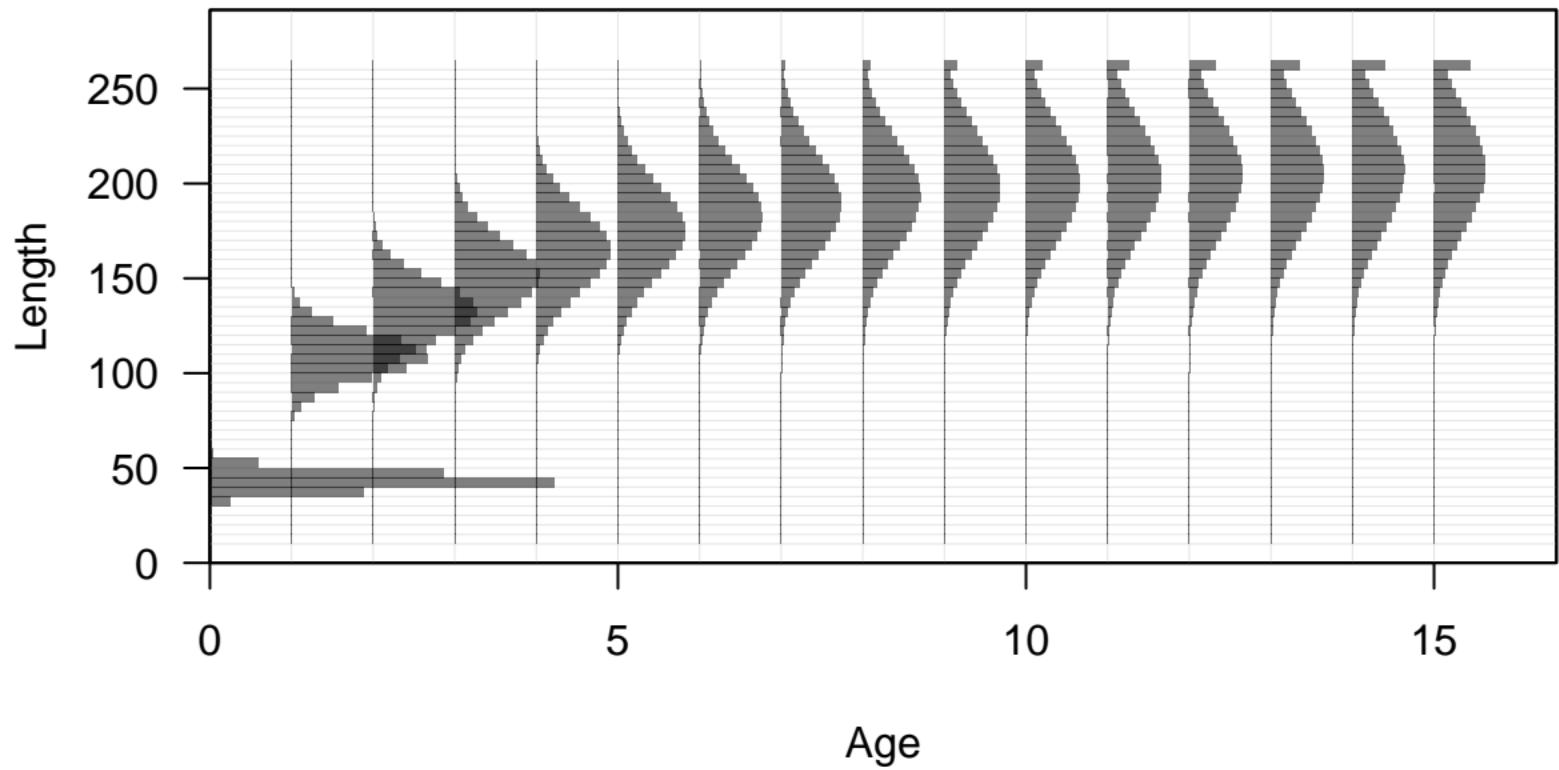


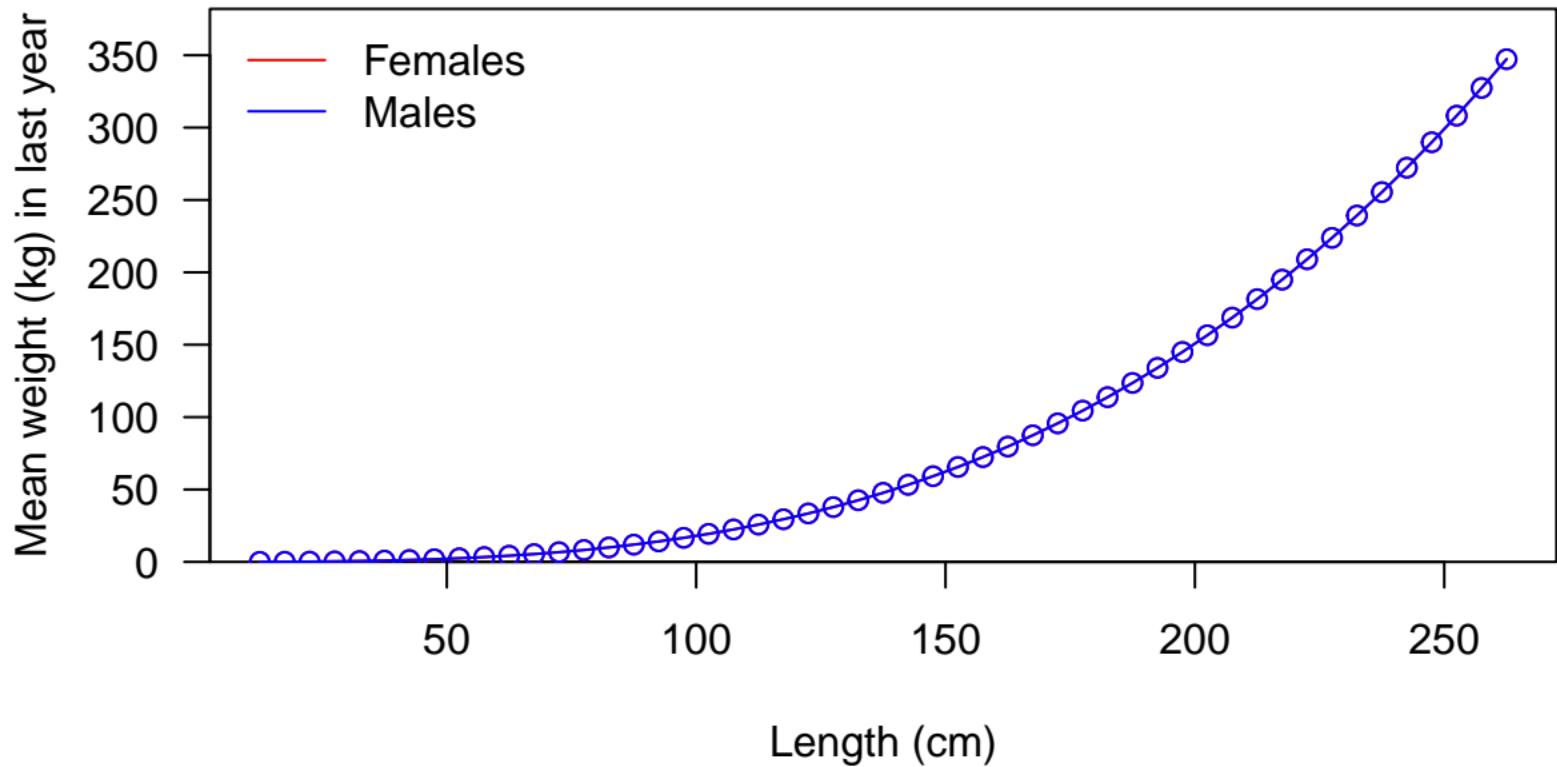


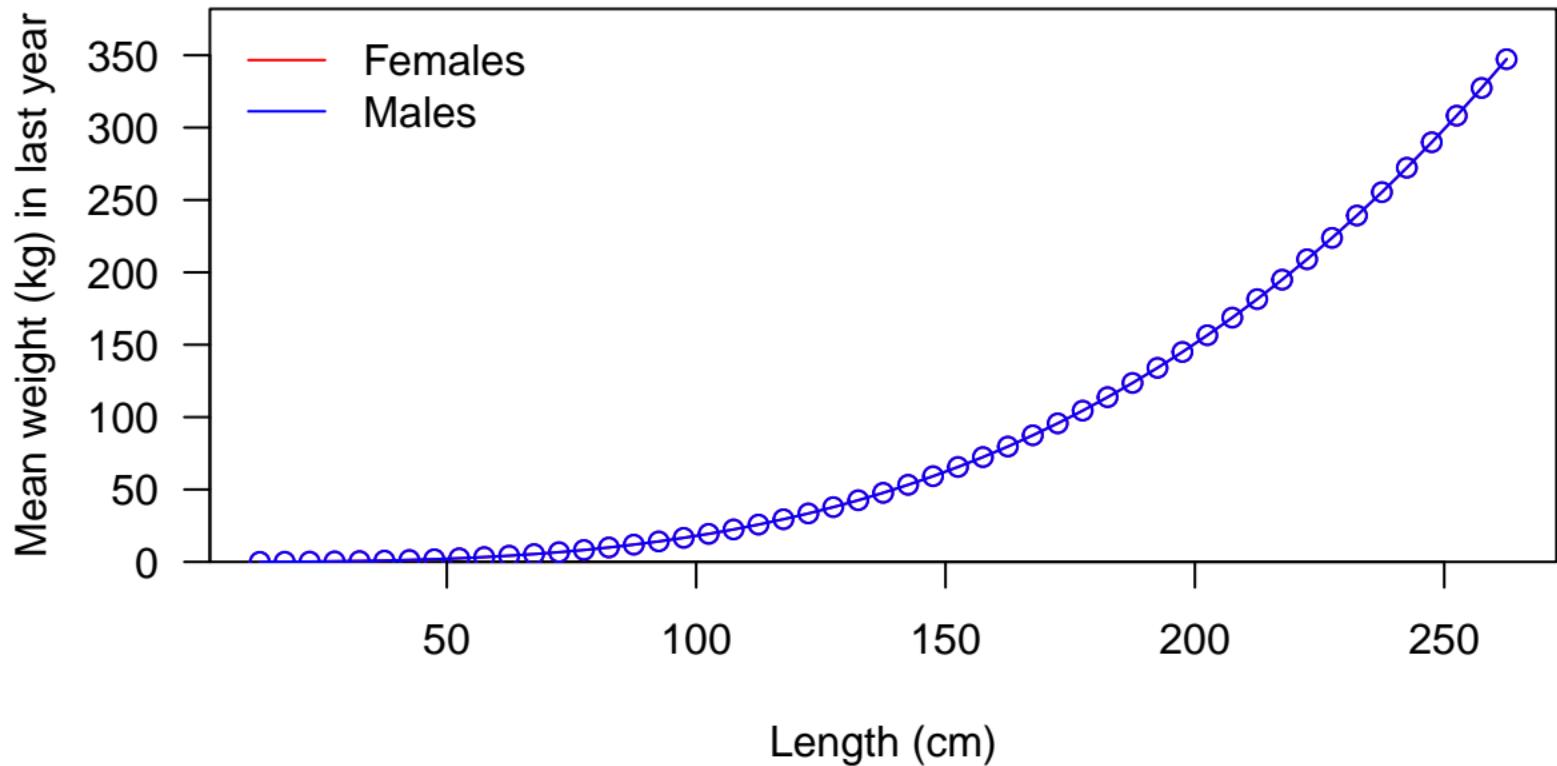


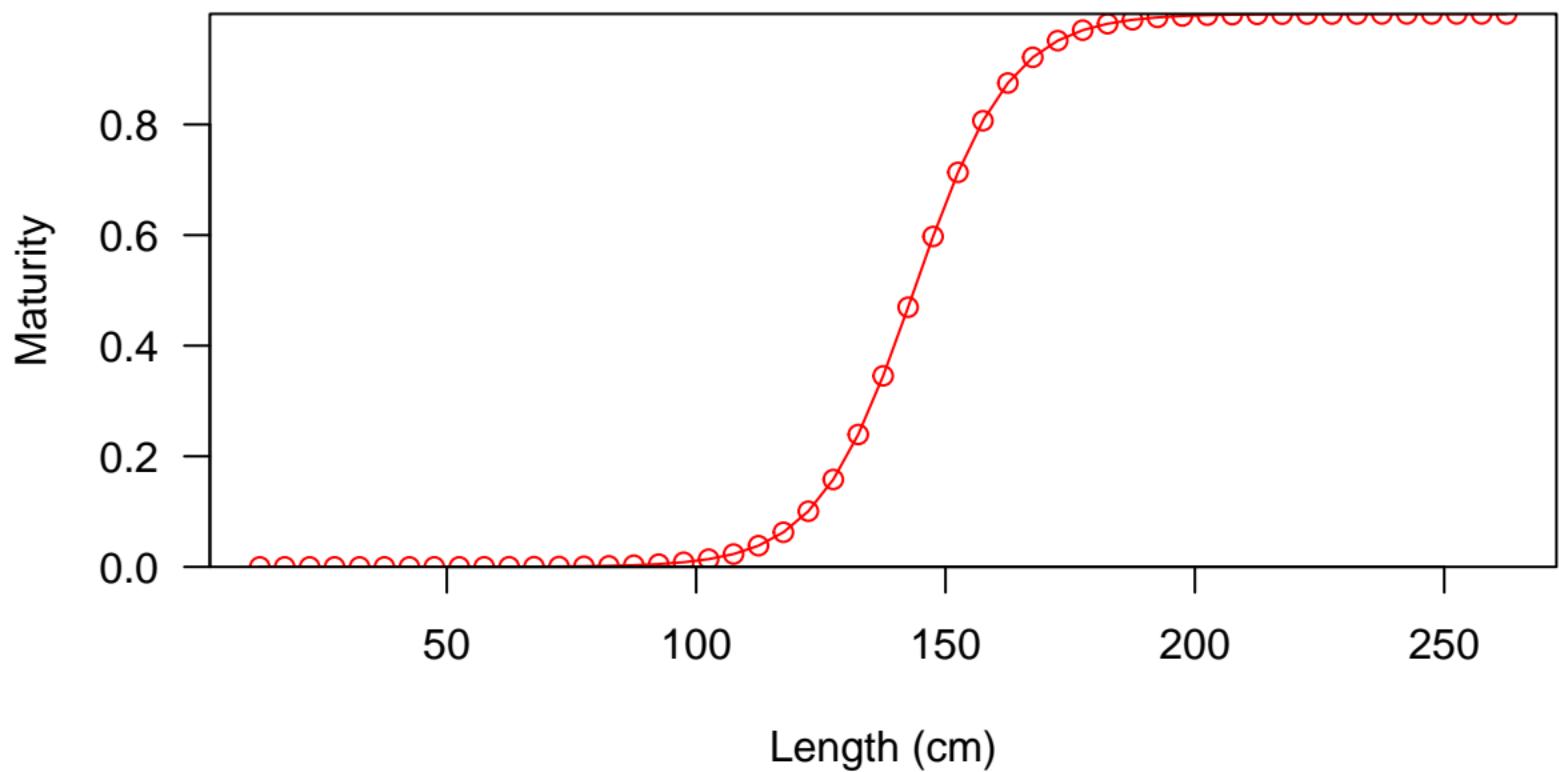


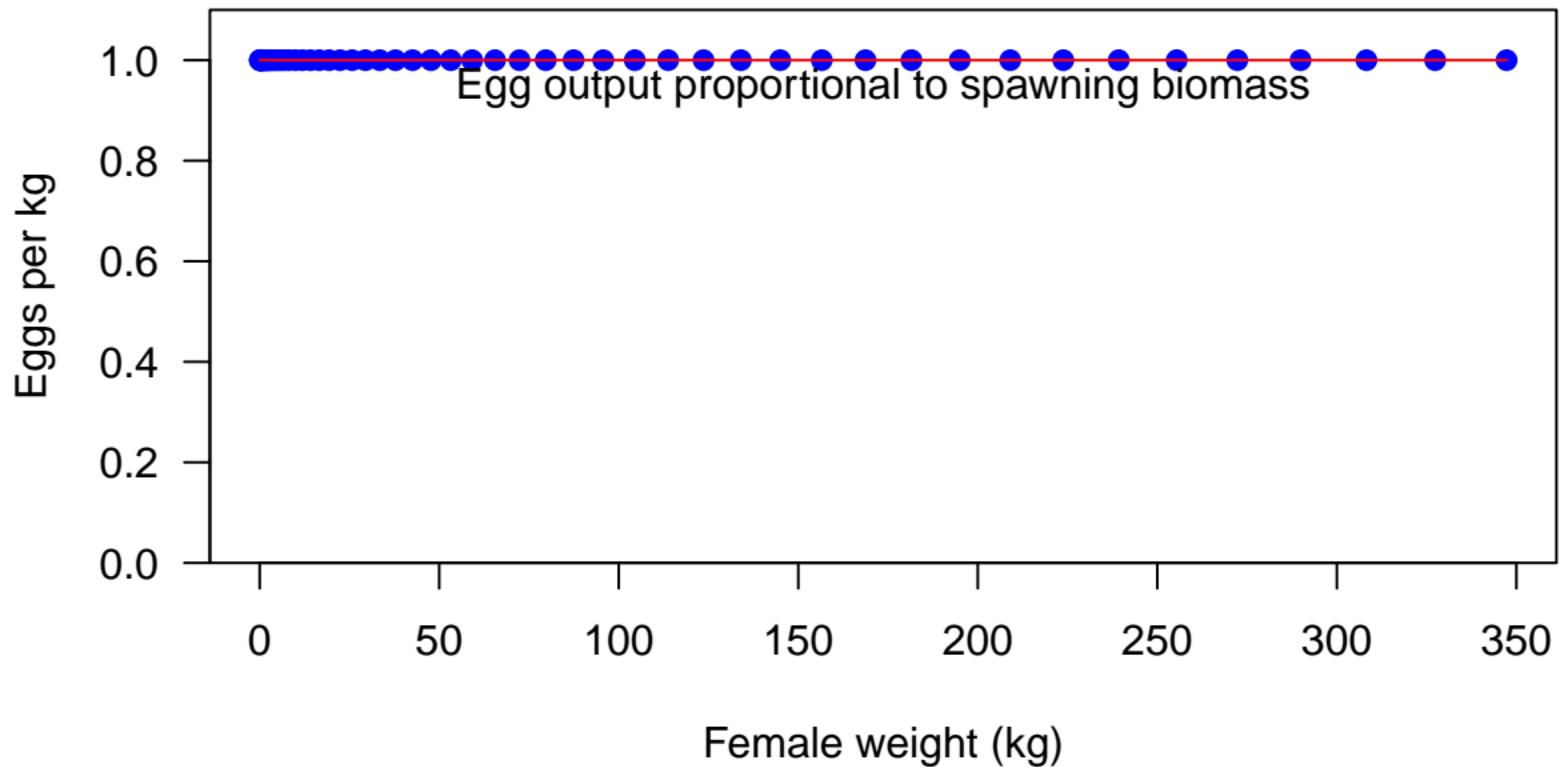


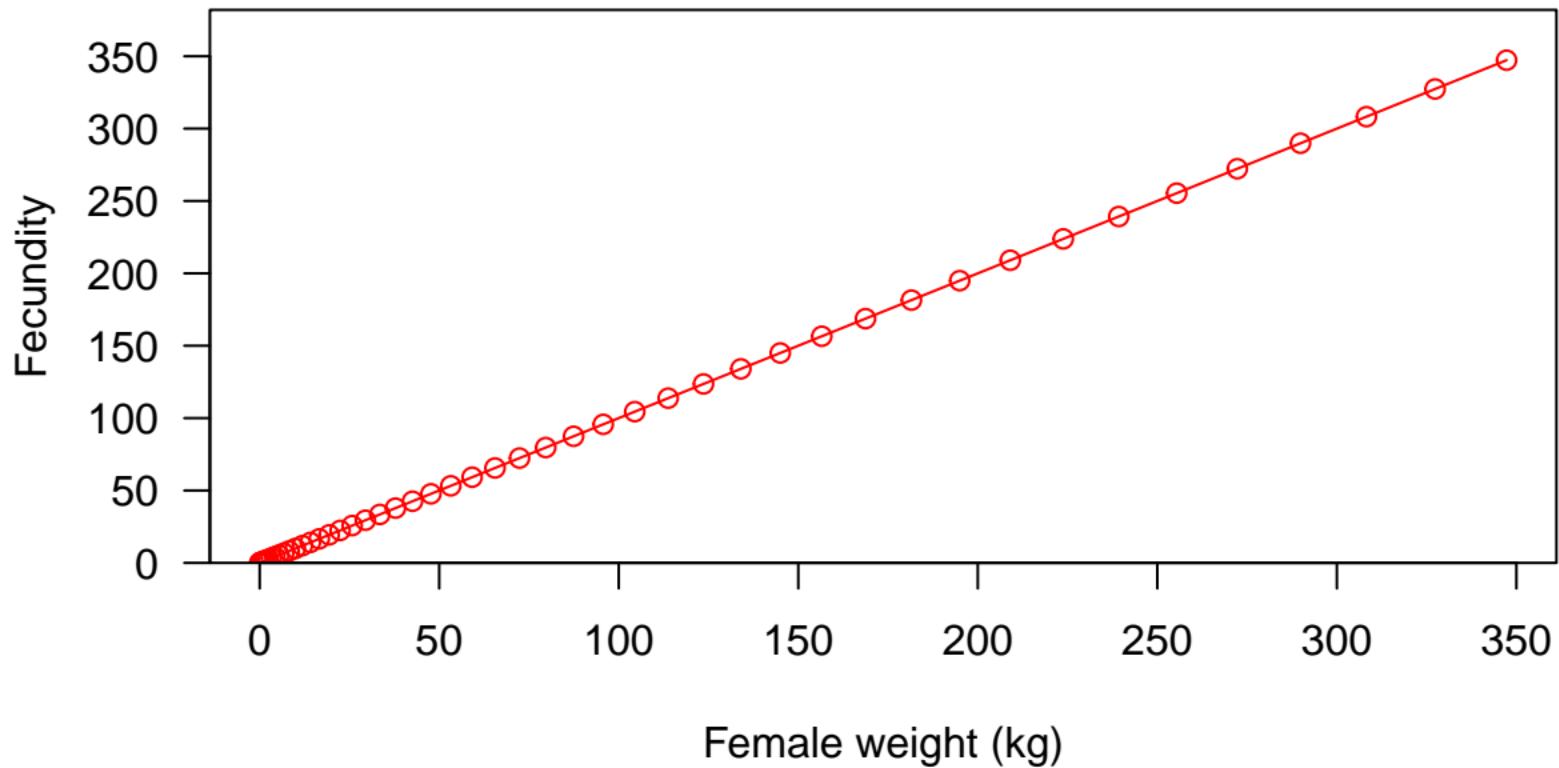


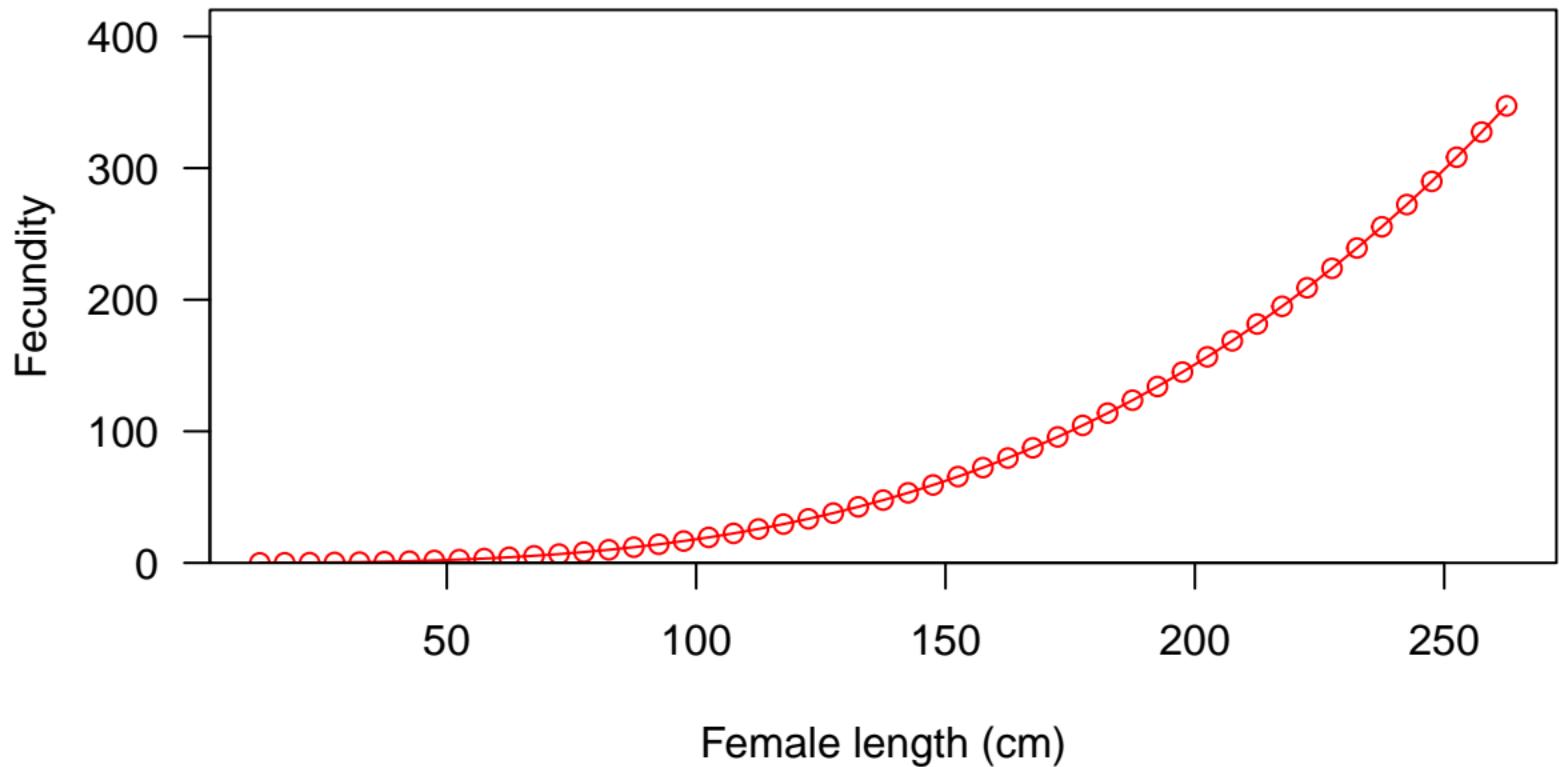


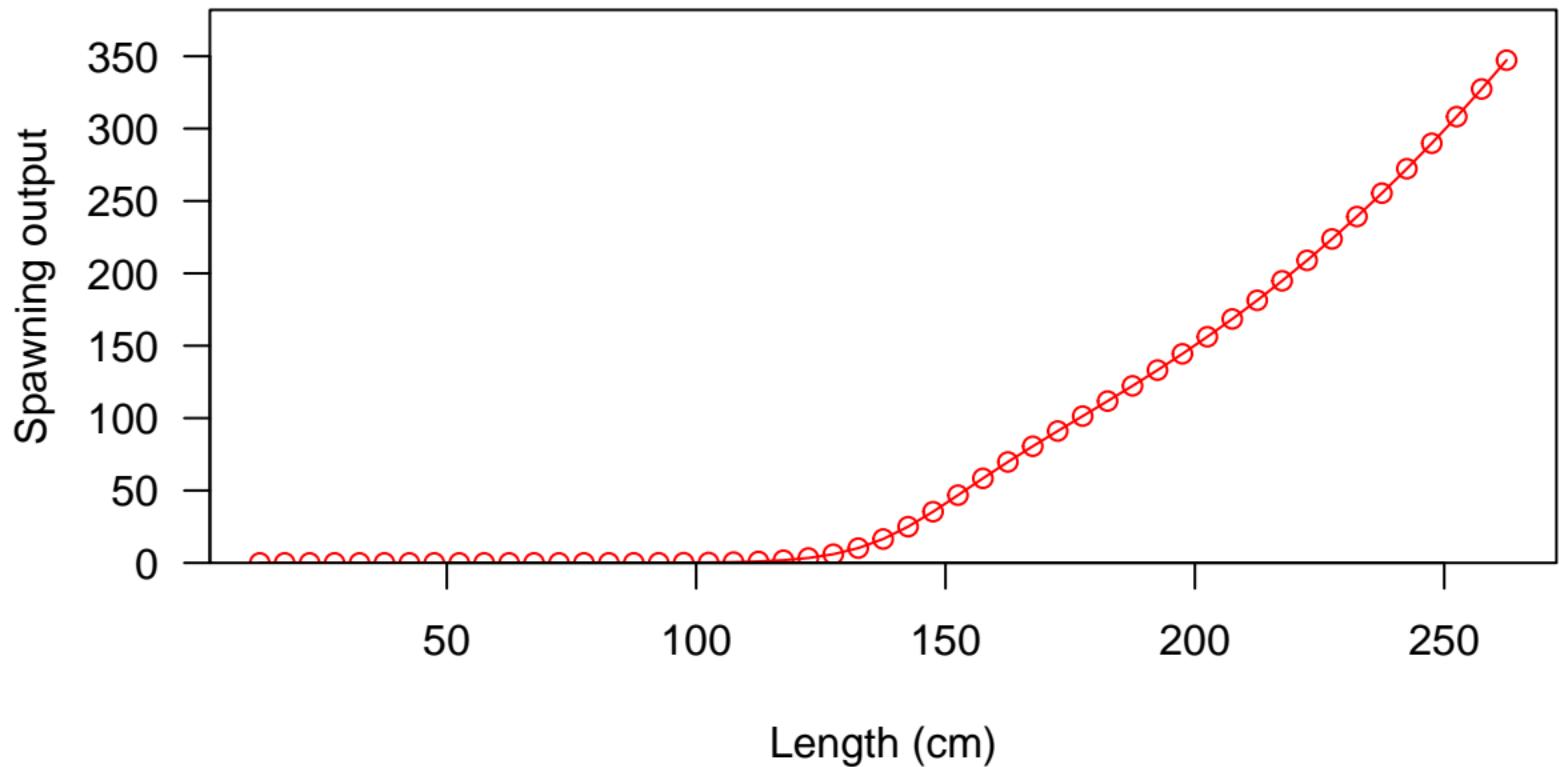


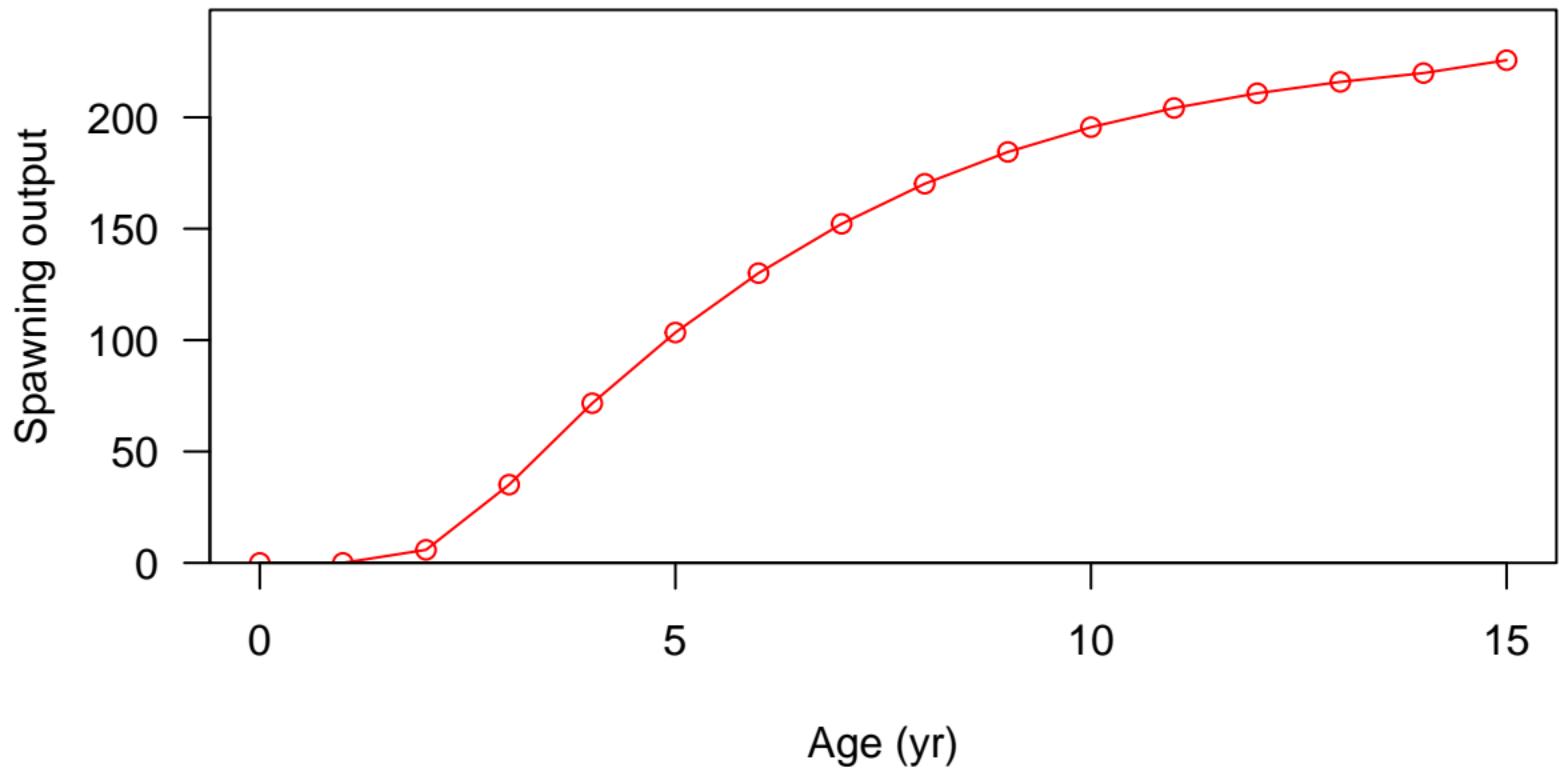


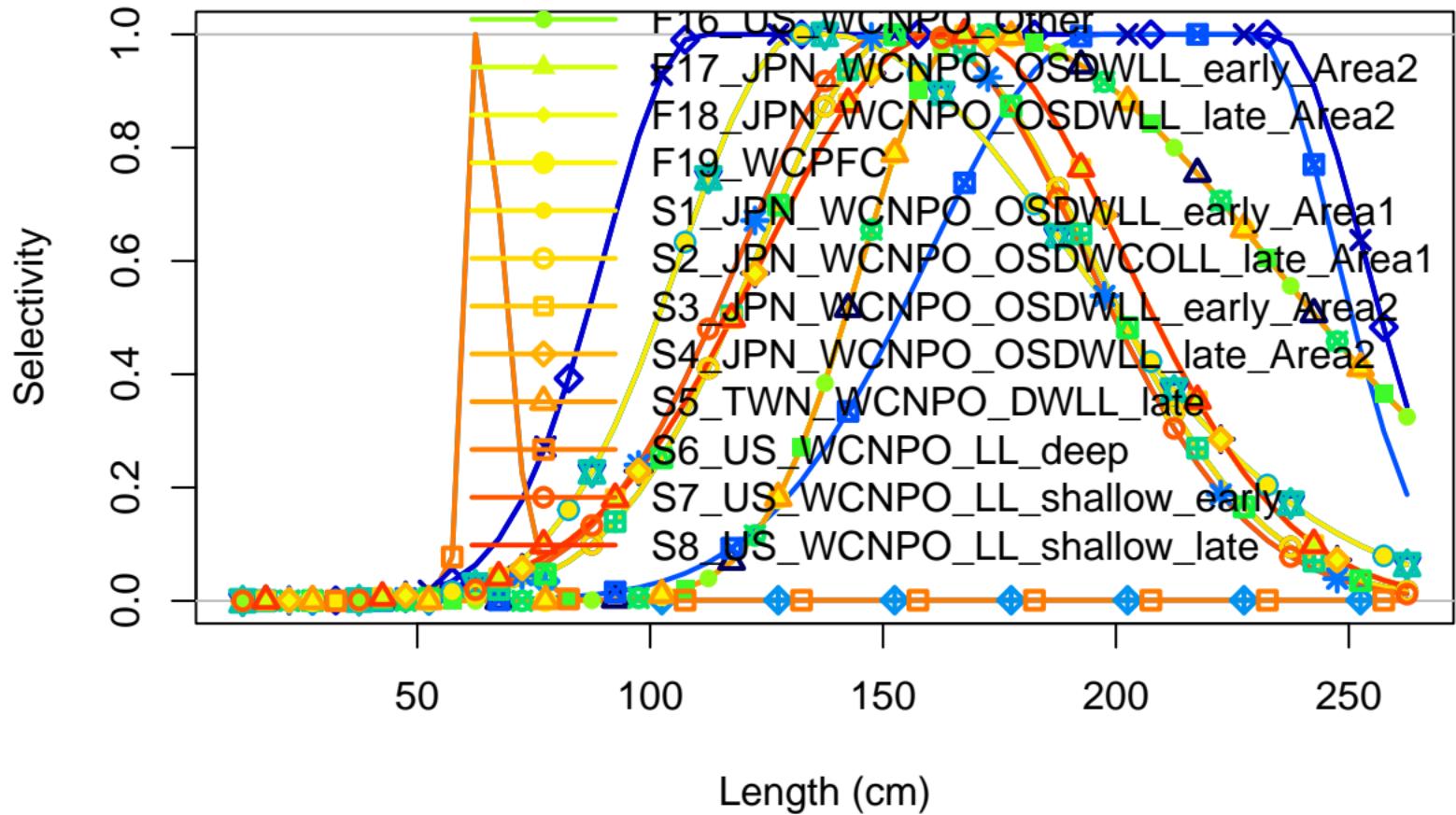


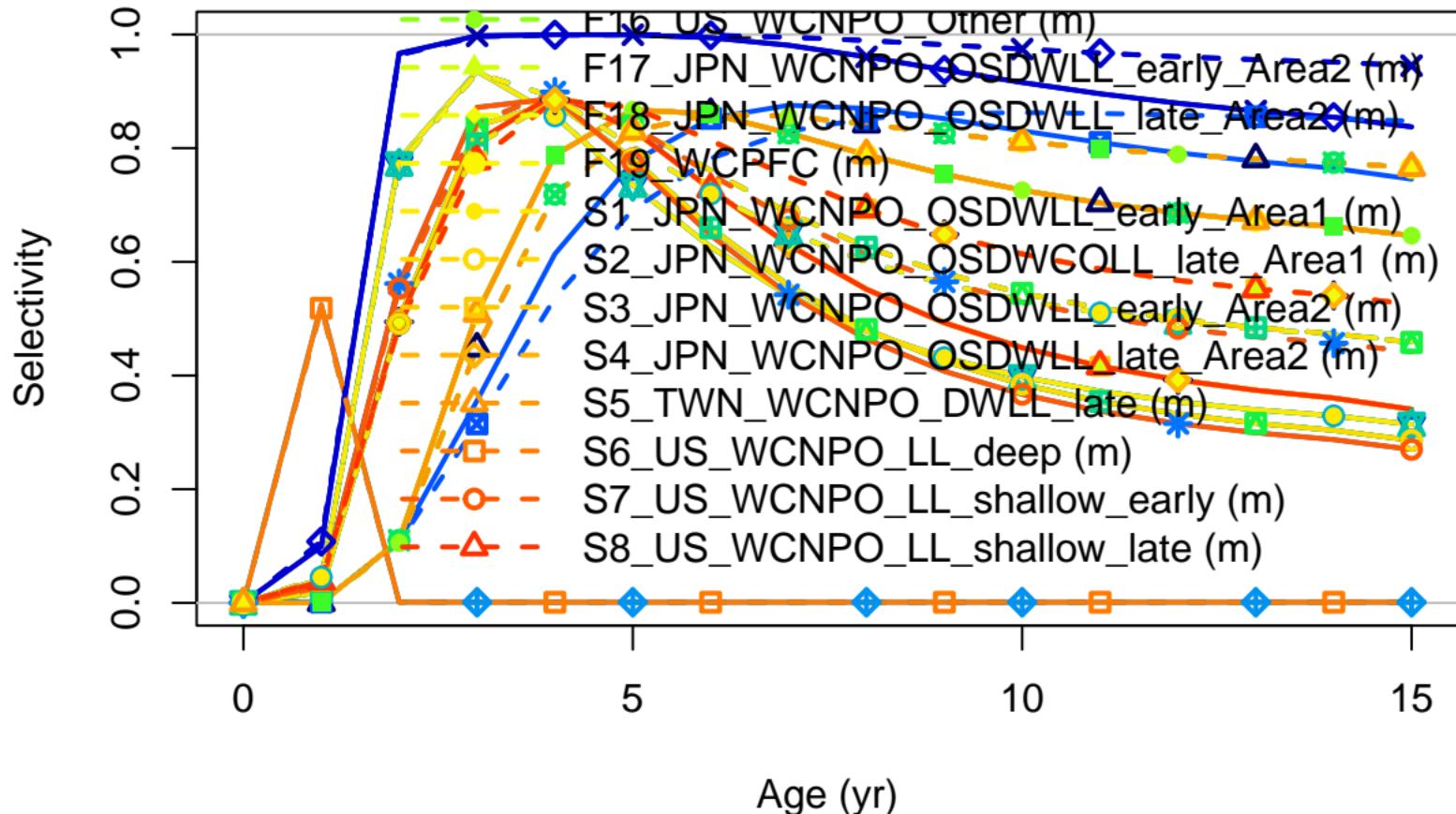


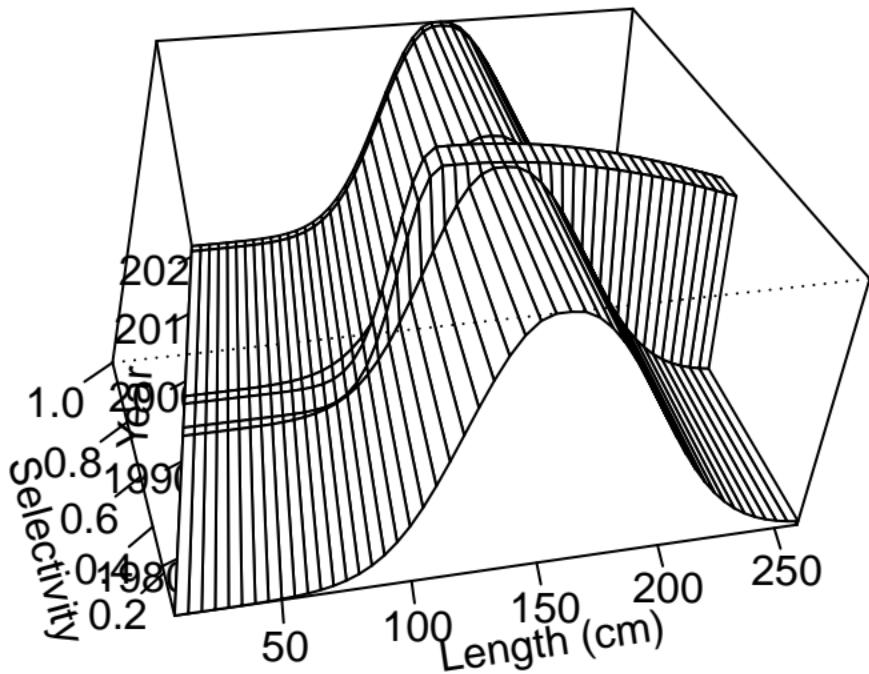


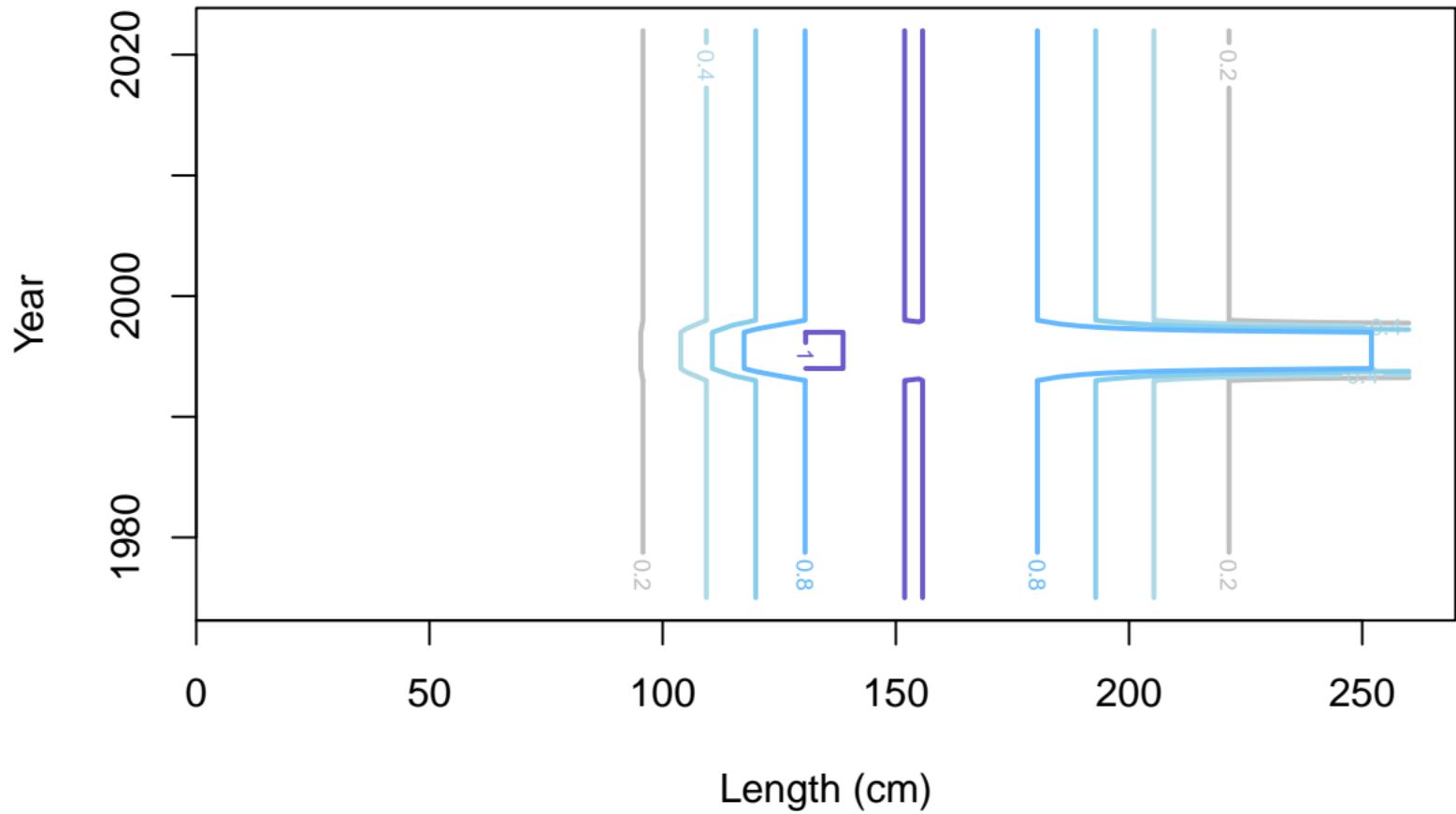


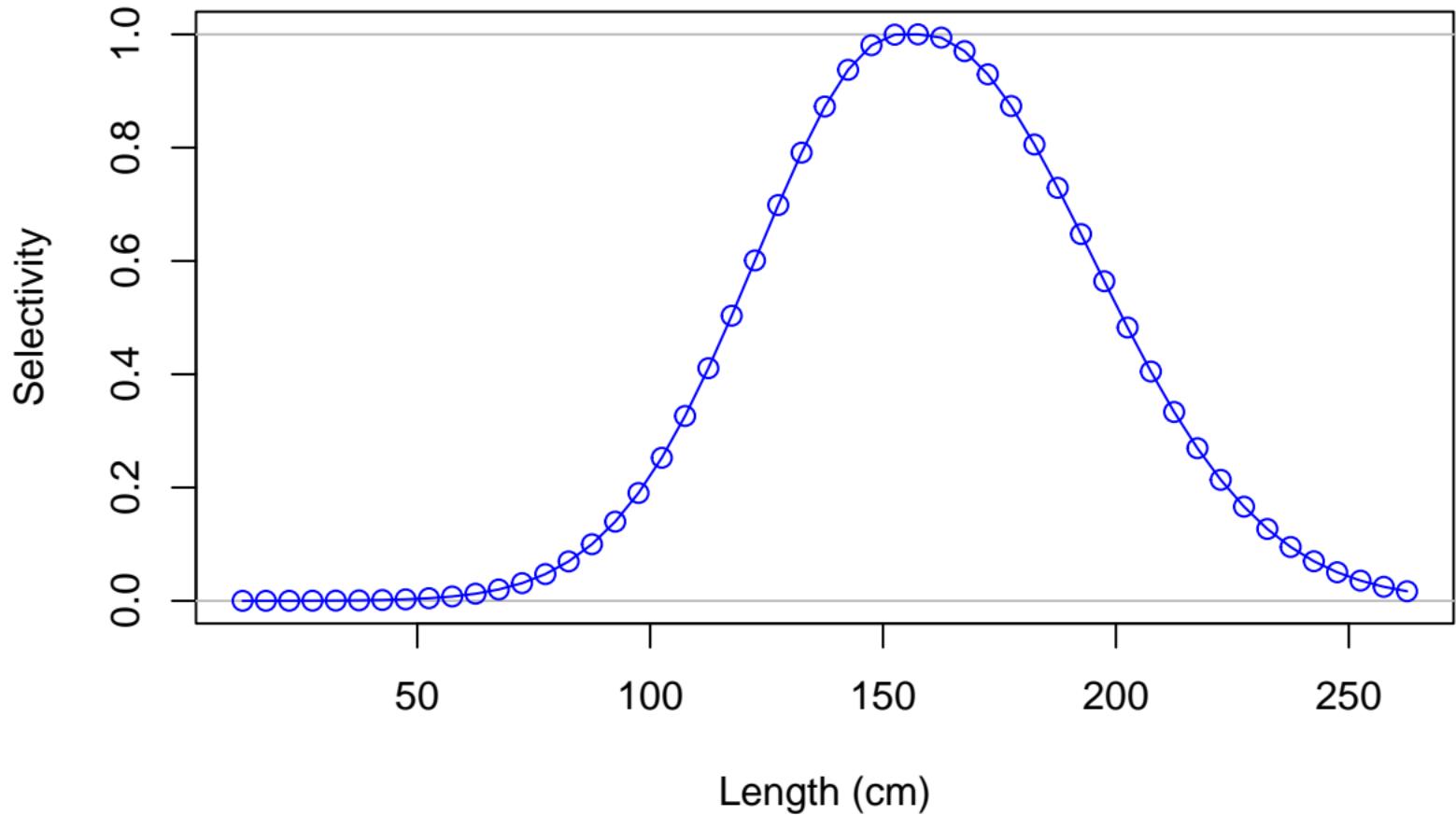


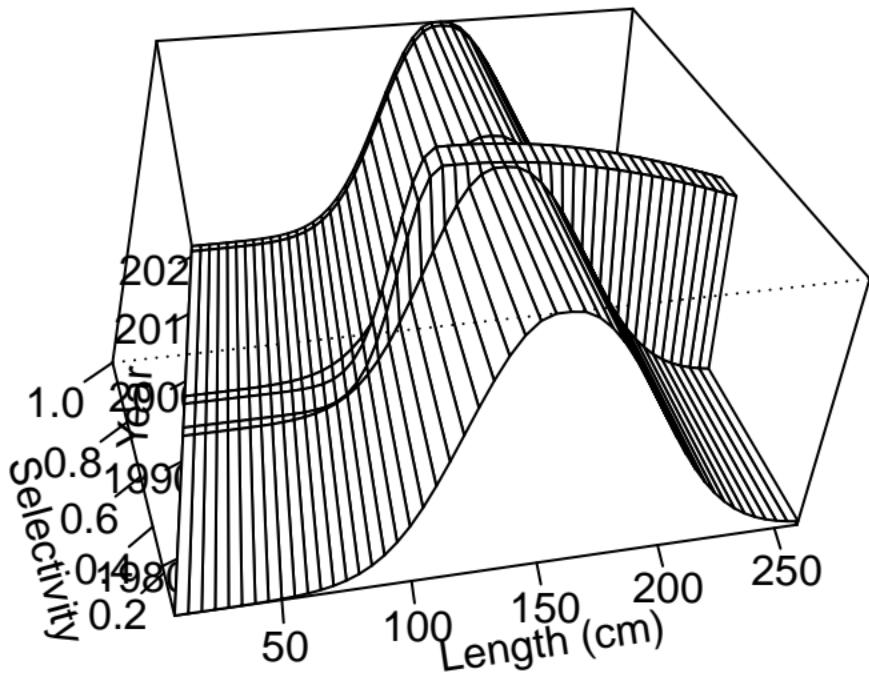


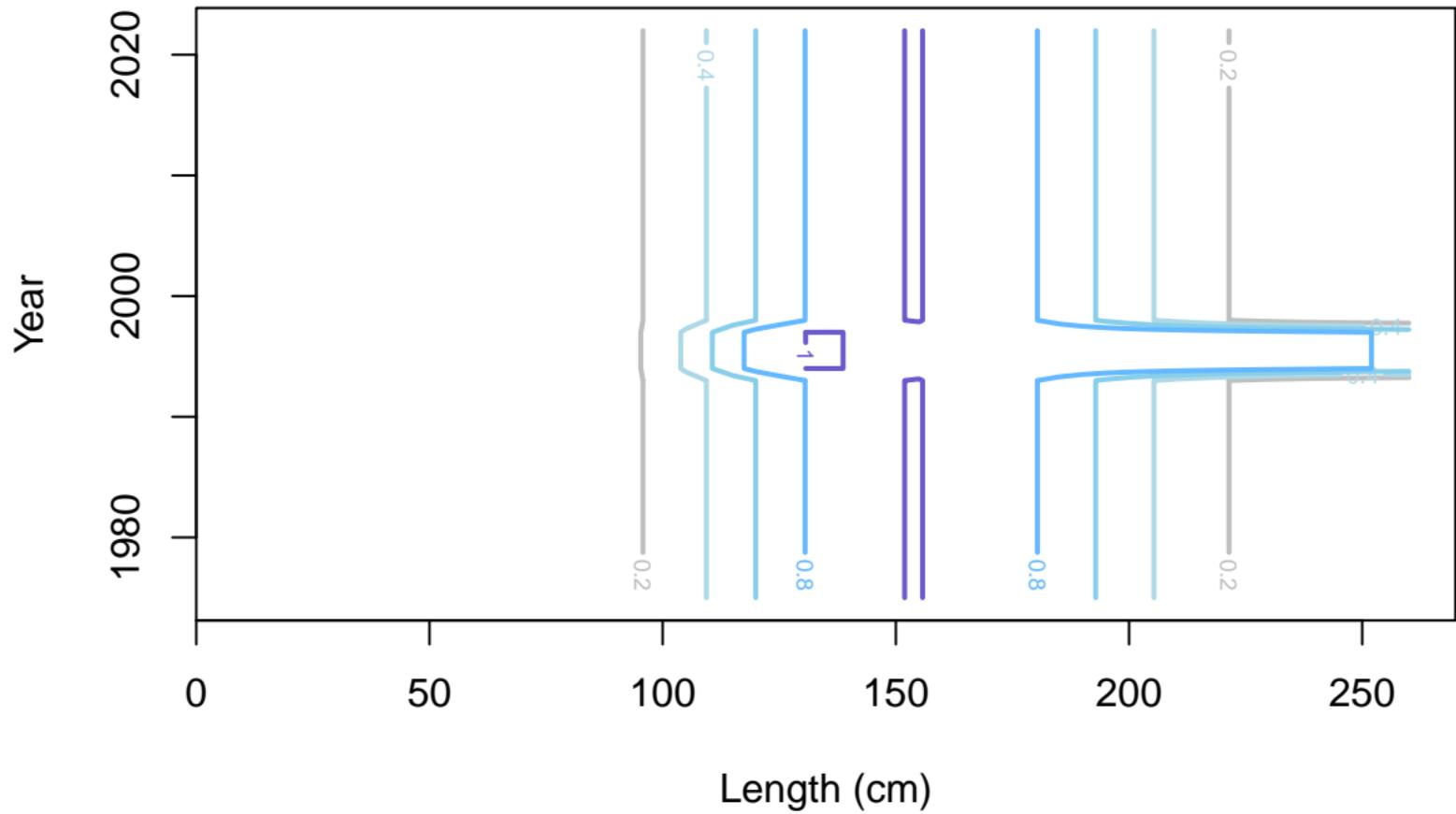


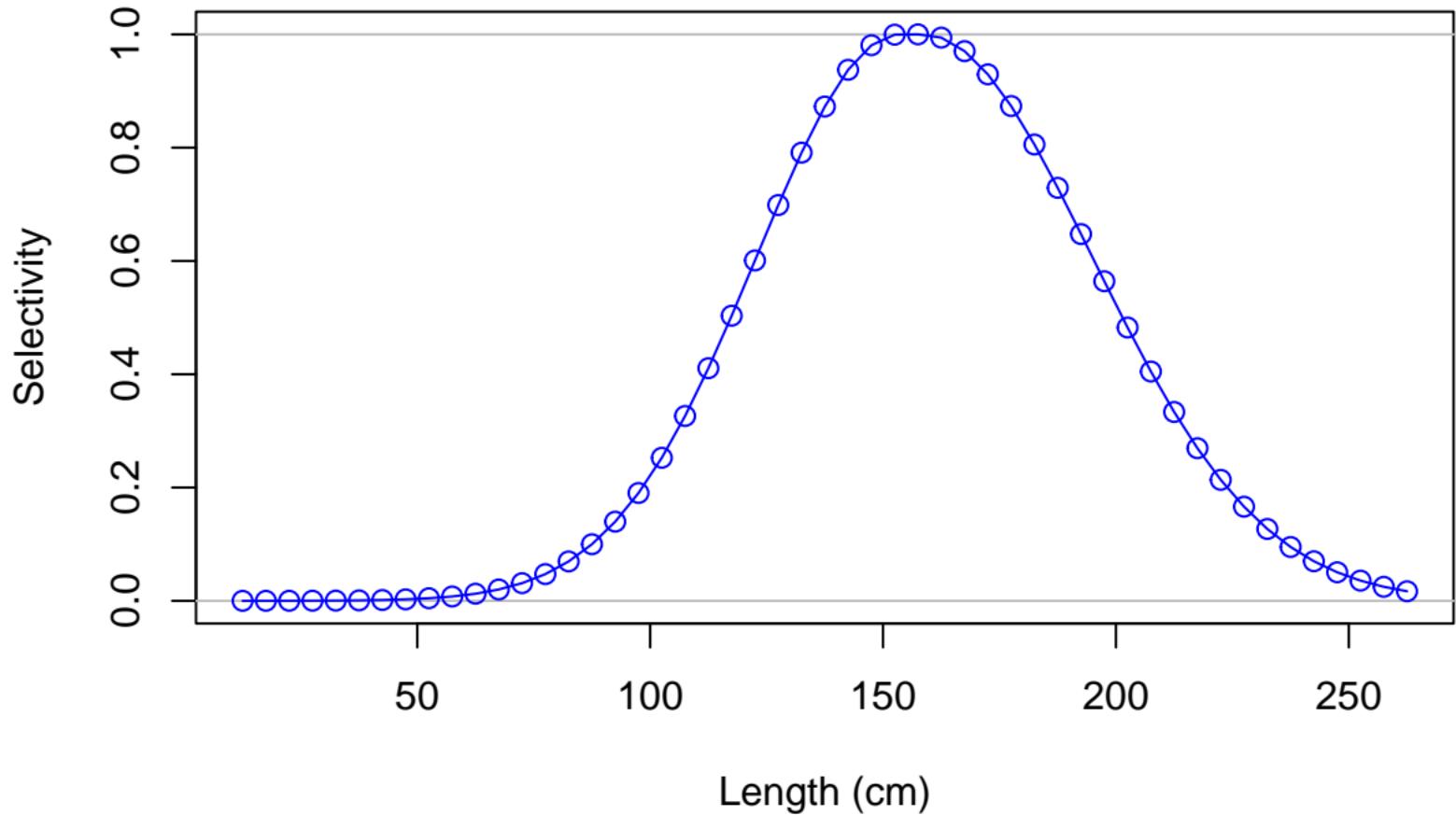


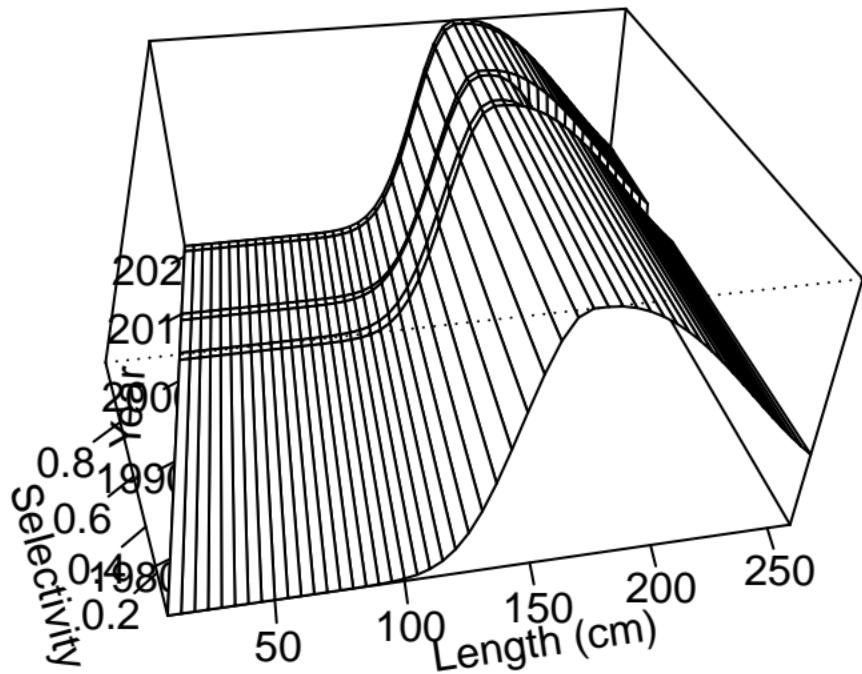












Year

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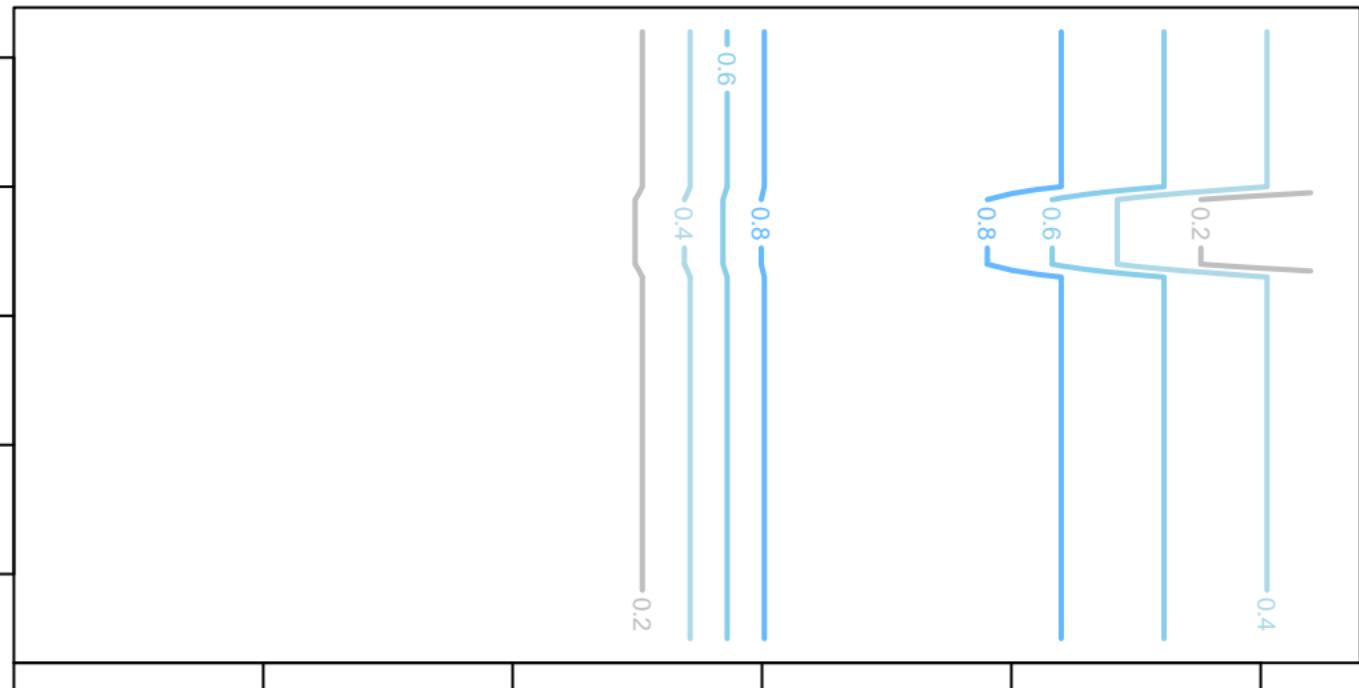
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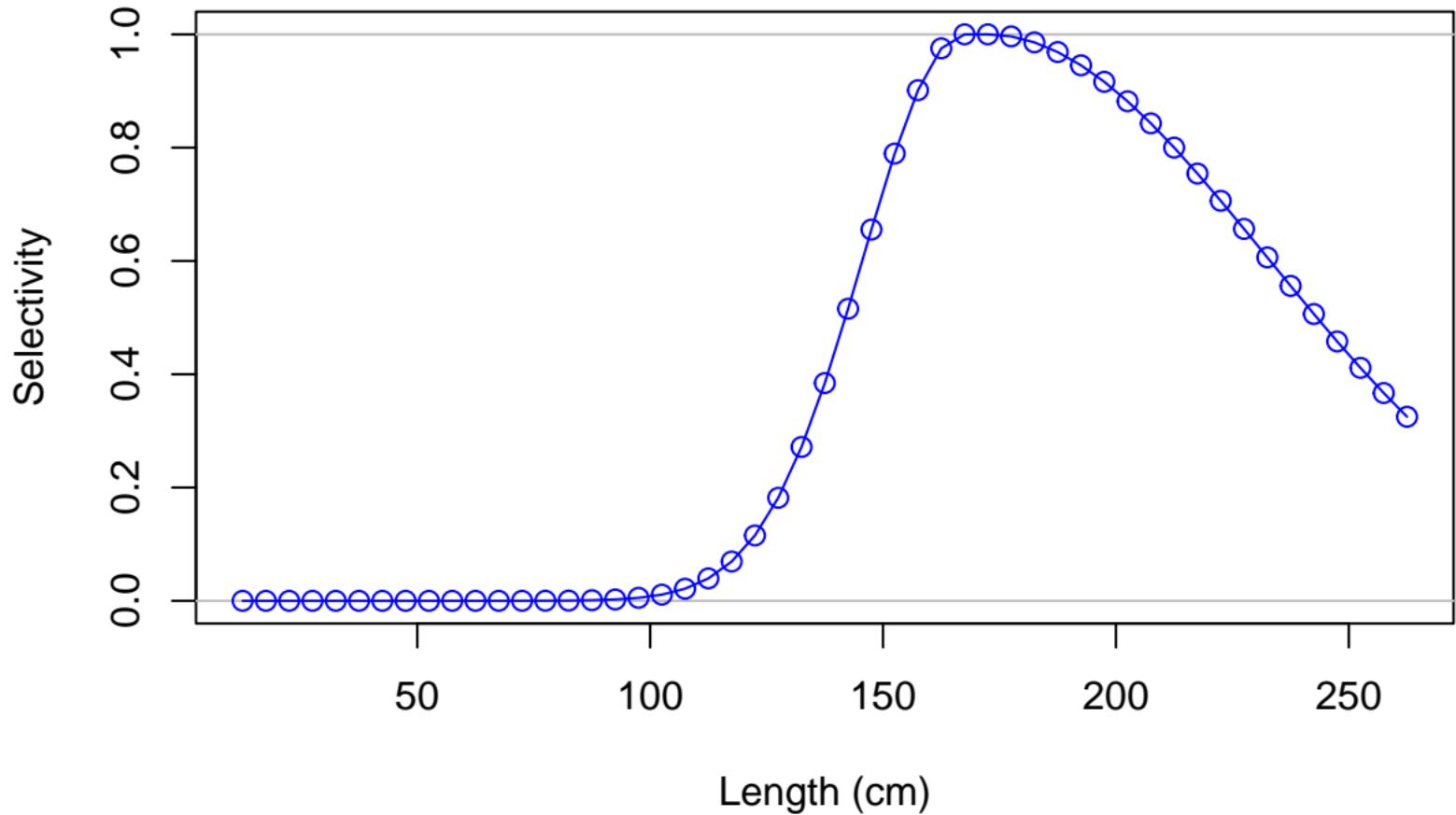
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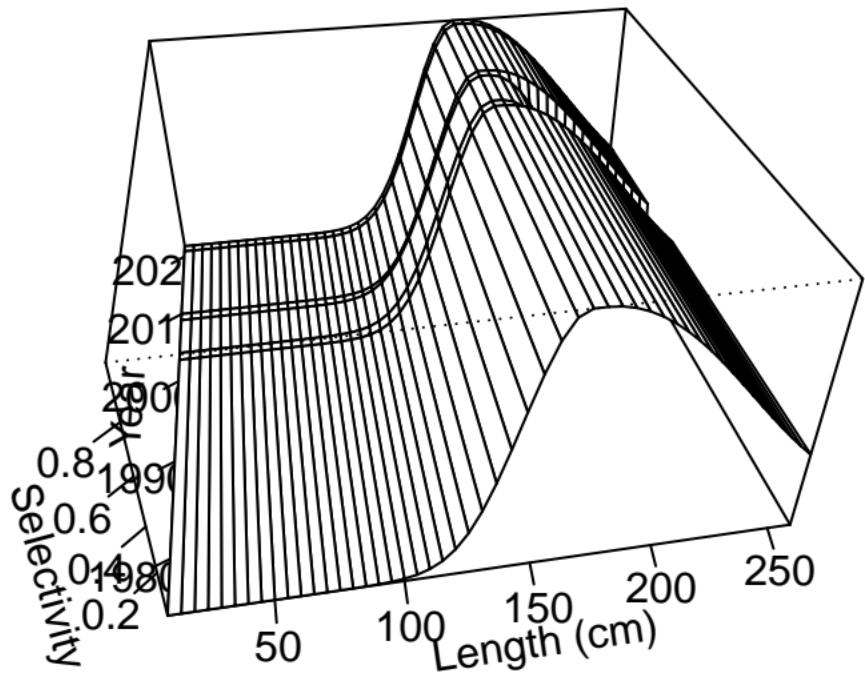
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Length (cm)







Year

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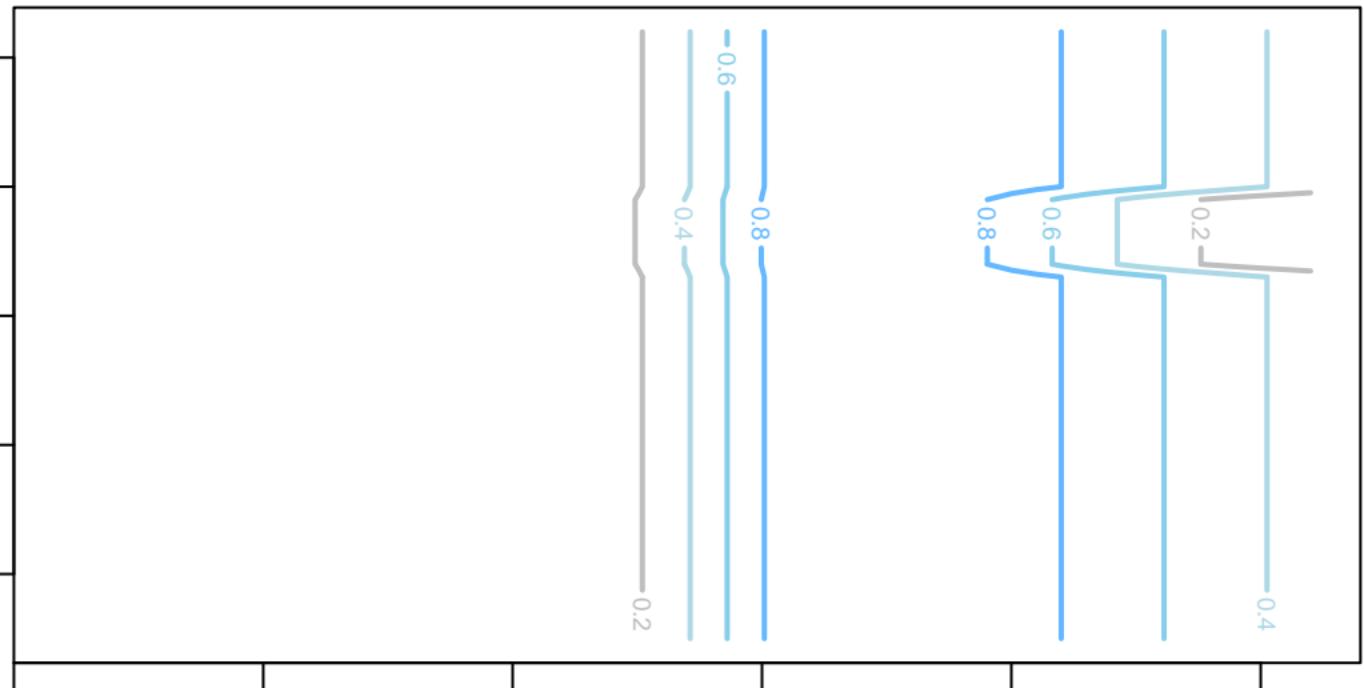
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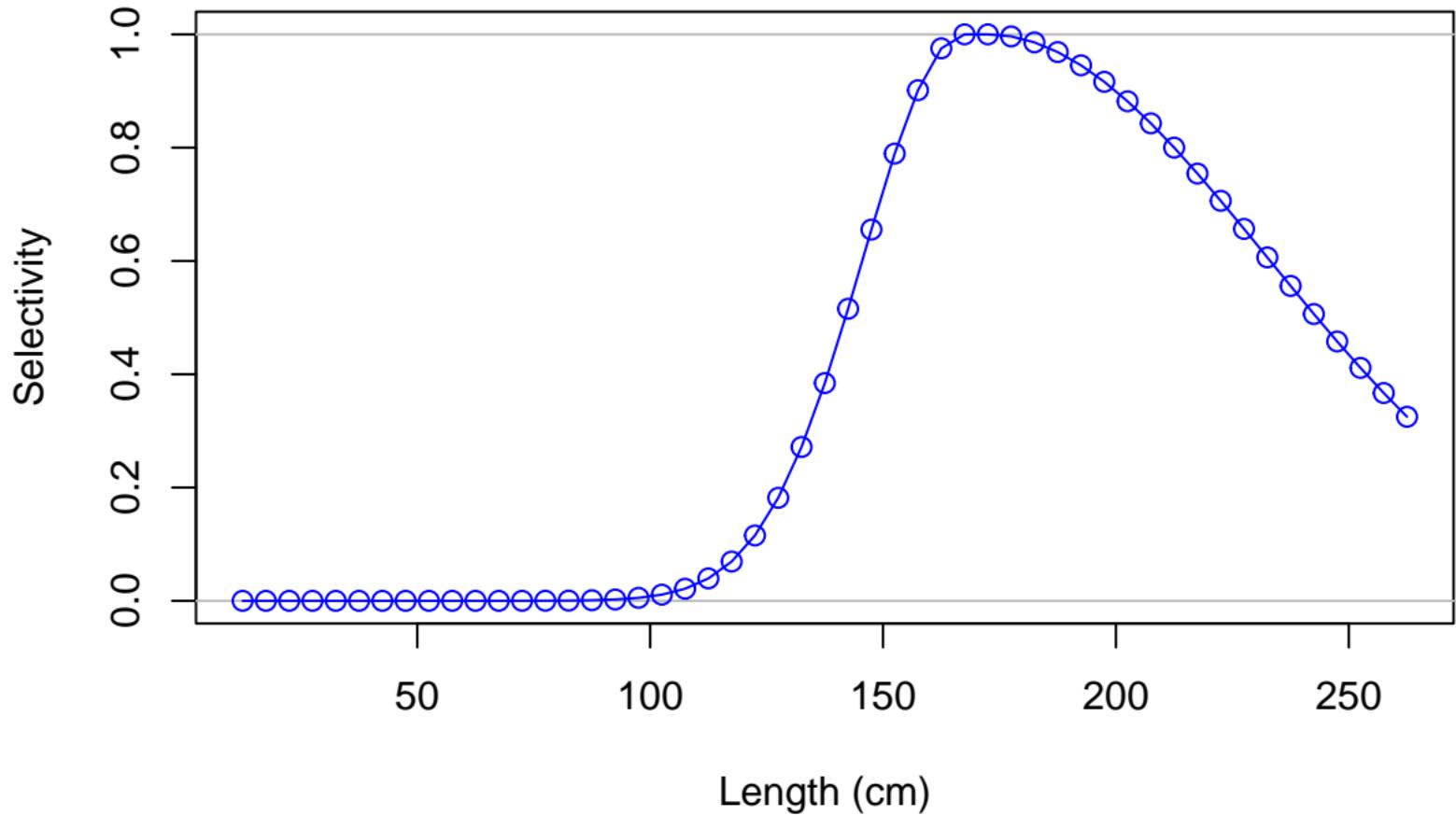
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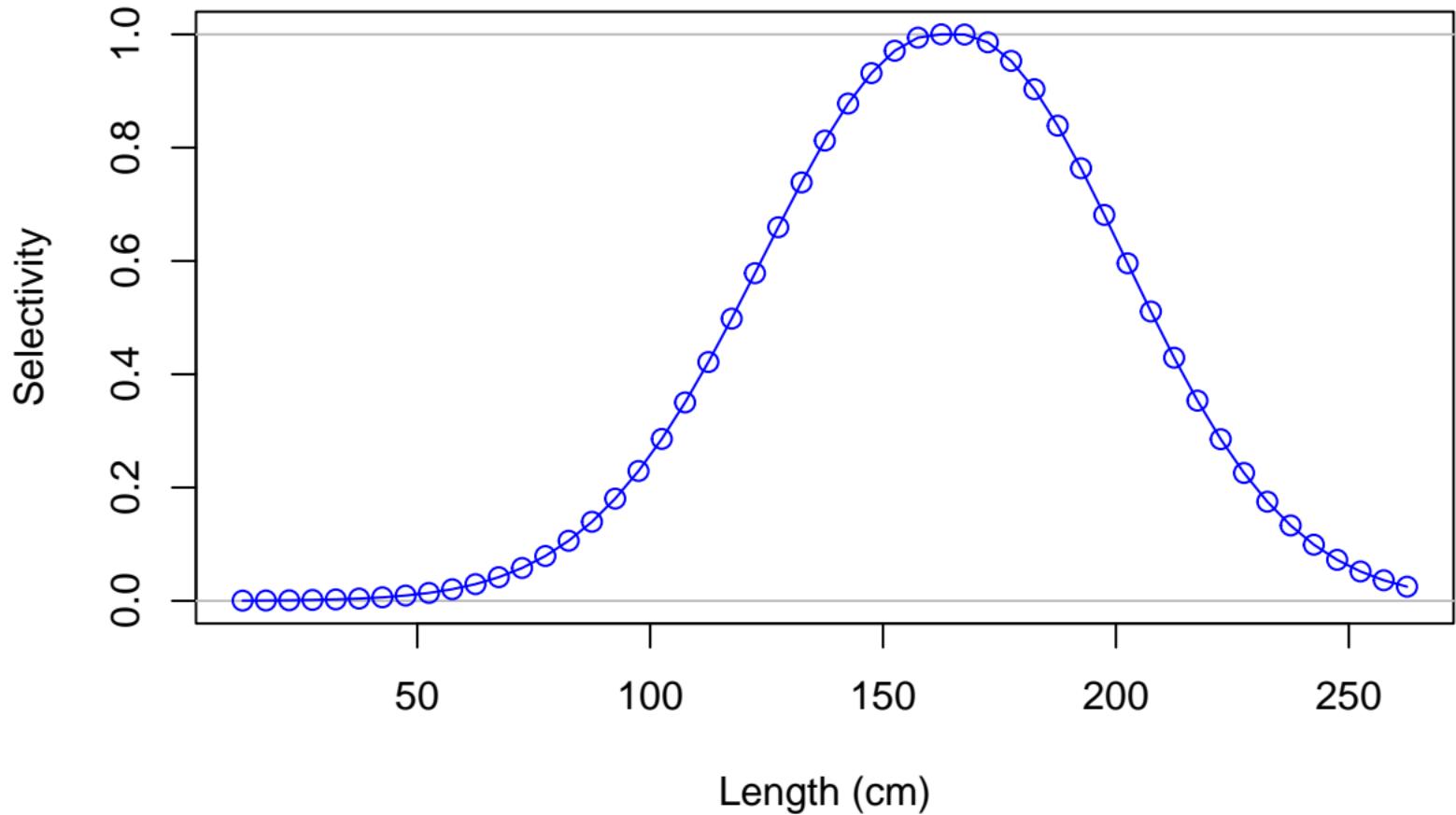
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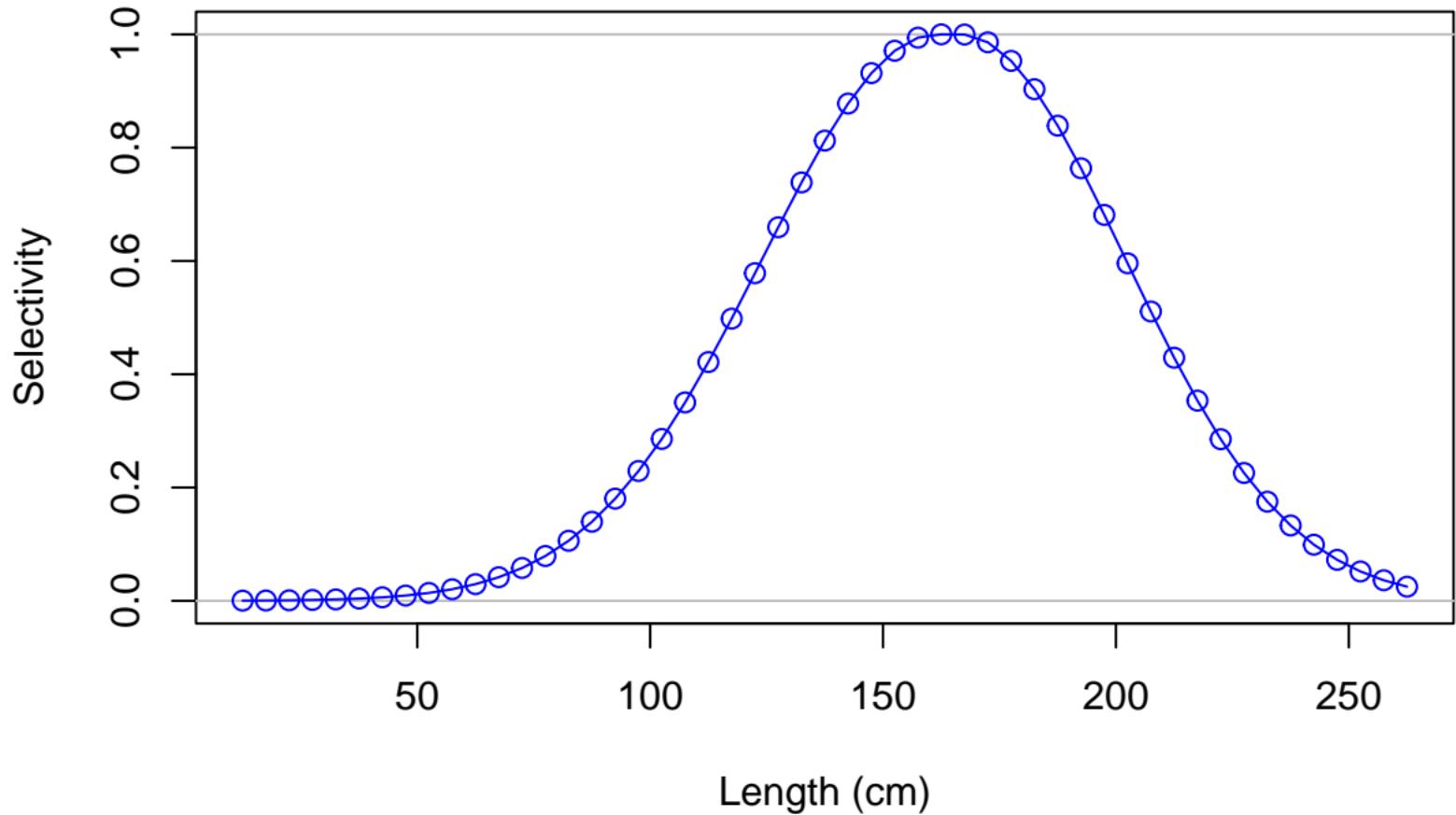
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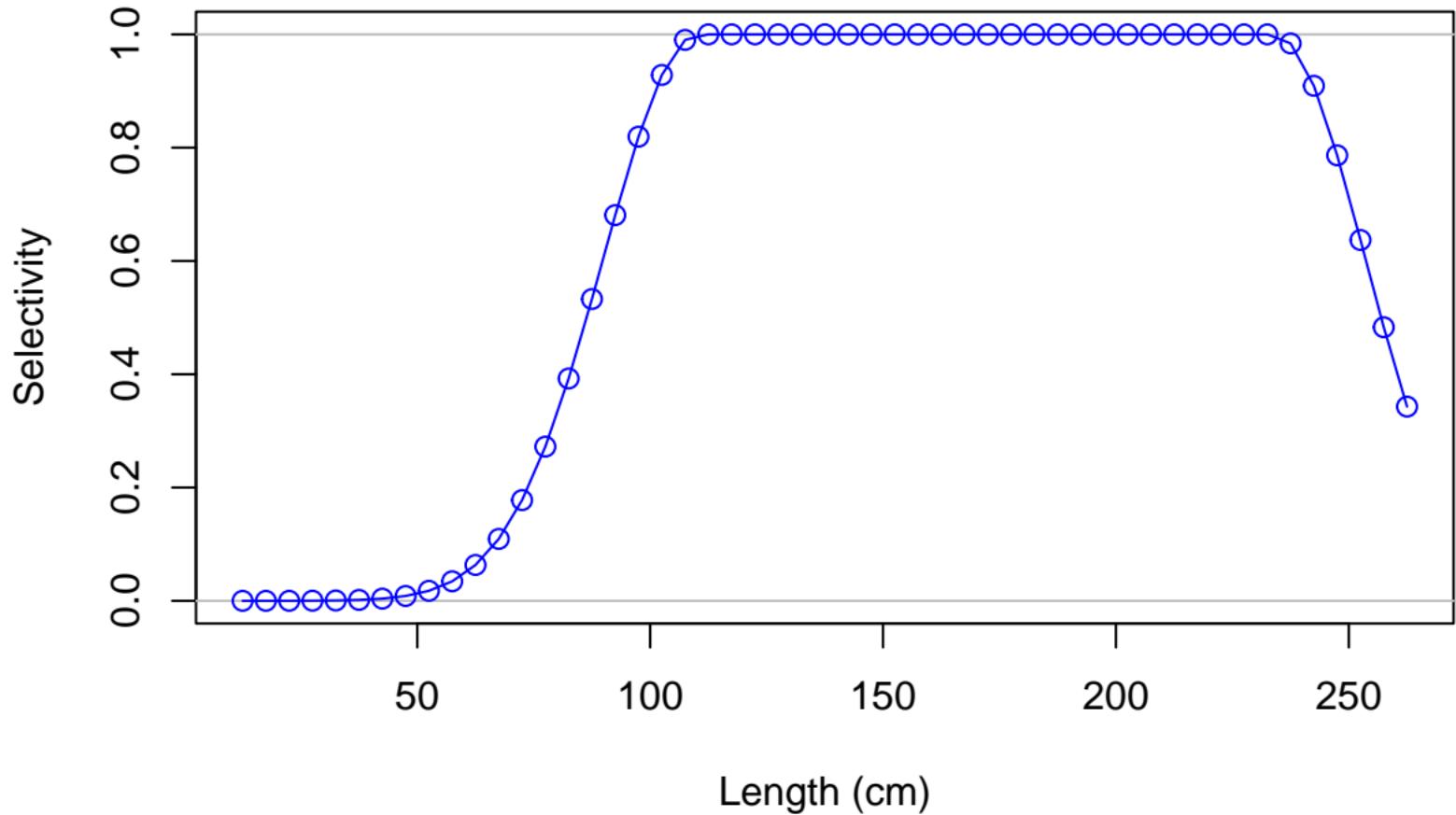
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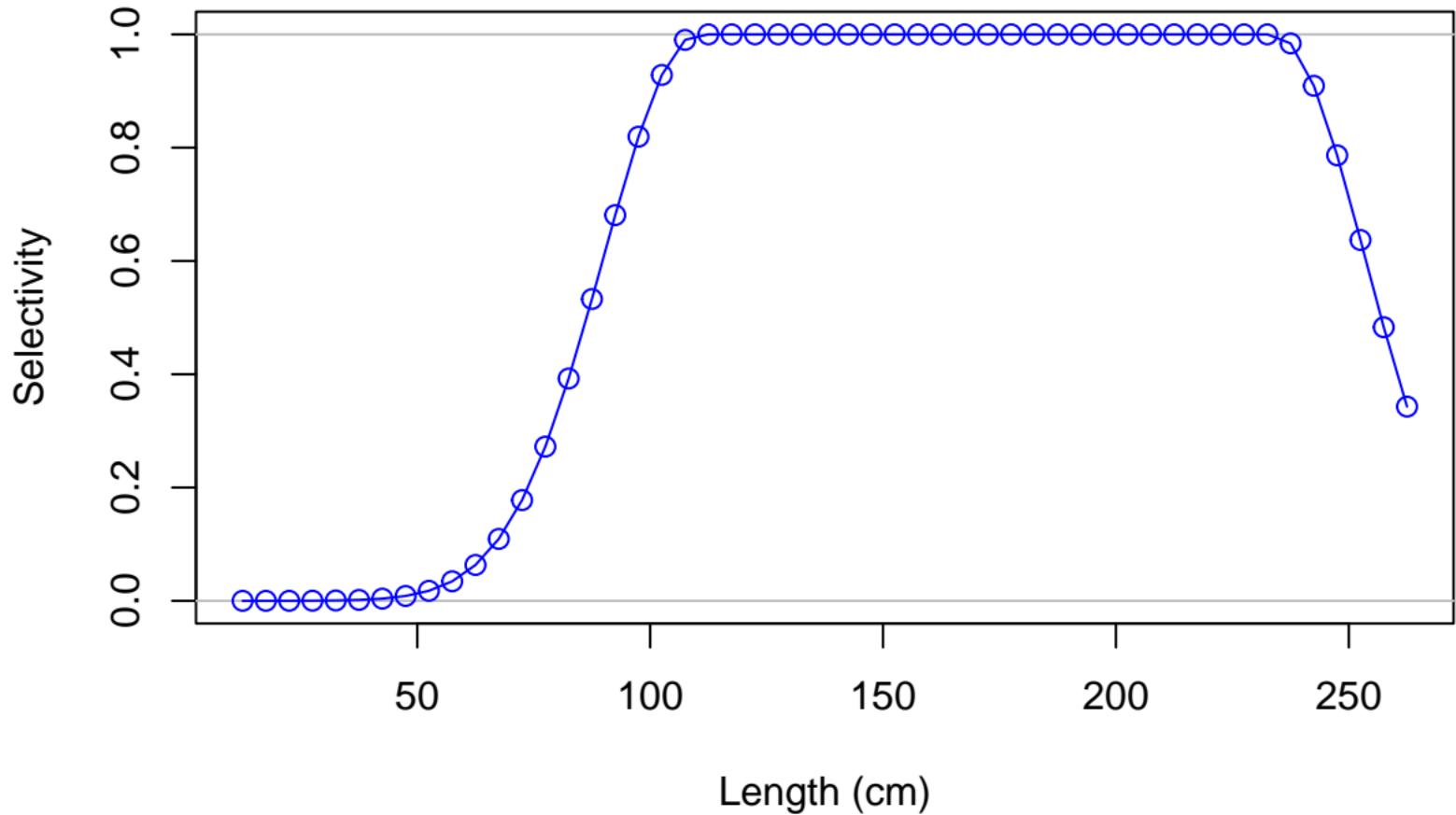


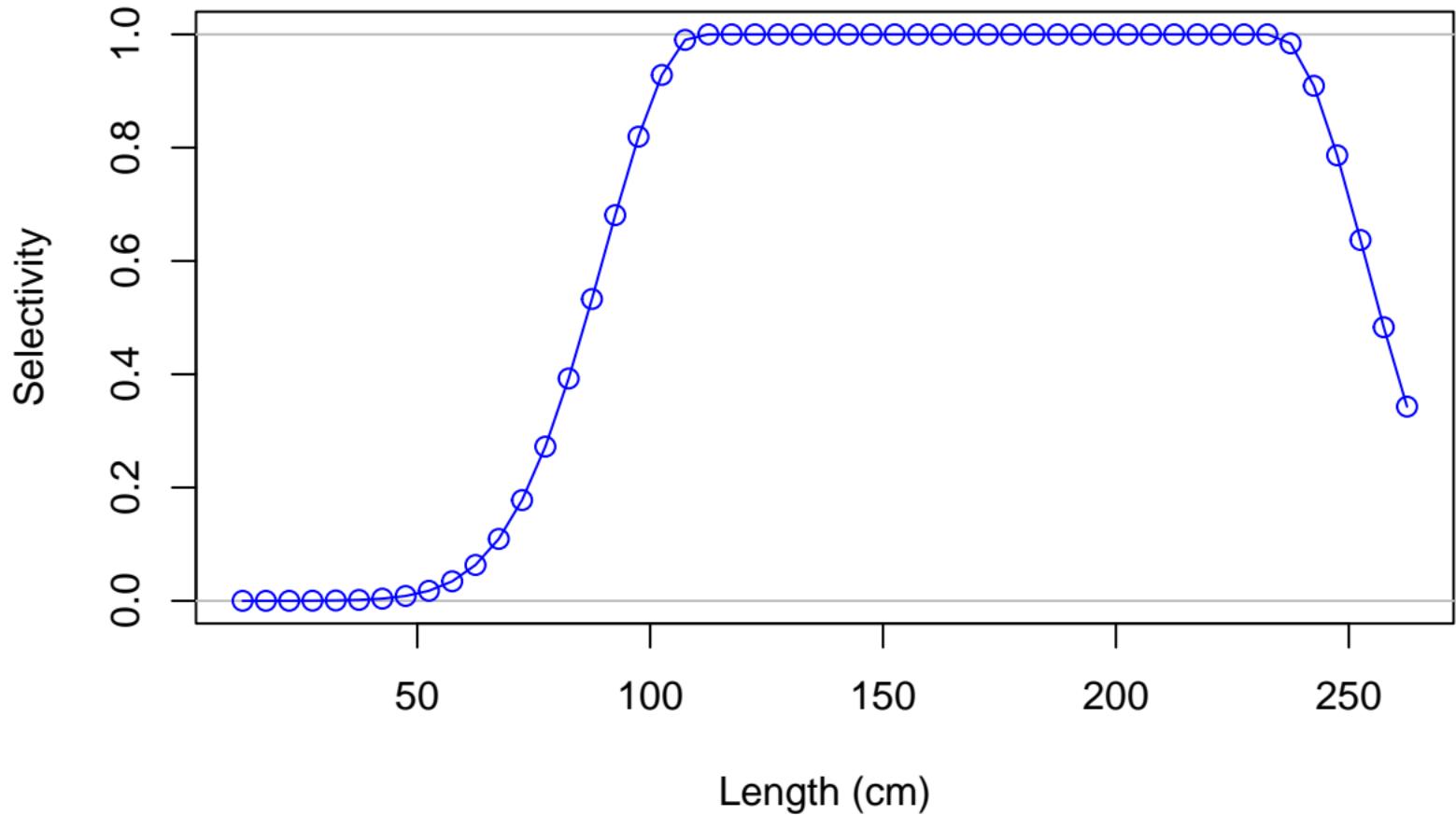


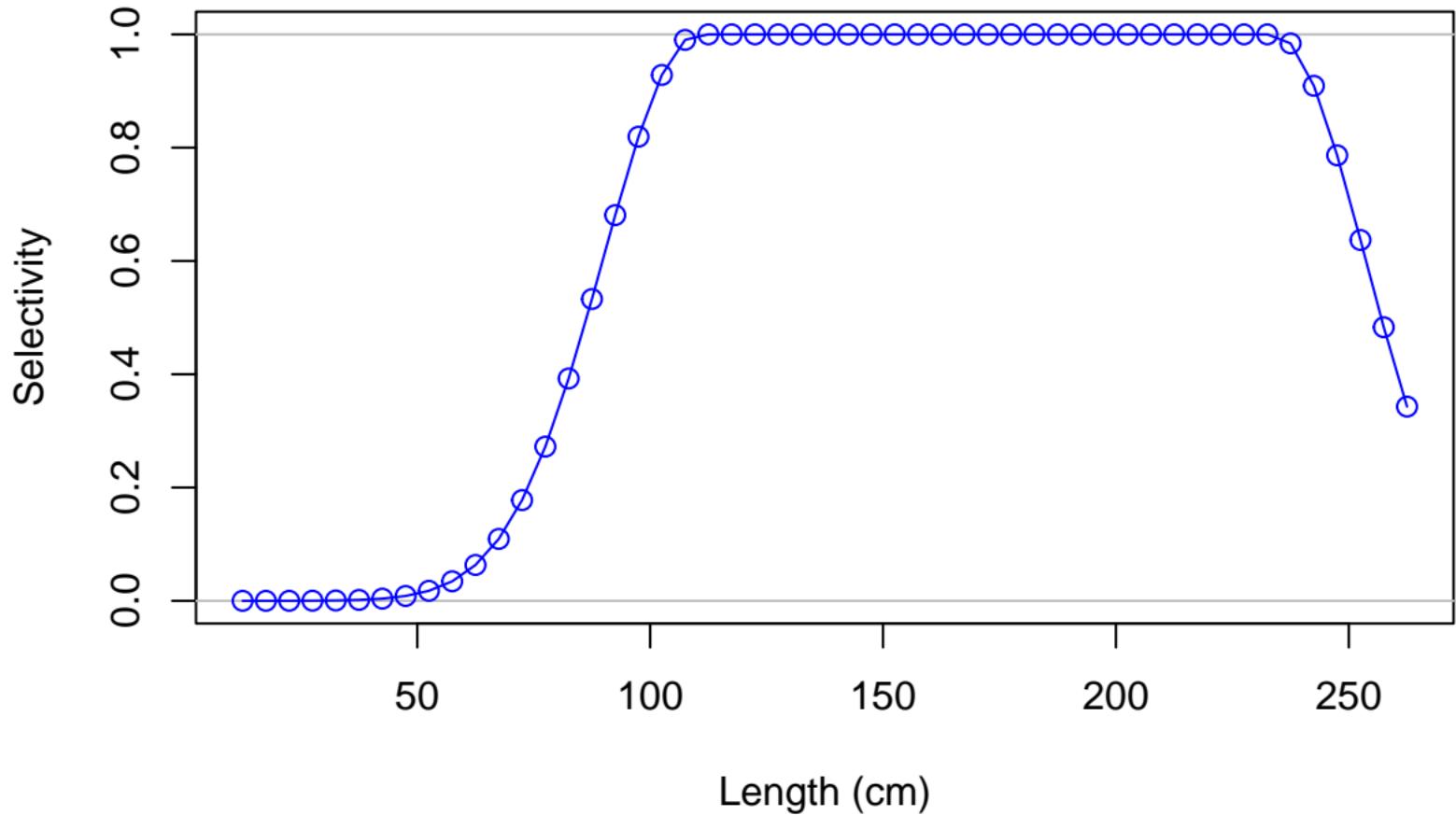


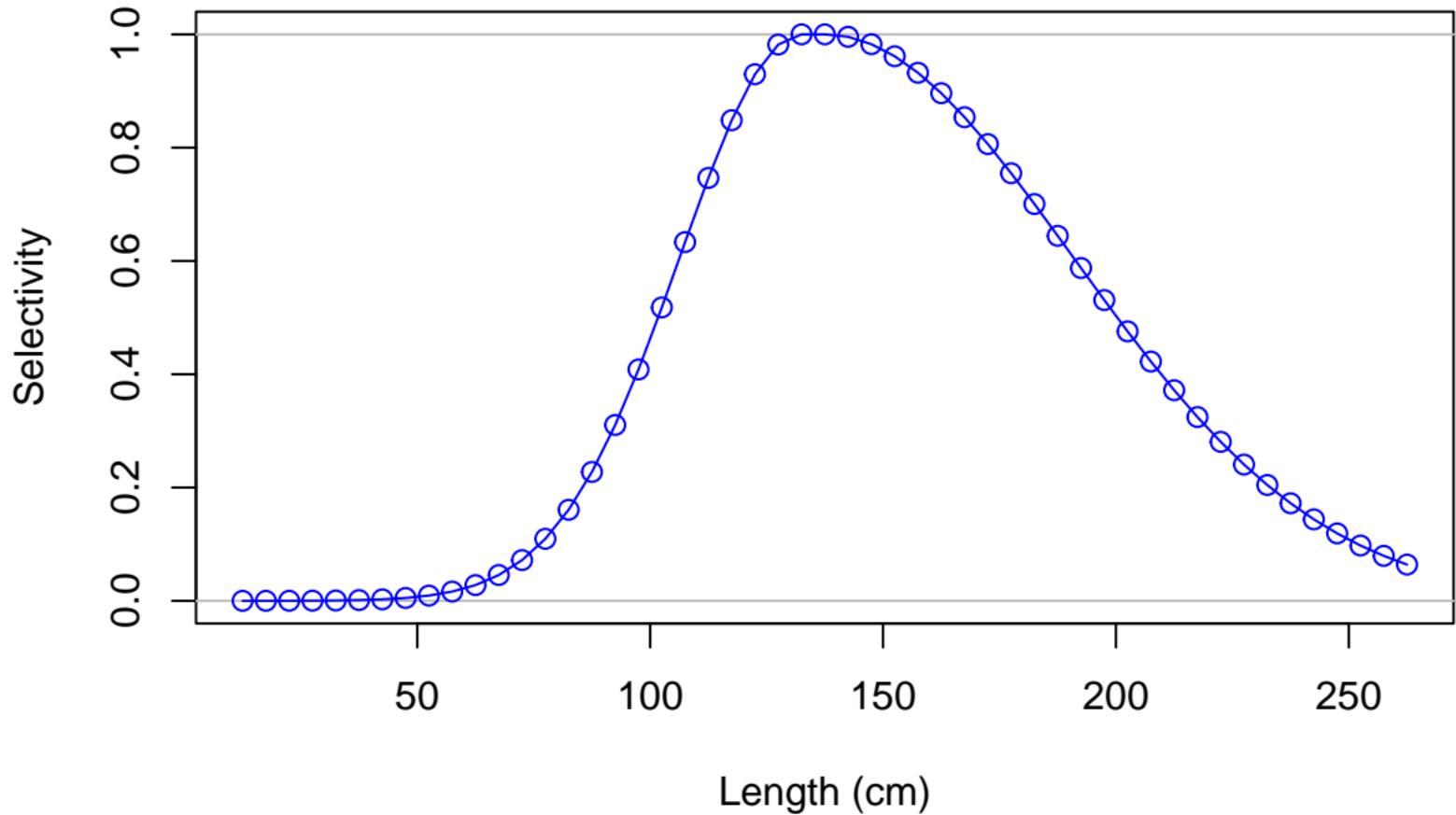


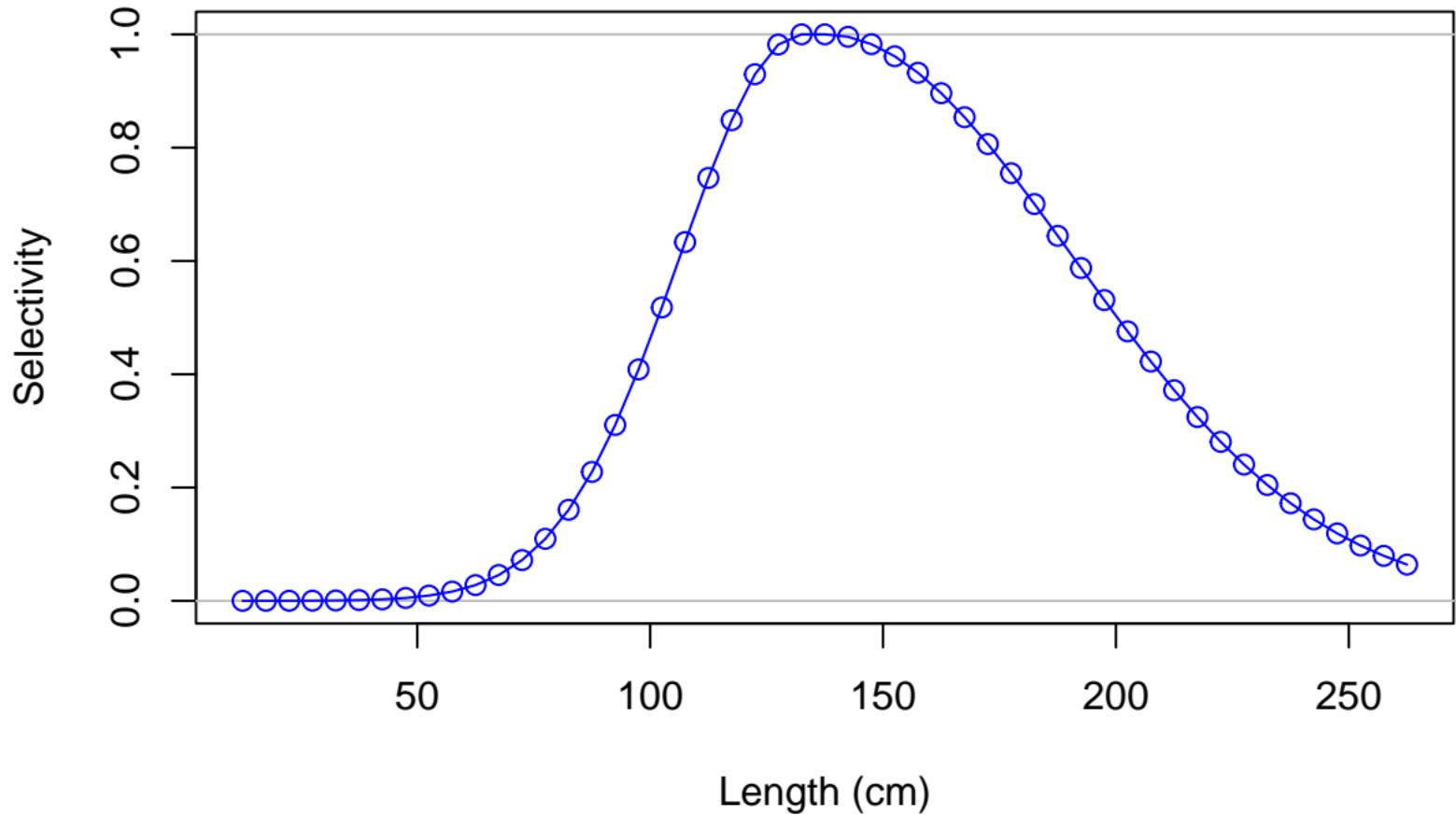


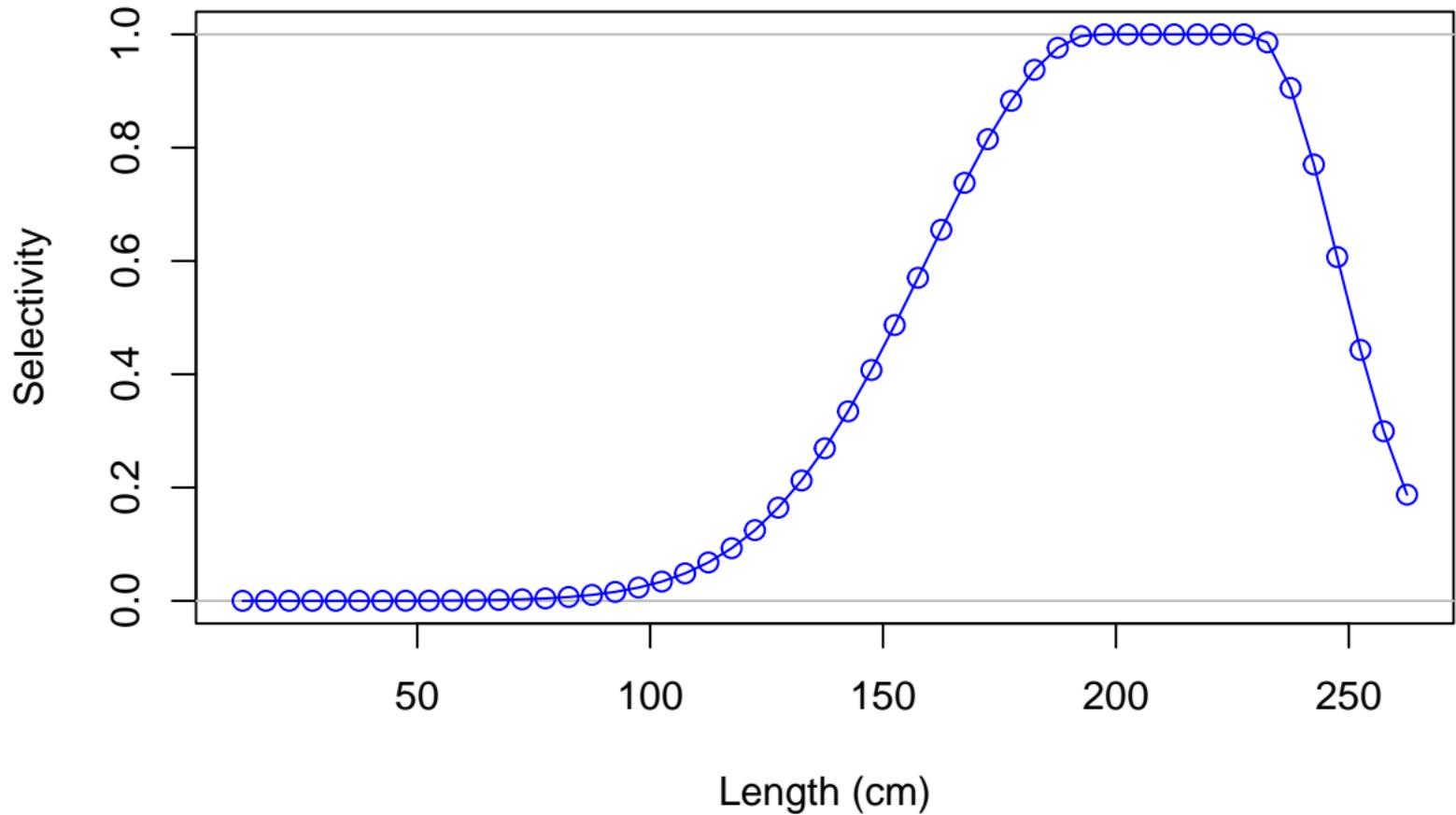


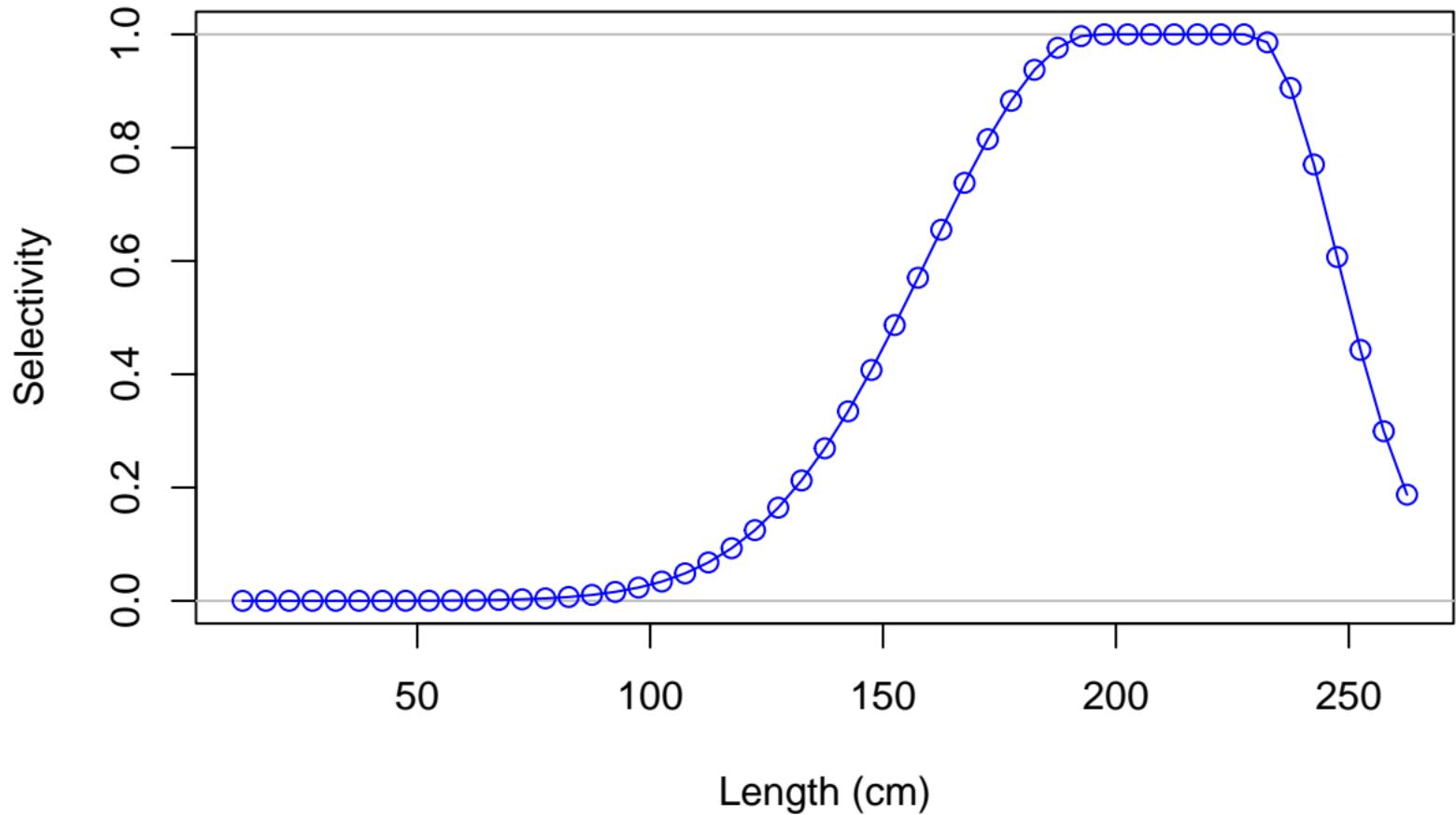


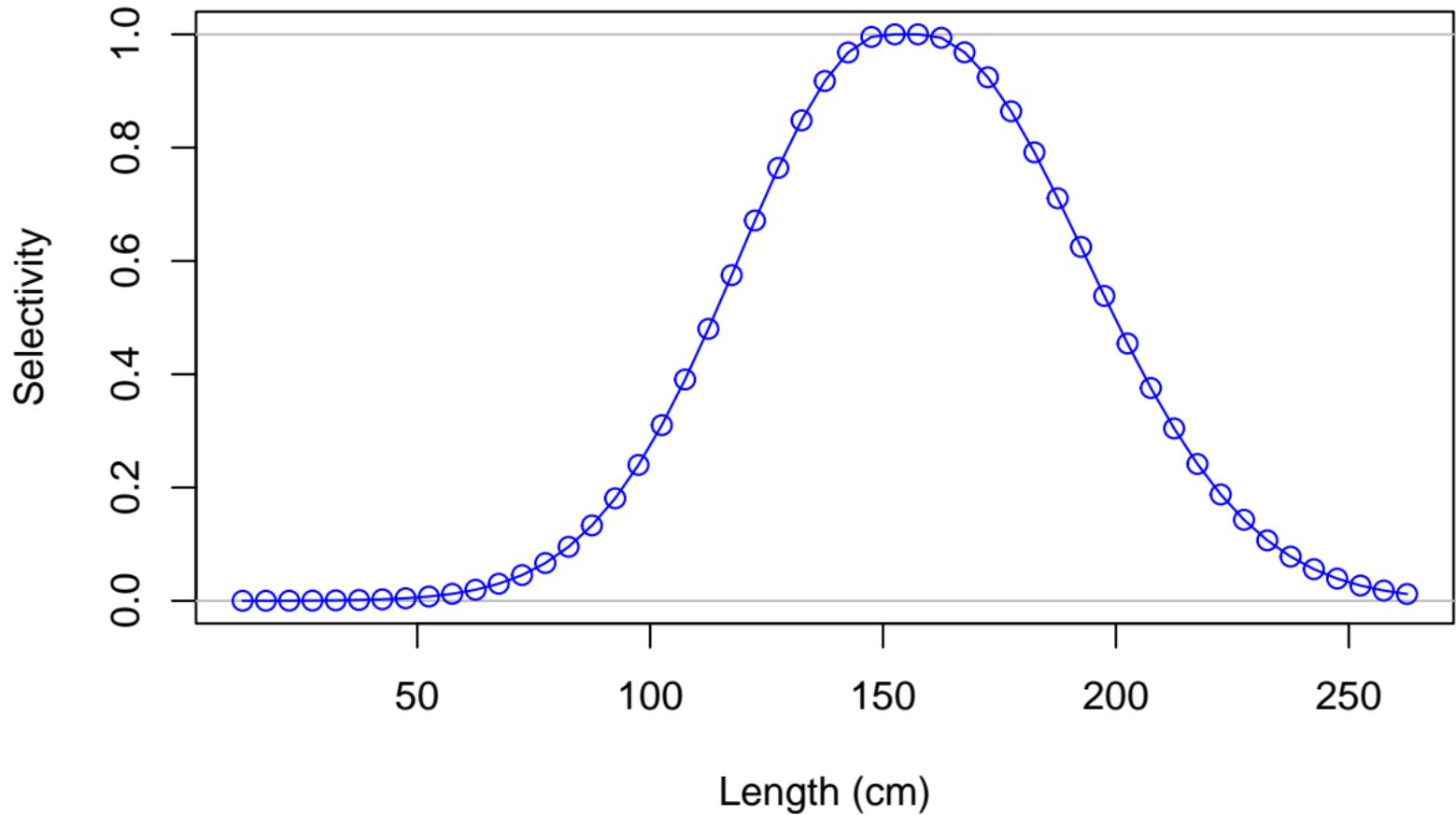


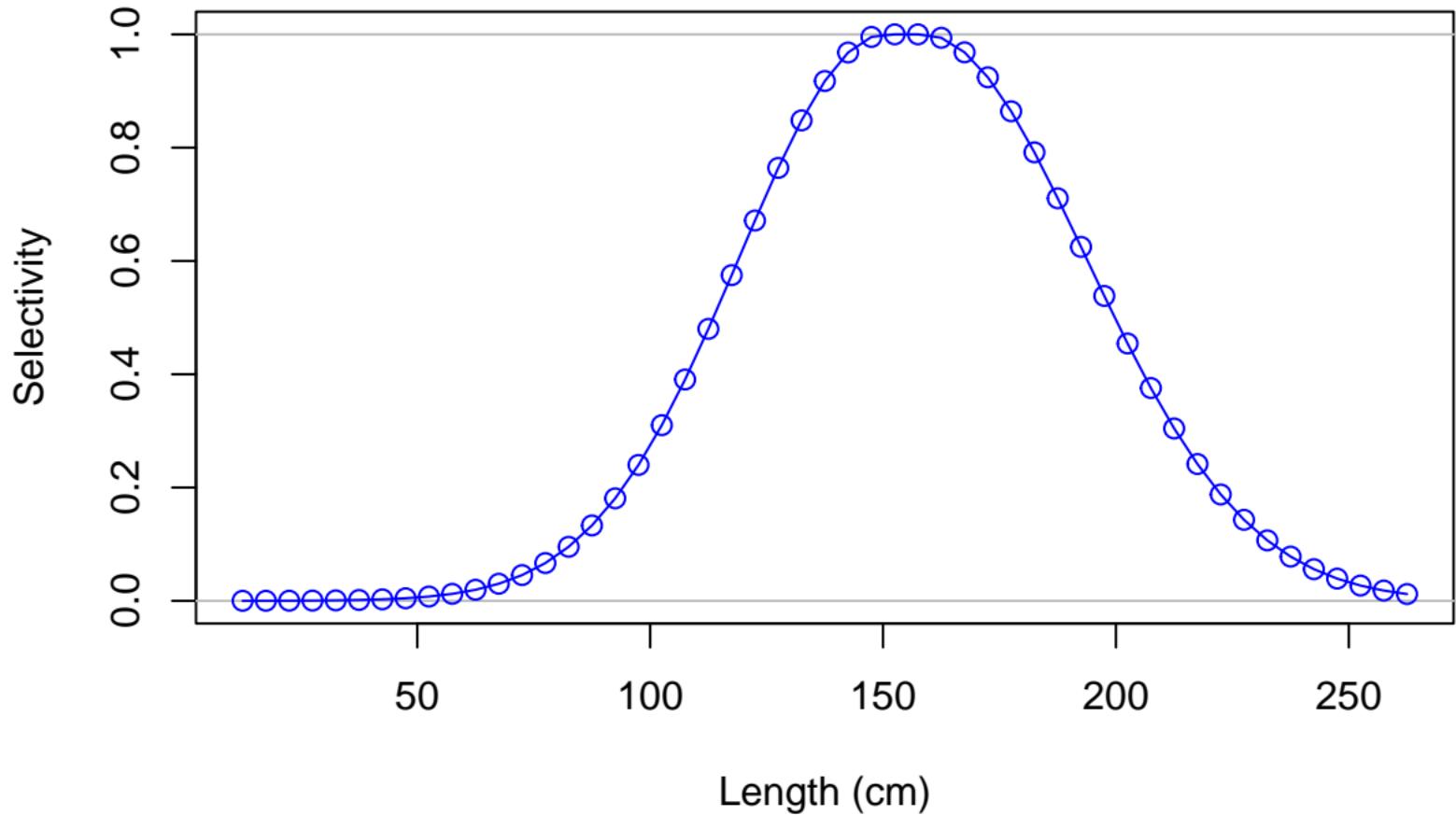


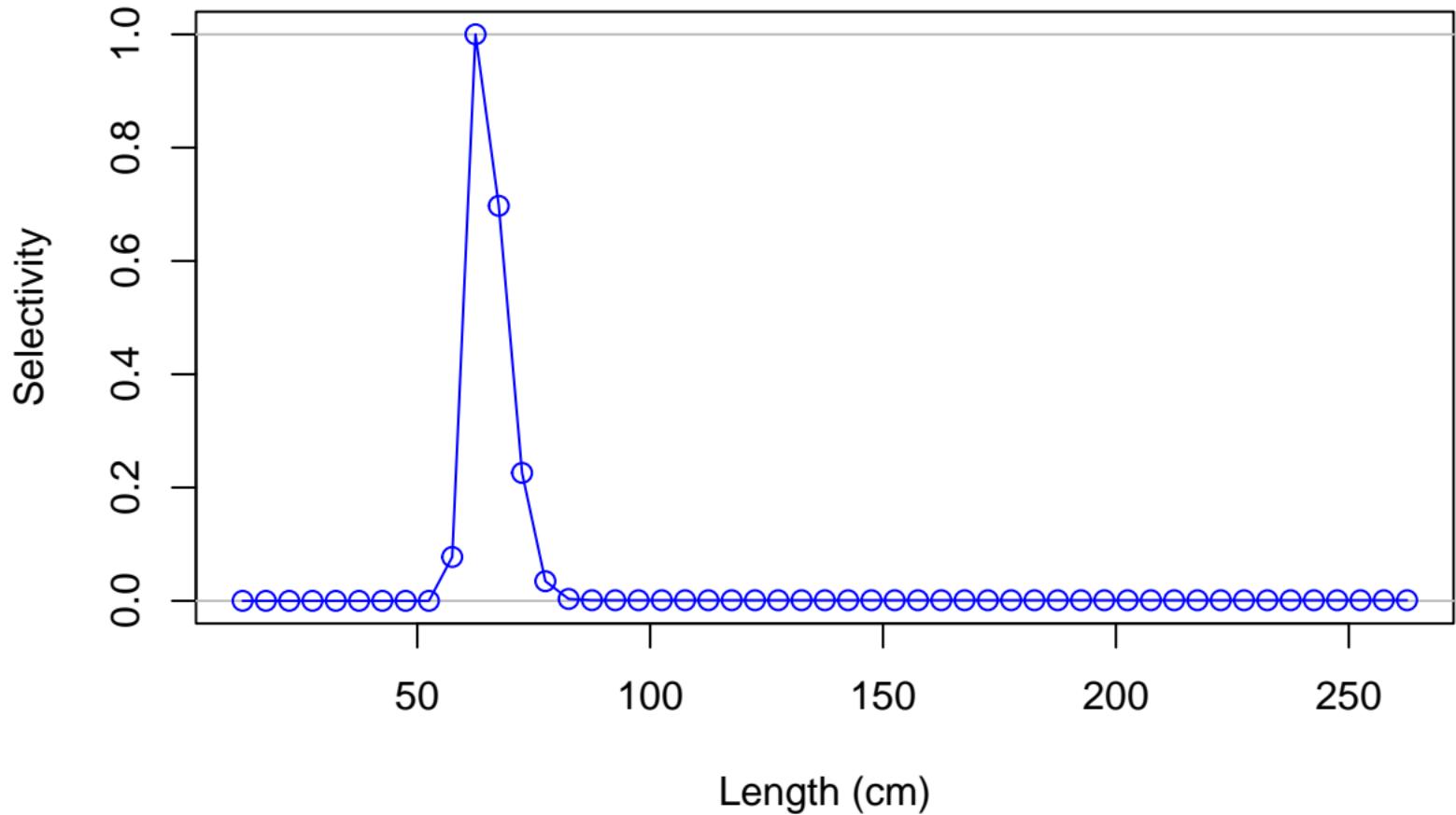


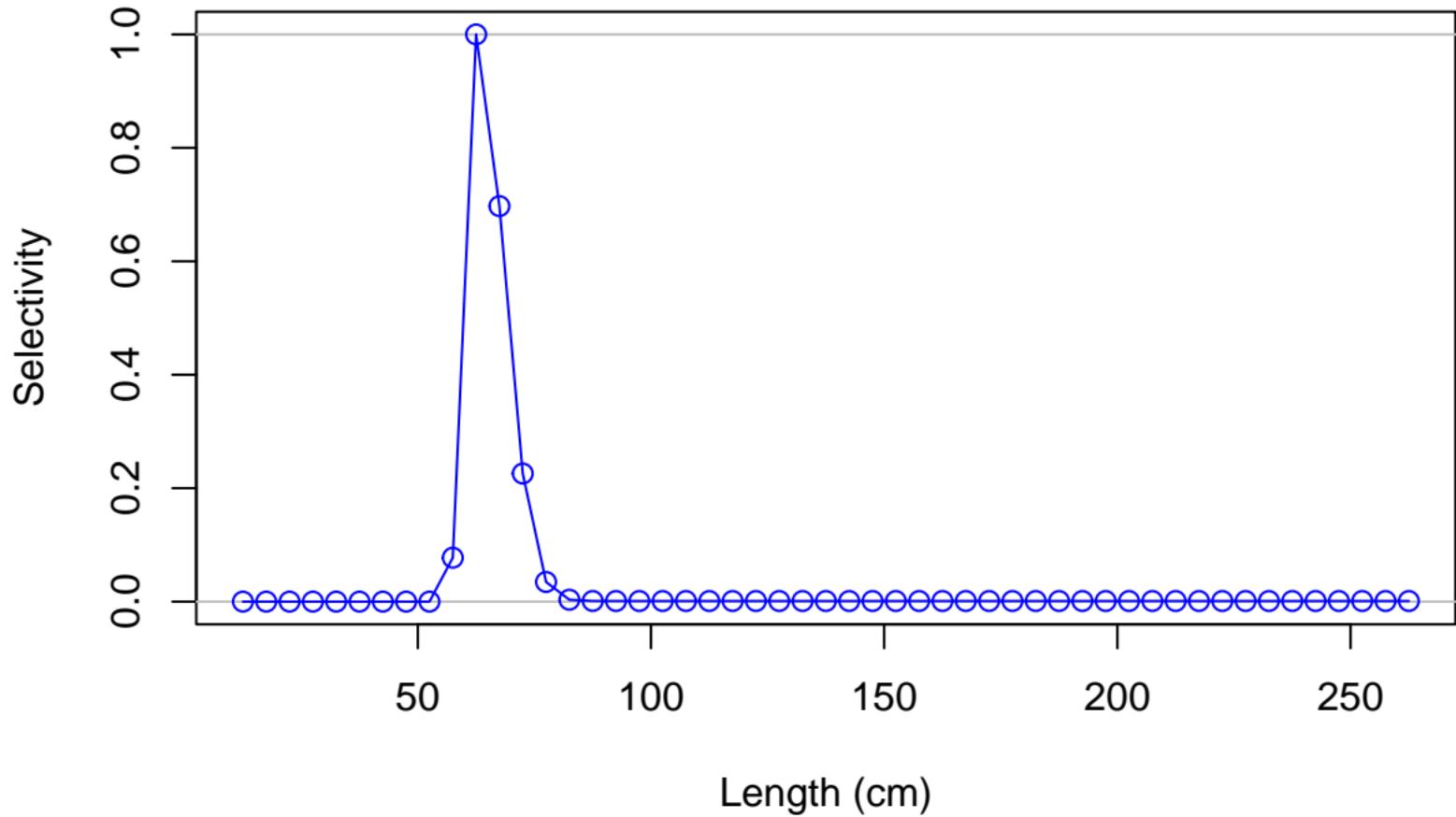


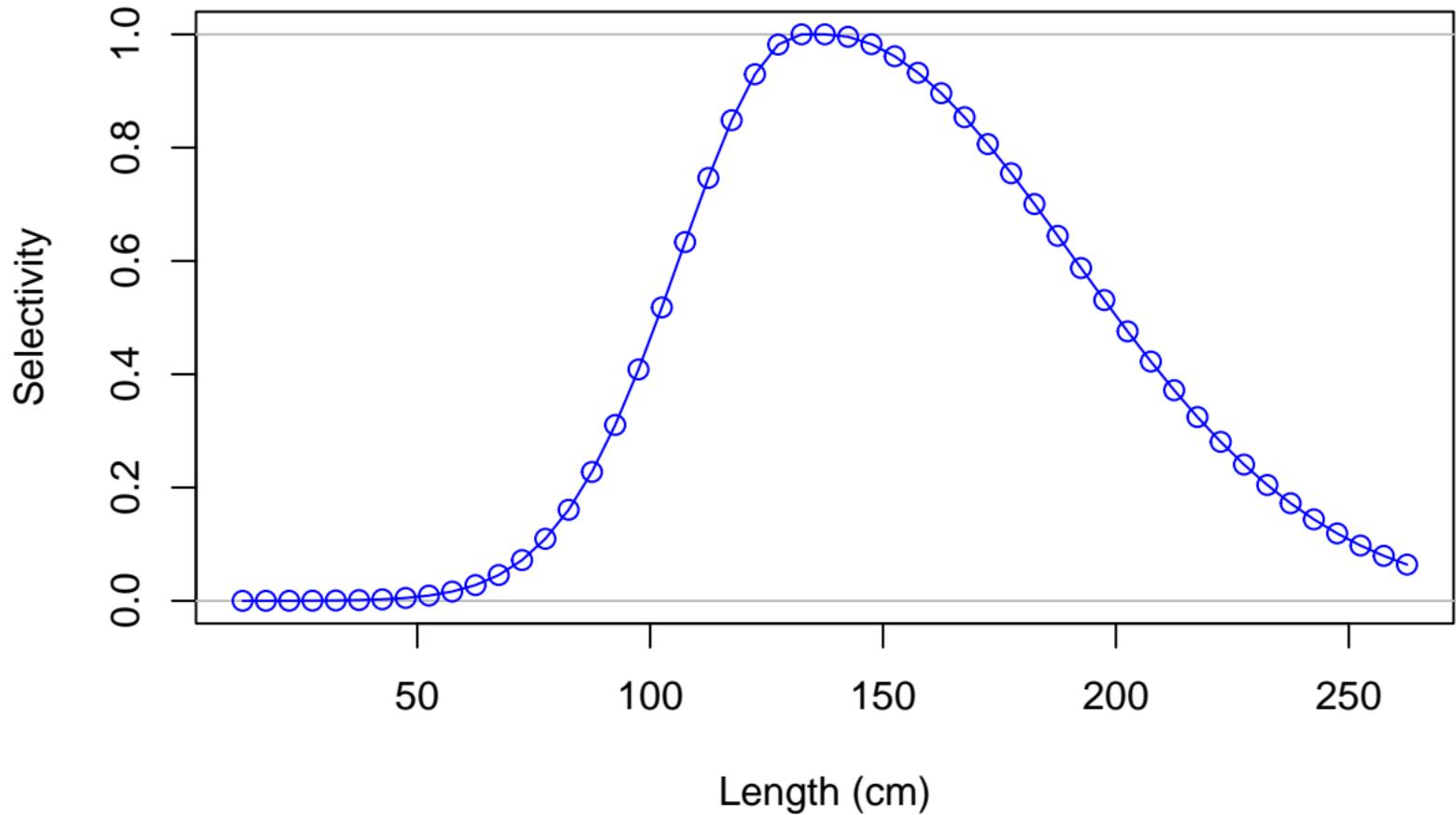


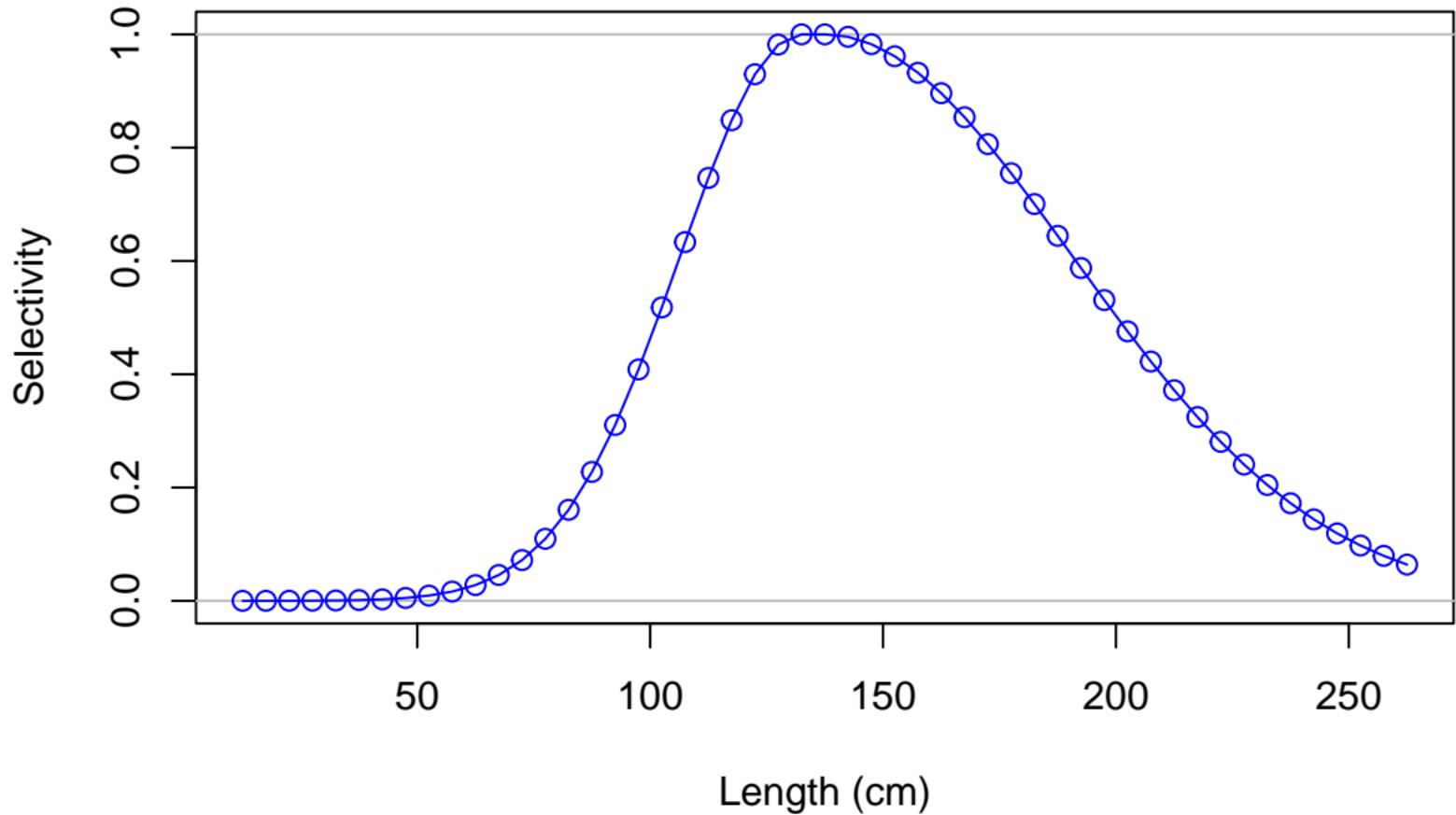


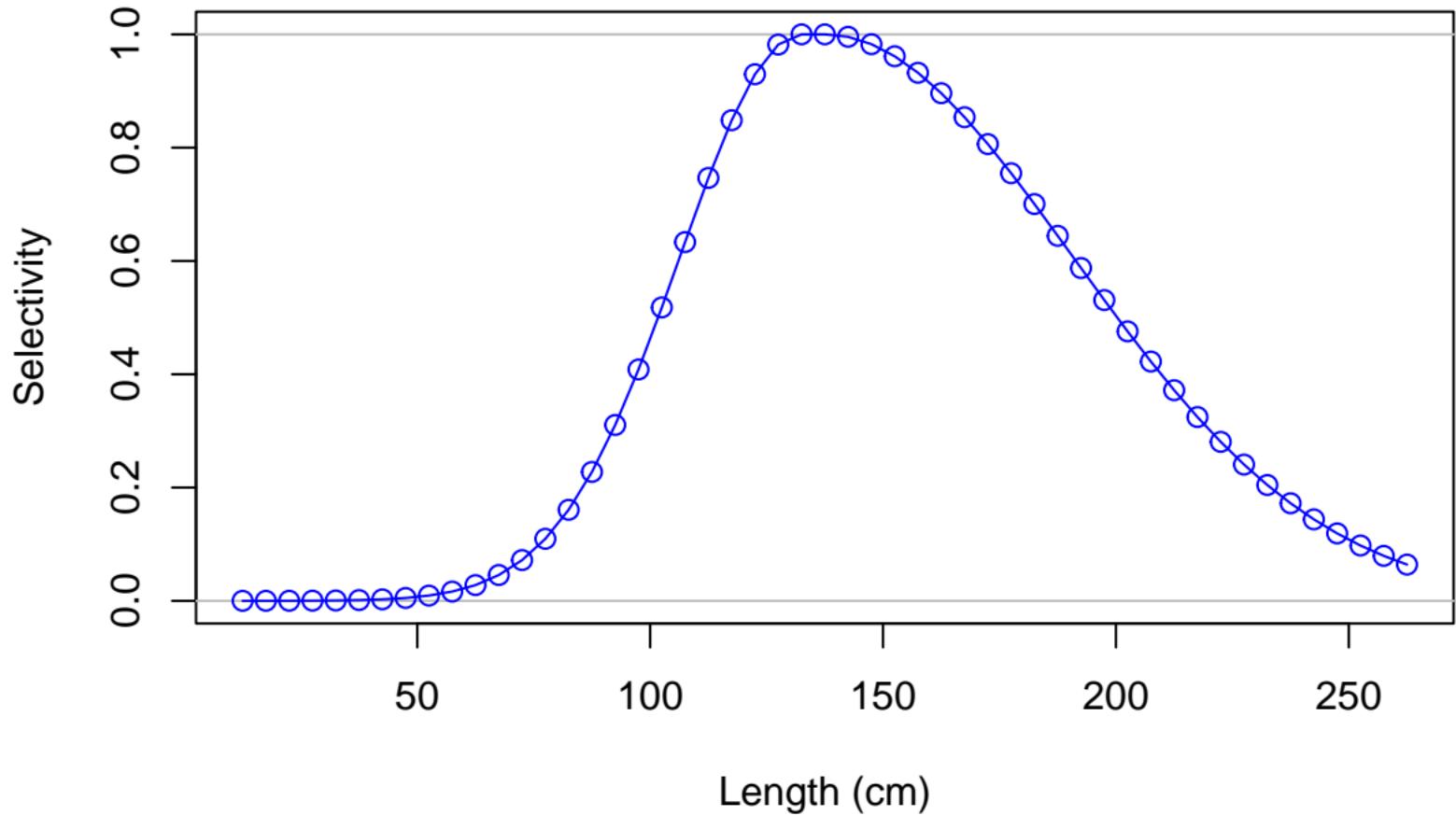


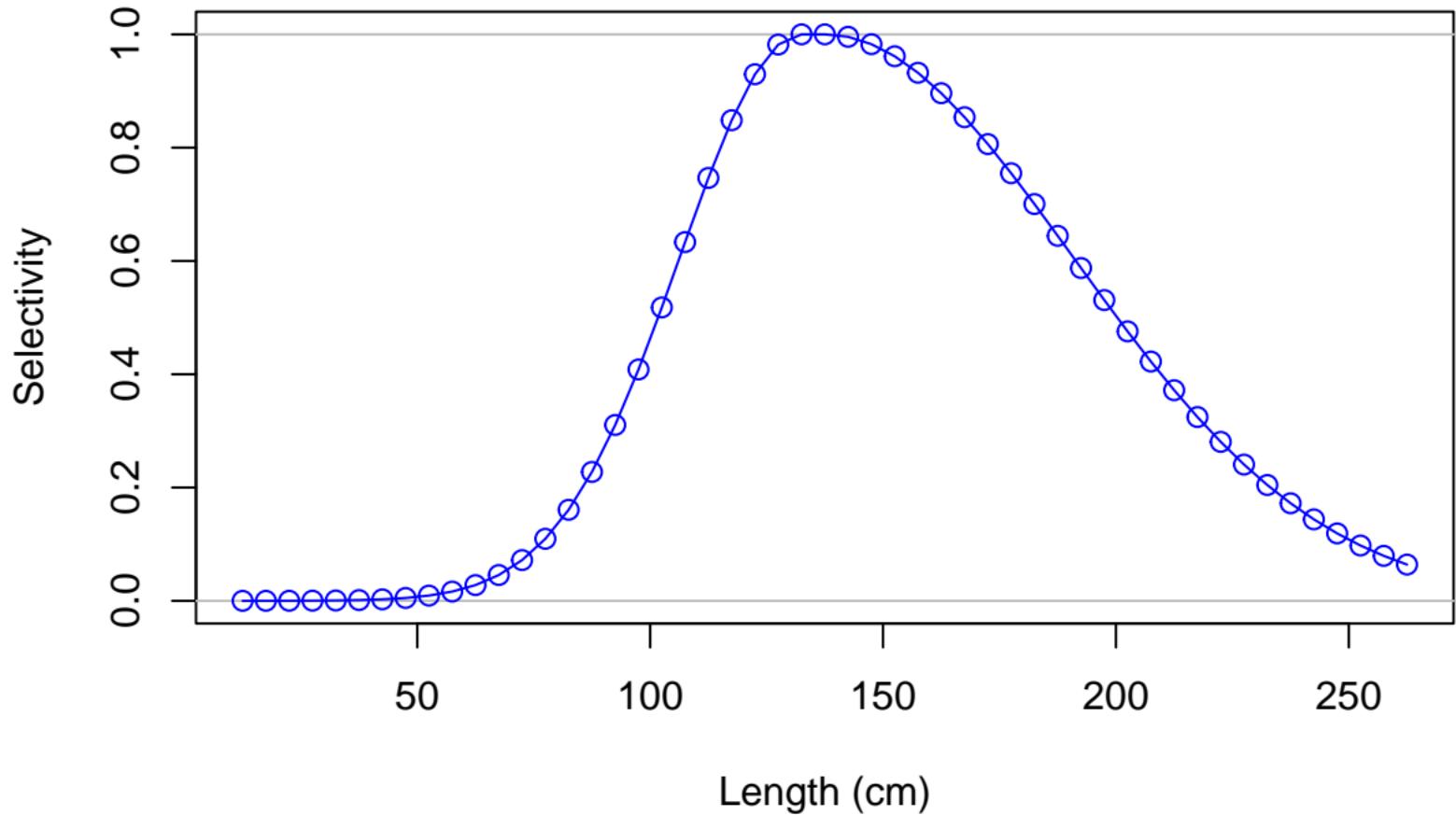


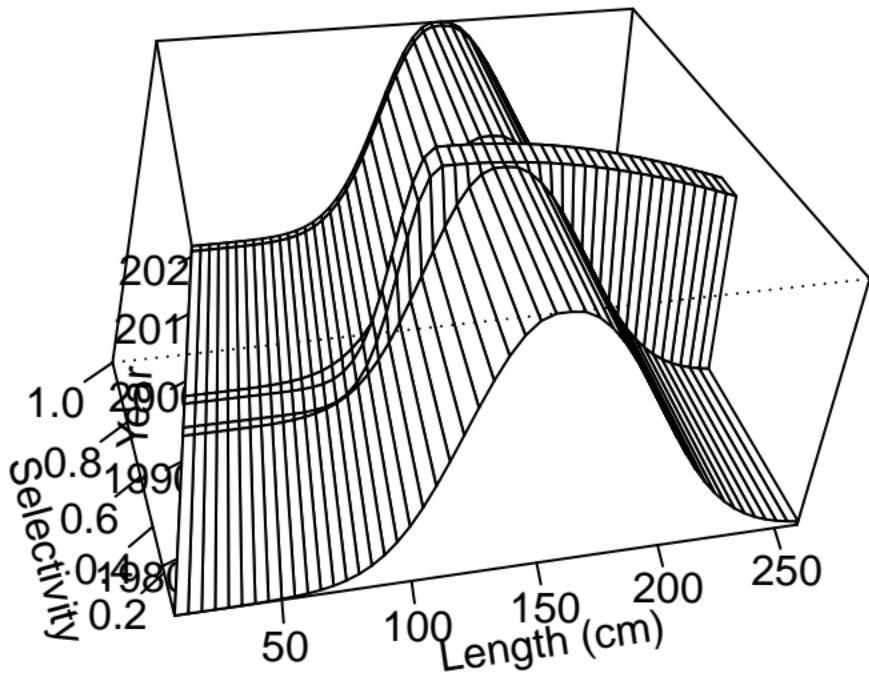


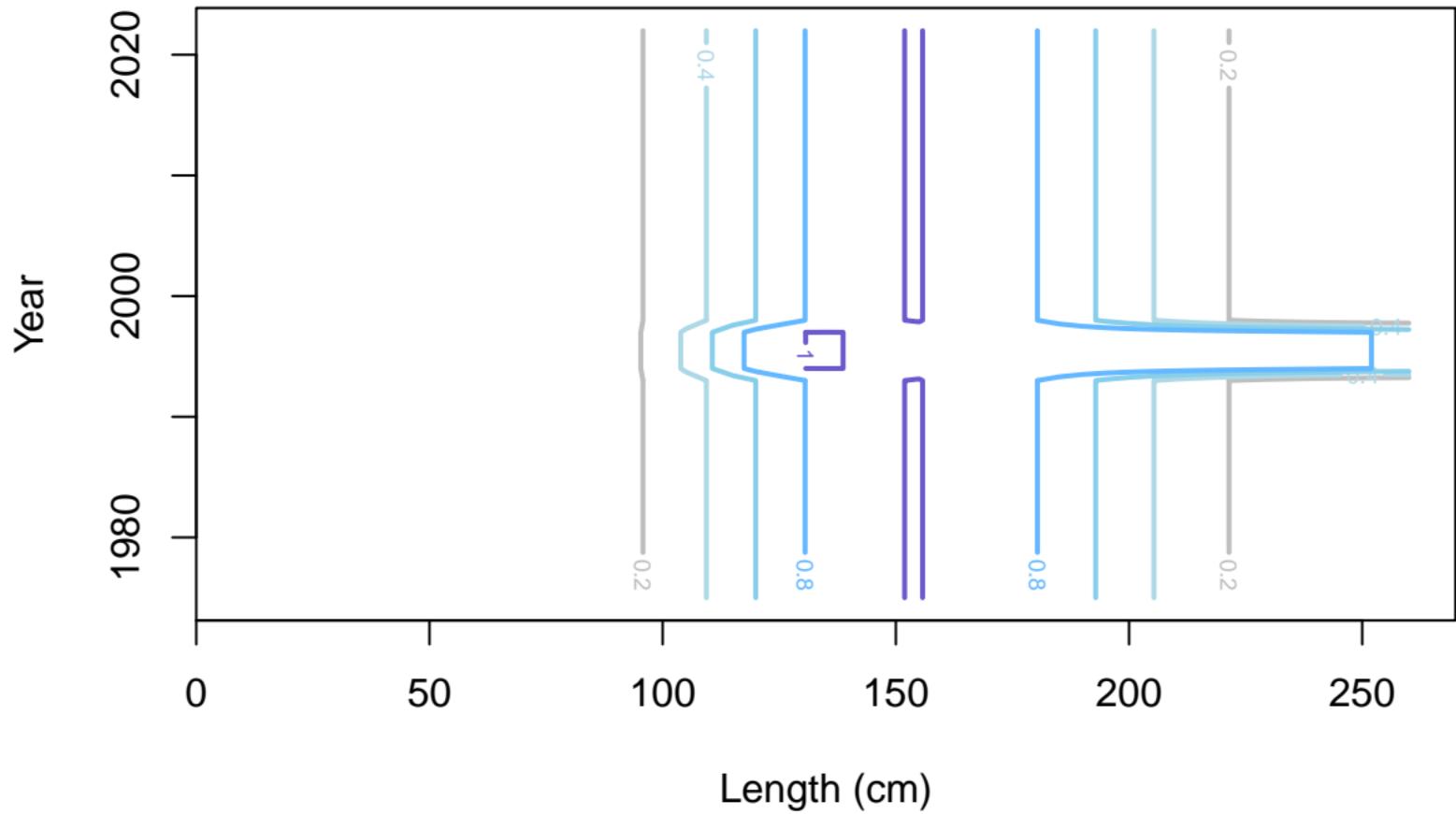


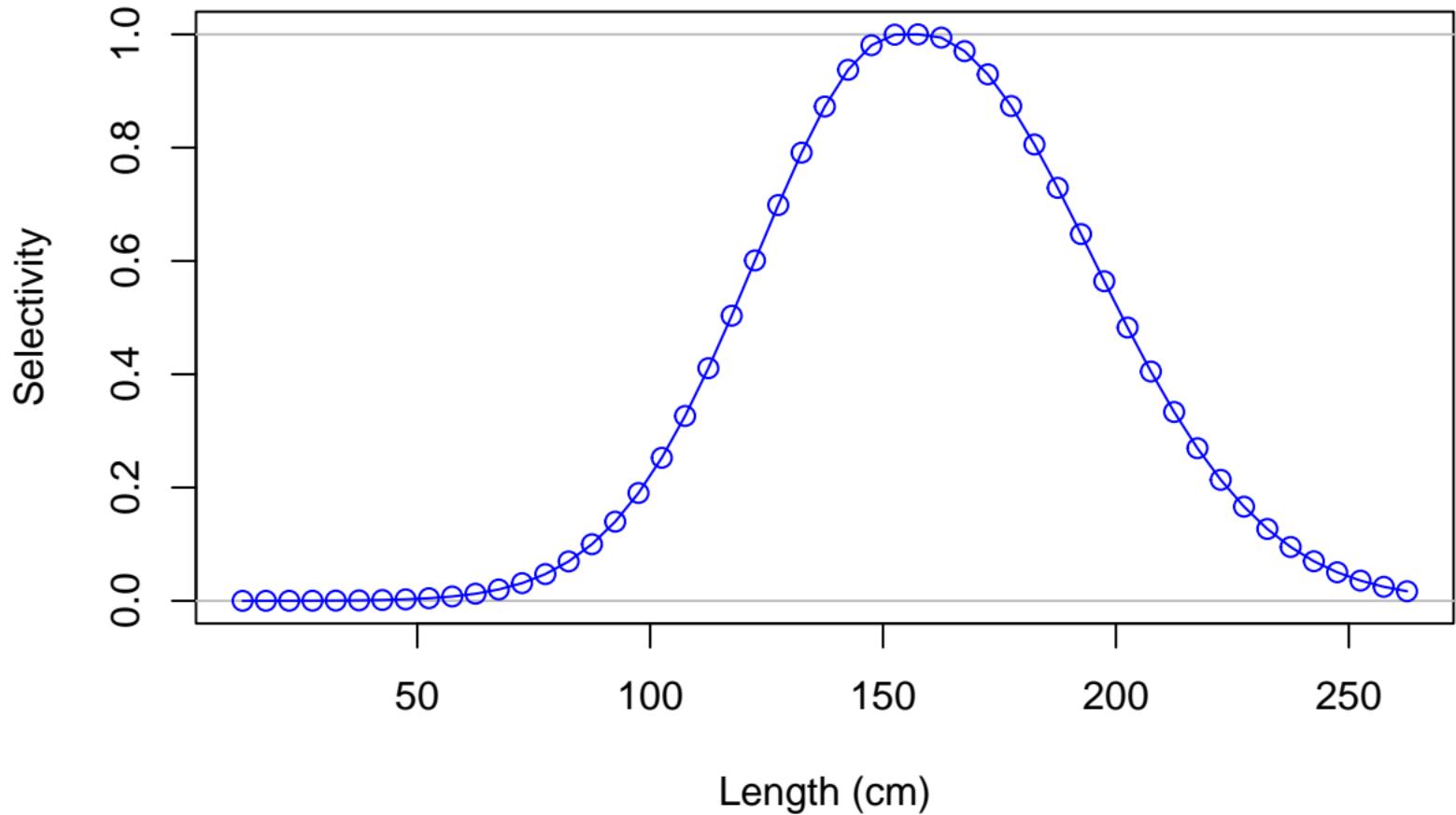


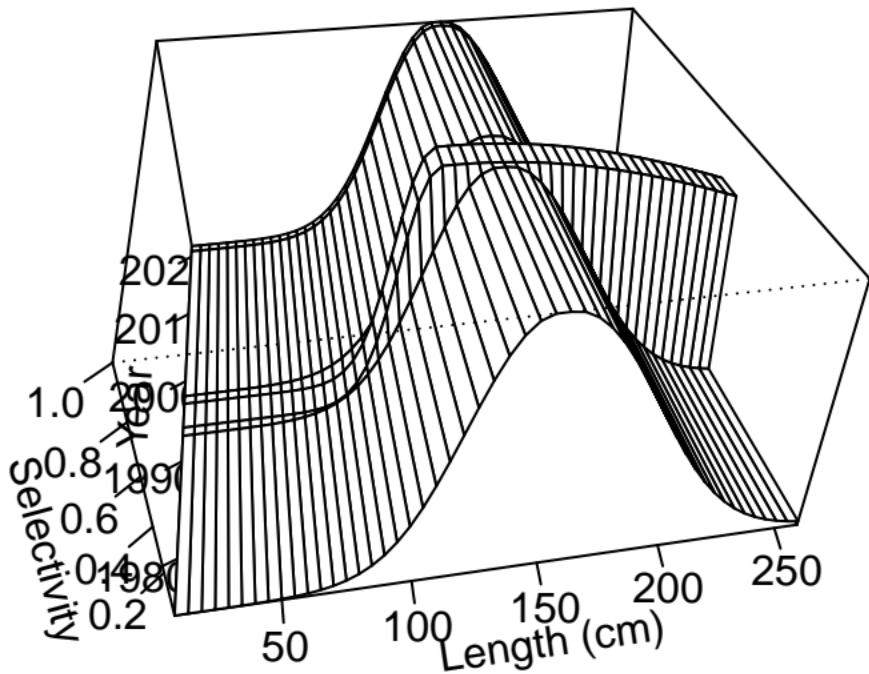


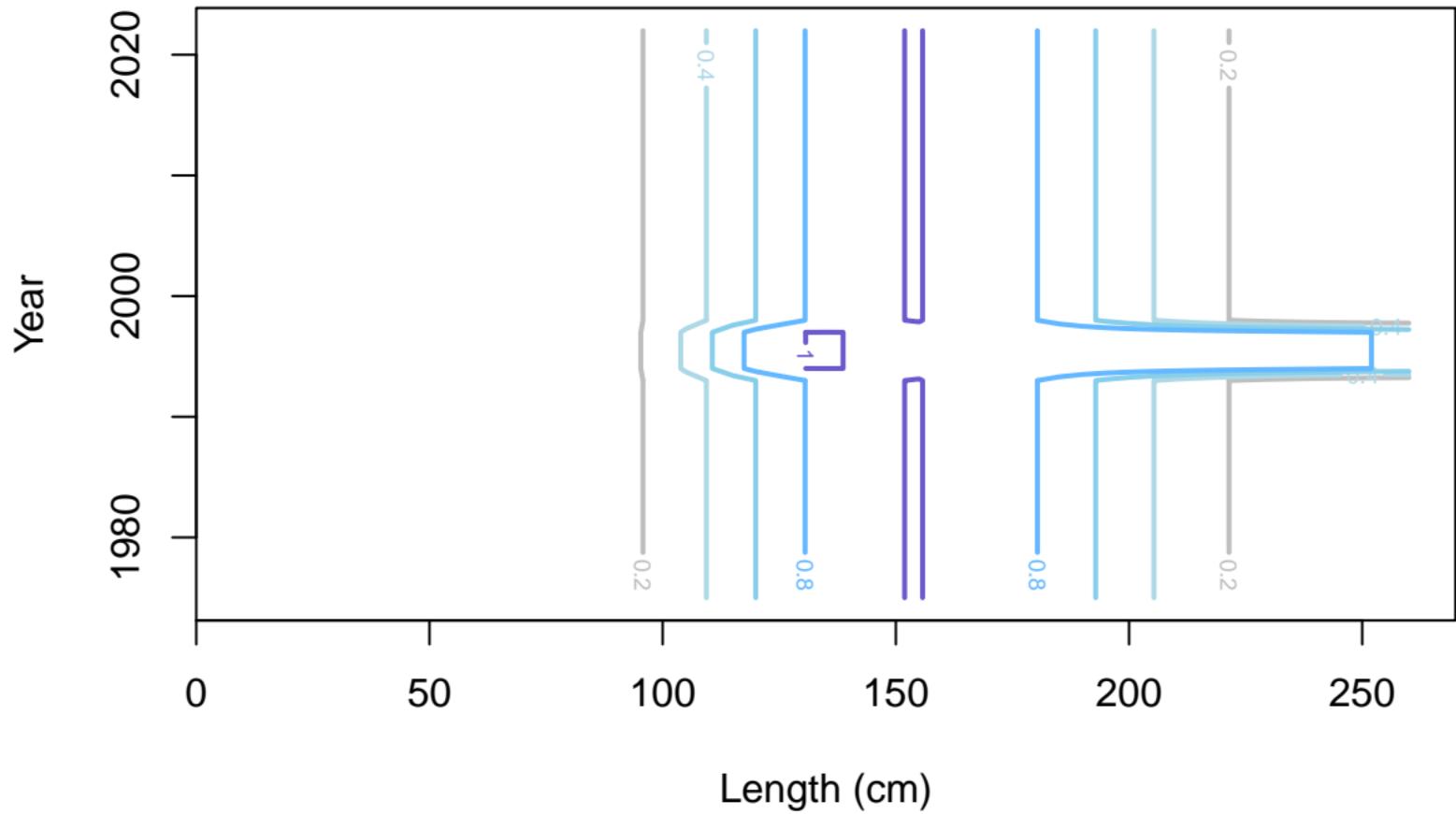


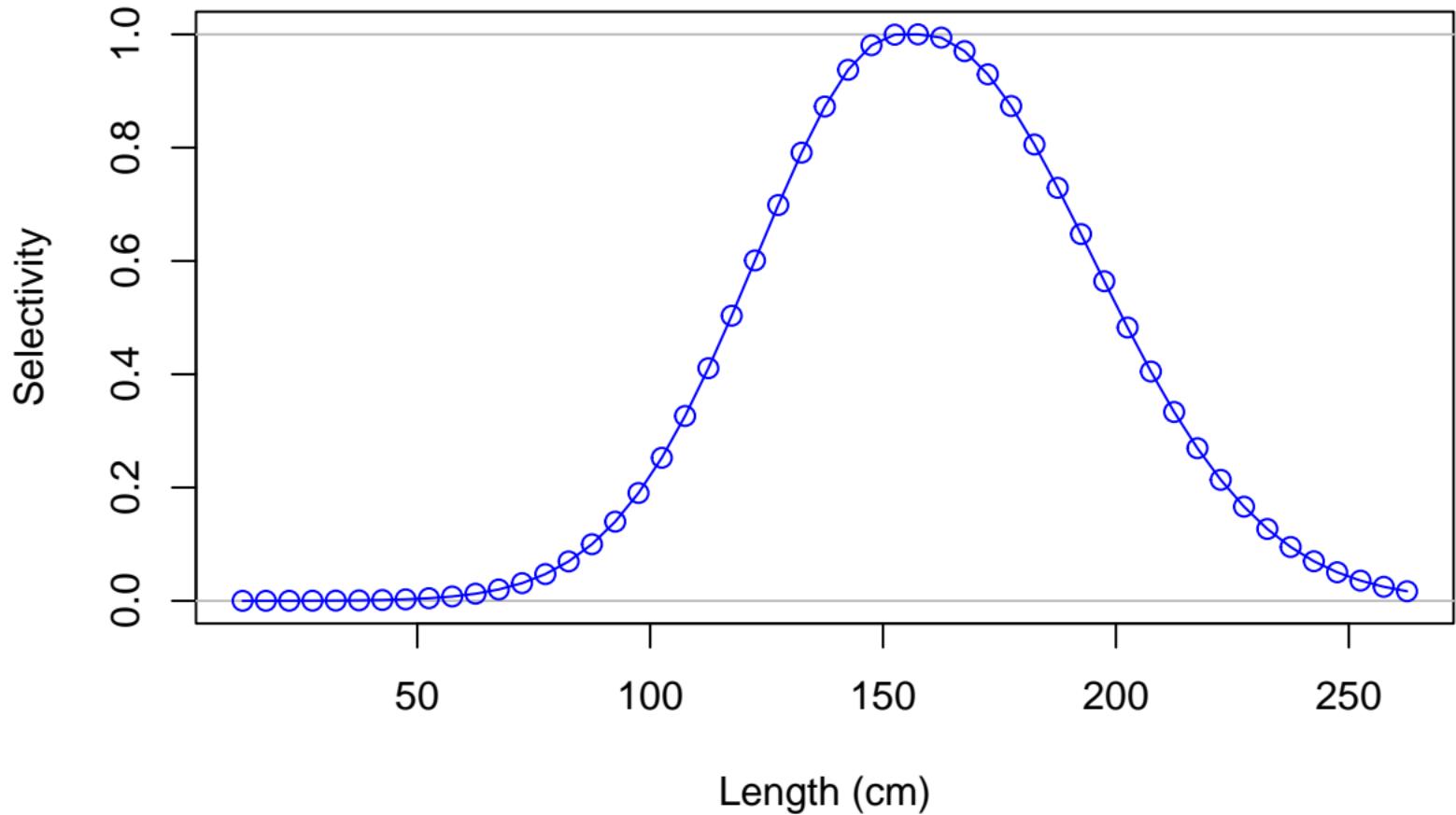


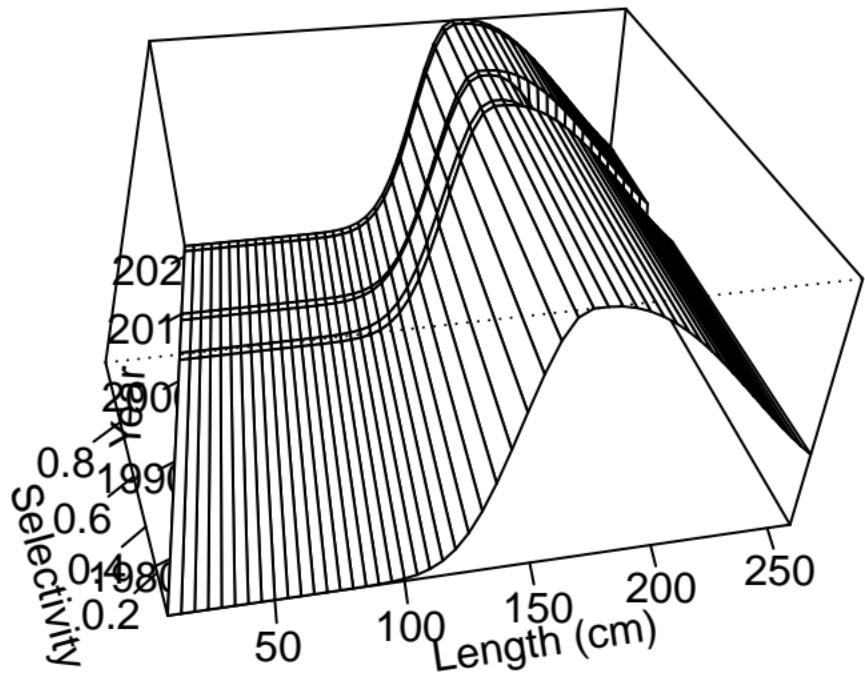












Year

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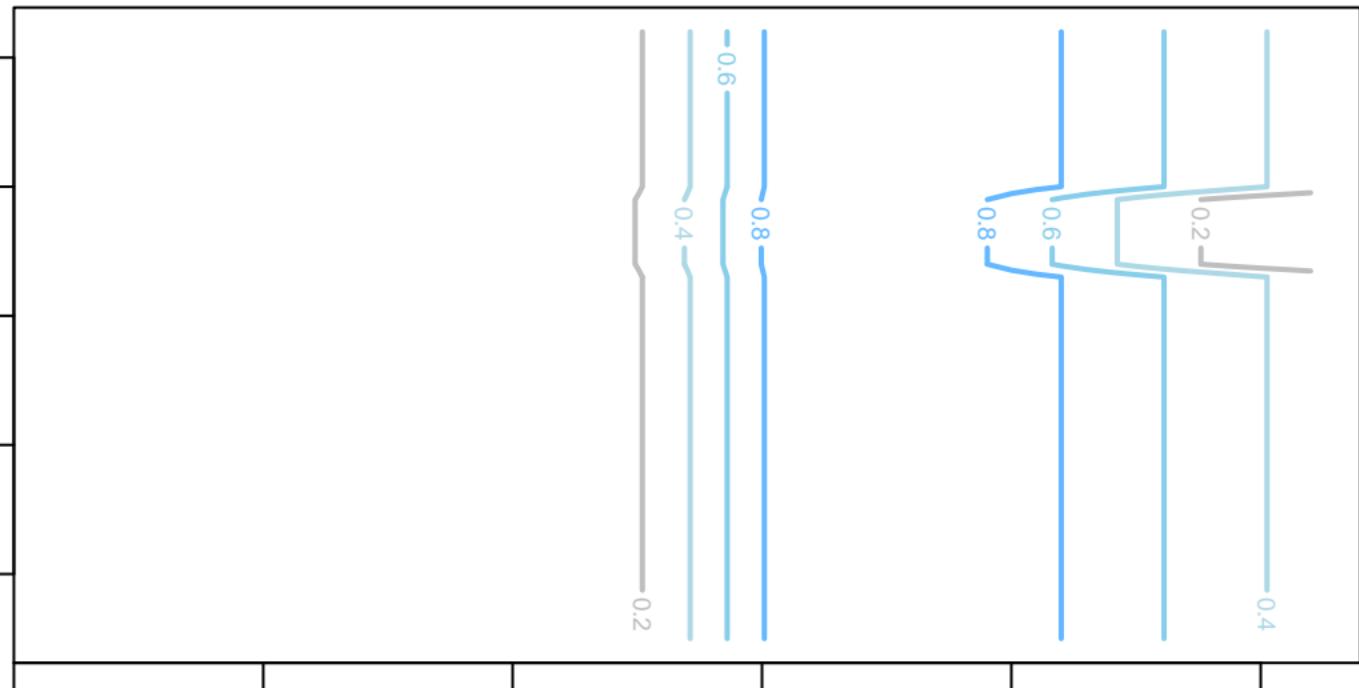
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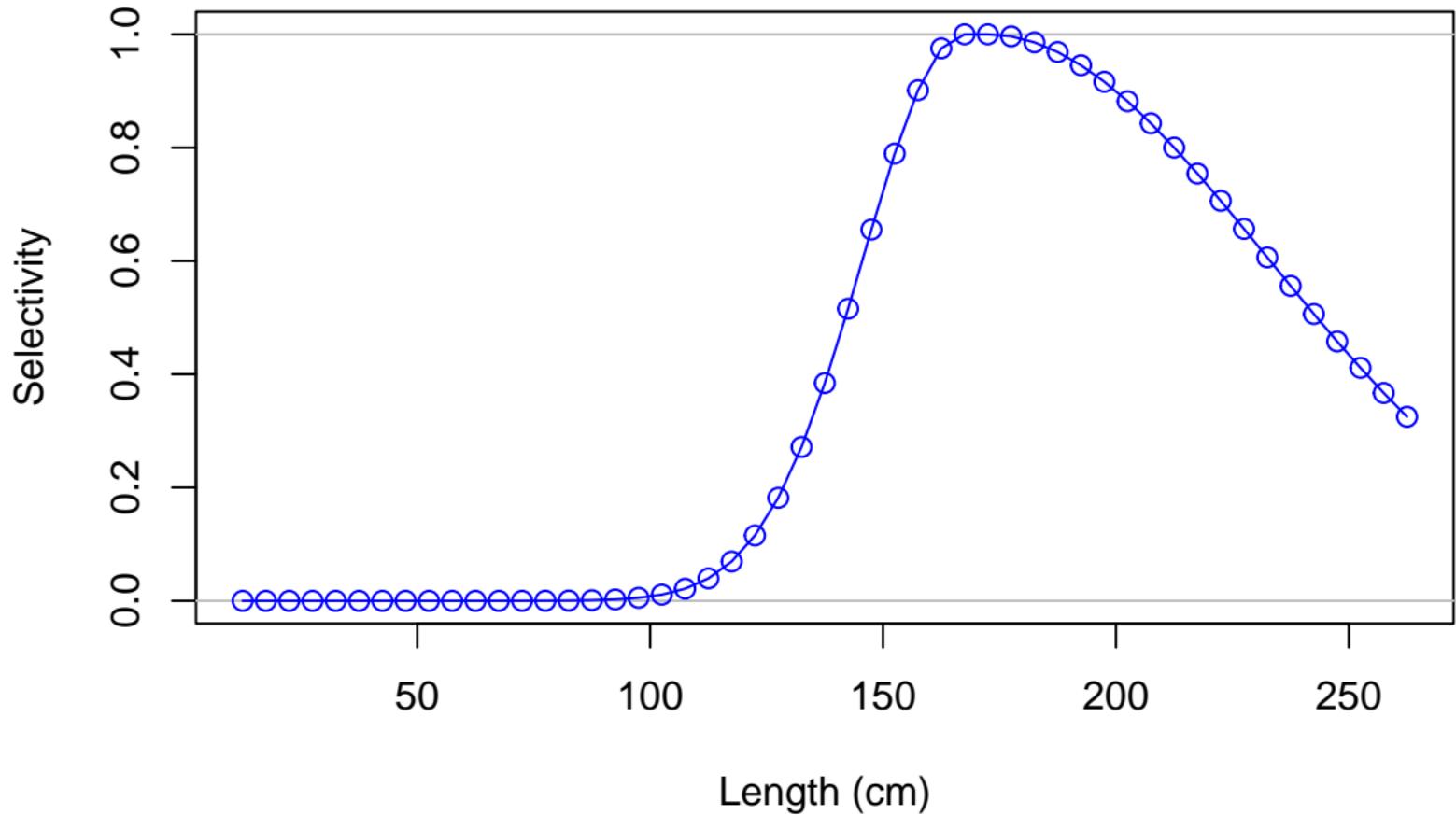
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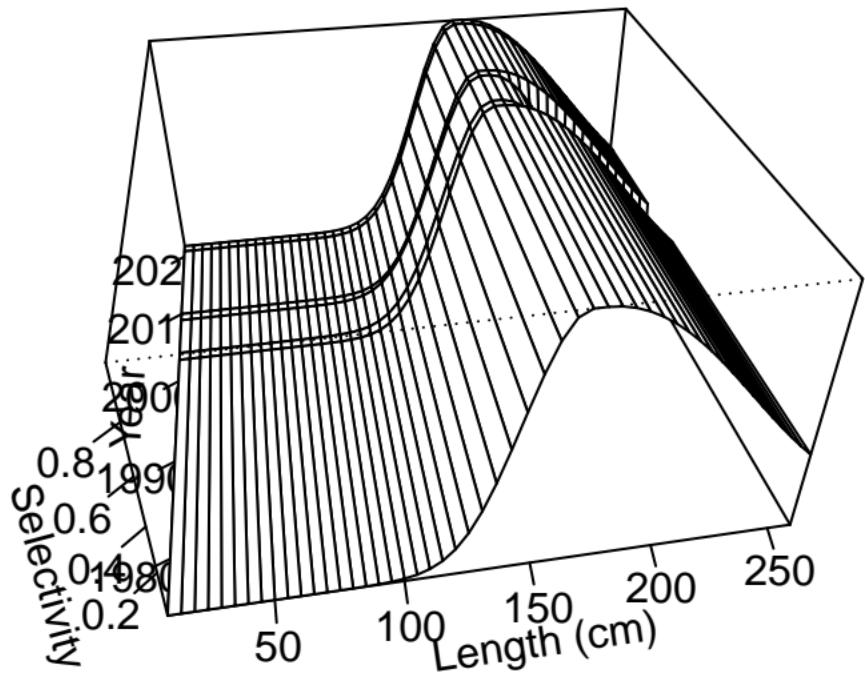
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Length (cm)







Year

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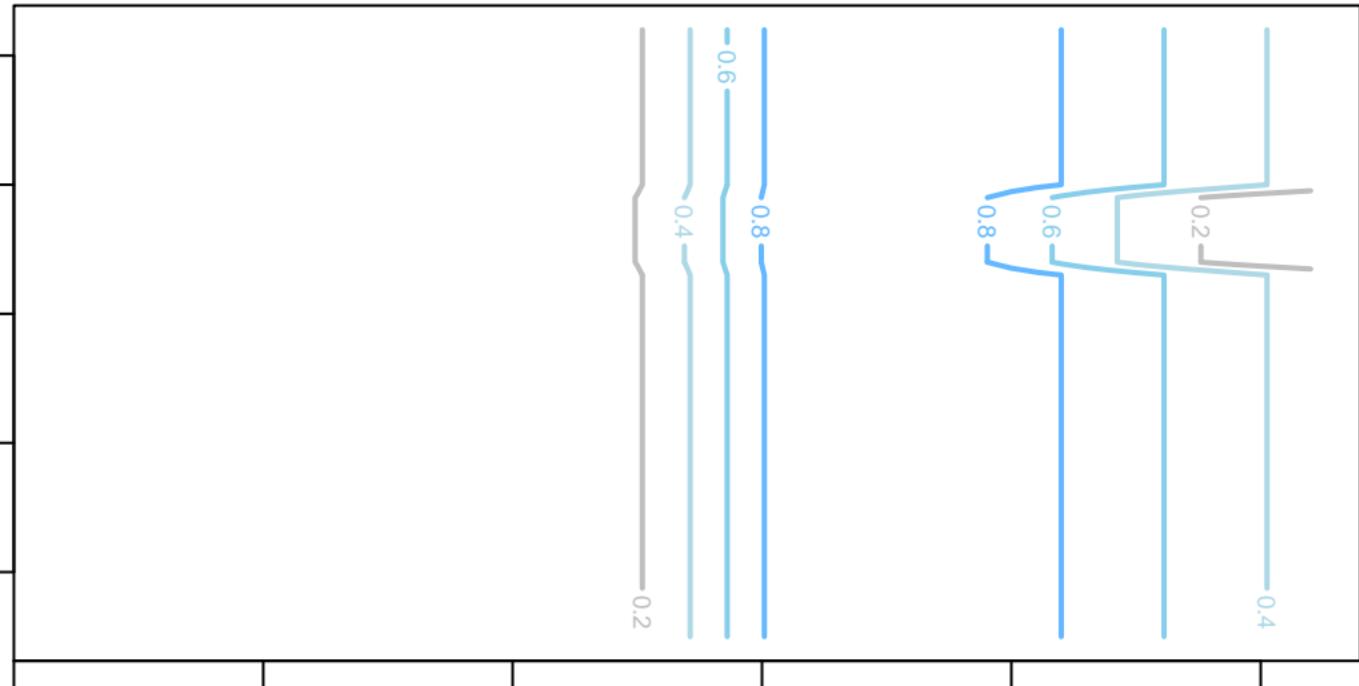
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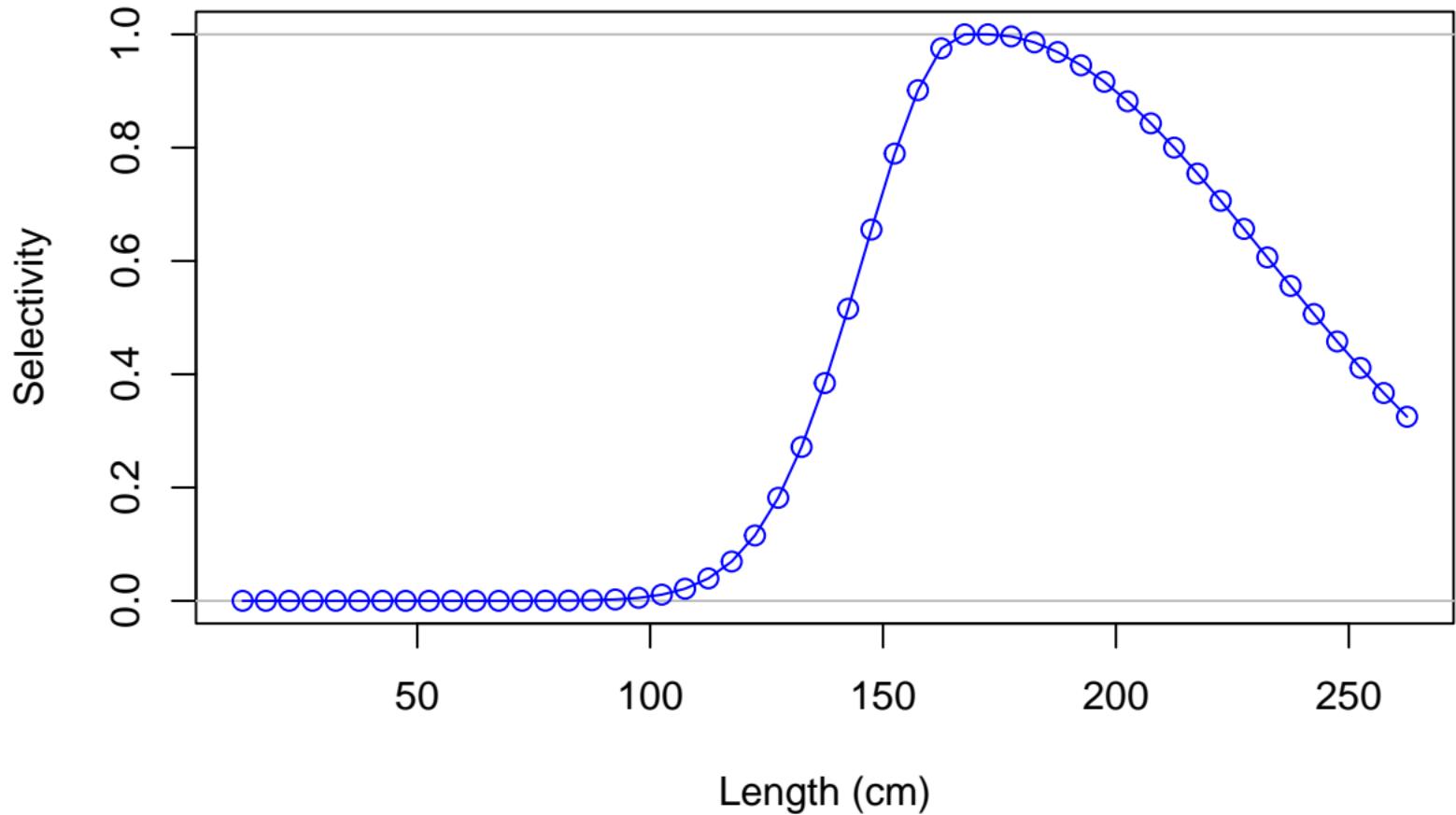
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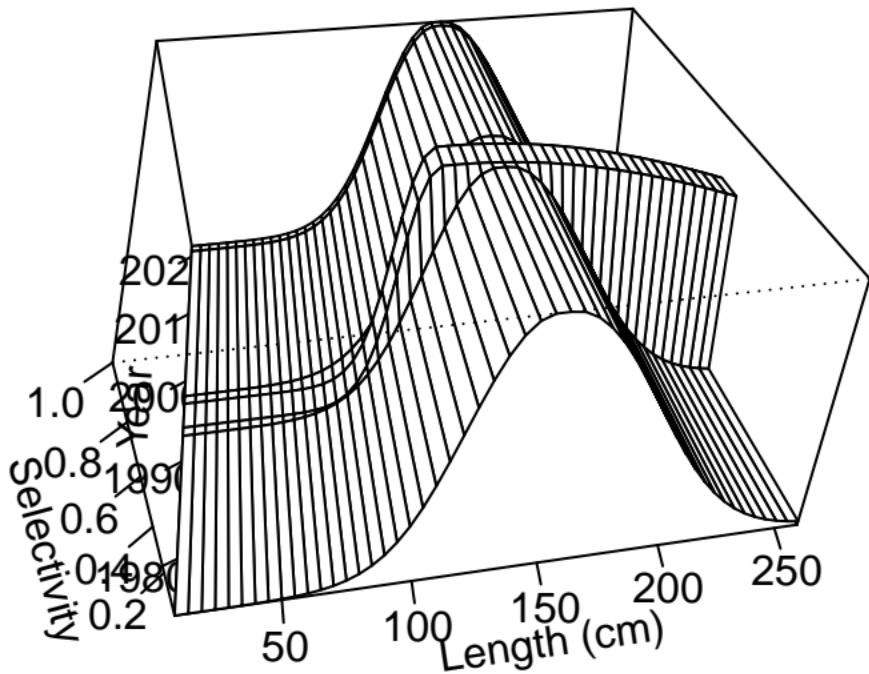
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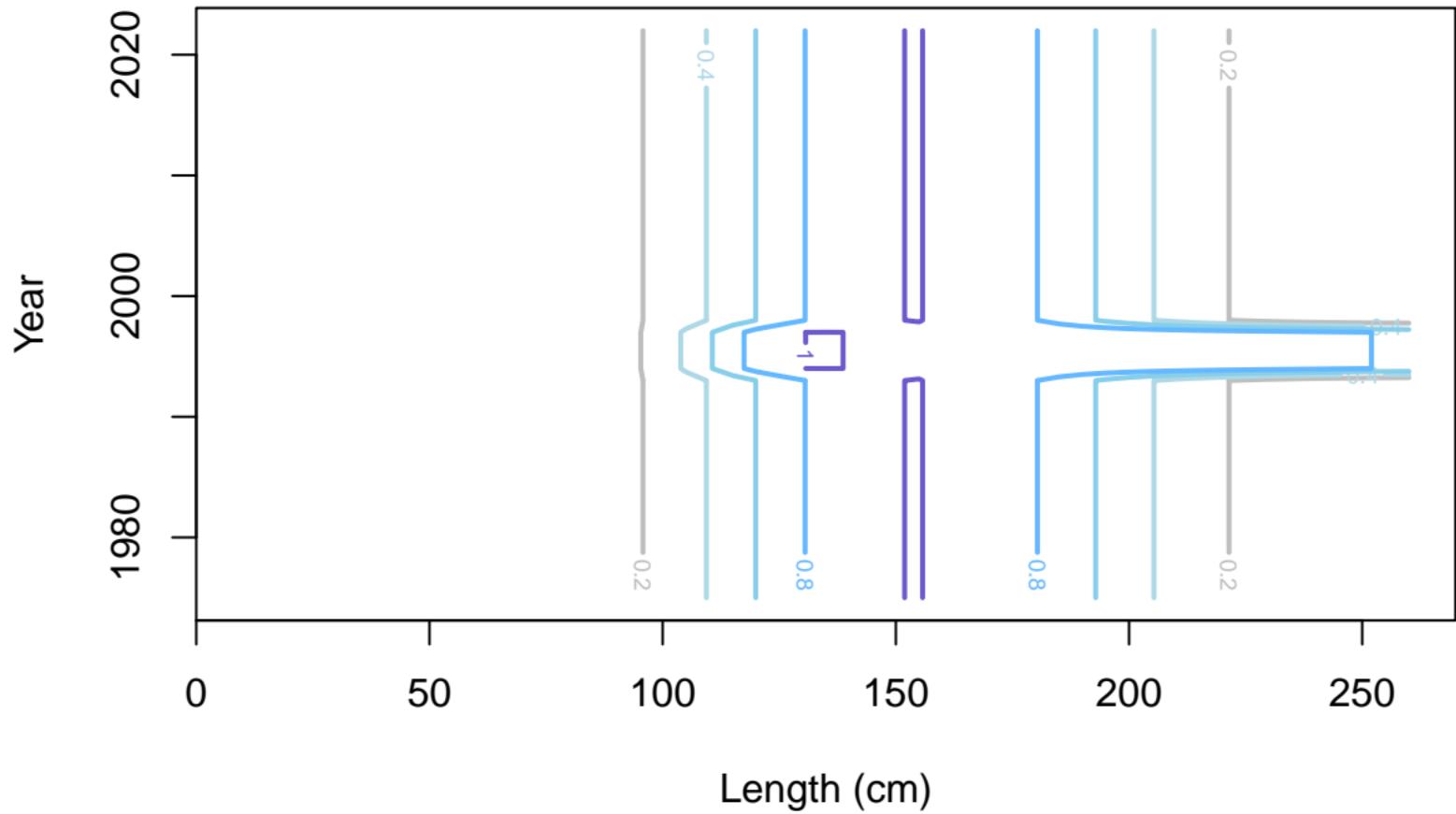
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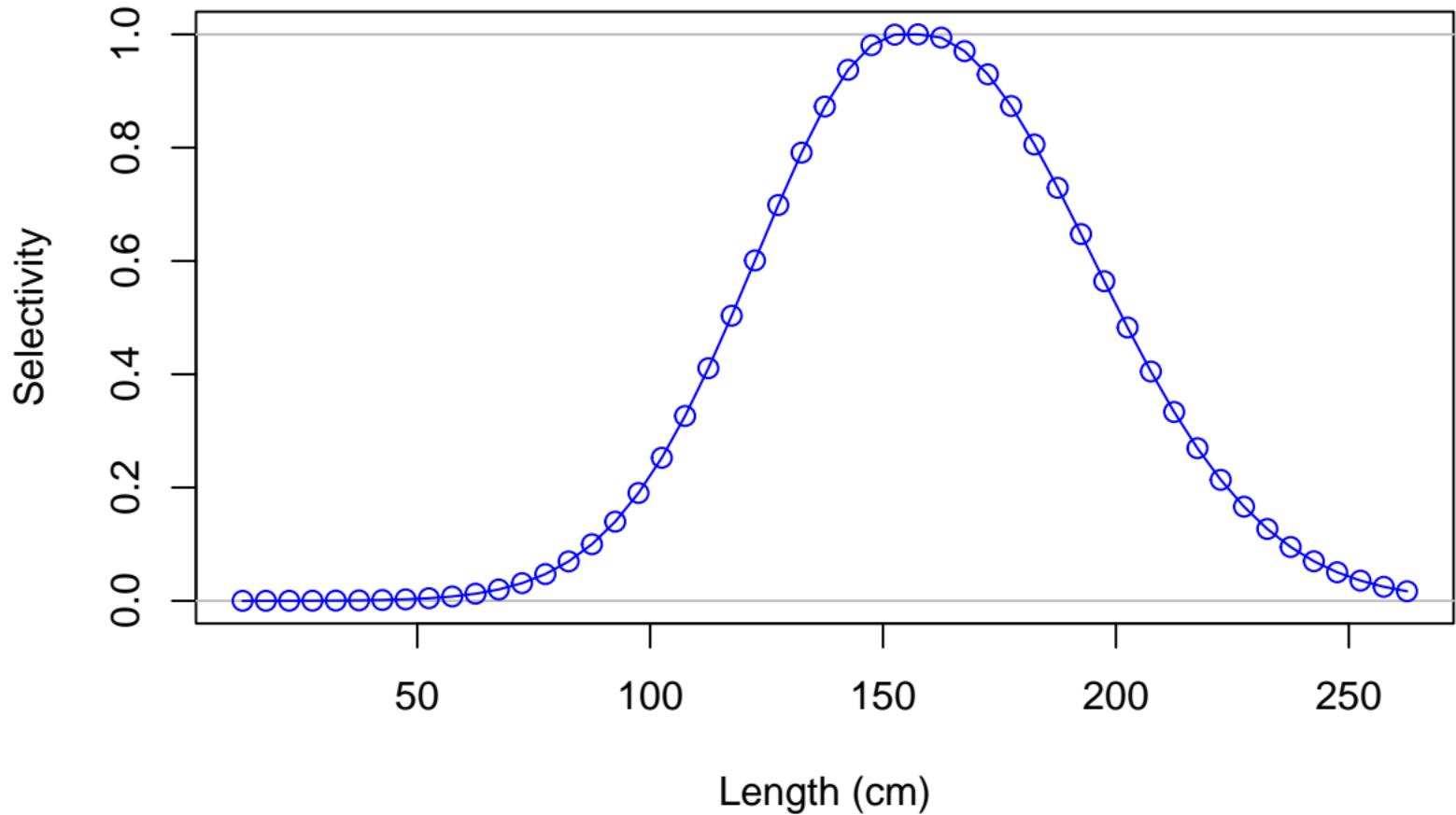
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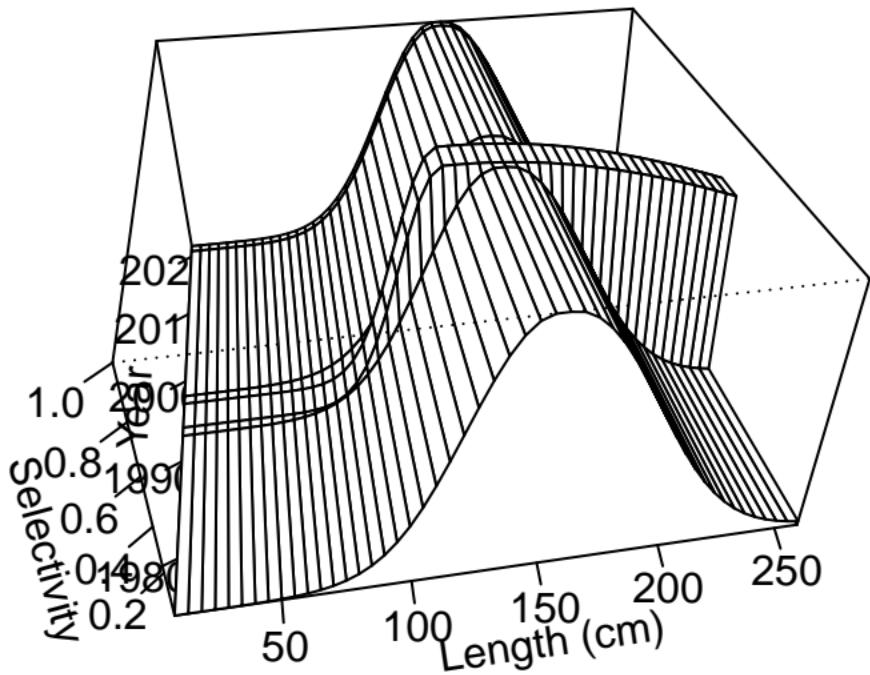


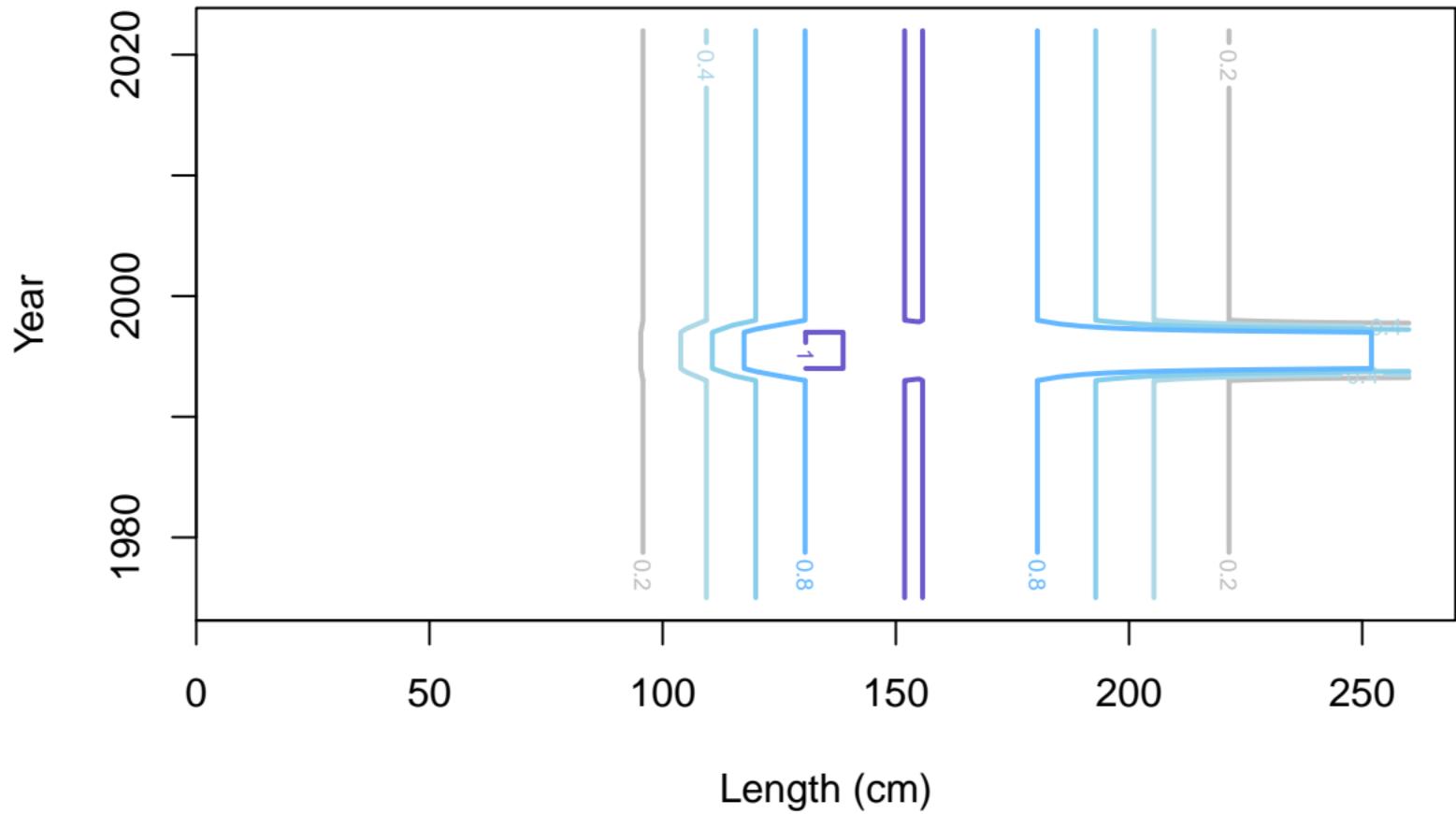


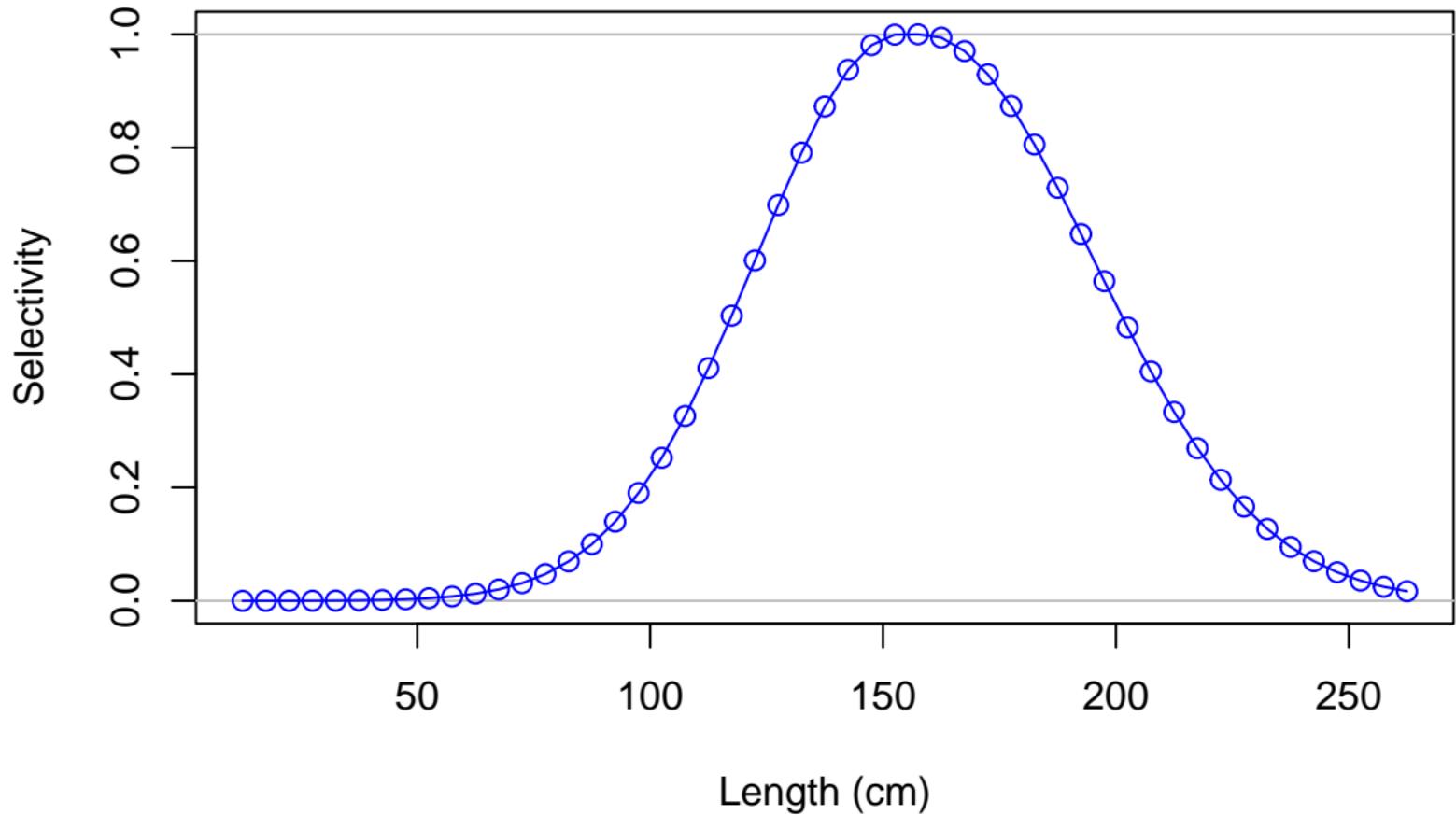


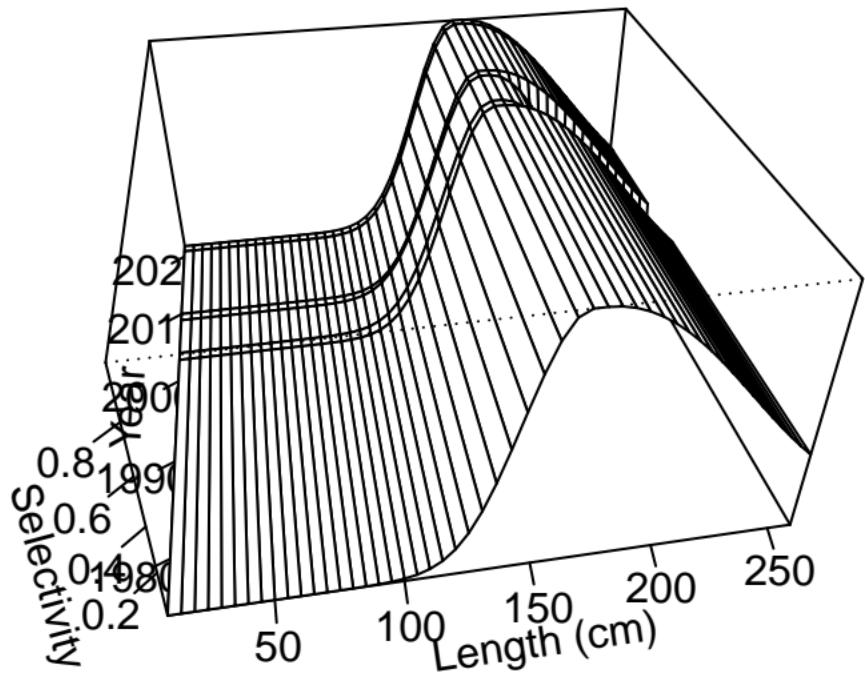


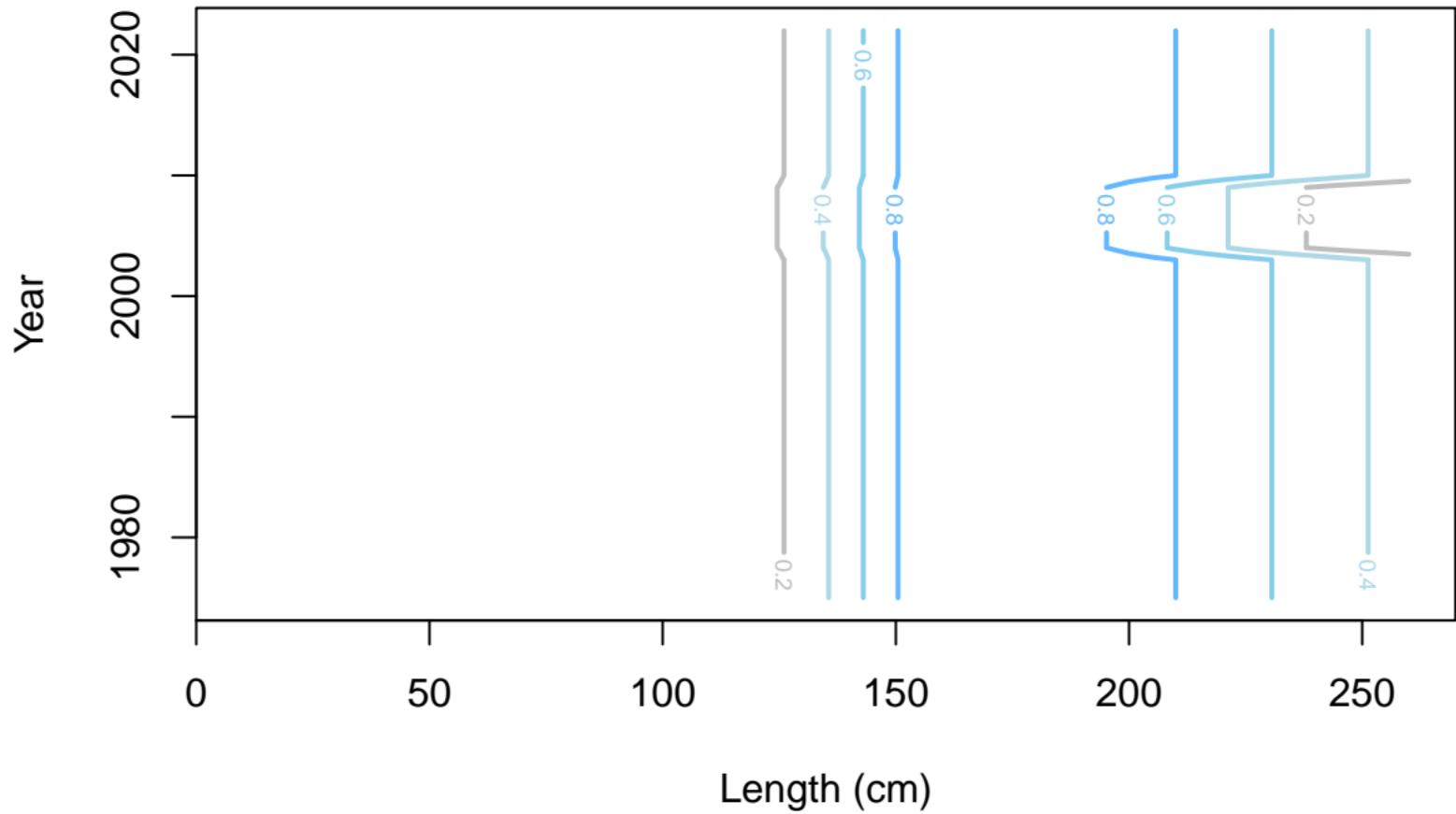


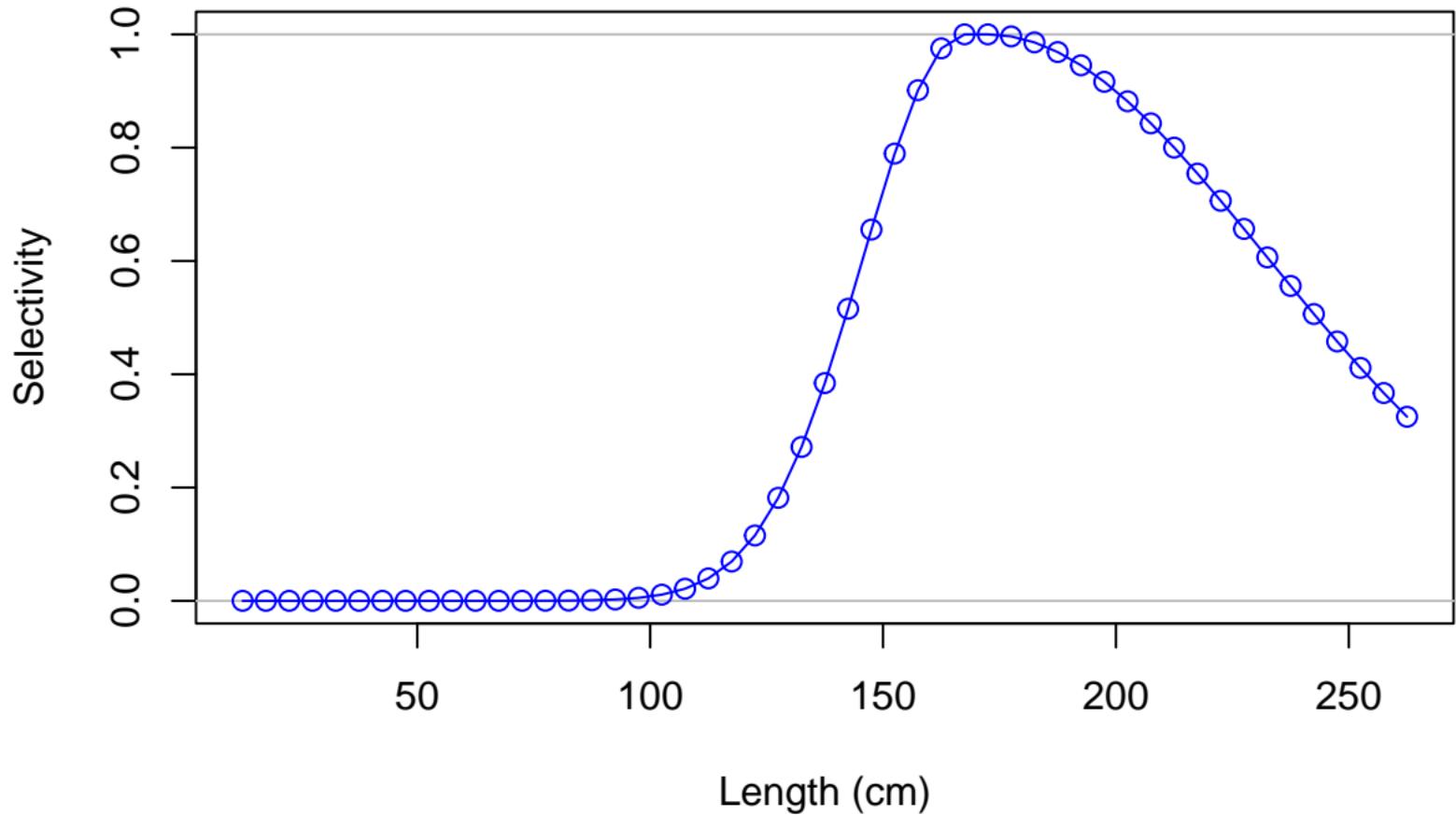


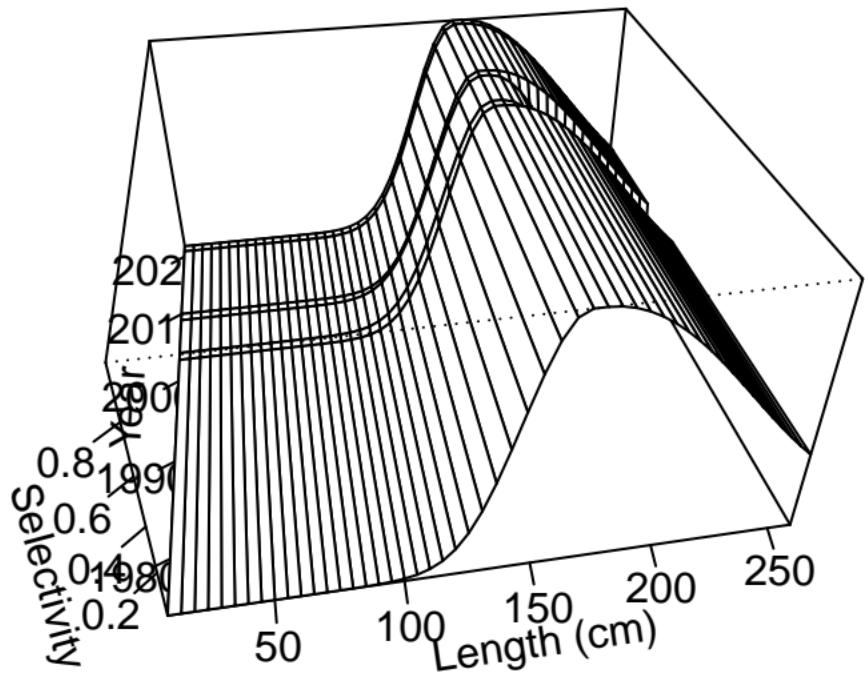












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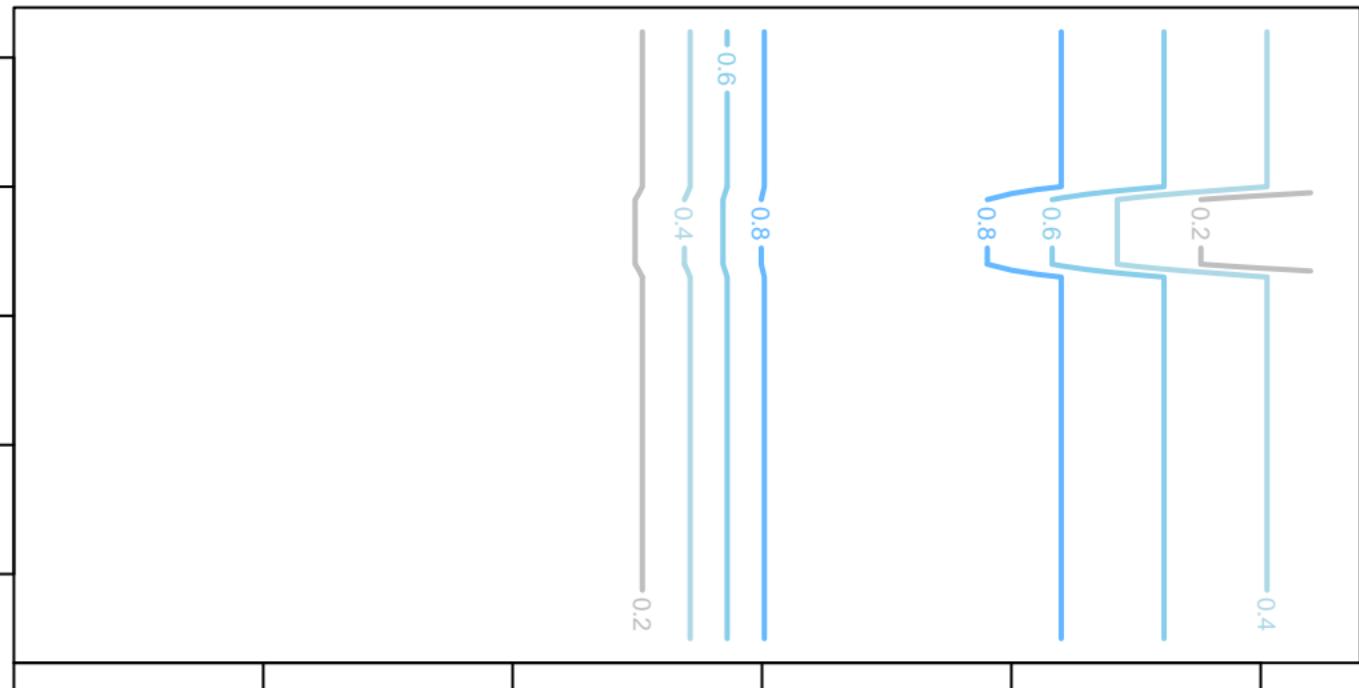
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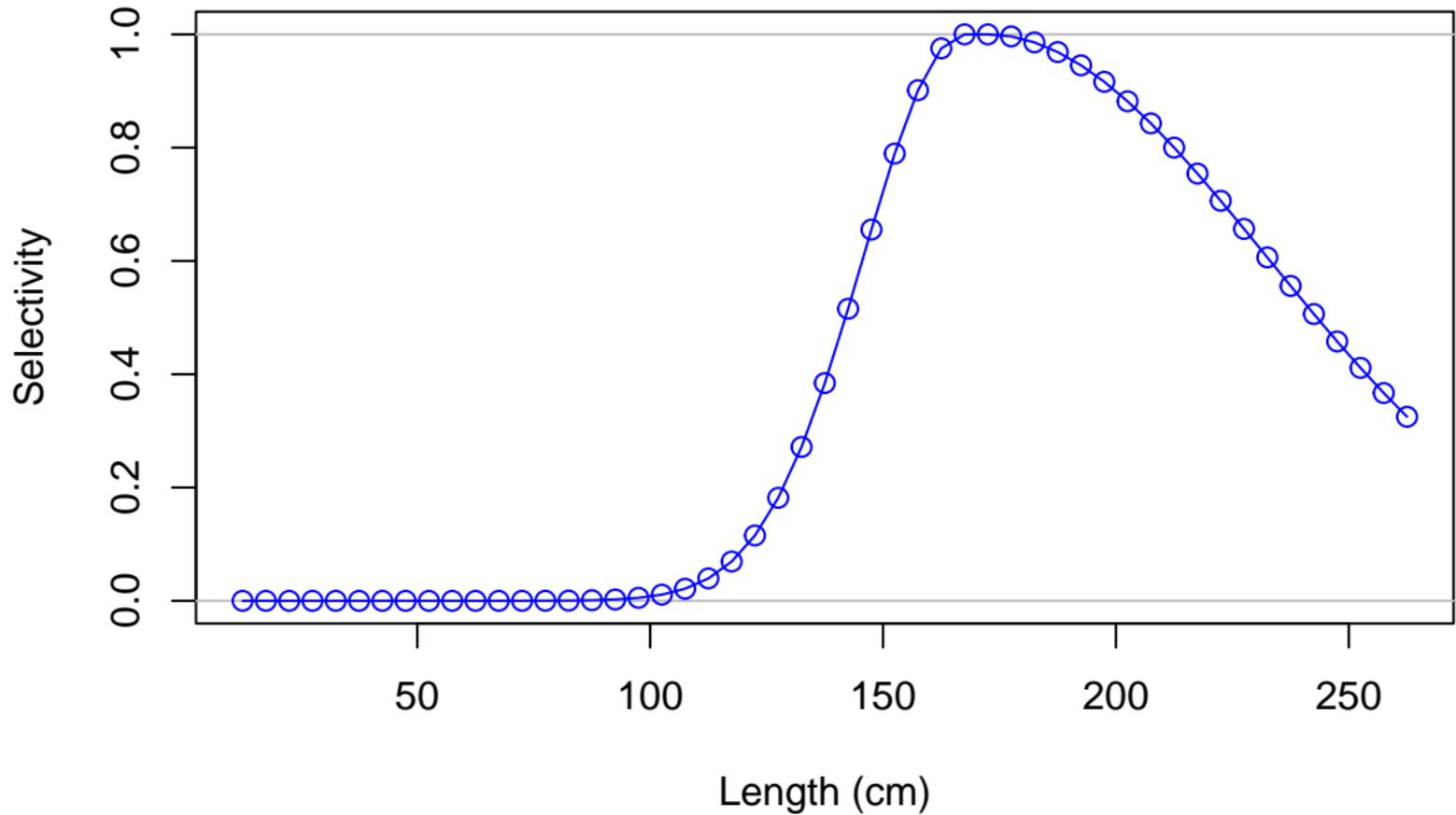
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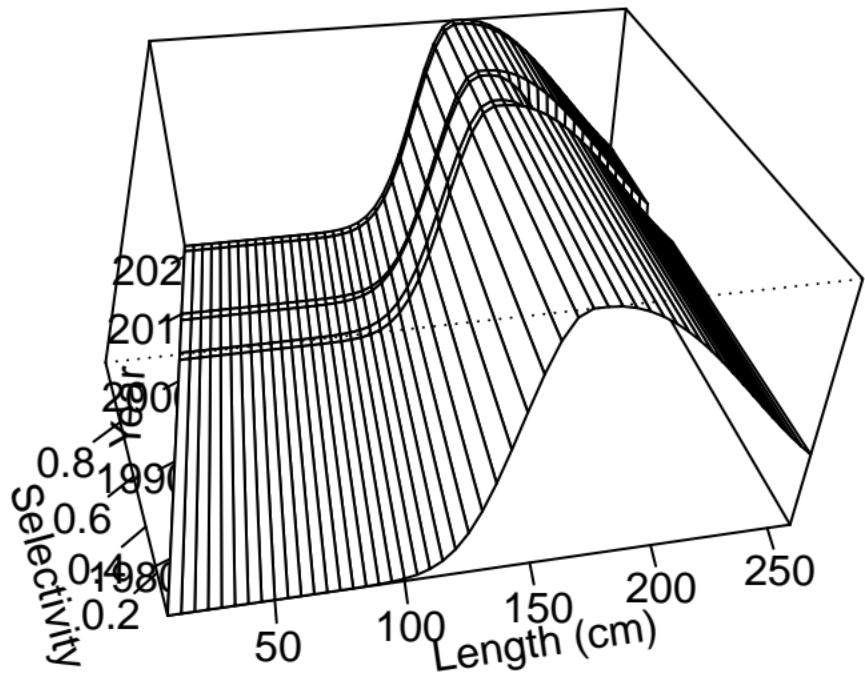
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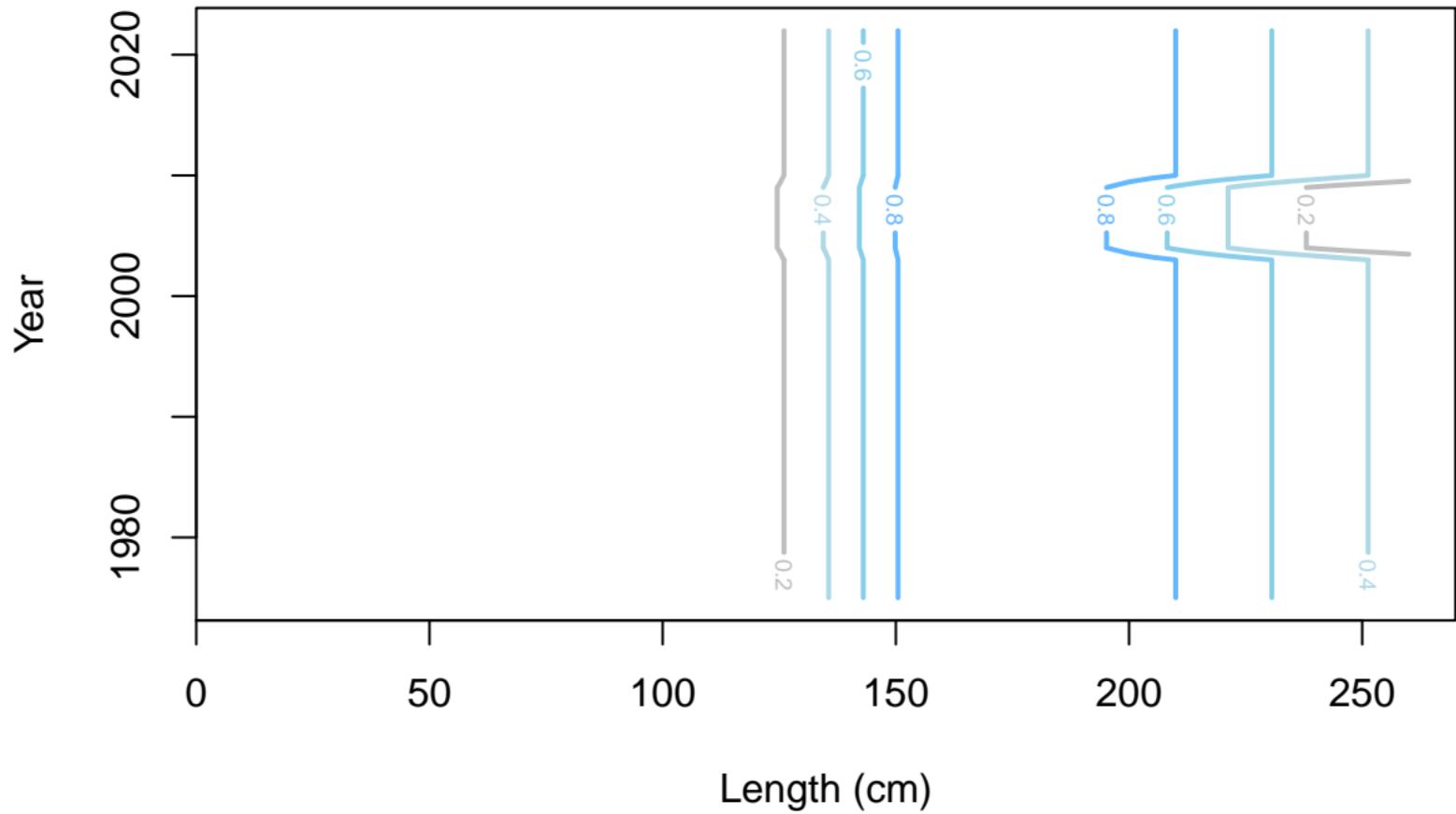
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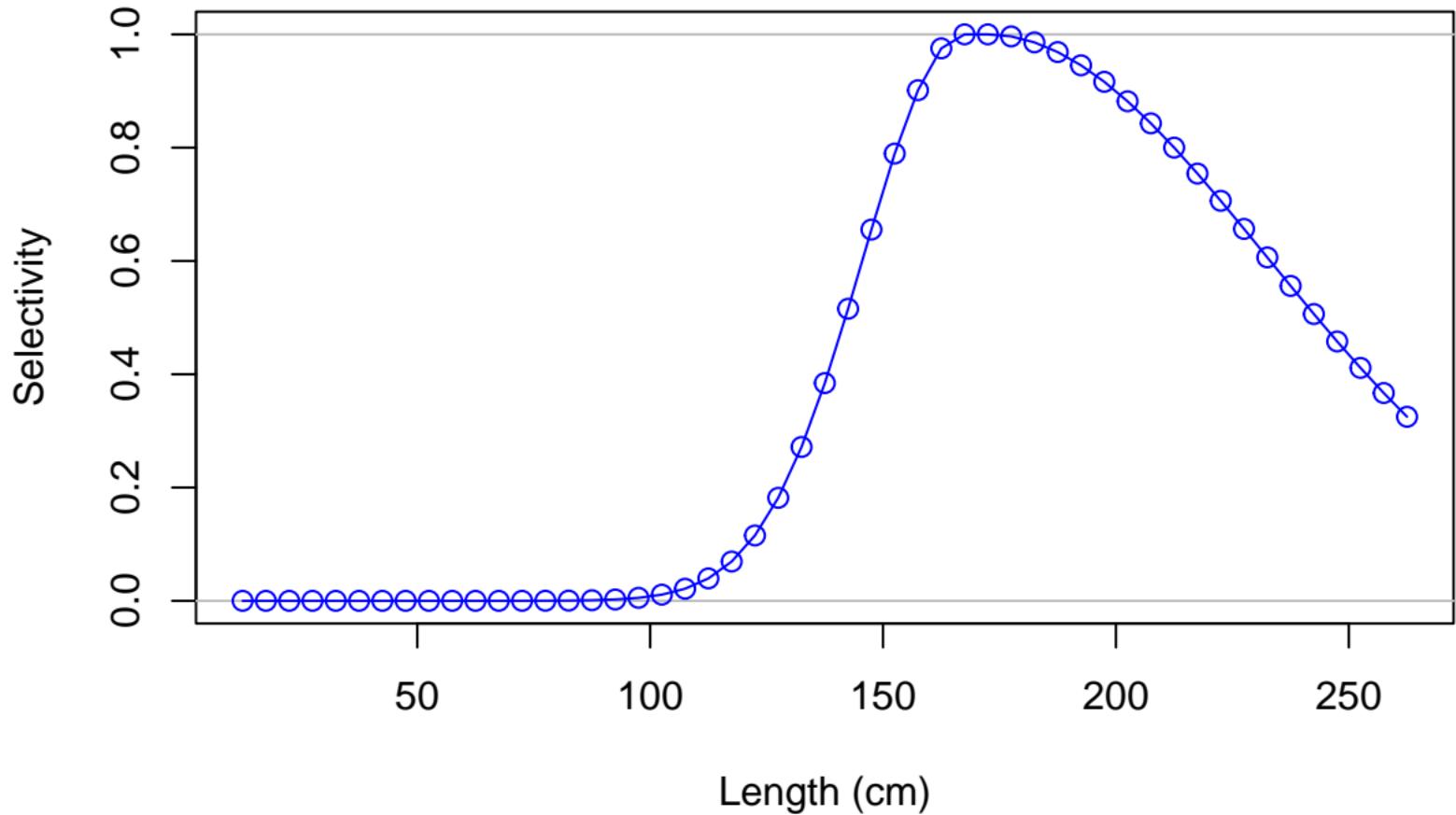
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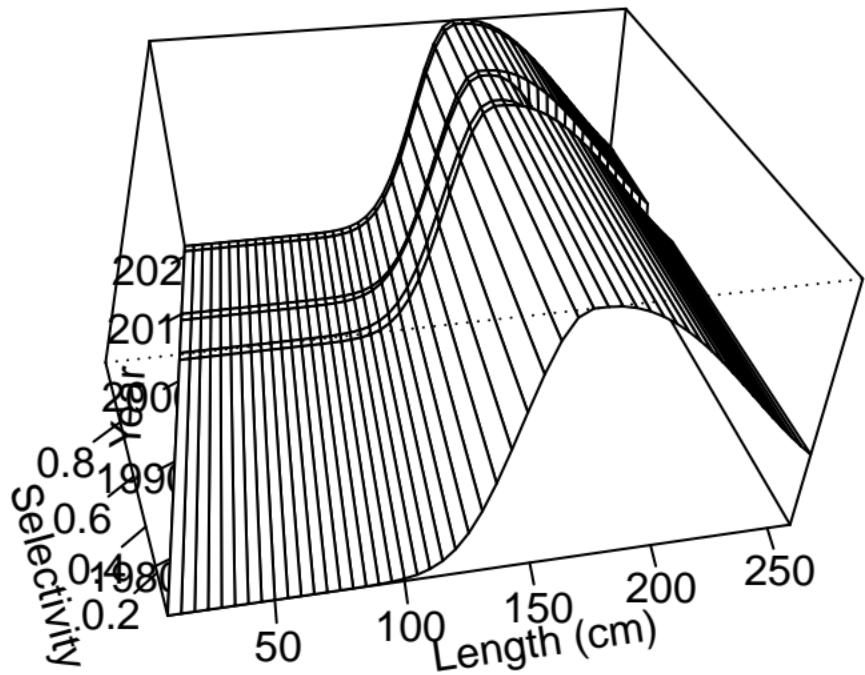












Year

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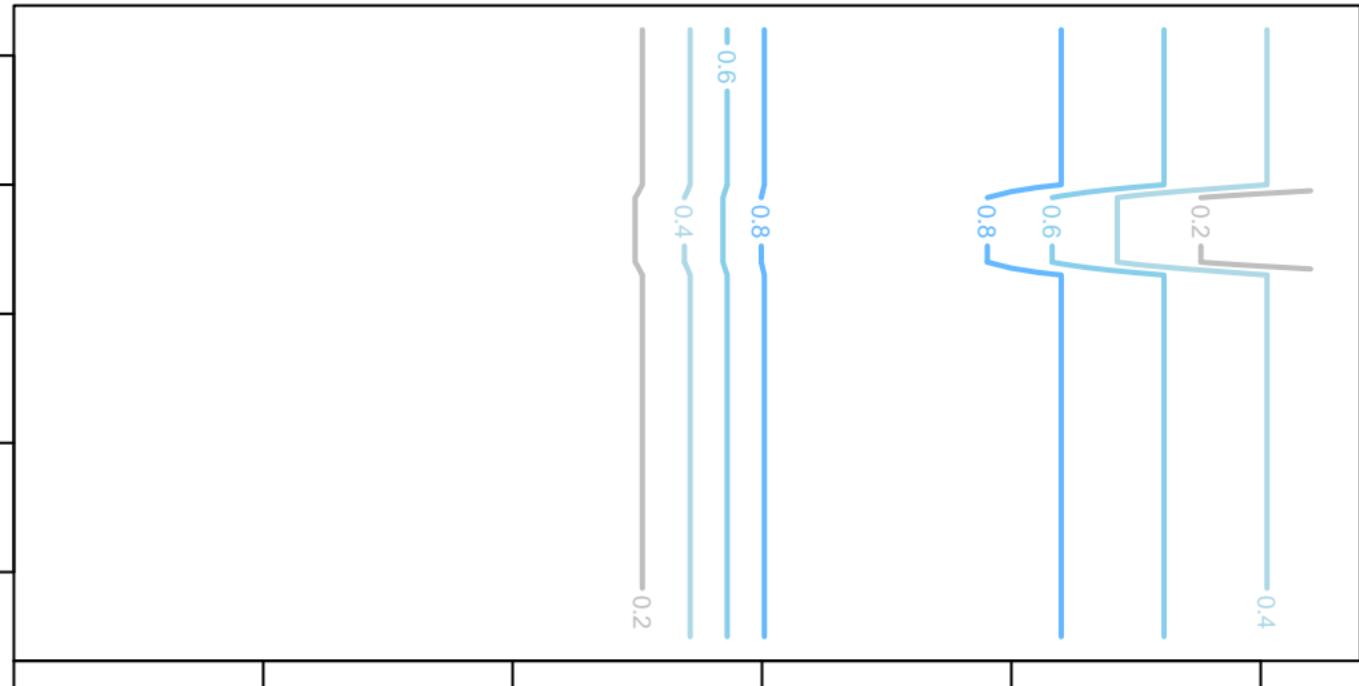
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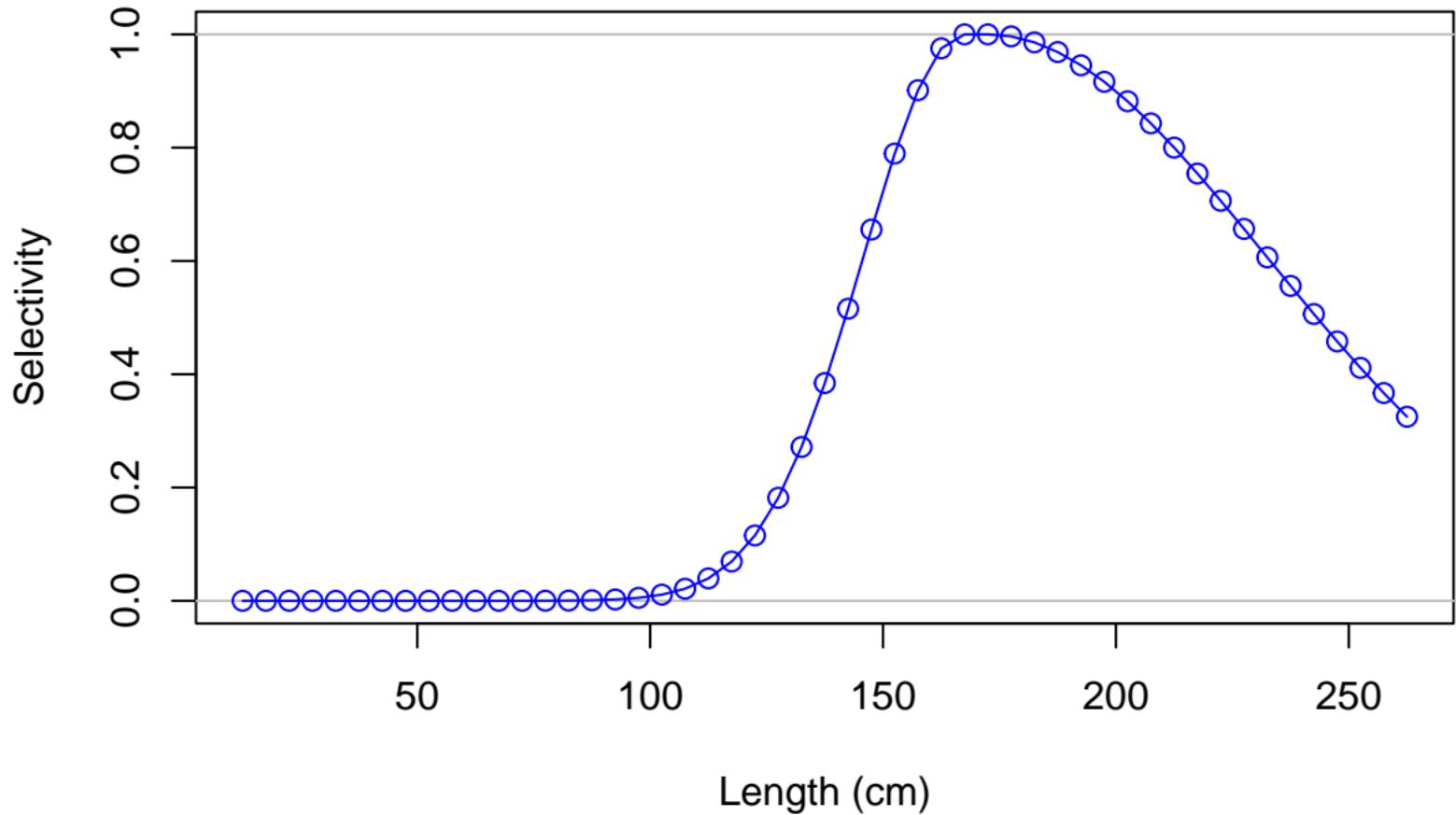
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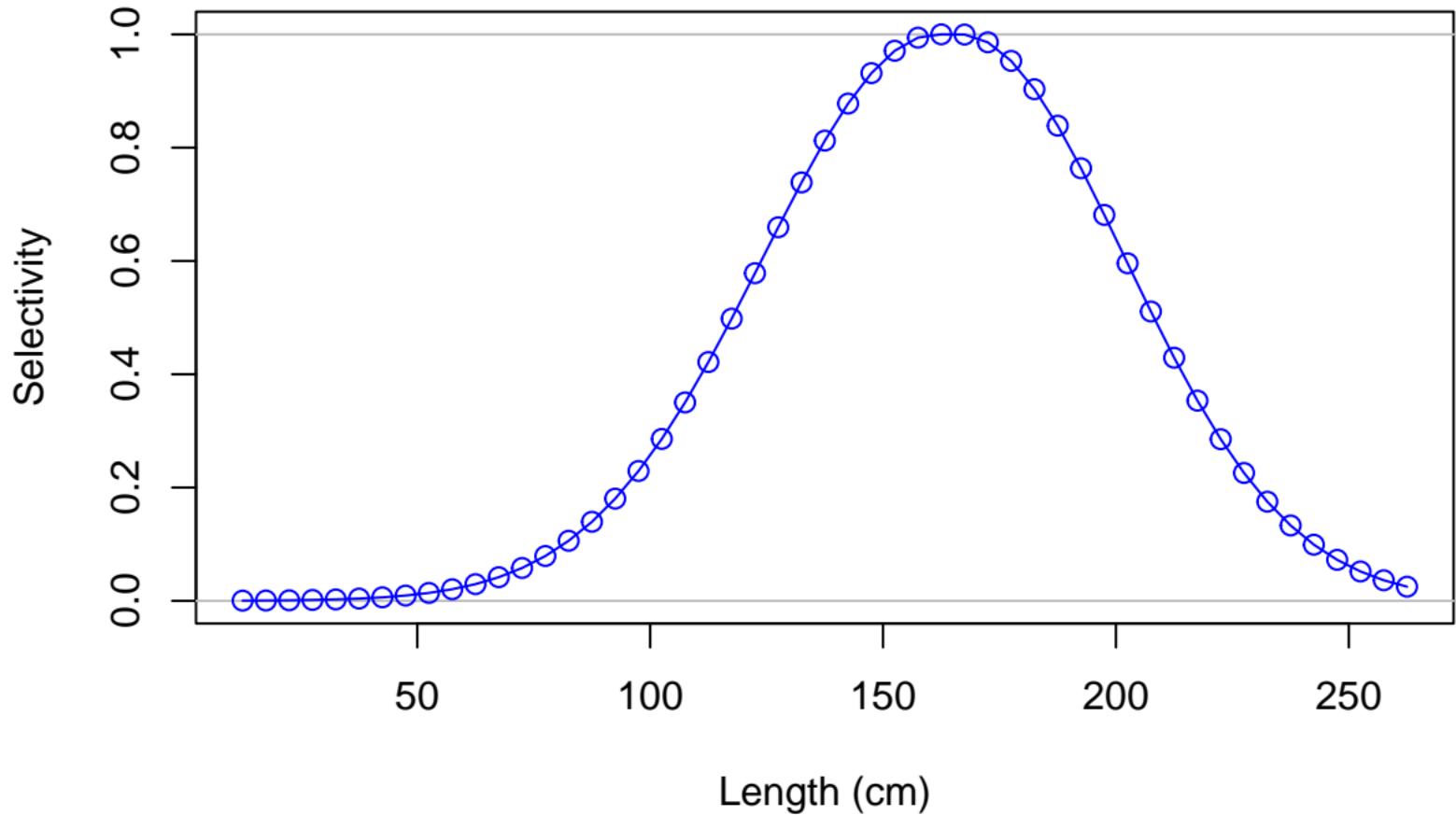
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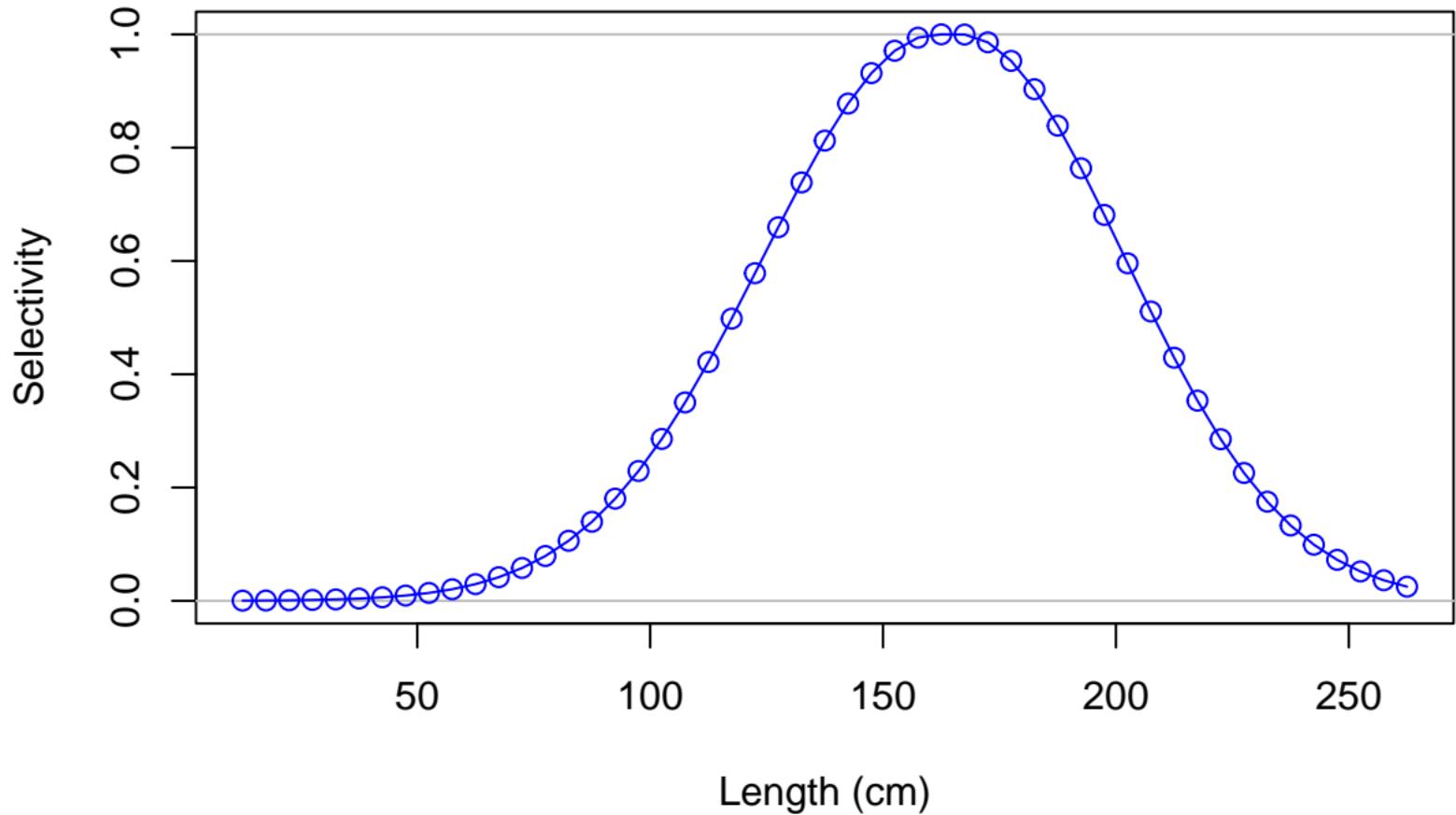
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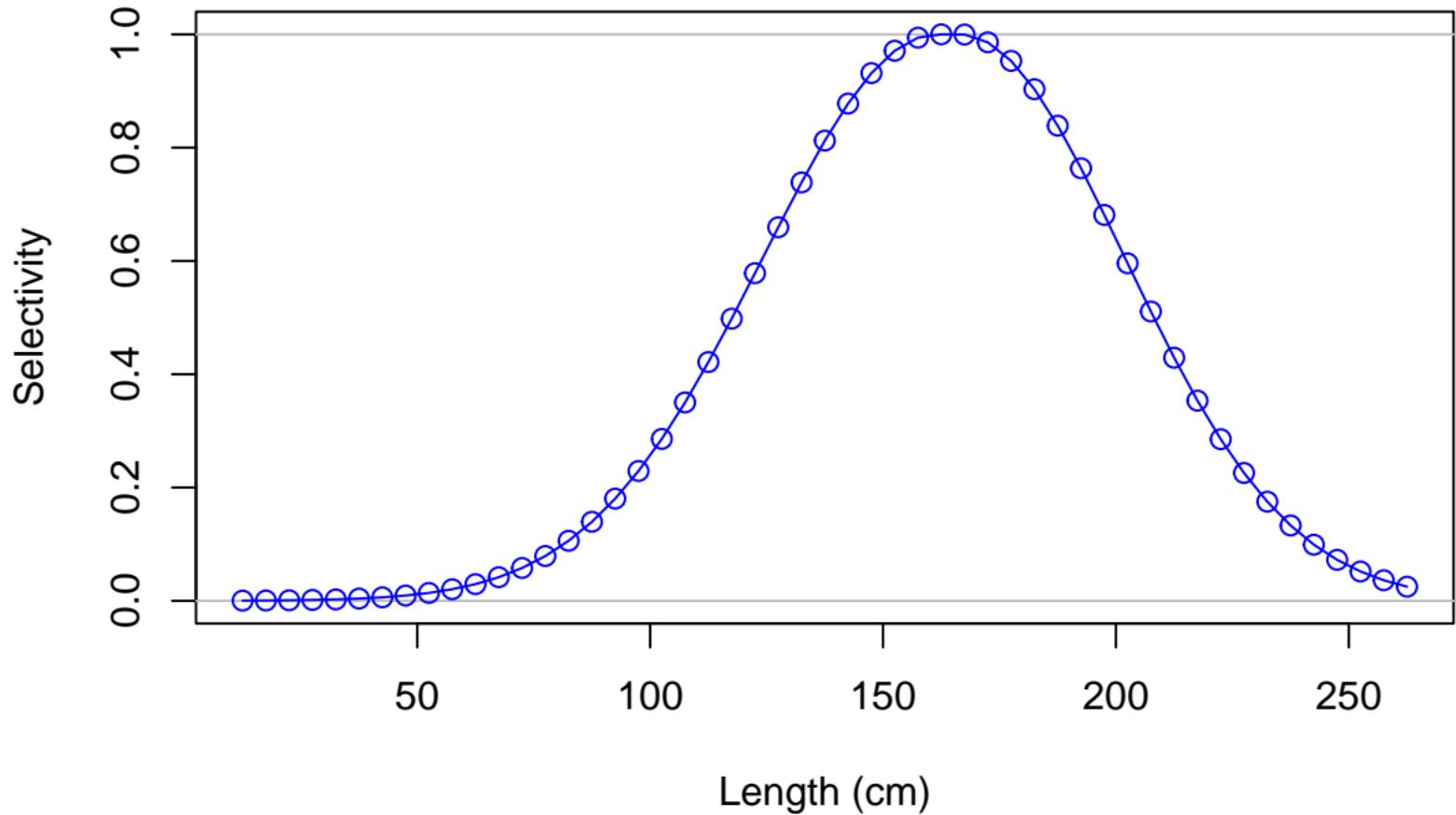
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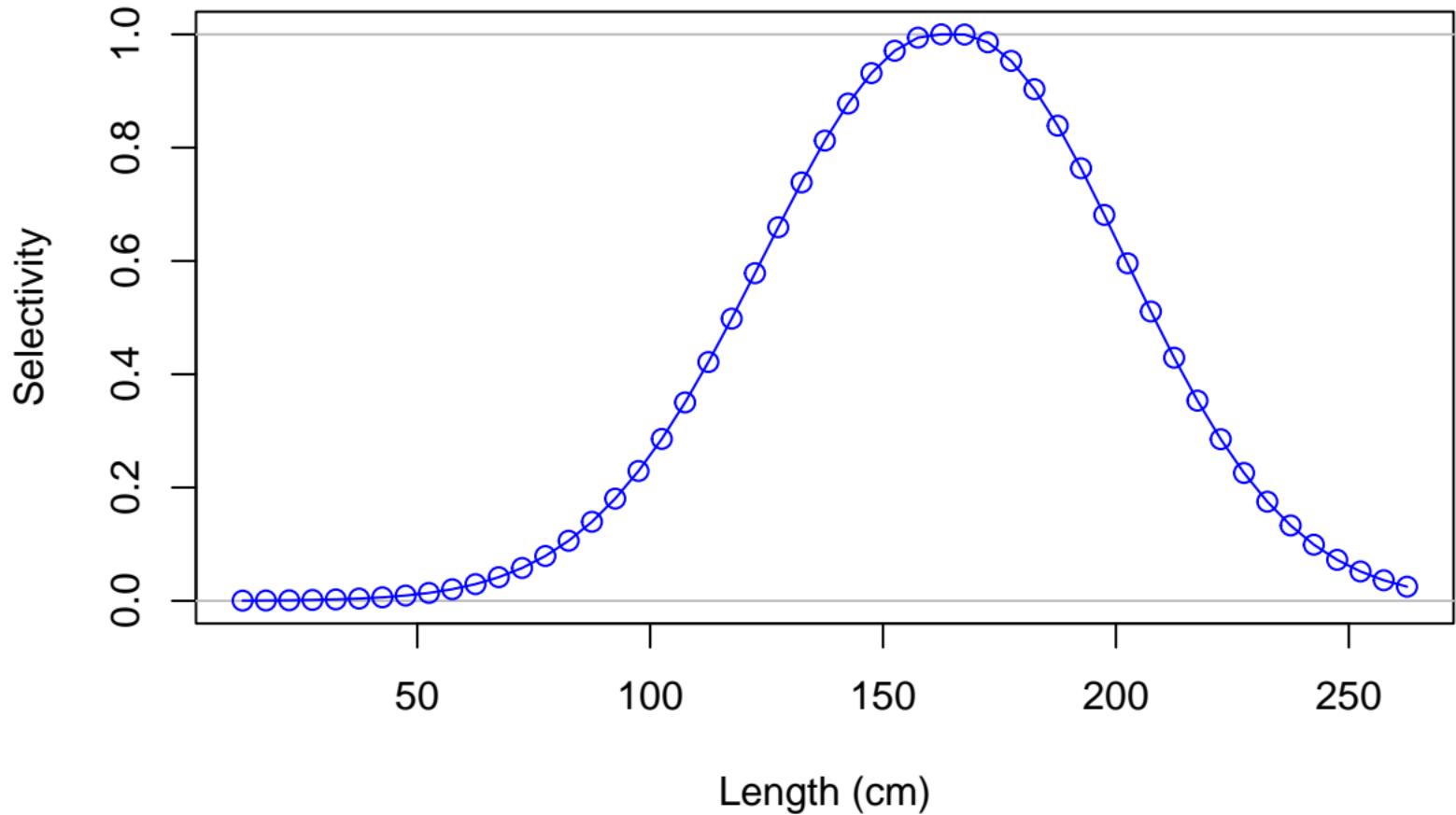


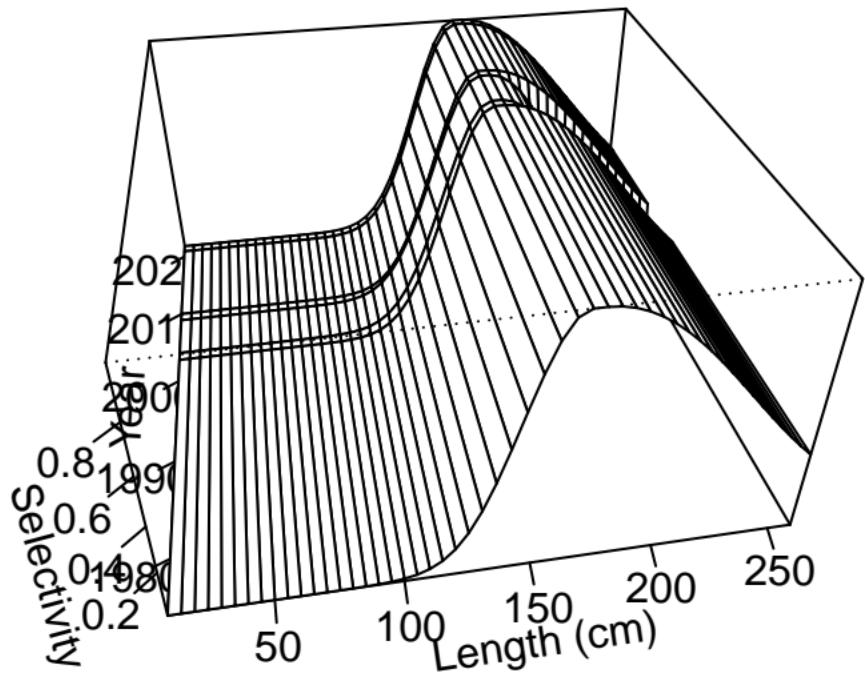












Year

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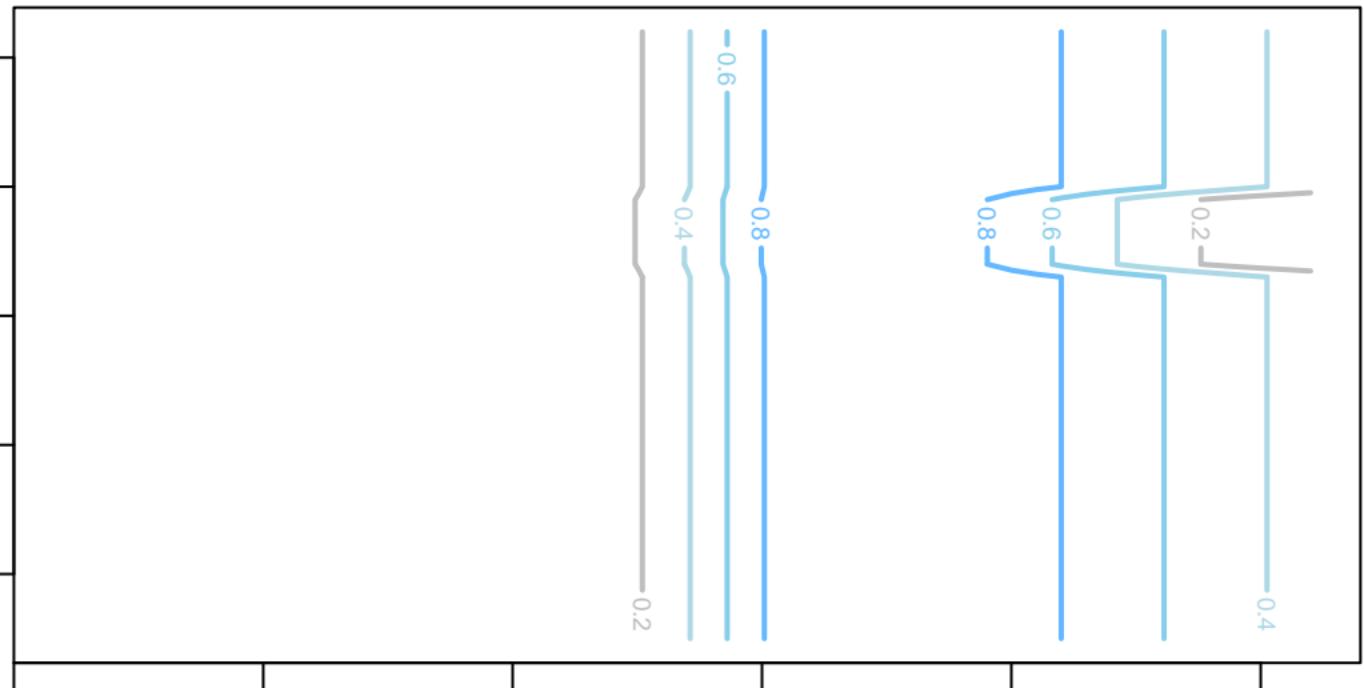
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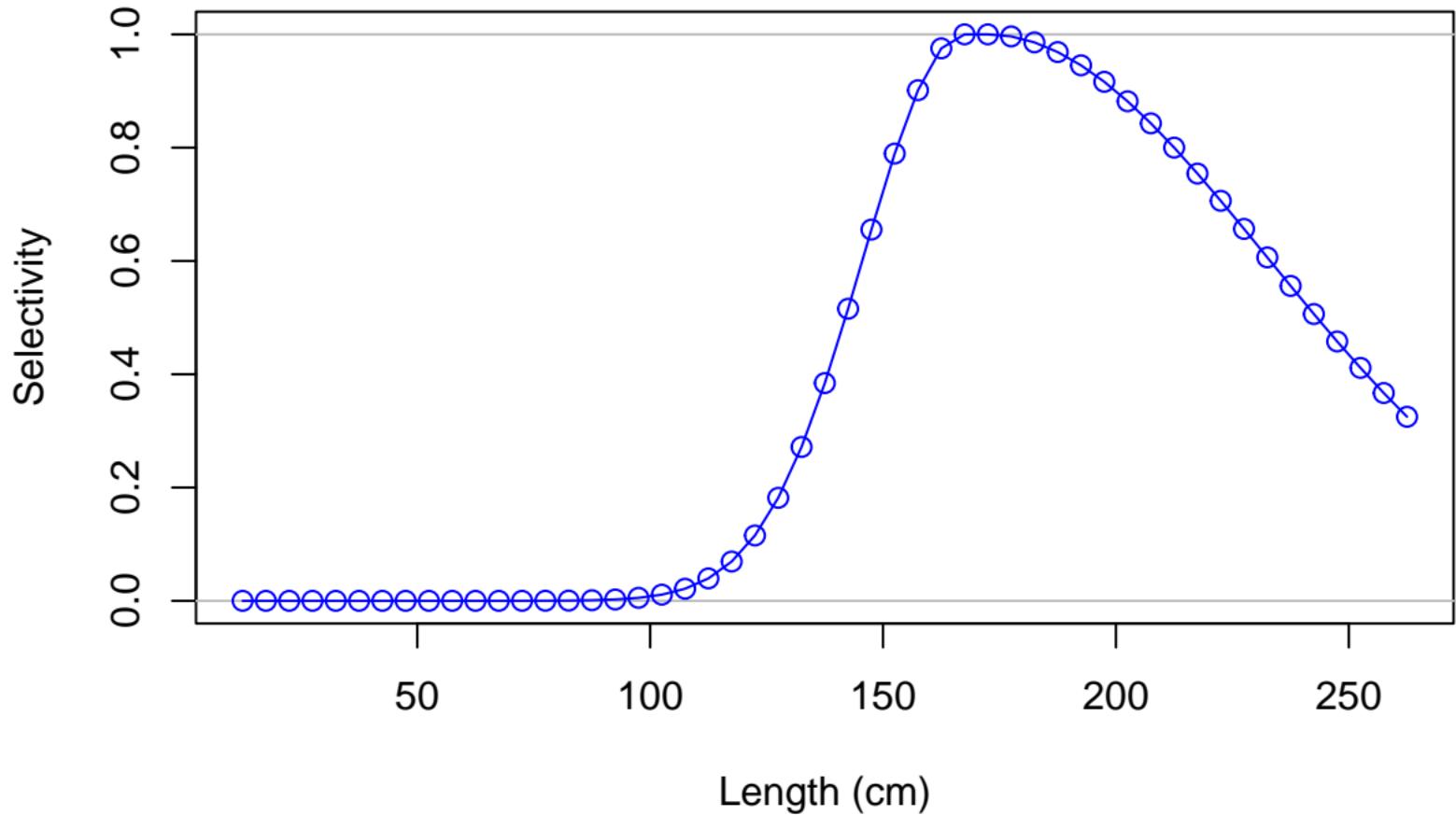
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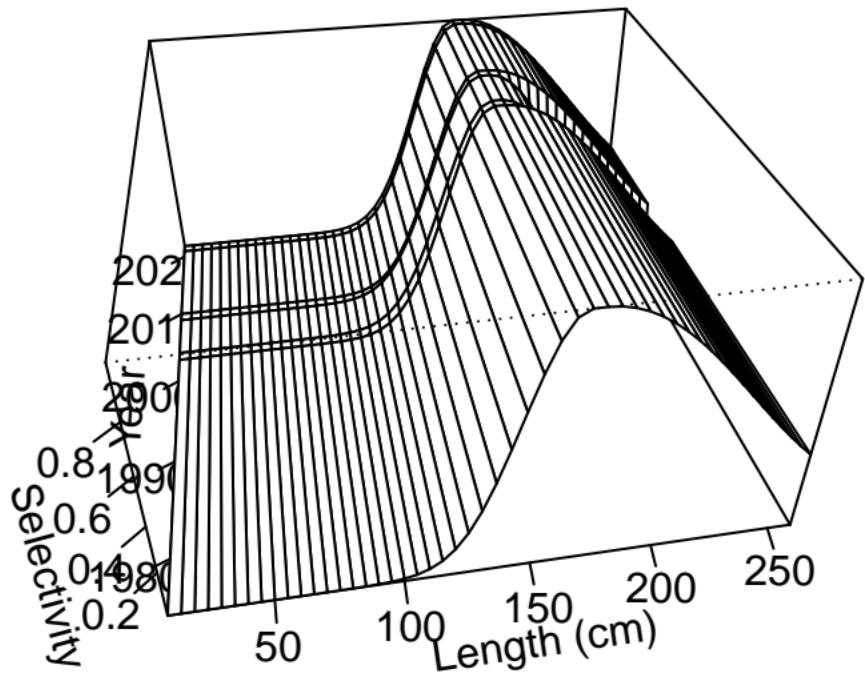
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Length (cm)







Year

2020

2000

1980

0

50

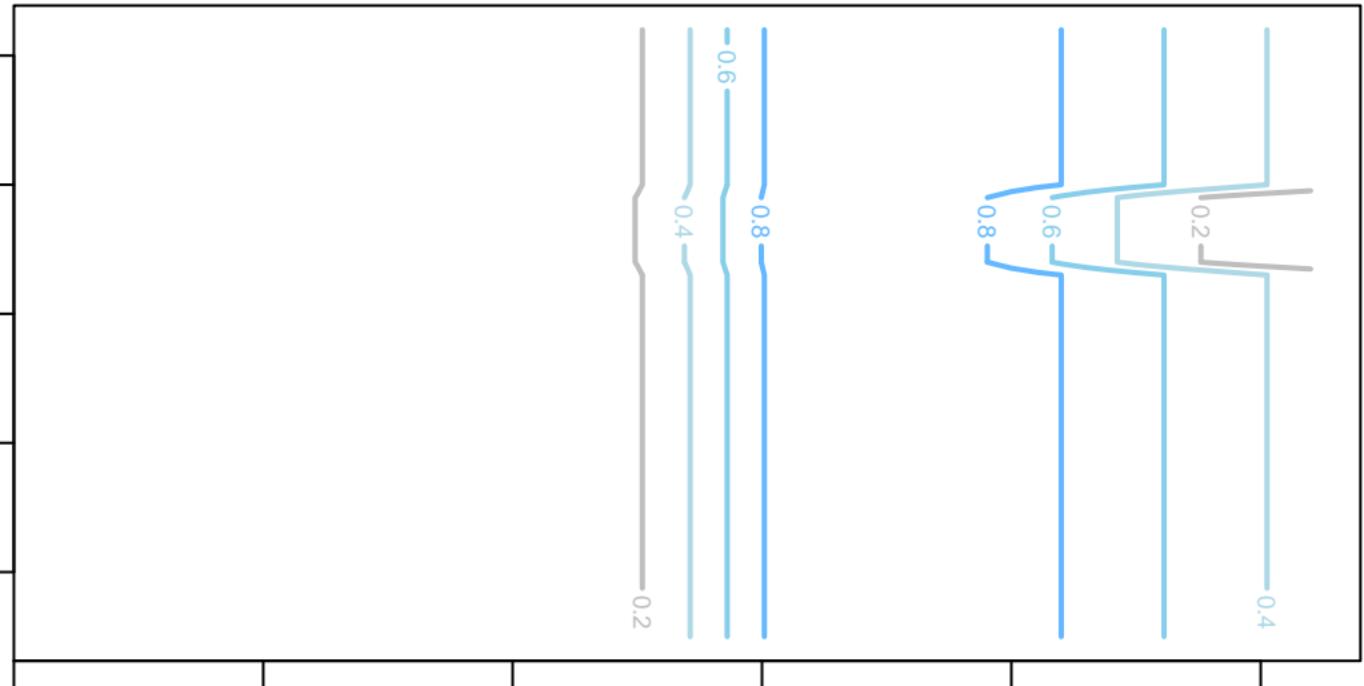
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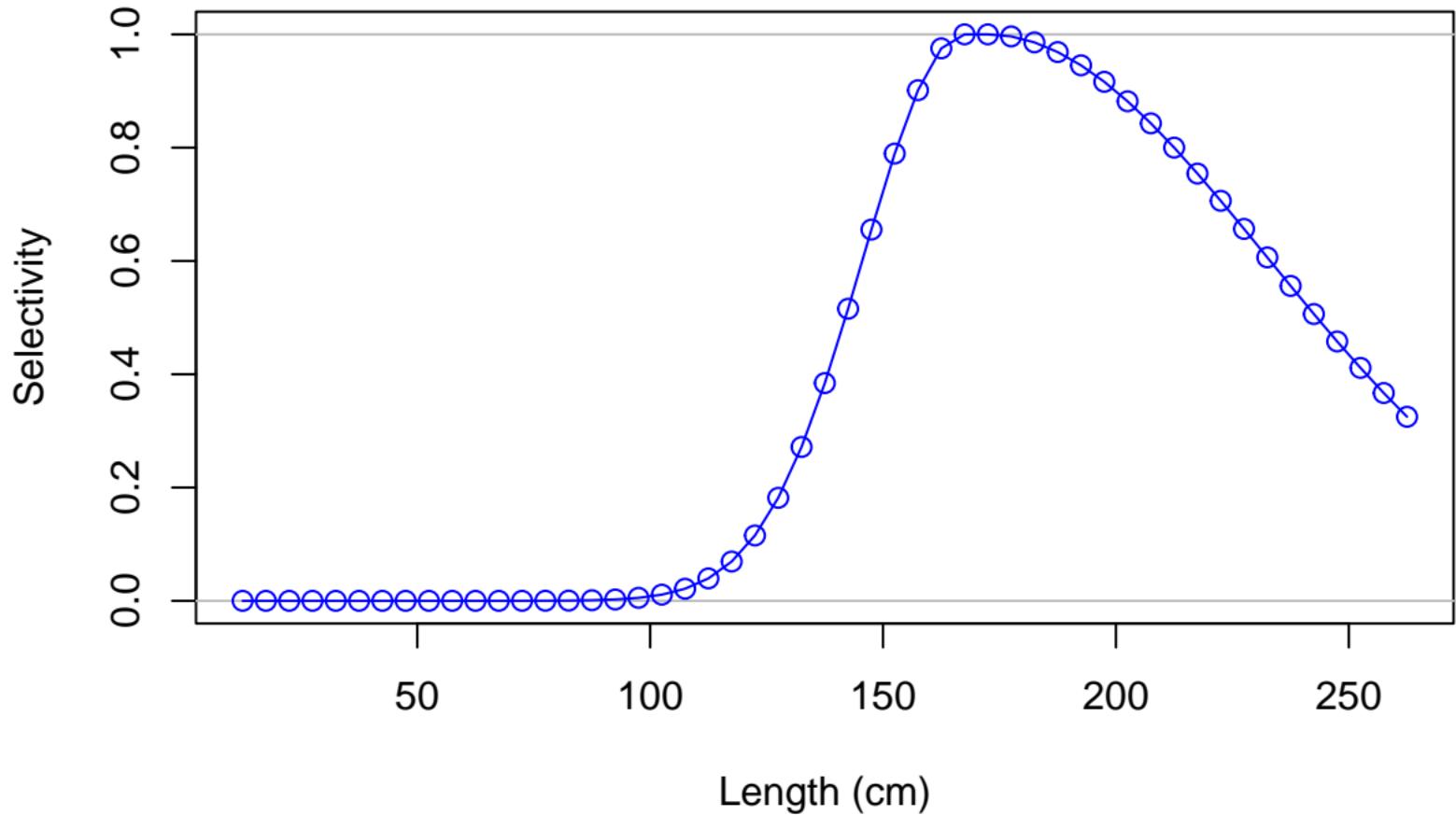
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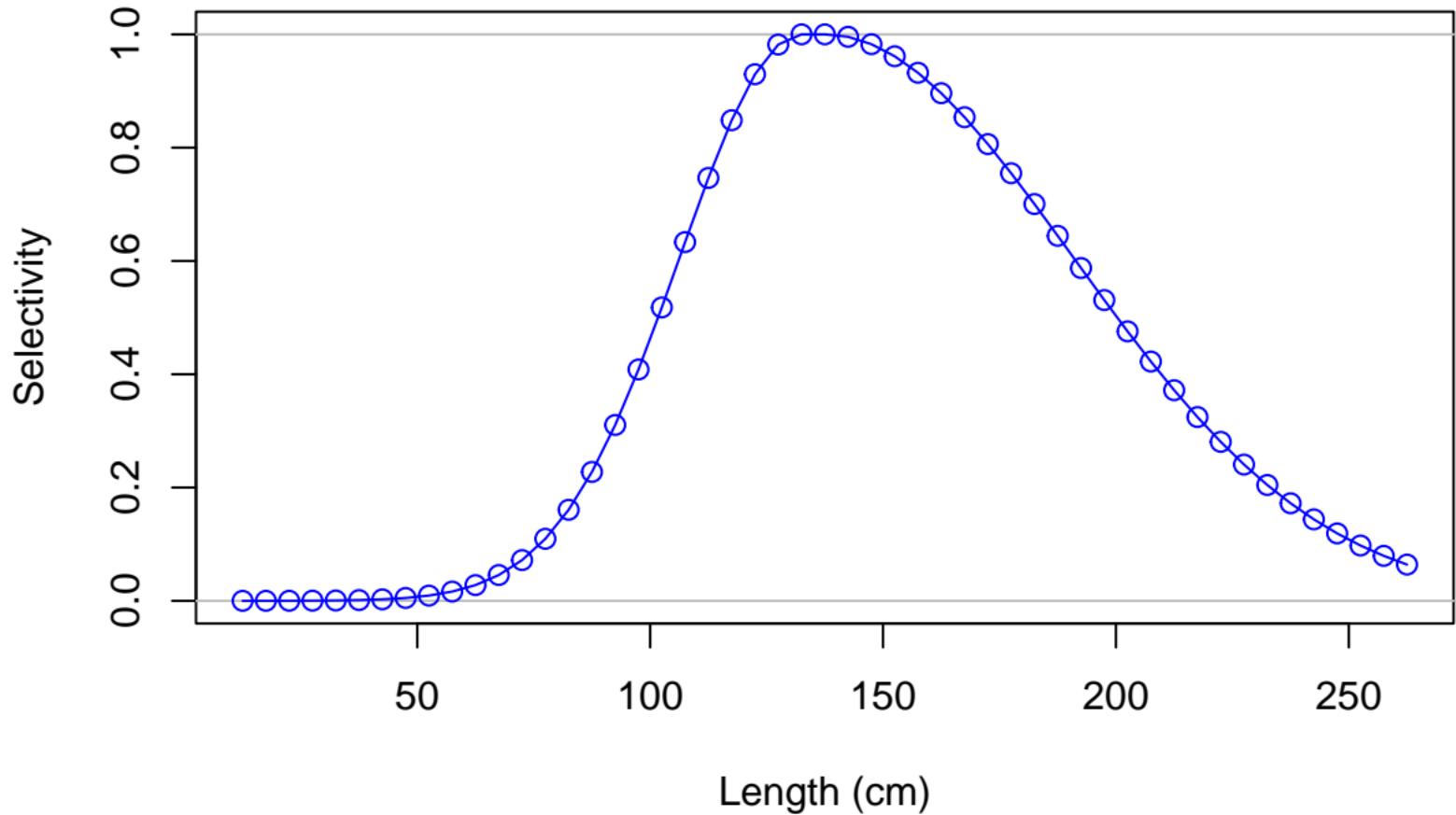
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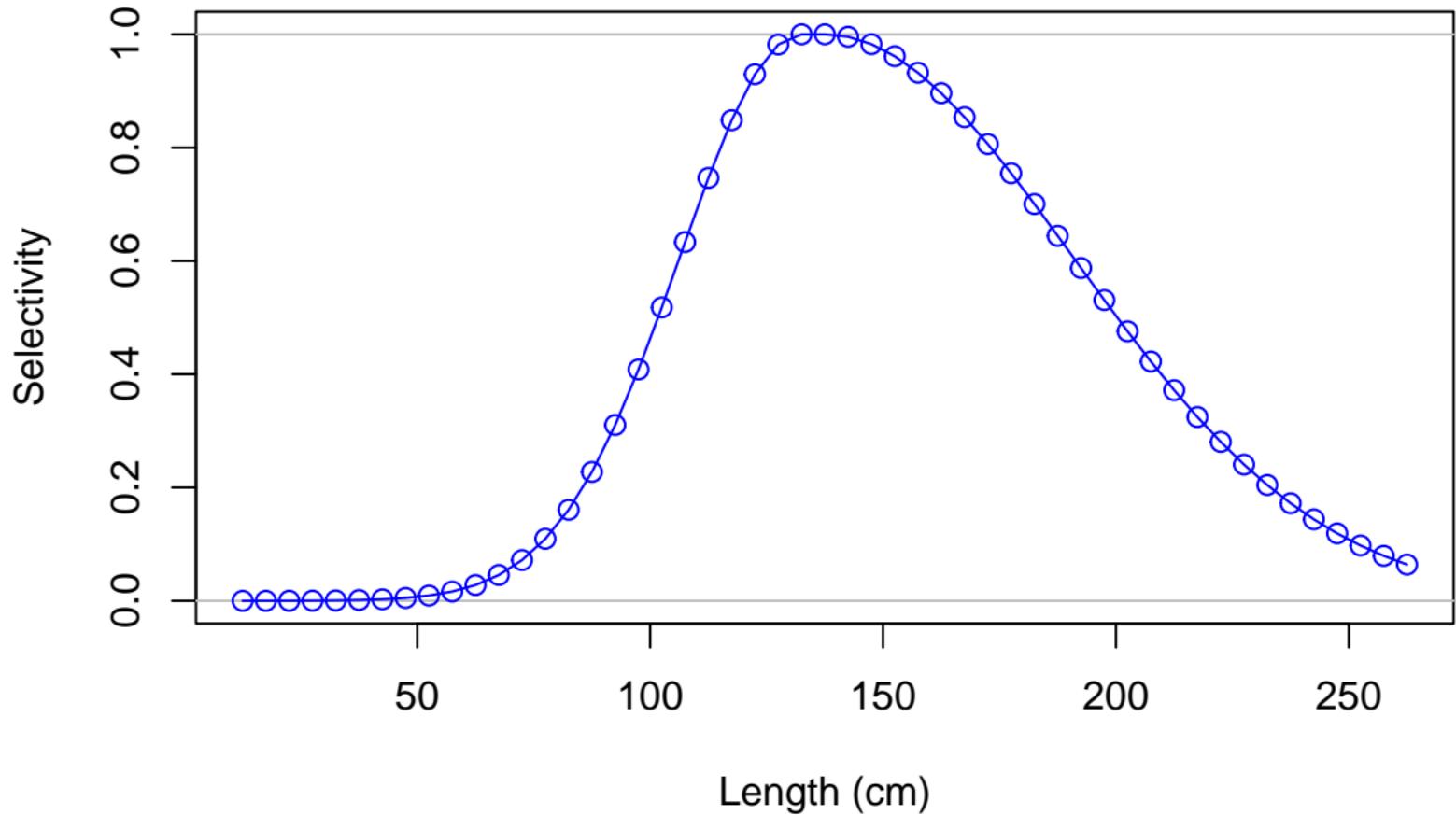
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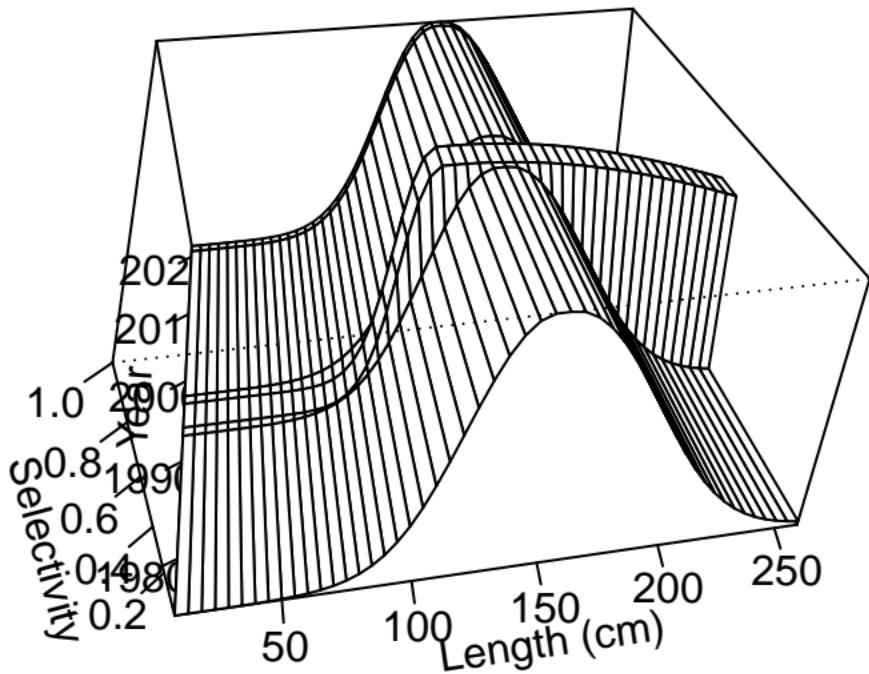
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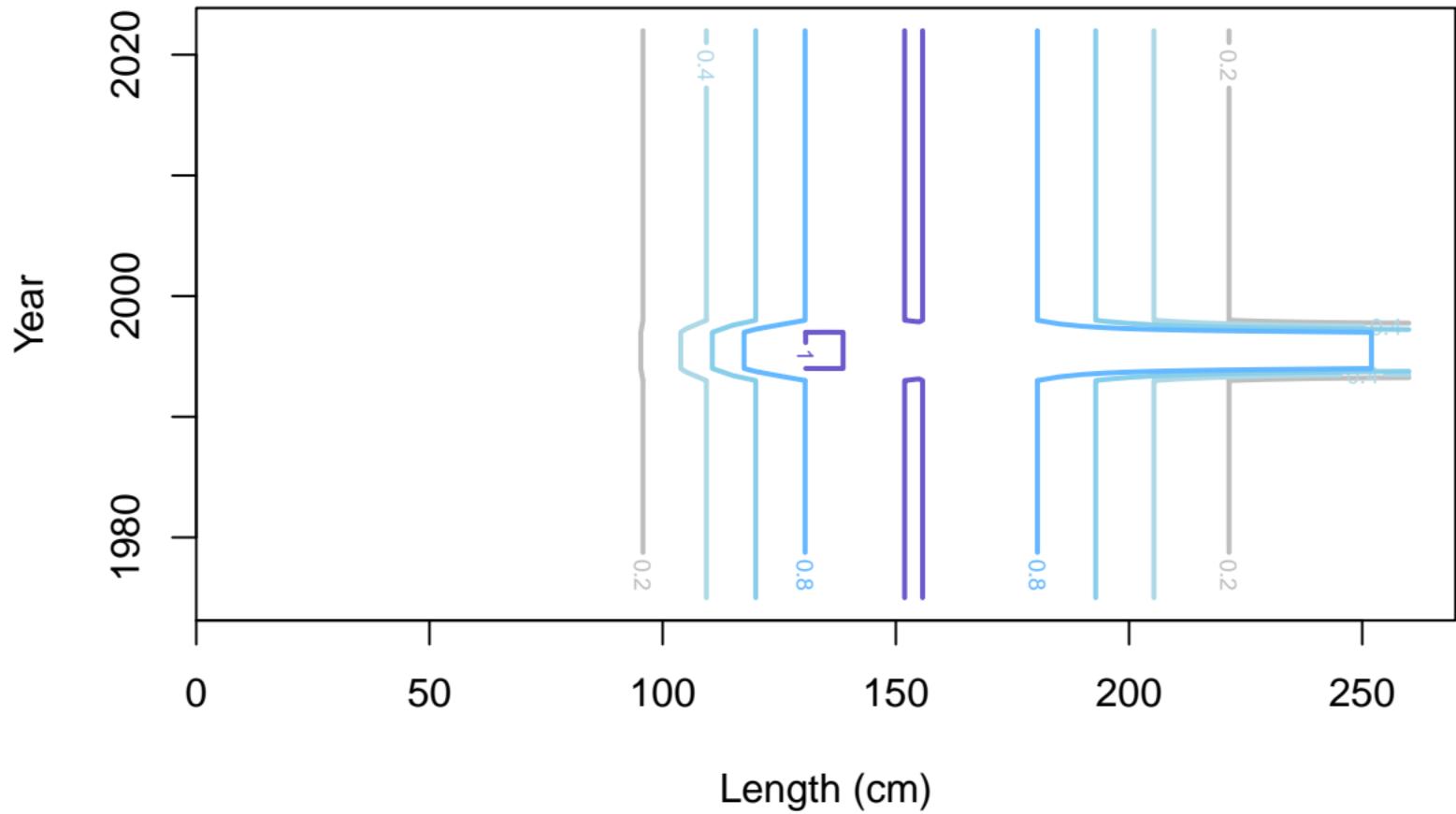


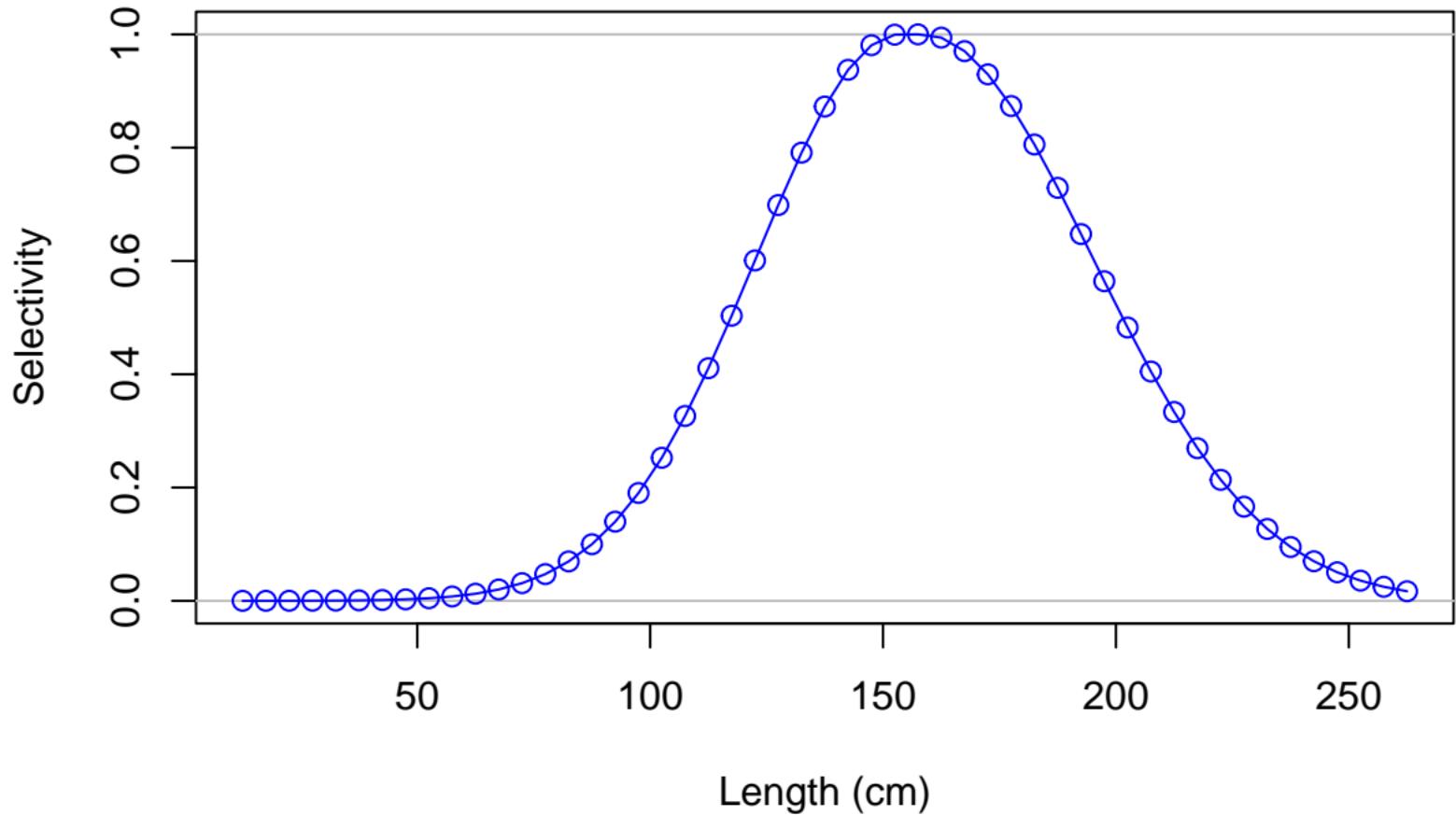


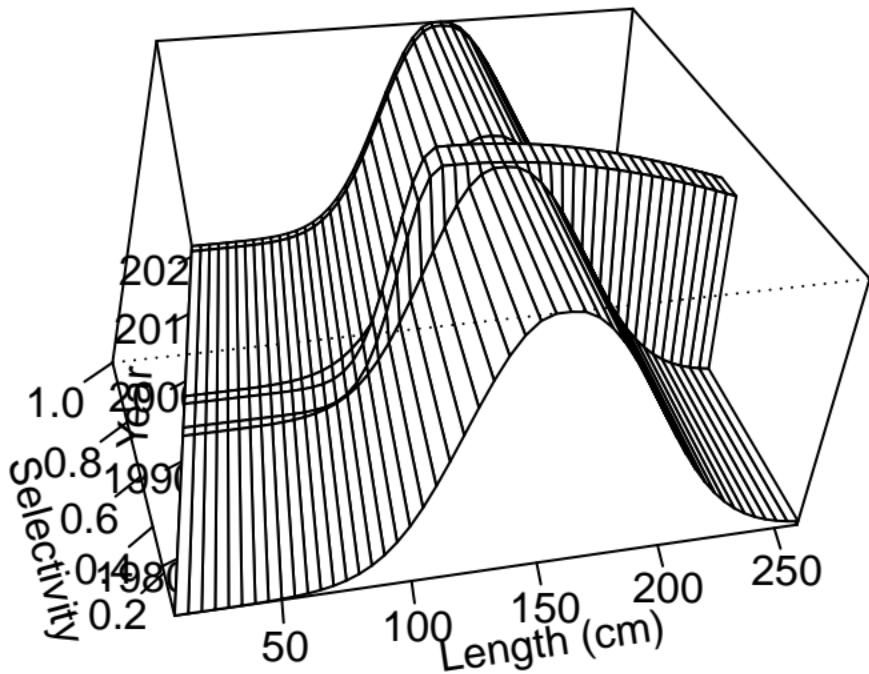


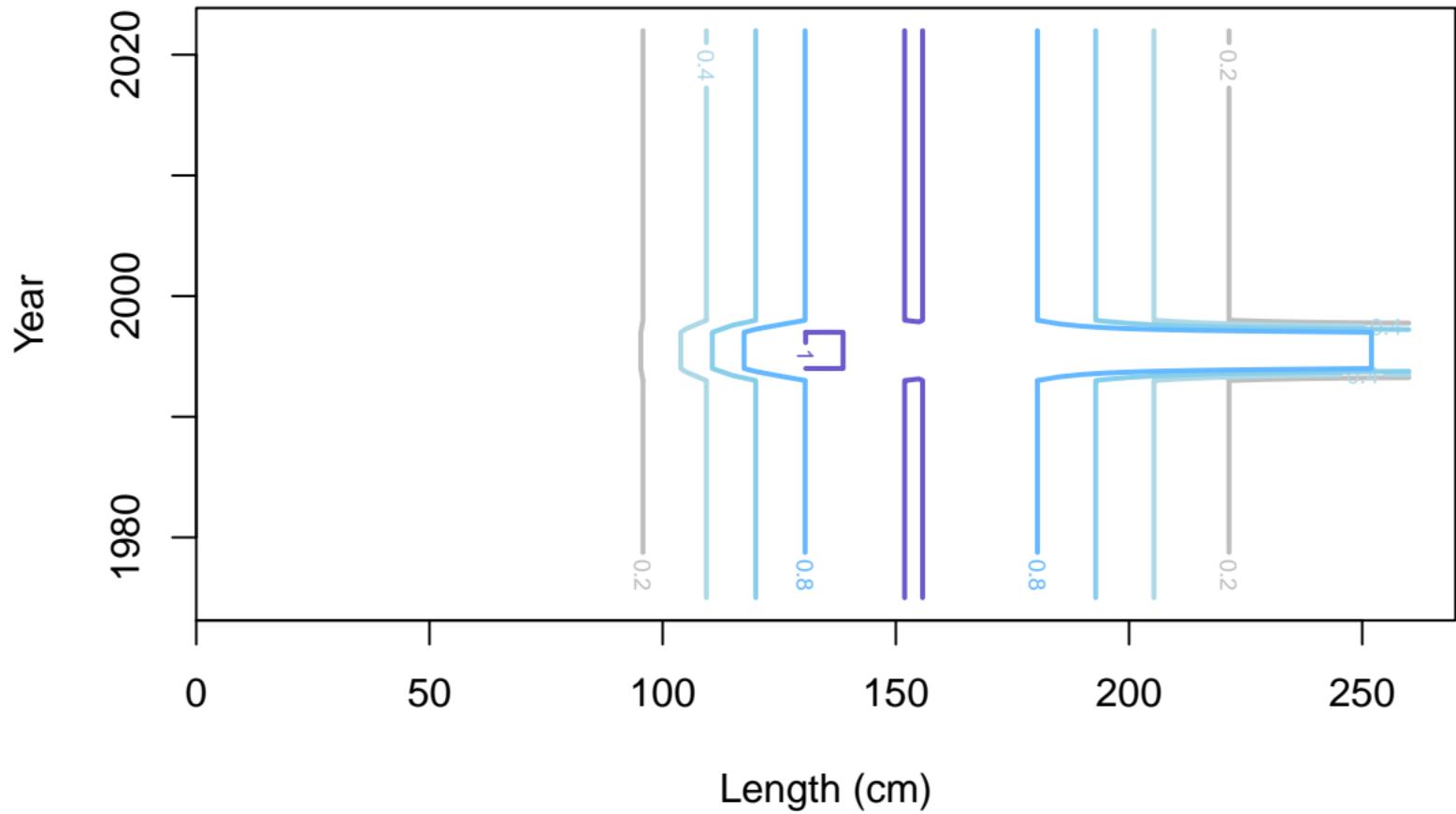


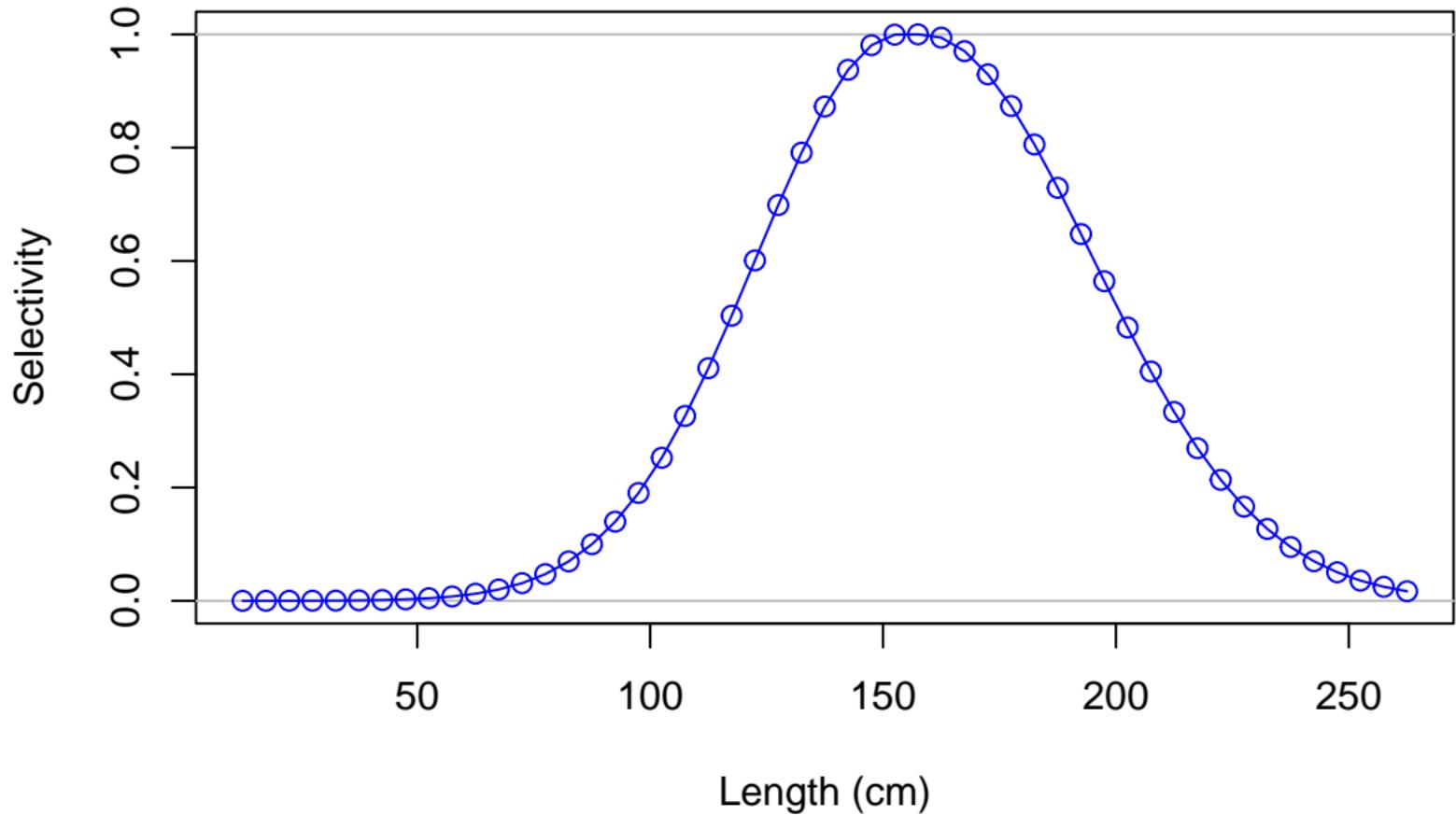


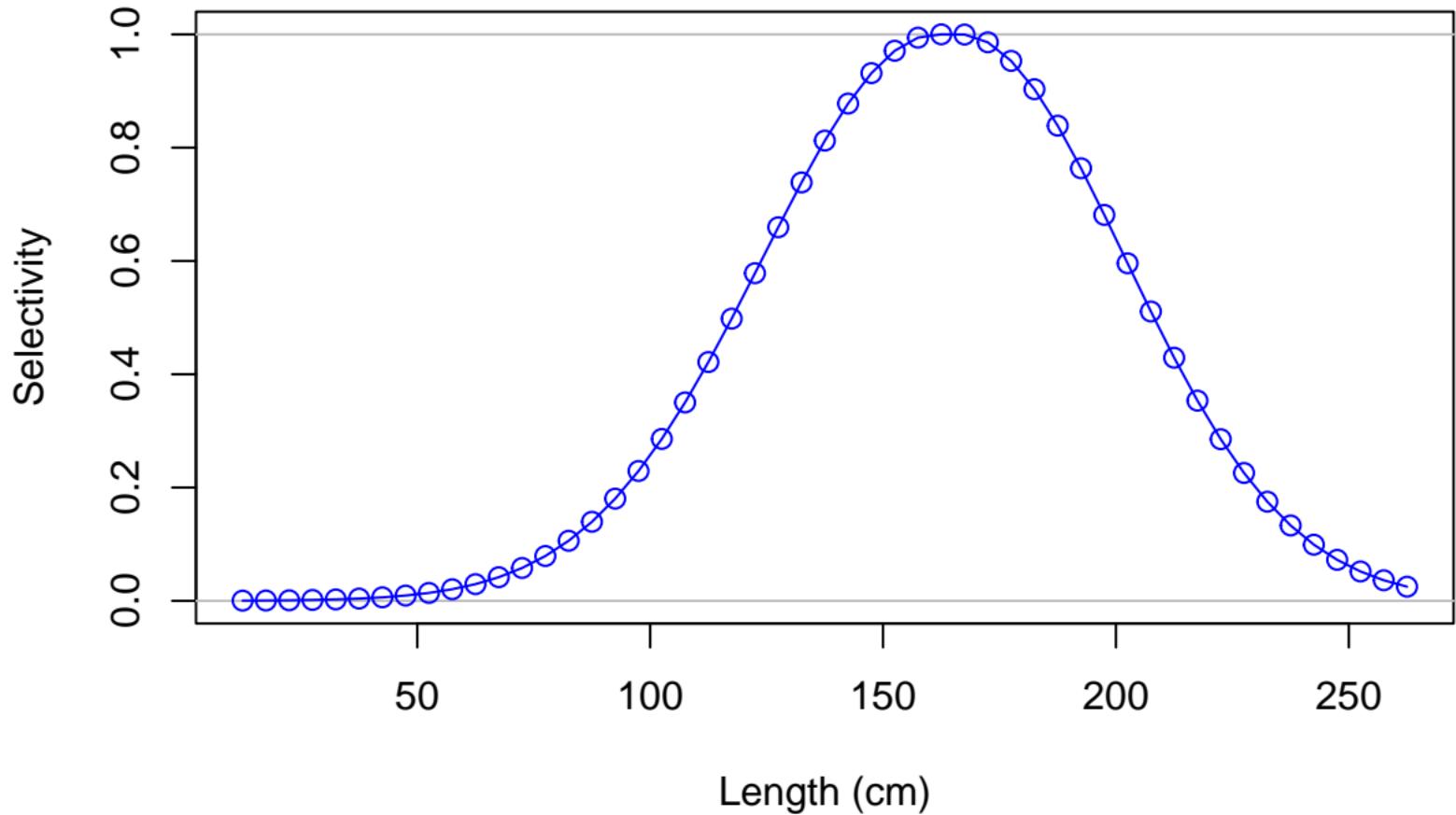


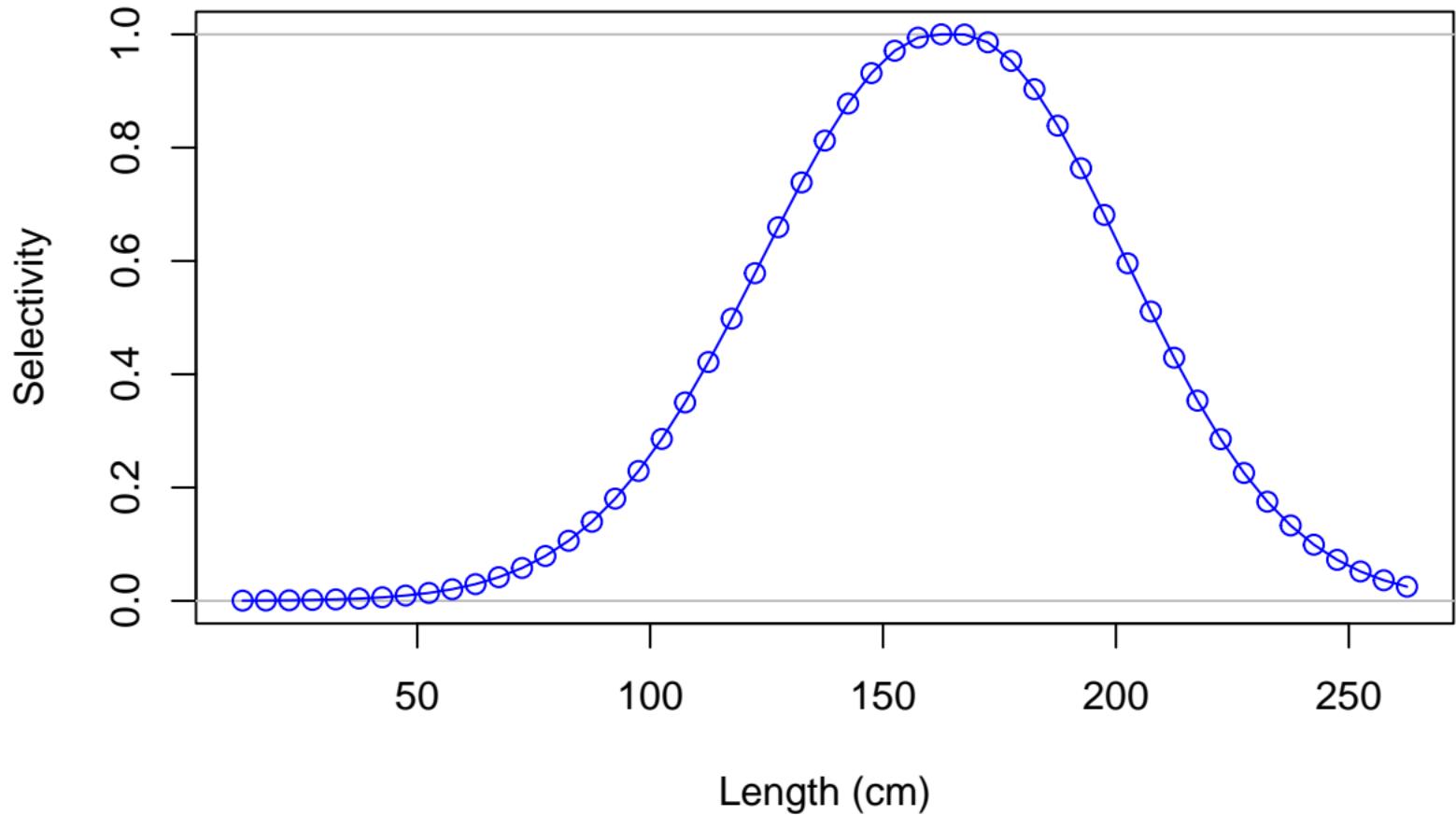


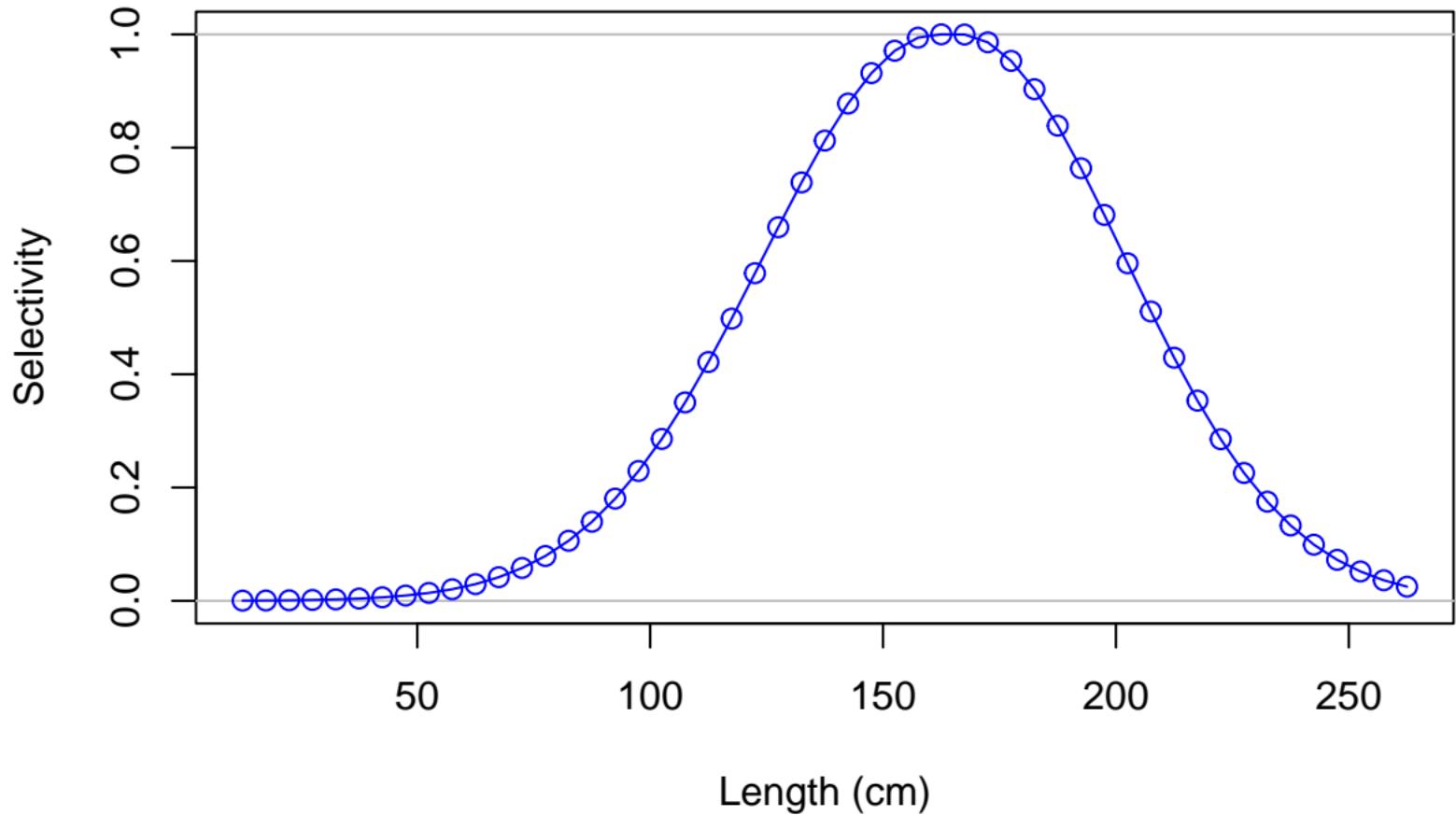


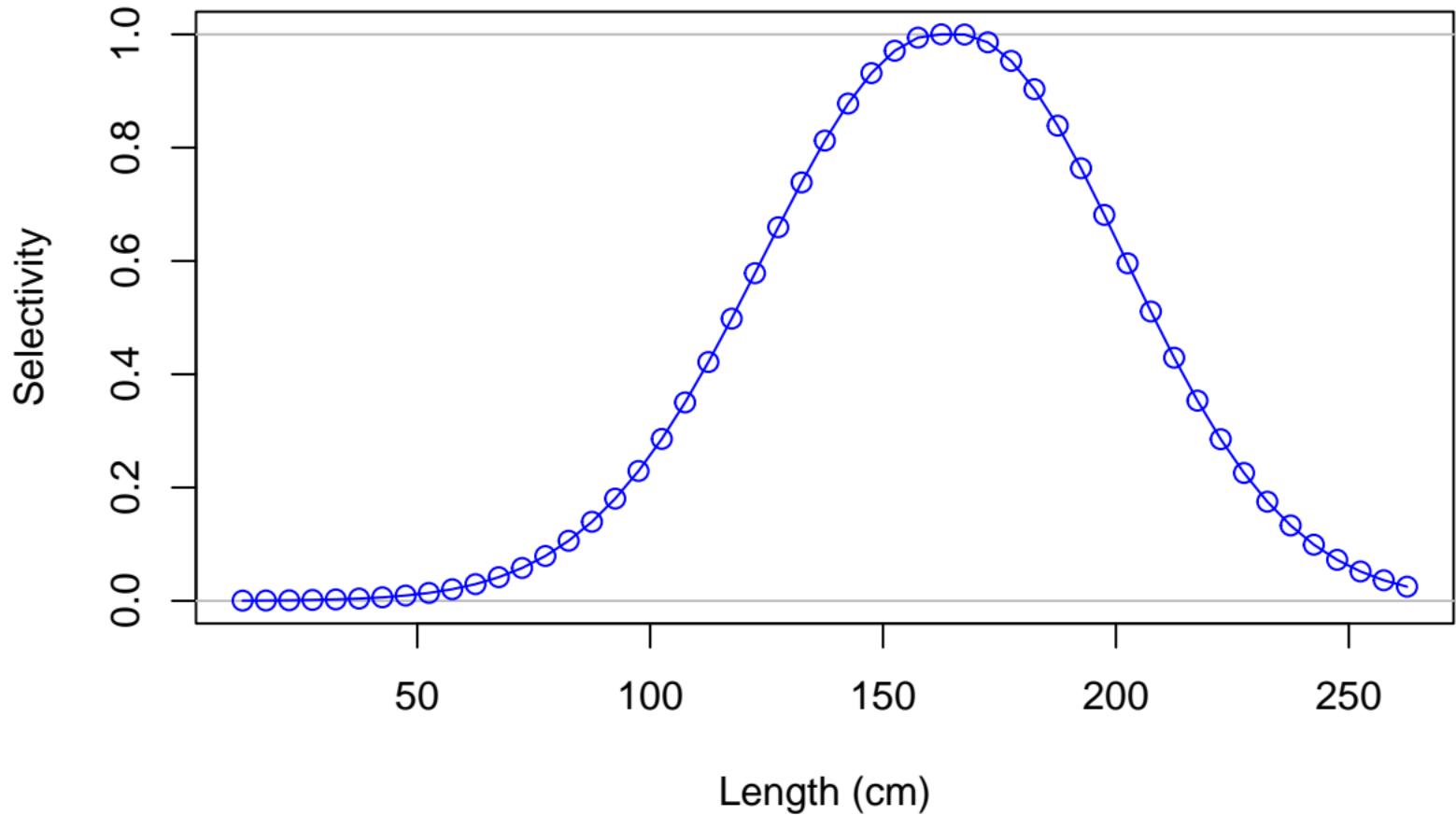


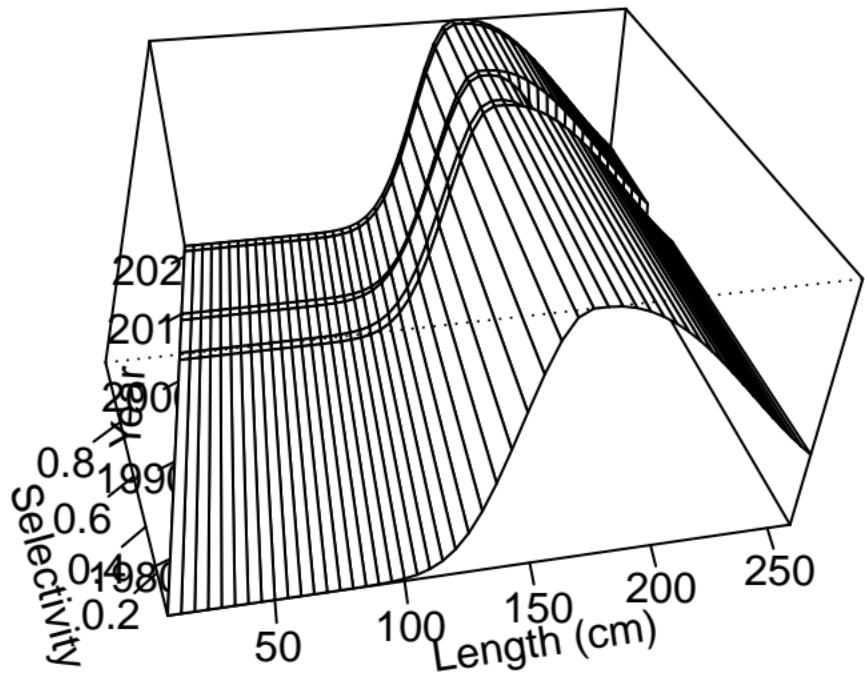












Year

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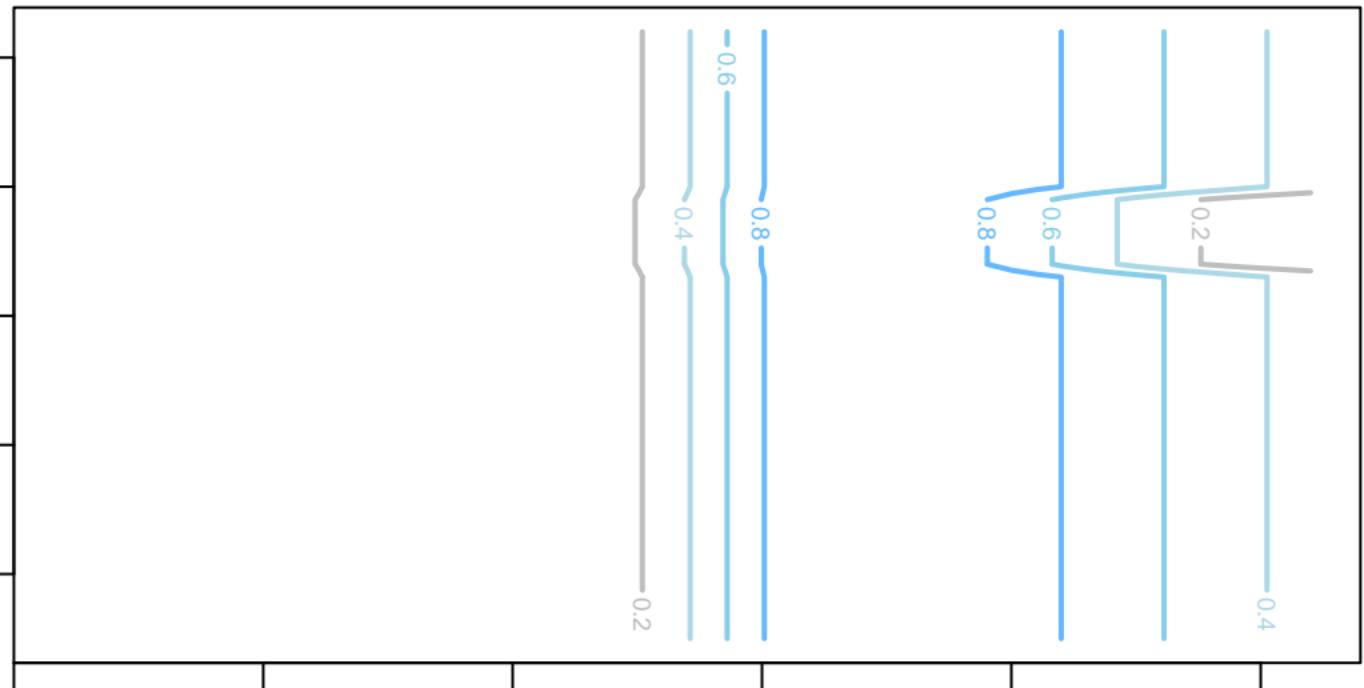
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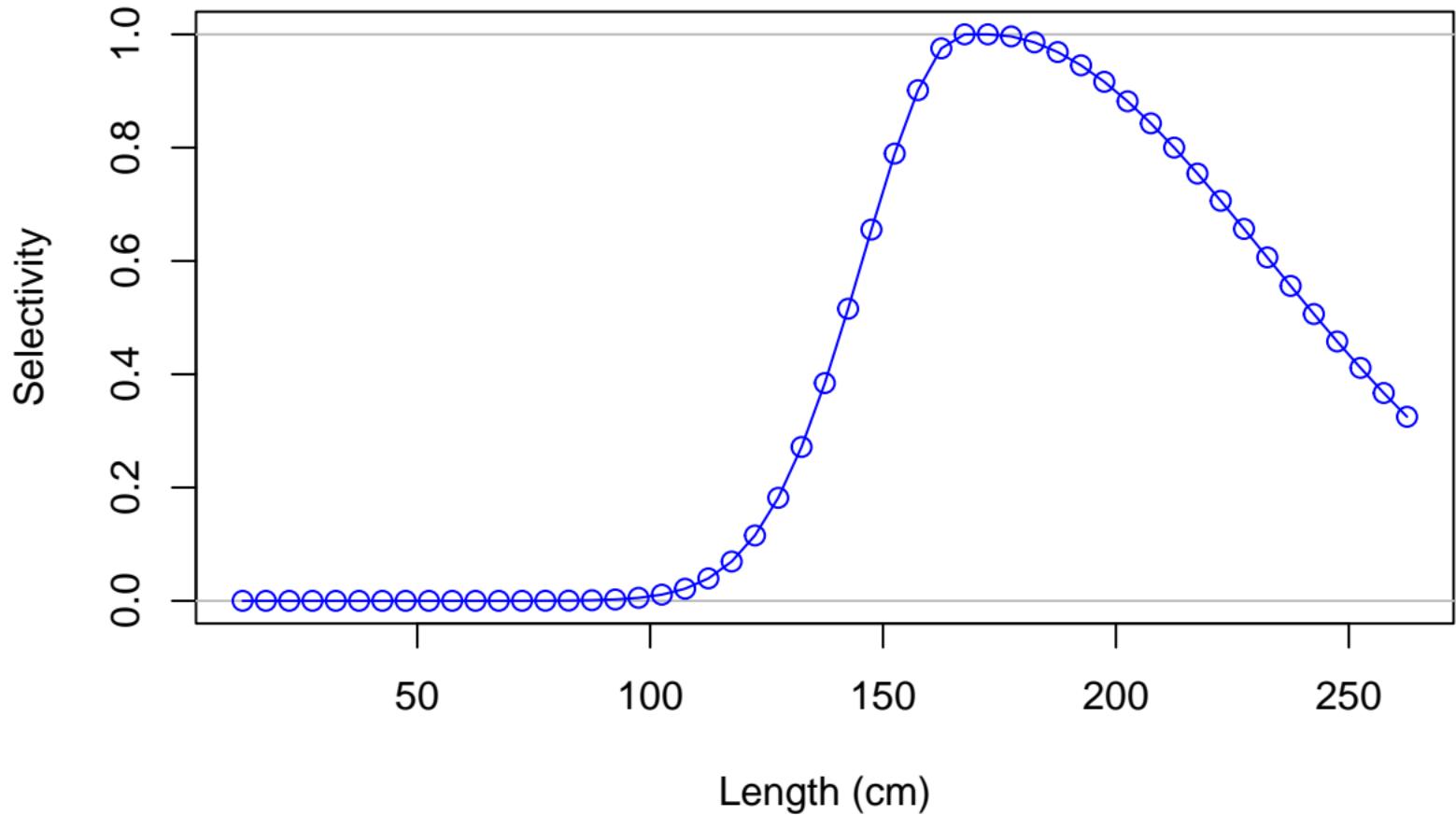
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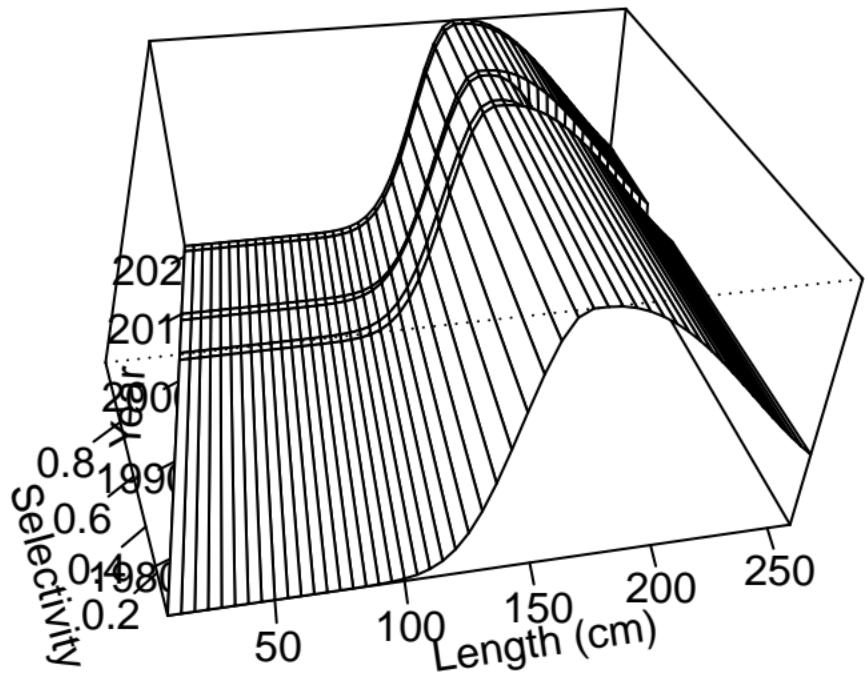
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Length (cm)







Year

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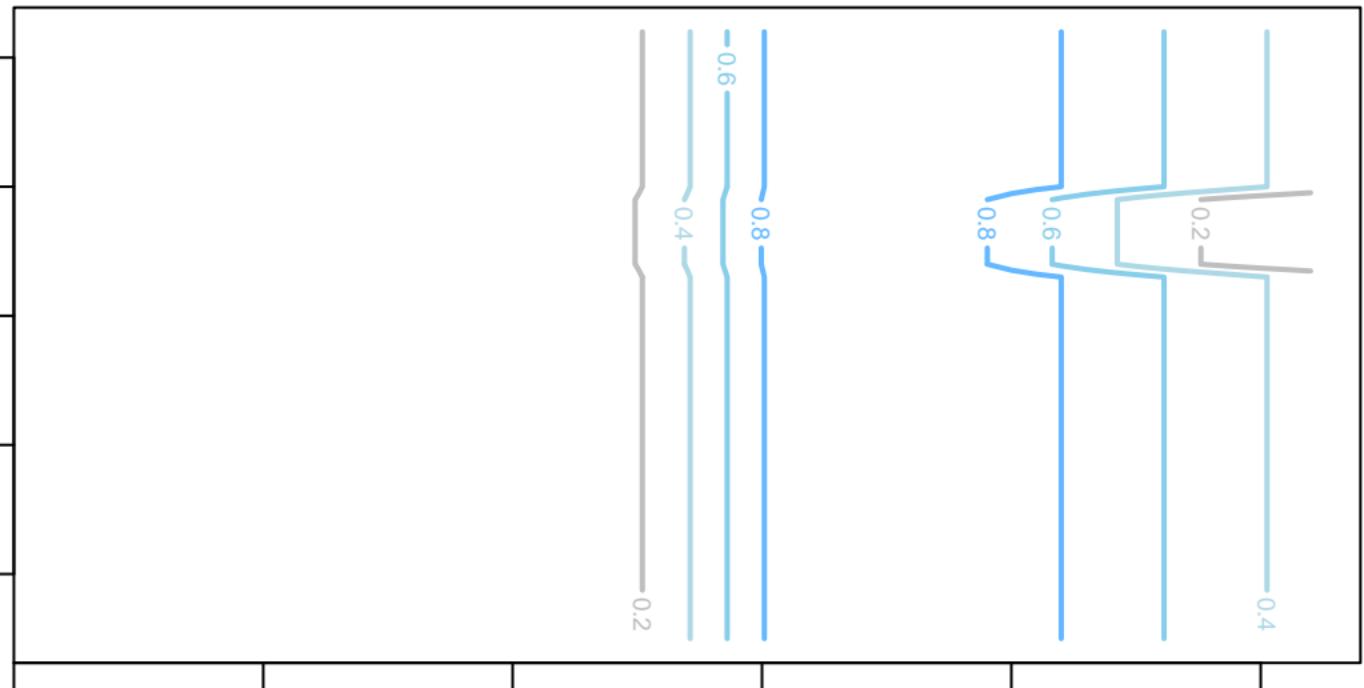
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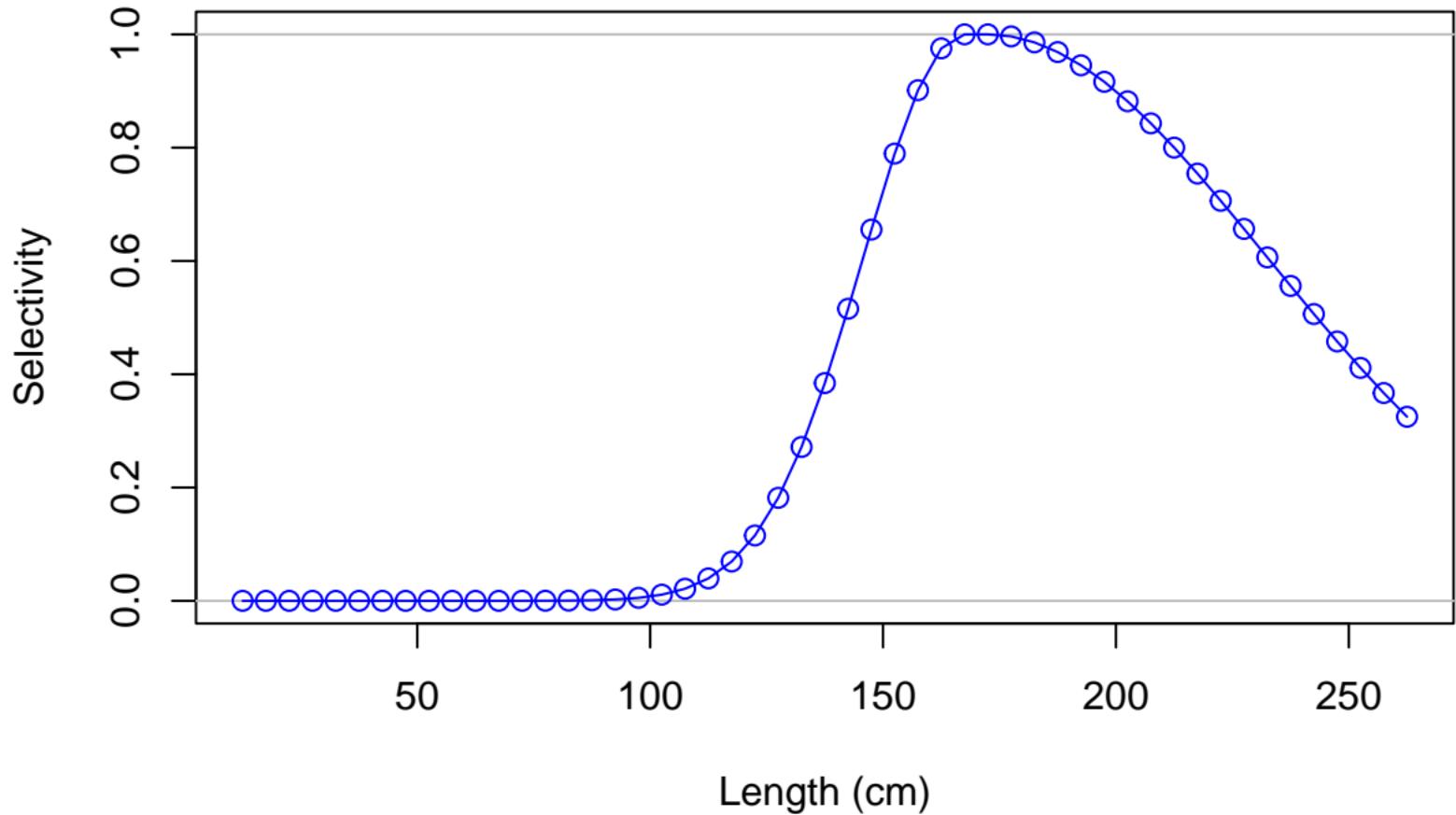
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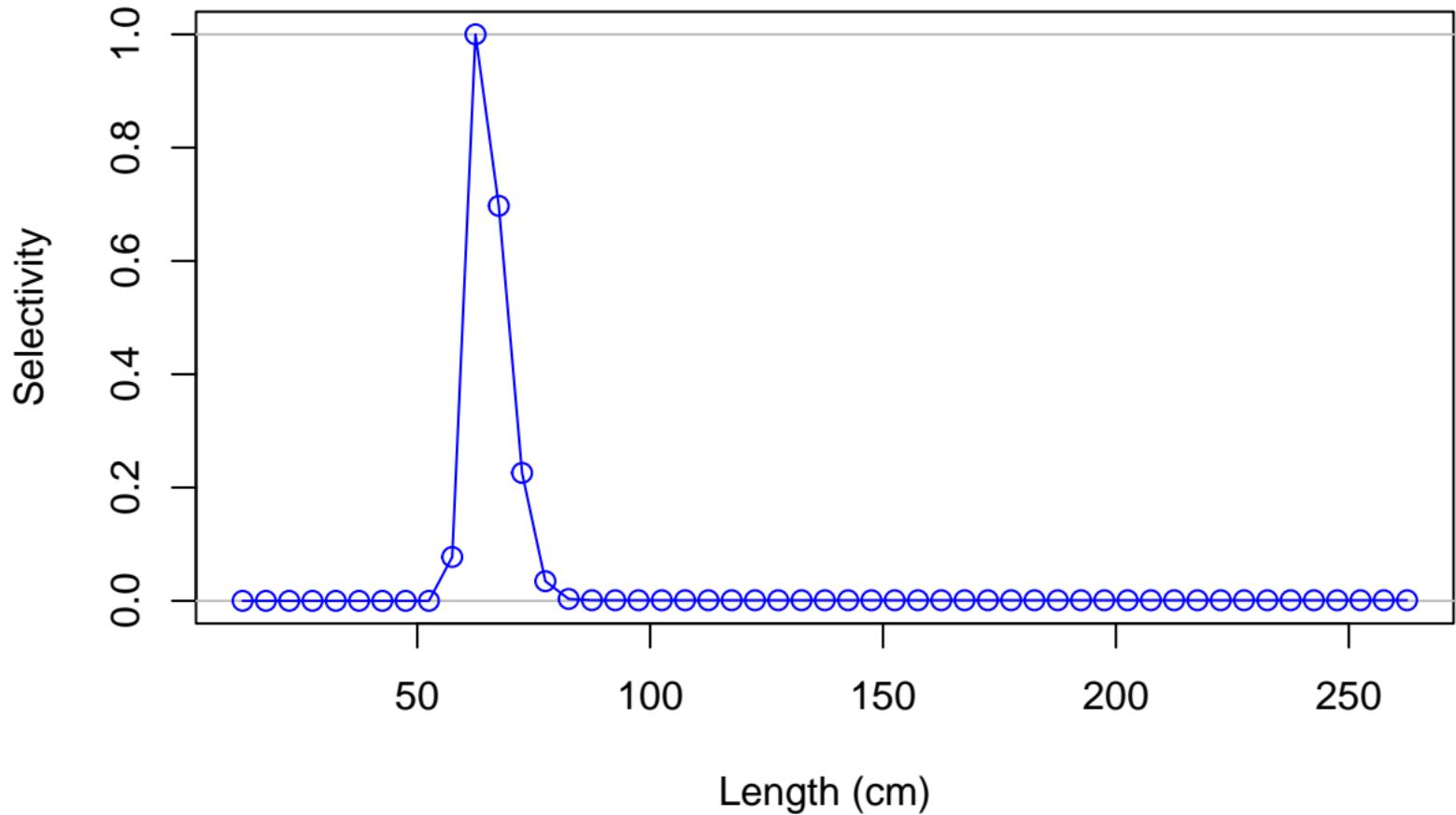
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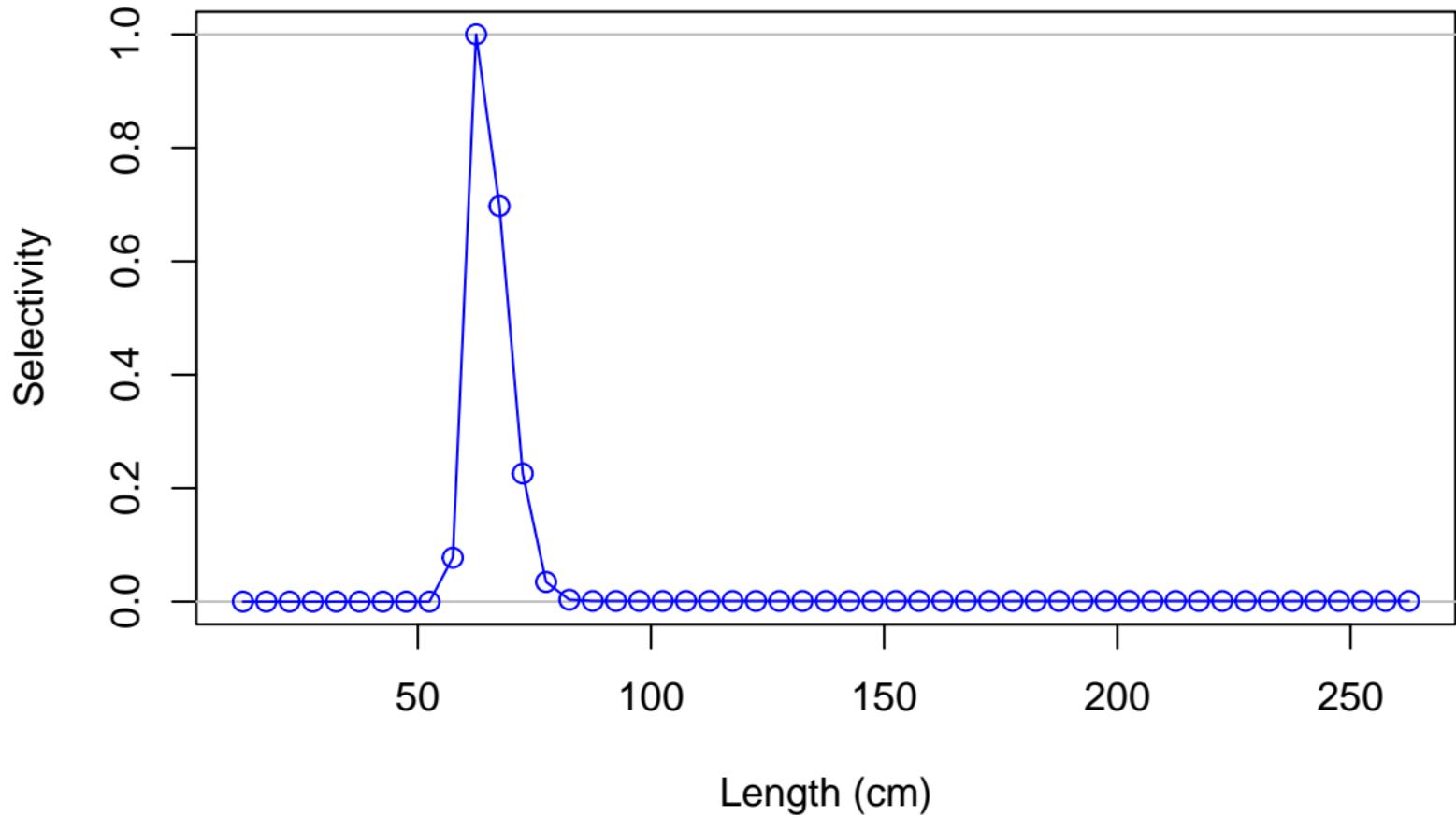
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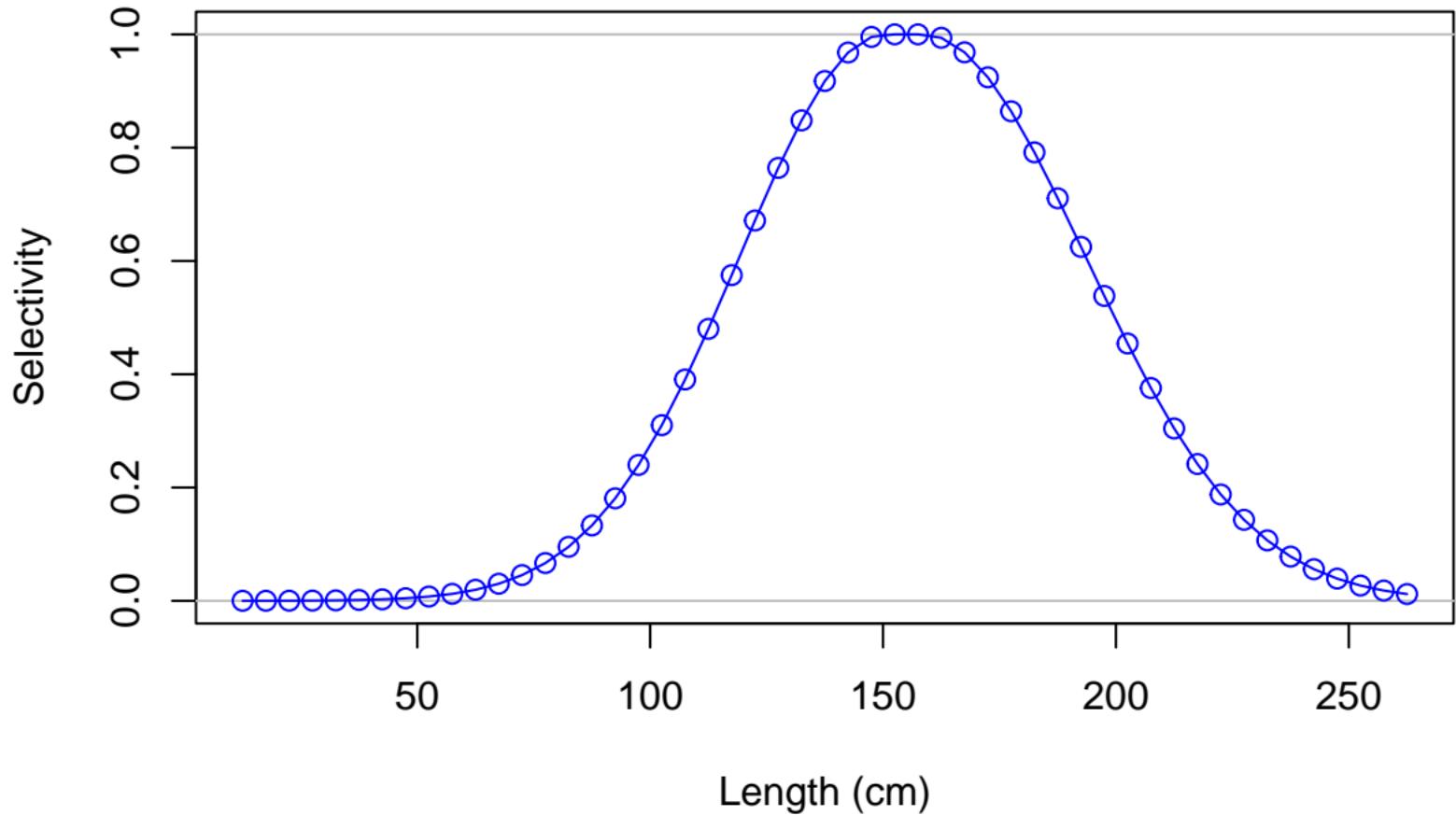
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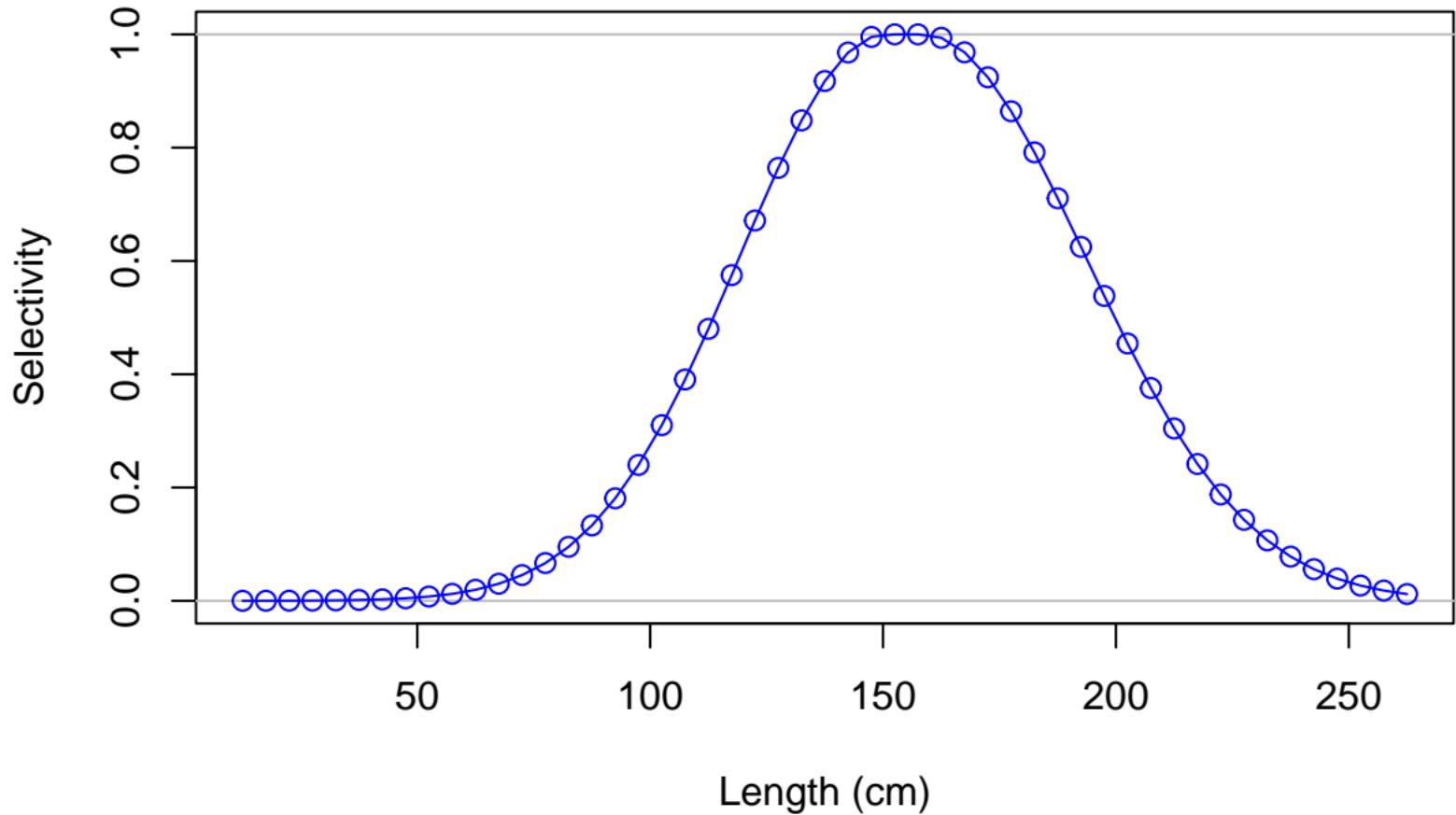


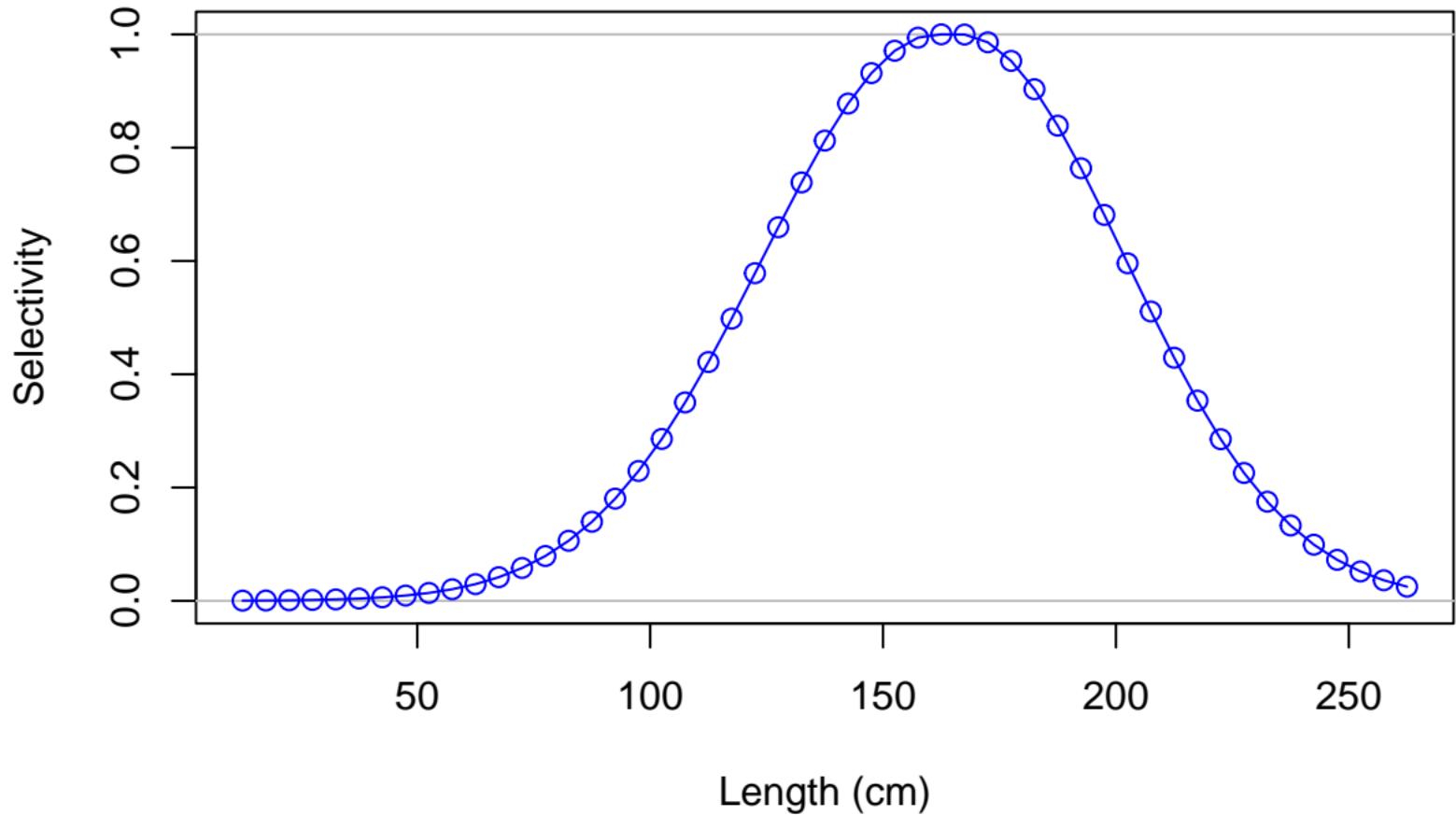


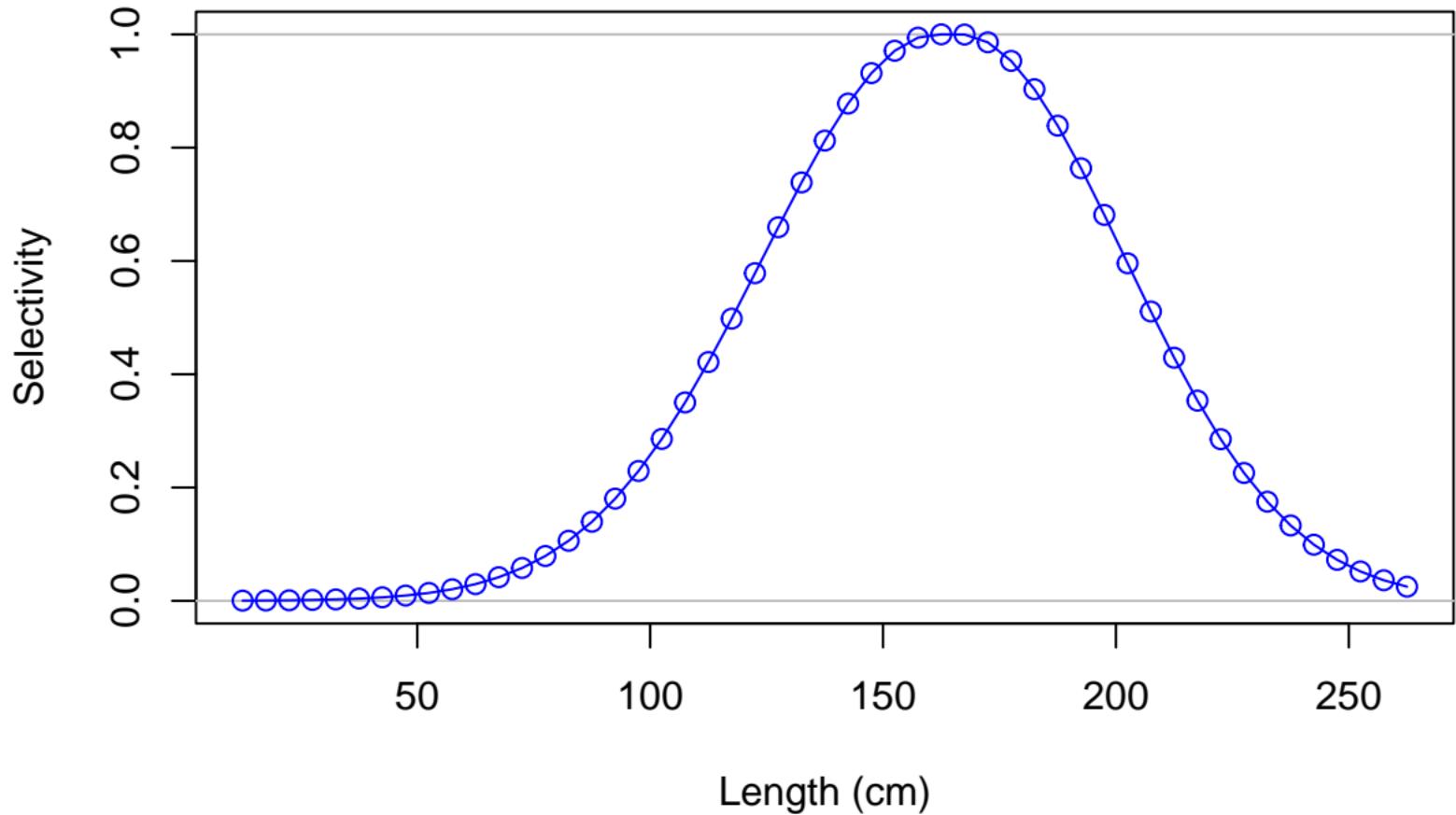


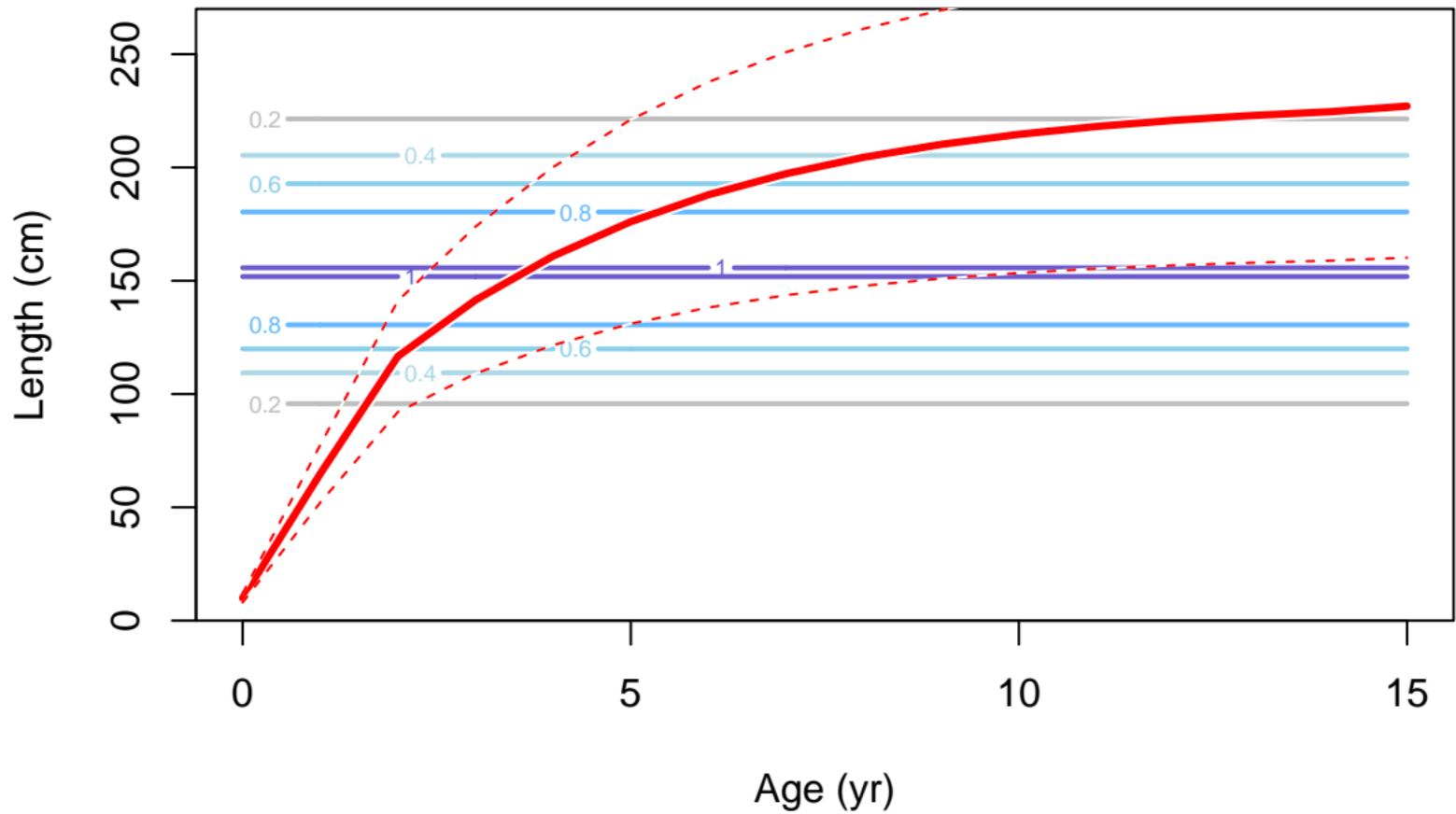


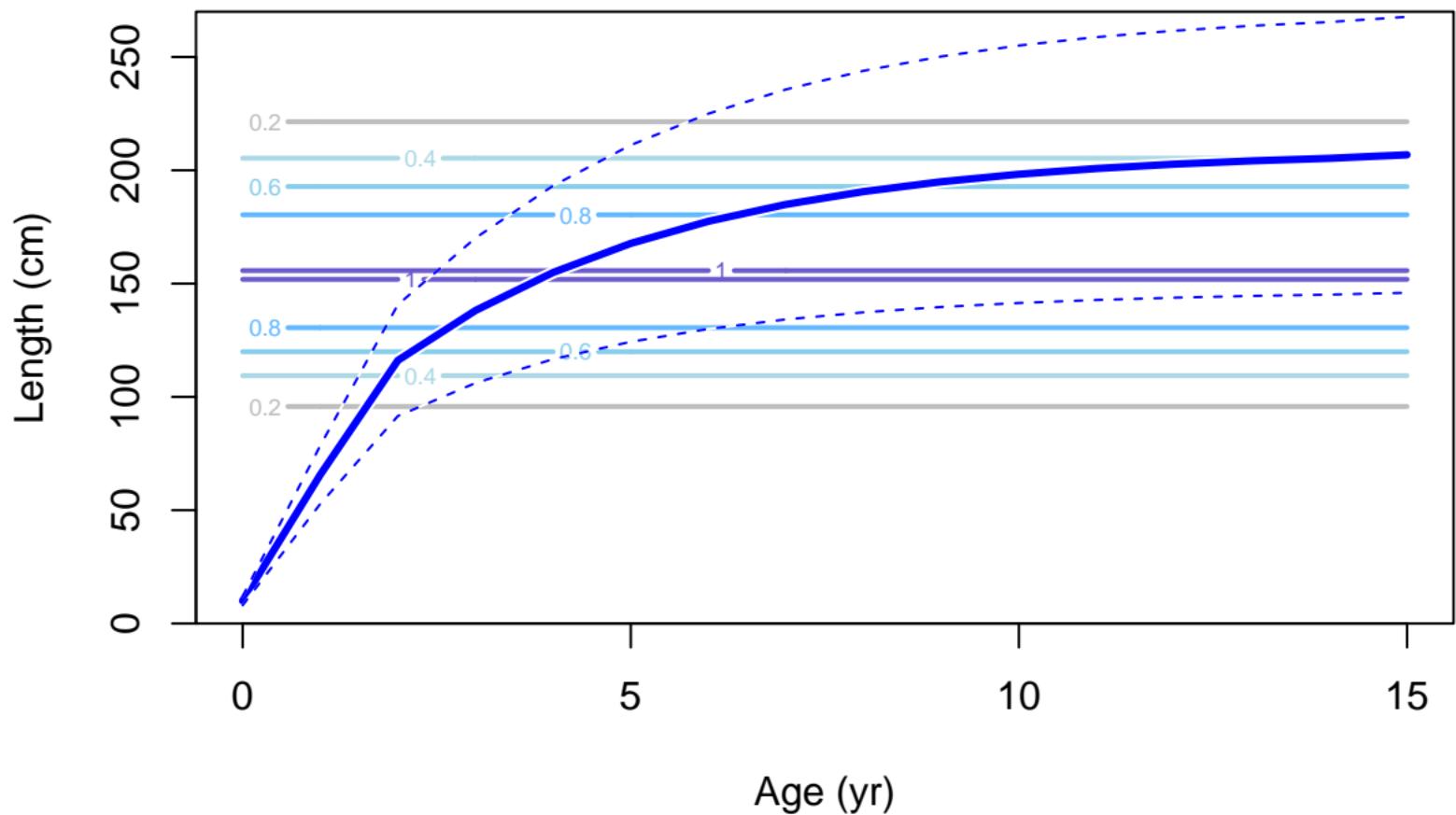


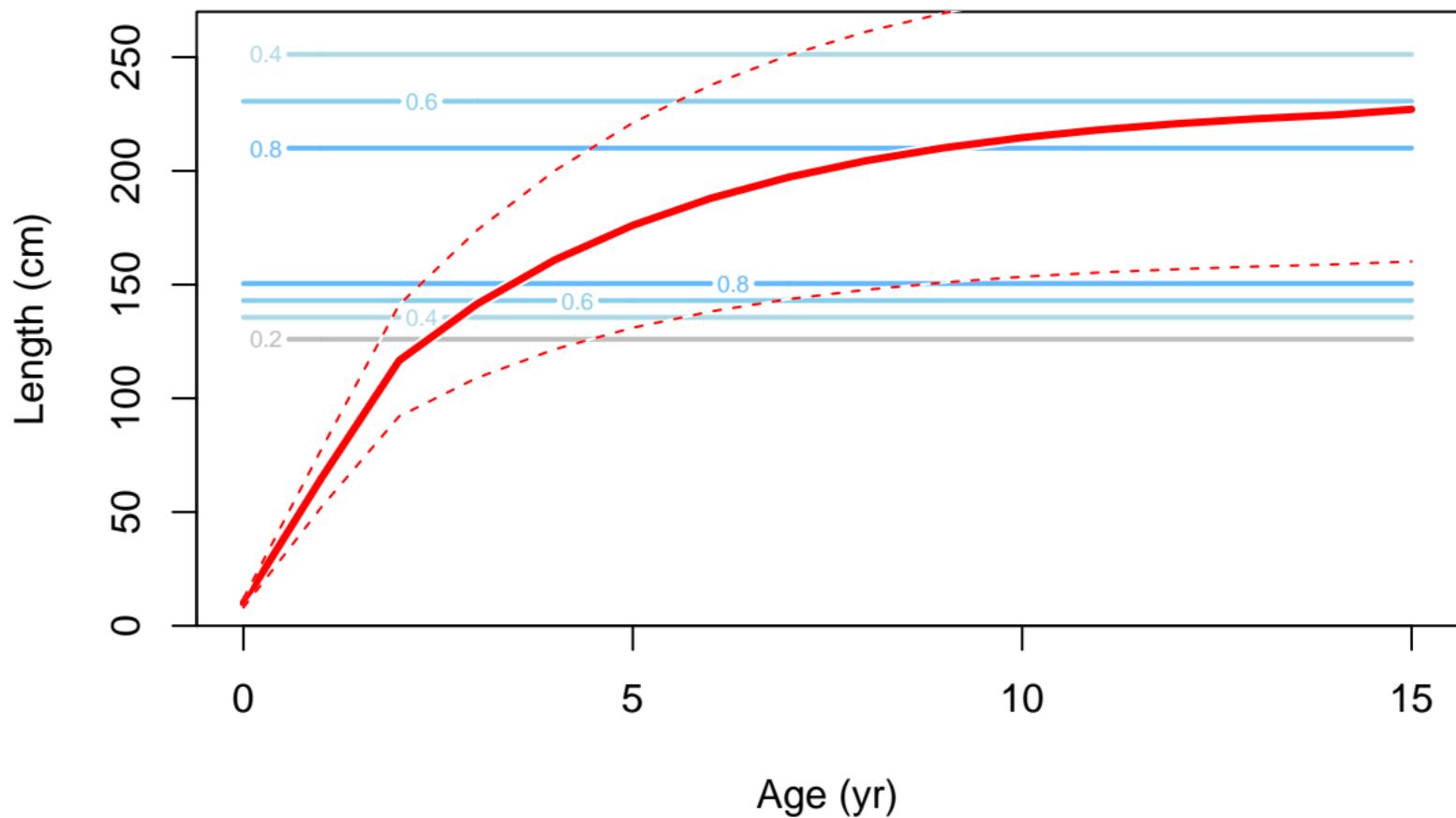


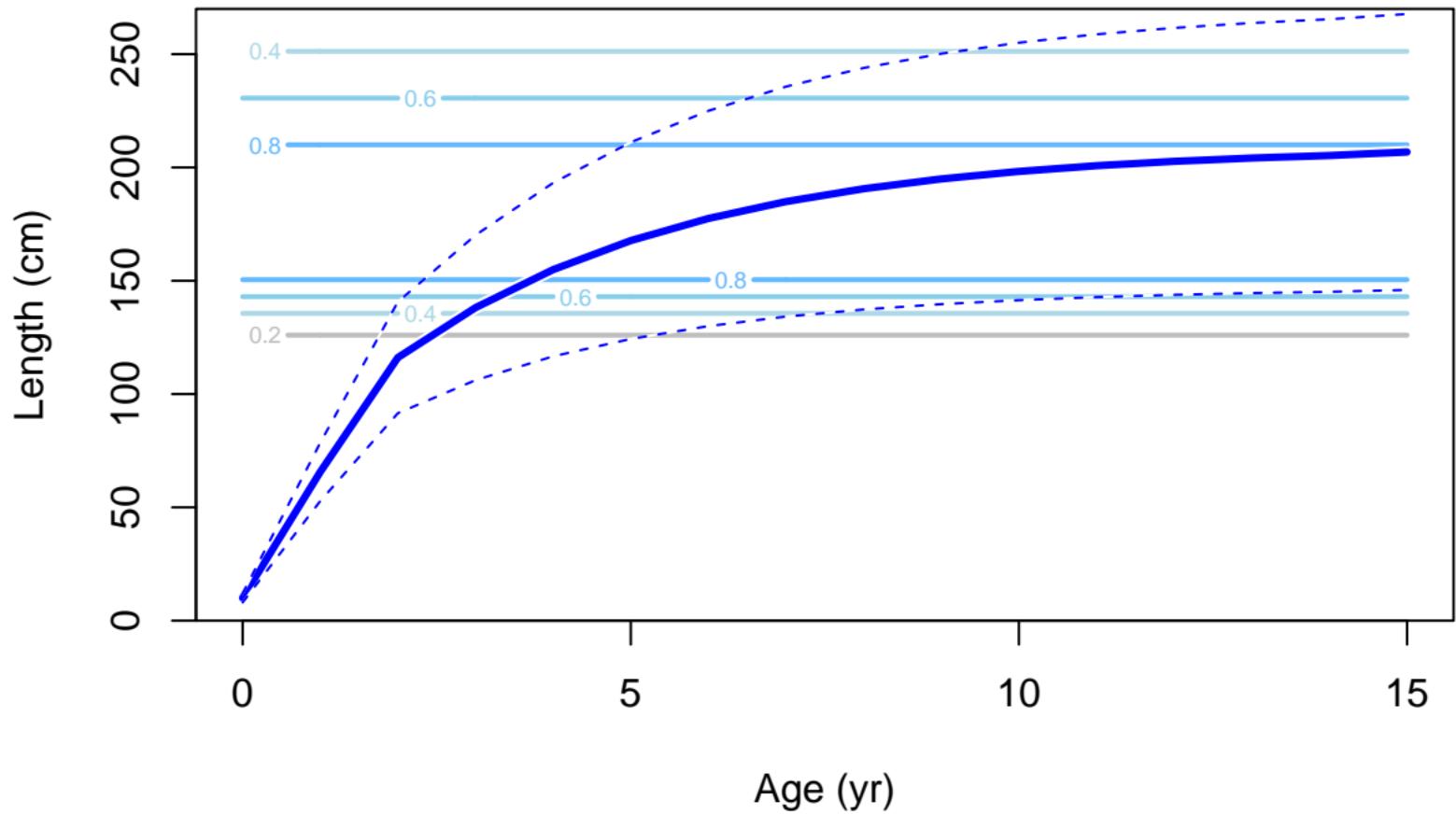


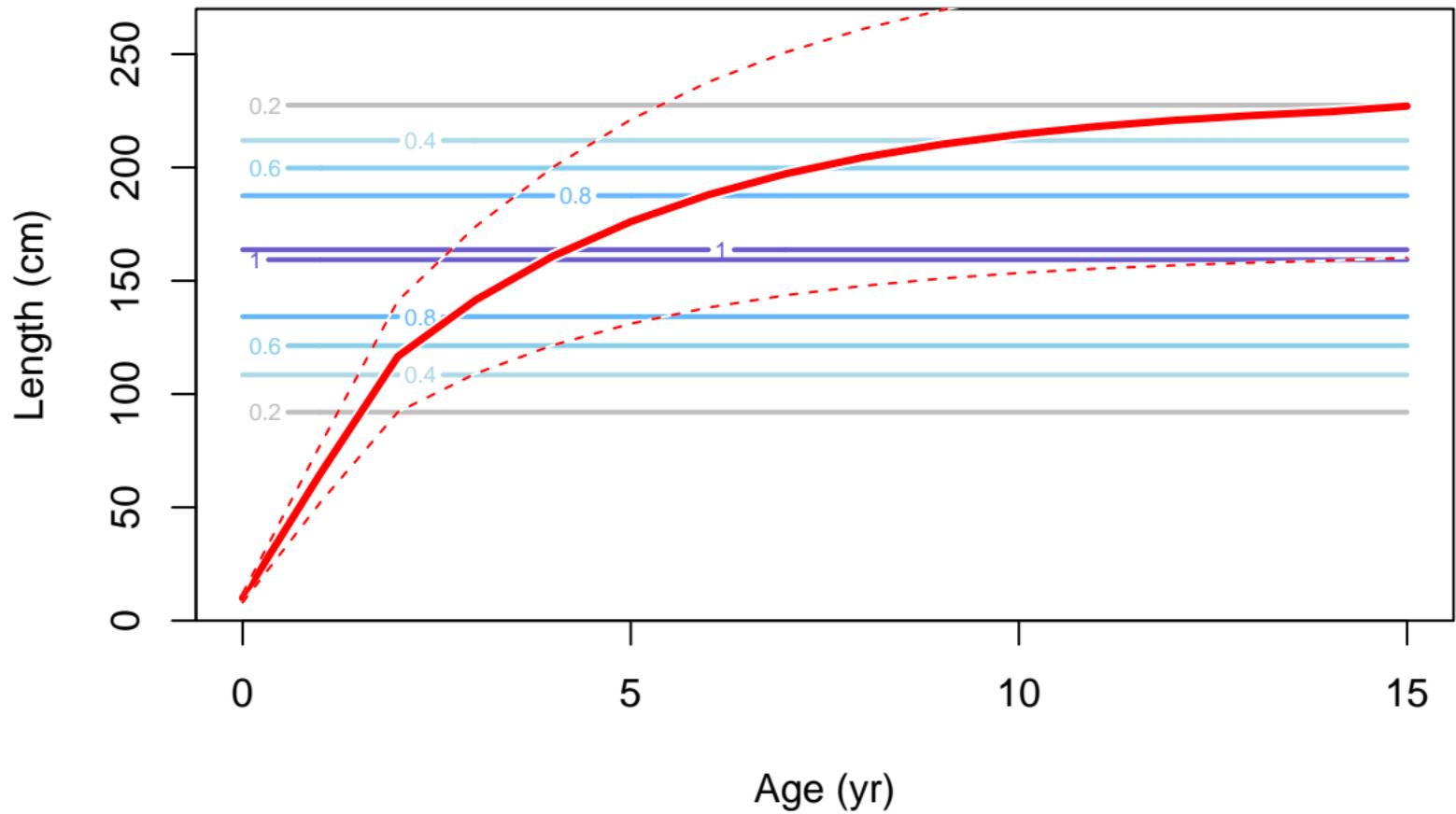


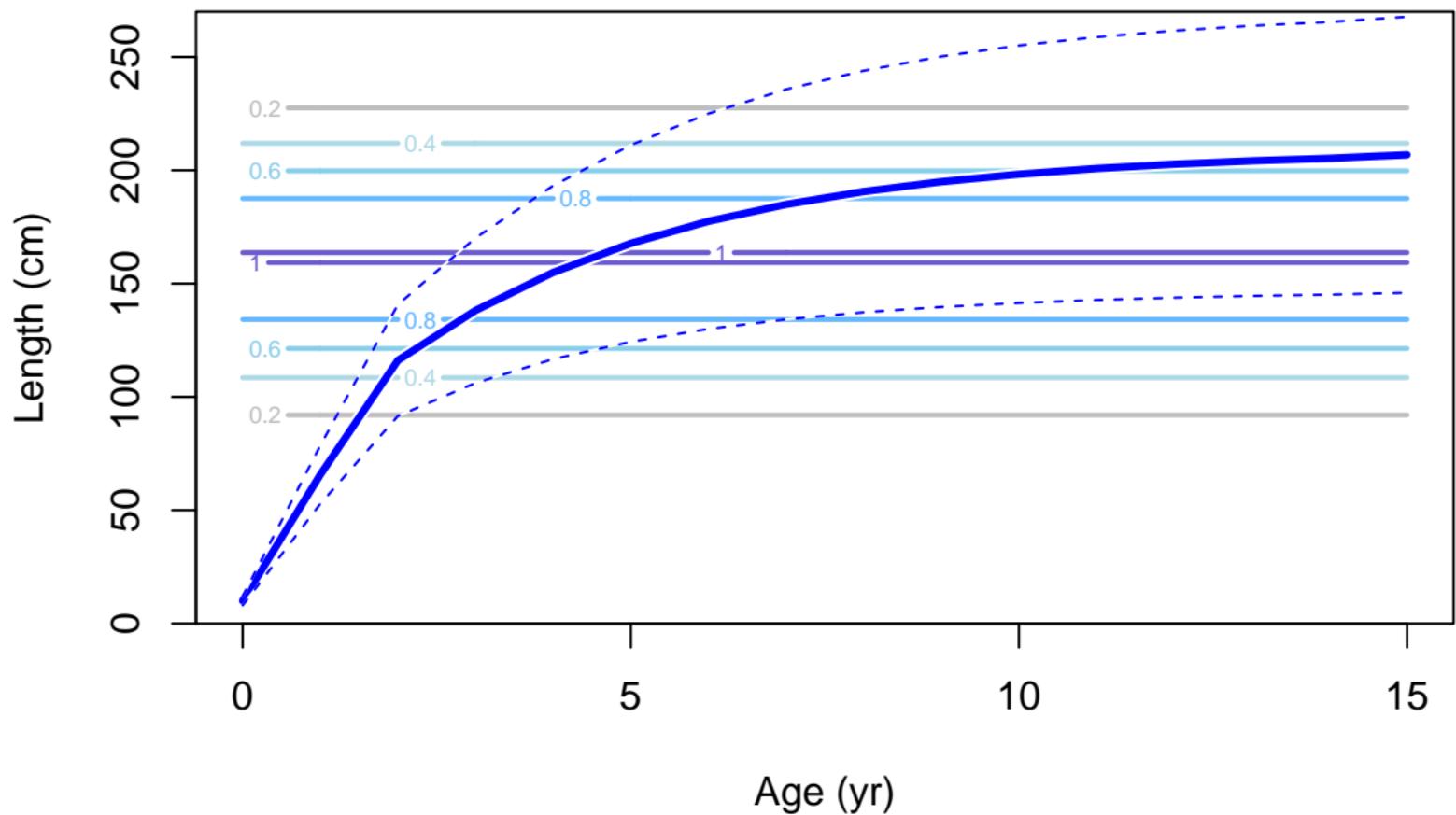


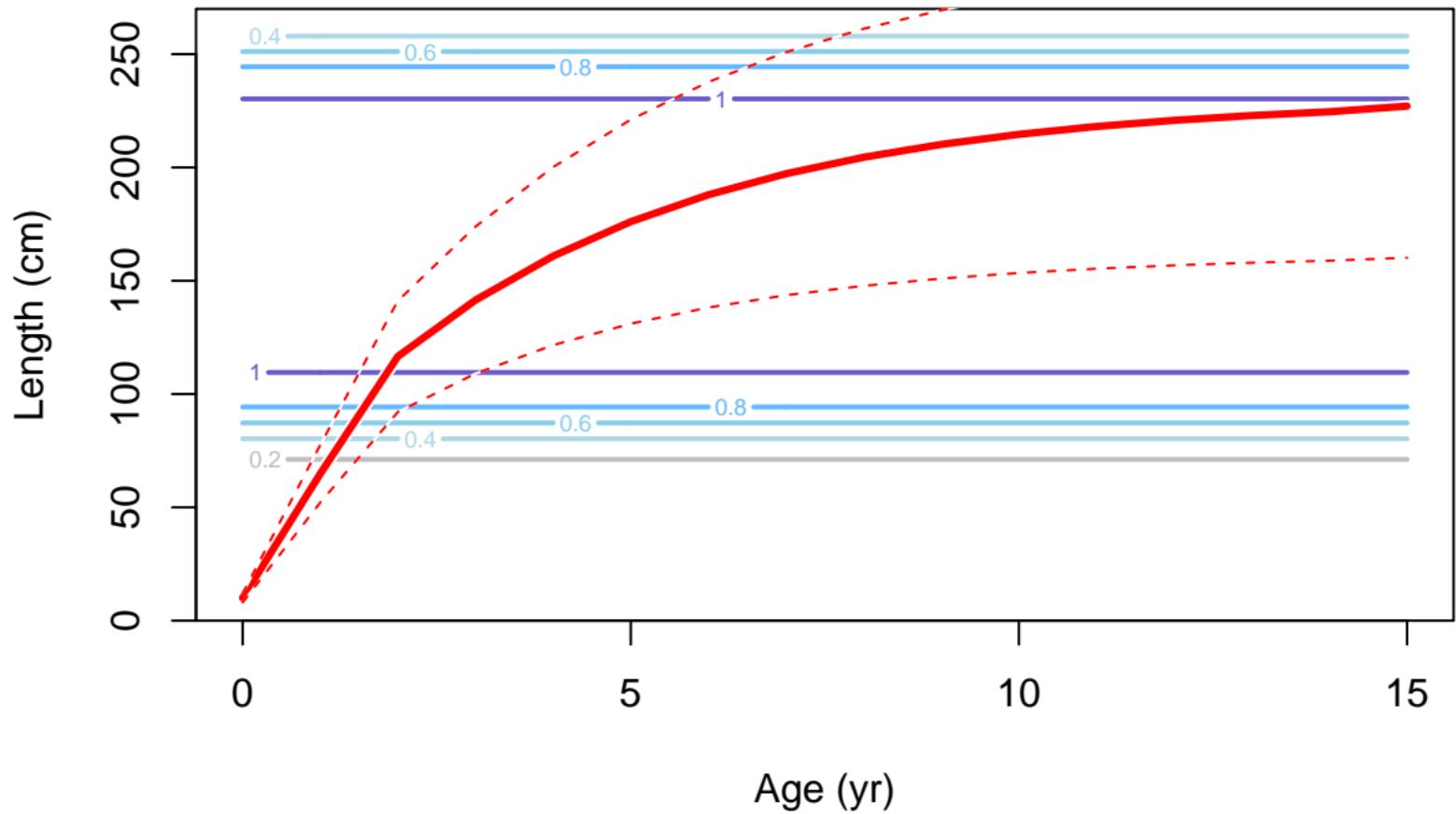


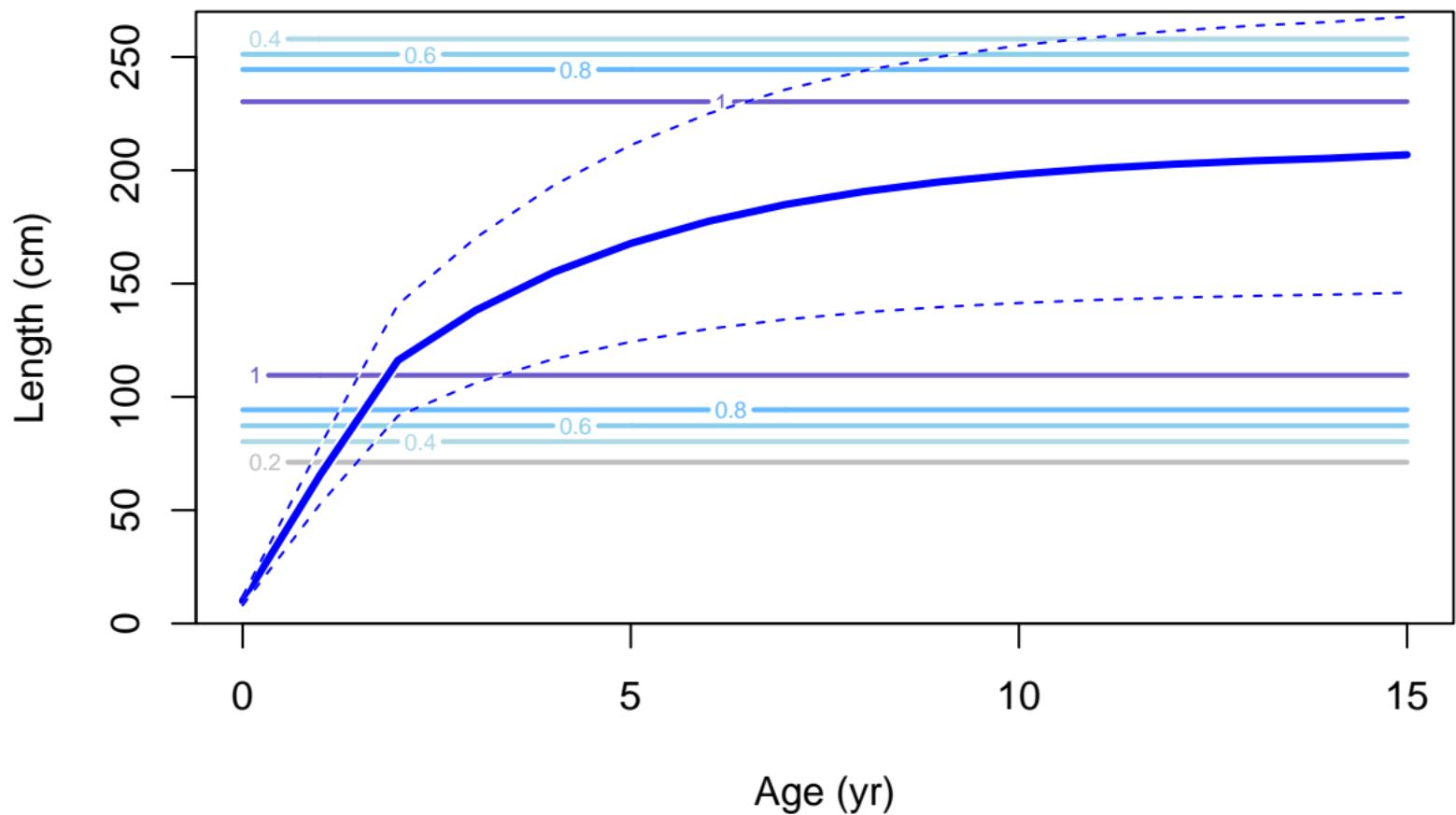


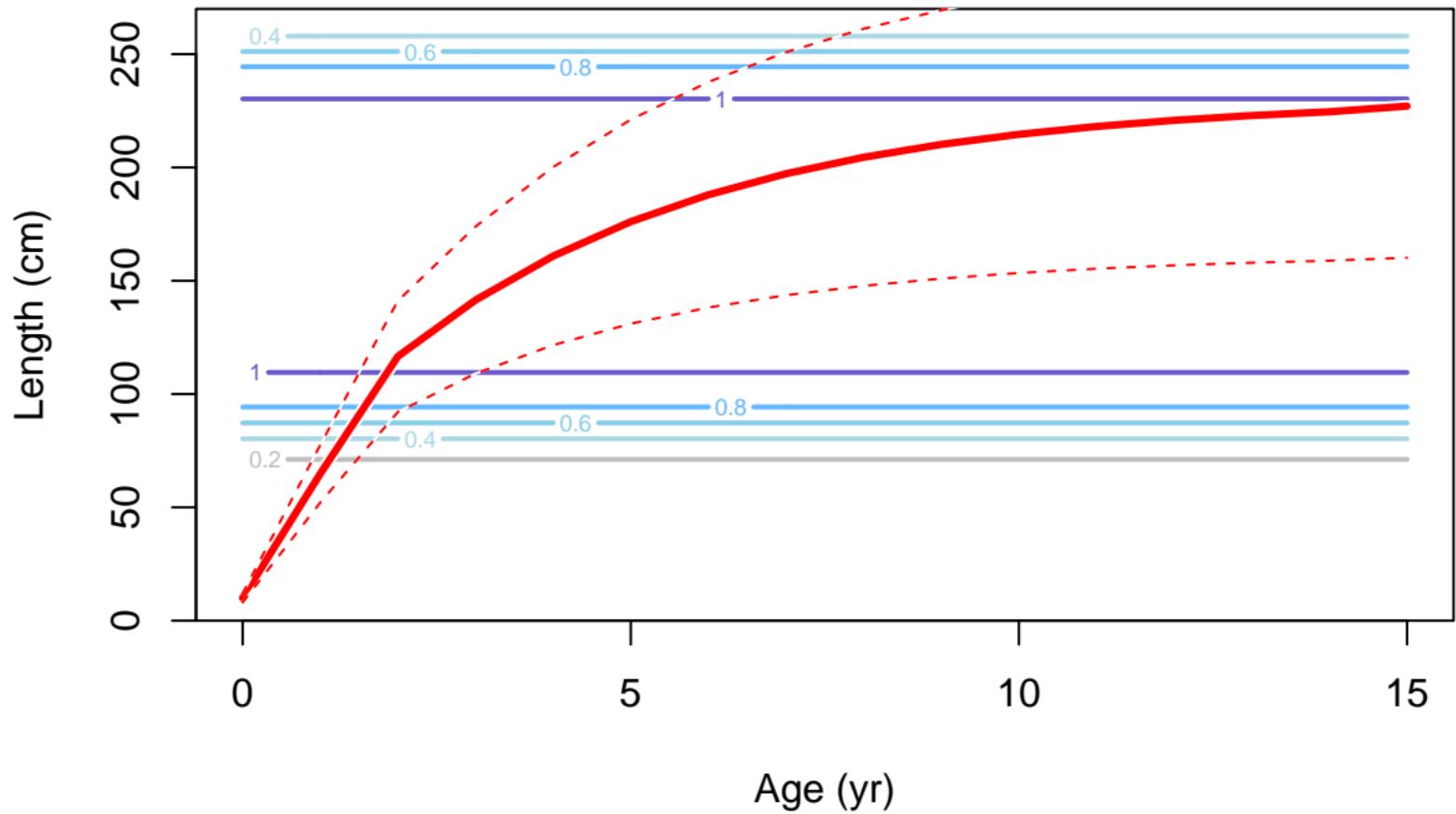


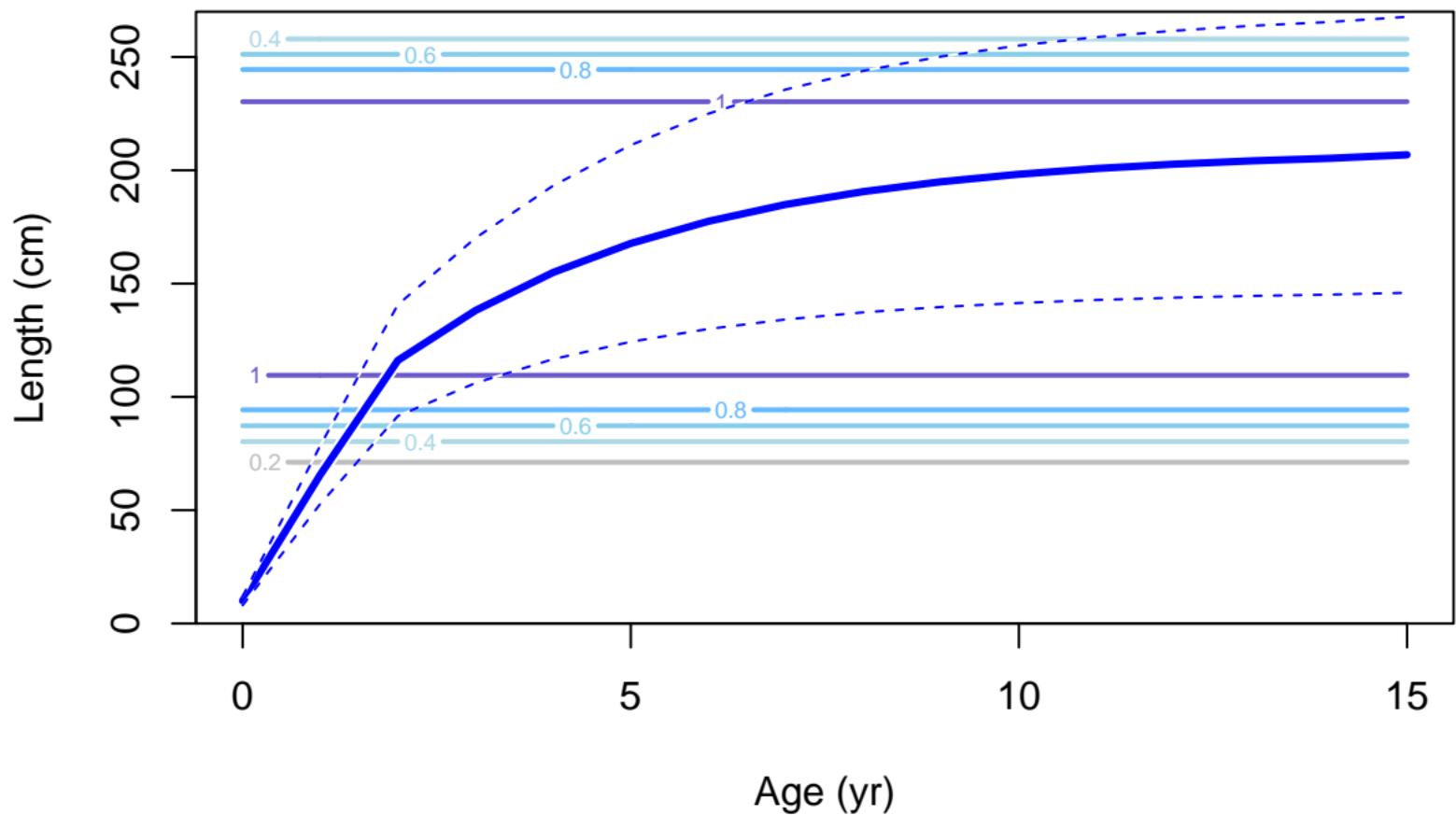


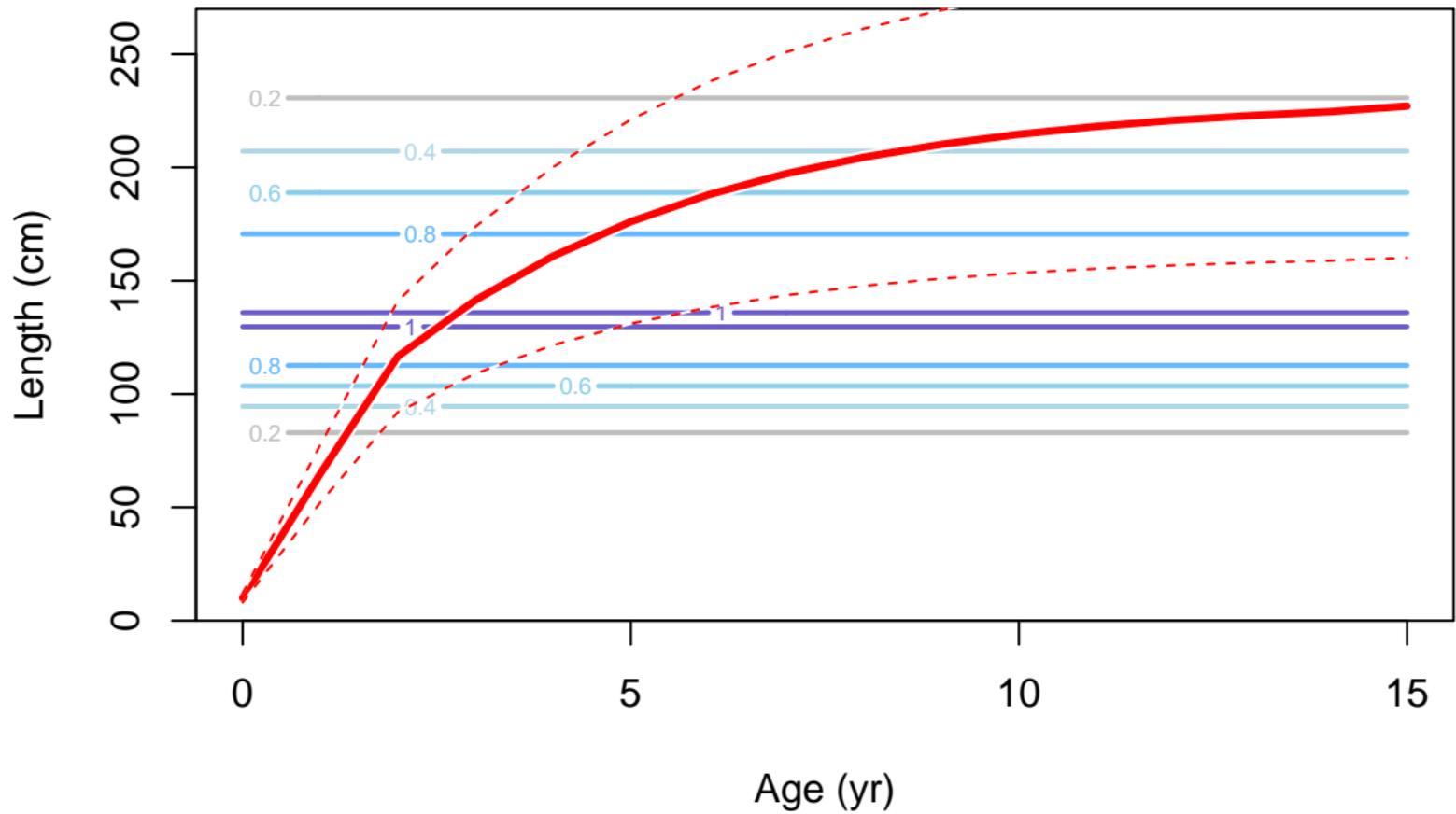


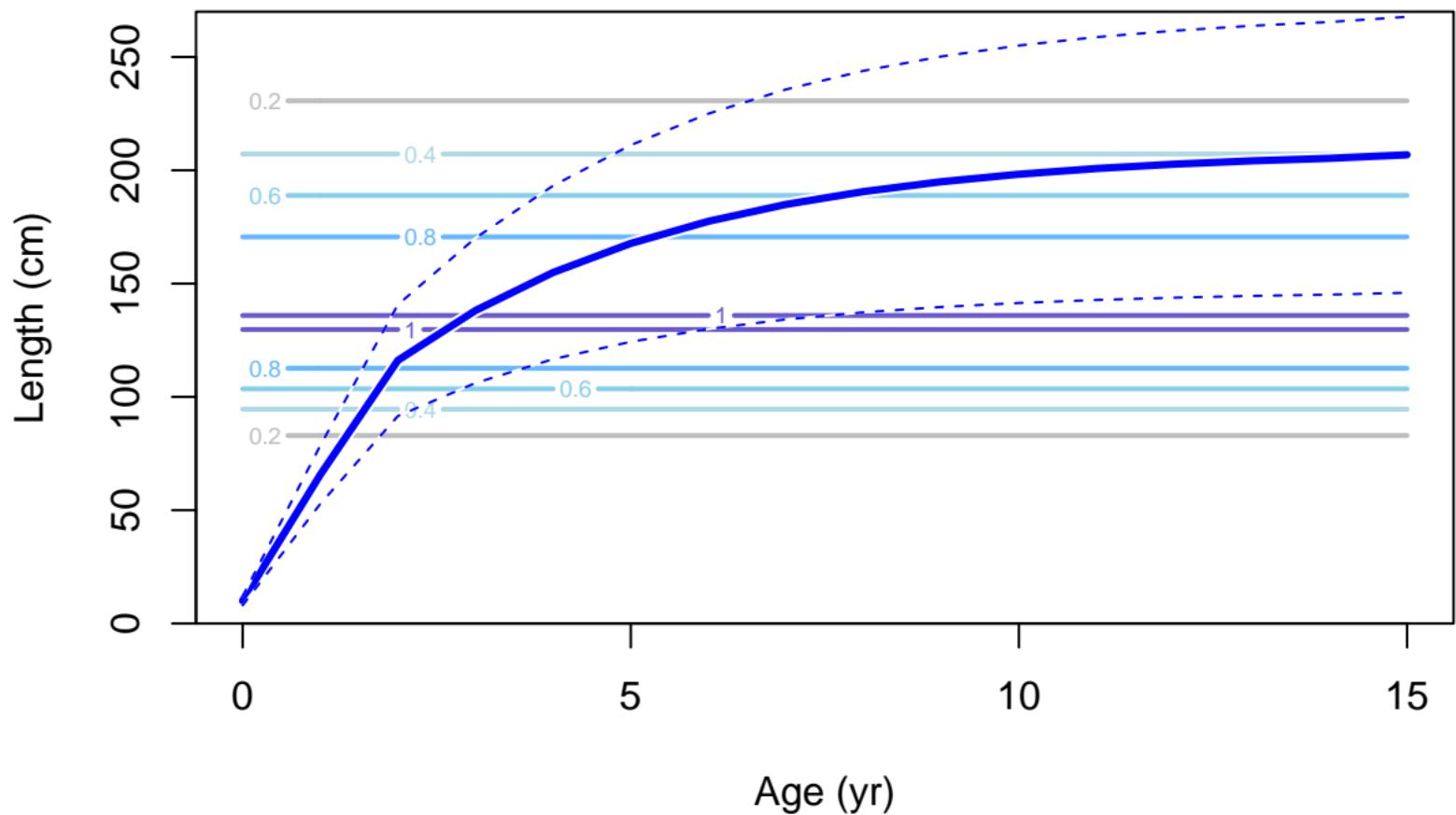


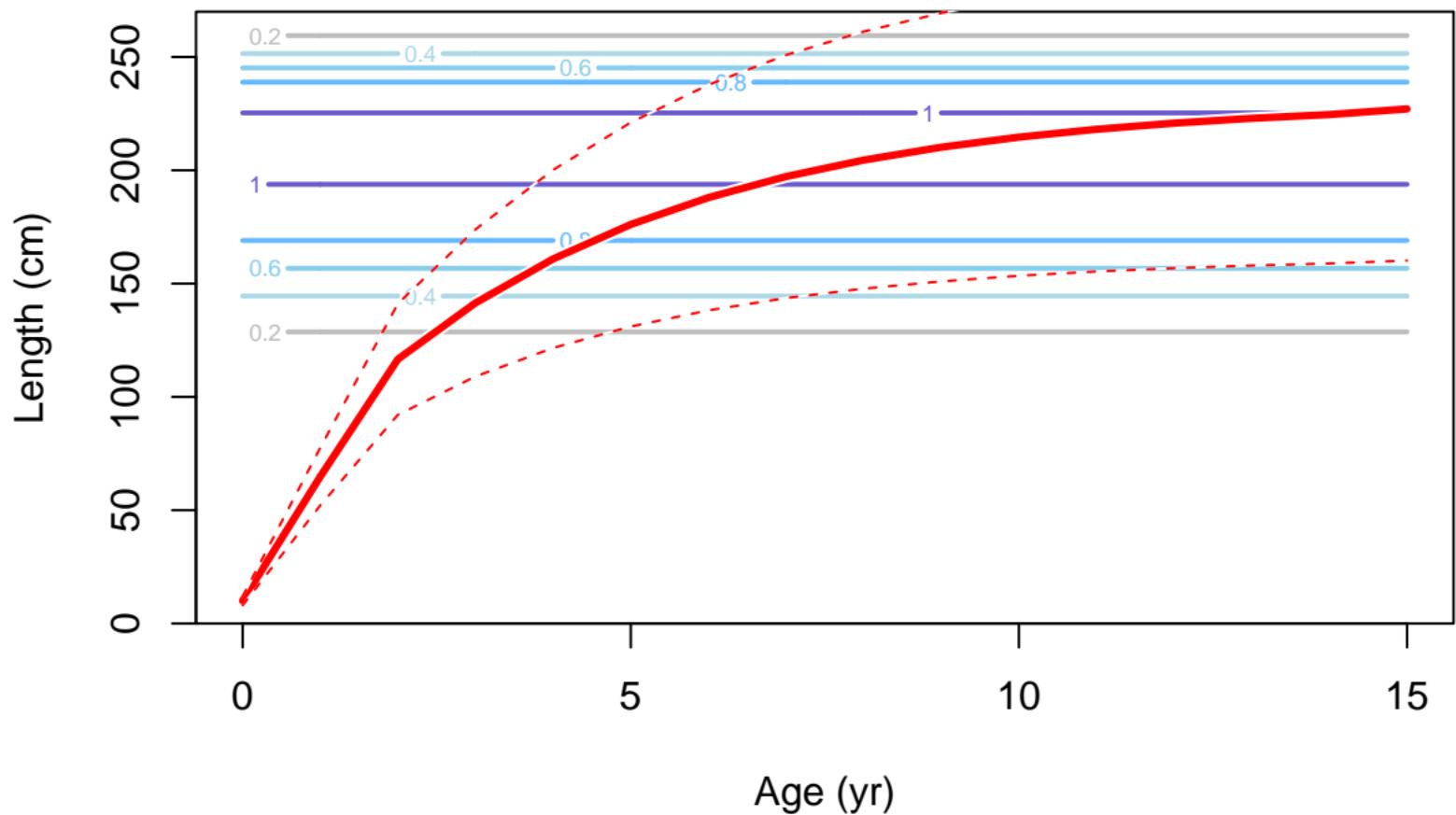


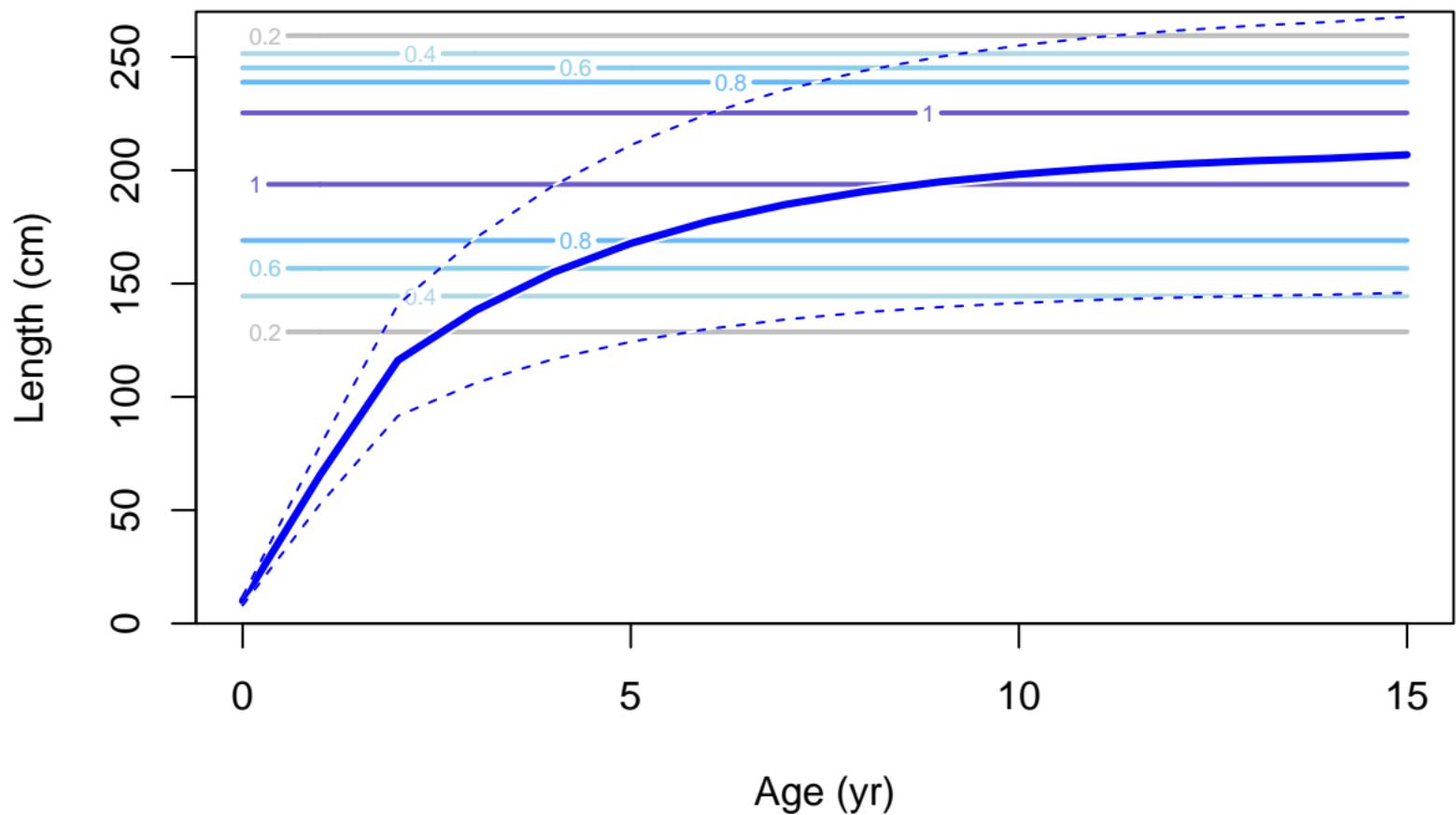


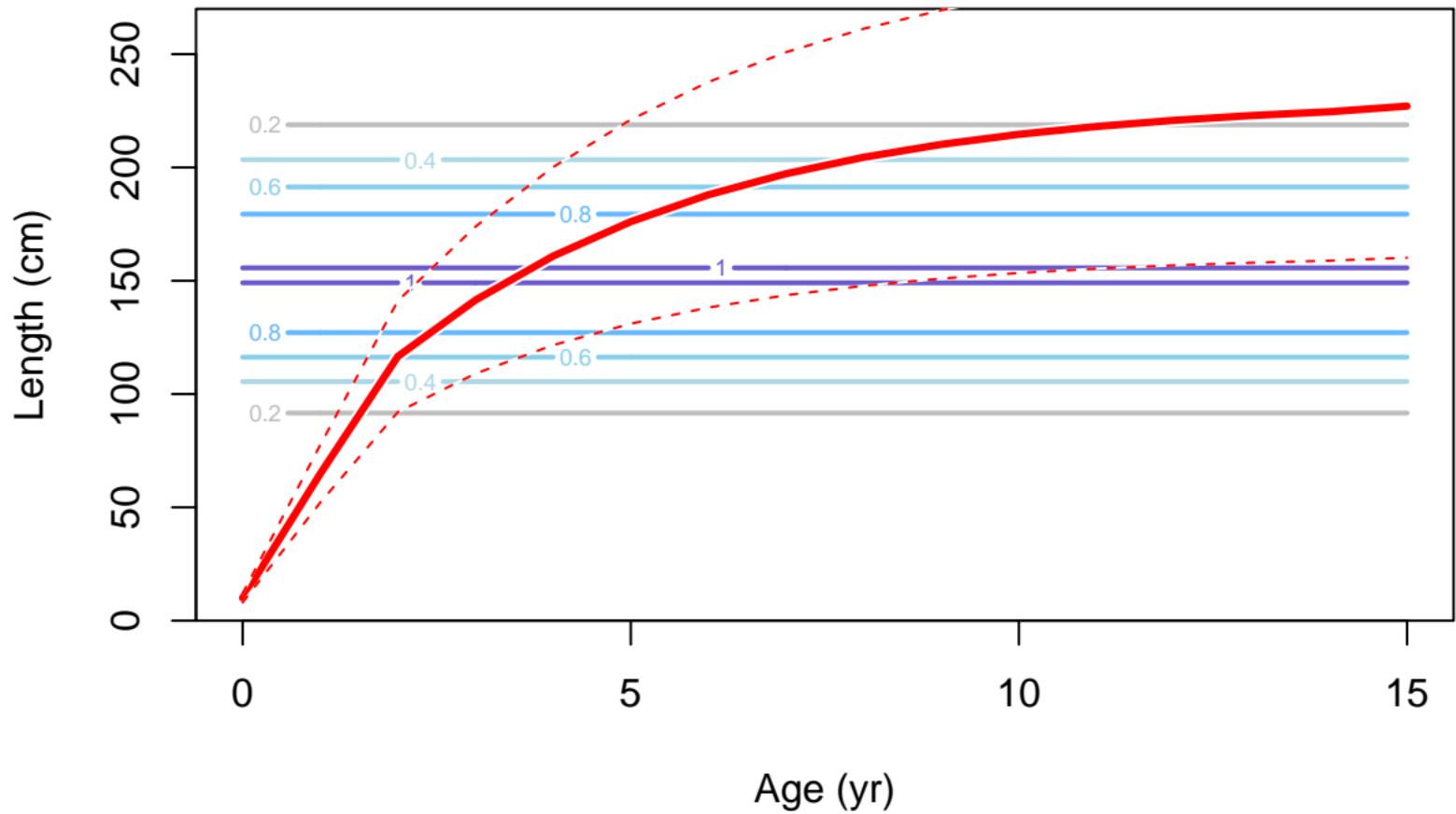


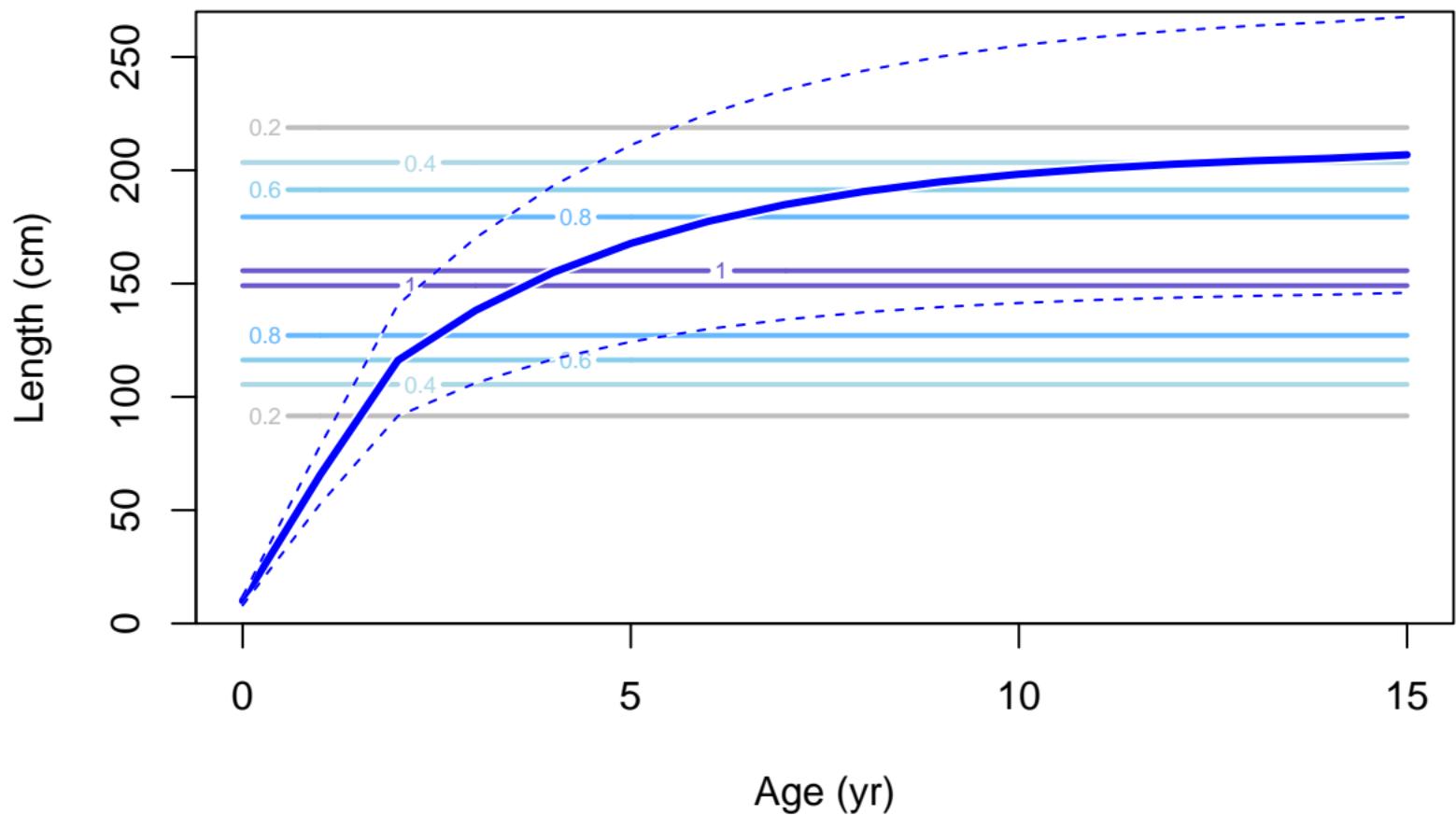


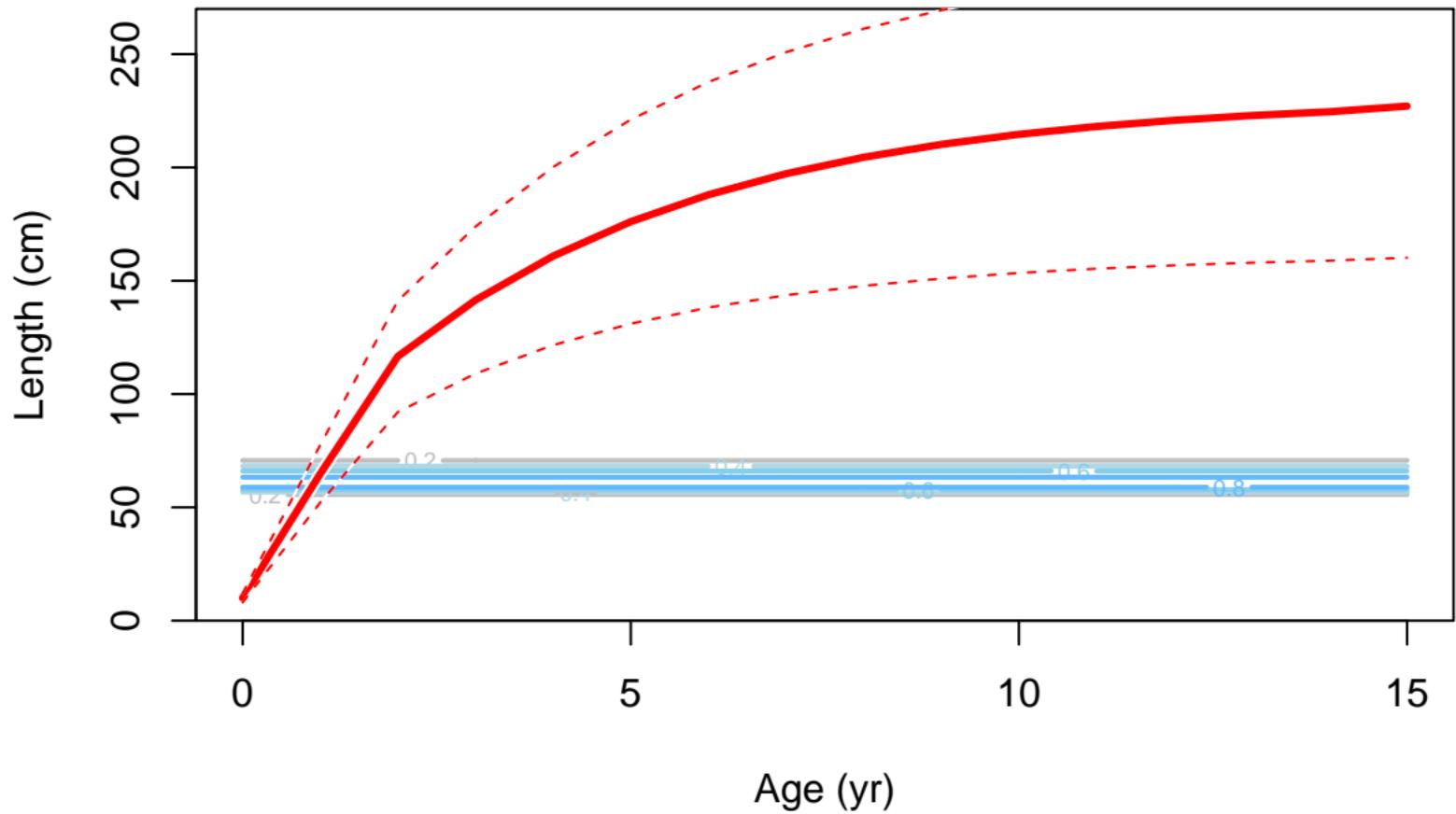


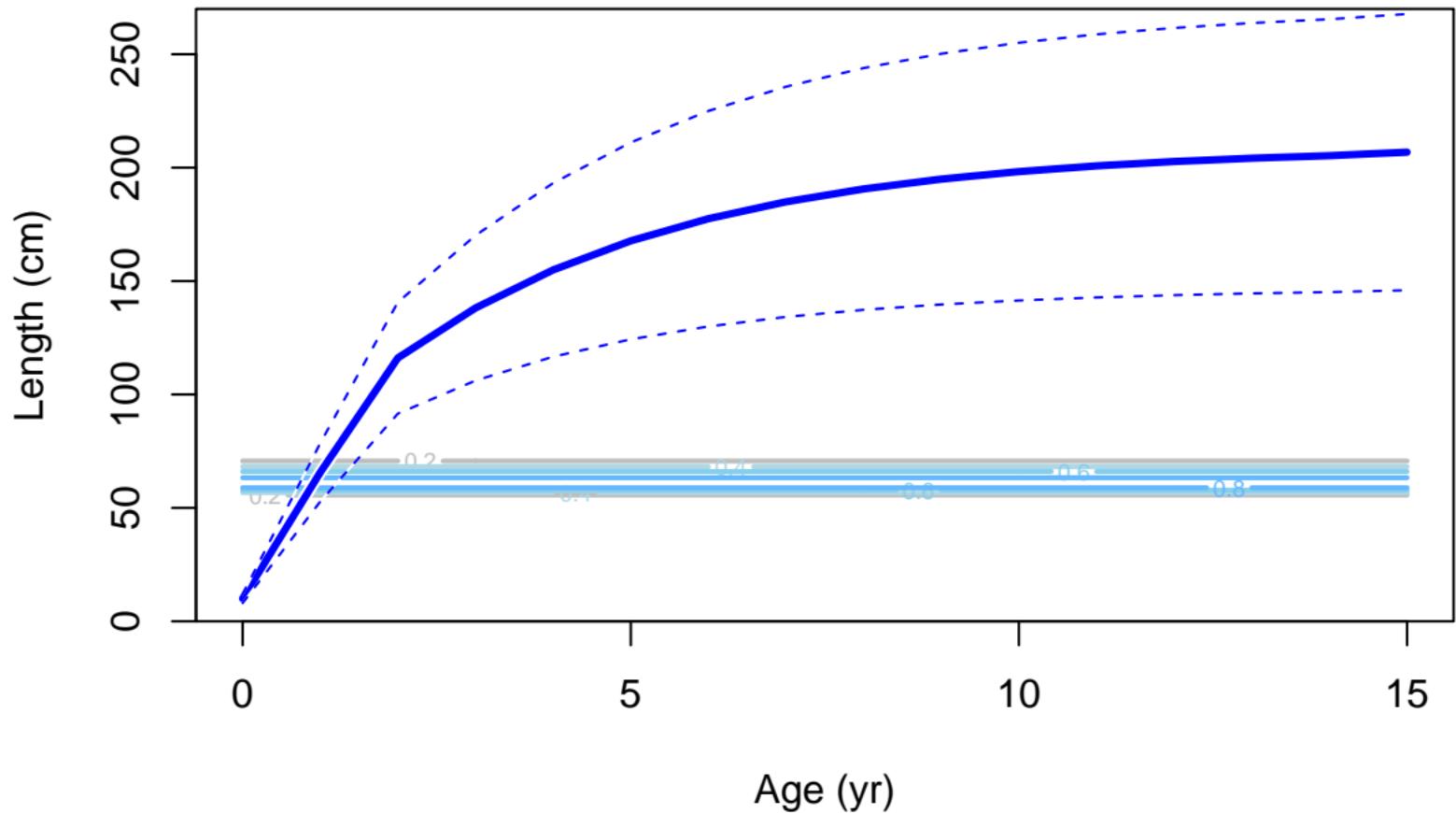


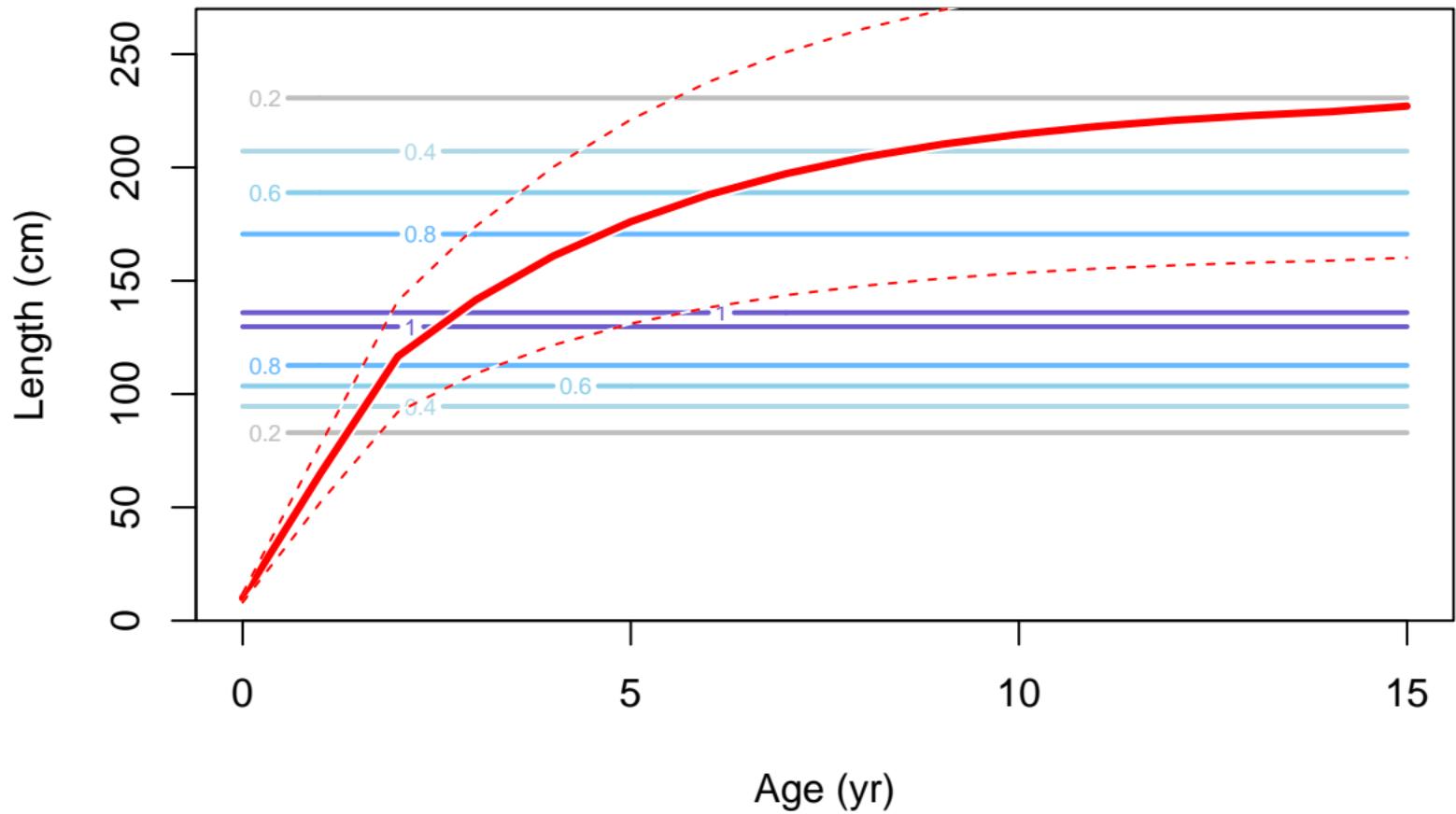


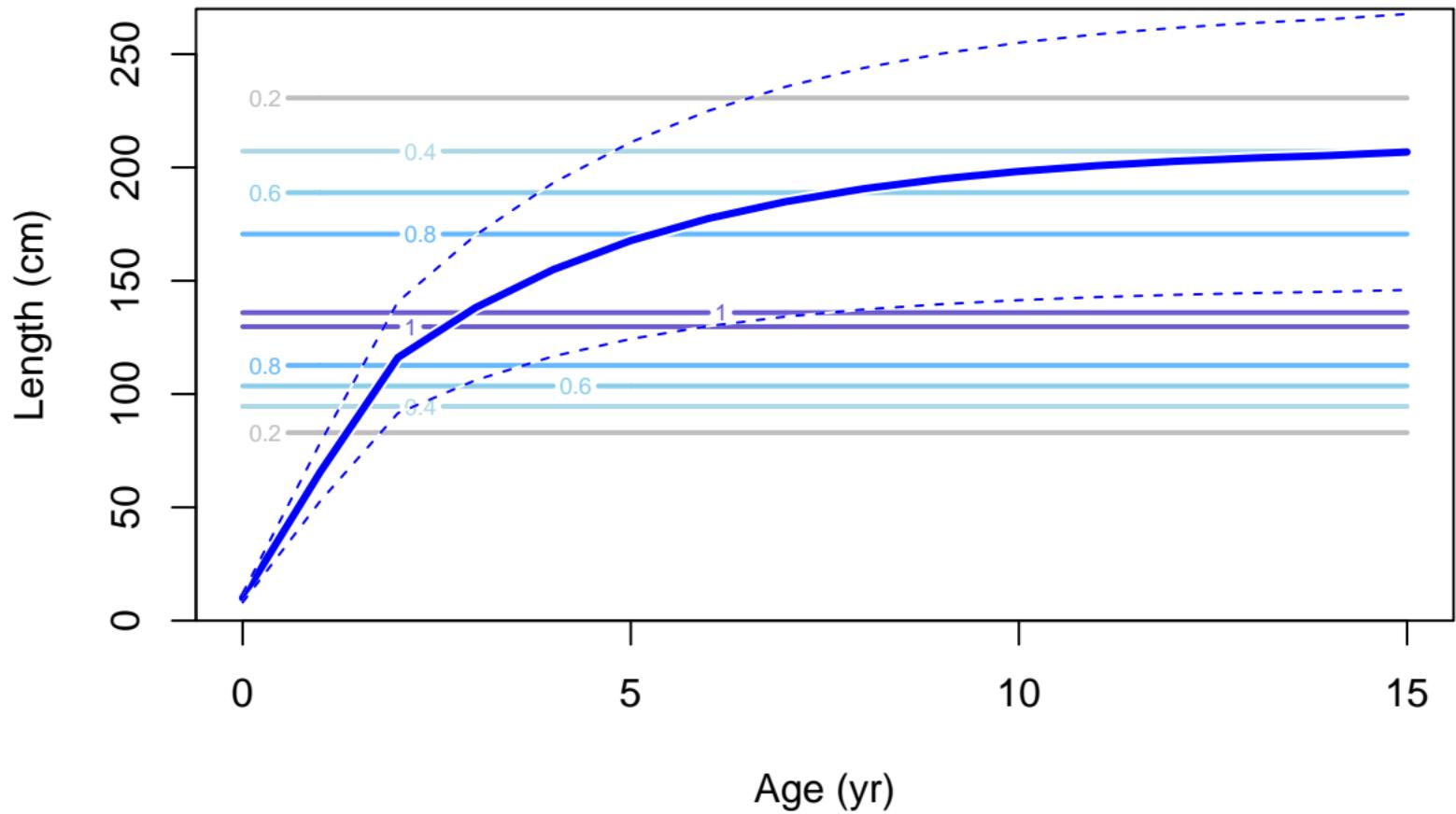


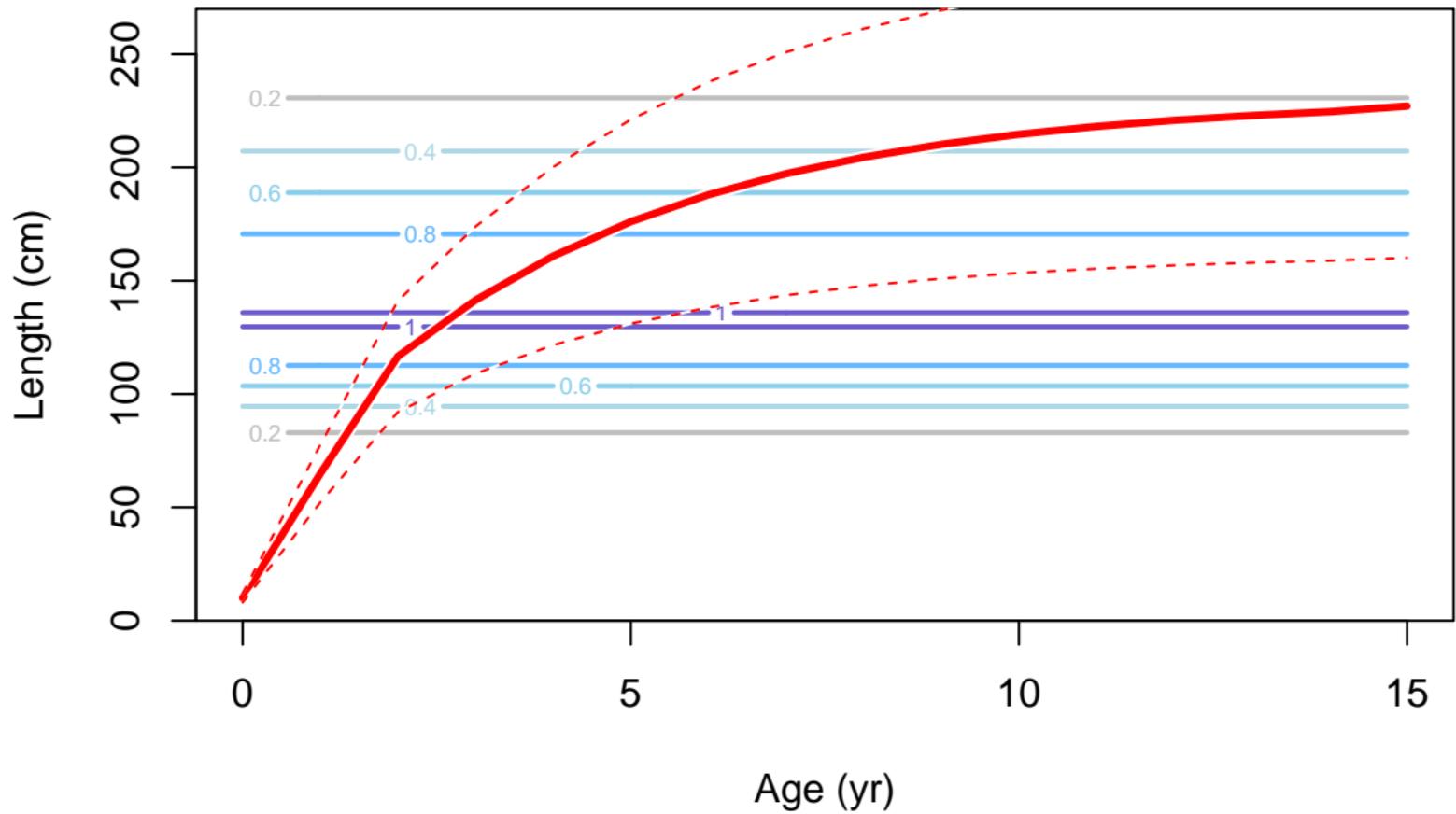


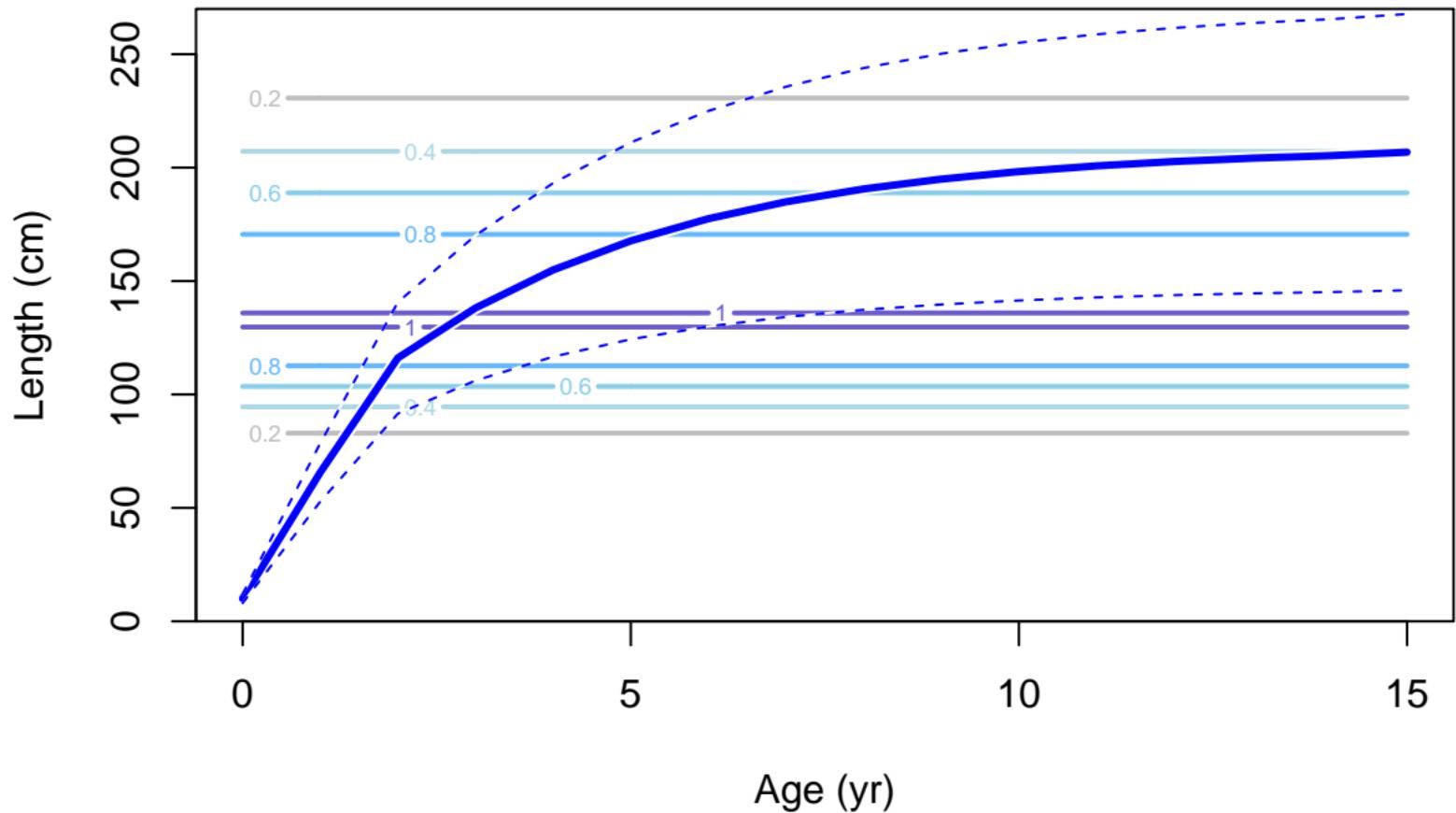


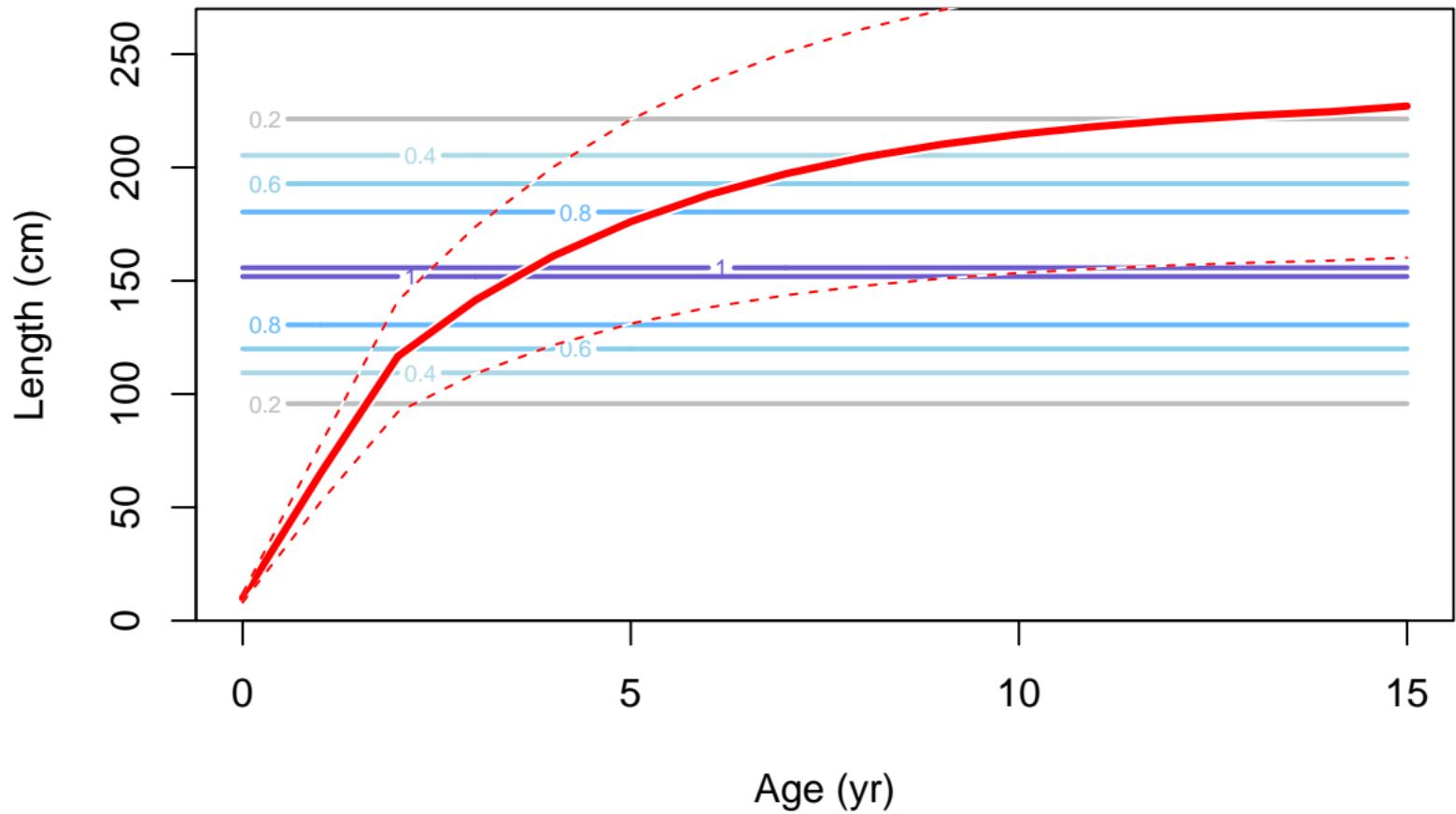


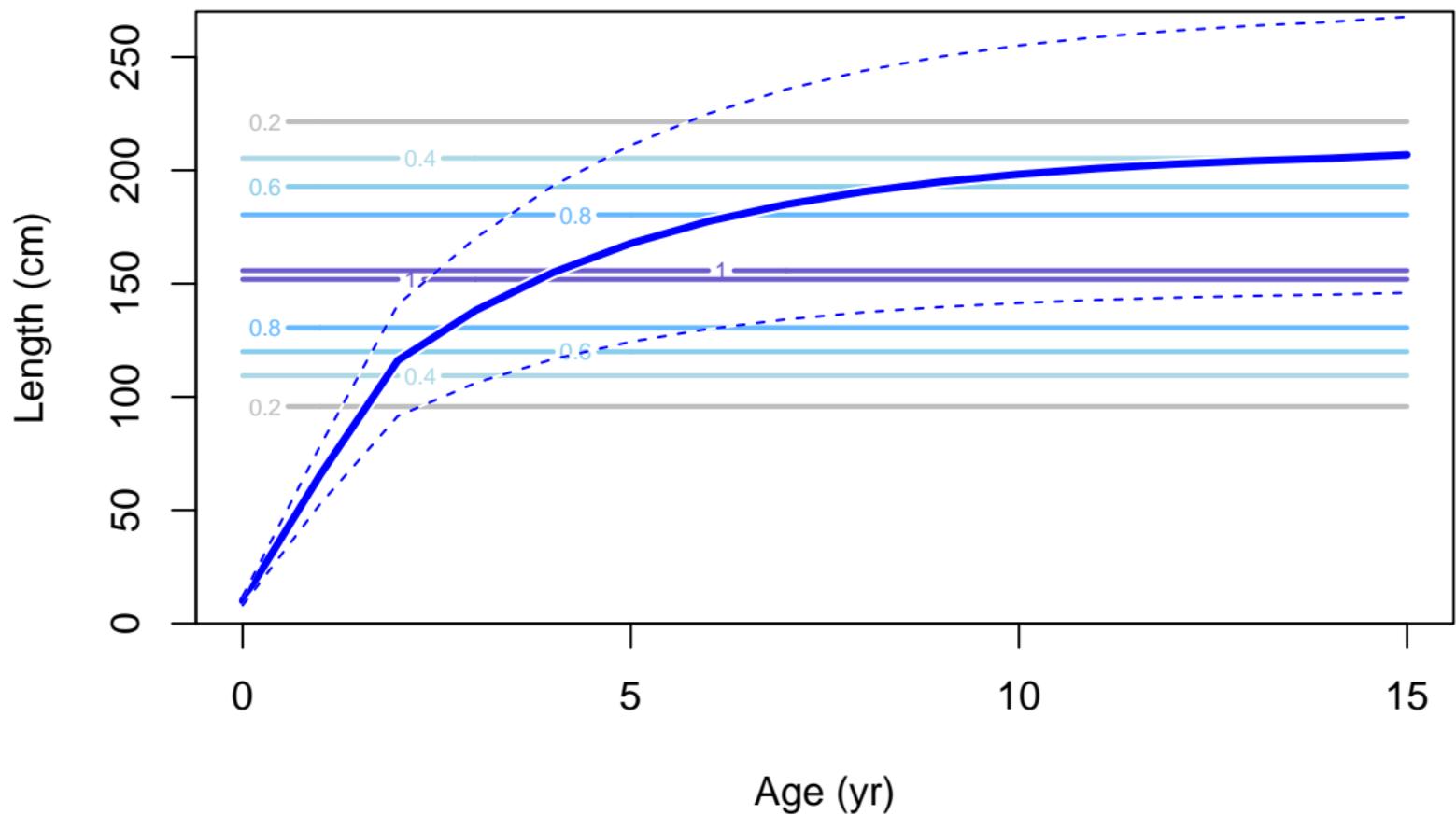


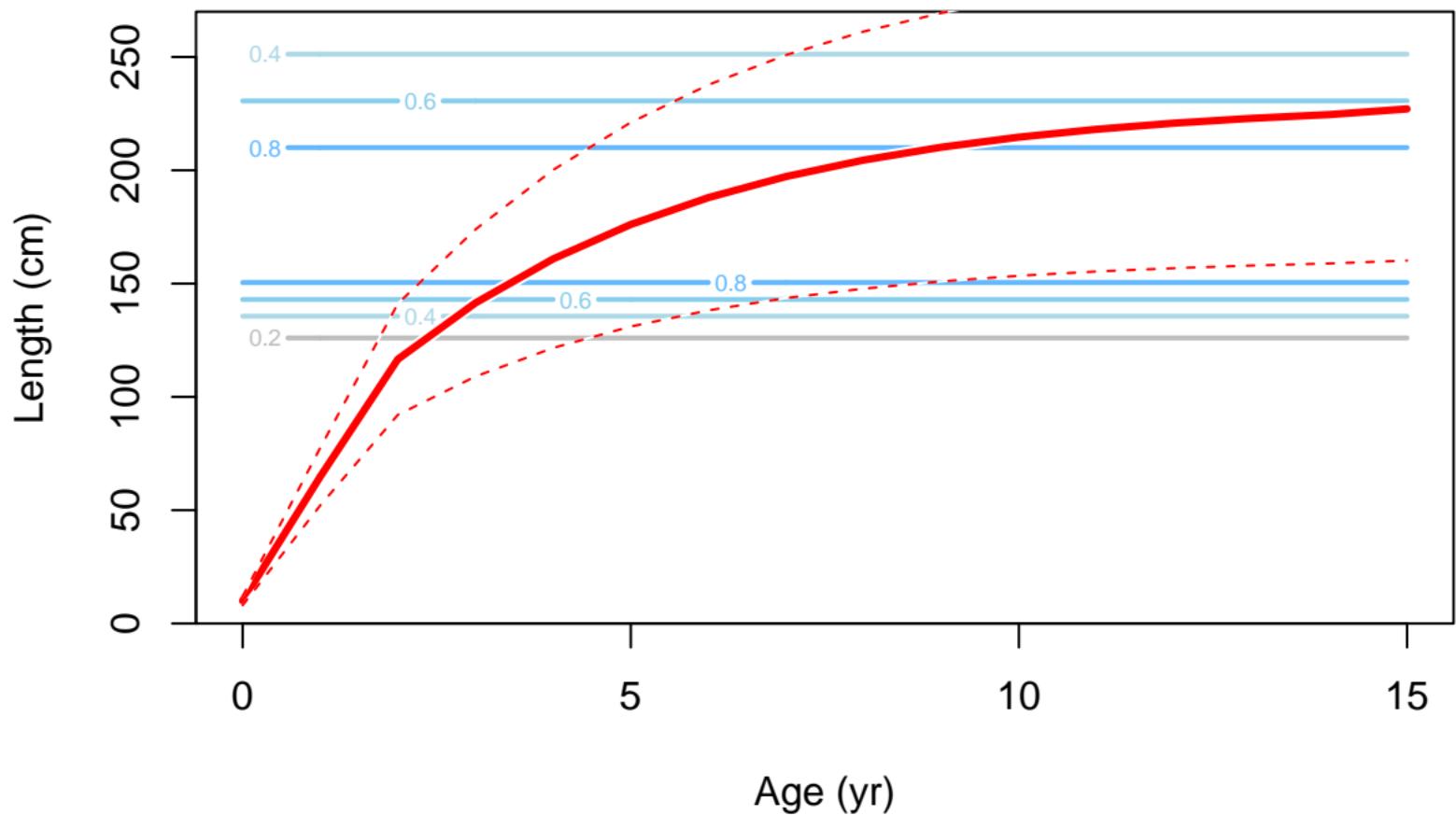


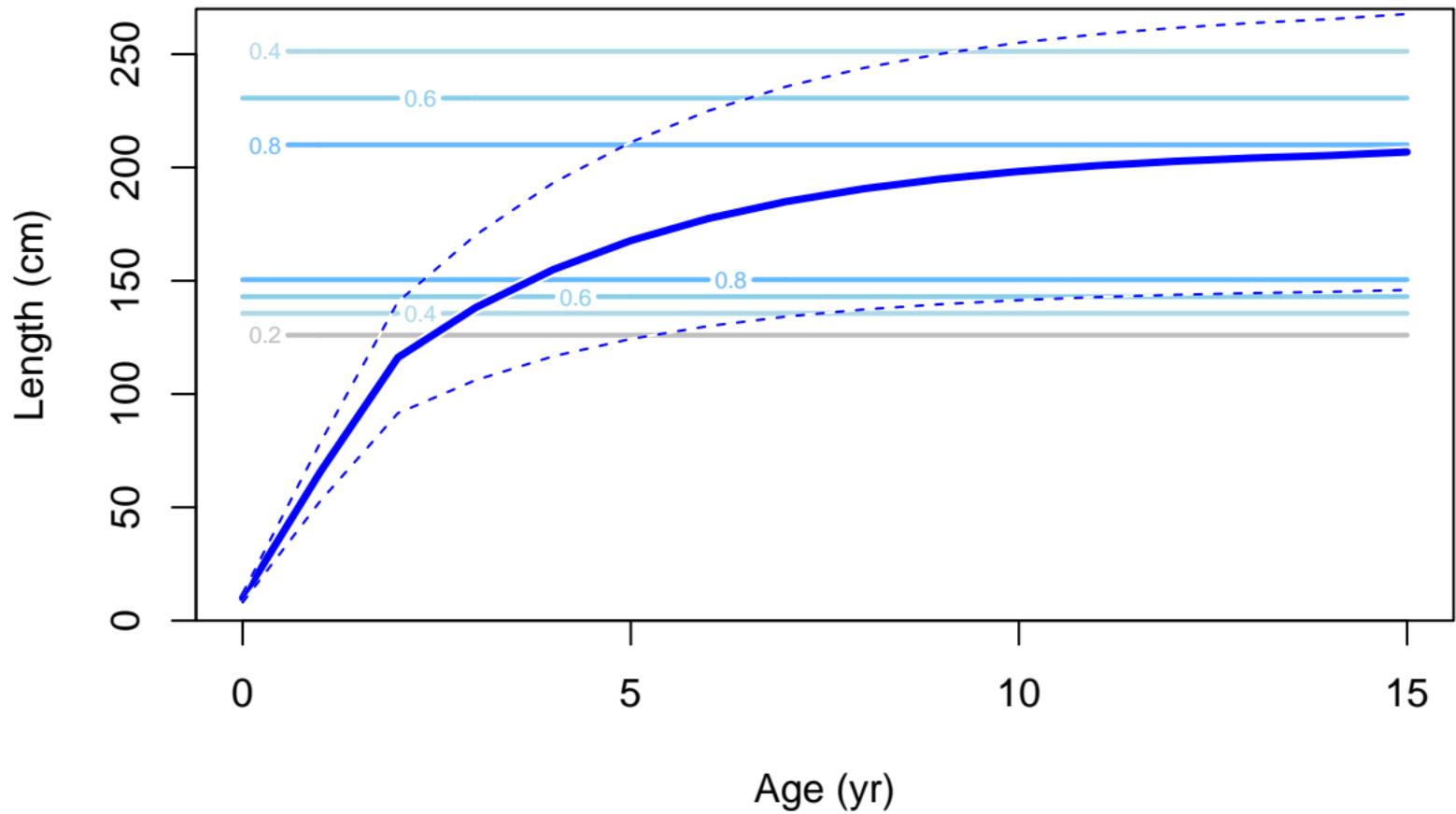


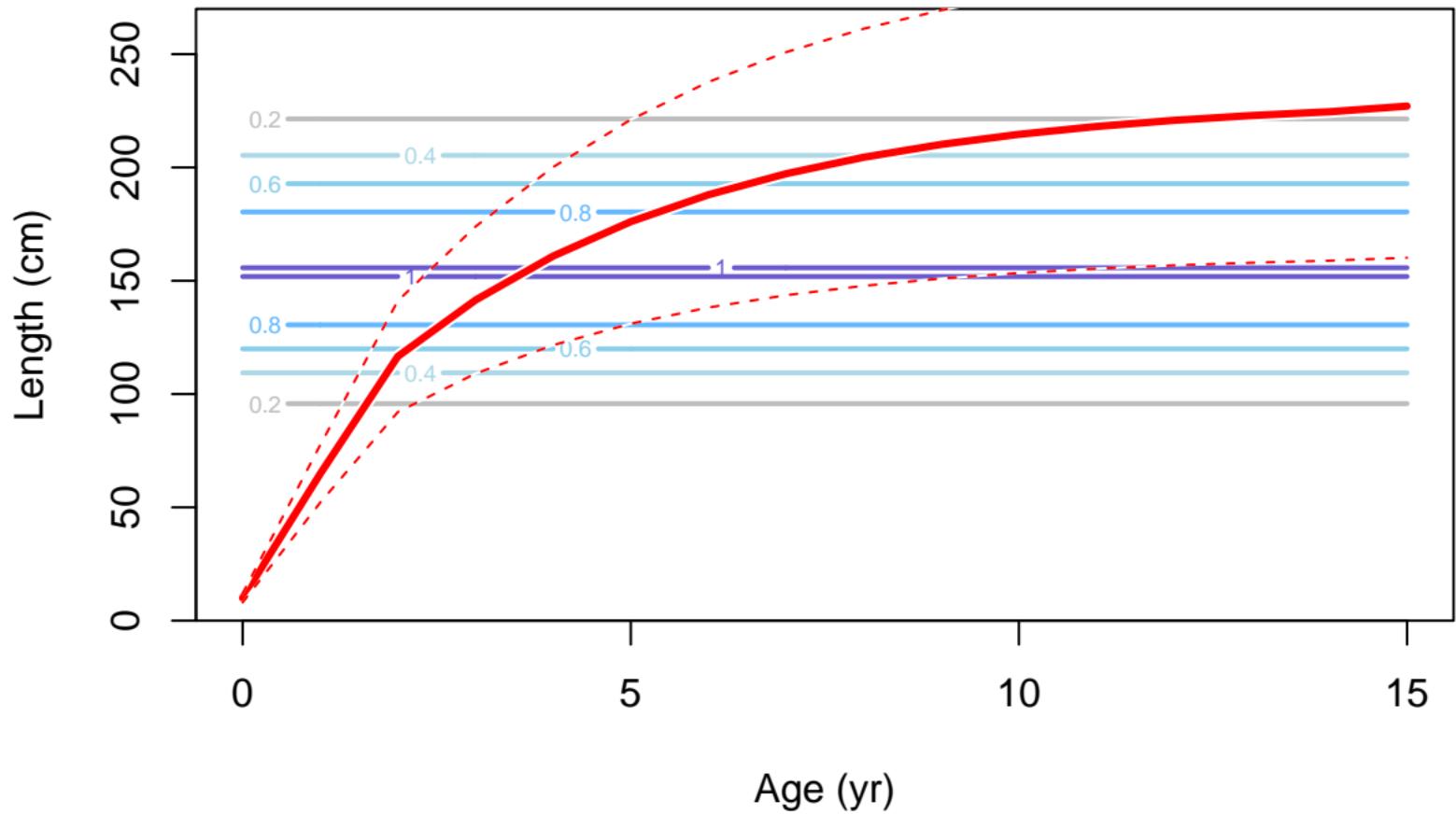


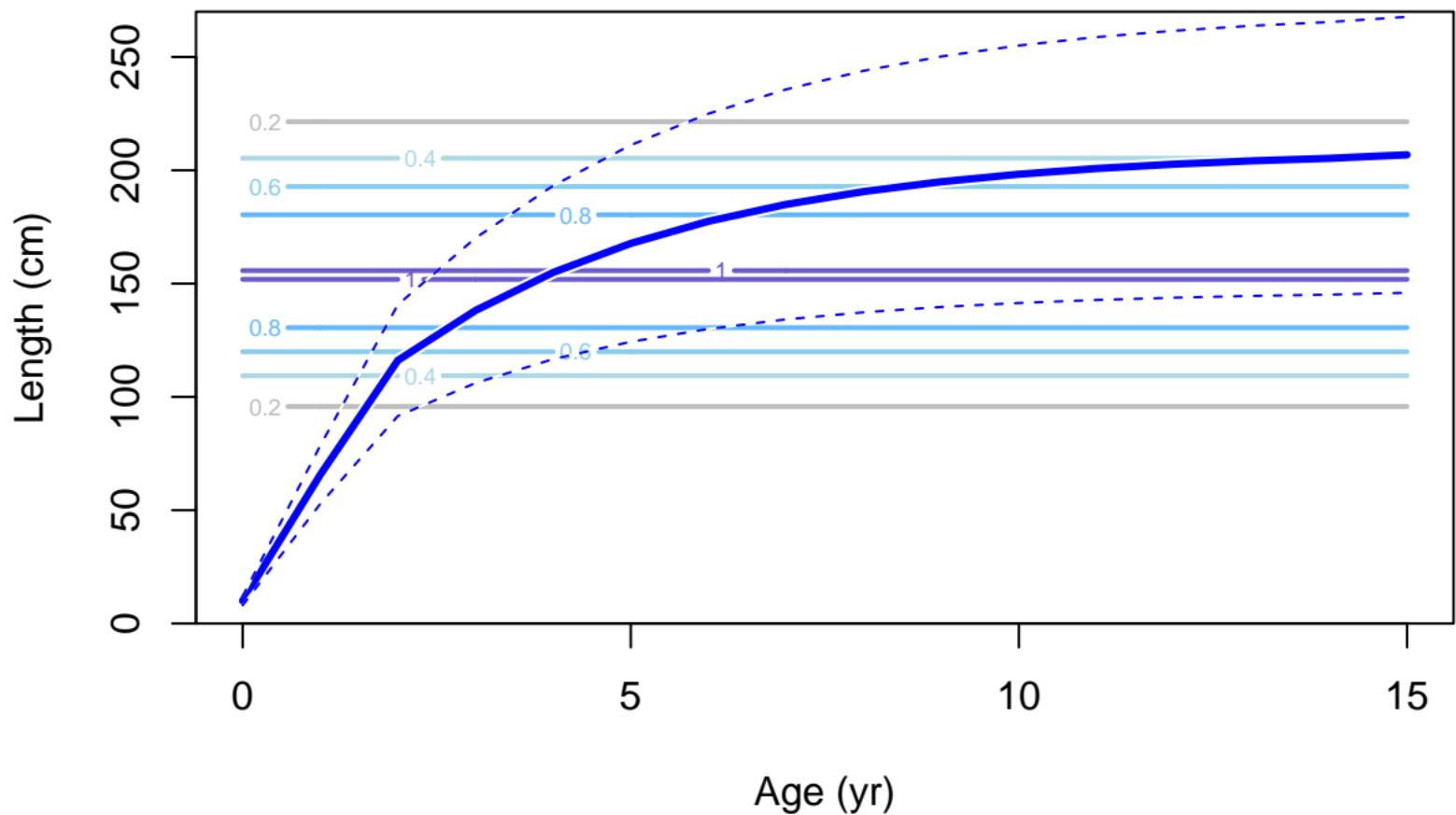


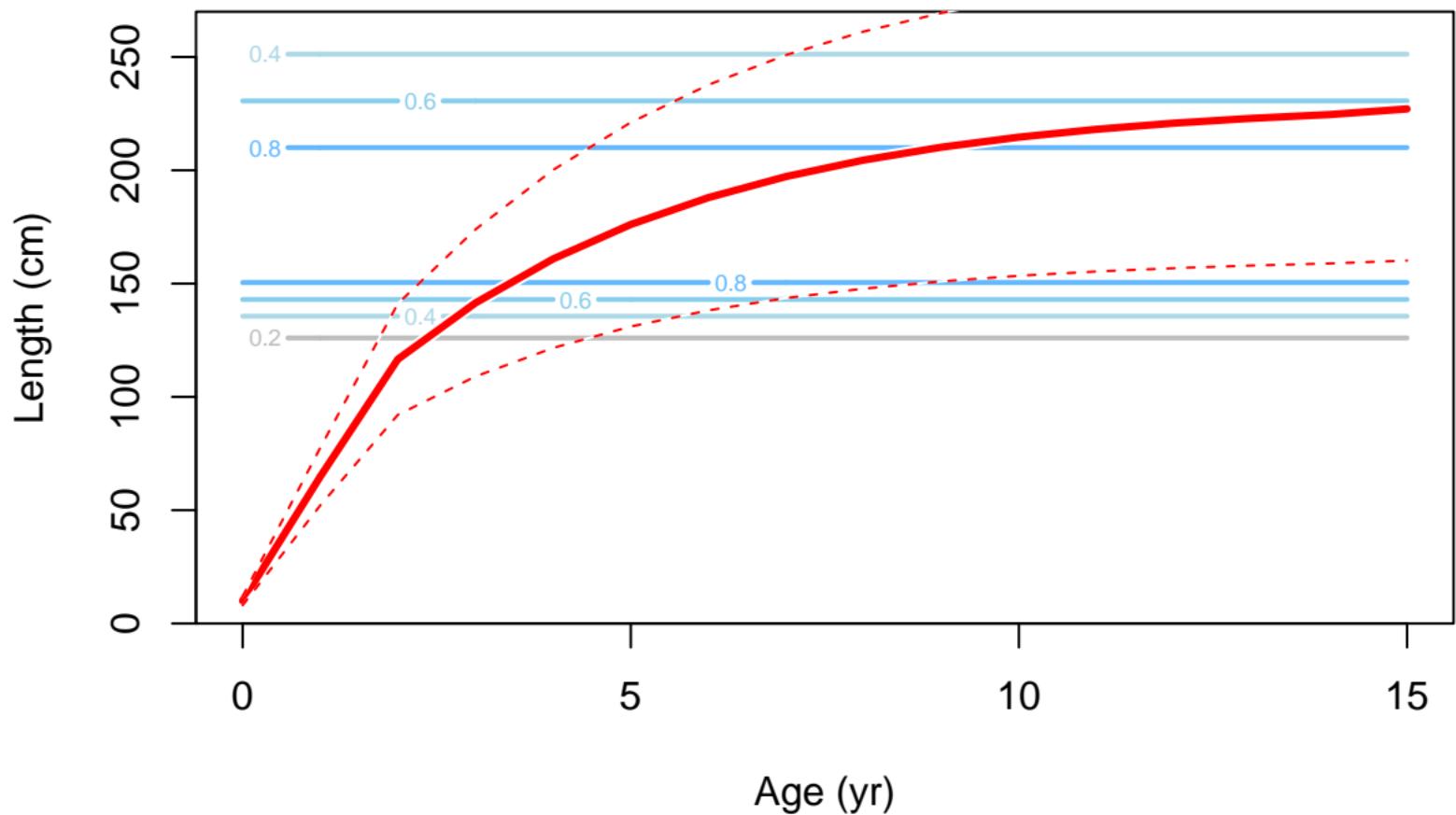


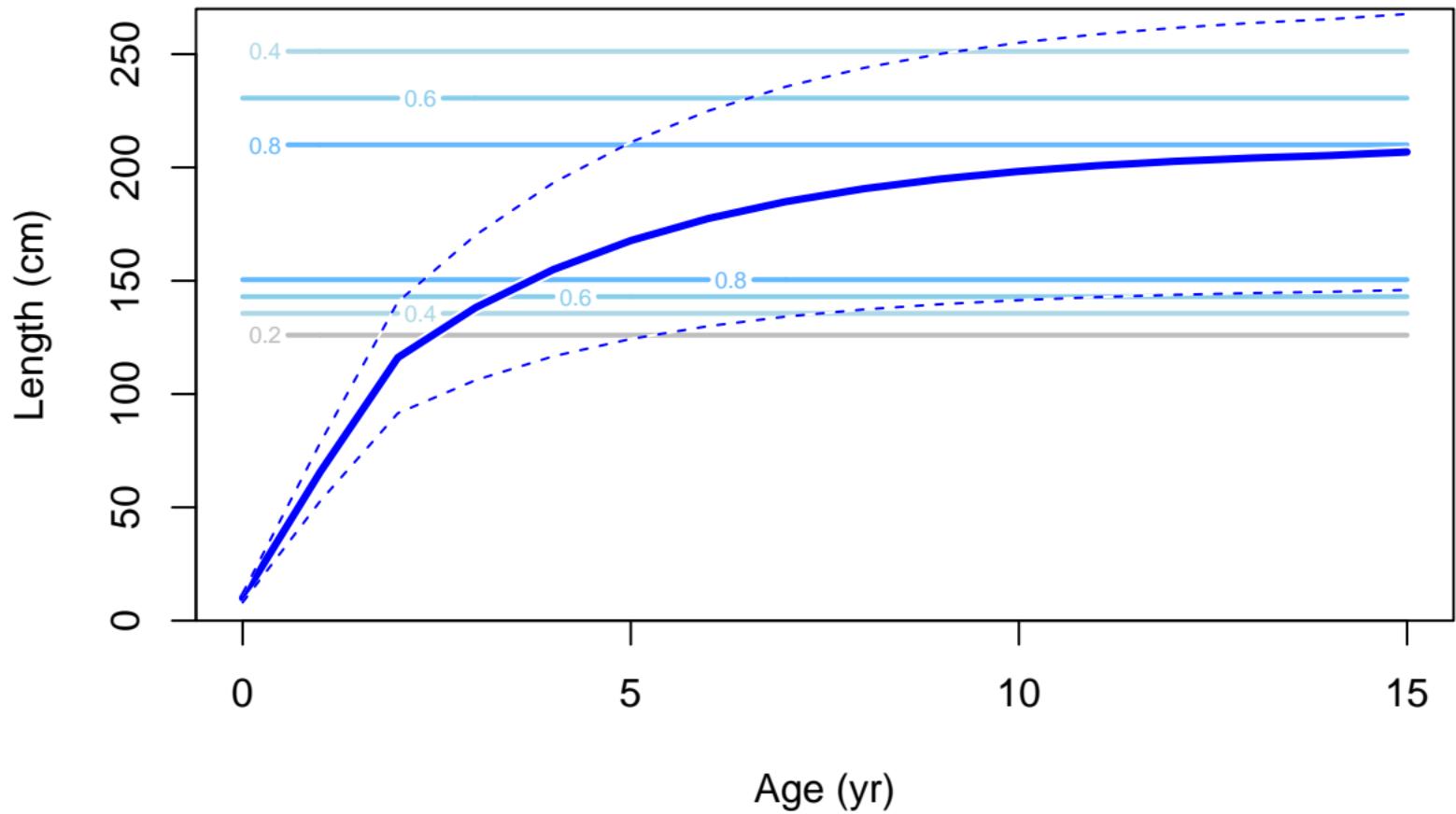


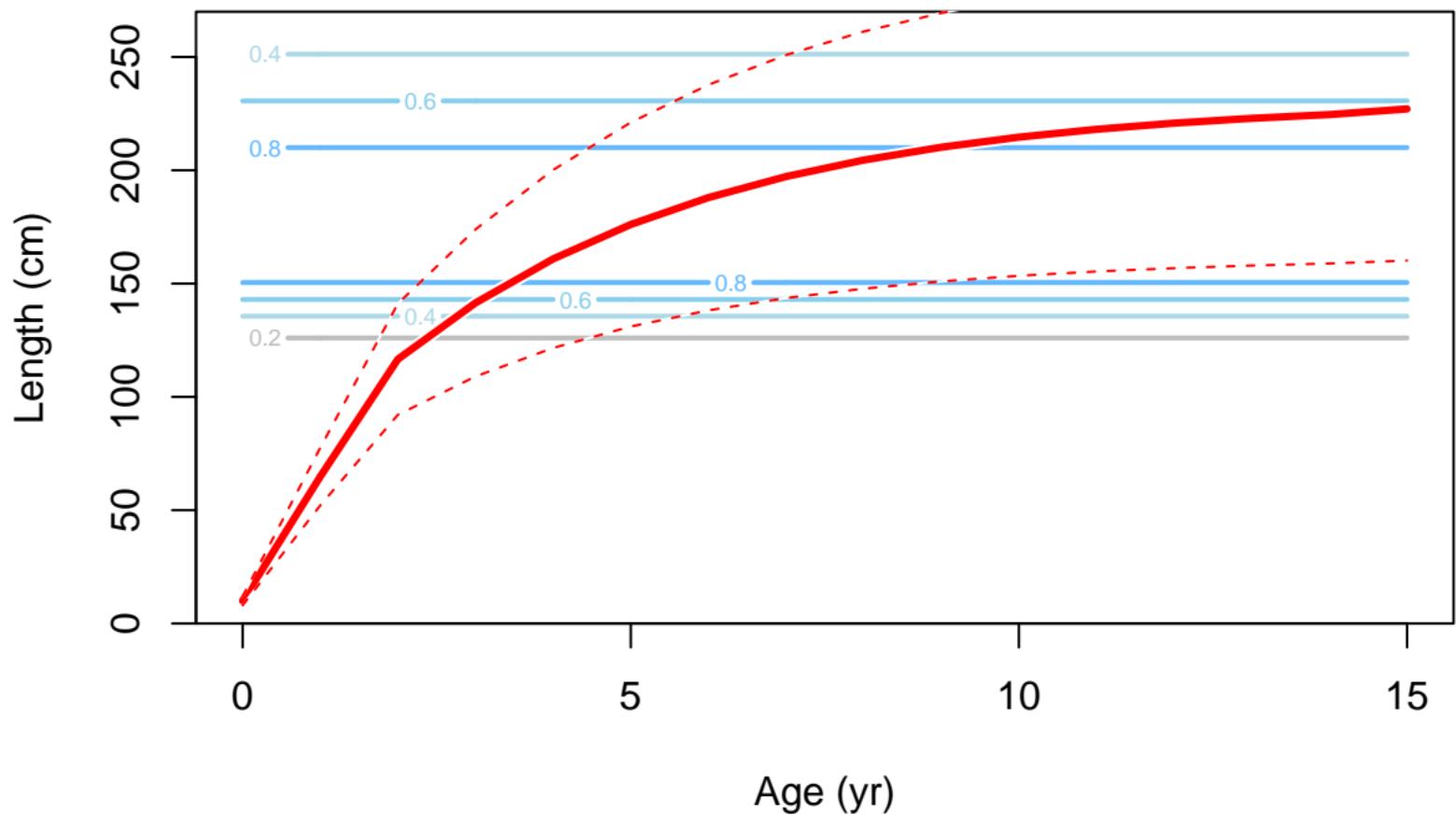


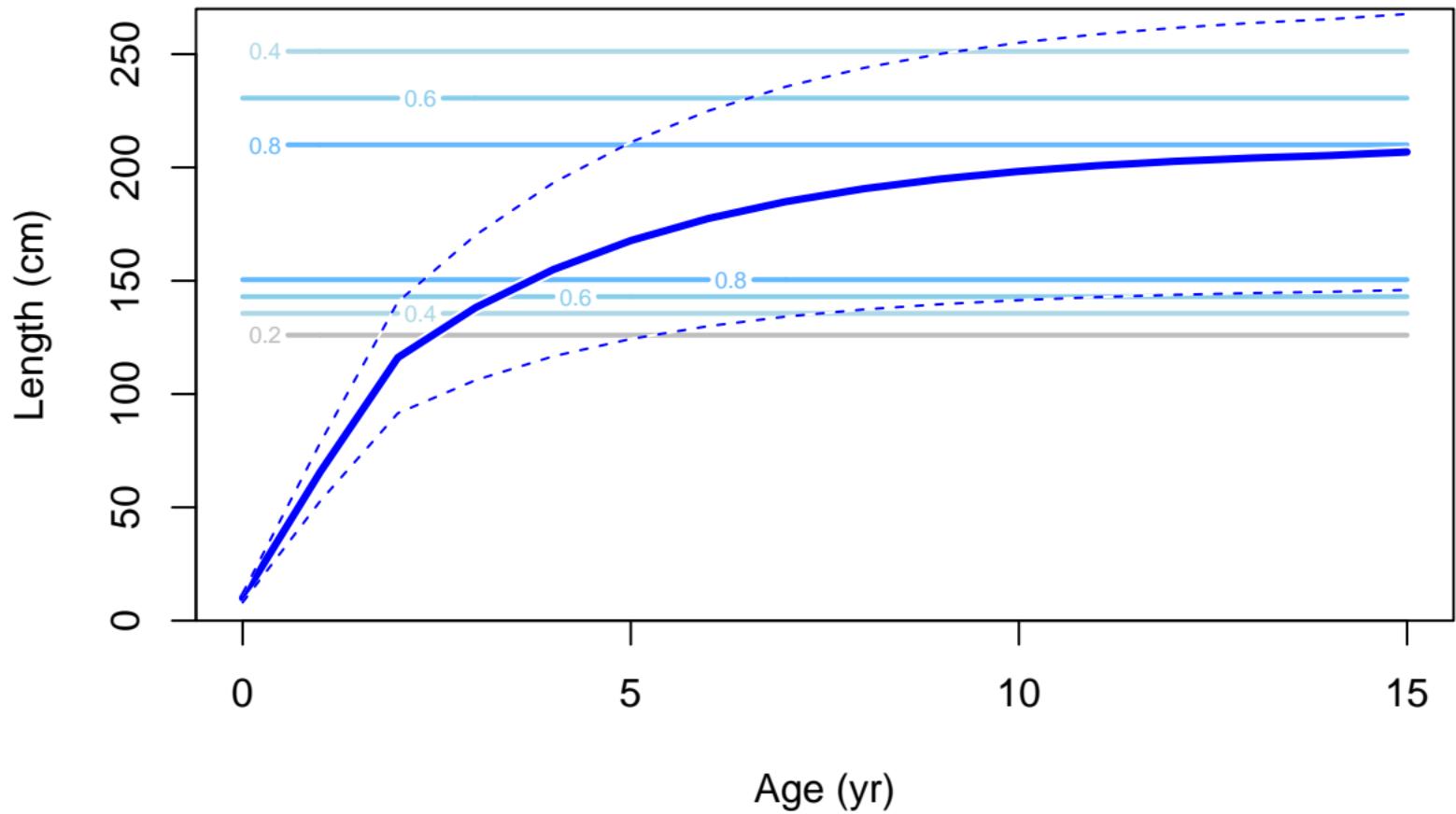


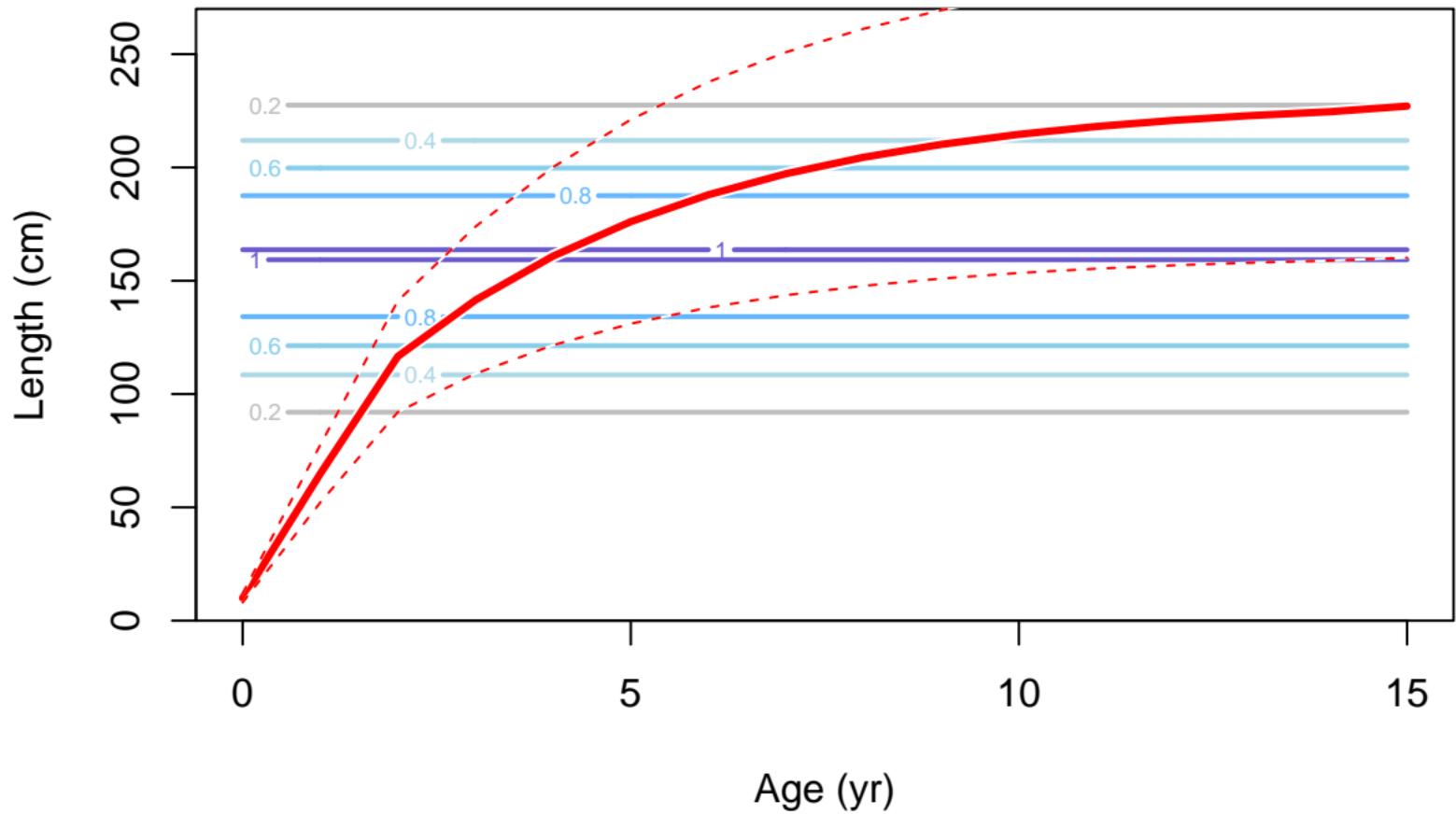


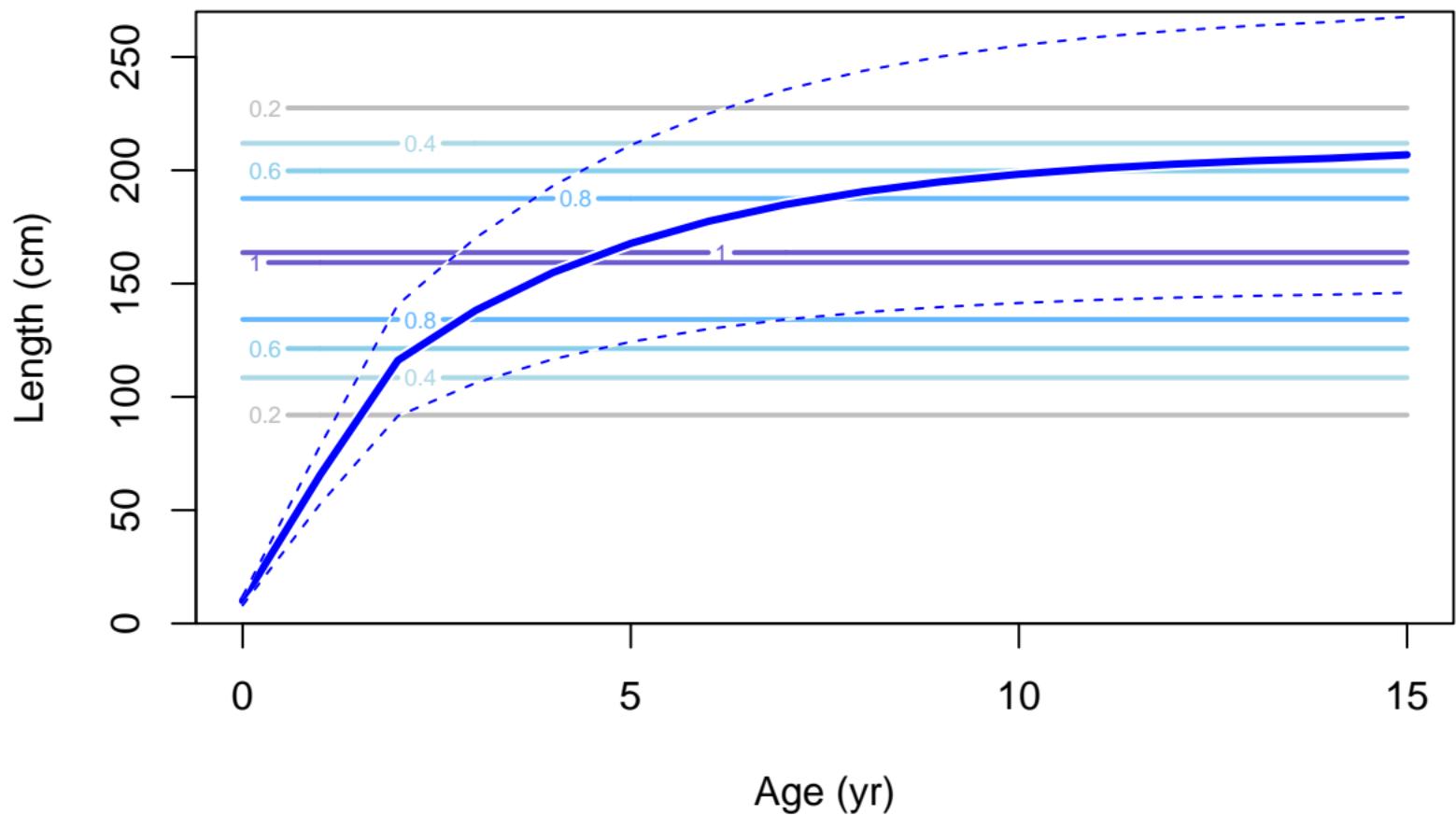


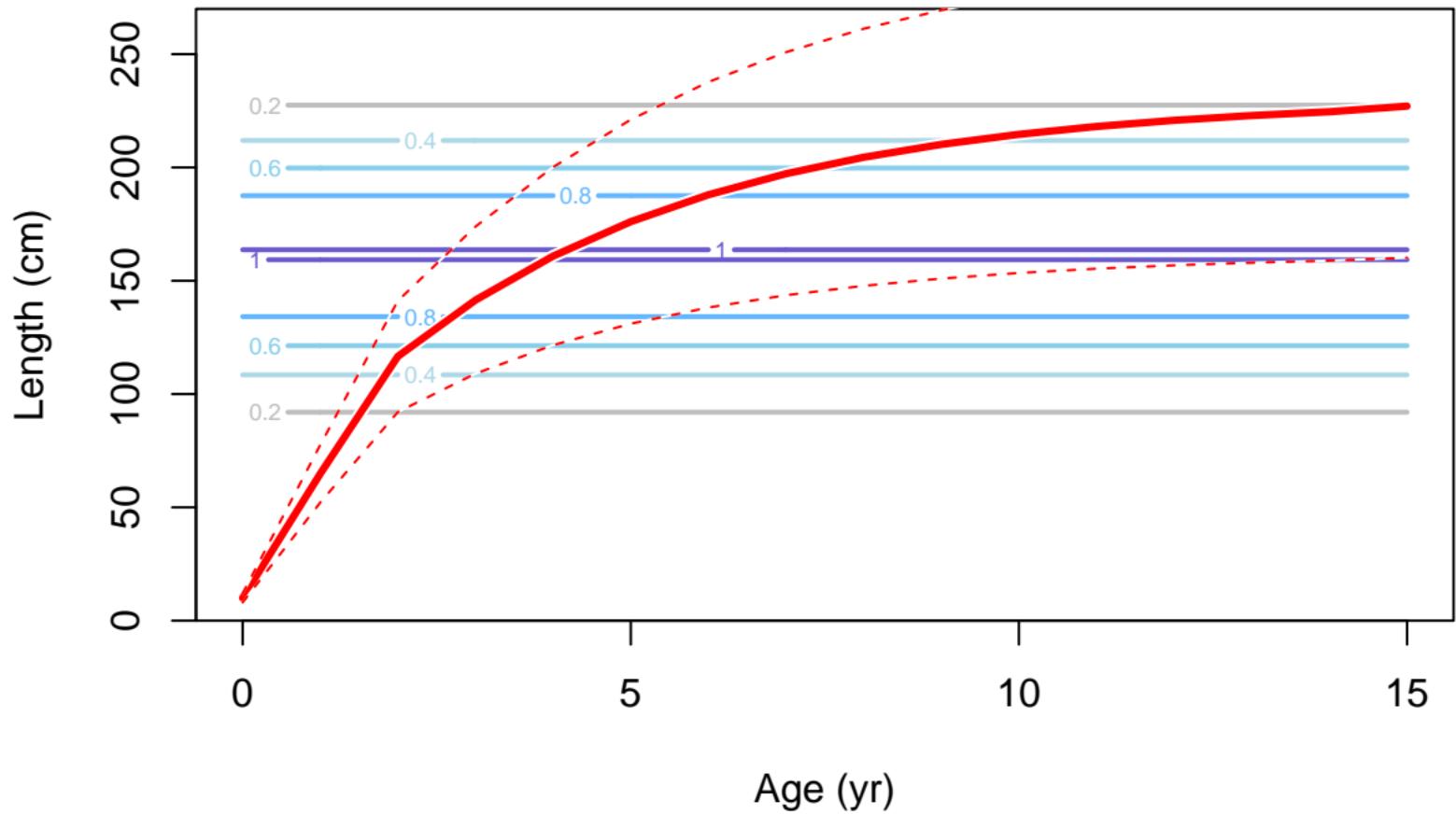


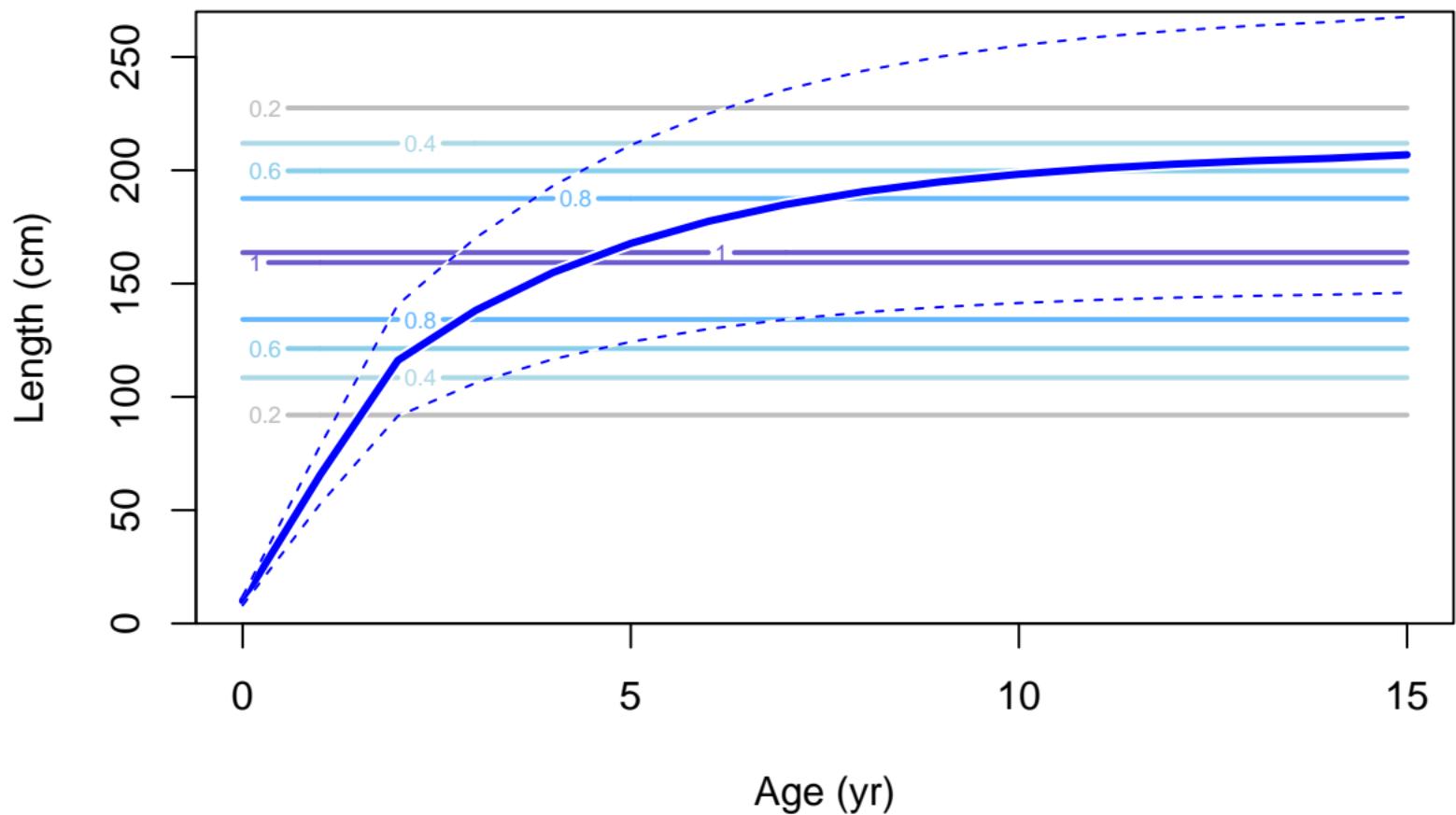


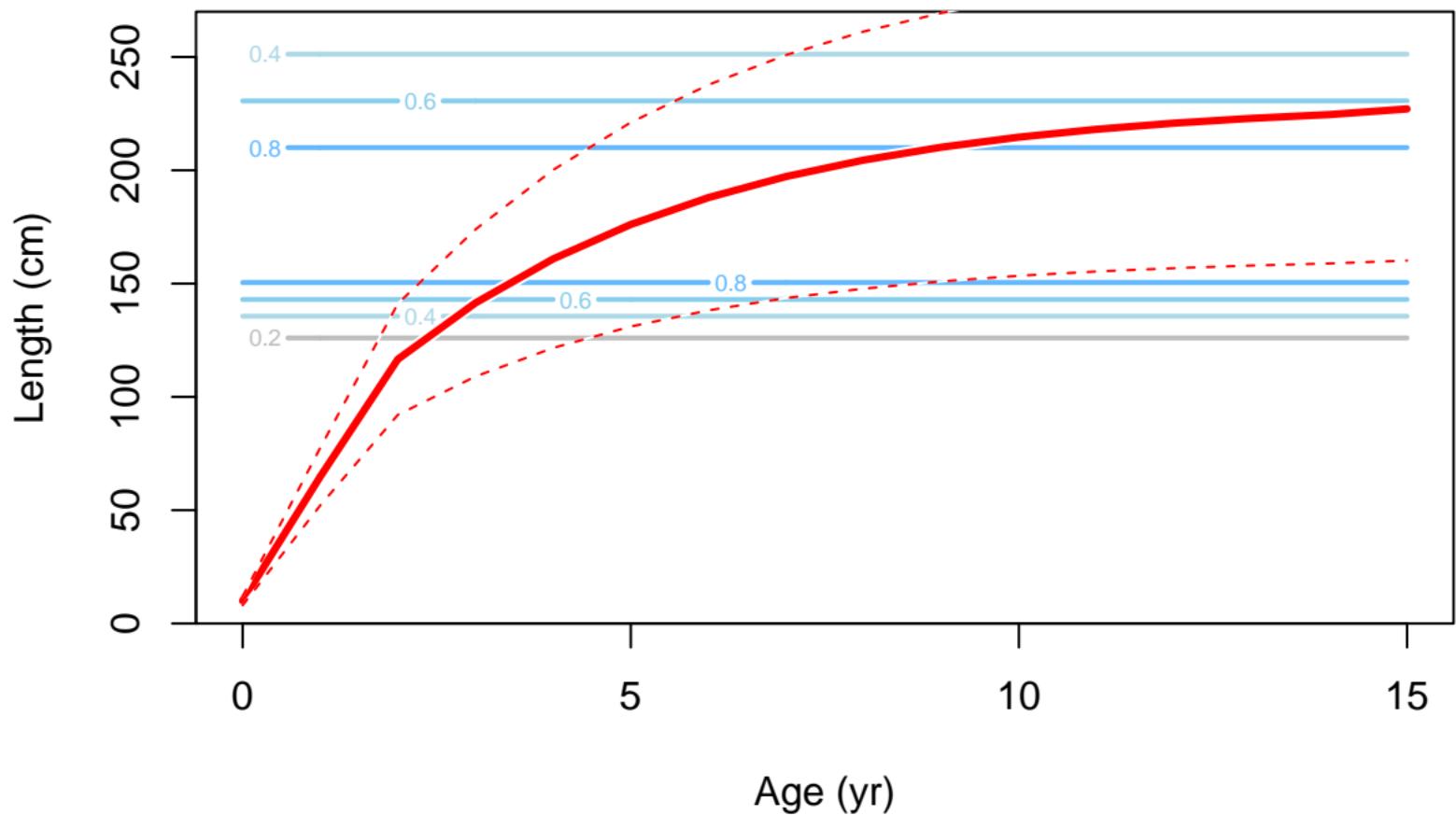


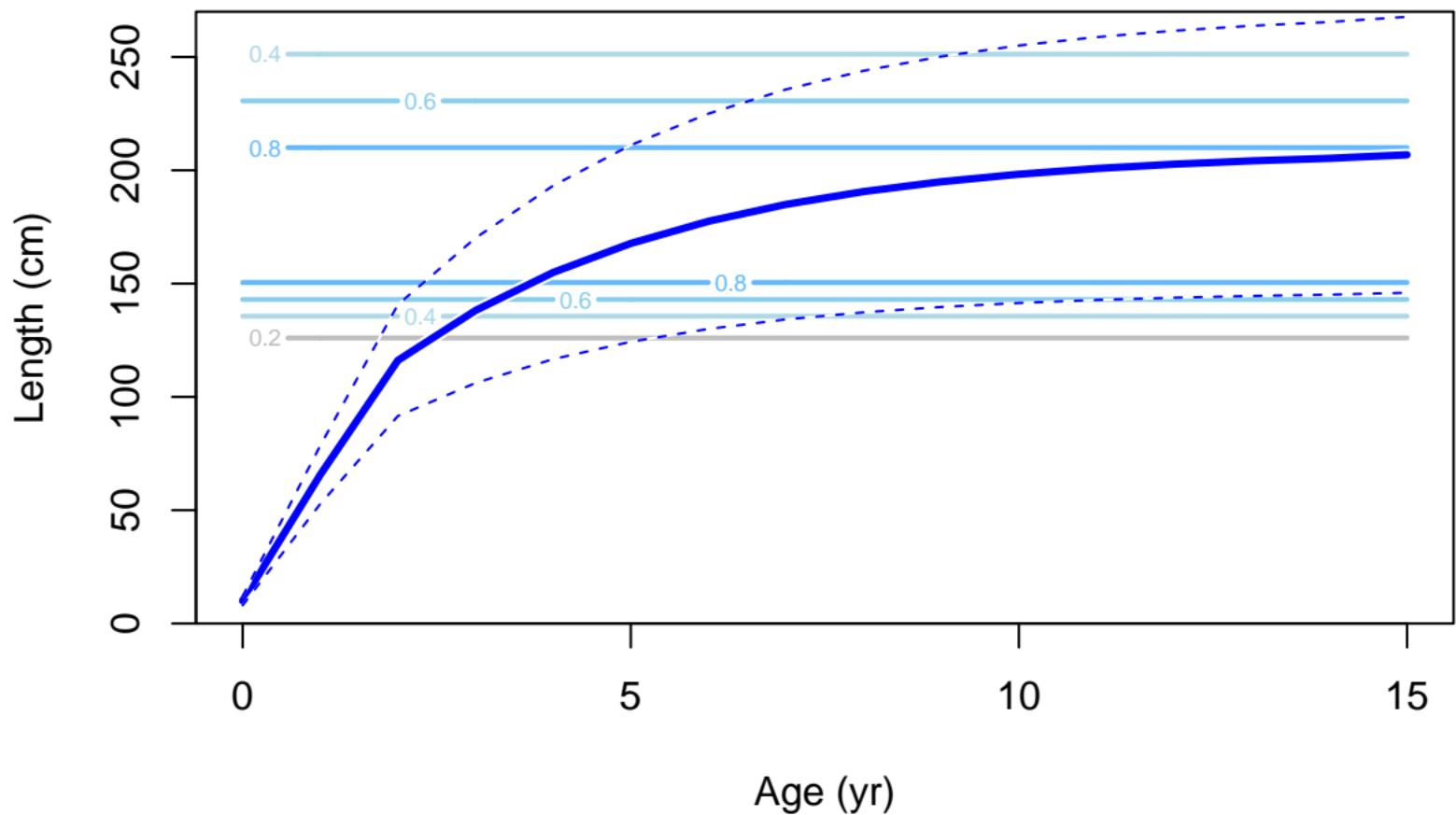


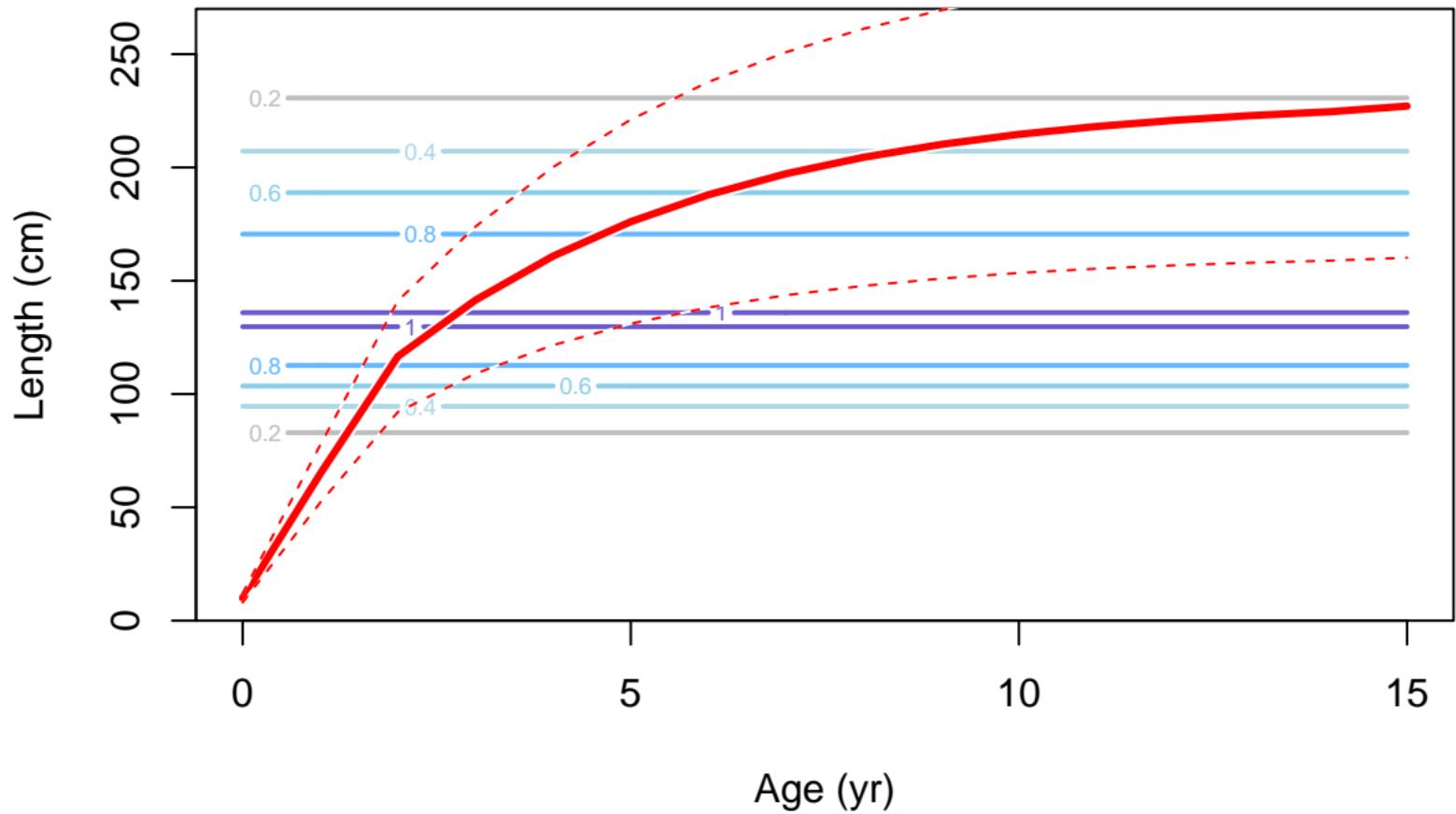


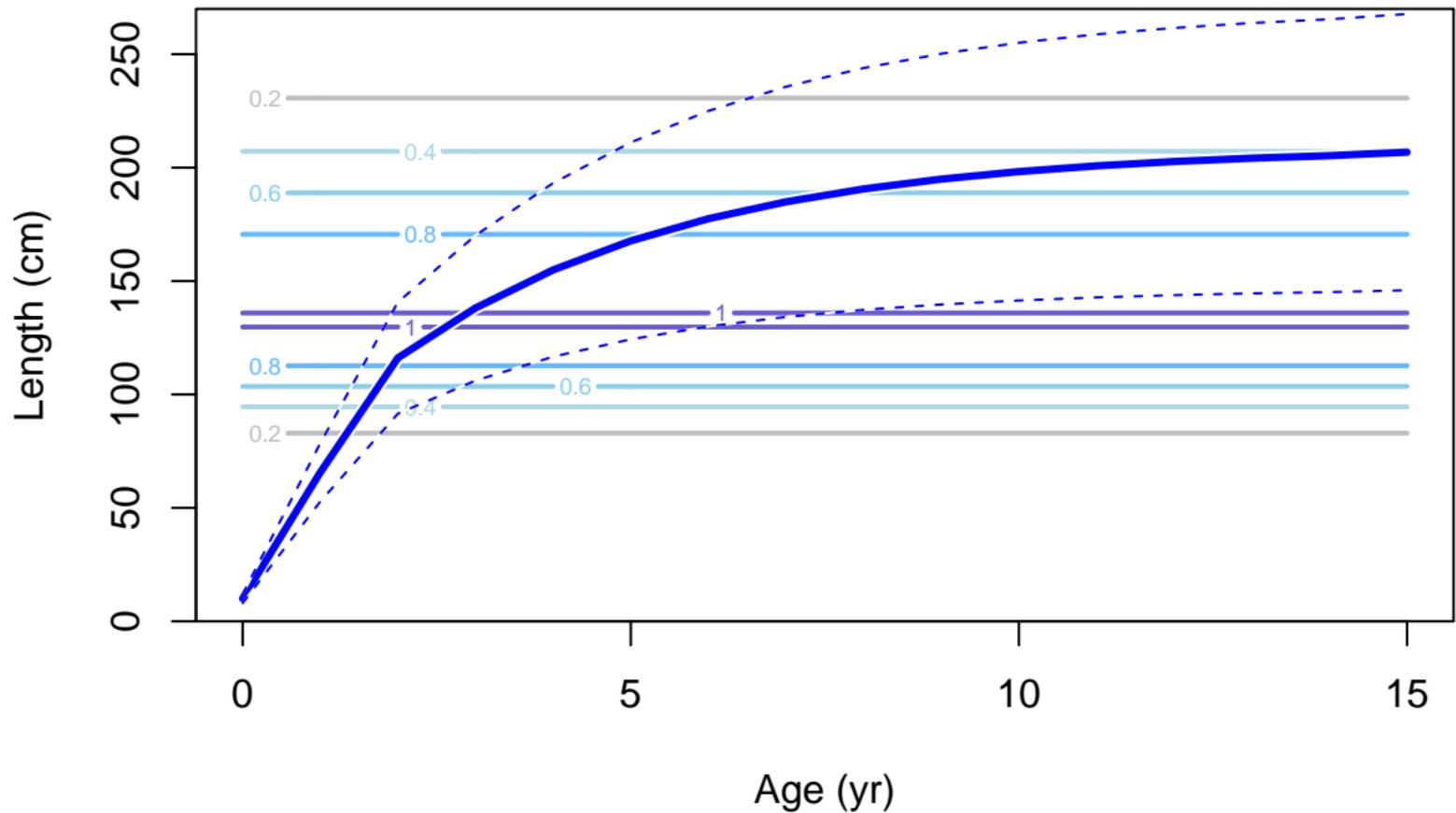


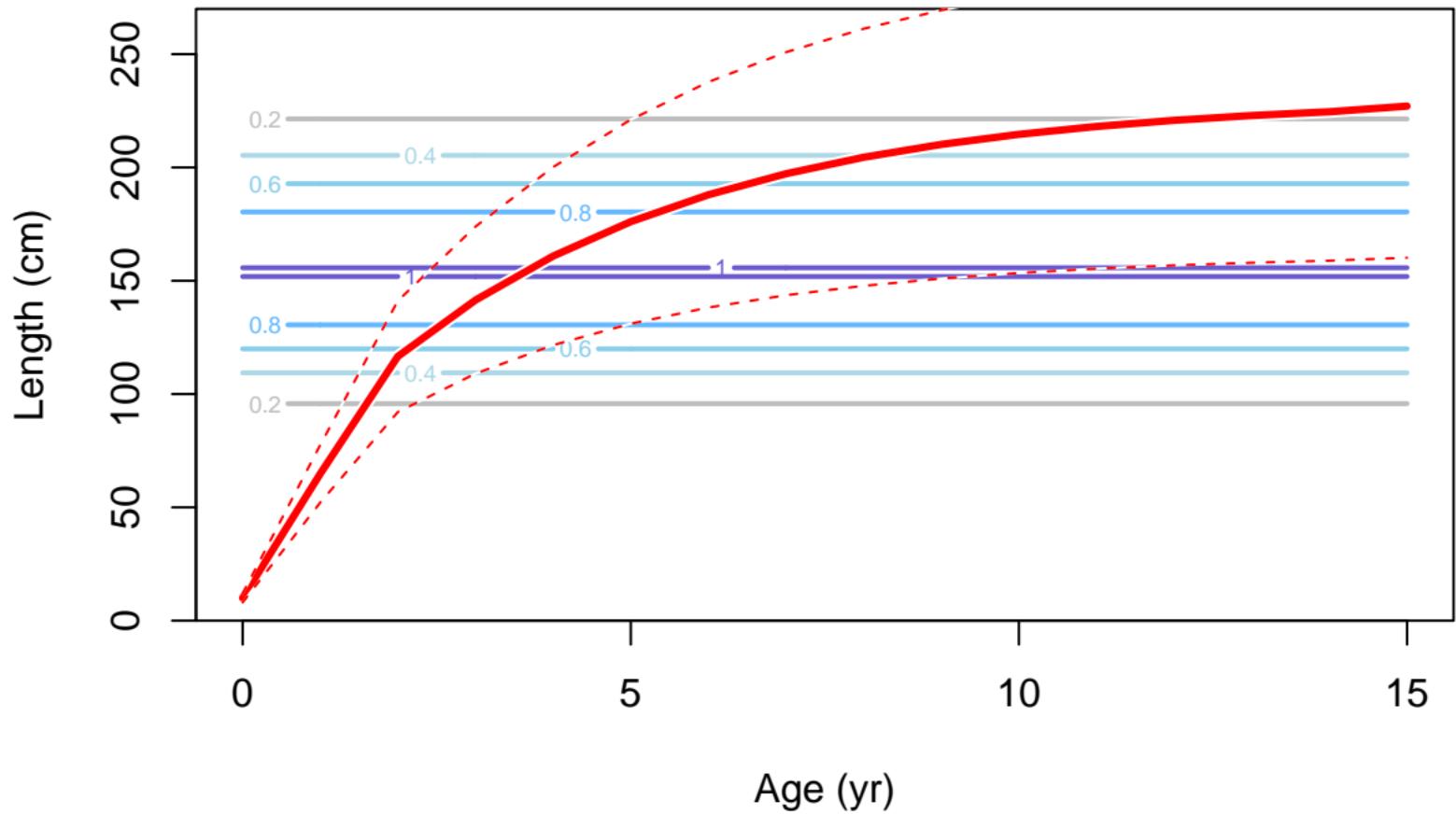


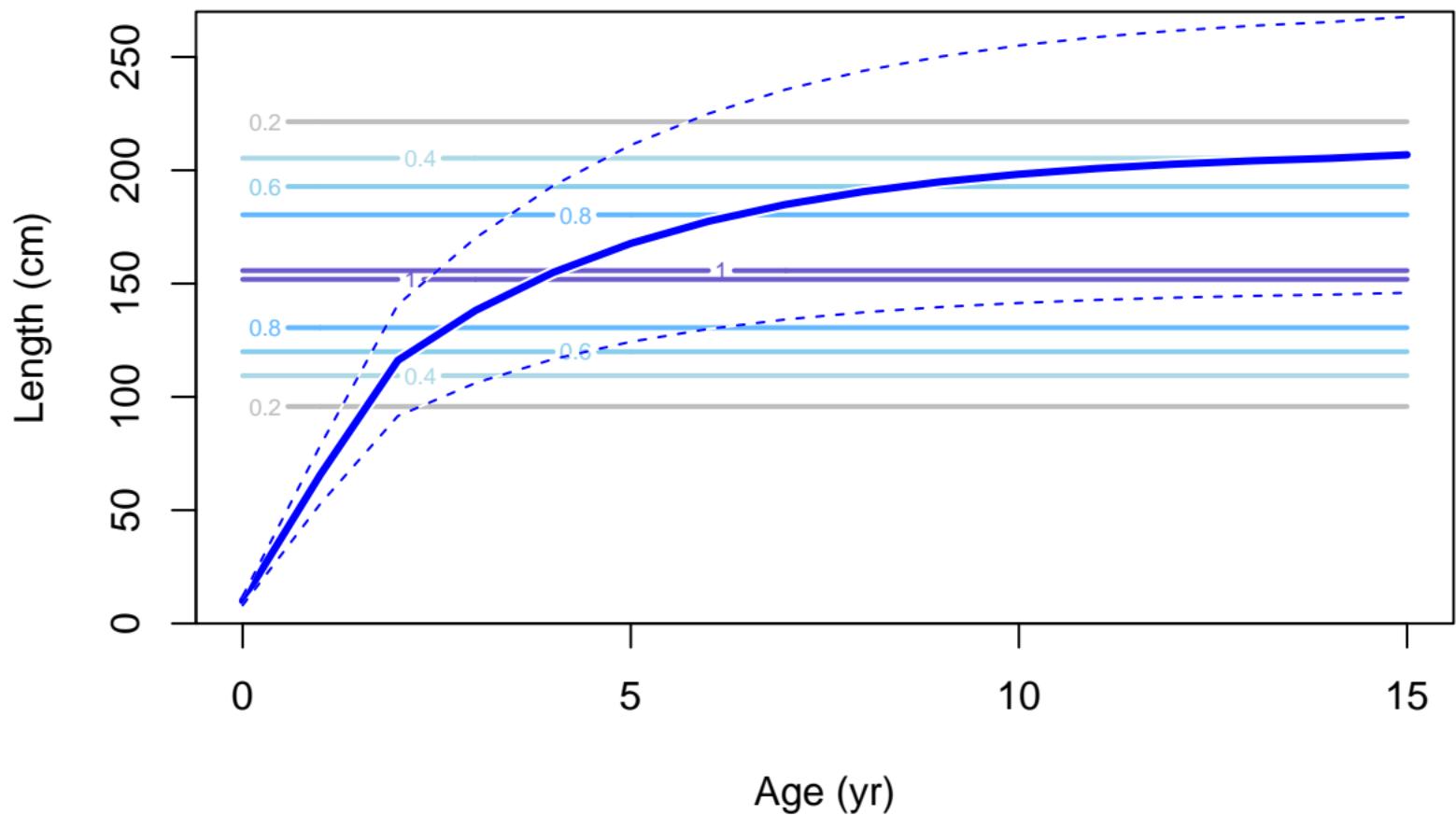


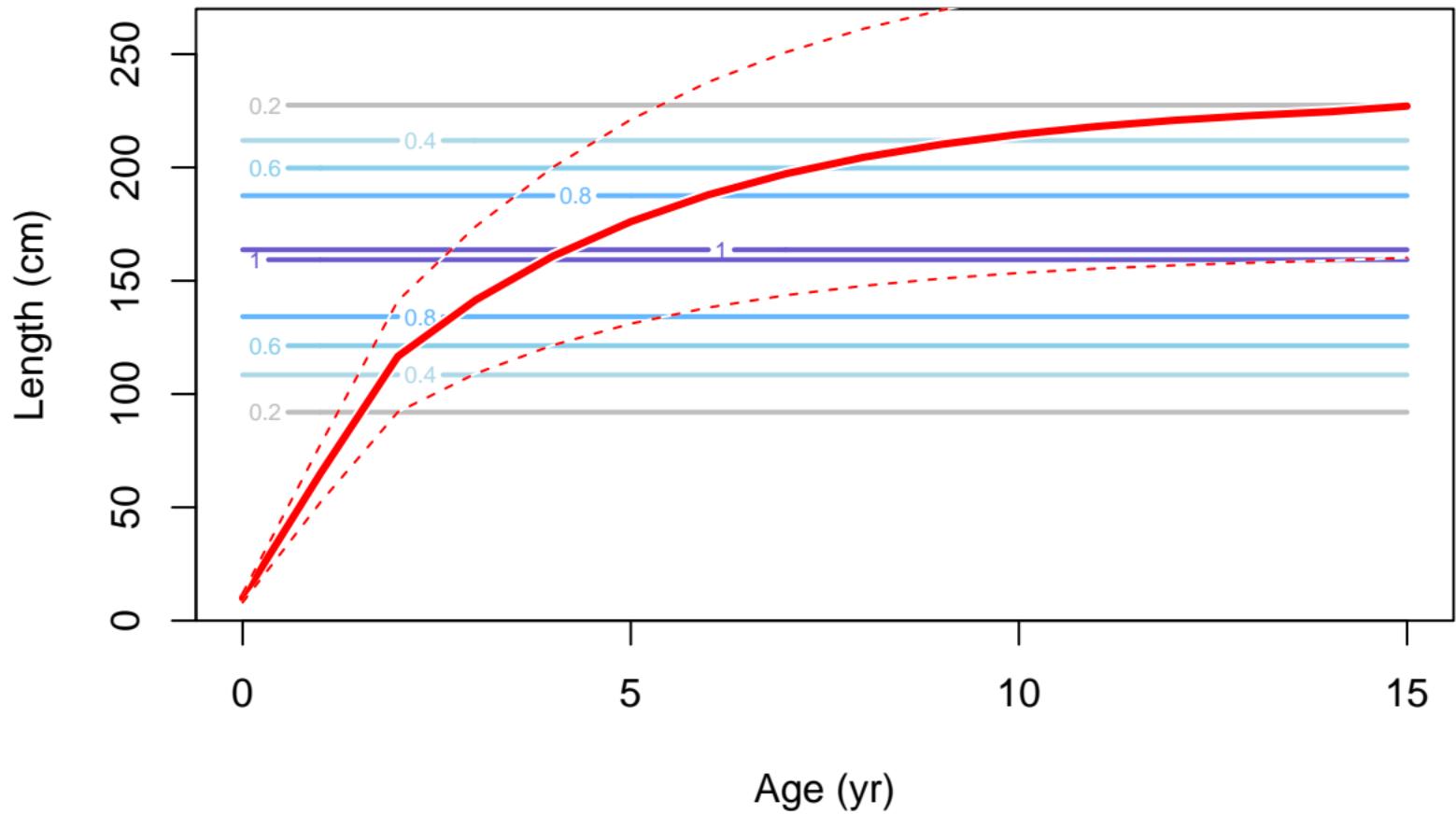


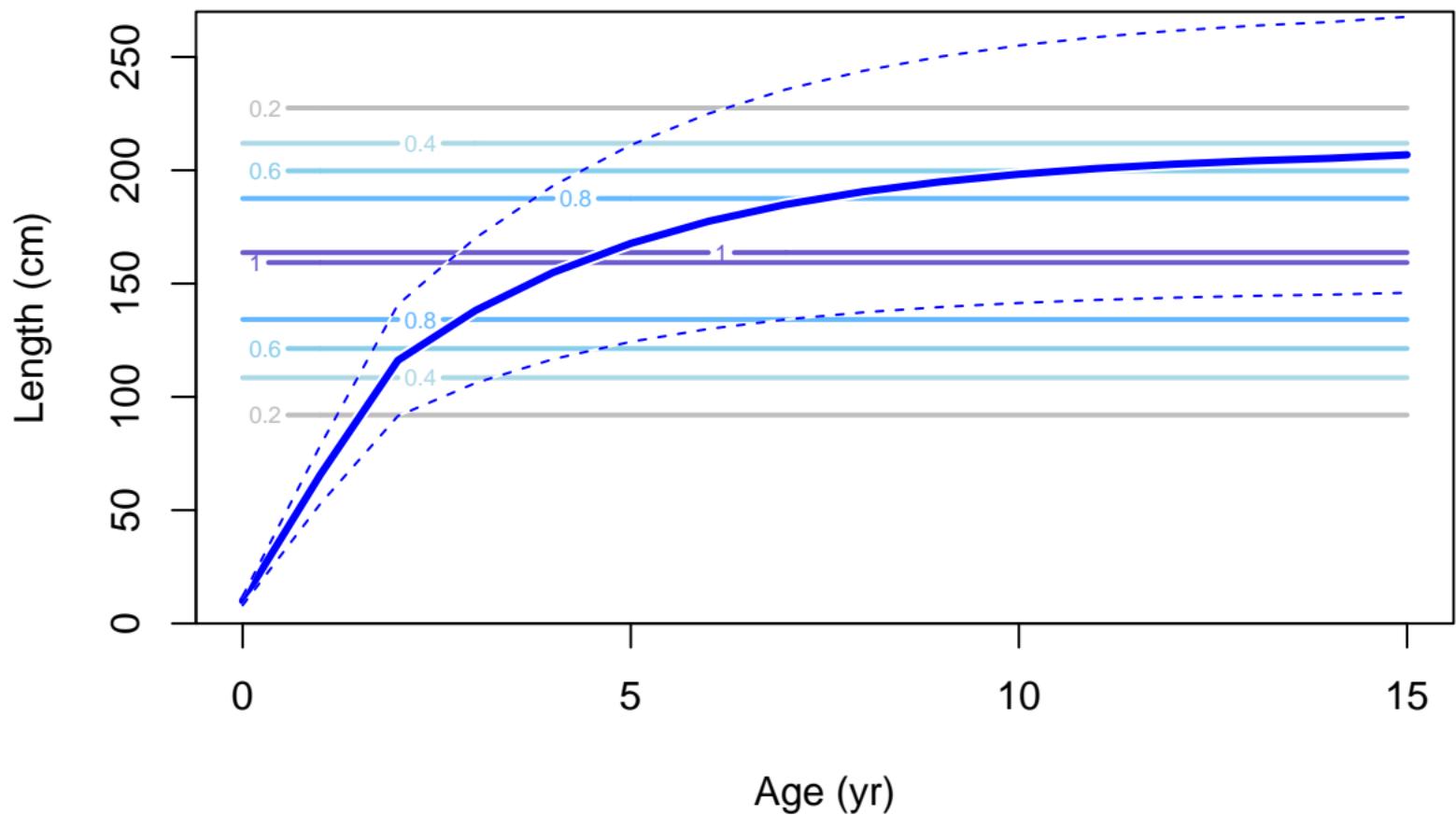


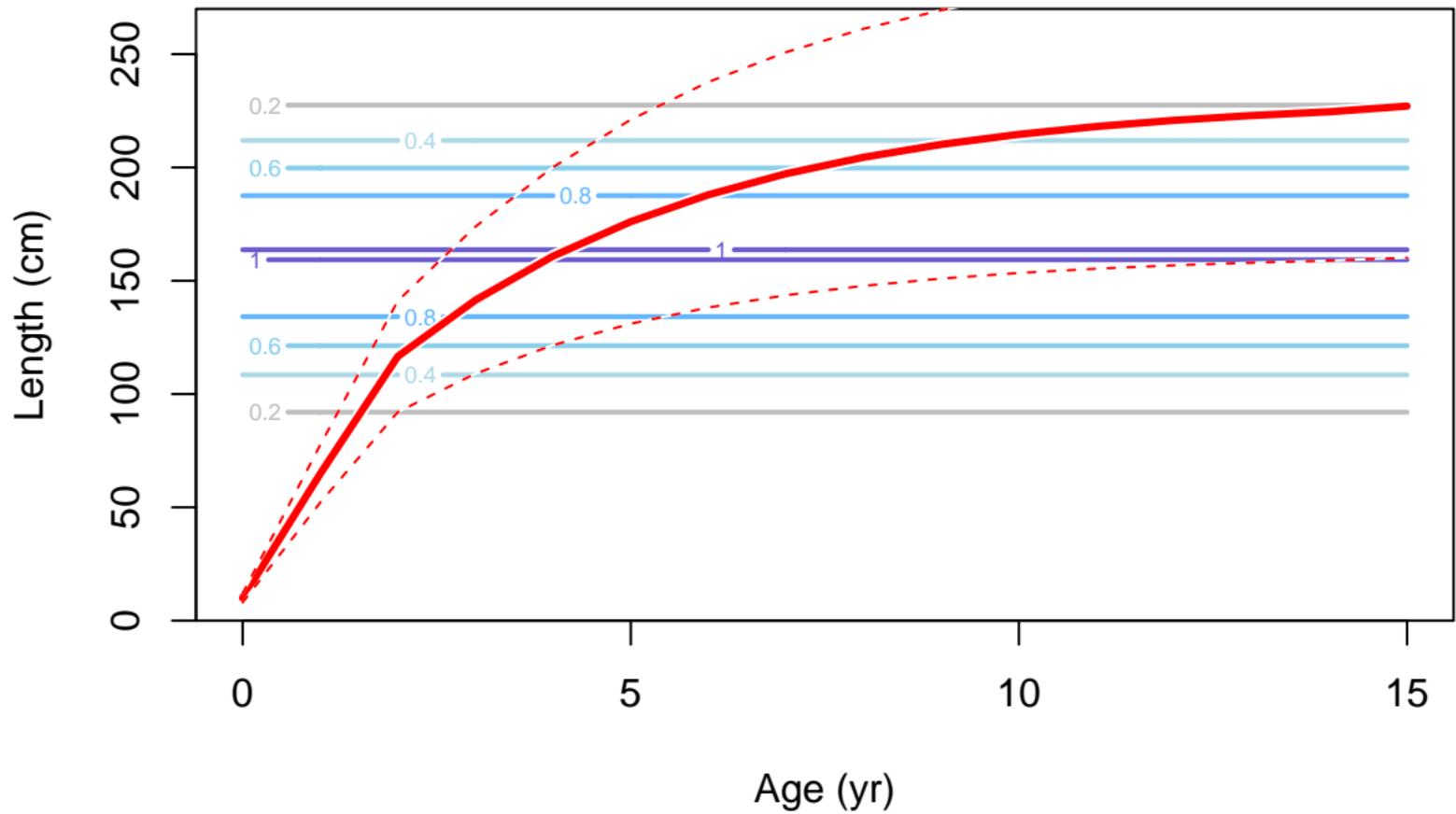


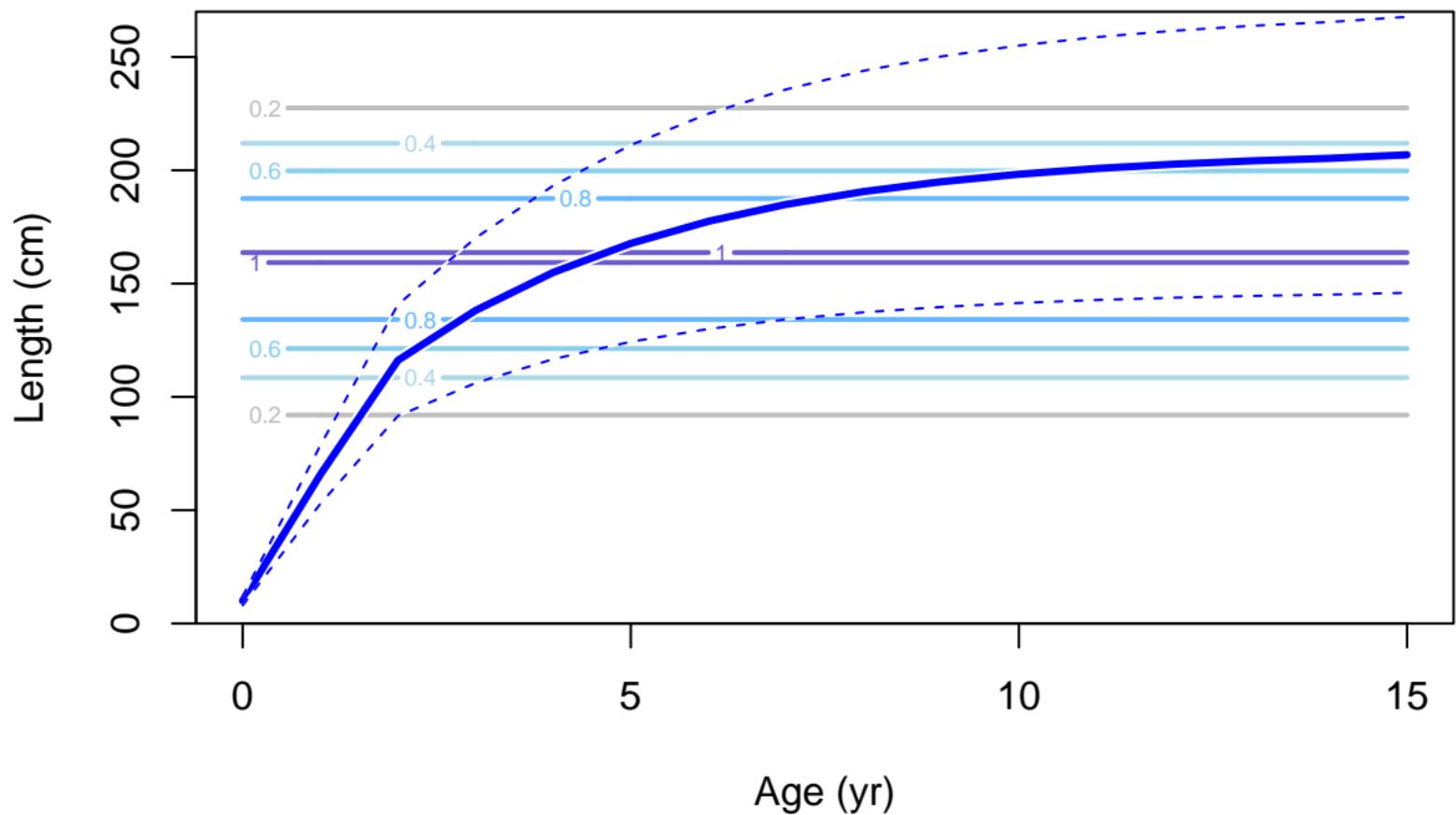


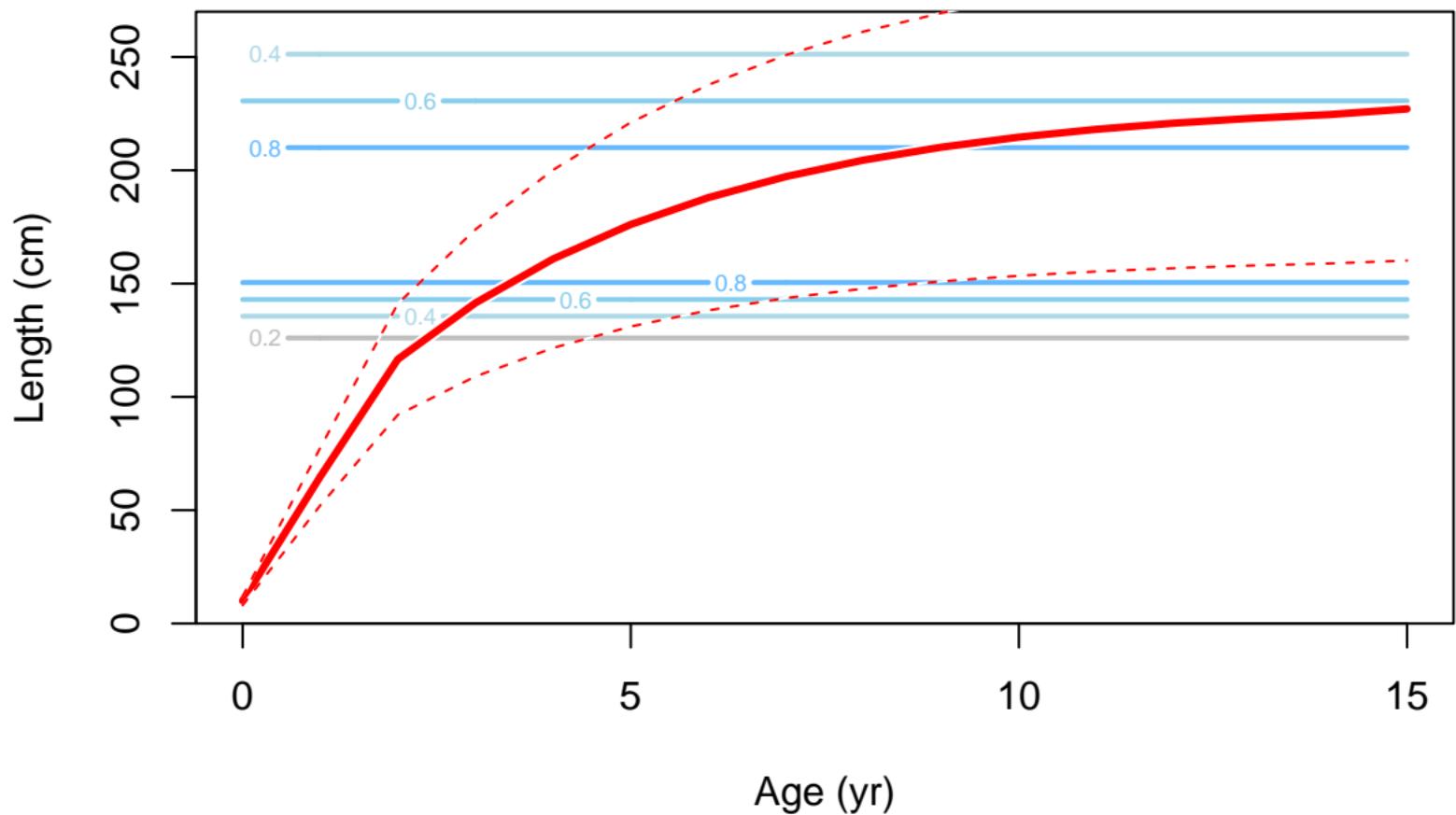


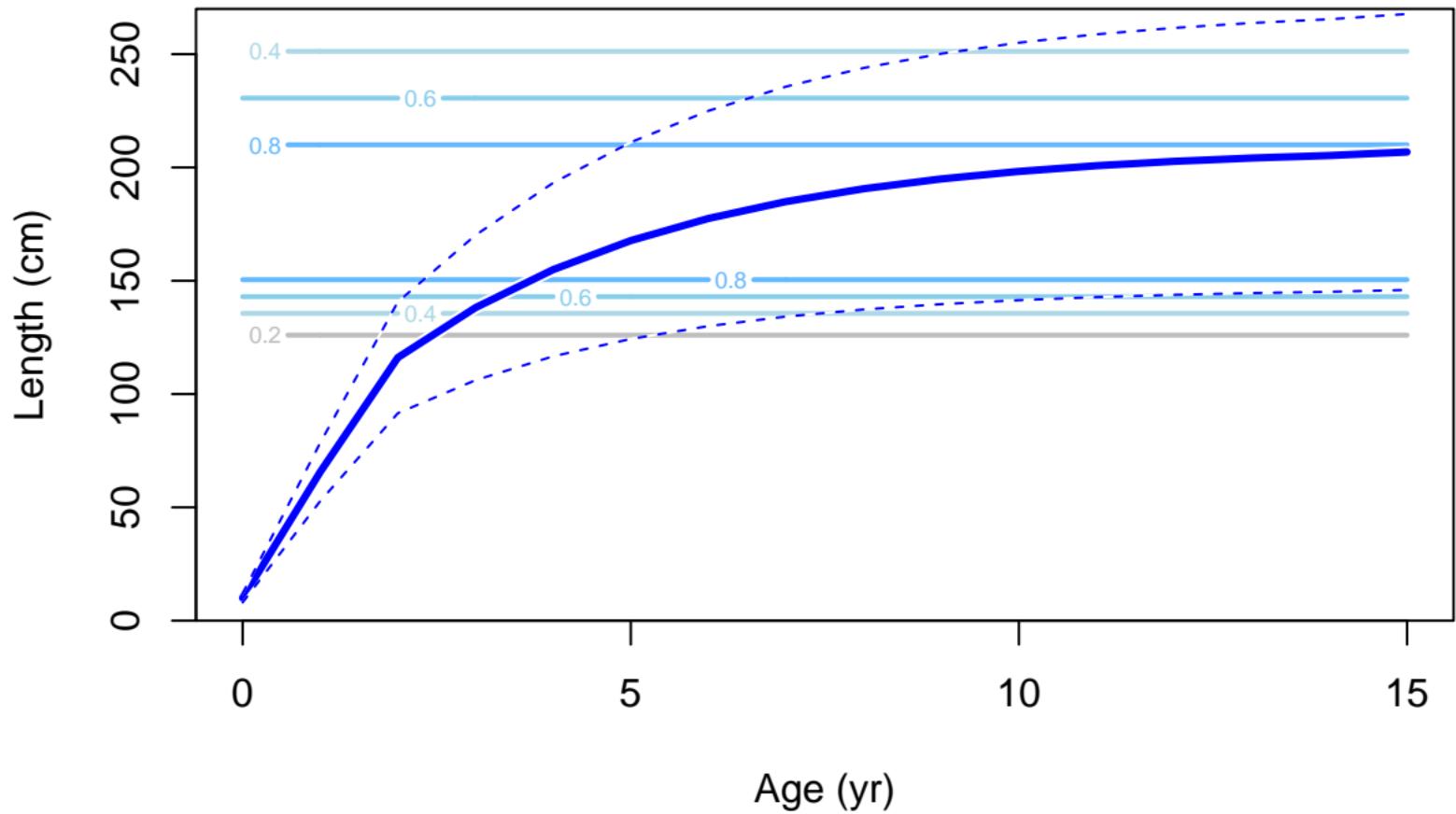


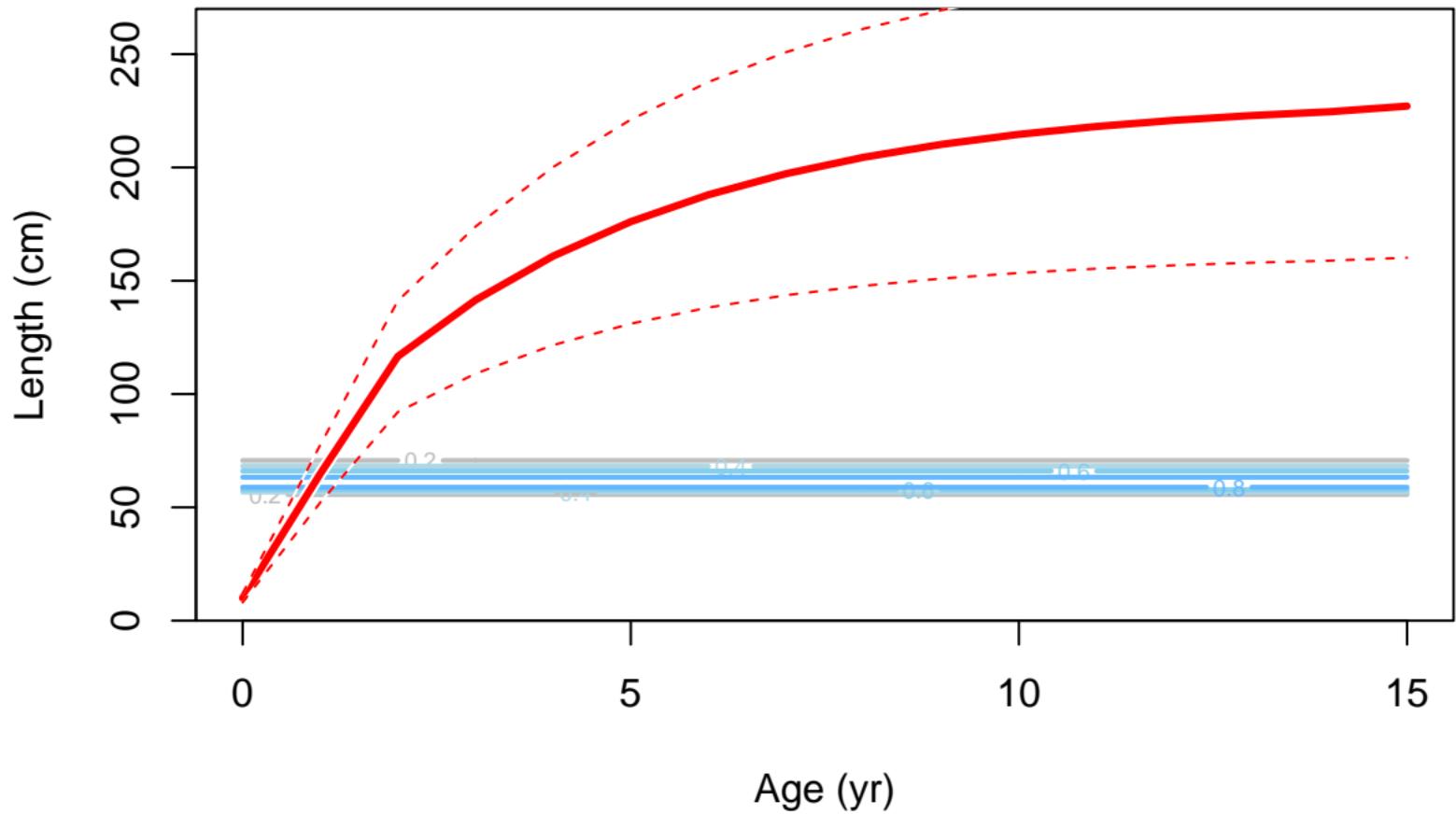


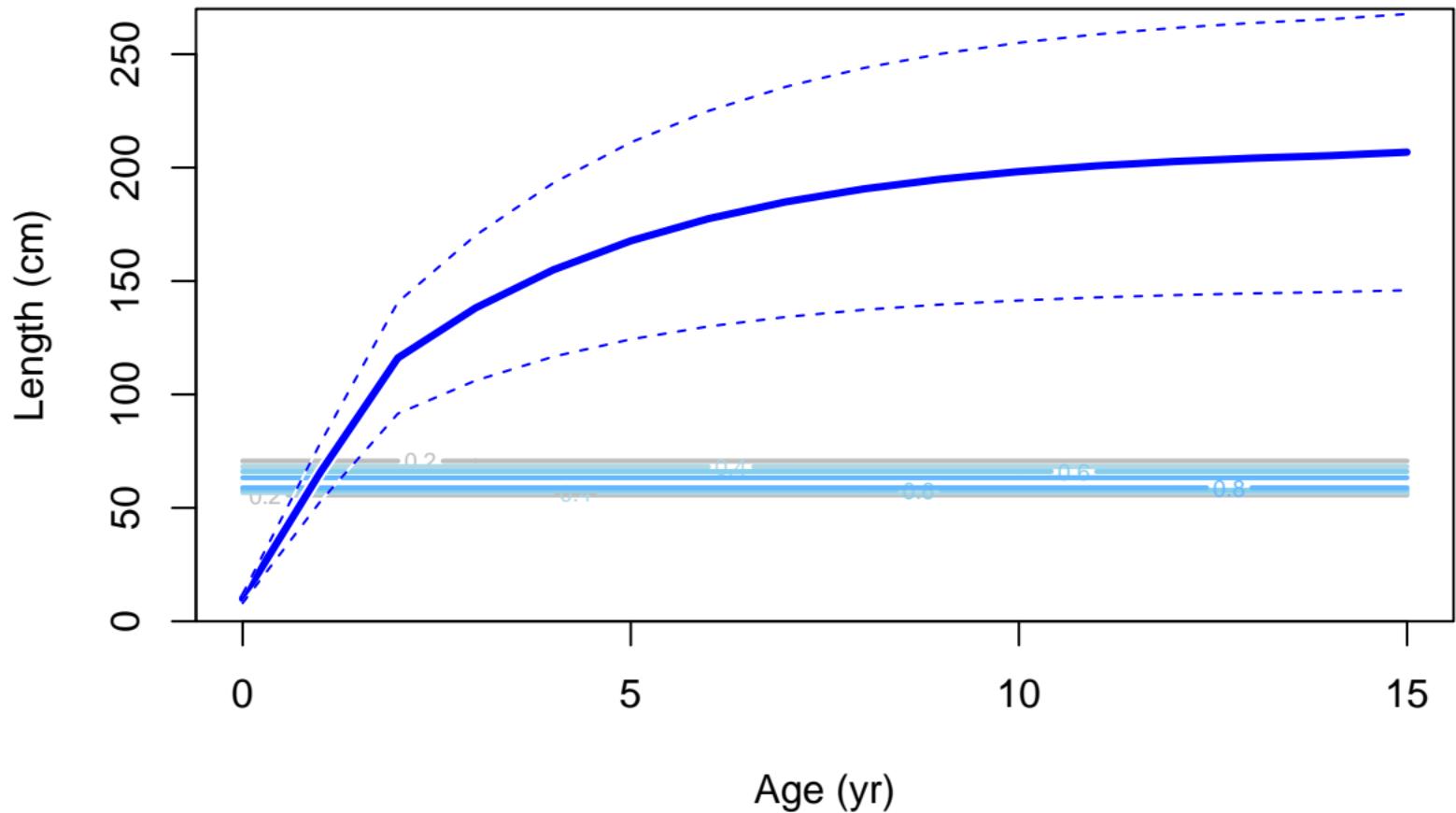


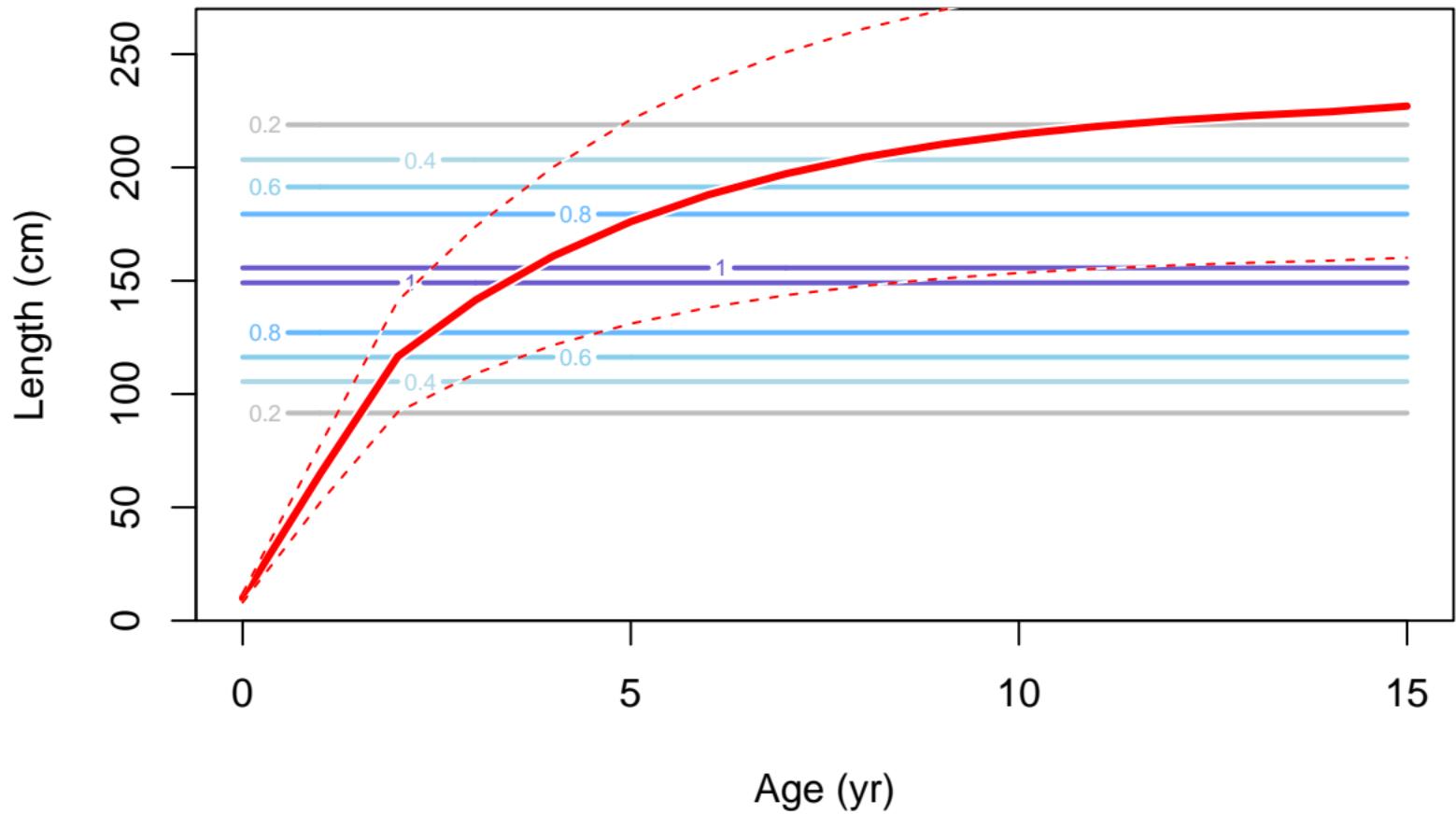


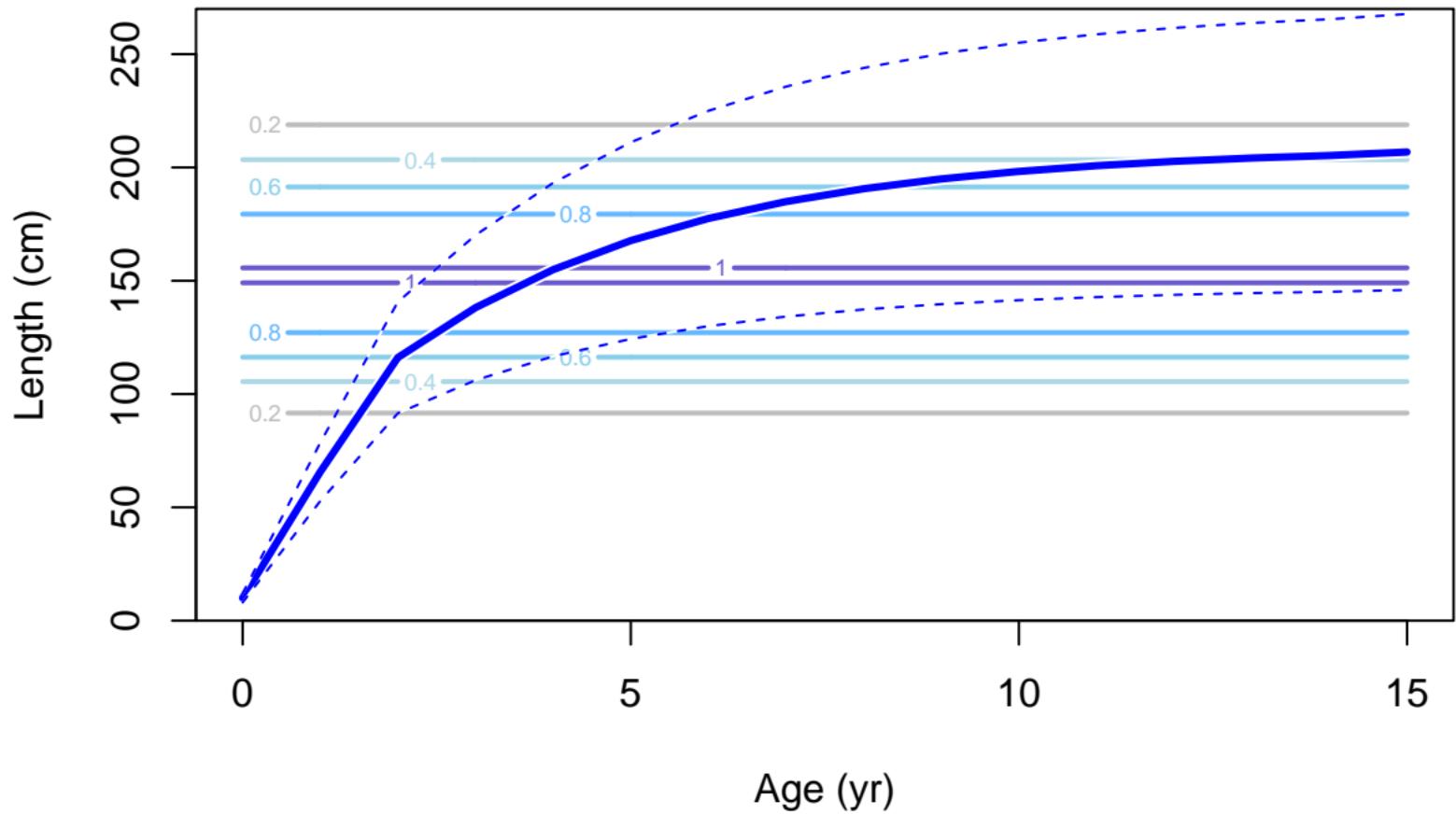


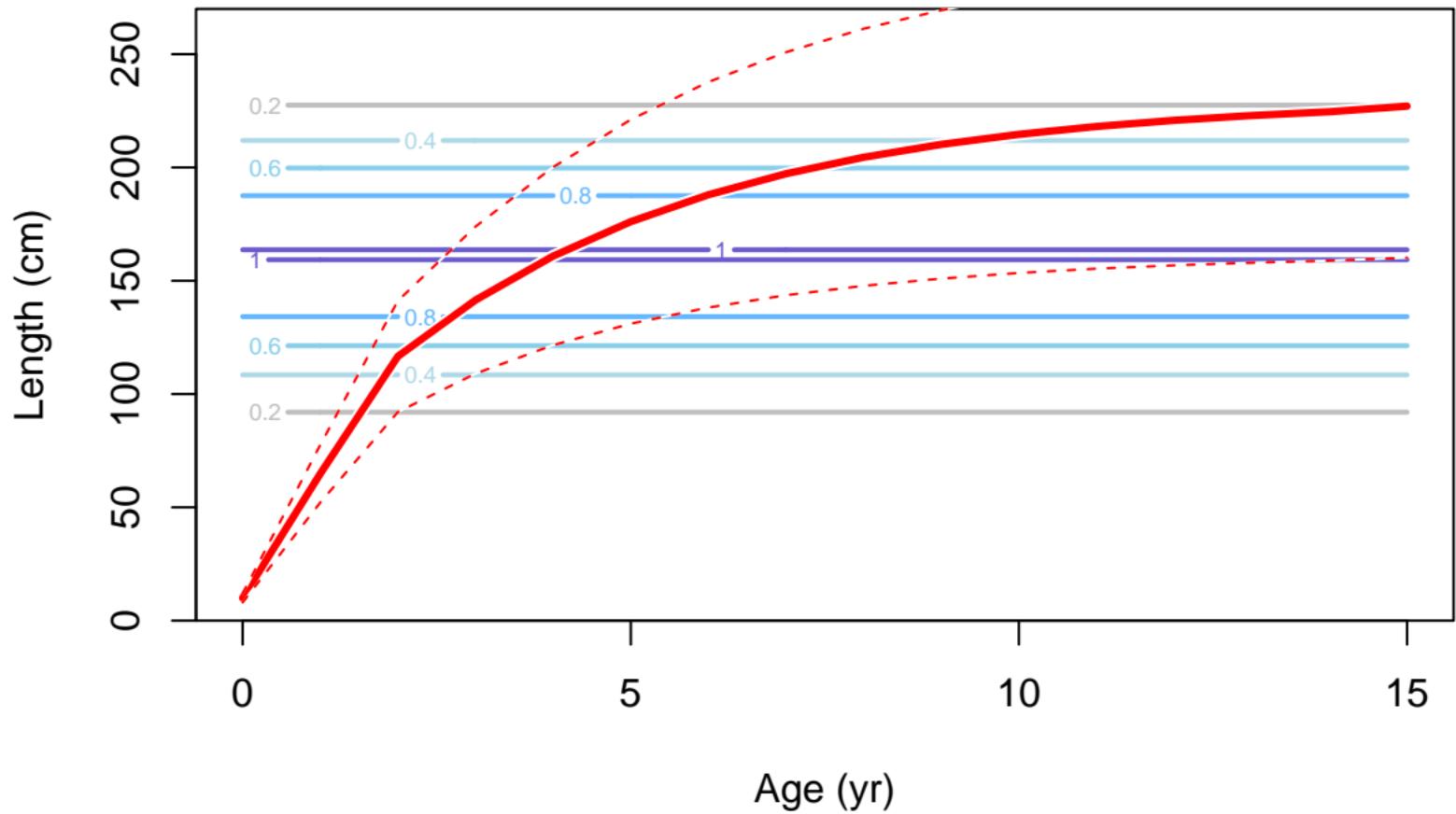


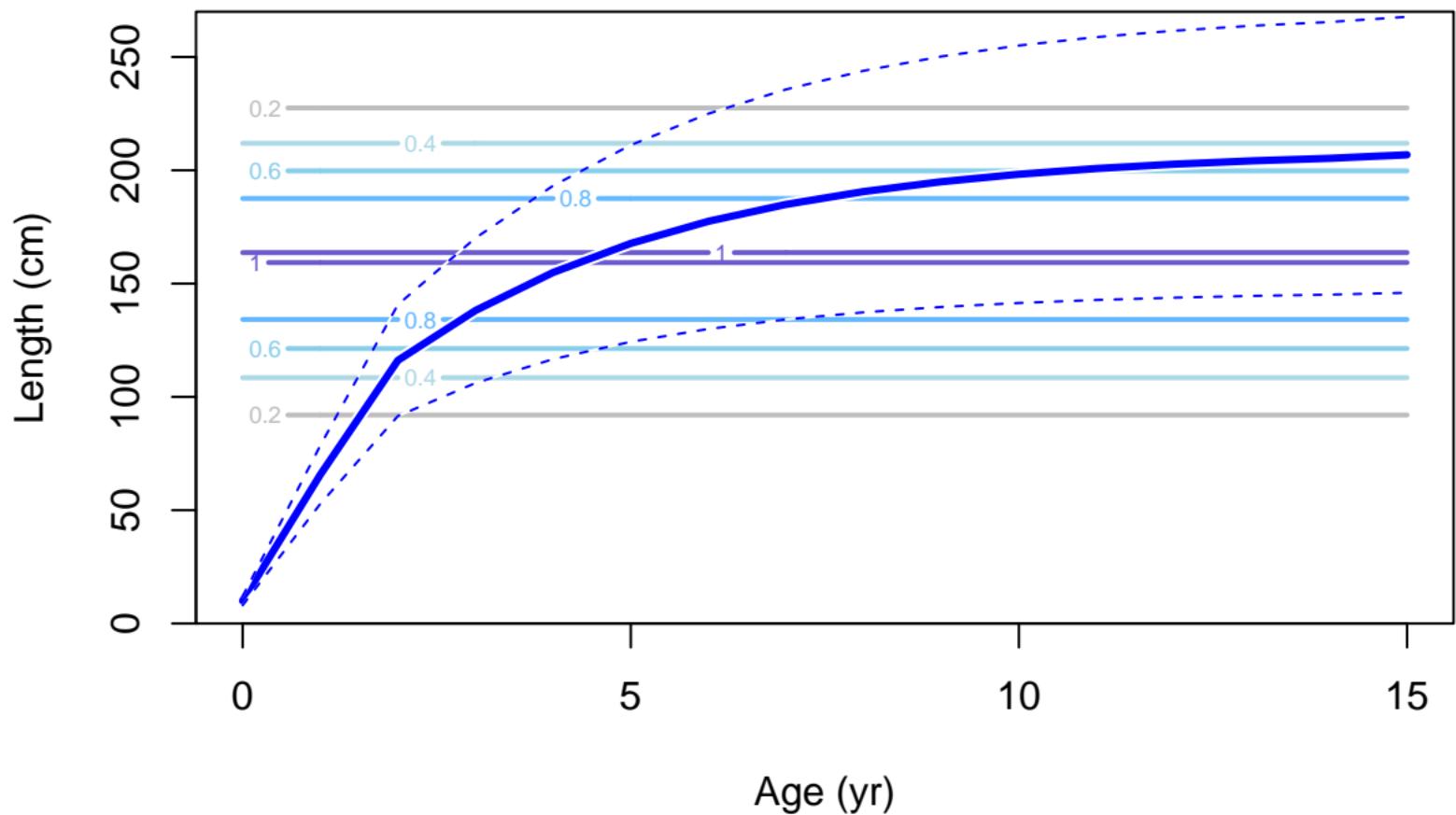


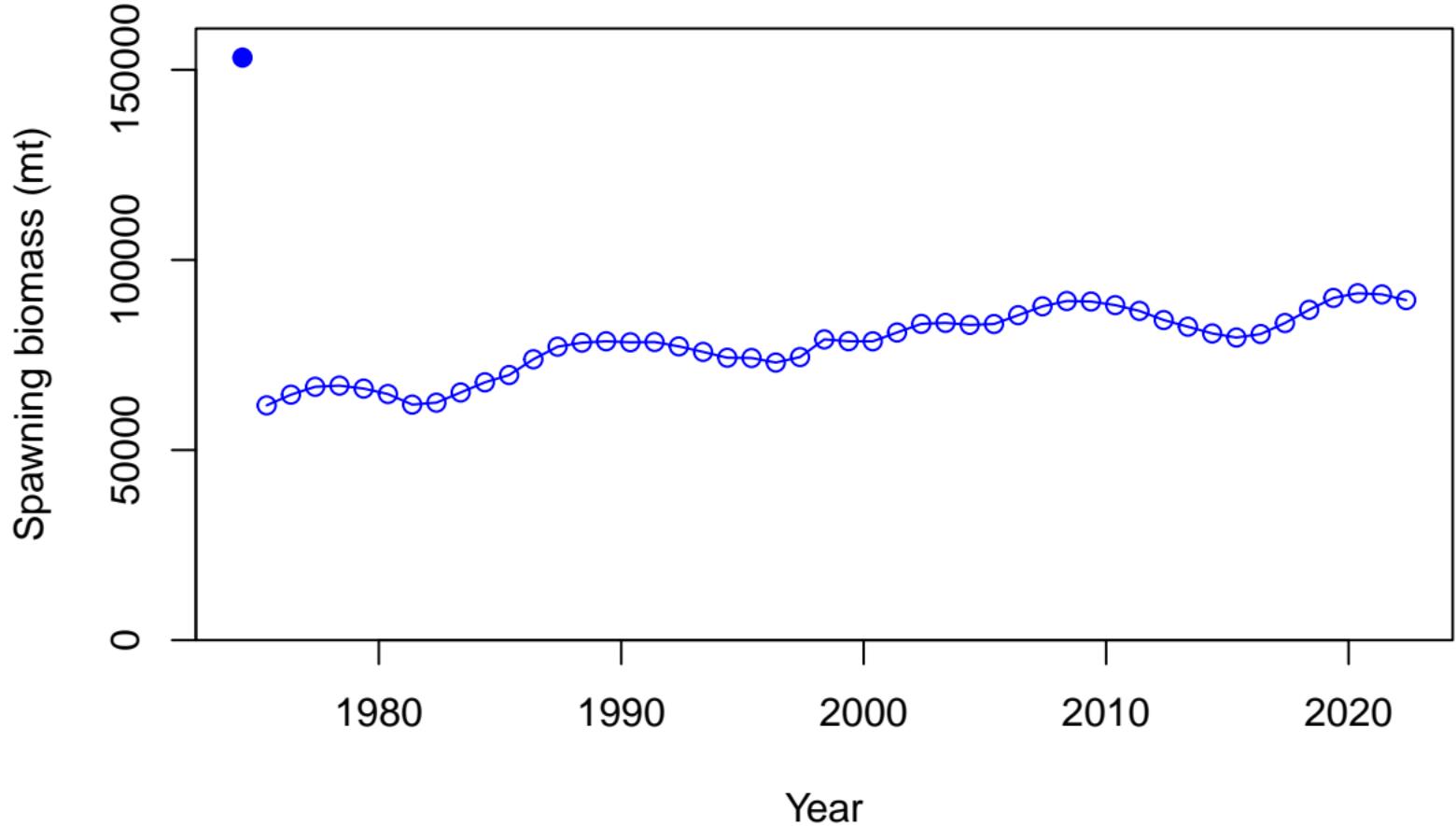


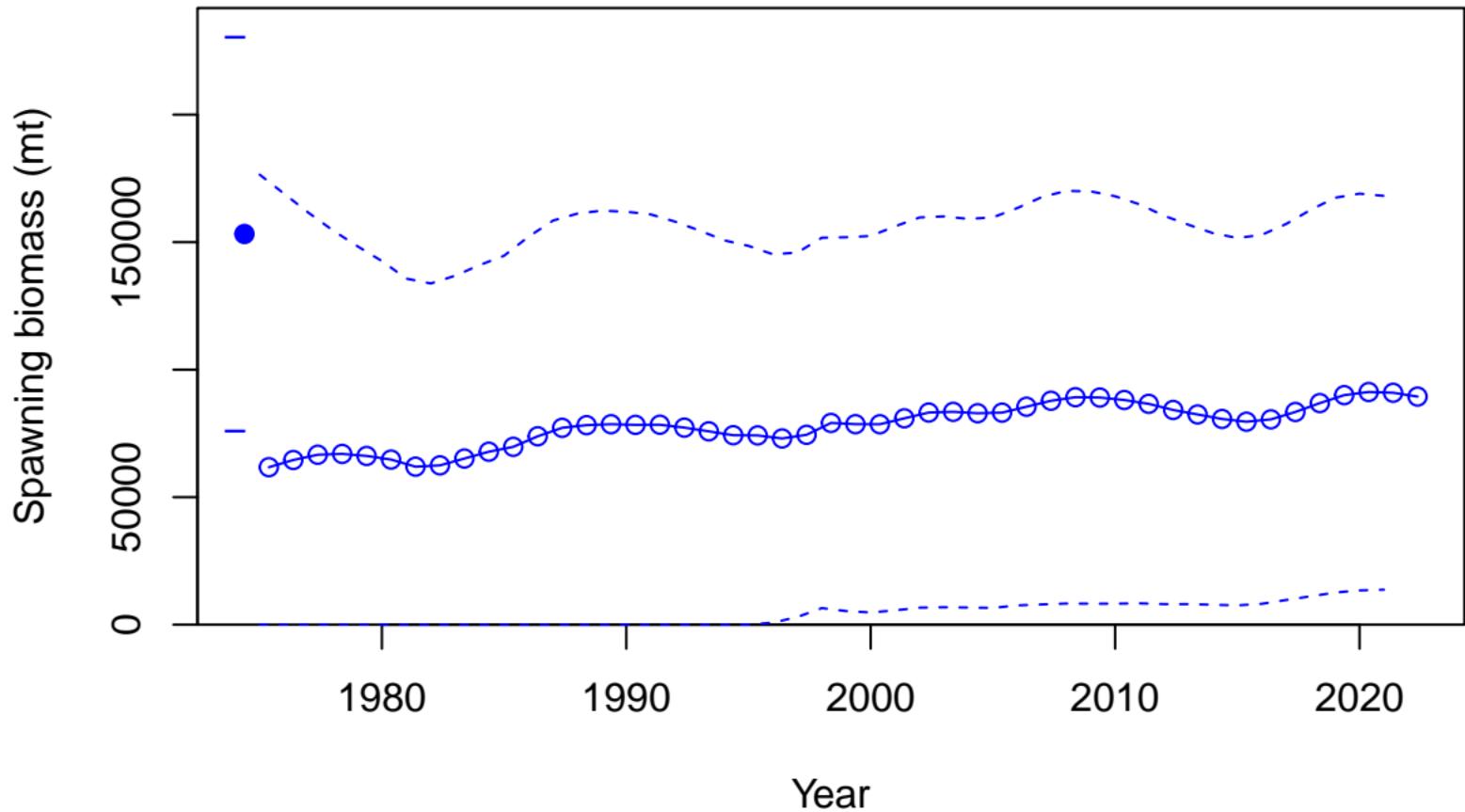




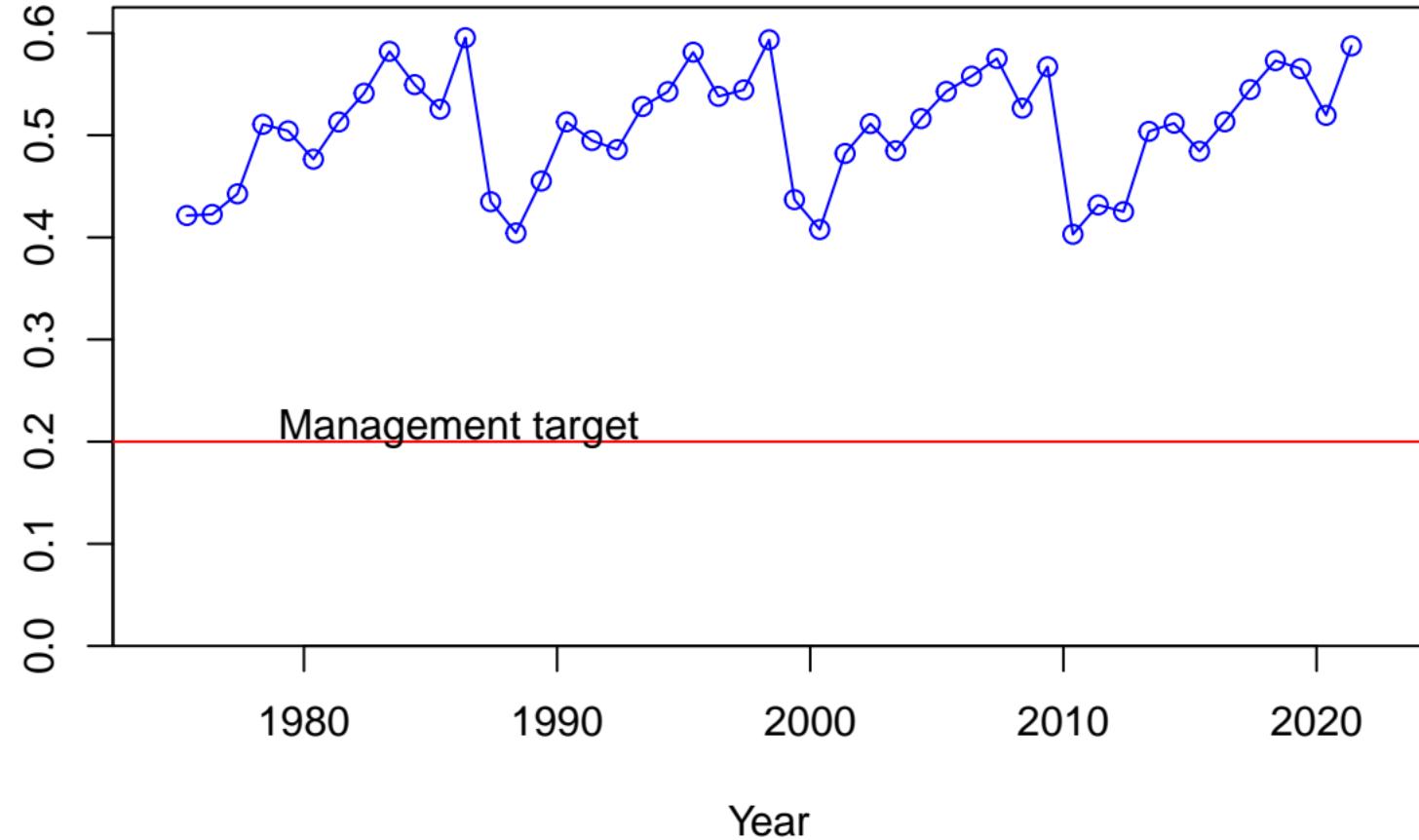




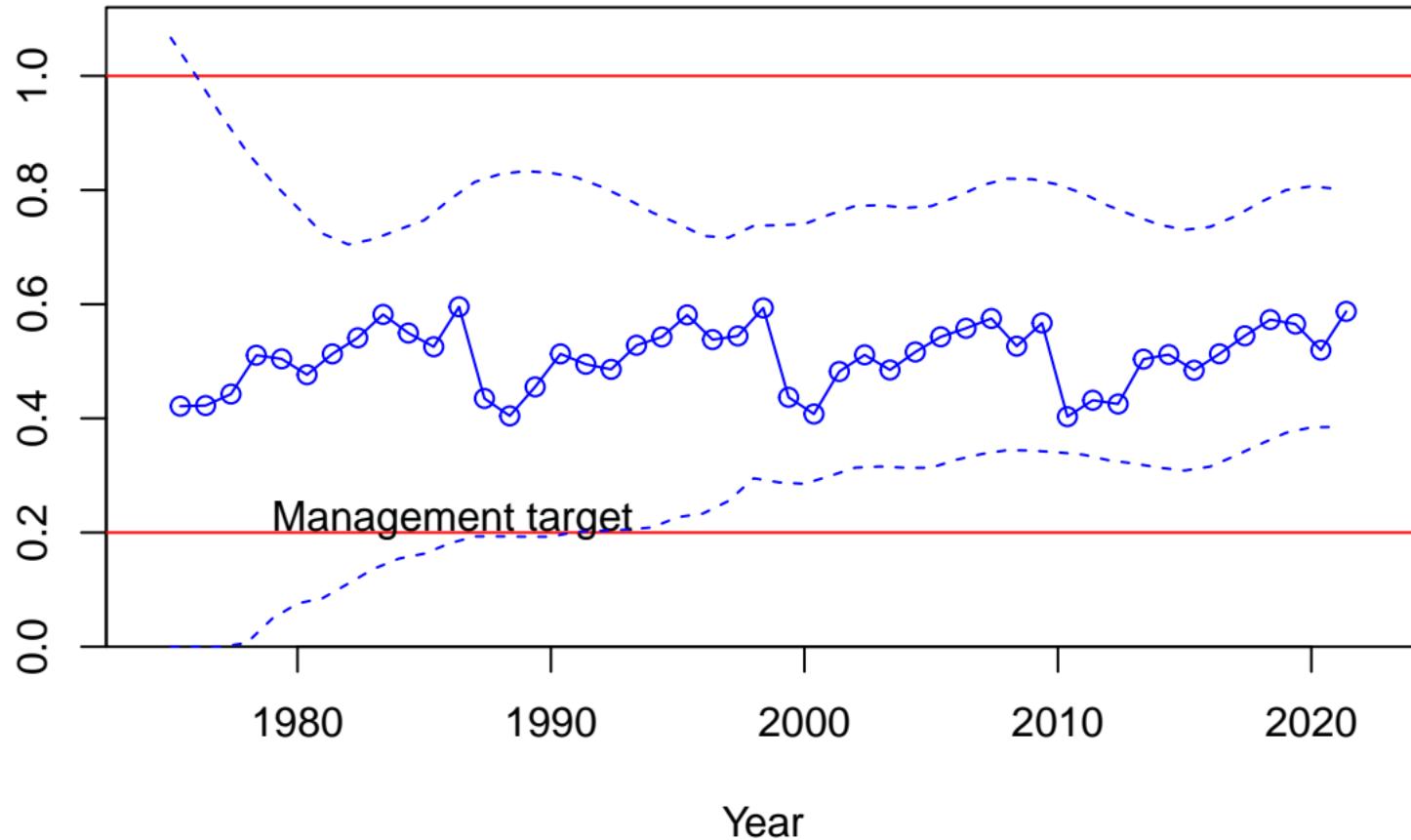


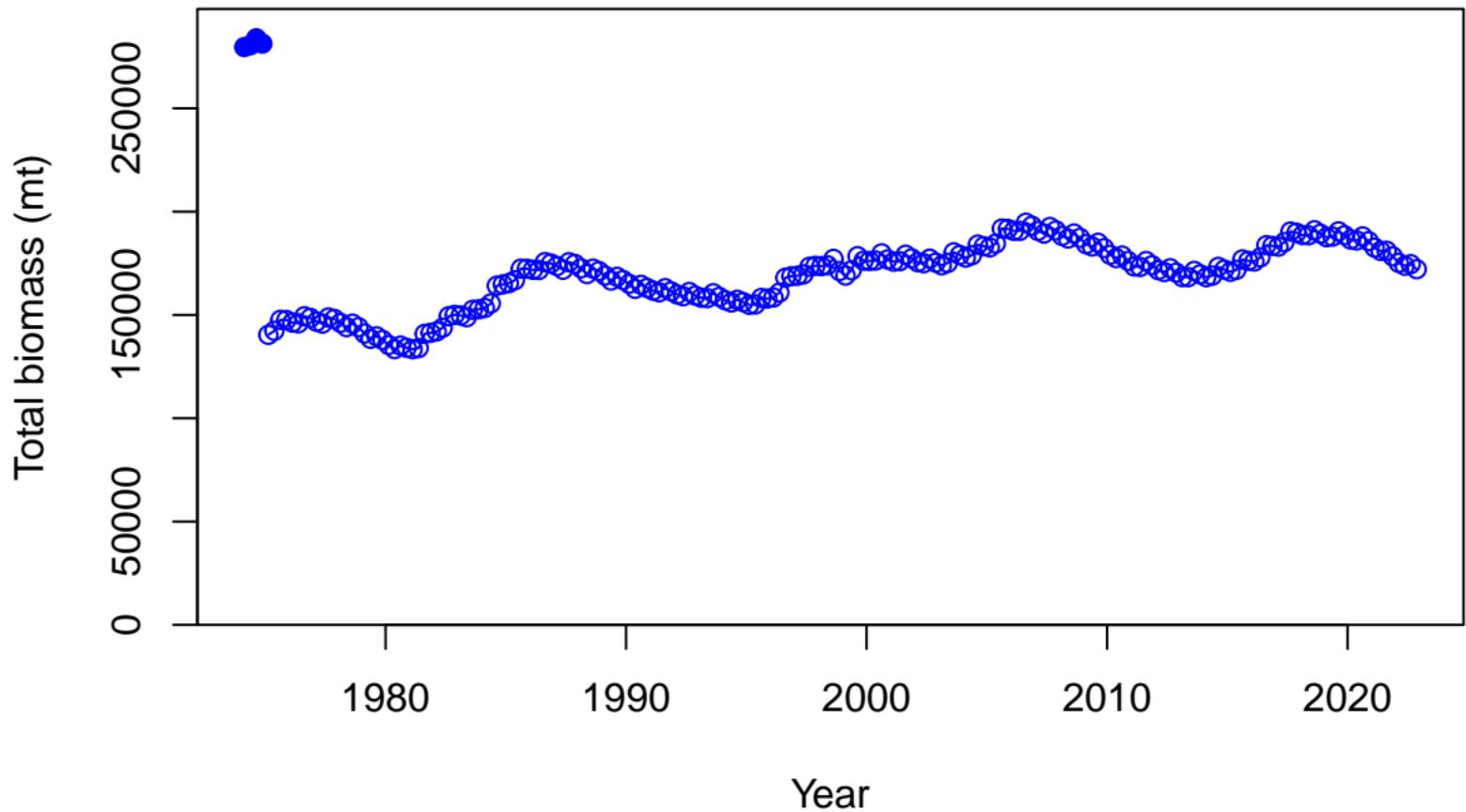


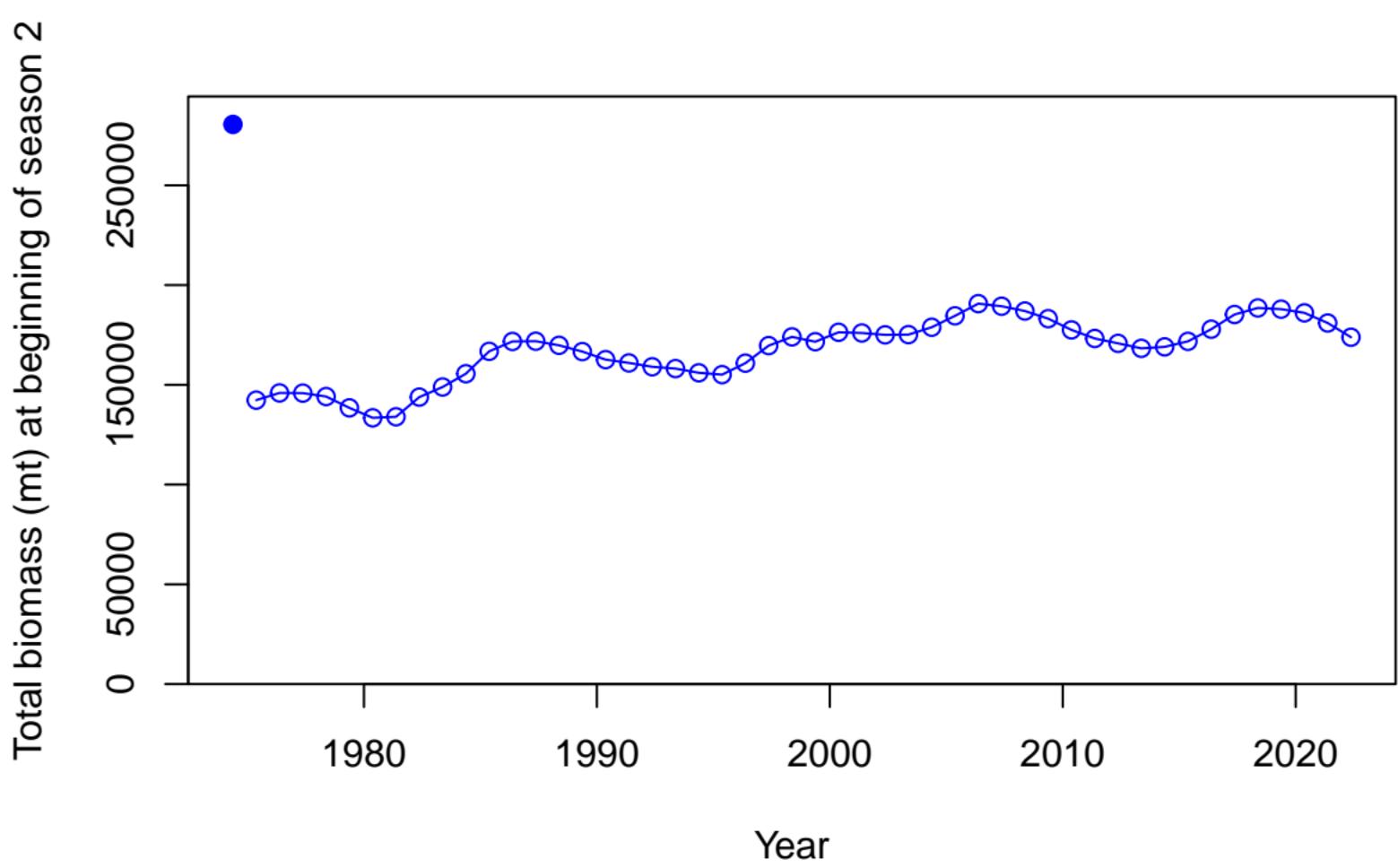
Relative spawning biomass: B/B_0

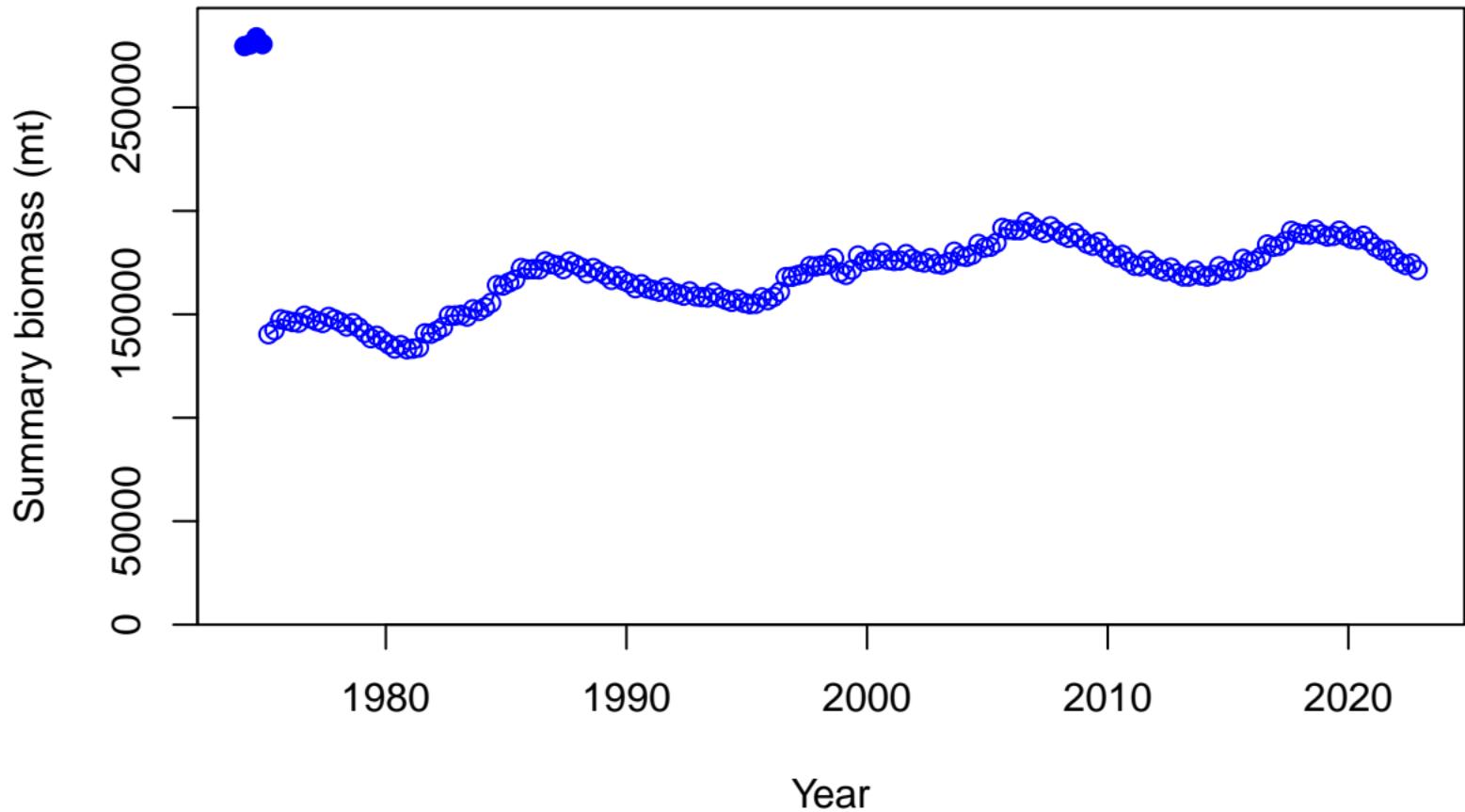


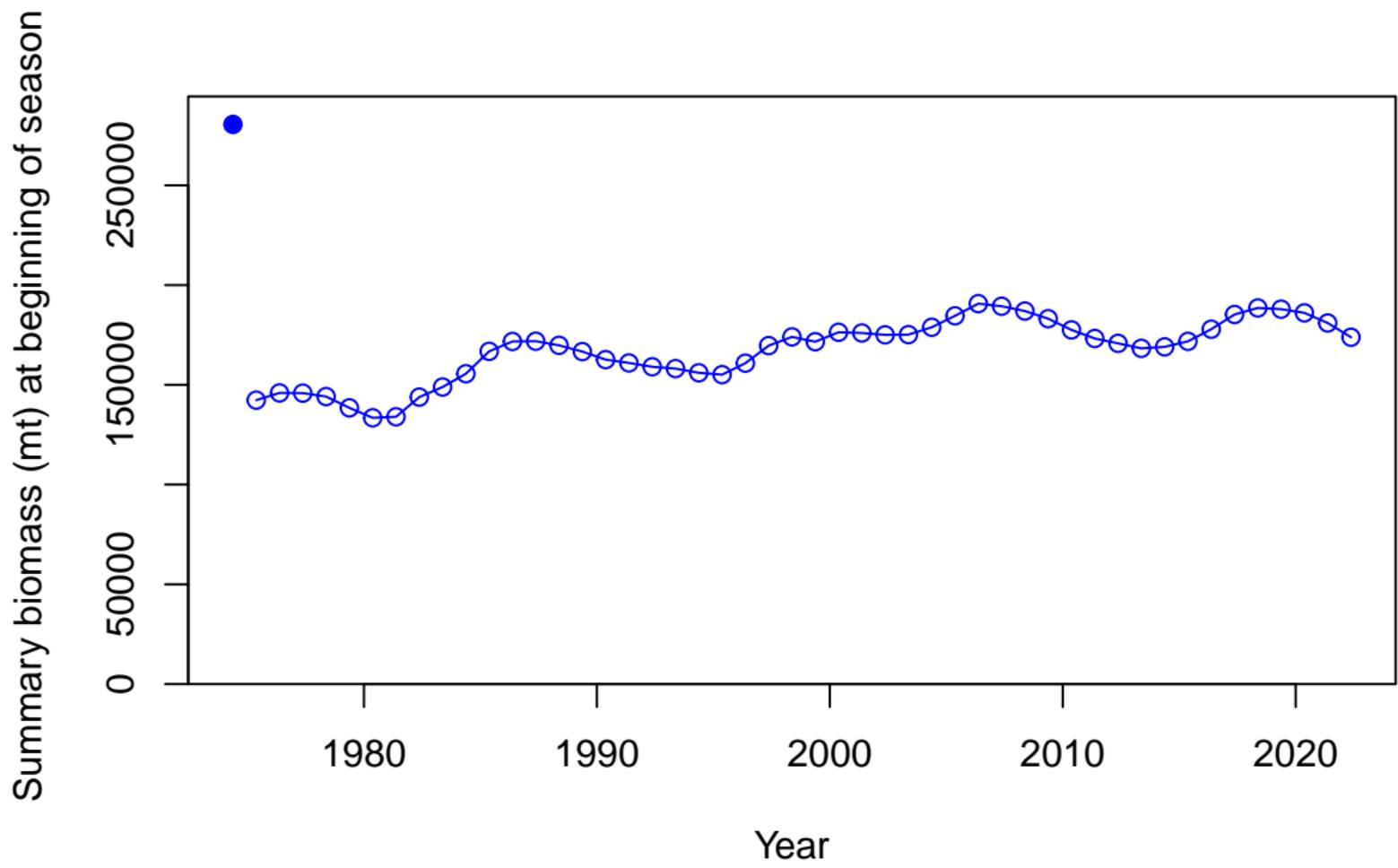
Relative spawning biomass: B/B_0

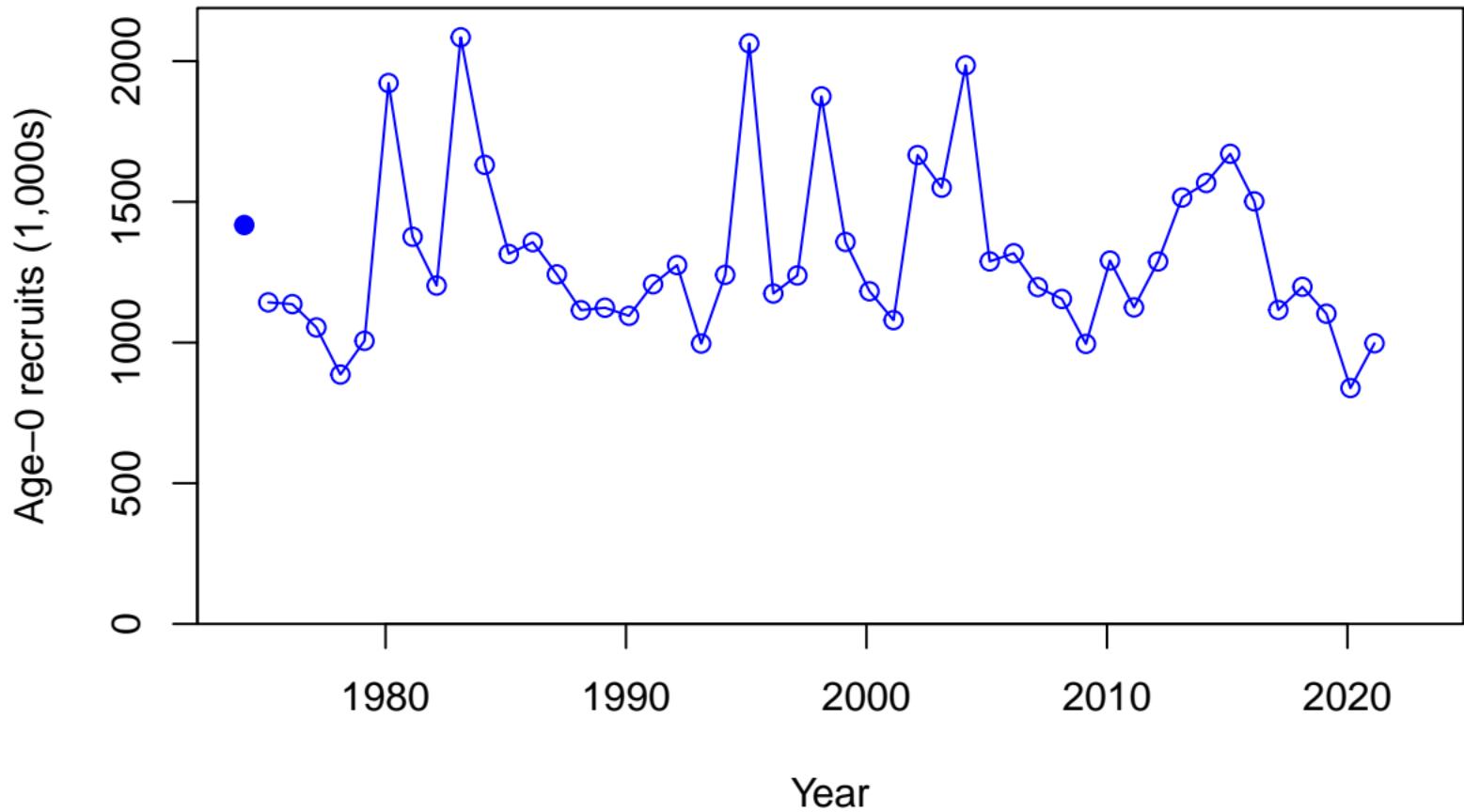


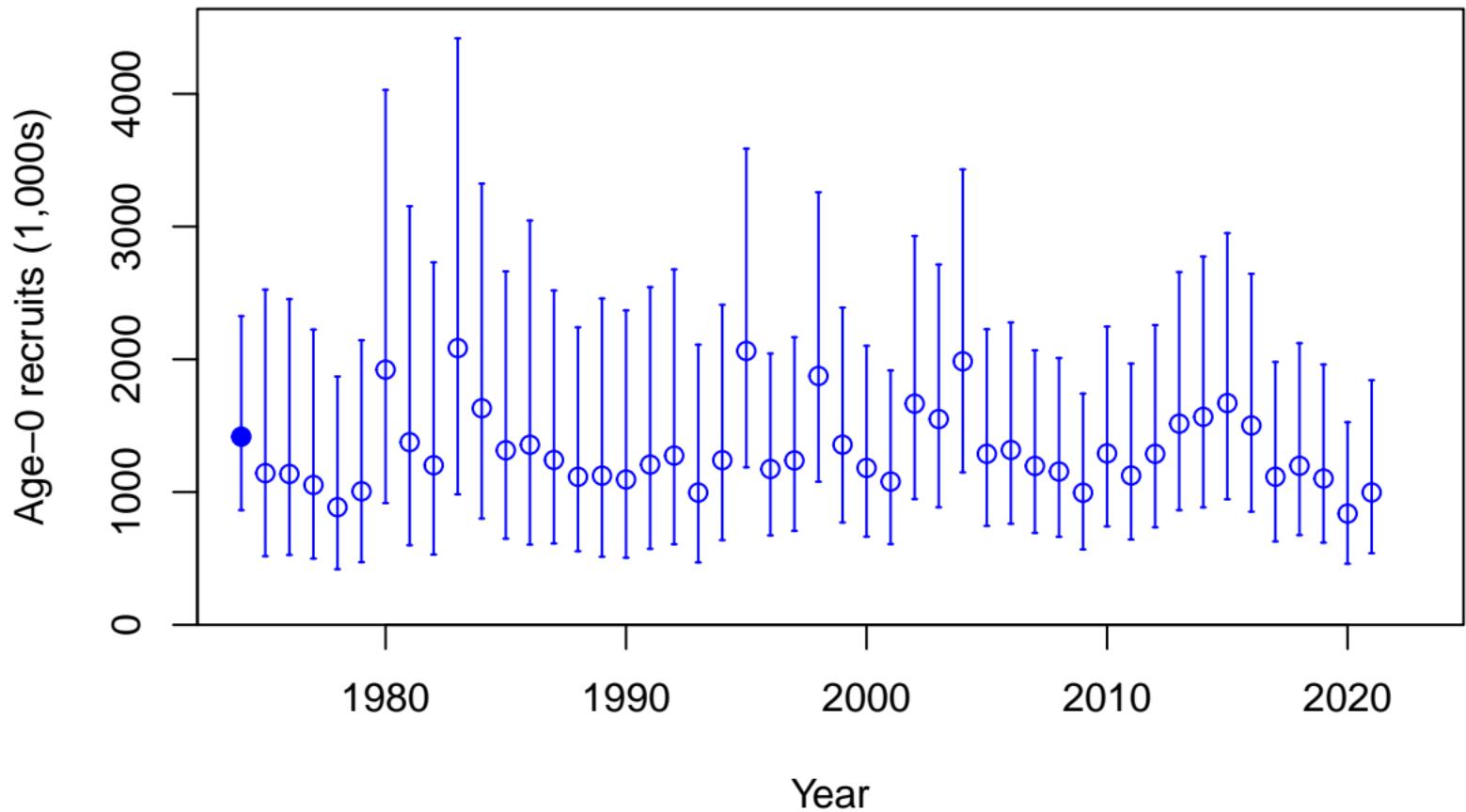


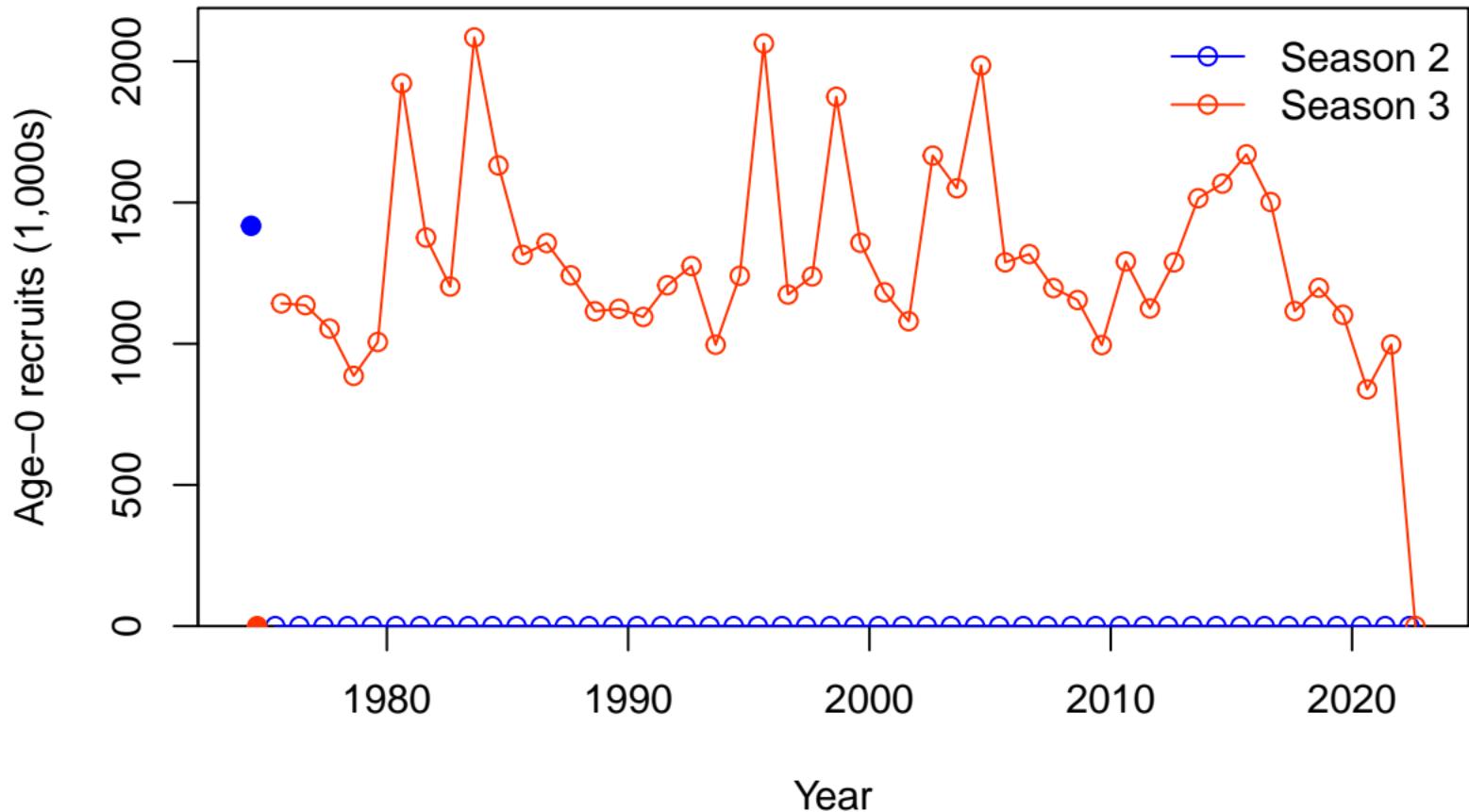




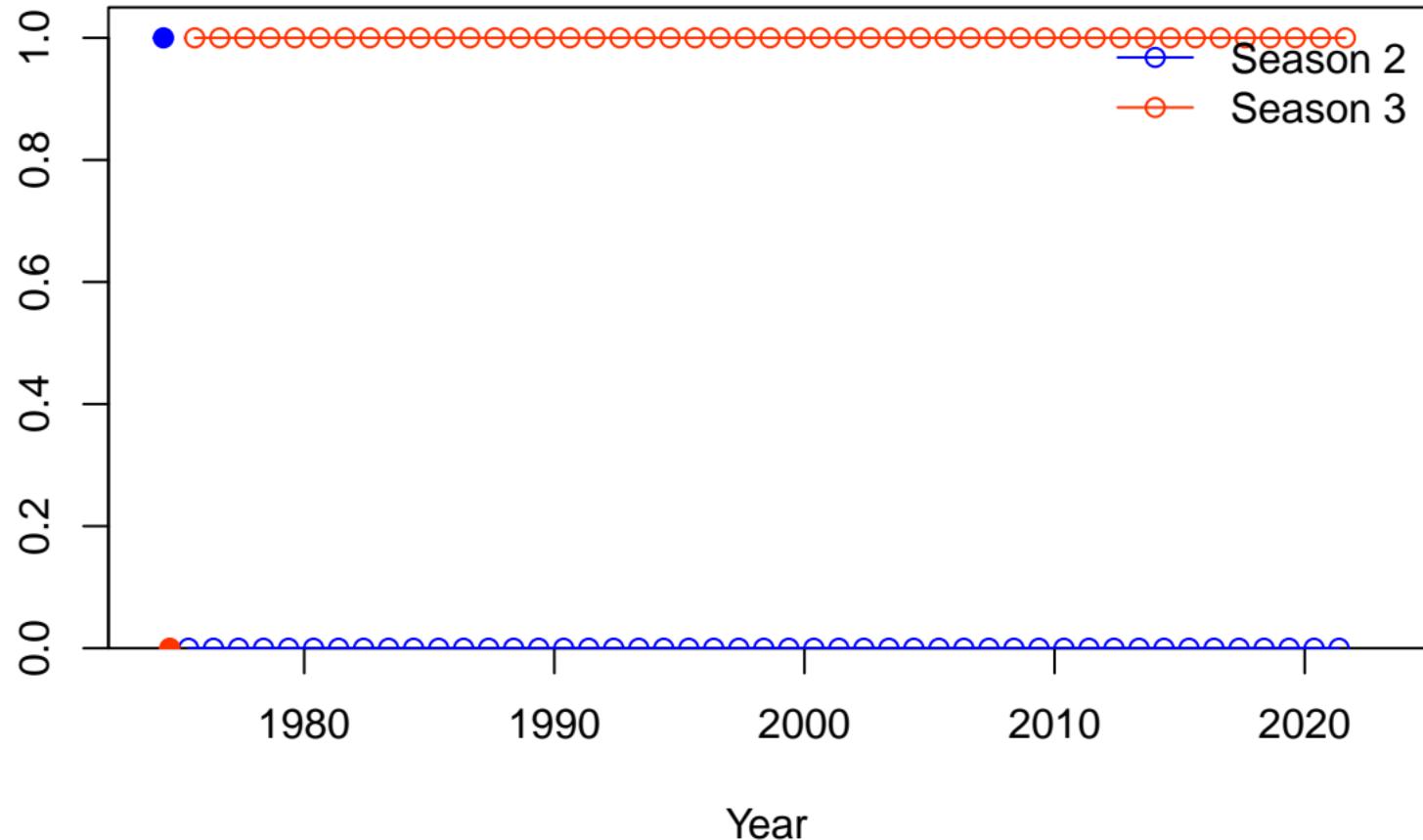




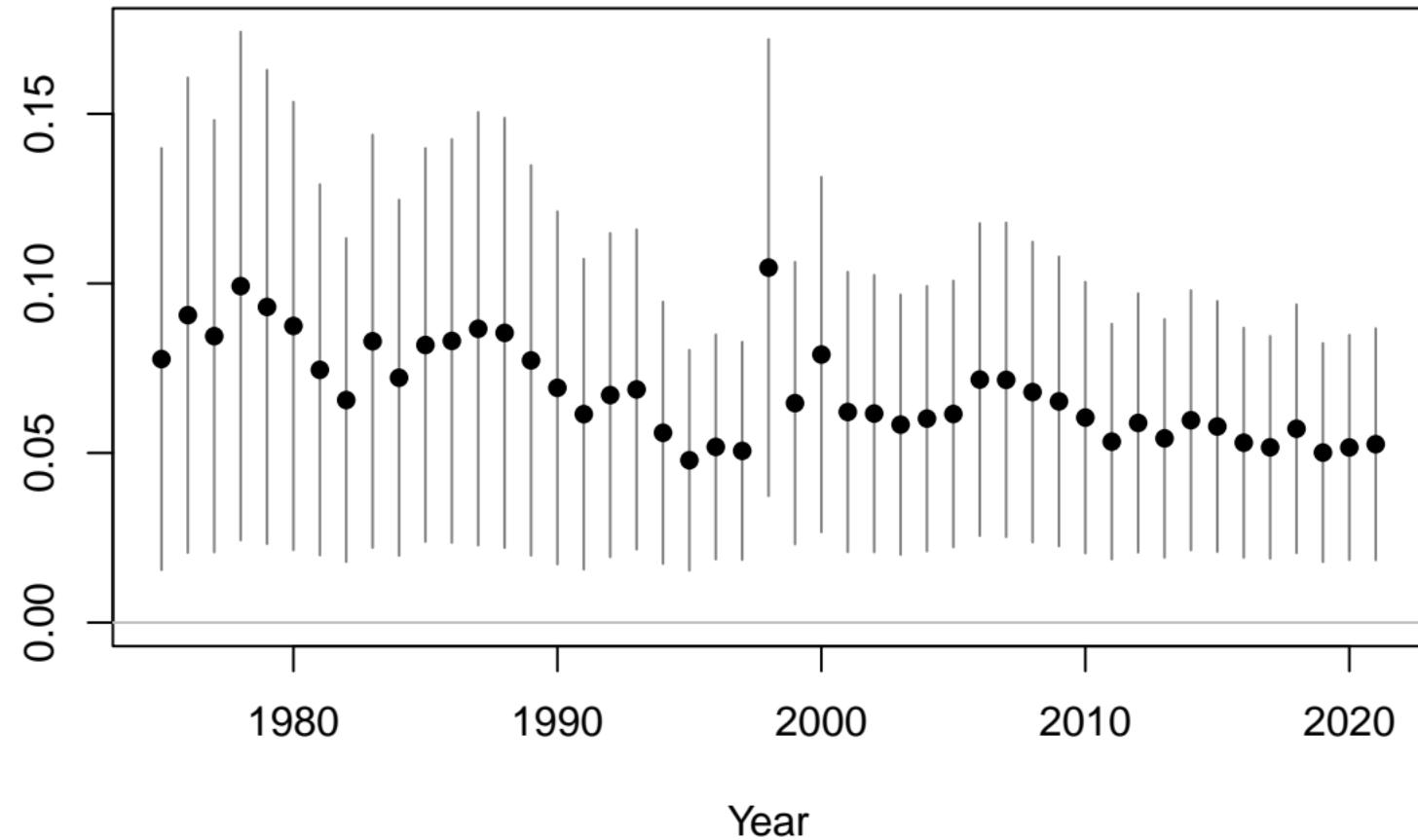


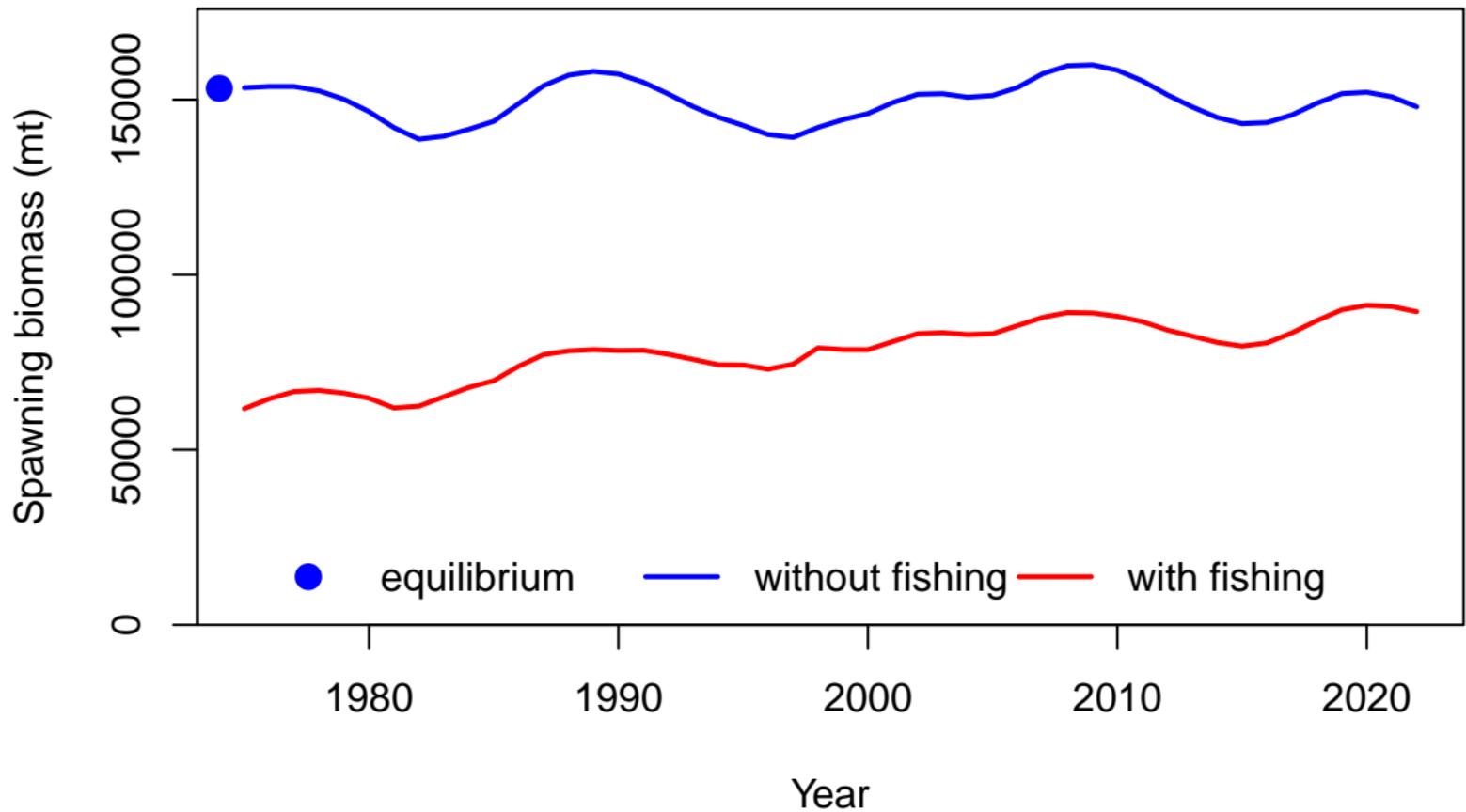


Fraction of total Age-0 recruits

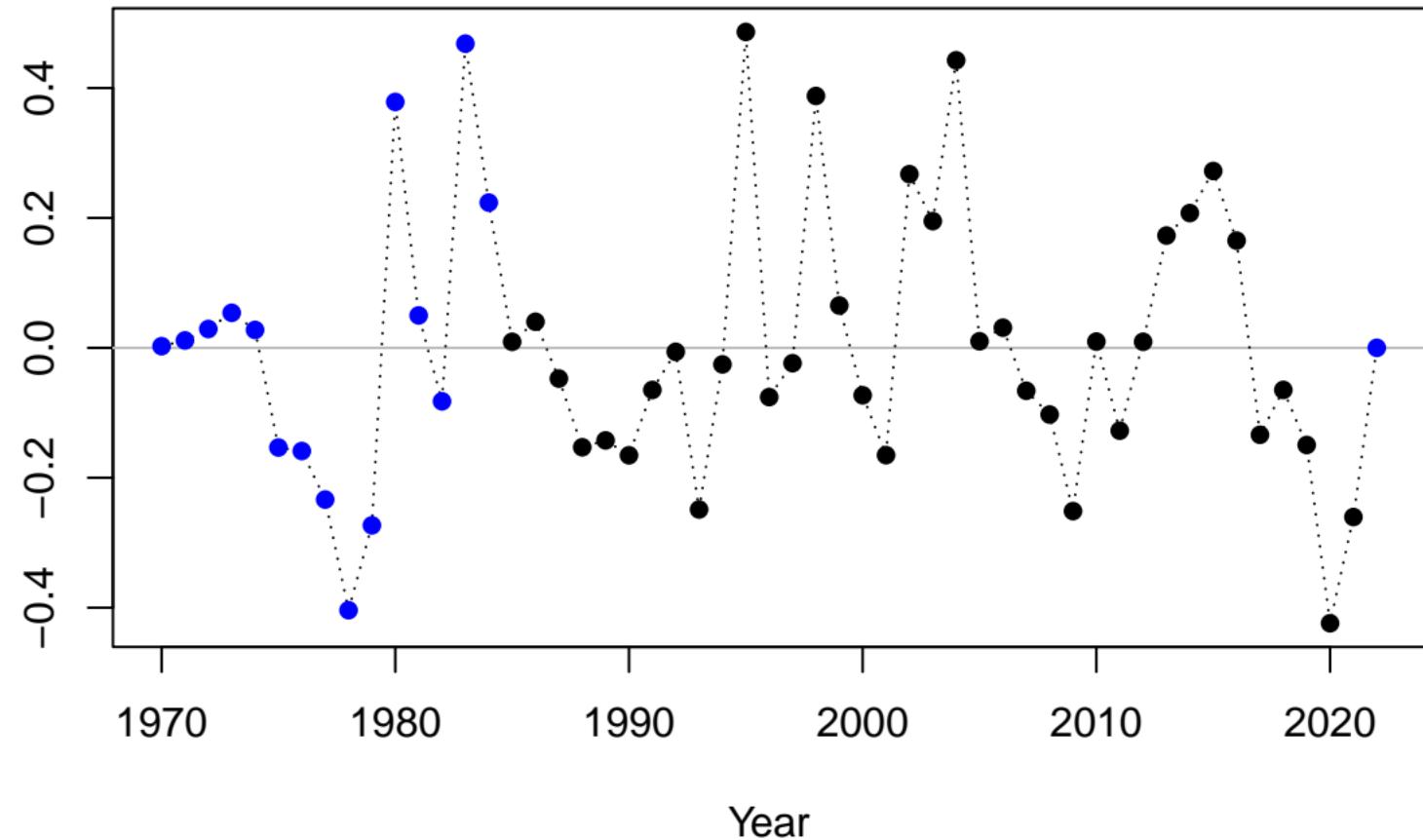


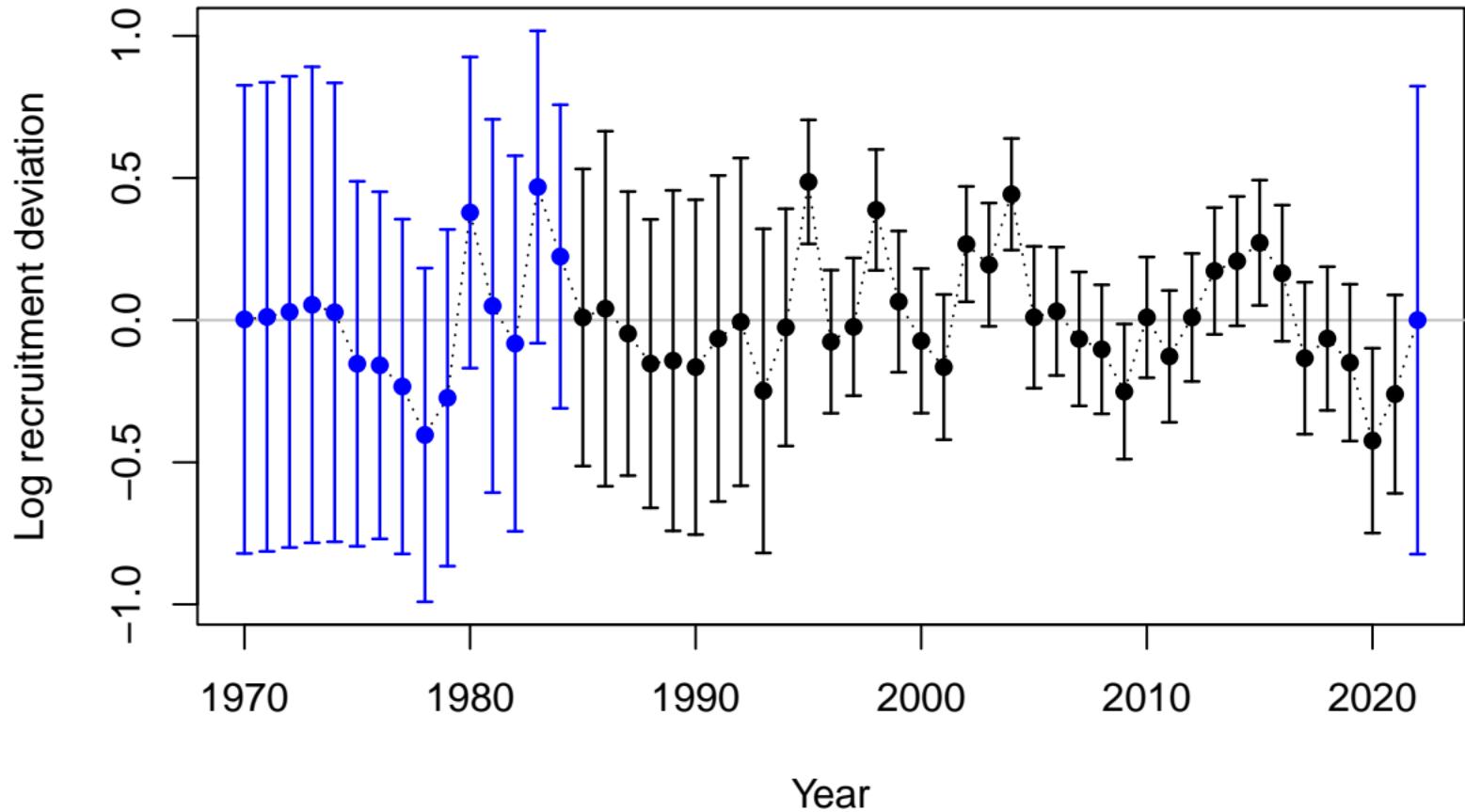
Summary Fishing Mortality



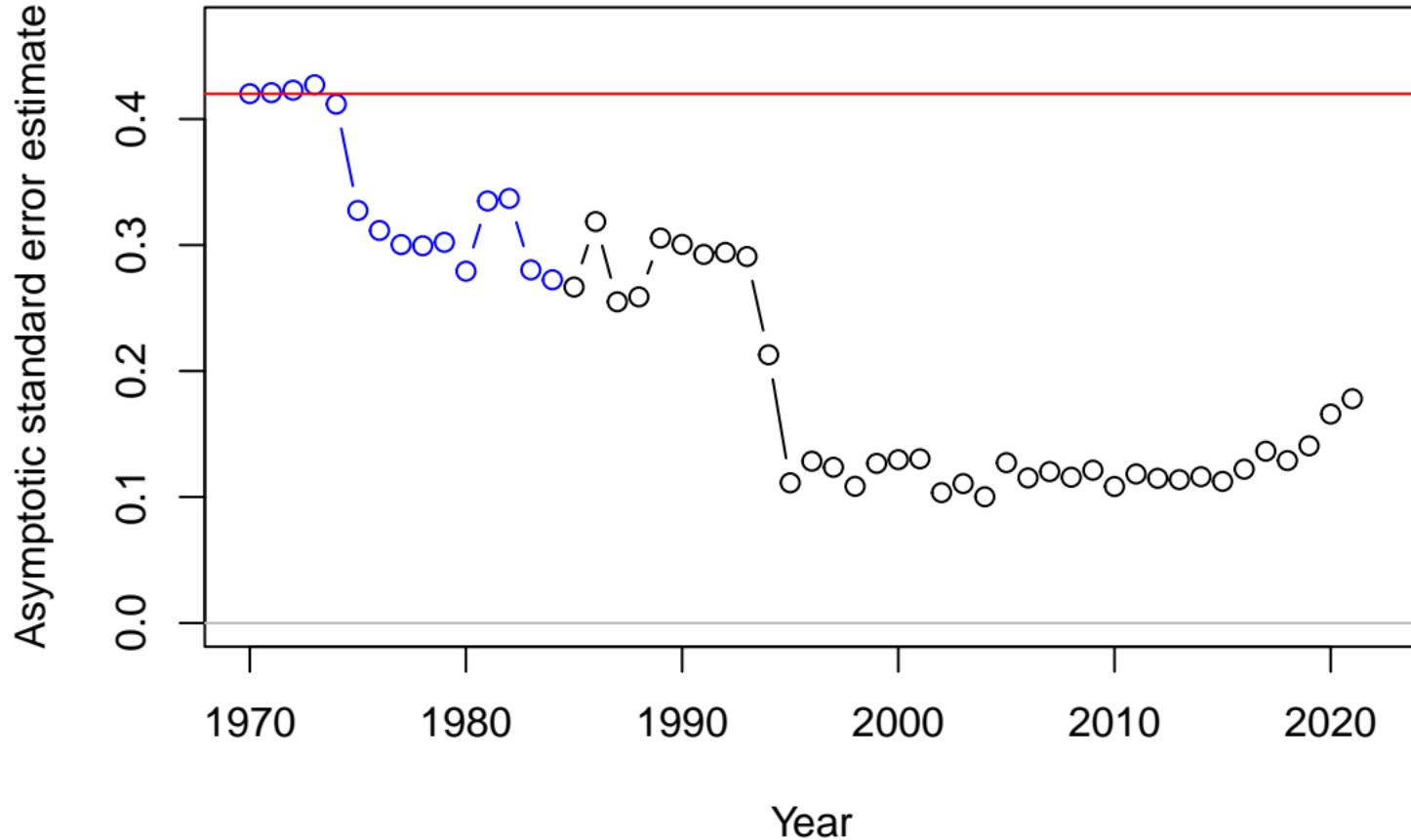


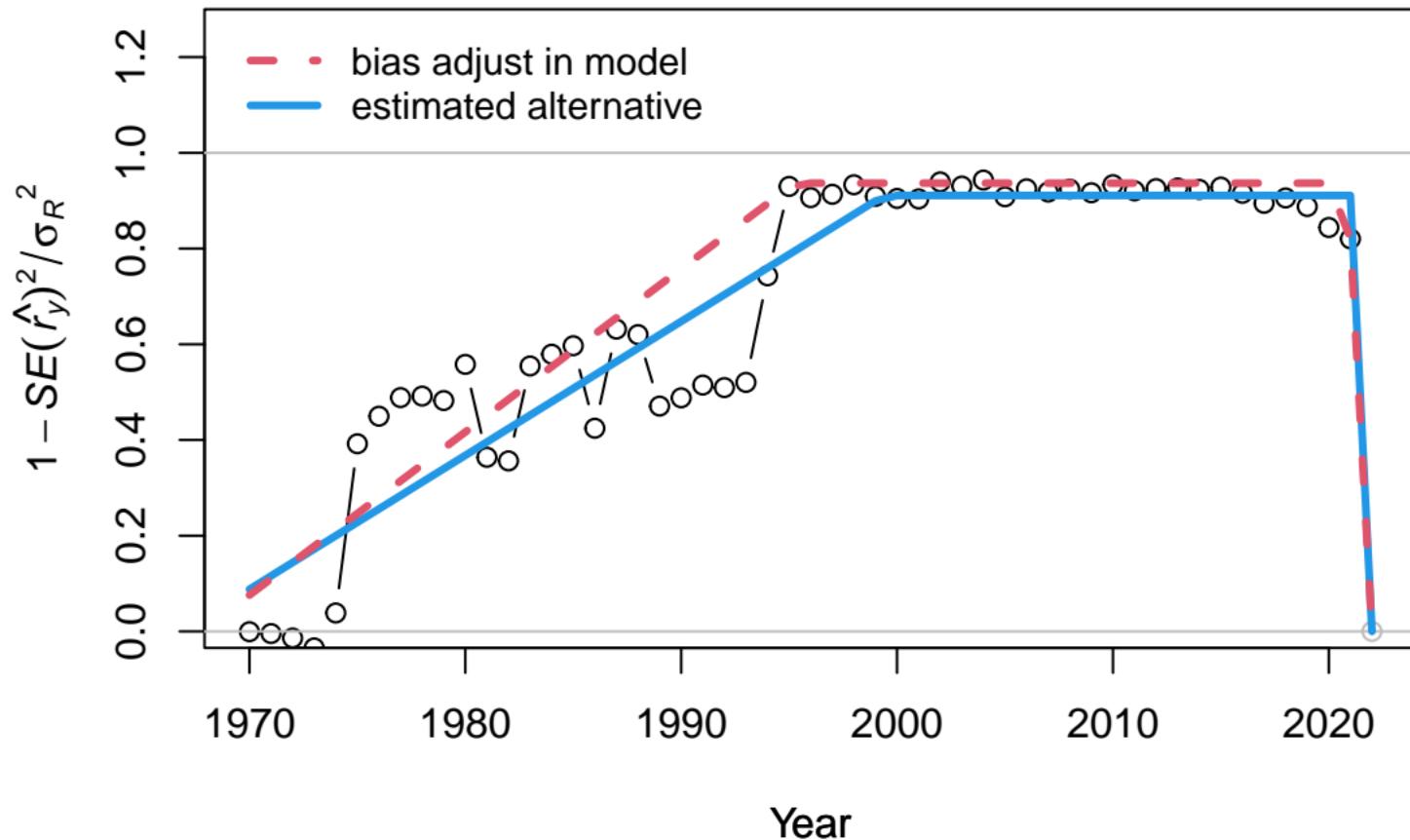
Log recruitment deviation

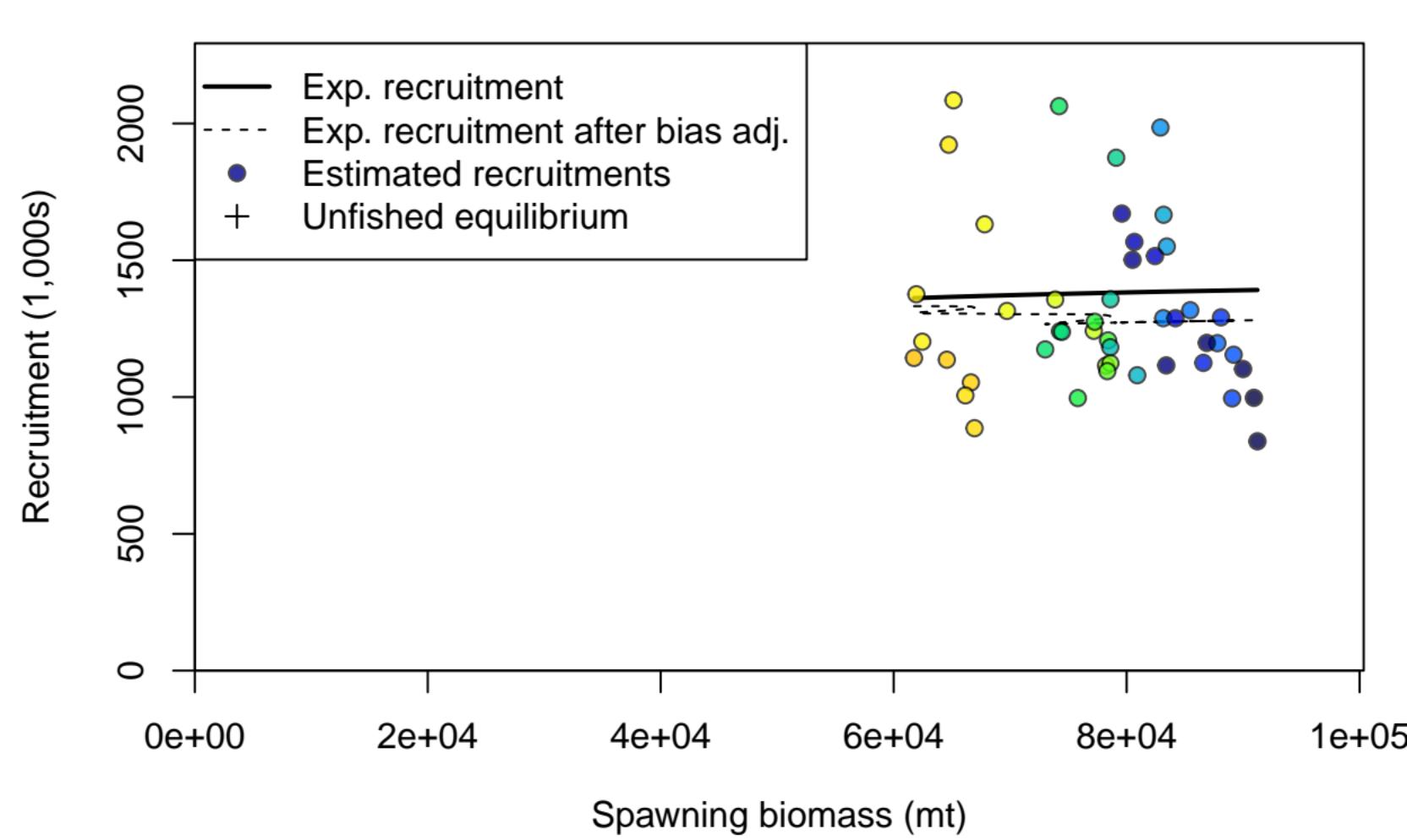


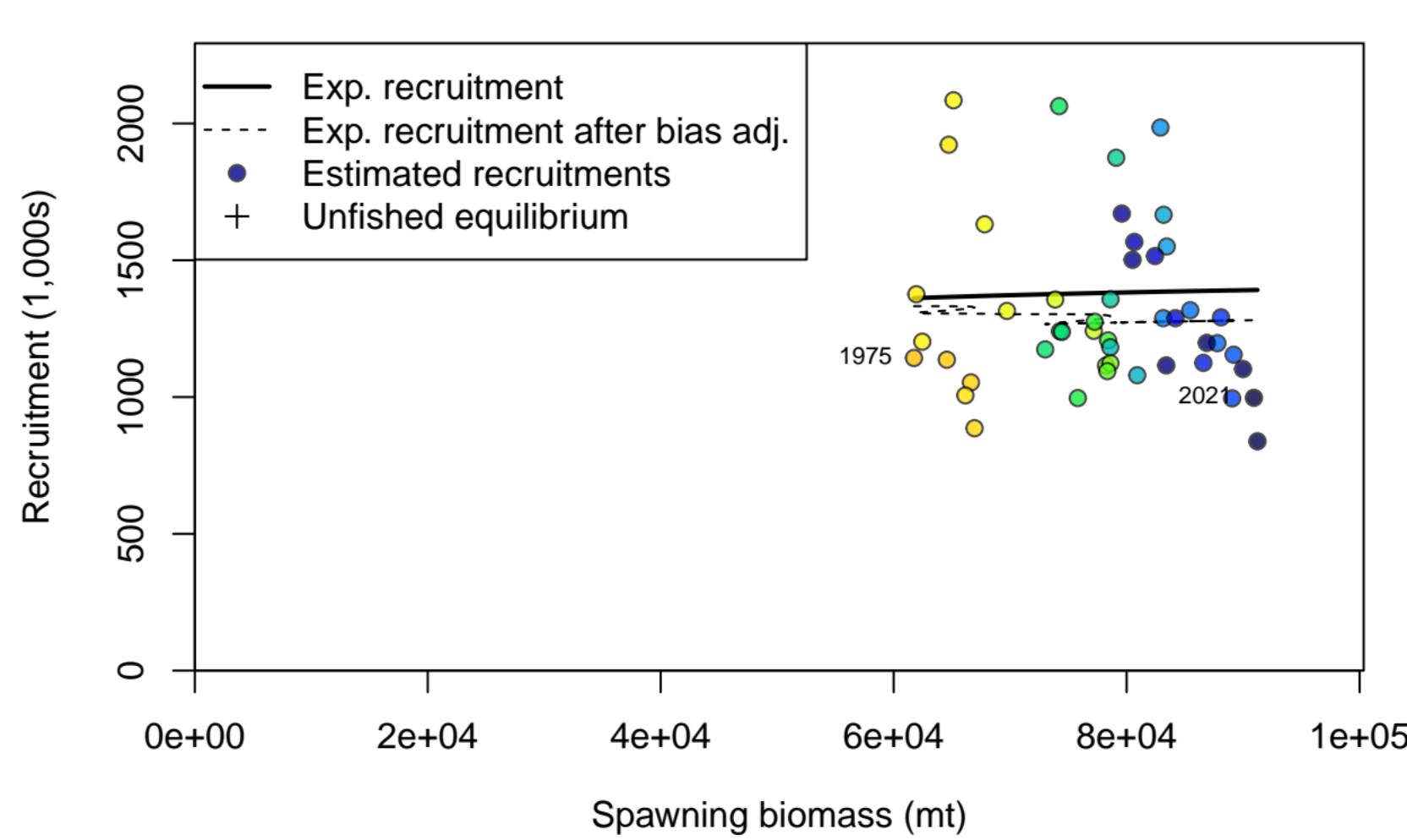


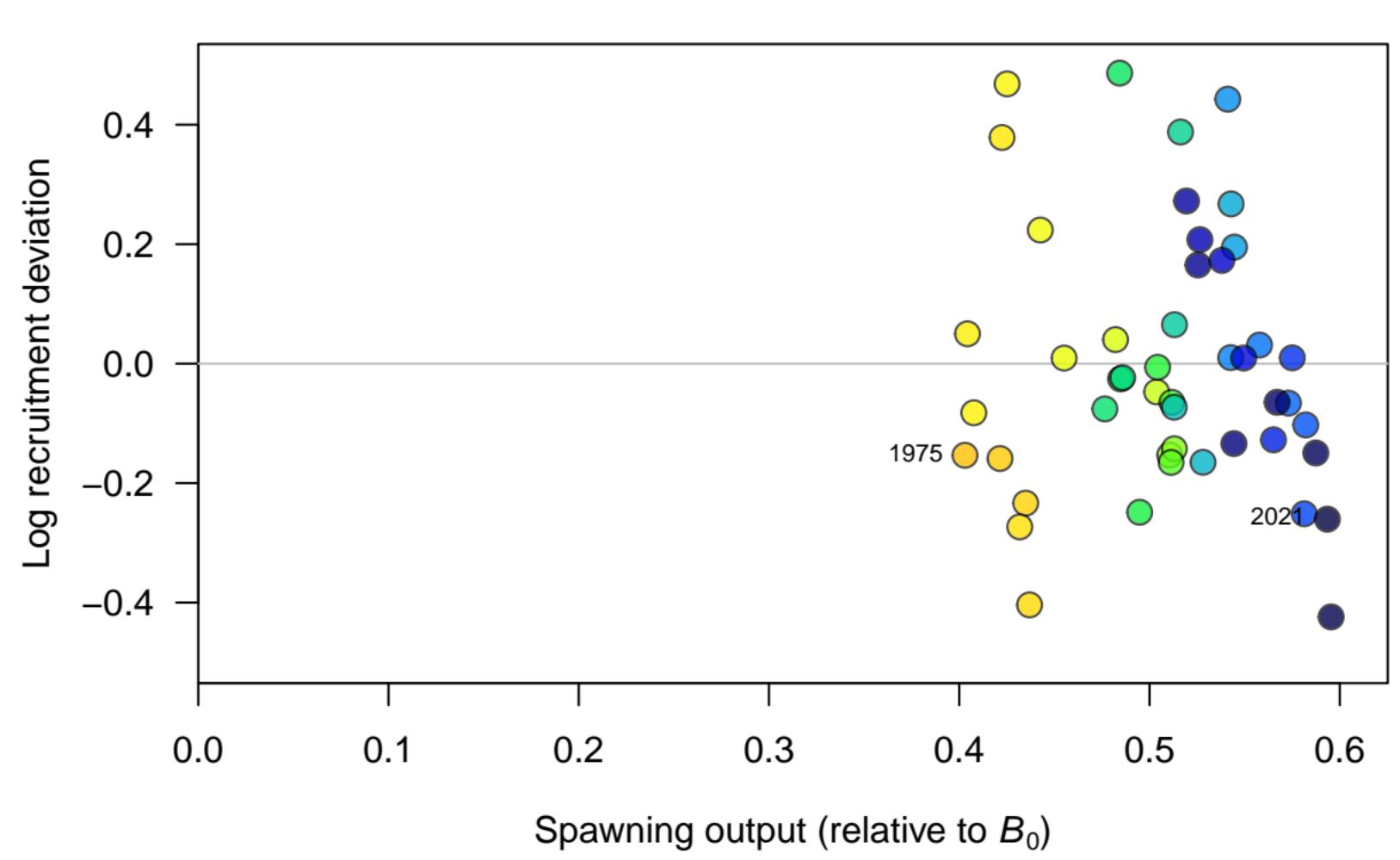
Recruitment deviation variance

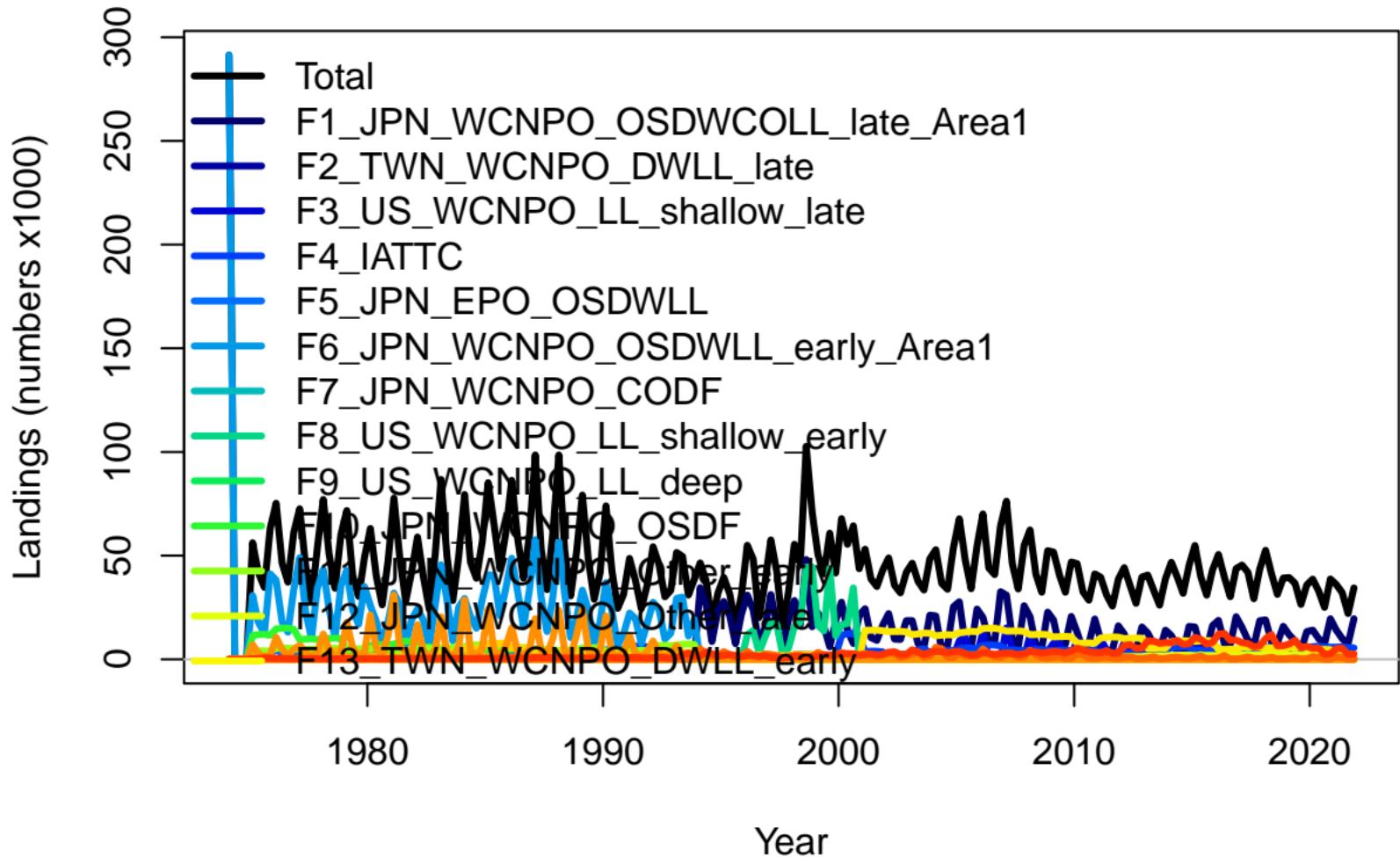


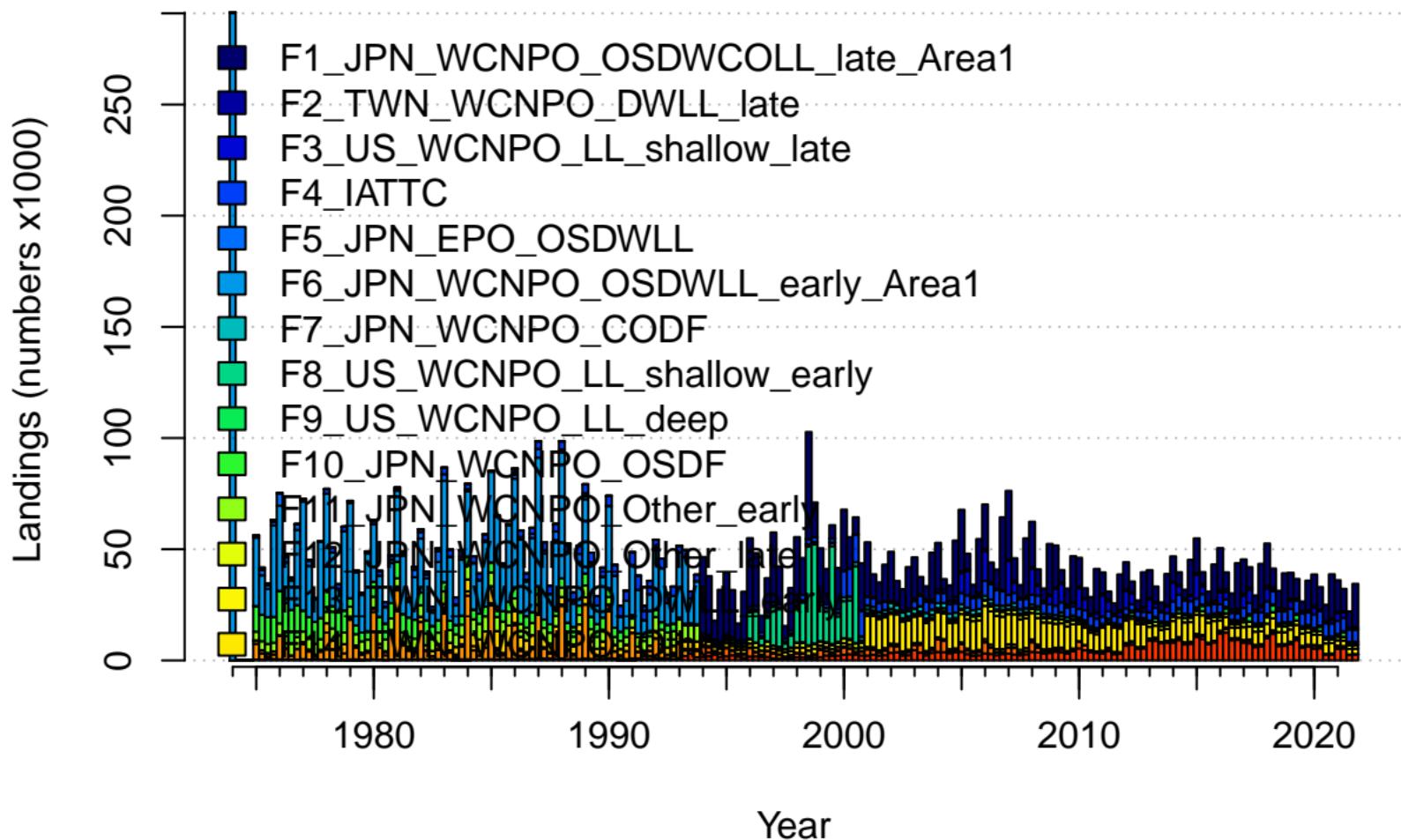


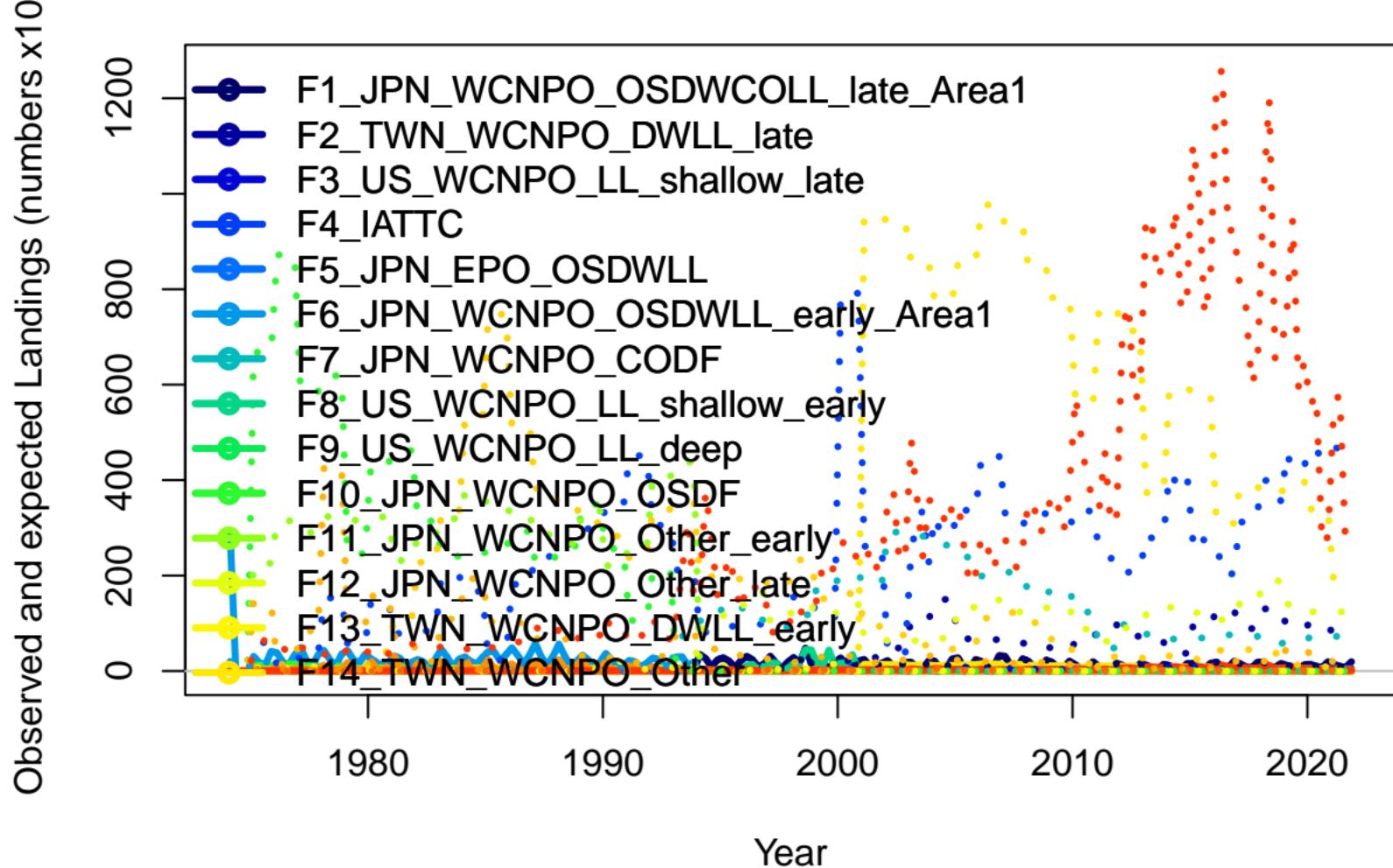


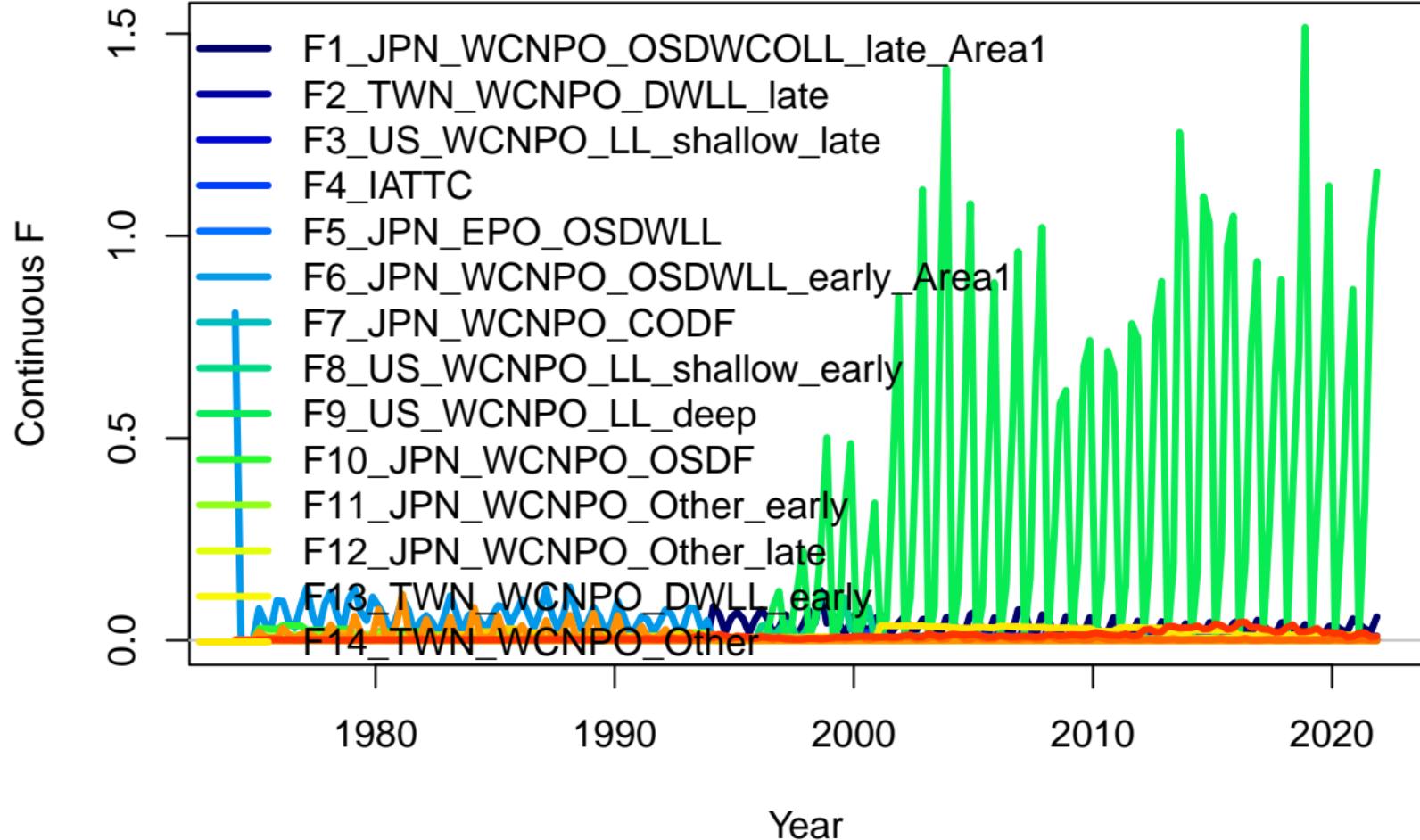


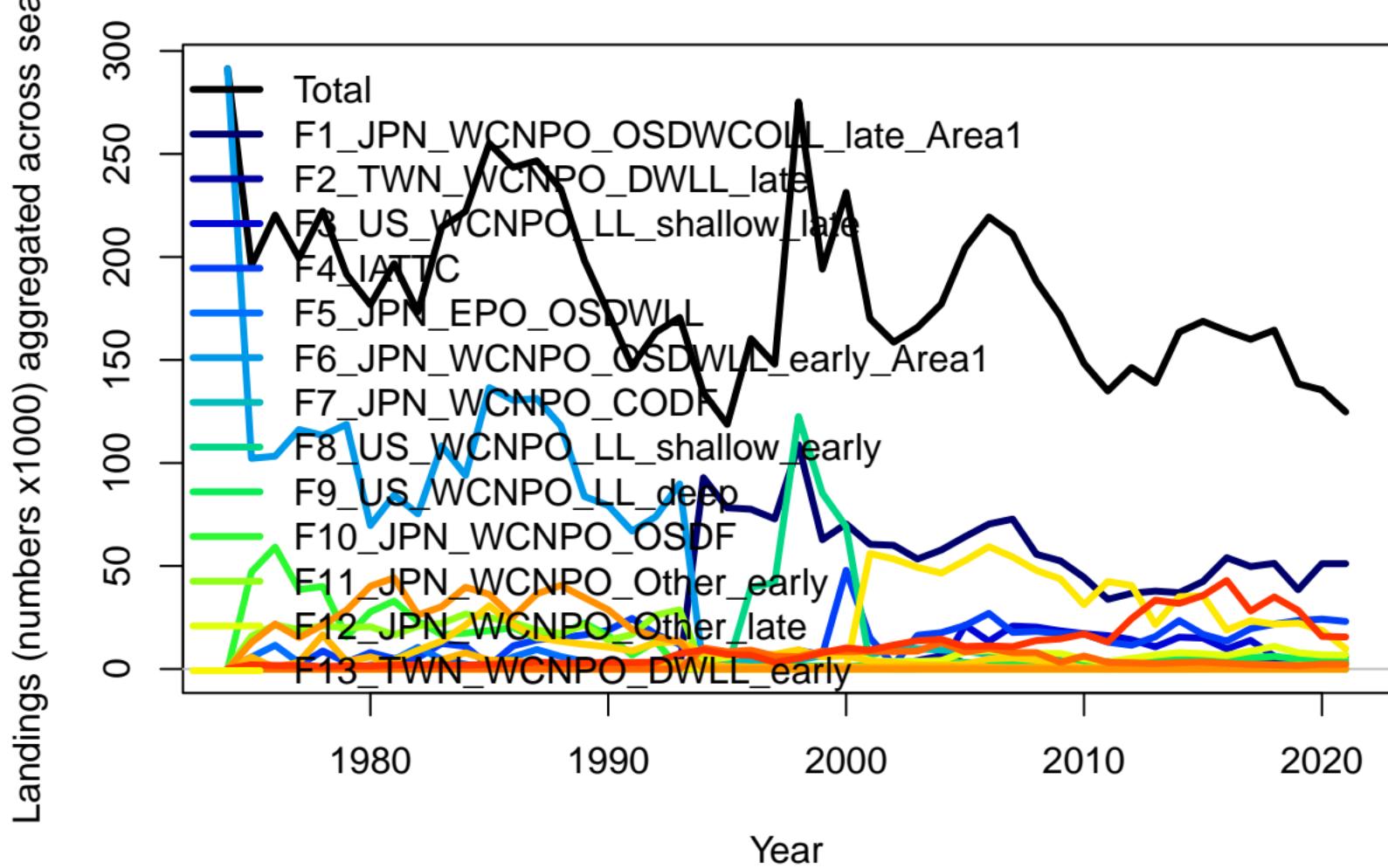


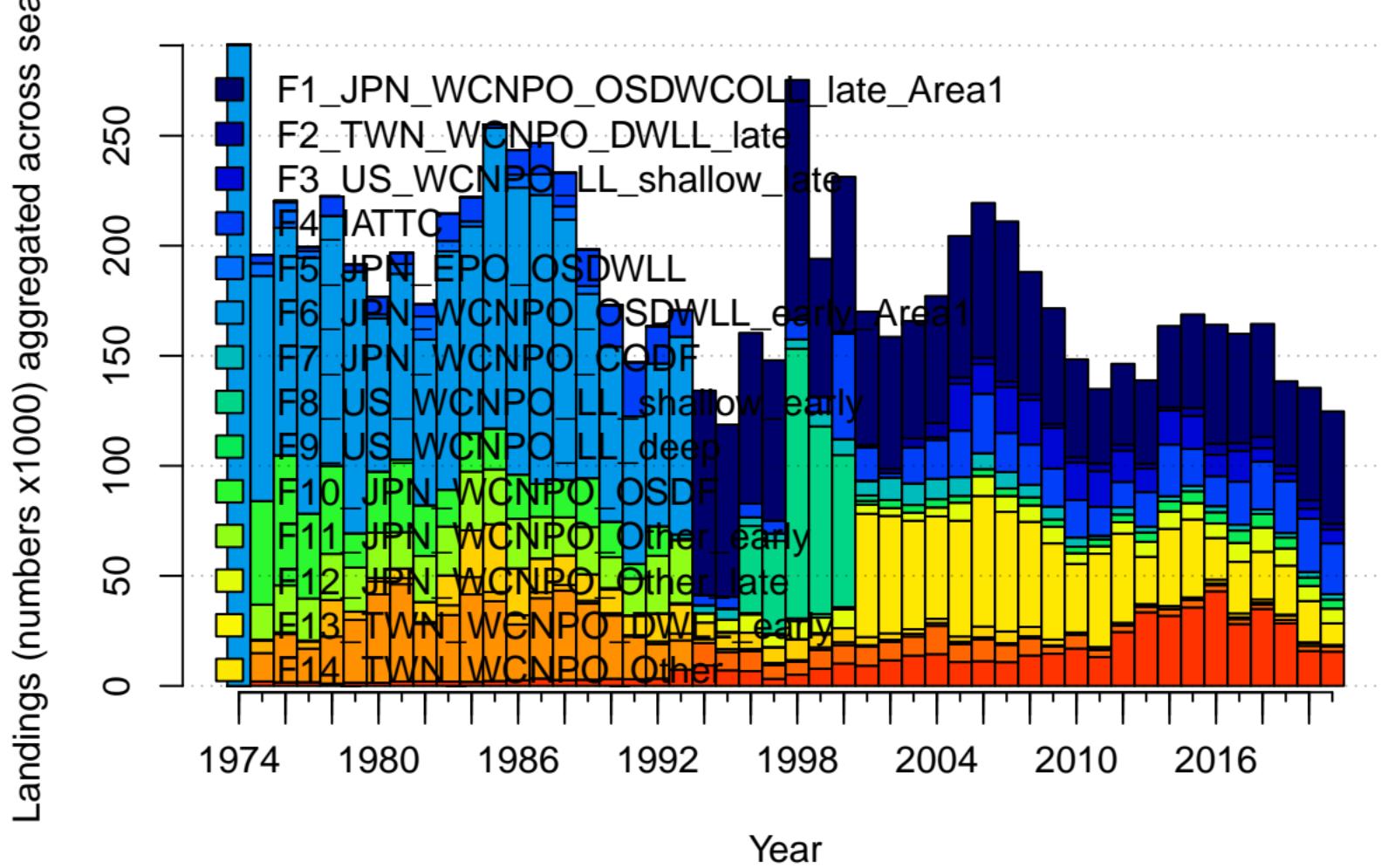




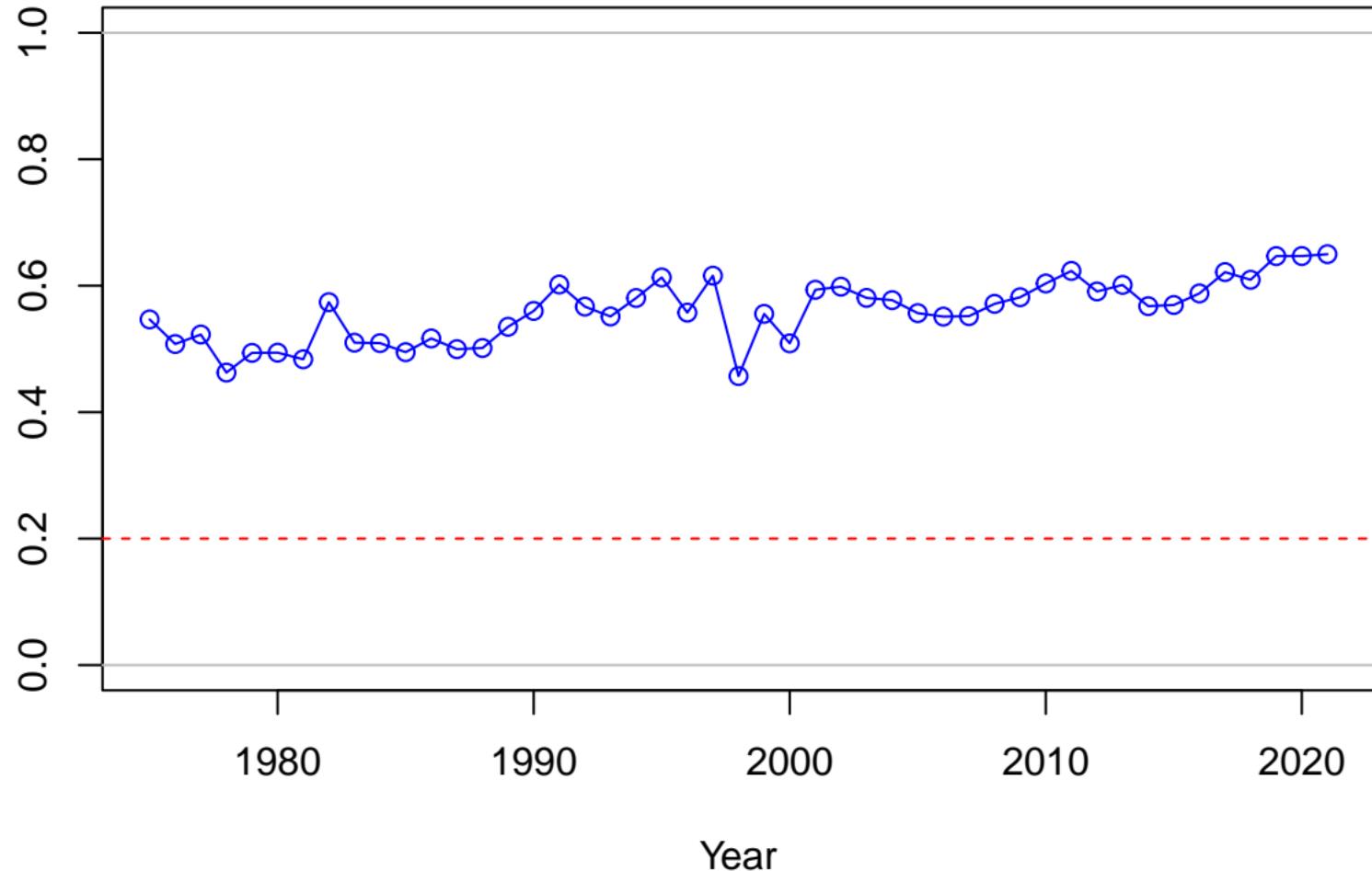




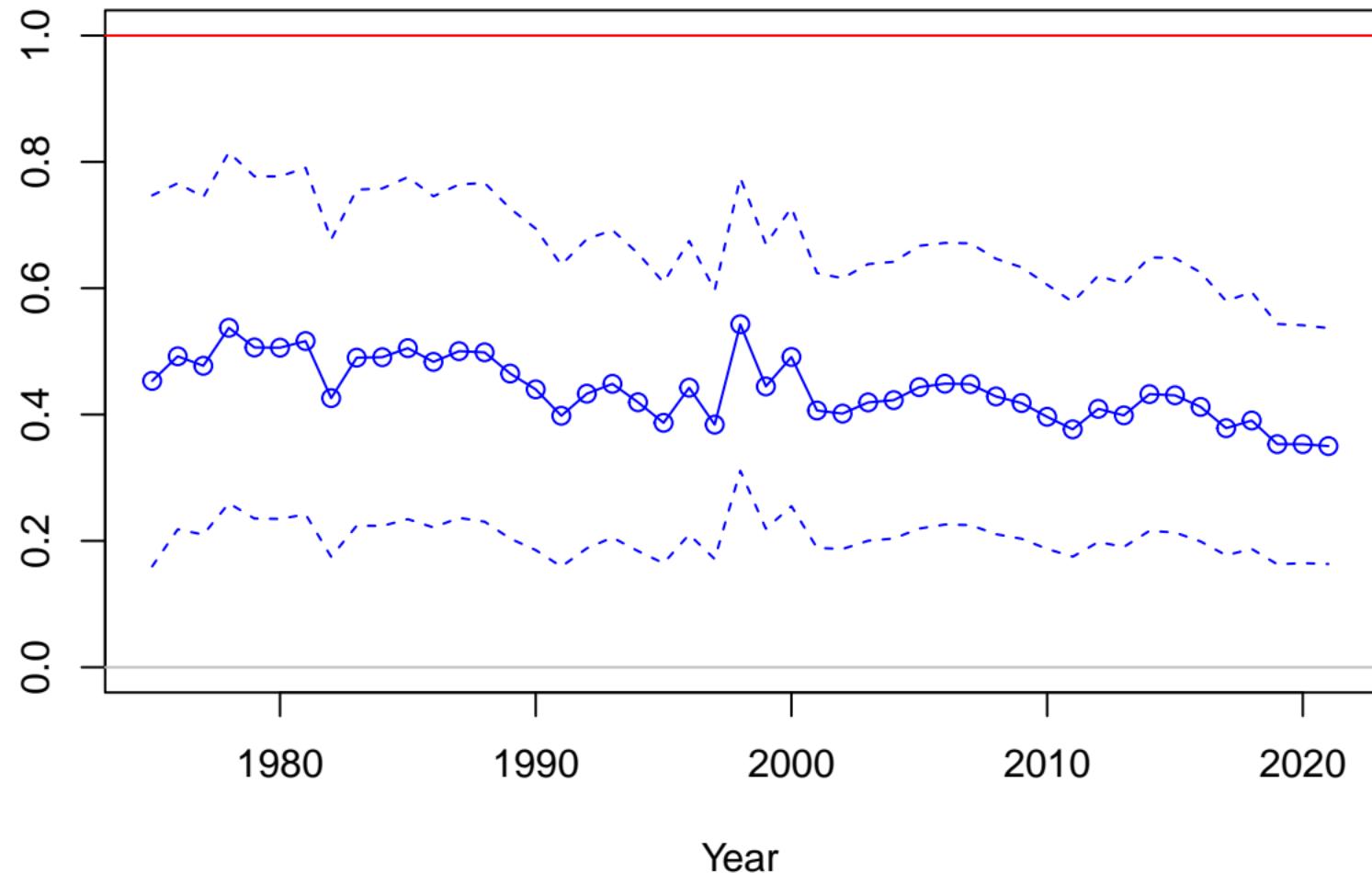




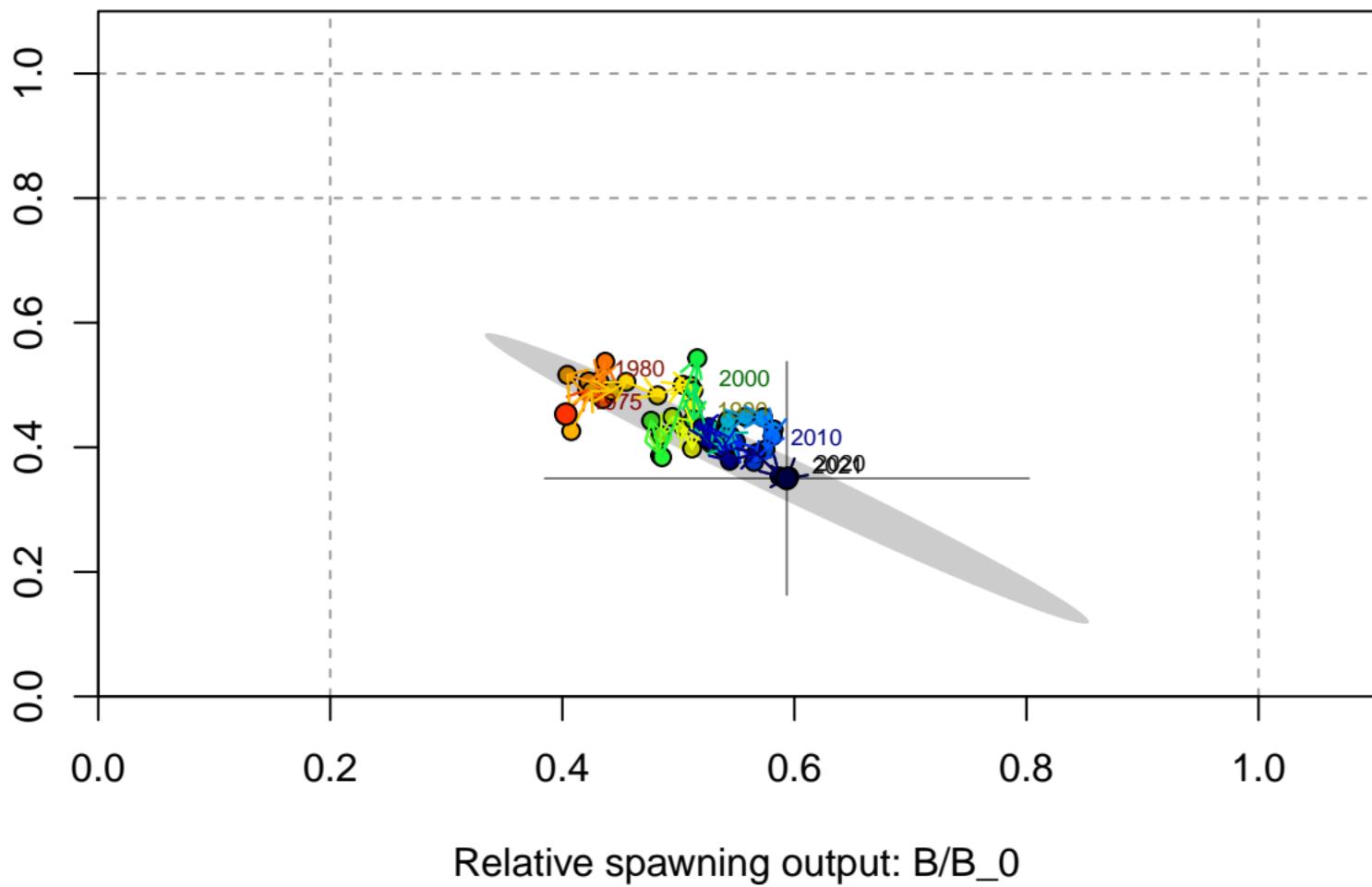
SPR

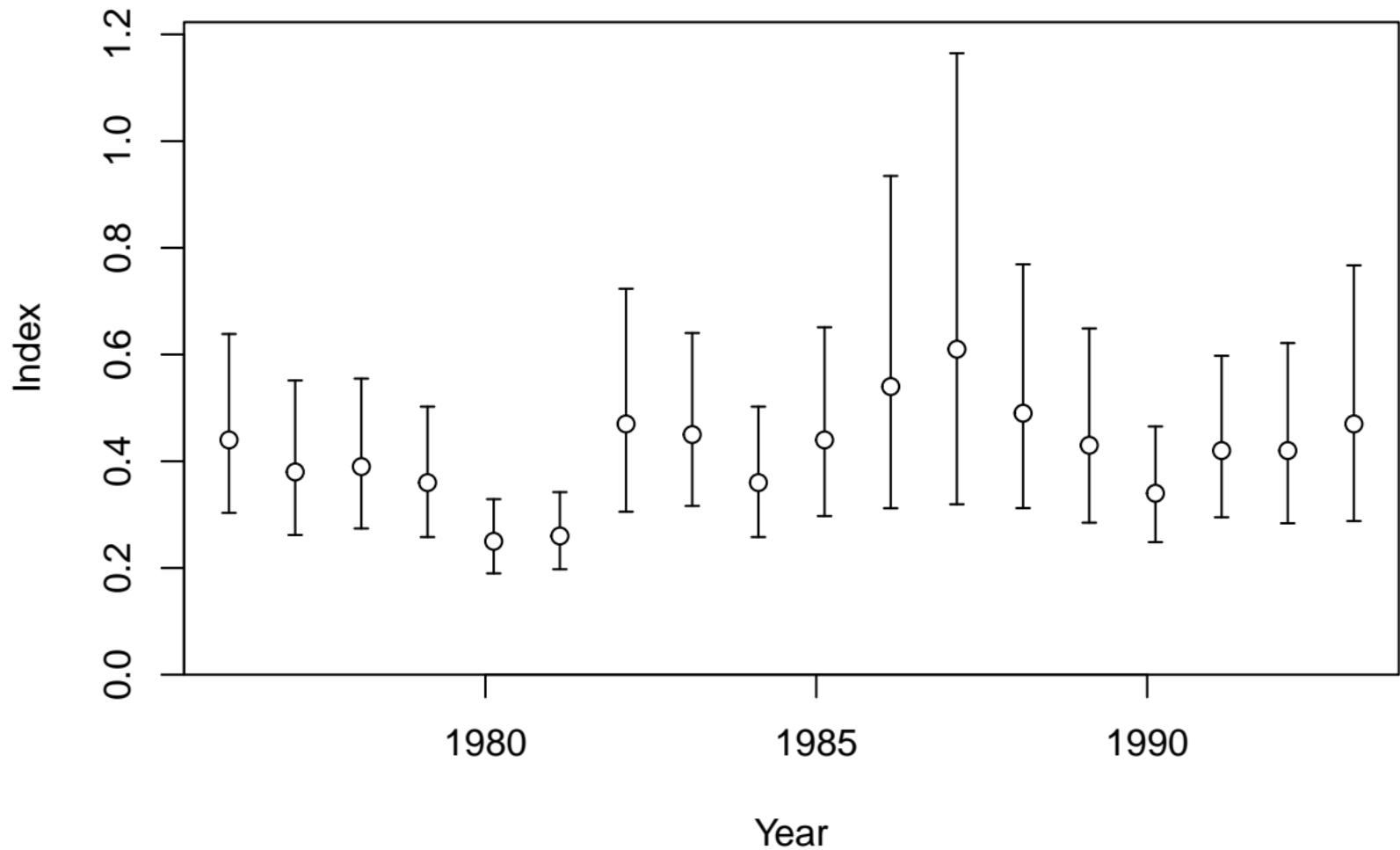


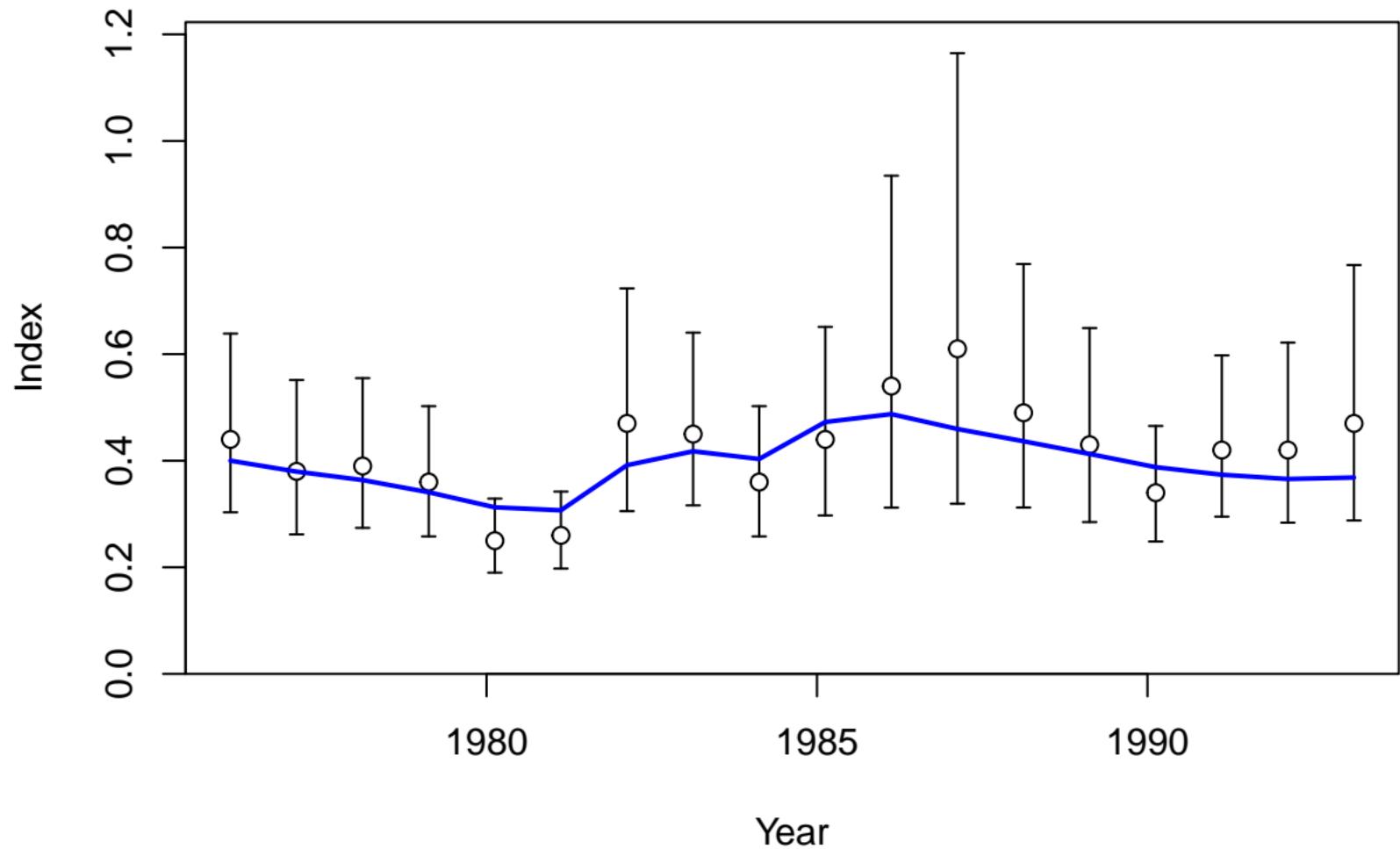
Fishing intensity: 1-SPR



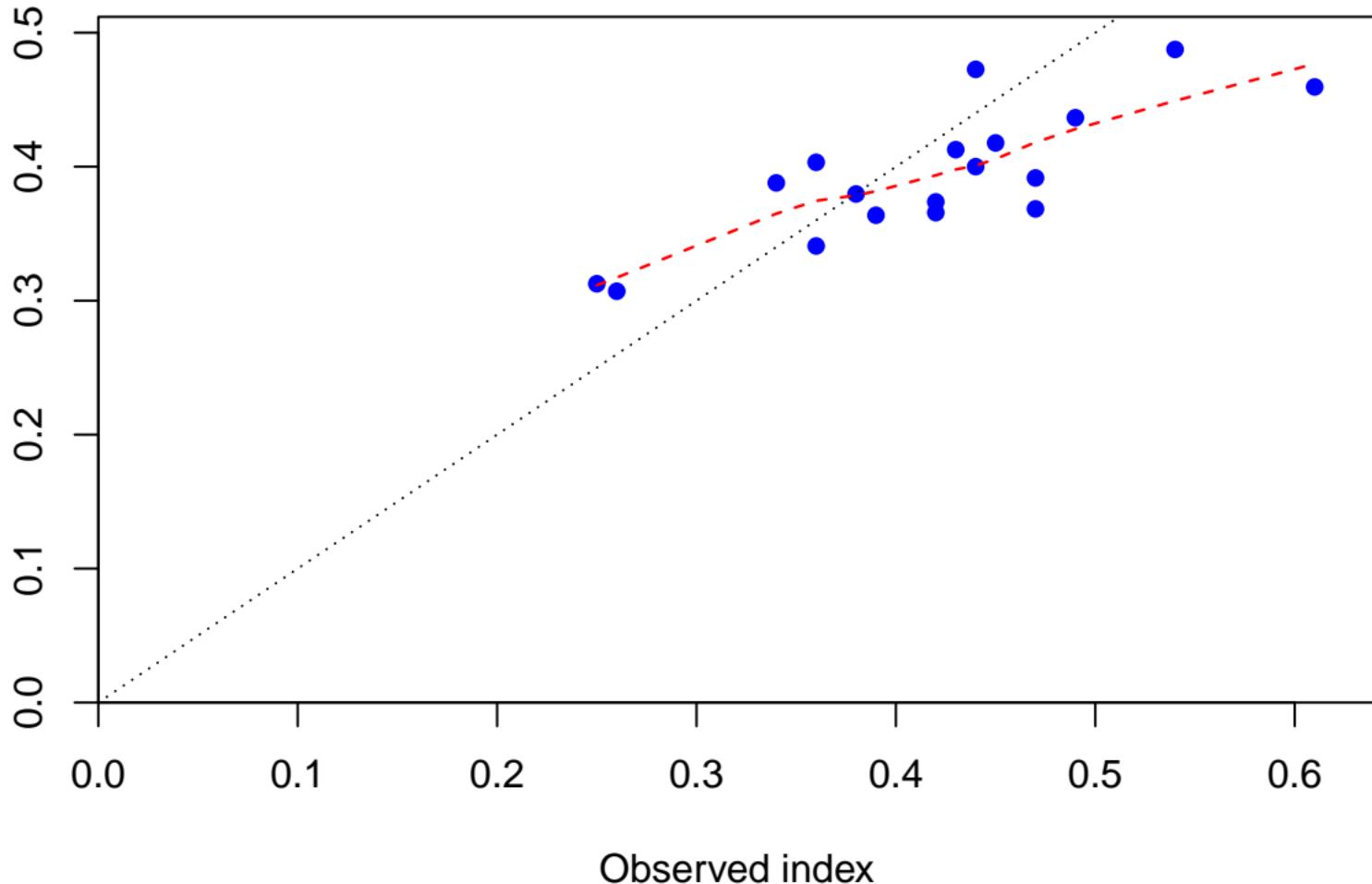
Fishing intensity: 1-SPR

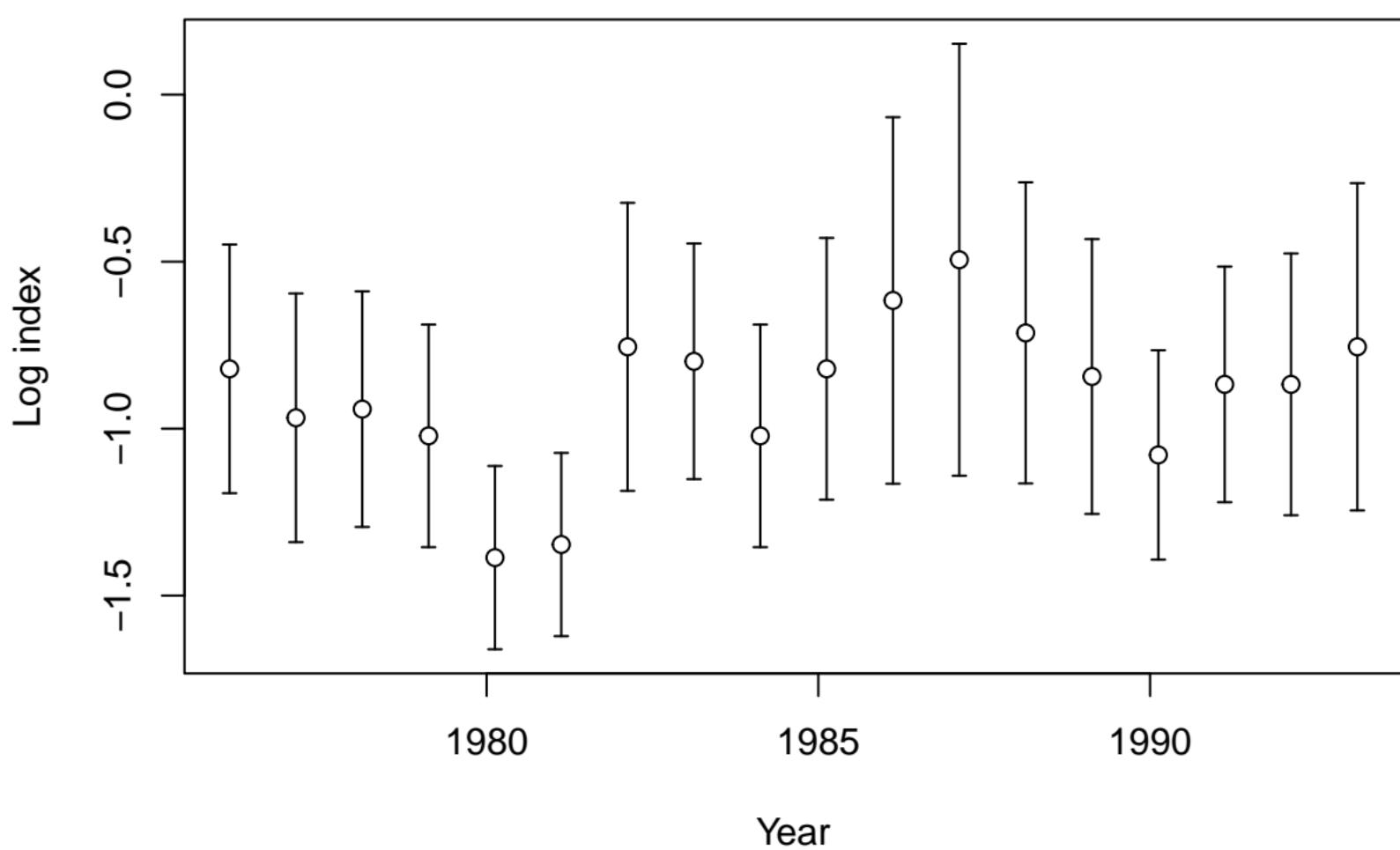


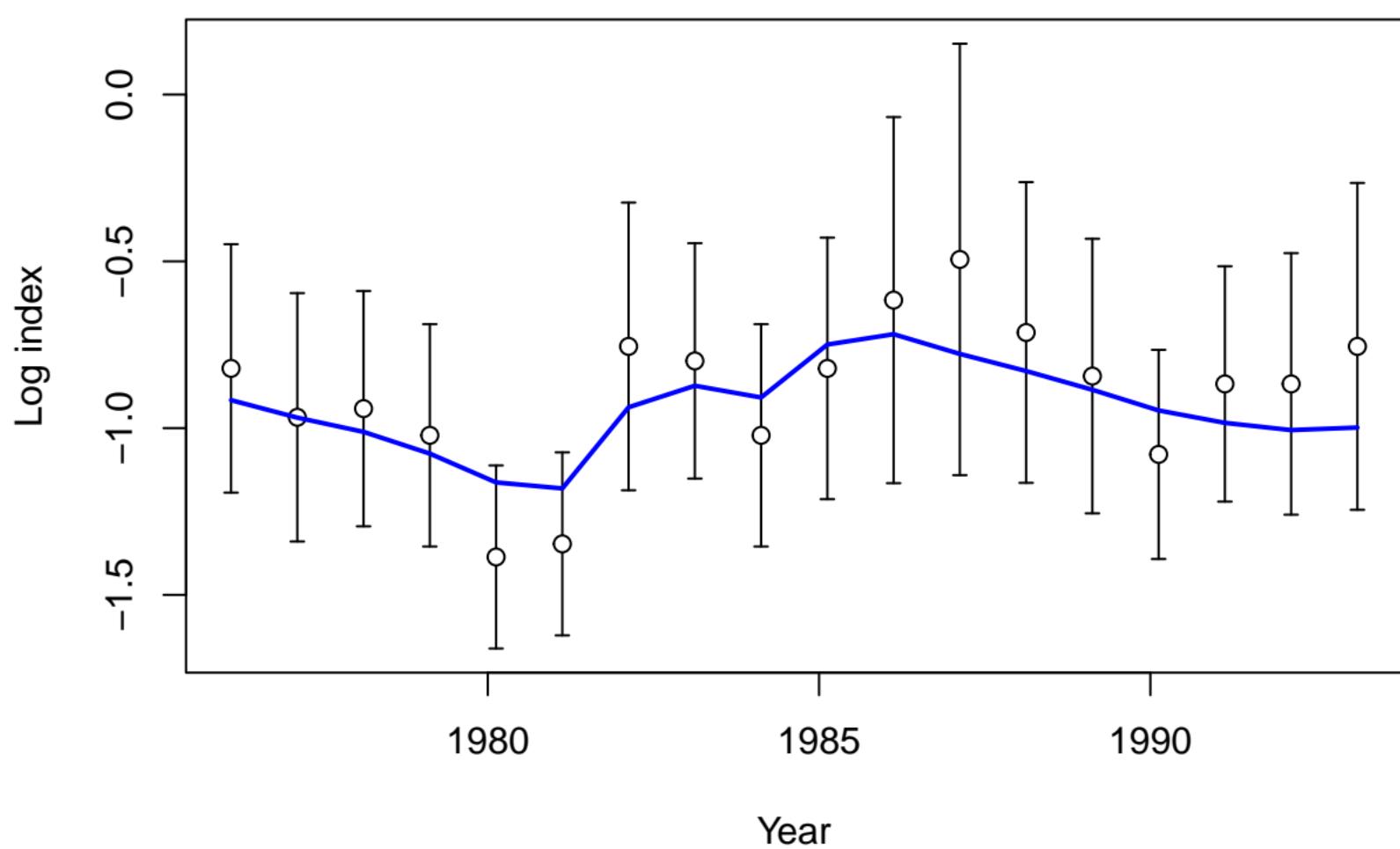


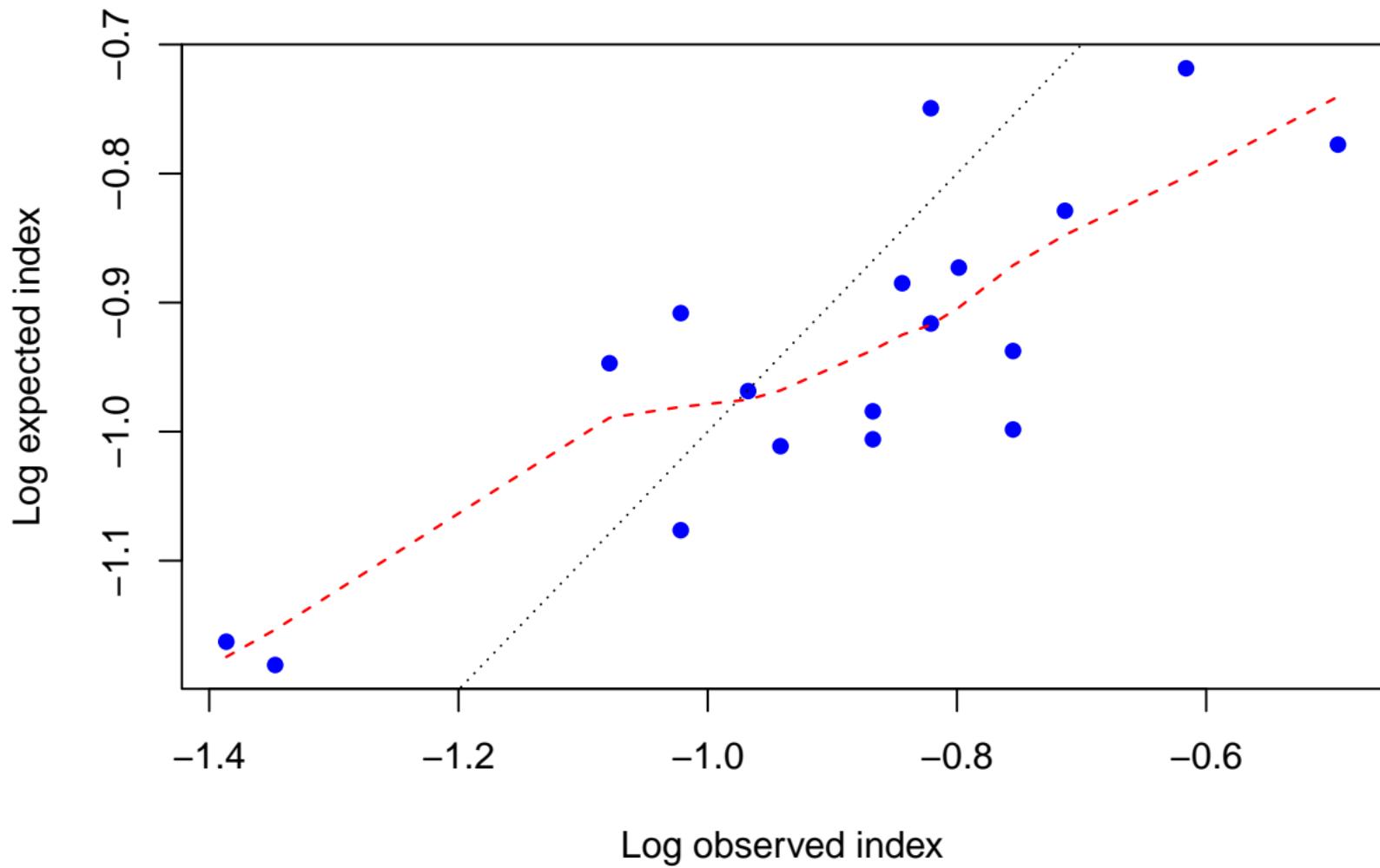


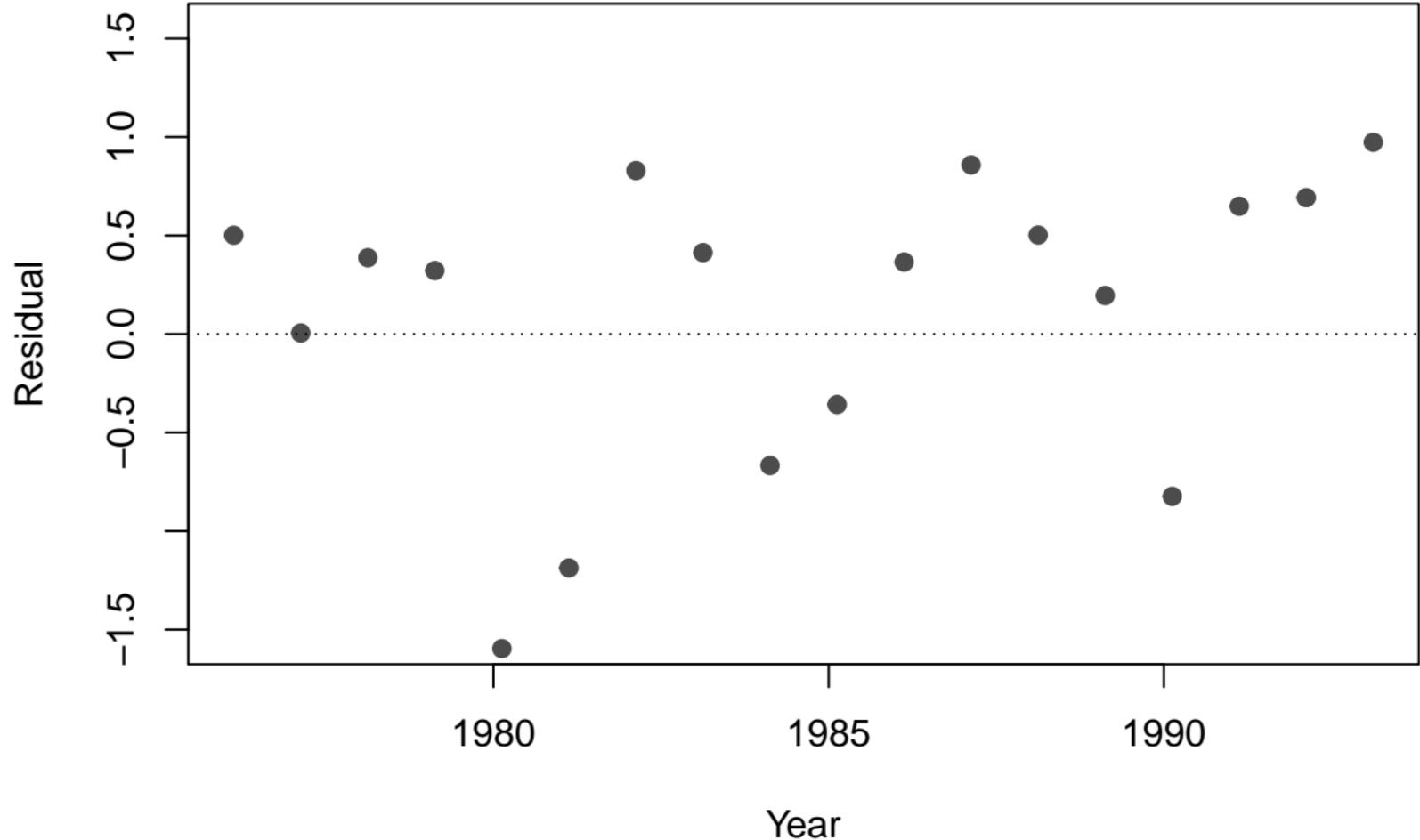
Expected index





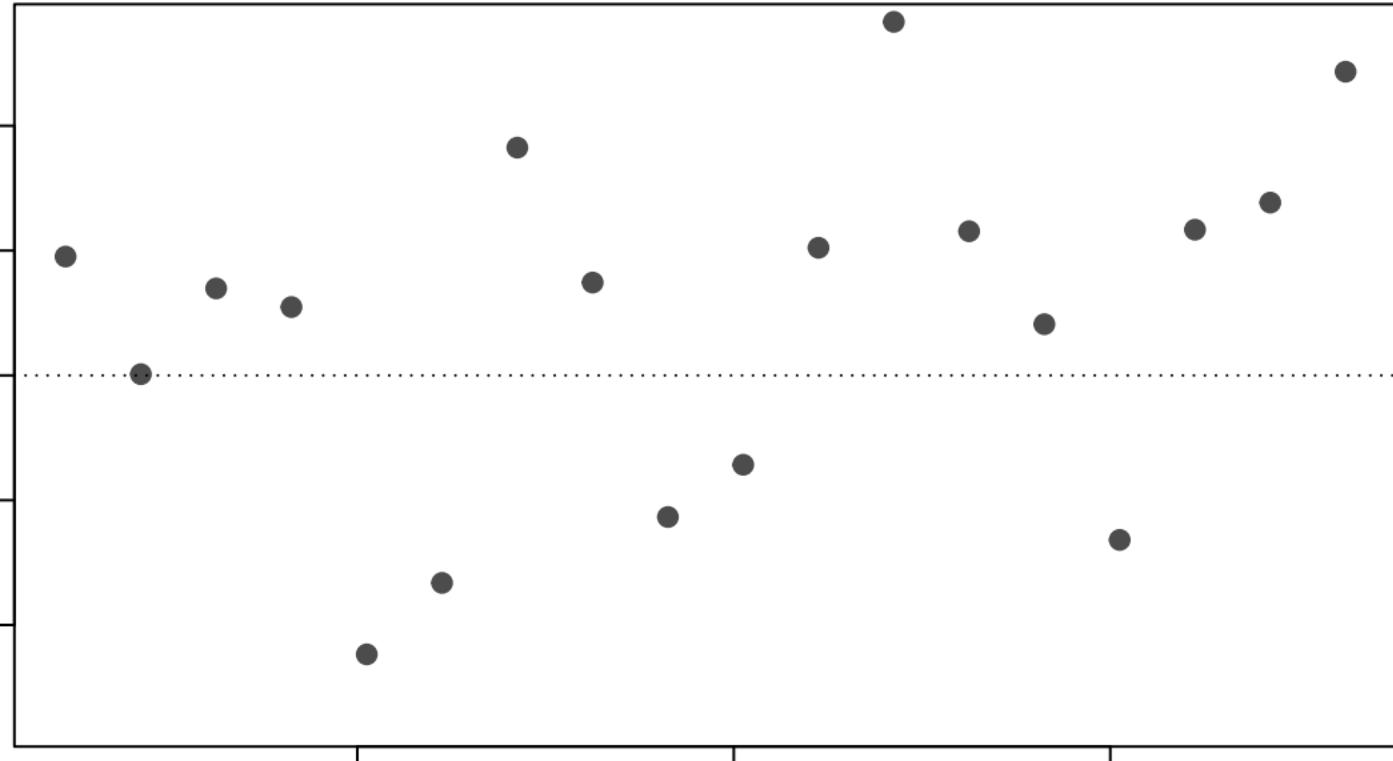






Deviation

-0.2 -0.1 0.0 0.1 0.2

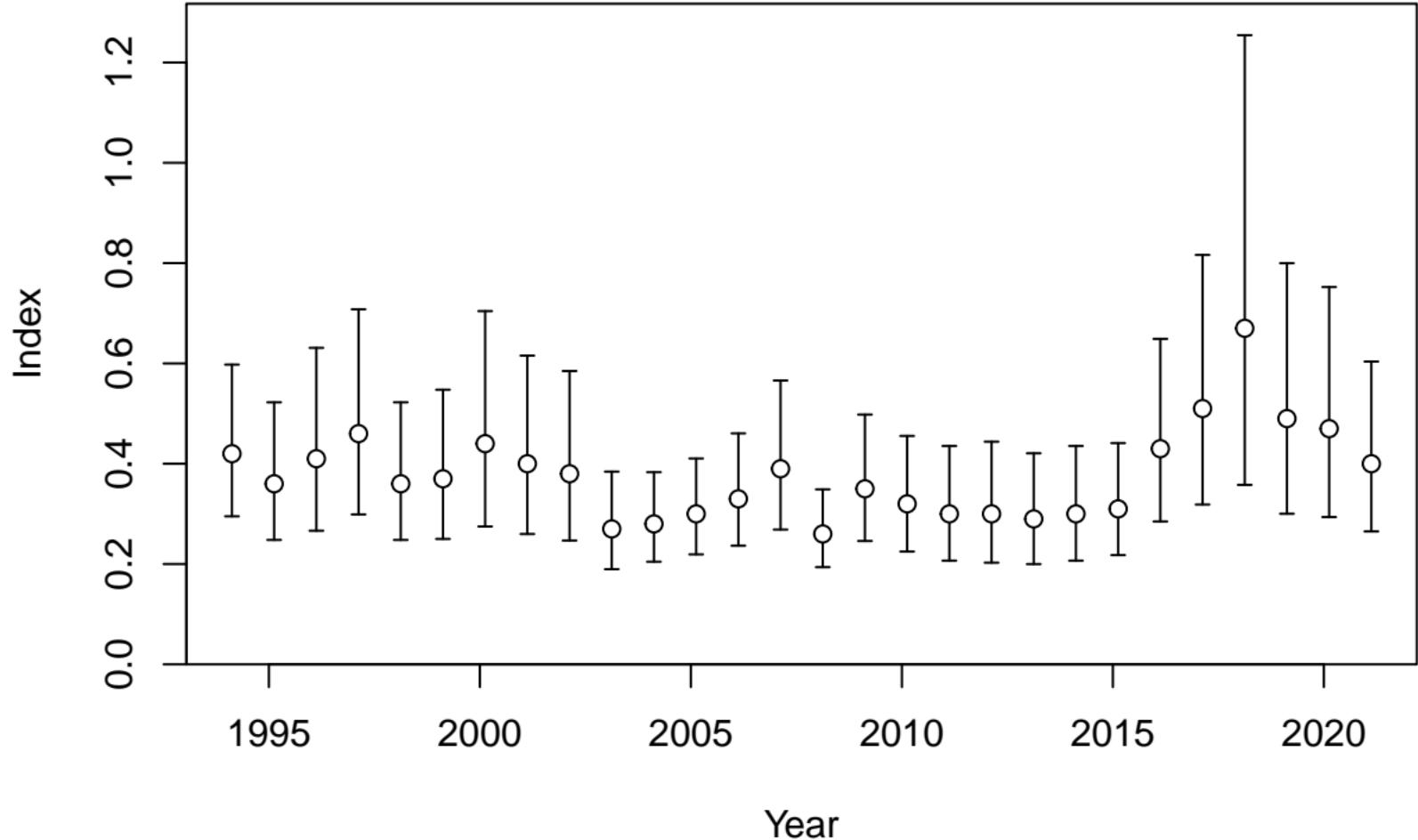


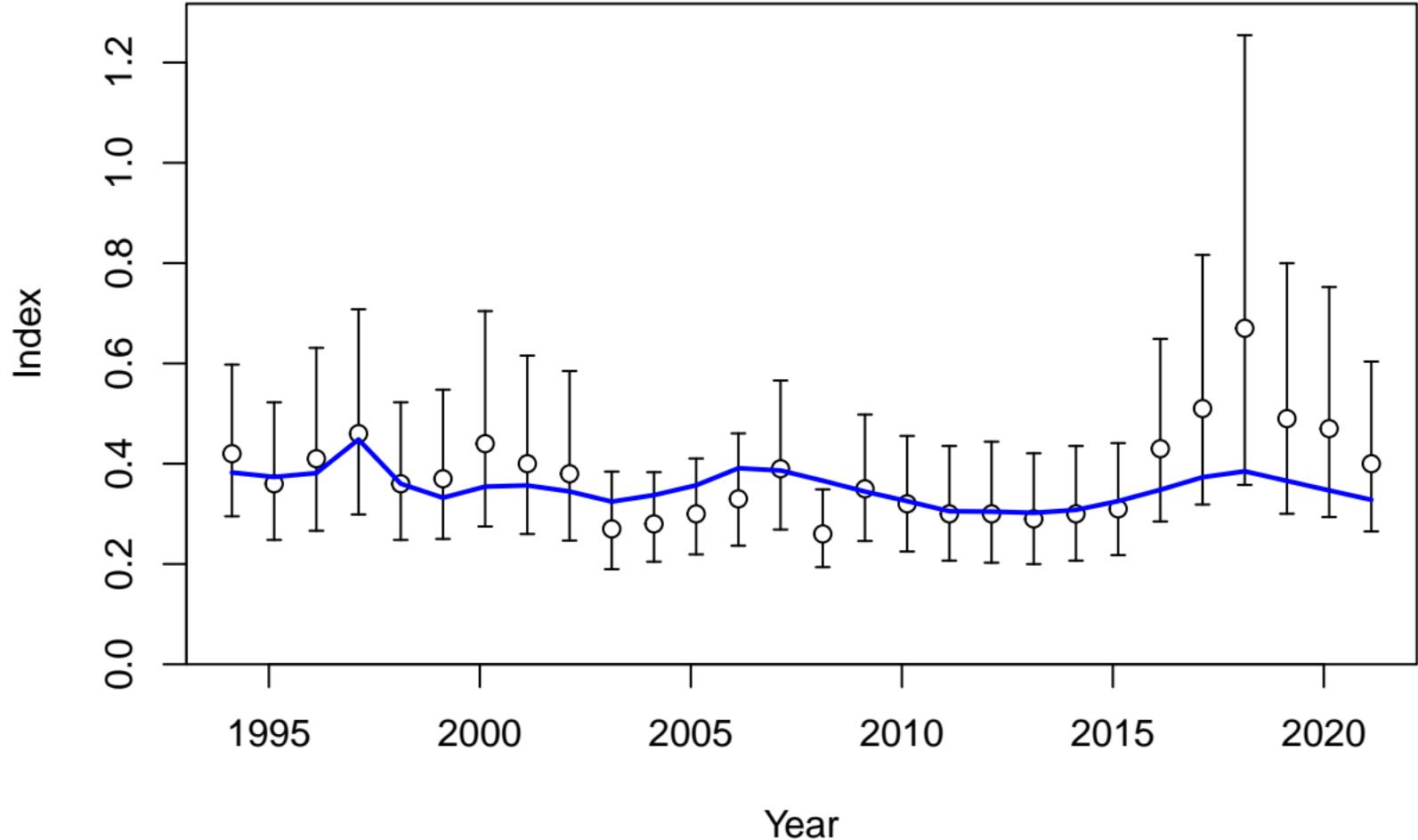
1980

1985

1990

Year



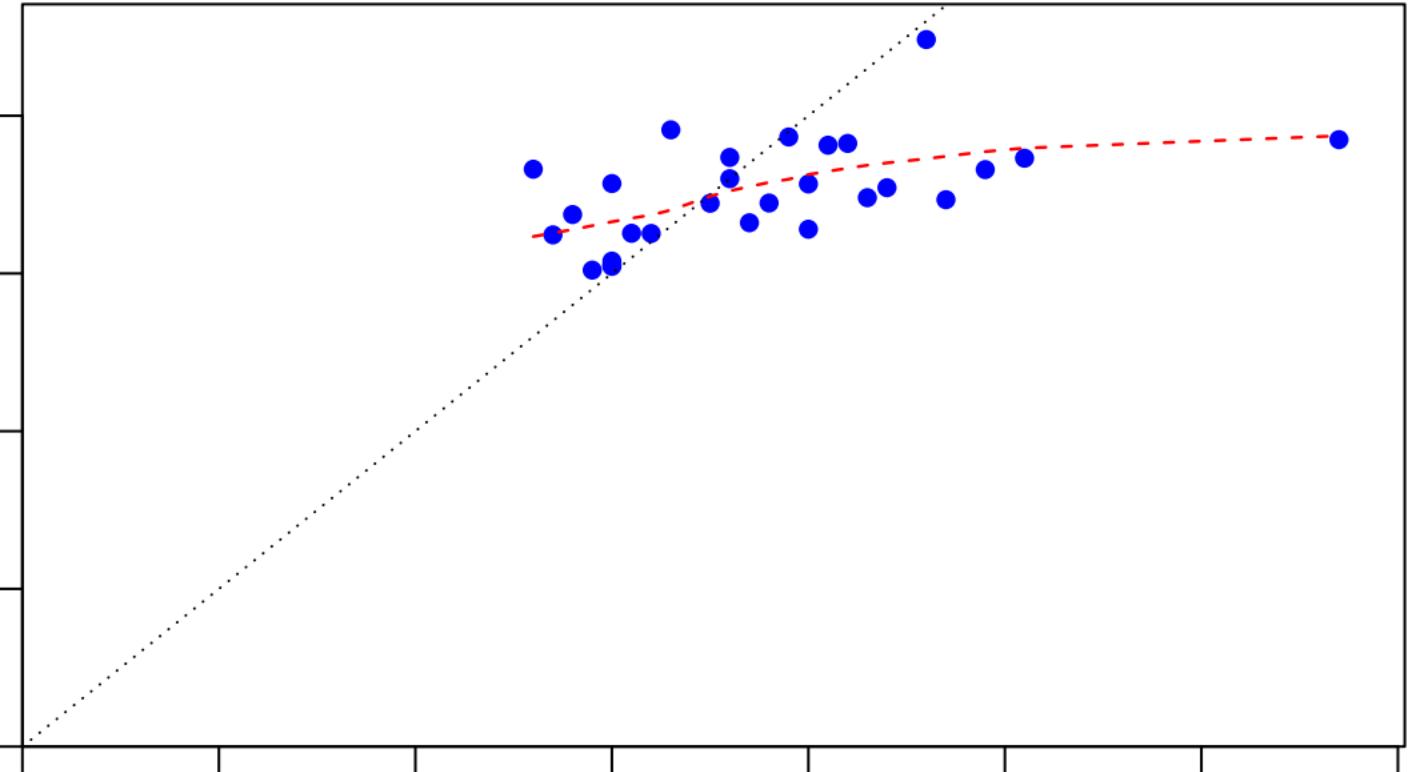


Expected index

0.4
0.3
0.2
0.1
0.0

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7

Observed index

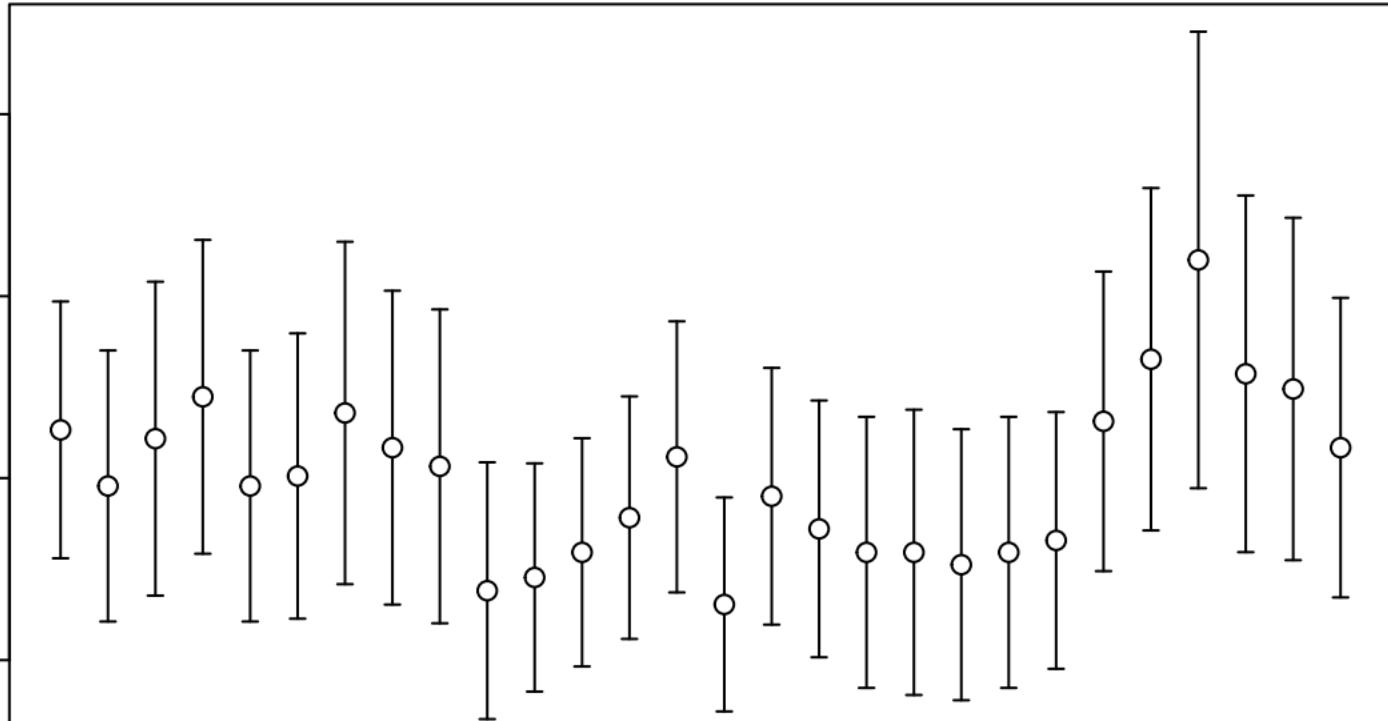


Log index

-1.5 -1.0 -0.5 0.0

1995 2000 2005 2010 2015 2020

Year

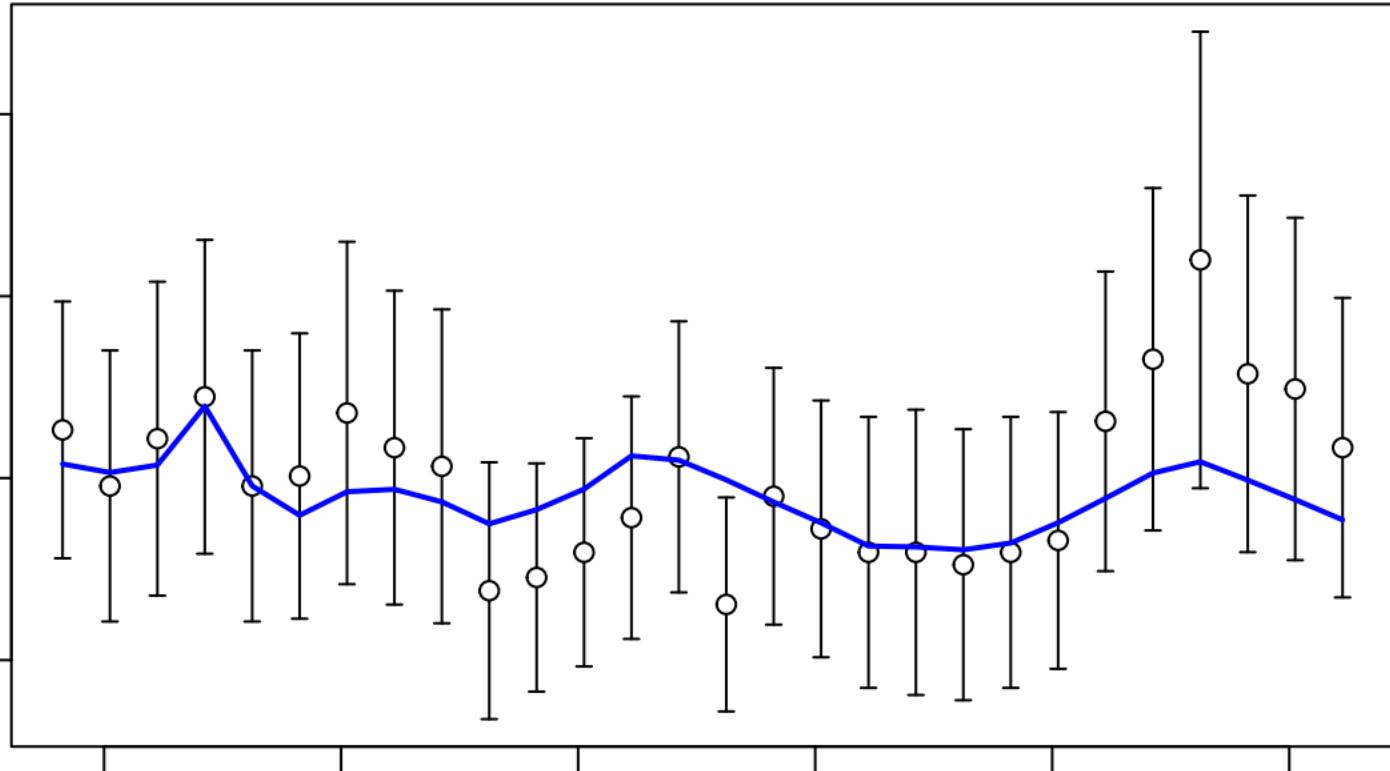


Log index

-1.5 -1.0 -0.5 0.0

1995 2000 2005 2010 2015 2020

Year

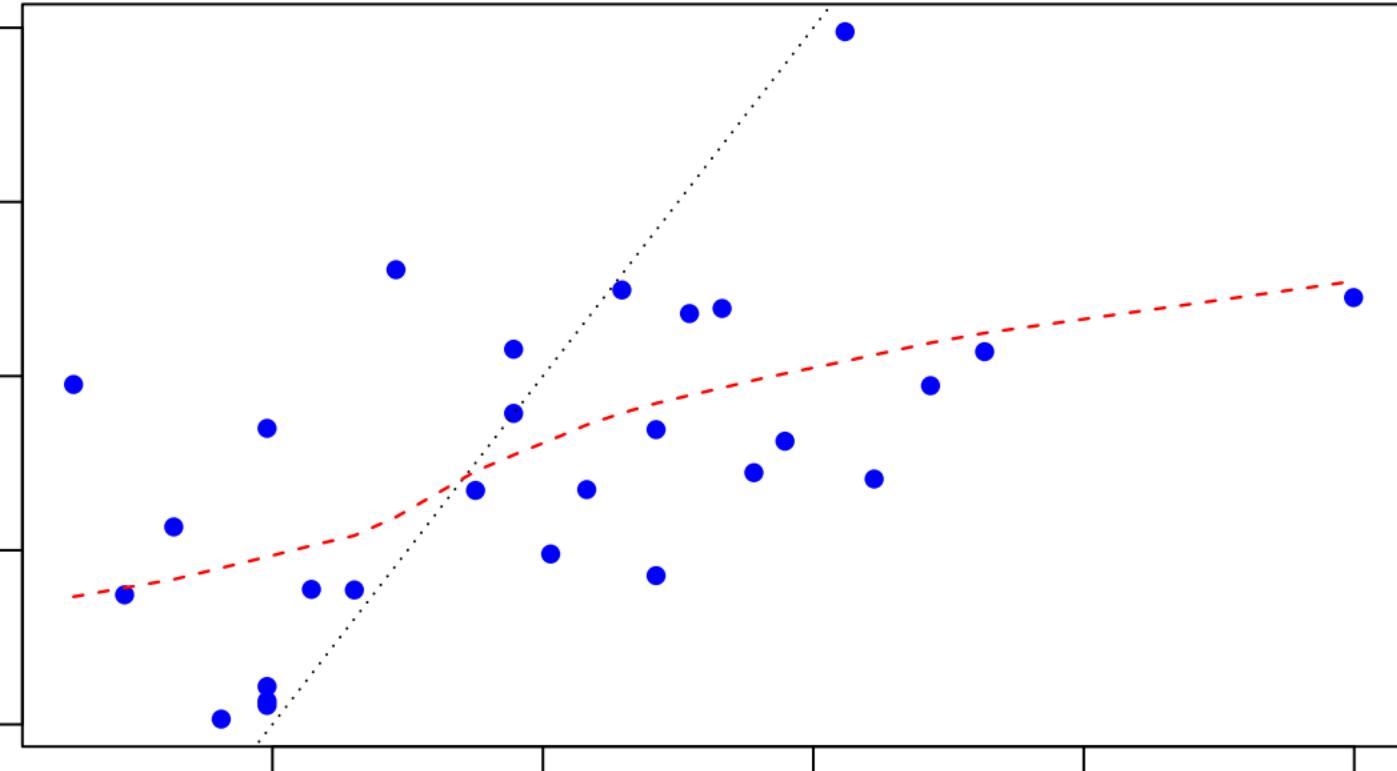


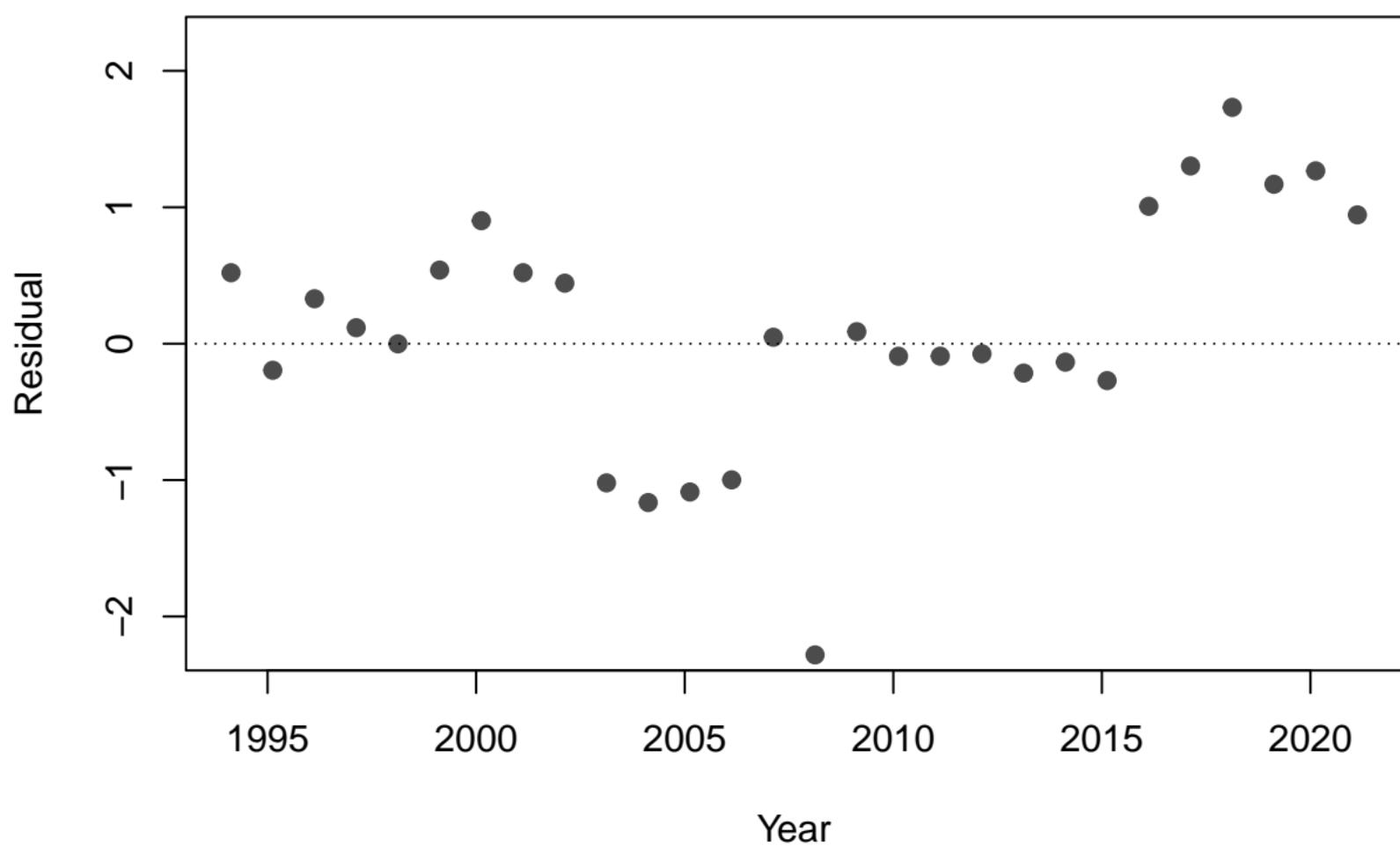
Log expected index

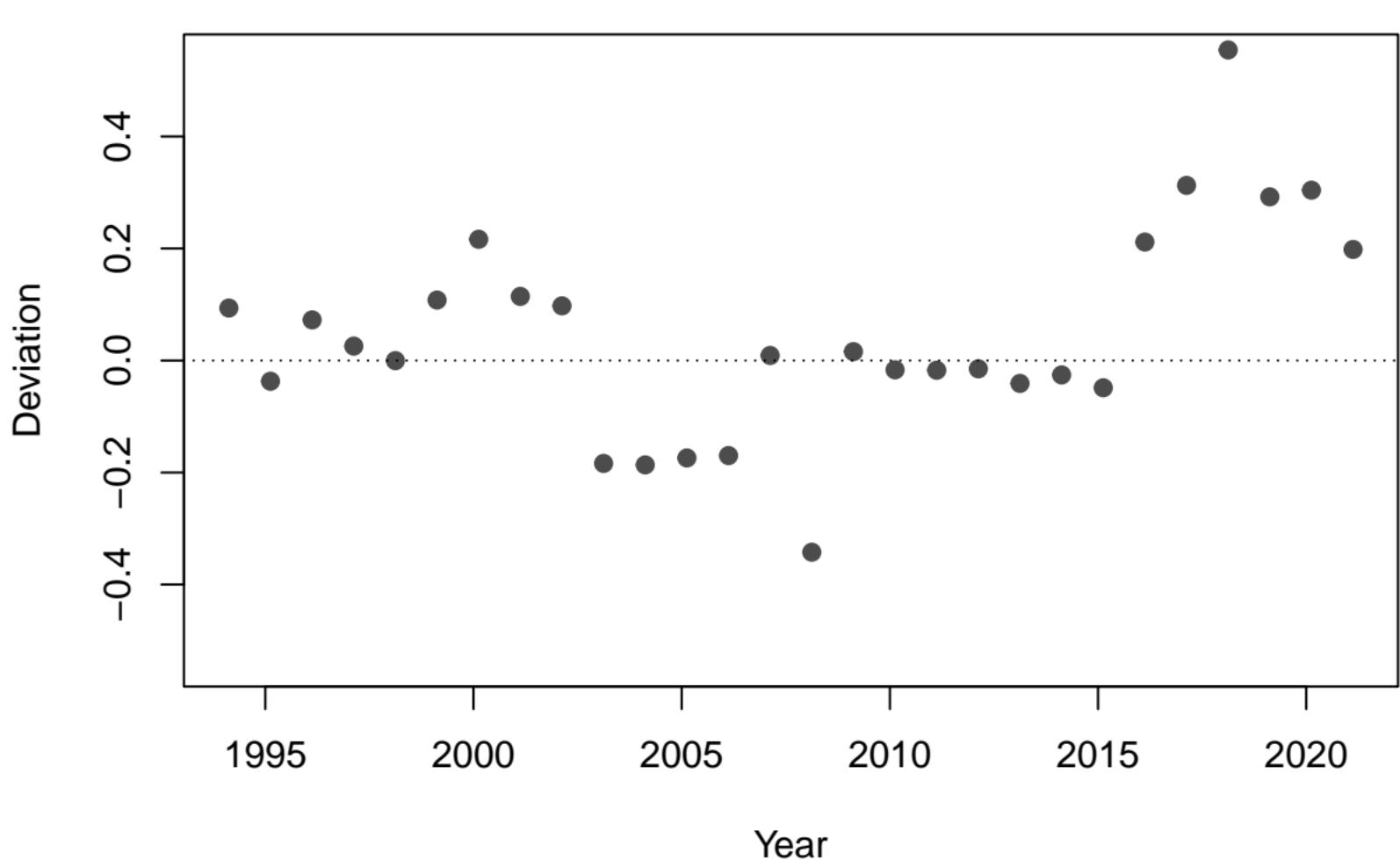
-0.8
-0.9
-1.0
-1.1
-1.2

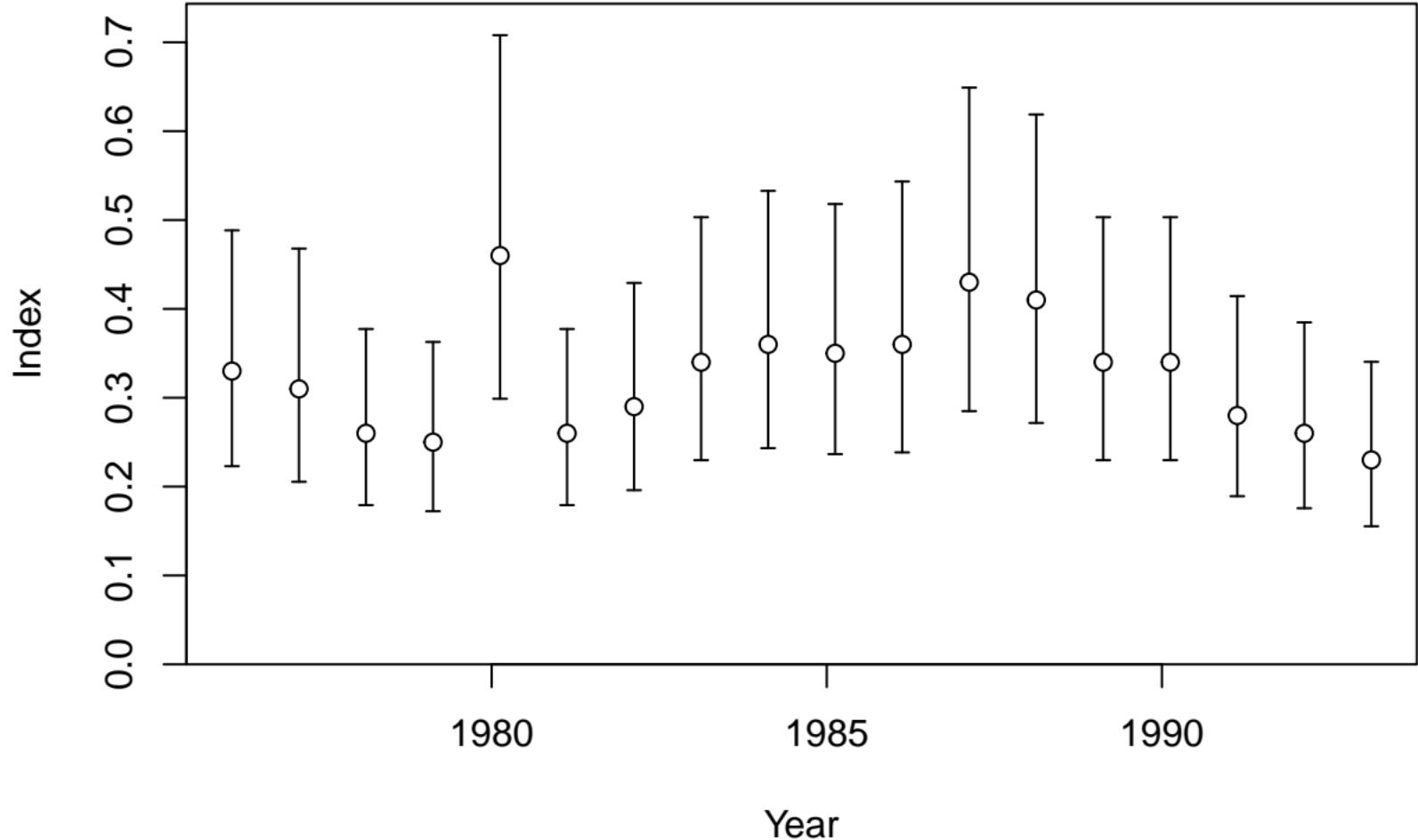
-1.2 -1.1 -1.0 -0.9 -0.8 -0.6 -0.4

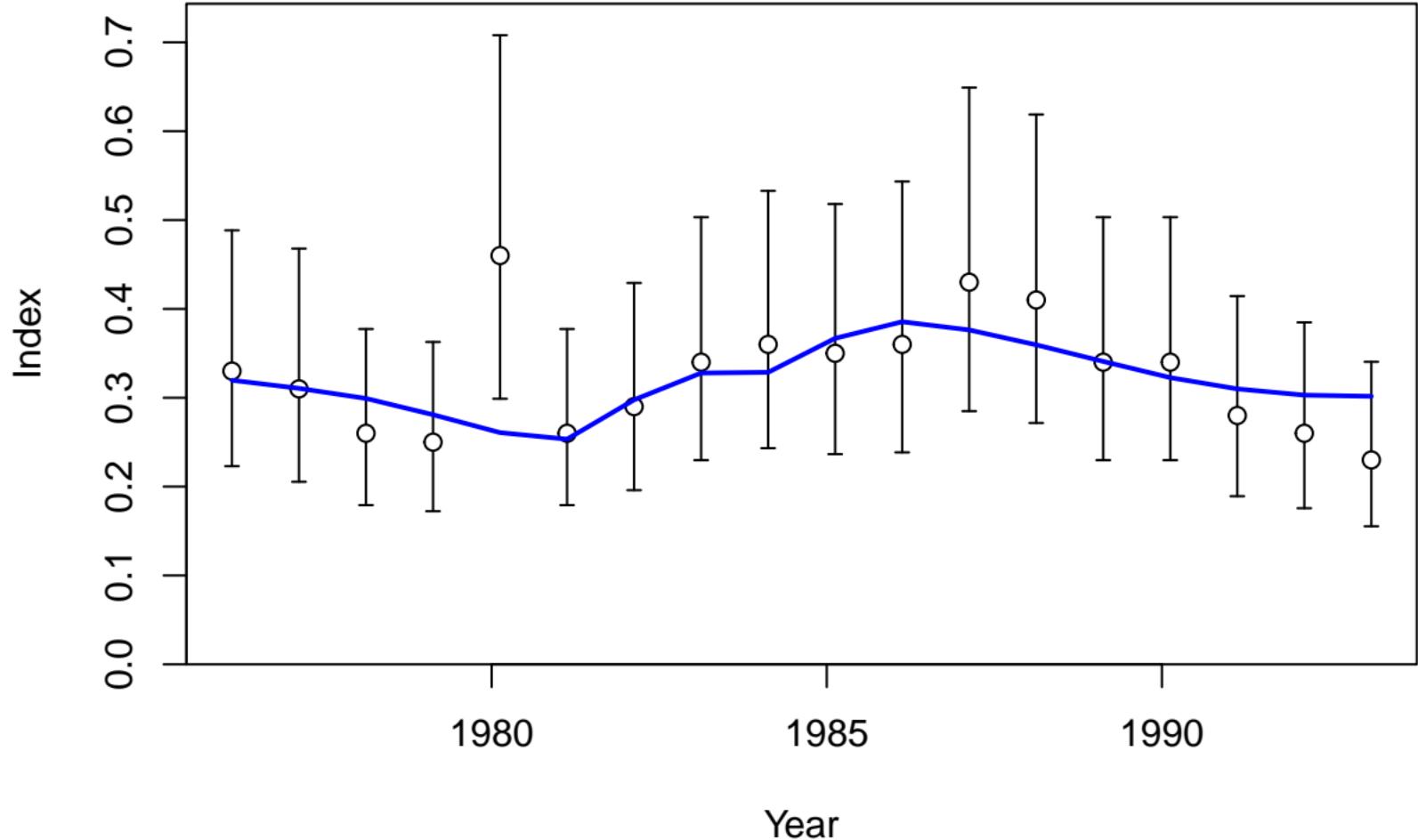
Log observed index

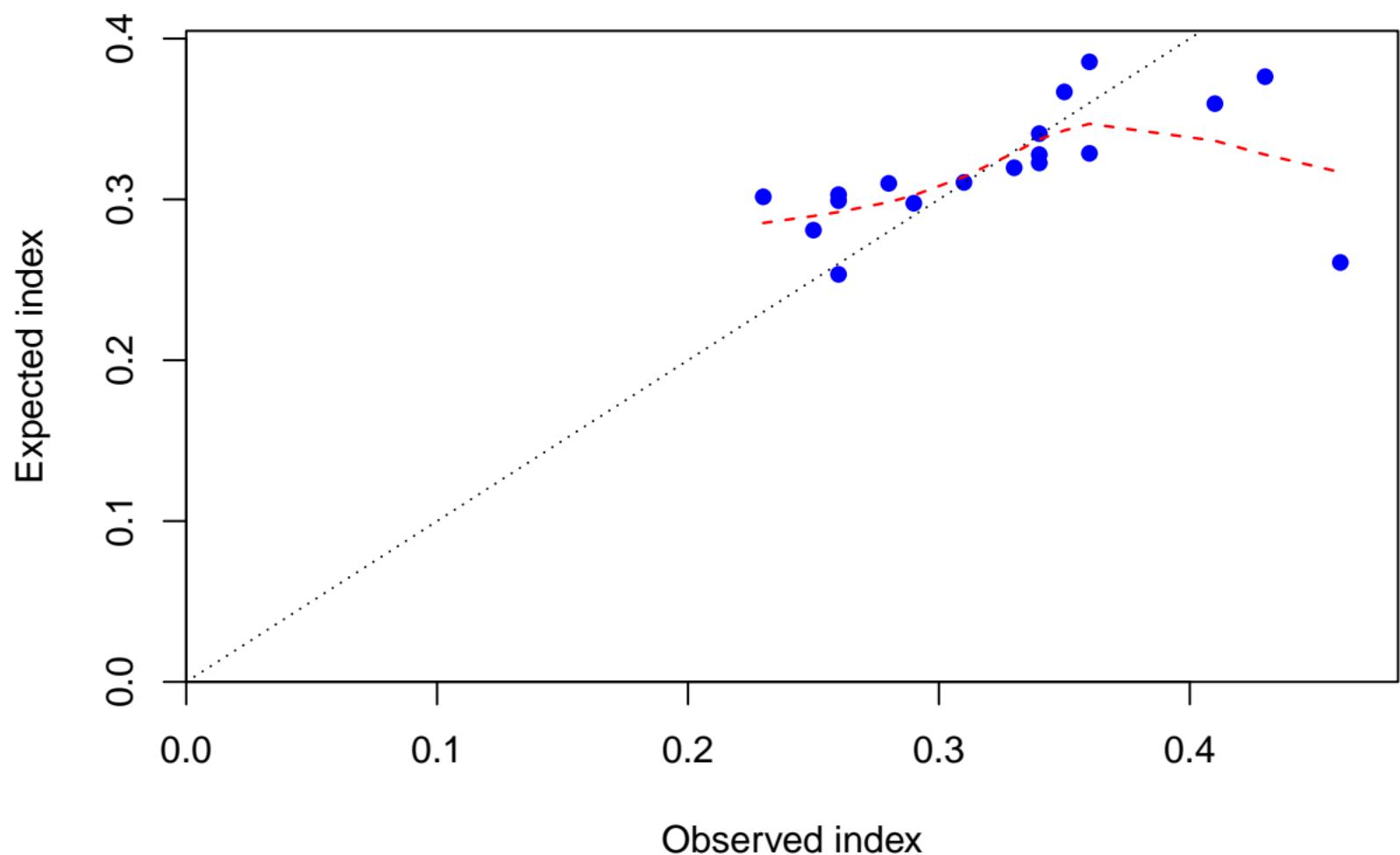






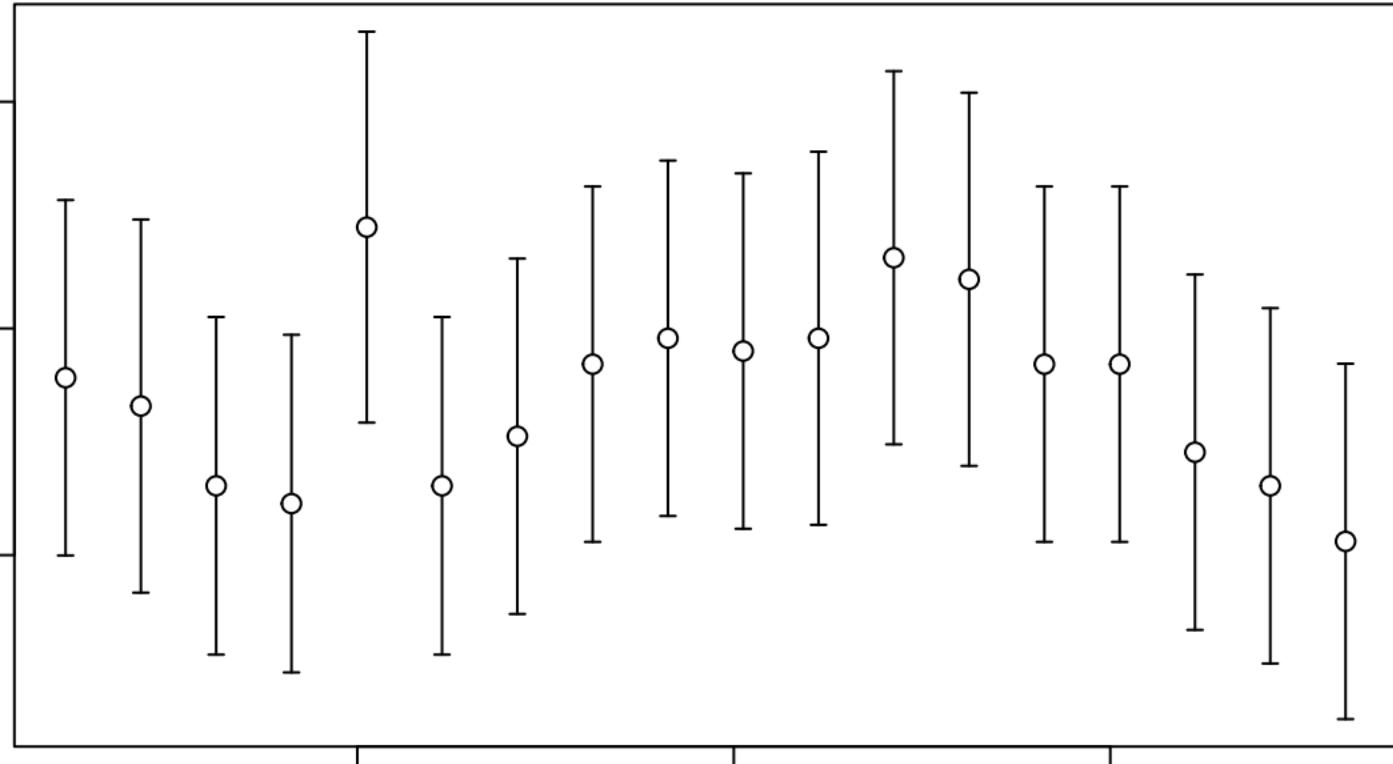






Log index

-0.5
-1.0
-1.5



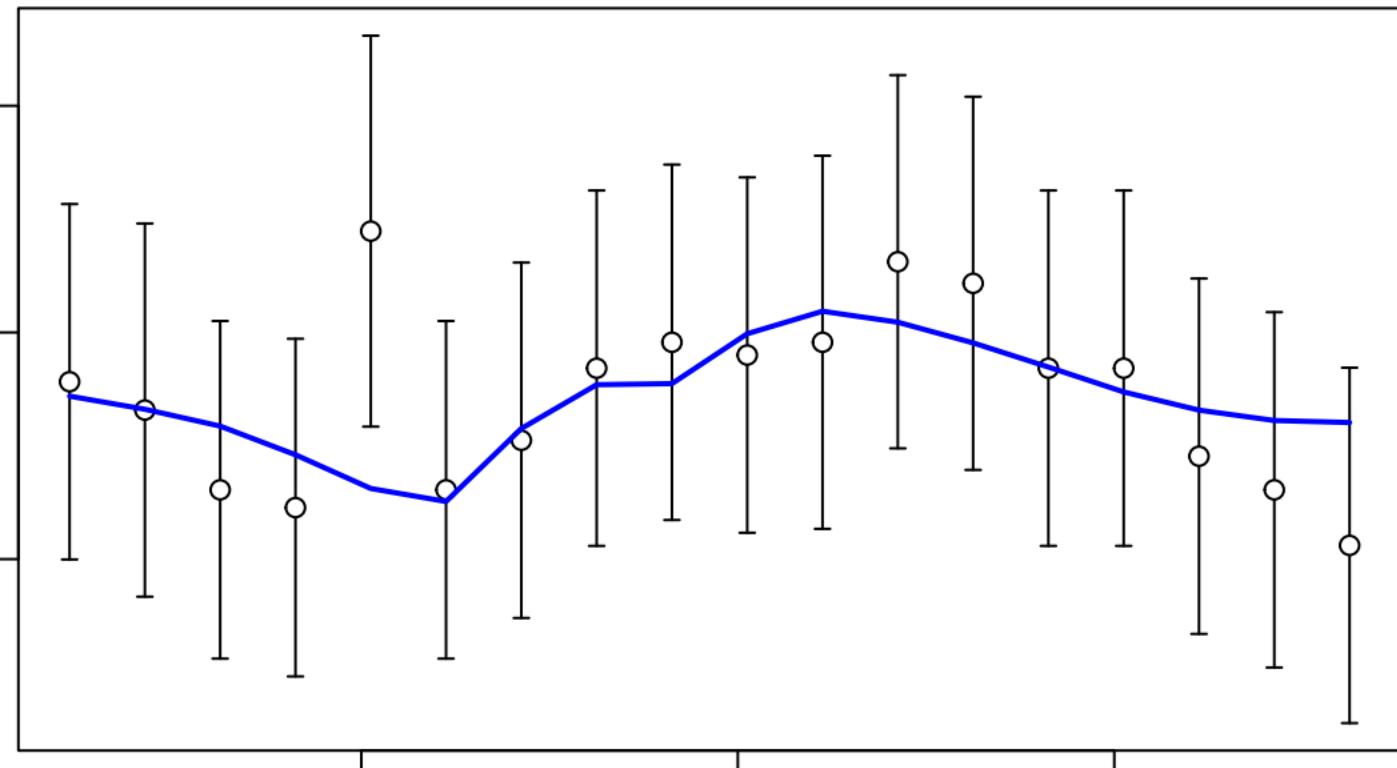
Year

Log index

-0.5
-1.0
-1.5

1980 1985 1990

Year

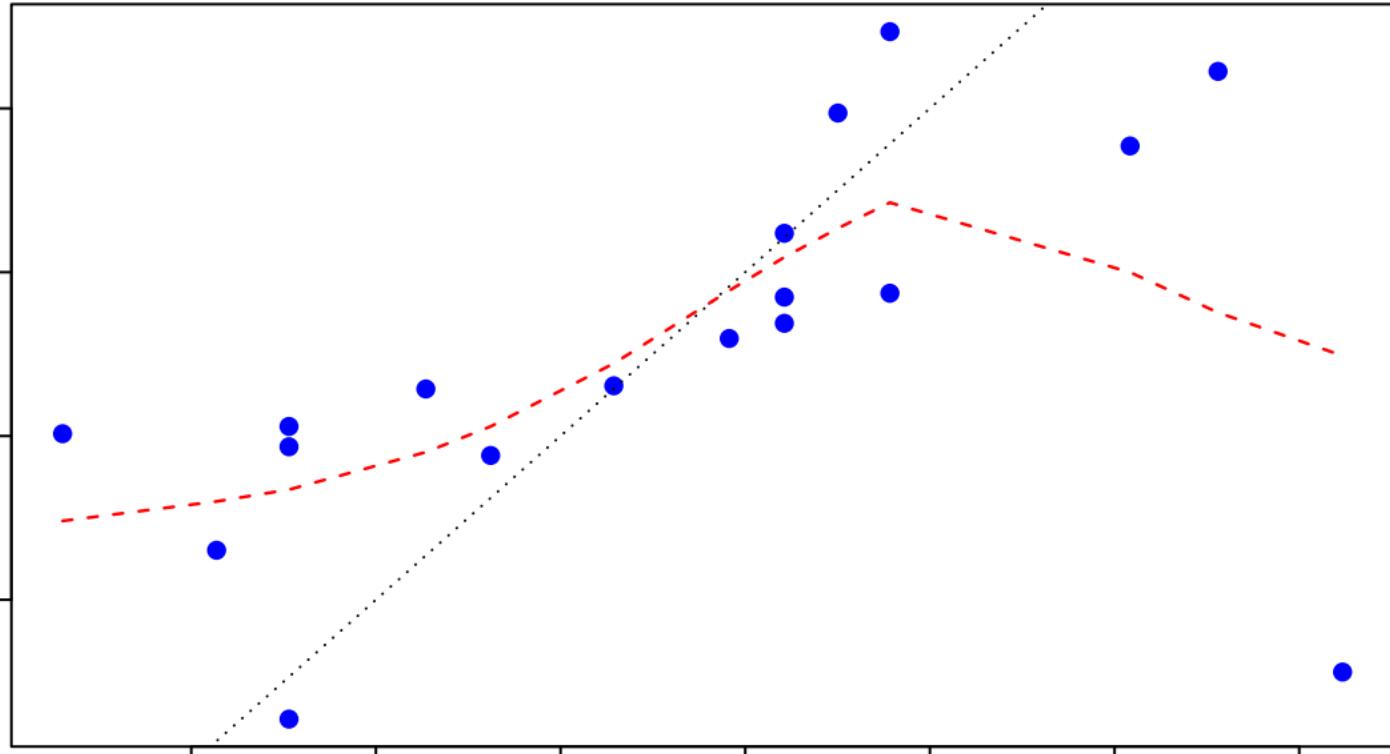


Log expected index

-1.0
-1.1
-1.2
-1.3

-1.4 -1.3 -1.2 -1.1 -1.0 -0.9 -0.8

Log observed index

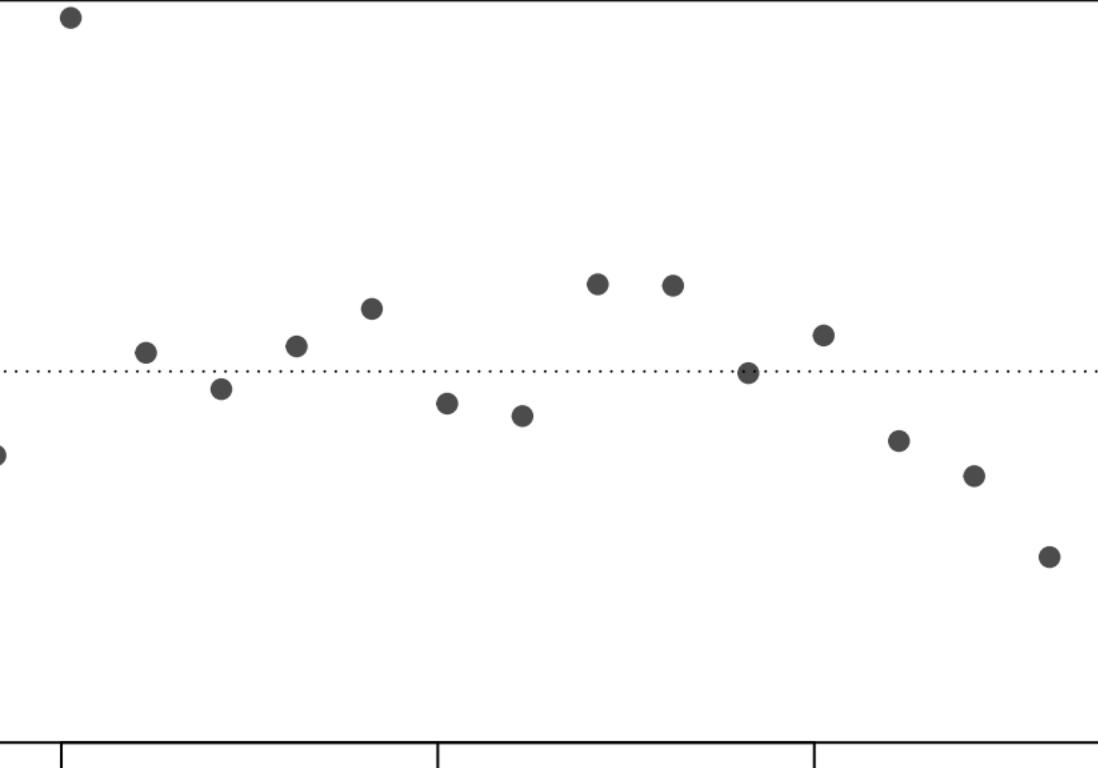


Residual

-2
-1
0
1
2

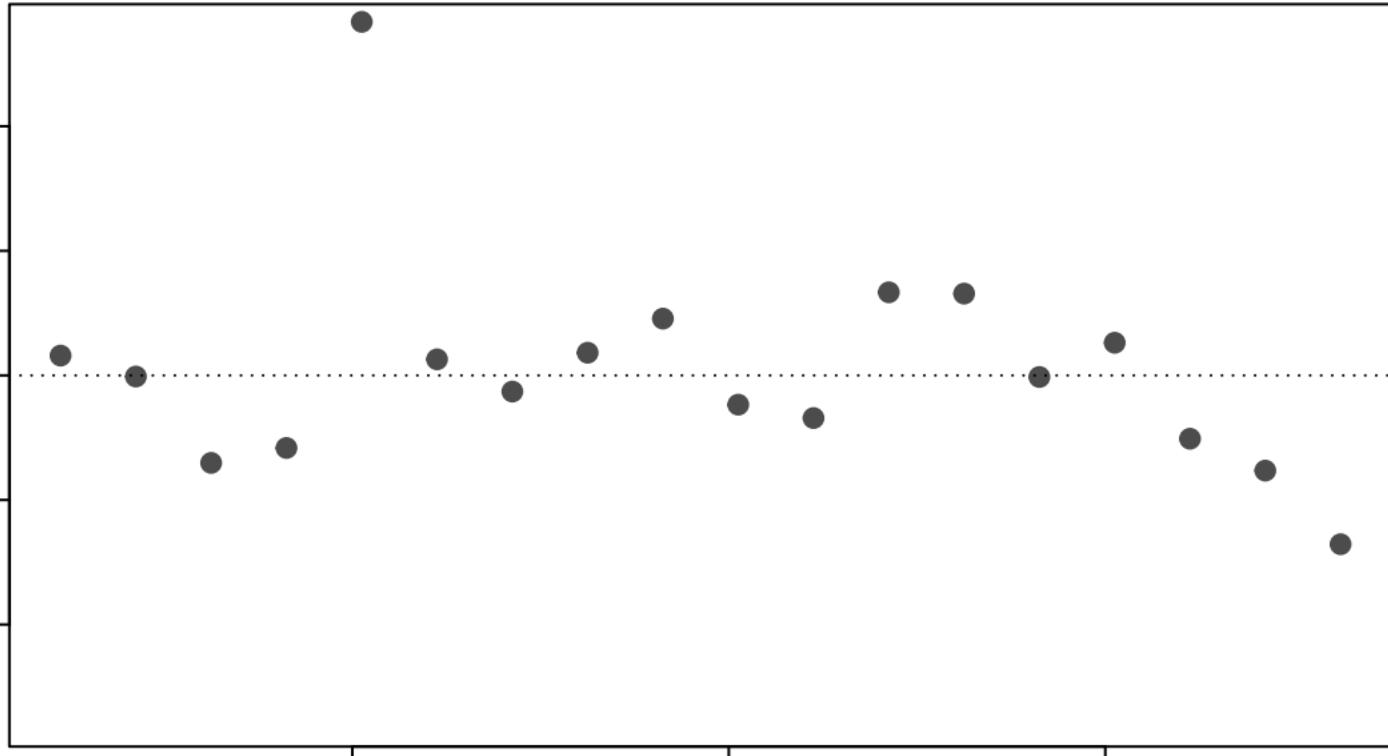
1980

Year



Deviation

-0.4 -0.2 0.0 0.2 0.4

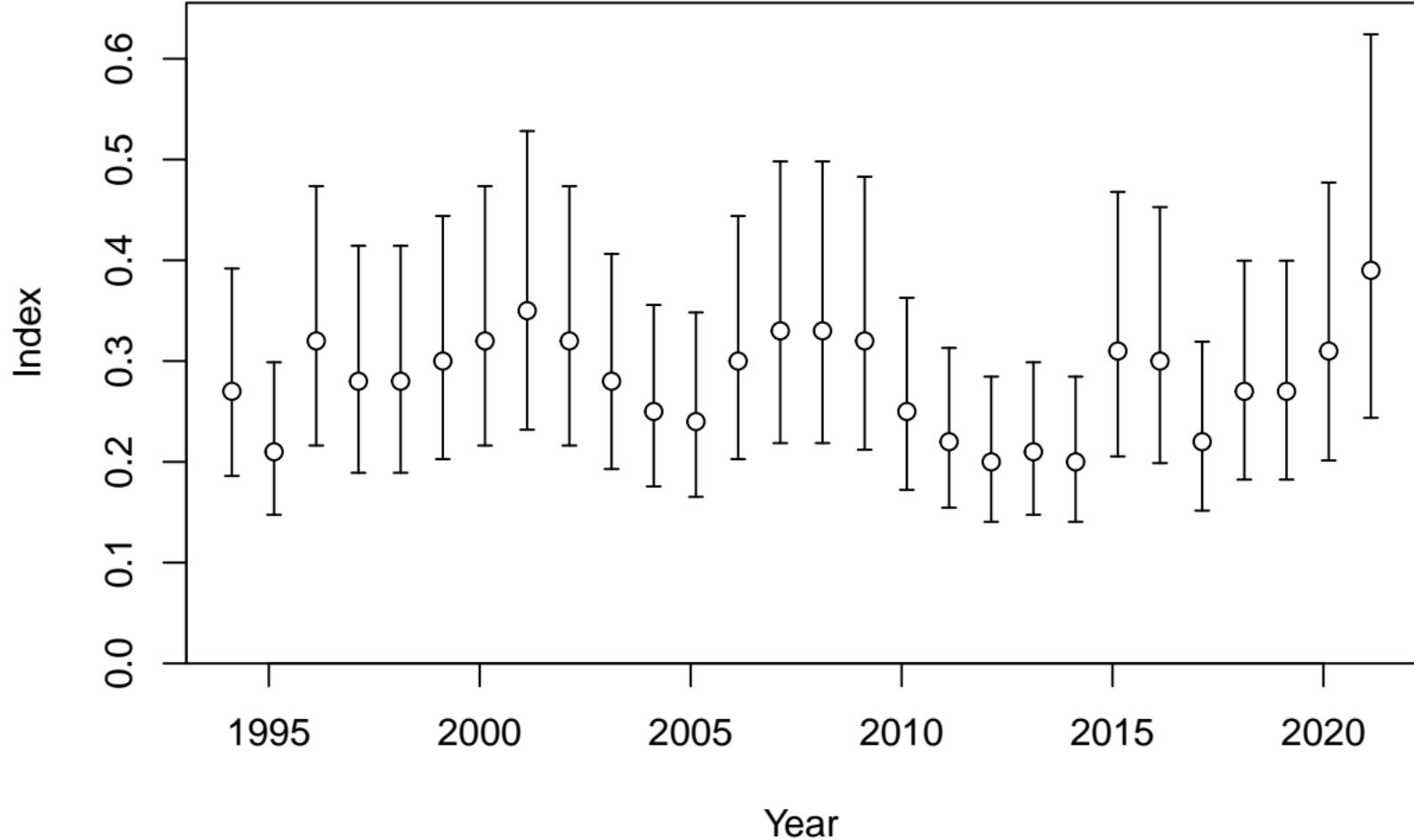


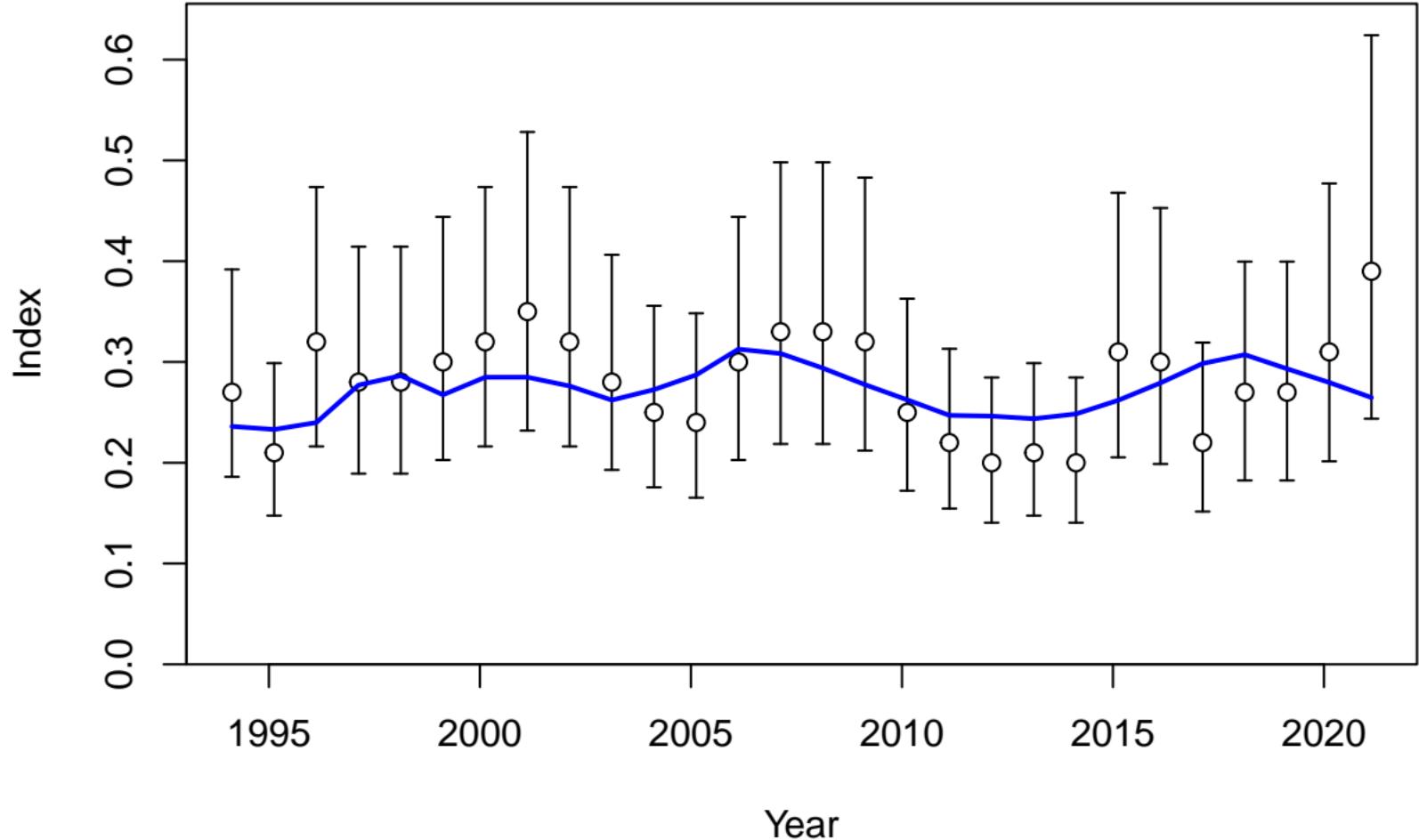
1980

1985

1990

Year



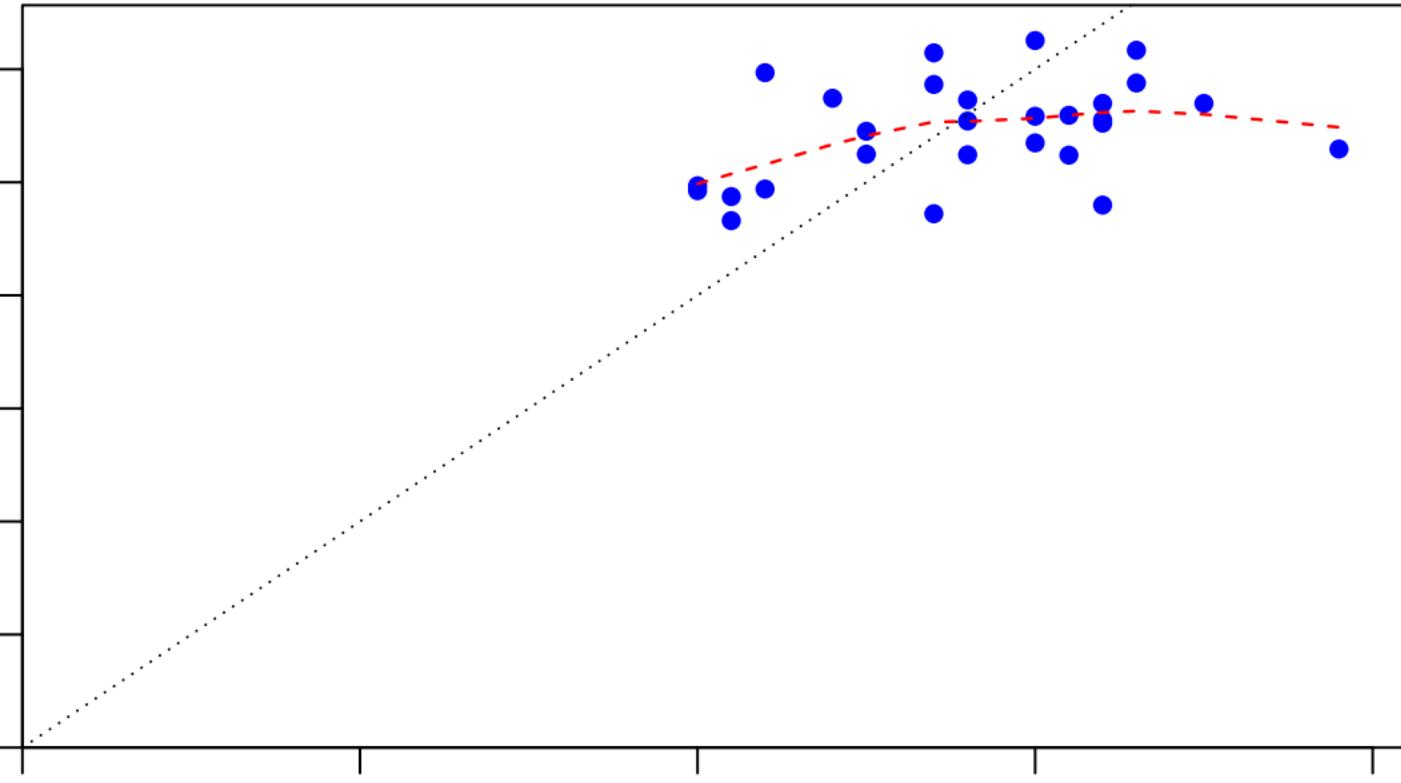


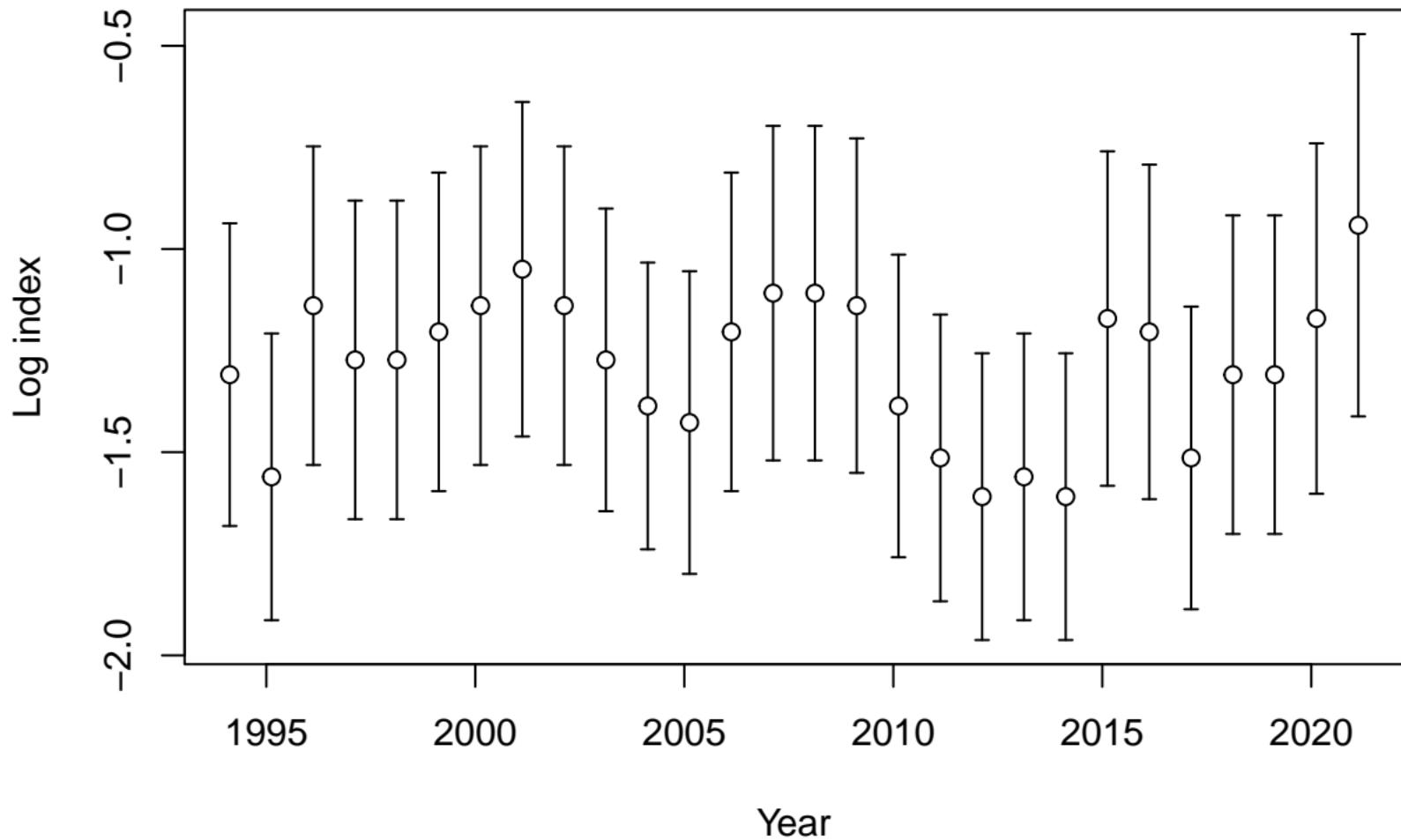
Expected index

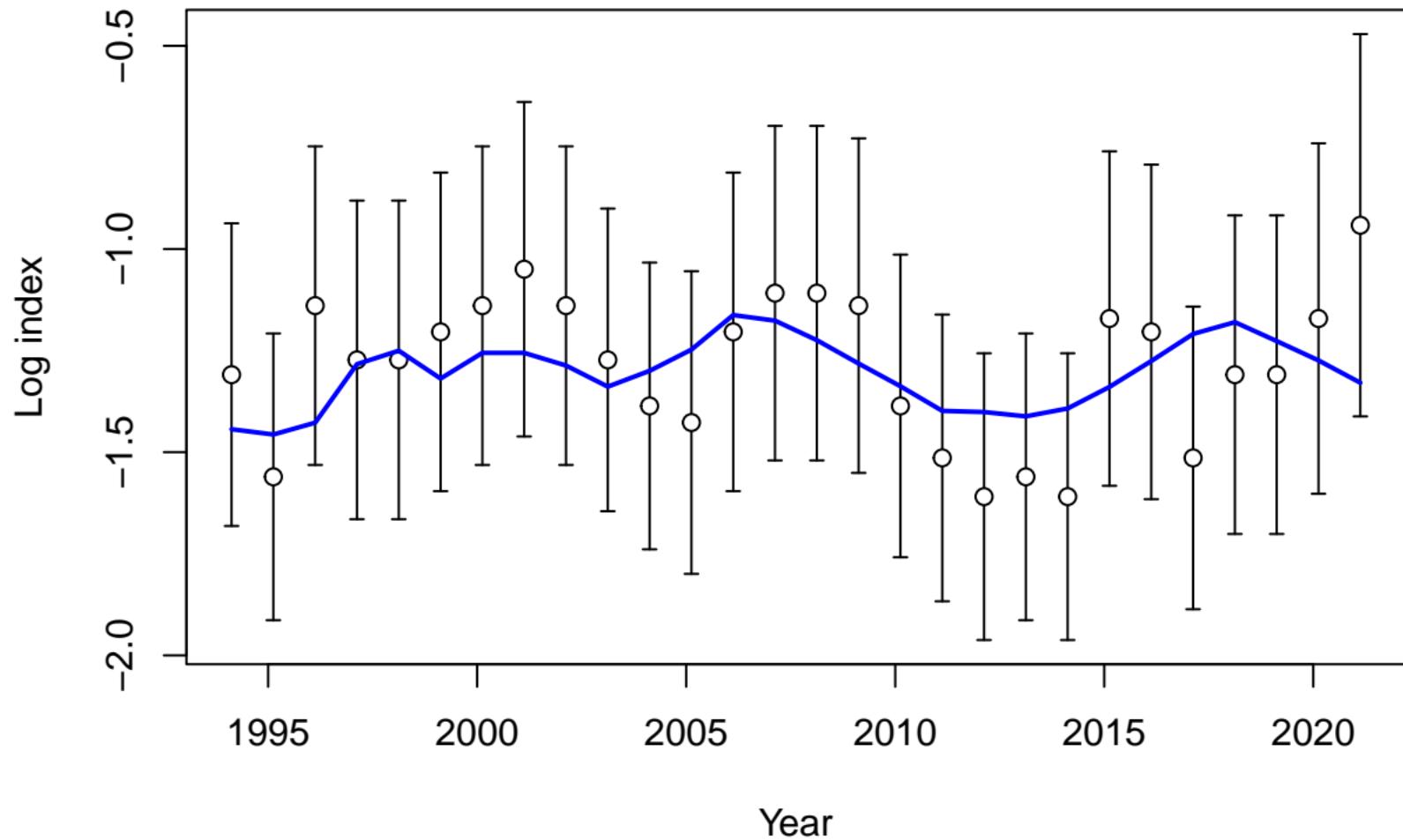
0.30
0.20
0.10
0.00

0.0 0.1 0.2 0.3 0.4

Observed index





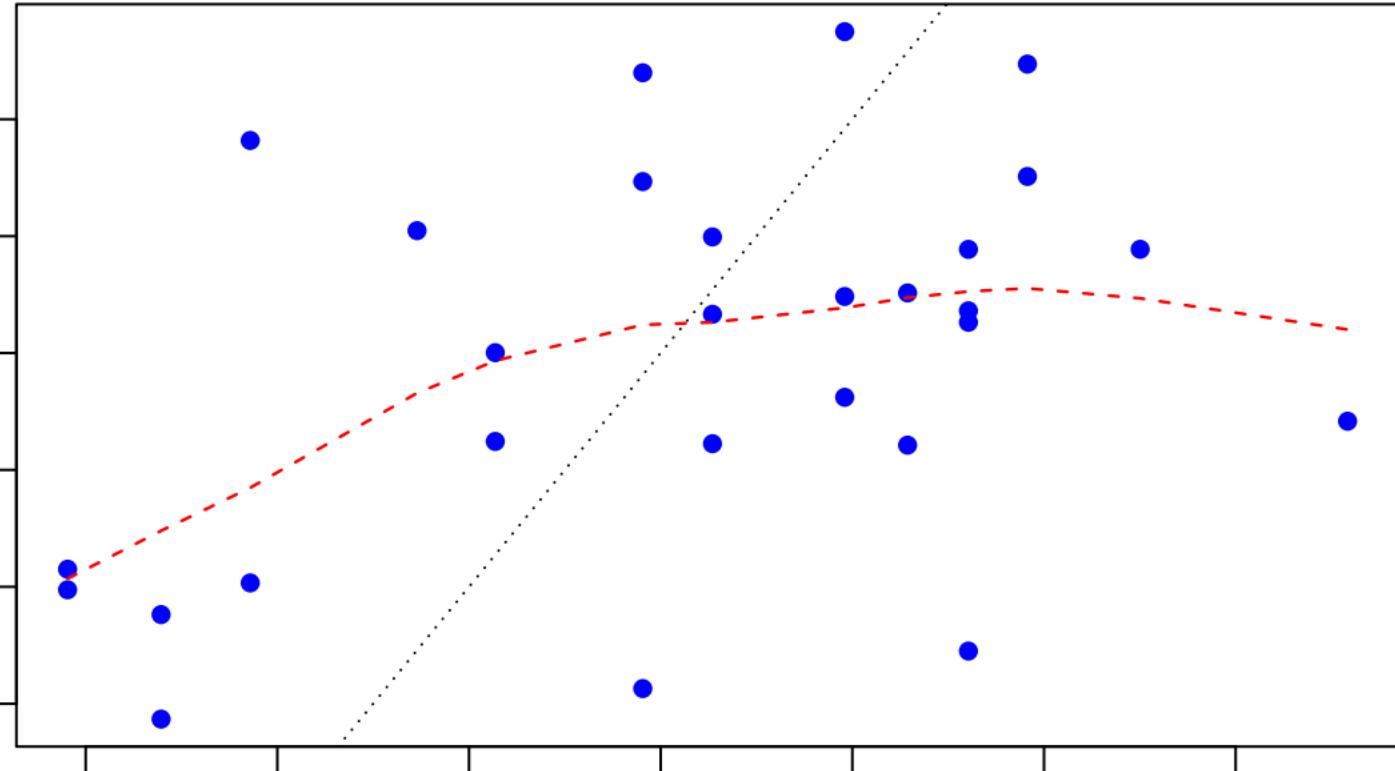


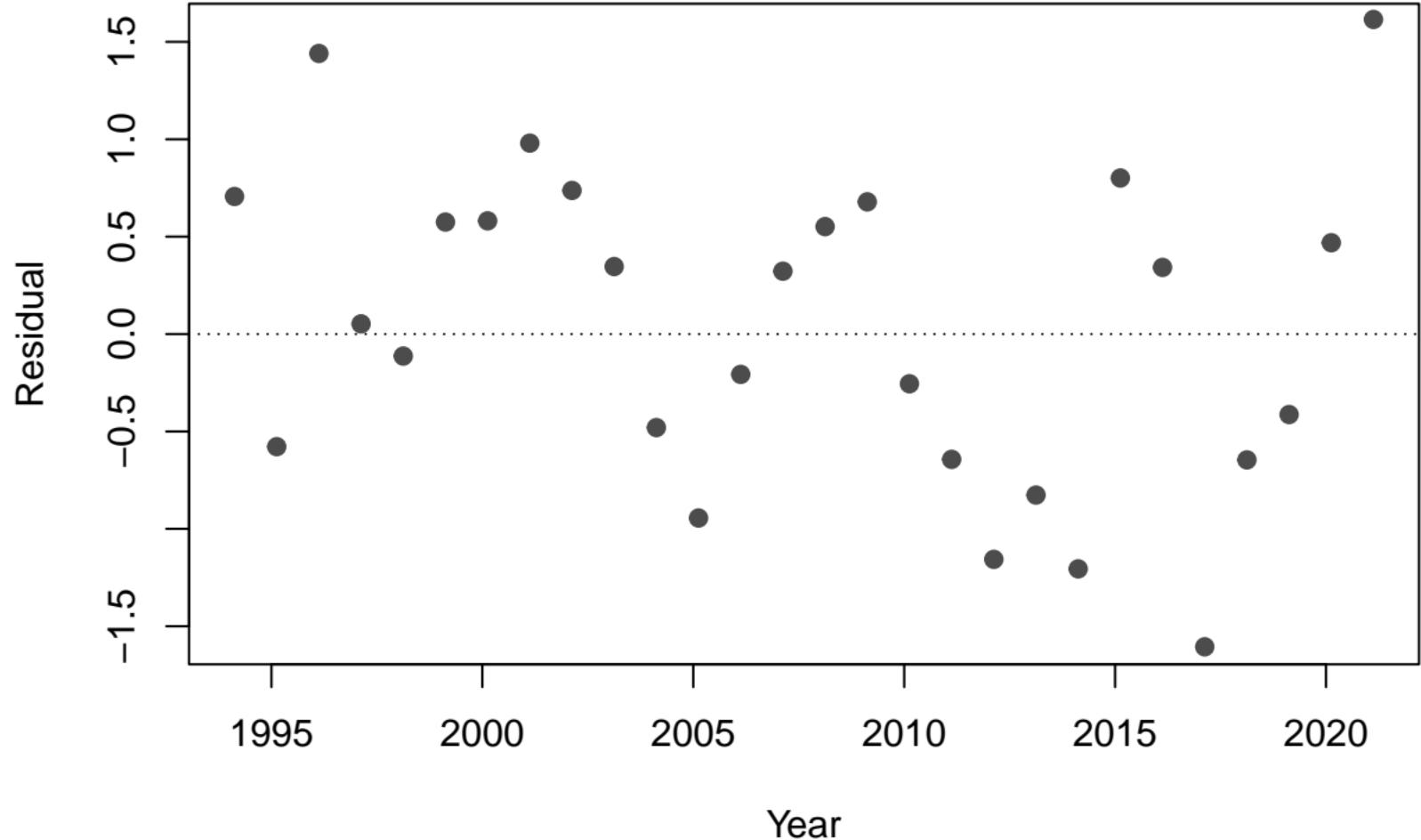
Log expected index

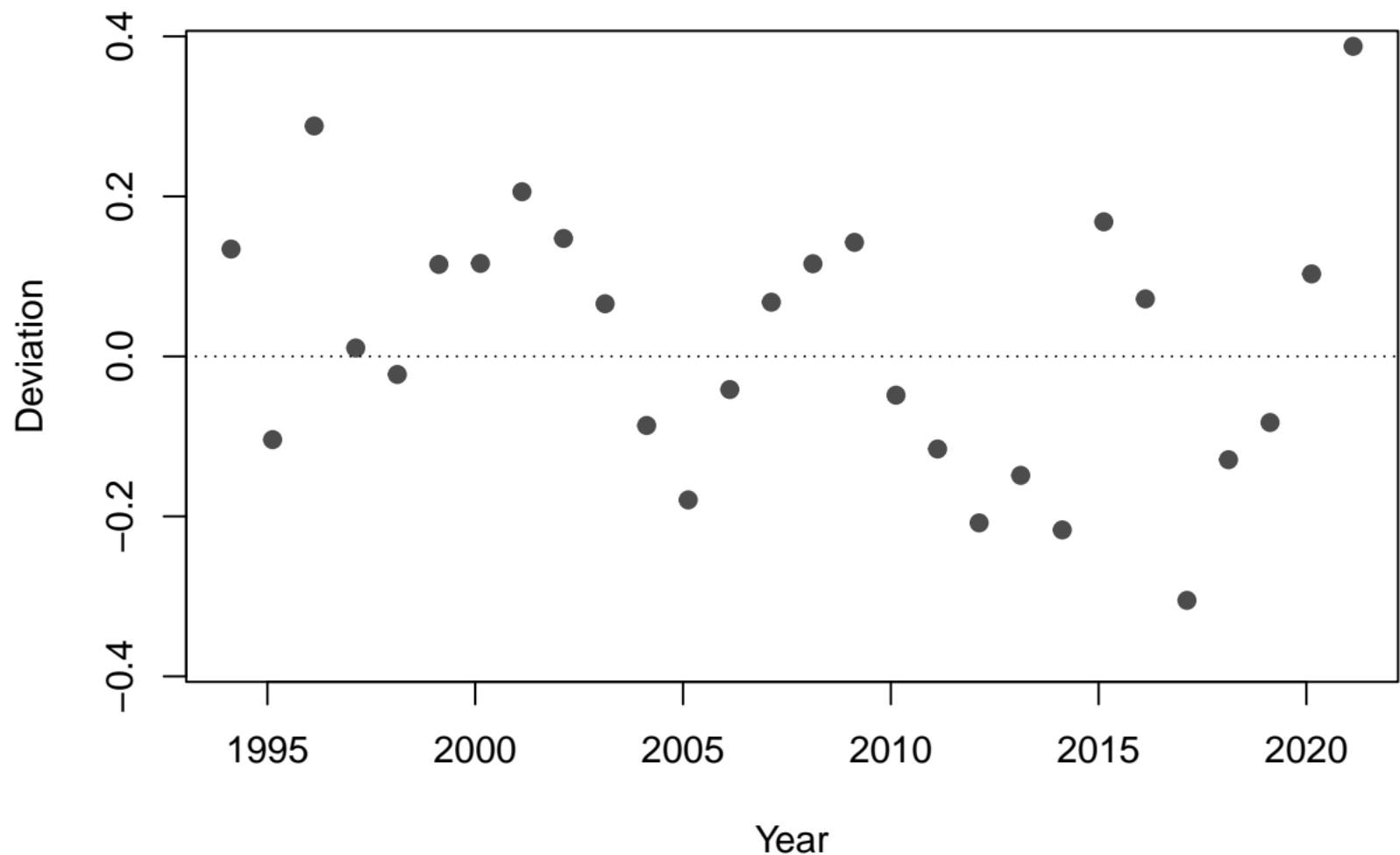
-1.25
-1.35
-1.45

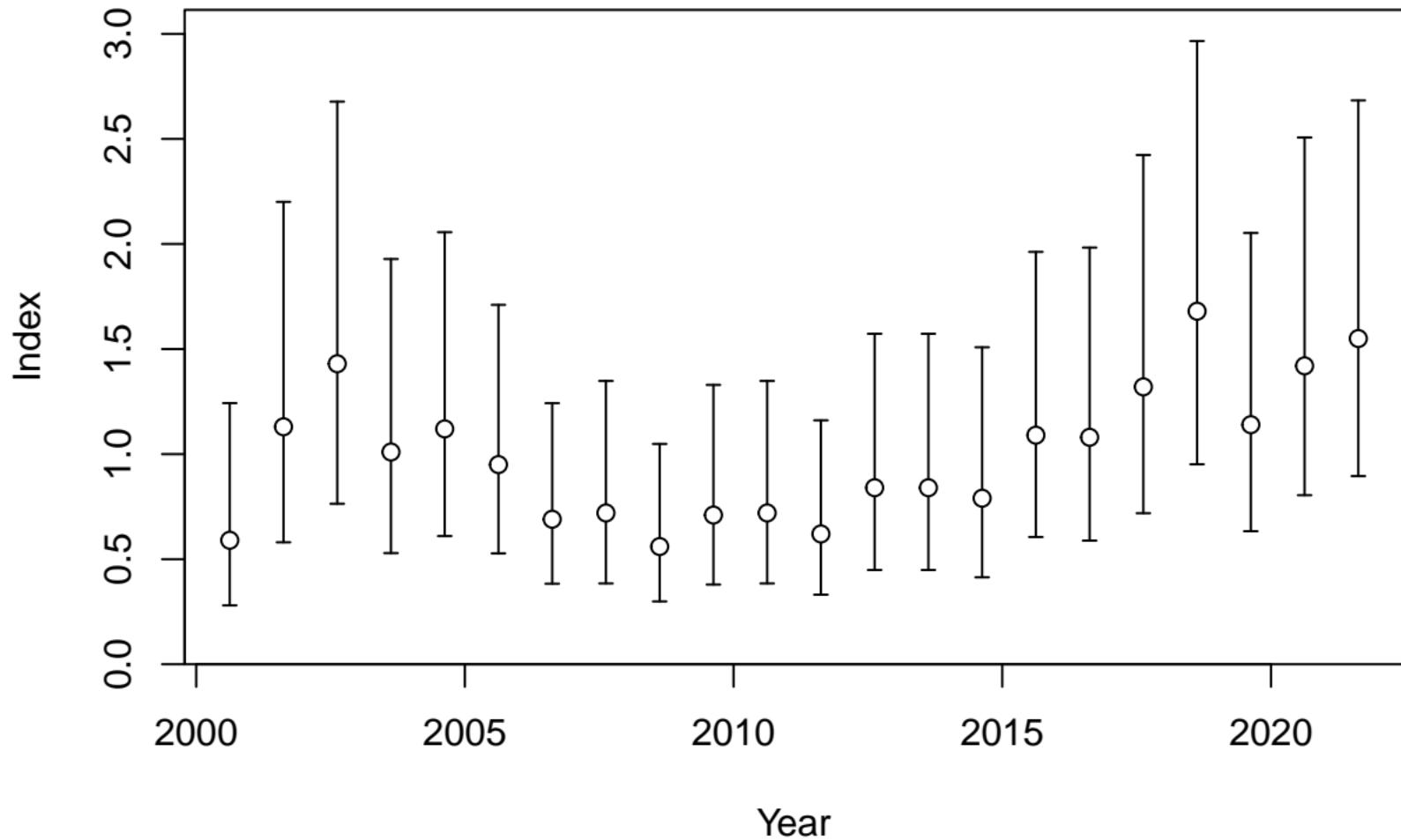
-1.6 -1.5 -1.4 -1.3 -1.2 -1.1 -1.0

Log observed index

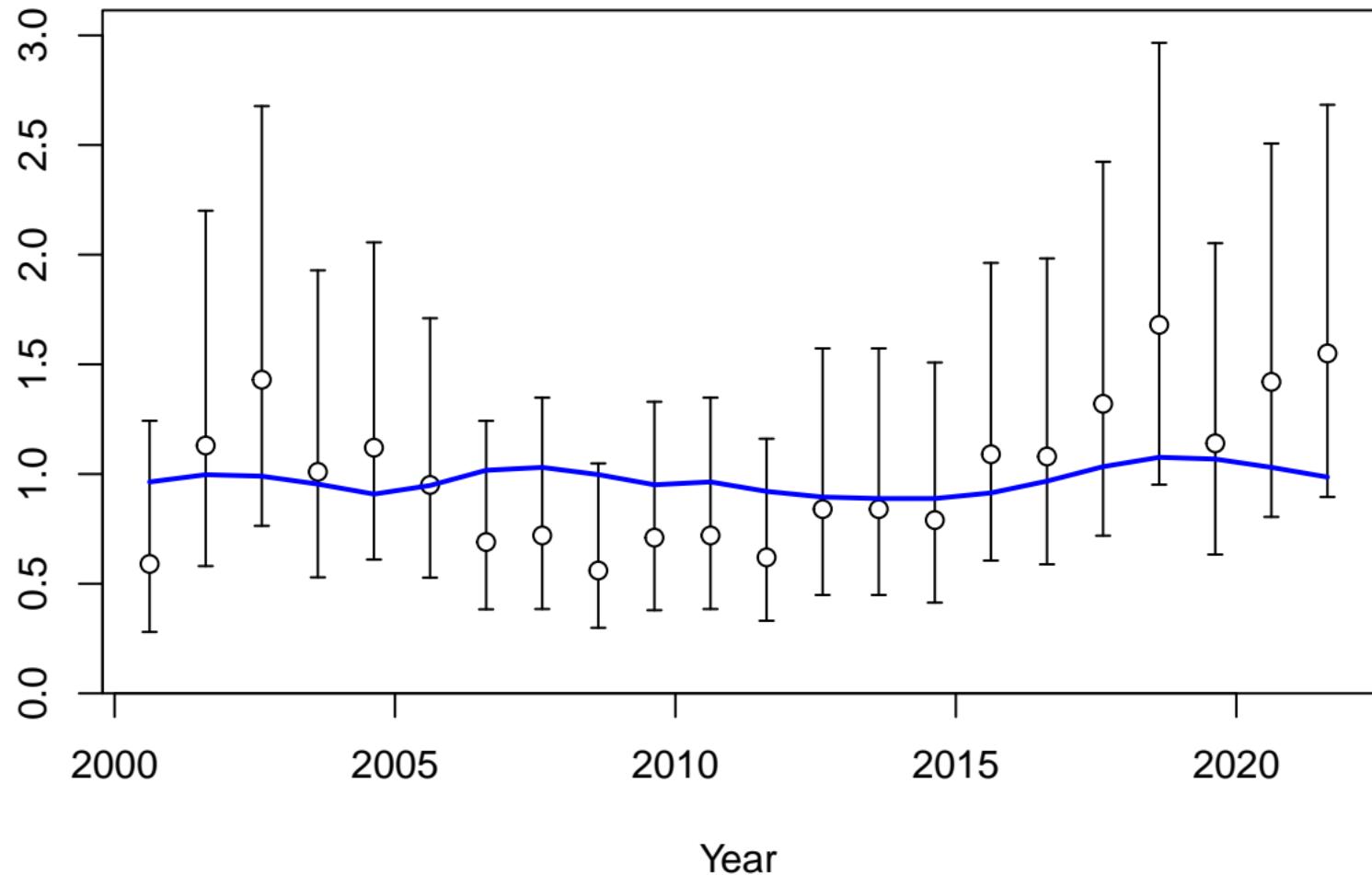








Index



Expected index

1.0
0.8
0.6
0.4
0.2
0.0

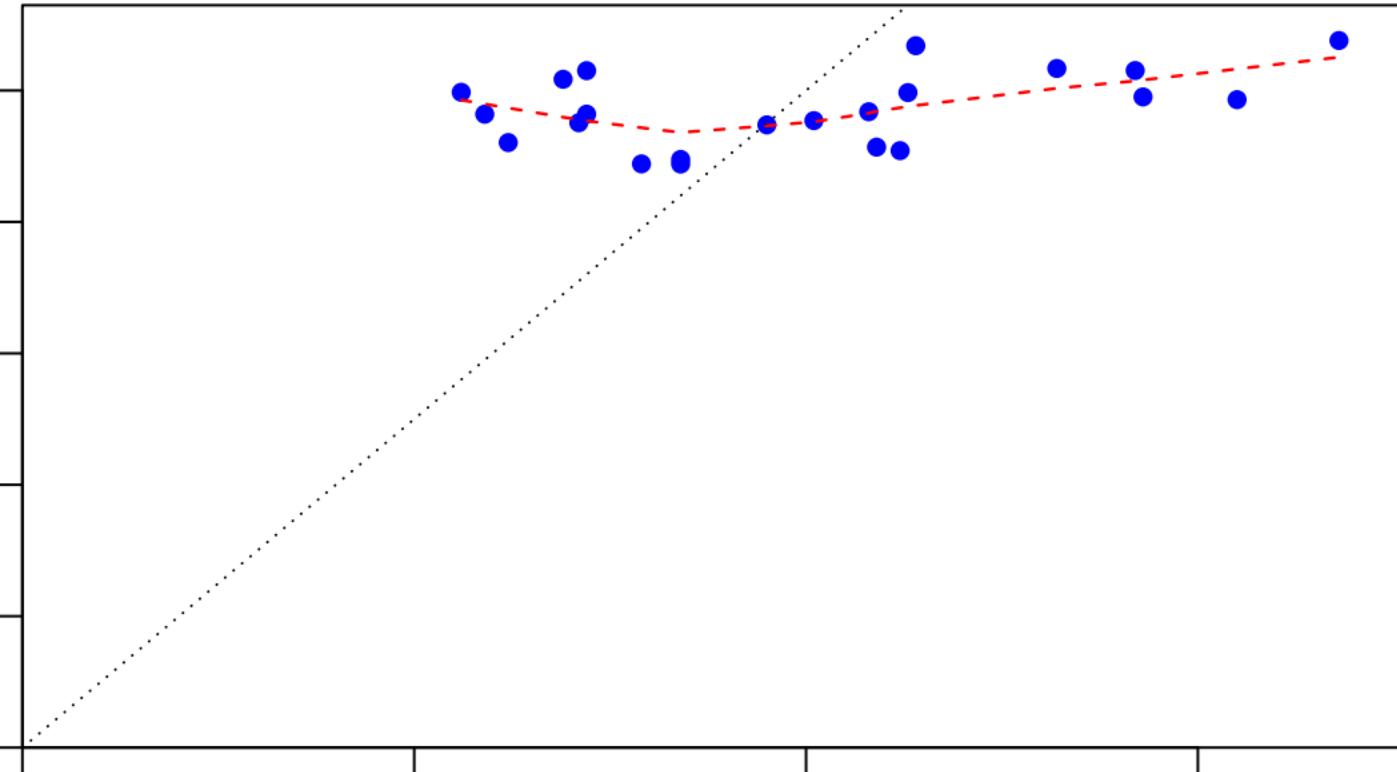
0.0

0.5

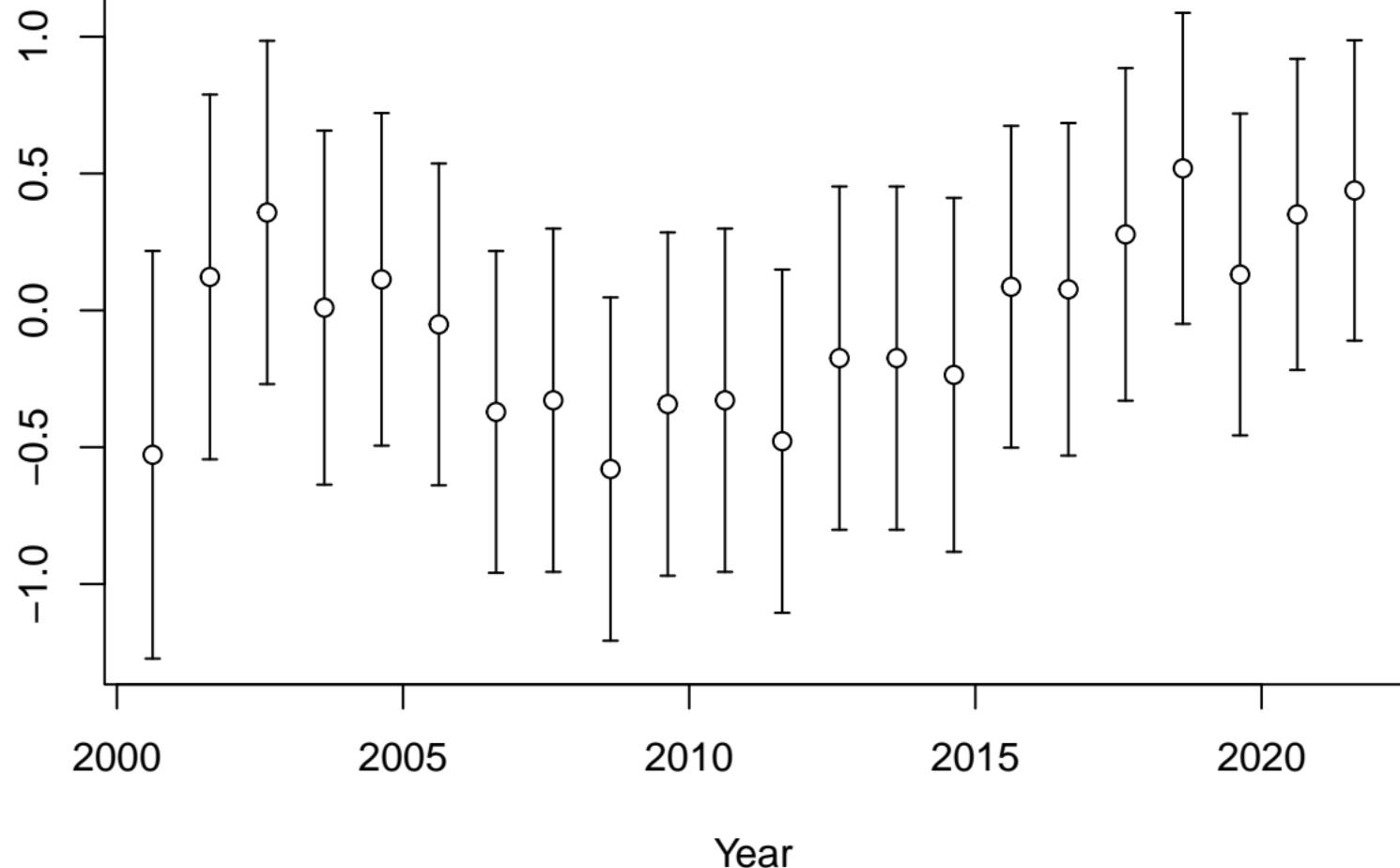
1.0

1.5

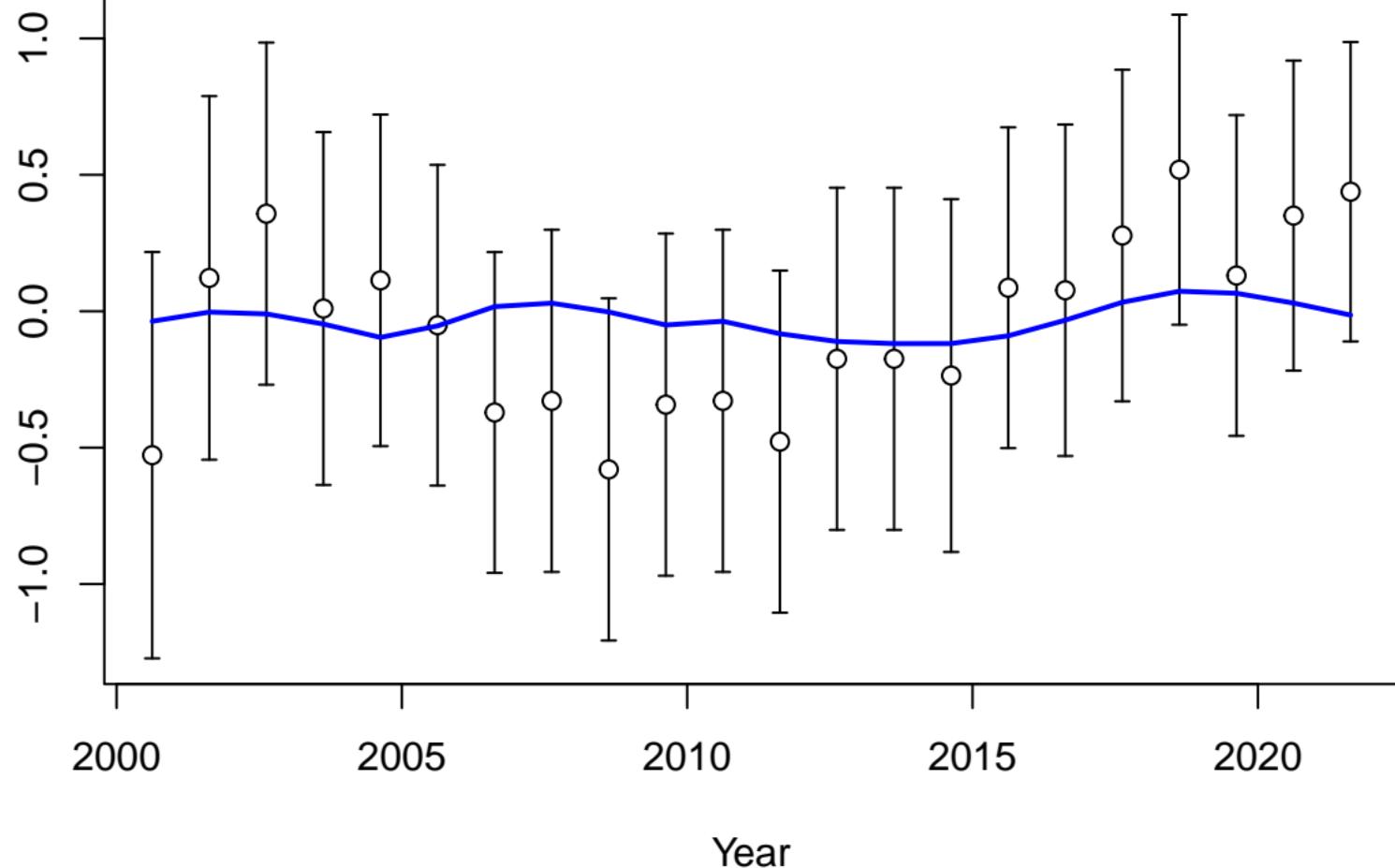
Observed index



Log index



Log index

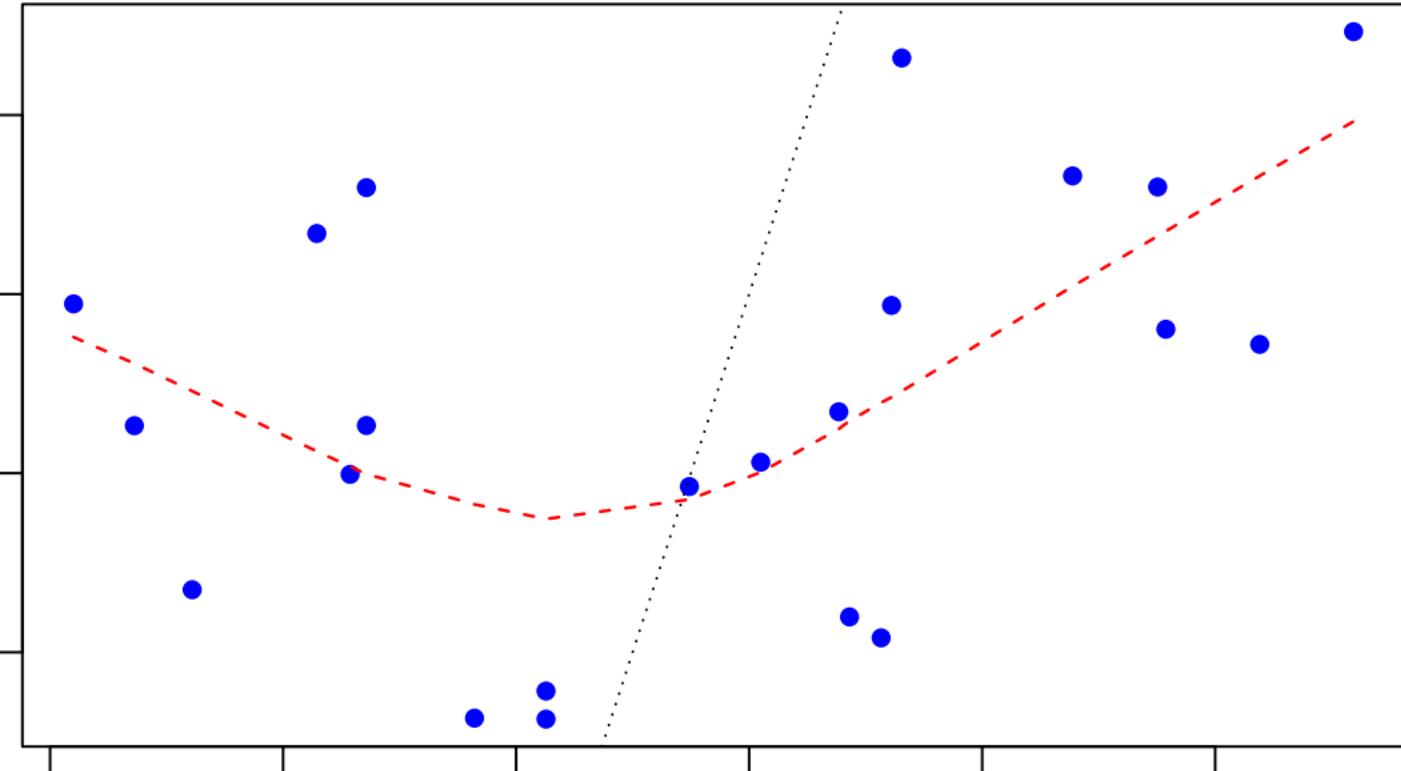


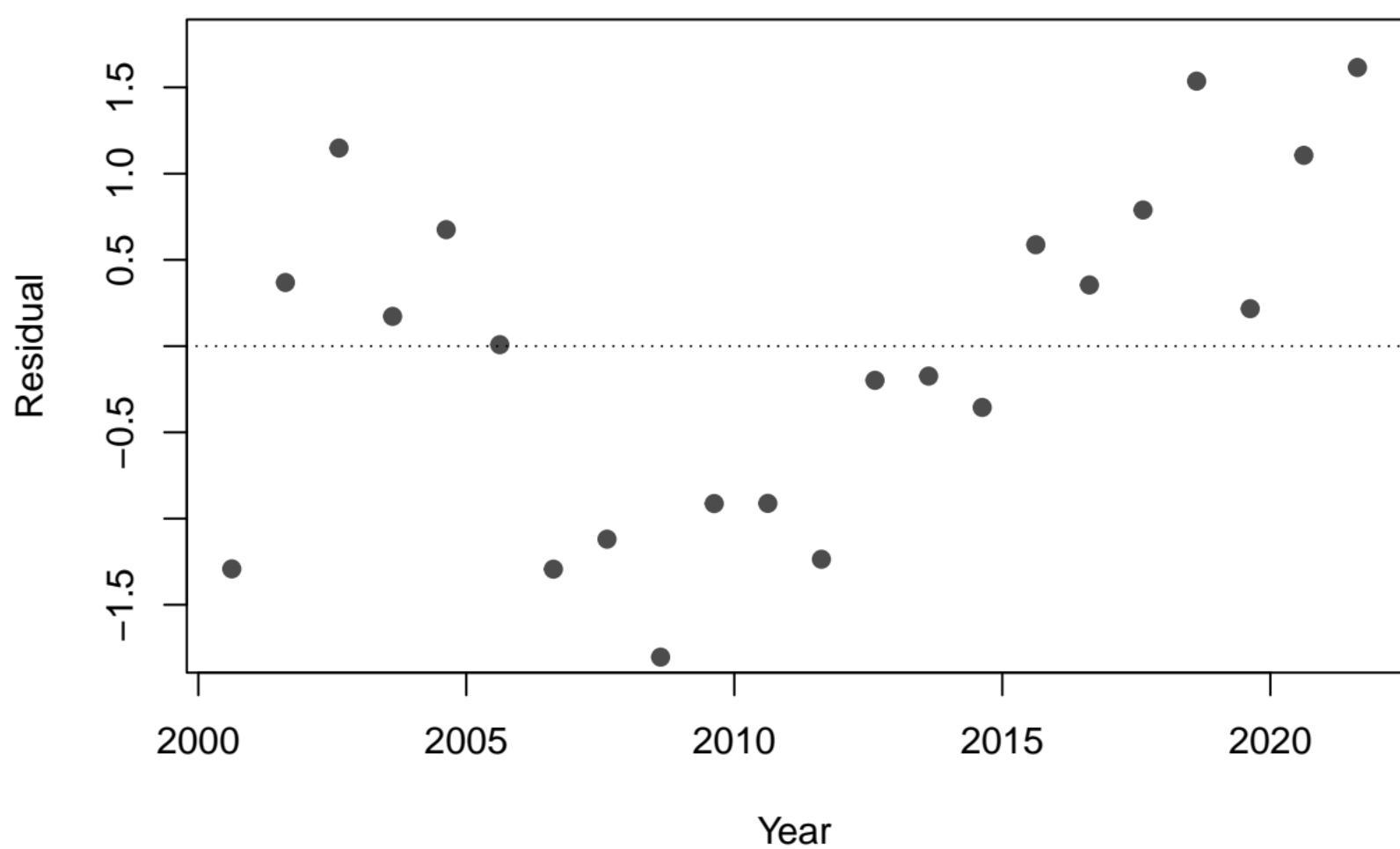
Log expected index

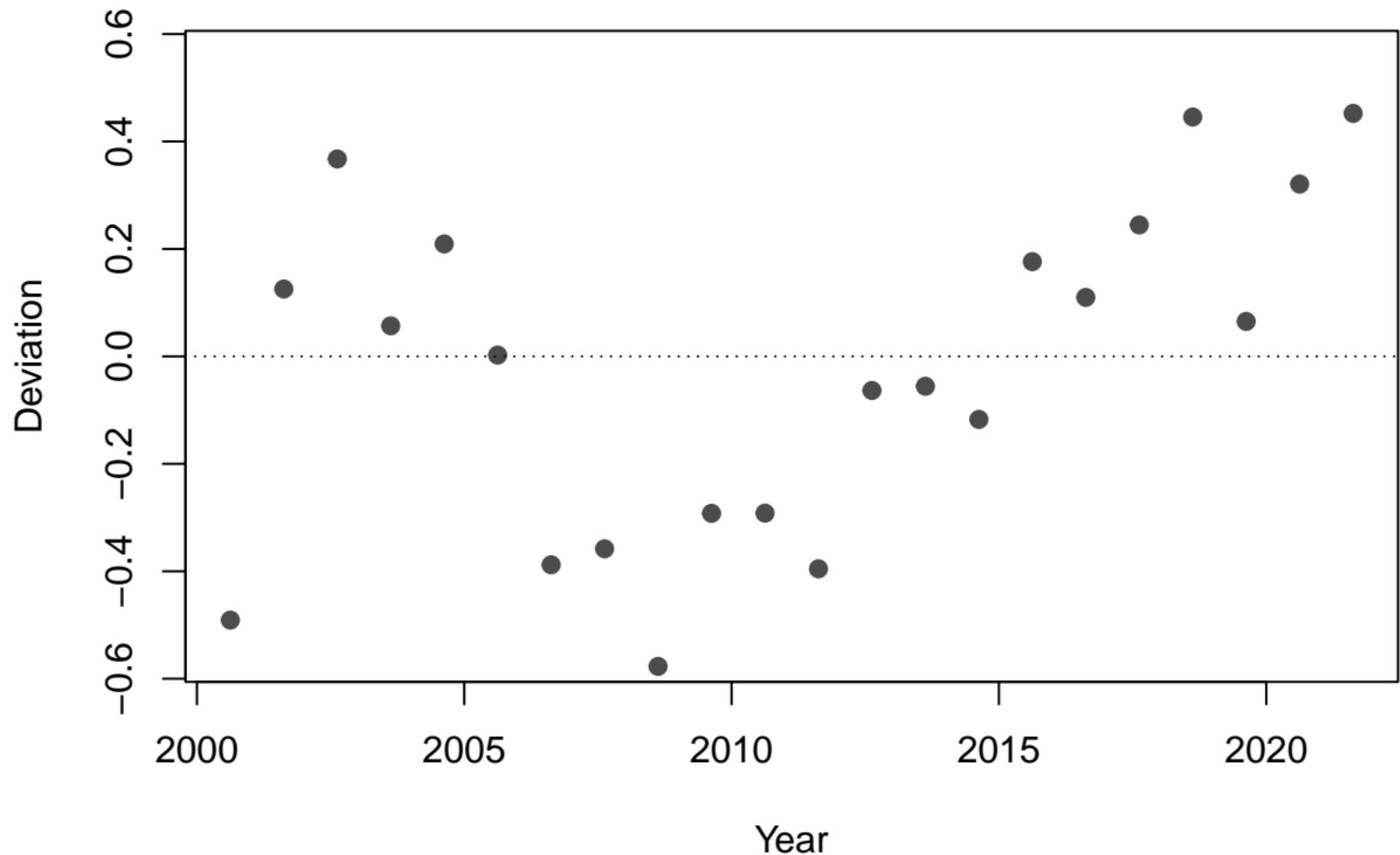
-0.10
-0.05
0.00
0.05

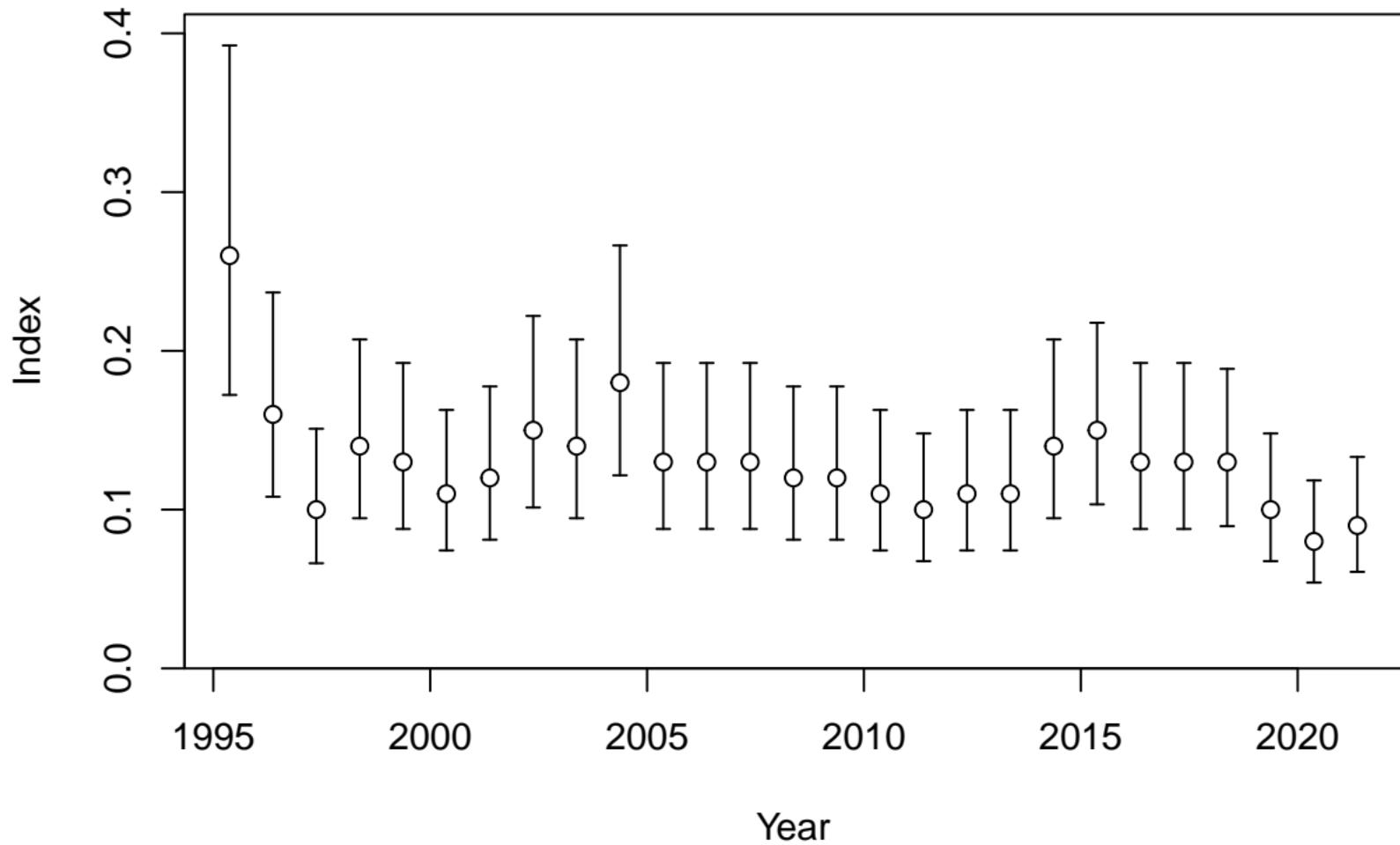
-0.6 -0.4 -0.2 0.0 0.2 0.4

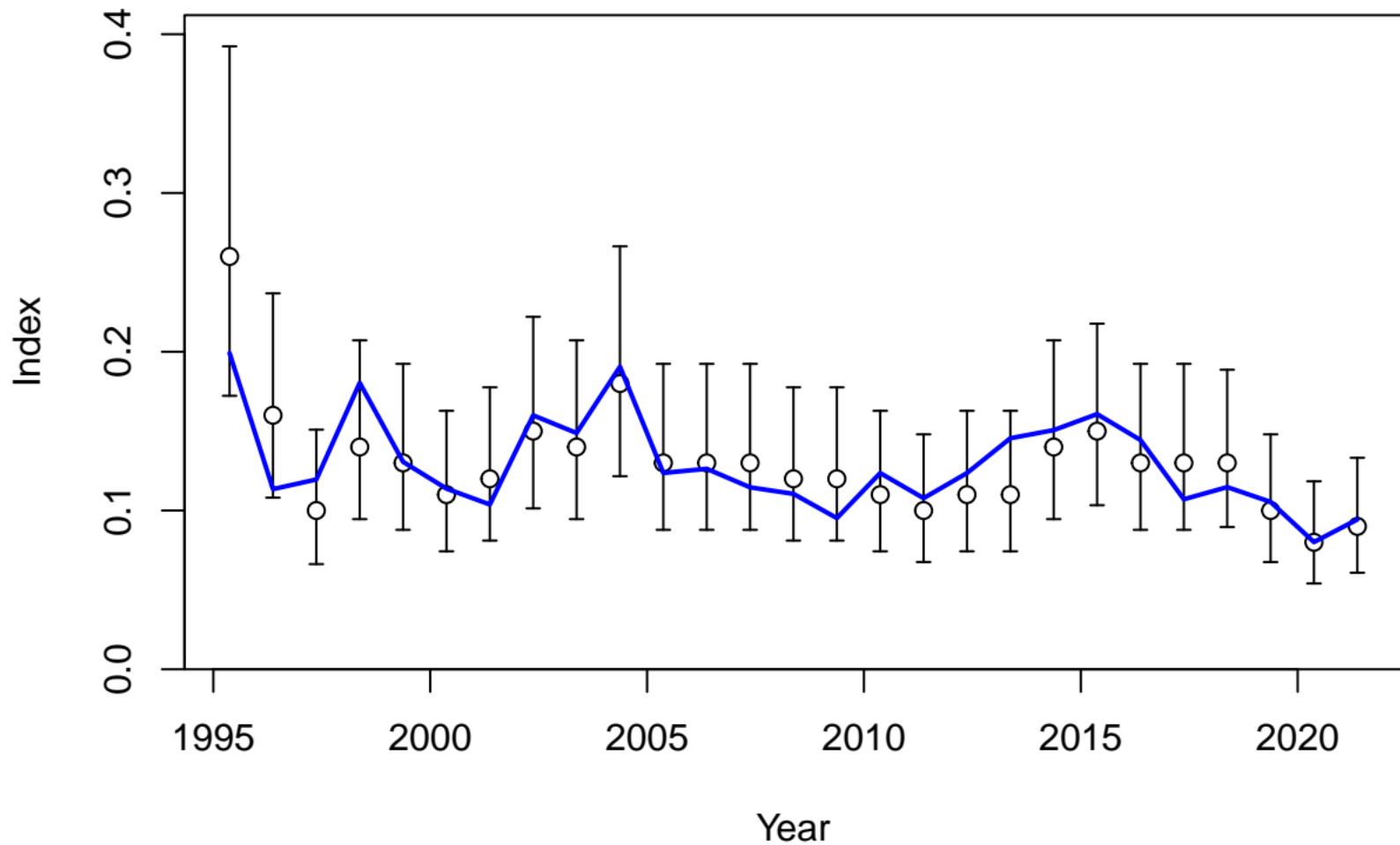
Log observed index



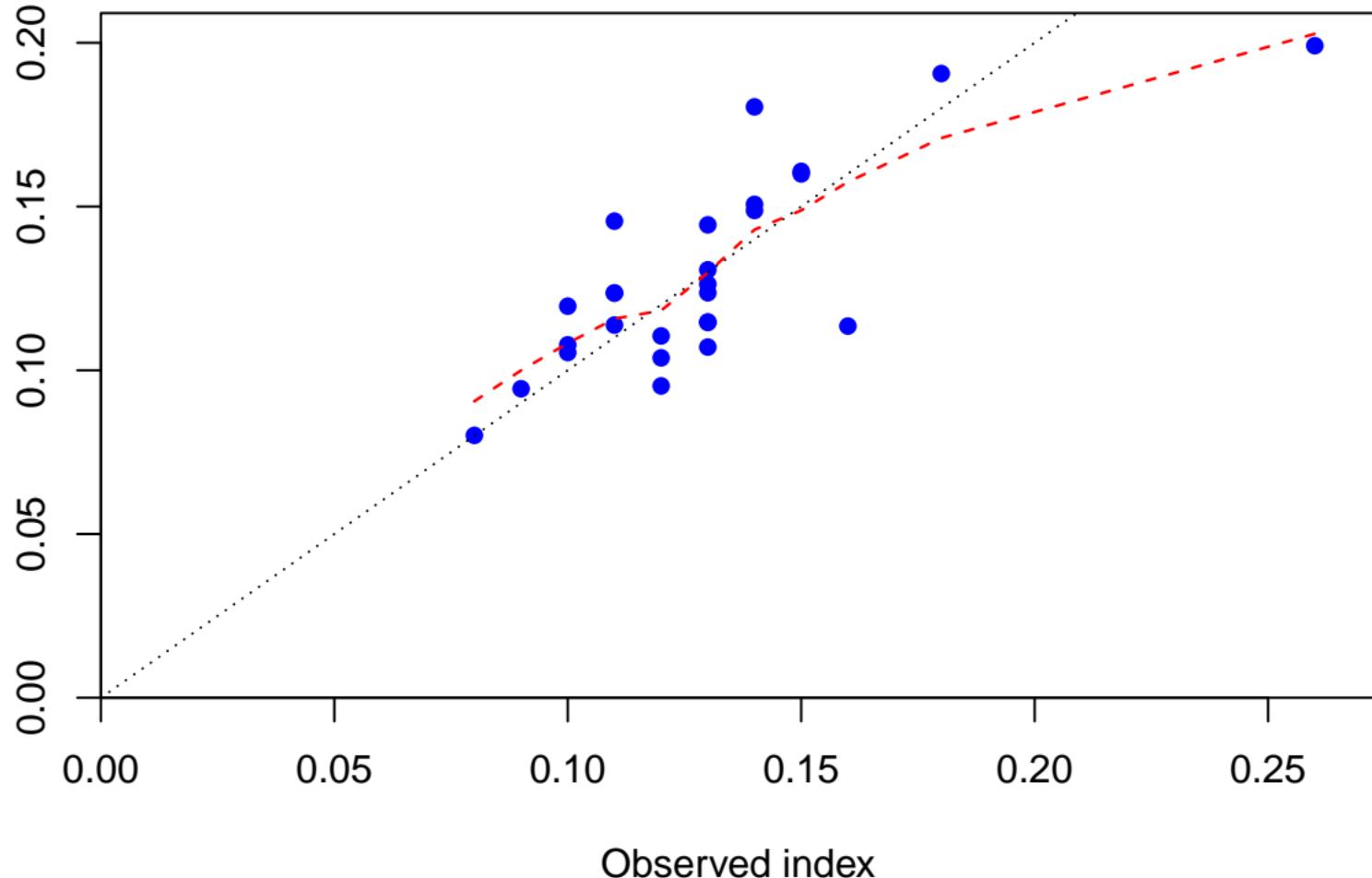




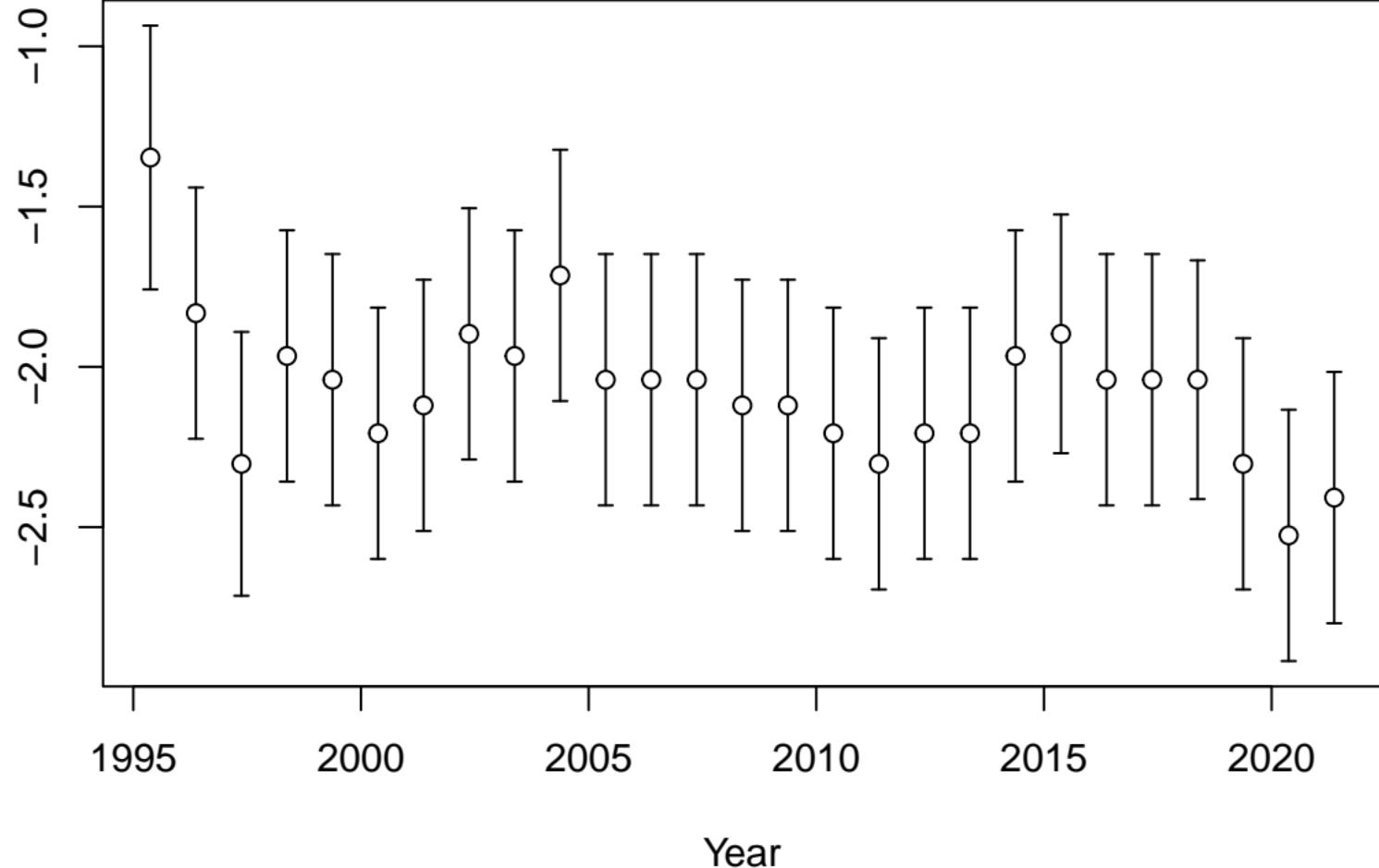


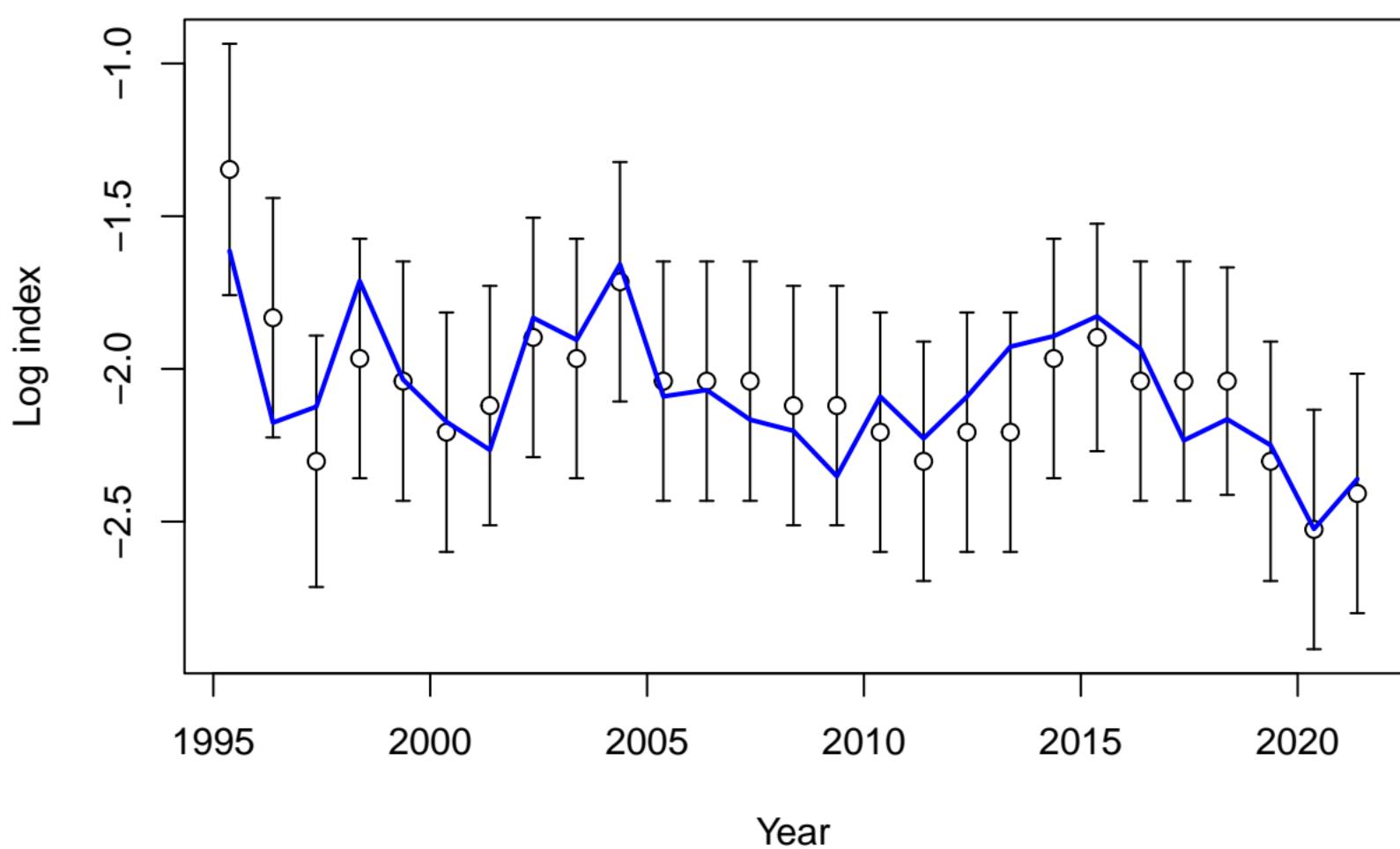


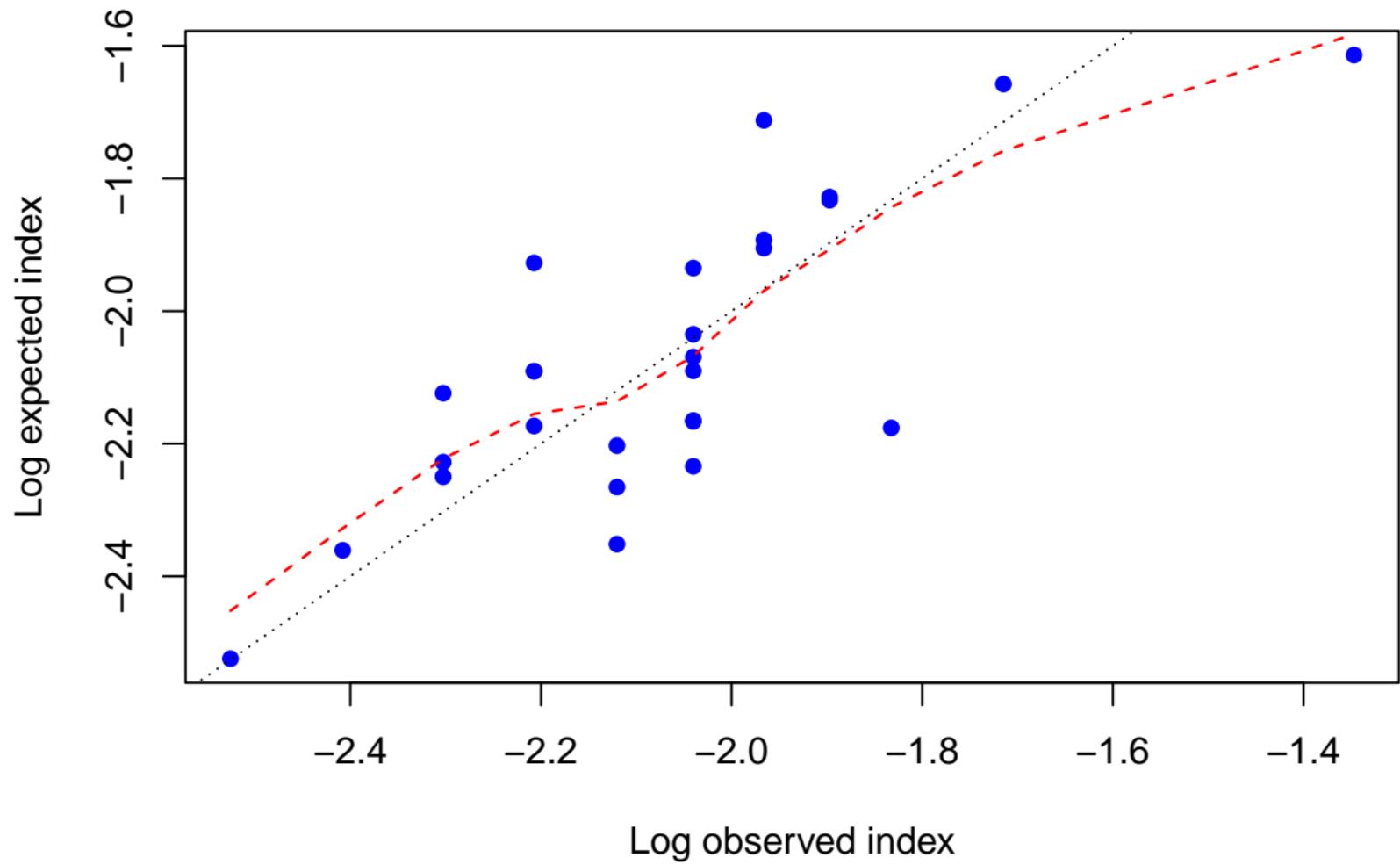
Expected index

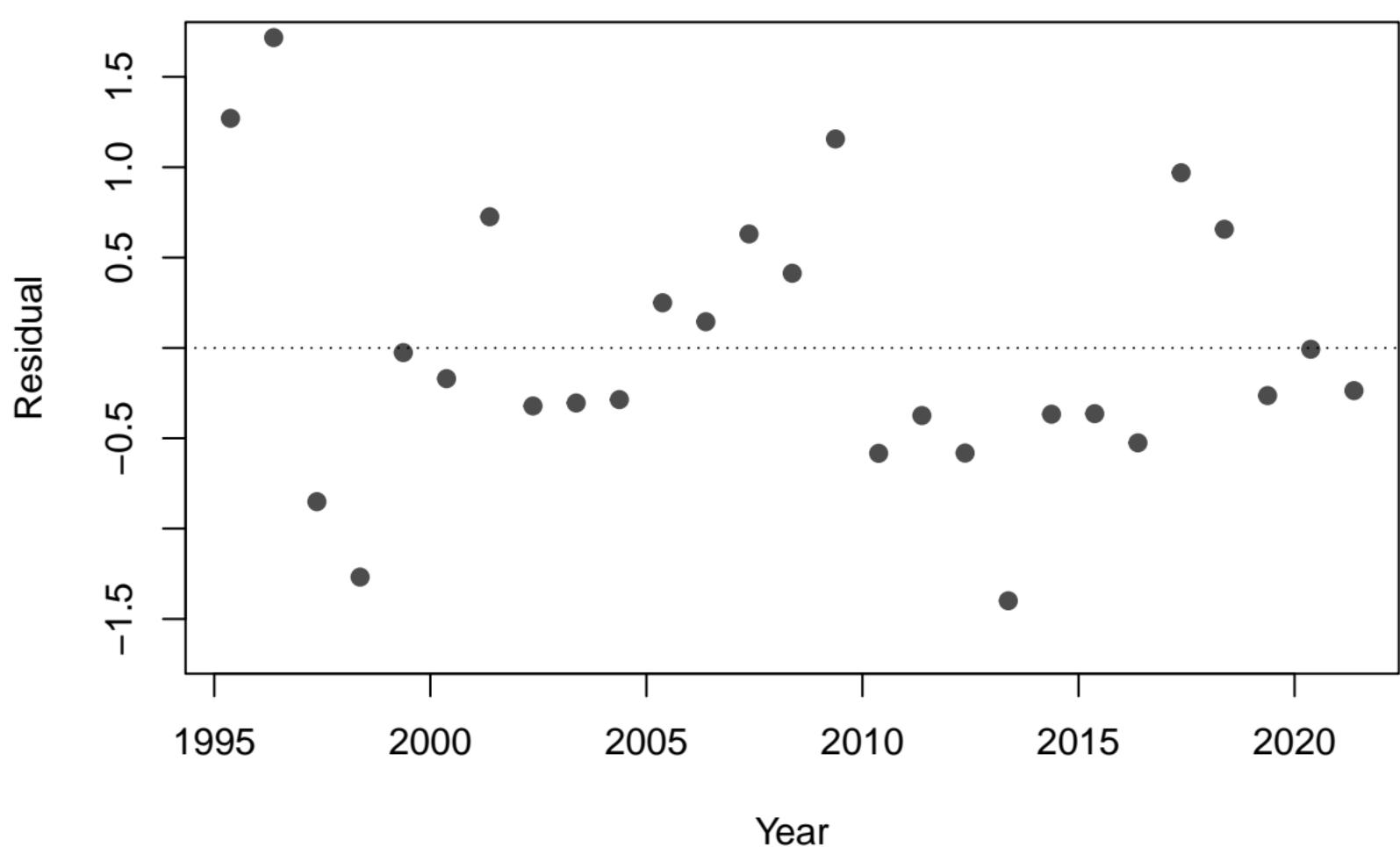


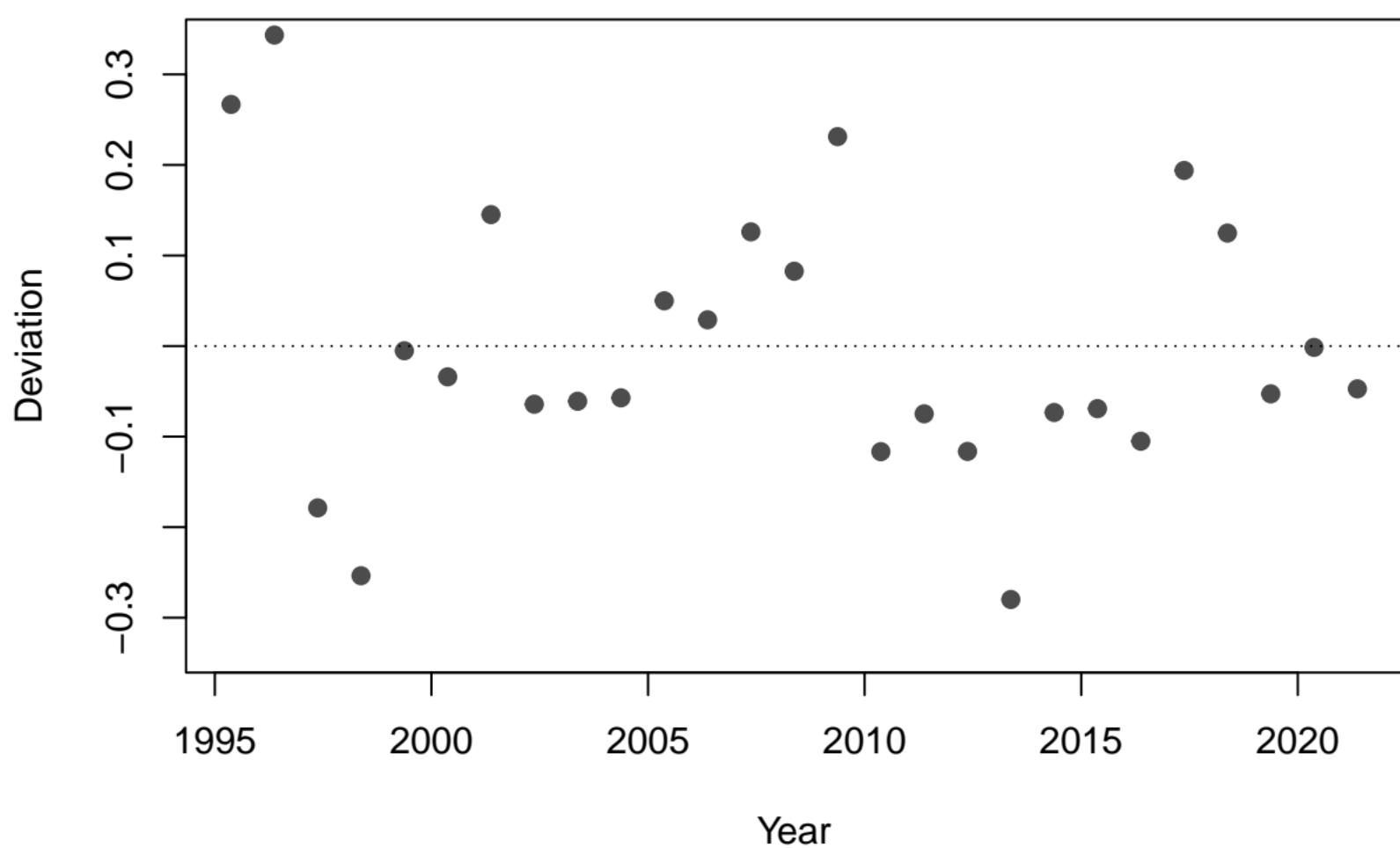
Log index

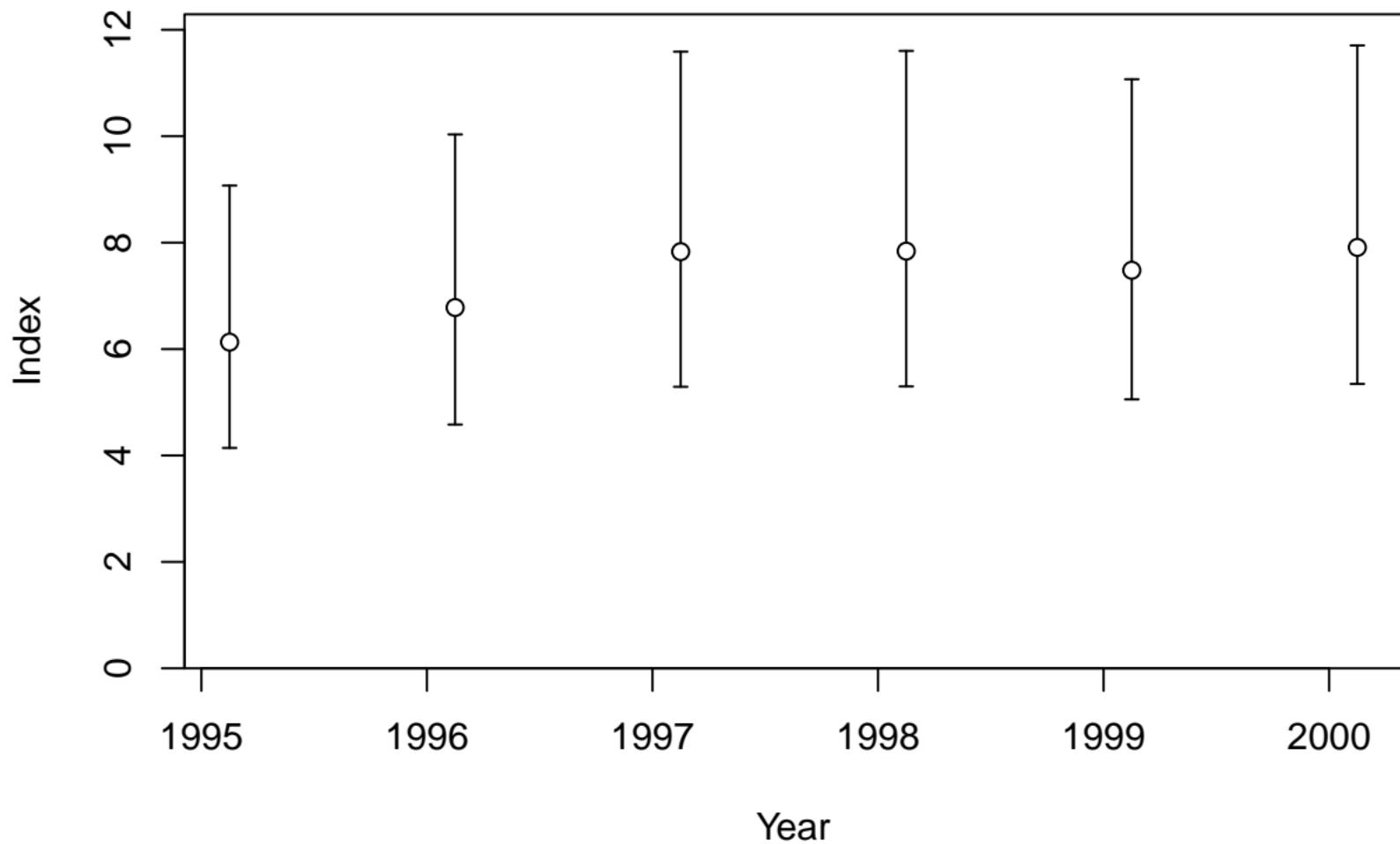


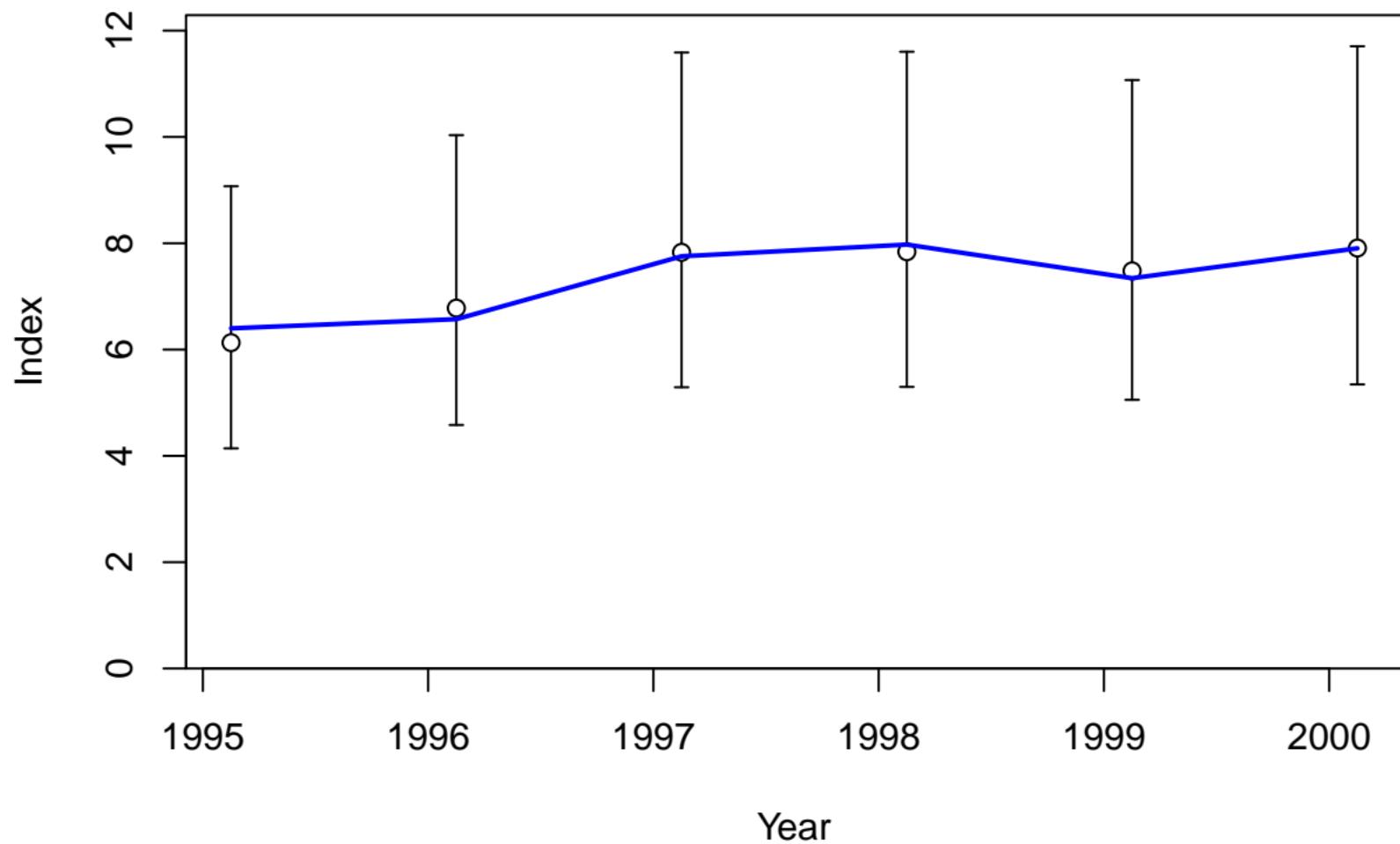




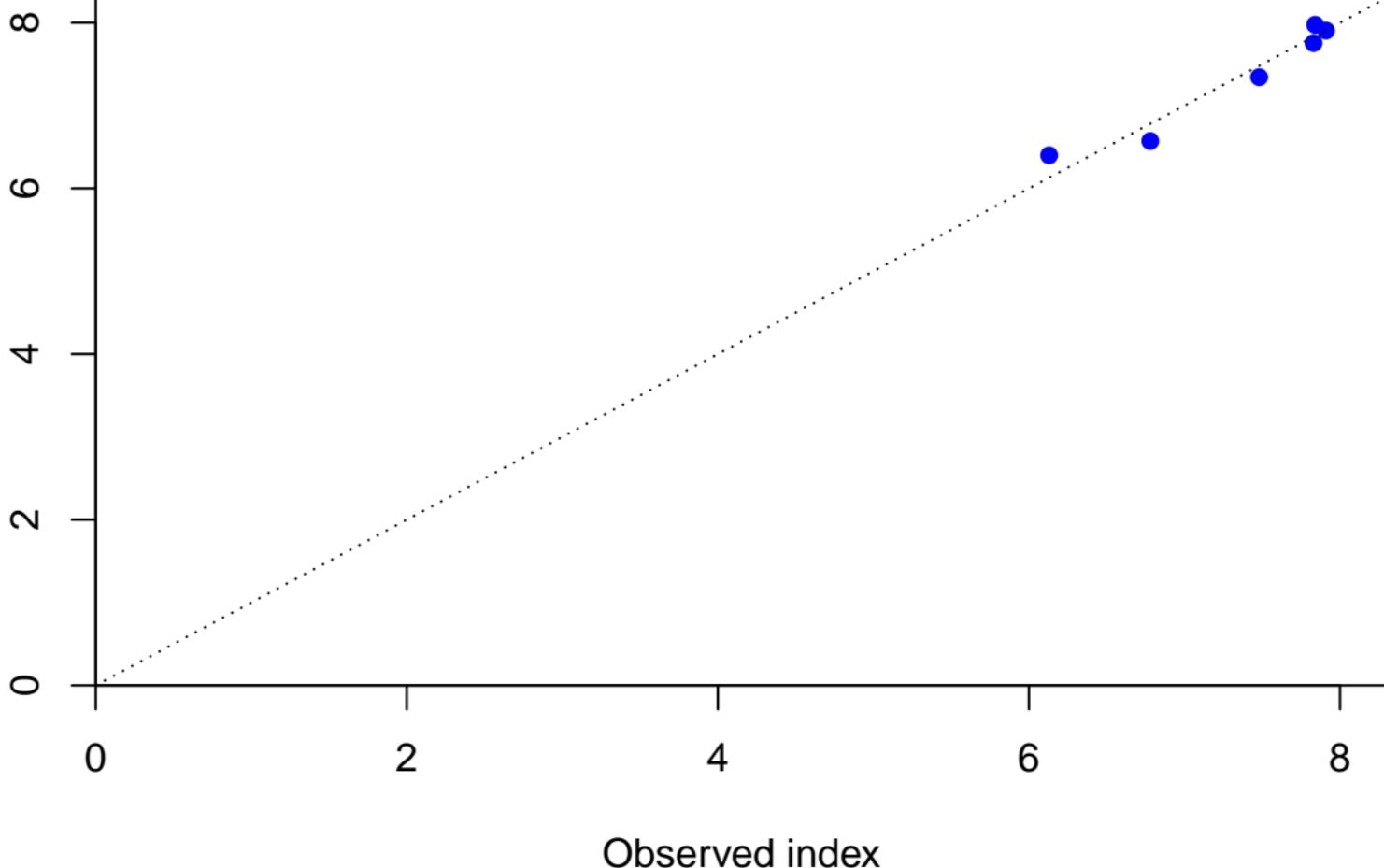


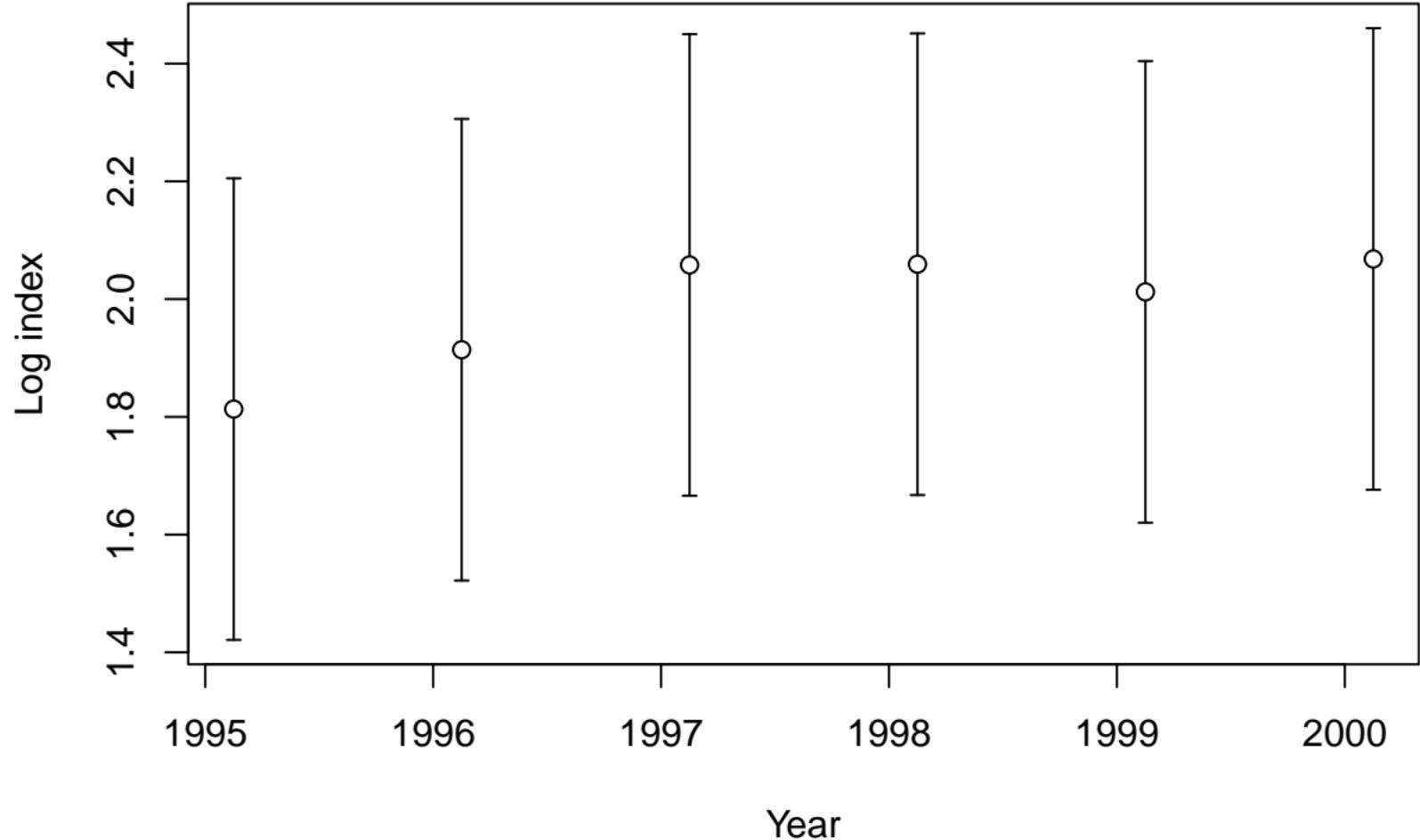






Expected index



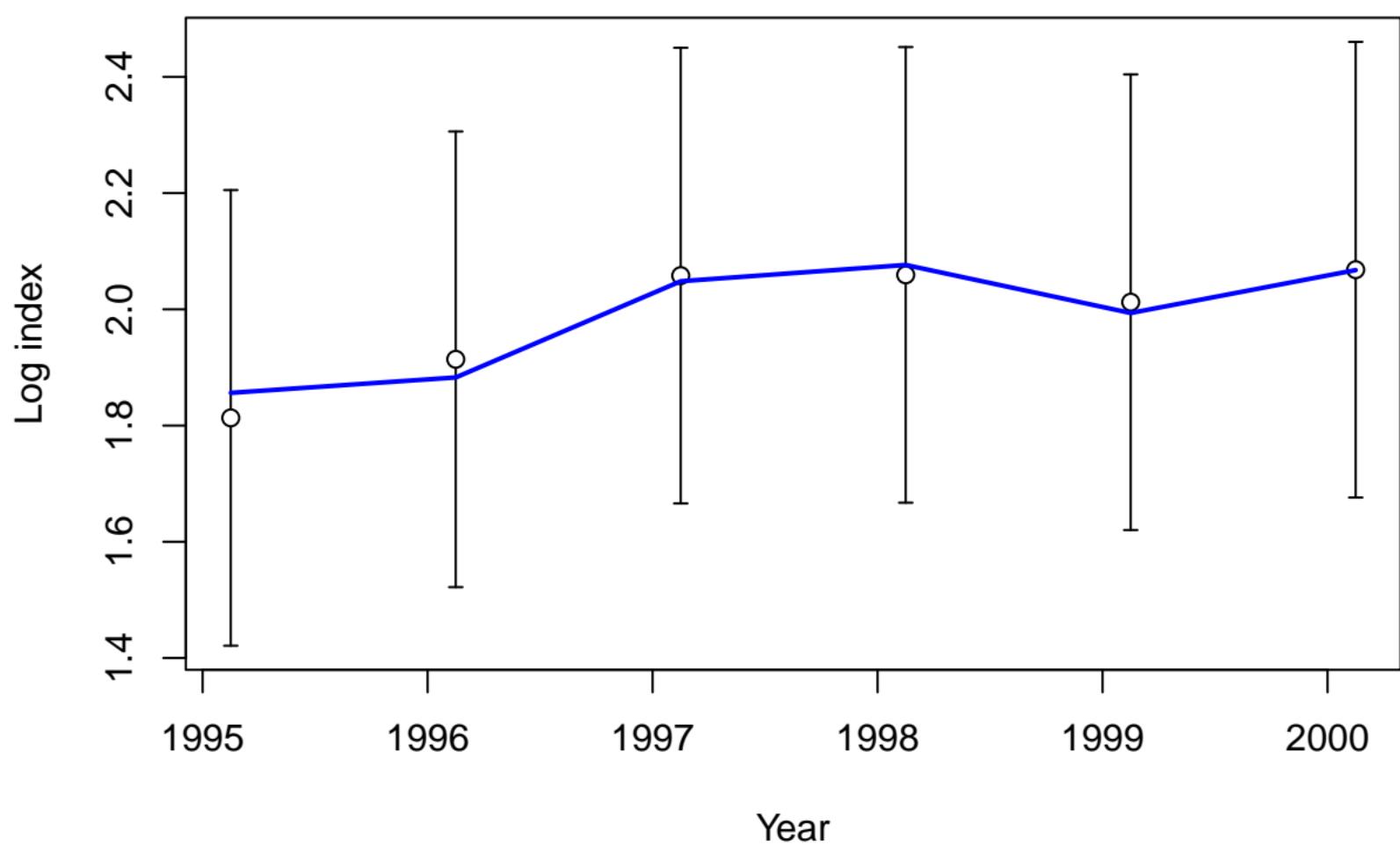


Log index

2.4
2.2
2.0
1.8
1.6
1.4

1995 1996 1997 1998 1999 2000

Year



Log expected index

1.85 1.90 1.95 2.00 2.05

1.85

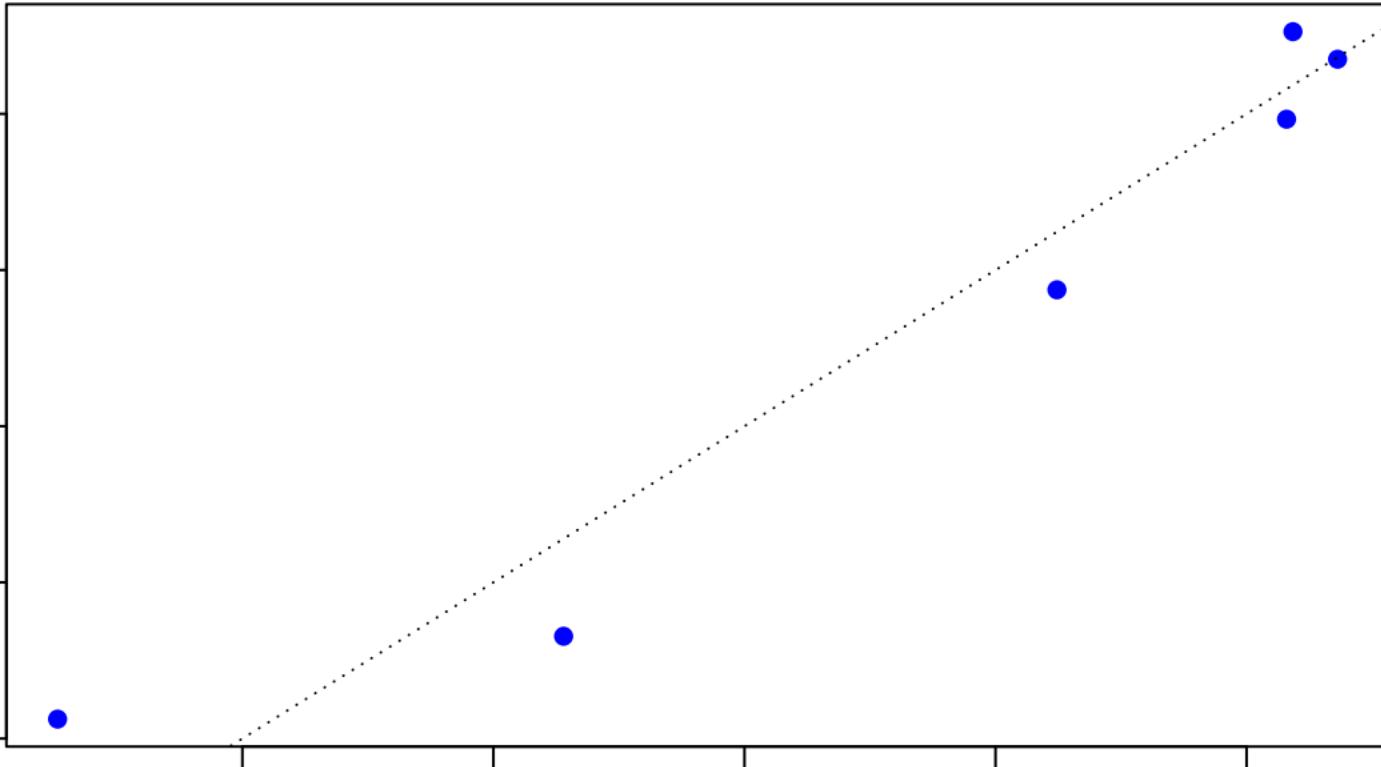
1.90

1.95

2.00

2.05

Log observed index



Residual

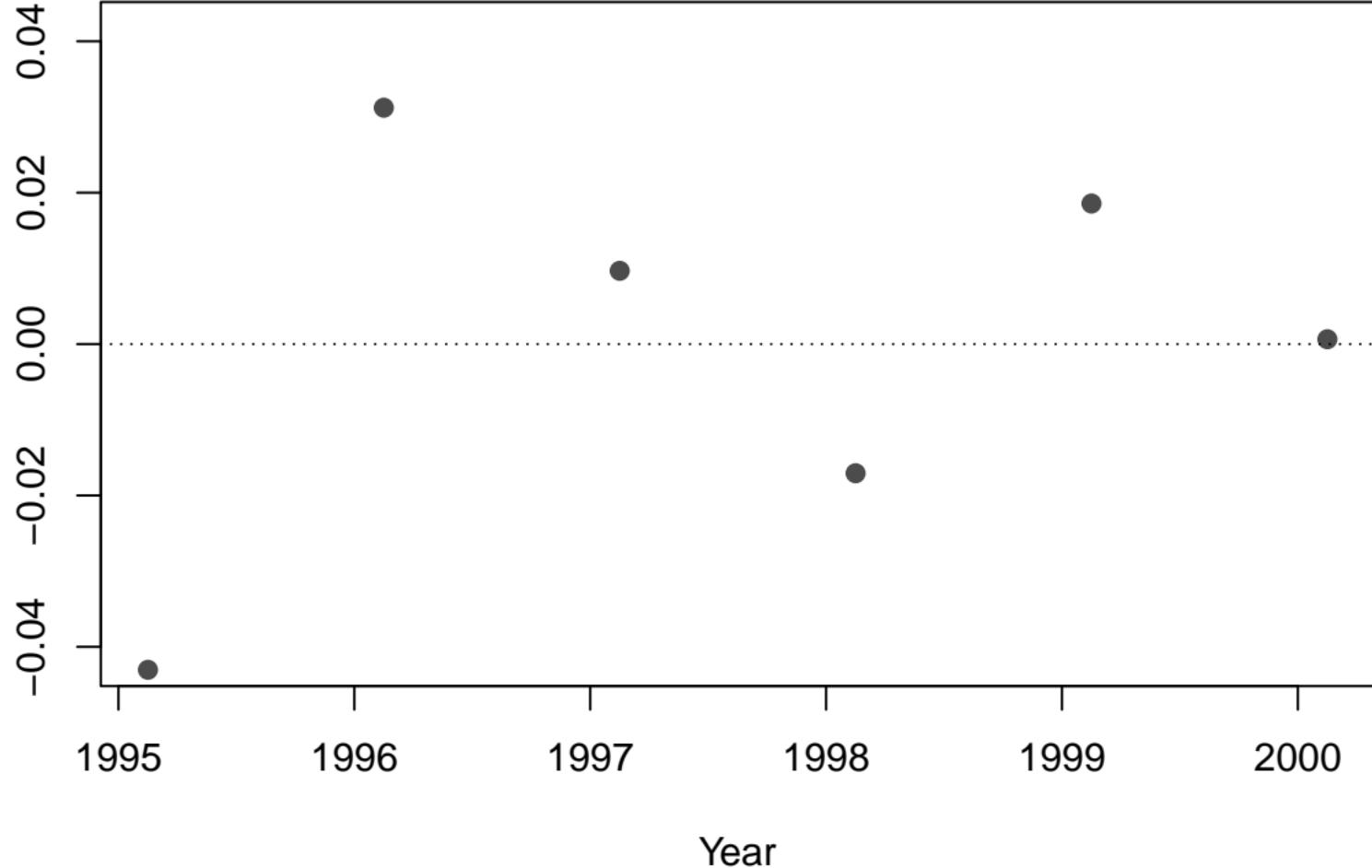
0.2
0.1
0.0
-0.1
-0.2

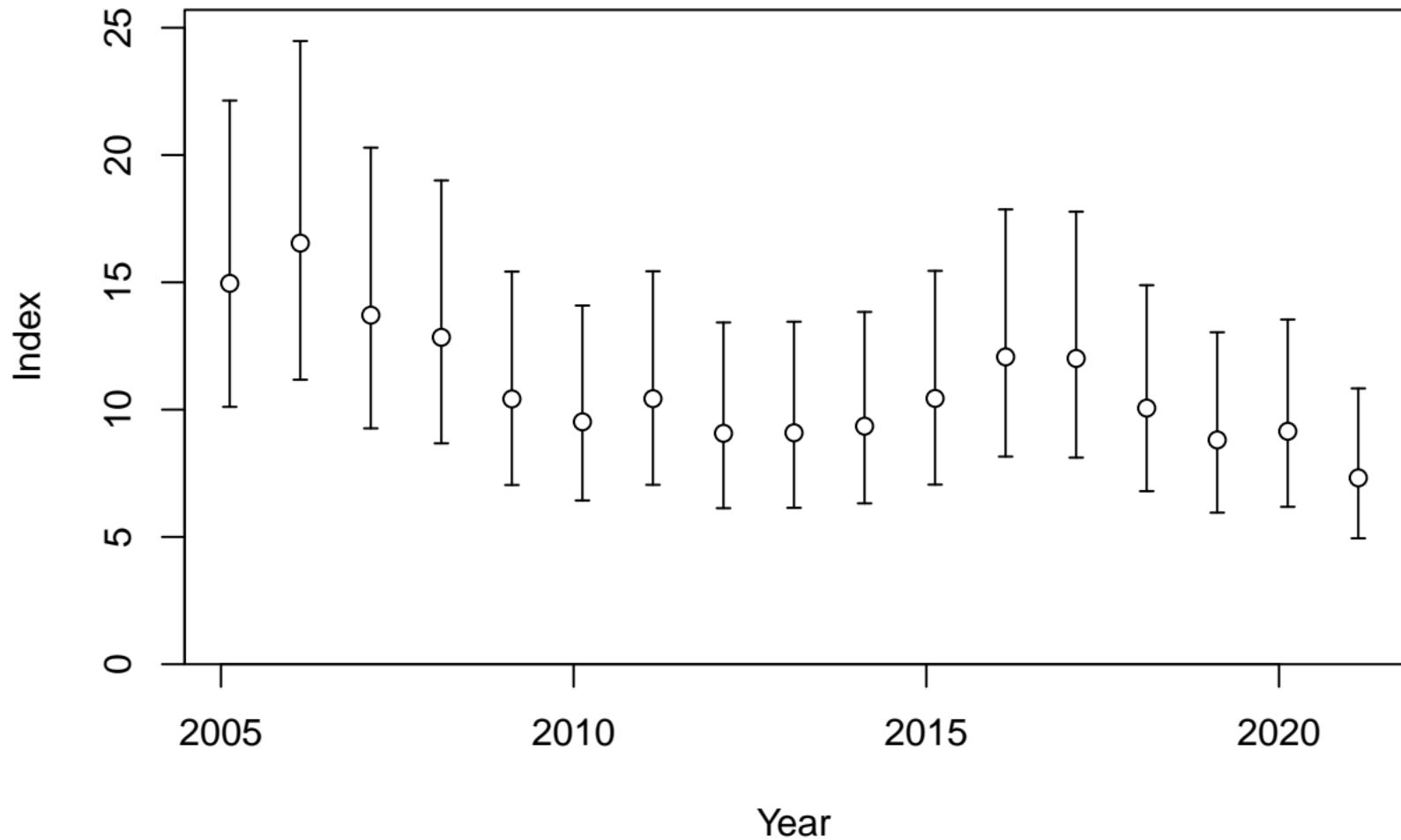
1995 1996 1997 1998 1999 2000

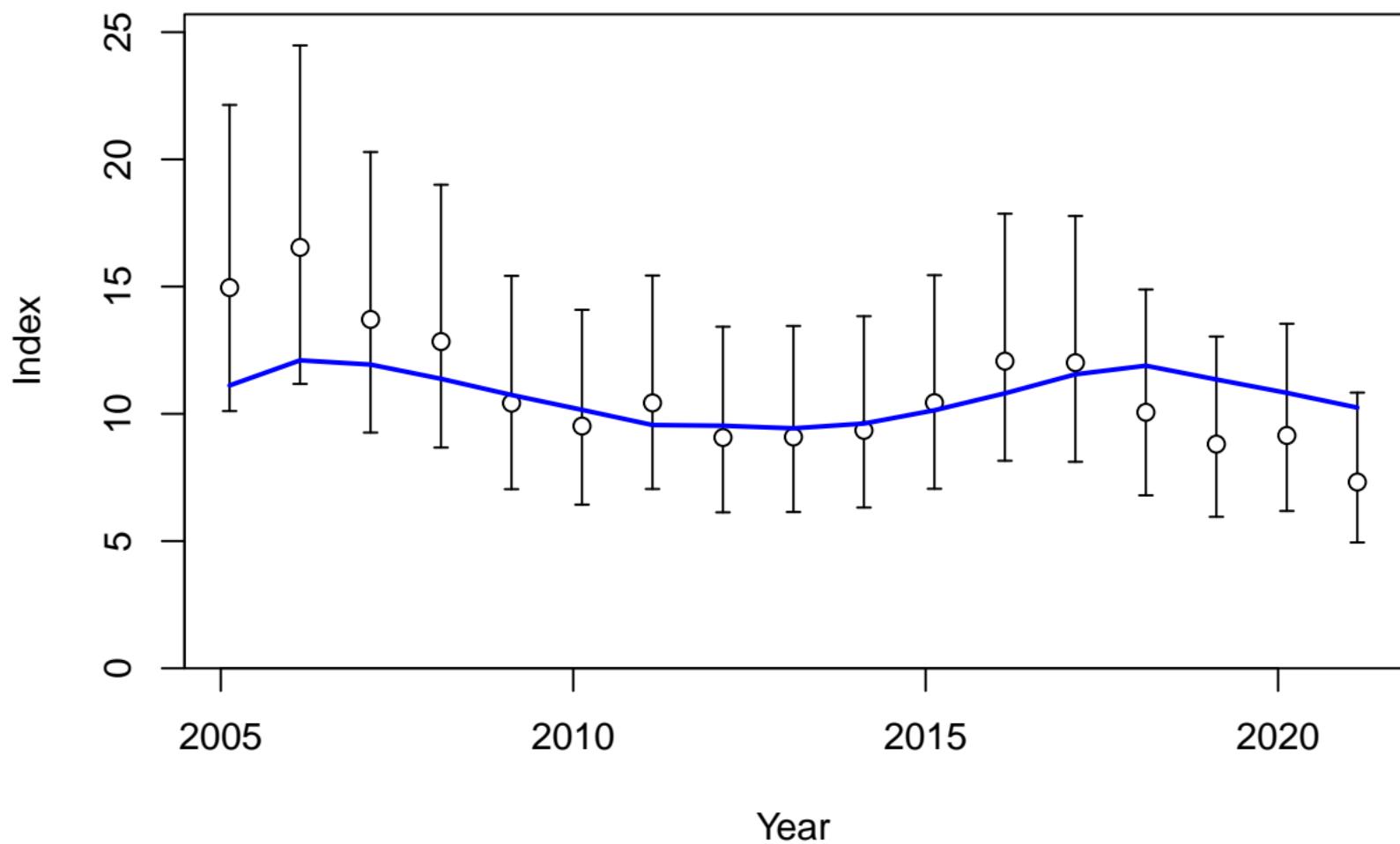
Year



Deviation





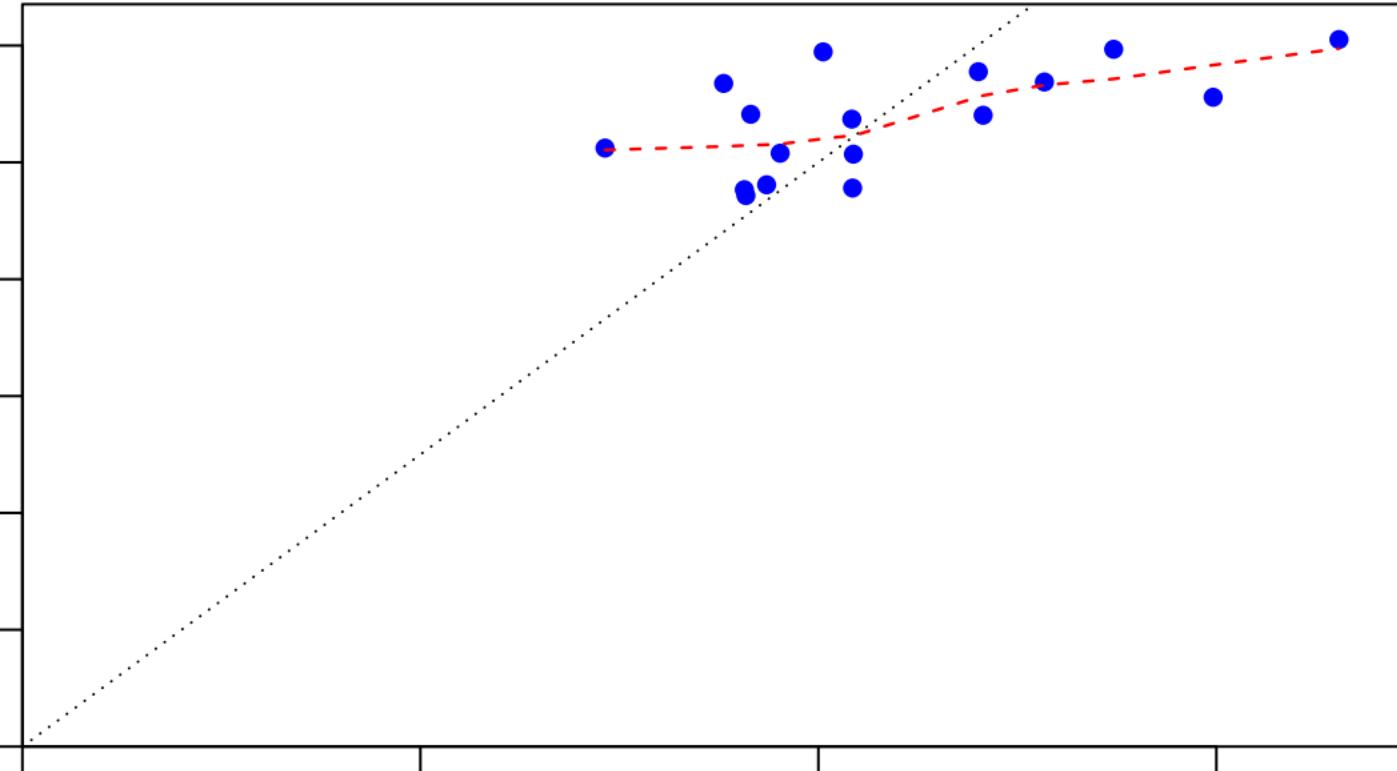


Expected index

12
10
8
6
4
2
0

0 5 10 15

Observed index



Log index

3.0
2.5
2.0

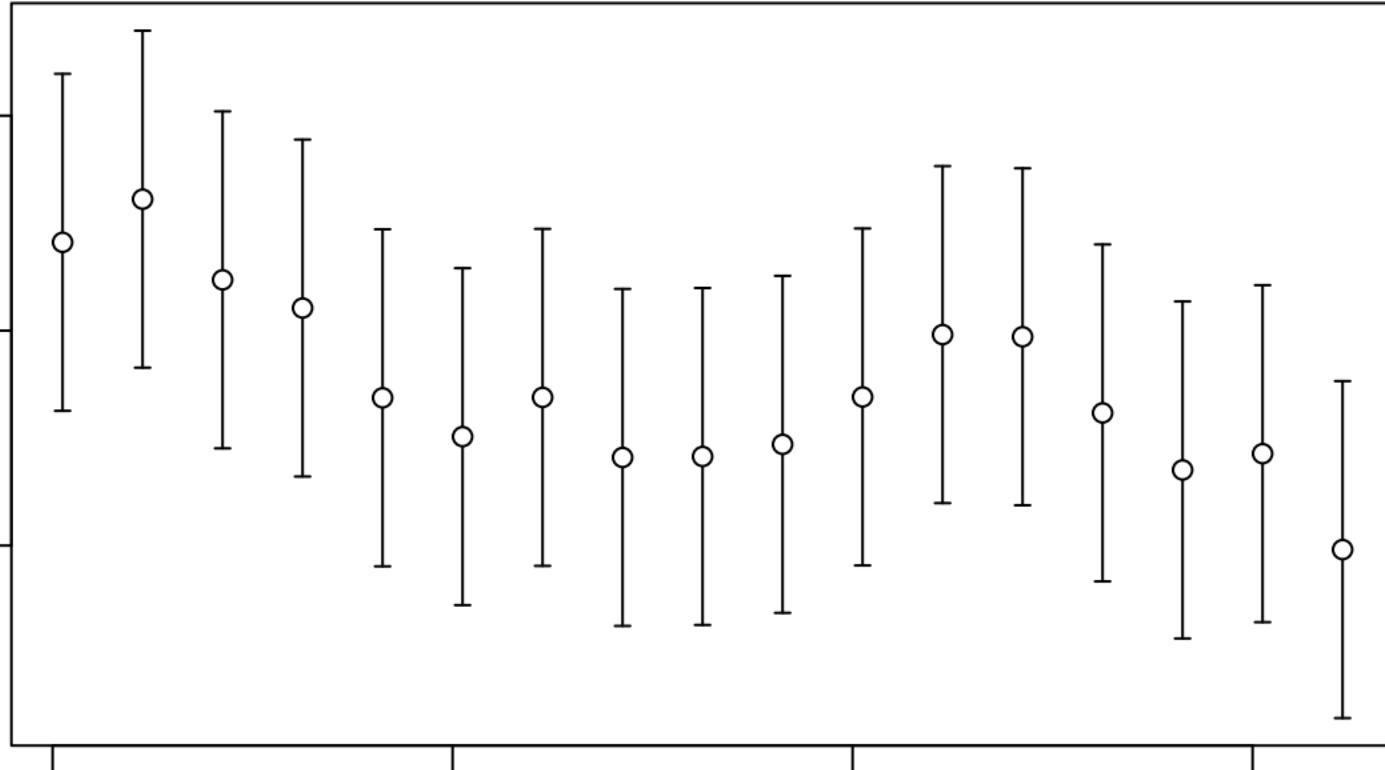
2005

2010

2015

2020

Year

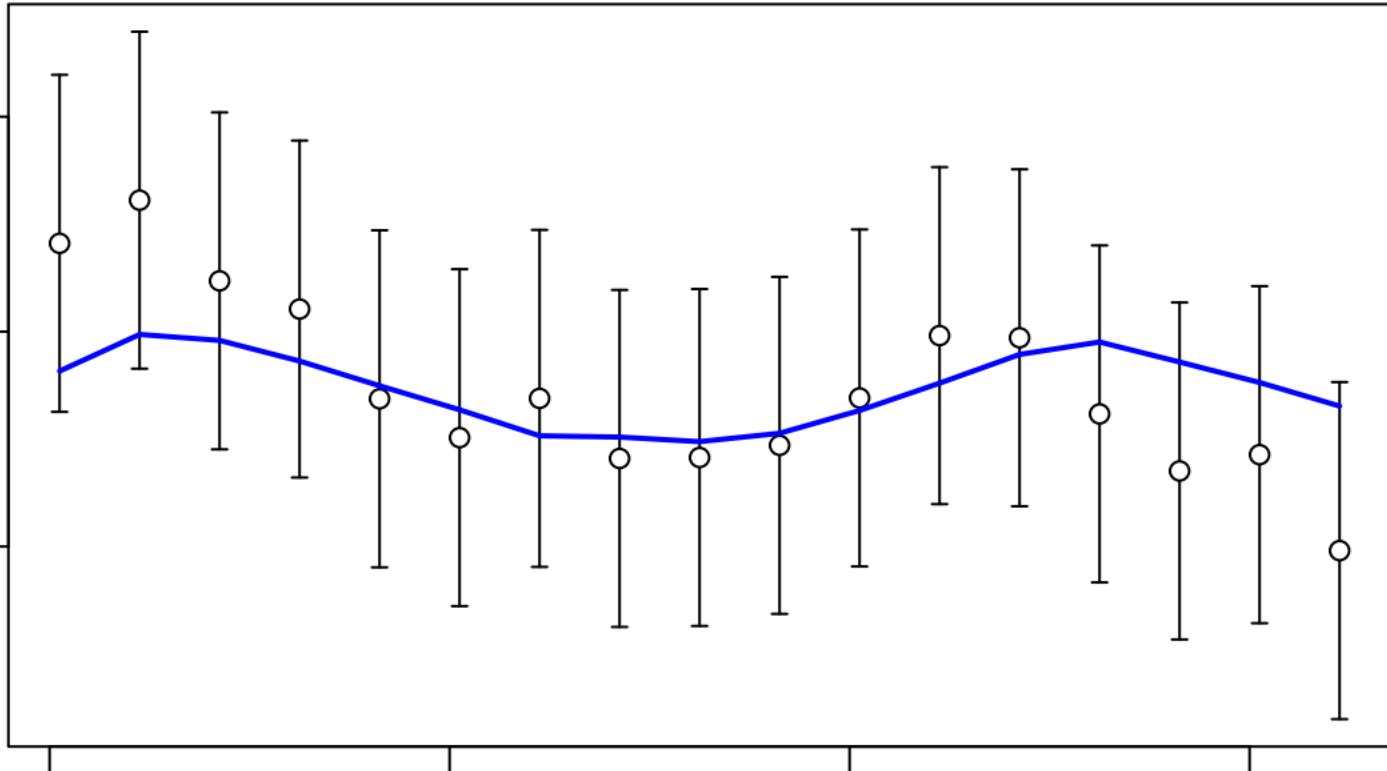


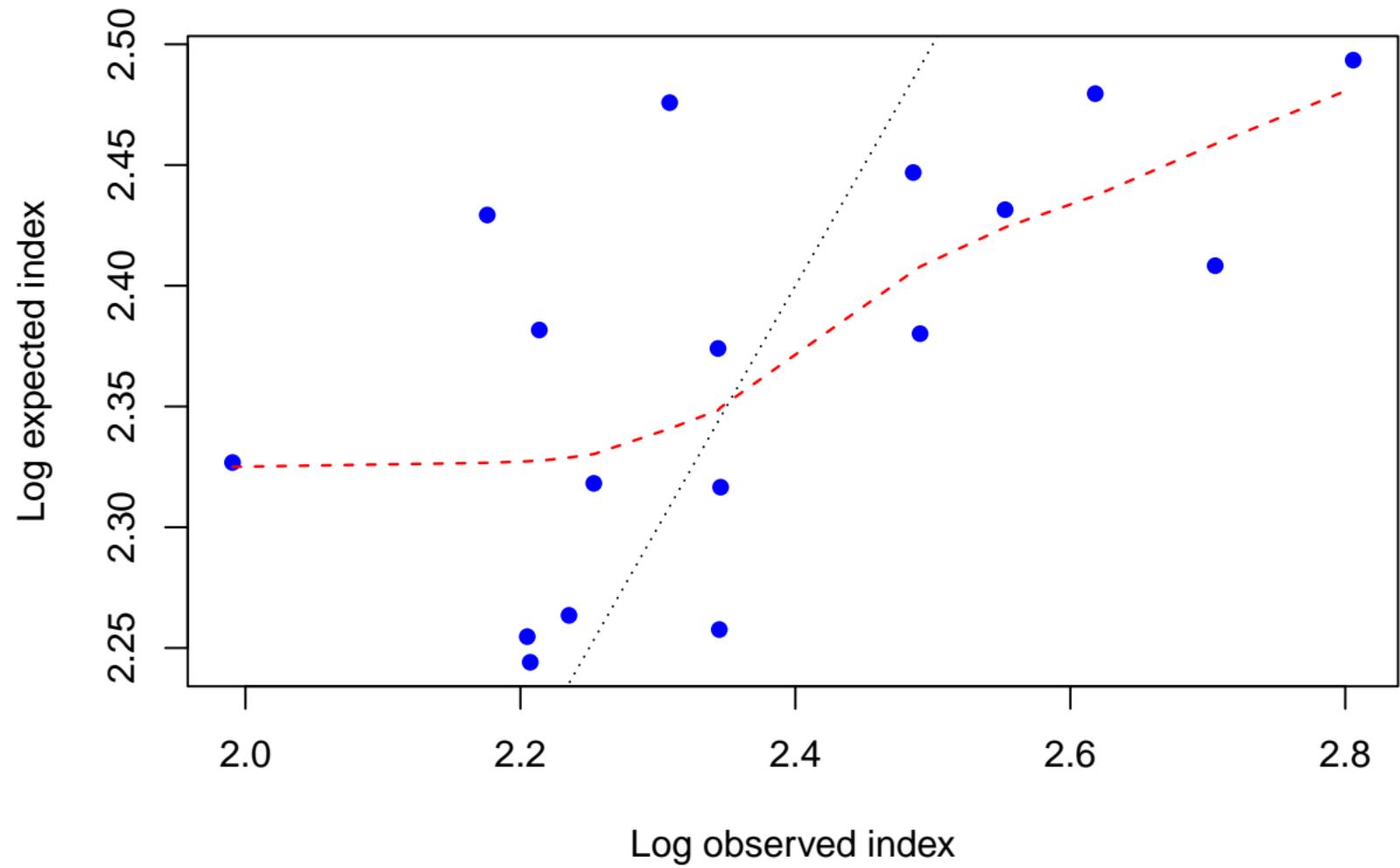
Log index

3.0
2.5
2.0

2005 2010 2015 2020

Year



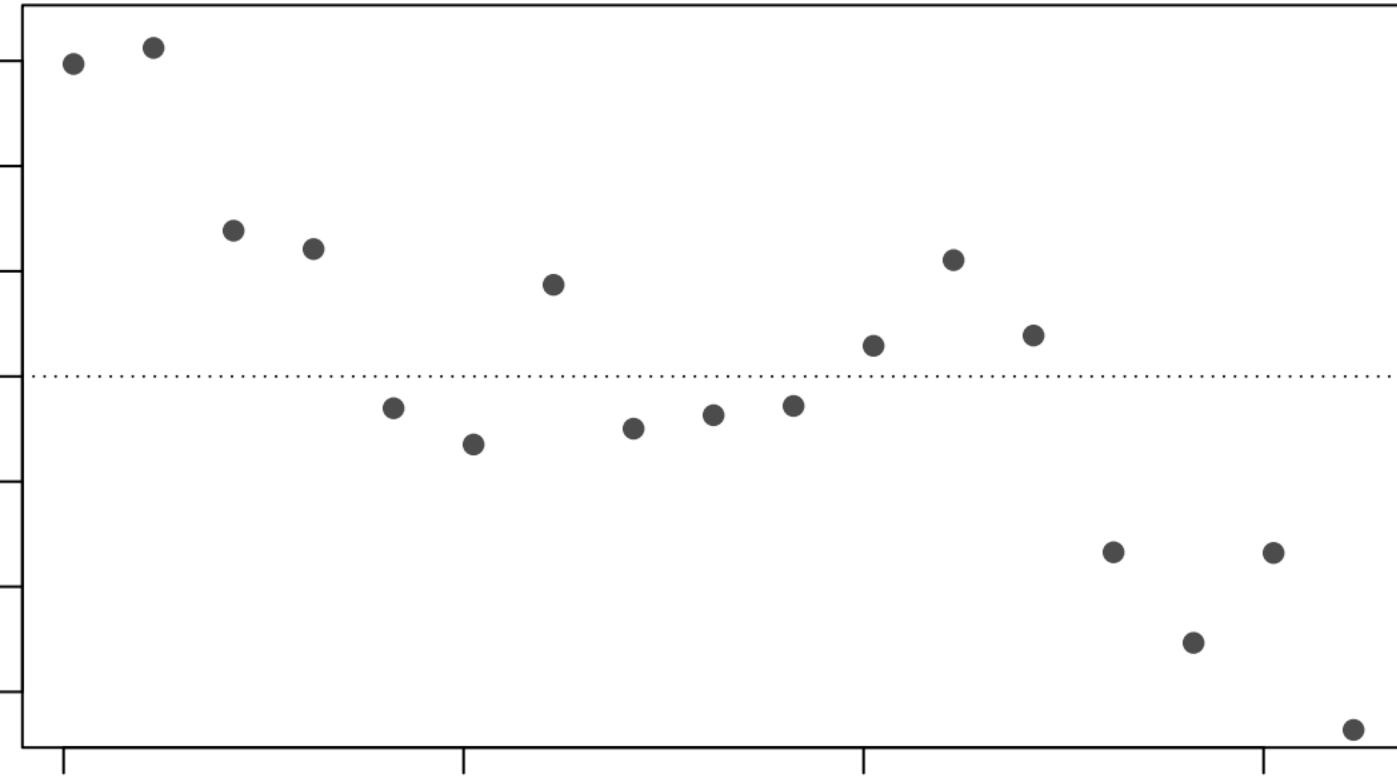


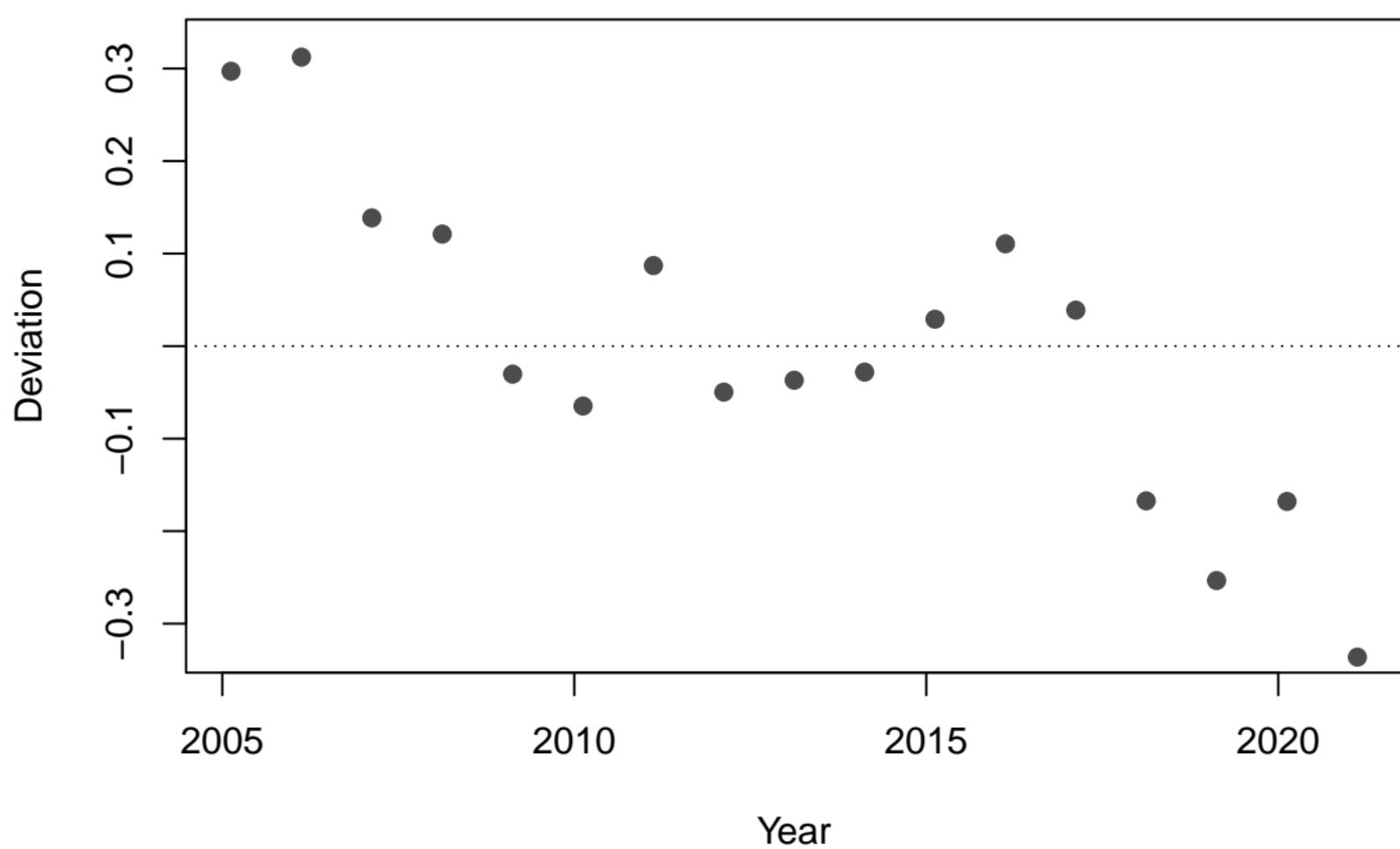
Residual

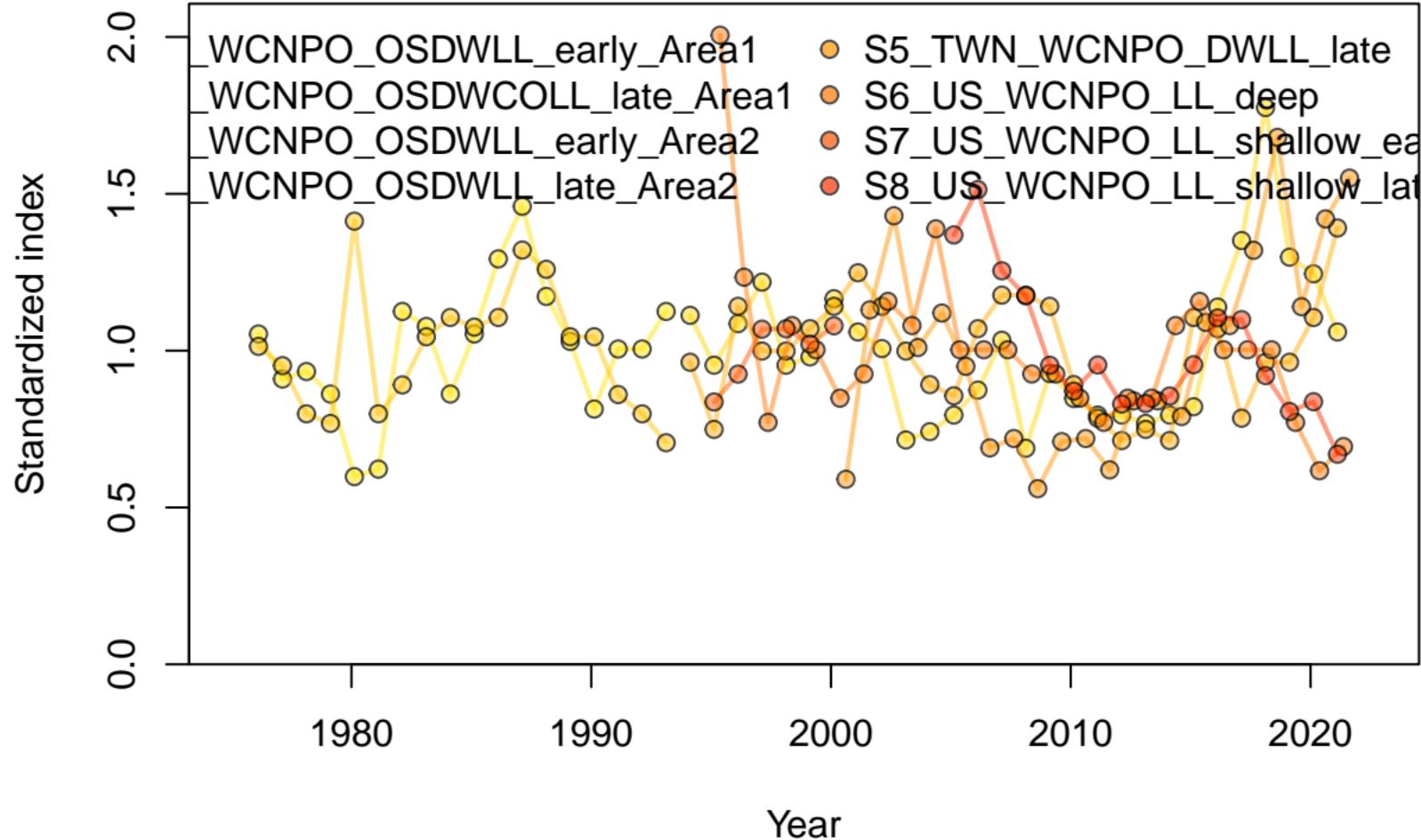
-1.5
-0.5
0.5
1.0
1.5

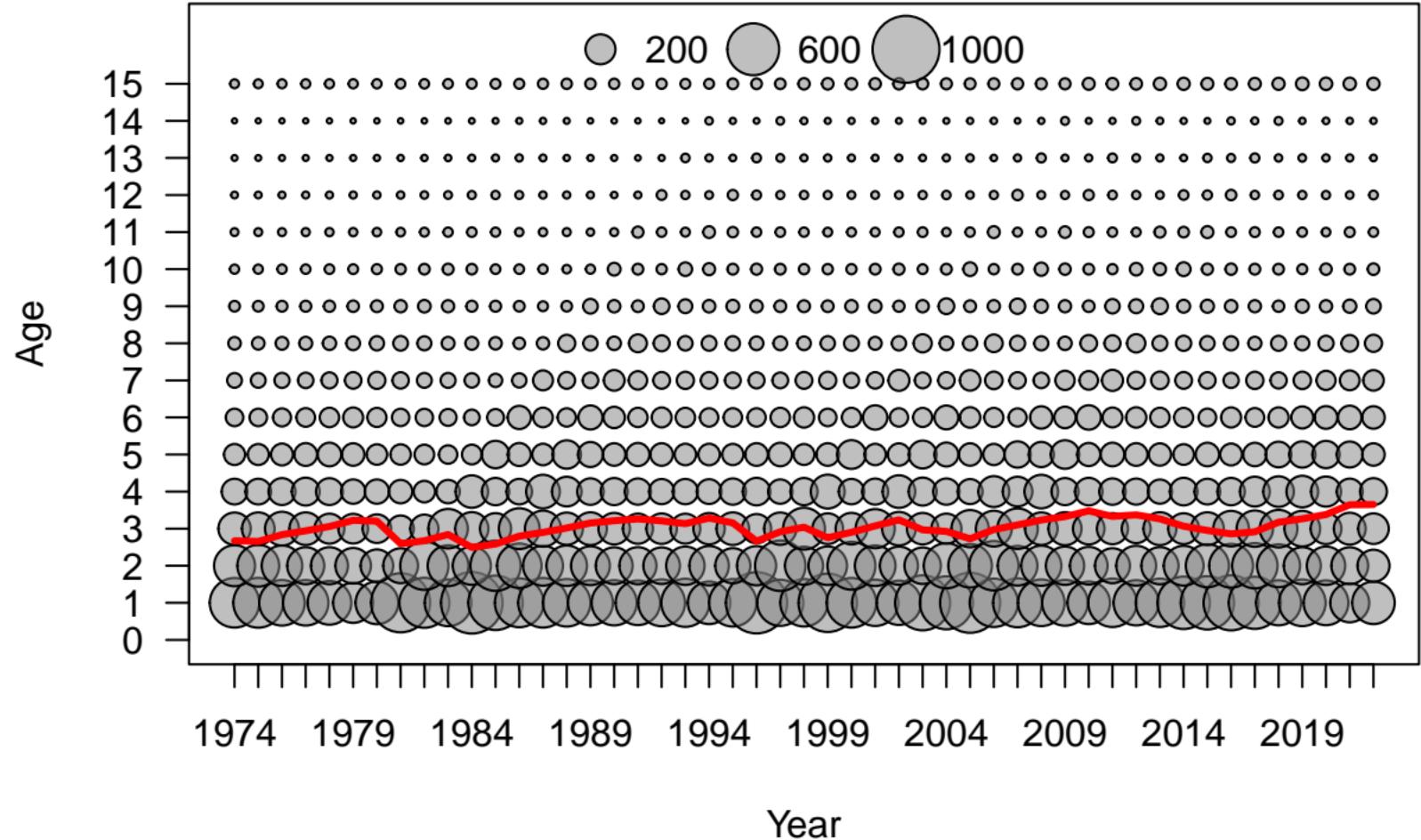
2005 2010 2015 2020

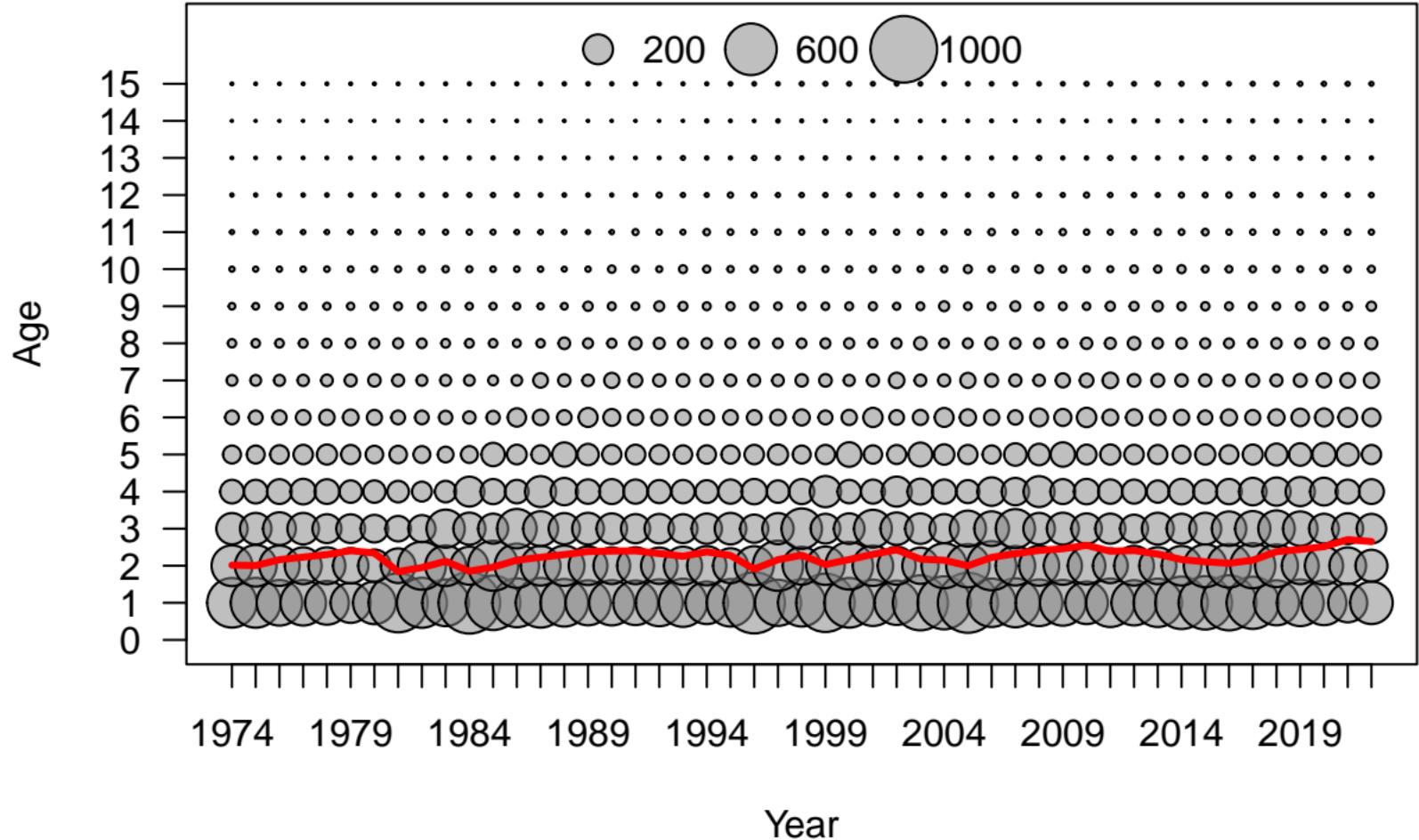
Year

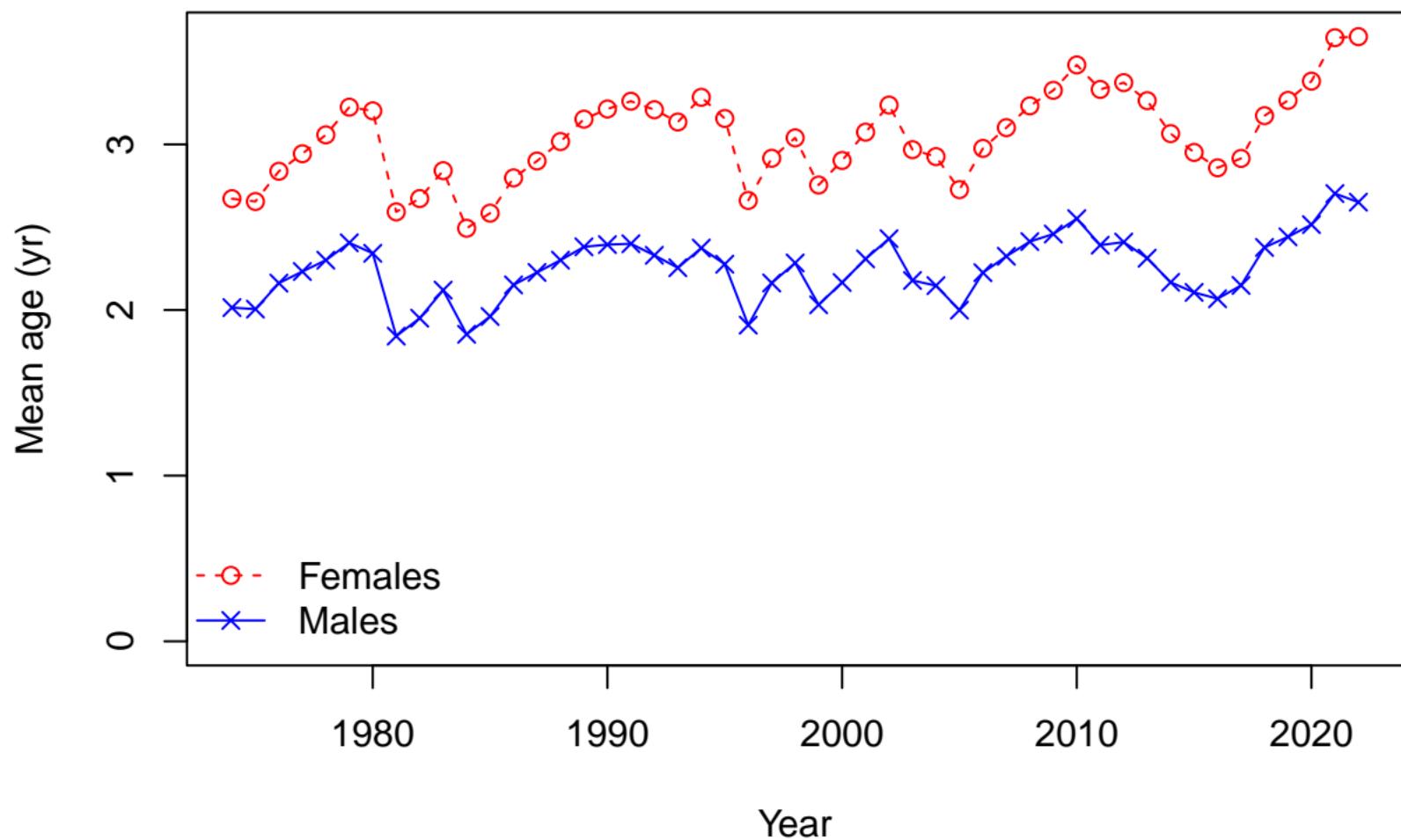


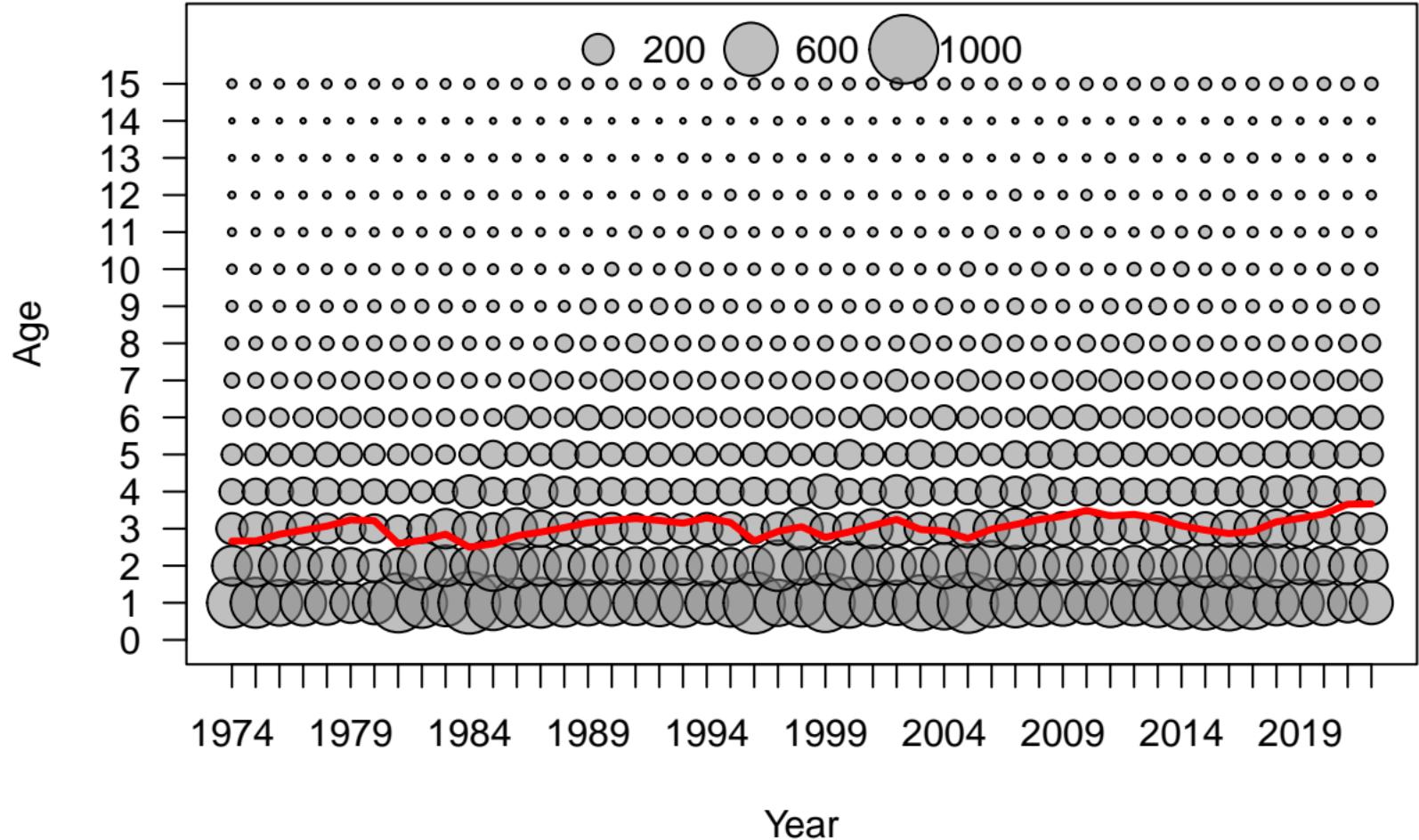


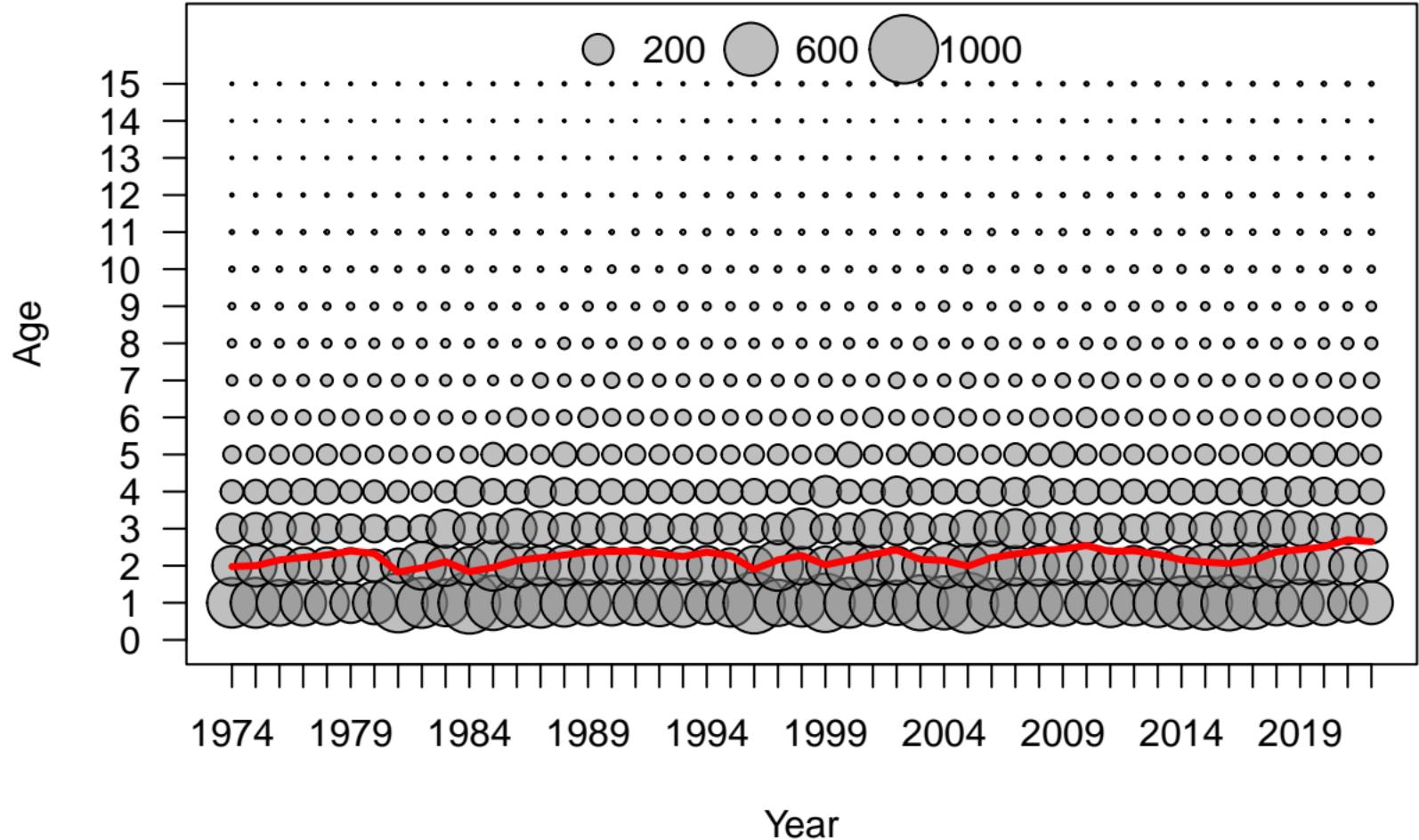


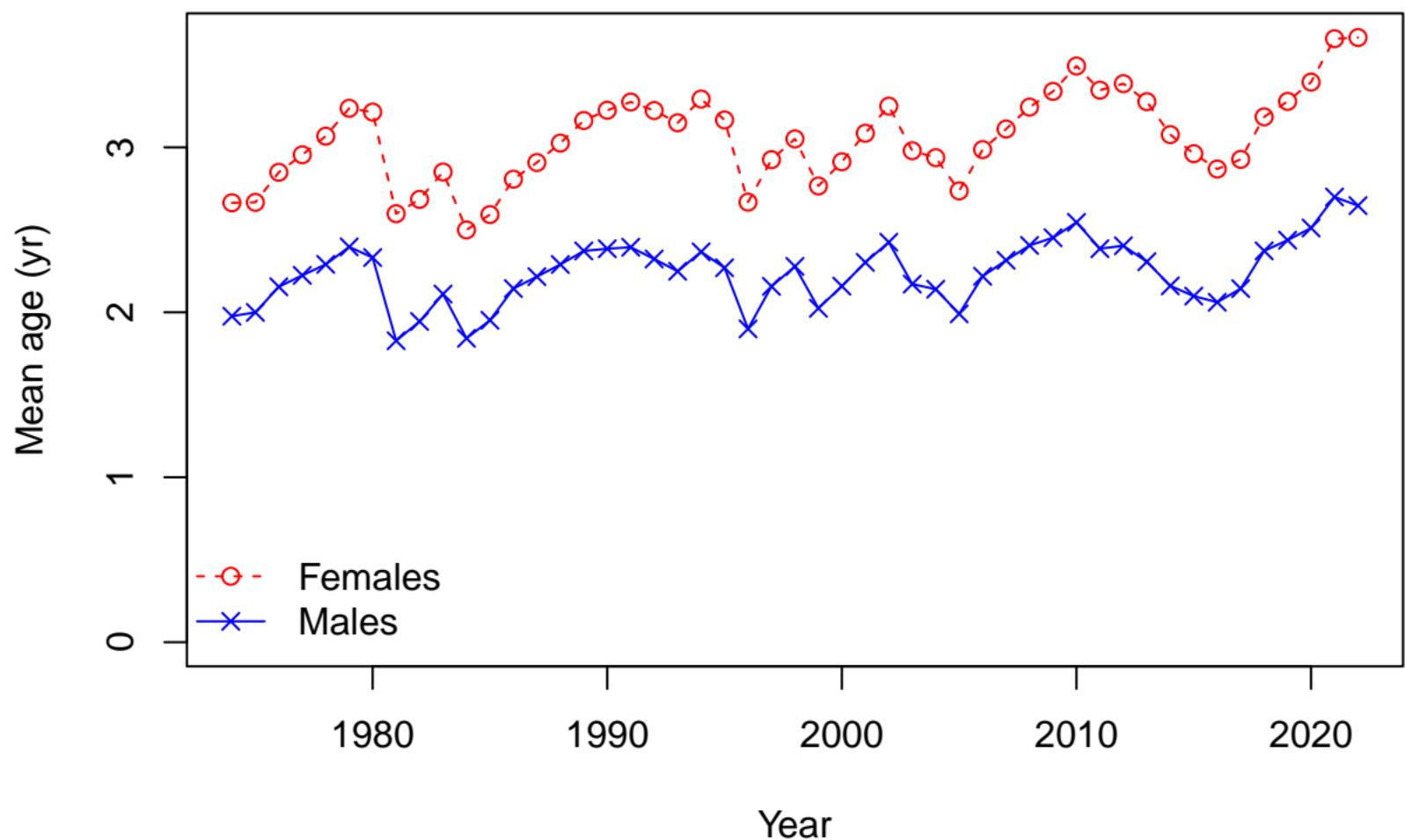


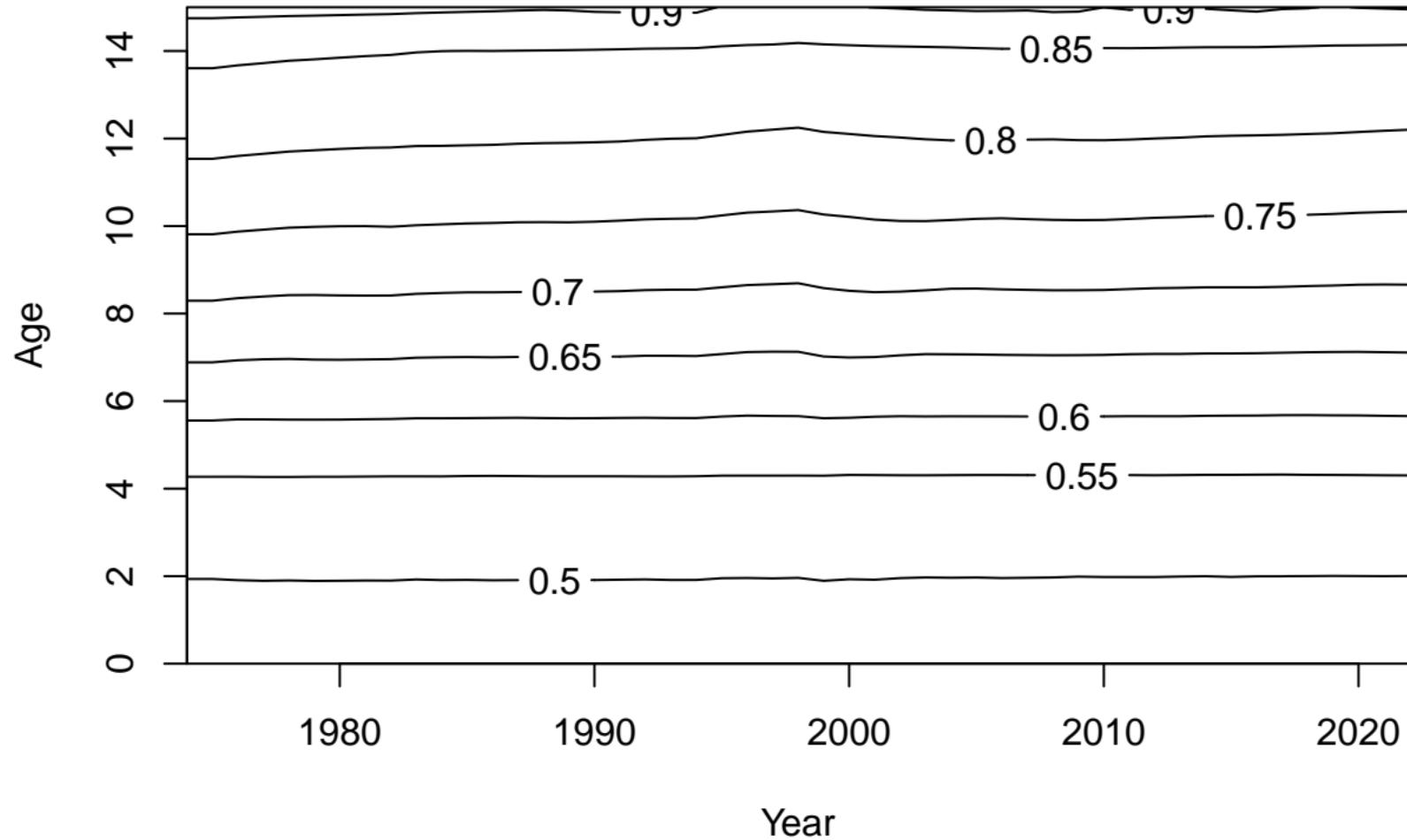


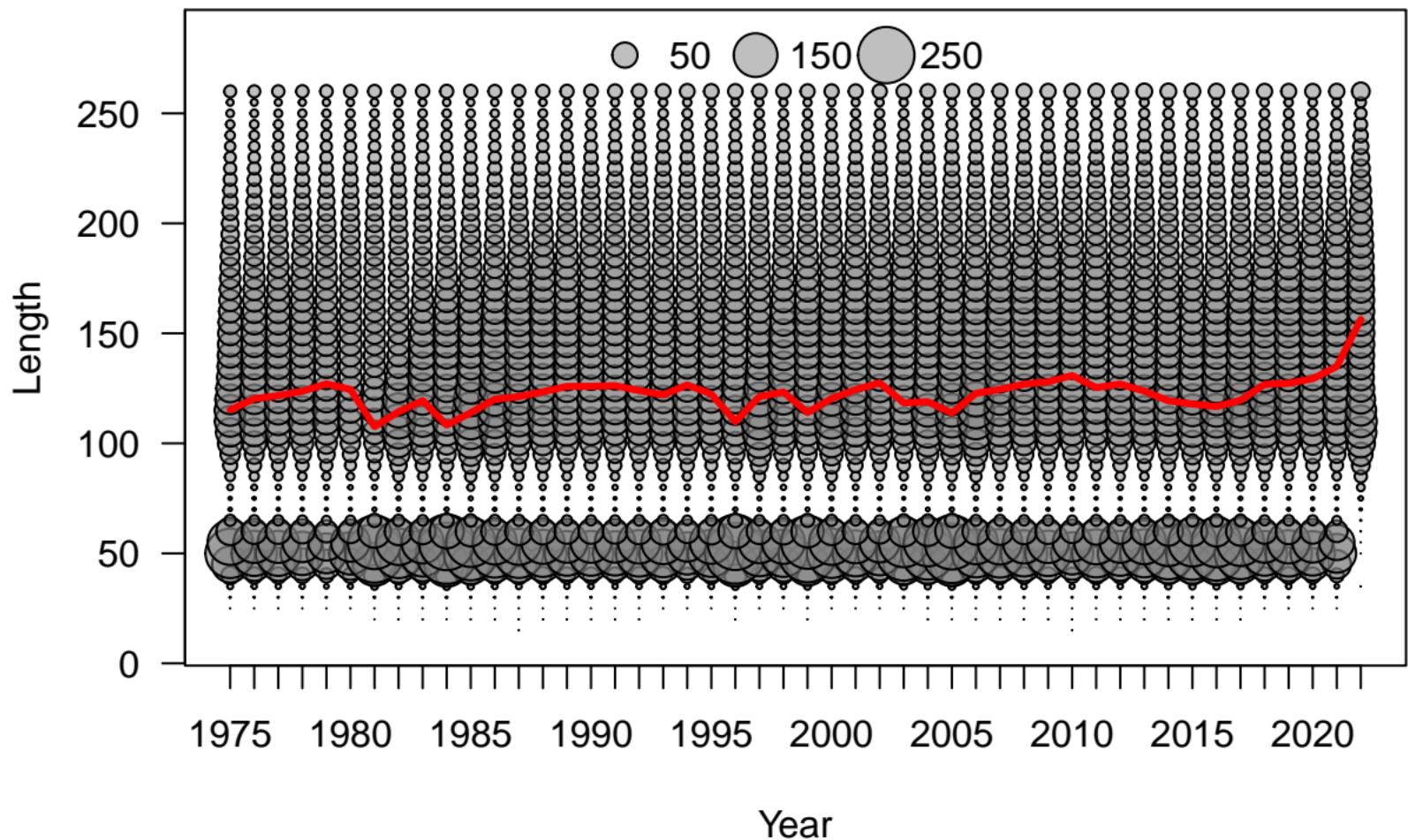


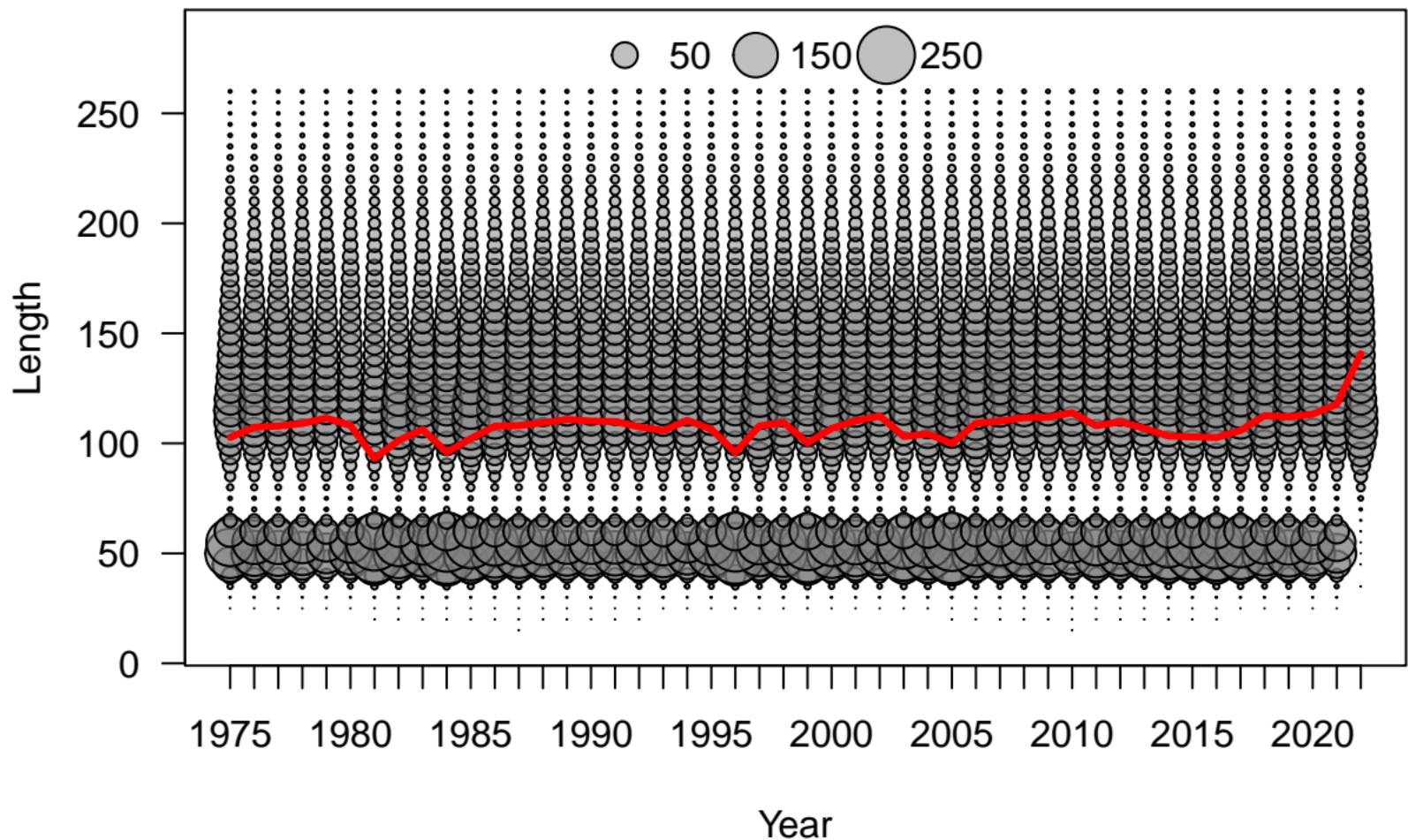


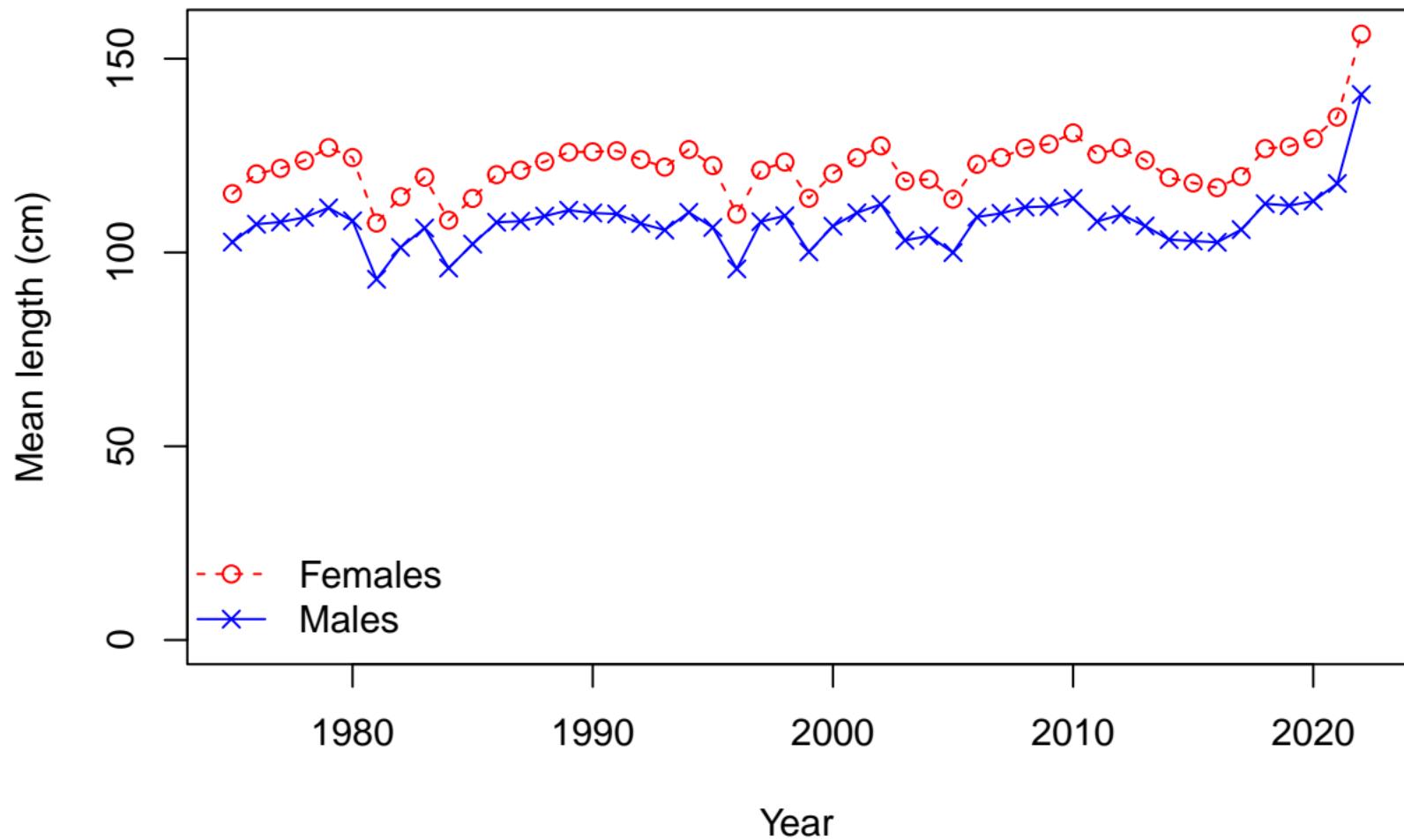


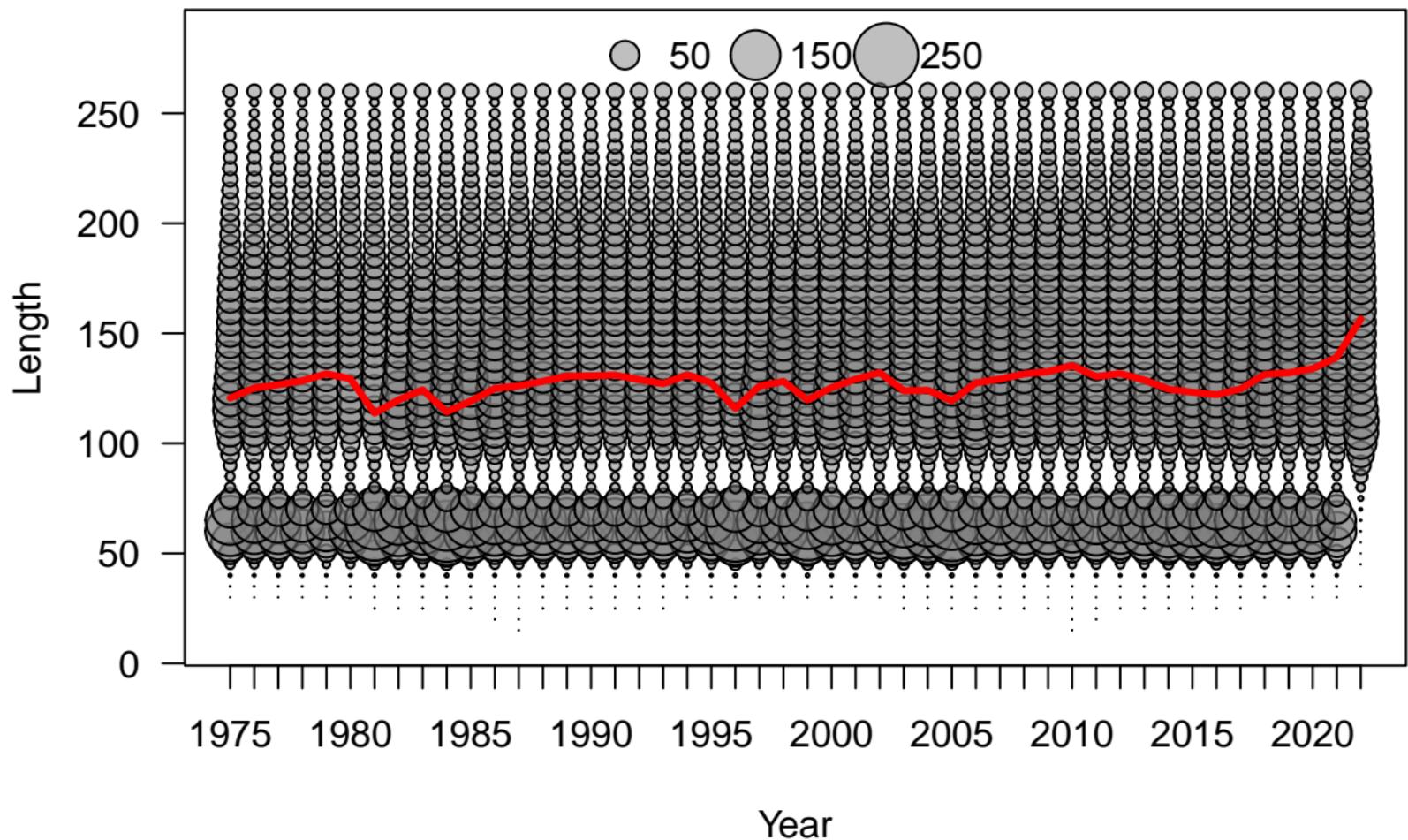


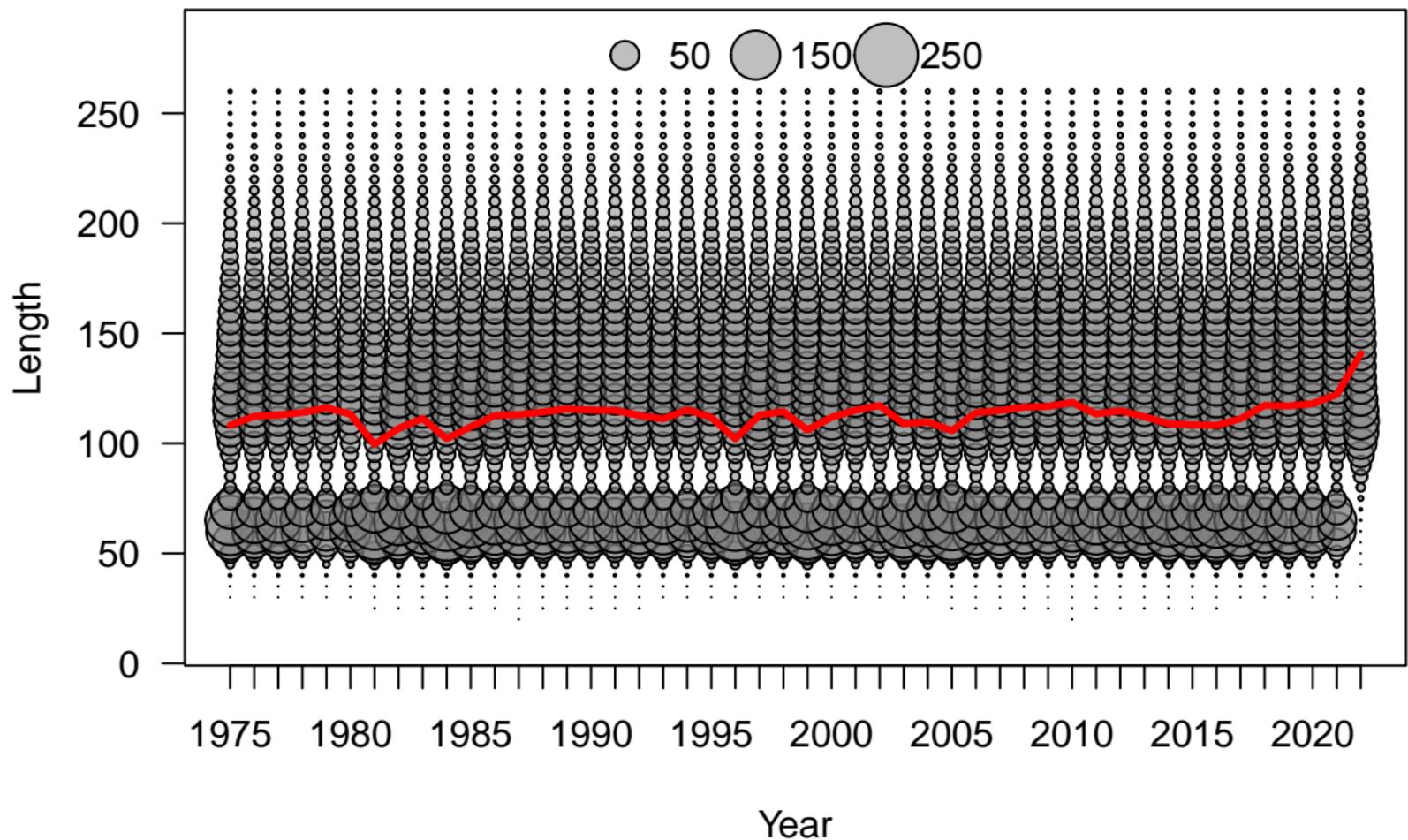


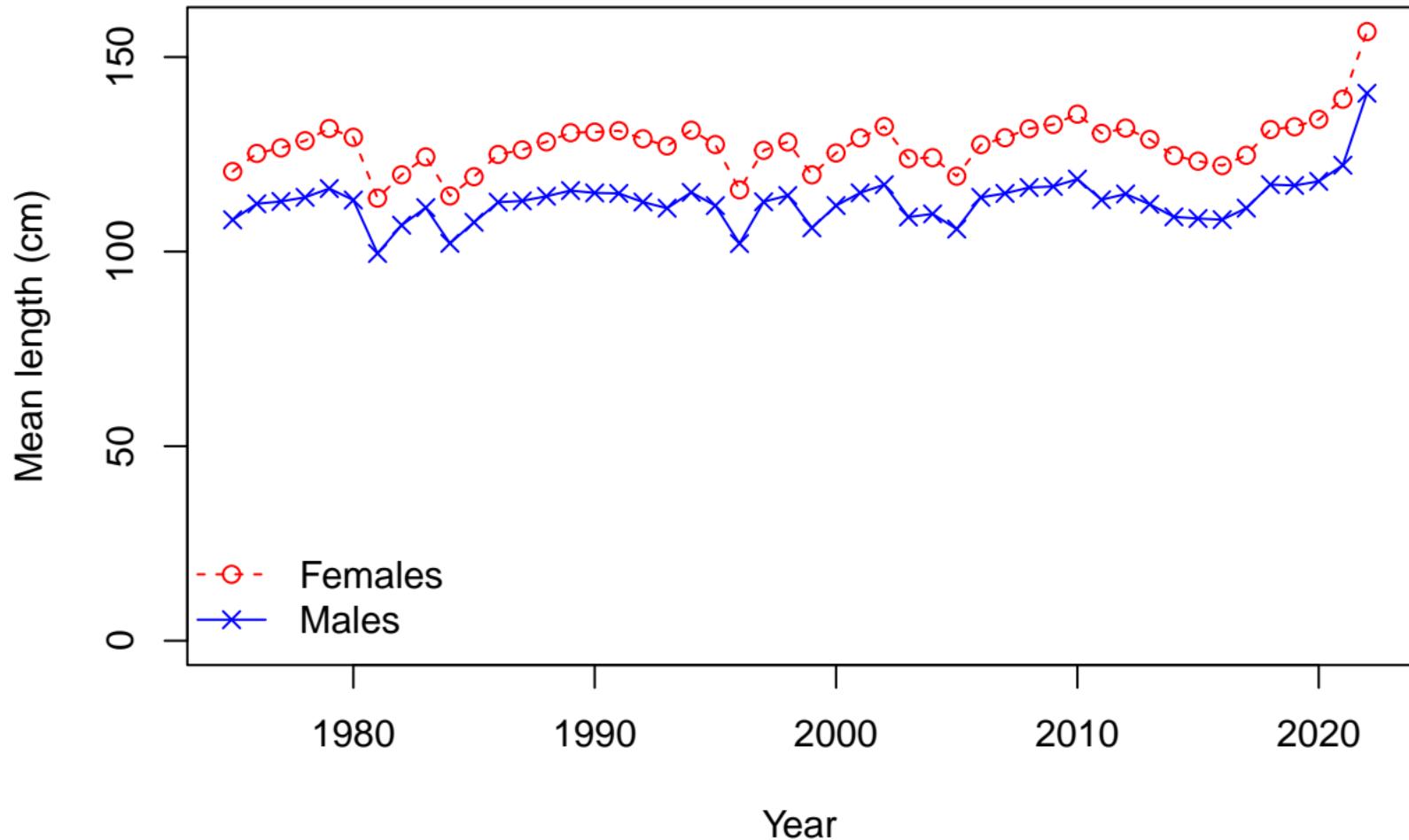


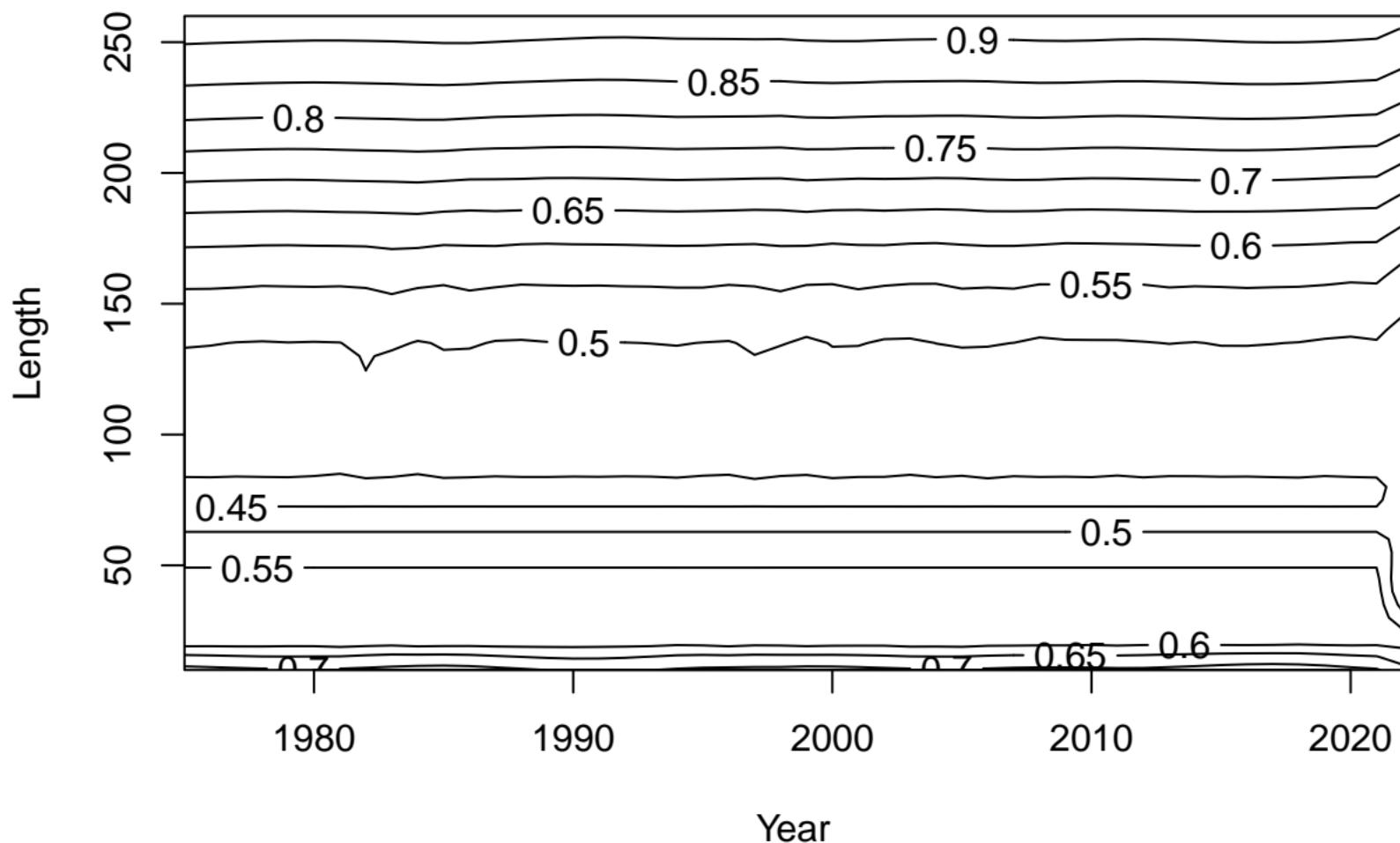




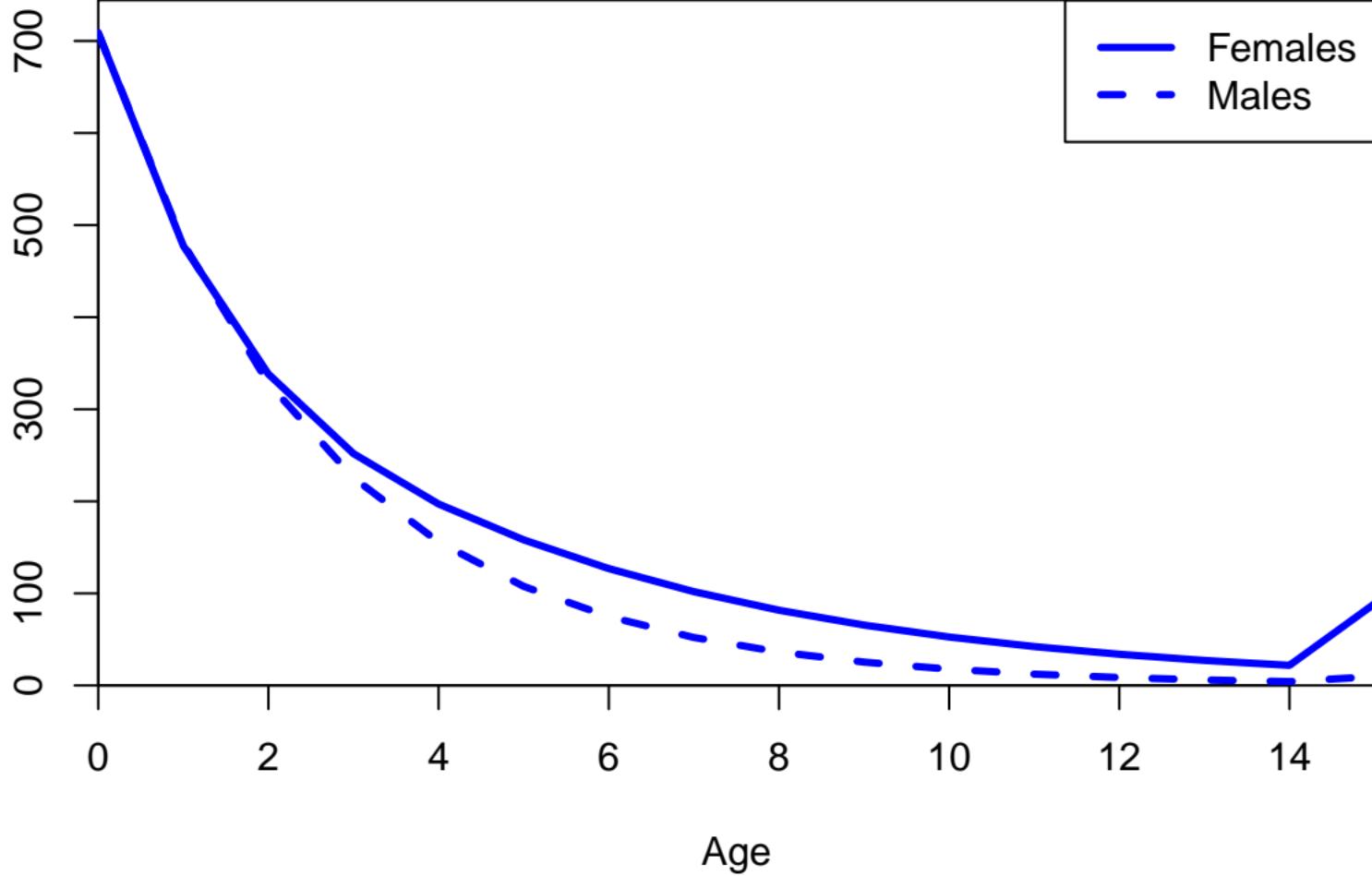


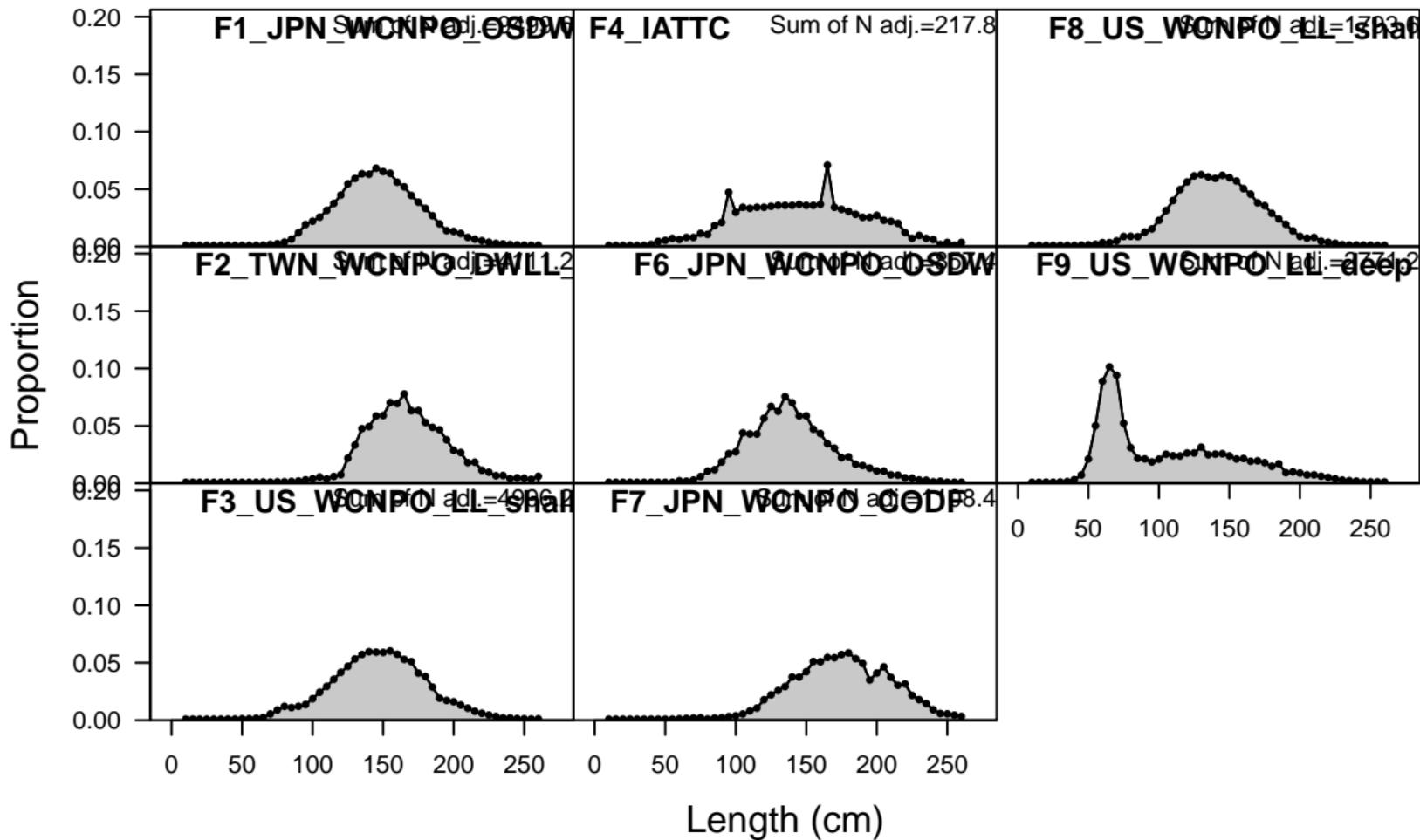


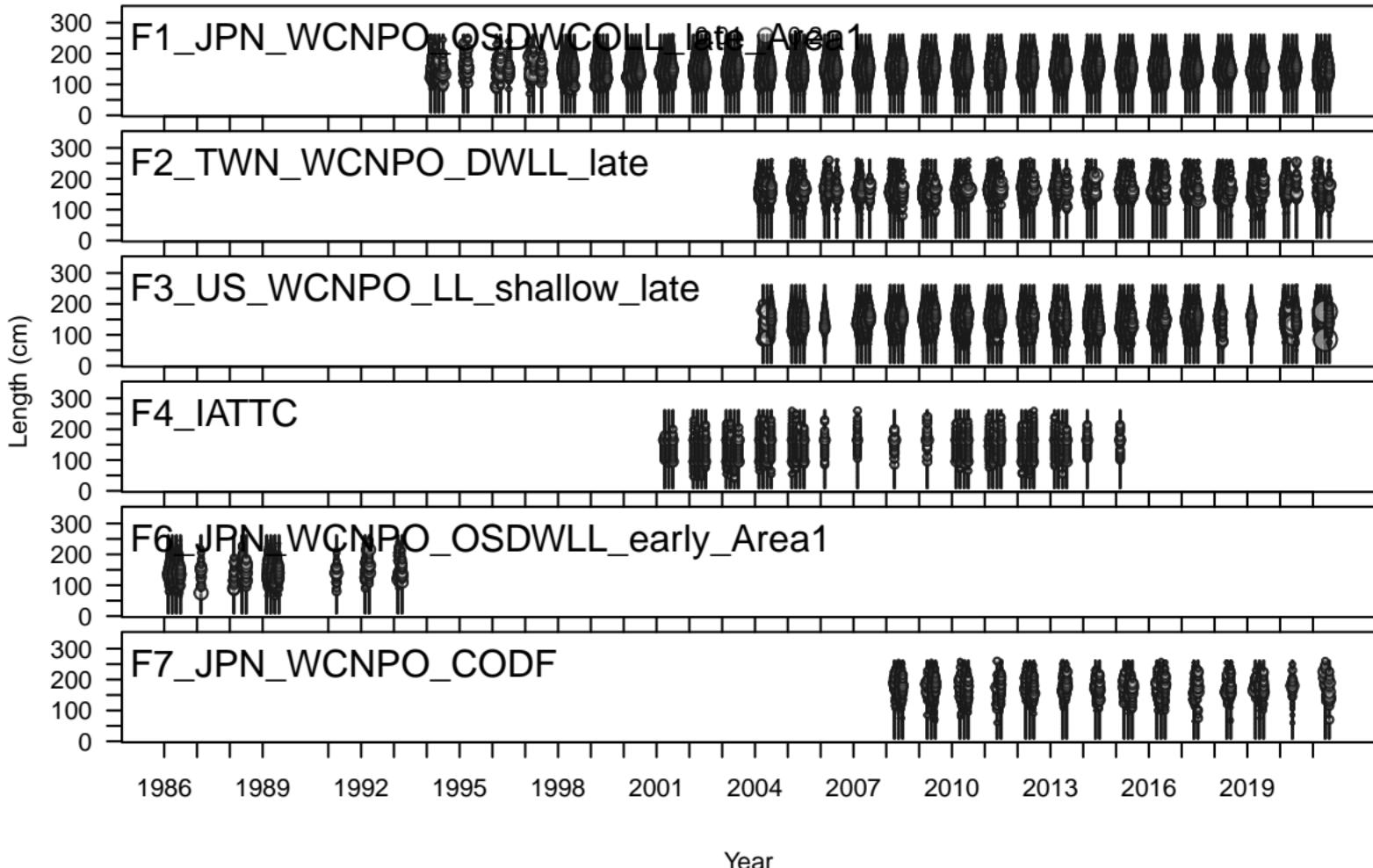


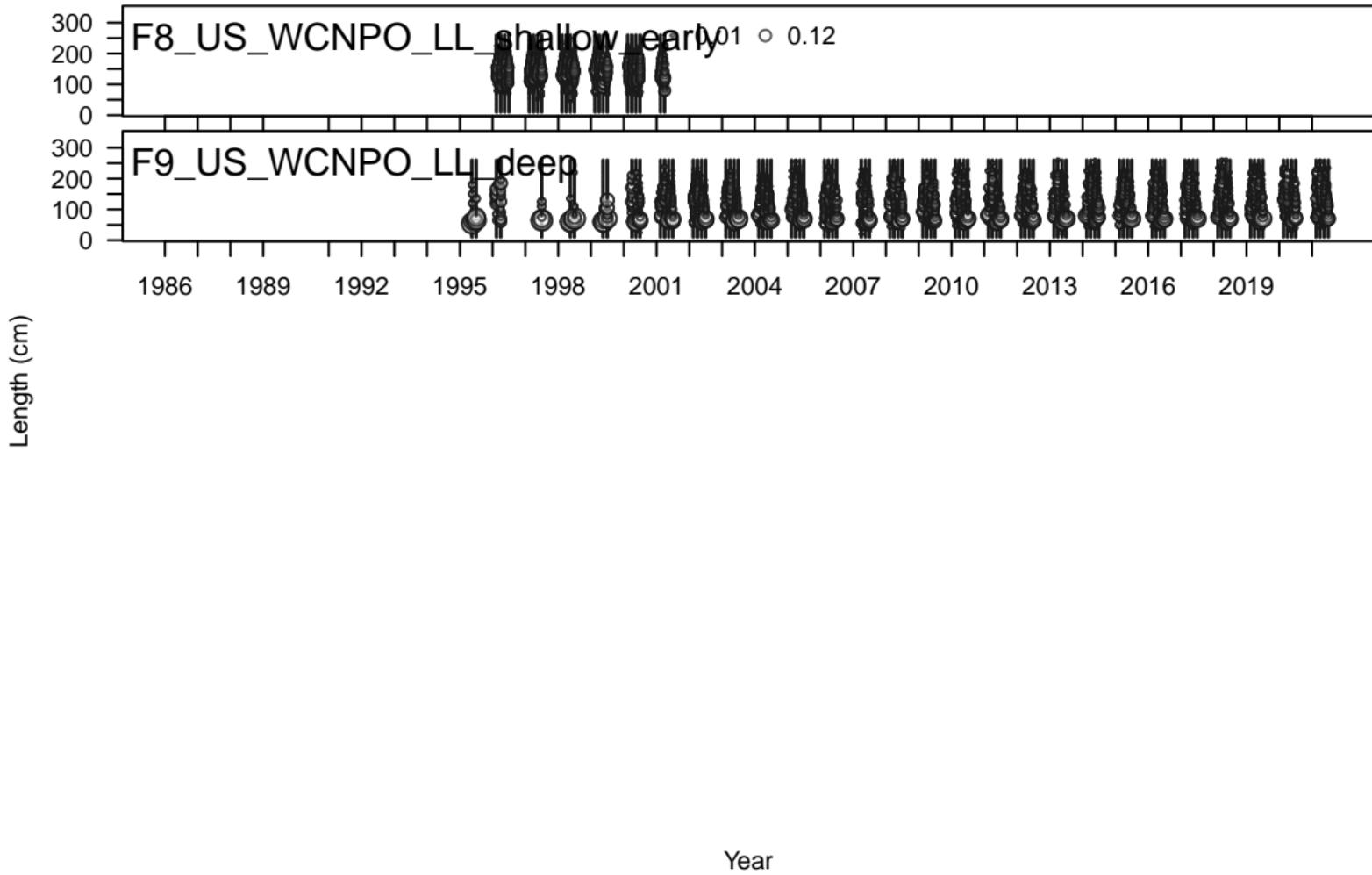


Numbers at age at equilibrium

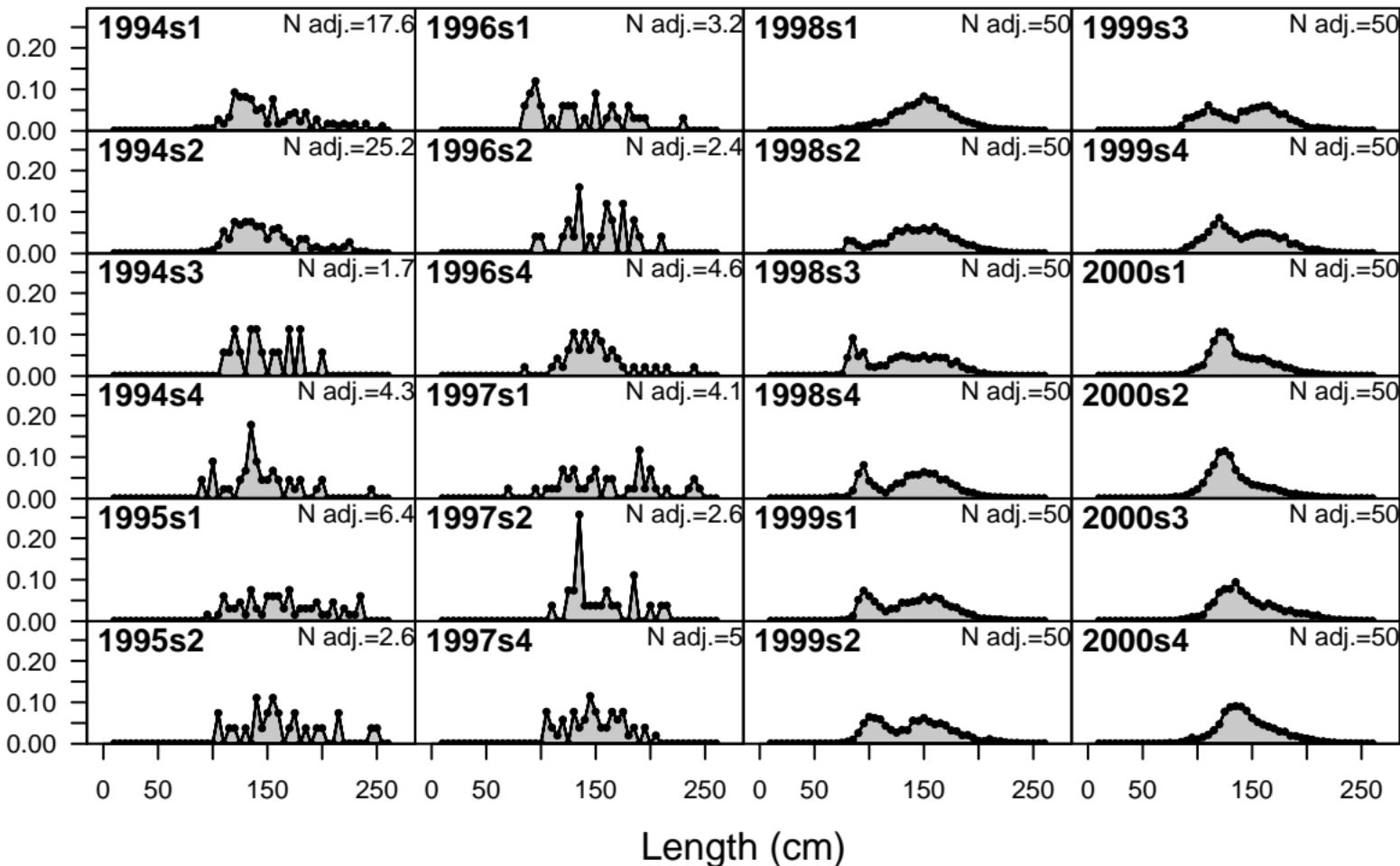




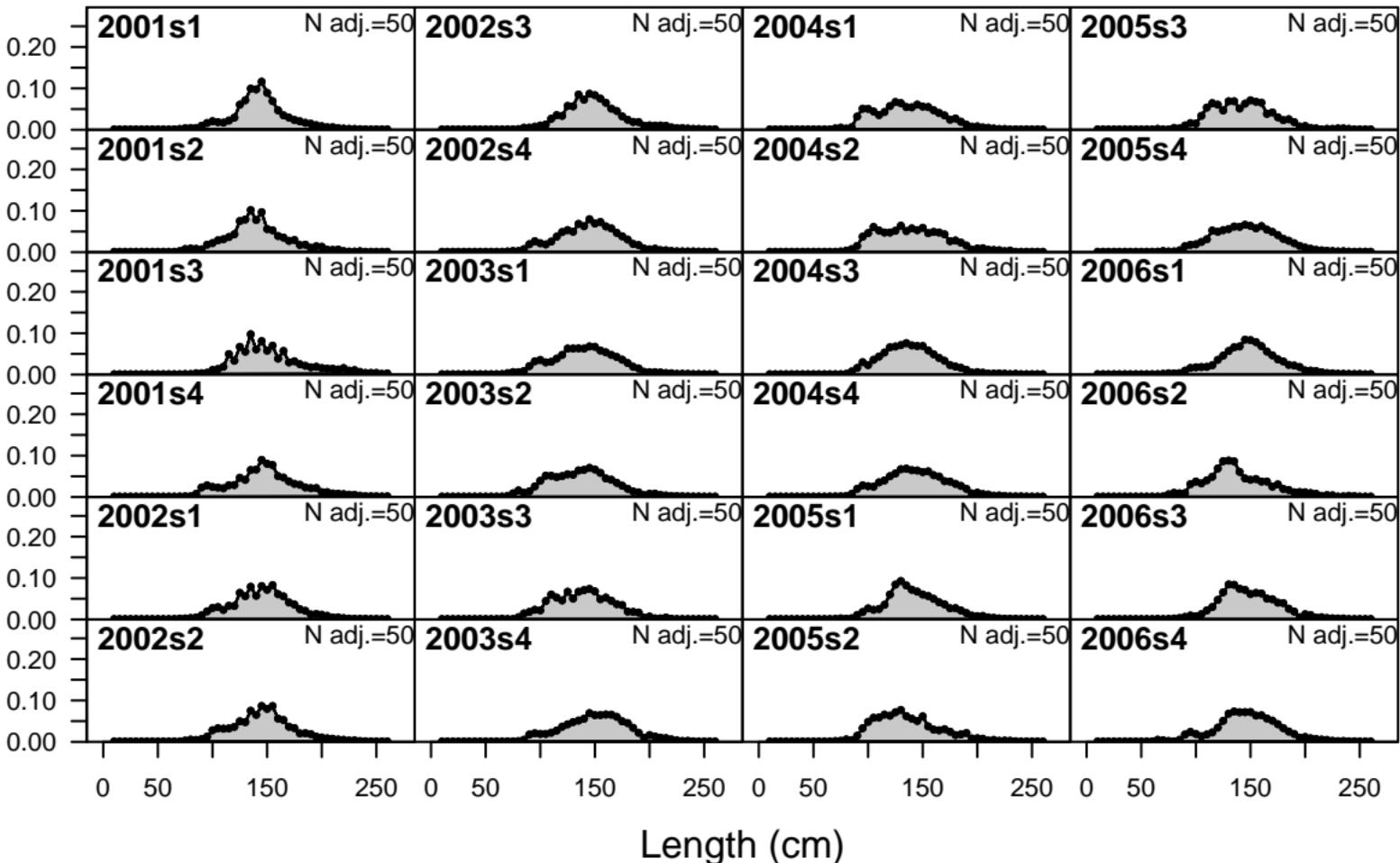




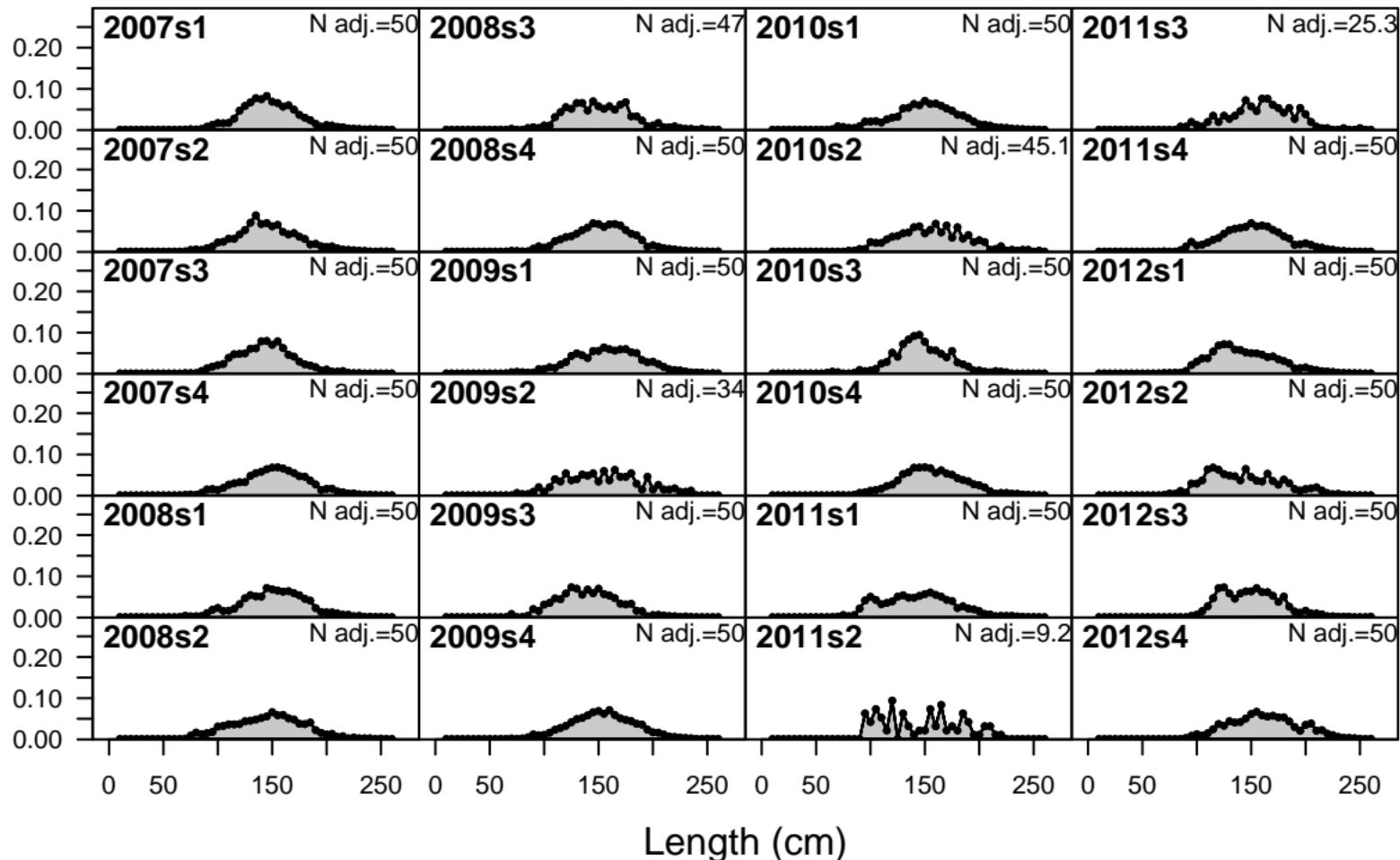
Proportion



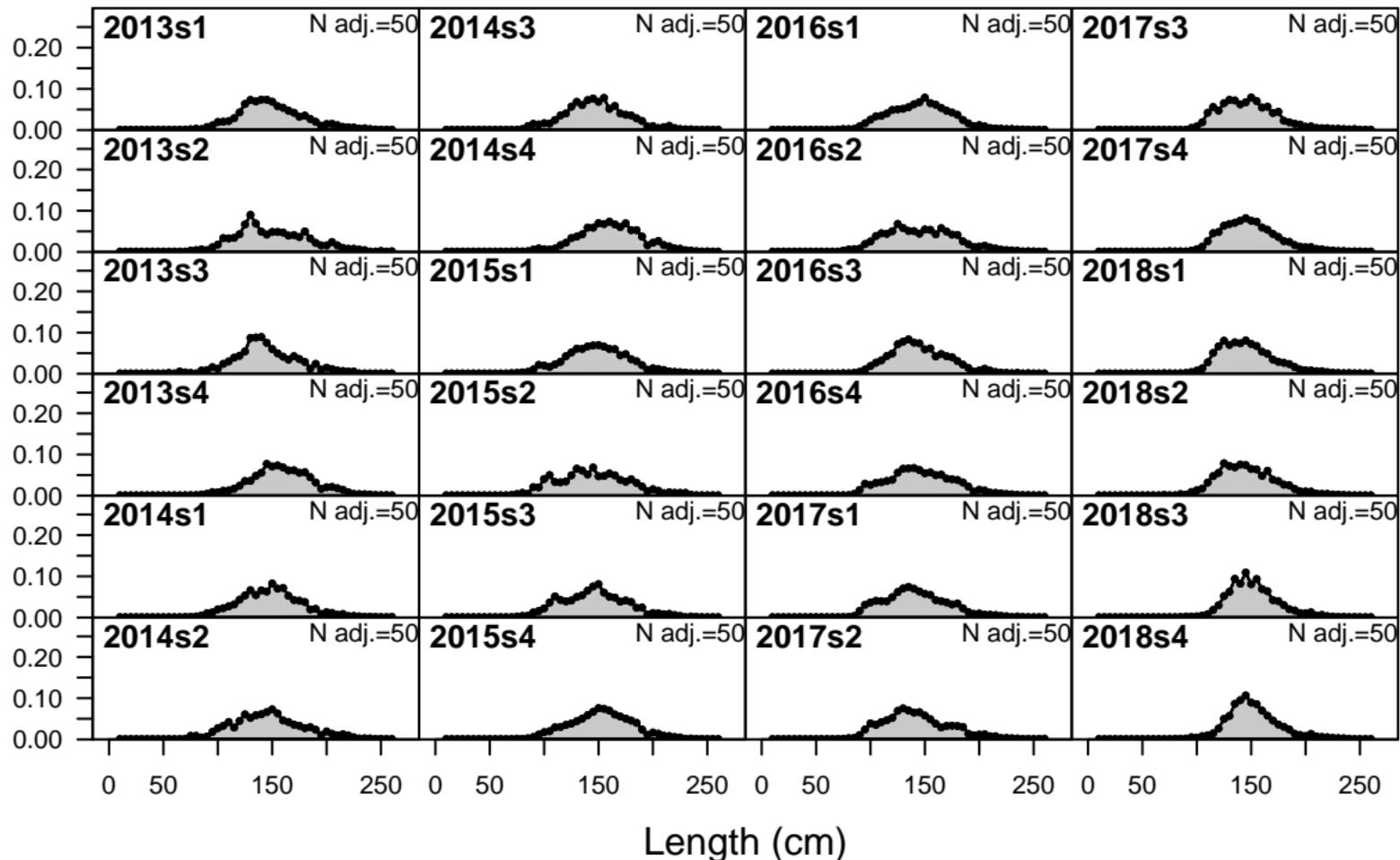
Proportion



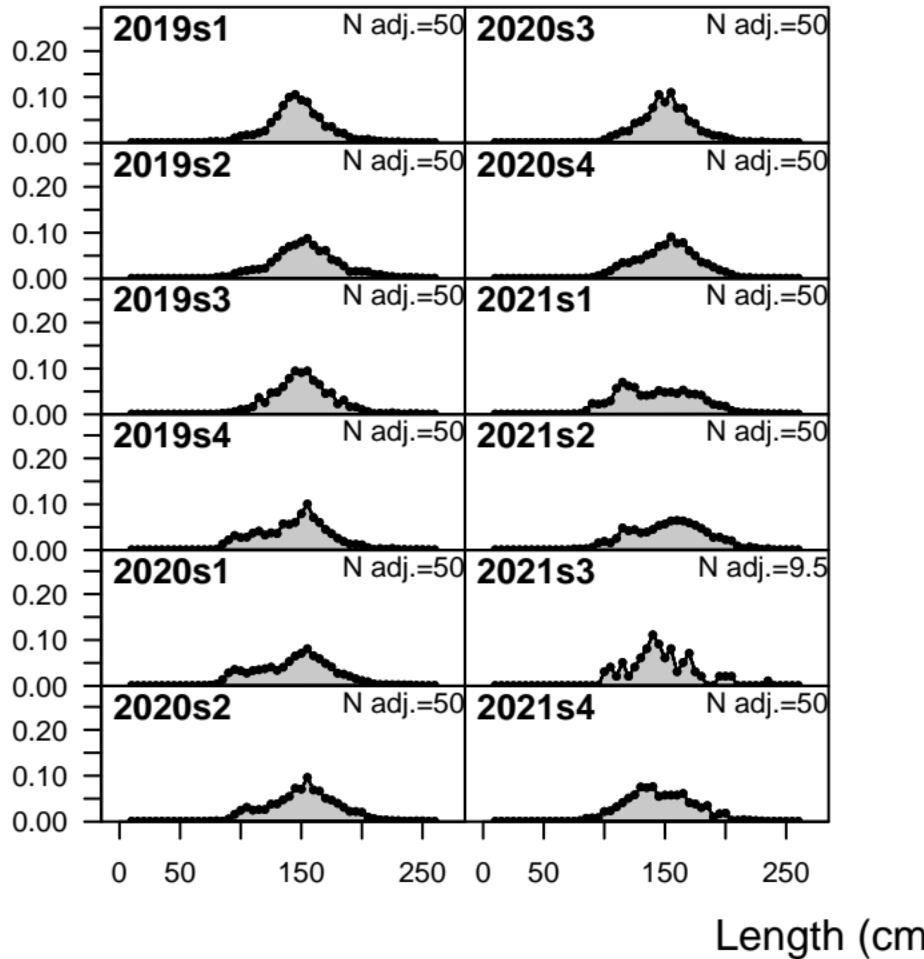
Proportion

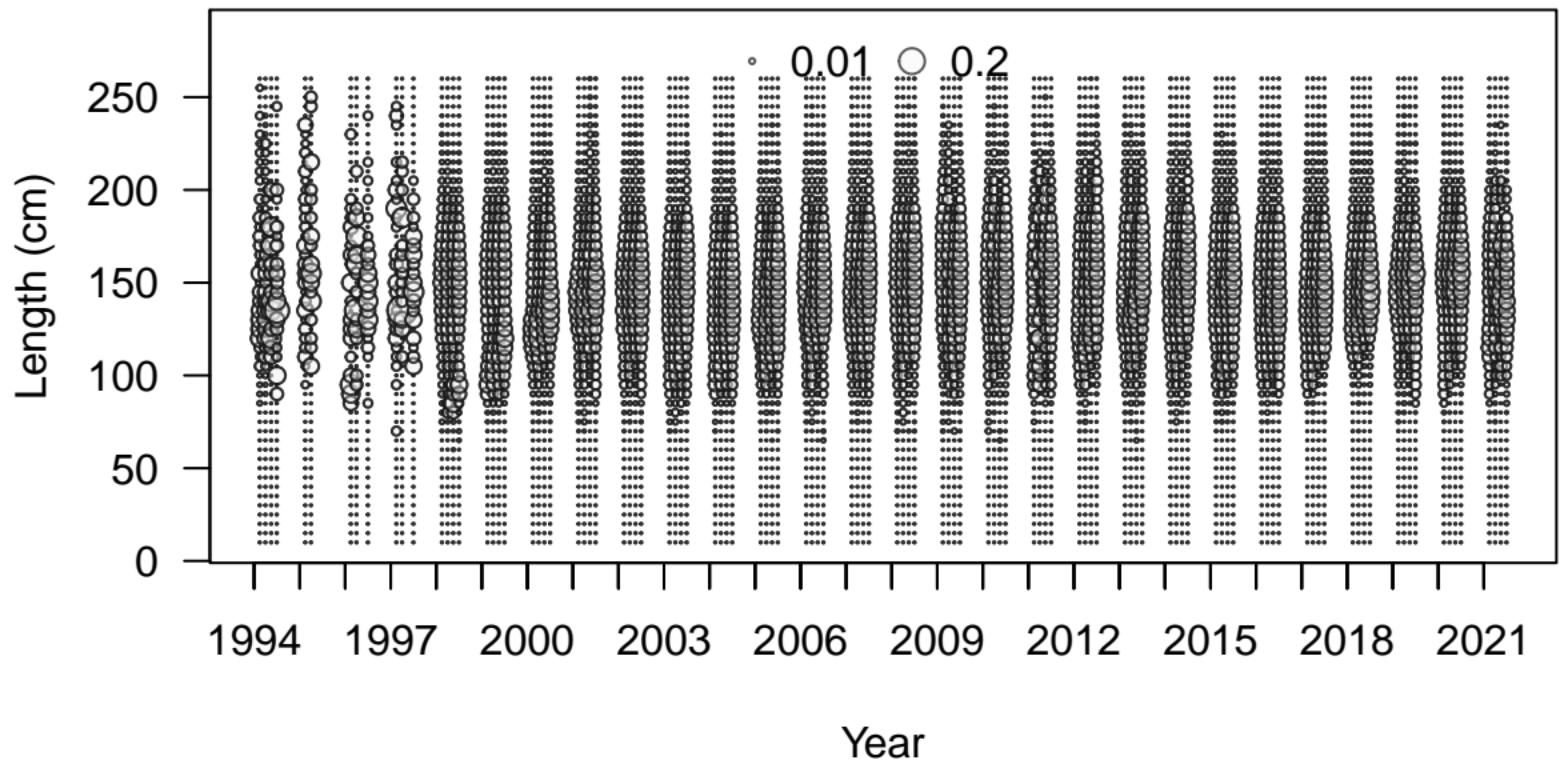


Proportion

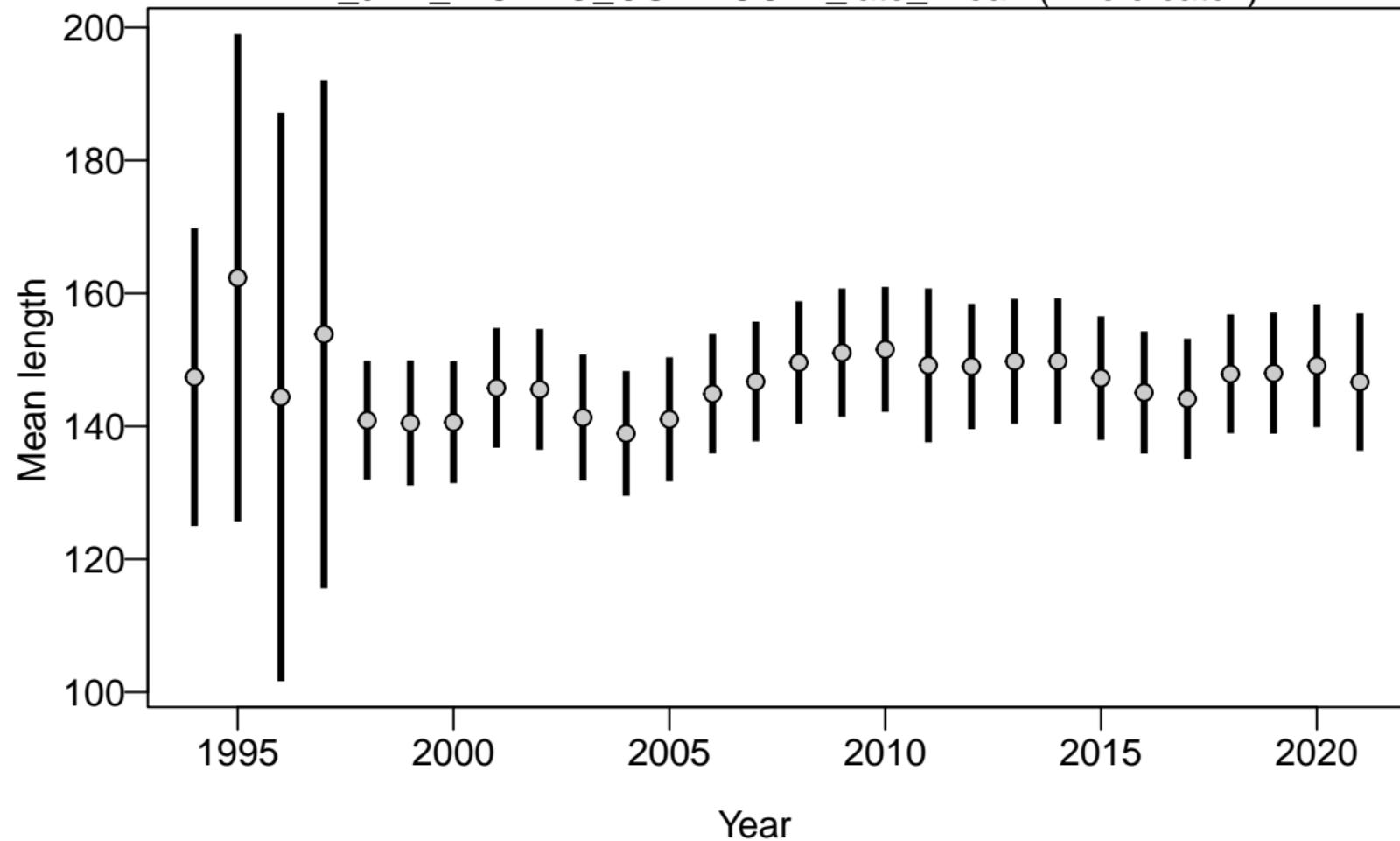


Proportion

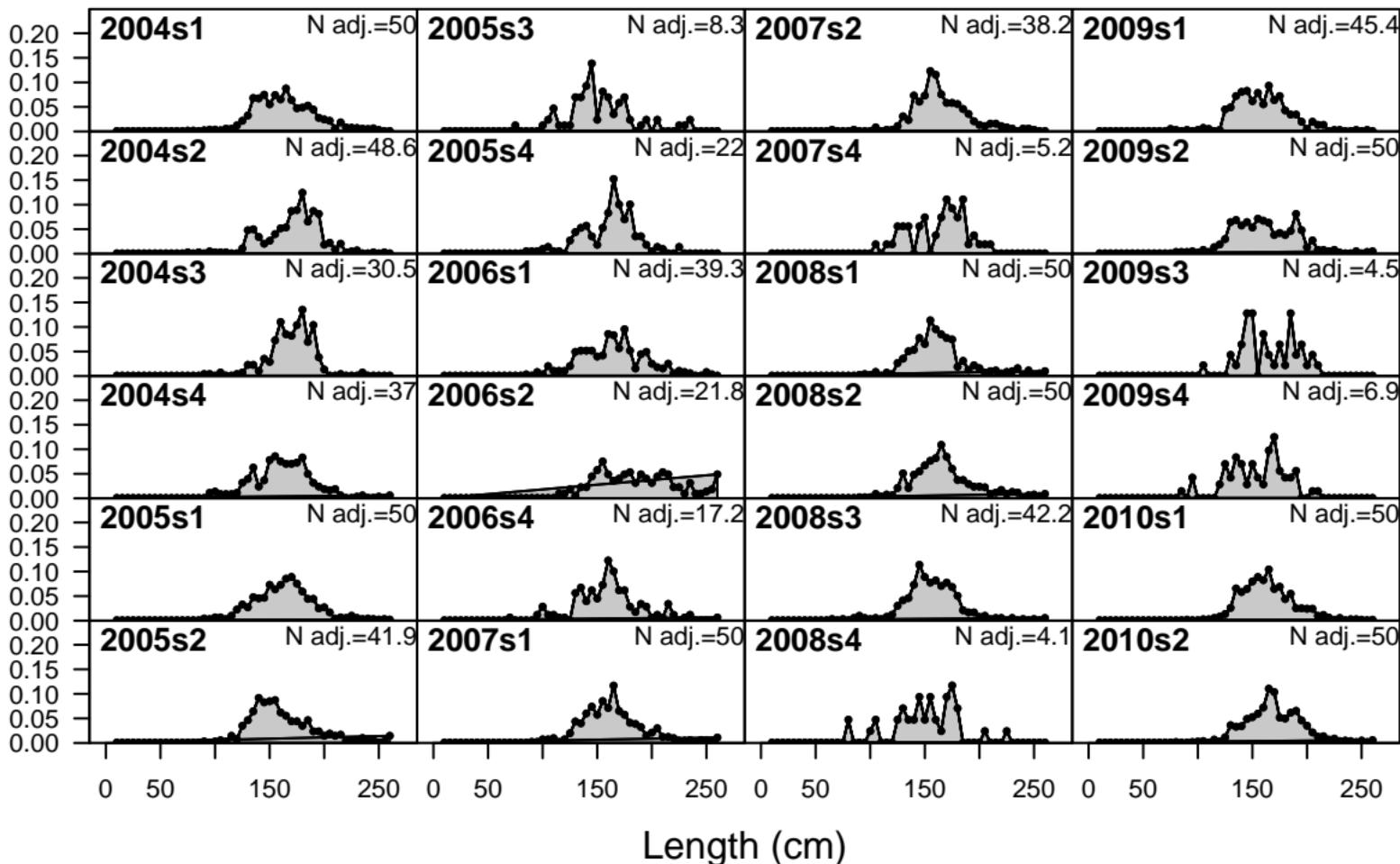




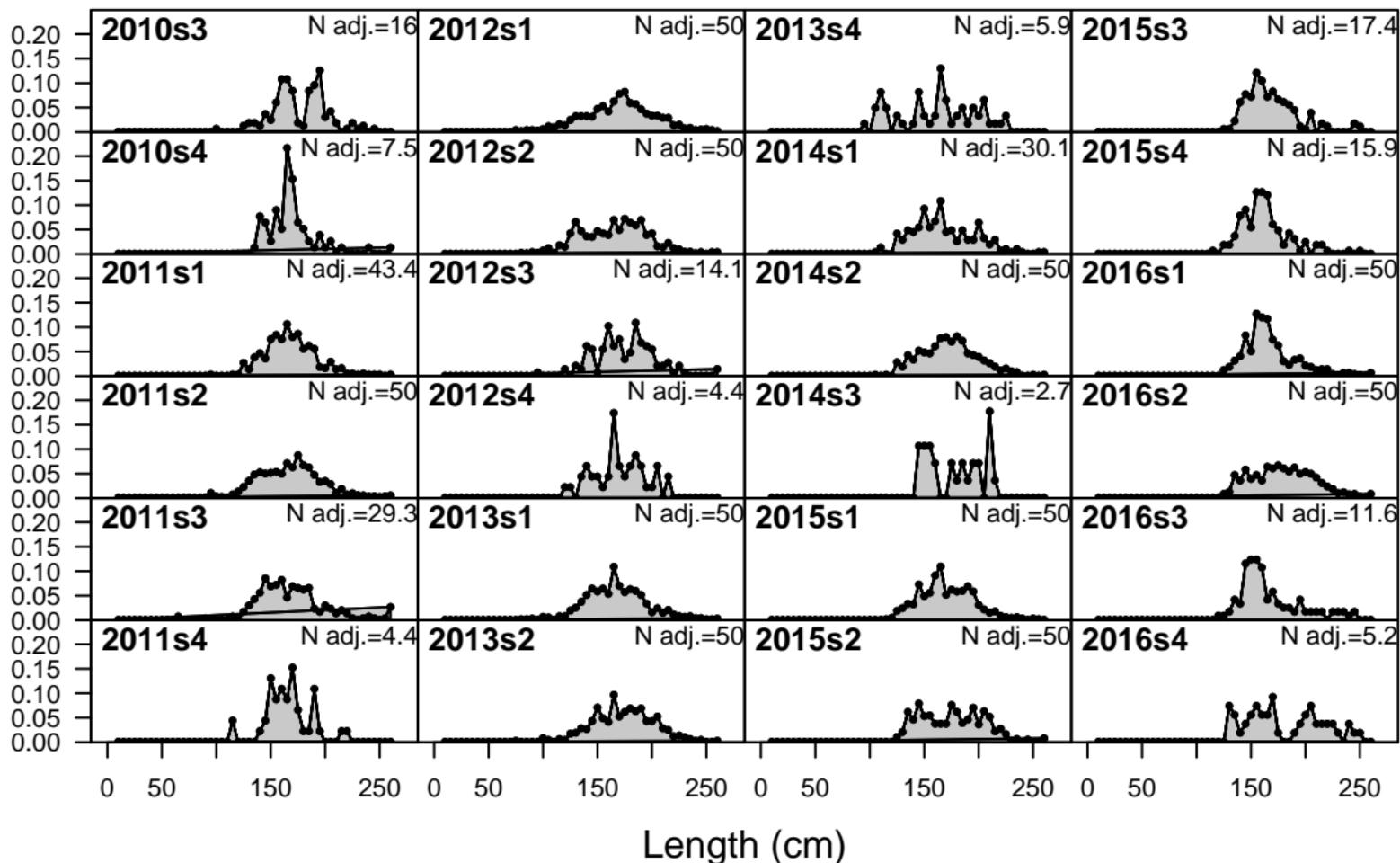
F1_JPN_WCNPO OSDWCOLL late Area1 (whole catch)



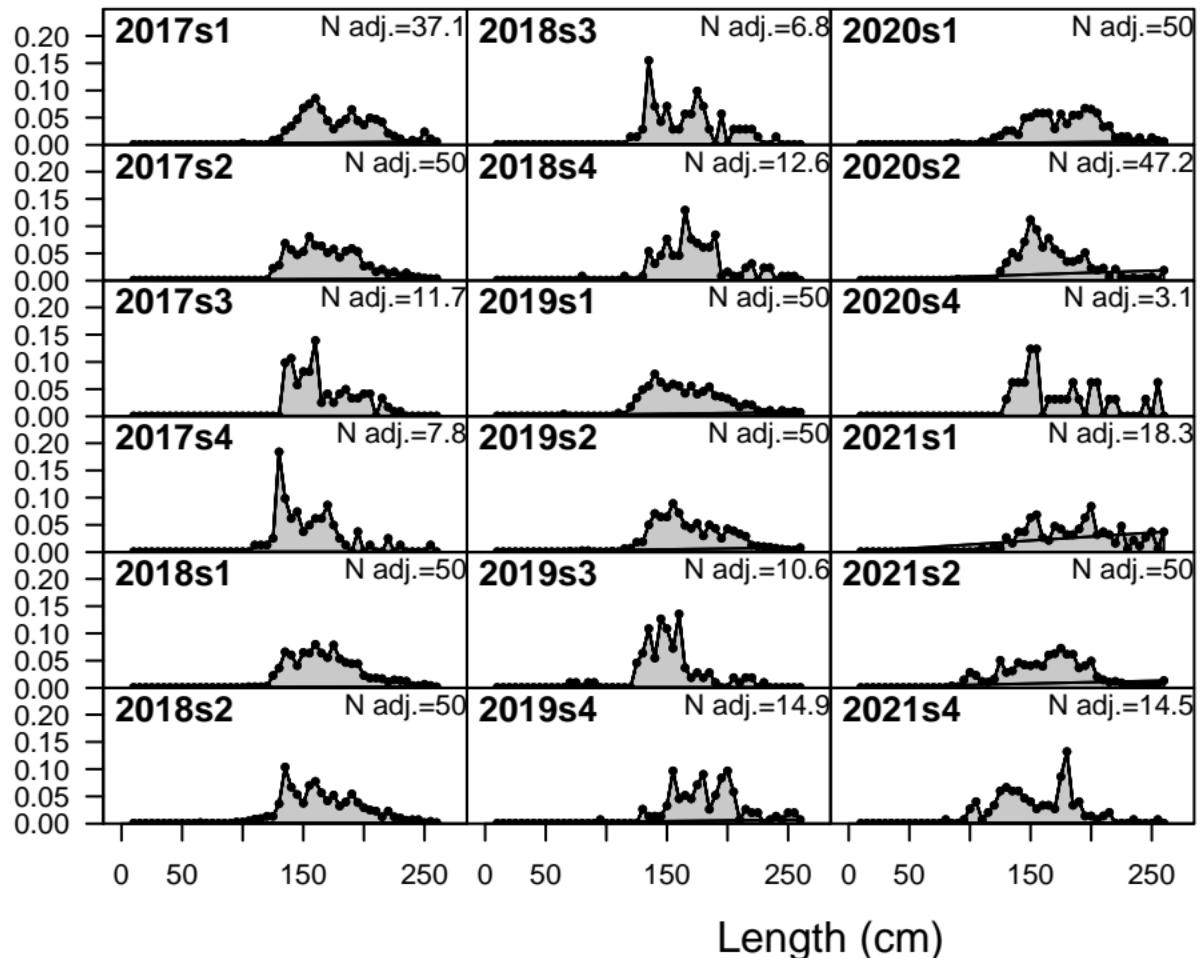
Proportion

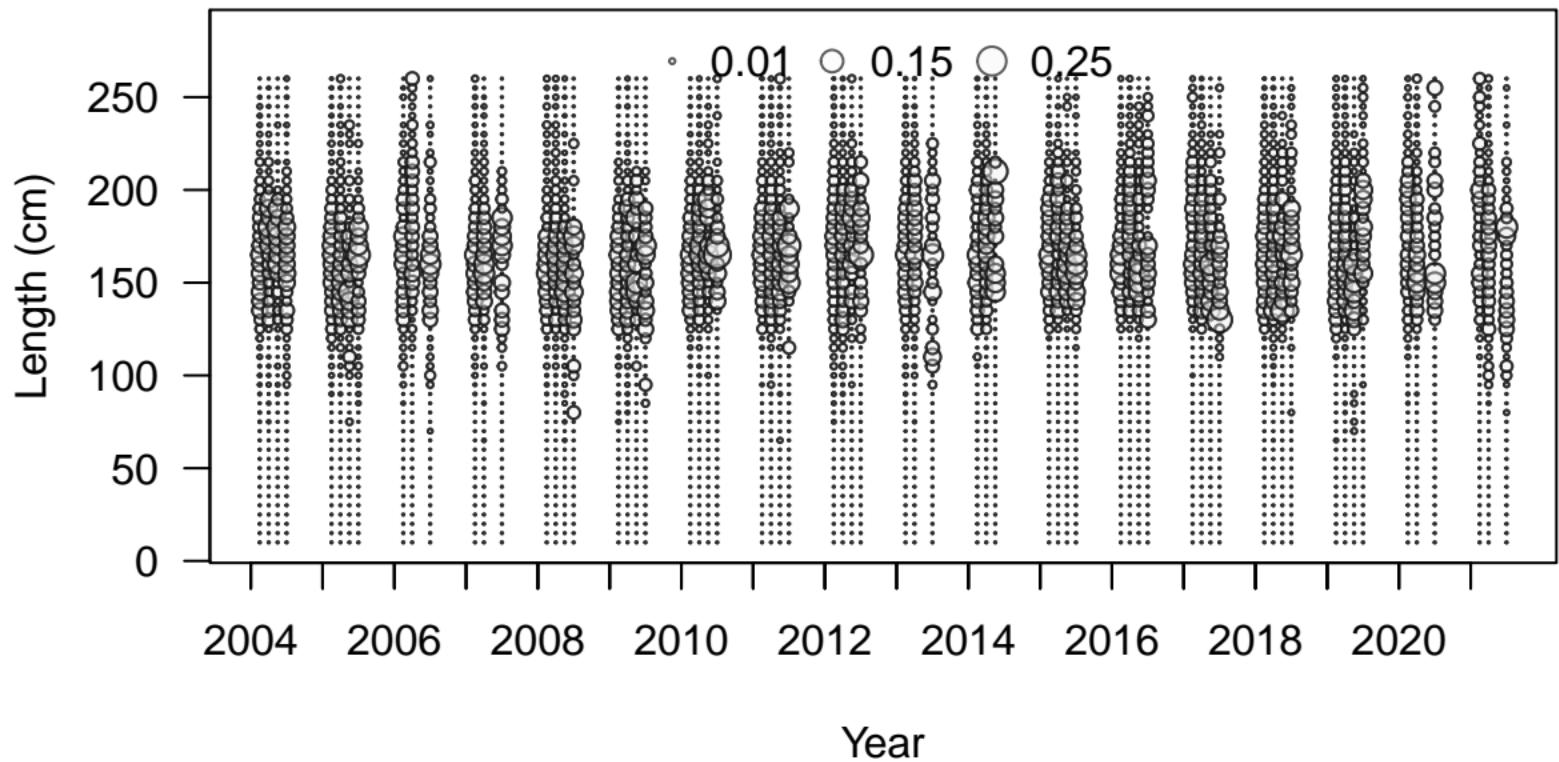


Proportion

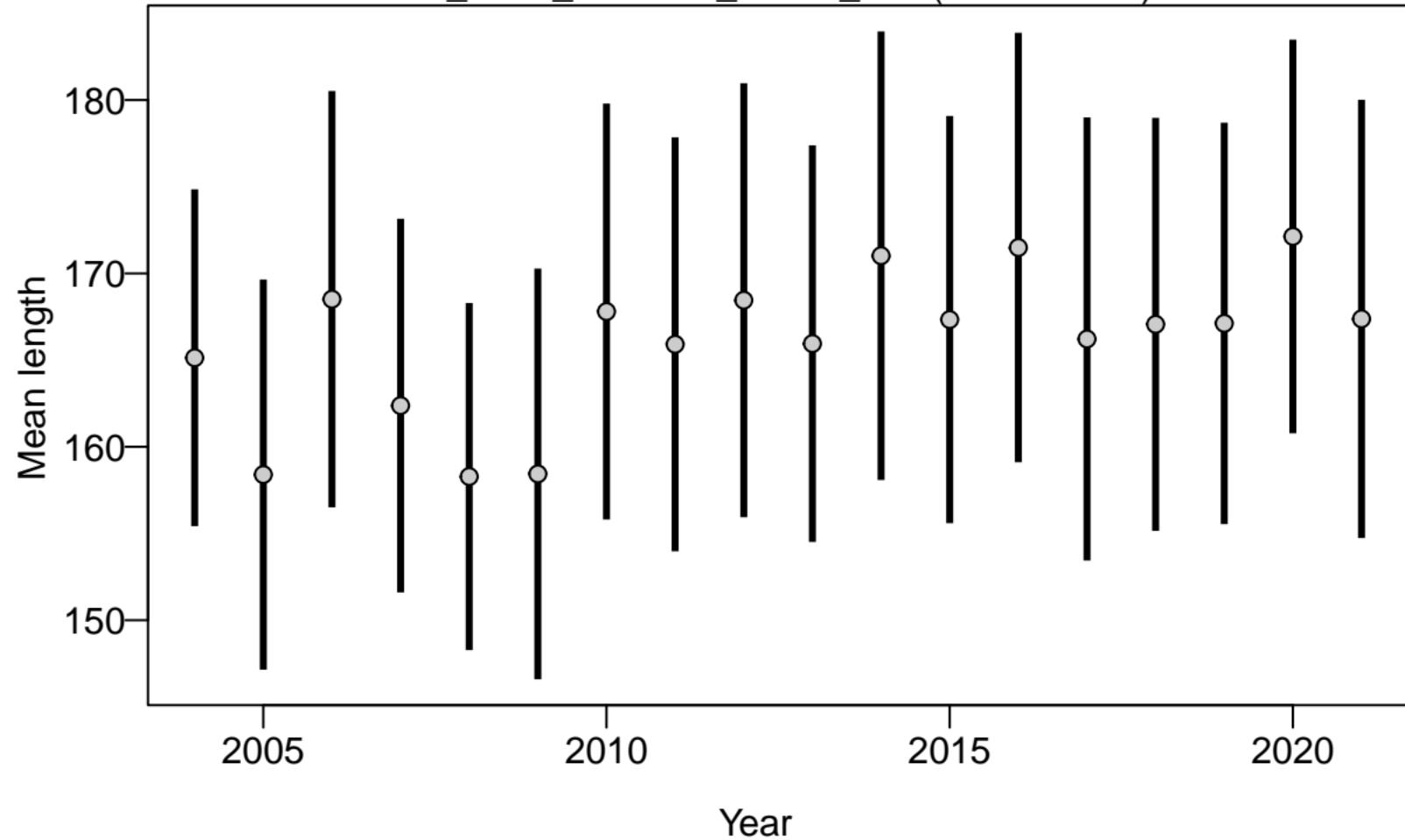


Proportion

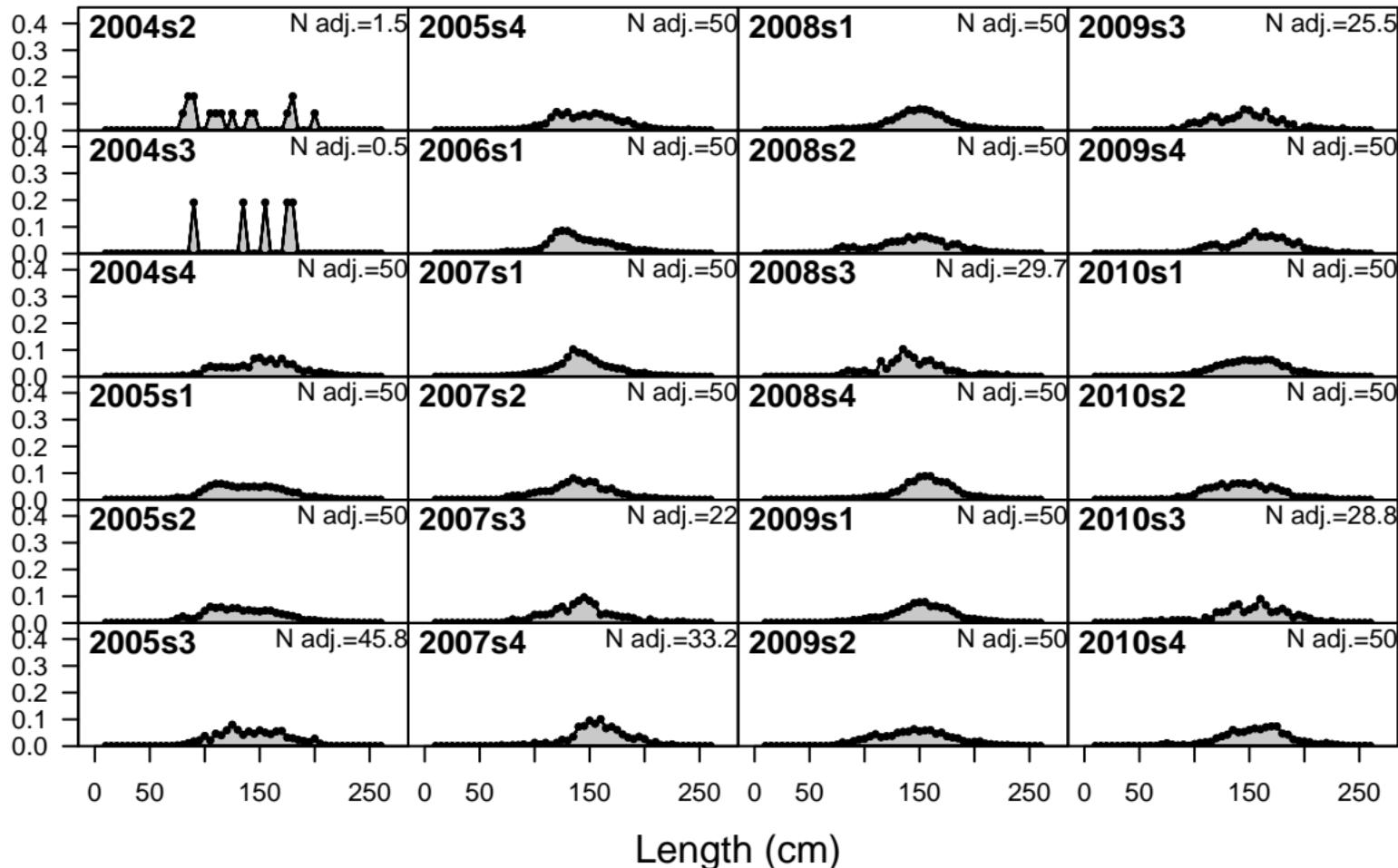




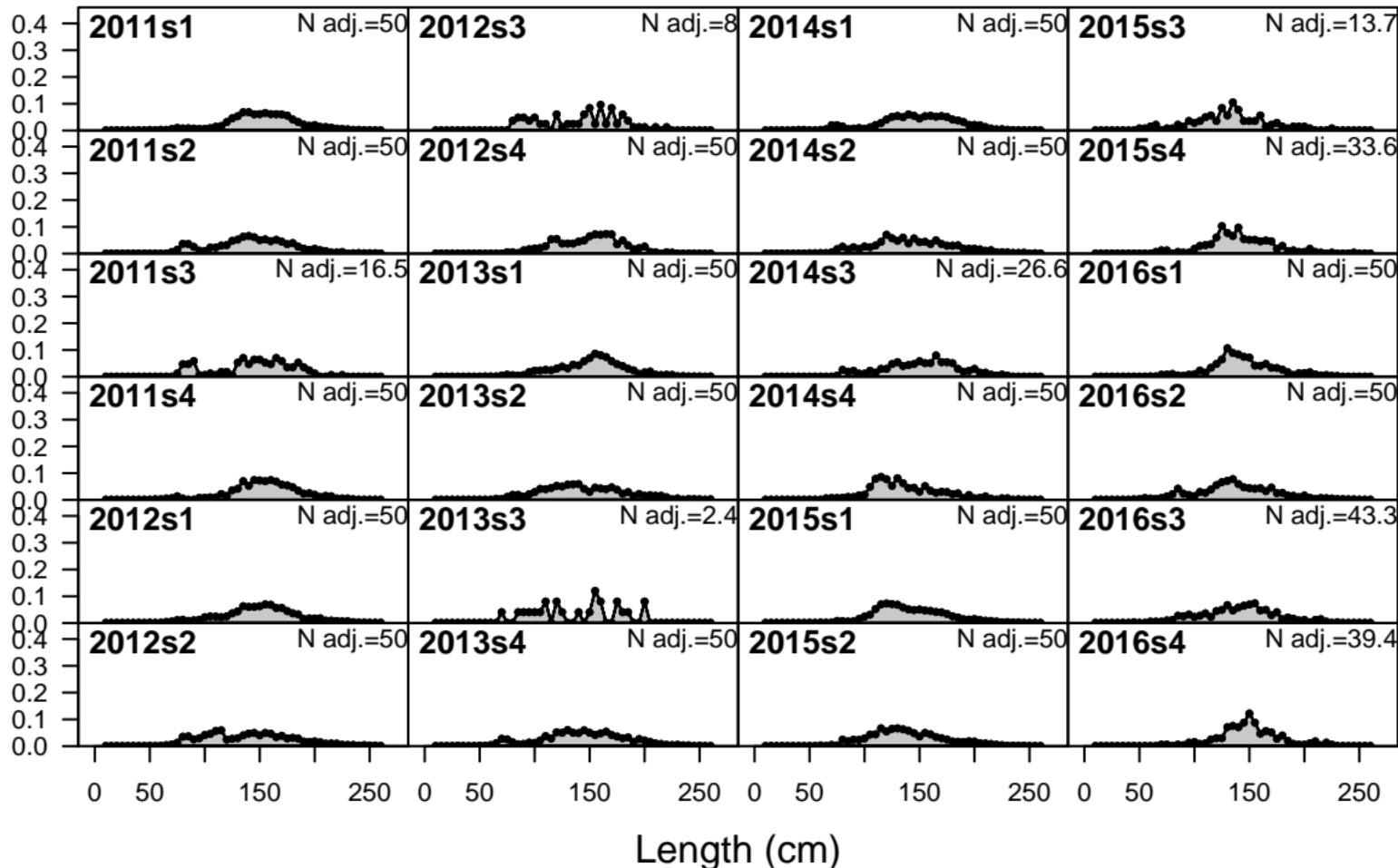
F2_TWN_WCNPO_DWLL_late (whole catch)



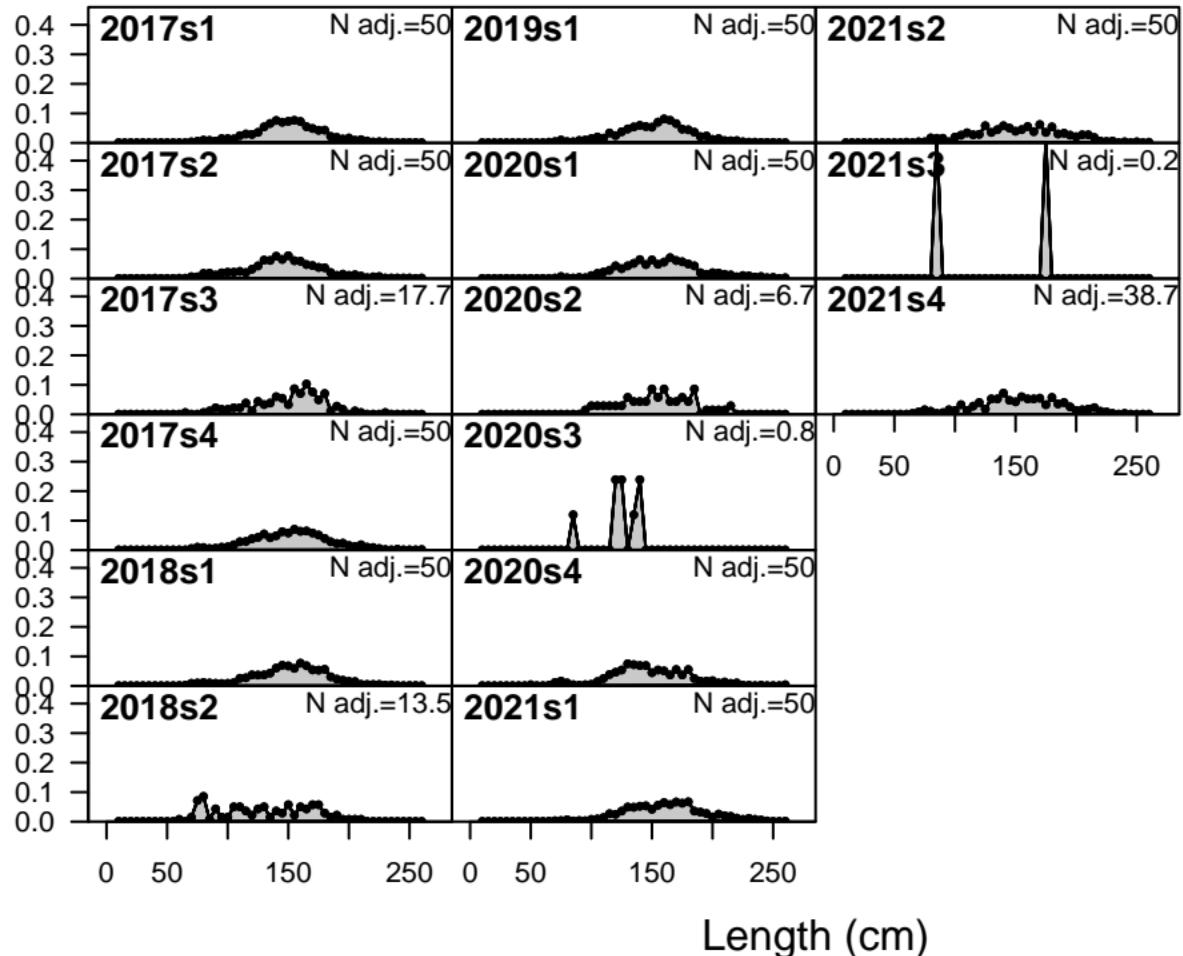
Proportion

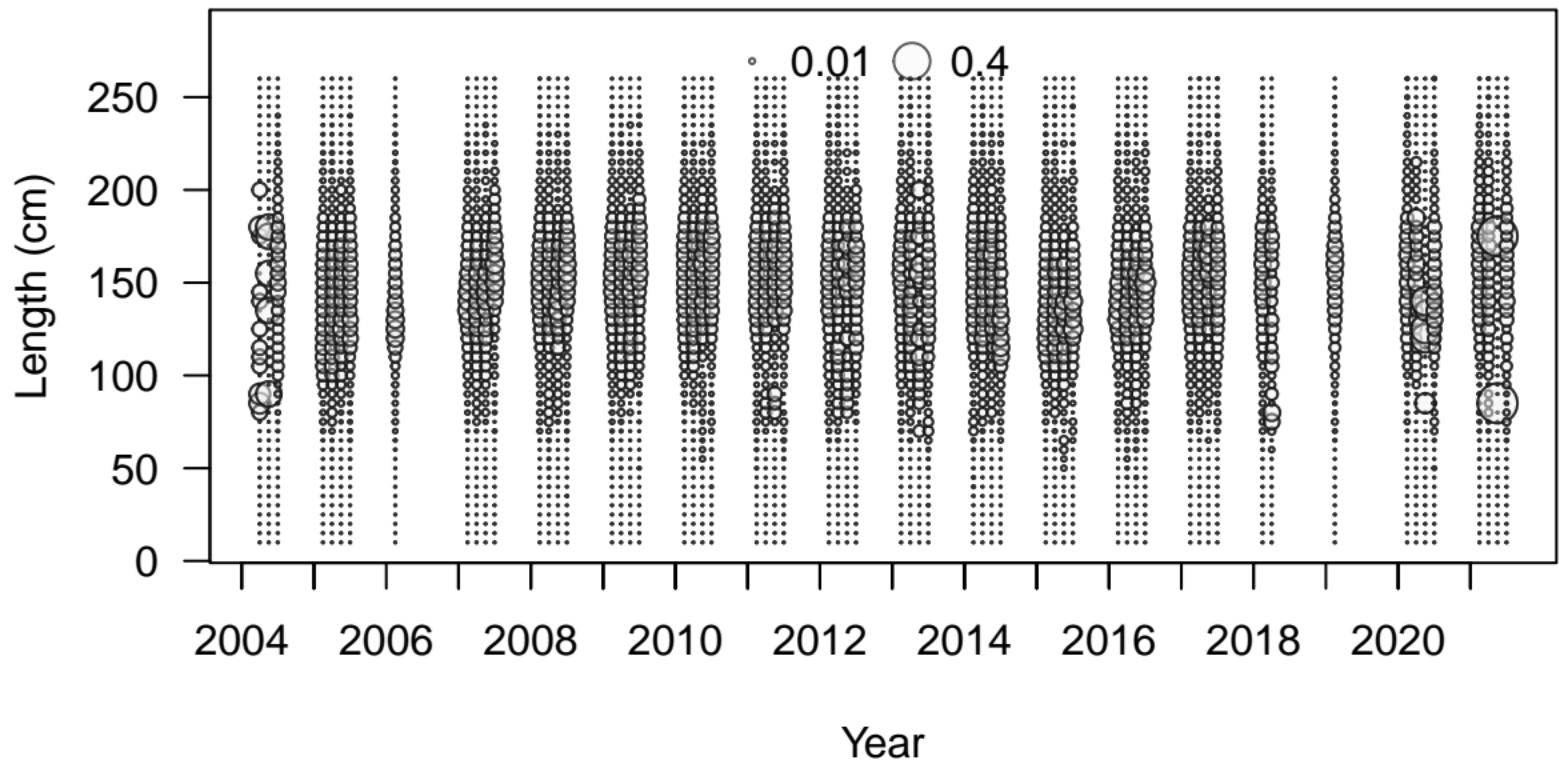


Proportion

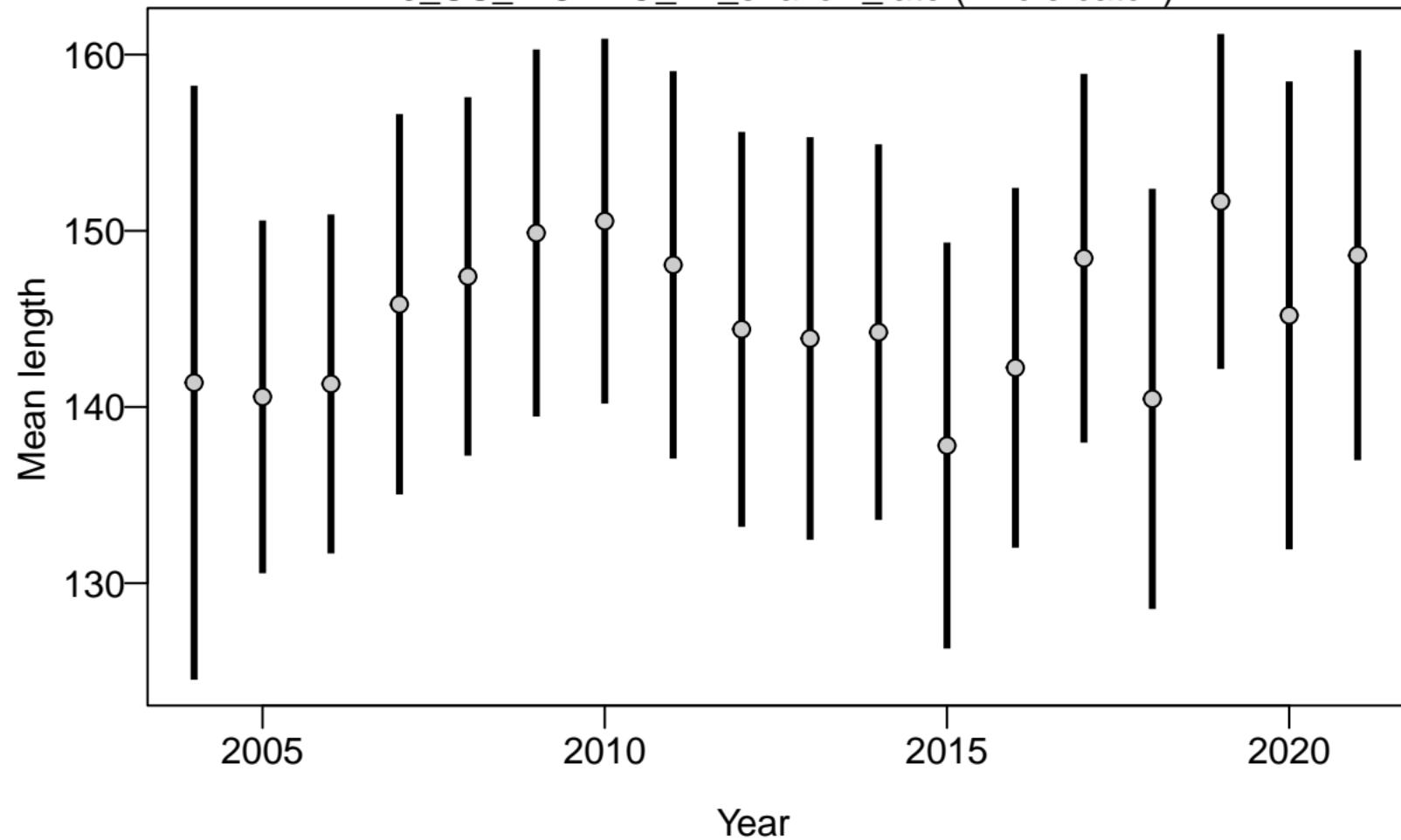


Proportion

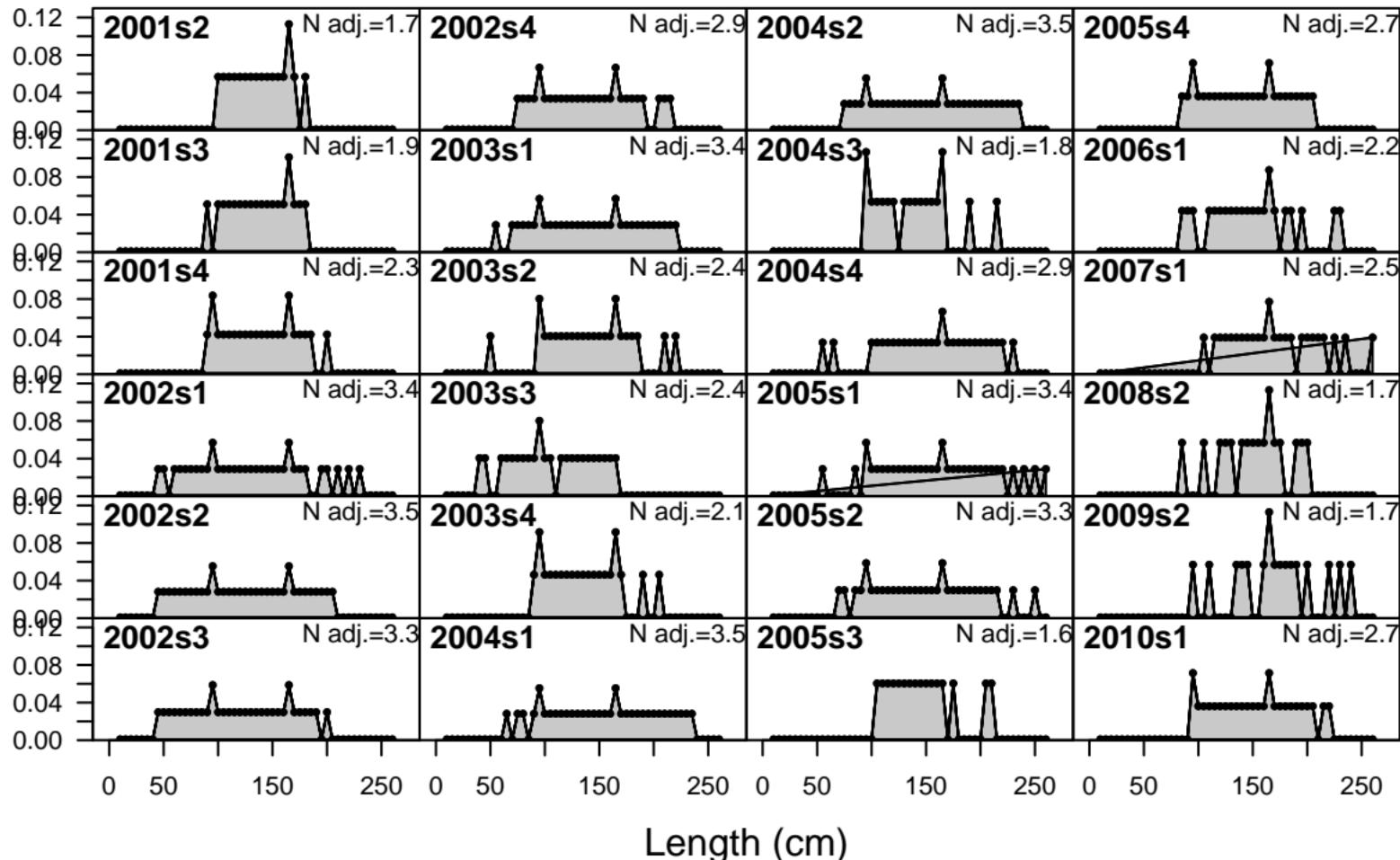




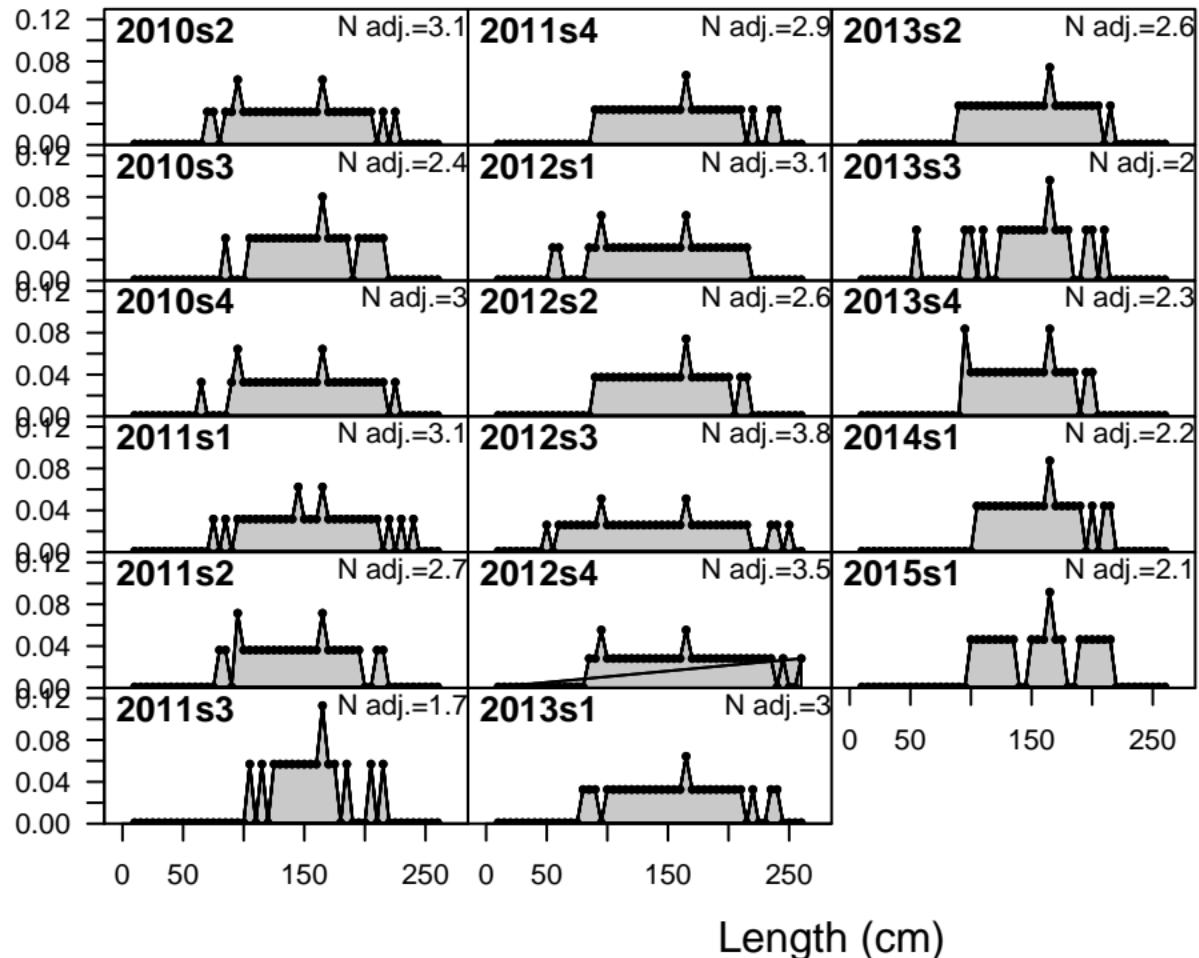
F3_US_WCNPO_LL_shallow_late (whole catch)

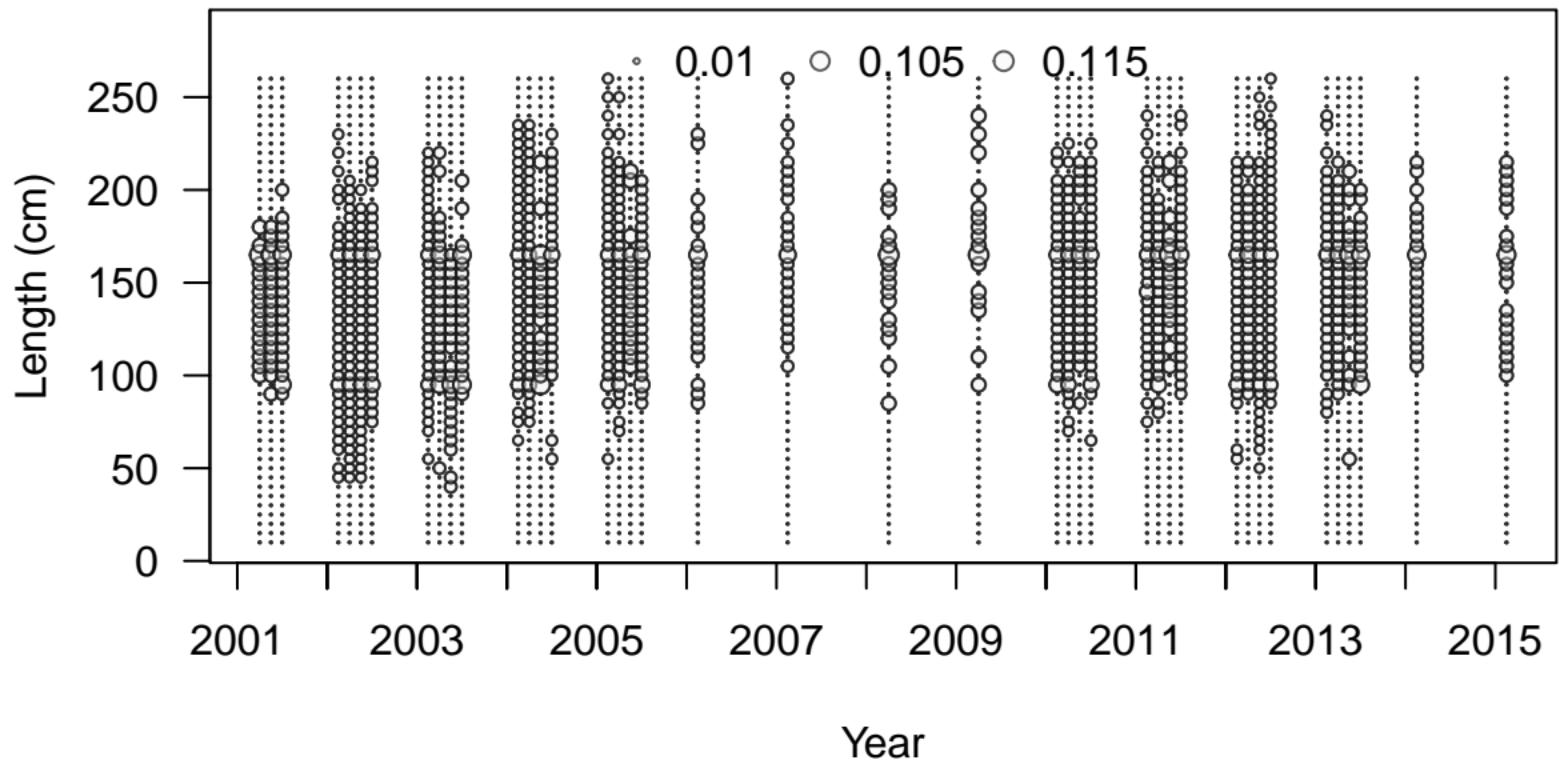


Proportion

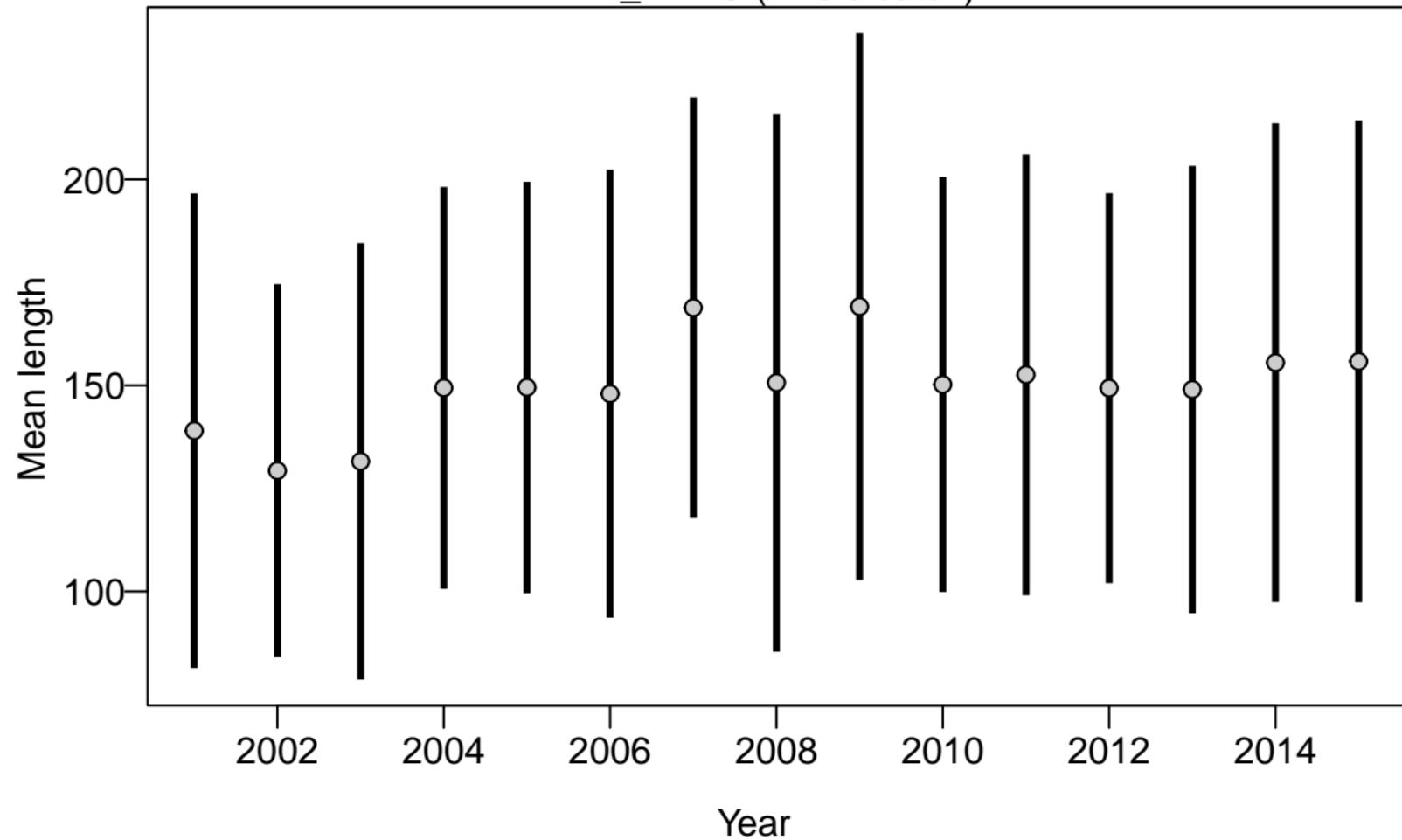


Proportion

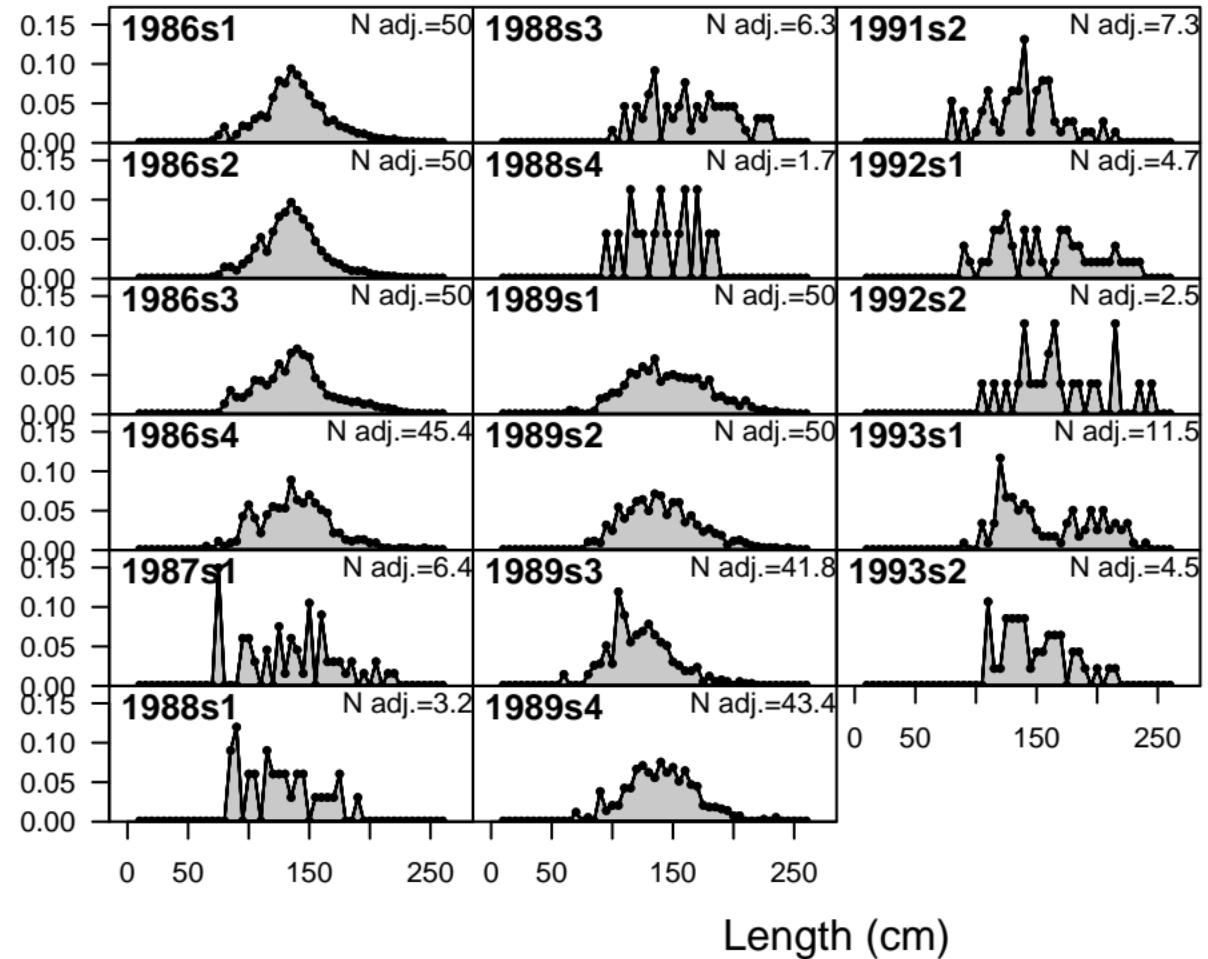


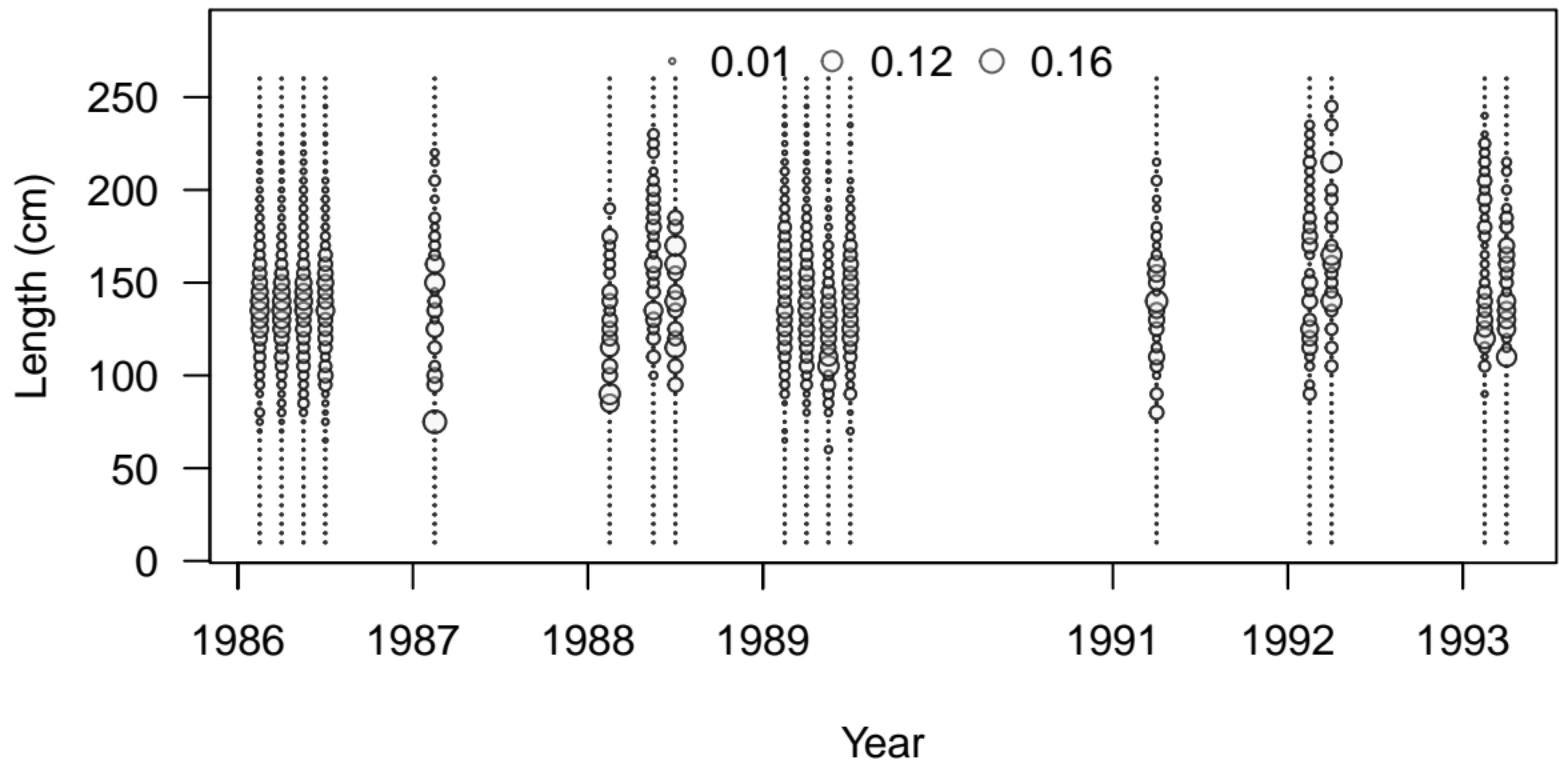


F4_IATTC (whole catch)

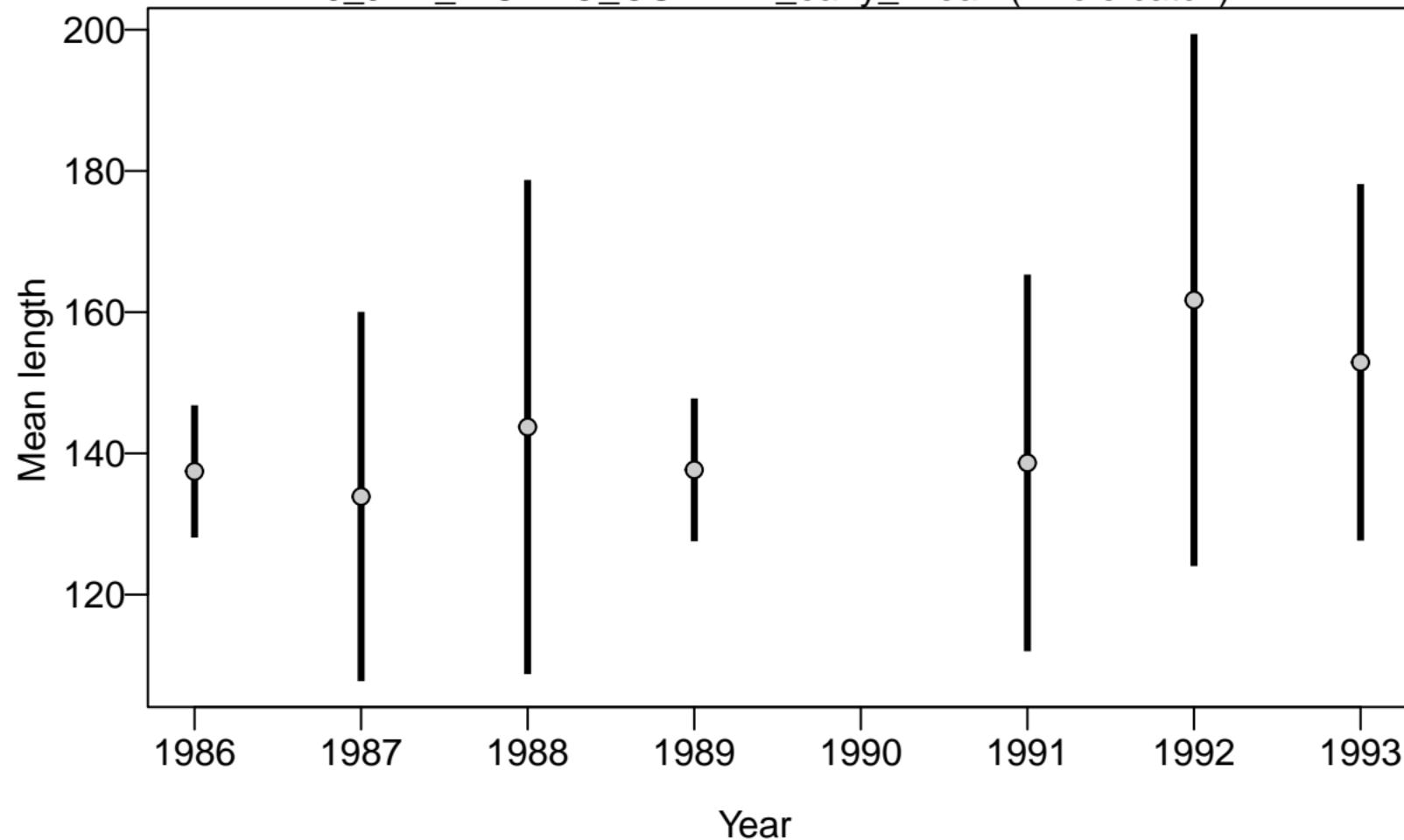


Proportion

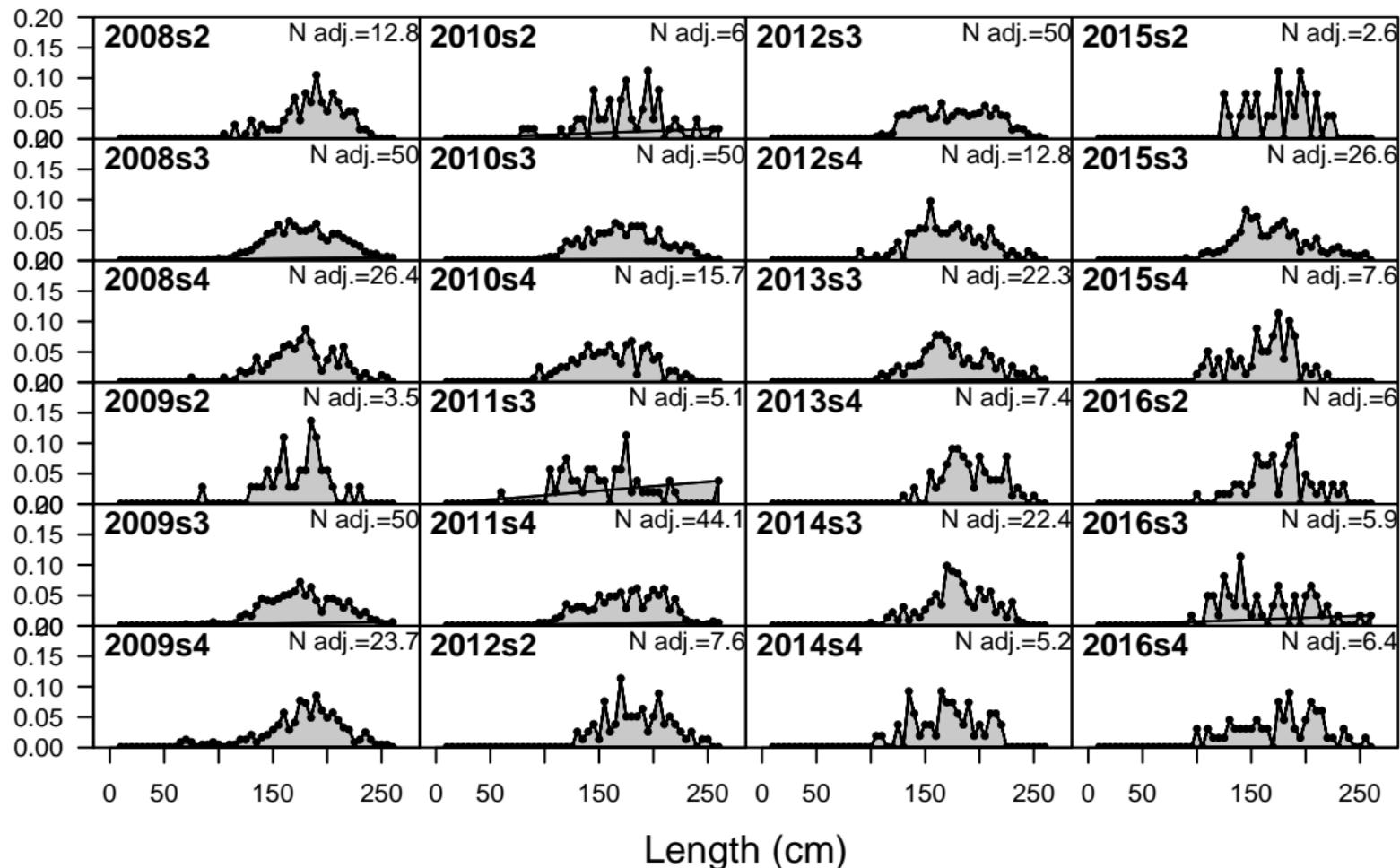




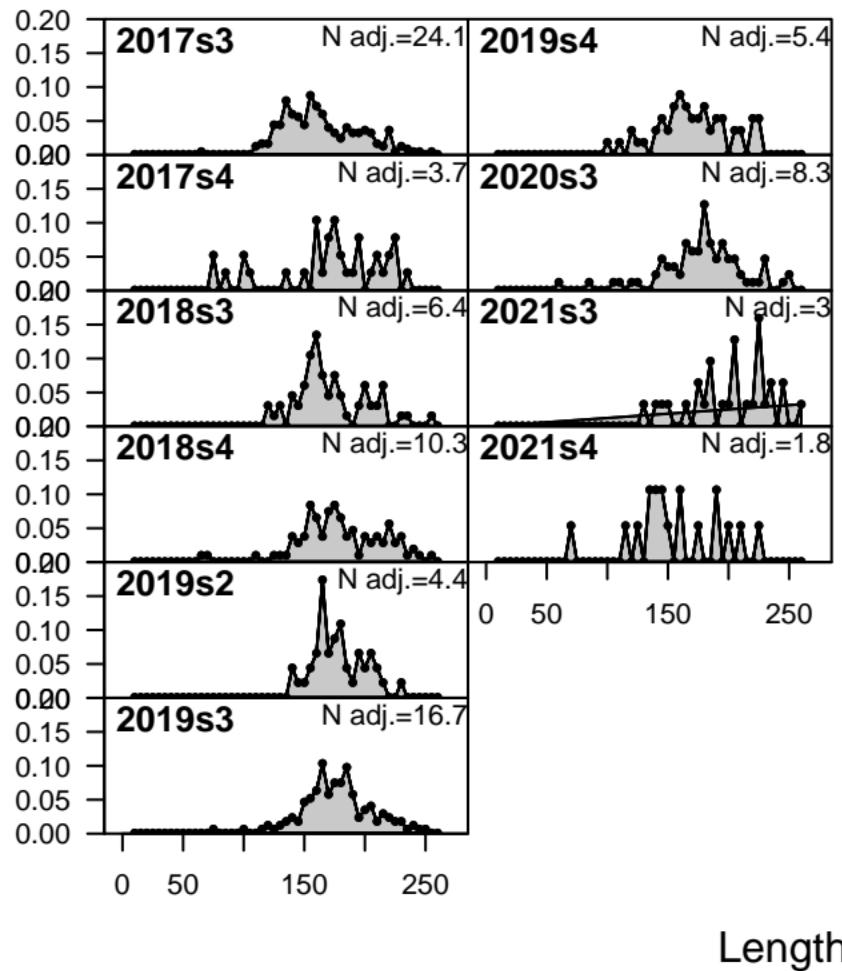
F6_JPN_WCNPO OSDWLL_early_Area1 (whole catch)

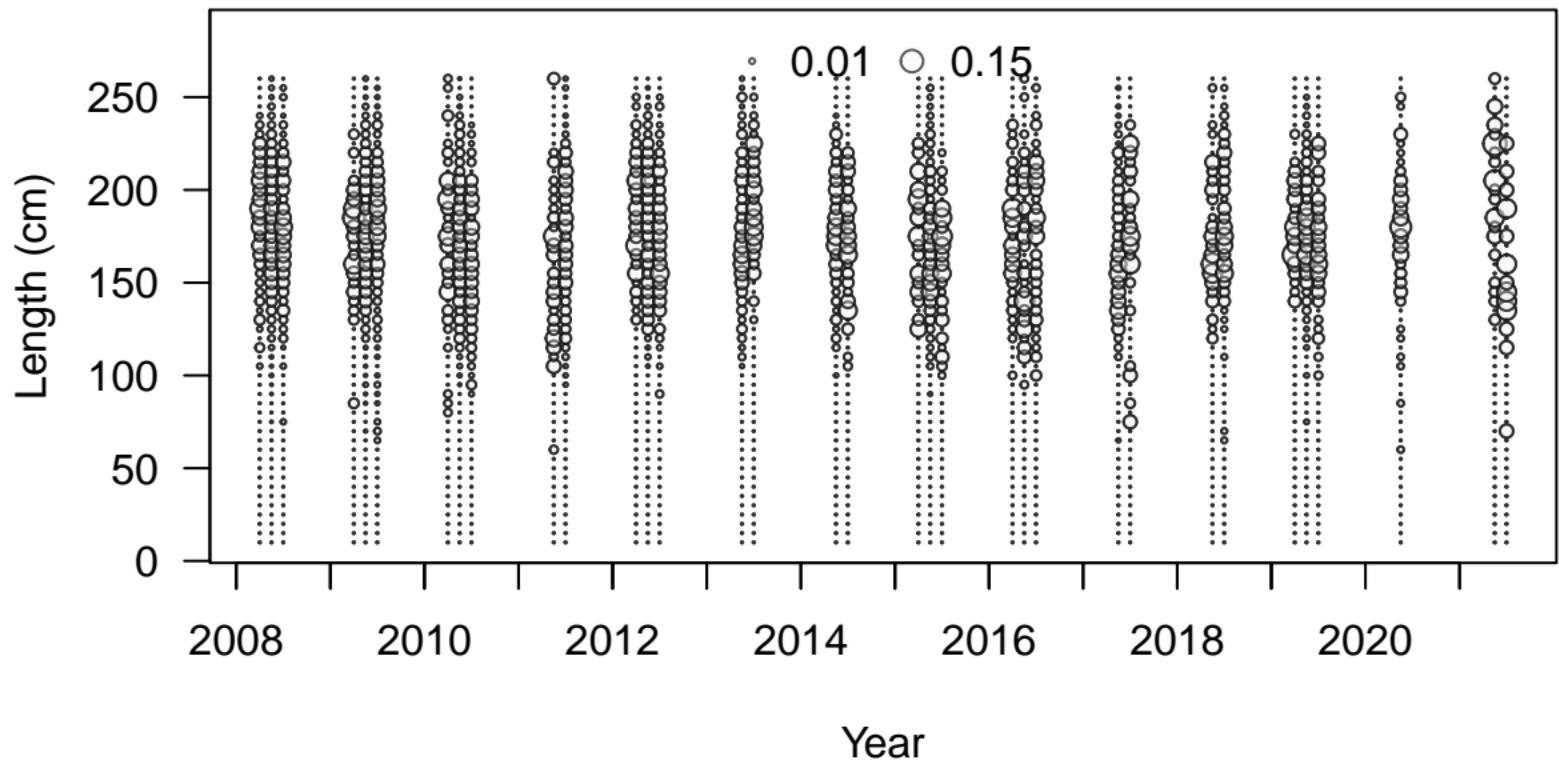


Proportion

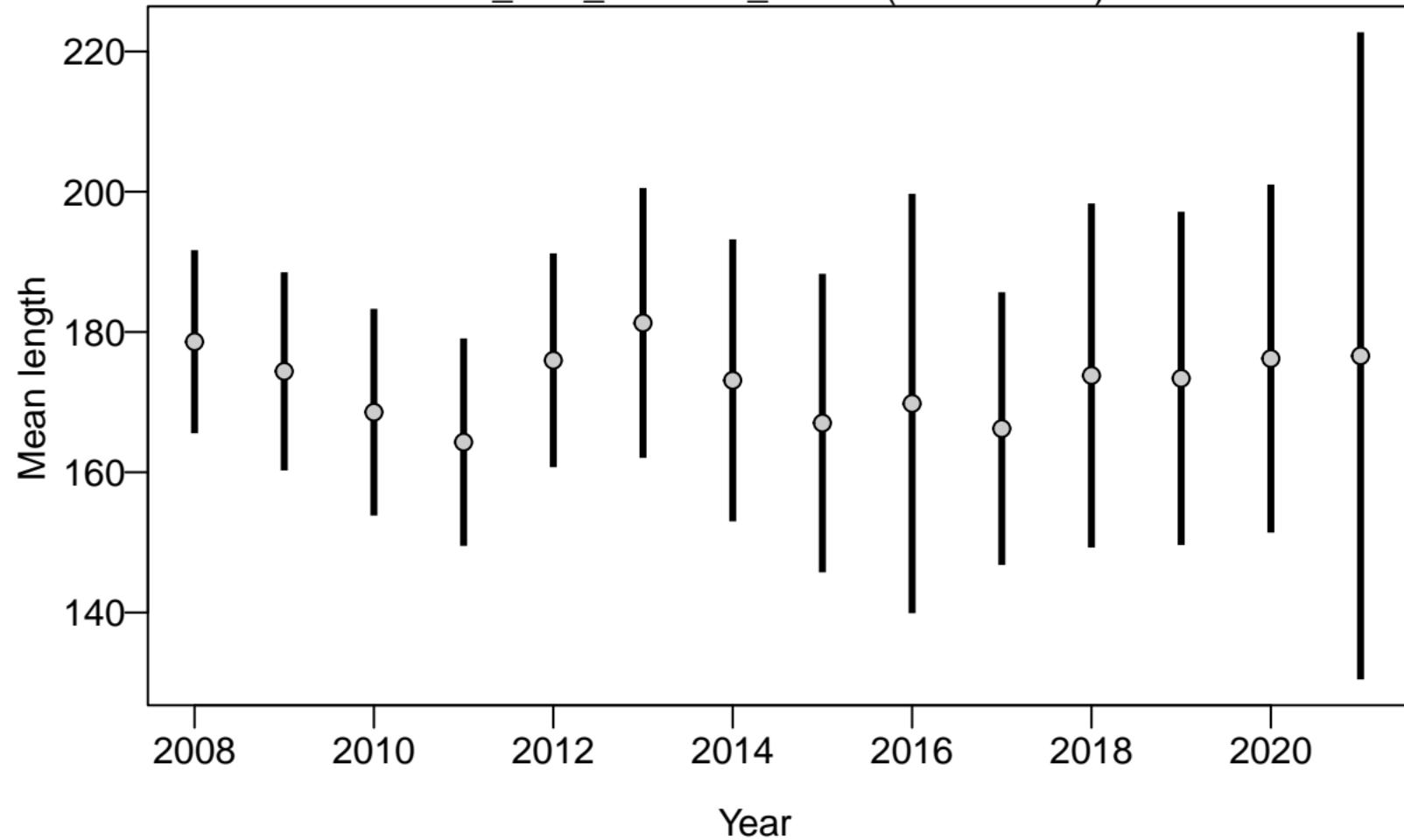


Proportion

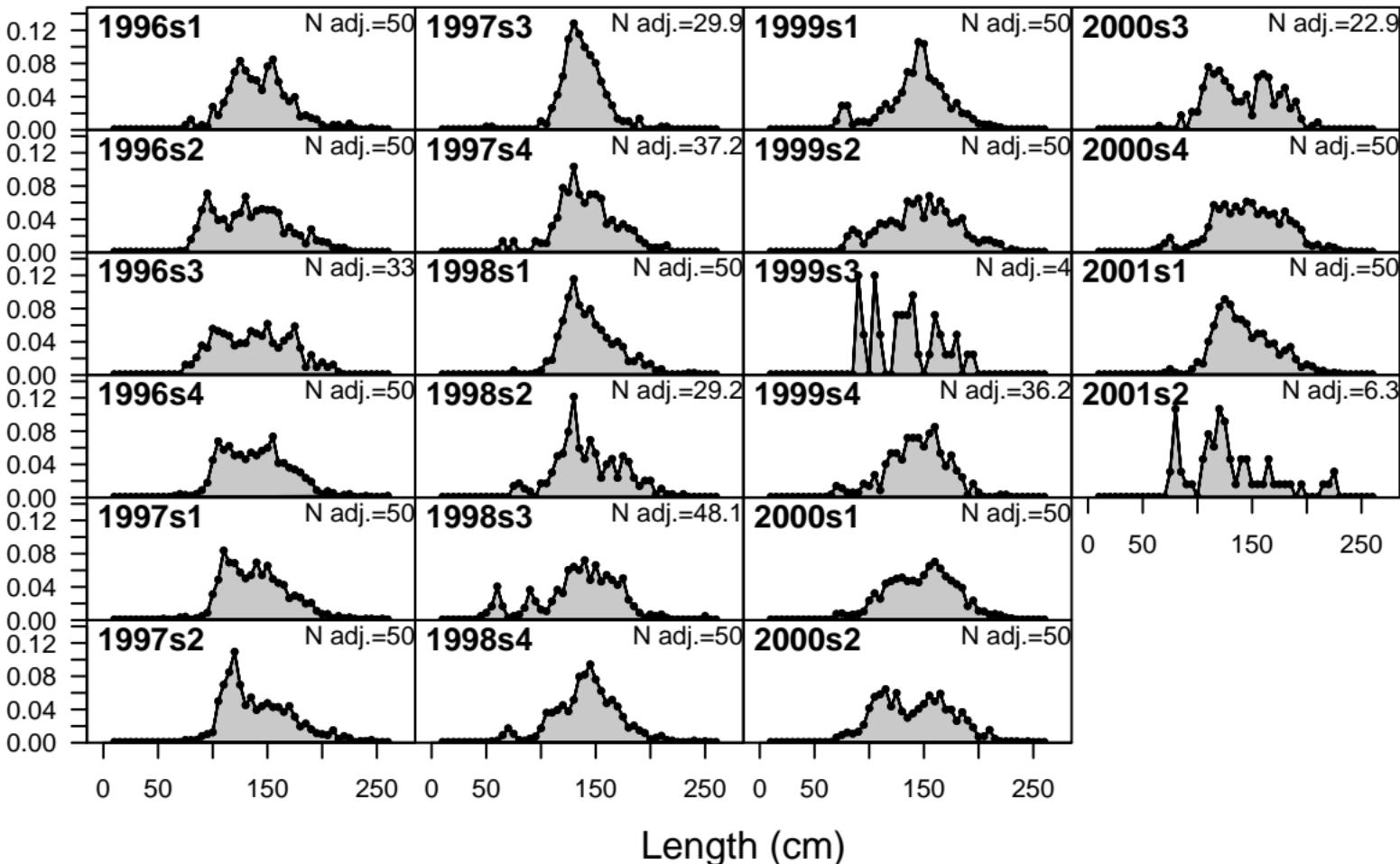


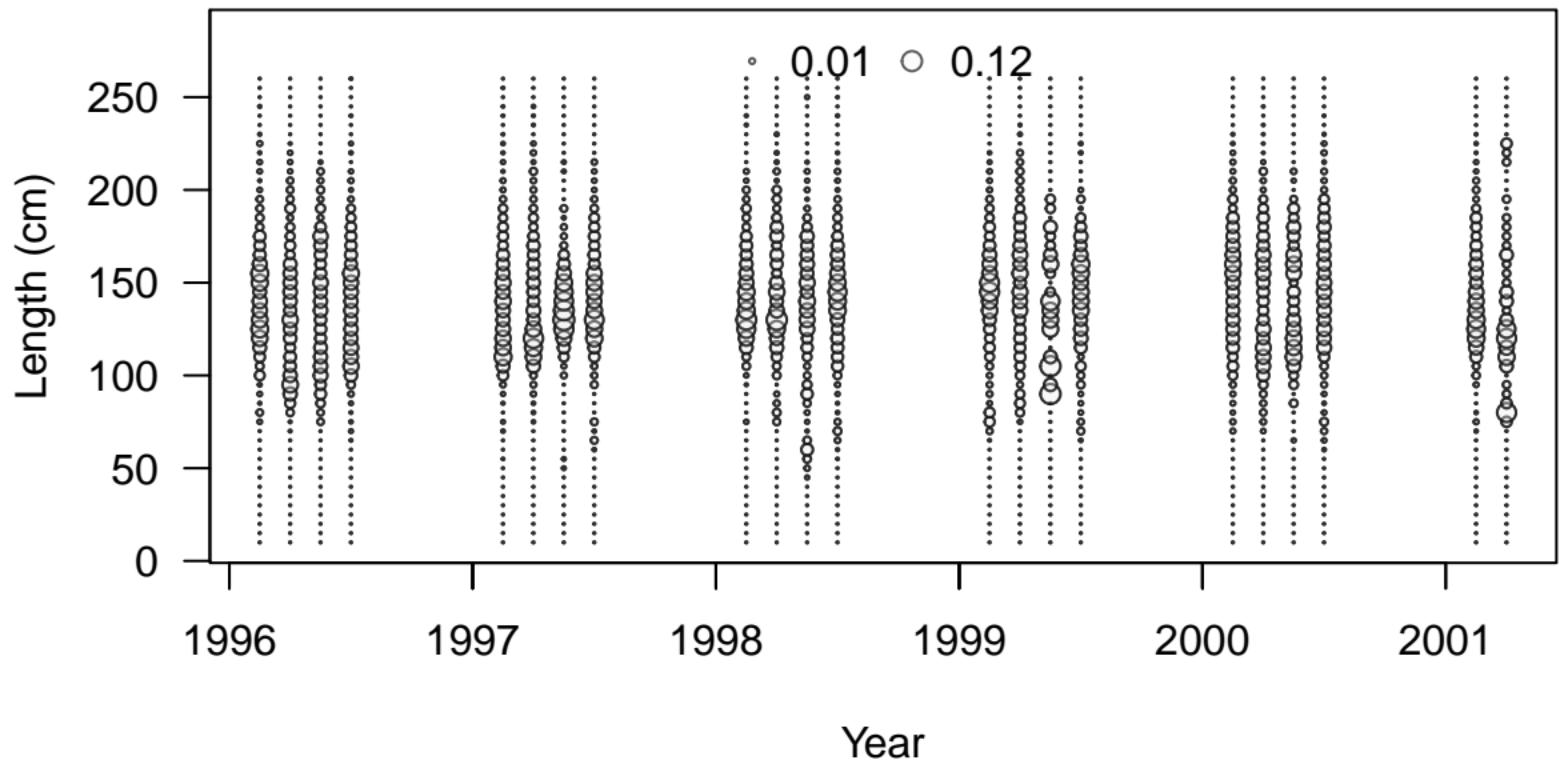


F7_JPN_WCNPO_CODF (whole catch)

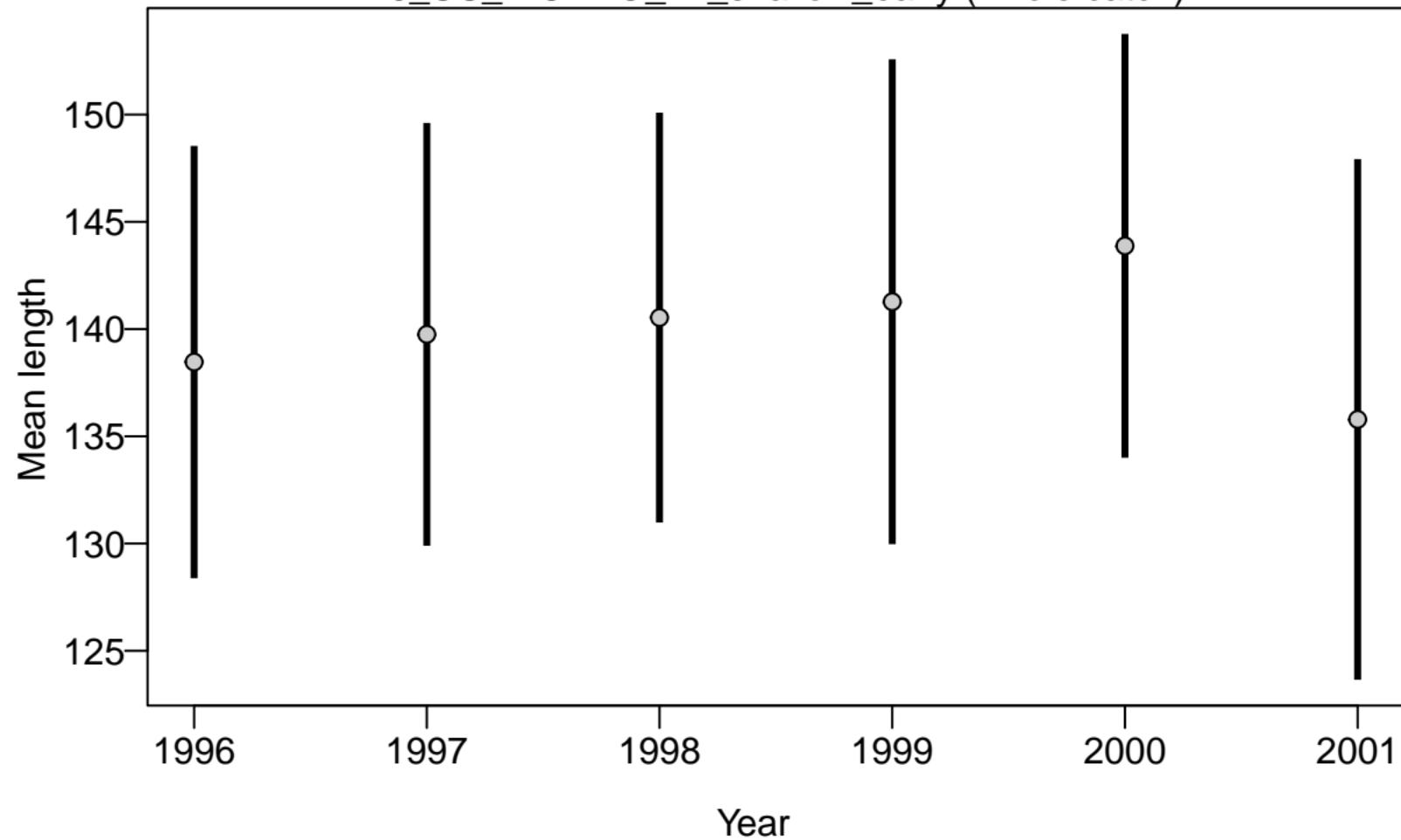


Proportion

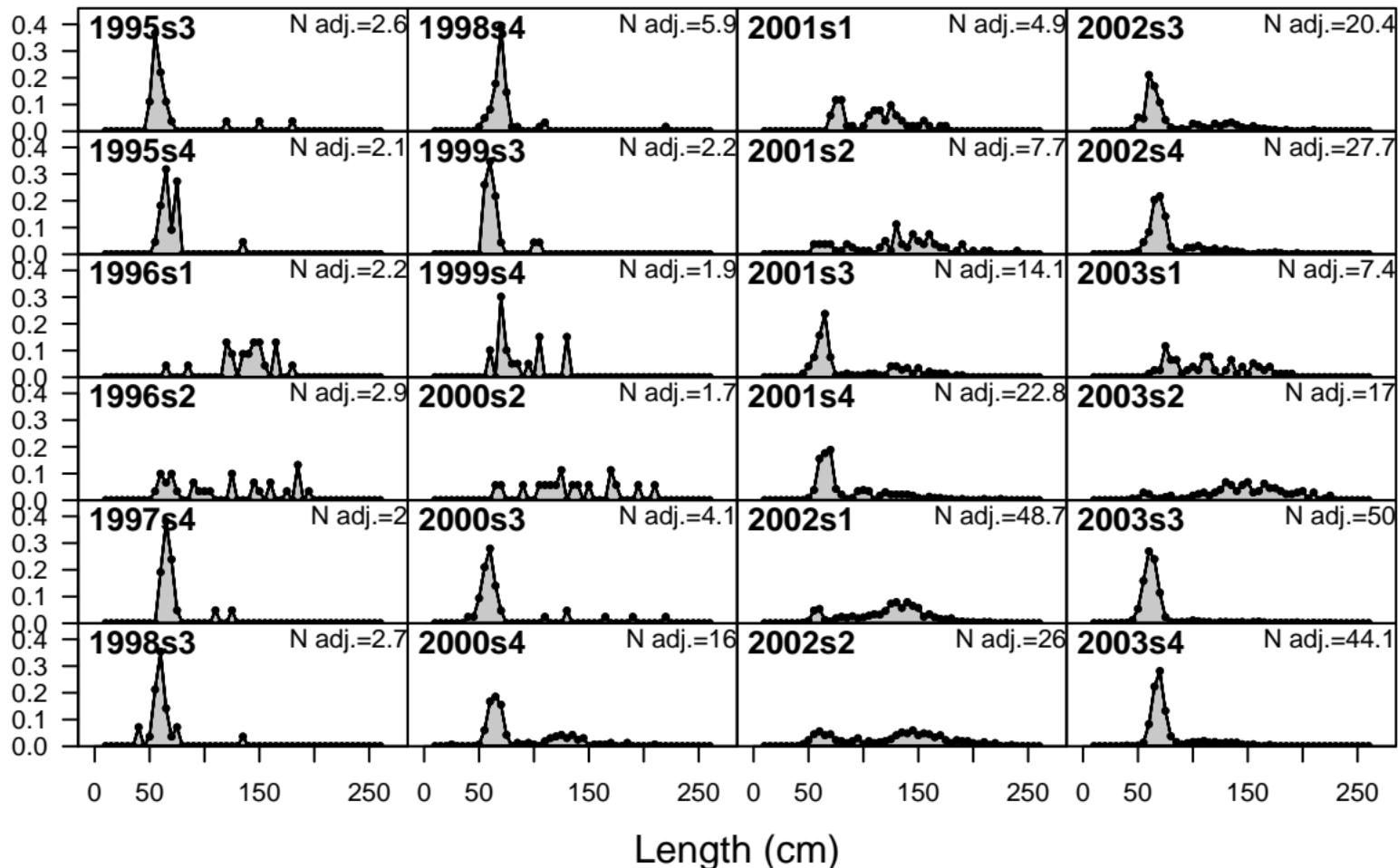




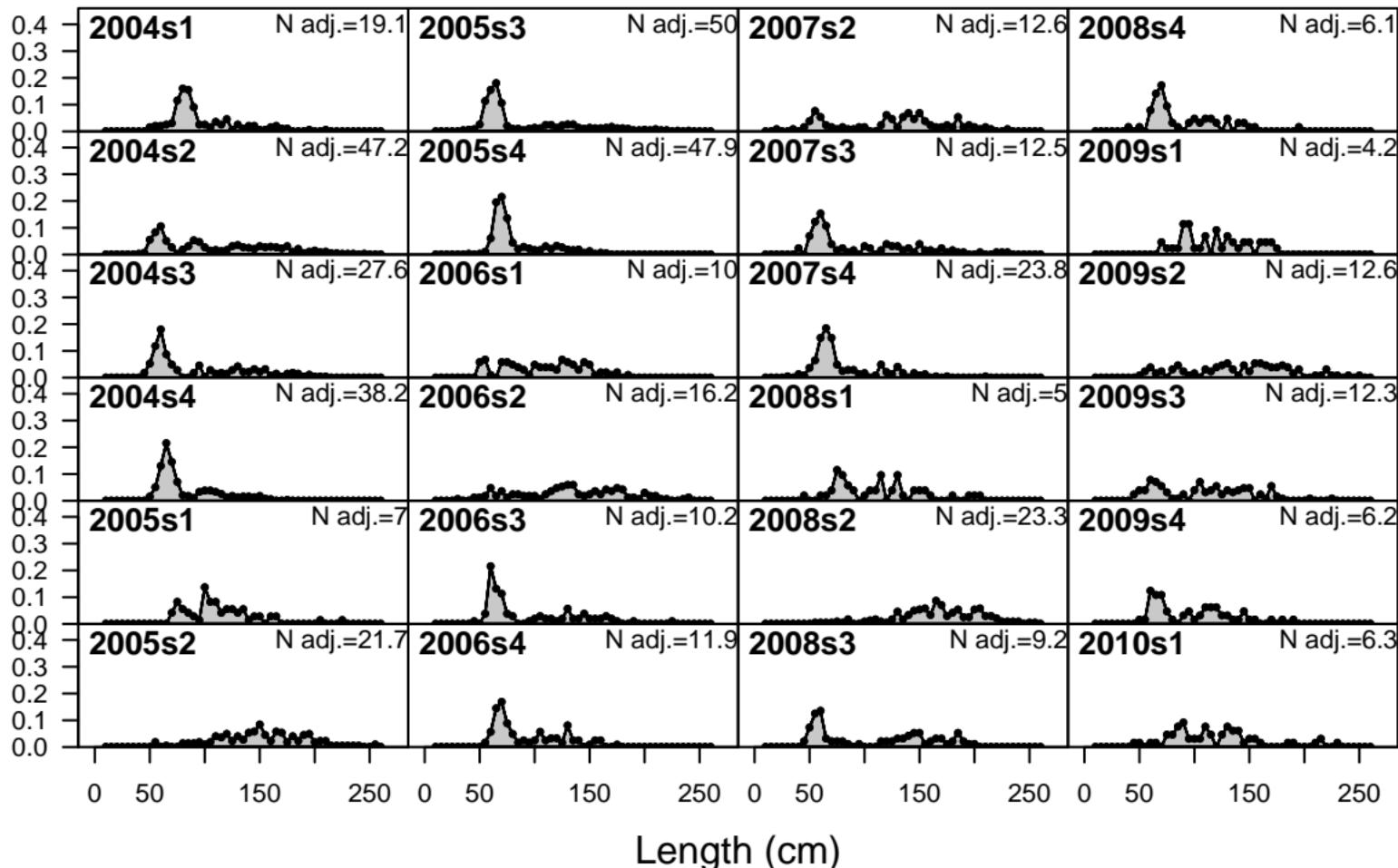
F8_US_WCNPO_LL_shallow_early (whole catch)



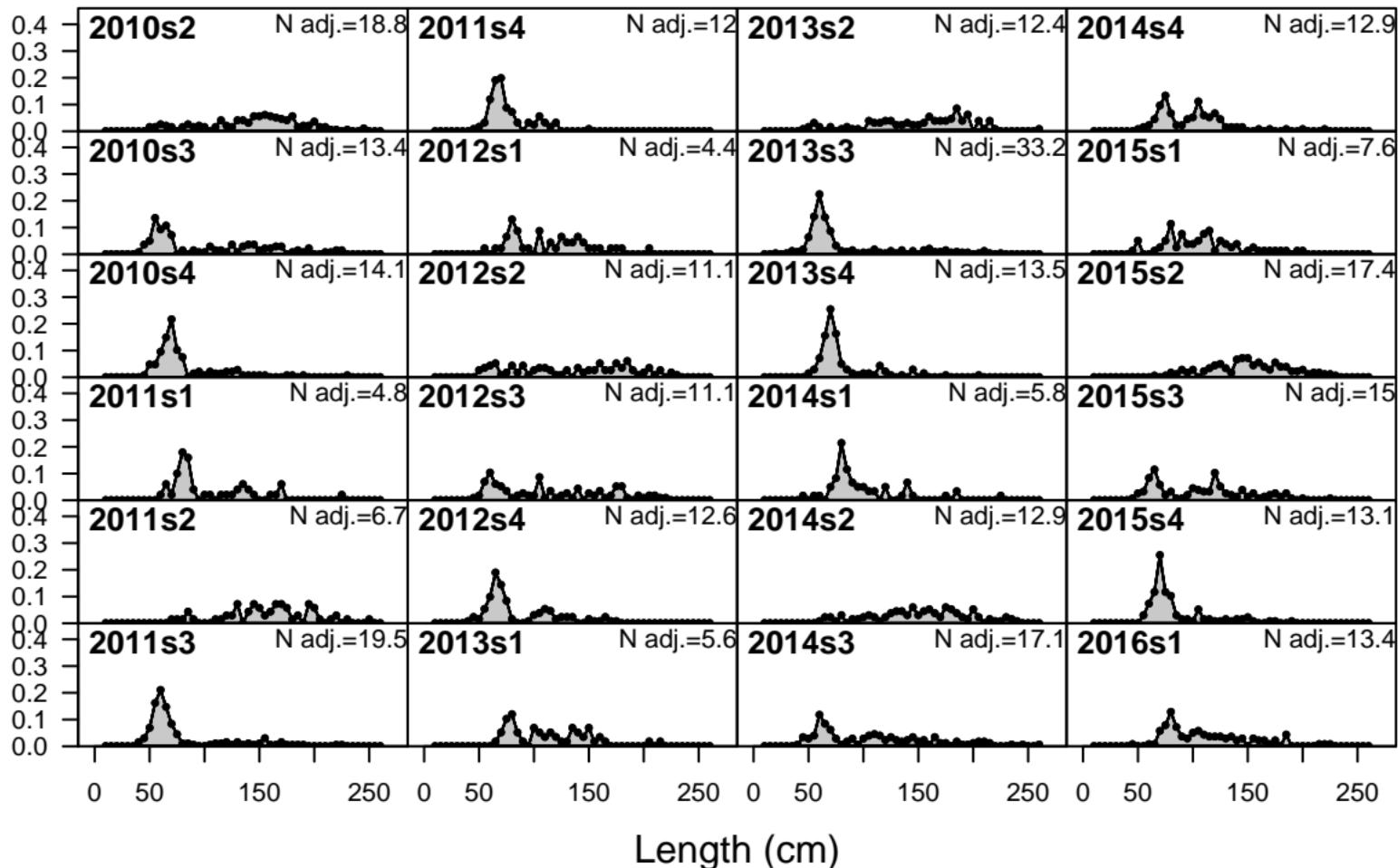
Proportion



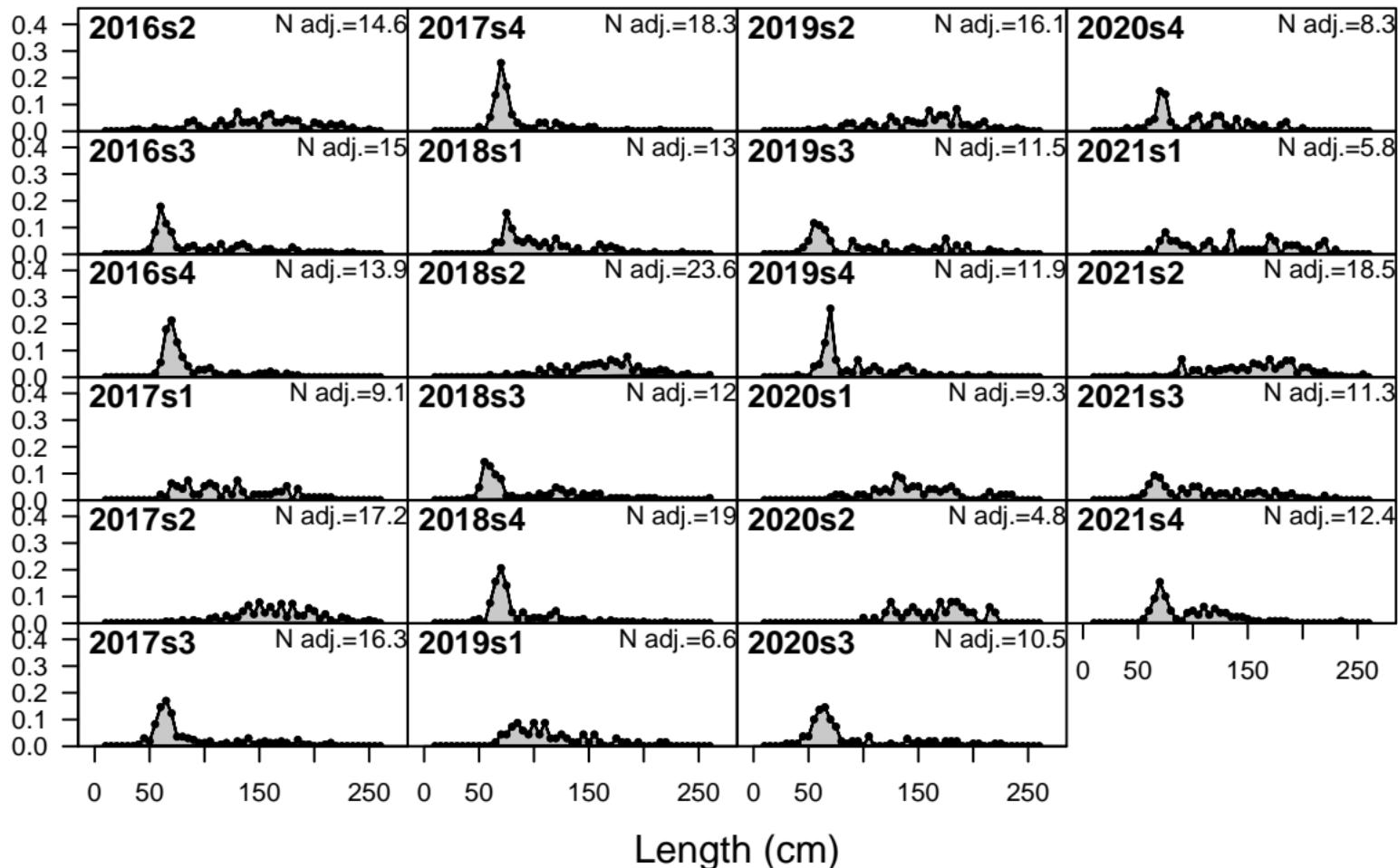
Proportion

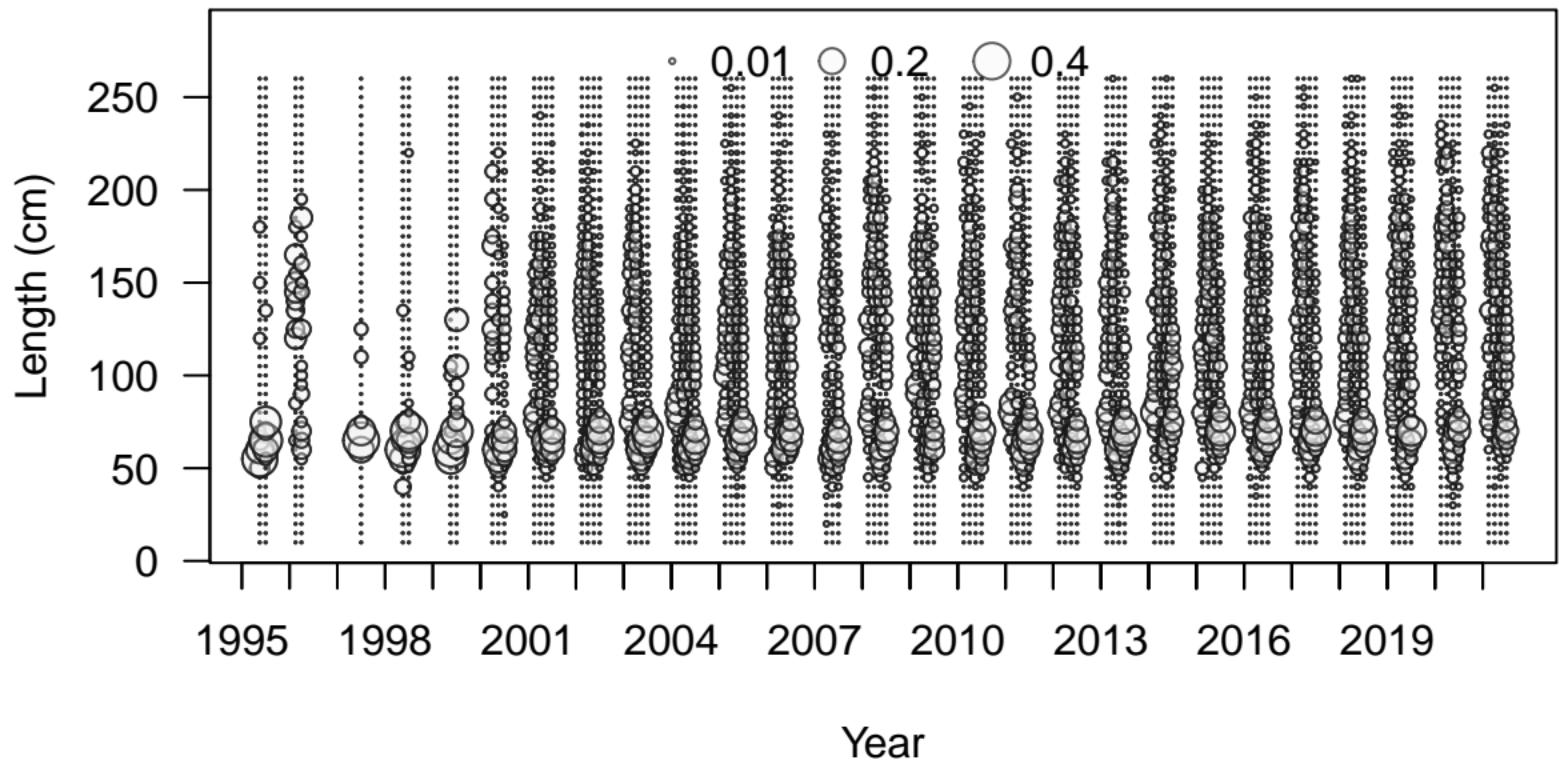


Proportion

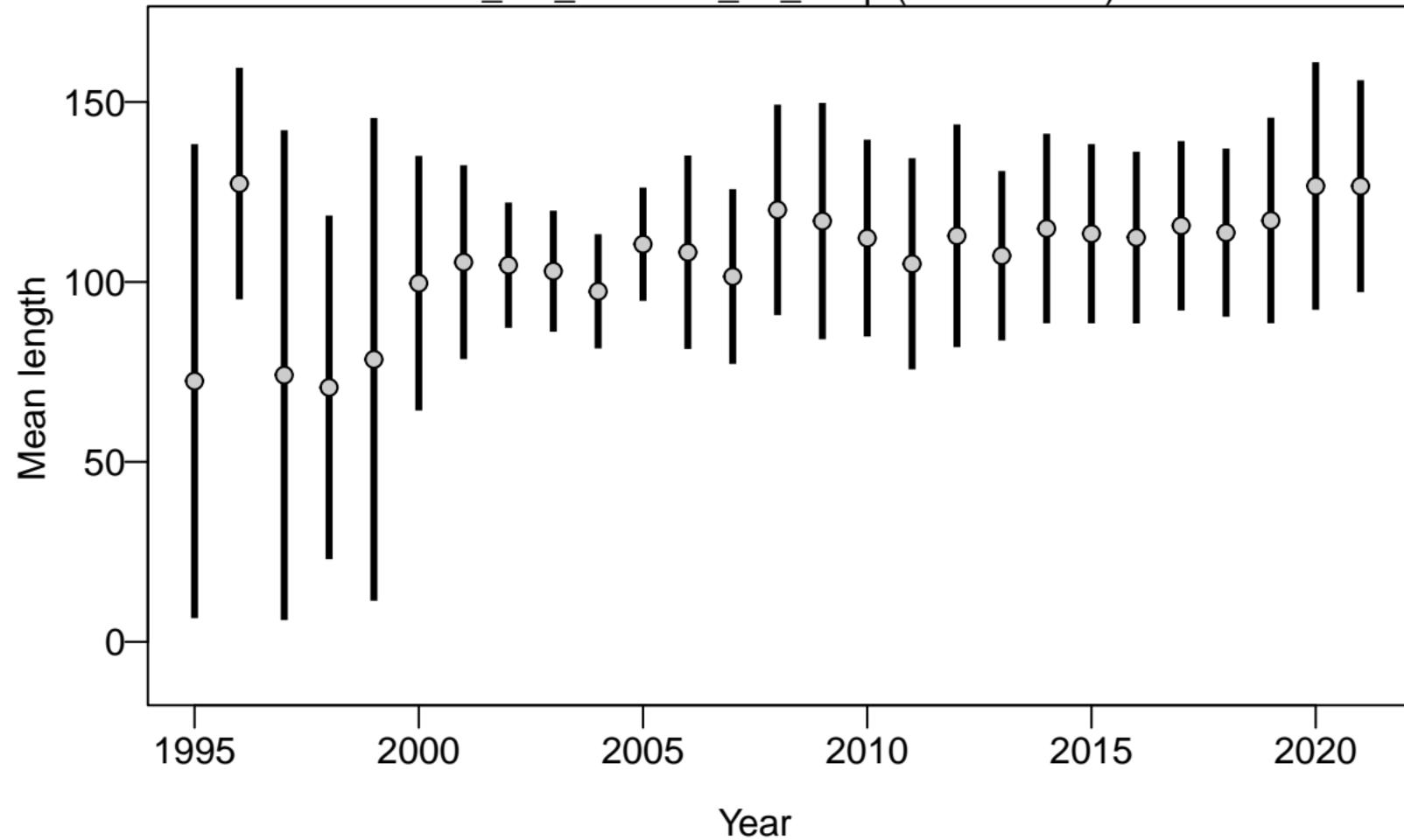


Proportion

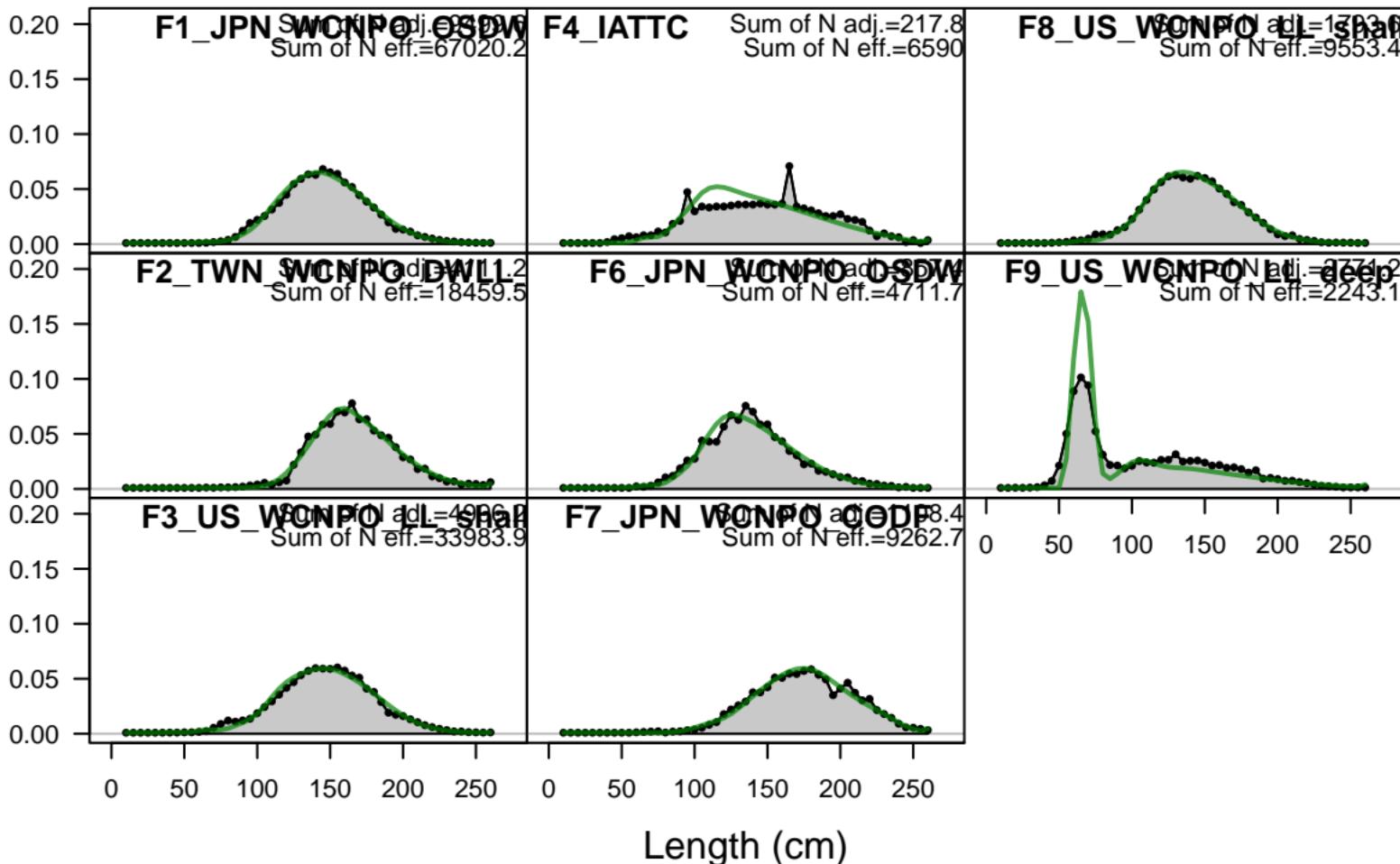


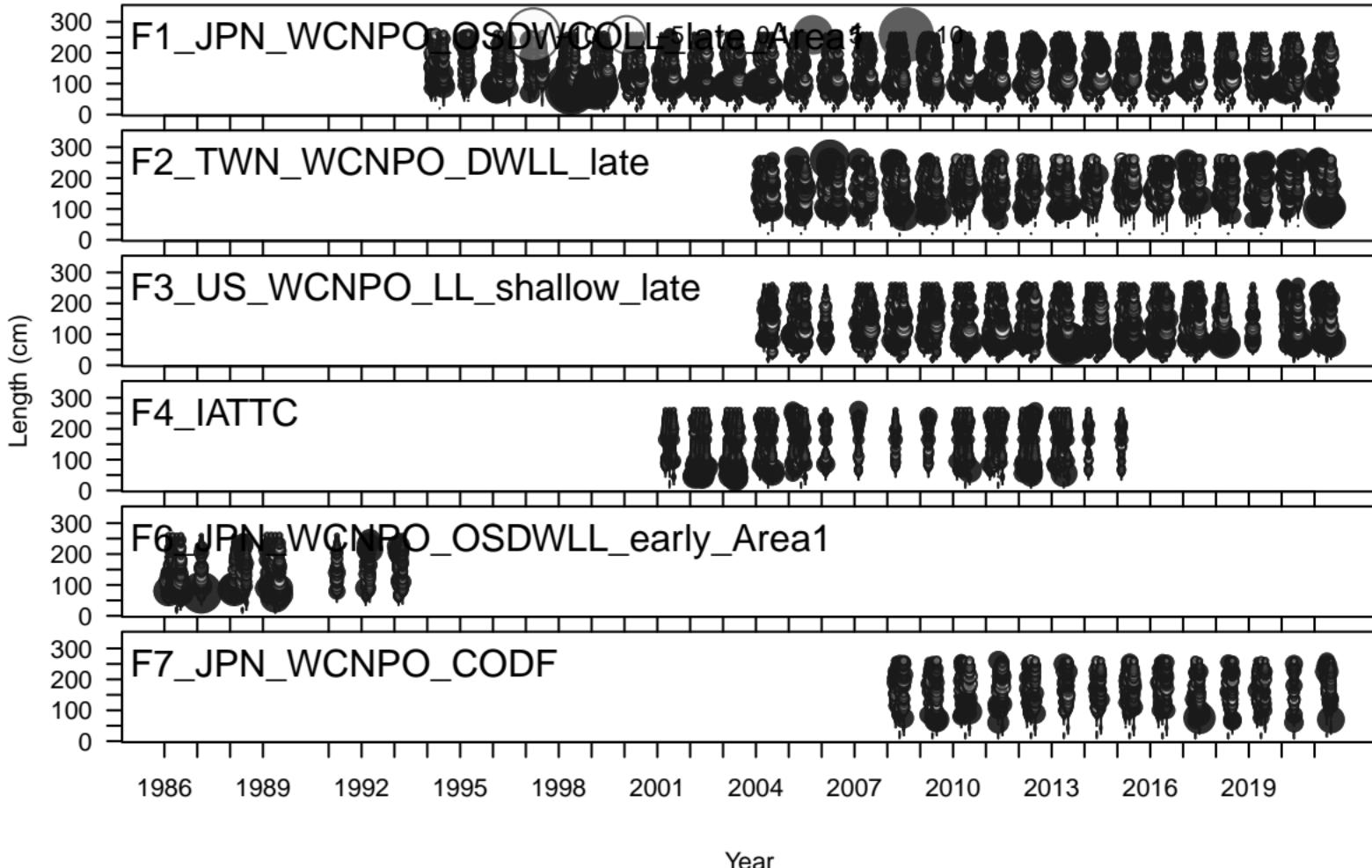


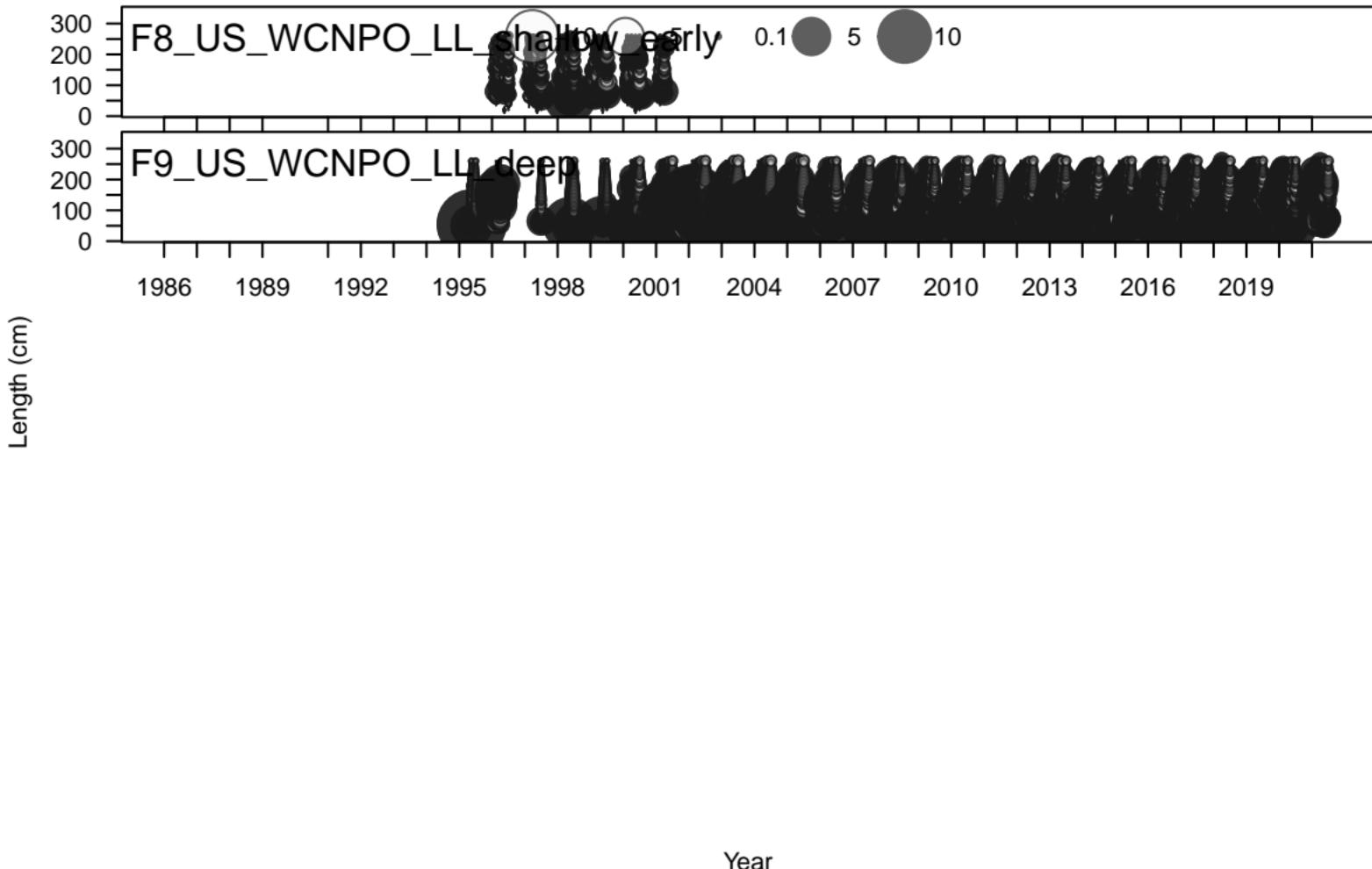
F9_US_WCNPO_LL_deep (whole catch)



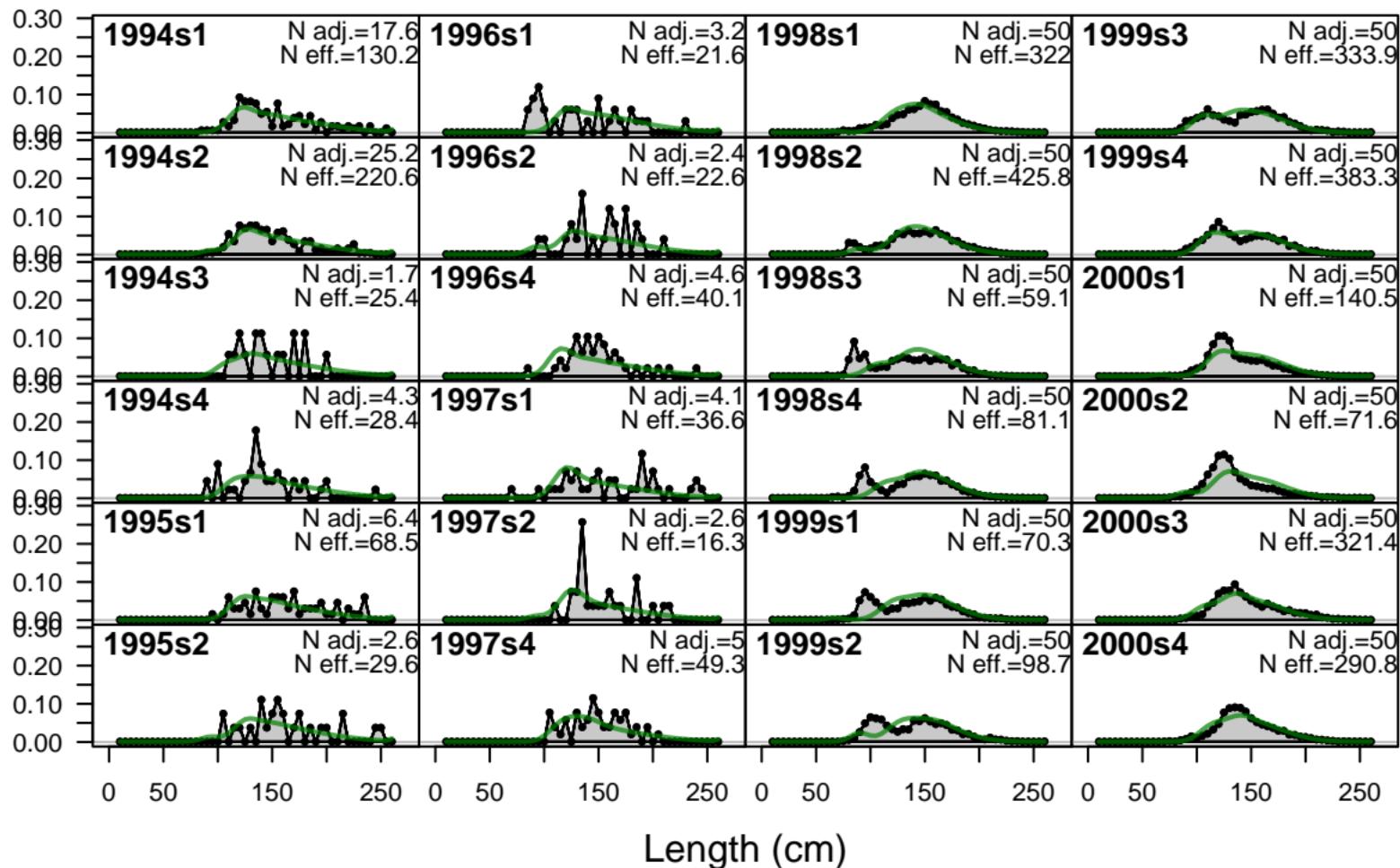
Proportion



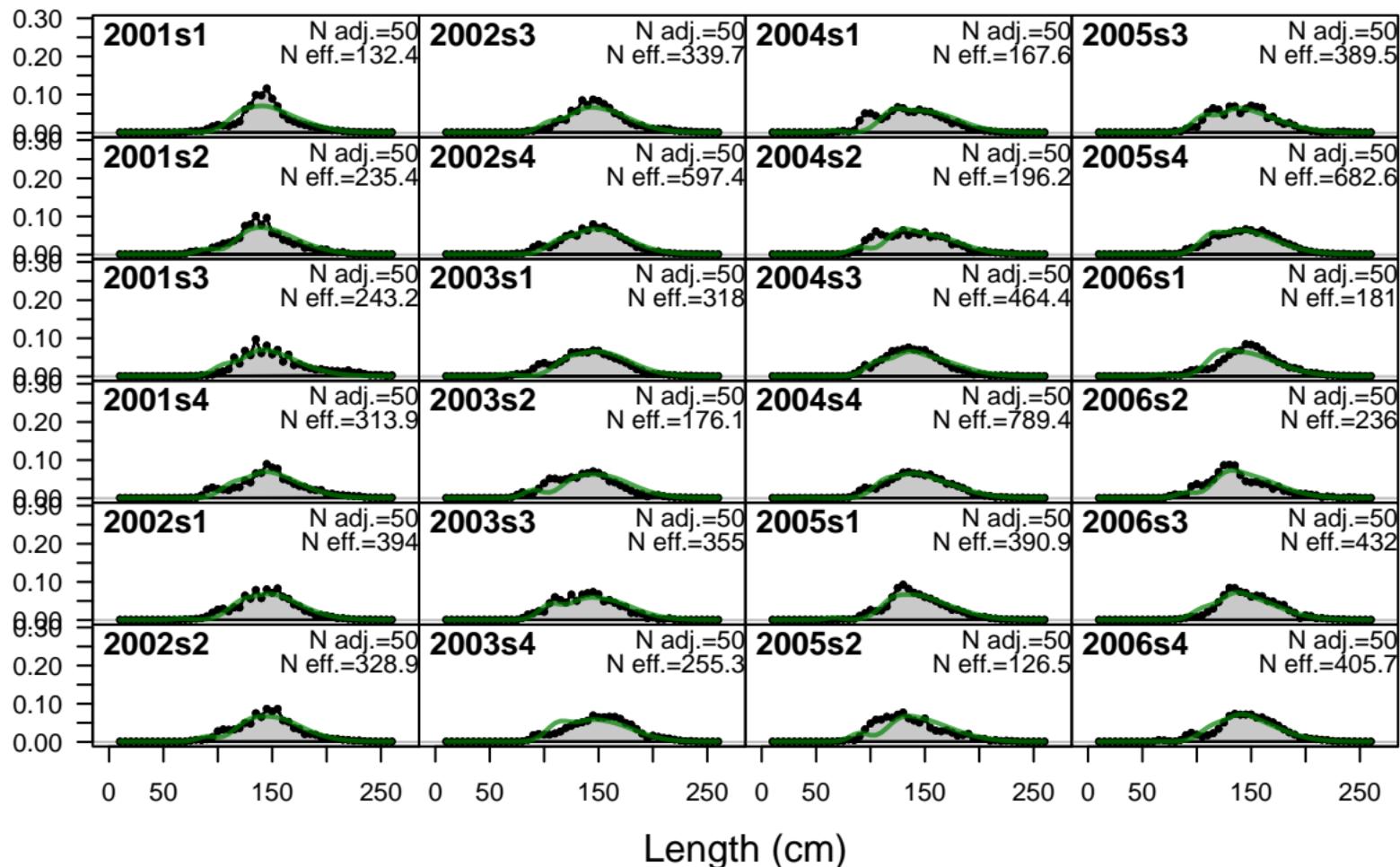




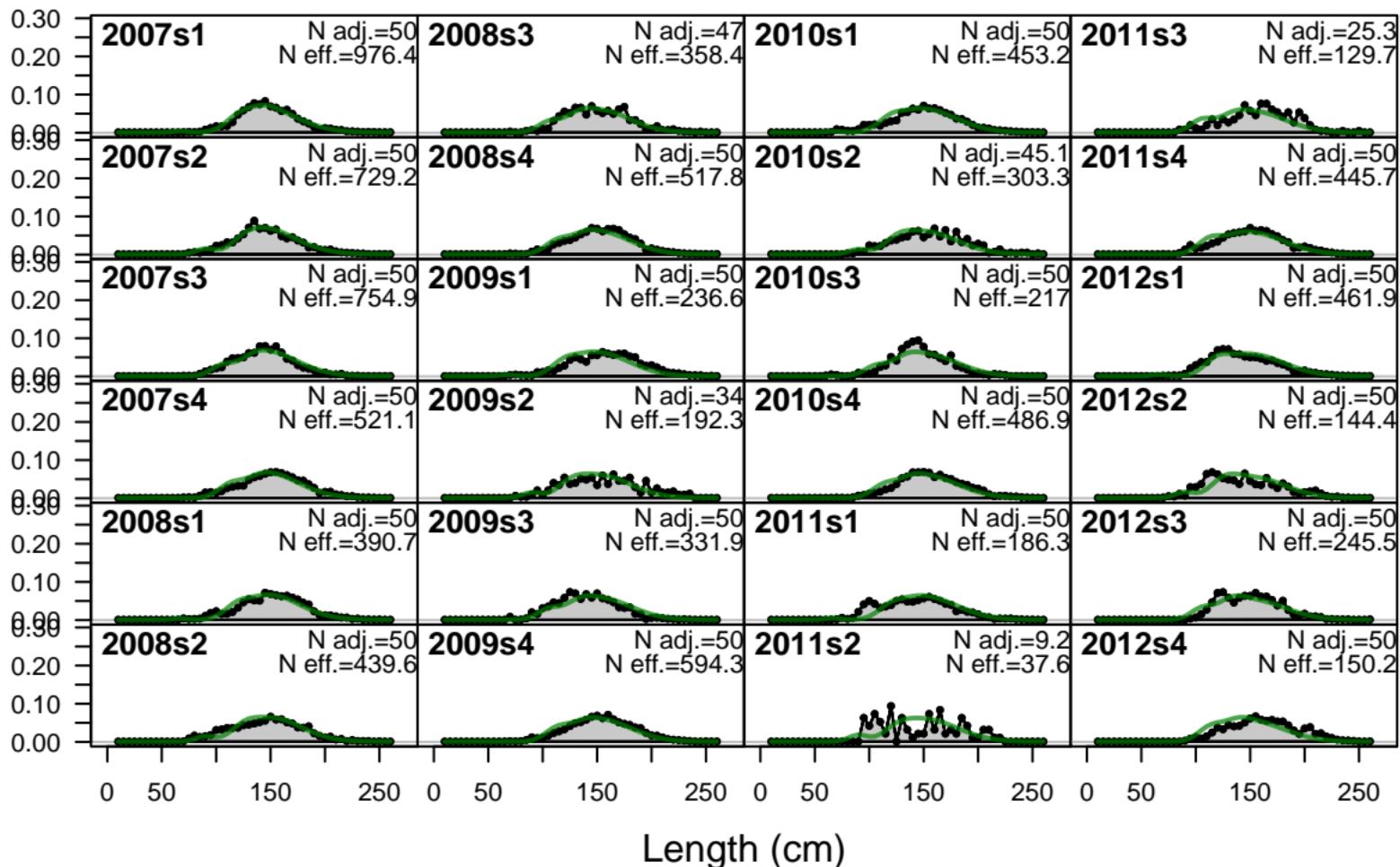
Proportion



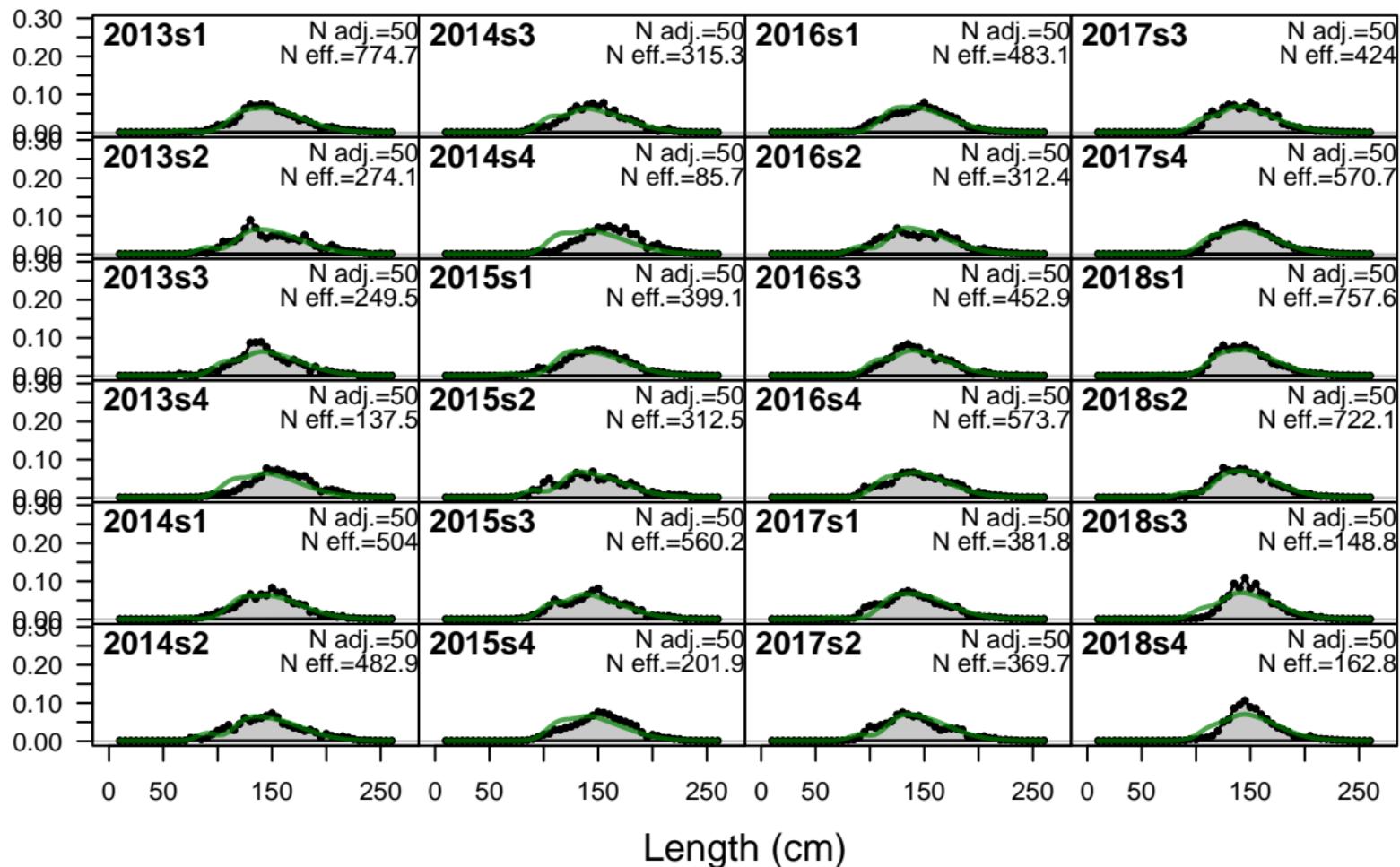
Proportion



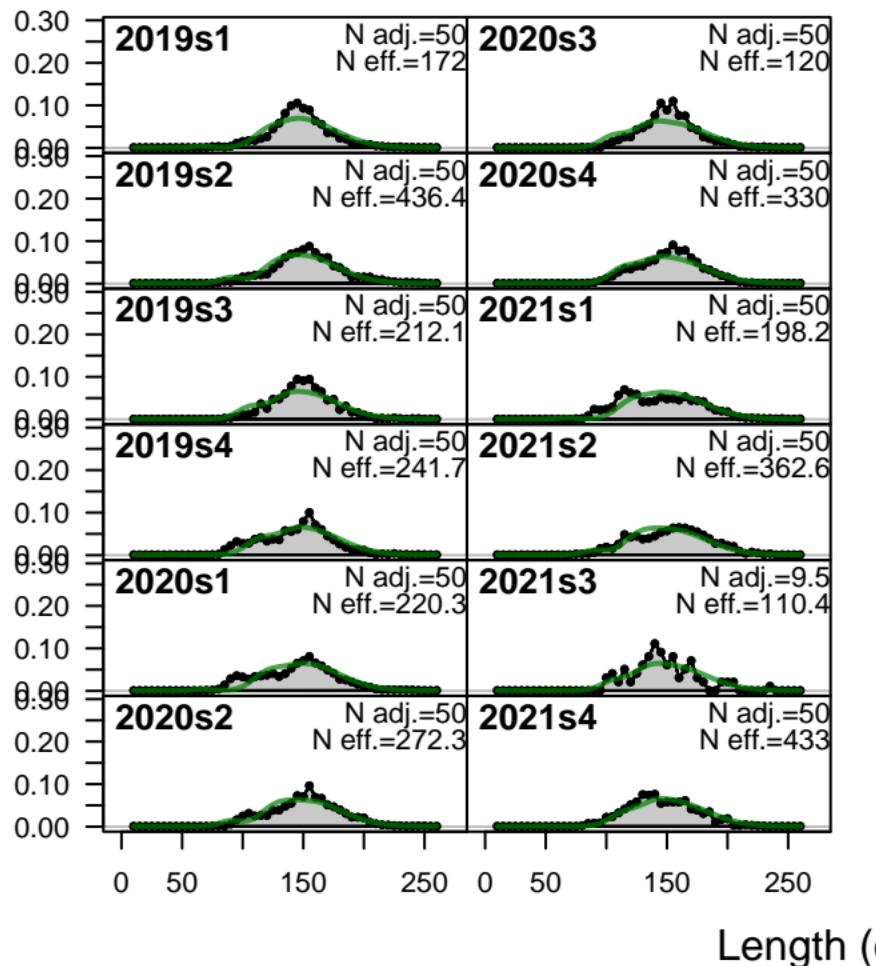
Proportion

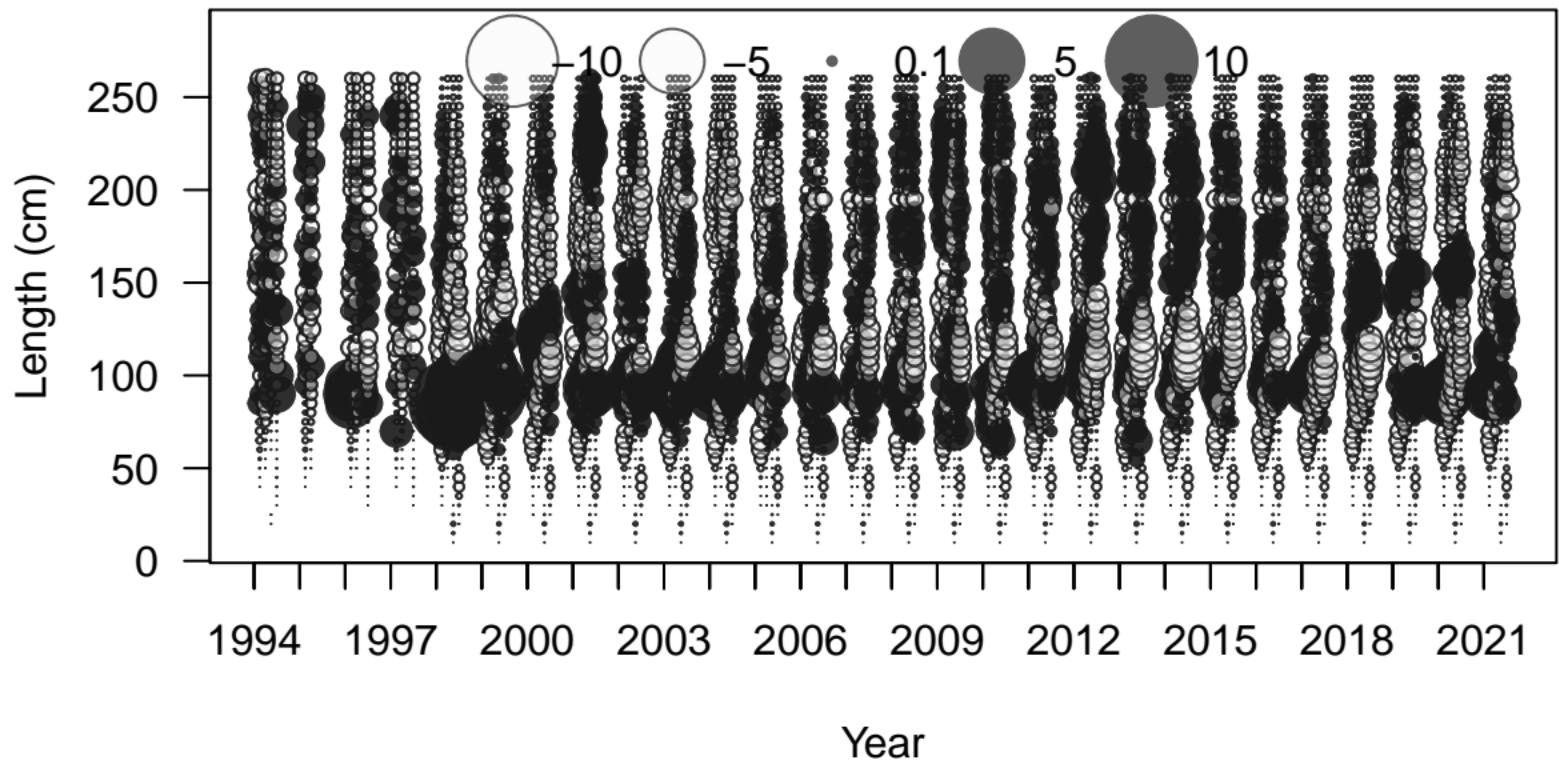


Proportion

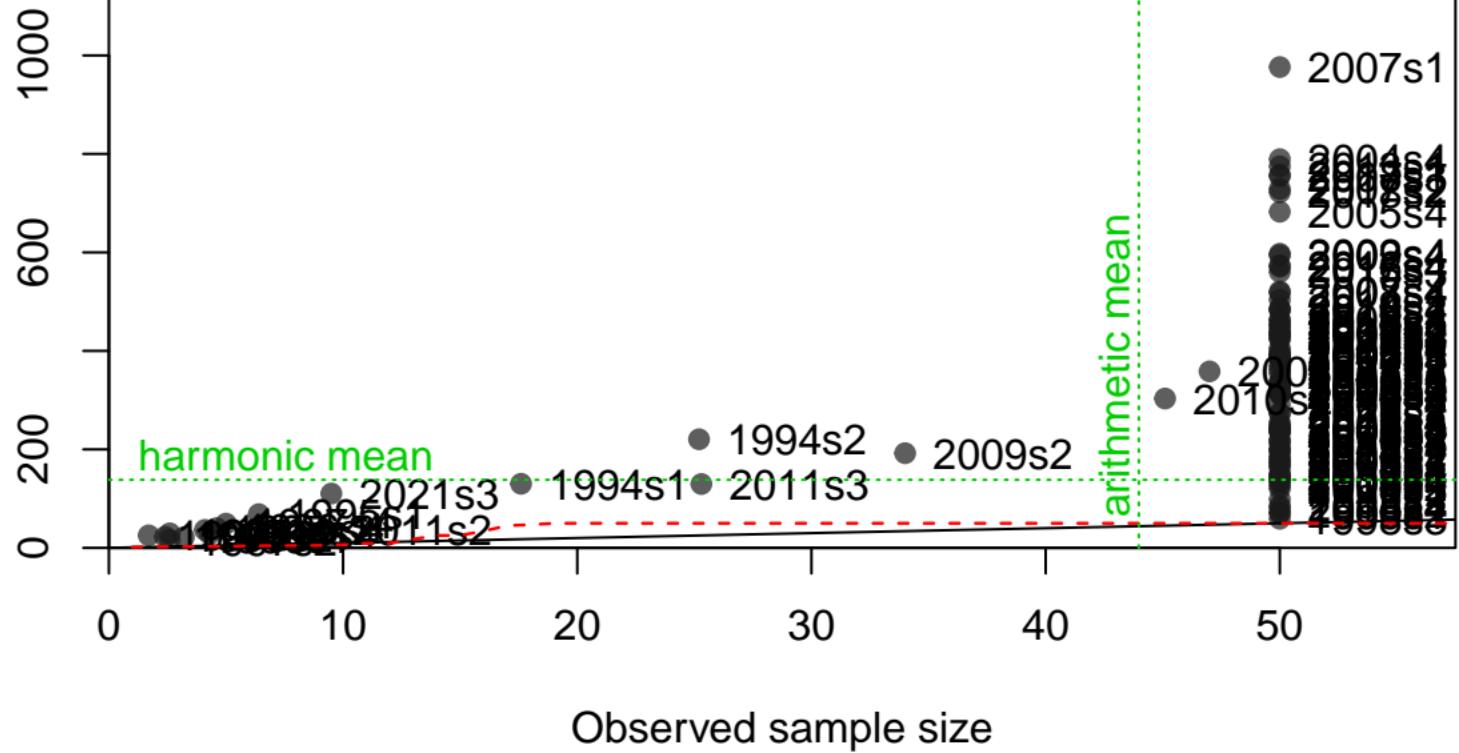


Proportion

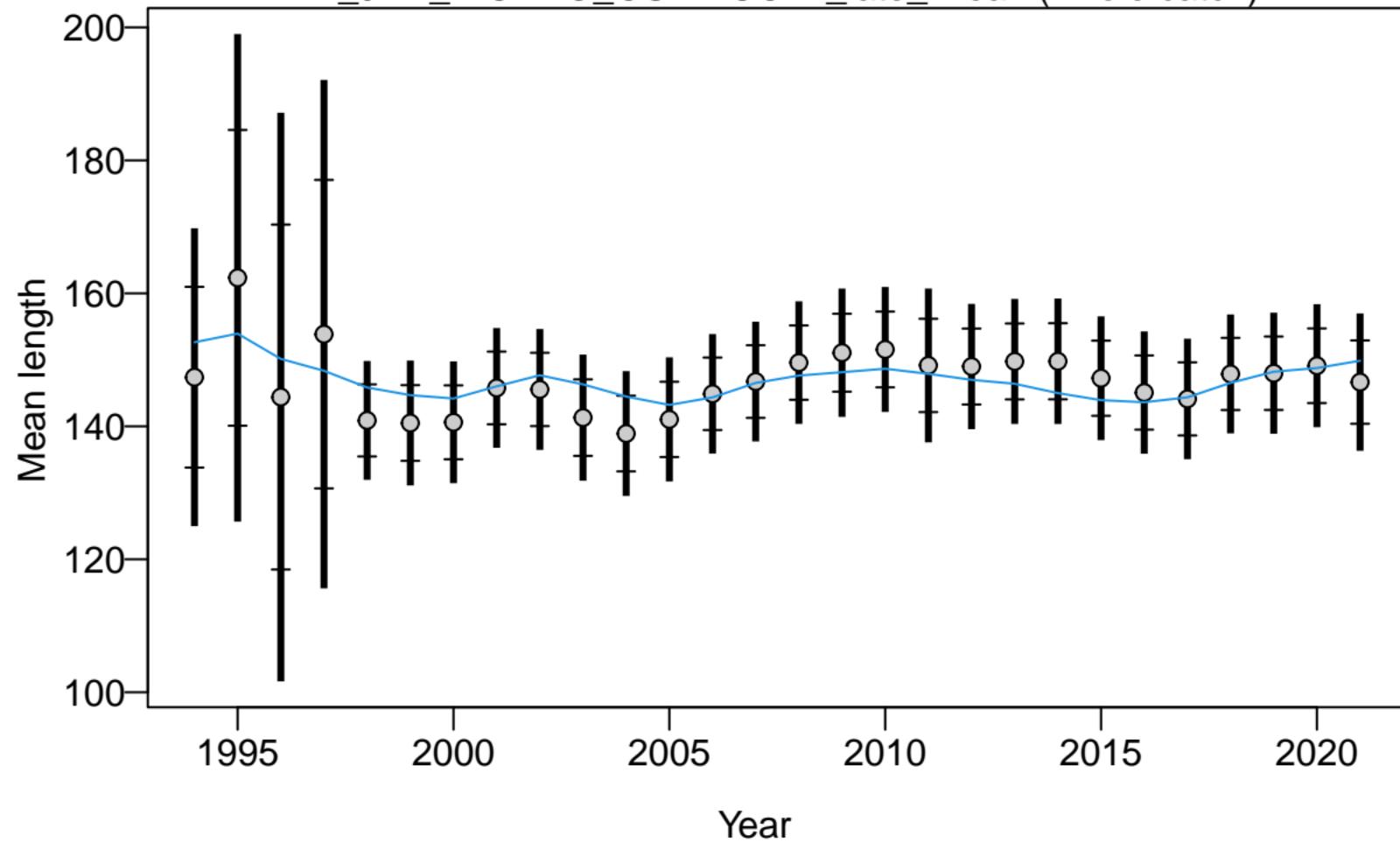




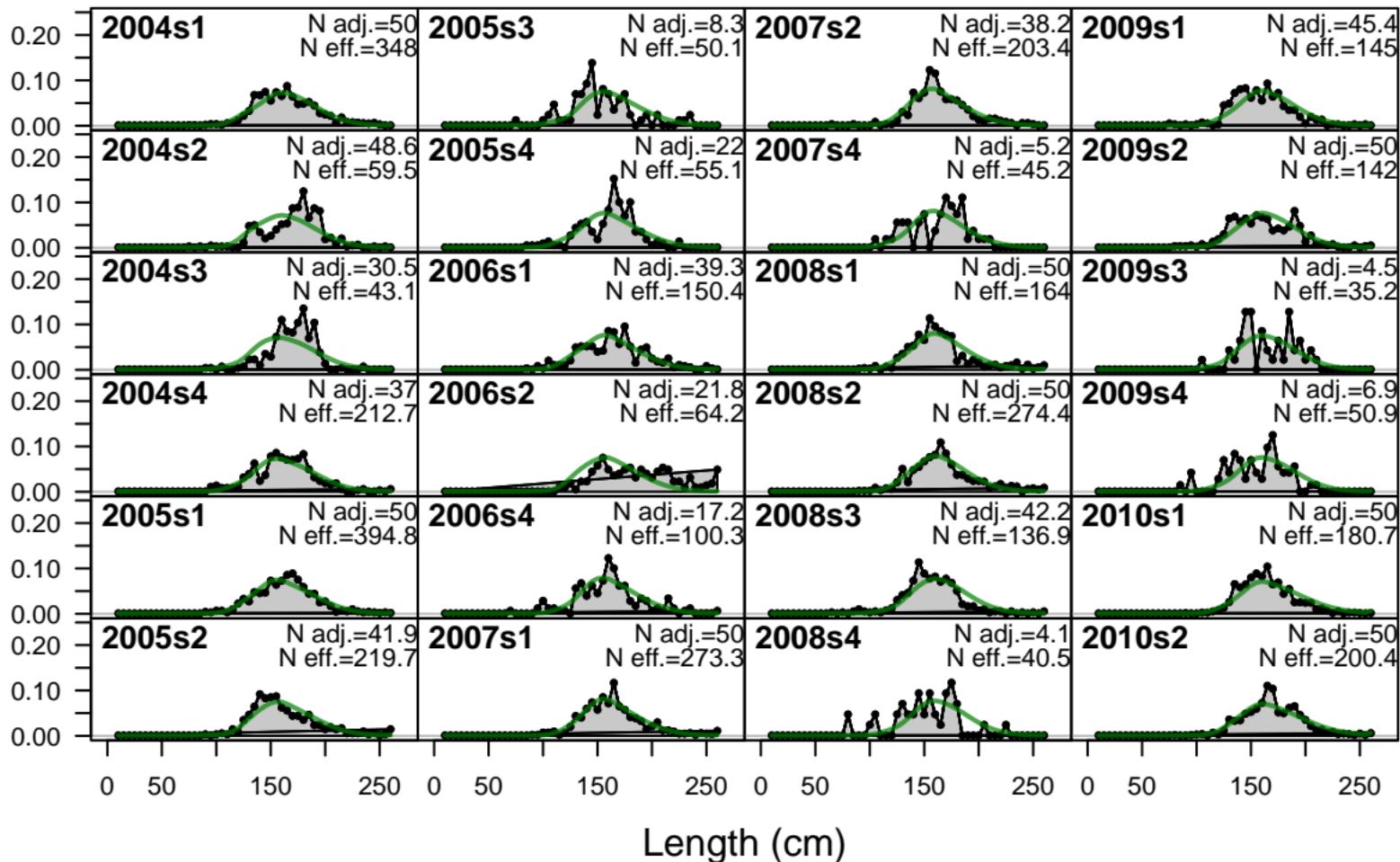
Effective sample size



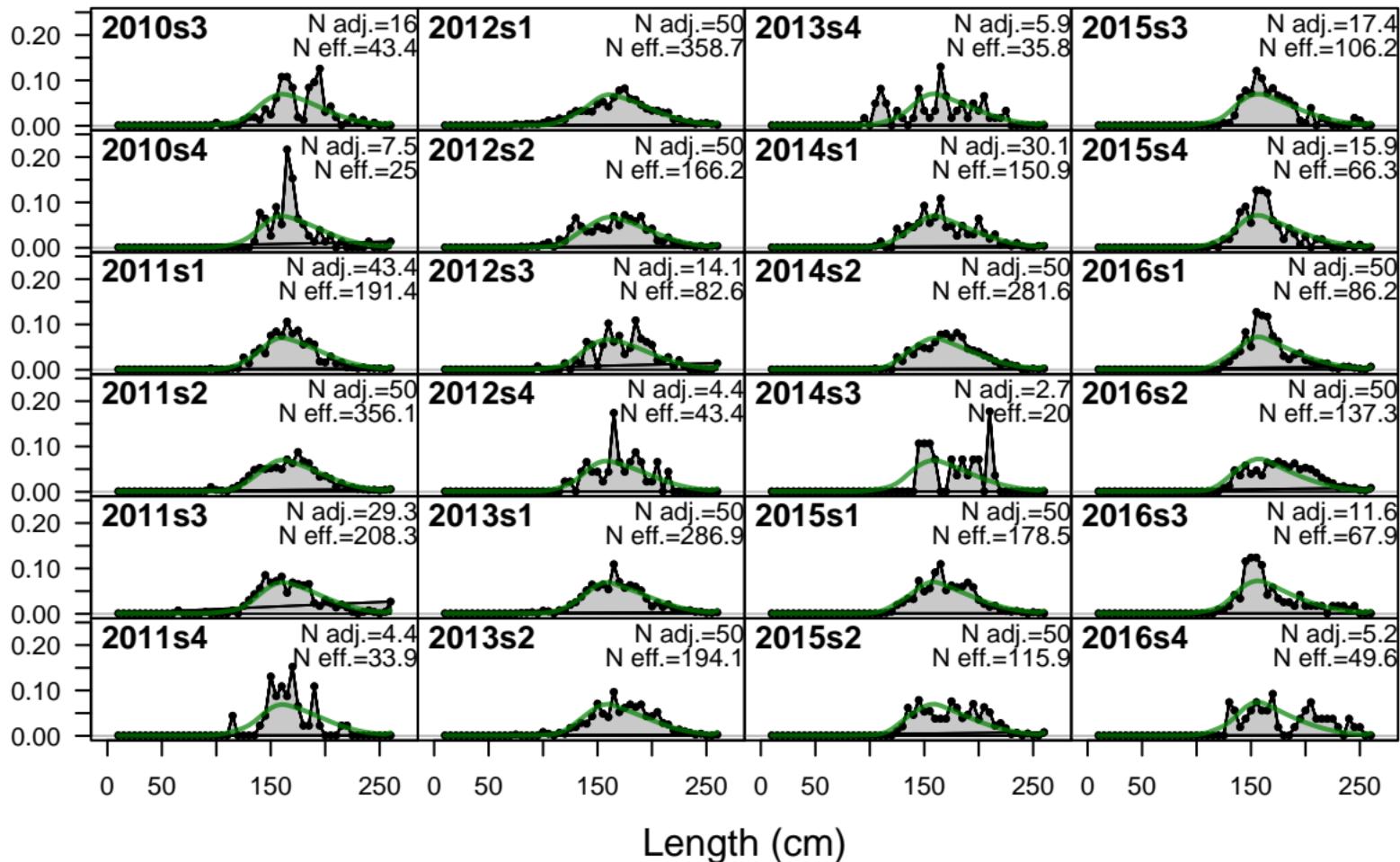
F1_JPN_WCNPO OSDWCOLL_late_Area1 (whole catch)



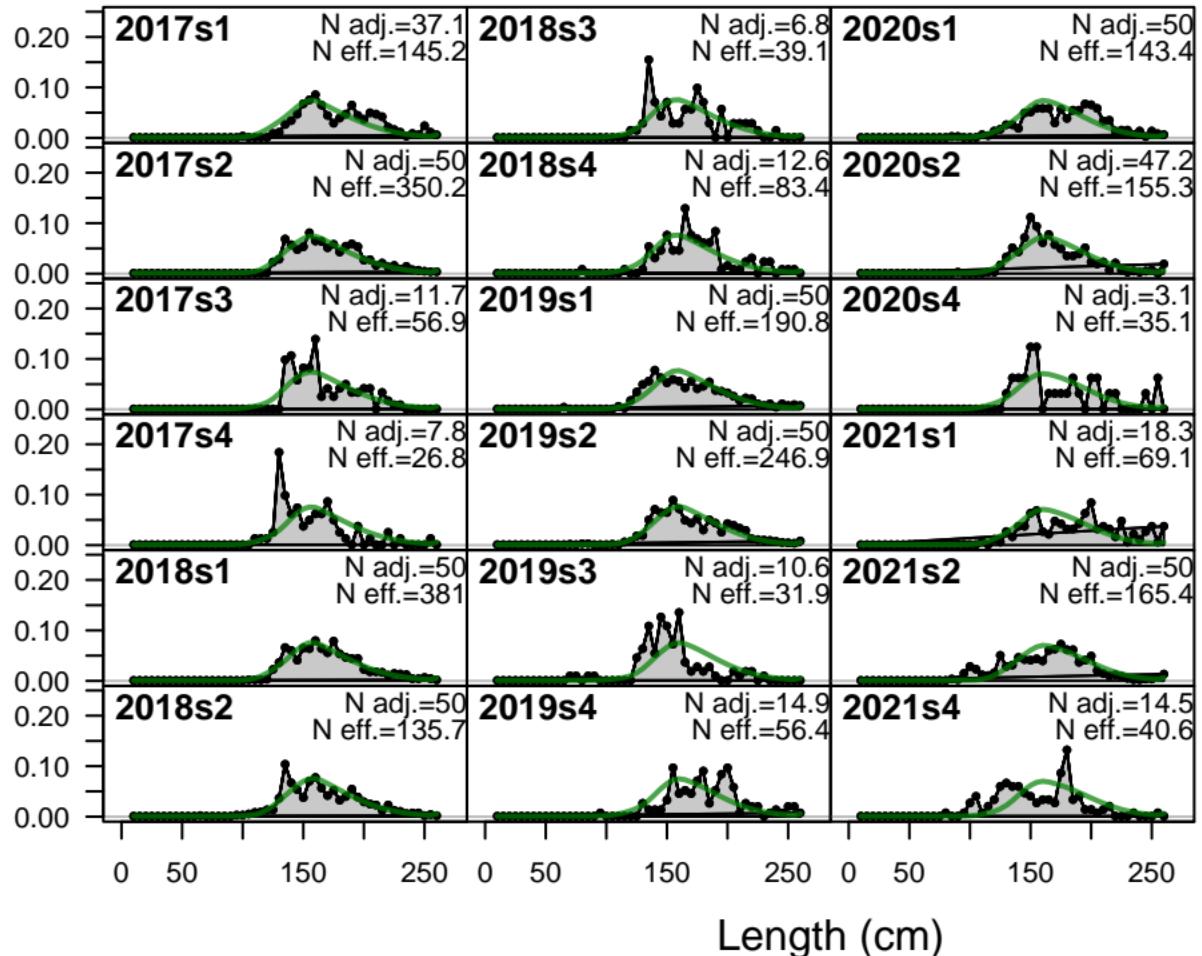
Proportion

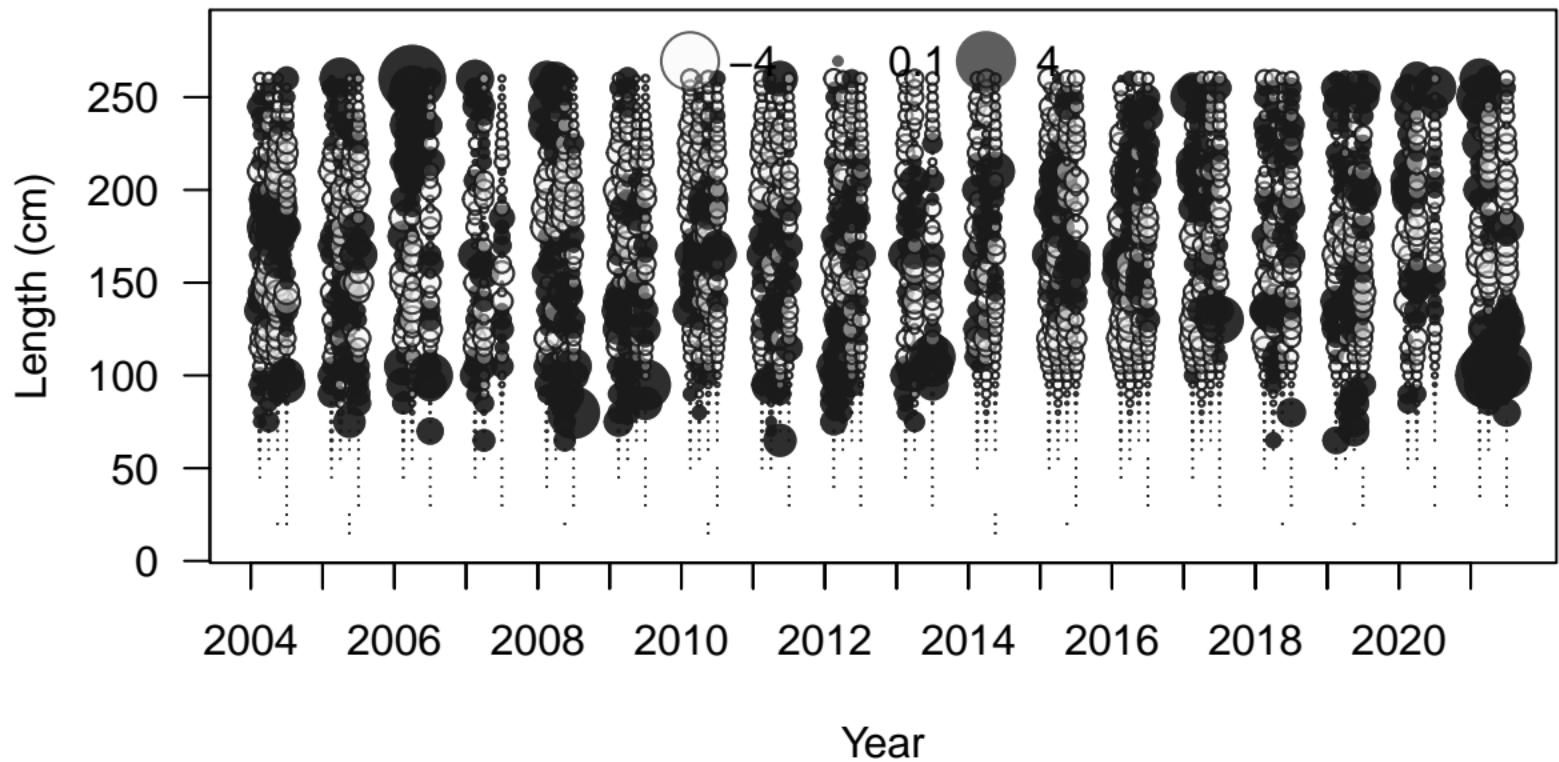


Proportion

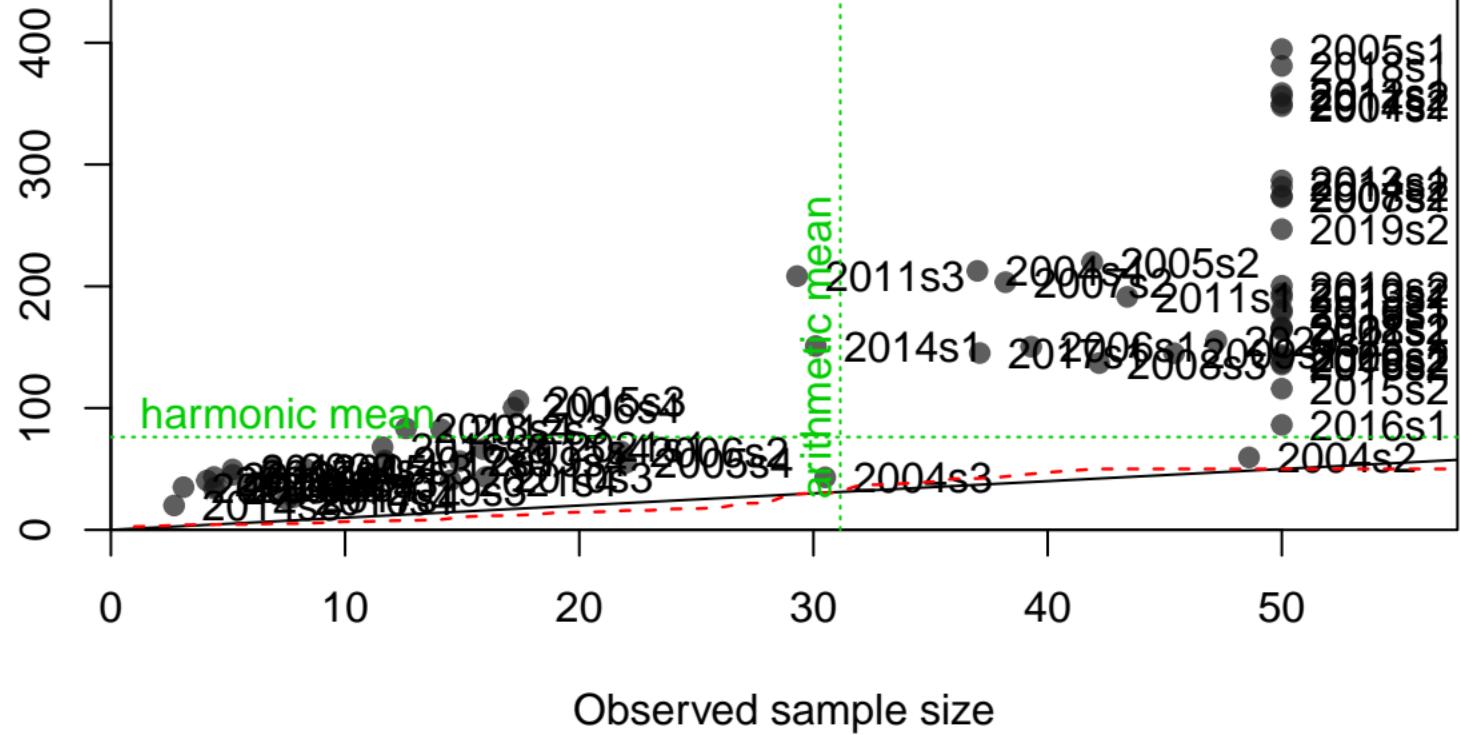


Proportion

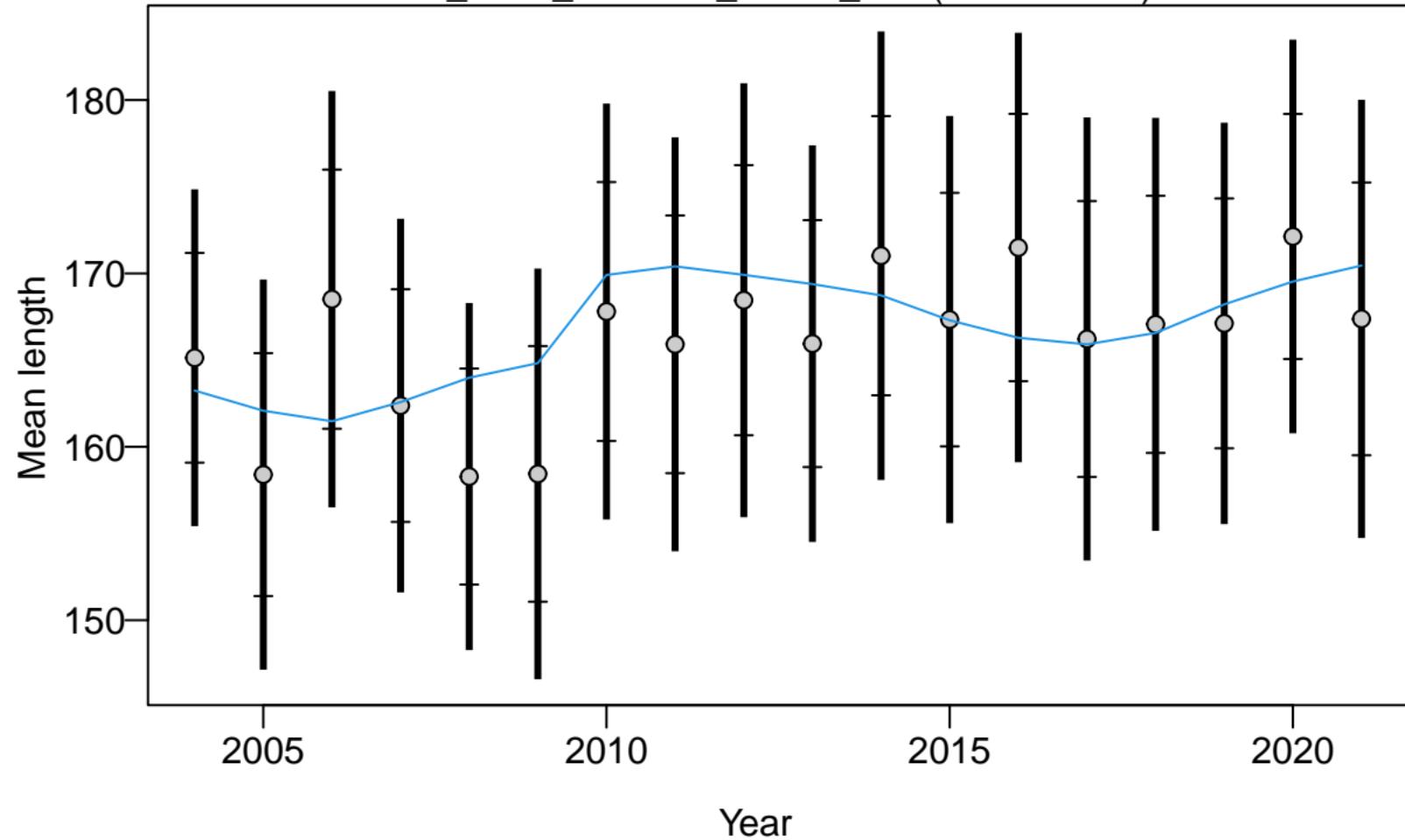




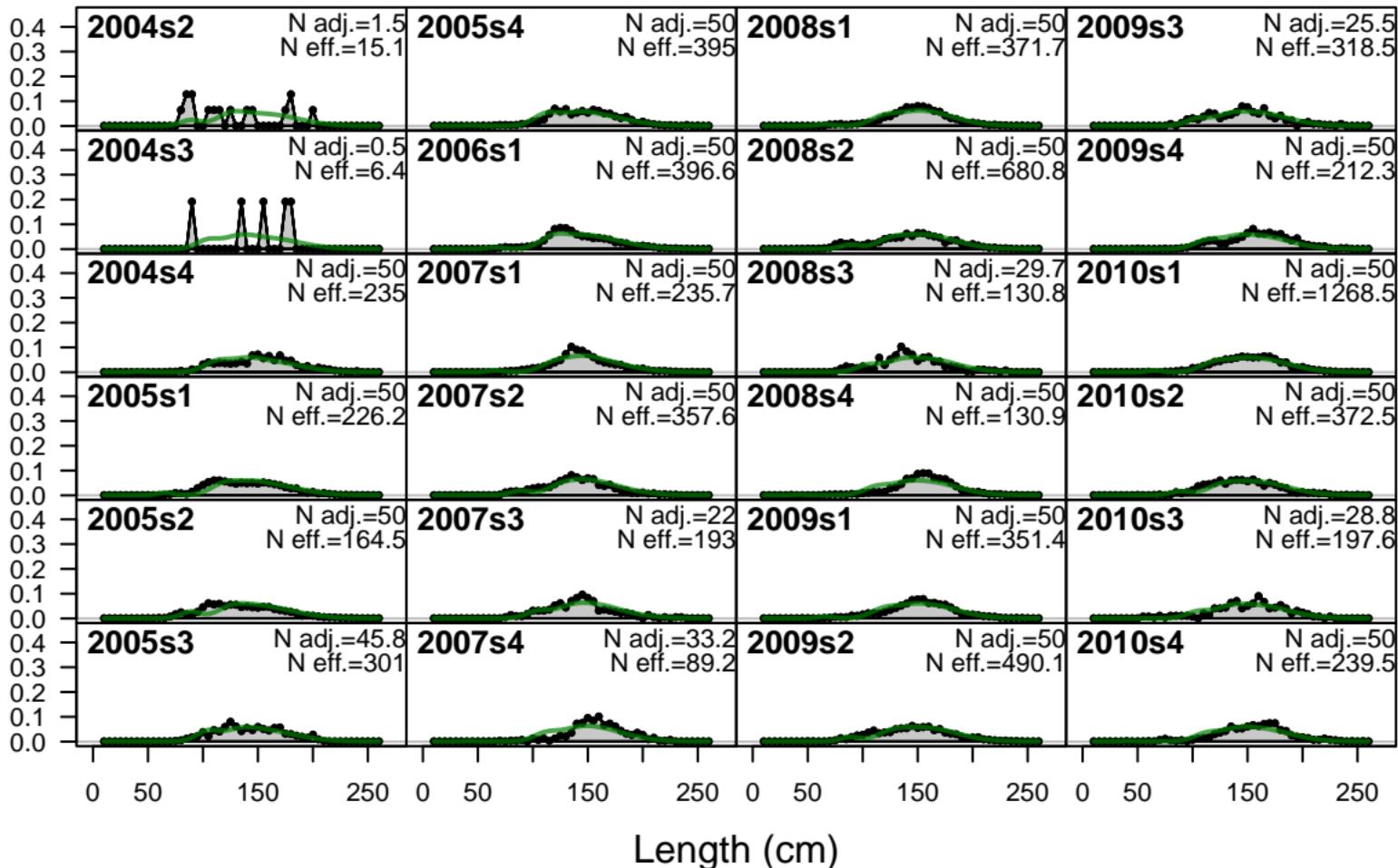
Effective sample size



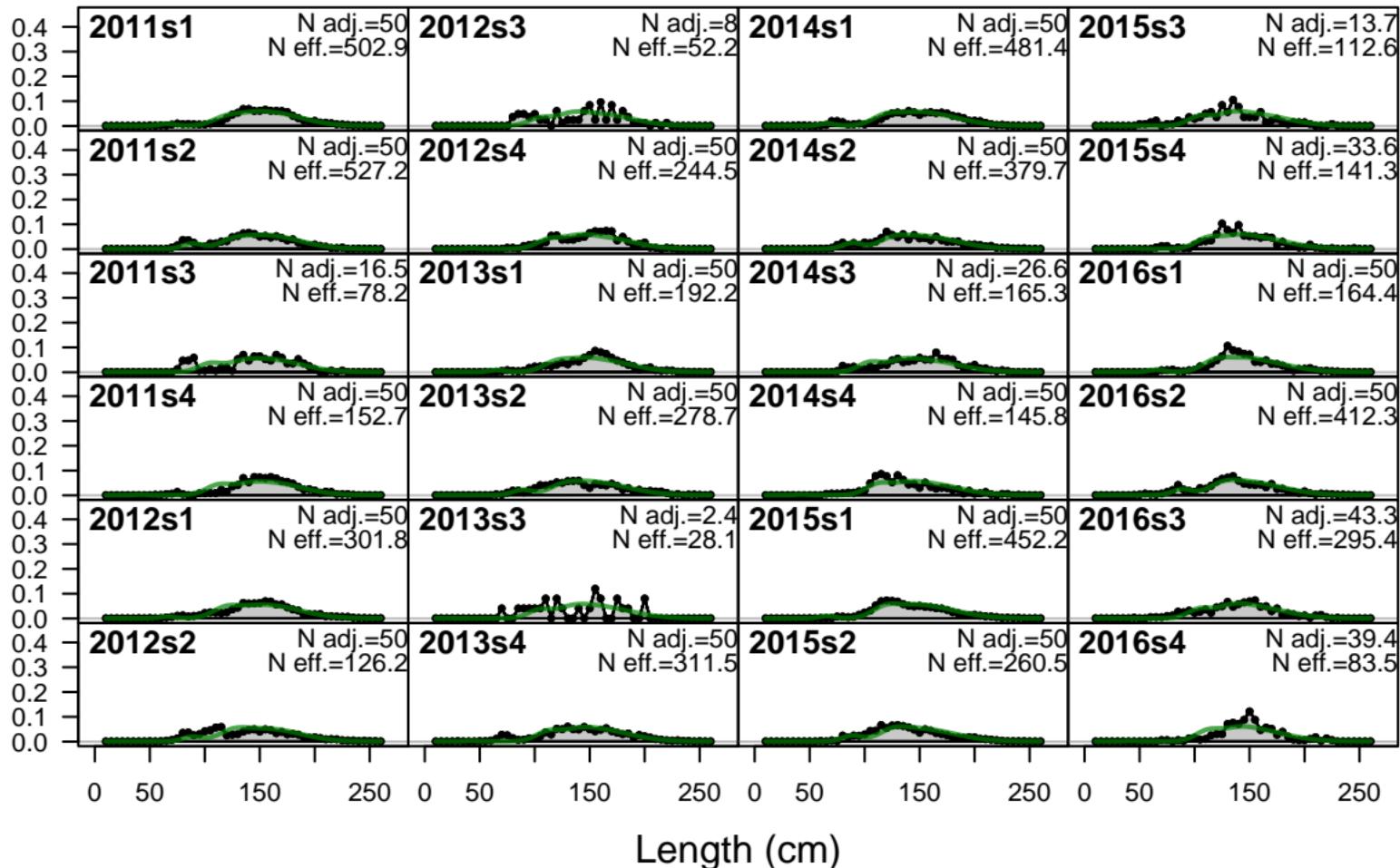
F2_TWN_WCNPO_DWLL_late (whole catch)



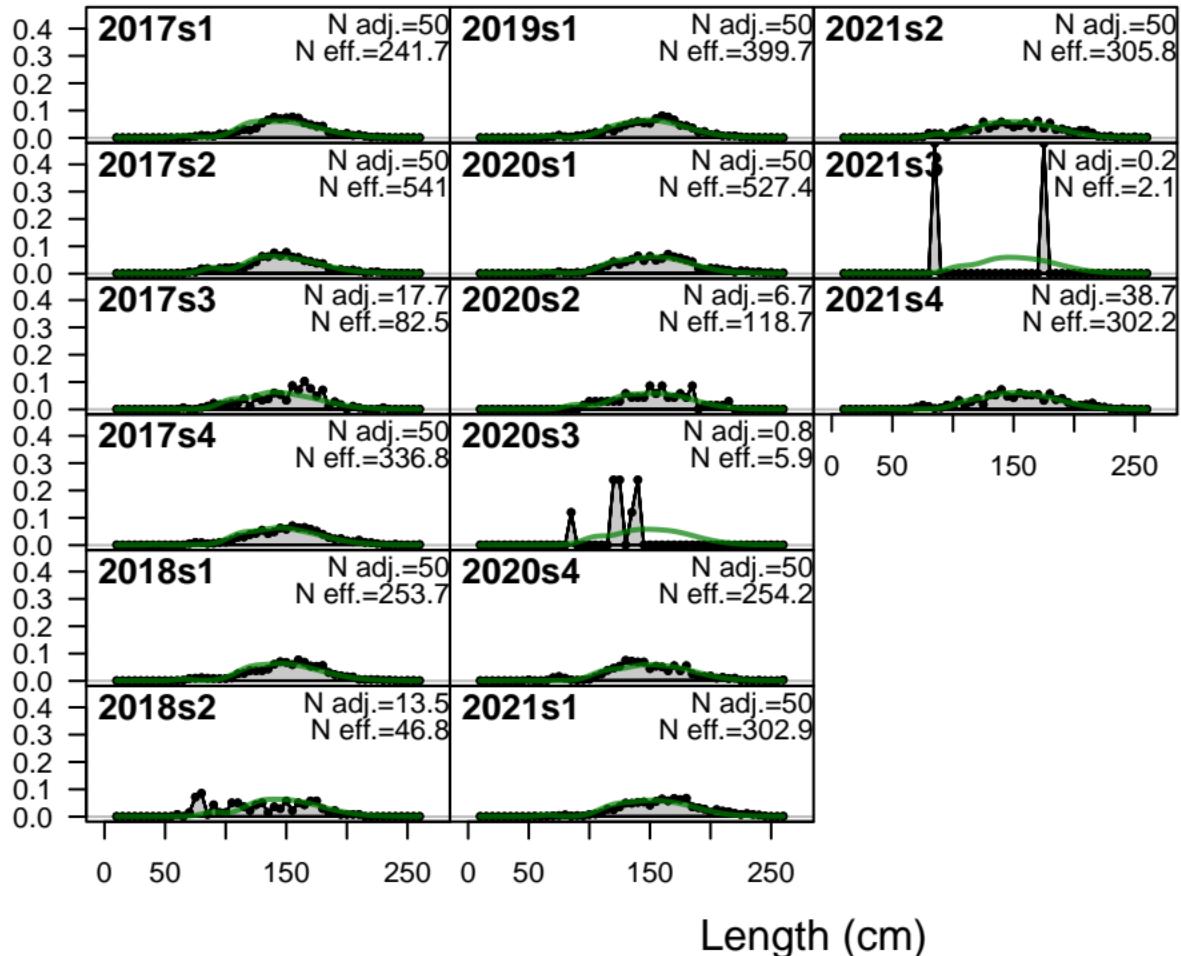
Proportion

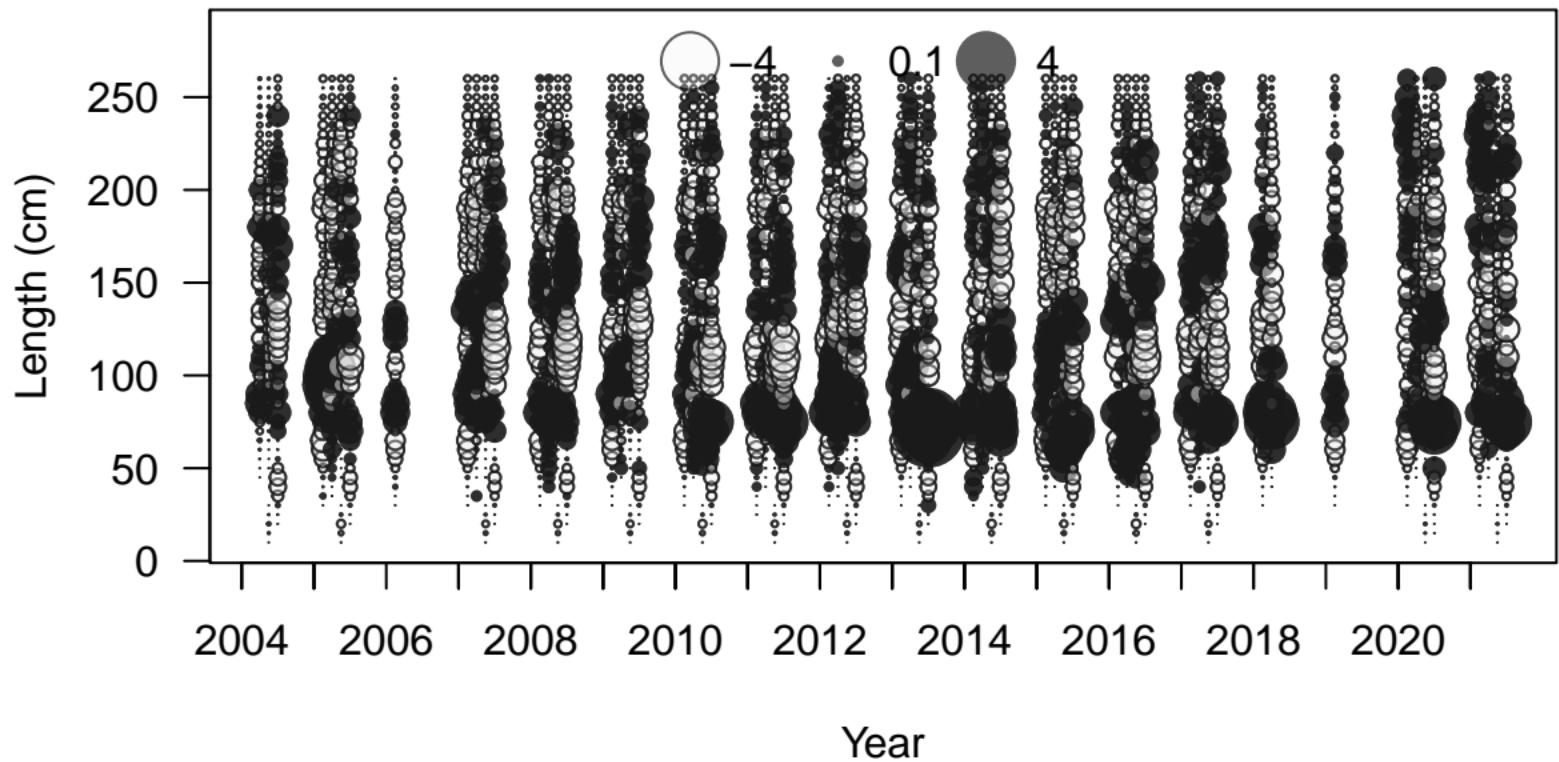


Proportion

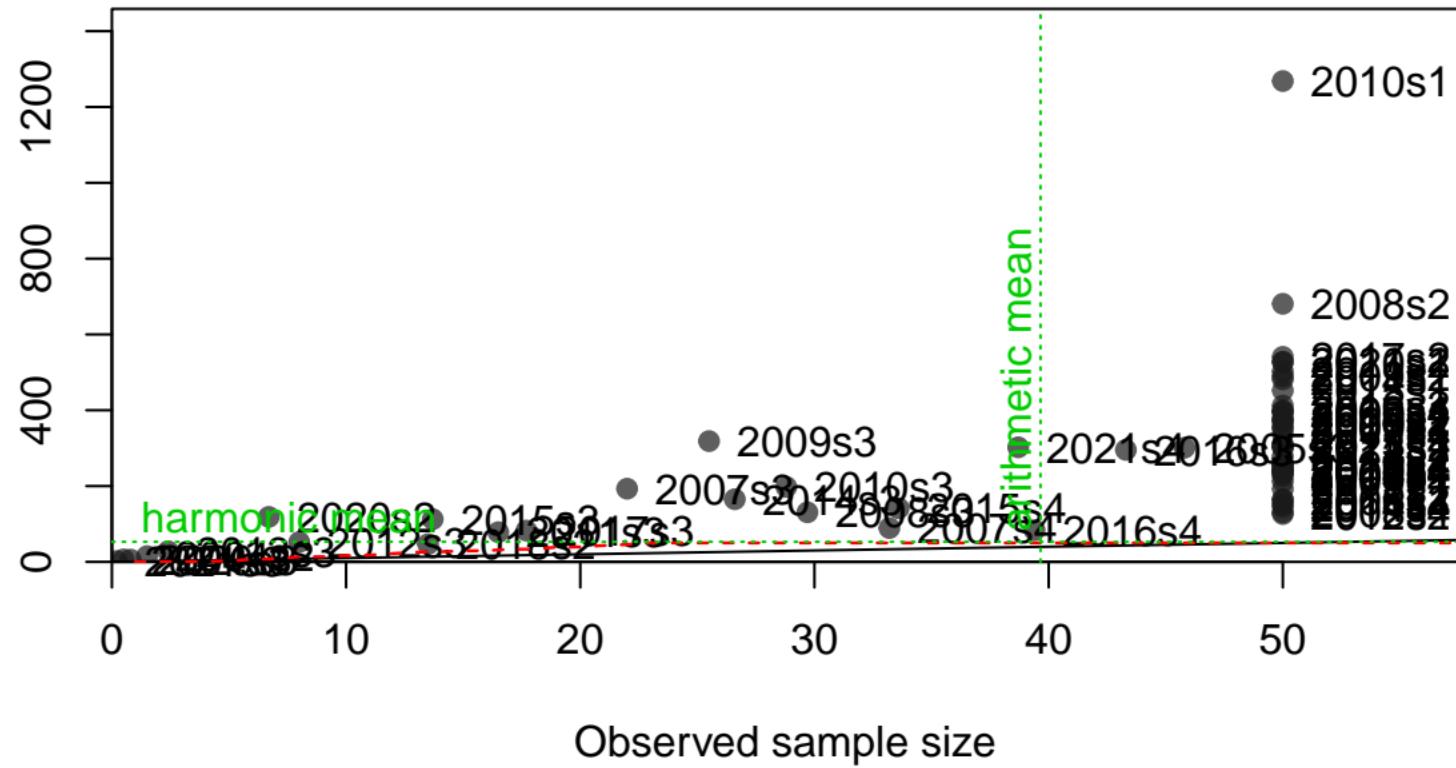


Proportion

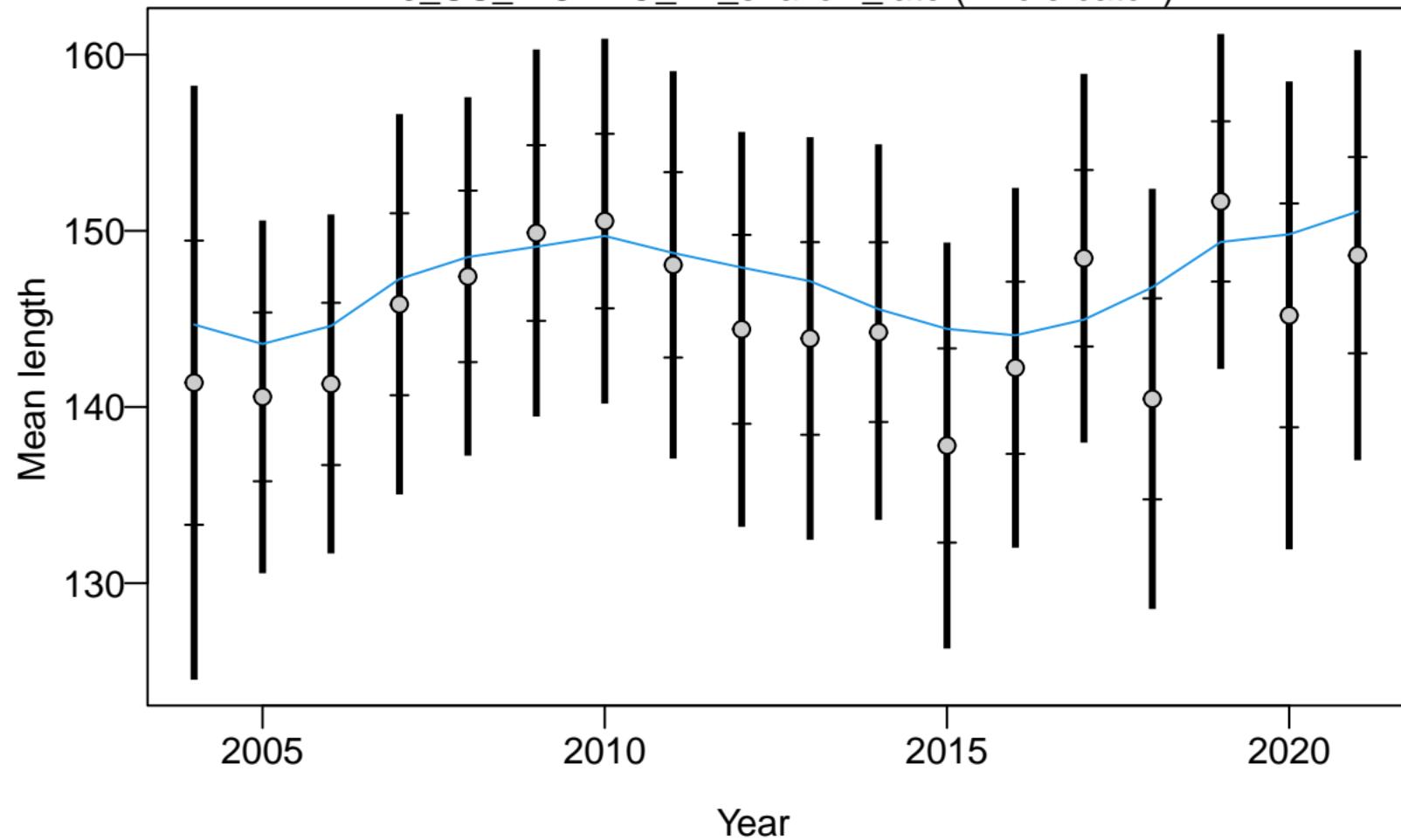




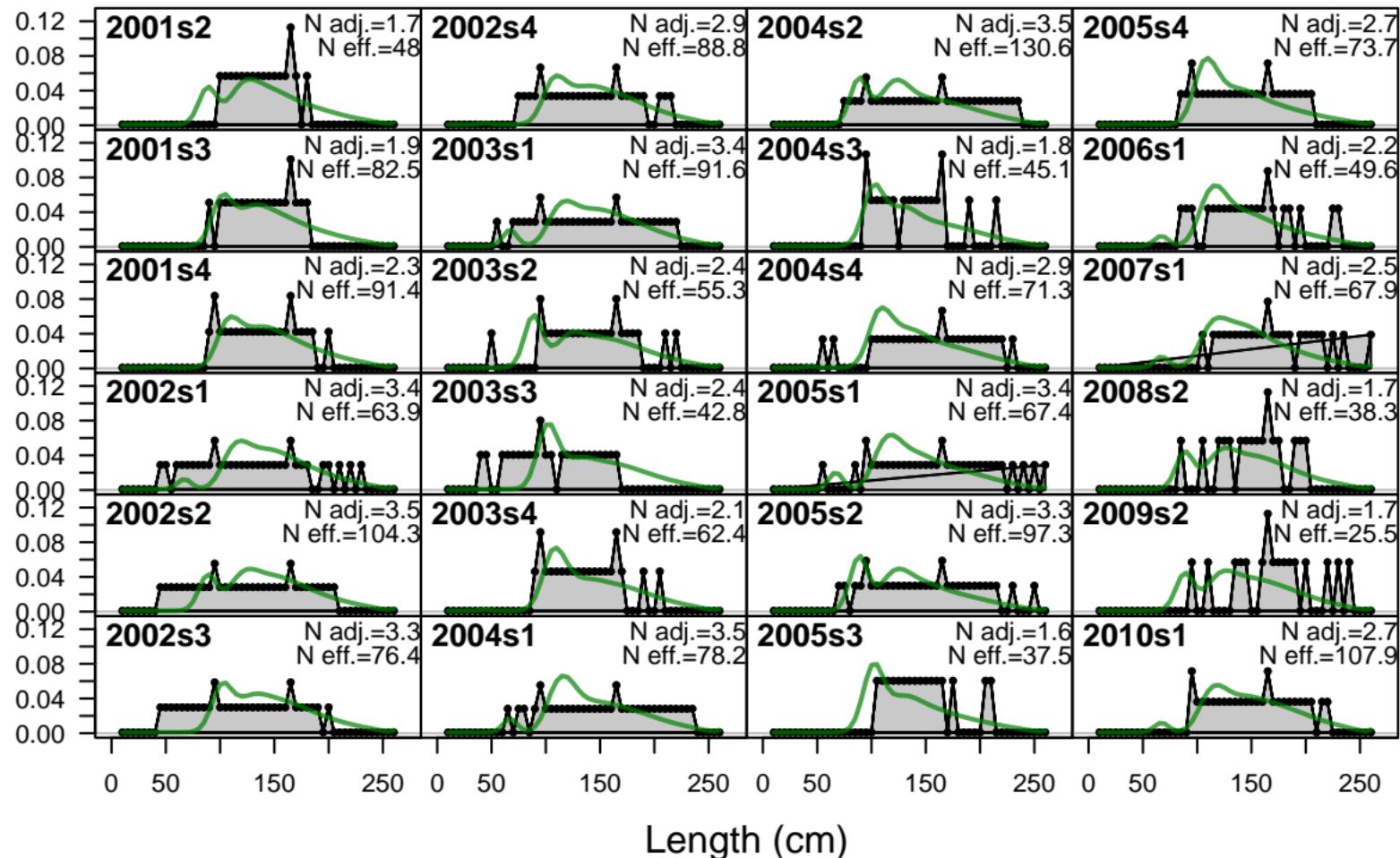
Effective sample size



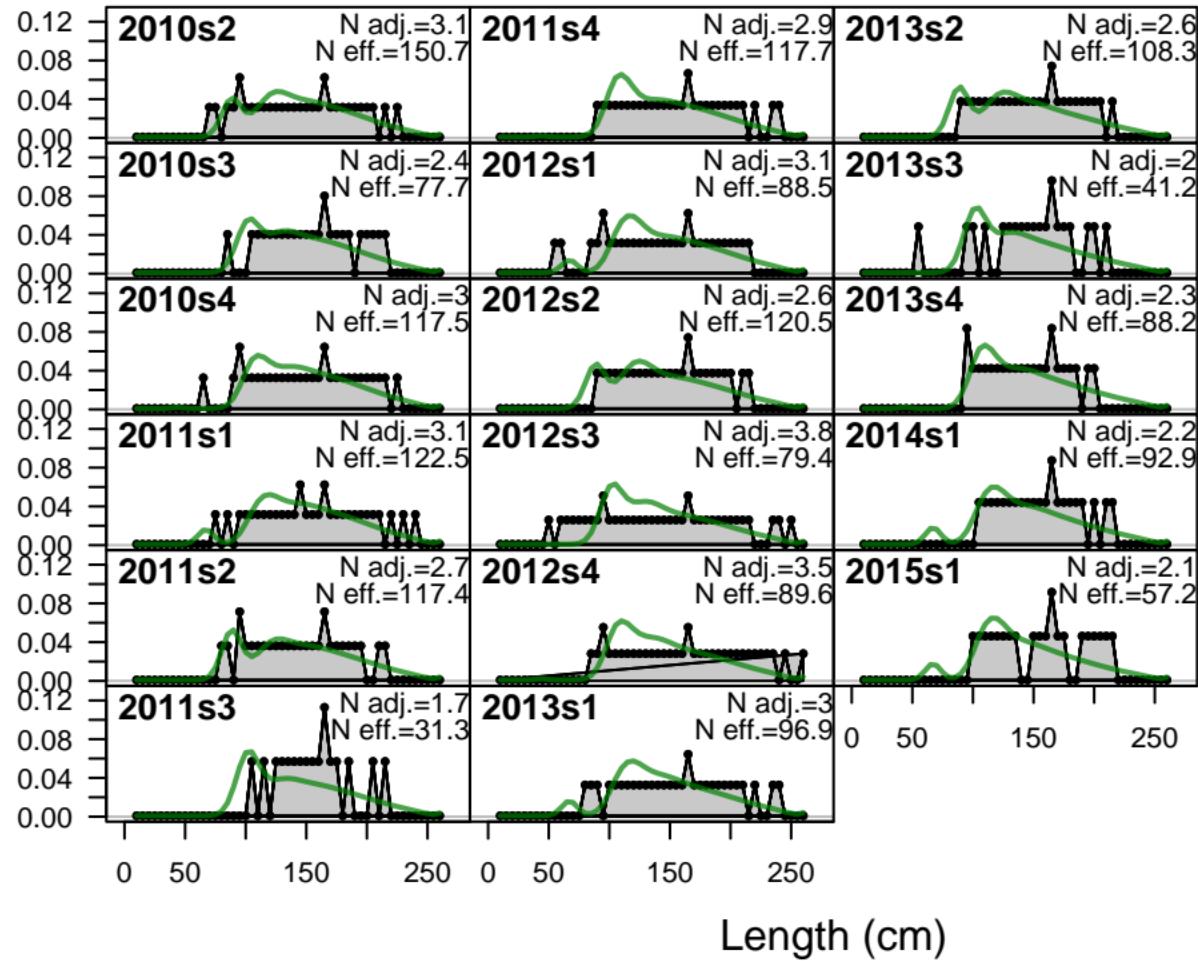
F3_US_WCNPO_LL_shallow_late (whole catch)

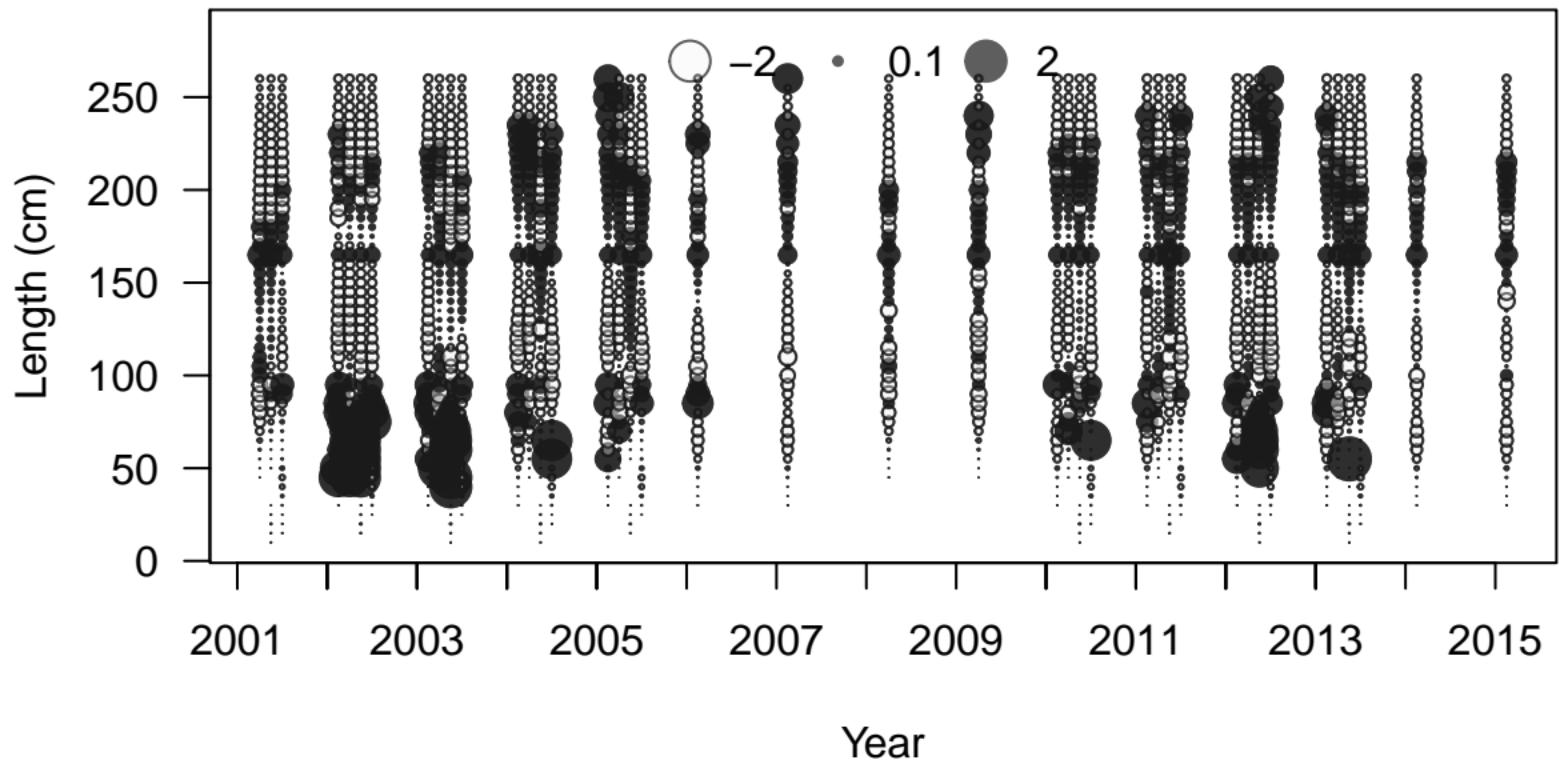


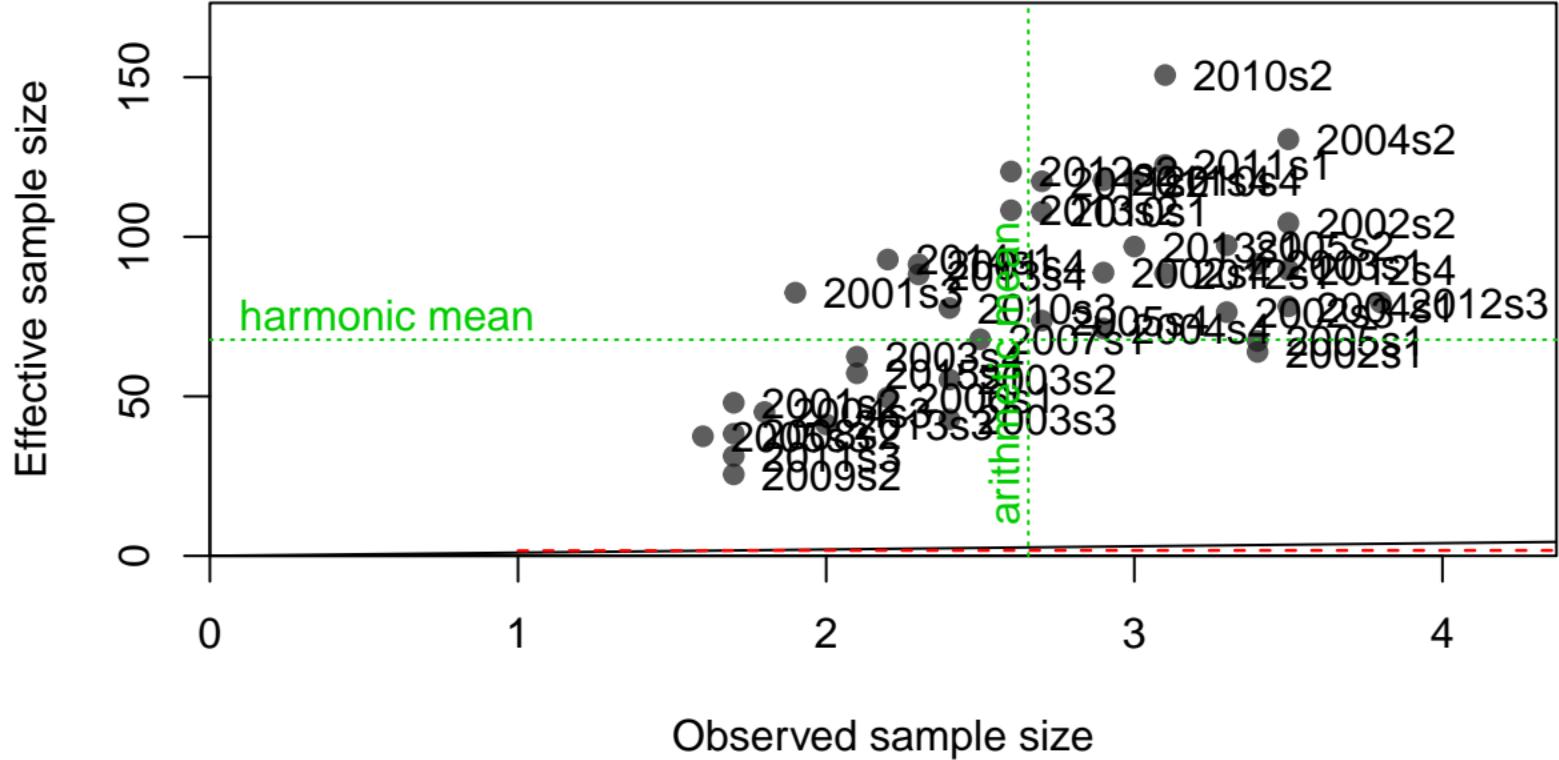
Proportion



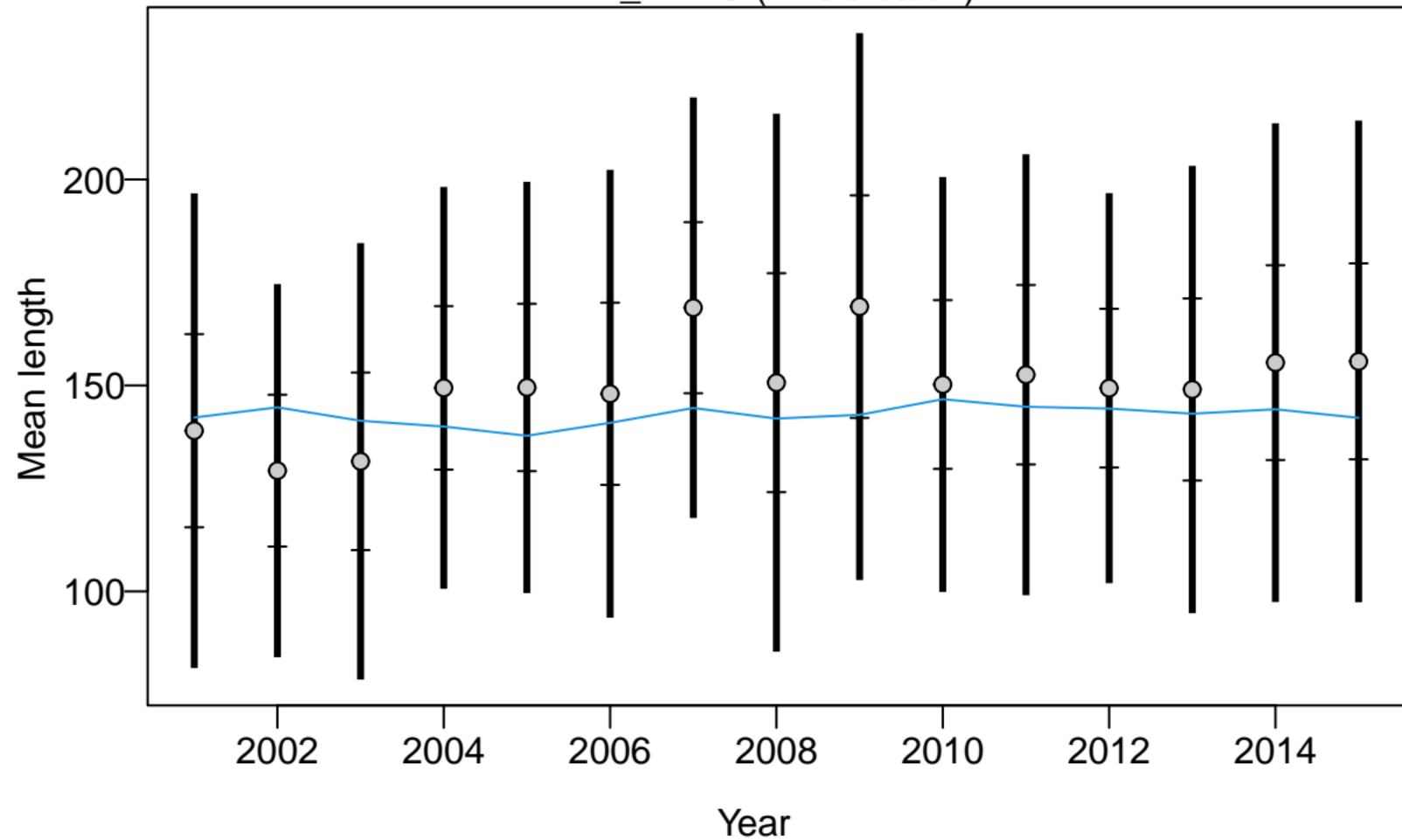
Proportion



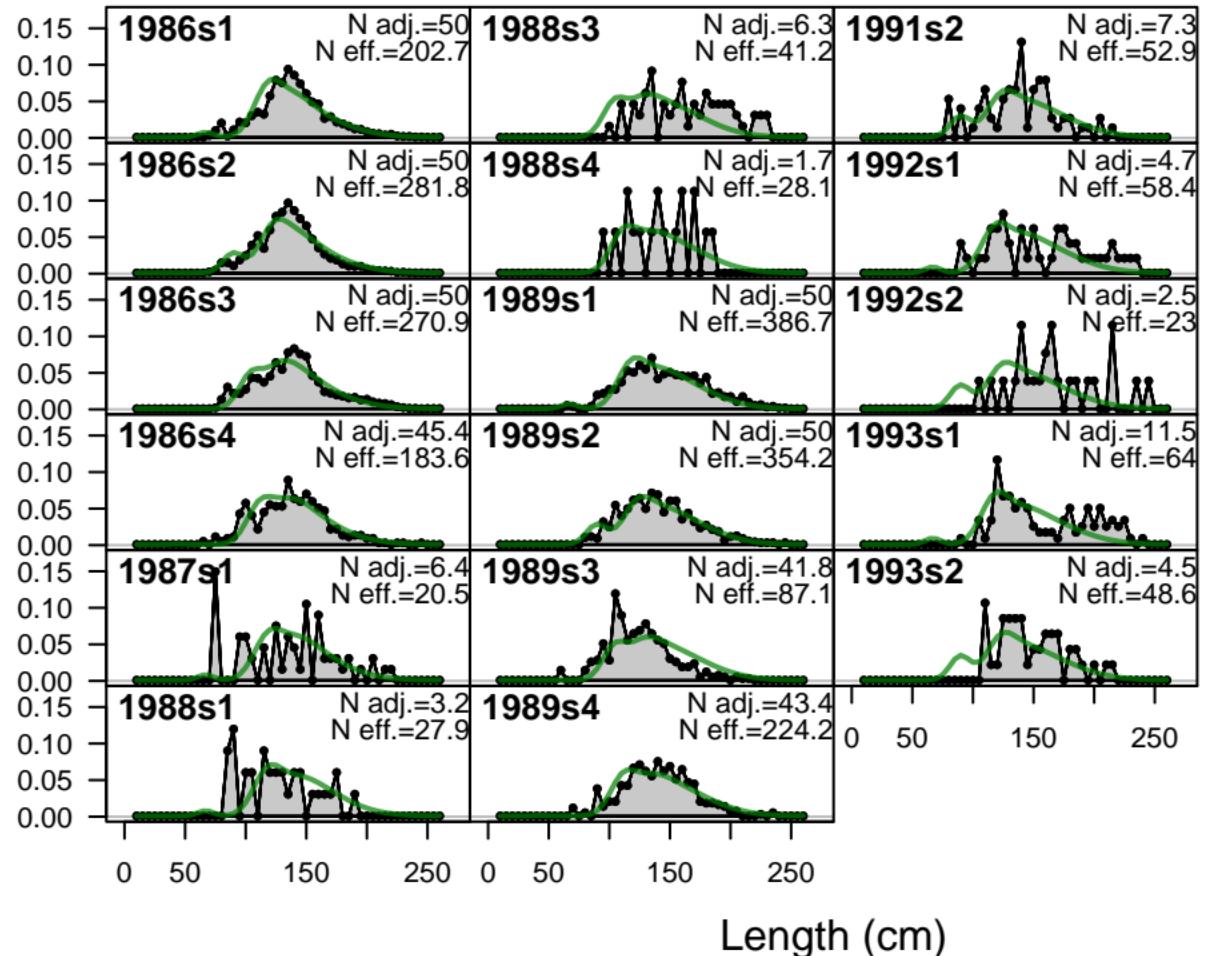


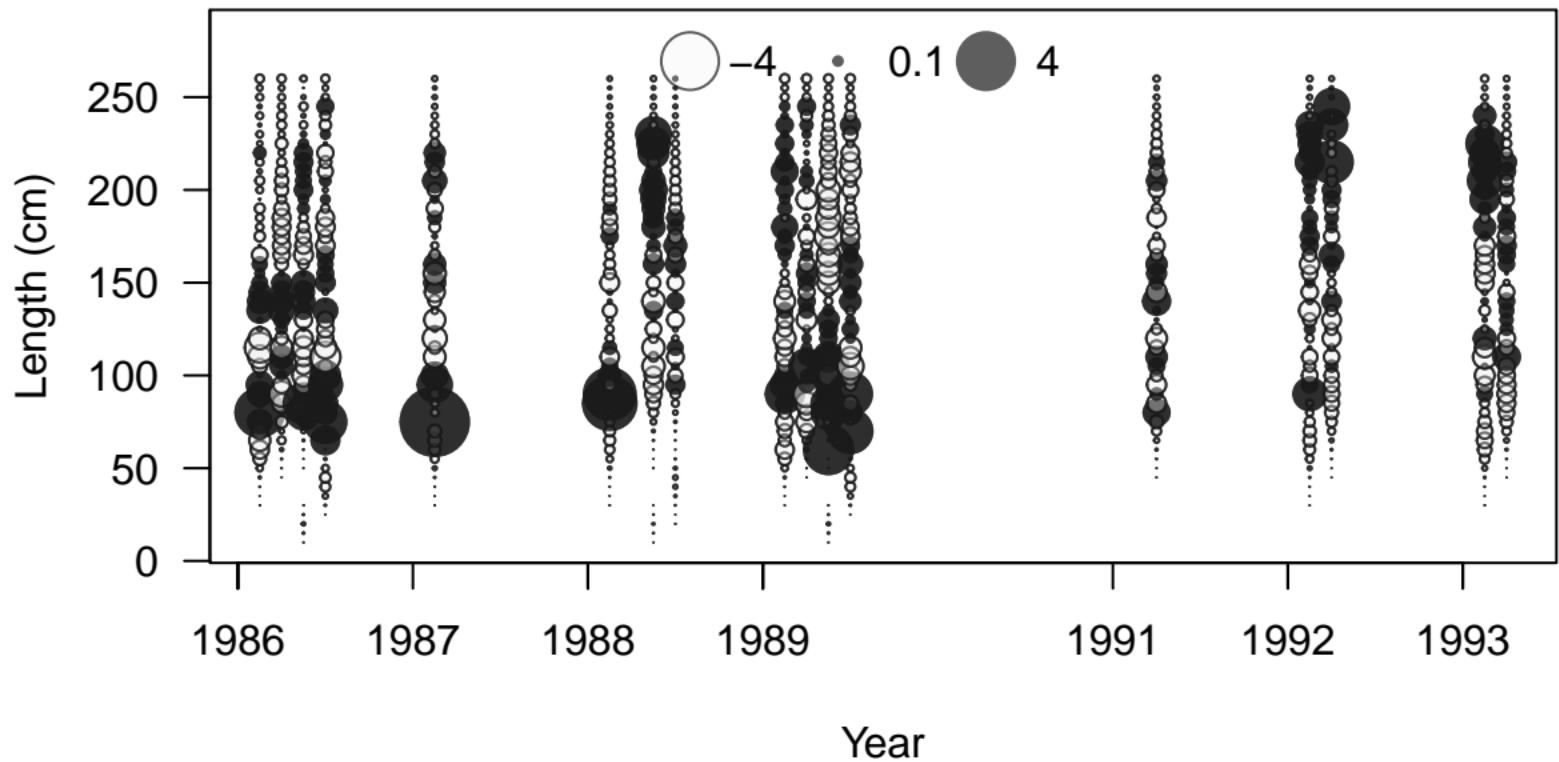


F4_IATTC (whole catch)

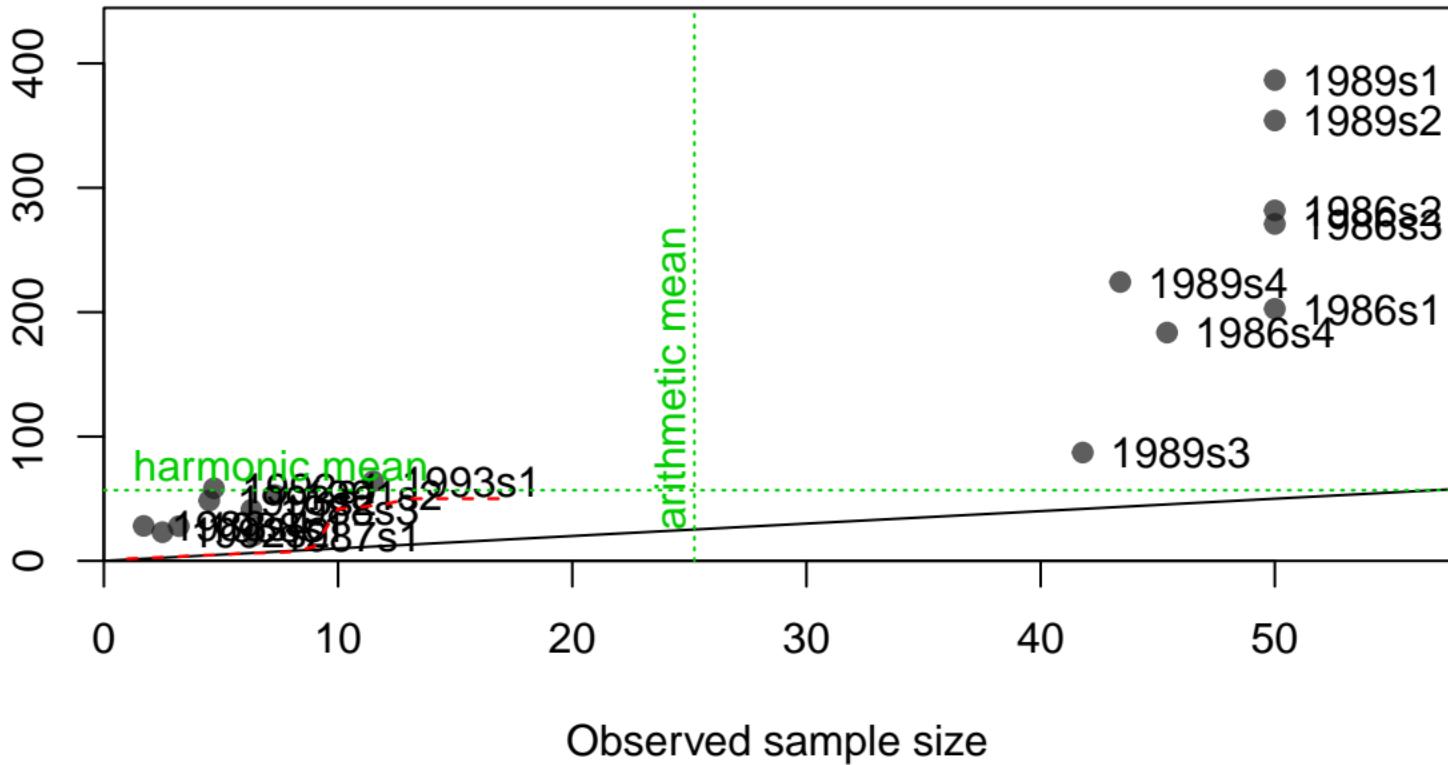


Proportion

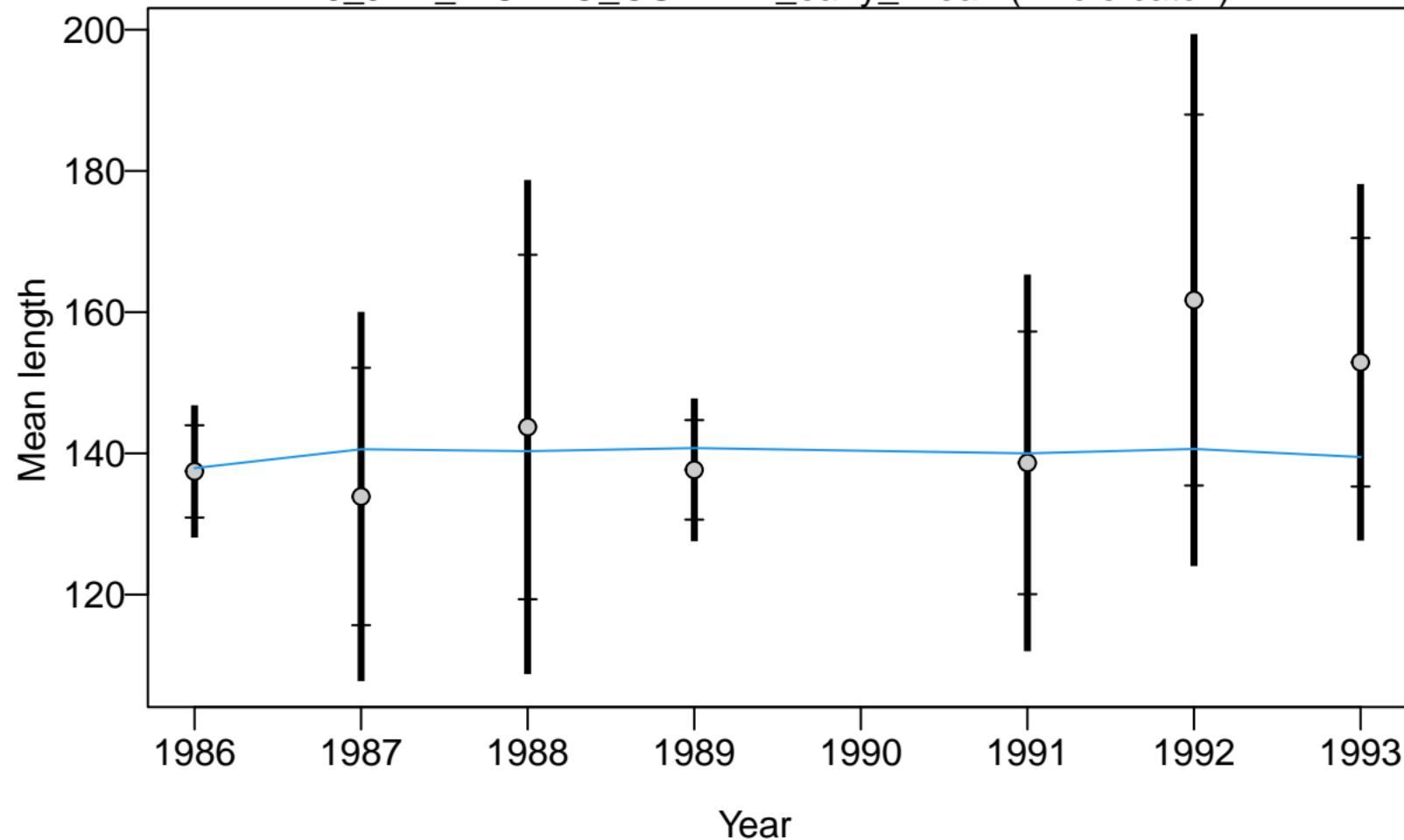




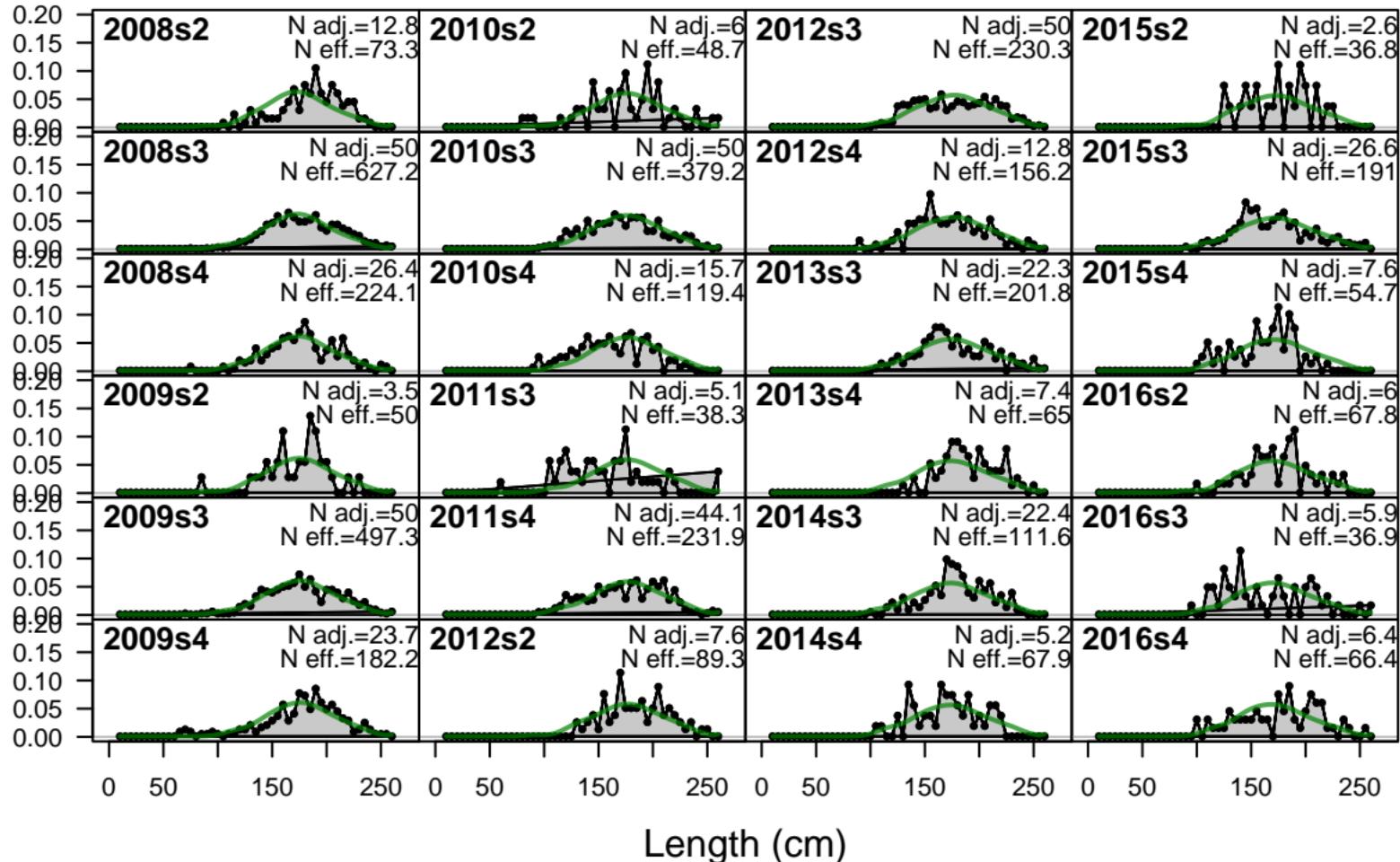
Effective sample size



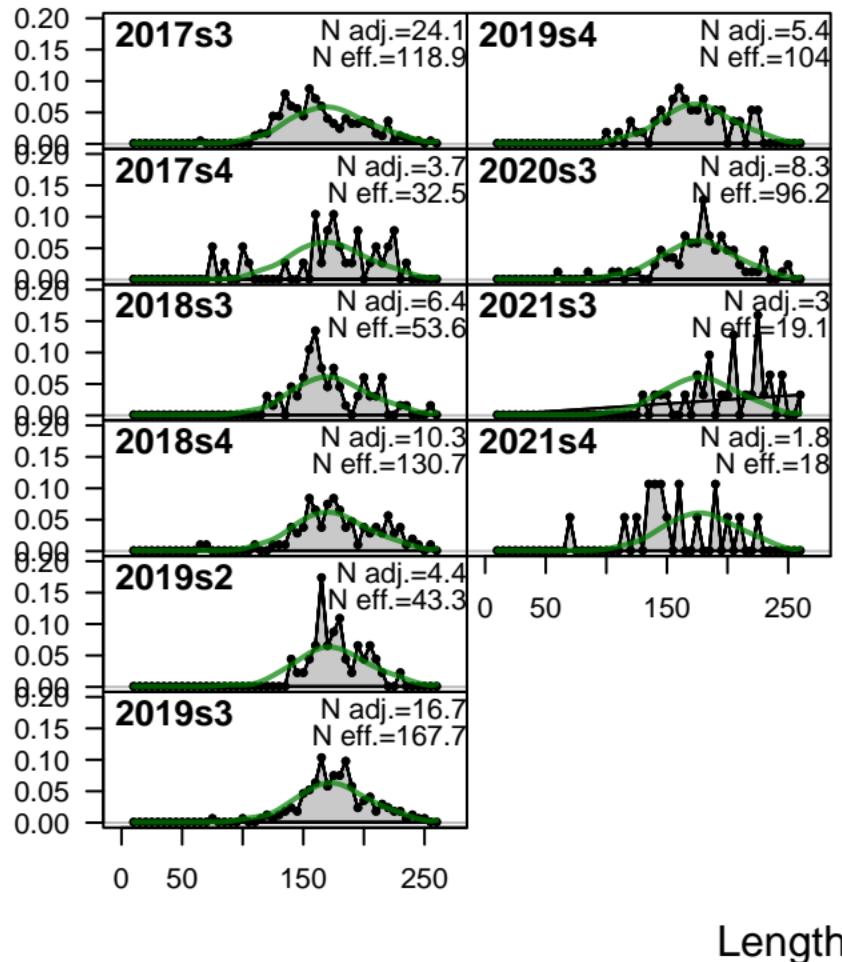
F6_JPN_WCNPO OSDWLL_early_Area1 (whole catch)

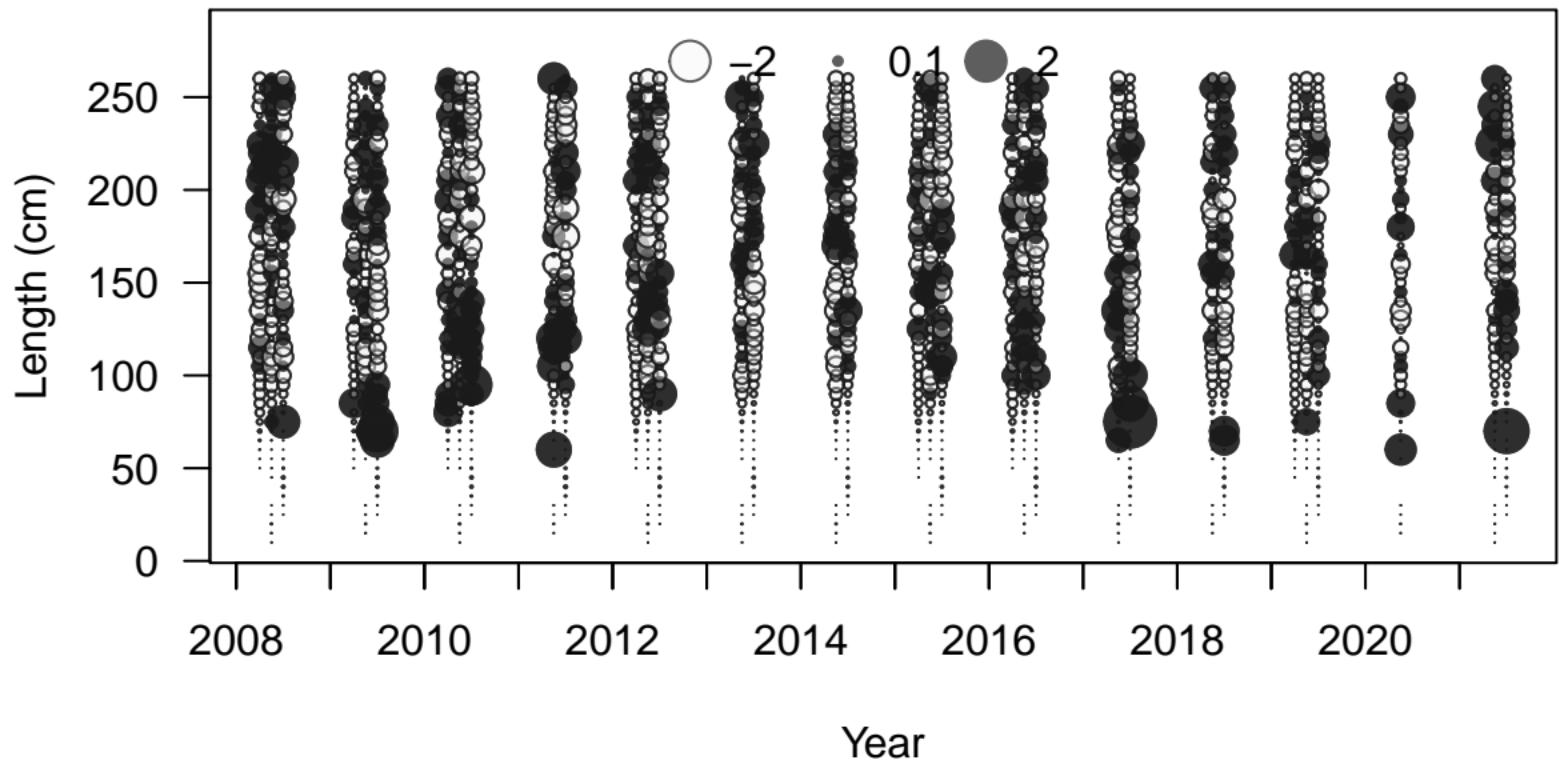


Proportion

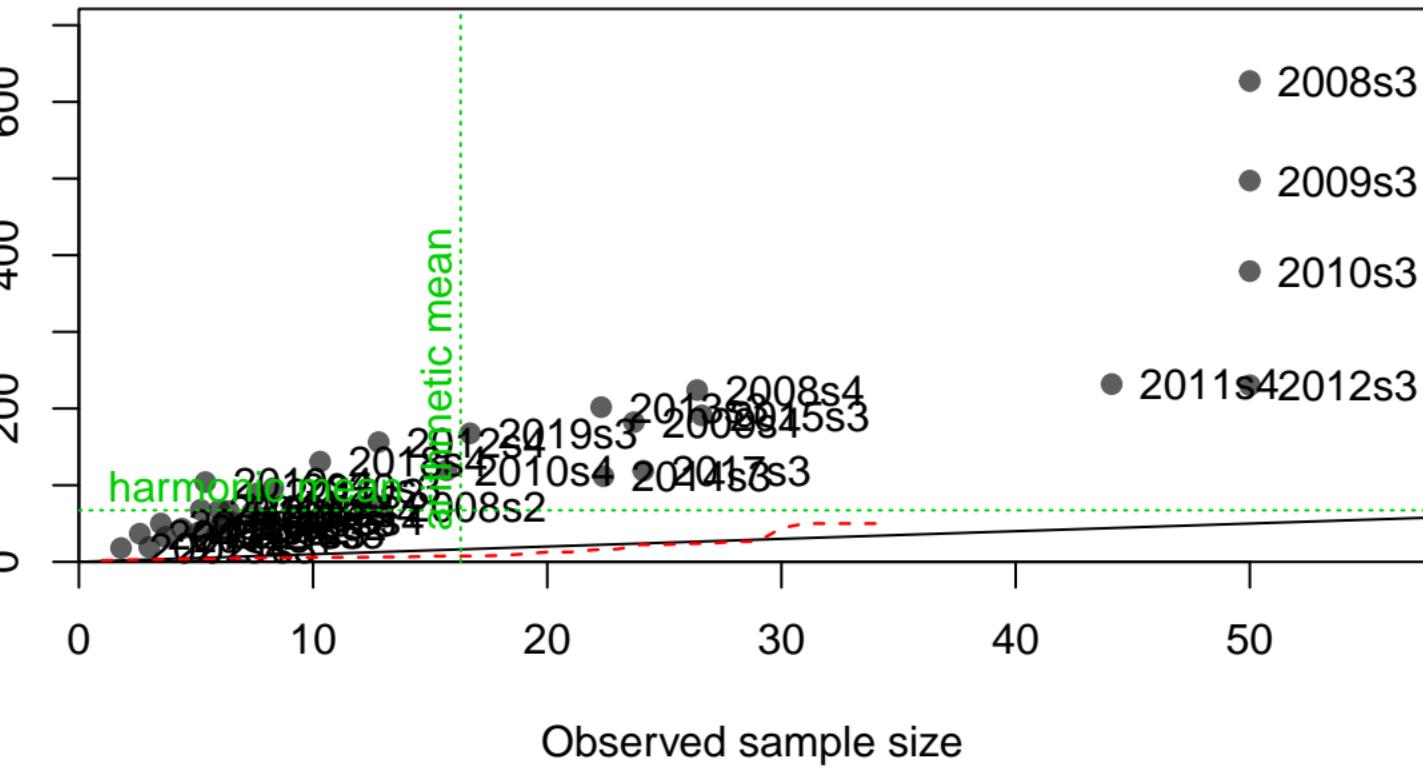


Proportion

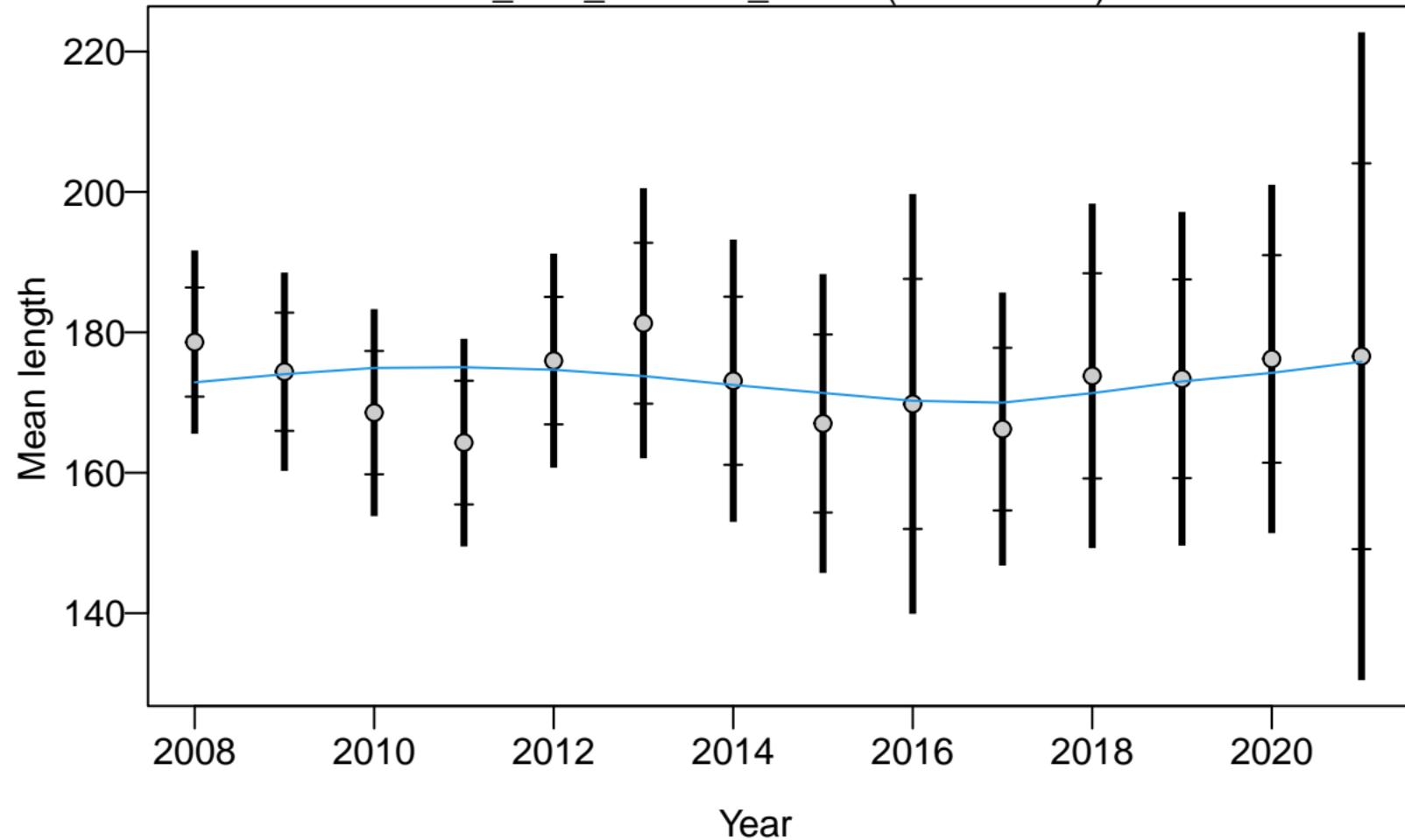




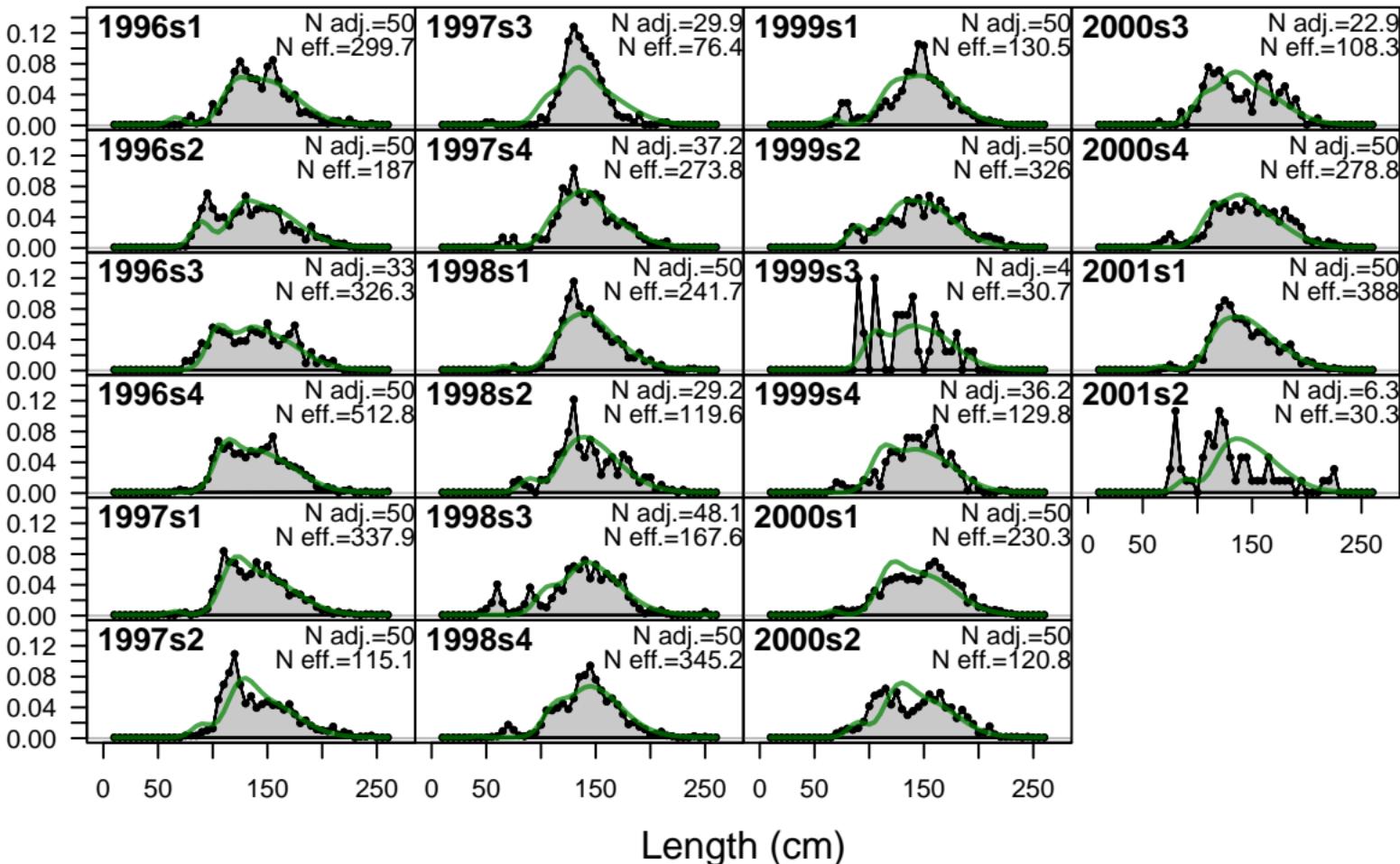
Effective sample size

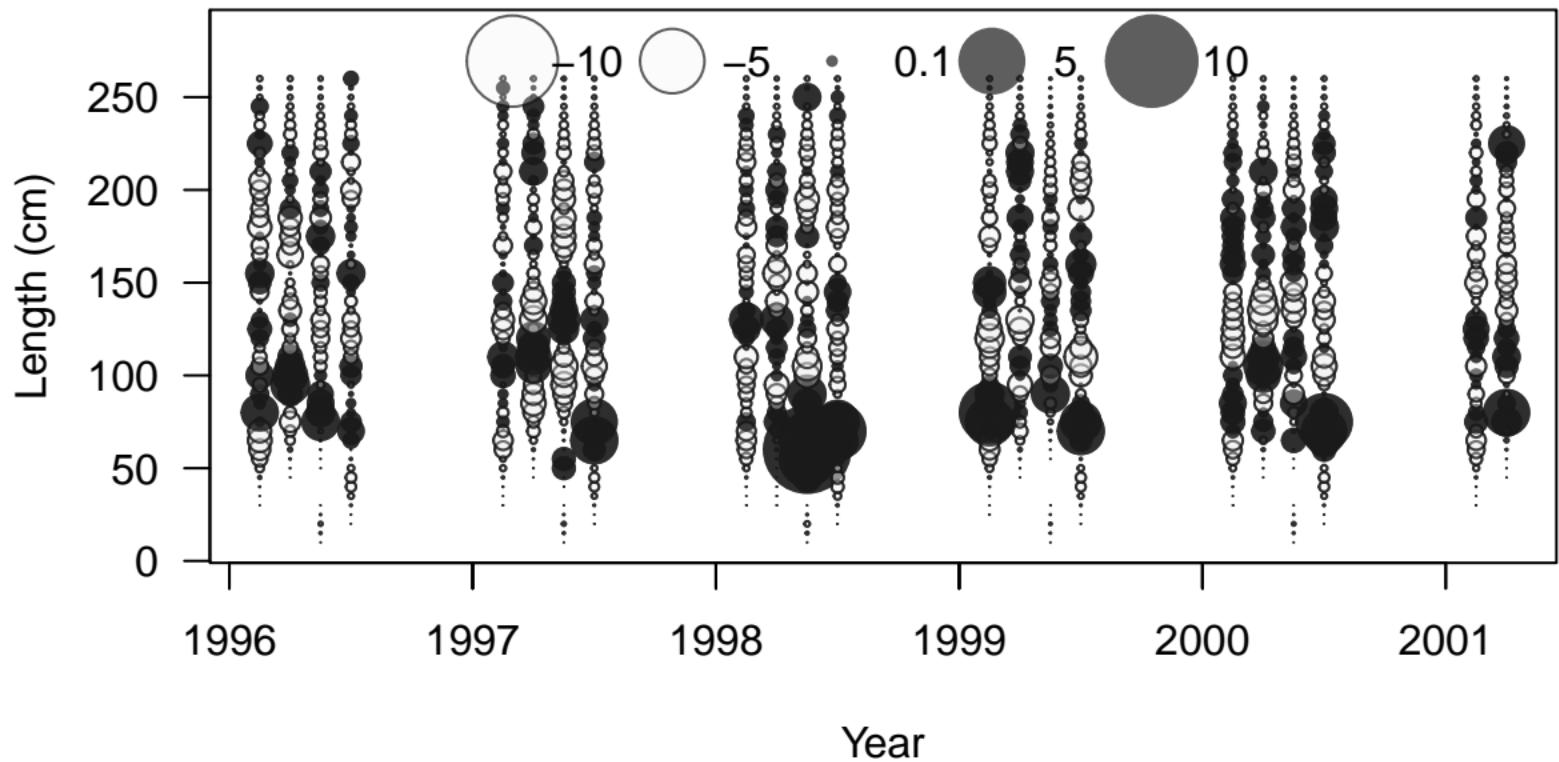


F7_JPN_WCNPO_CODF (whole catch)



Proportion





Effective sample size

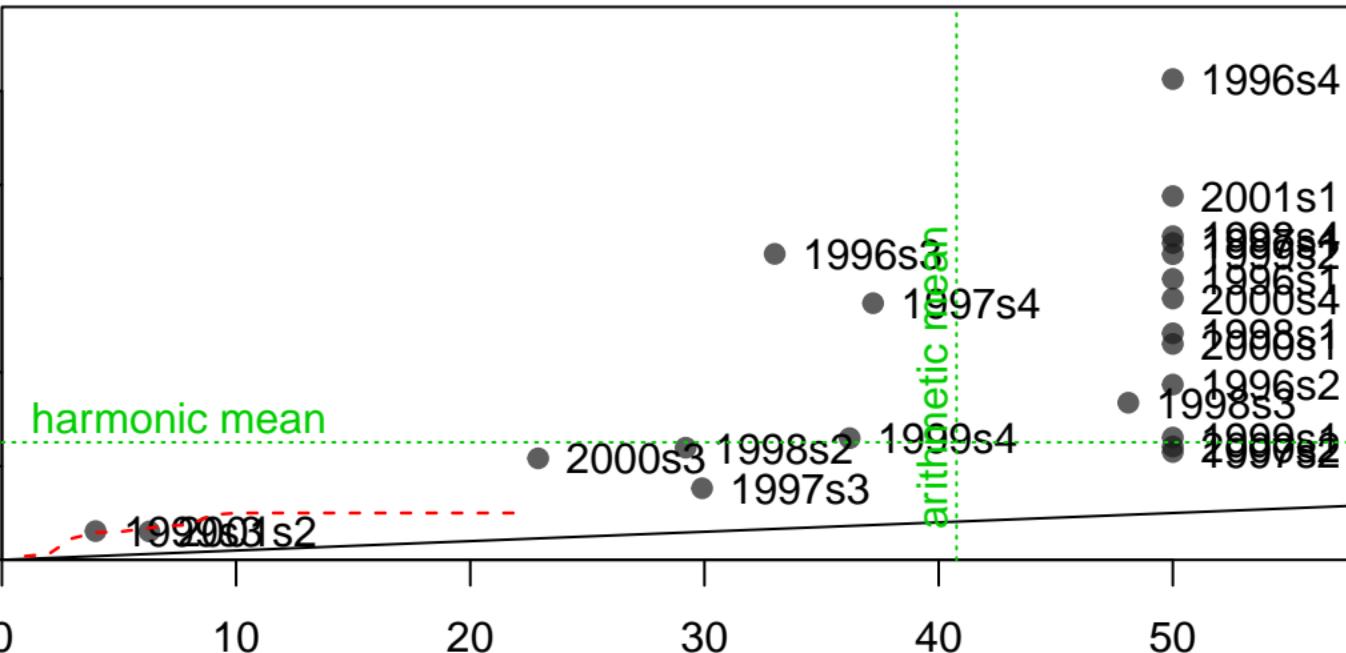
500
300
100
0

0 10 20 30 40 50

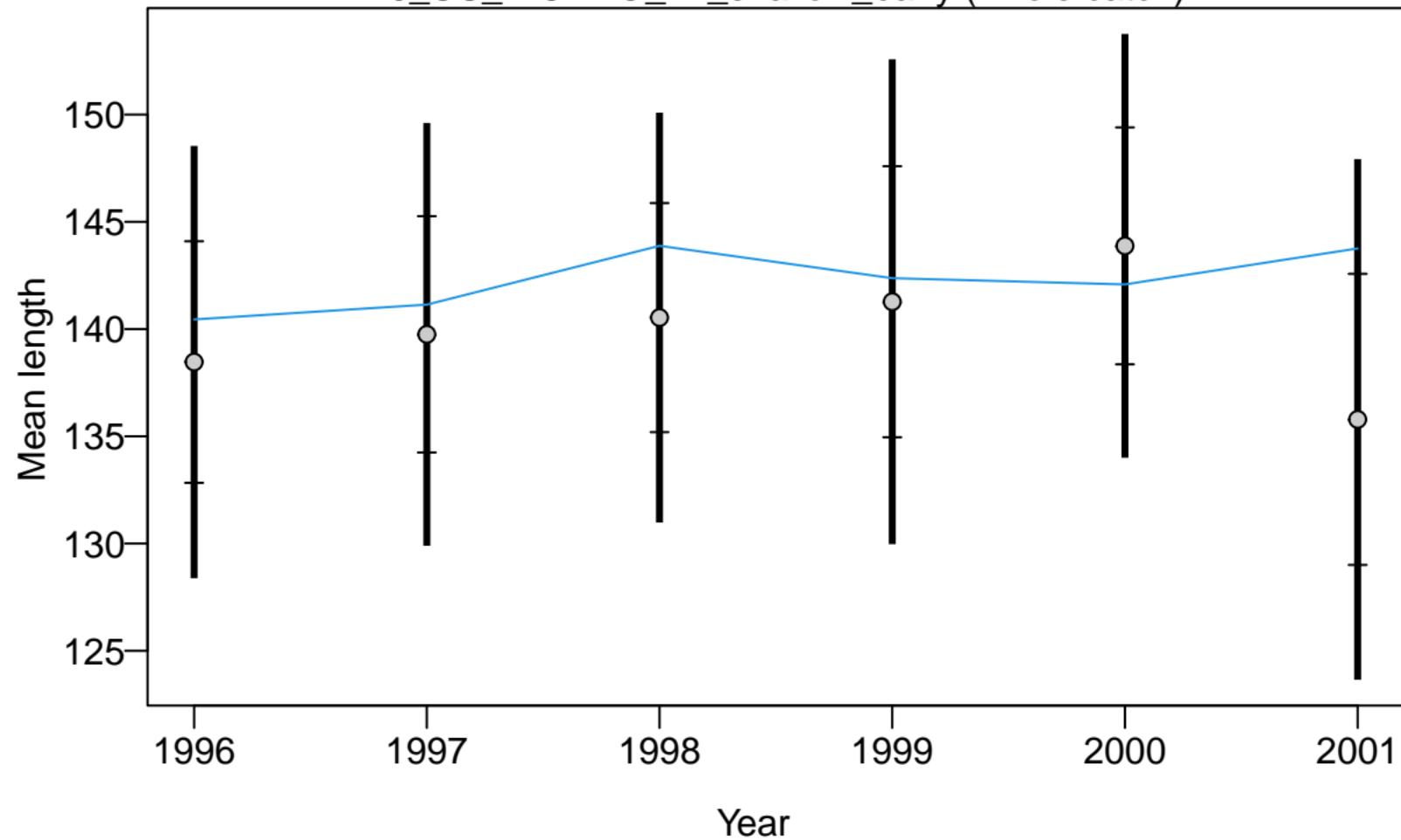
Observed sample size

harmonic mean

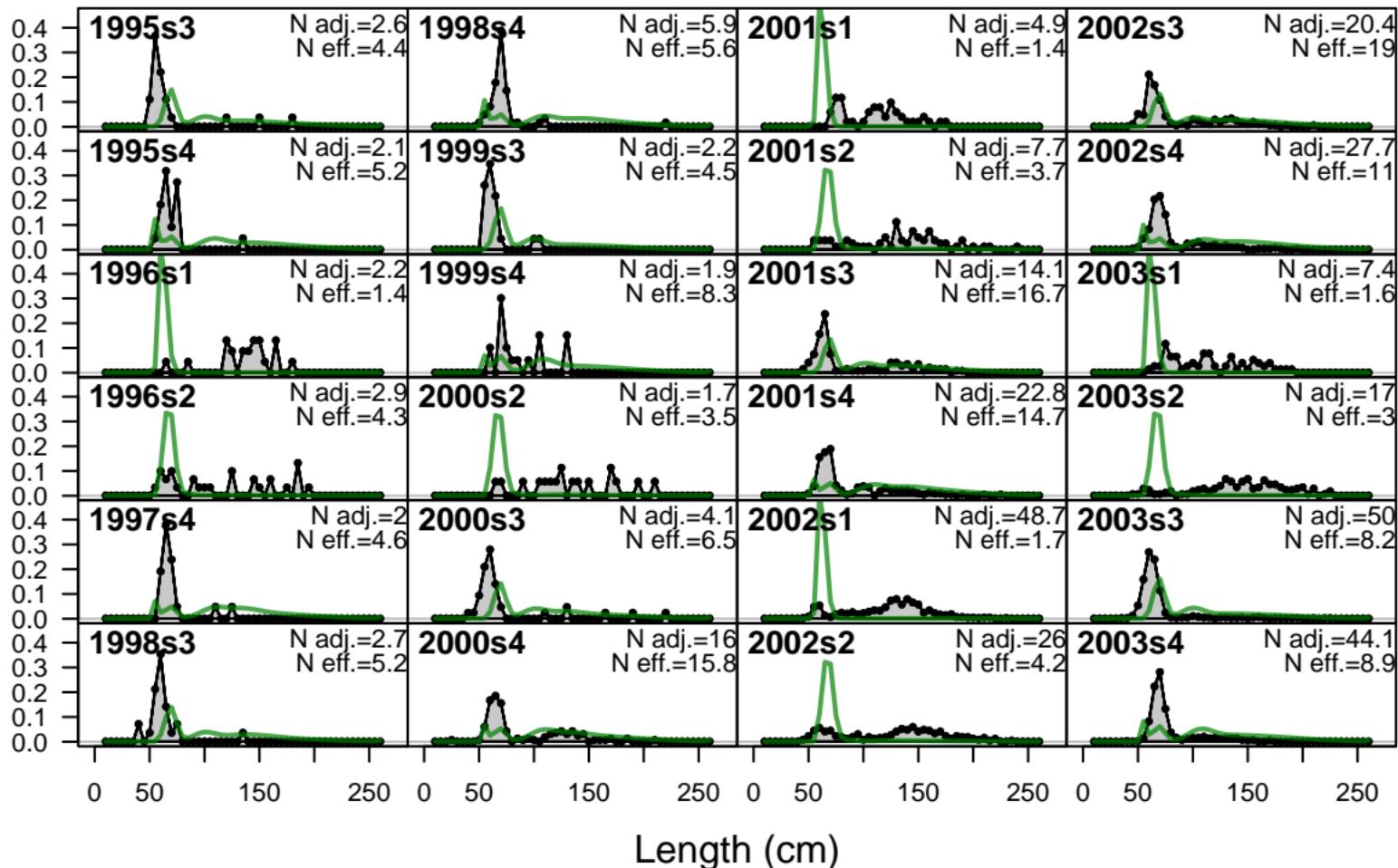
arithmetic mean



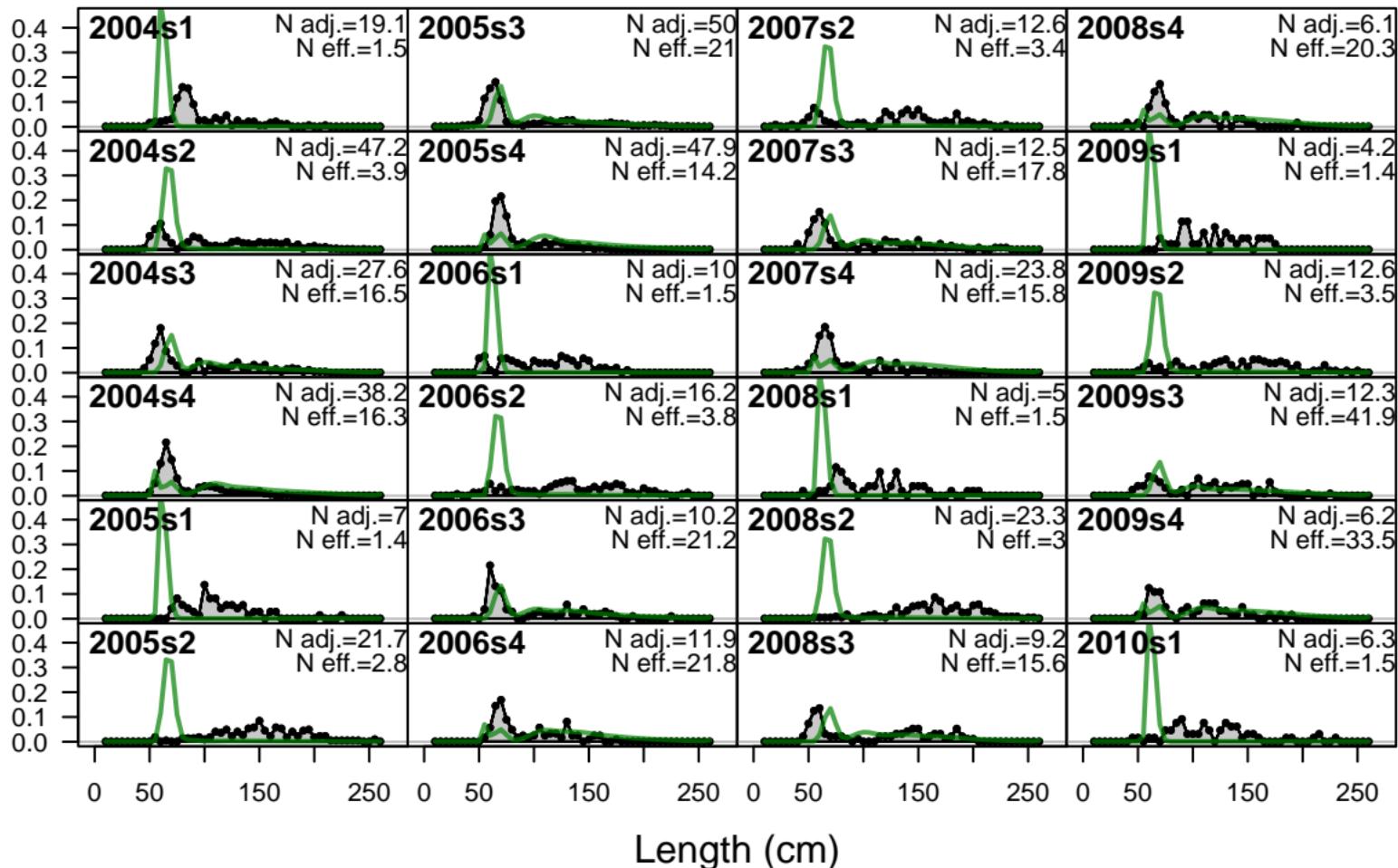
F8_US_WCNPO_LL_shallow_early (whole catch)



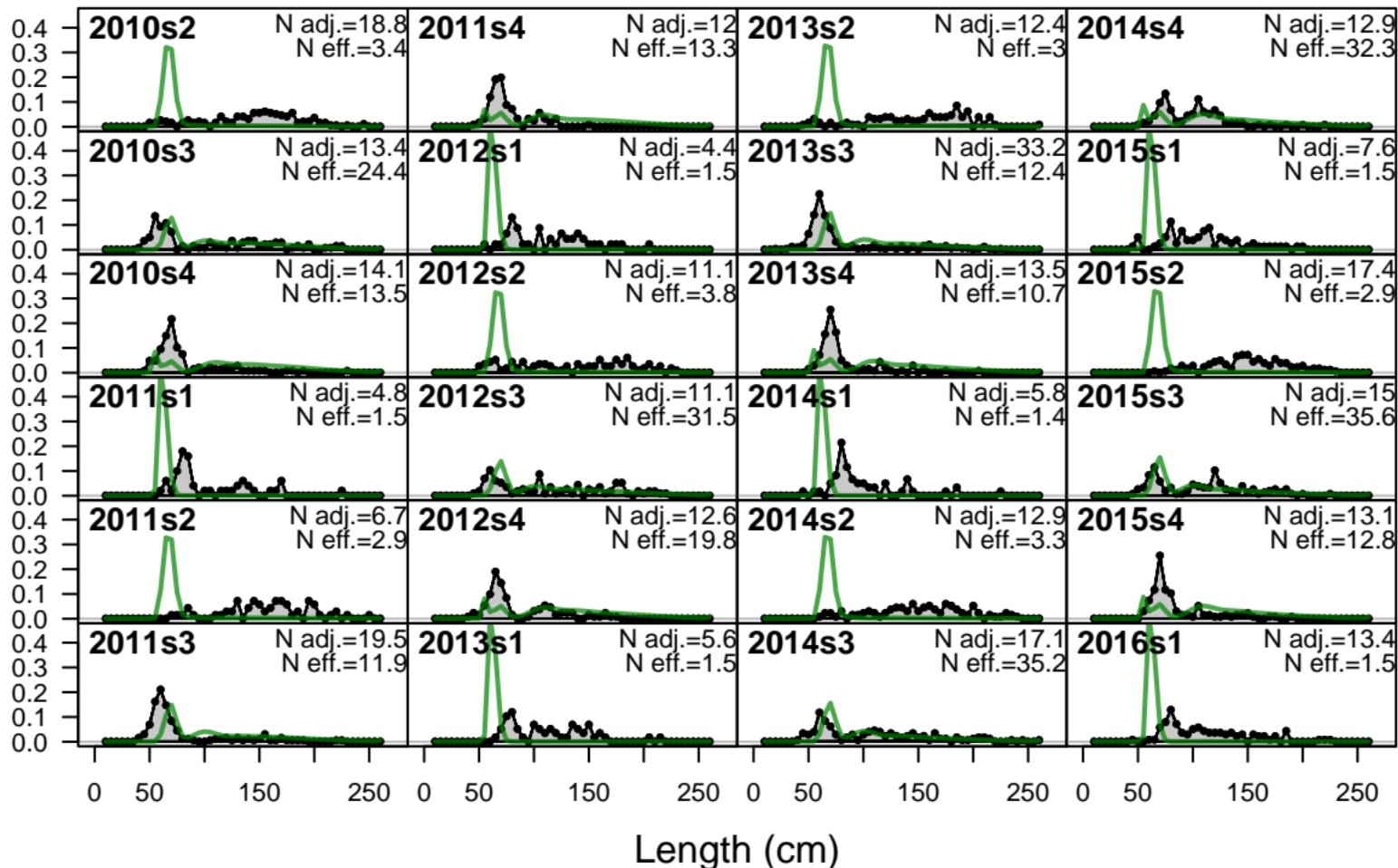
Proportion



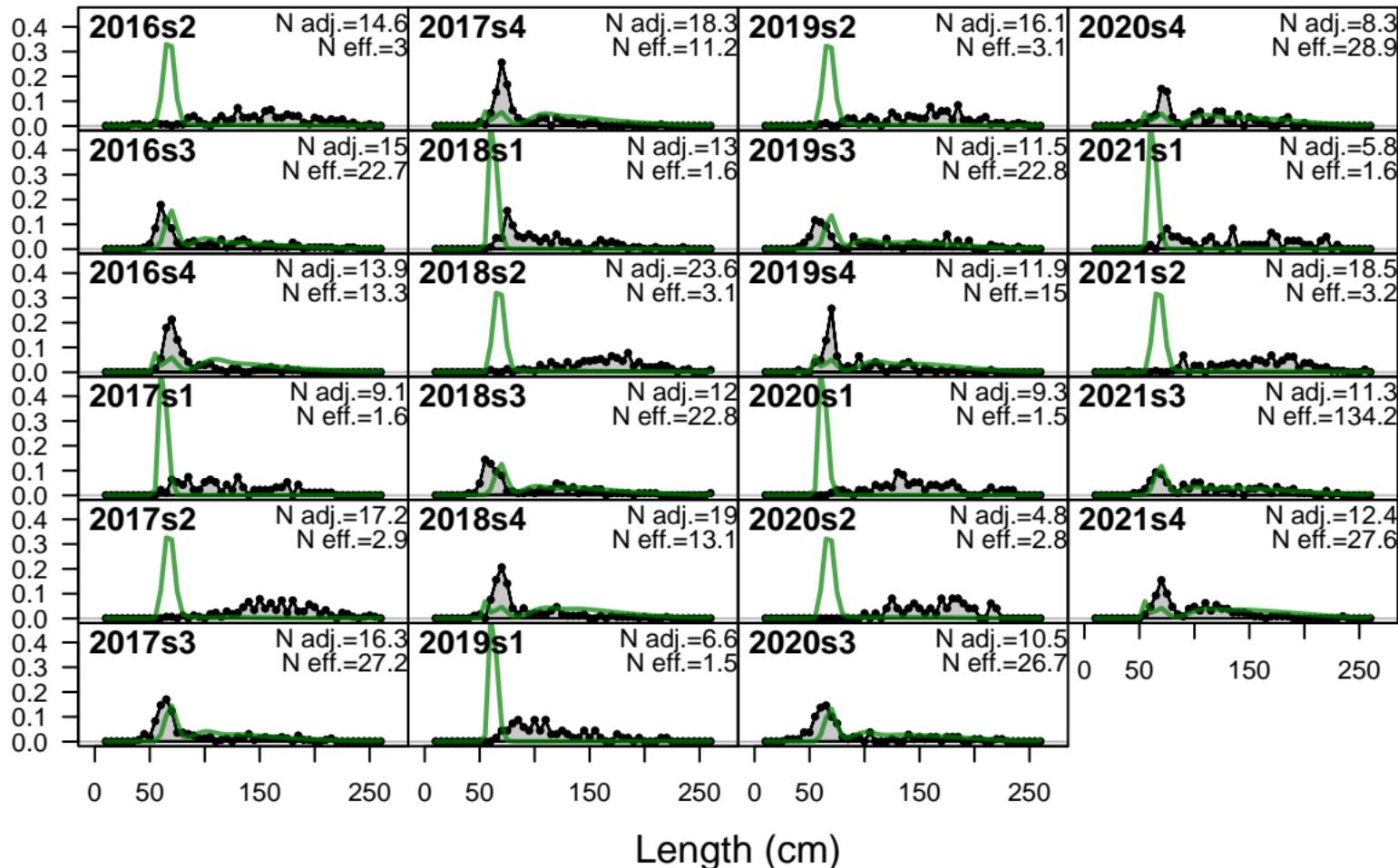
Proportion

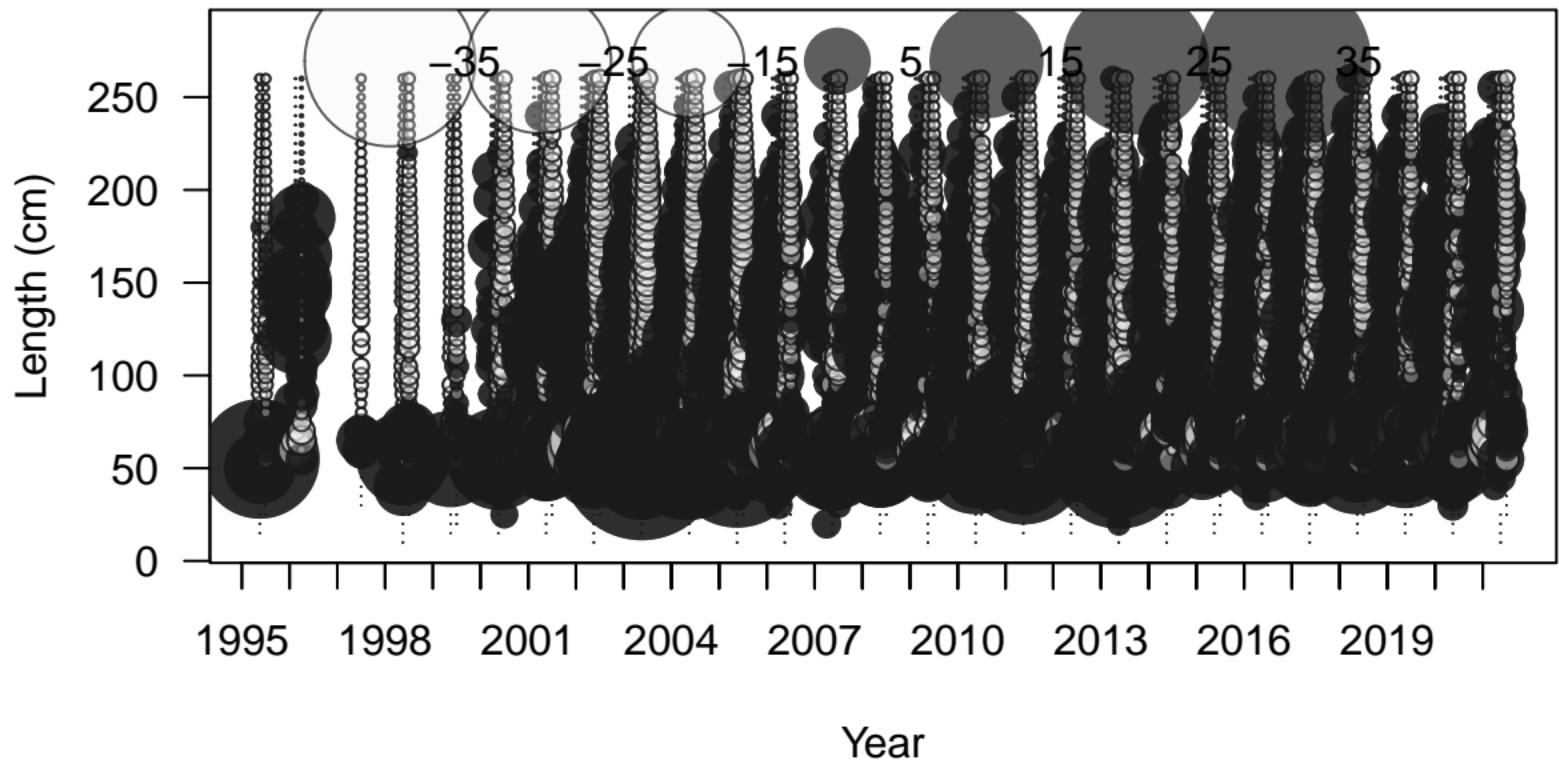


Proportion

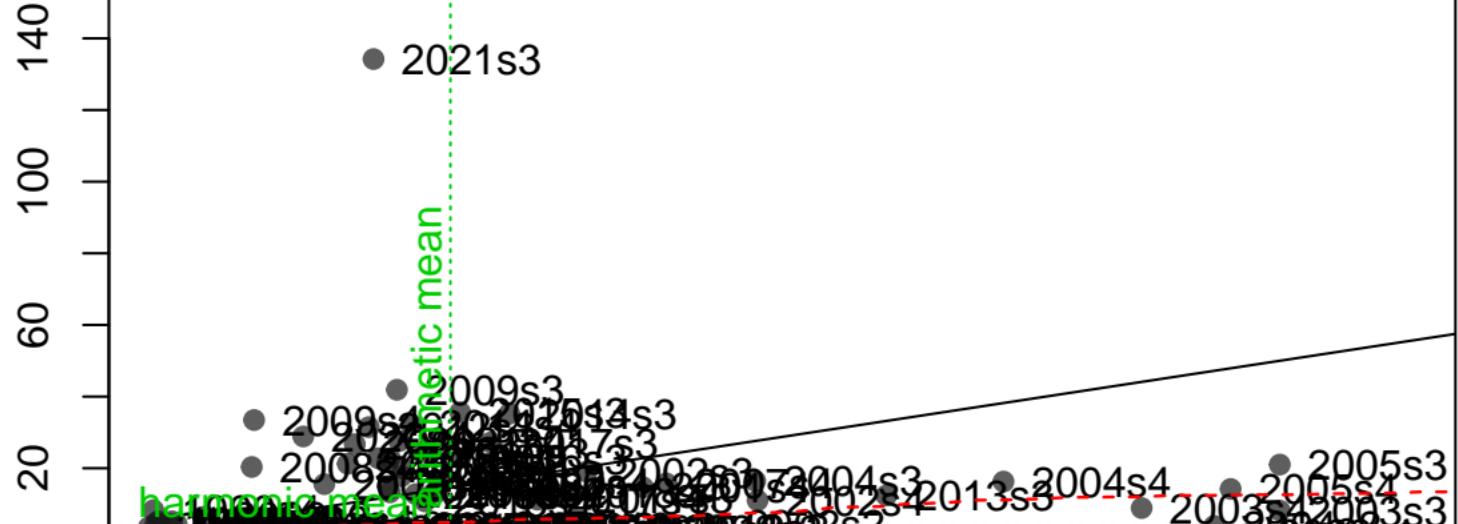


Proportion



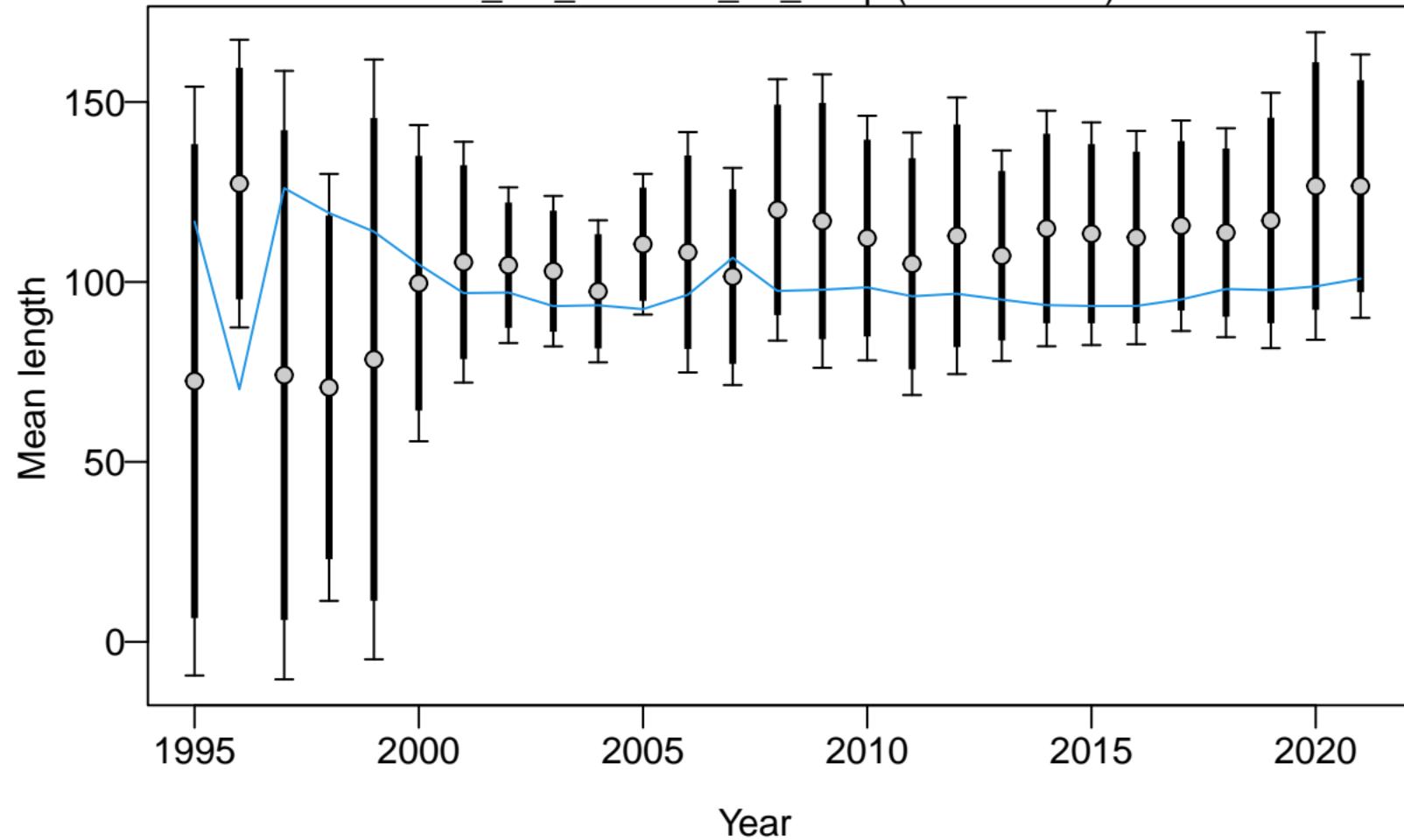


Effective sample size

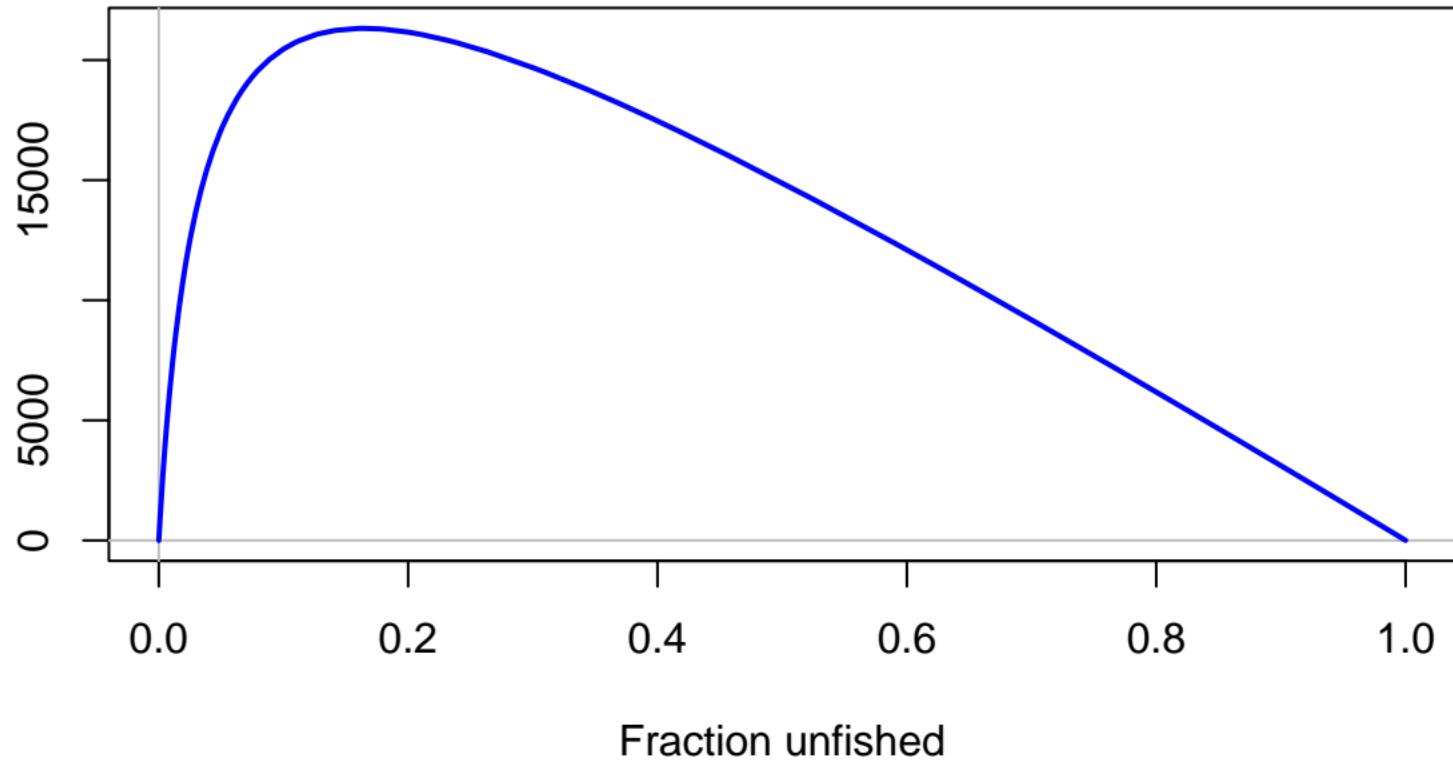


Observed sample size

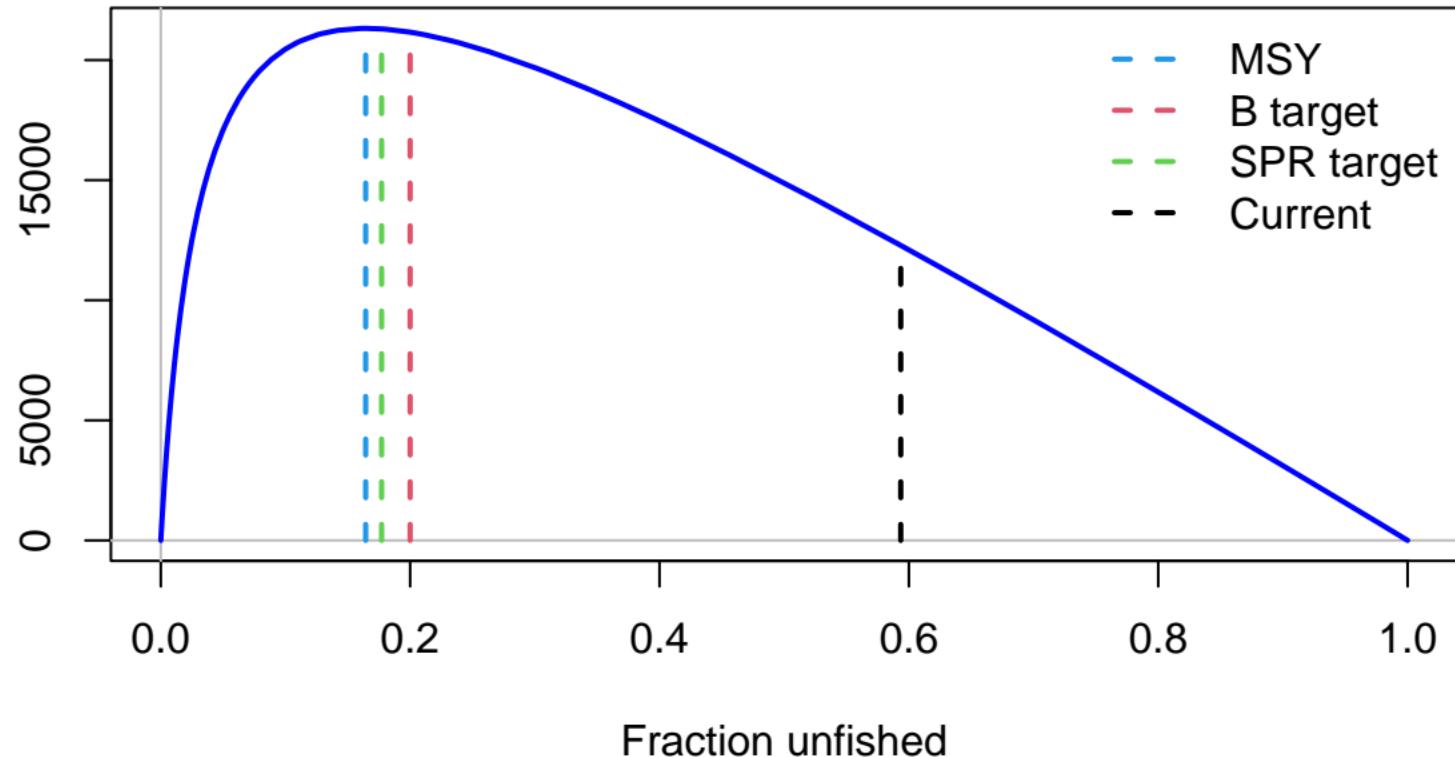
F9_US_WCNPO_LL_deep (whole catch)

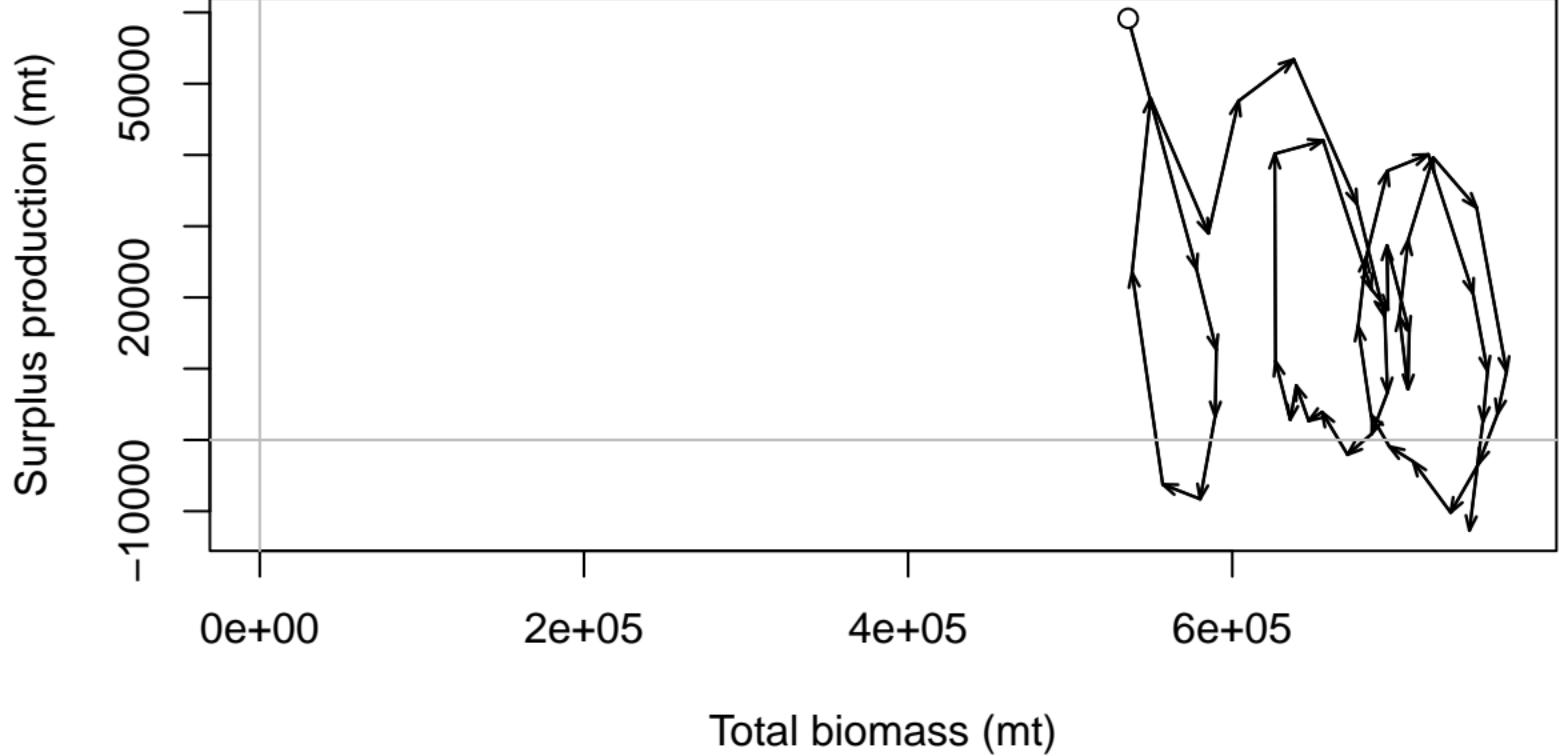


Equilibrium yield (mt)



Equilibrium yield (mt)





Yield per recruit (kg)

12
10
8
6
4
2
0

1980

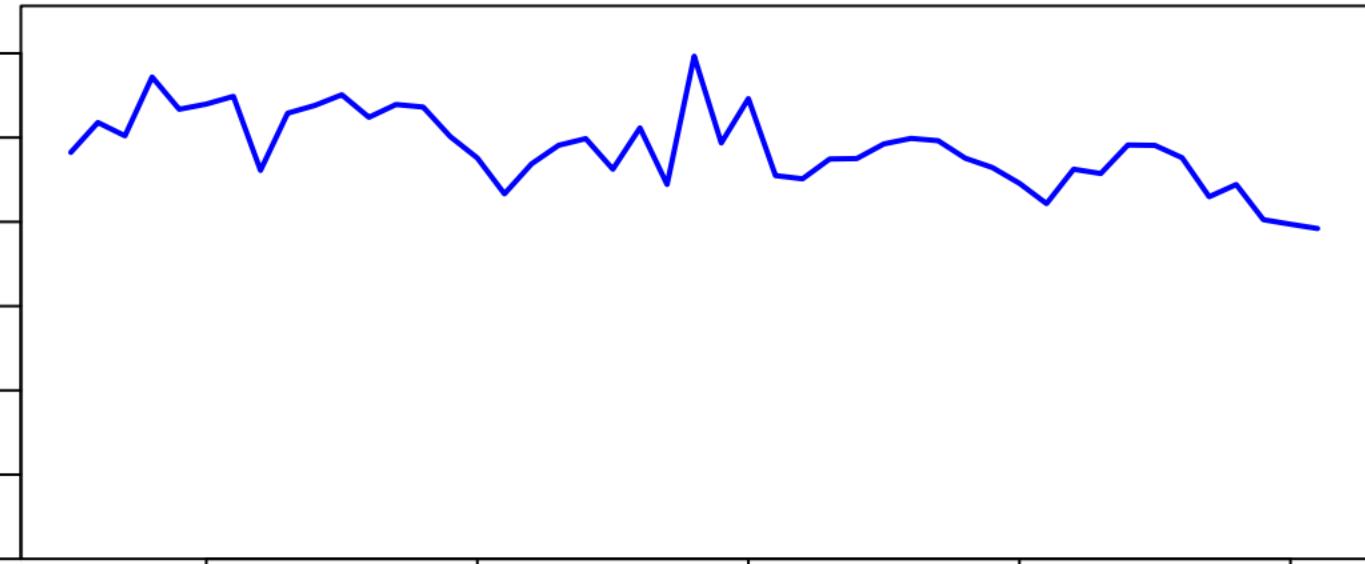
1990

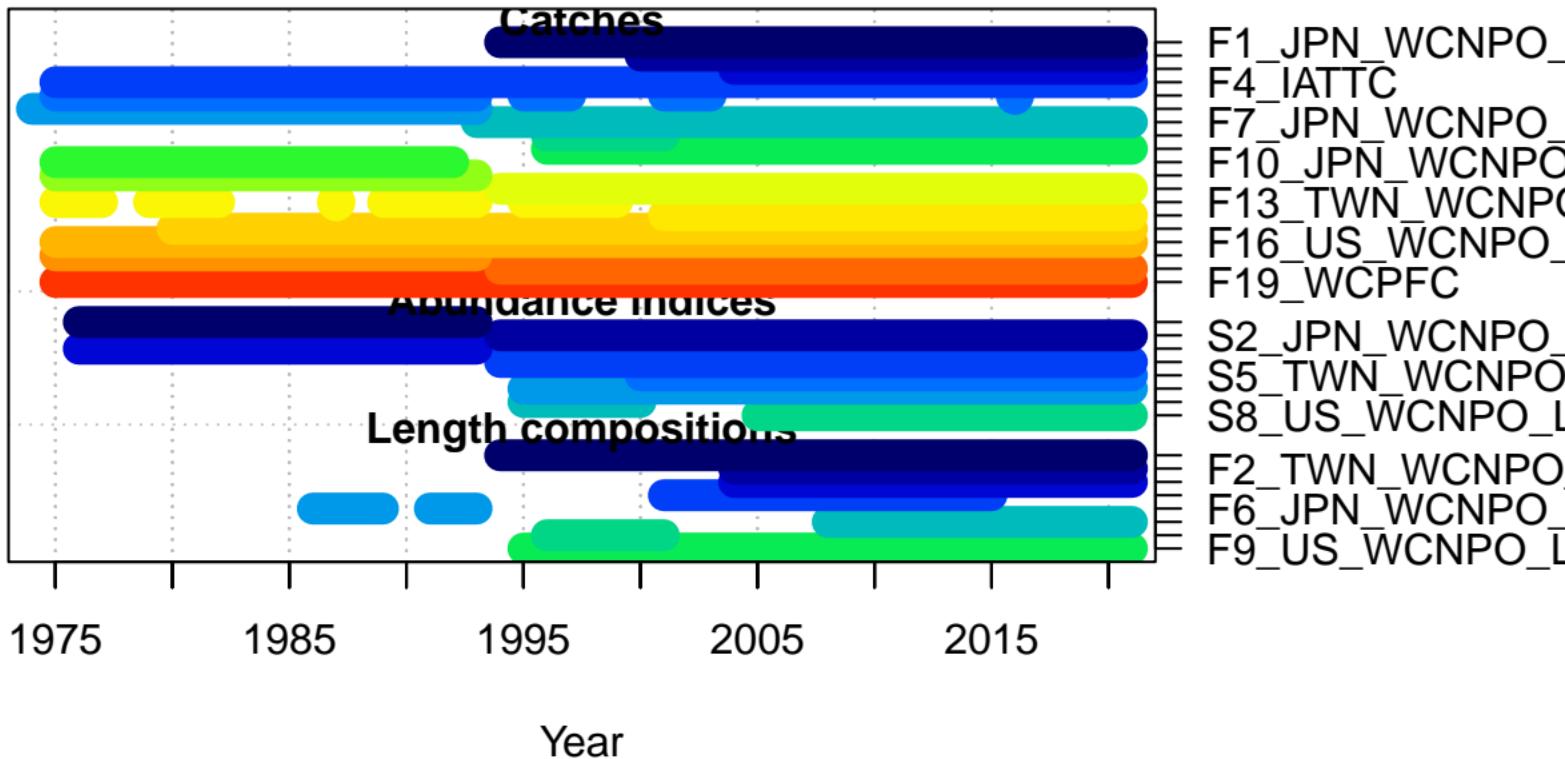
2000

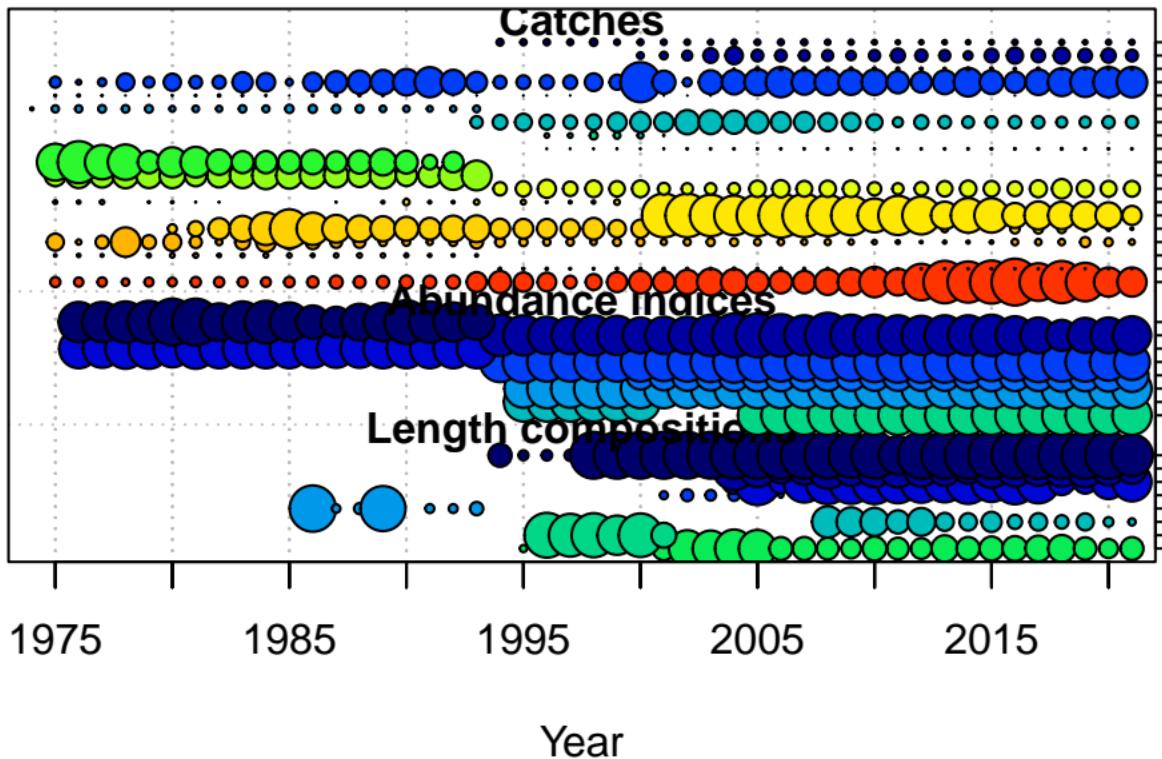
2010

2020

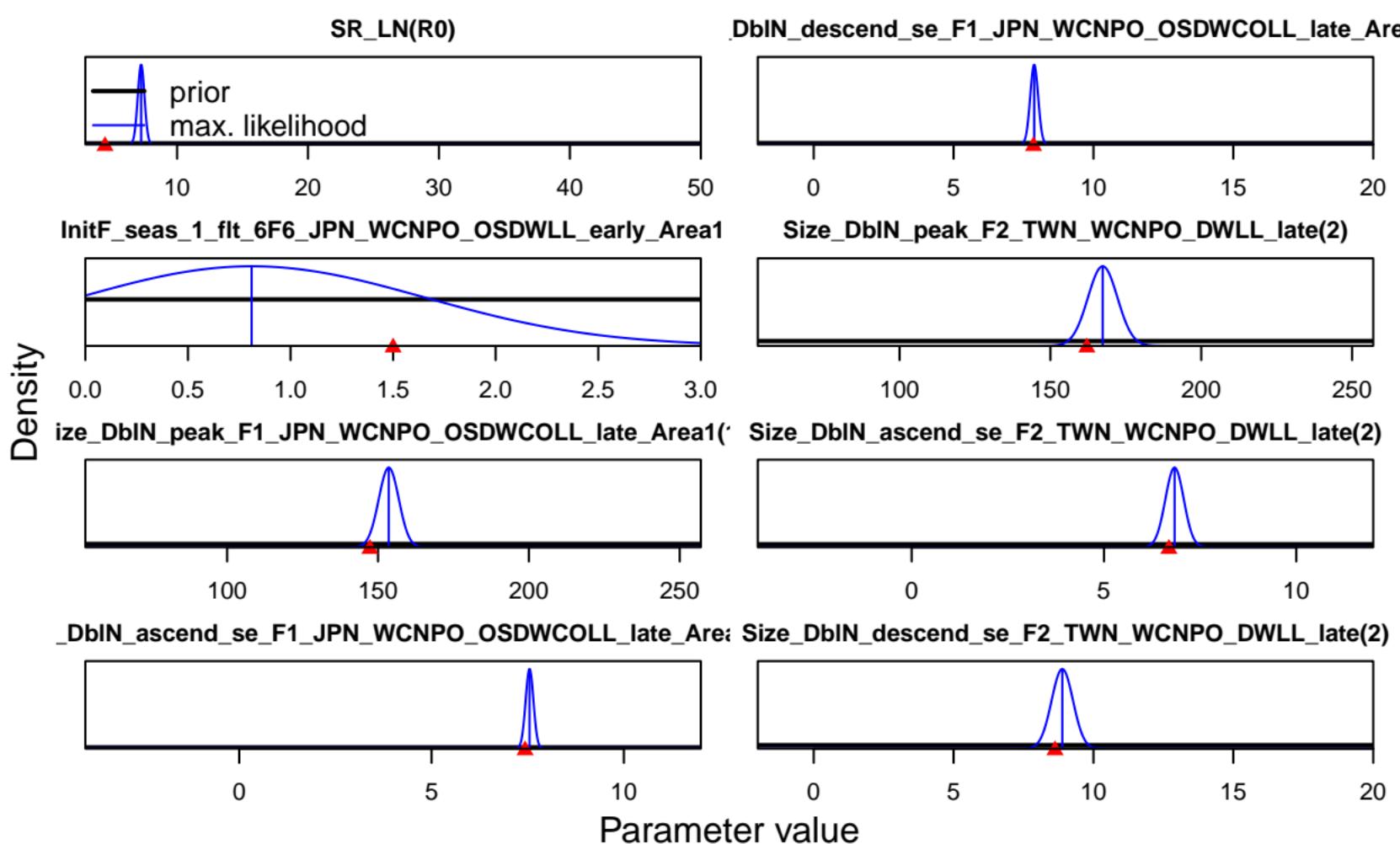
Year





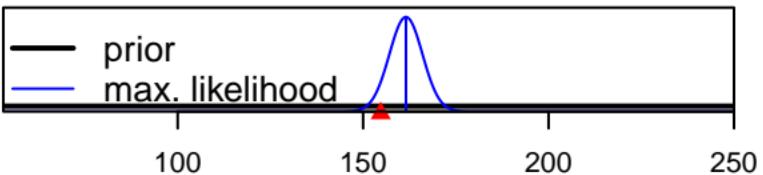


F1_JPN_WCNPO
F4_IATTC
F7_JPN_WCNPO
F10_JPN_WCNPO
F13_TWN_WCNPO
F16_US_WCNPO
F19_WCPFC
S2_JPN_WCNPO
S5_TWN_WCNPO
S8_US_WCNPO_L
F2_TWN_WCNPO
F6_JPN_WCNPO
F9_US_WCNPO_L

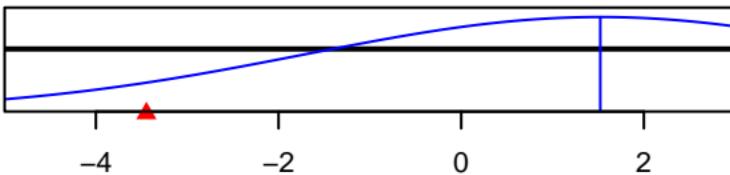


Density

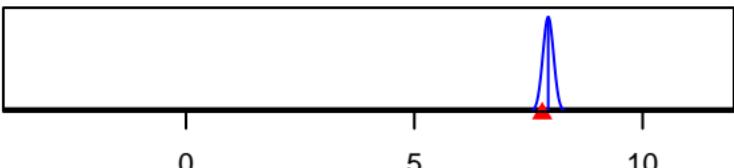
Size_DbIN_peak_F3_US_WCNPO_LL_shallow_late(3)



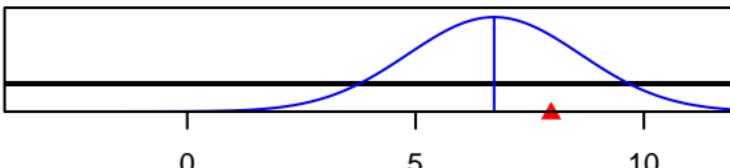
Size_DbIN_top_logit_F4_IATTC(4)



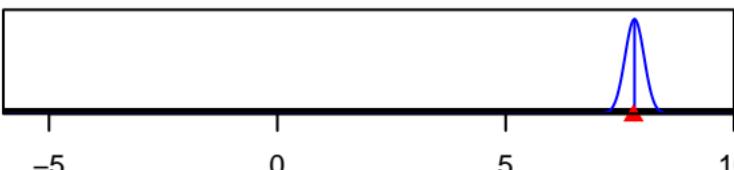
Size_DbIN_ascend_se_F3_US_WCNPO_LL_shallow_late(3)



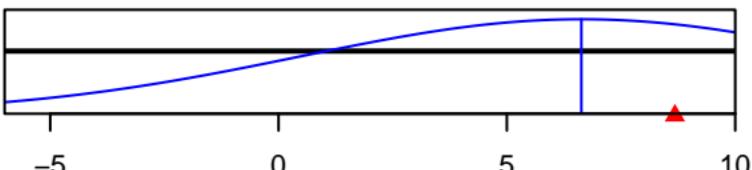
Size_DbIN_ascend_se_F4_IATTC(4)



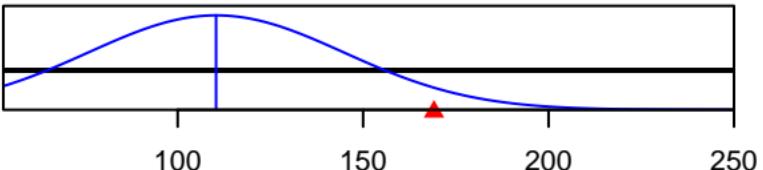
Size_DbIN_descend_se_F3_US_WCNPO_LL_shallow_late(3)



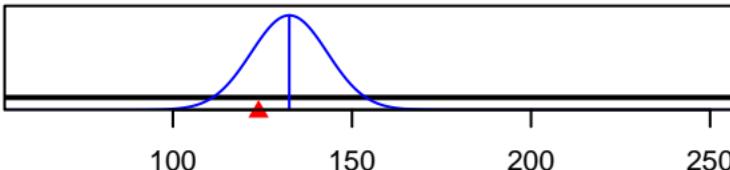
Size_DbIN_descend_se_F4_IATTC(4)



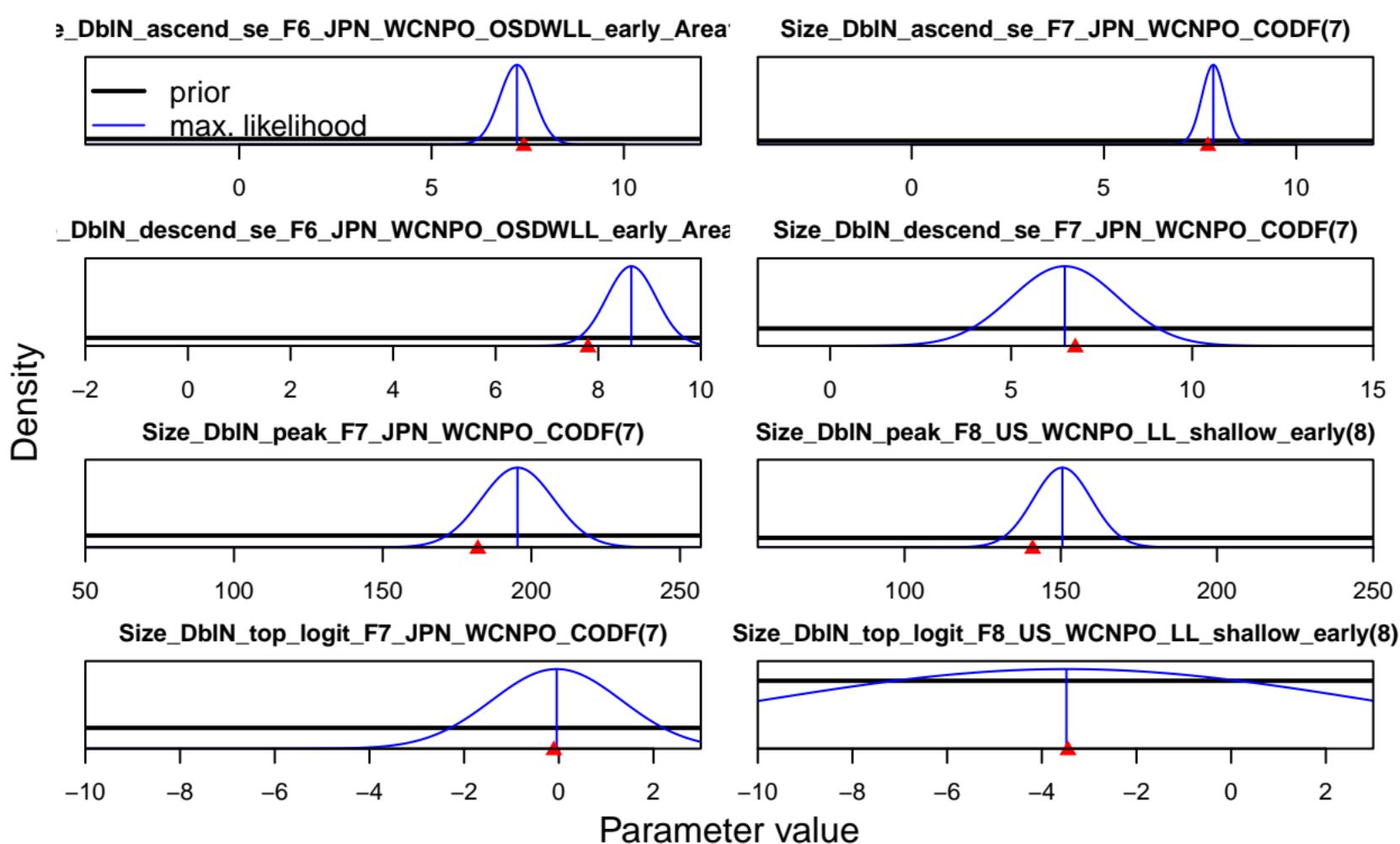
Size_DbIN_peak_F4_IATTC(4)

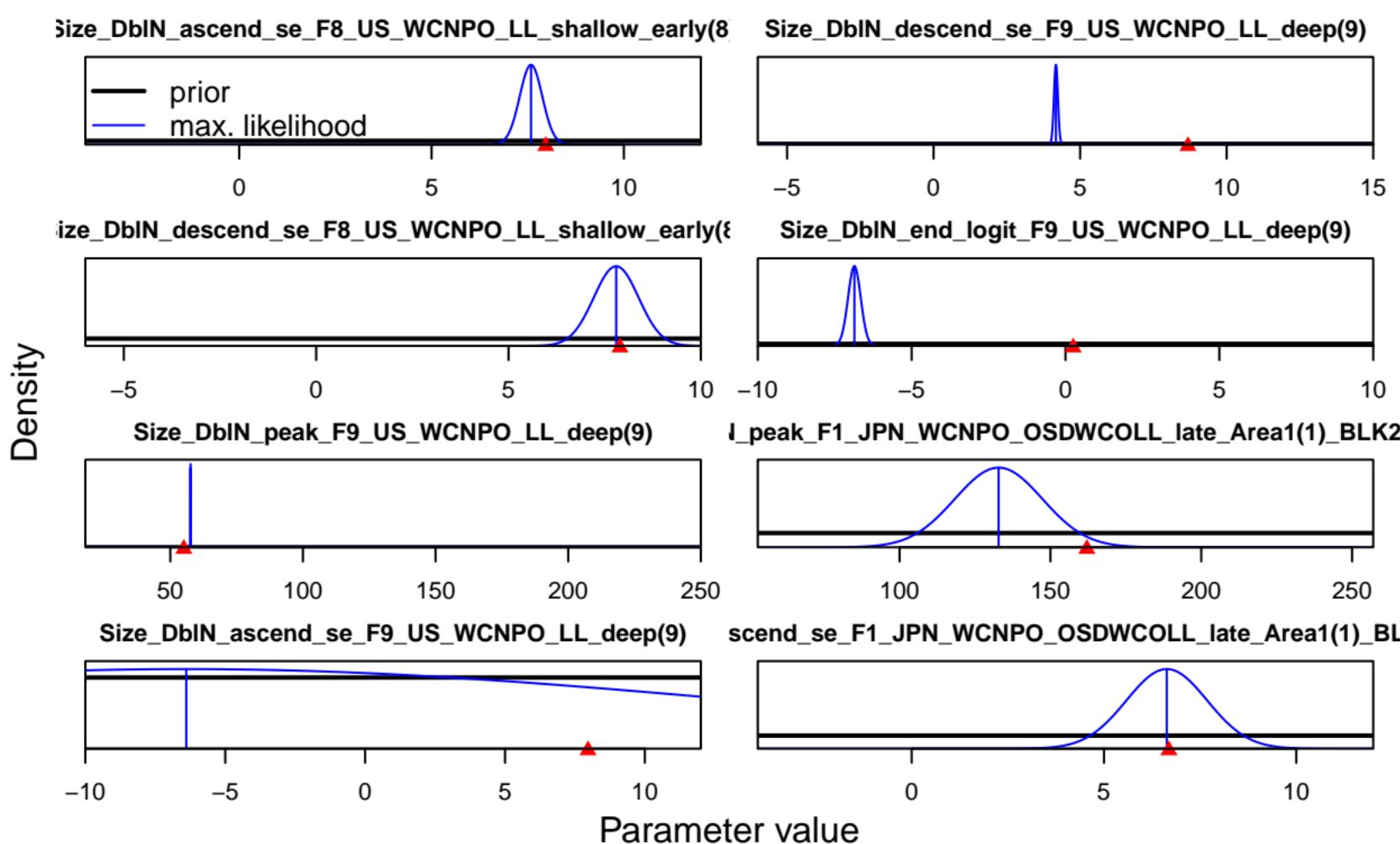


Size_DbIN_peak_F6_JPN_WCNPO_OSDWLL_early_Area1(6)

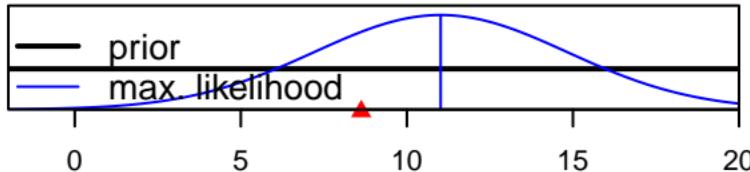


Parameter value

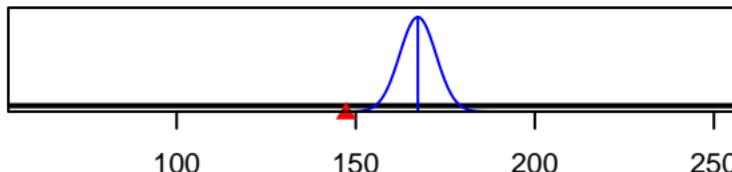




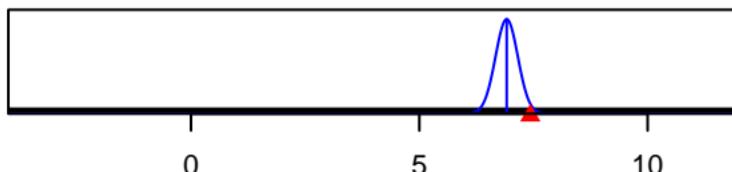
ascend_se_F1_JPN_WCNPO OSDWCOLL_late_Area1(1)_BI



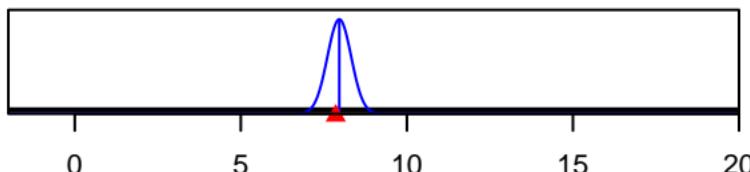
DbIN_peak_F2_TWN_WCNPO_DWLL_late(2)_BLK1rep_2



DbIN_ascend_se_F2_TWN_WCNPO_DWLL_late(2)_BLK1rep



bIN_descend_se_F2_TWN_WCNPO_DWLL_late(2)_BLK1rep



Parameter value