

Plots created using the 'r4ss' package in R

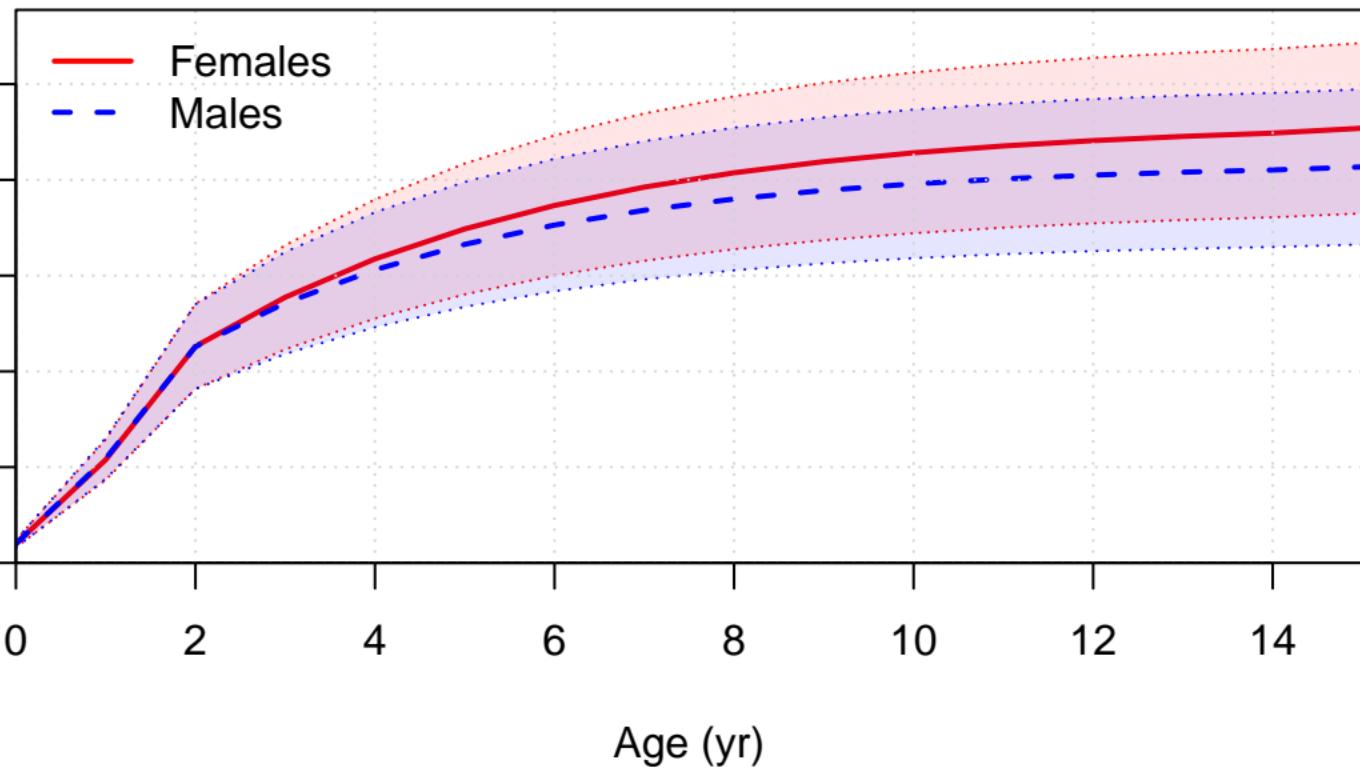
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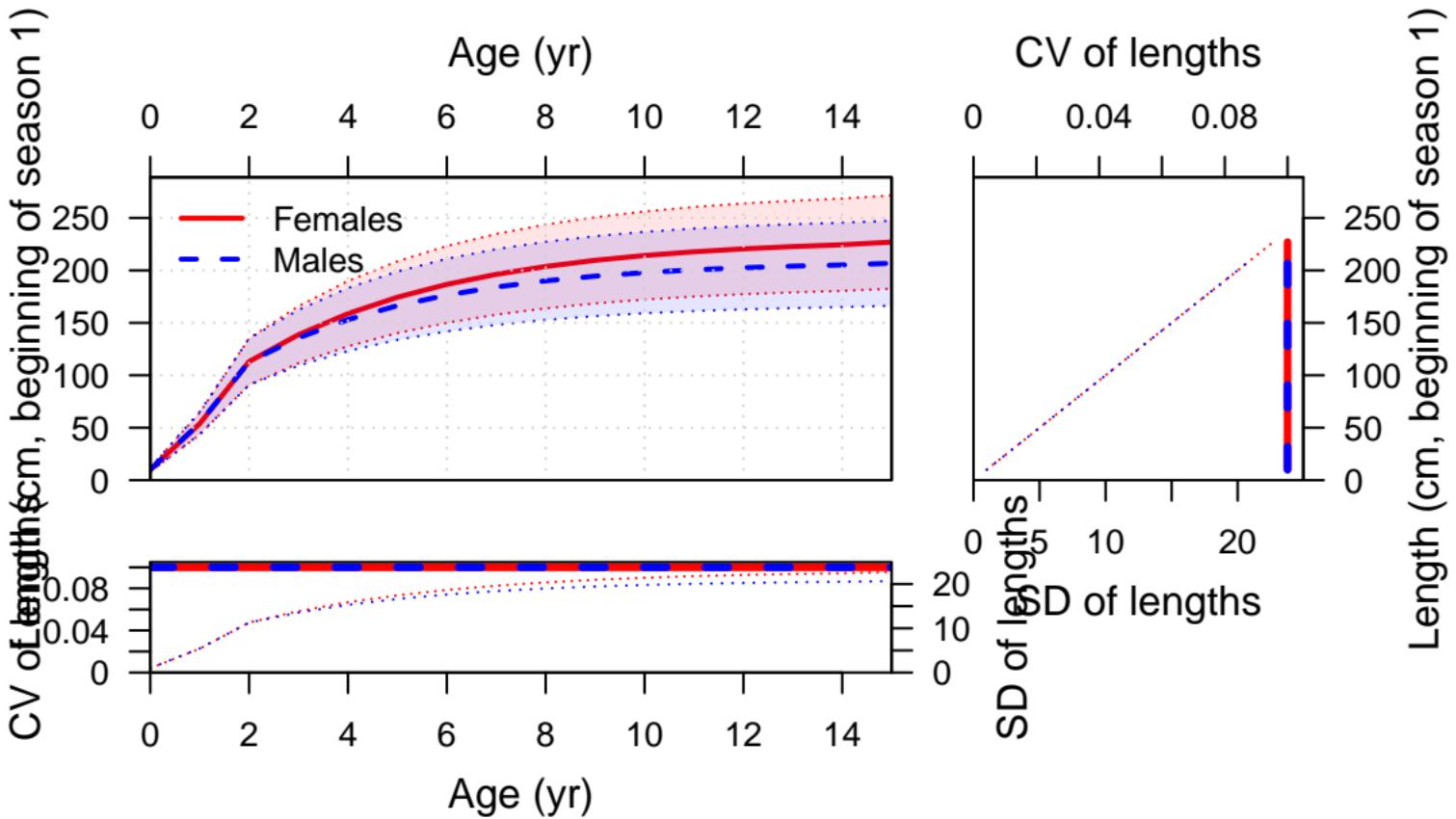
StartTime: Fri Apr 14 10:33:32 2023

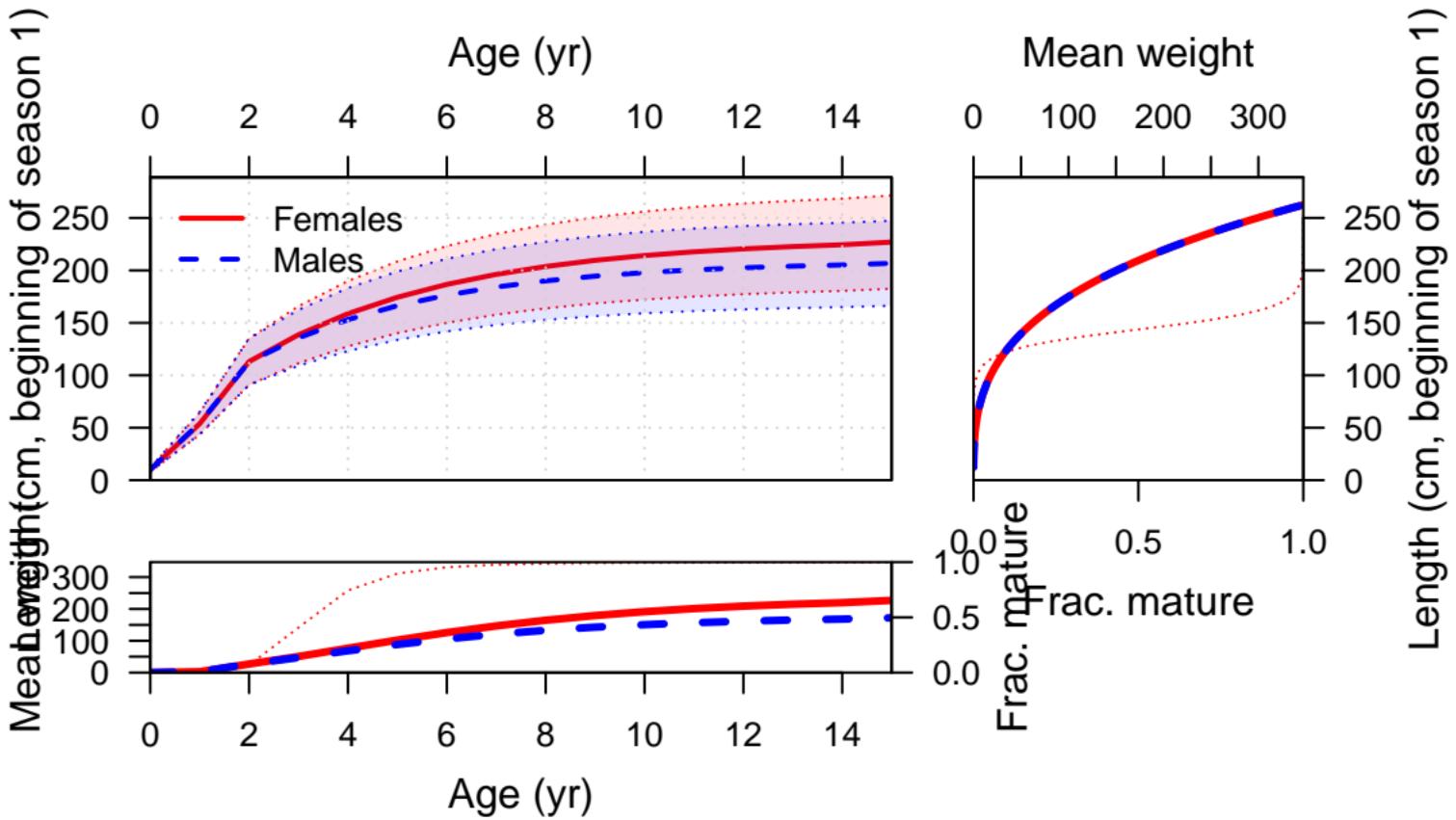
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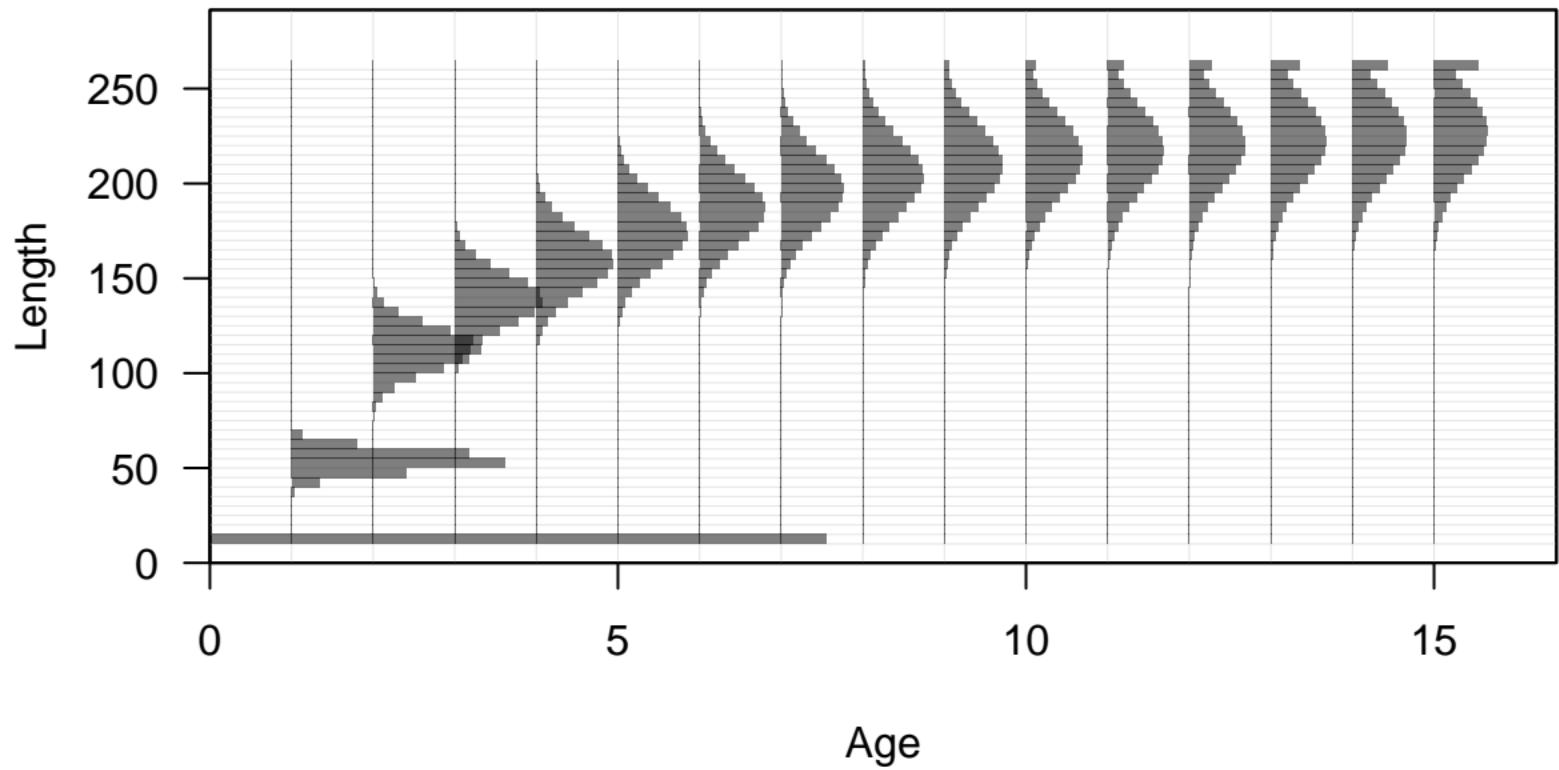
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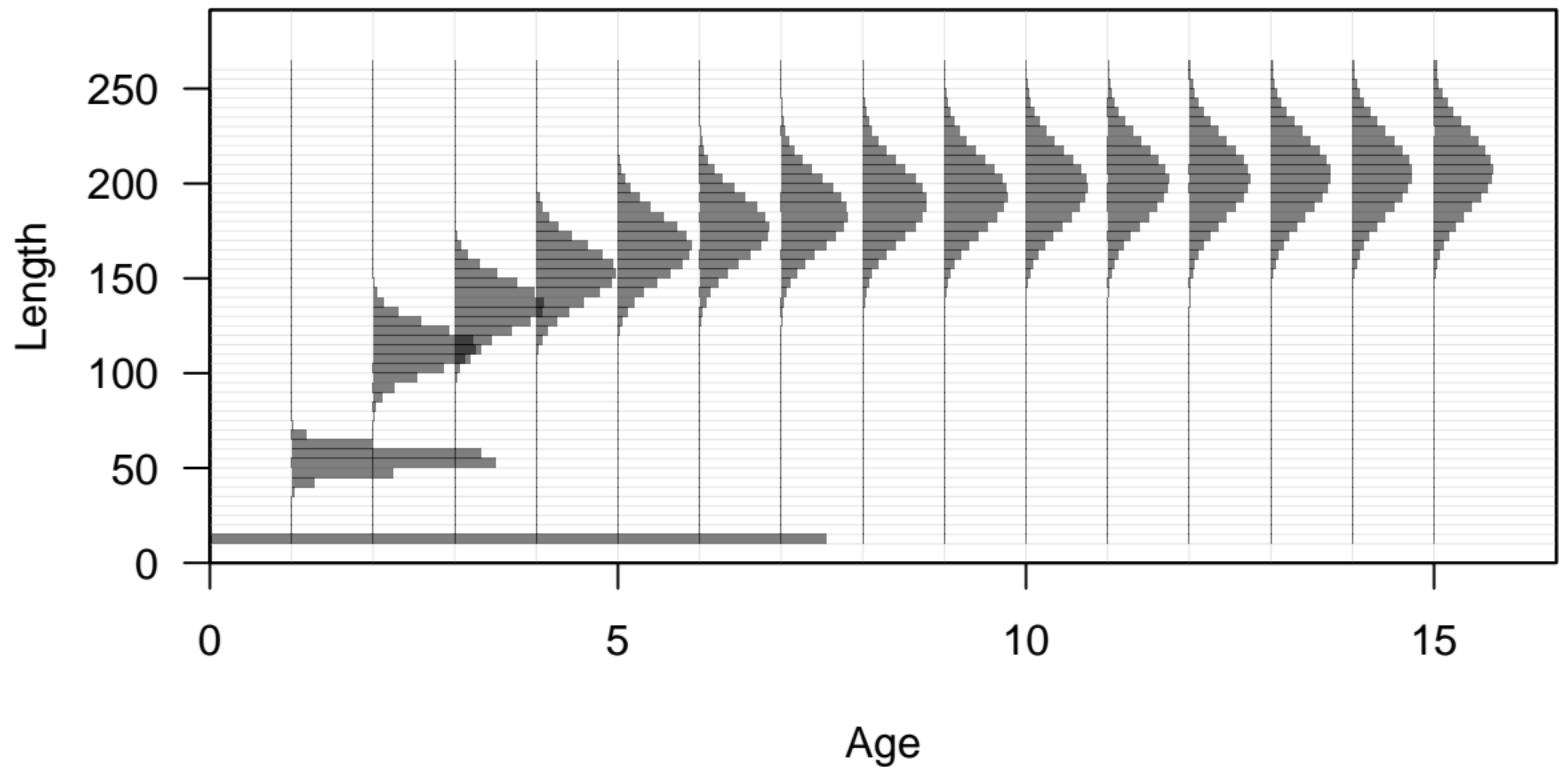
Length (cm, beginning of season 1)

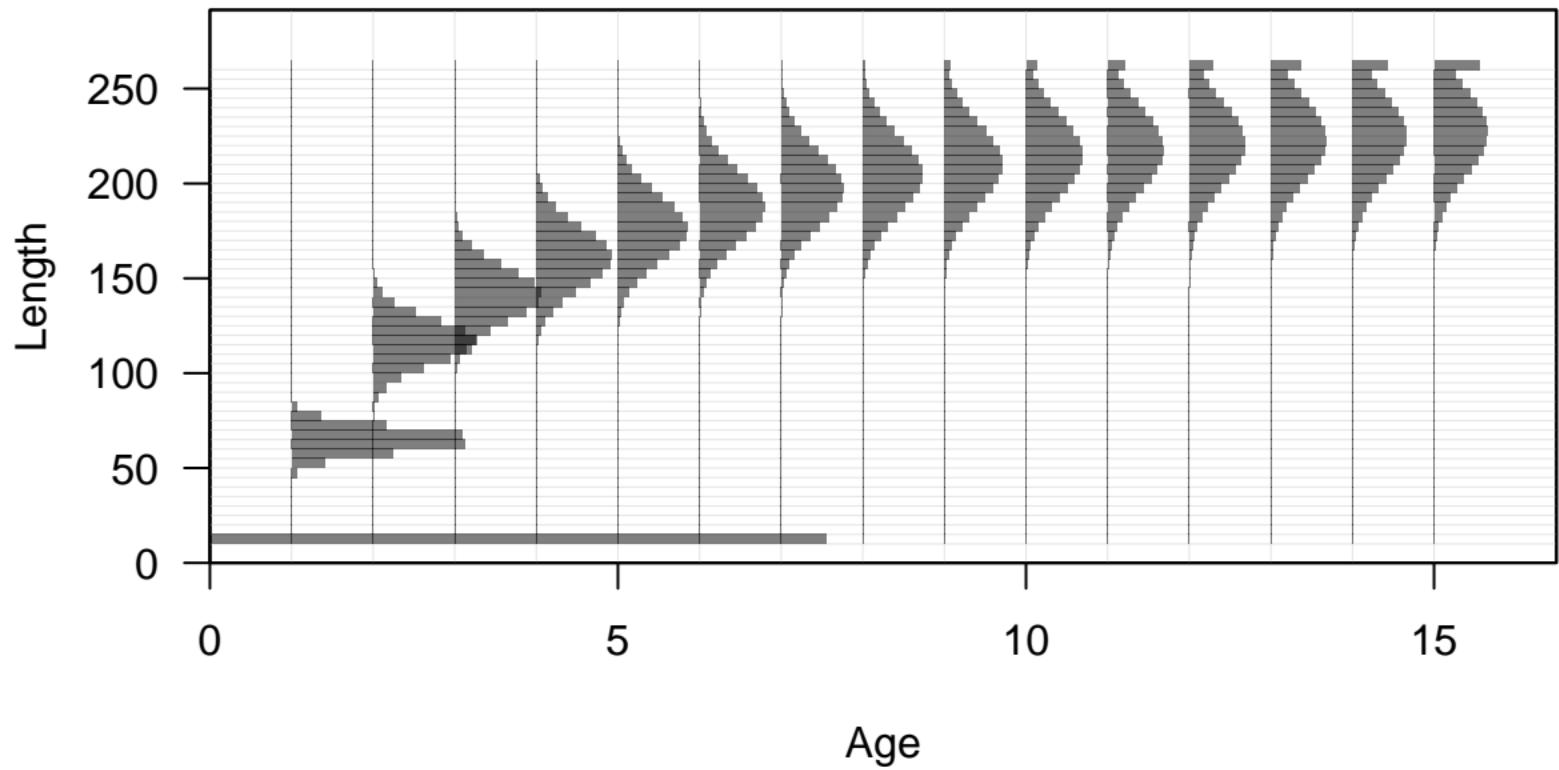


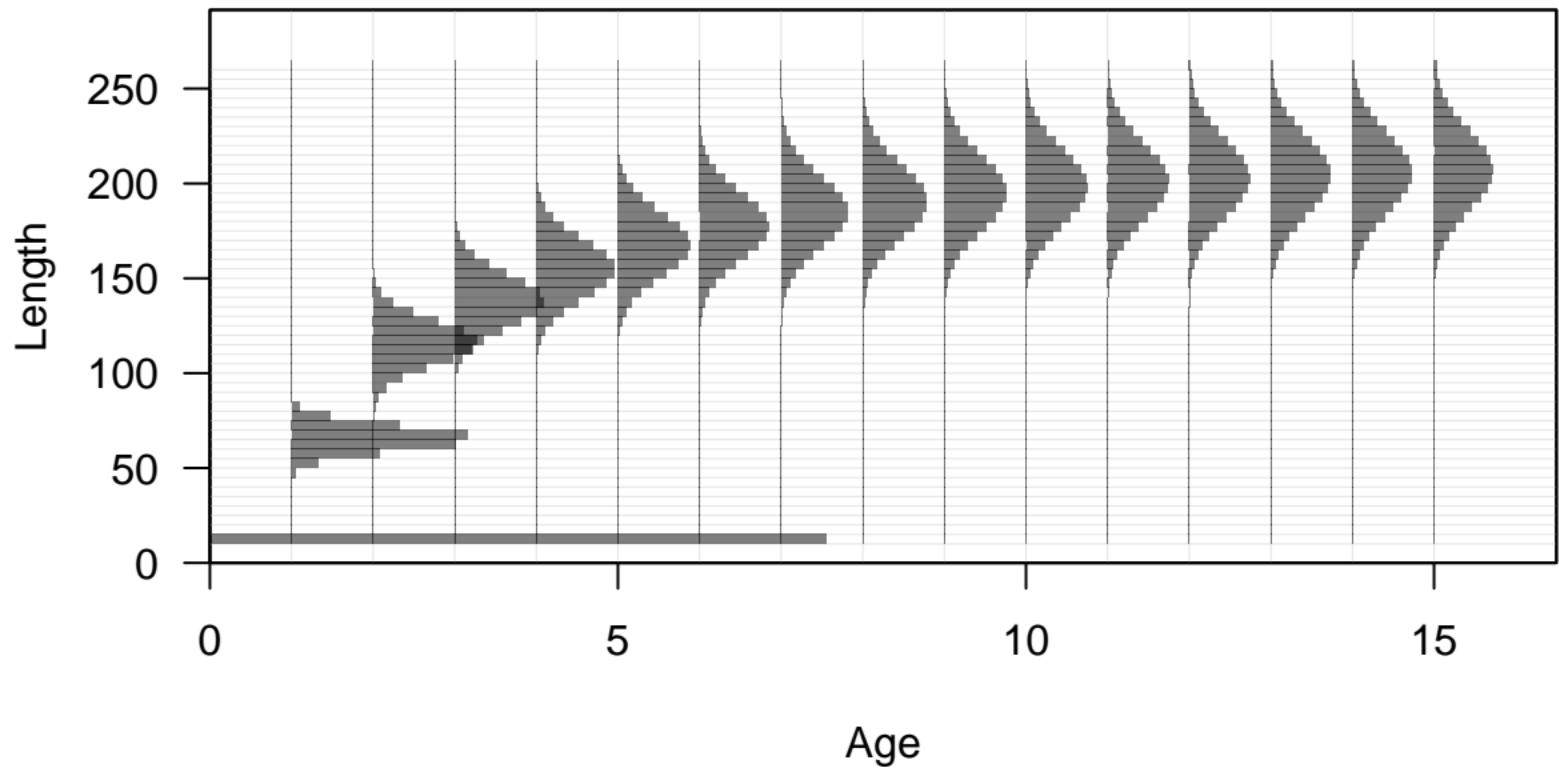


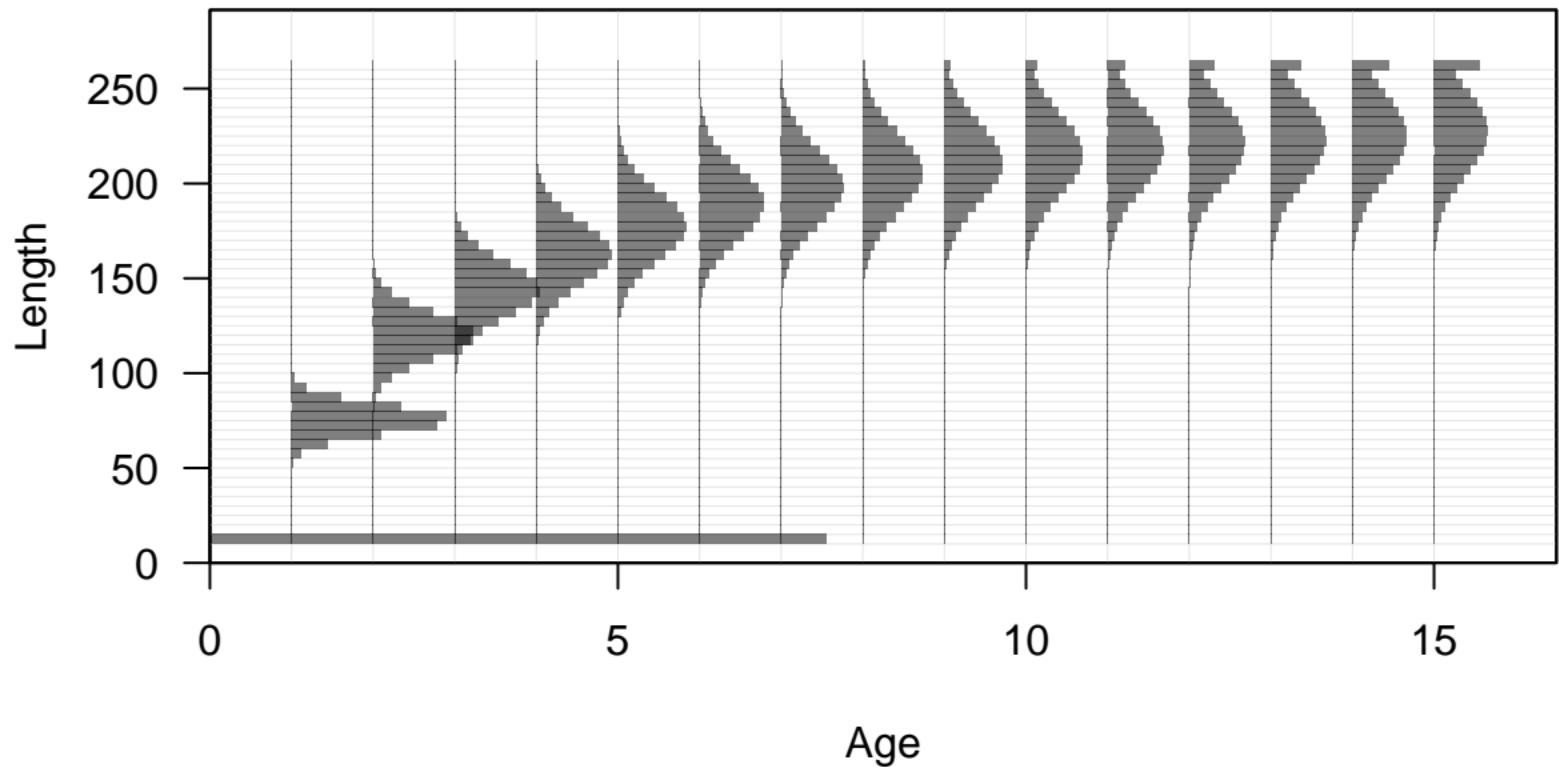


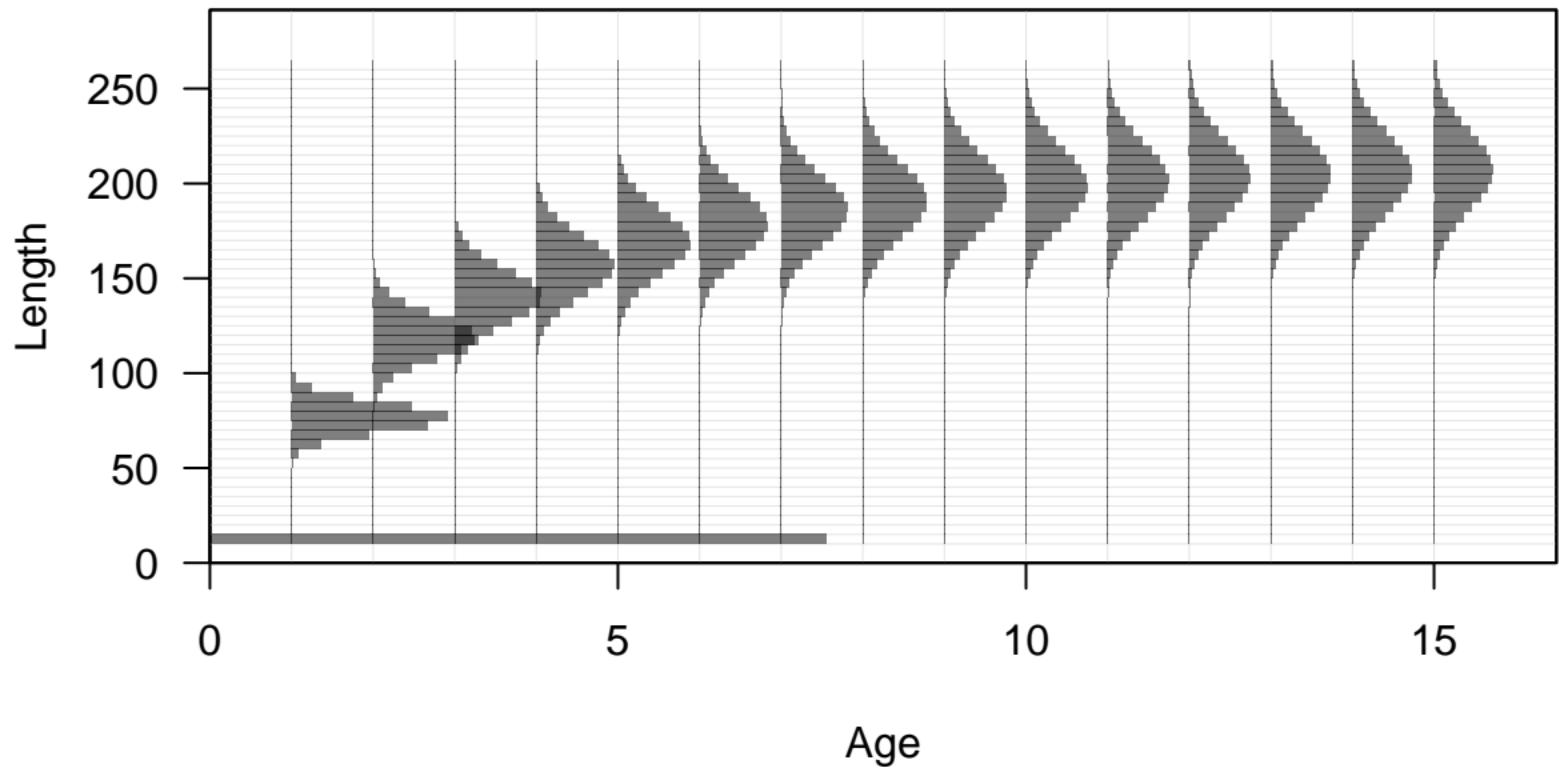


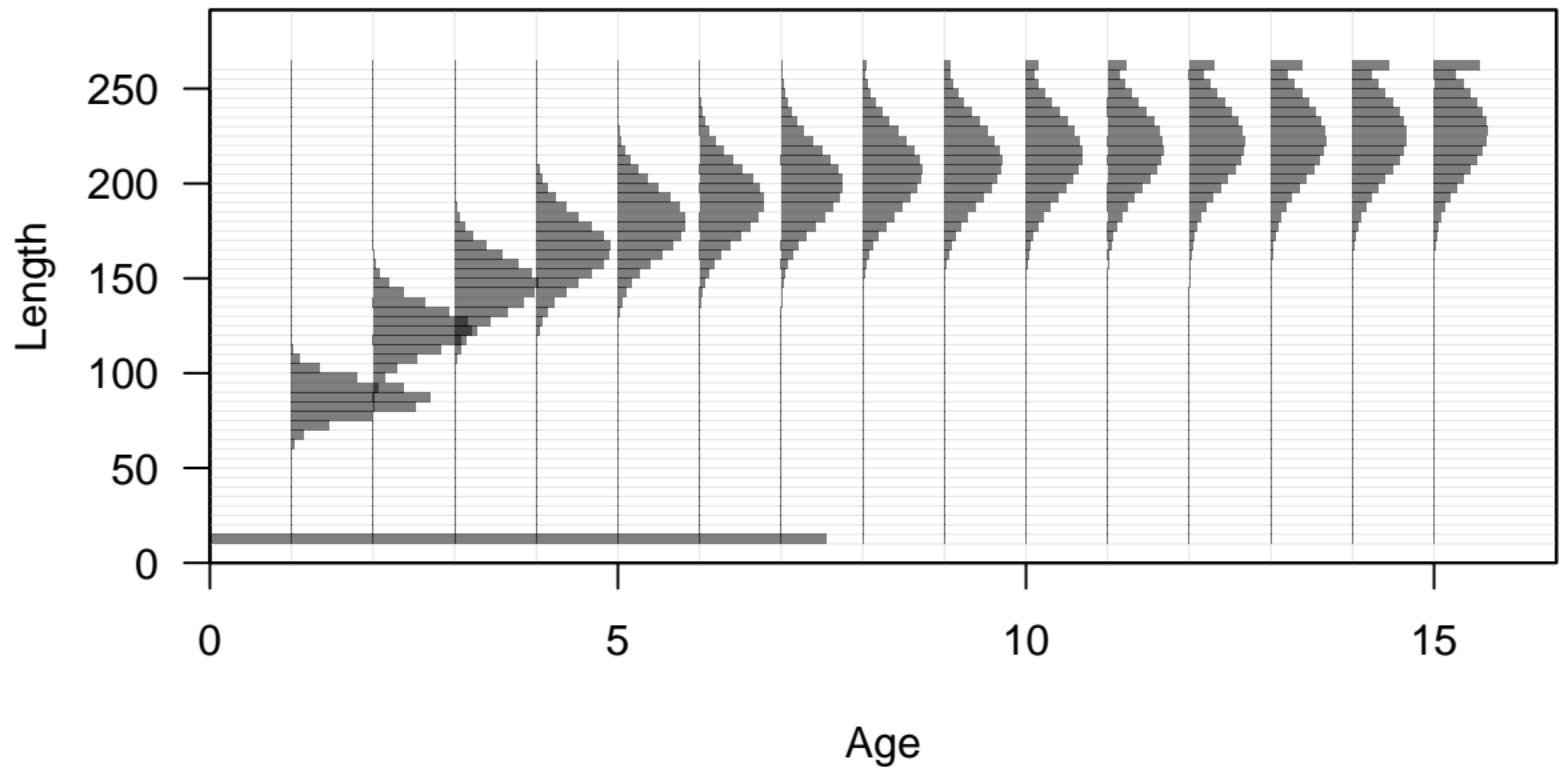


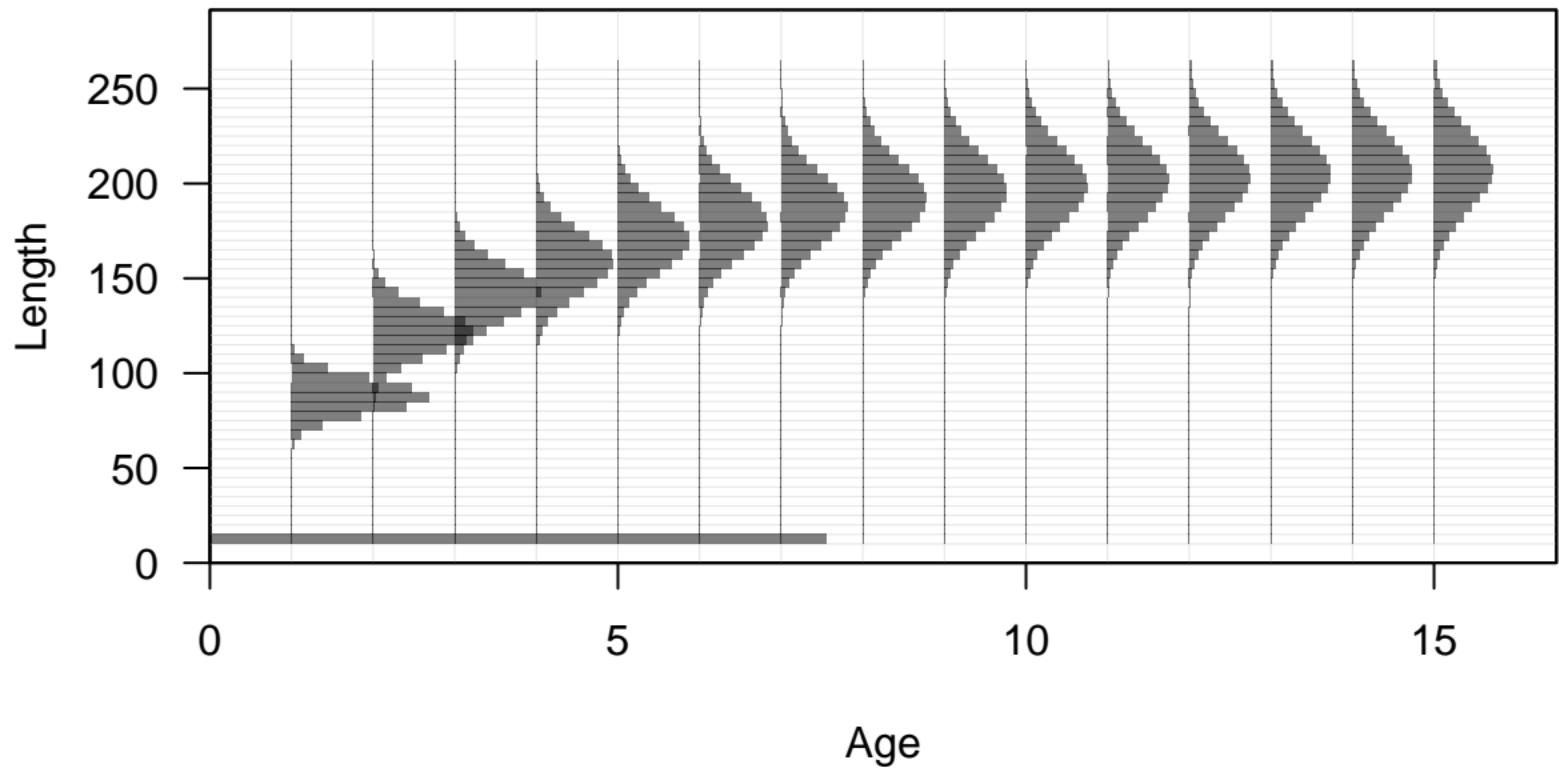


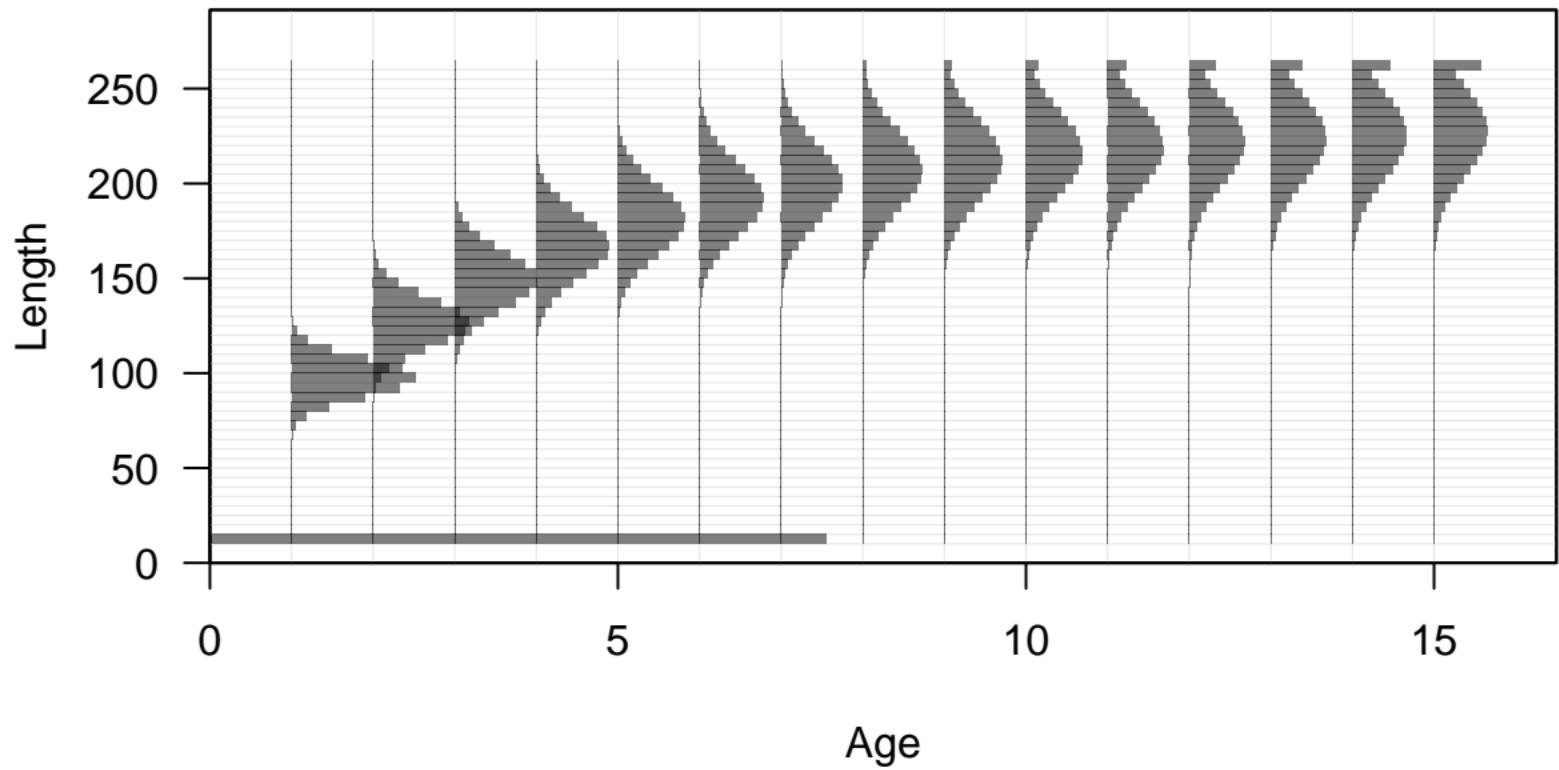


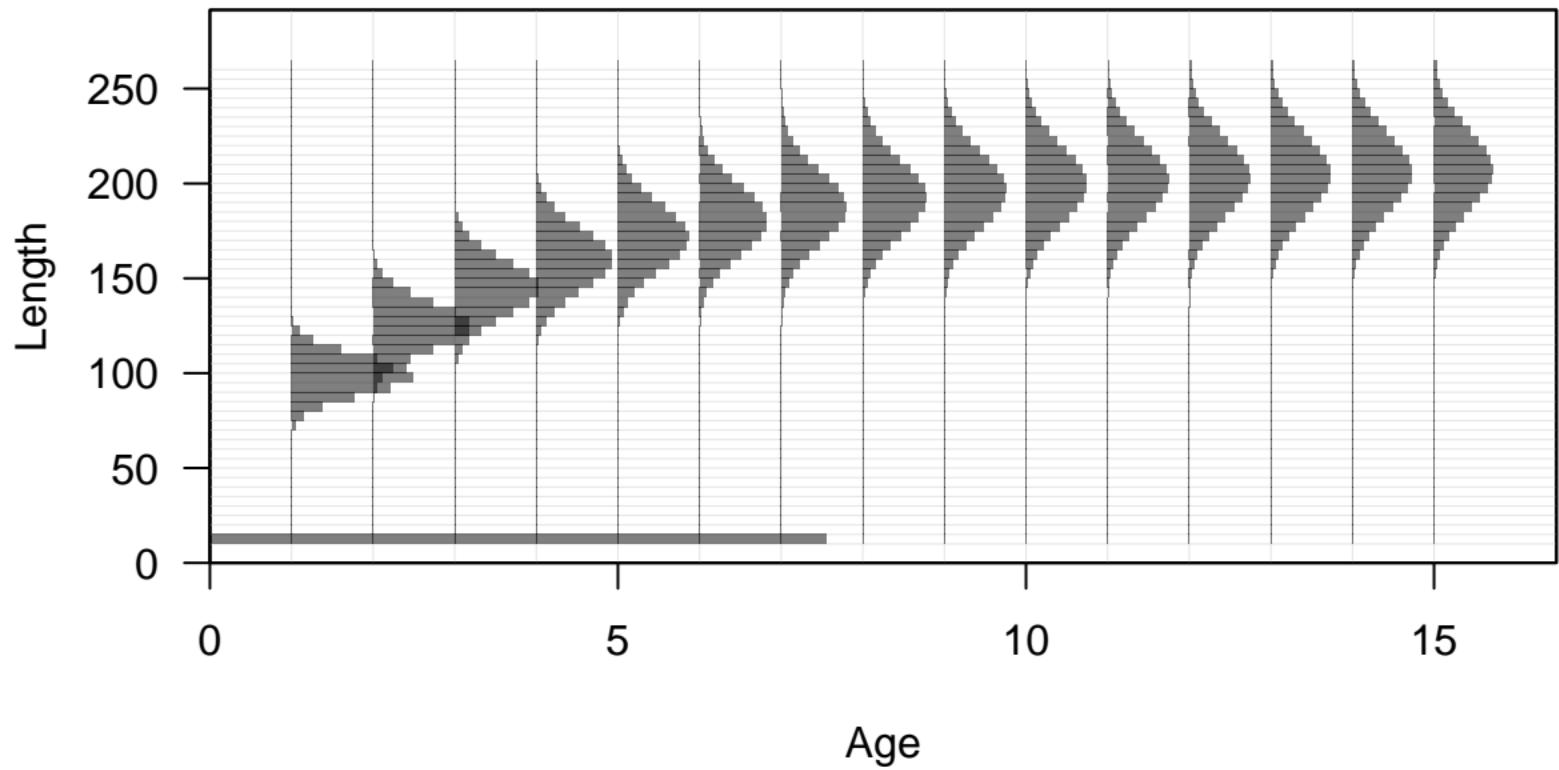


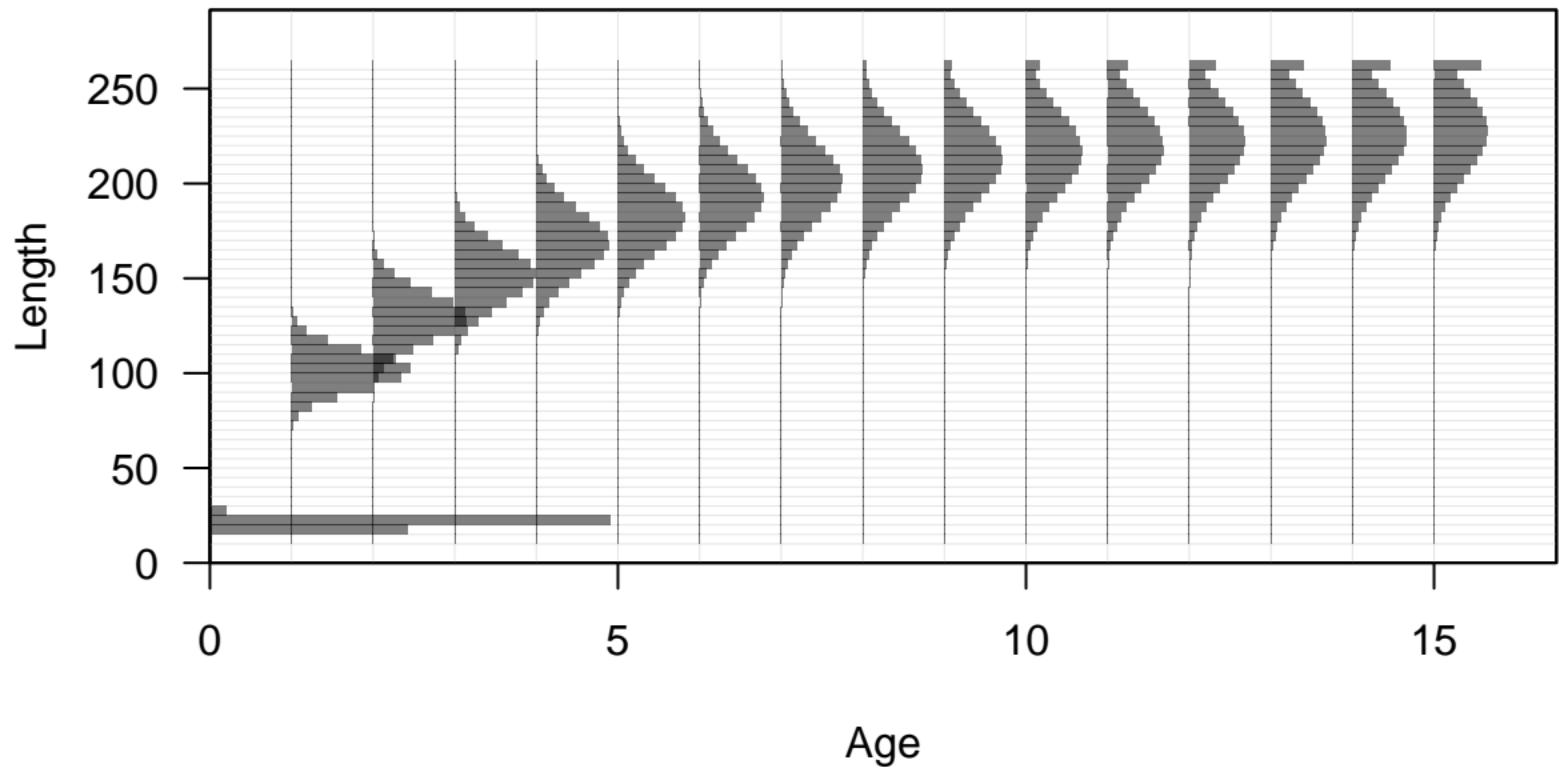


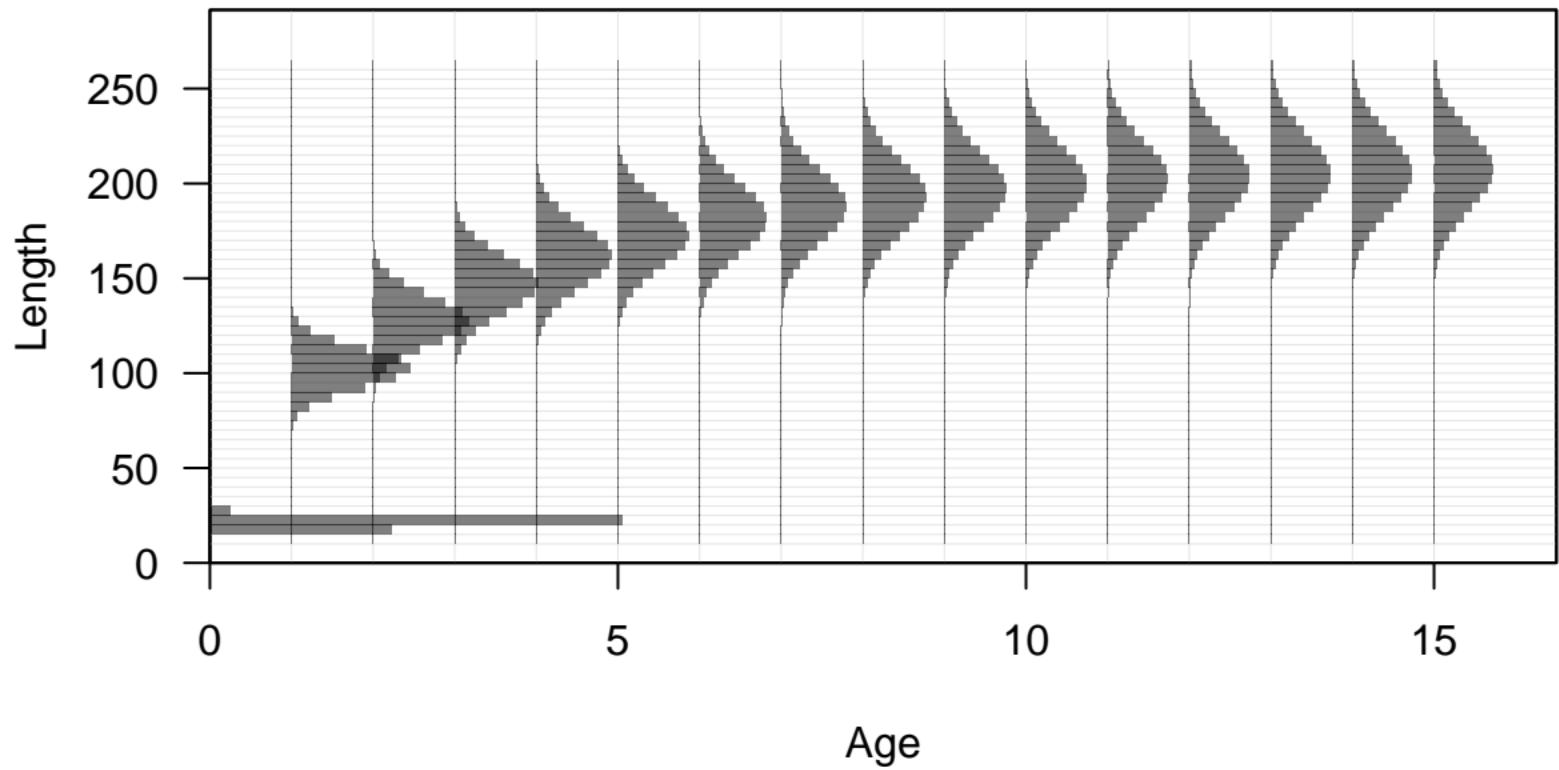


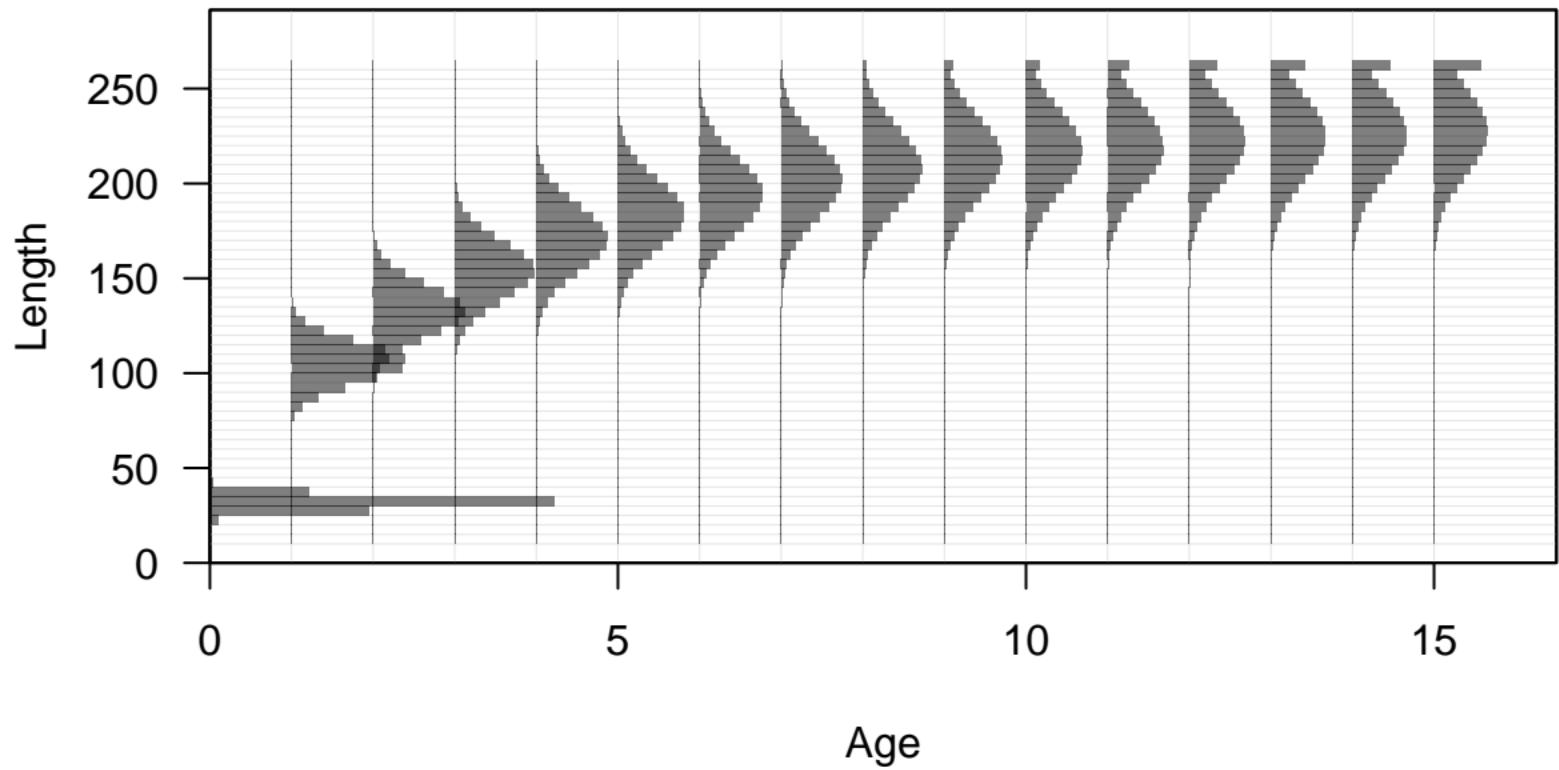


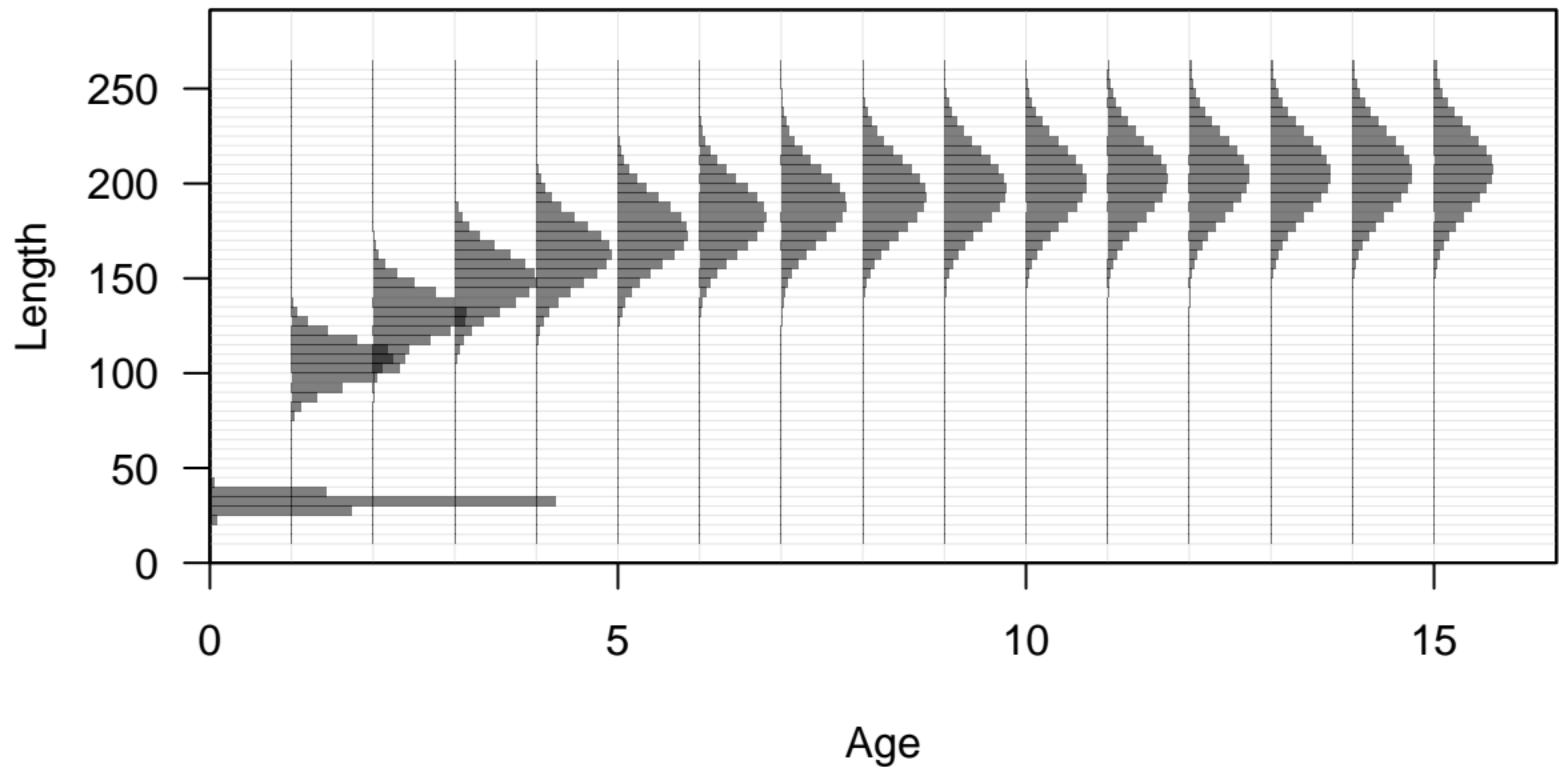


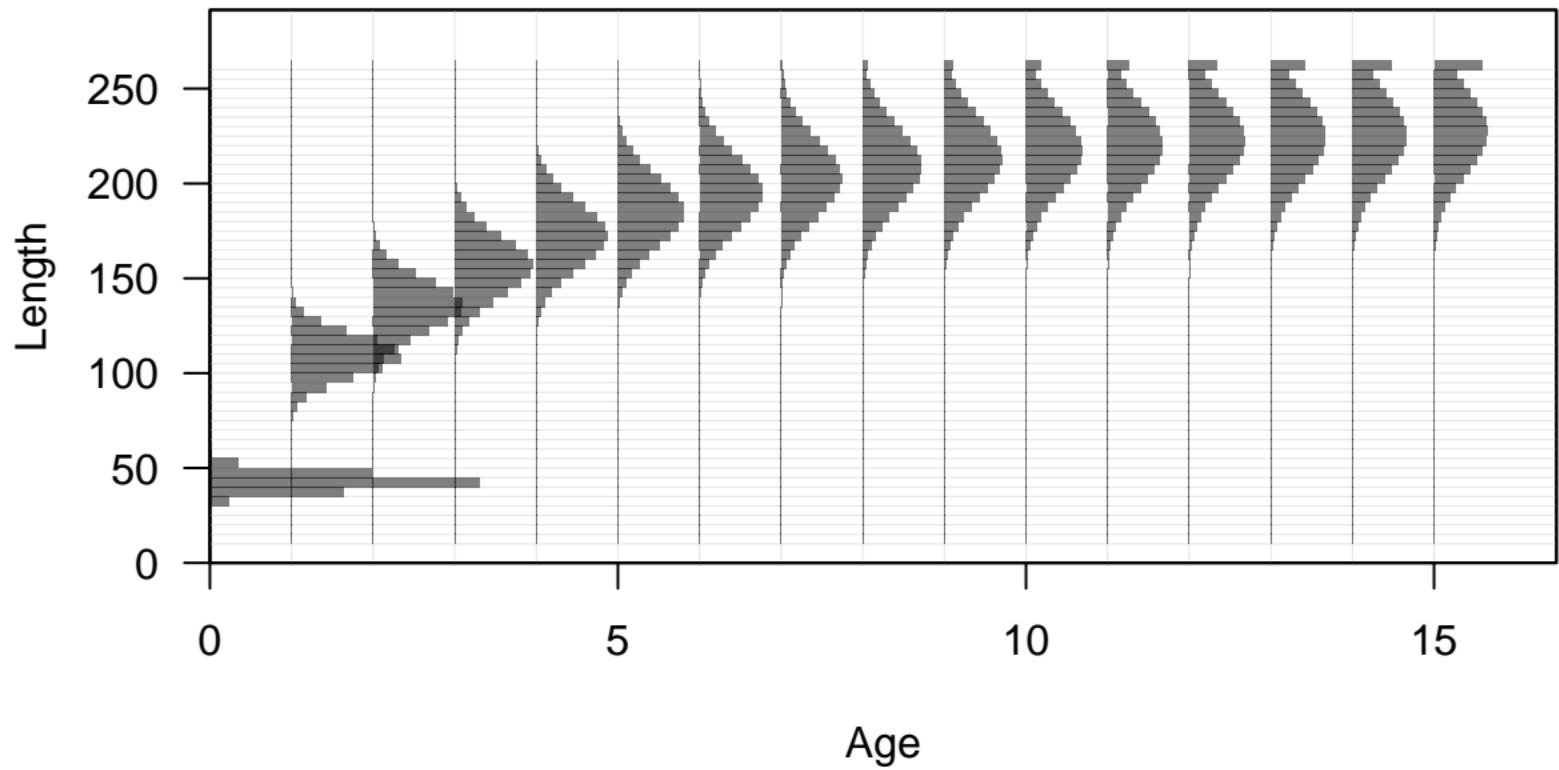


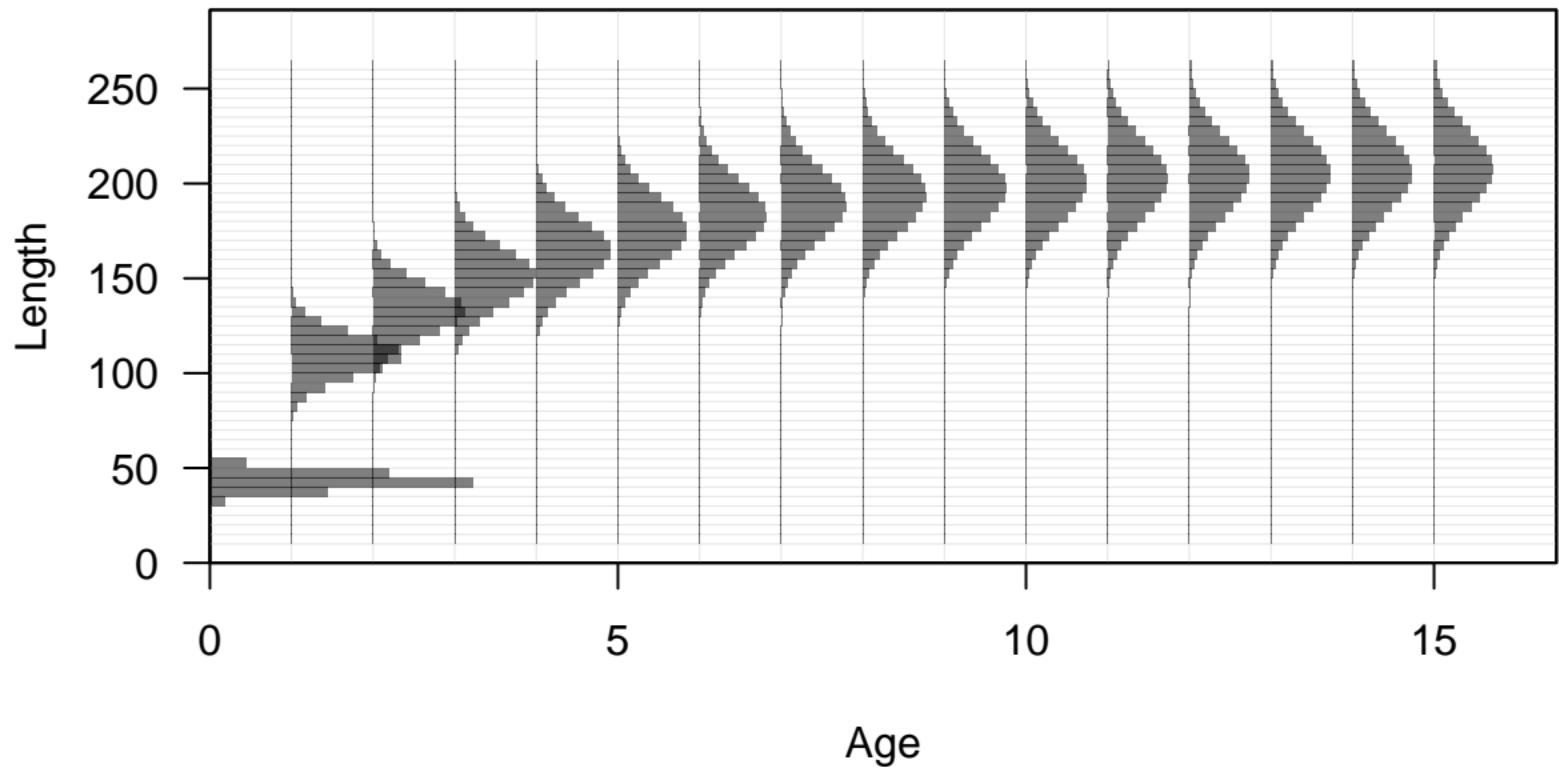


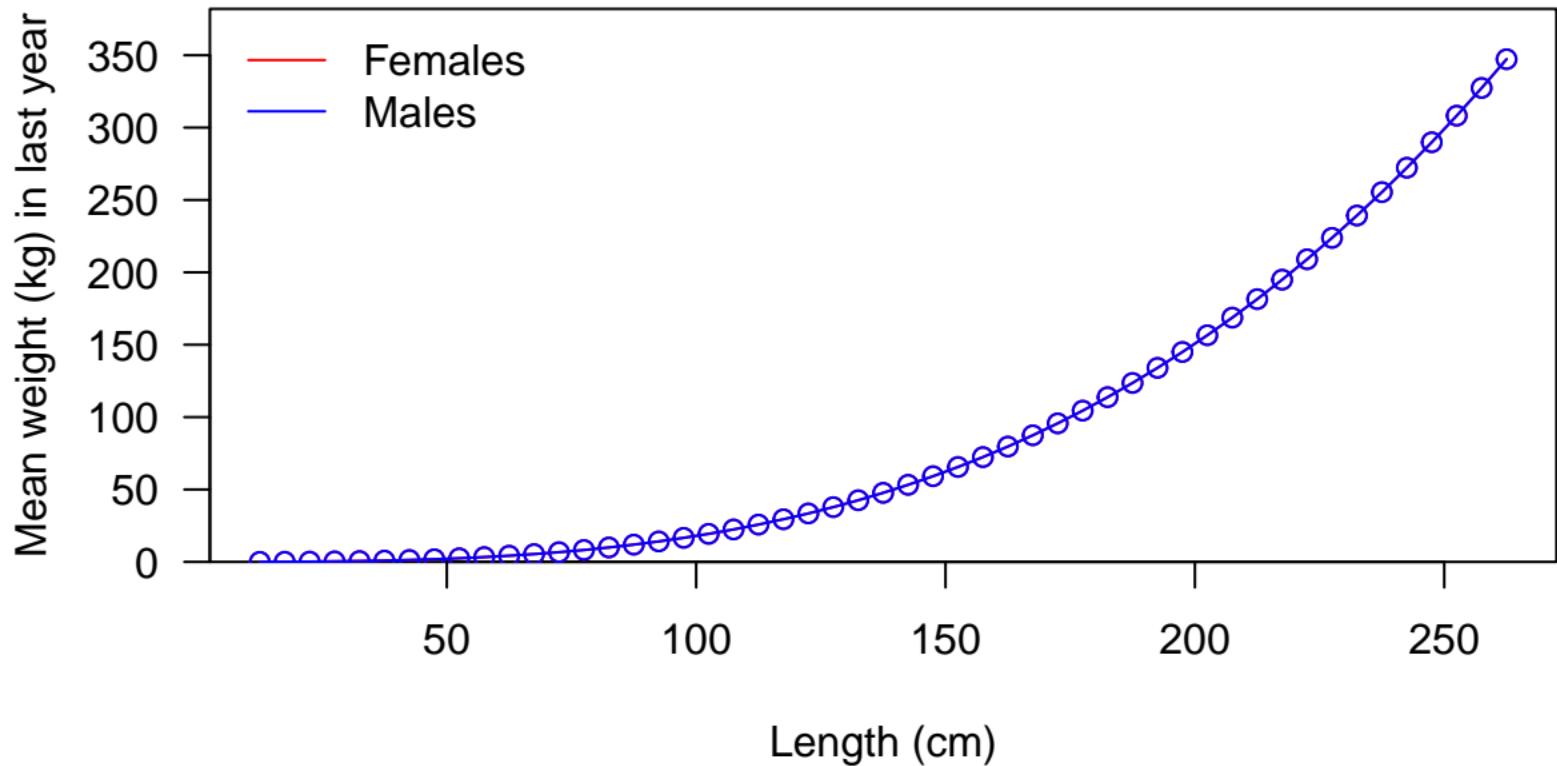


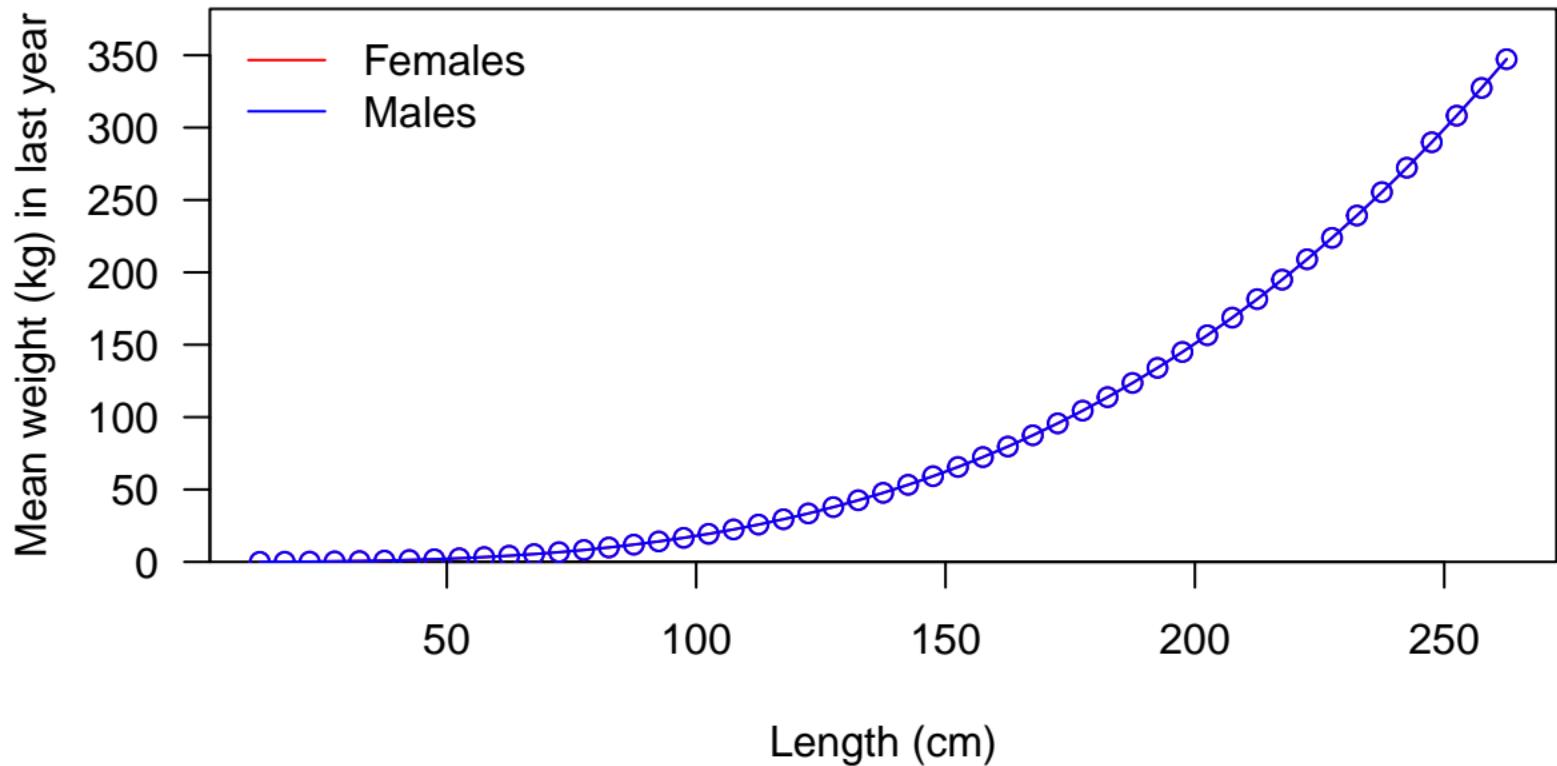


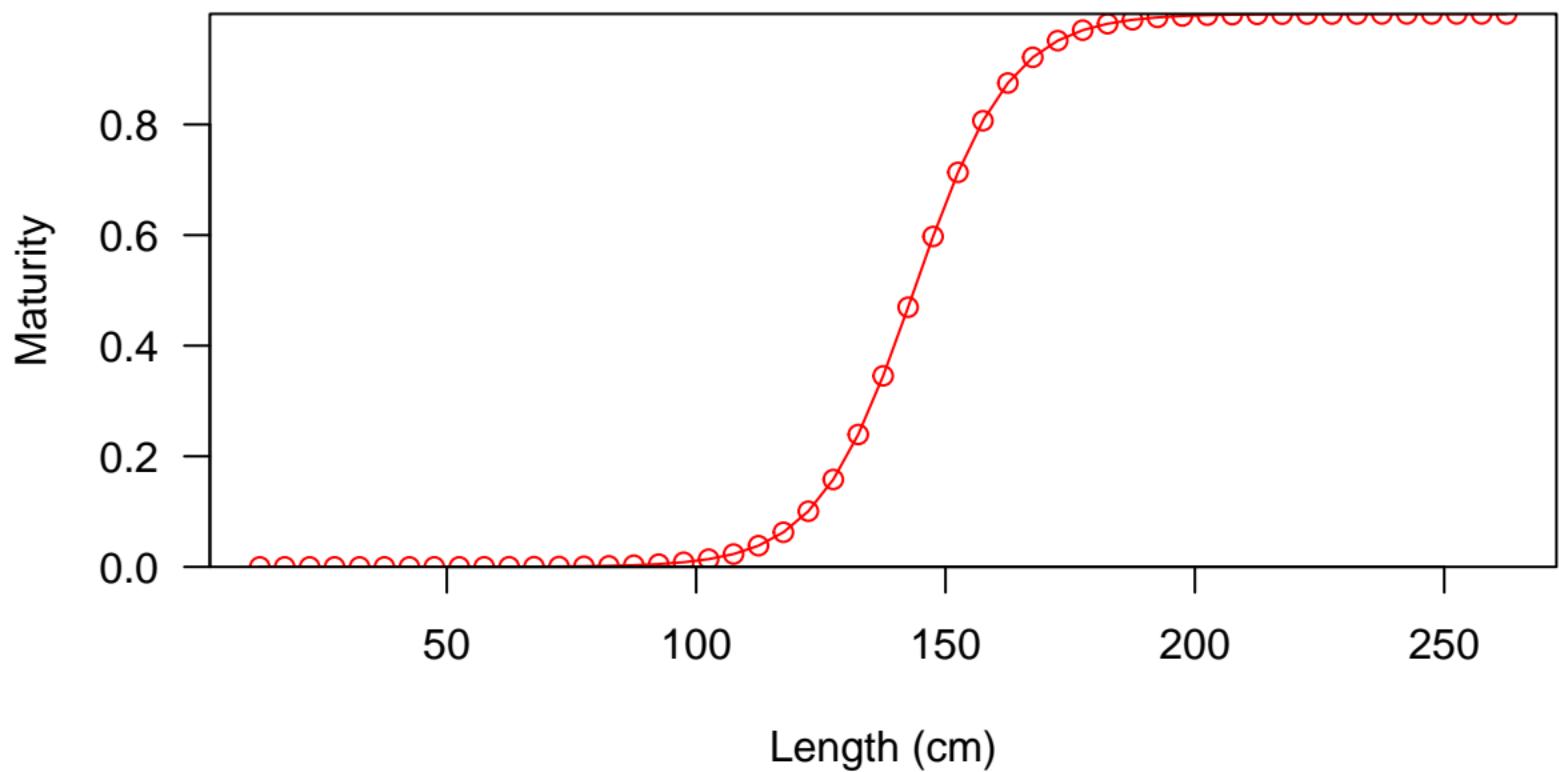


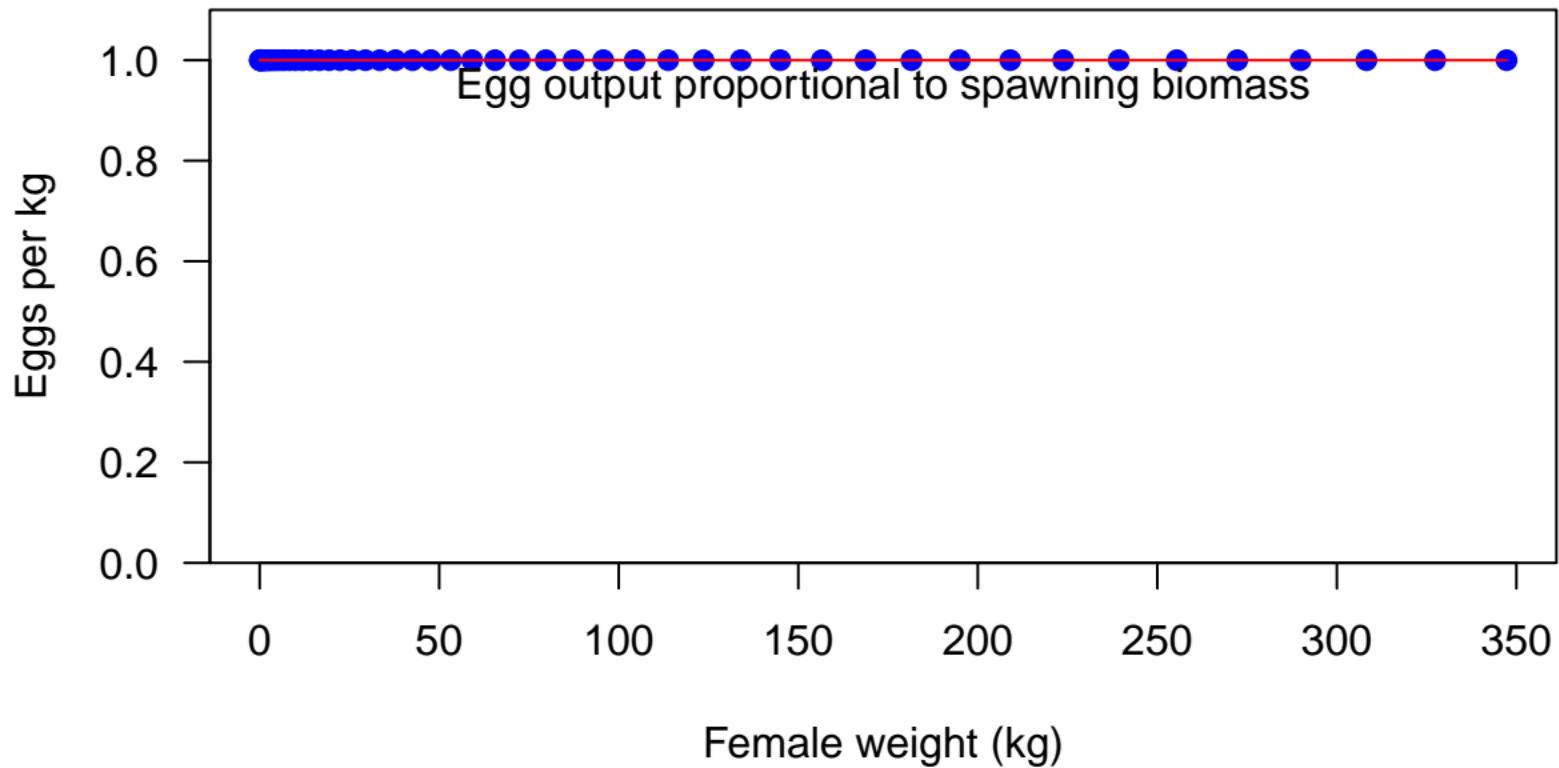


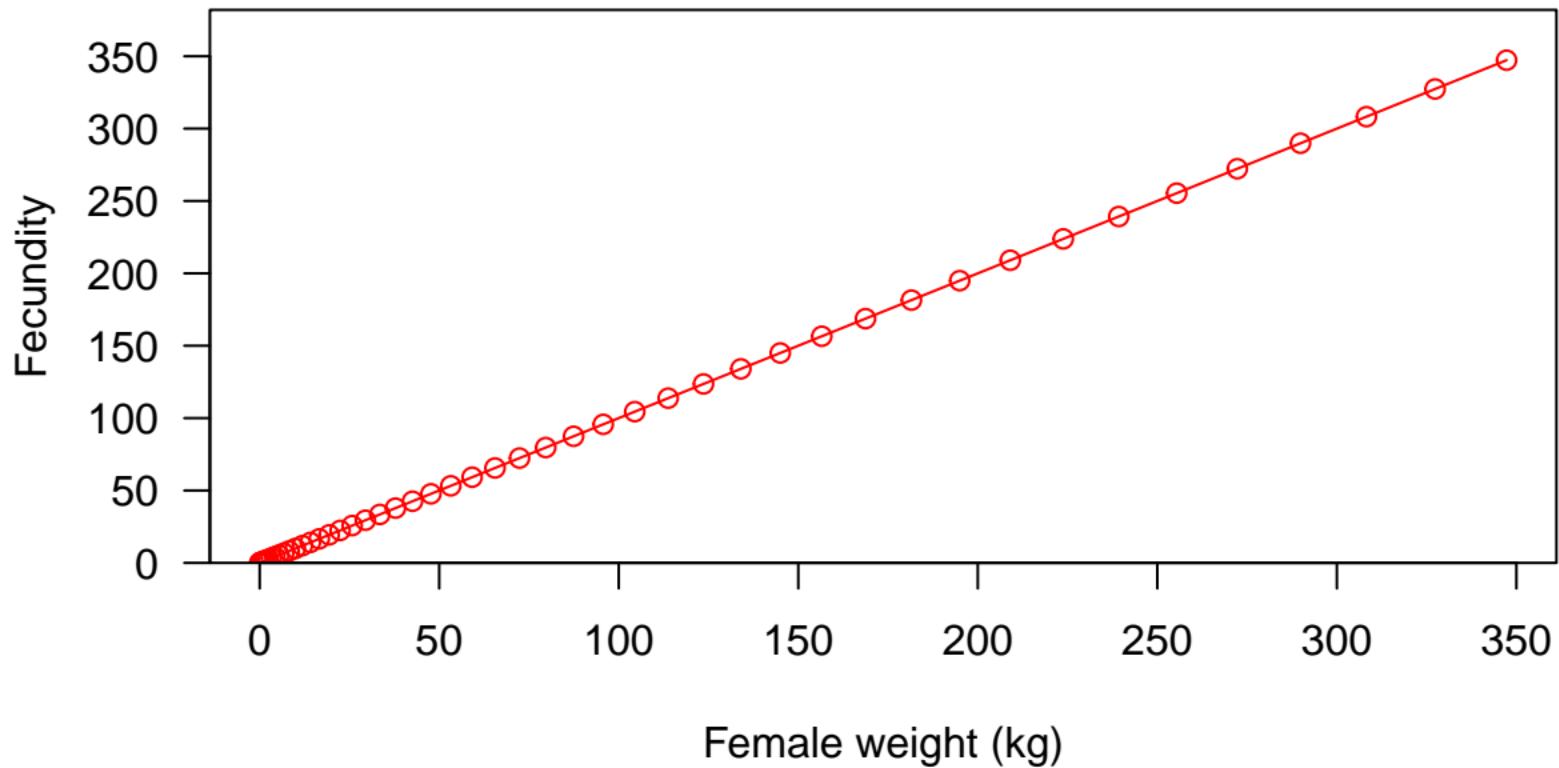


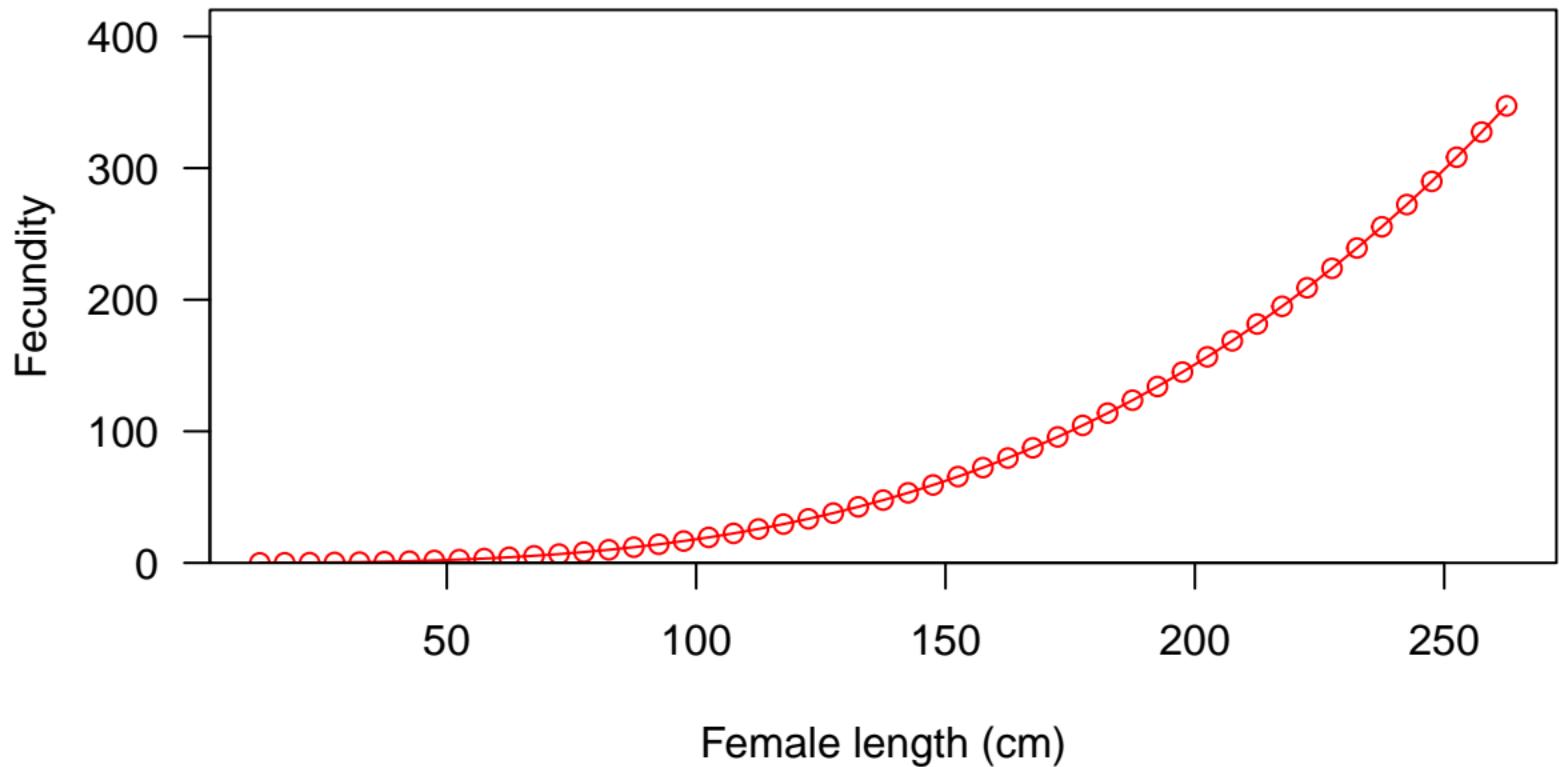


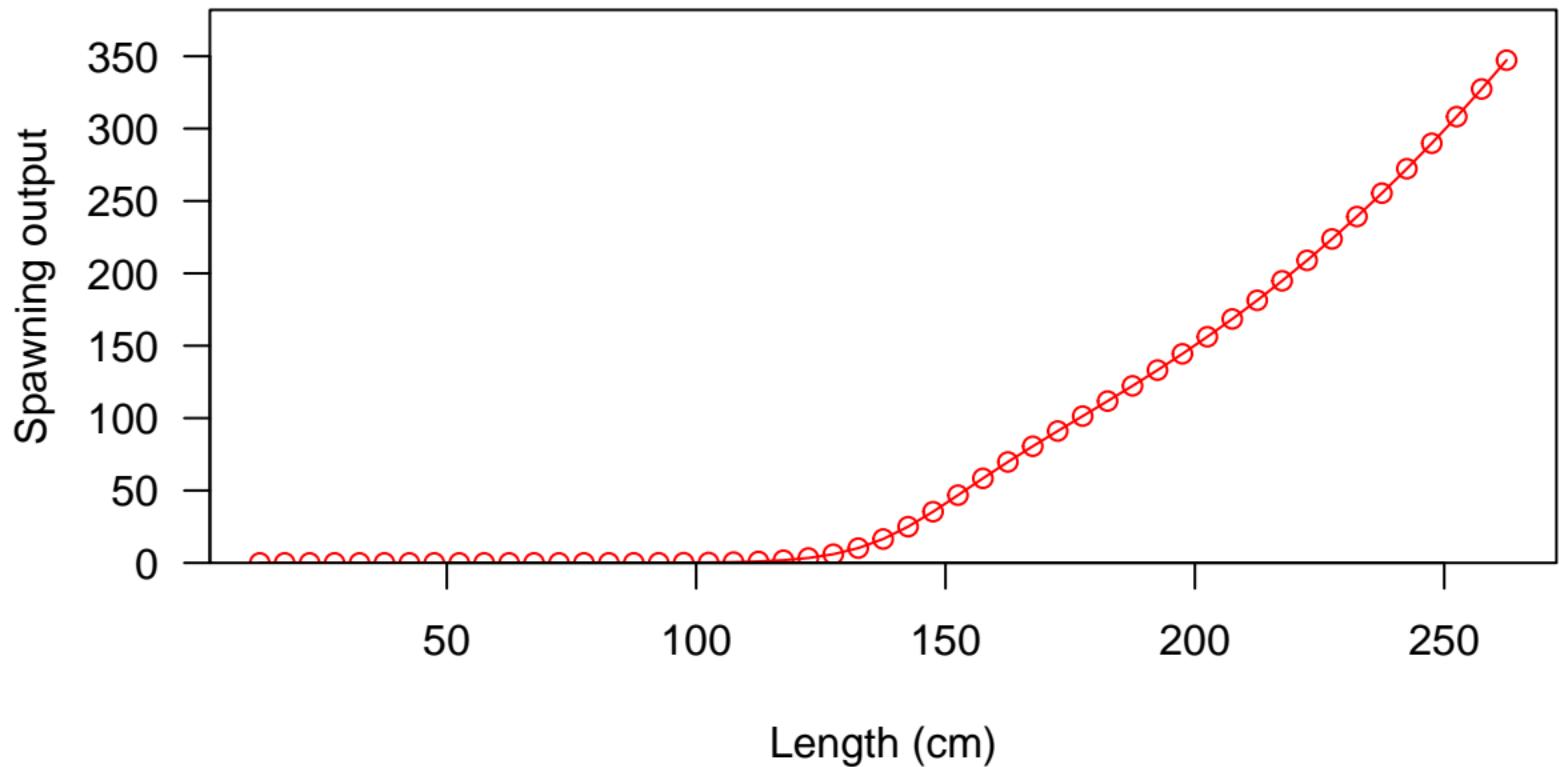


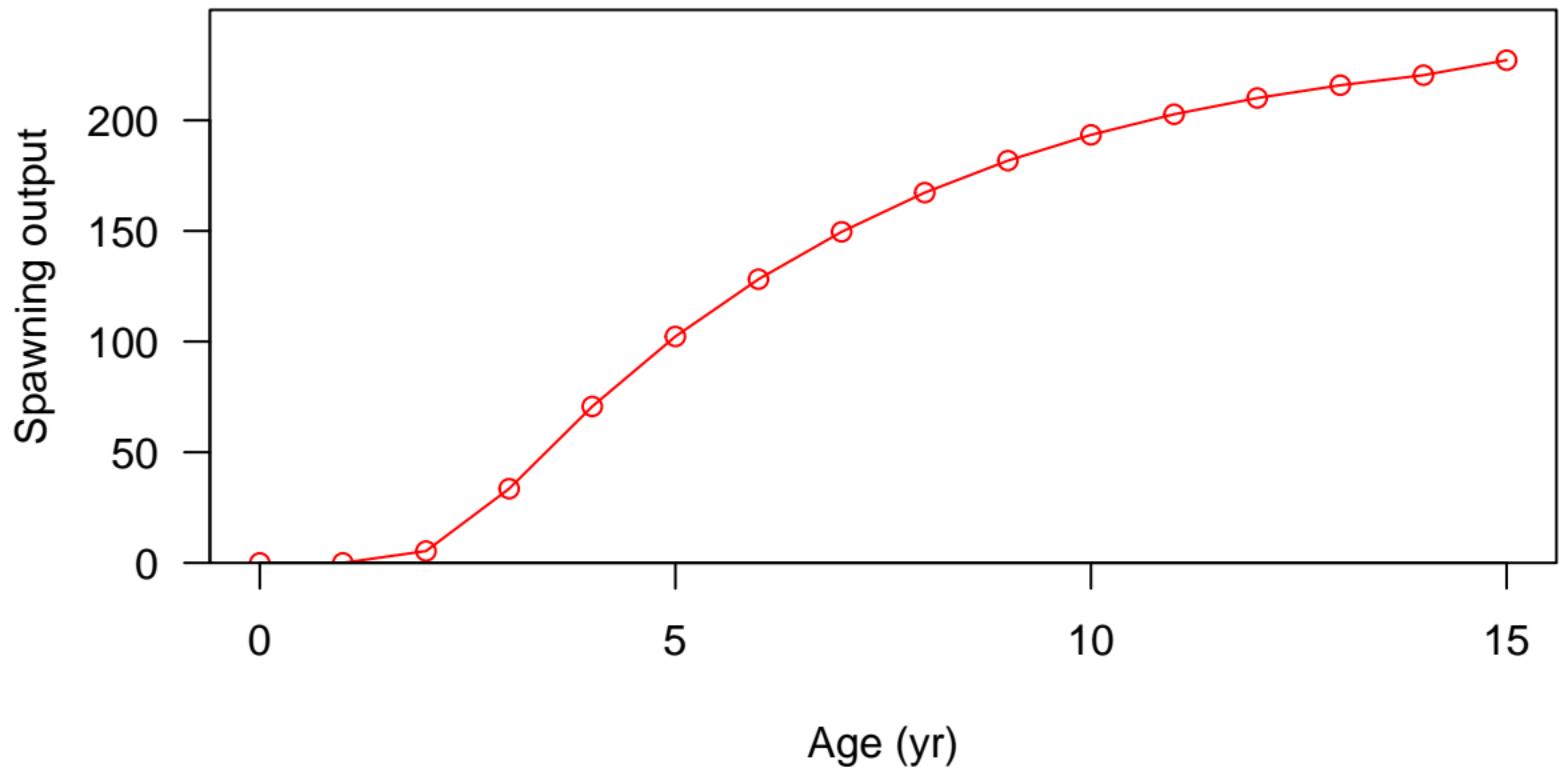


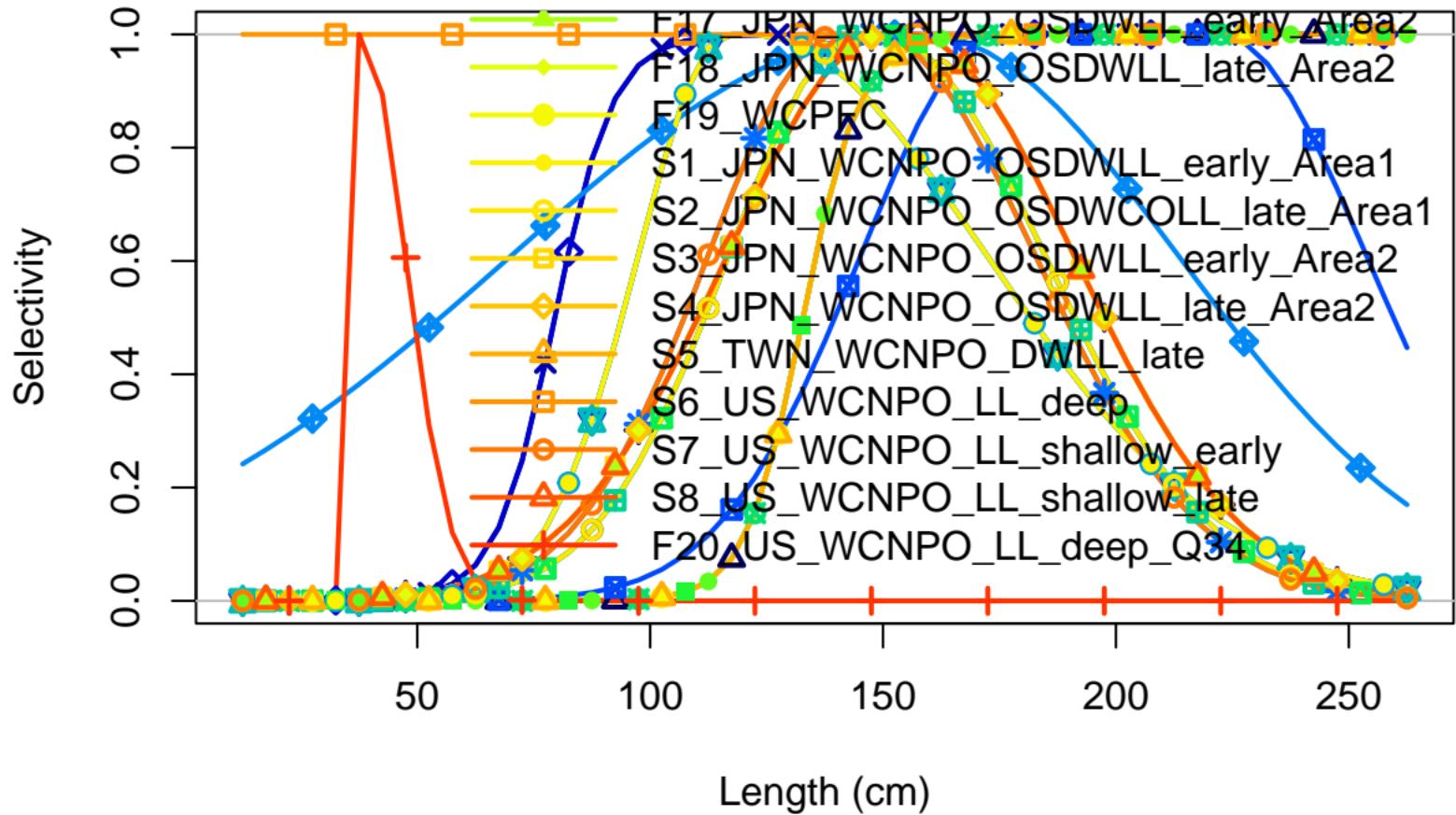


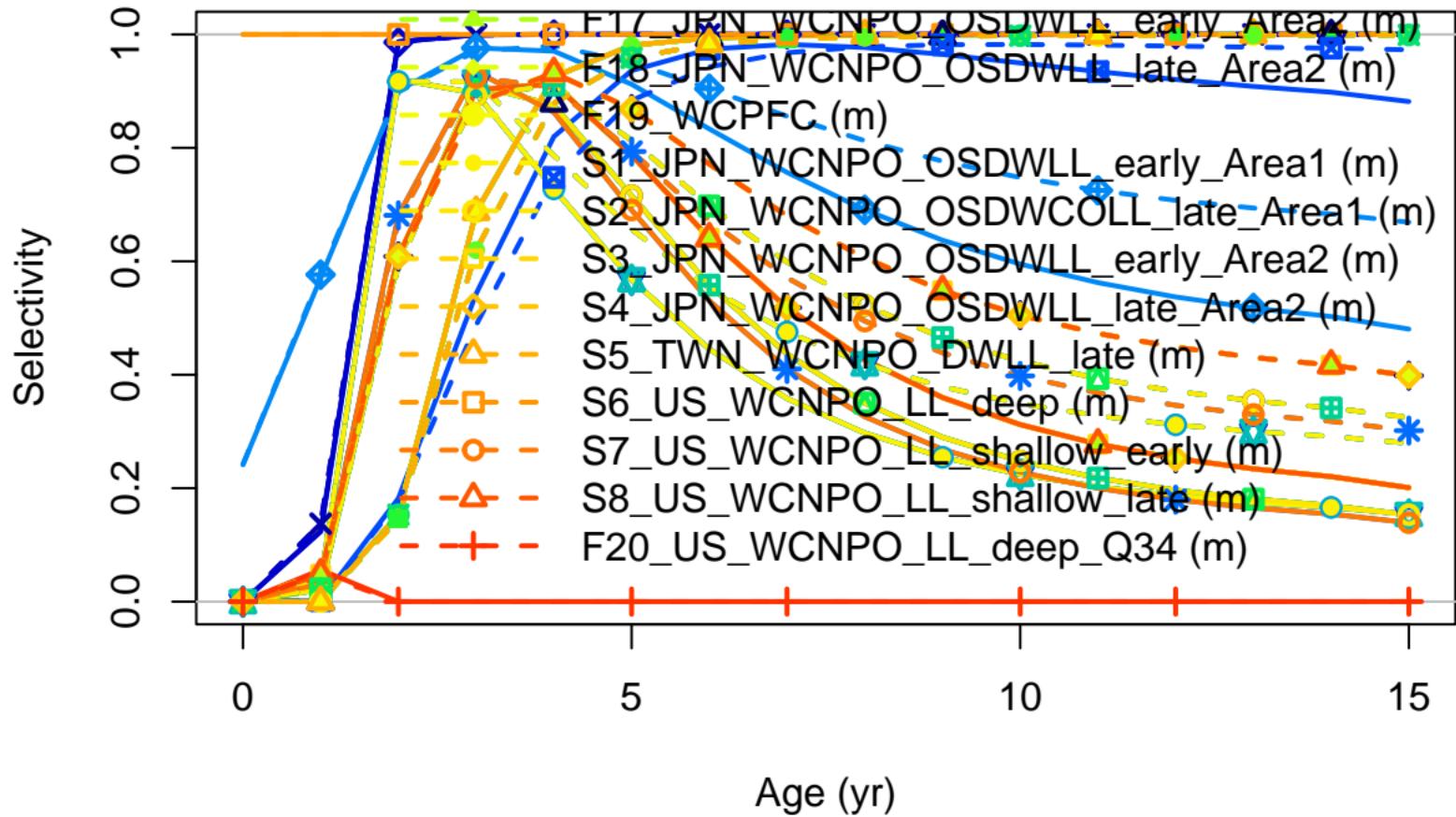


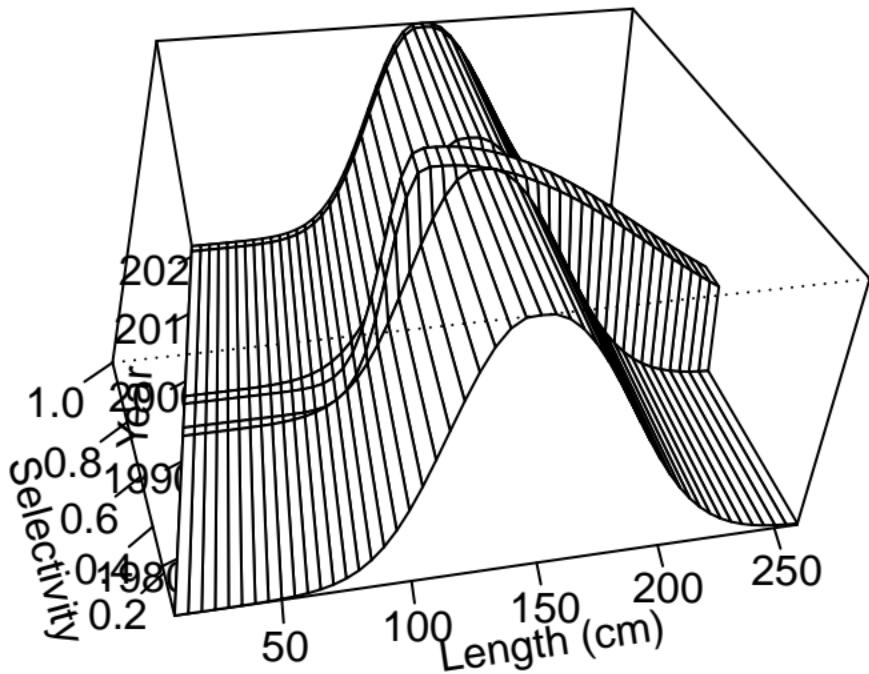


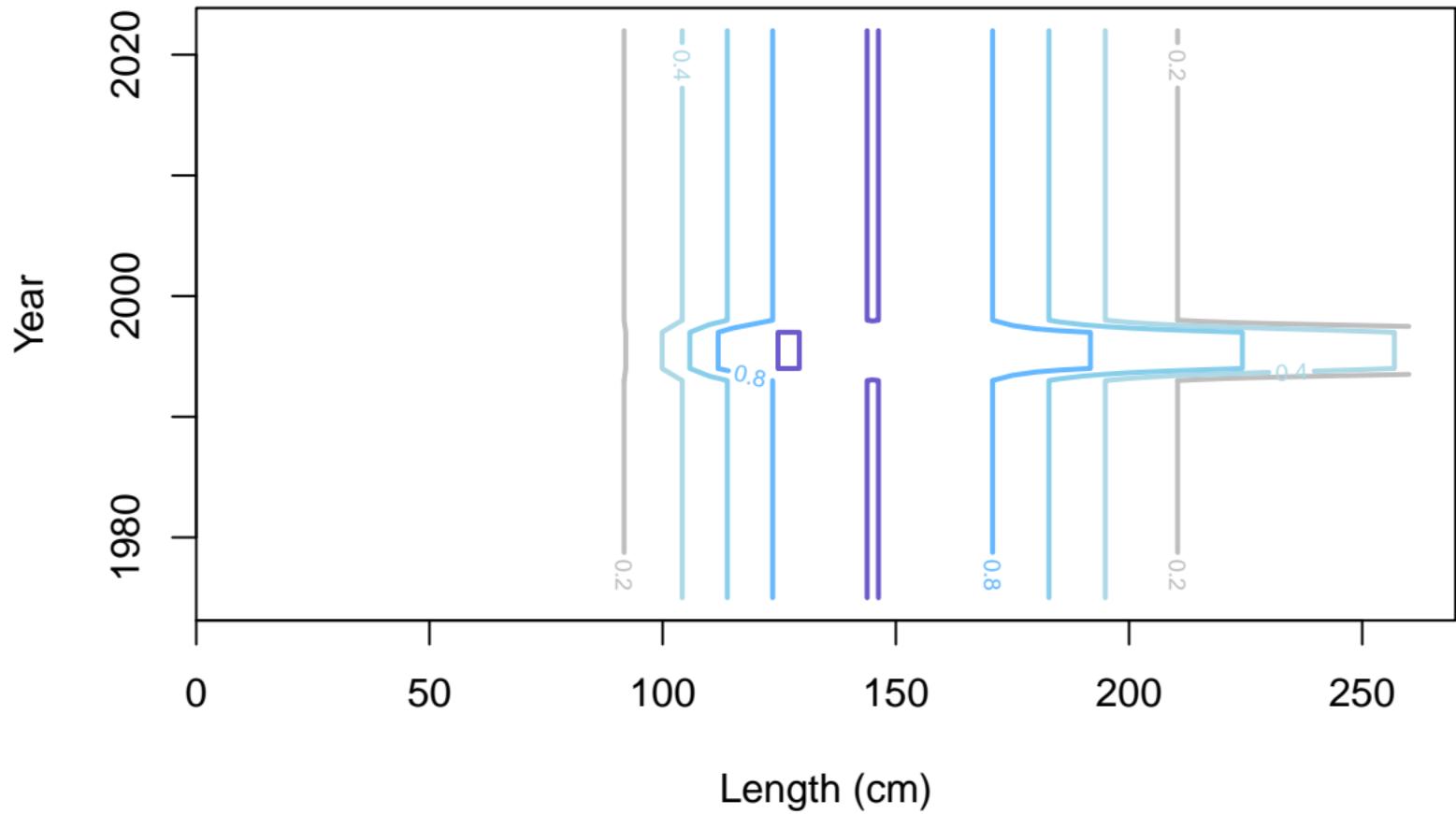


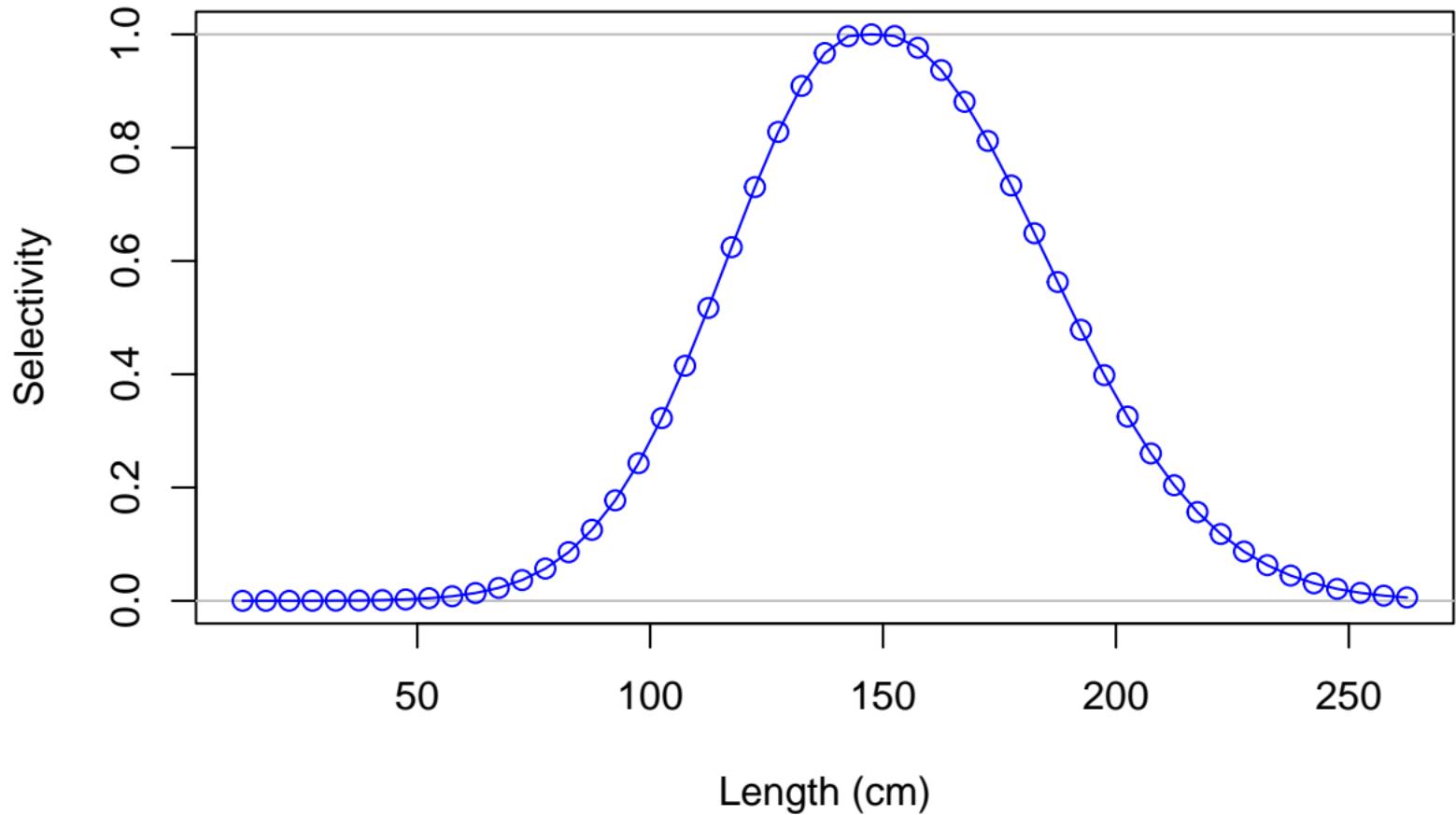


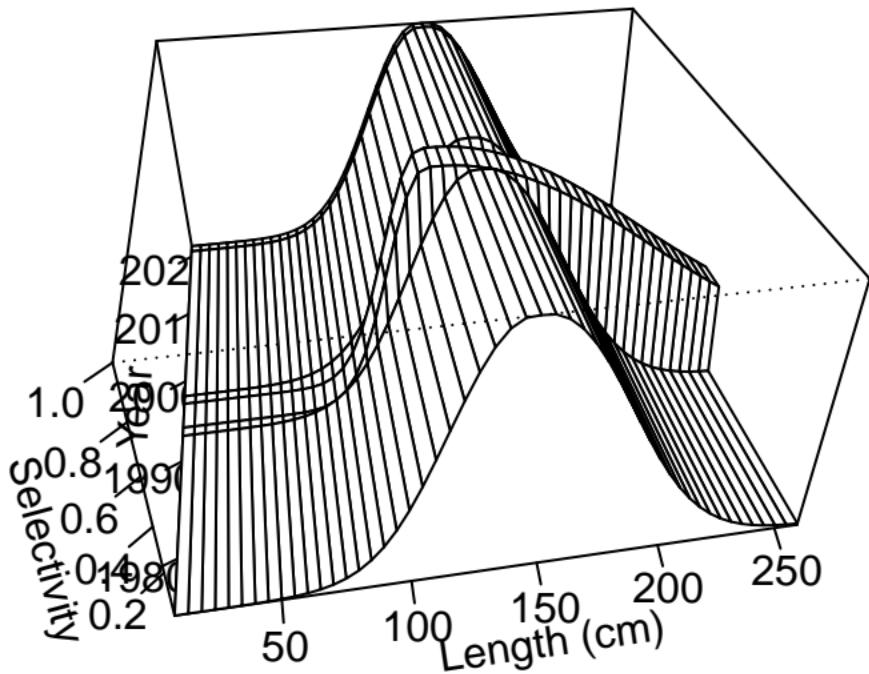


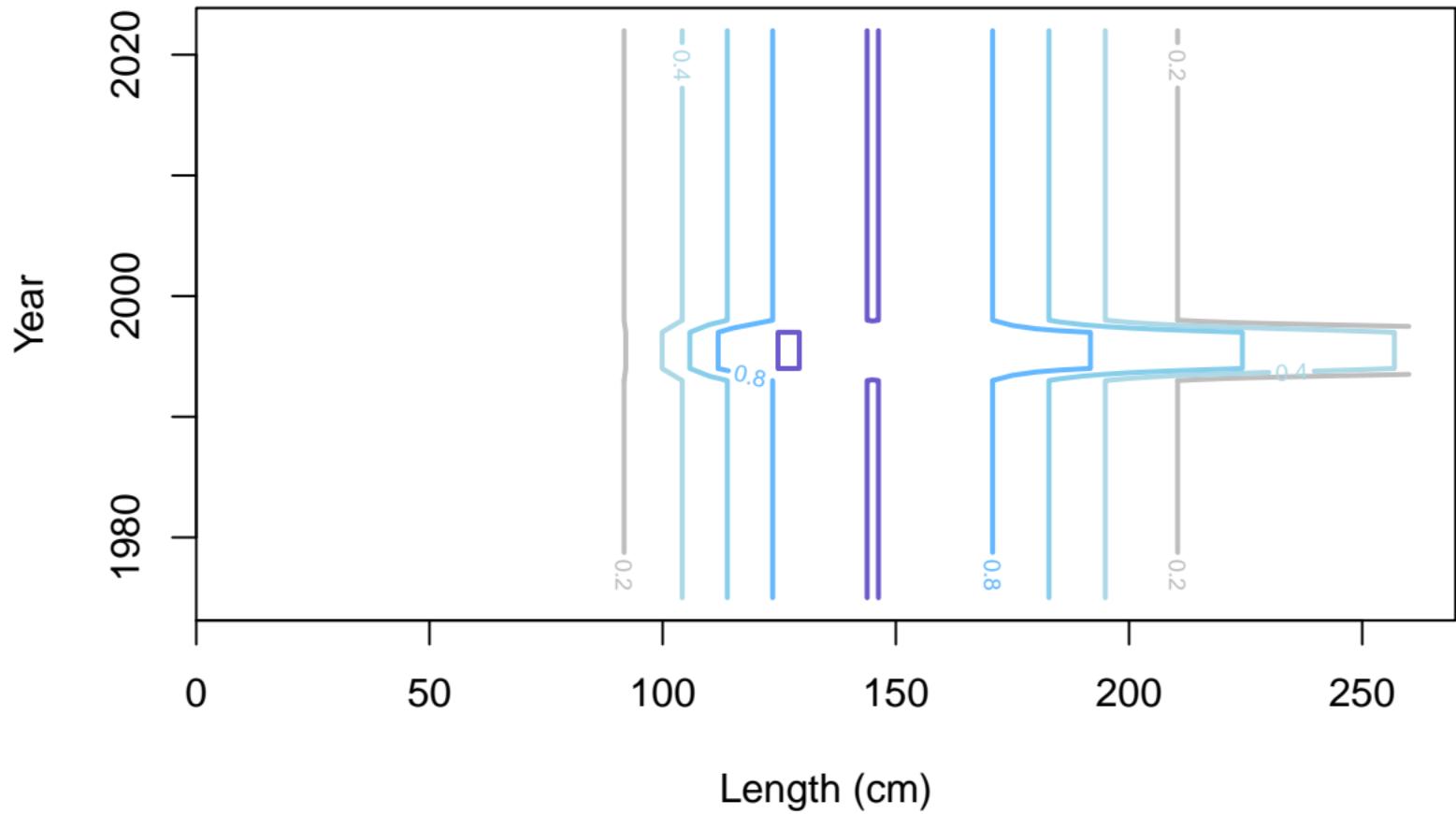


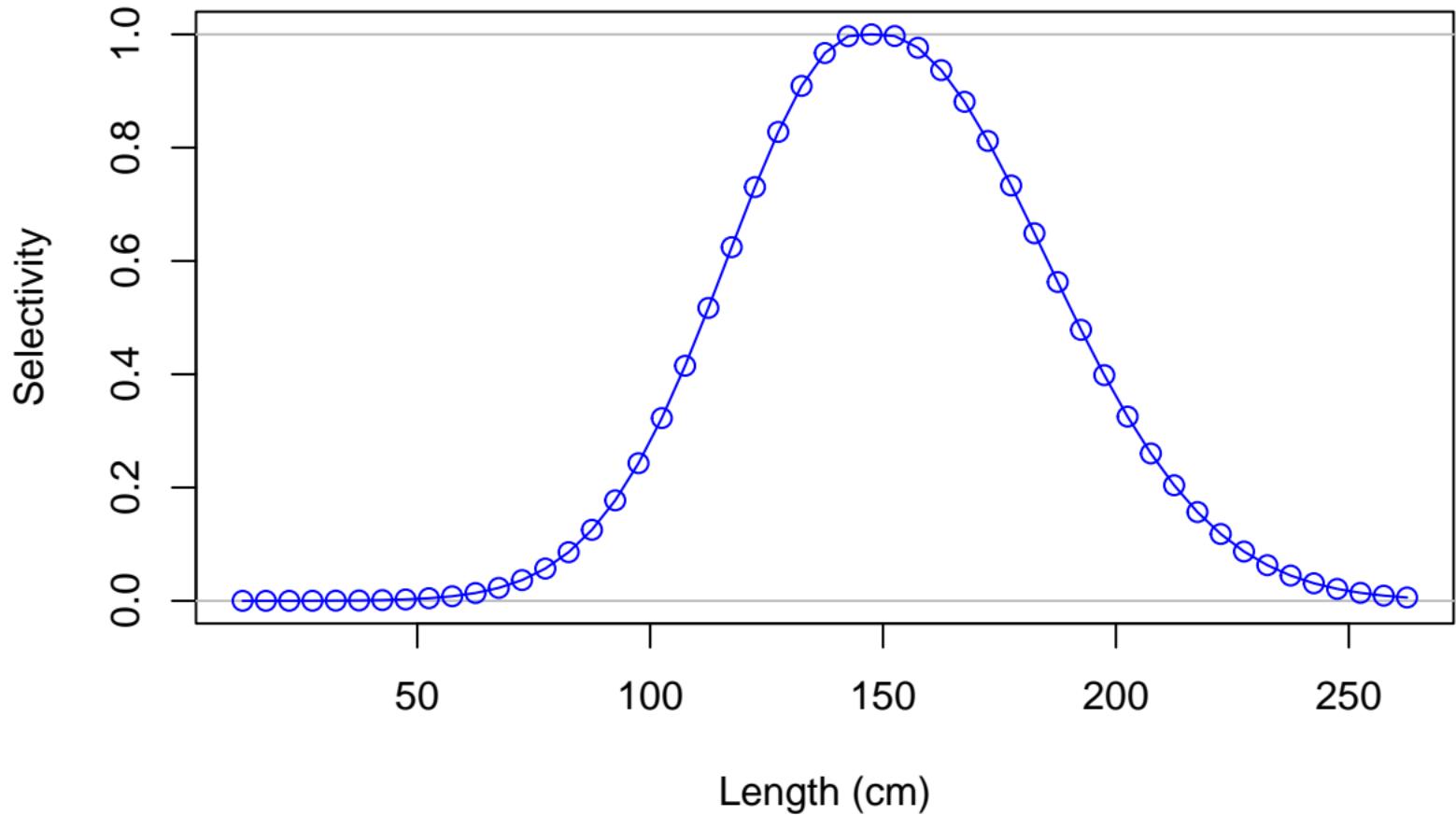


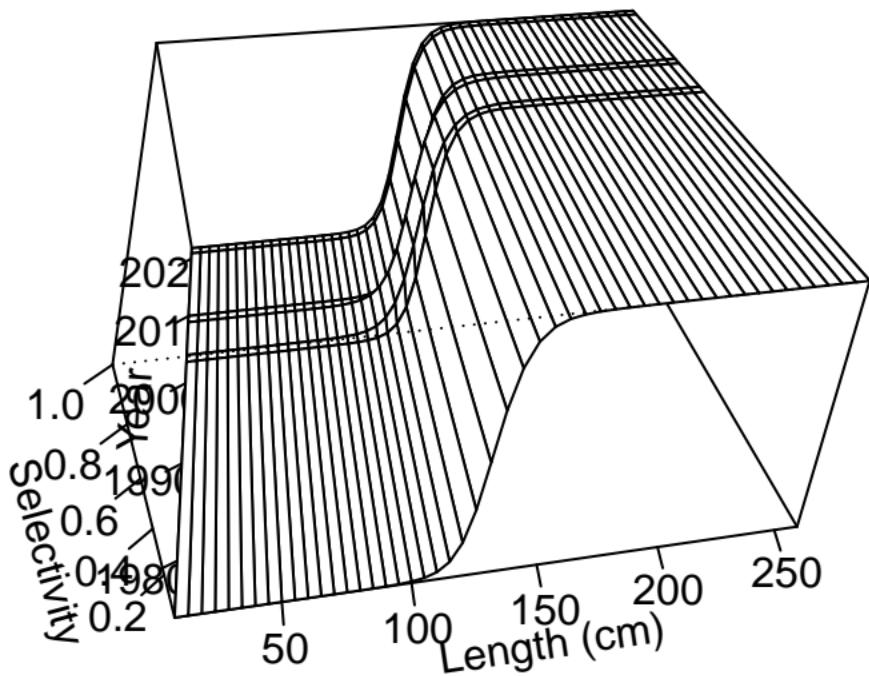


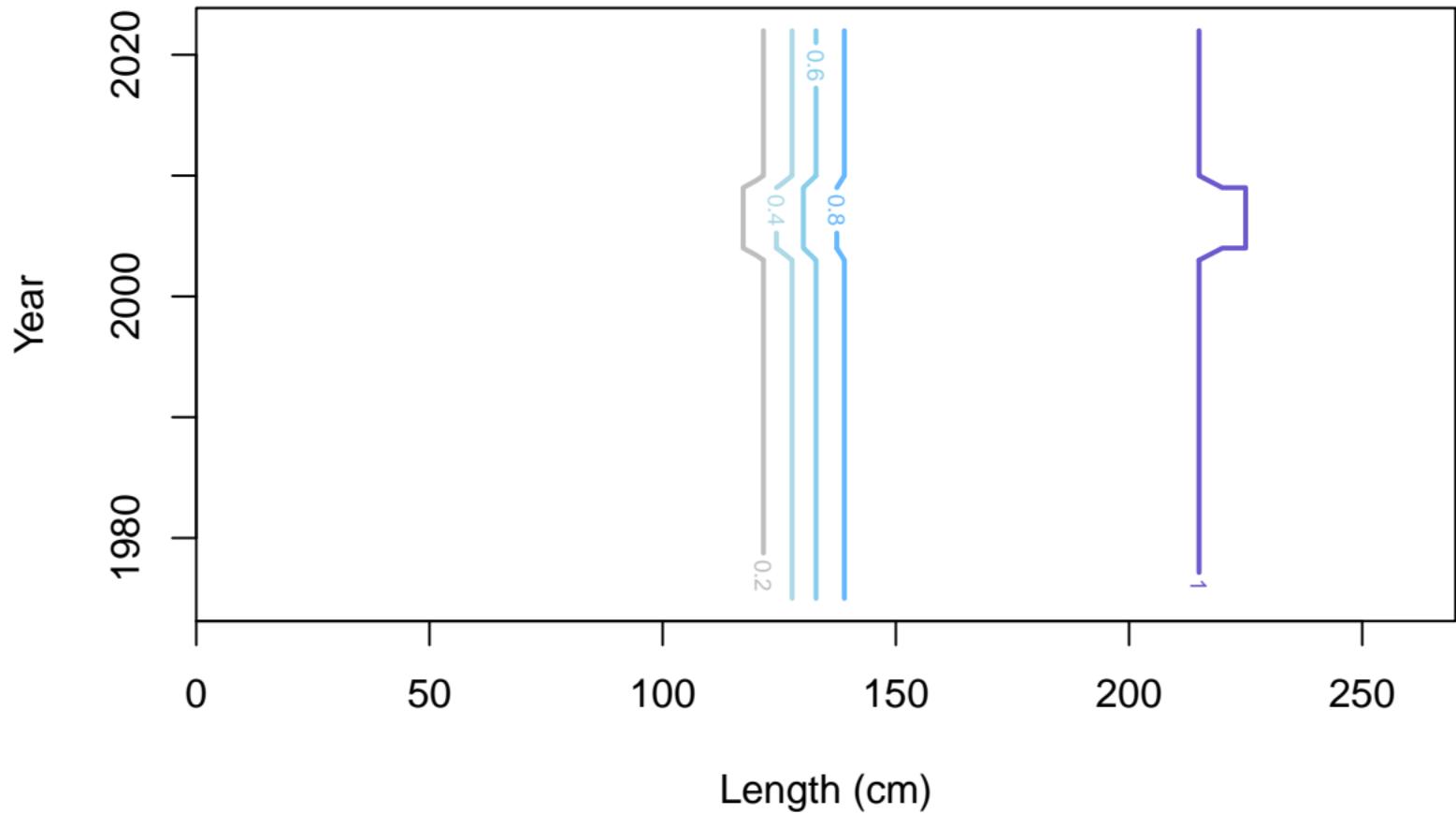


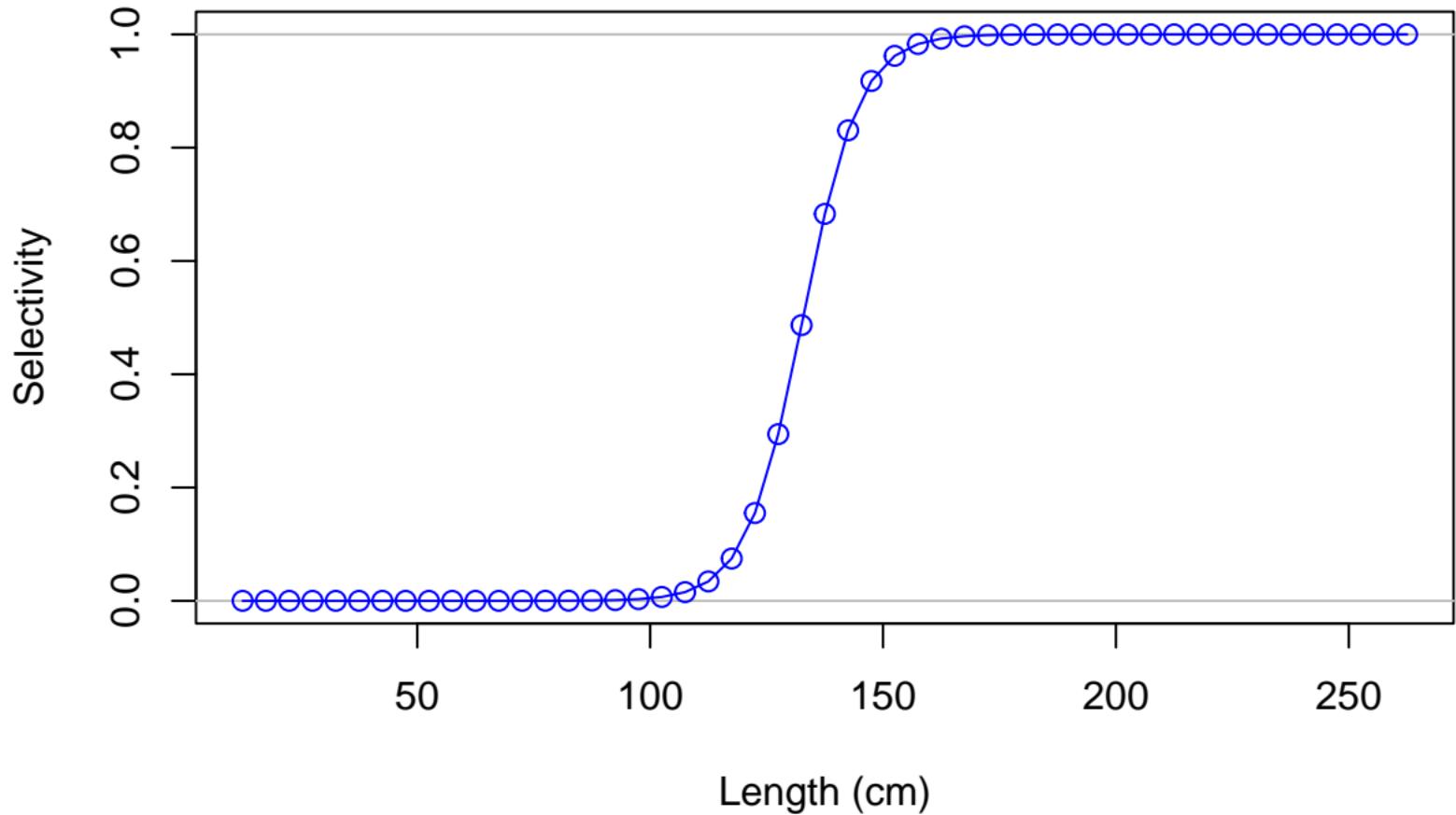


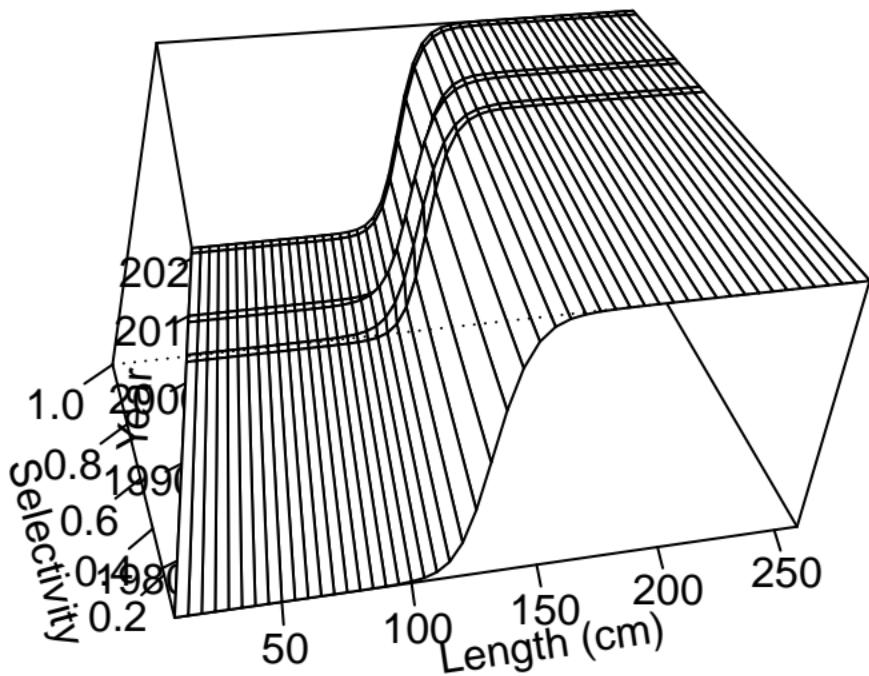


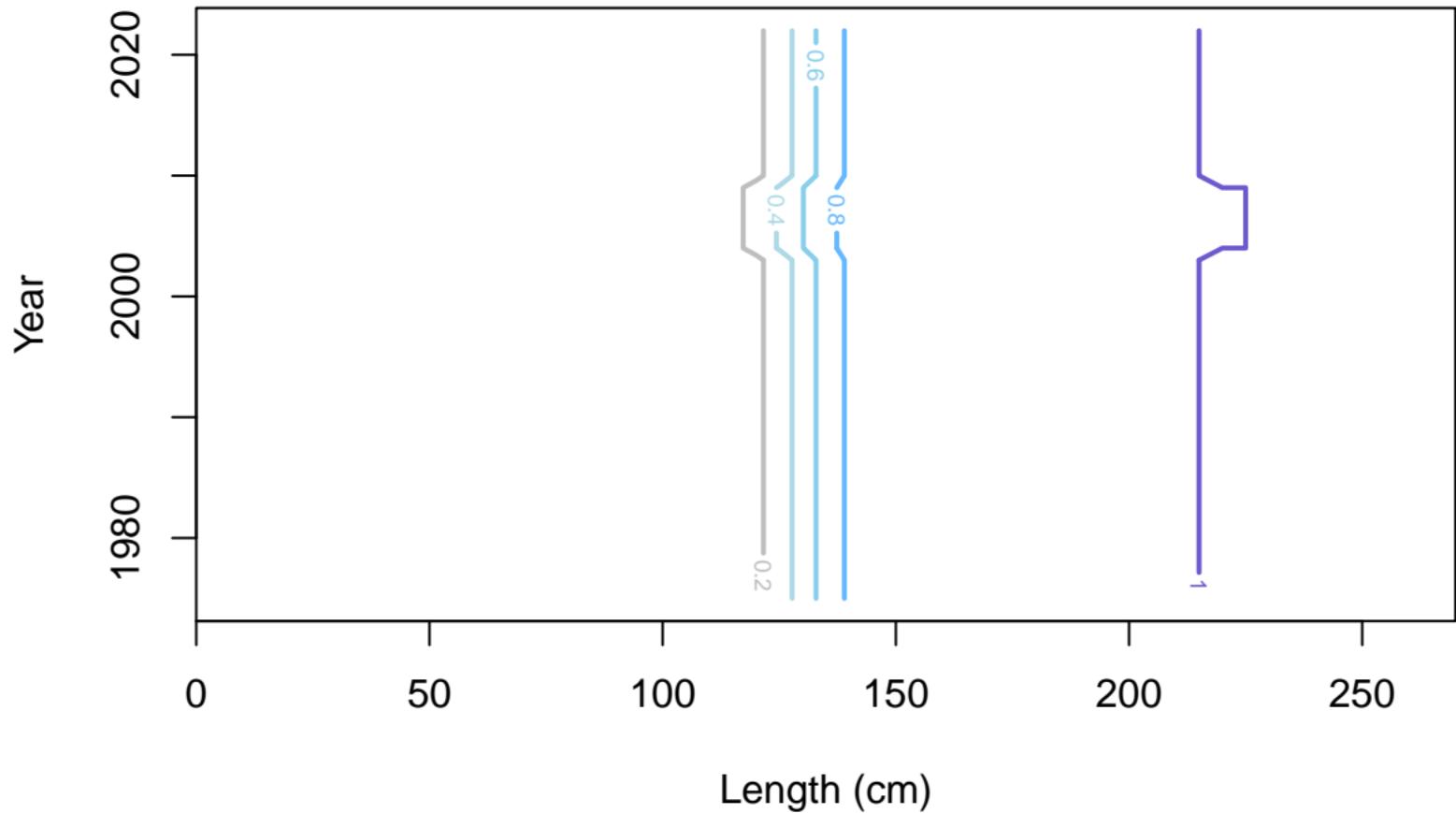


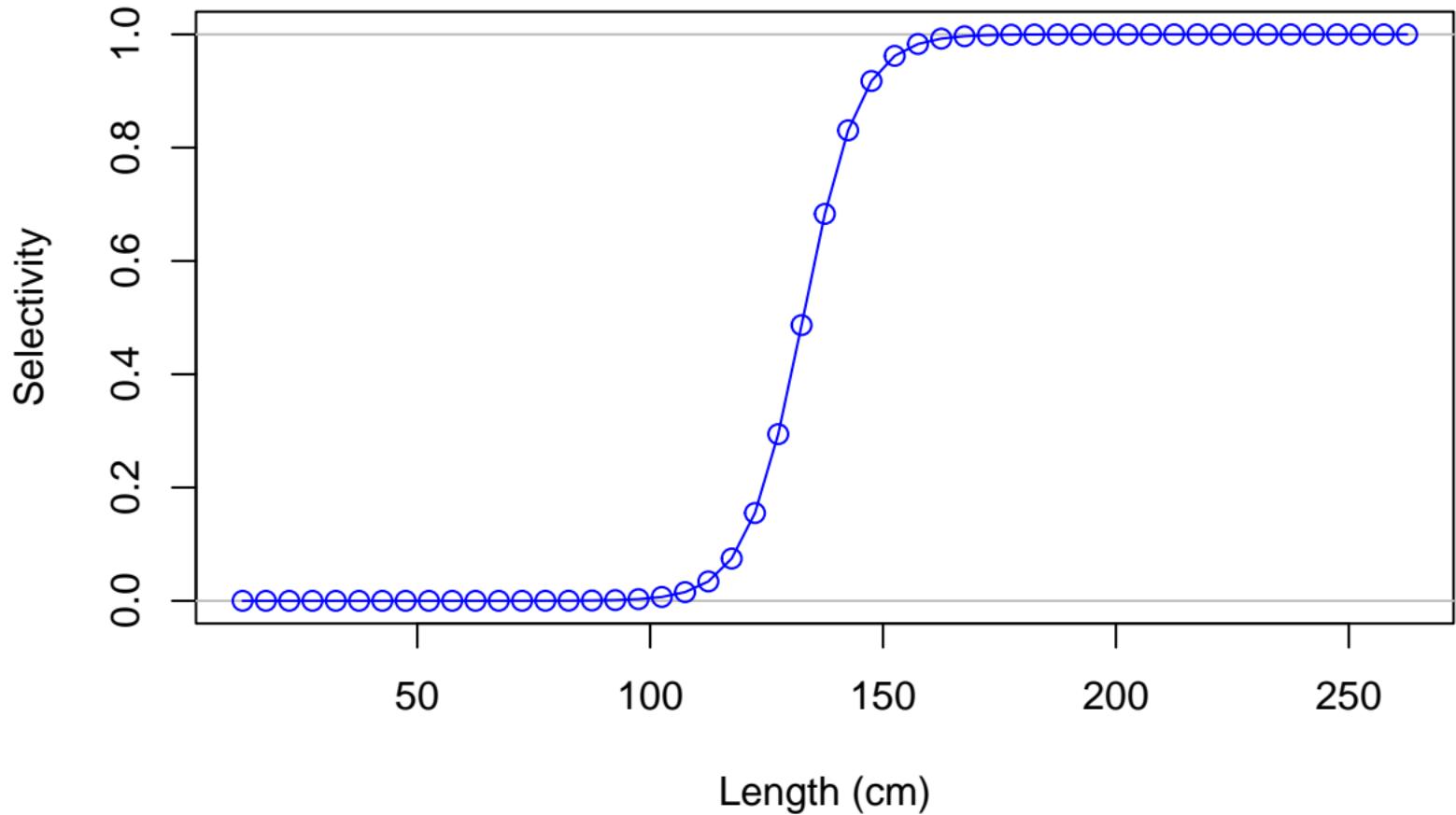


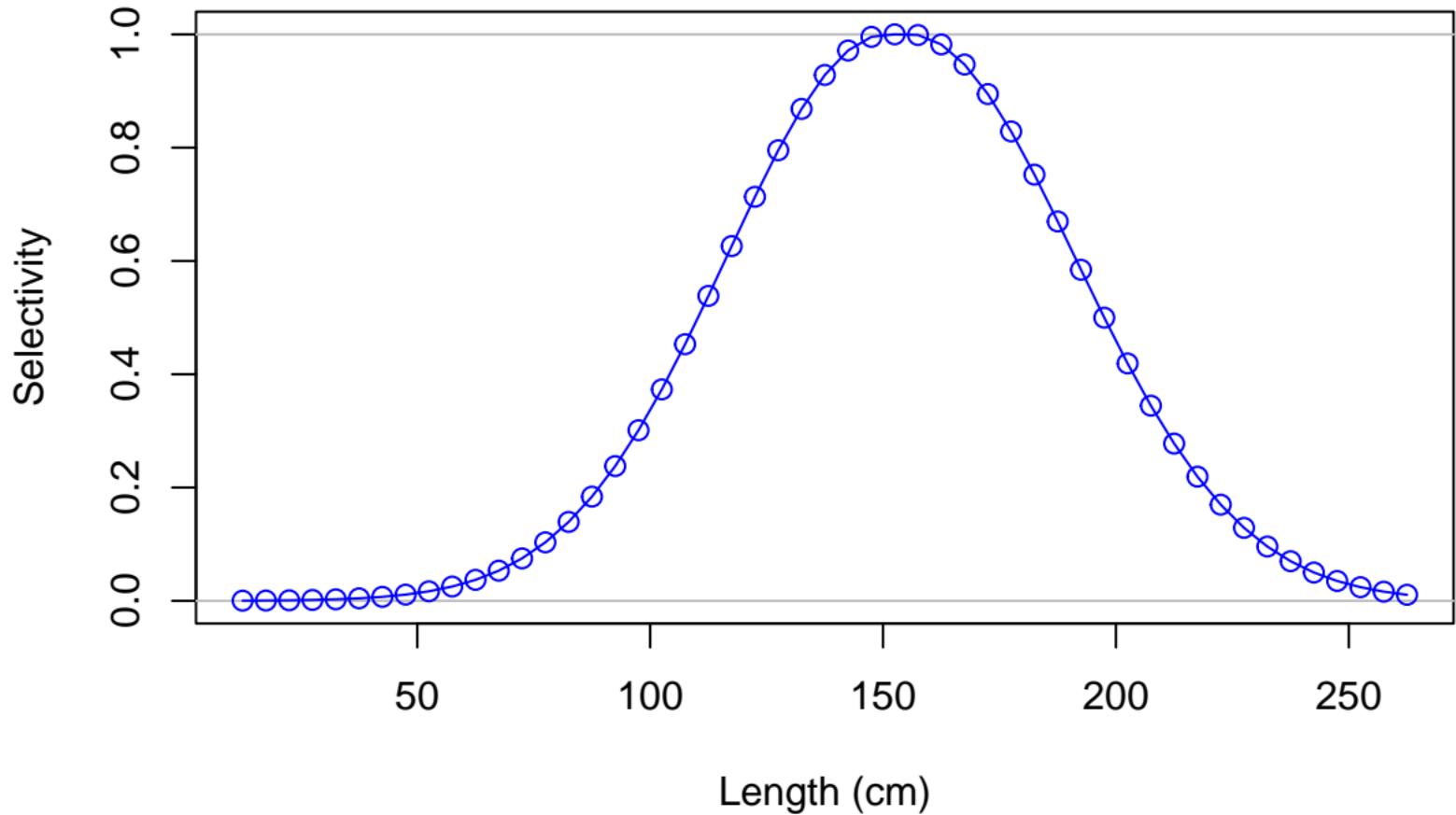


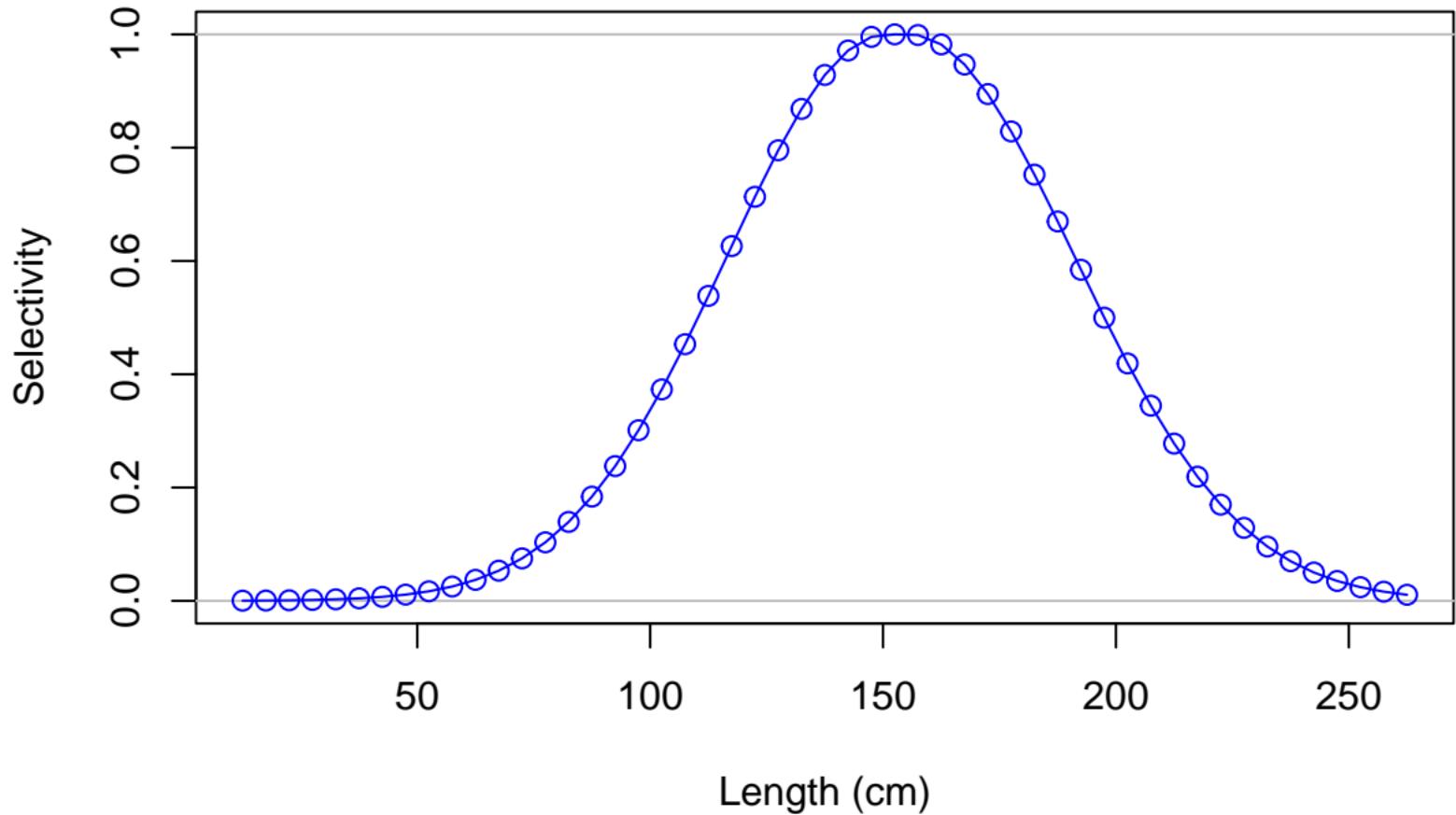


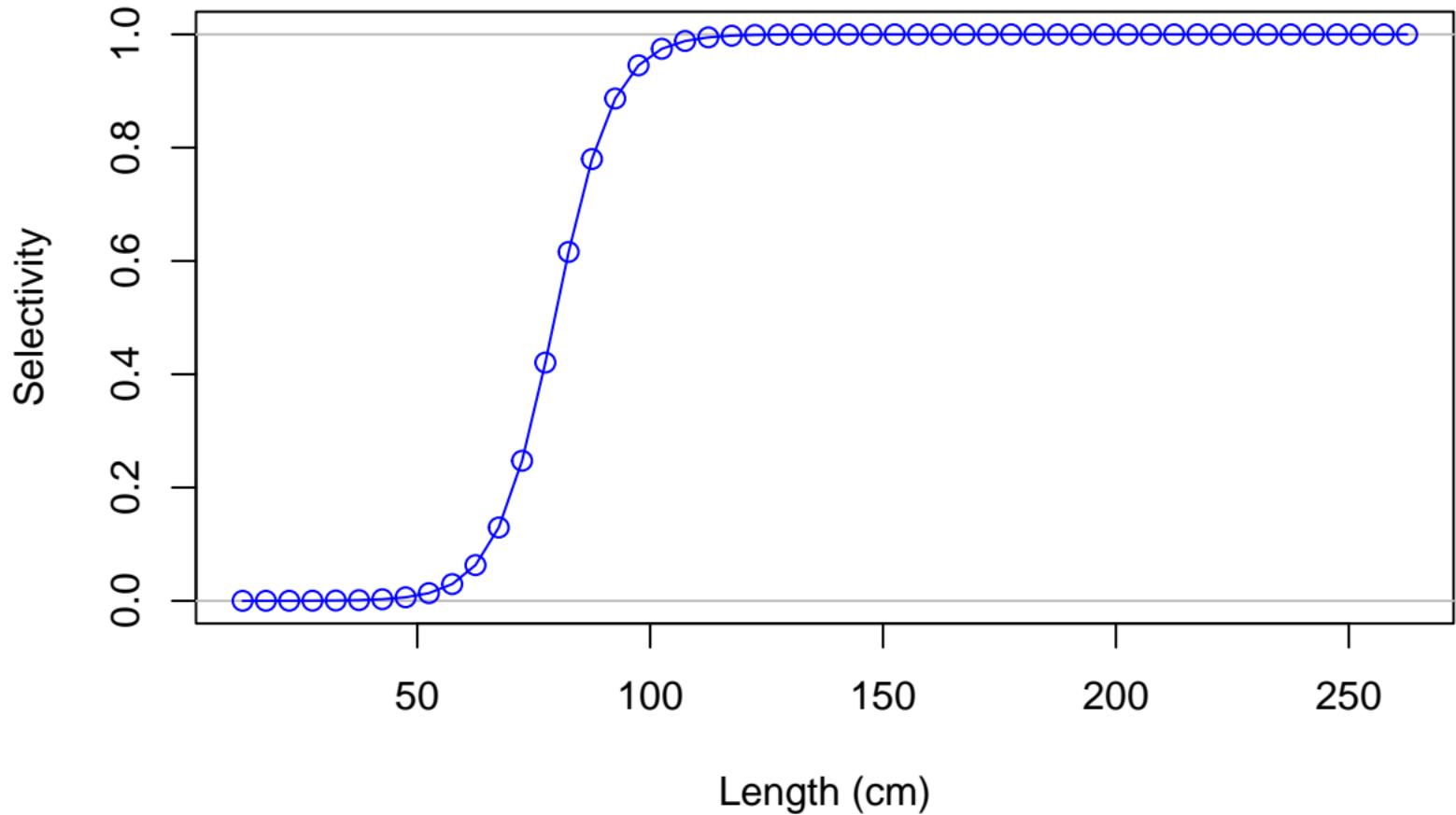


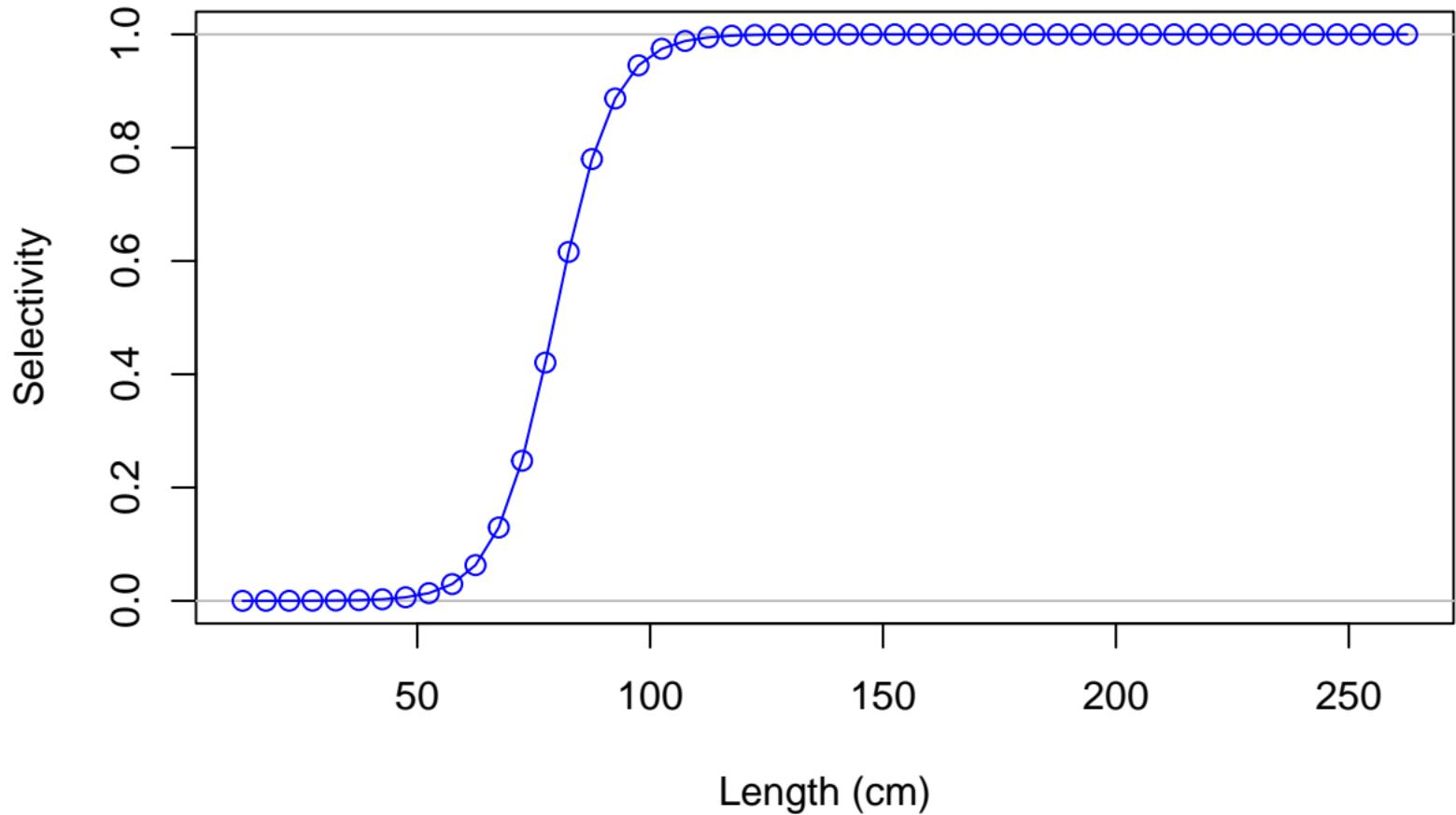


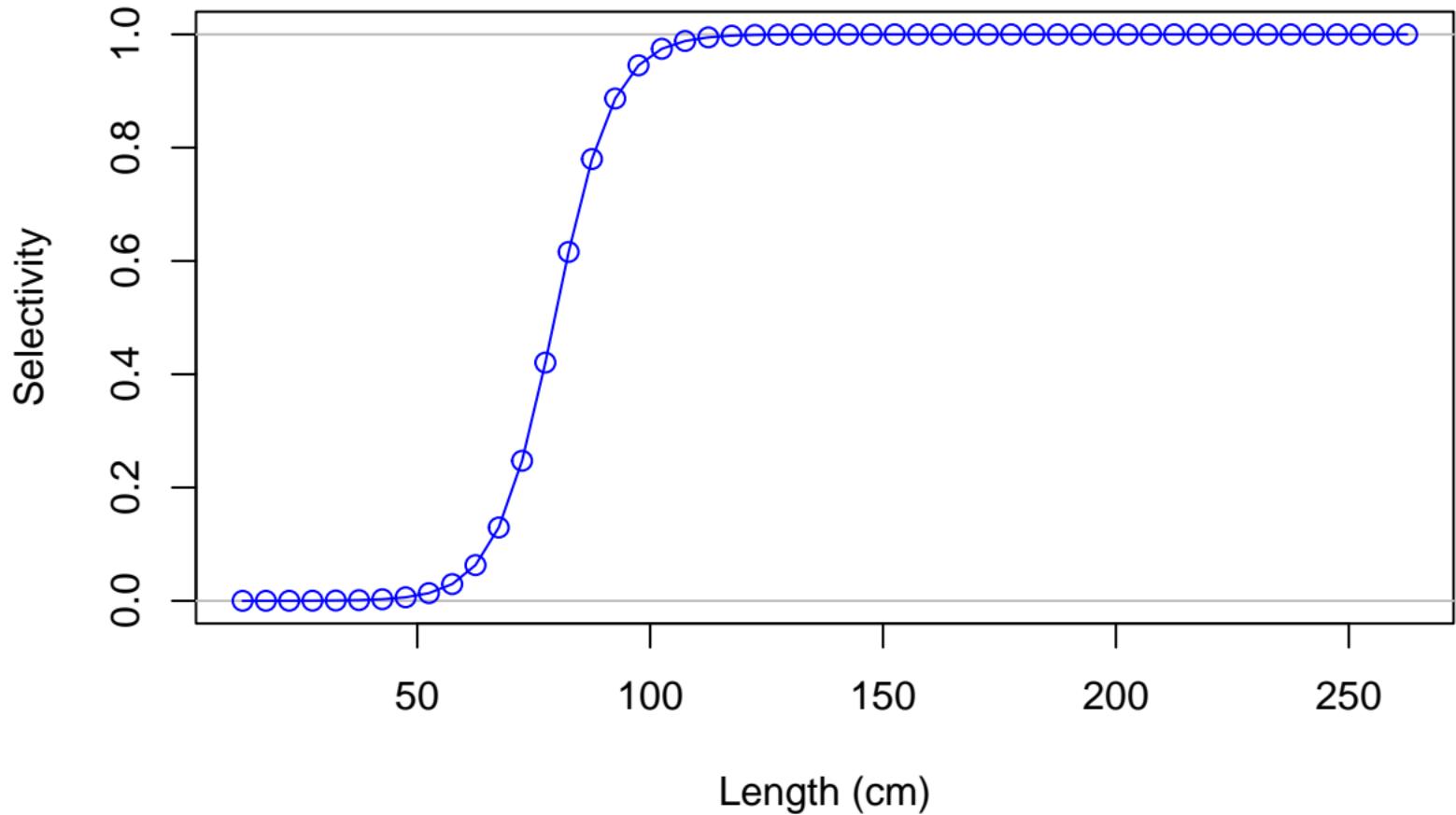


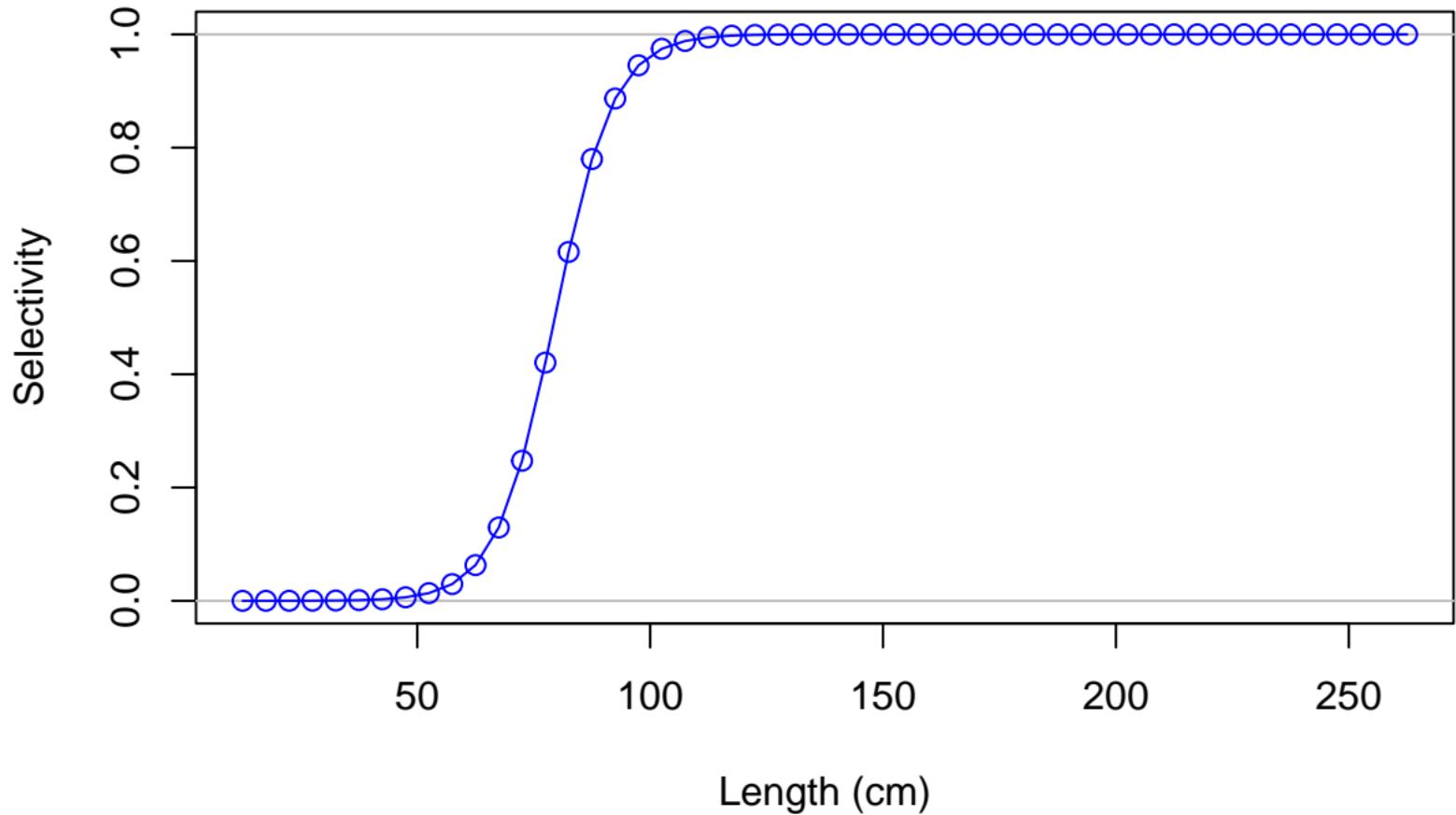


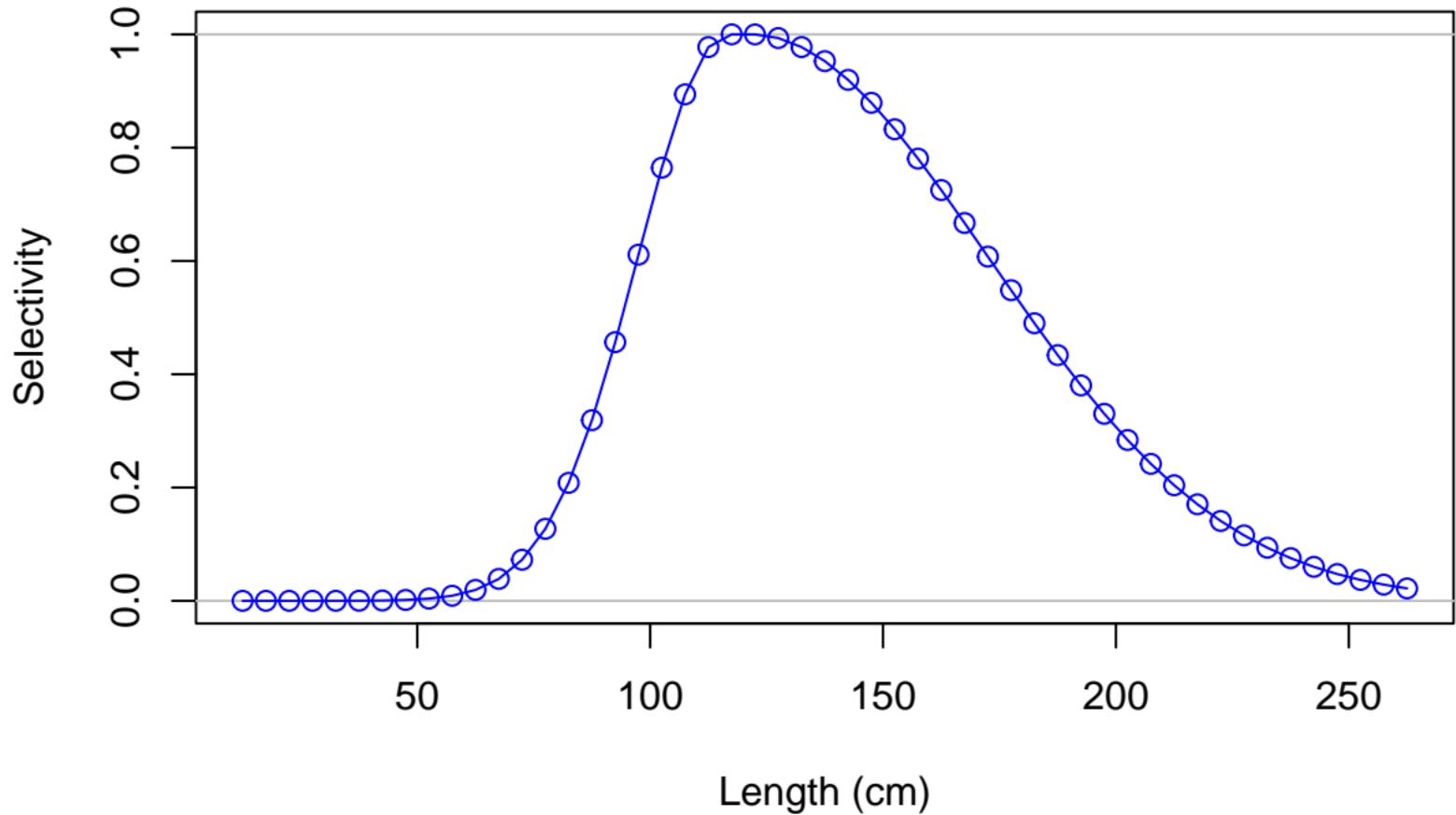


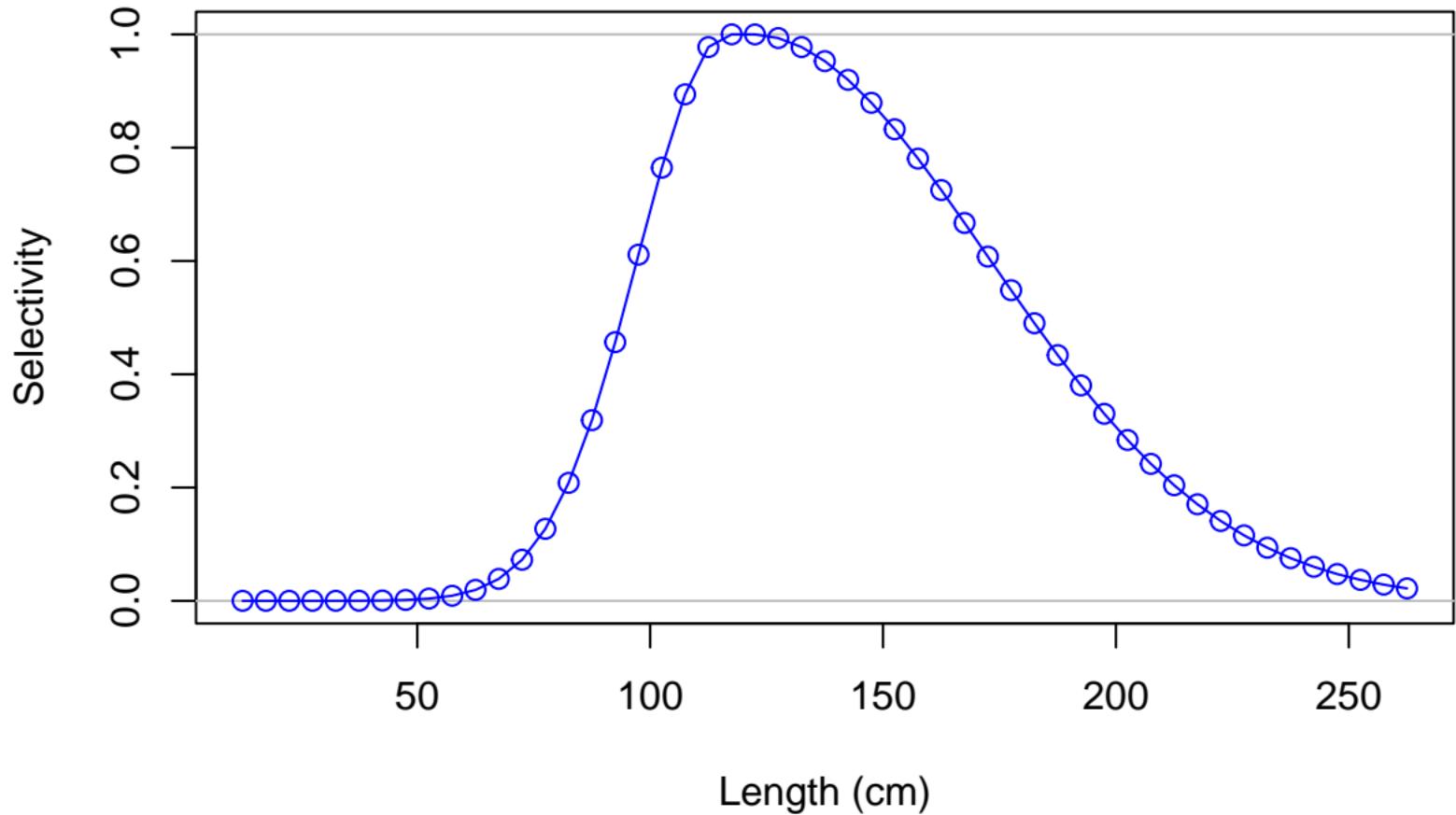


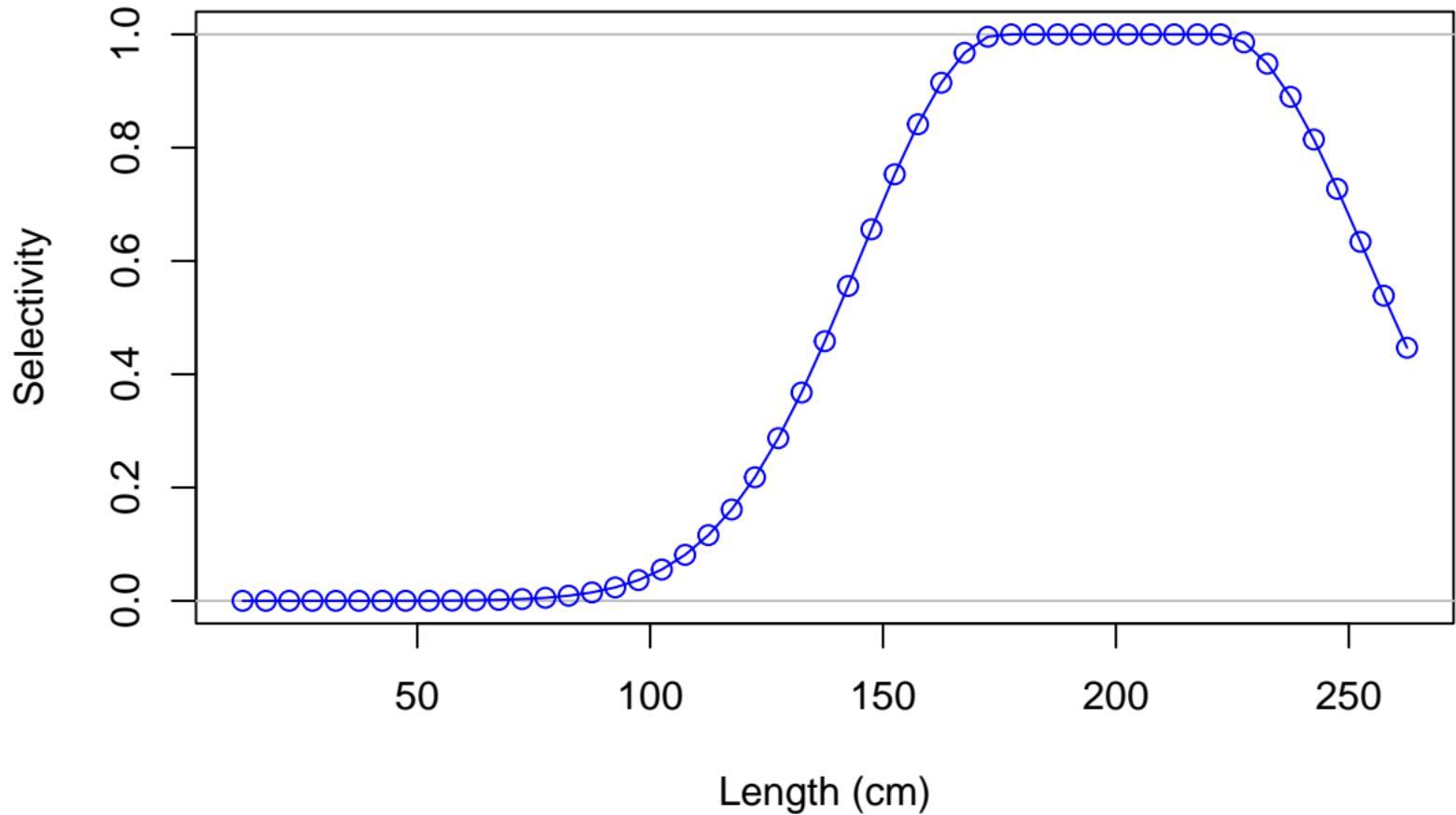


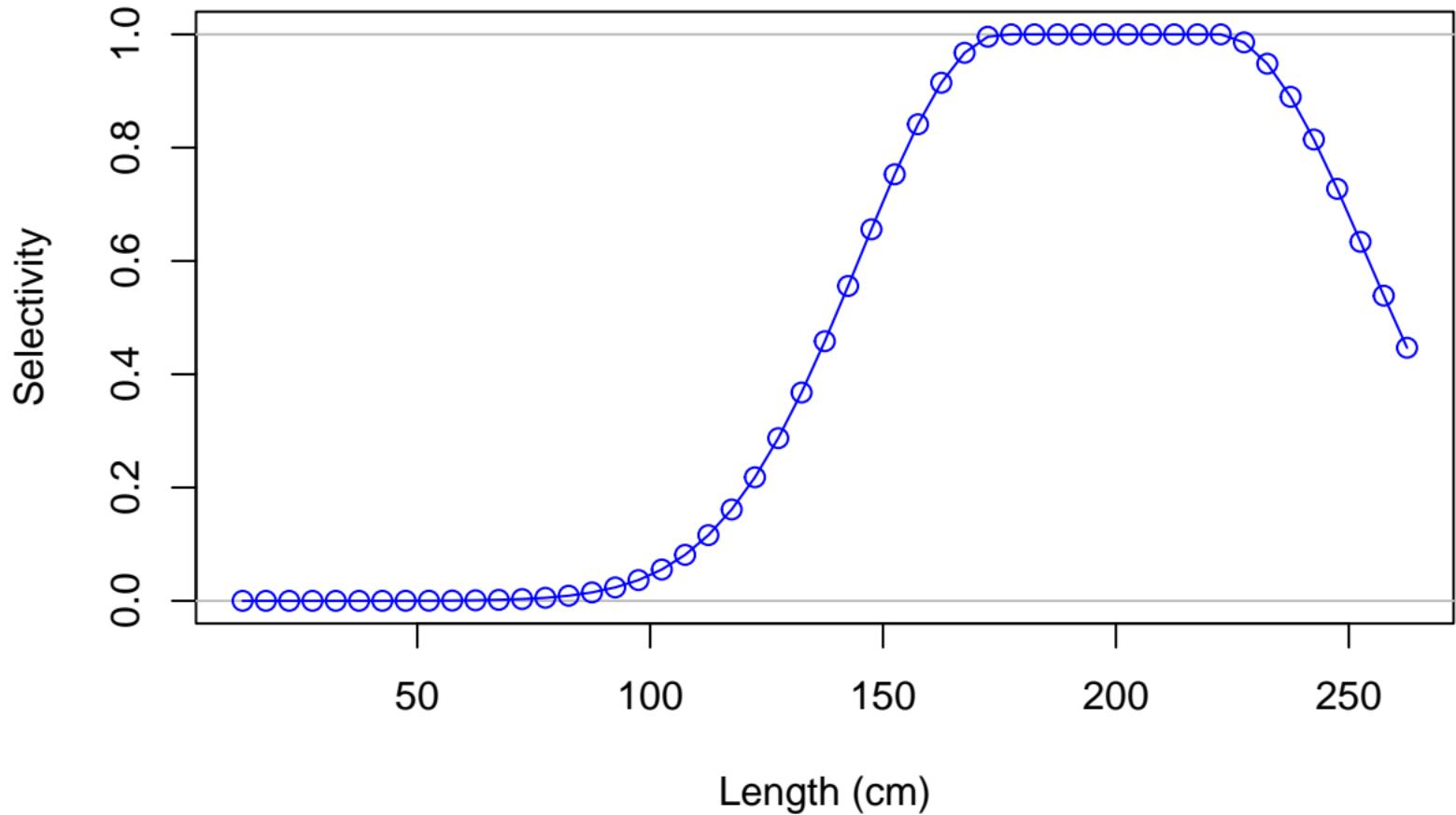


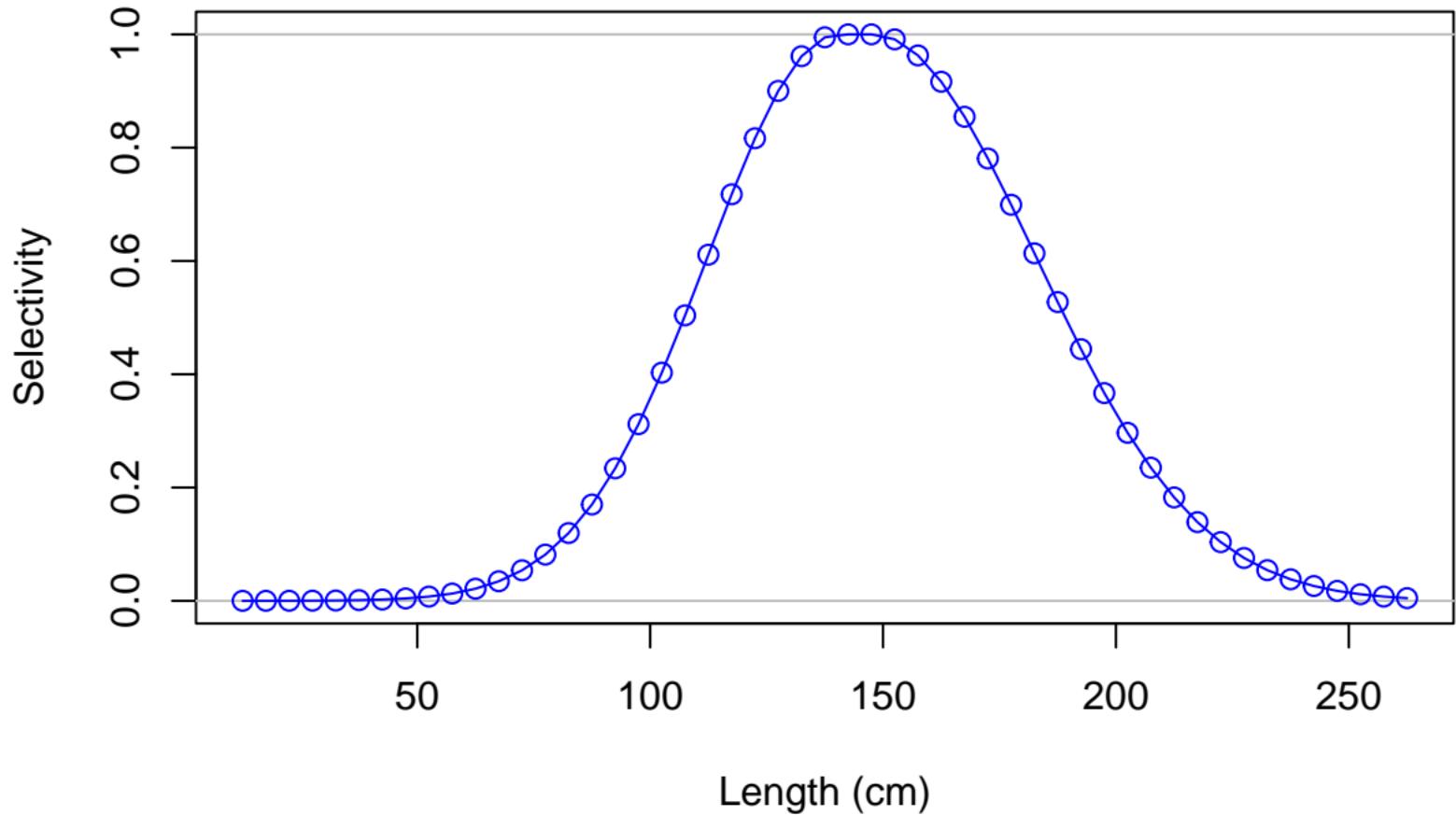


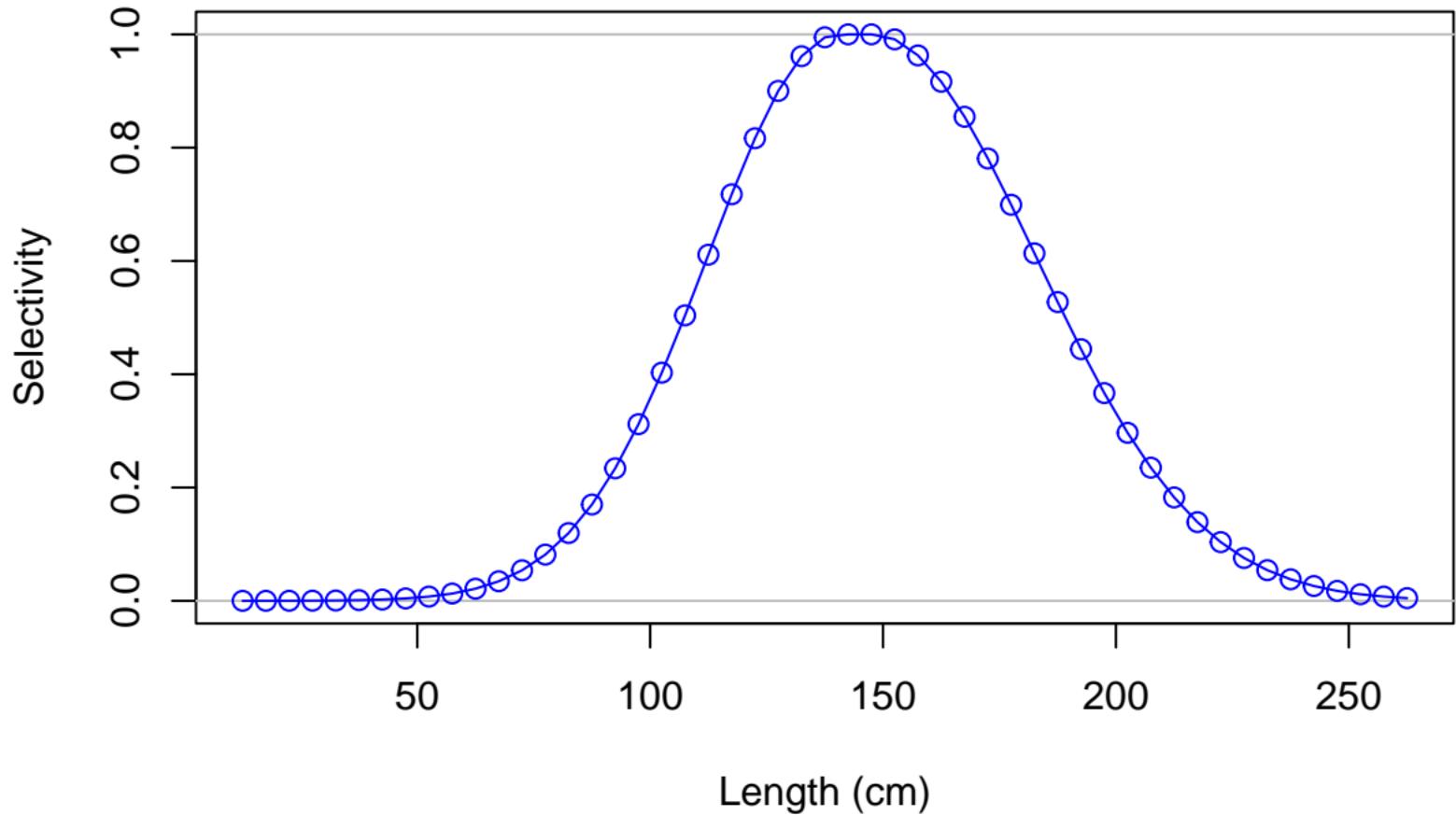


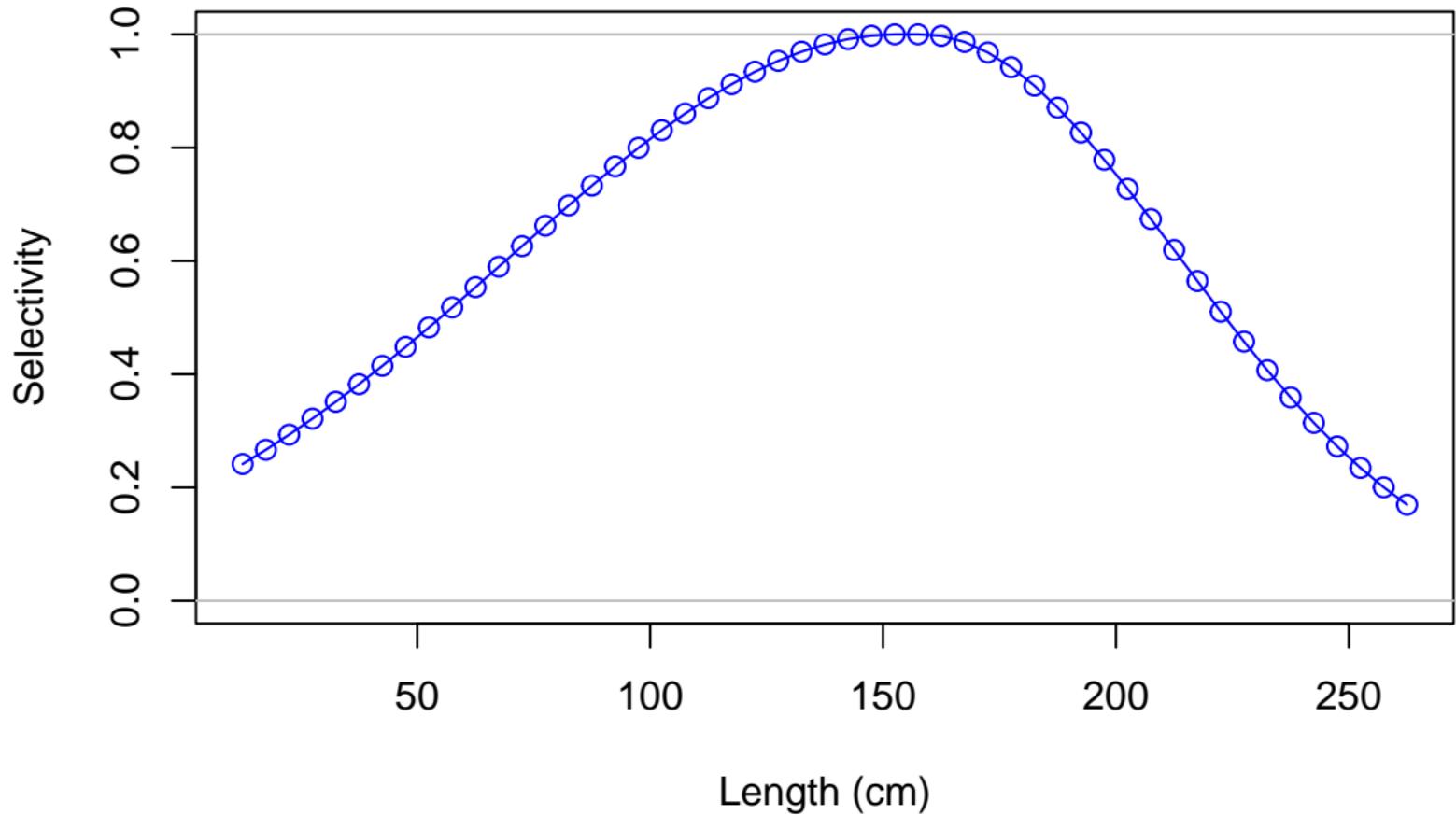


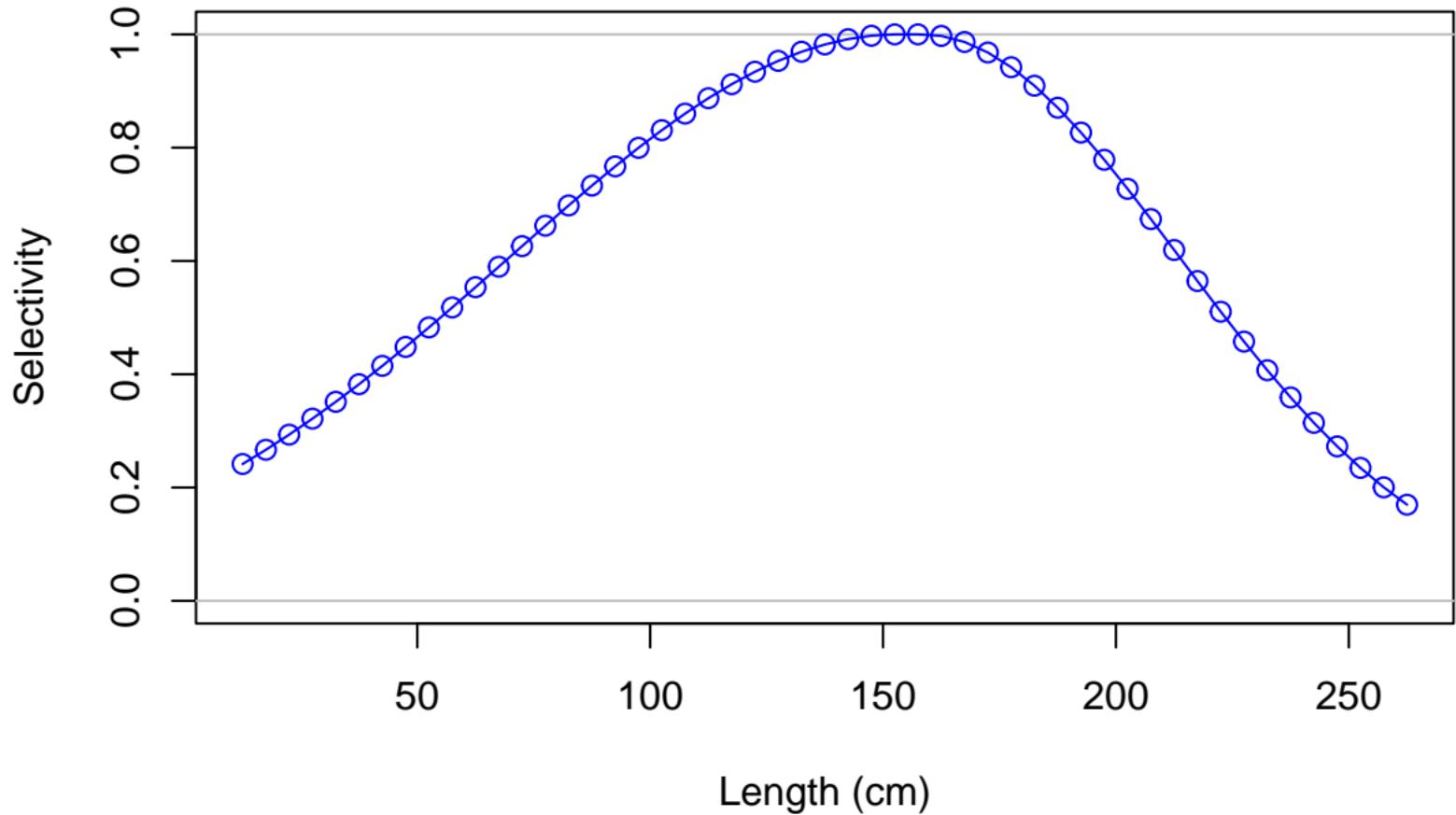


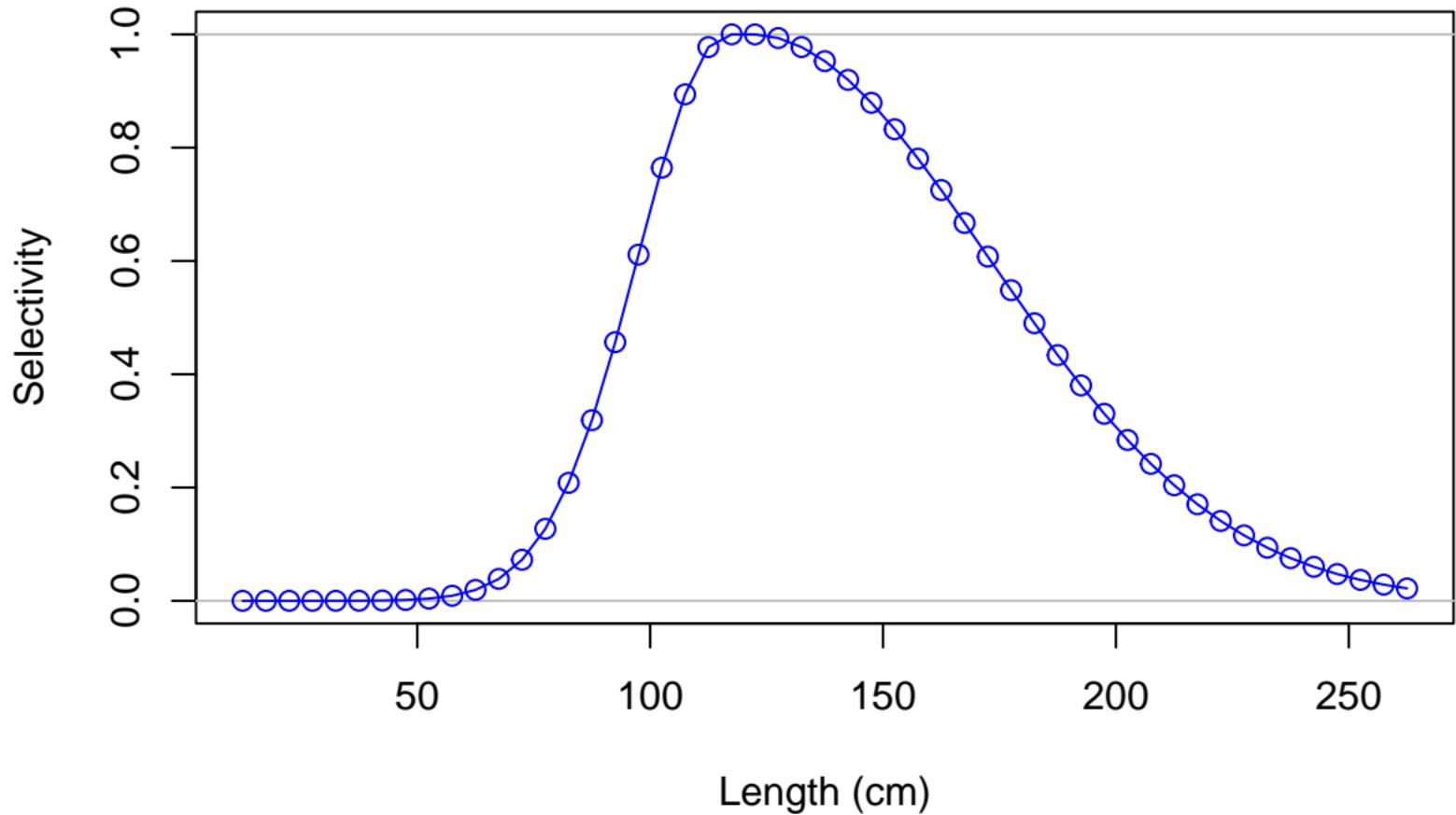


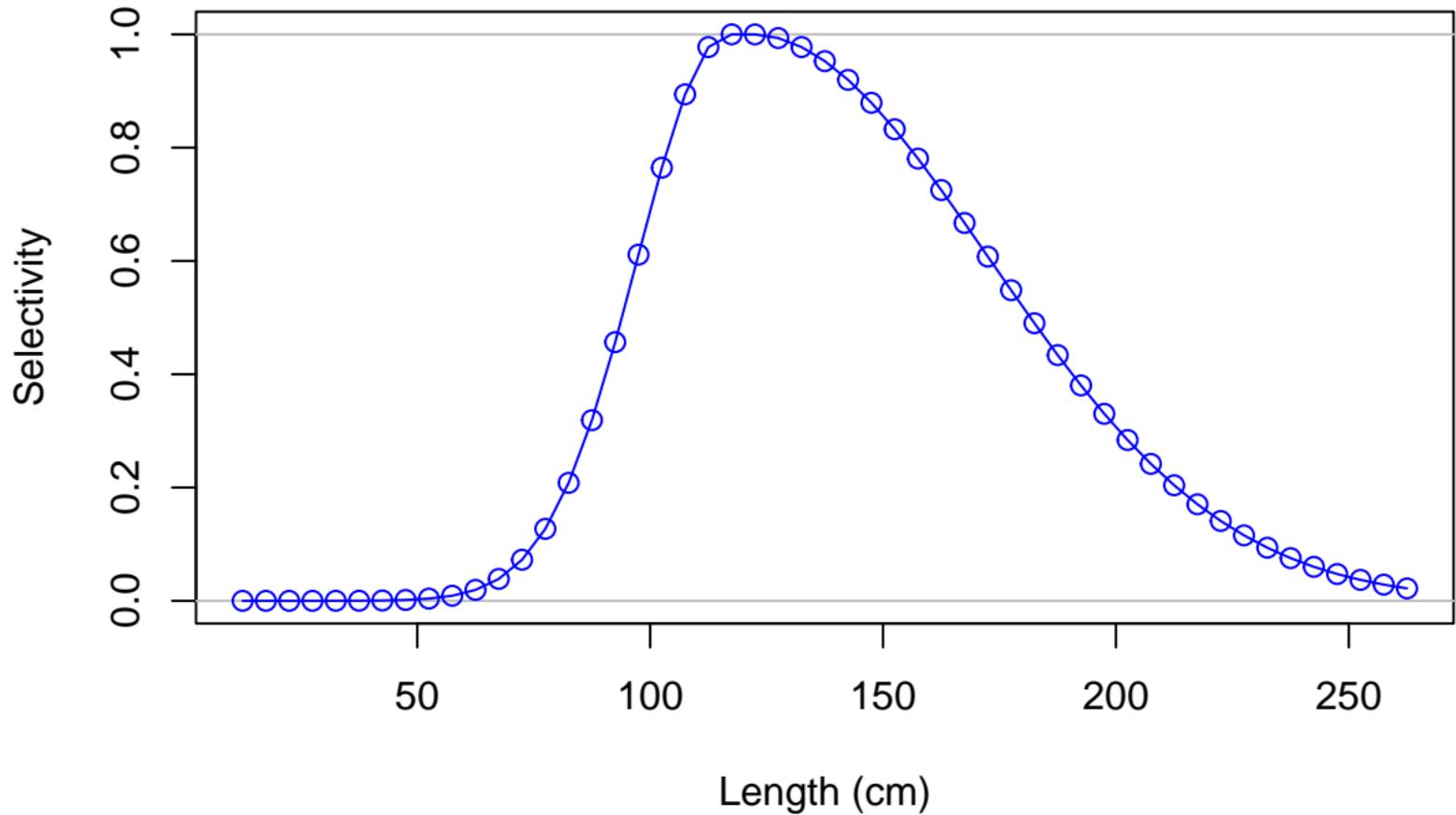


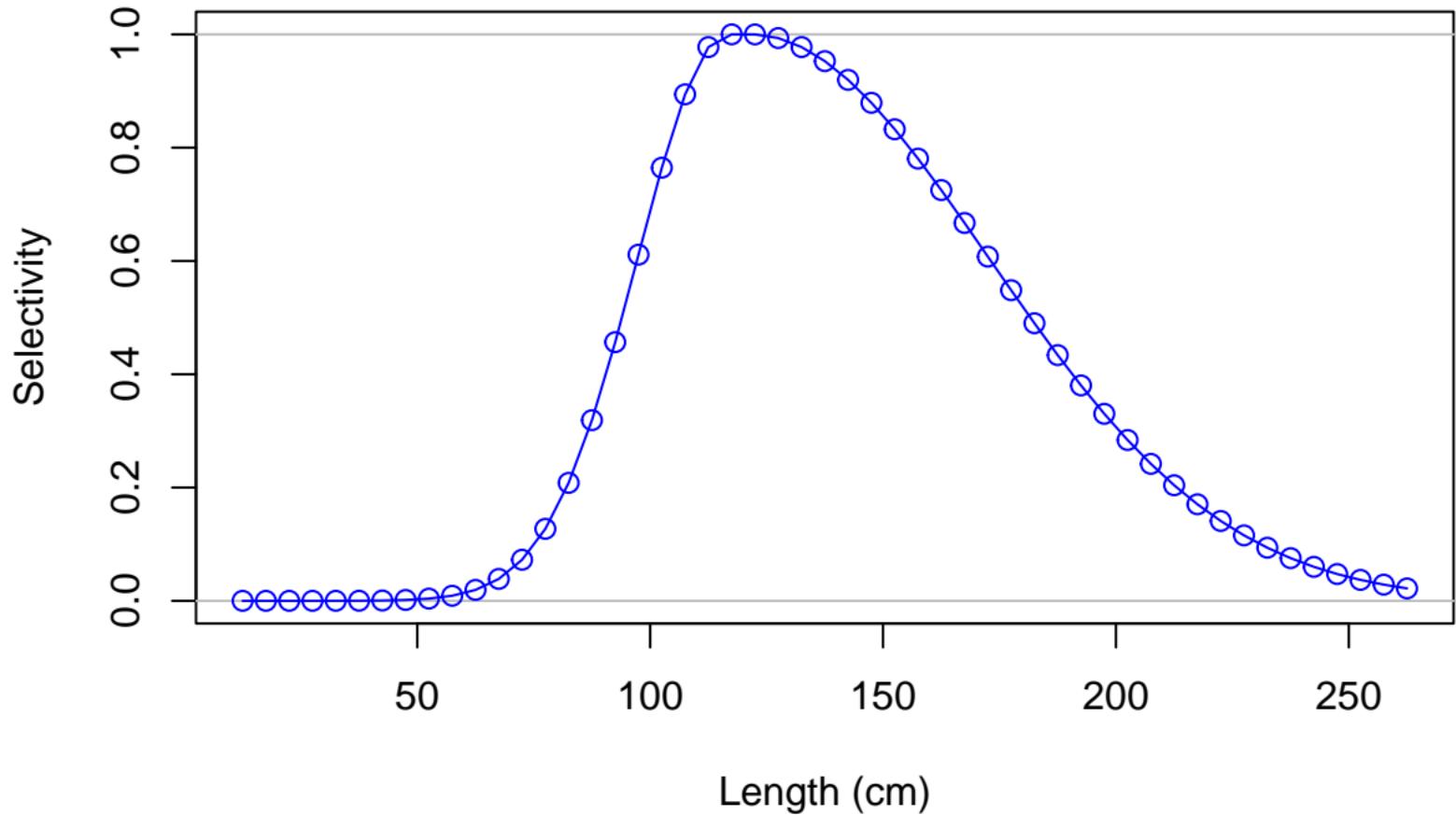


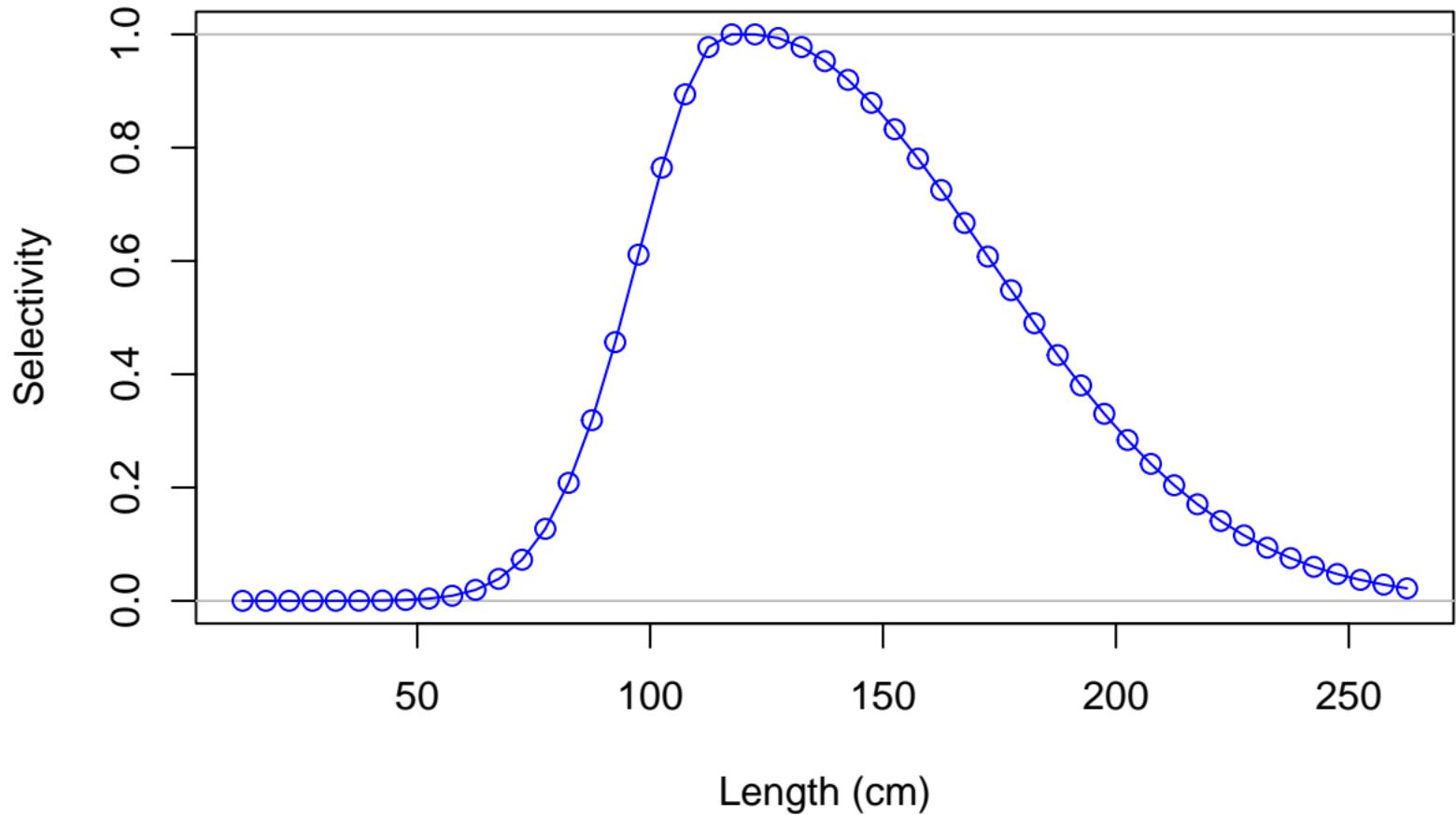


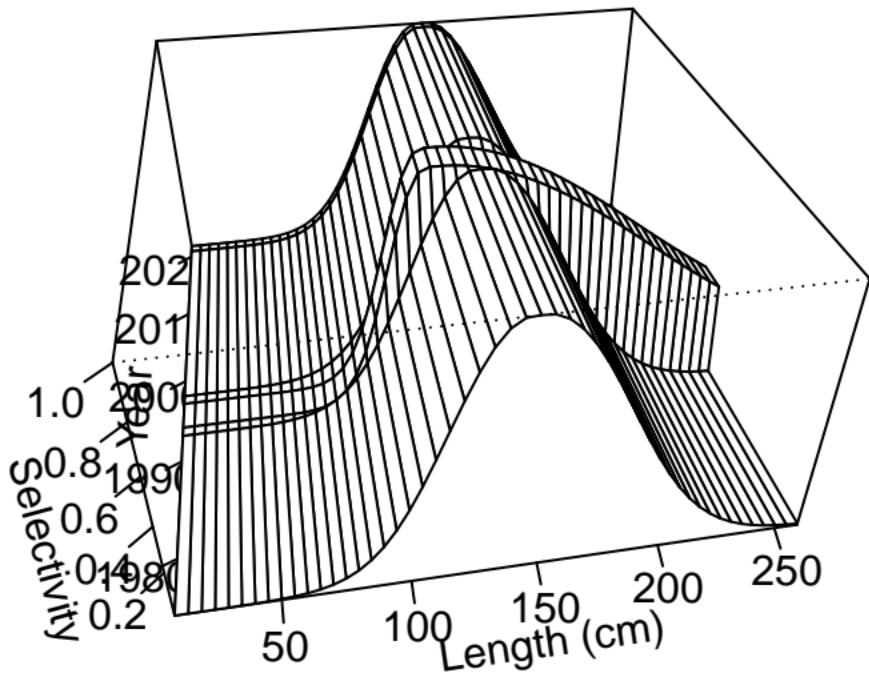


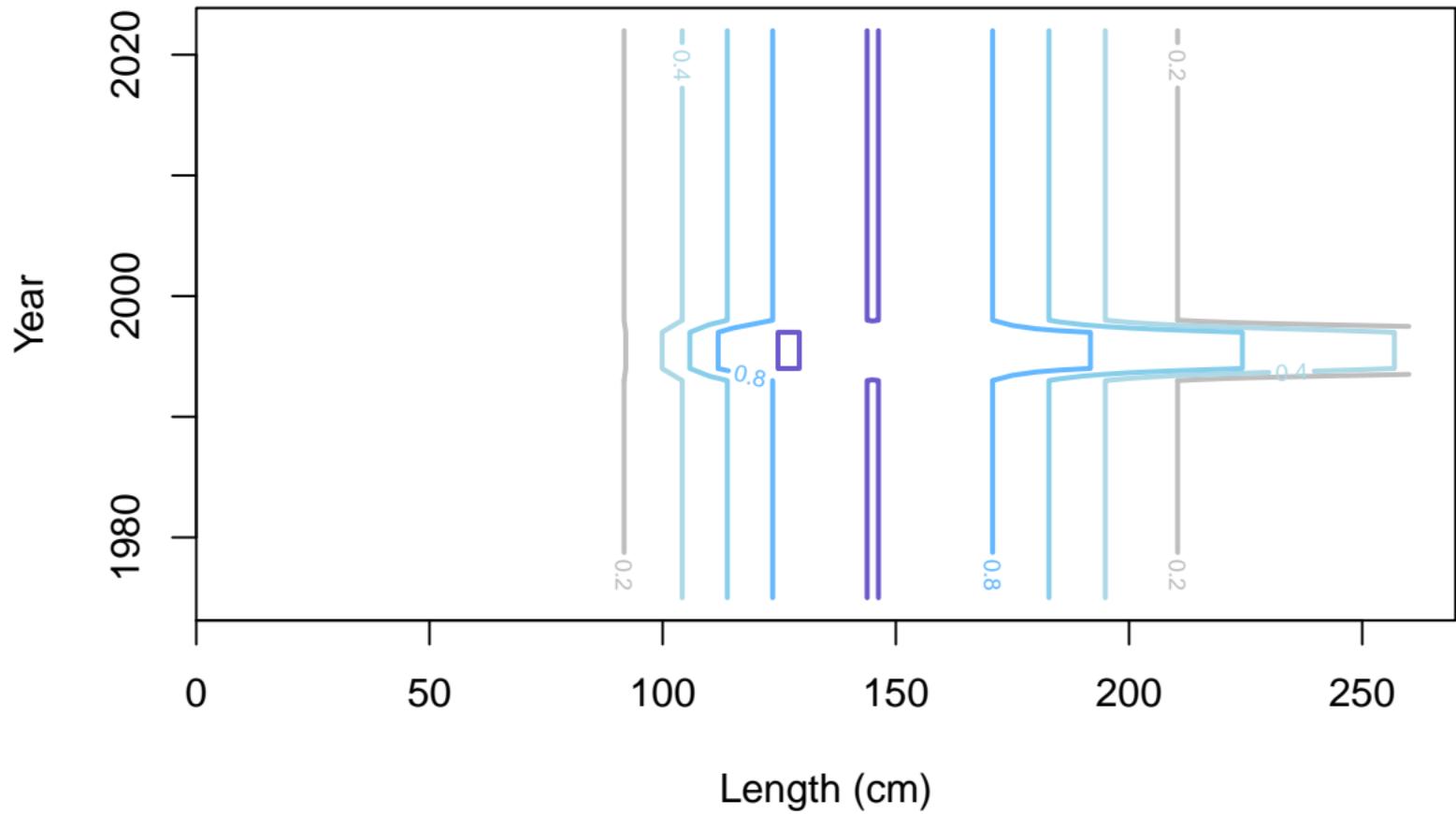


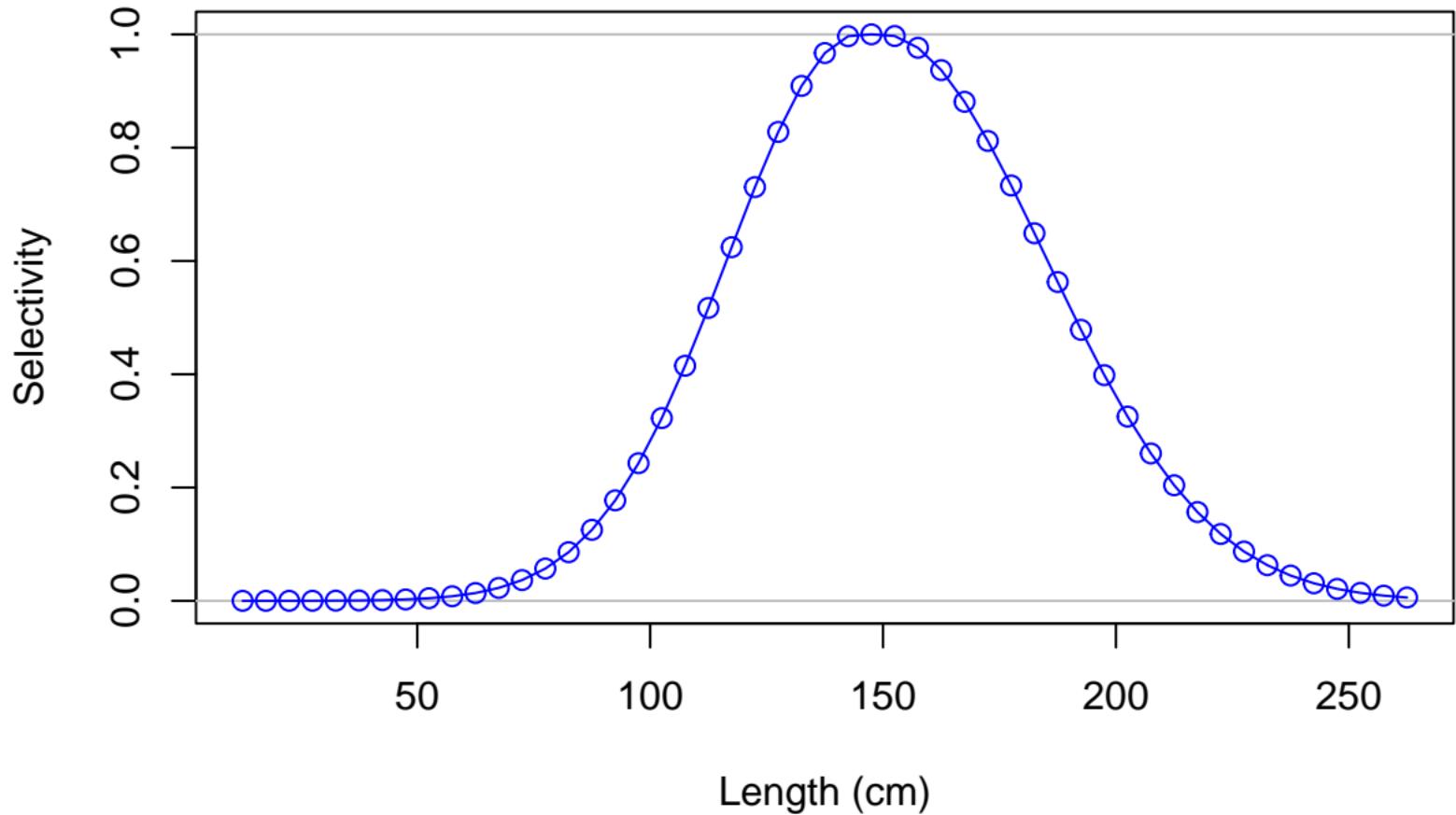


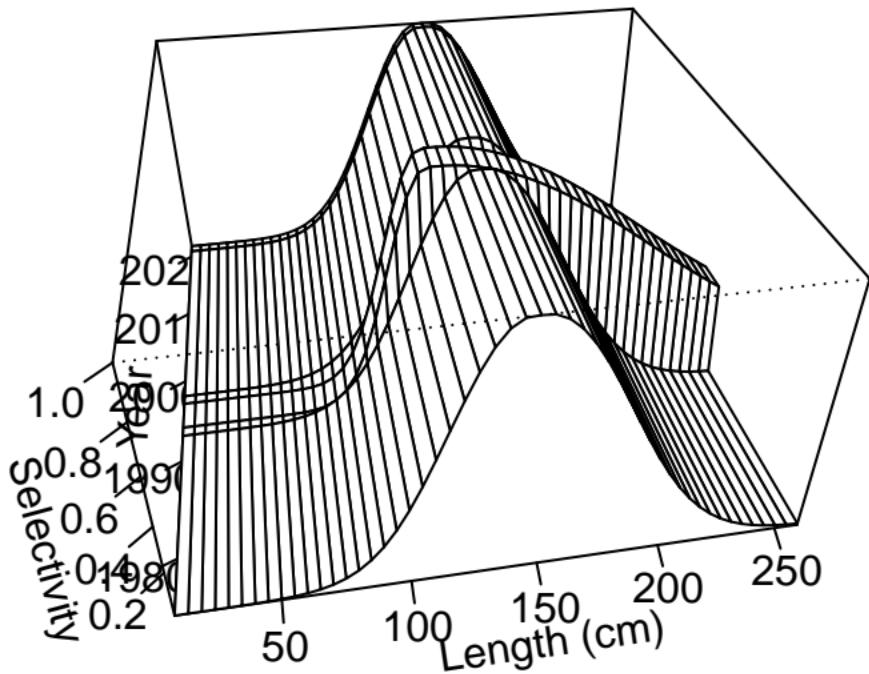


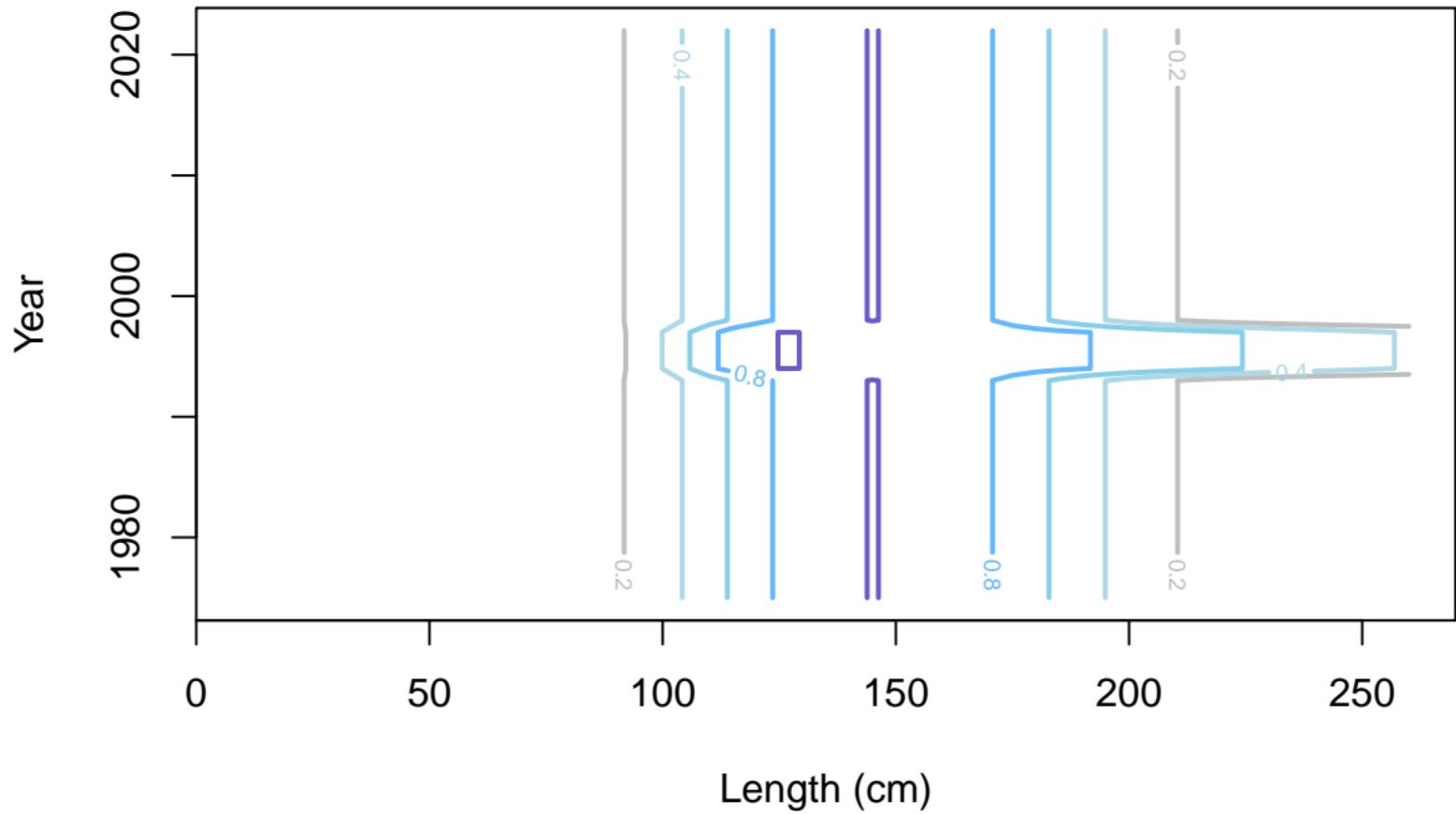


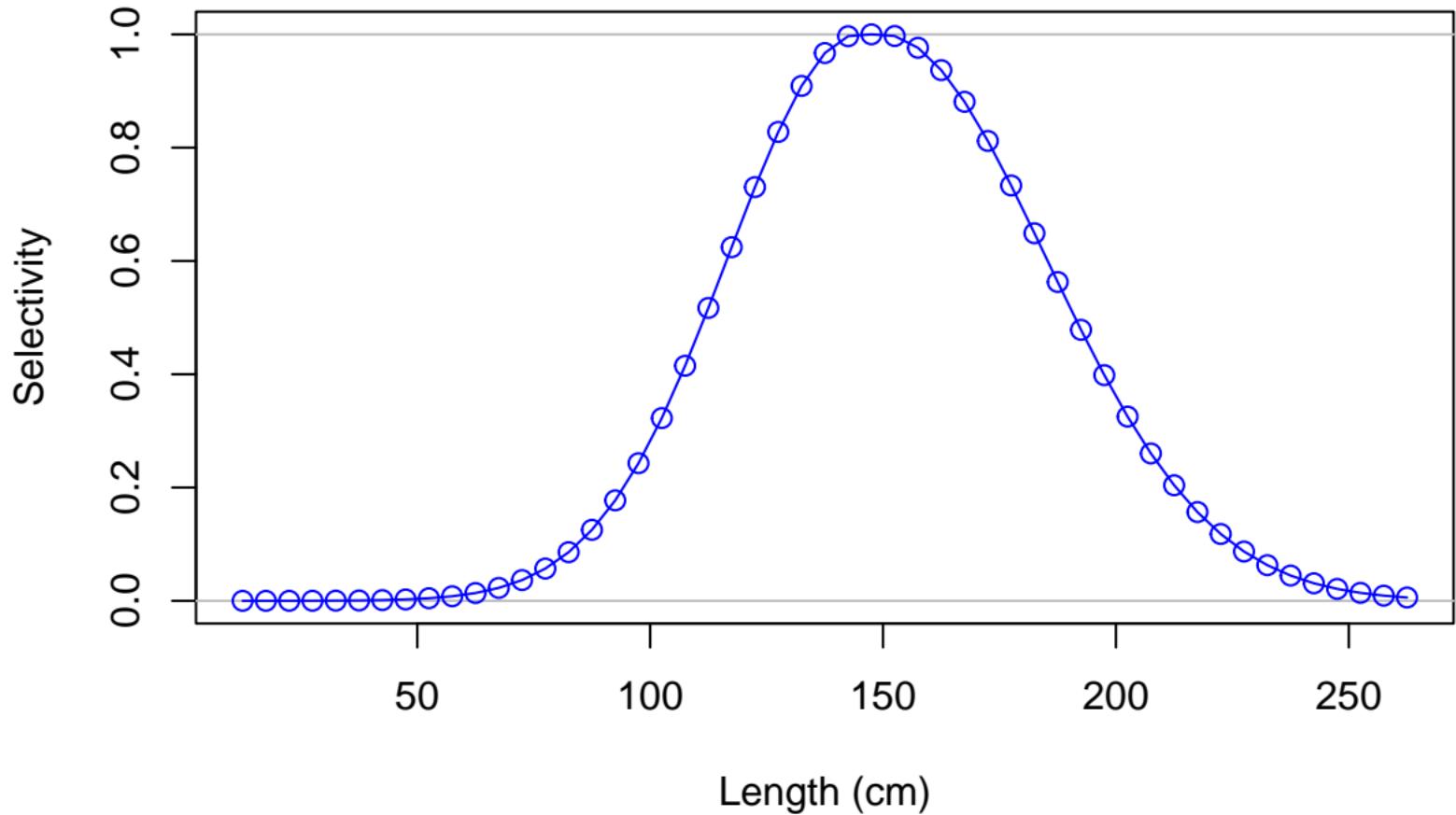


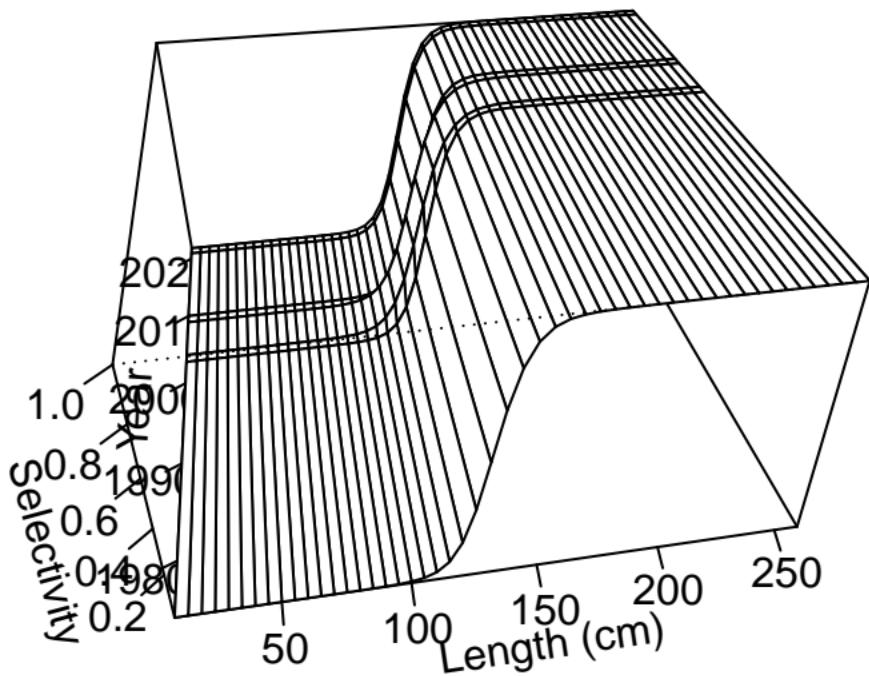


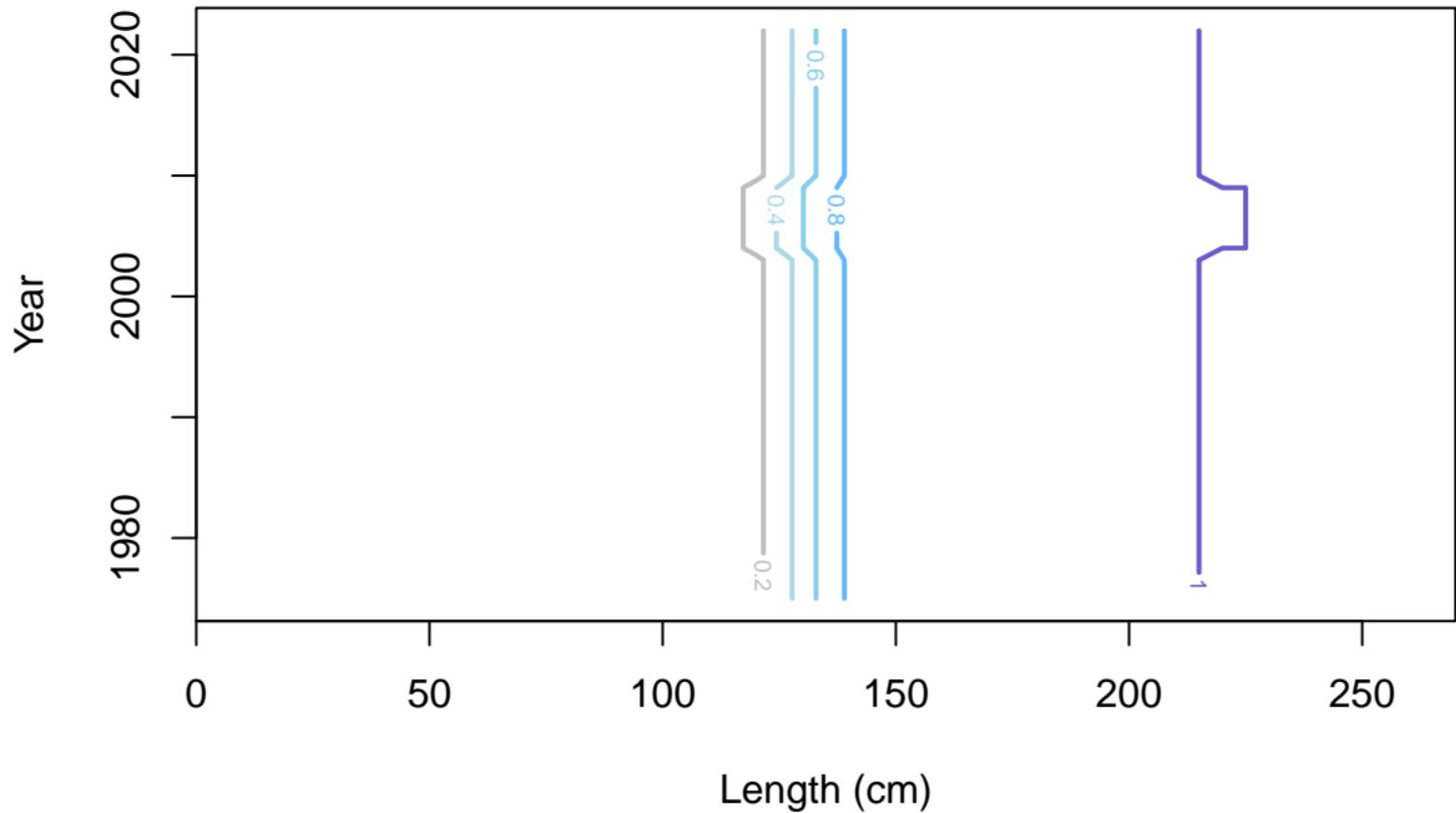


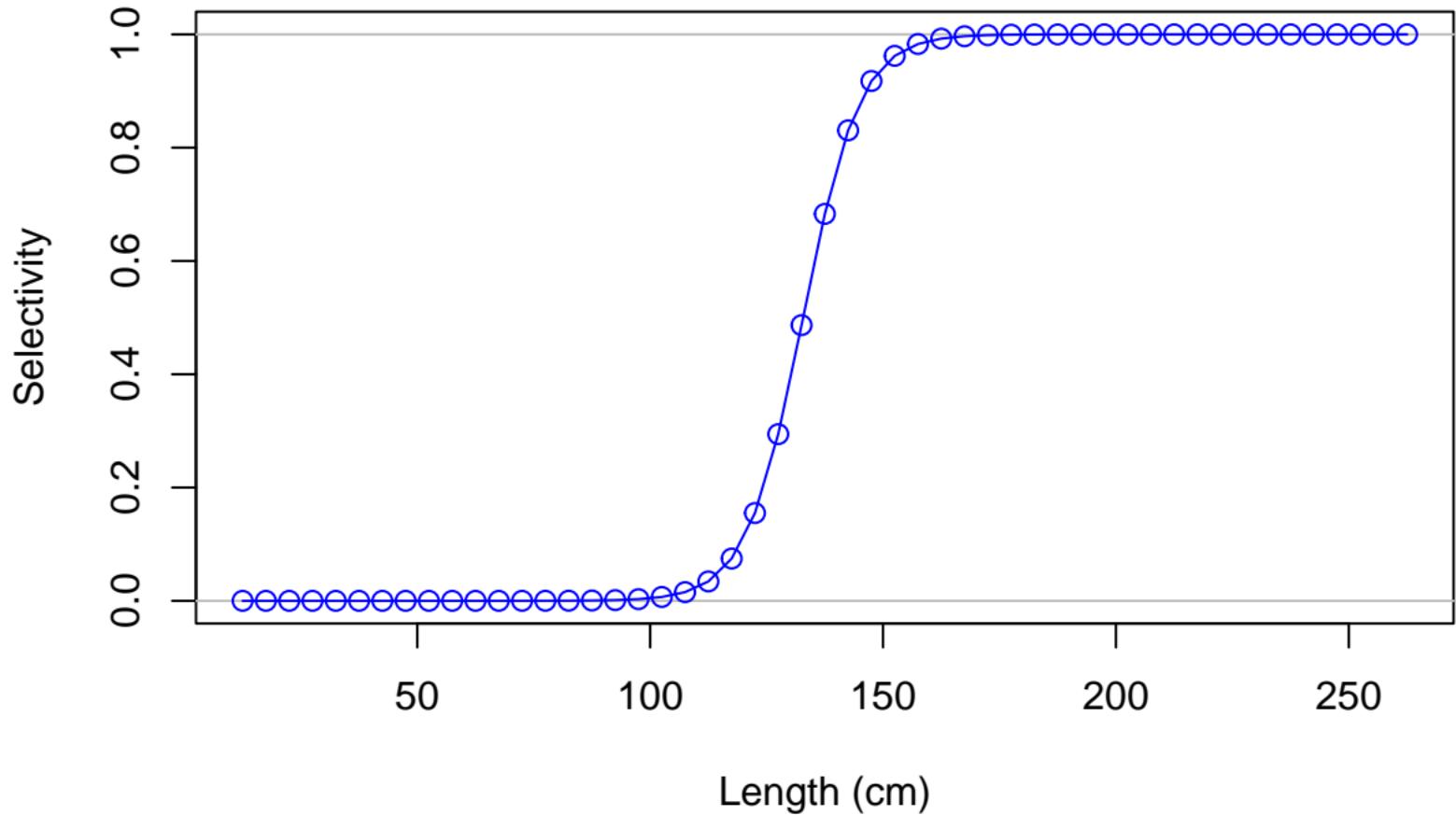


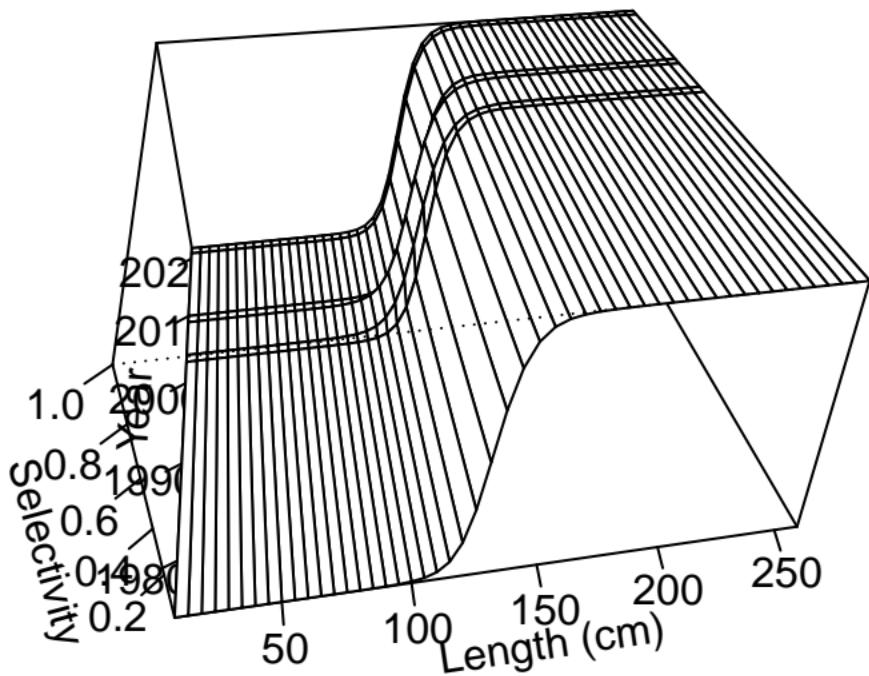


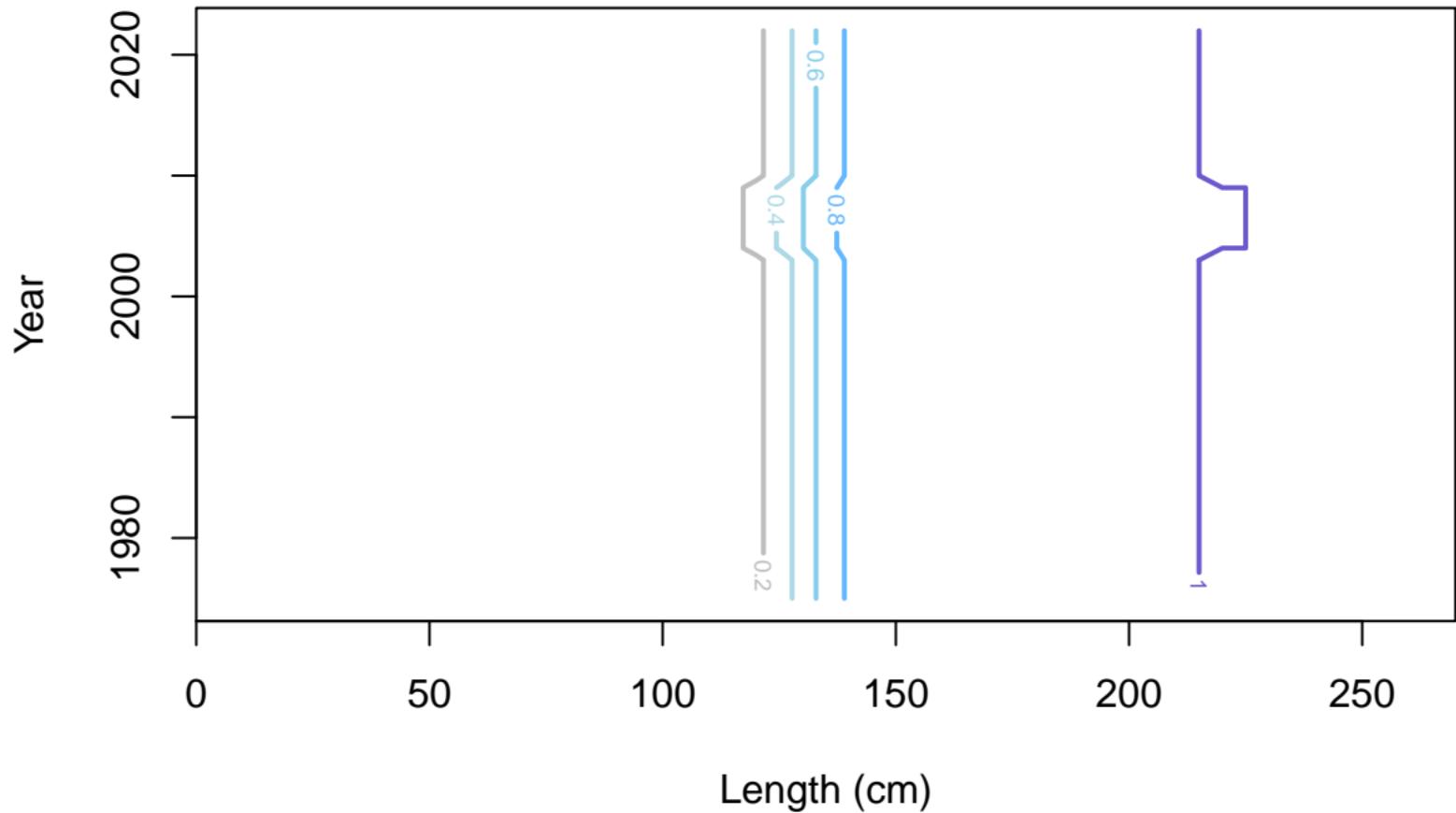


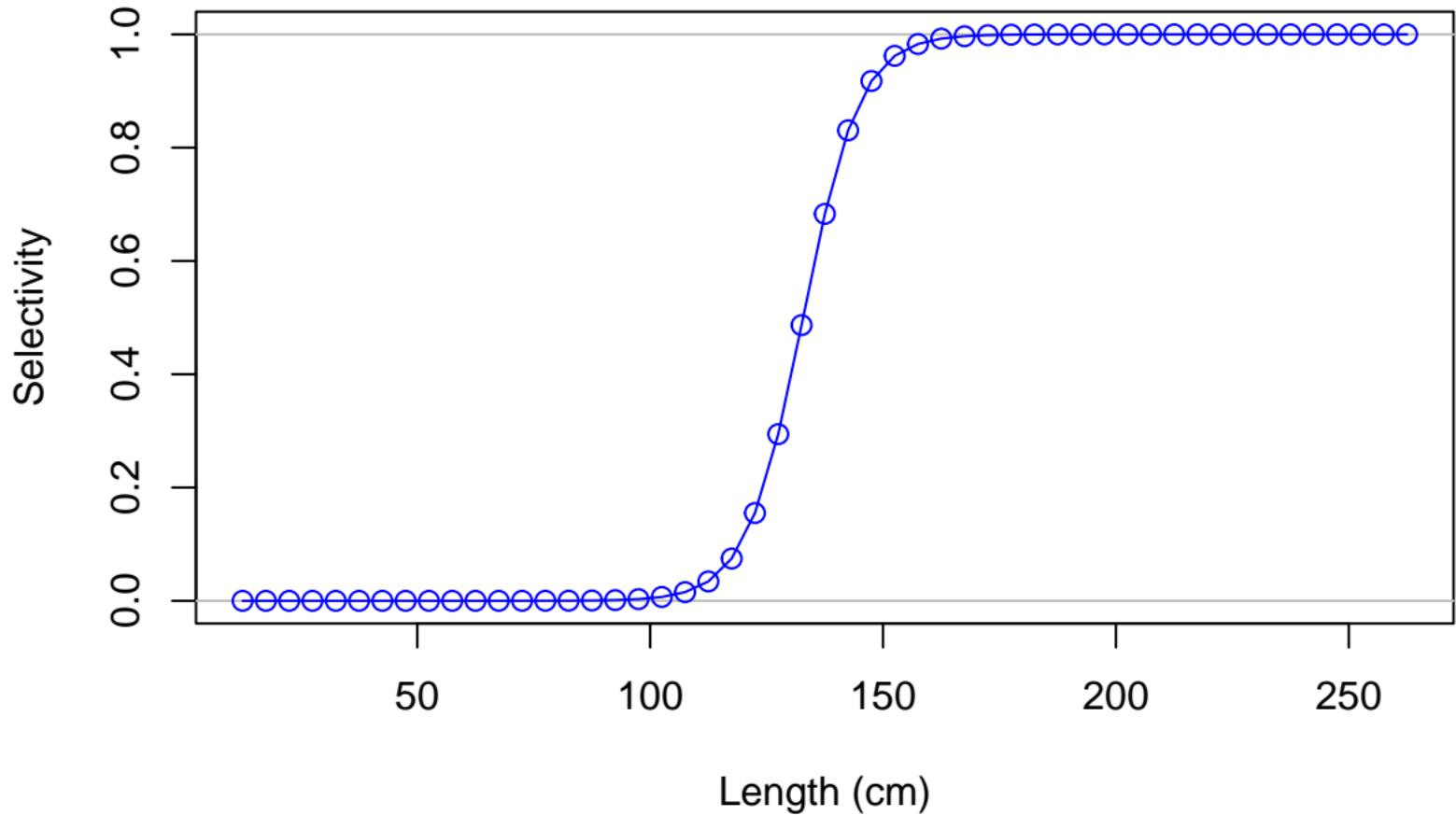


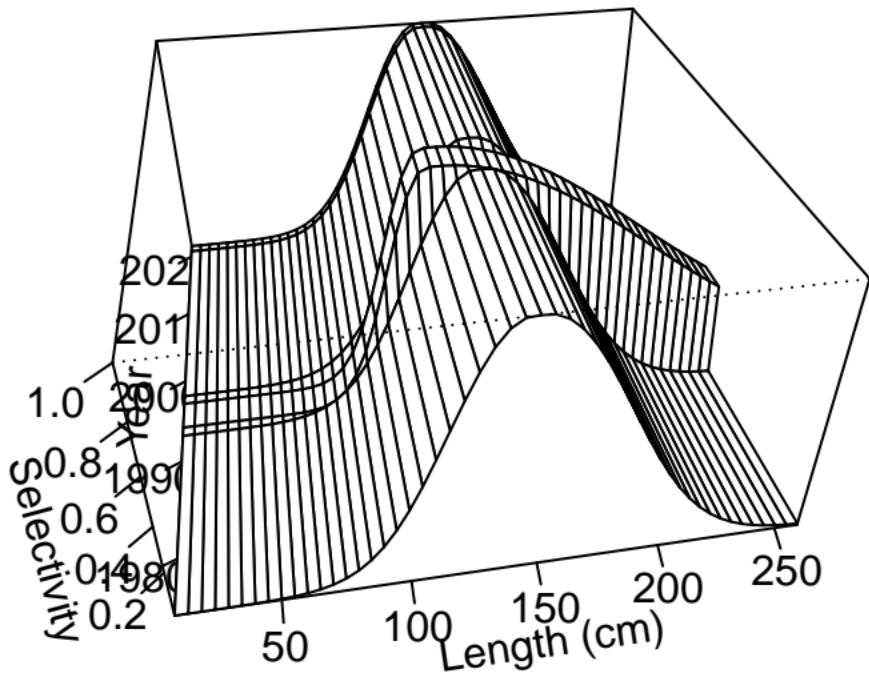


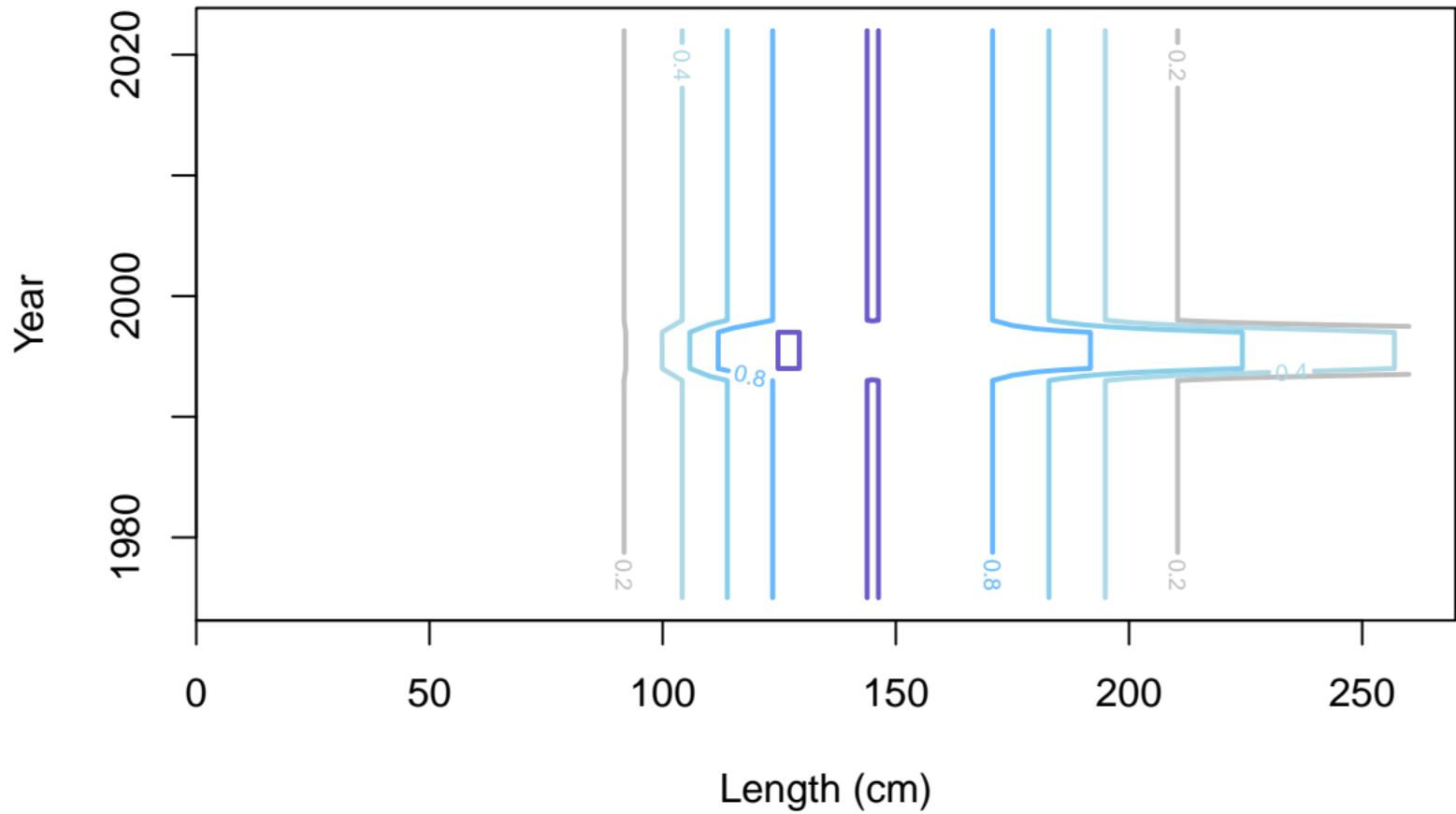


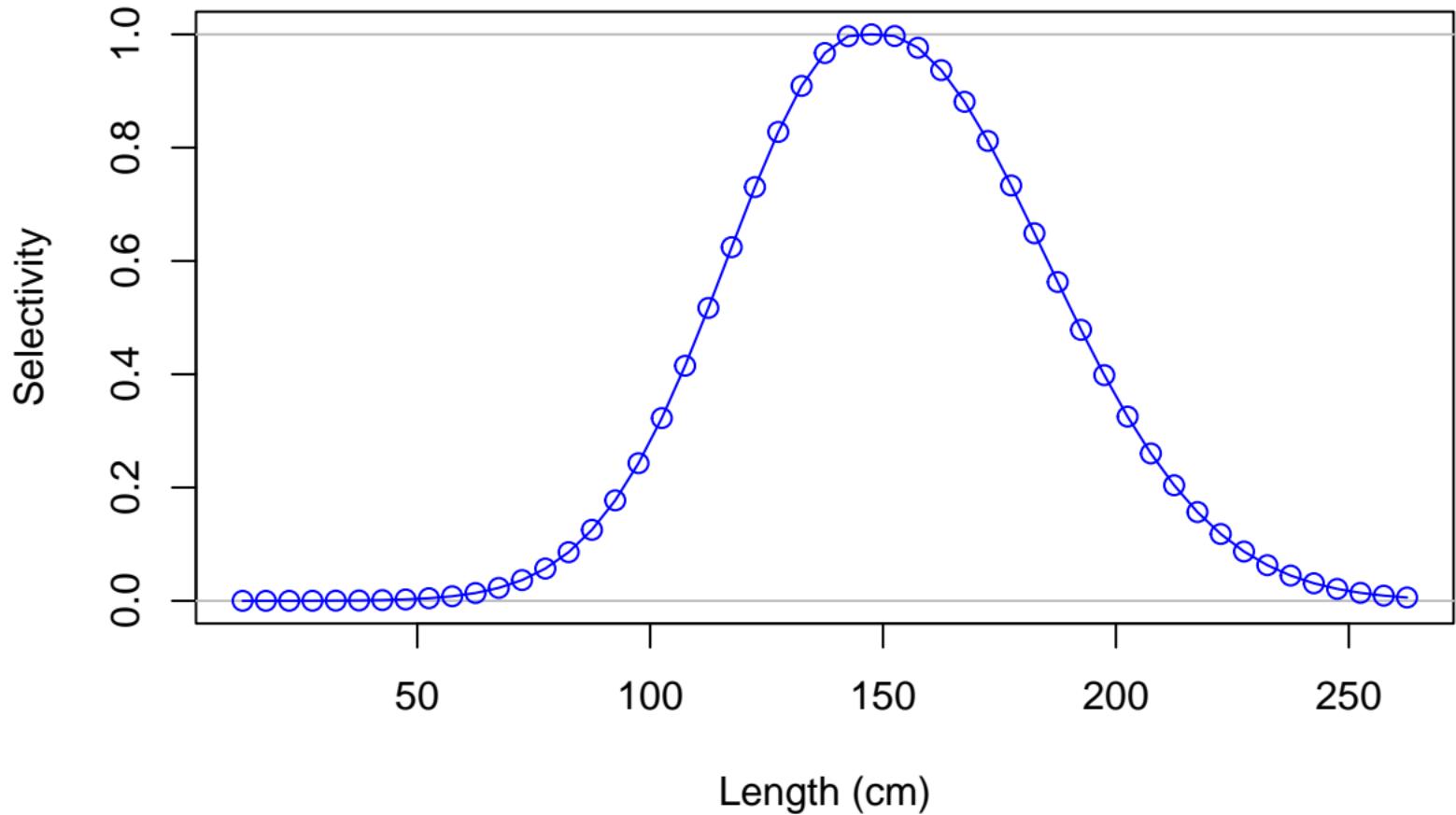


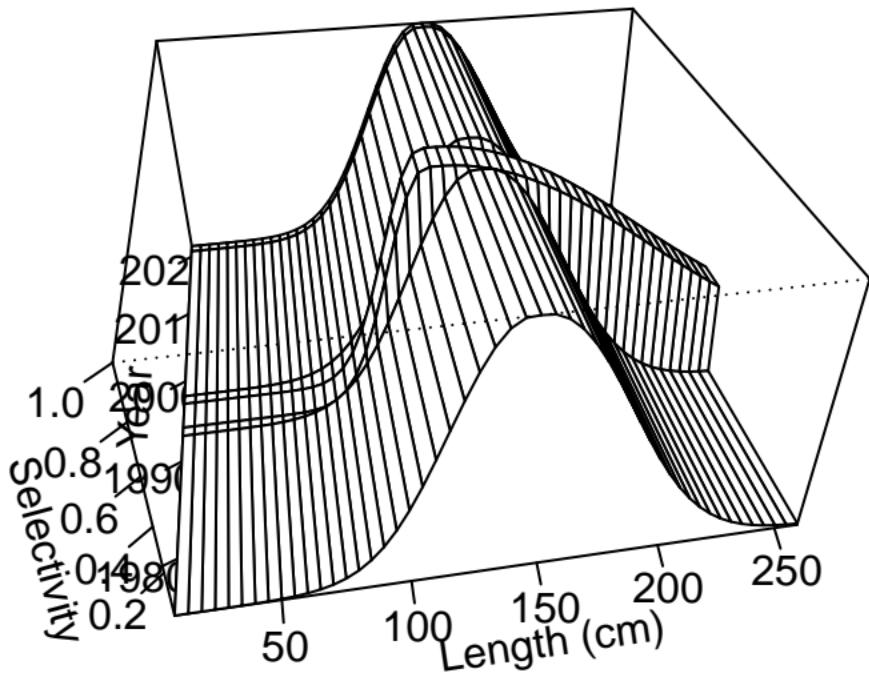


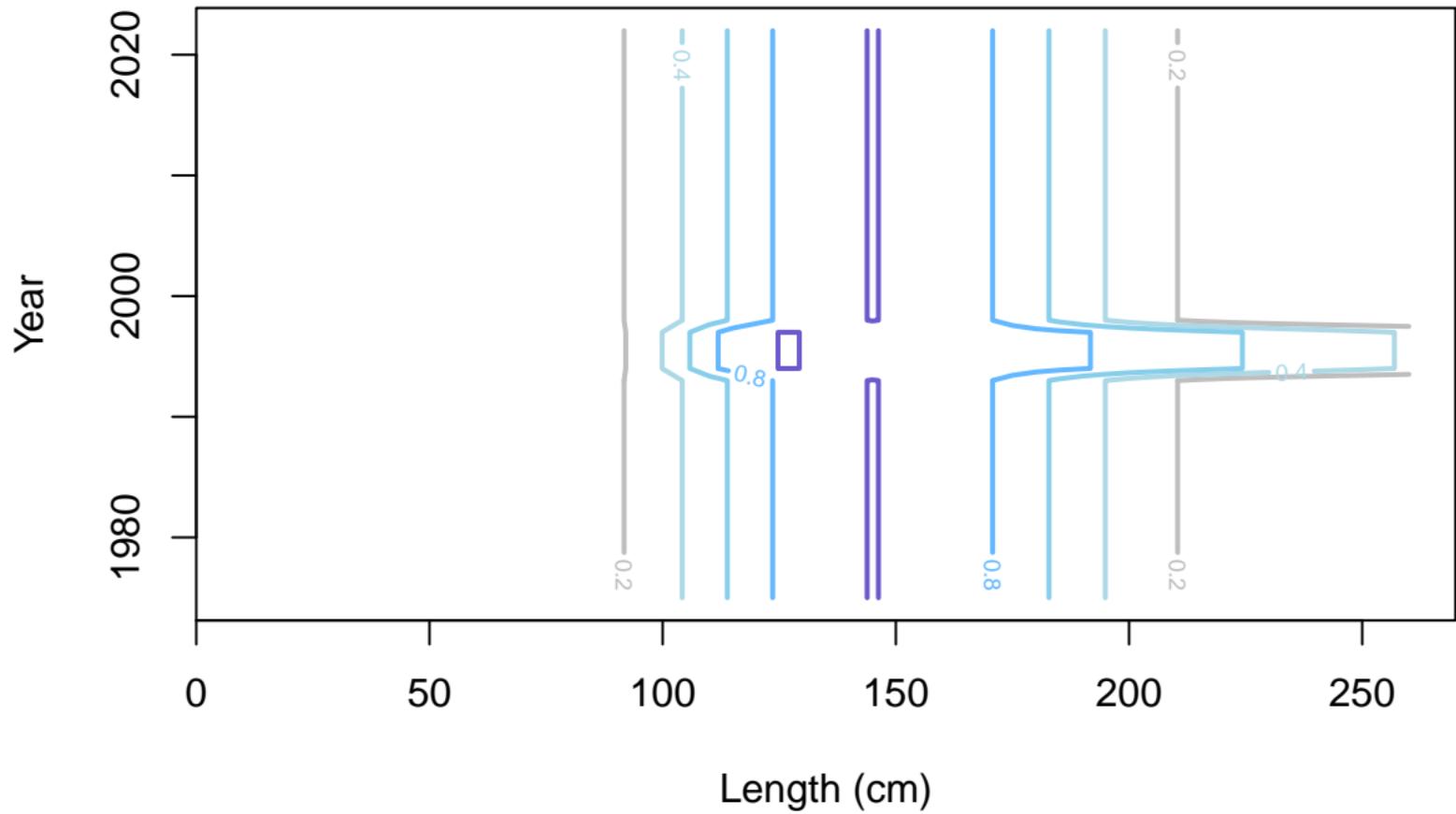


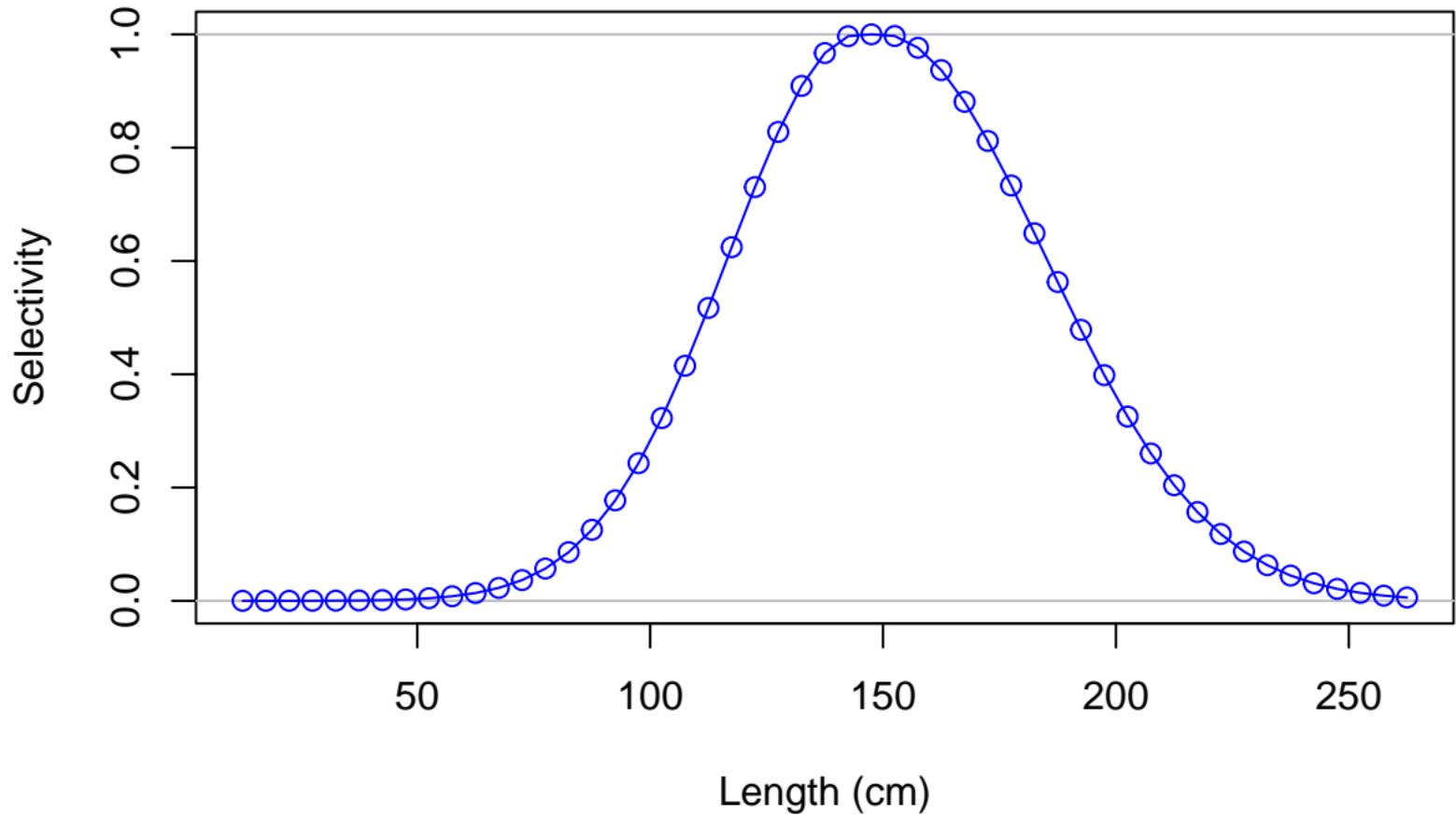


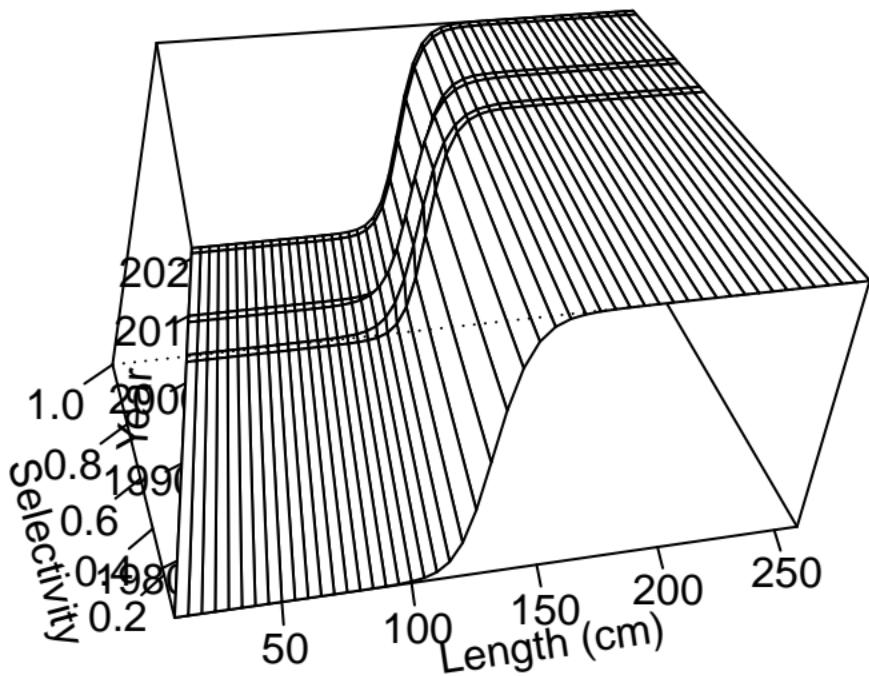


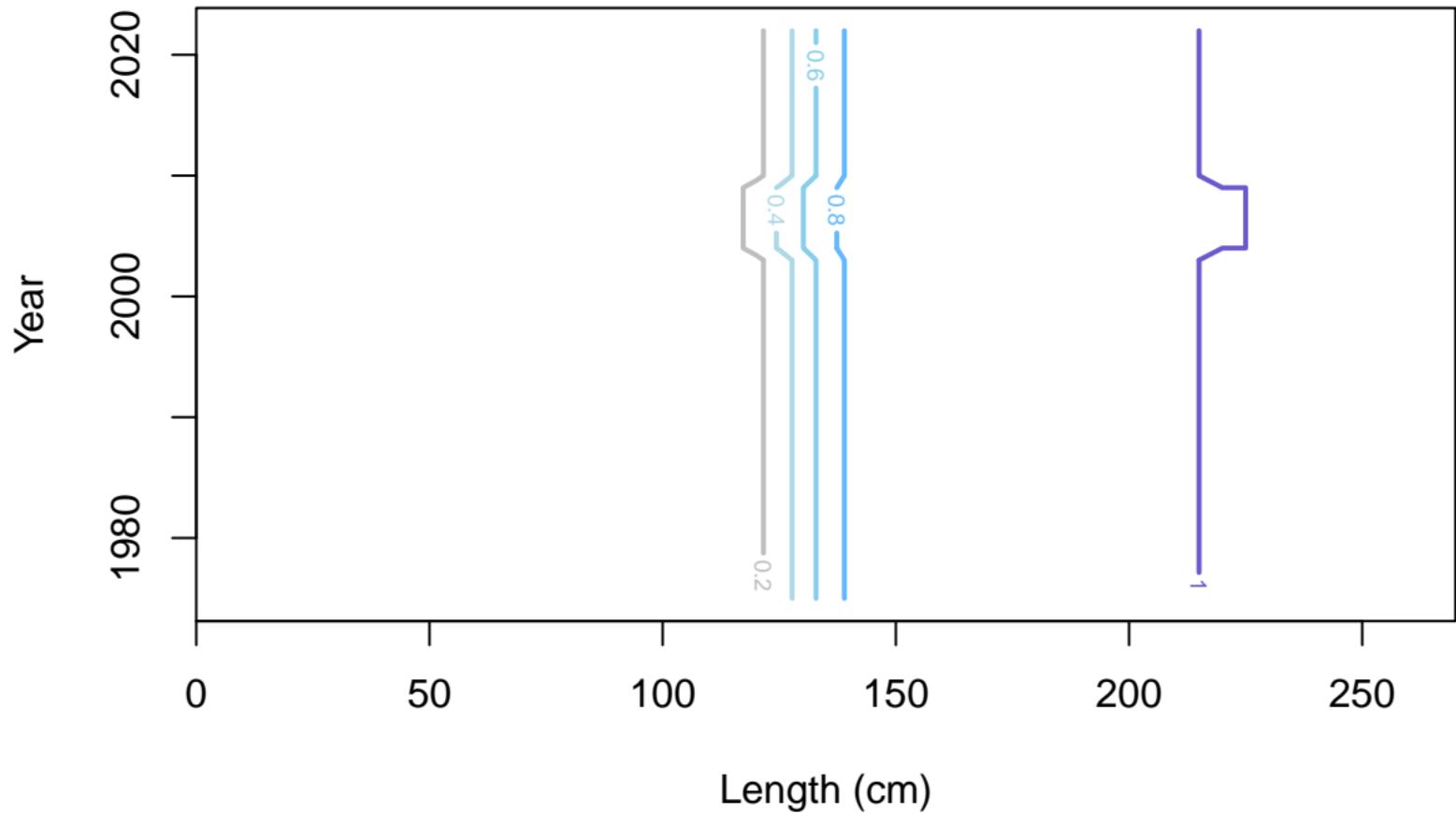


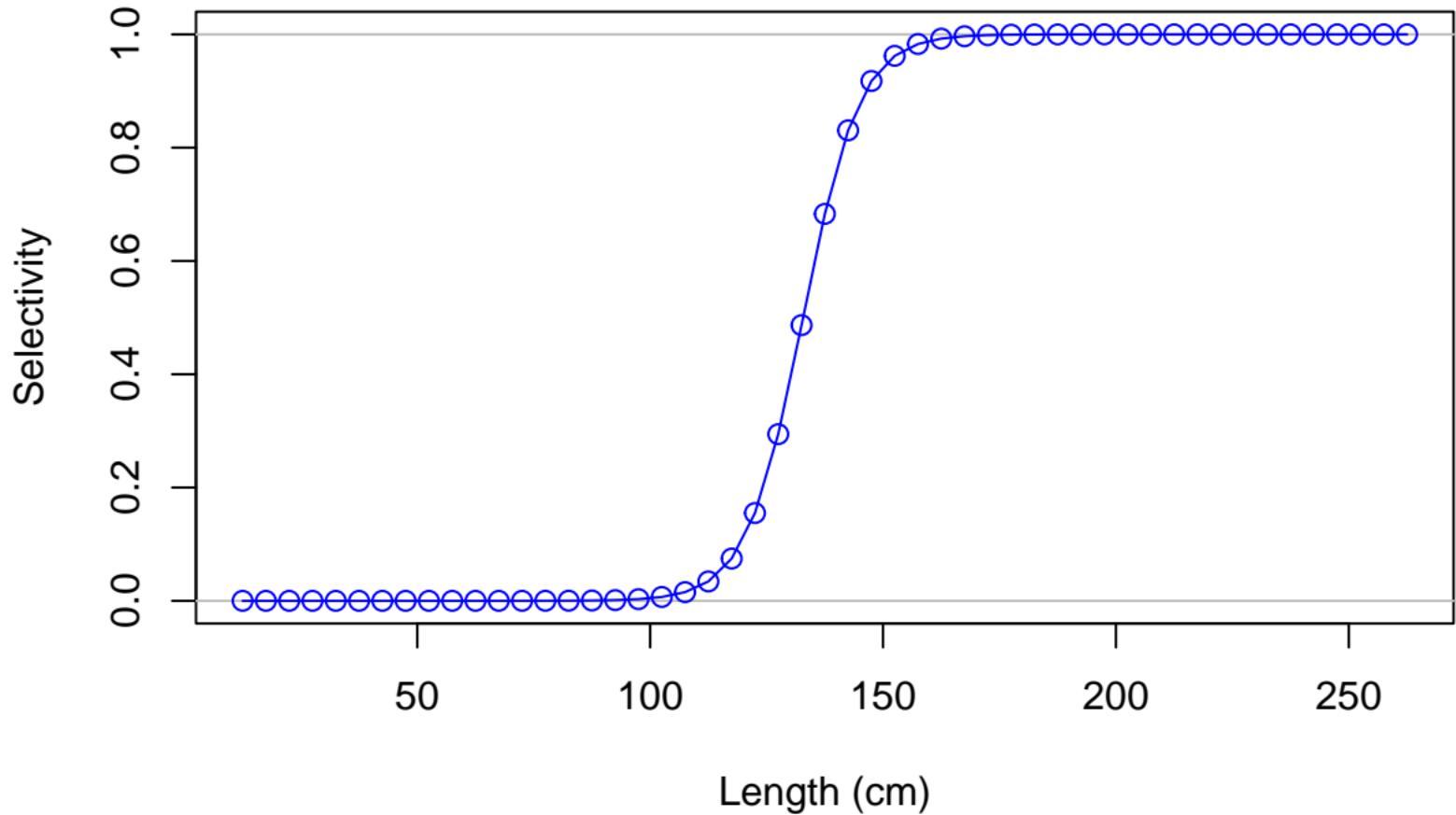


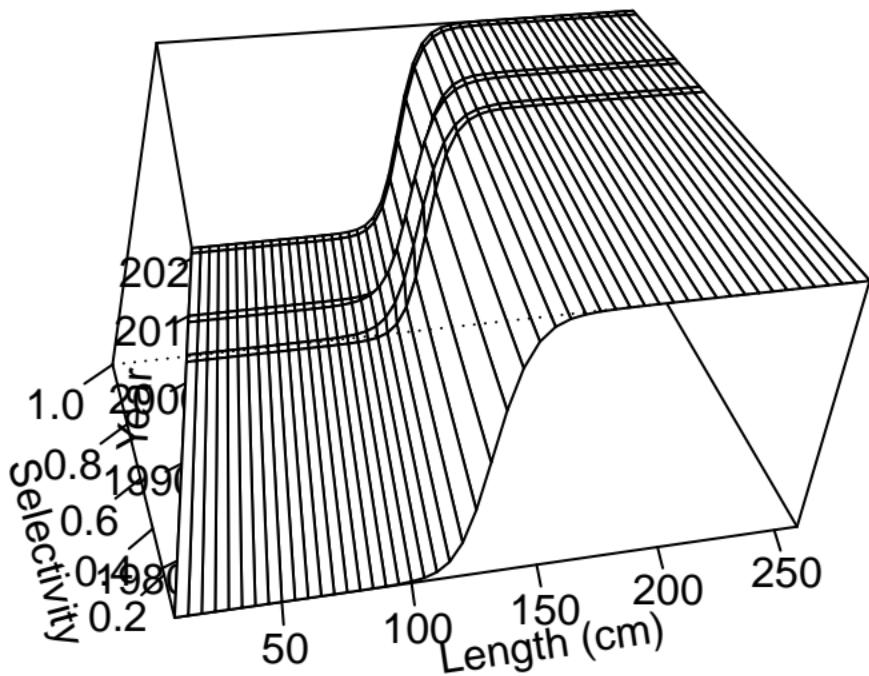


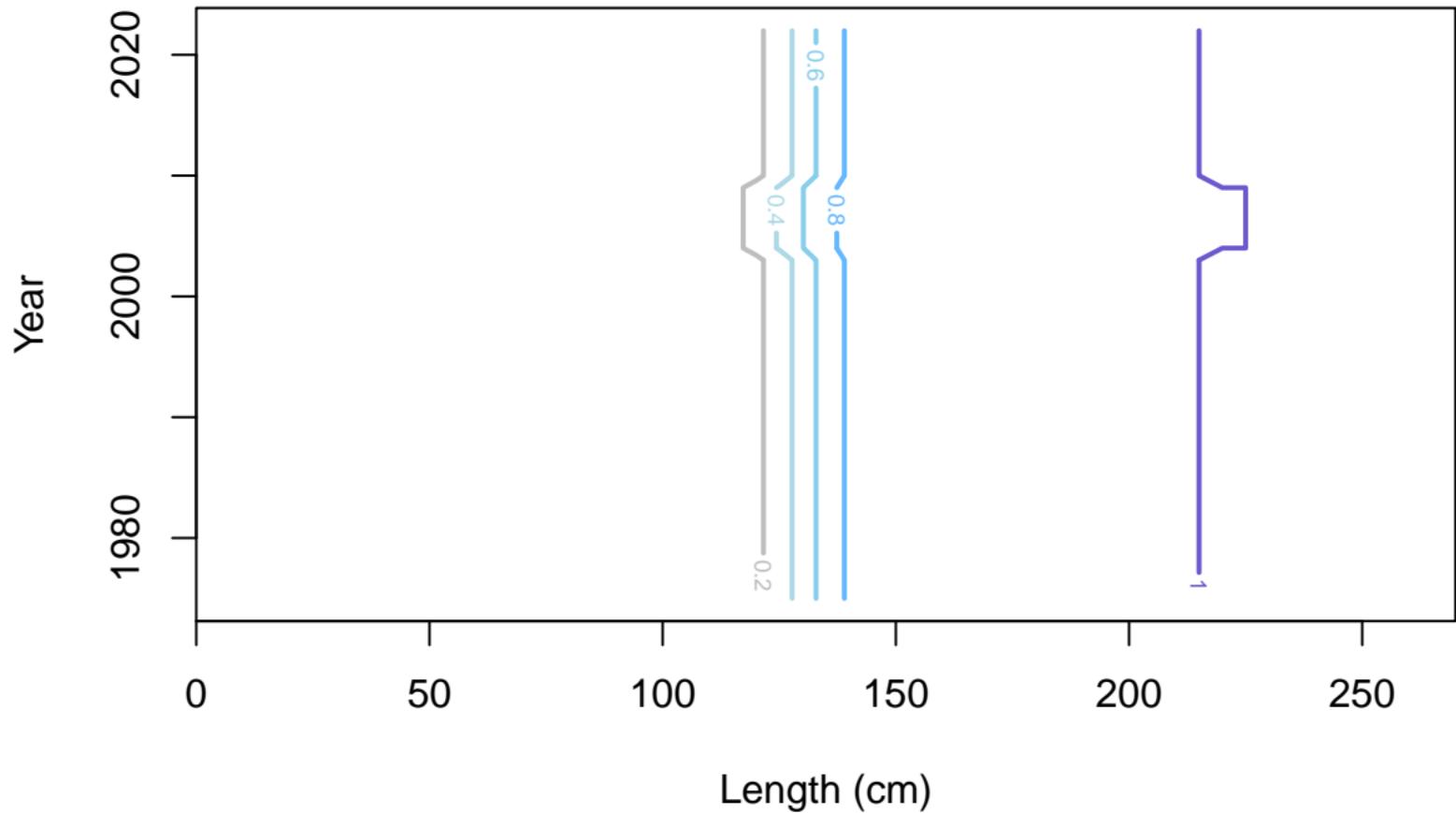


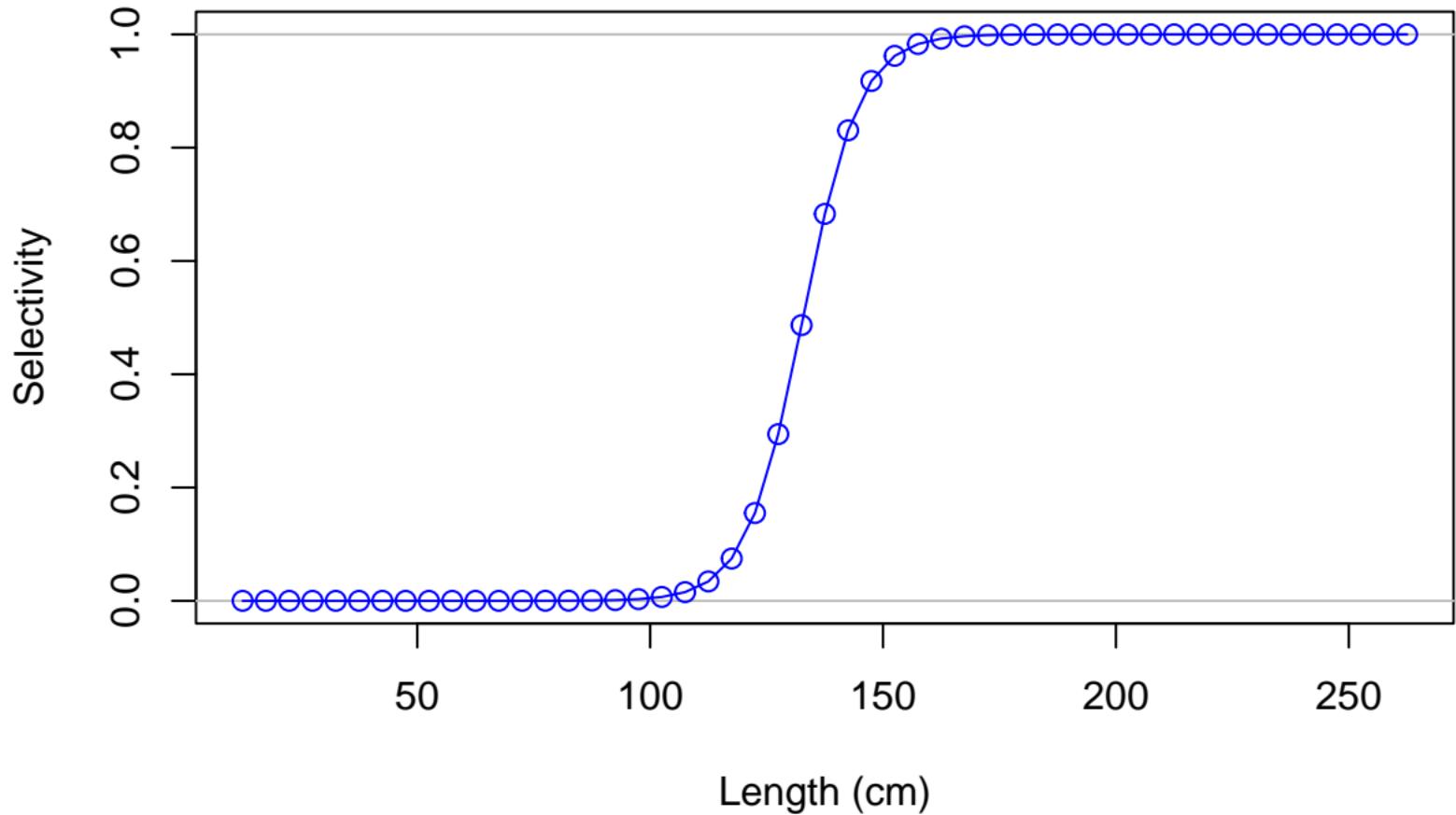


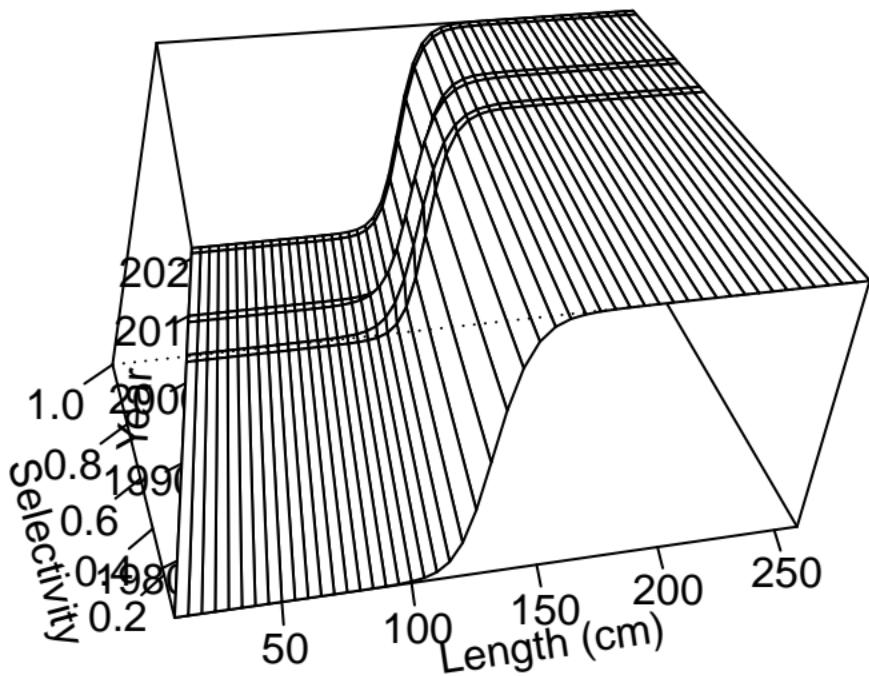


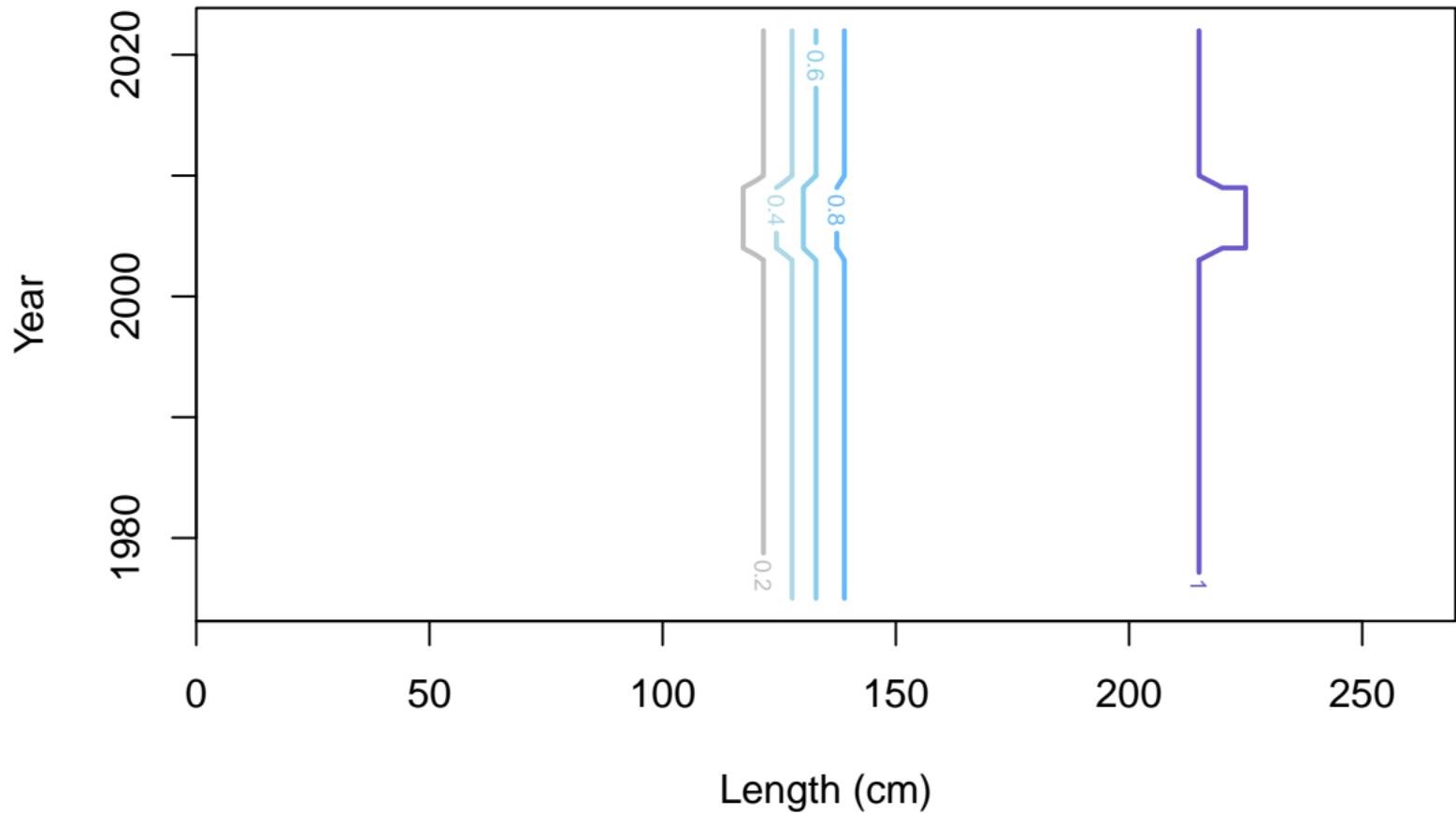


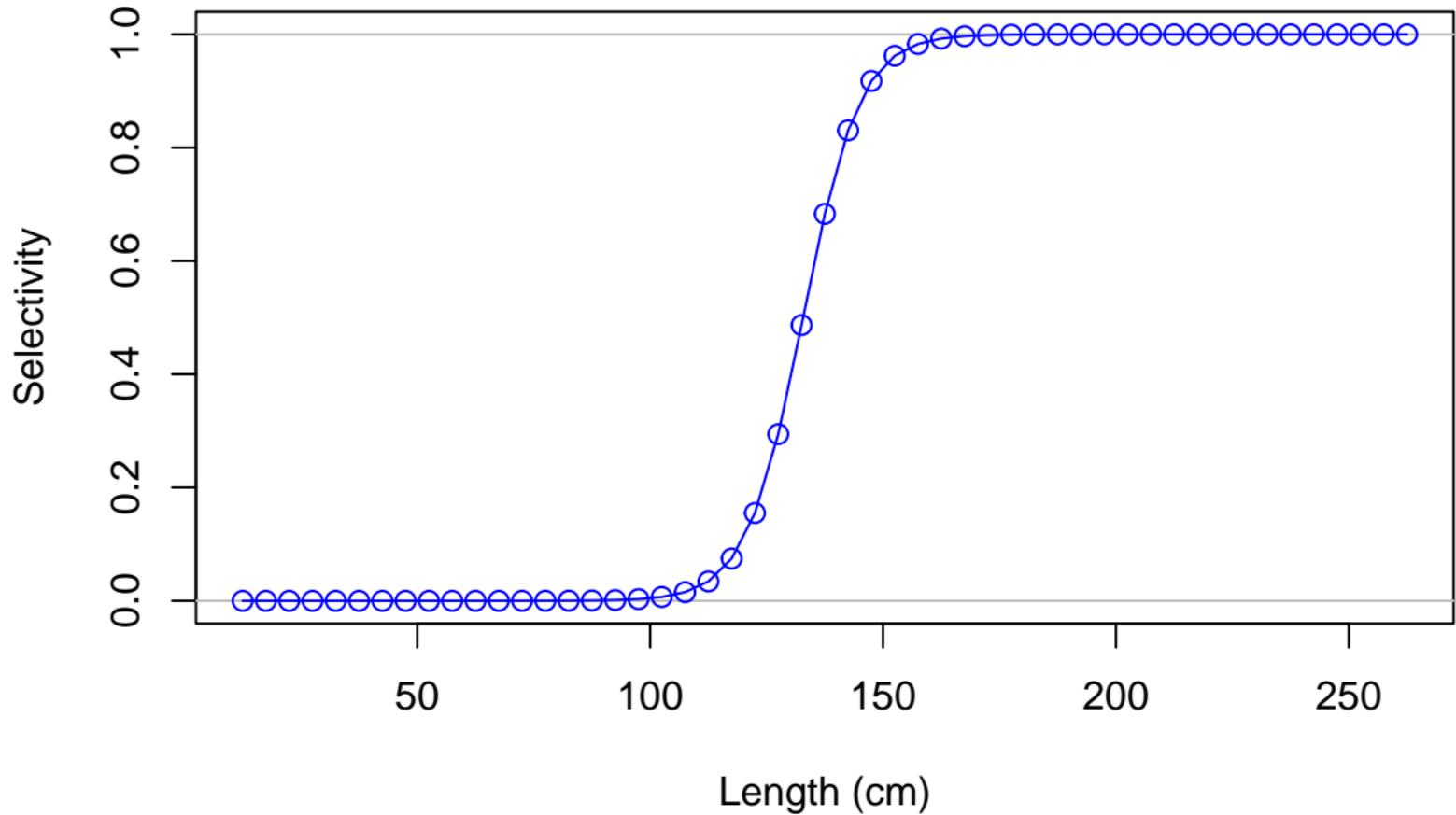


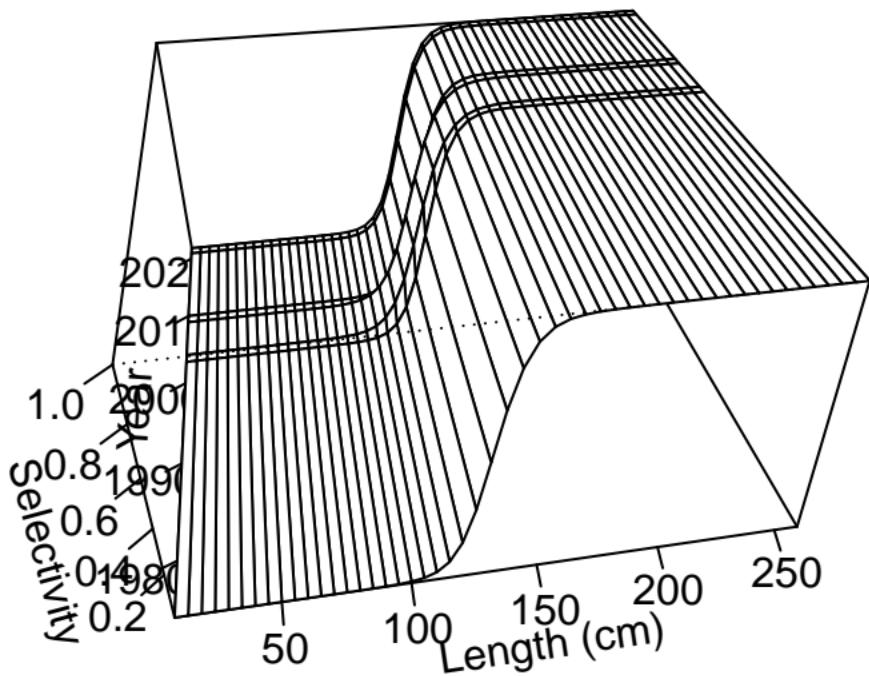


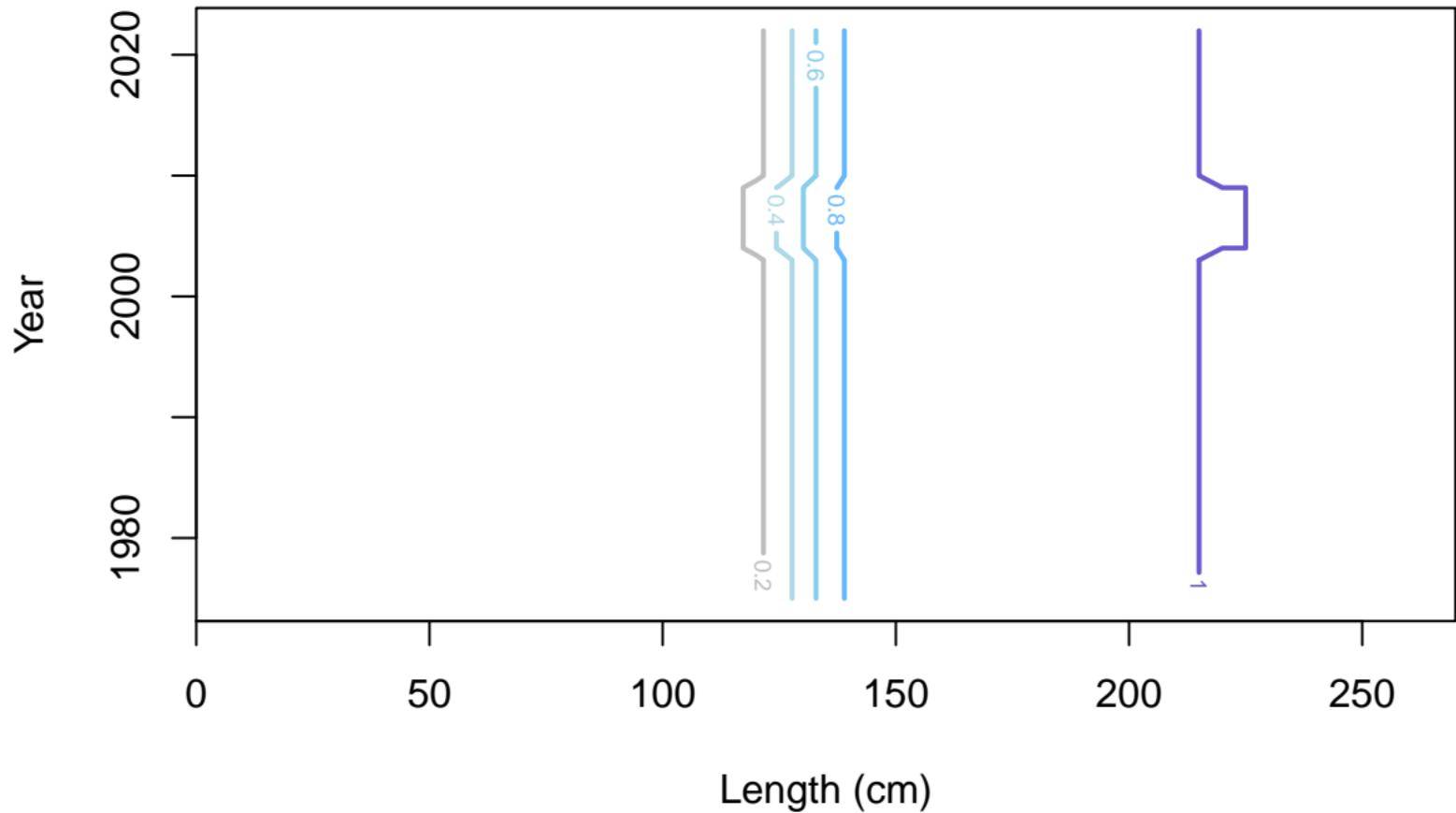


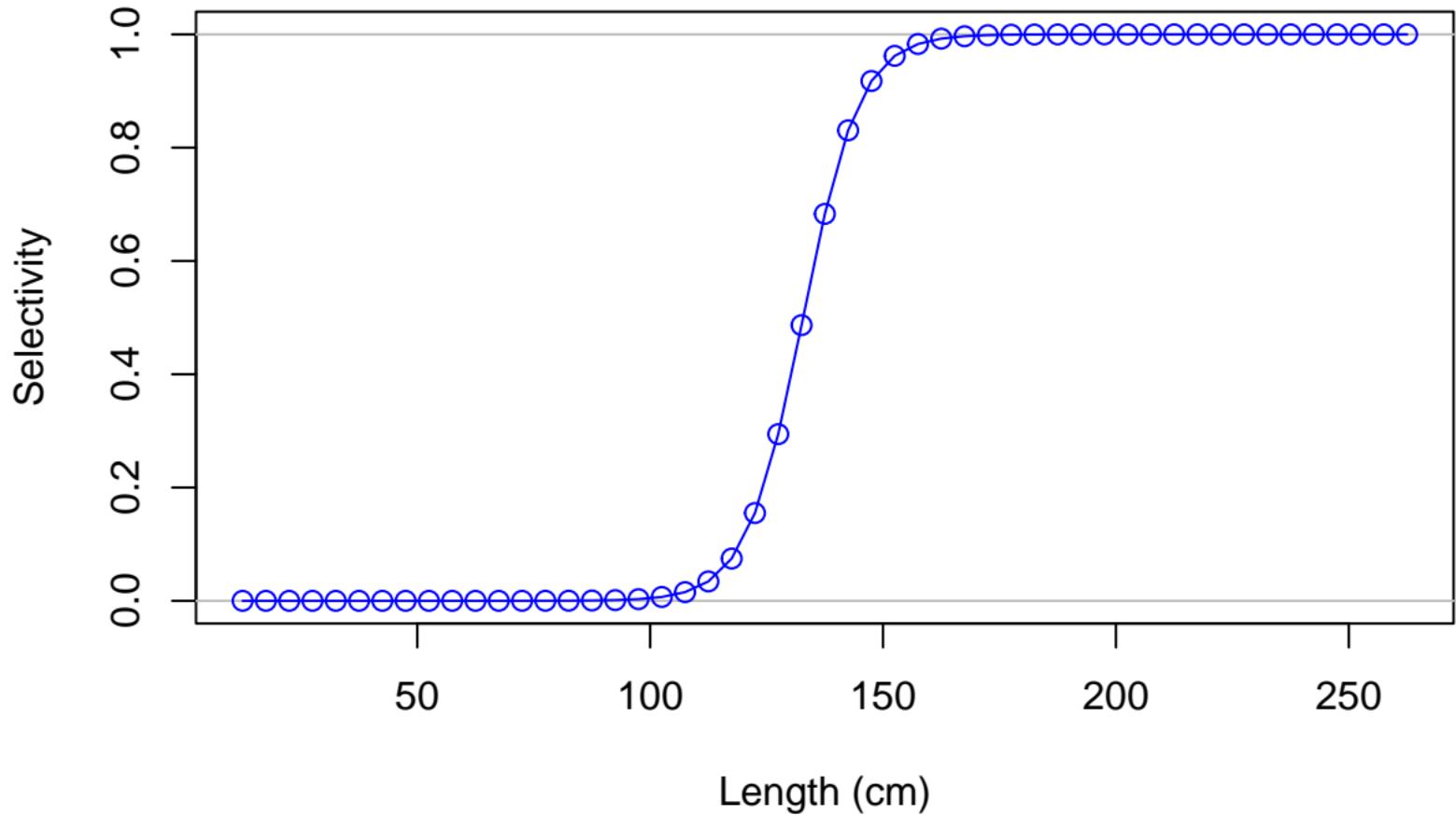


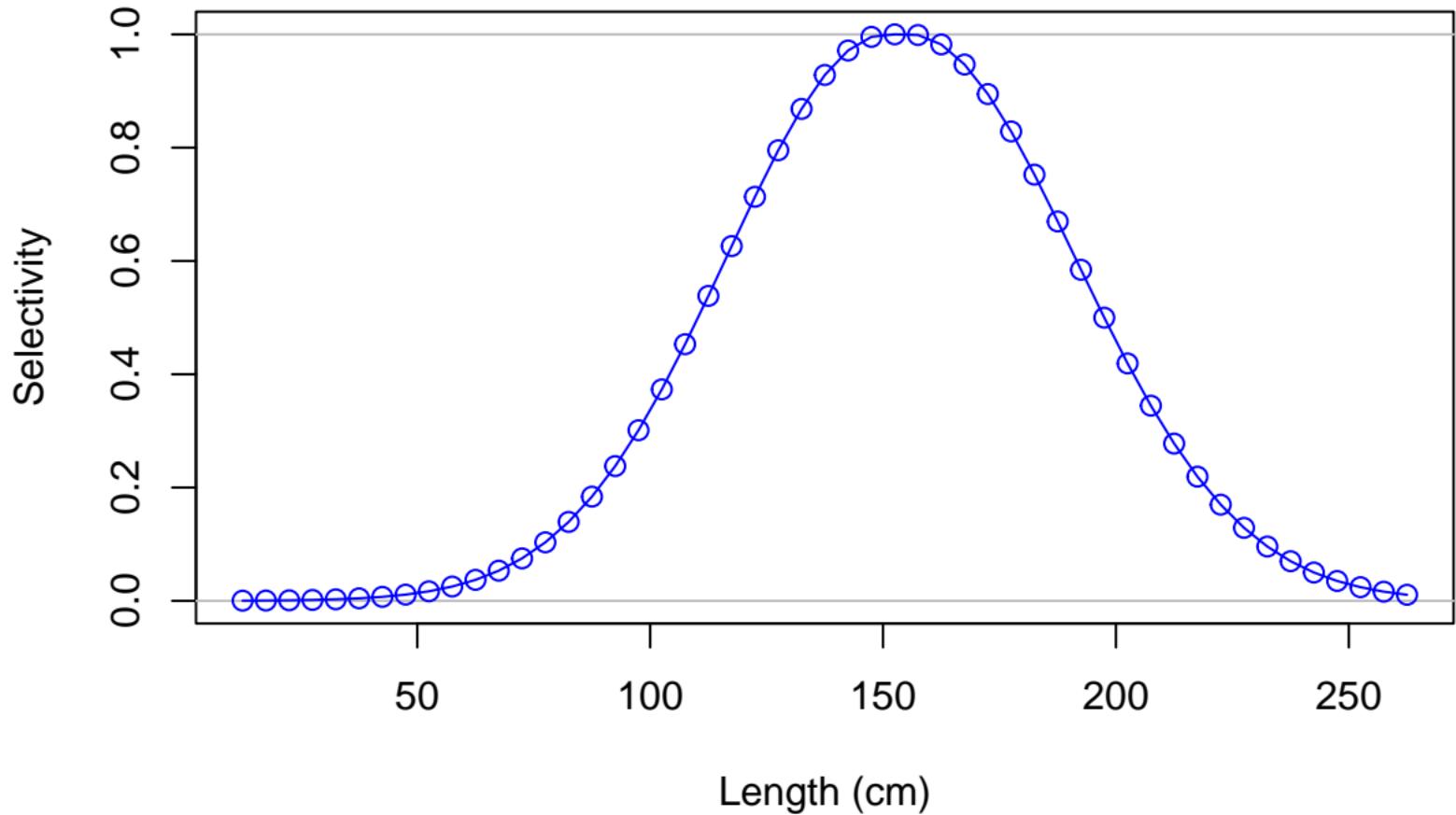


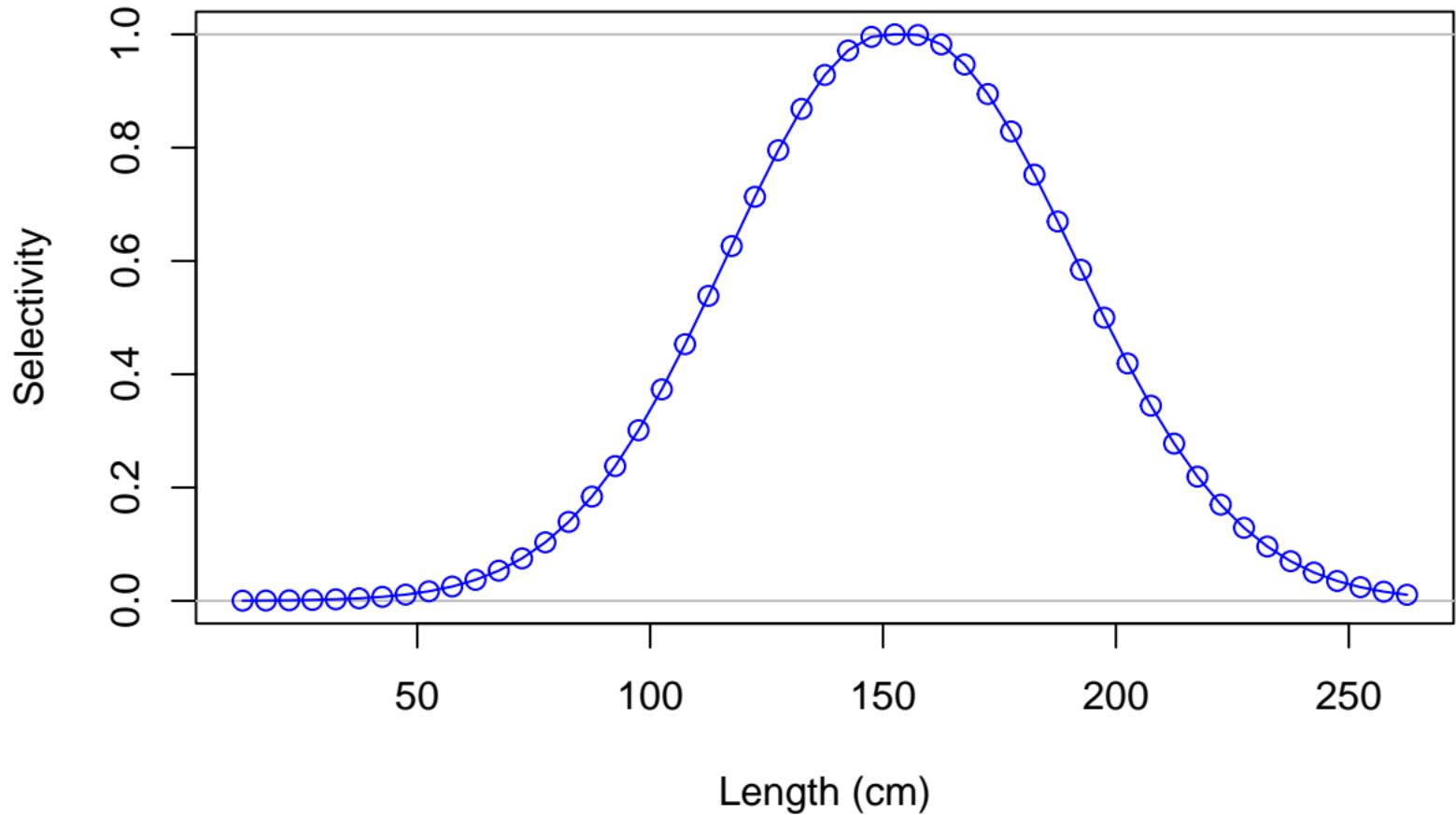


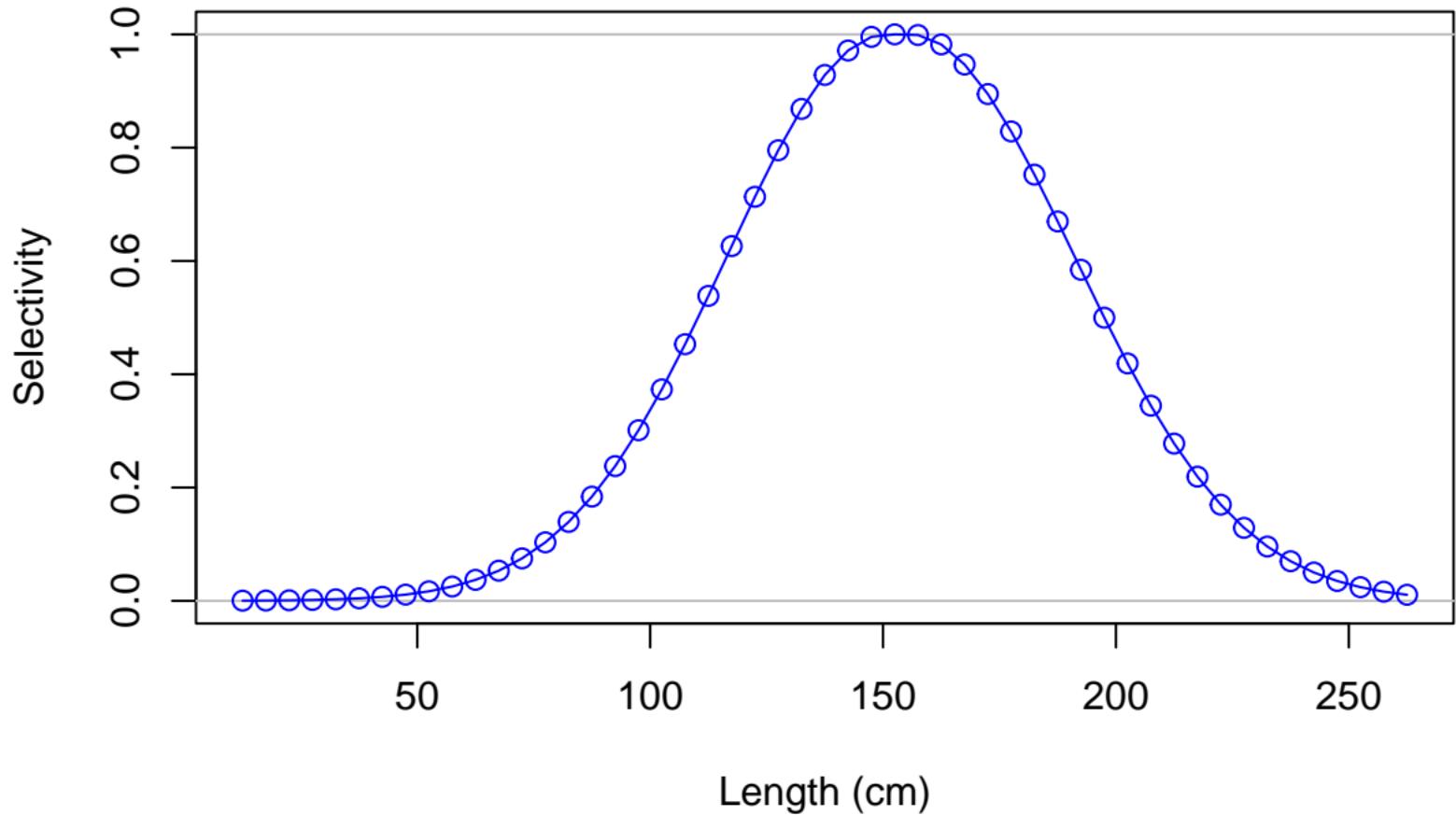


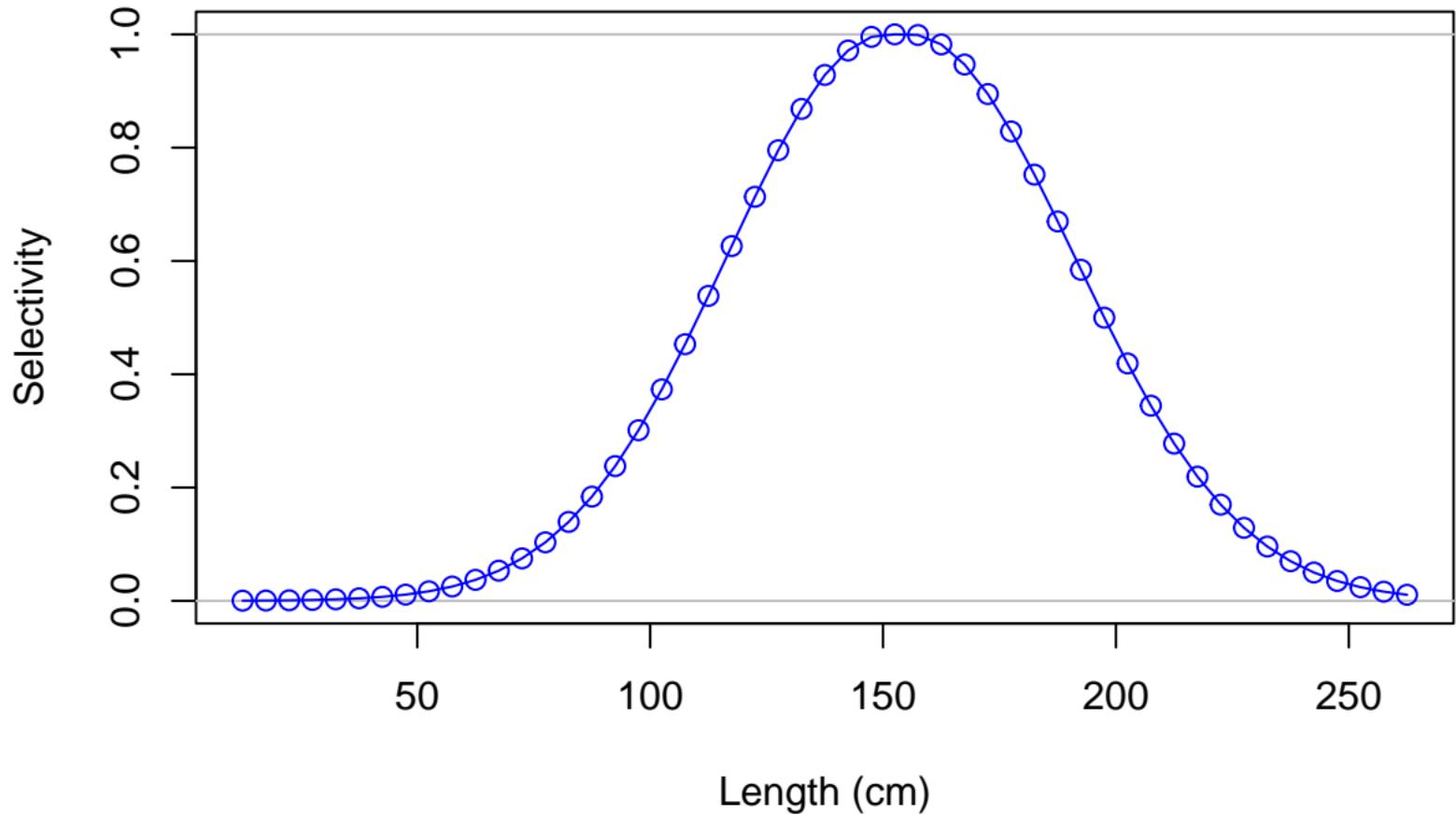


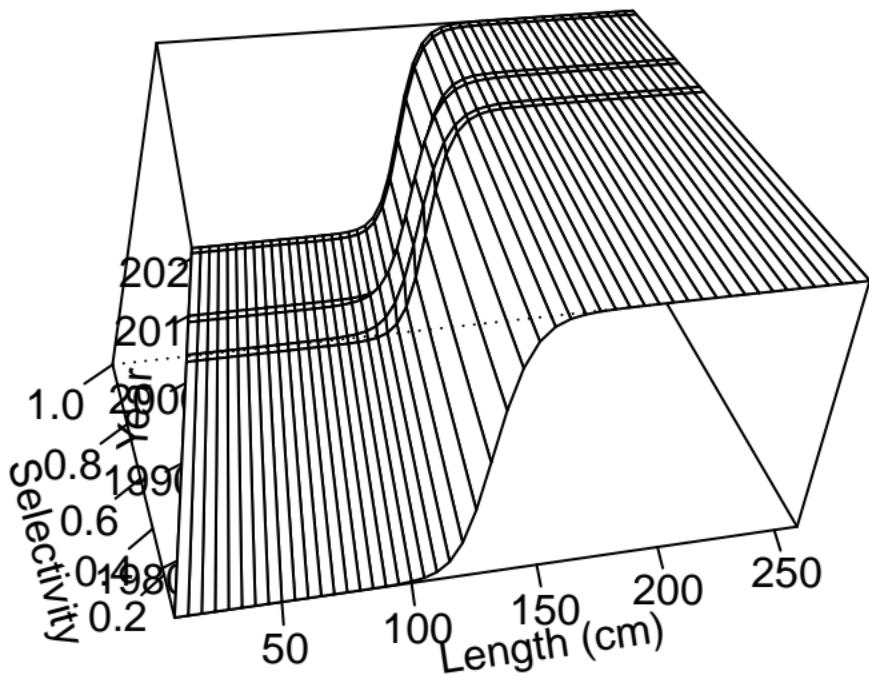


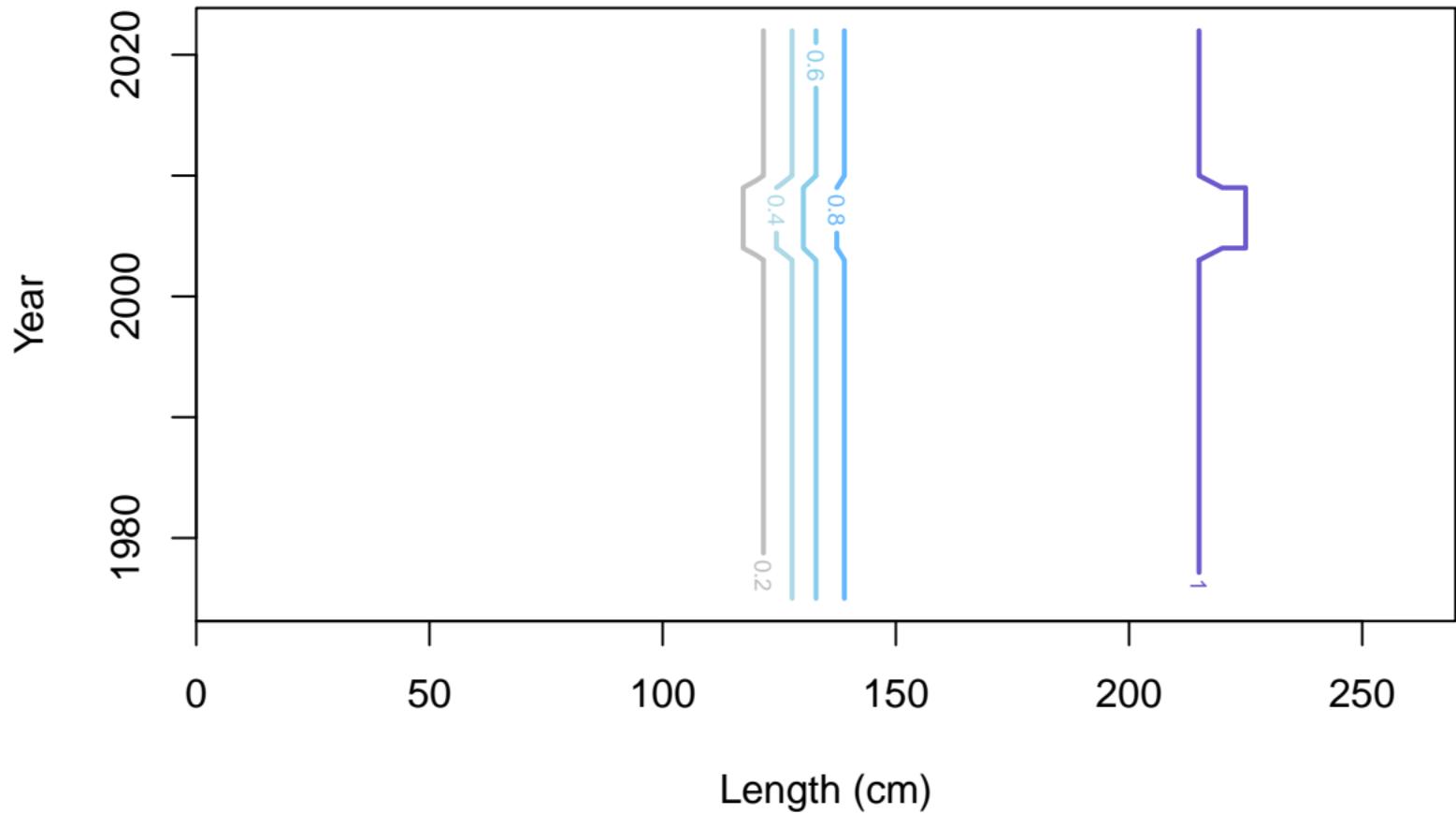


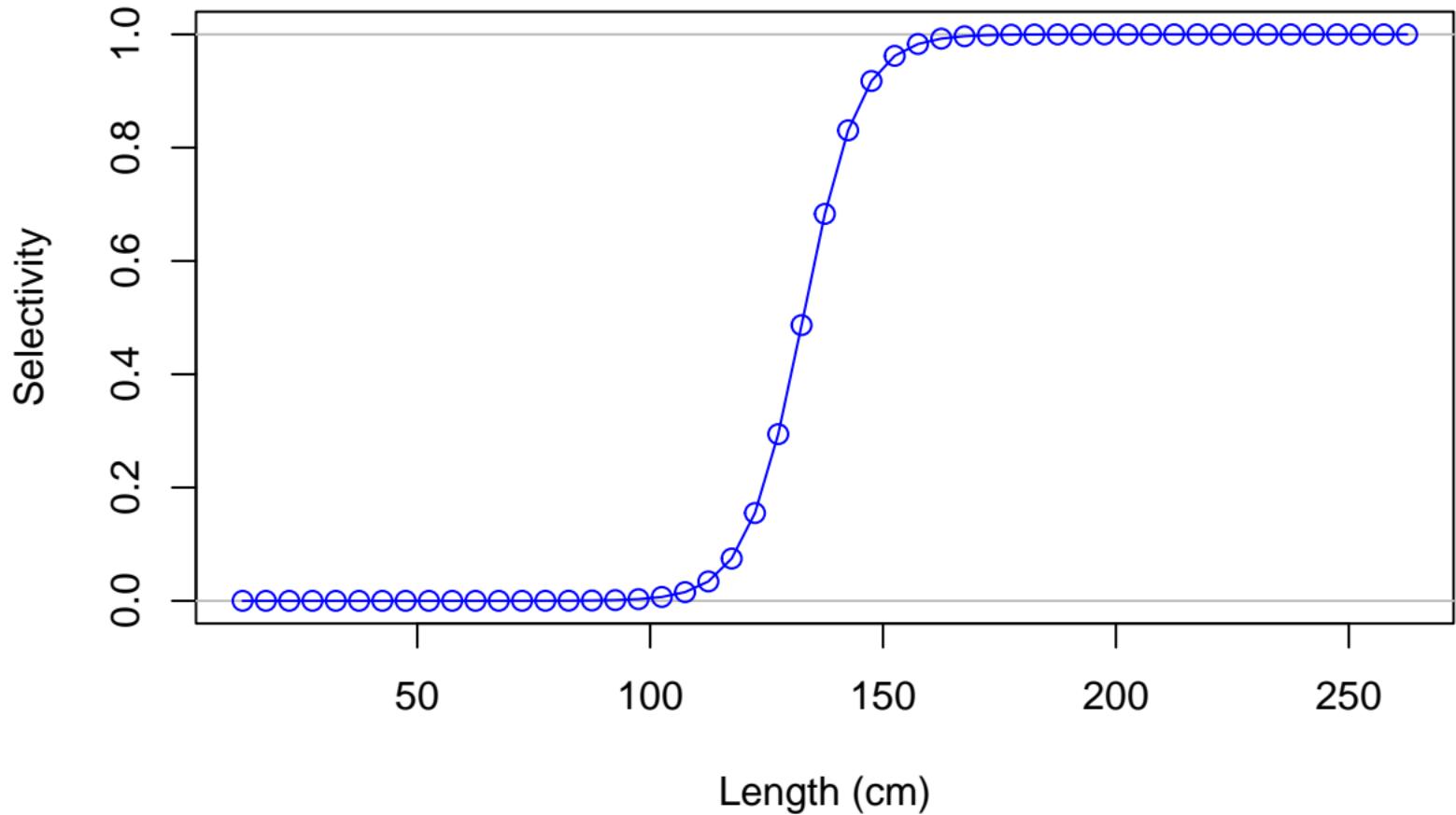


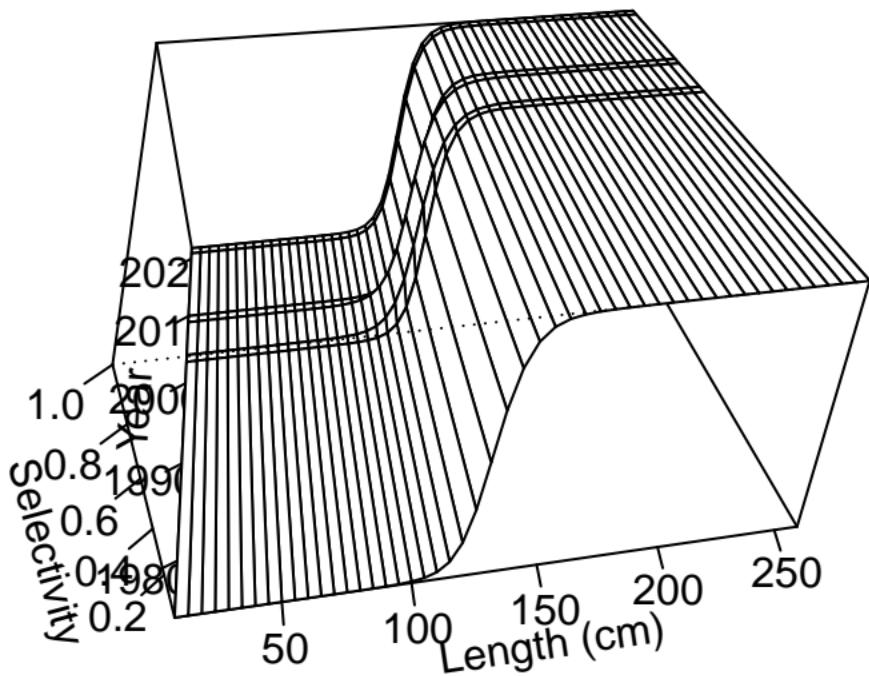


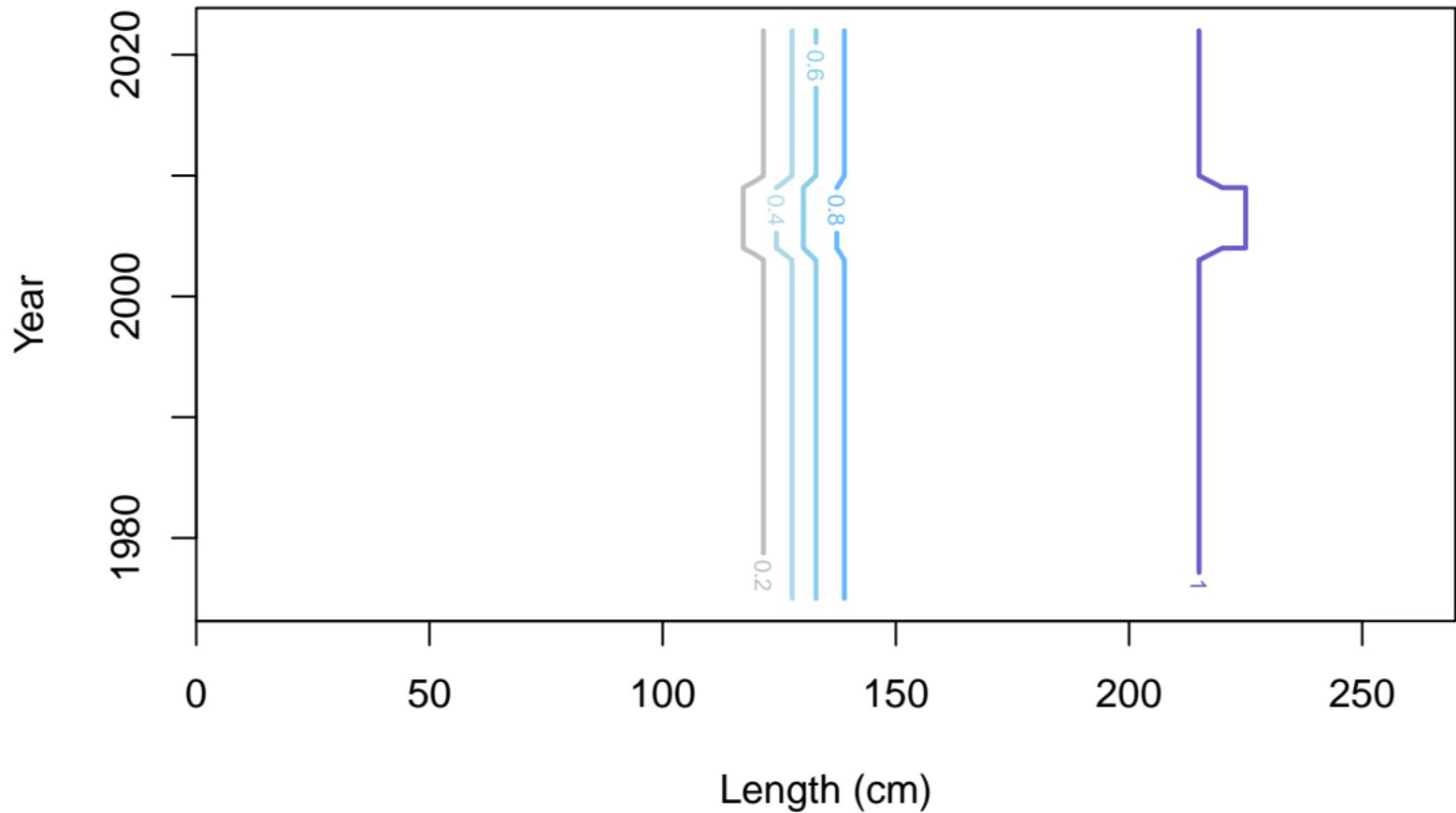


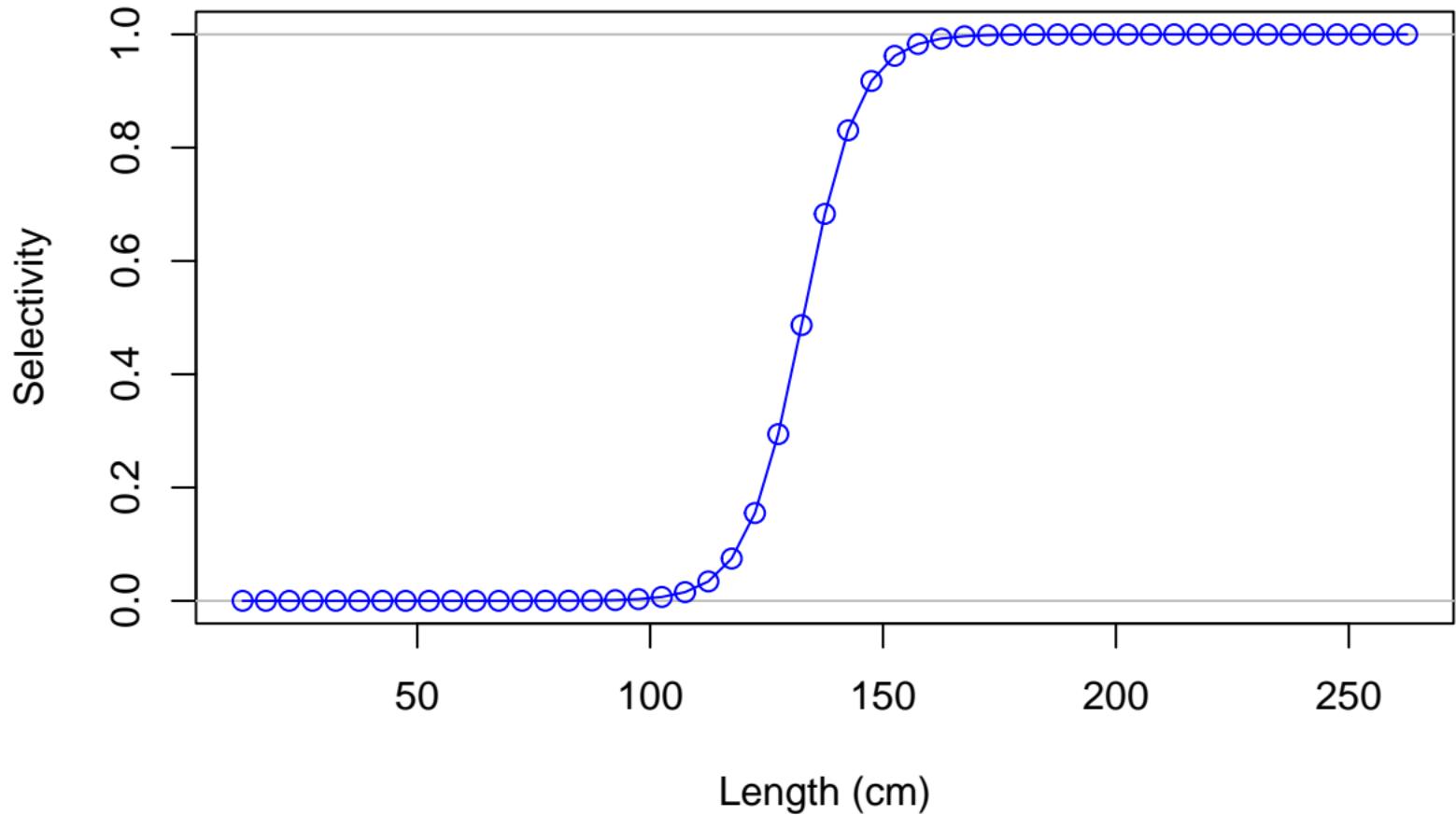


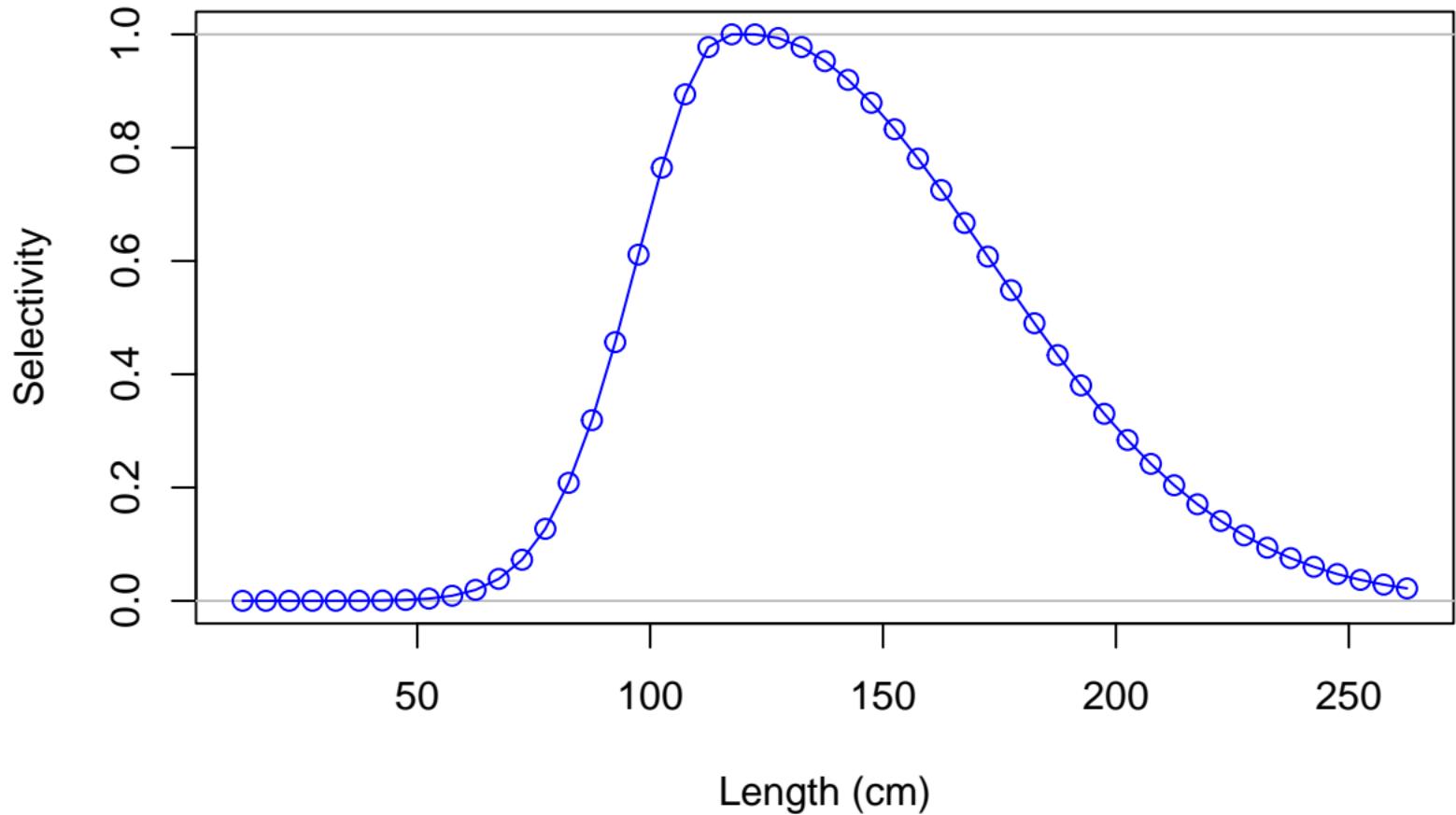


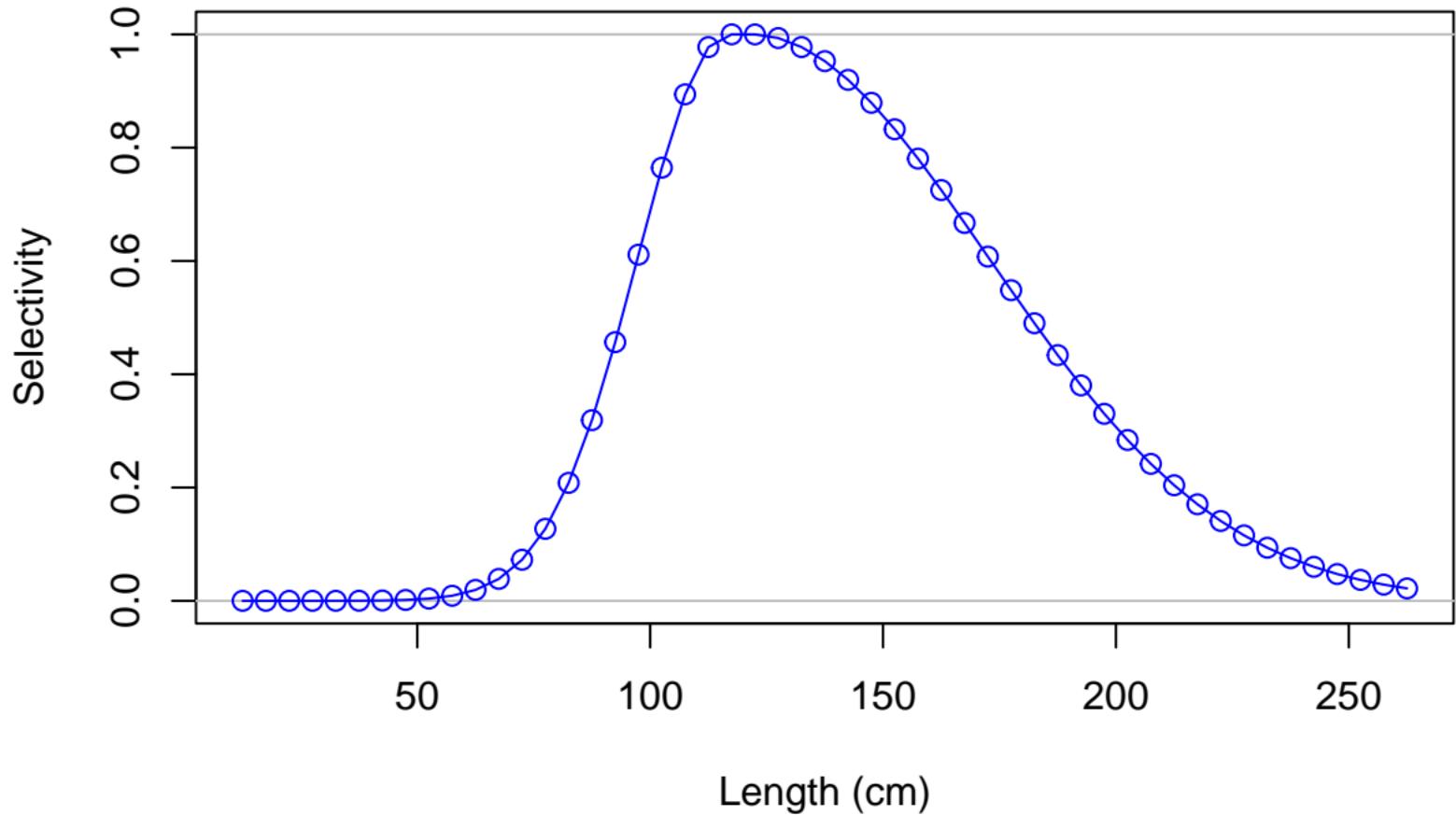


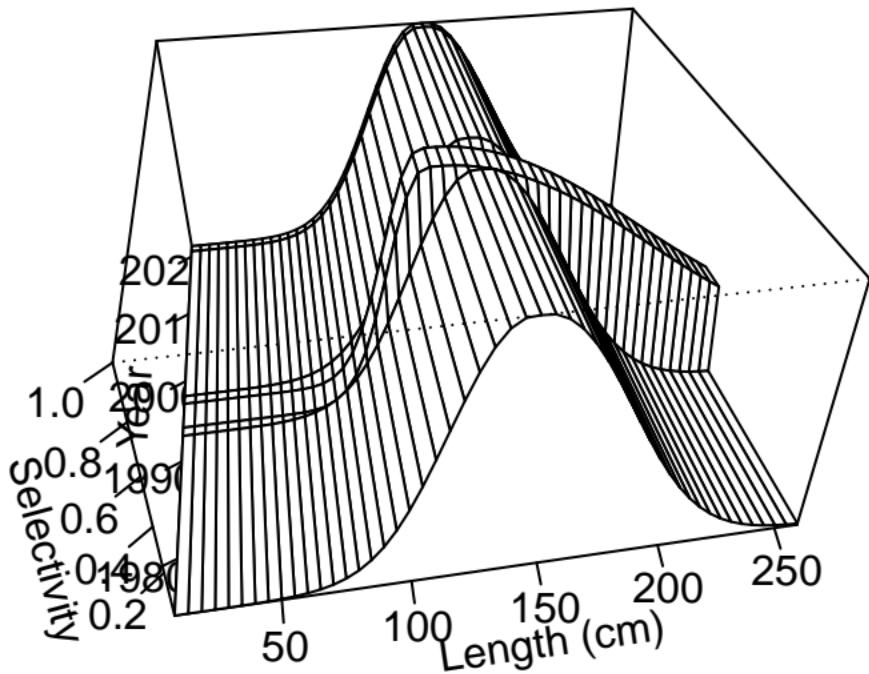


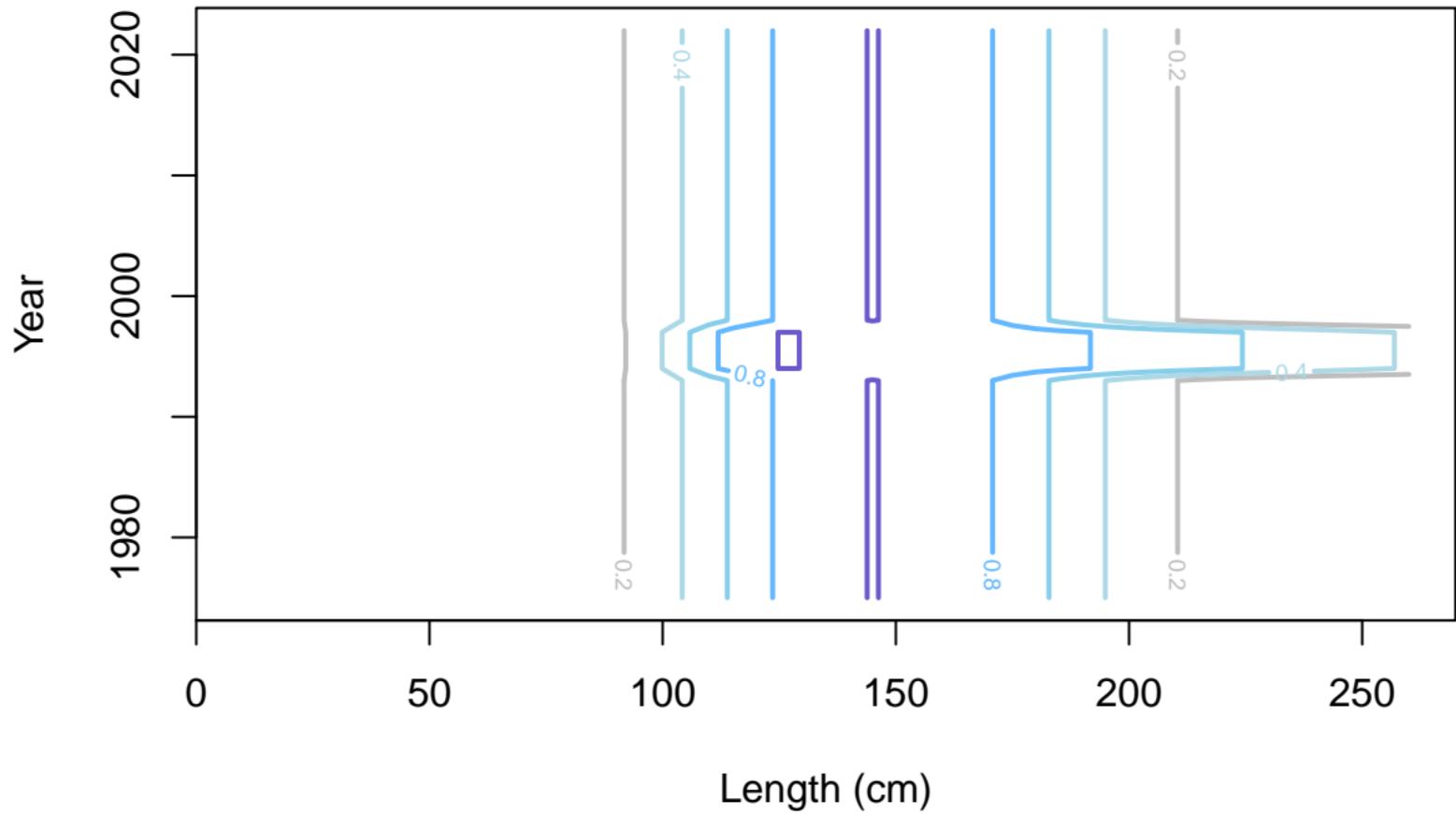


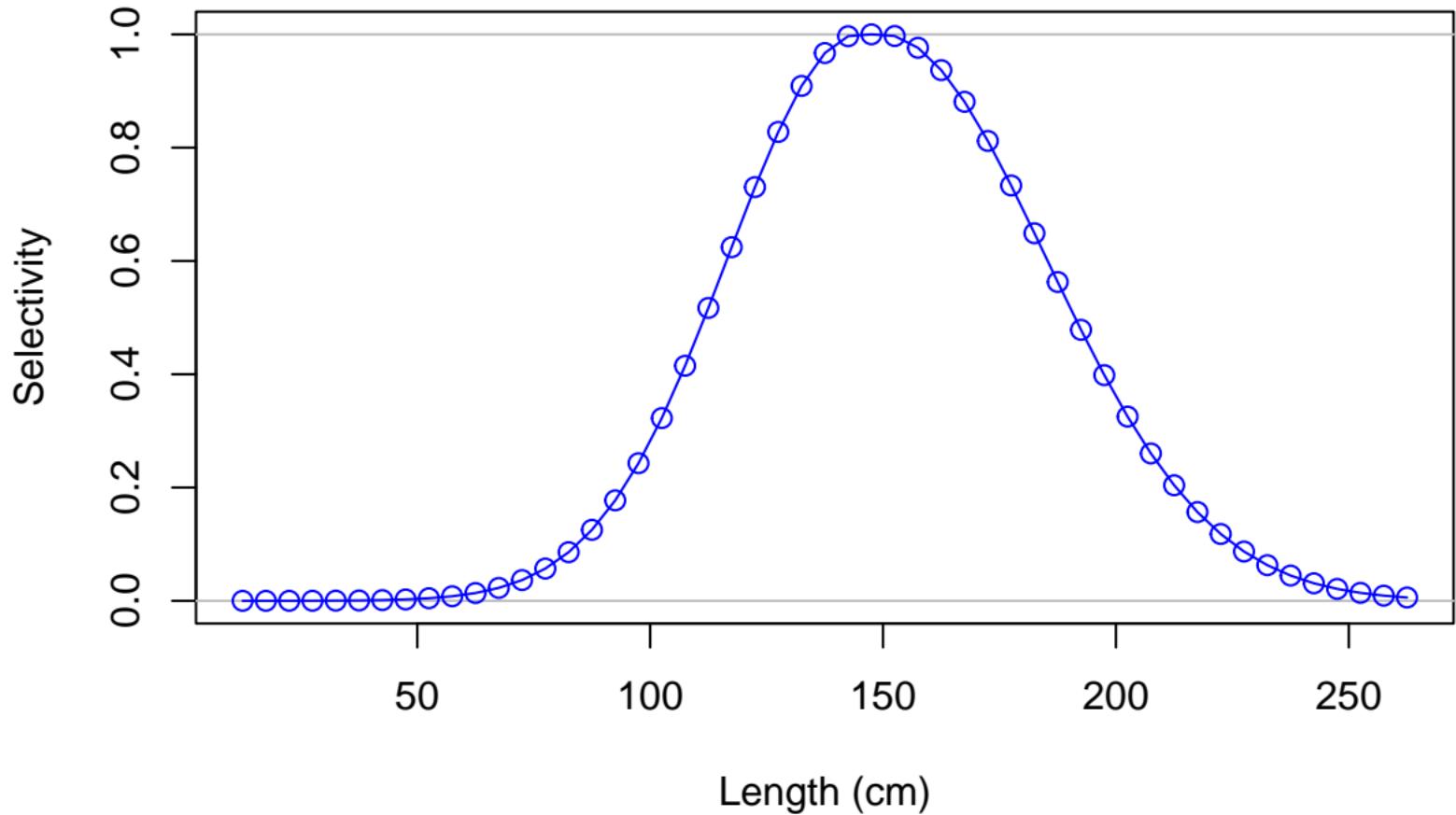


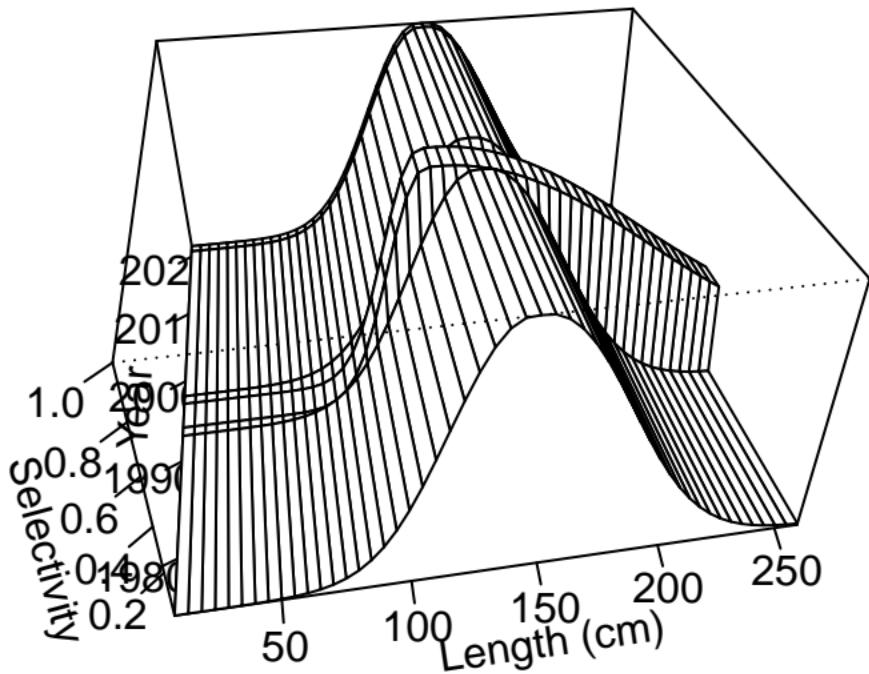


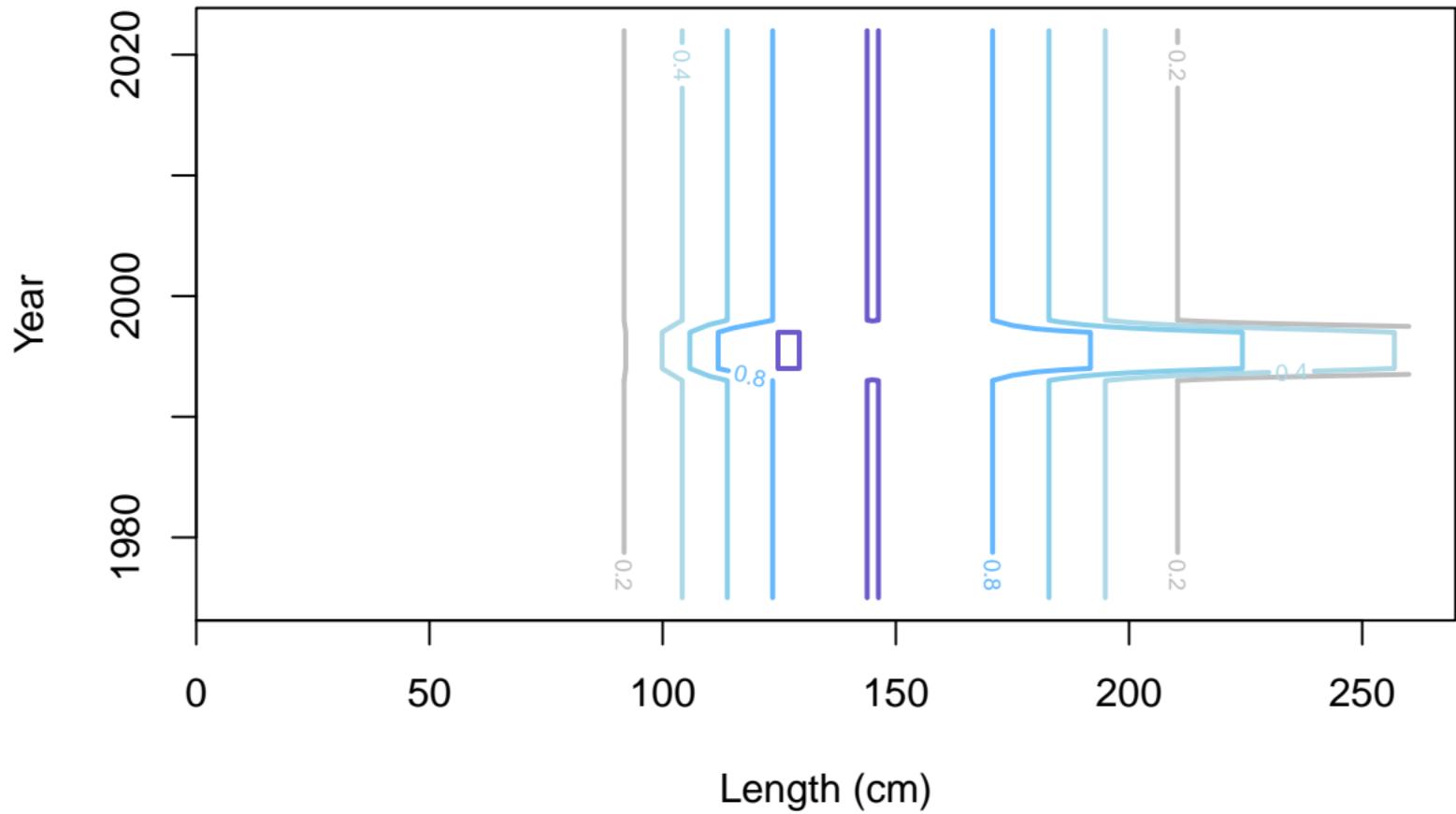


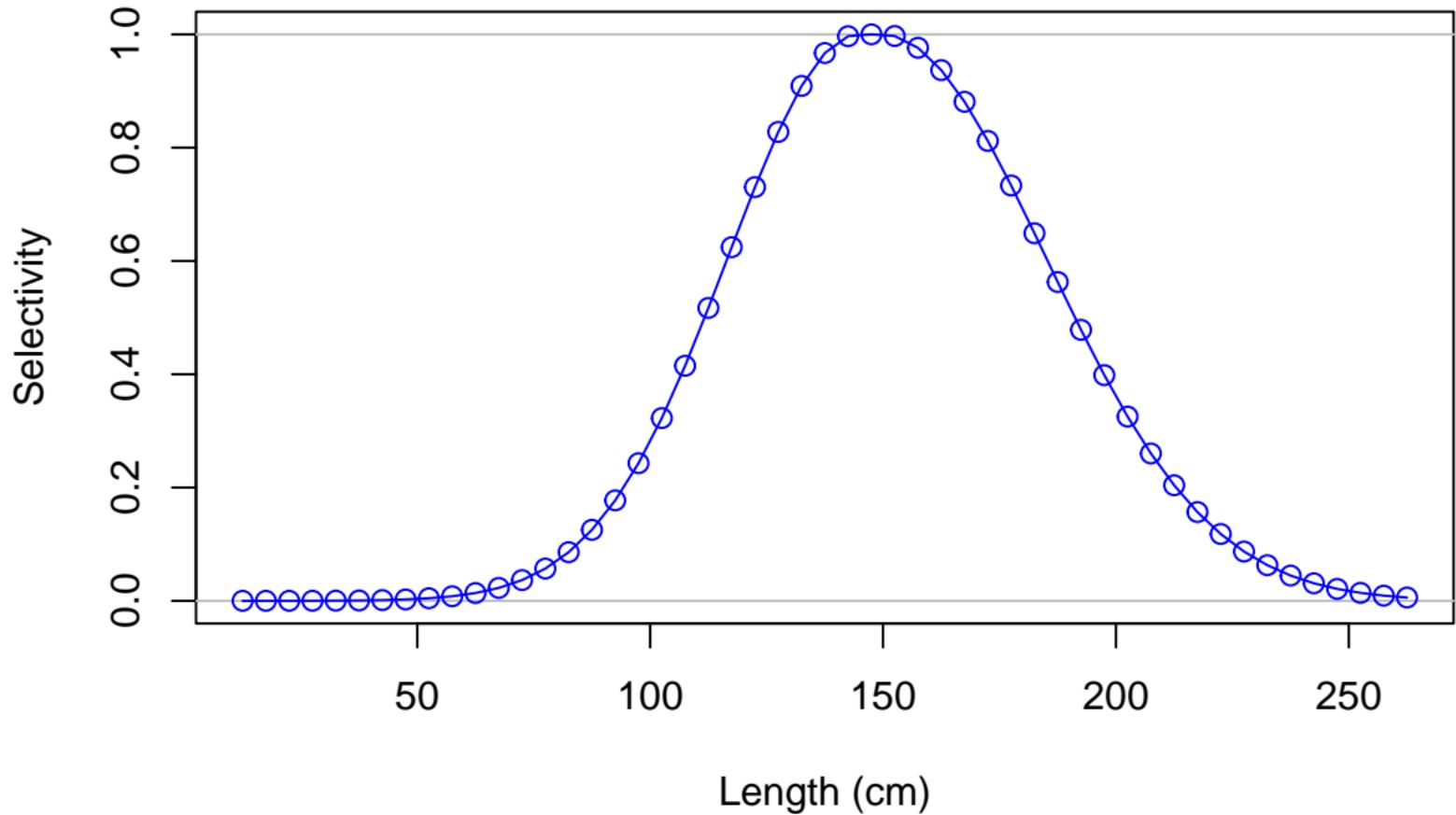


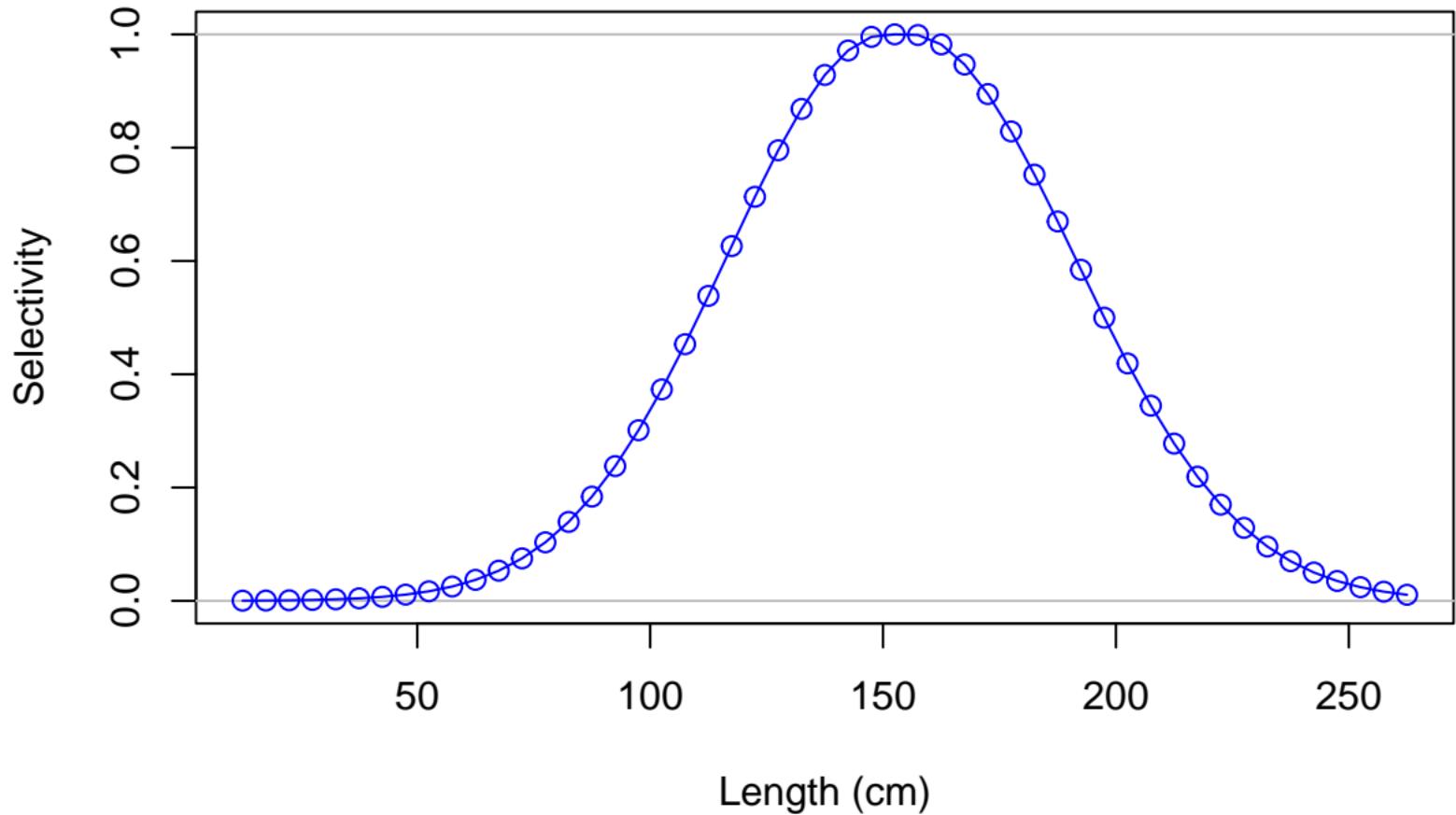


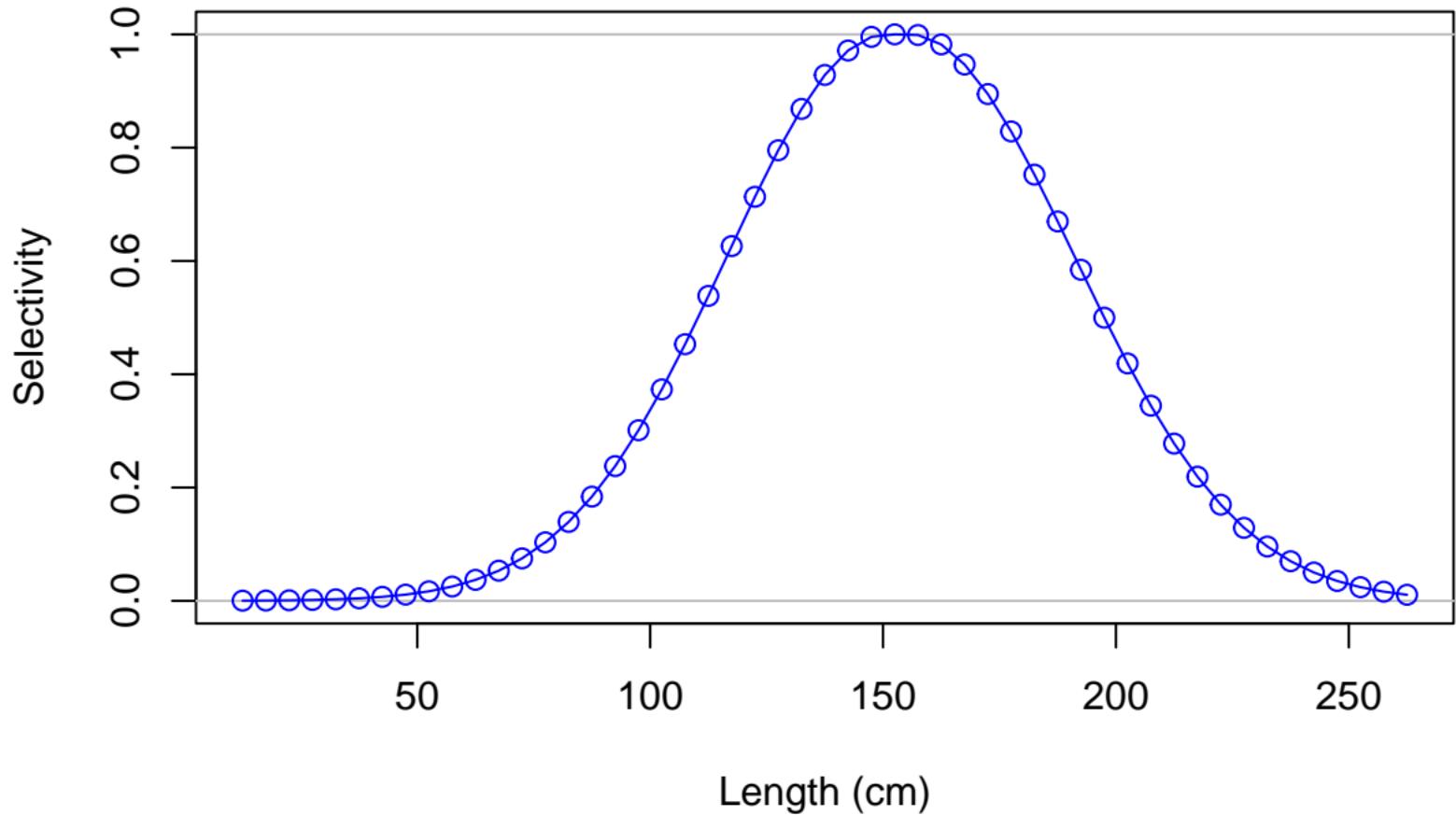


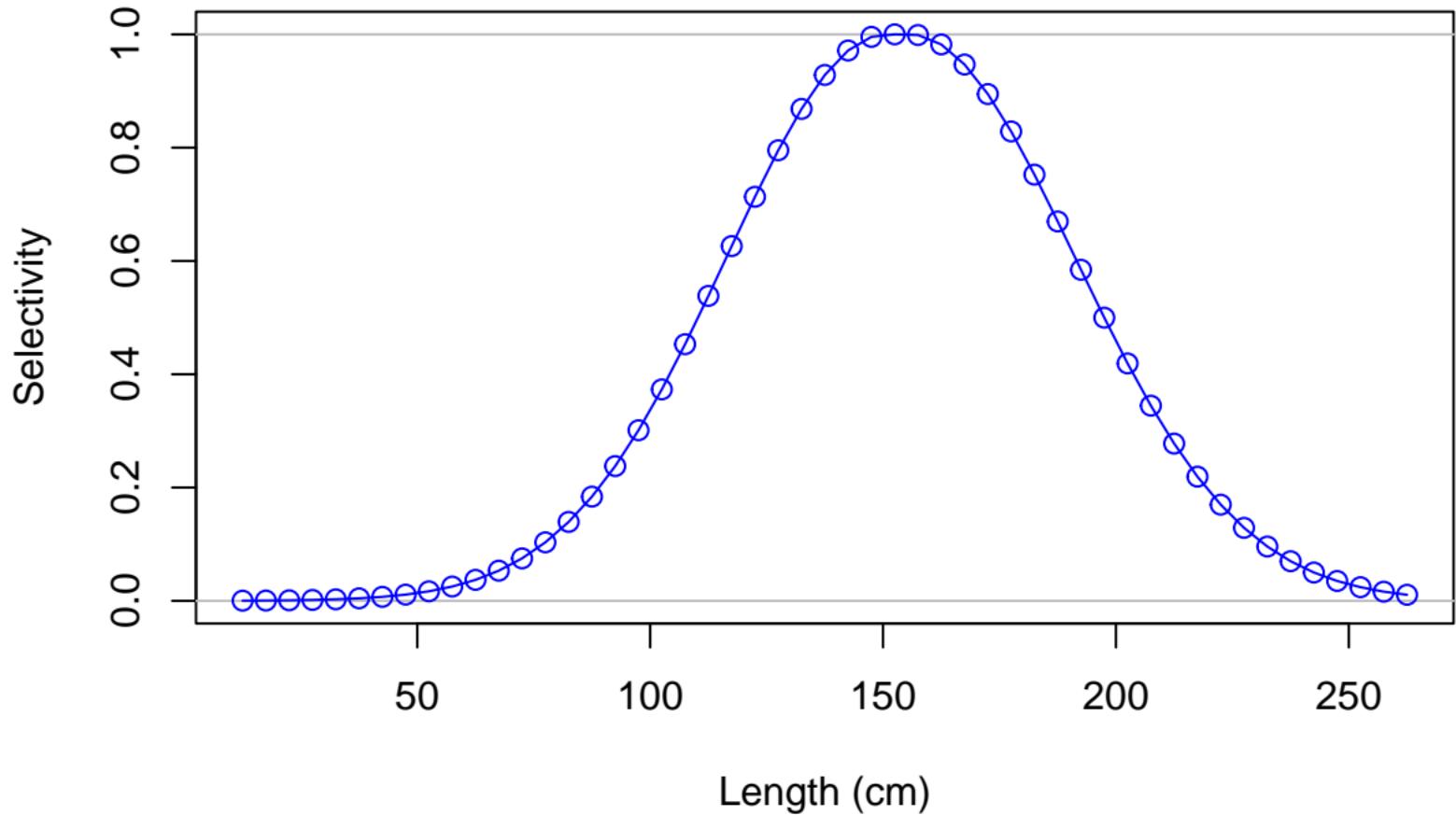


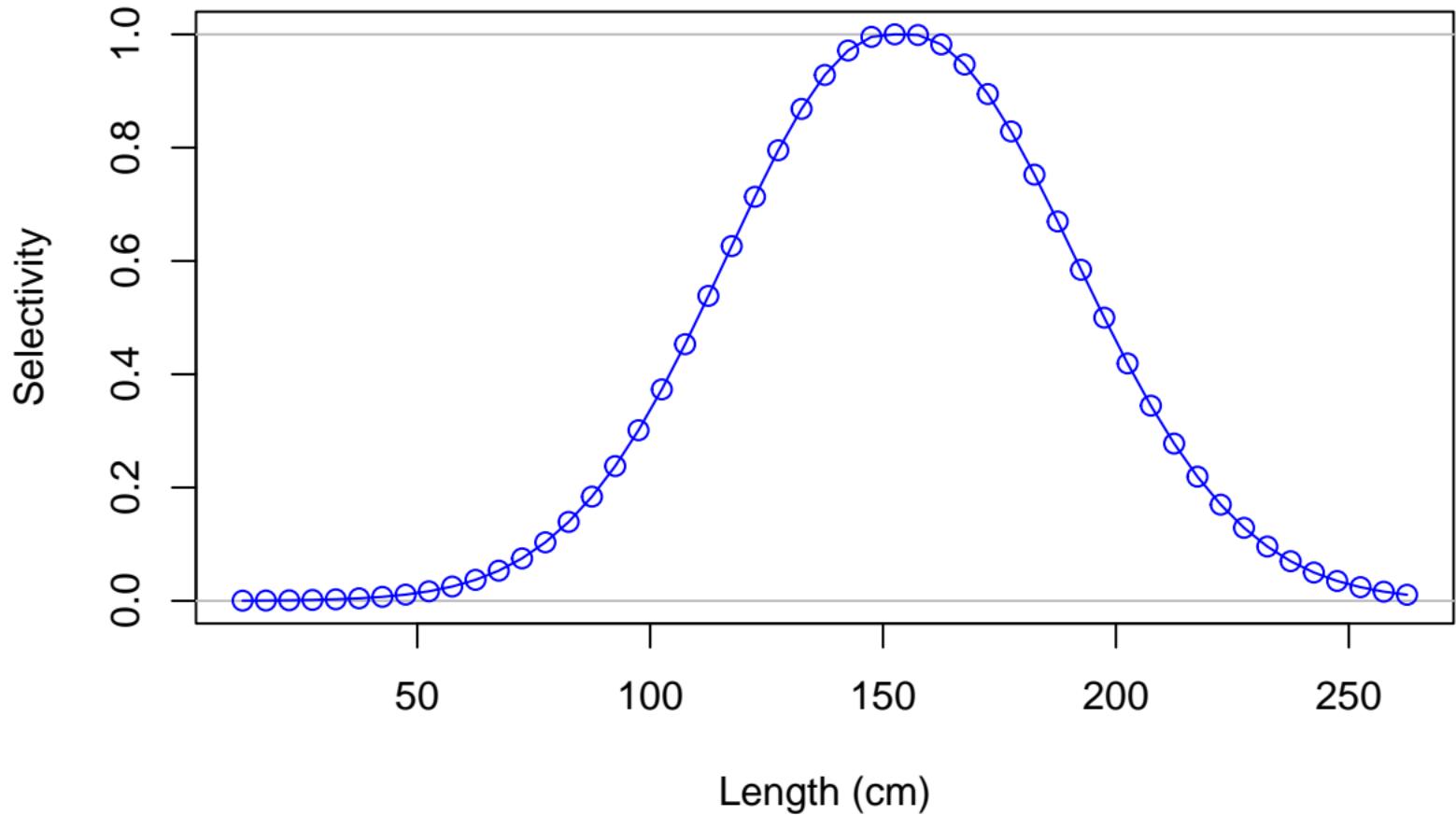


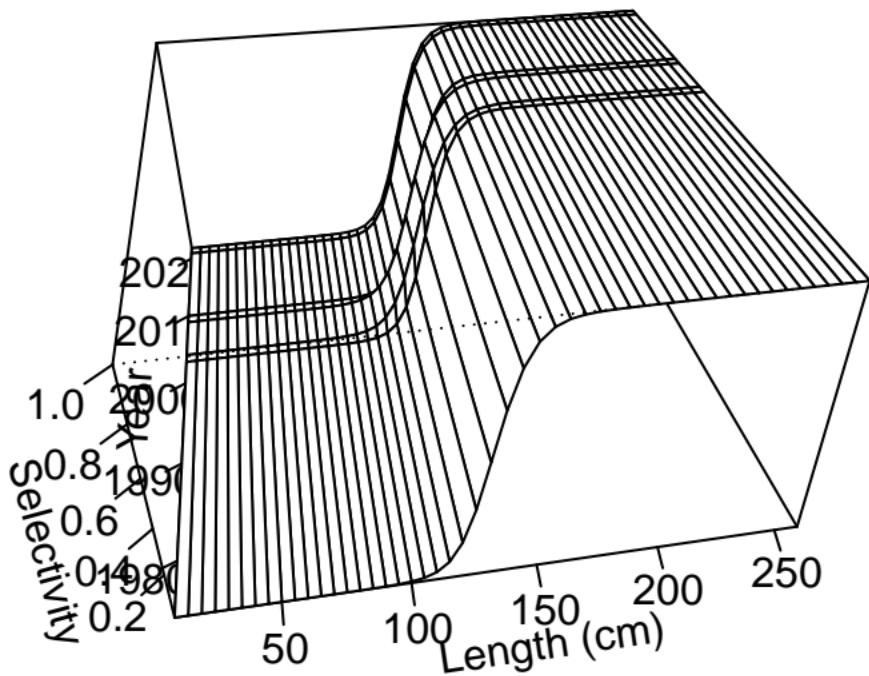


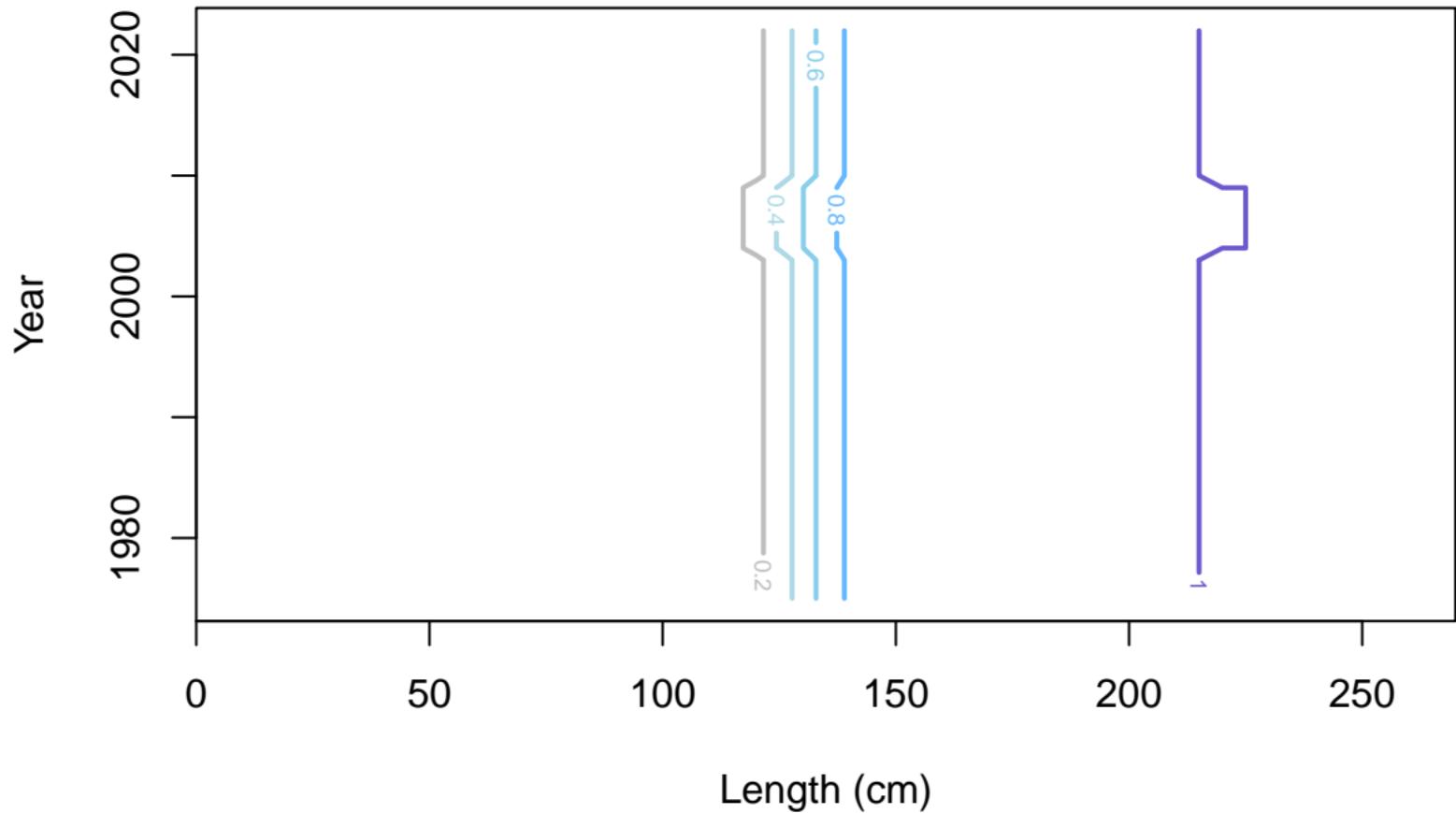


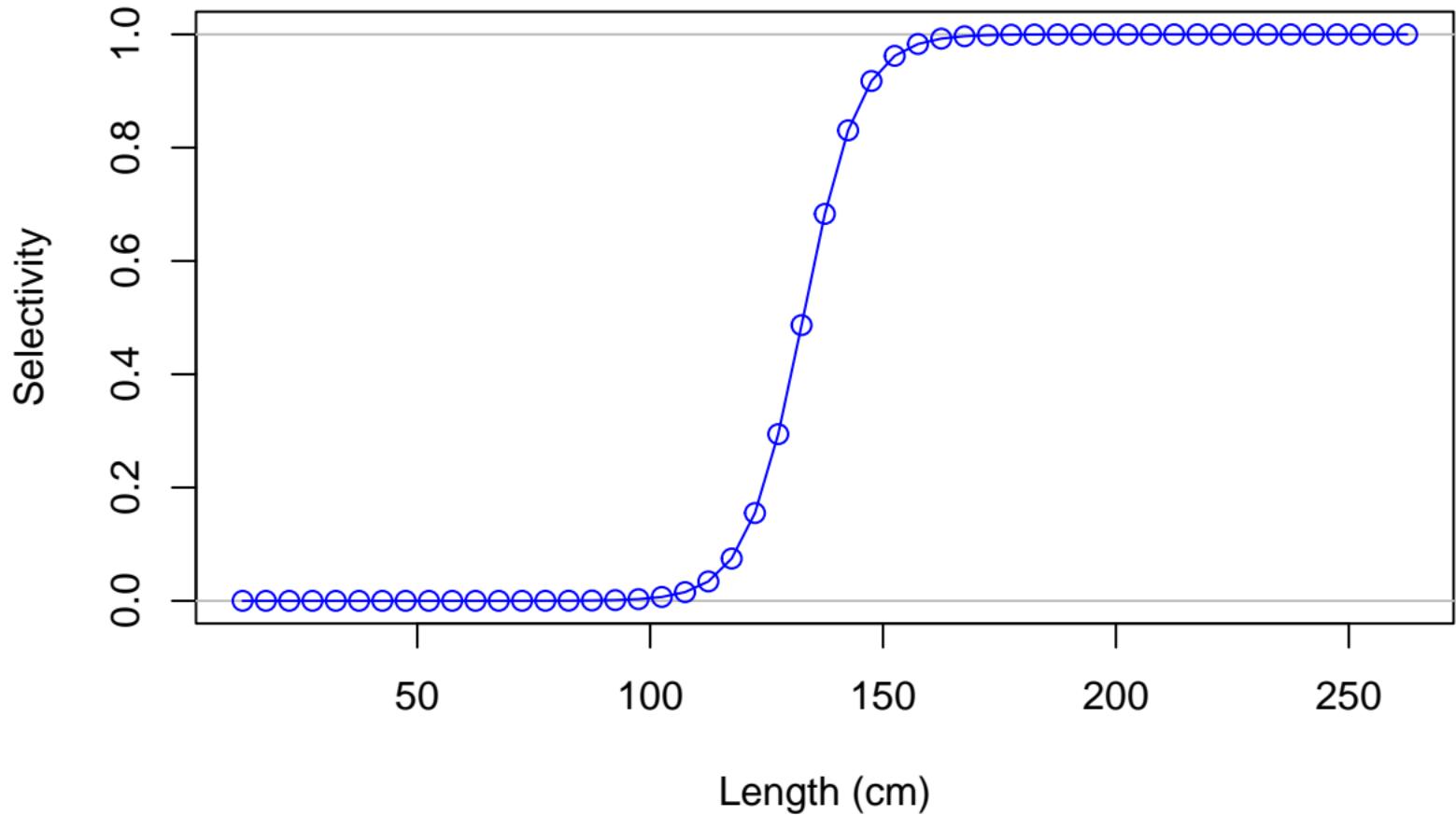


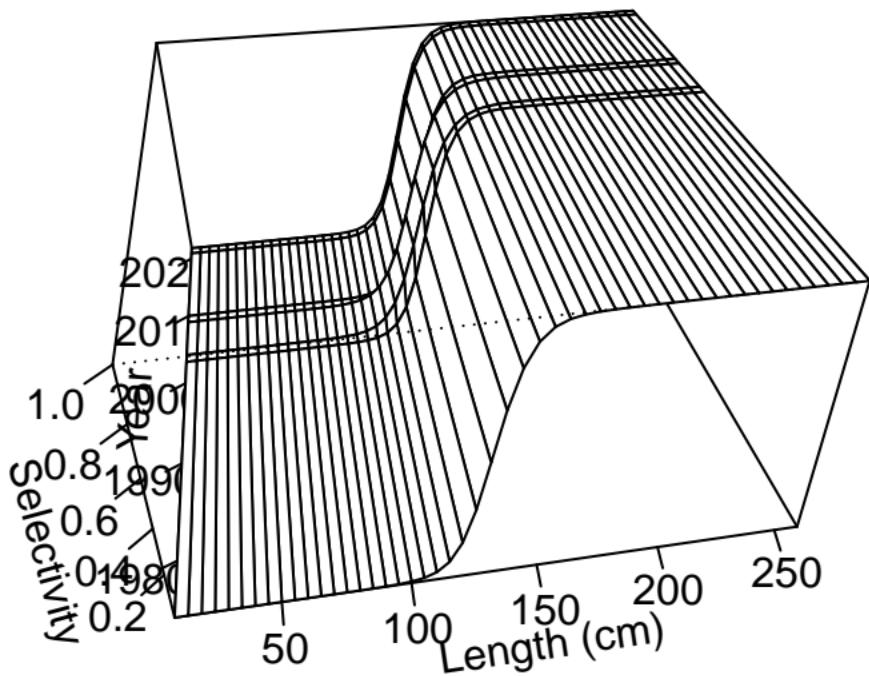


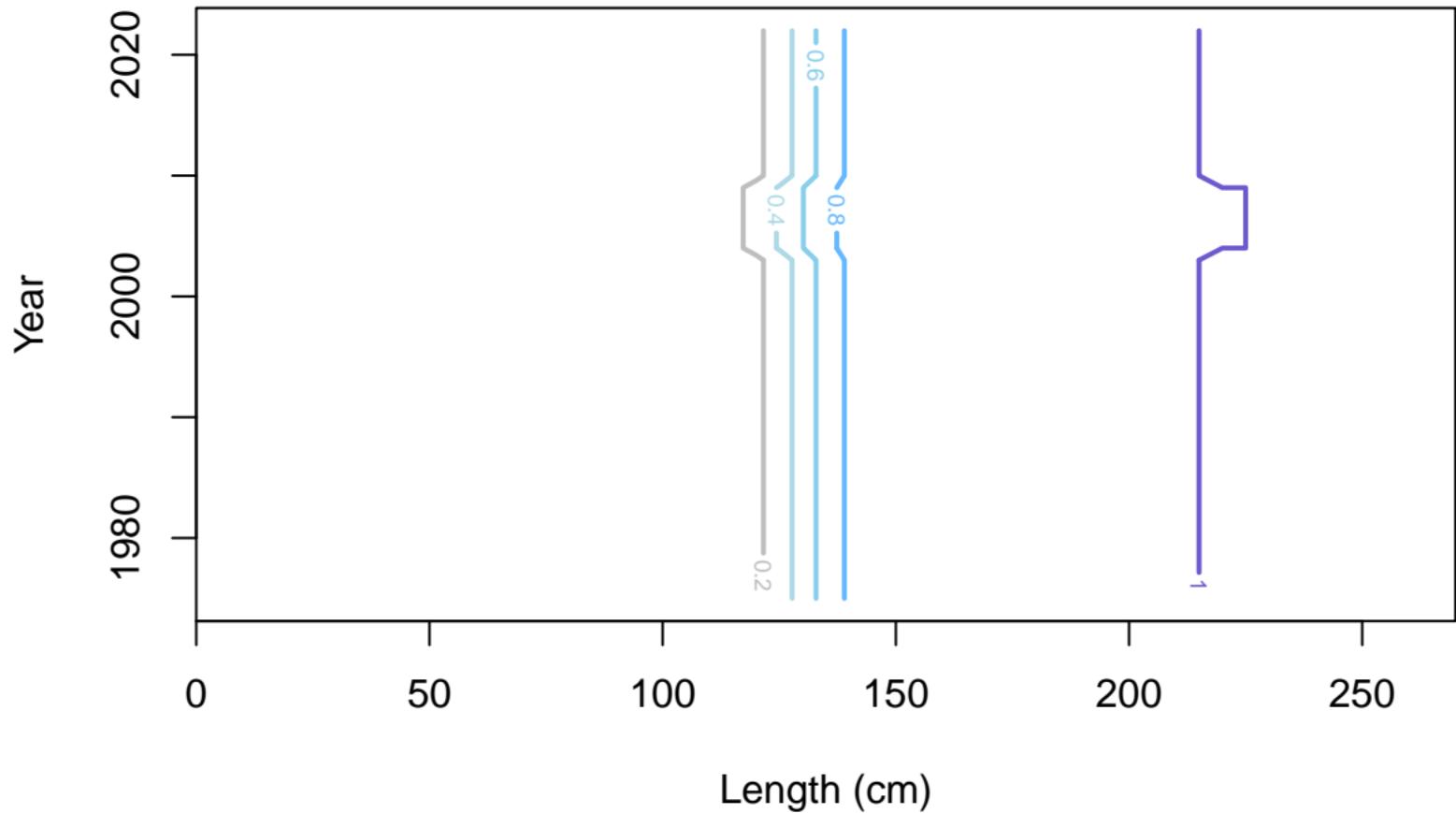


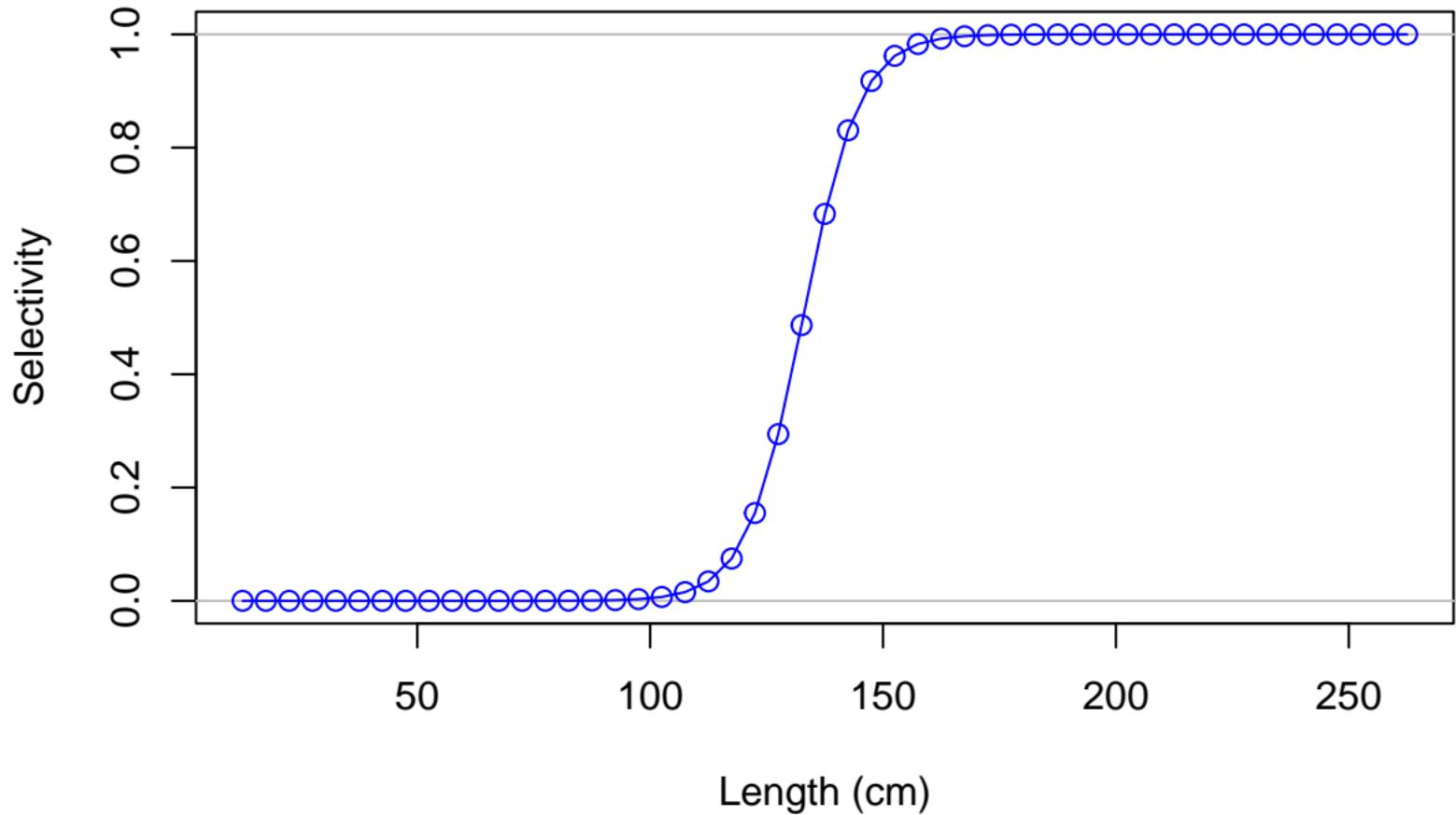


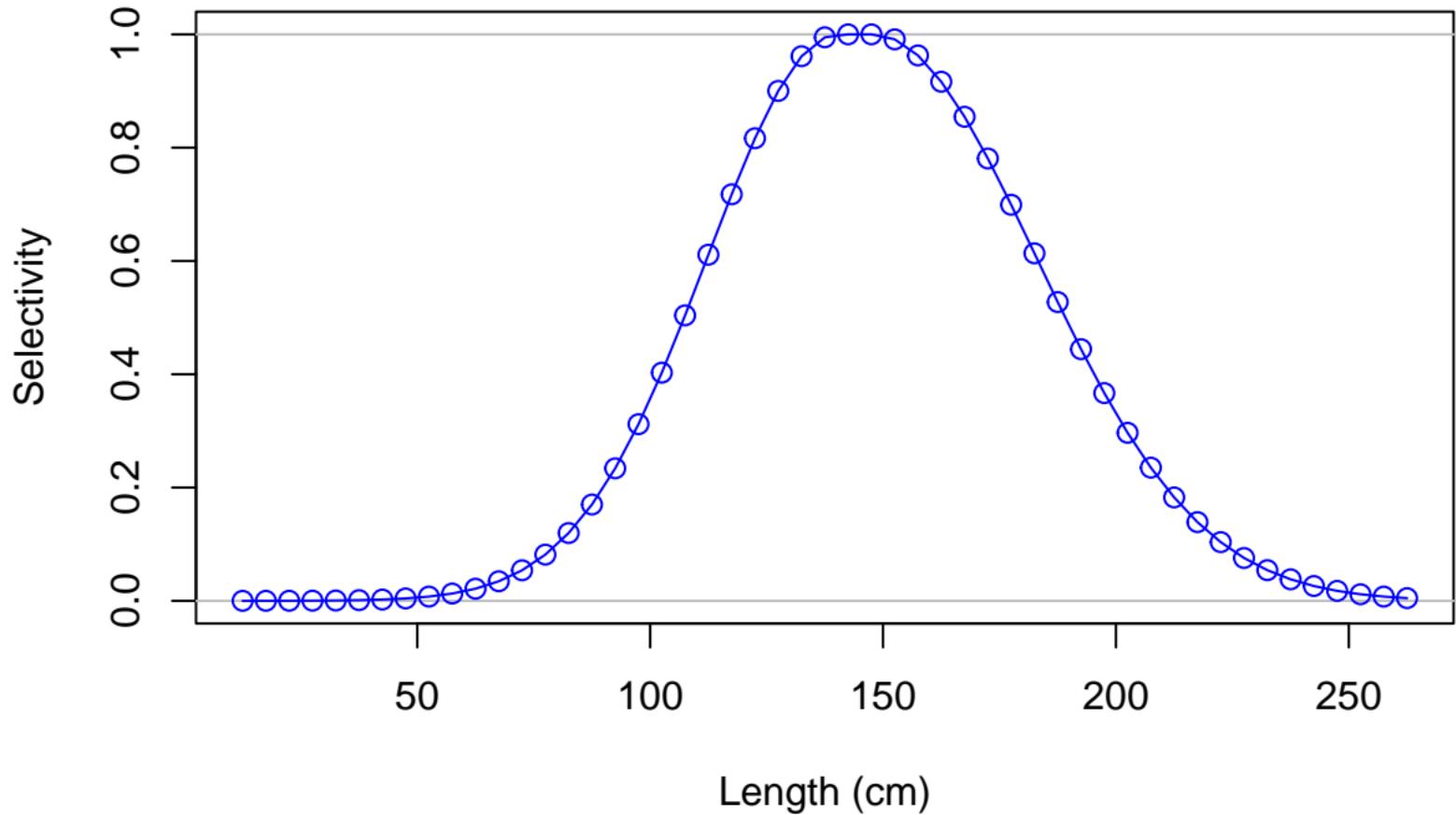


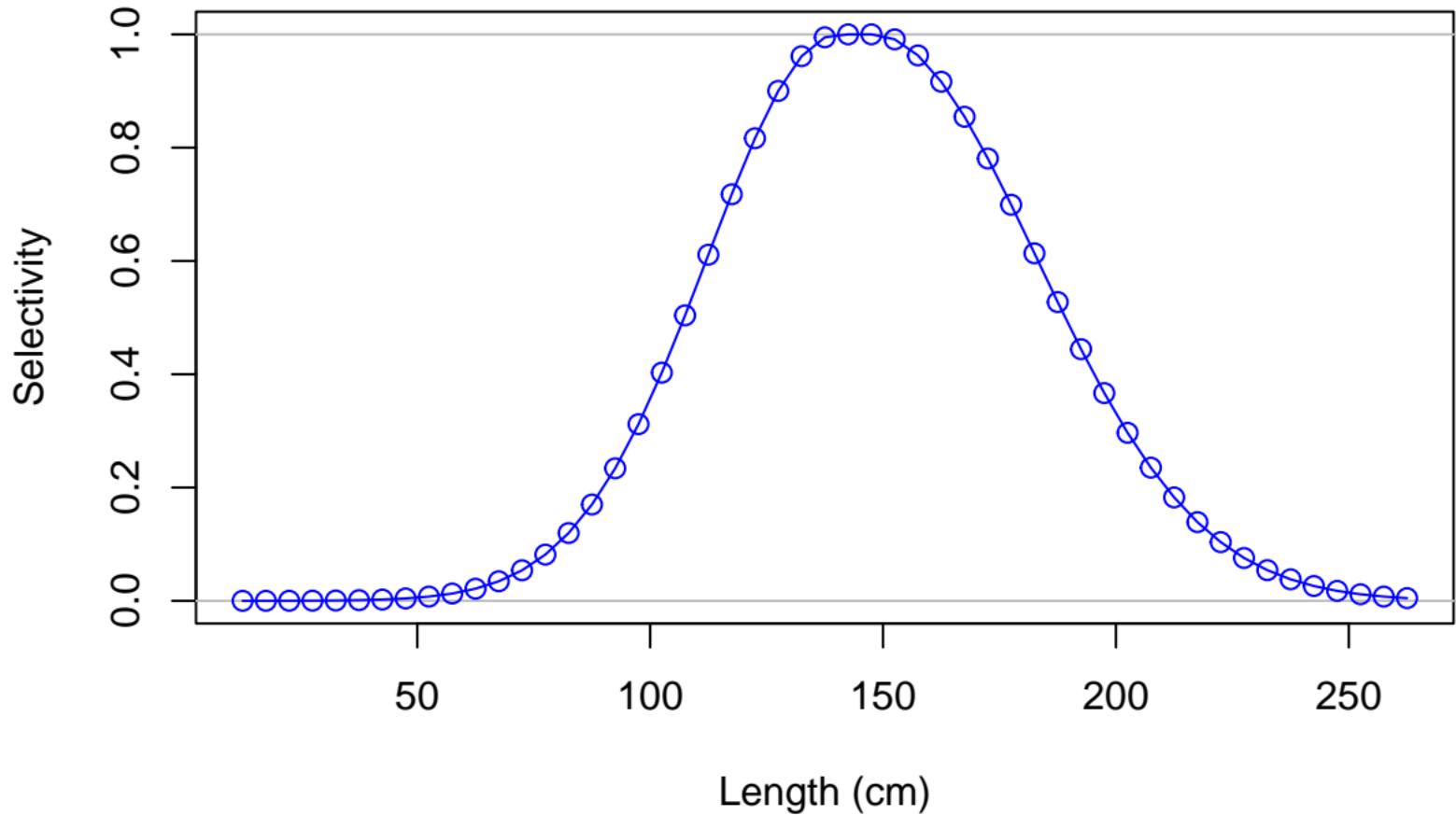


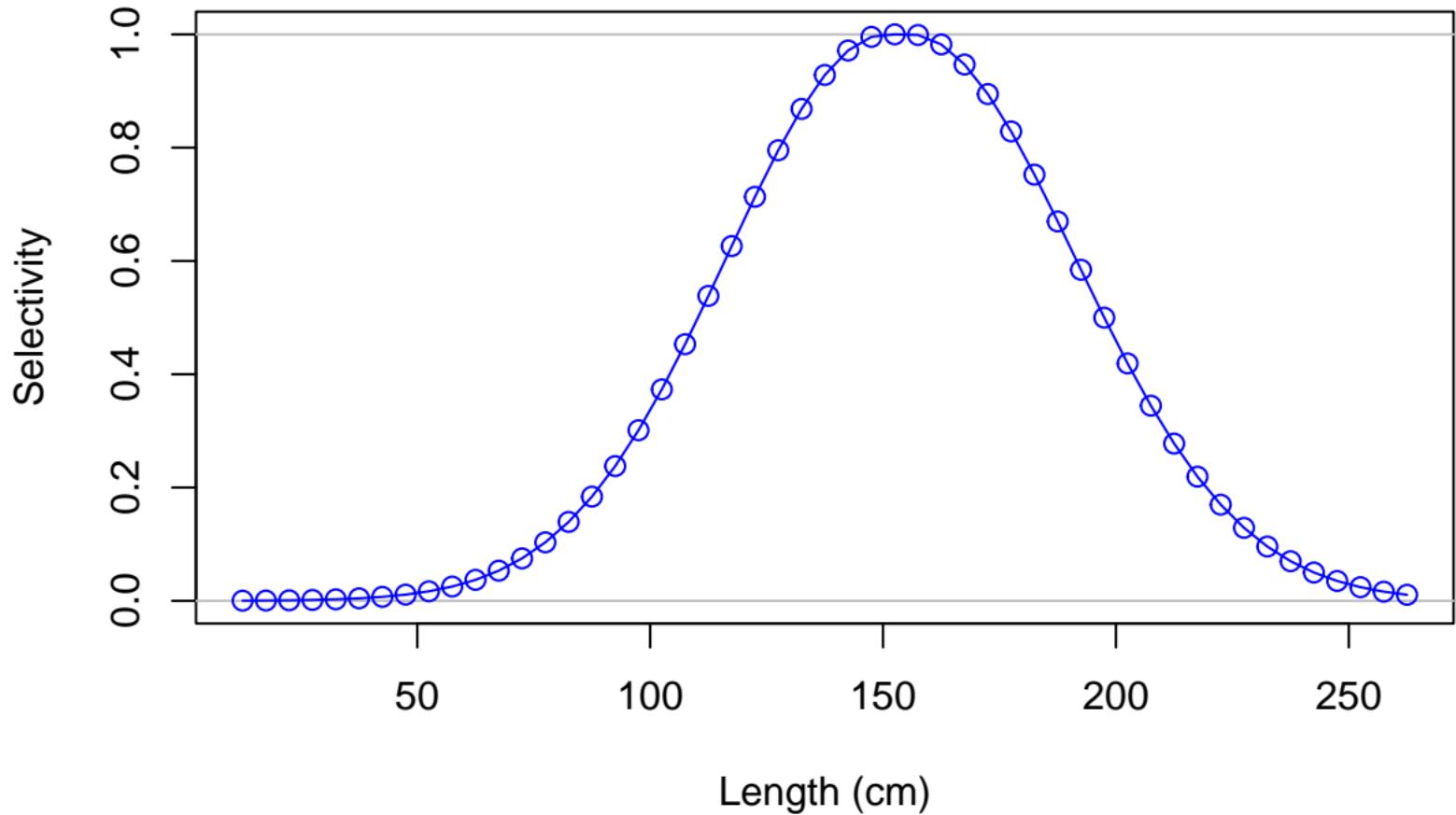


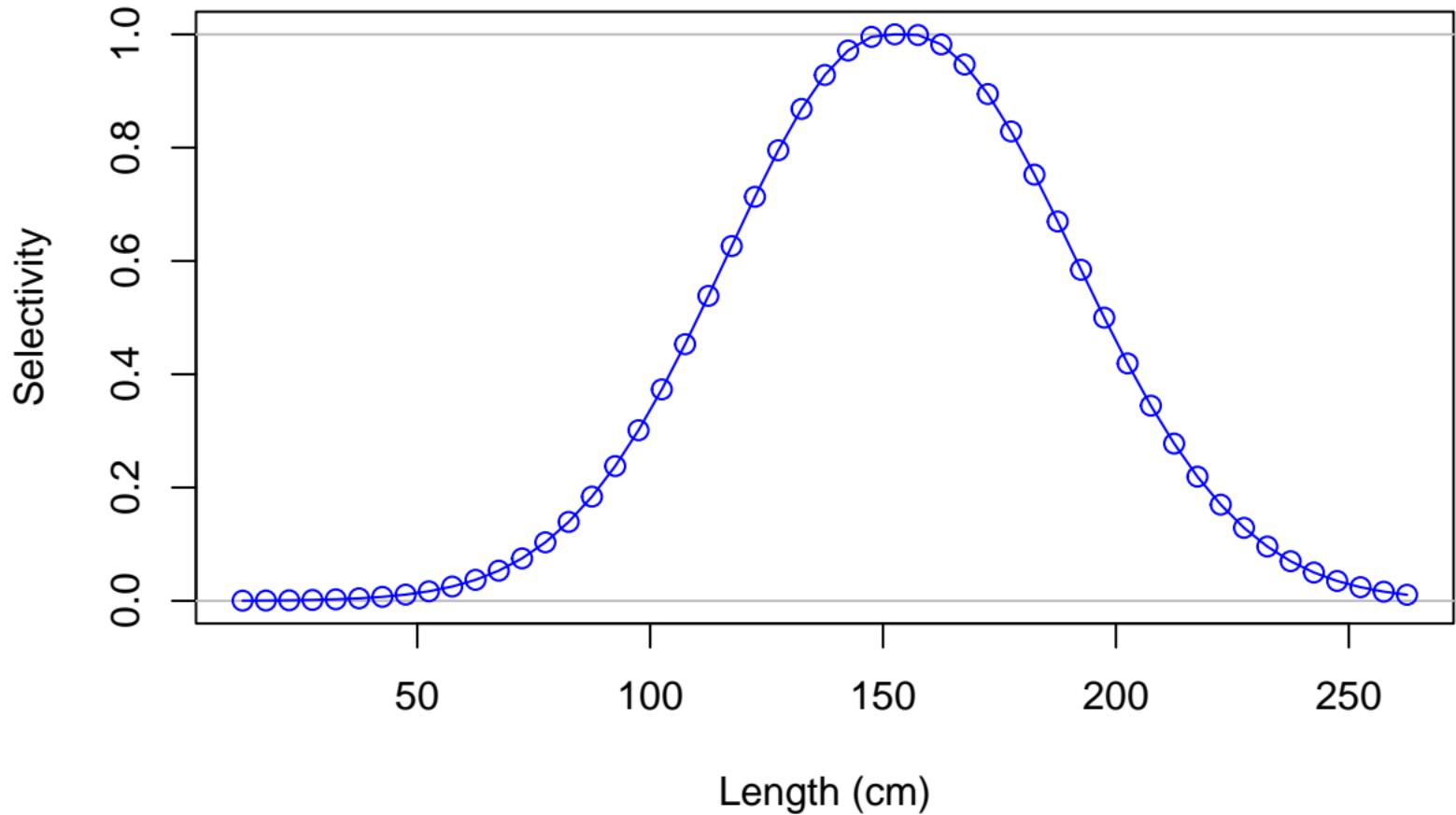


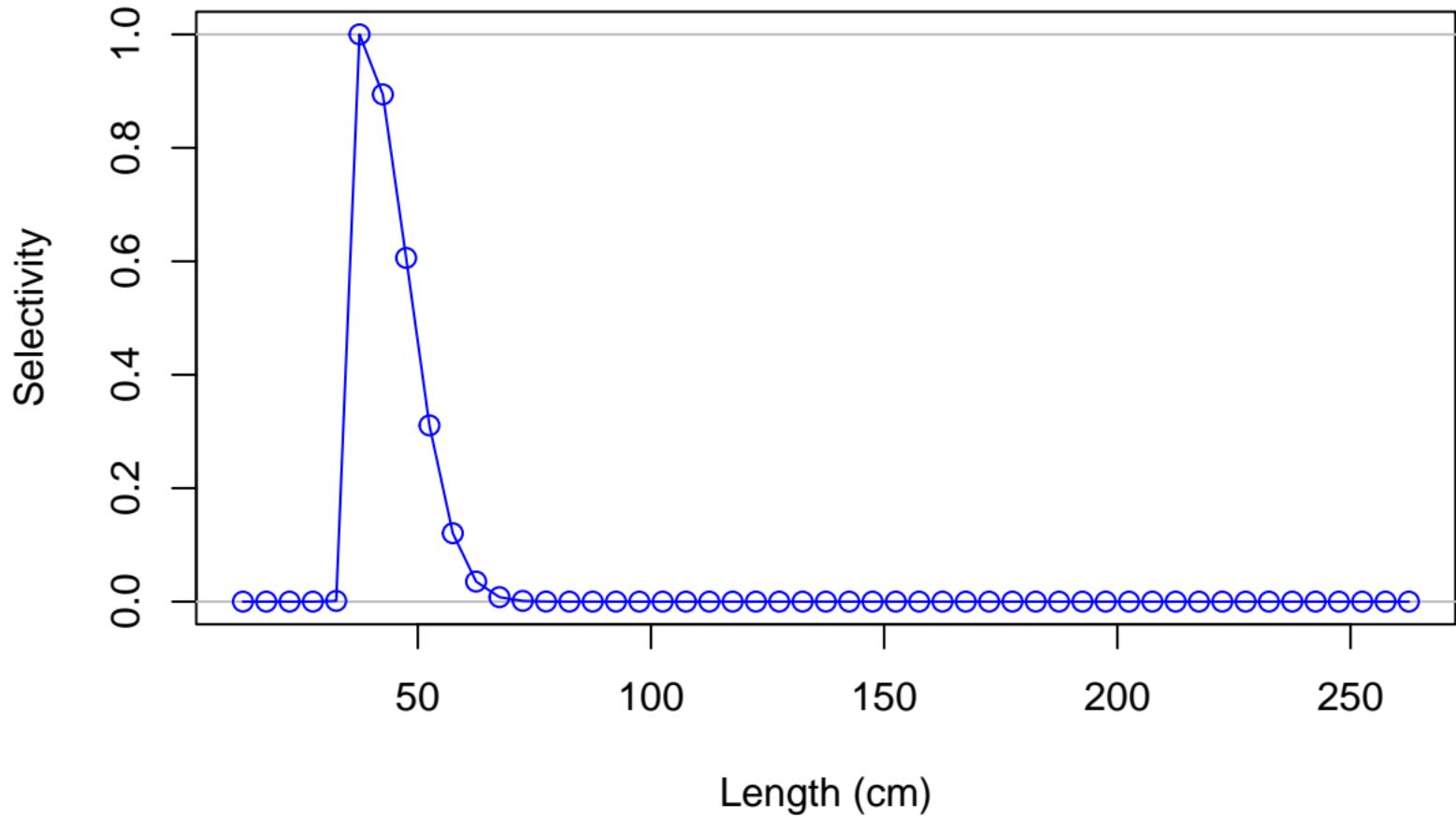


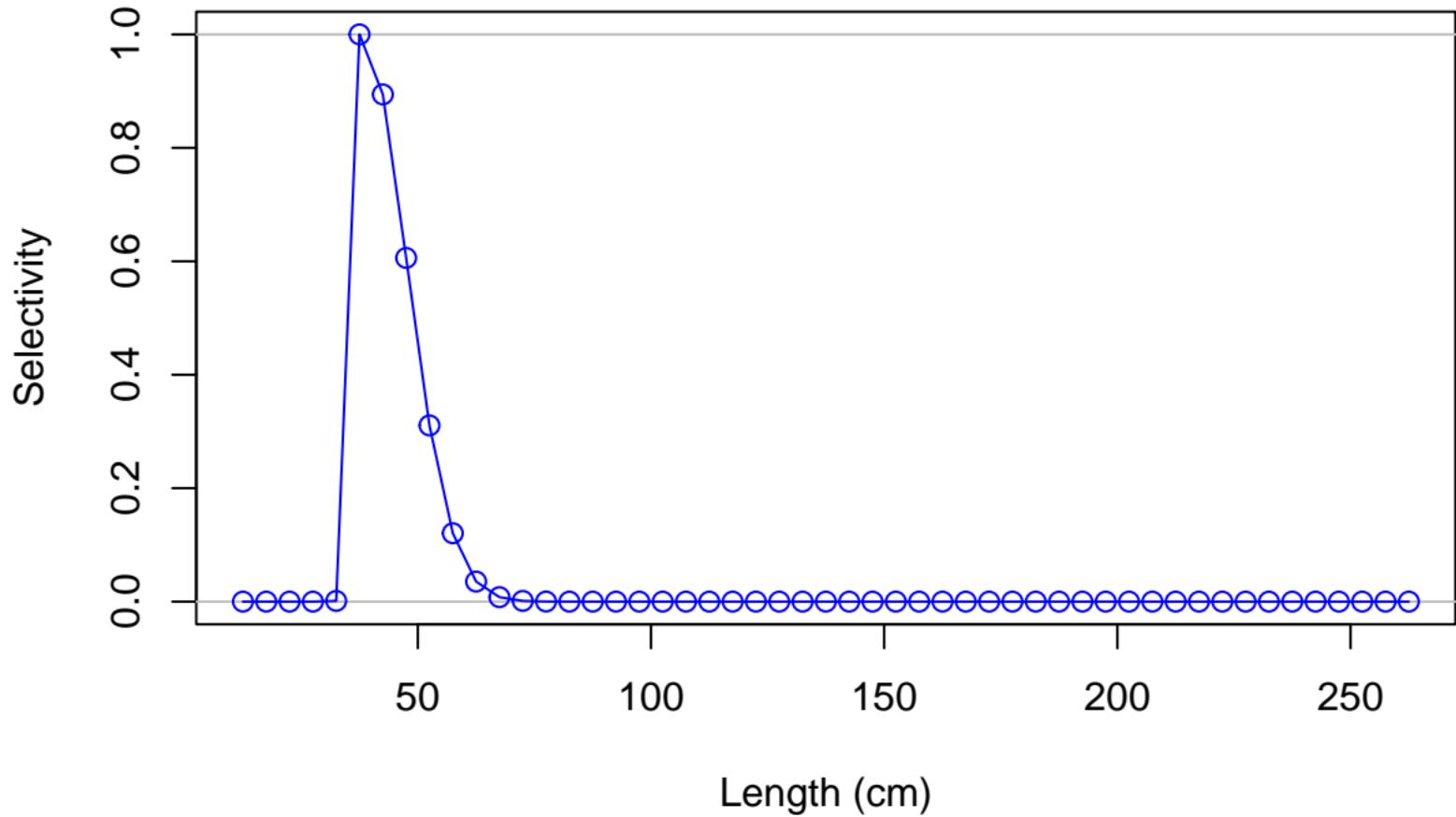


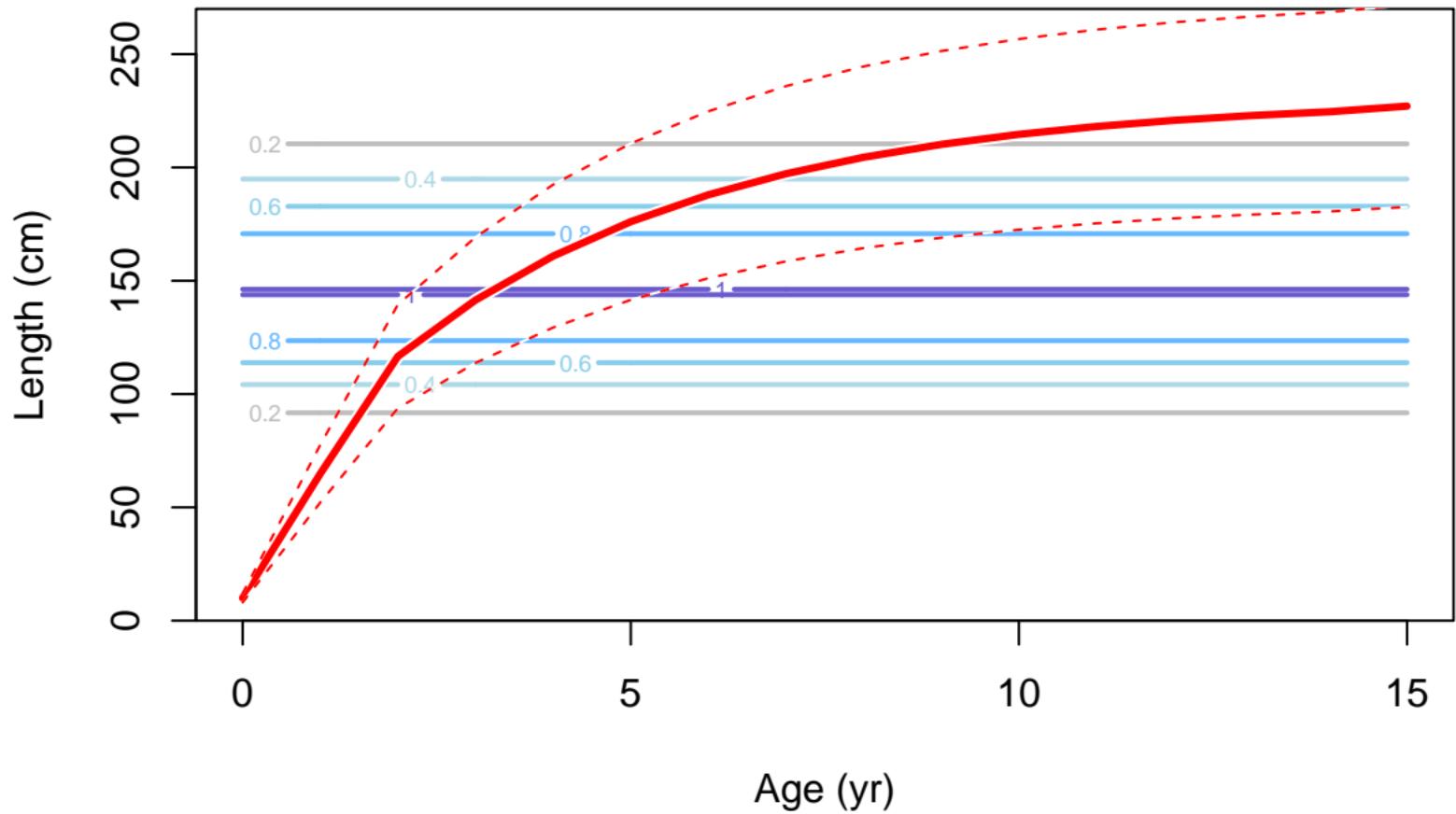


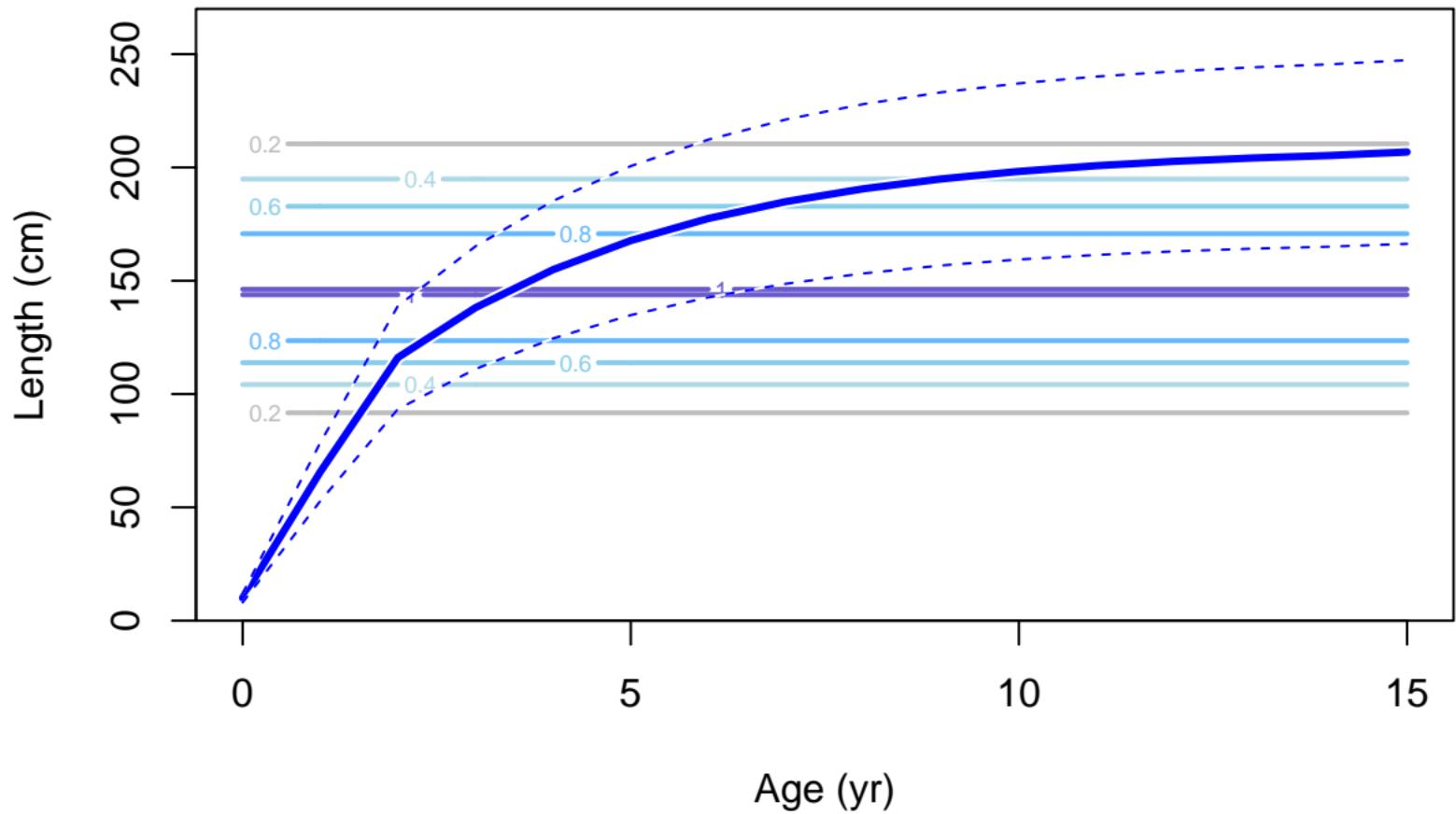


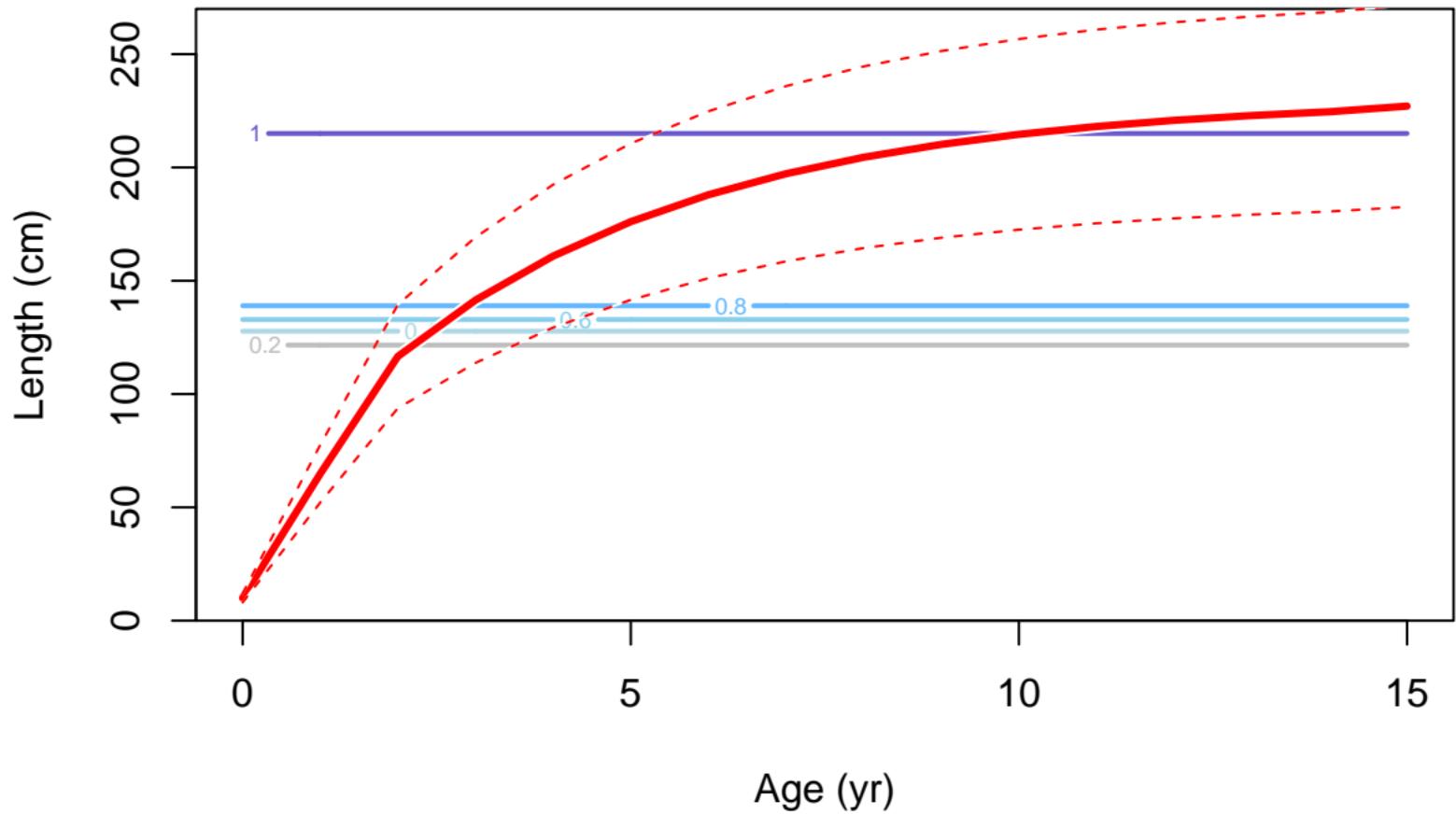


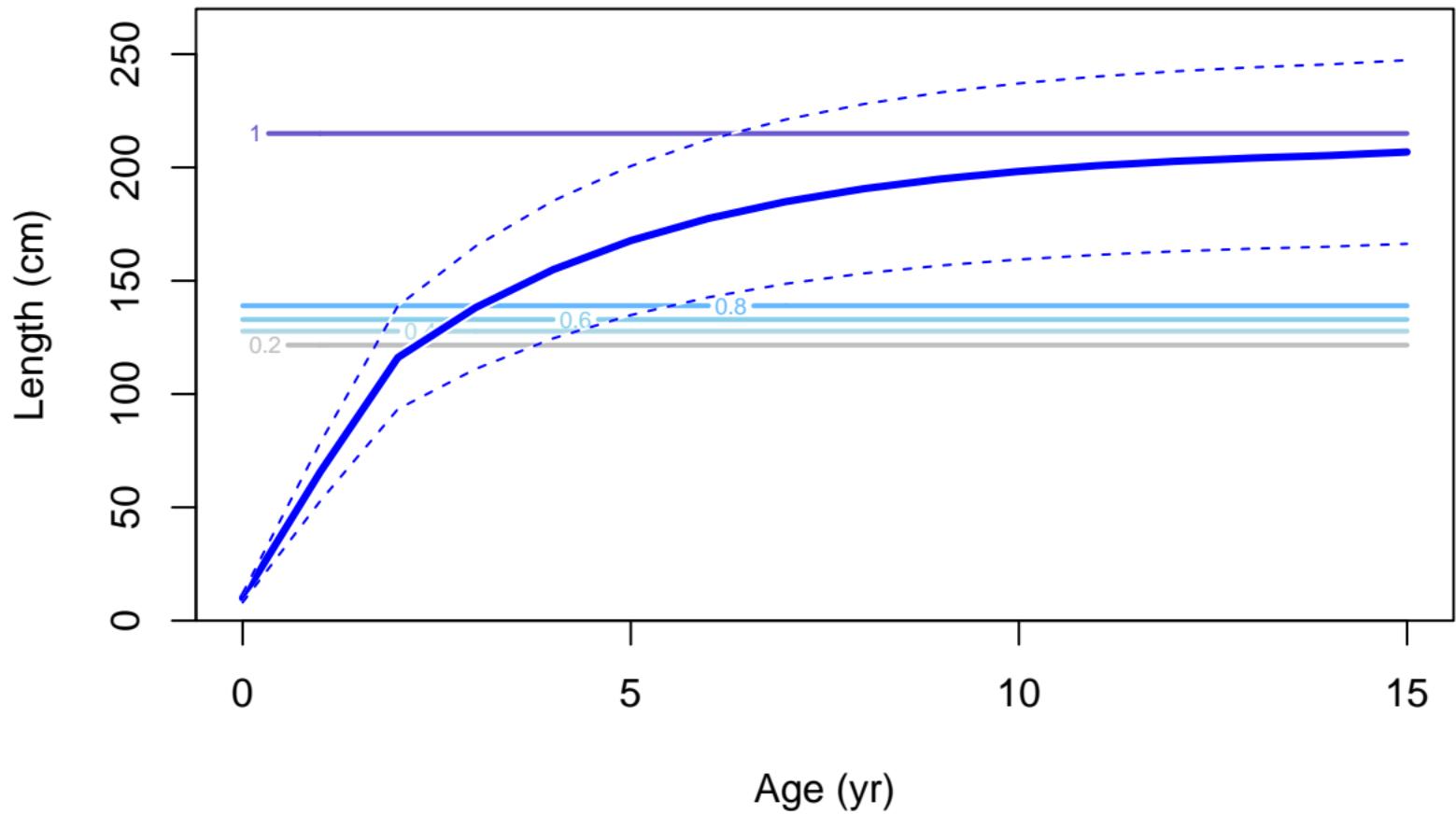


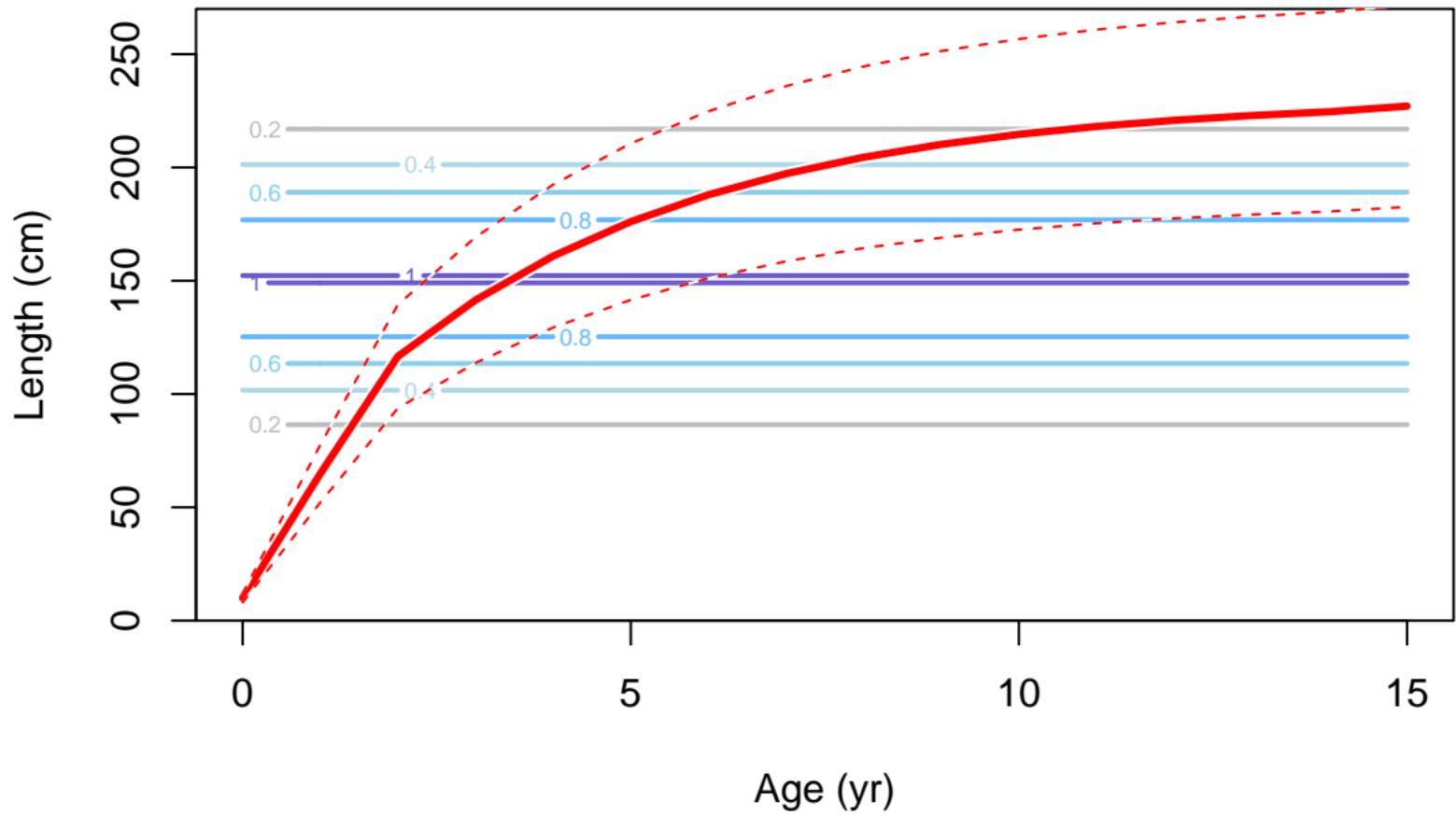


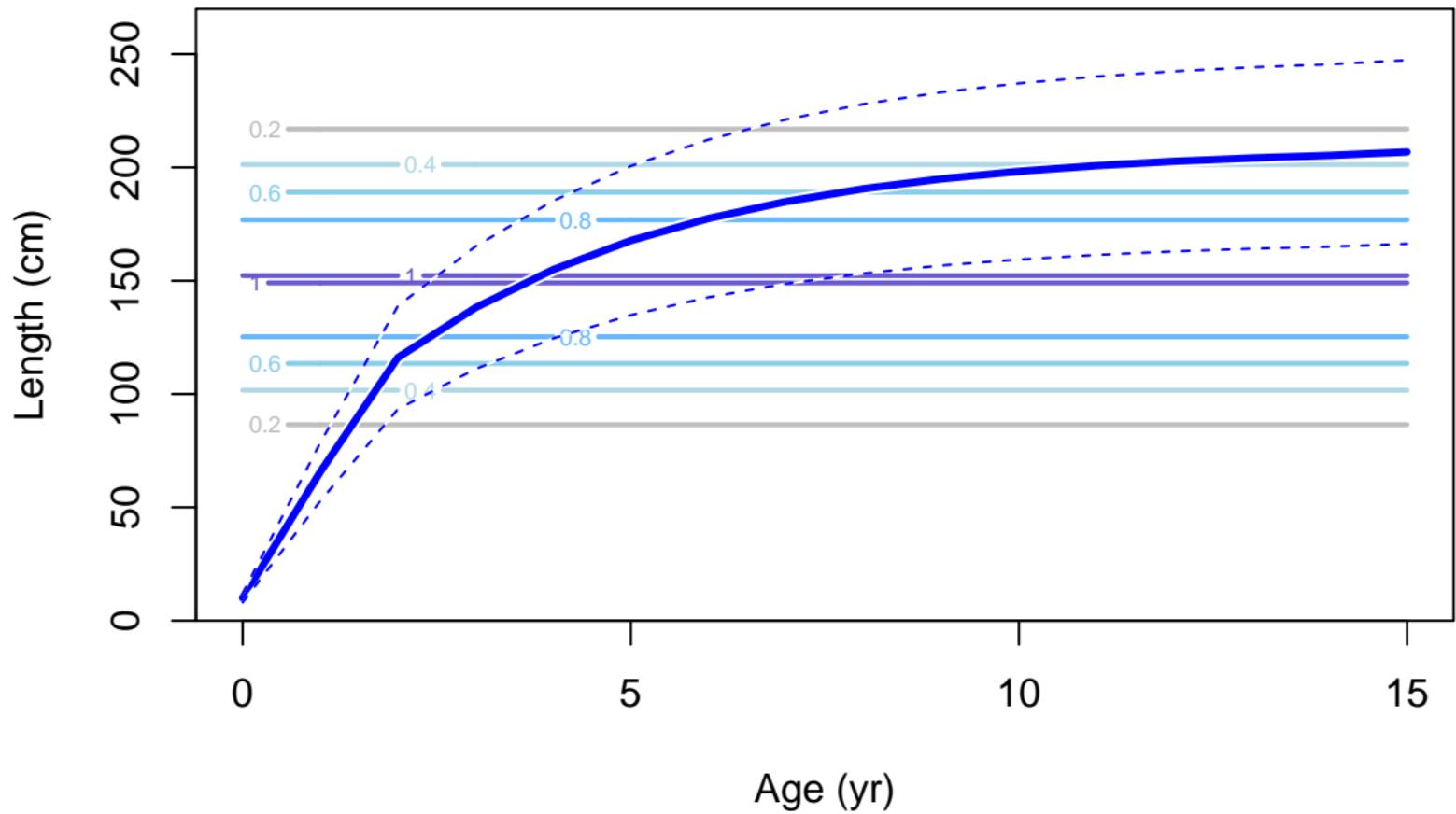


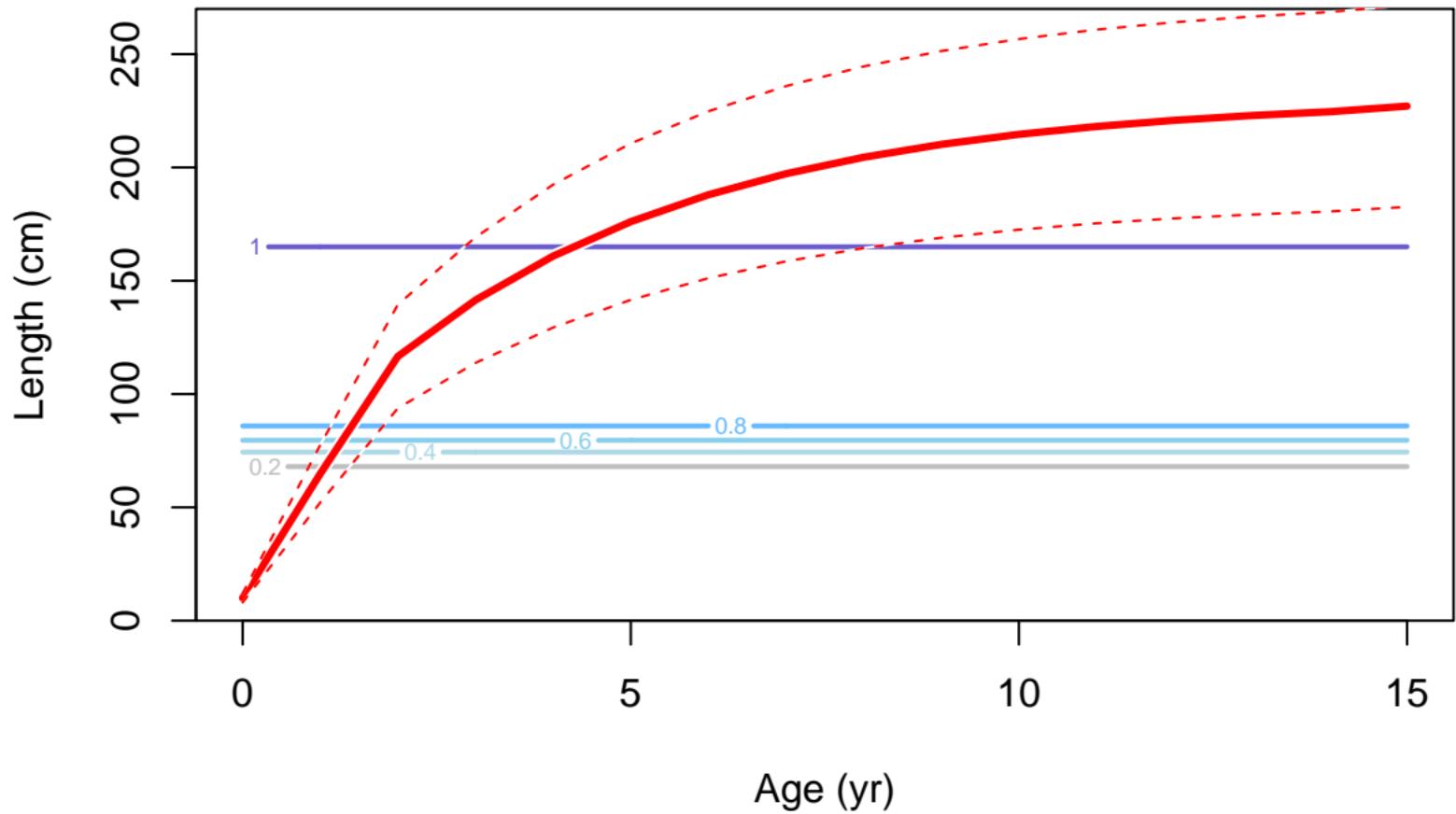


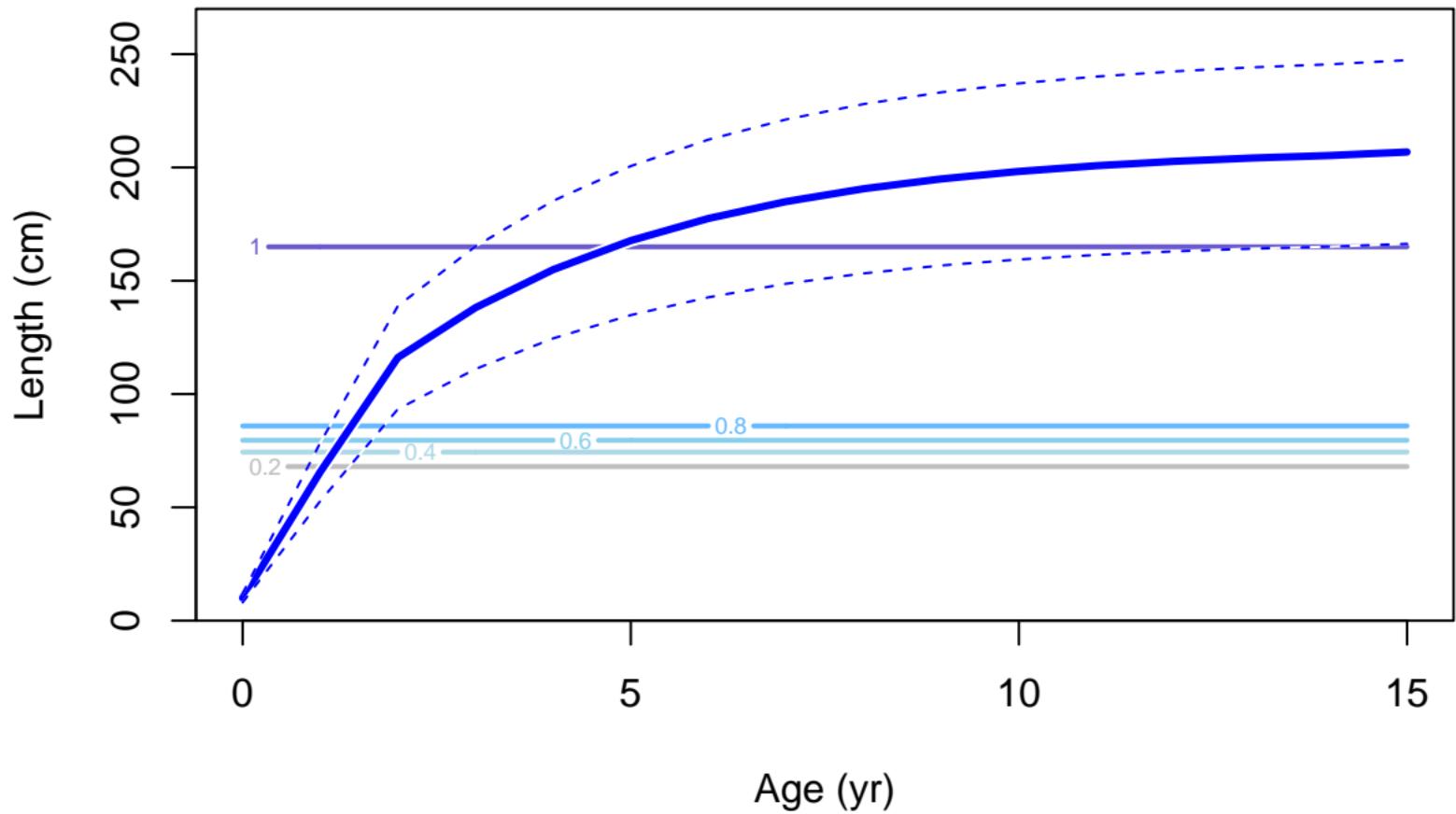


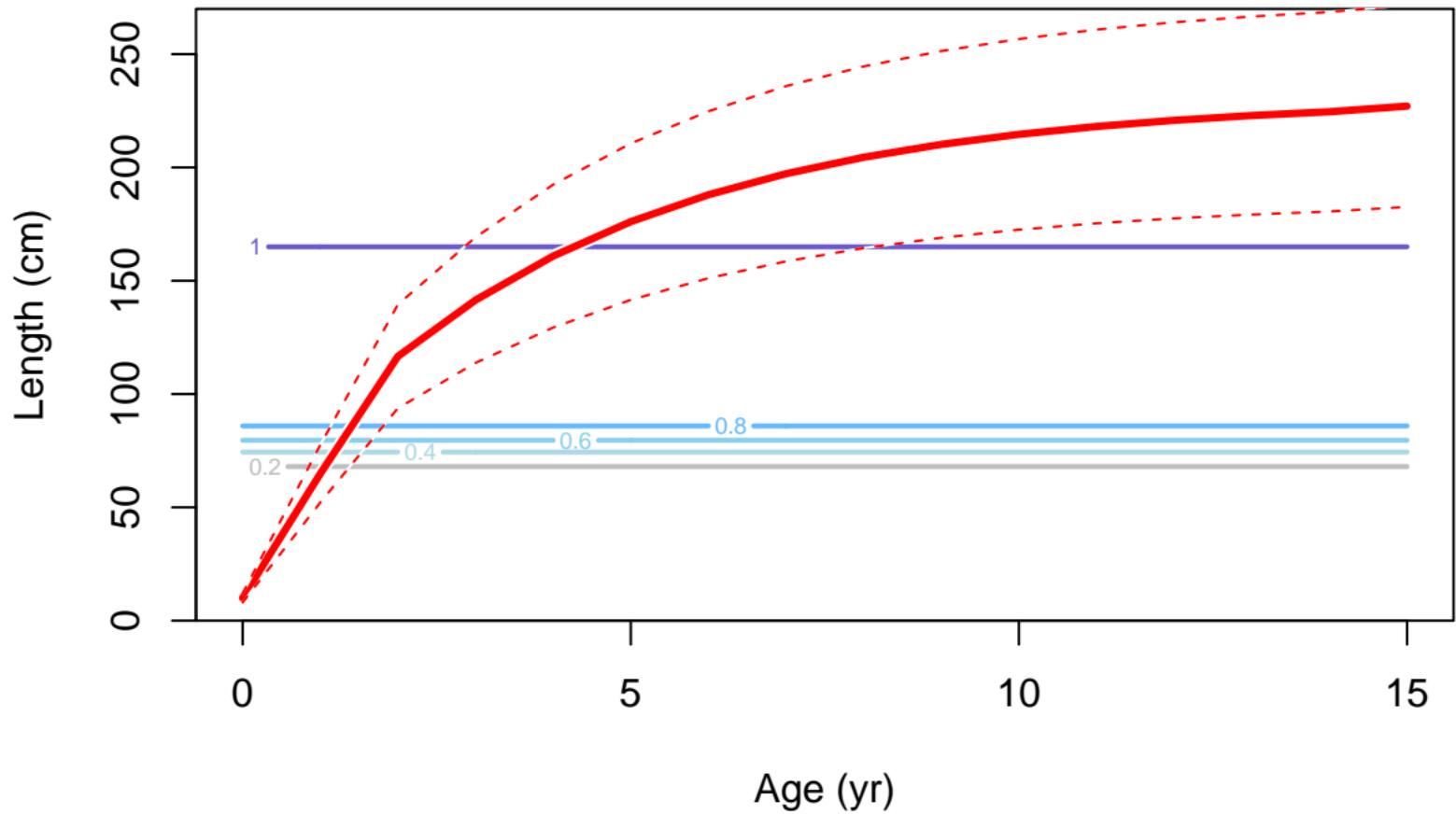


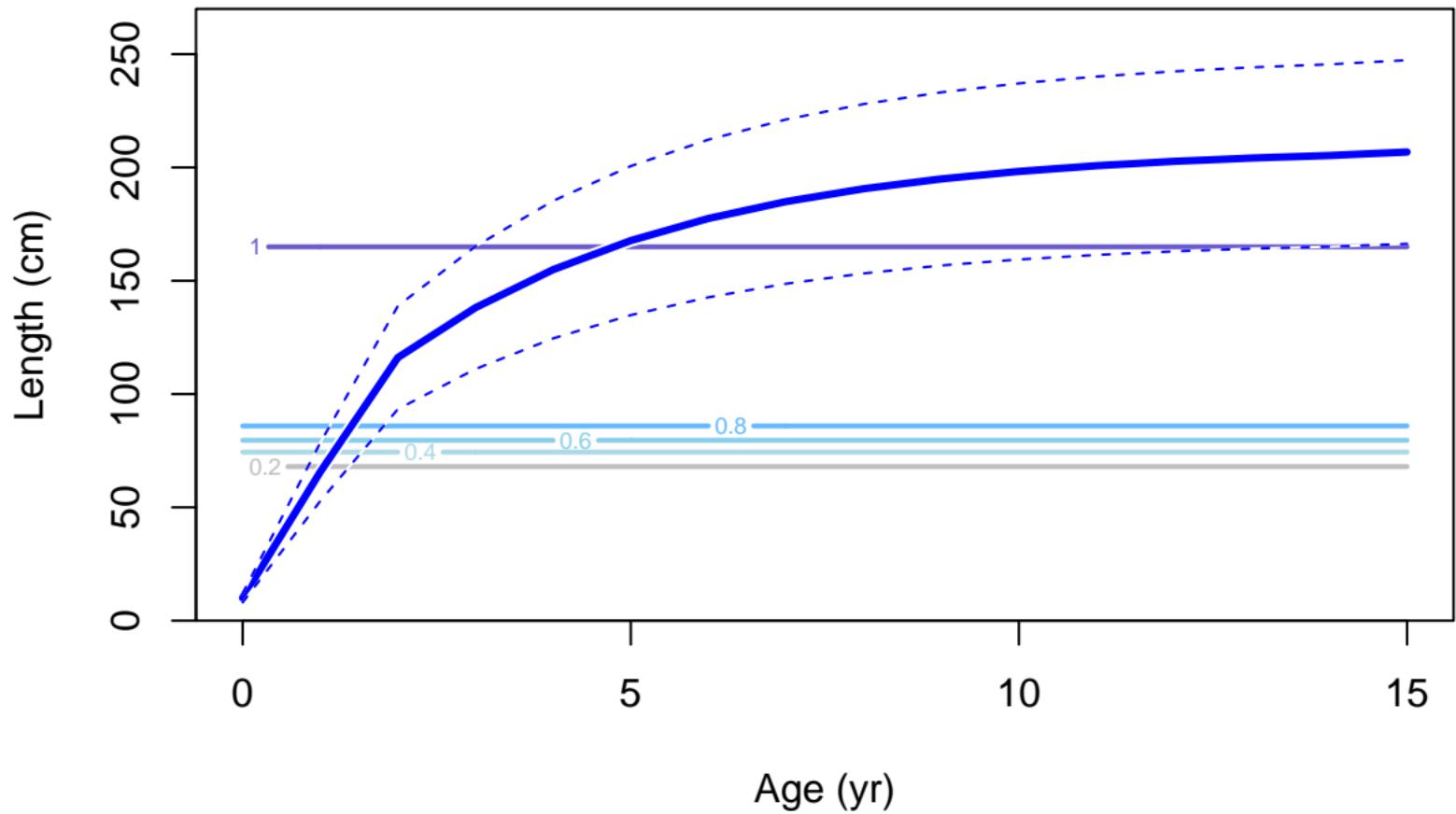


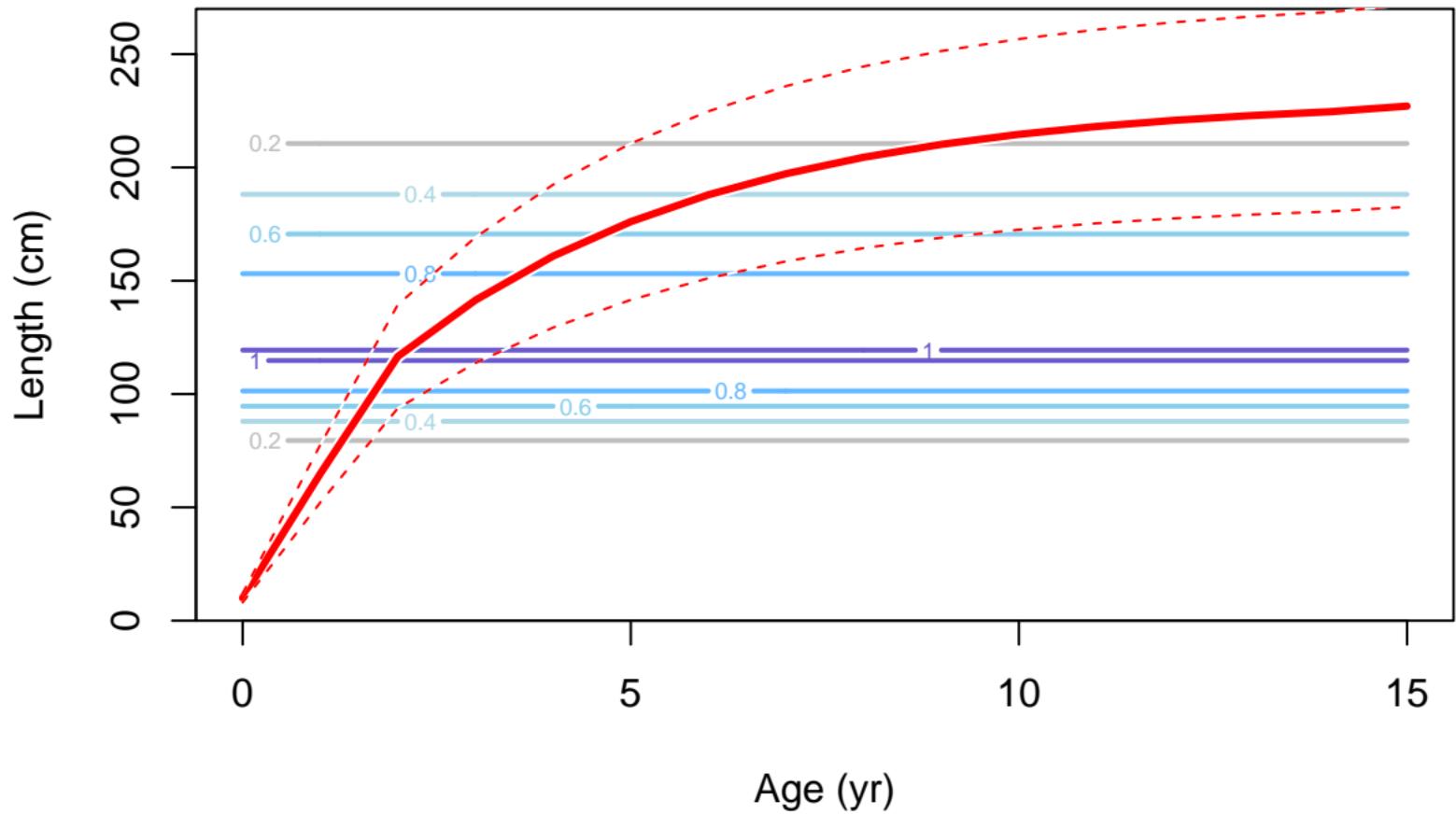


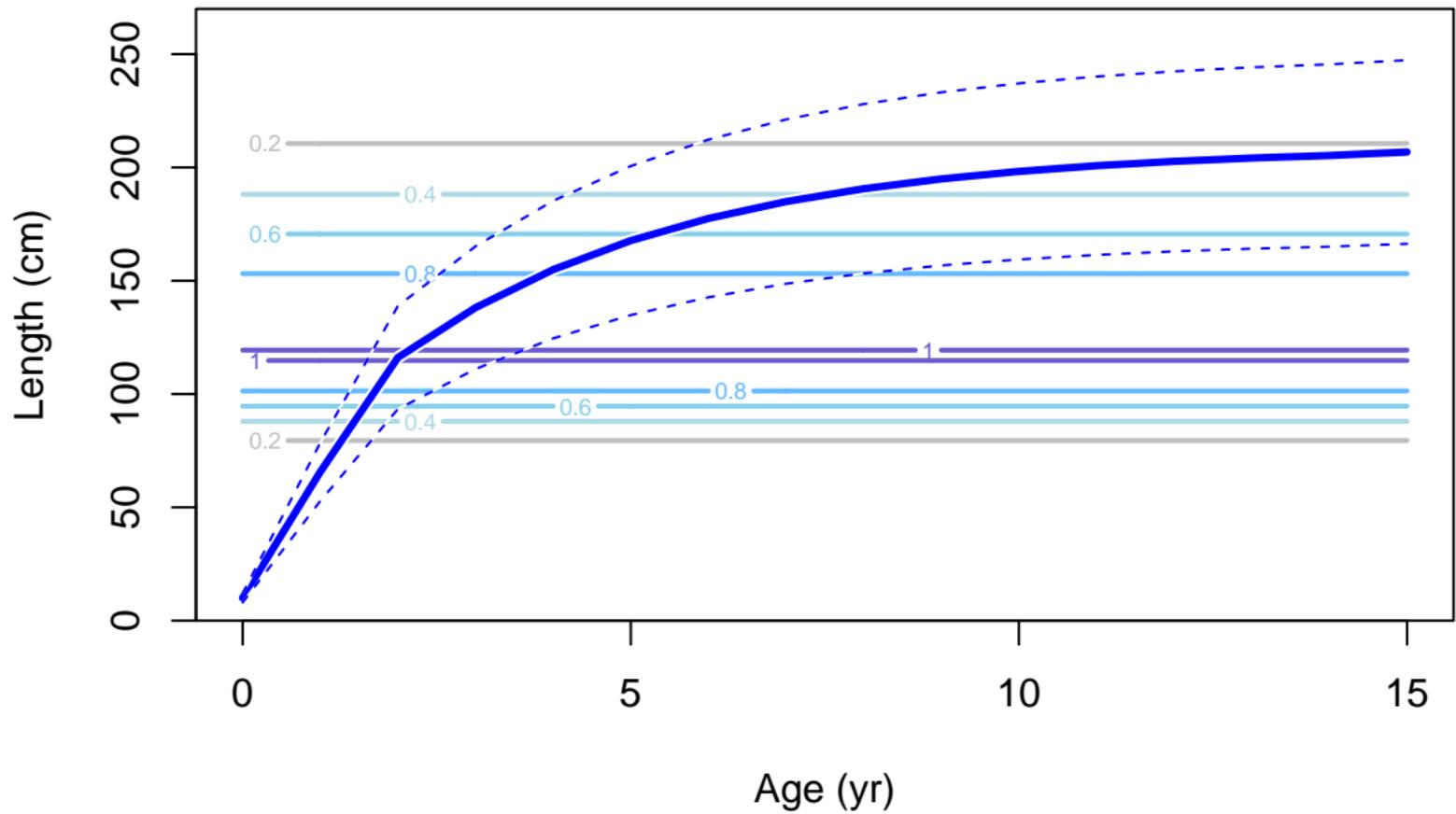


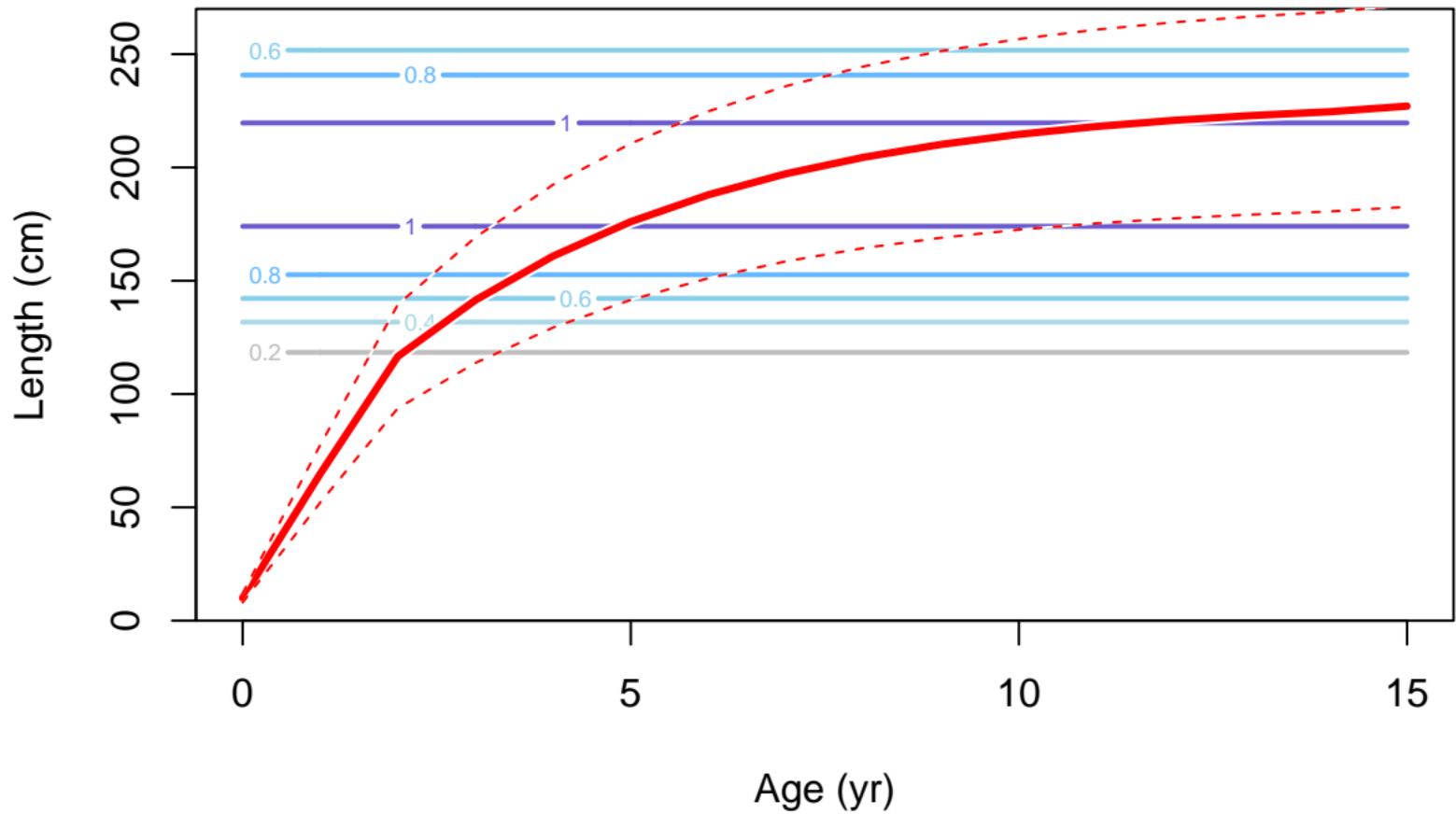


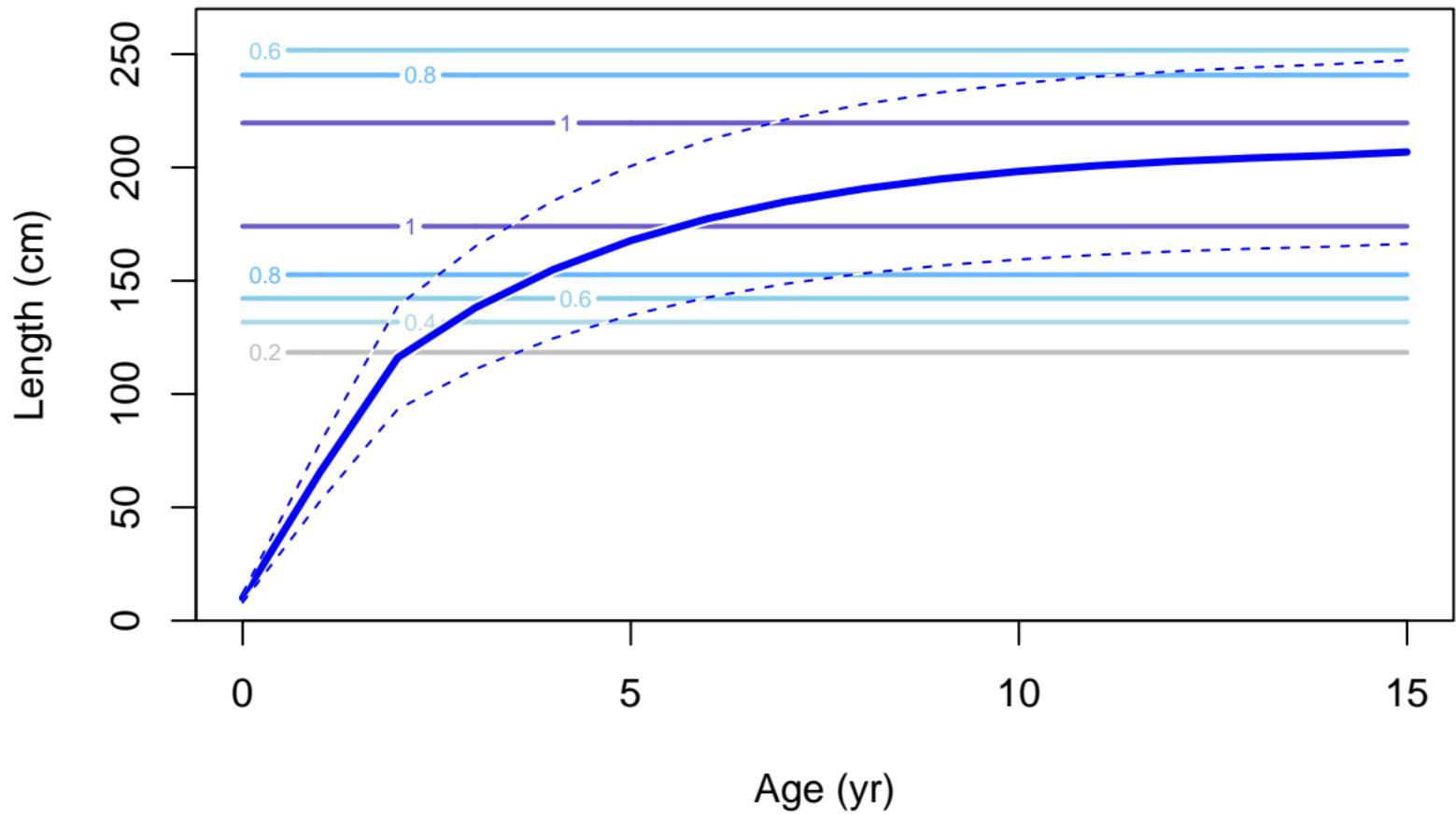


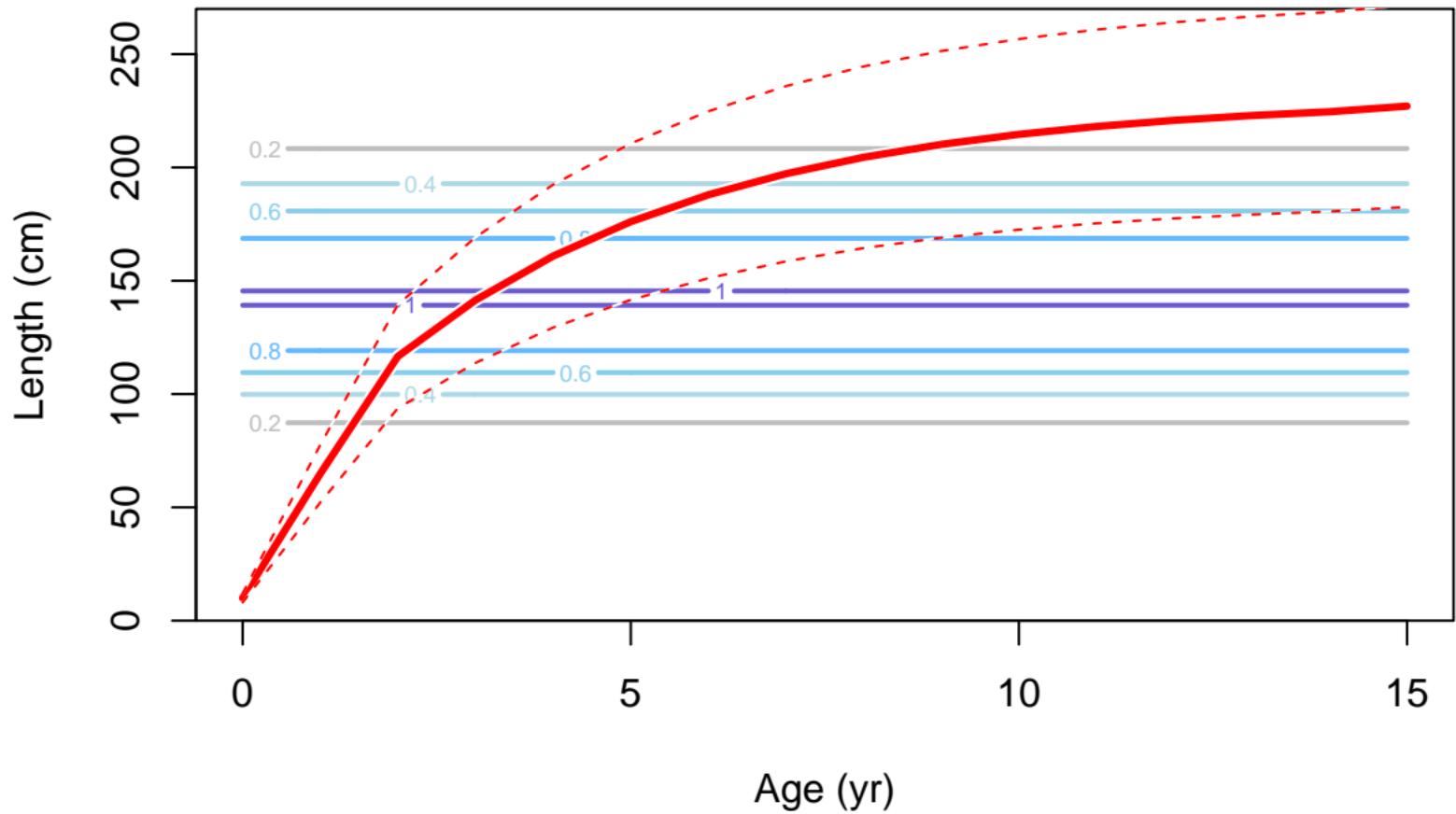


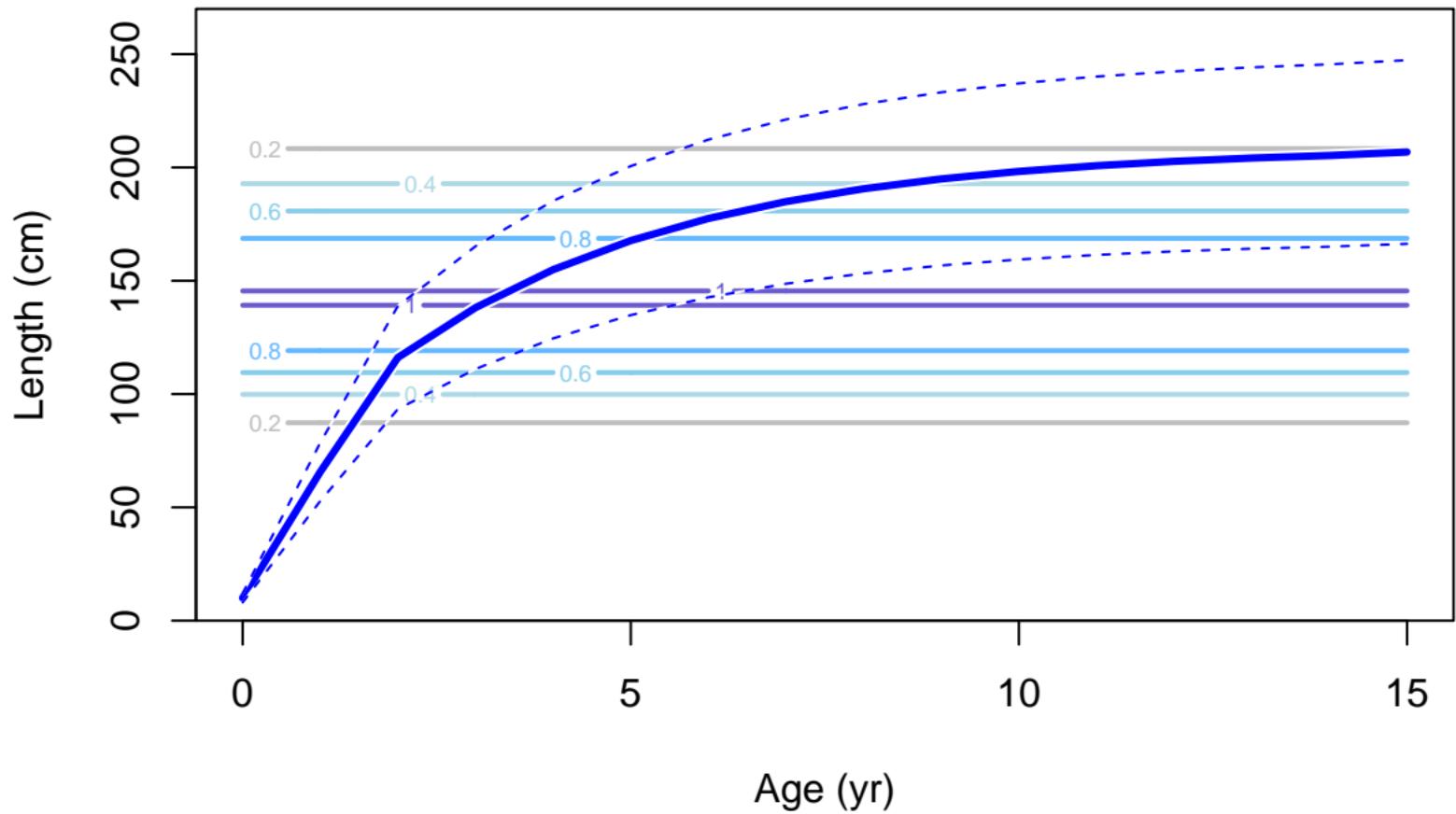


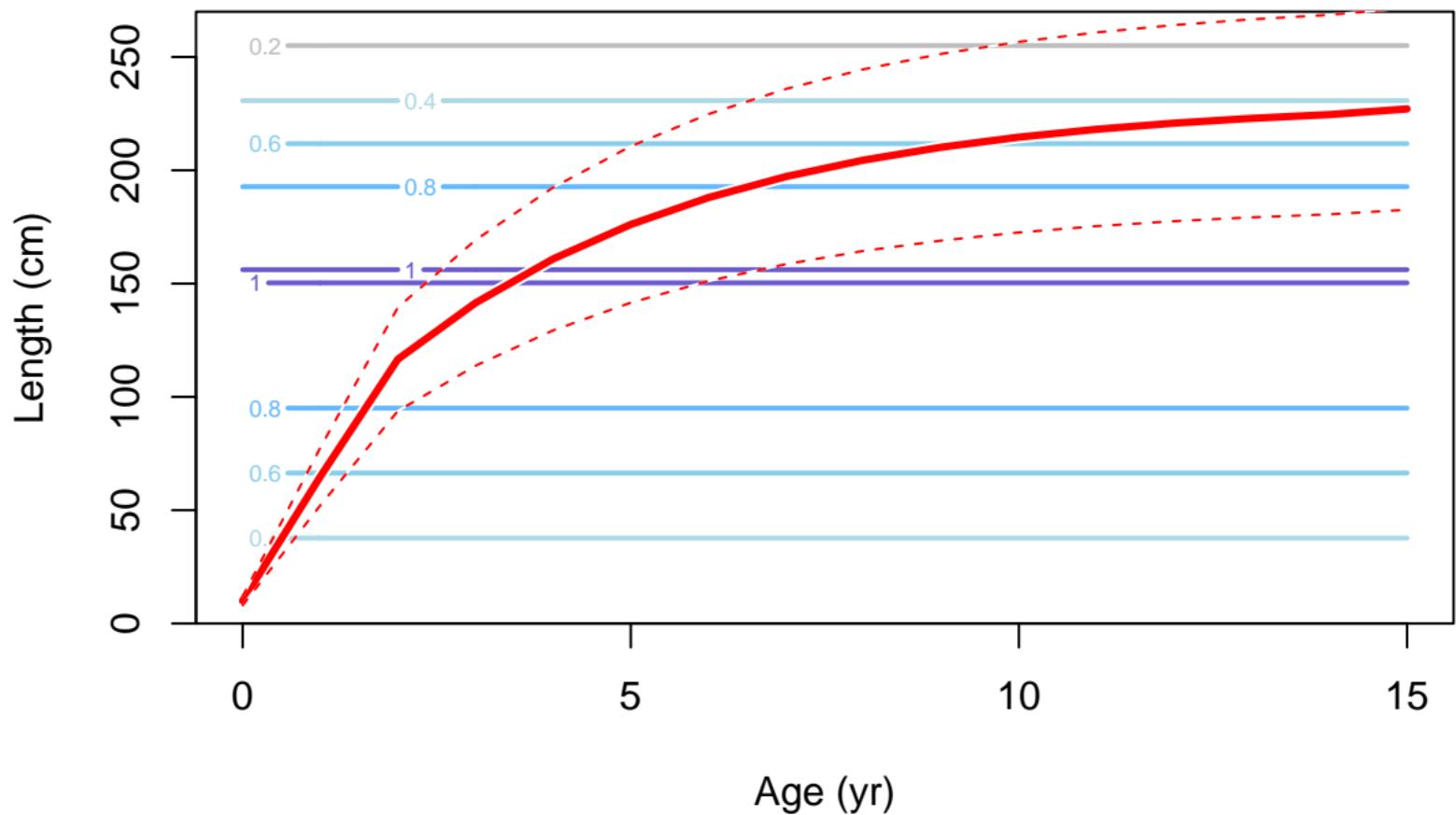


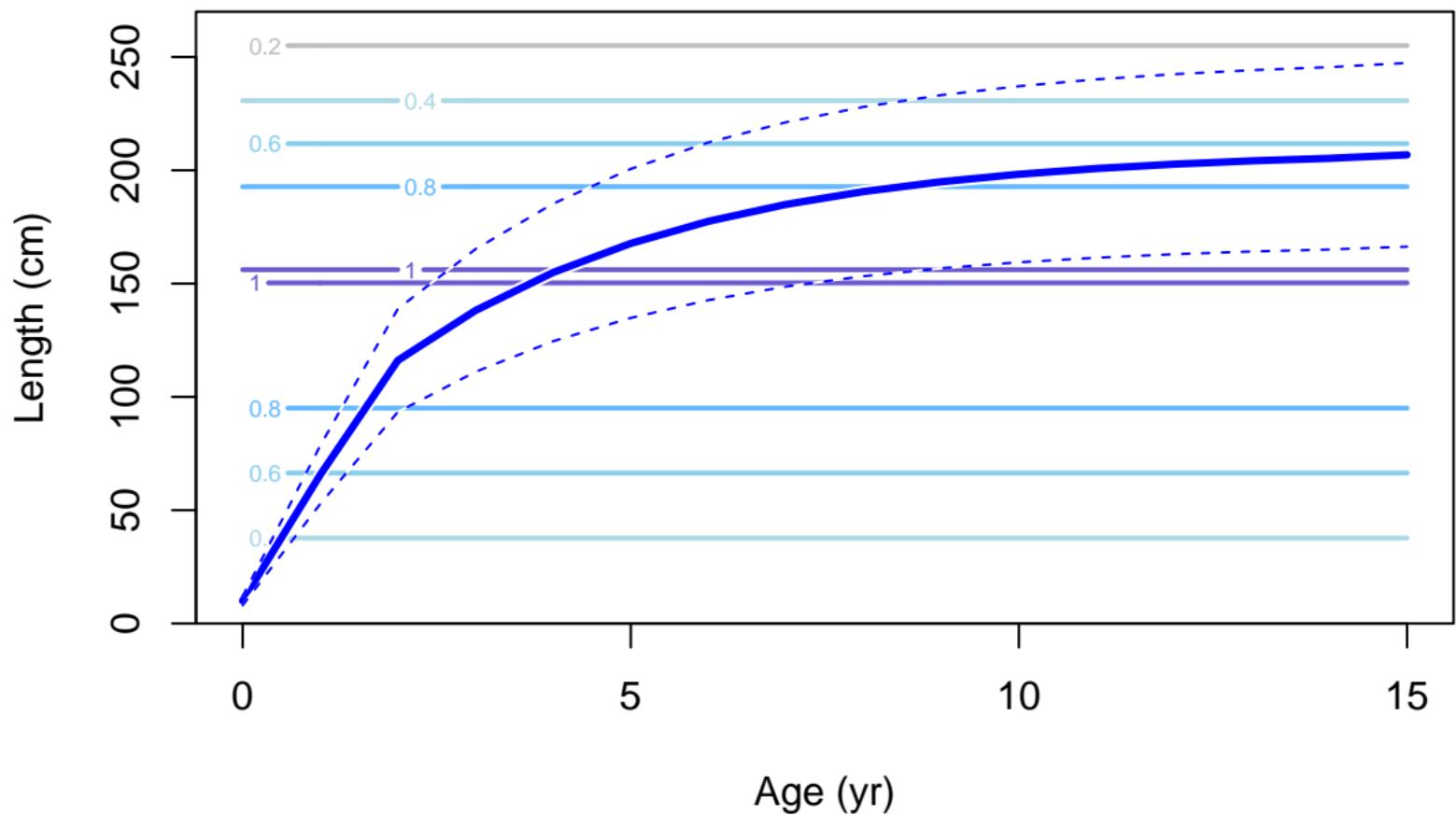


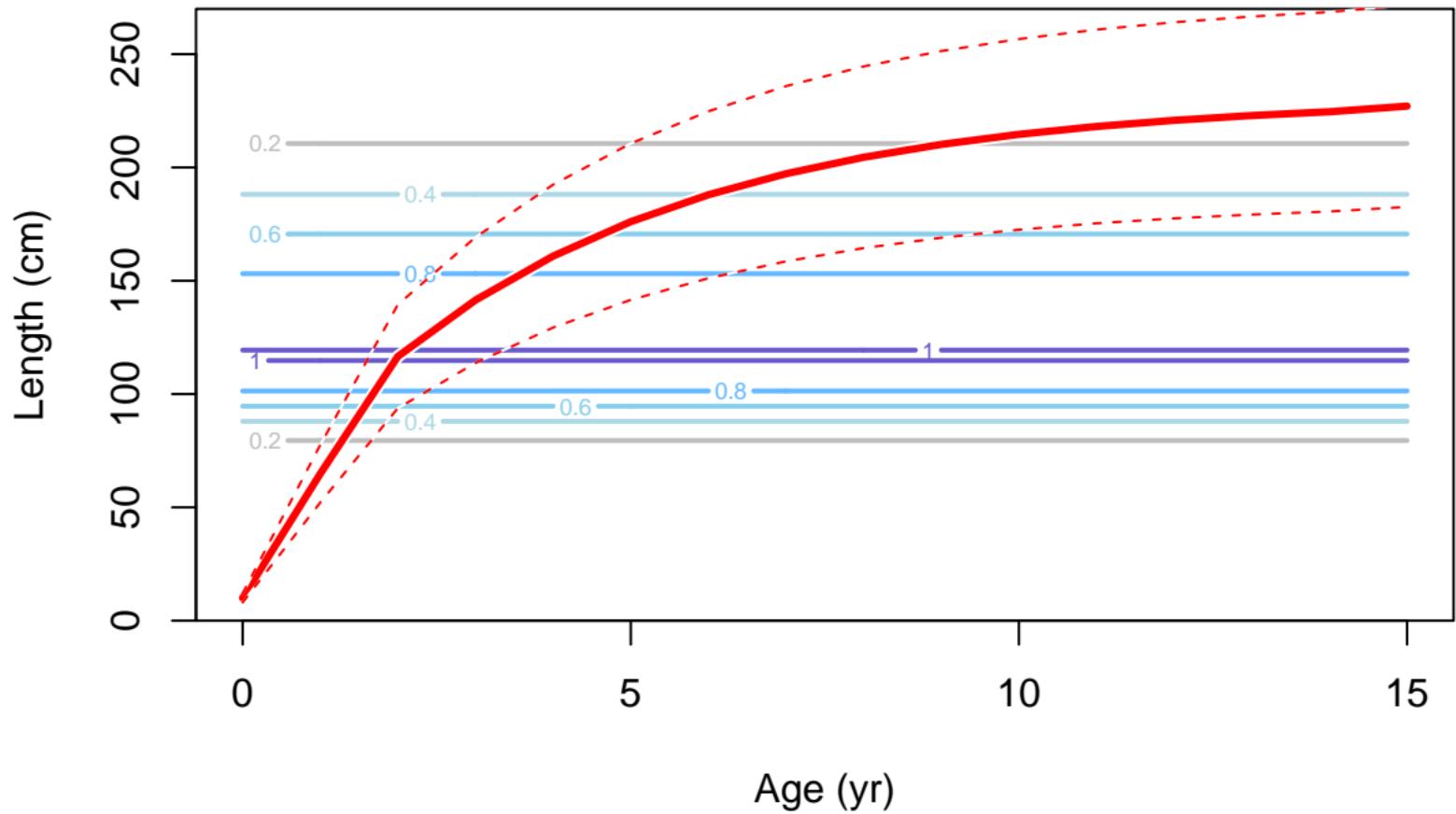


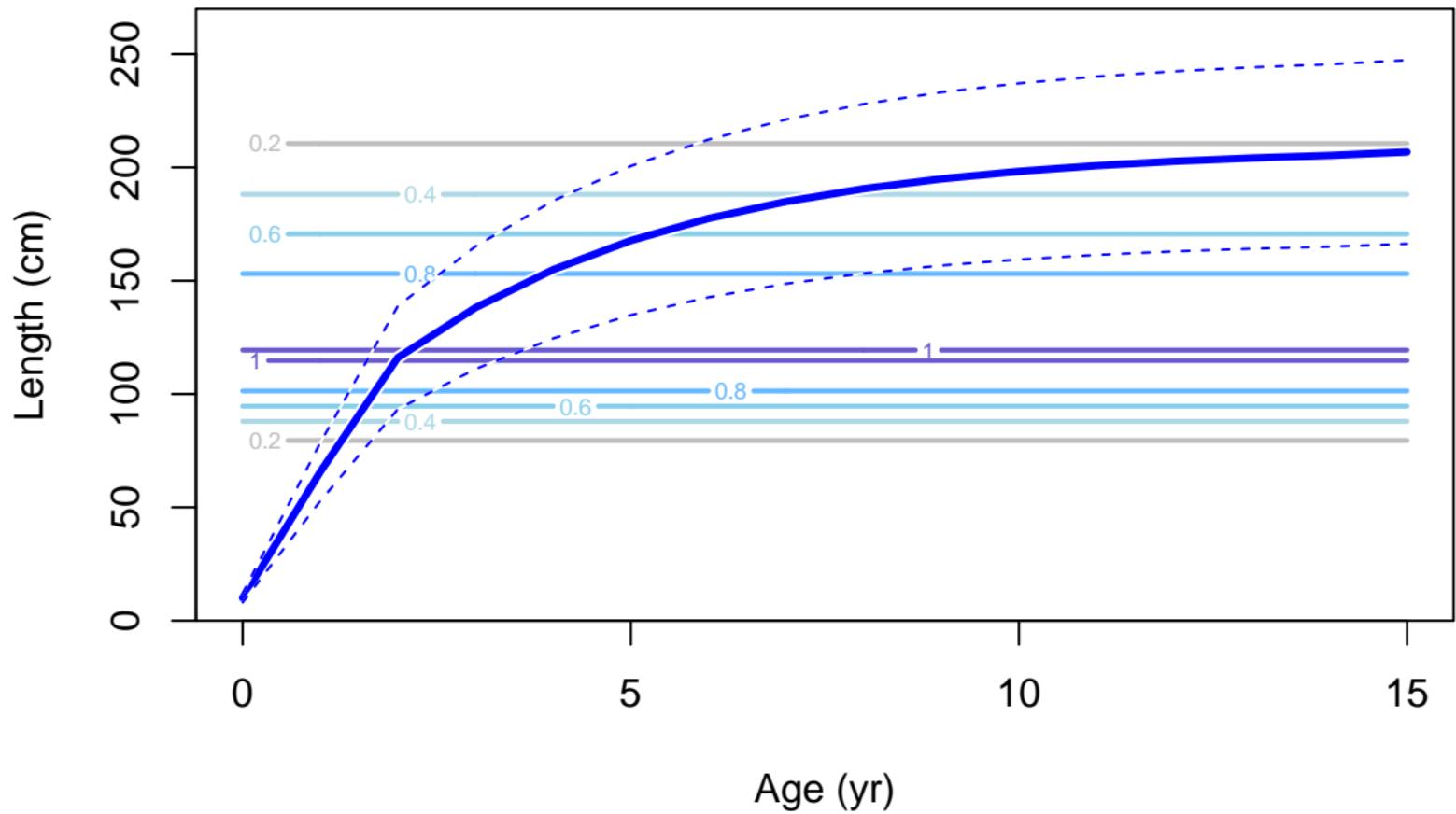


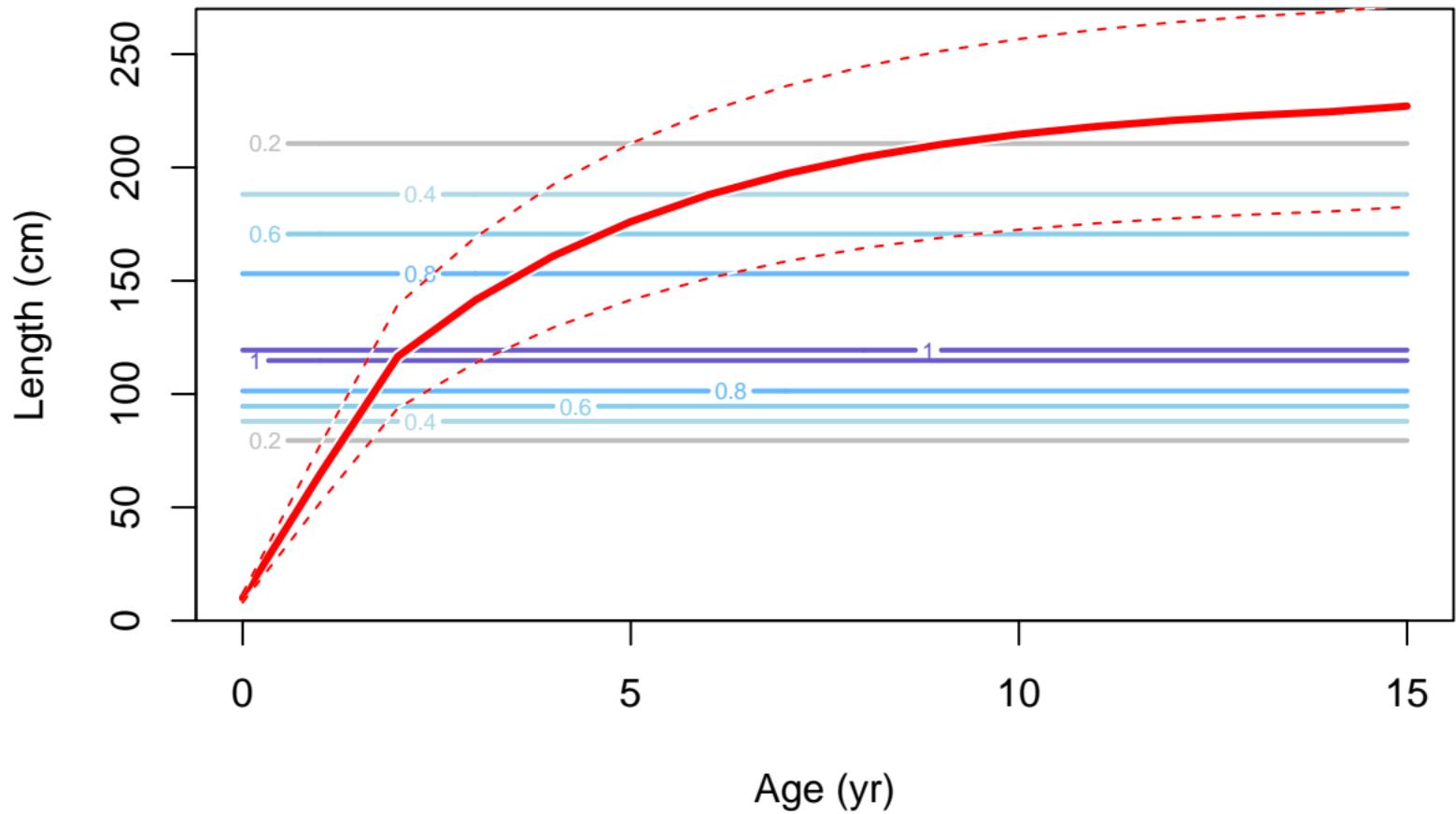


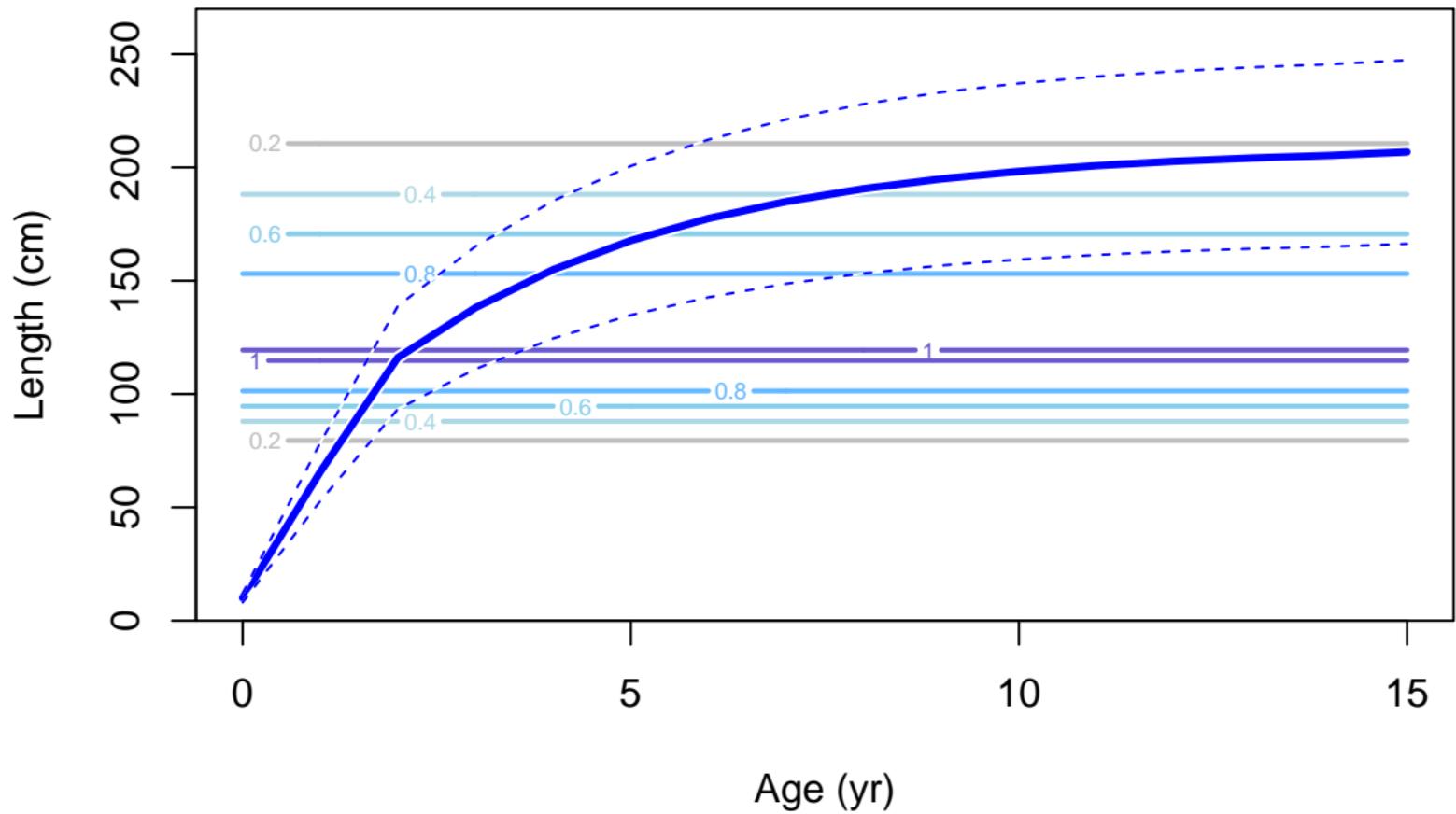


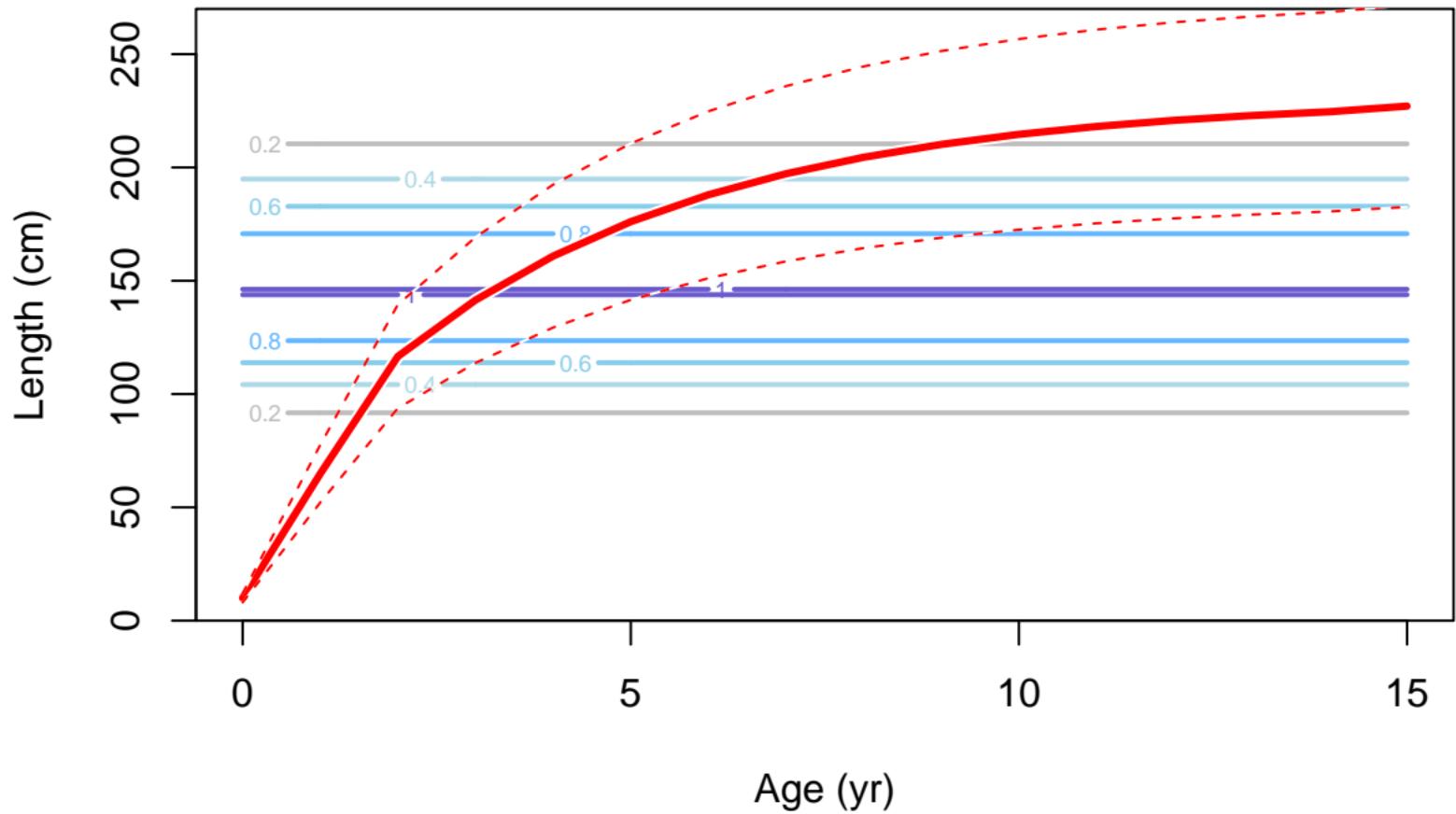


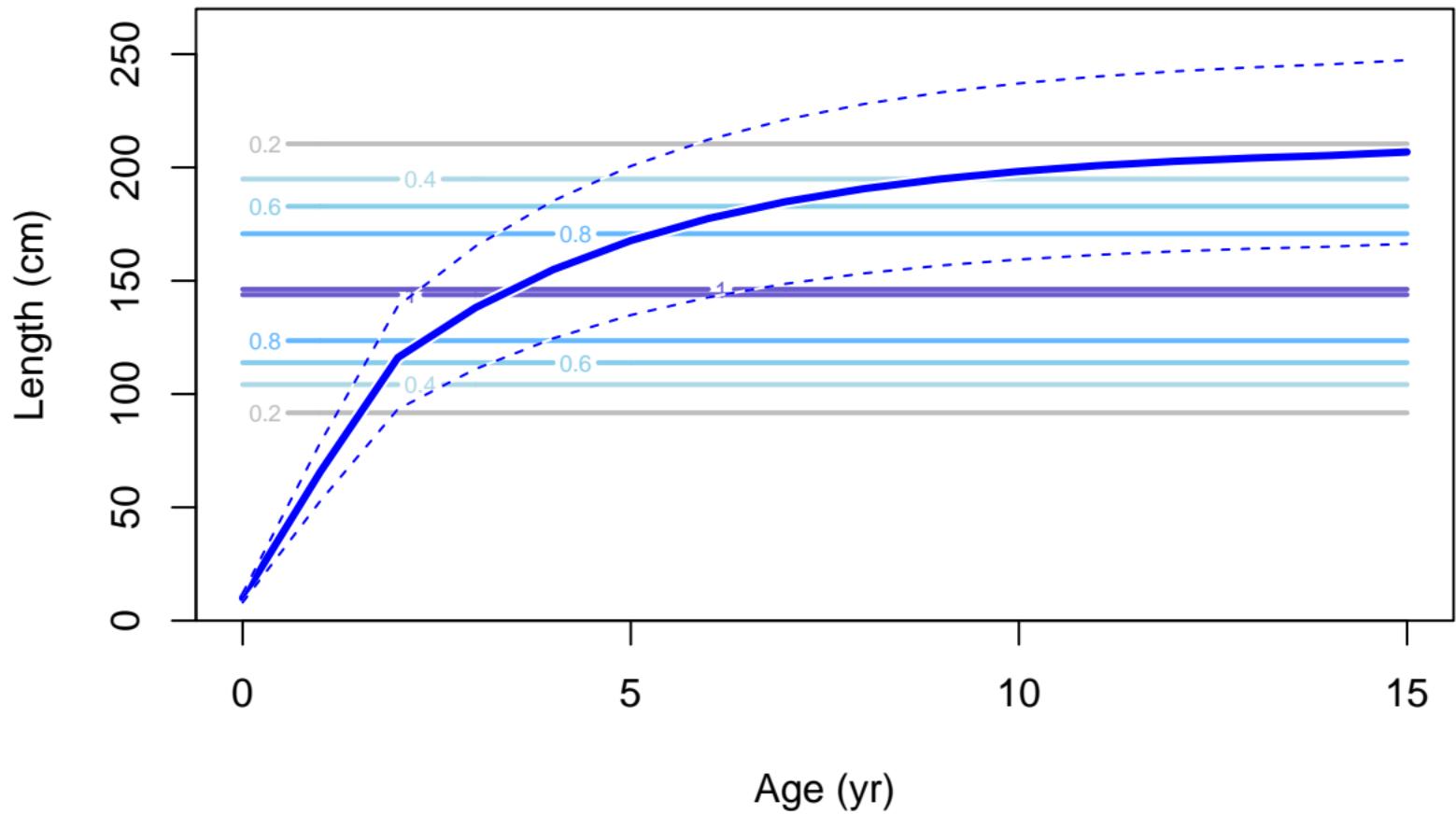


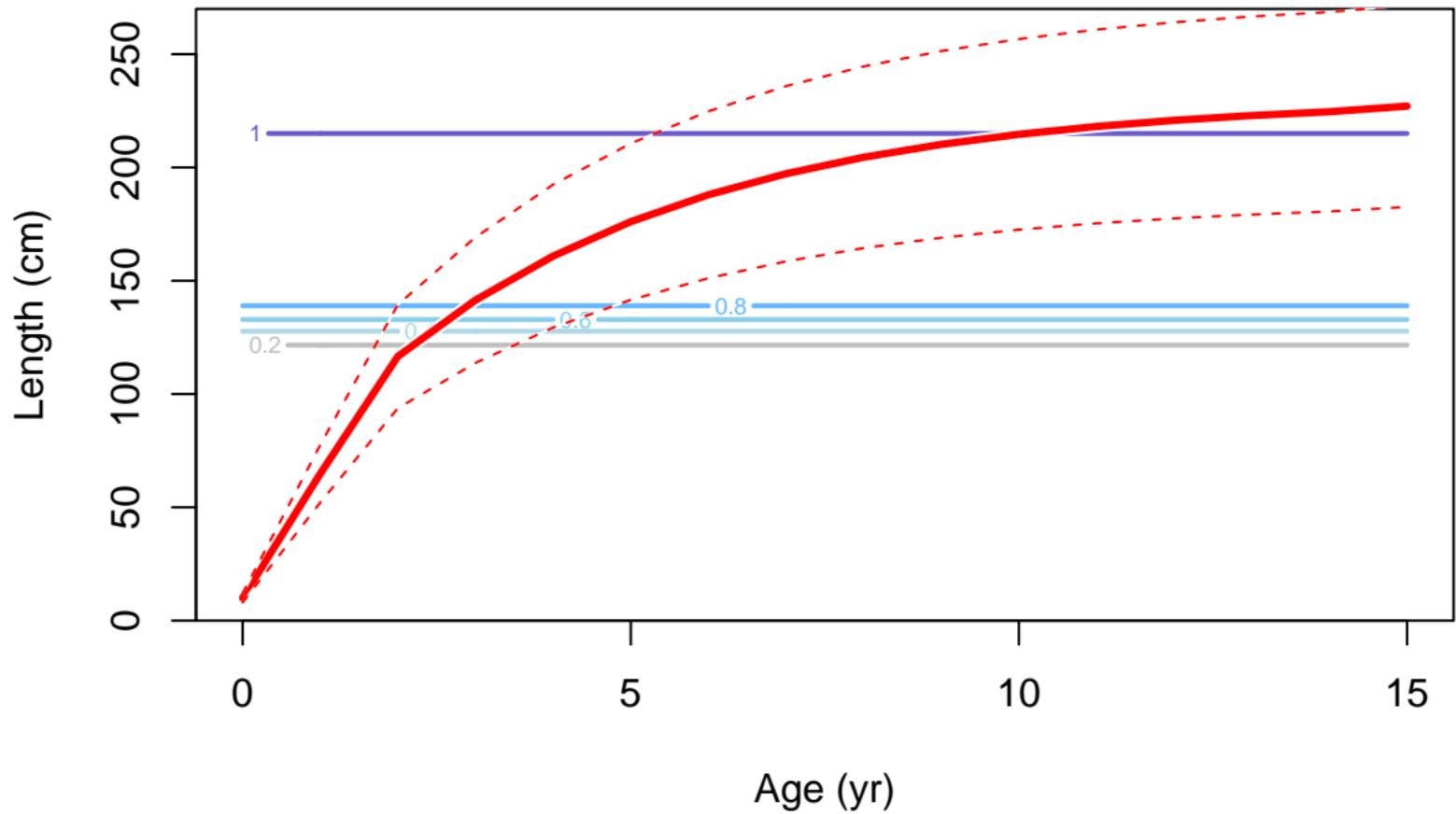


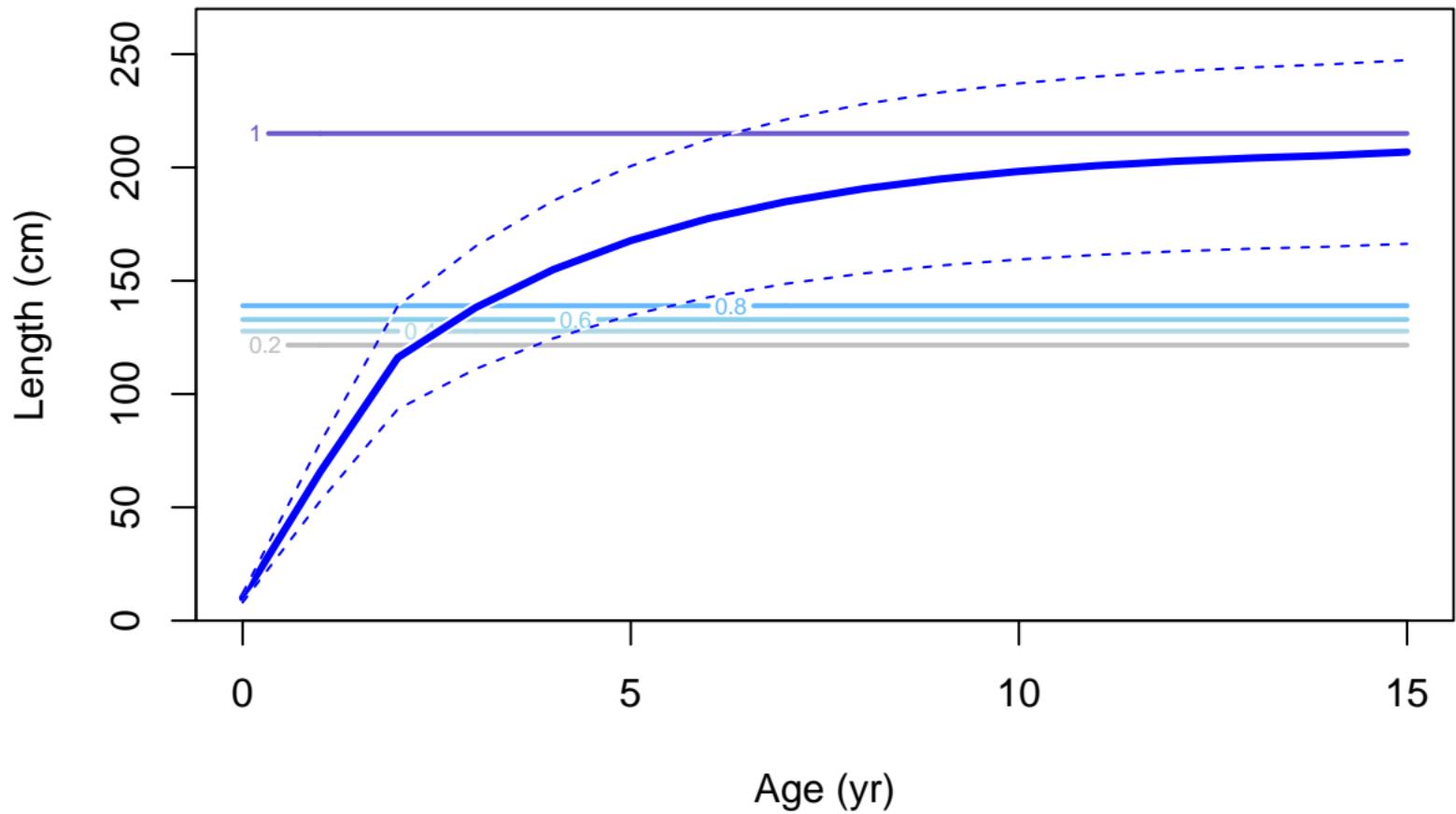


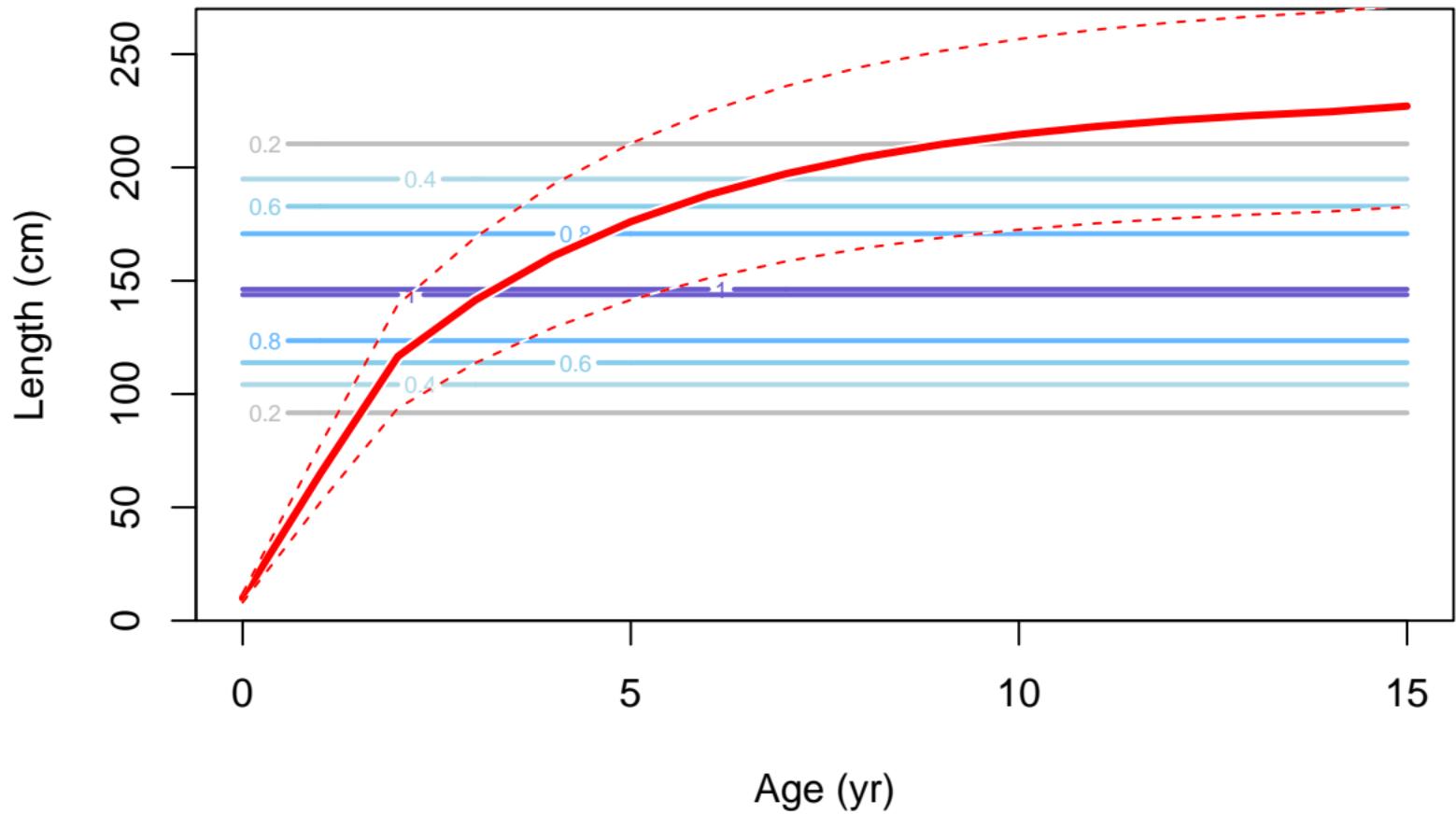


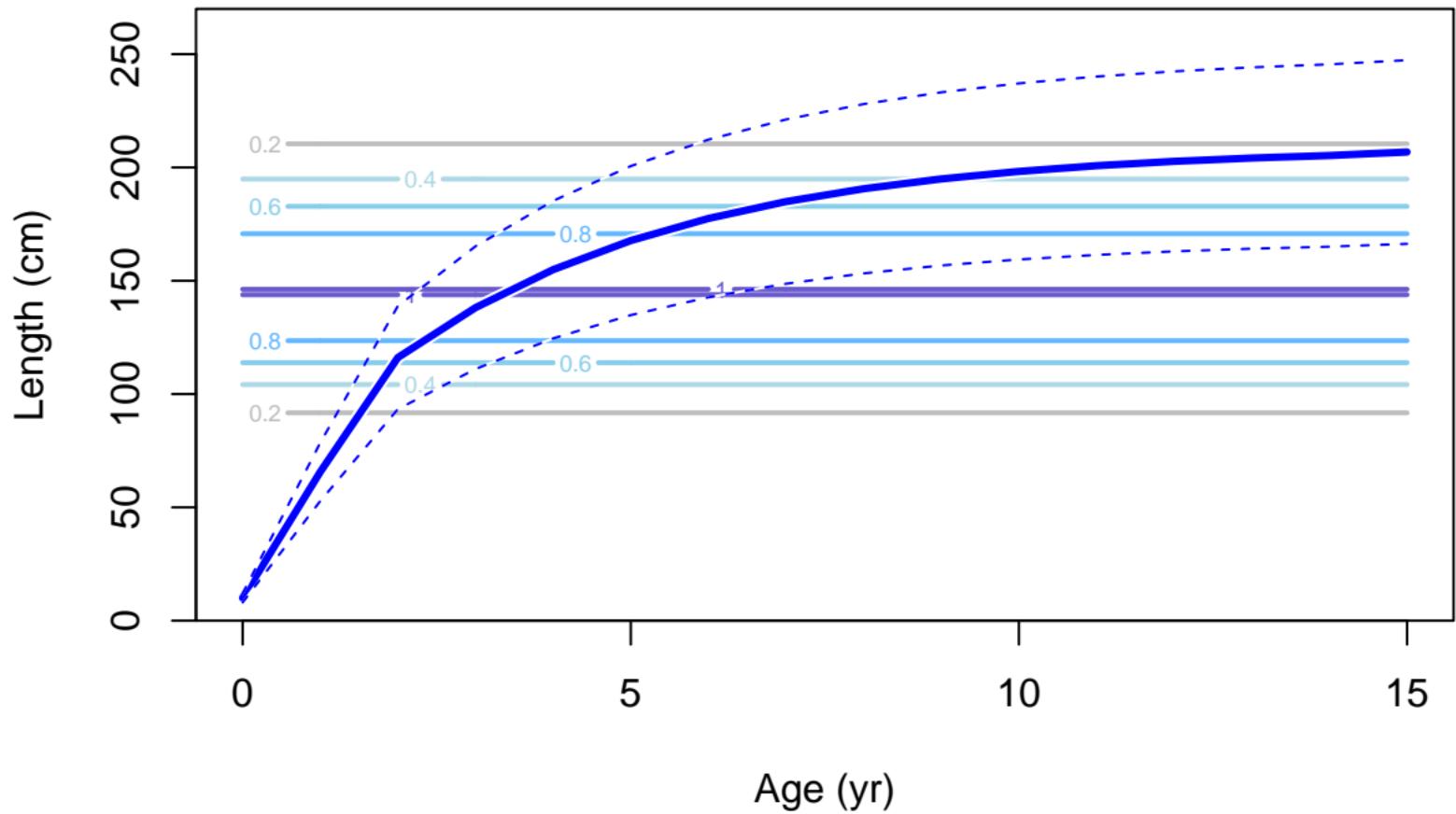


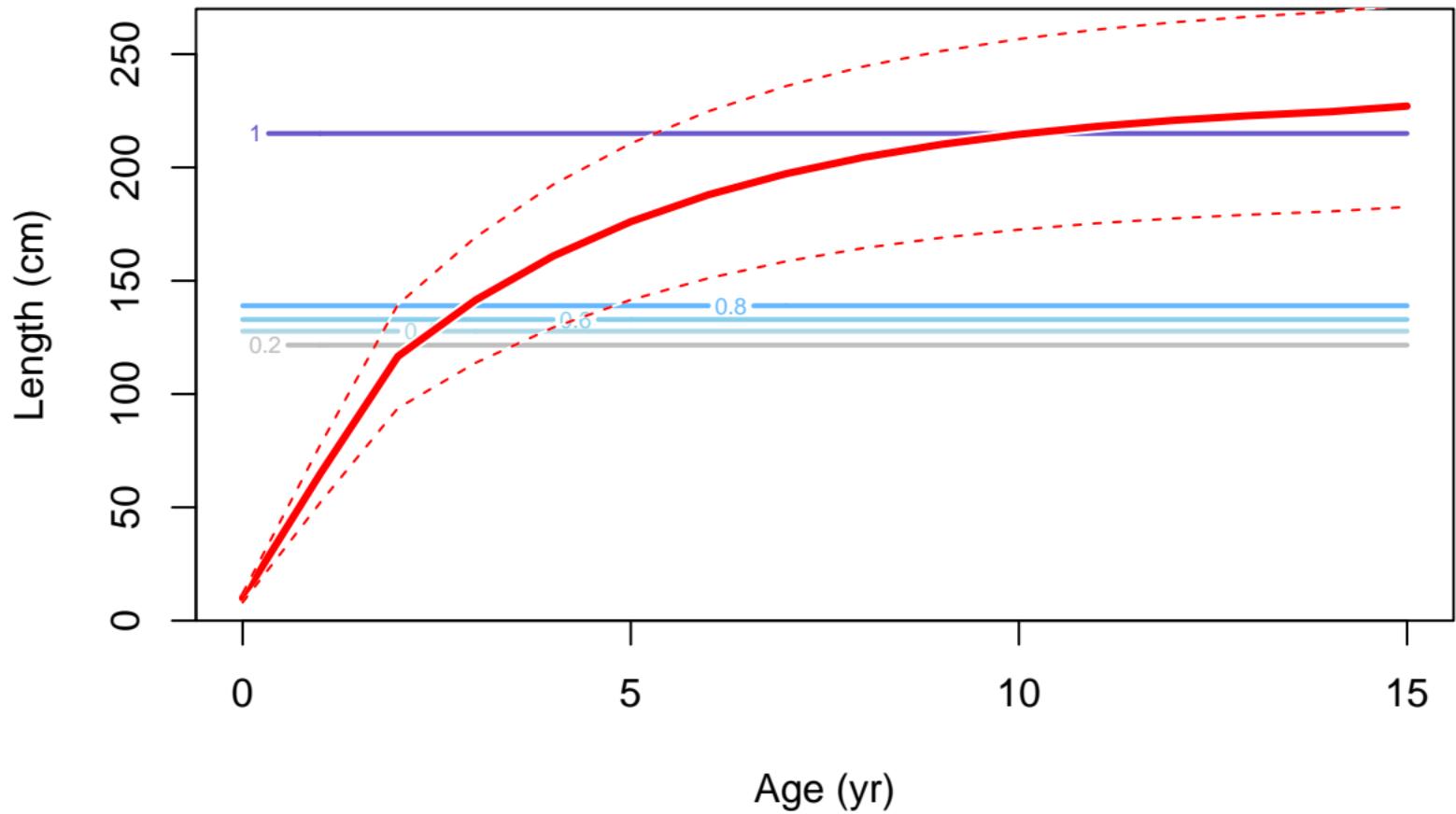


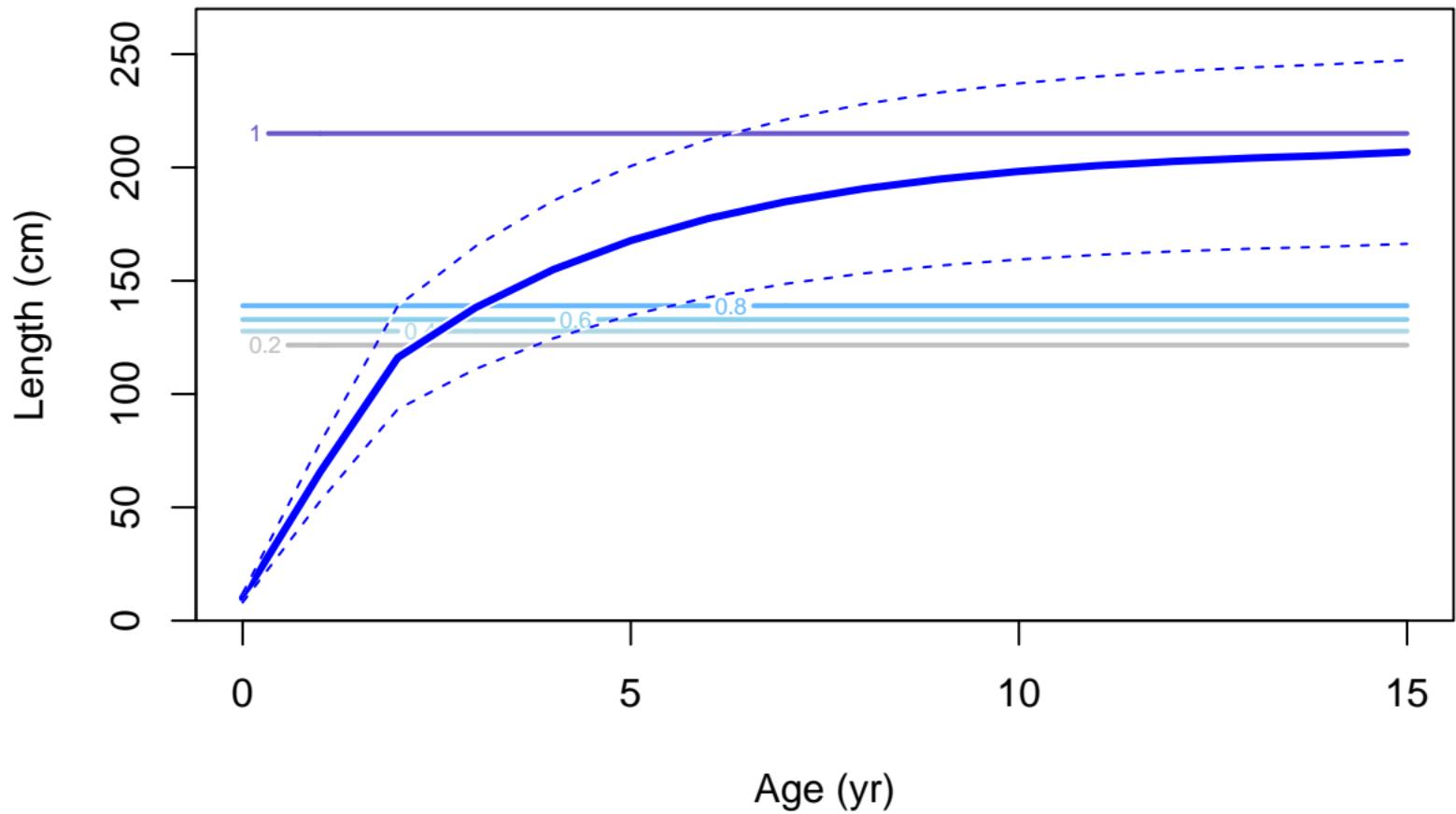


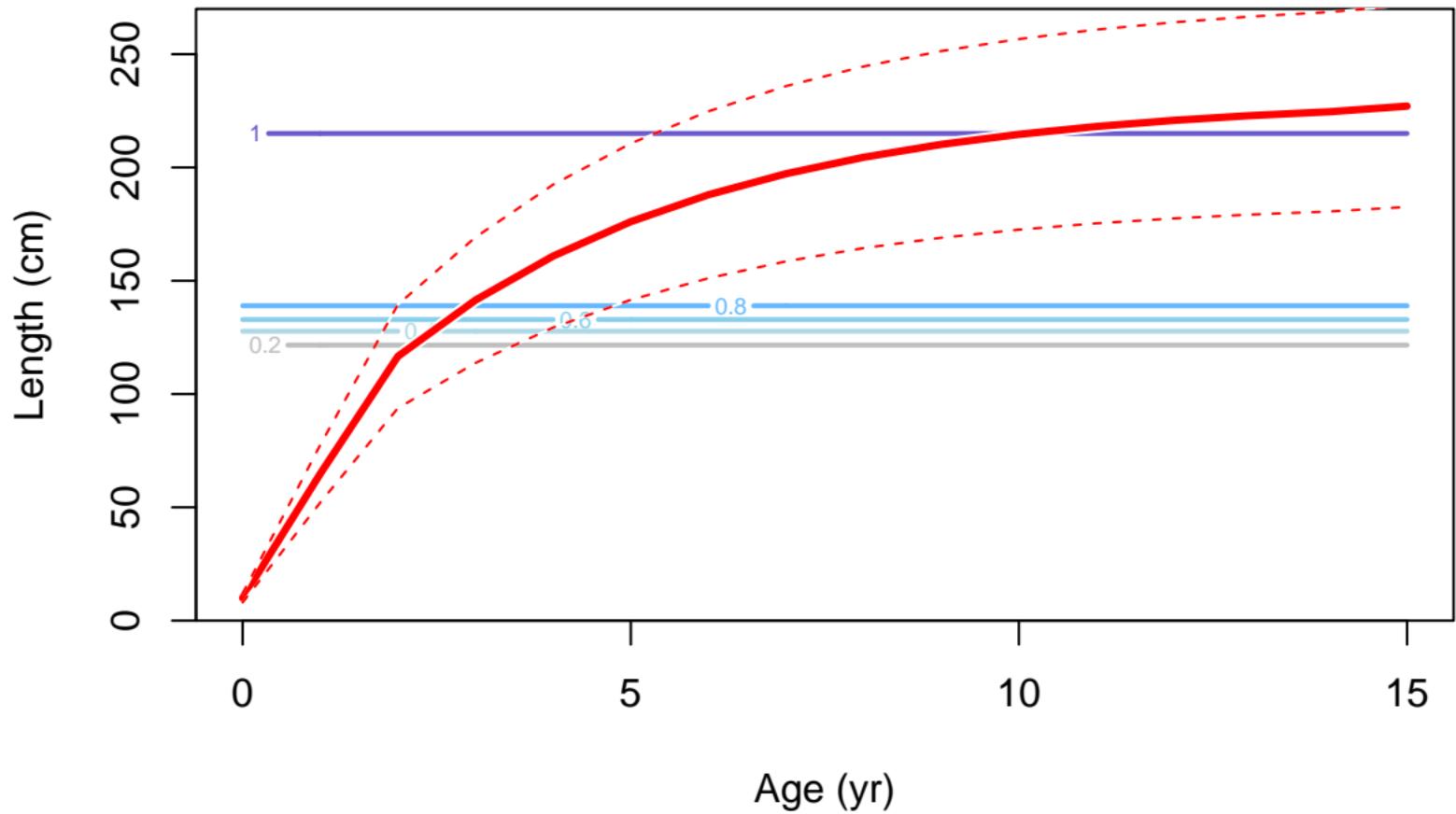


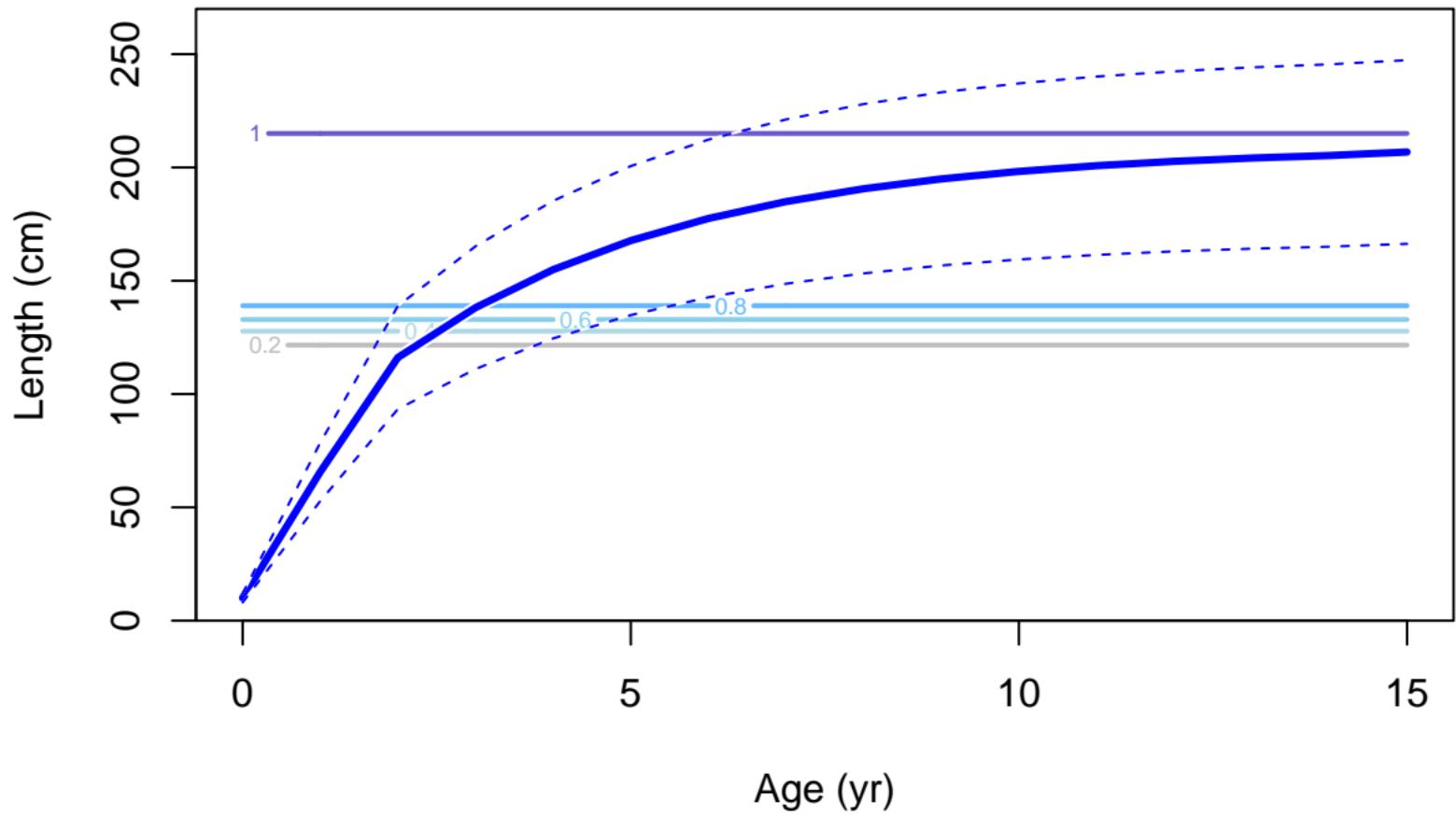


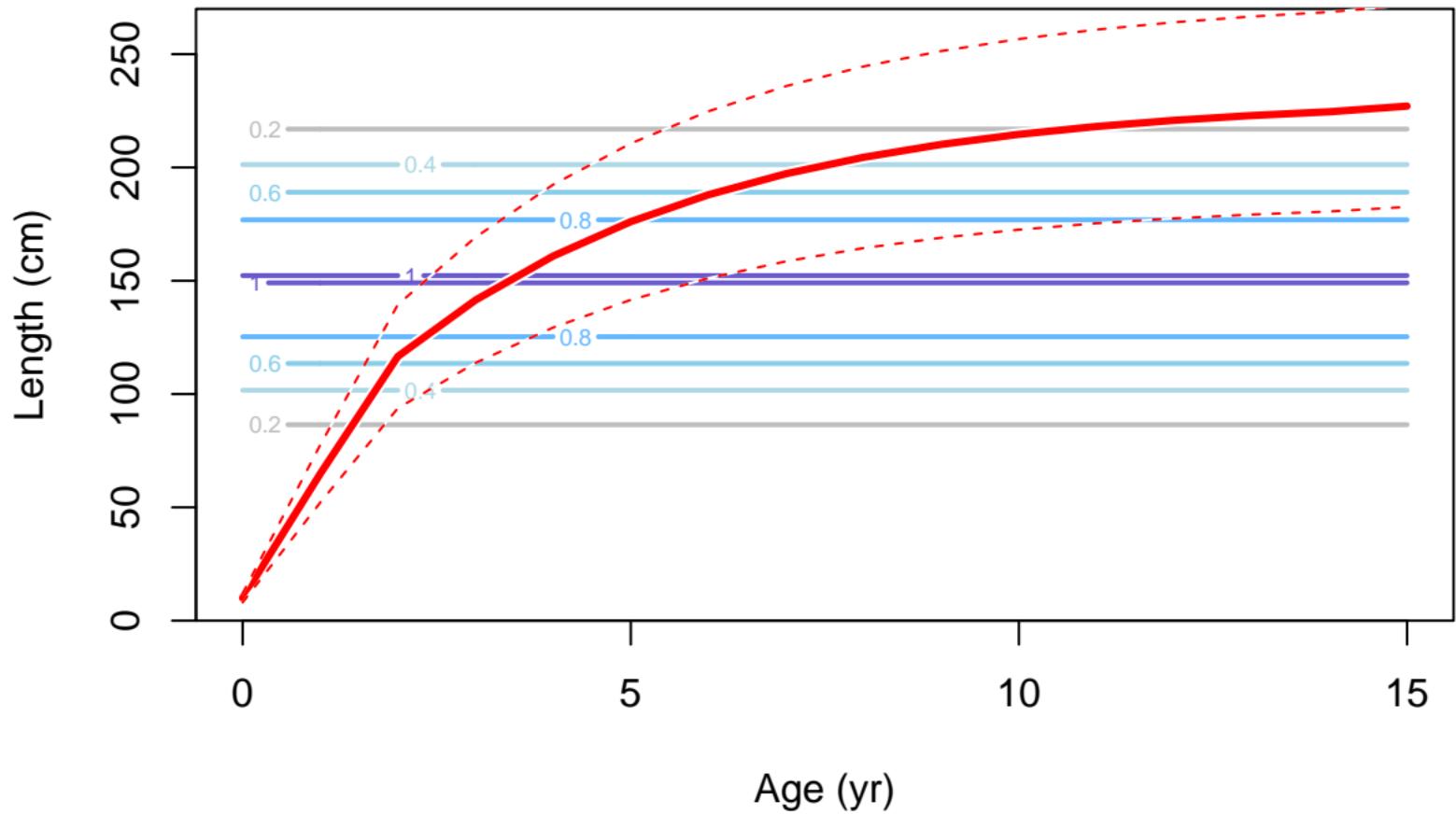


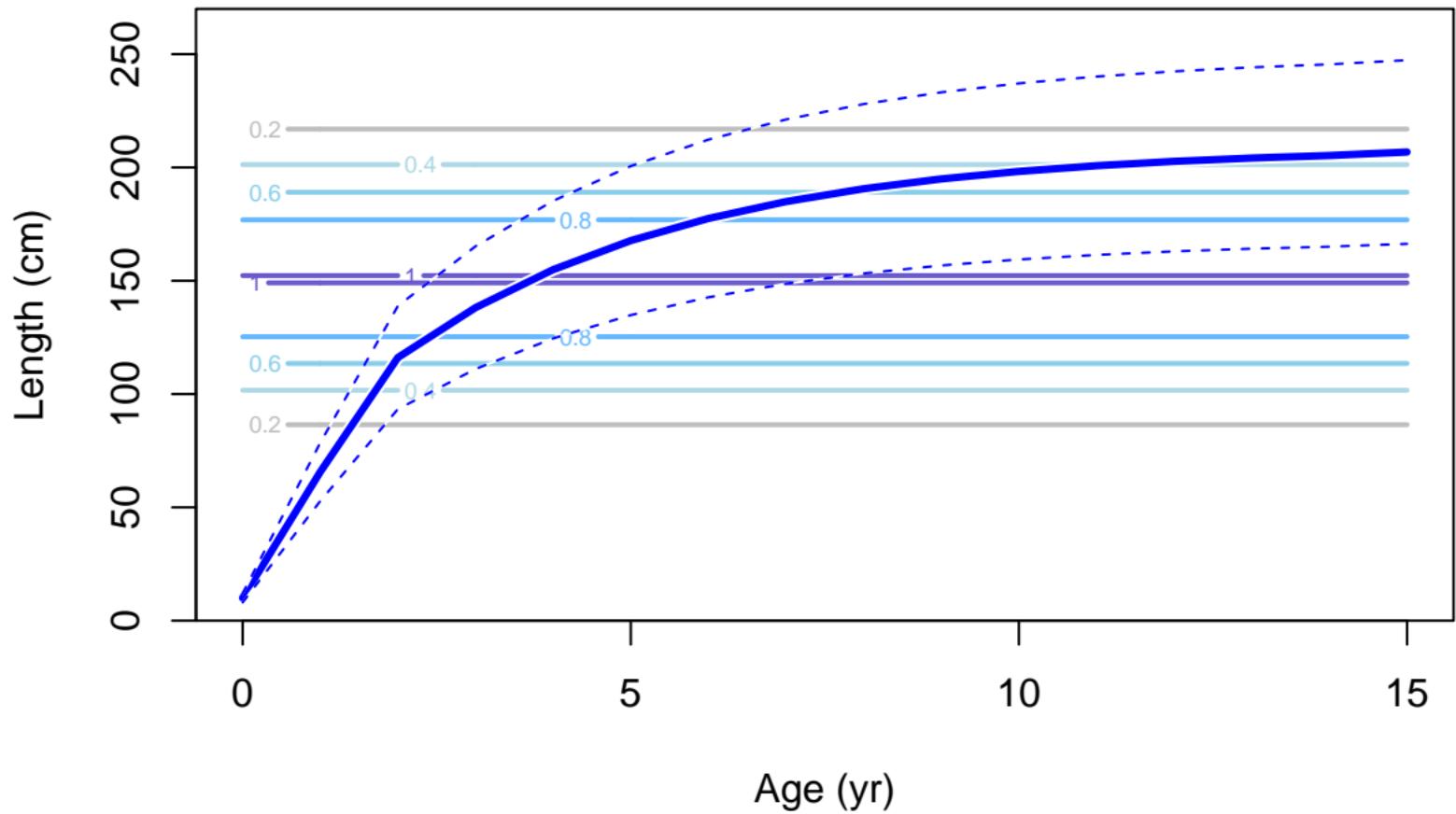


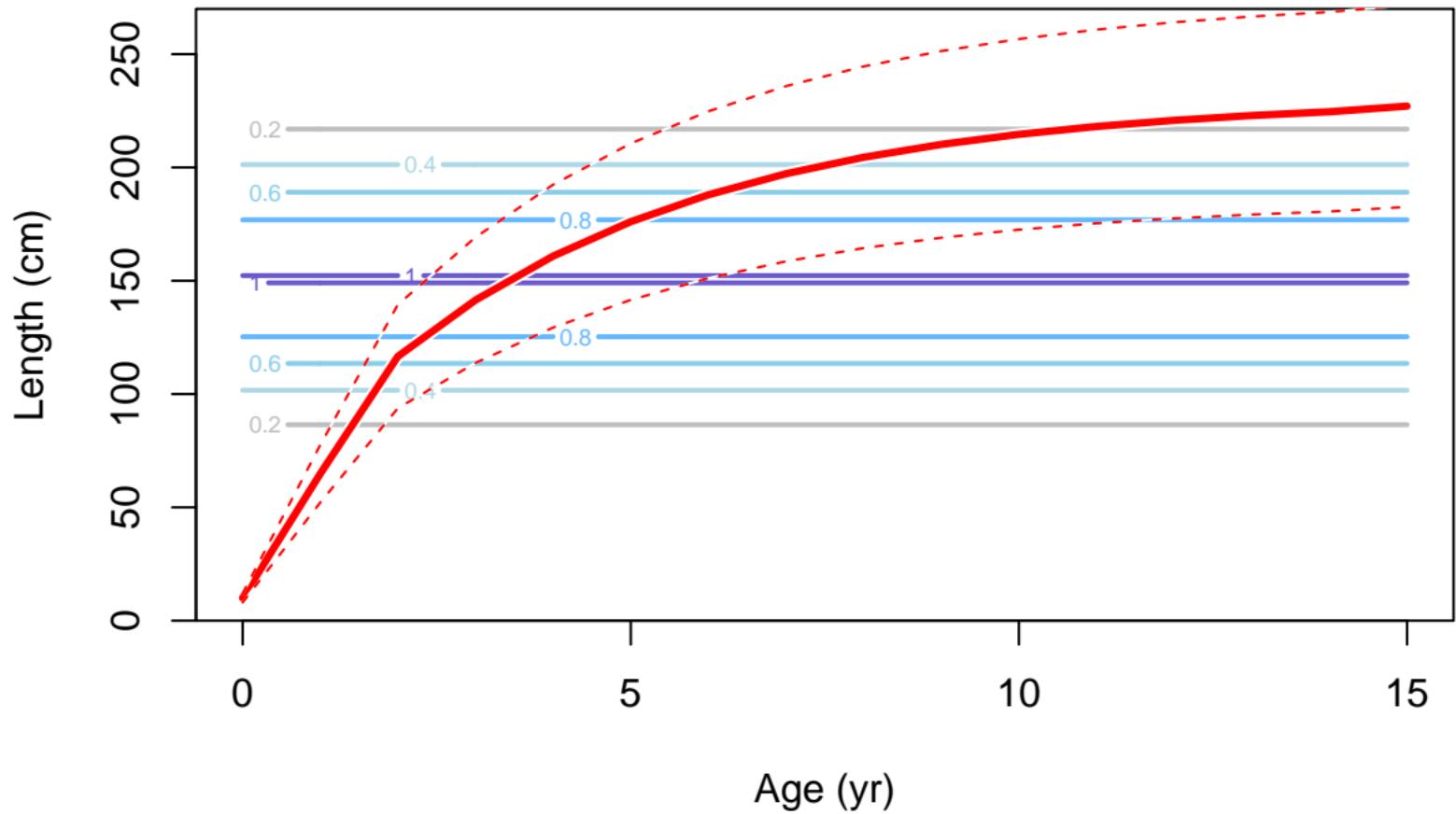


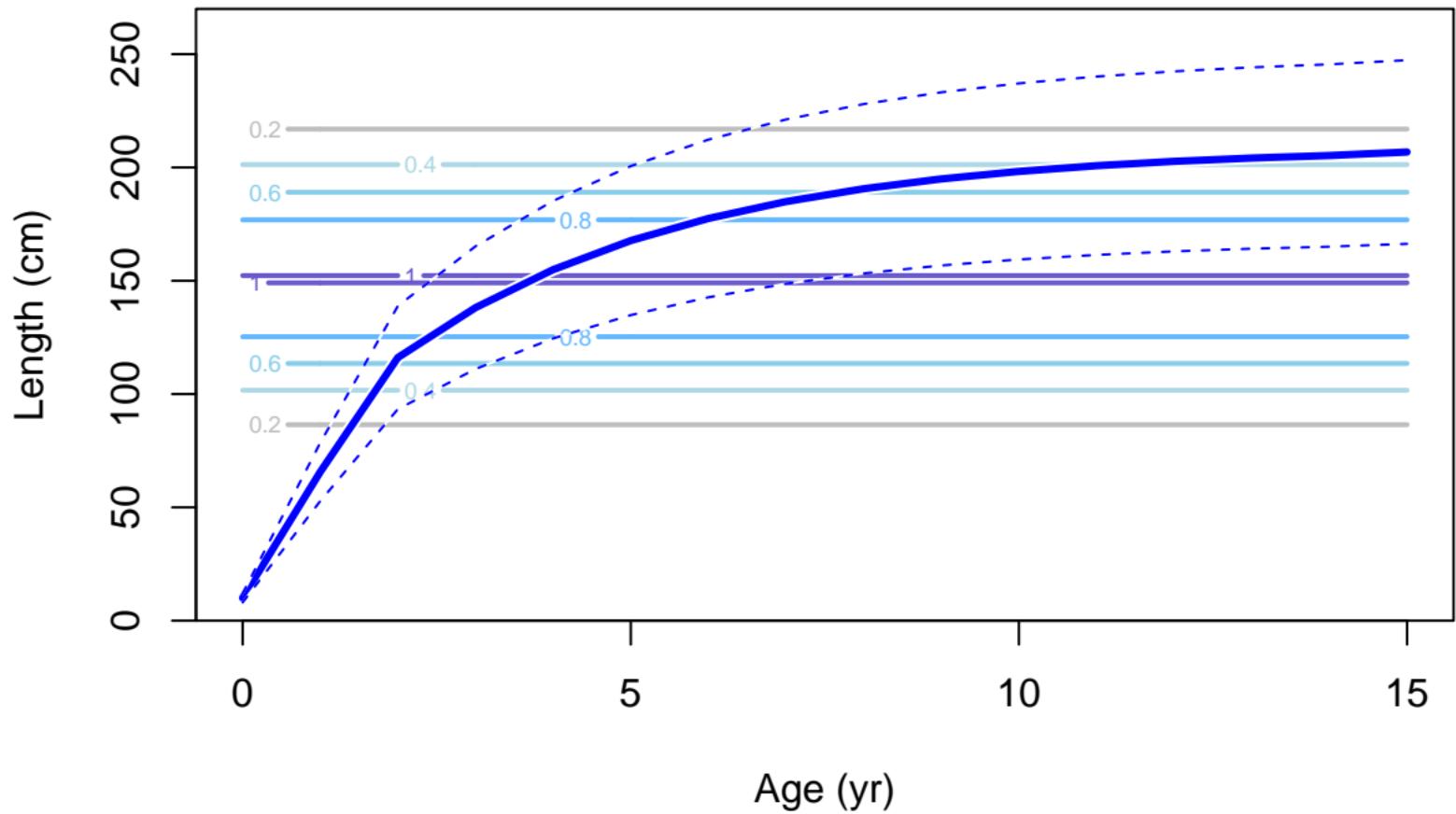


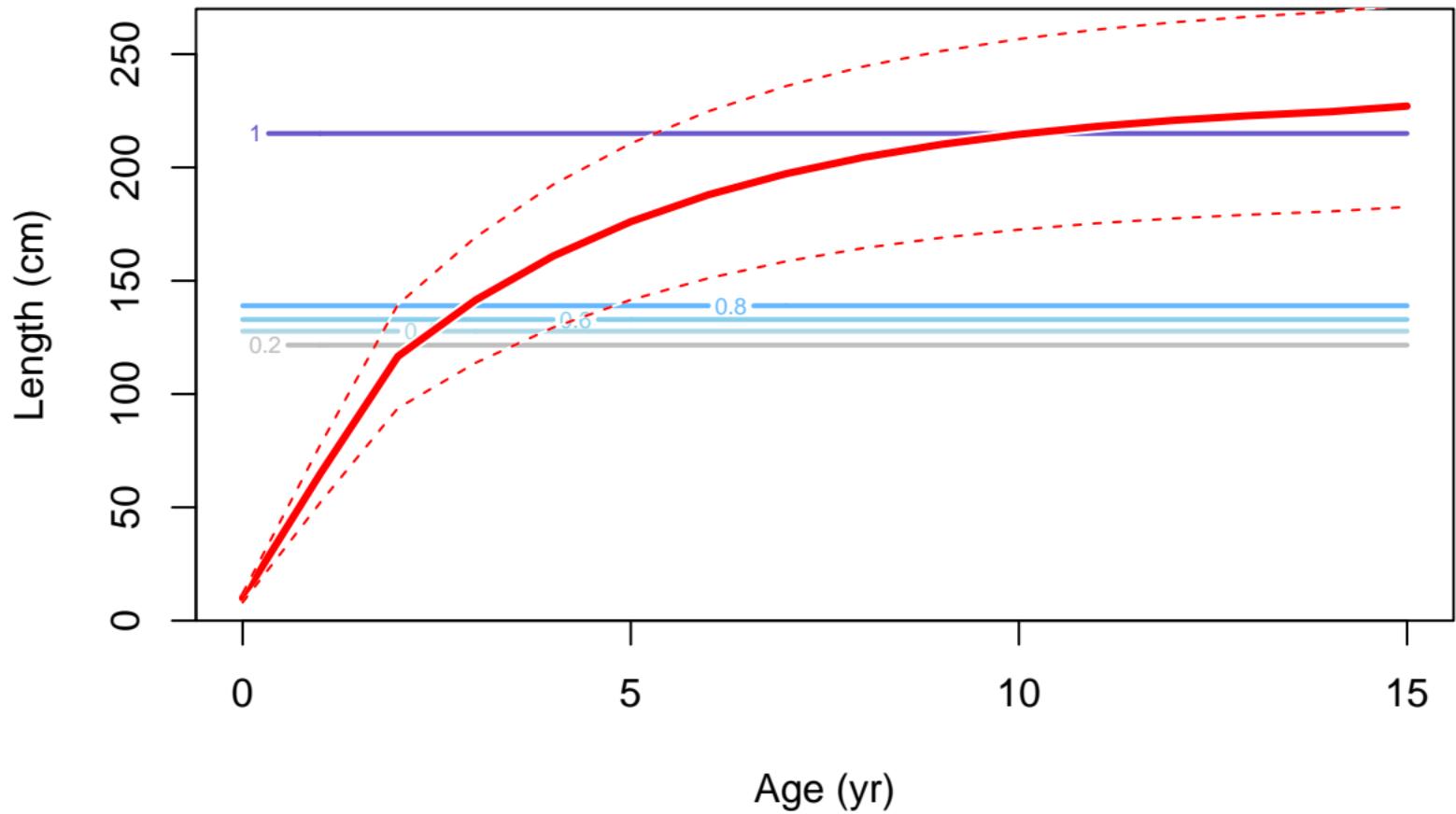


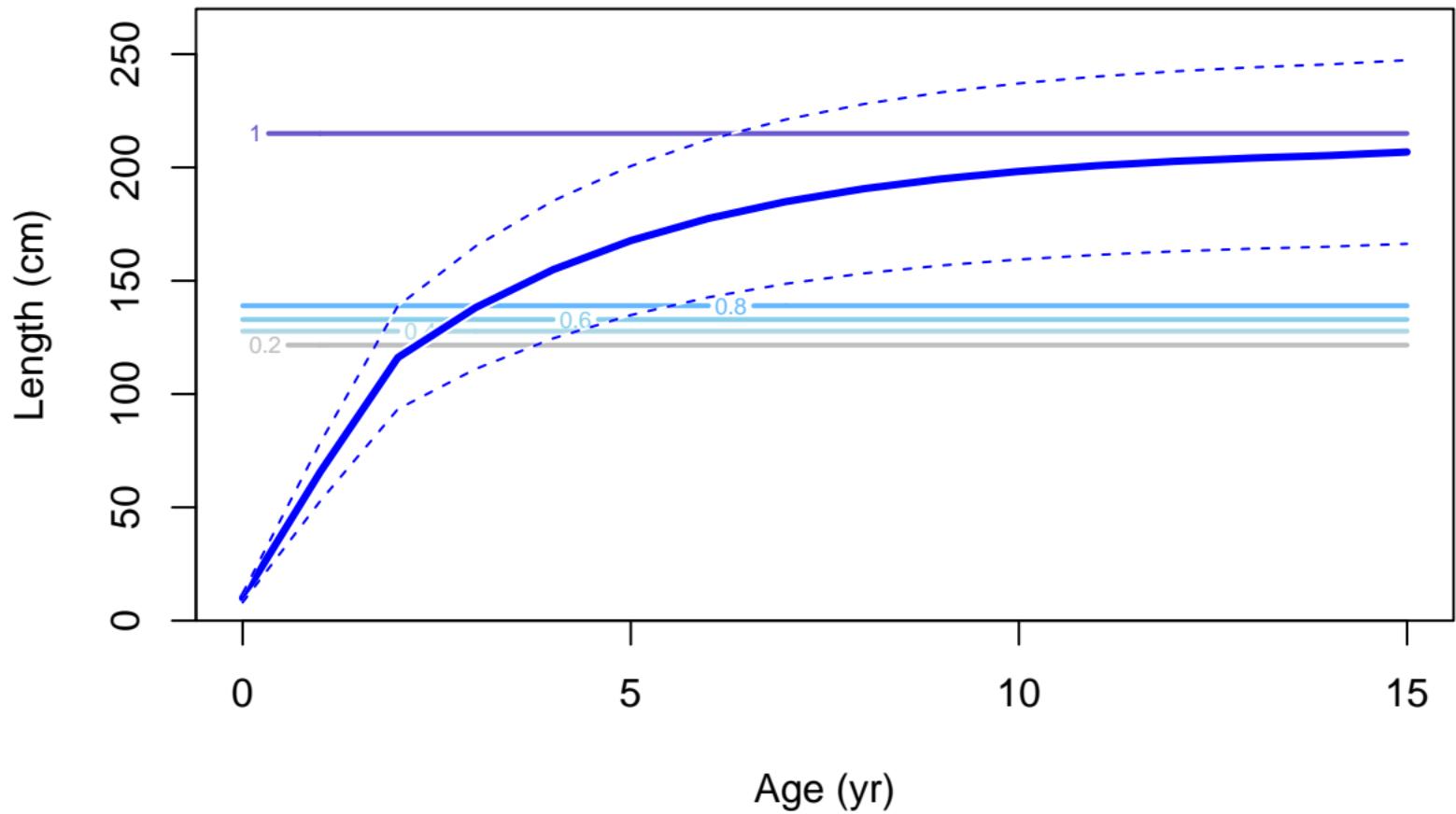


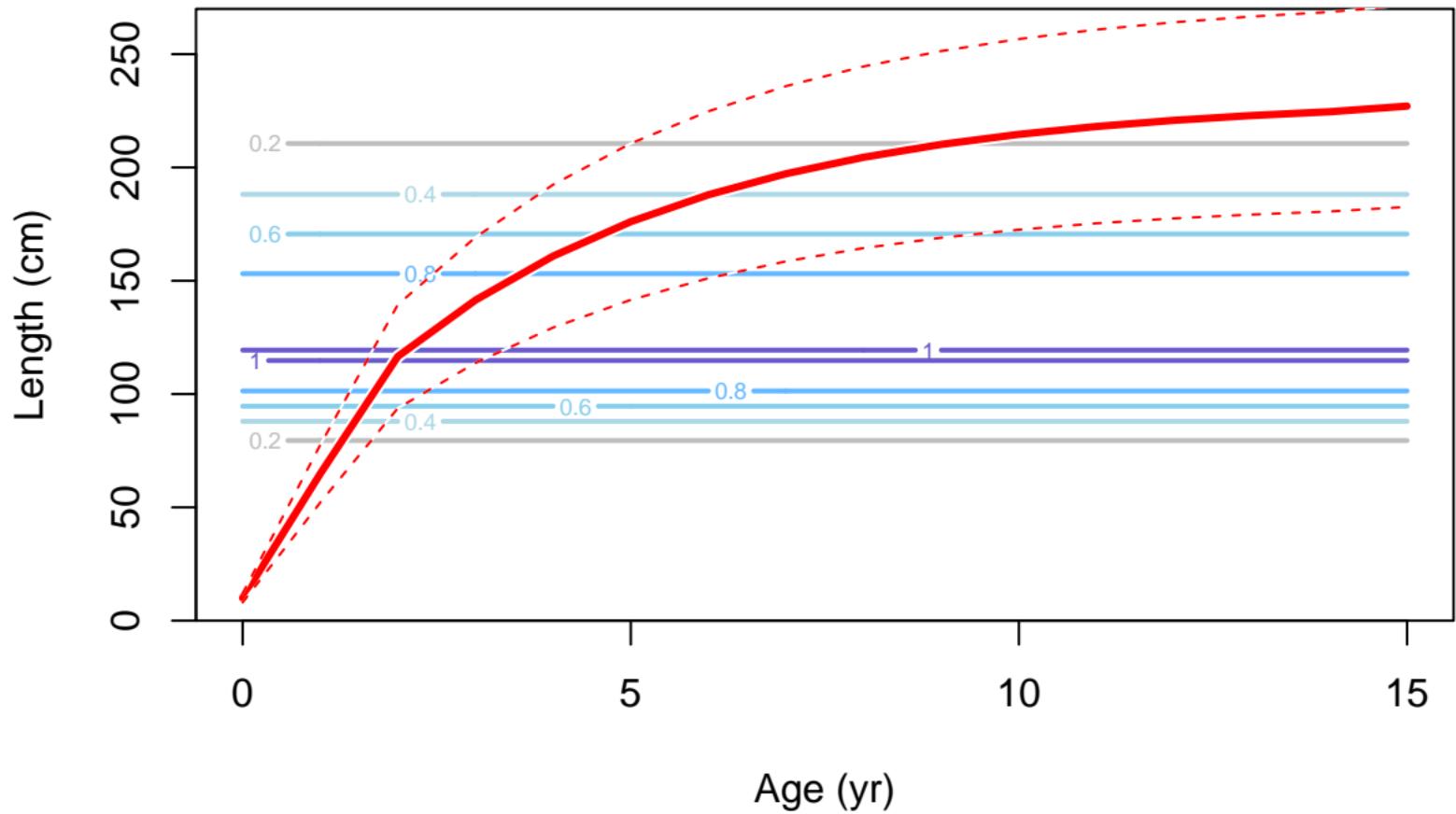


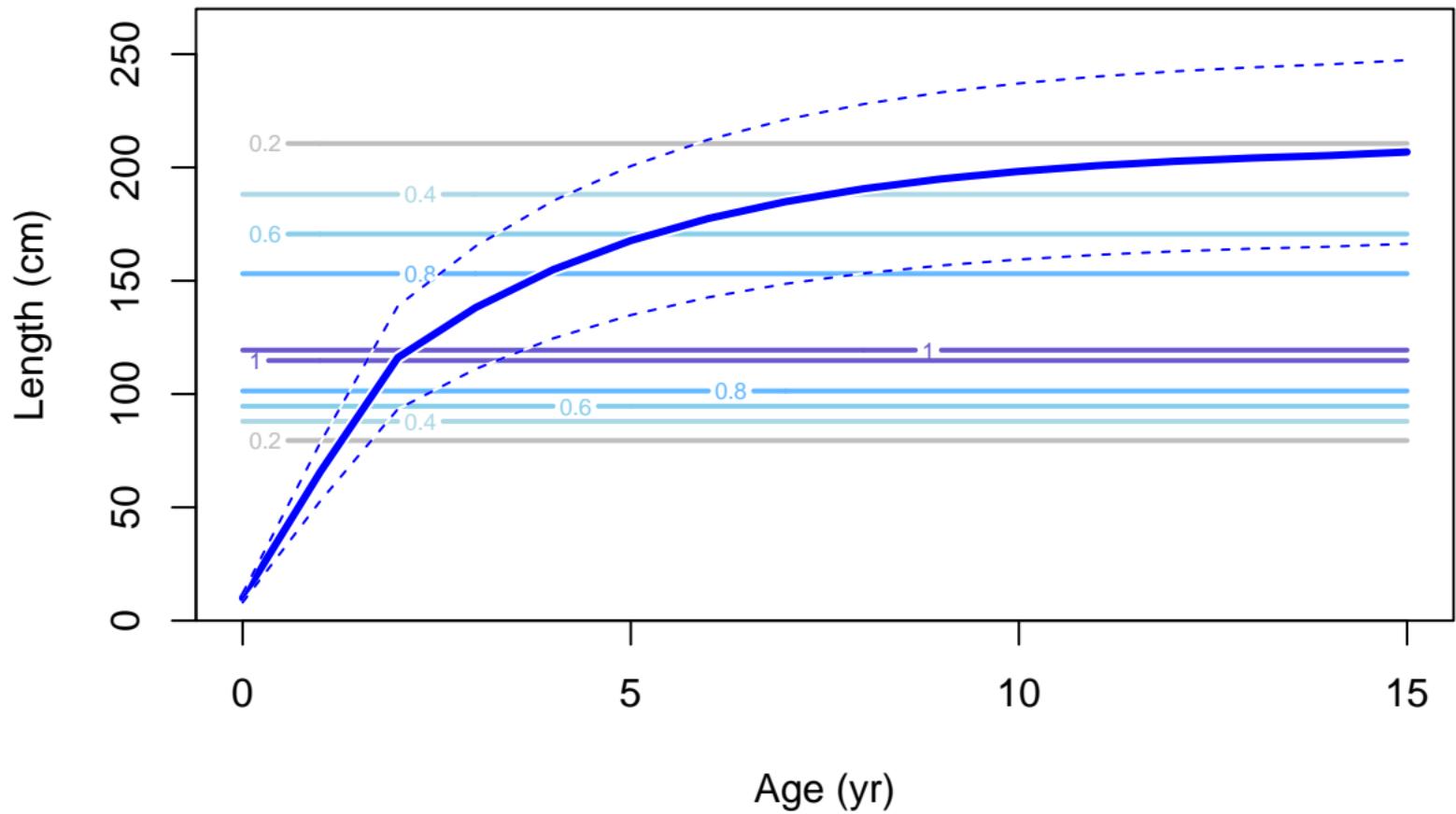


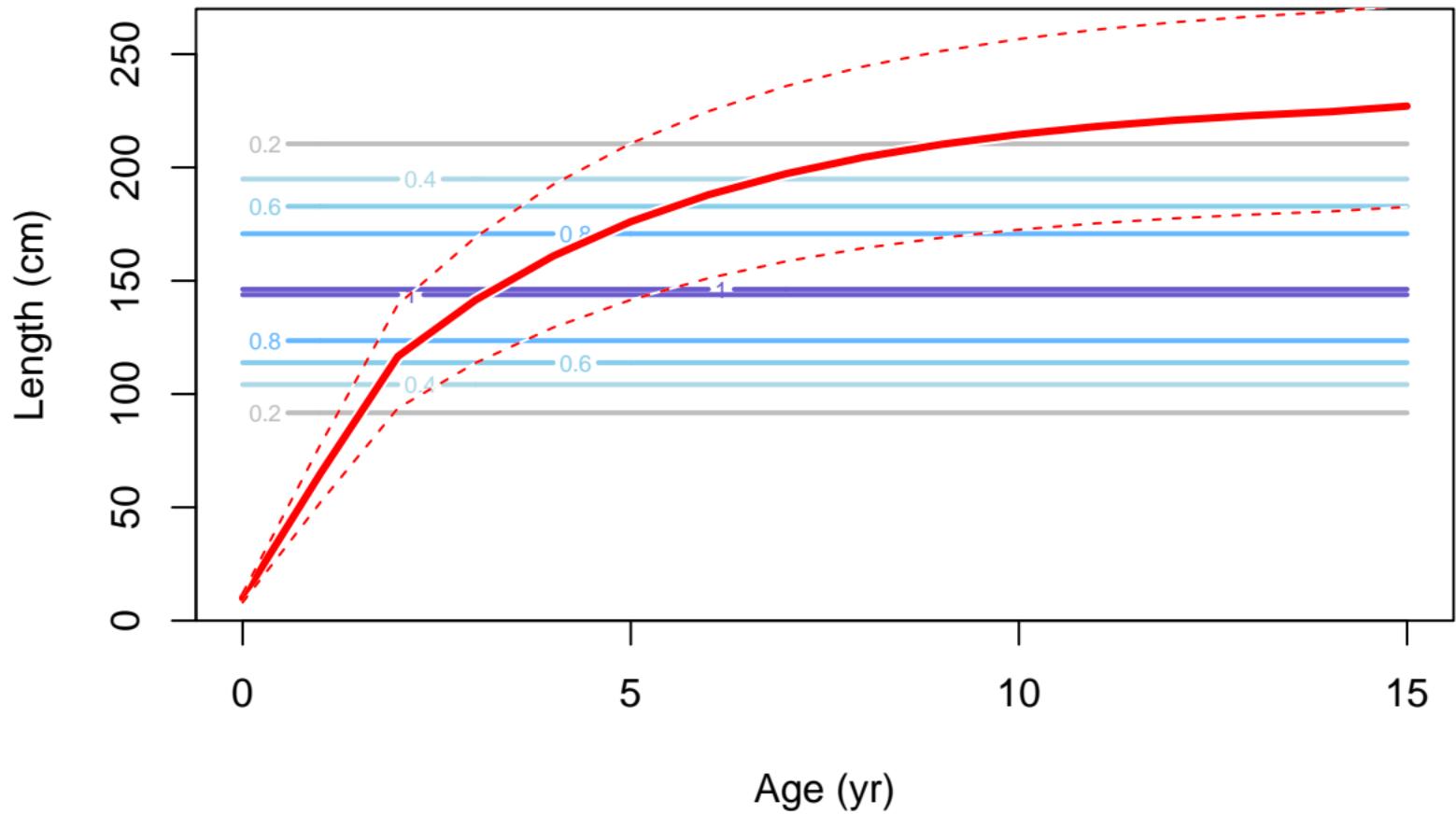


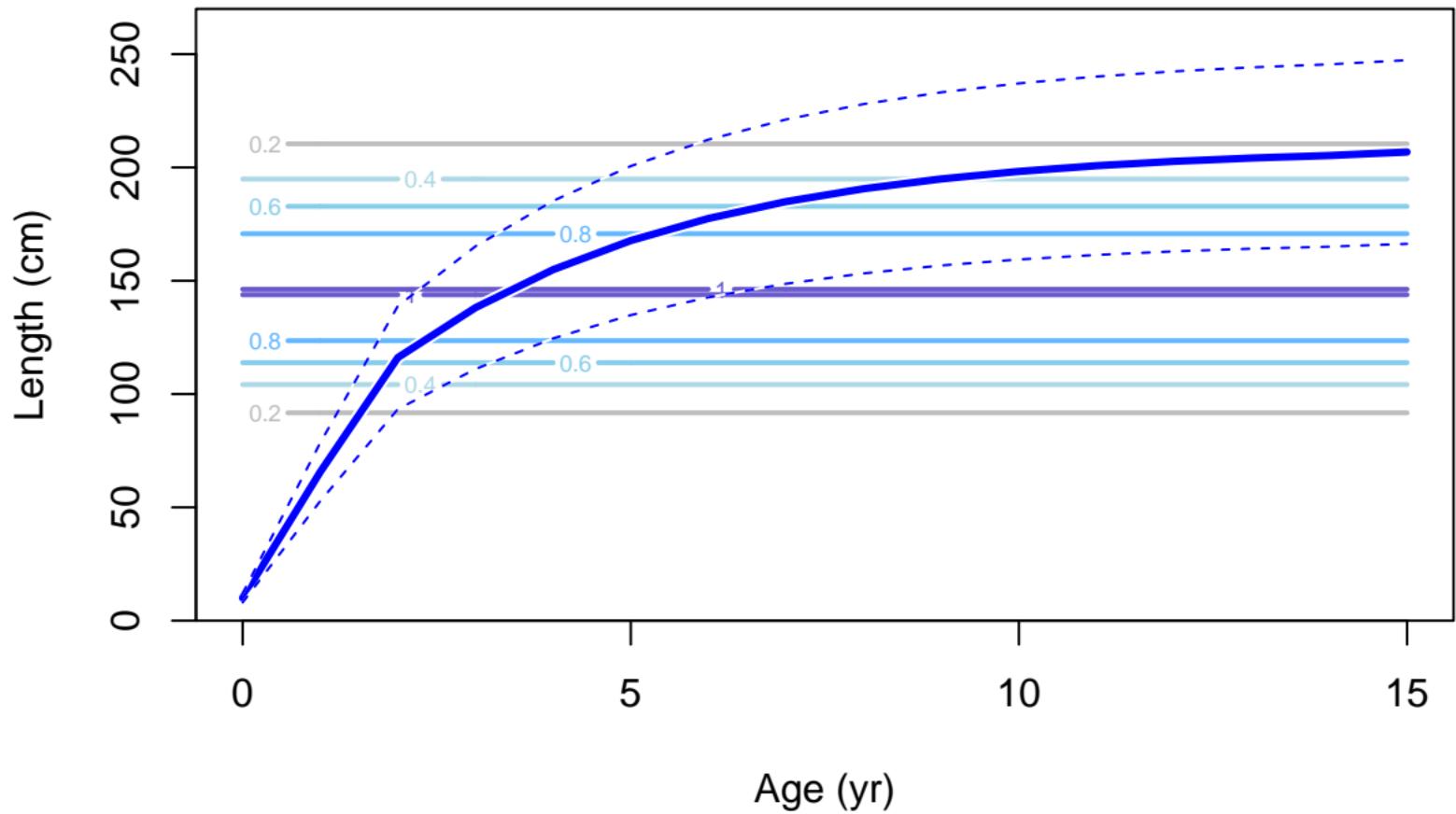


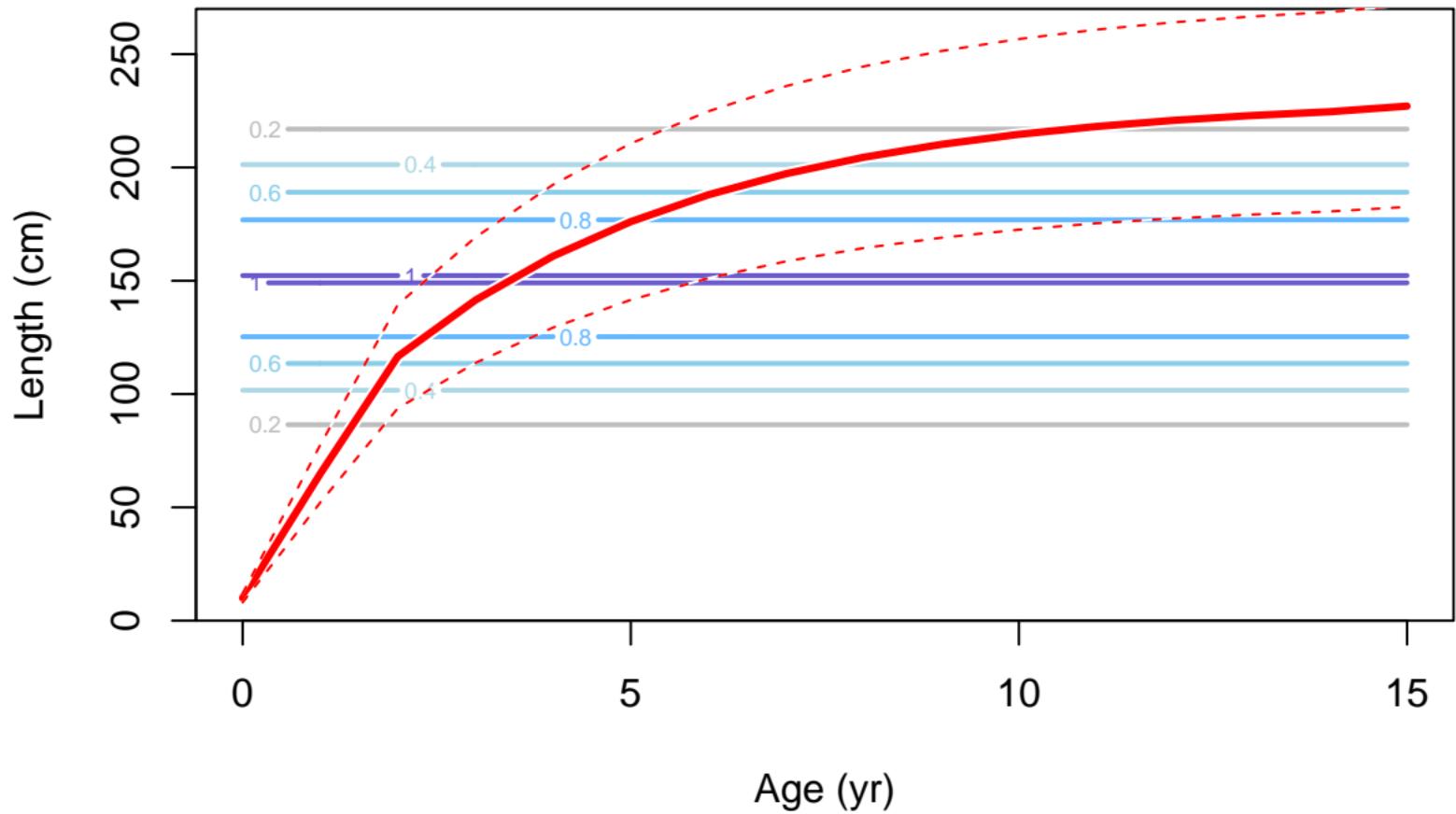


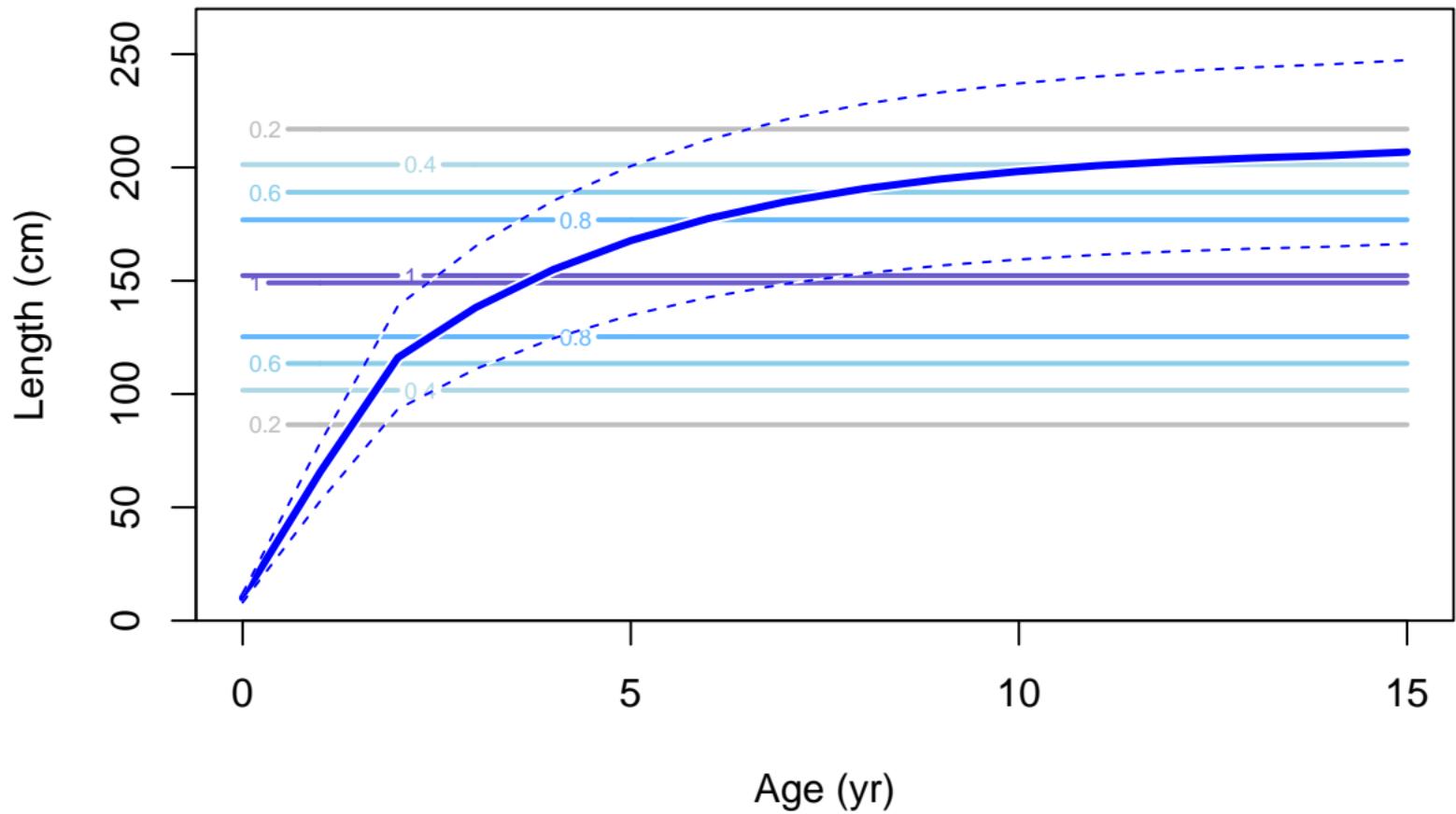


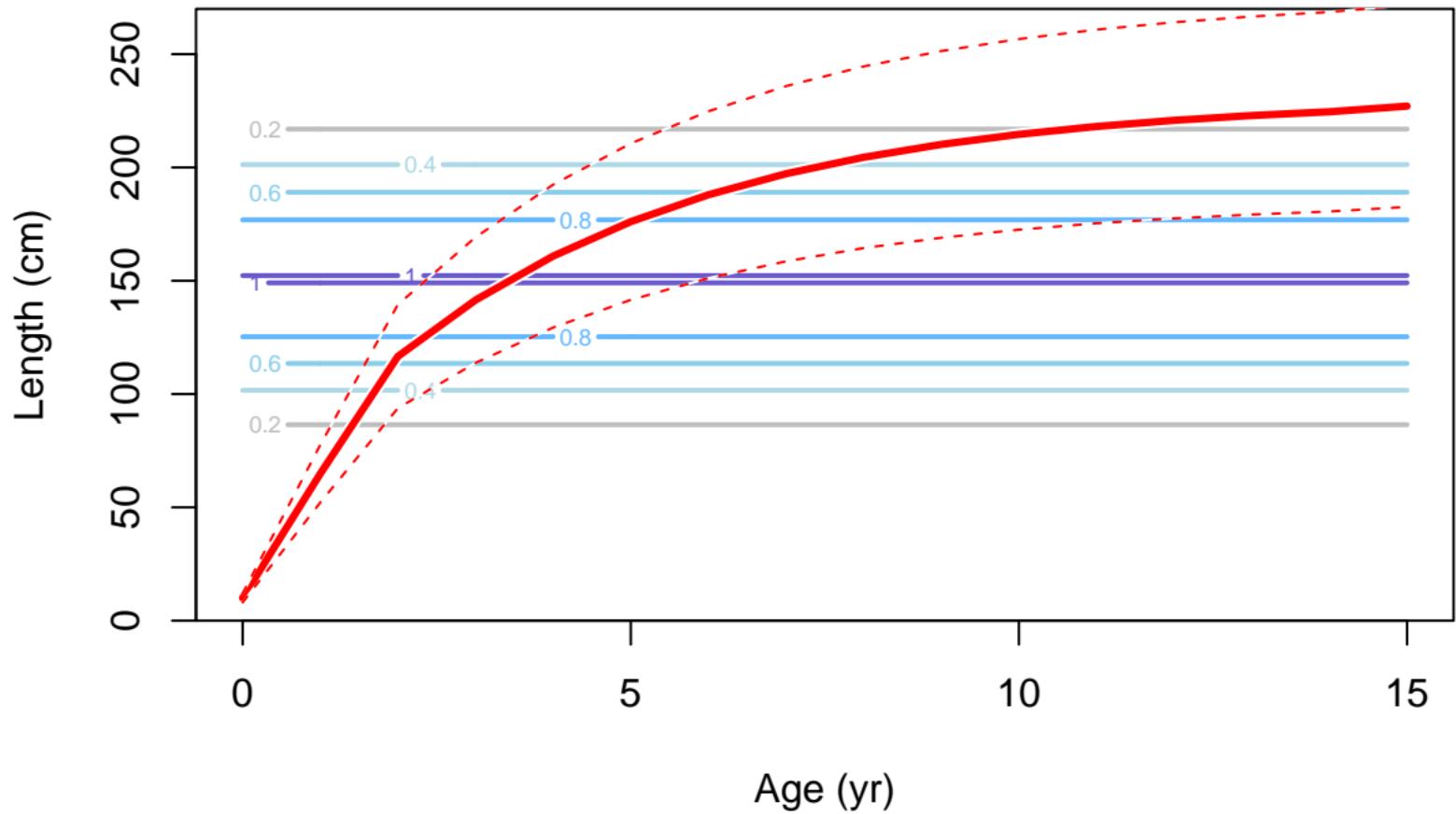


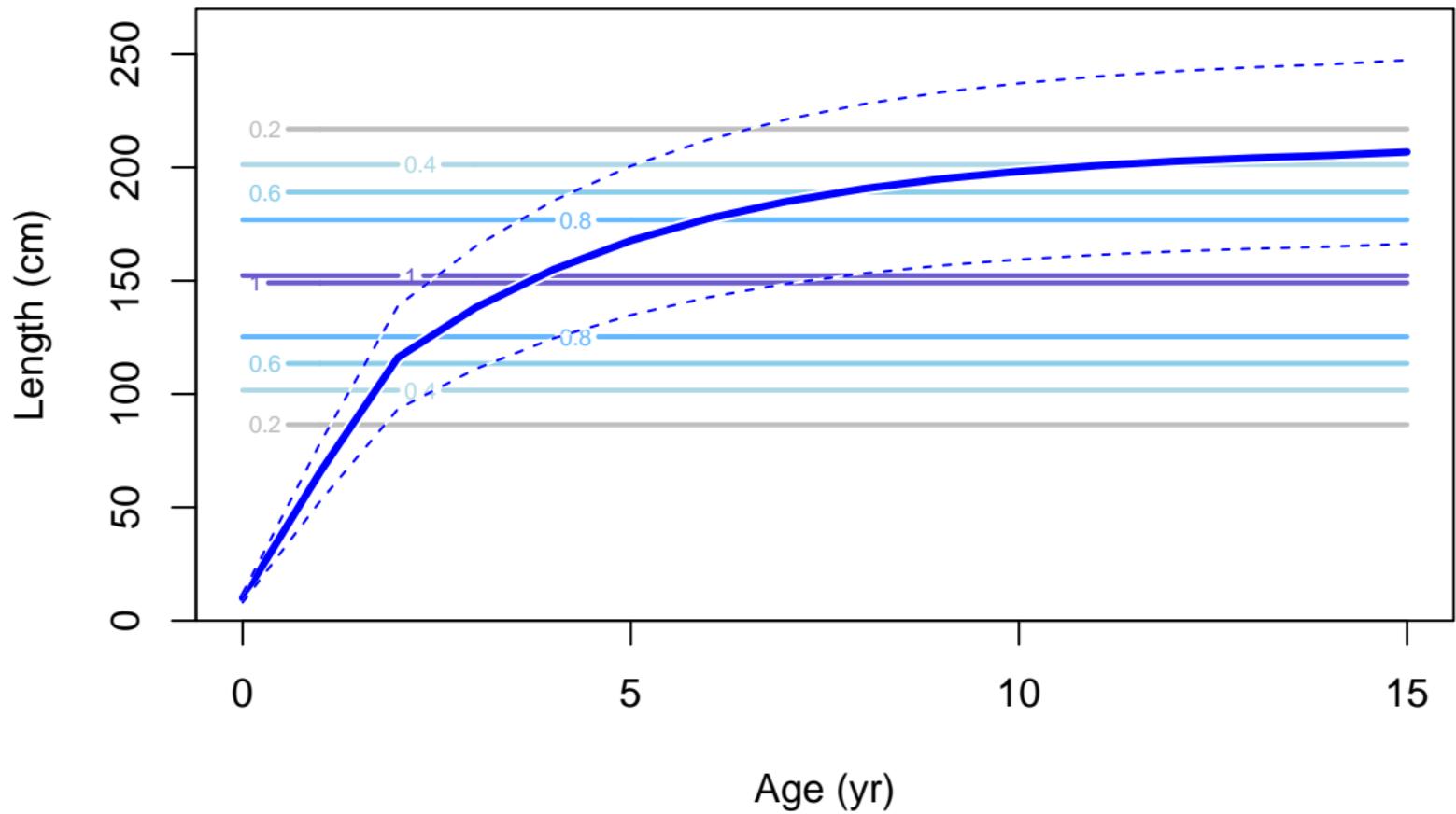


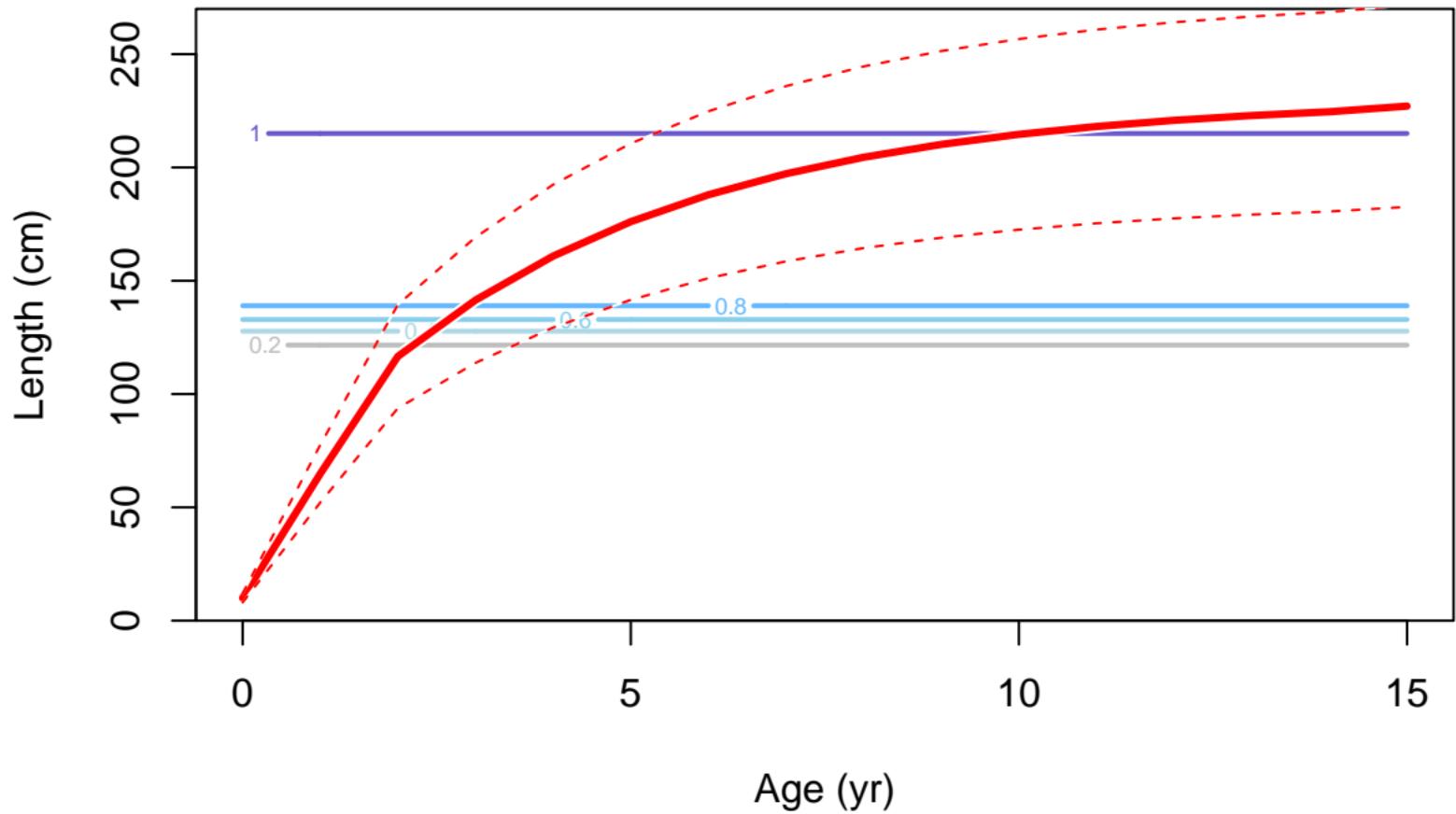


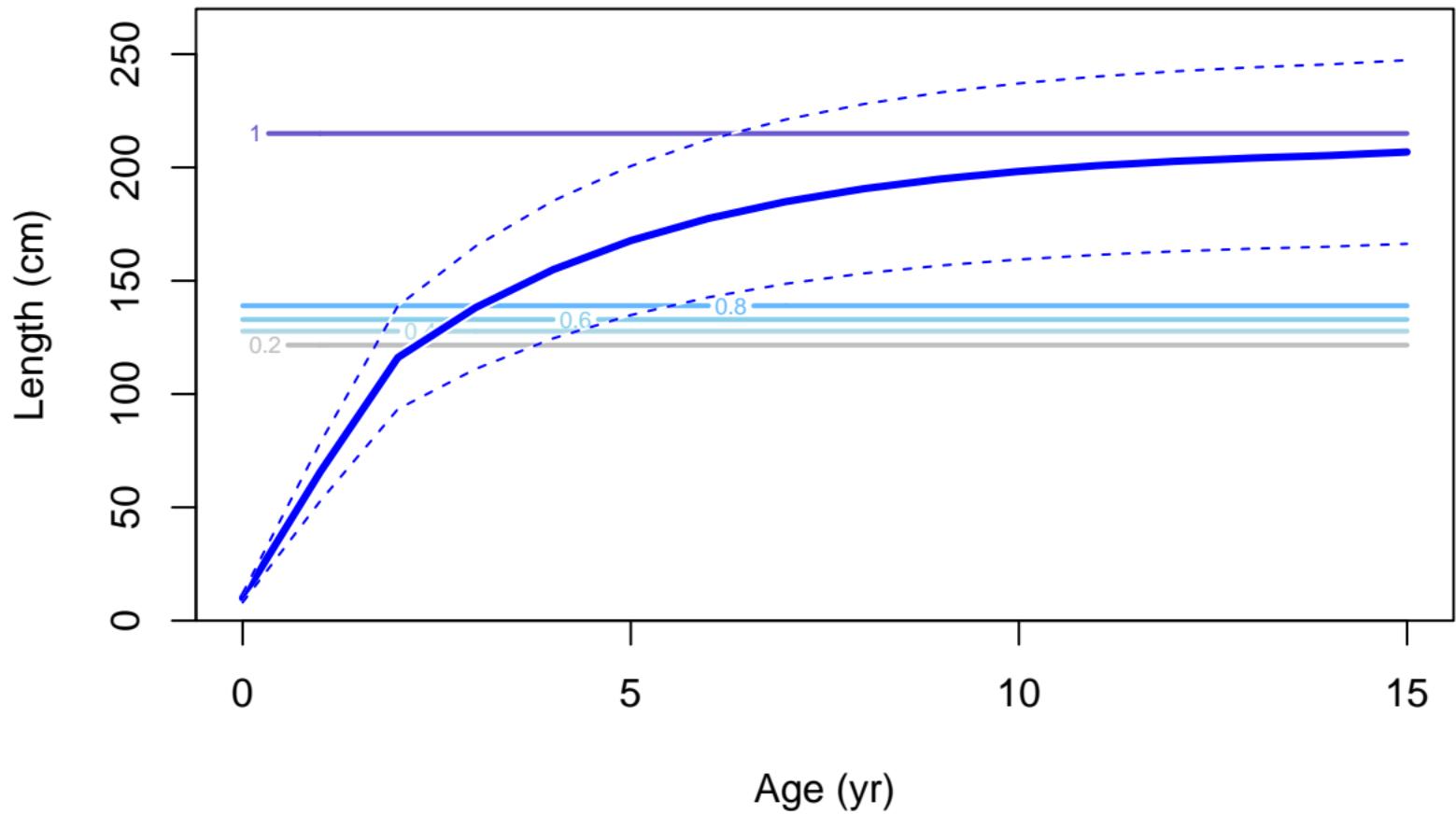


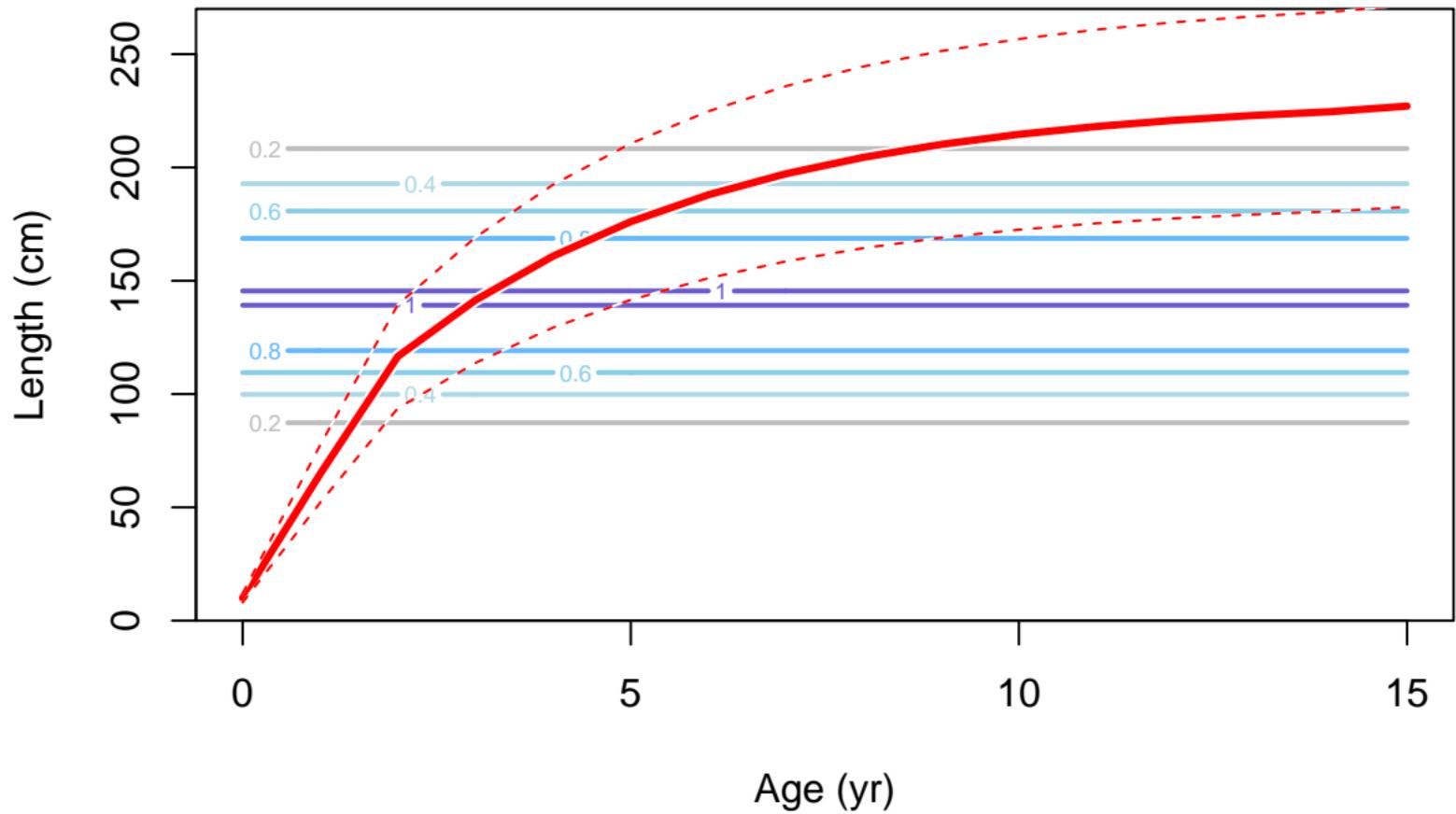


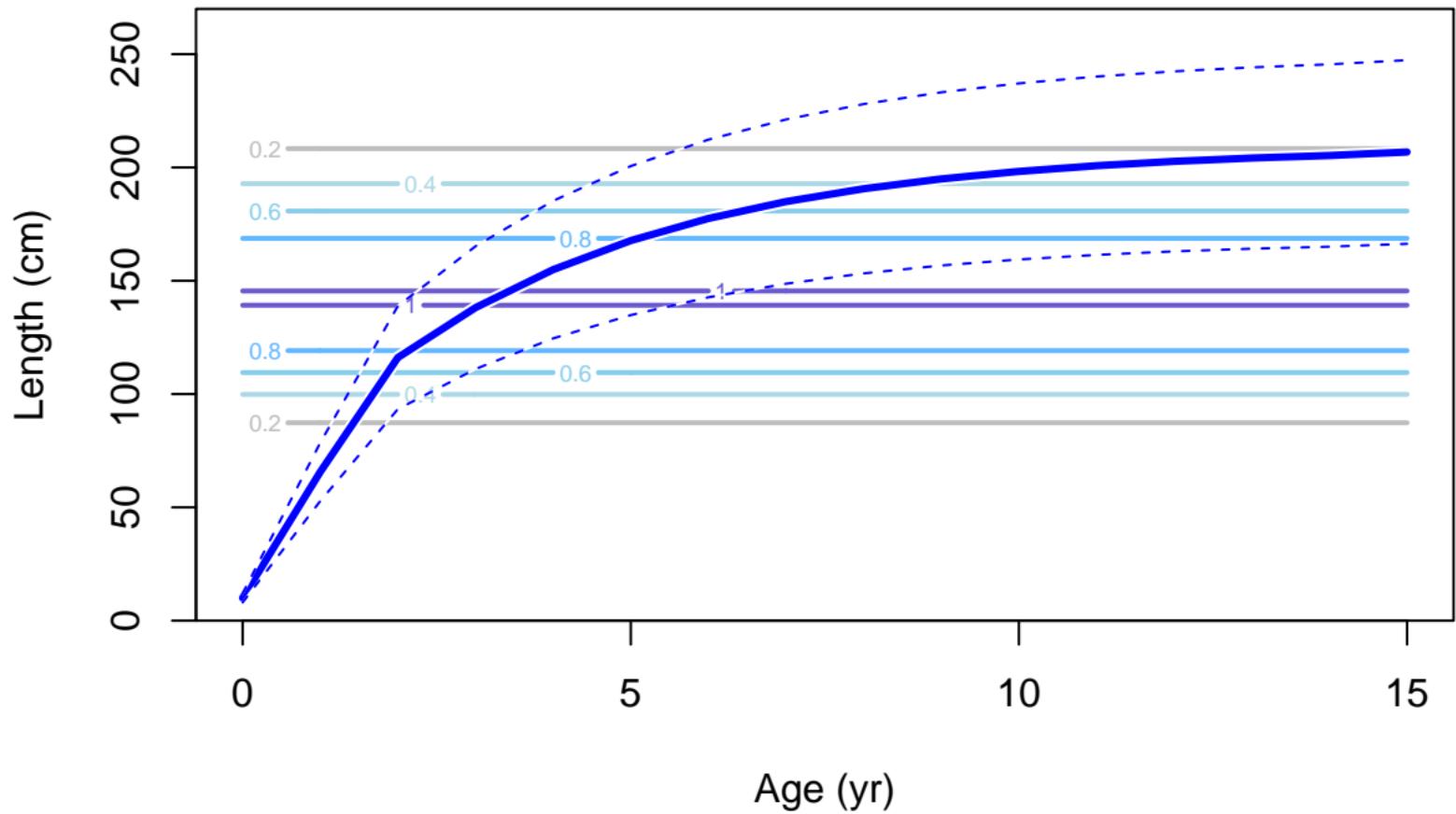


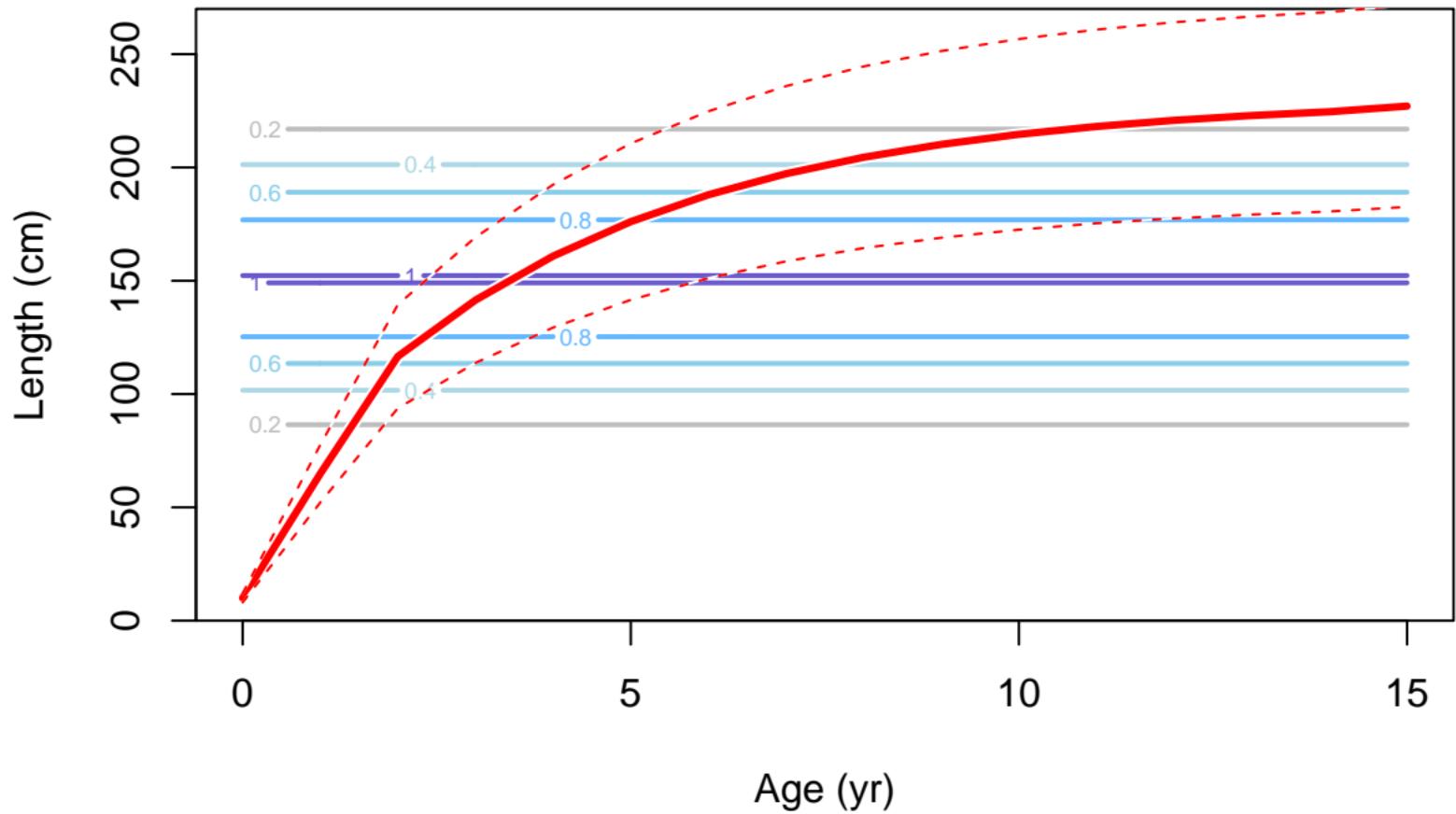


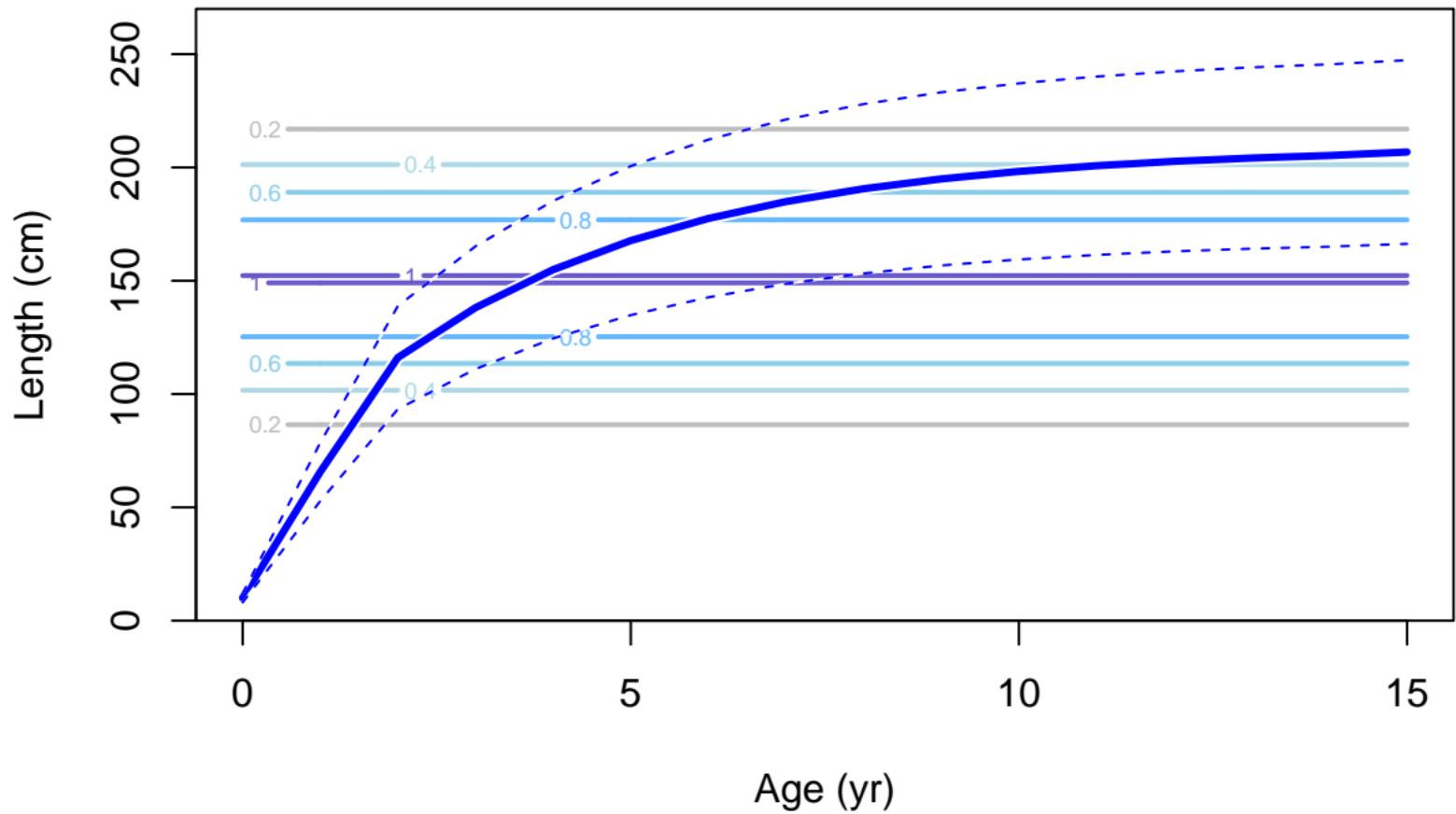


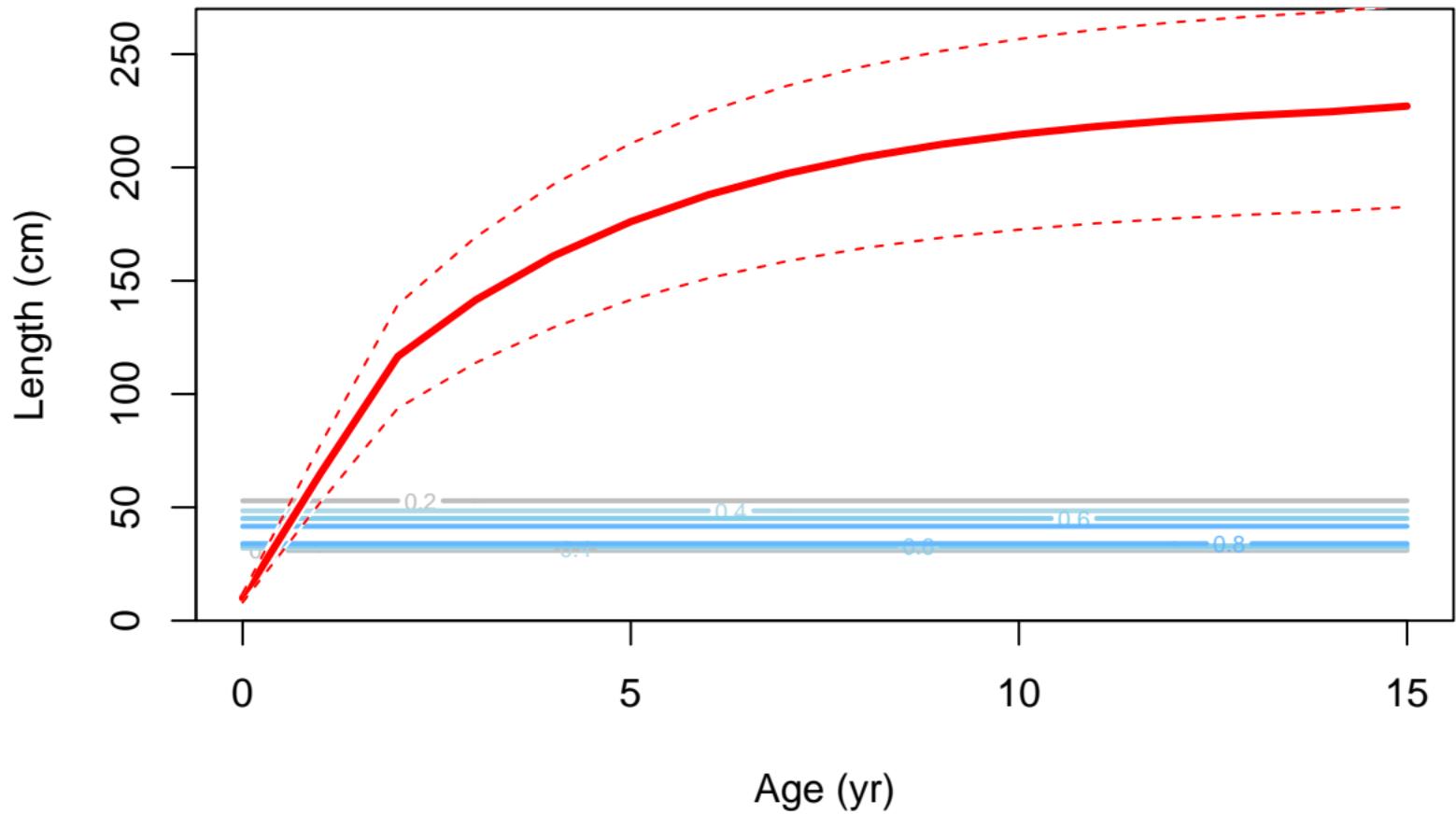


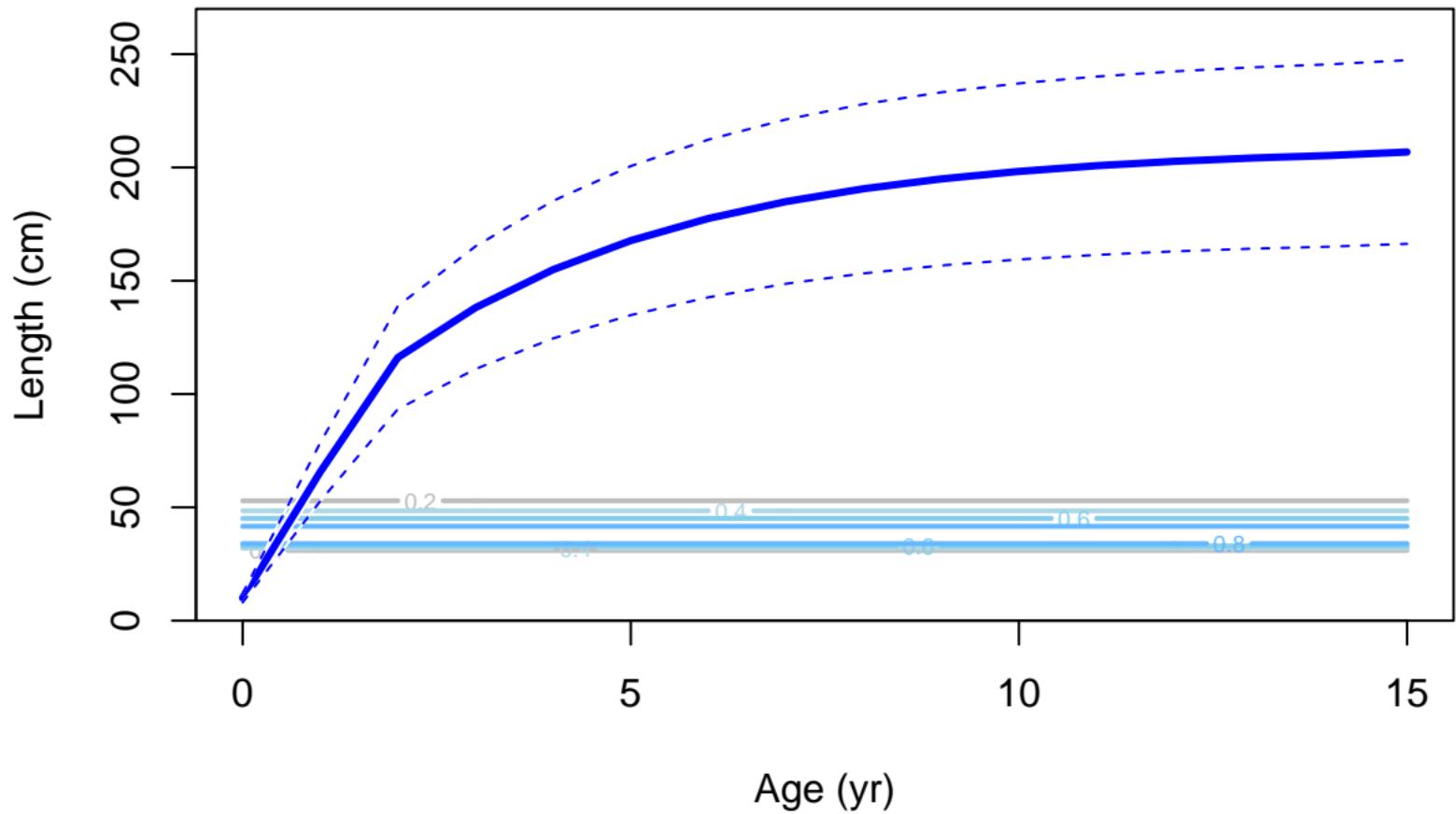


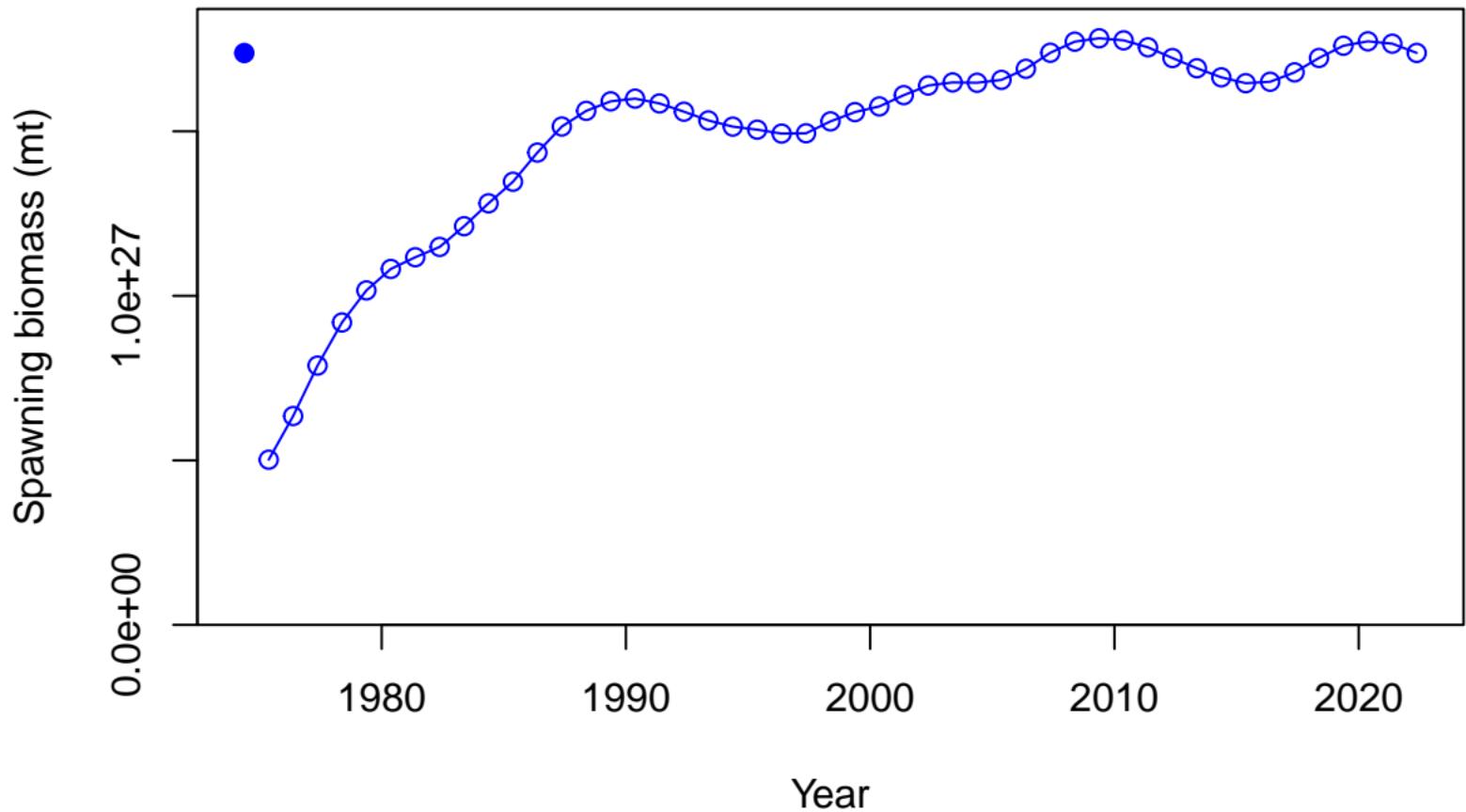


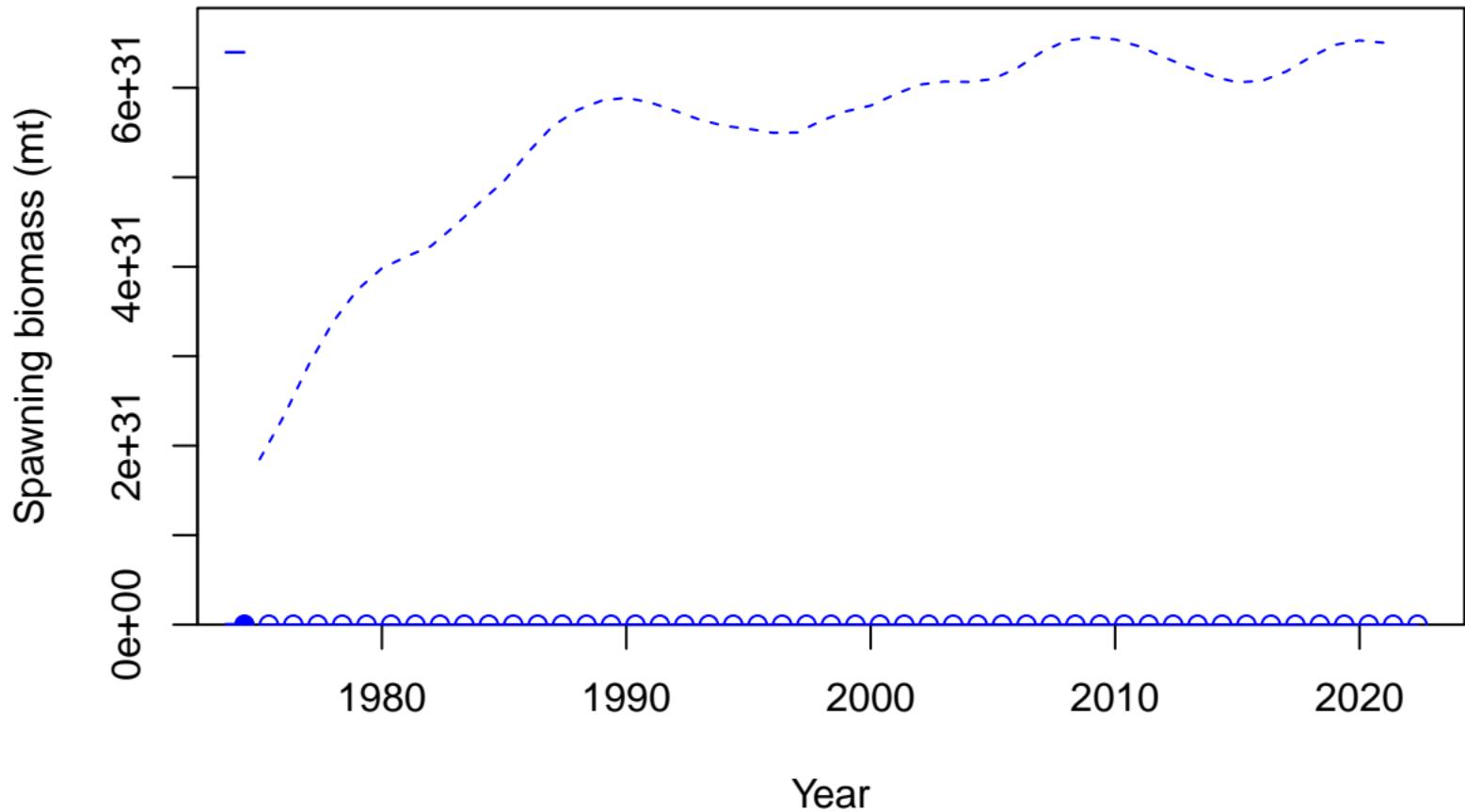




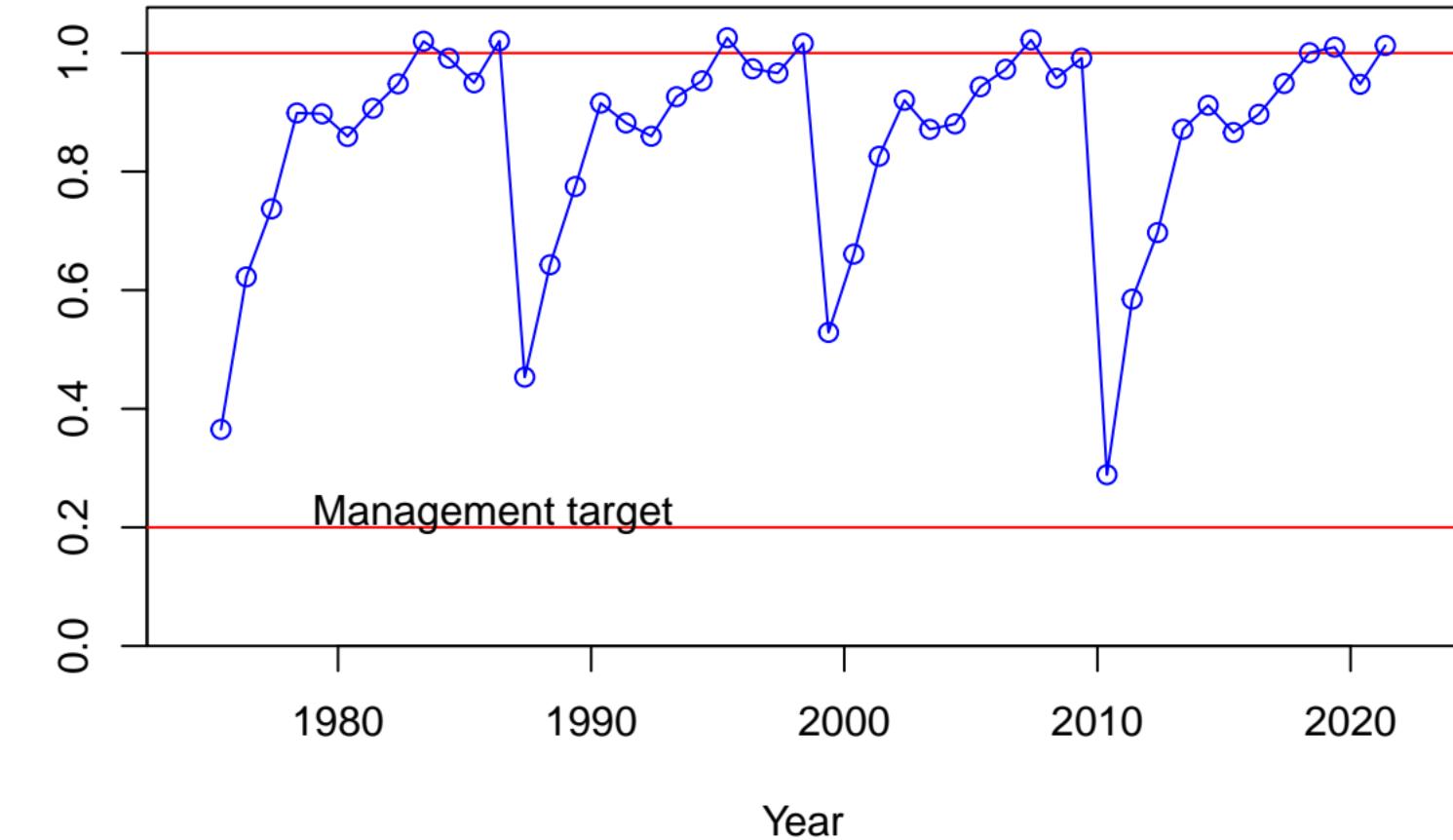




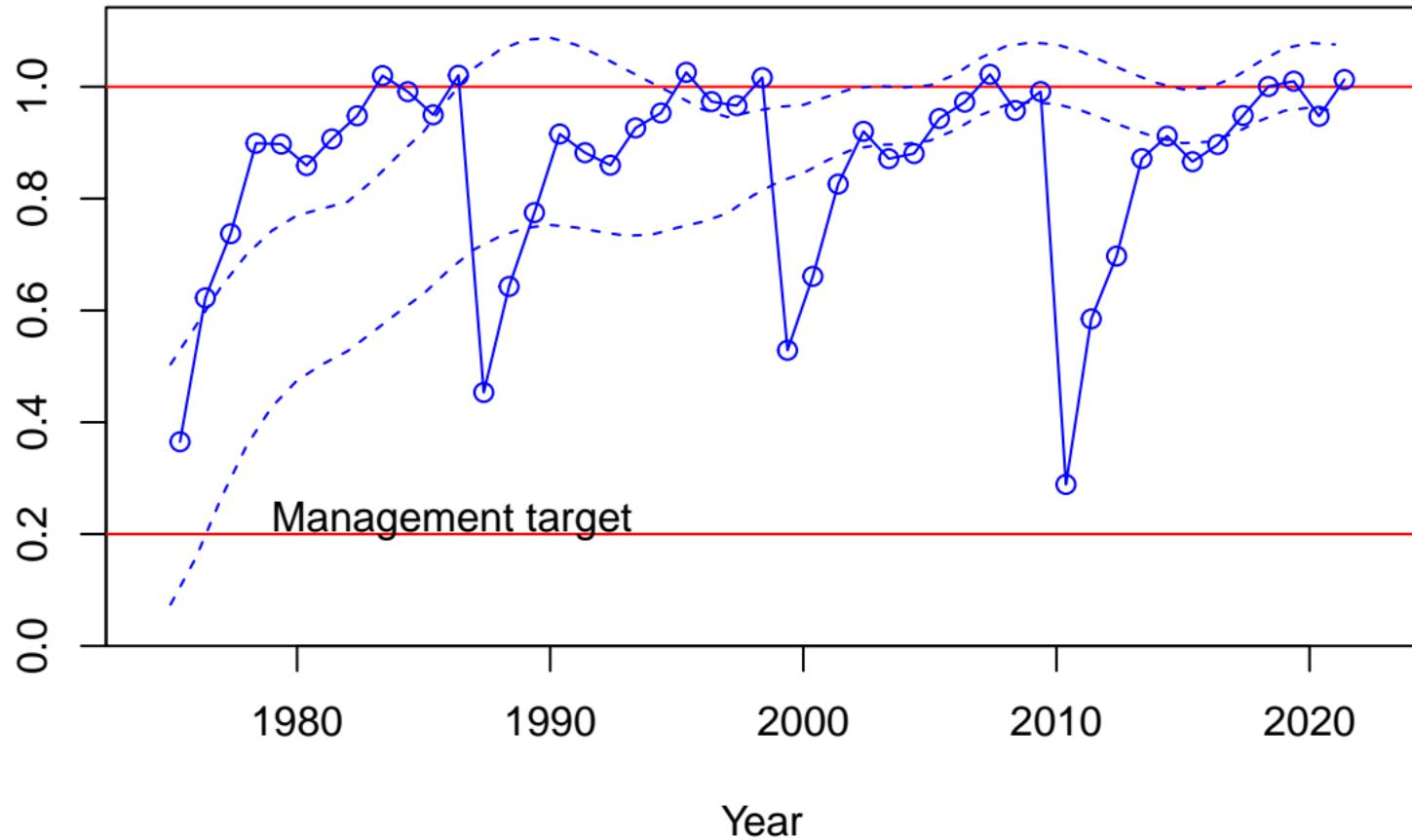


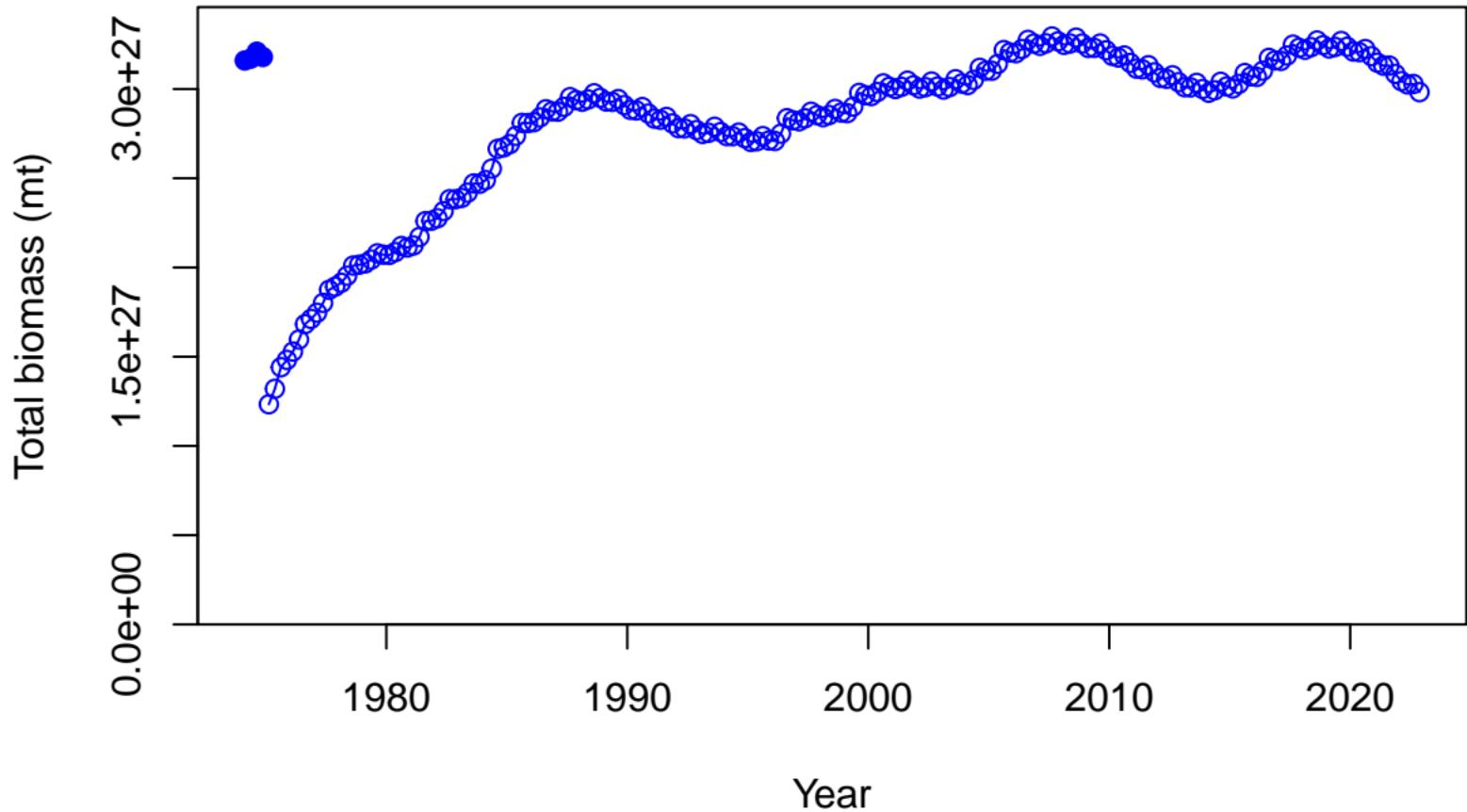


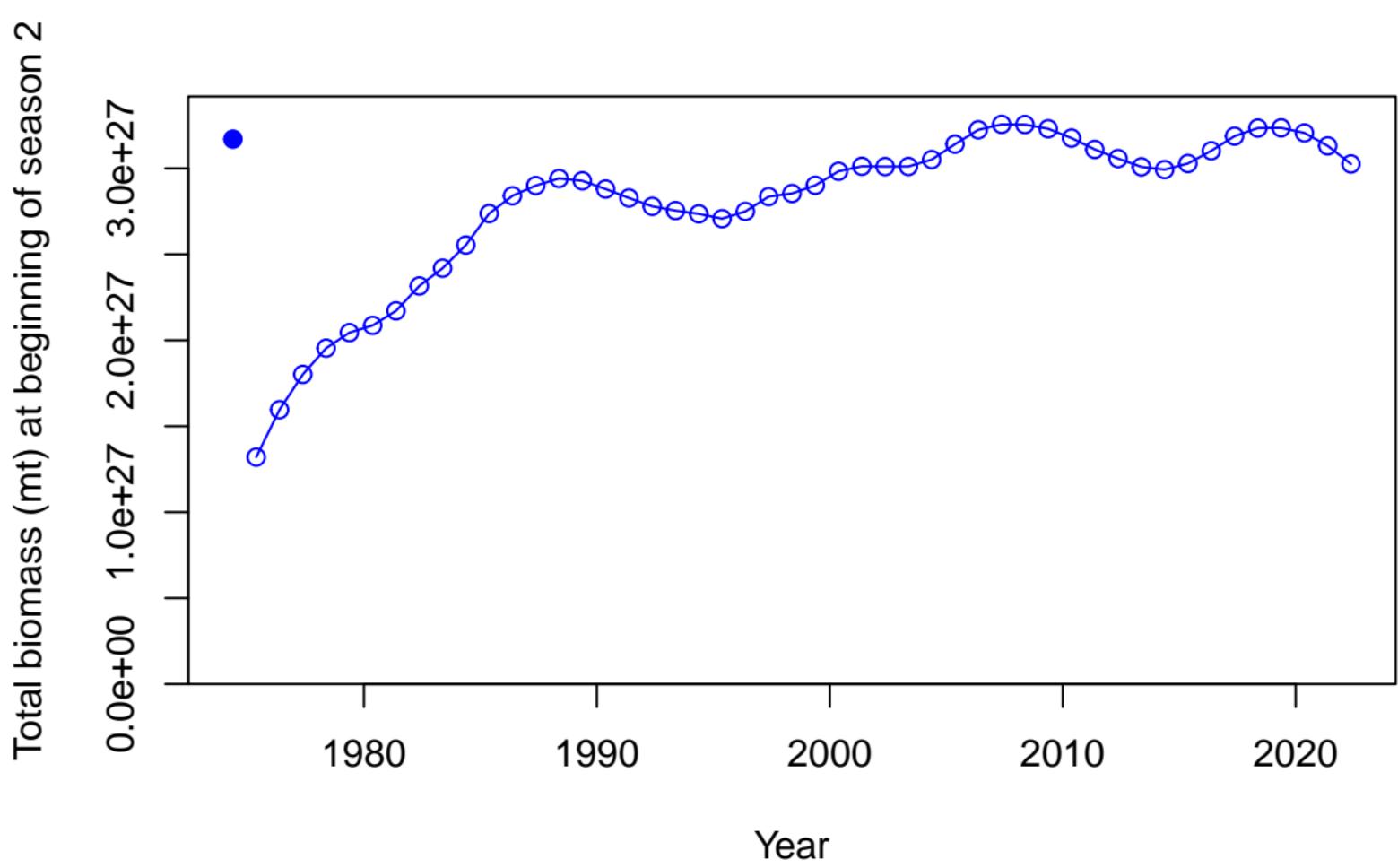
Relative spawning biomass: B/B_0

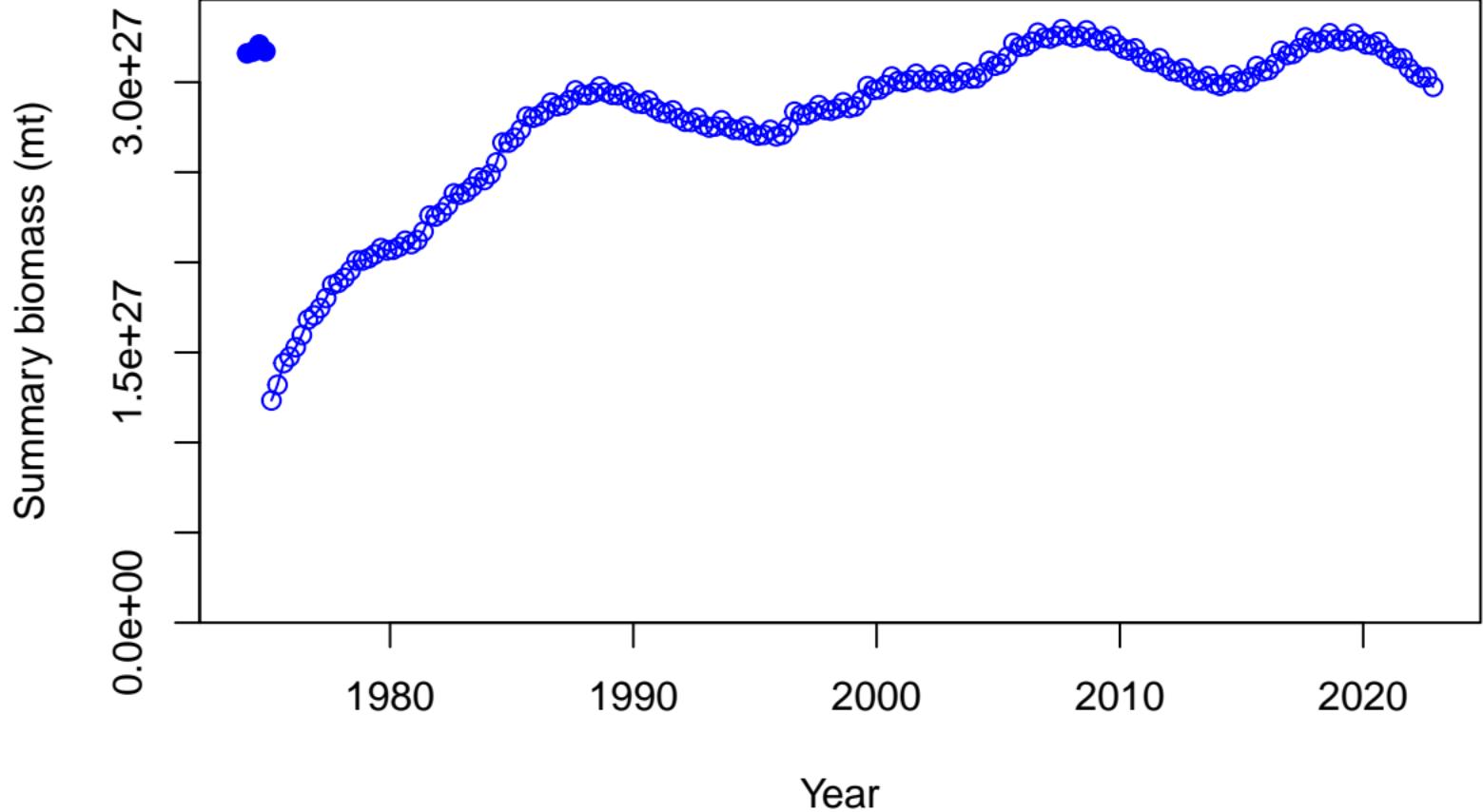


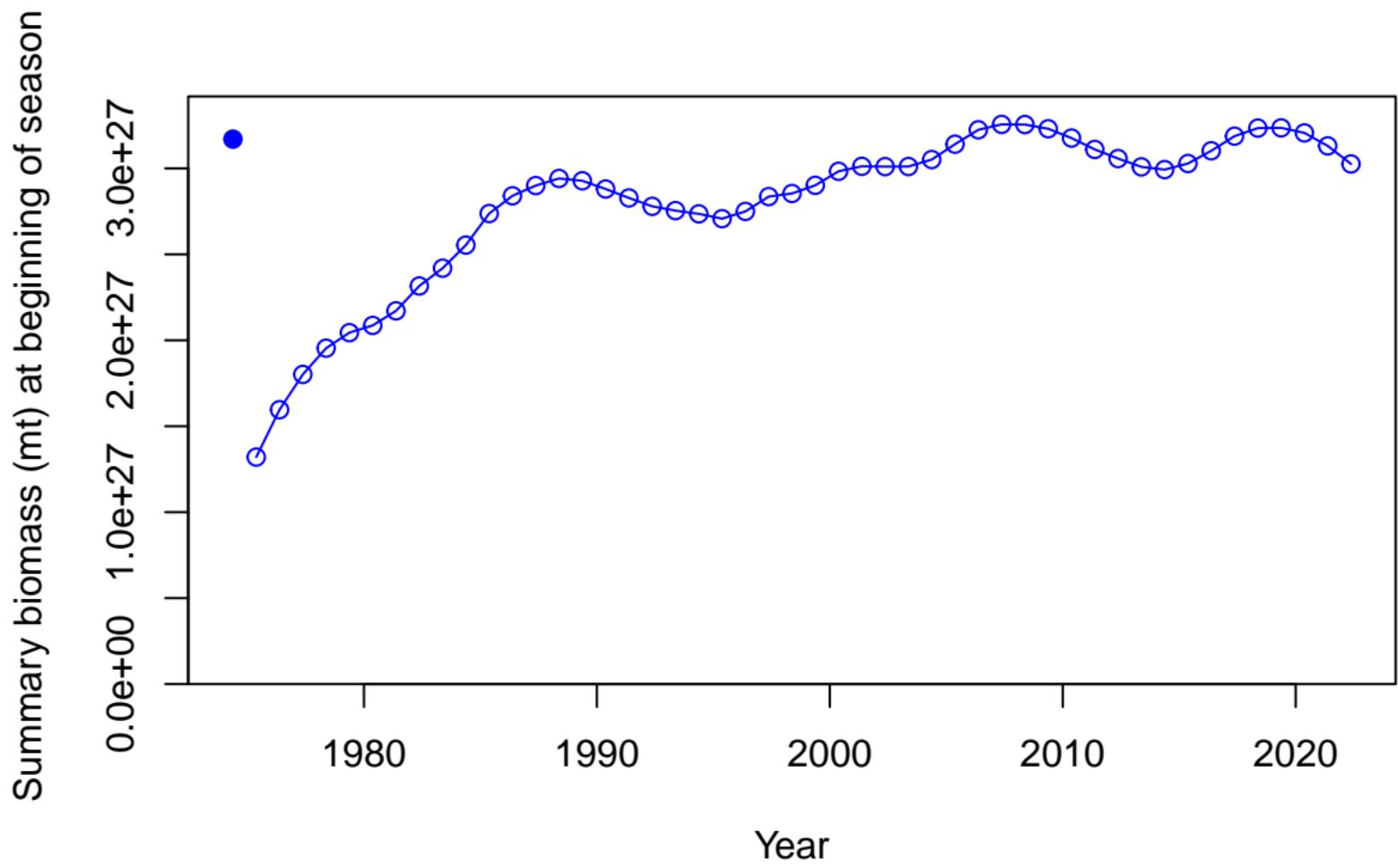
Relative spawning biomass: B/B_0

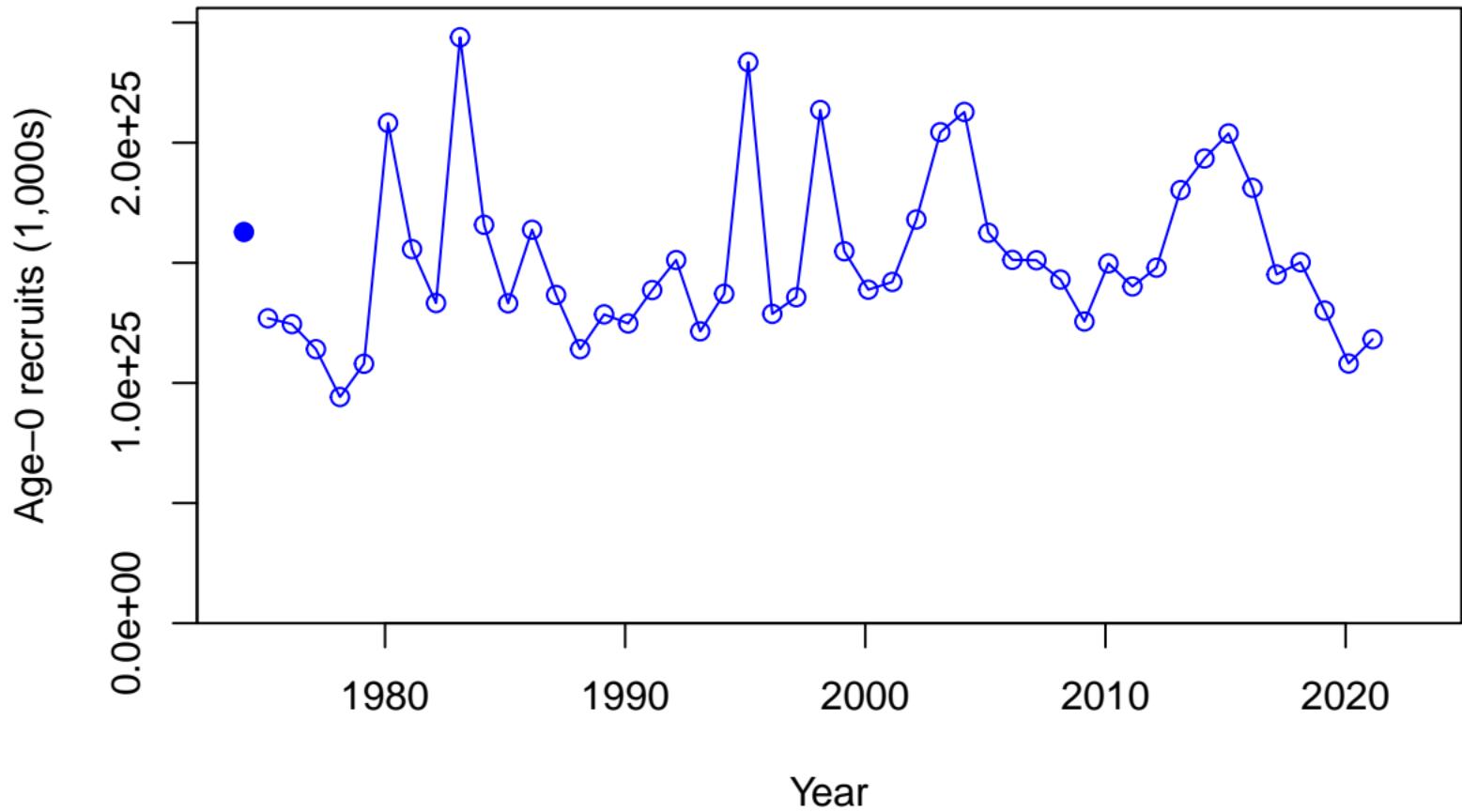


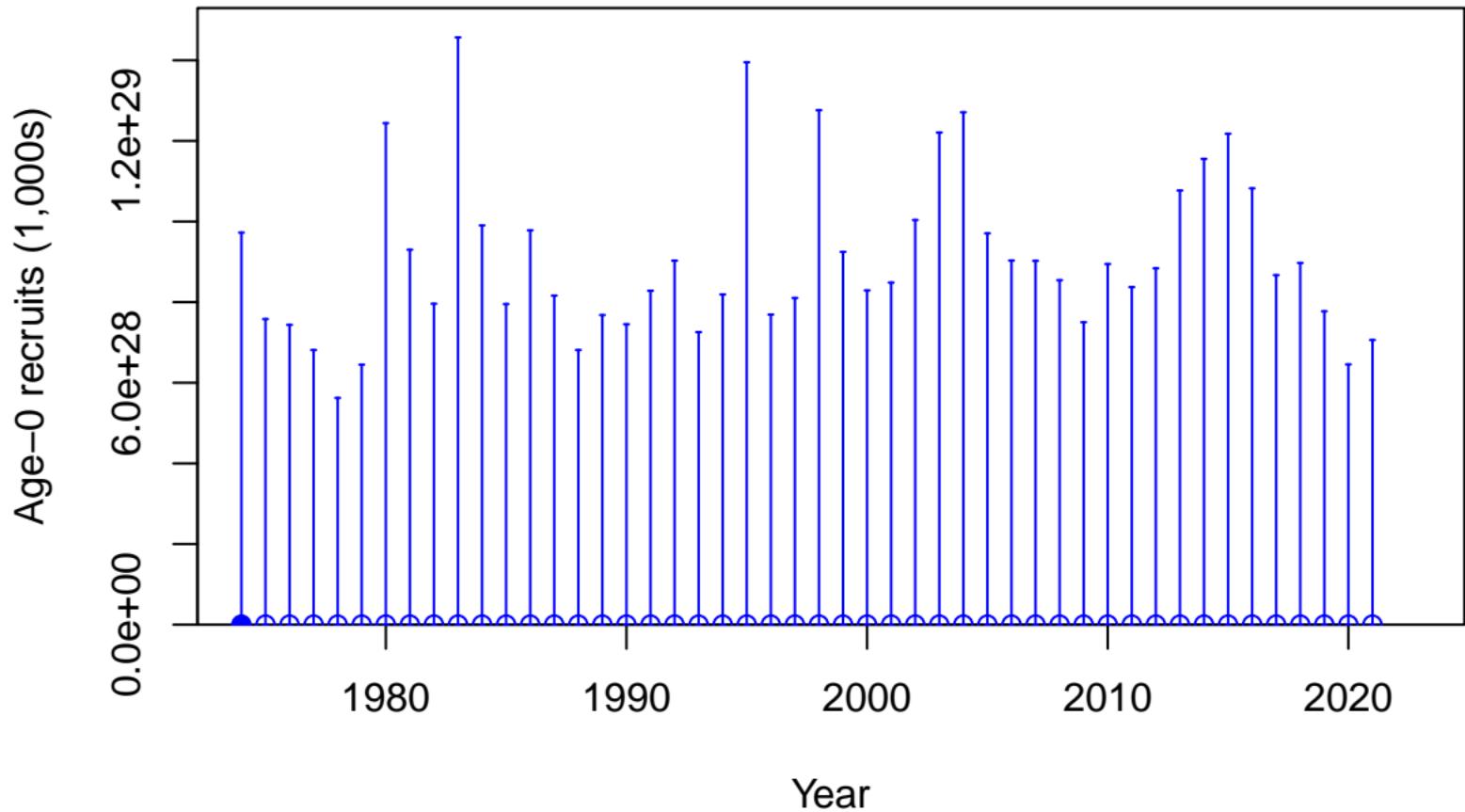


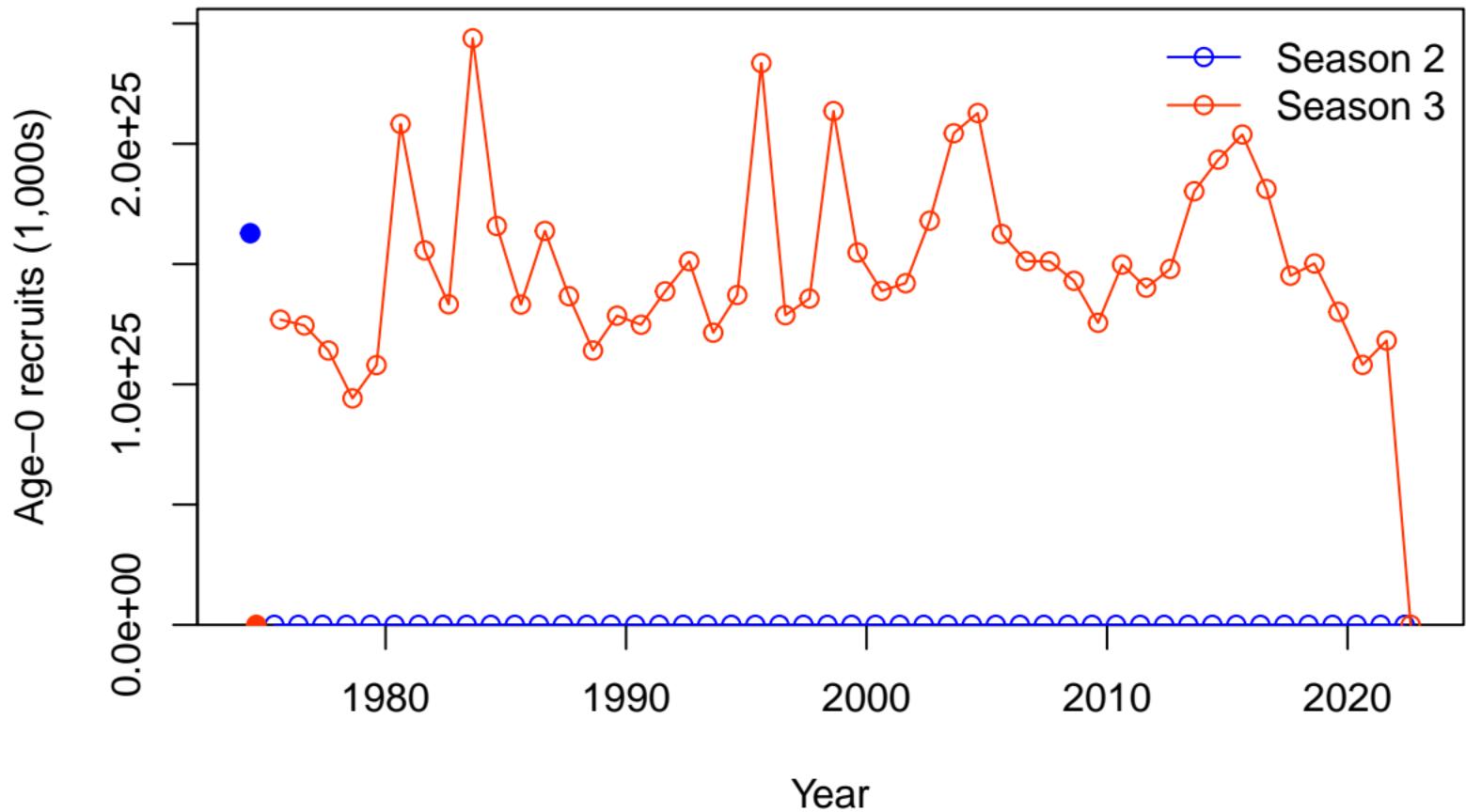




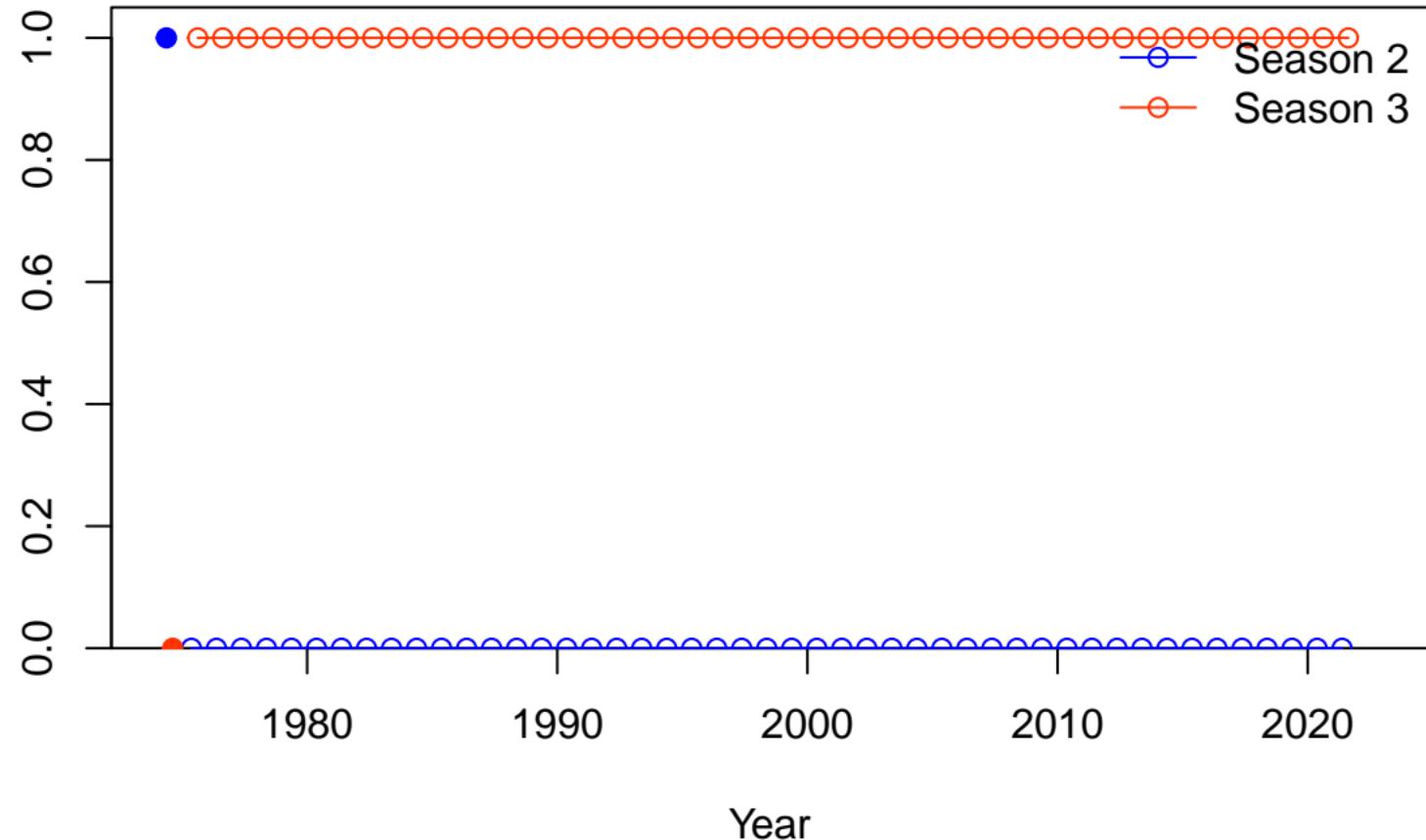




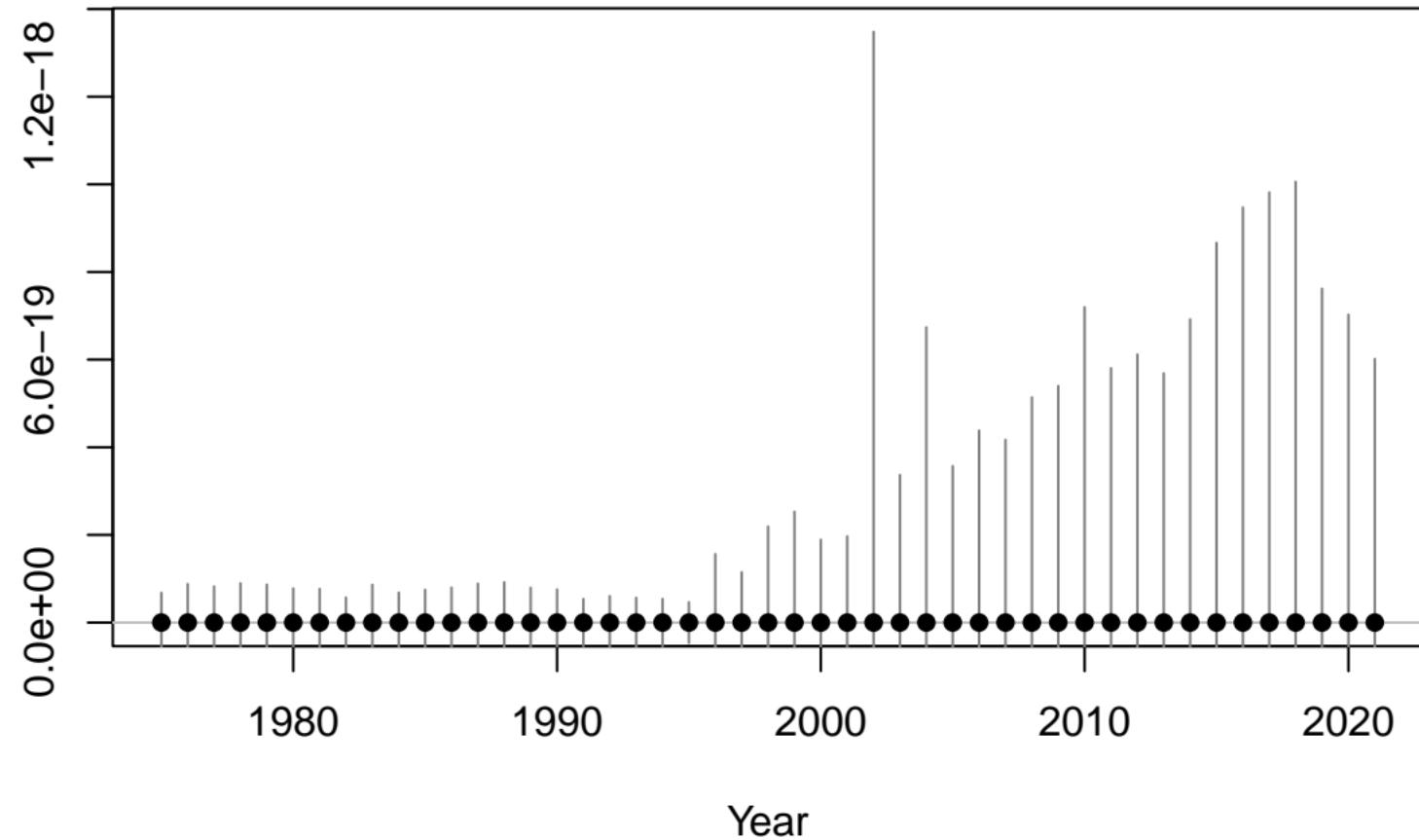


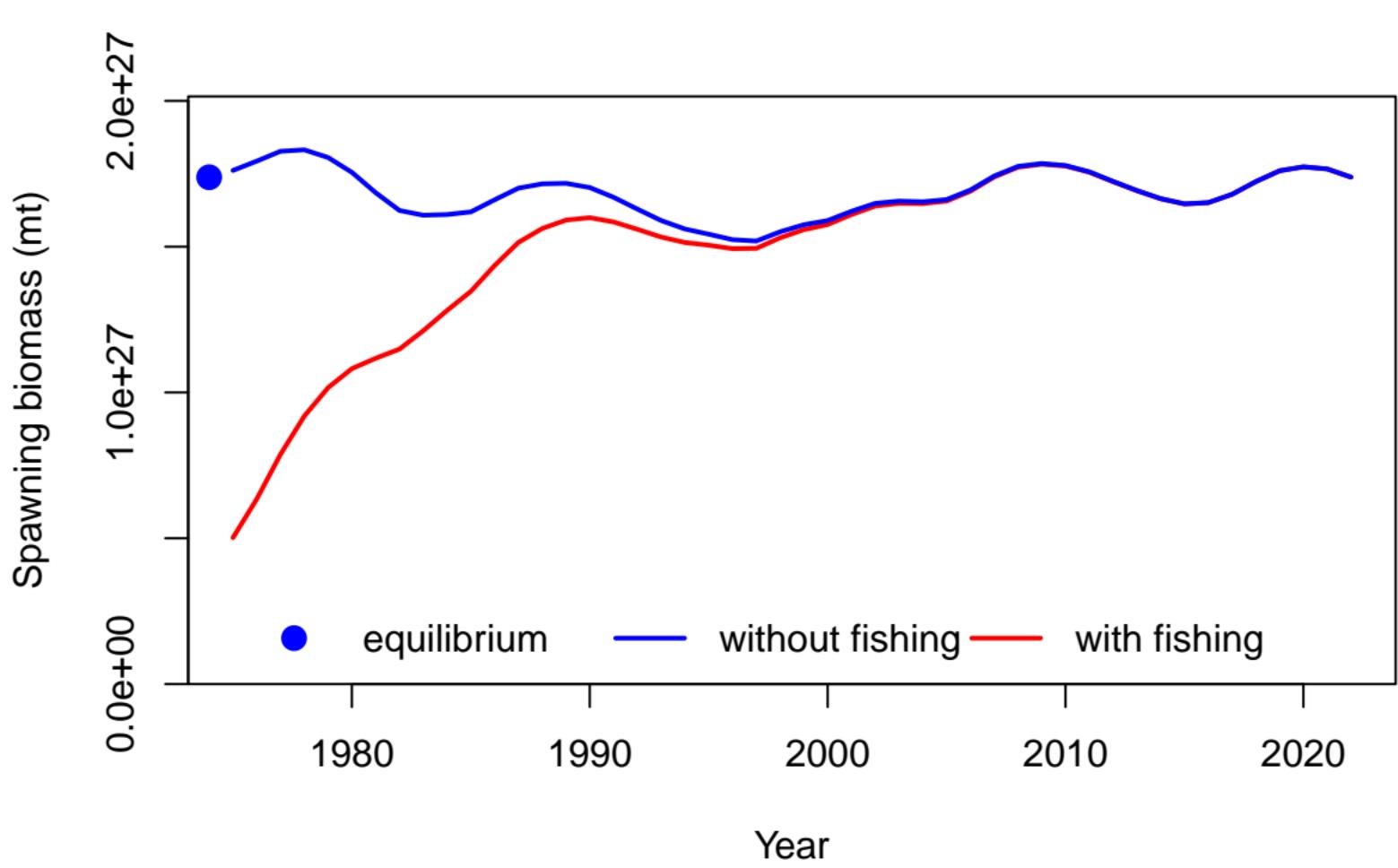


Fraction of total Age-0 recruits

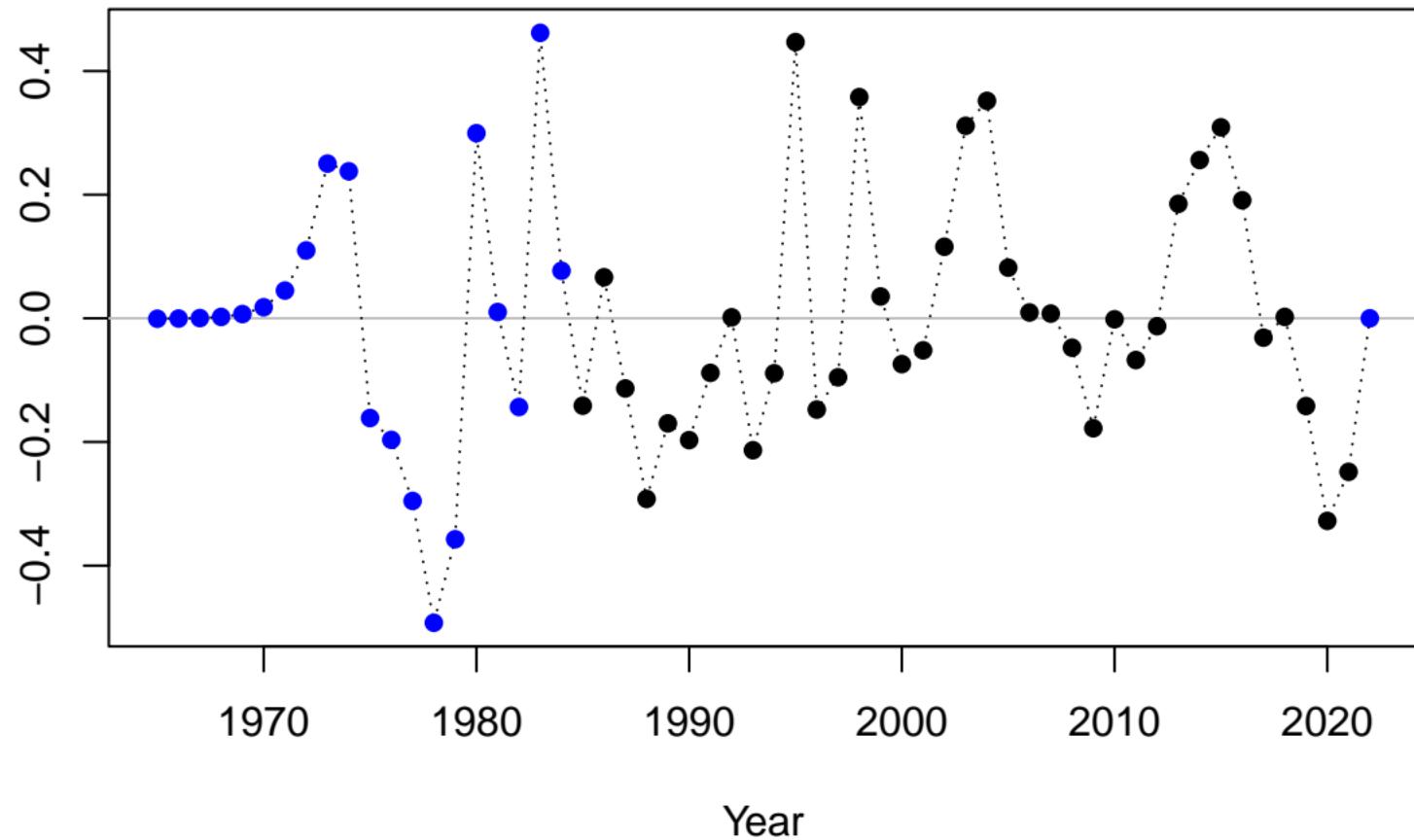


Summary Fishing Mortality

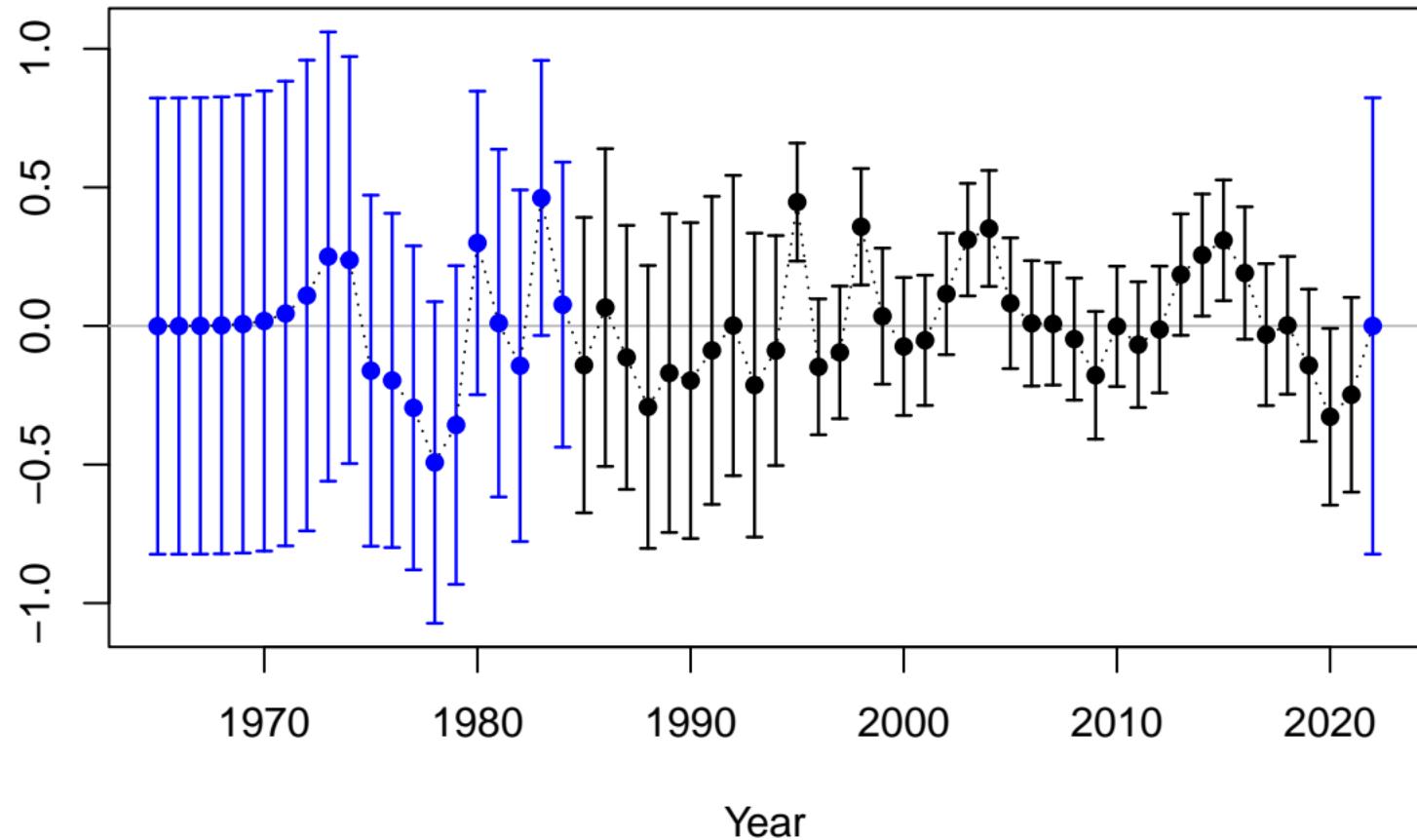




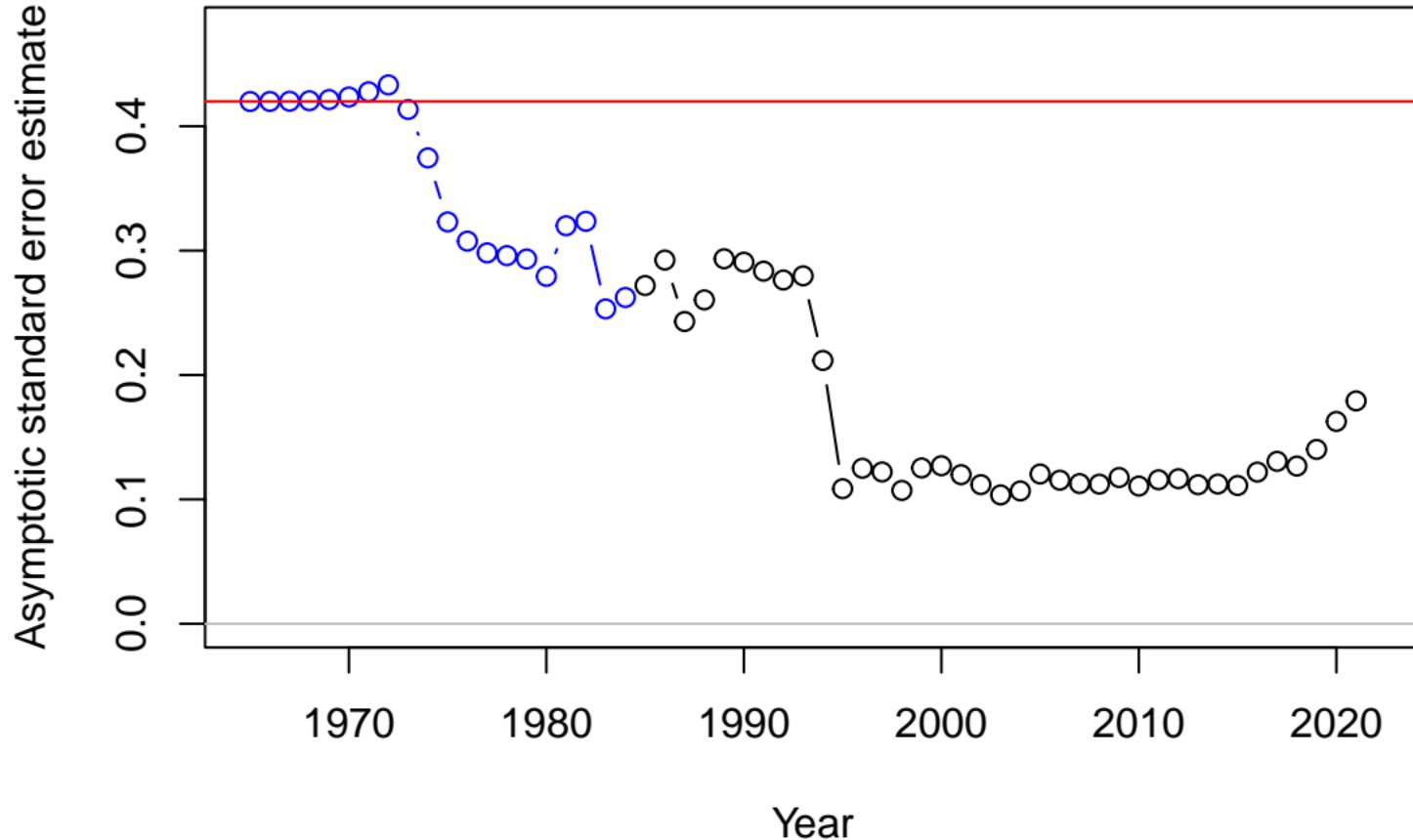
Log recruitment deviation

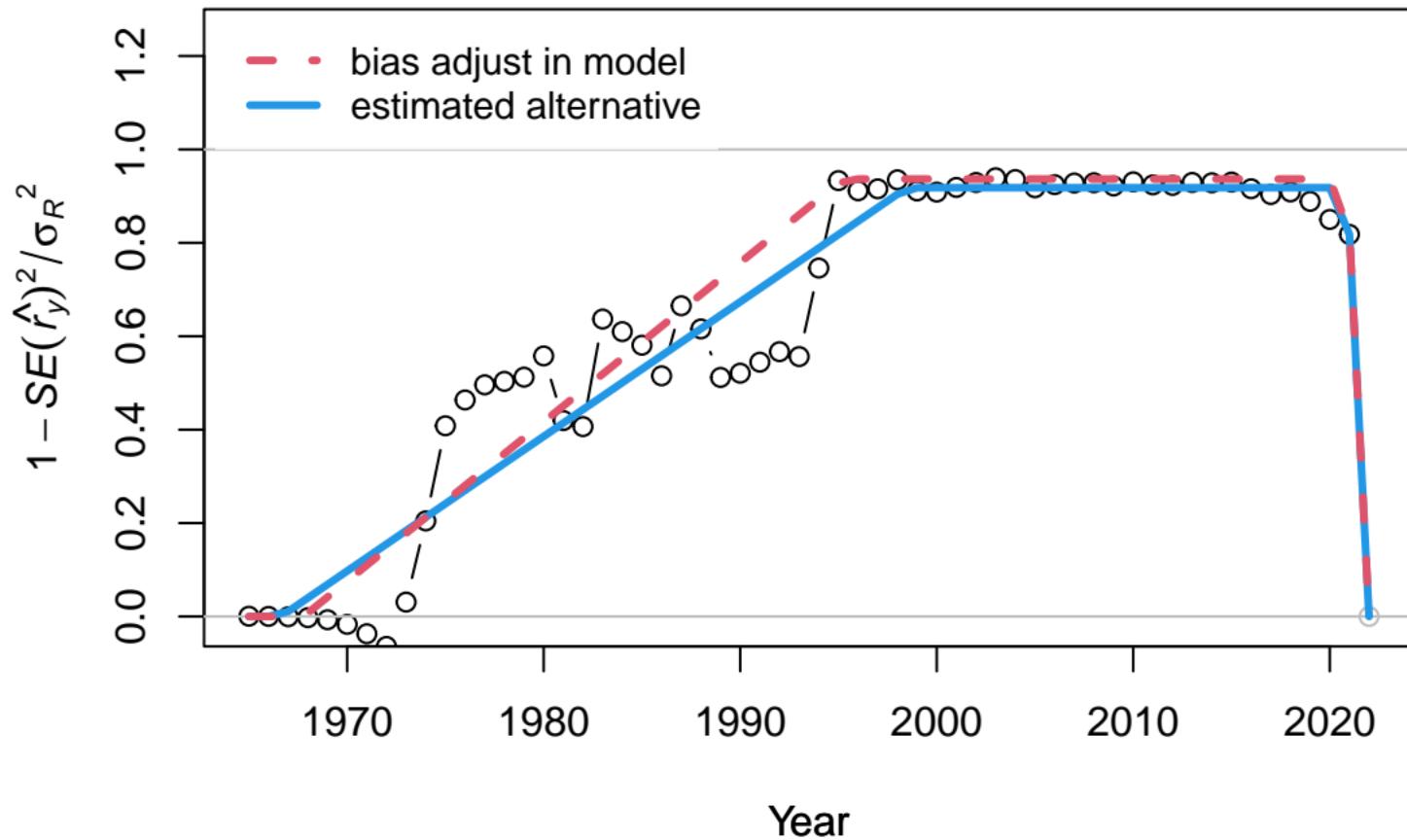


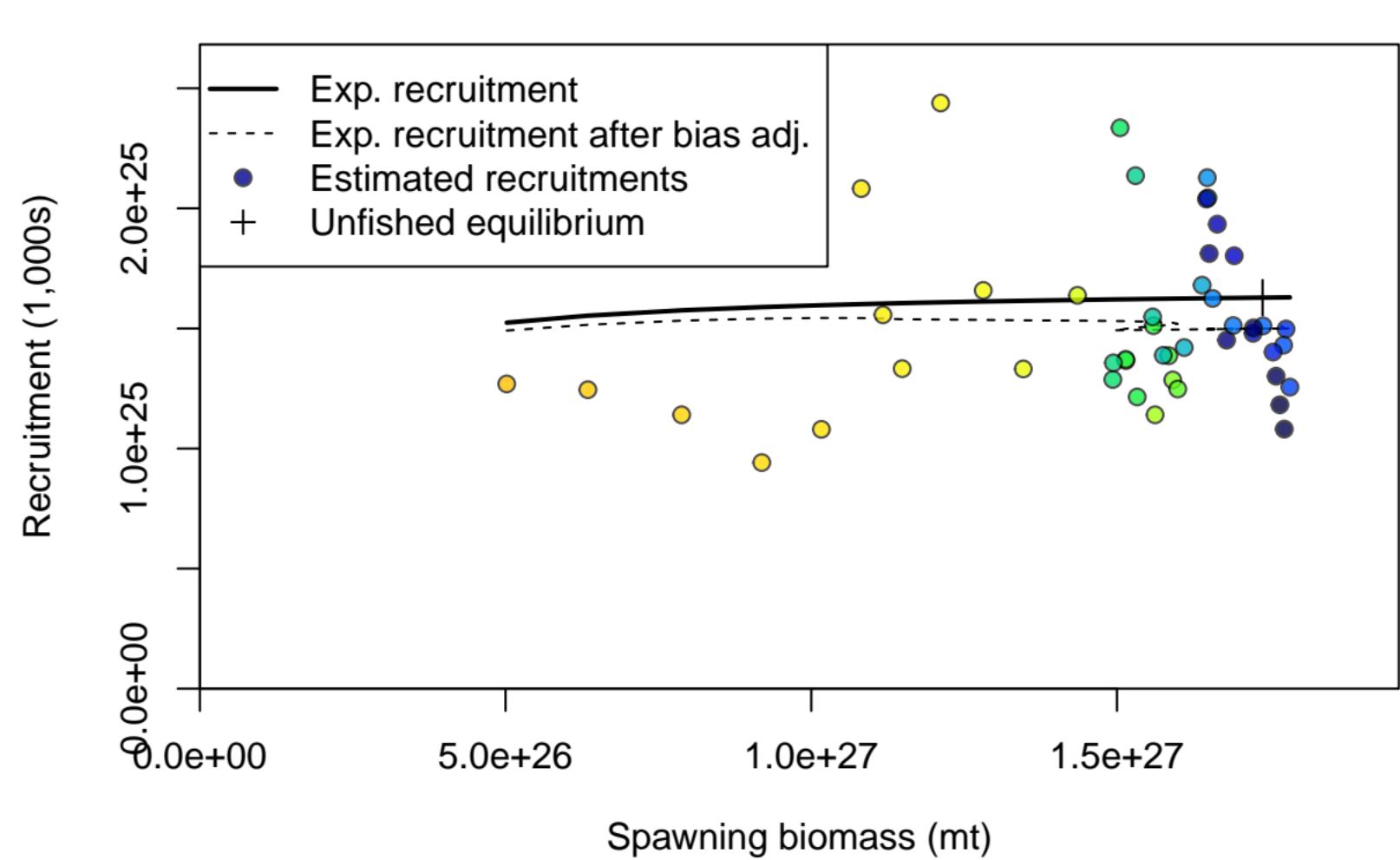
Log recruitment deviation

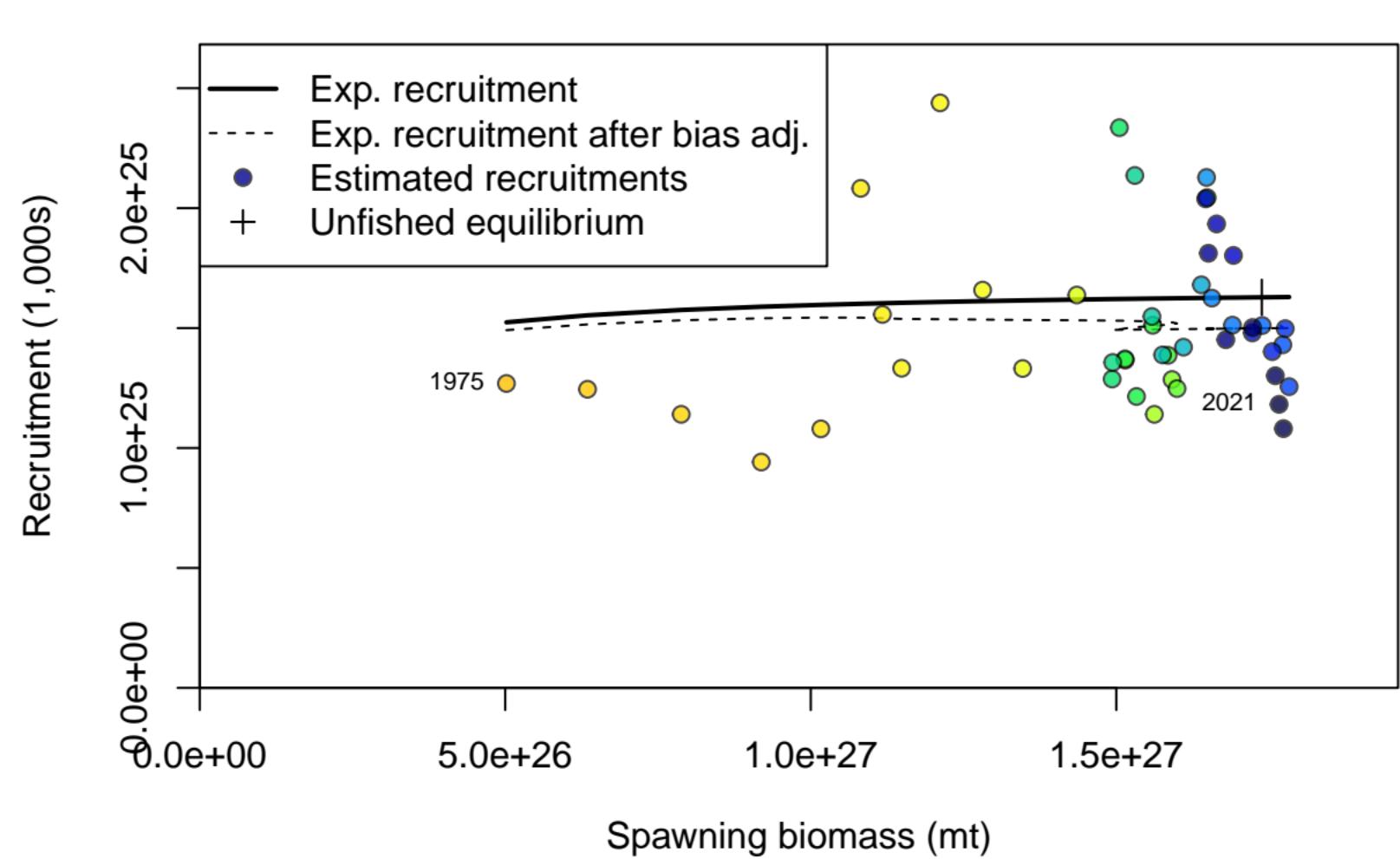


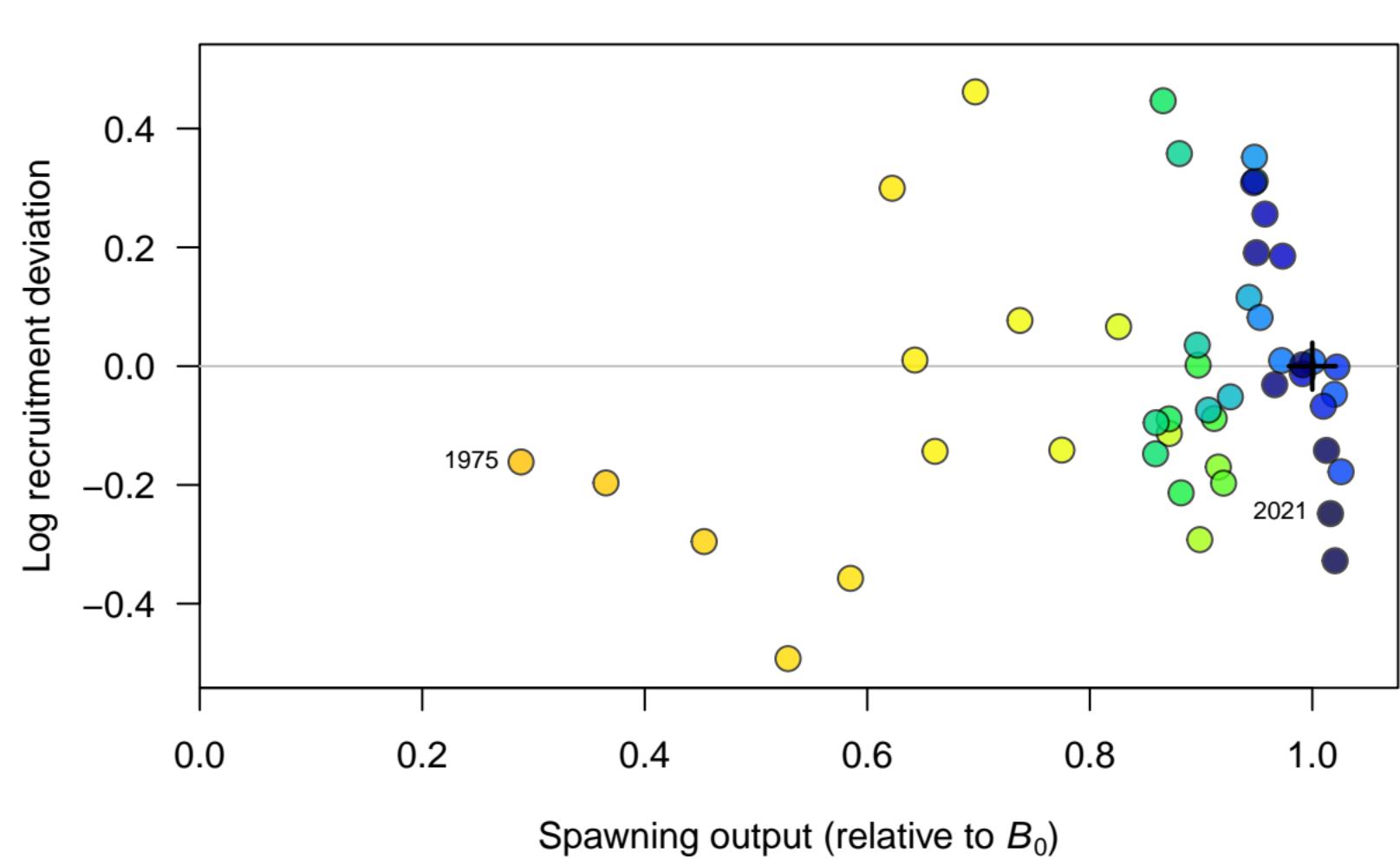
Recruitment deviation variance

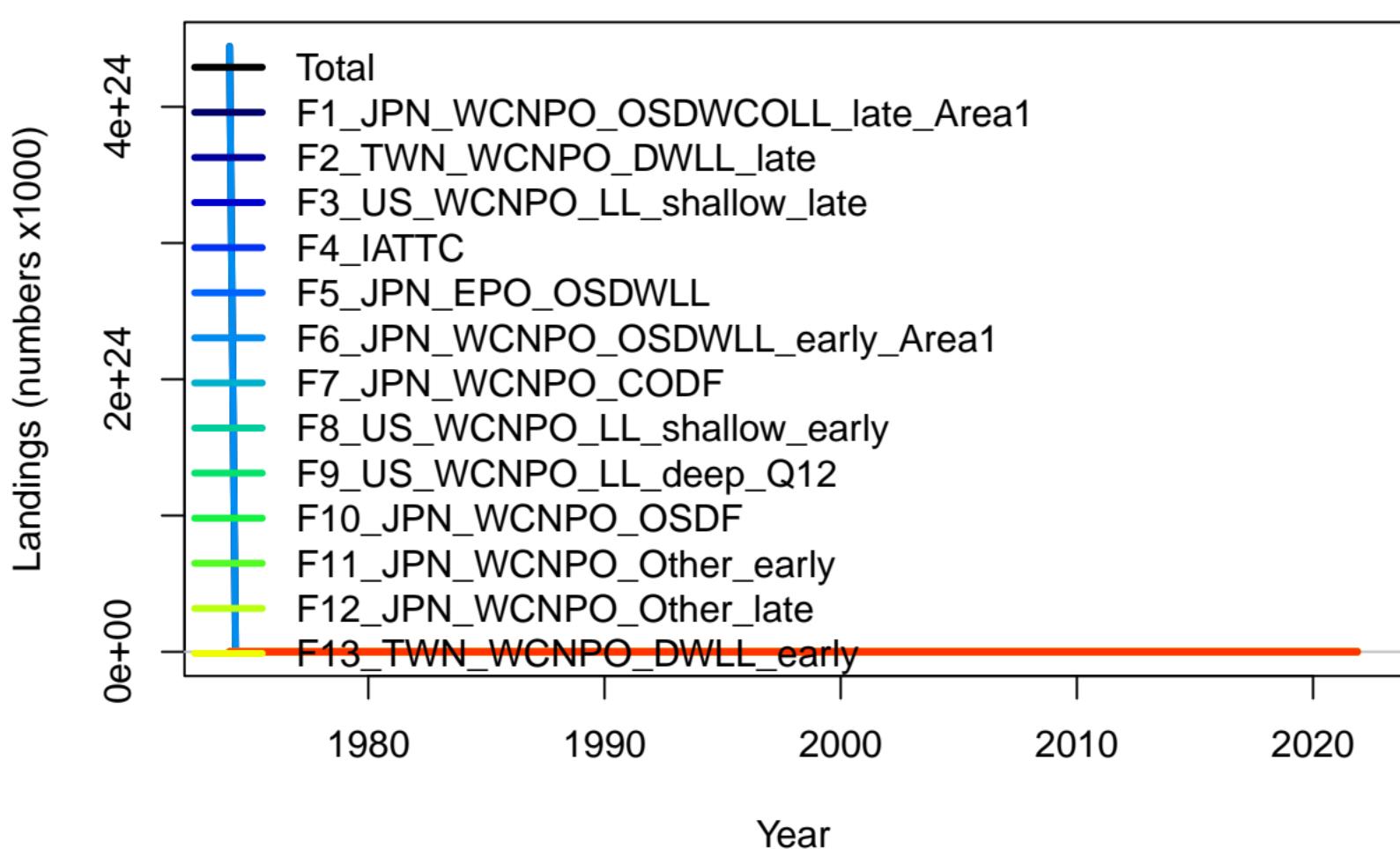


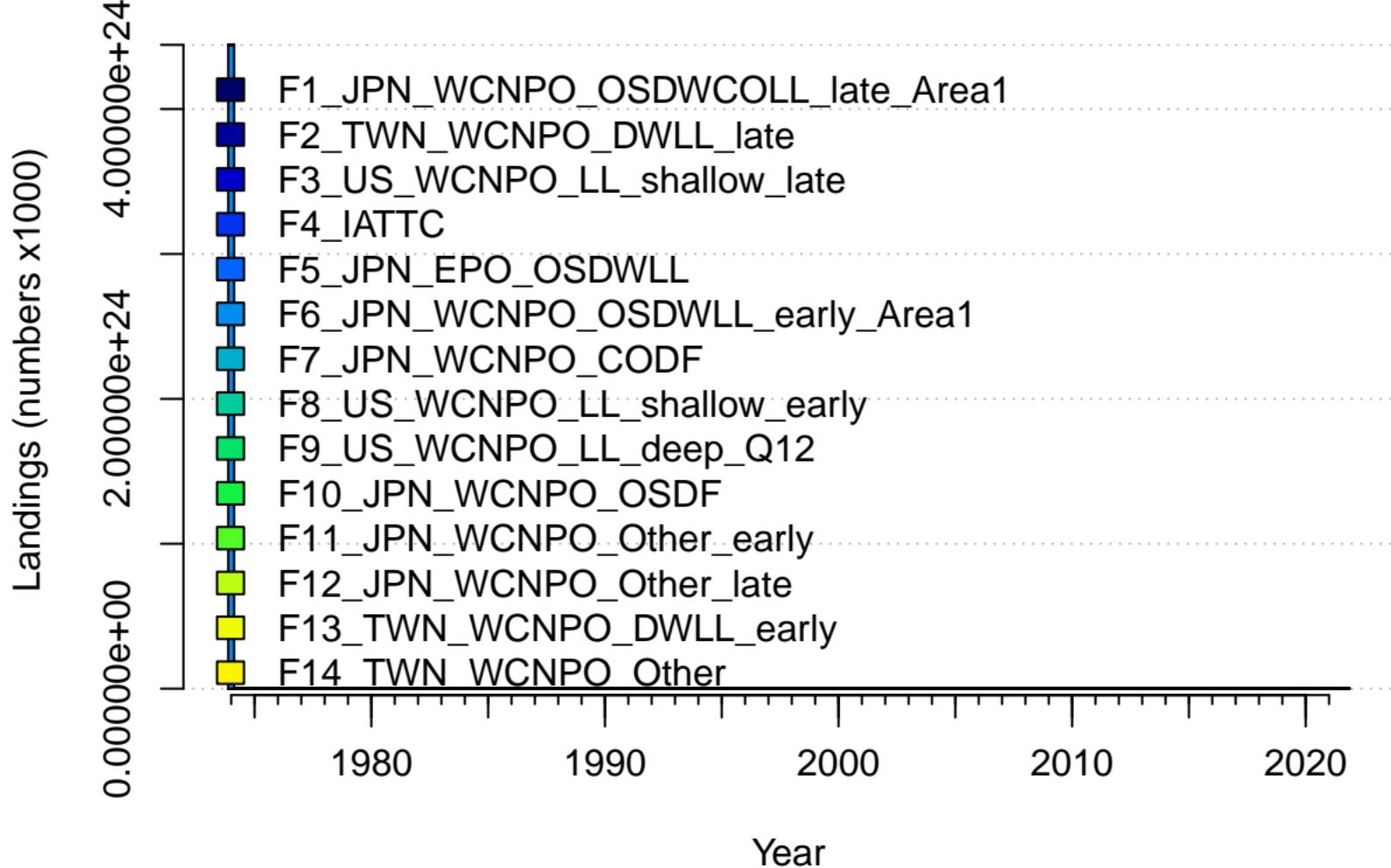


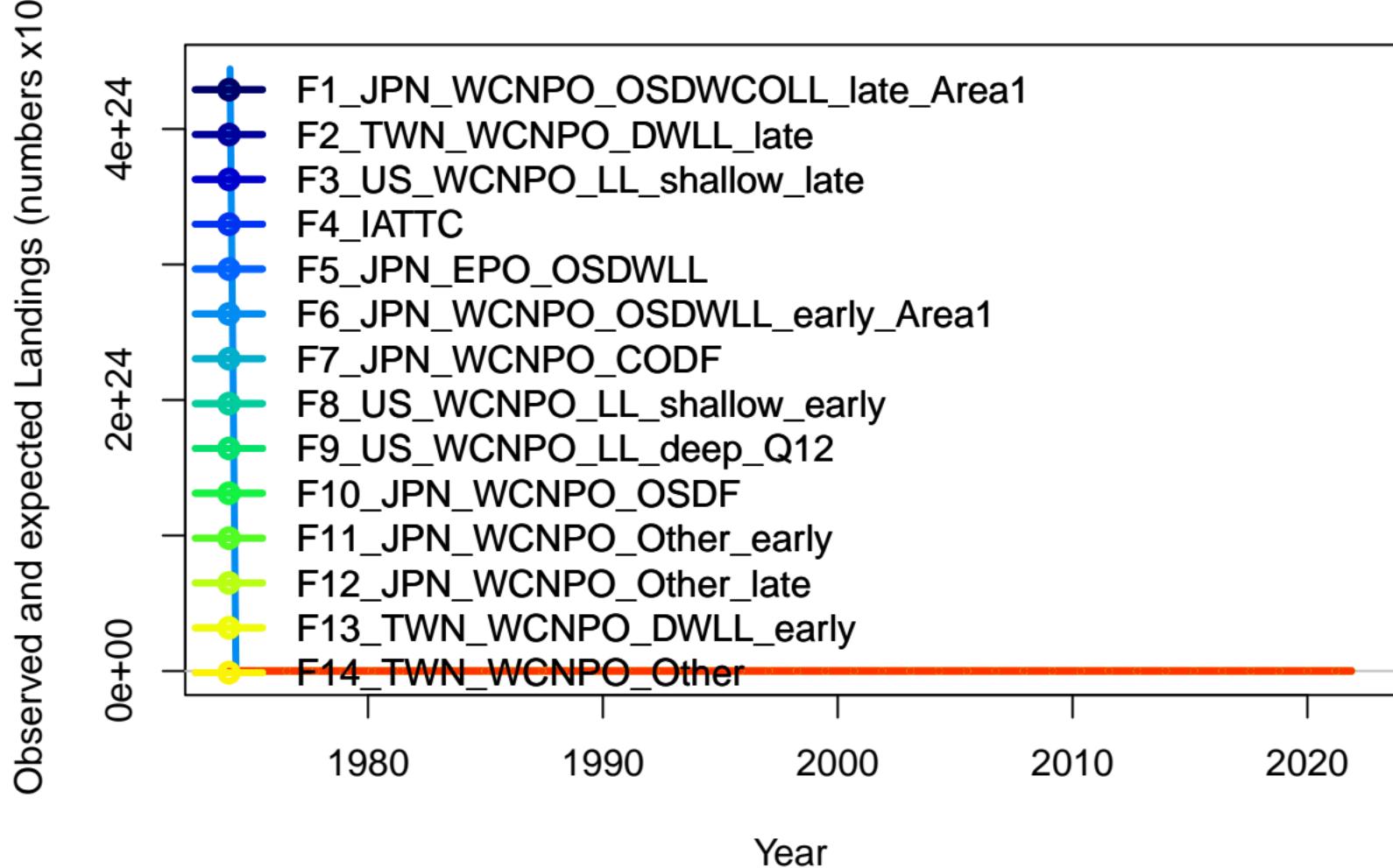


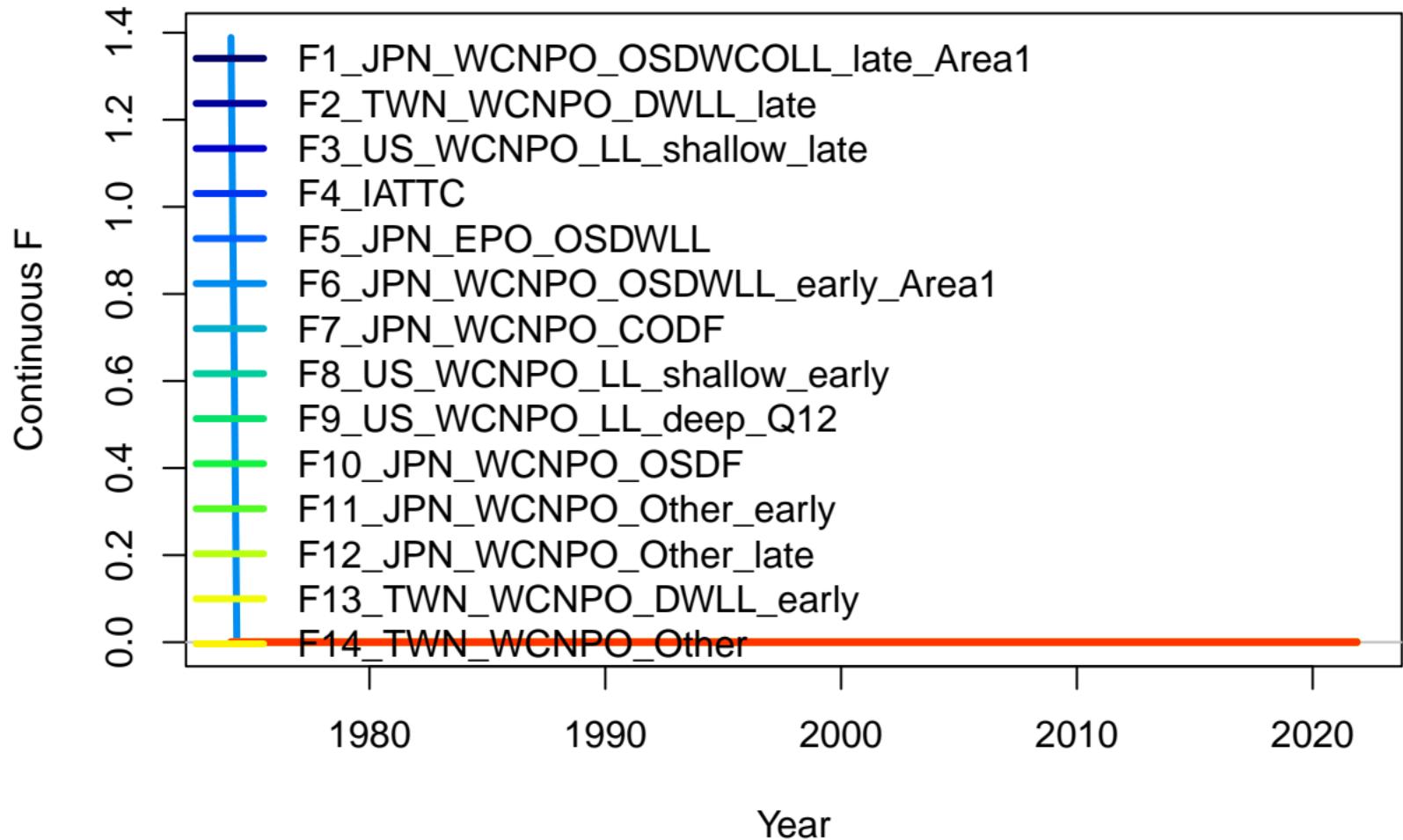


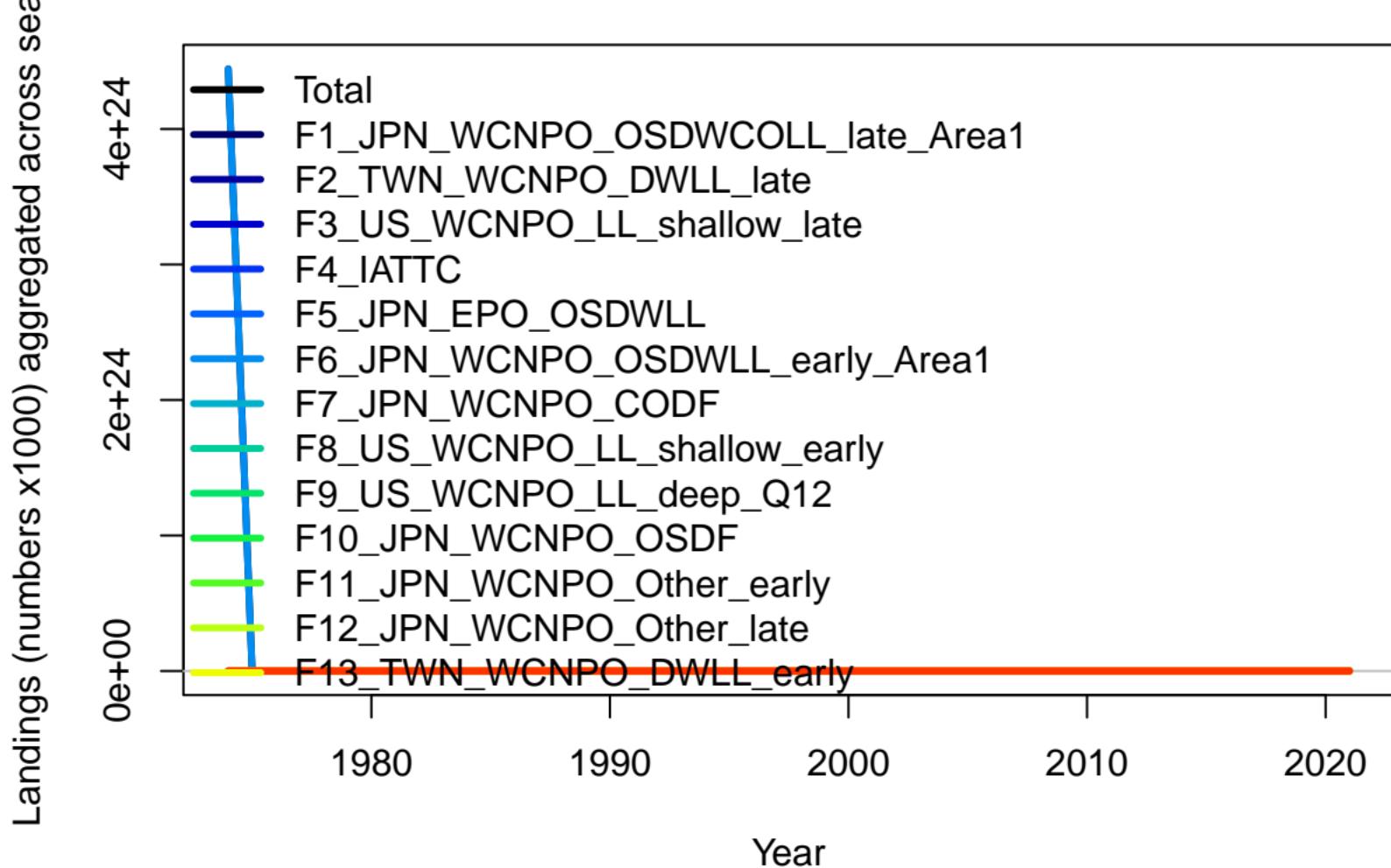


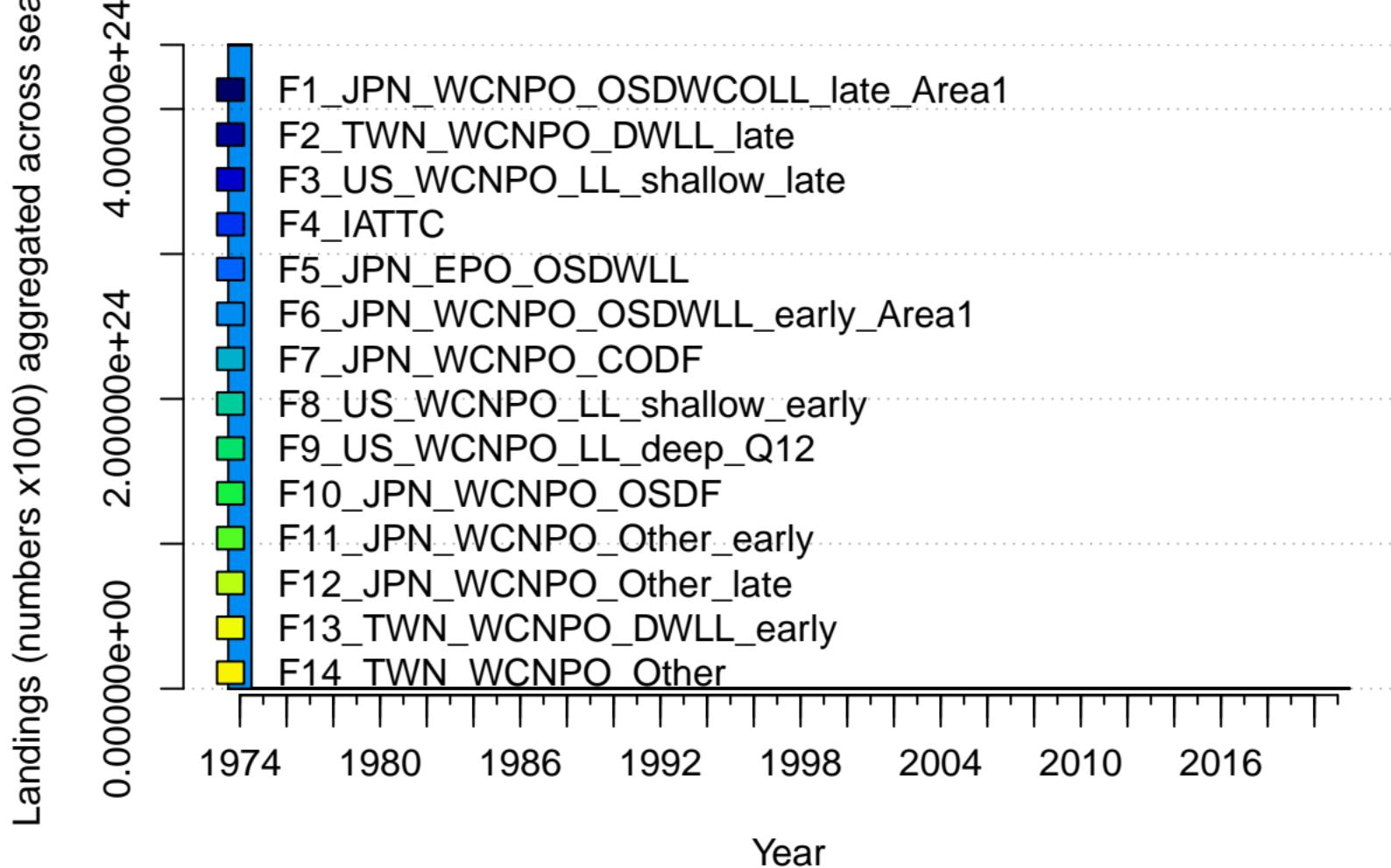


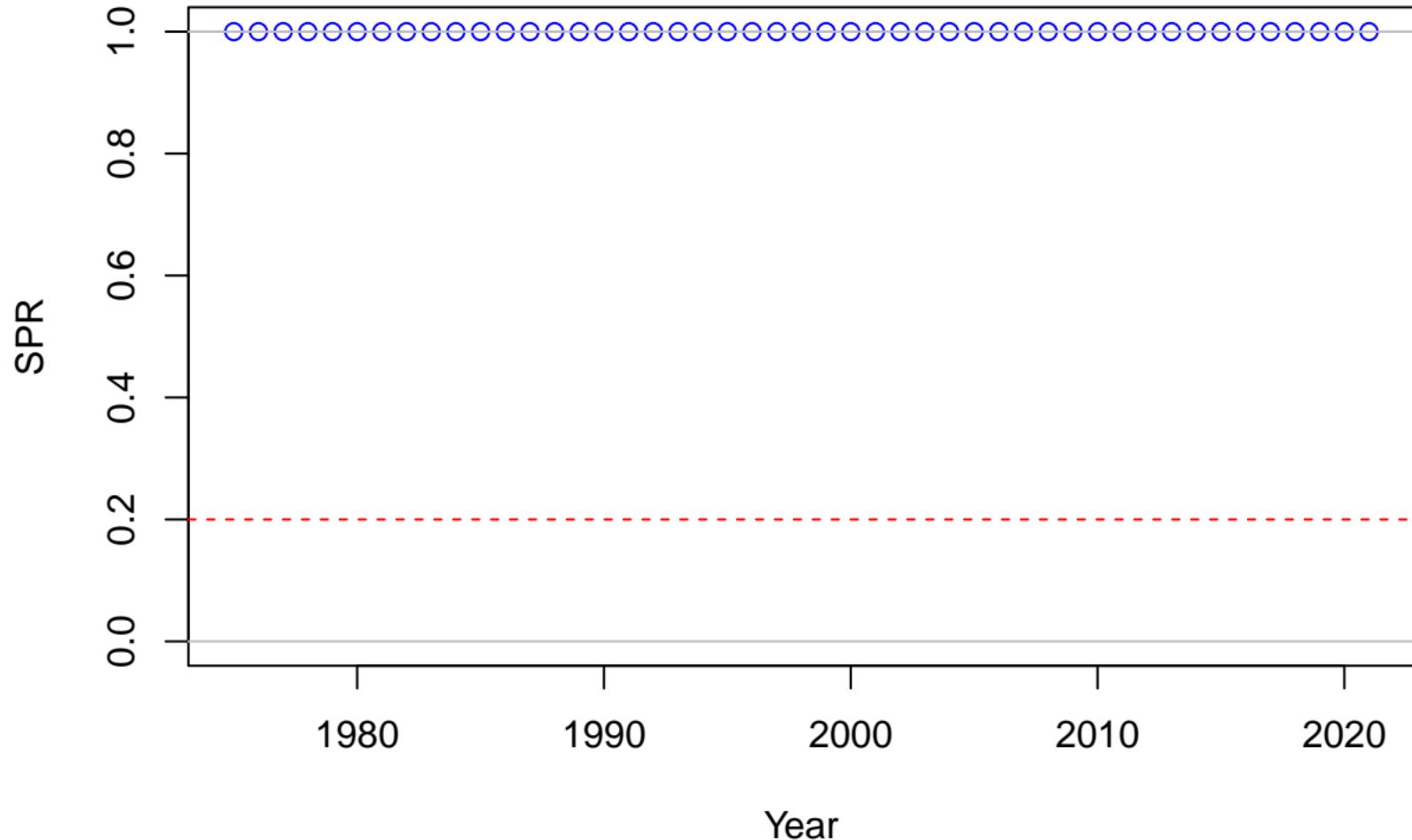




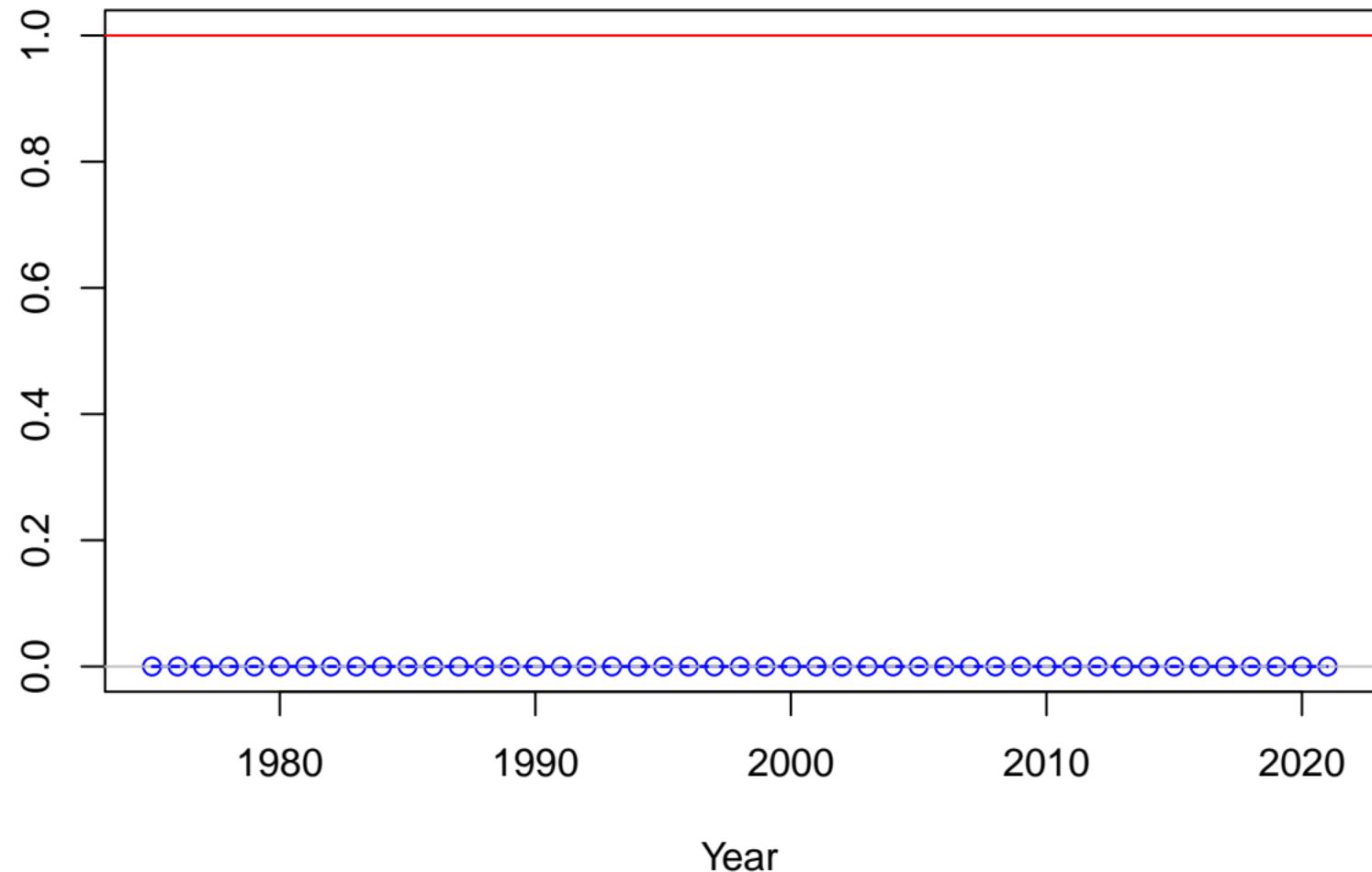




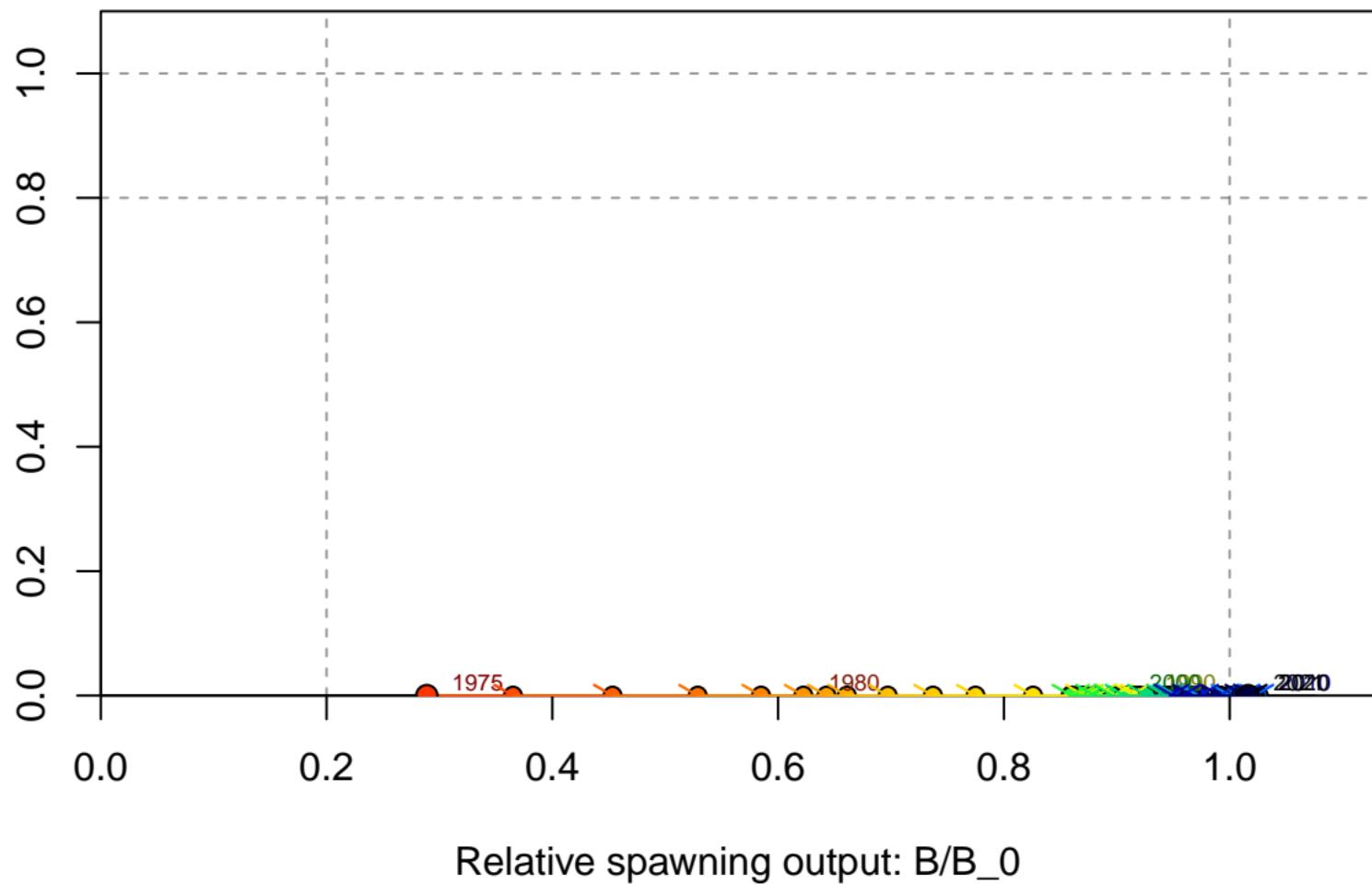


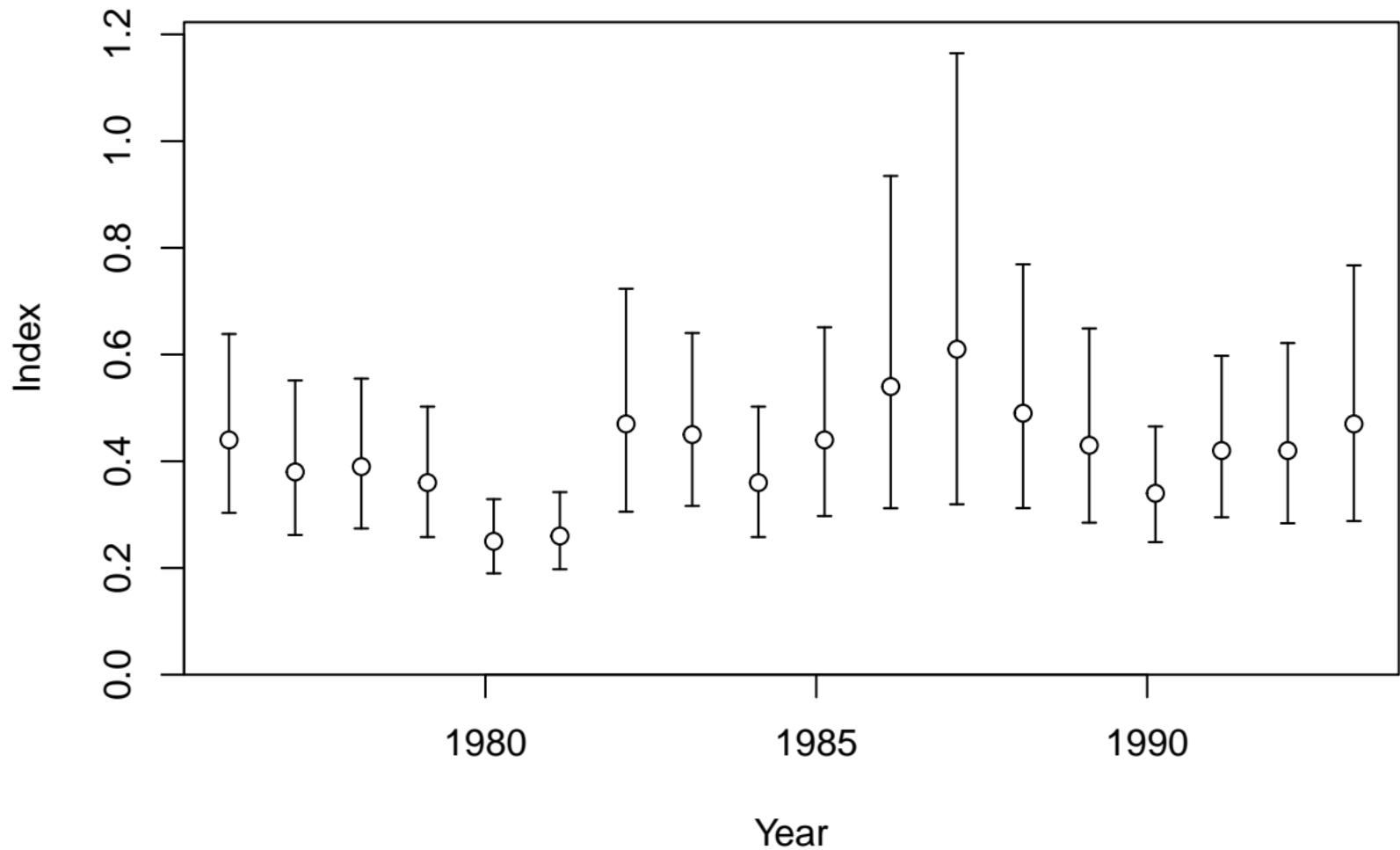


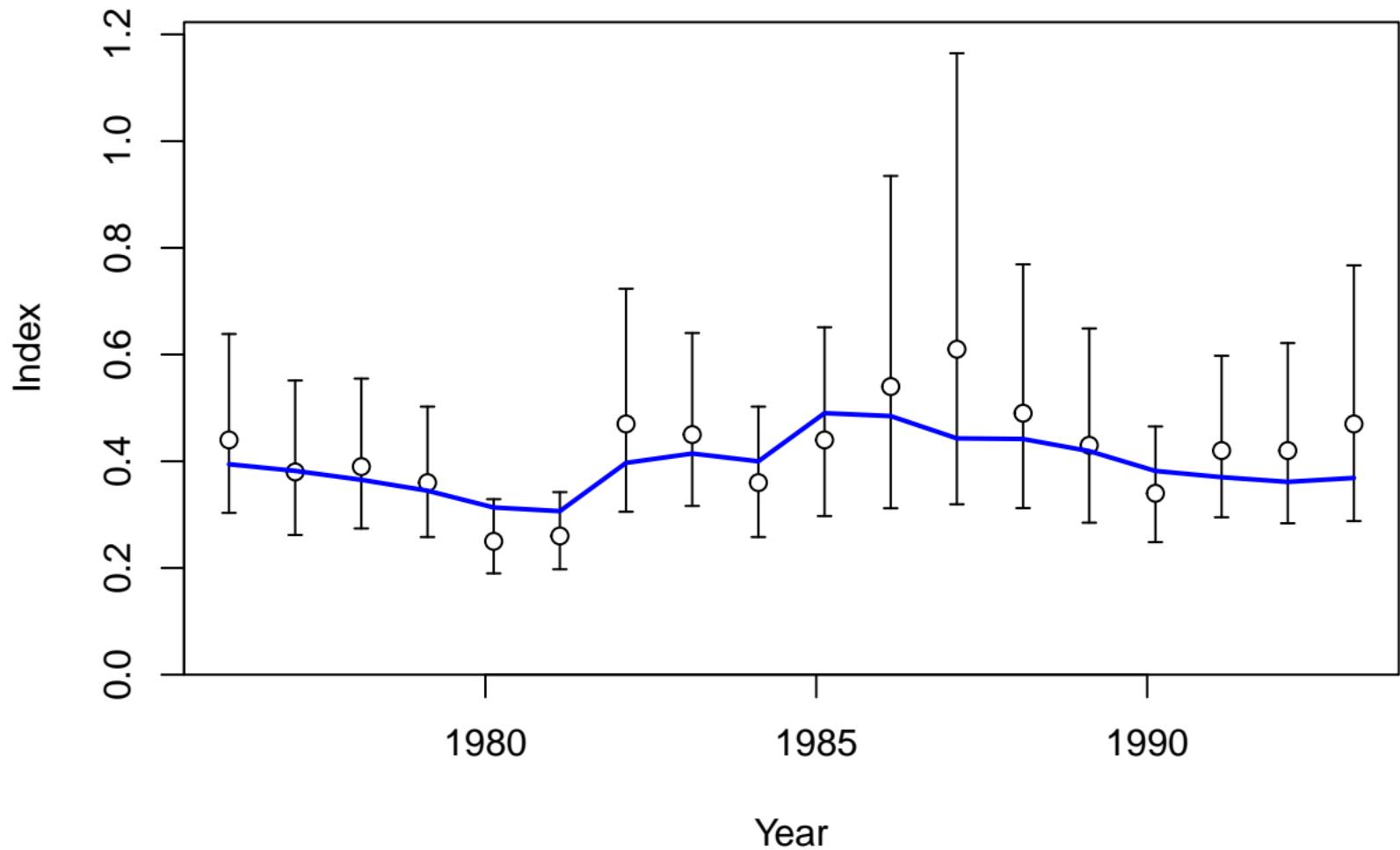
Fishing intensity: 1-SPR

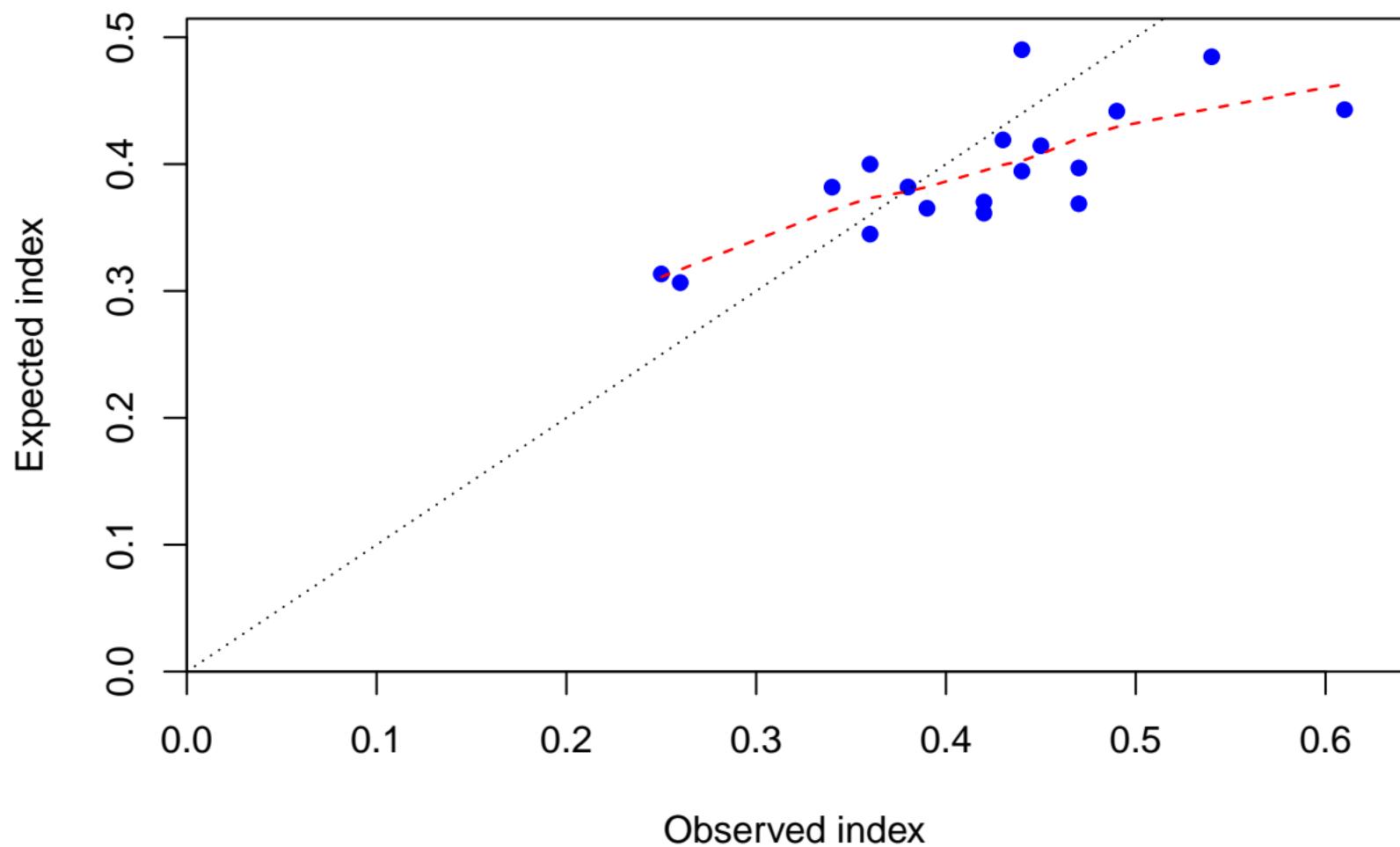


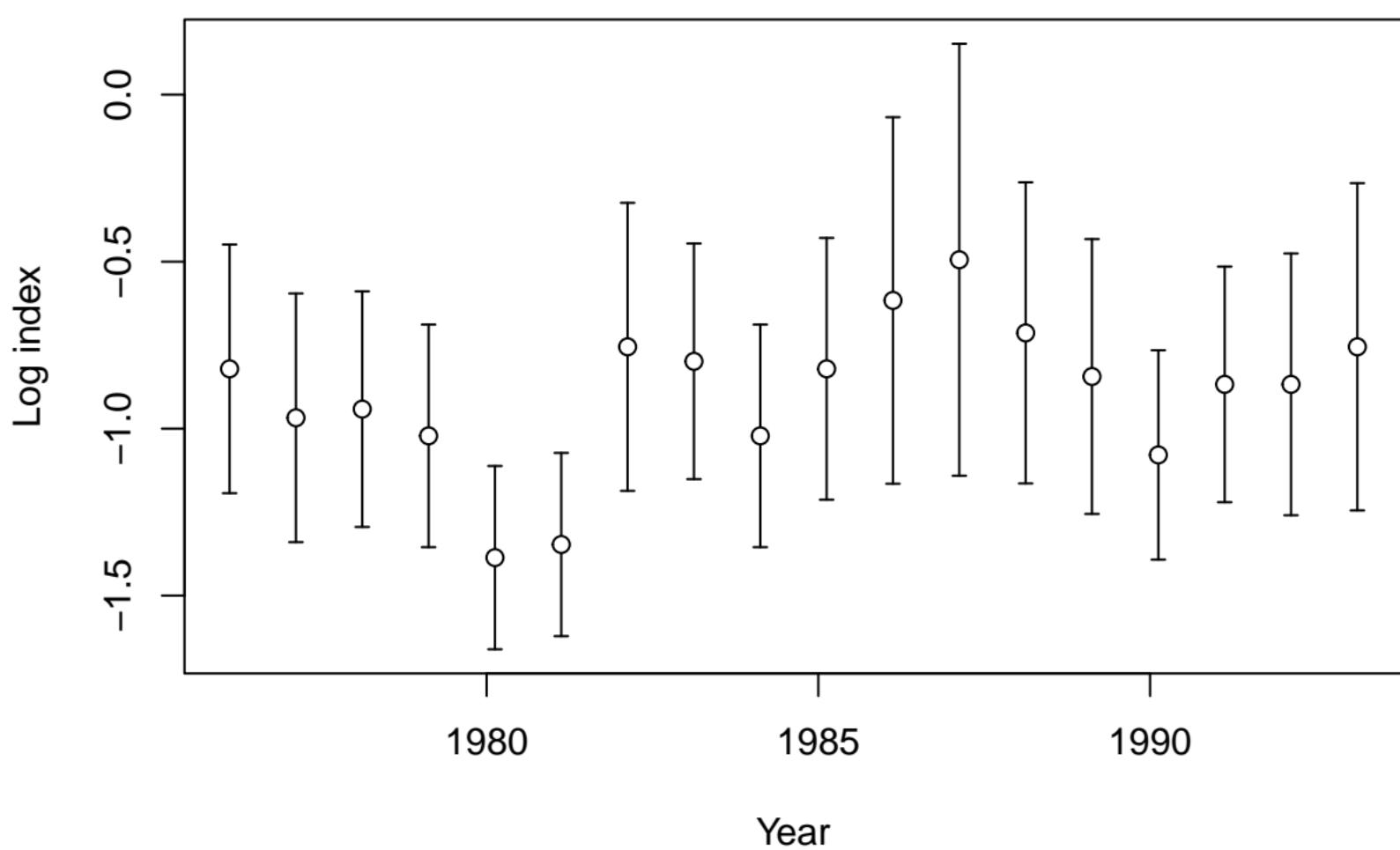
Fishing intensity: 1-SPR

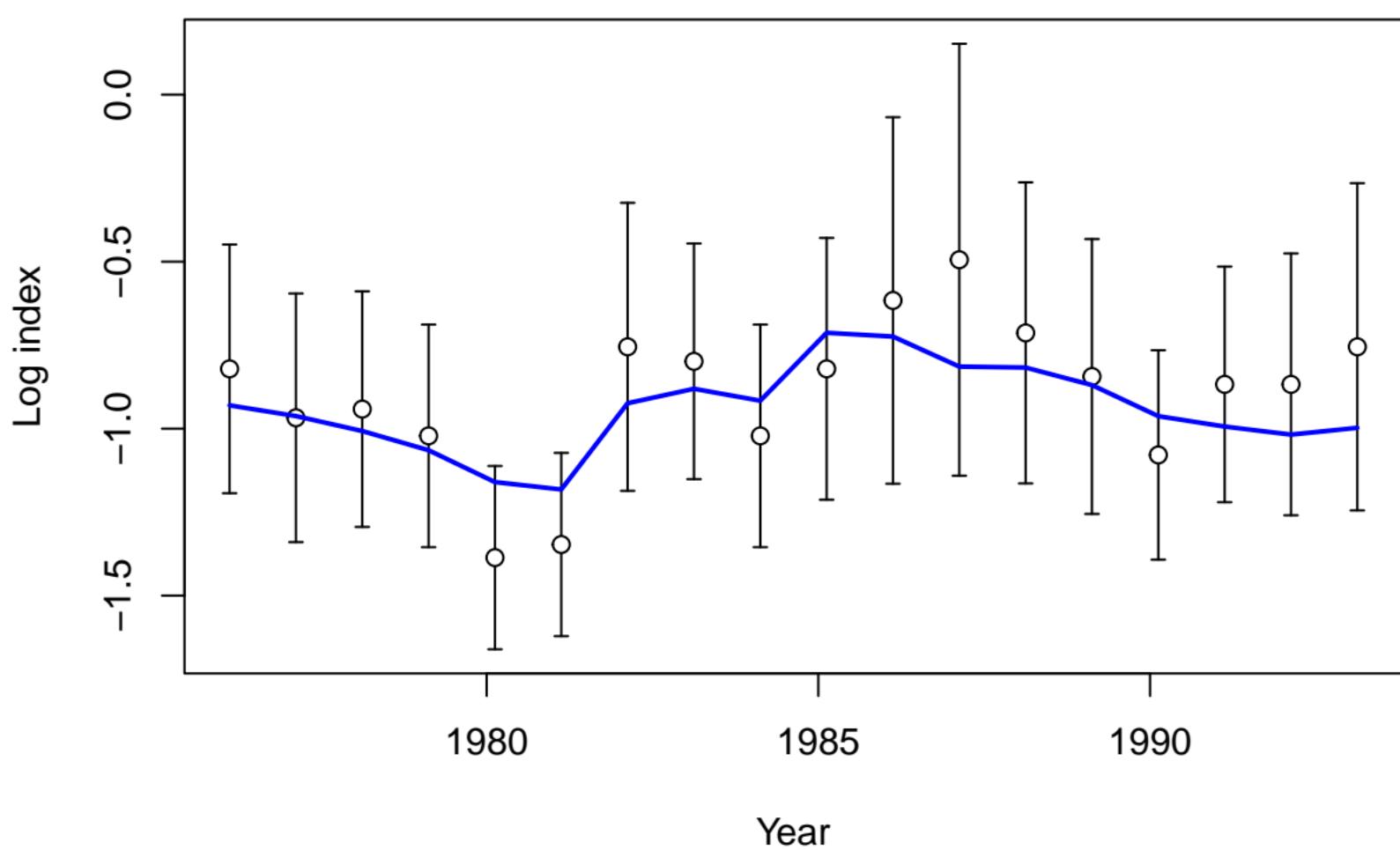


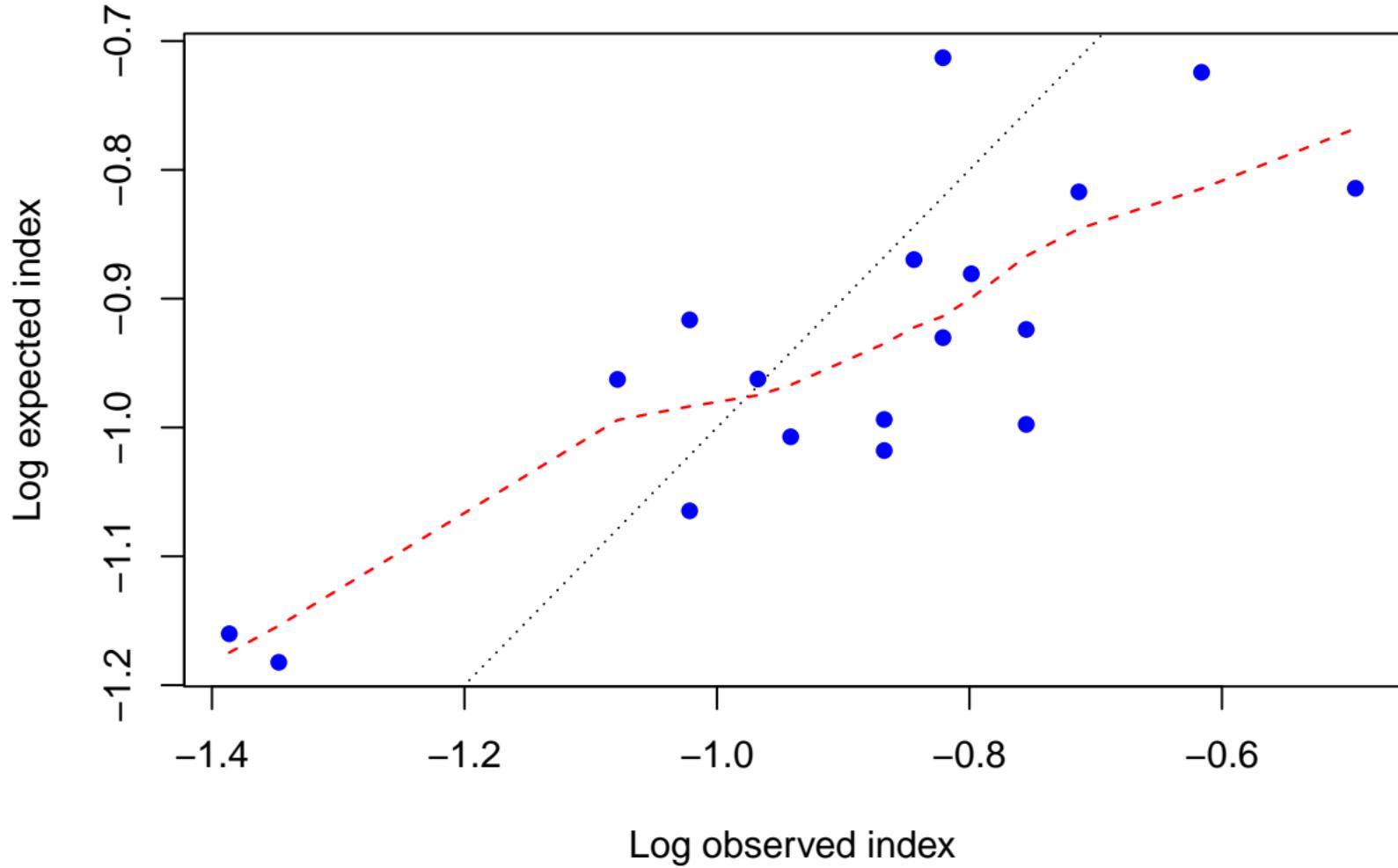


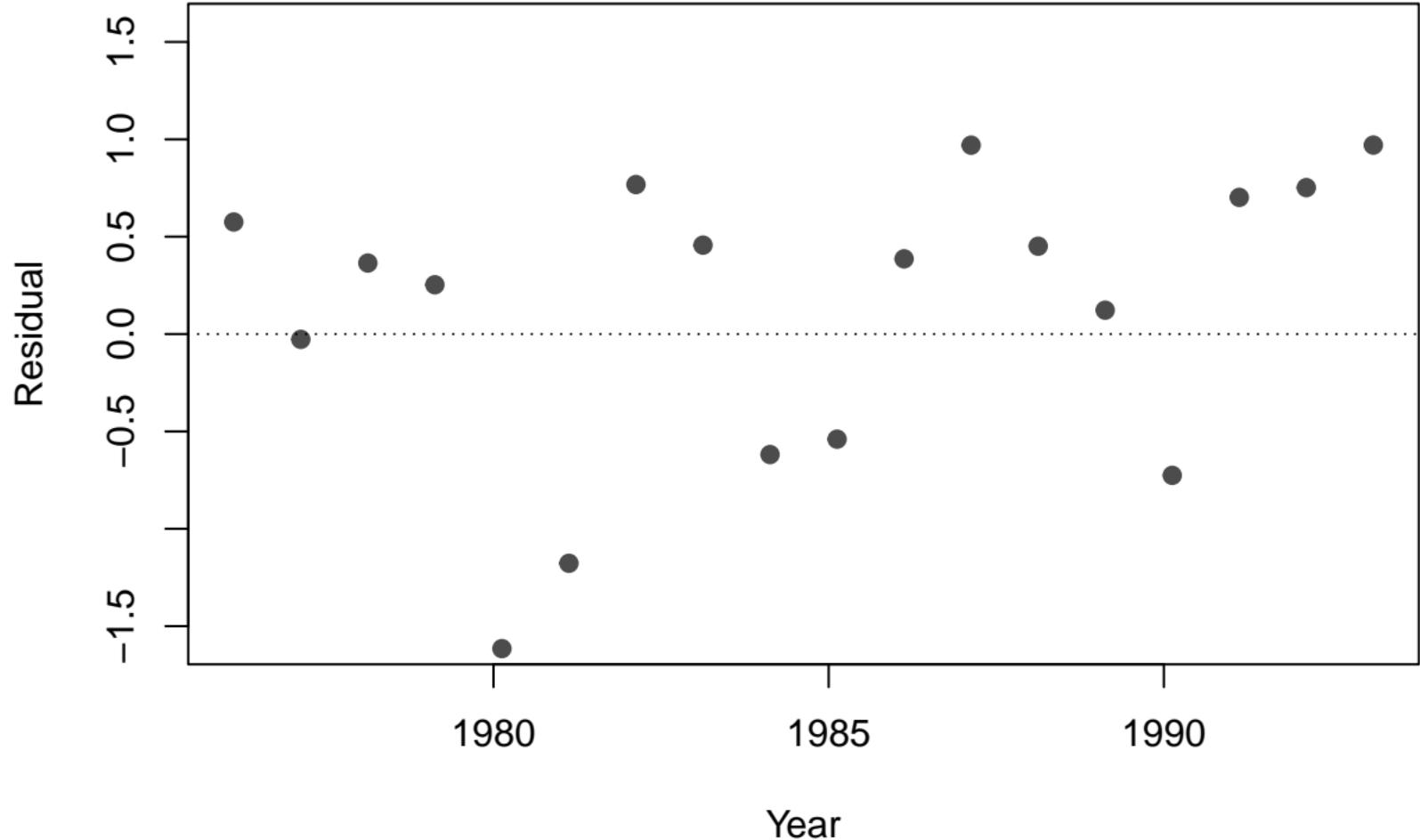


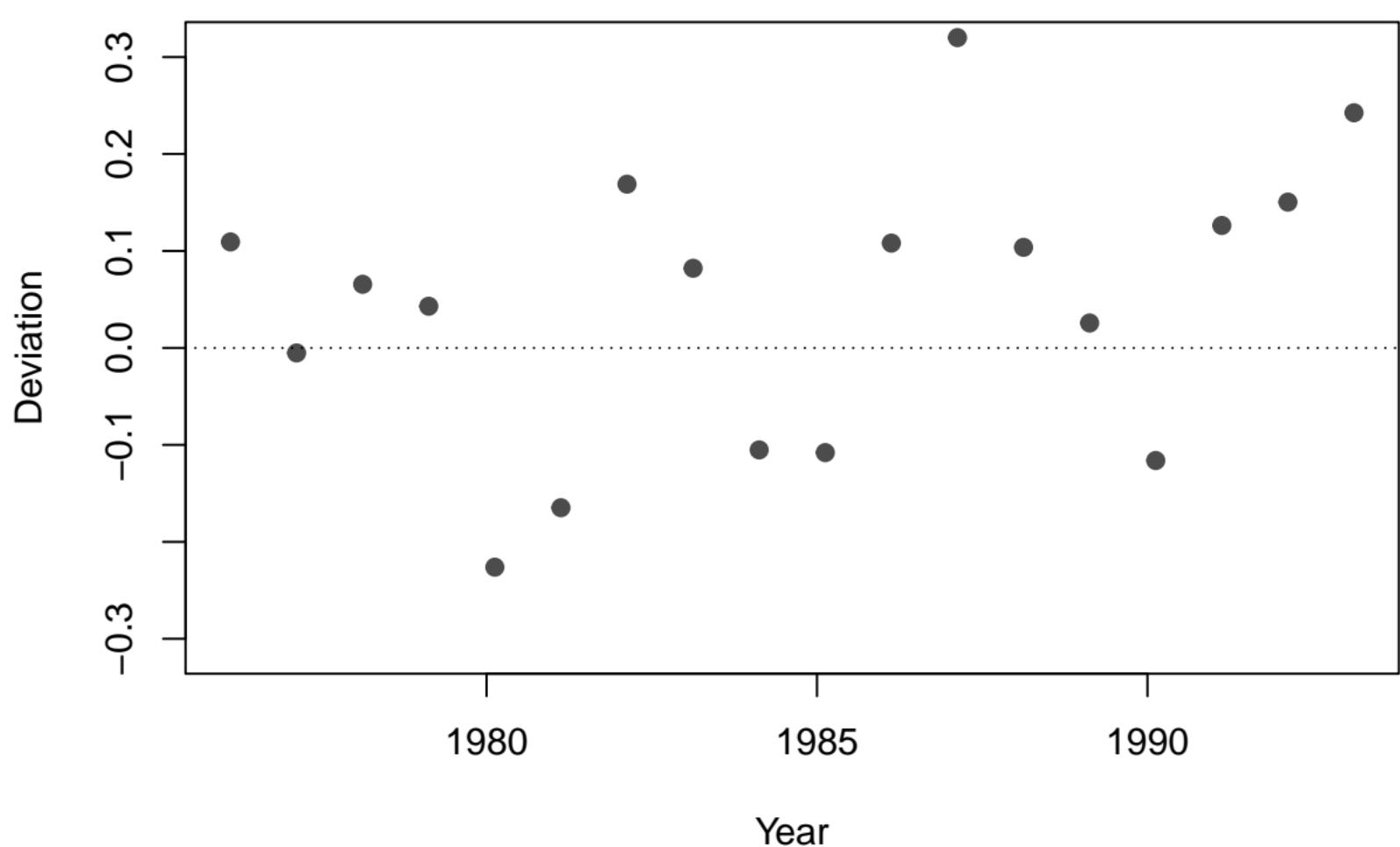


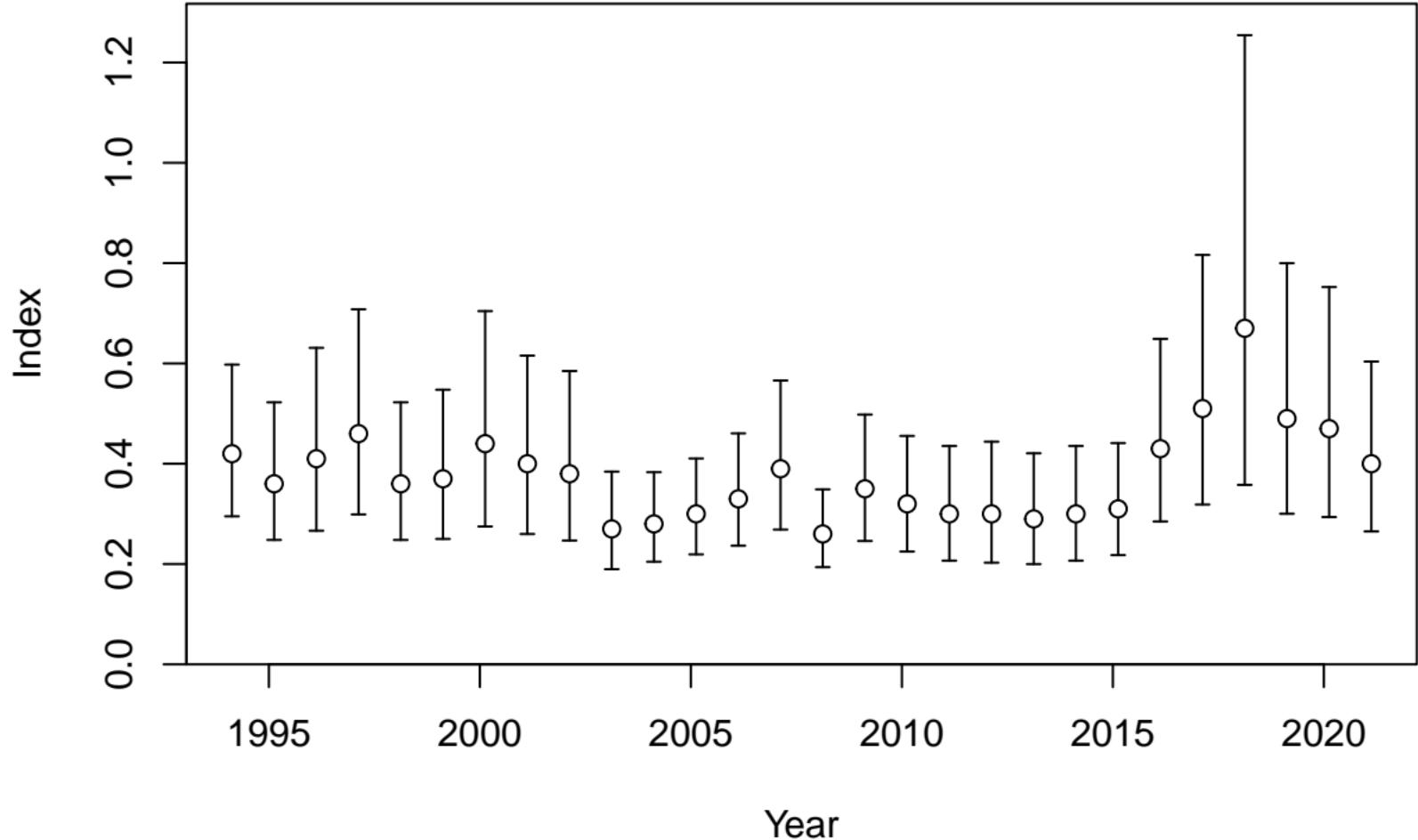


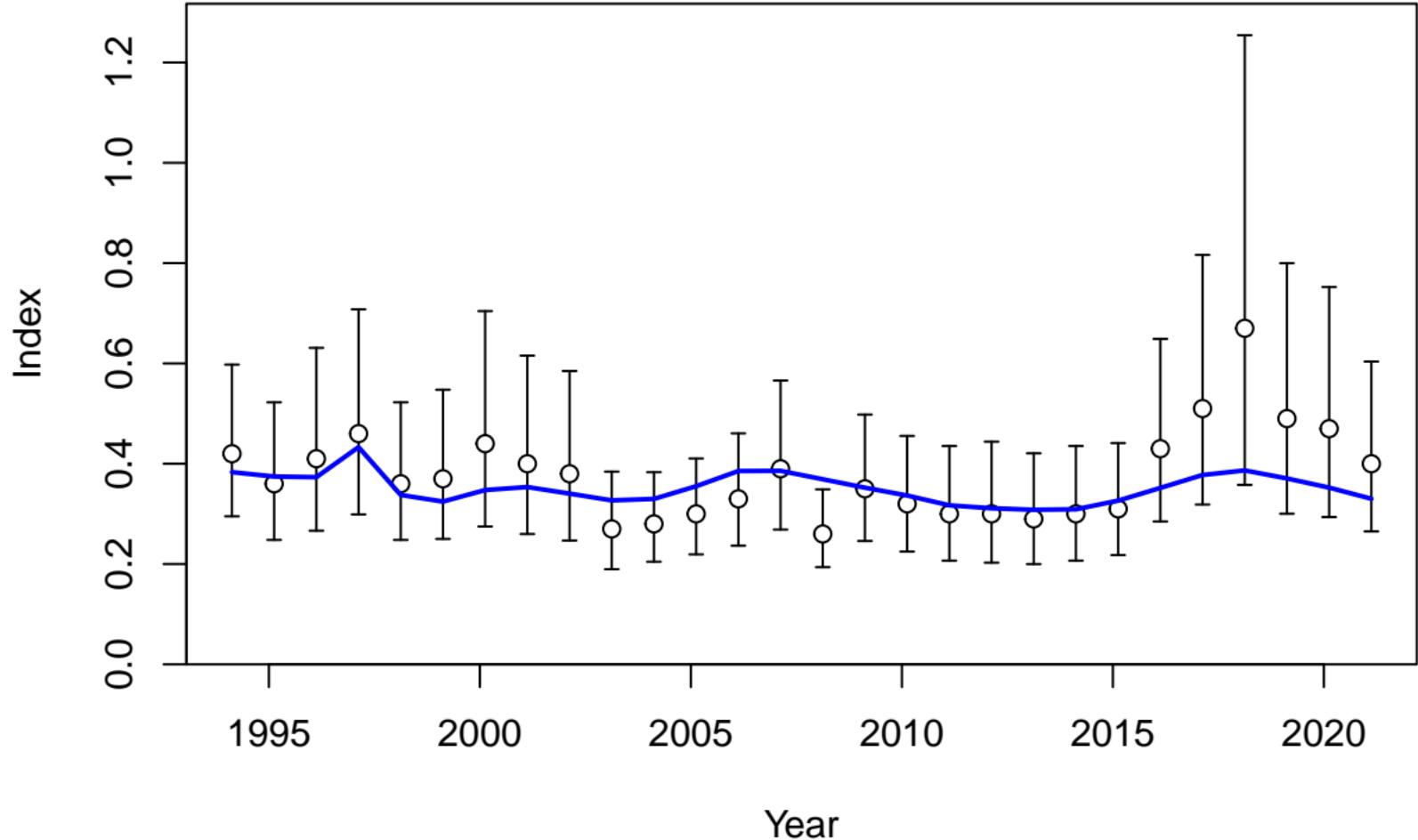










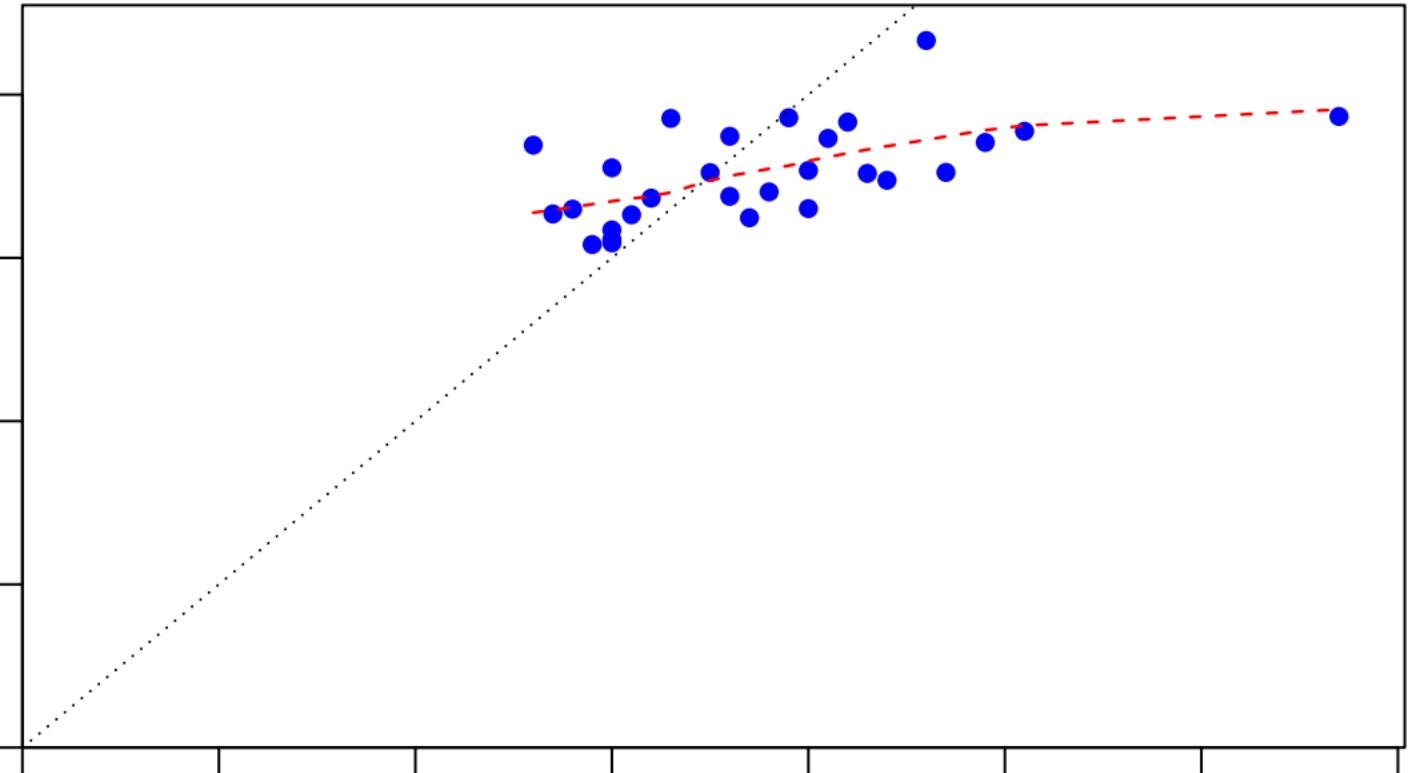


Expected index

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

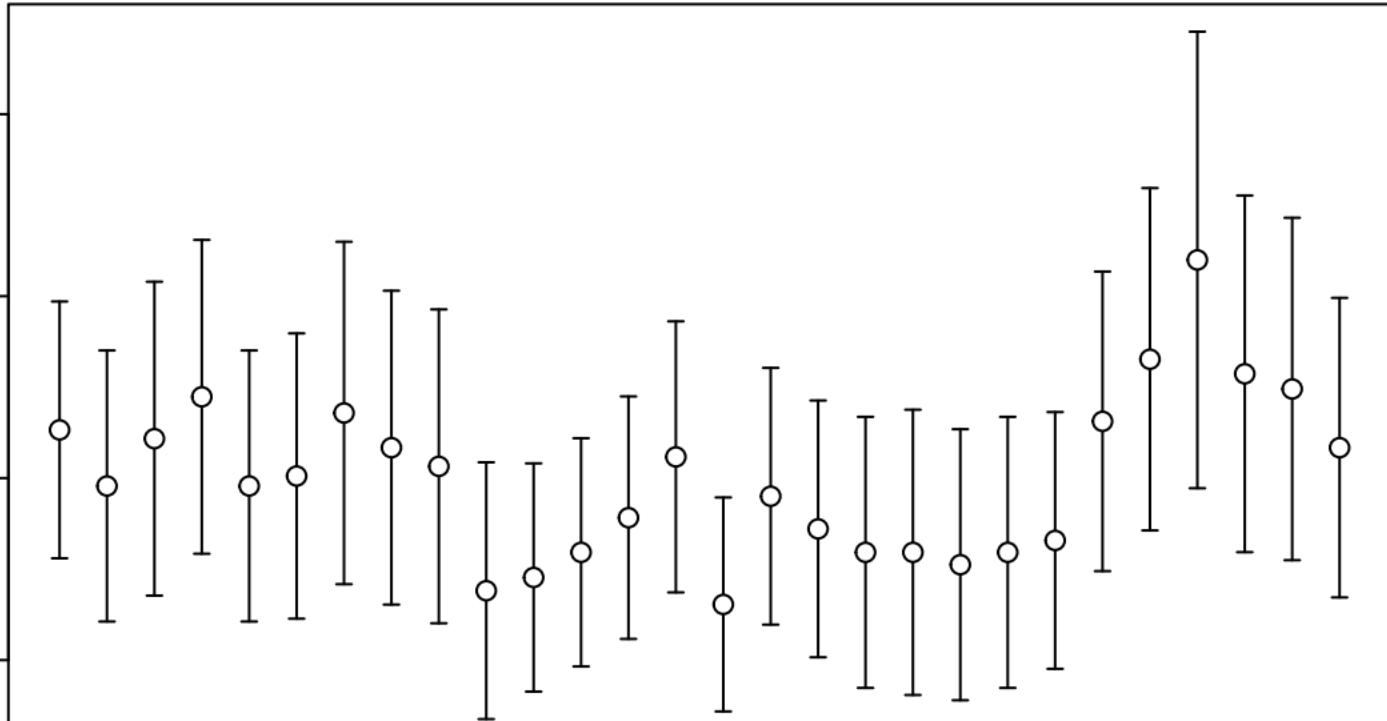


Log index

-1.5 -1.0 -0.5 0.0

1995 2000 2005 2010 2015 2020

Year

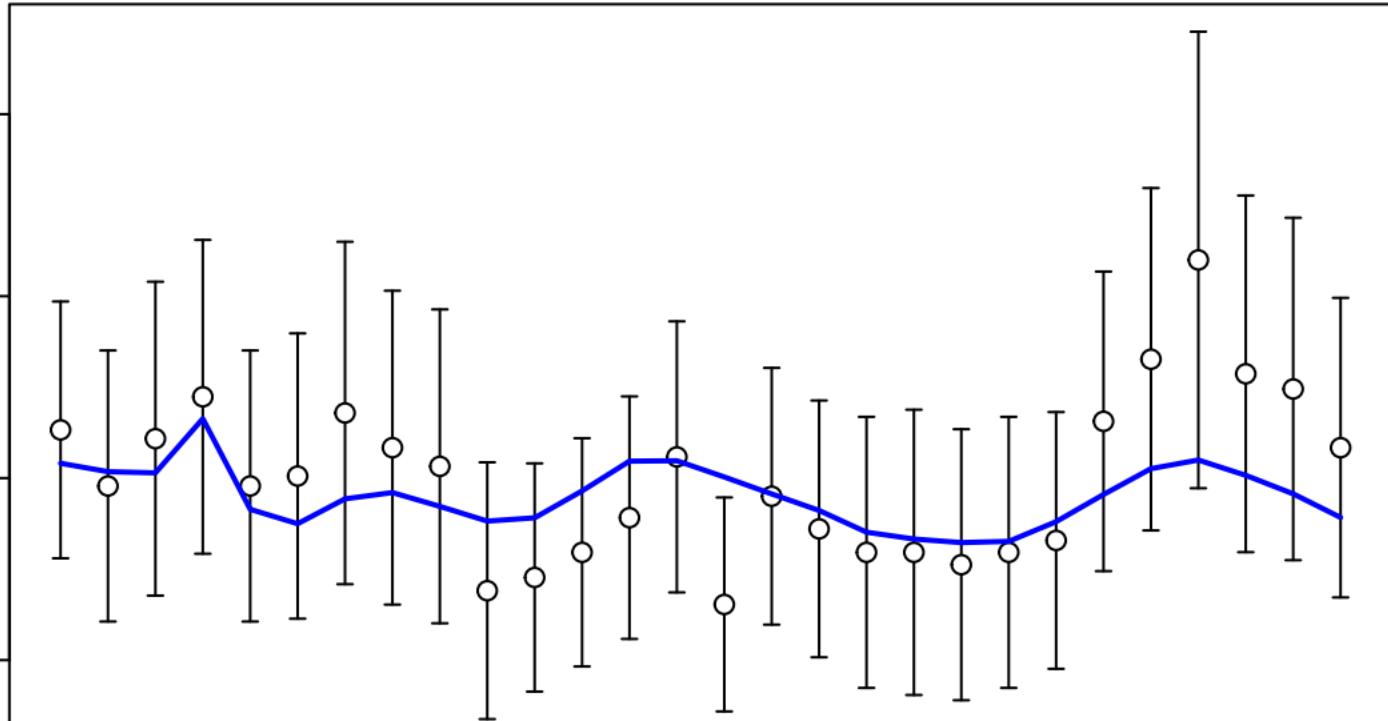


Log index

-1.5 -1.0 -0.5 0.0

1995 2000 2005 2010 2015 2020

Year

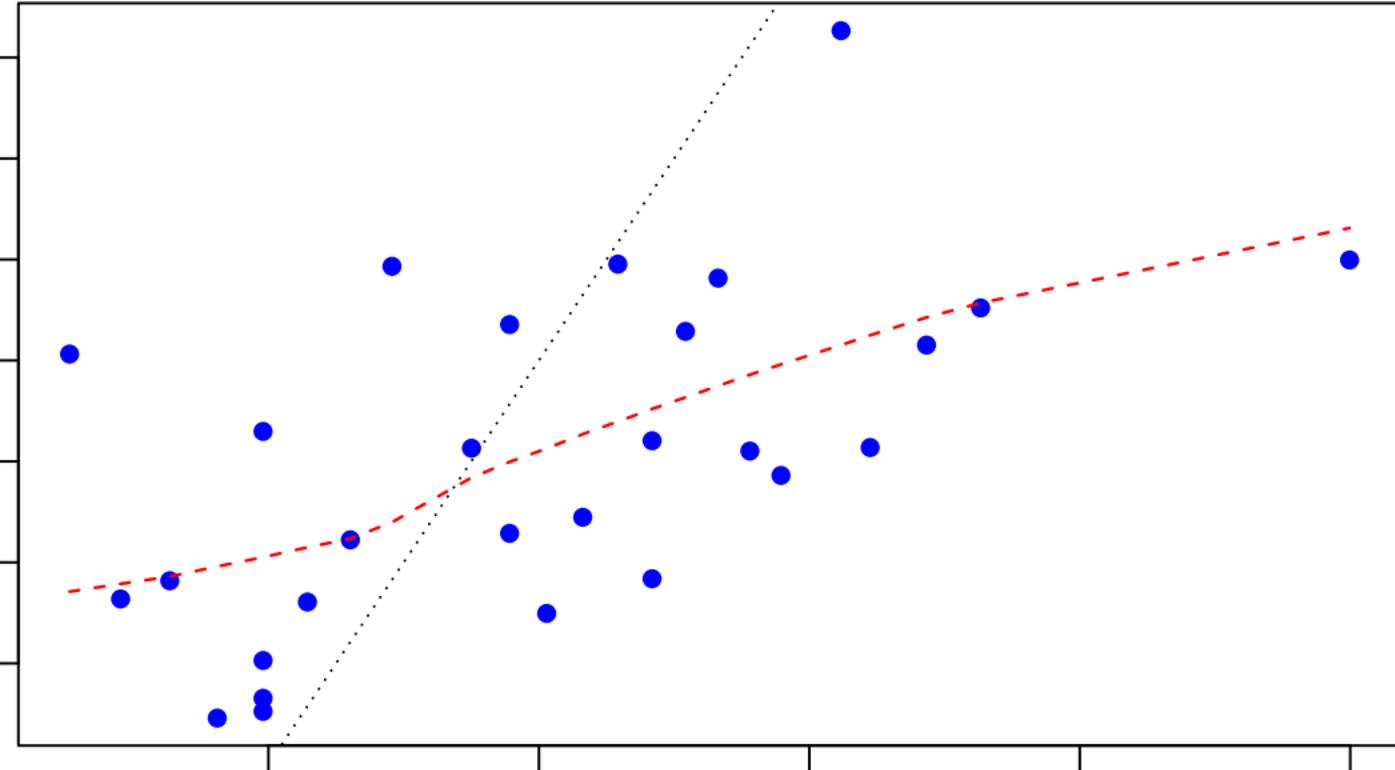


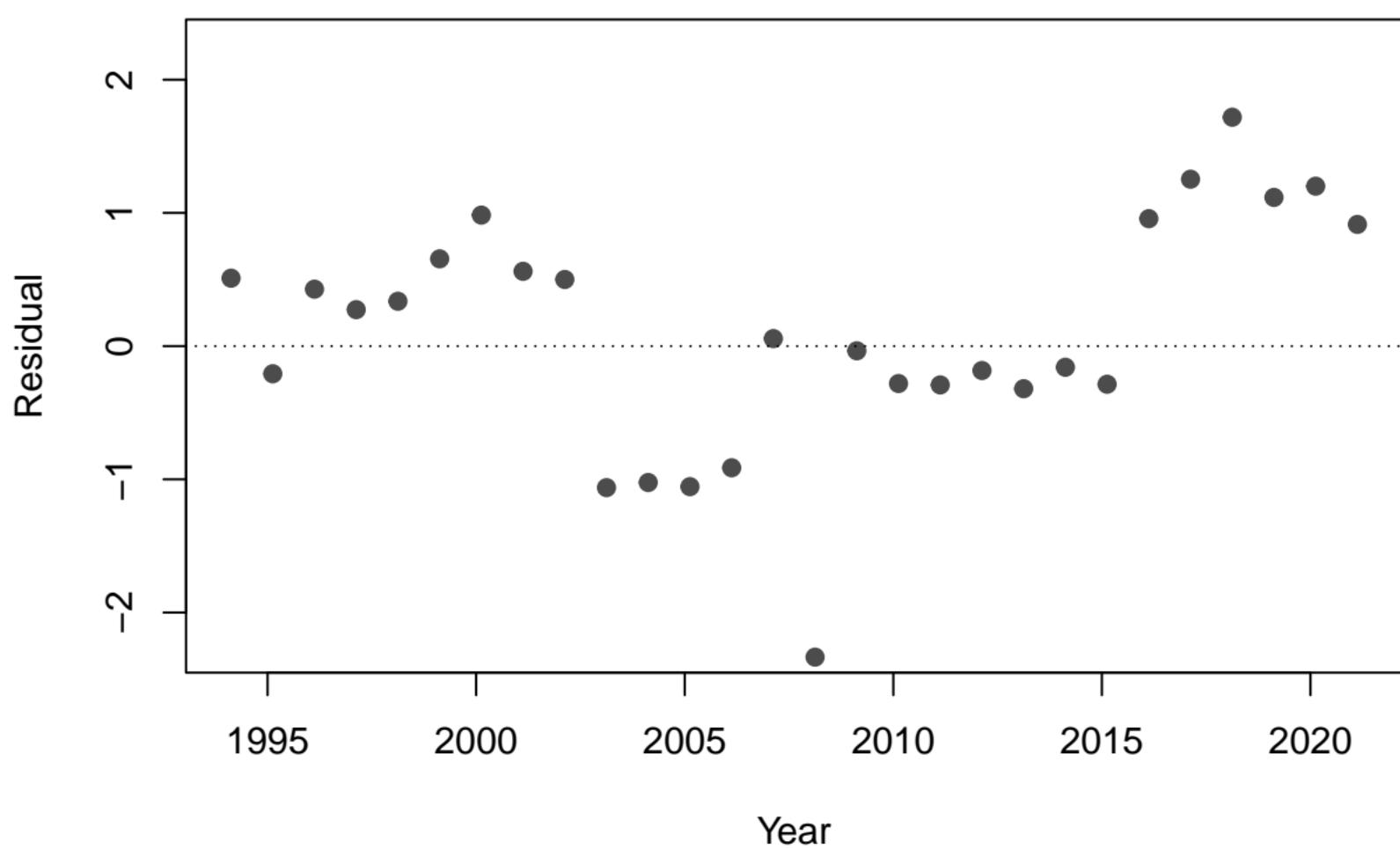
Log expected index

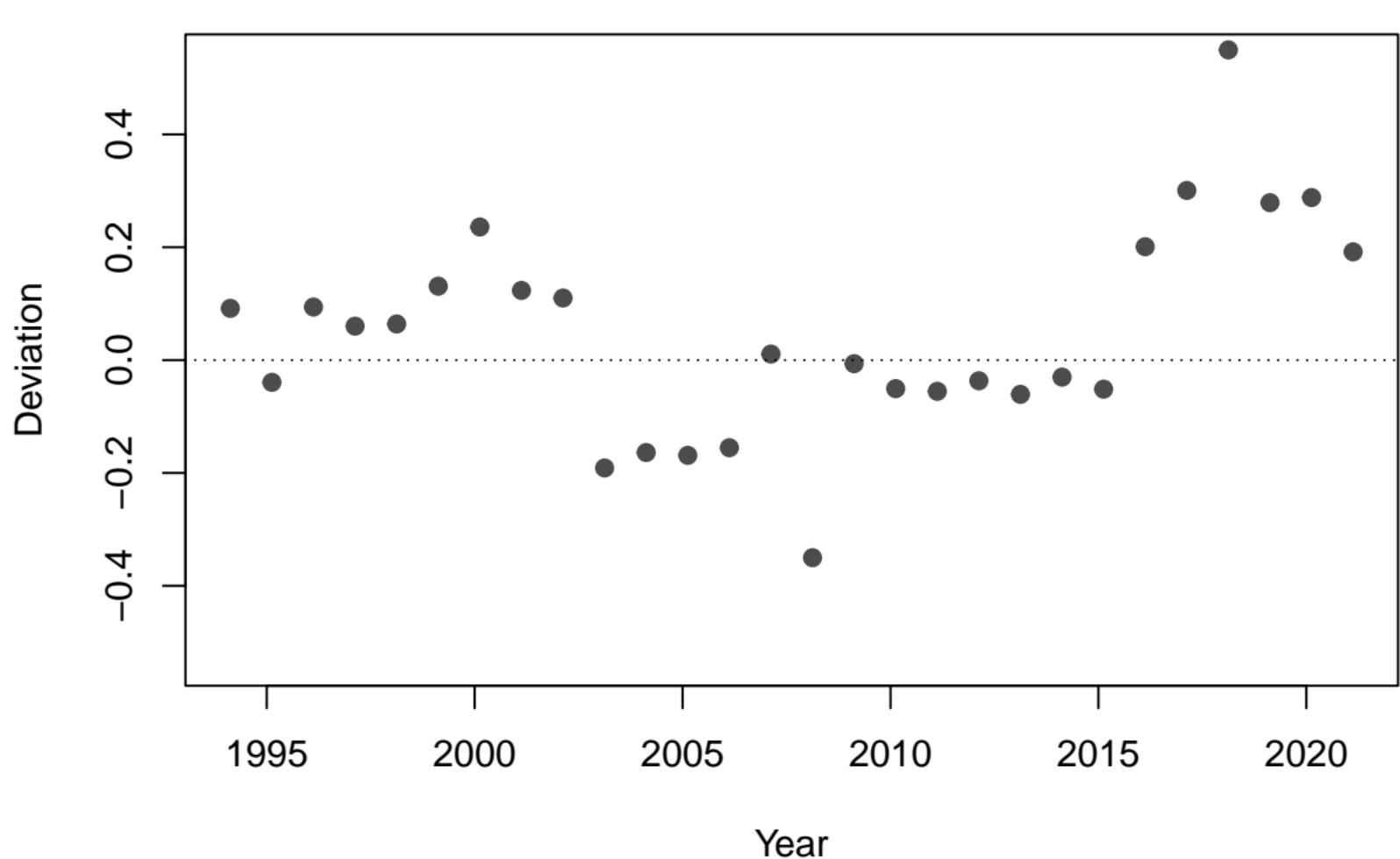
-0.85
-0.95
-1.05
-1.15

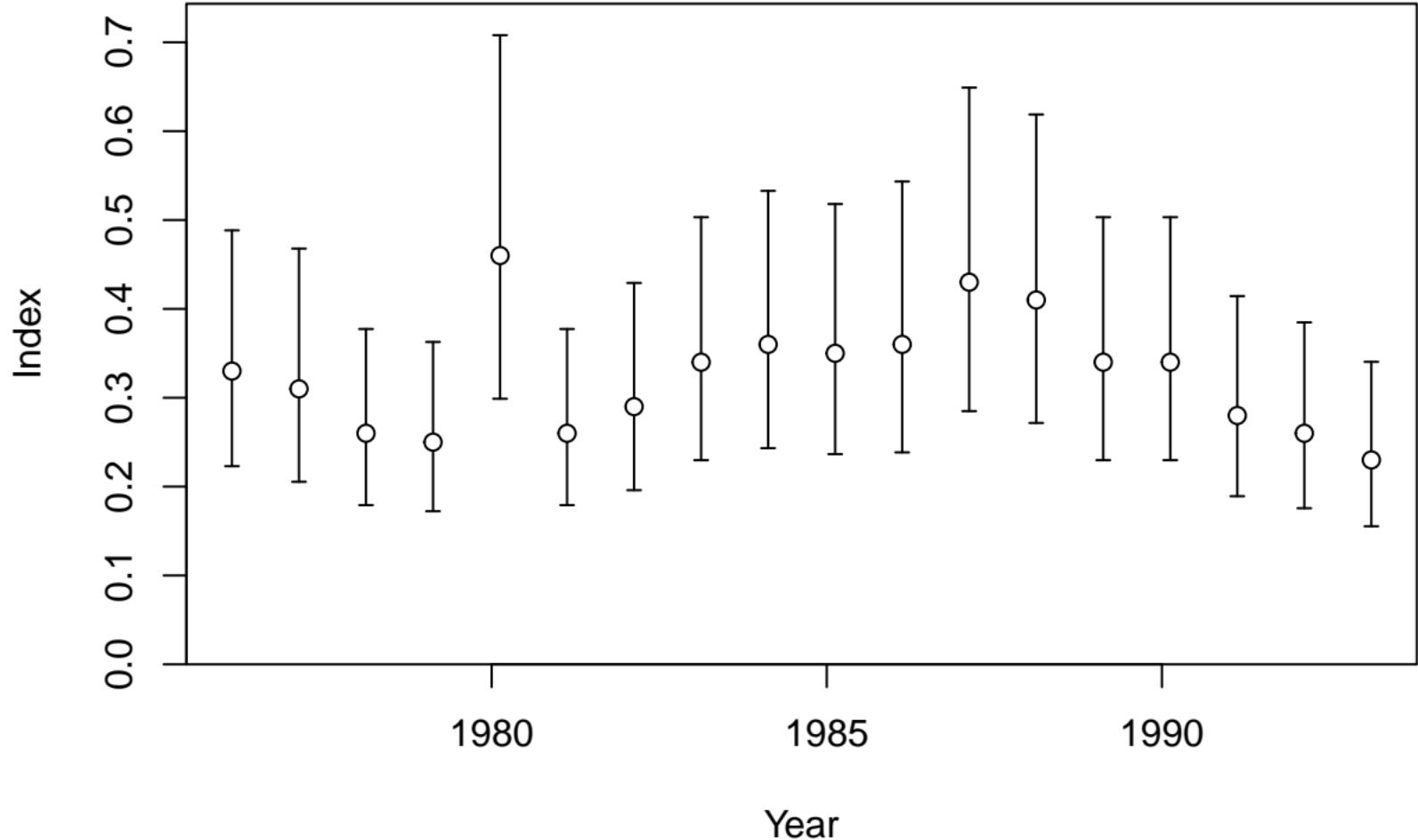
-1.2 -1.0 -0.8 -0.6 -0.4

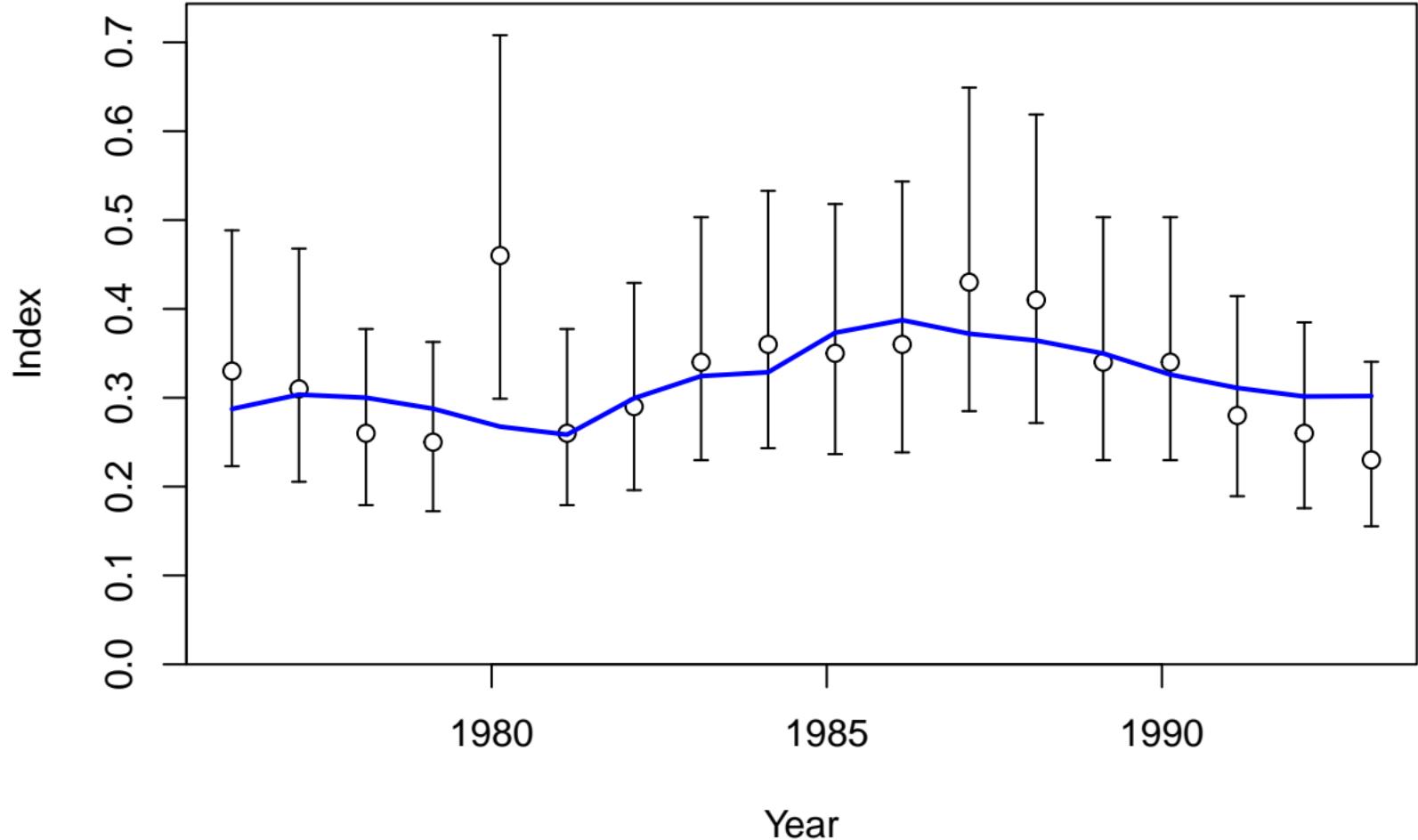
Log observed index



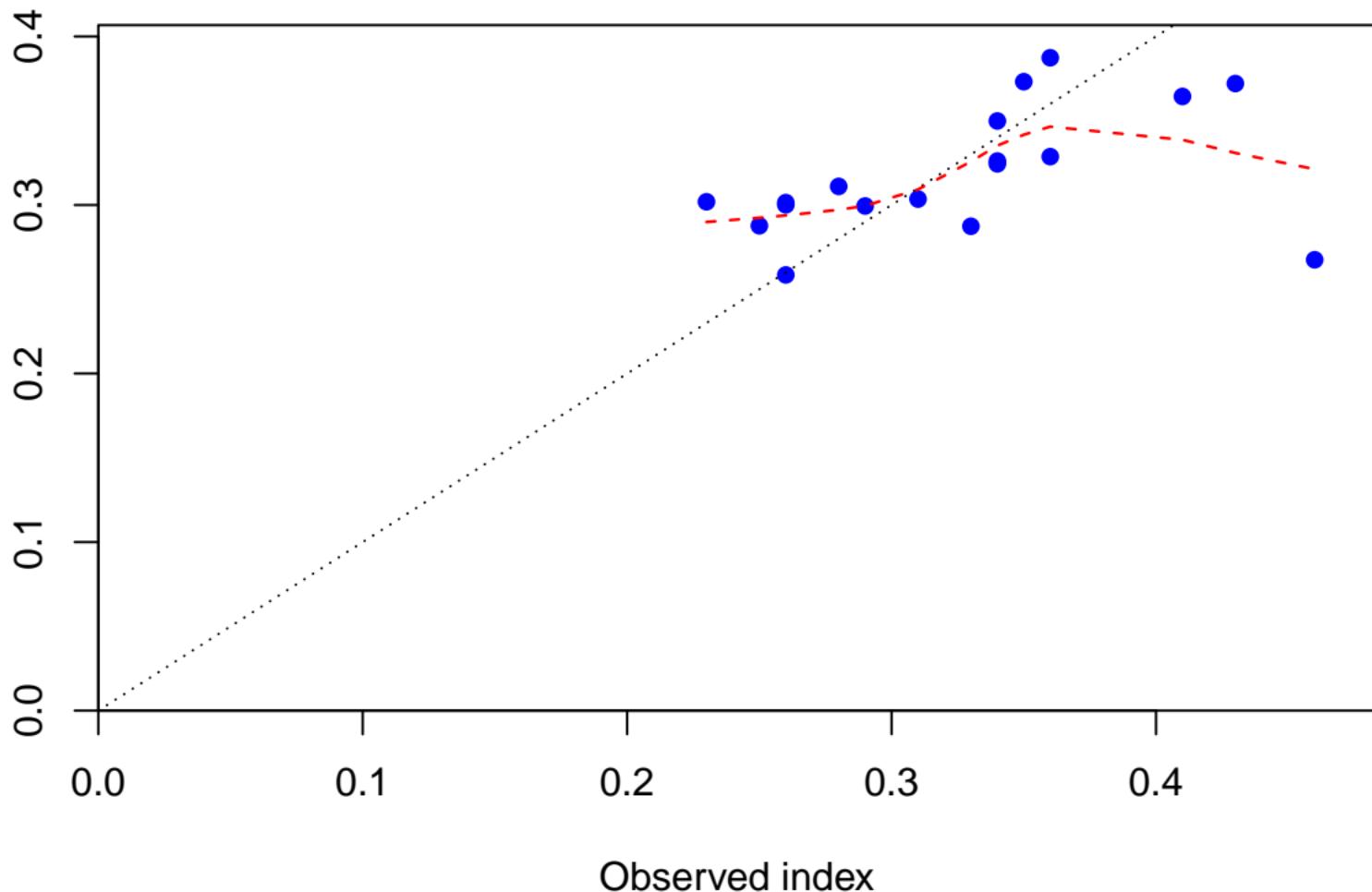






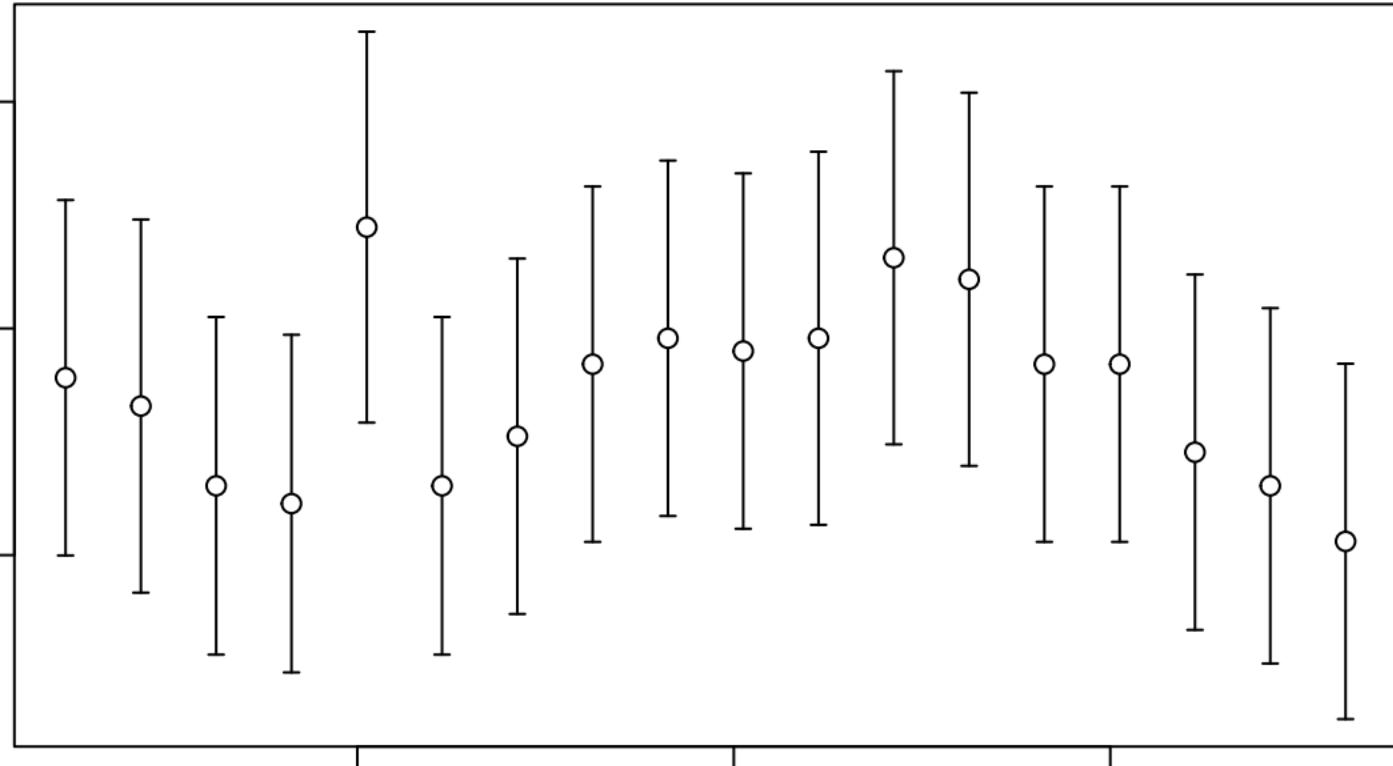


Expected index



Log index

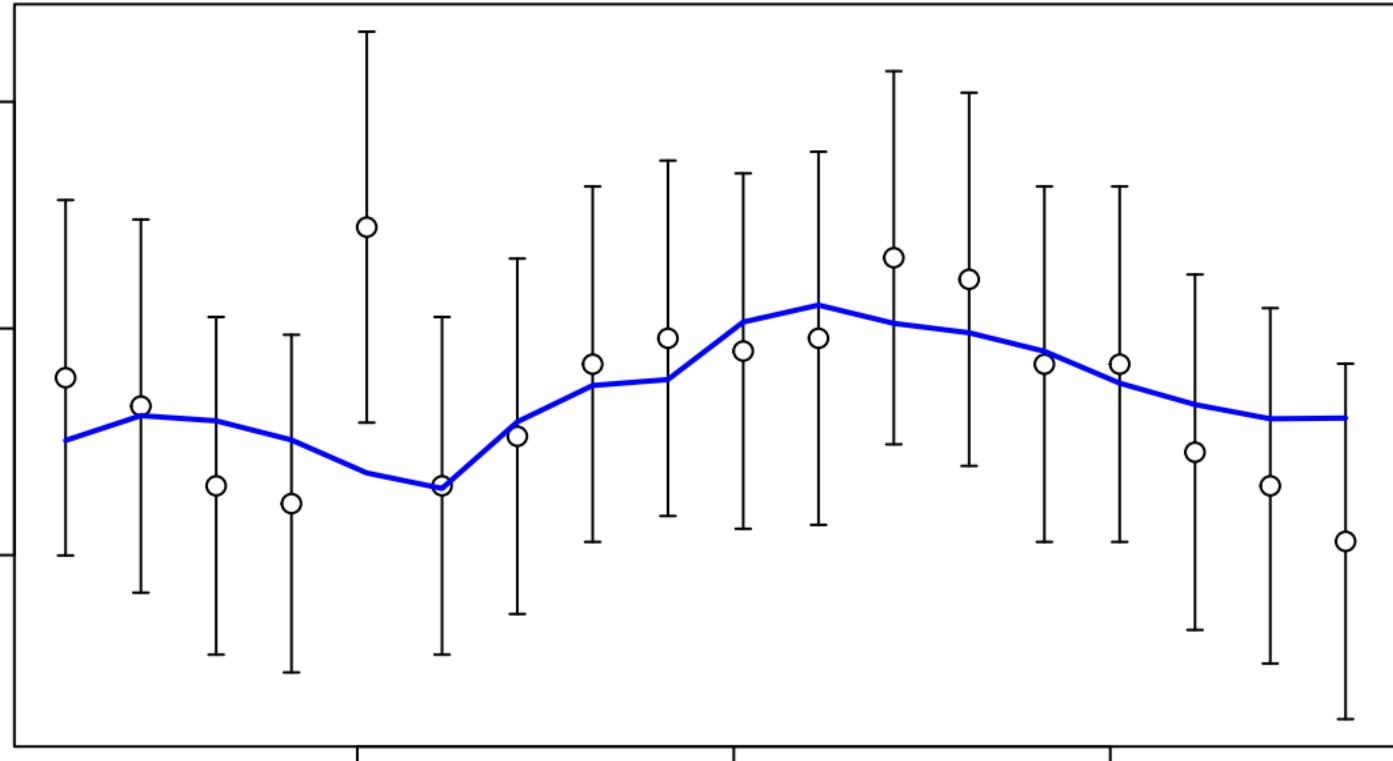
-0.5
-1.0
-1.5



Year

Log index

-0.5
-1.0
-1.5



1980

1985

1990

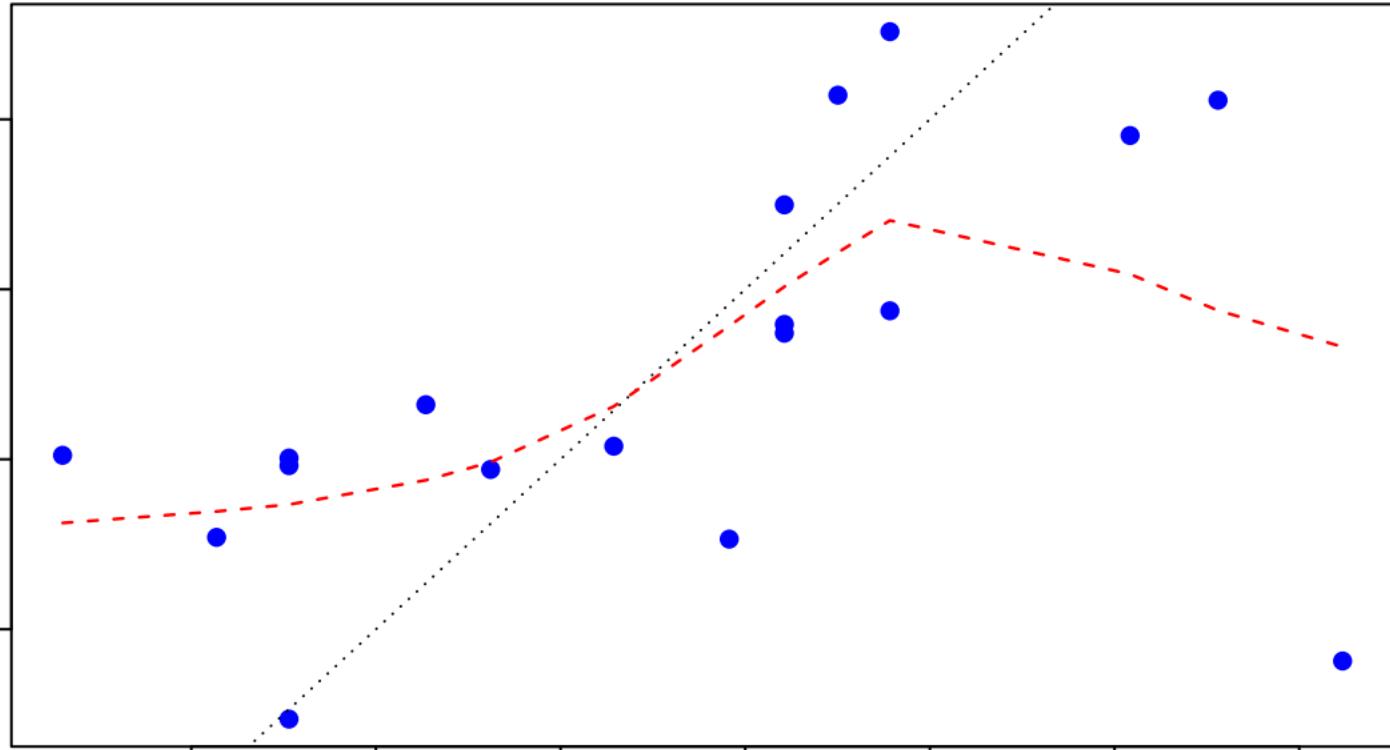
Year

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

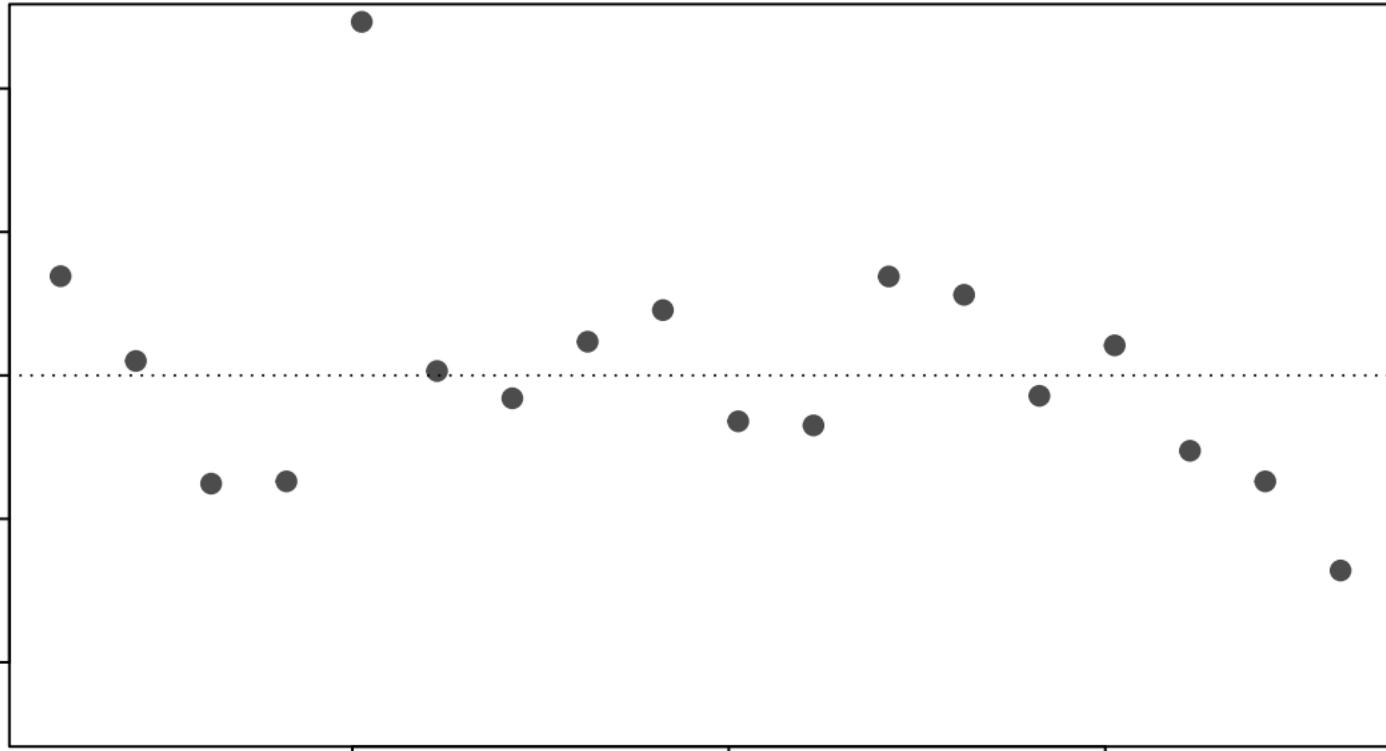


Residual

2
1
0
-1
-2

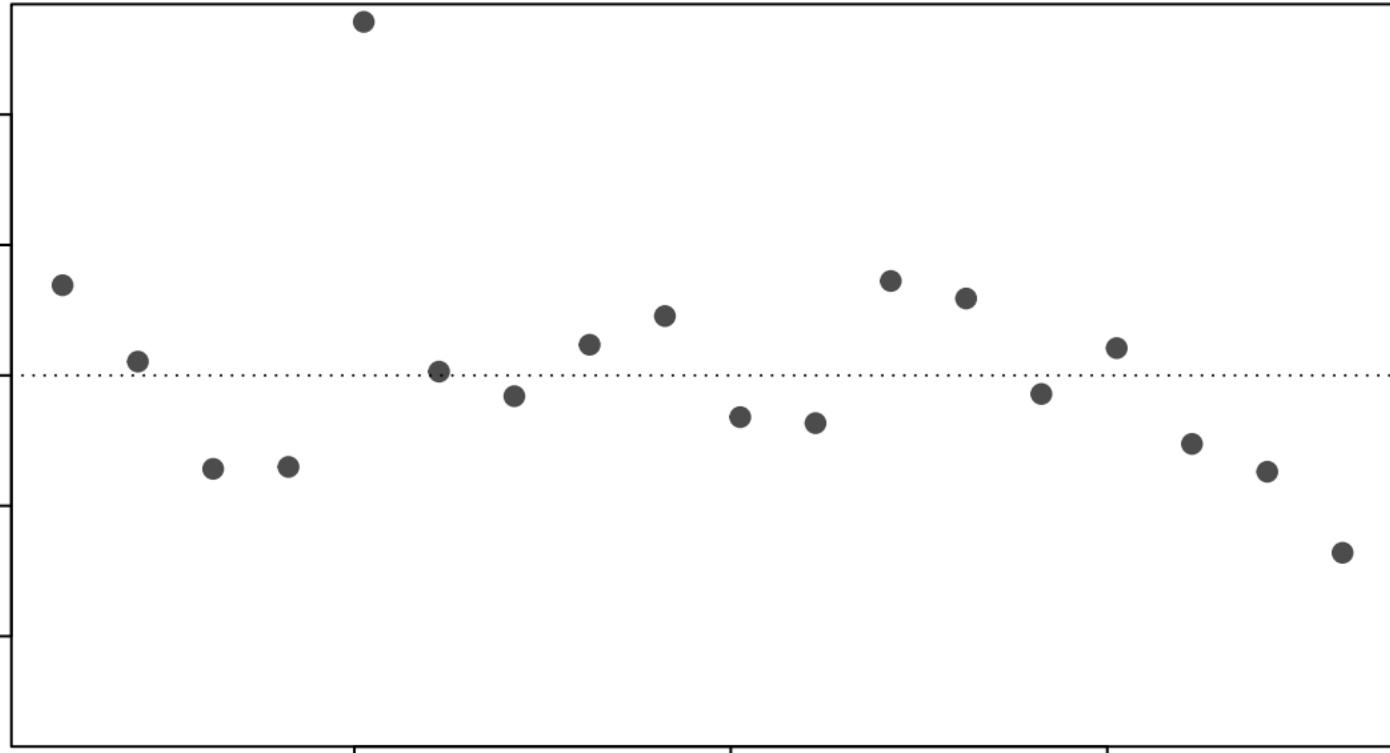
1980 1985 1990

Year

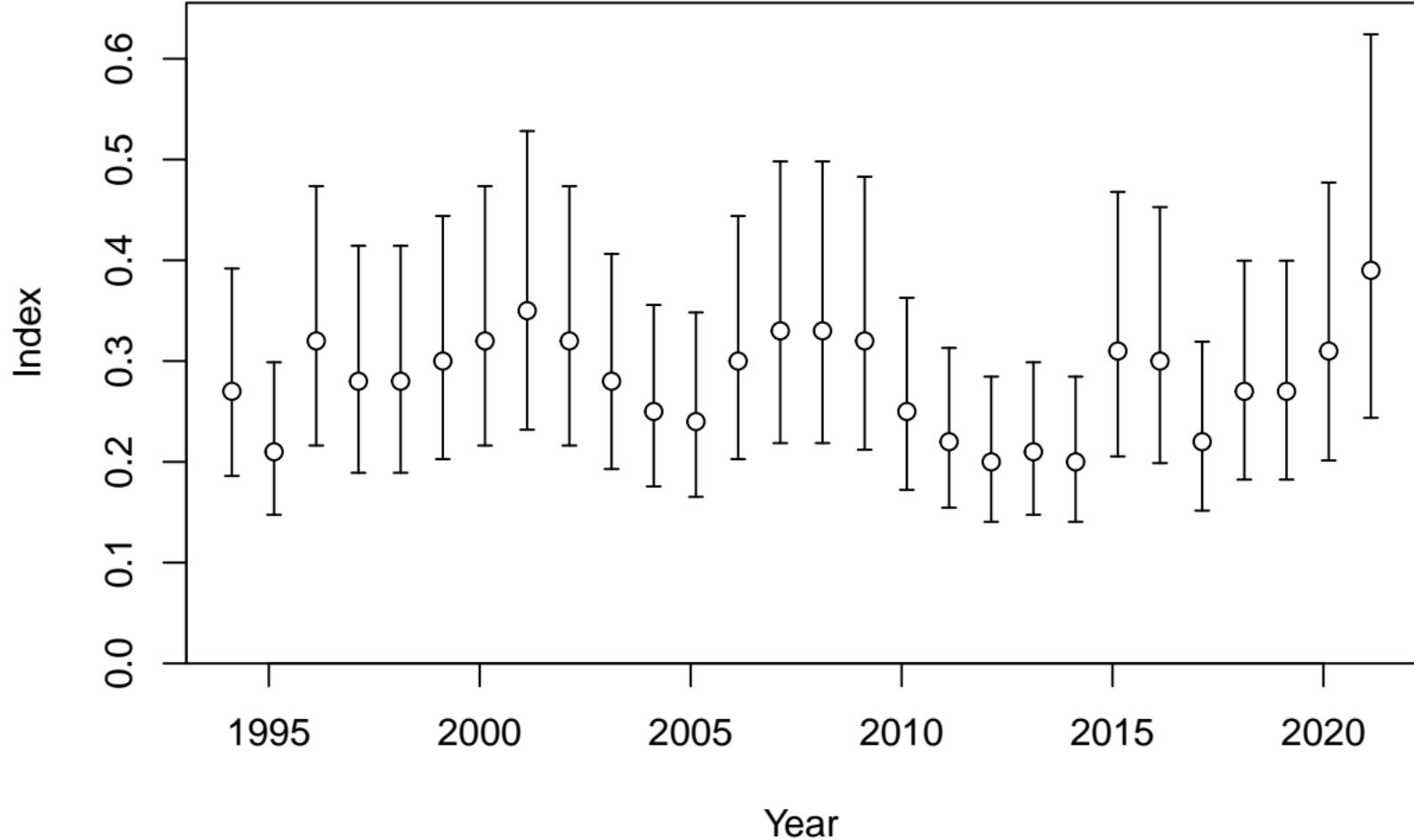


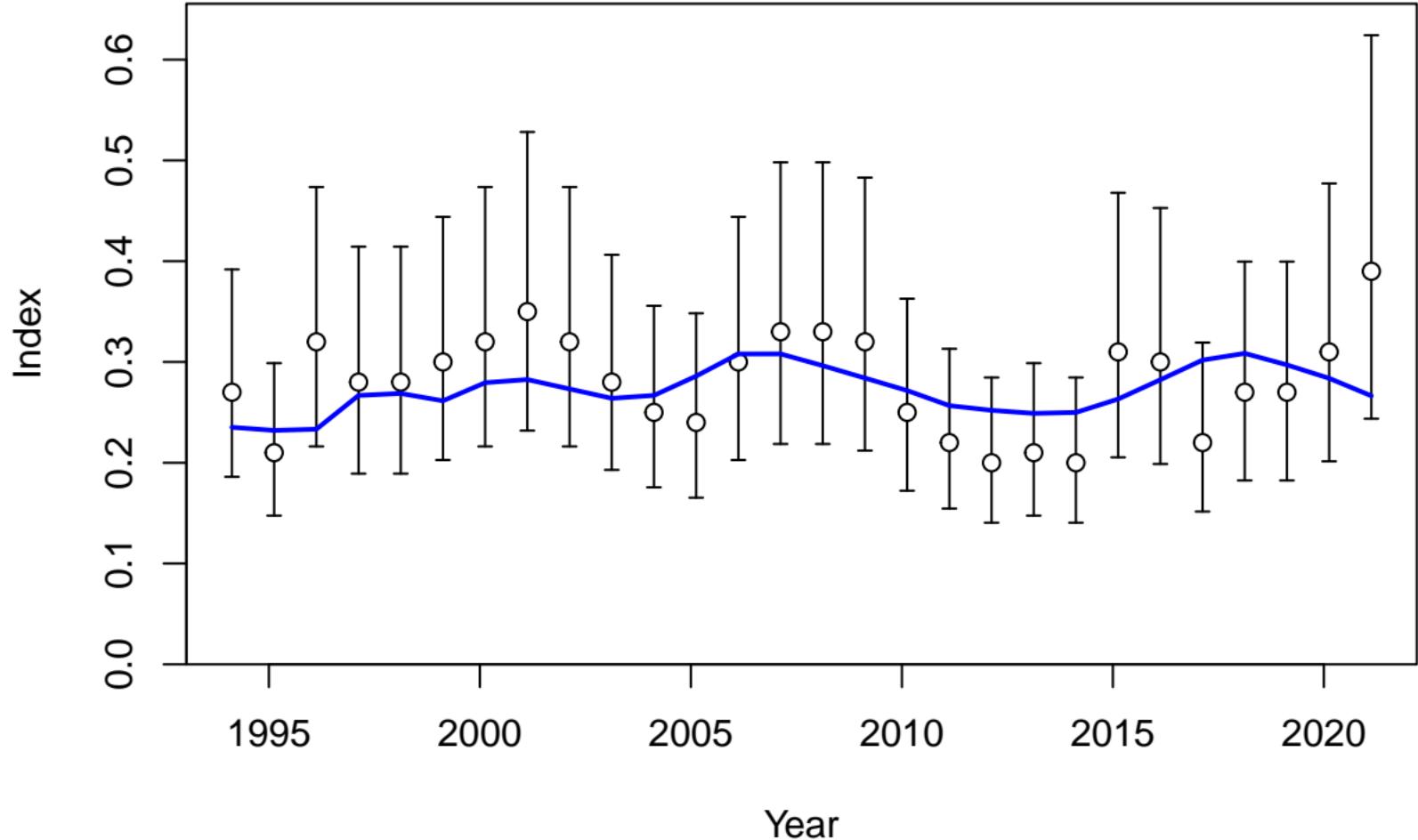
Deviation

-0.4 -0.2 0.0 0.2 0.4



Year



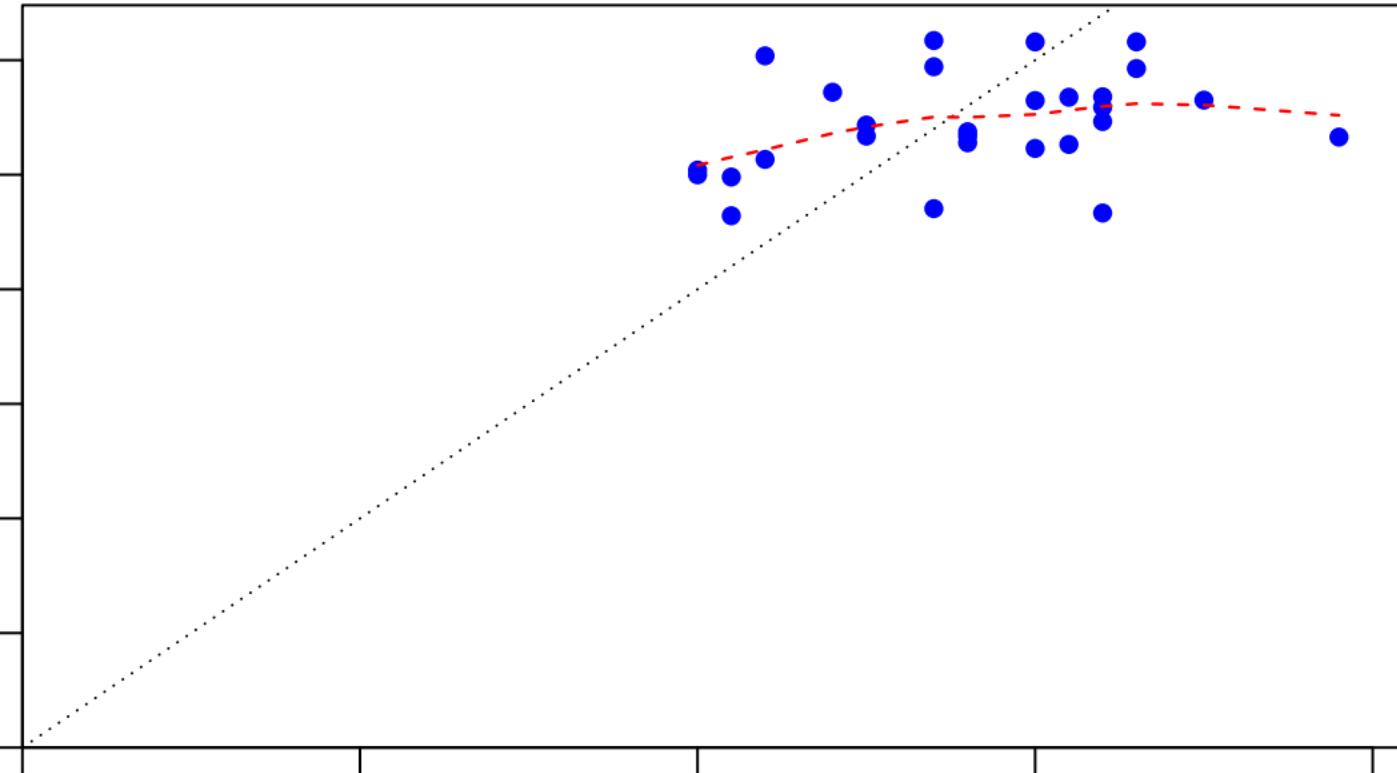


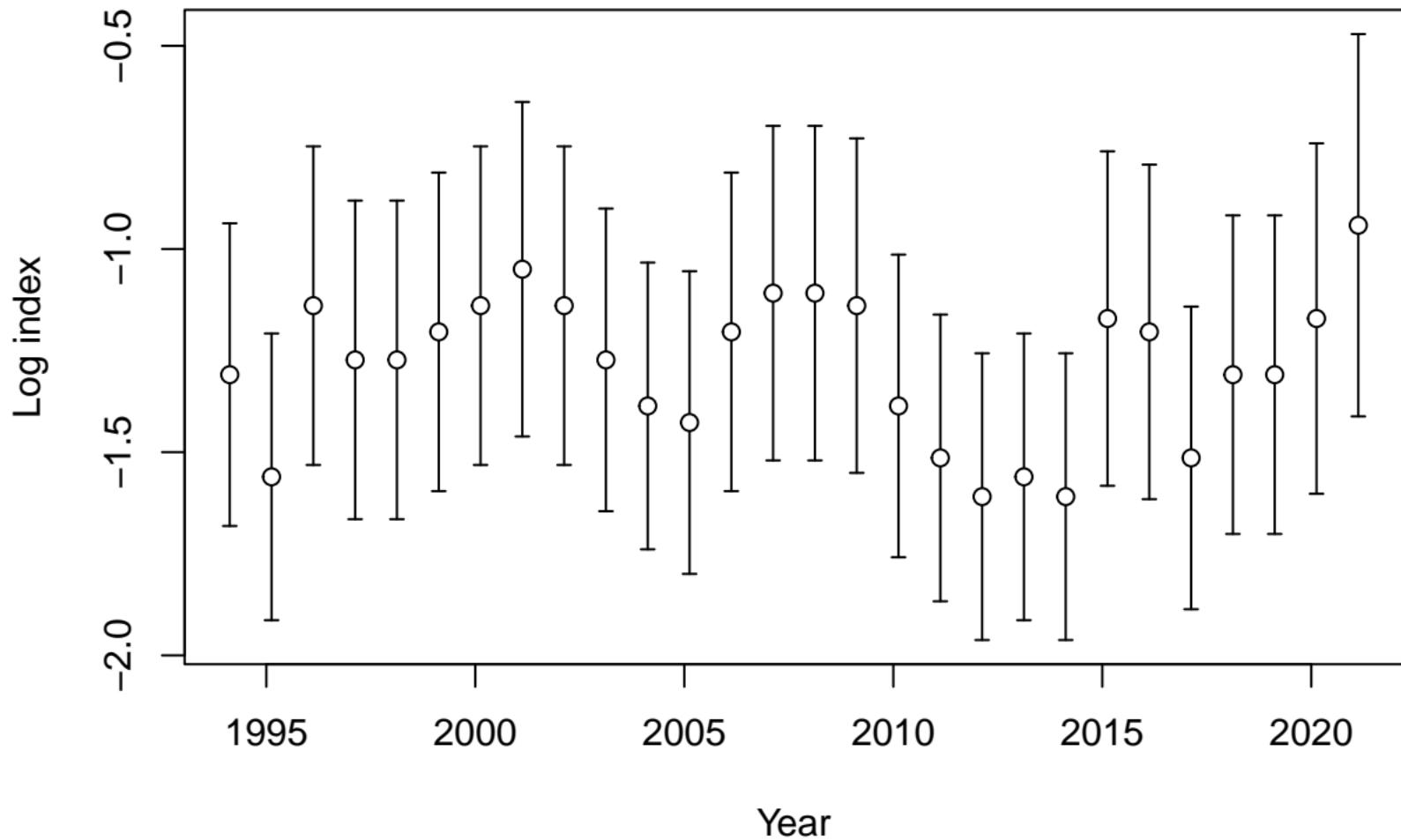
Expected index

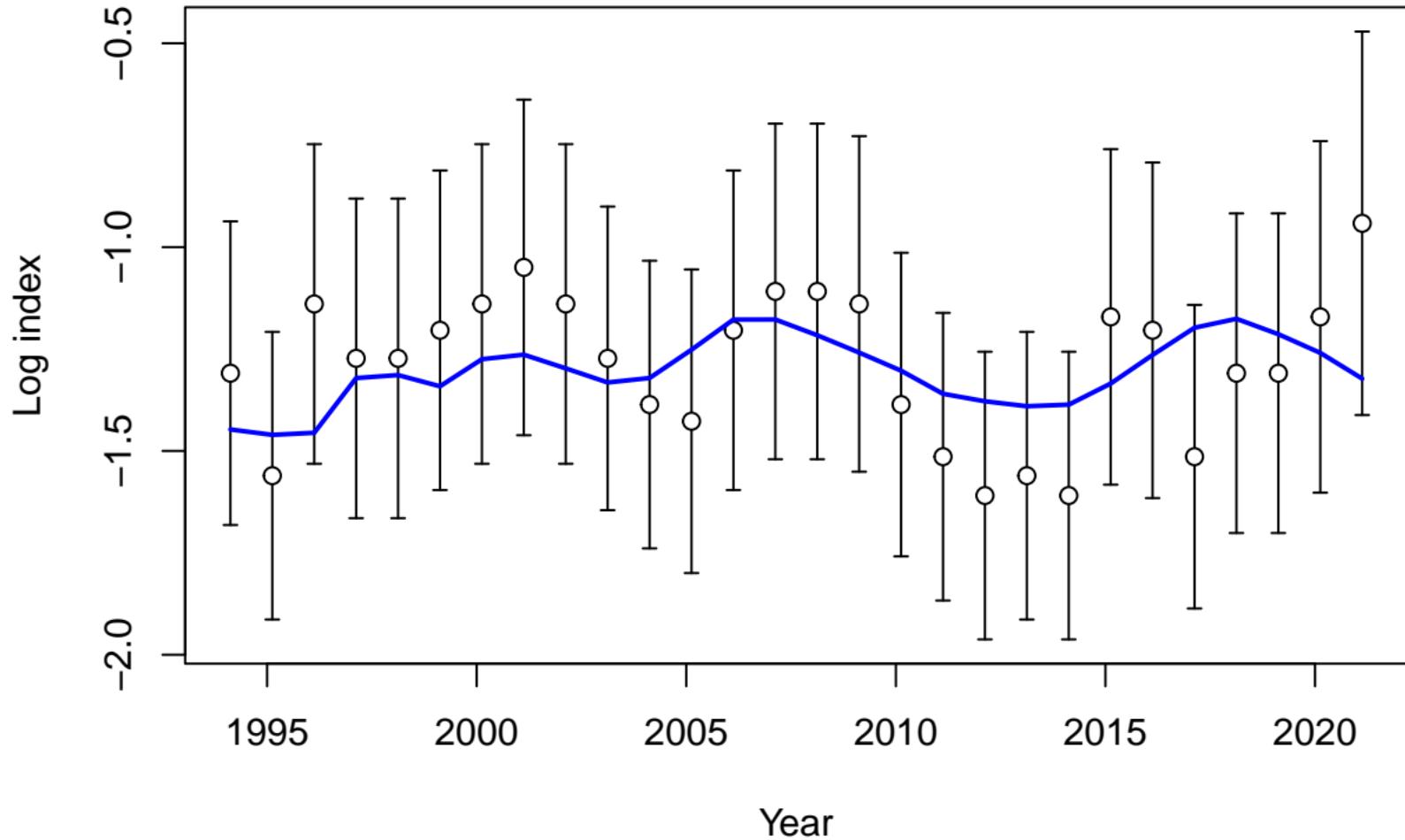
0.30
0.20
0.10
0.00

0.0 0.1 0.2 0.3 0.4

Observed index





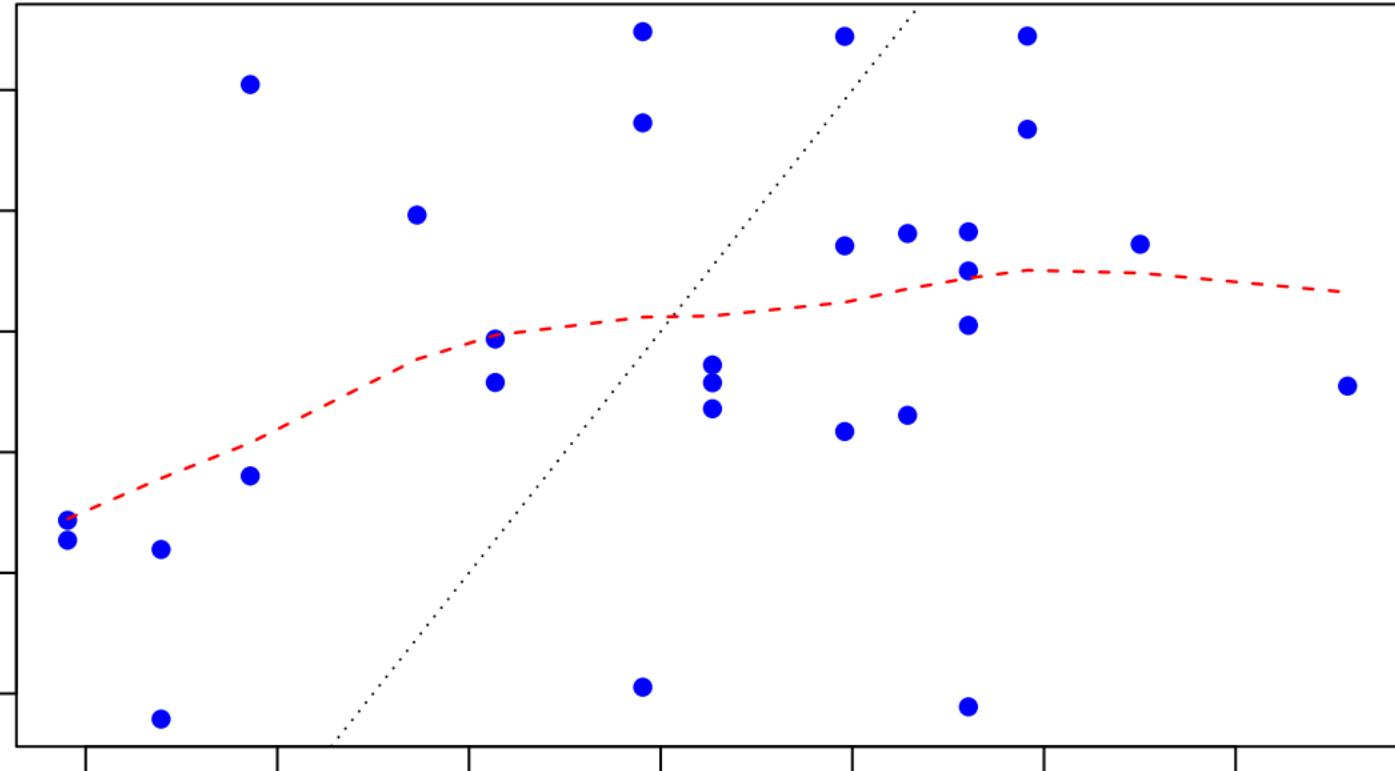


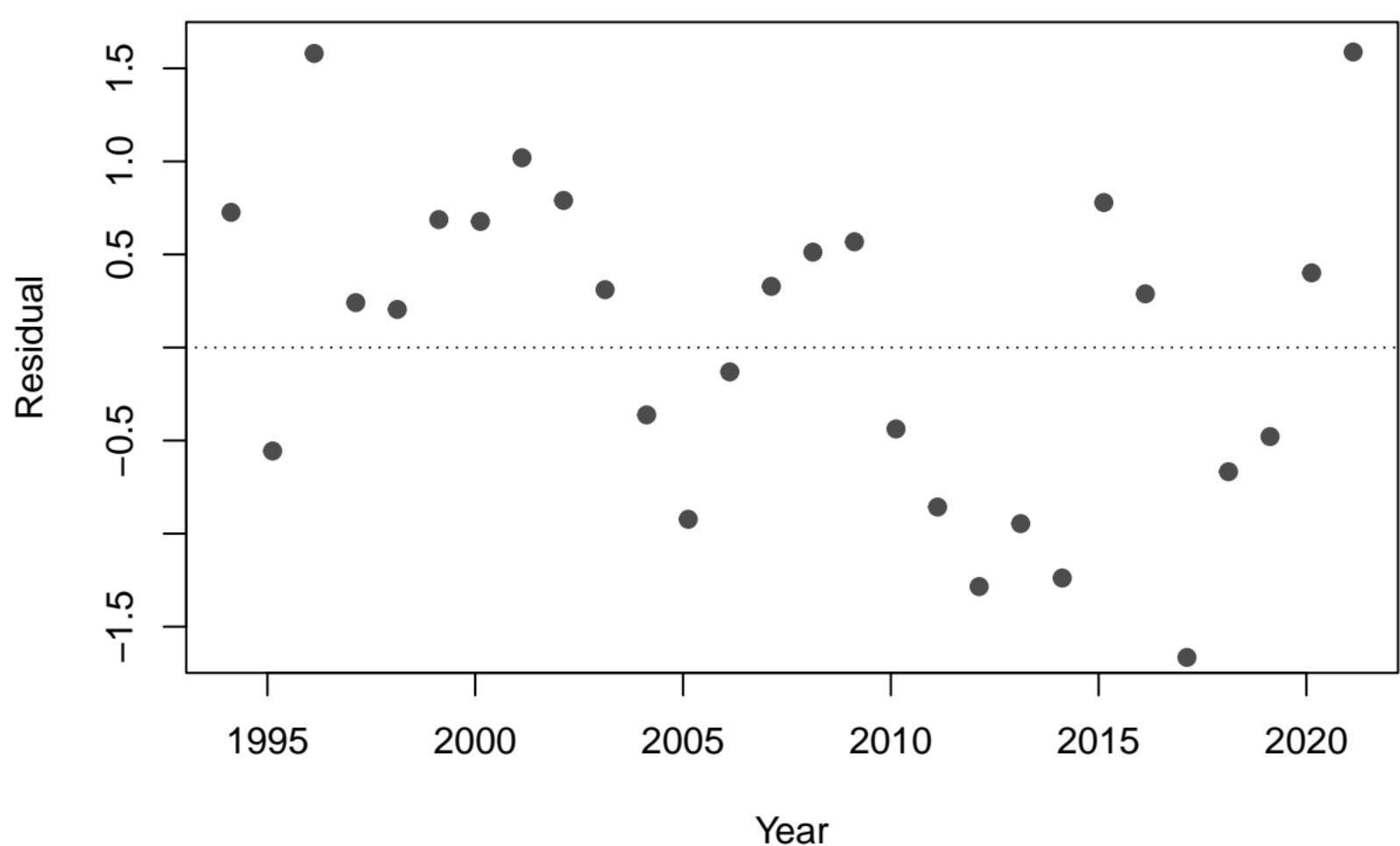
Log expected index

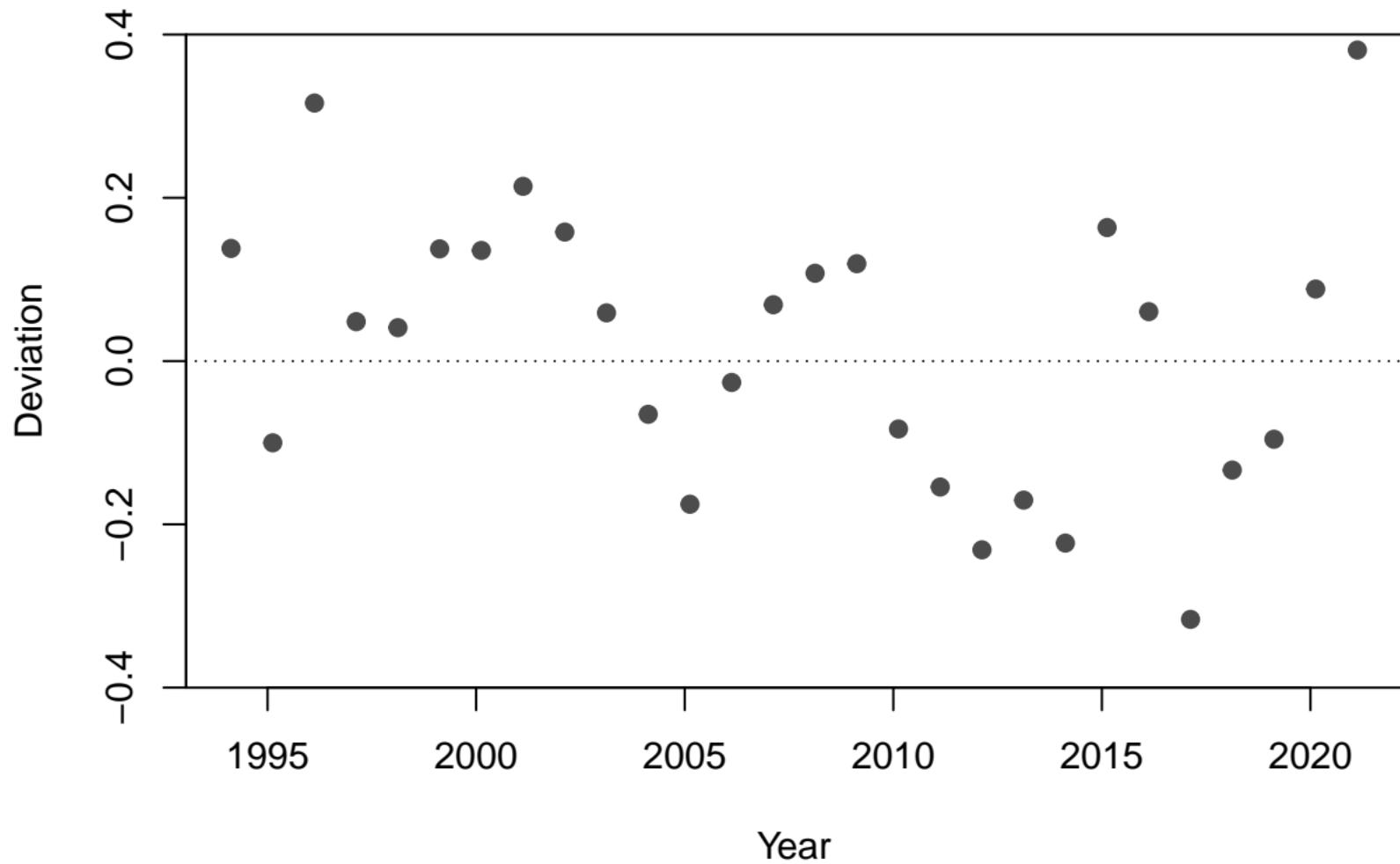
-1.25
-1.35
-1.45

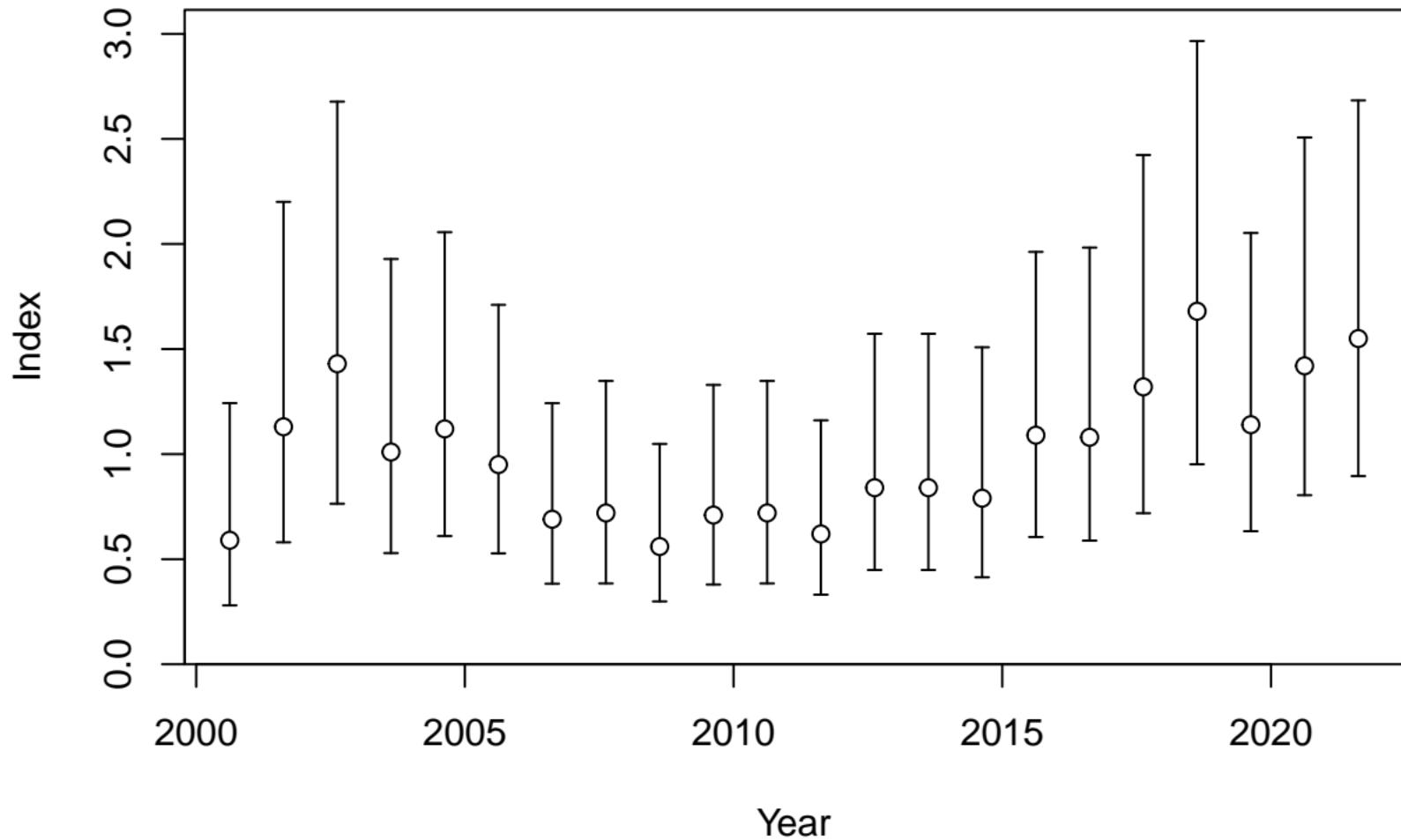
-1.6 -1.5 -1.4 -1.3 -1.2 -1.1 -1.0

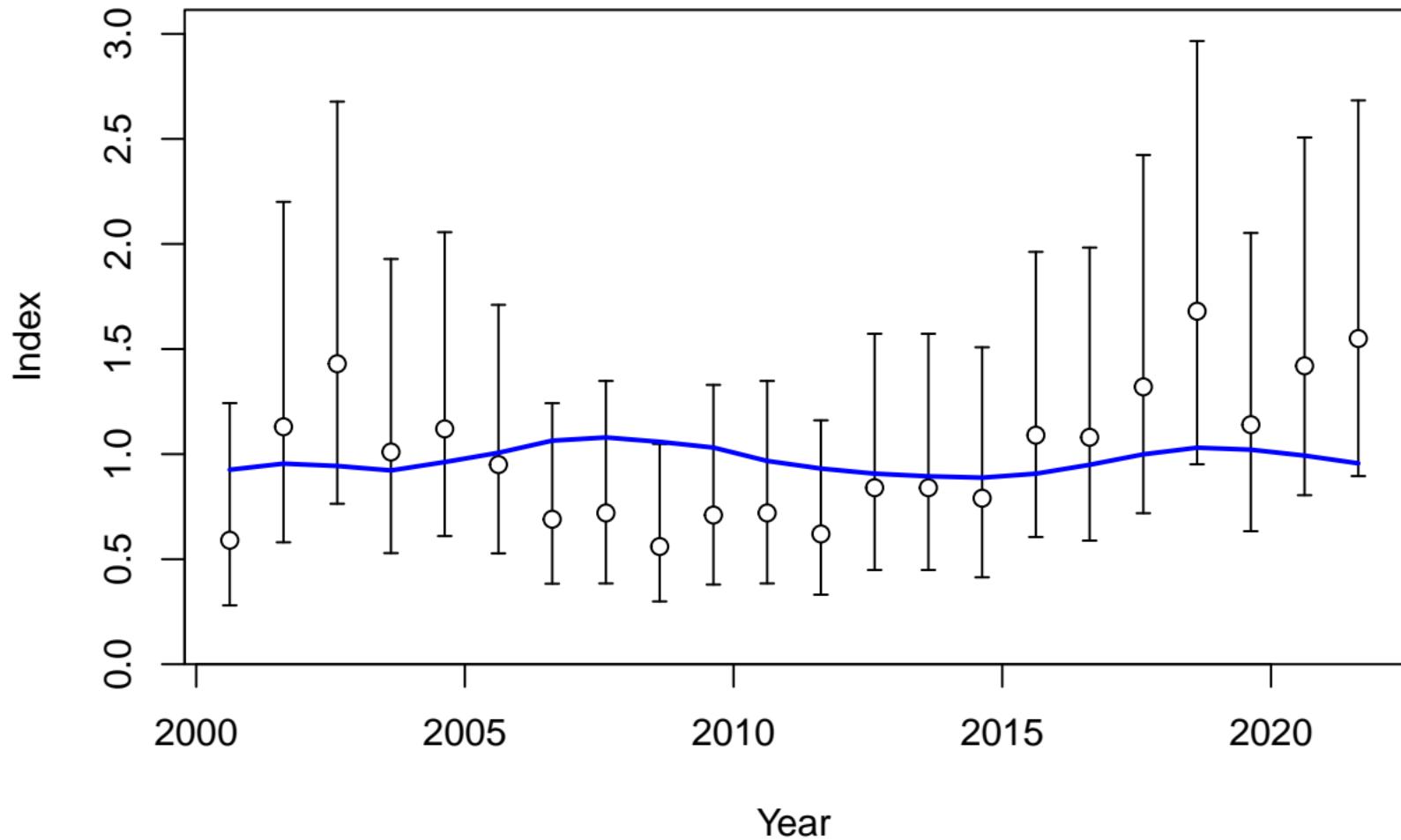
Log observed index











Expected index

1.0
0.8
0.6
0.4
0.2
0.0

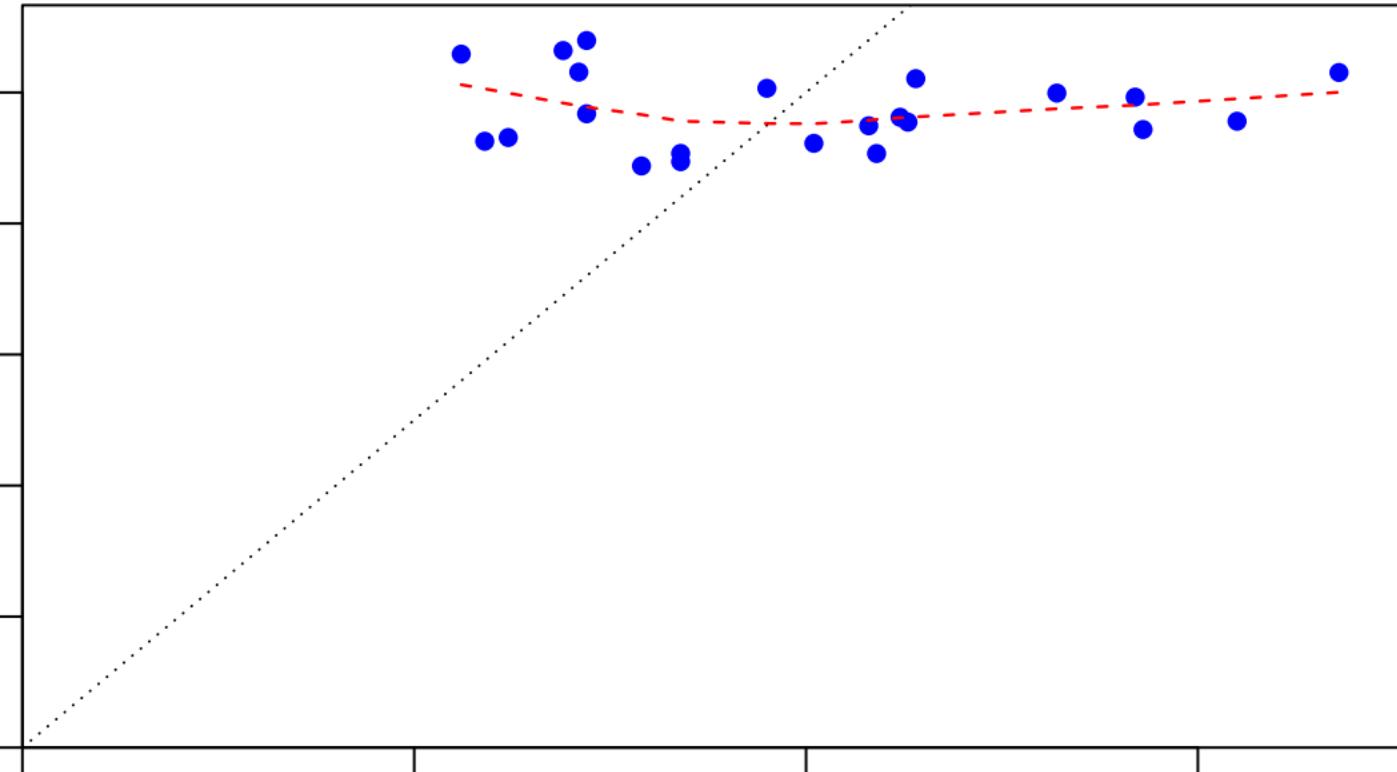
0.0

0.5

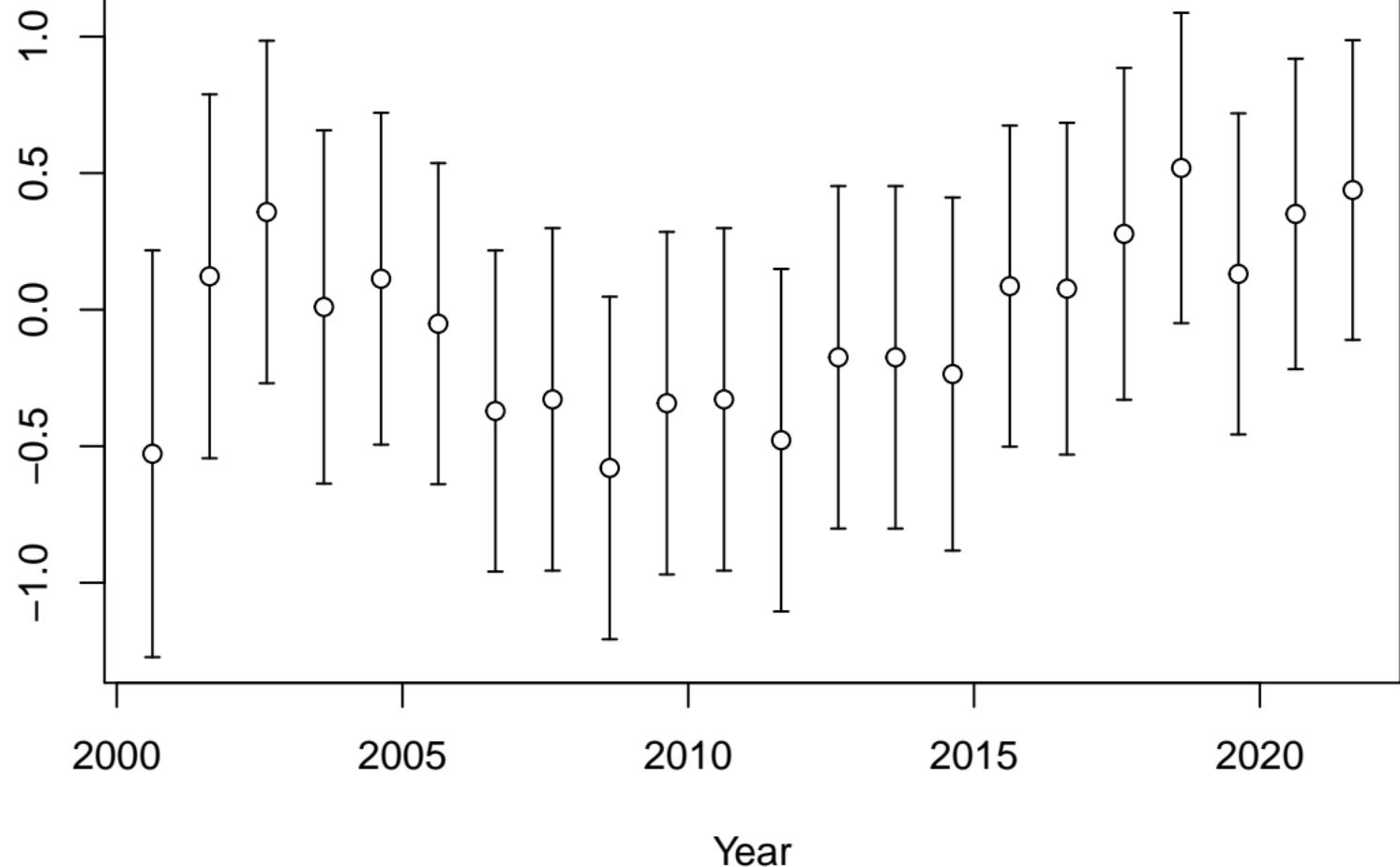
1.0

1.5

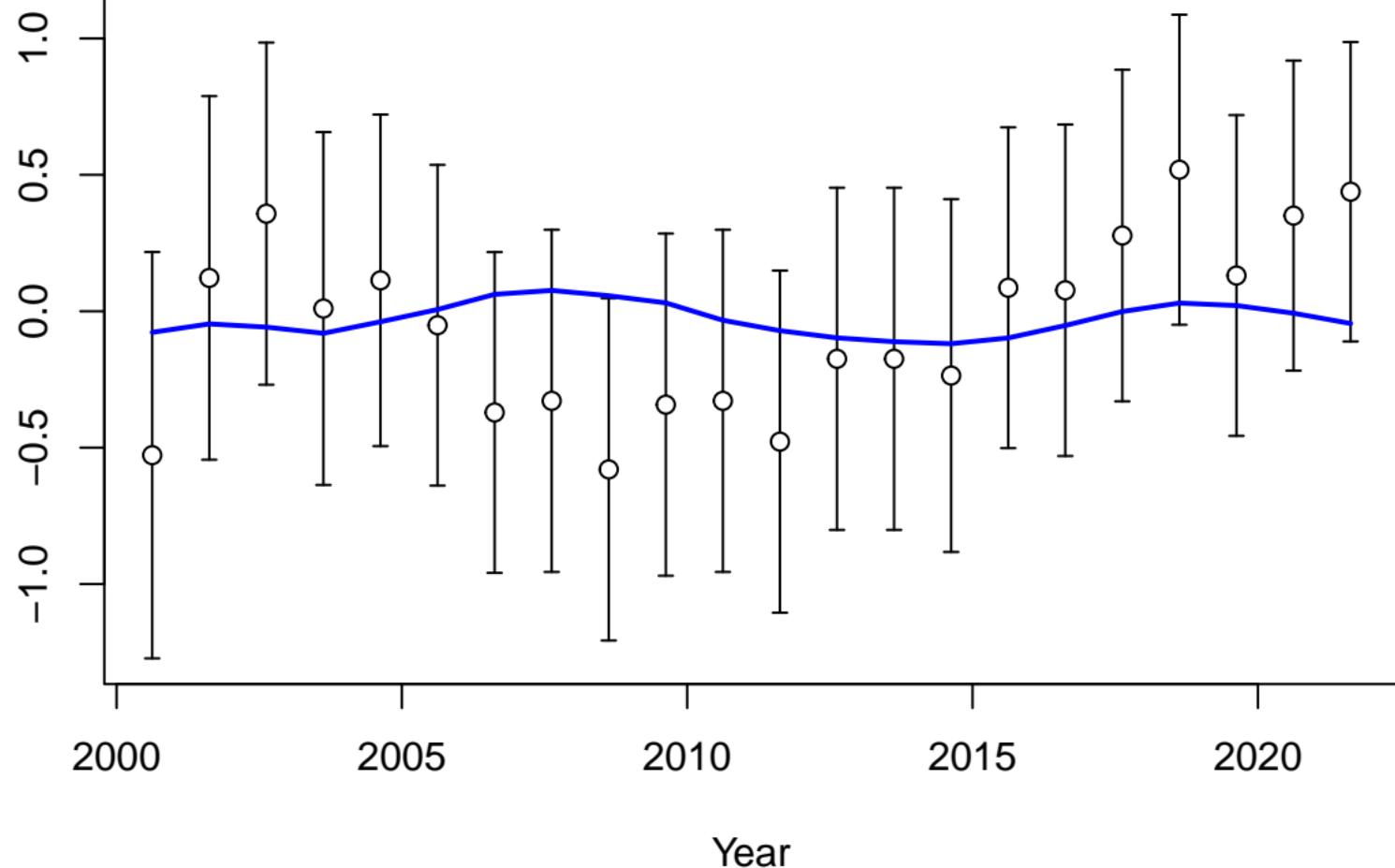
Observed index



Log index



Log index

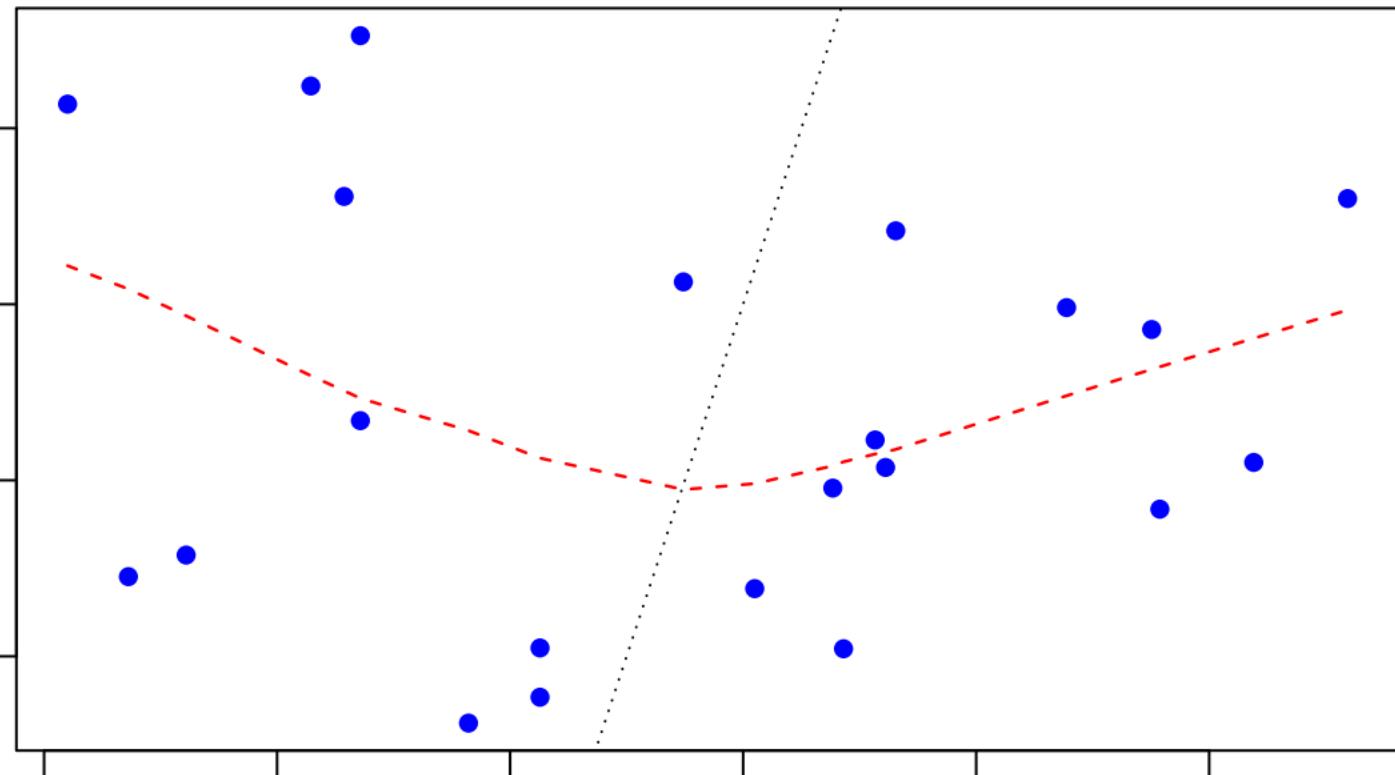


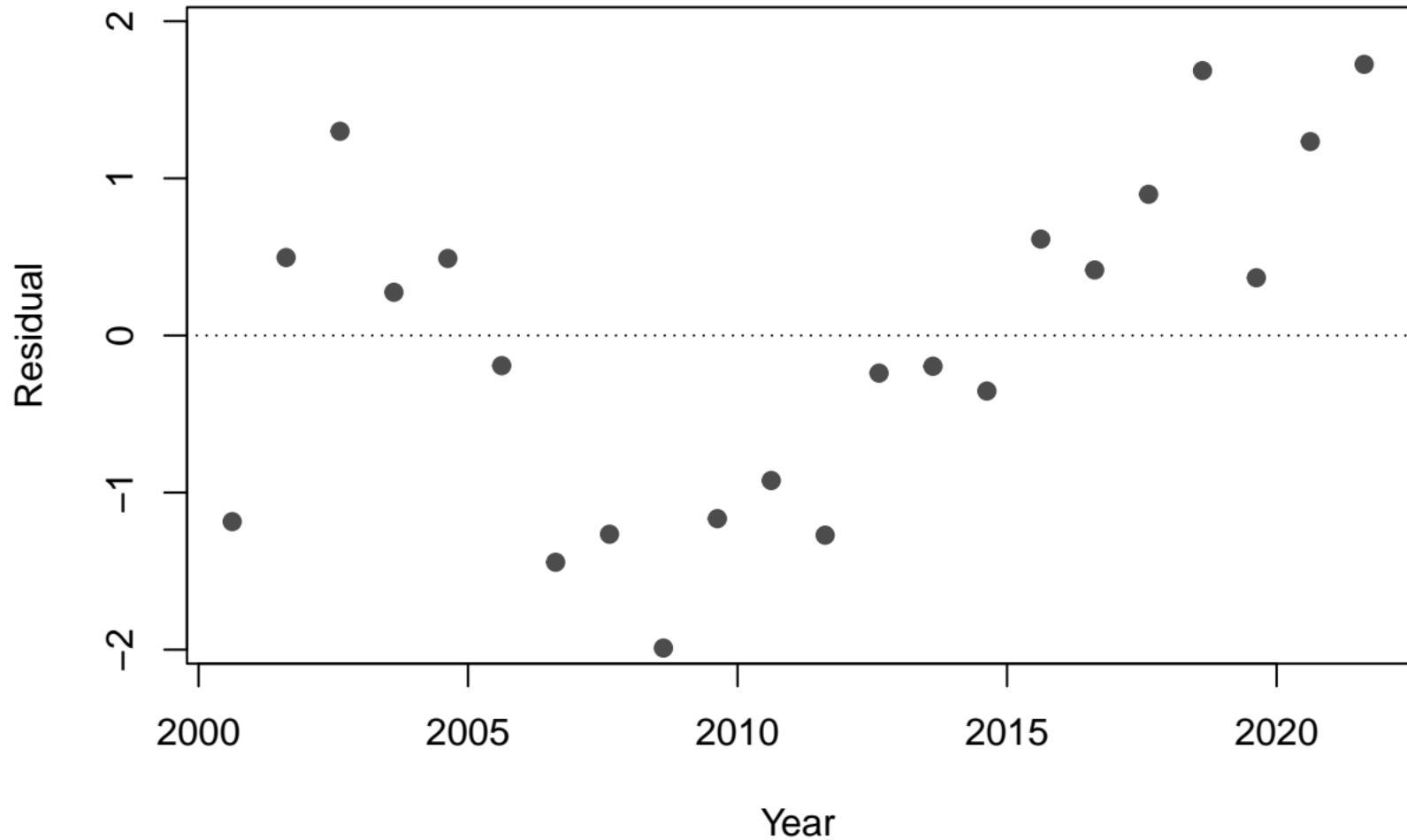
Log expected index

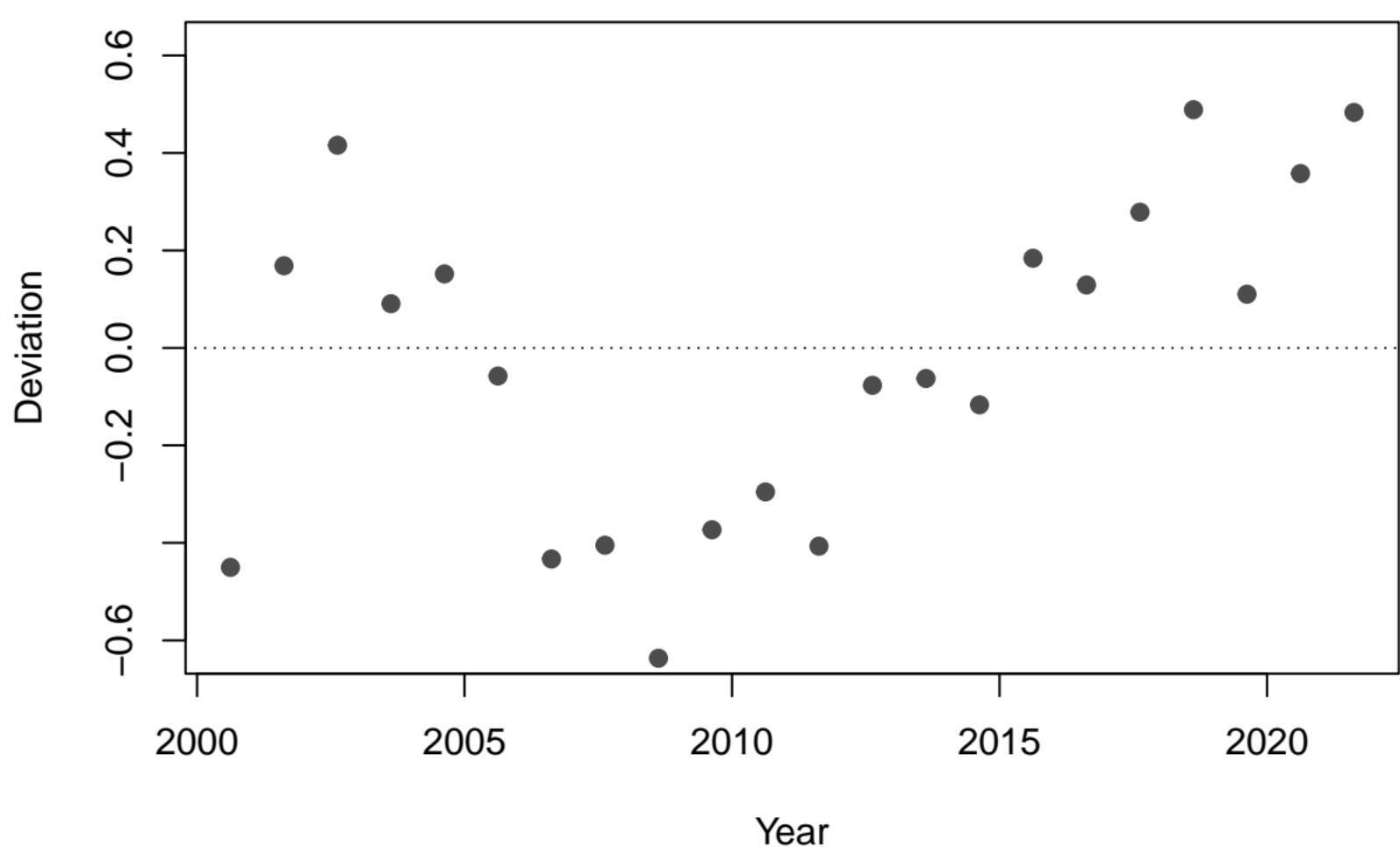
-0.10
-0.05
0.00
0.05

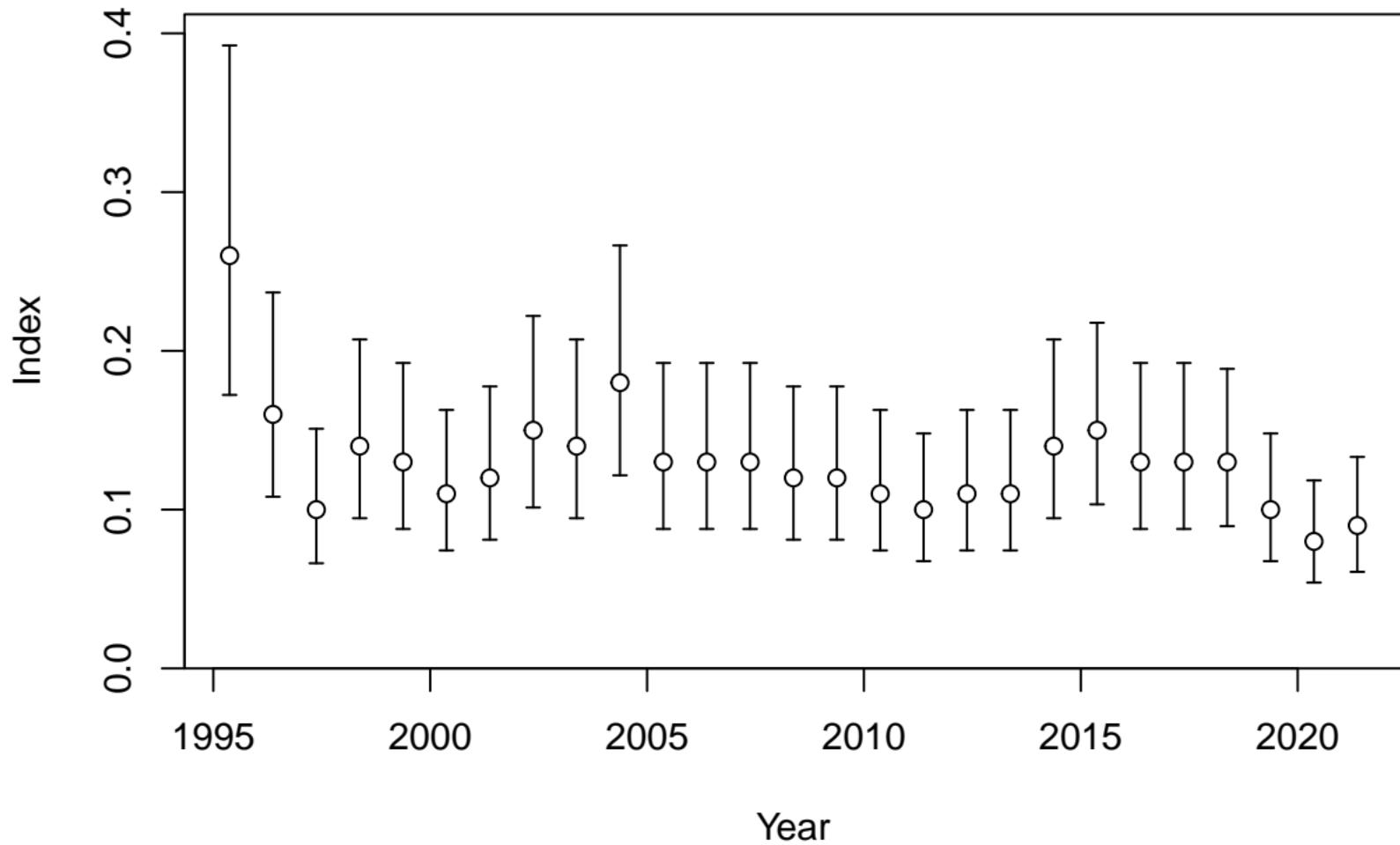
-0.6 -0.4 -0.2 0.0 0.2 0.4

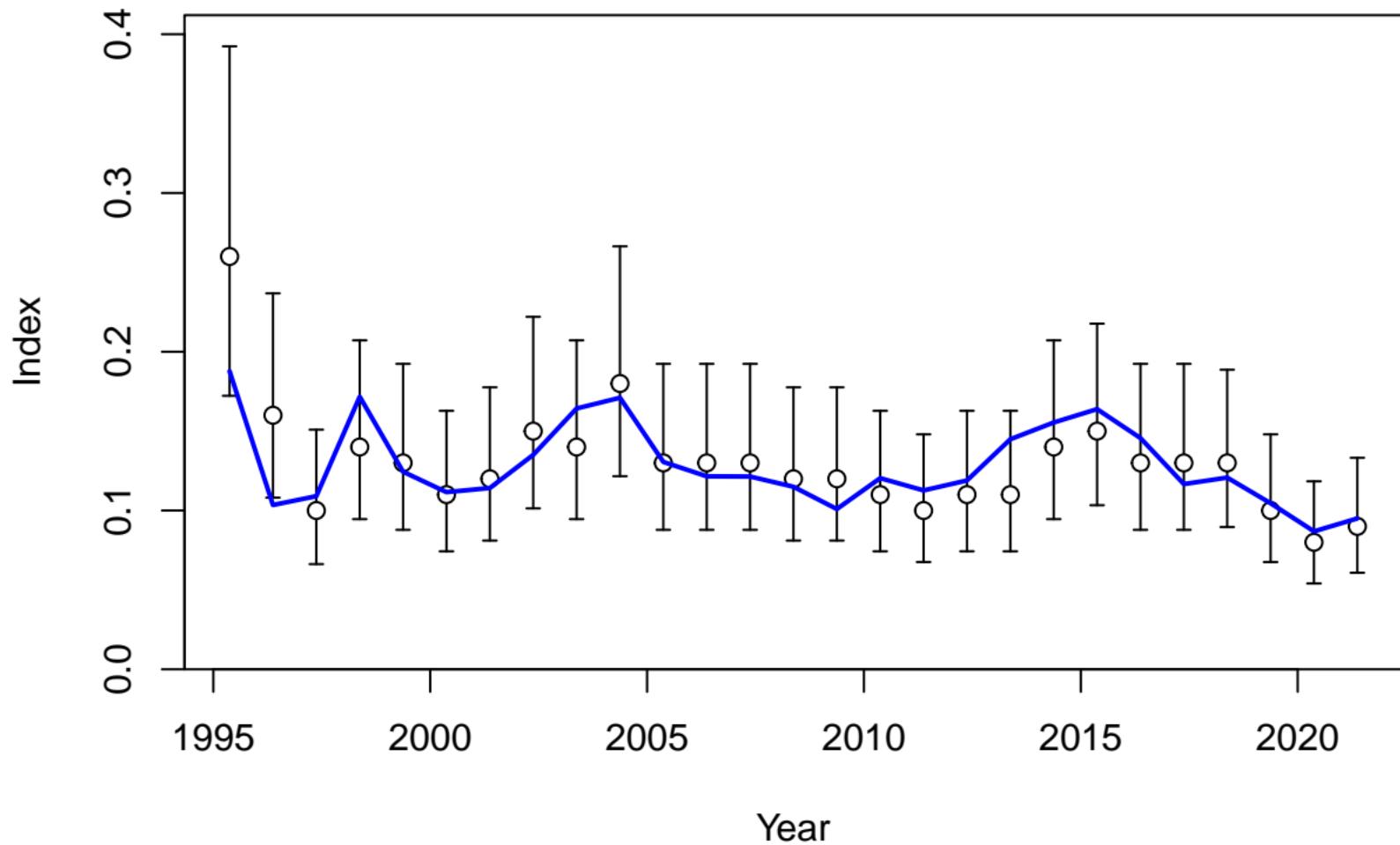
Log observed index









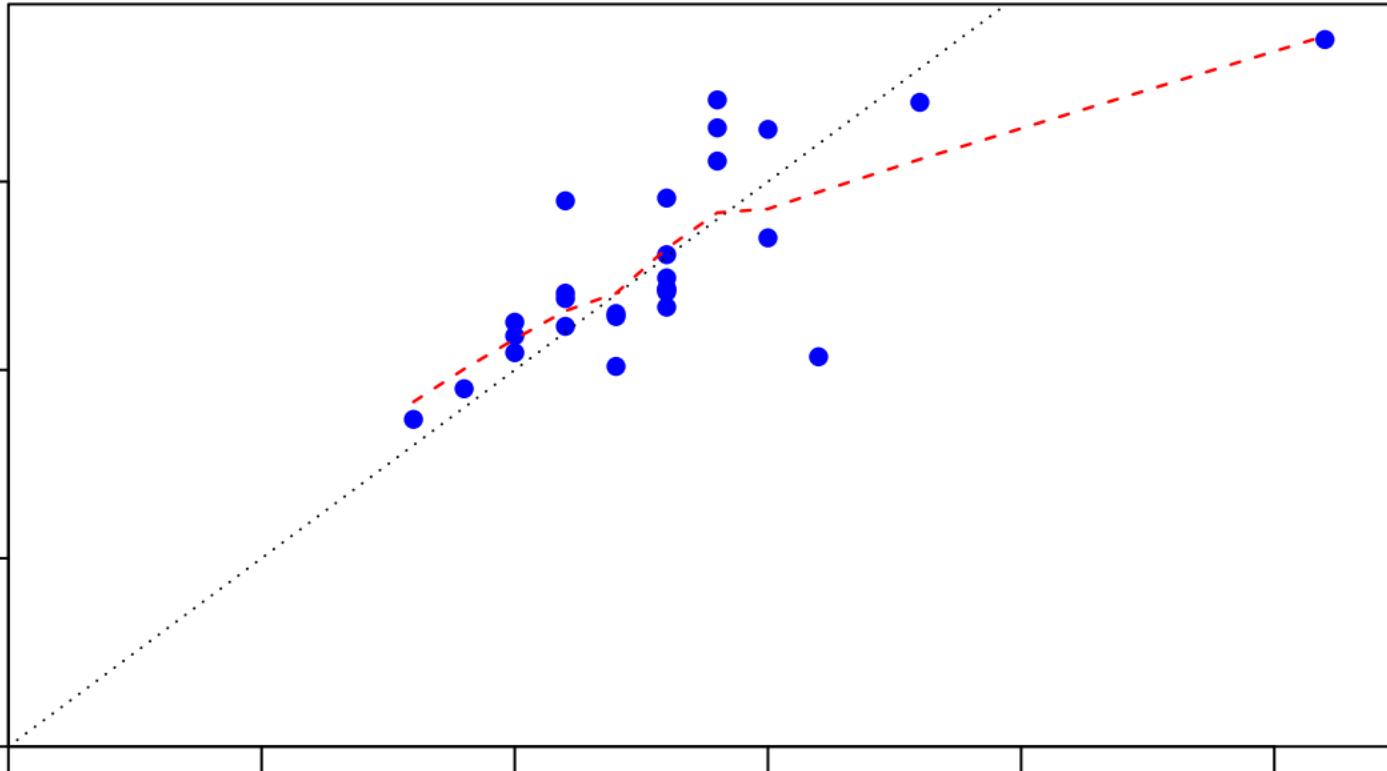


Expected index

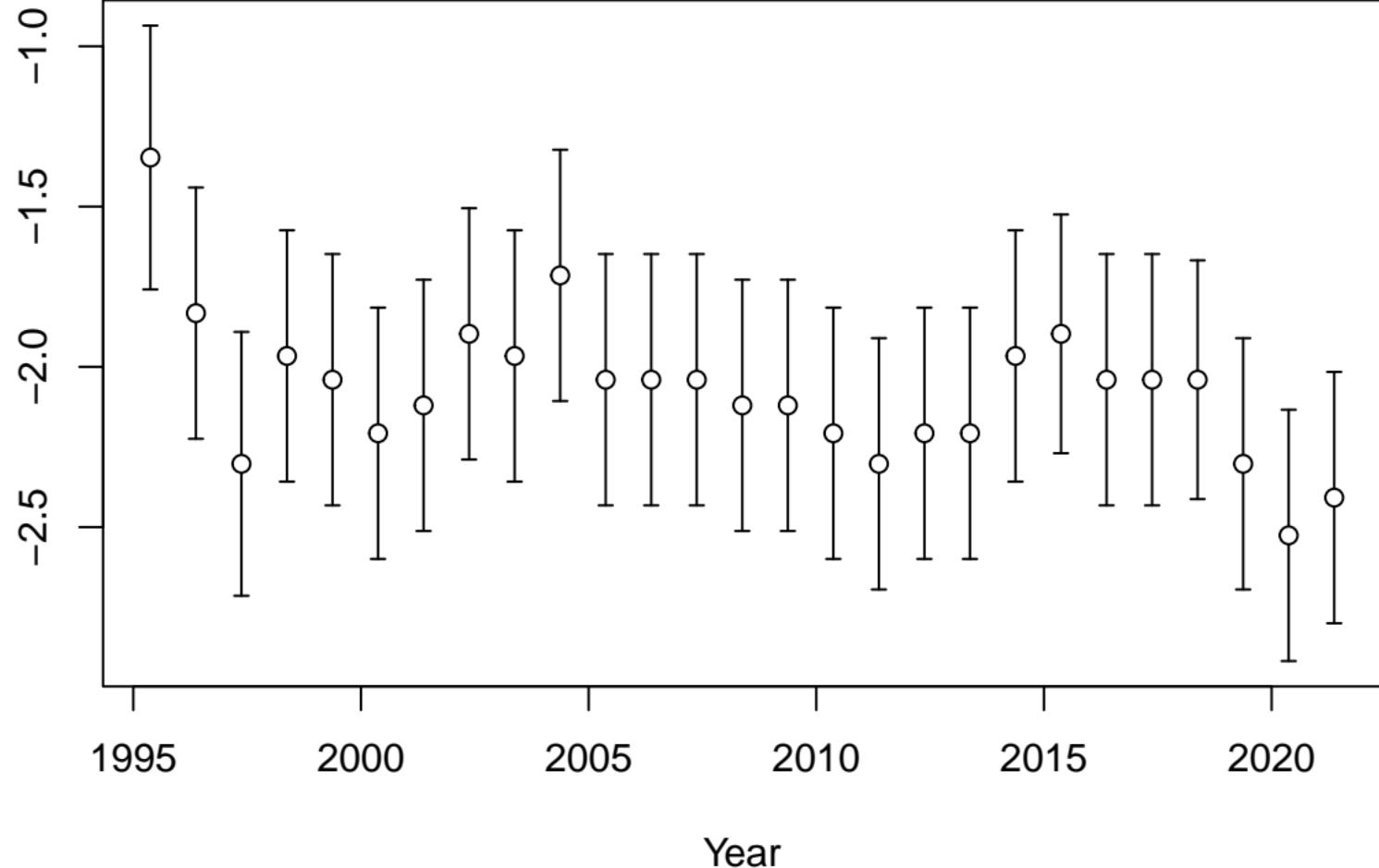
0.00 0.05 0.10 0.15

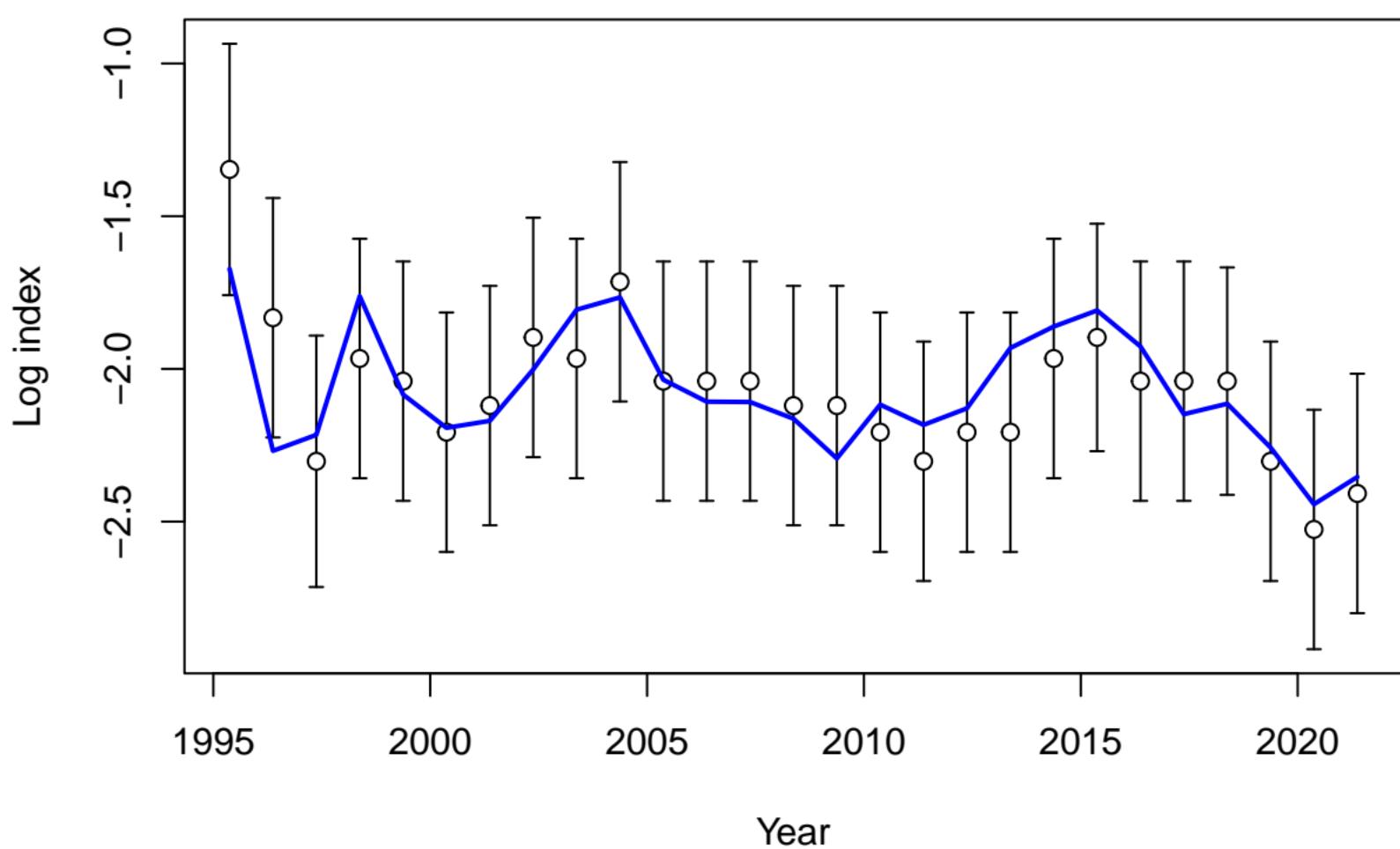
0.00 0.05 0.10 0.15 0.20 0.25

Observed index



Log index





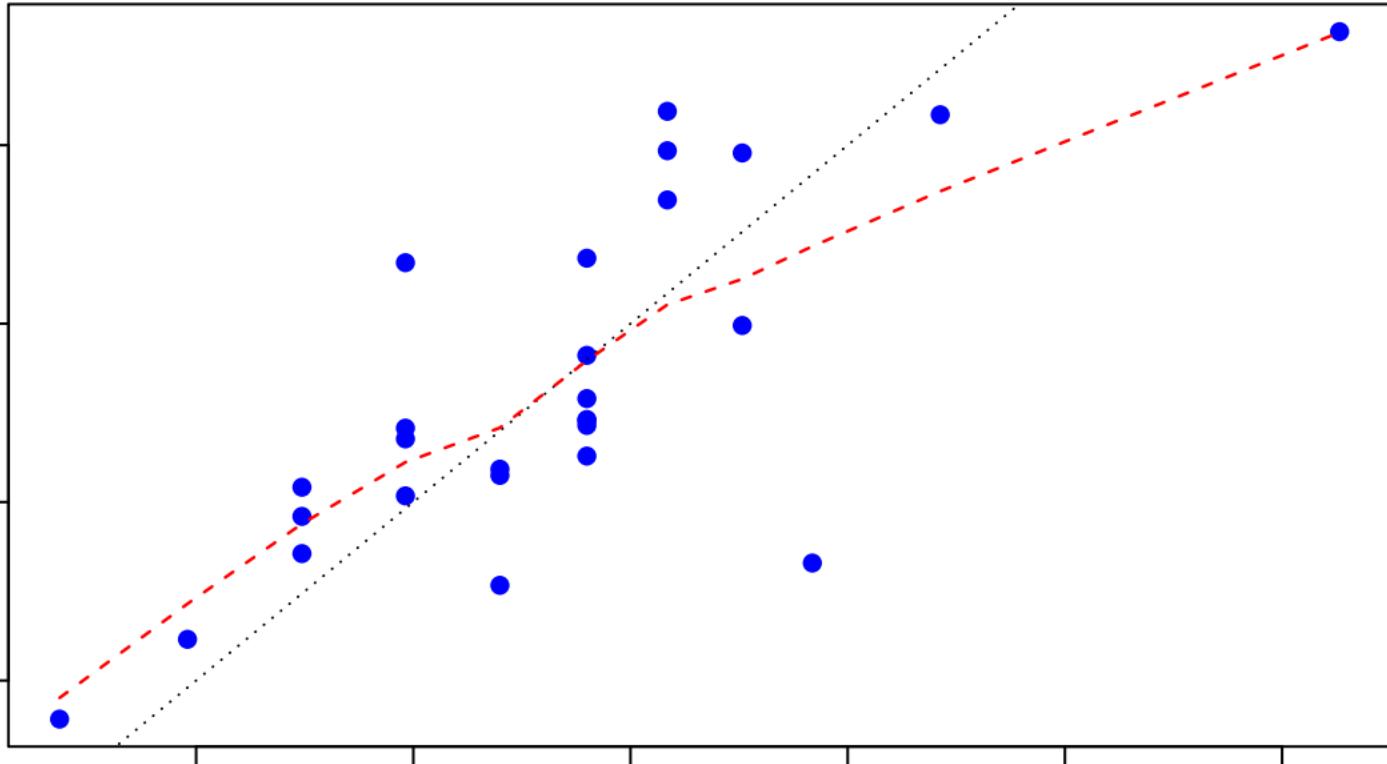
Log expected index

-2.4
-2.2
-2.0
-1.8

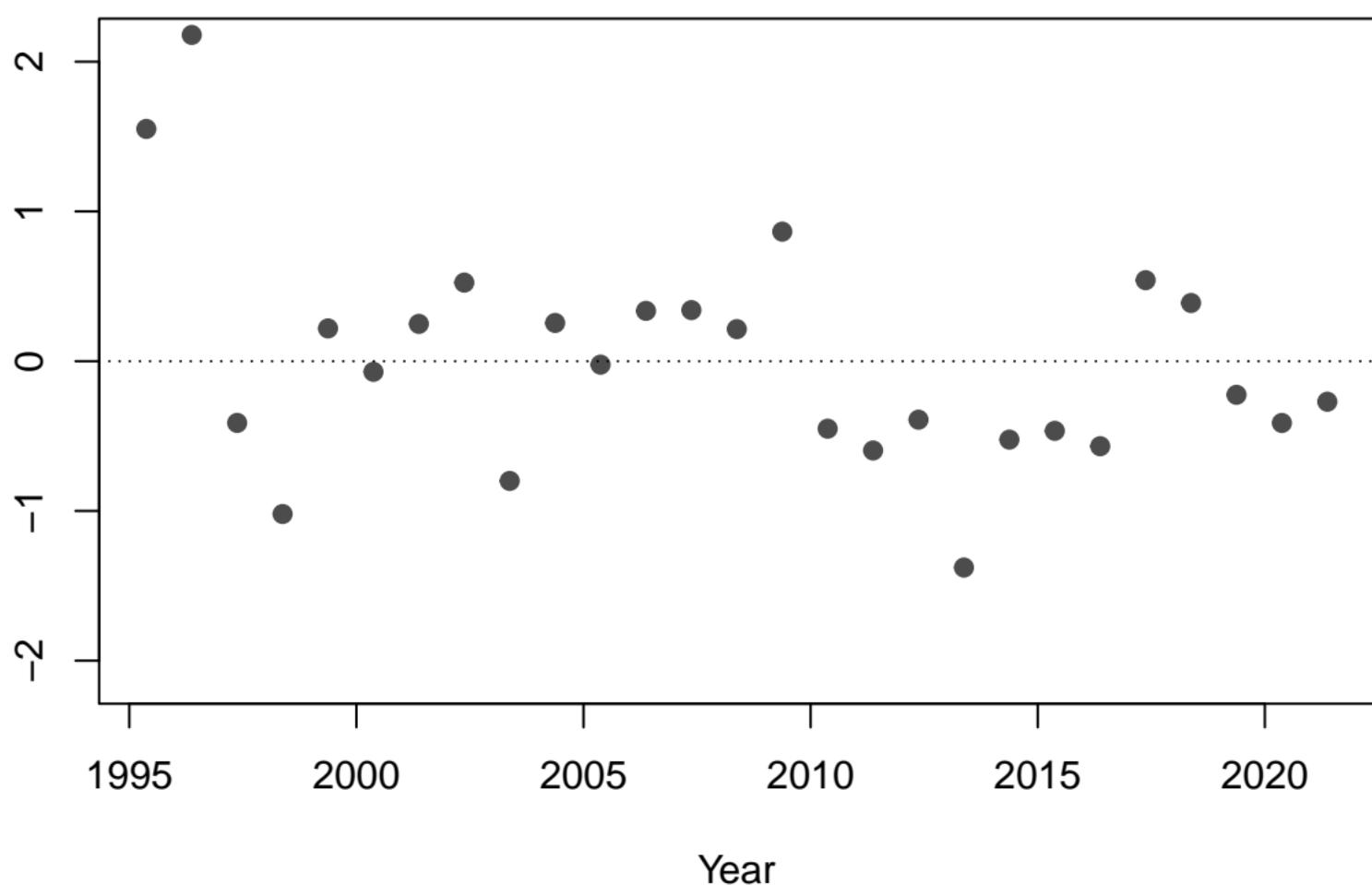
1

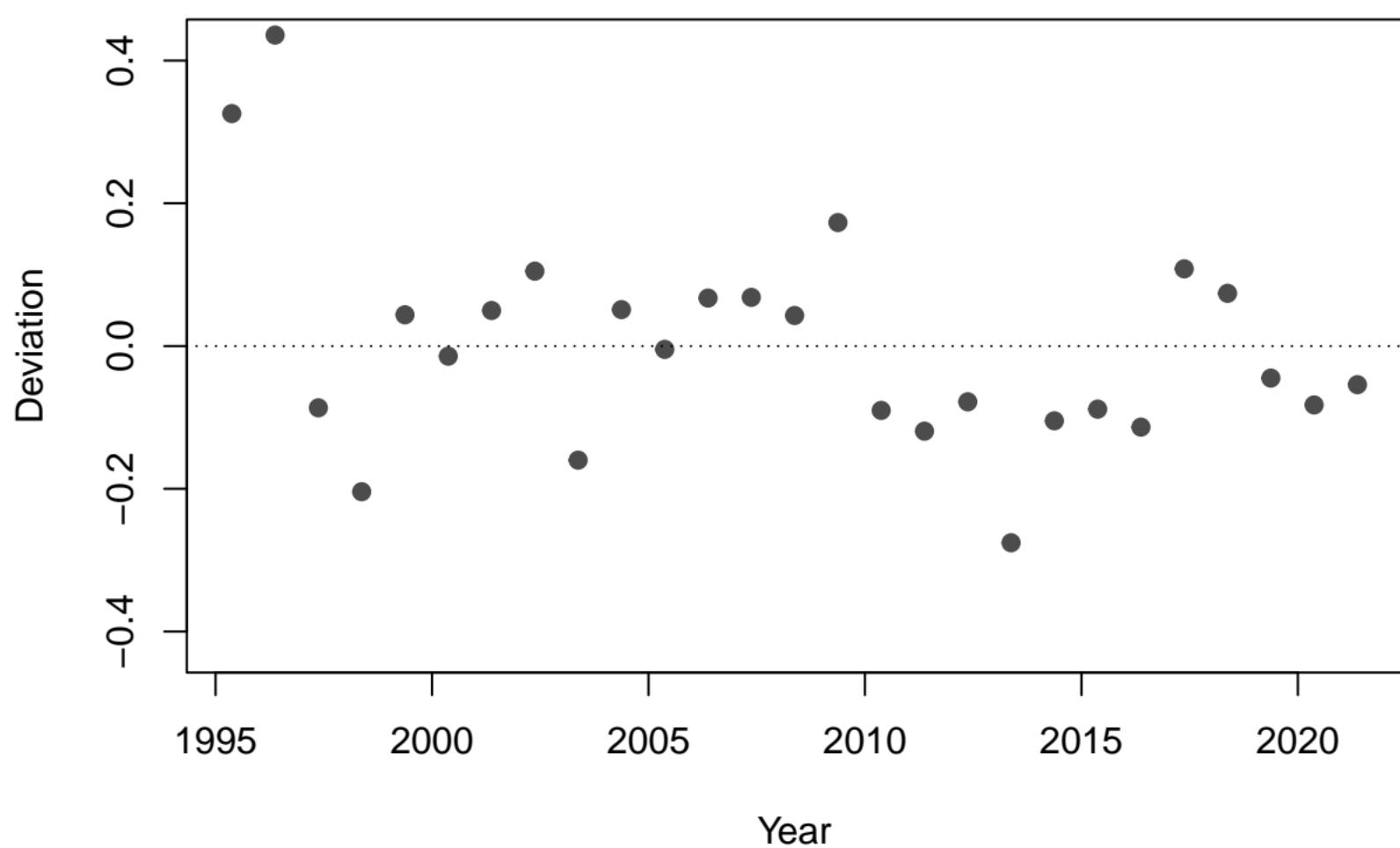
-2.4 -2.2 -2.0 -1.8 -1.6 -1.4

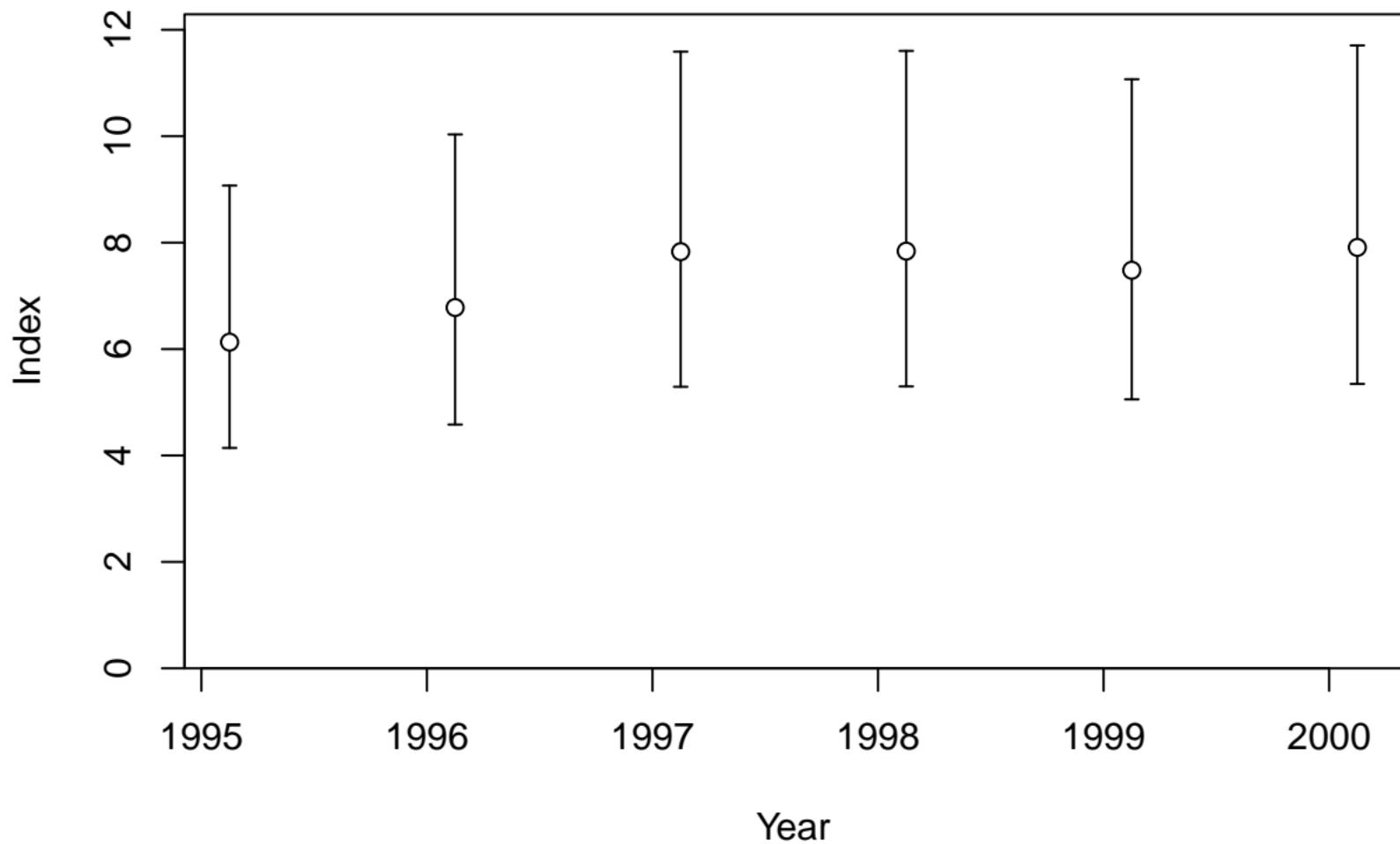
Log observed index

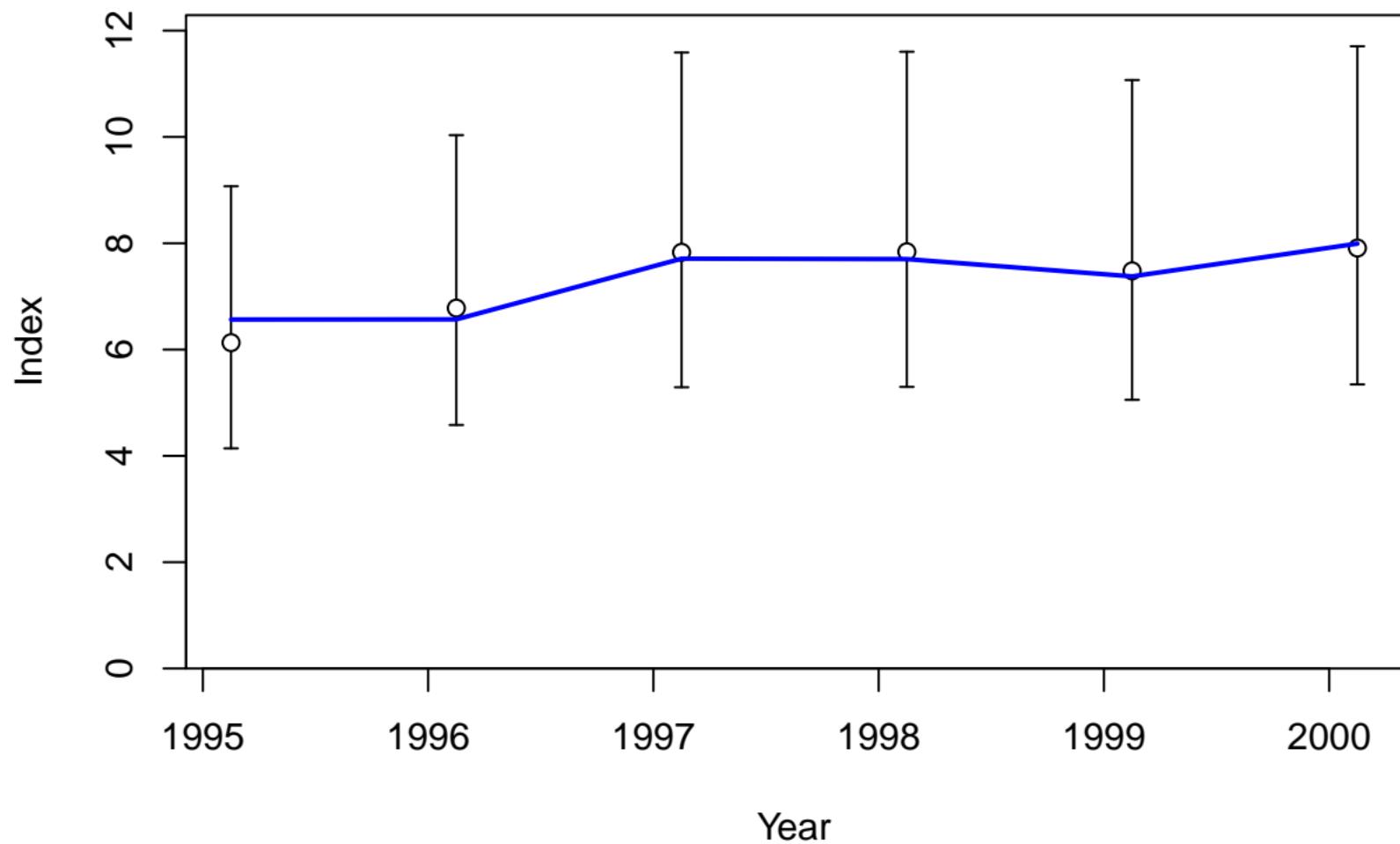


Residual

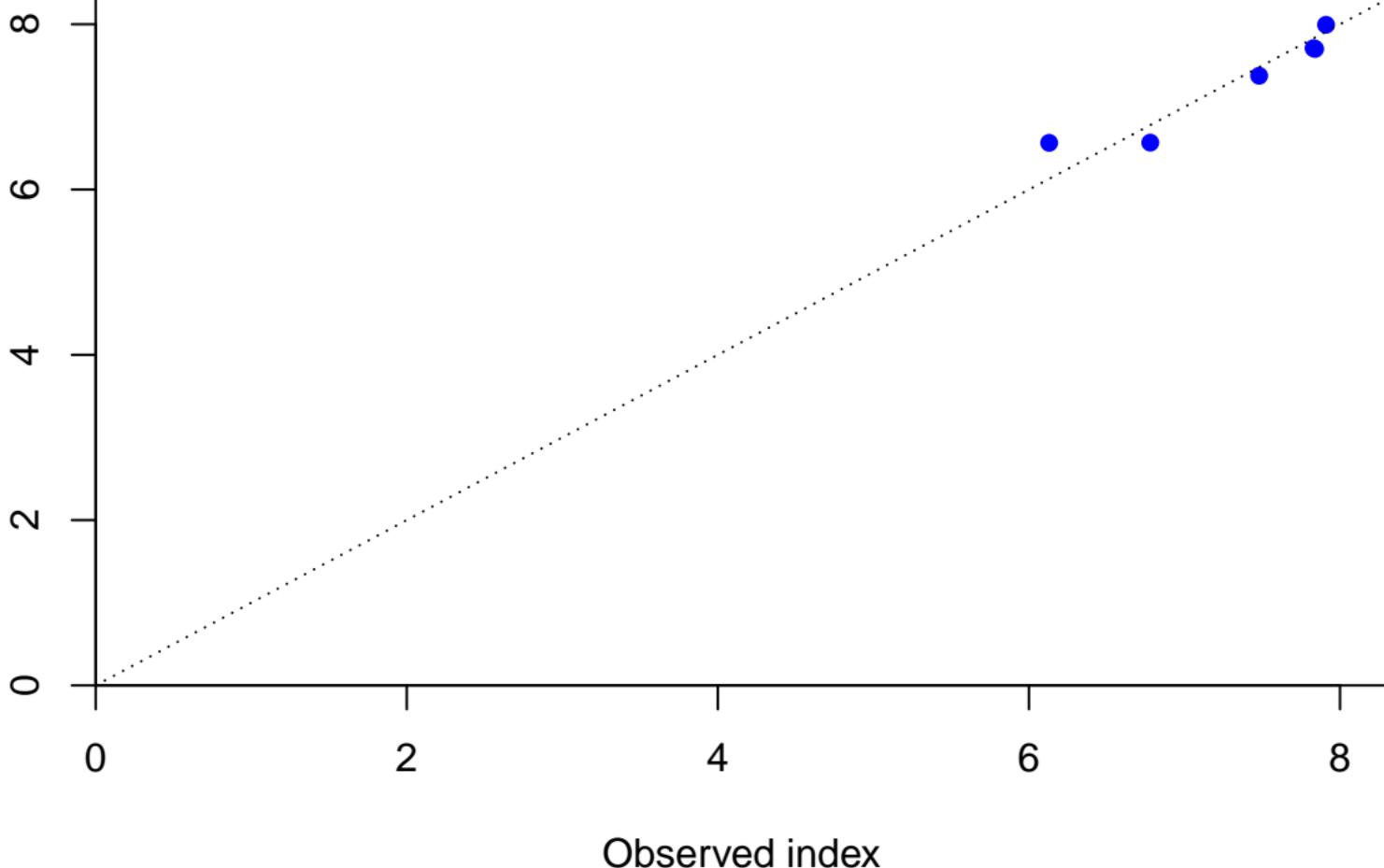






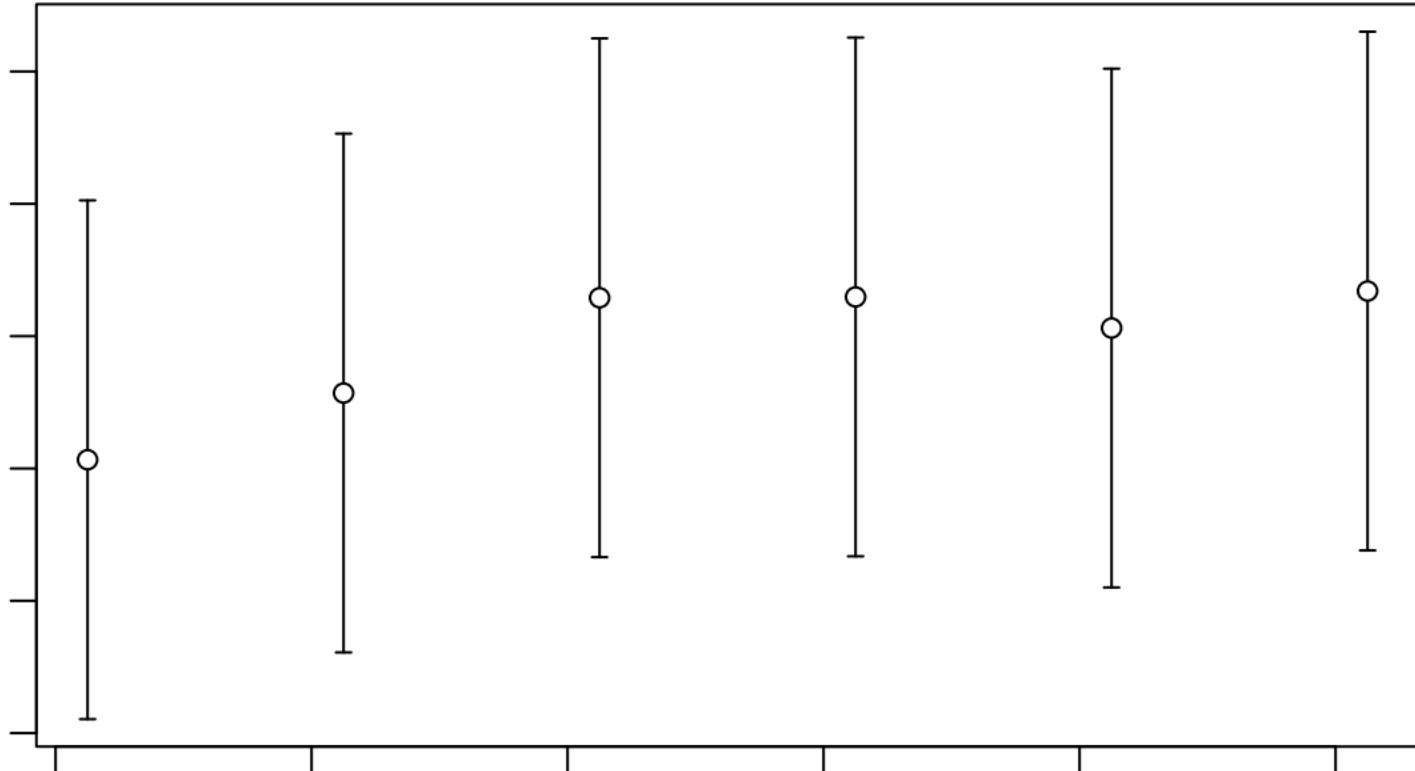


Expected index



Log index

1.4 1.6 1.8 2.0 2.2 2.4



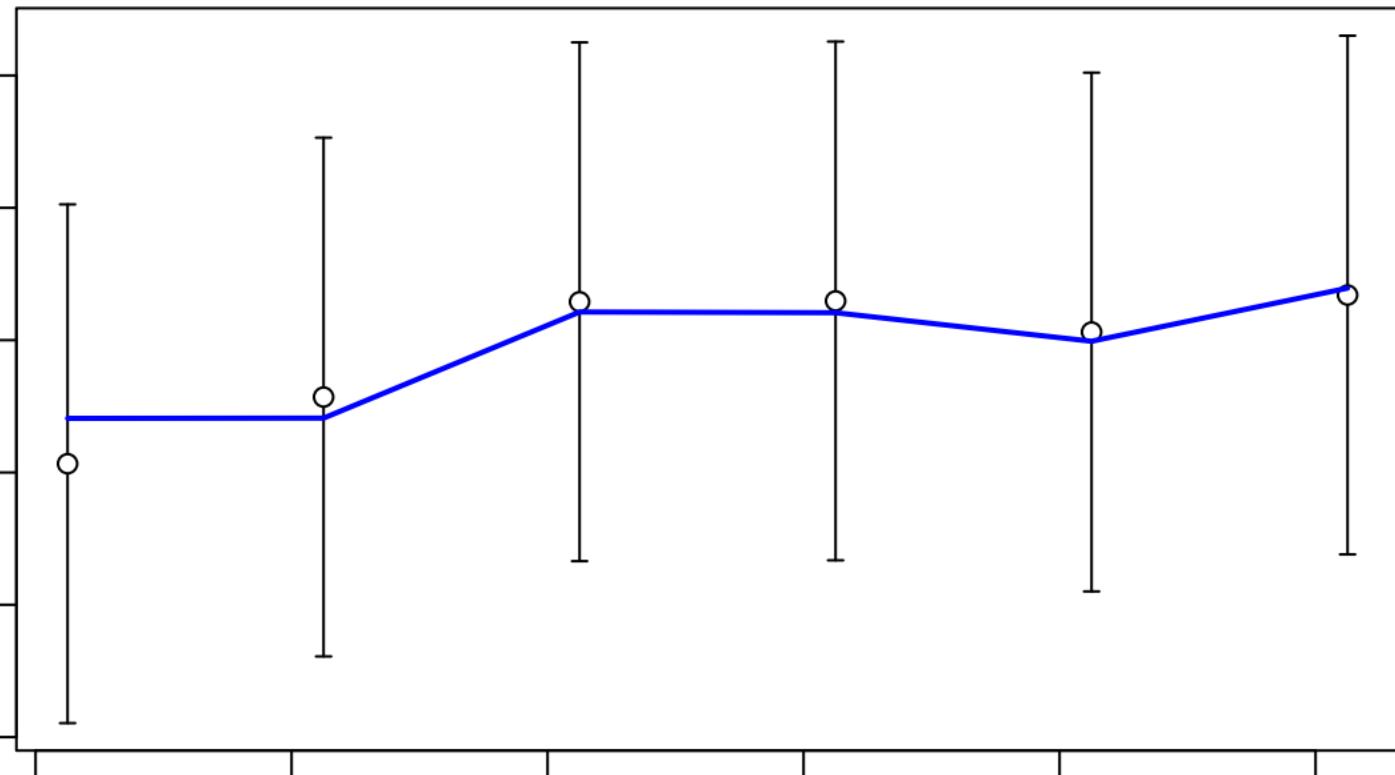
Year

Log index

2.4
2.2
2.0
1.8
1.6
1.4

1995 1996 1997 1998 1999 2000

Year



Log expected index

1.90 1.95 2.00 2.05

1.85

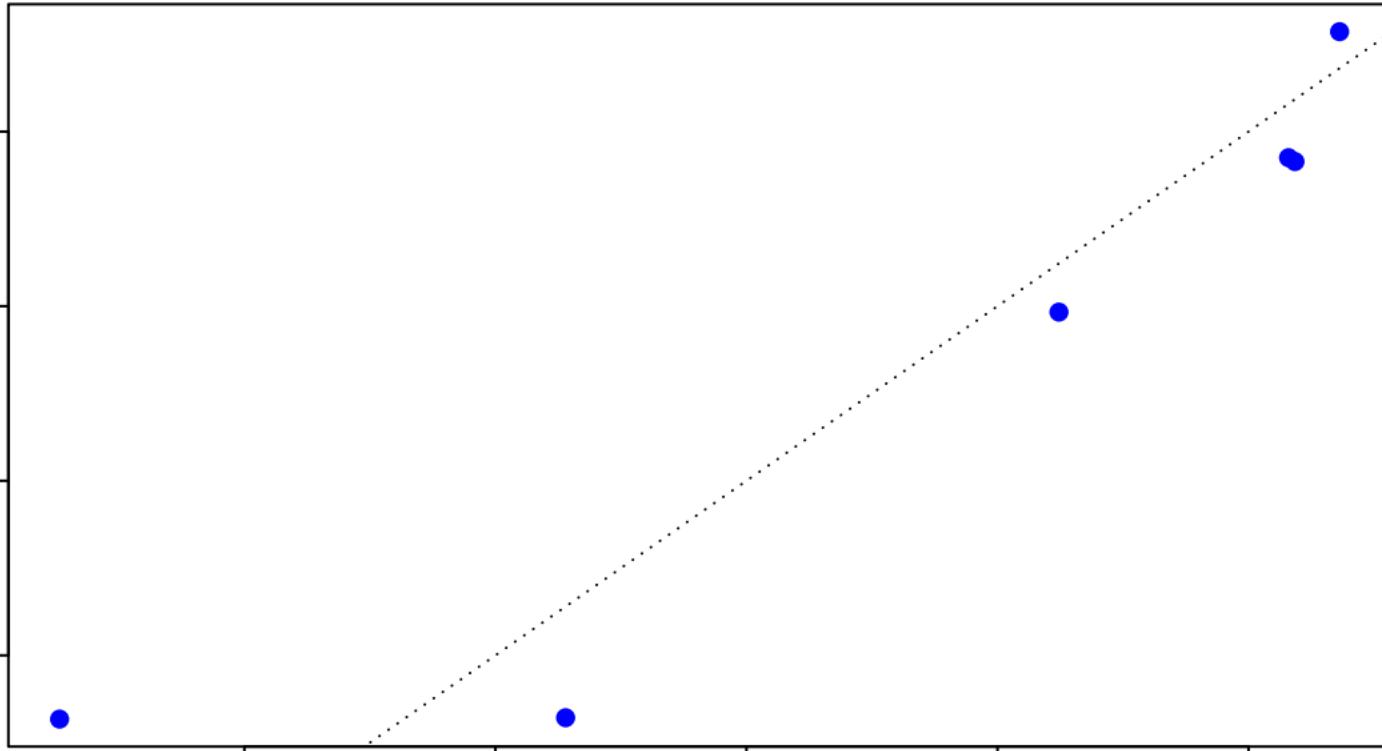
1.90

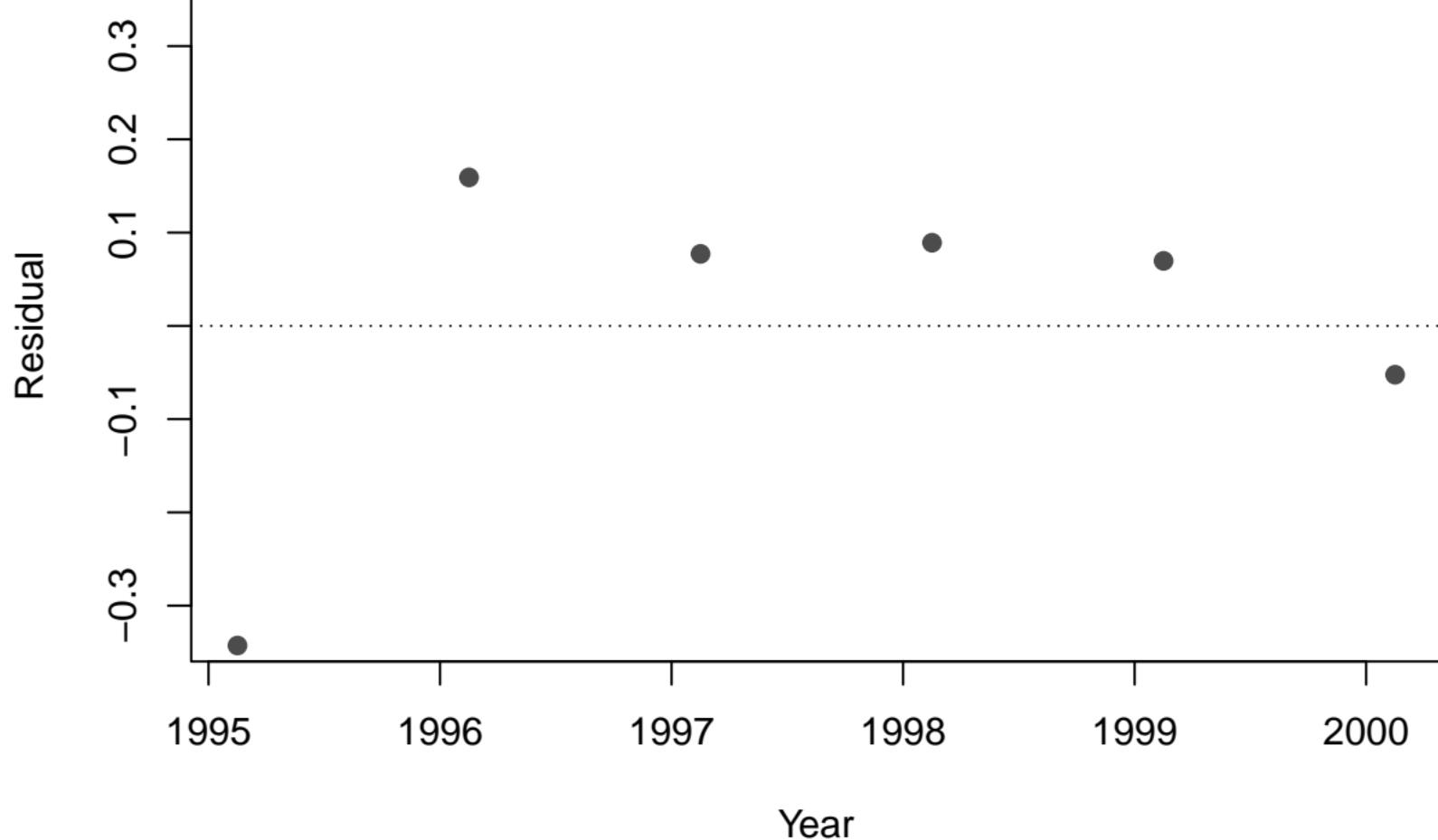
1.95

2.00

2.05

Log observed index



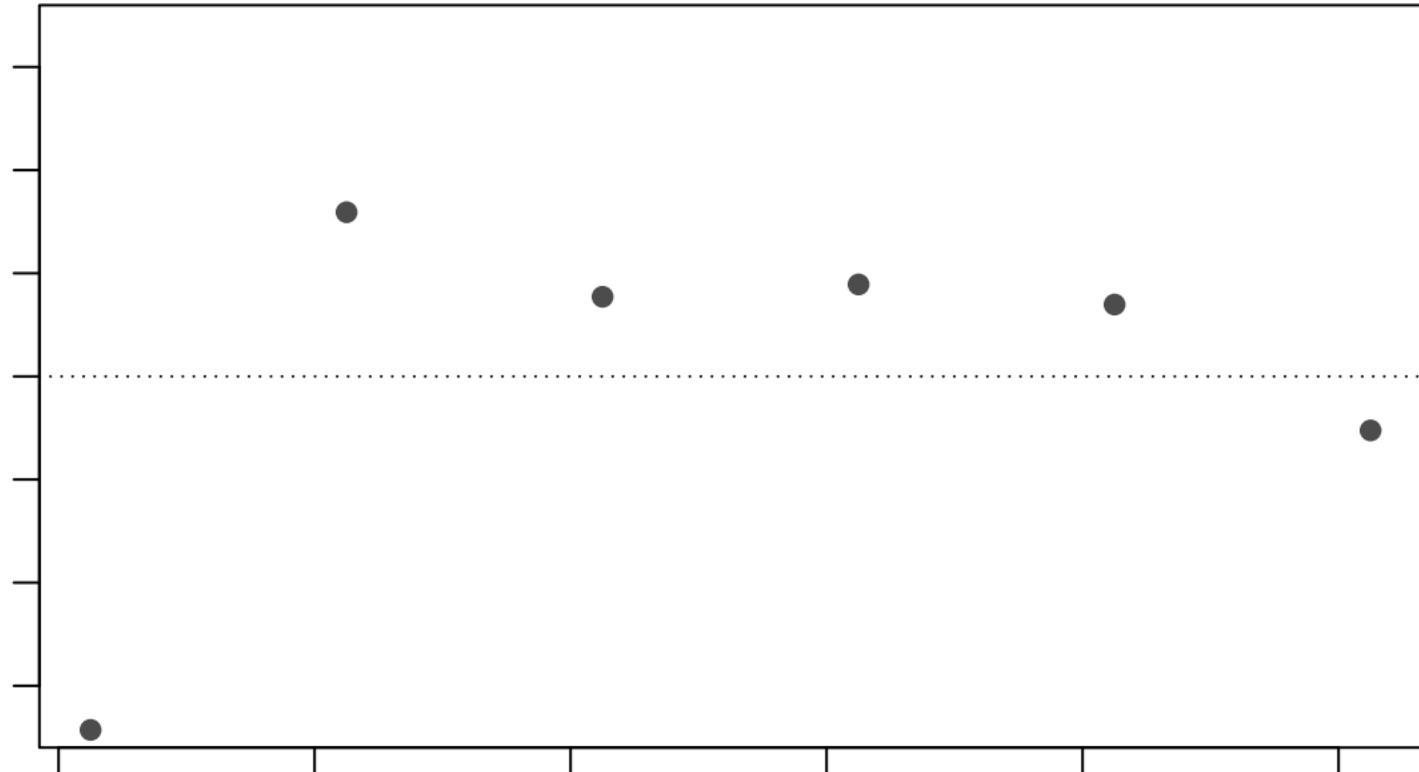


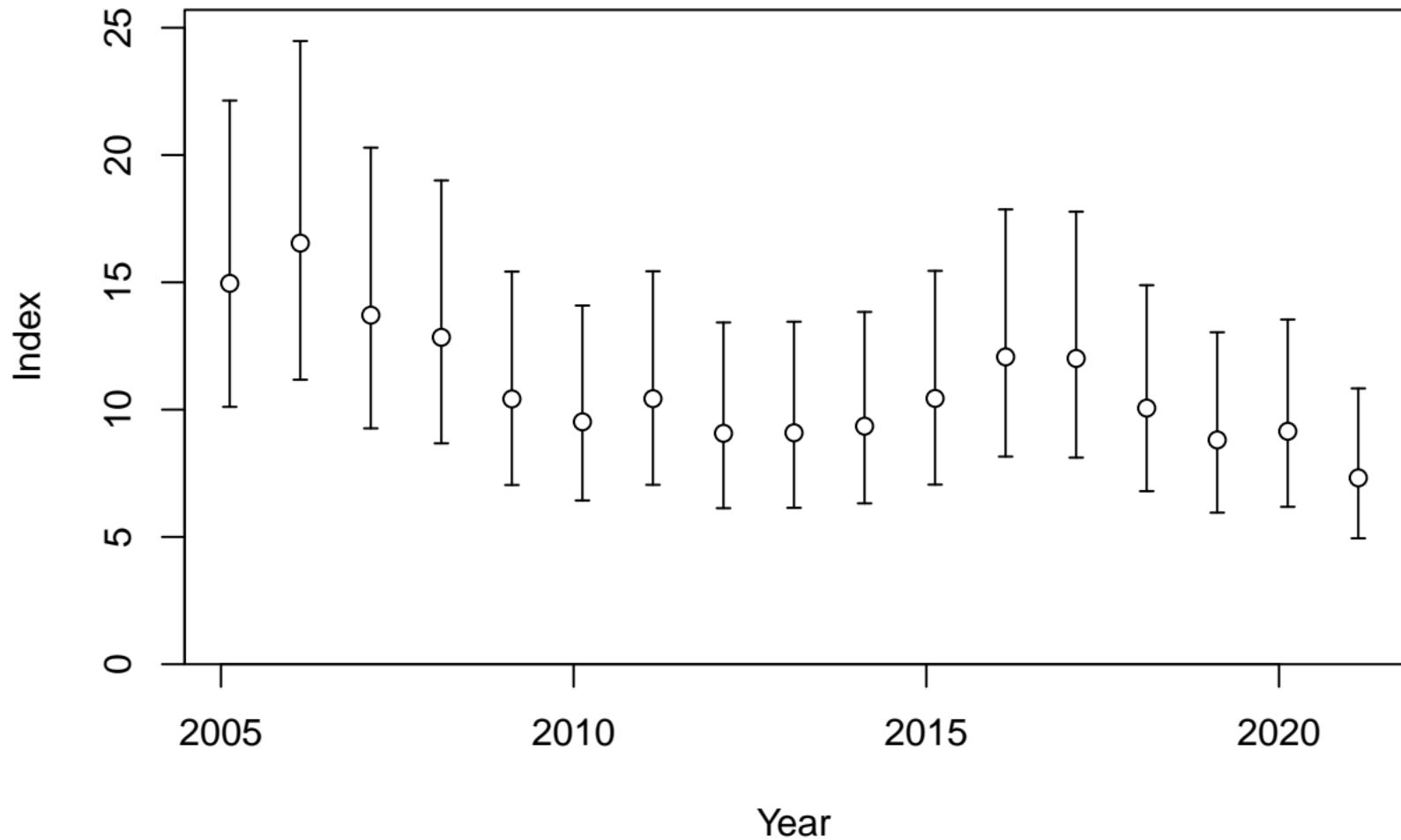
Deviation

0.06
0.02
-0.02
-0.06

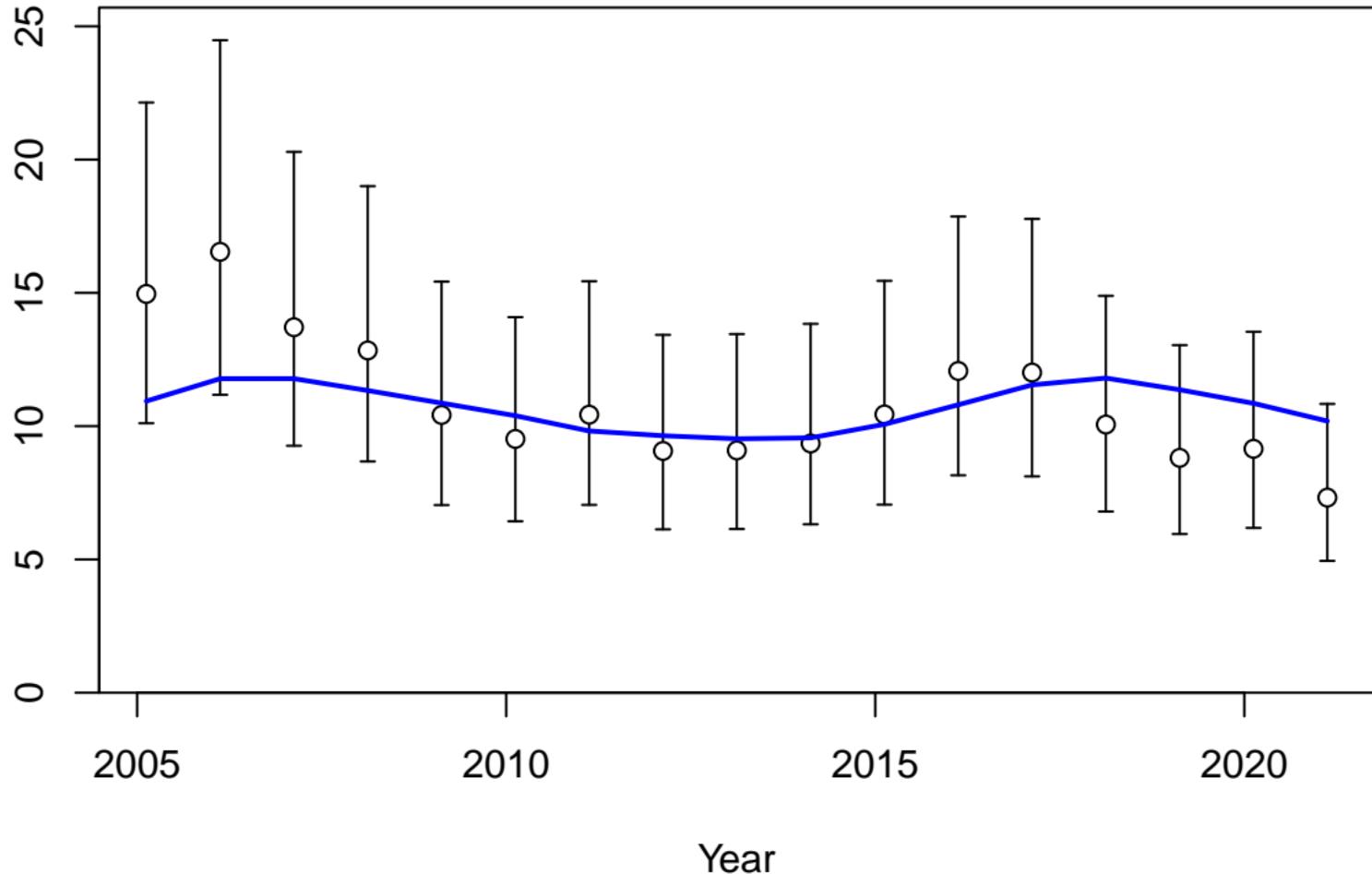
1995 1996 1997 1998 1999 2000

Year

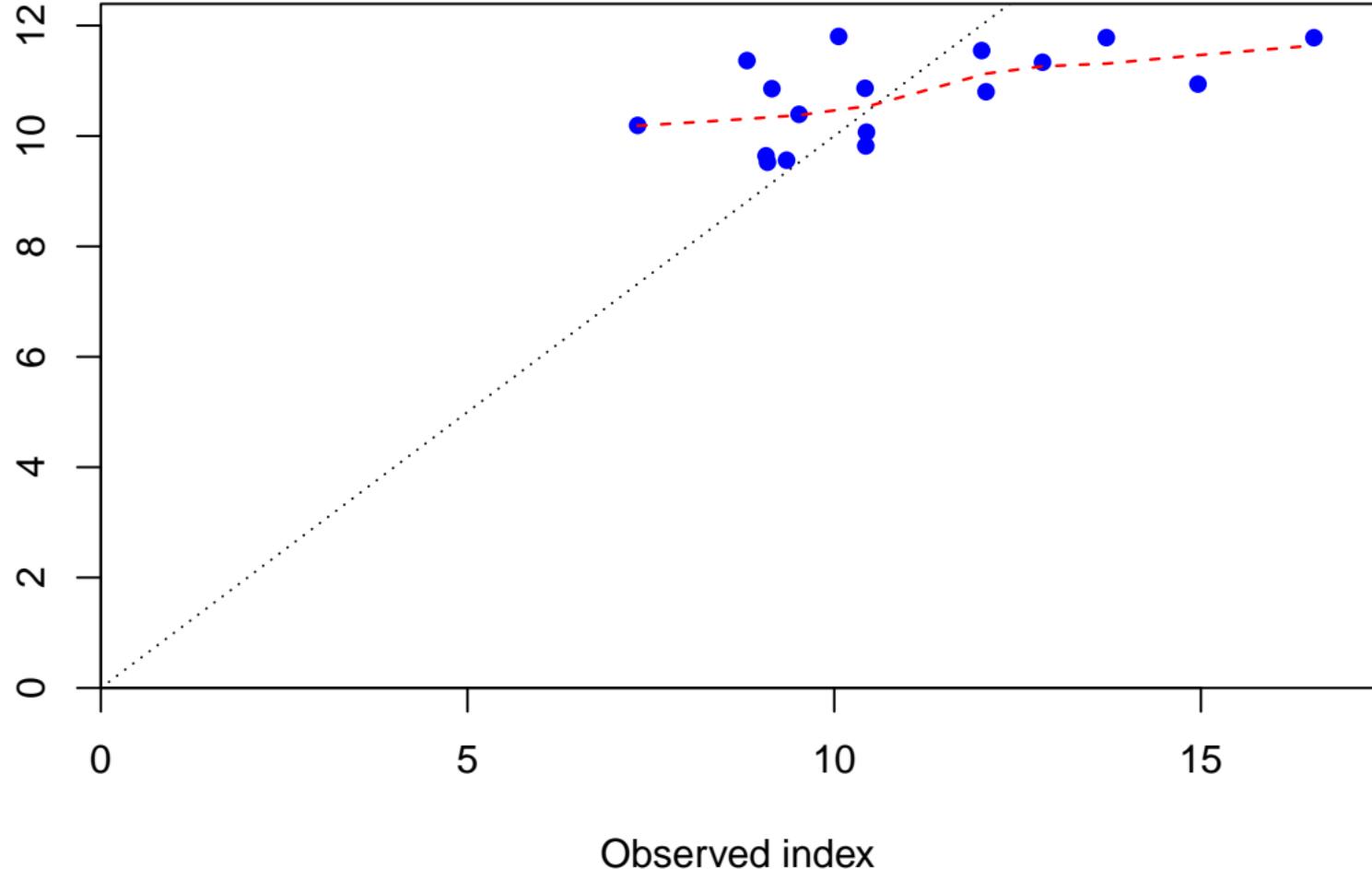




Index



Expected index



Log index

3.0
2.5
2.0

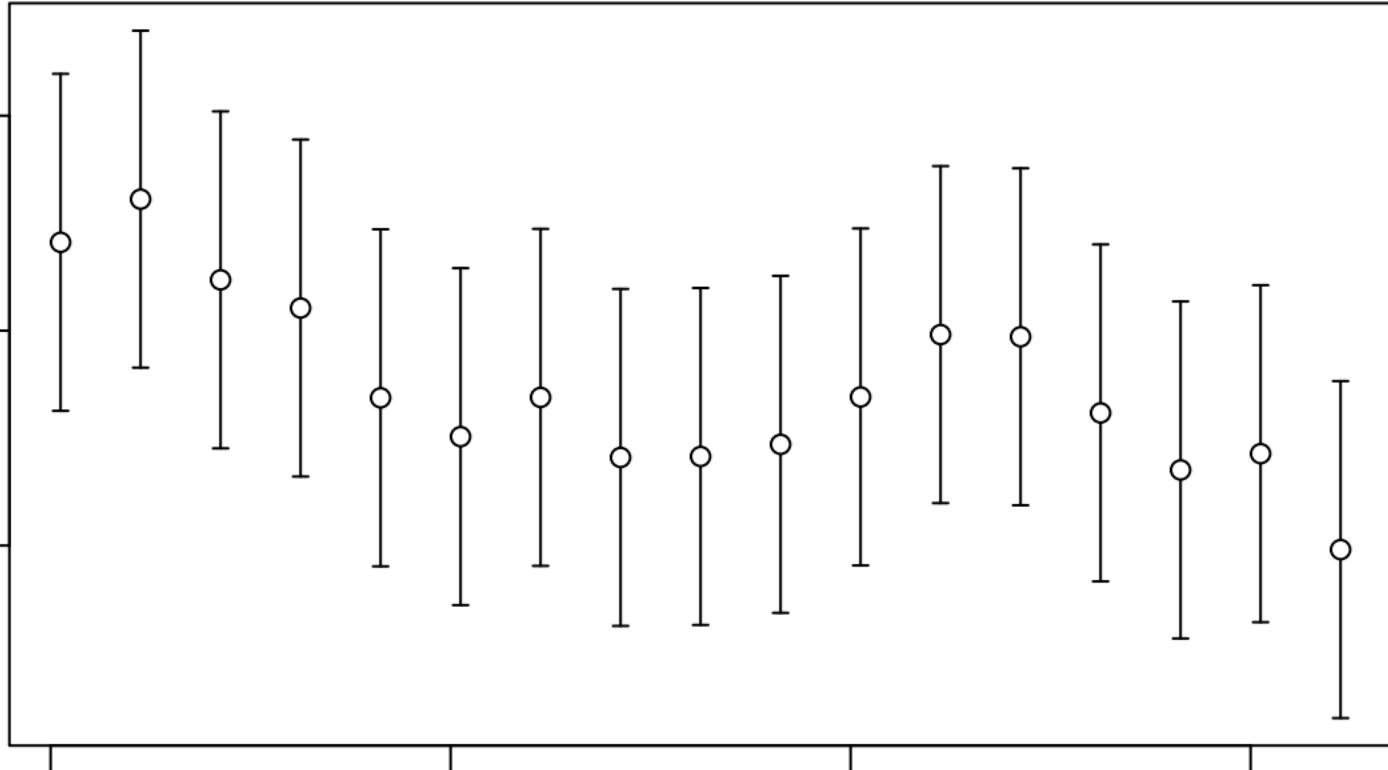
2005

2010

2015

2020

Year

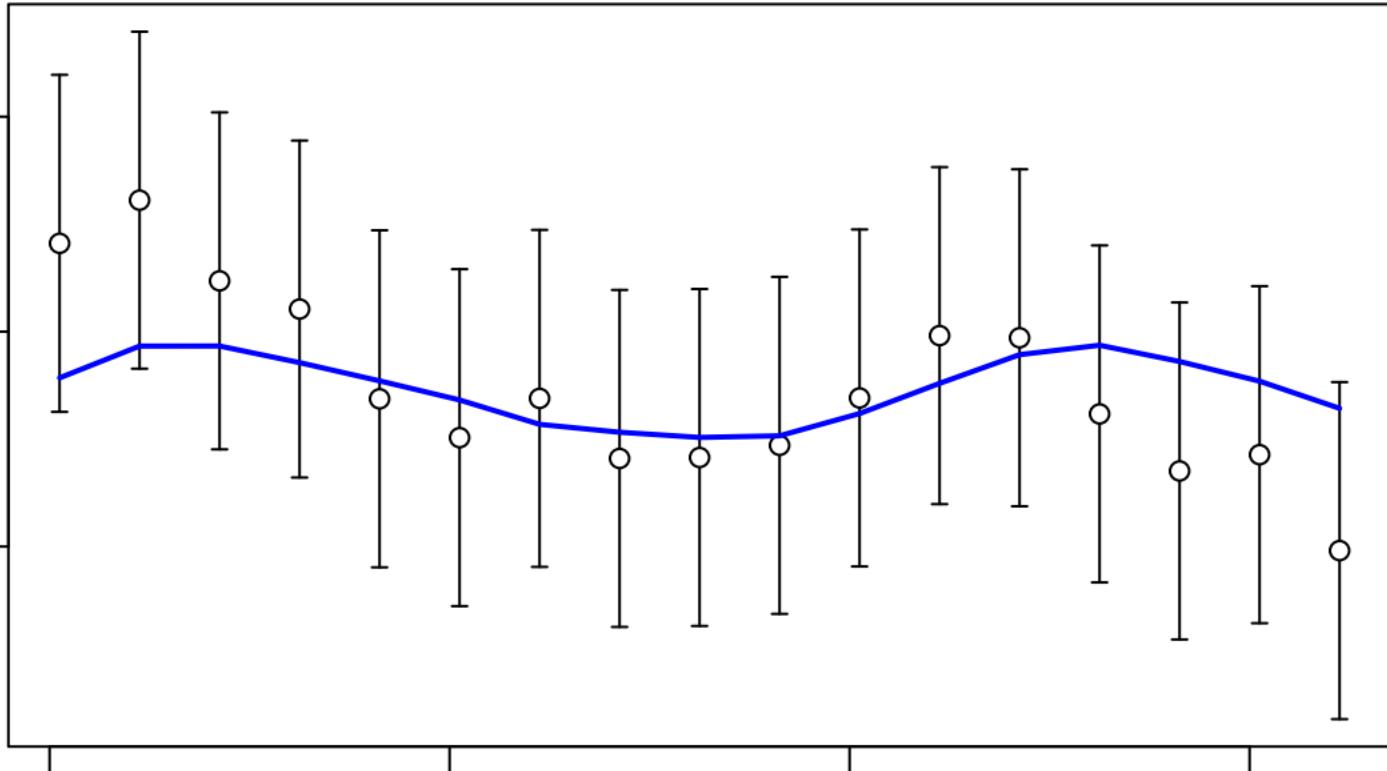


Log index

3.0
2.5
2.0

2005 2010 2015 2020

Year

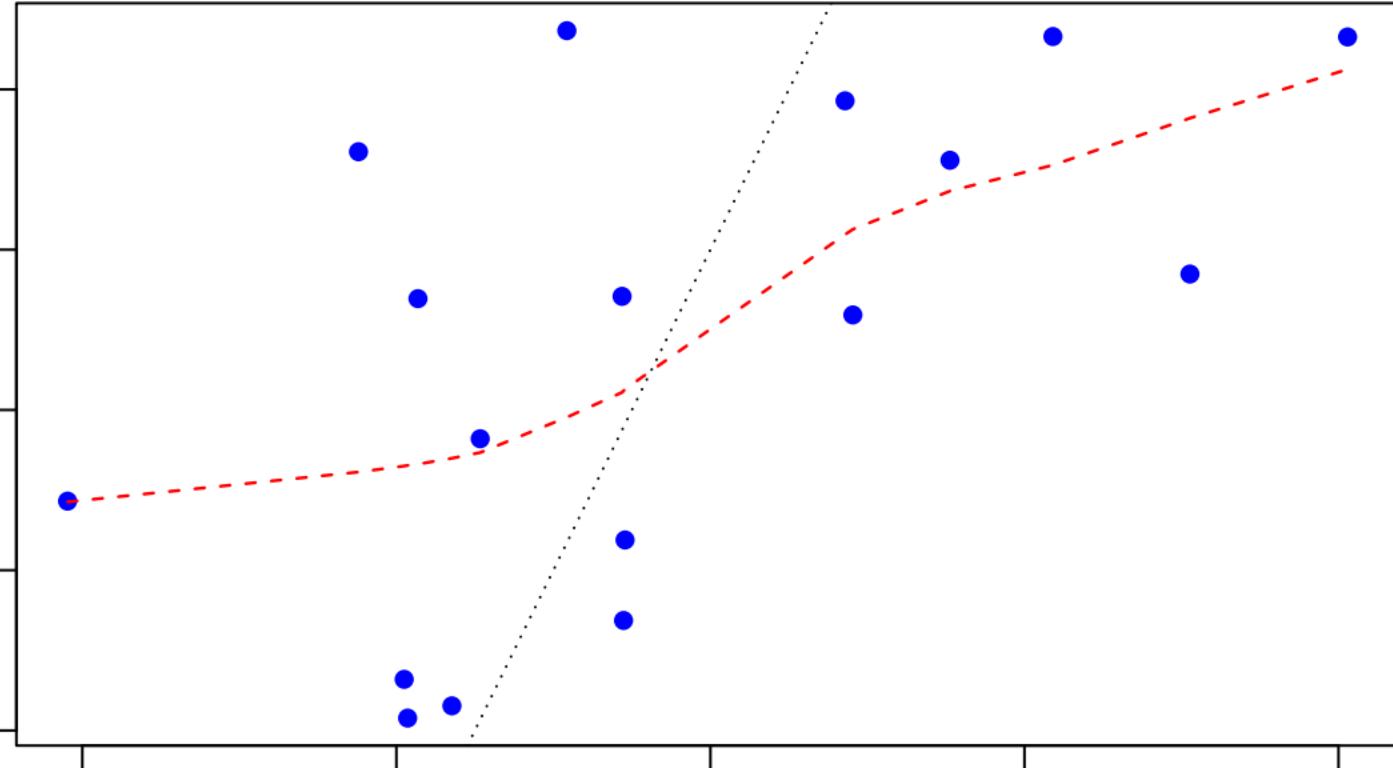


Log expected index

2.25 2.30 2.35 2.40 2.45

2.0 2.2 2.4 2.6 2.8

Log observed index

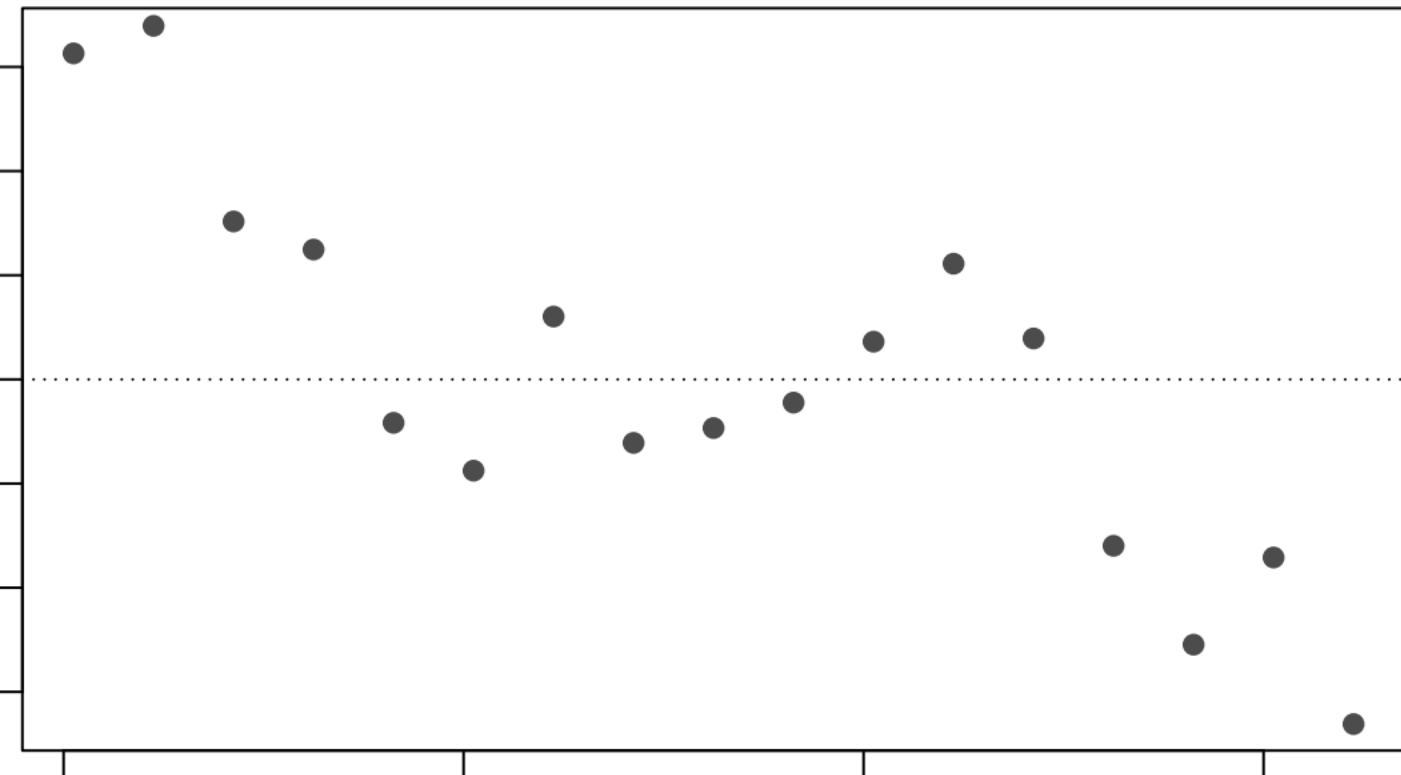


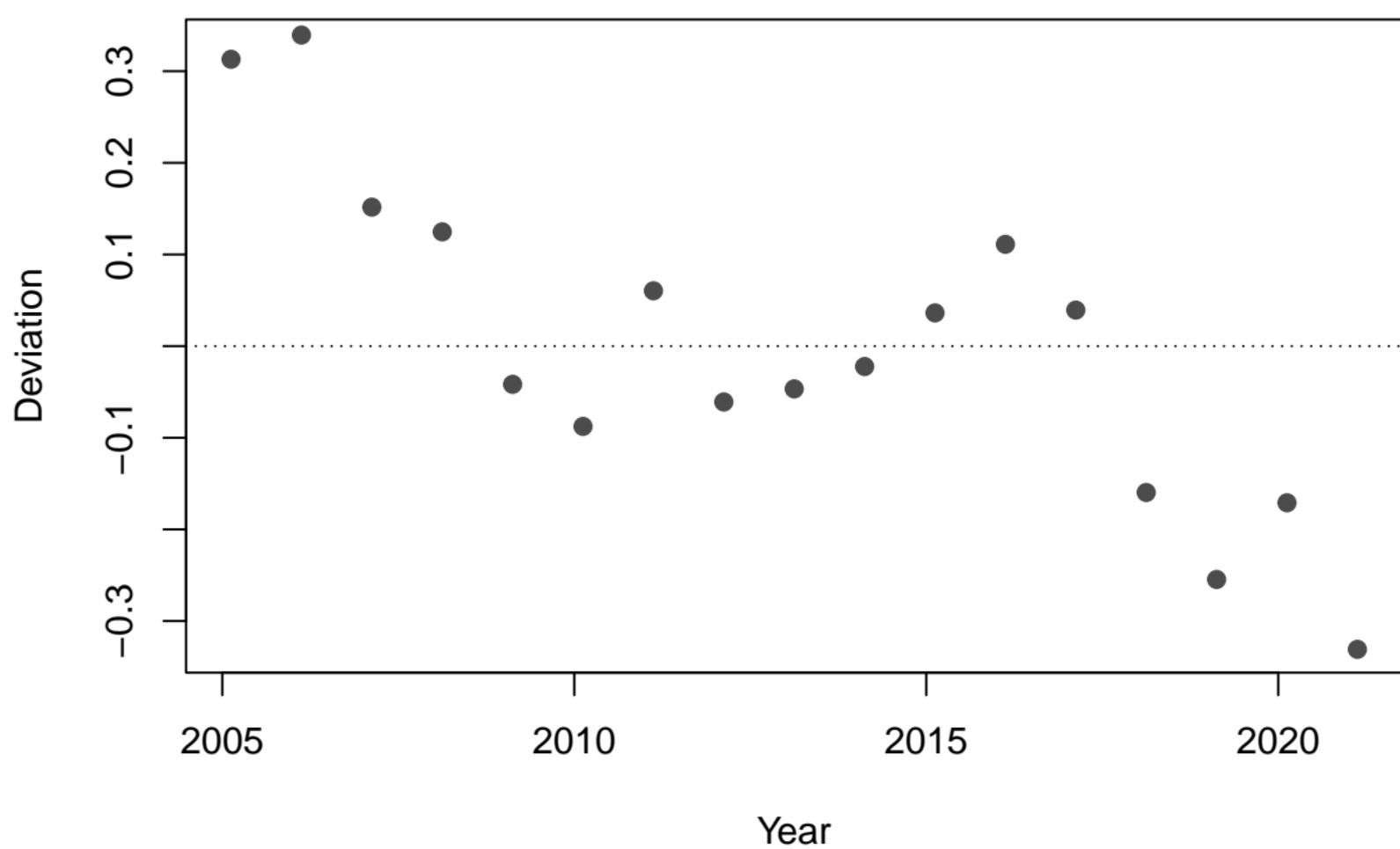
Residual

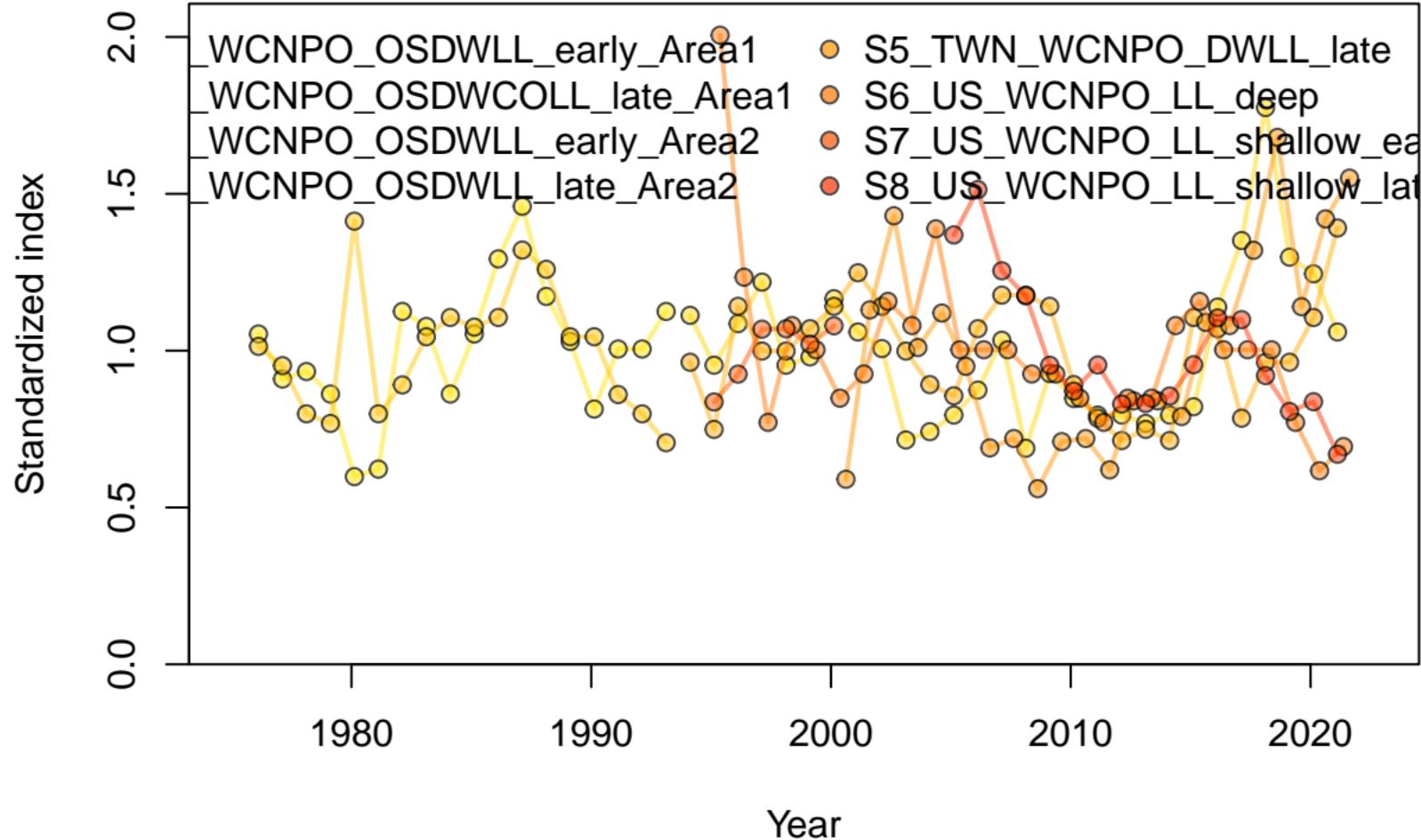
-1.5
-0.5
0.5
1.0
1.5

2005 2010 2015 2020

Year





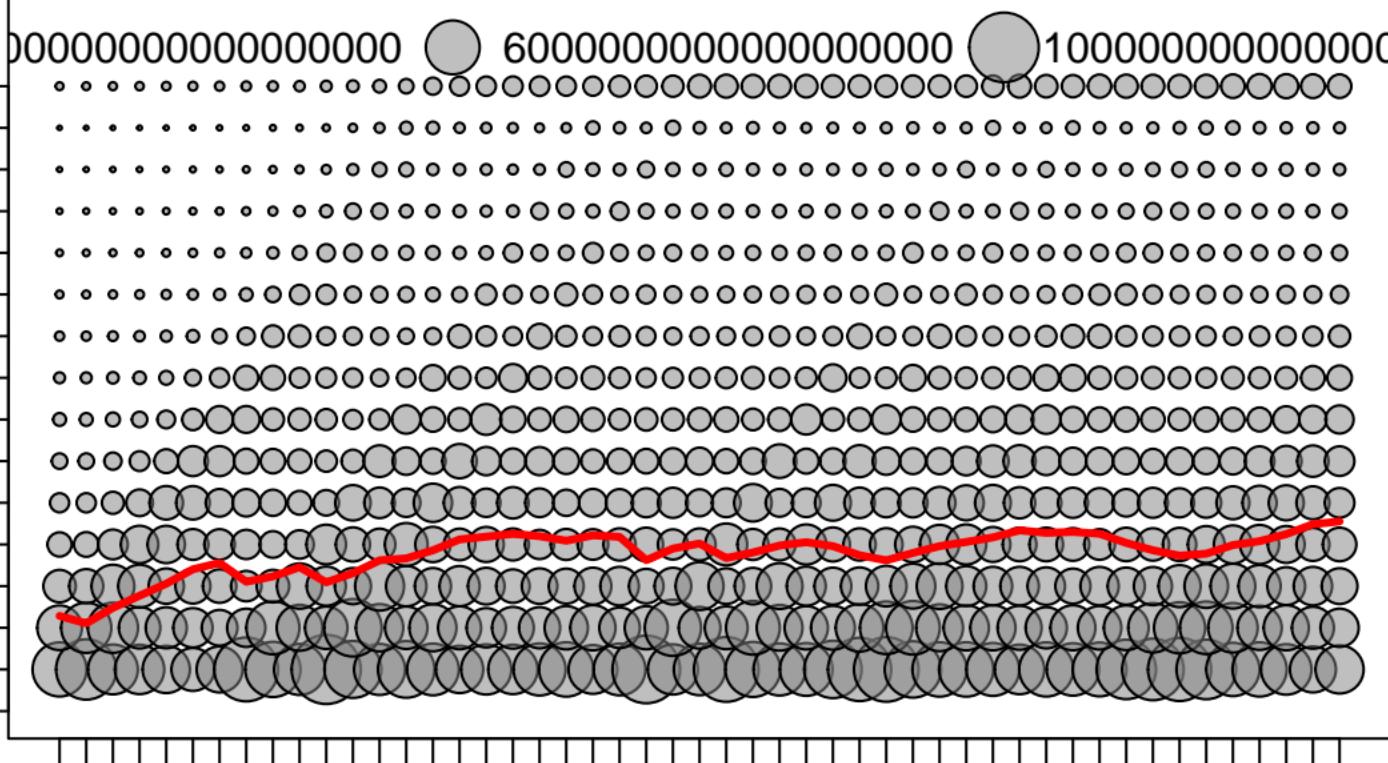


Age

15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0

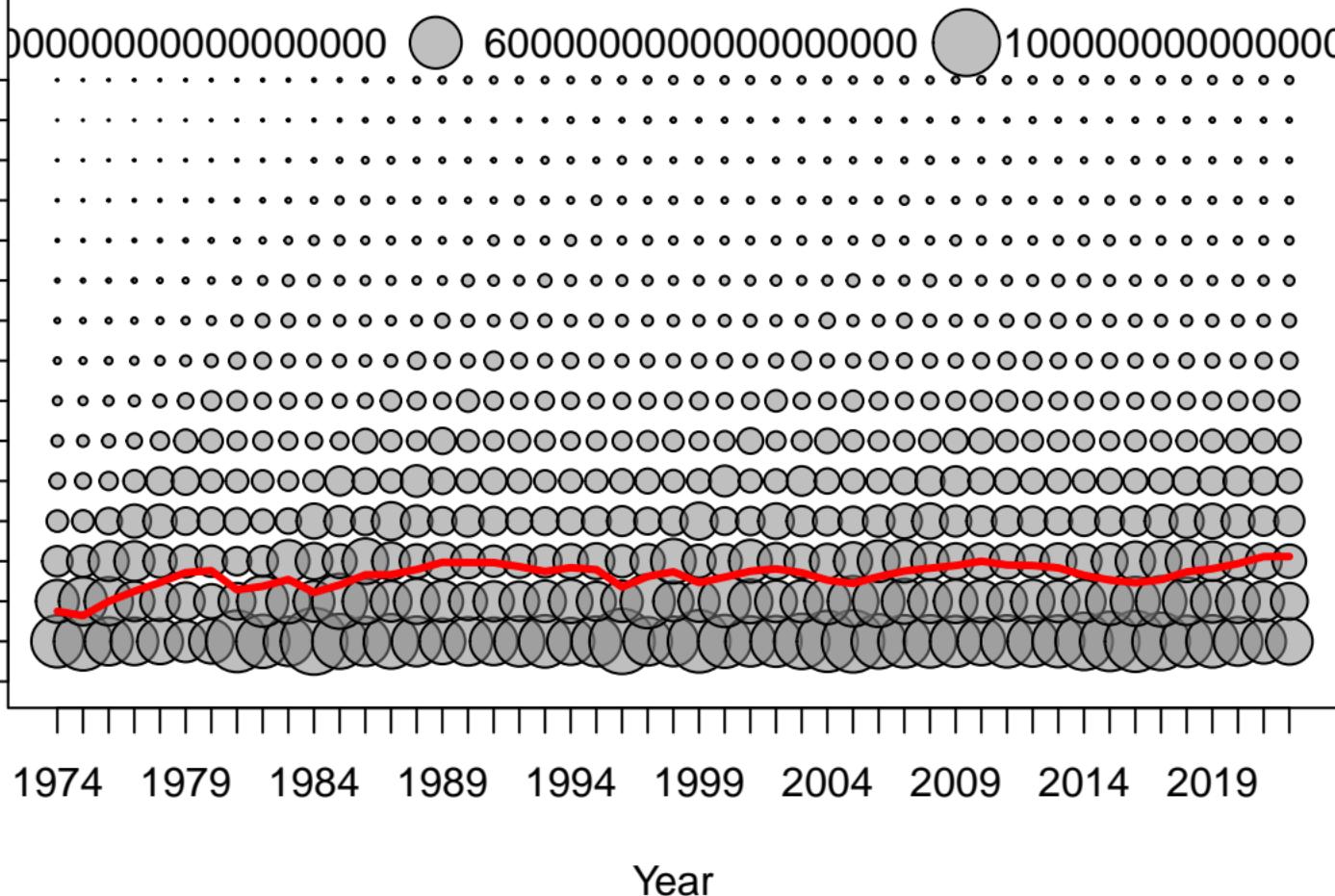
1974 1979 1984 1989 1994 1999 2004 2009 2014 2019

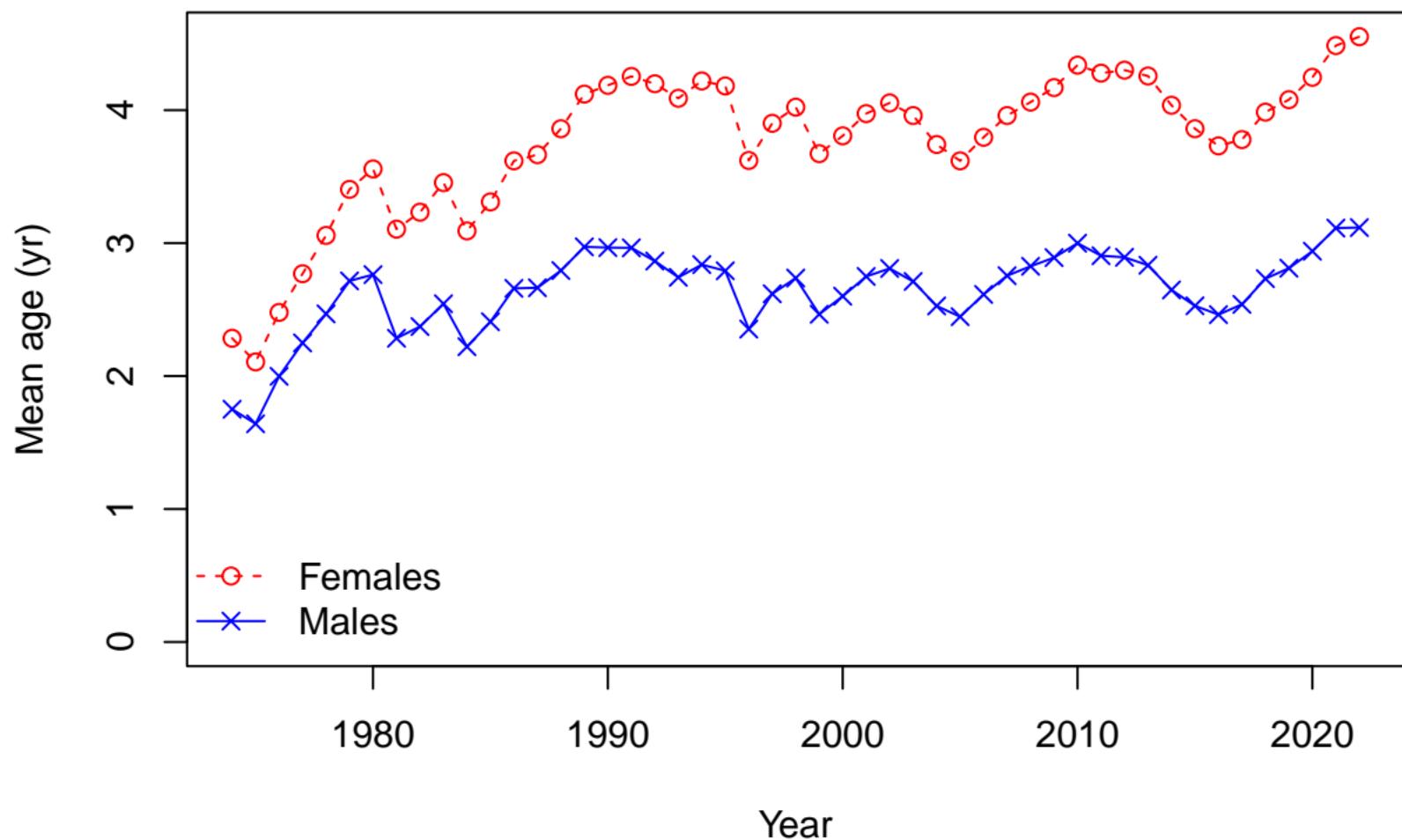
Year



Age

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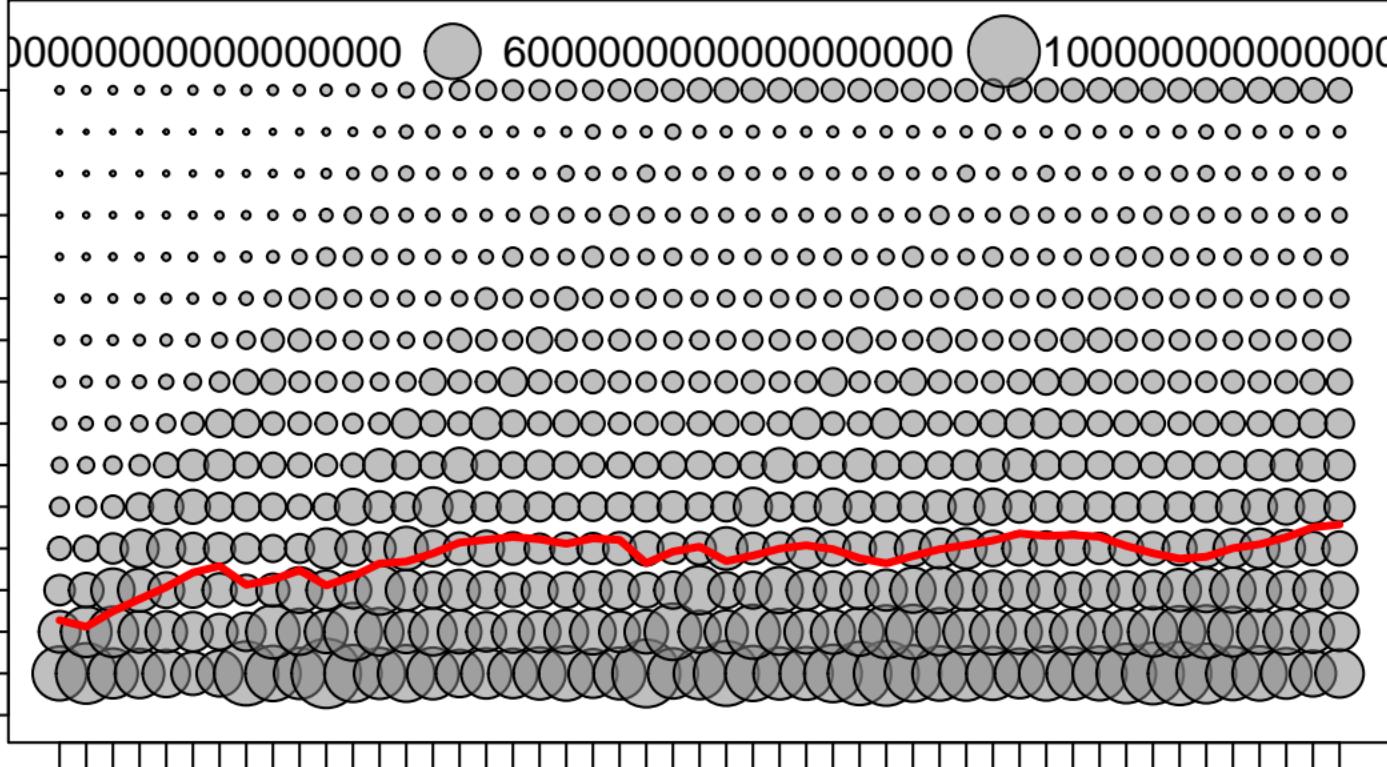


Age

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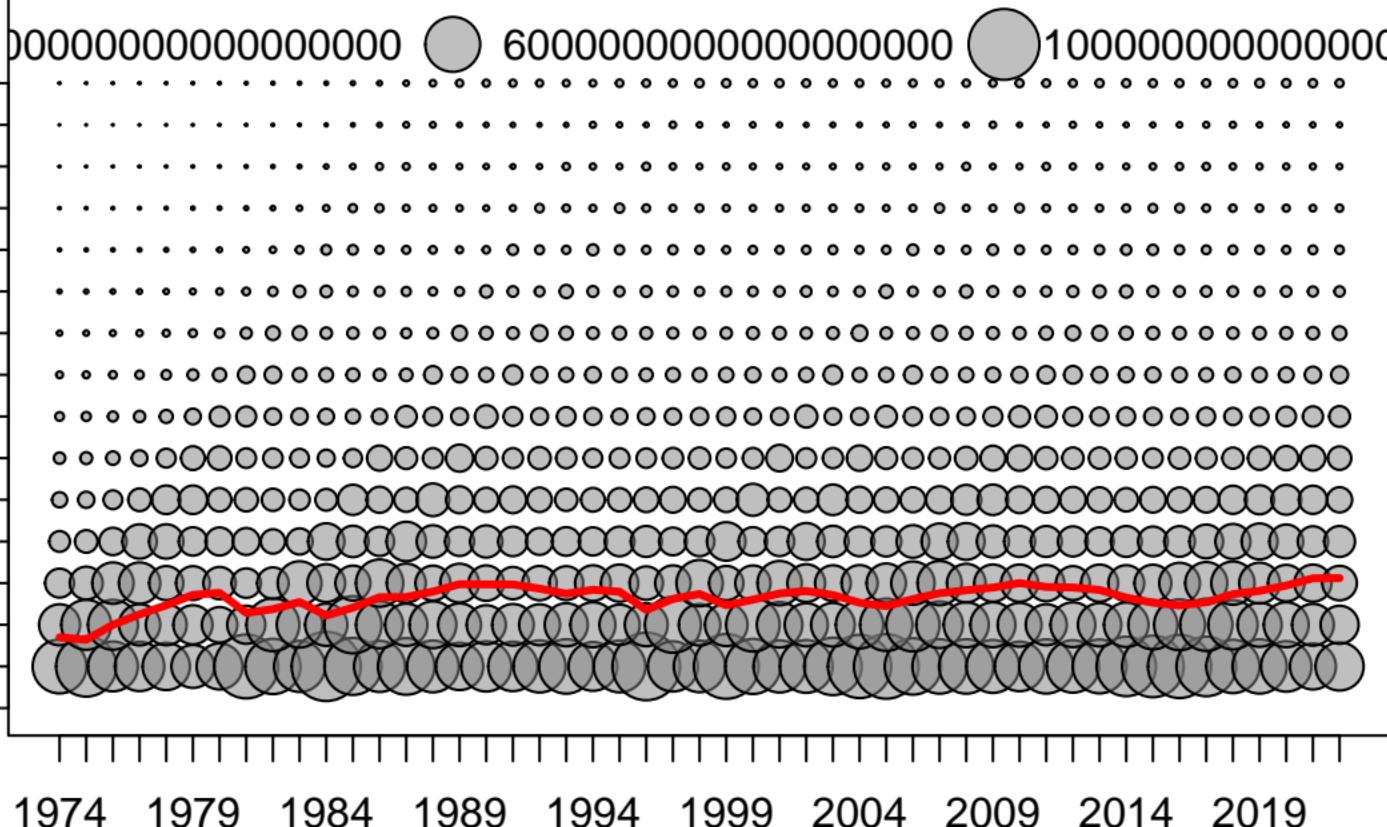
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Year

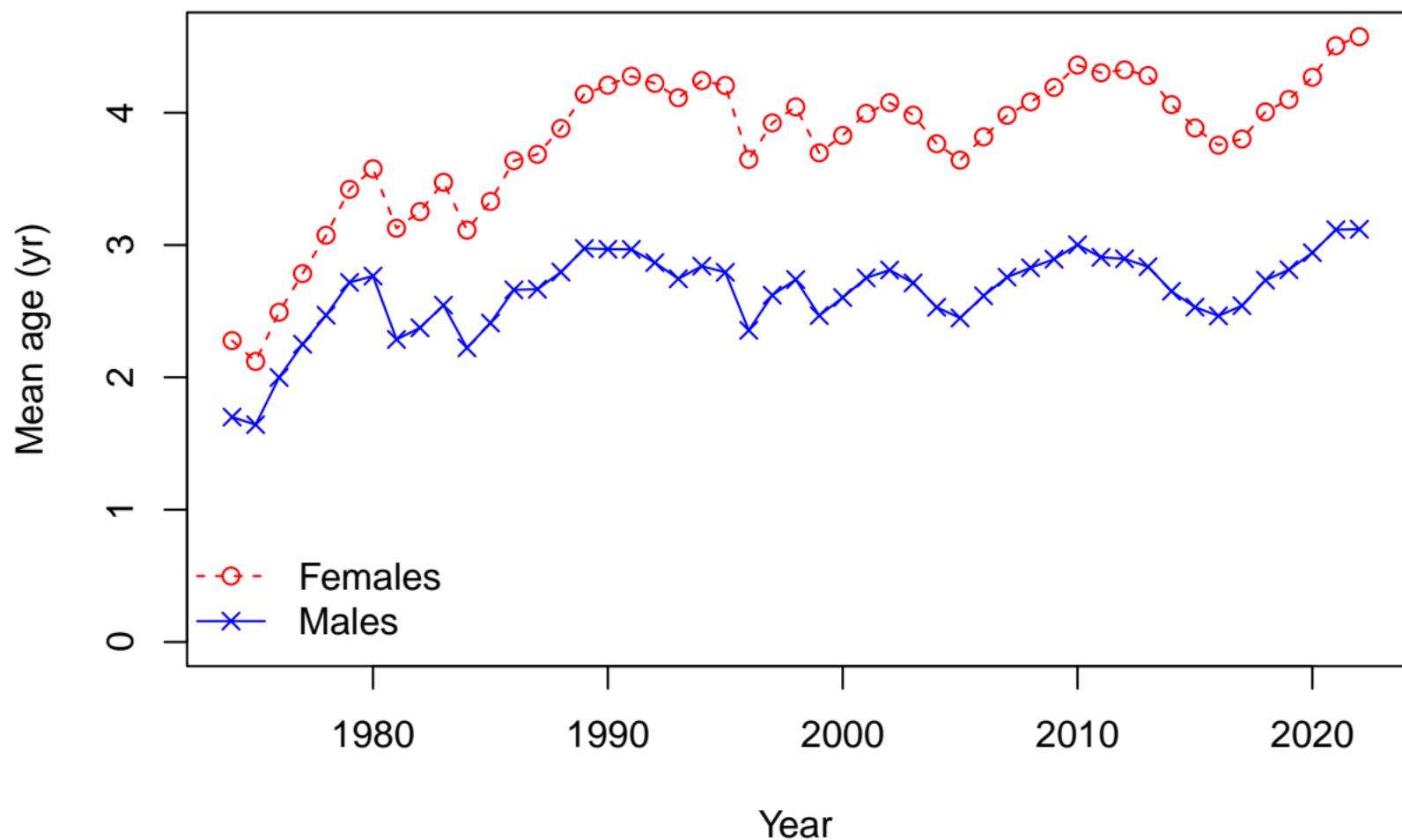


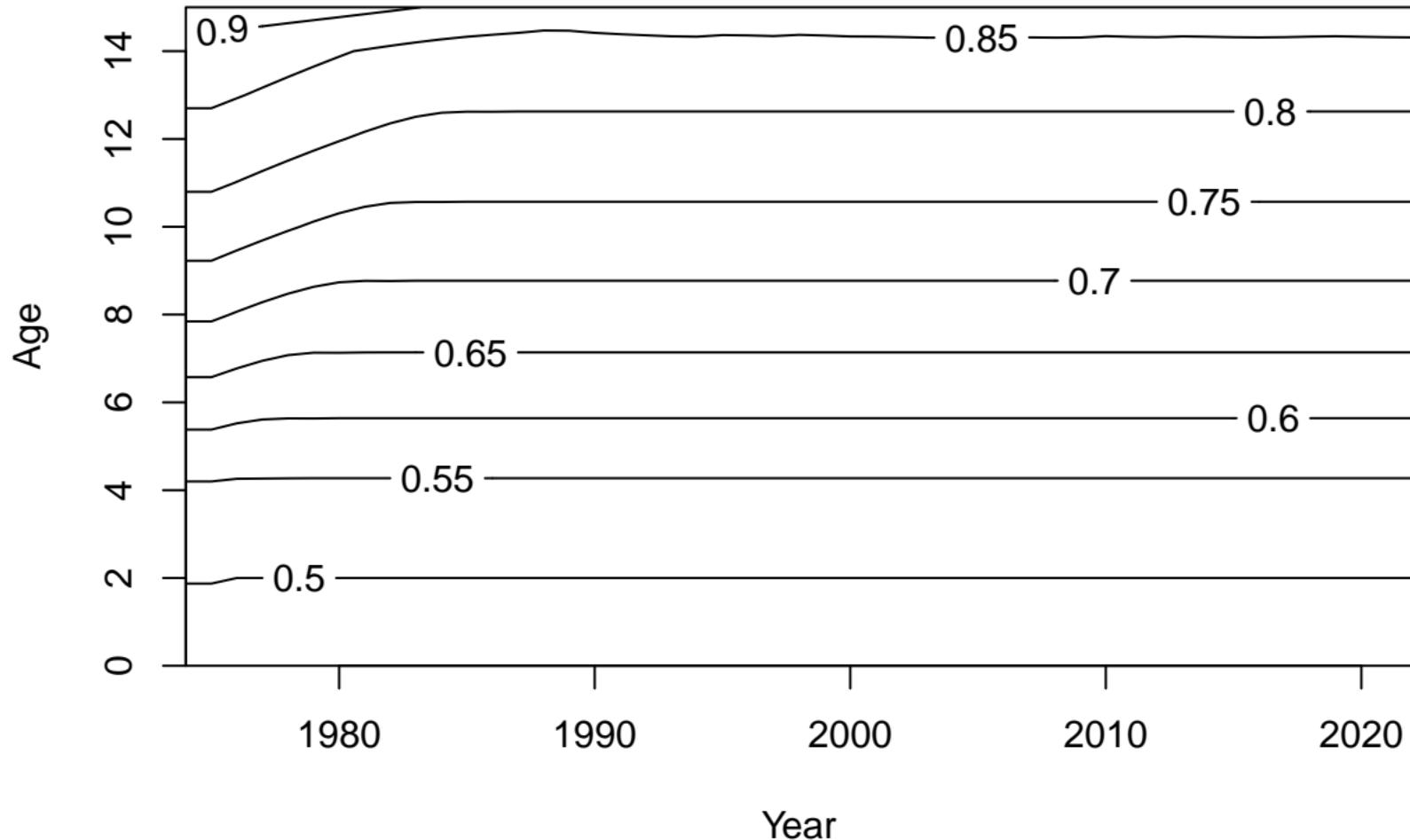
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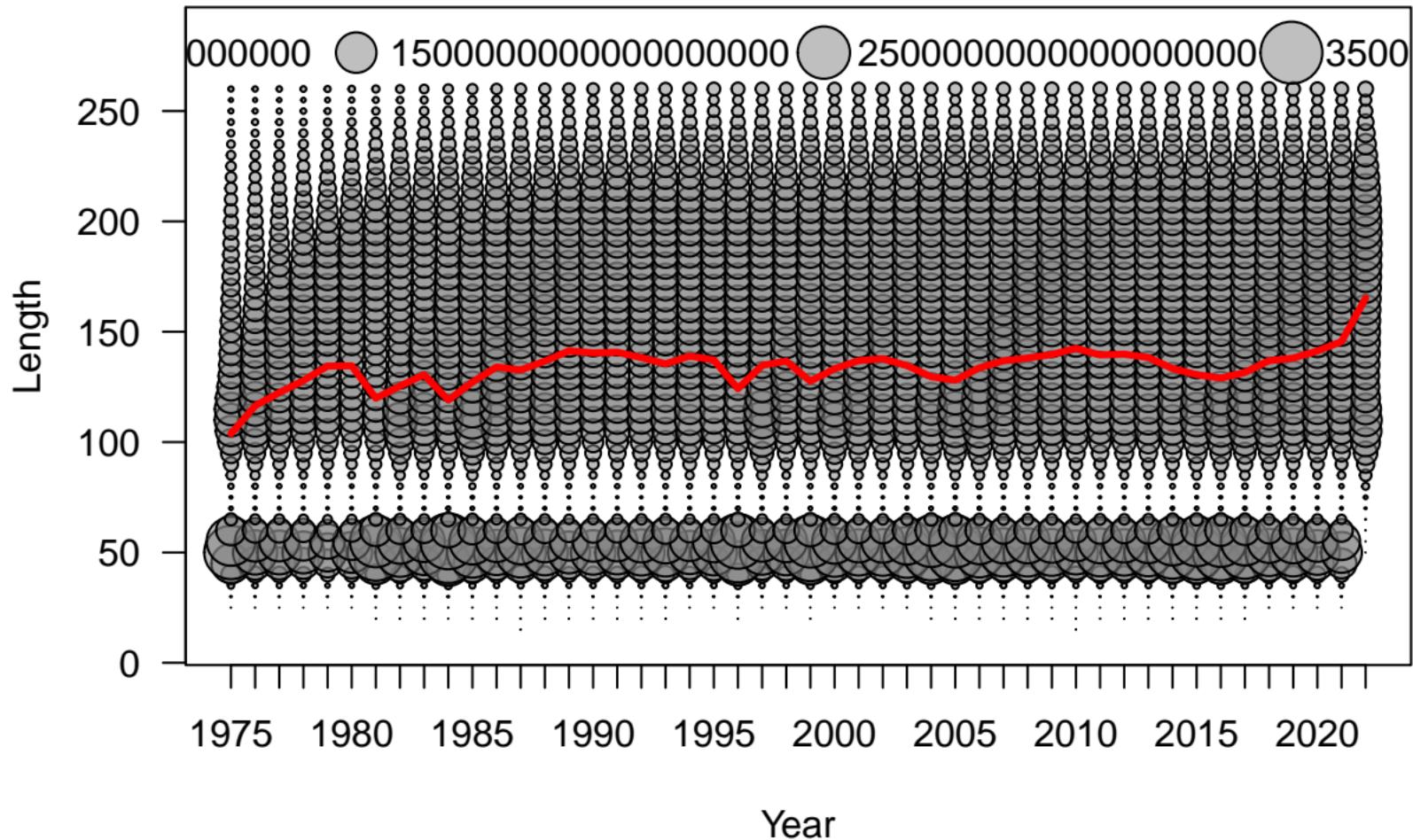
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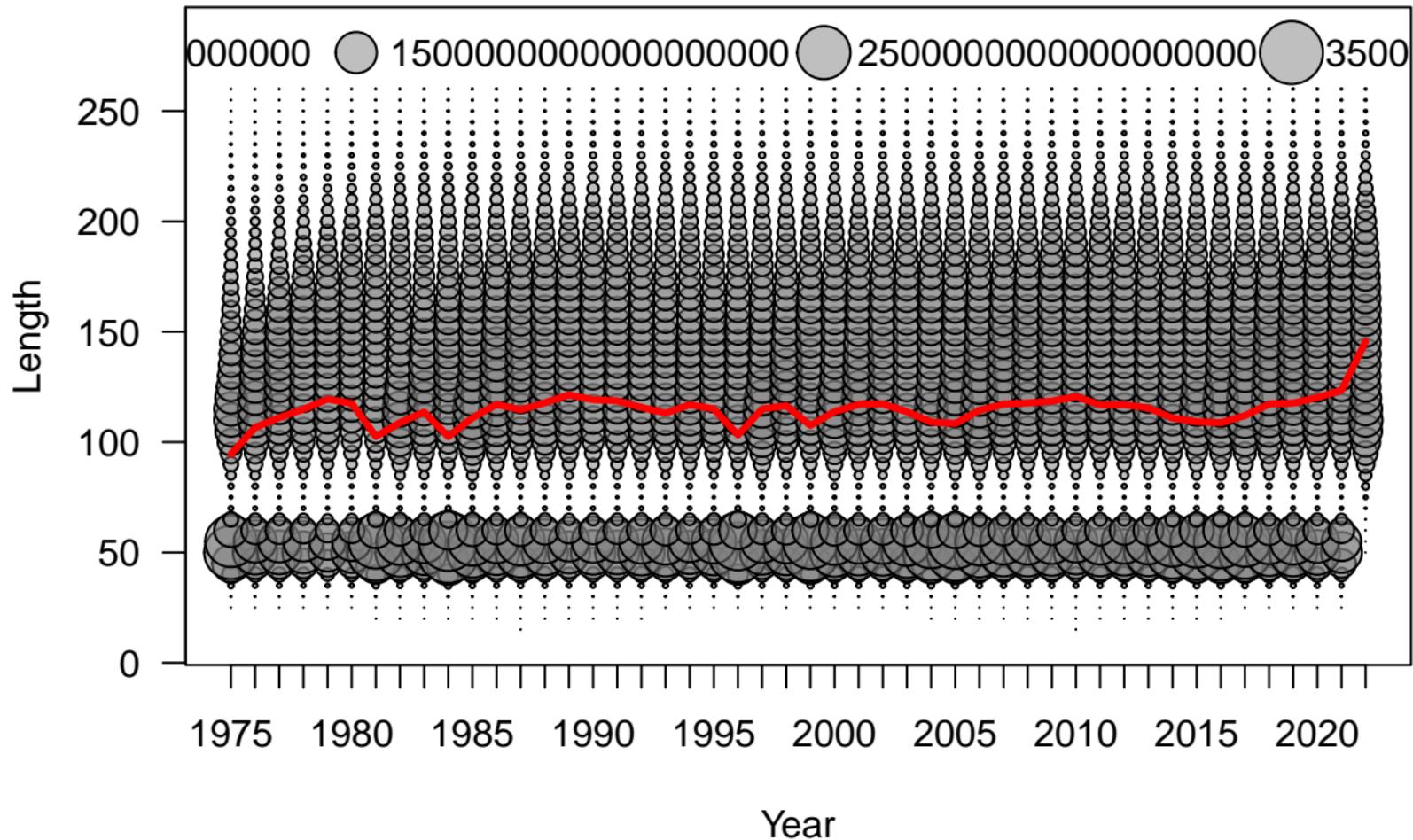


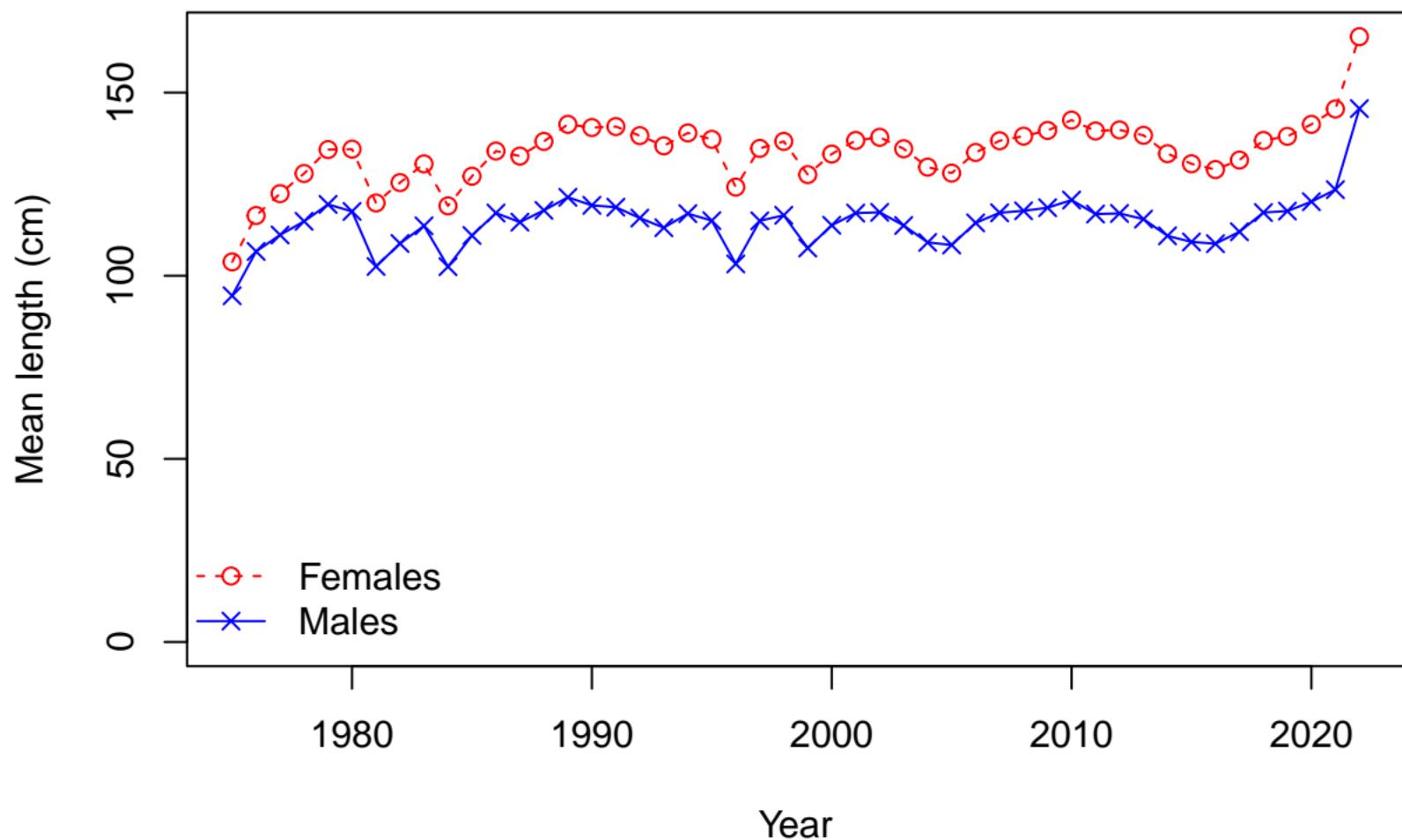
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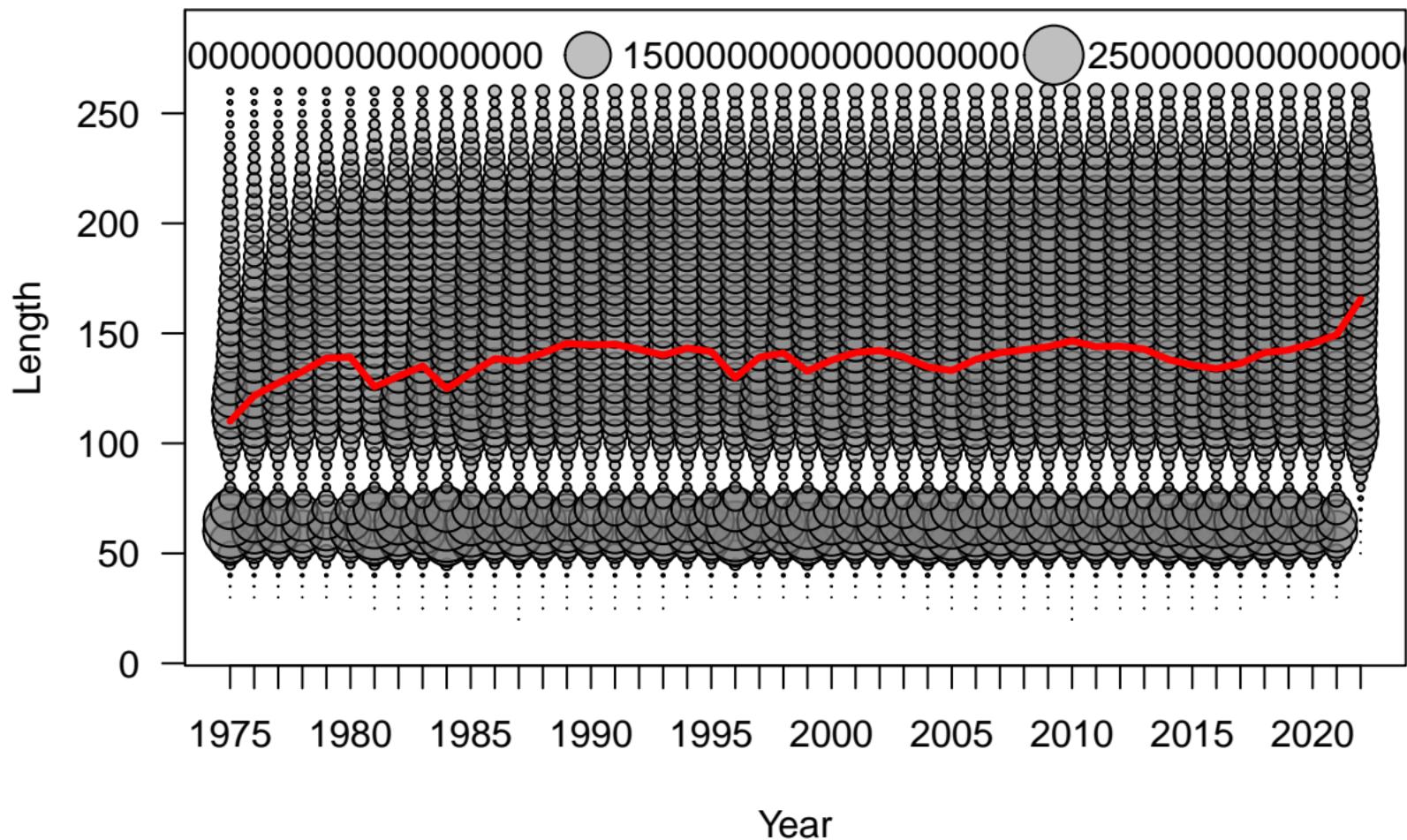


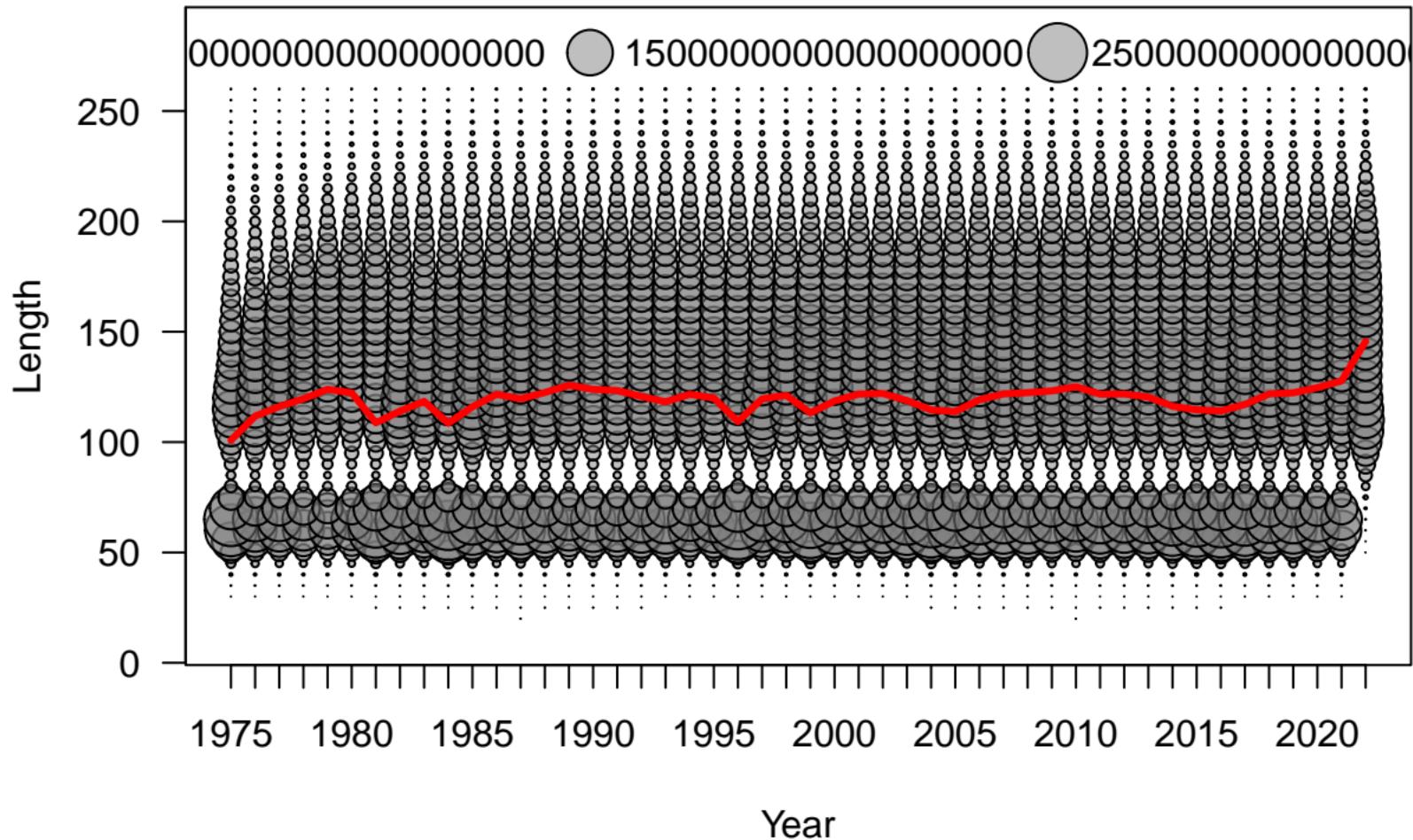


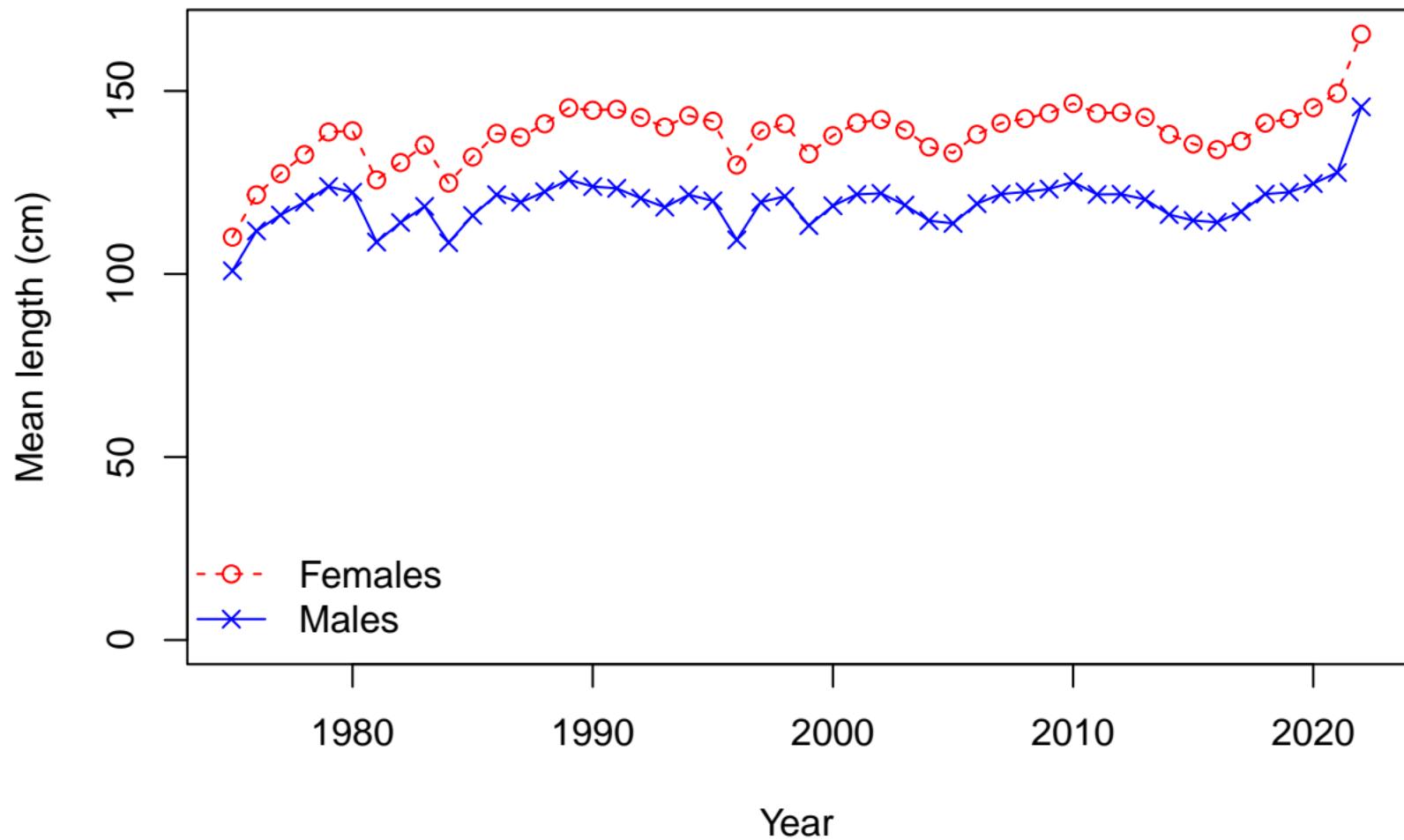


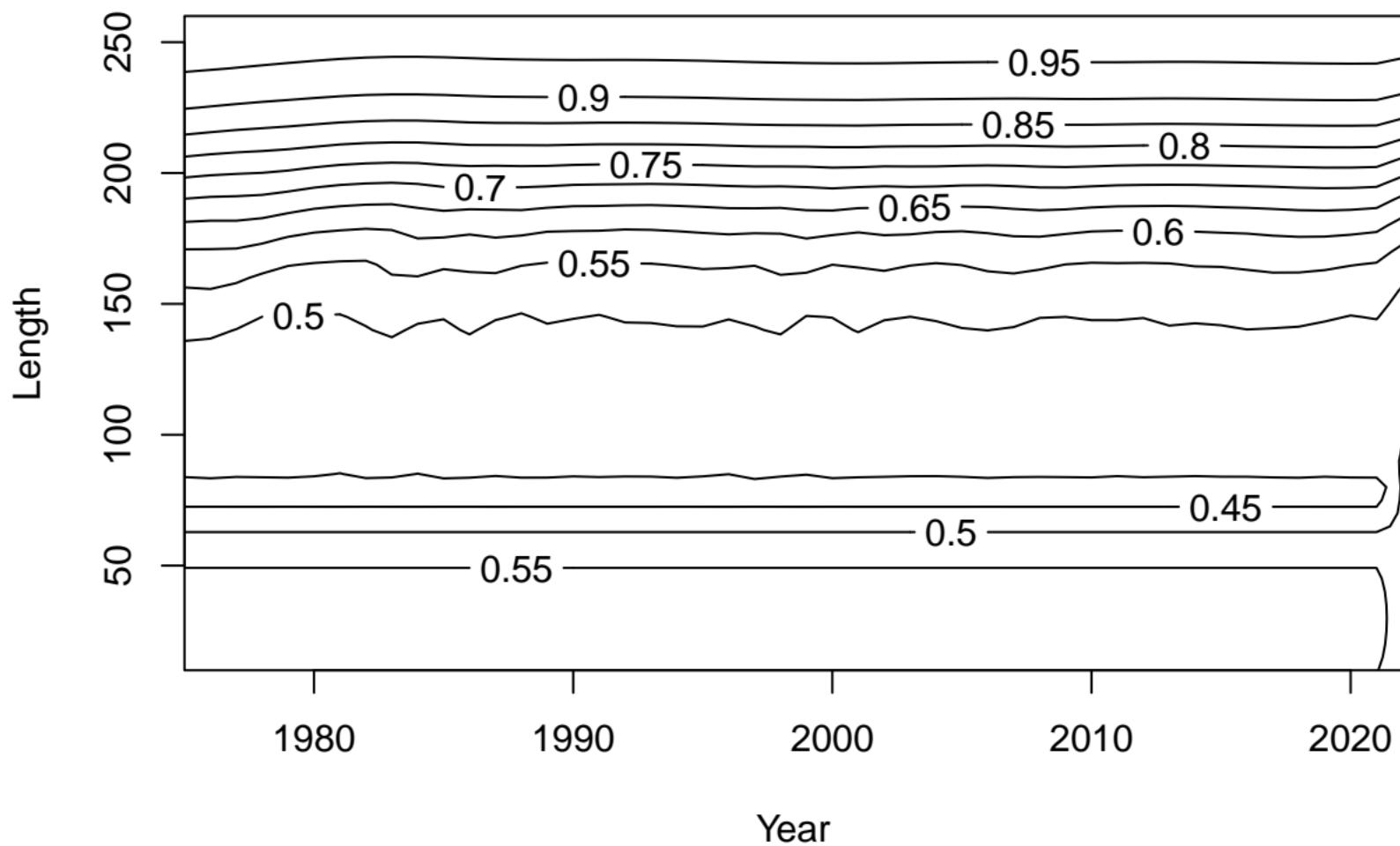


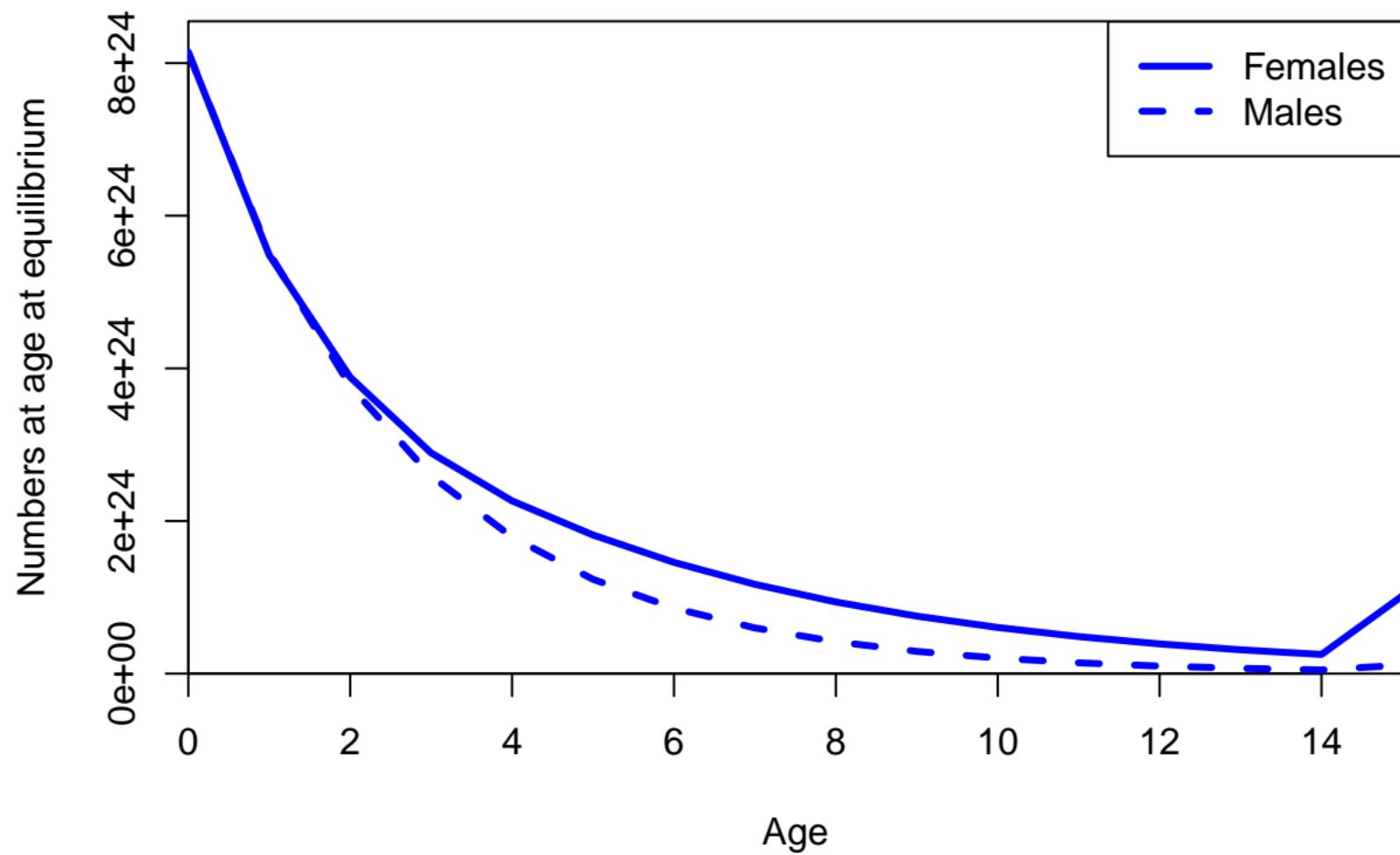


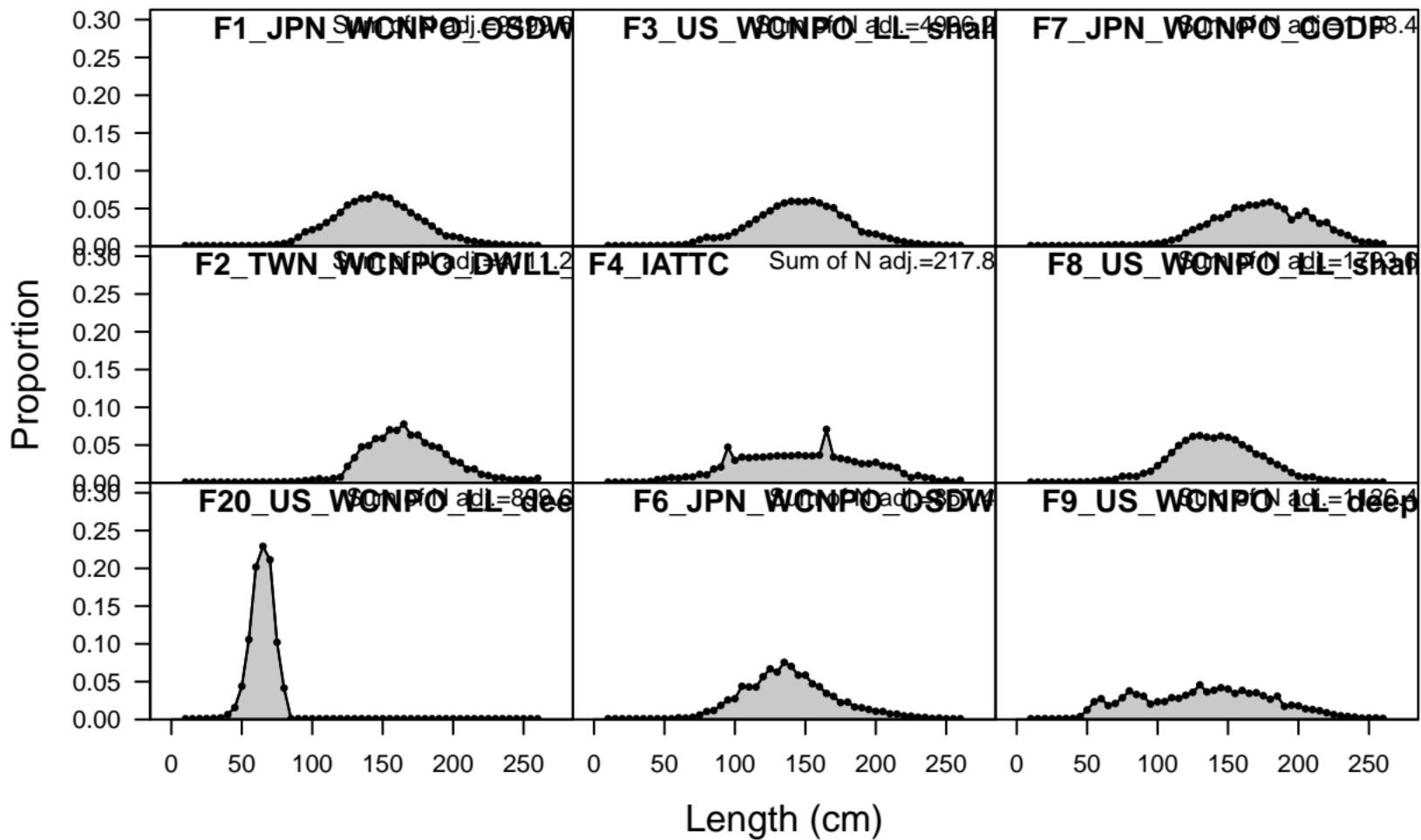


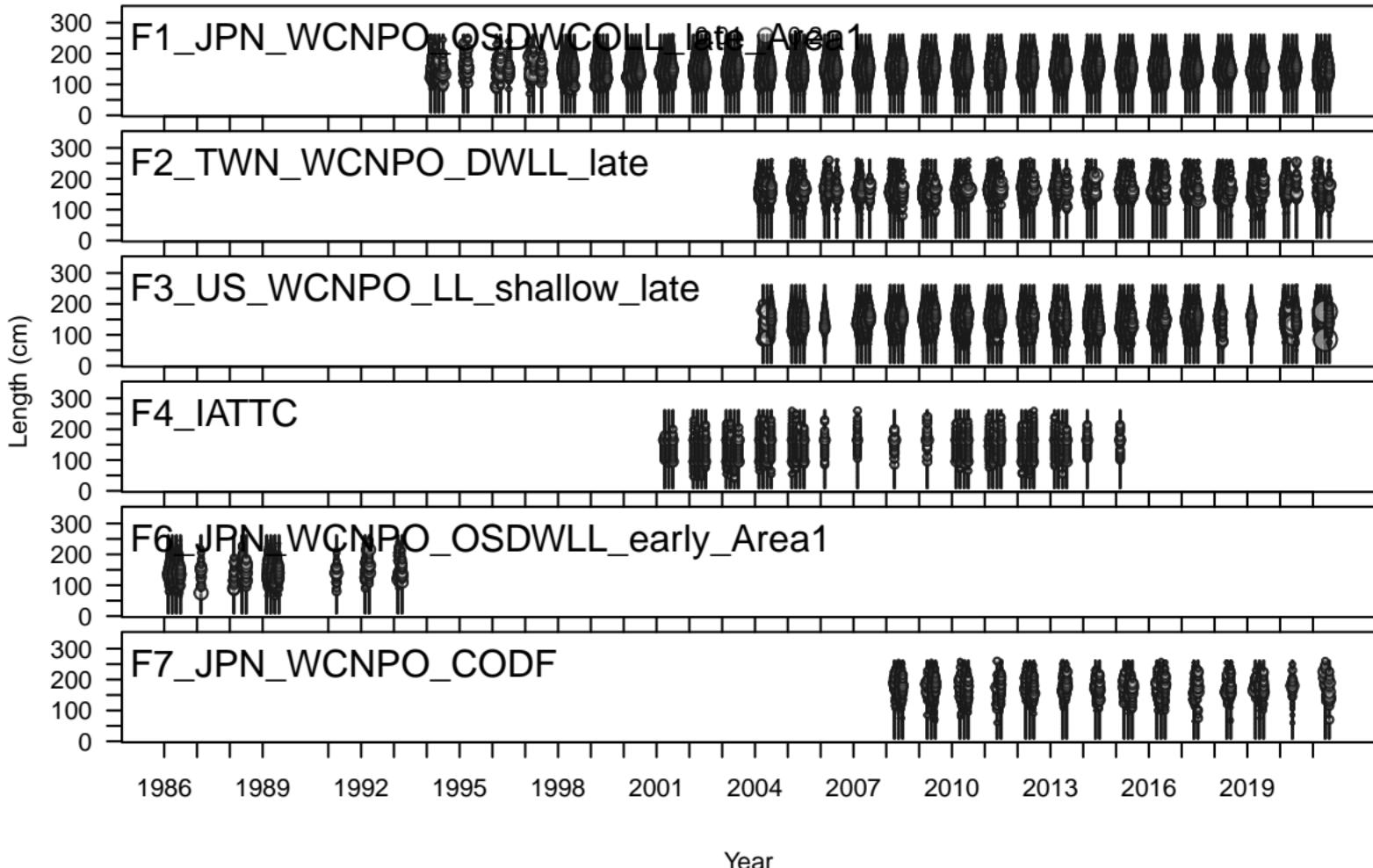


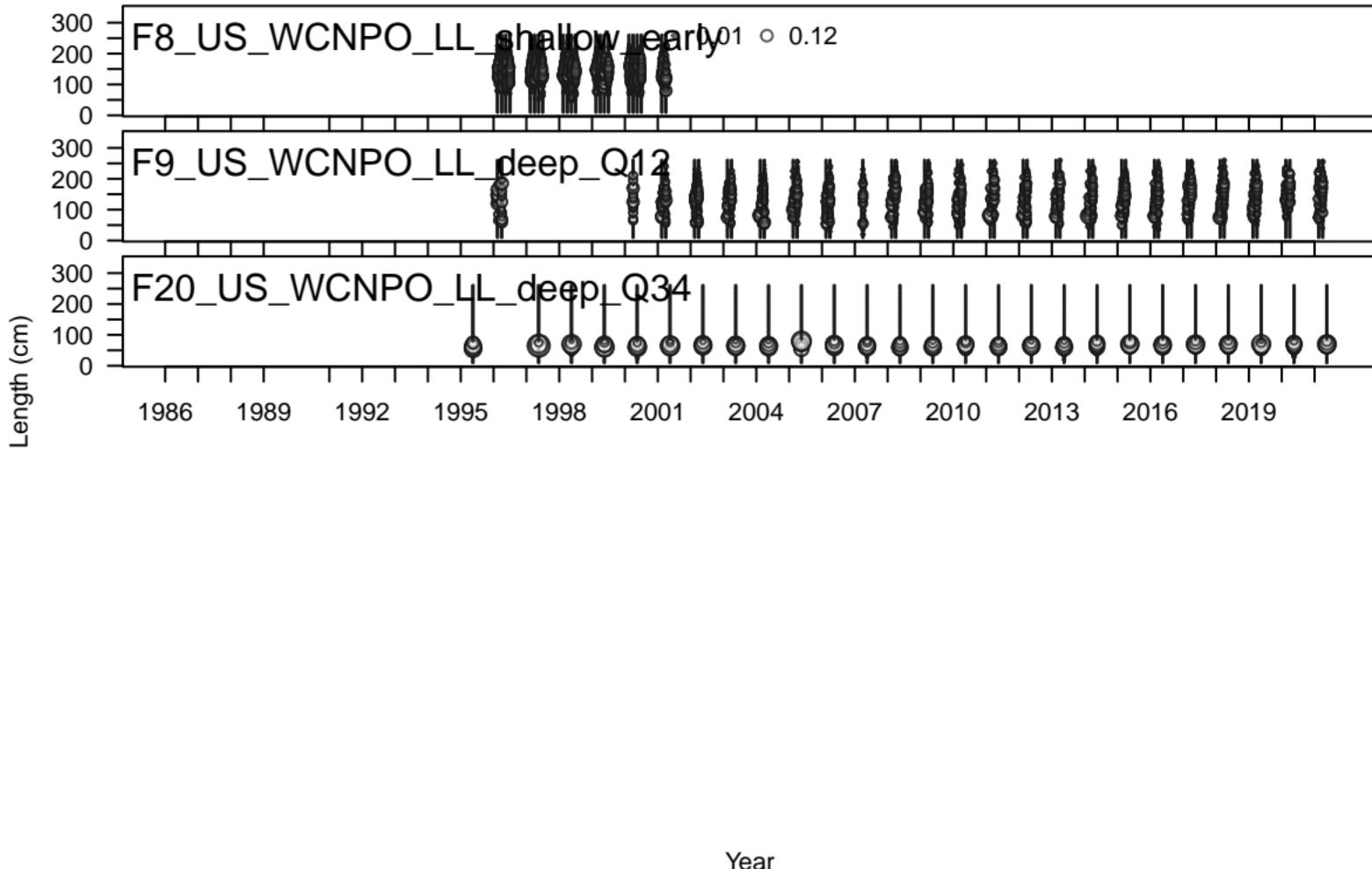




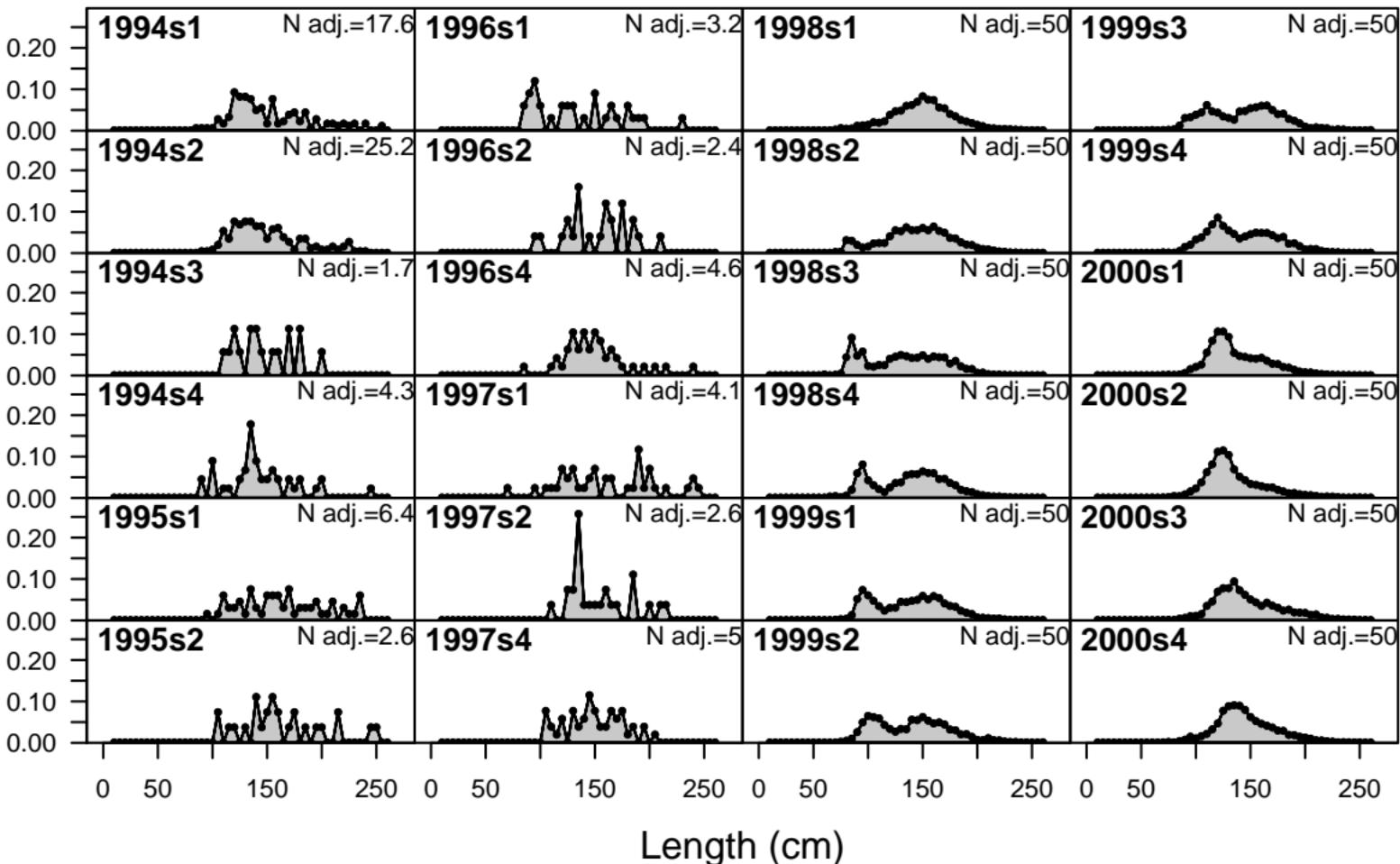




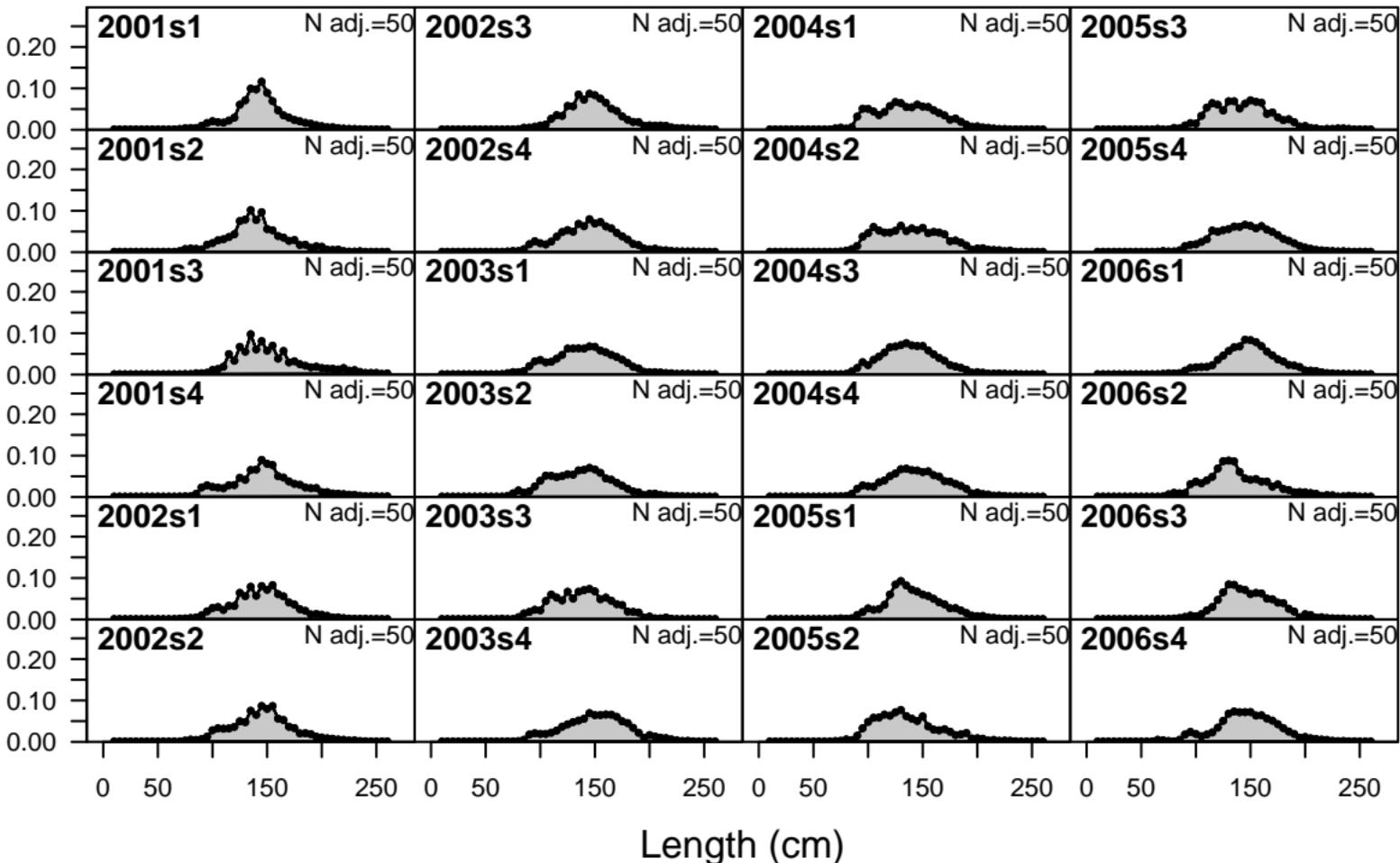




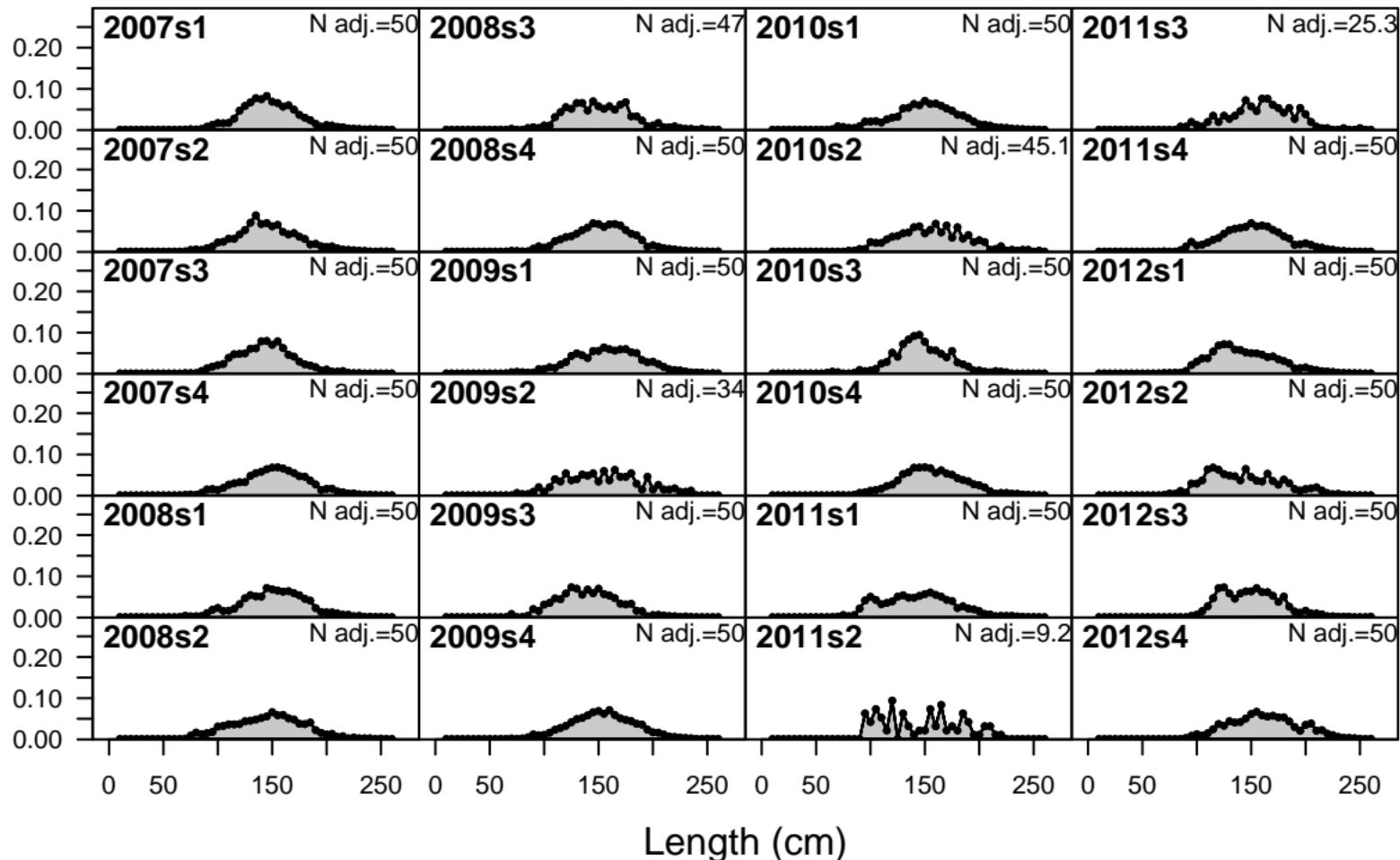
Proportion



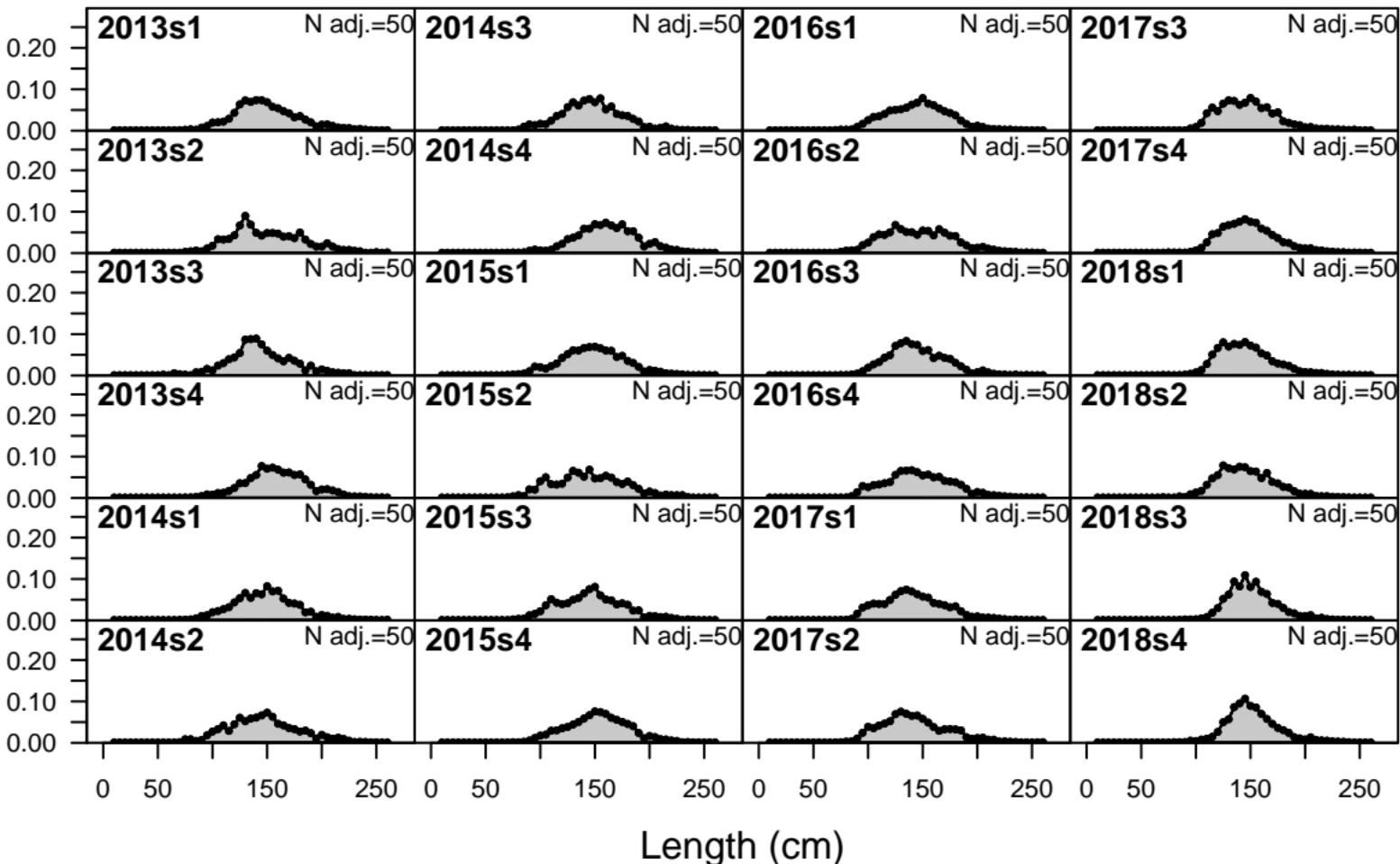
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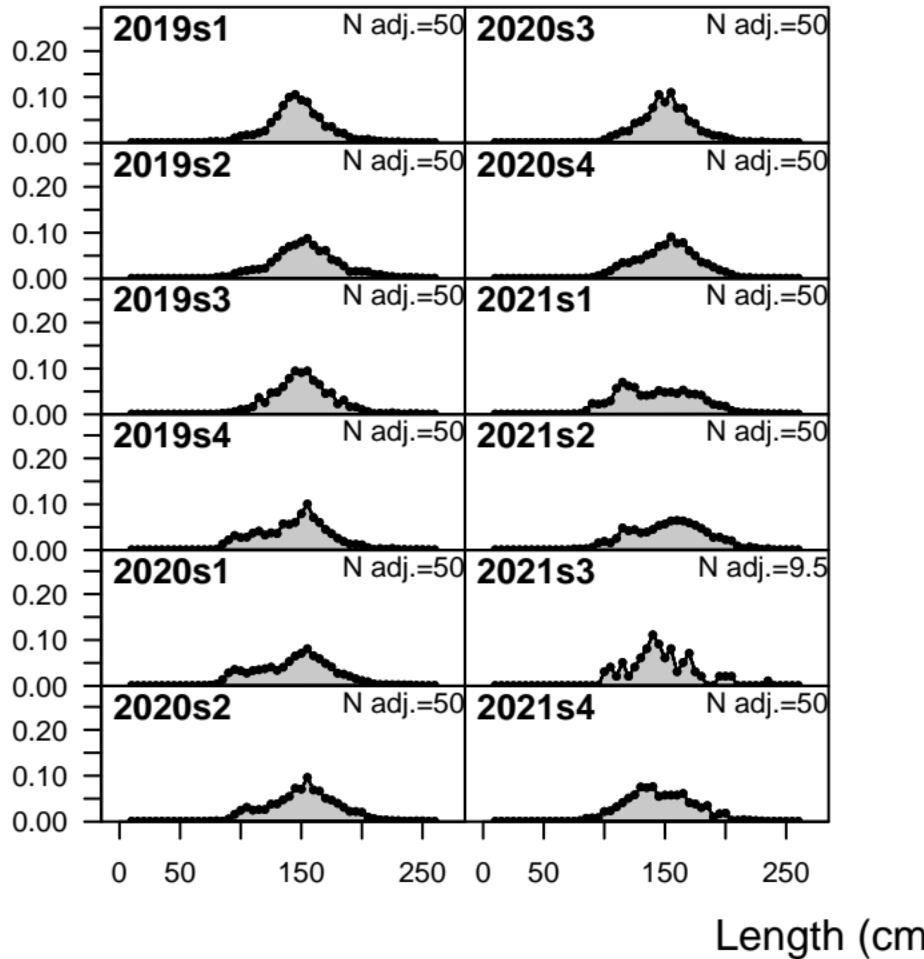
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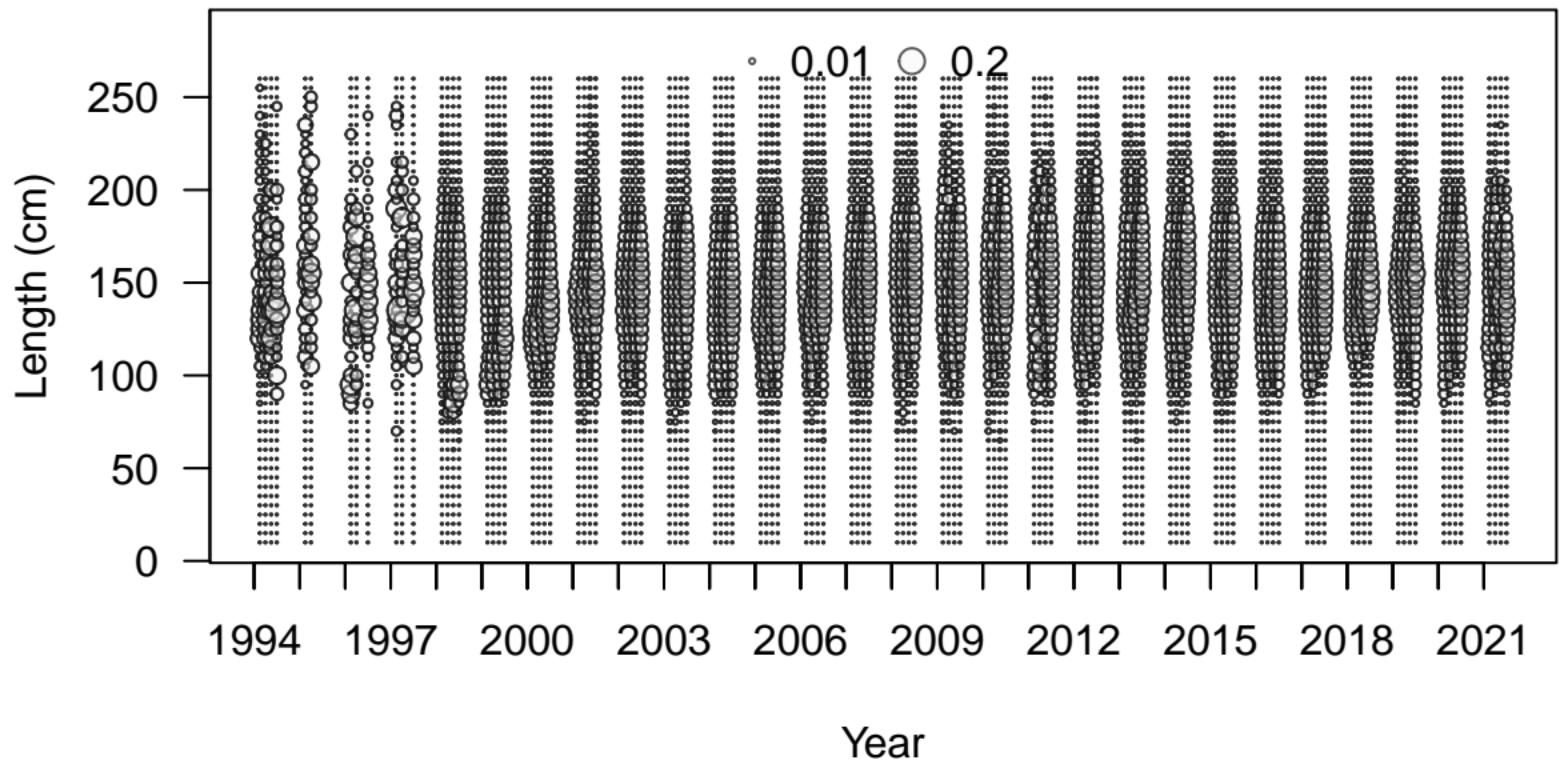


Proportion

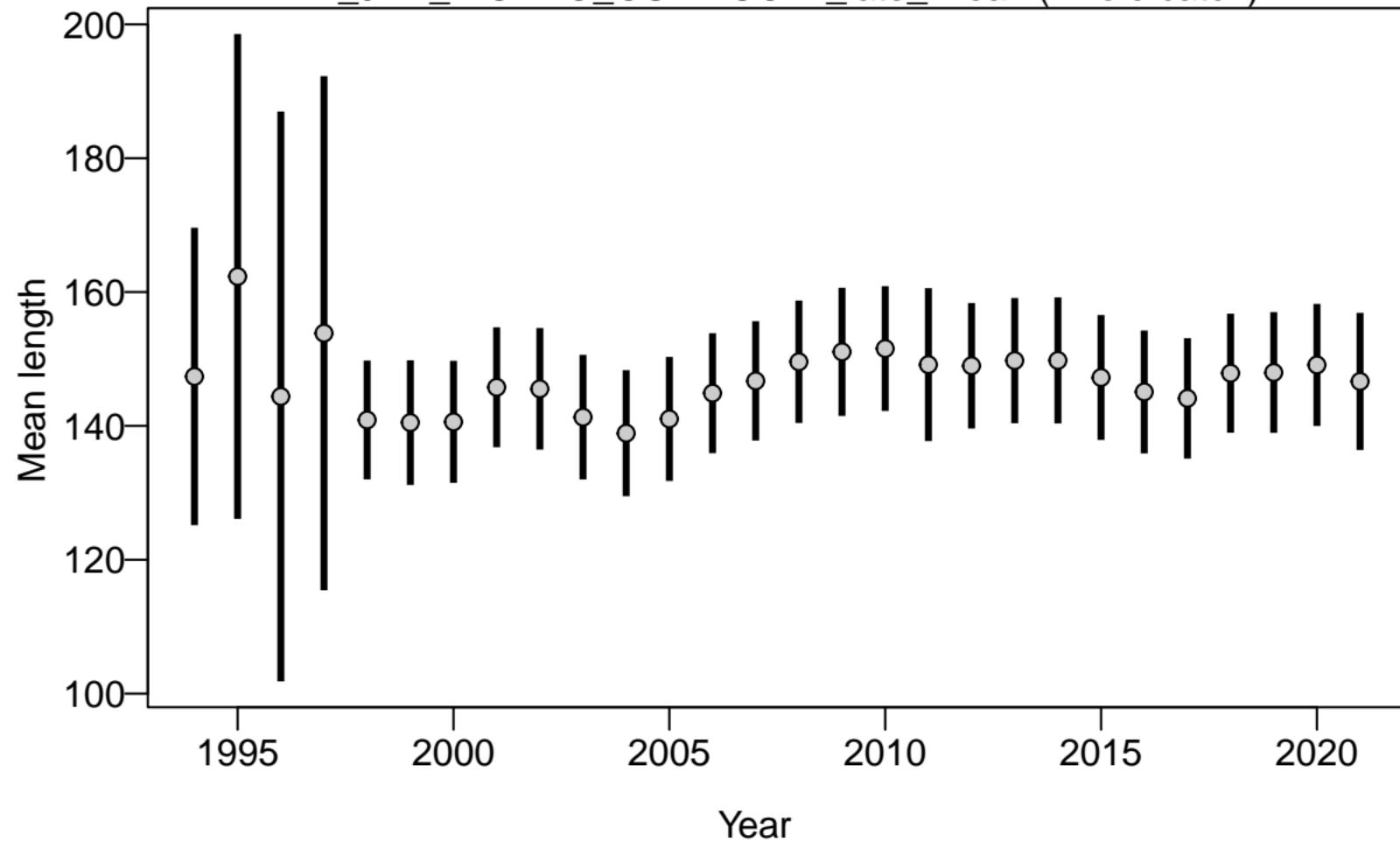


Proportion

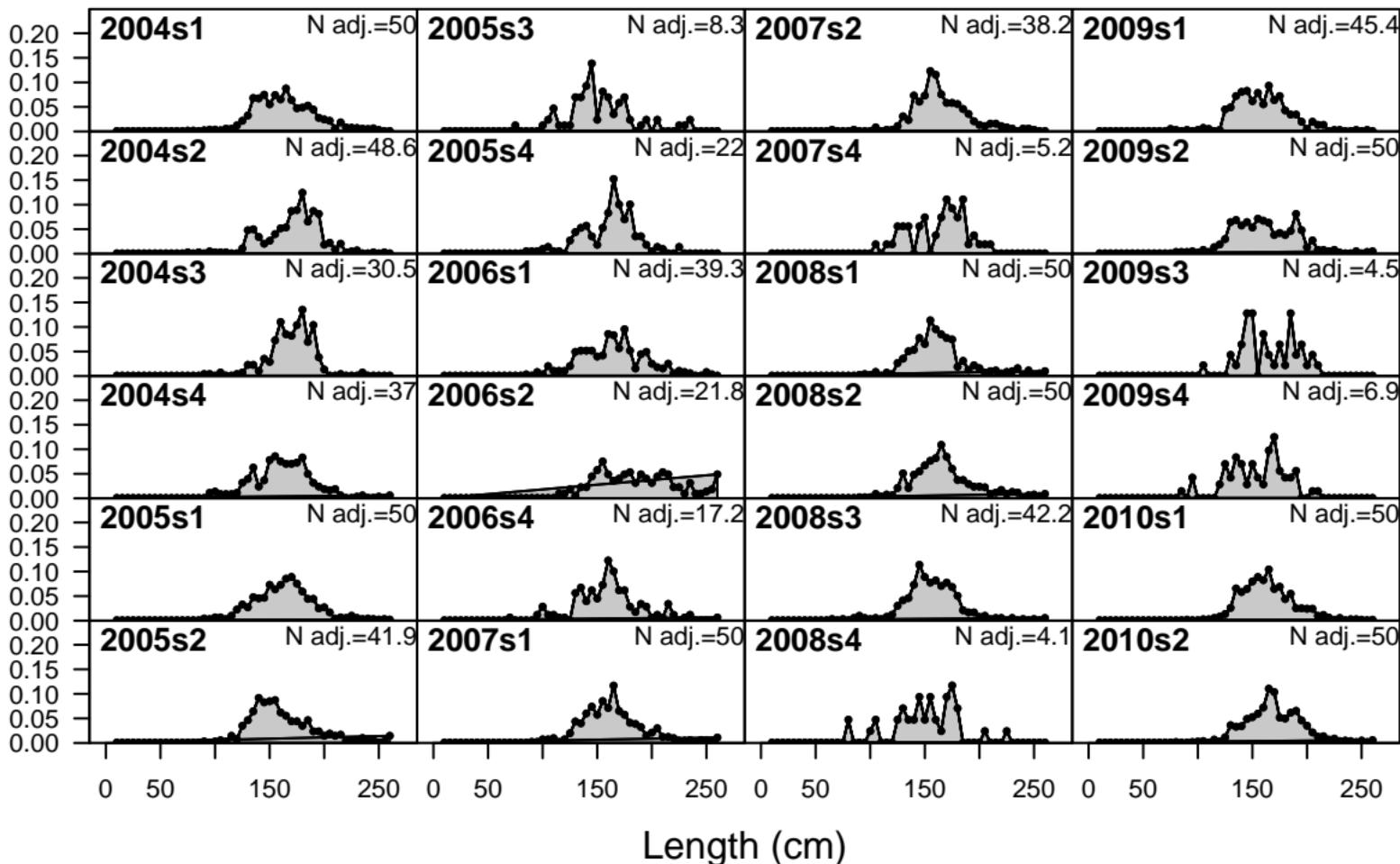




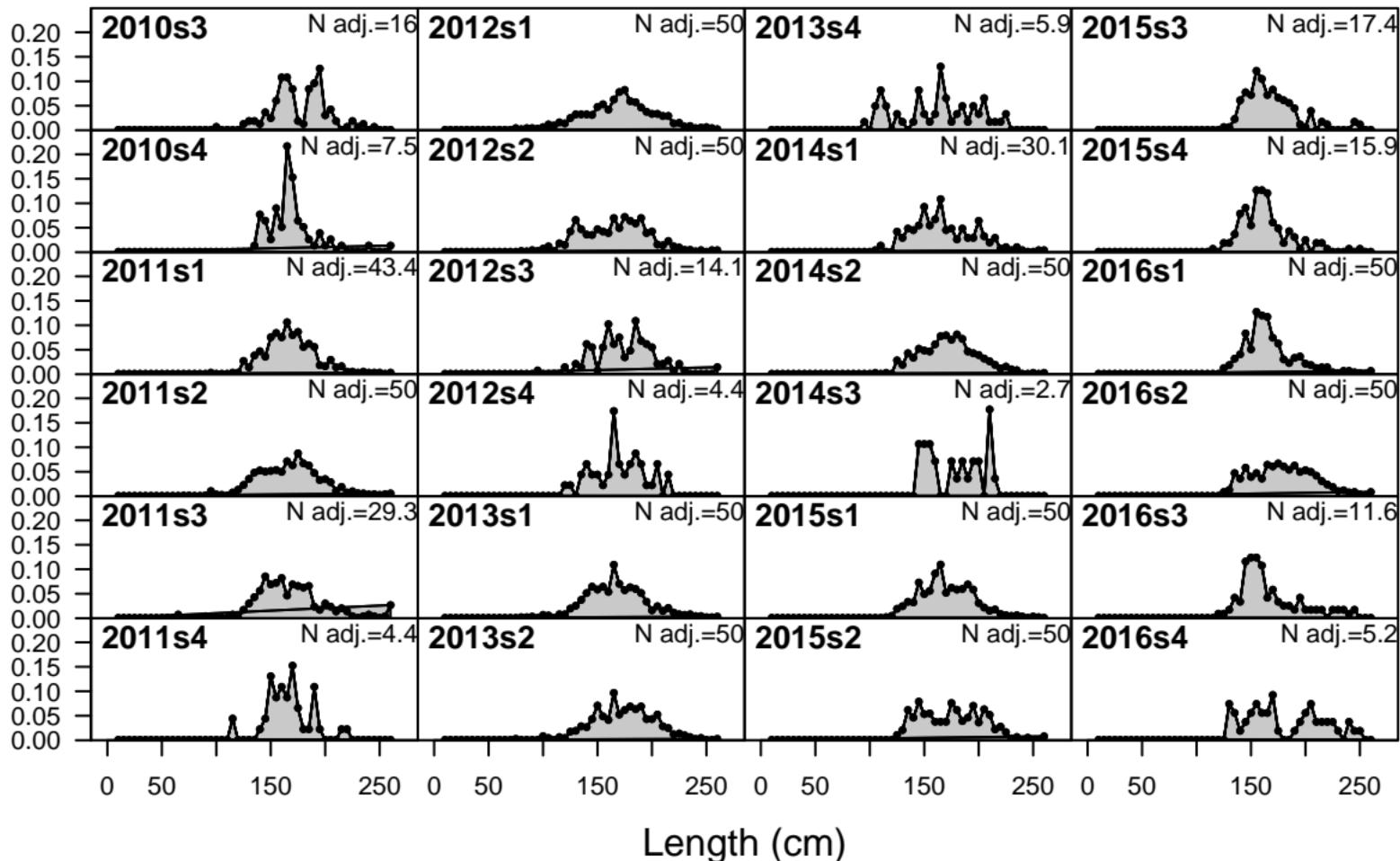
F1_JPN_WCNPO OSDWCOLL late Area1 (whole catch)



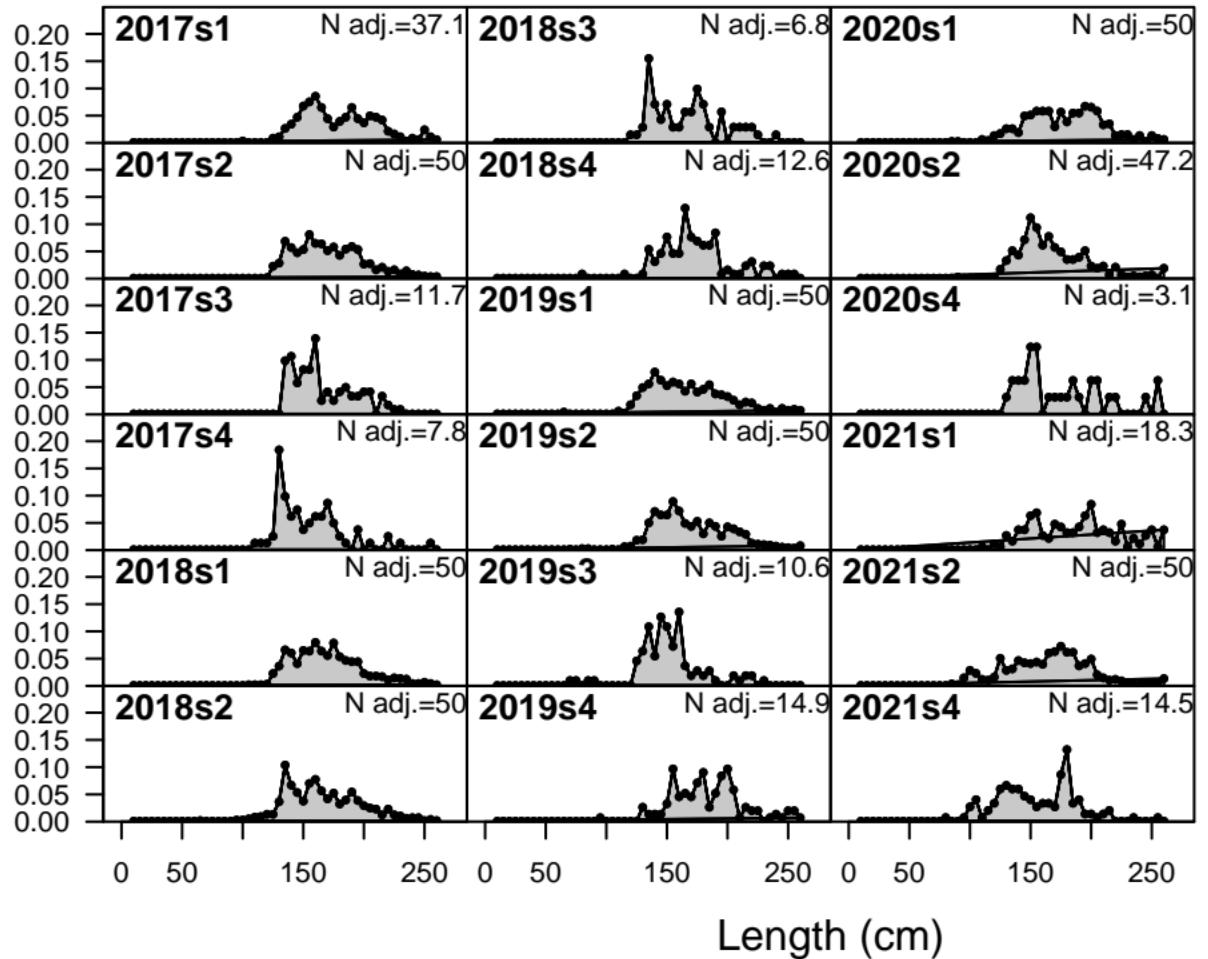
Proportion

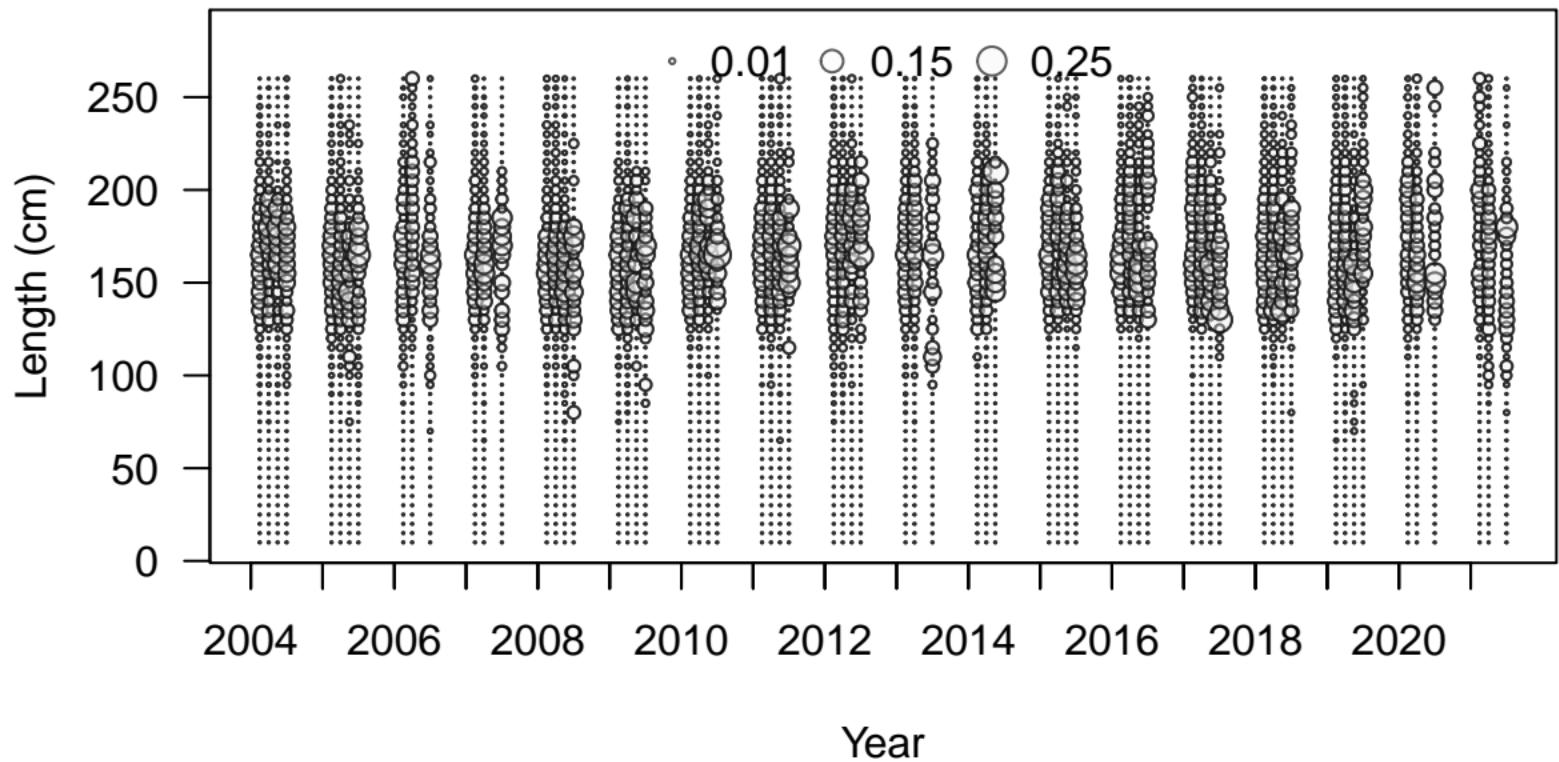


Proportion

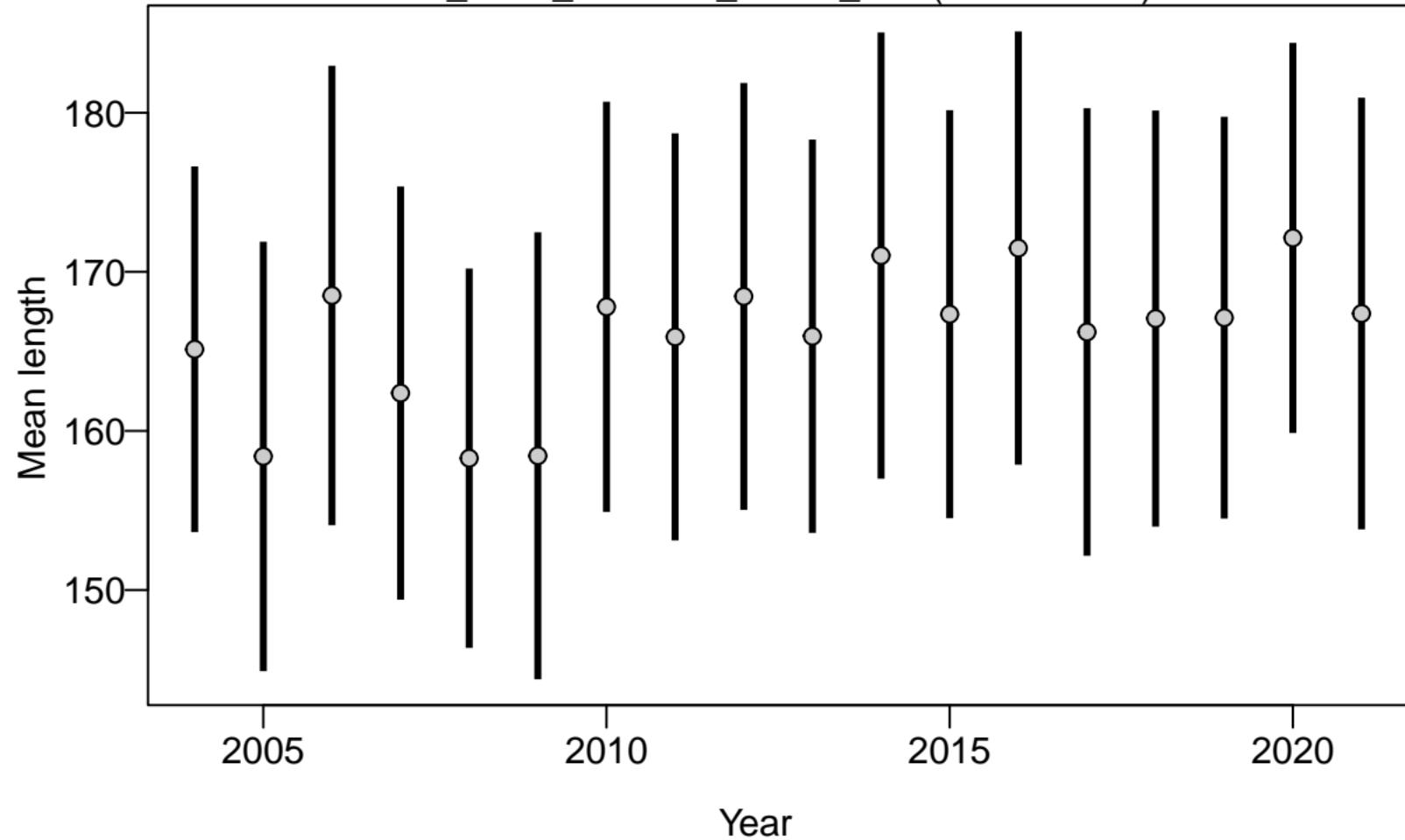


Proportion

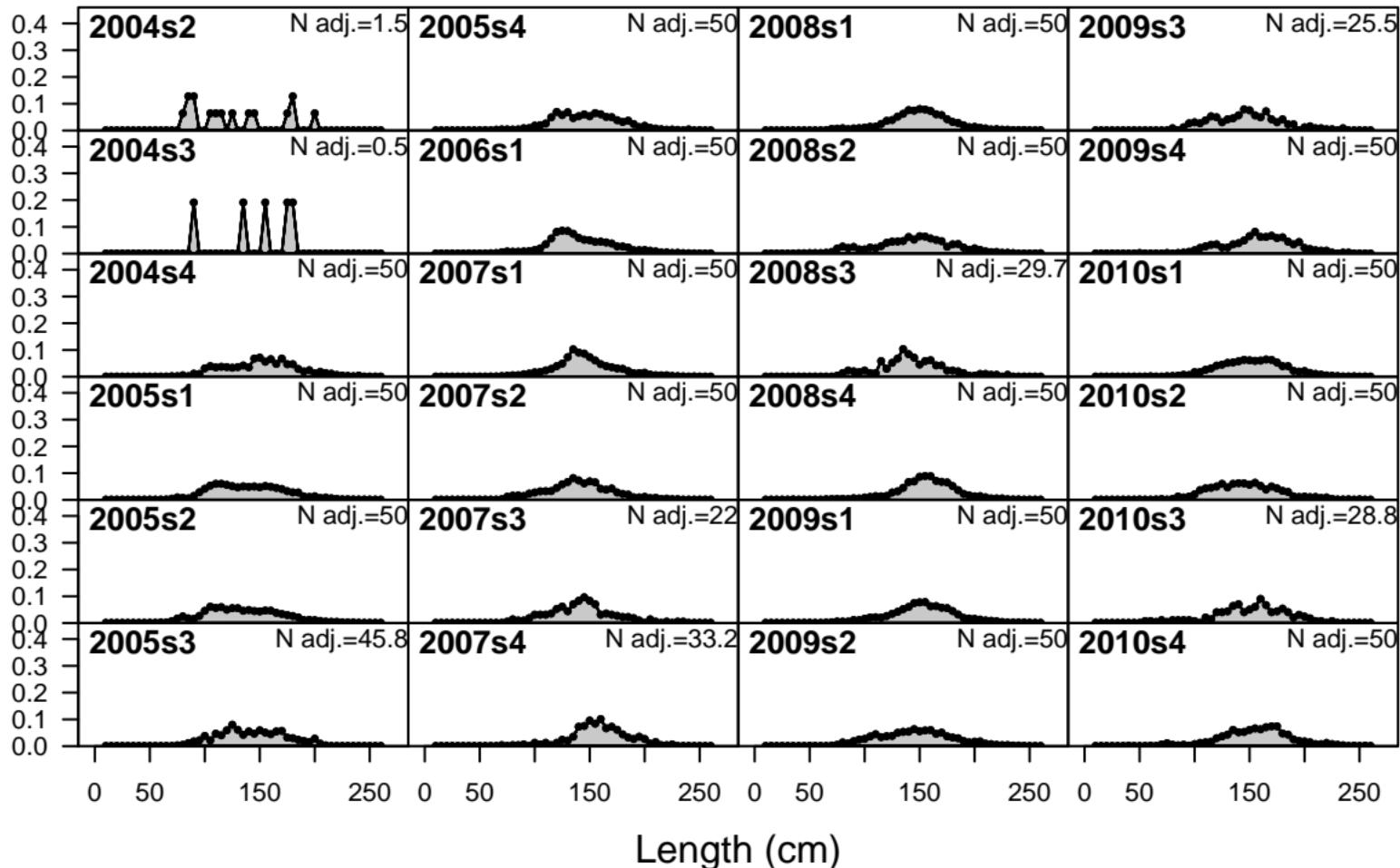




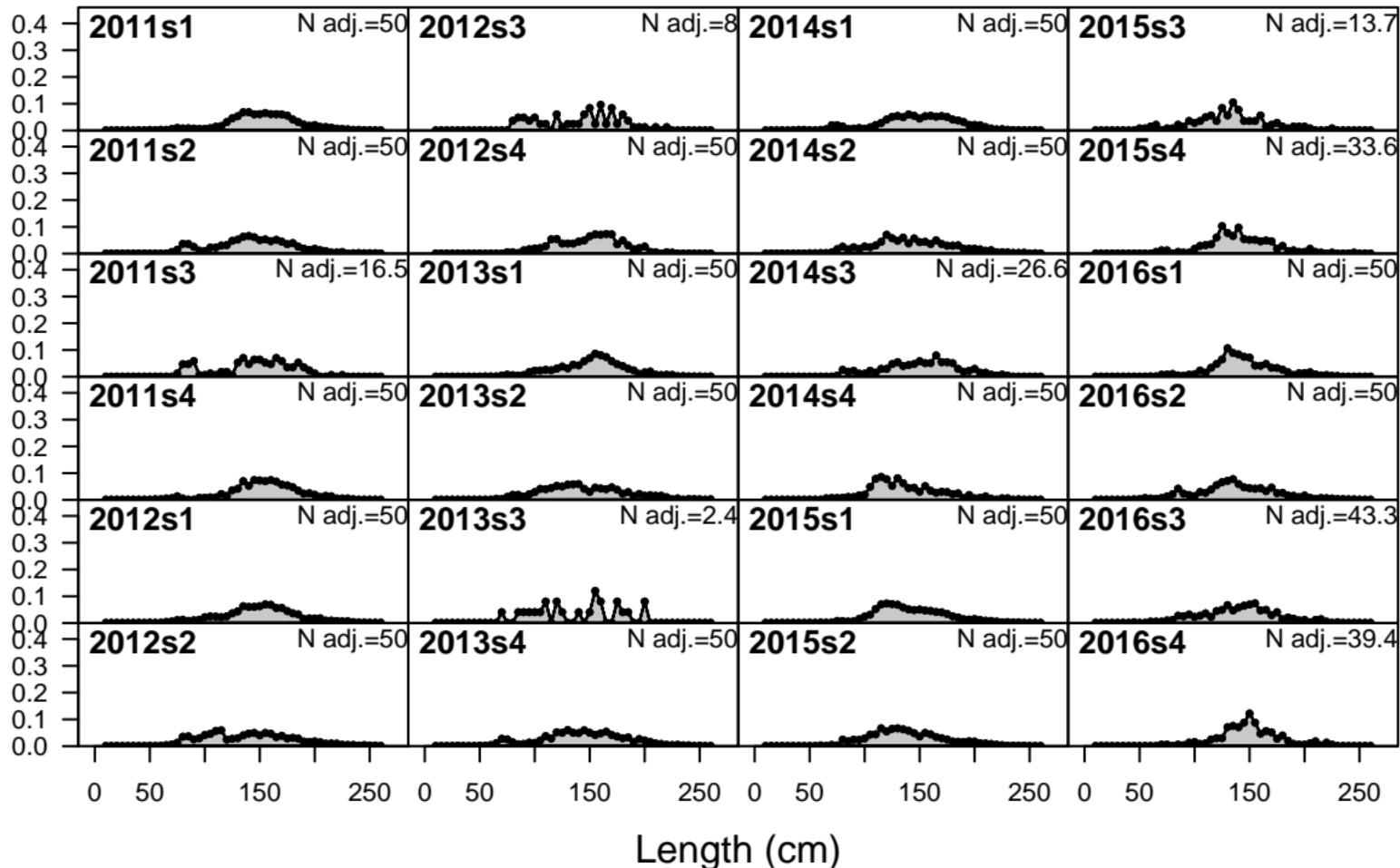
F2_TWN_WCNPO_DWLL_late (whole catch)



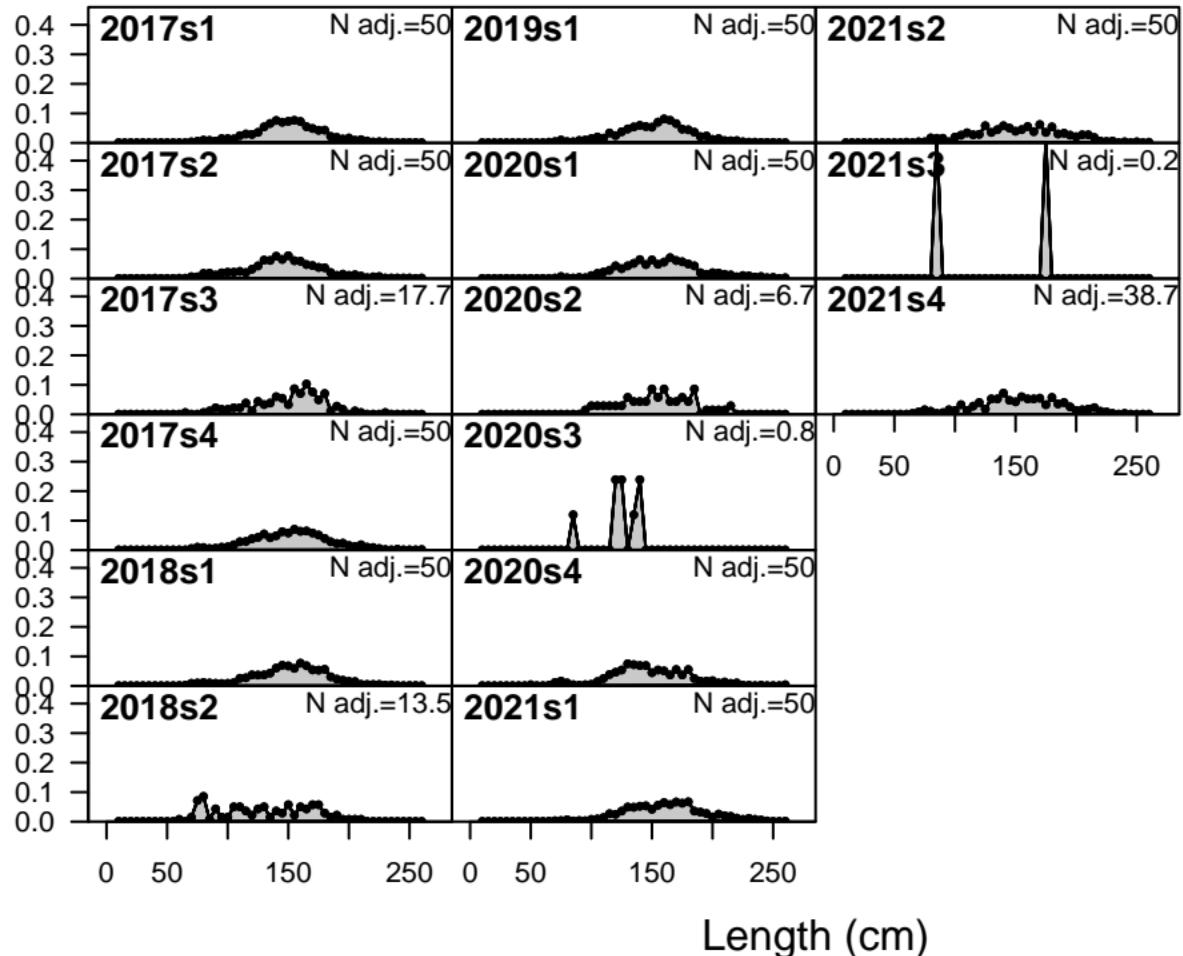
Proportion

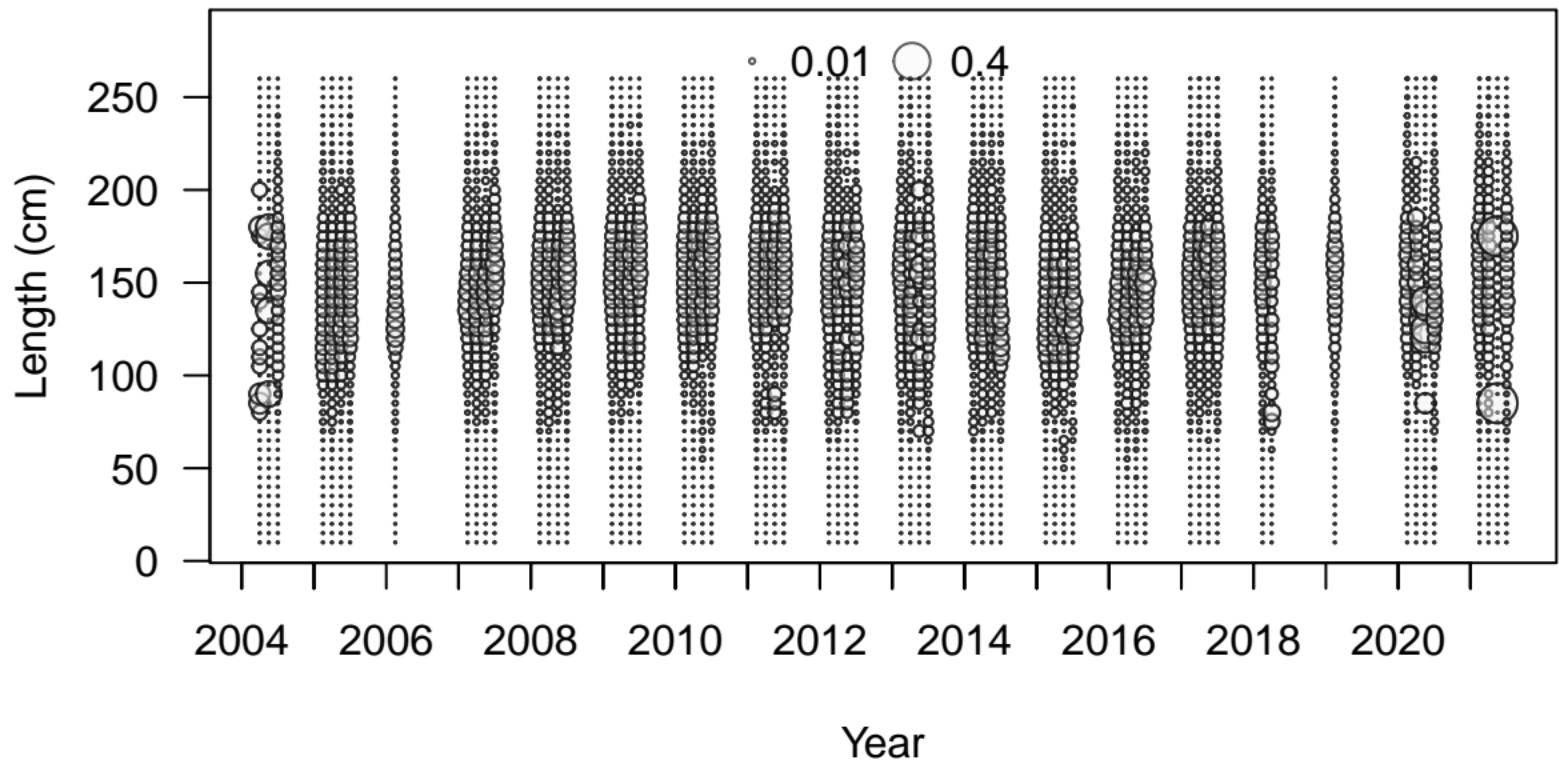


Proportion

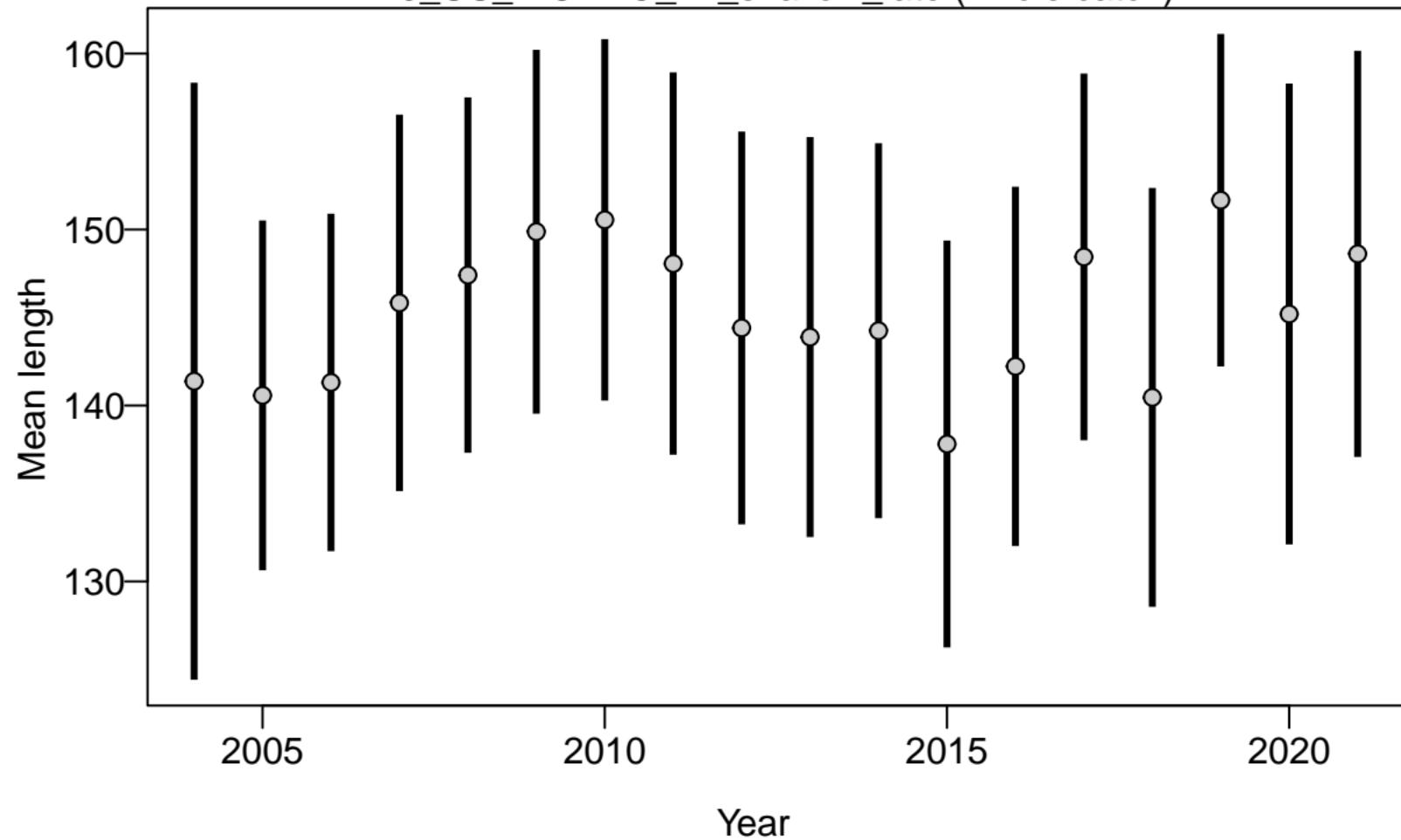


Proportion

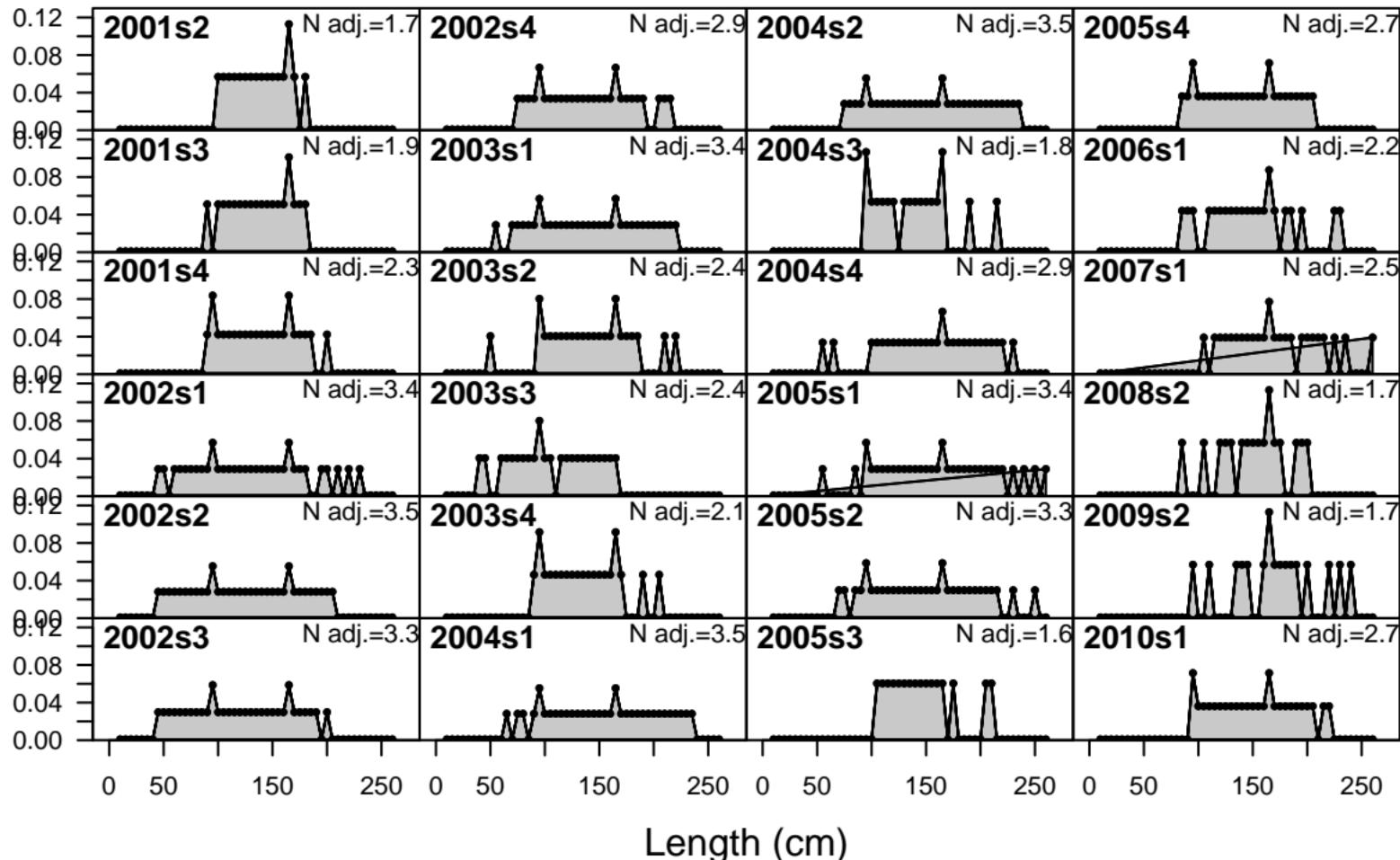




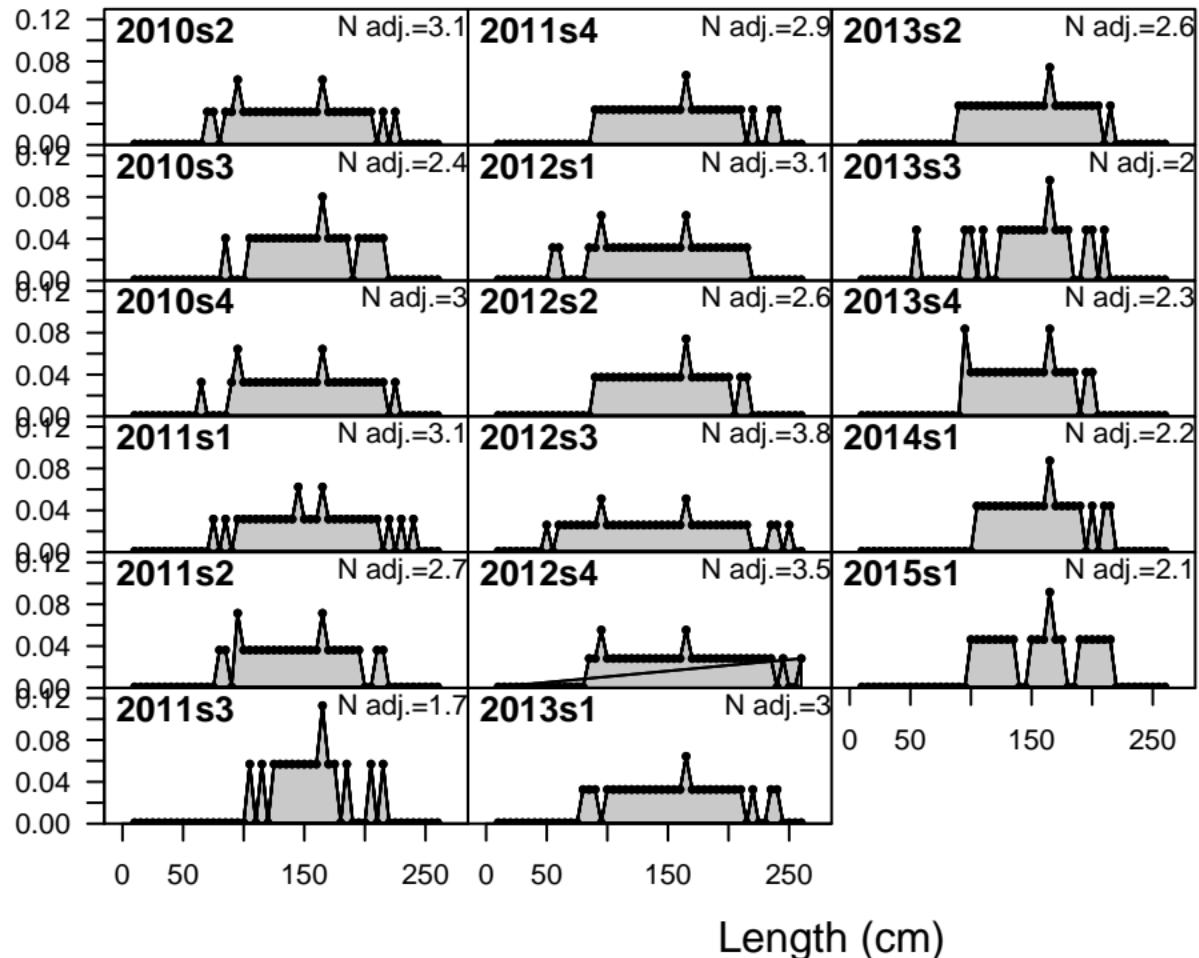
F3_US_WCNPO_LL_shallow_late (whole catch)

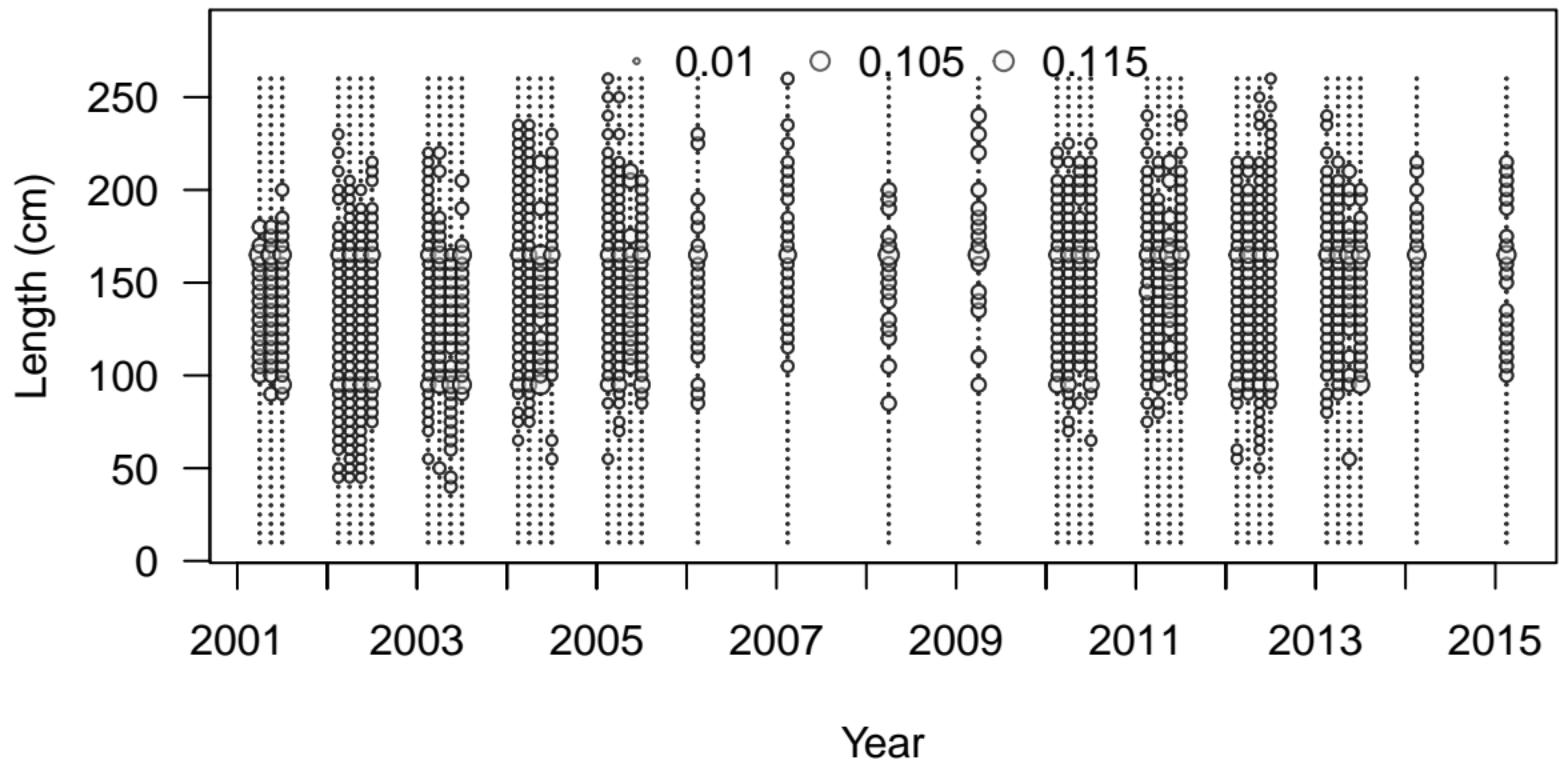


Proportion

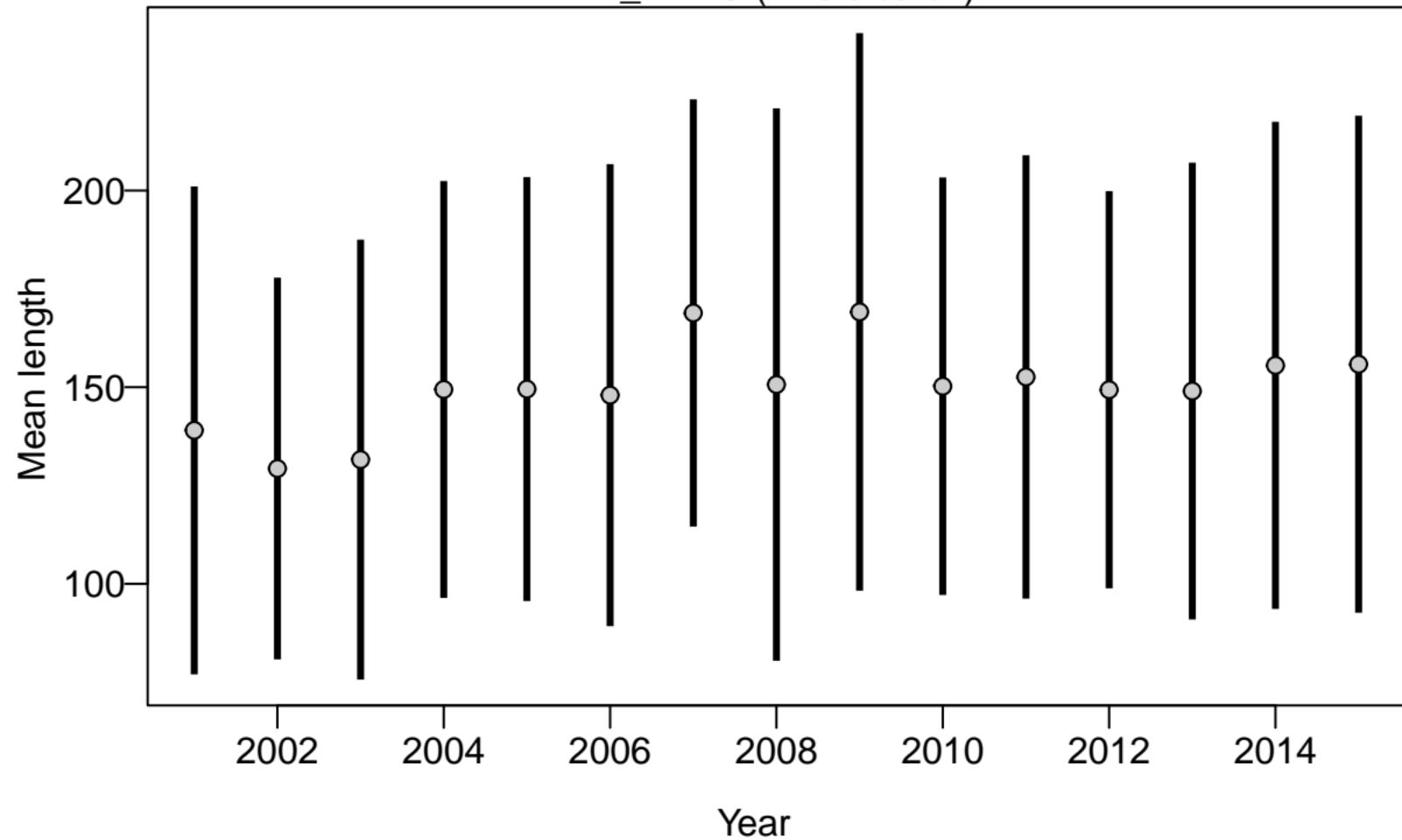


Proportion

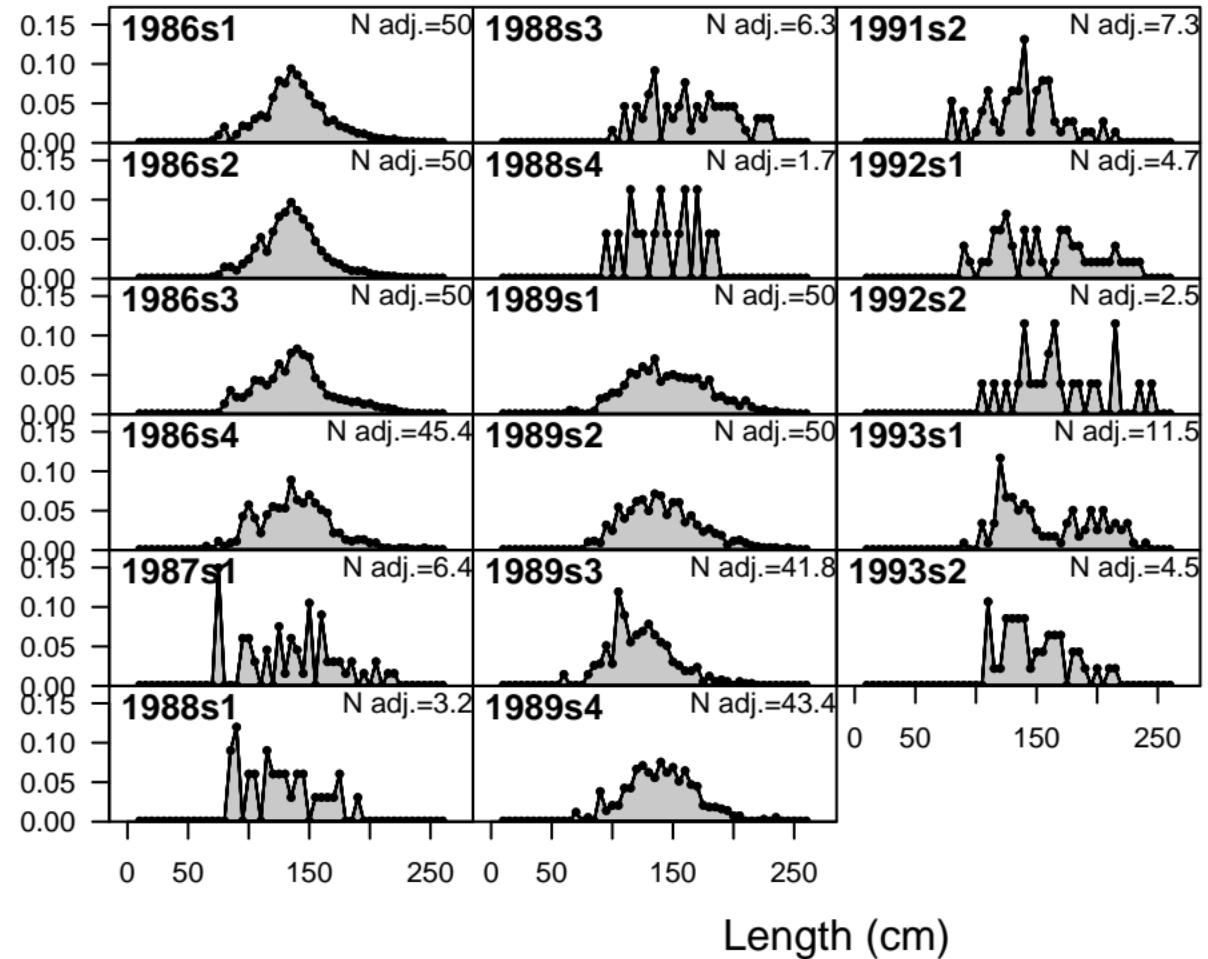


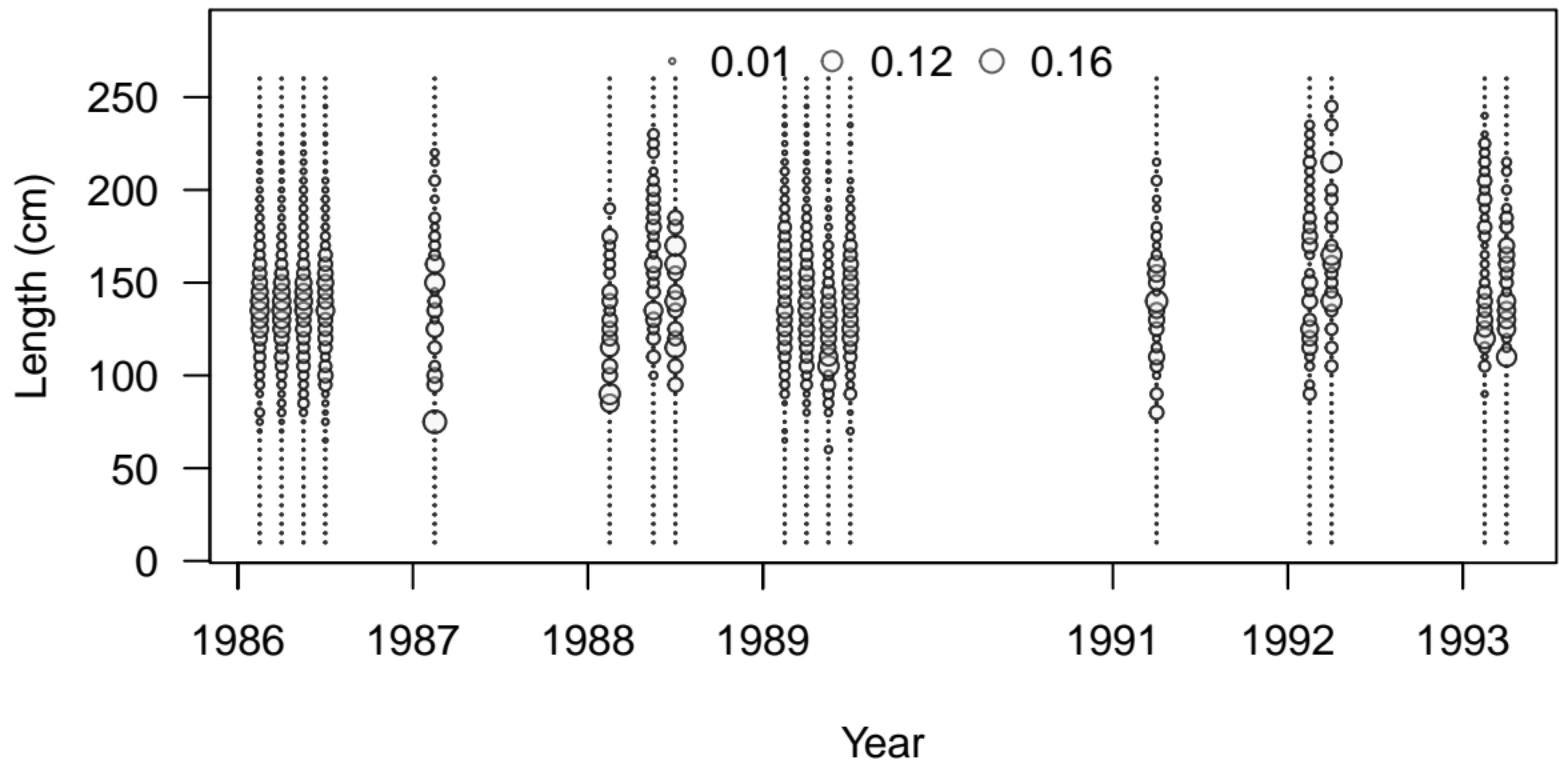


F4_IATTC (whole catch)

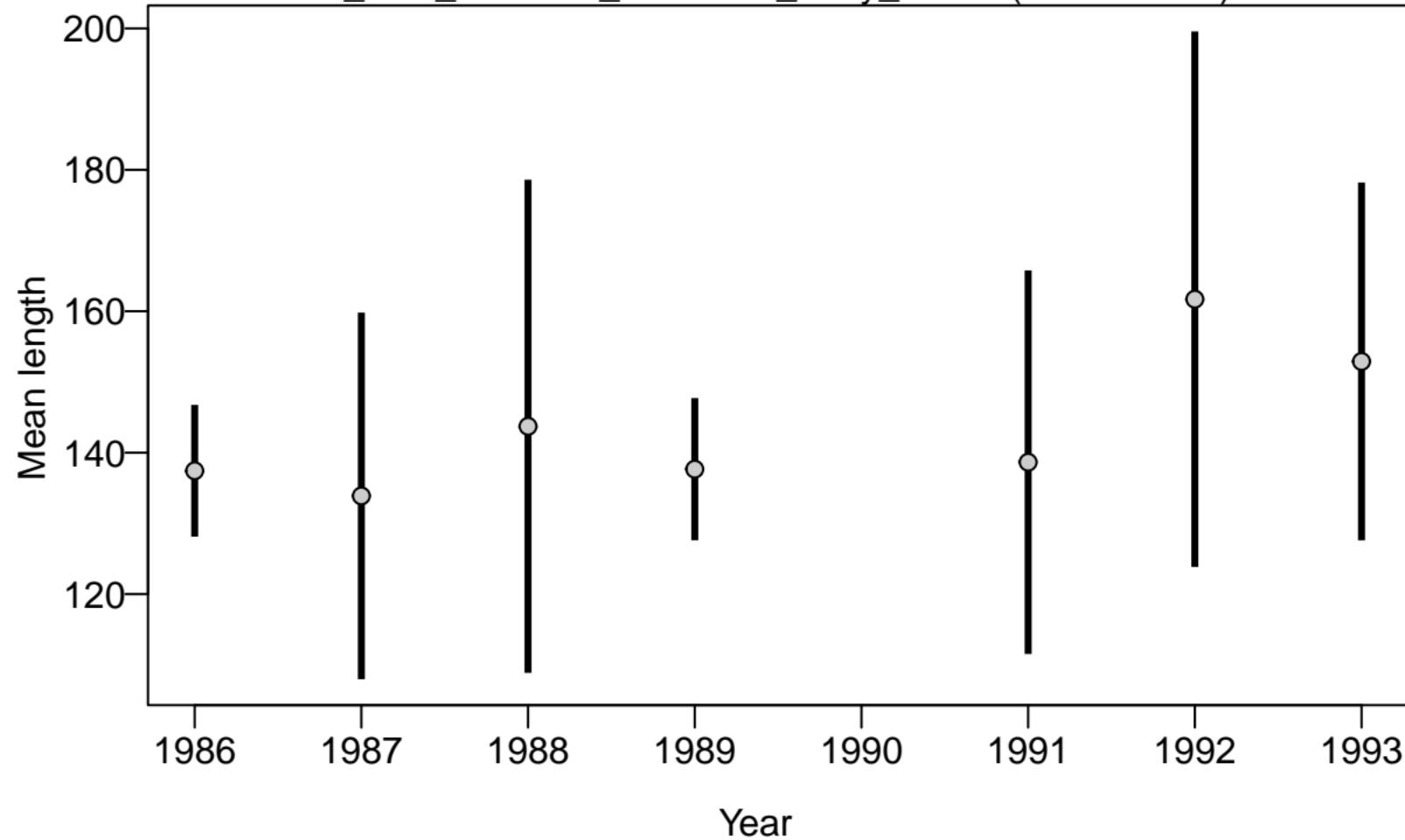


Proportion

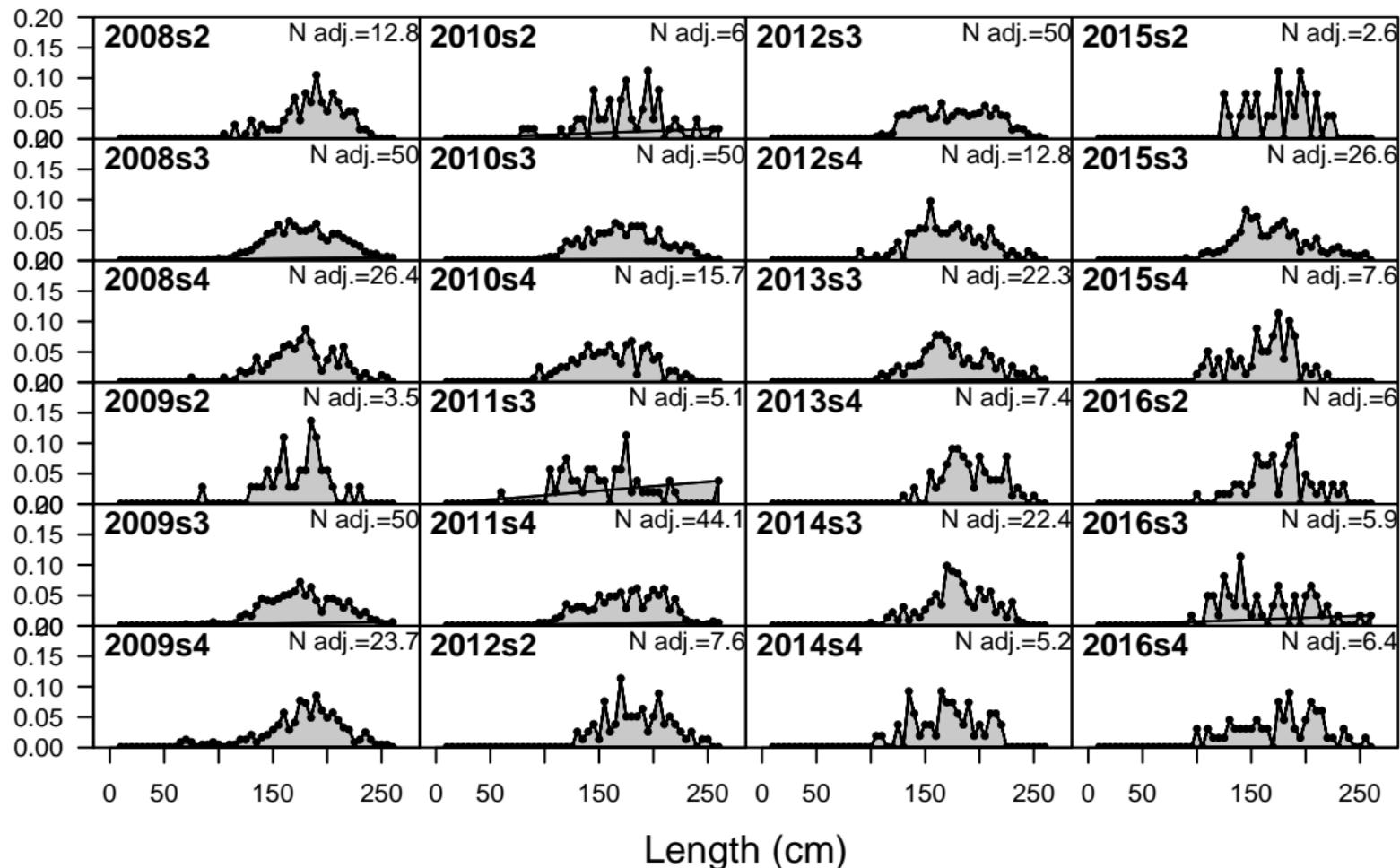




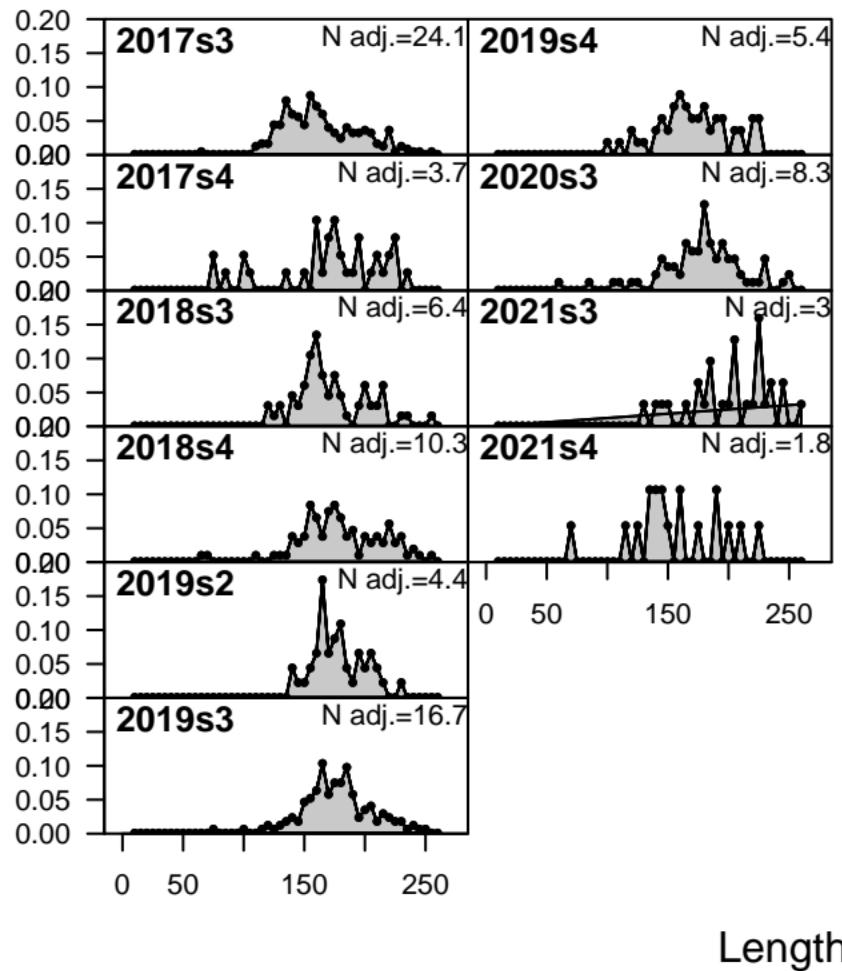
F6_JPN_WCNPO OSDWLL_early_Area1 (whole catch)

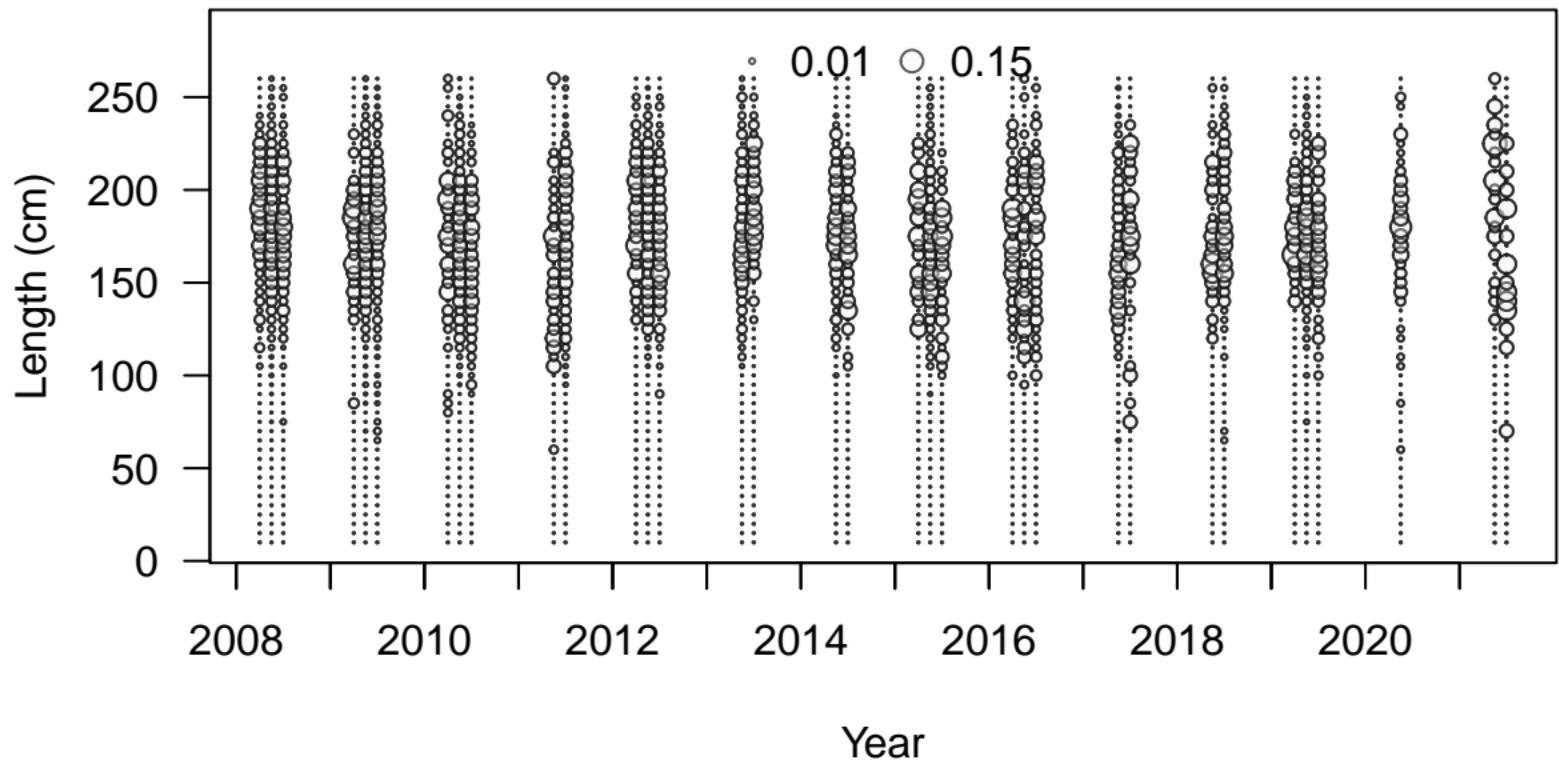


Proportion

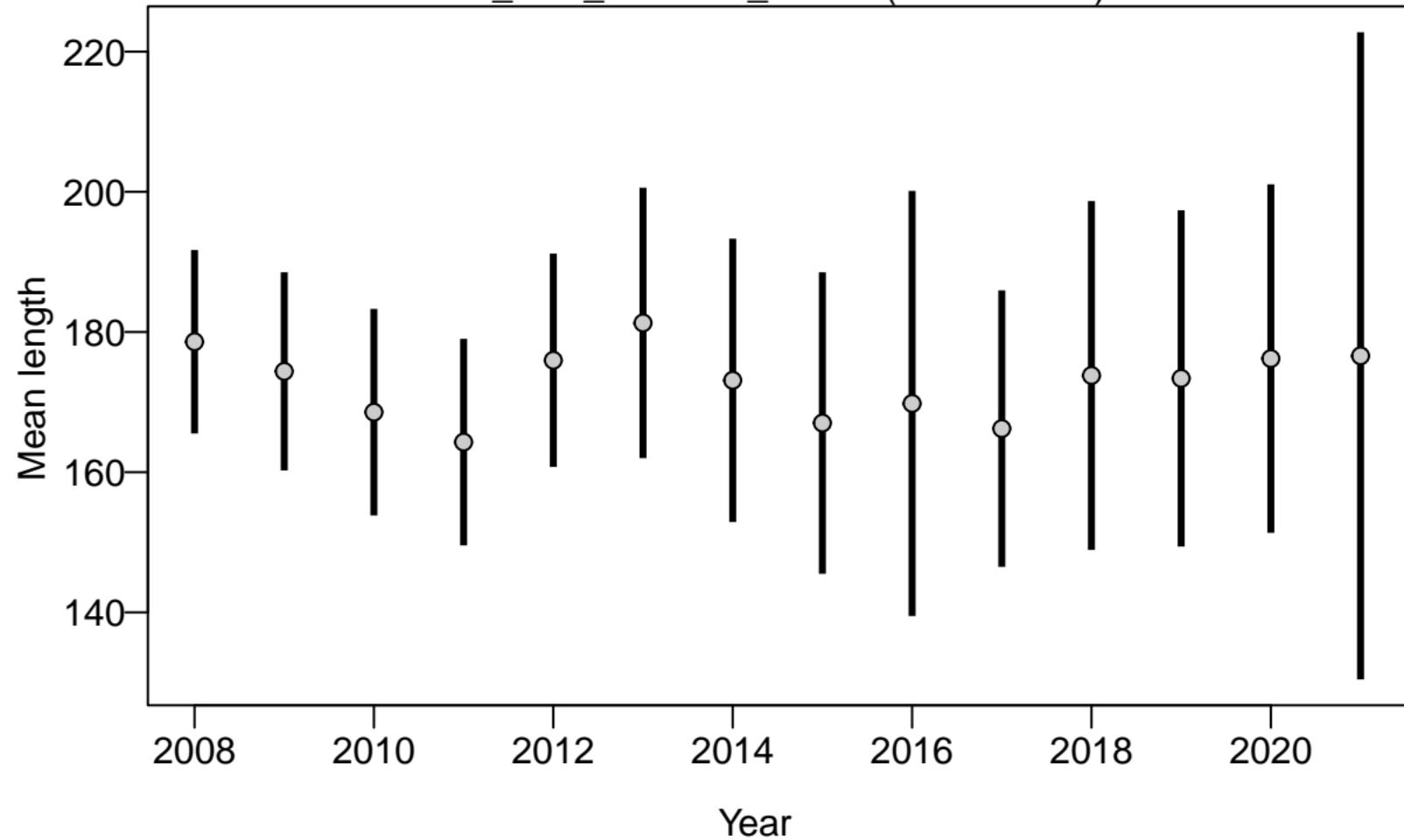


Proportion

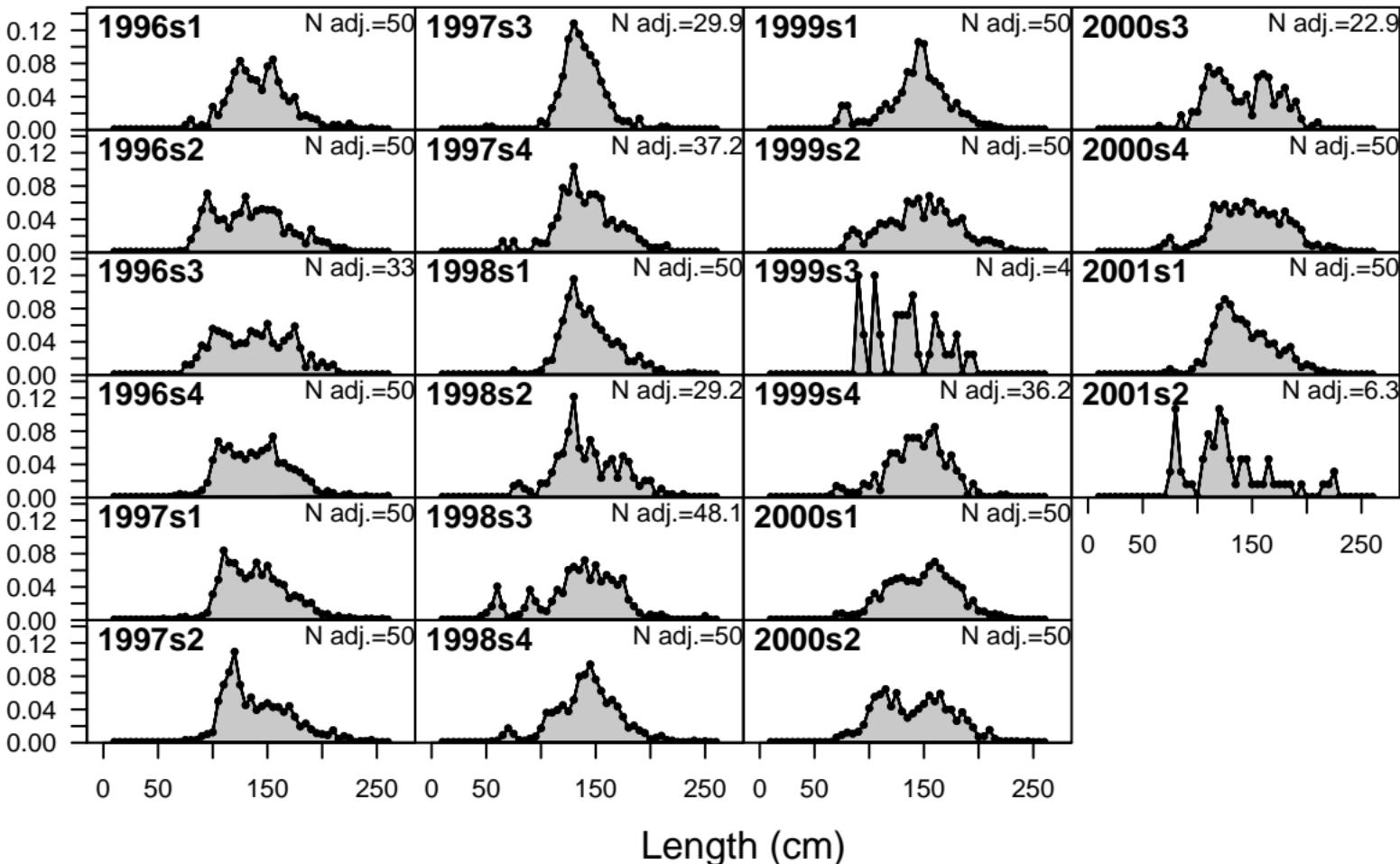


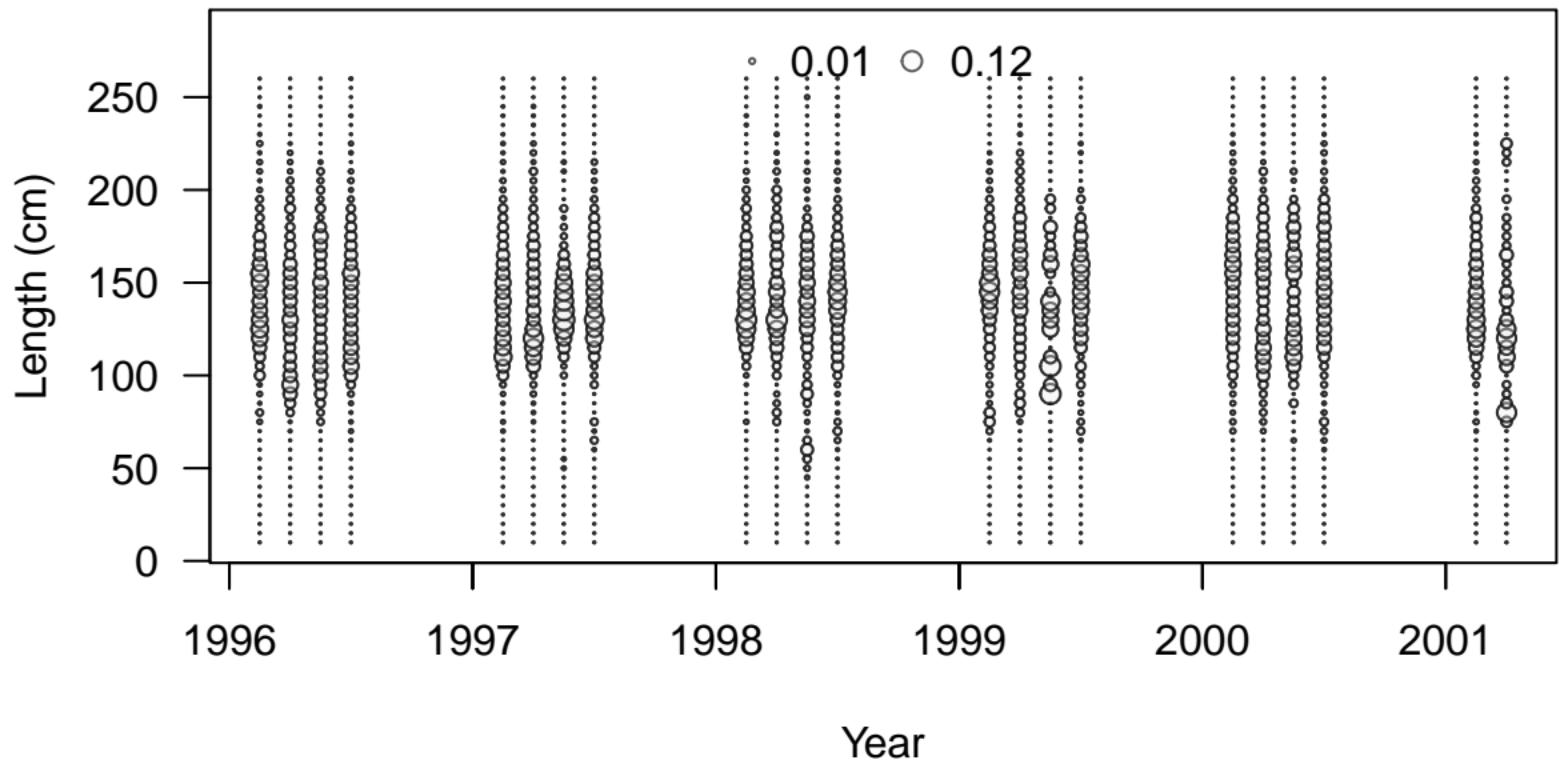


F7_JPN_WCNPO_CODF (whole catch)

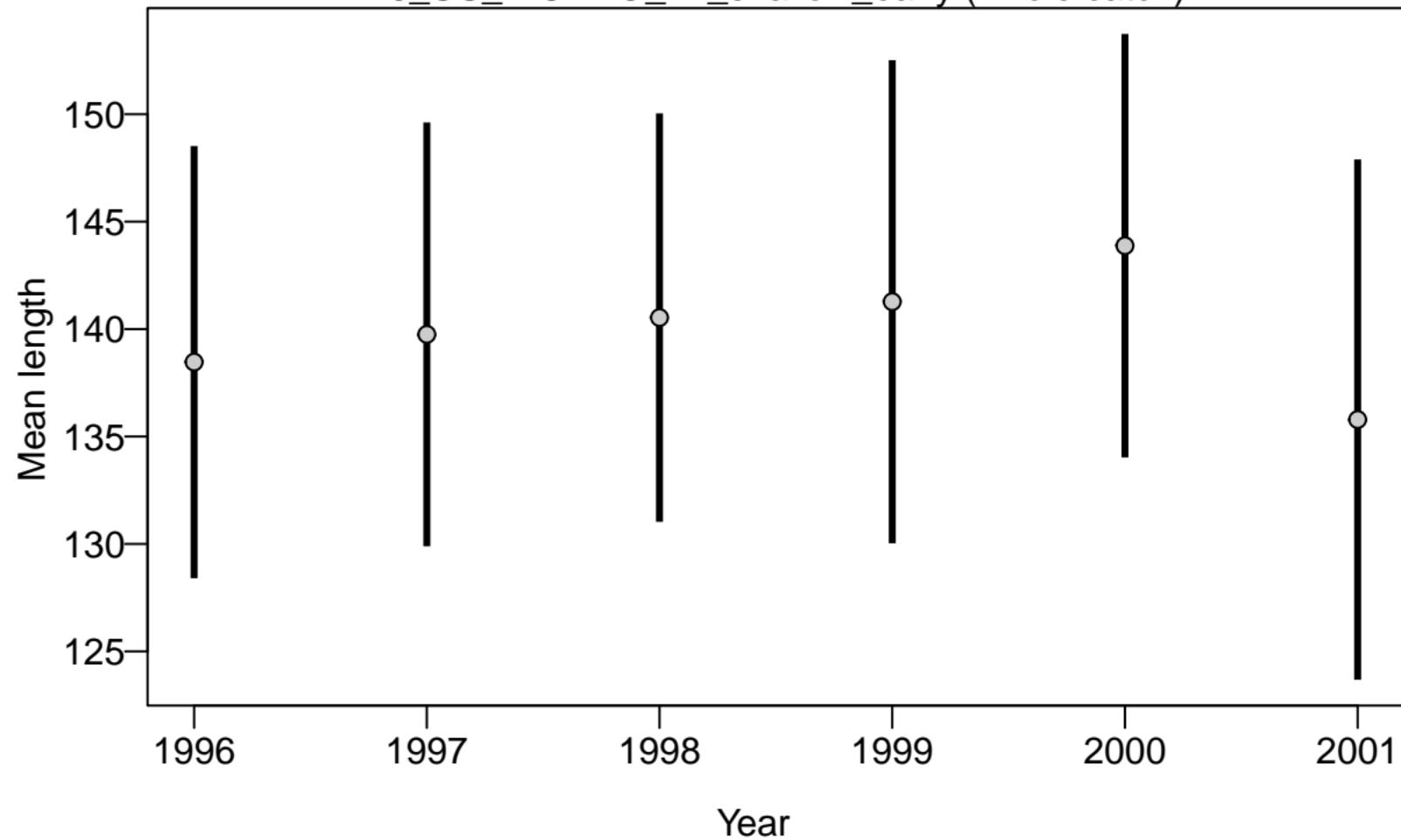


Proportion

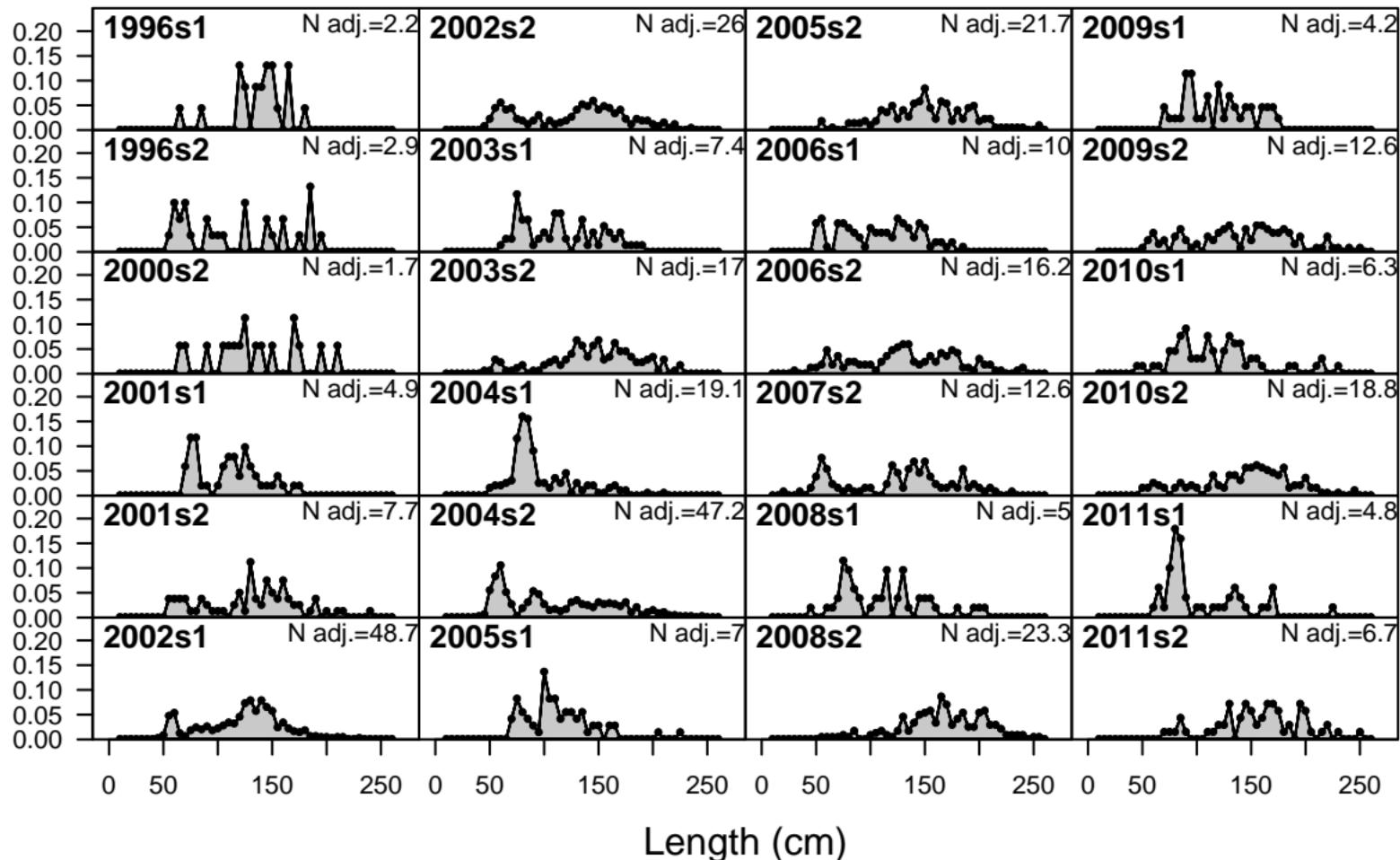




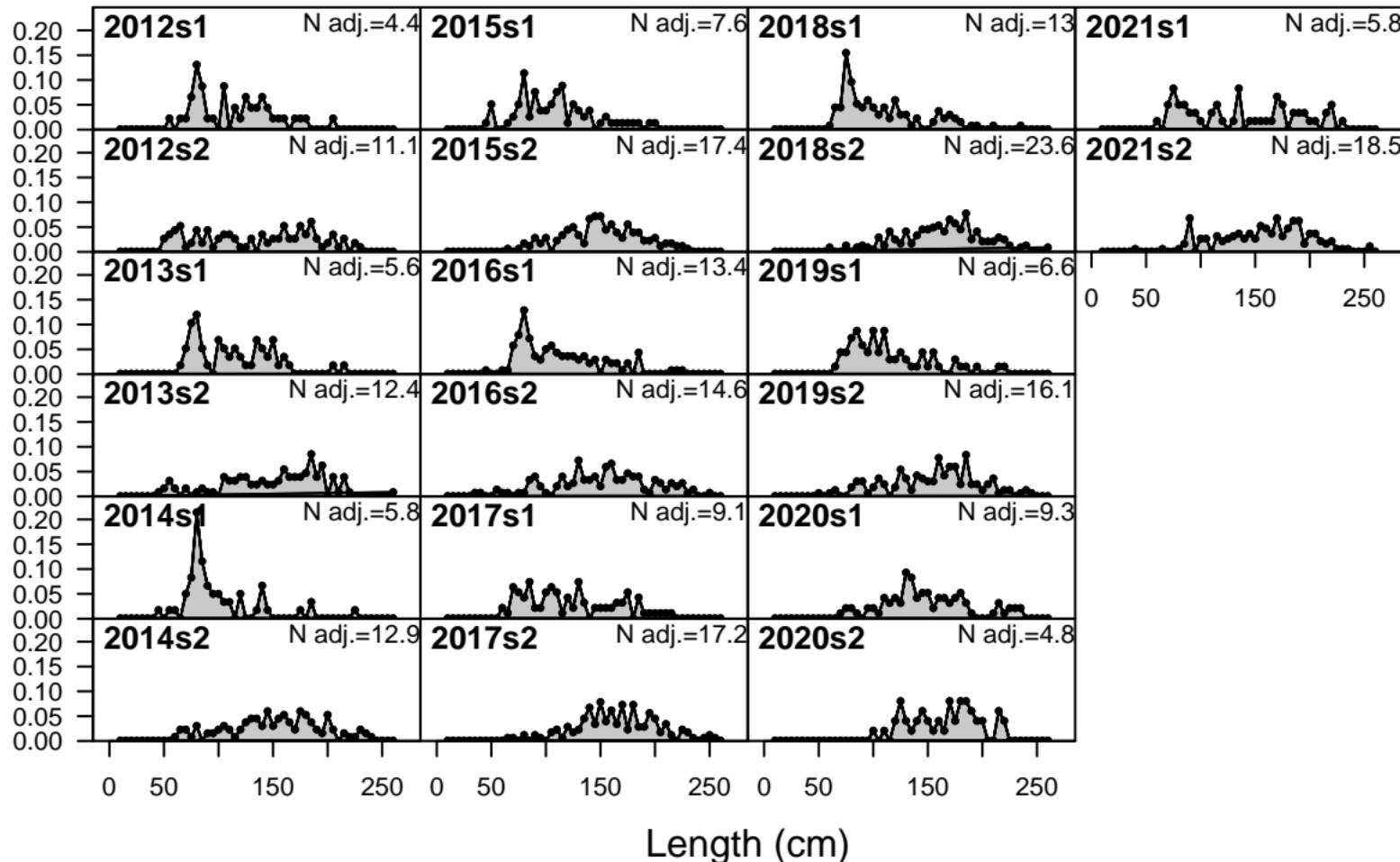
F8_US_WCNPO_LL_shallow_early (whole catch)

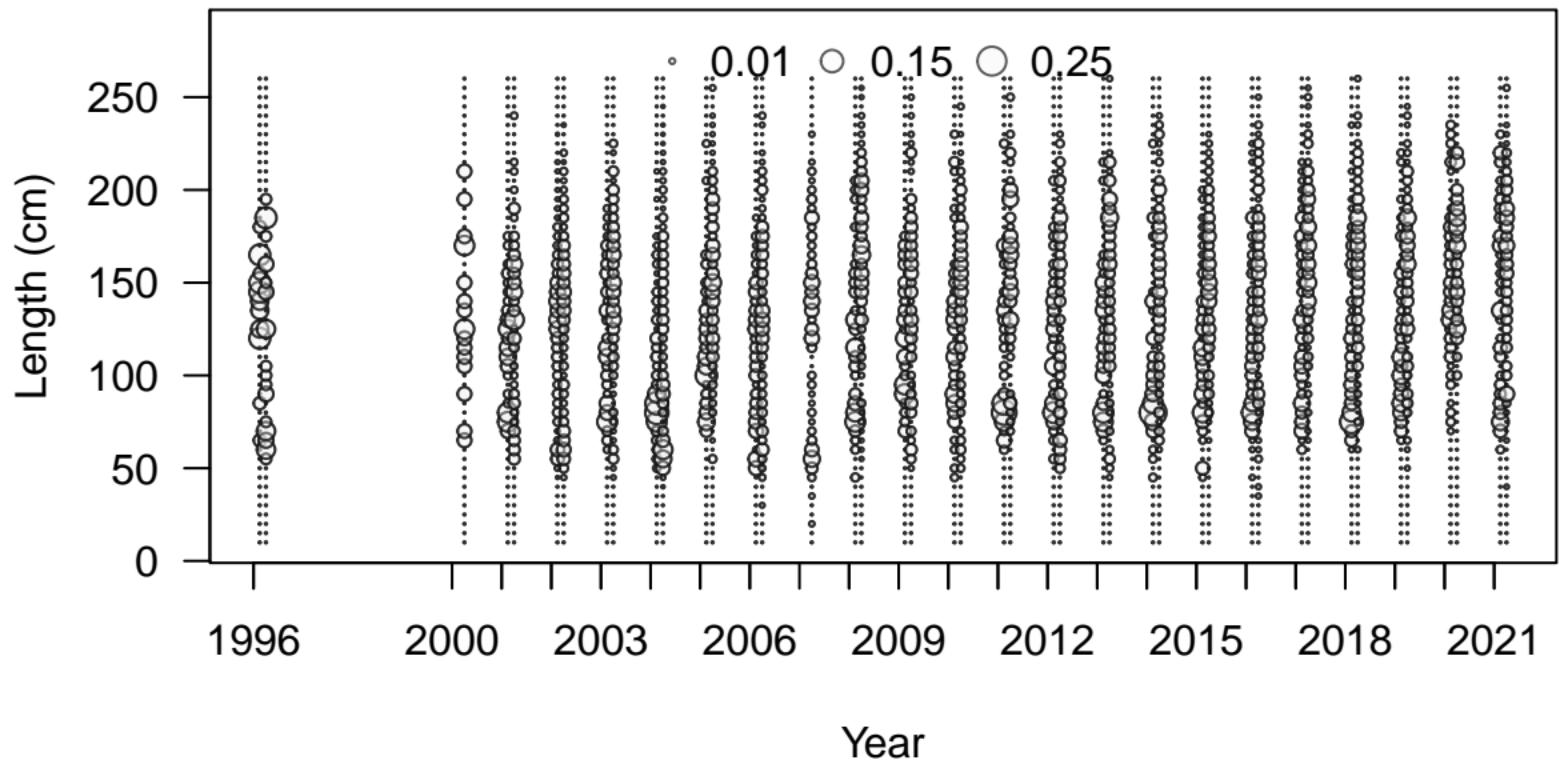


Proportion

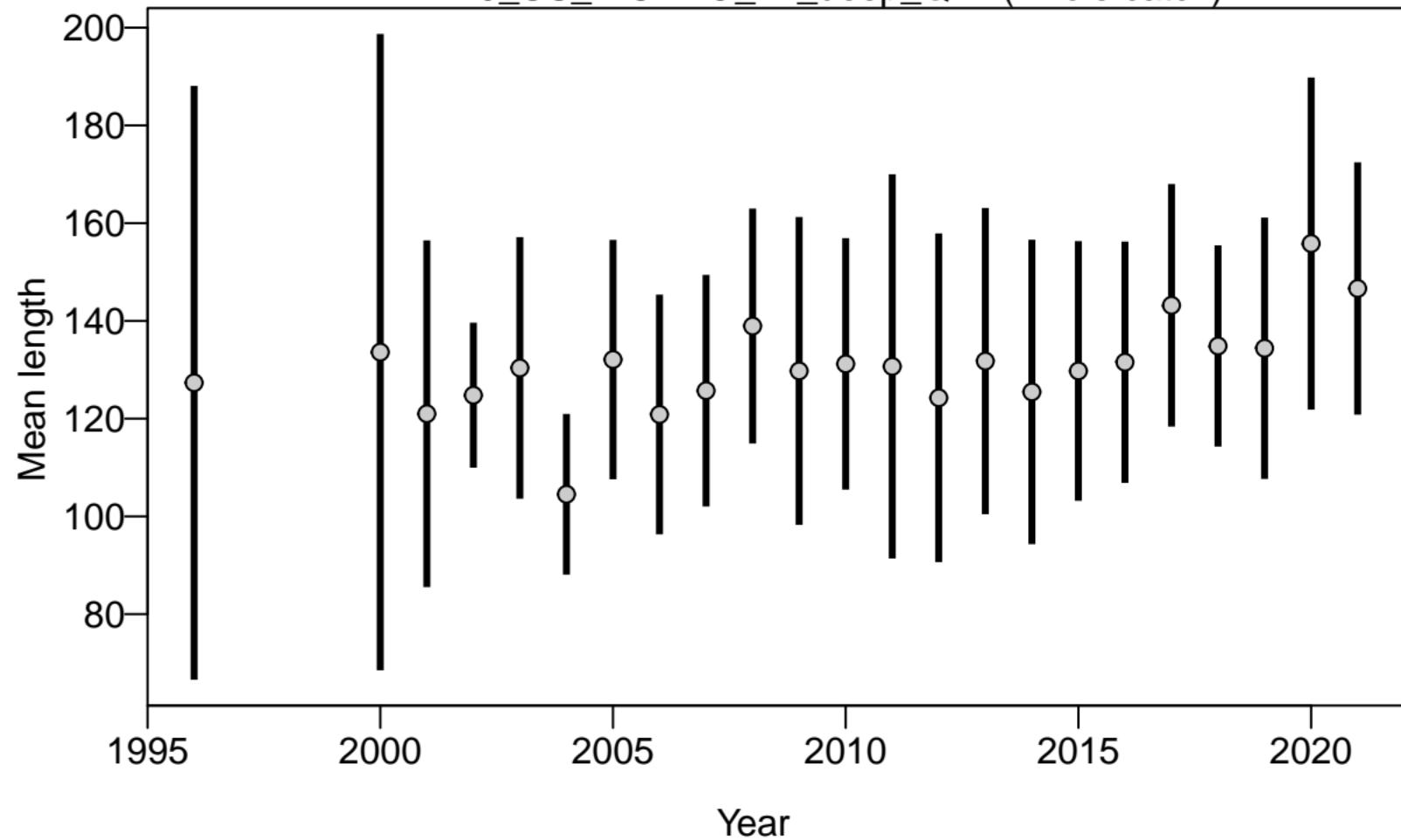


Proportion

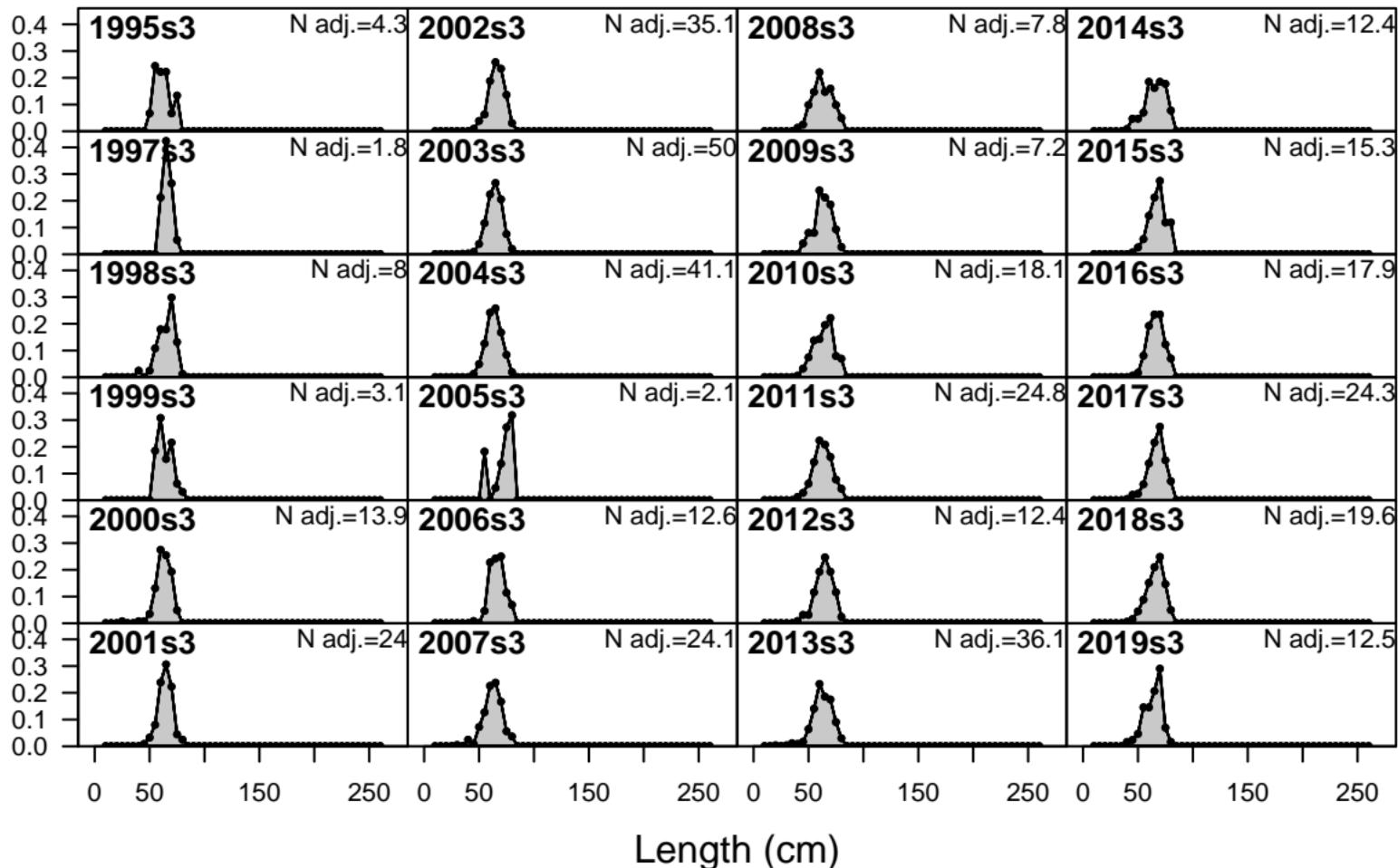




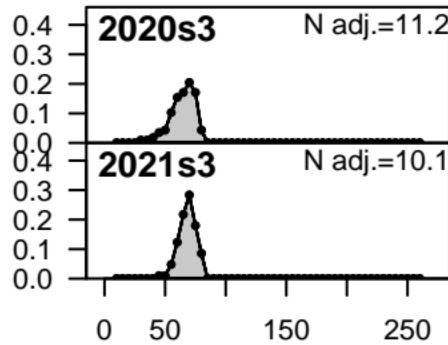
F9_US_WCNPO_LL_deep_Q12 (whole catch)



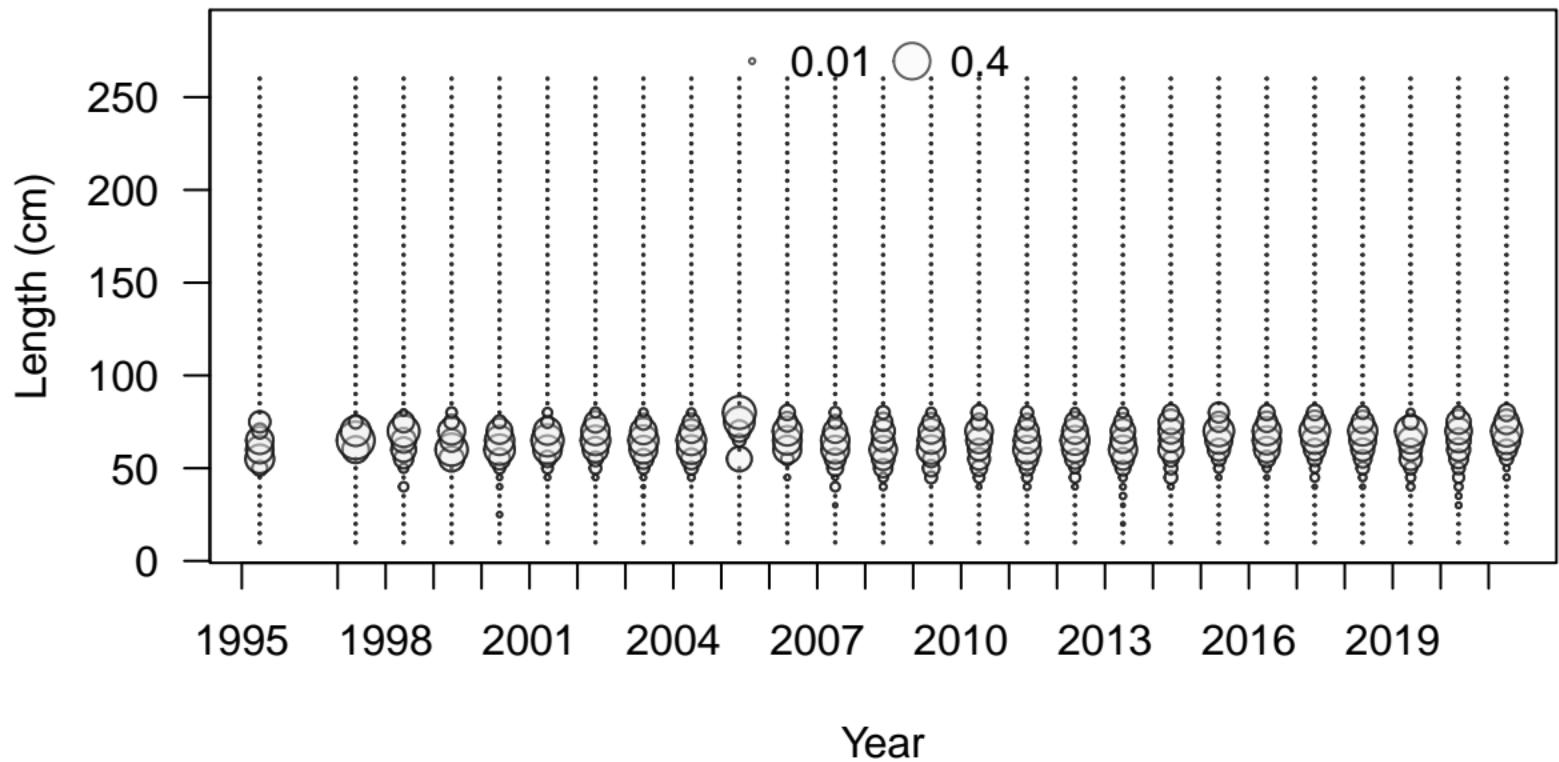
Proportion



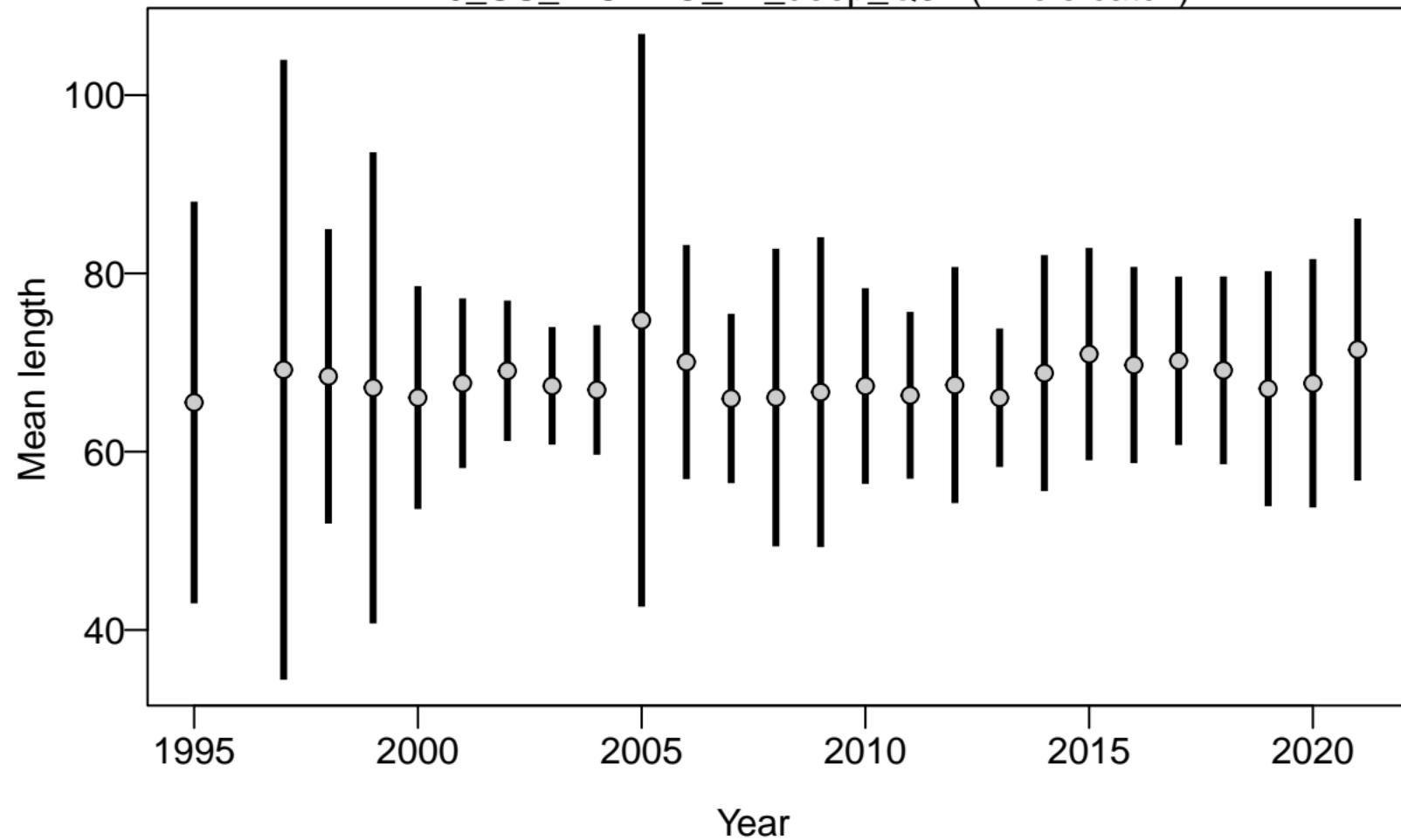
Proportion



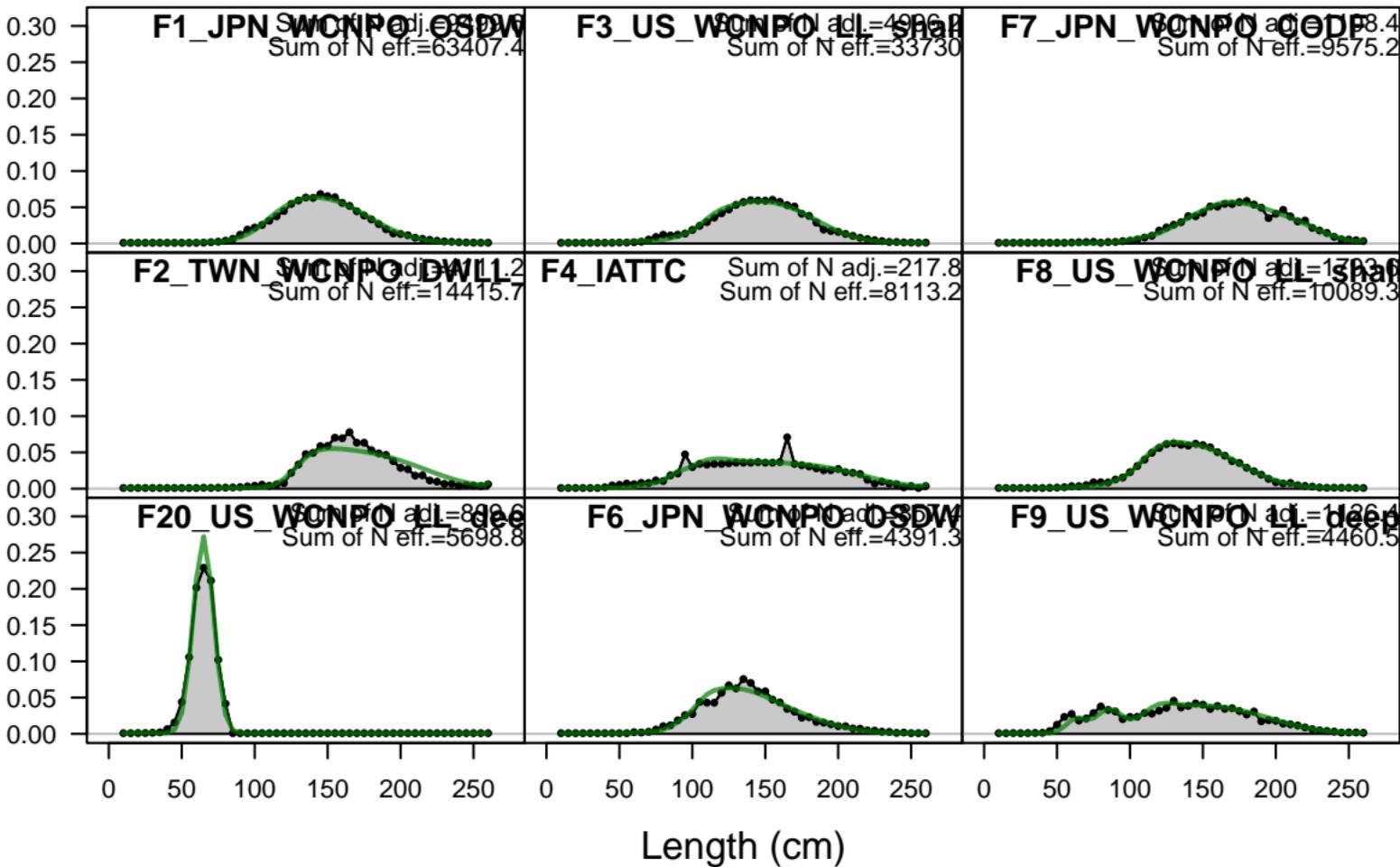
Length (cm)

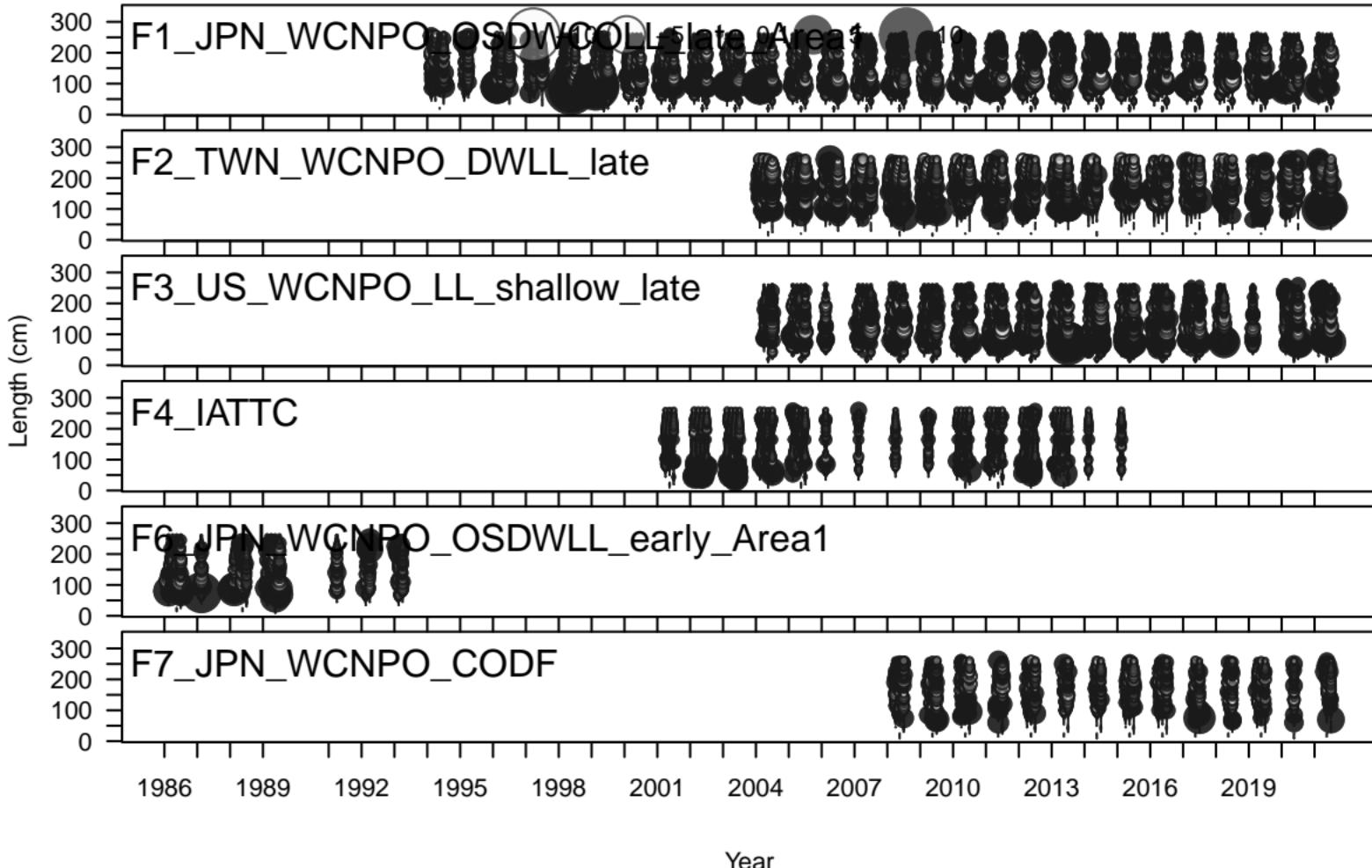


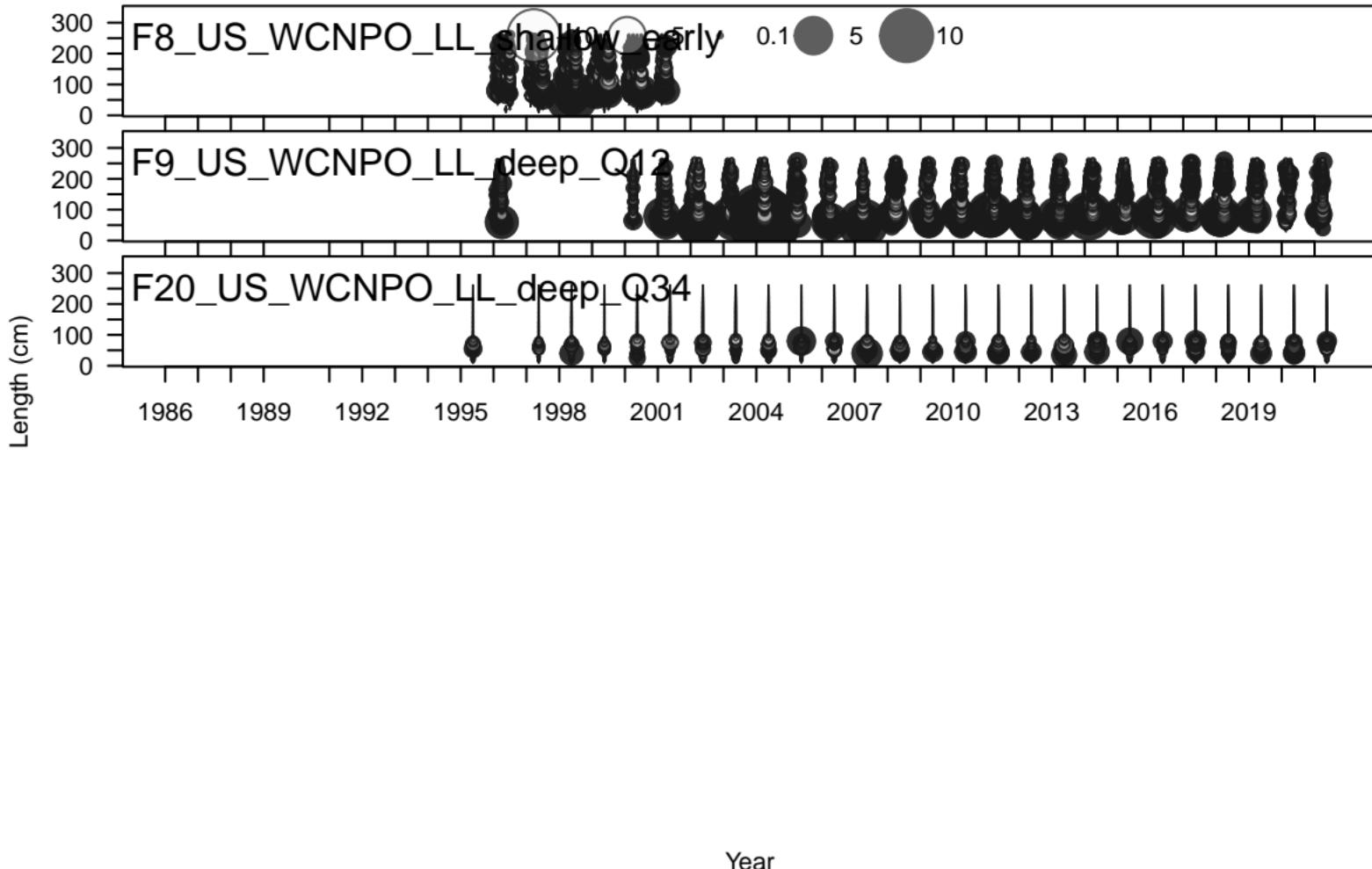
F20_US_WCNPO_LL_deep_Q34 (whole catch)



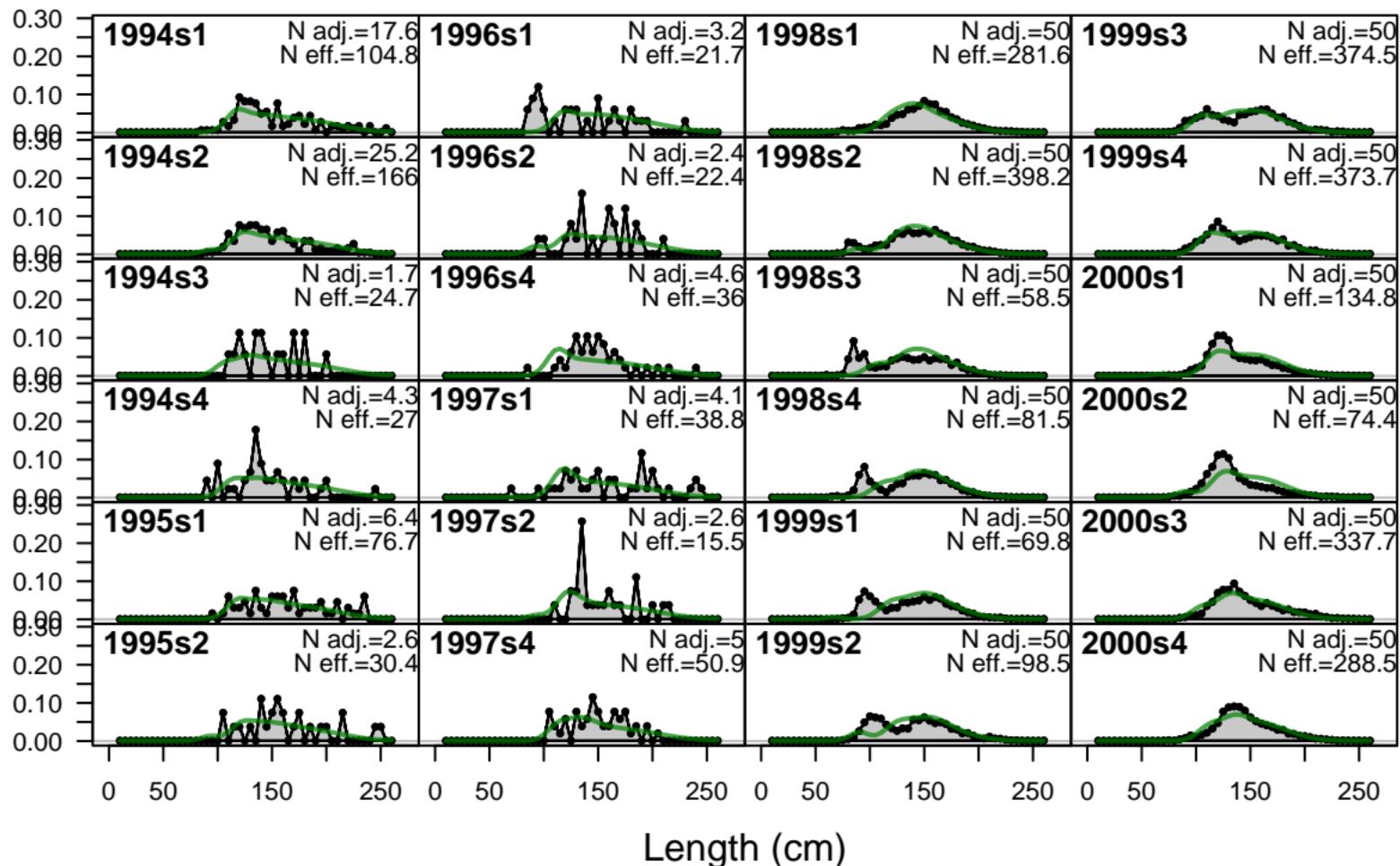
Proportion



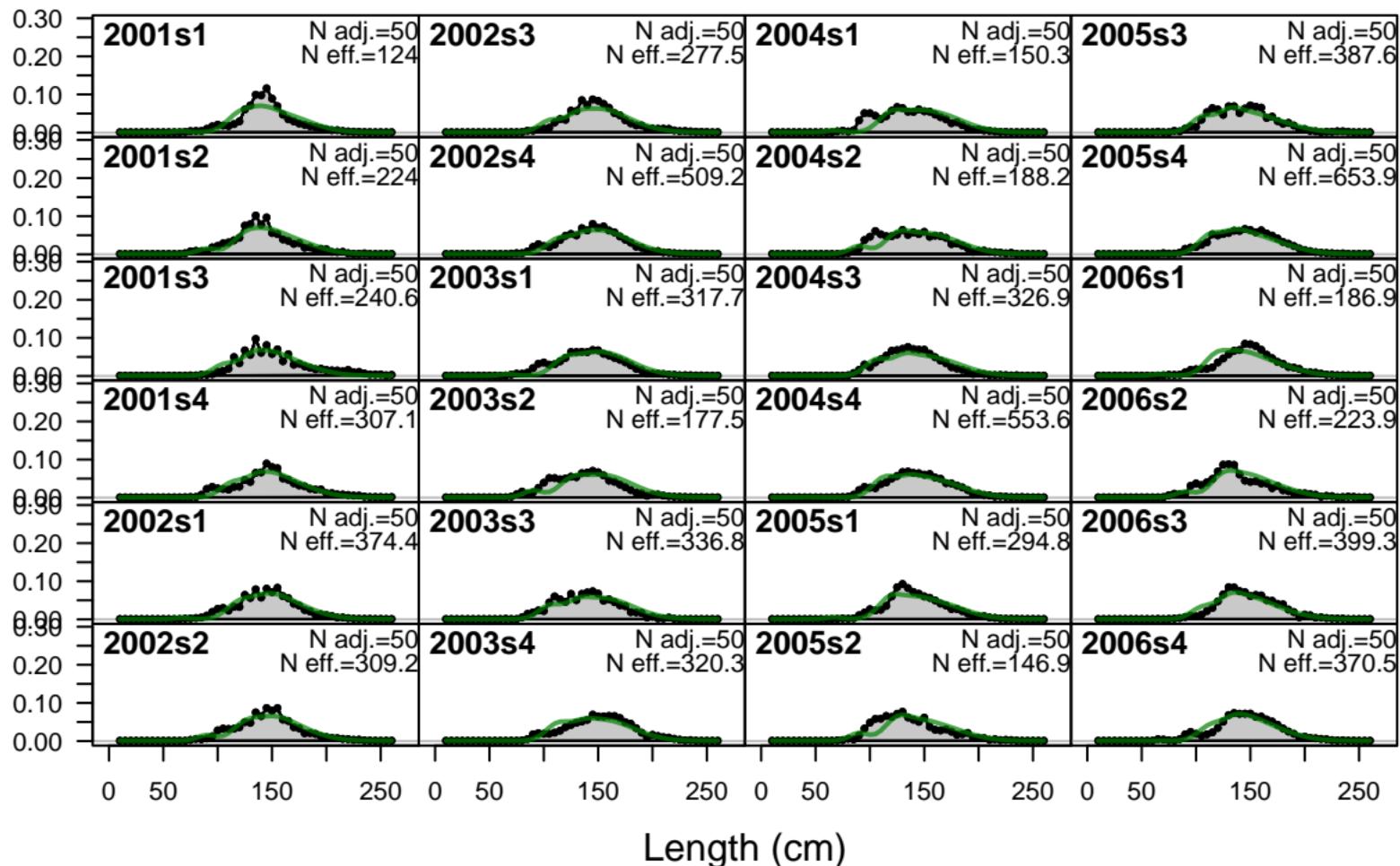




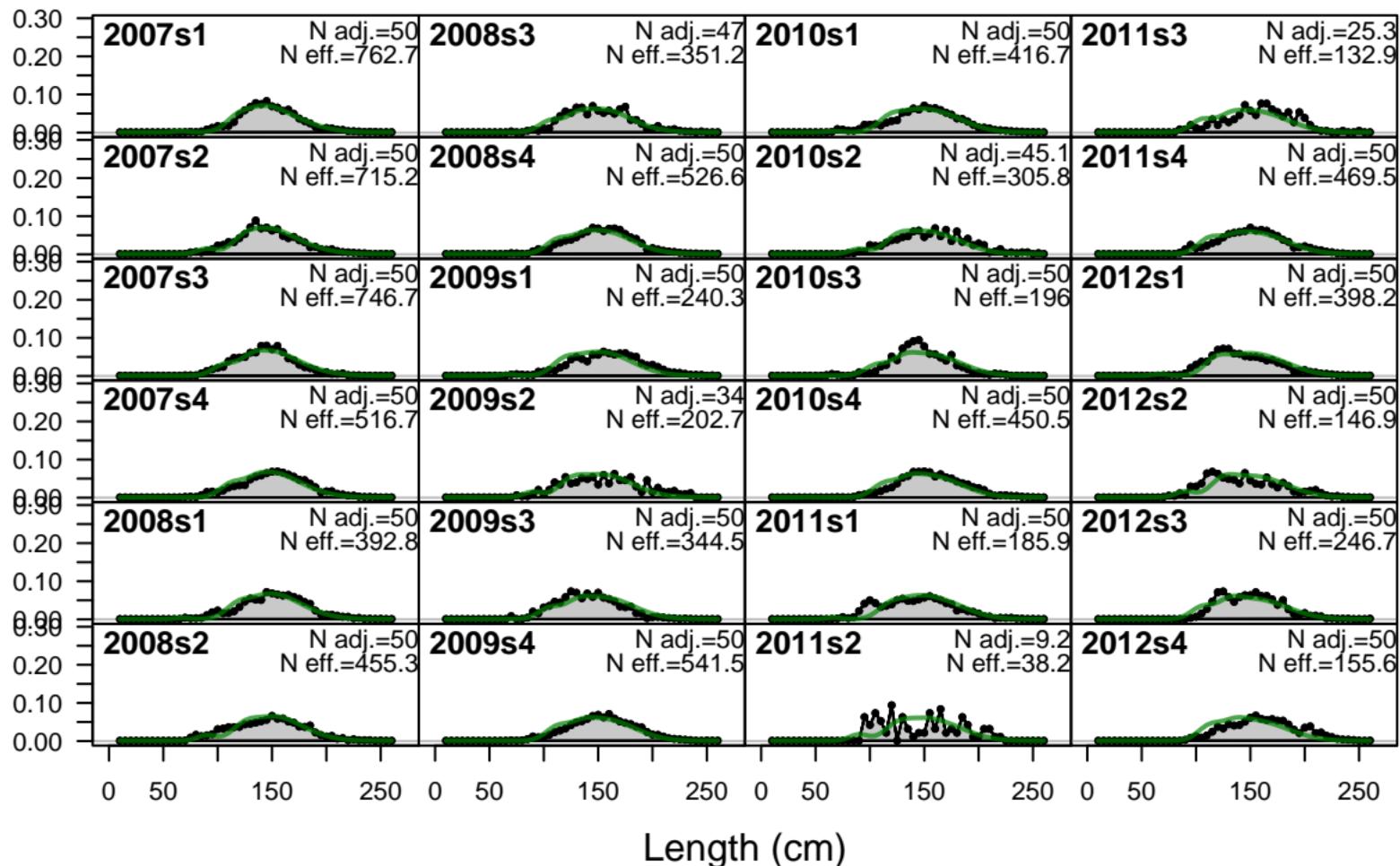
Proportion



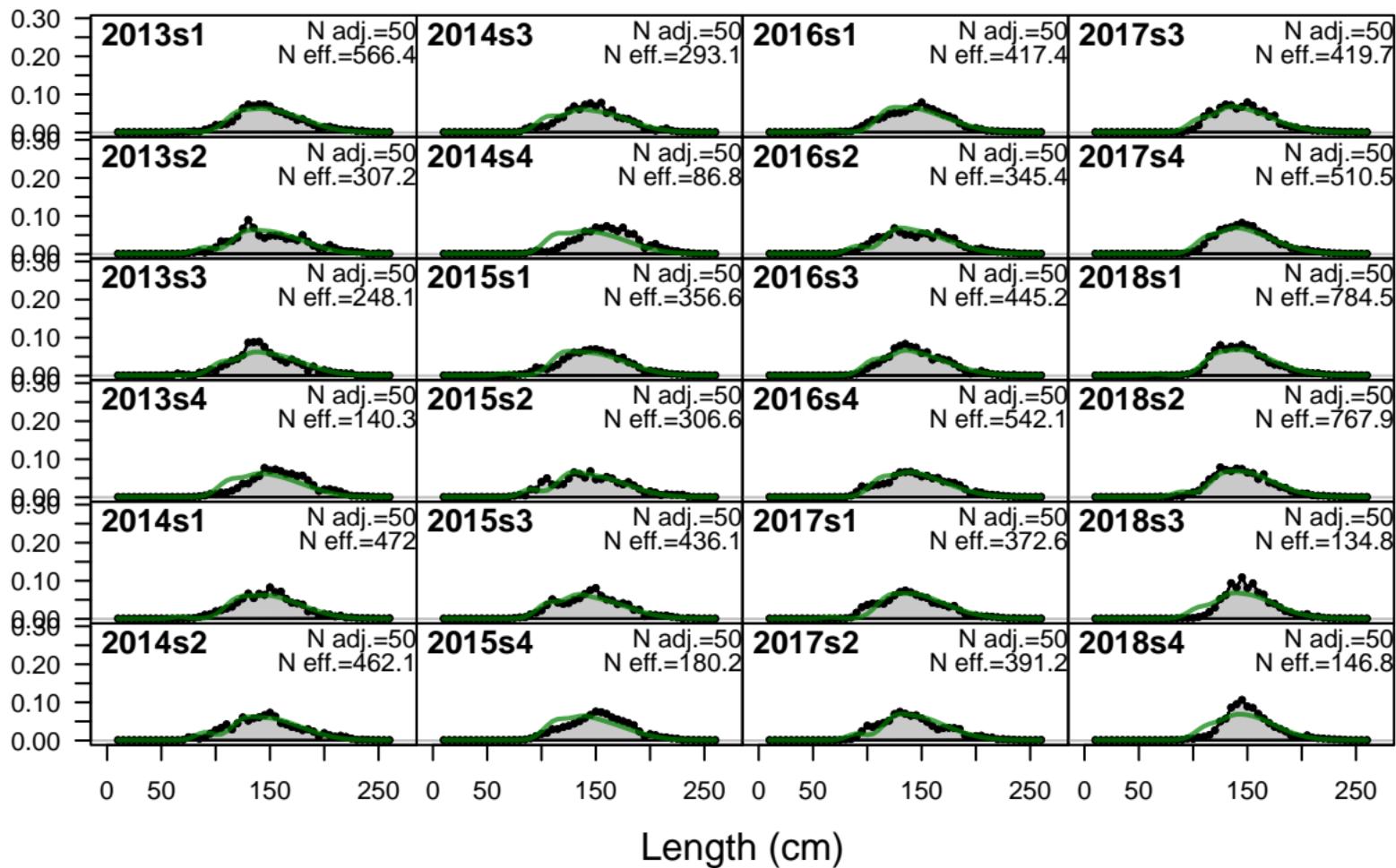
Proportion



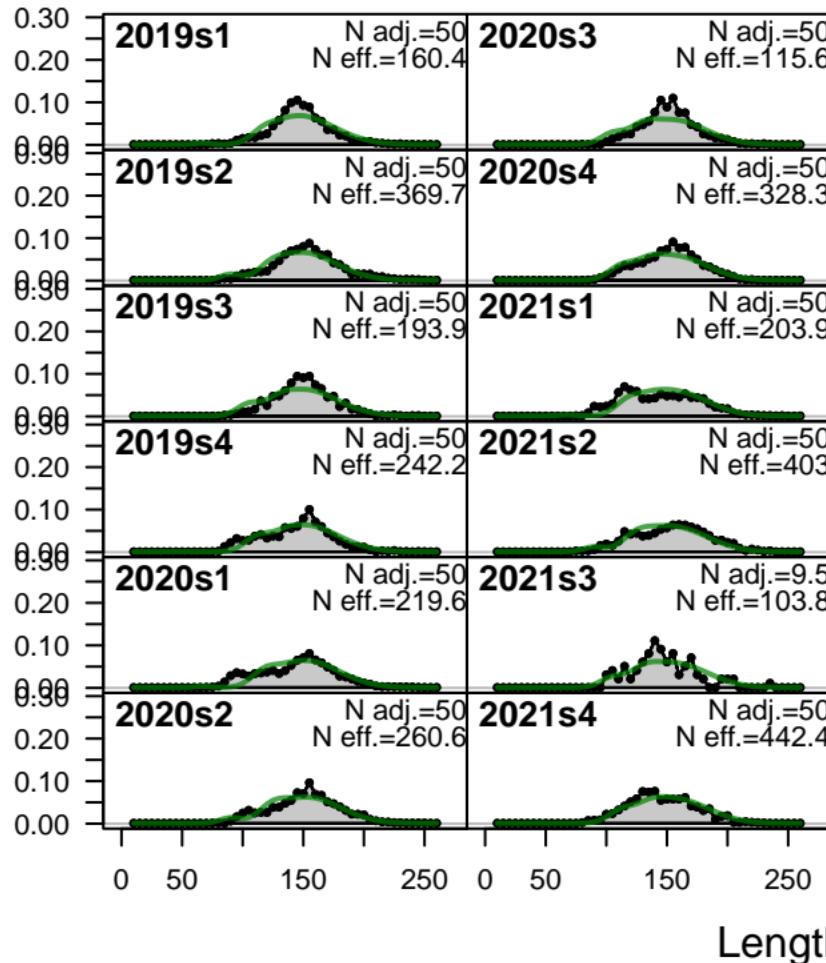
Proportion

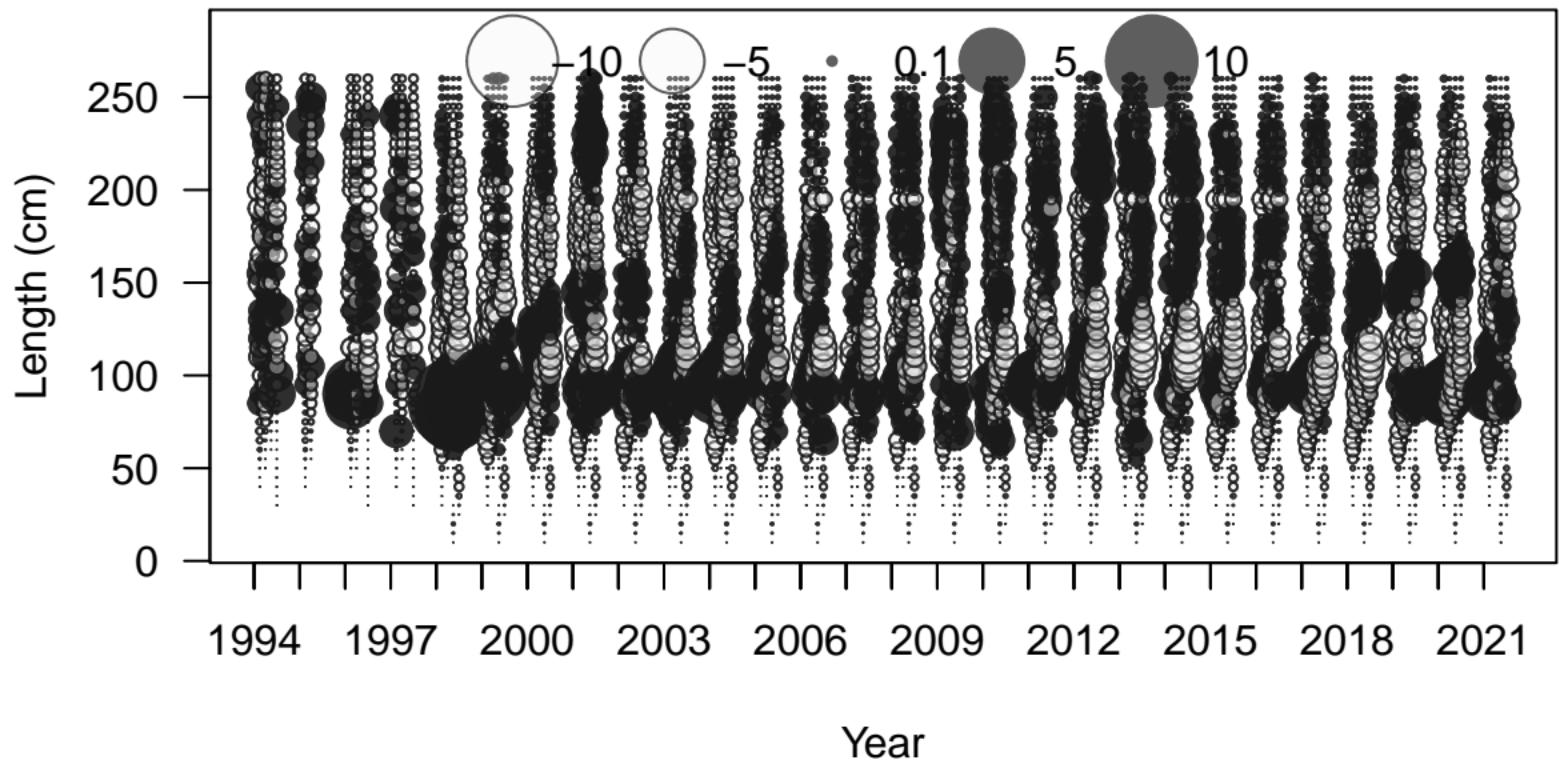


Proportion

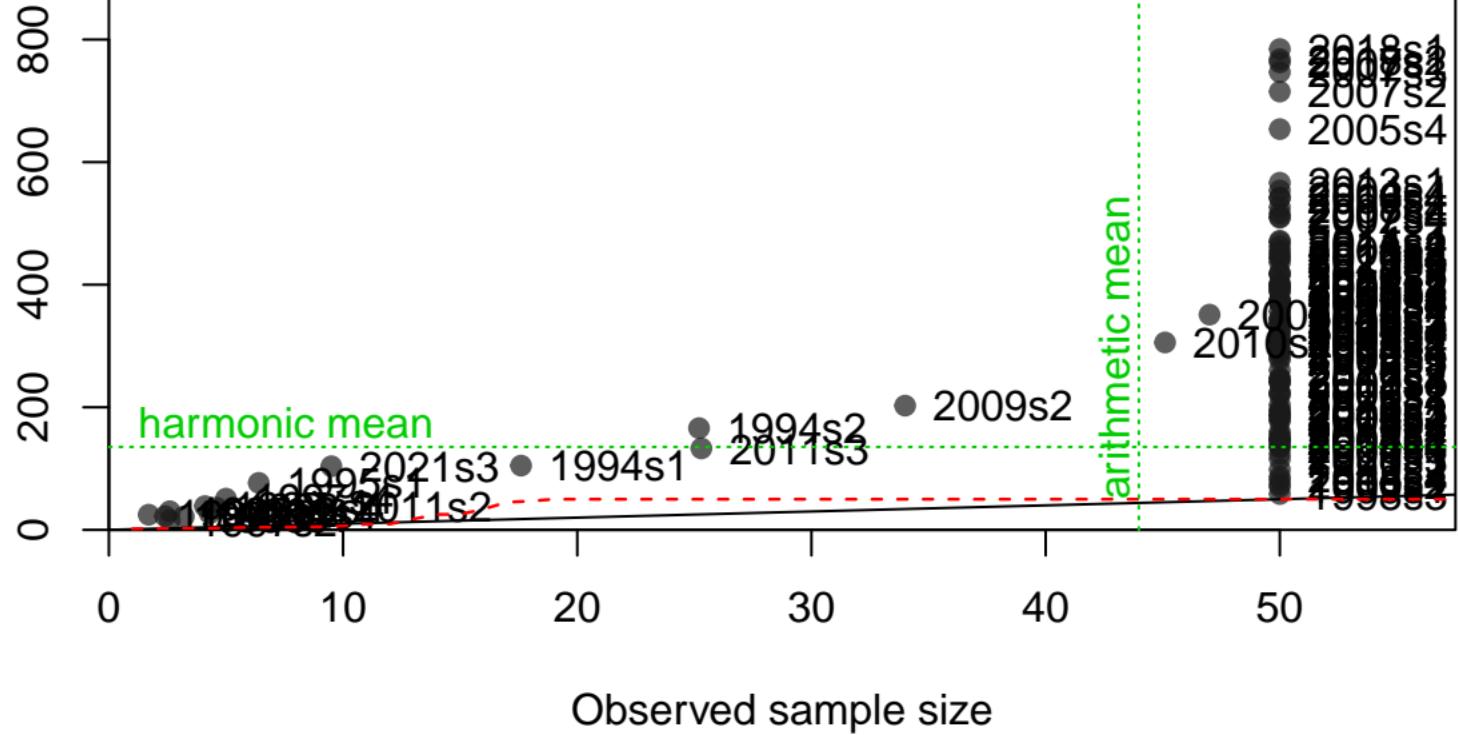


Proportion

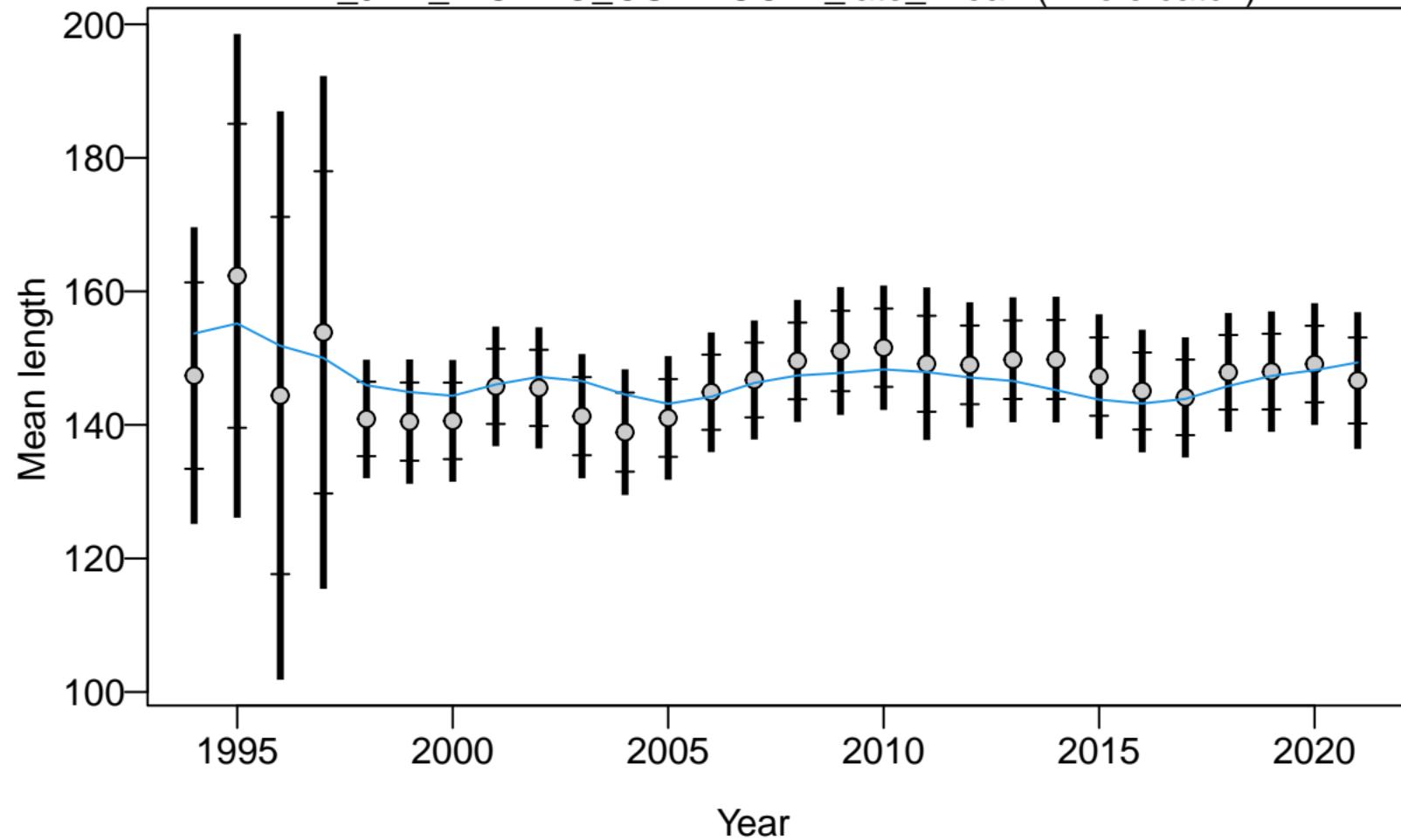




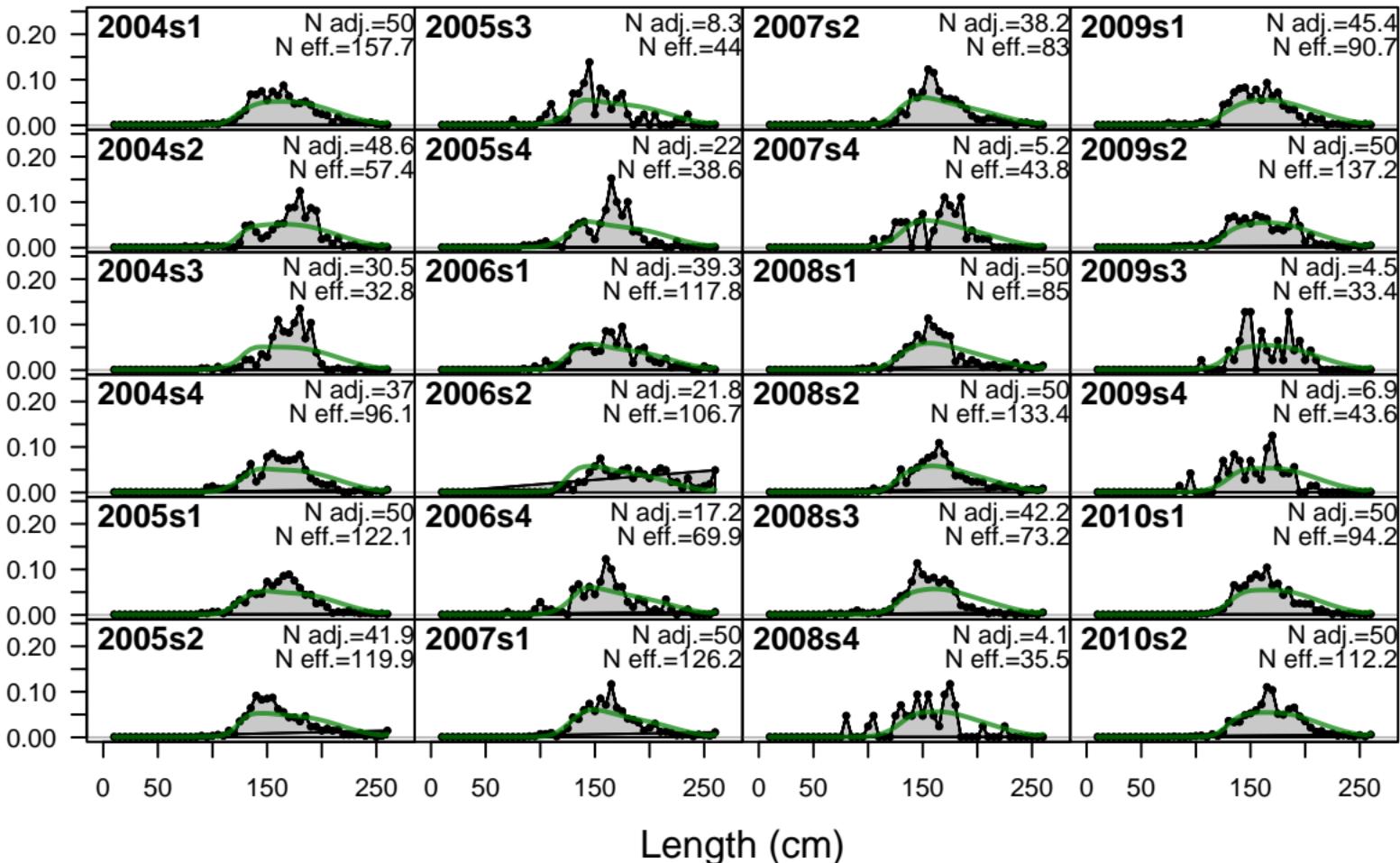
Effective sample size



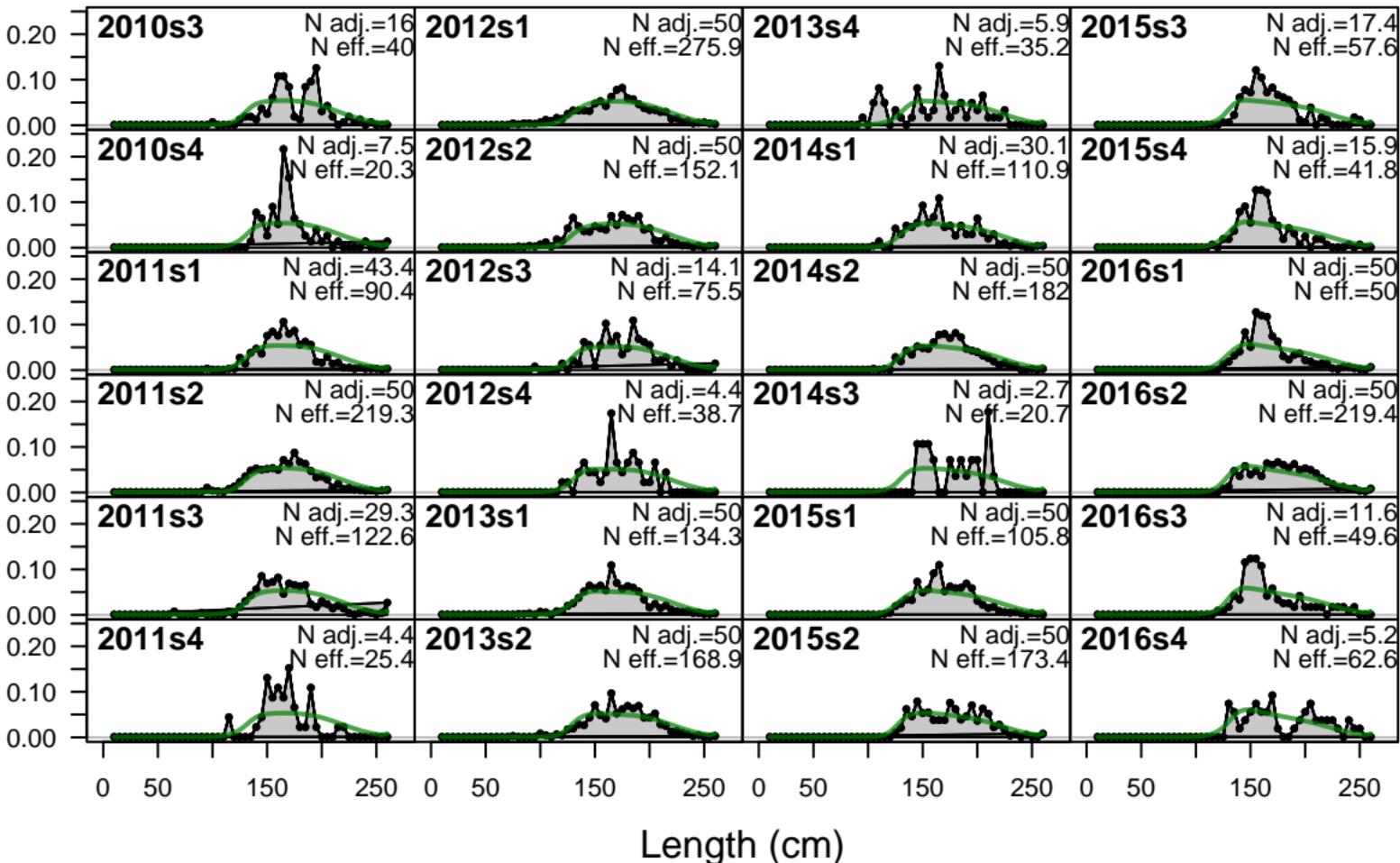
F1_JPN_WCNPO OSDWCOLL_late_Area1 (whole catch)



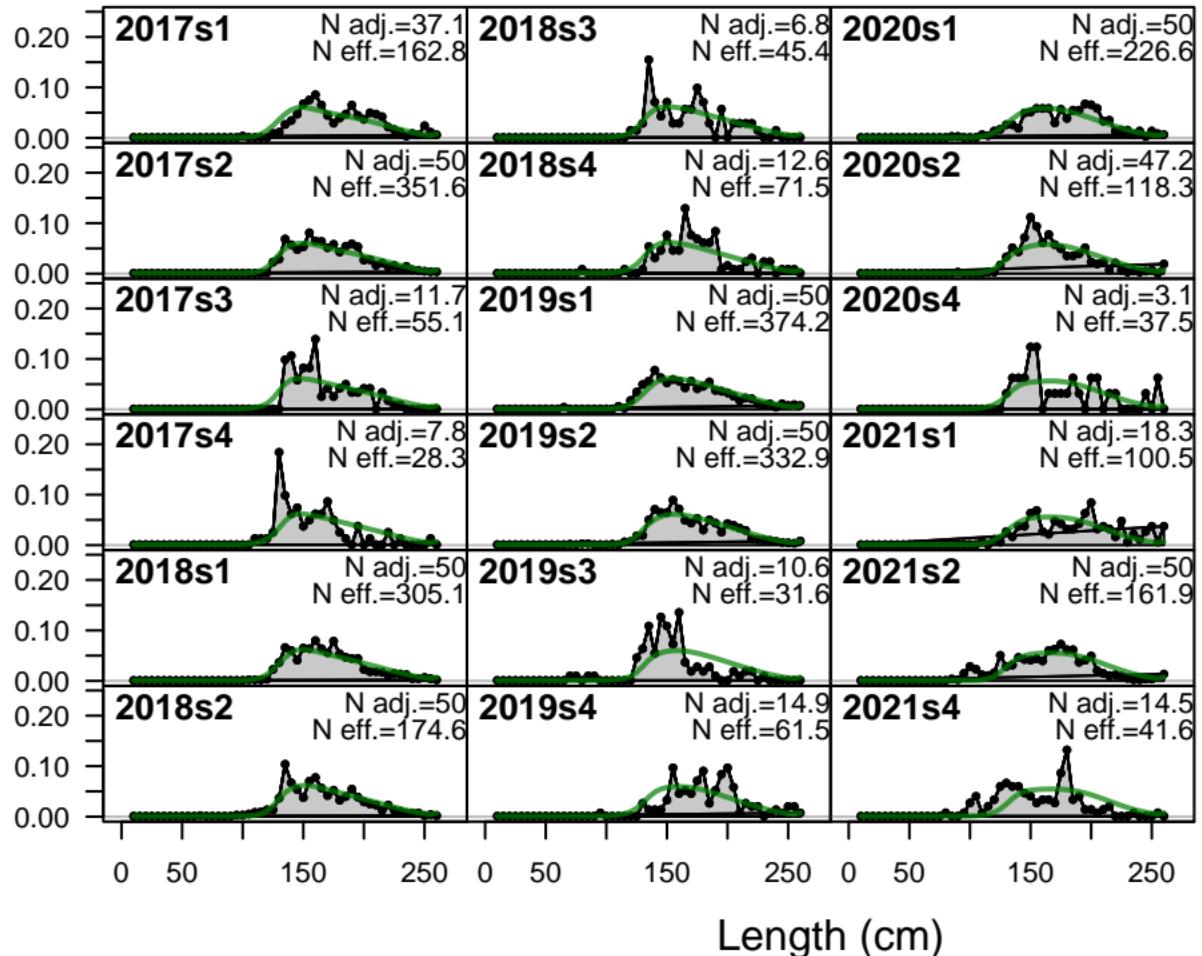
Proportion

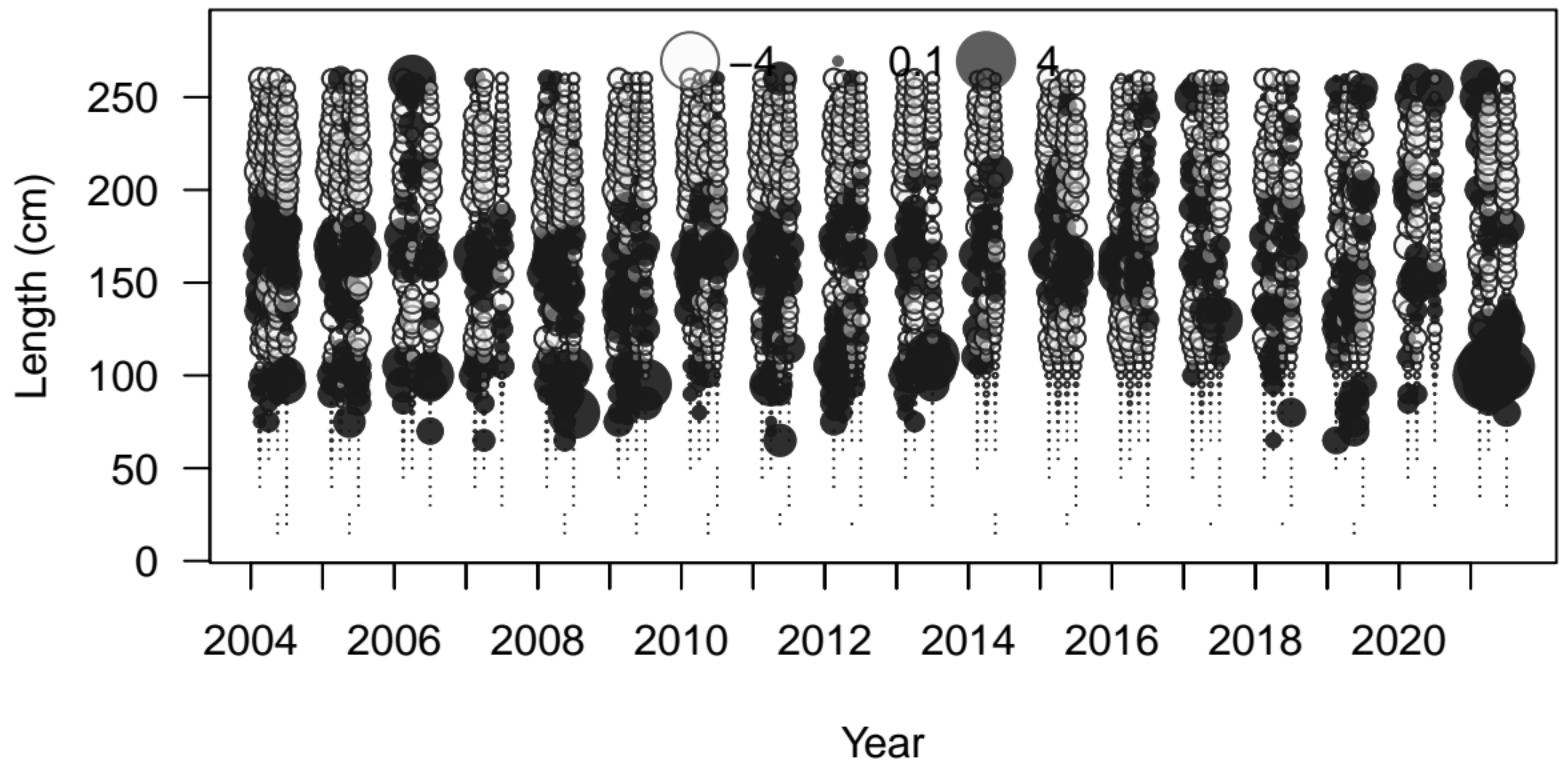


Proportion

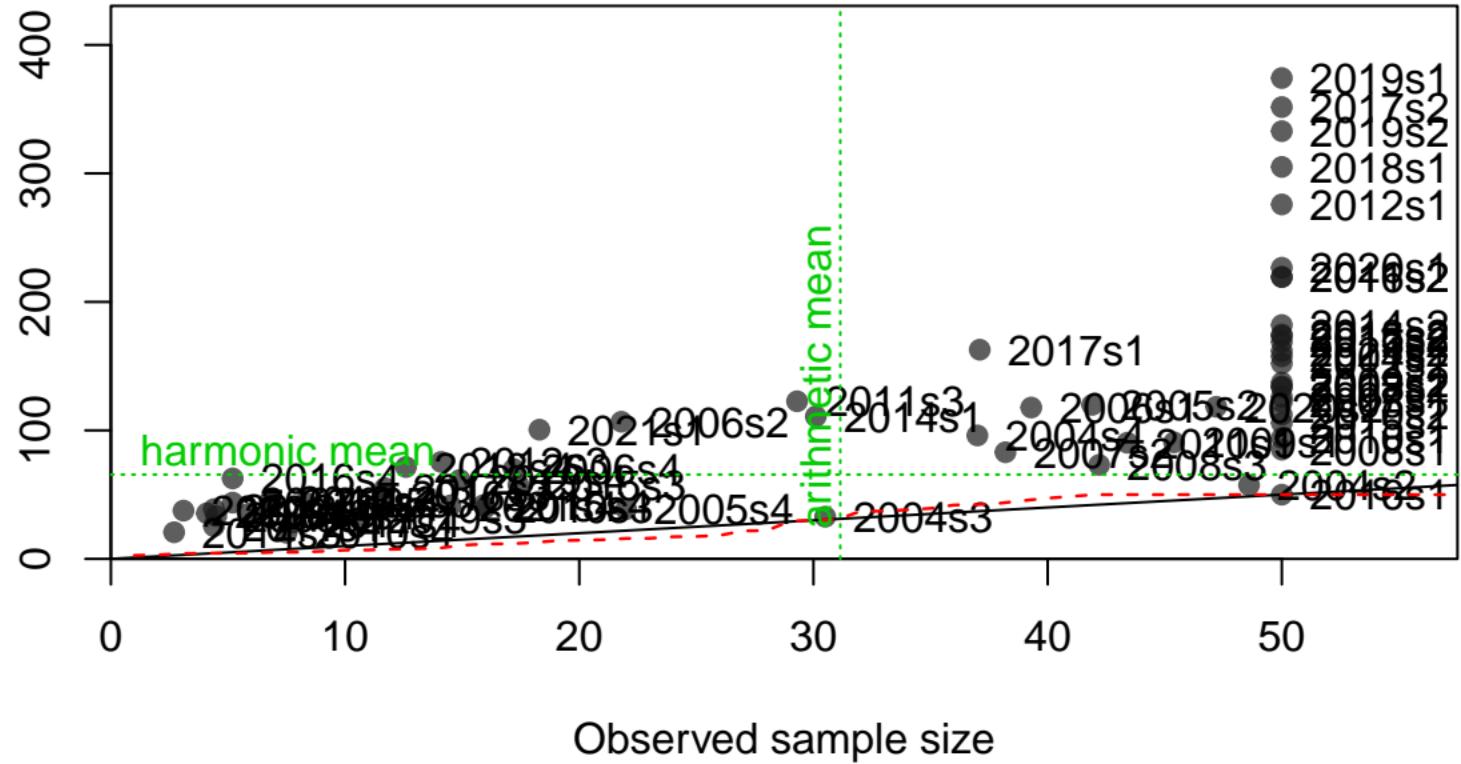


Proportion

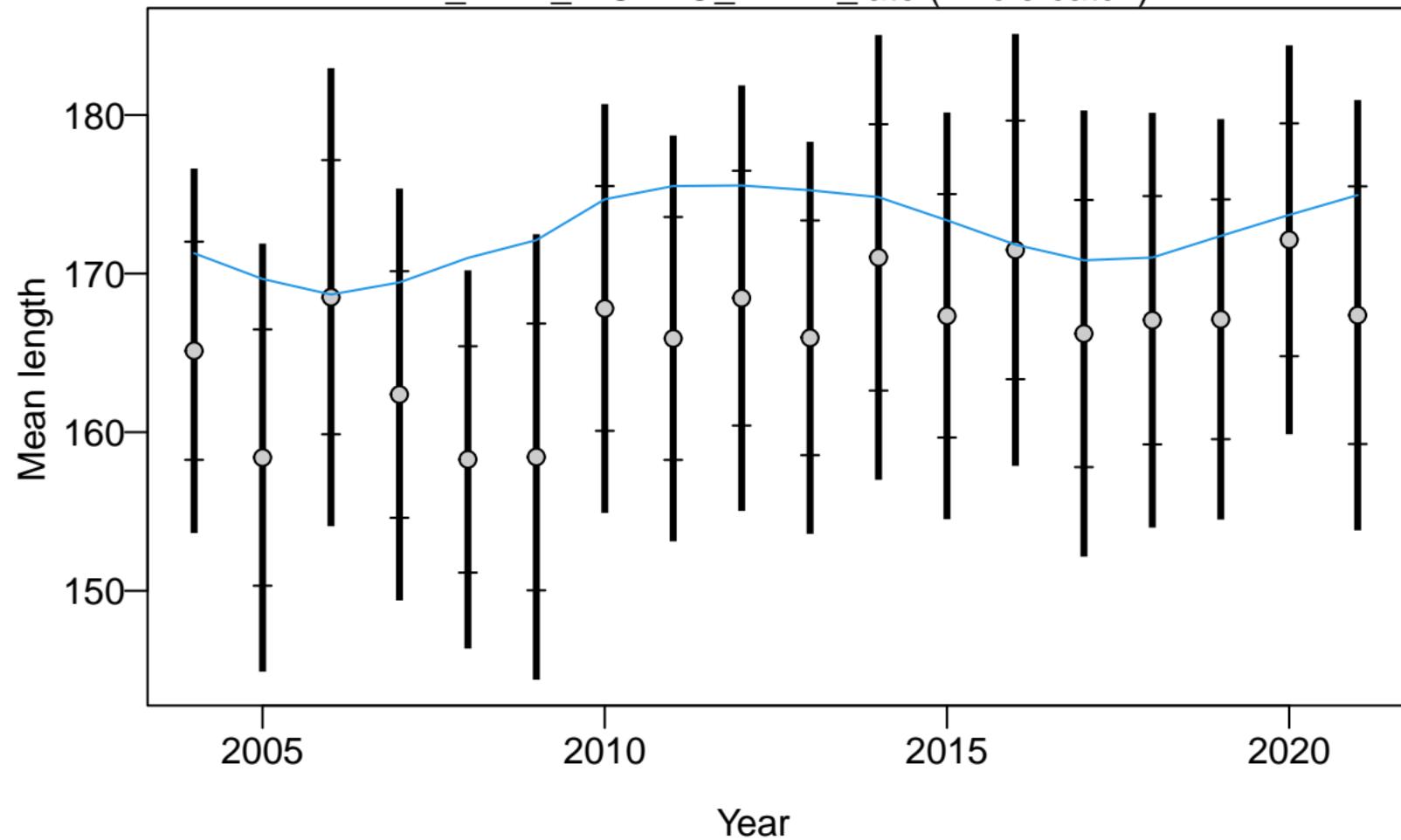




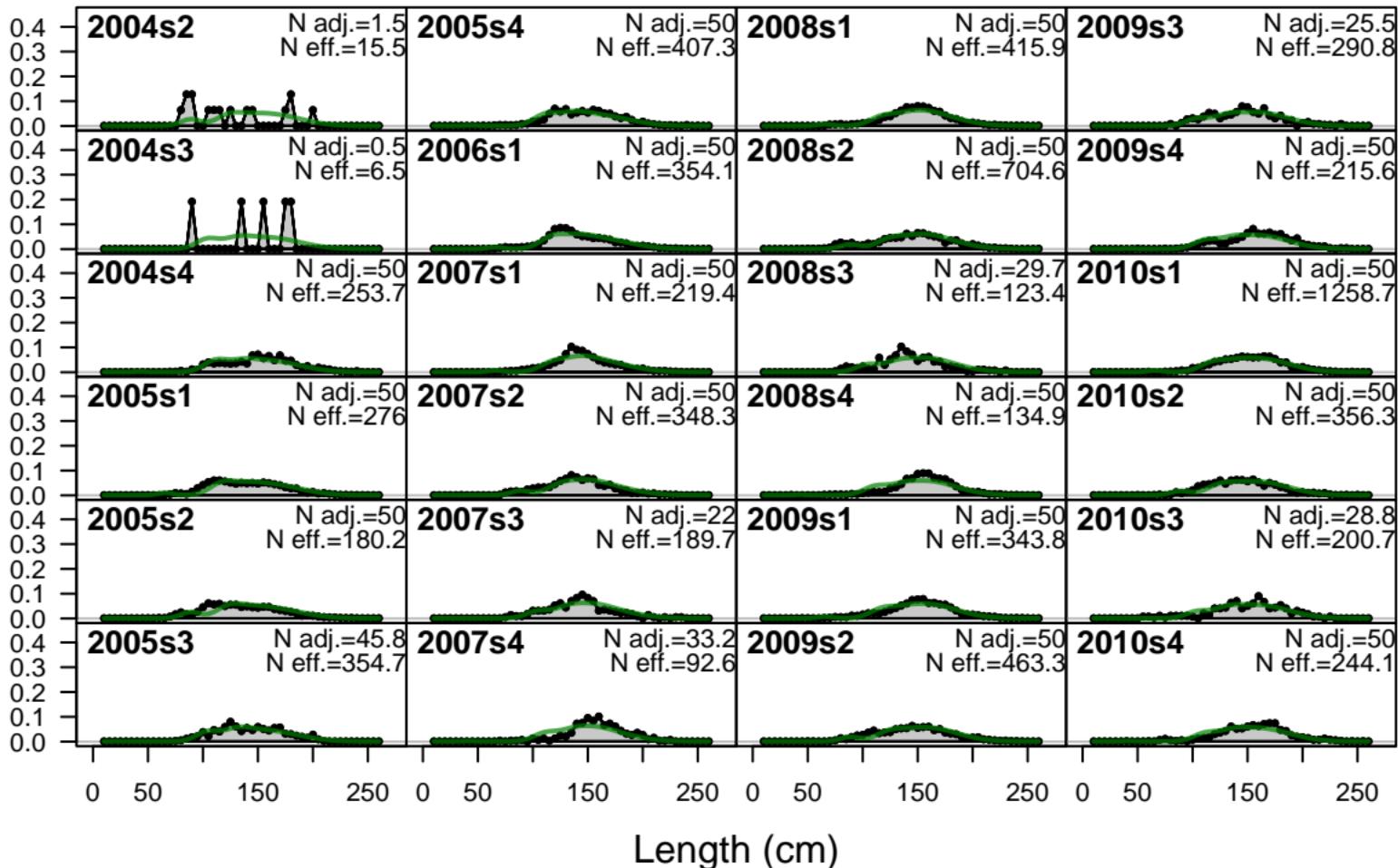
Effective sample size



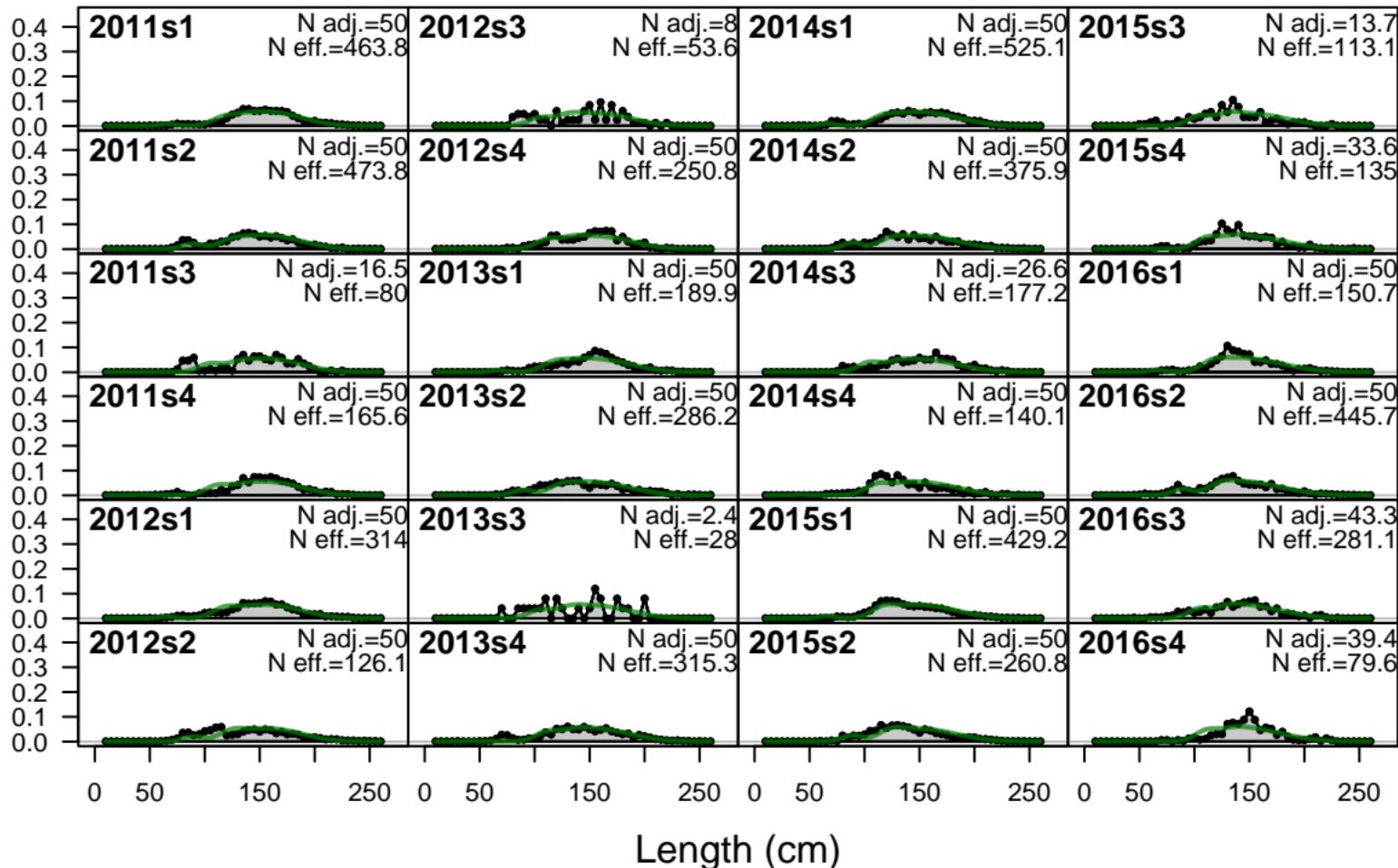
F2_TWN_WCNPO_DWLL_late (whole catch)



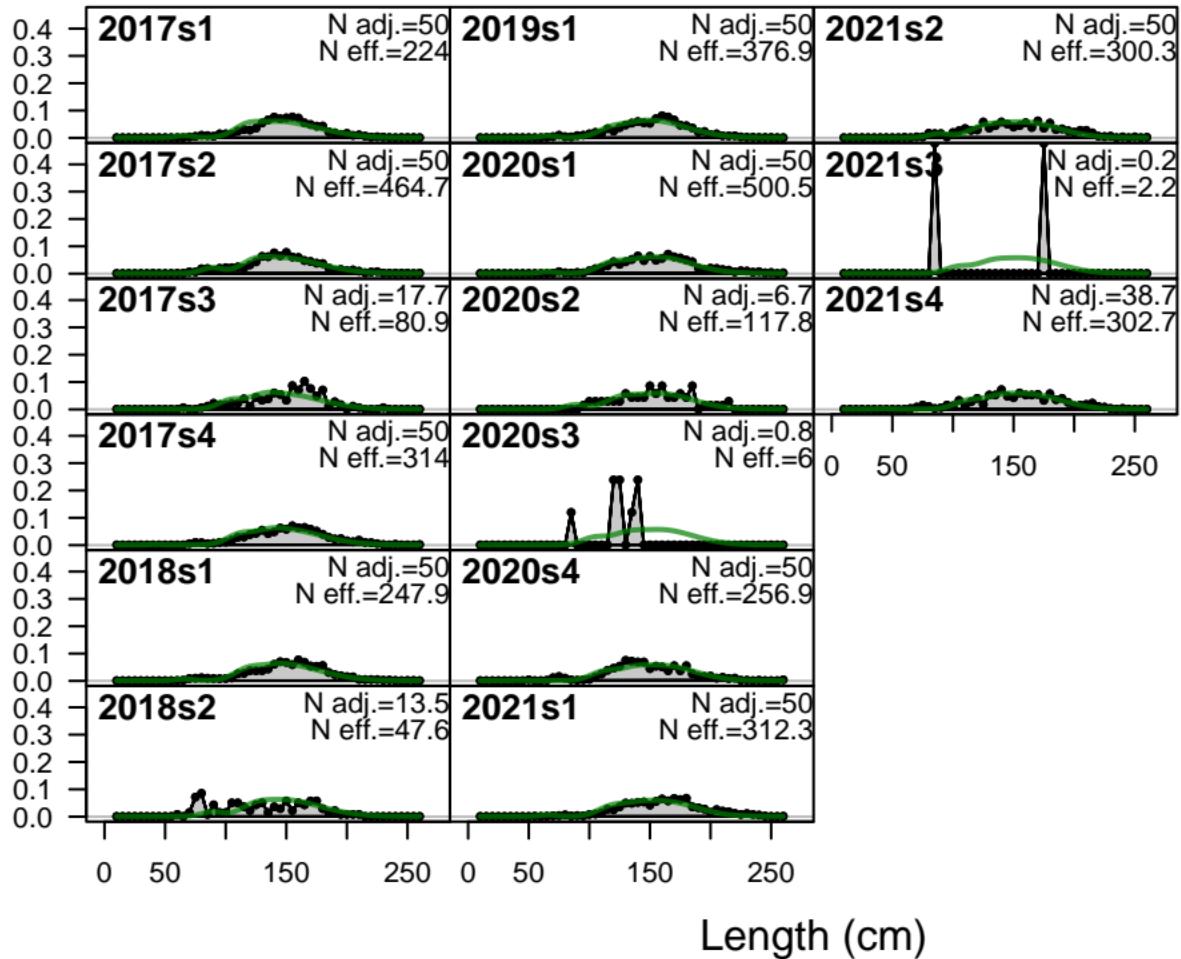
Proportion

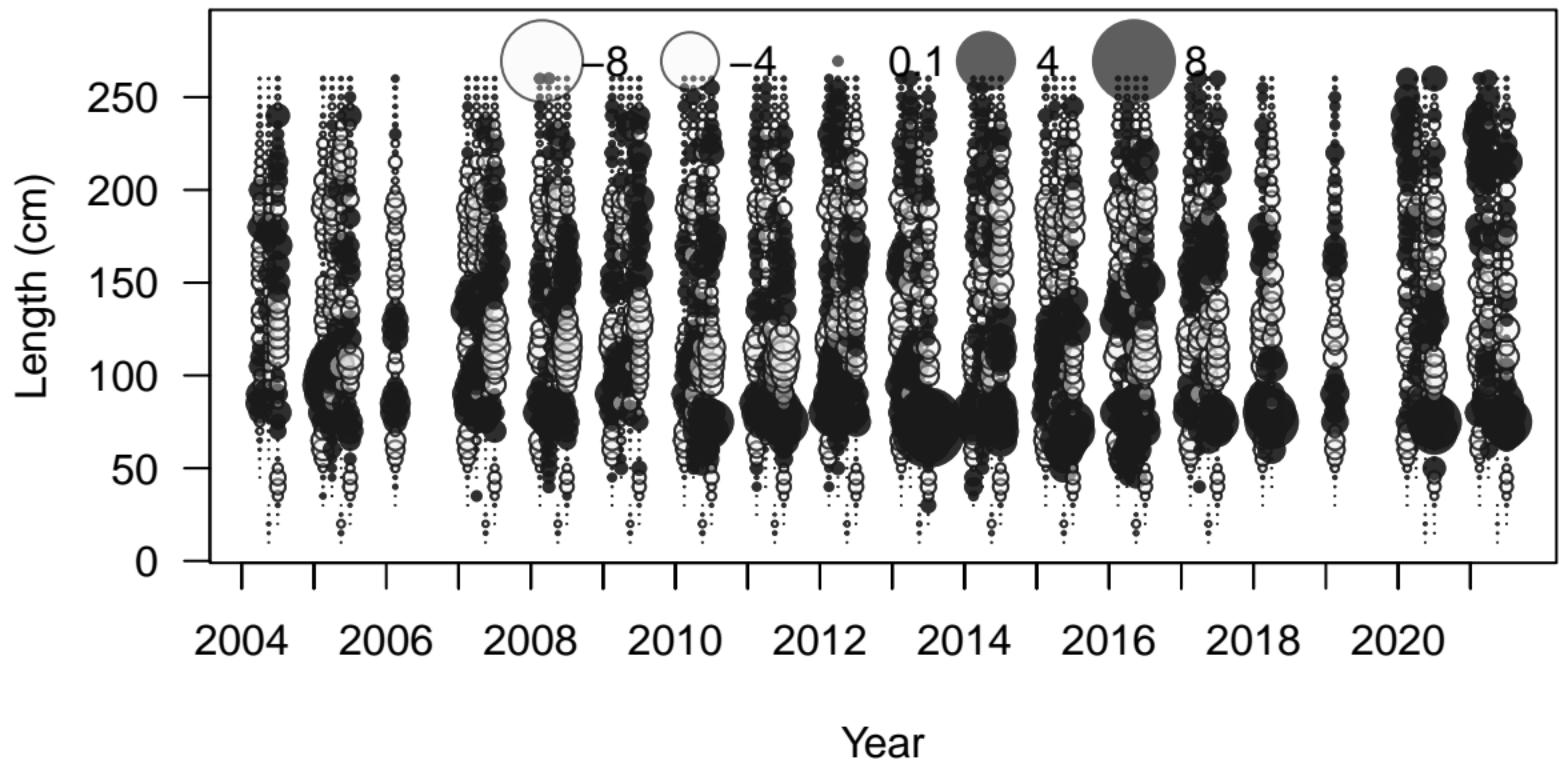


Proportion

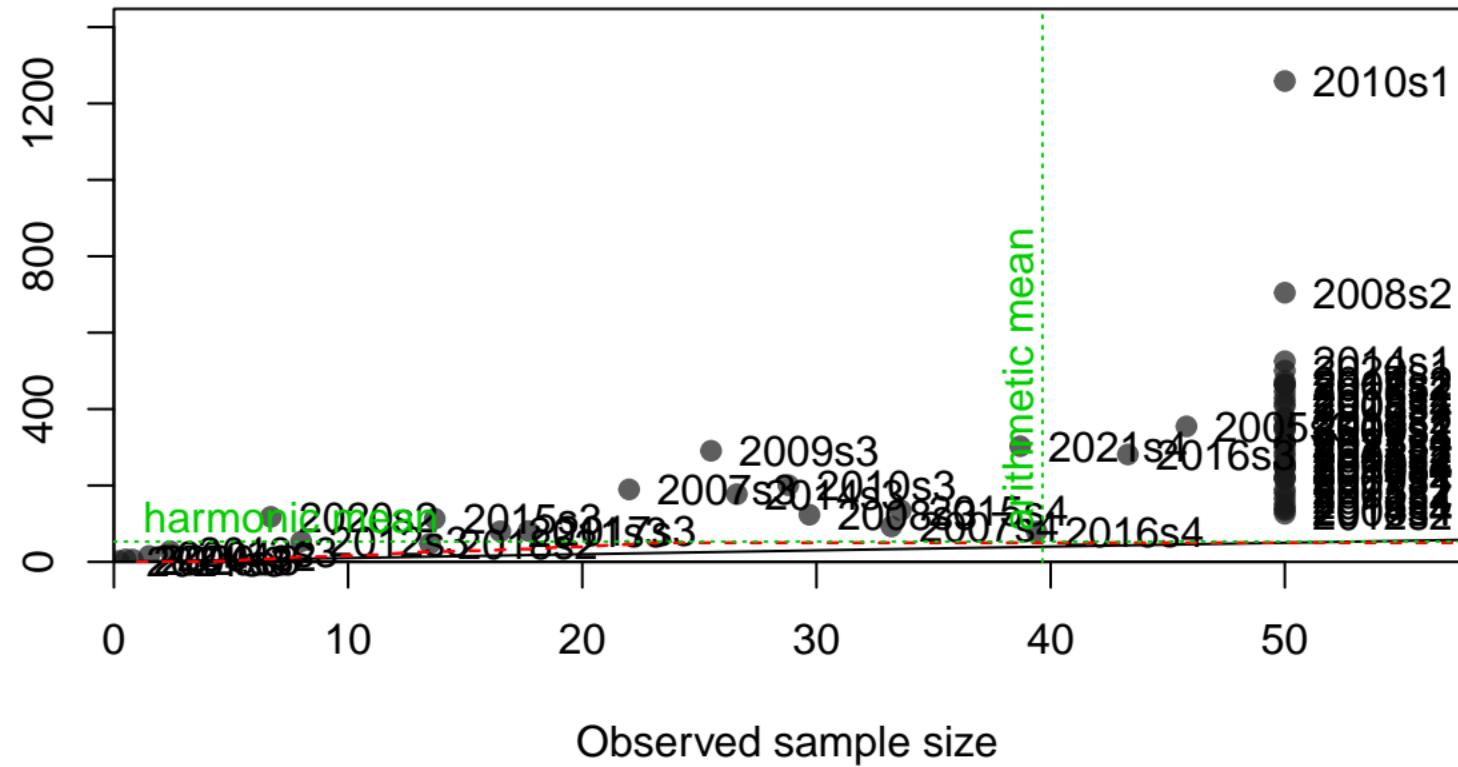


Proportion

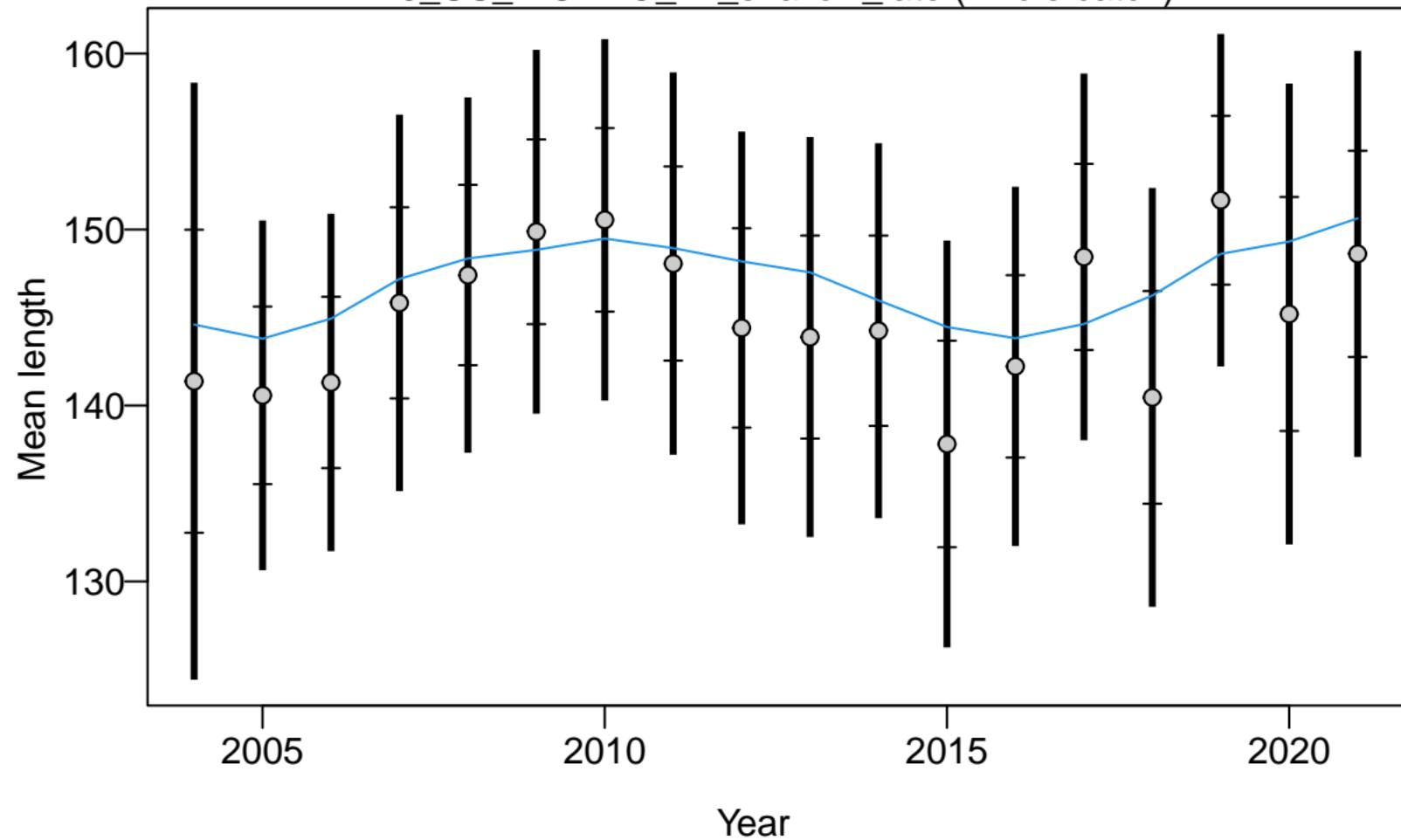




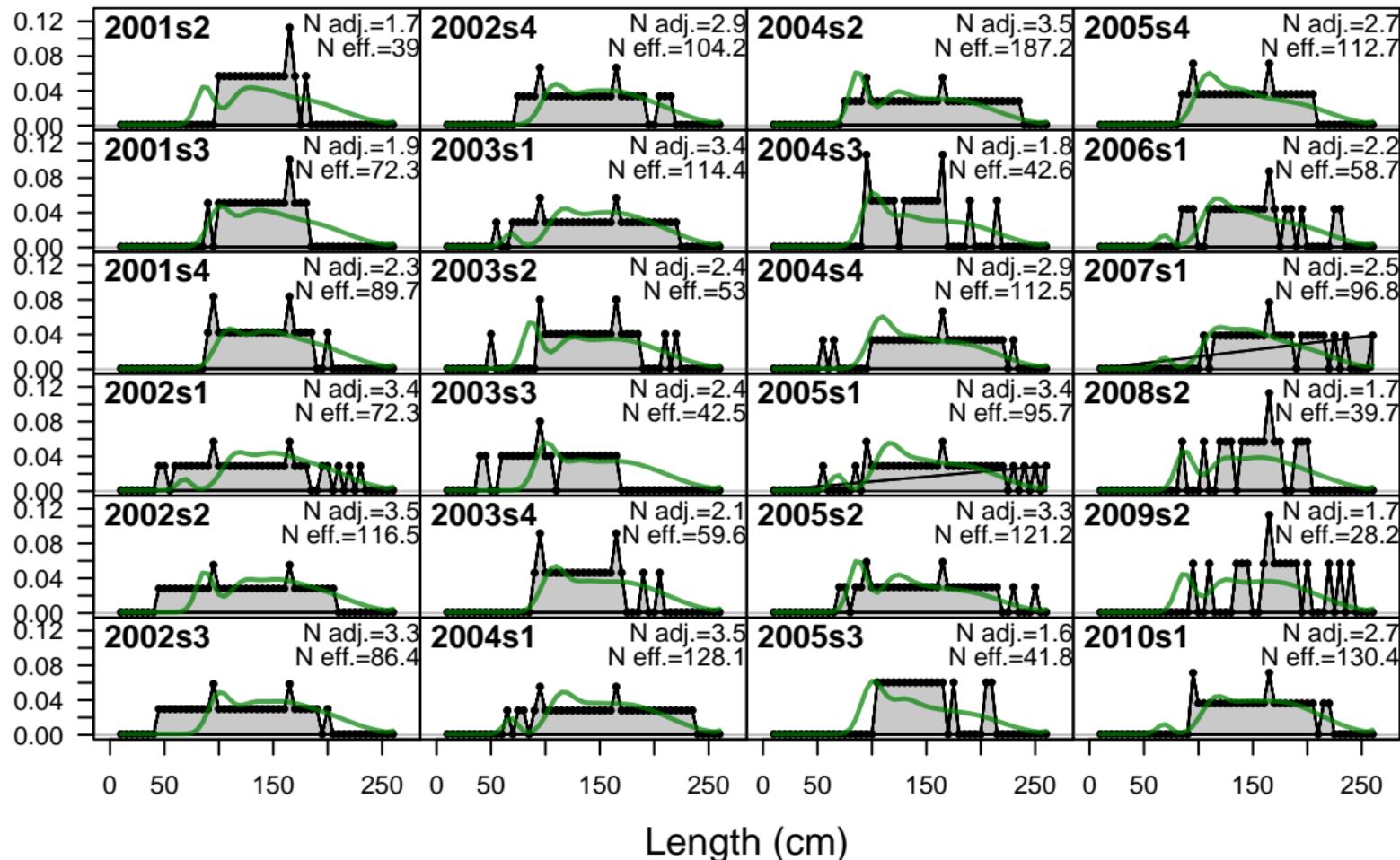
Effective sample size



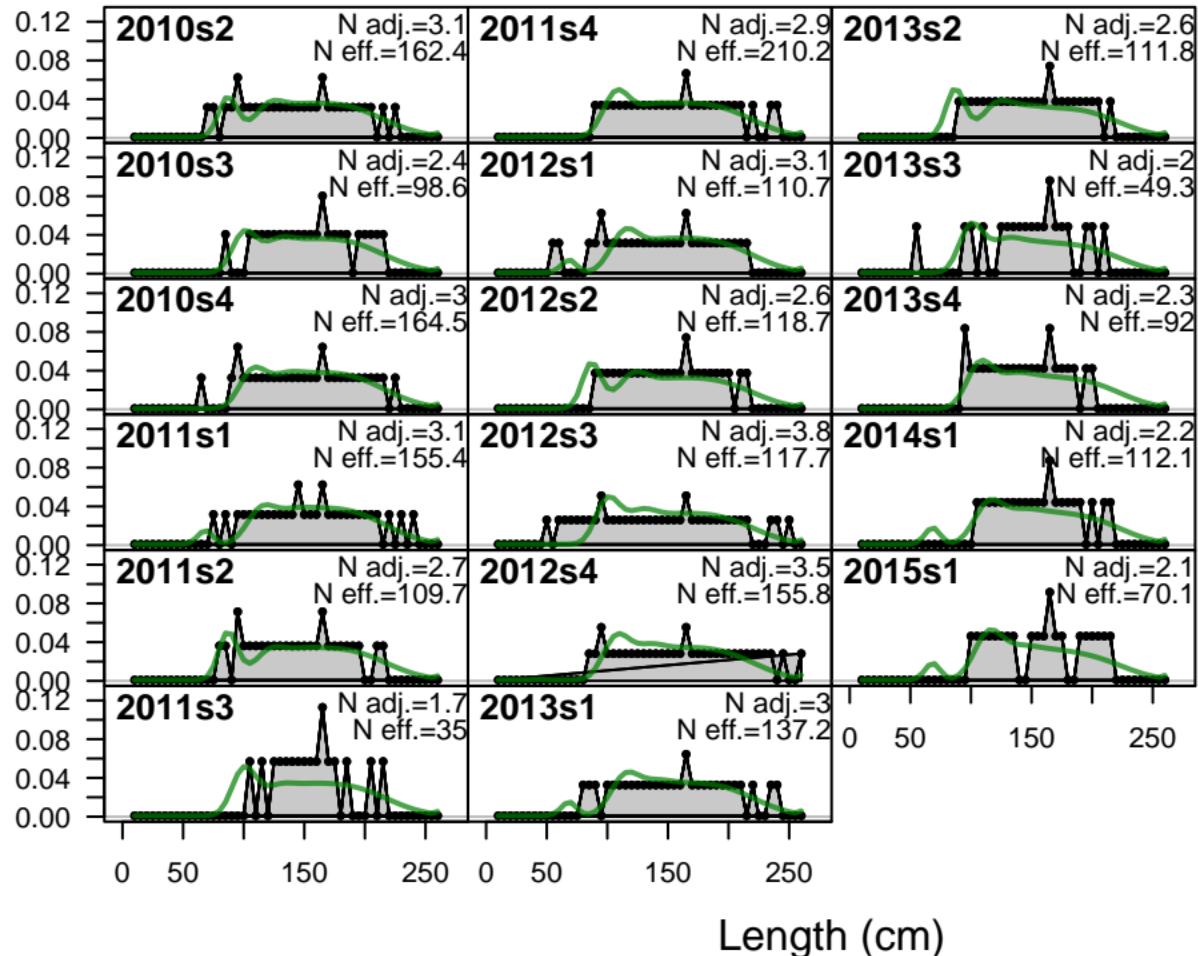
F3_US_WCNPO_LL_shallow_late (whole catch)

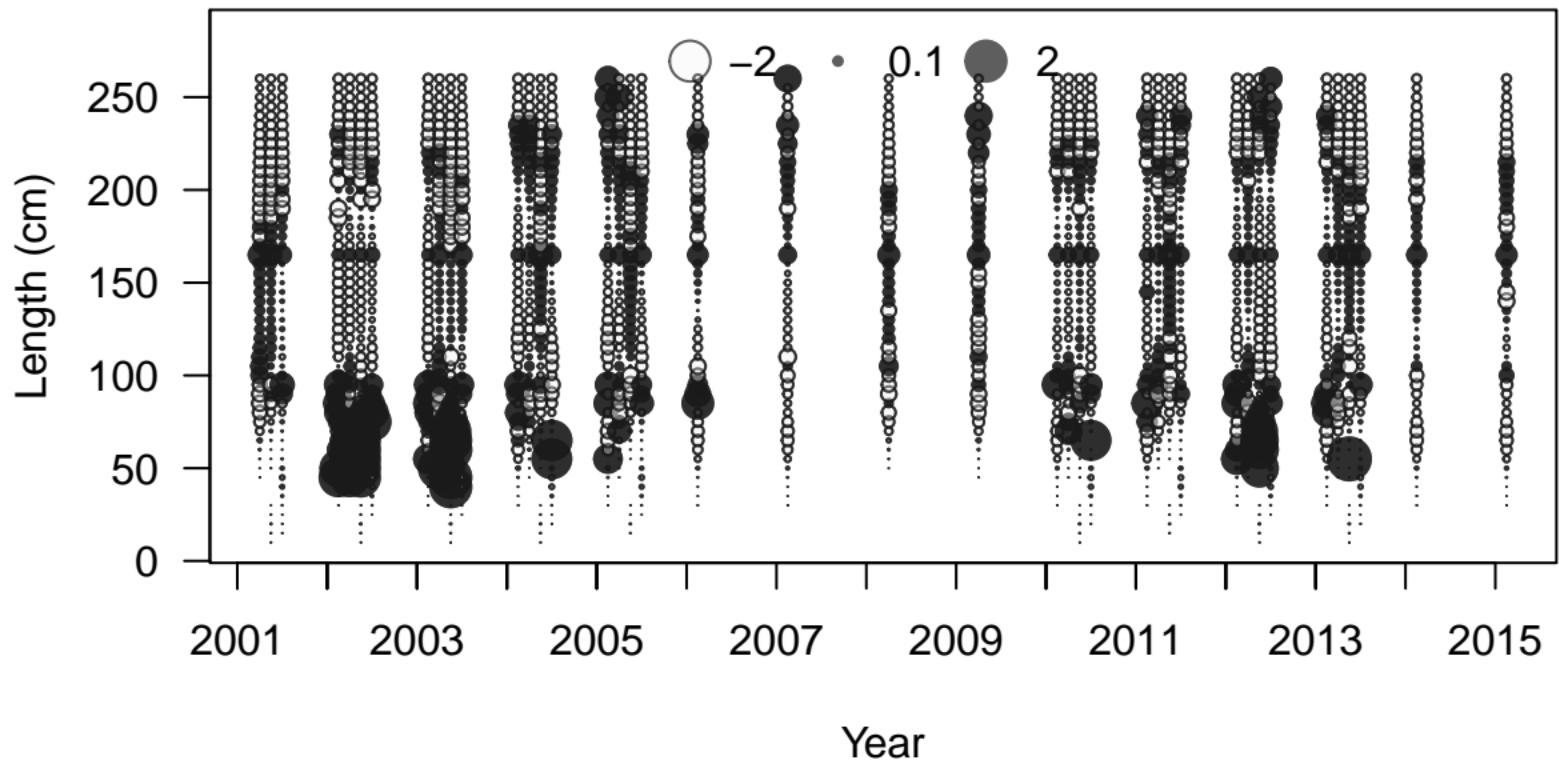


Proportion



Proportion





Effective sample size

200
150
100
50
0

0

1

2

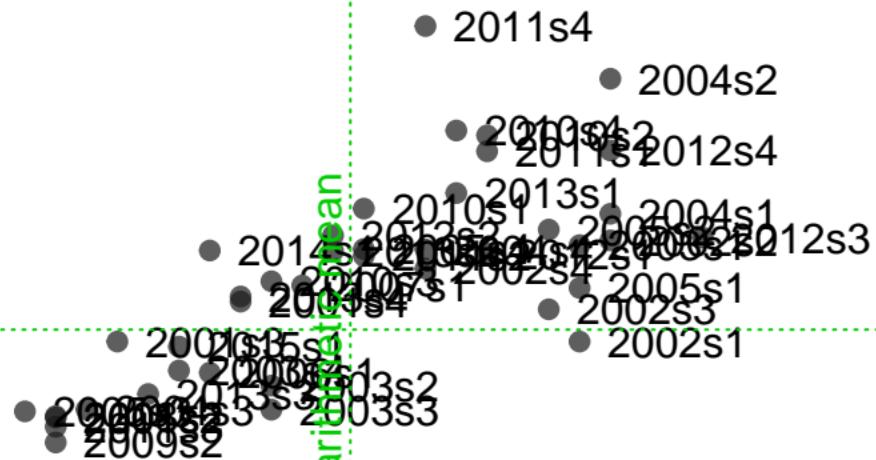
3

4

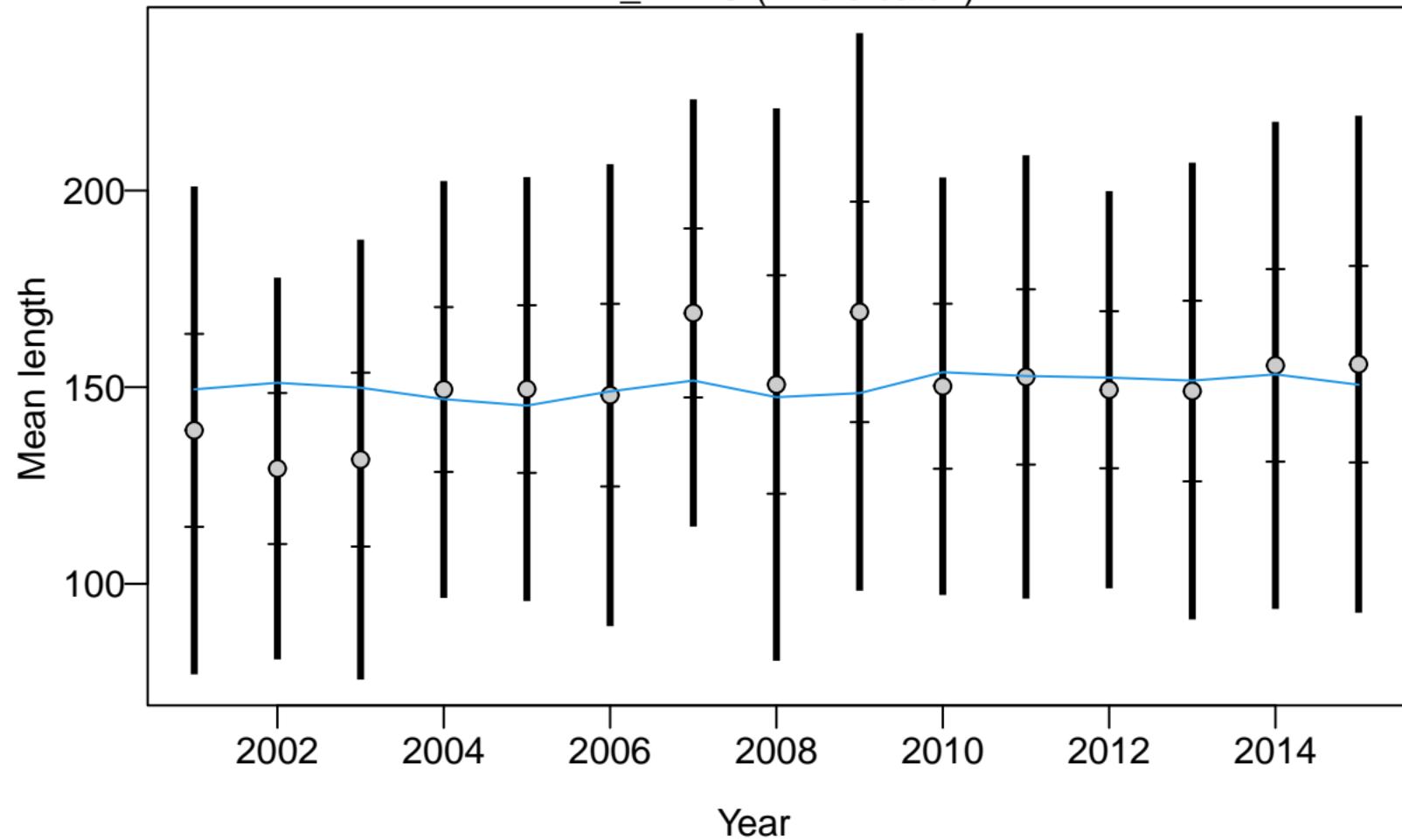
Observed sample size

harmonic mean

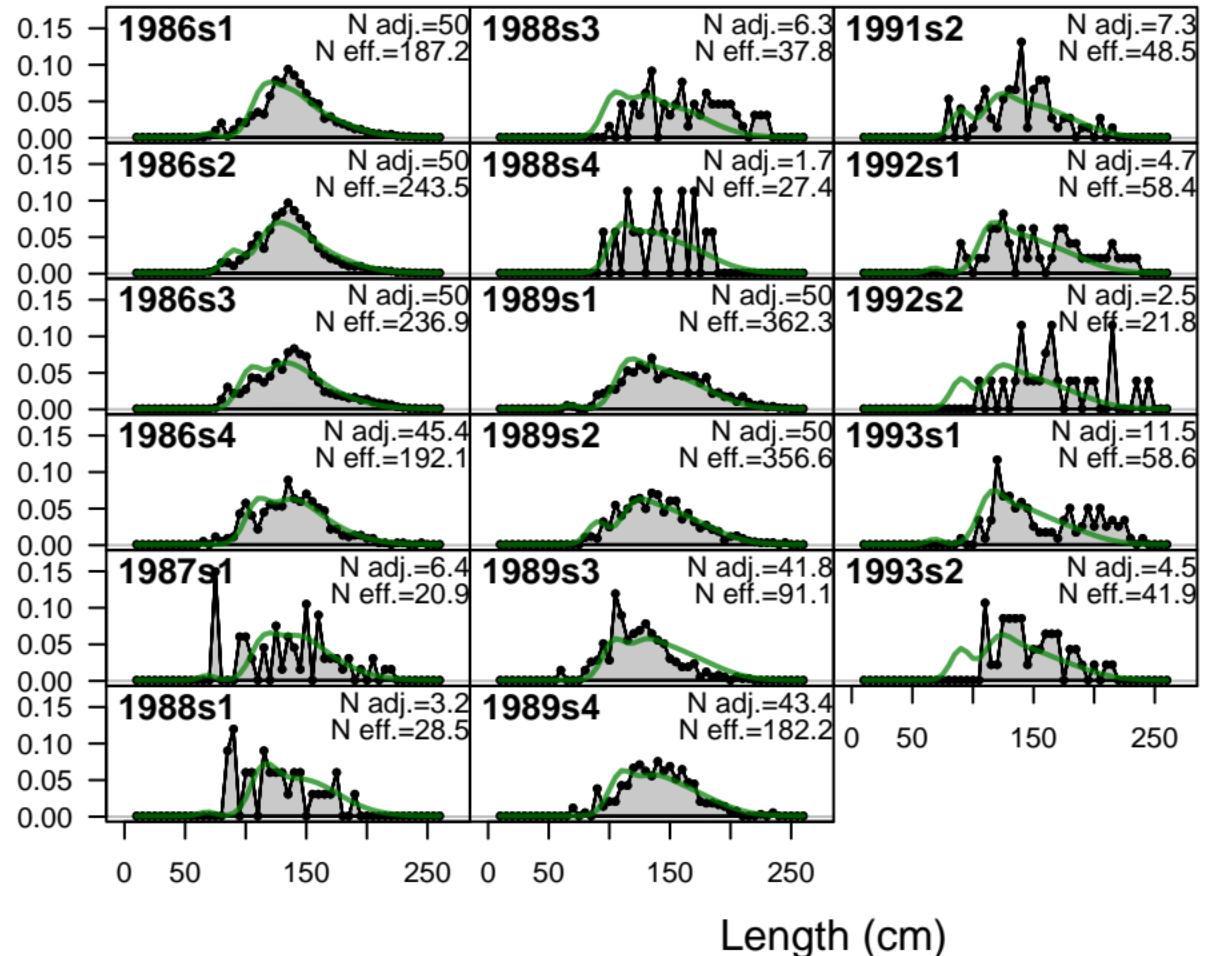
arithmetic mean

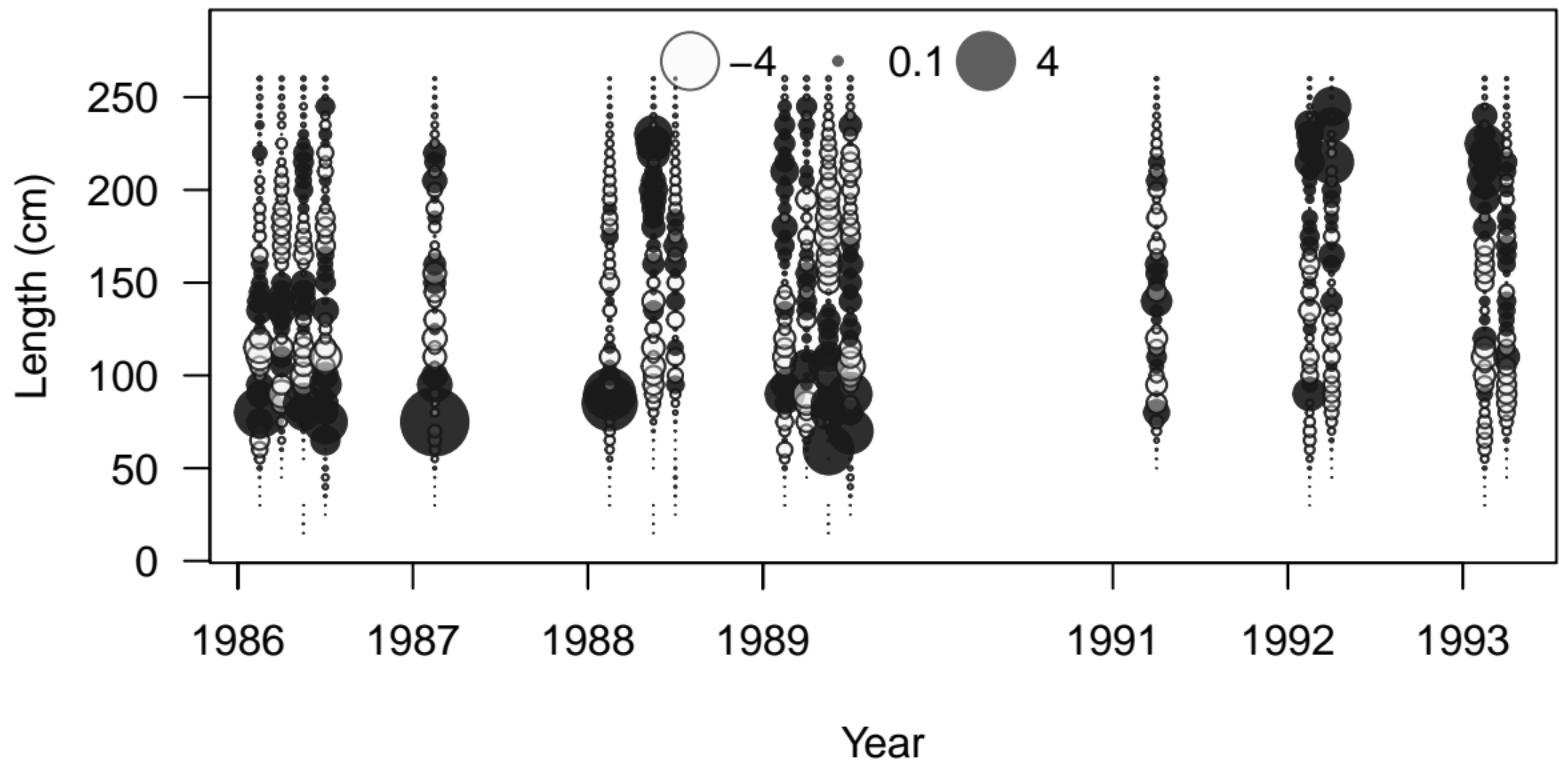


F4_IATTC (whole catch)

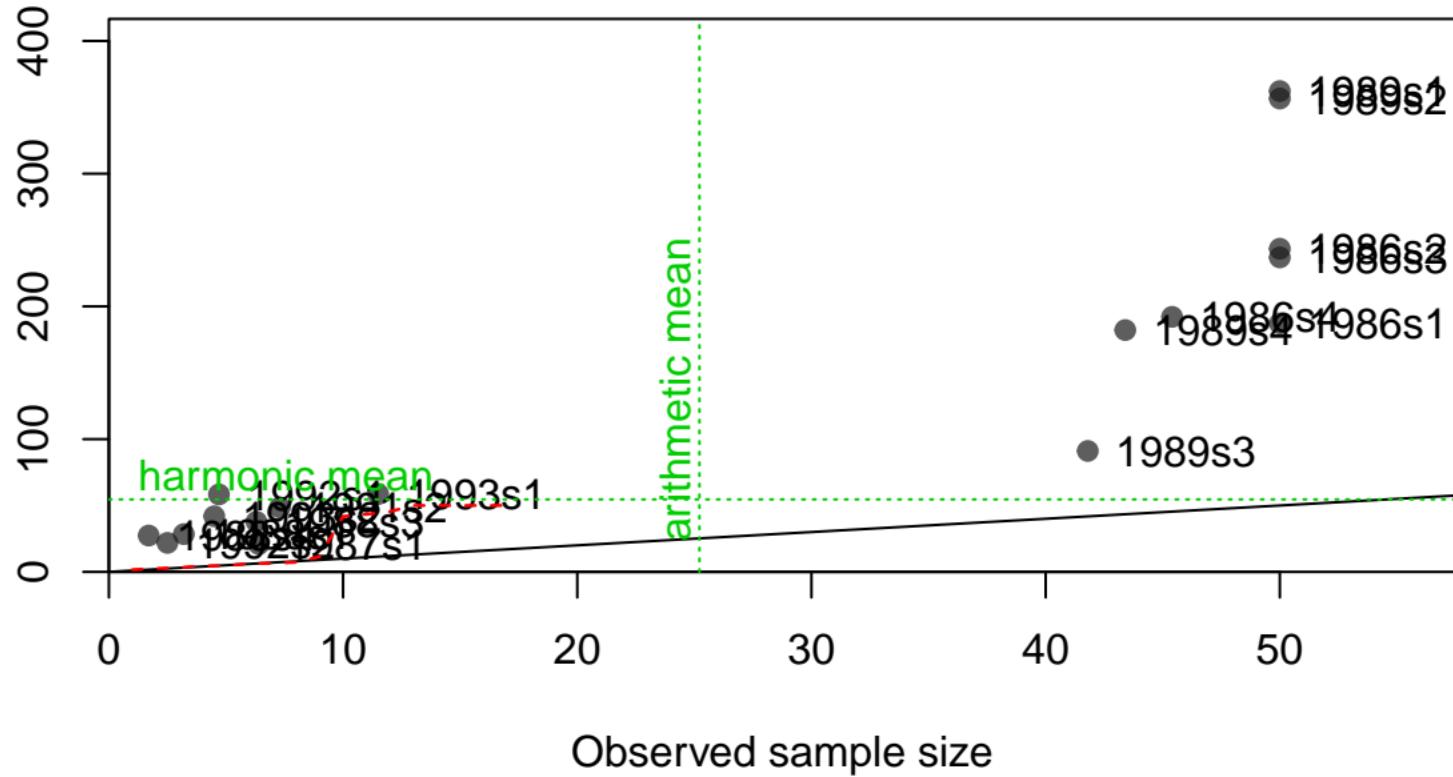


Proportion

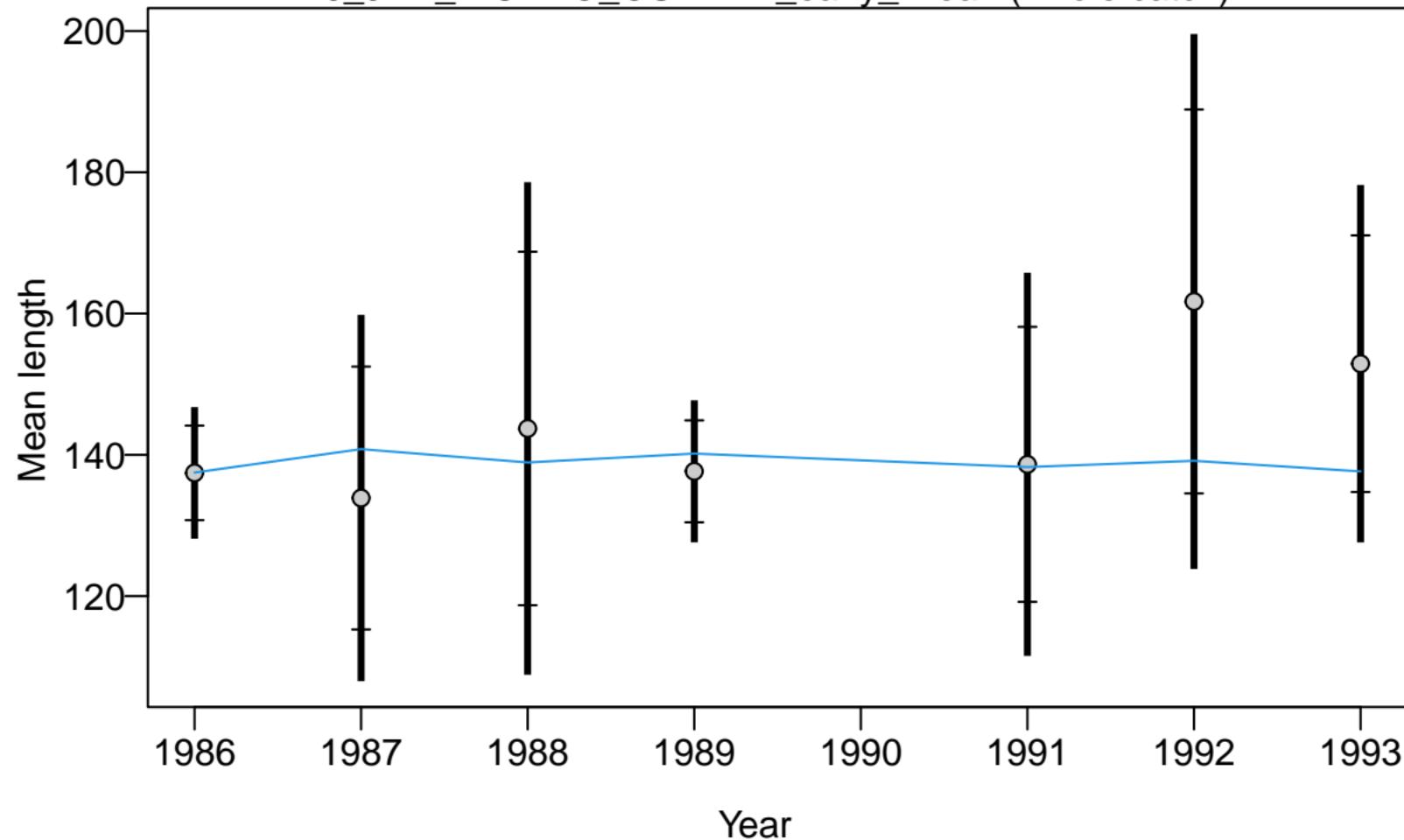




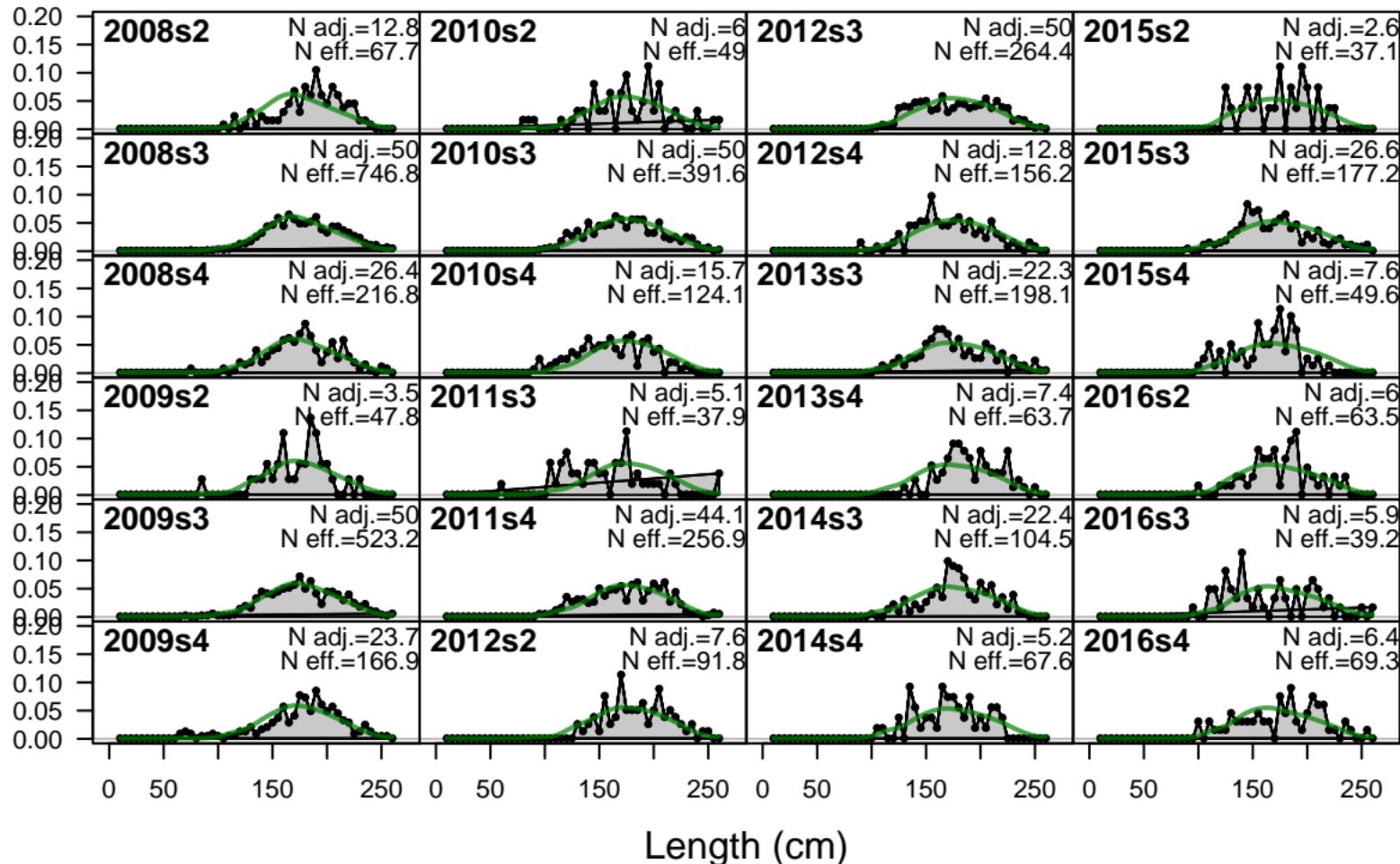
Effective sample size



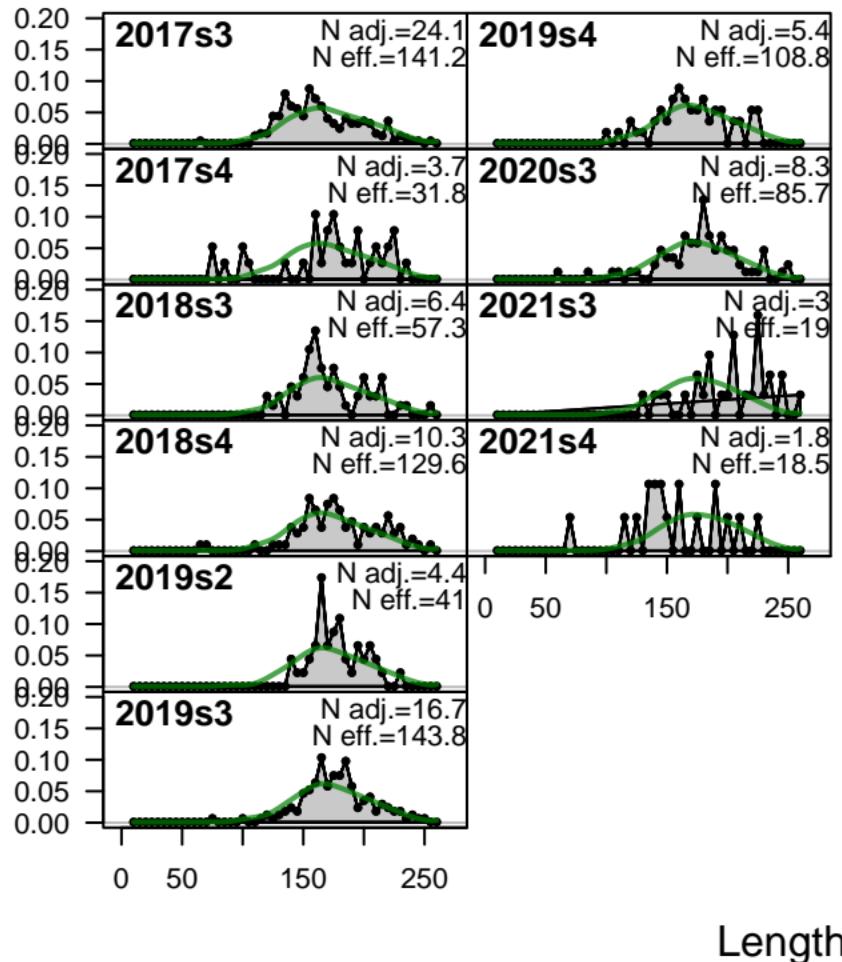
F6_JPN_WCNPO OSDWLL_early_Area1 (whole catch)

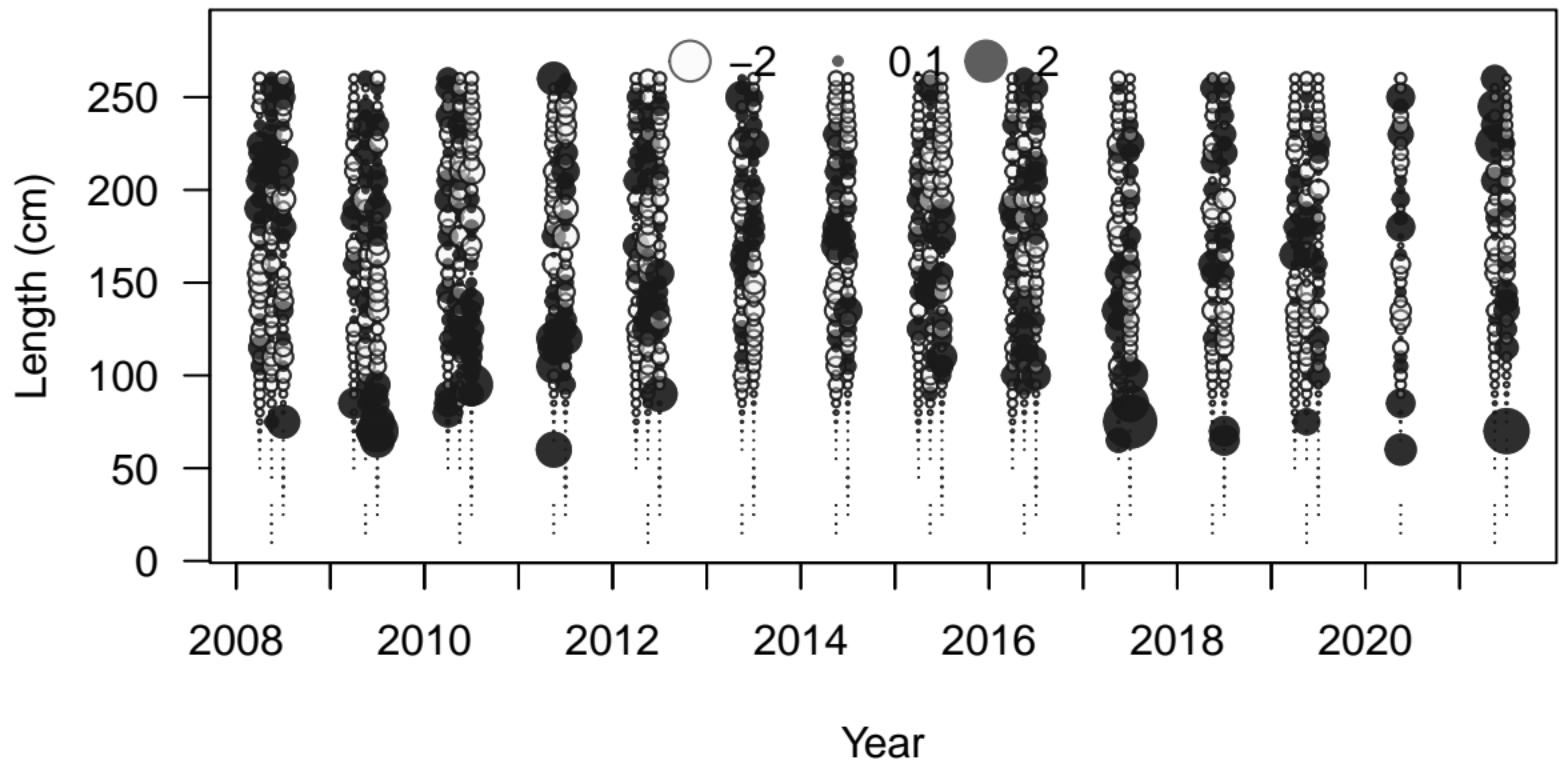


Proportion

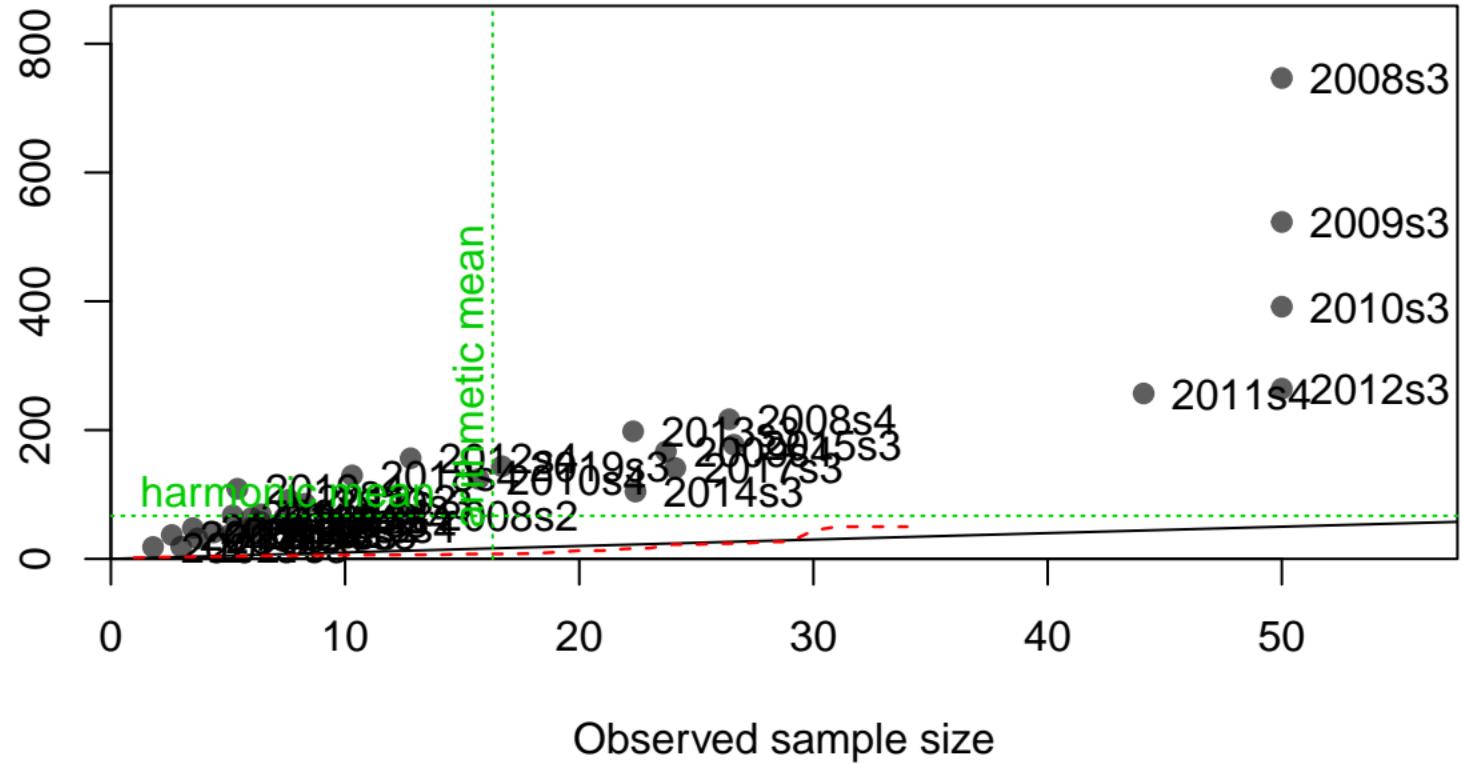


Proportion

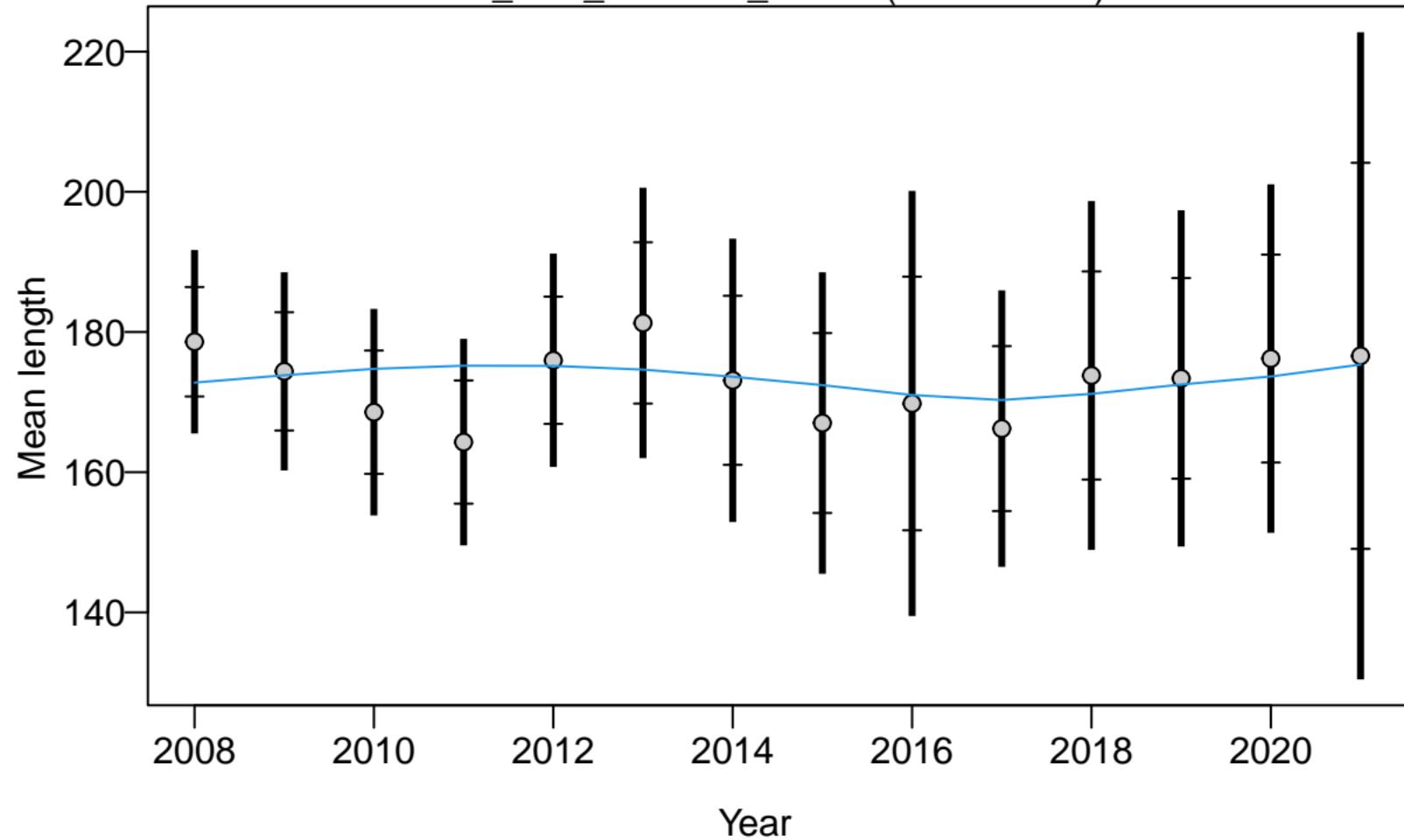




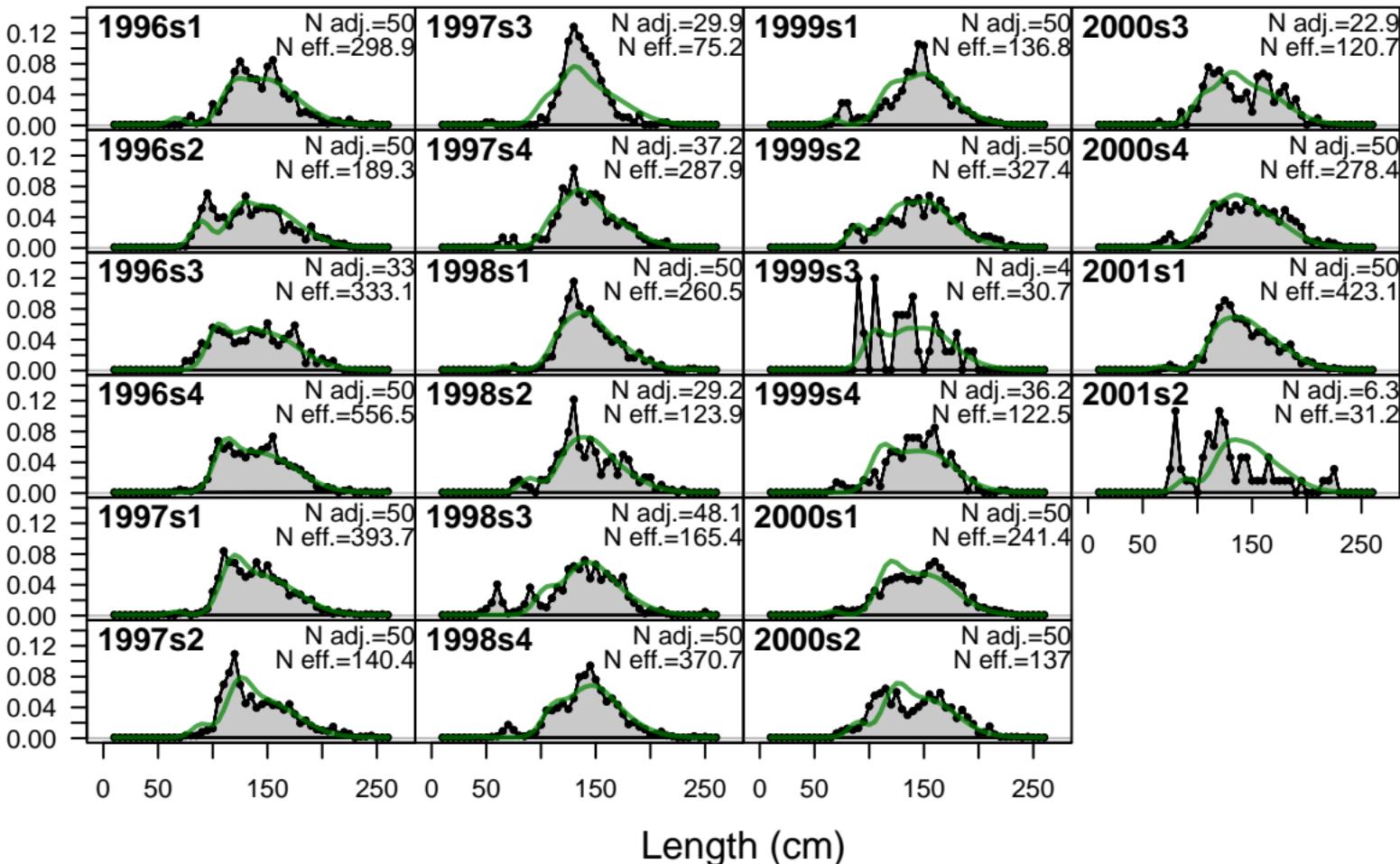
Effective sample size

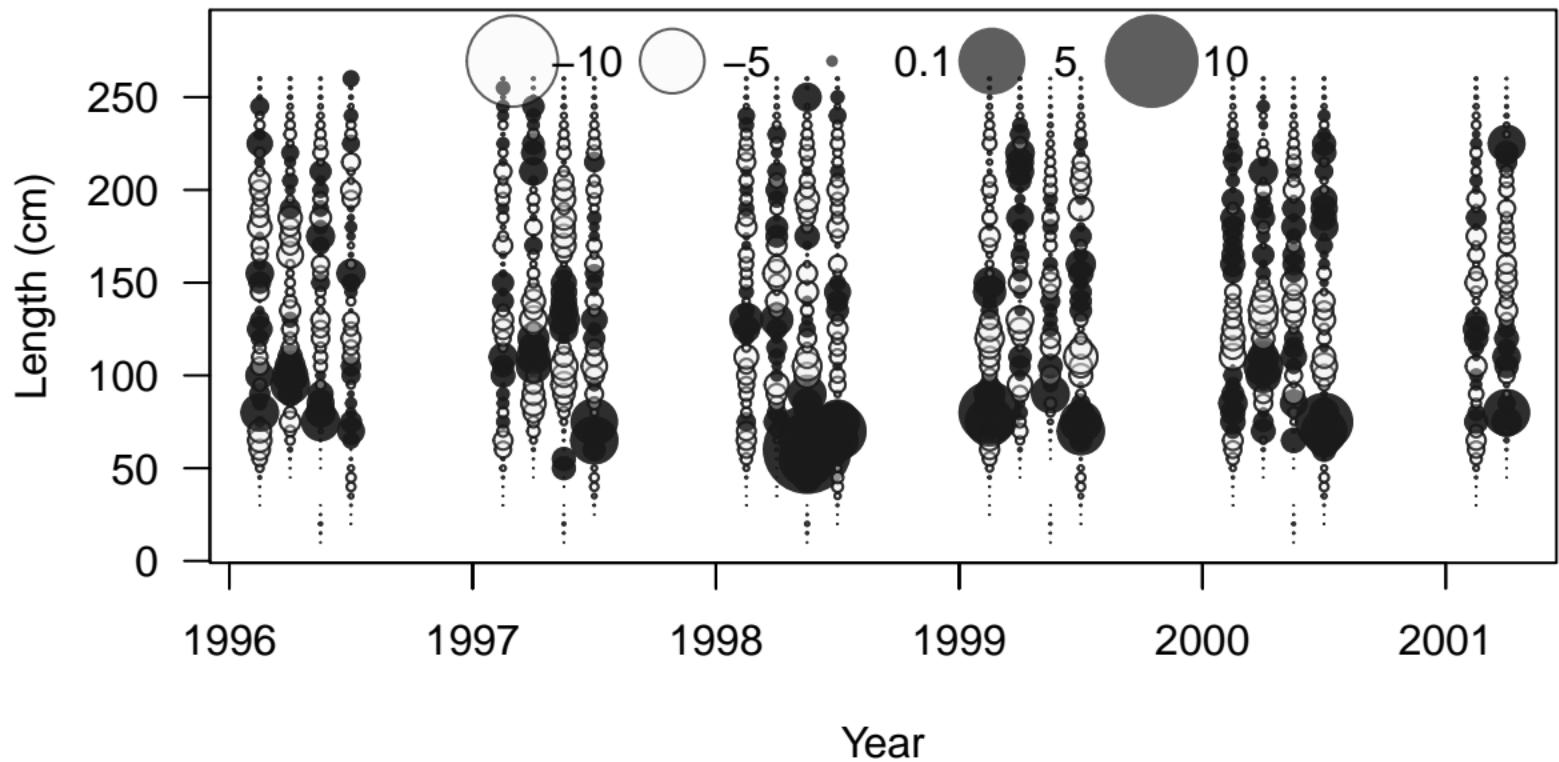


F7_JPN_WCNPO_CODF (whole catch)

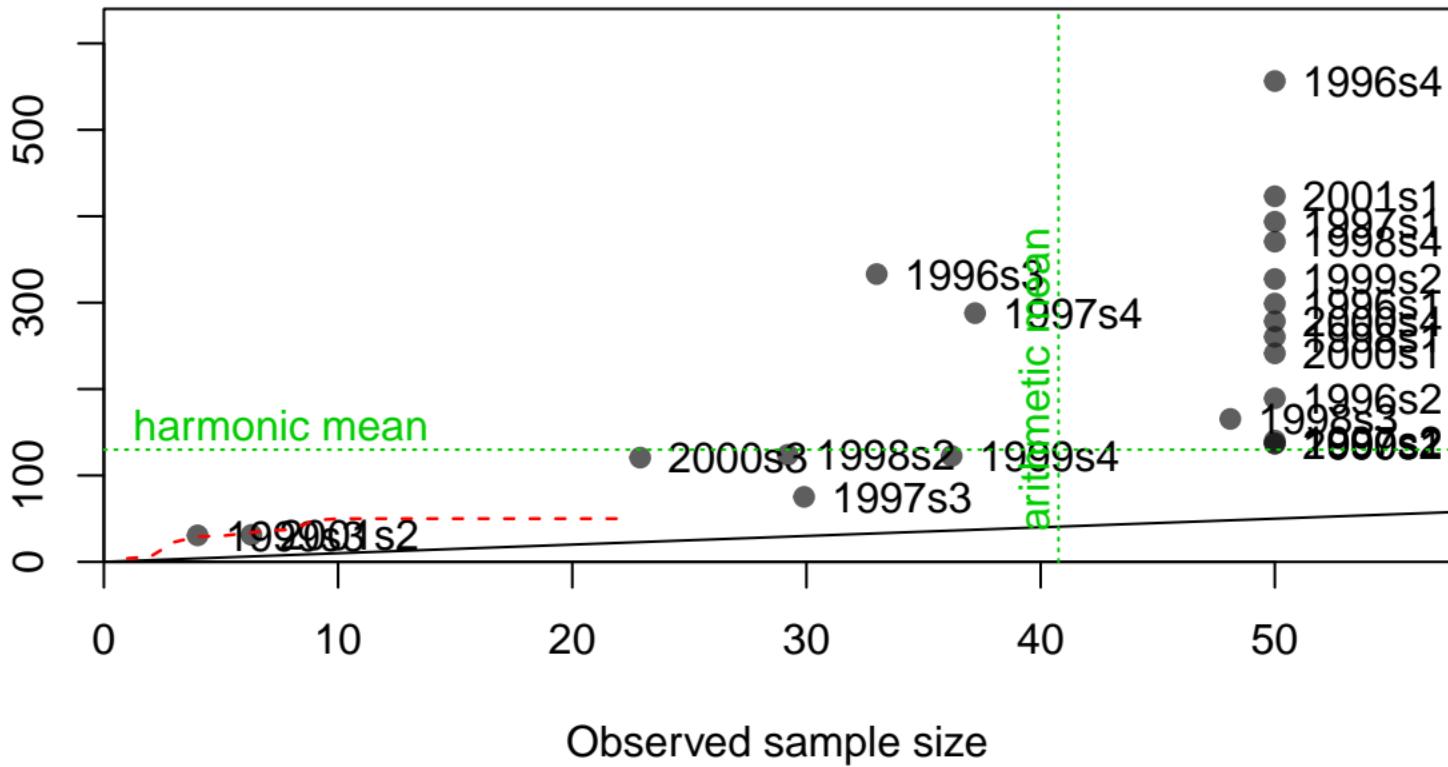


Proportion

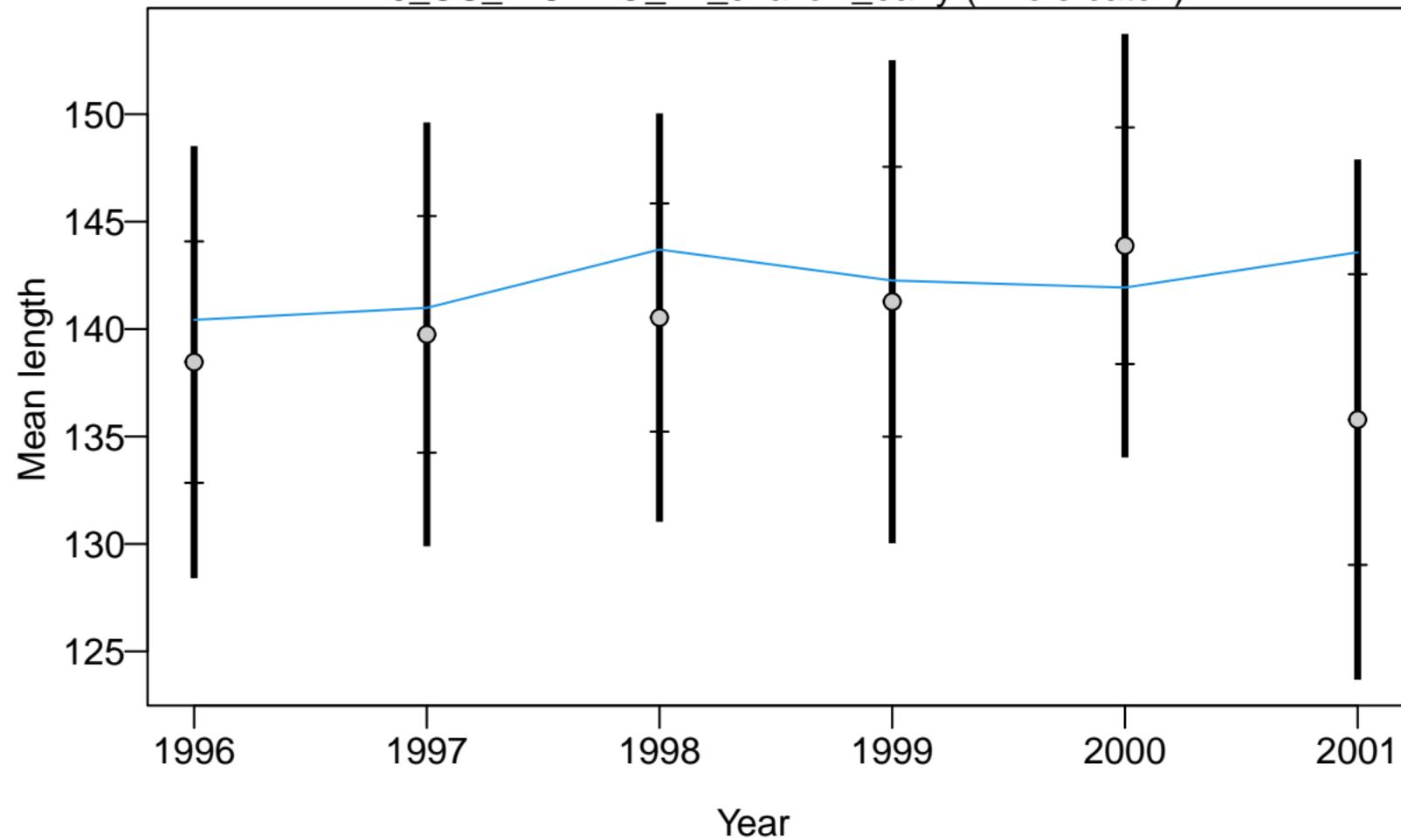




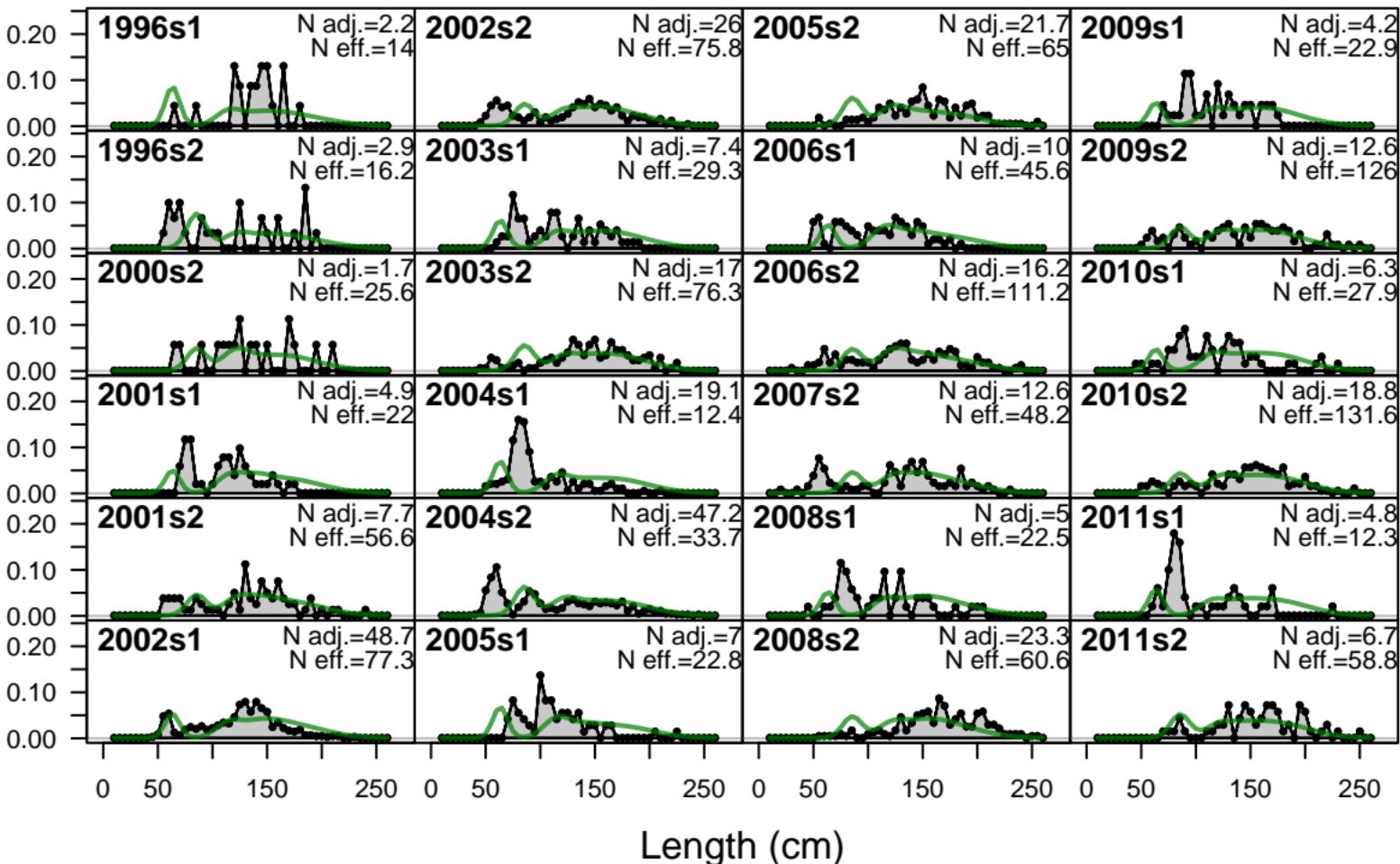
Effective sample size



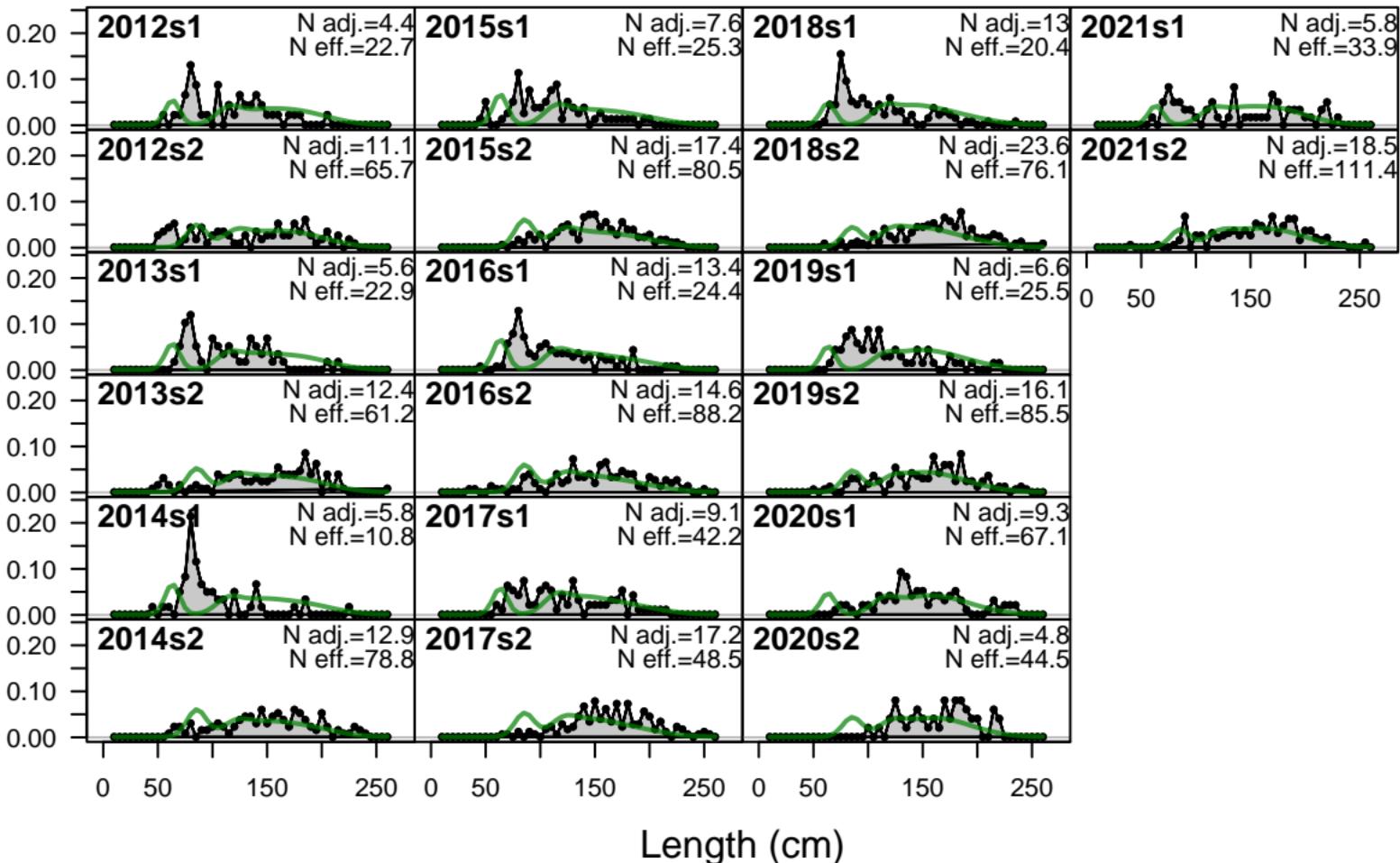
F8_US_WCNPO_LL_shallow_early (whole catch)

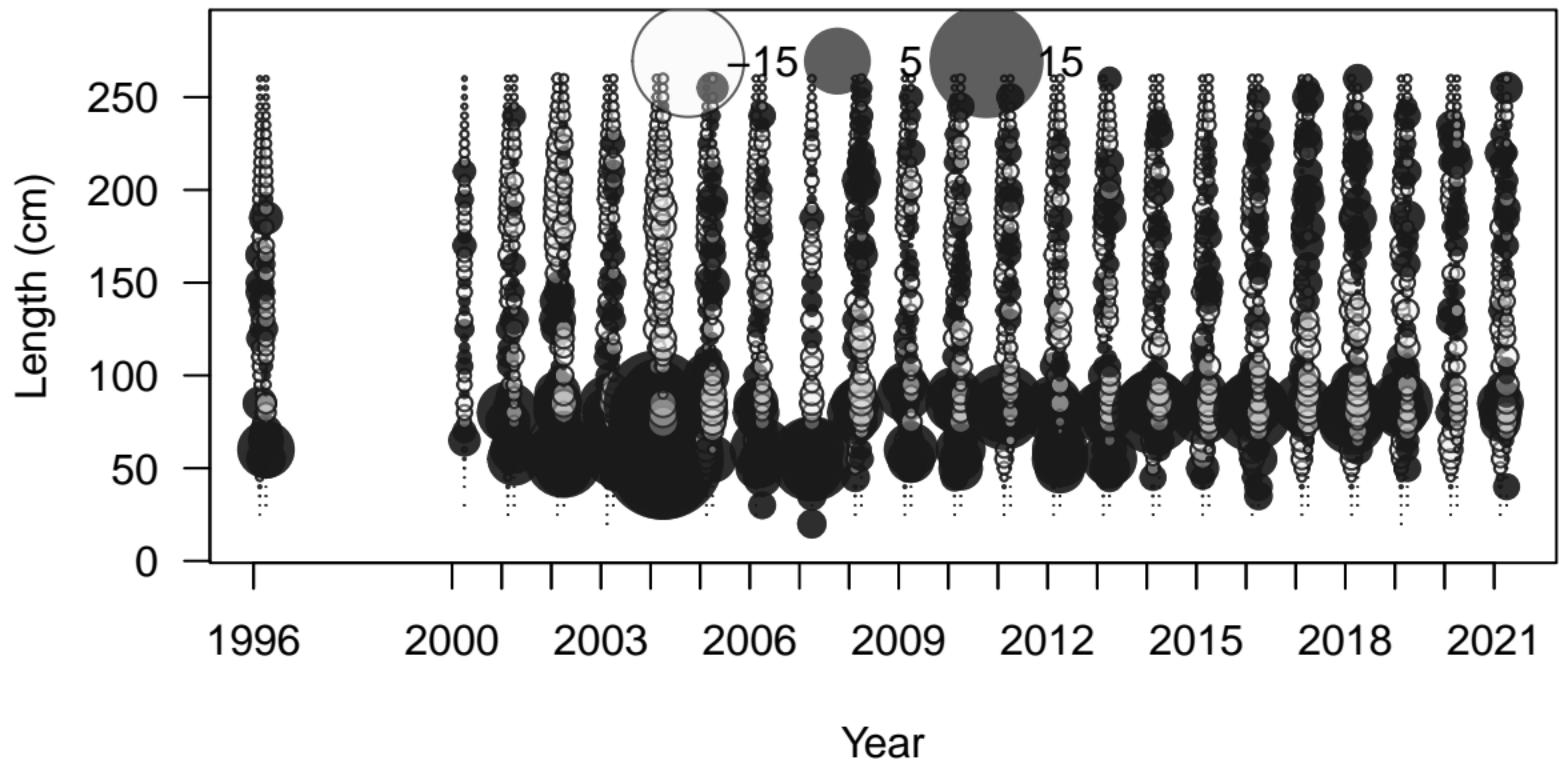


Proportion

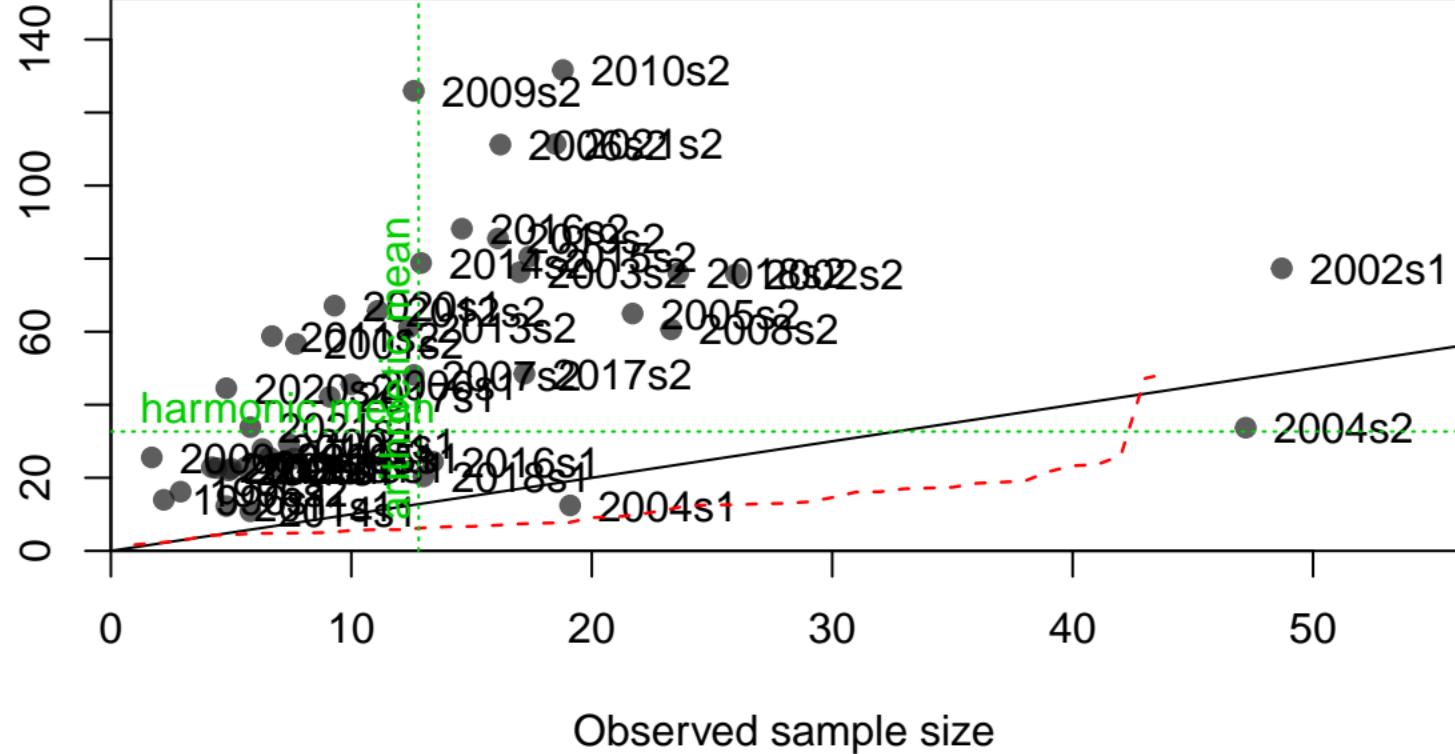


Proportion

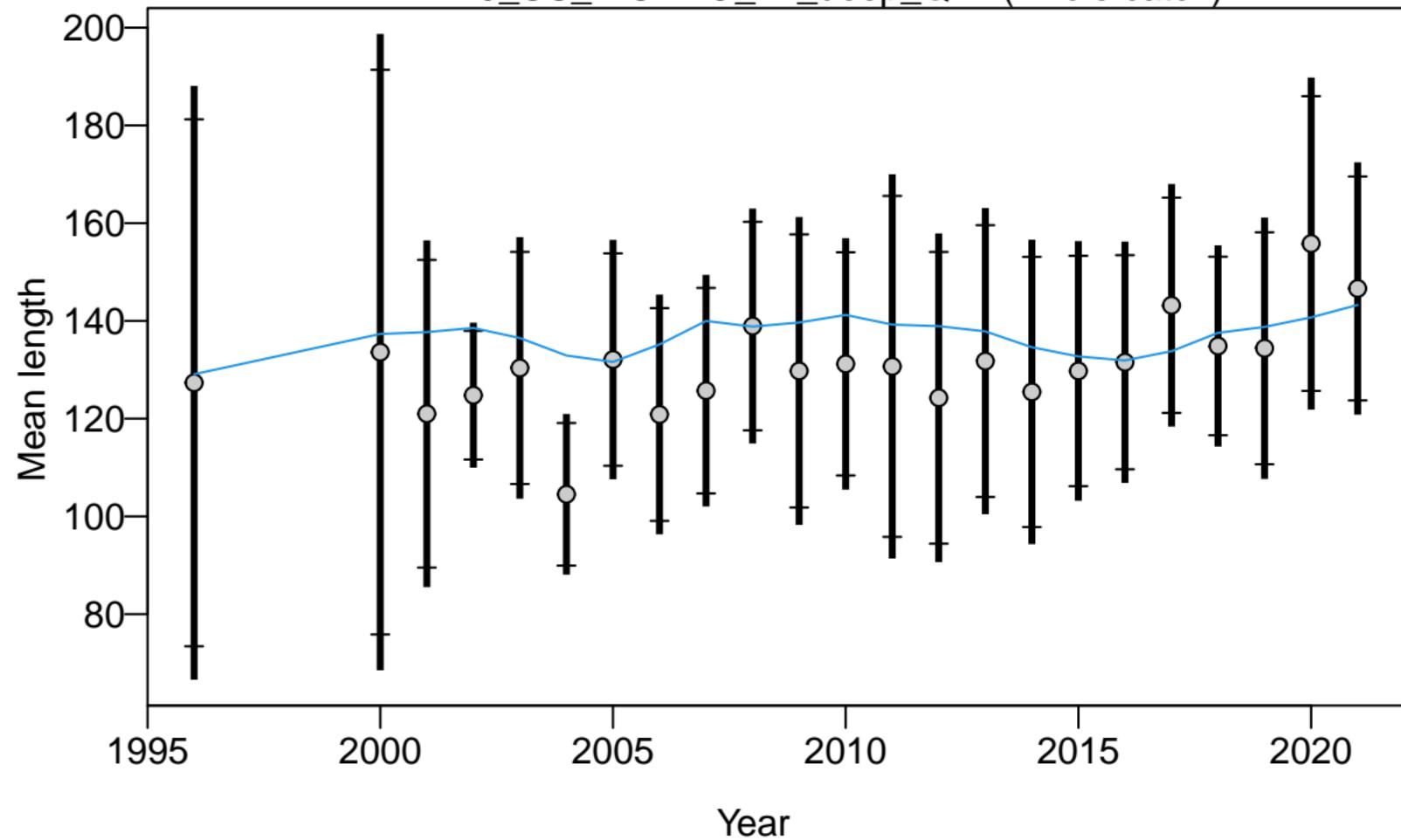




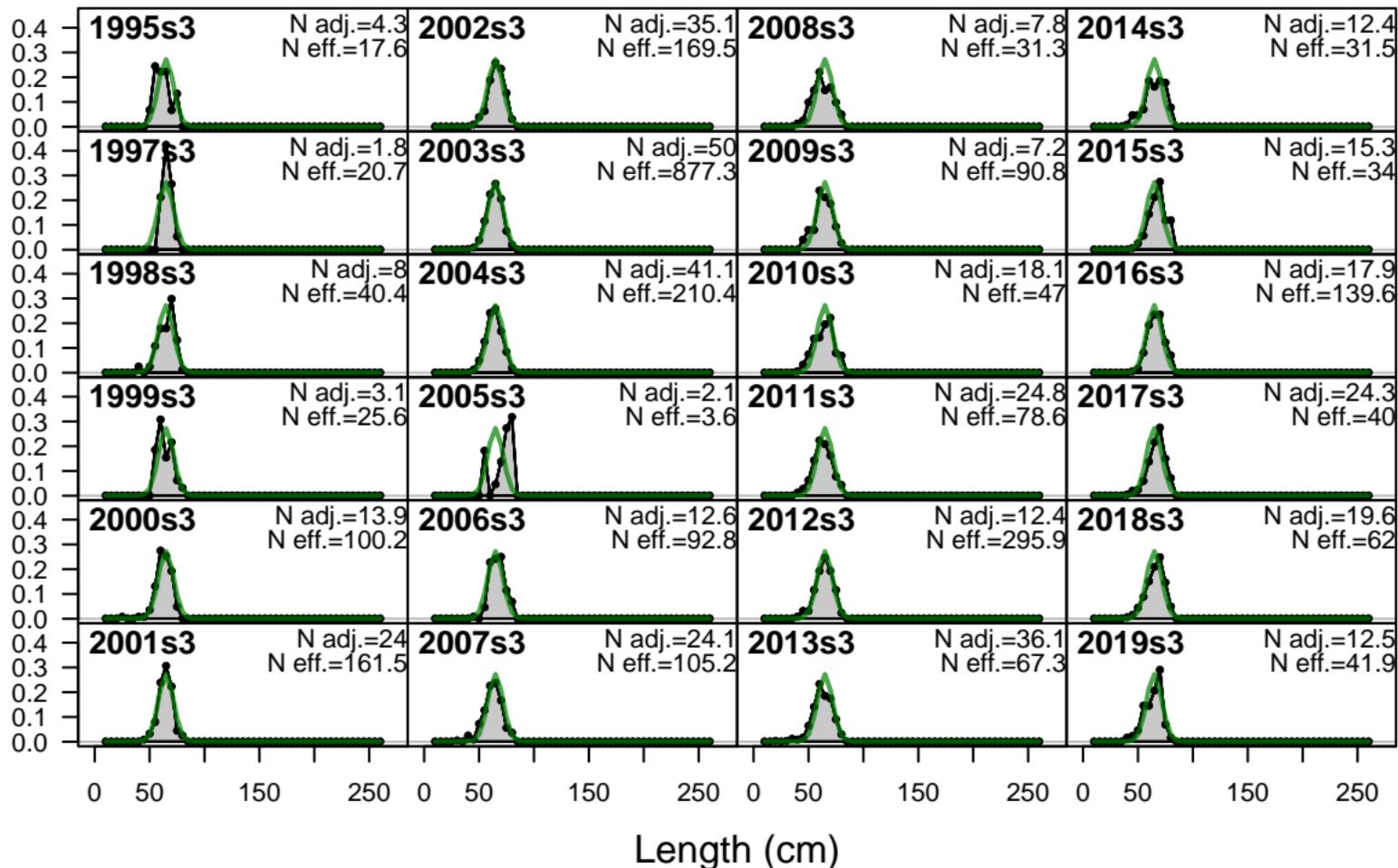
Effective sample size



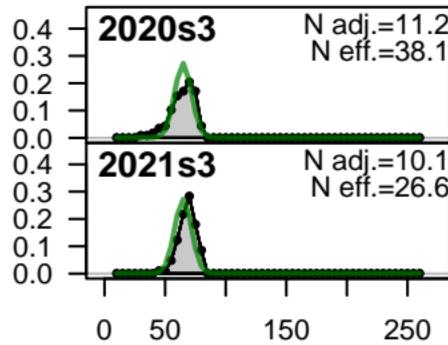
F9_US_WCNPO_LL_deep_Q12 (whole catch)

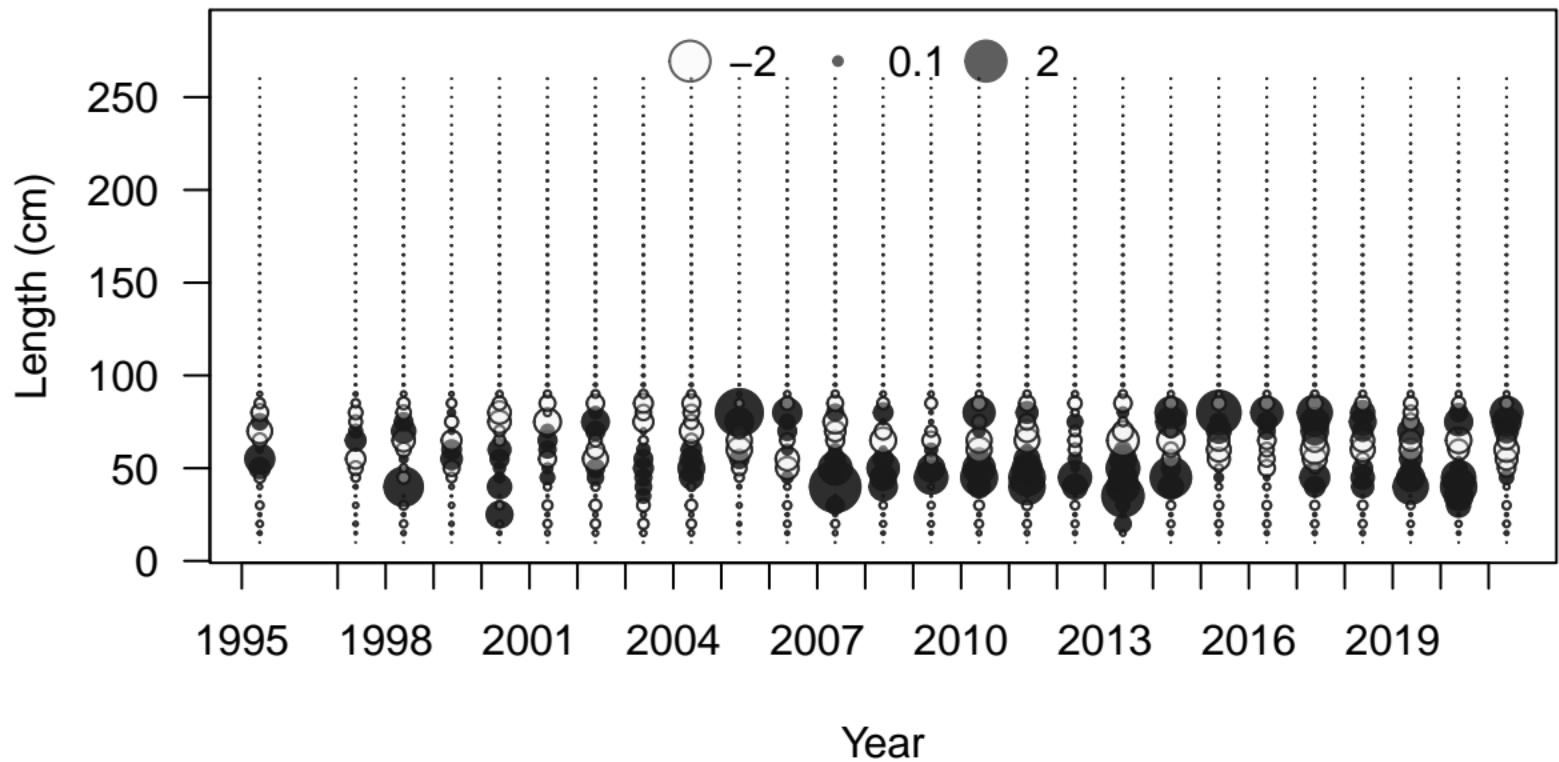


Proportion

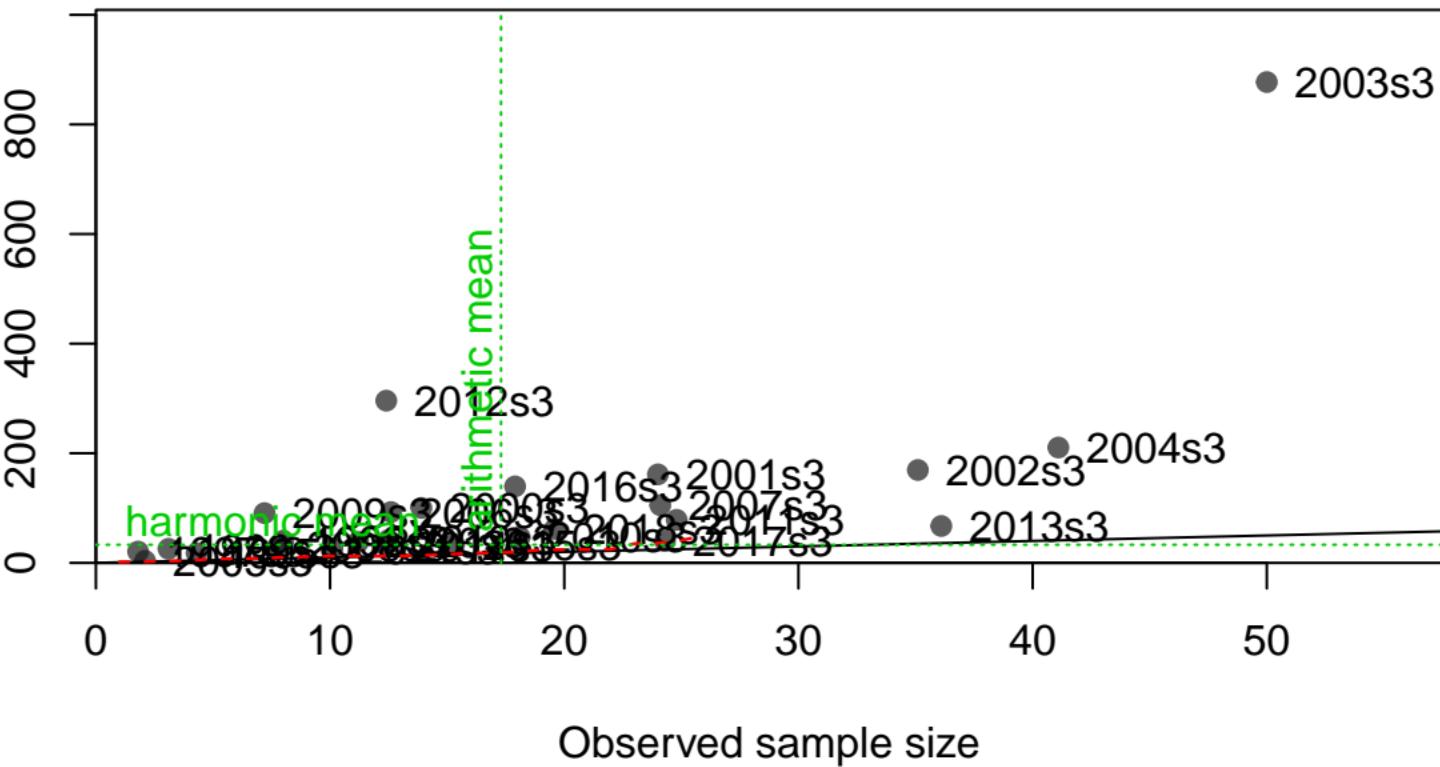


Proportion

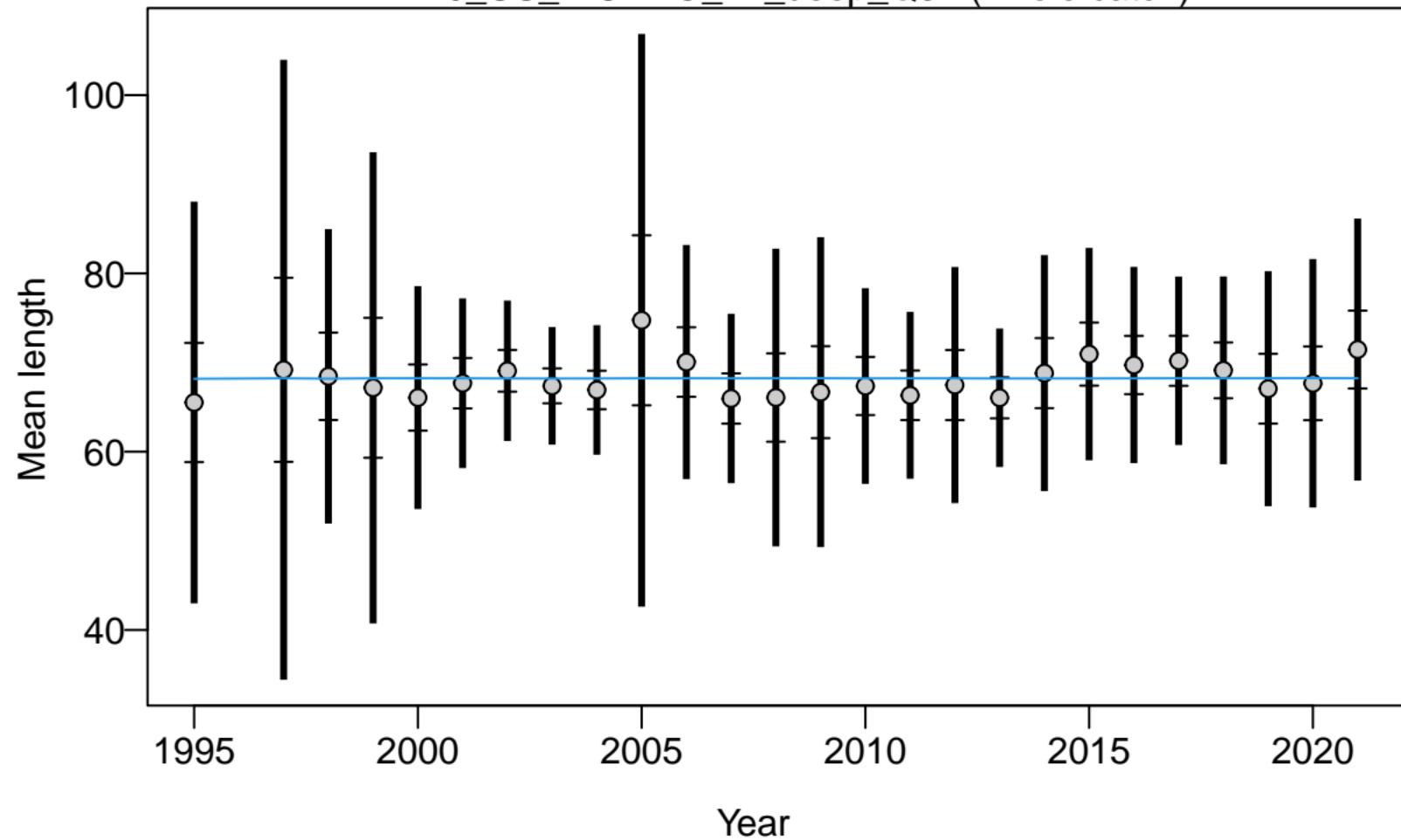




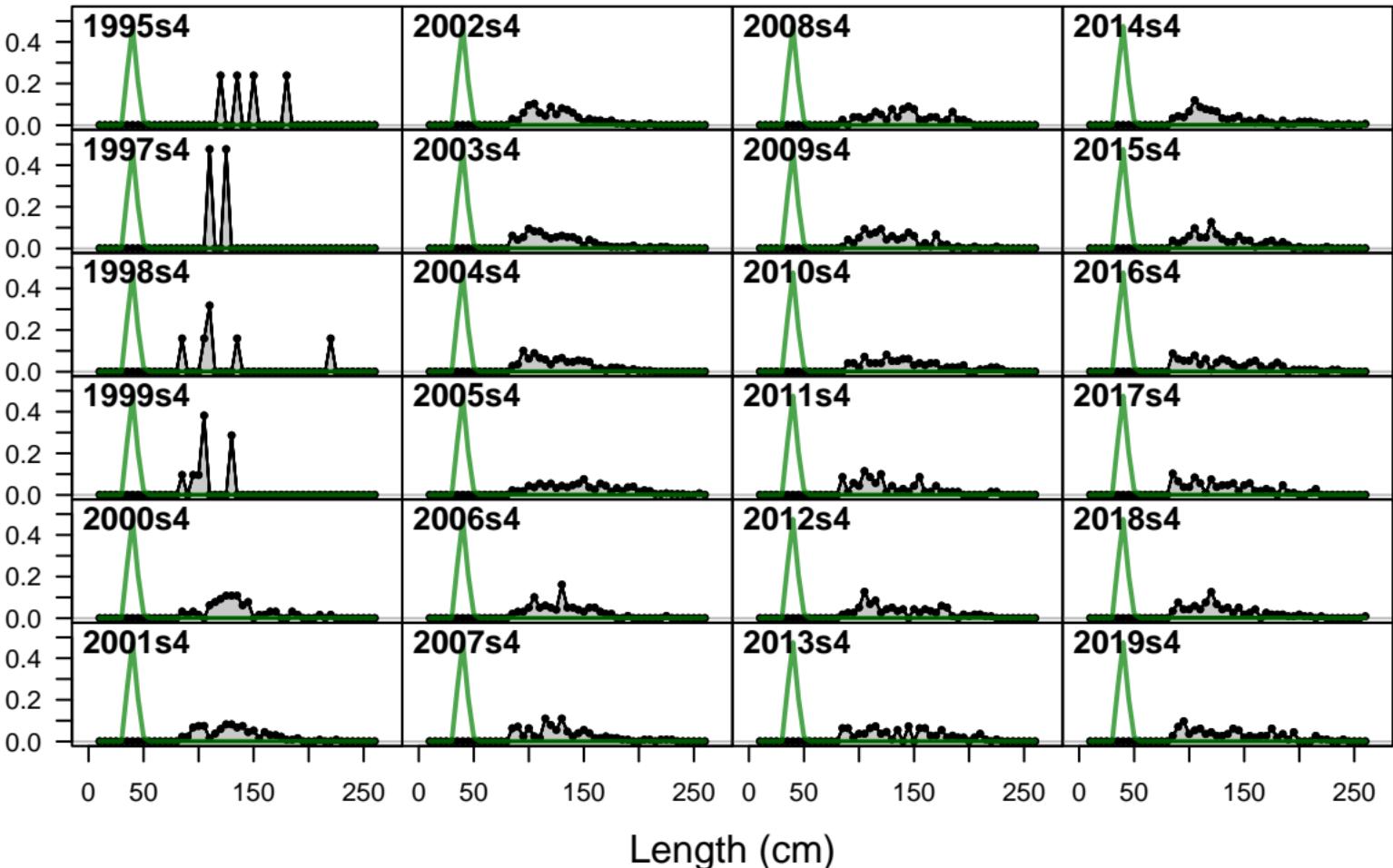
Effective sample size



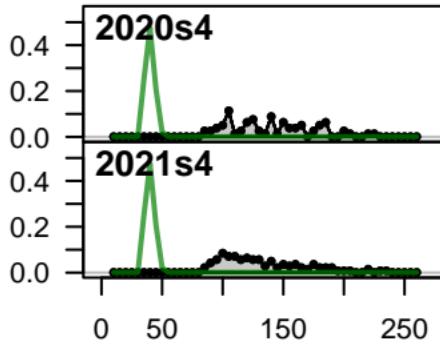
F20_US_WCNPO_LL_deep_Q34 (whole catch)



Proportion

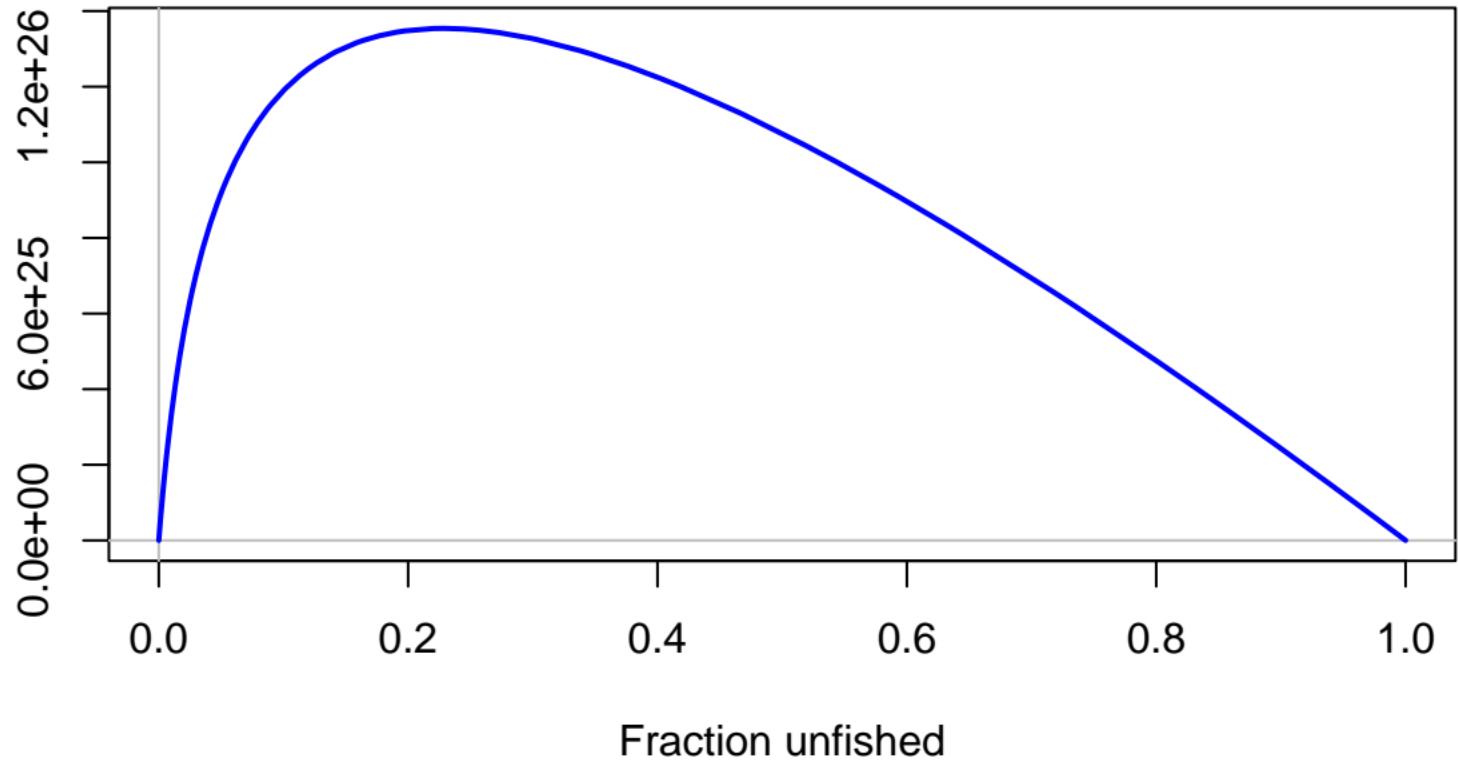


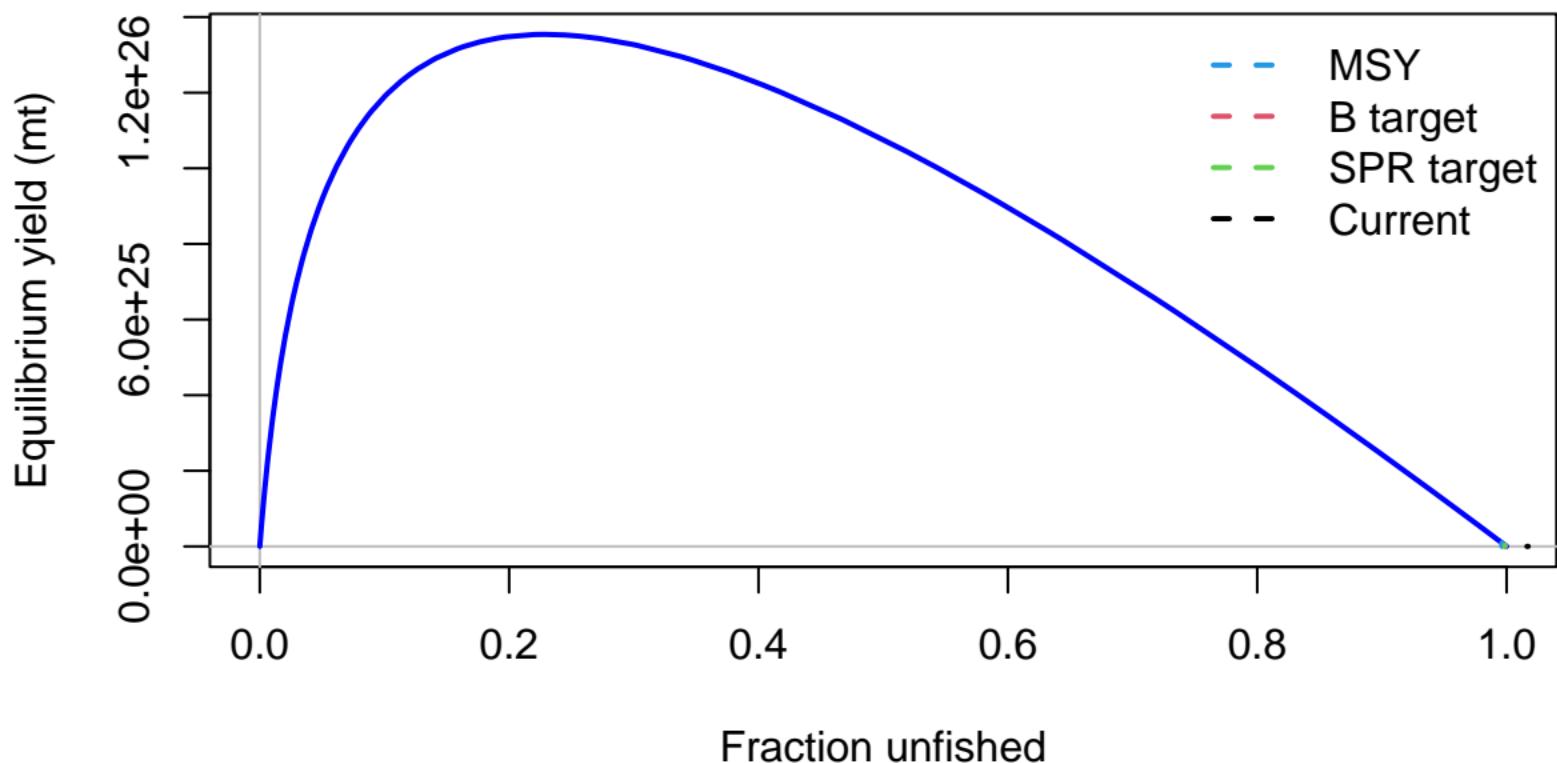
Proportion



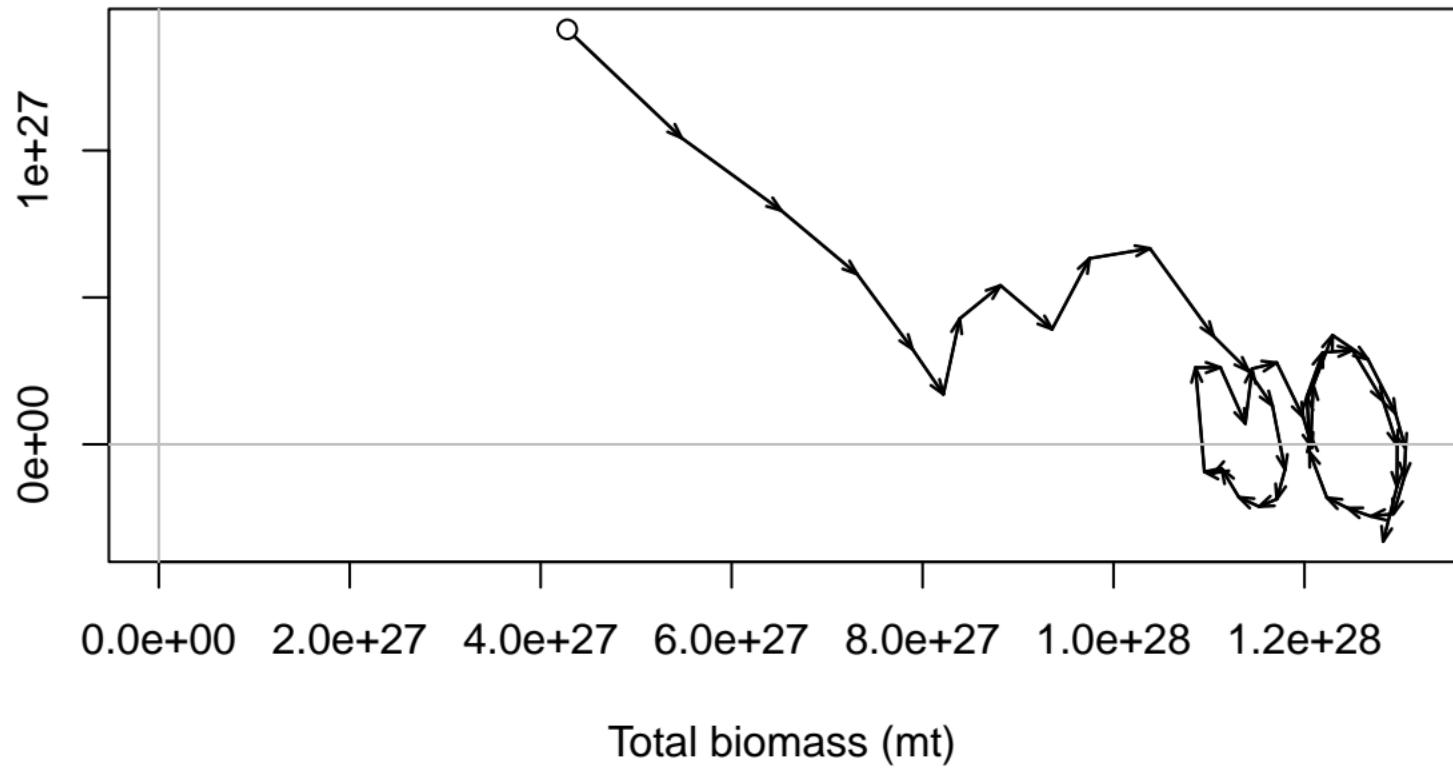
Length (cm)

Equilibrium yield (mt)





Surplus production (mt)



Yield per recruit (kg)

1.0e+20

0.0e+00

1980

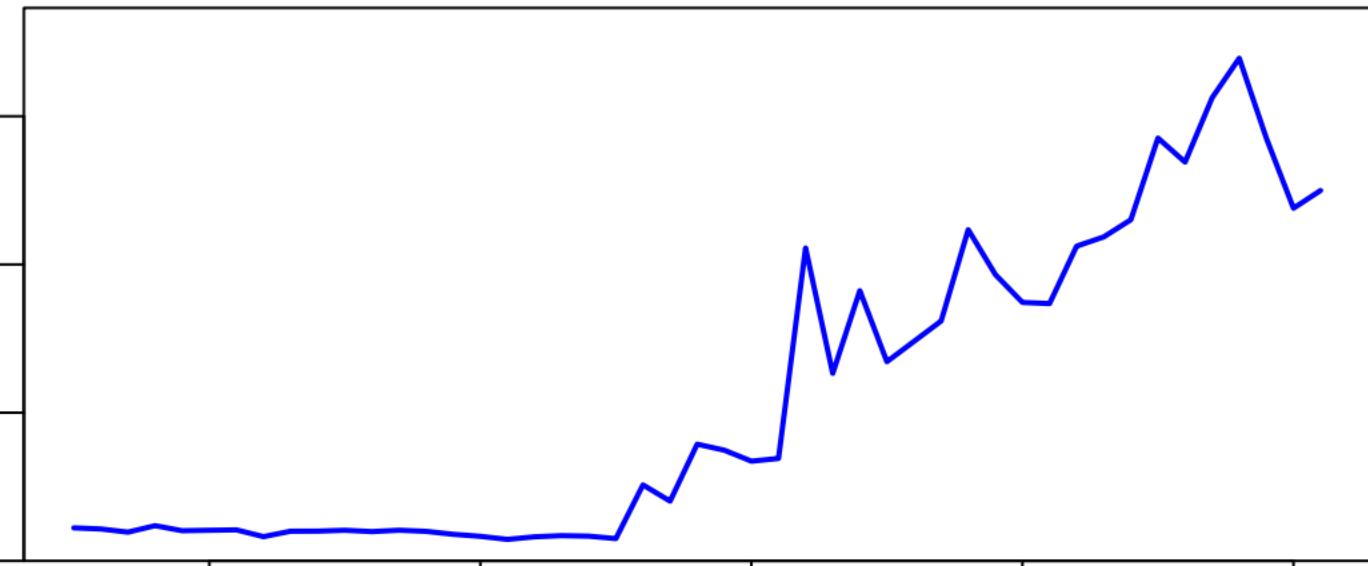
1990

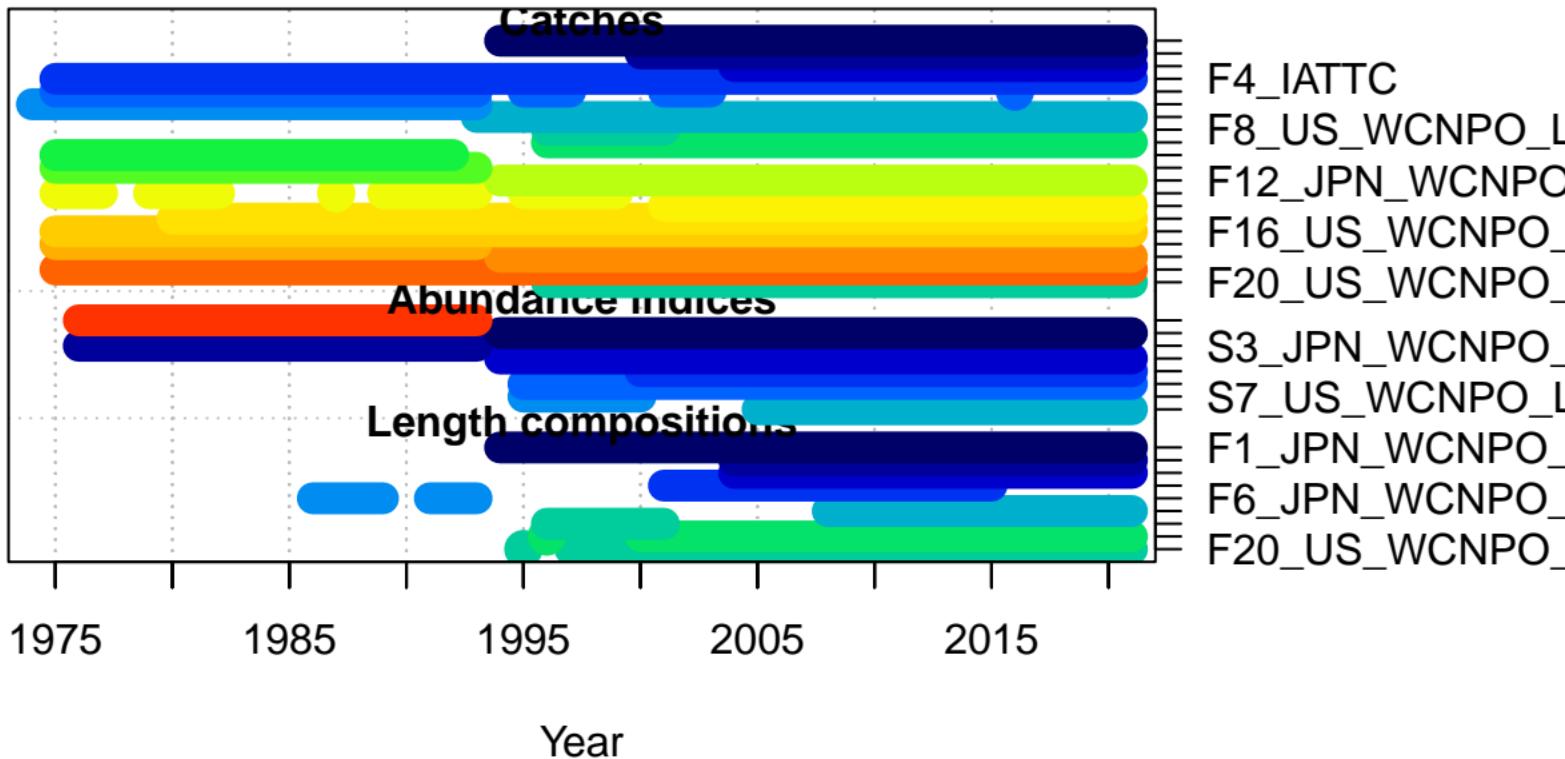
2000

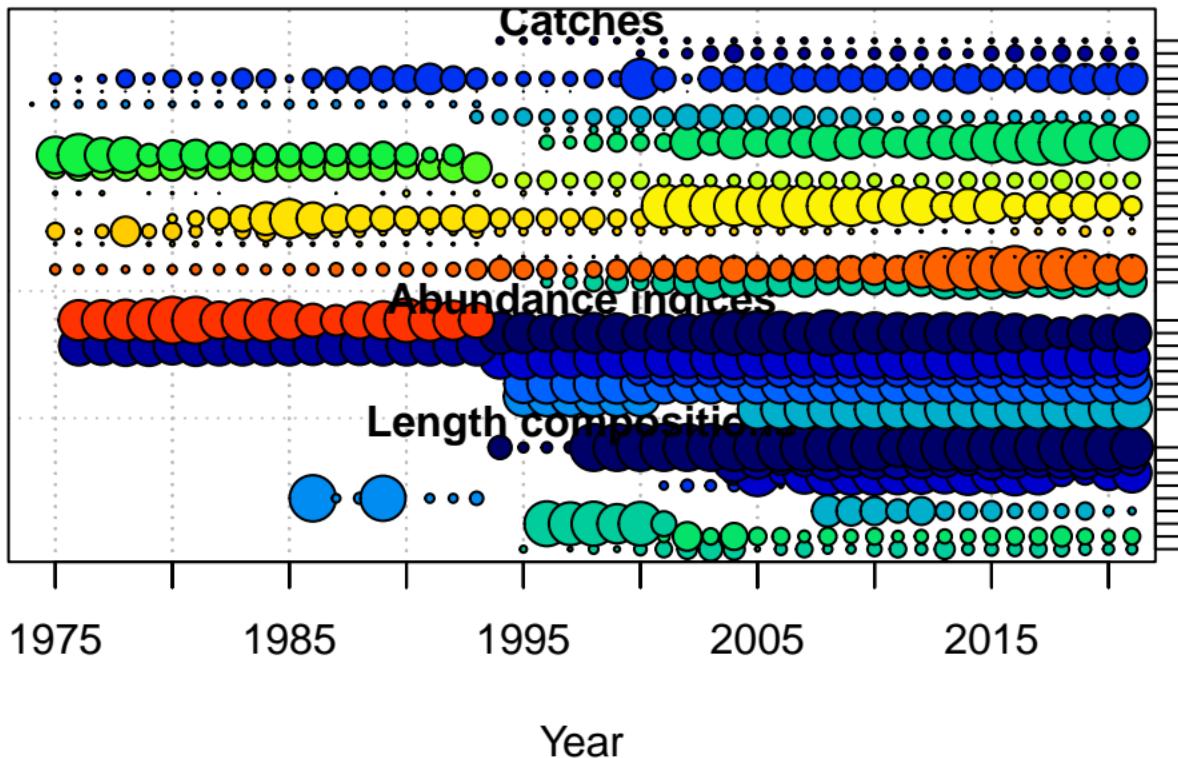
2010

2020

Year



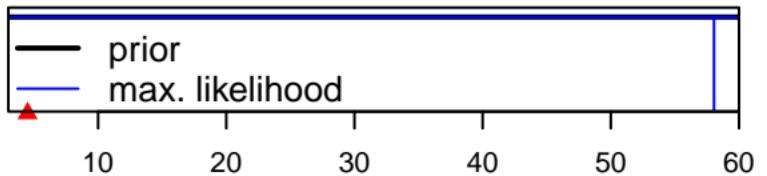




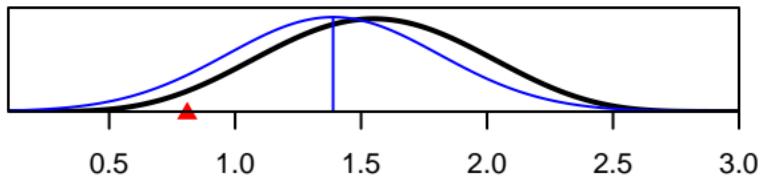
F4_IATTC
F8_US_WCNPO_L
F12_JPN_WCNPO
F16_US_WCNPO
F20_US_WCNPO
S3_JPN_WCNPO
S7_US_WCNPO_L
F1_JPN_WCNPO
F6_JPN_WCNPO
F20_US_WCNPO

Density

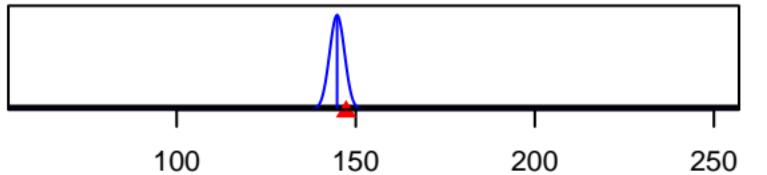
SR_LN(R0)



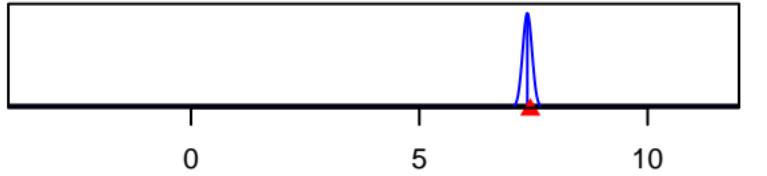
InitF_seas_1_flt_6F6_JPN_WCNPO_OSDWLL_early_Area1



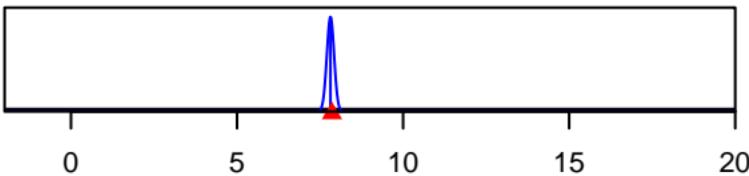
Size_DbIN_peak_F1_JPN_WCNPO_OSDWCOLL_late_Area1(



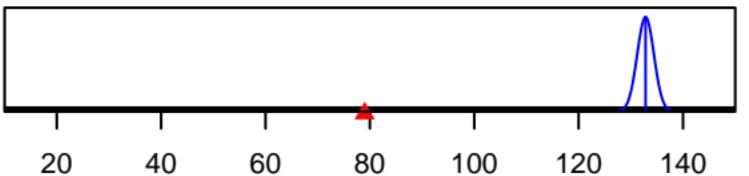
_DbIN_ascend_se_F1_JPN_WCNPO_OSDWCOLL_late_Are



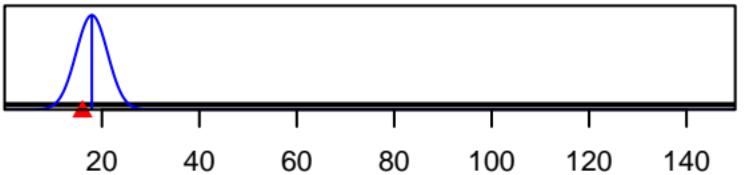
DbIN_descend_se_F1_JPN_WCNPO_OSDWCOLL_late_Are



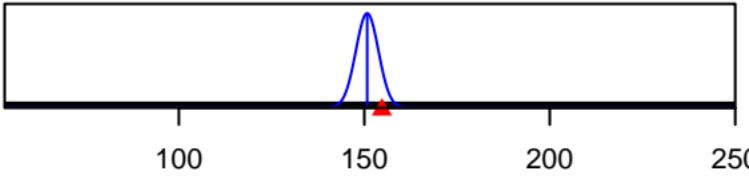
Size_inflection_F2_TWN_WCNPO_DWLL_late(2)



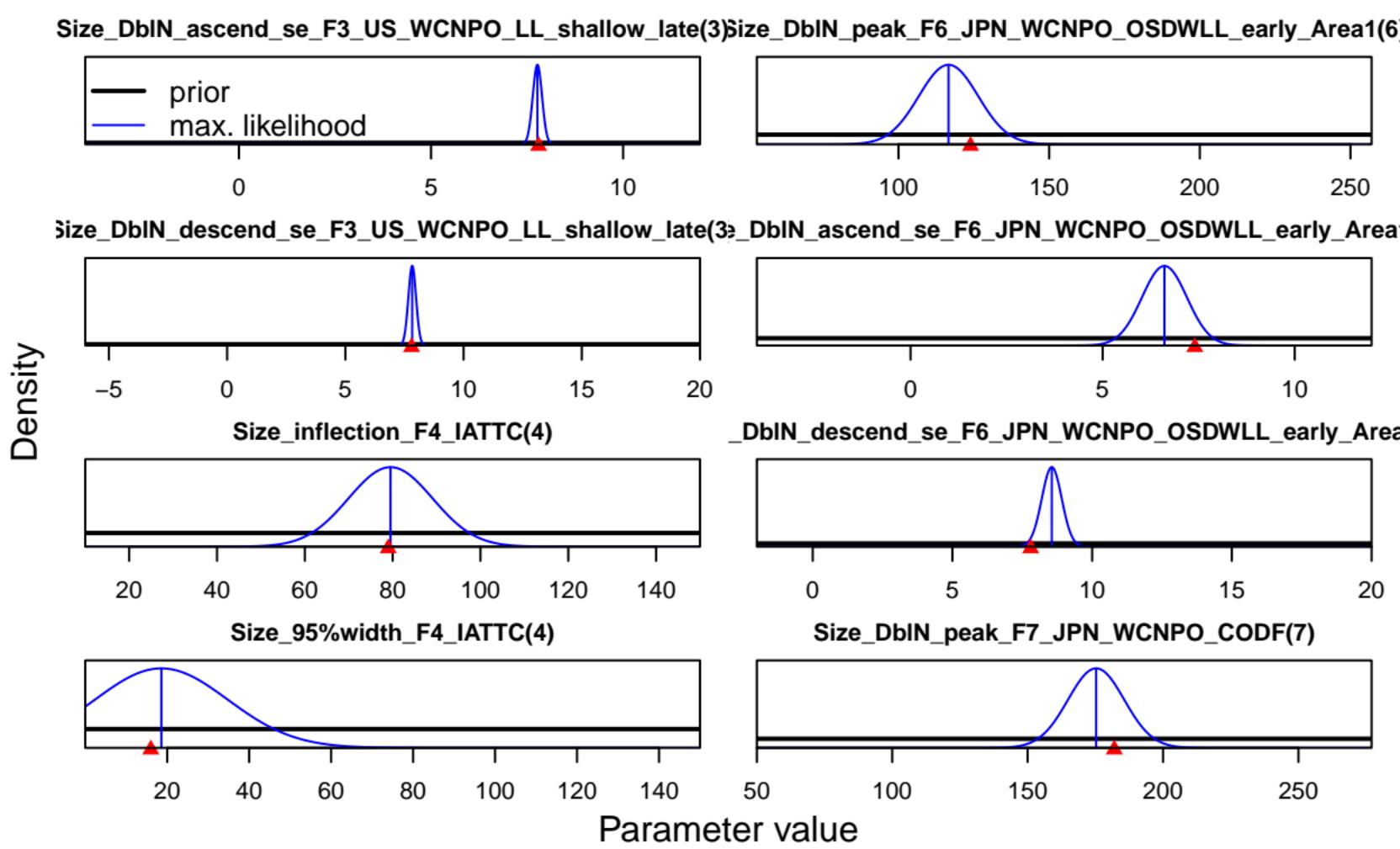
Size_95%width_F2_TWN_WCNPO_DWLL_late(2)



Size_DbIN_peak_F3_US_WCNPO_LL_shallow_late(3)

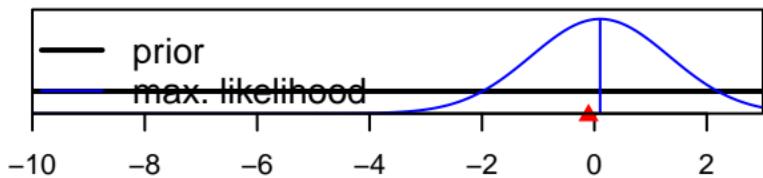


Parameter value

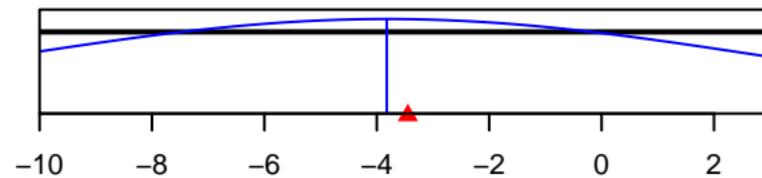


Density

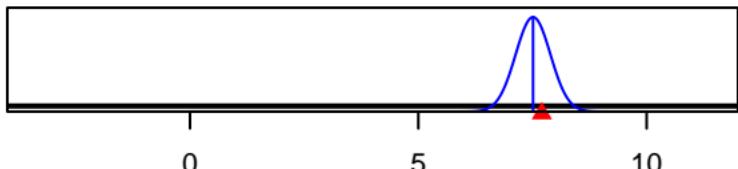
Size_DbIN_top_logit_F7_JPN_WCNPO_CODF(7)



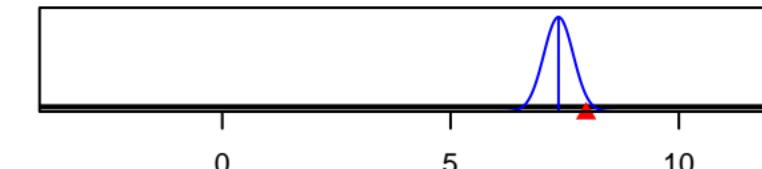
Size_DbIN_top_logit_F8_US_WCNPO_LL_shallow_early(8)



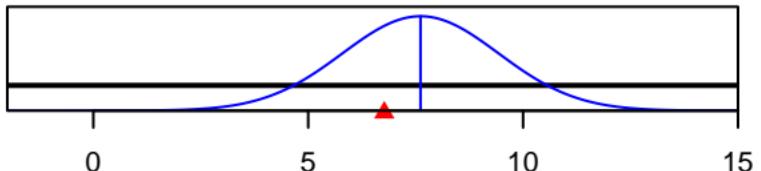
Size_DbIN_ascend_se_F7_JPN_WCNPO_CODF(7)



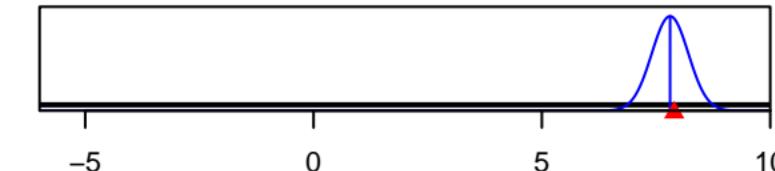
Size_DbIN_ascend_se_F8_US_WCNPO_LL_shallow_early(8)



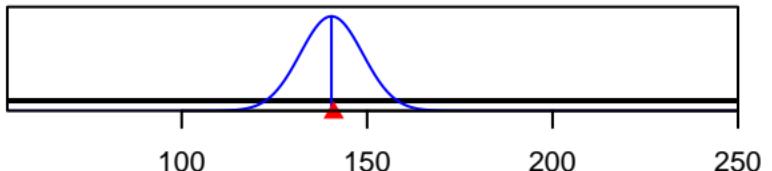
Size_DbIN_descend_se_F7_JPN_WCNPO_CODF(7)



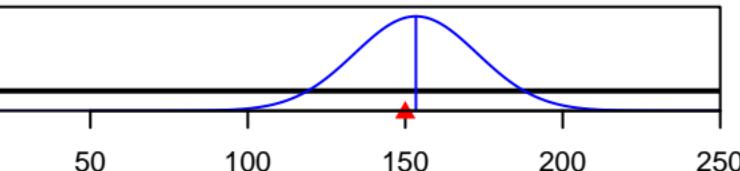
Size_DbIN_descend_se_F8_US_WCNPO_LL_shallow_early(8)



Size_DbIN_peak_F8_US_WCNPO_LL_shallow_early(8)

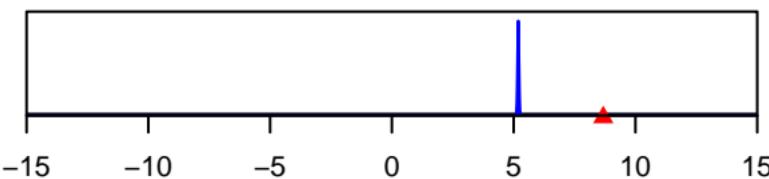
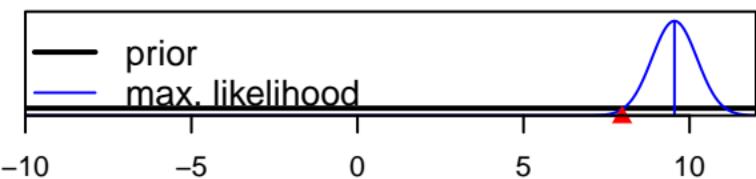


Size_DbIN_peak_F9_US_WCNPO_LL_deep_Q12(9)

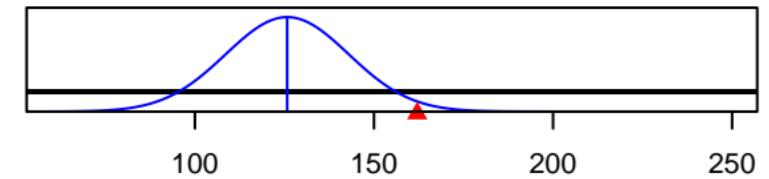
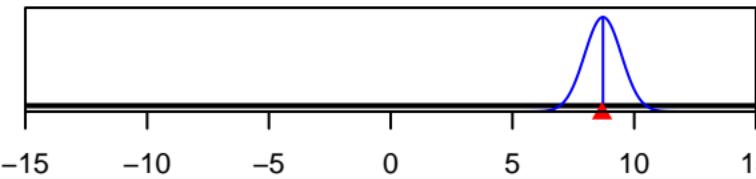


Parameter value

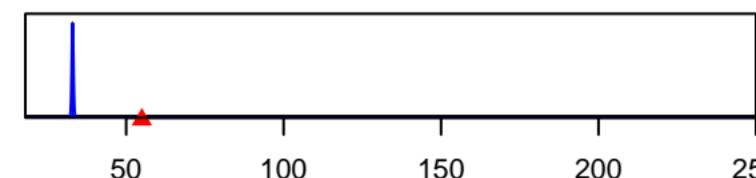
Size_DbIN_ascend_se_F9_US_WCNPO_LL_deep_Q12(9) Size_DbIN_descend_se_F20_US_WCNPO_LL_deep_Q34(28)



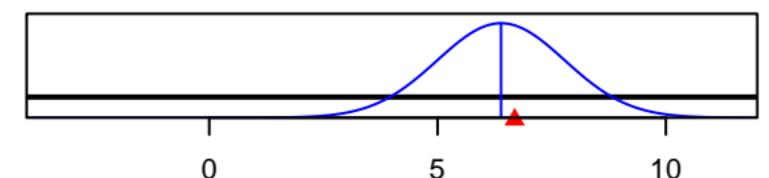
Size_DbIN_descend_se_F9_US_WCNPO_LL_deep_Q12(9) l_peak_F1_JPN_WCNPO OSDWCOLL_late_Area1(1)_BLK2



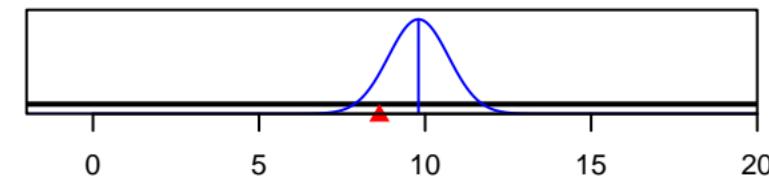
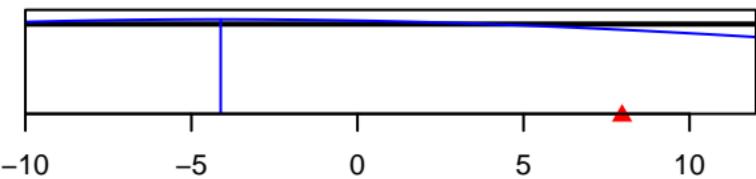
Size_DbIN_peak_F20_US_WCNPO_LL_deep_Q34(28)



scend_se_F1_JPN_WCNPO OSDWCOLL_late_Area1(1)_BL

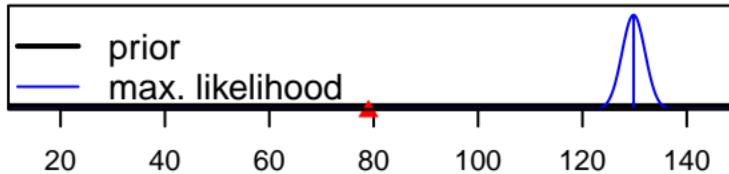


Size_DbIN_ascend_se_F20_US_WCNPO_LL_deep_Q34(28) scend_se_F1_JPN_WCNPO OSDWCOLL_late_Area1(1)_BL

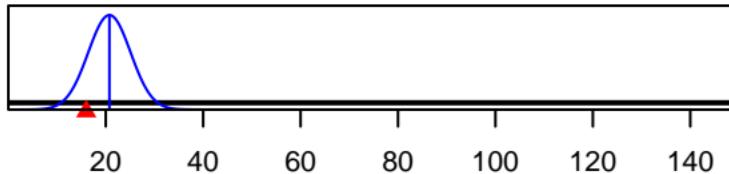


Parameter value

:e_inflection_F2_TWN_WCNPO_DWLL_late(2)_BLK1repl_20



:e_95%width_F2_TWN_WCNPO_DWLL_late(2)_BLK1repl_20



Density

Parameter value