

Plots created using the 'r4ss' package in R

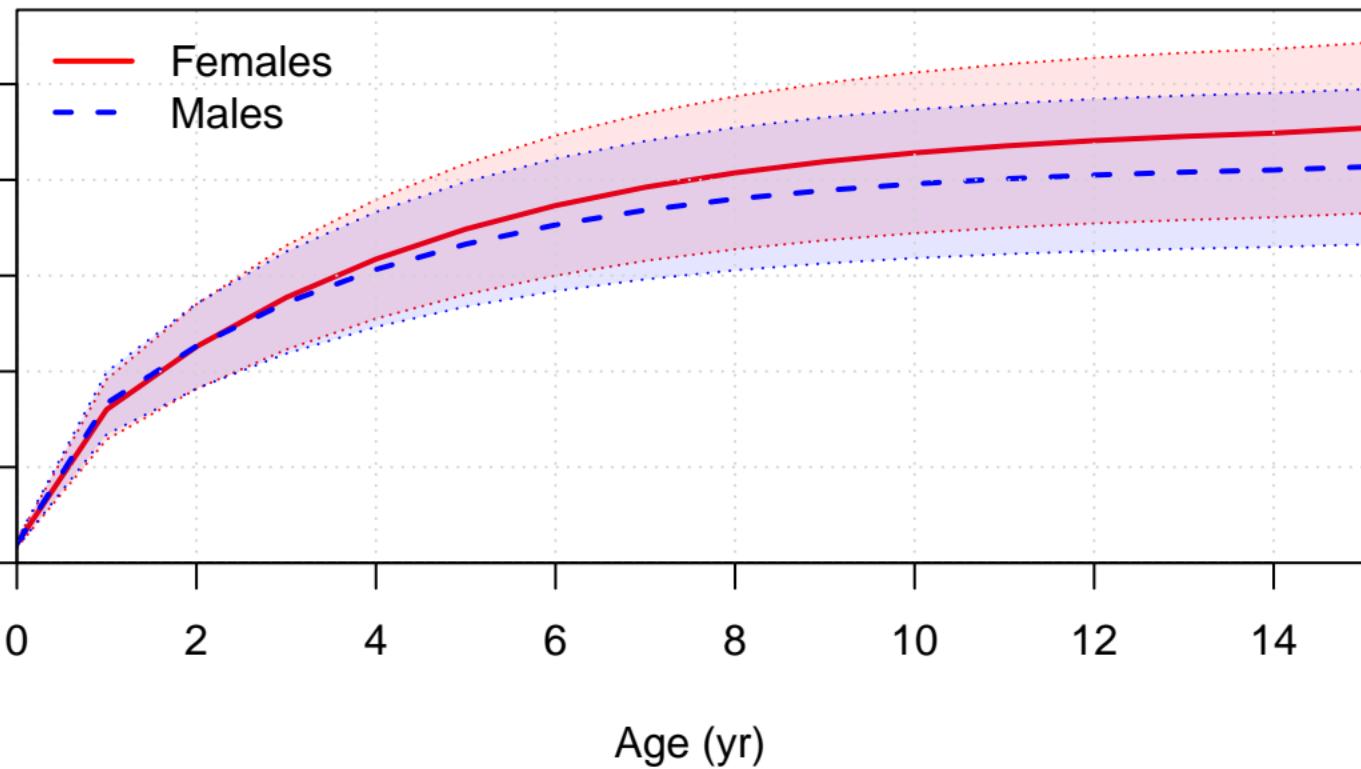
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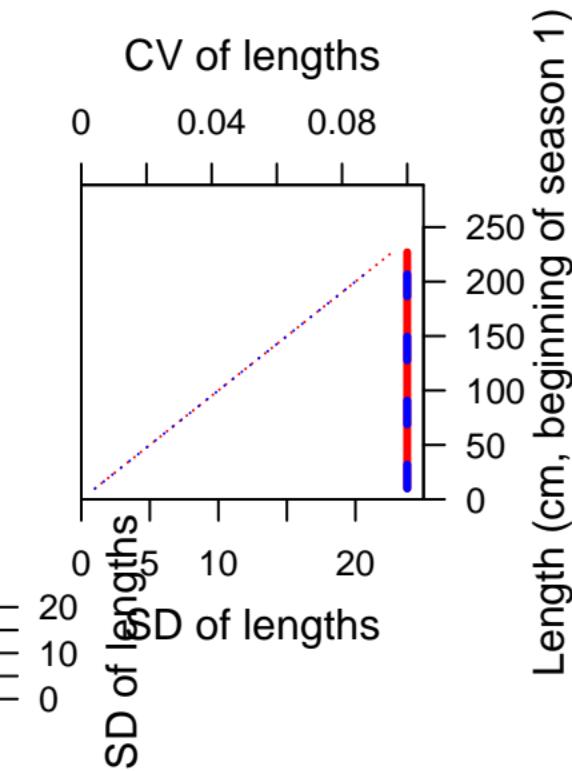
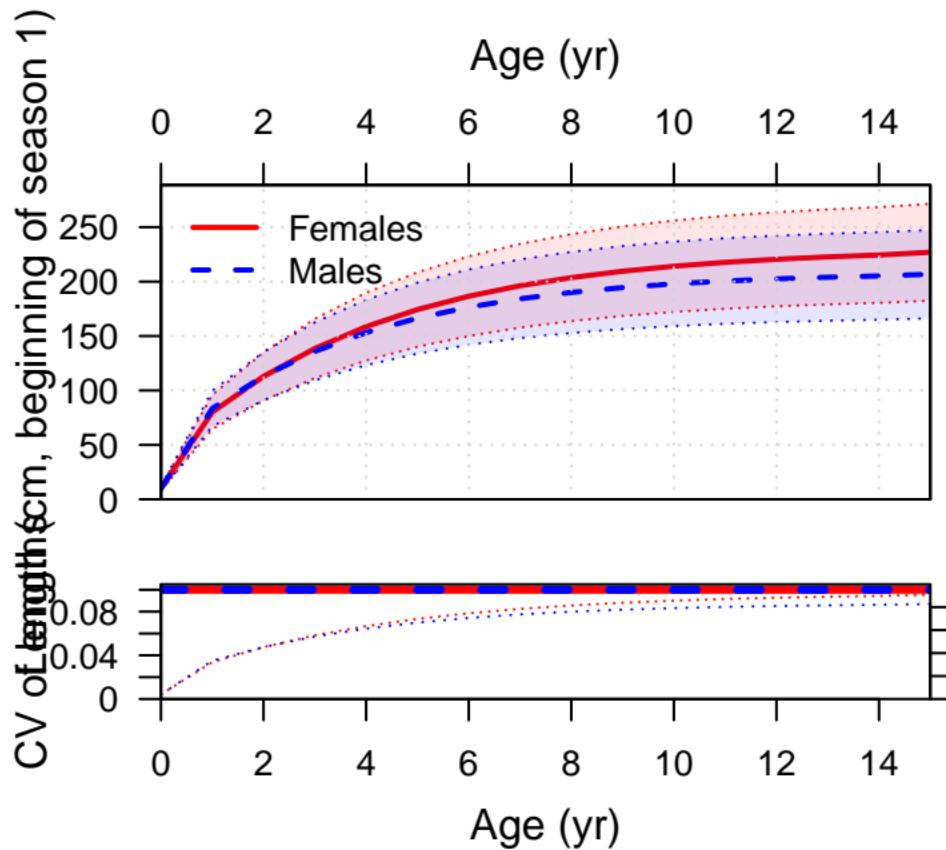
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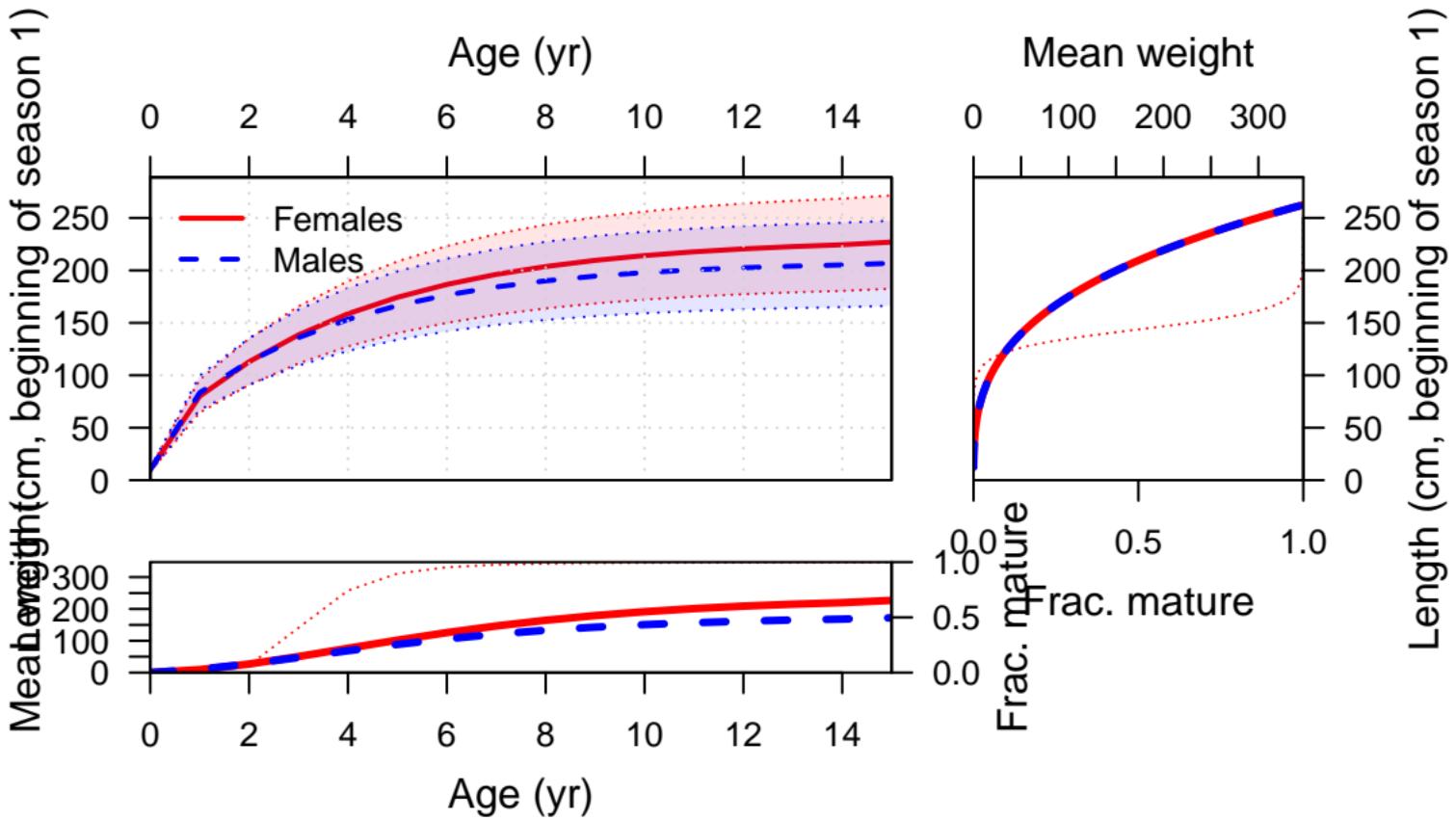
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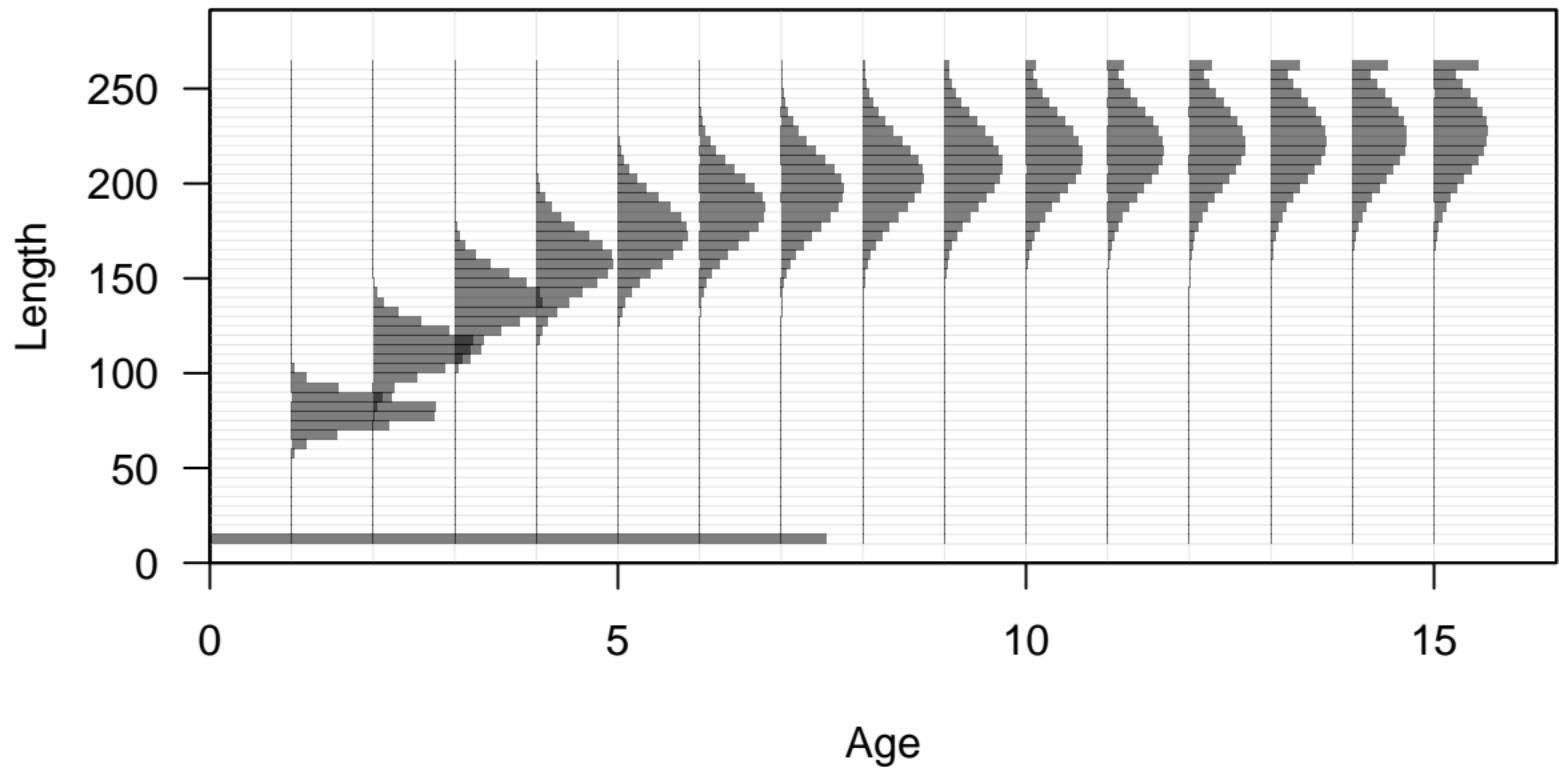
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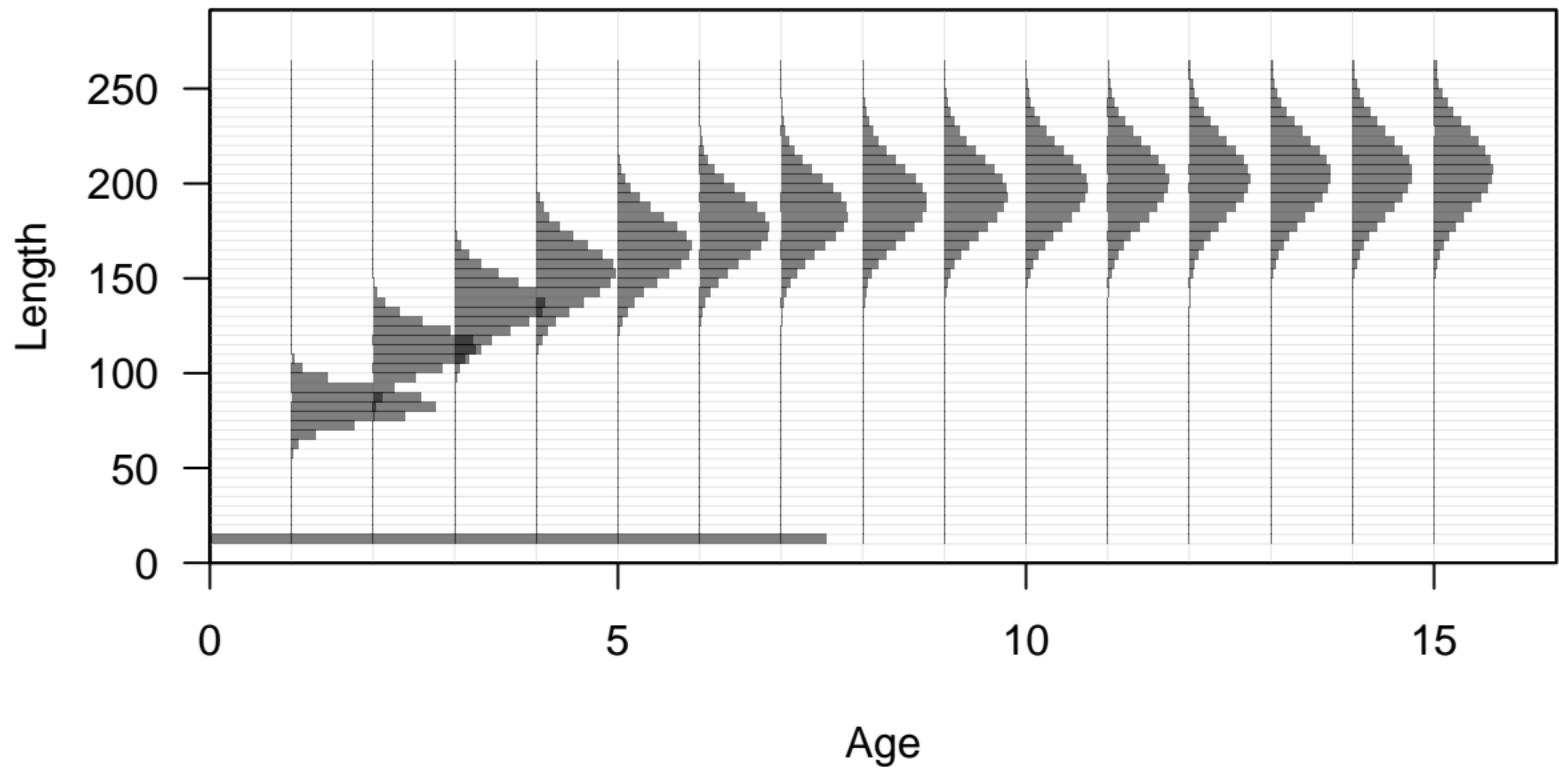
Length (cm, beginning of season 1)

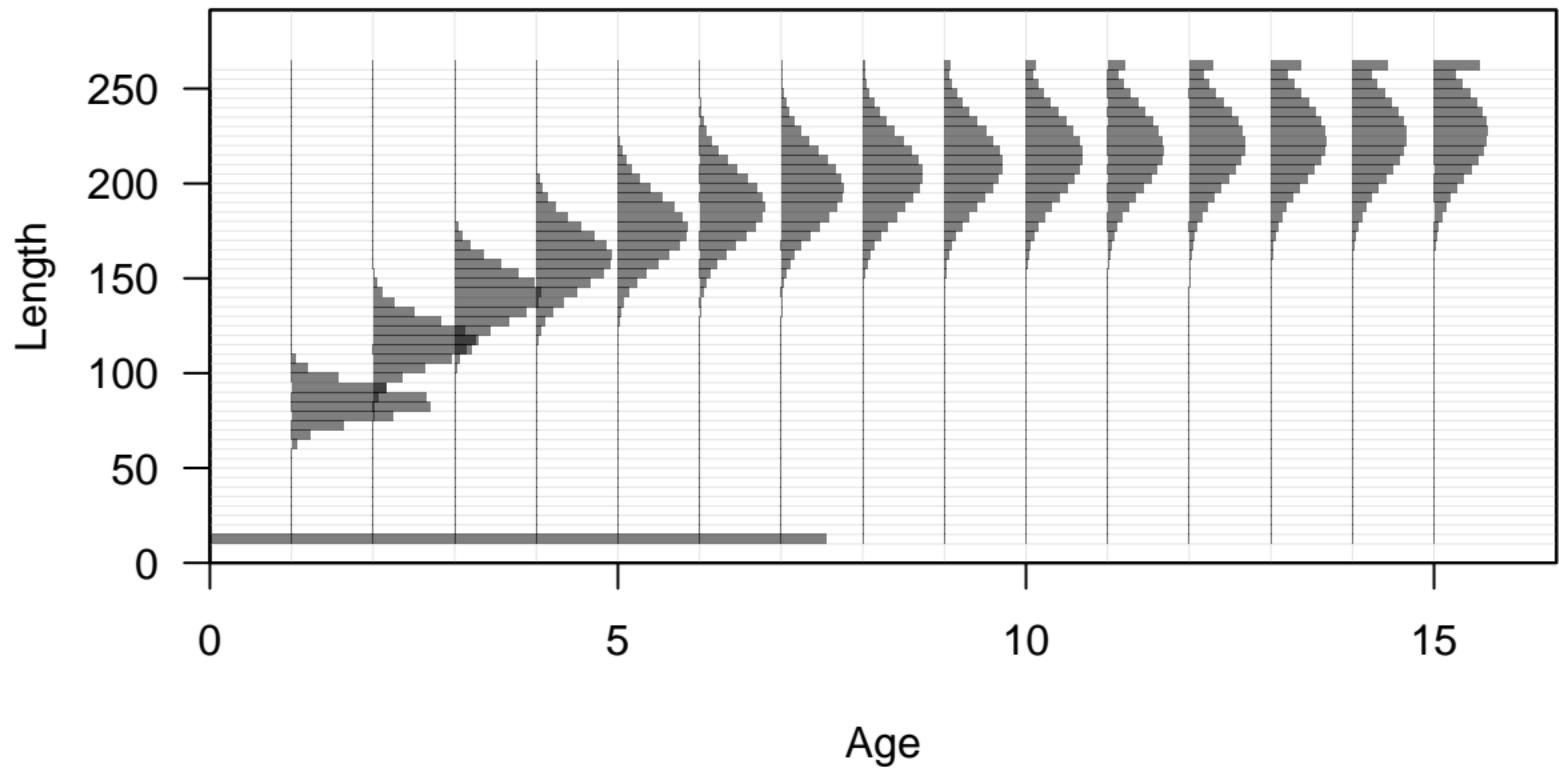


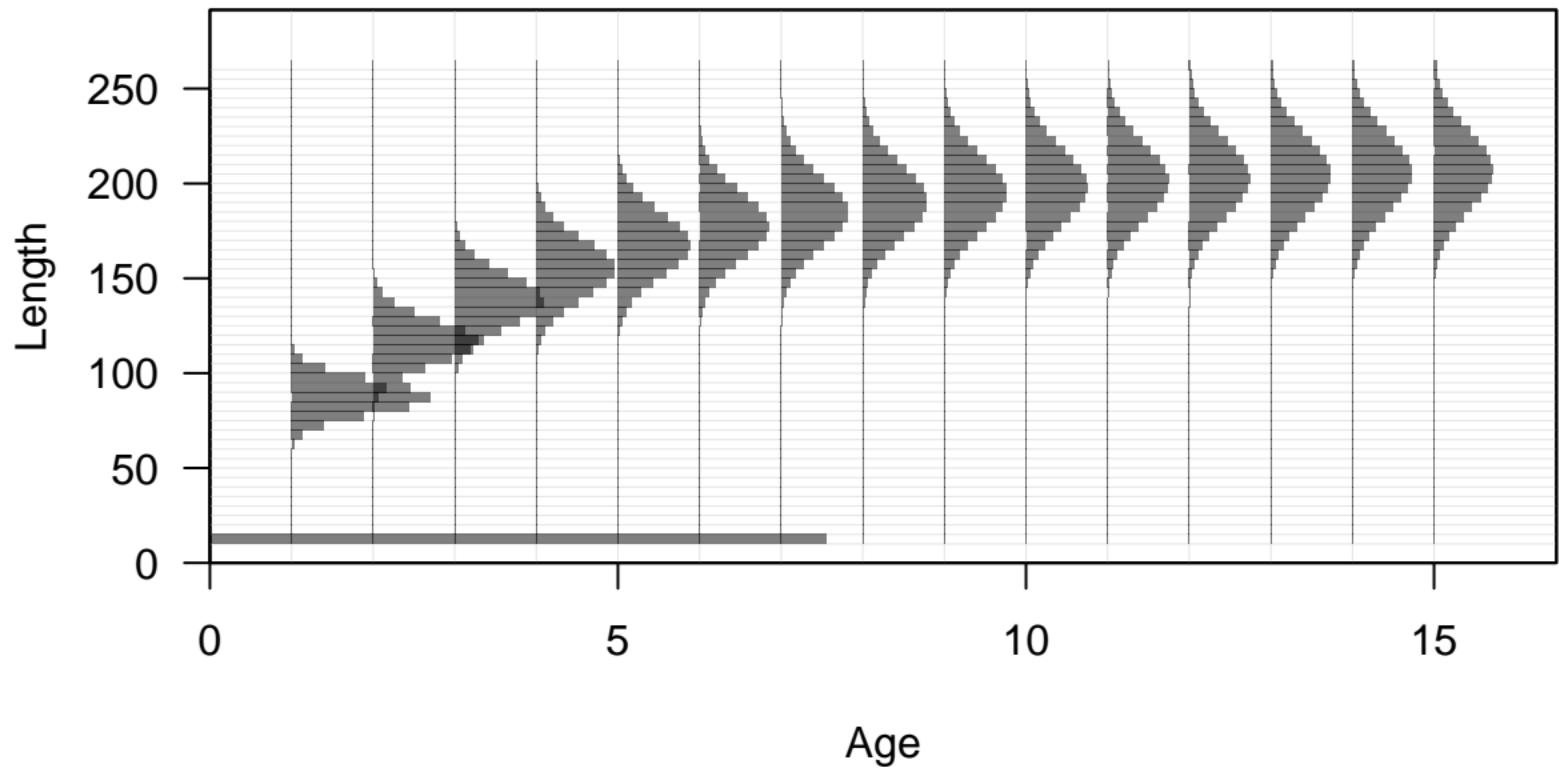


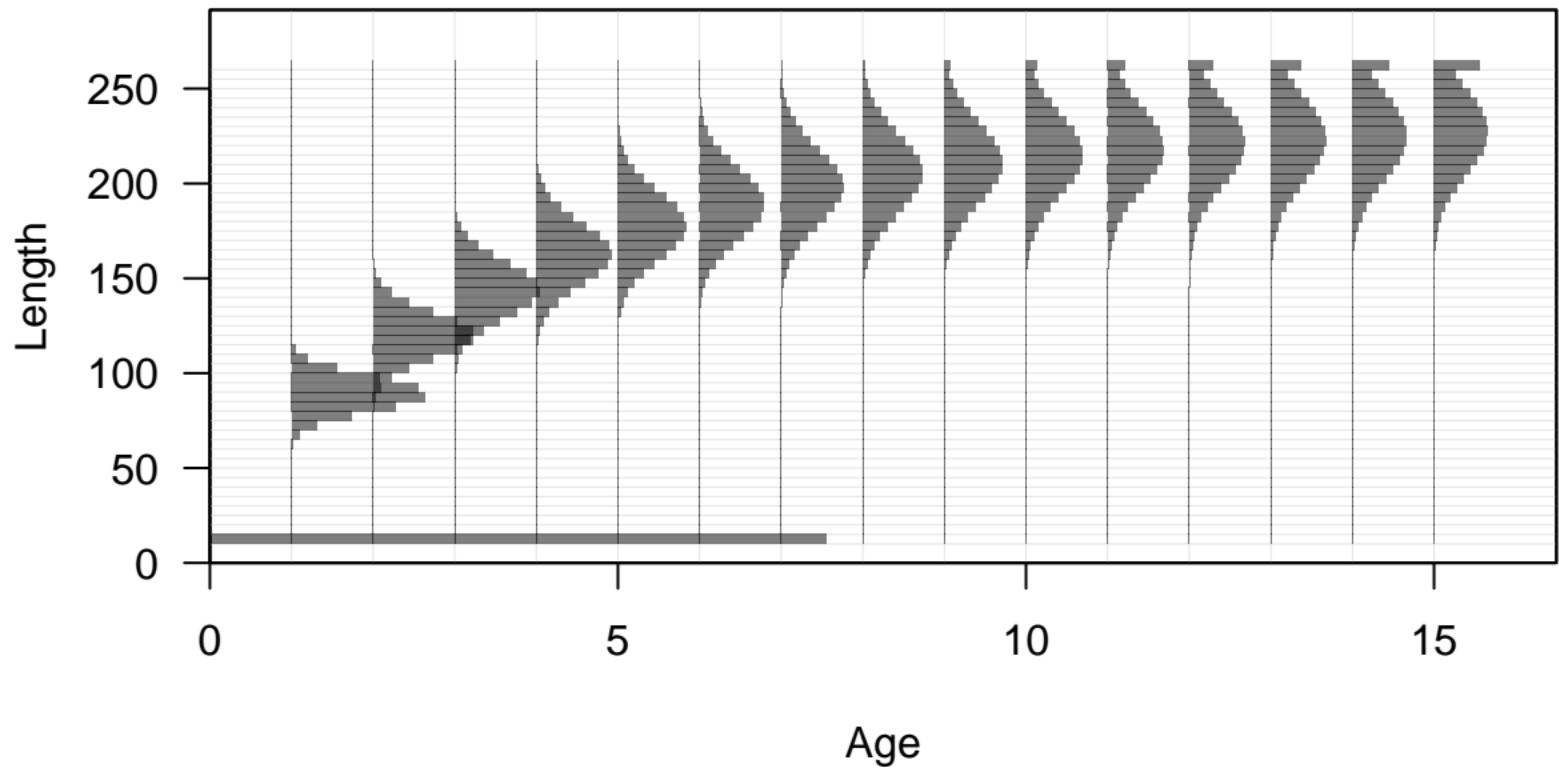


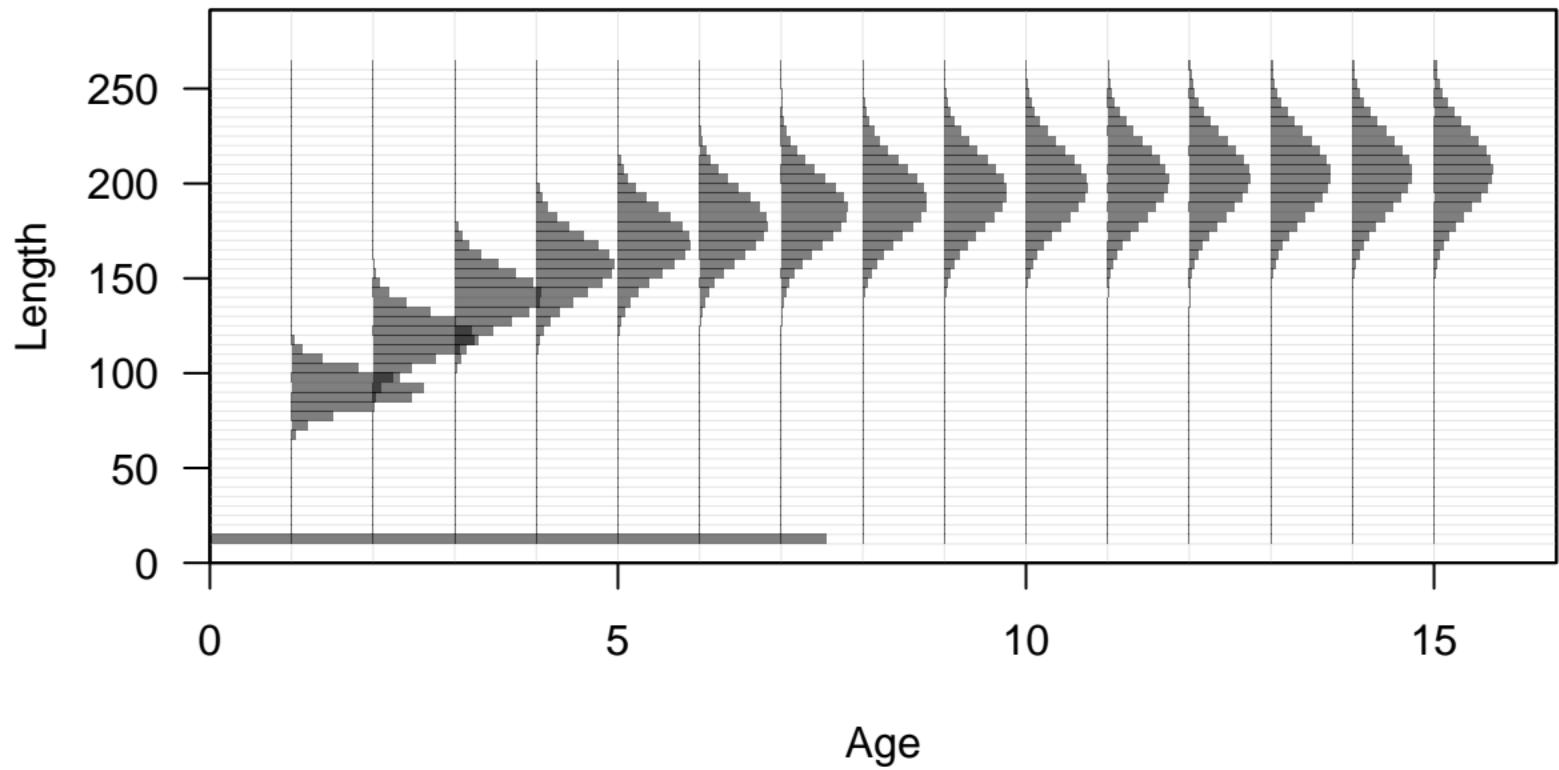


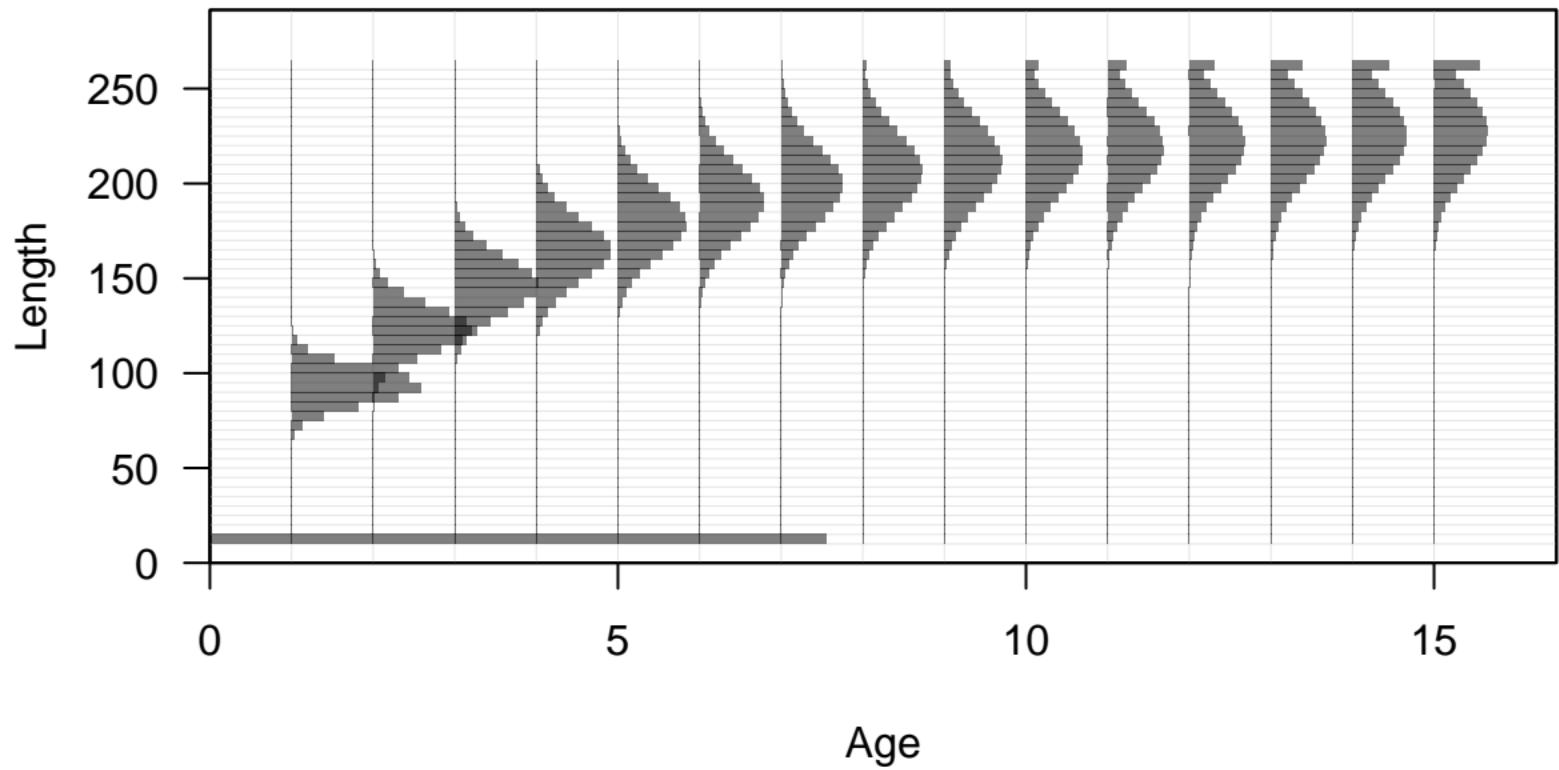


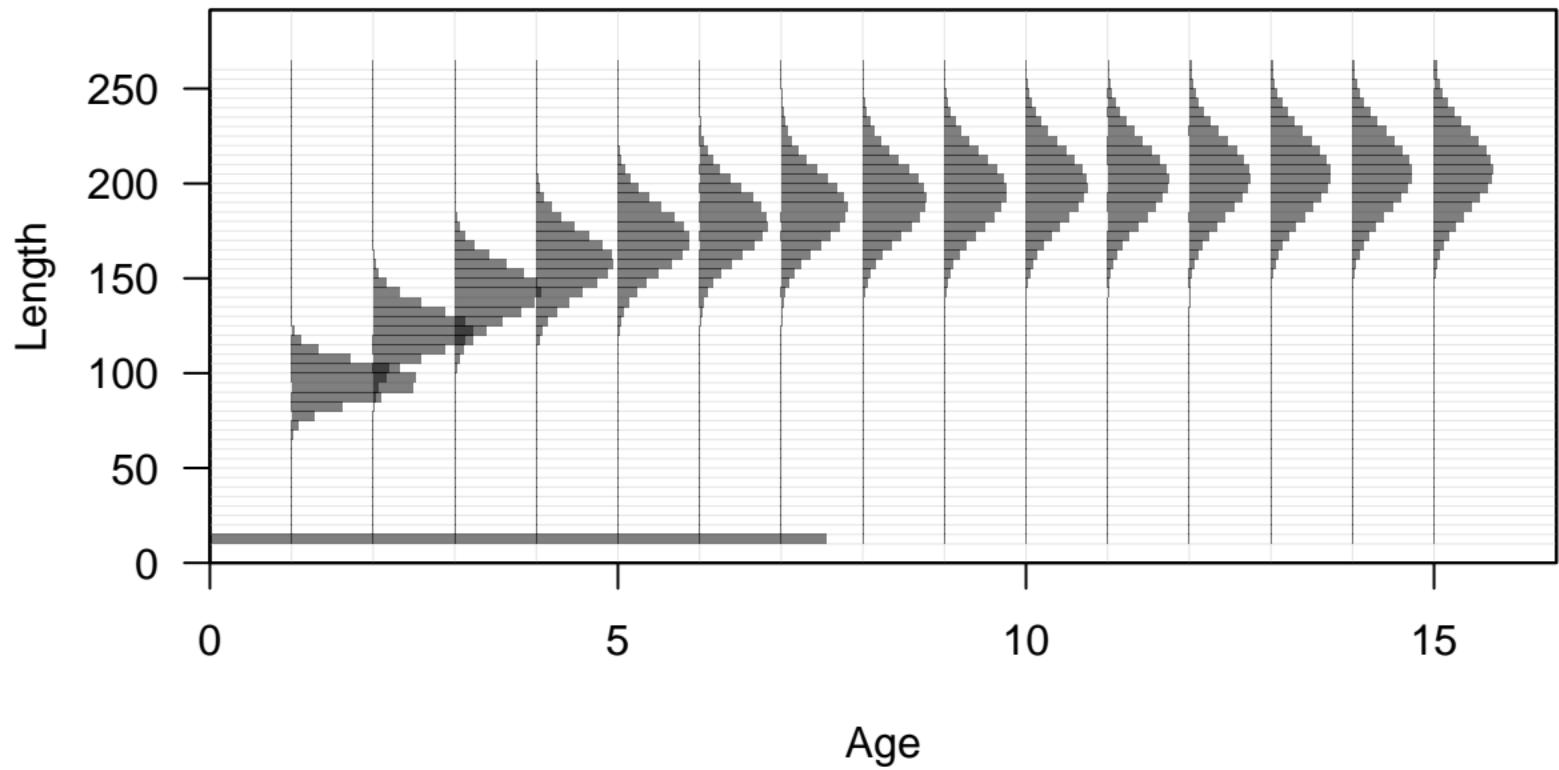


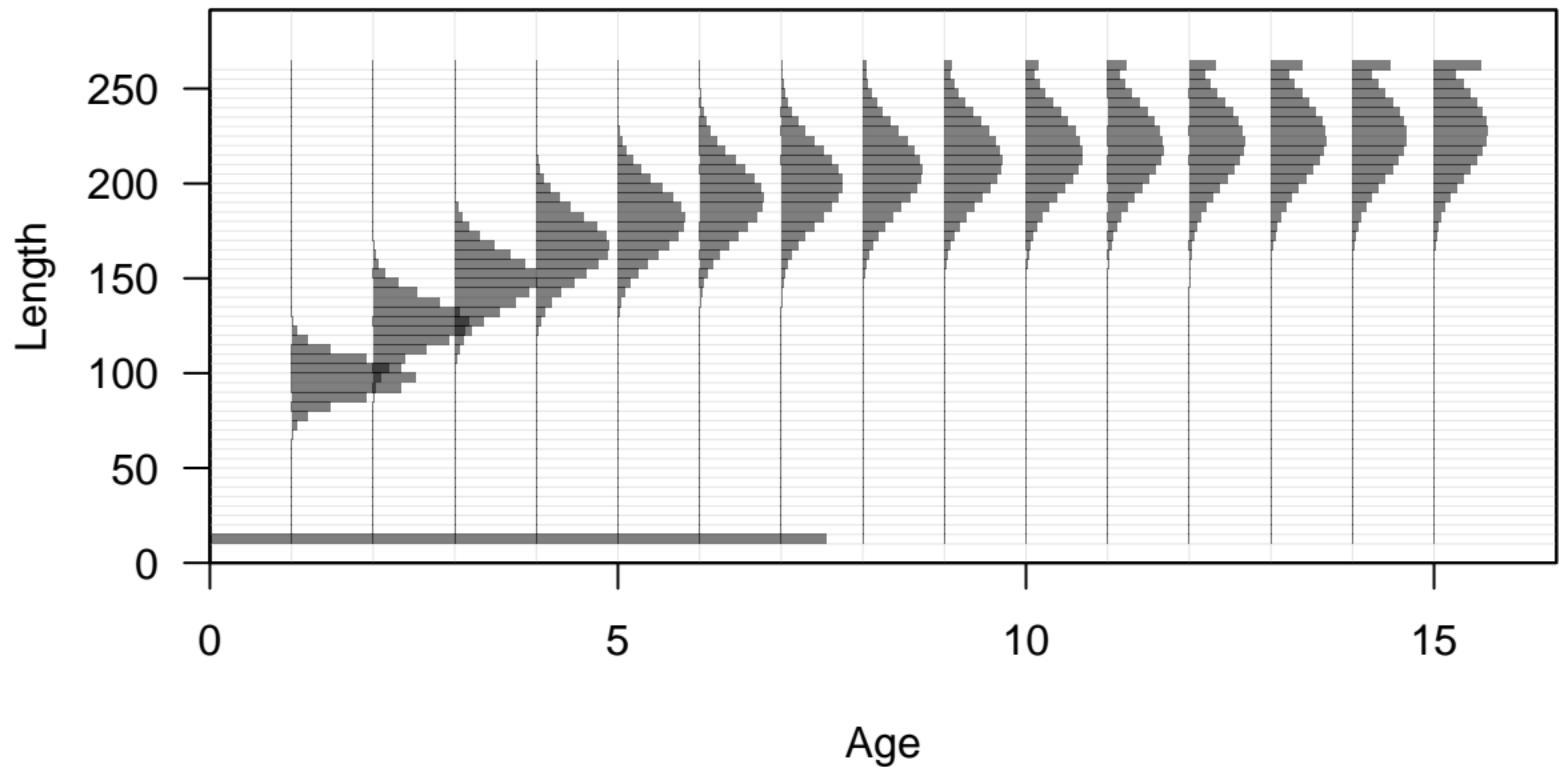


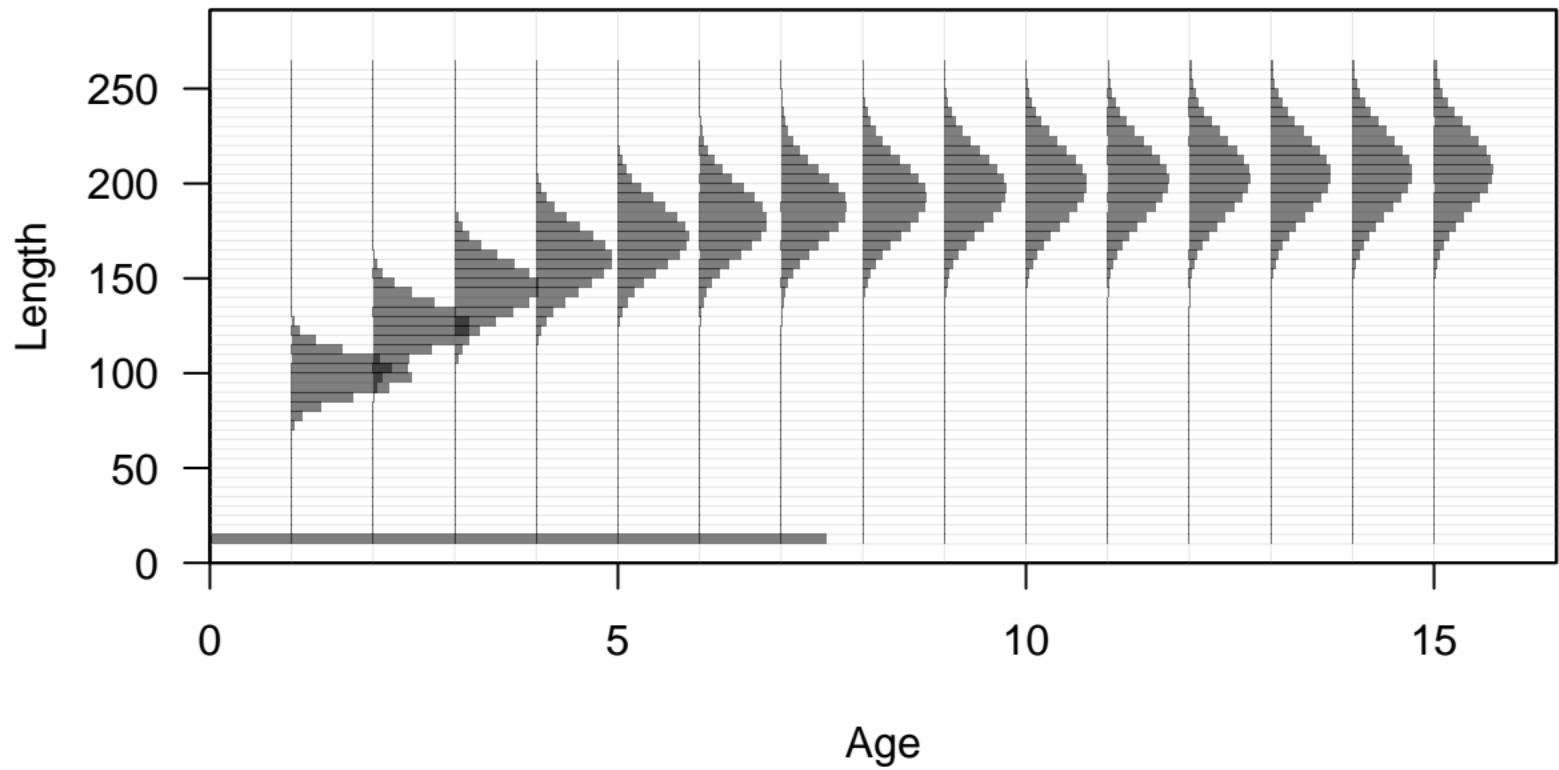


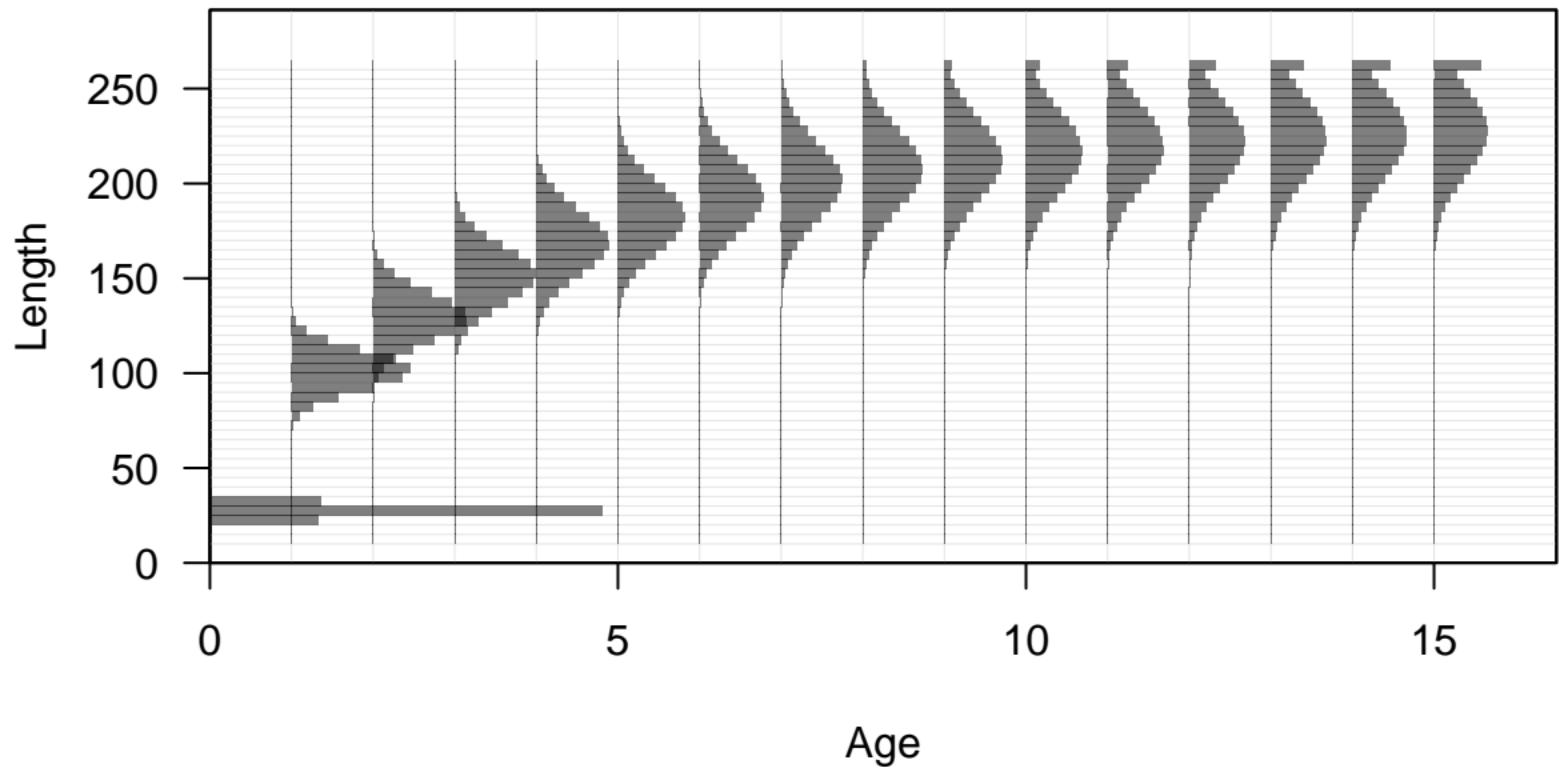


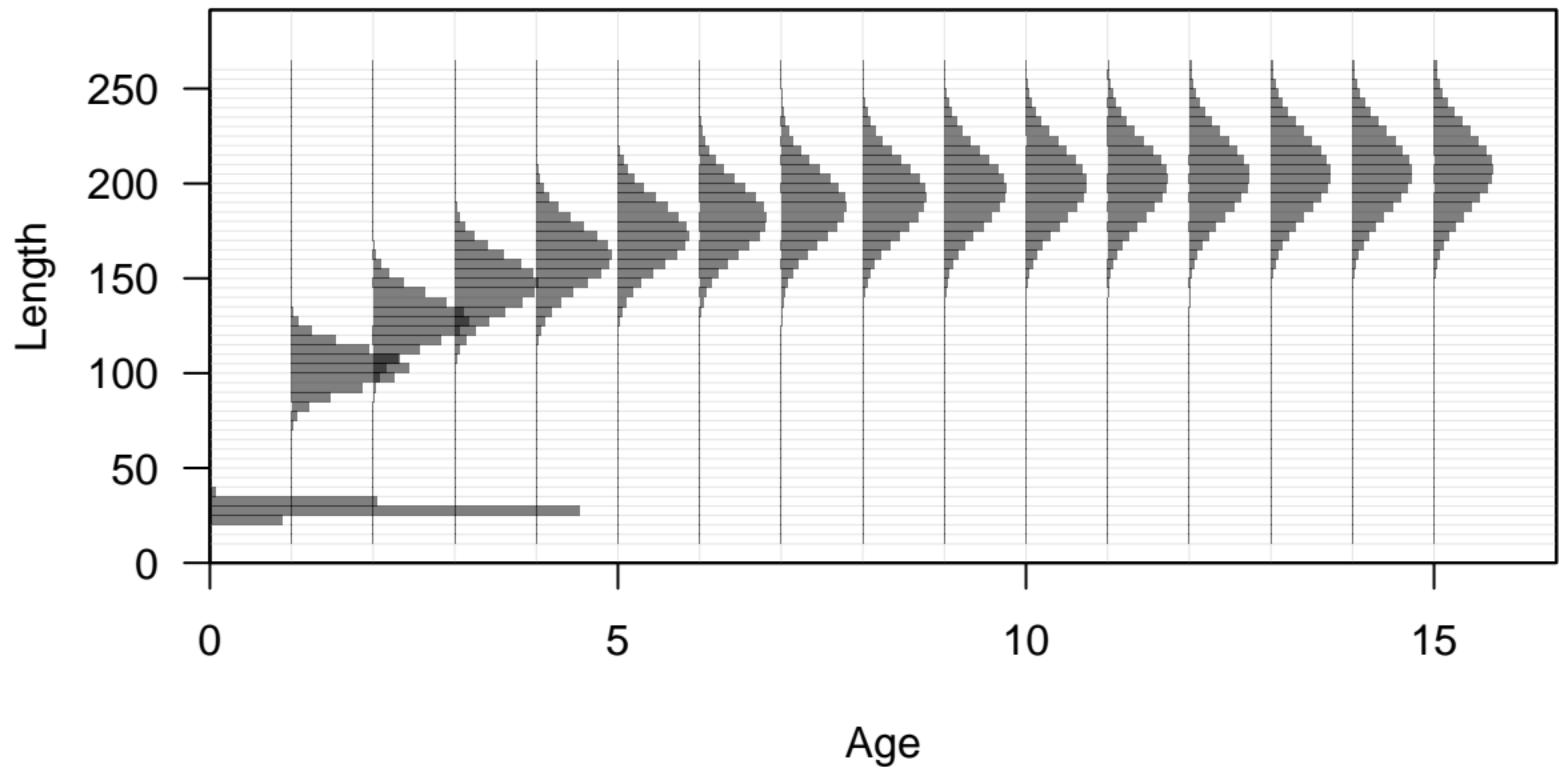


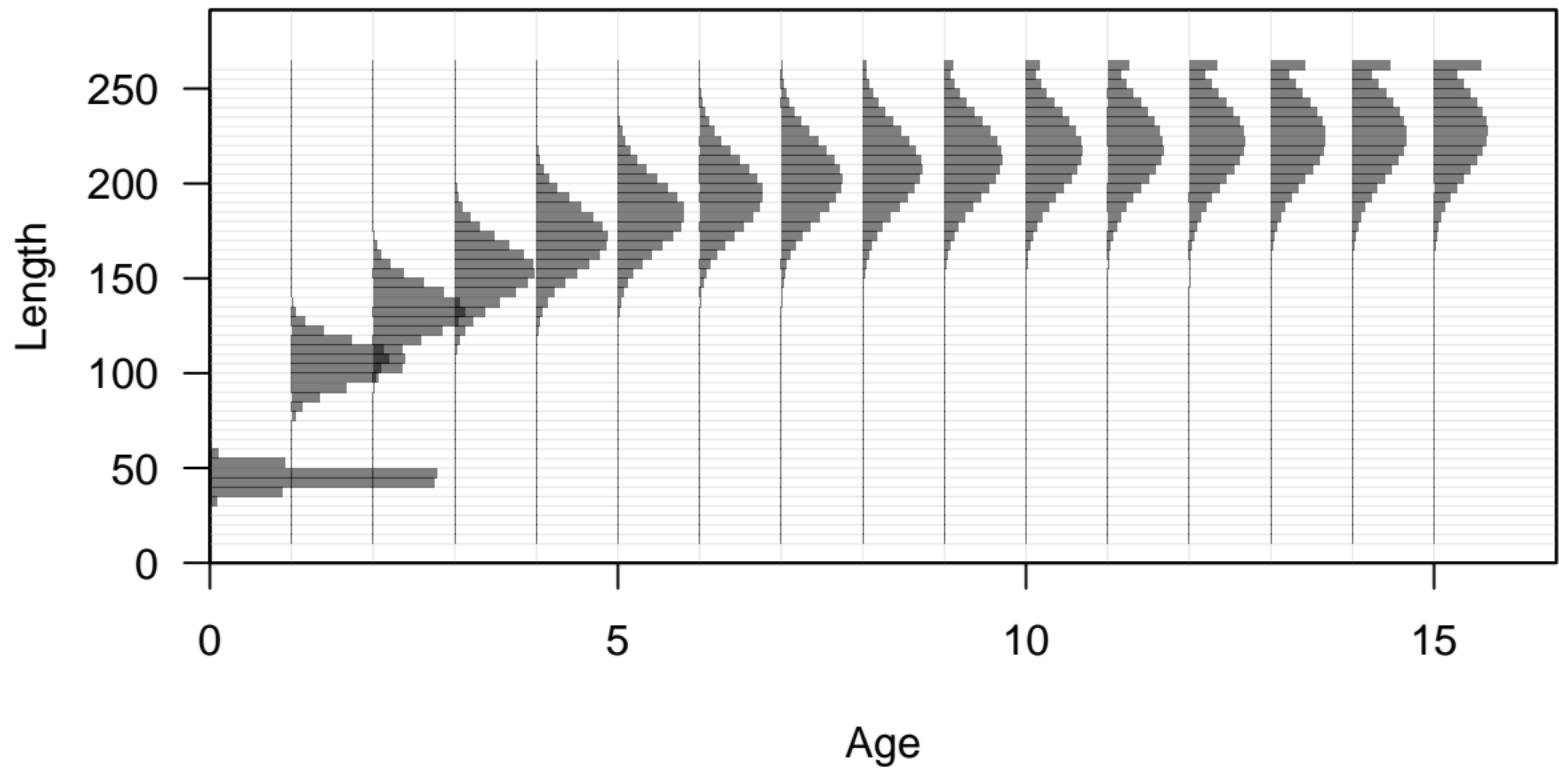


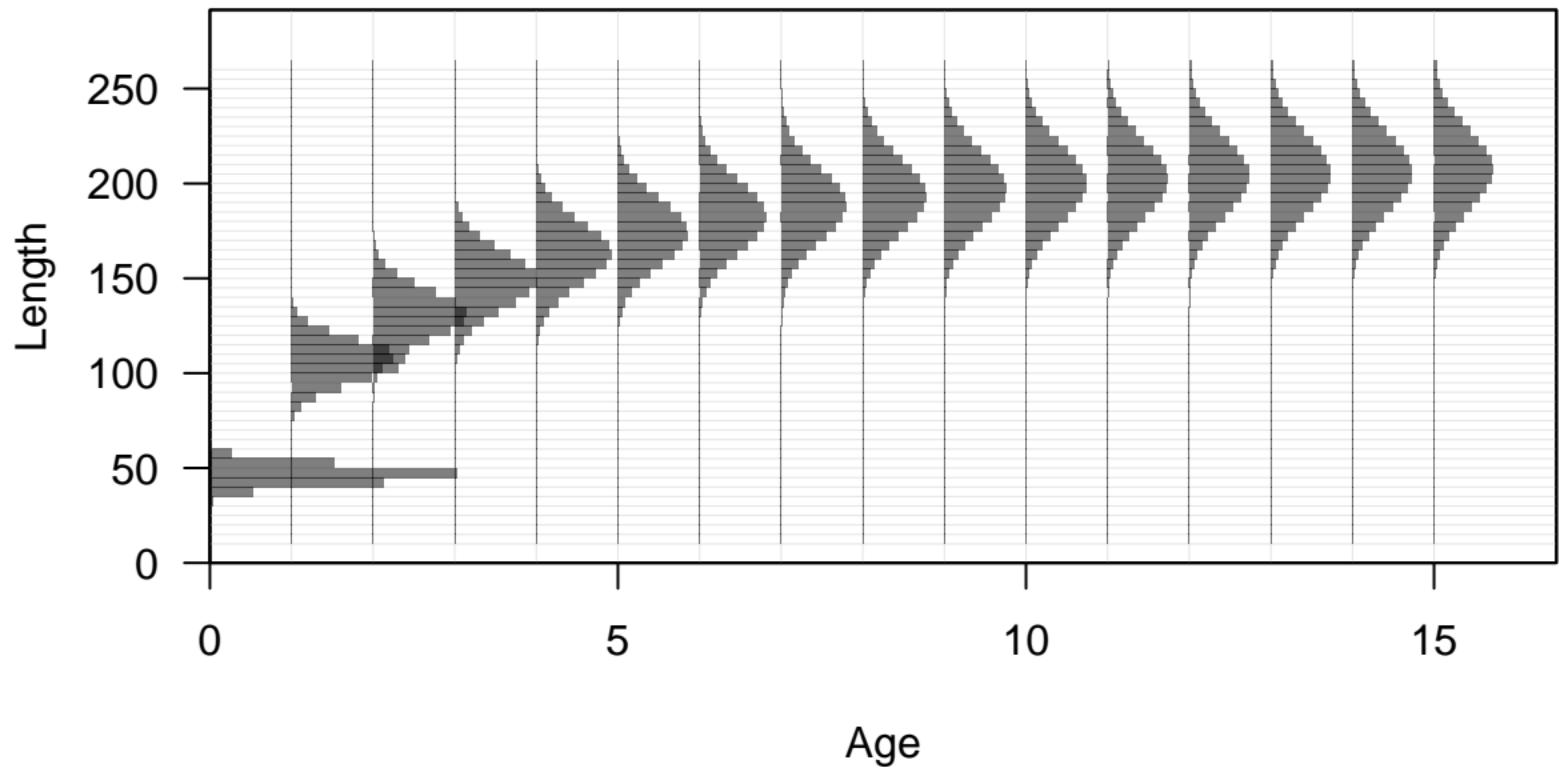


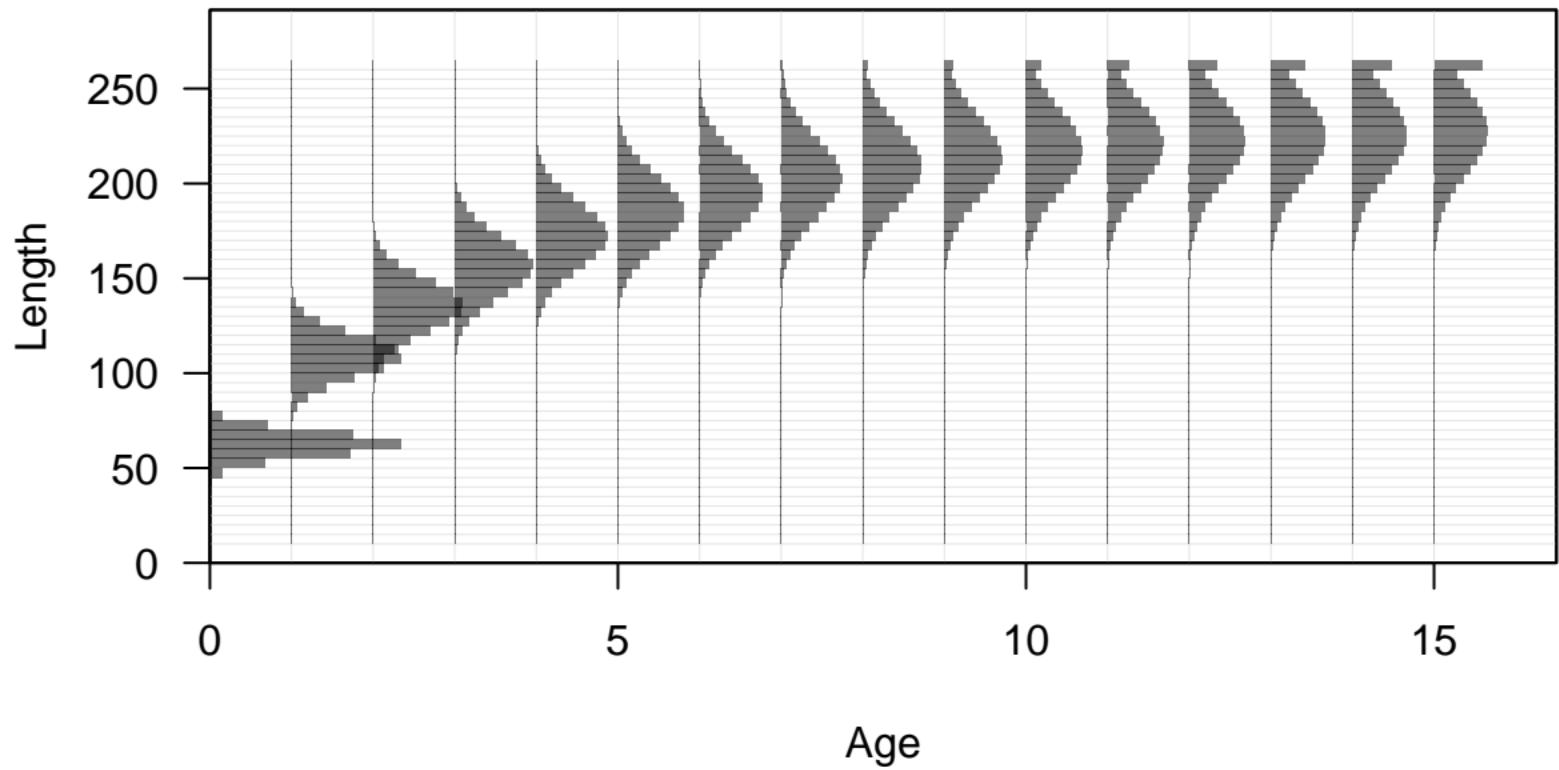


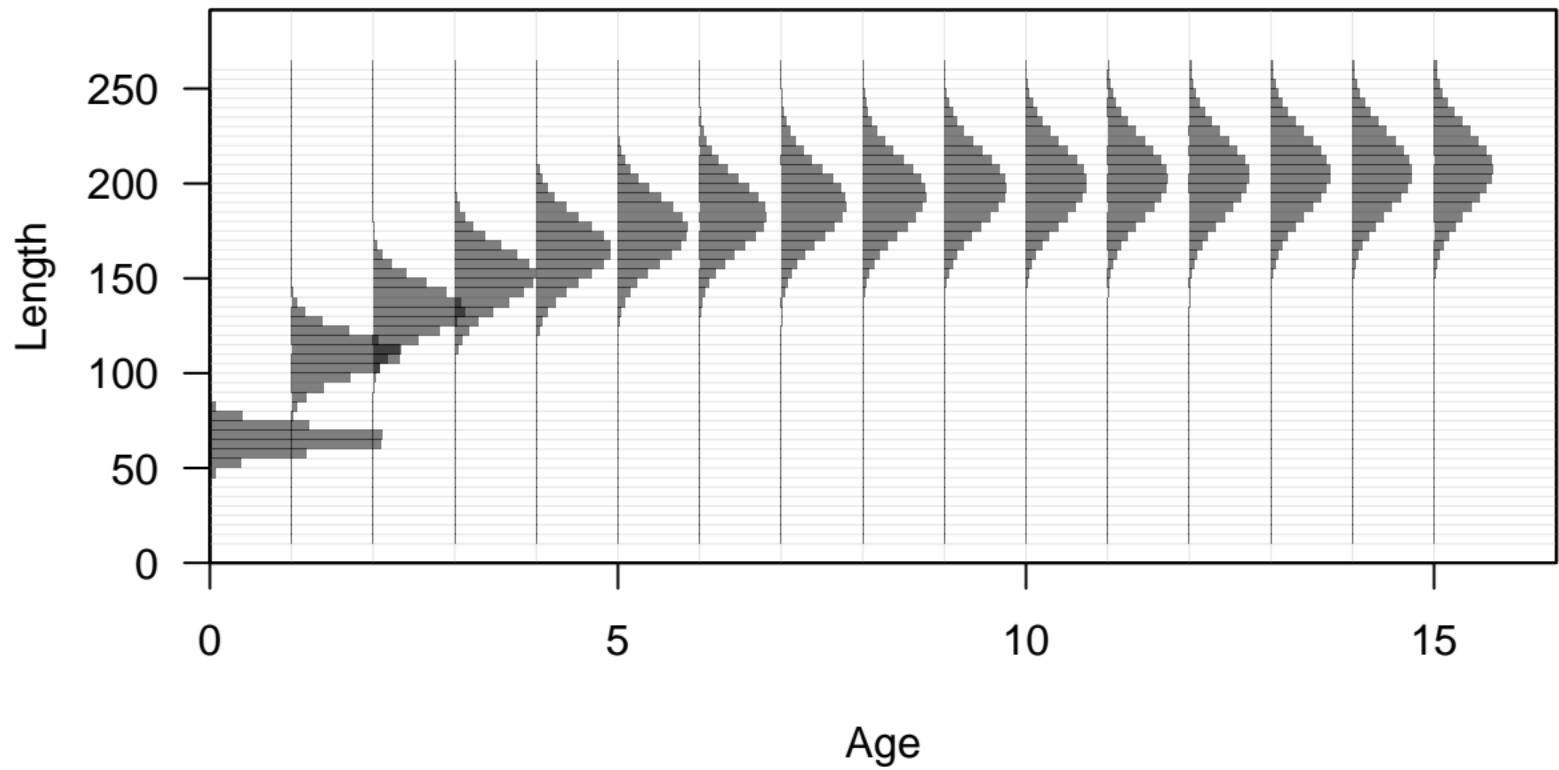


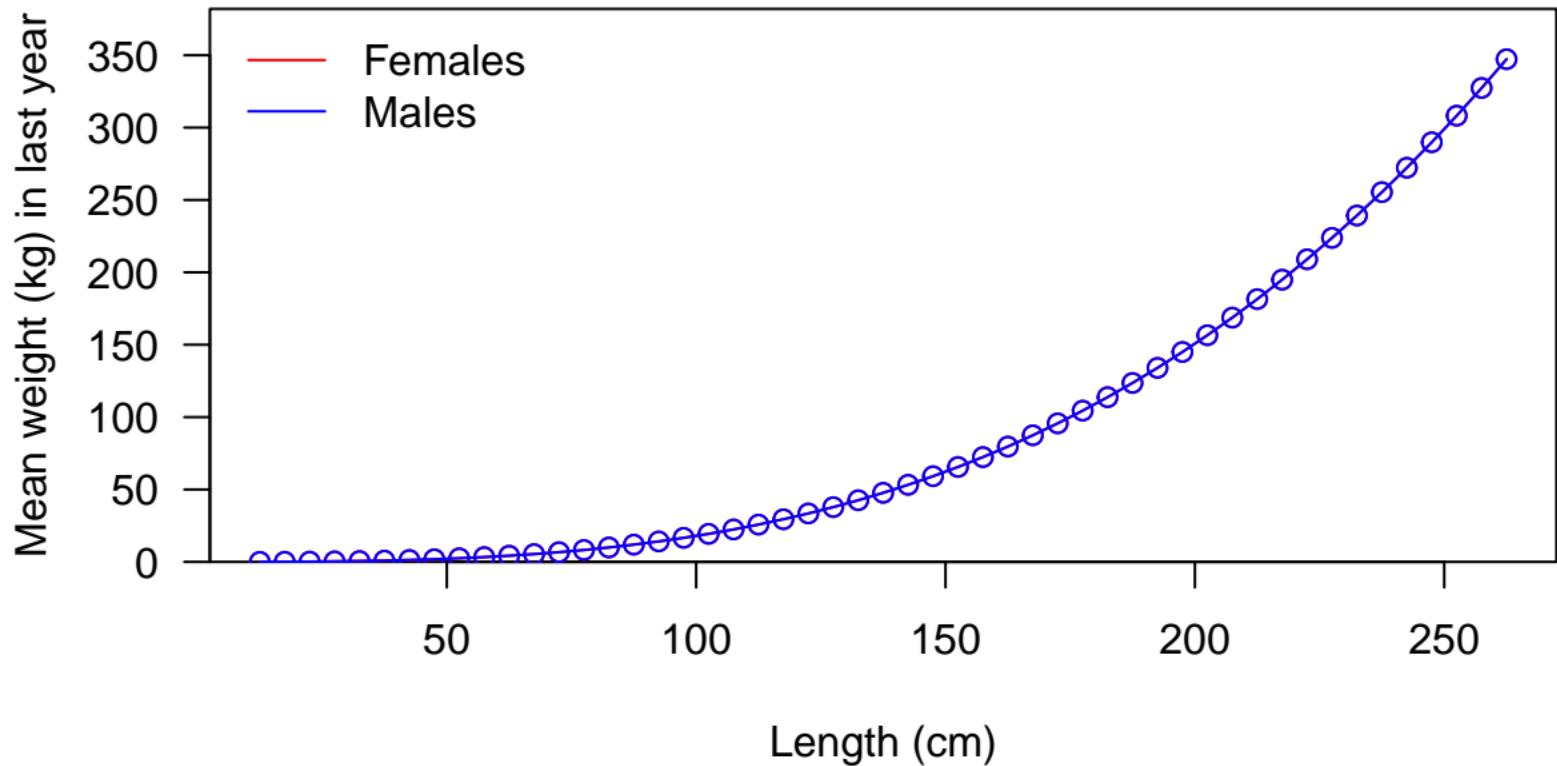


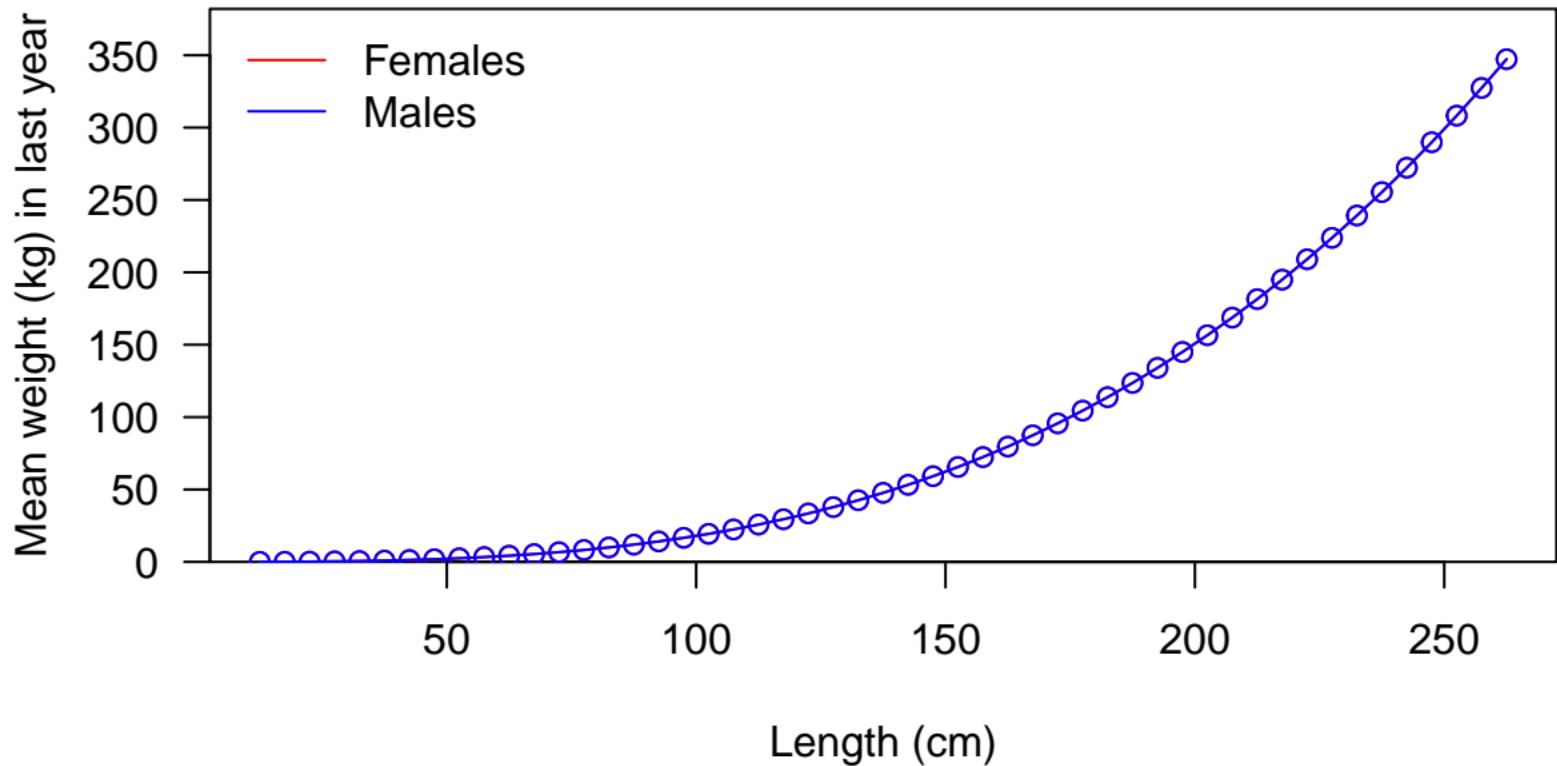


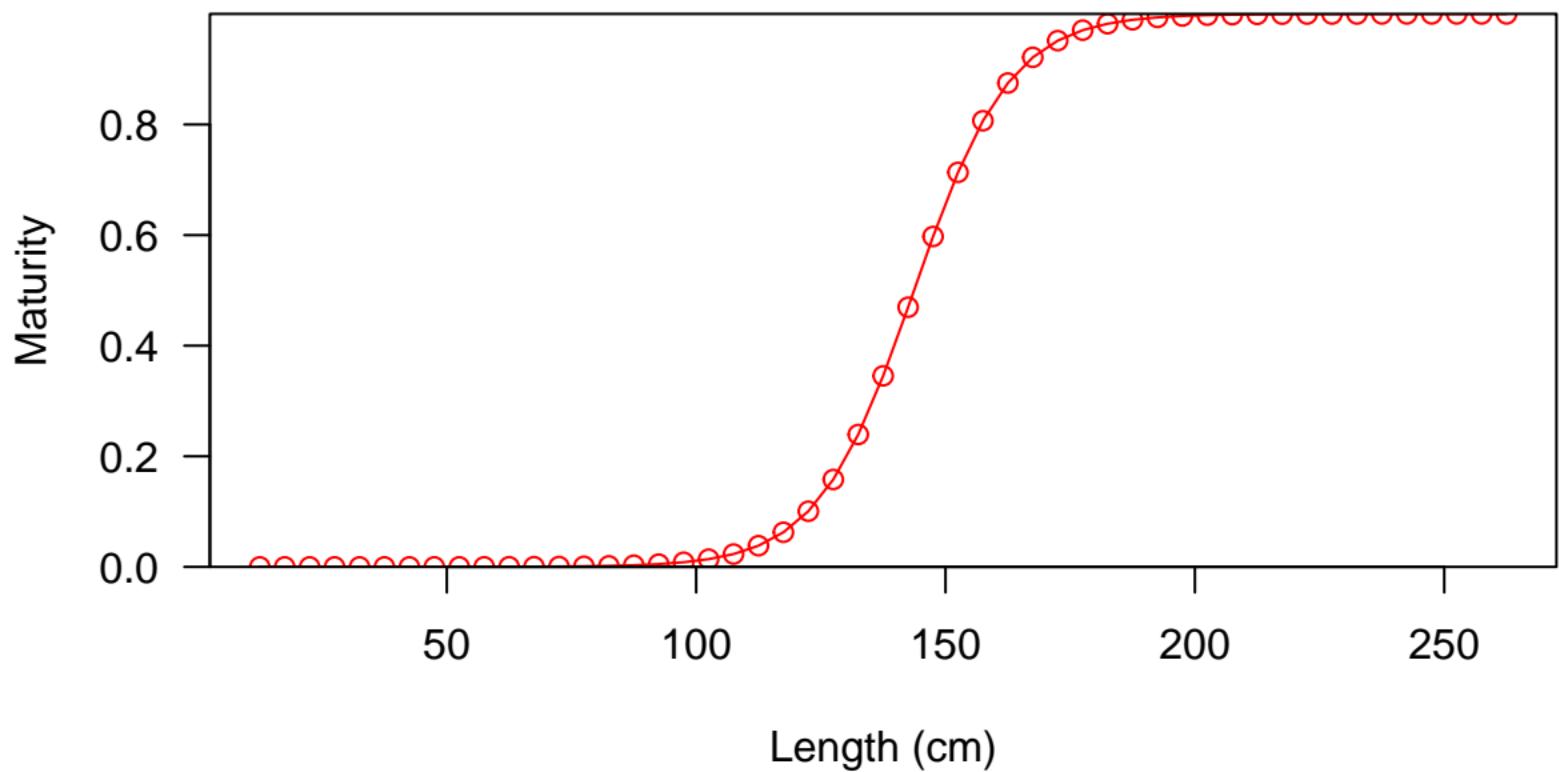


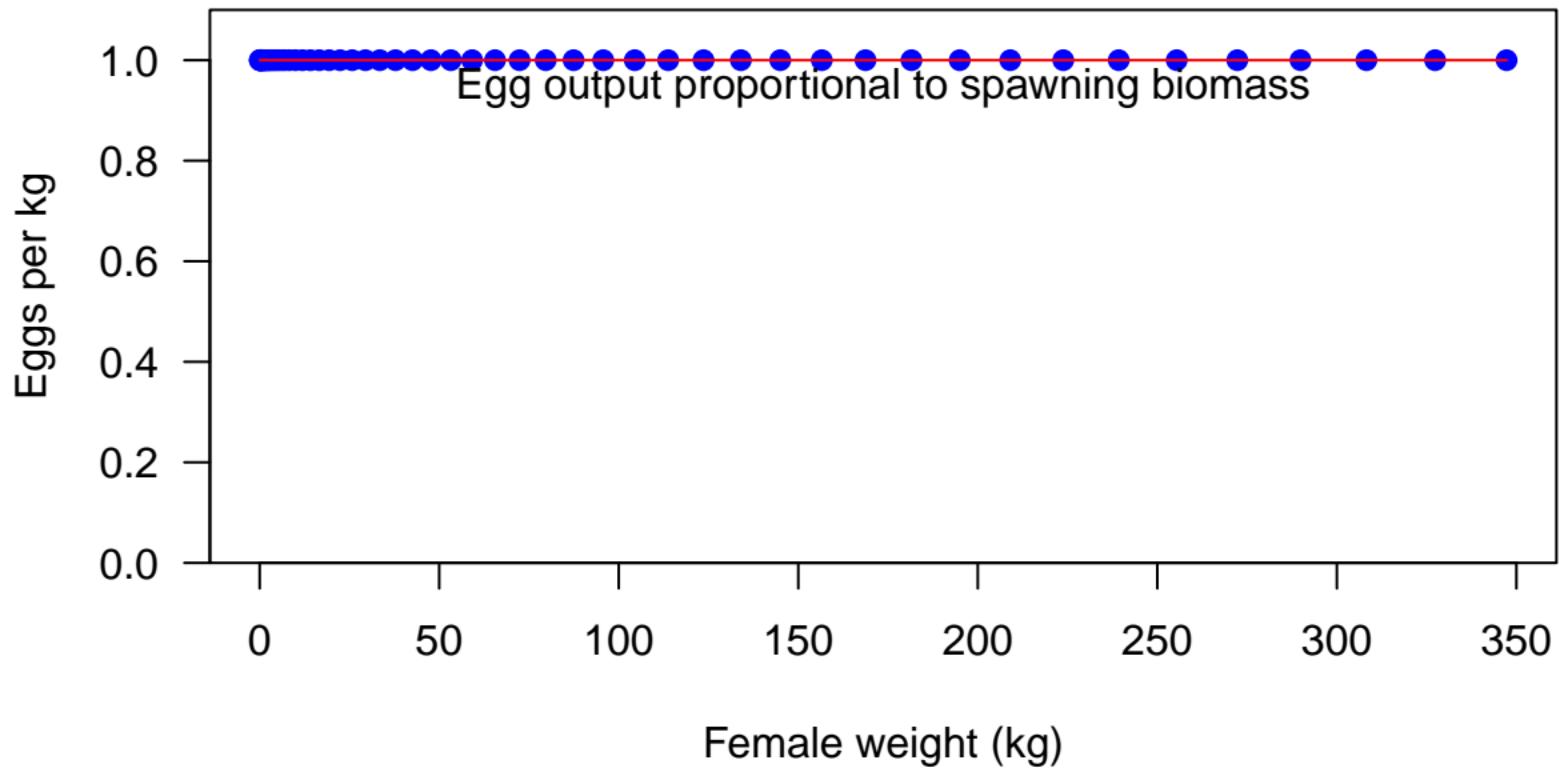


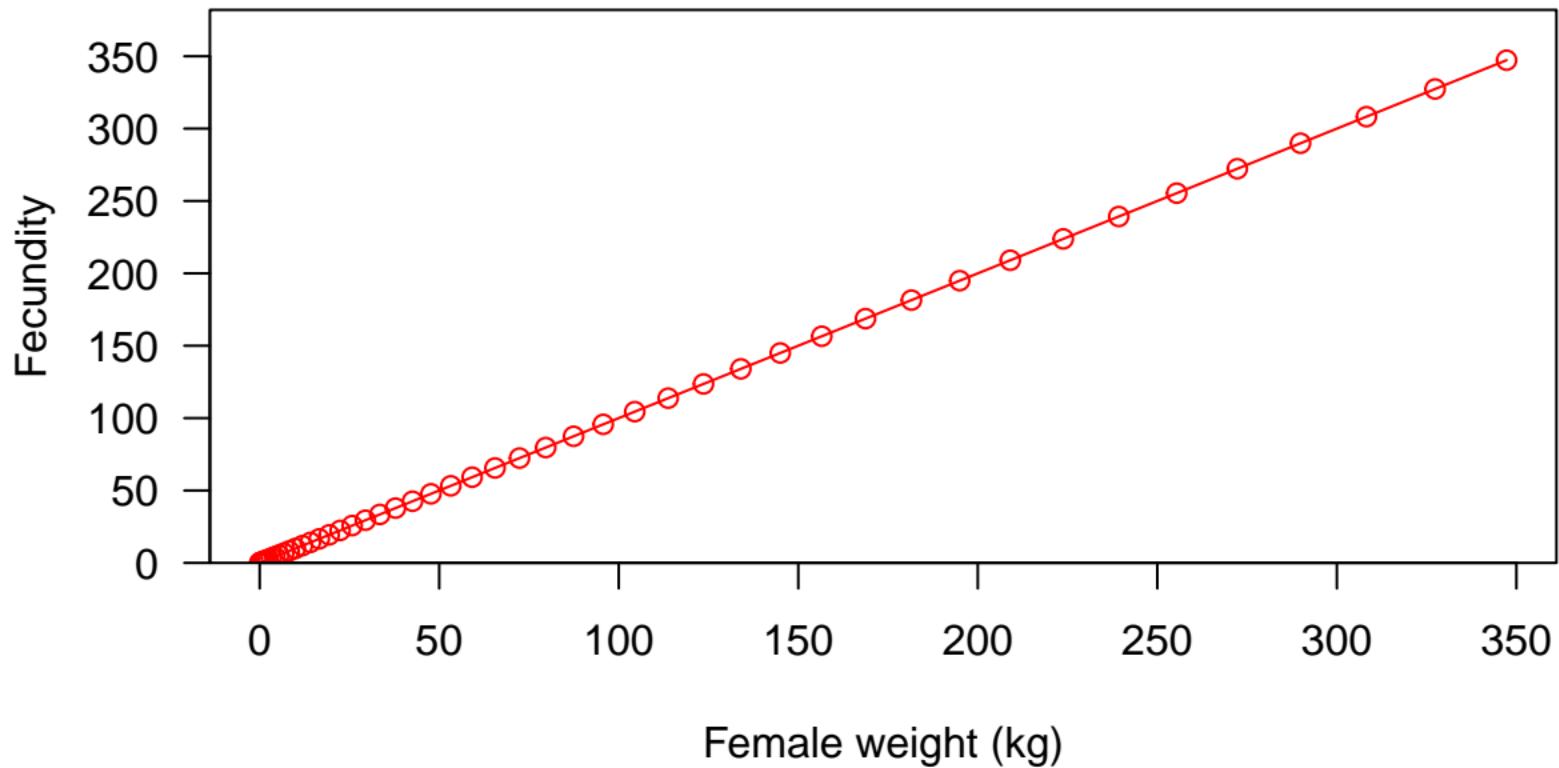


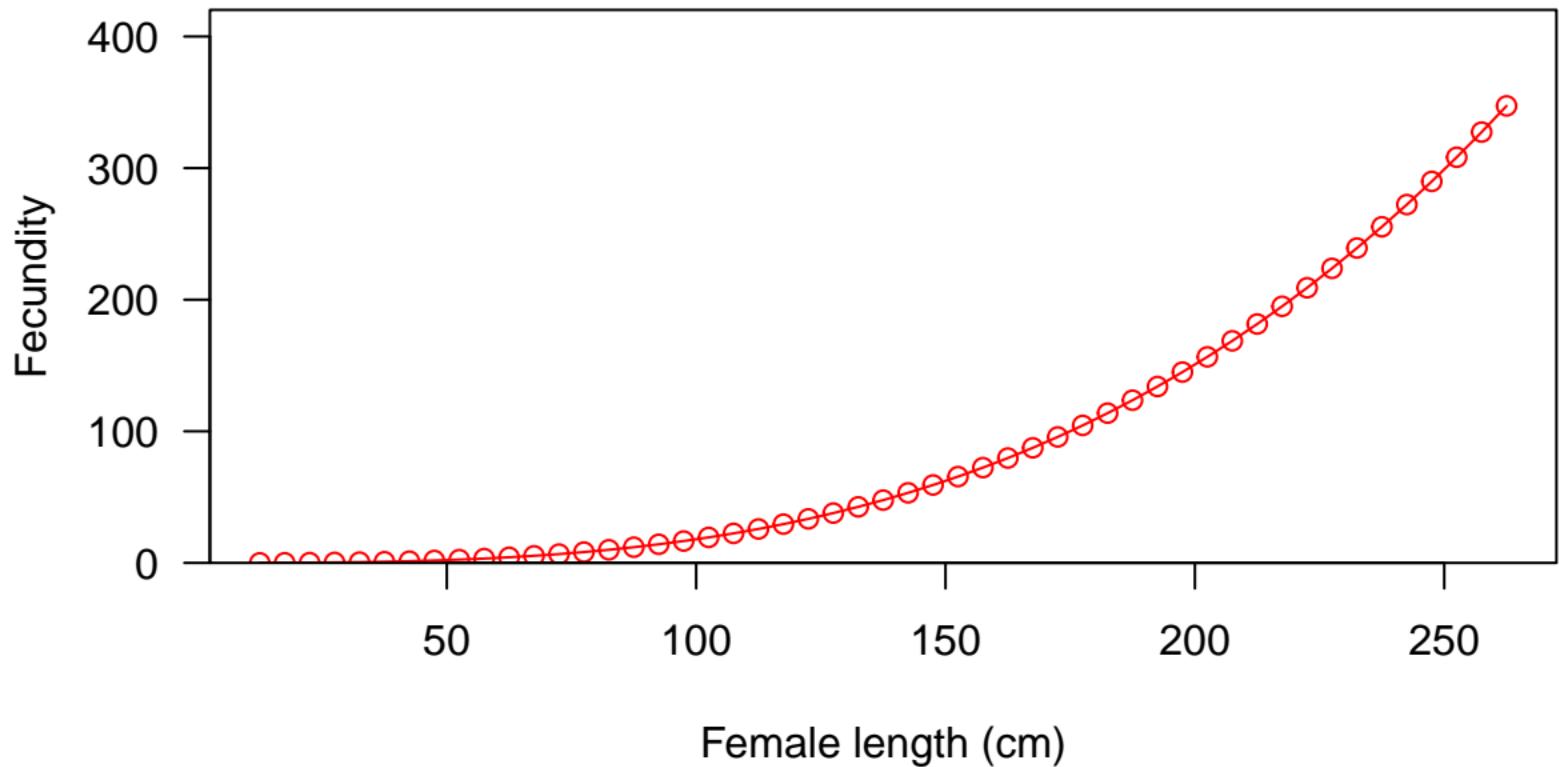


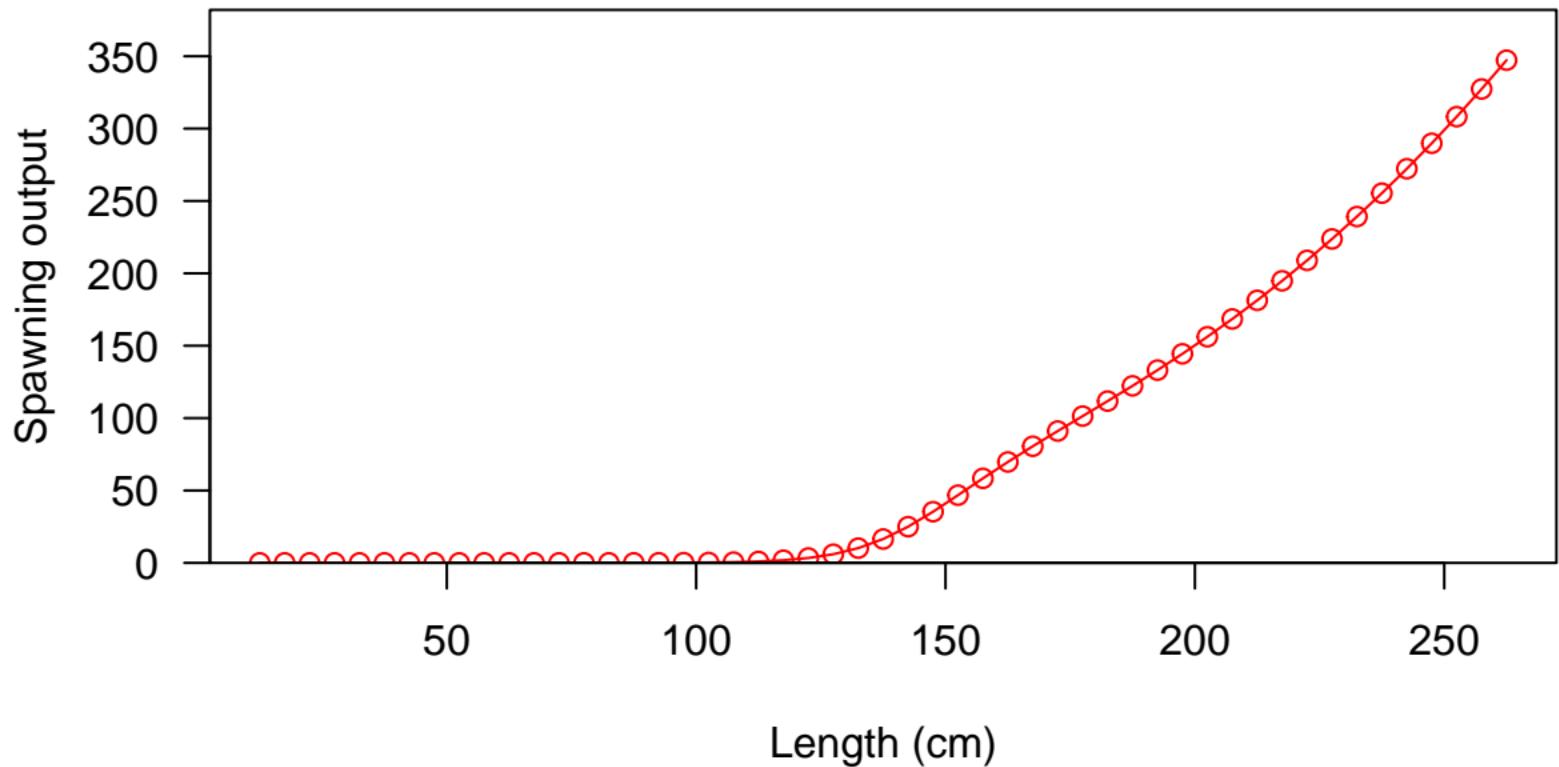


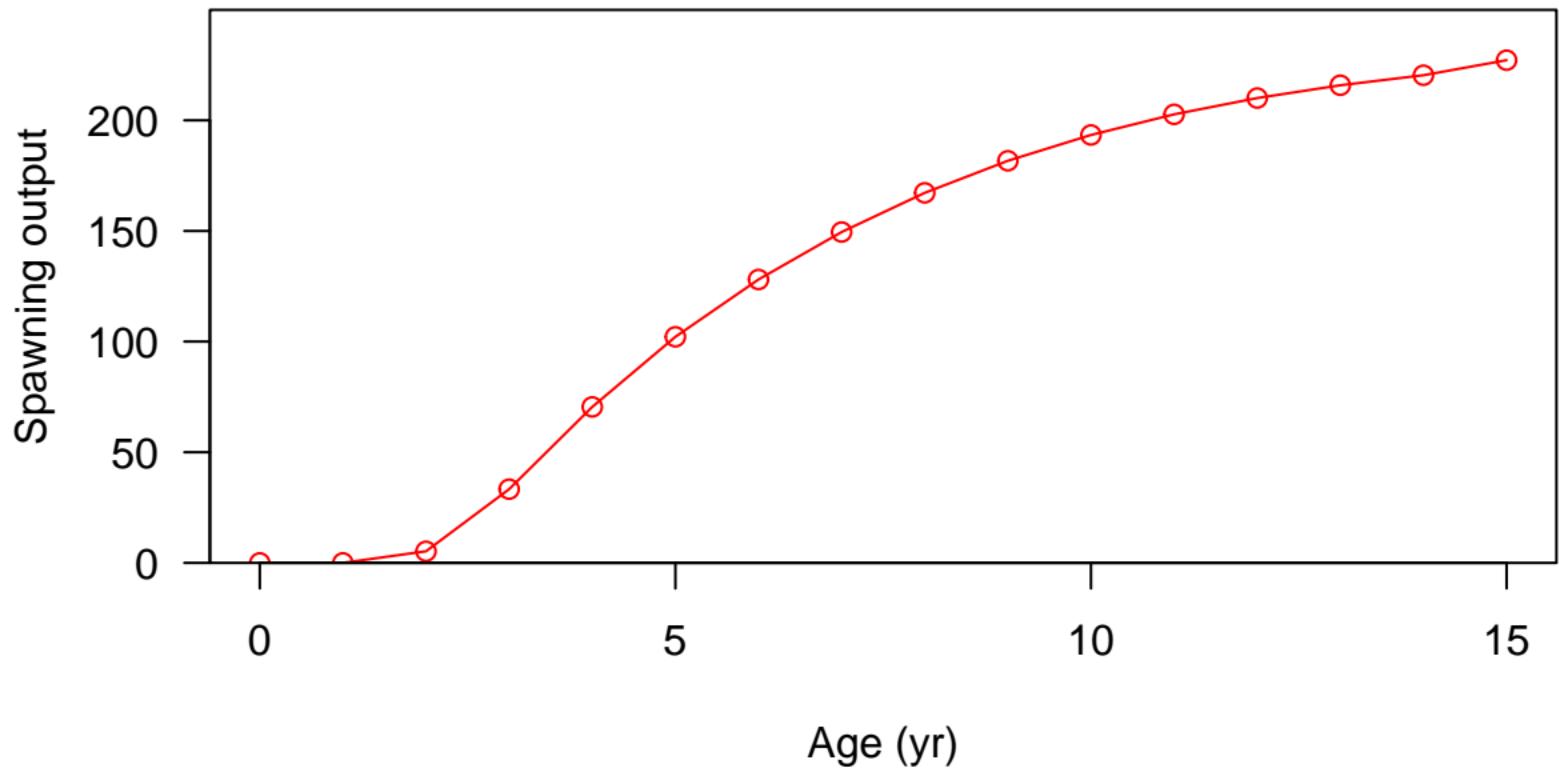


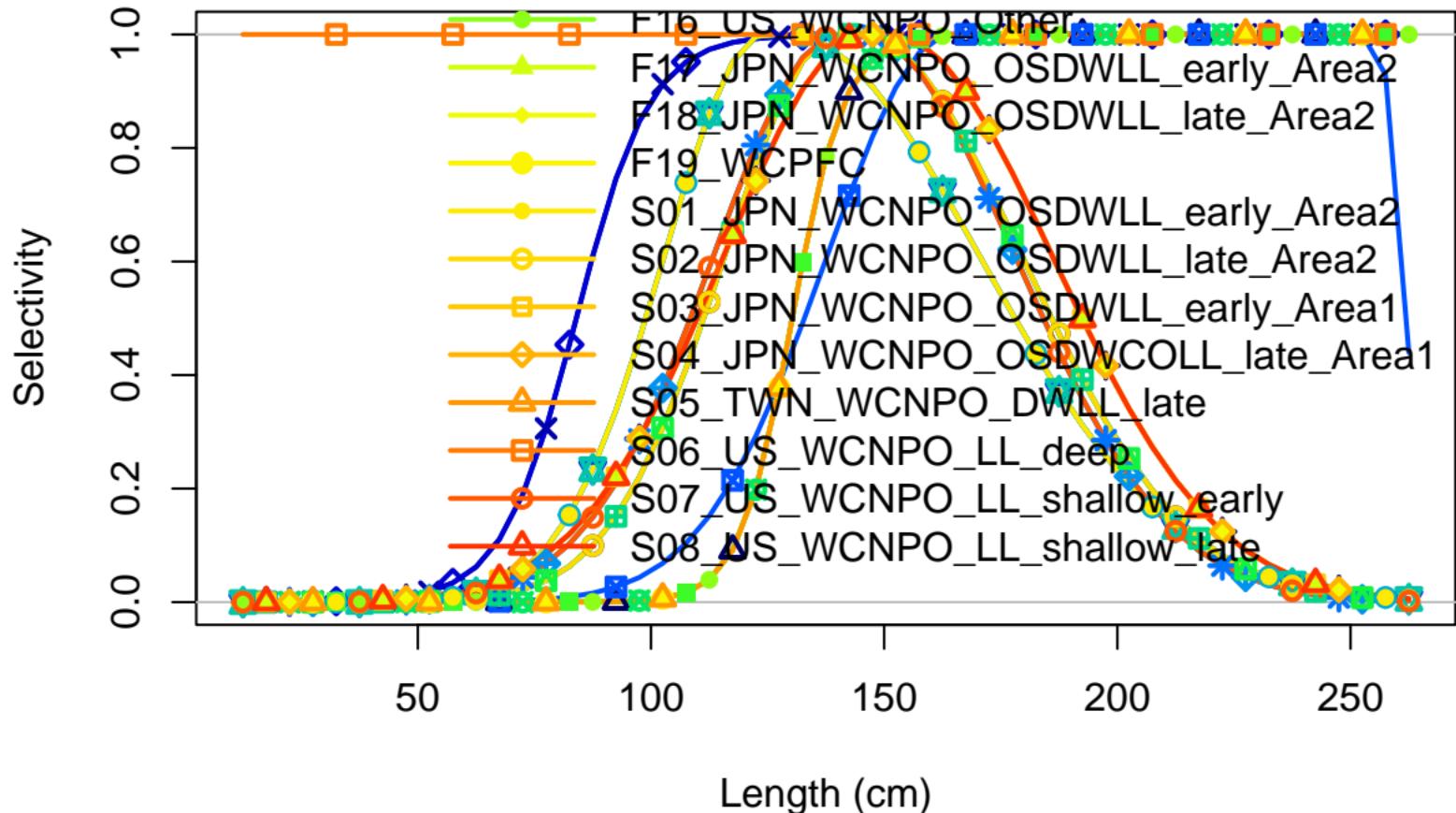


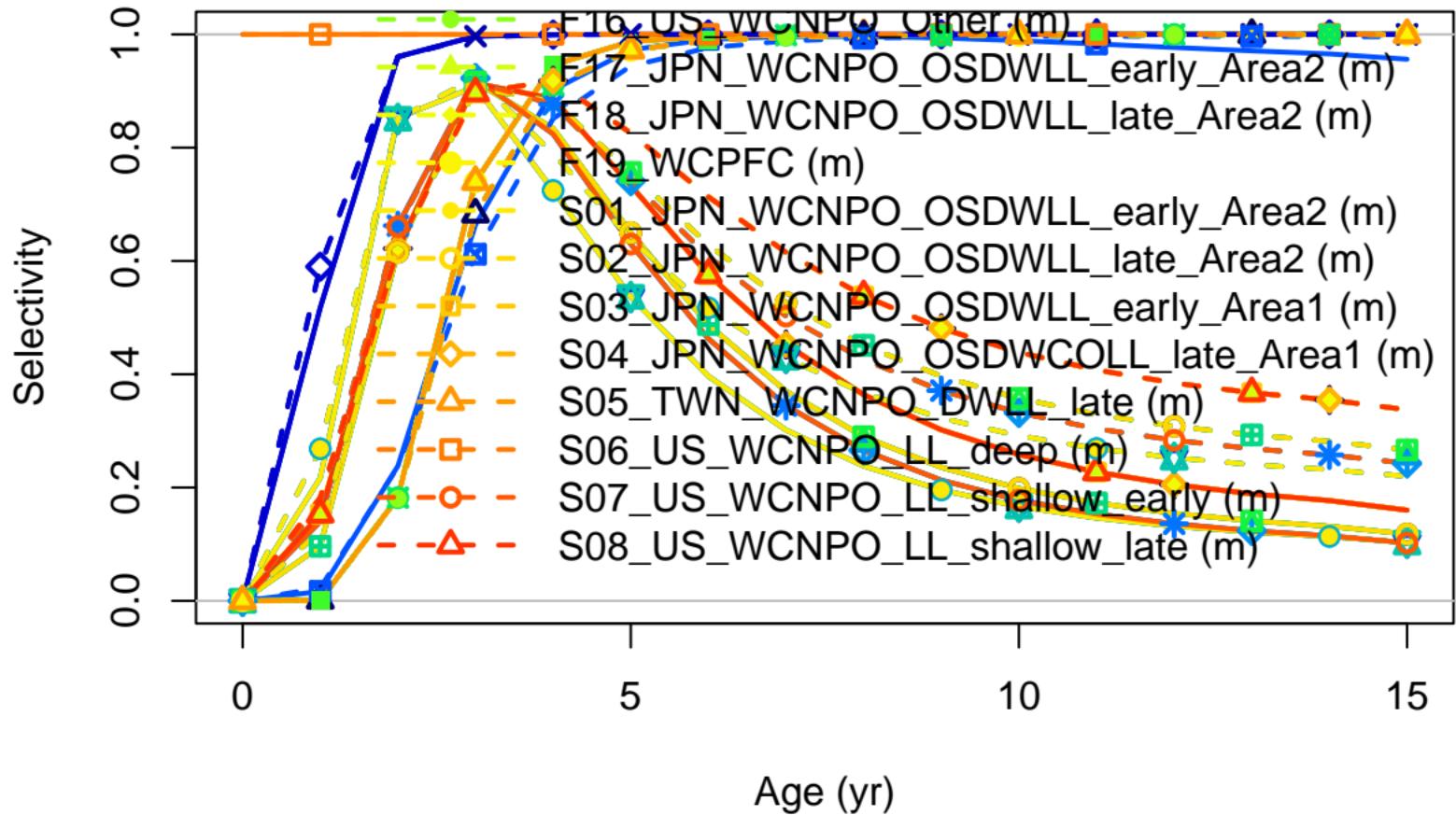


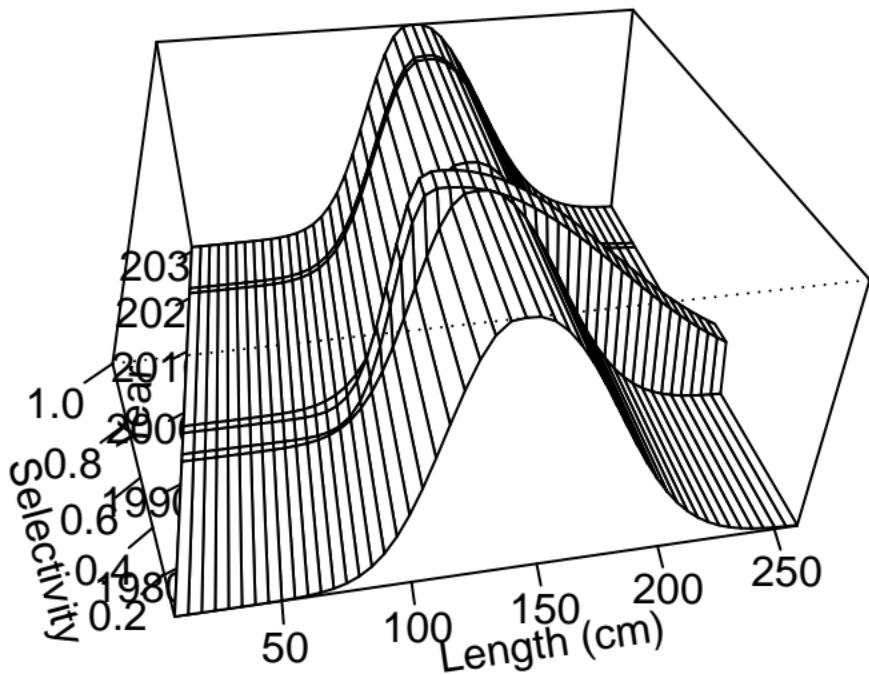


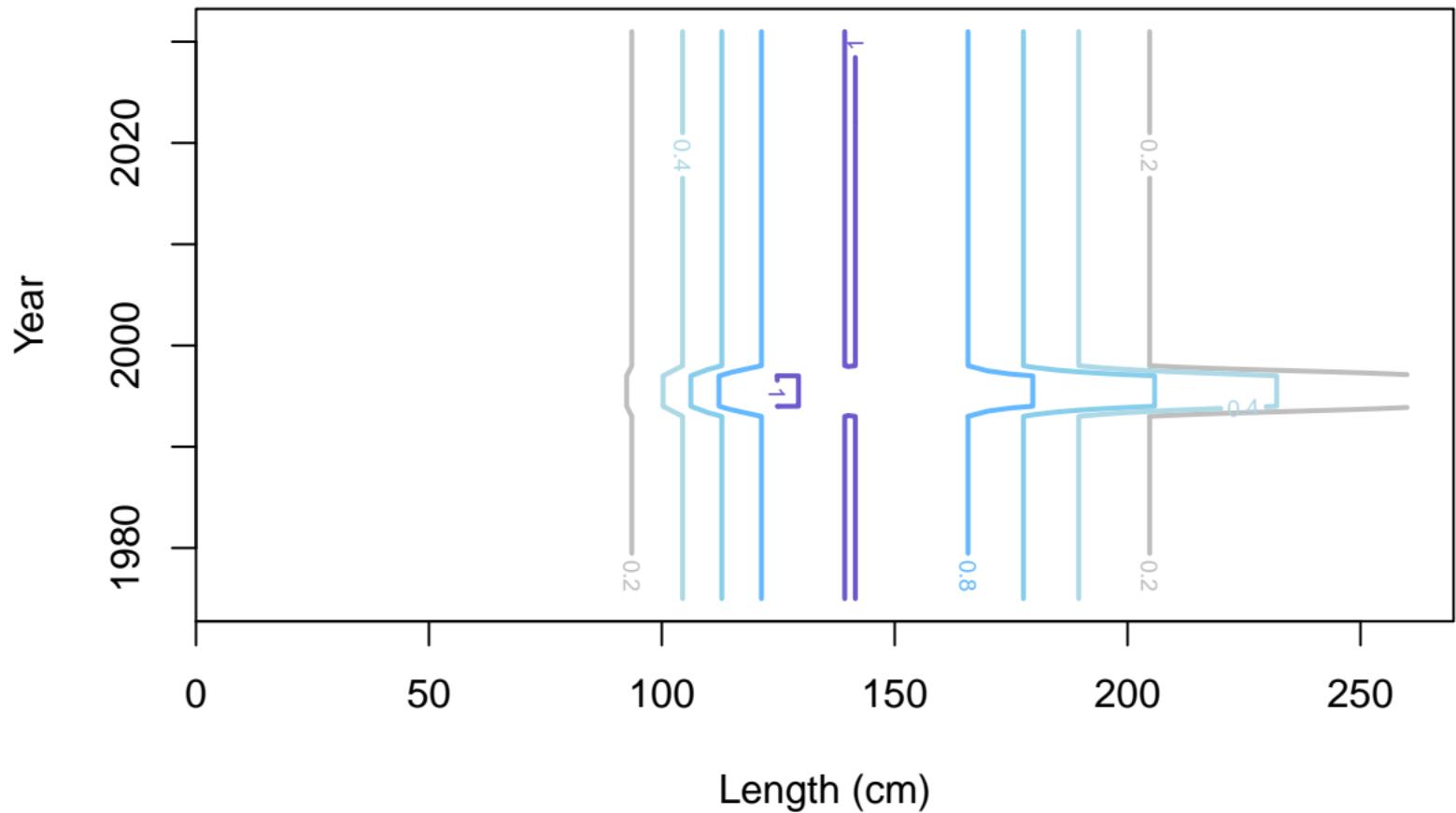


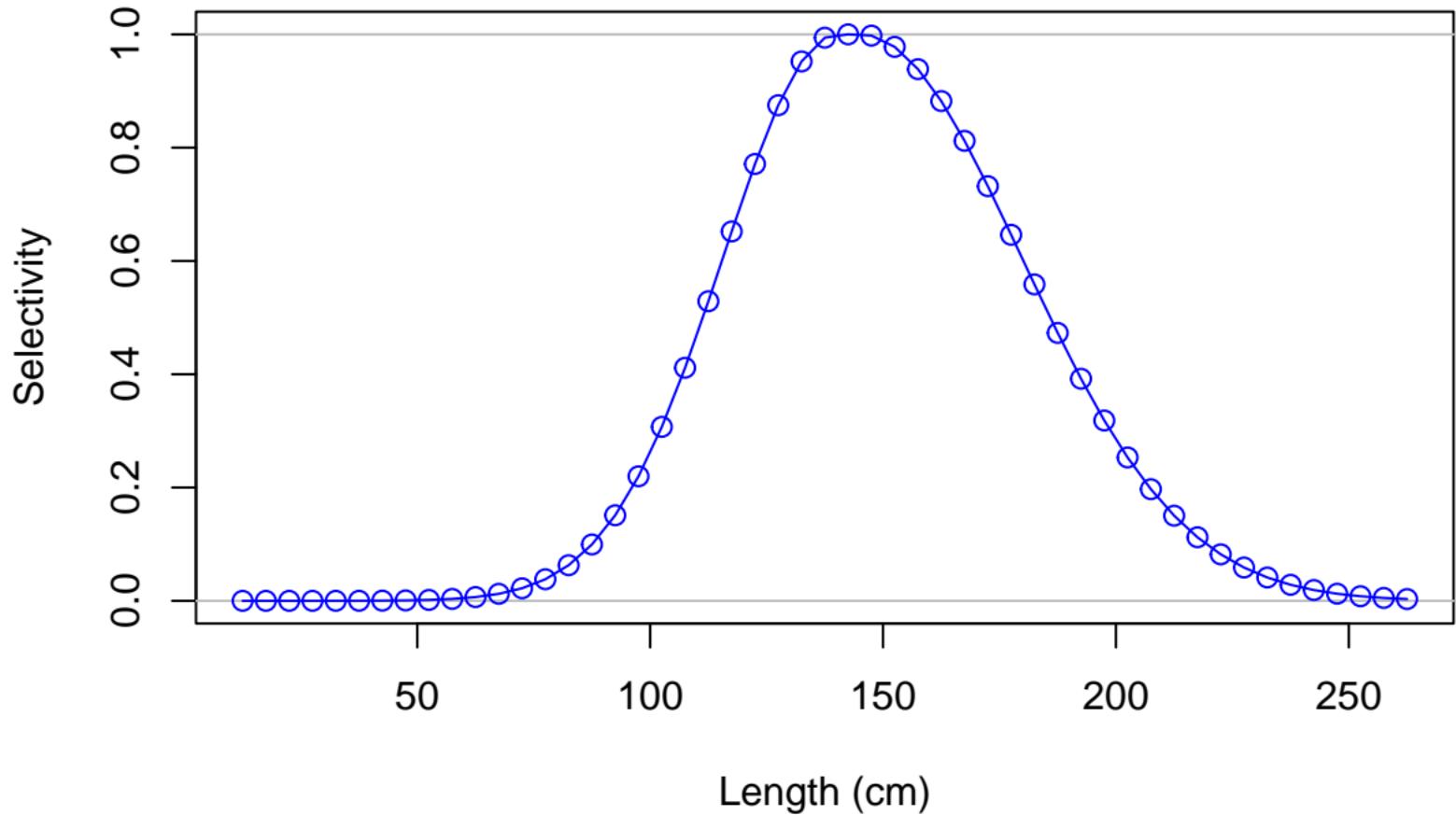


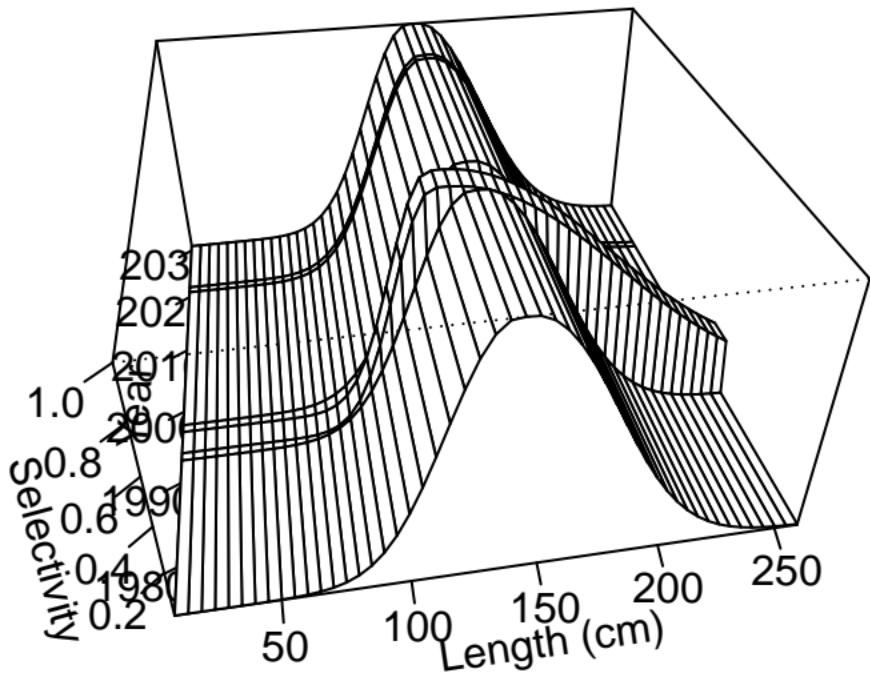


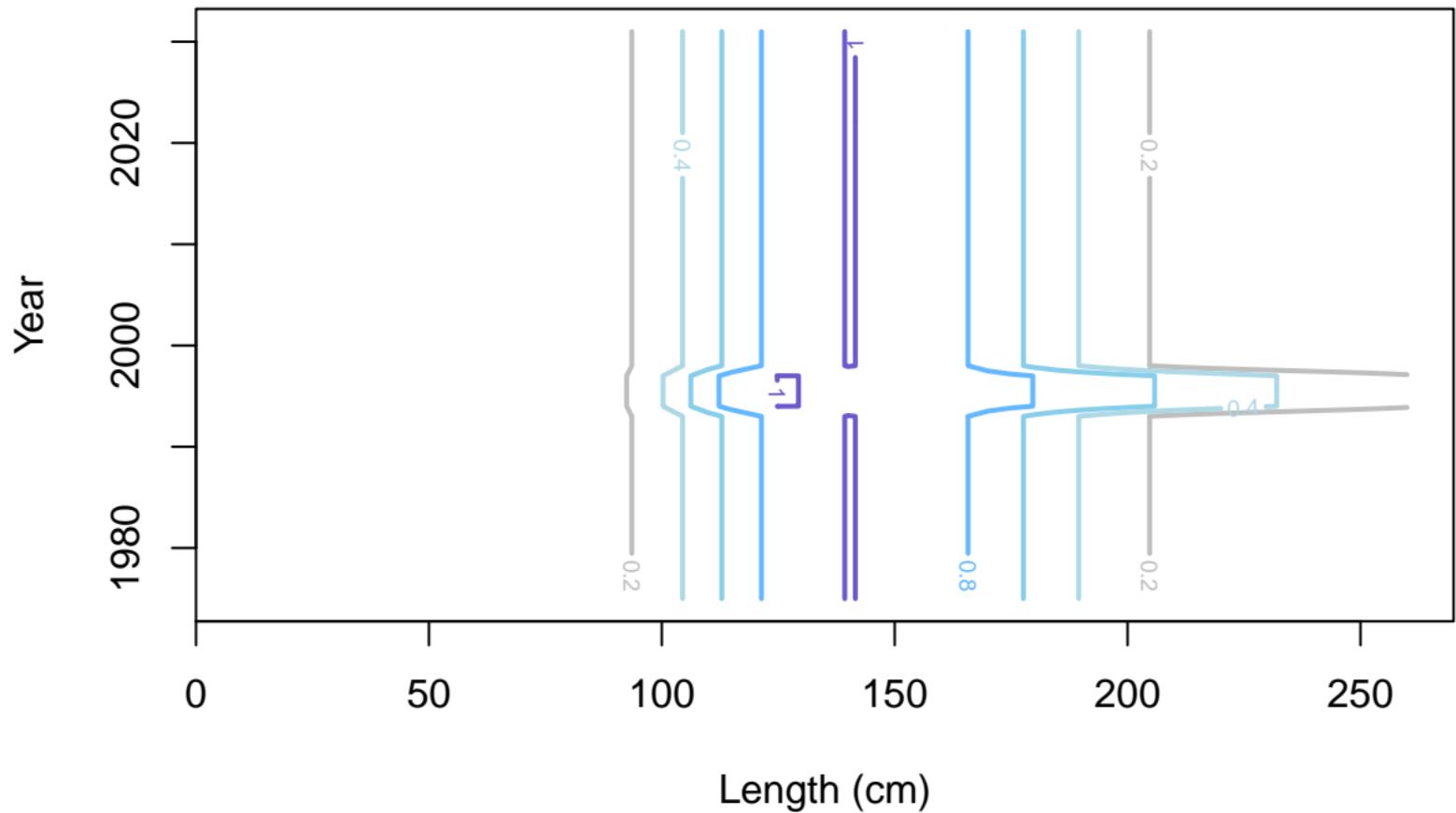


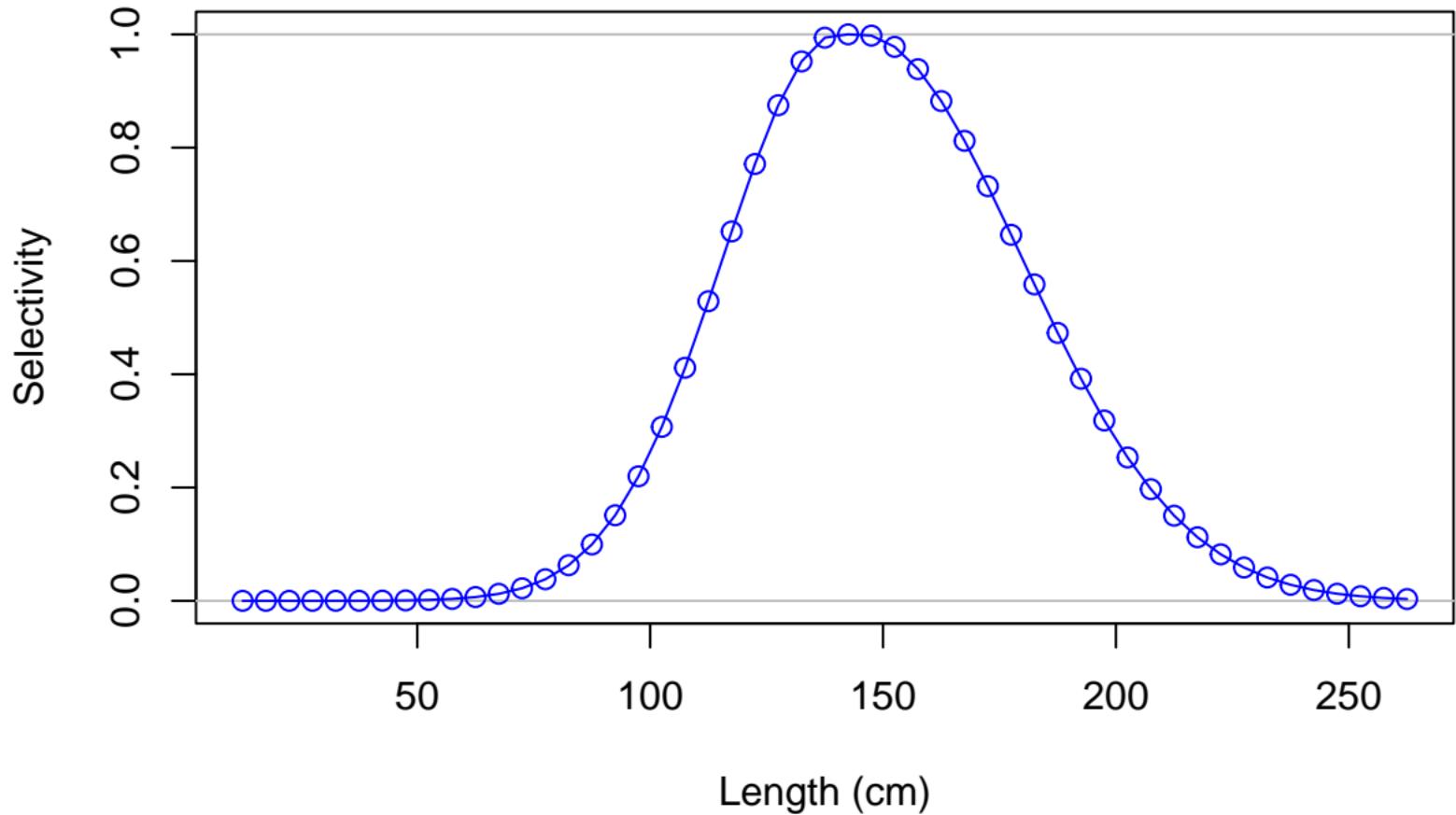


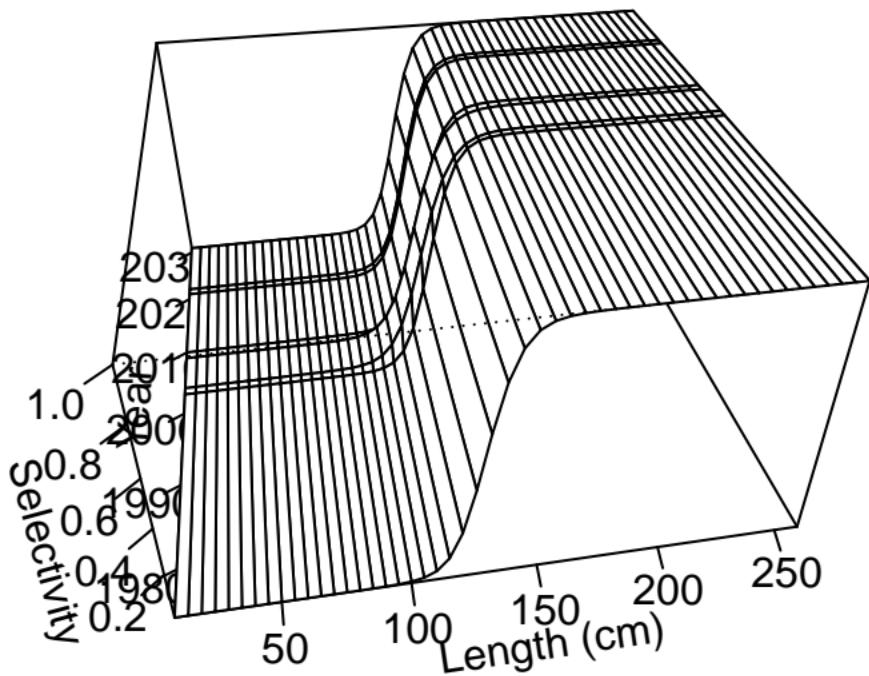












Year

2020

2000

1980

0

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100

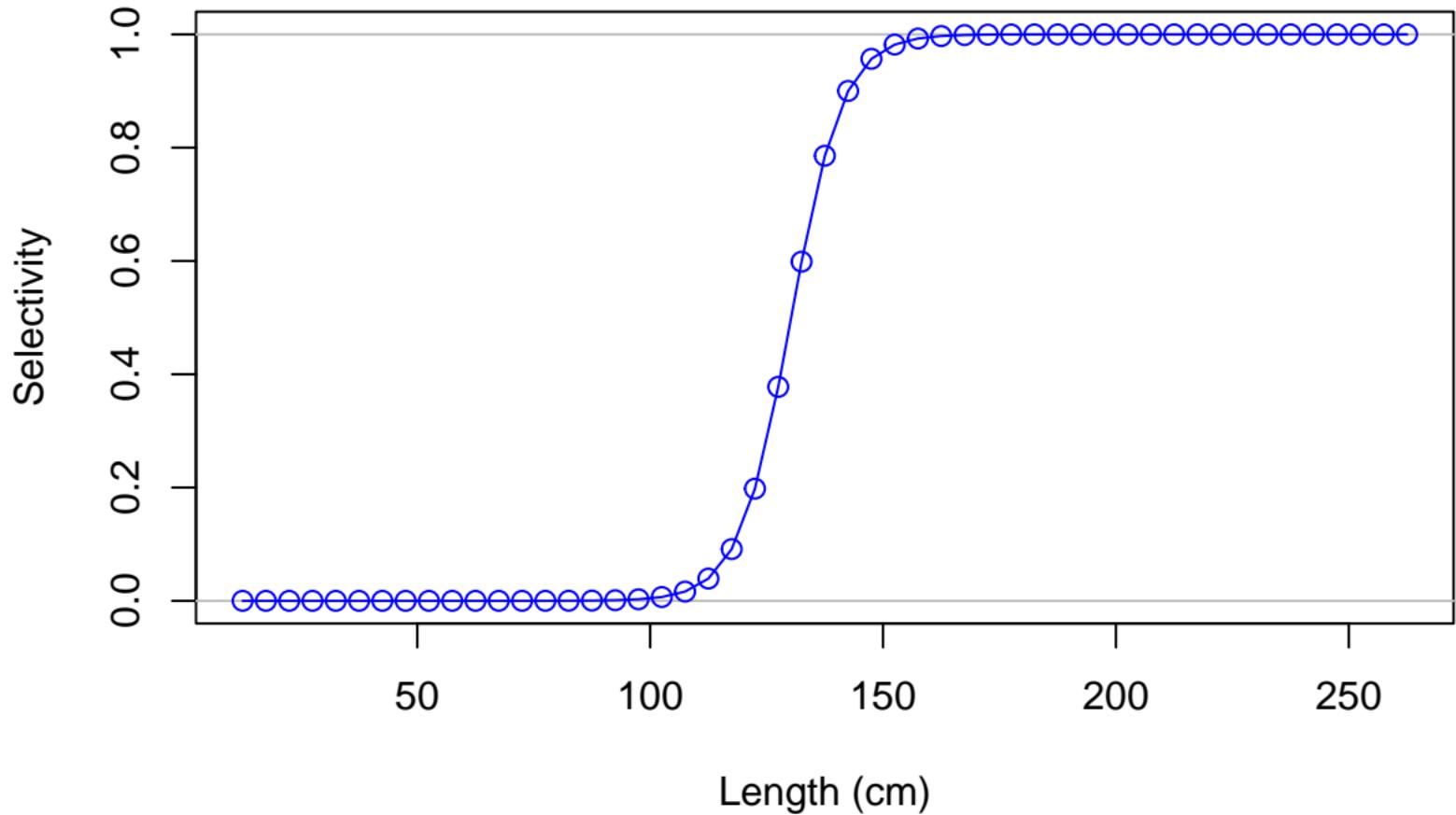
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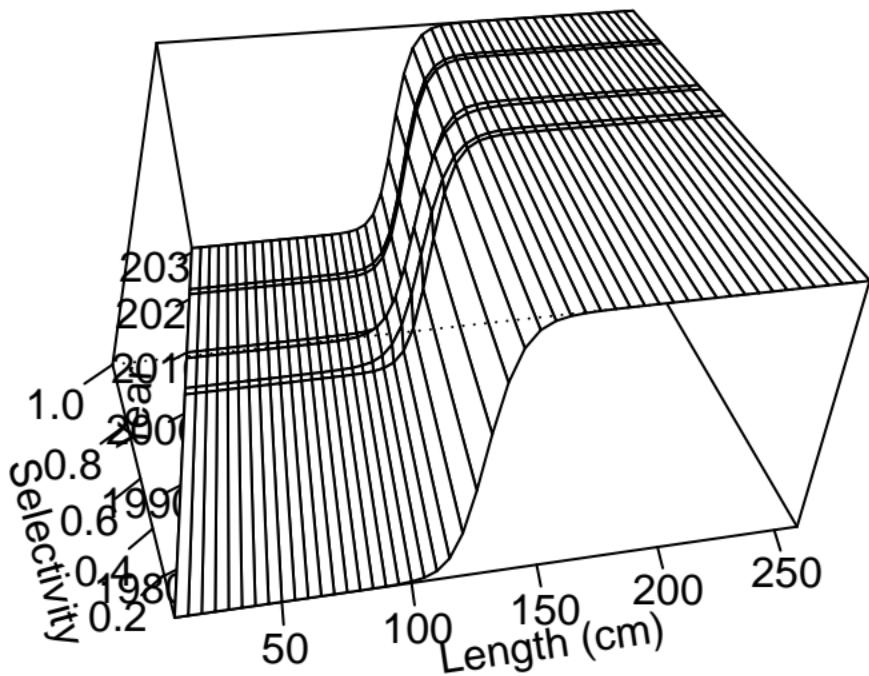
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250

Length (cm)







Year

1980 2000 2020

0

50

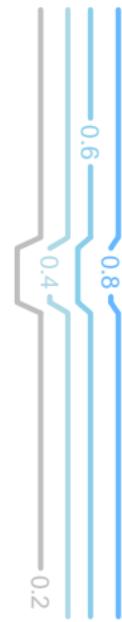
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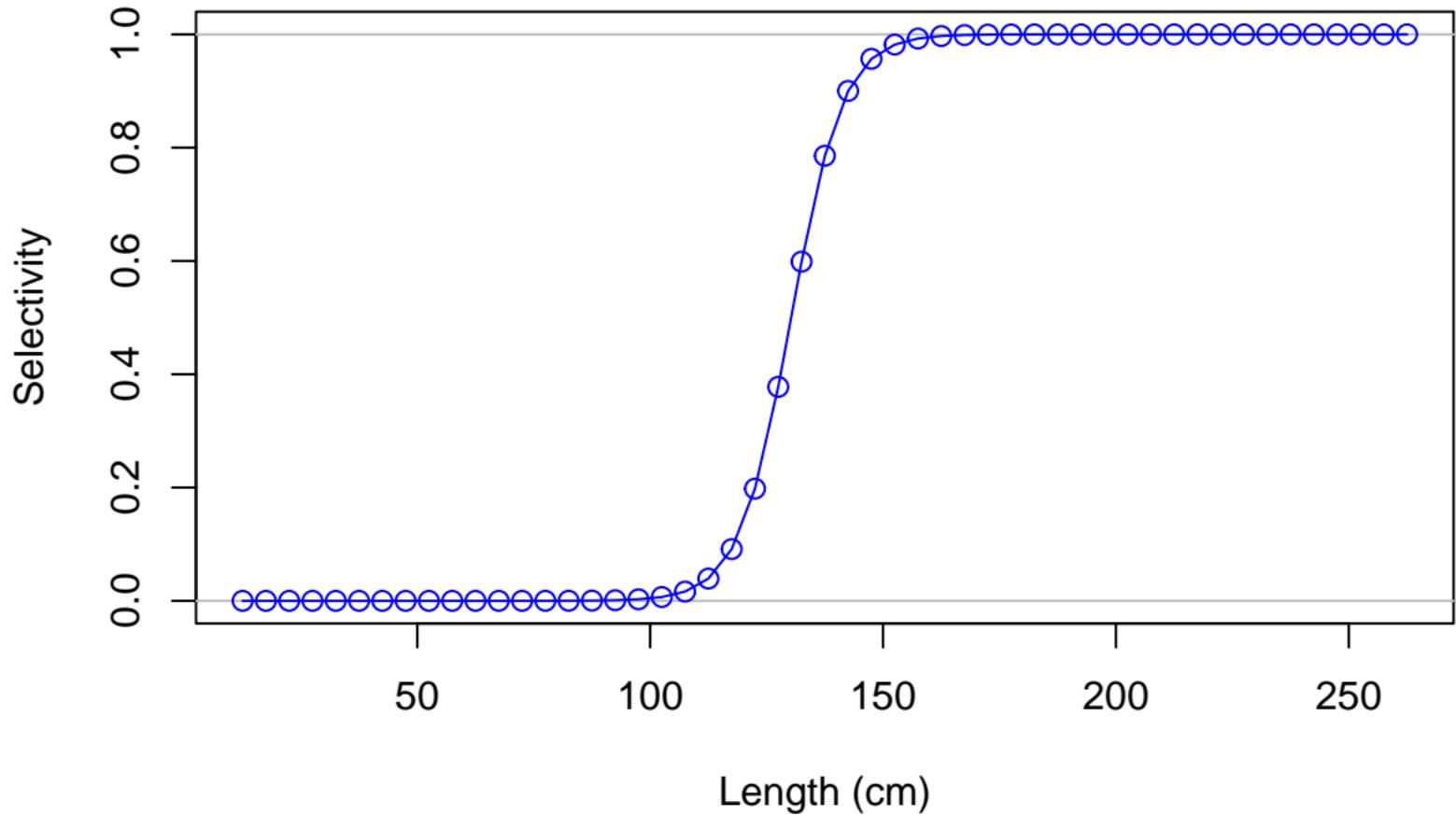
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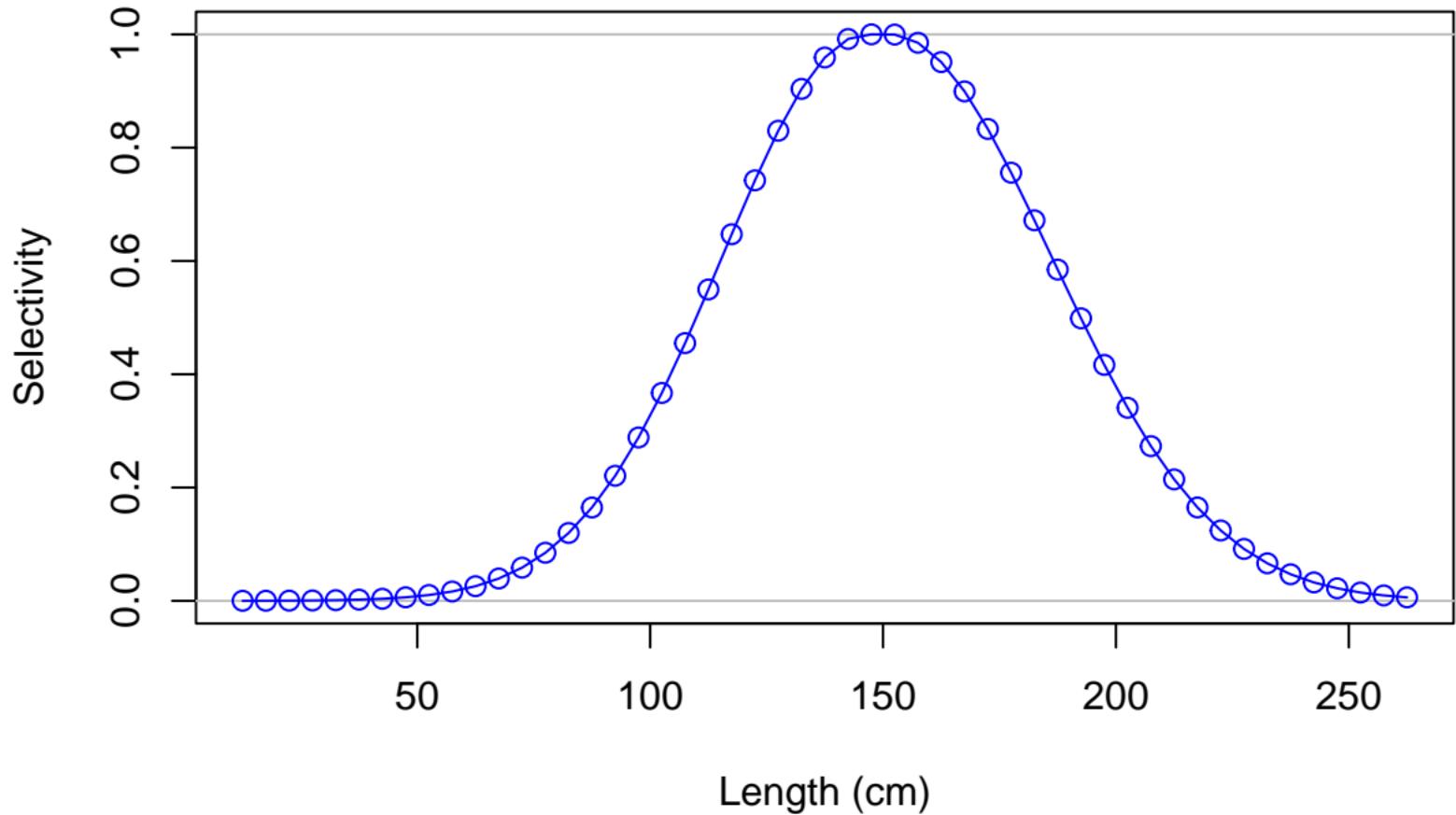
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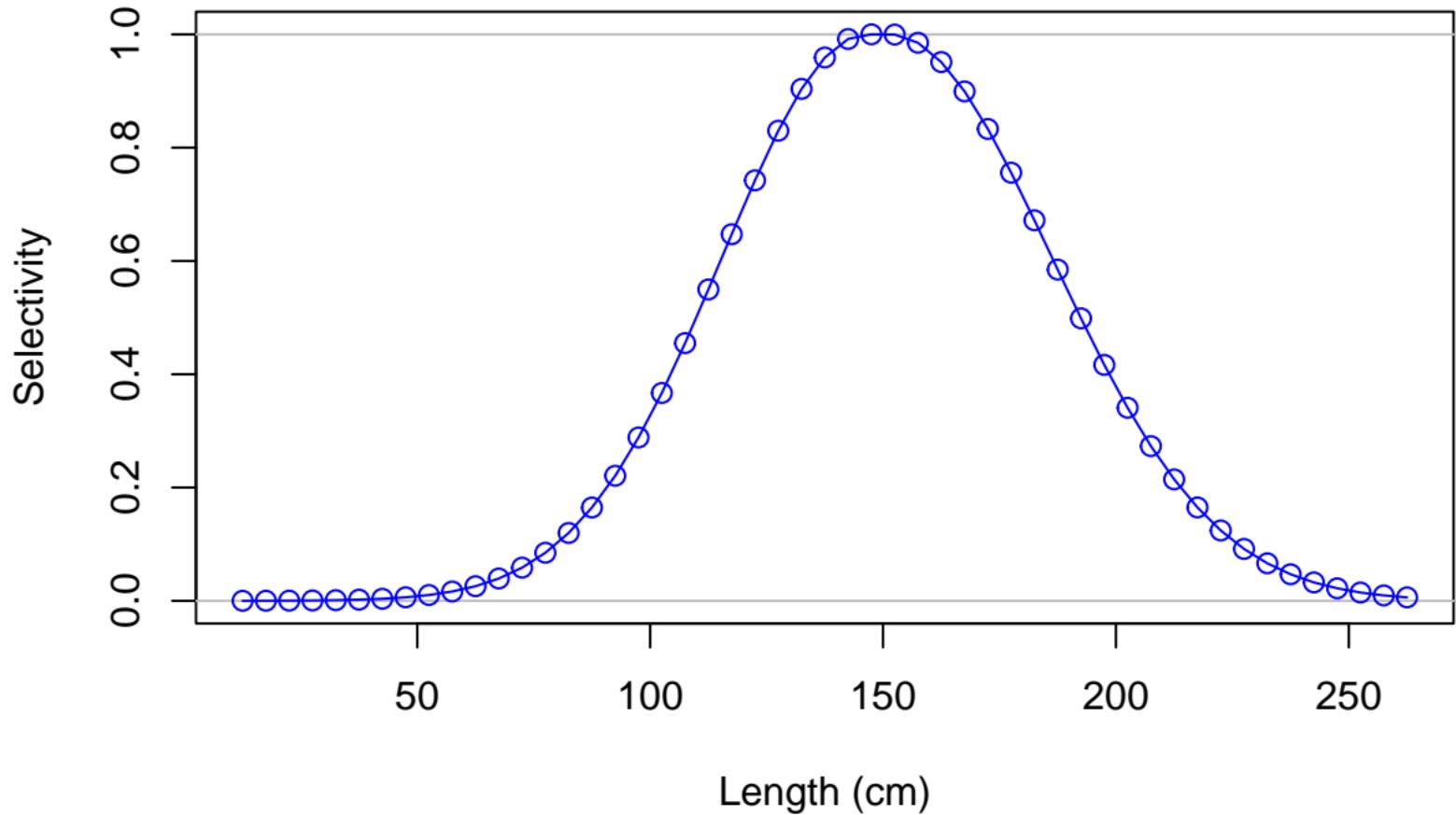
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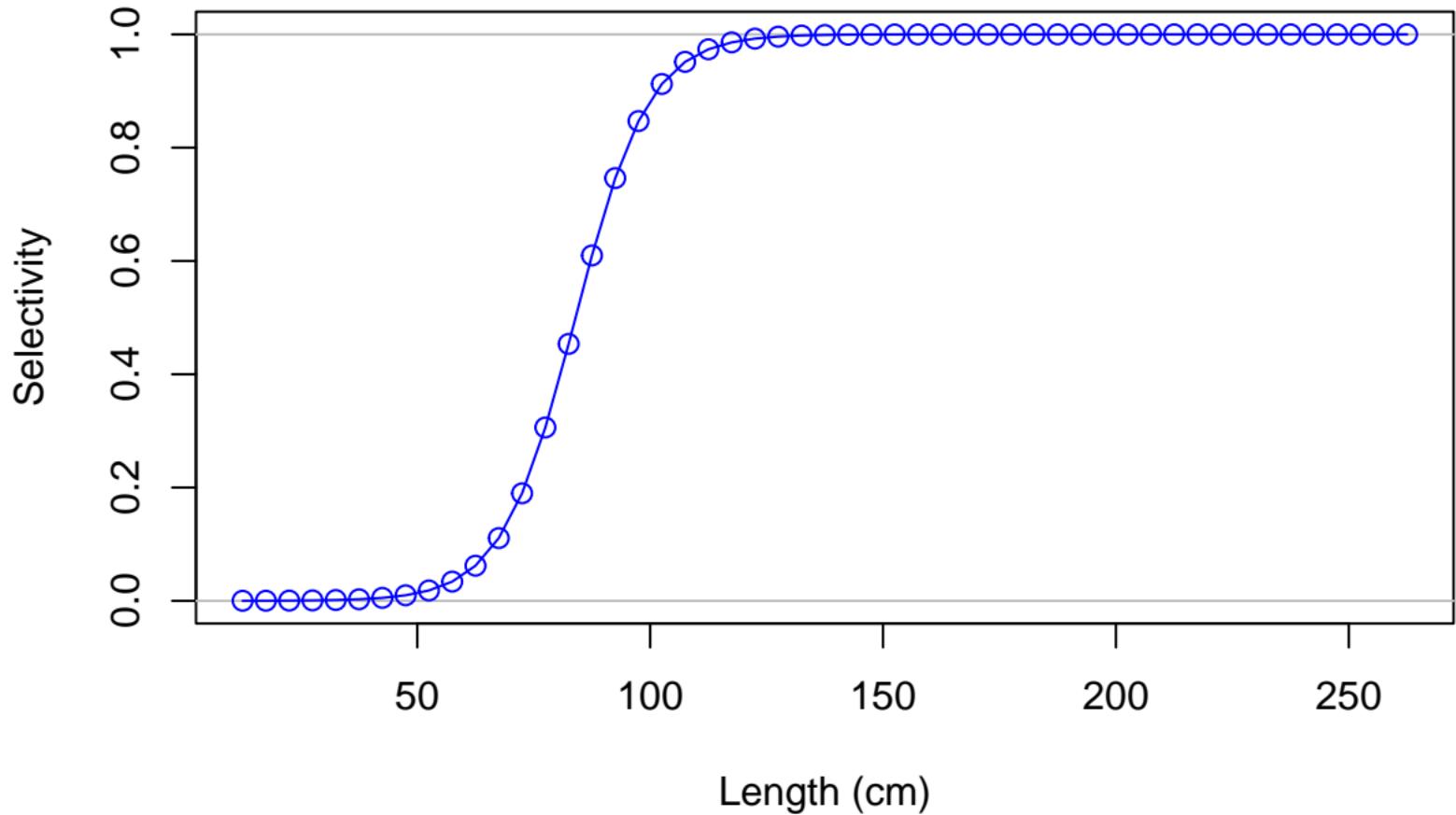
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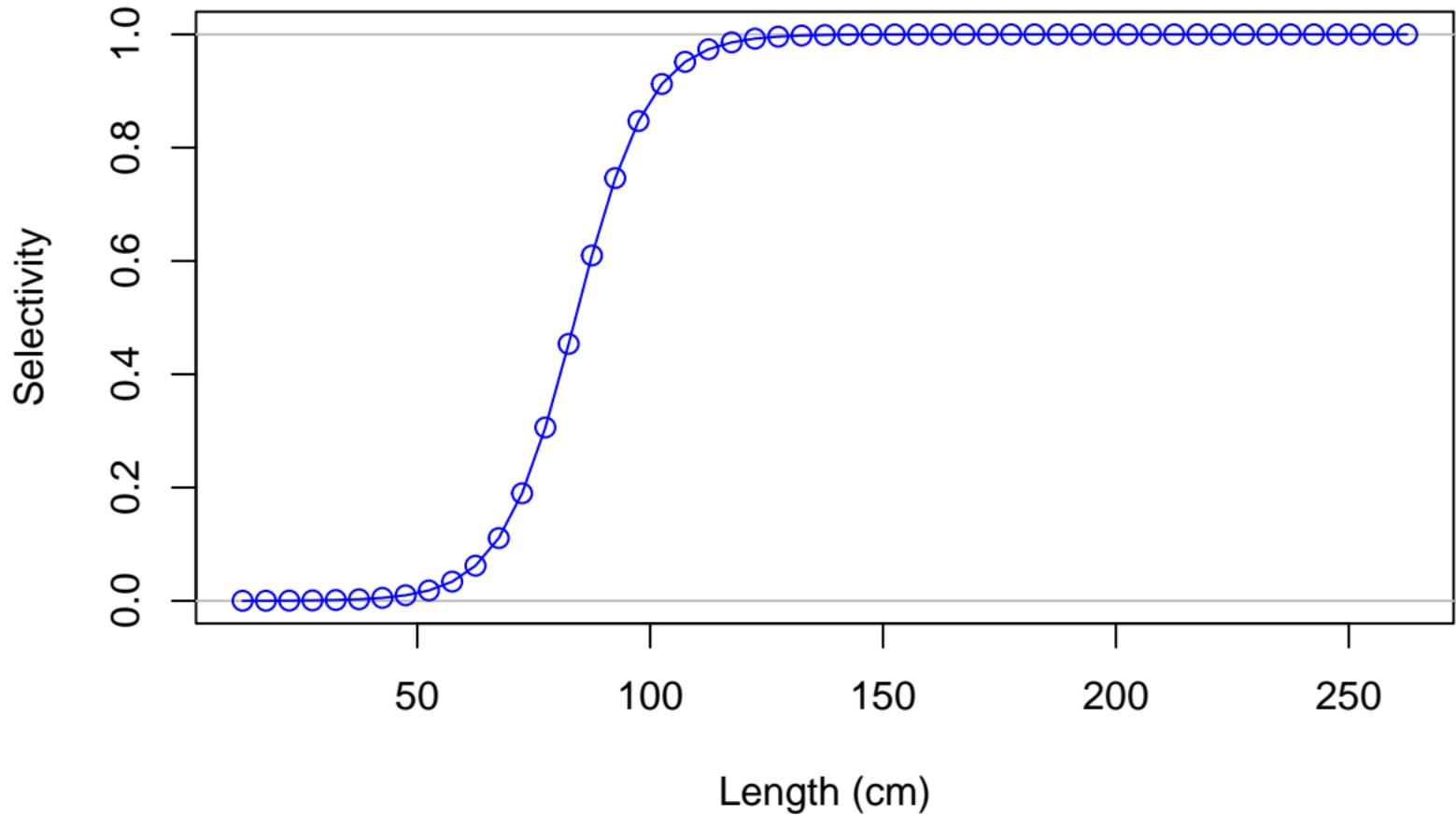


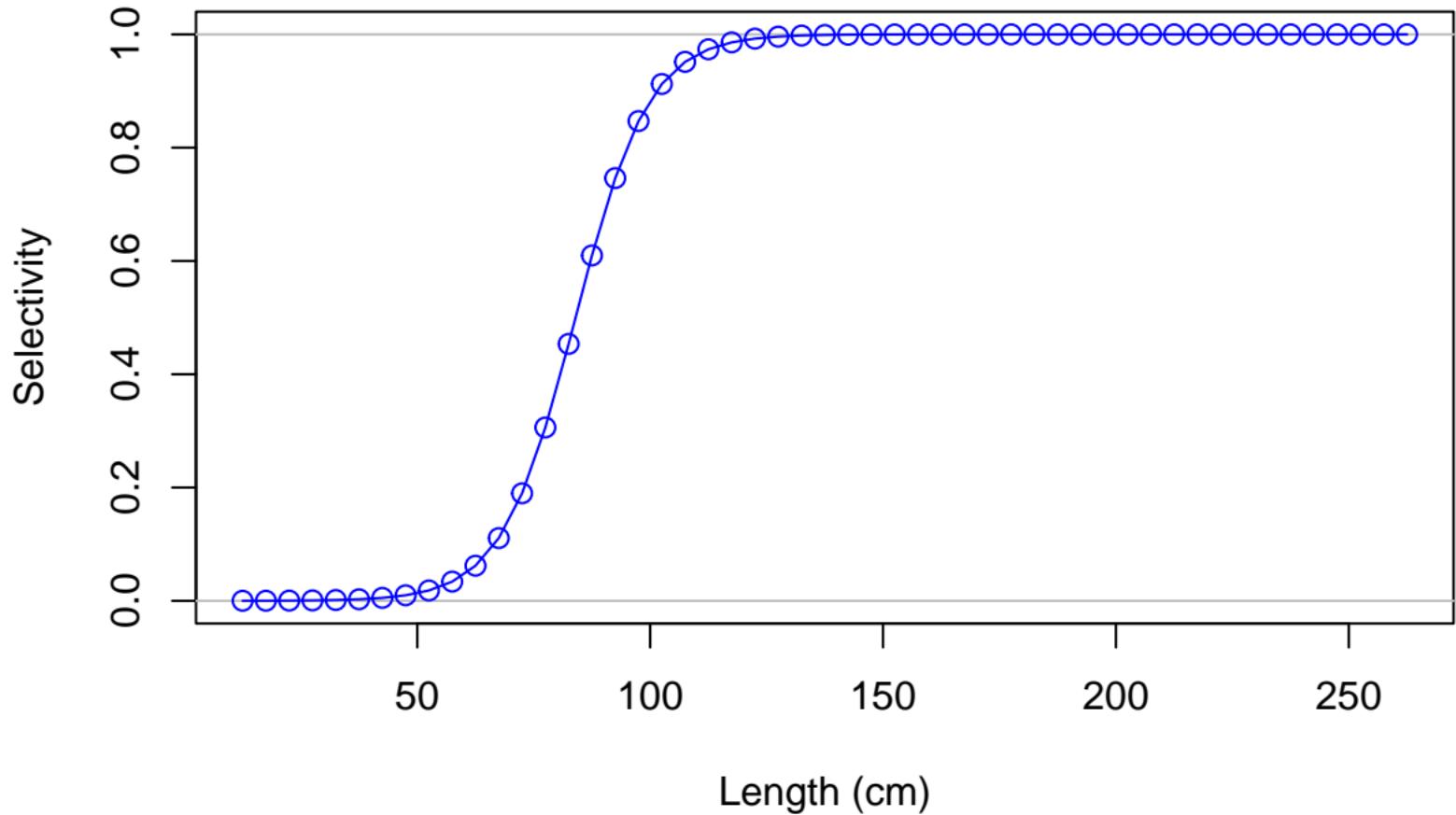


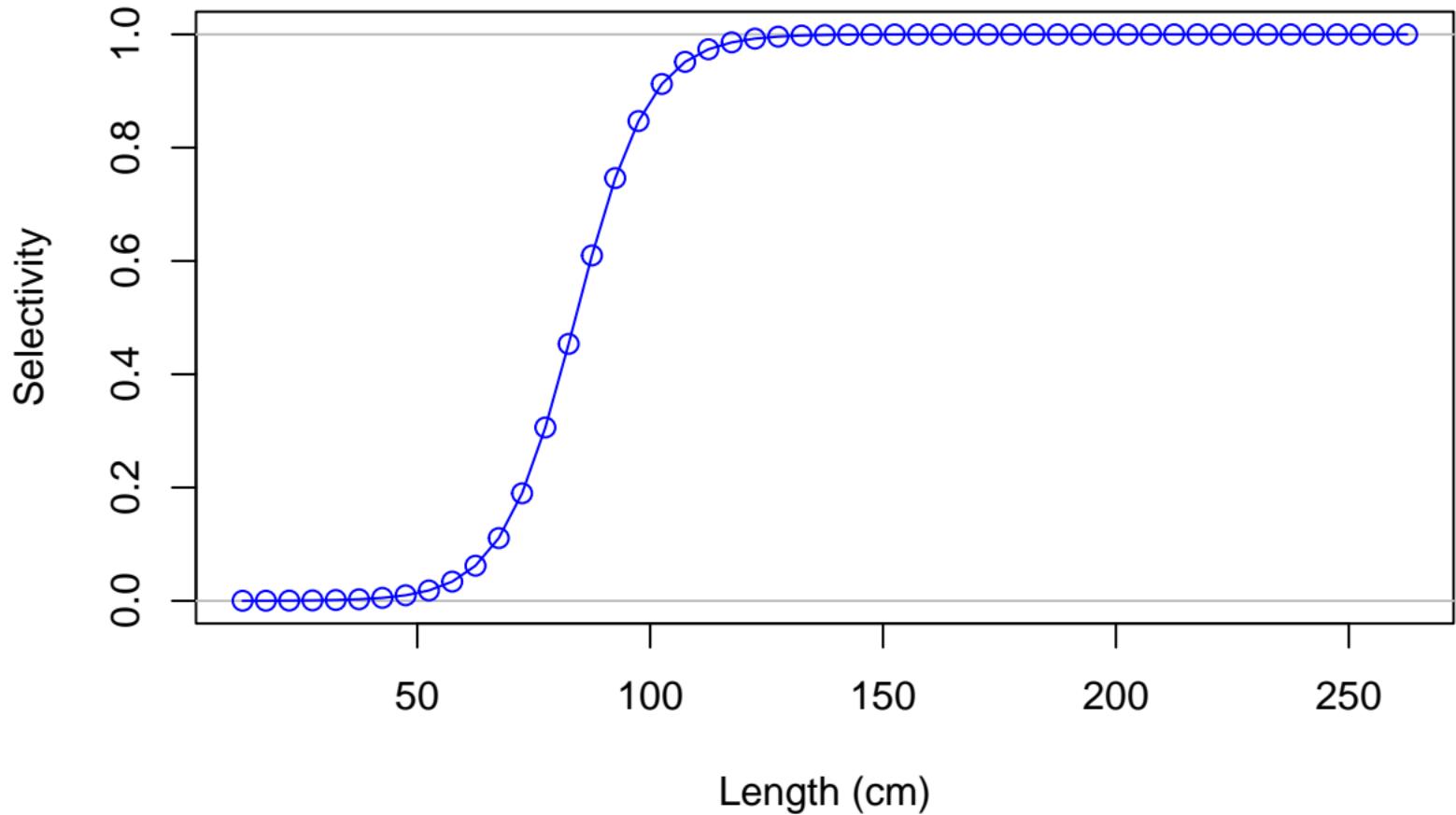


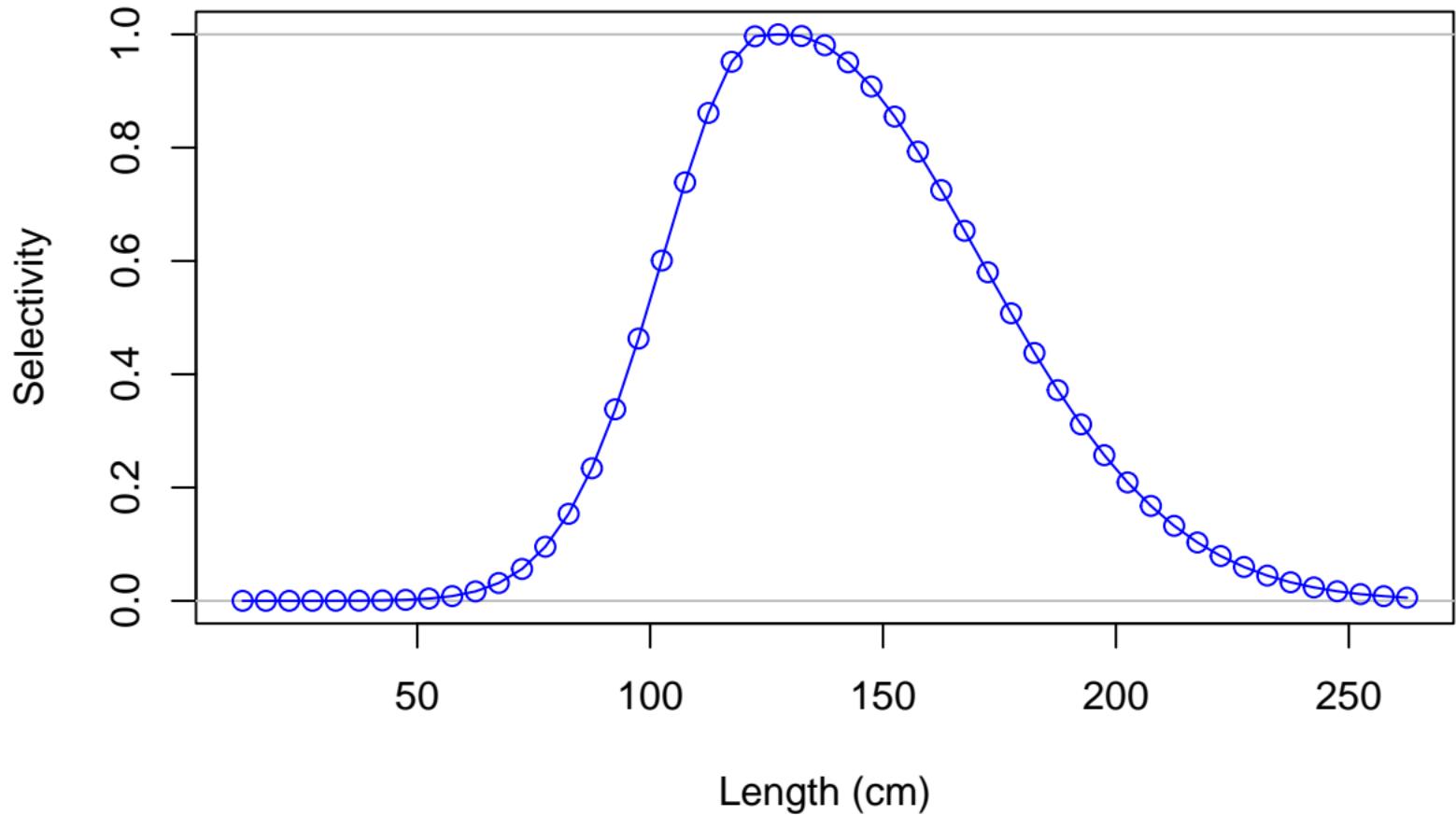


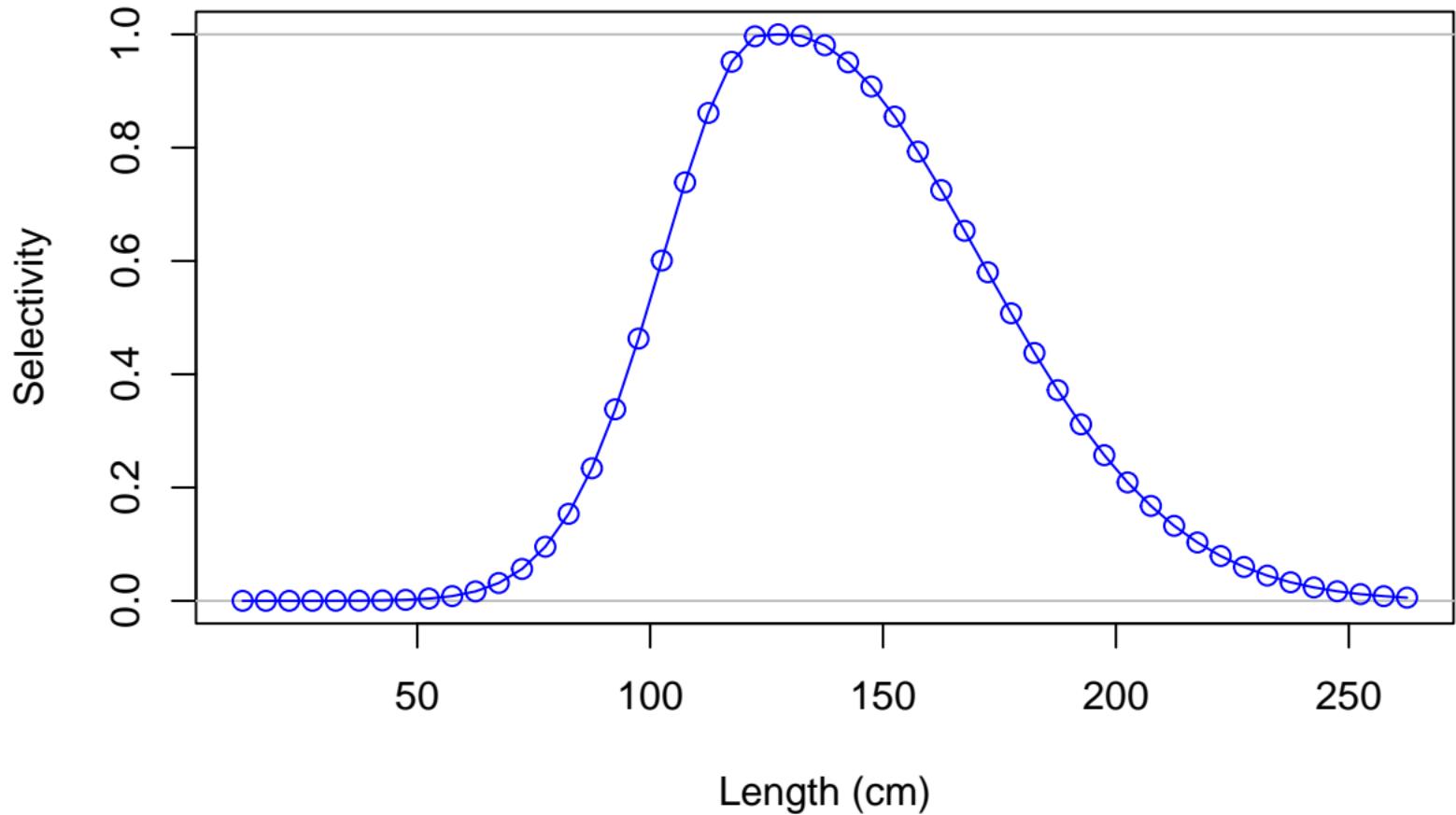


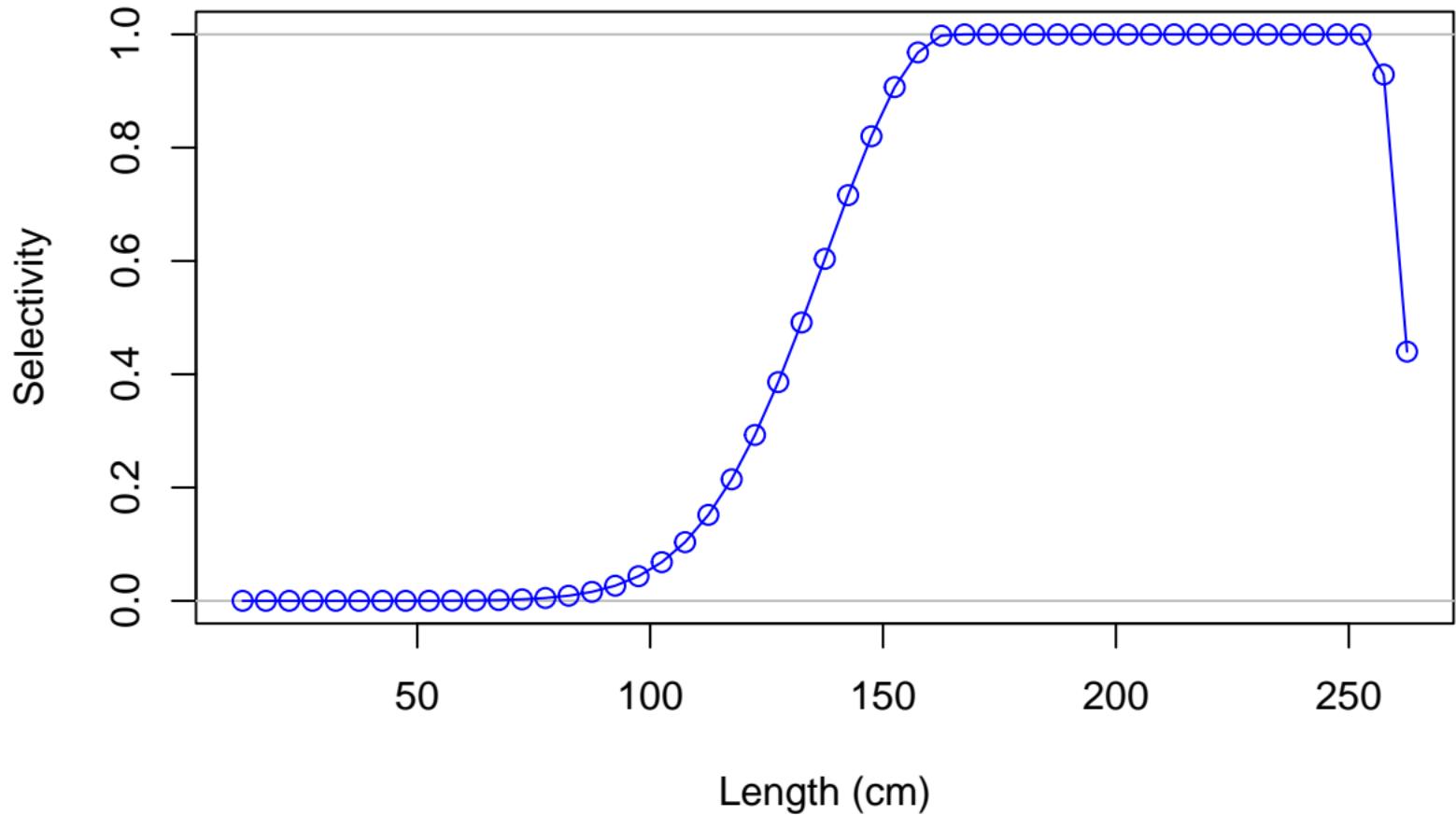


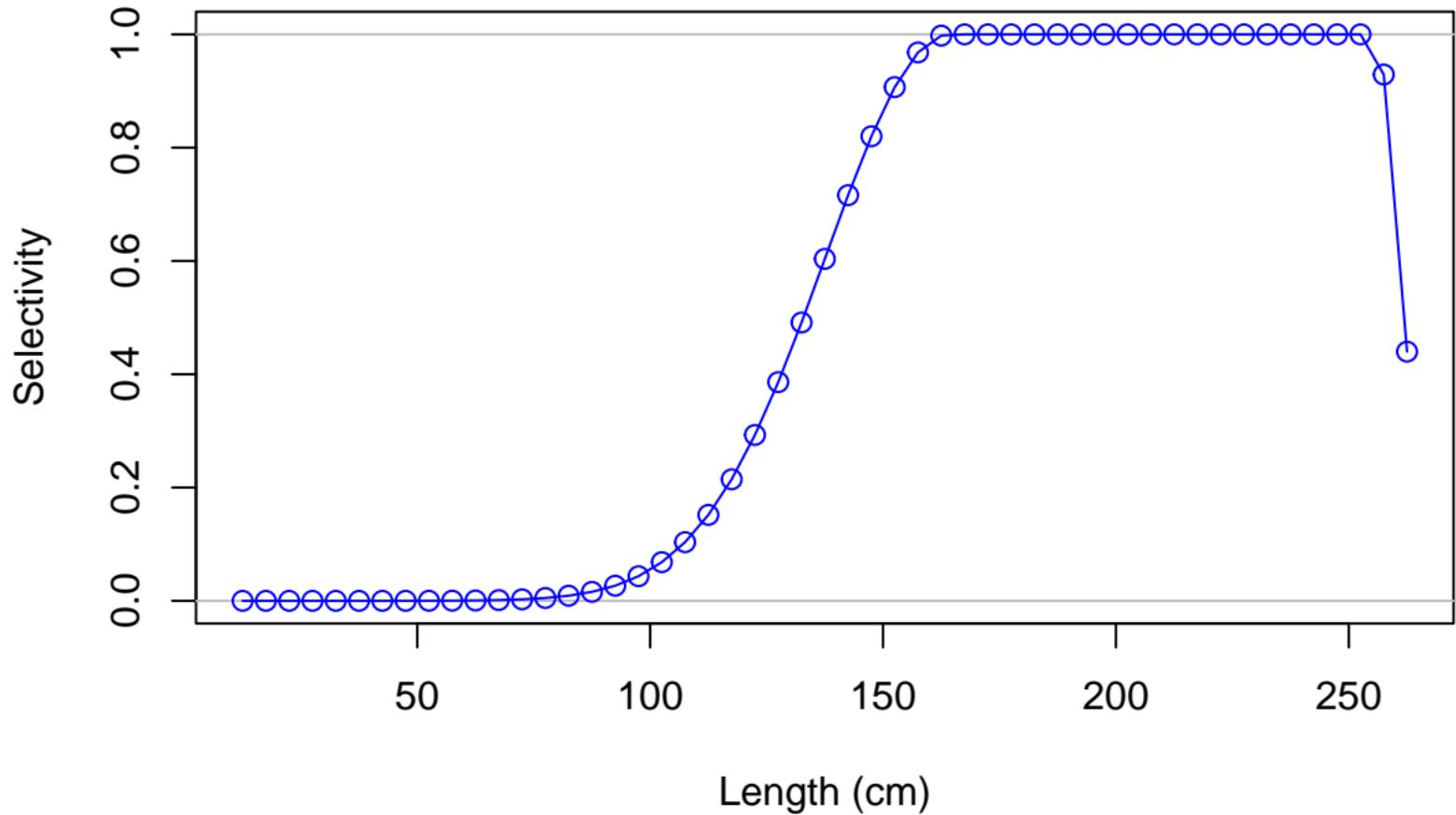


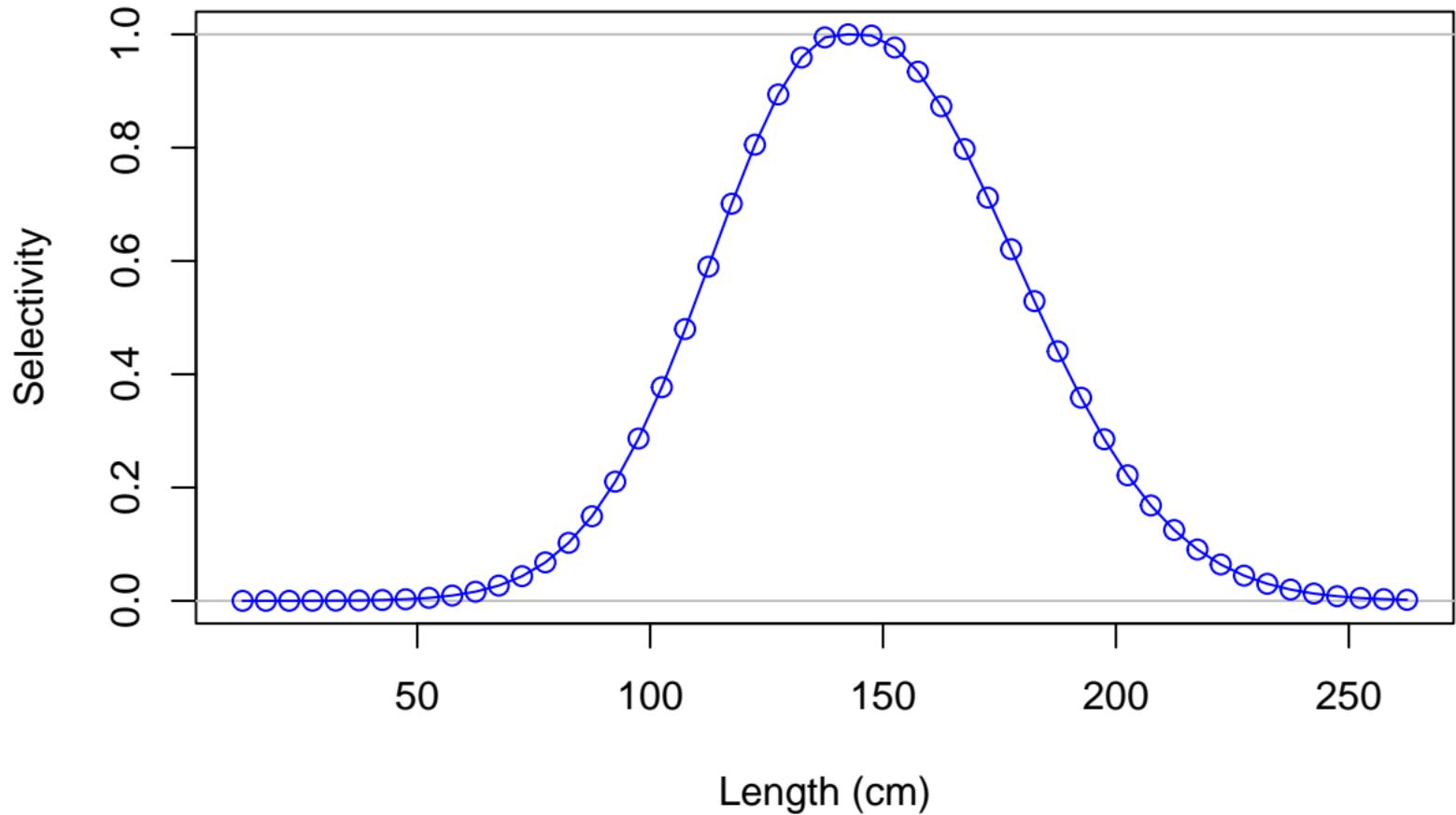


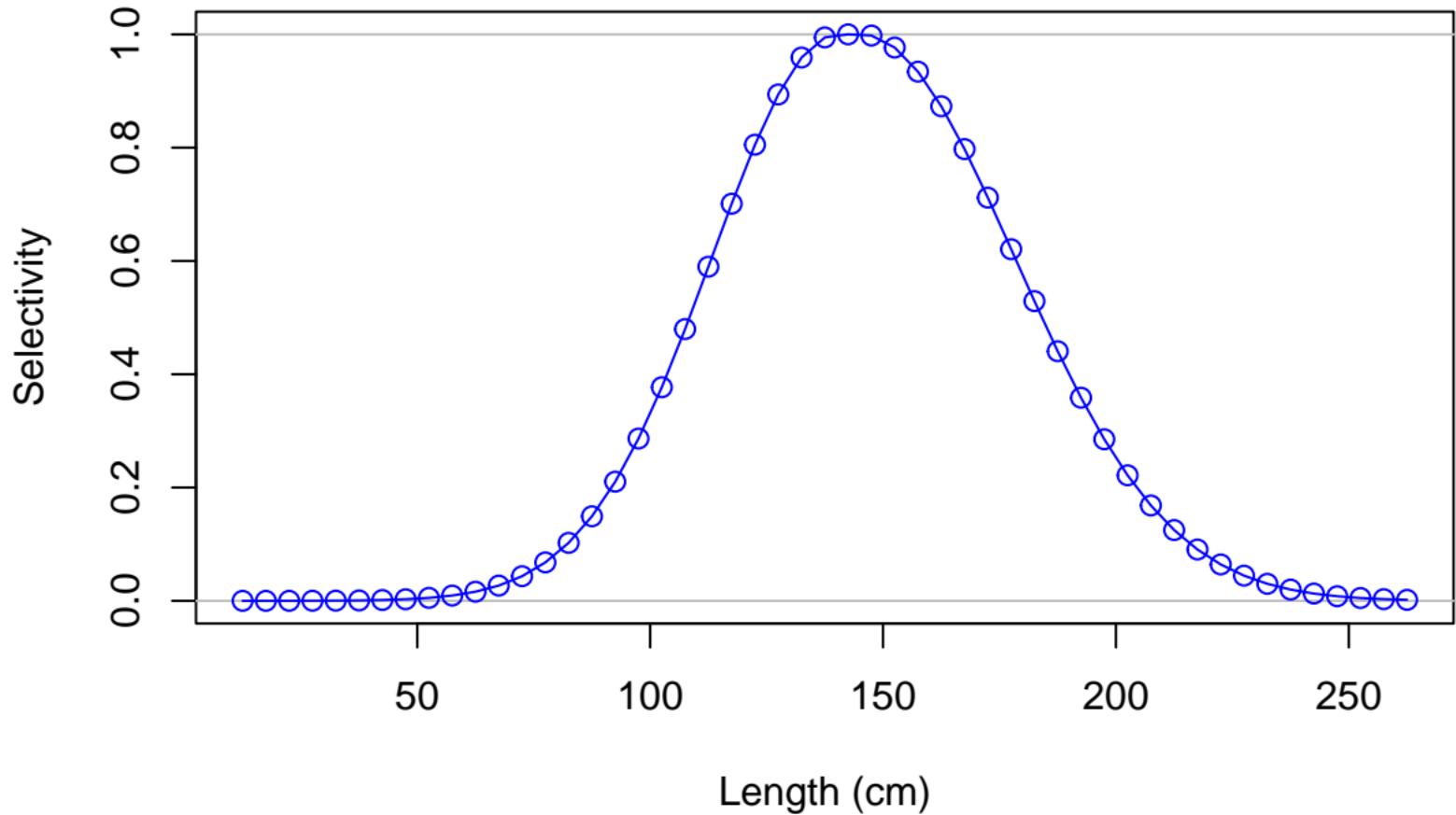


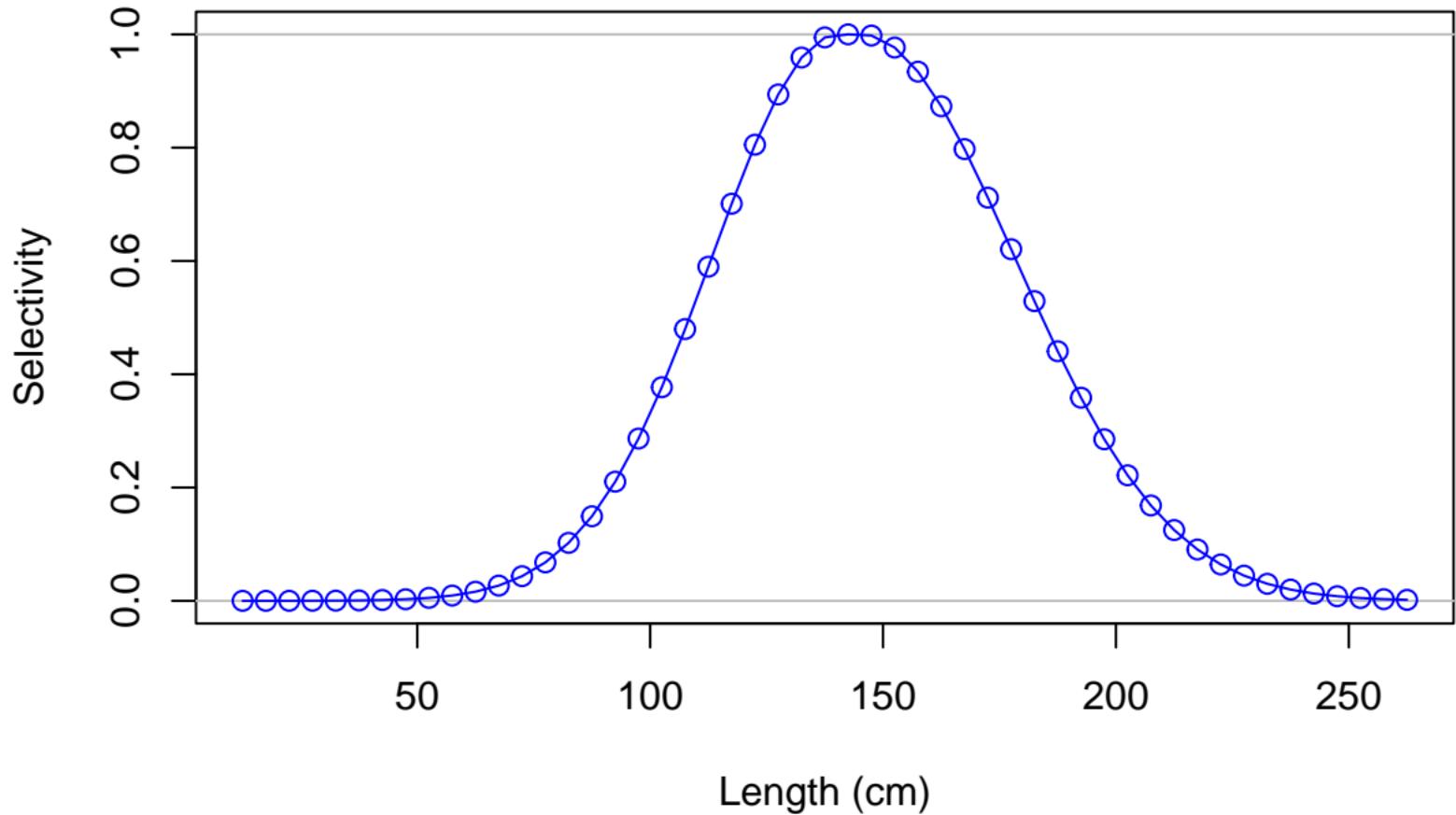


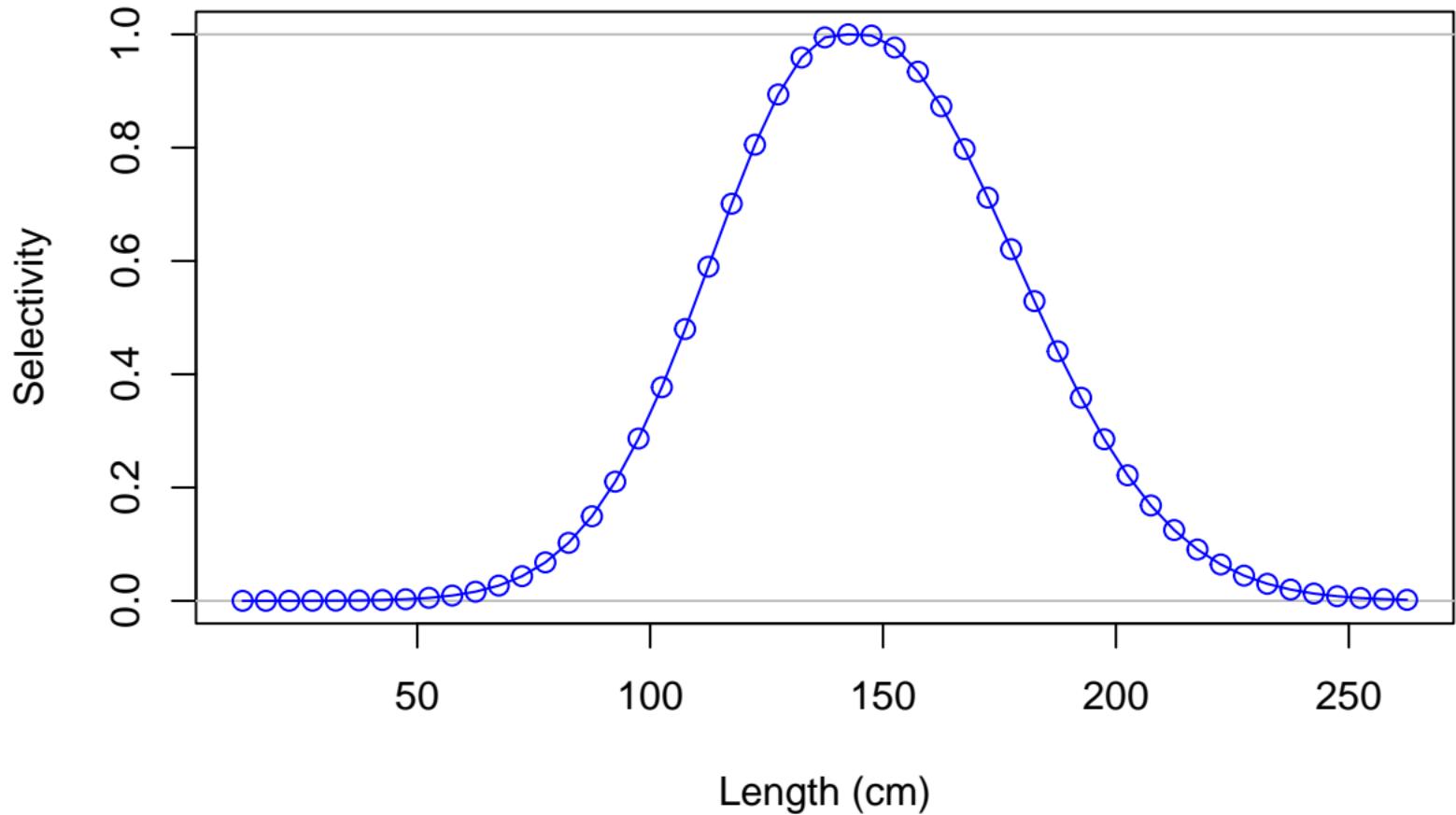


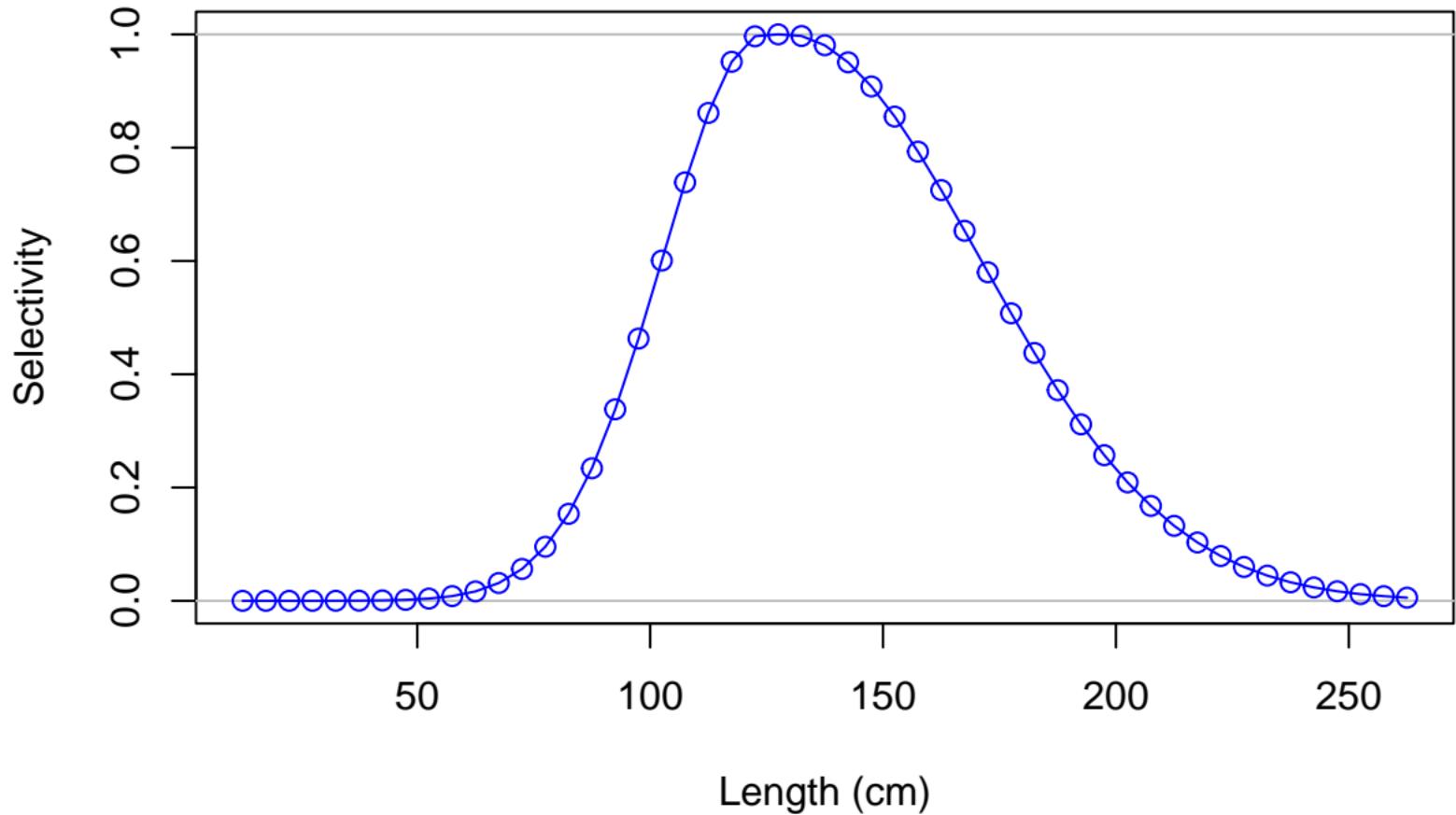


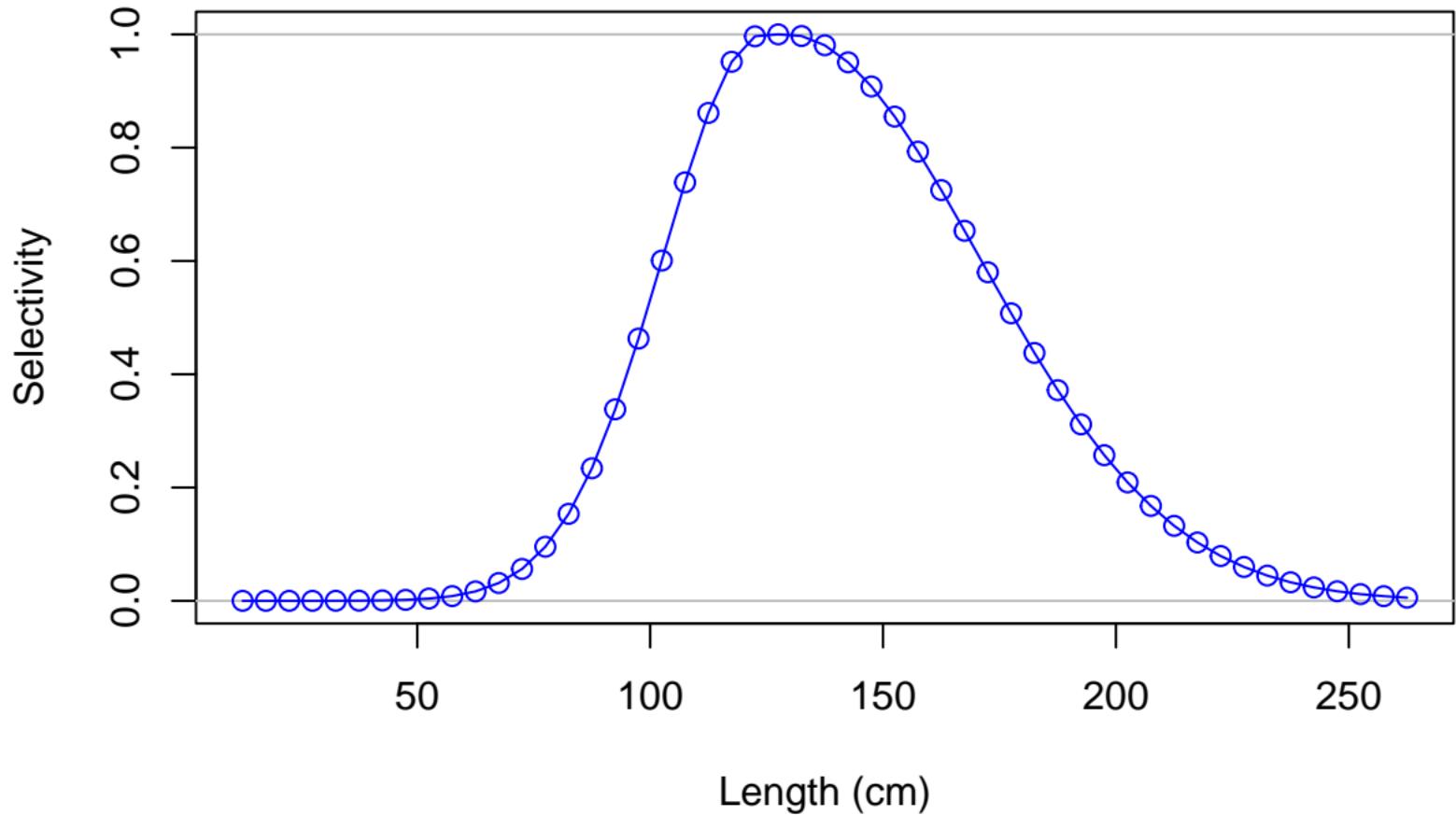


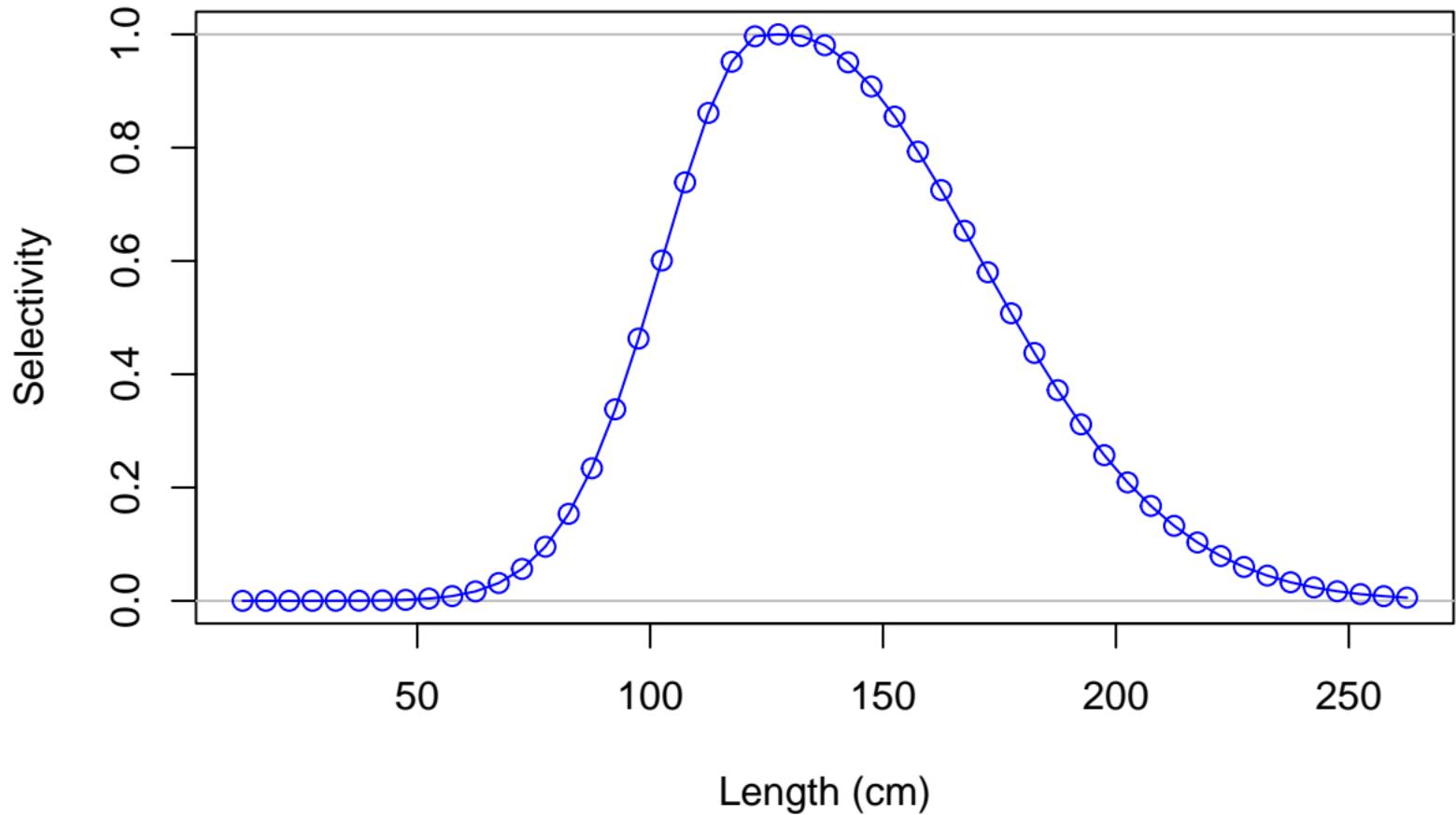


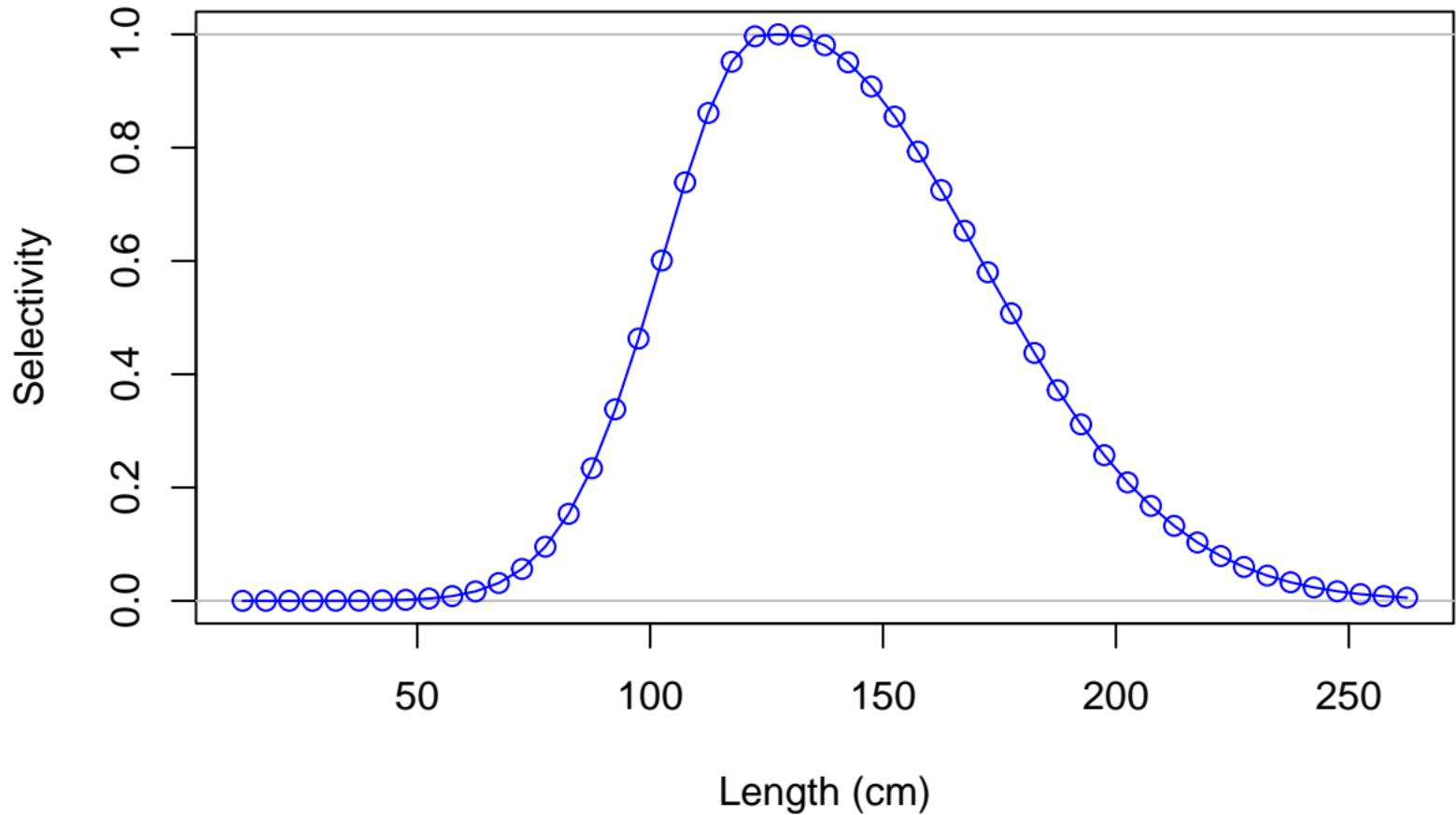


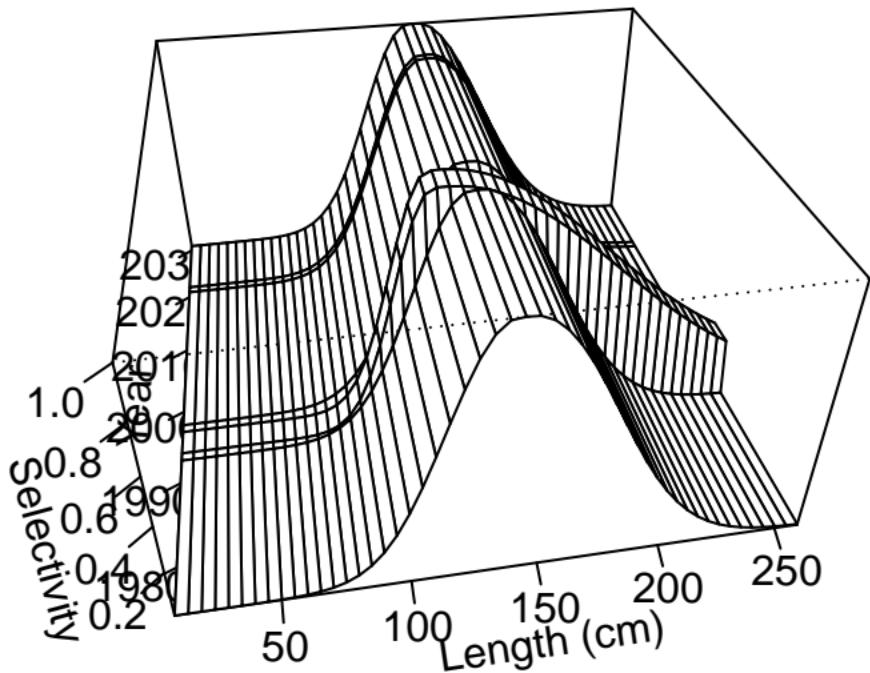


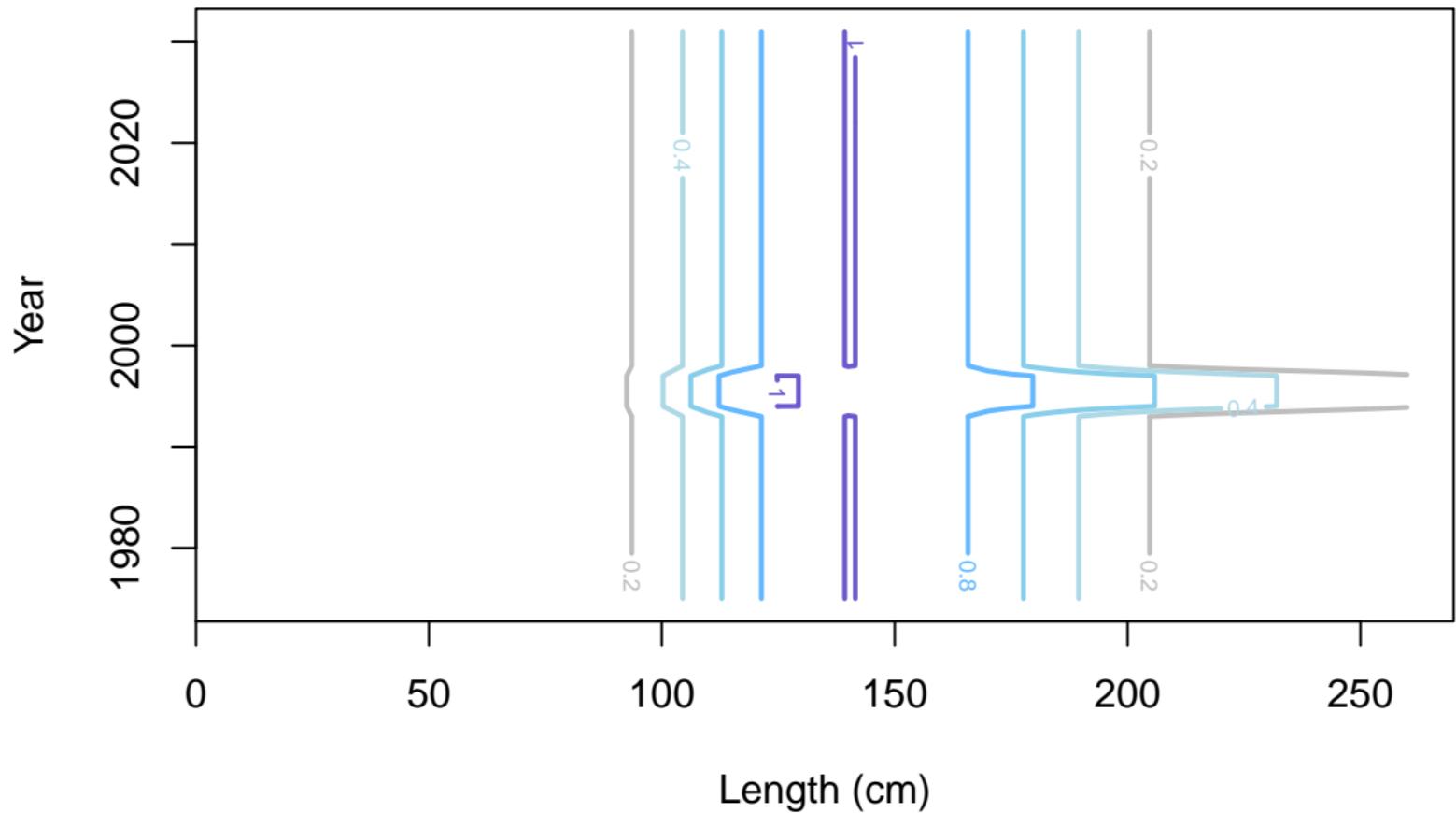


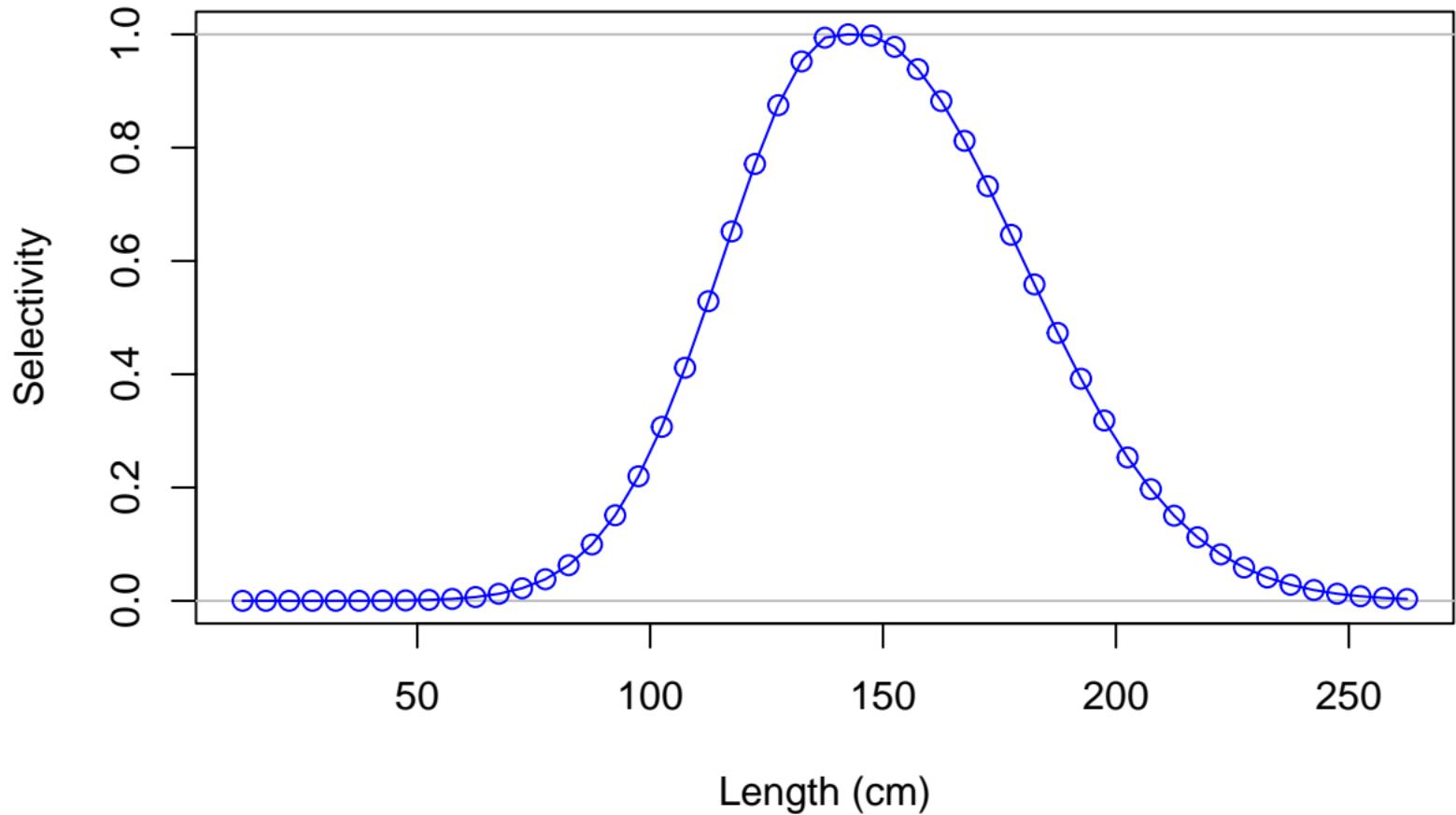


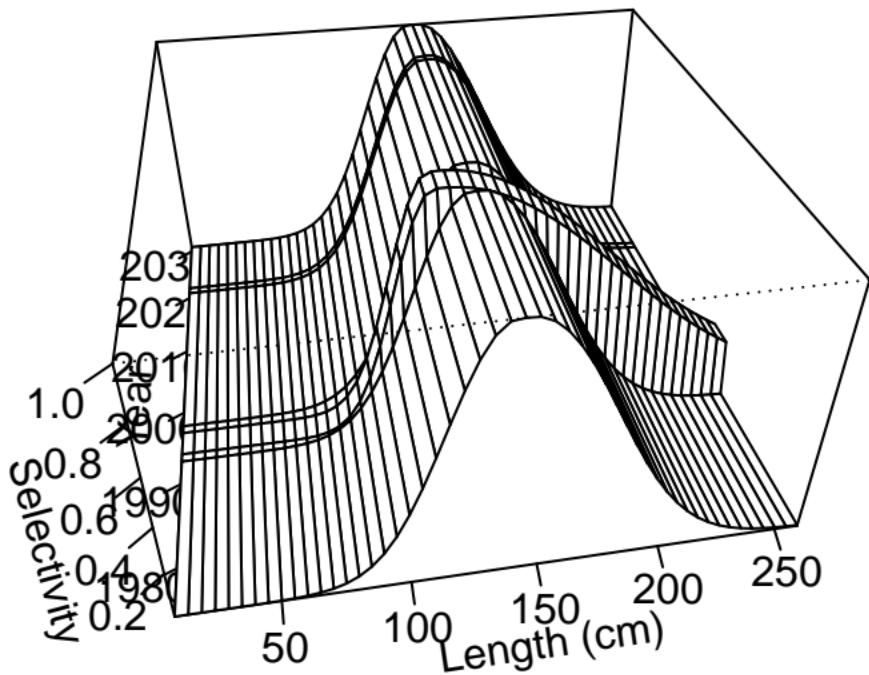


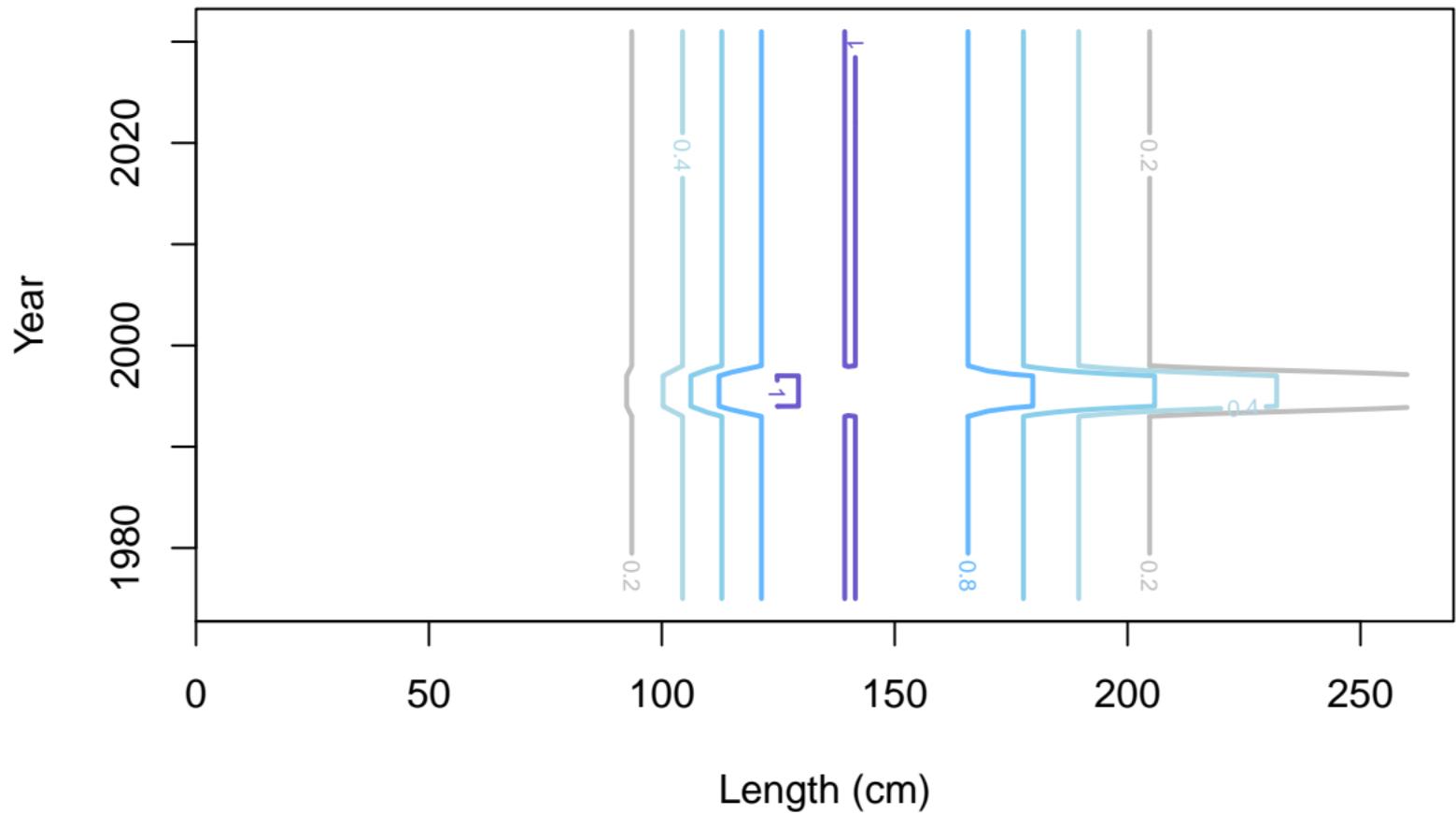


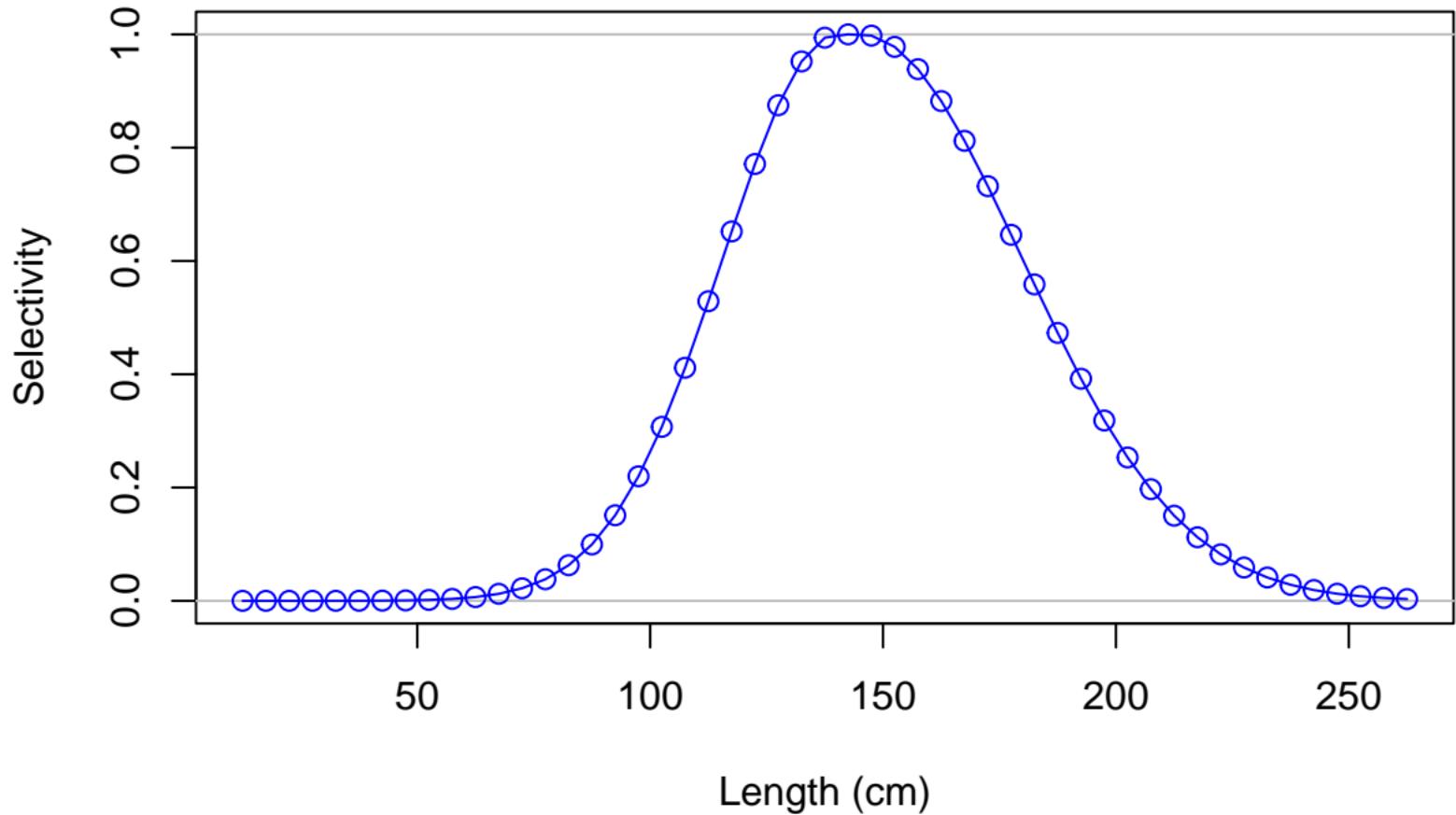


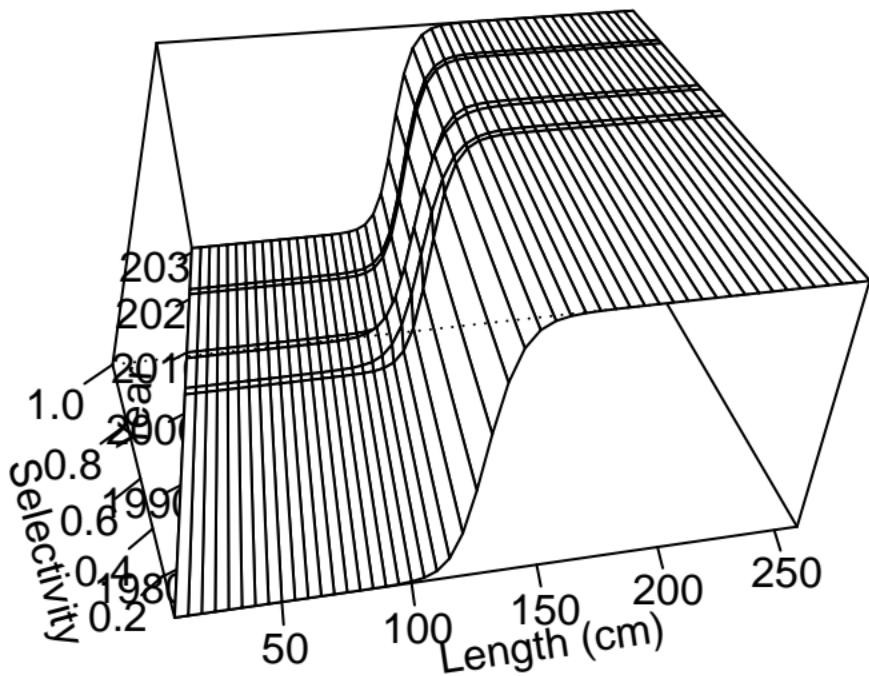












Year

1980 2000 2020

0

50

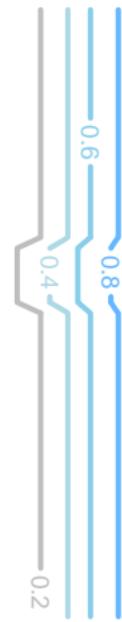
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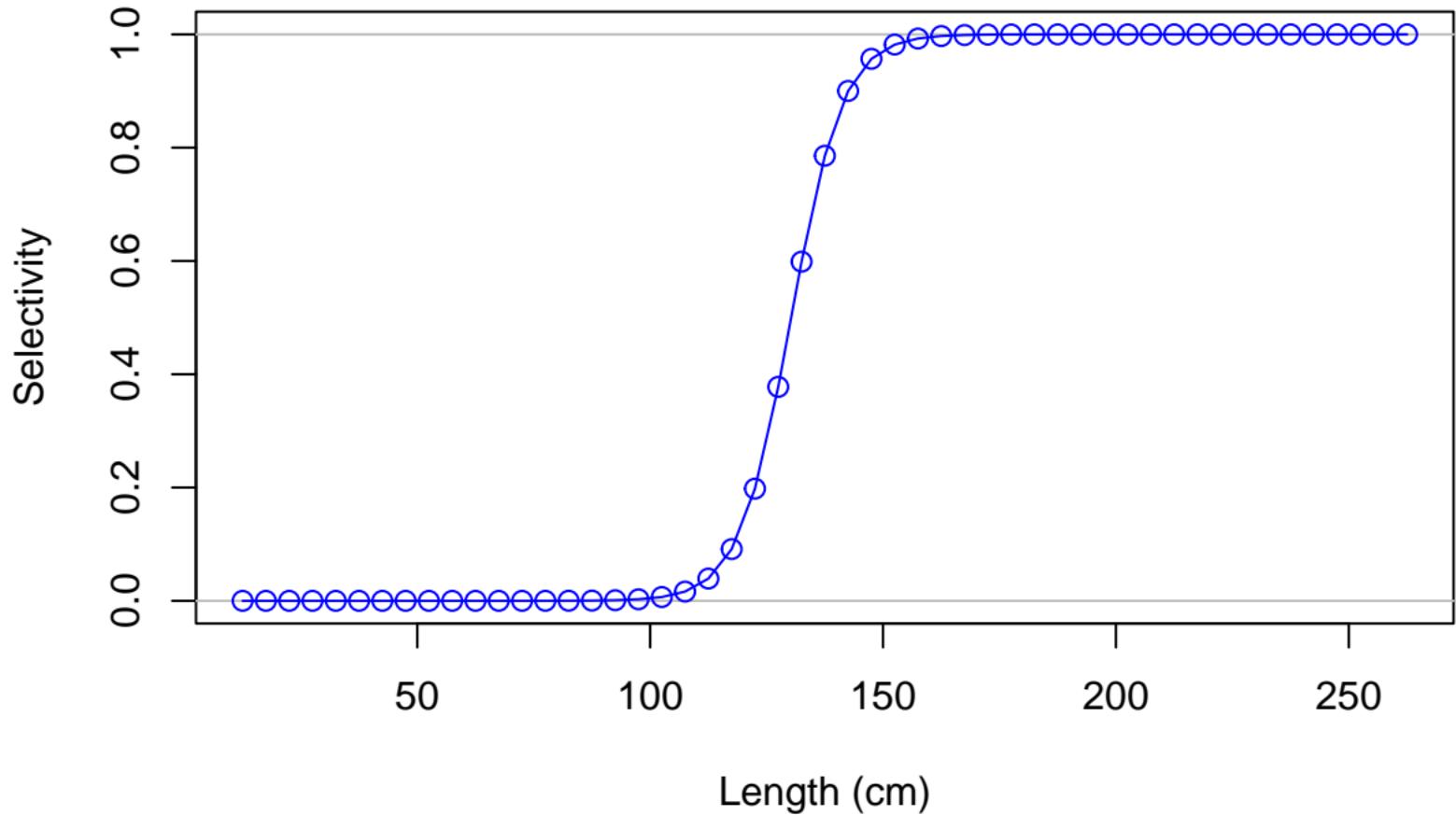
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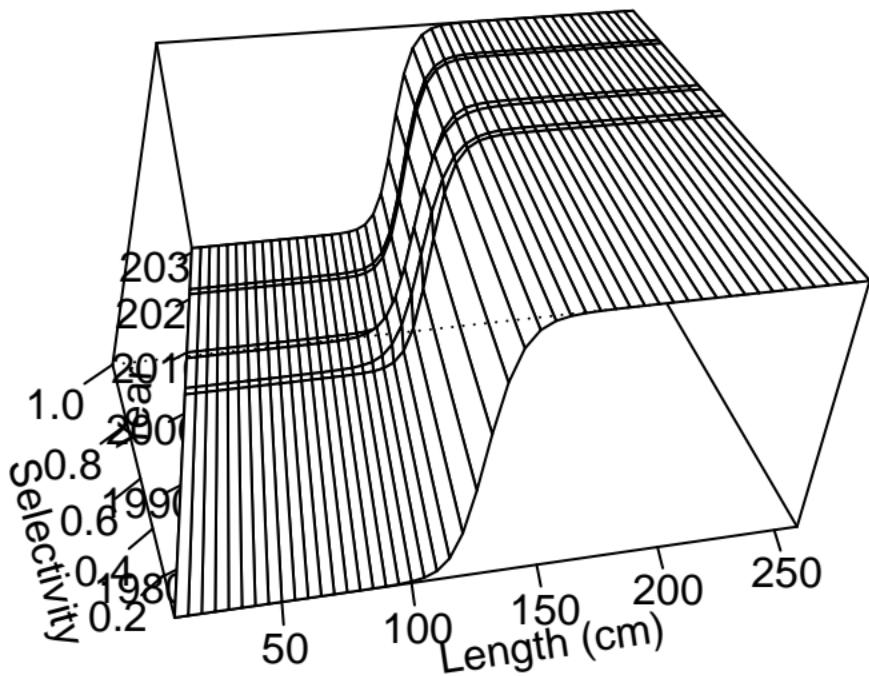
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Length (cm)







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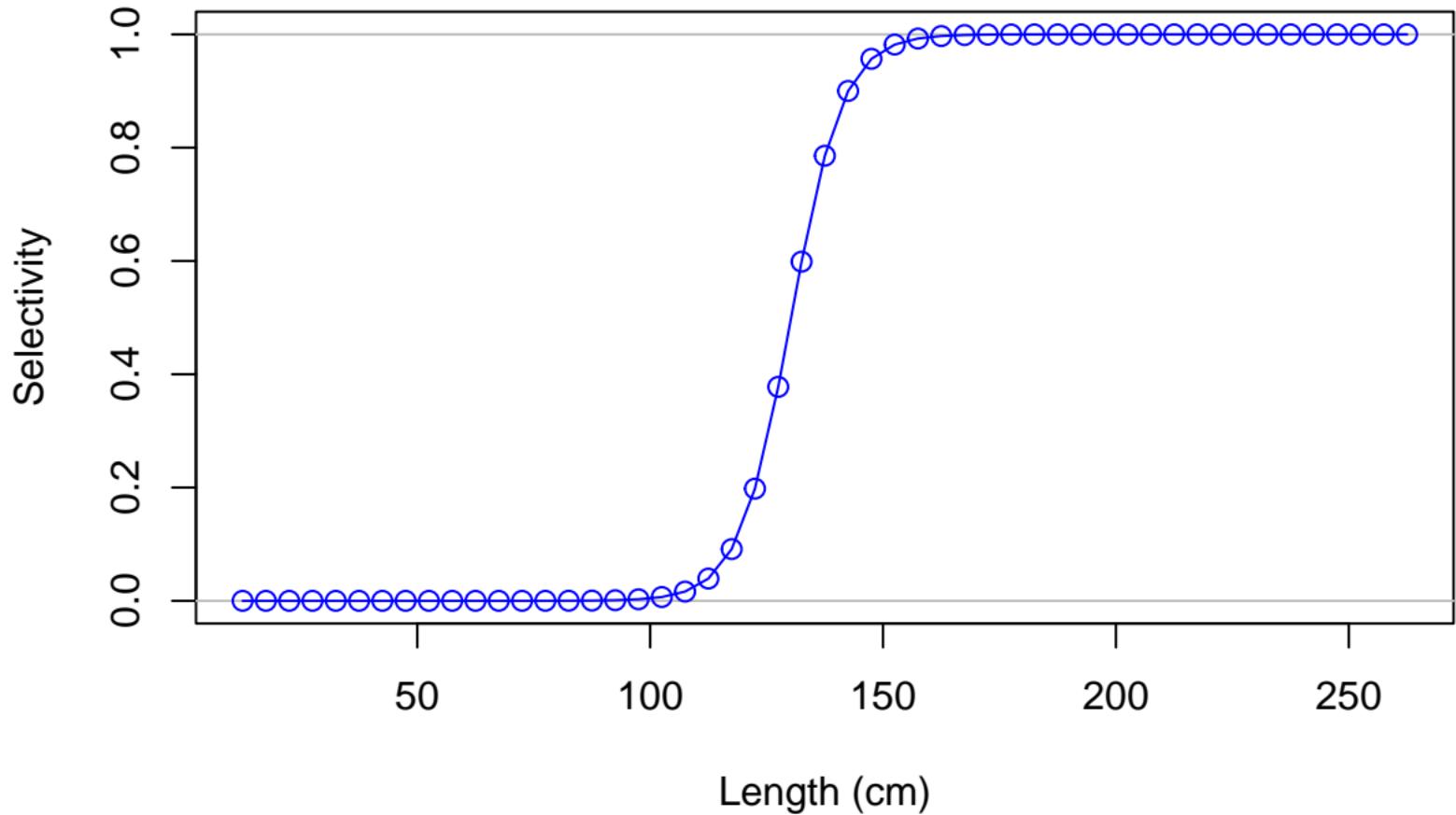
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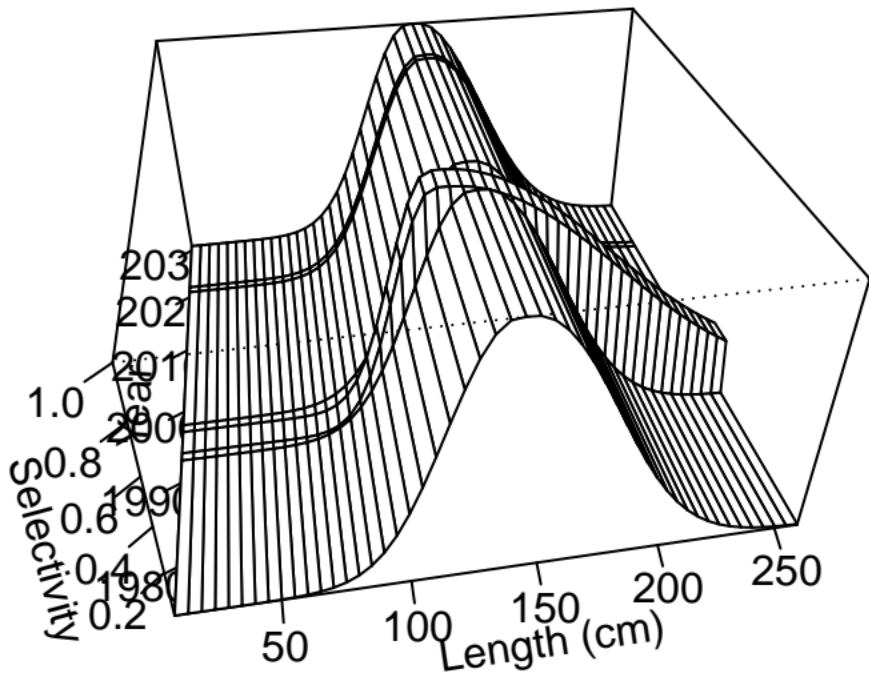
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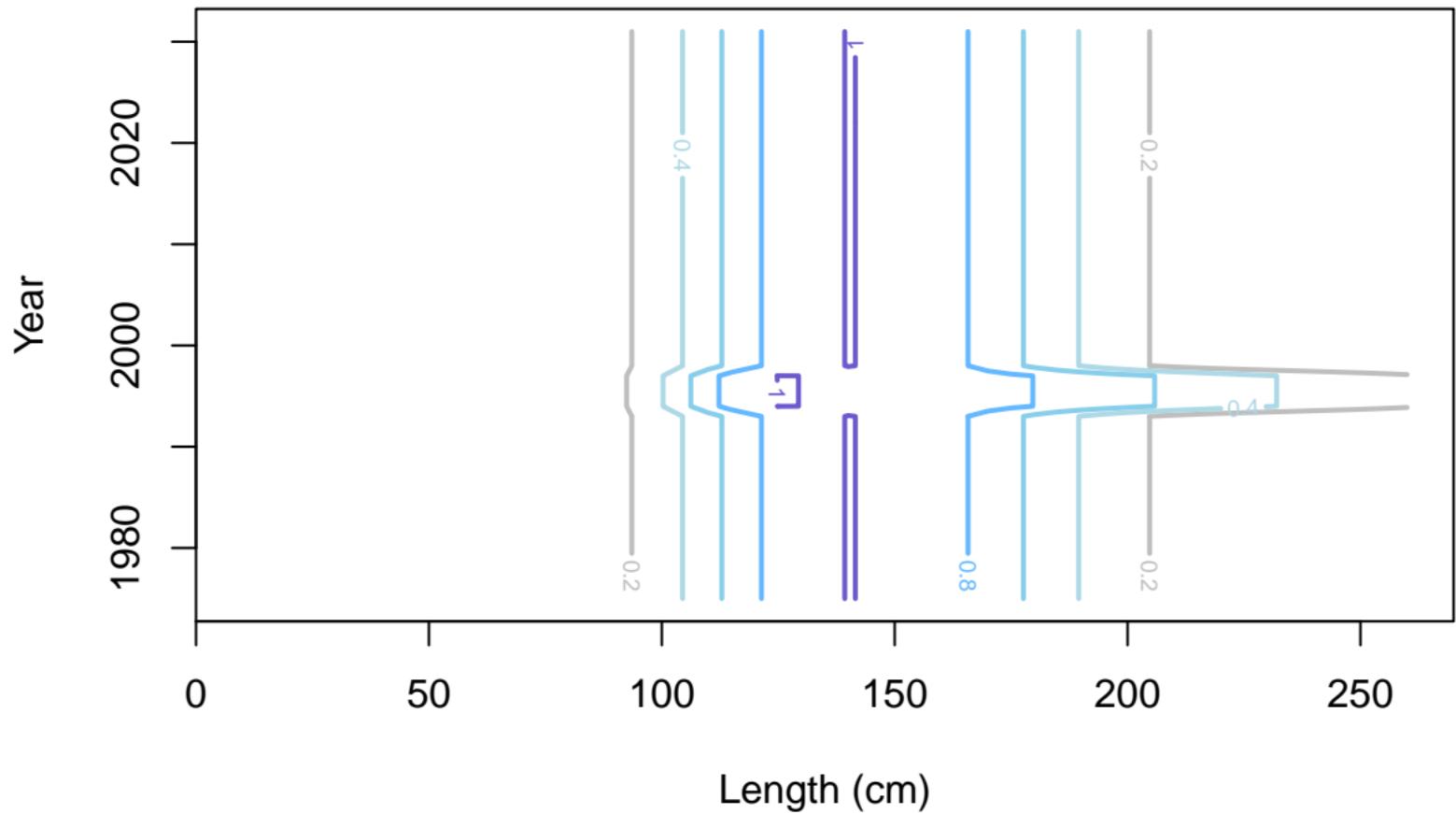
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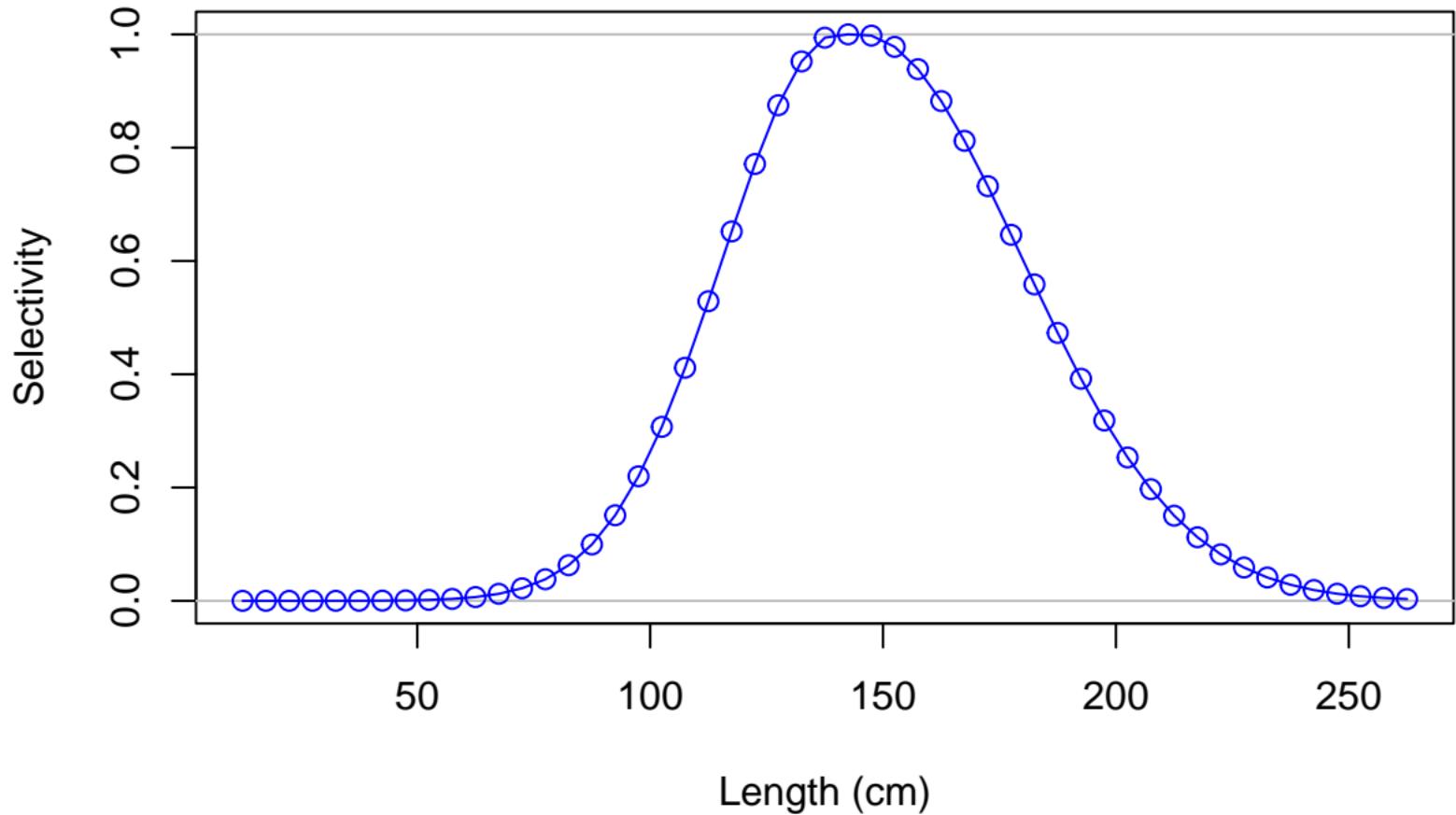
Length (cm)

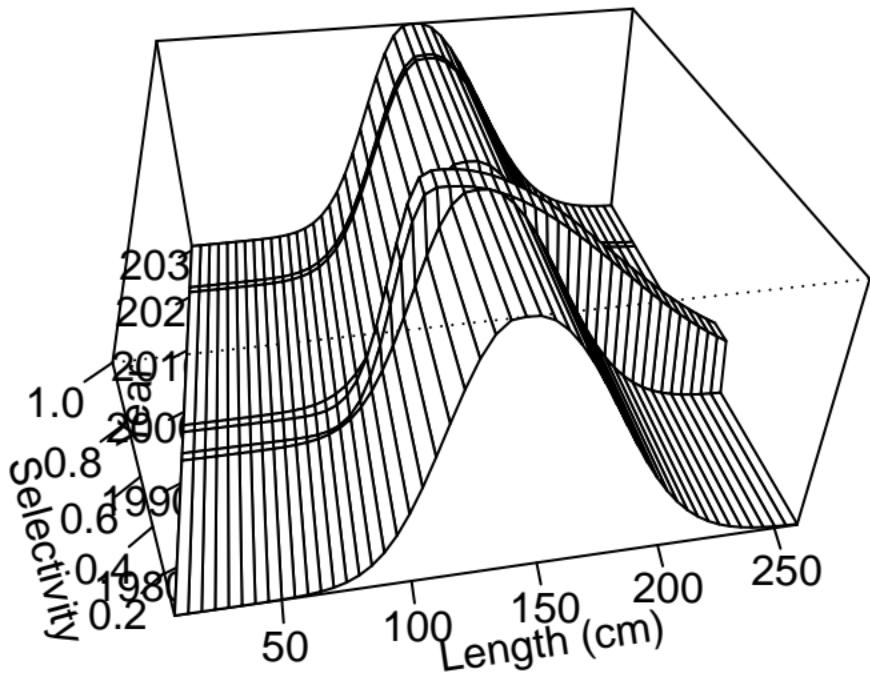


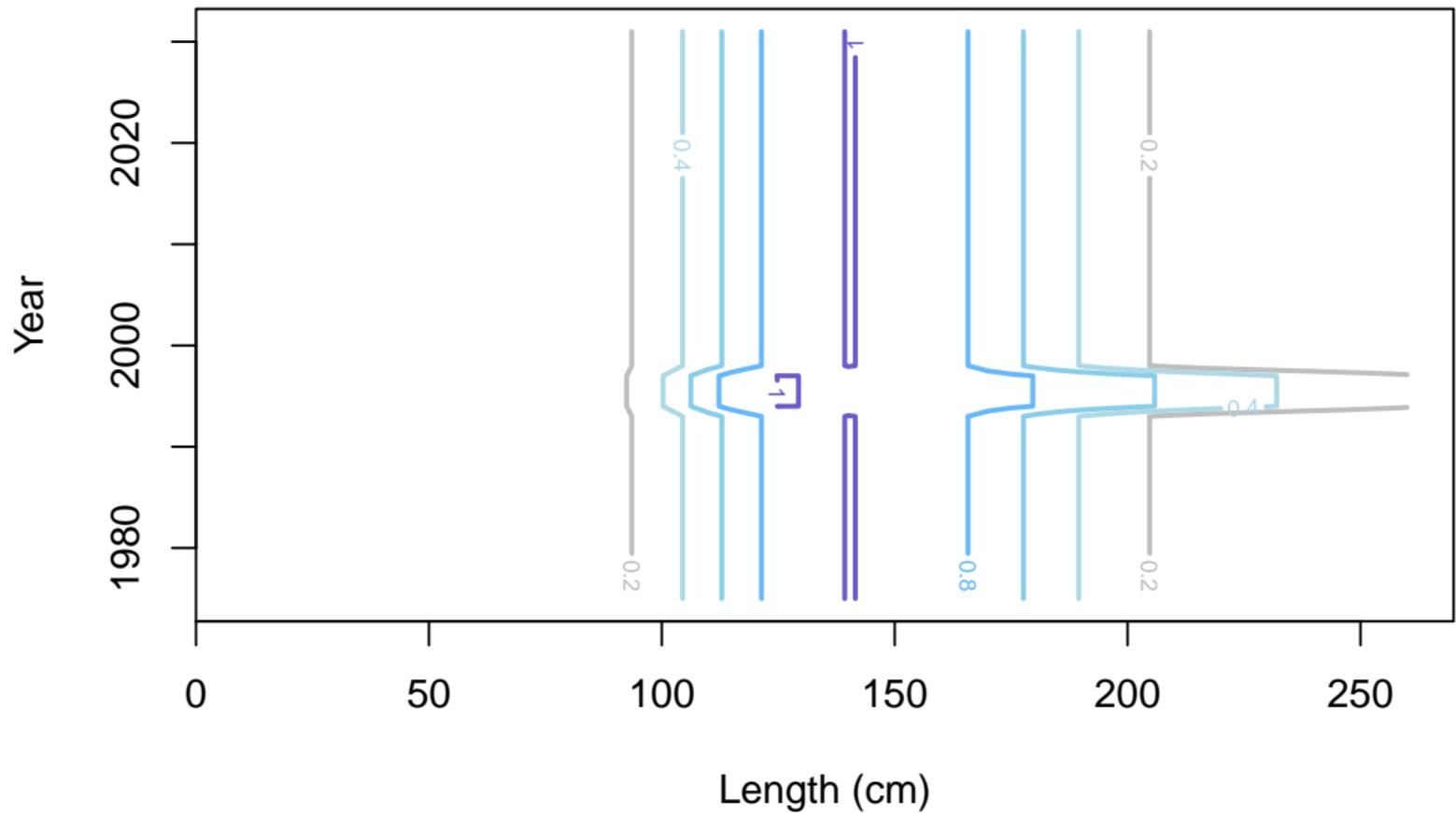


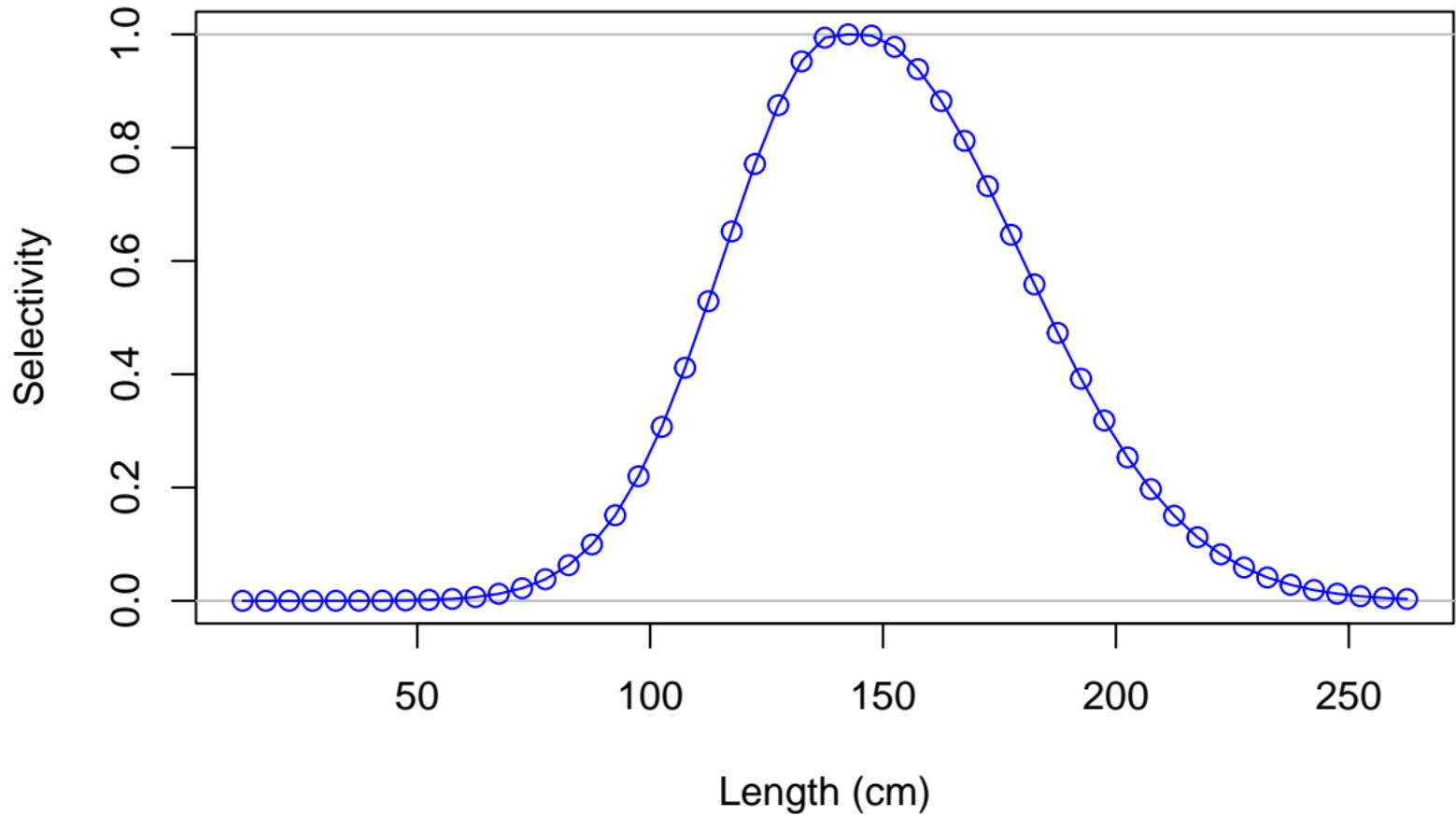


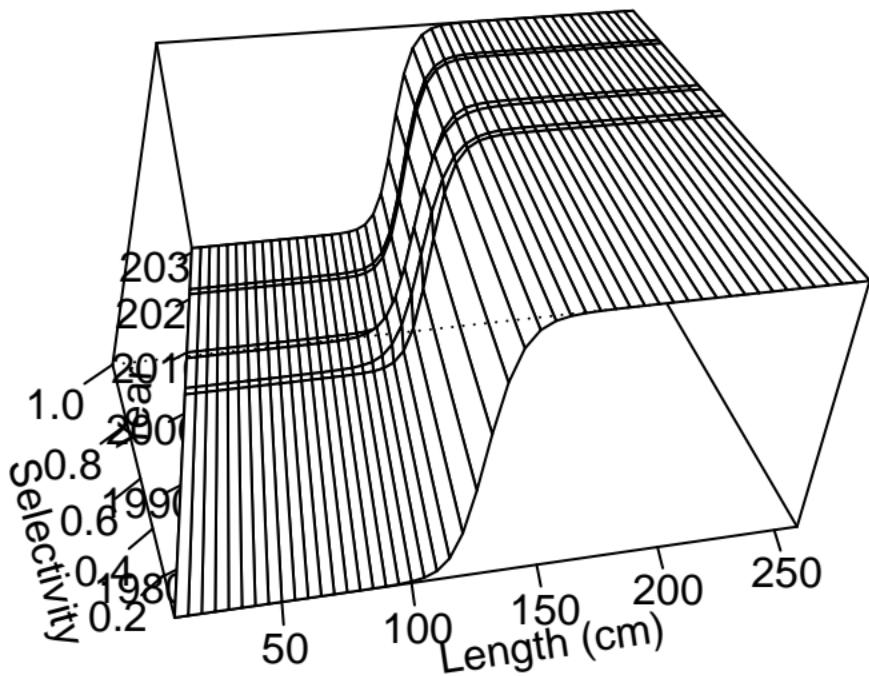












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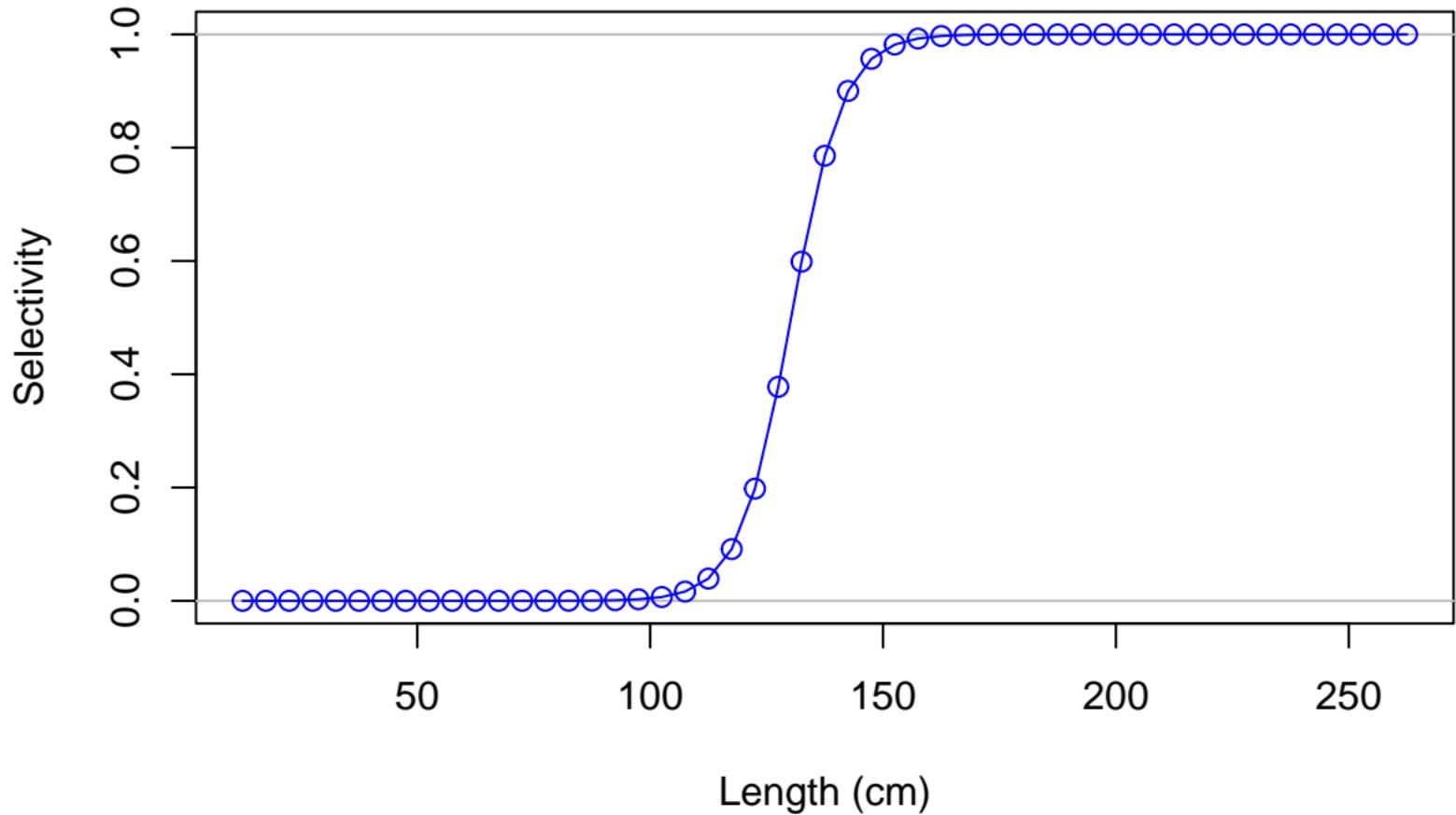
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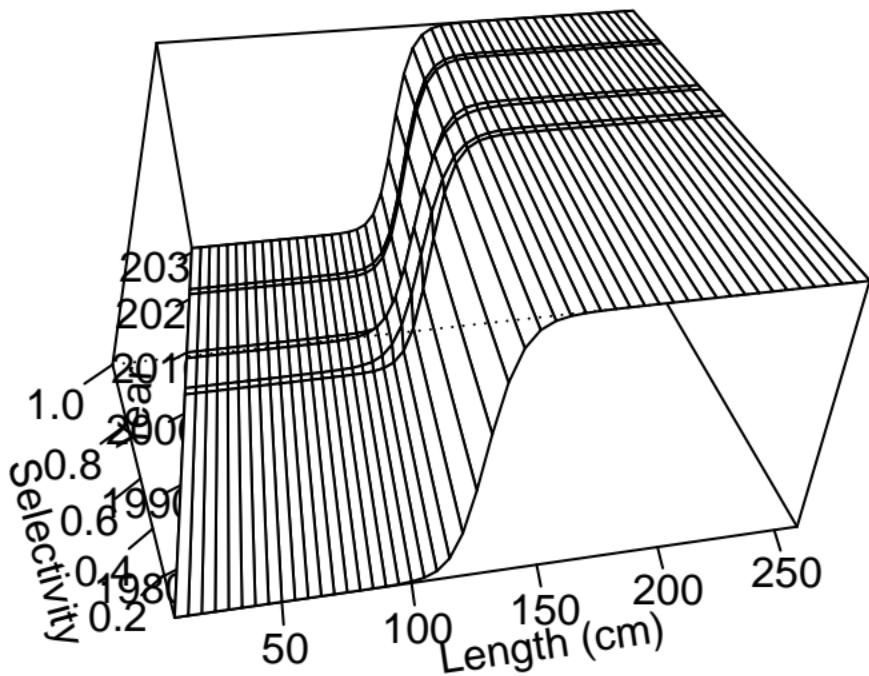
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Length (cm)







Year

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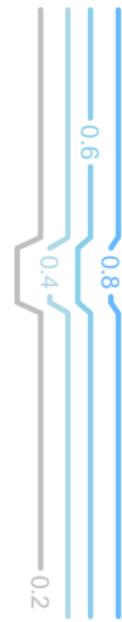
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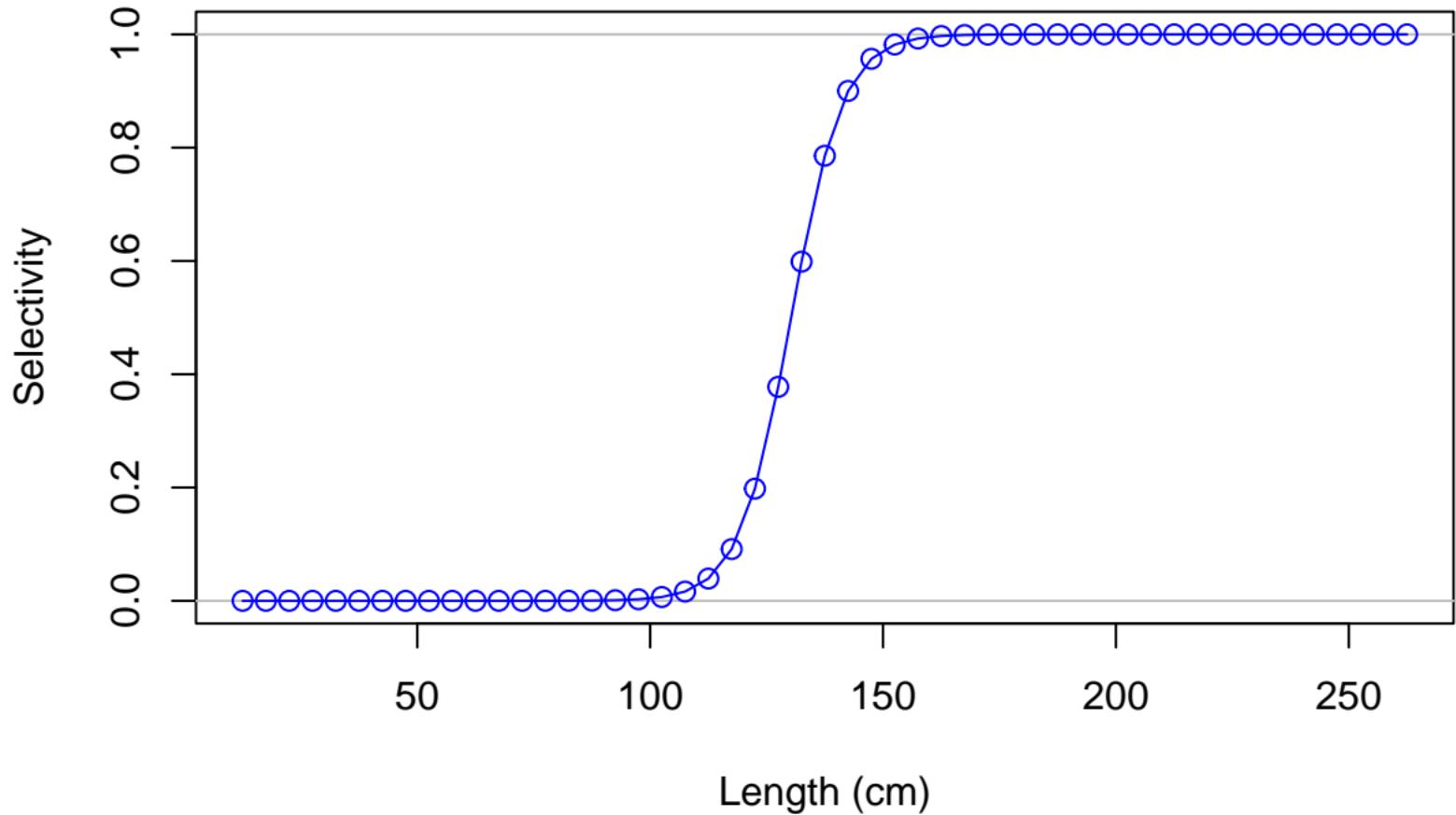
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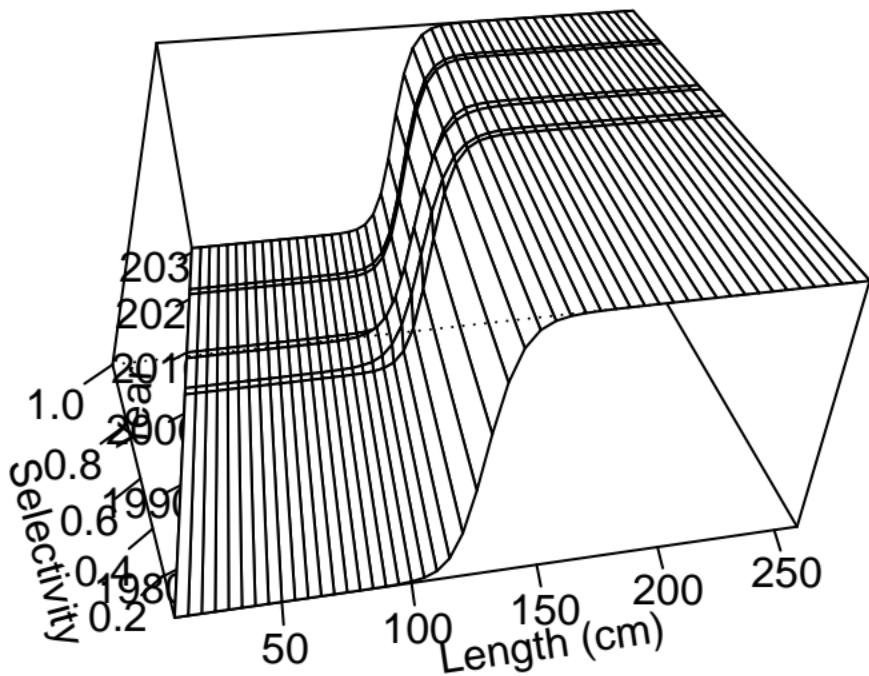
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250

Length (cm)







Year

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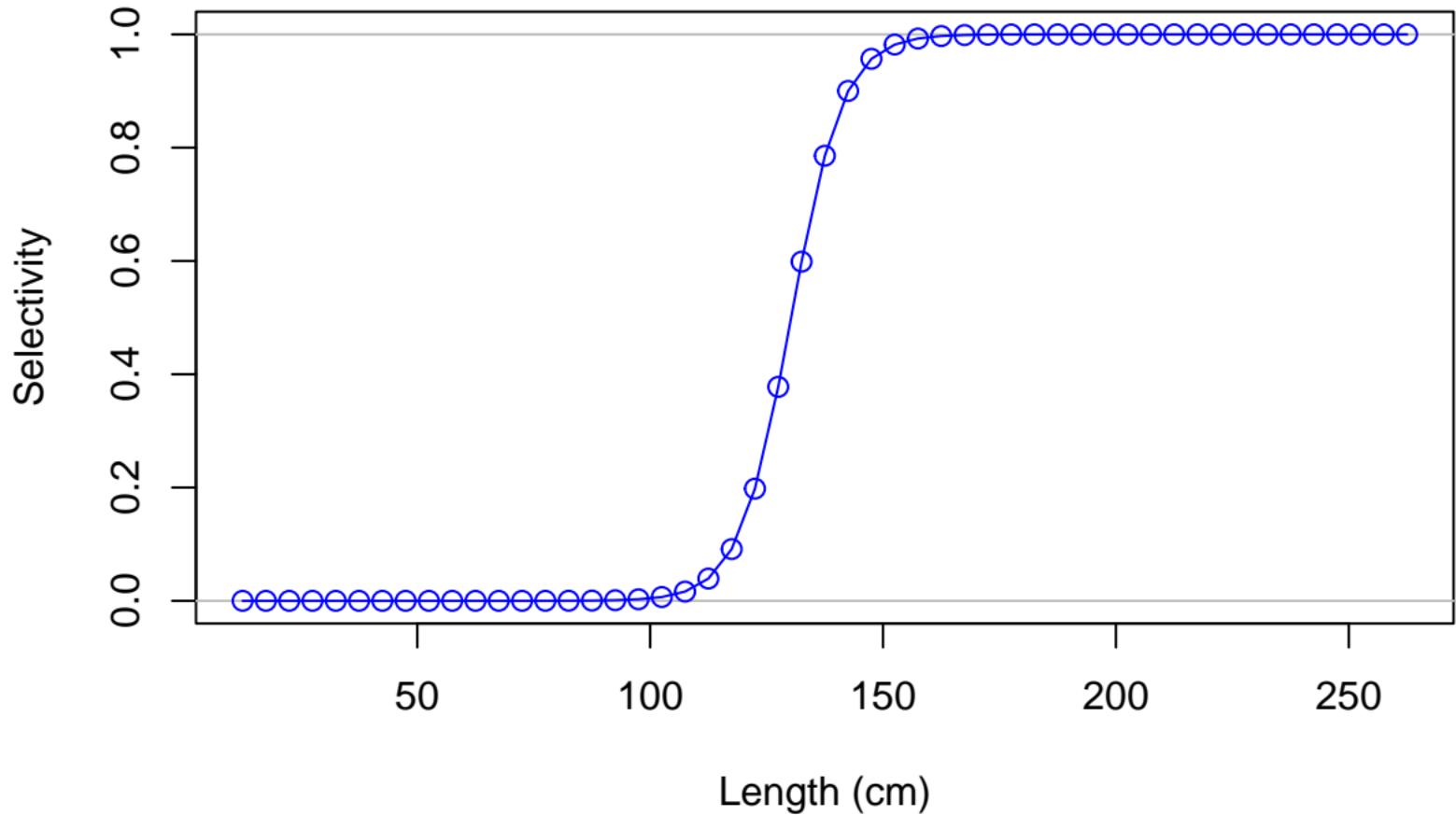
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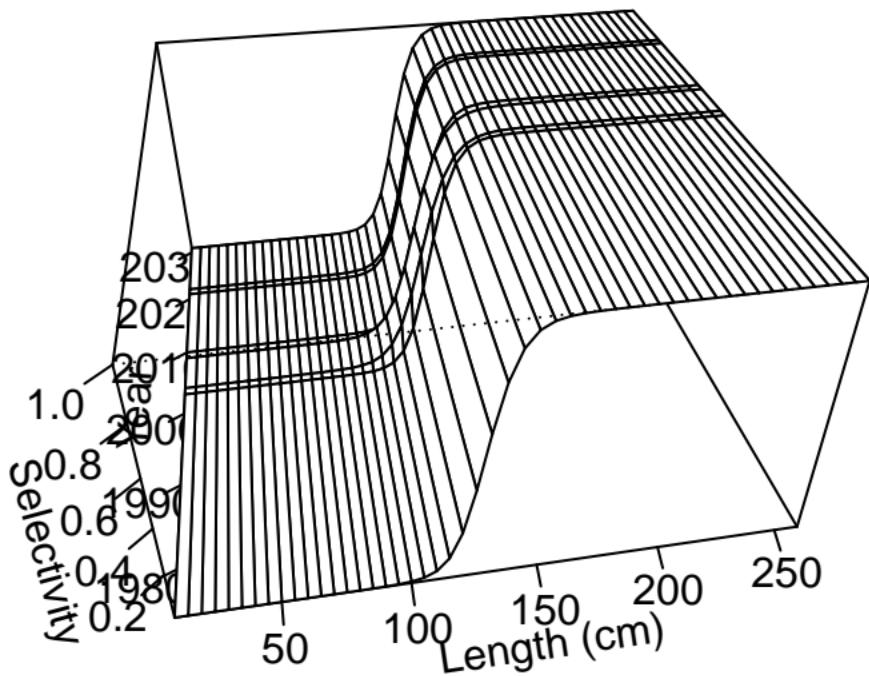
200

250

Length (cm)







Year

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0

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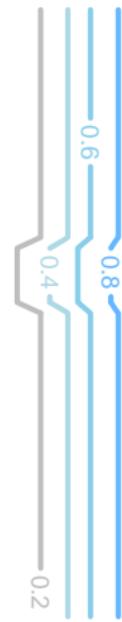
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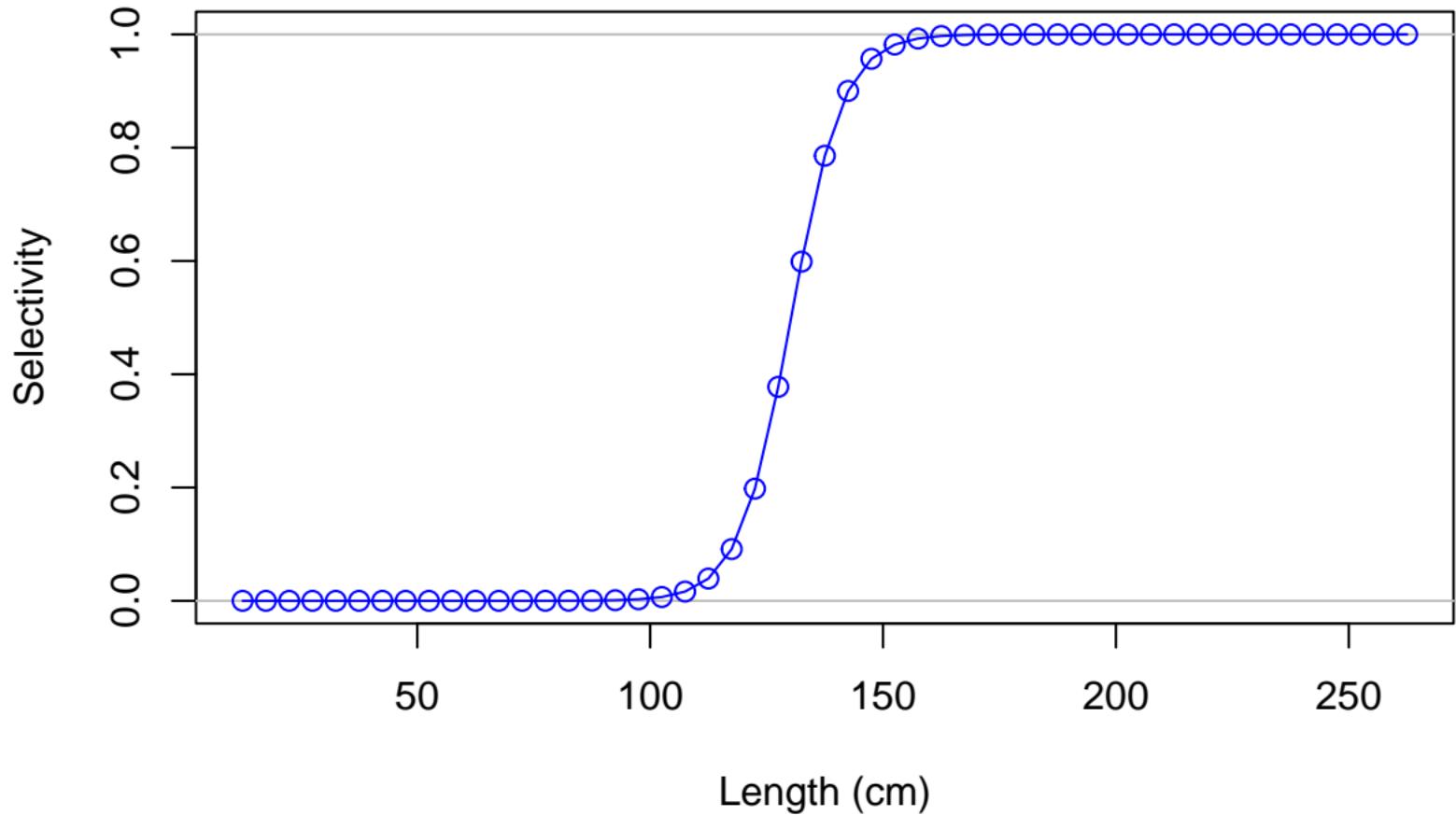
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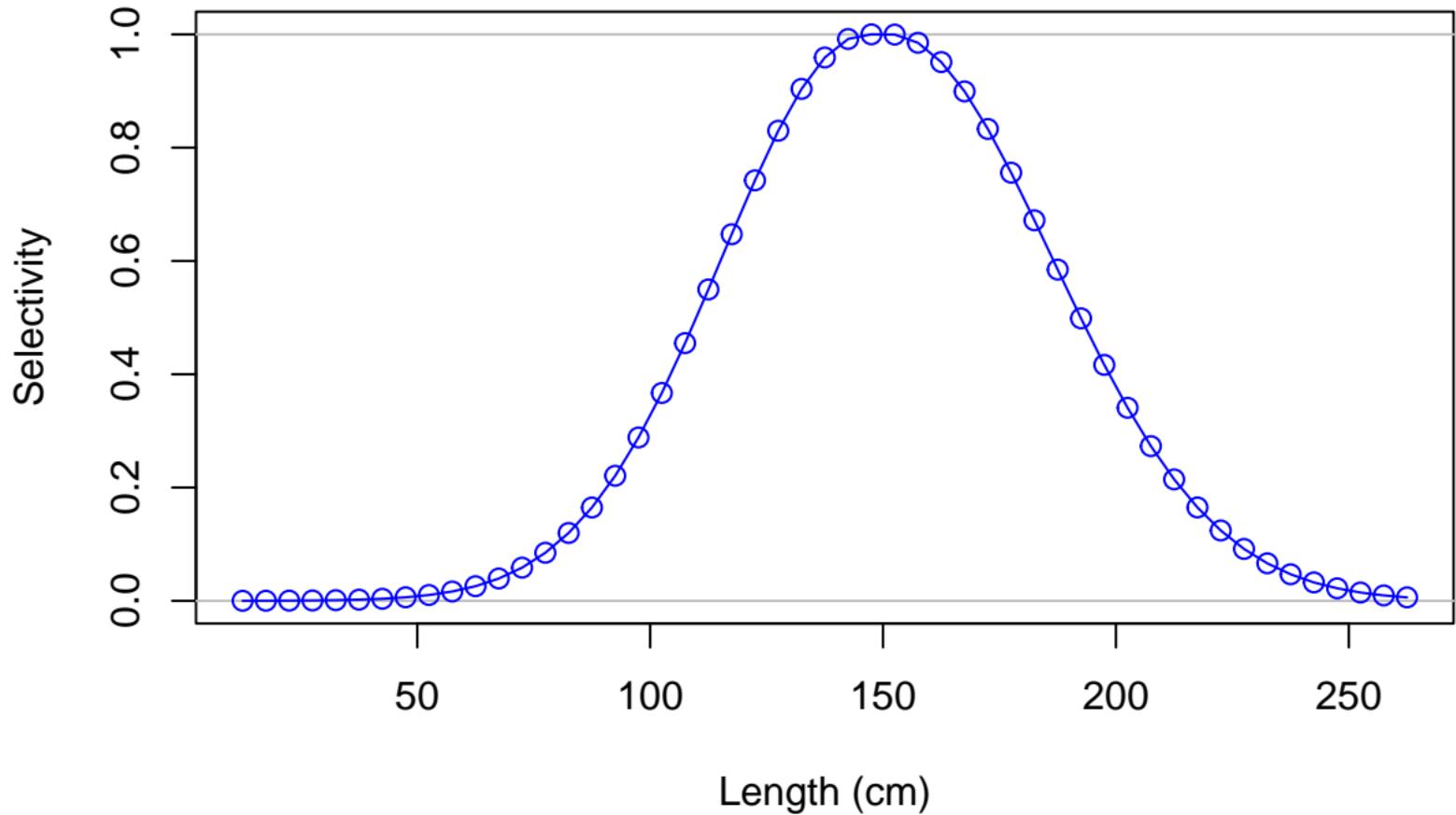
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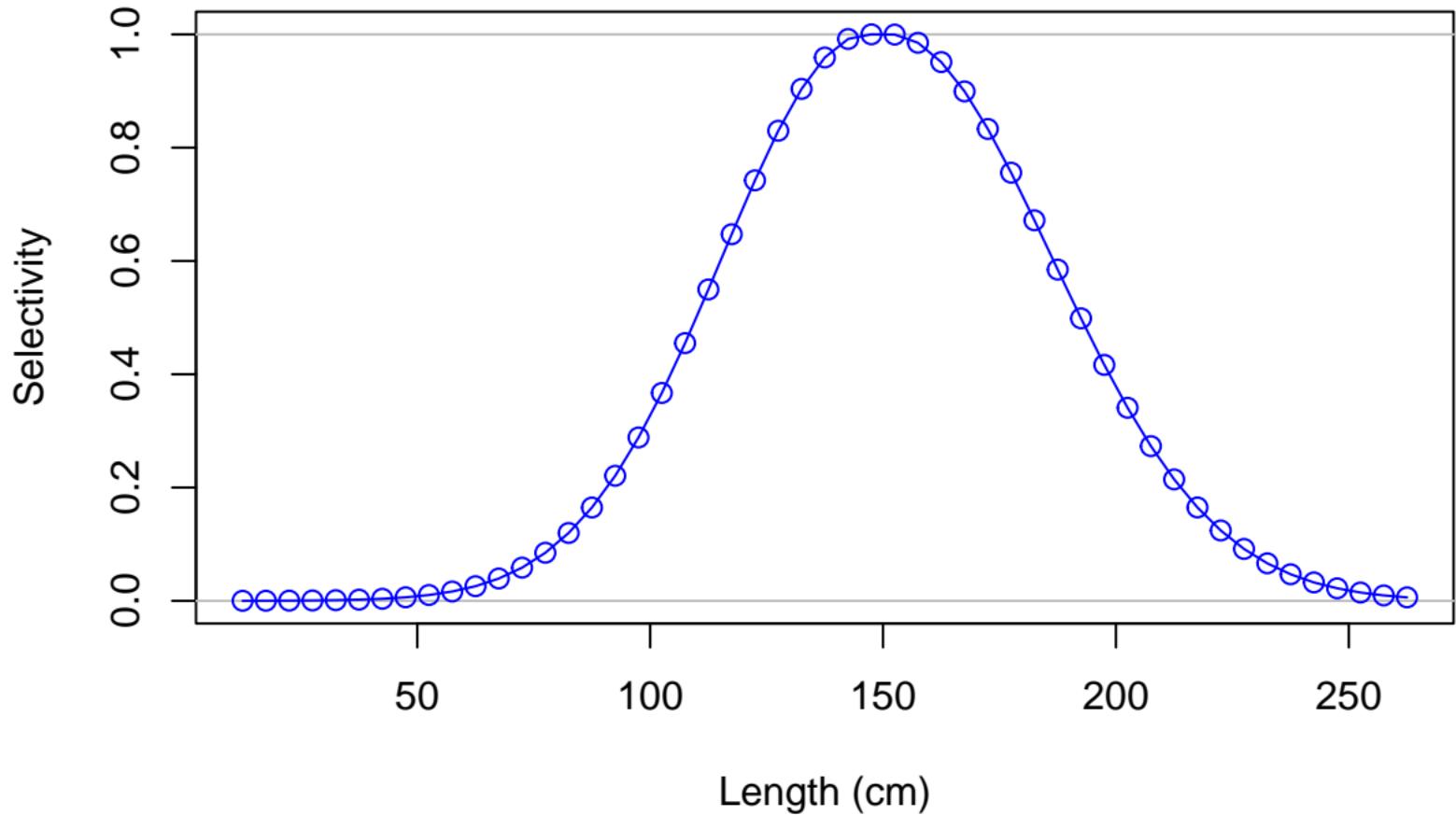
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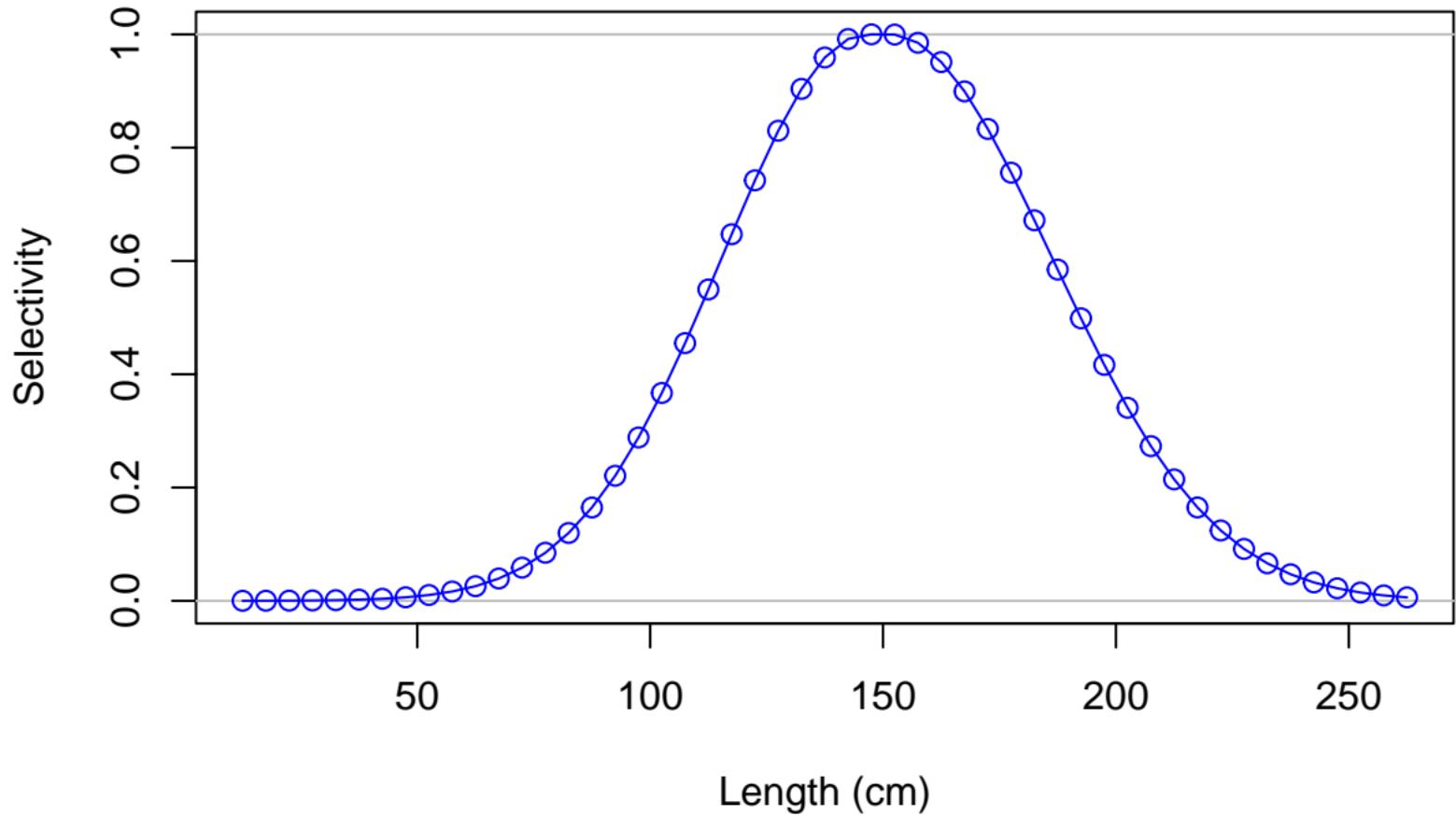
Length (cm)

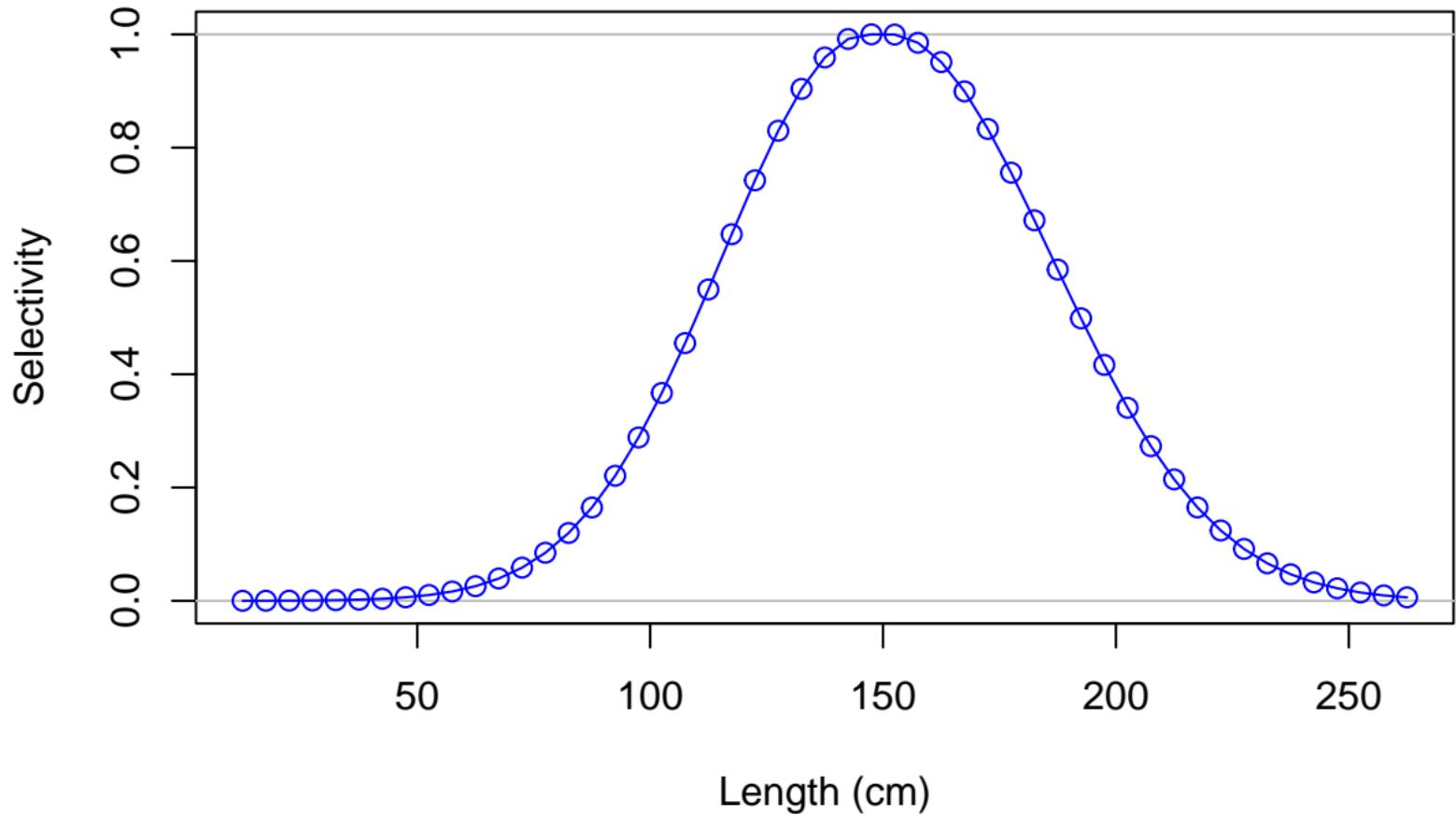


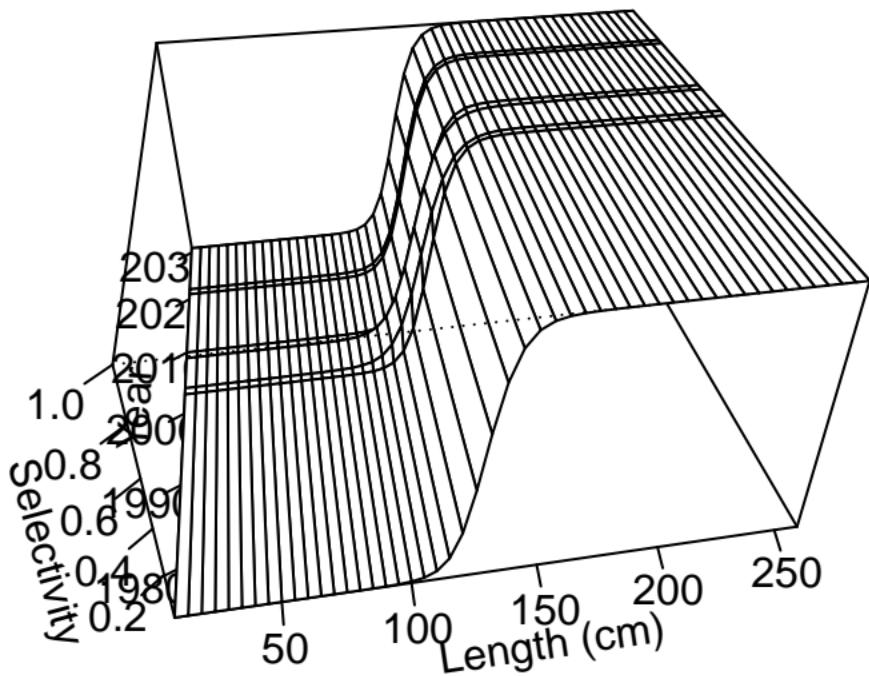












Year

1980 2000 2020

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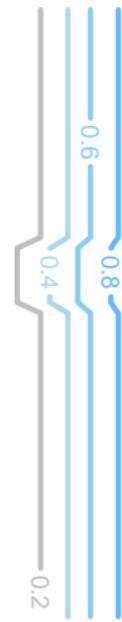
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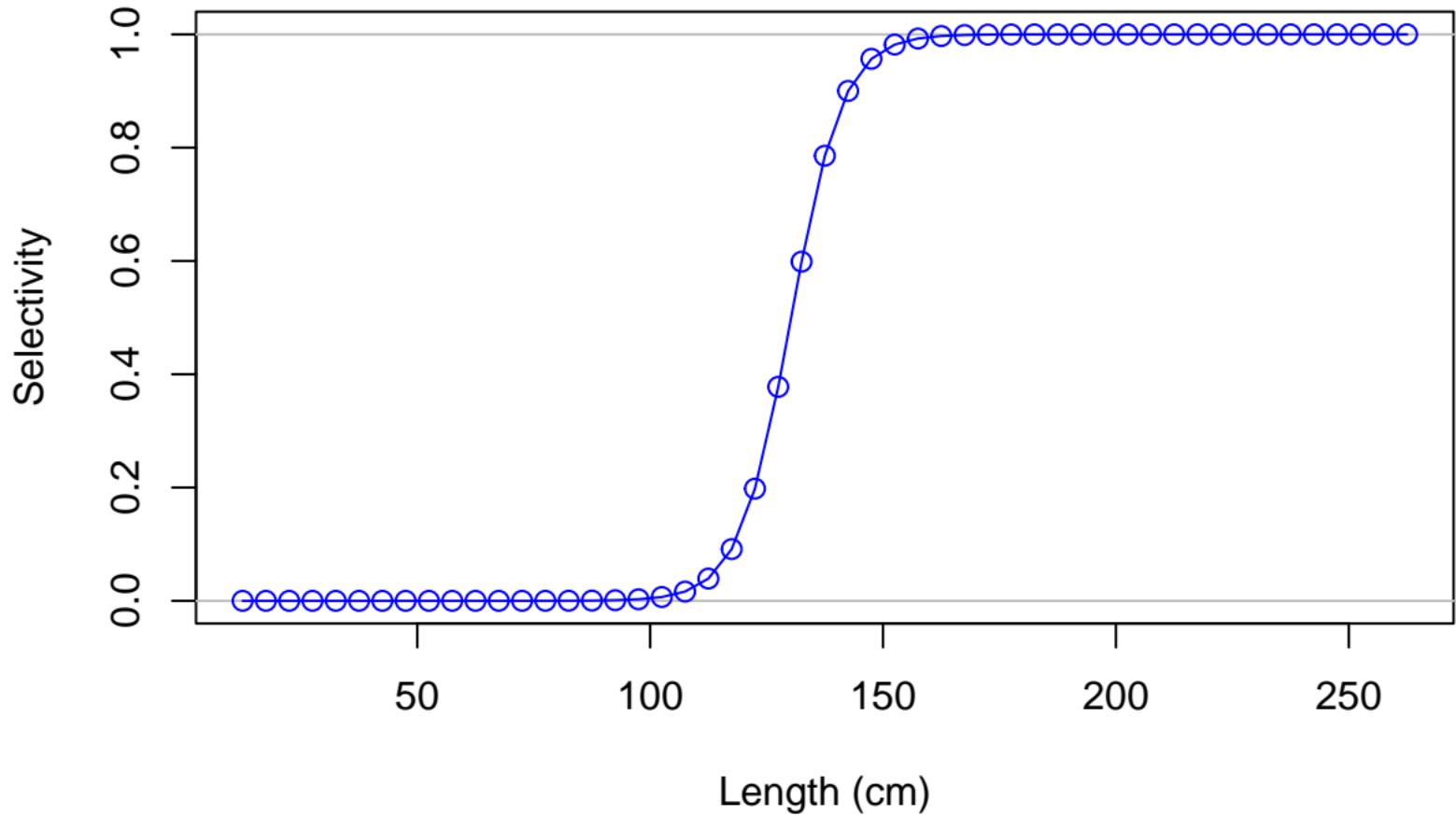
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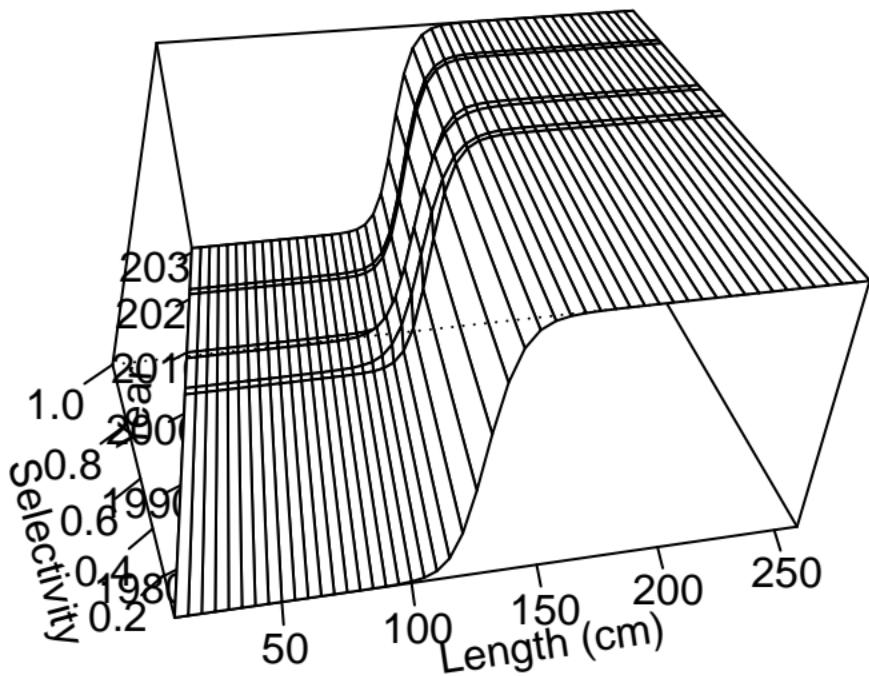
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Length (cm)







Year

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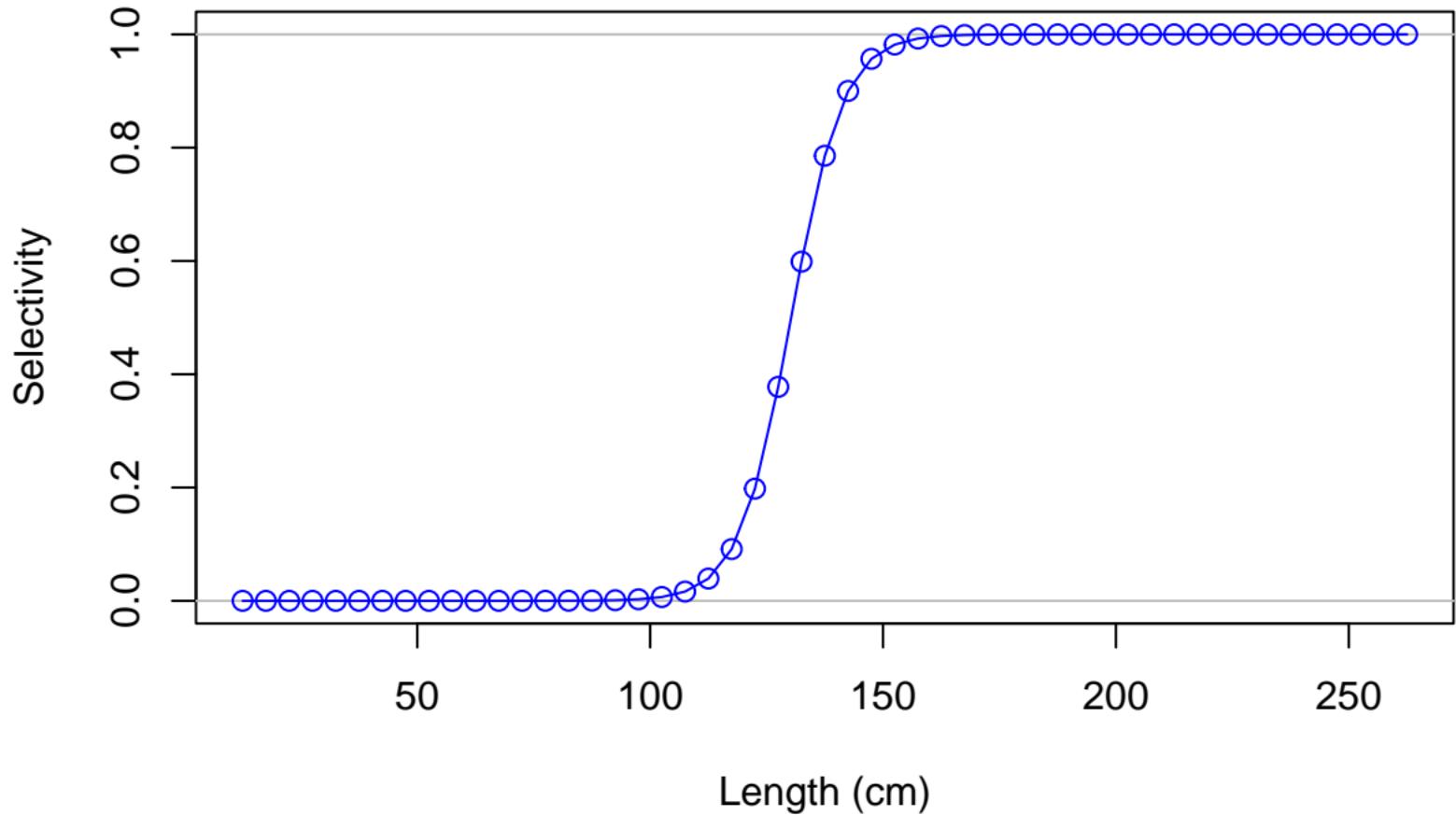
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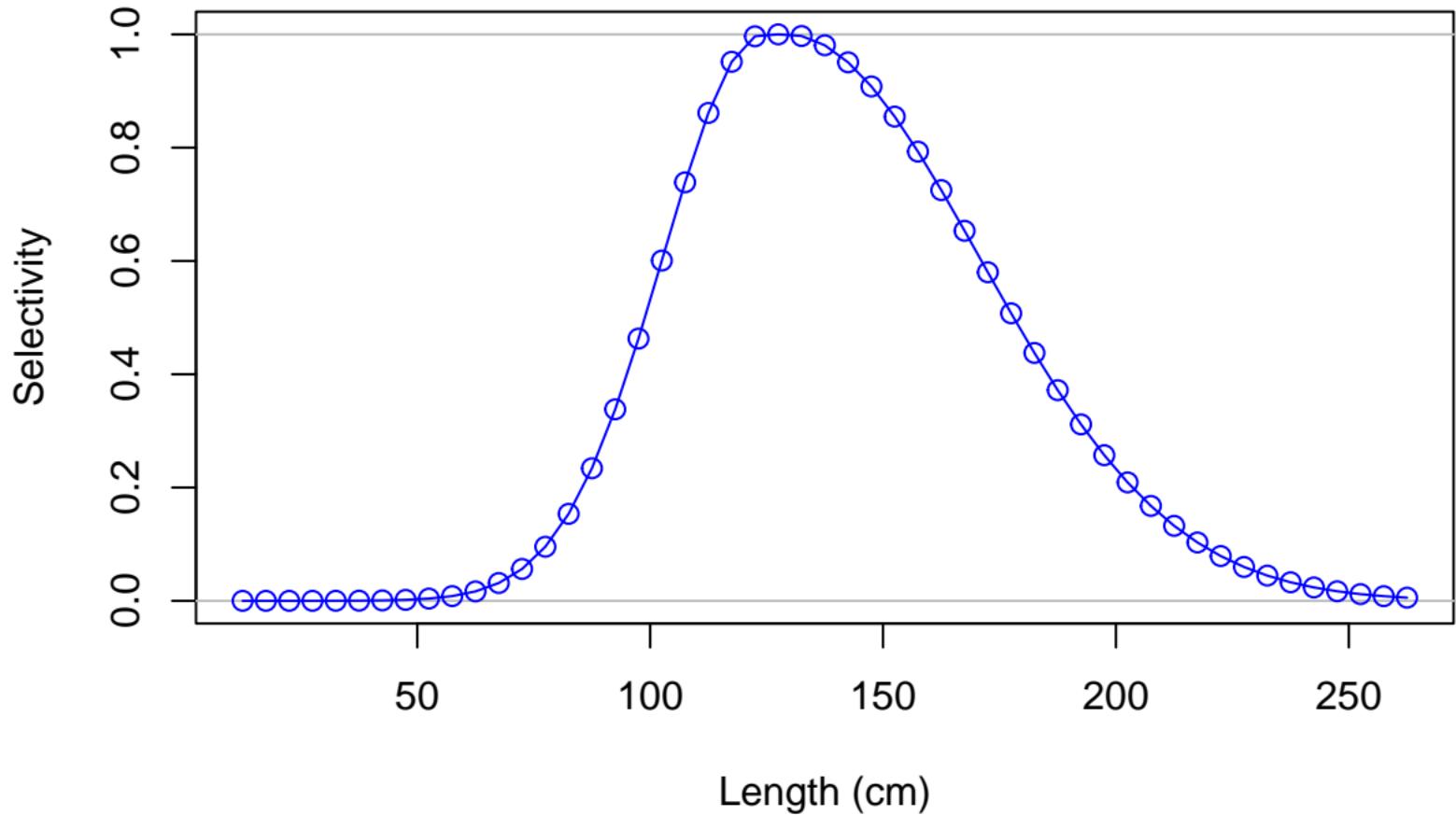
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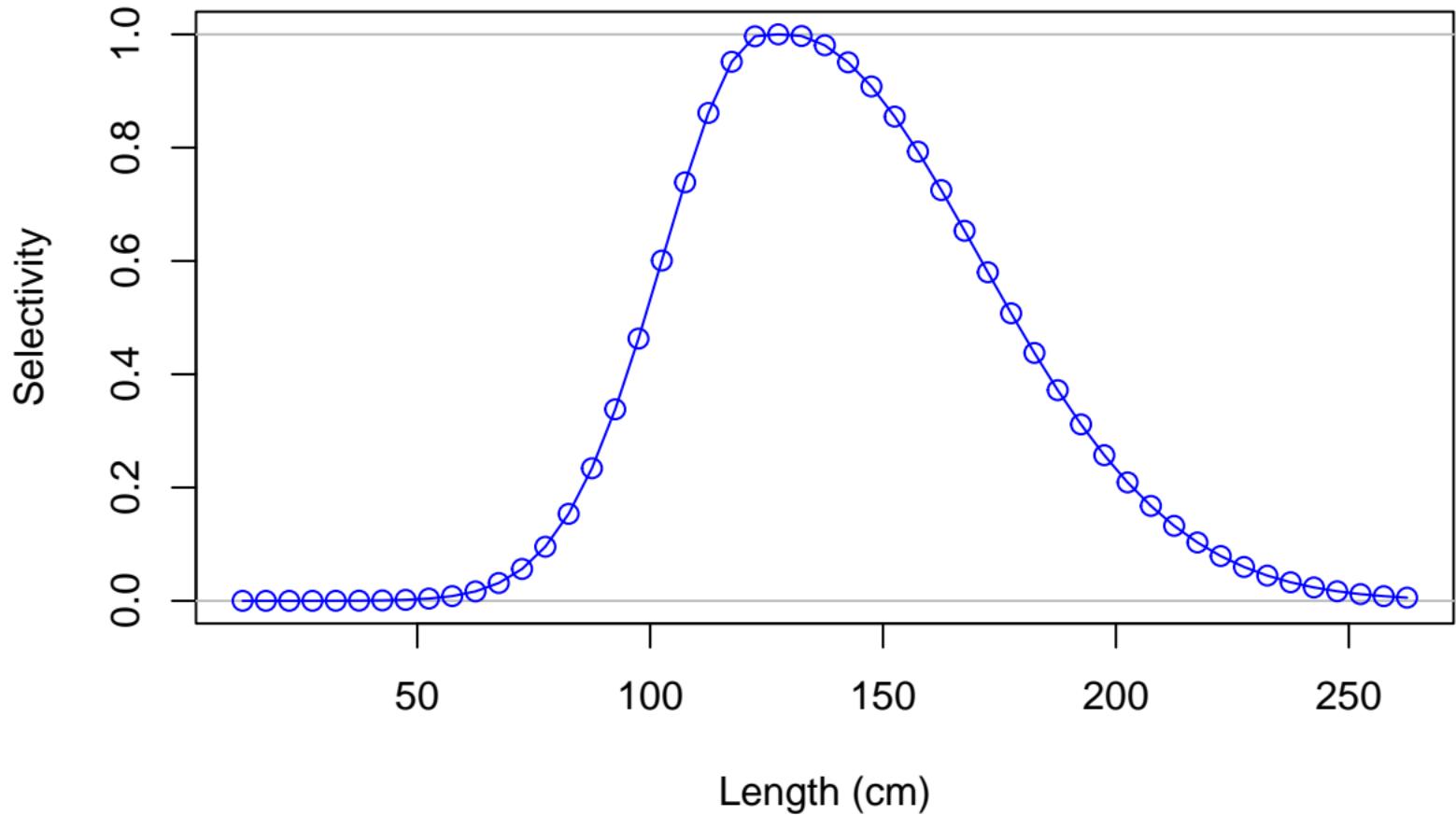
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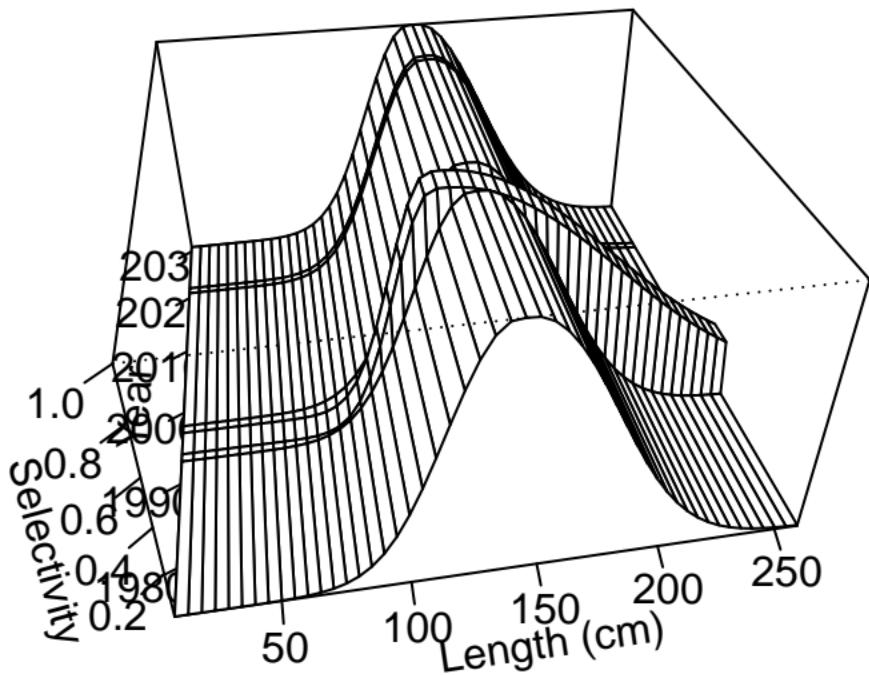
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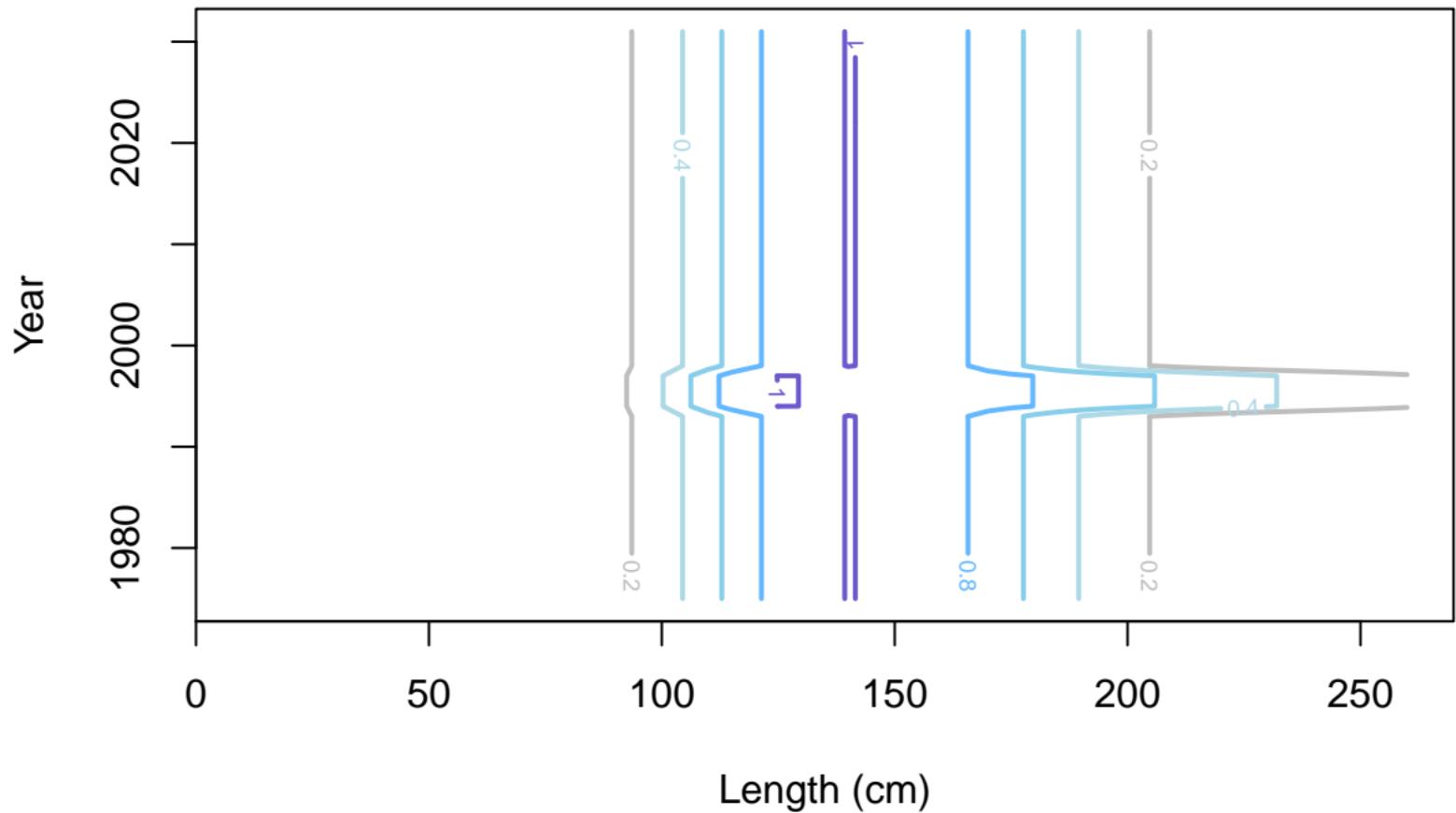


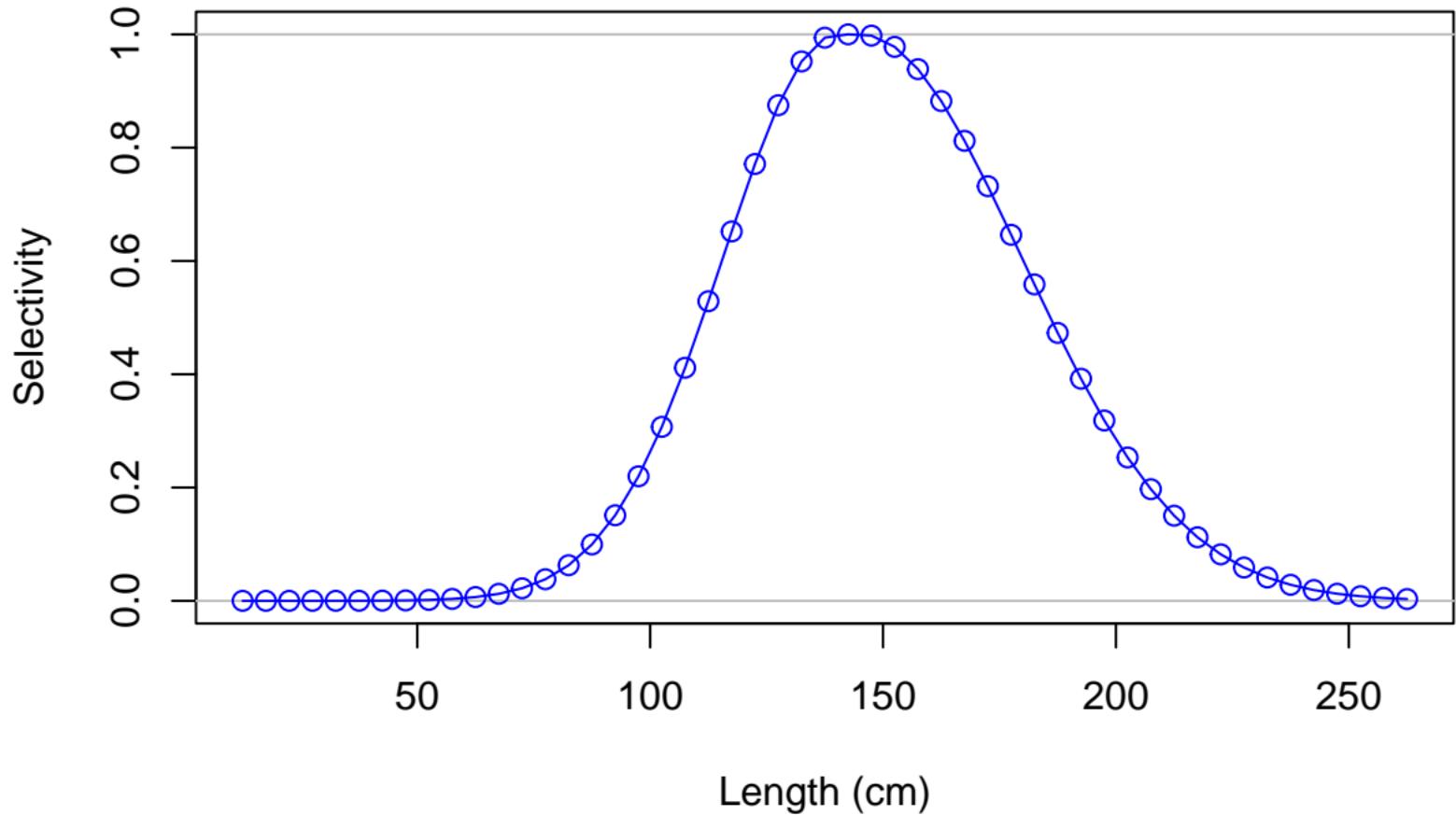


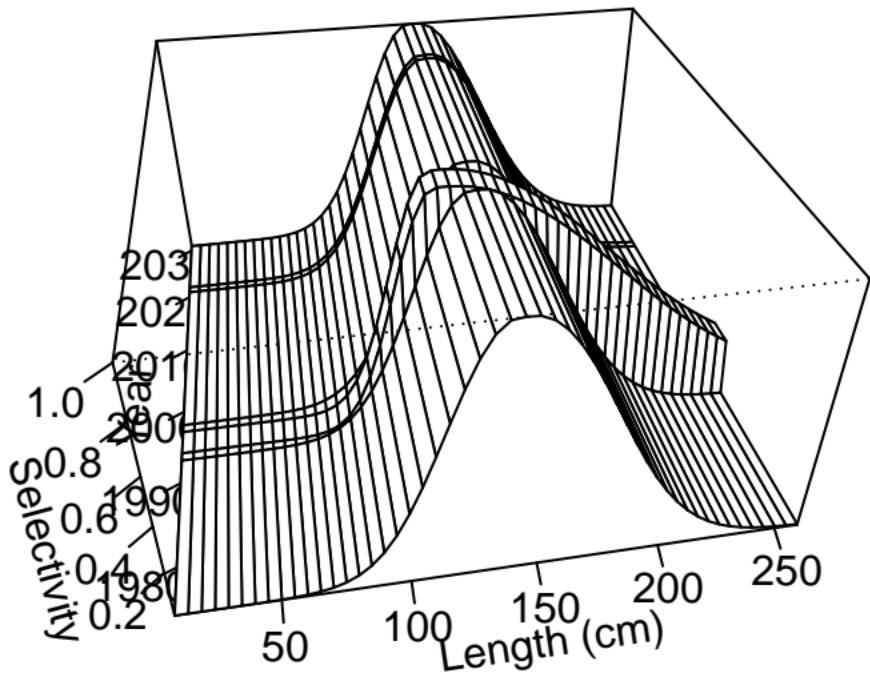


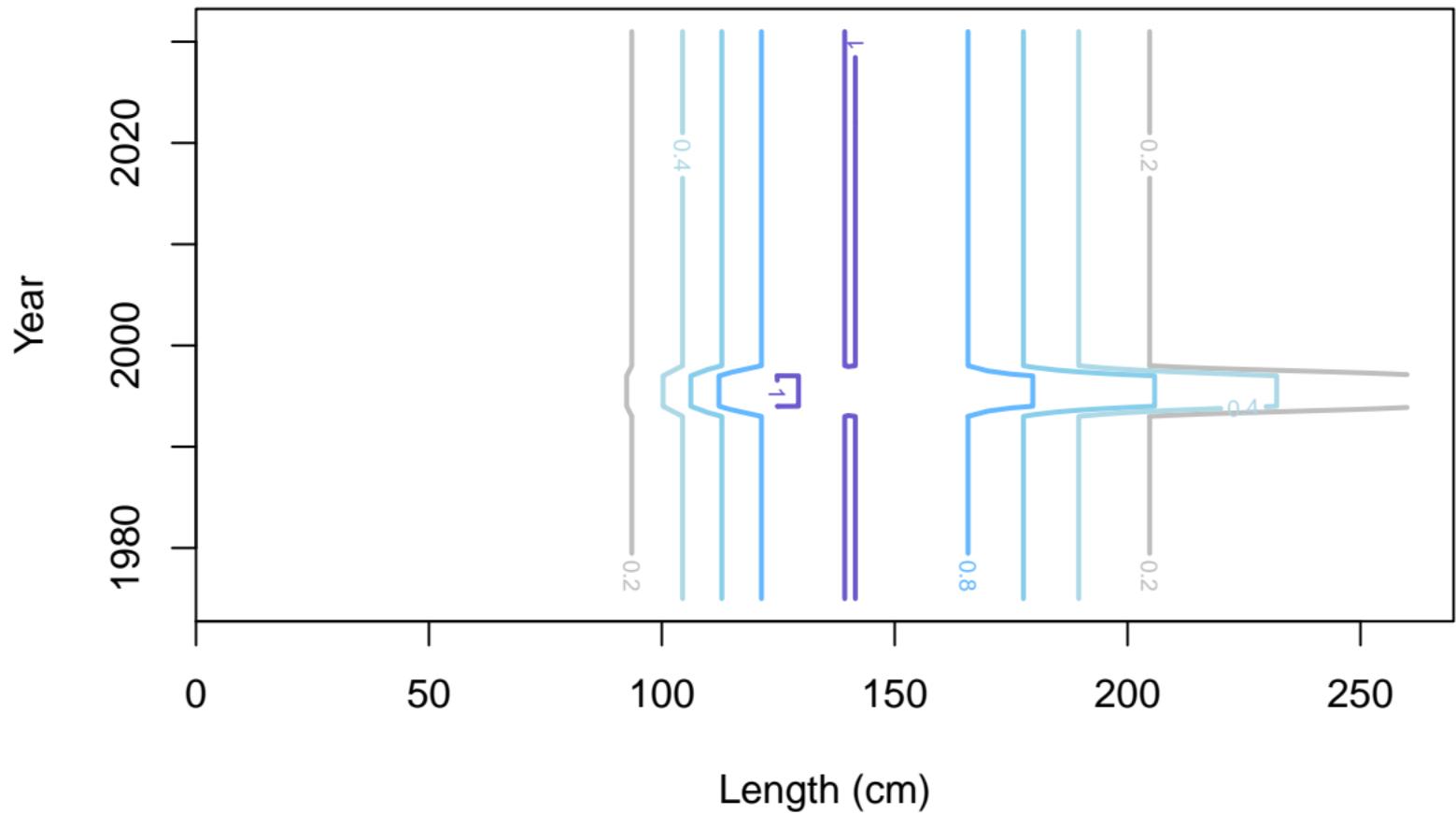


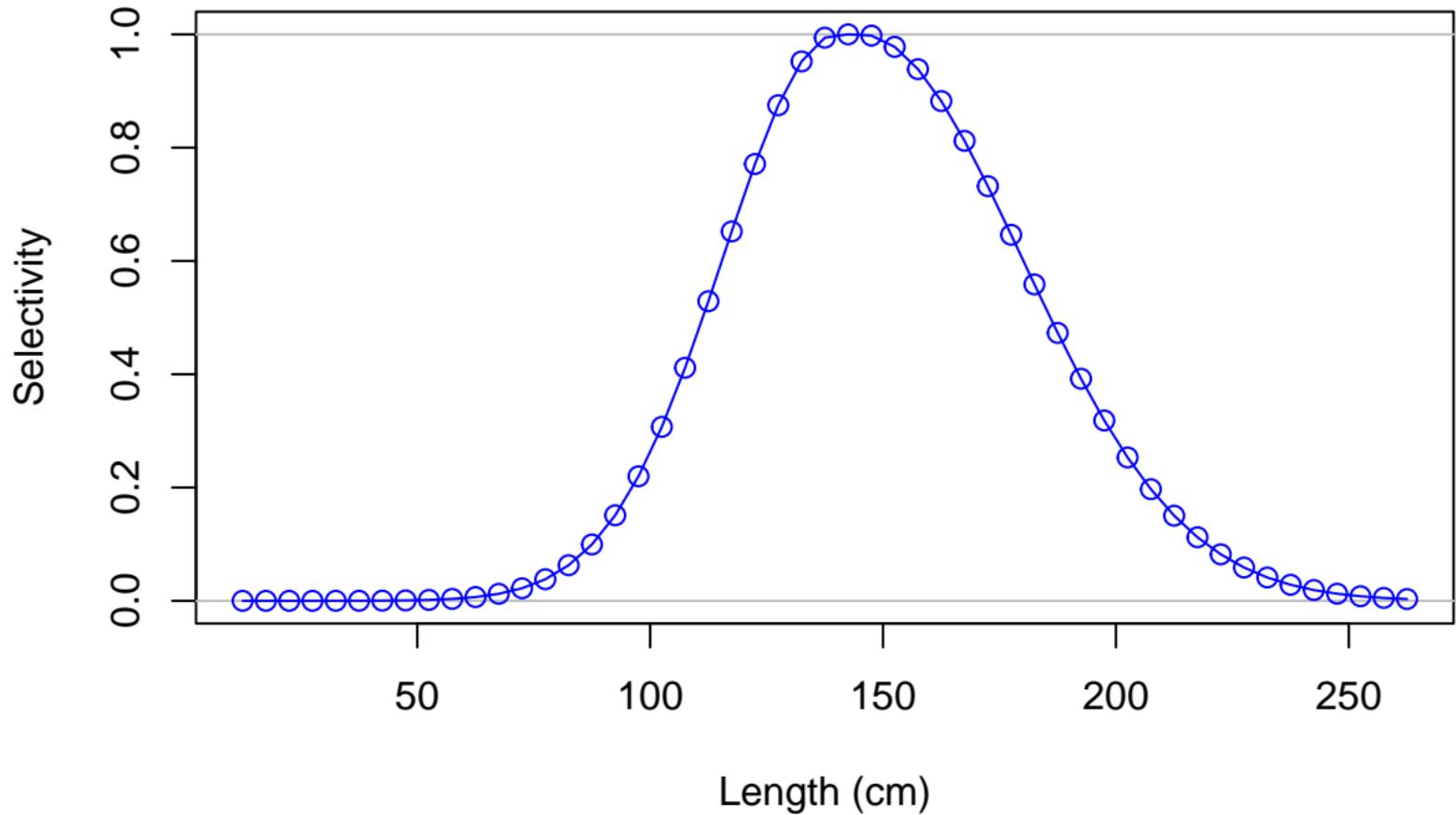


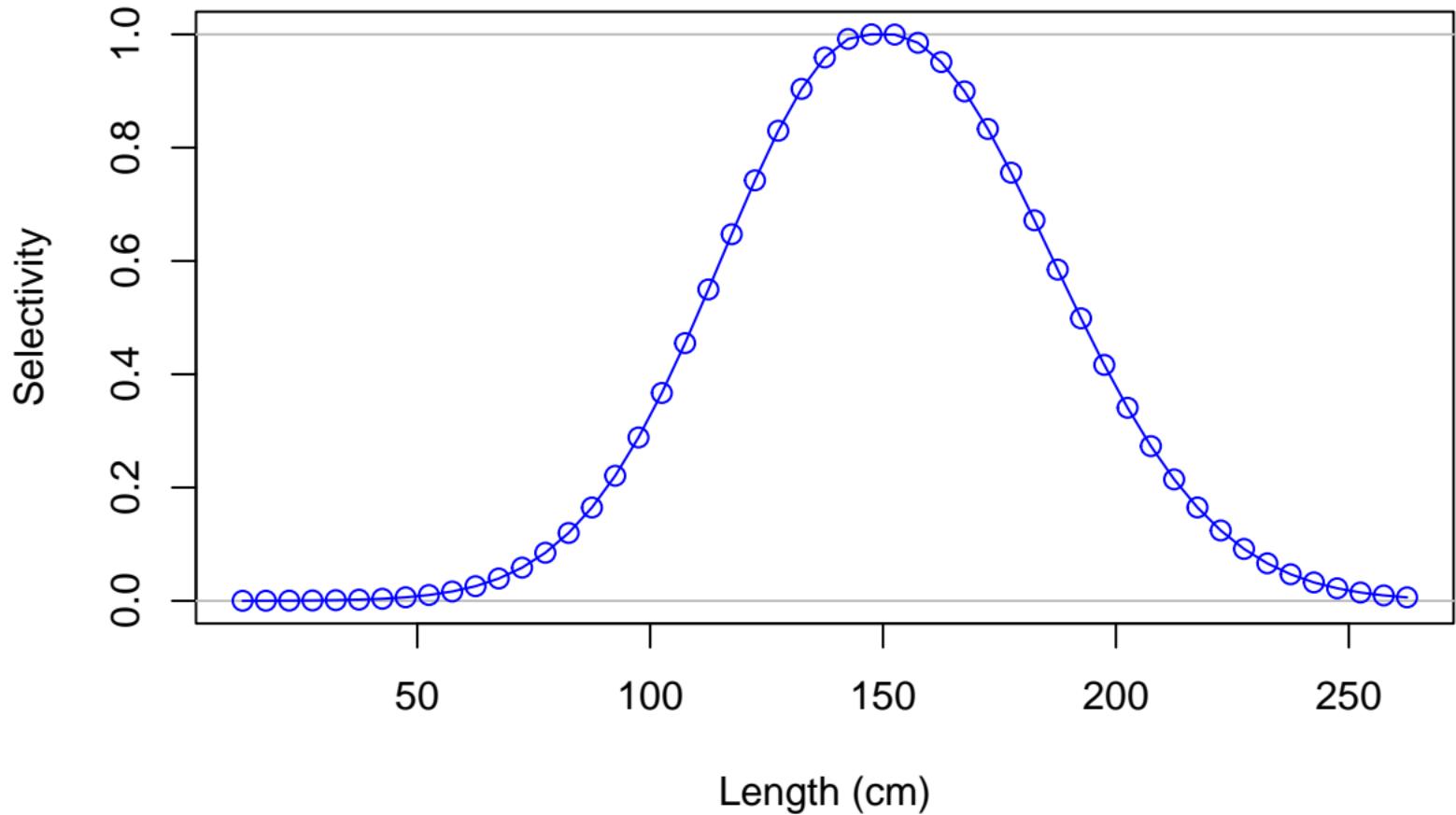


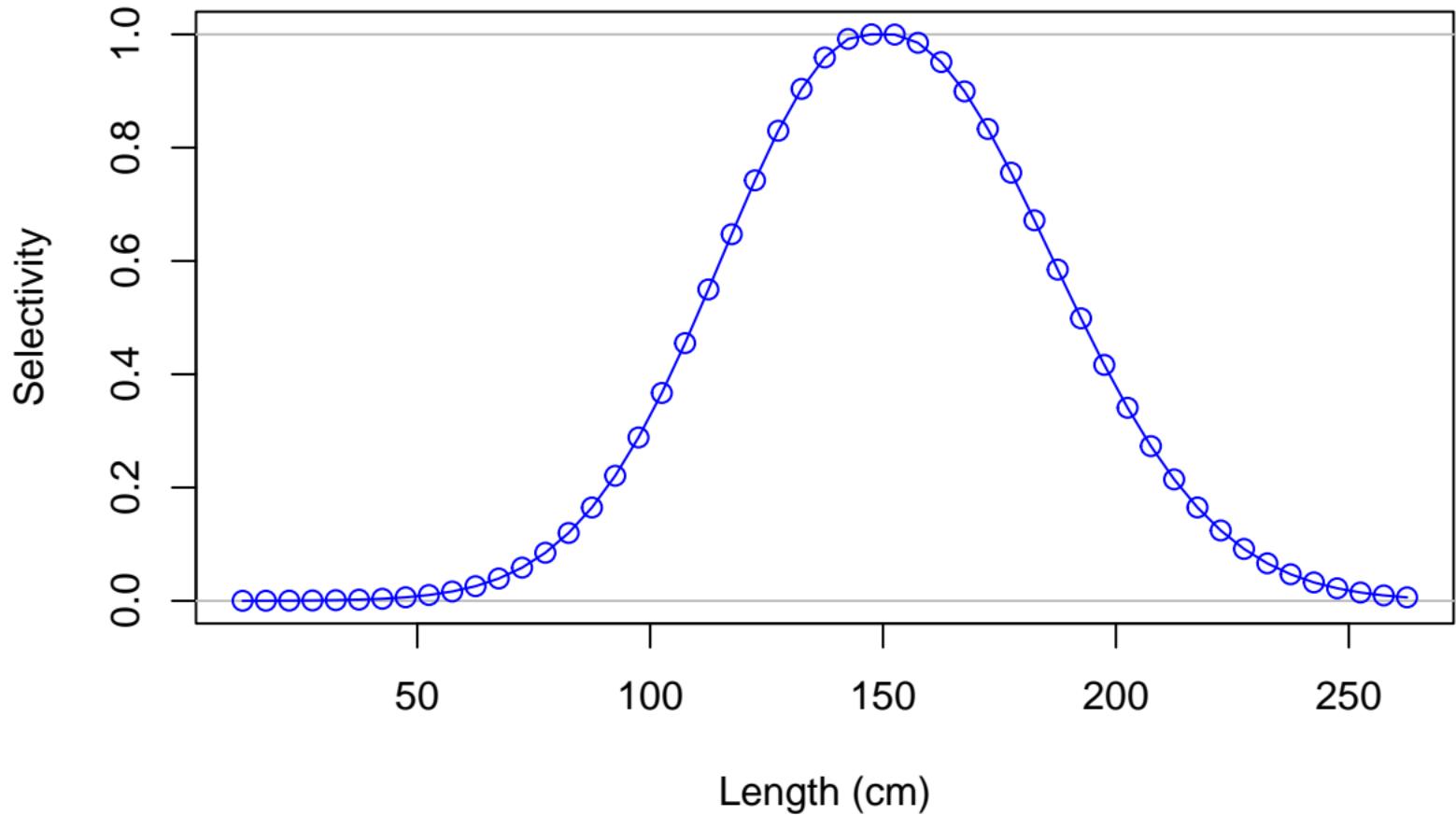


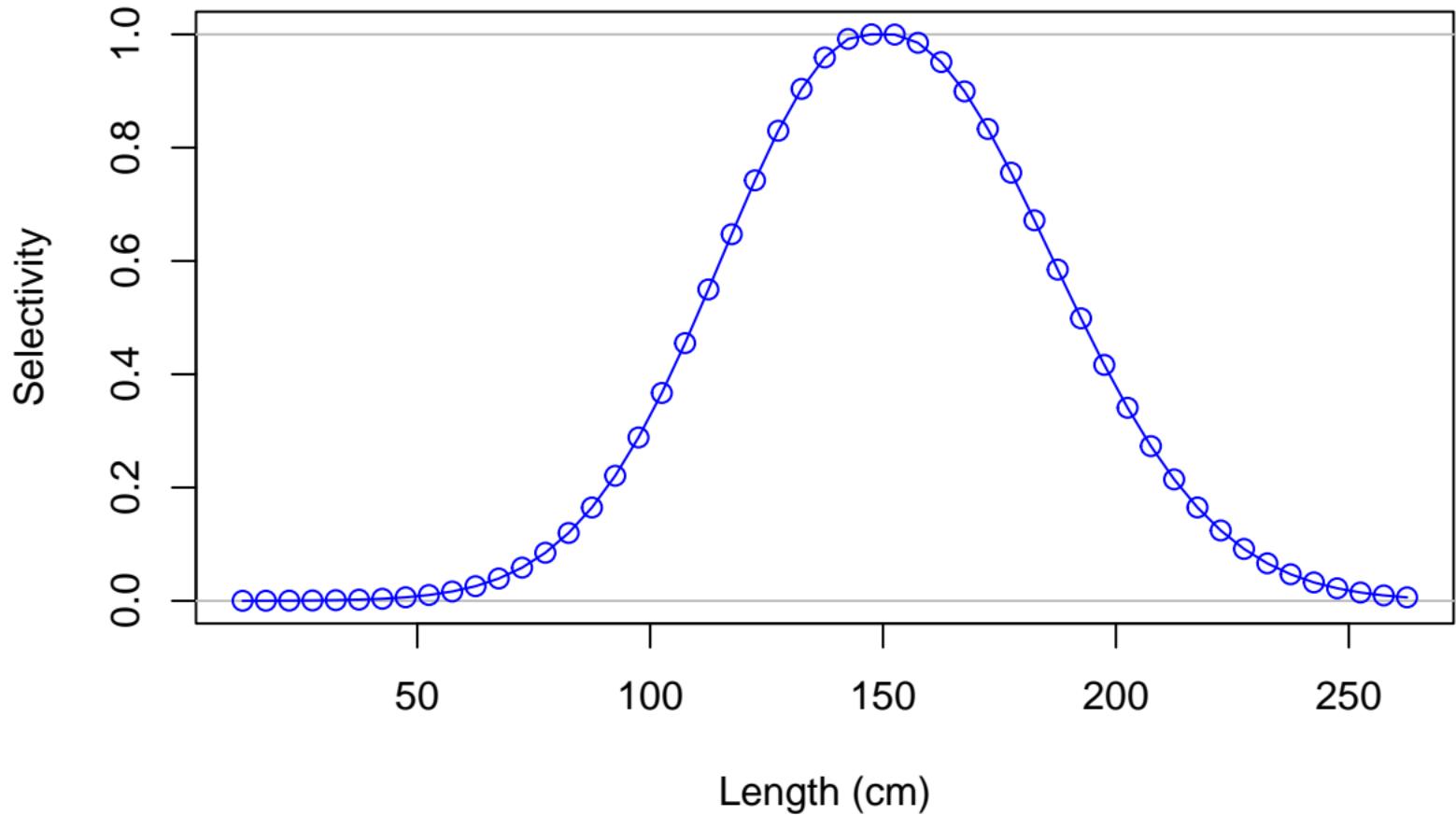


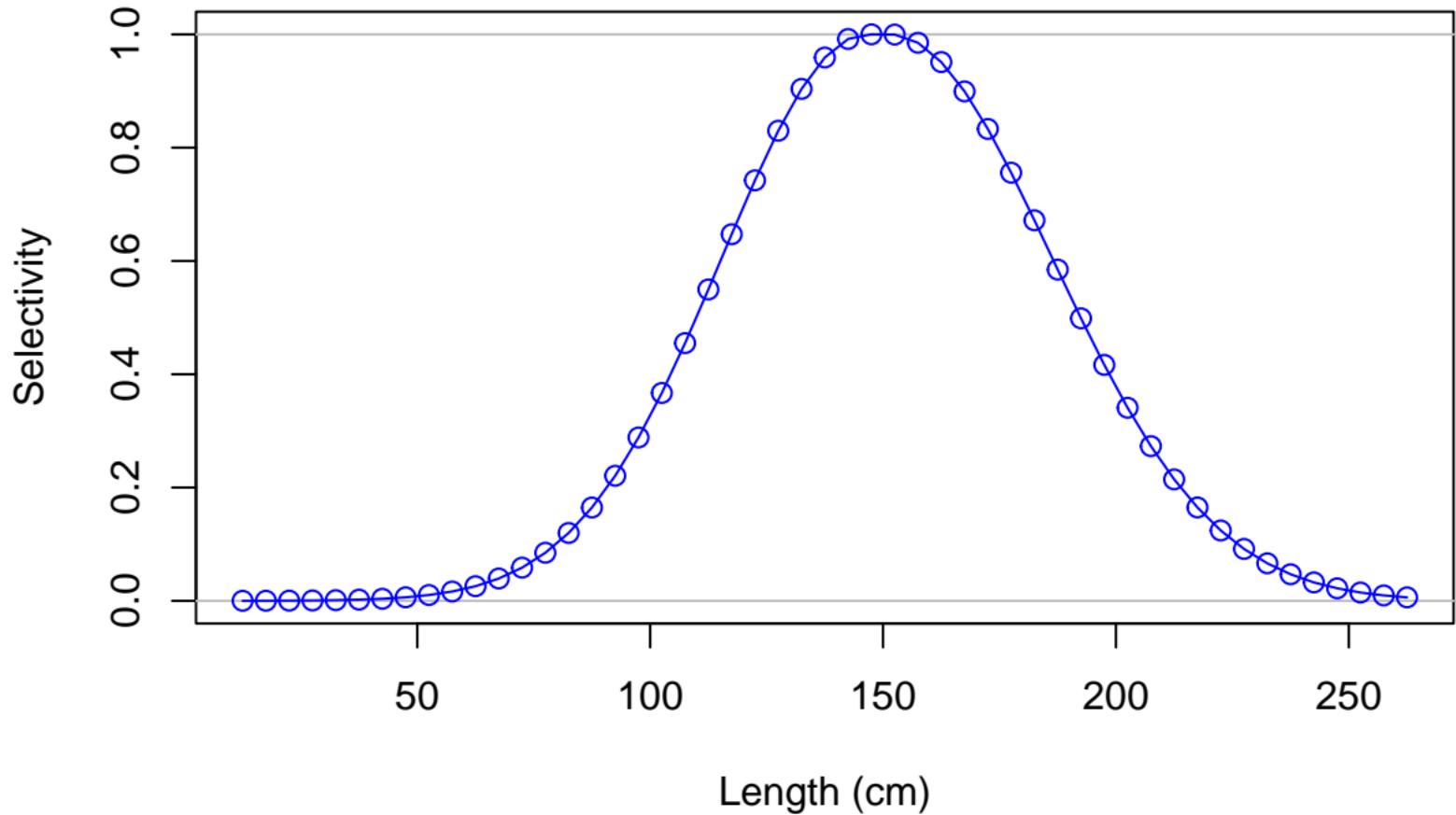


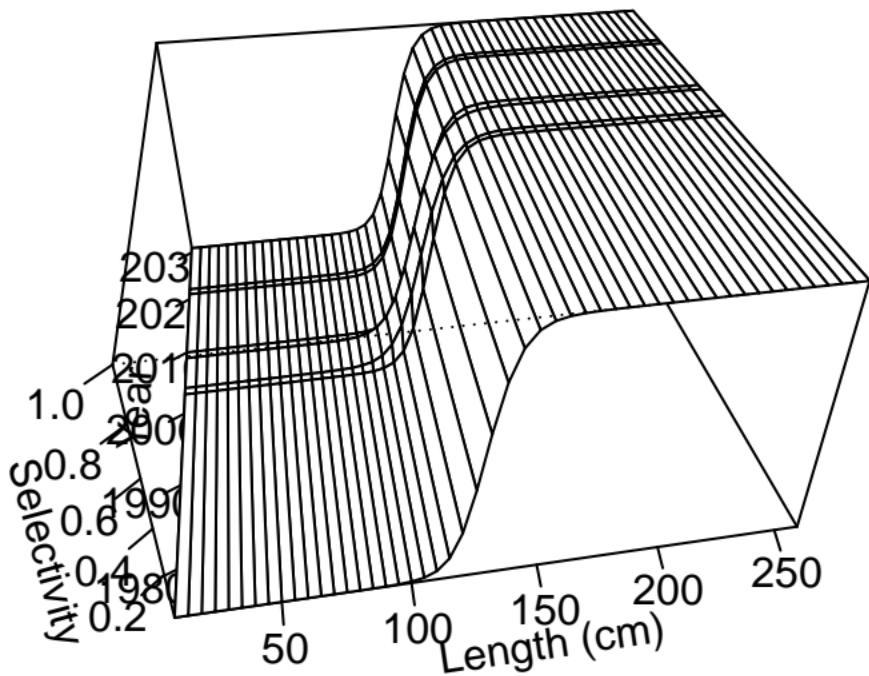












Year

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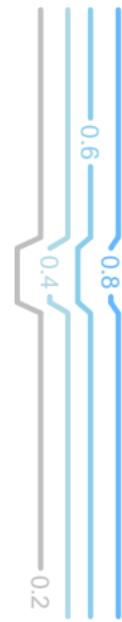
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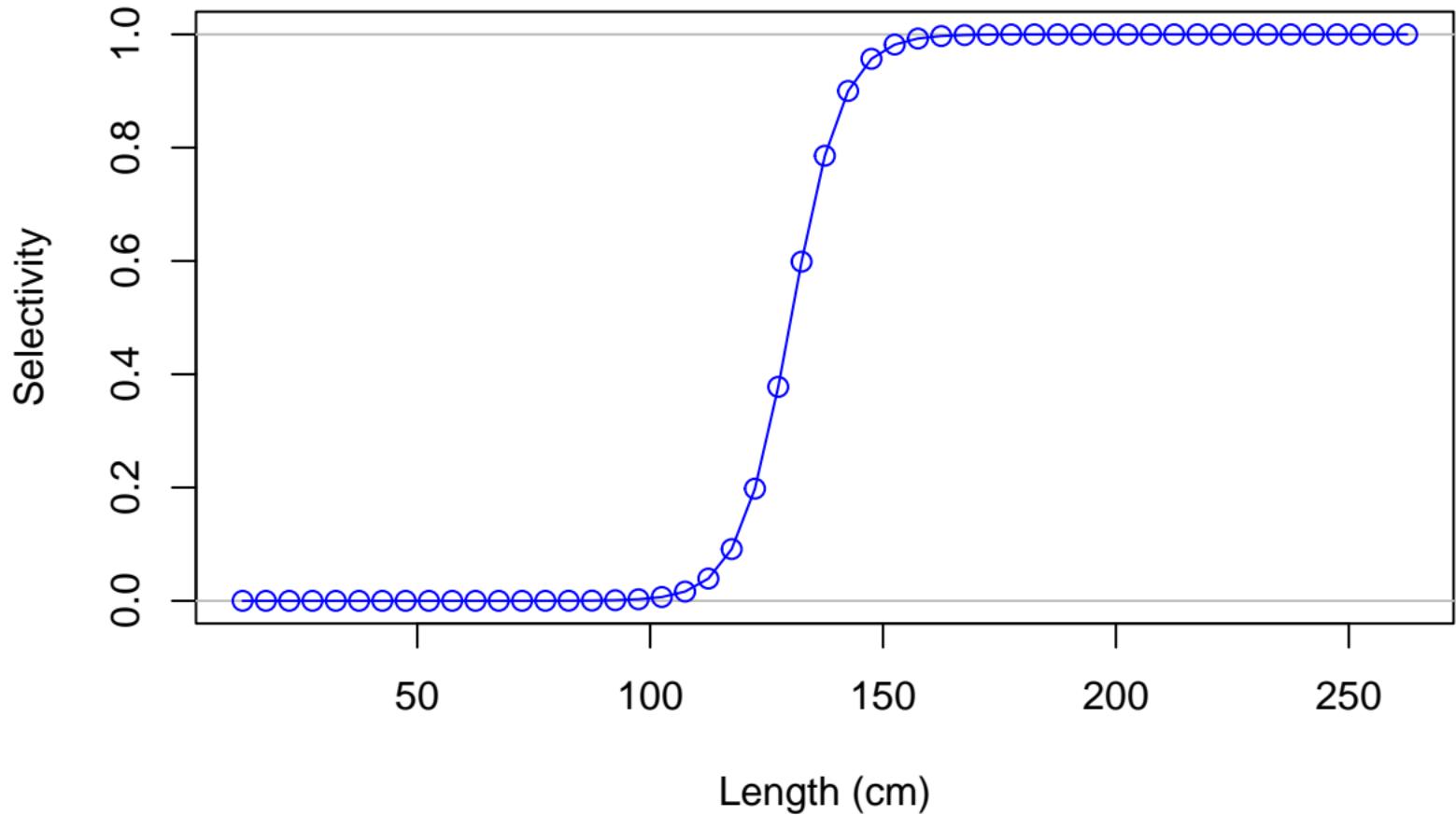
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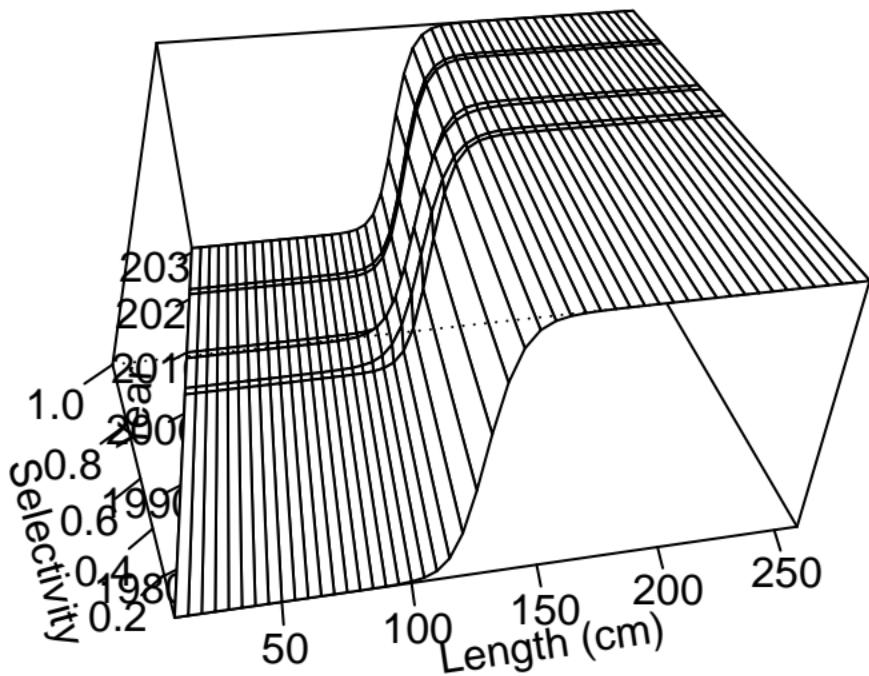
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Length (cm)







Year

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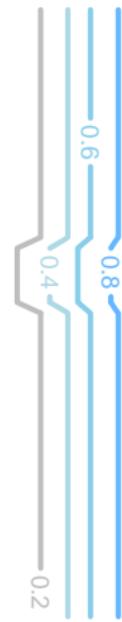
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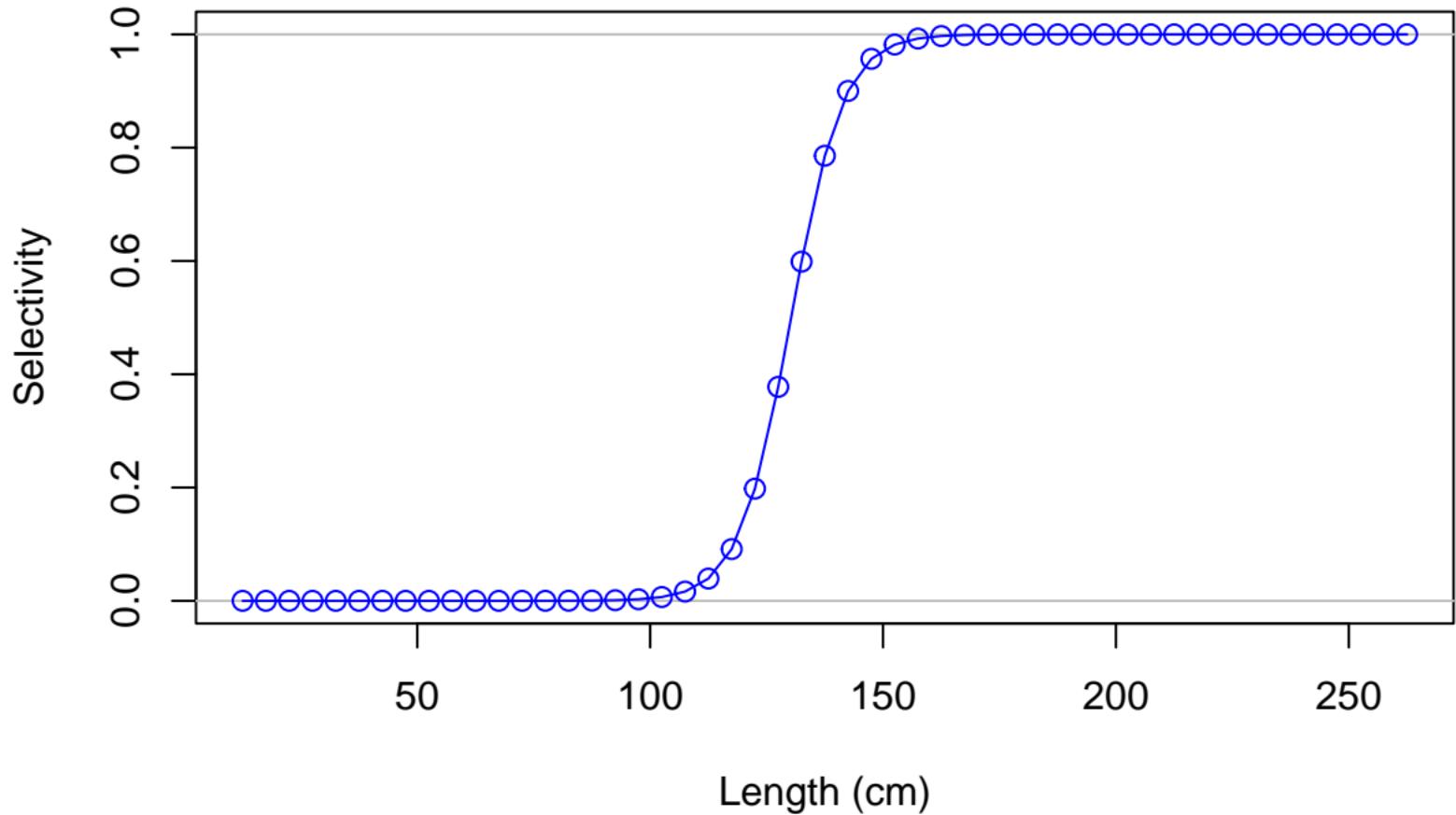
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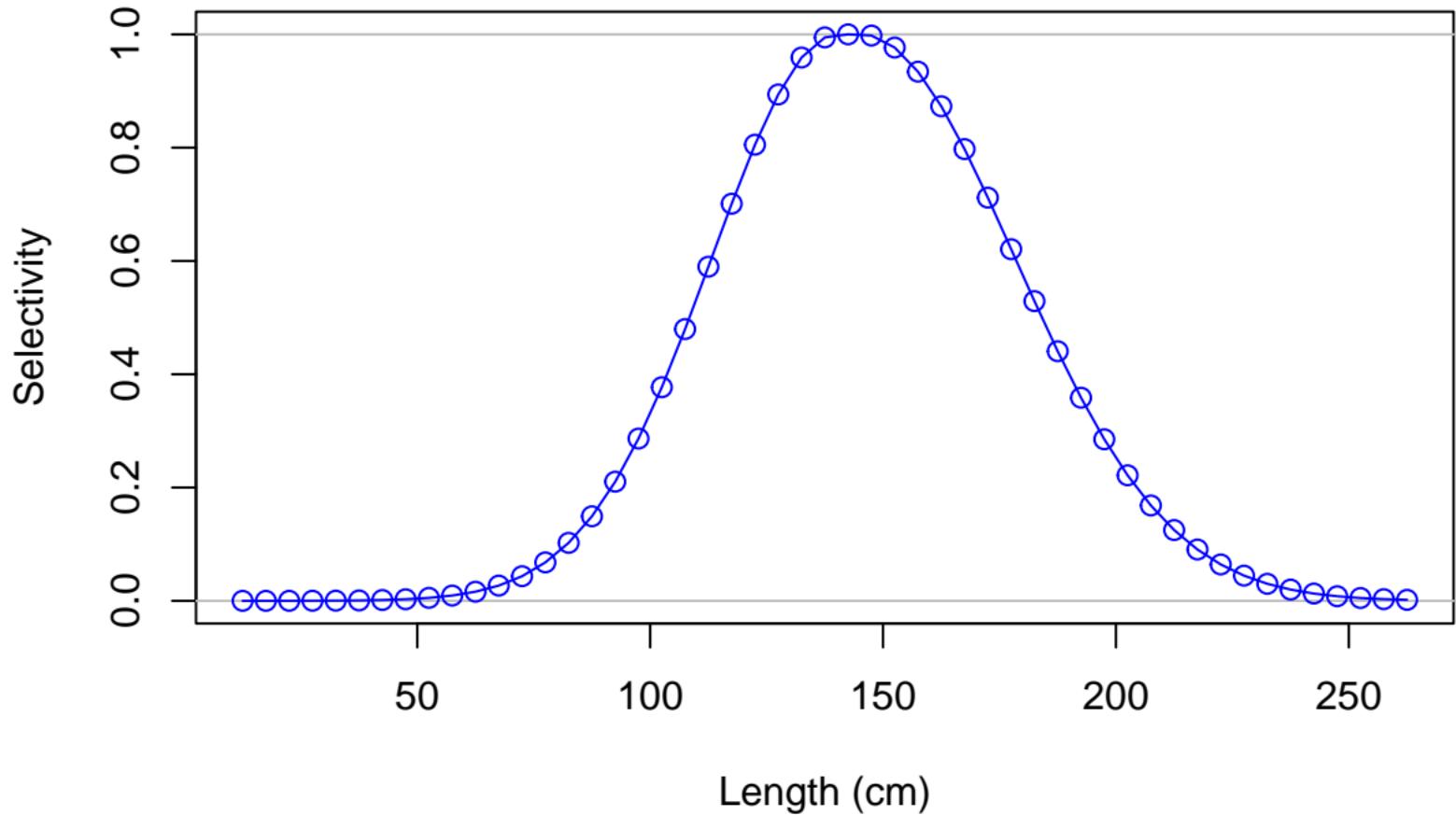
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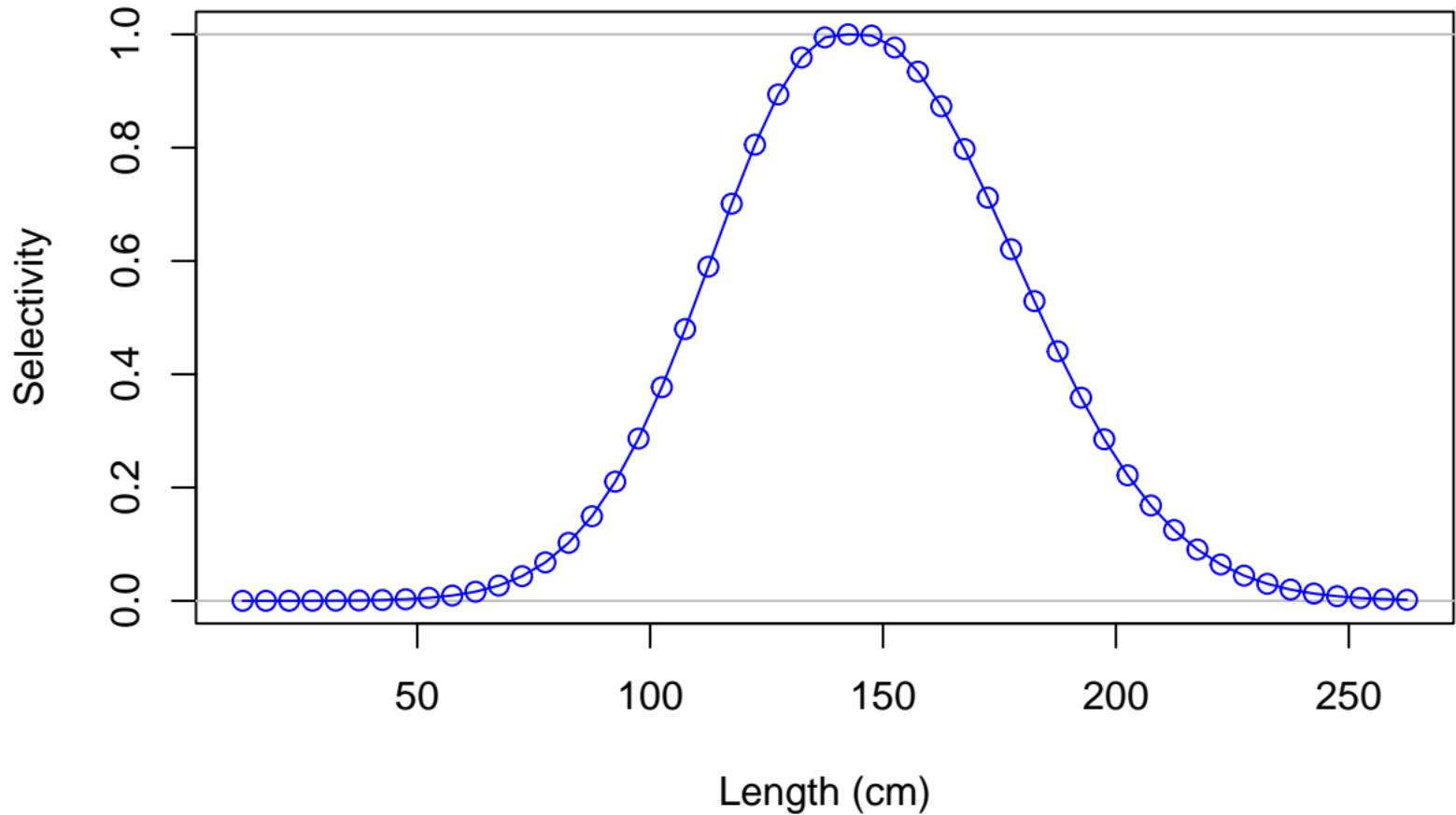
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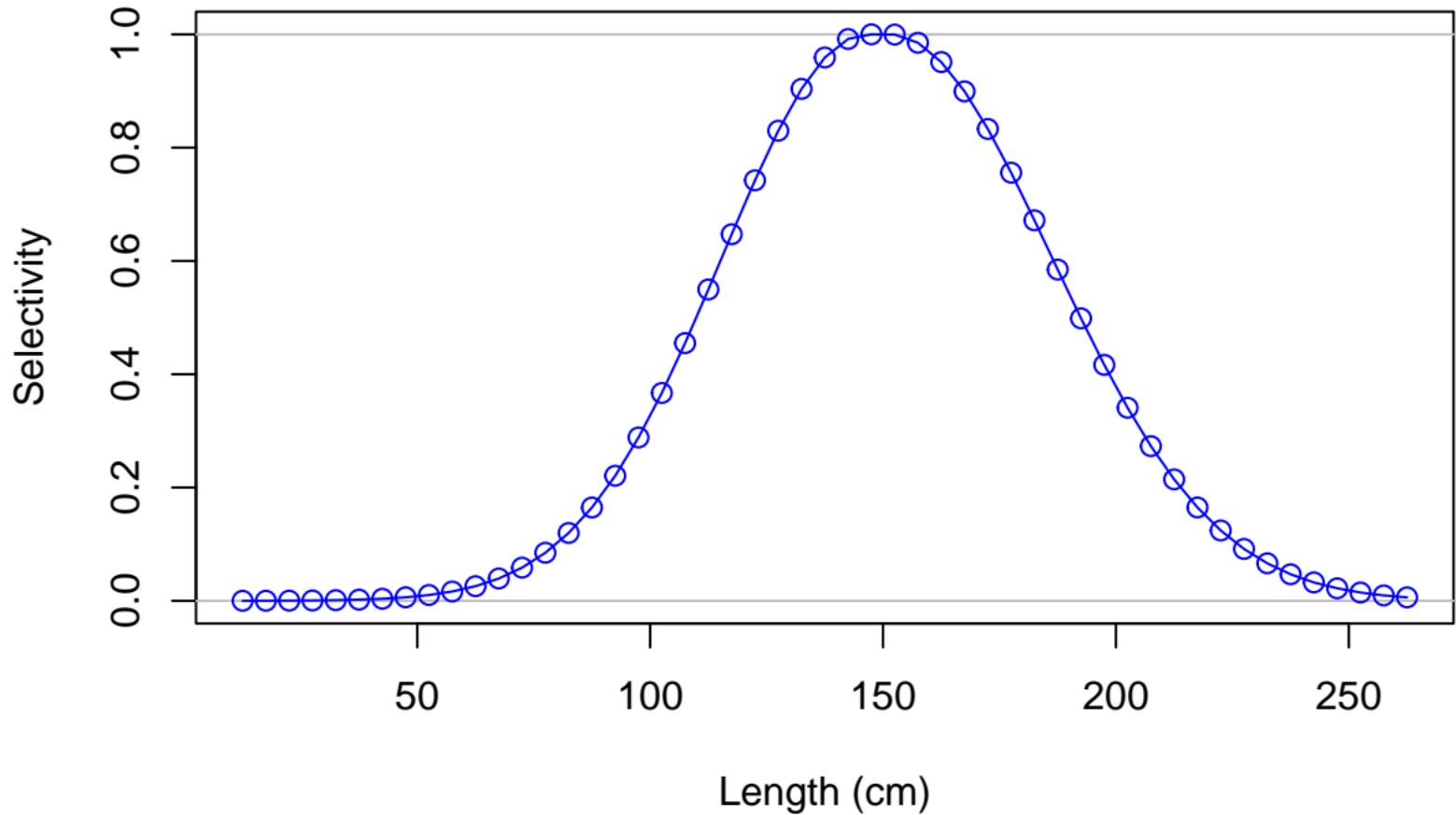
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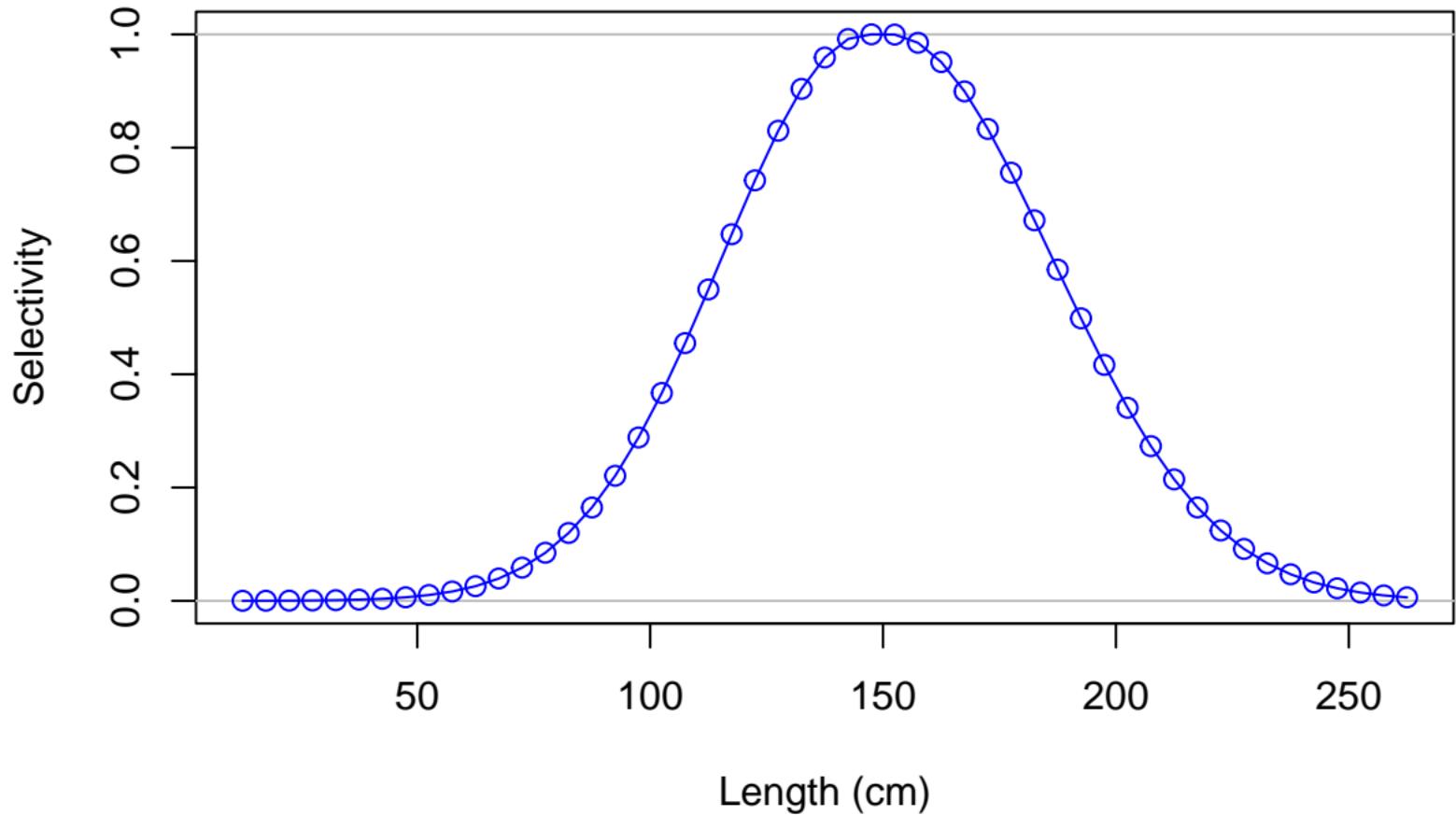


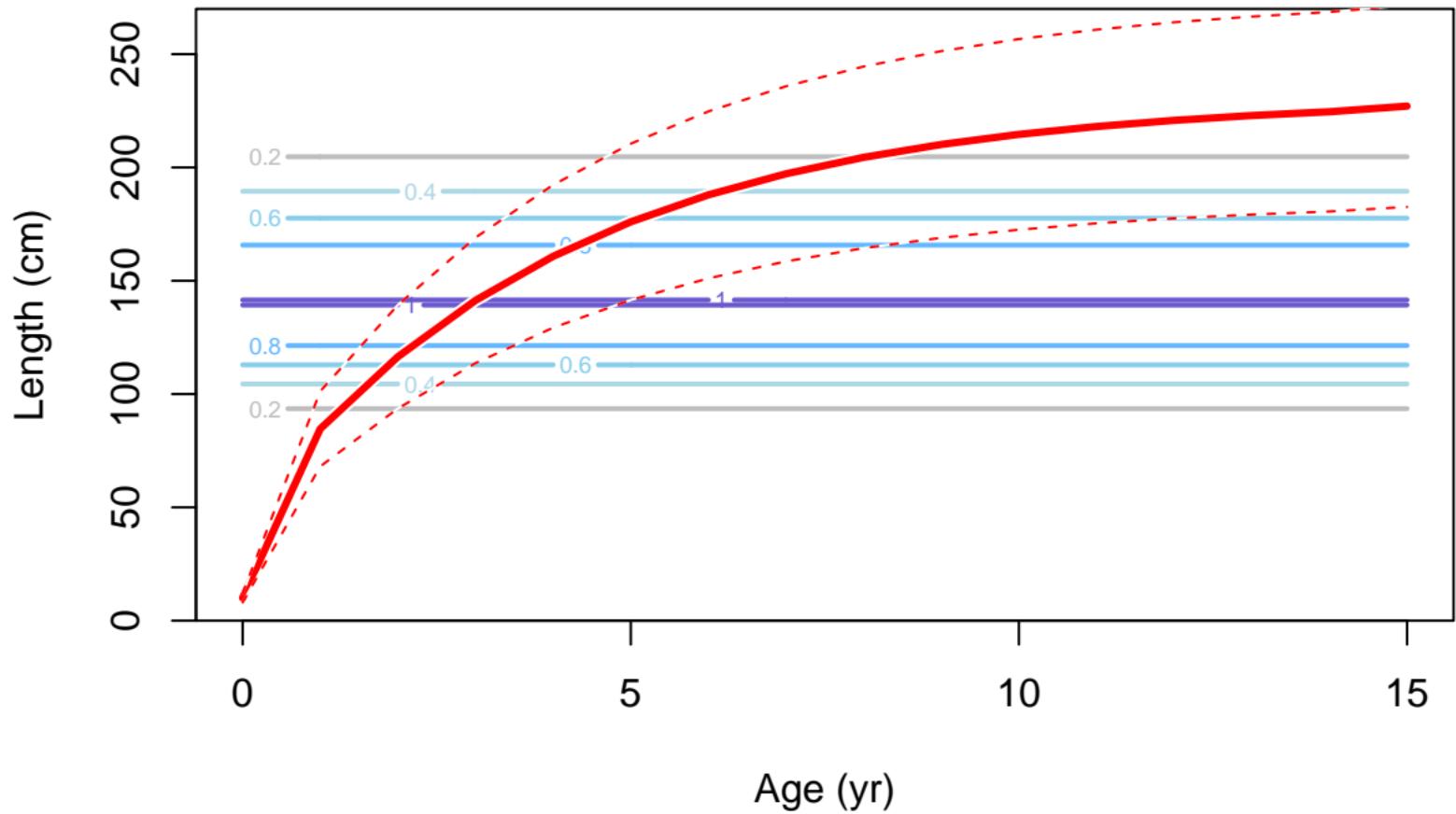


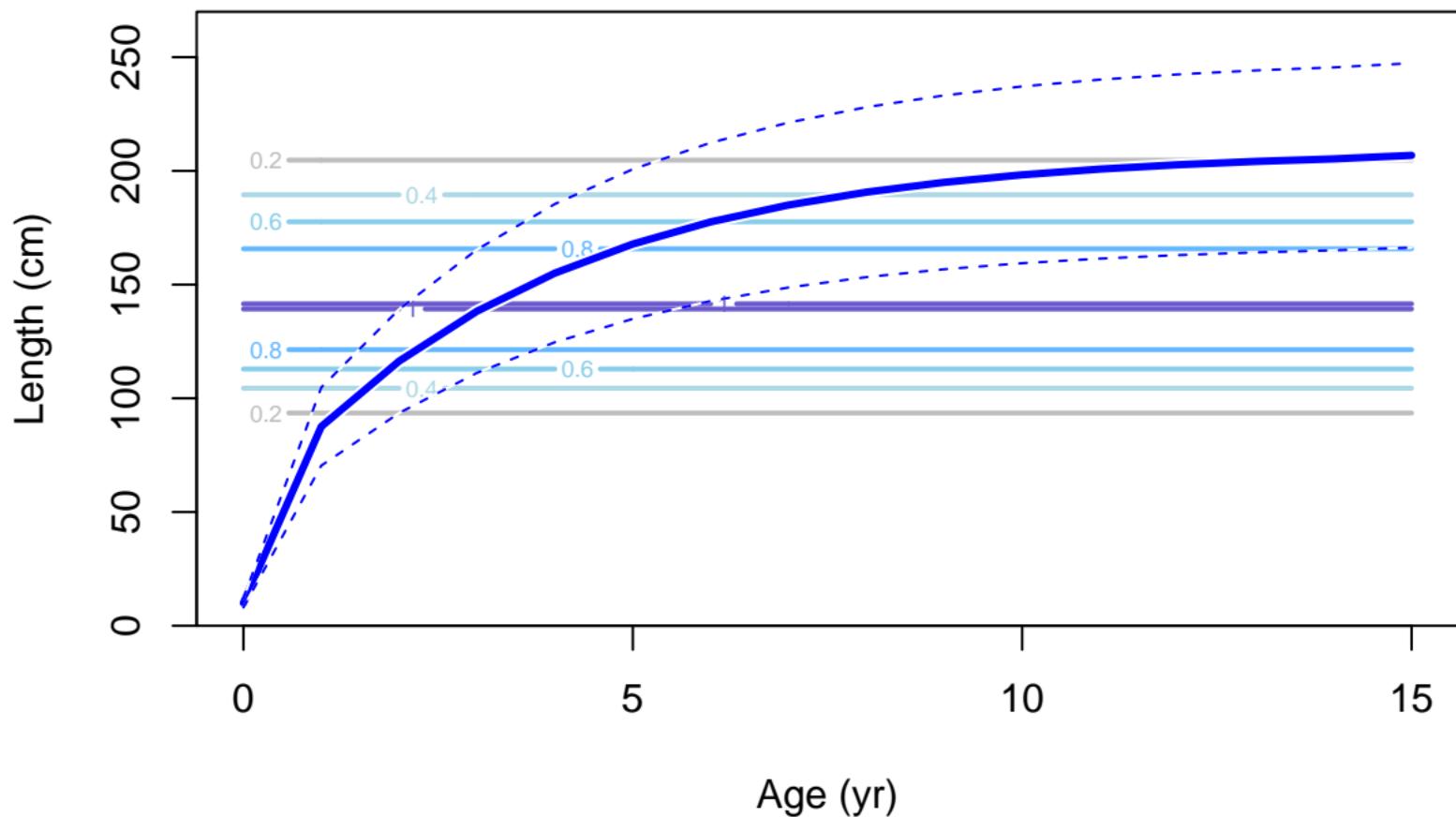


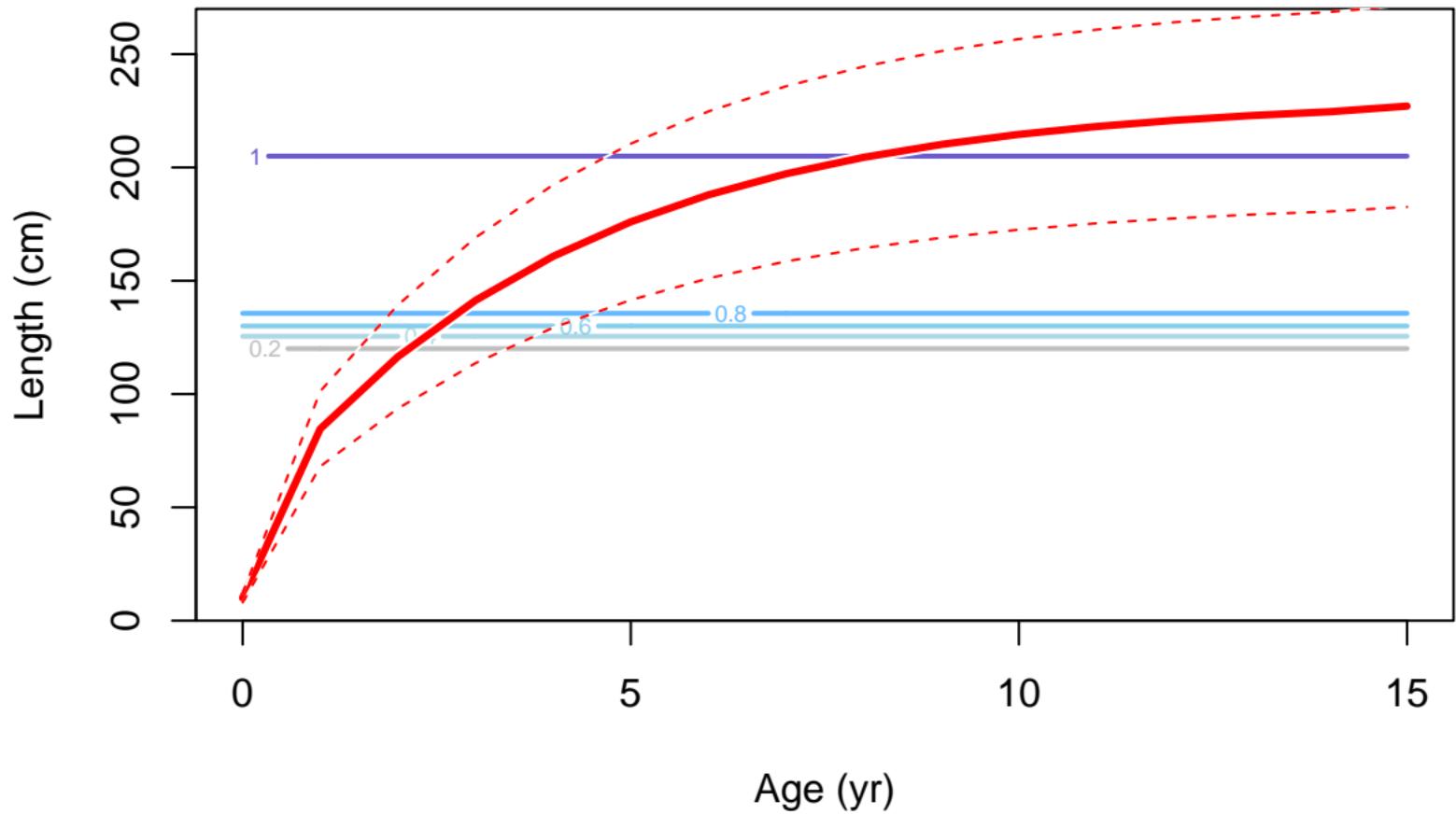


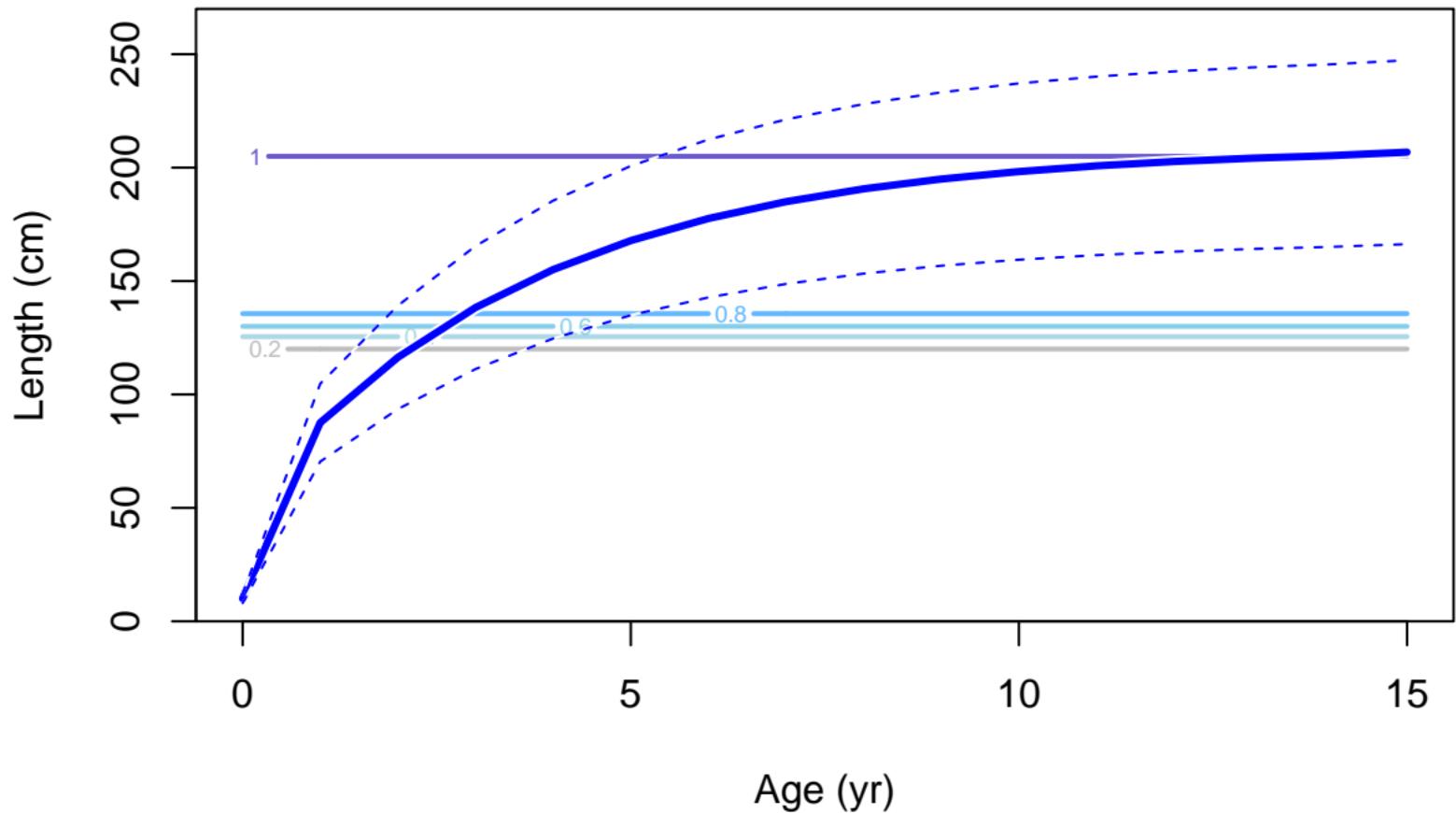


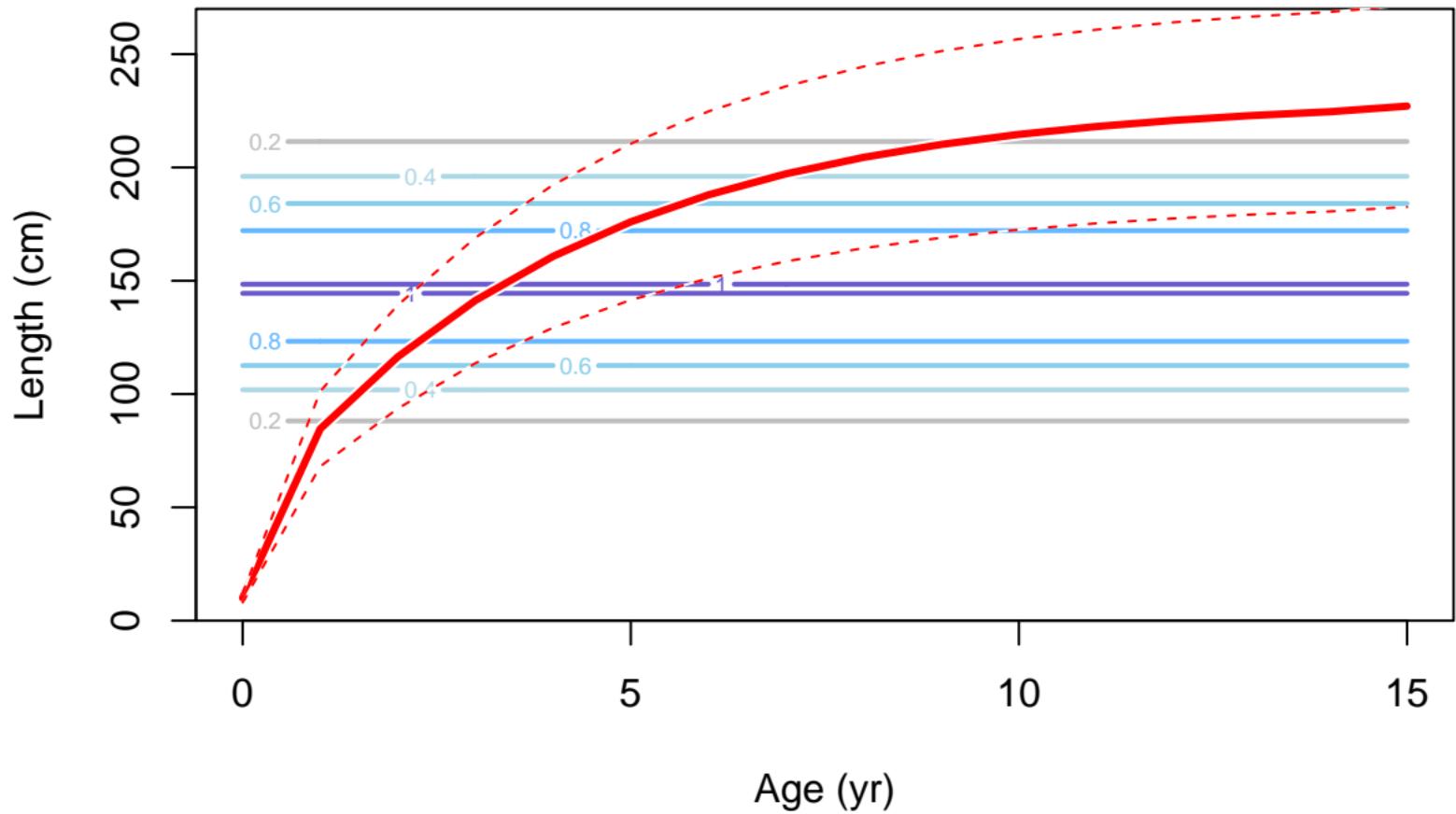


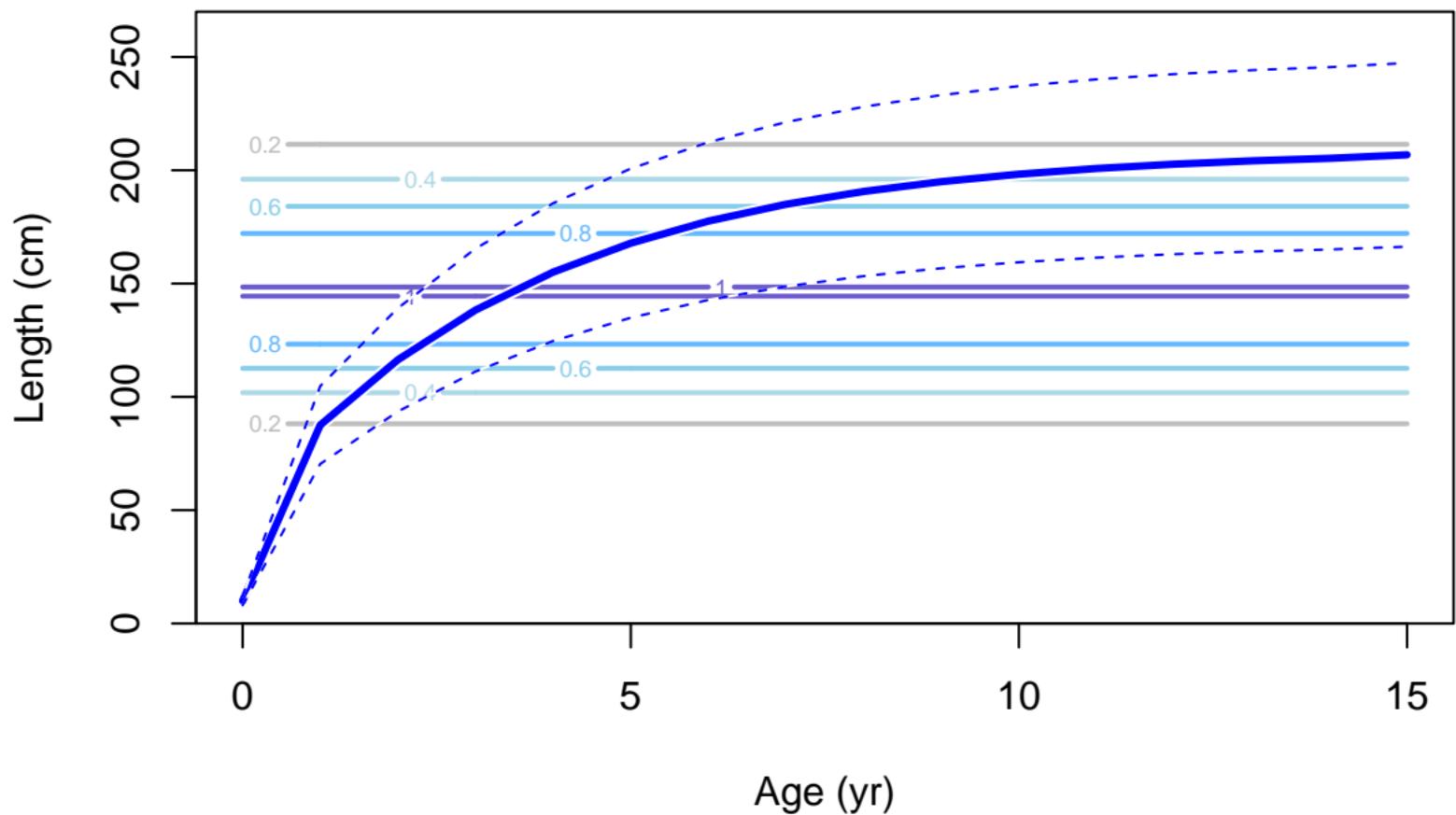


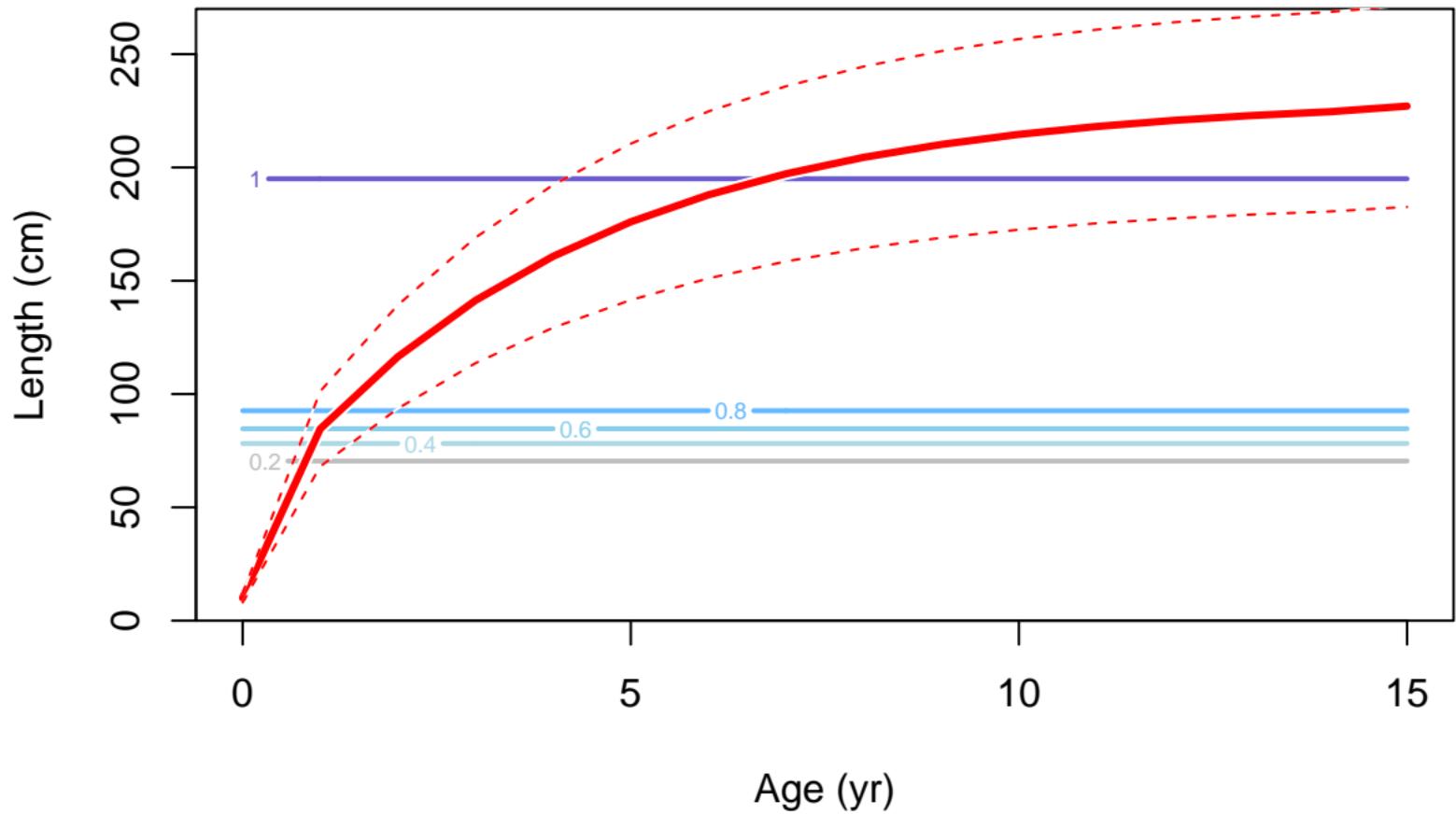


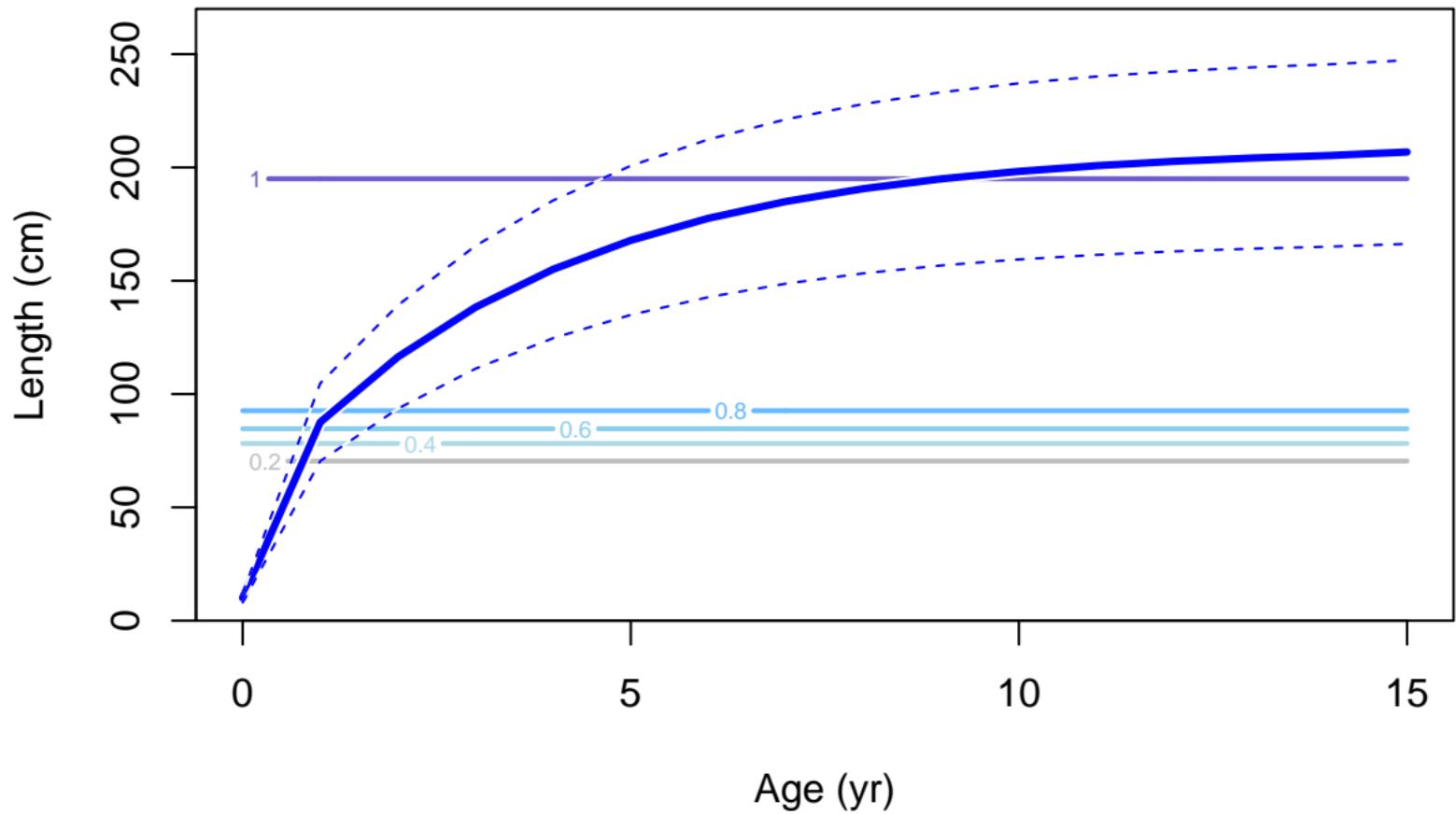


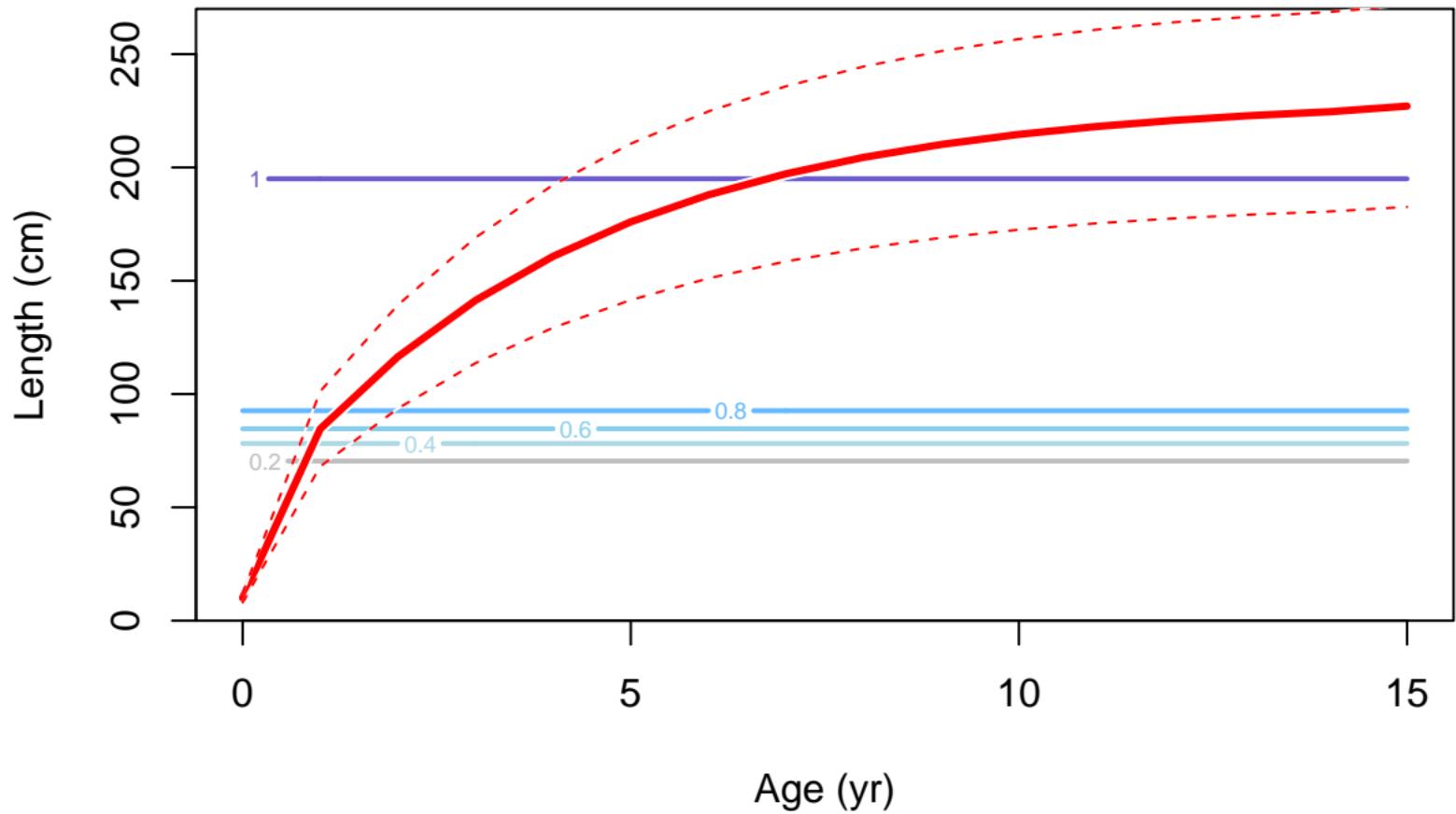


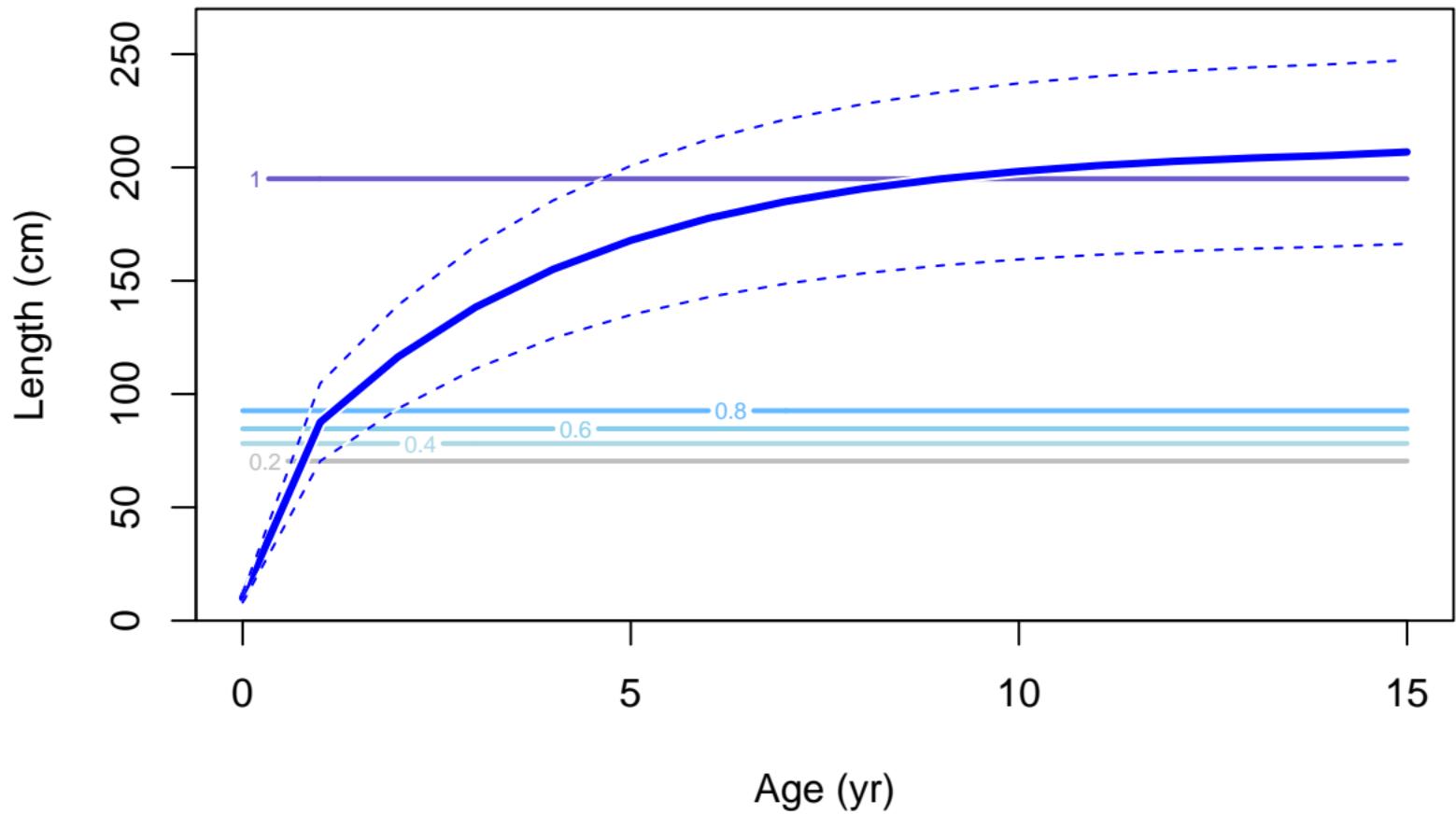


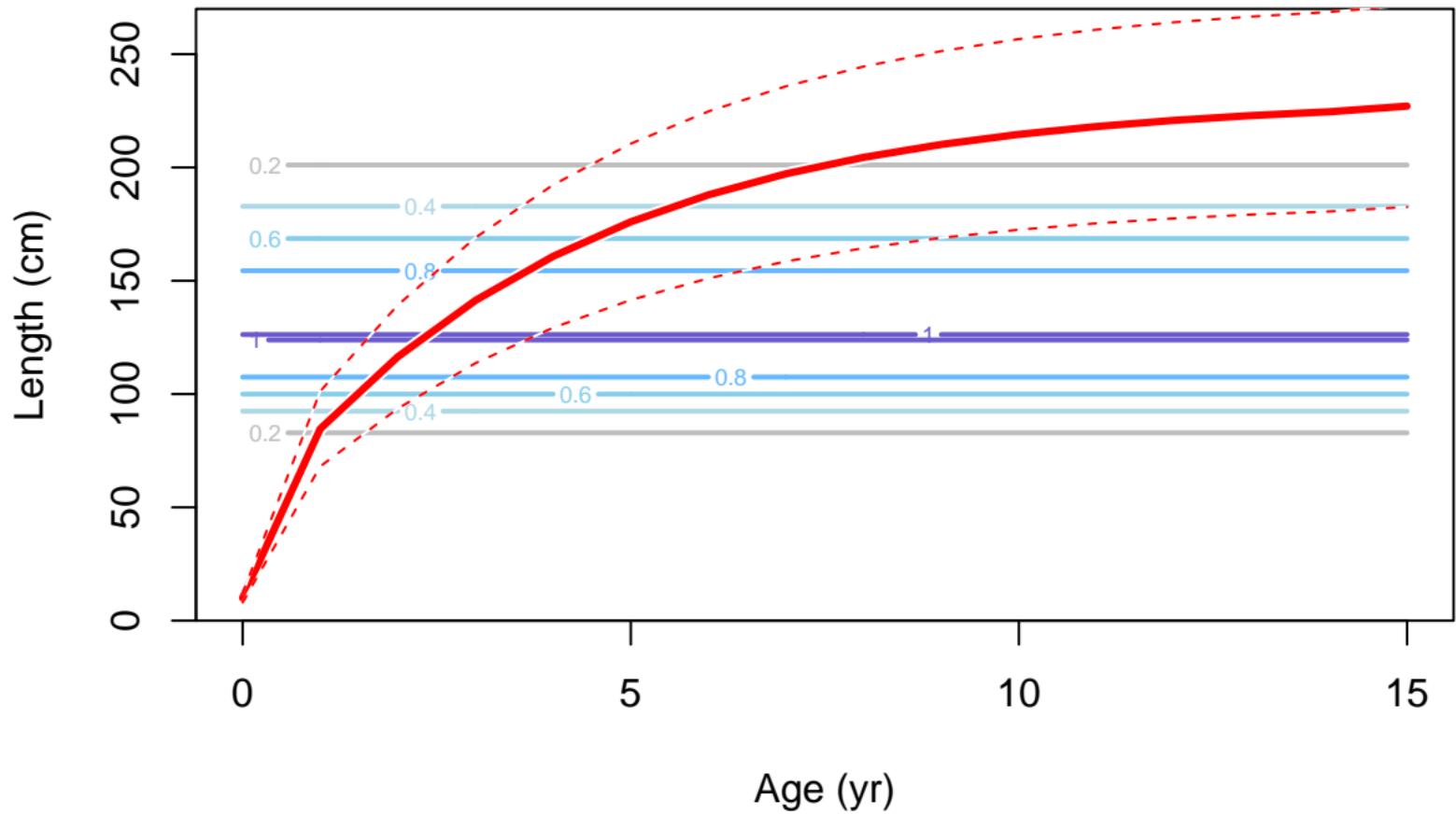


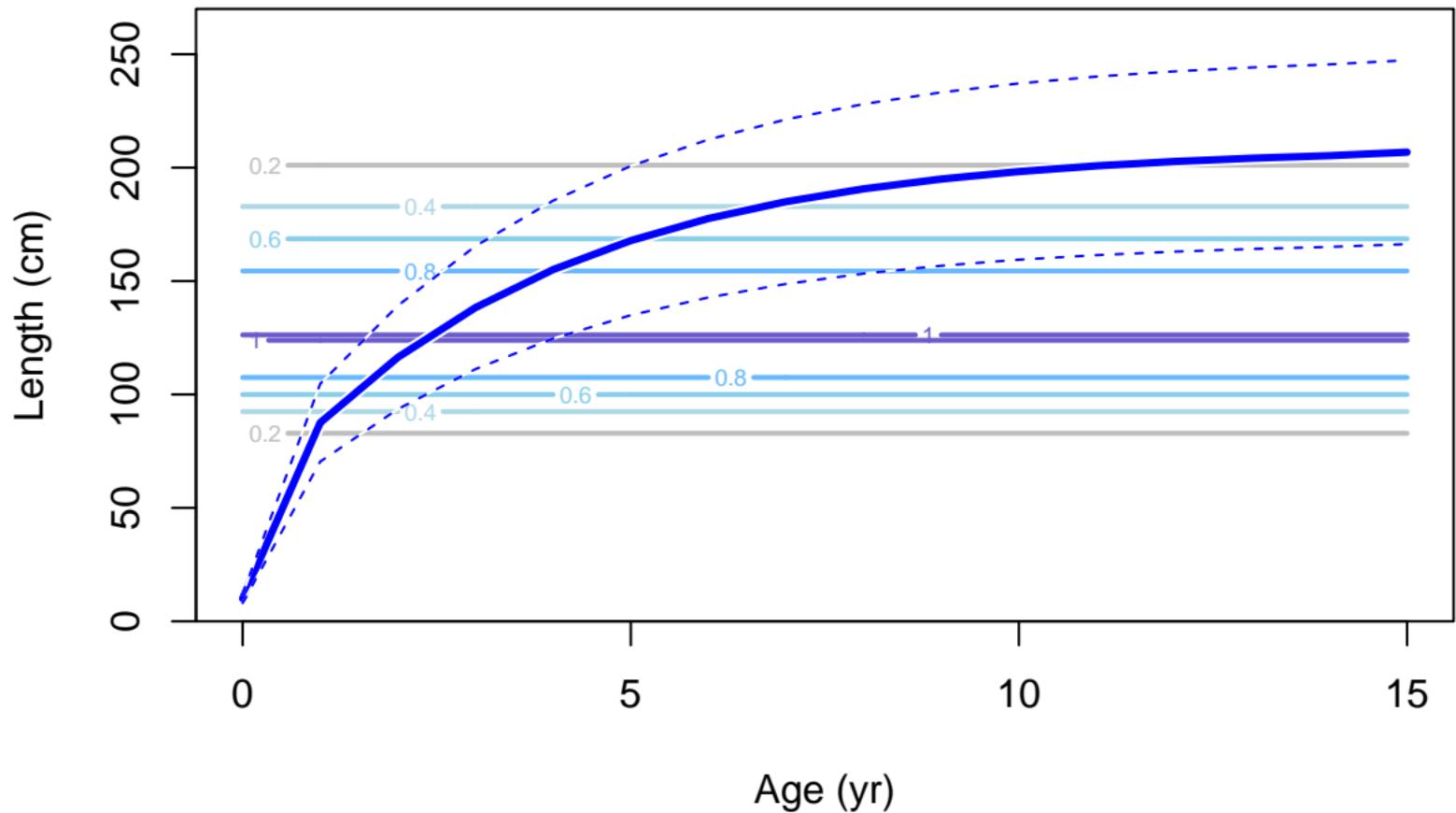


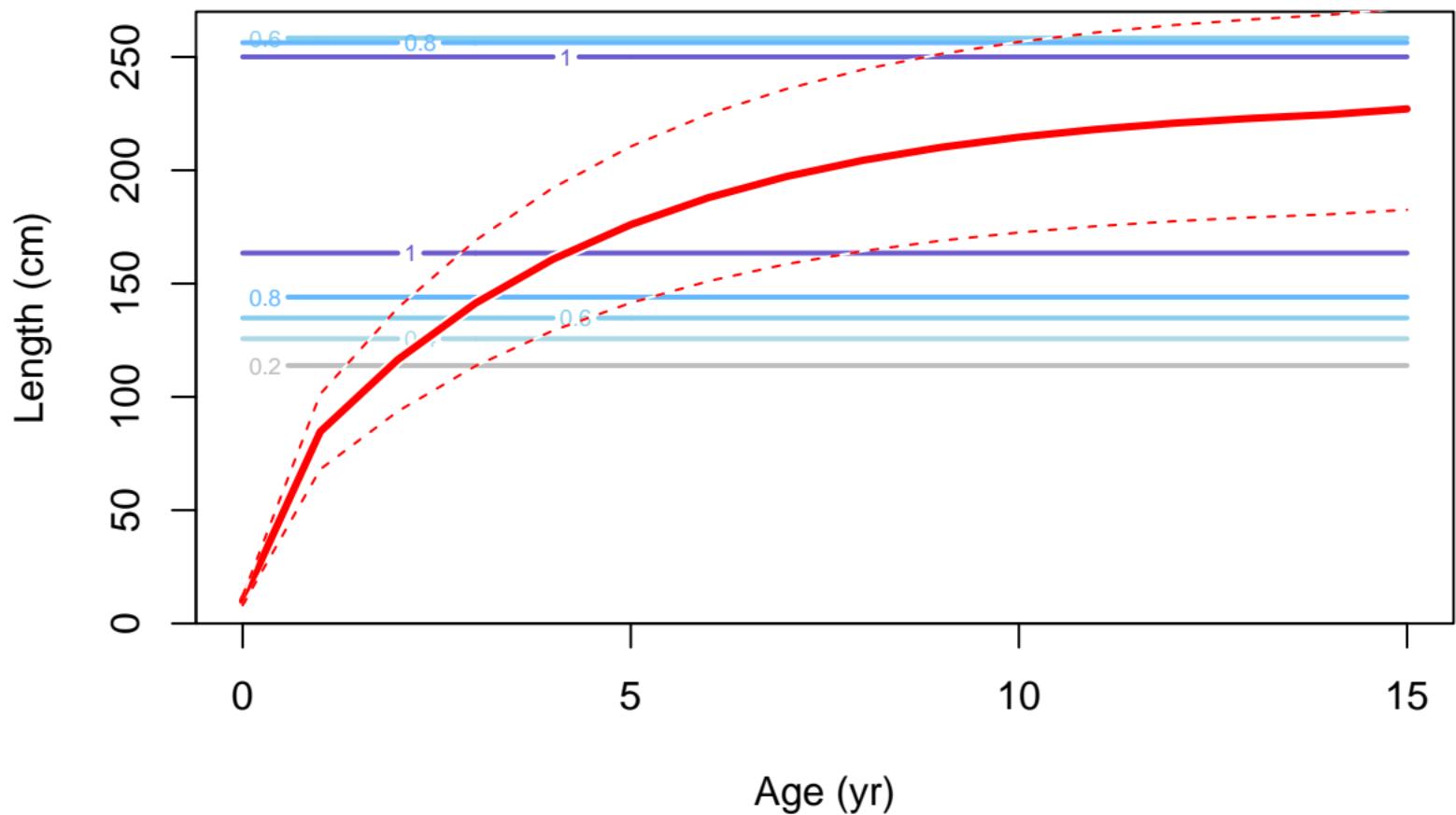


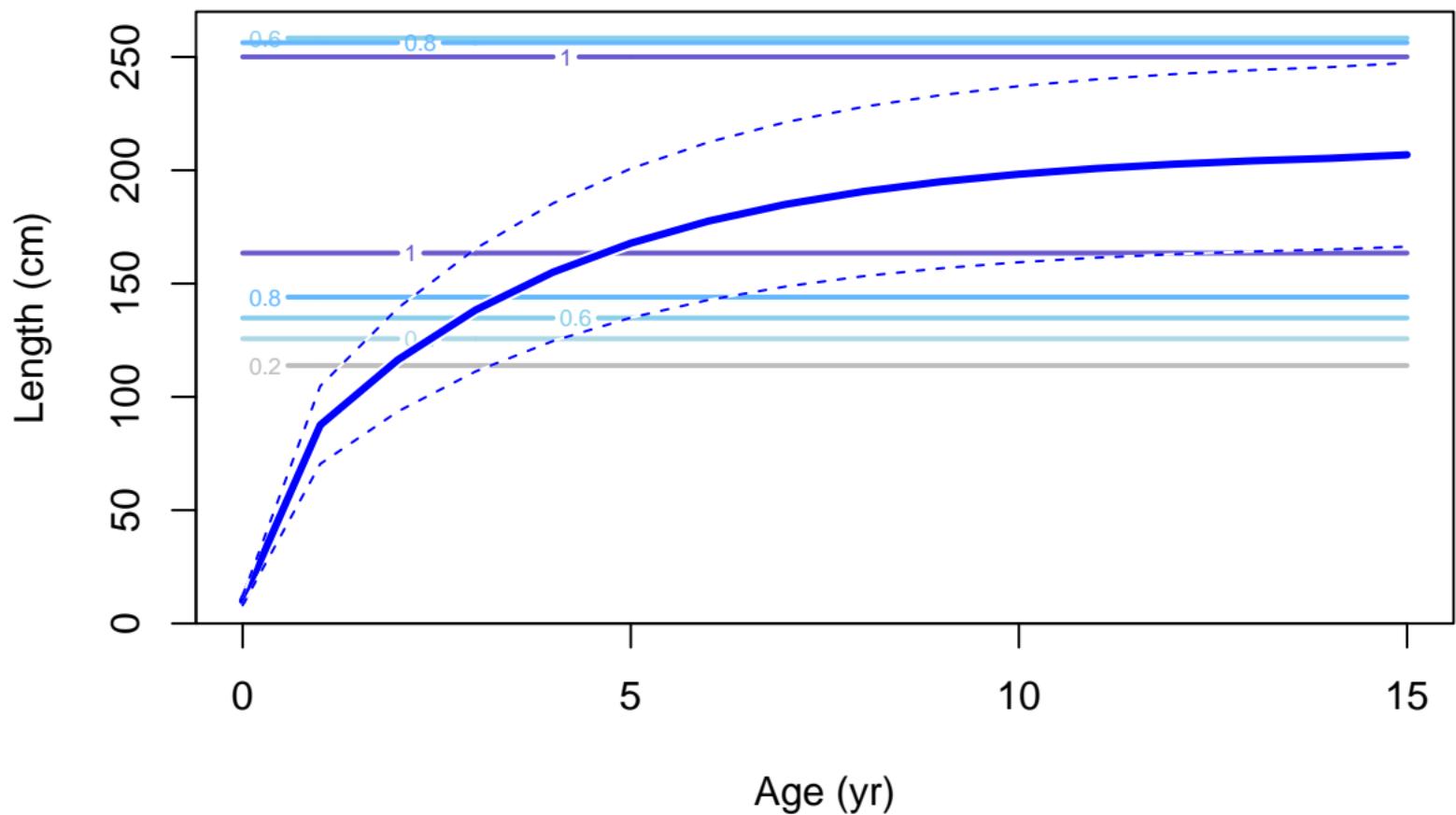


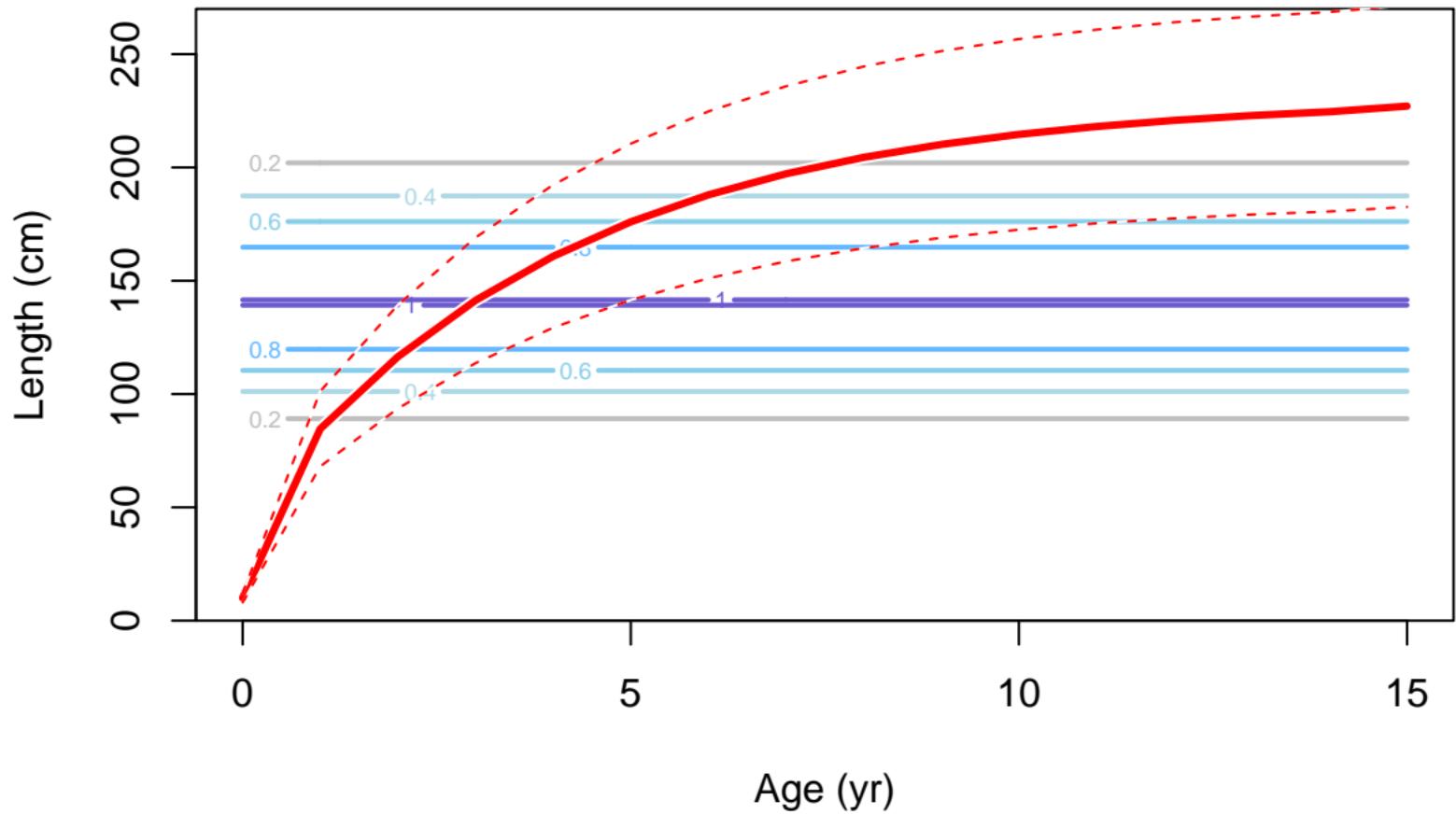


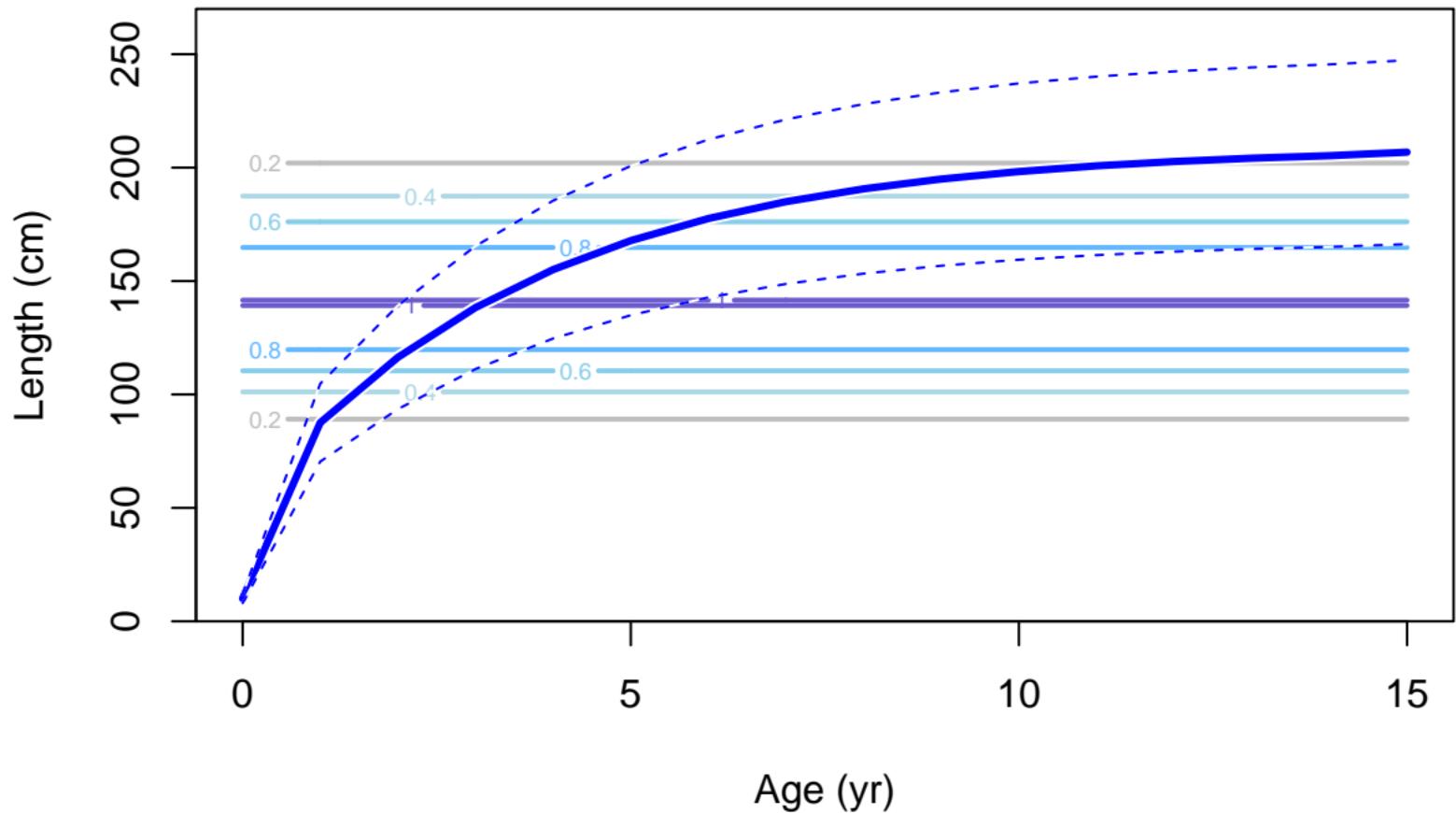


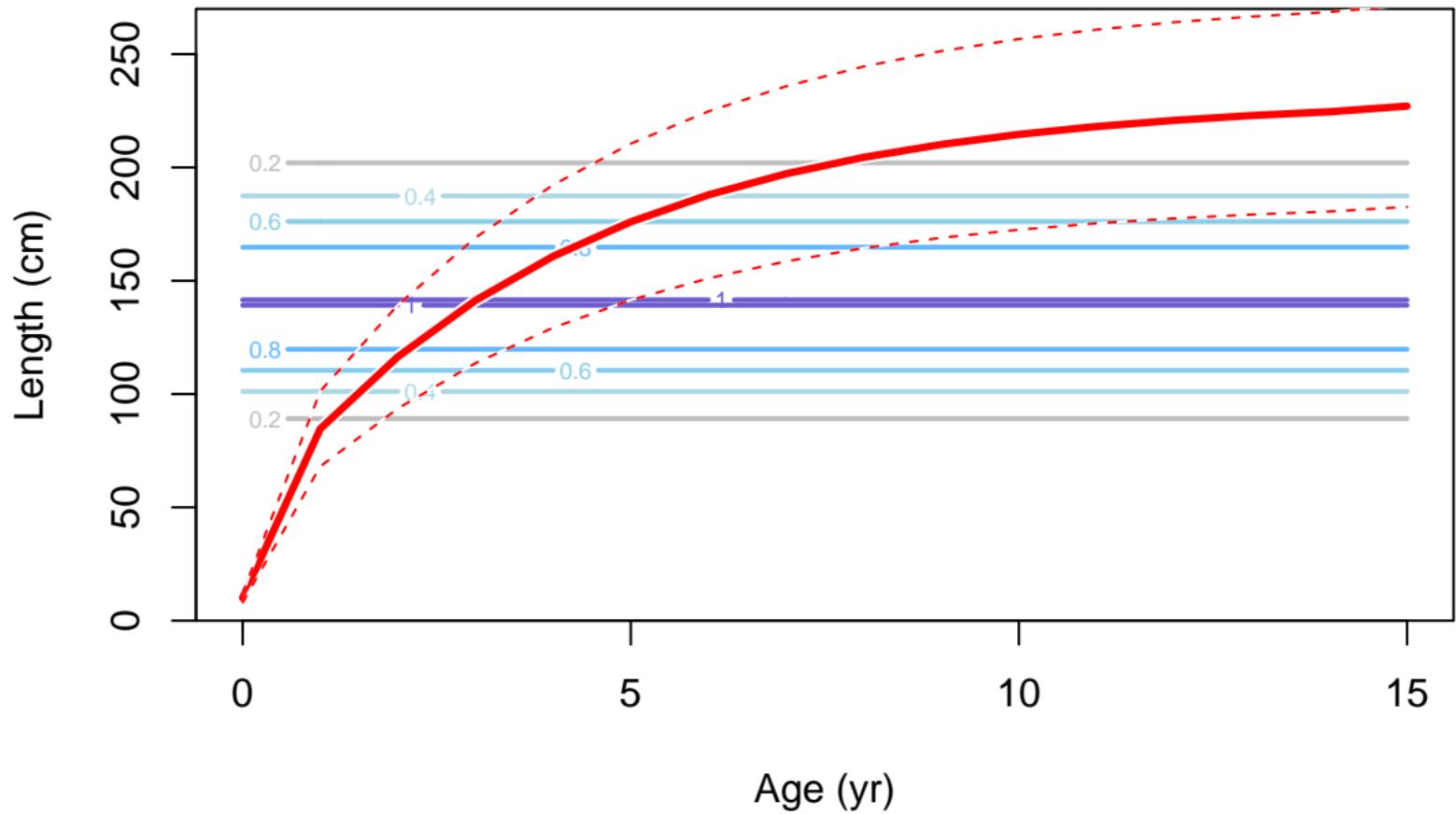


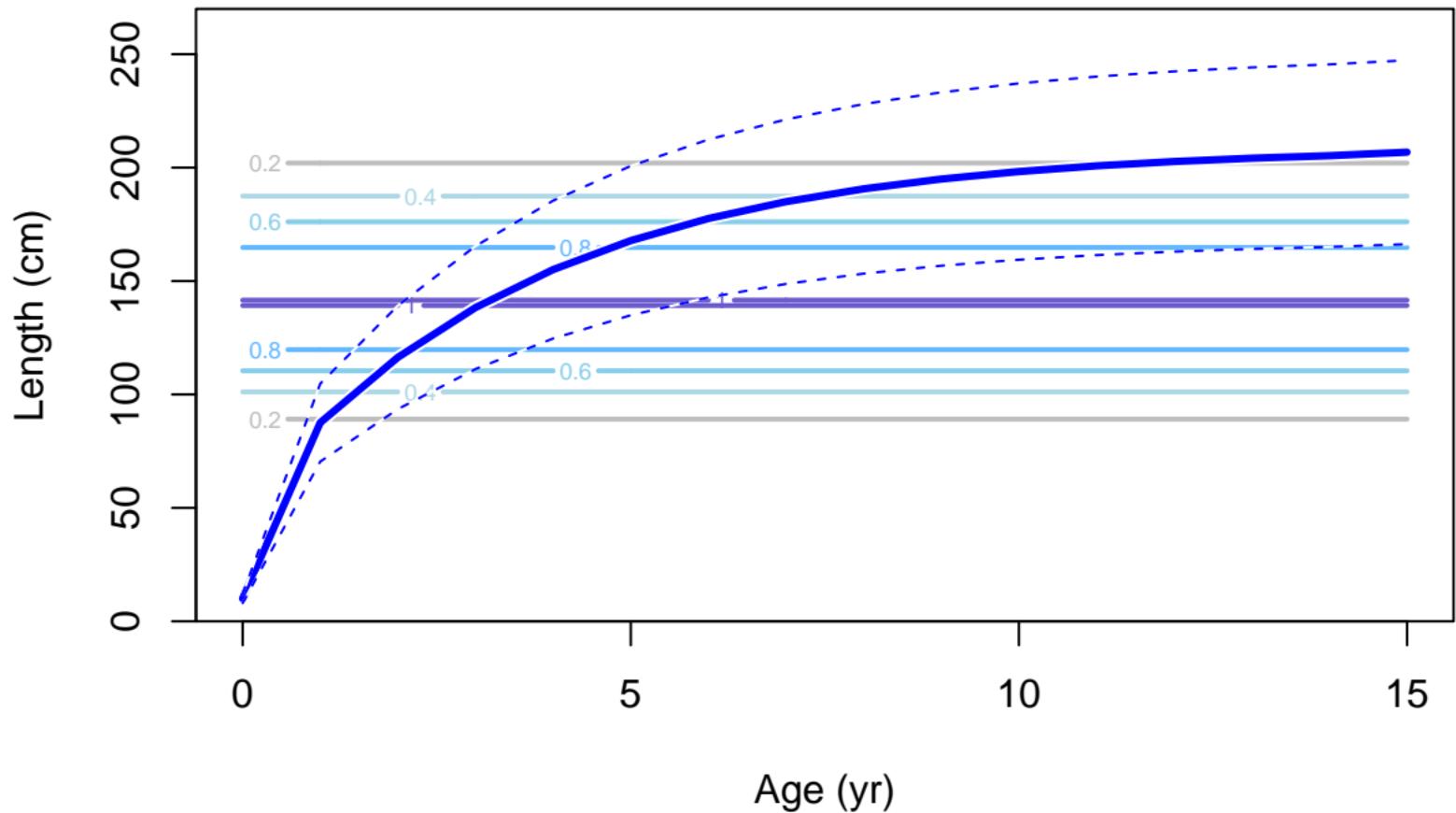


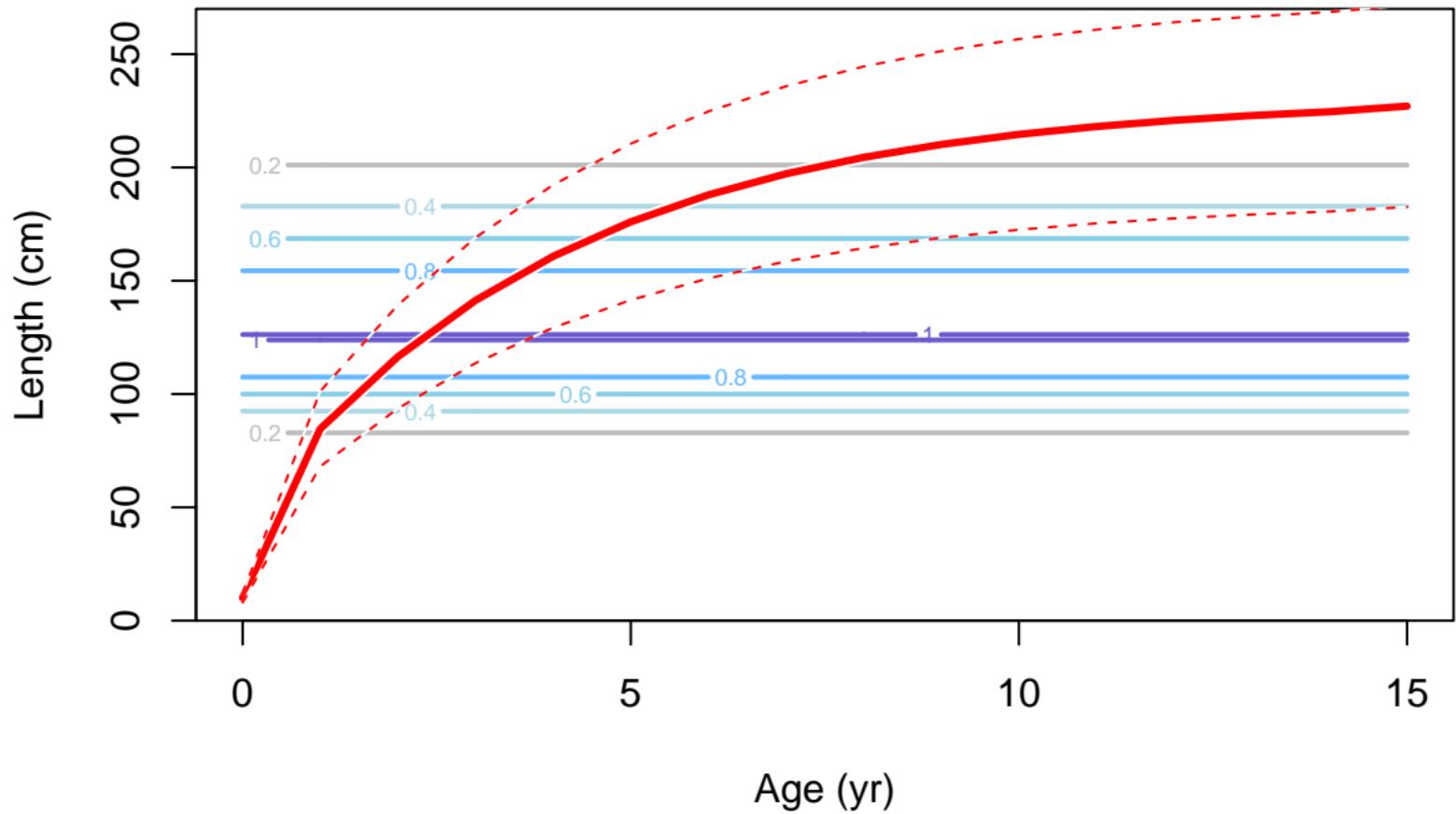


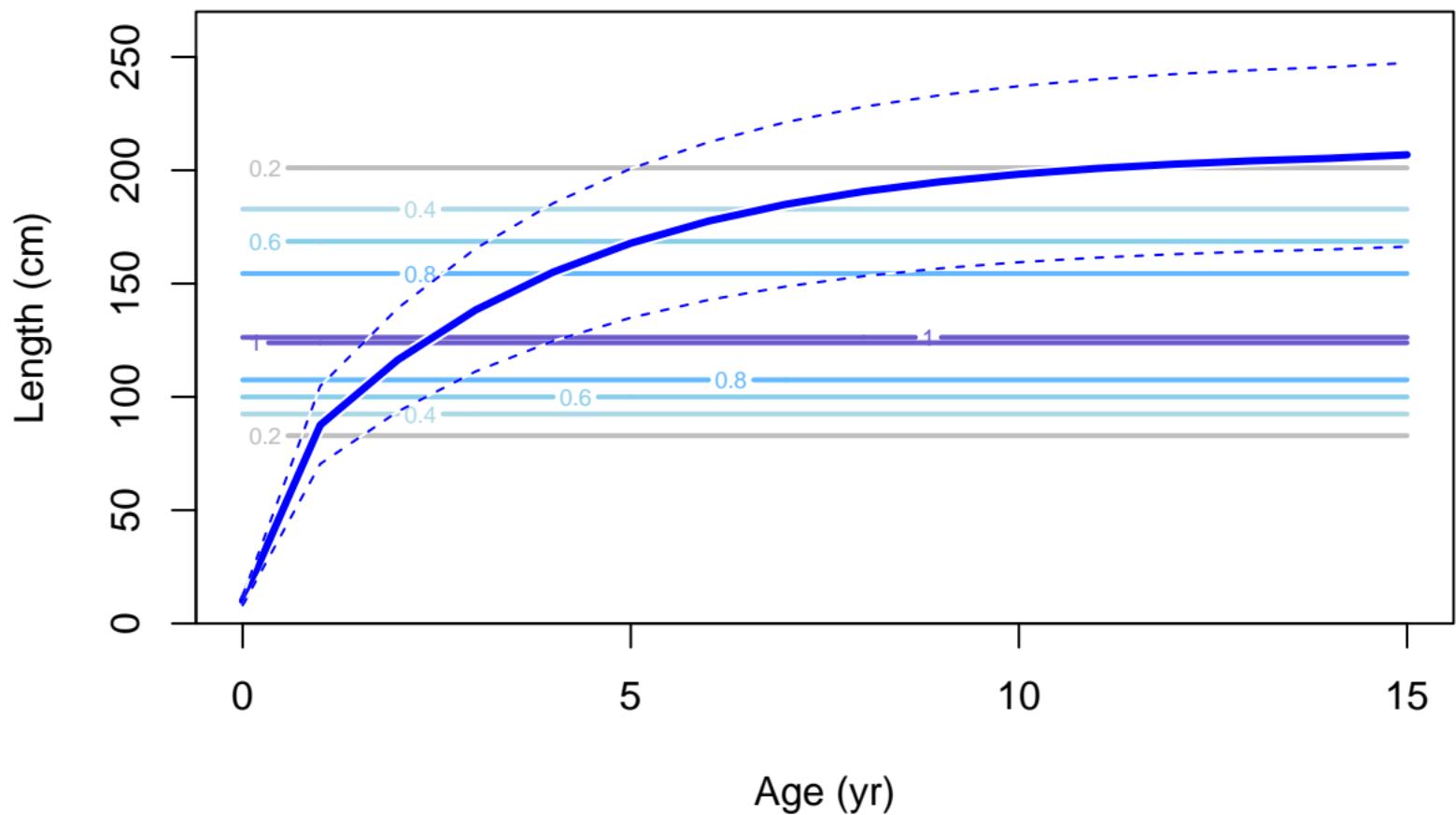


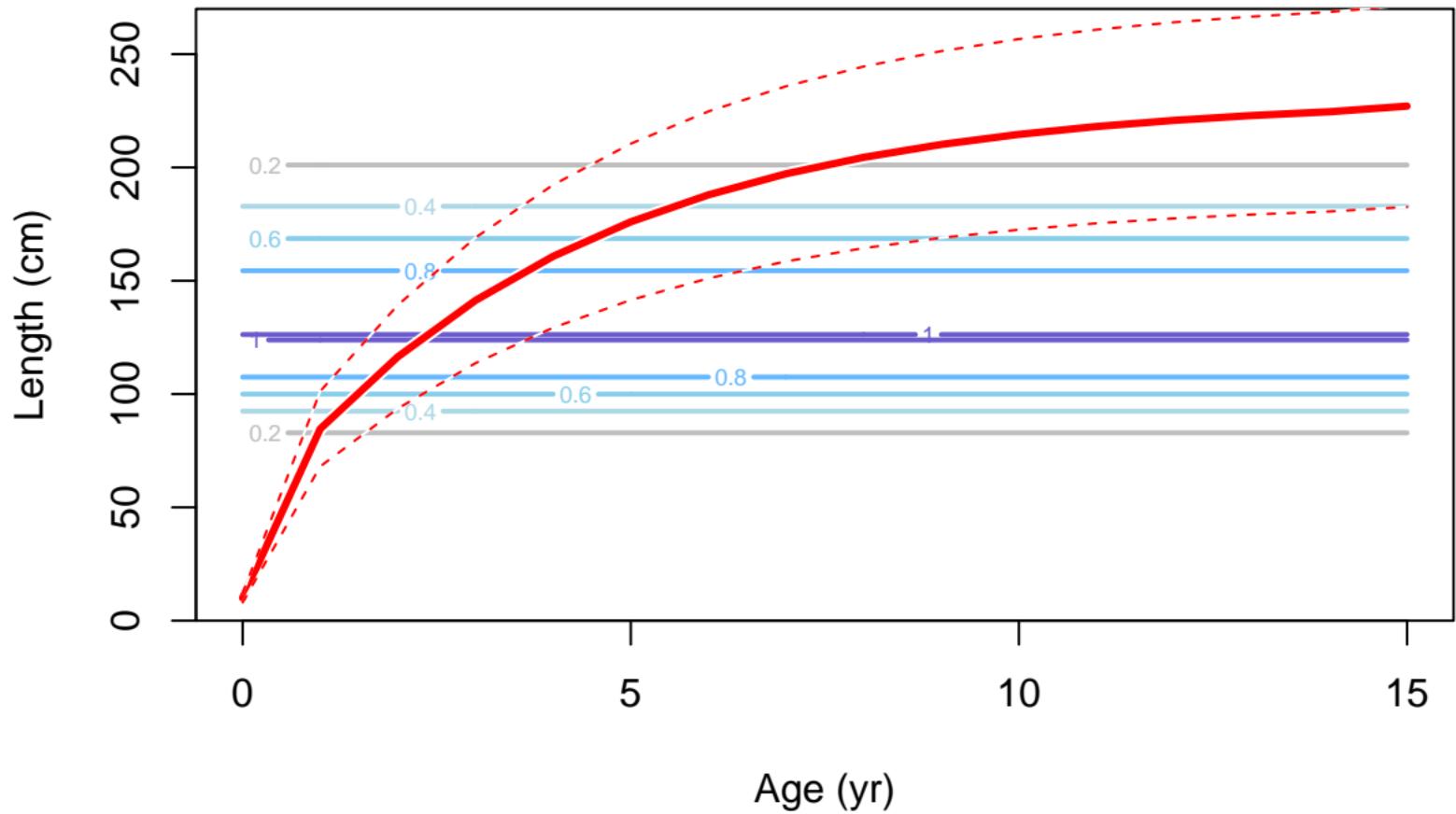


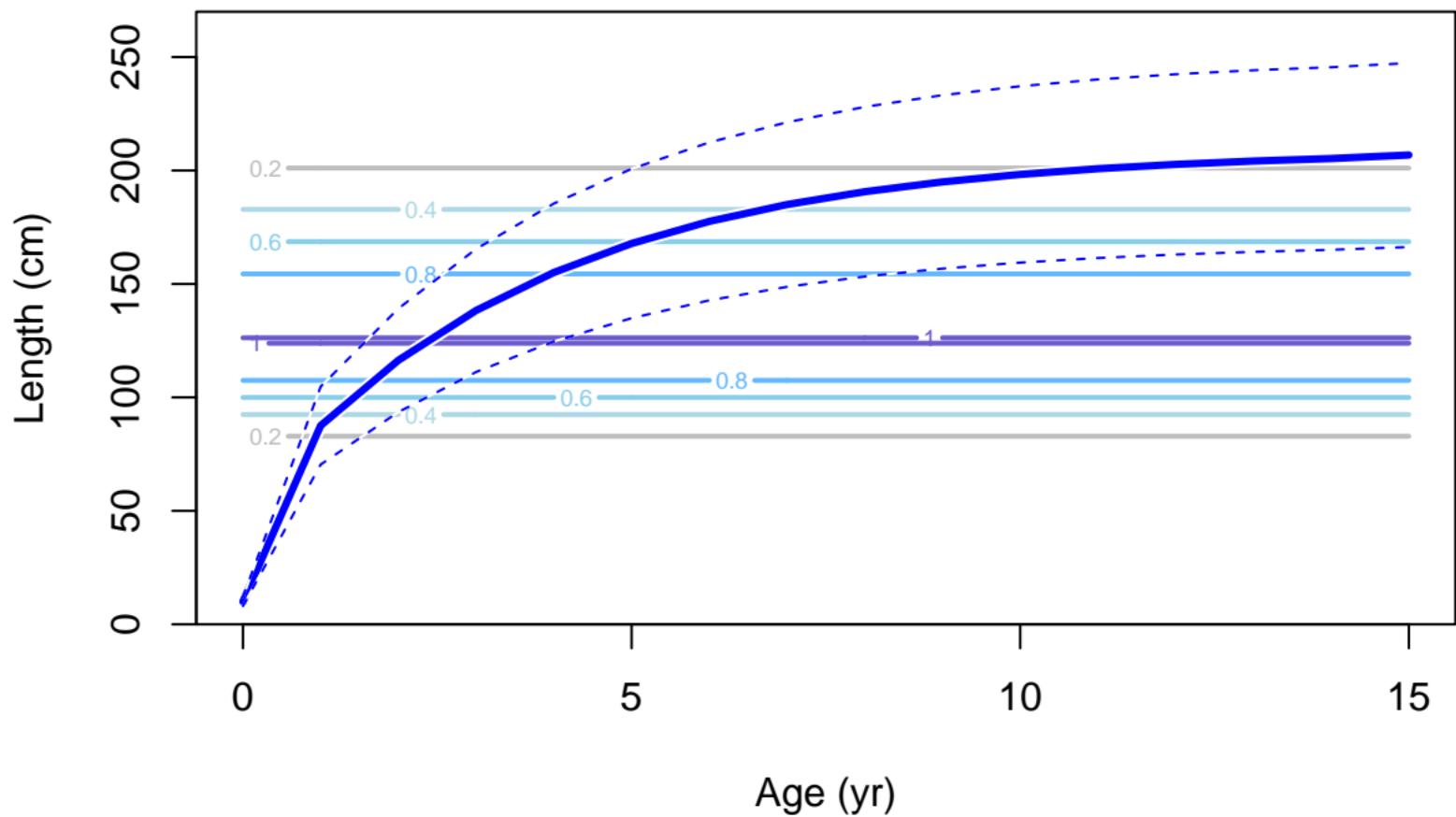


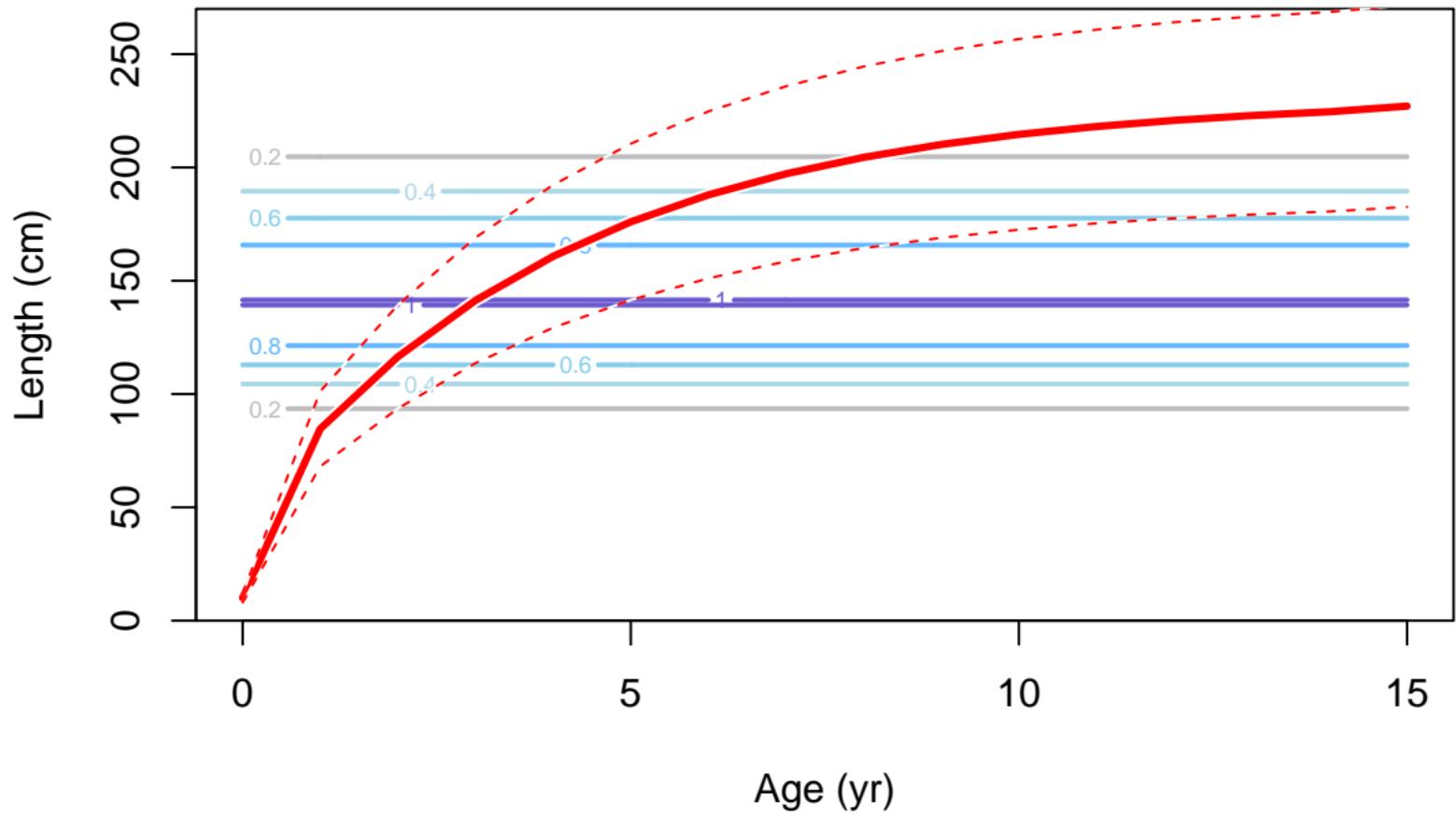


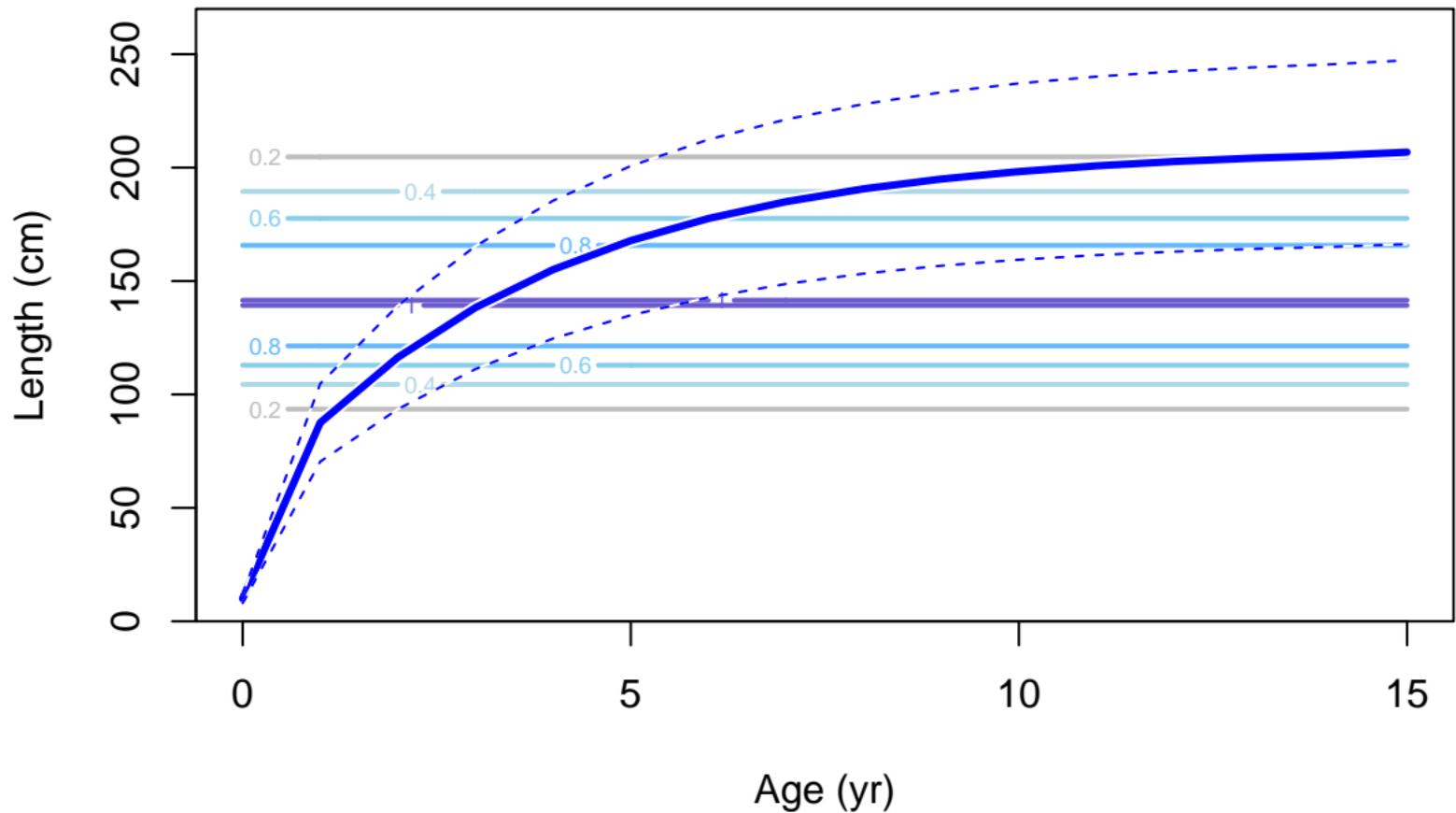


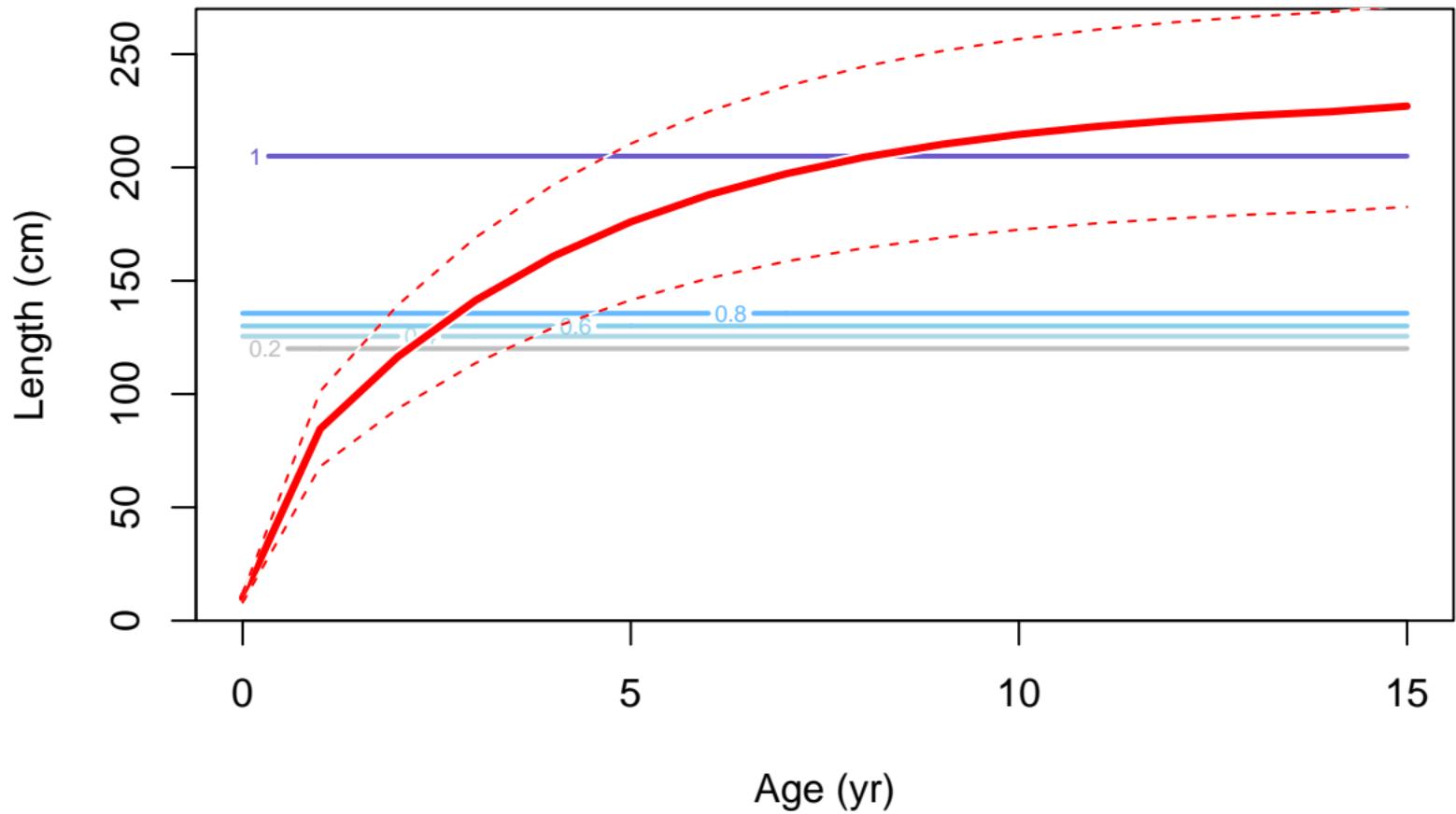


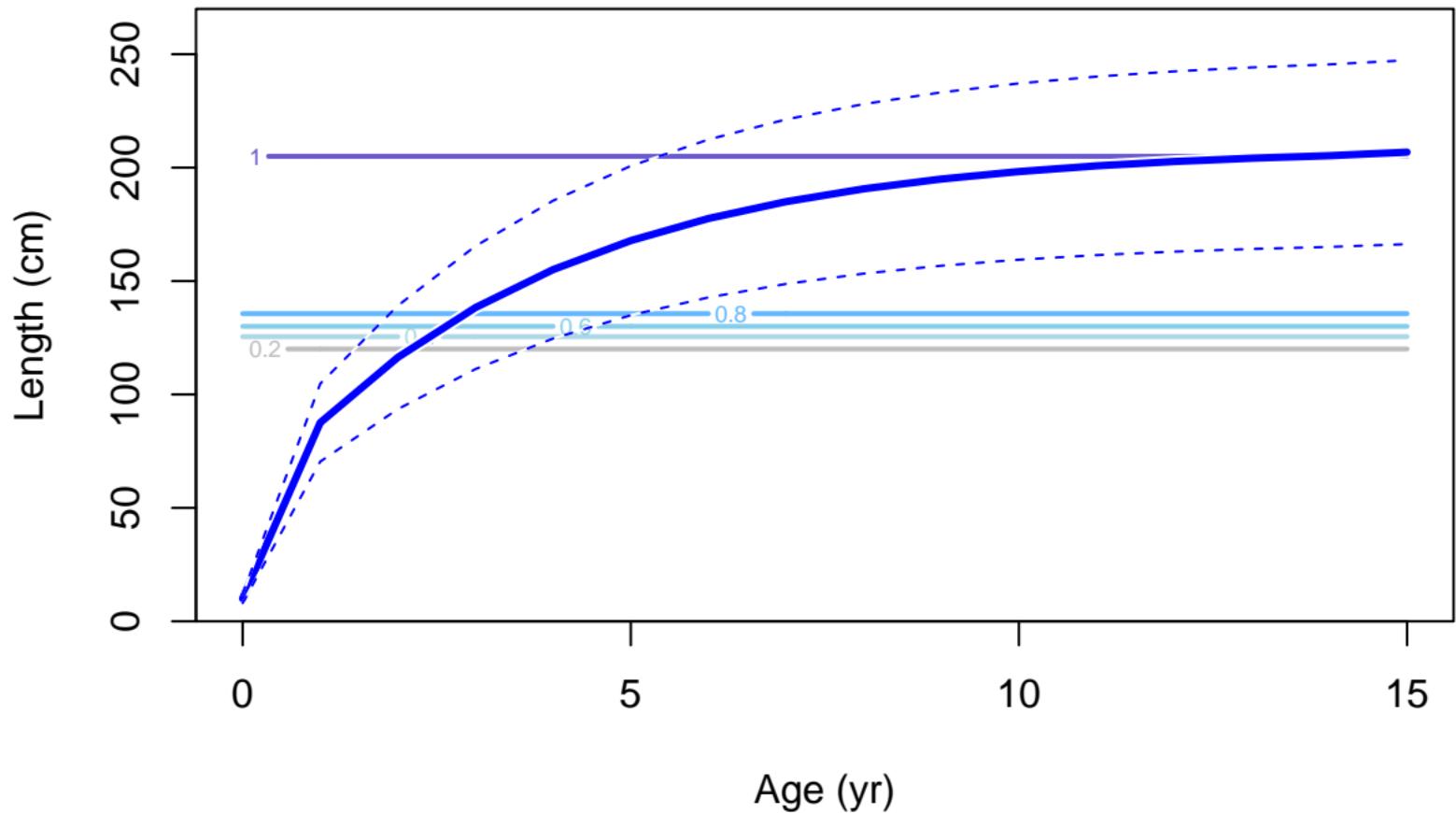


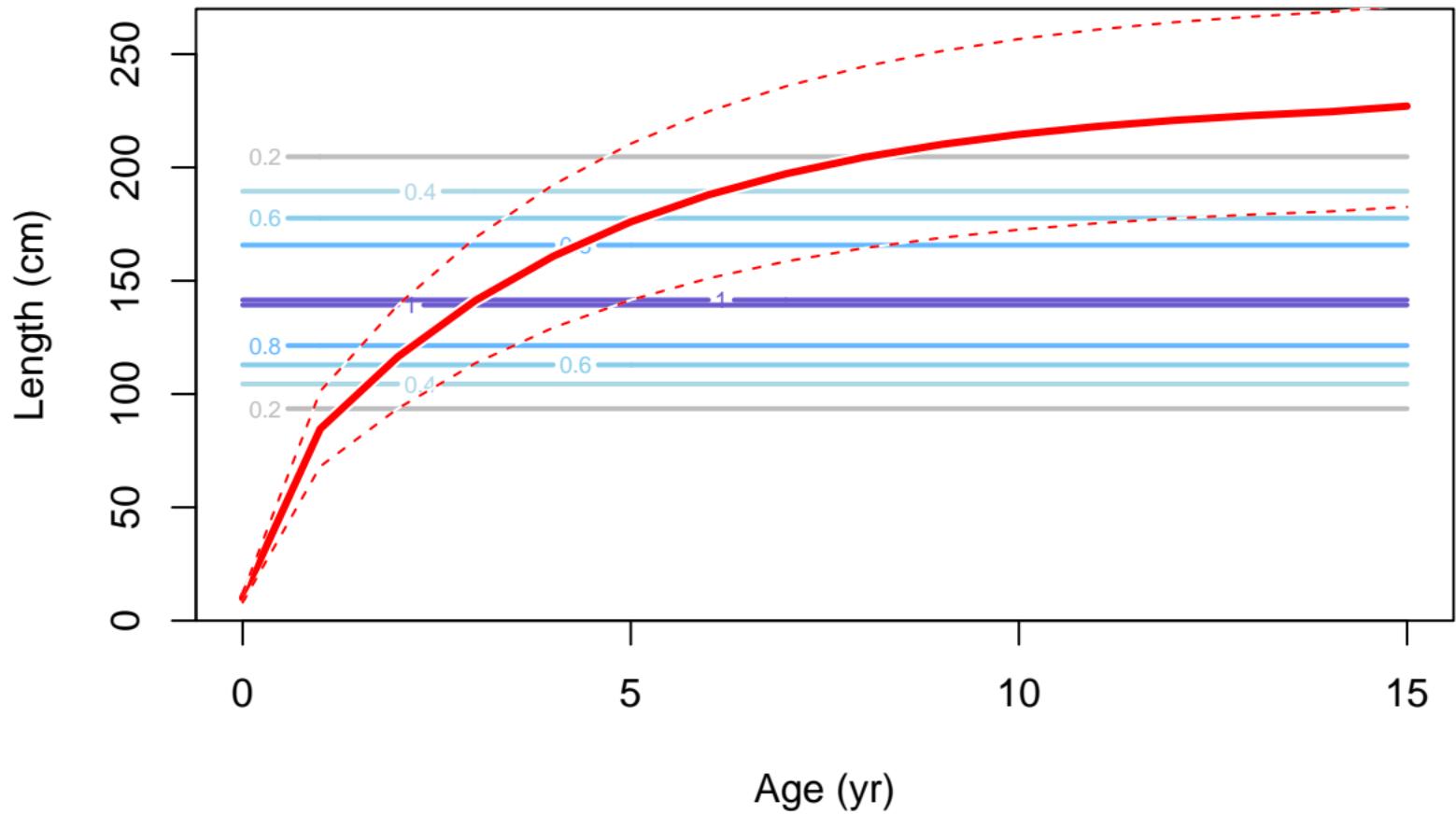


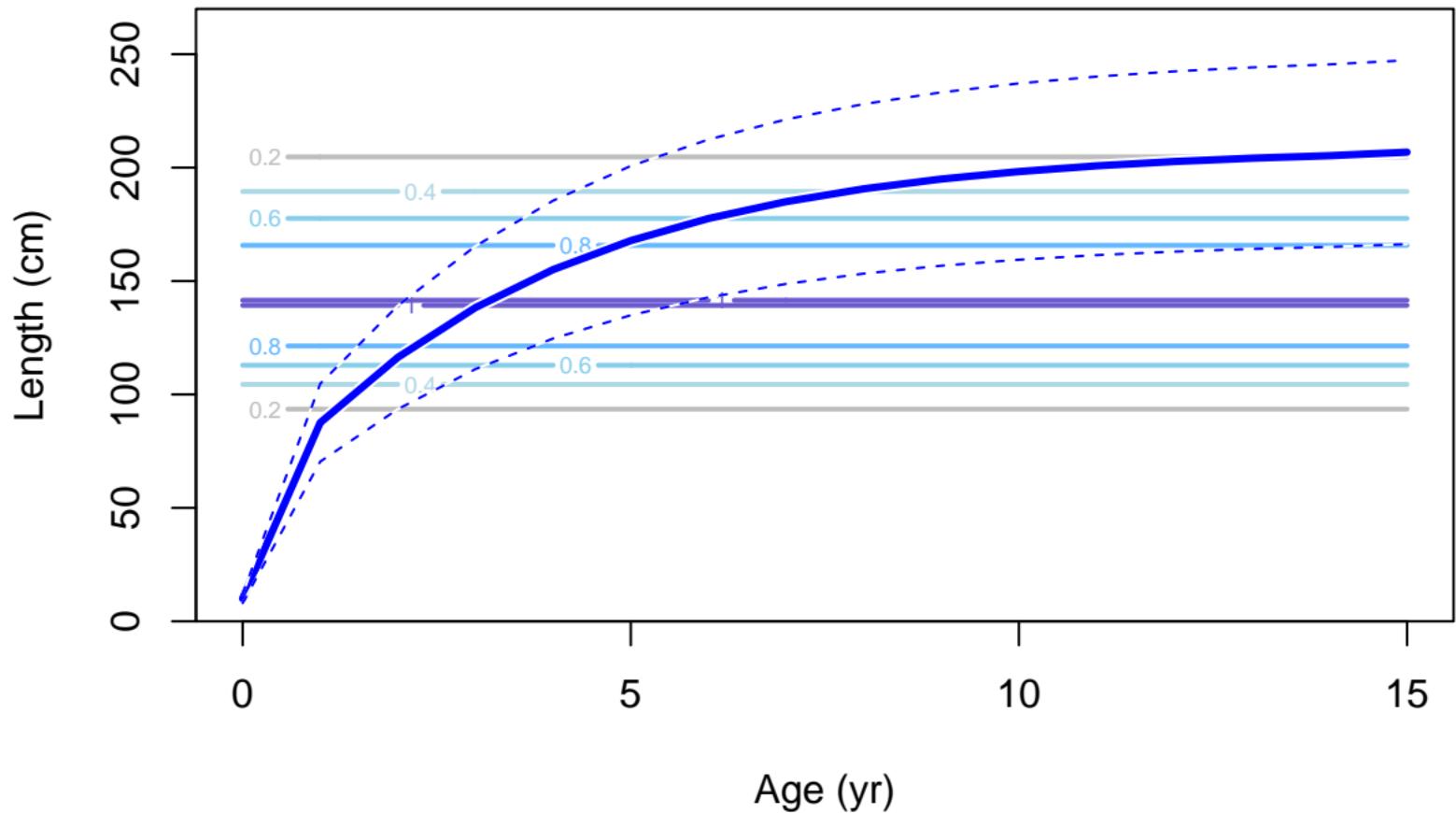


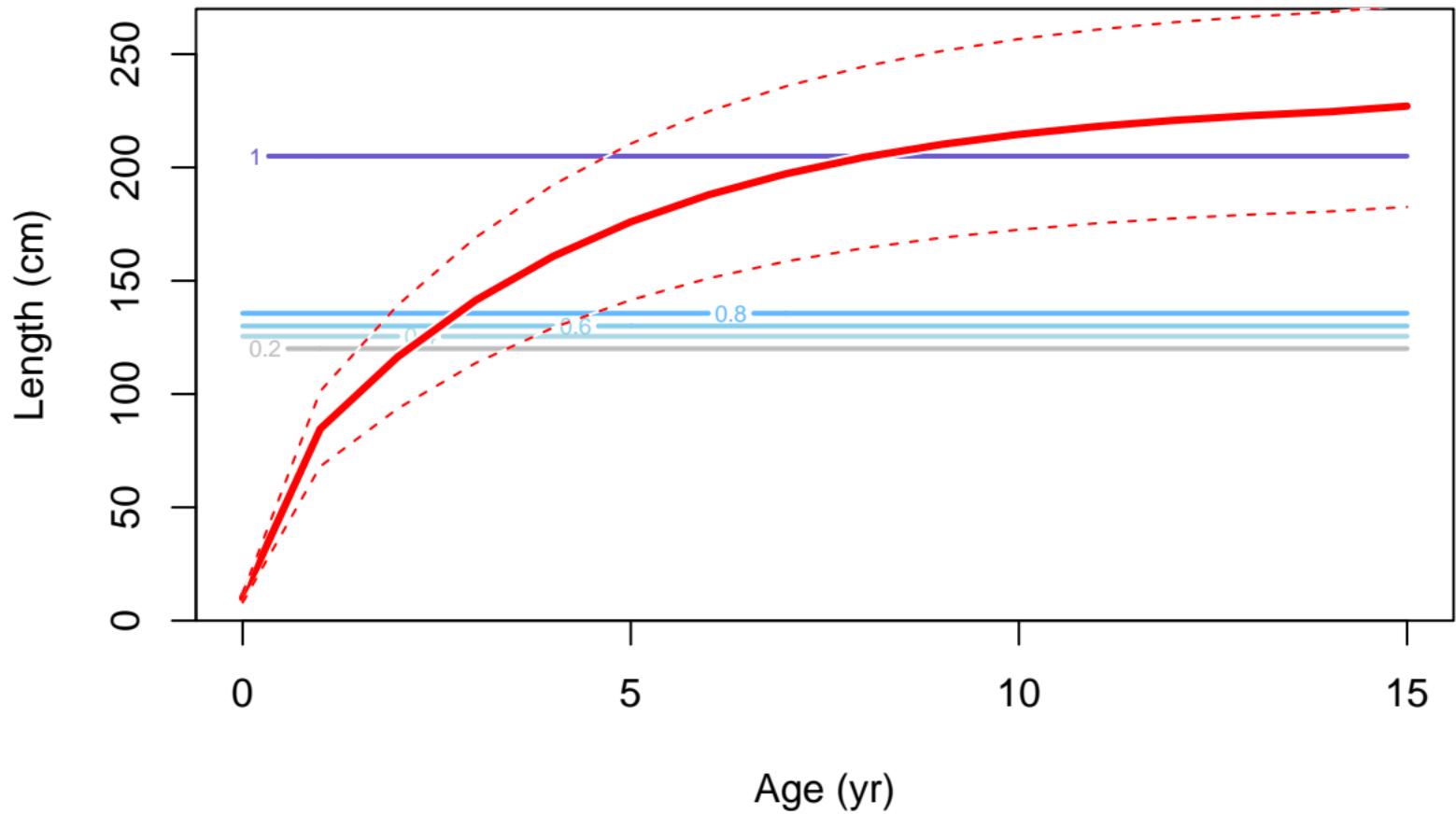


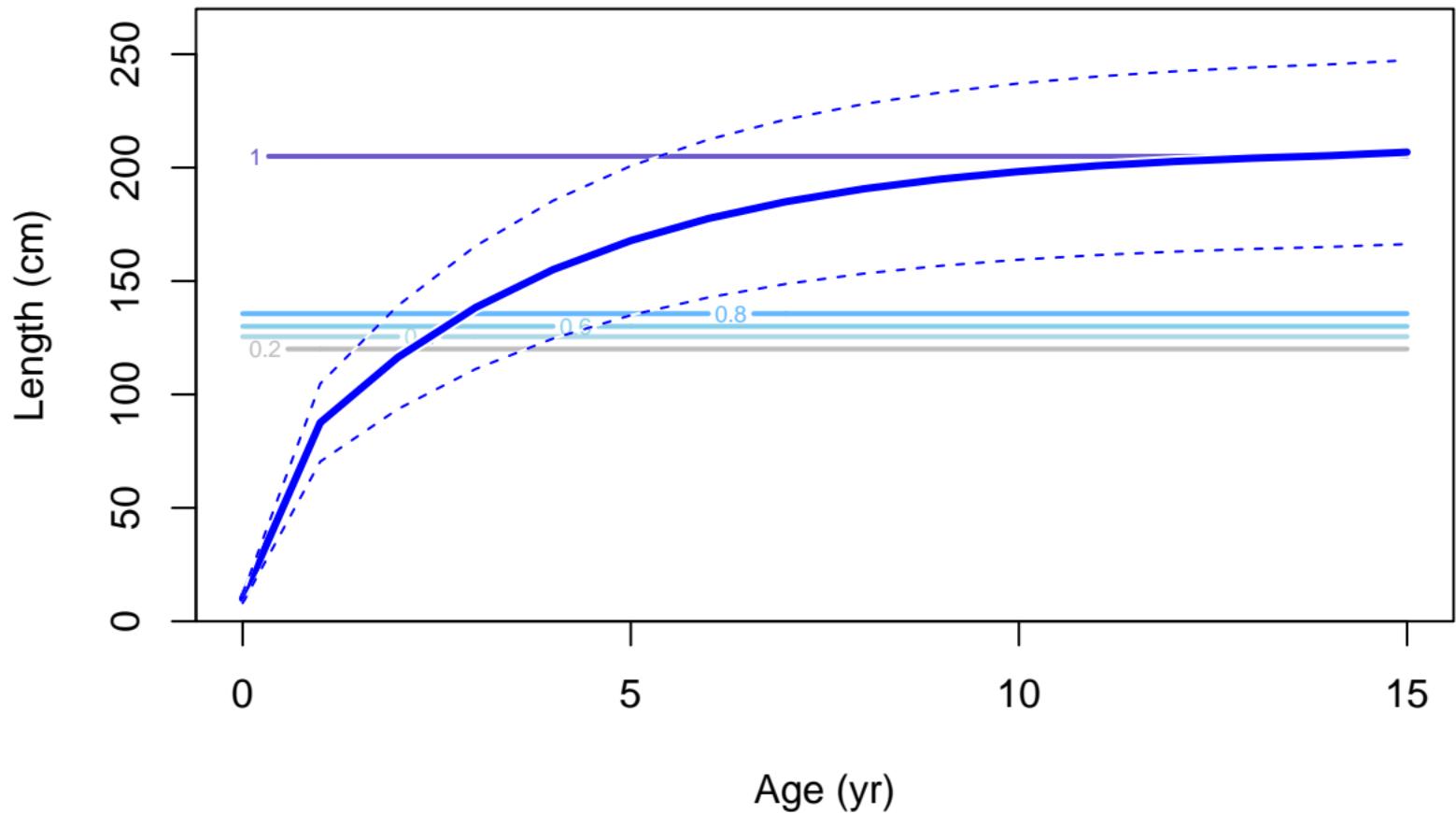


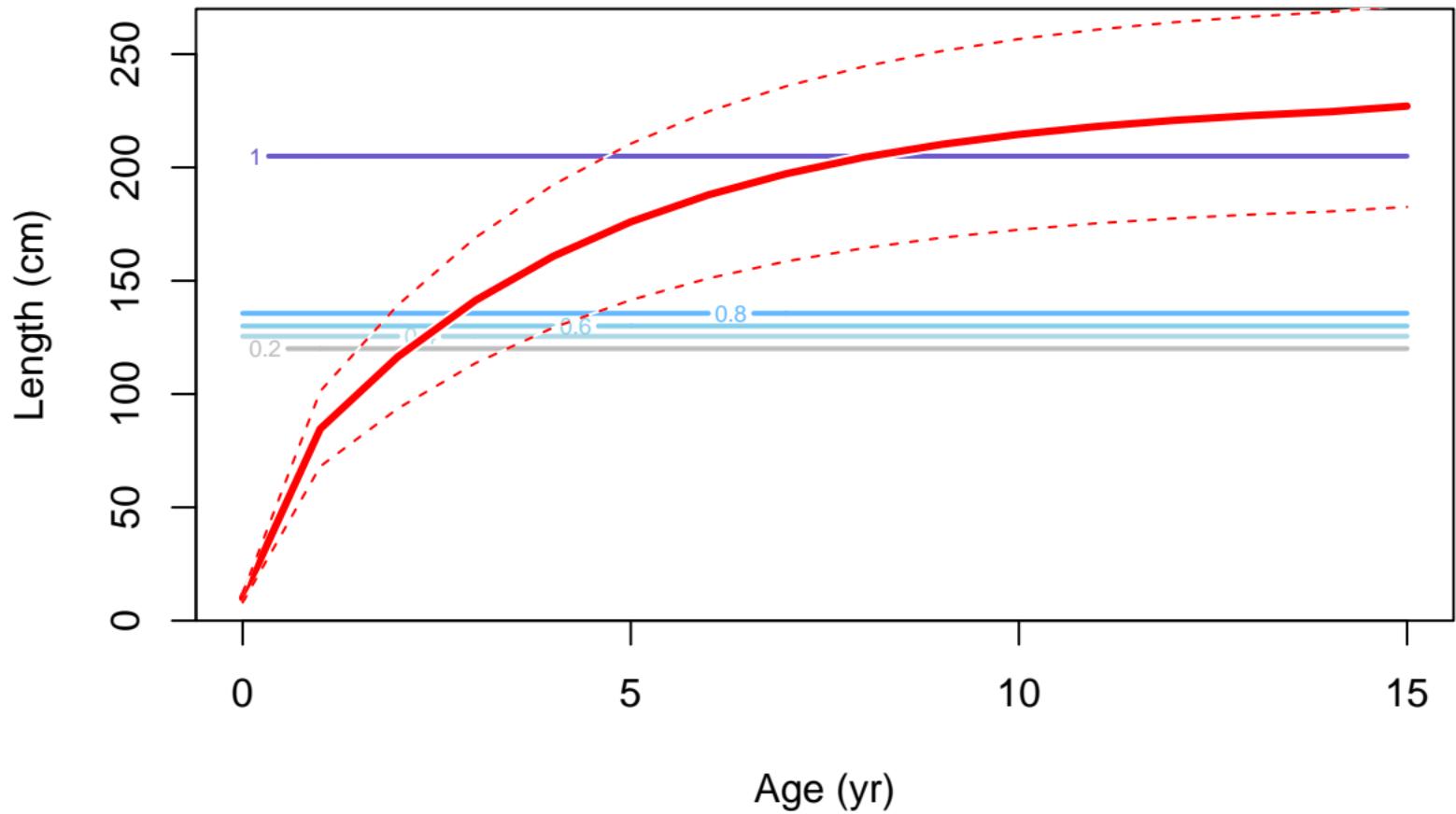


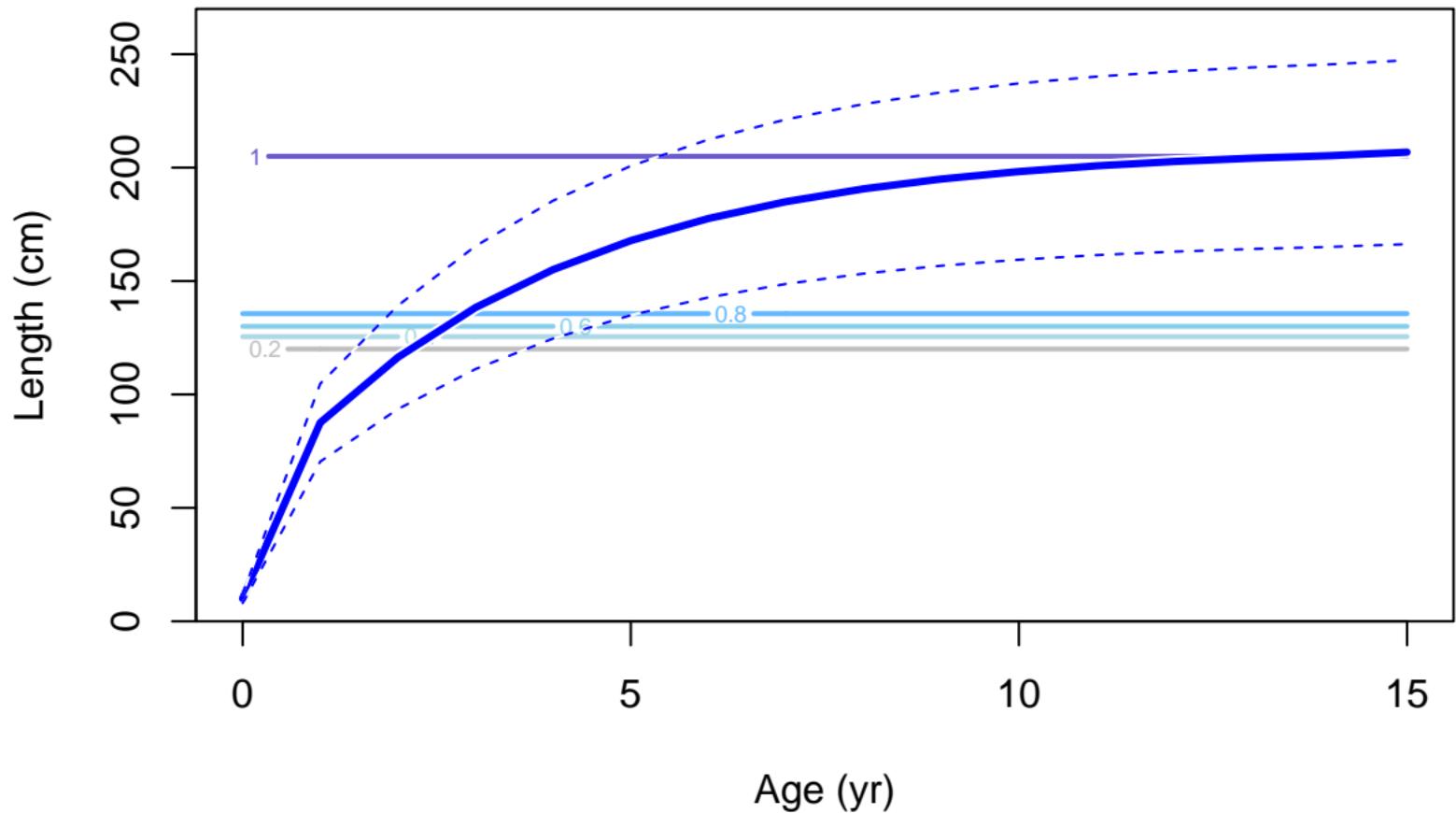


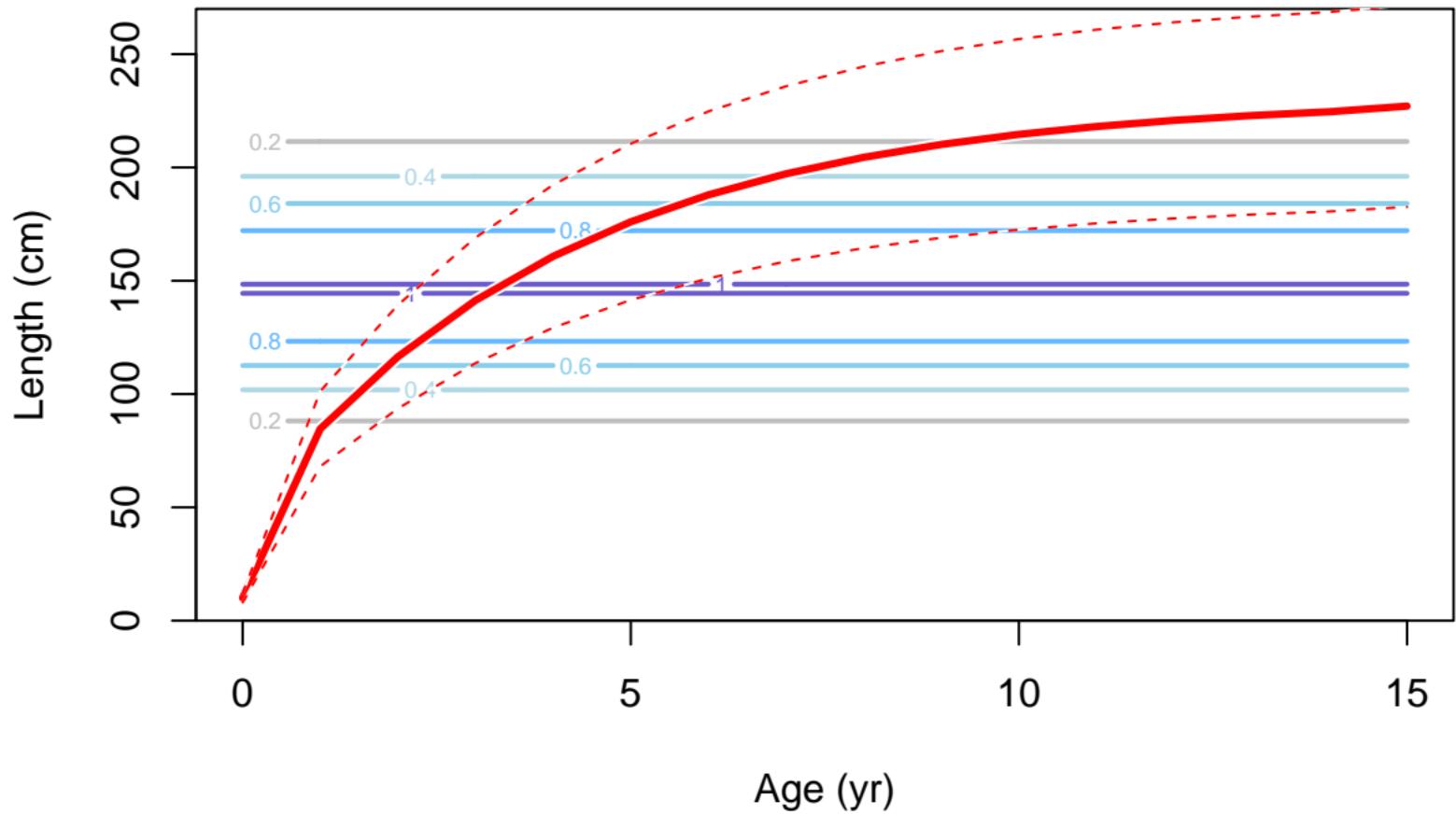


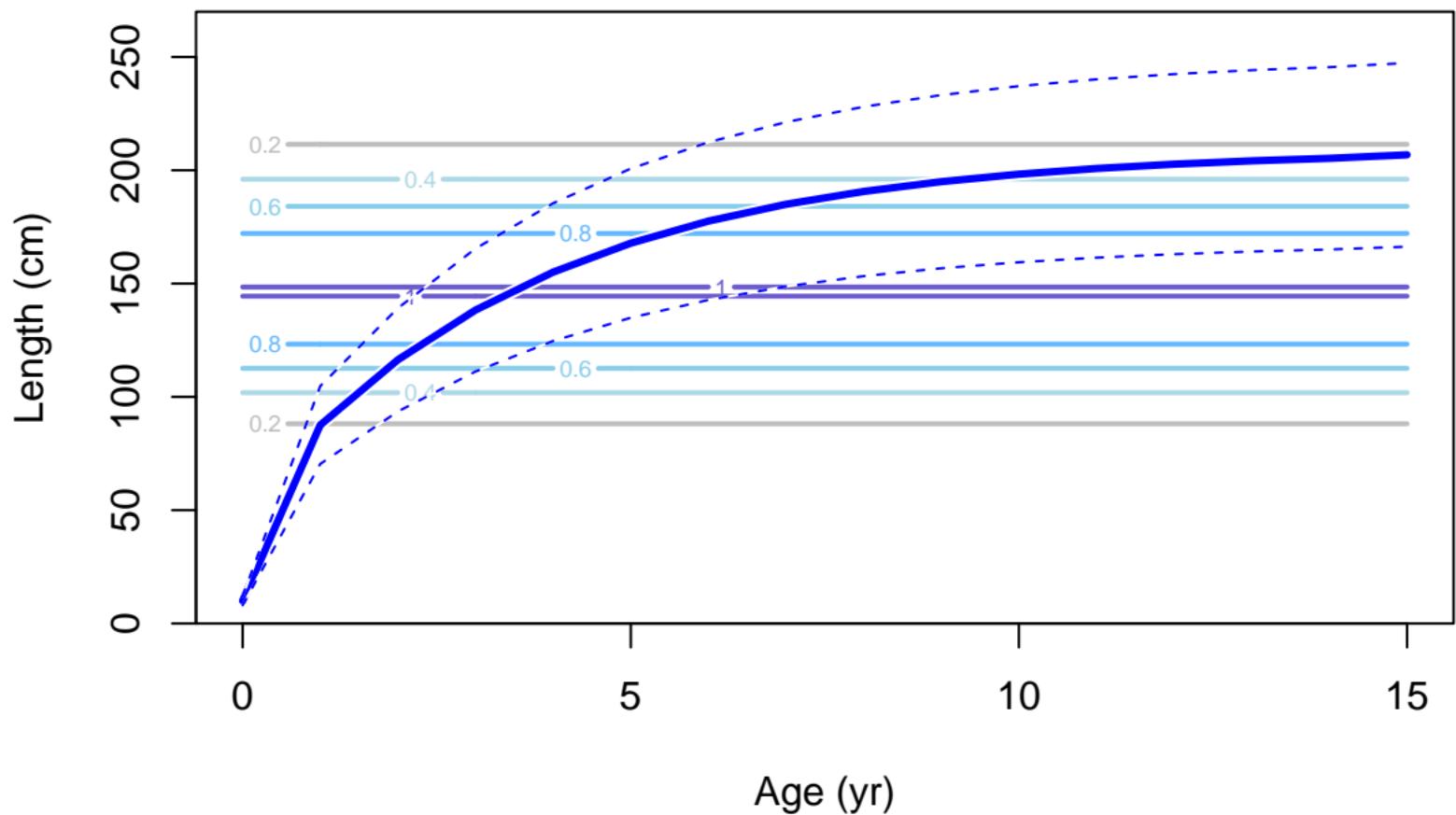


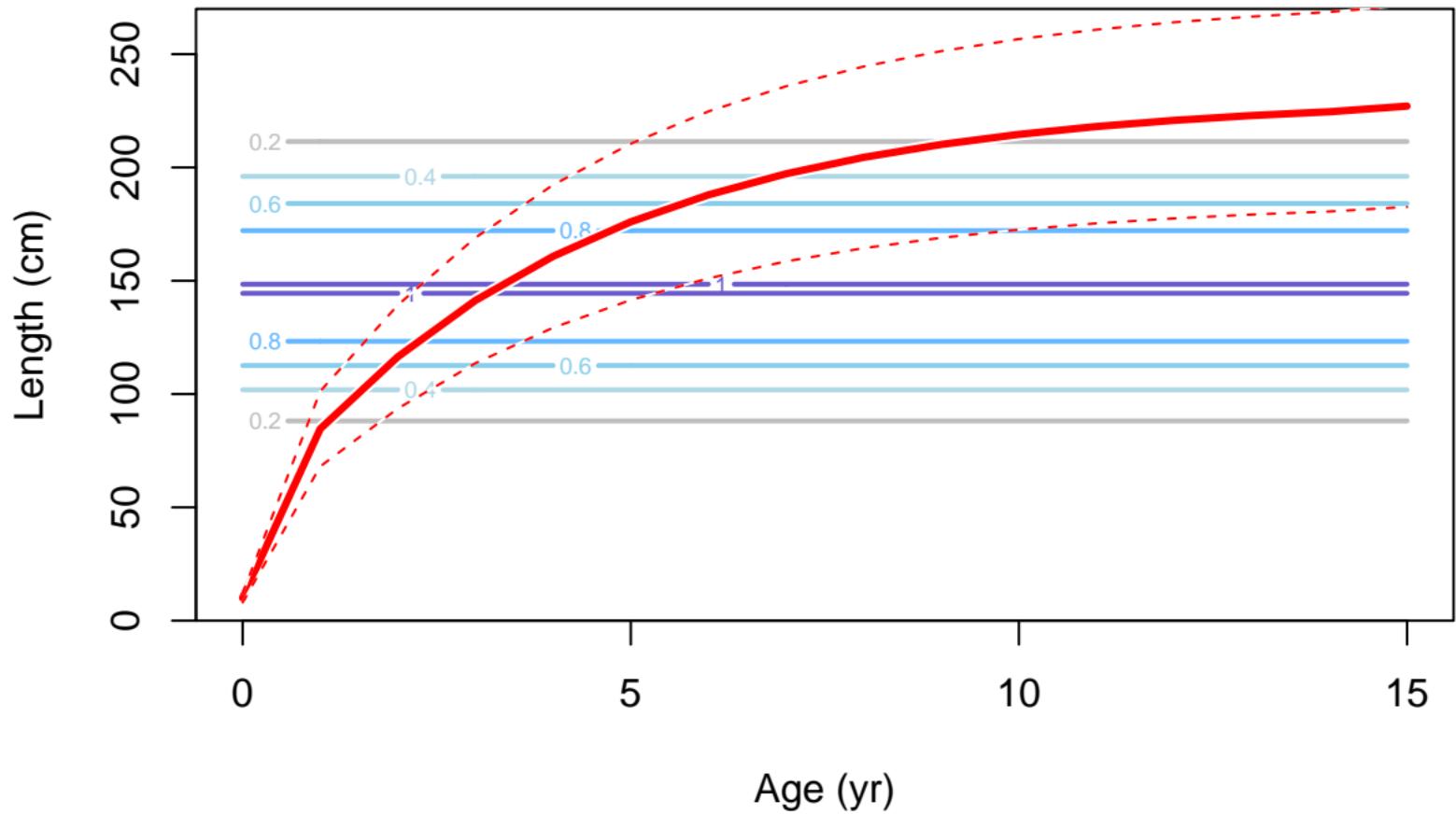


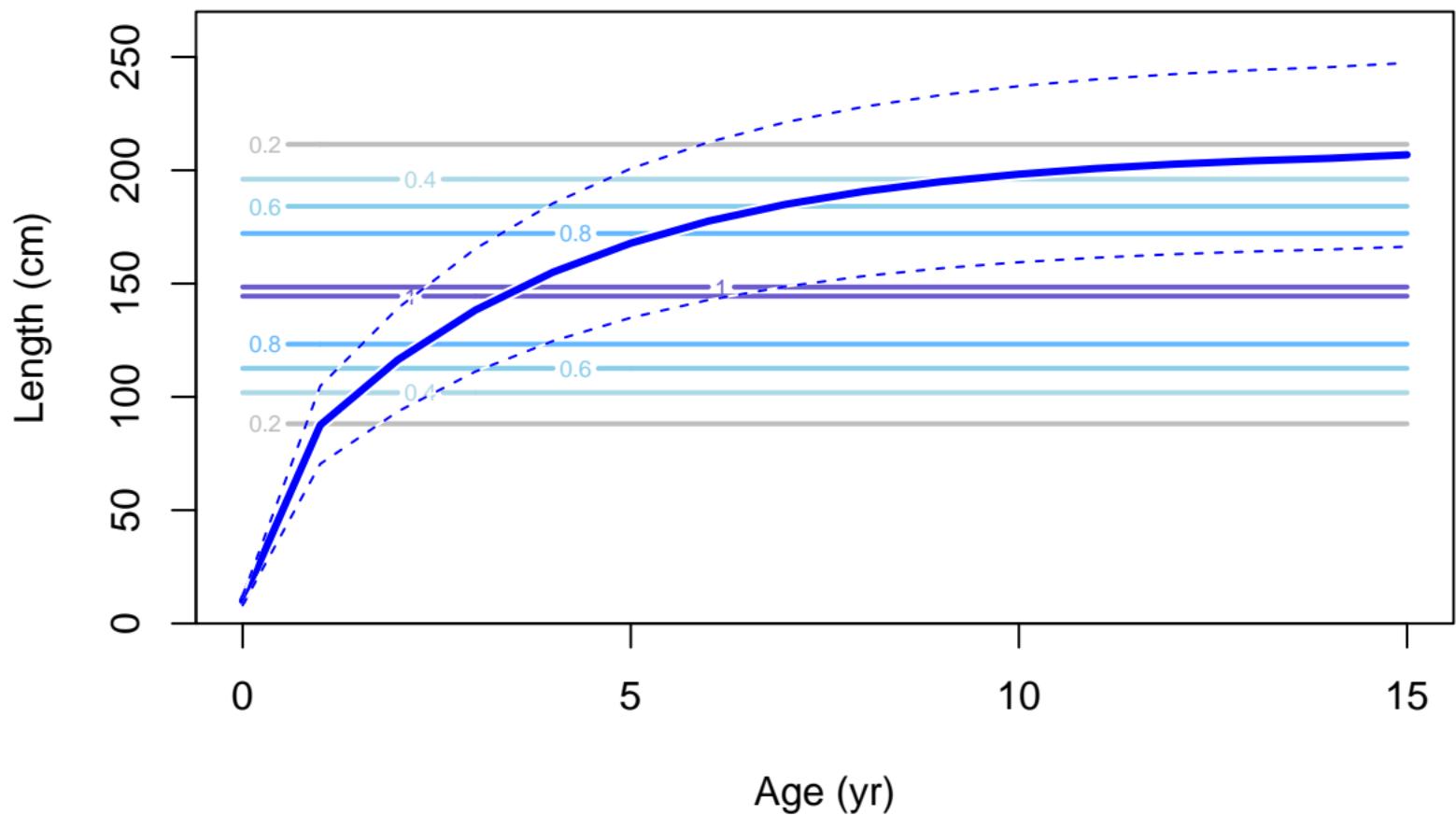


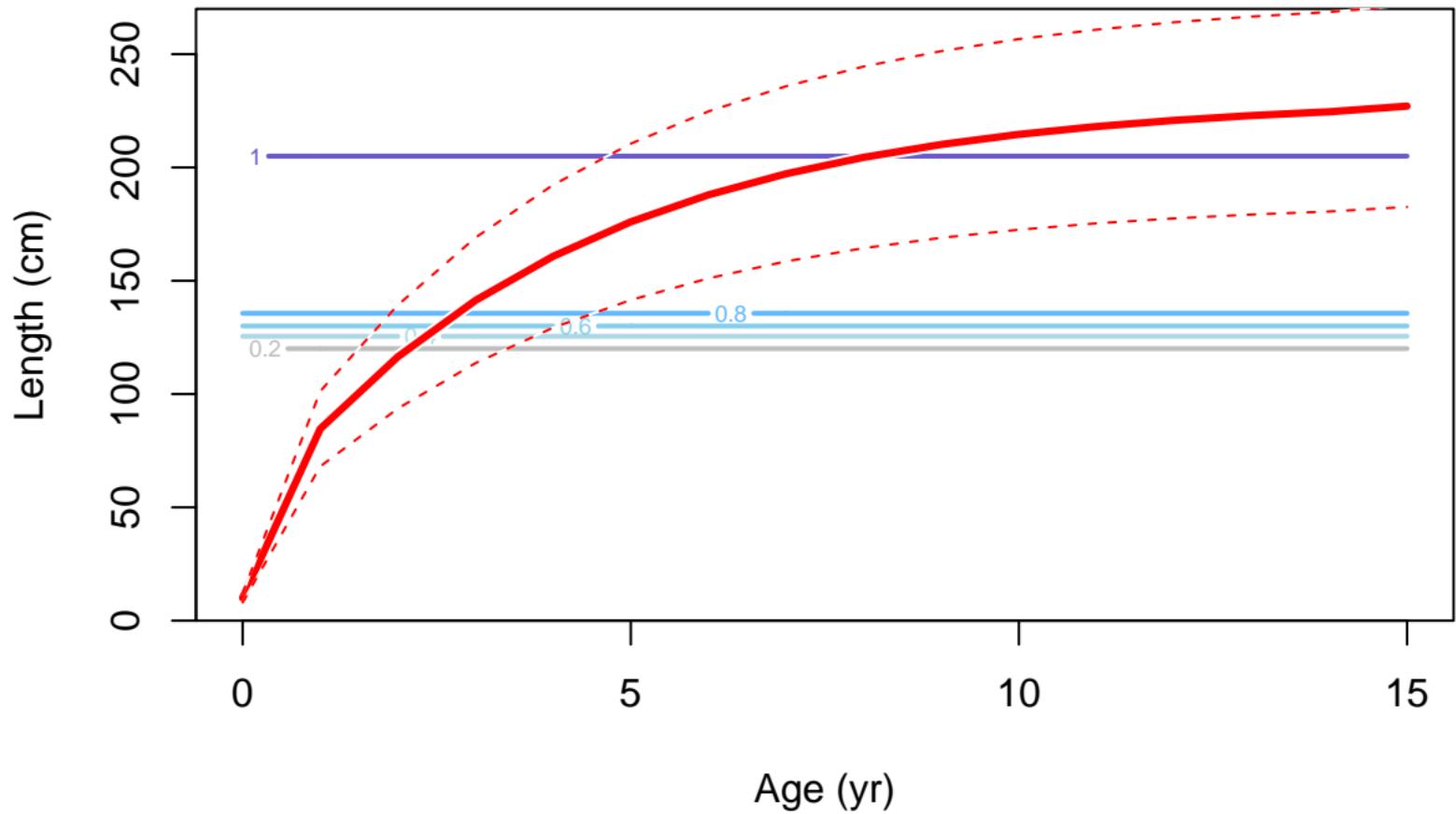


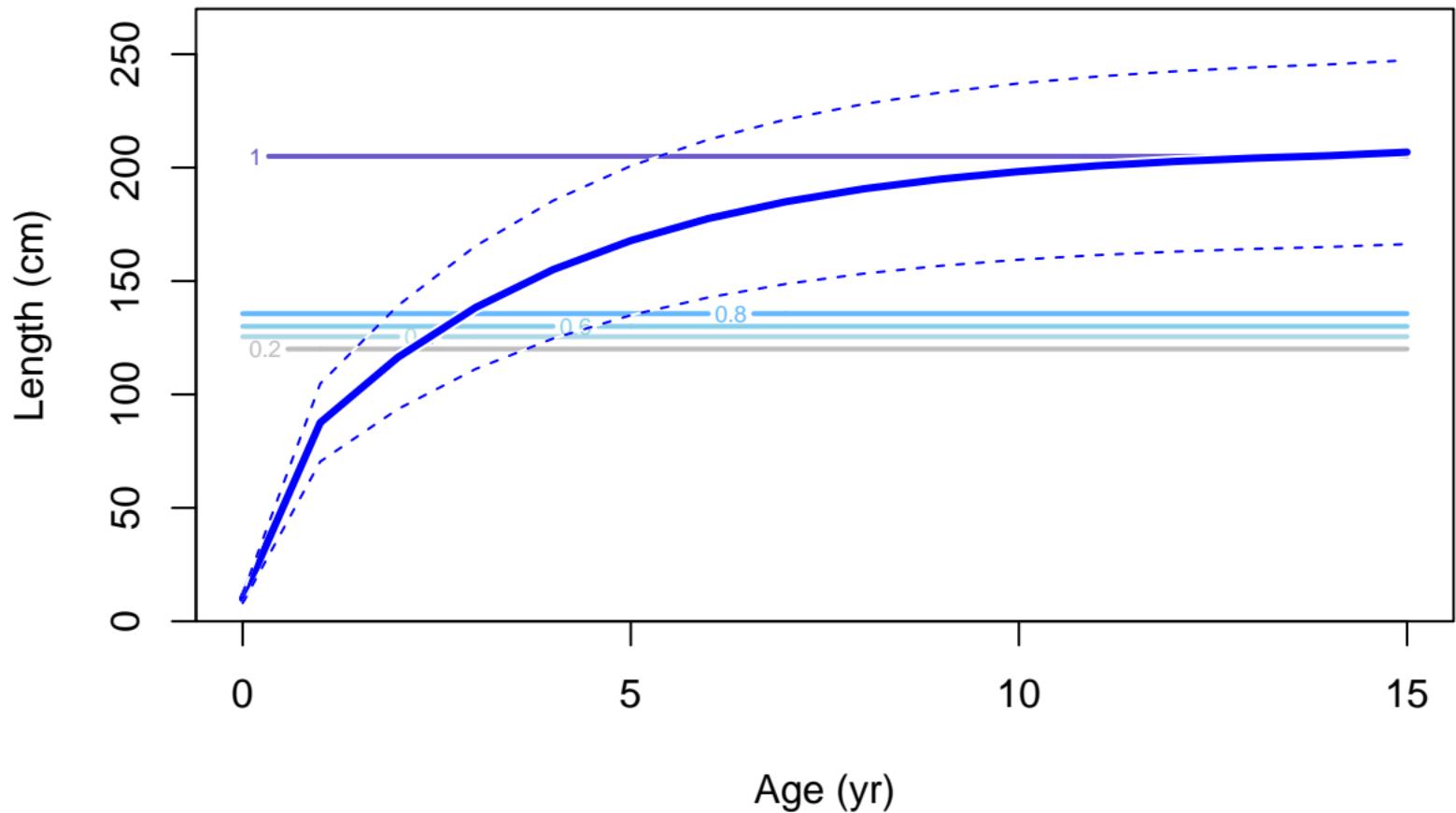


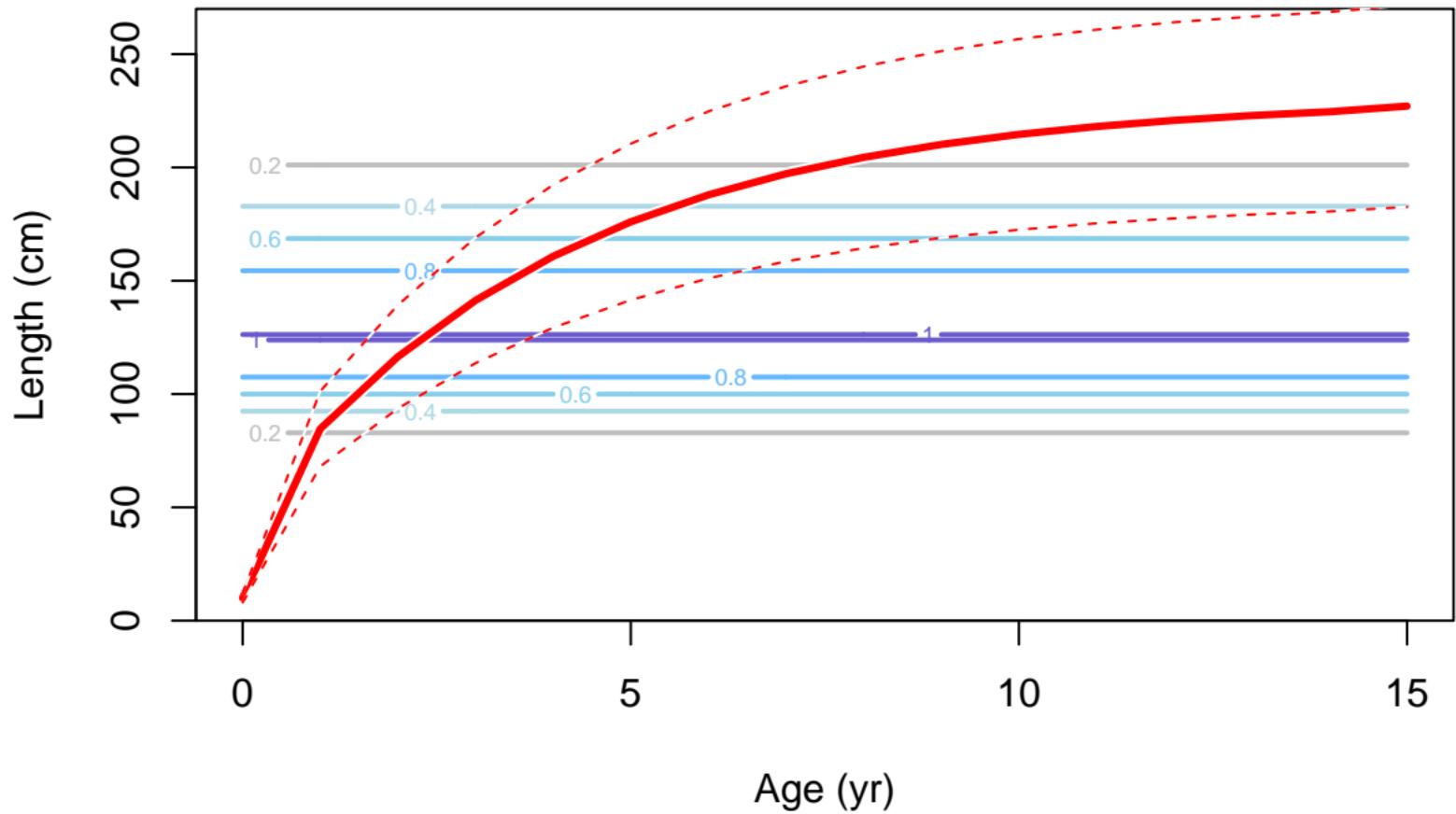


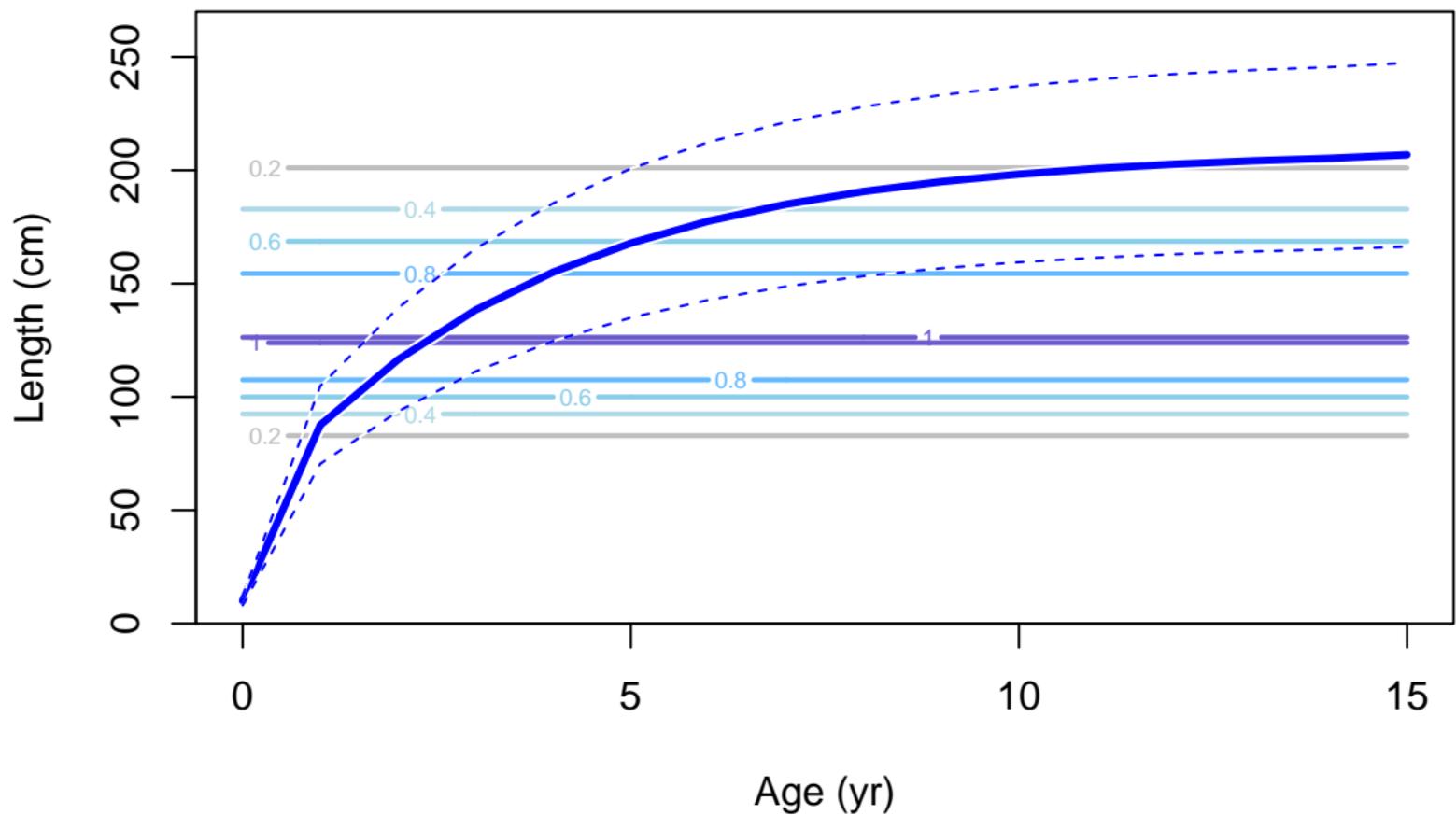


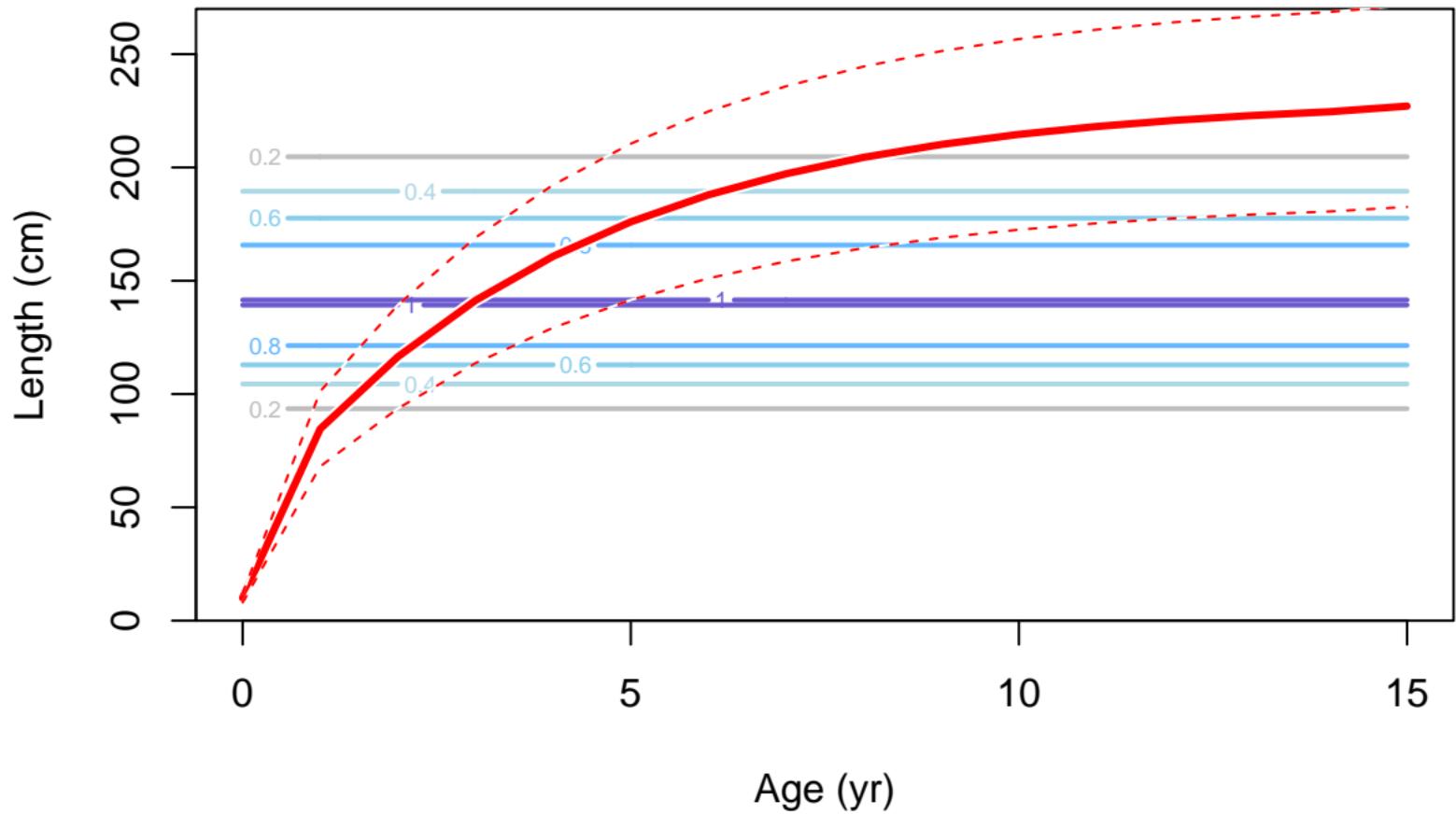


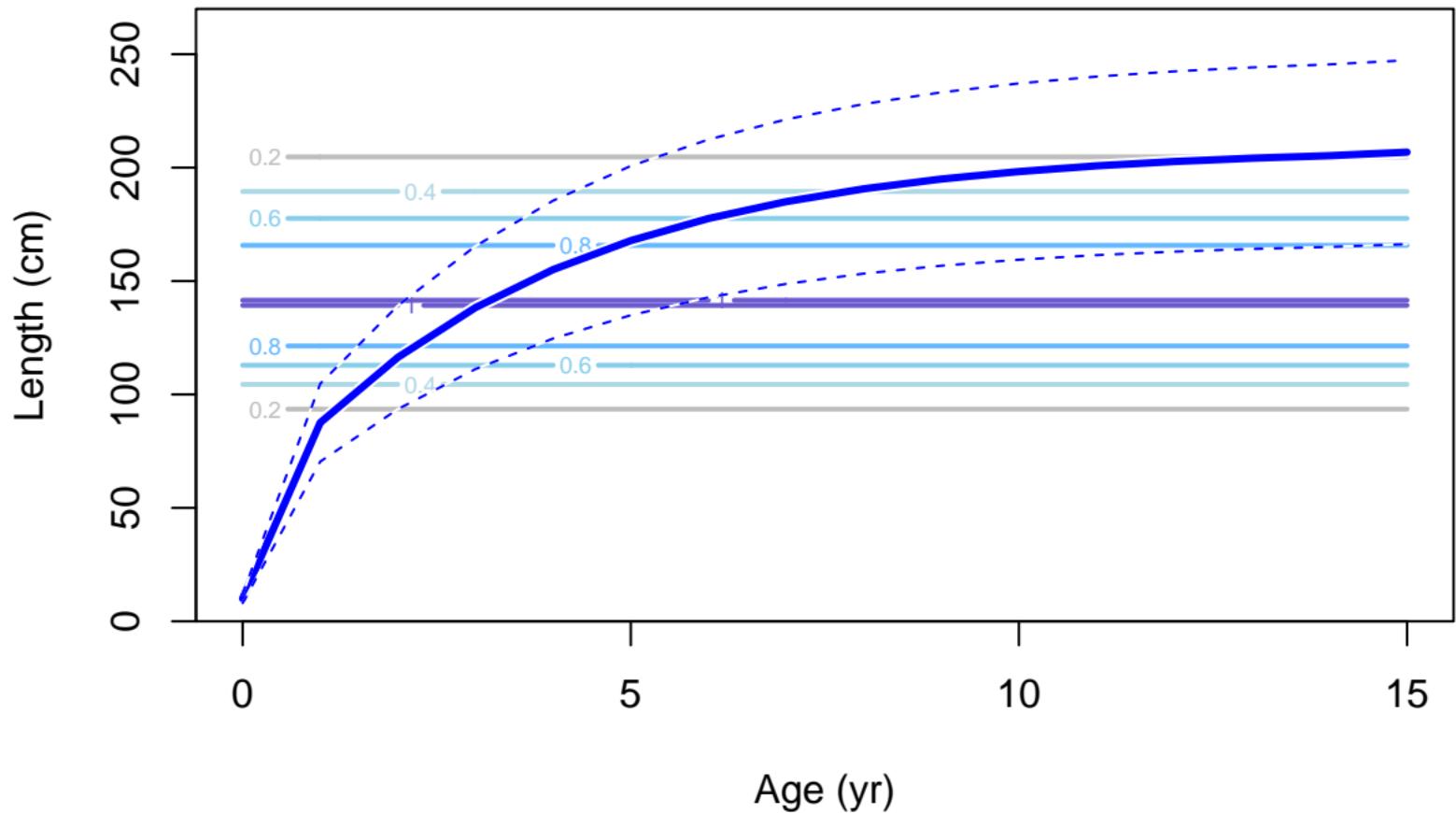


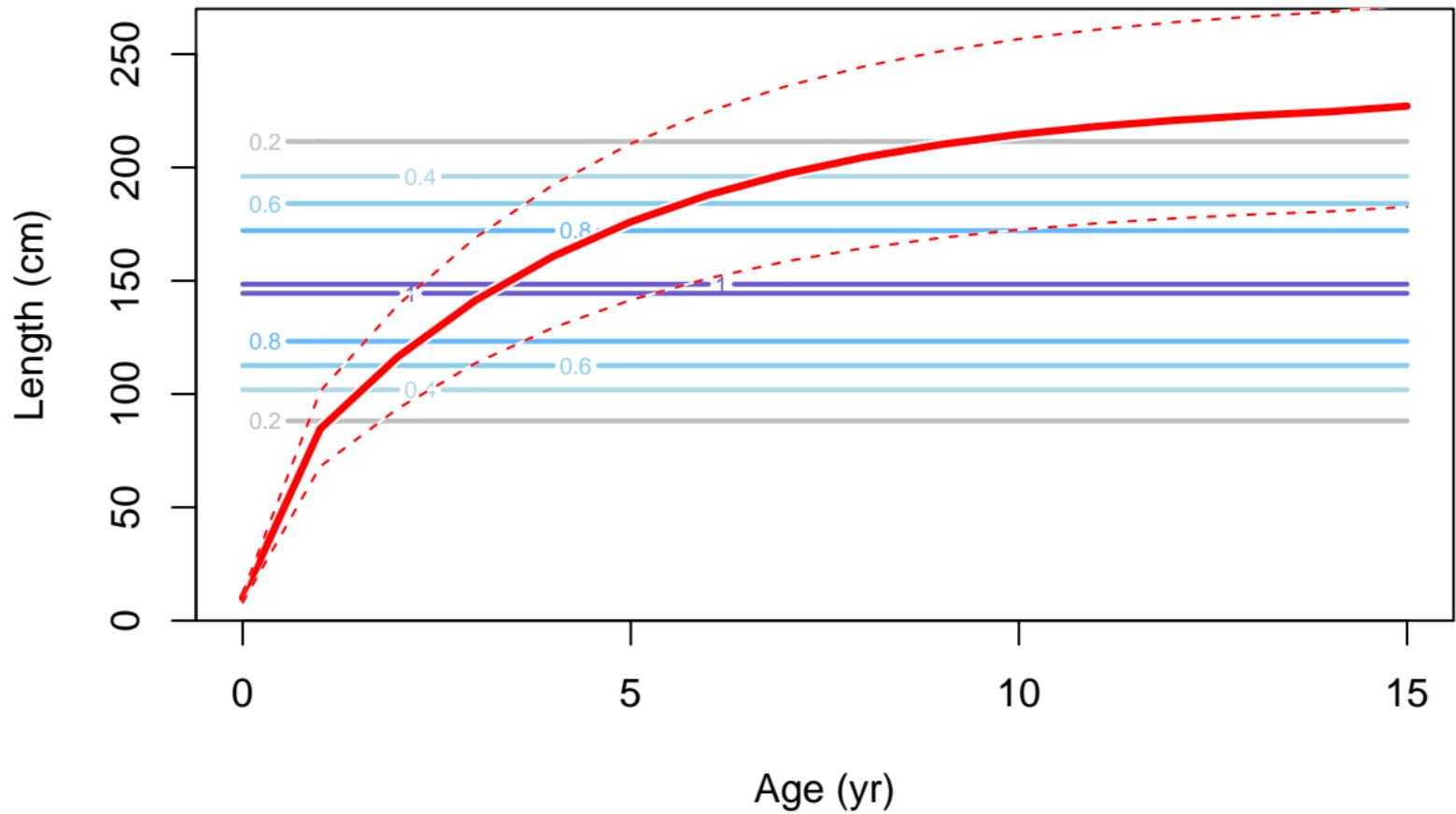


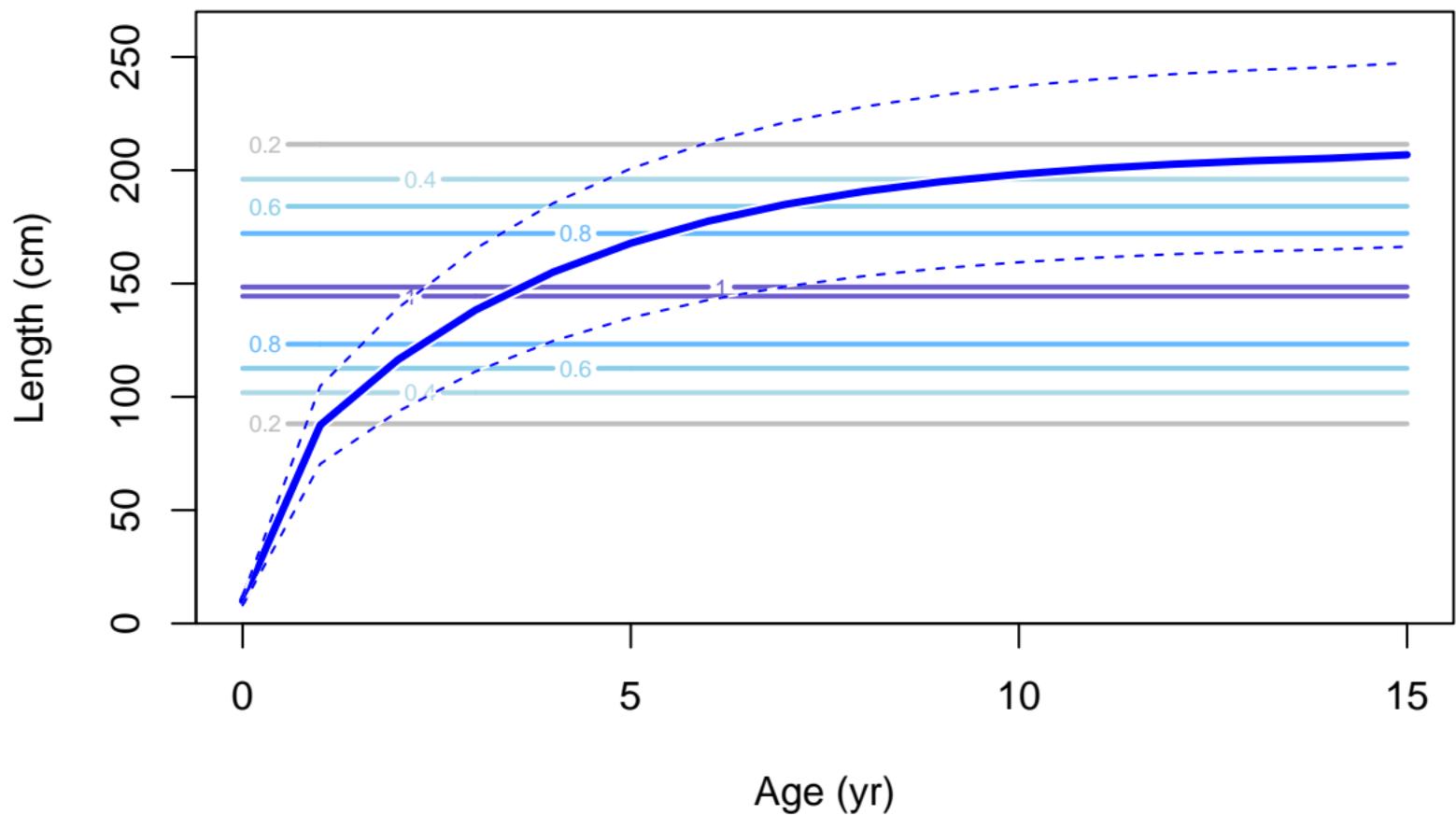


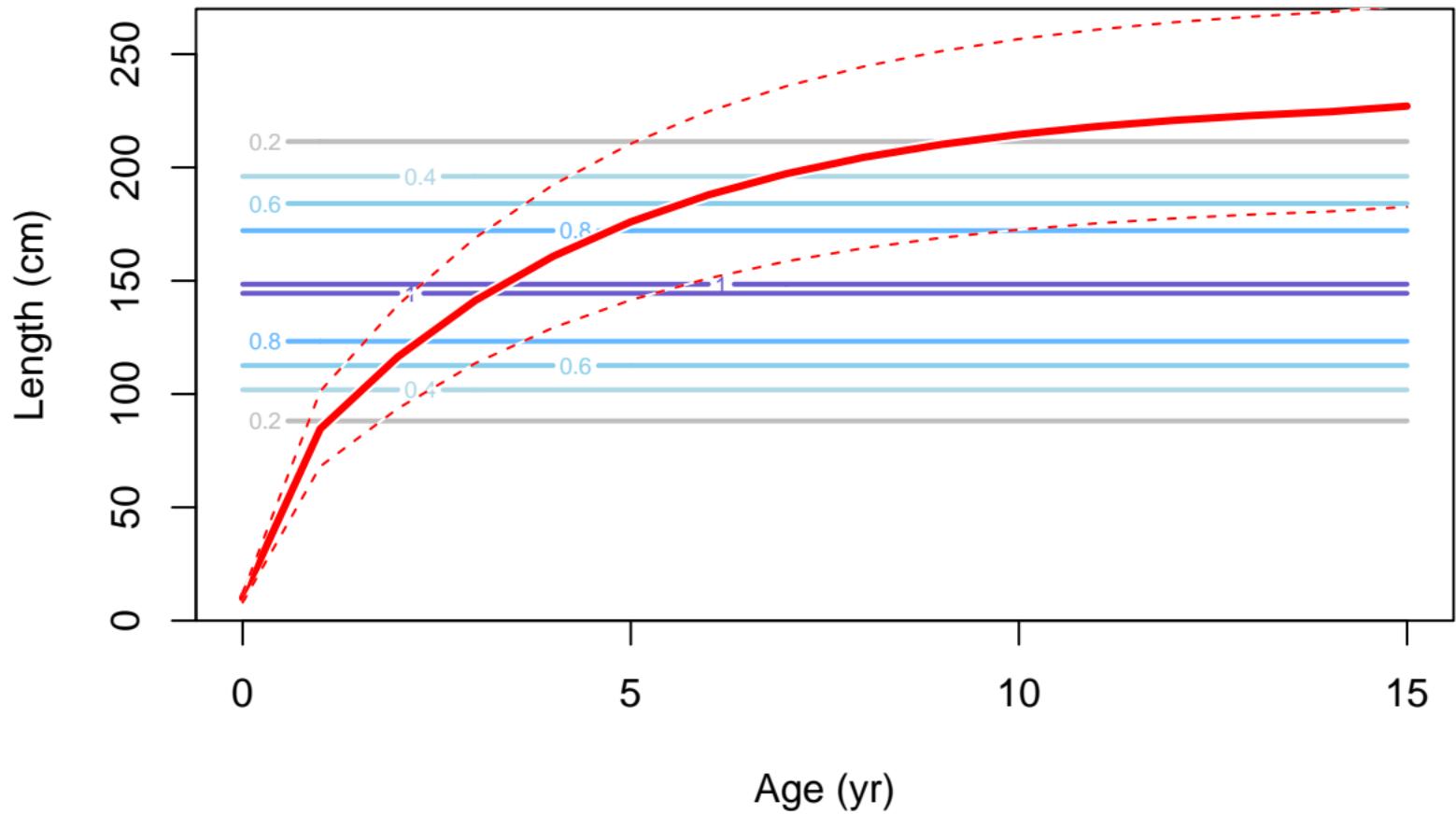


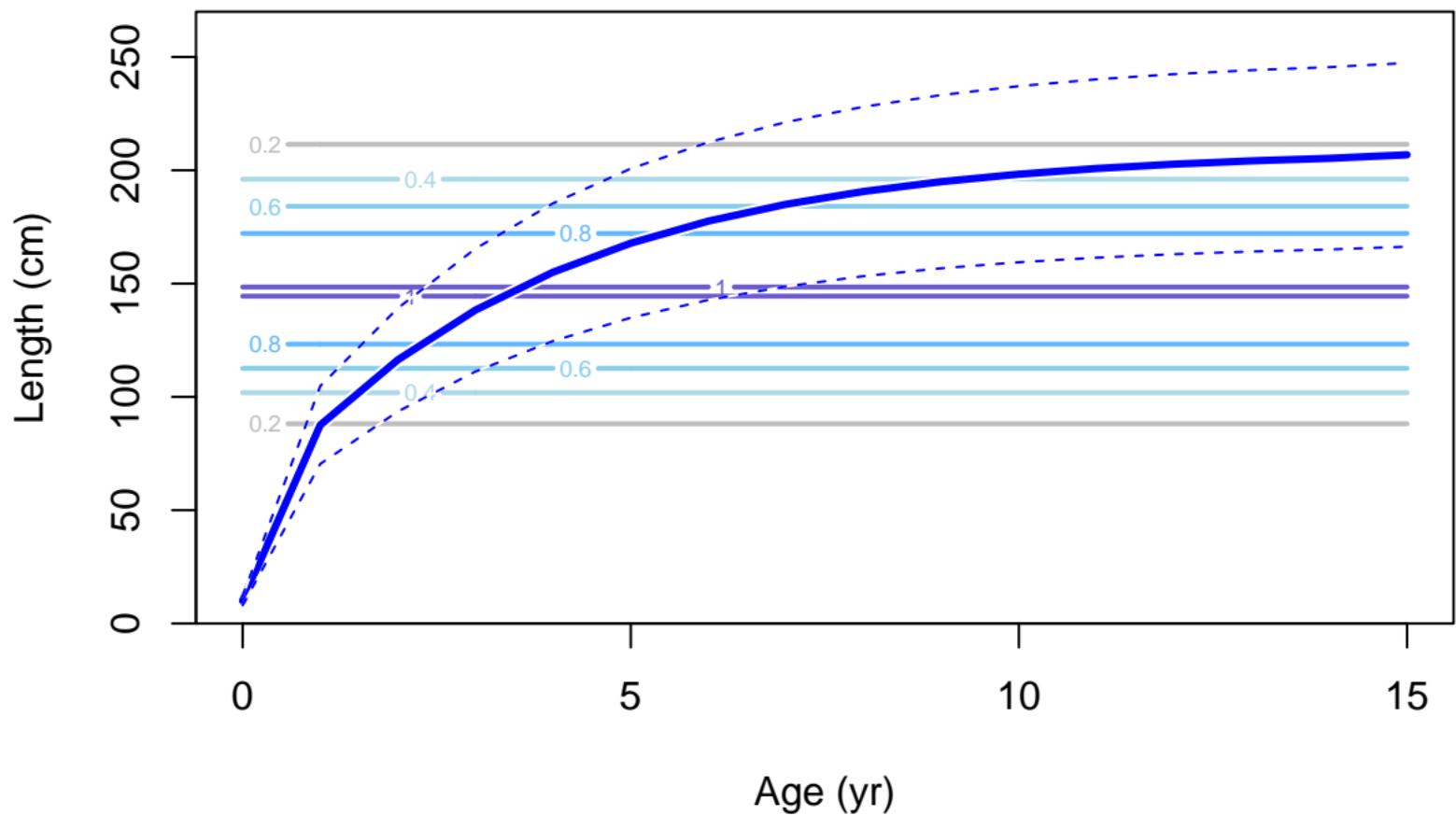


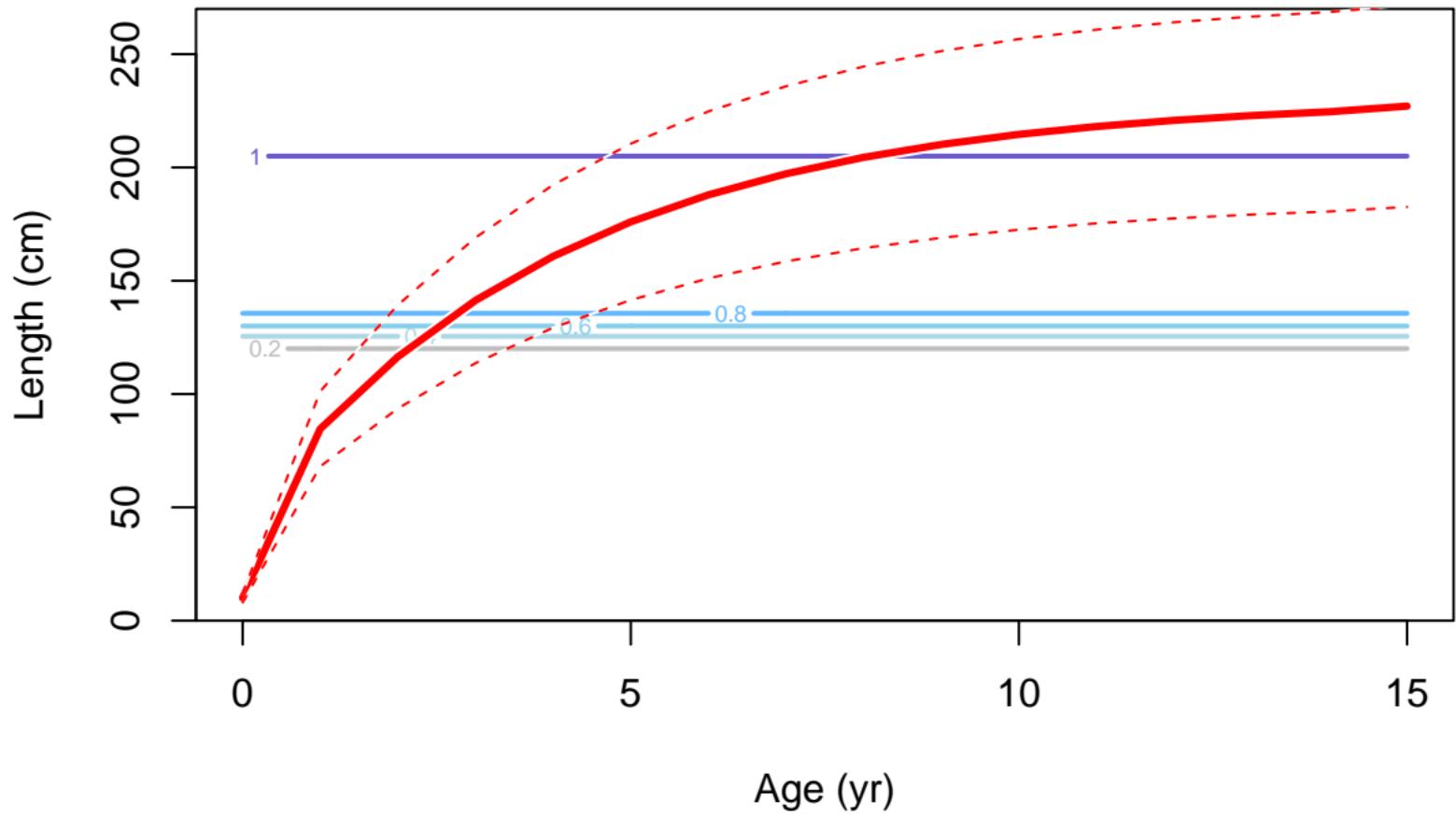


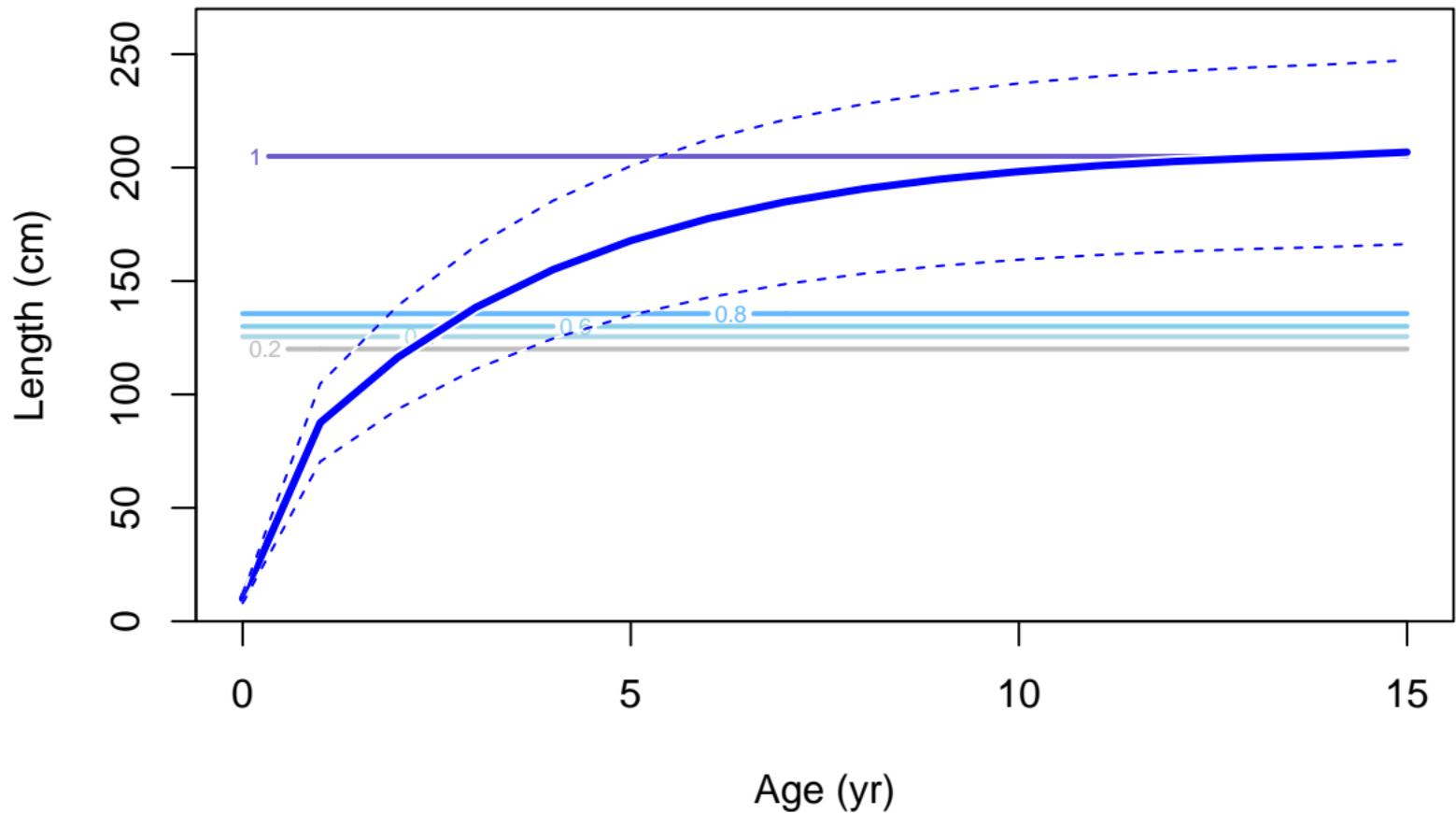


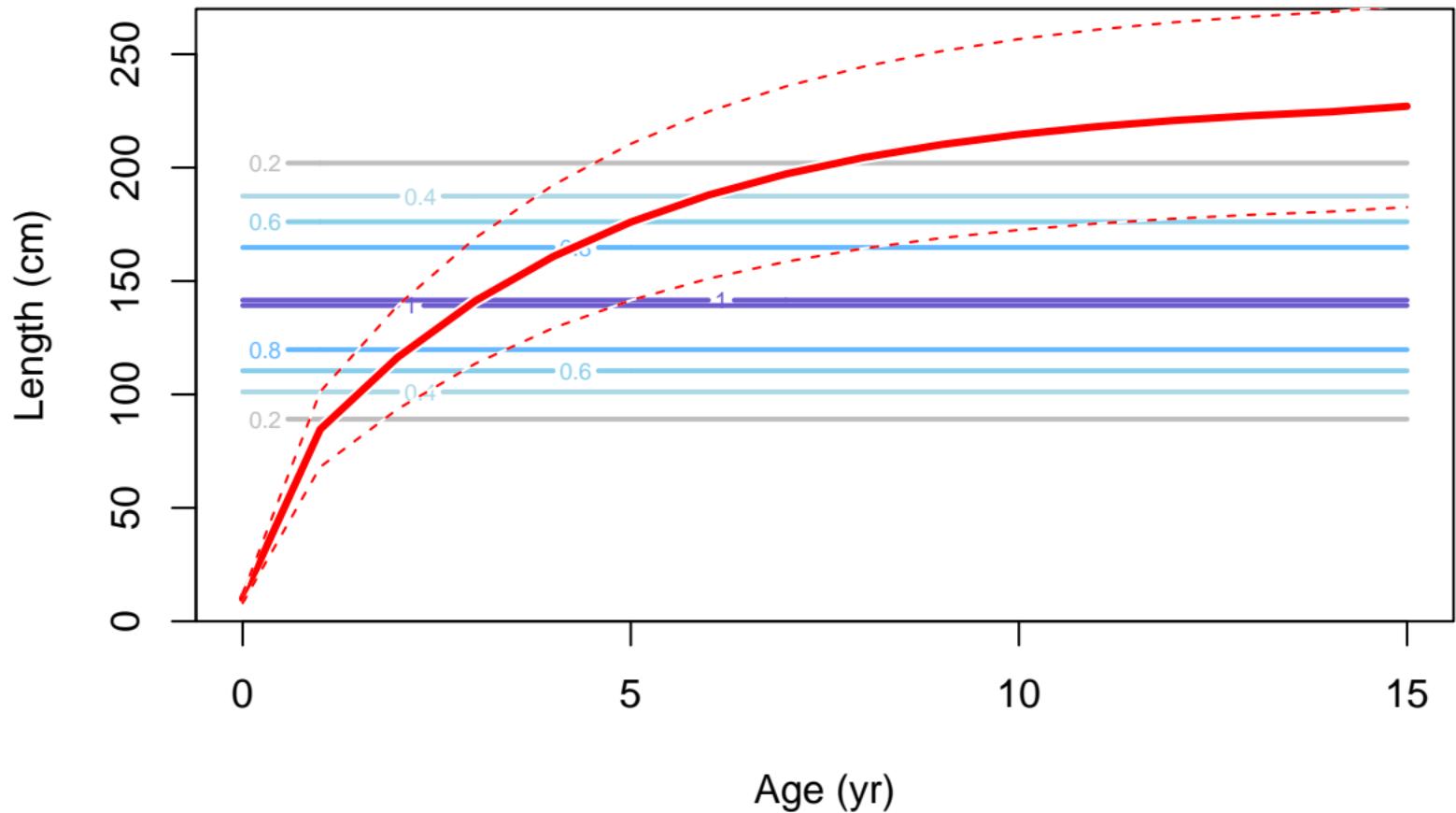


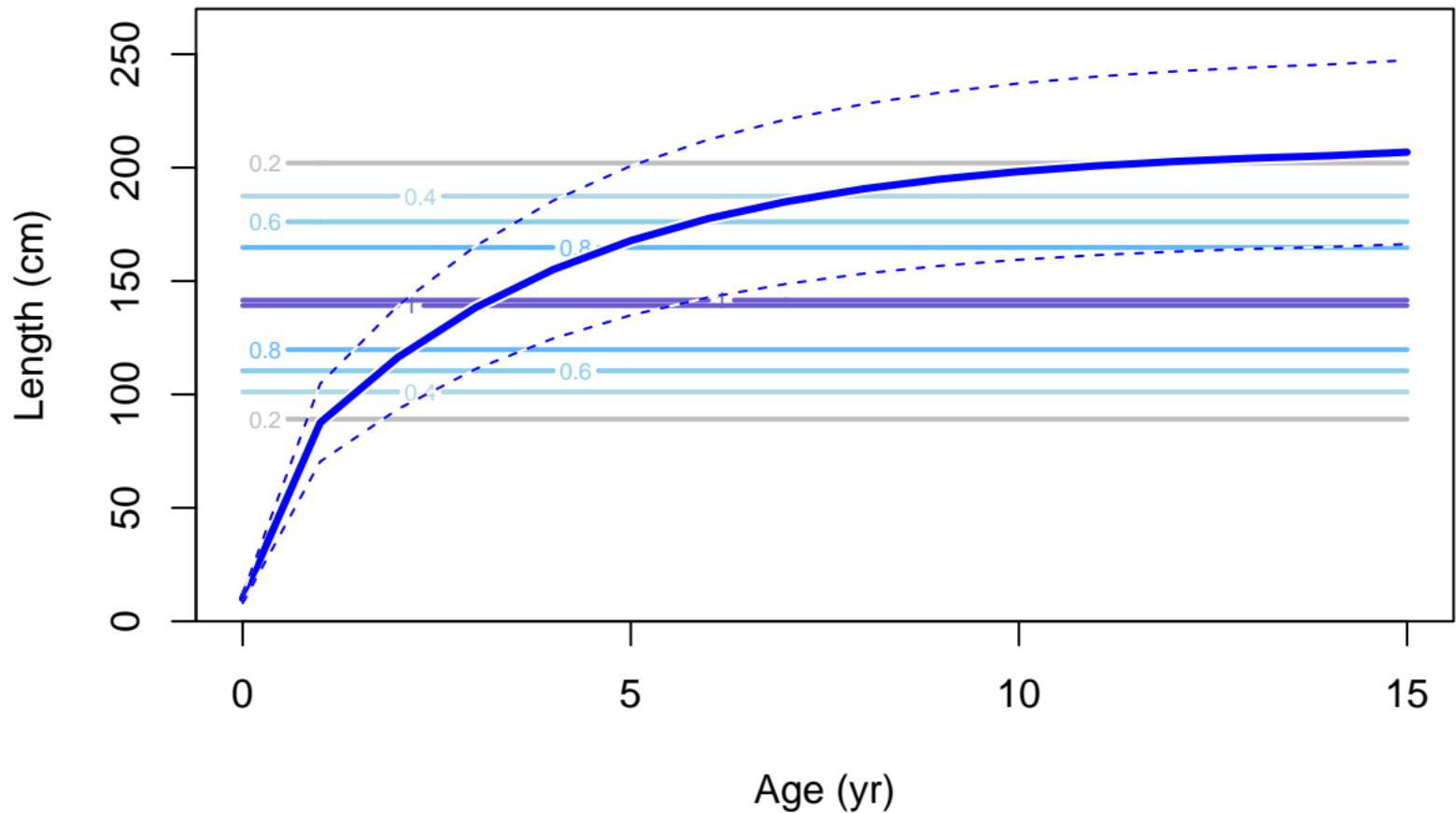


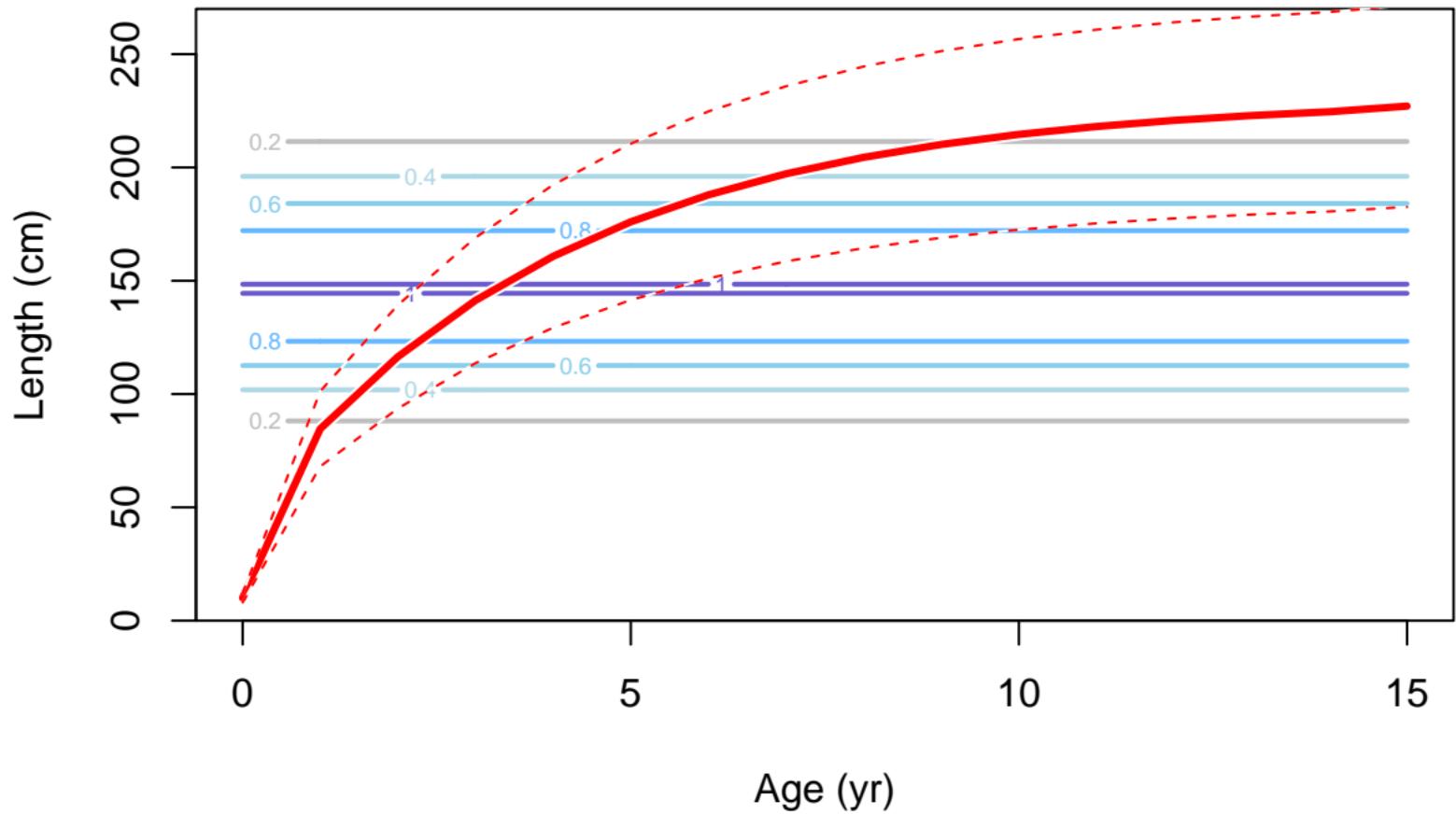


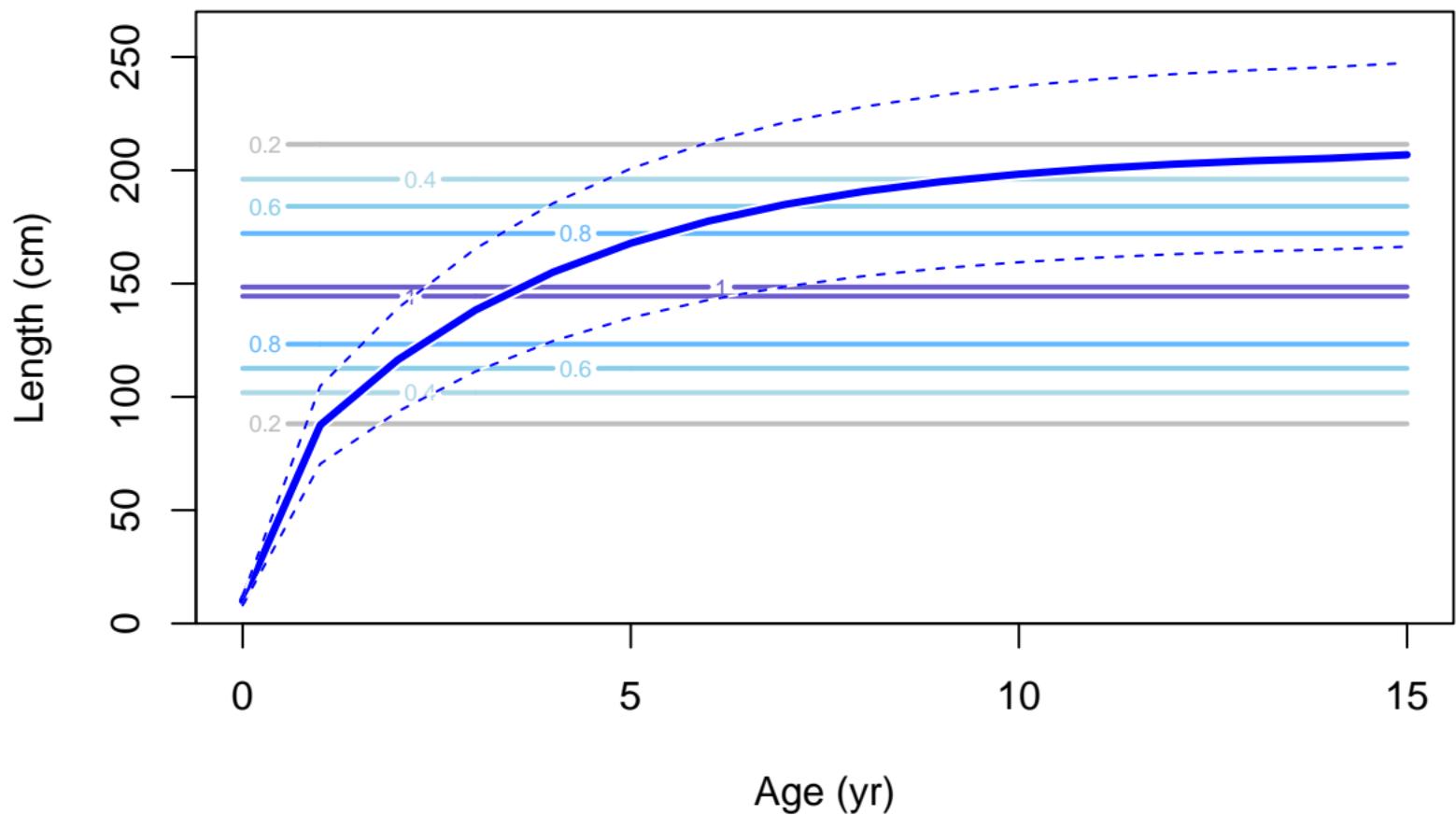


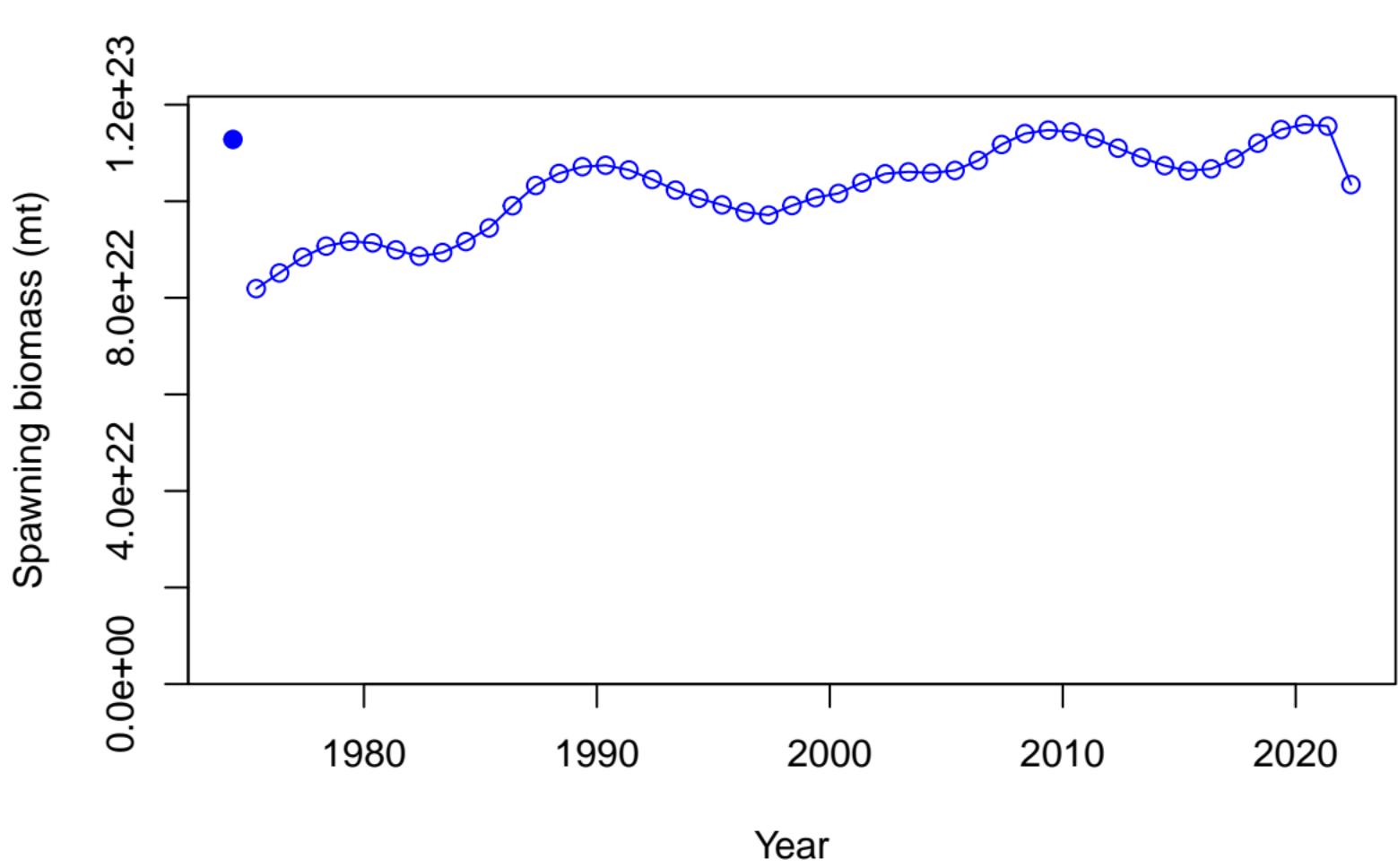




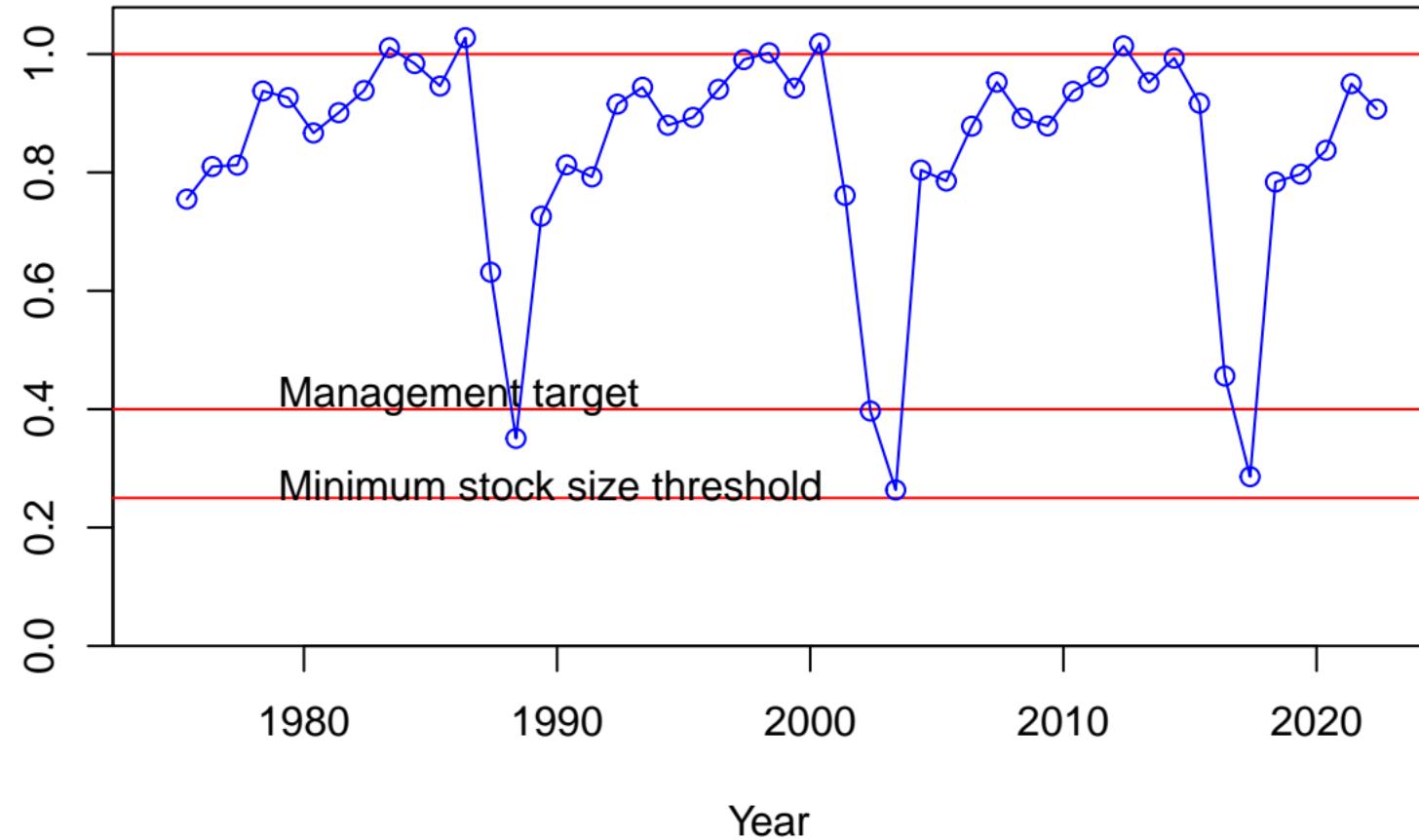


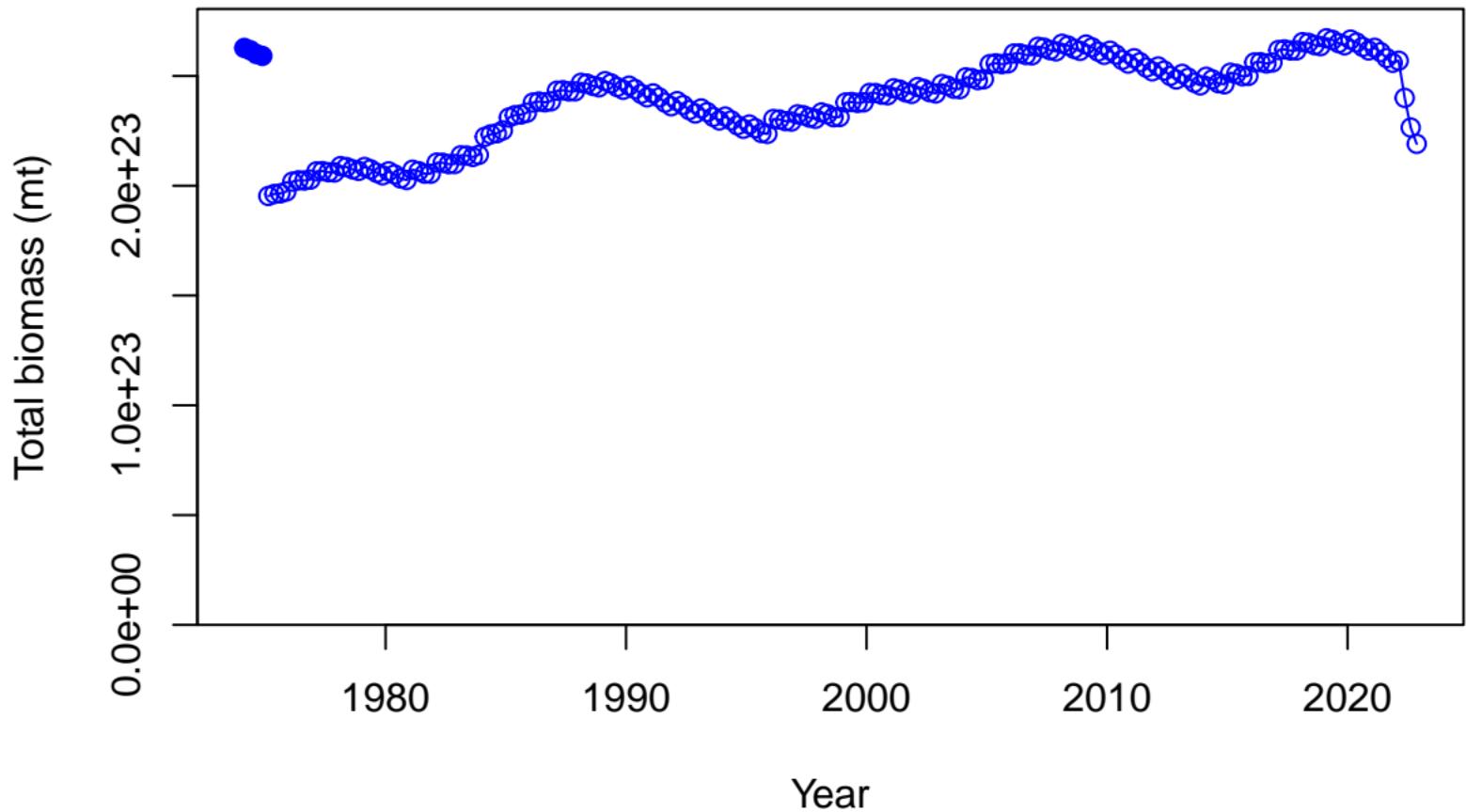


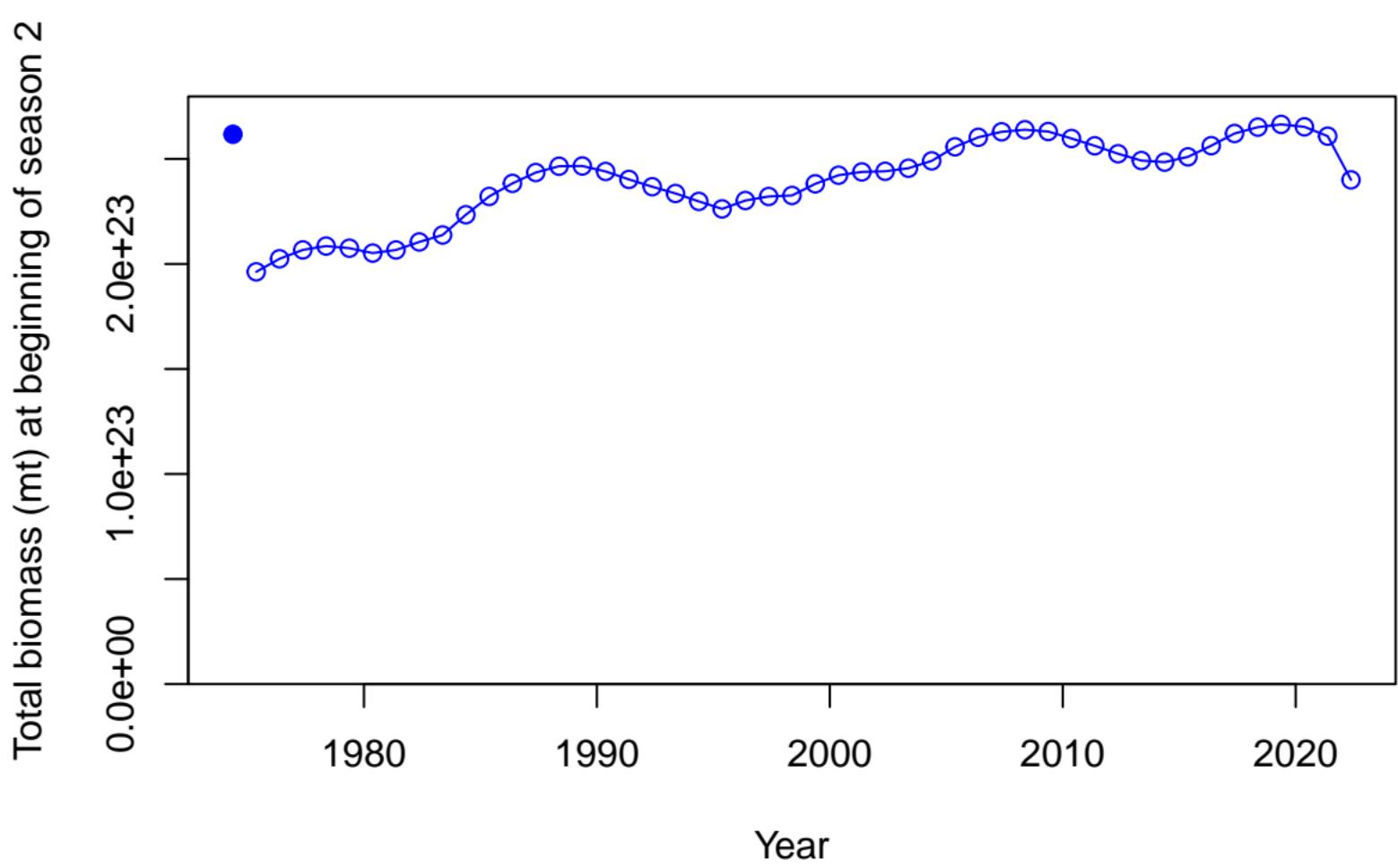




Relative spawning biomass: B/B_0

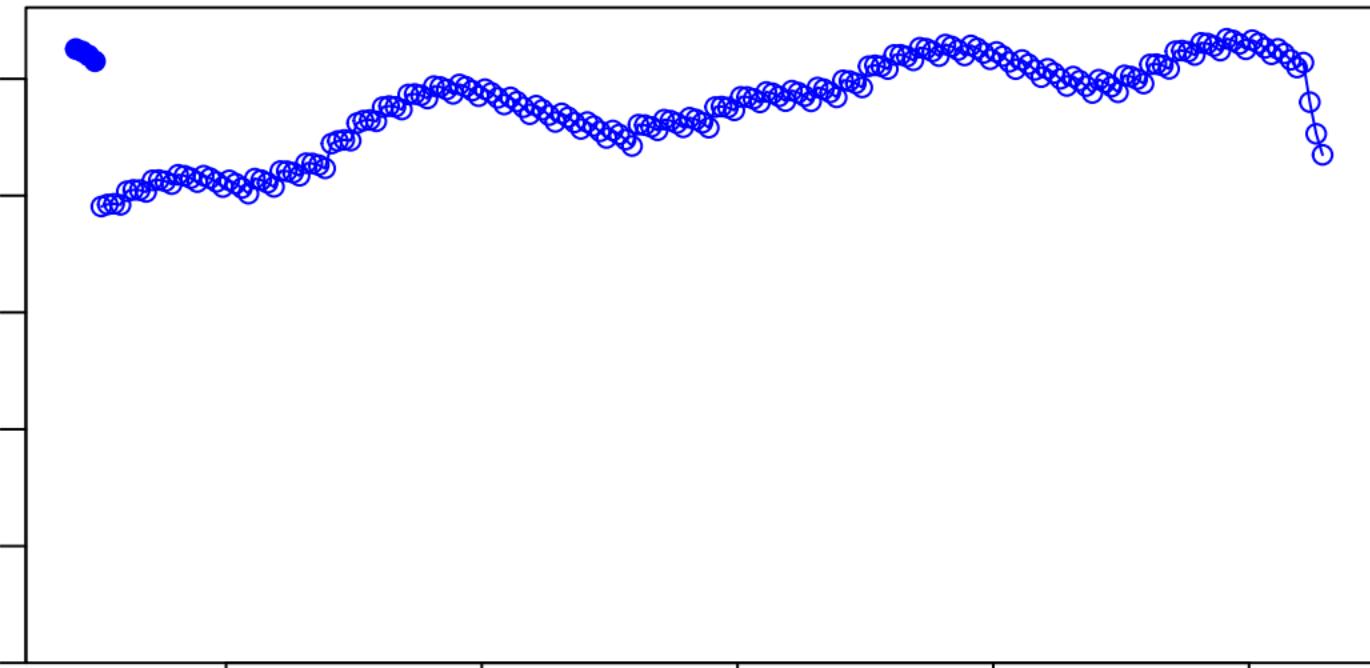




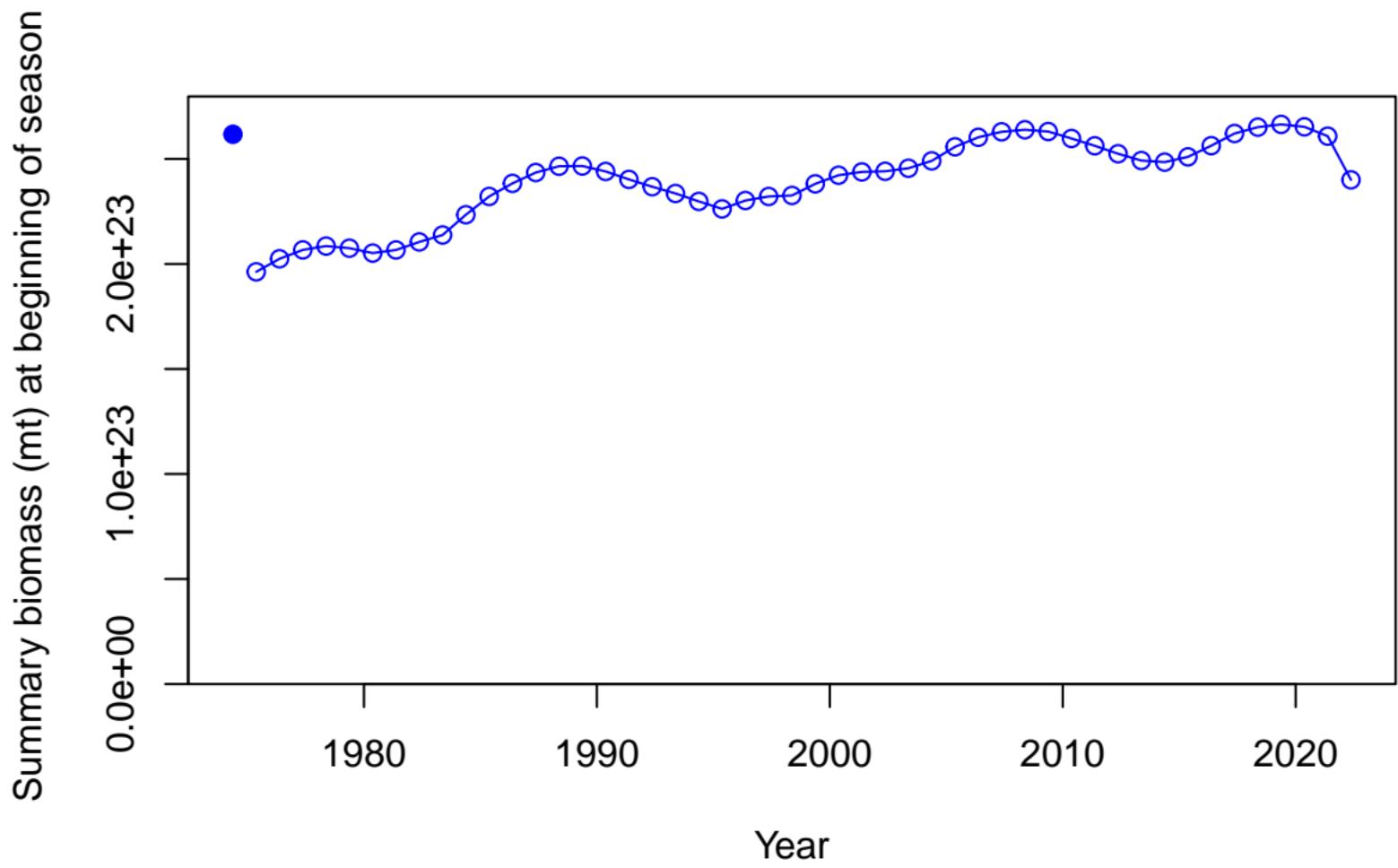


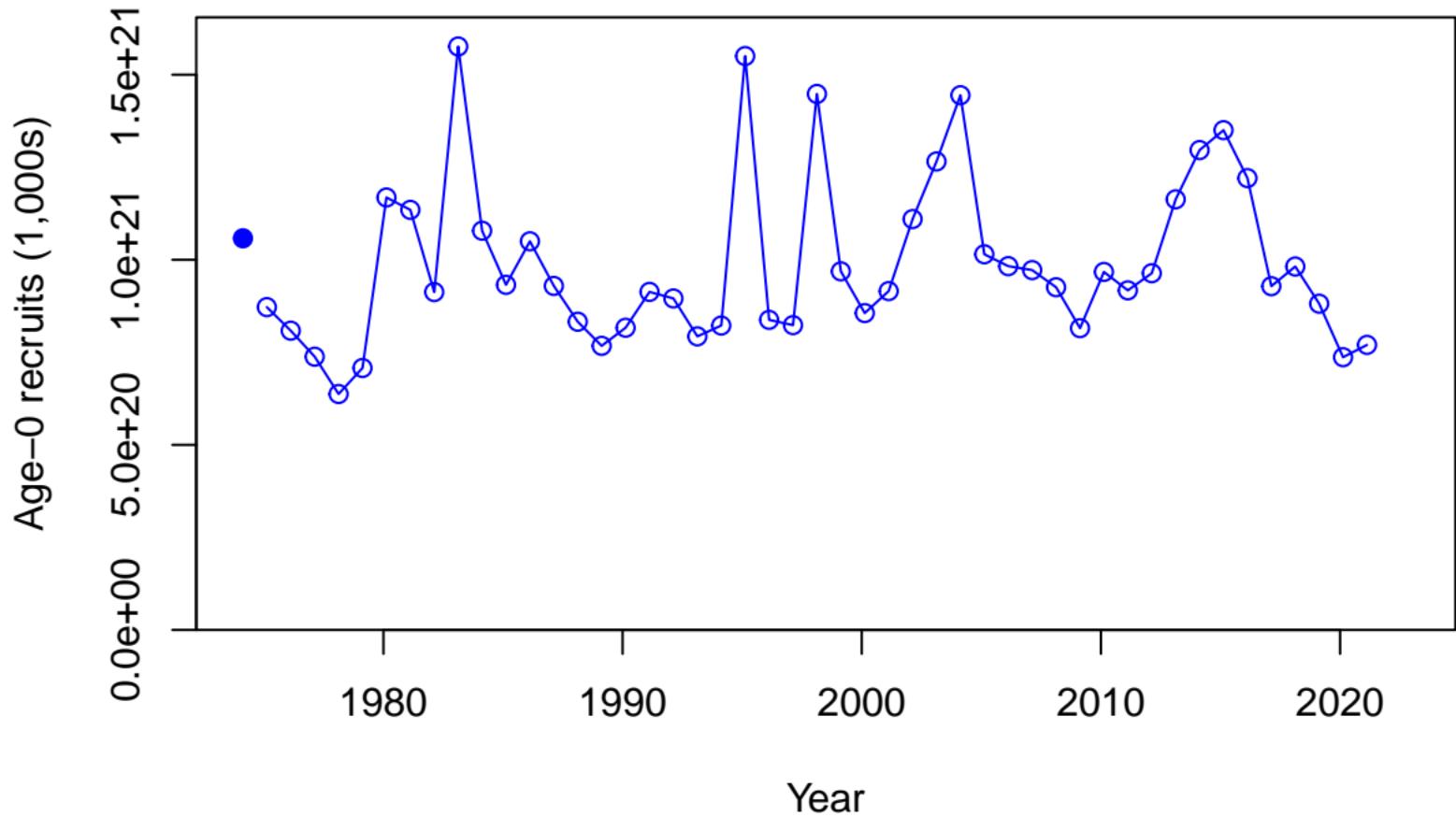
Summary biomass (mt)

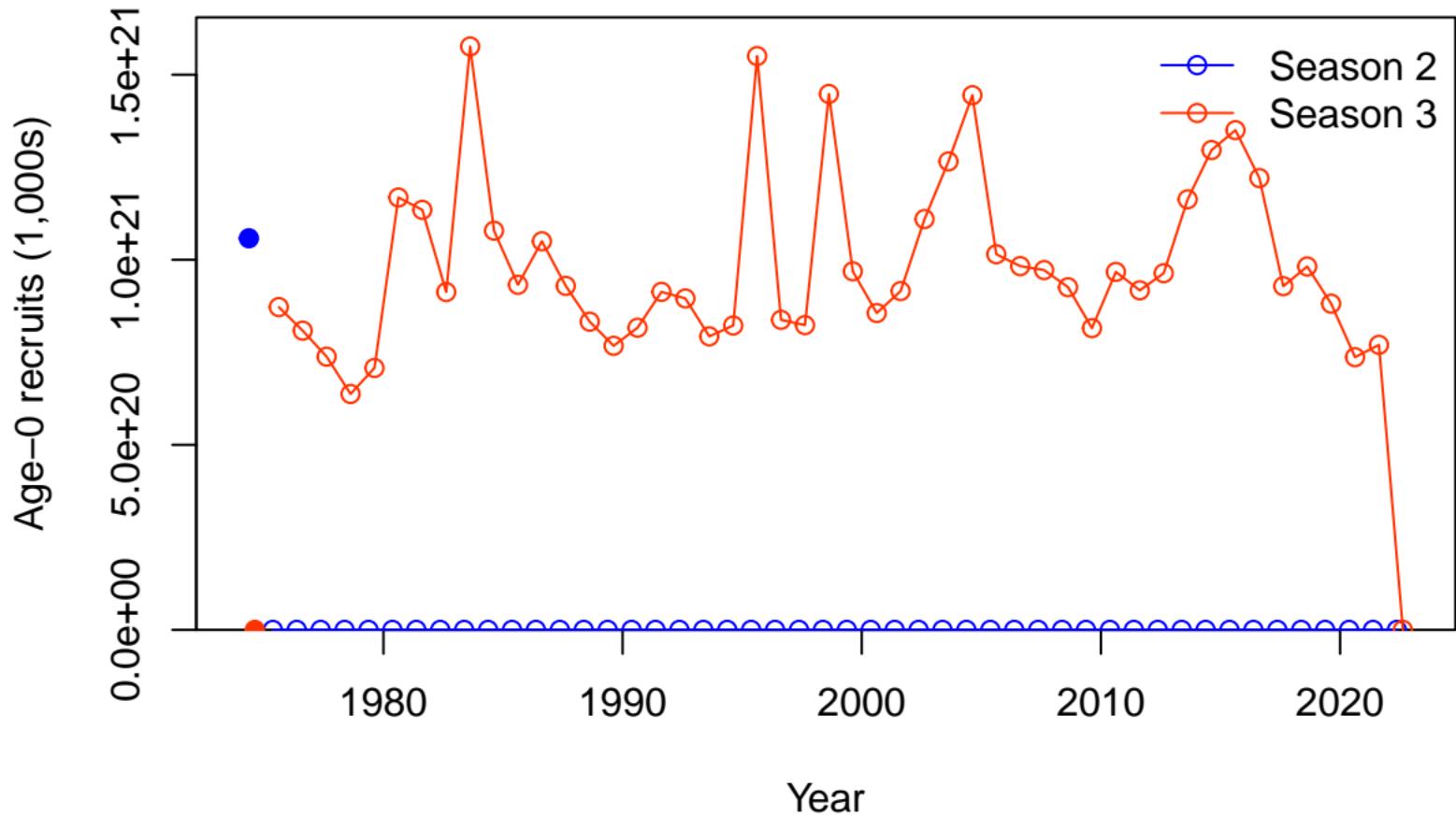
0.0e+00 1.0e+23 2.0e+23



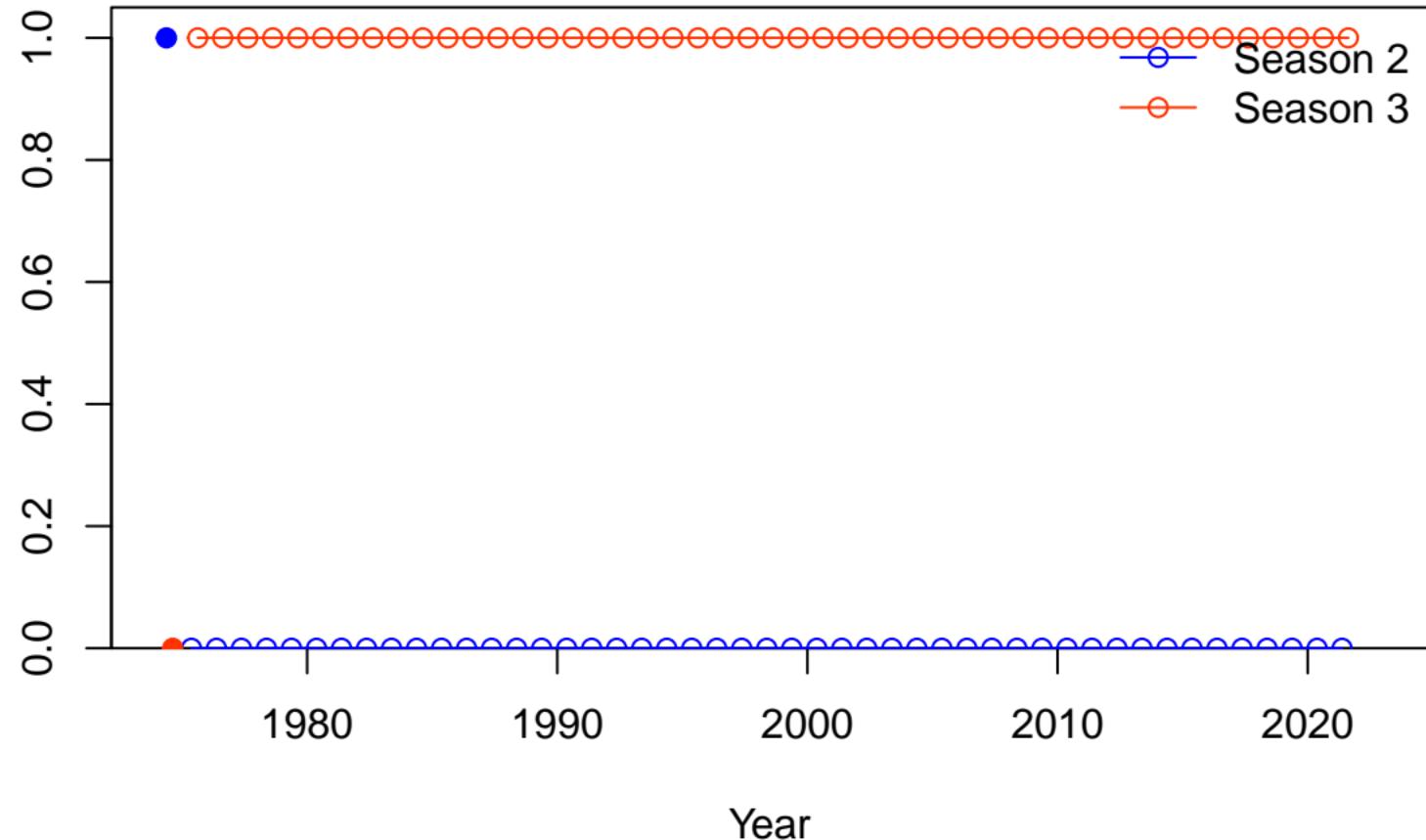
Year



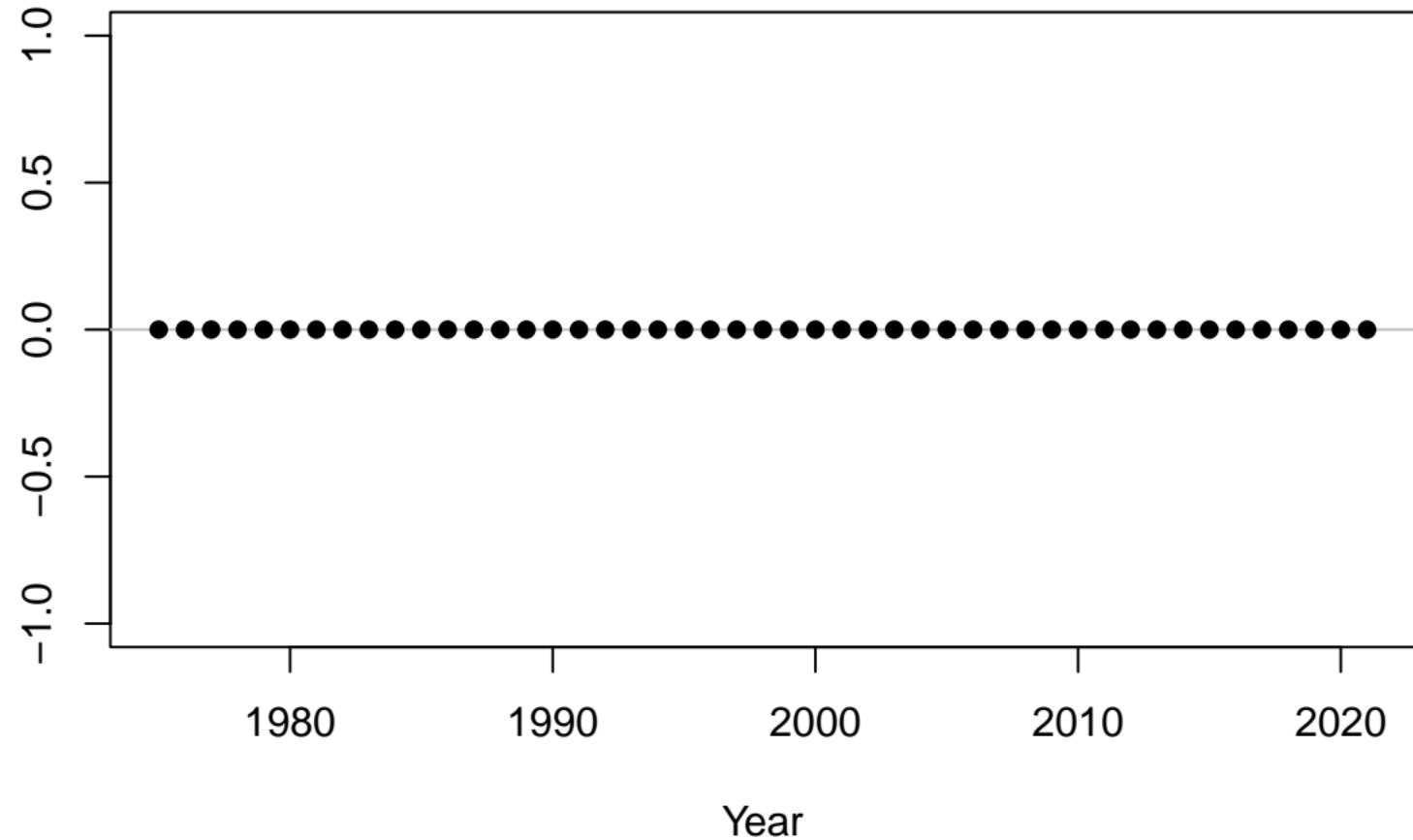


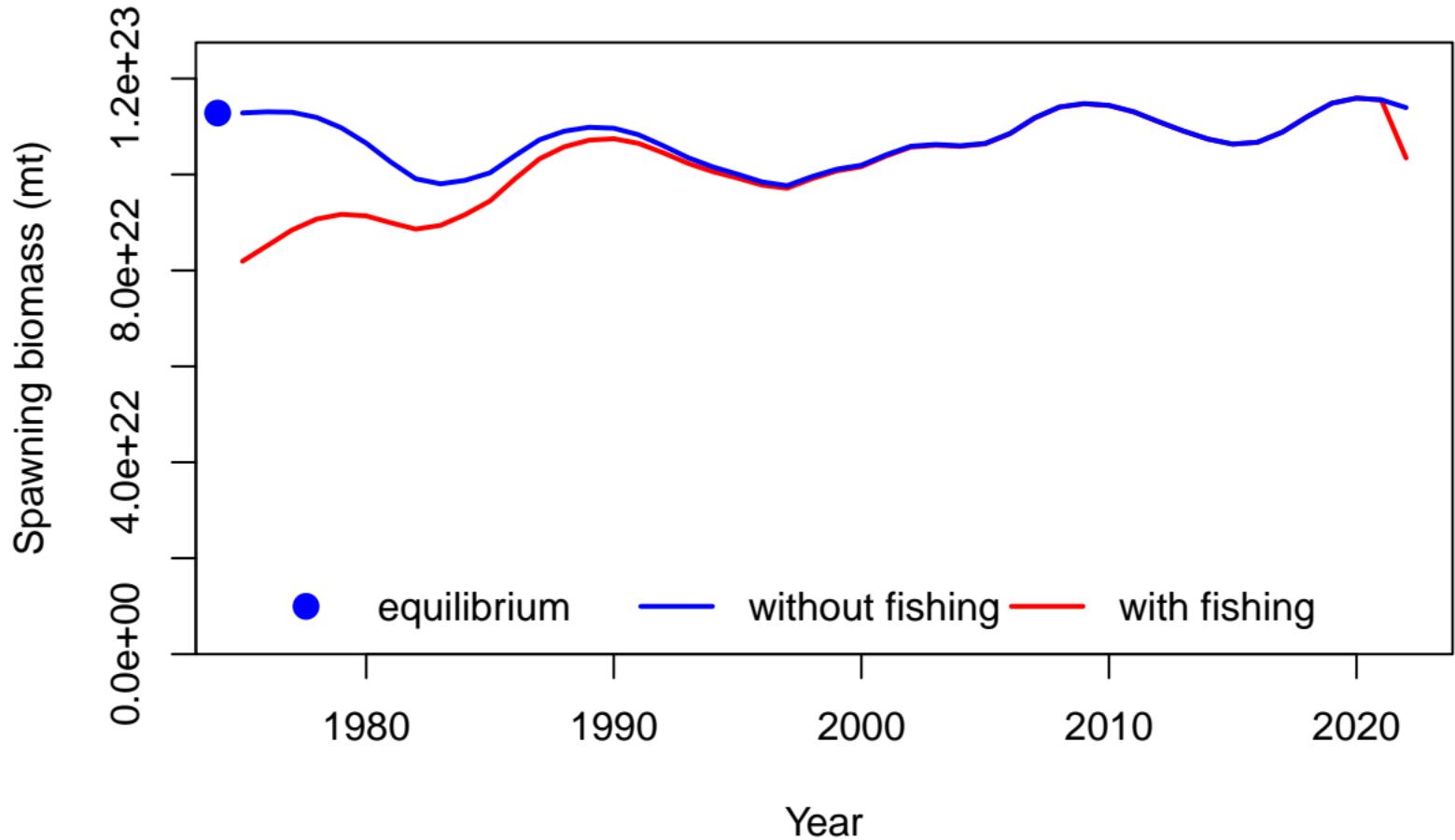


Fraction of total Age-0 recruits

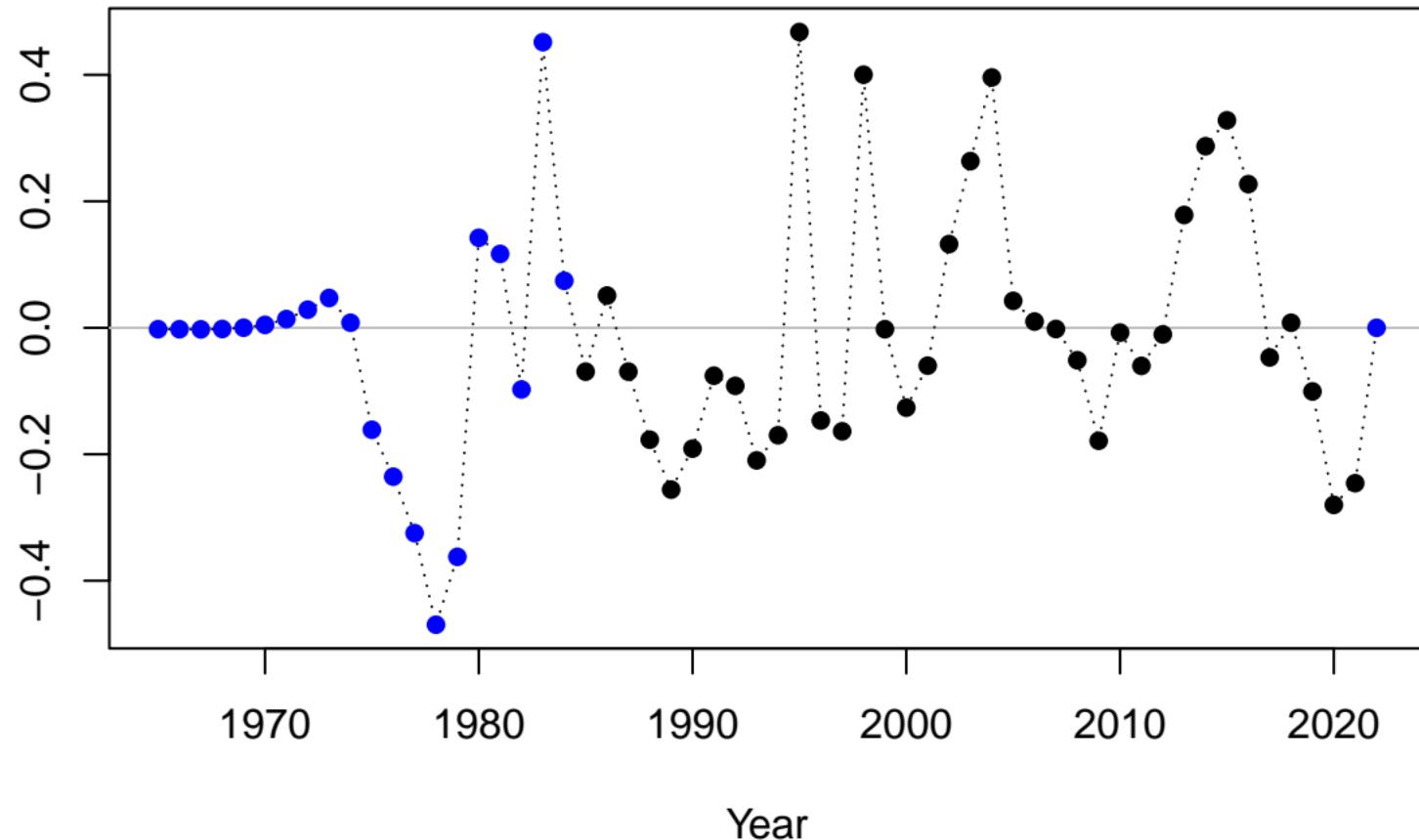


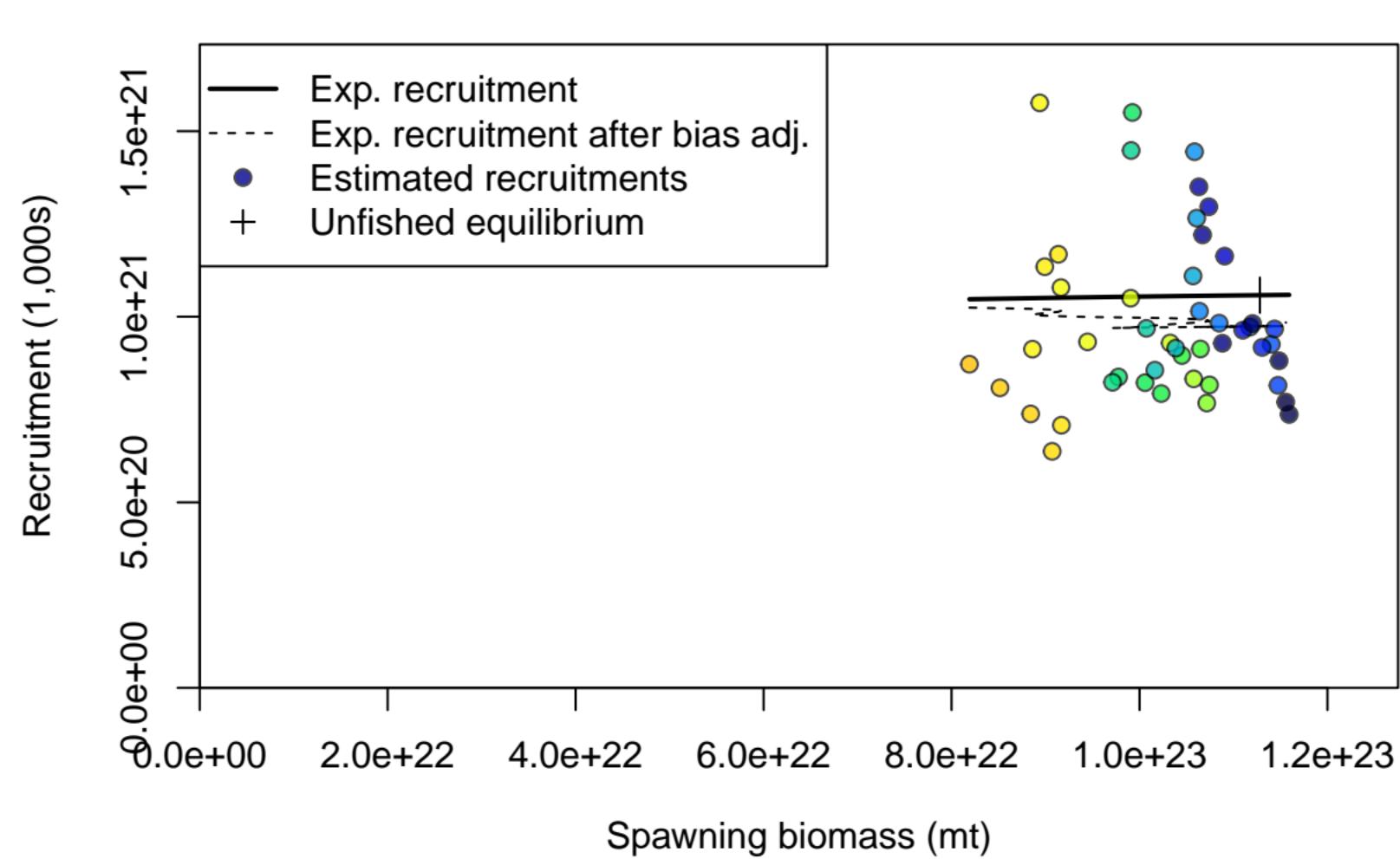
Summary Fishing Mortality

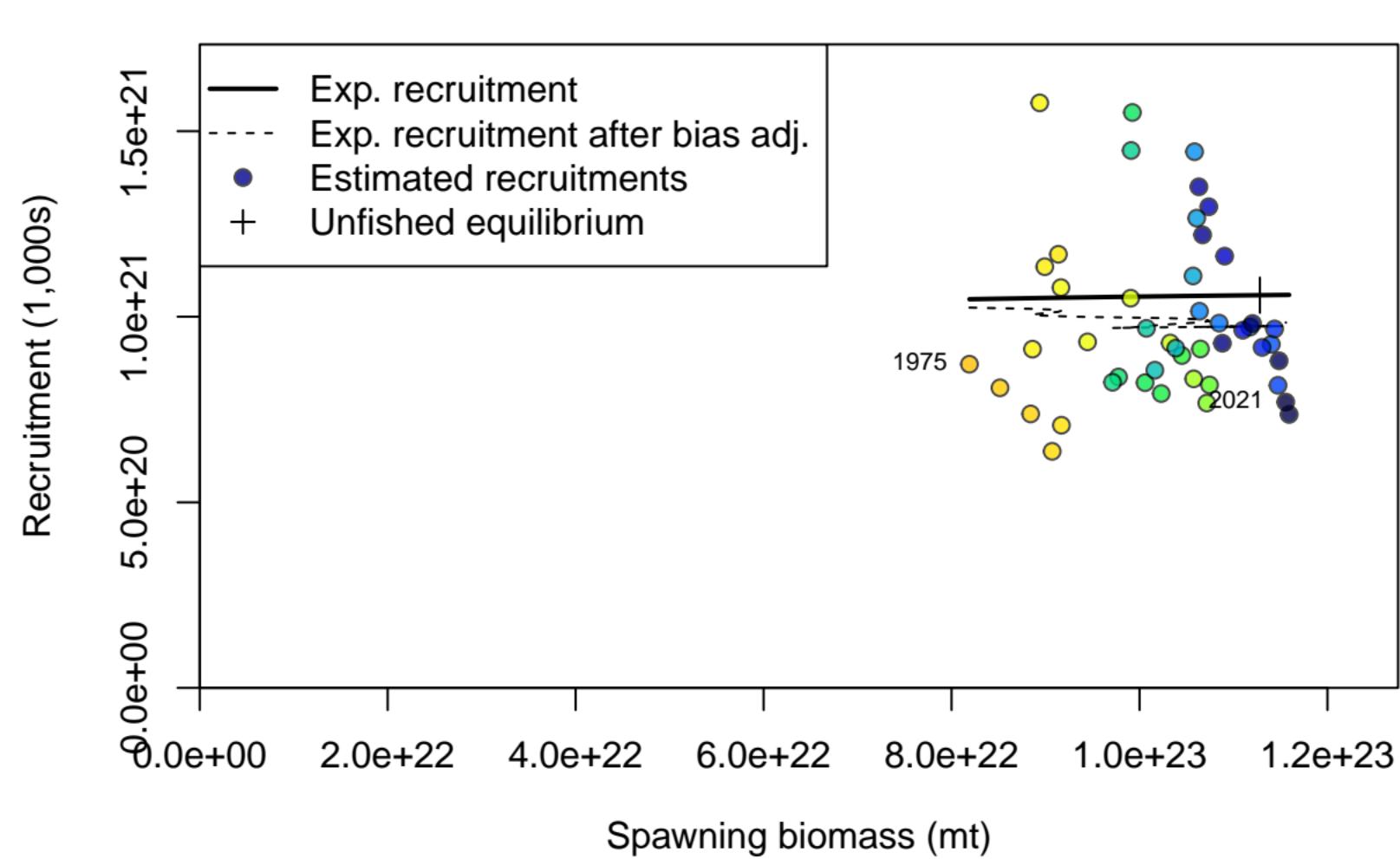


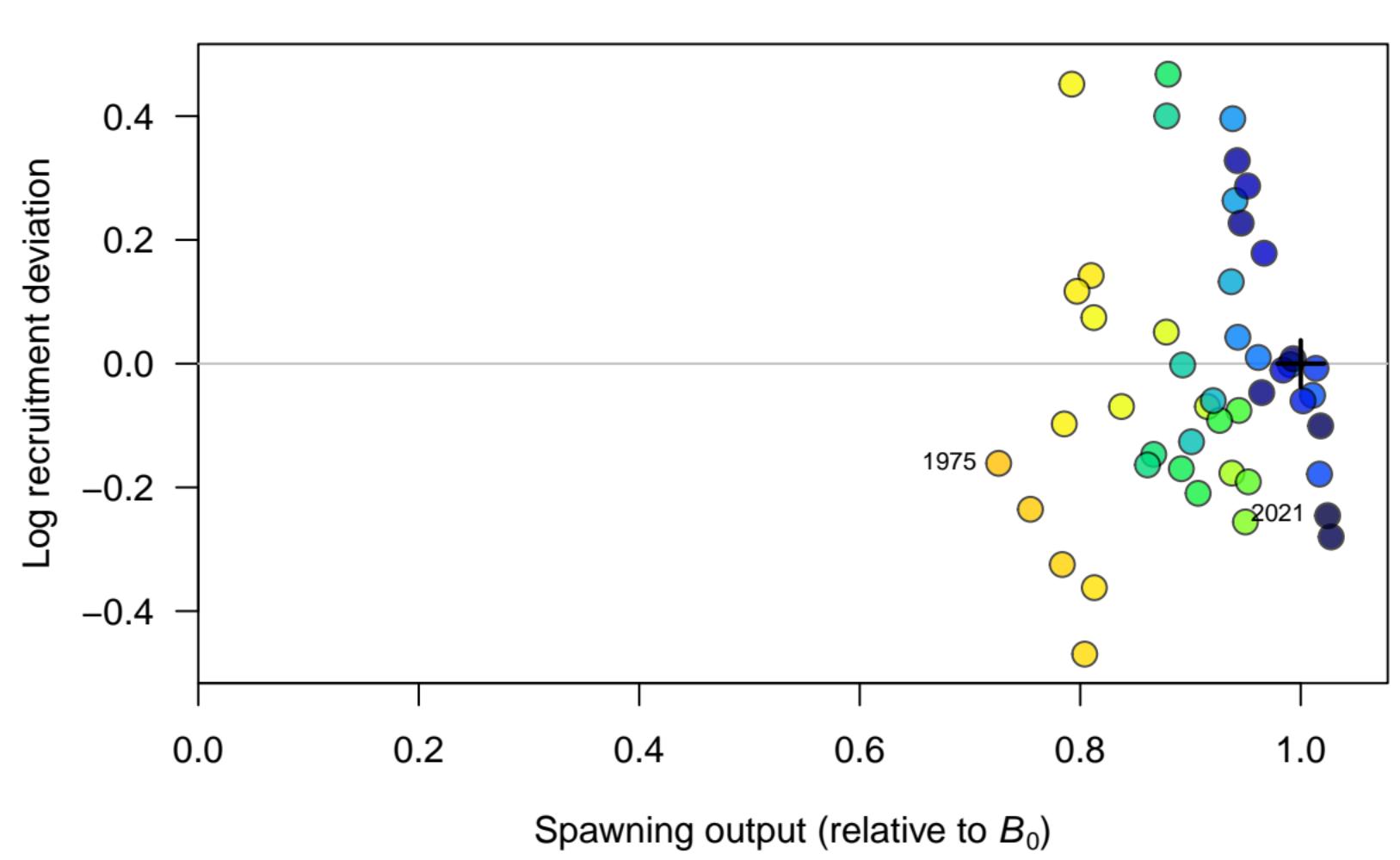


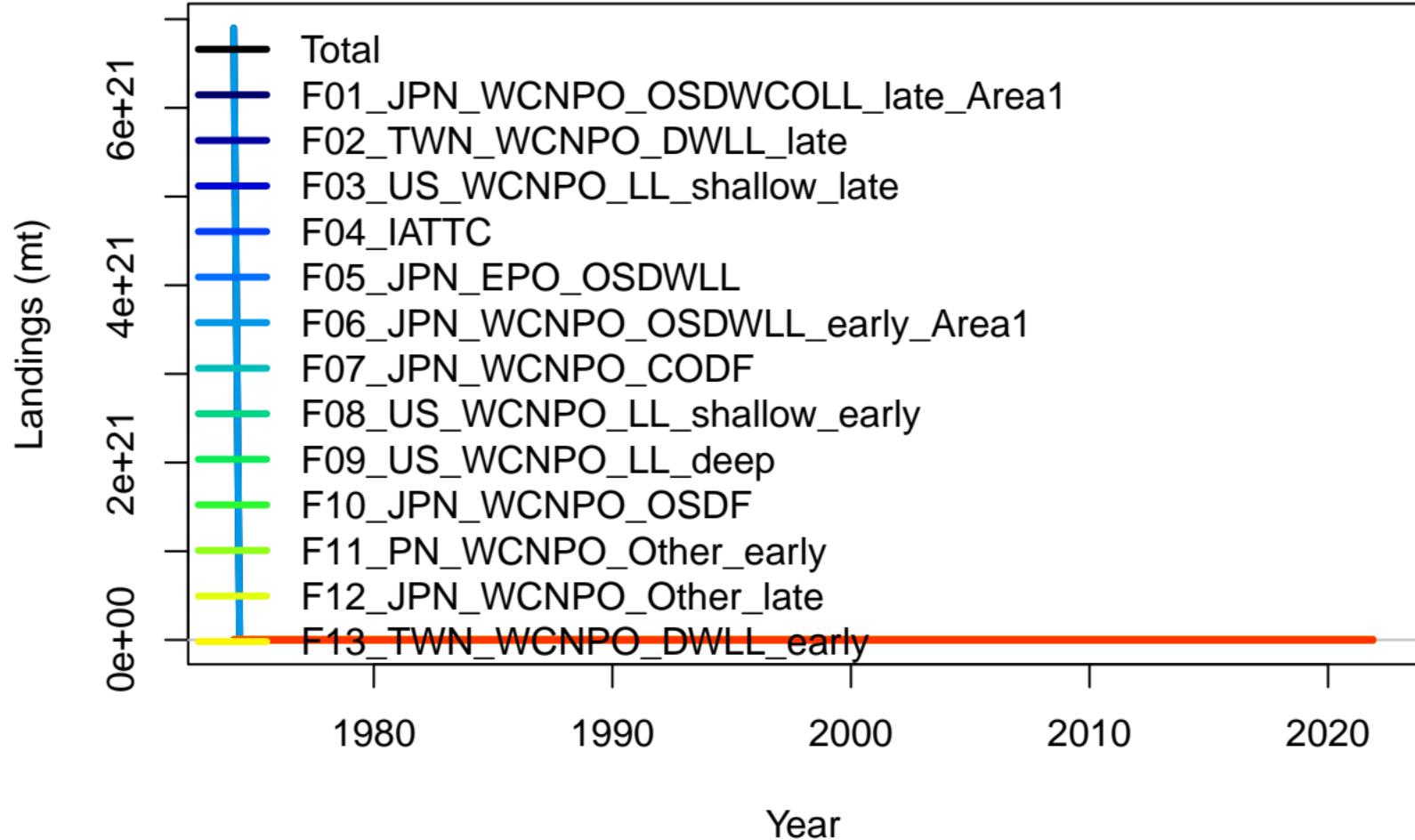
Log recruitment deviation

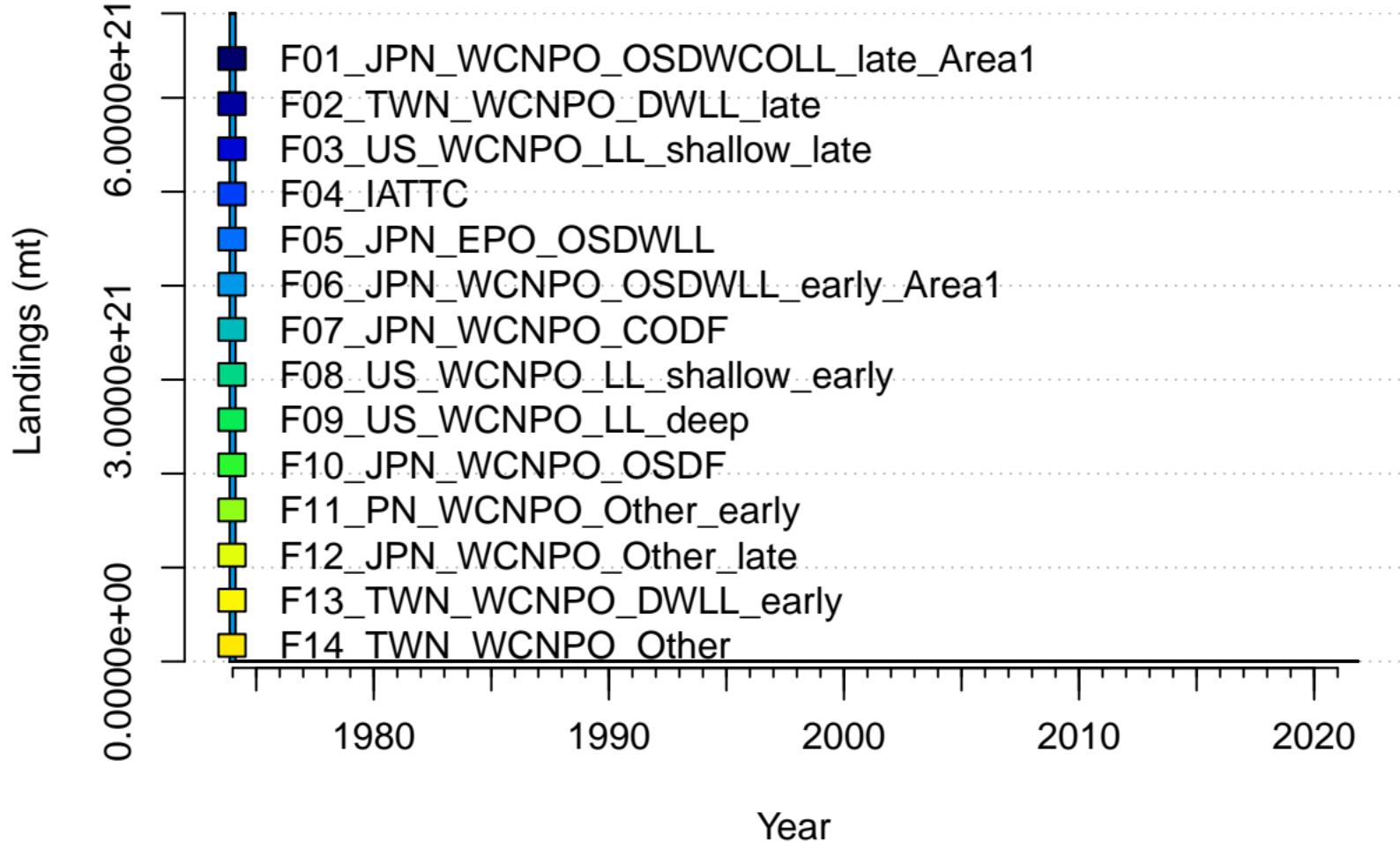




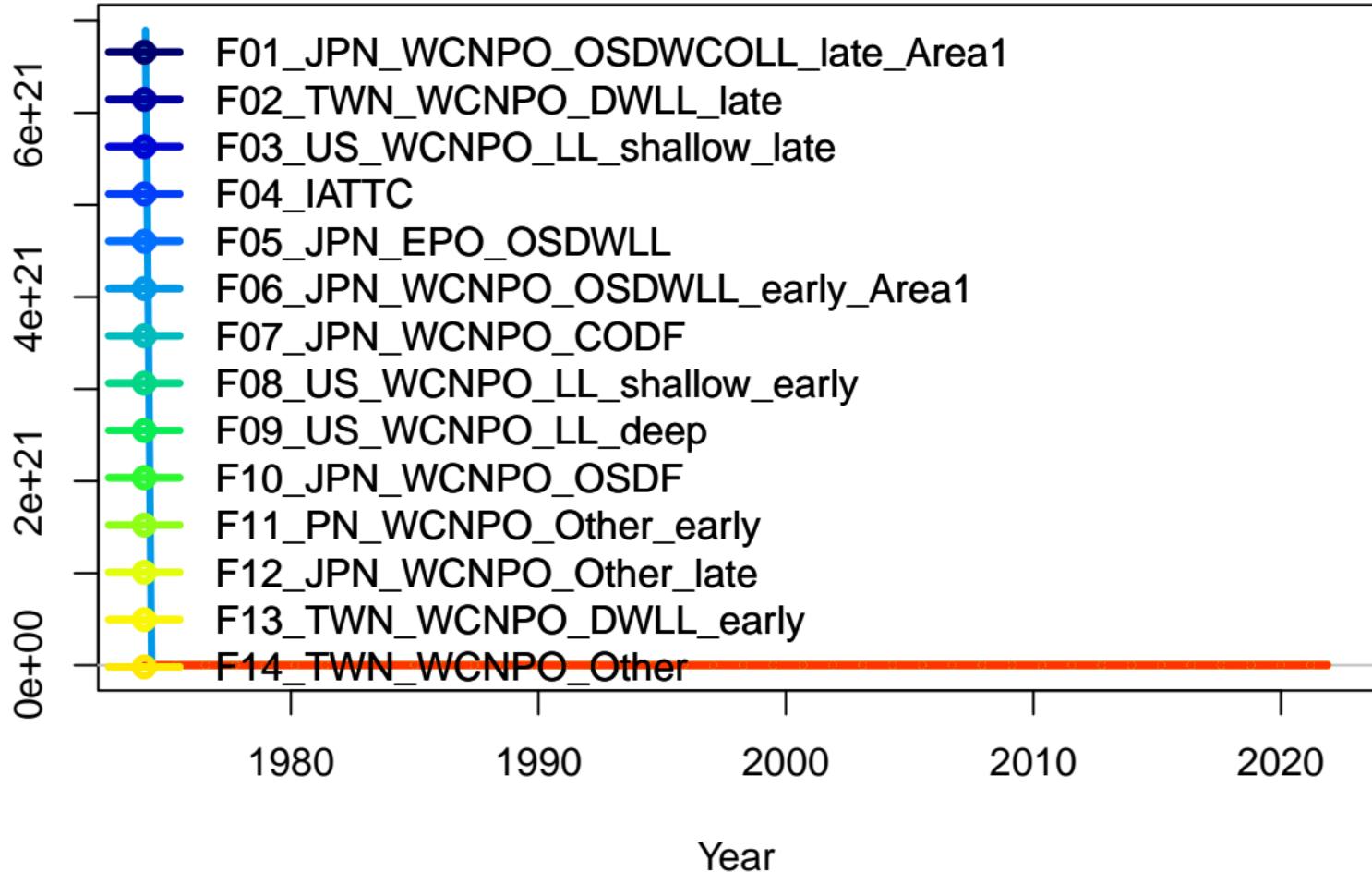






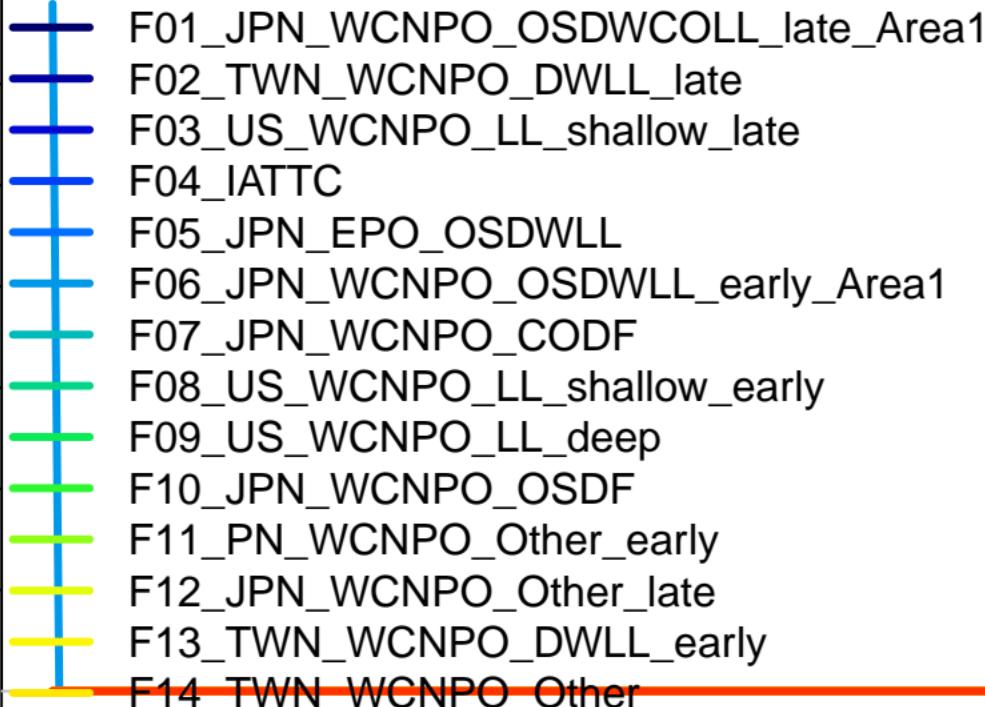


Observed and expected Landings (mt)



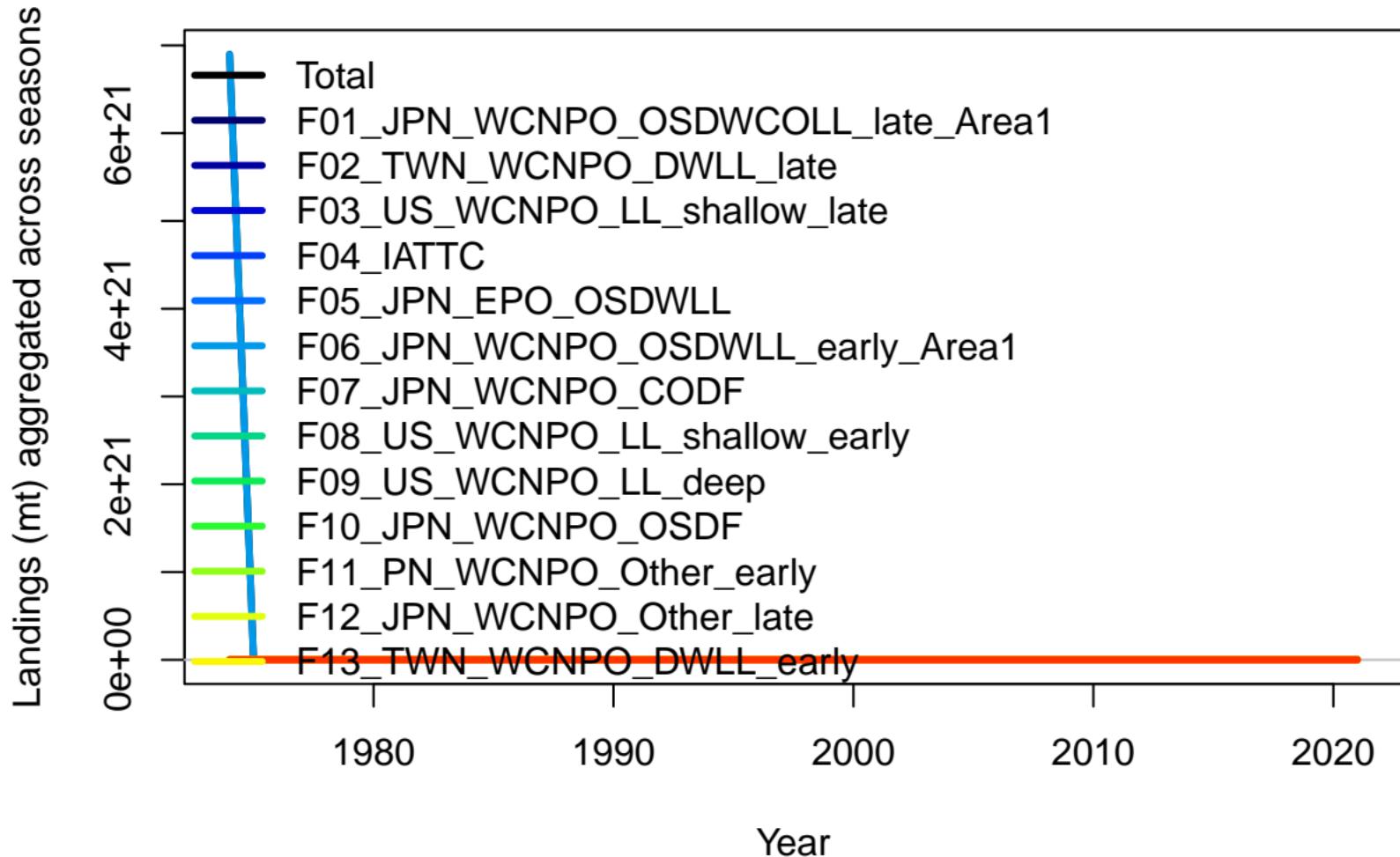
Continuous F

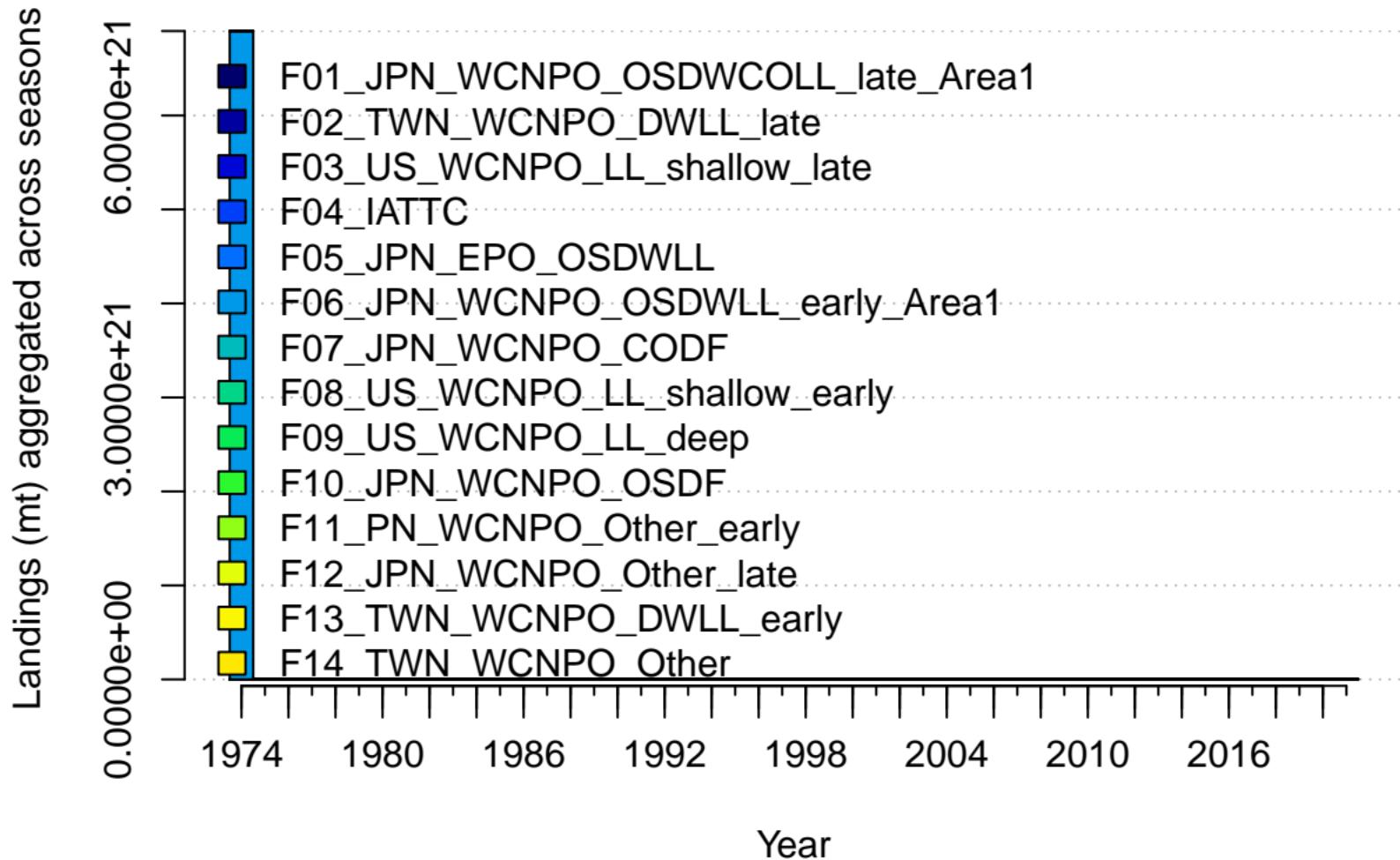
0.30
0.20
0.10
0.00

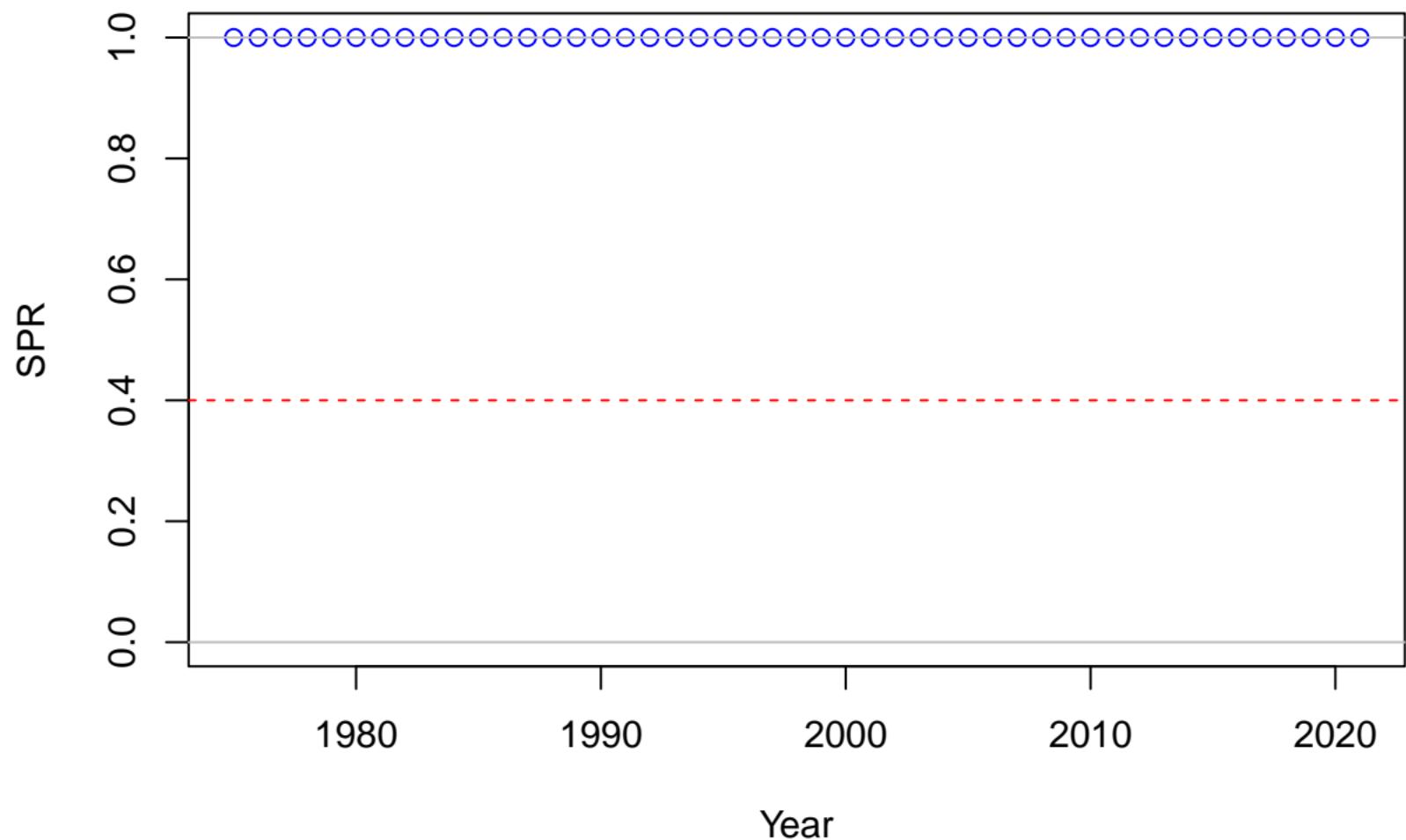


1980 1990 2000 2010 2020

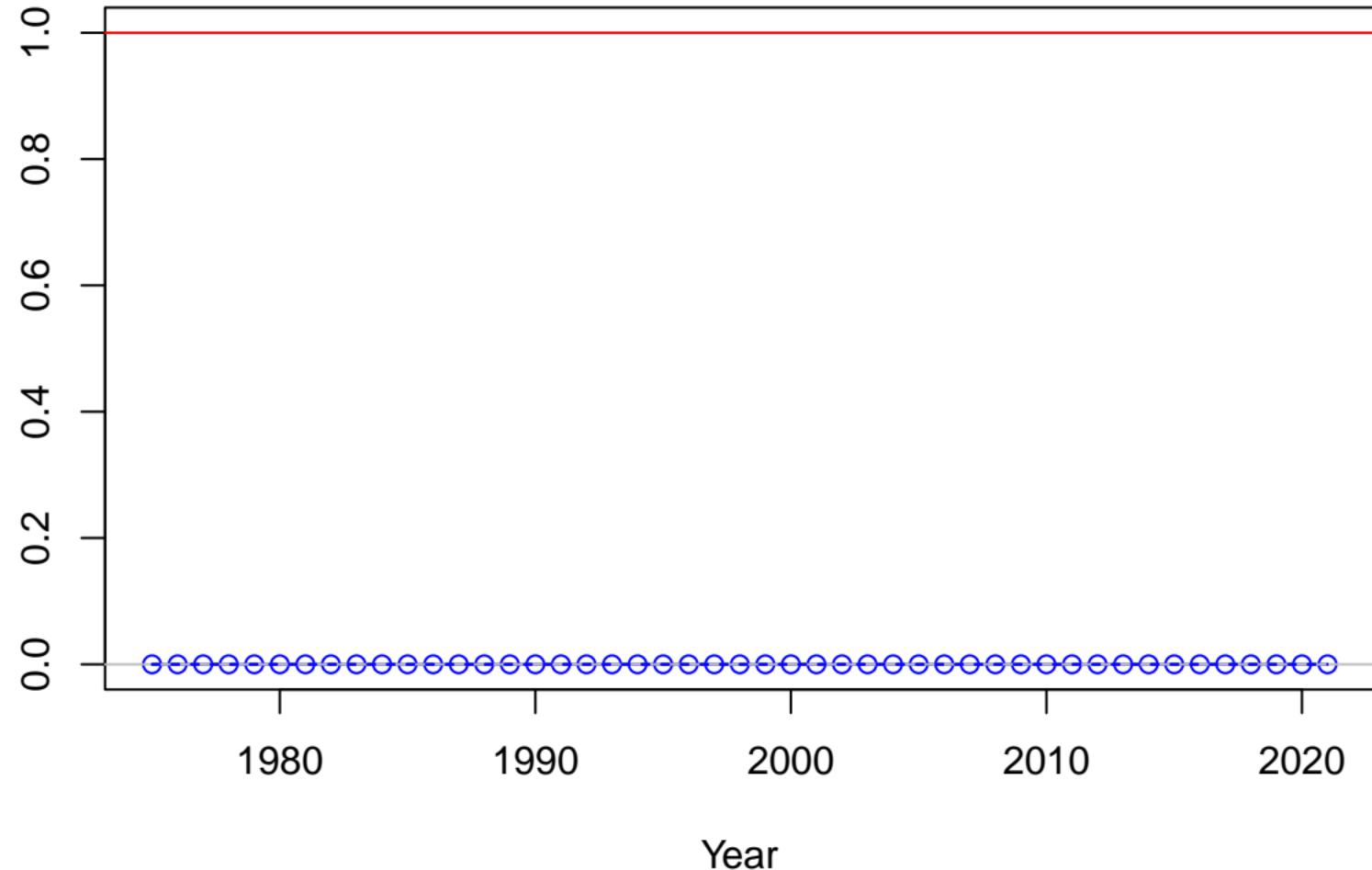
Year







Fishing intensity: 1-SPR



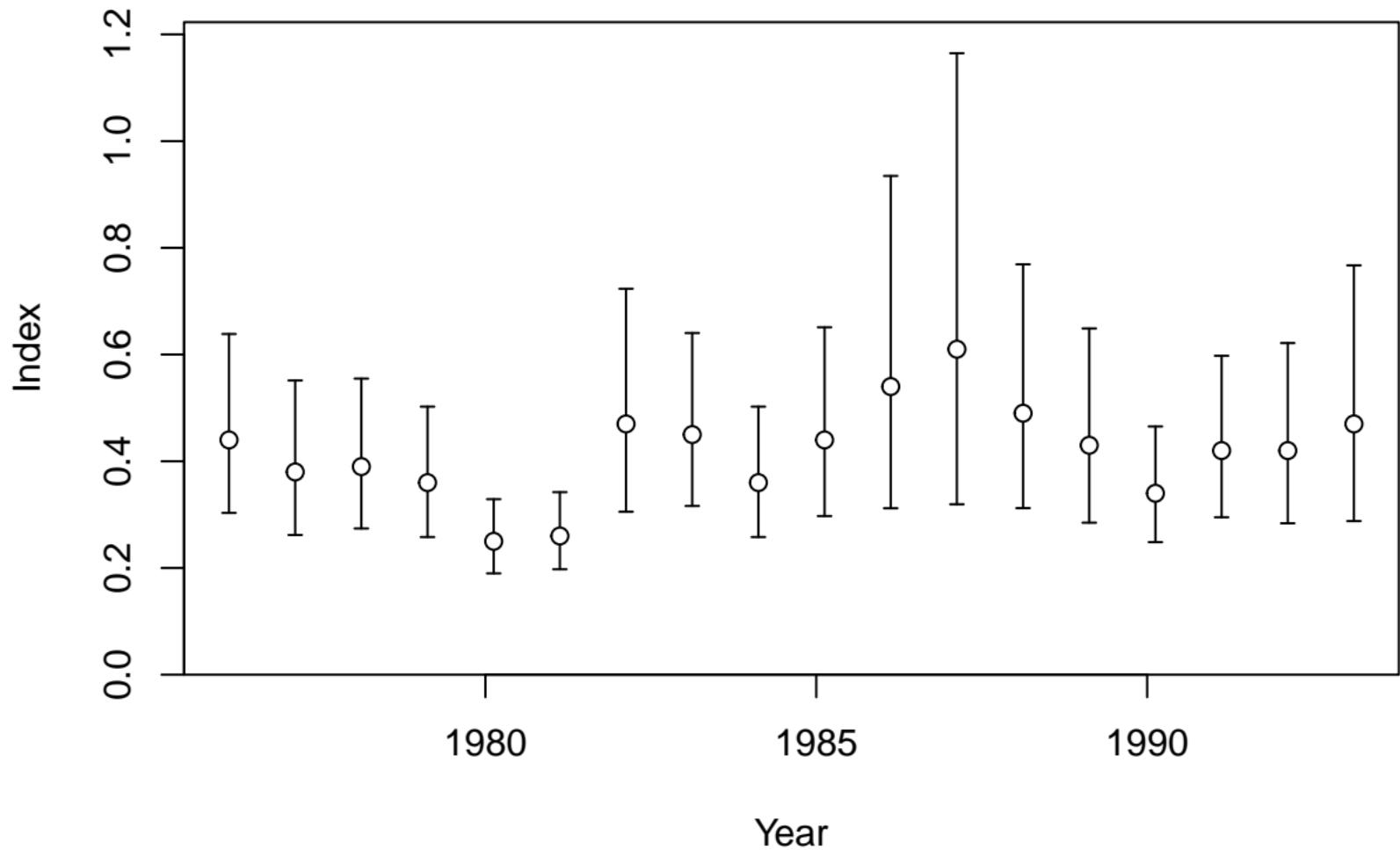
Fishing intensity: 1-SPR

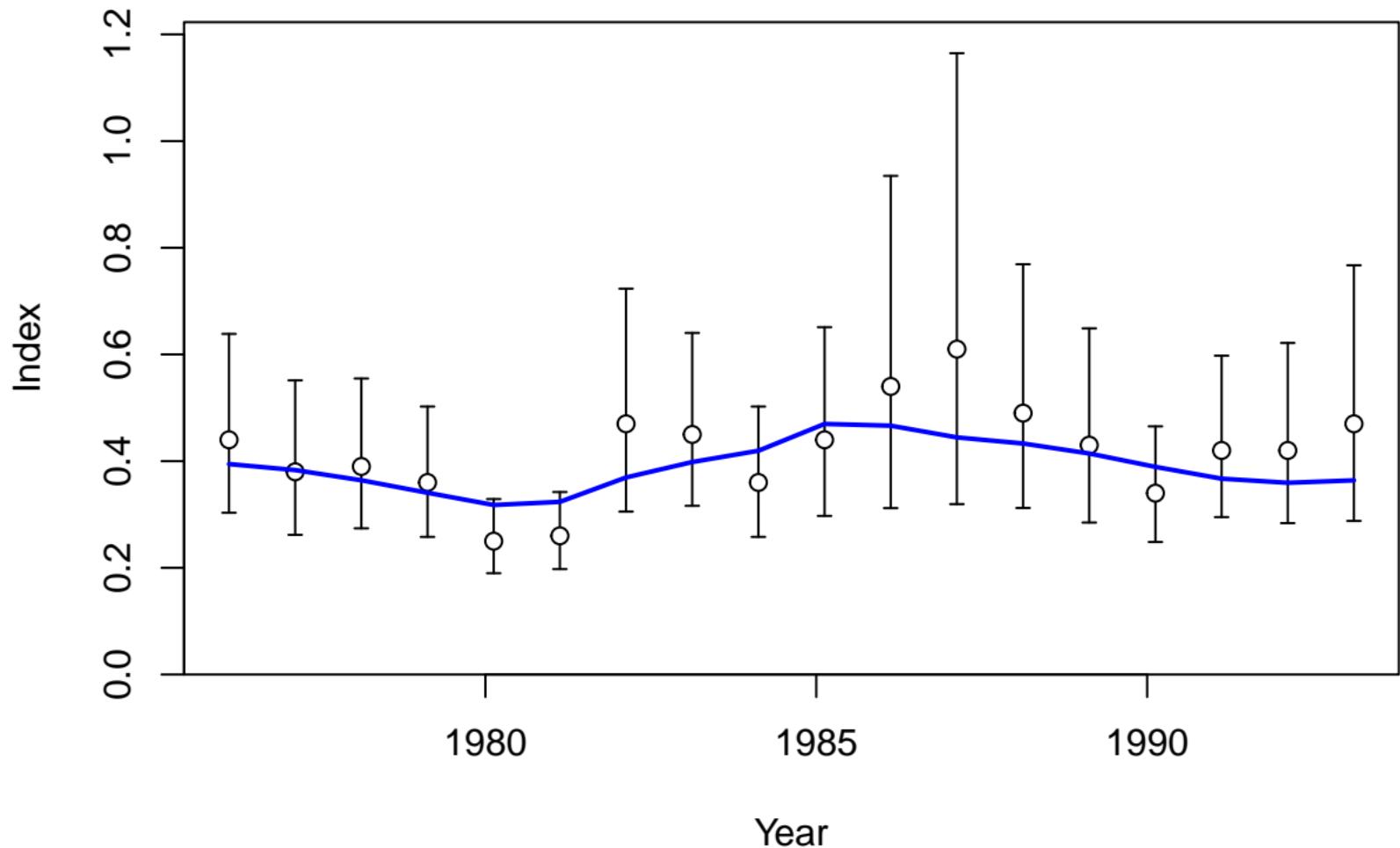
1.0
0.8
0.6
0.4
0.2
0.0

0.0 0.2 0.4 0.6 0.8 1.0

Relative spawning output: B/B_0

1975 1980 2000 1990 2020



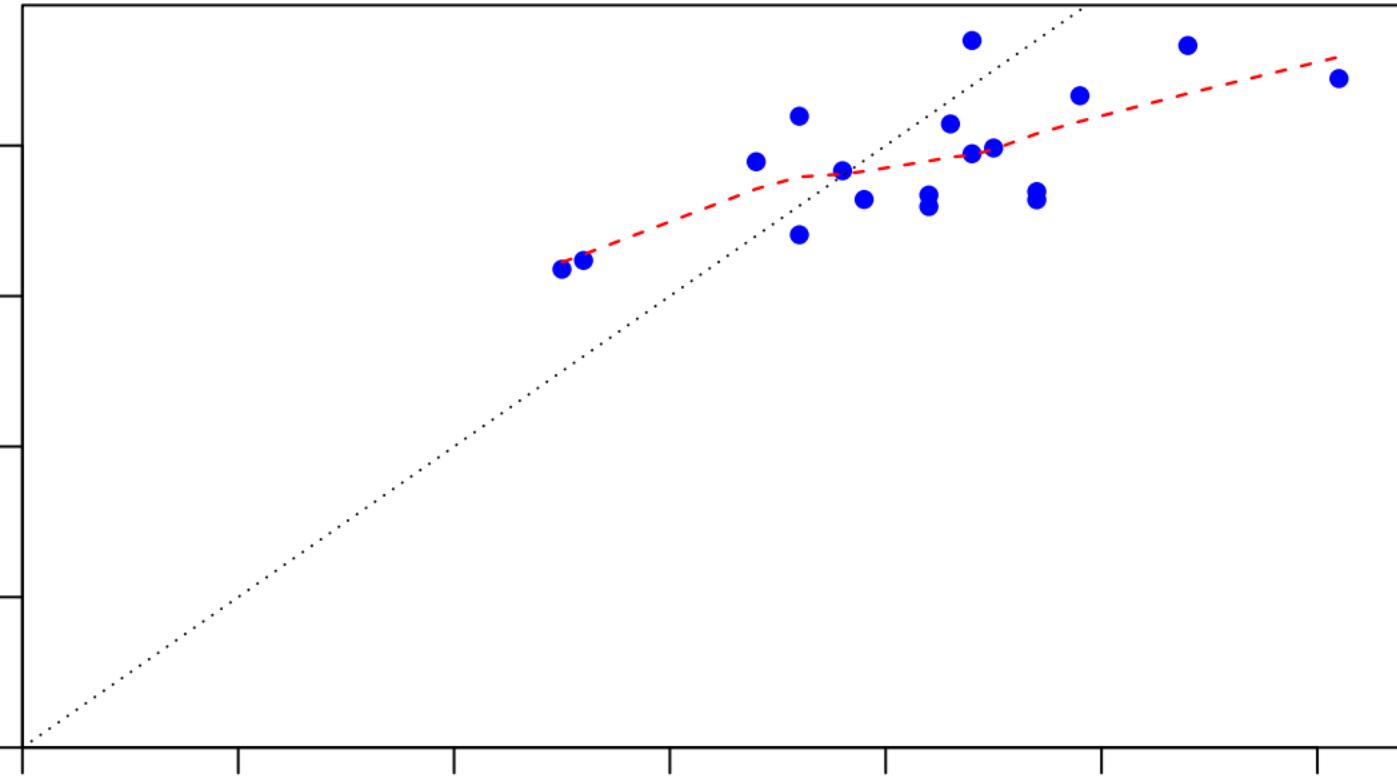


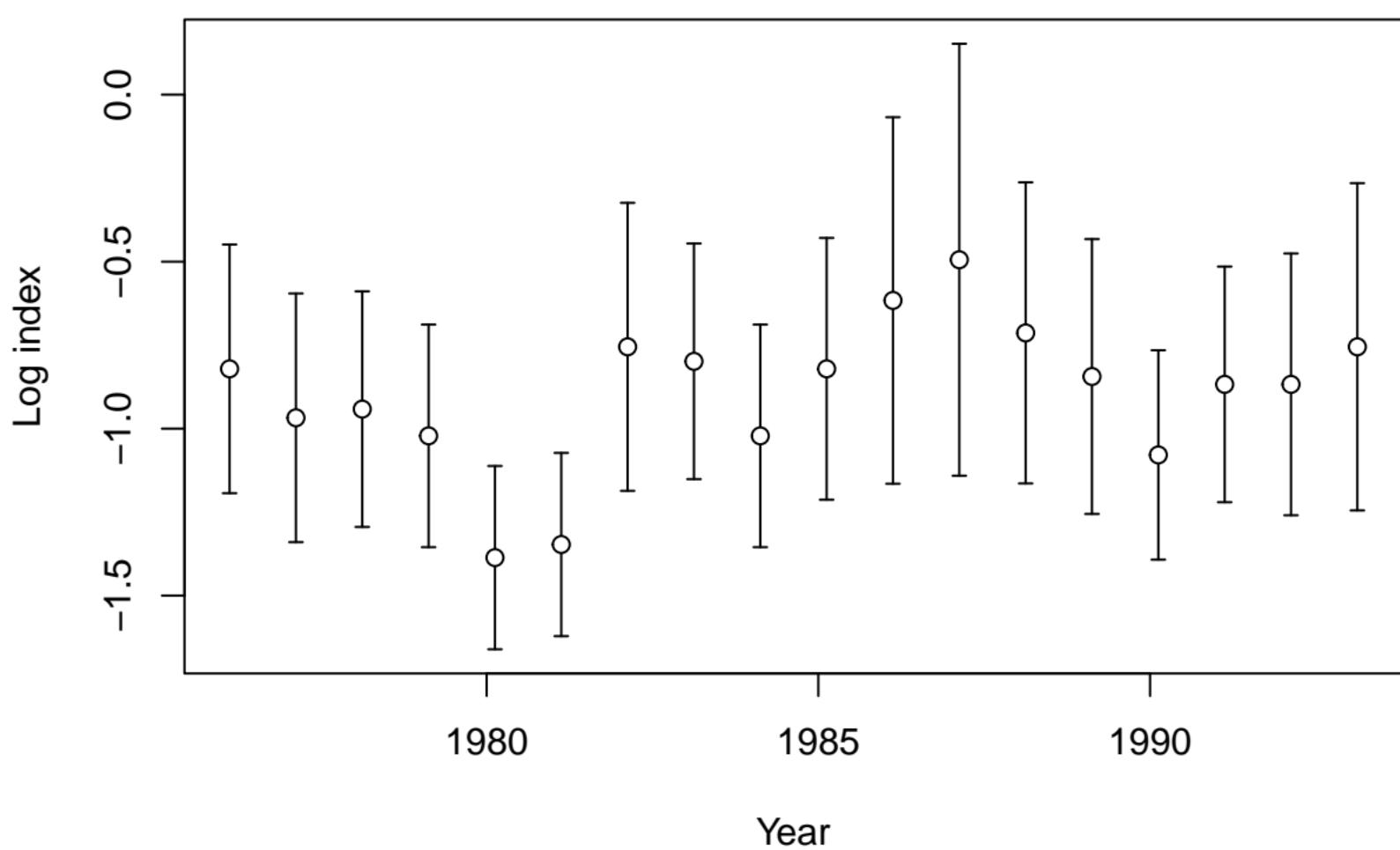
Expected index

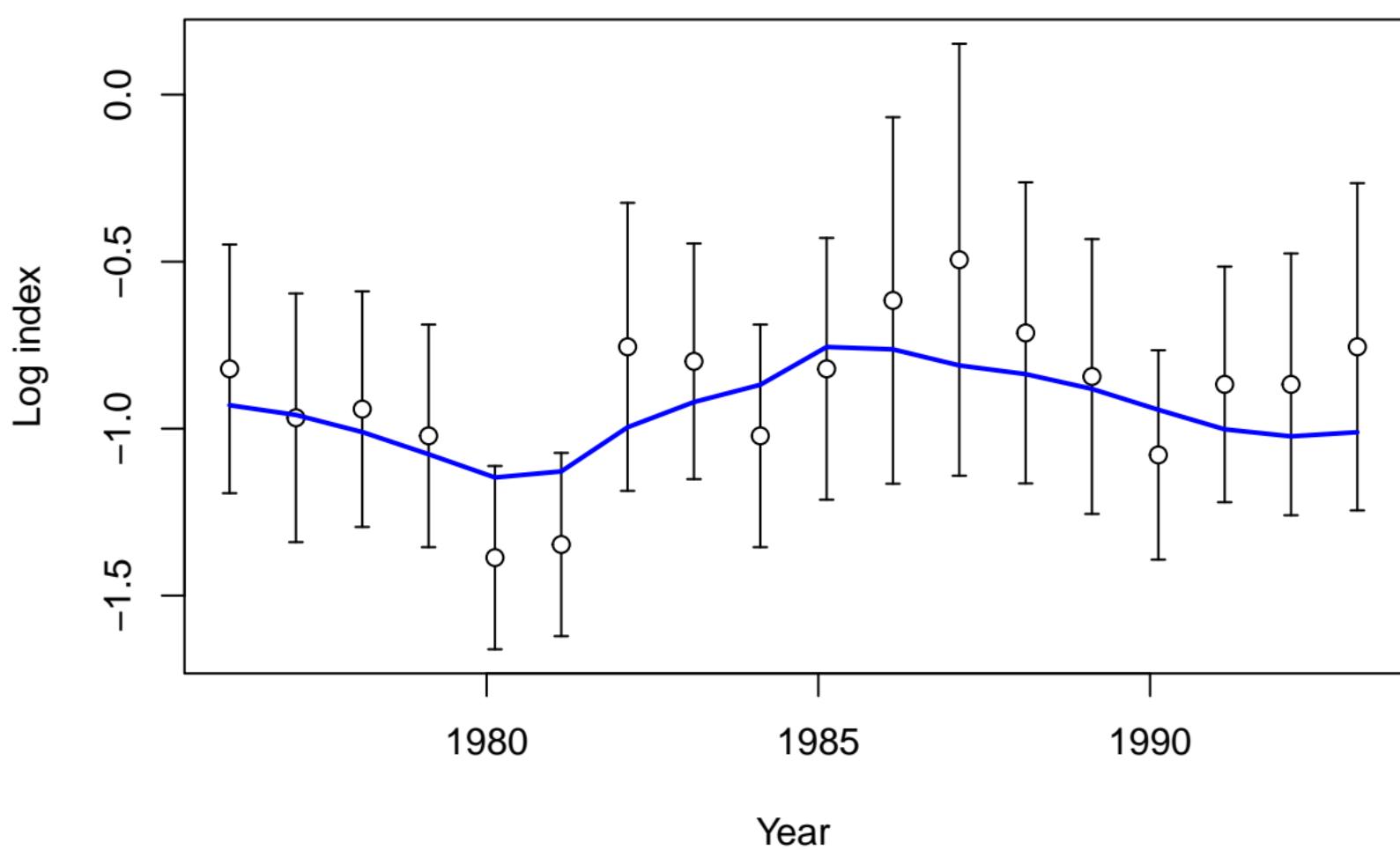
0.0 0.1 0.2 0.3 0.4

0.0 0.1 0.2 0.3 0.4 0.5 0.6

Observed index







Log expected index

-1.1
-1.0
-0.9
-0.8

-1.4

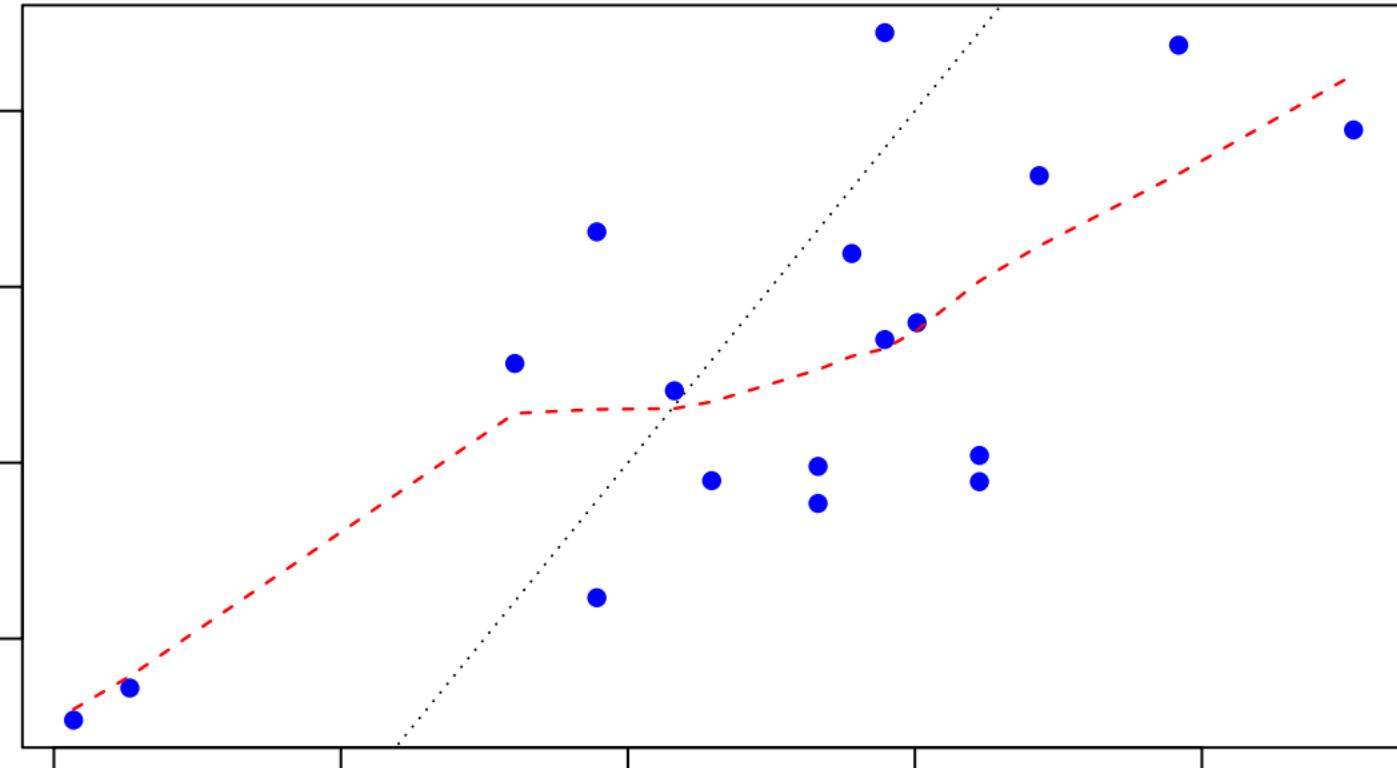
-1.2

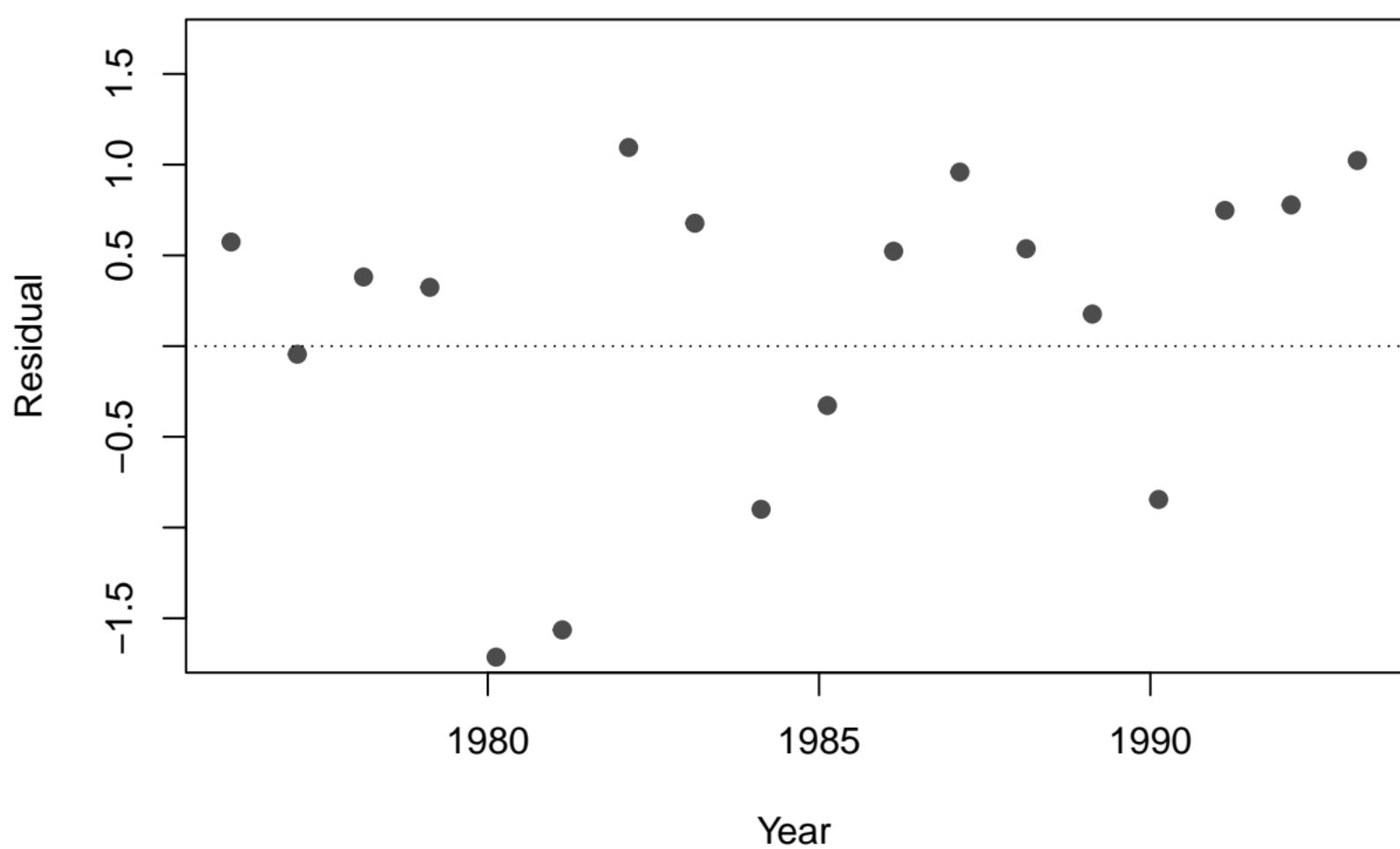
Log observed index

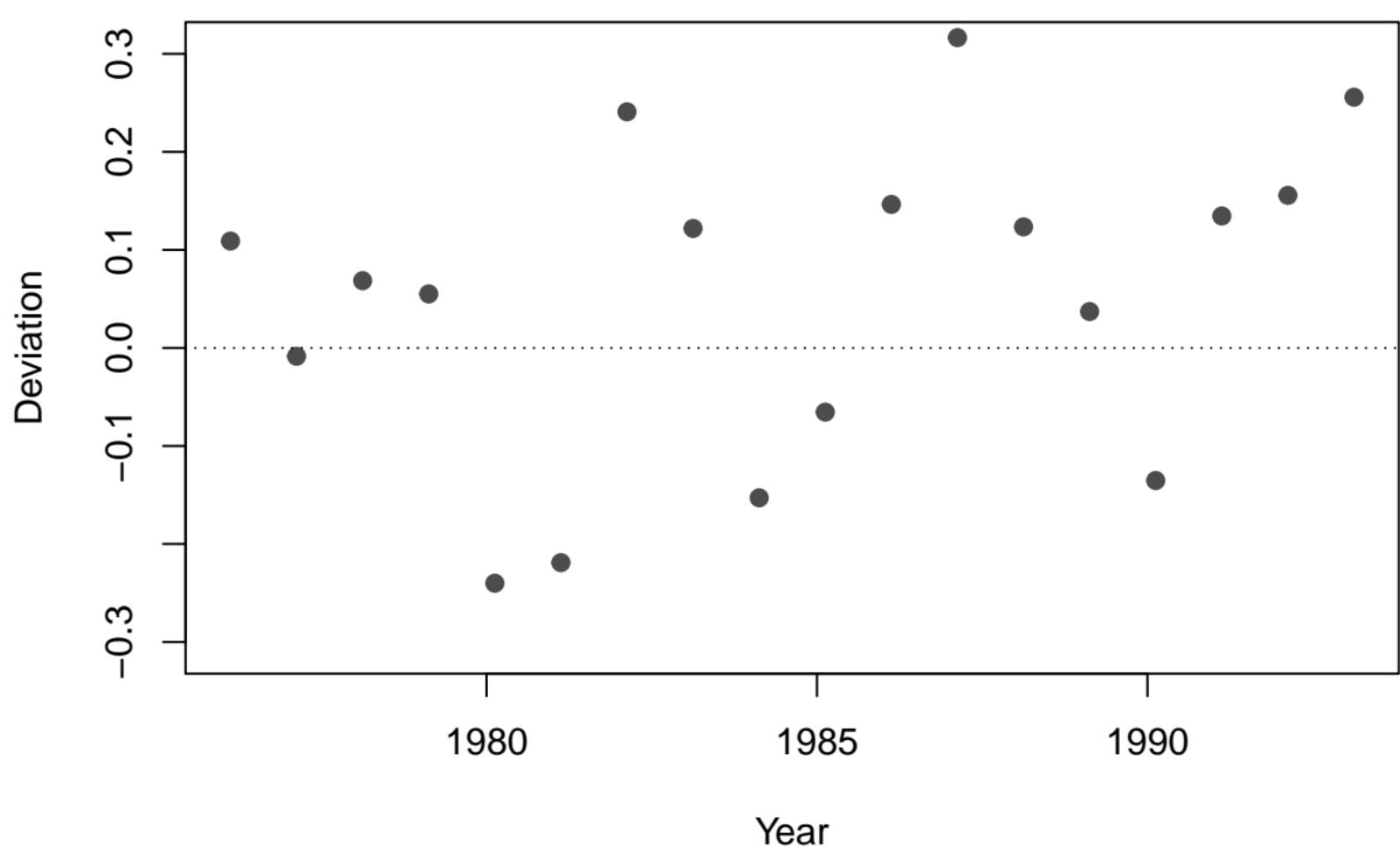
-1.0

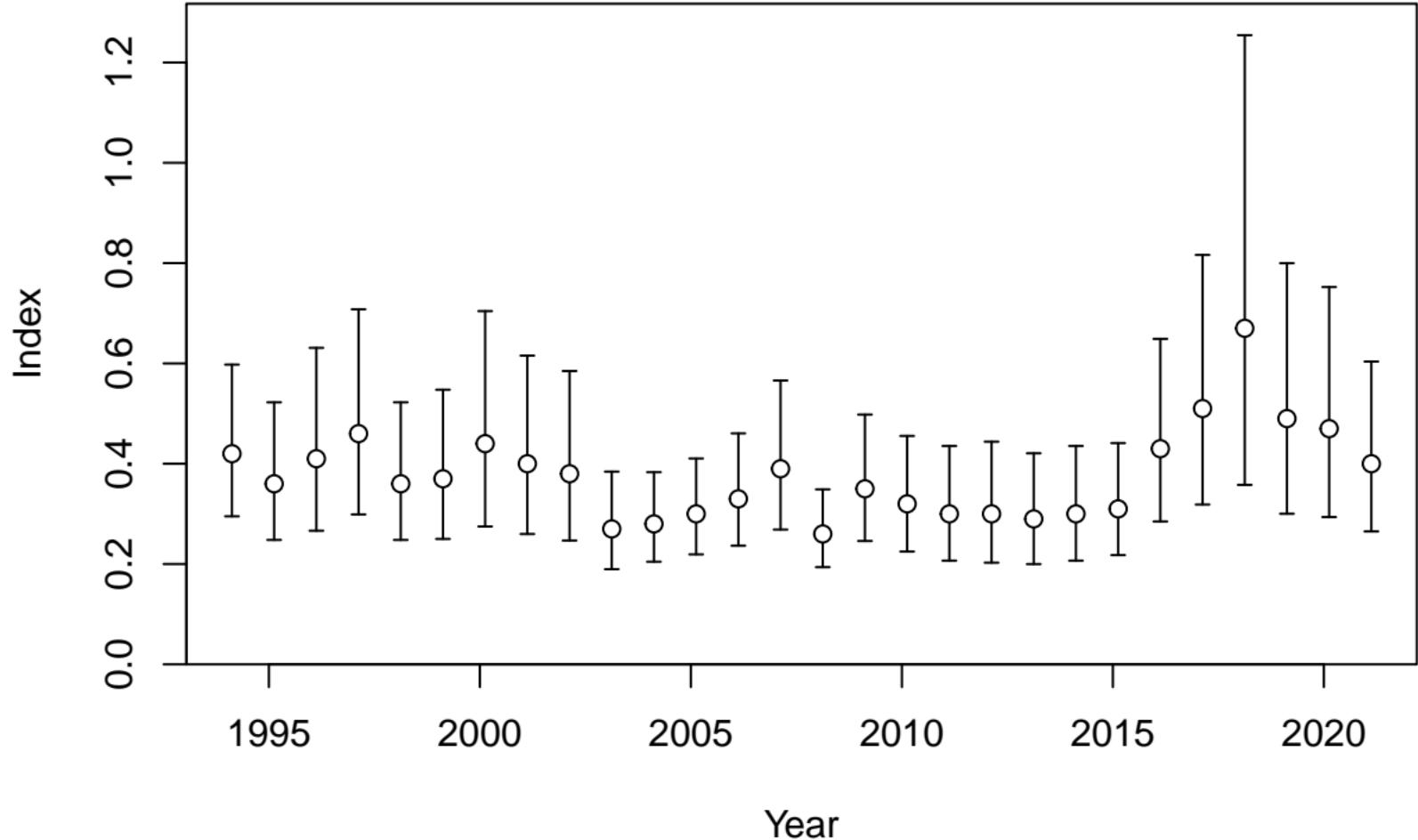
-0.8

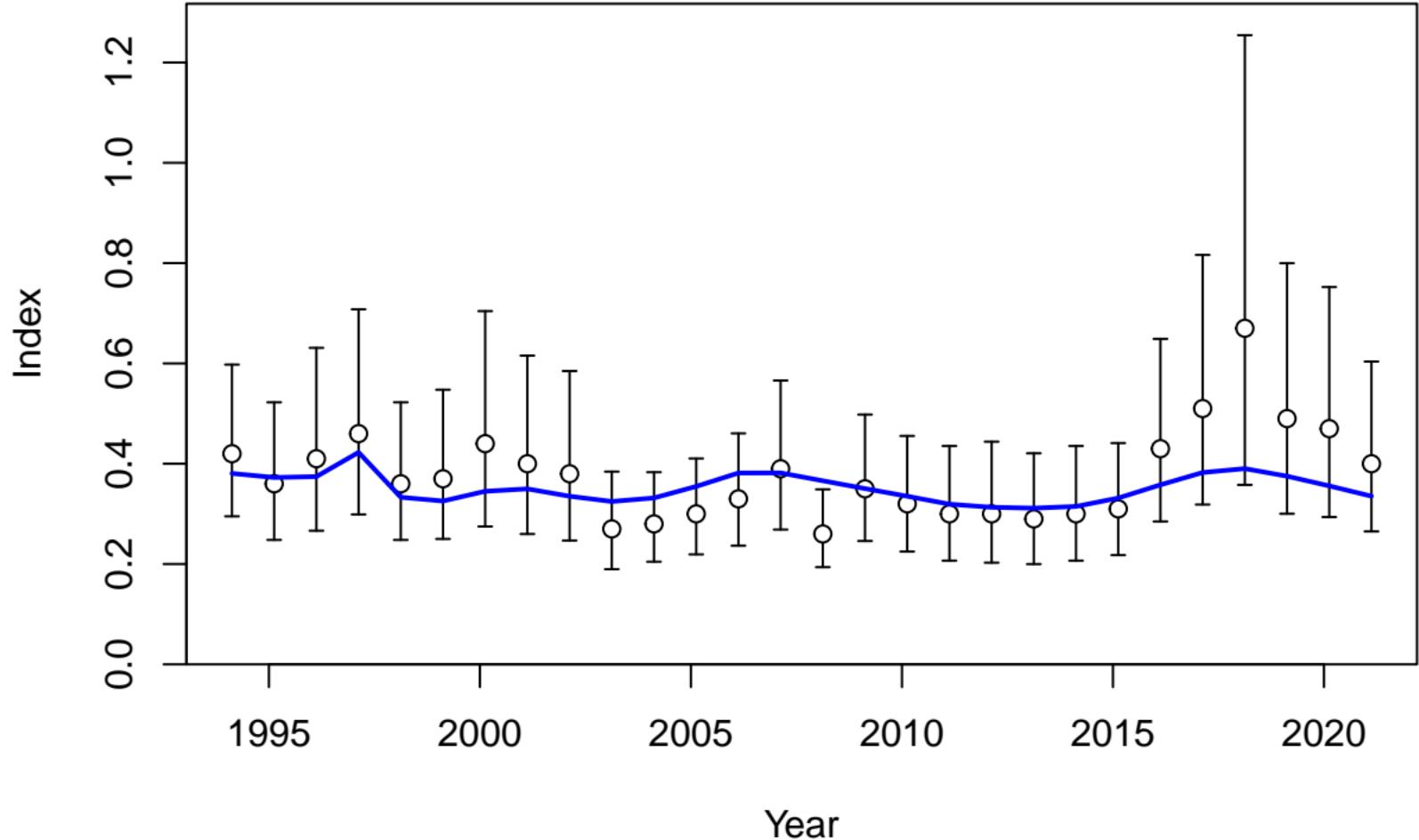
-0.6









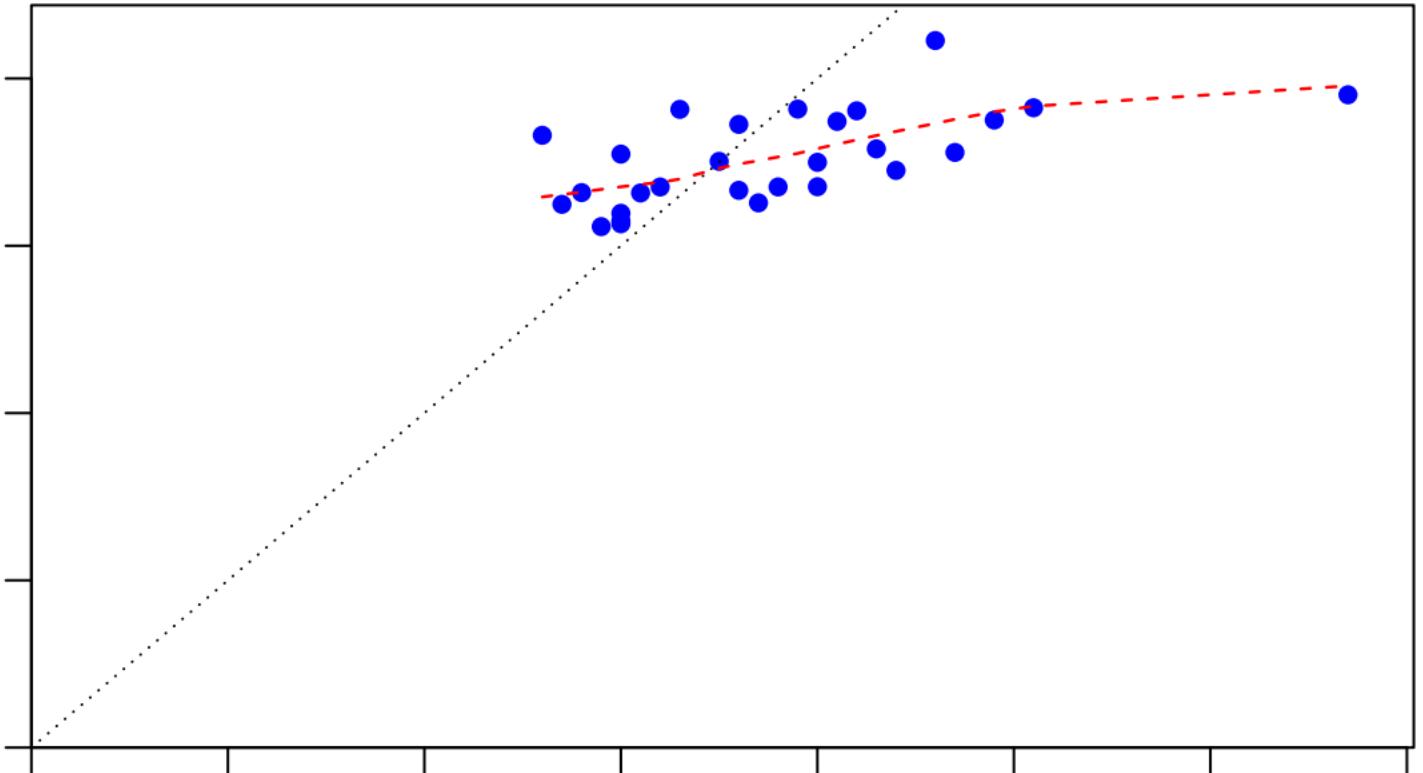


Expected index

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

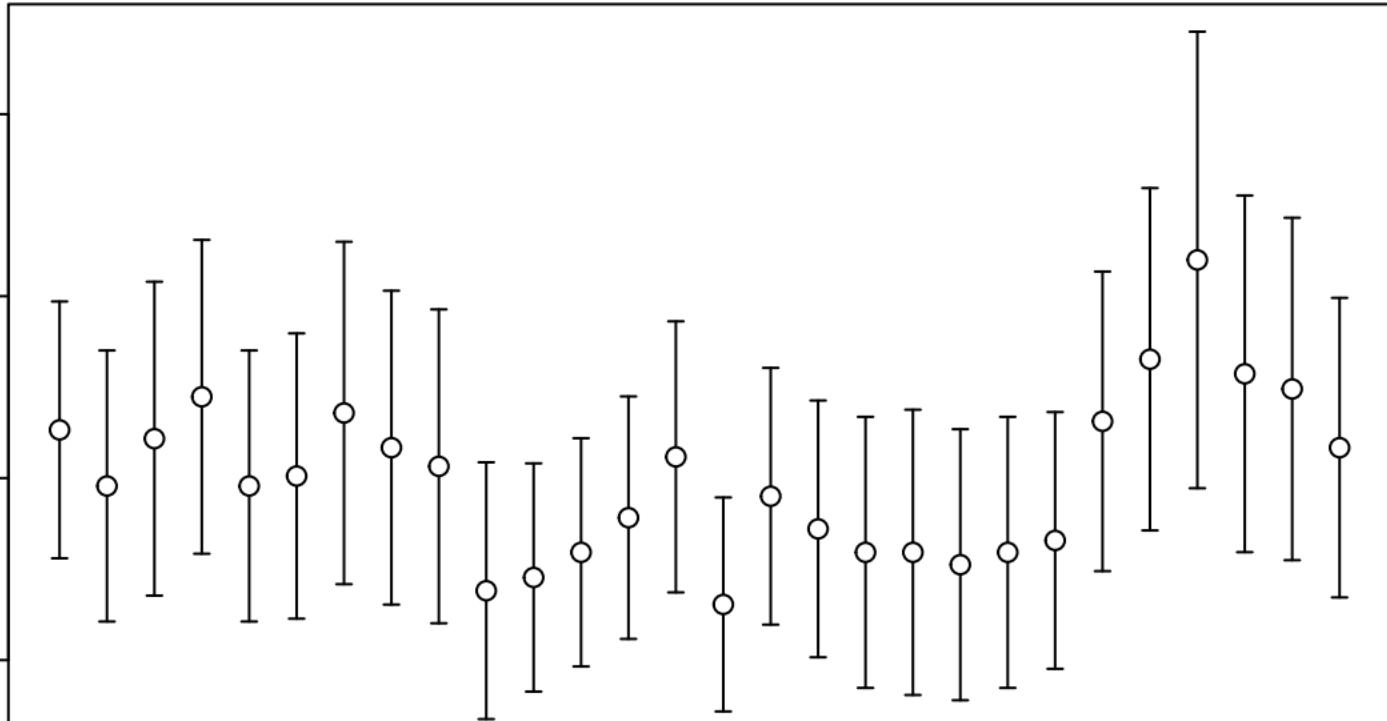


Log index

-1.5 -1.0 -0.5 0.0

1995 2000 2005 2010 2015 2020

Year

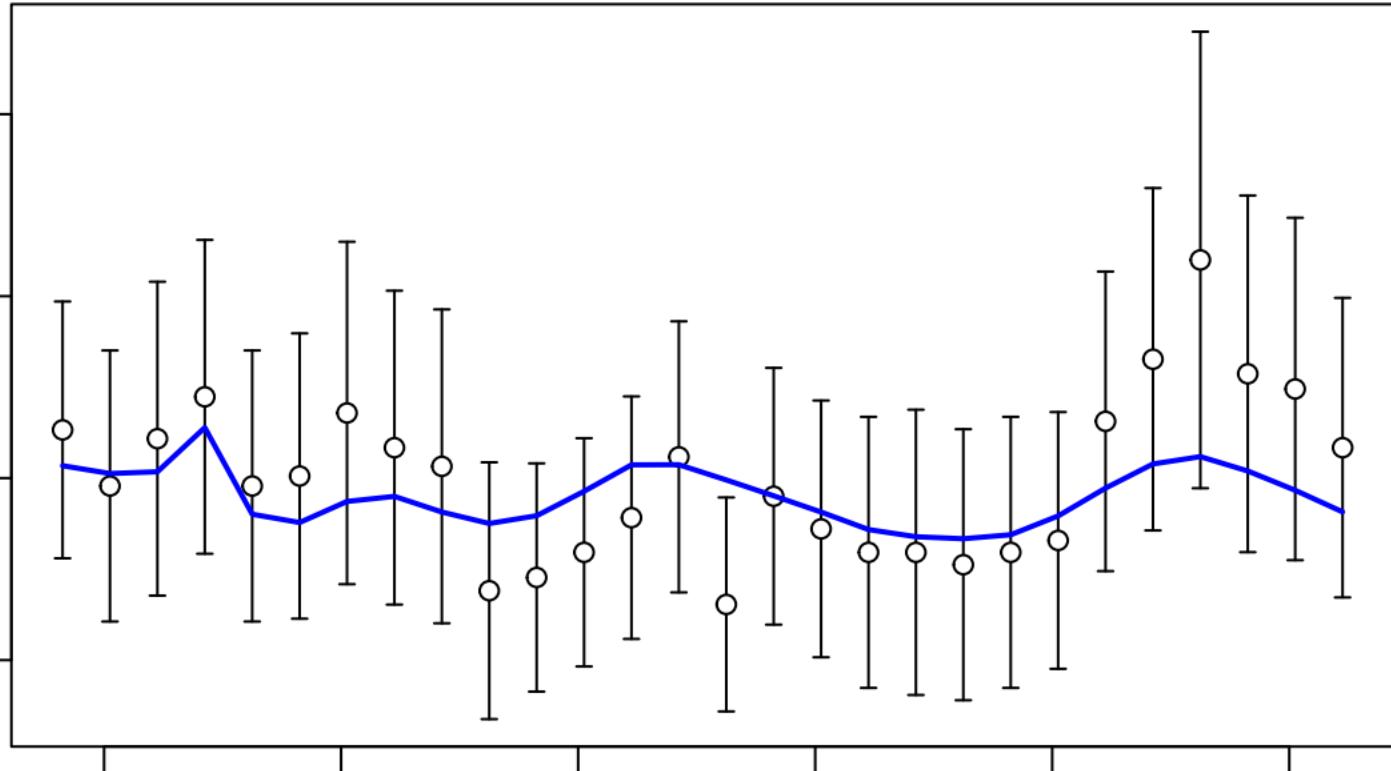


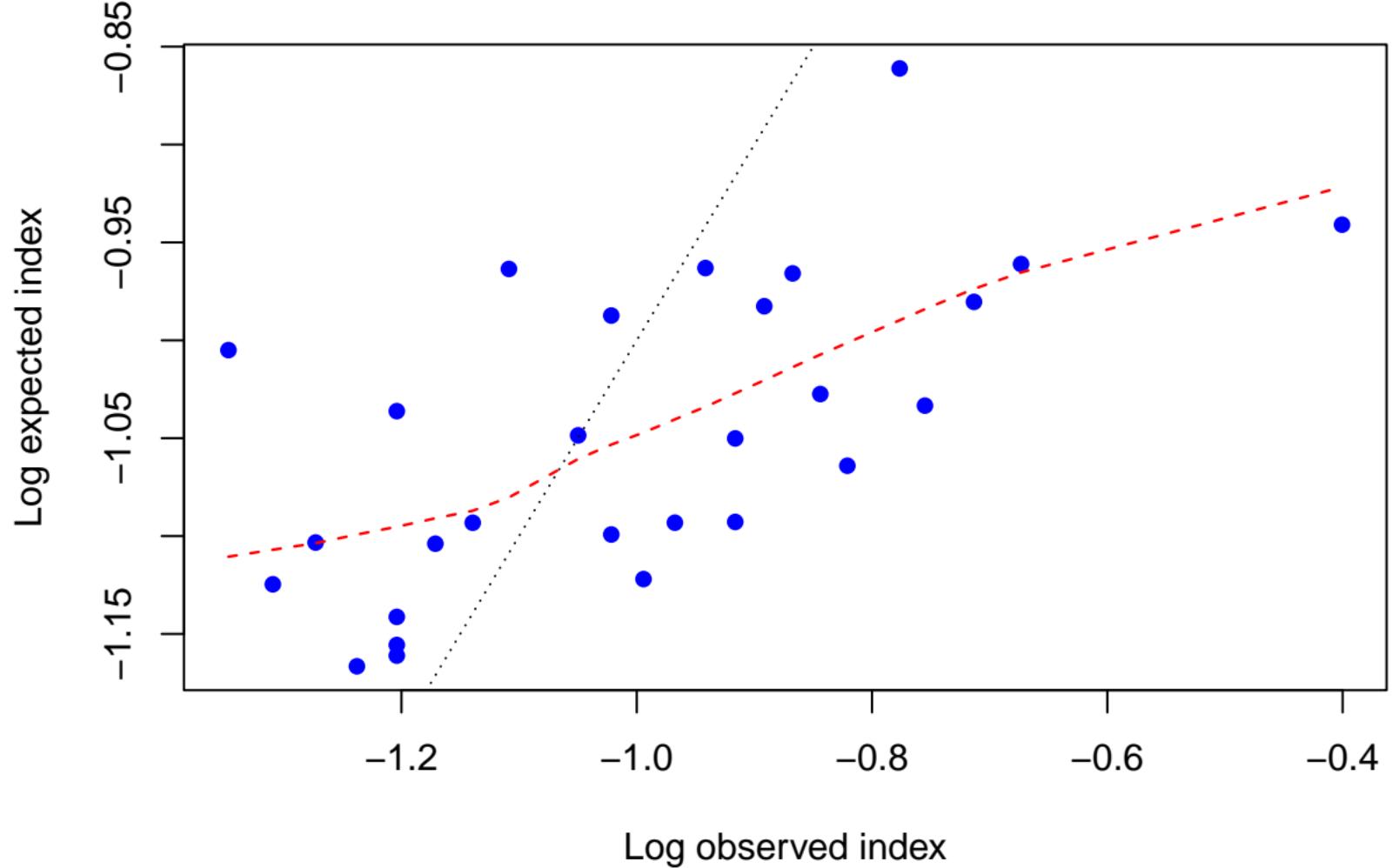
Log index

-1.5 -1.0 -0.5 0.0

1995 2000 2005 2010 2015 2020

Year





Residual

2

1

0

-1

-2

1995

2000

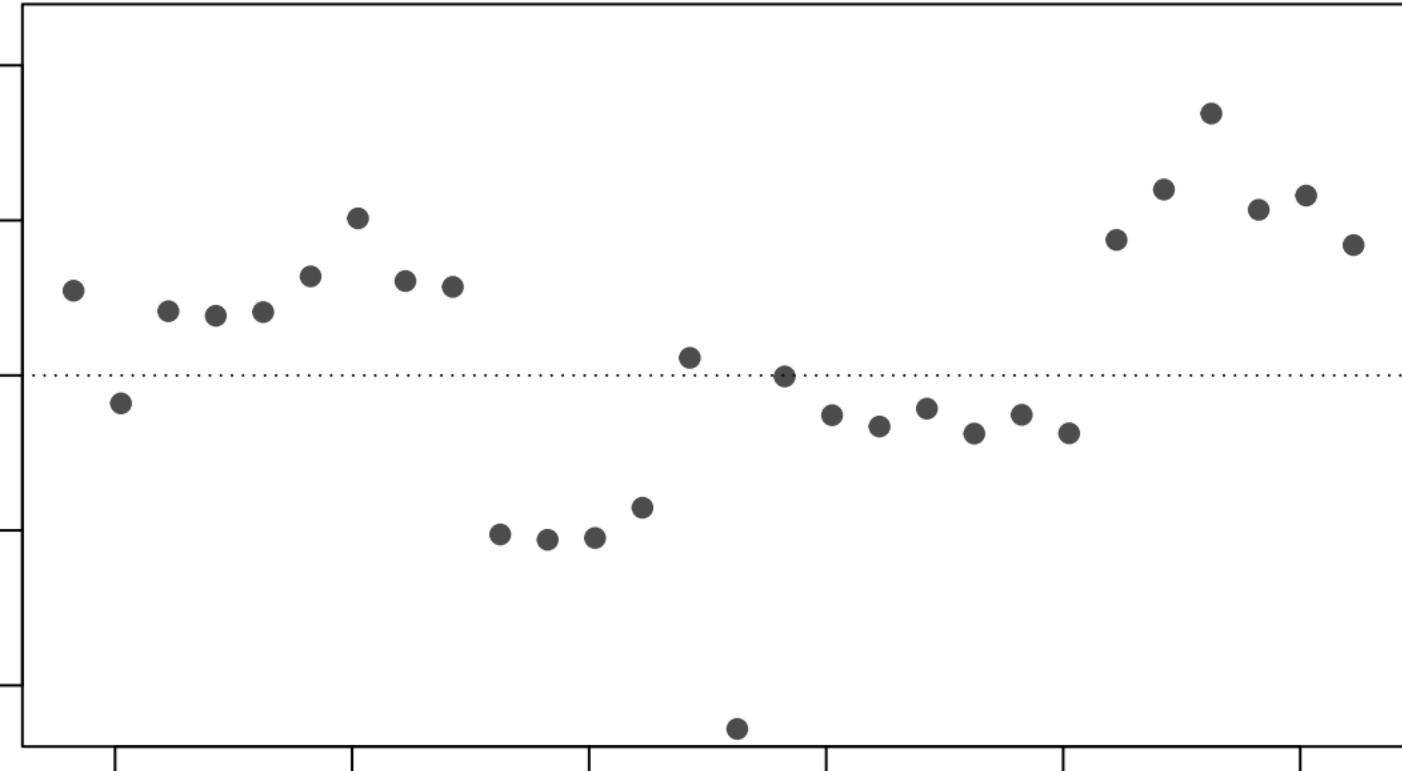
2005

2010

2015

2020

Year

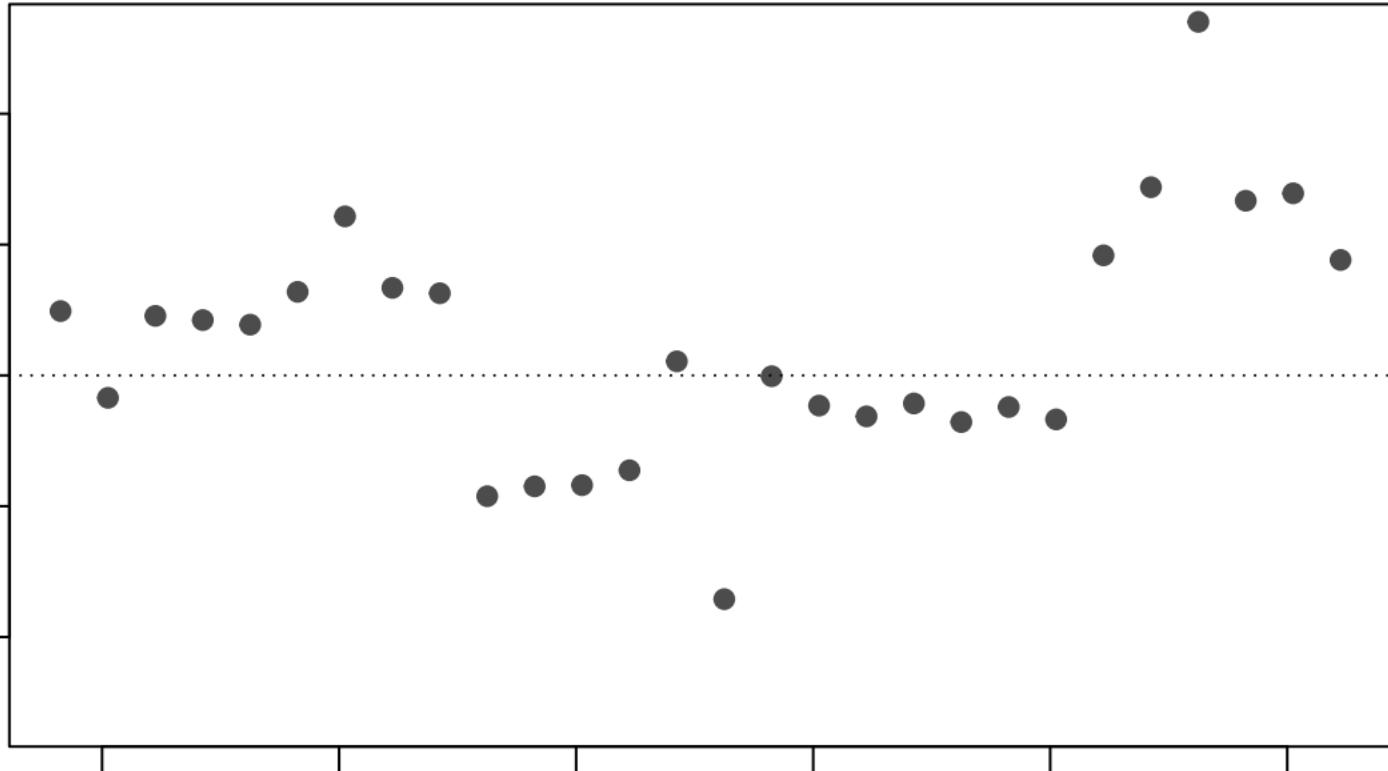


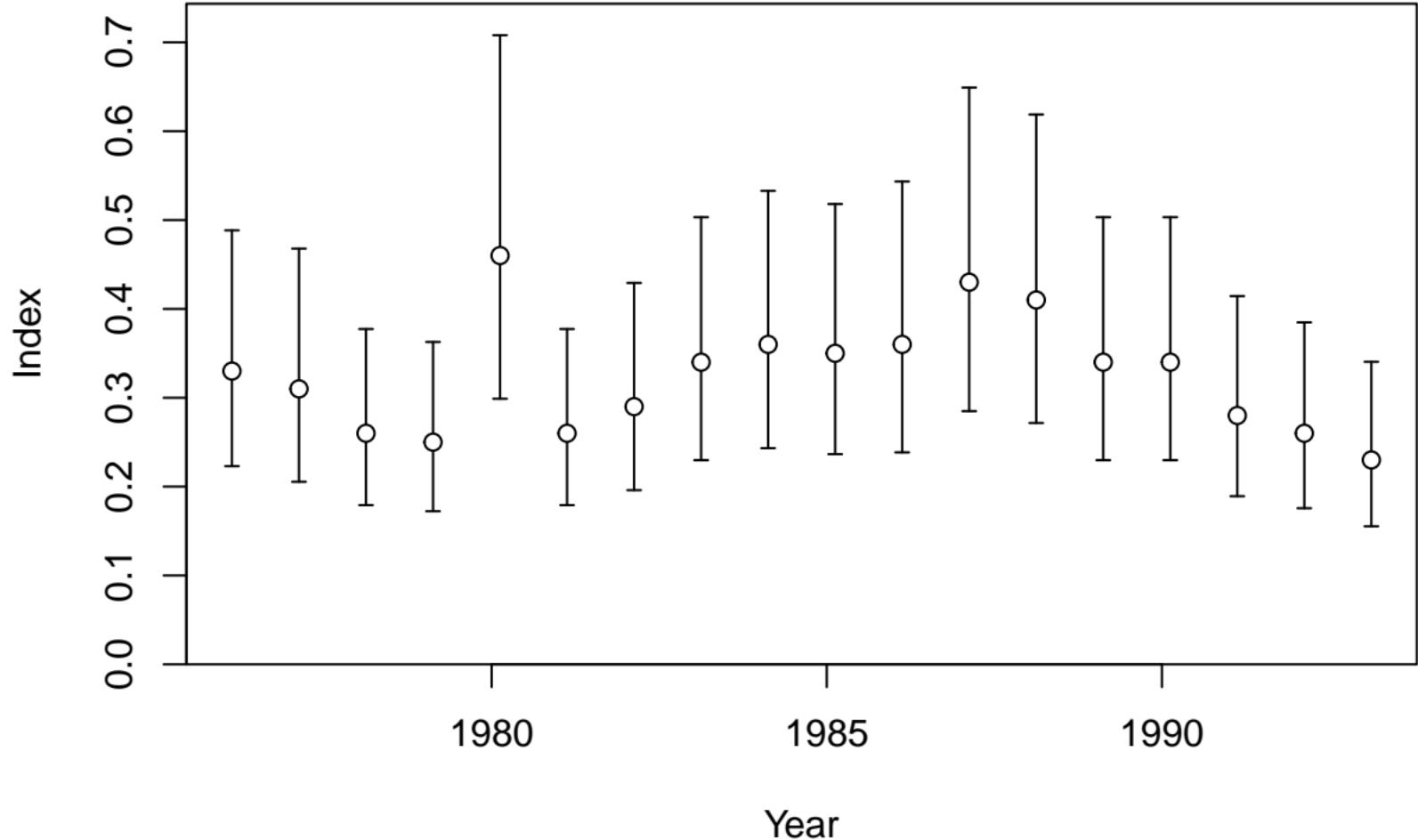
Deviation

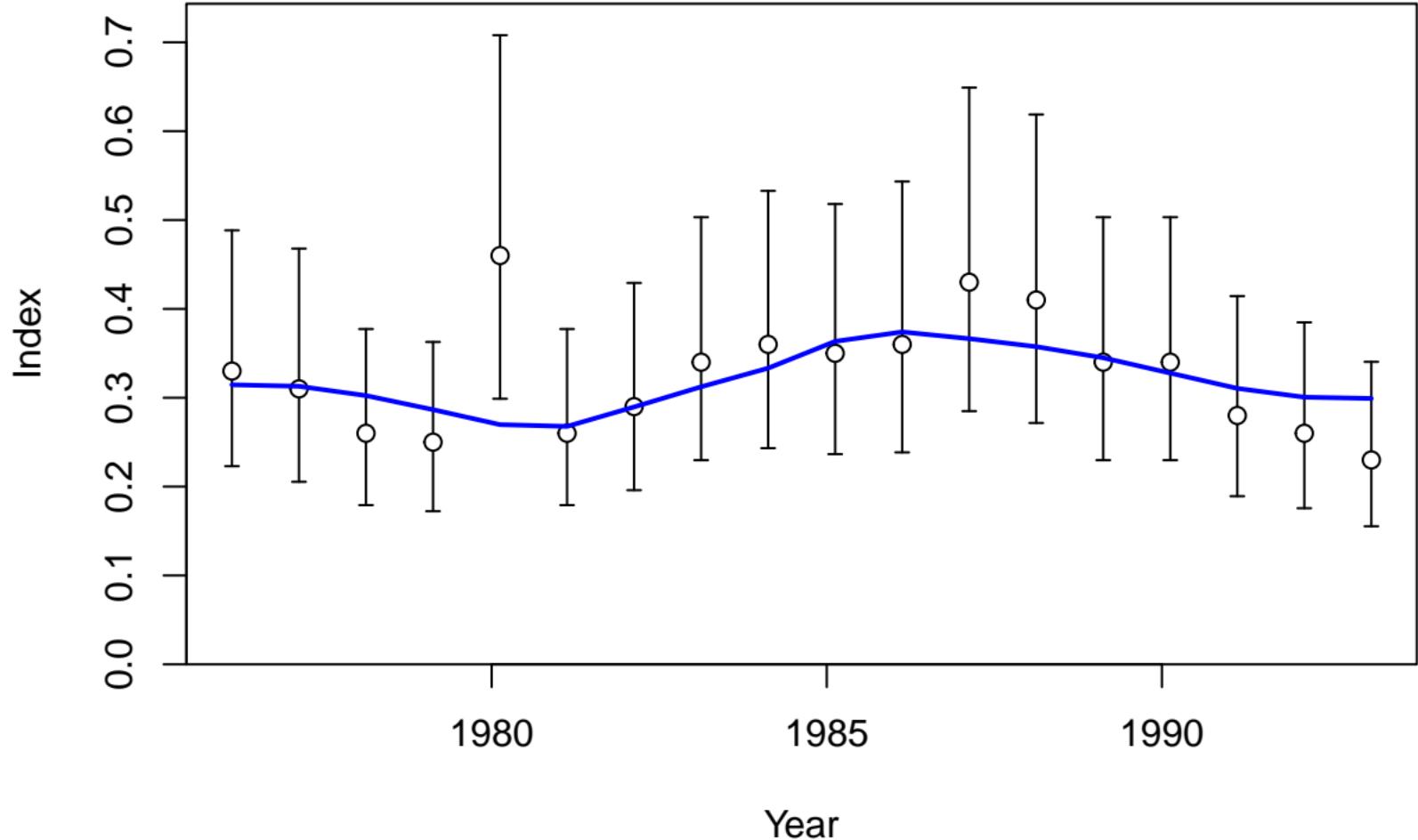
-0.4 -0.2 0.0 0.2 0.4

1995 2000 2005 2010 2015 2020

Year





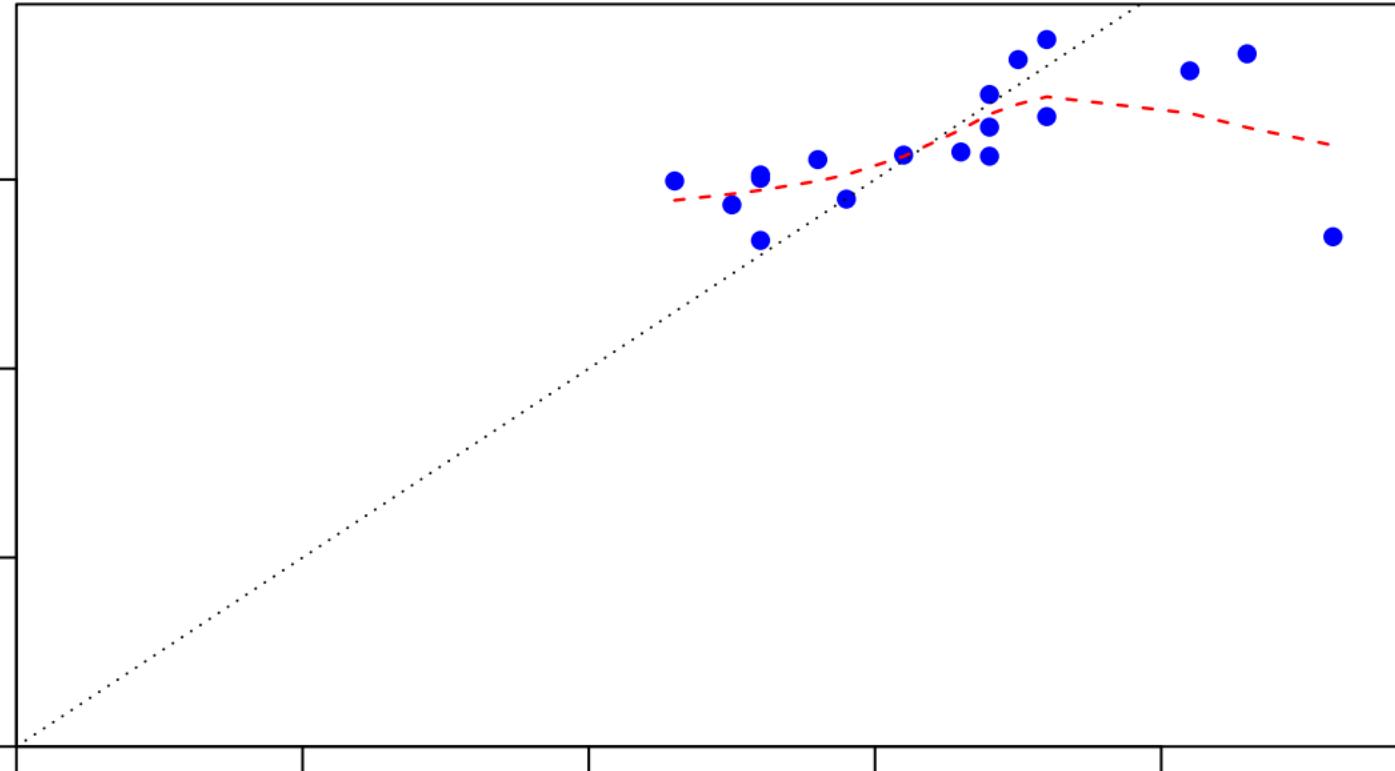


Expected index

0.0
0.1
0.2
0.3

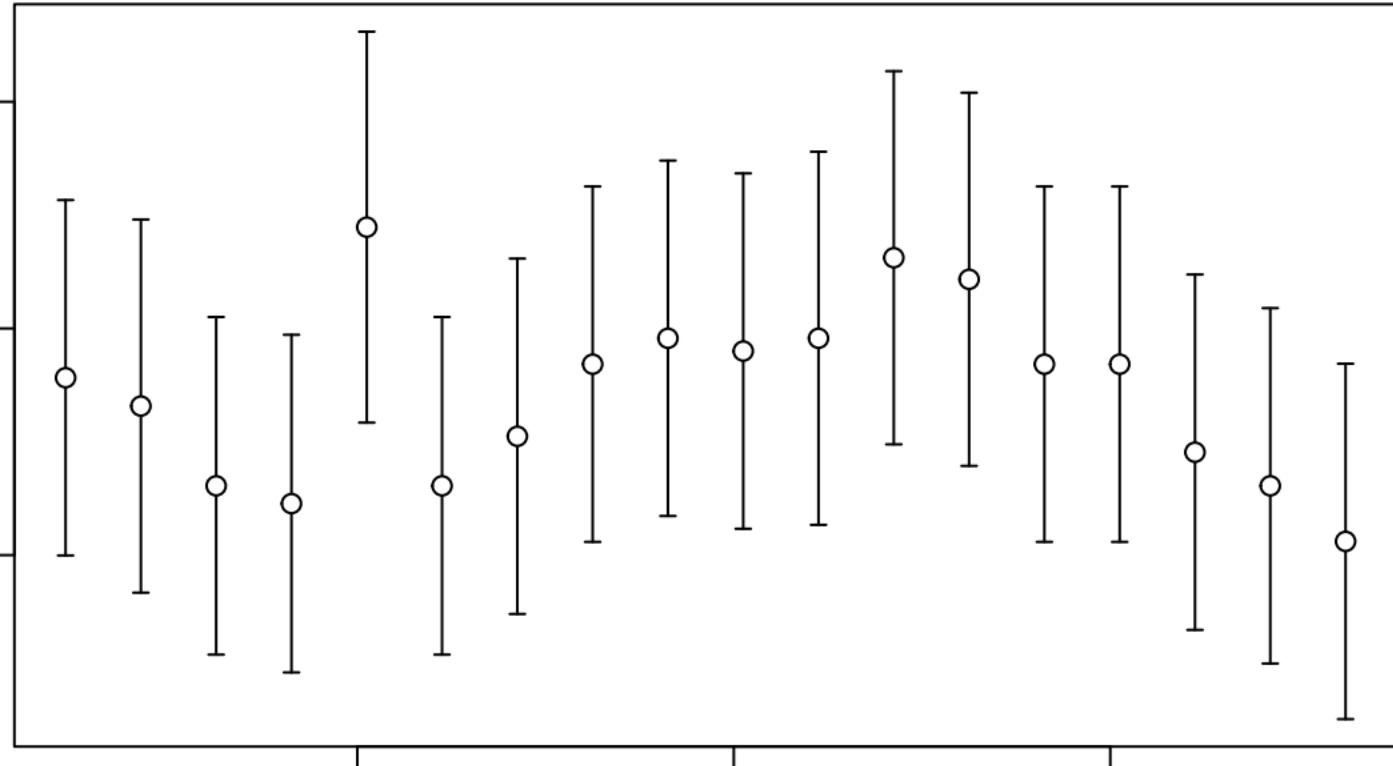
0.0 0.1 0.2 0.3 0.4

Observed index



Log index

-0.5
-1.0
-1.5



Year

Log index

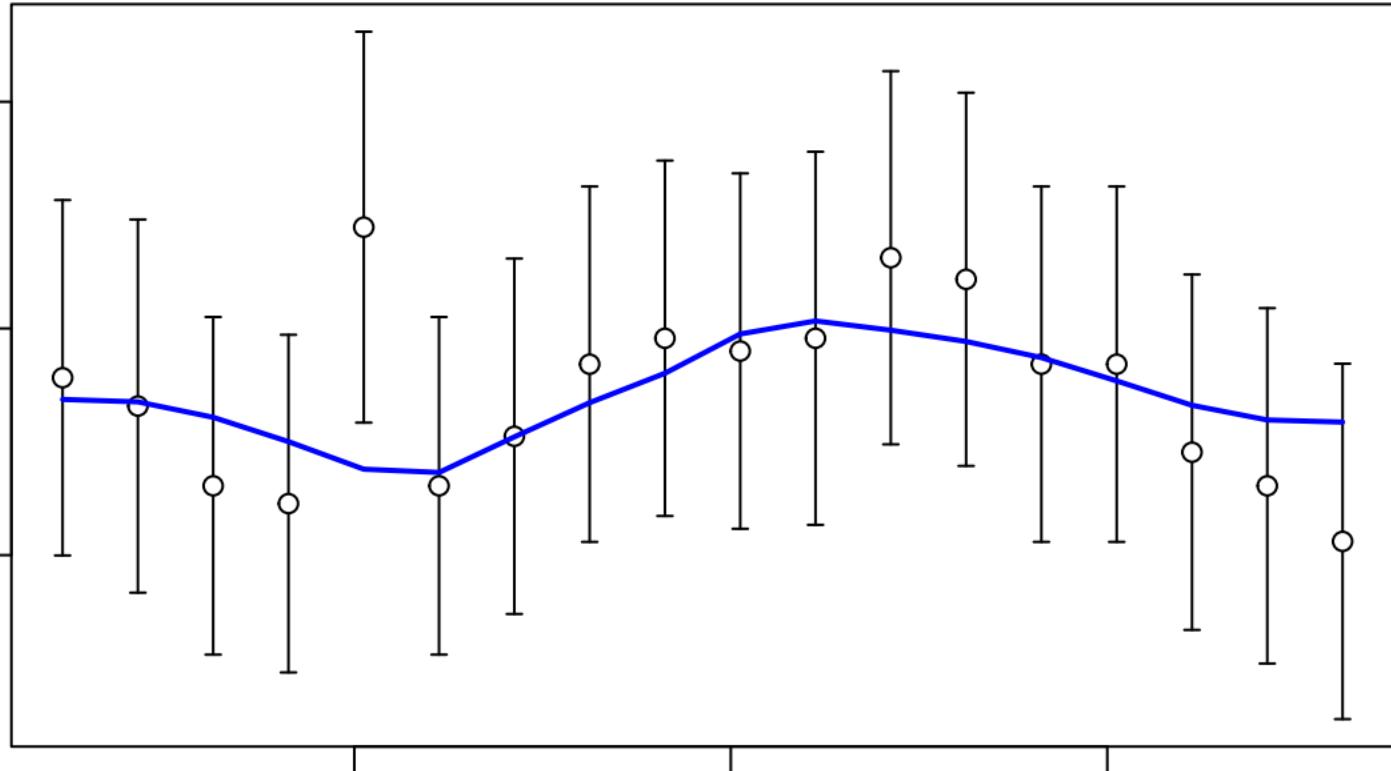
-0.5
-1.0
-1.5

1980

Year

1985

1990

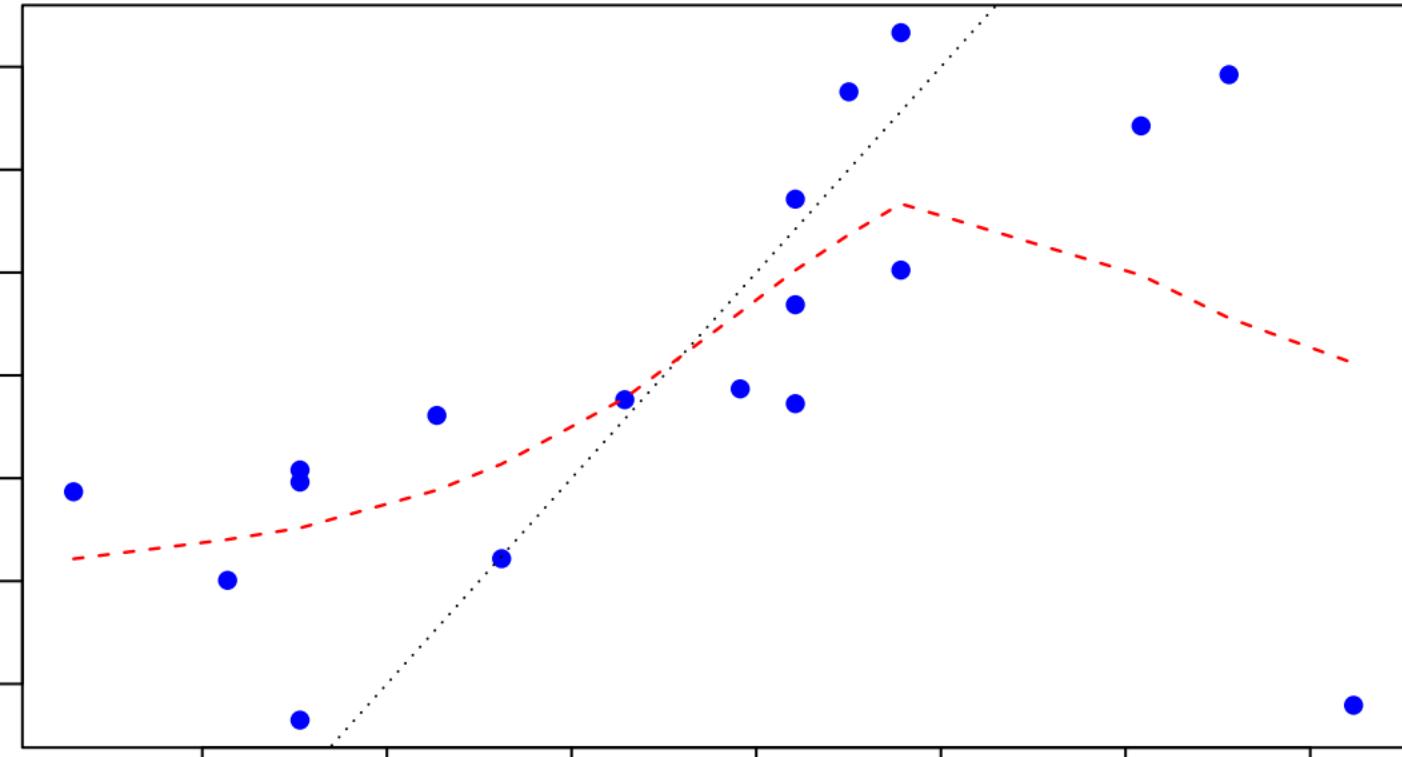


Log expected index

-1.30 -1.20 -1.10 -1.00

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

Log observed index



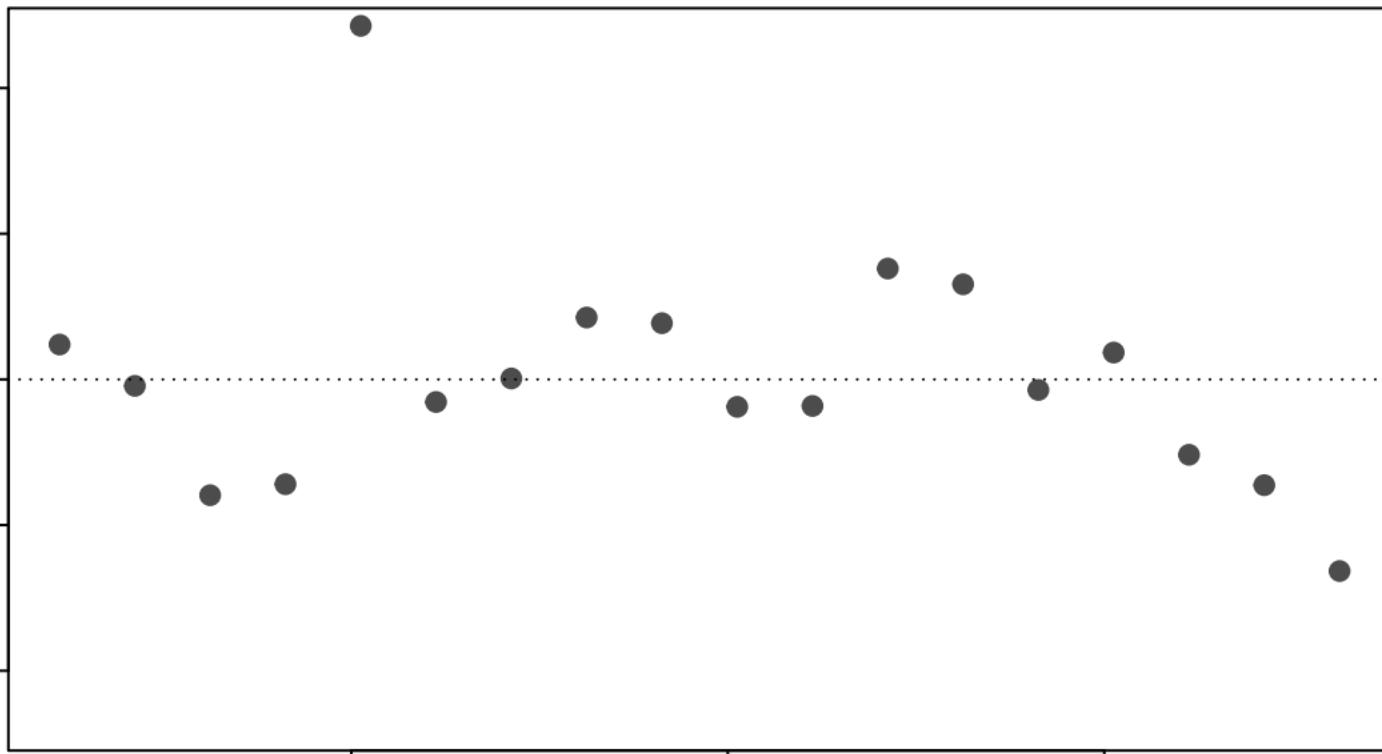
Residual

2
1
0
-1
-2

1980

Year

1985 1990



Deviation

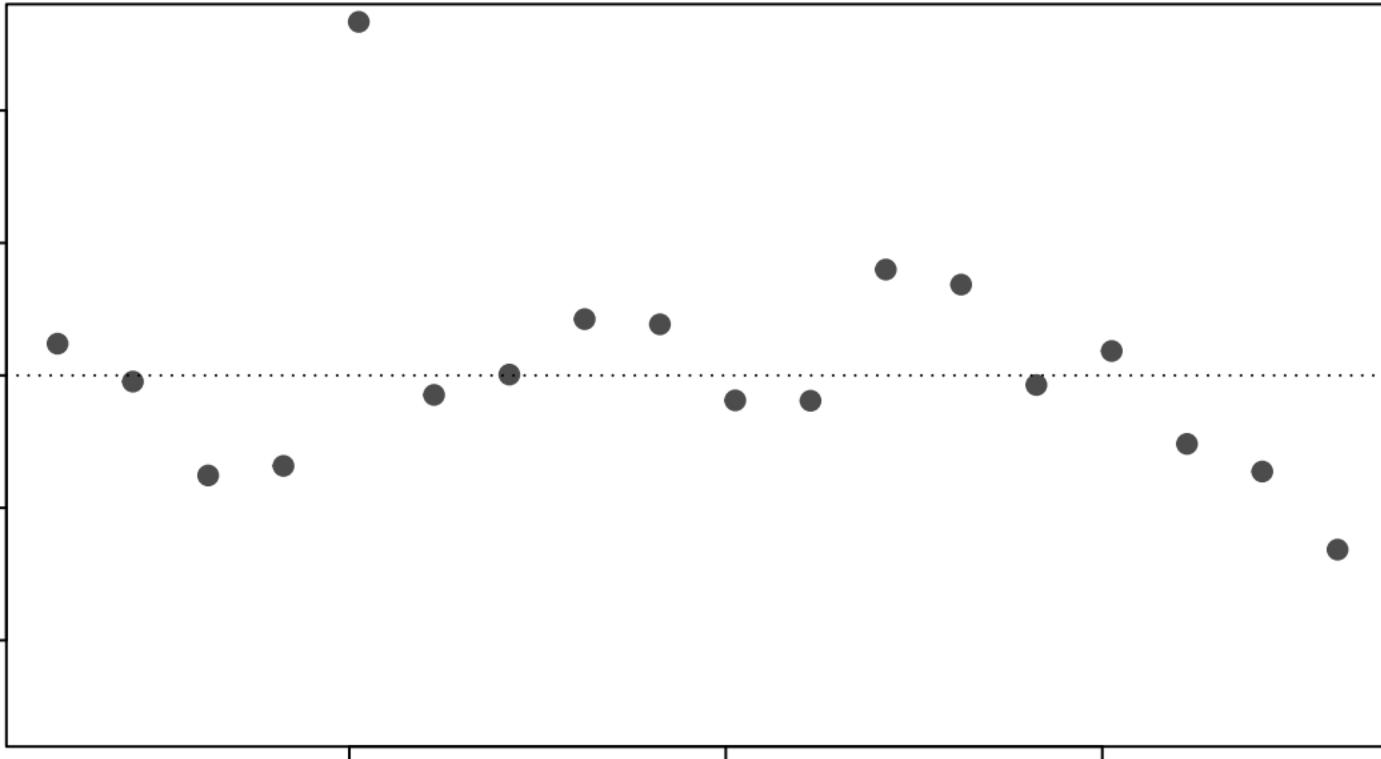
-0.4
-0.2
0.0
0.2
0.4

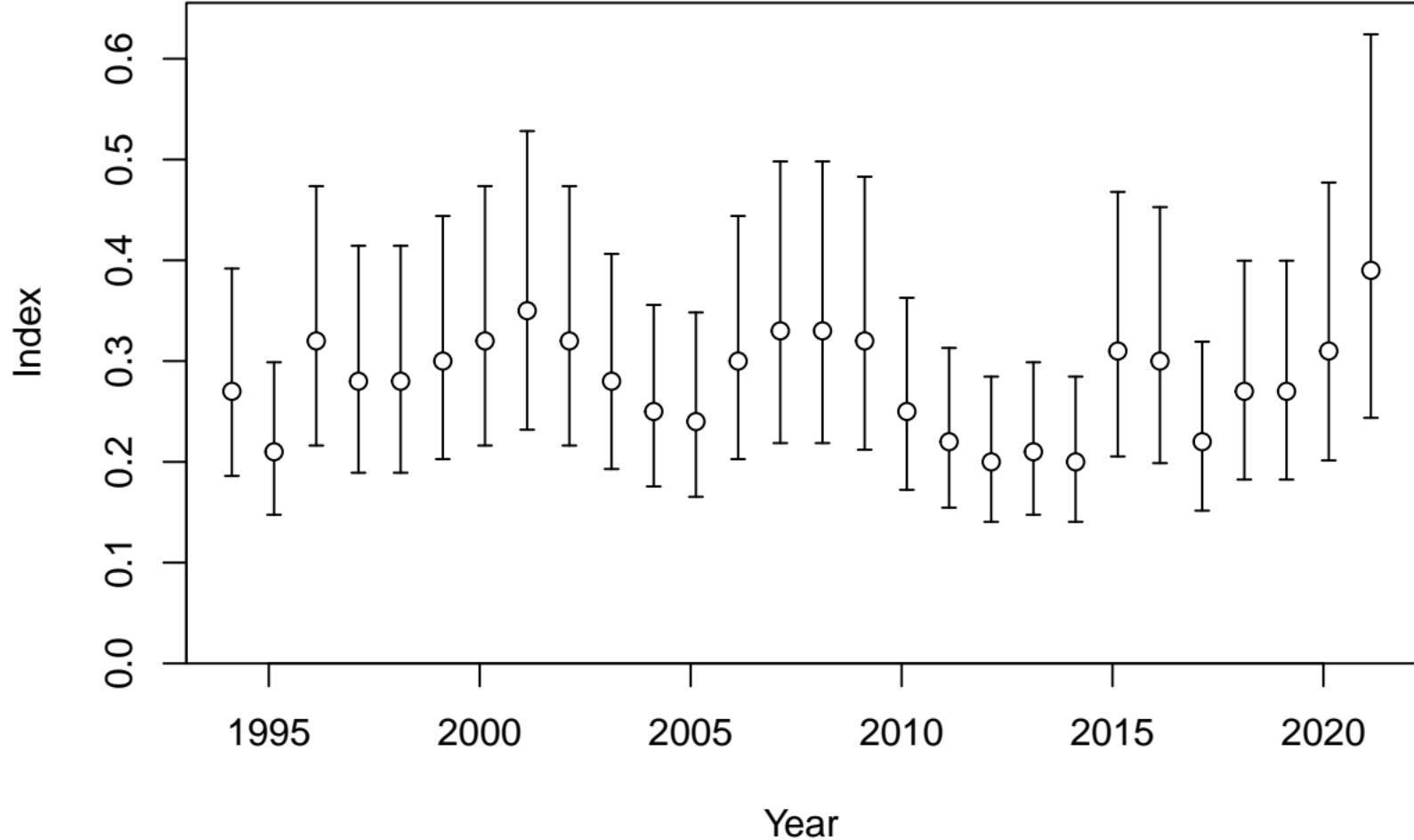
1980

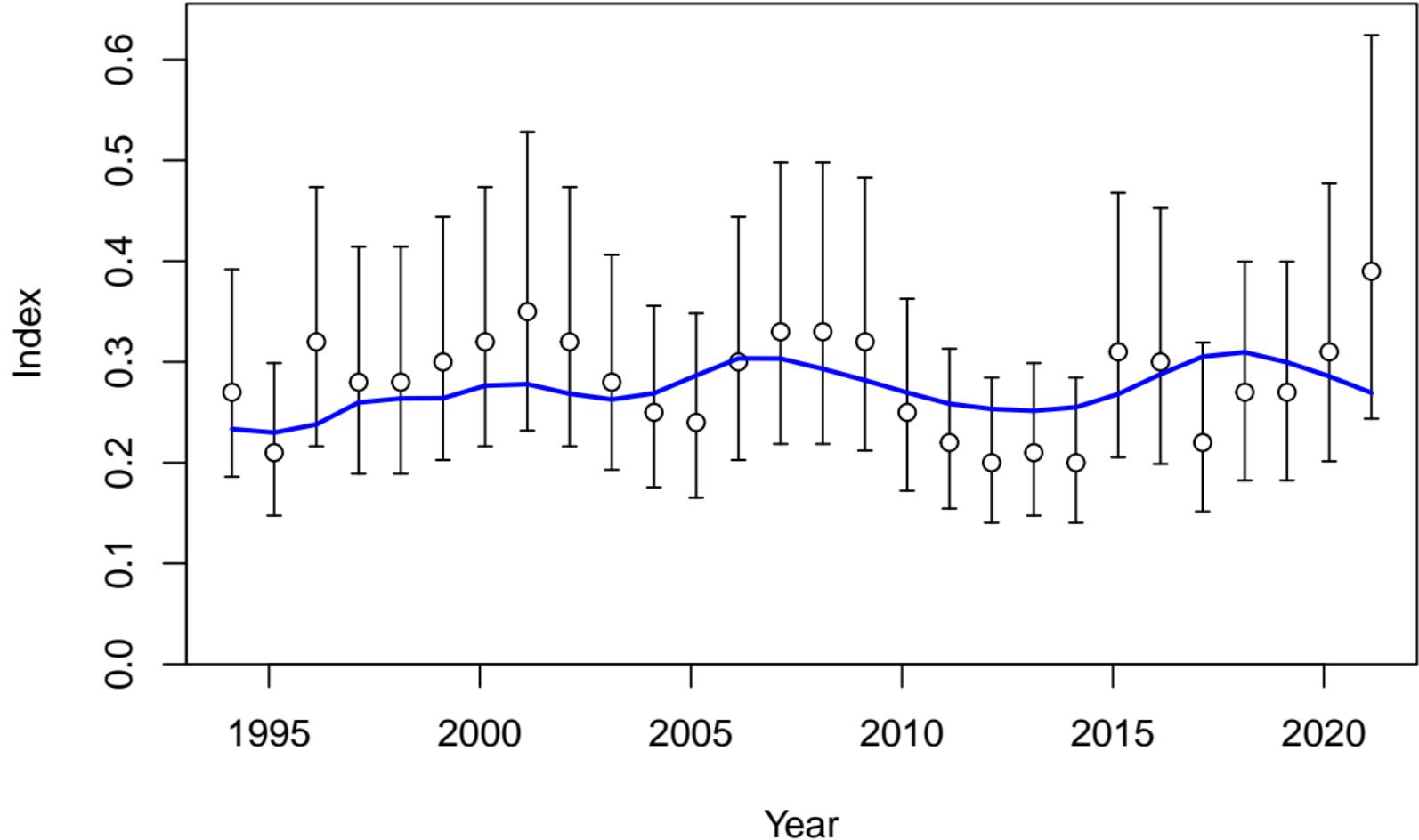
Year

1985

1990







Expected index

0.30

0.20

0.10

0.00

0.0

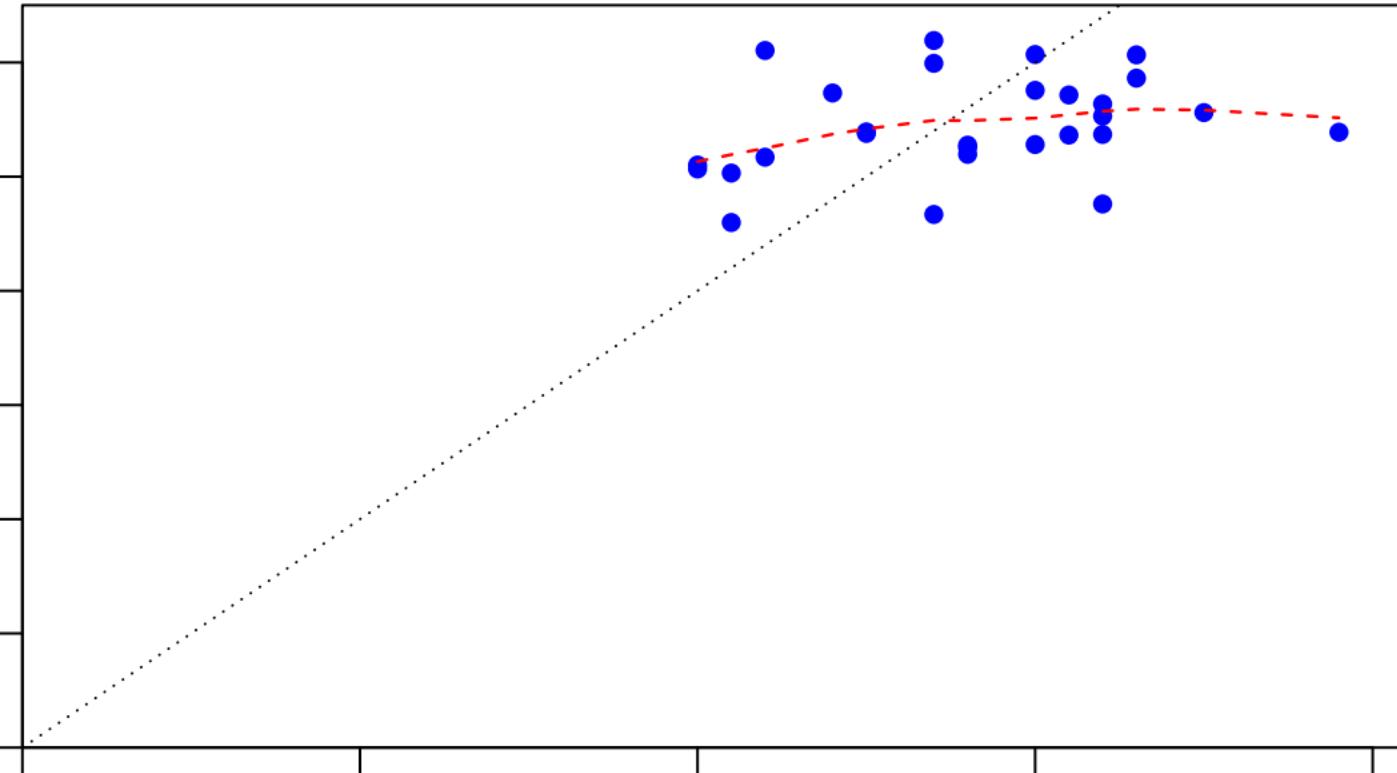
0.1

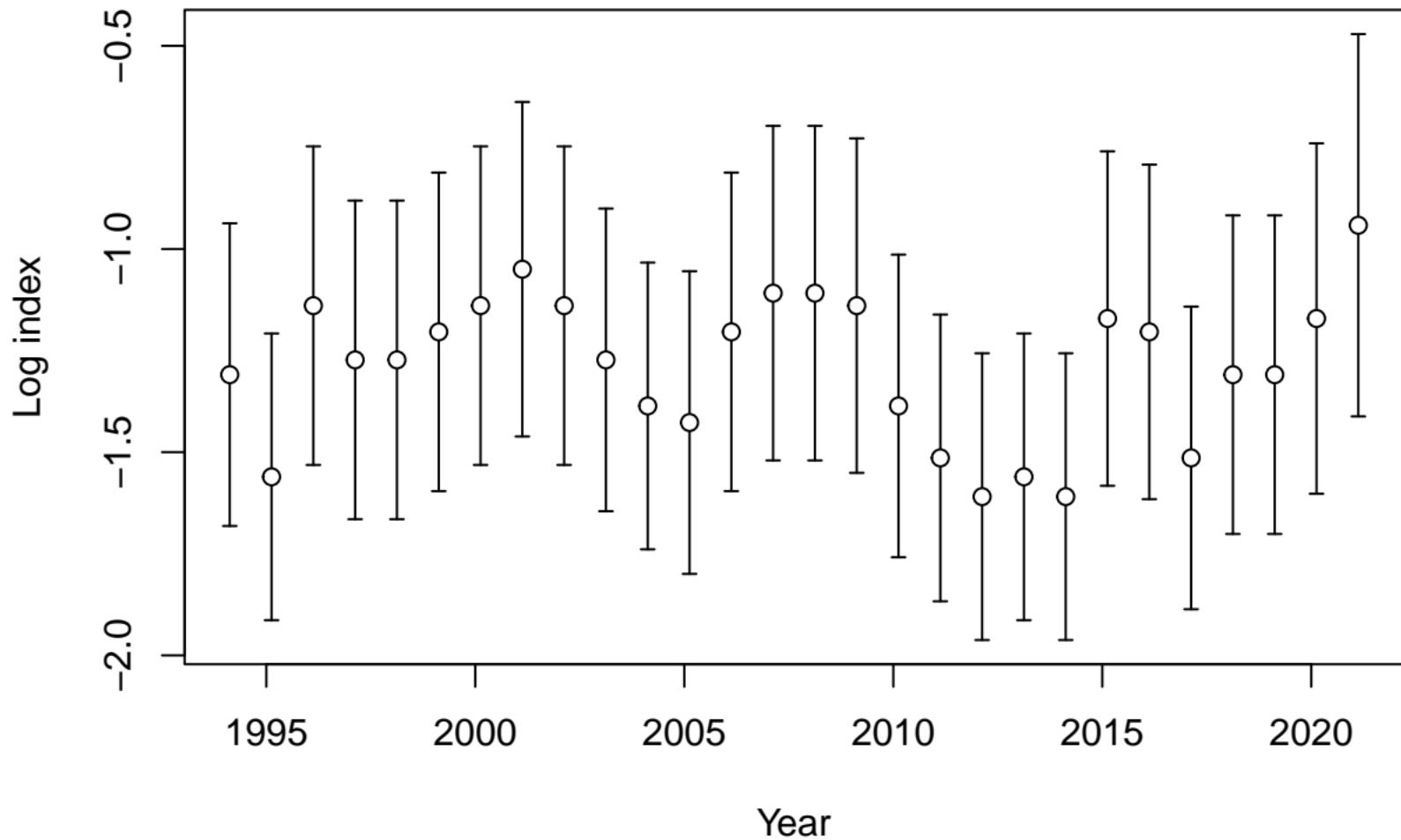
0.2

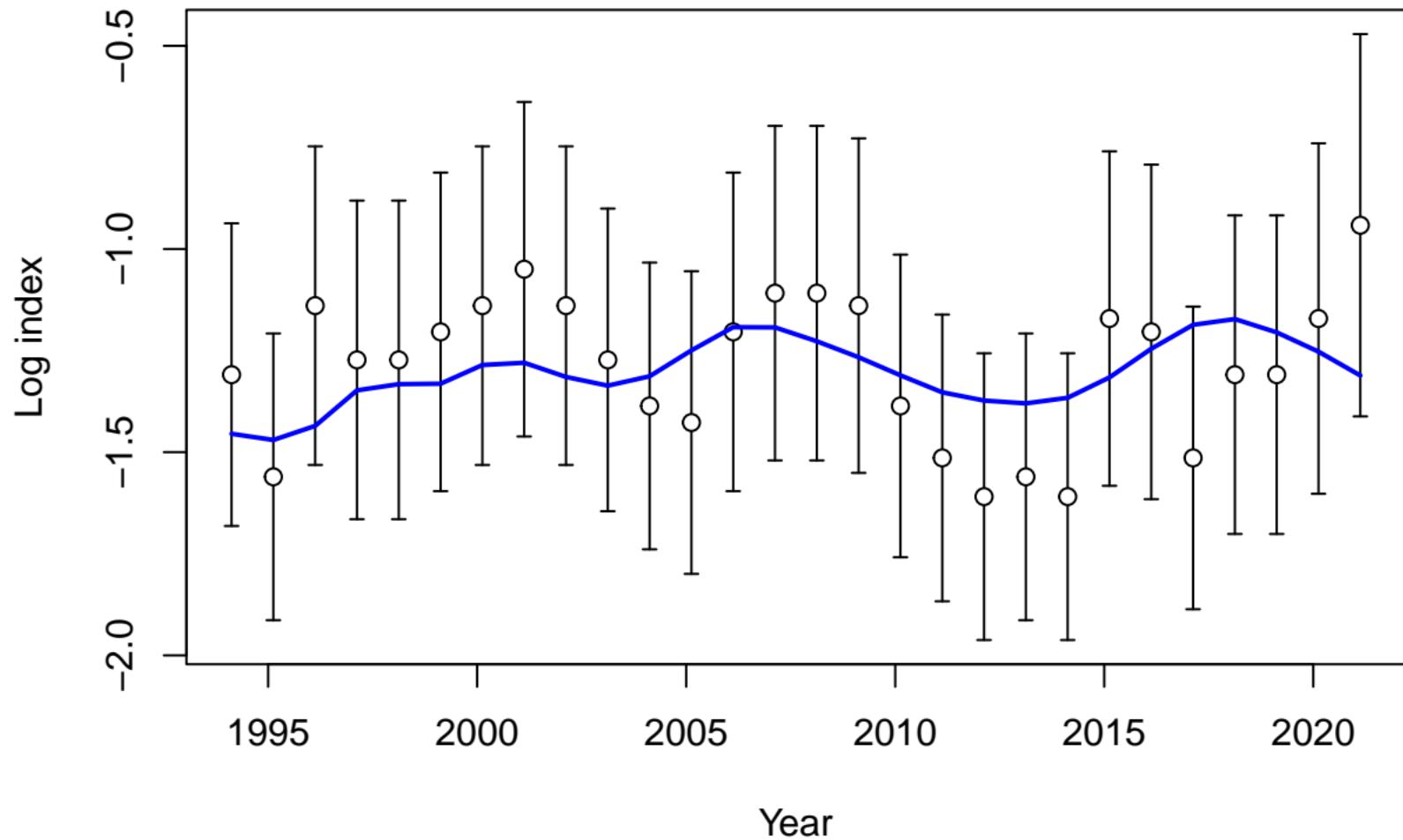
0.3

0.4

Observed index





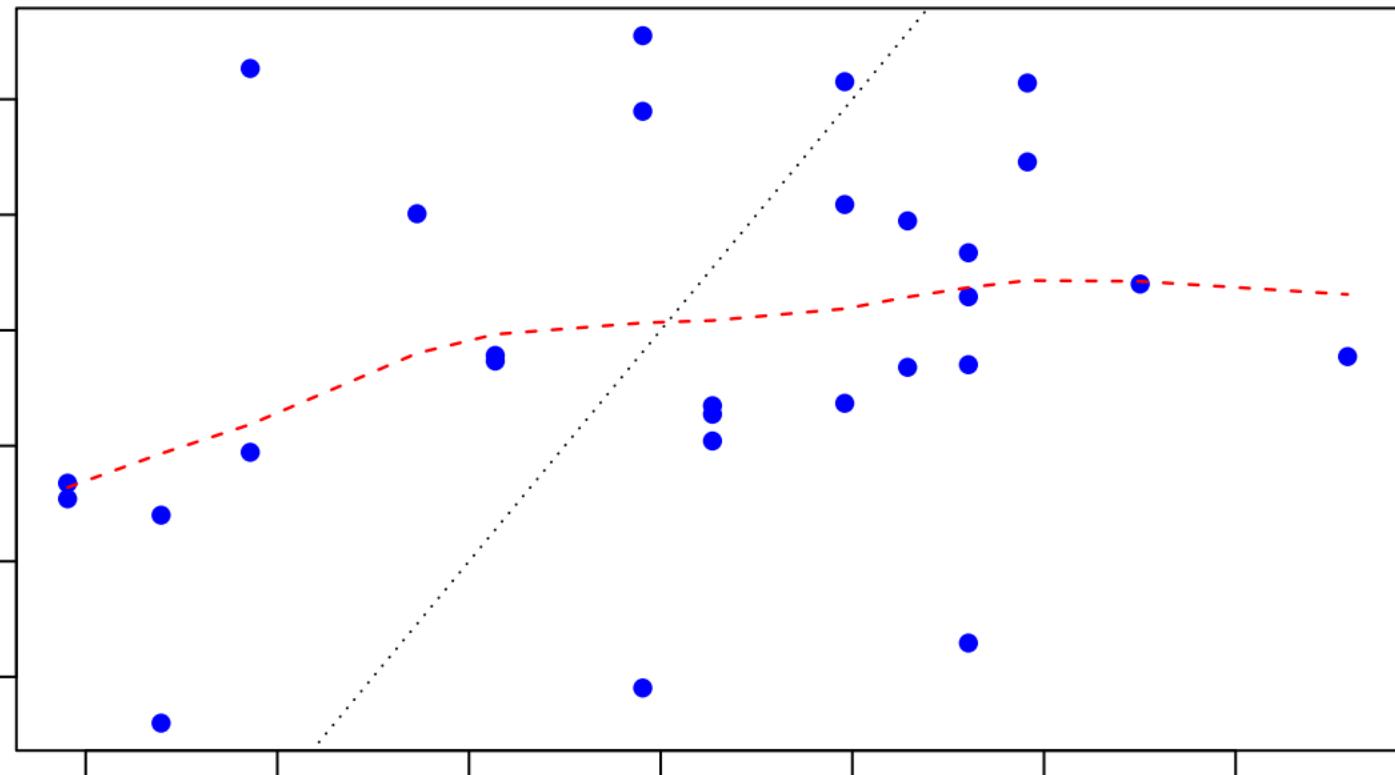


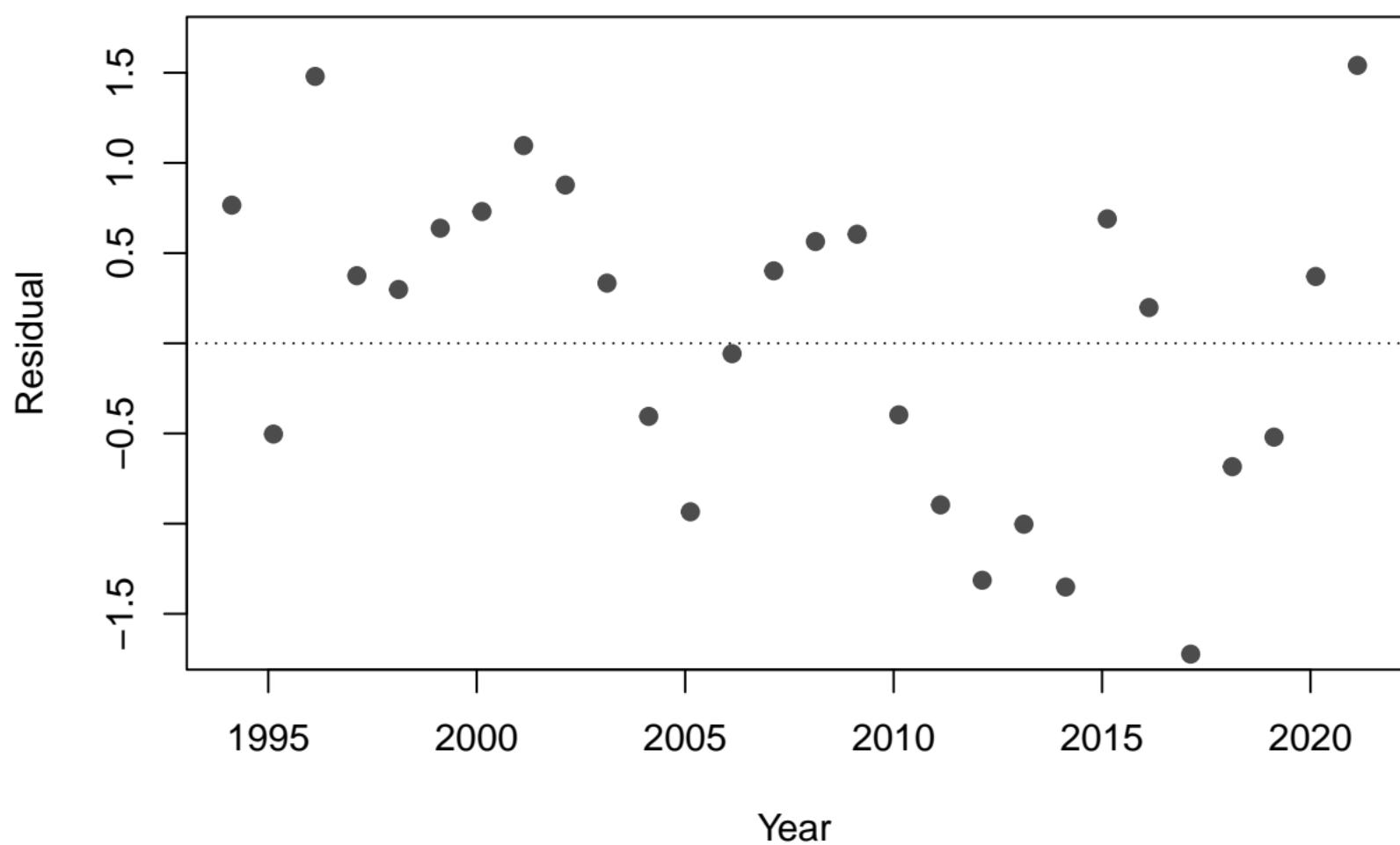
Log expected index

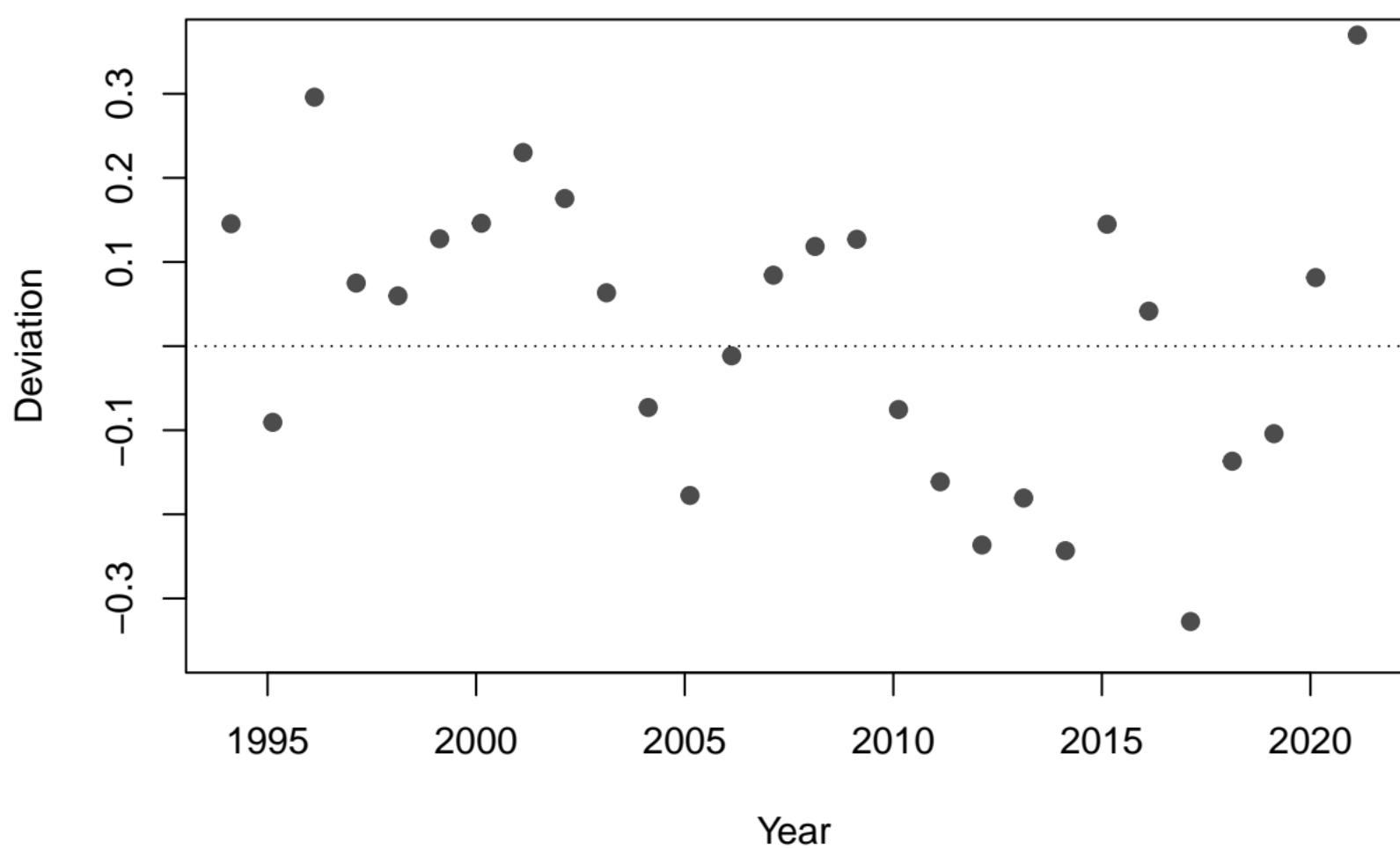
-1.25
-1.35
-1.45

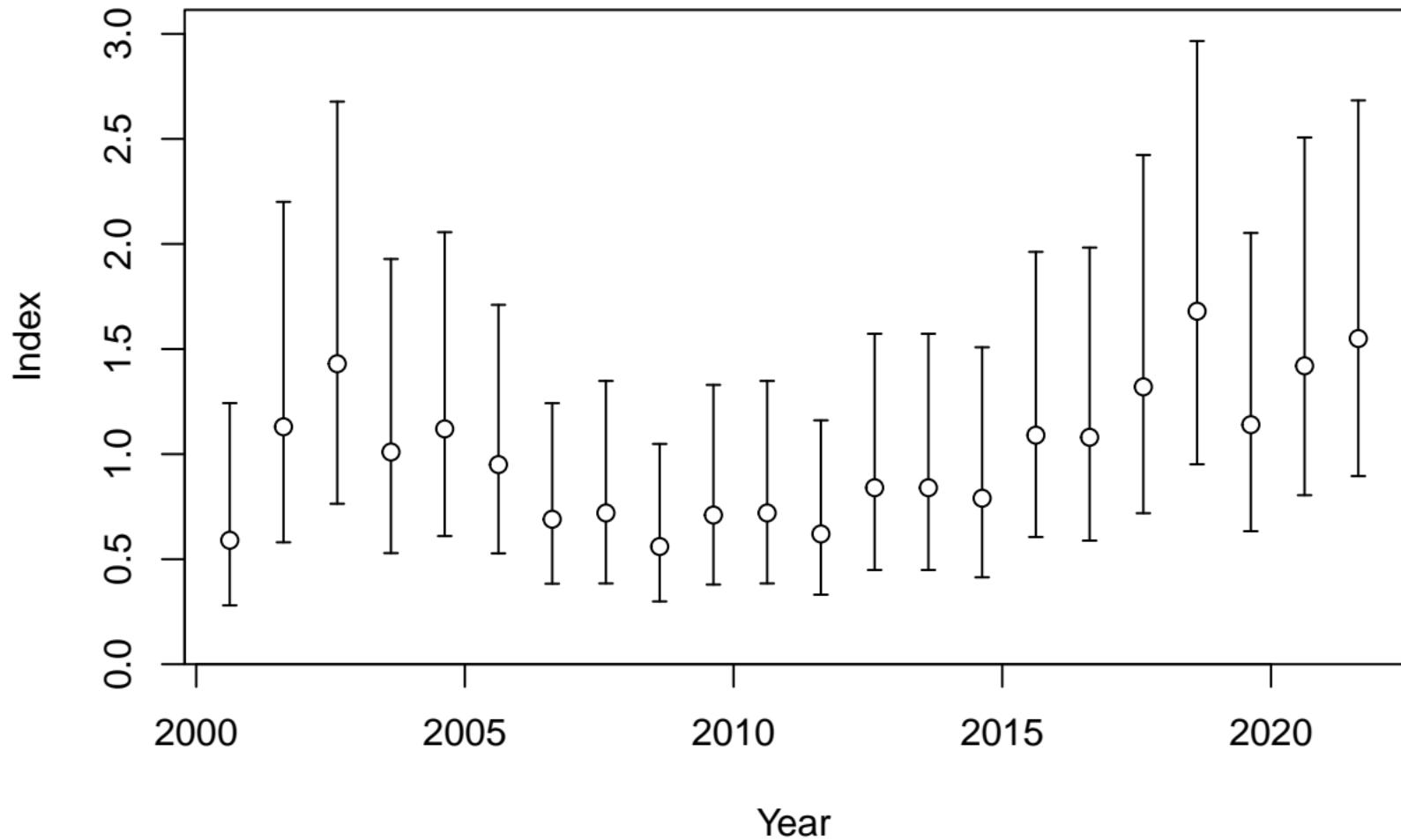
-1.6 -1.5 -1.4 -1.3 -1.2 -1.1 -1.0

Log observed index

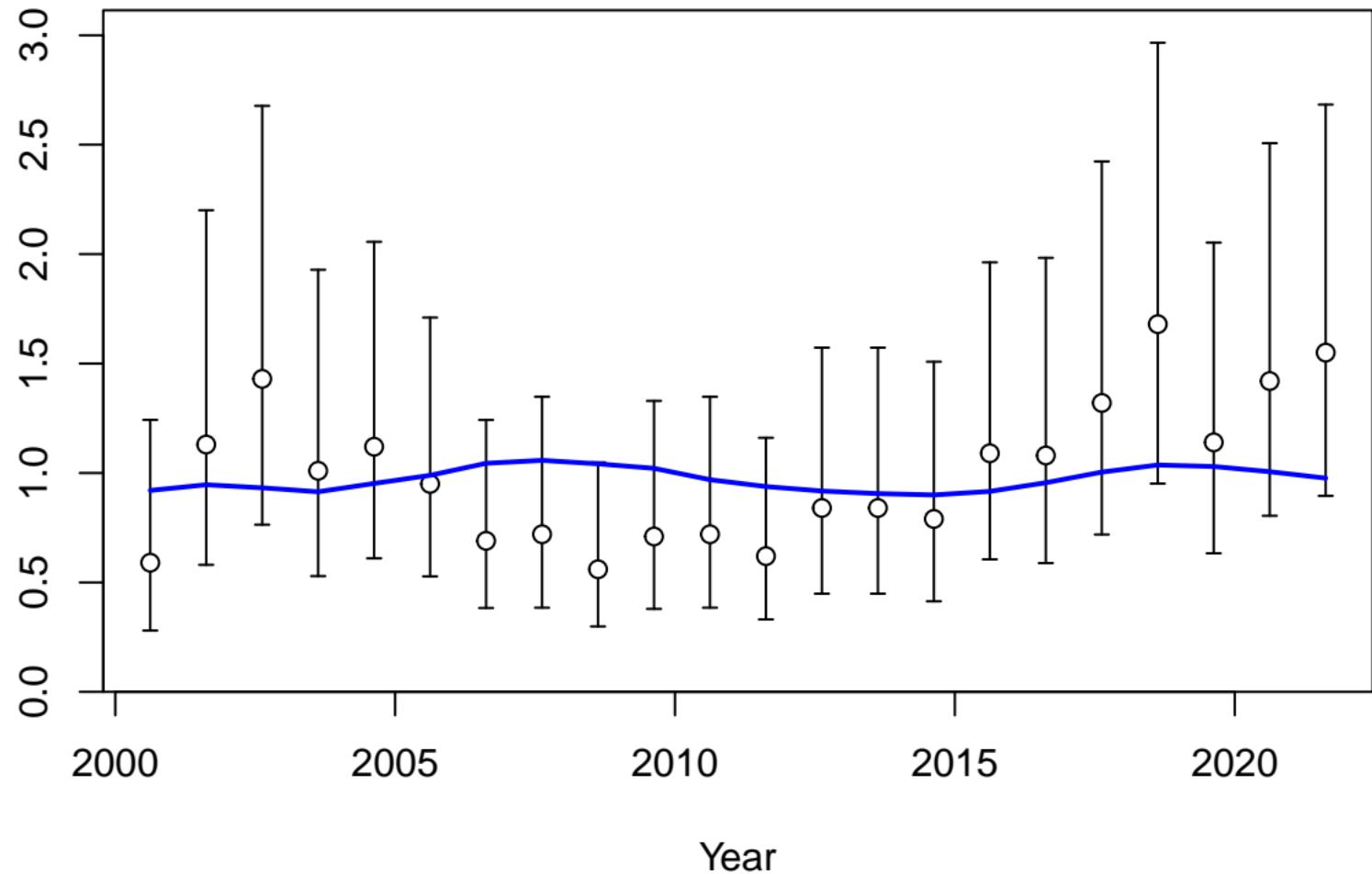








Index



Expected index

1.0
0.8
0.6
0.4
0.2
0.0

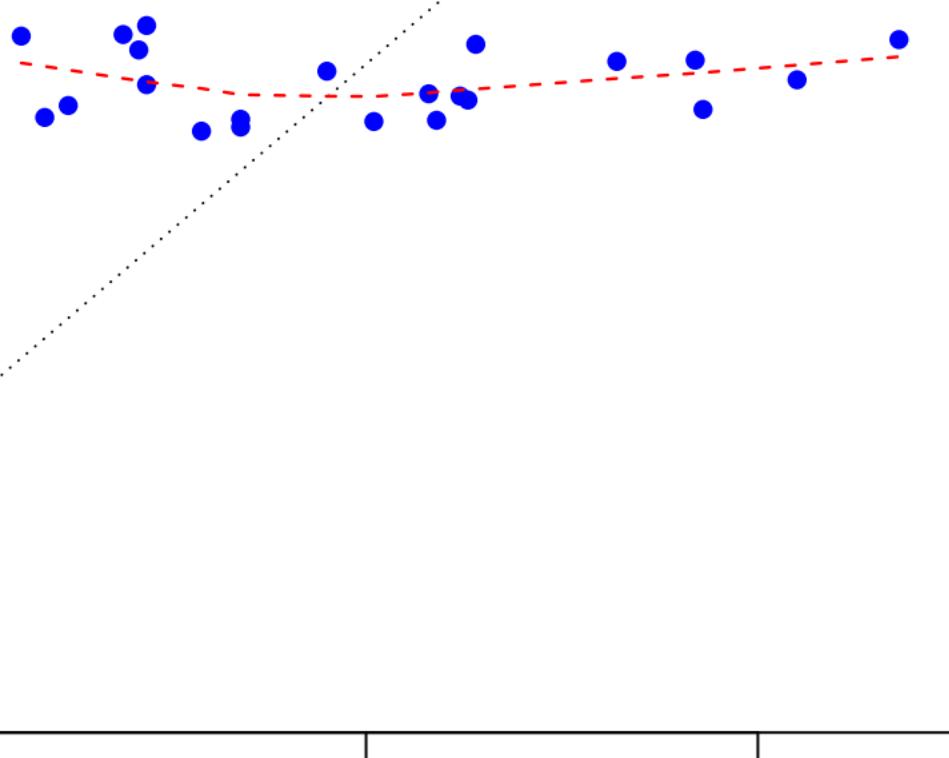
0.0

0.5

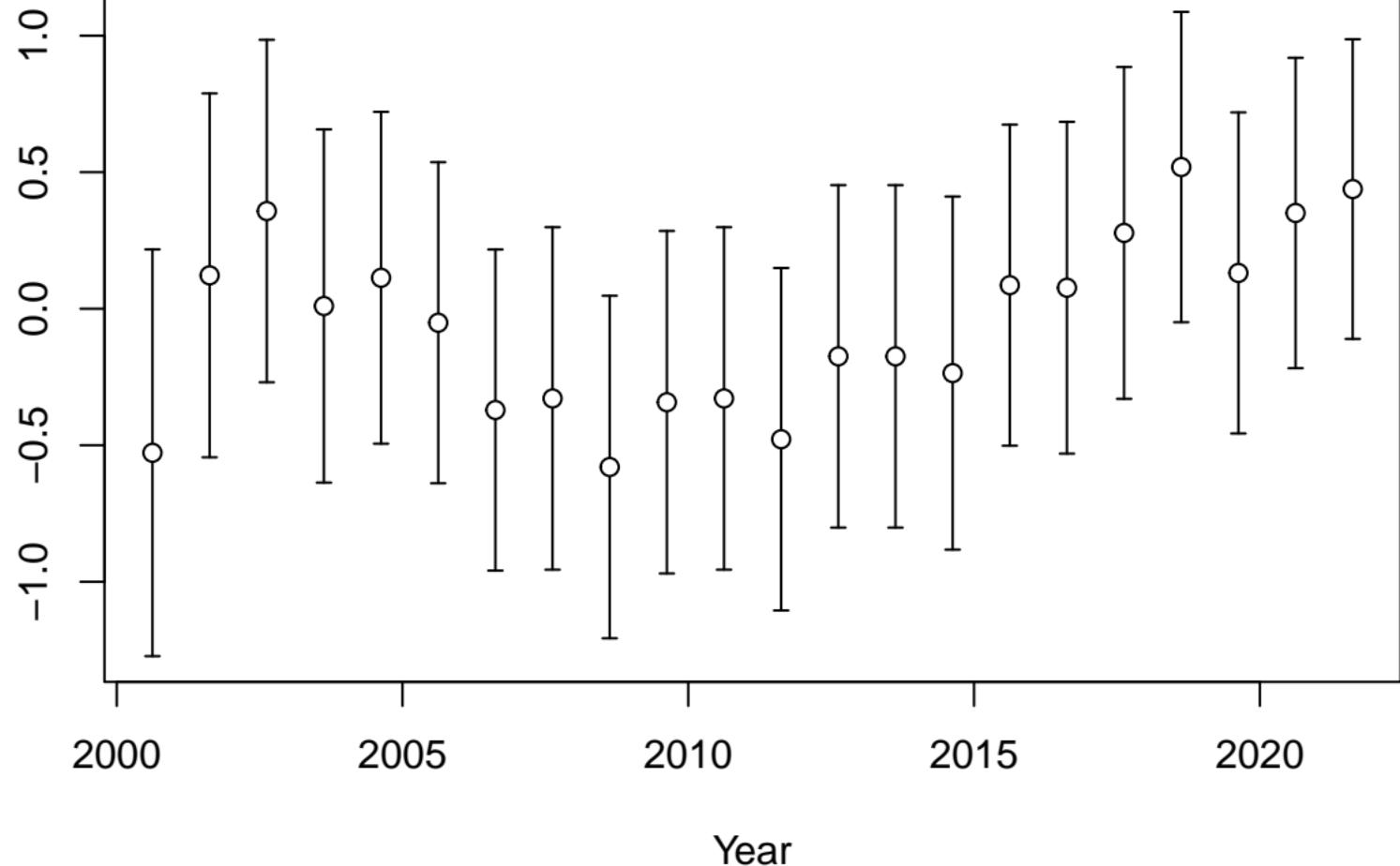
1.0

1.5

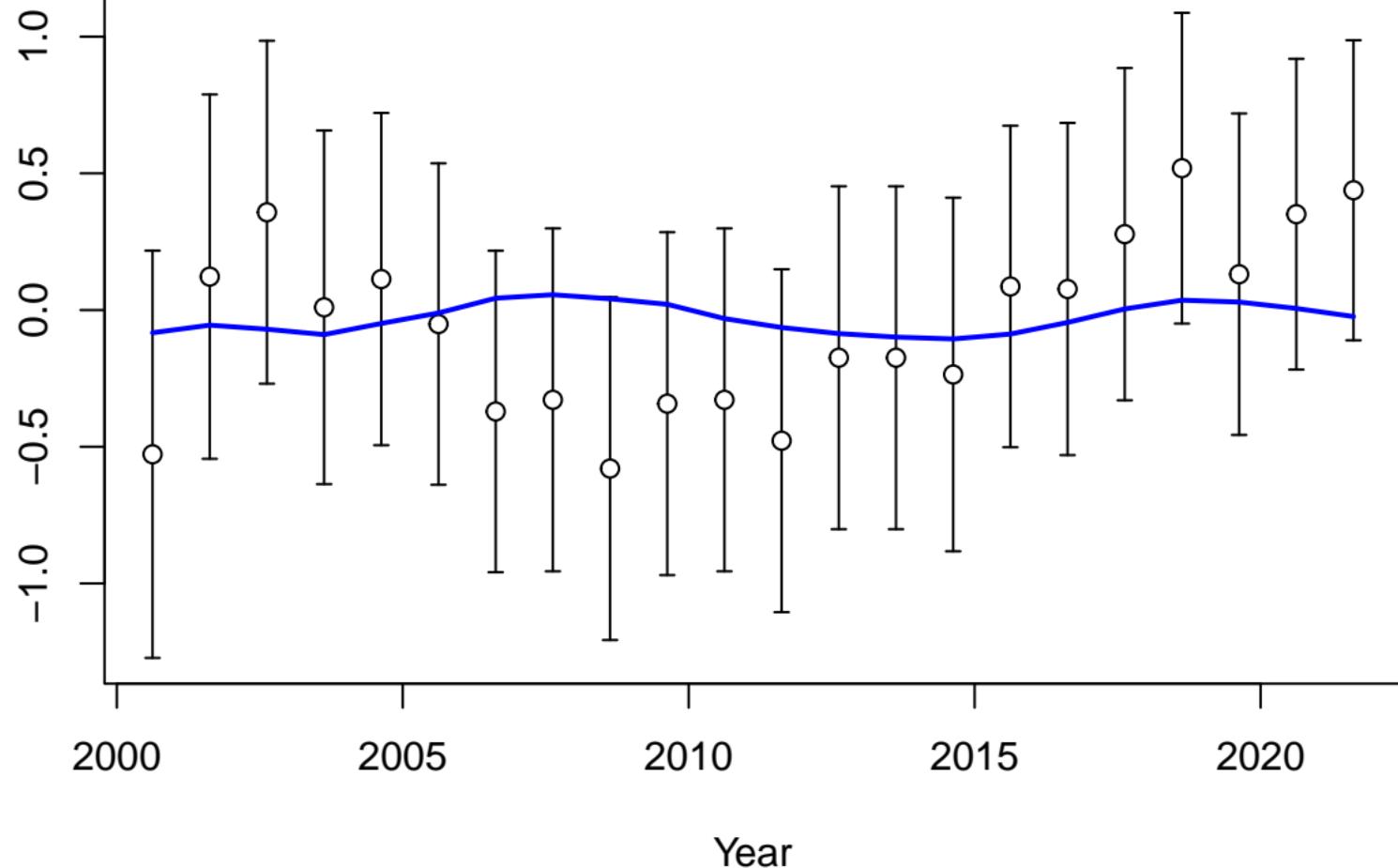
Observed index

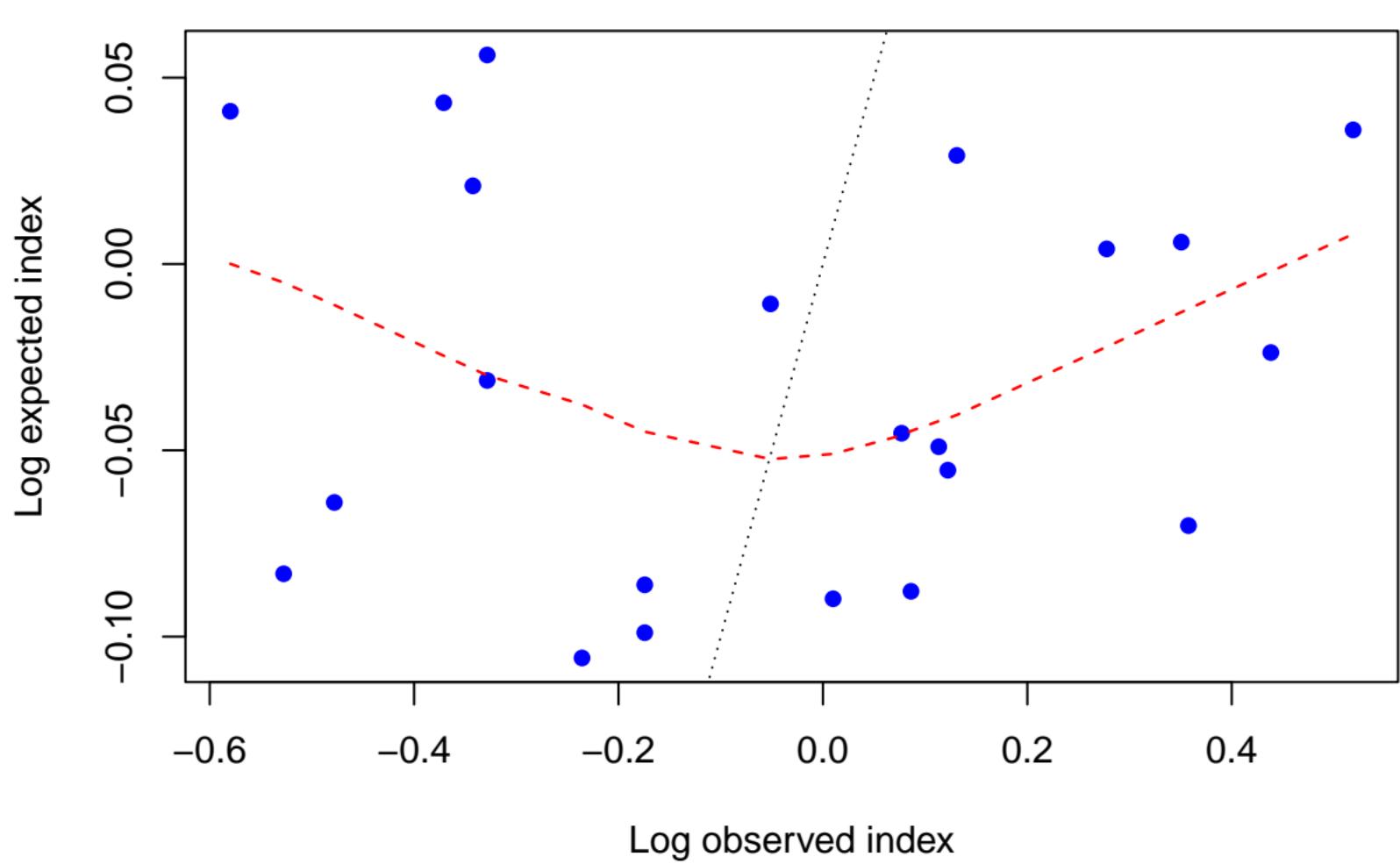


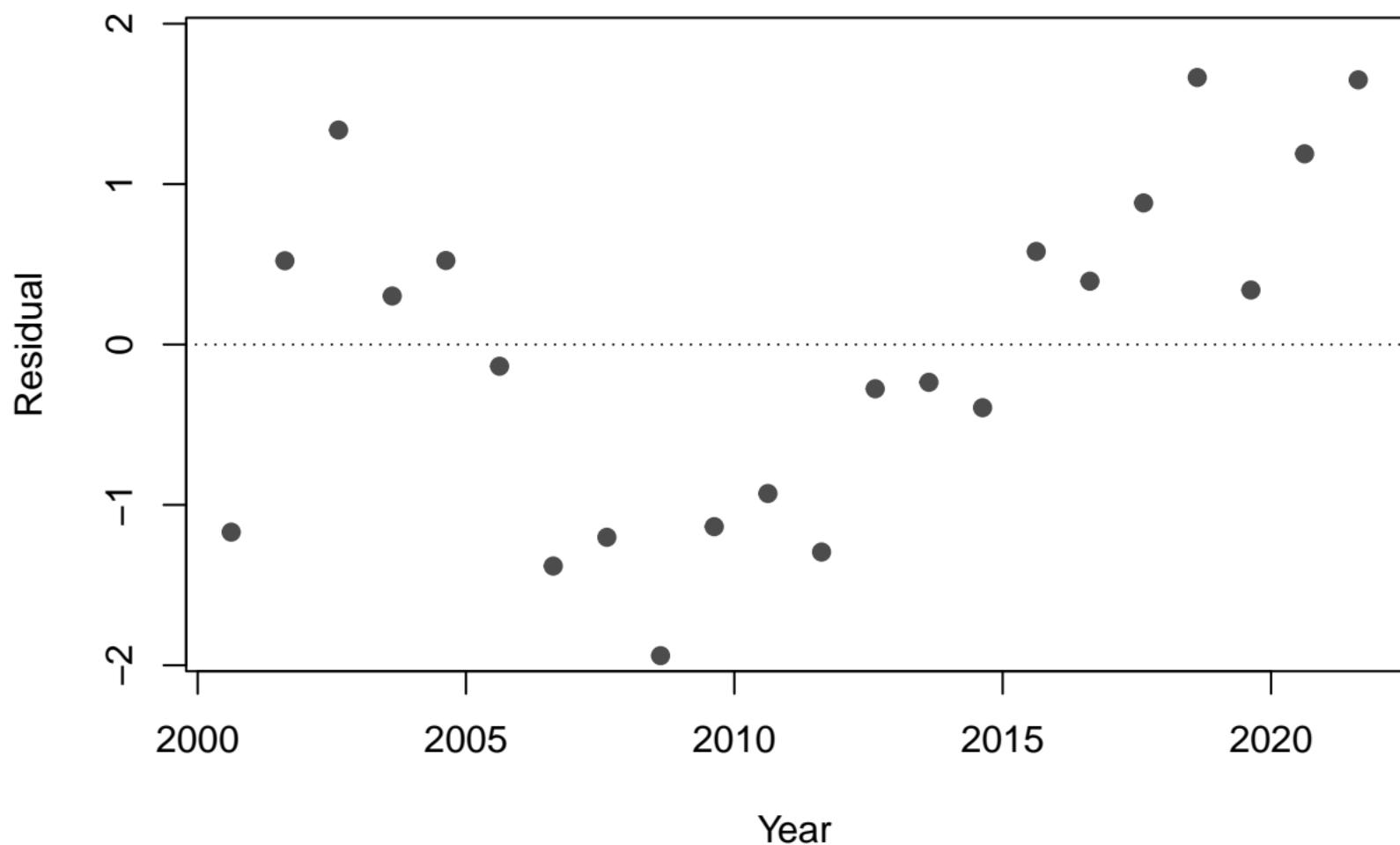
Log index

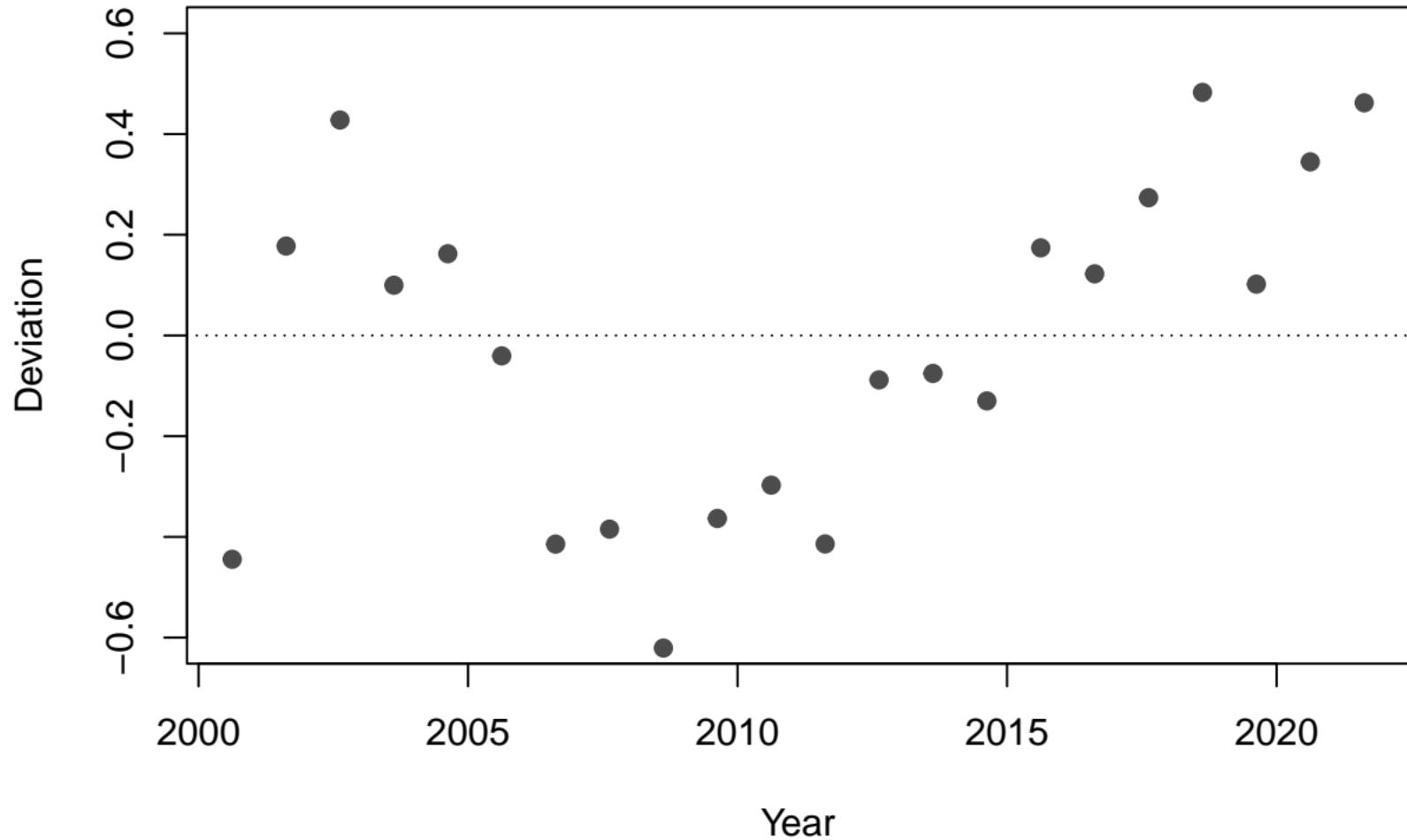


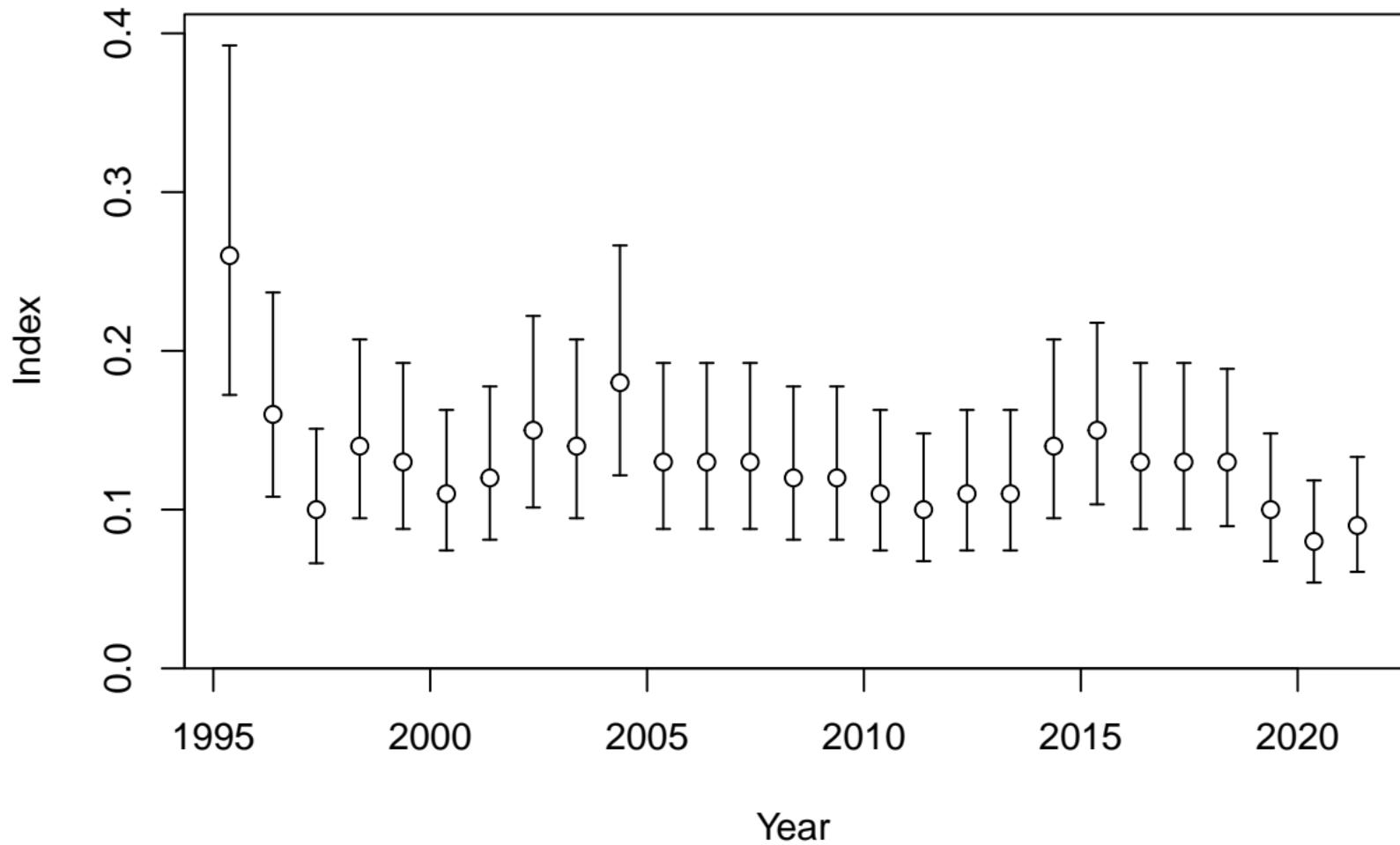
Log index

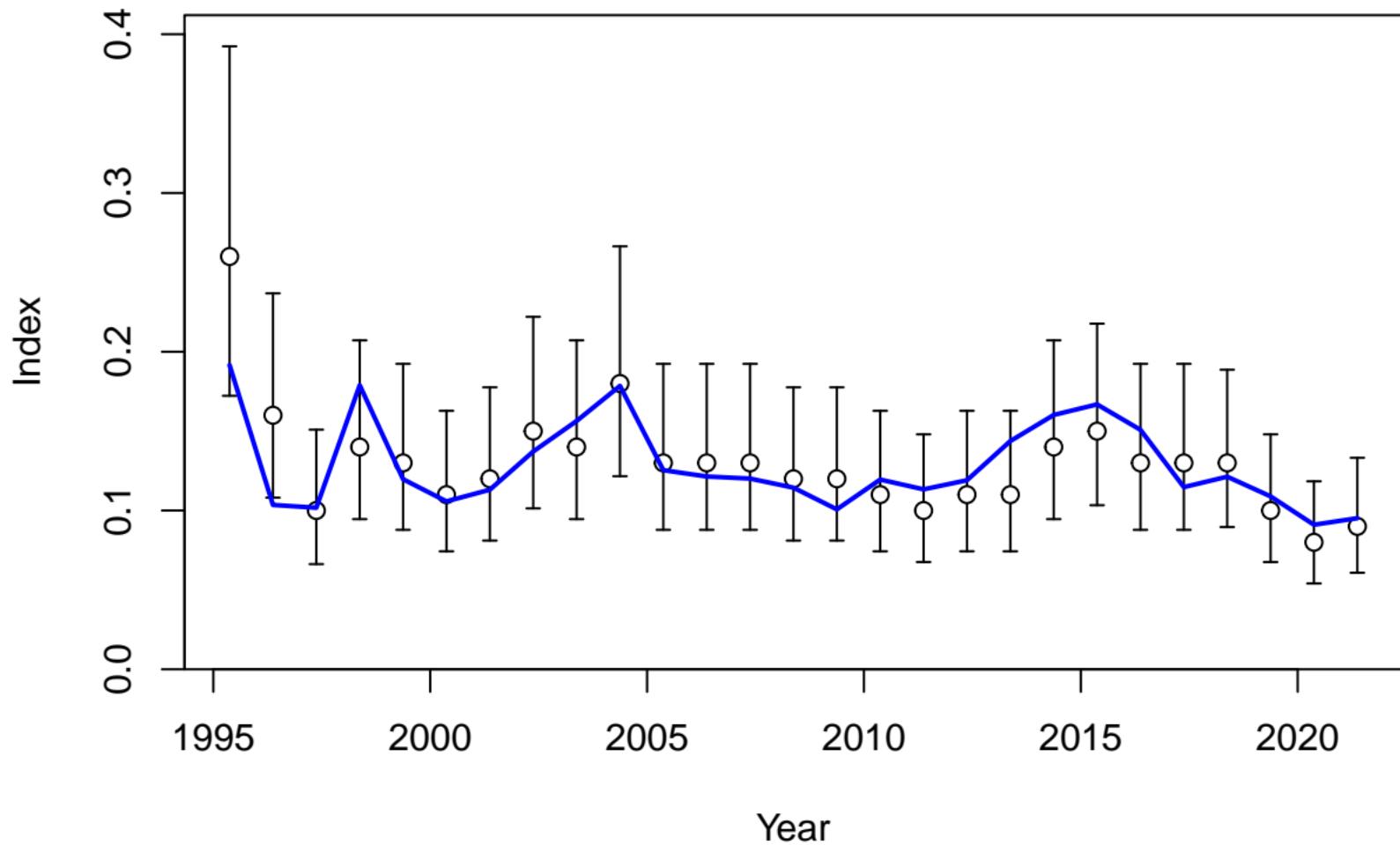




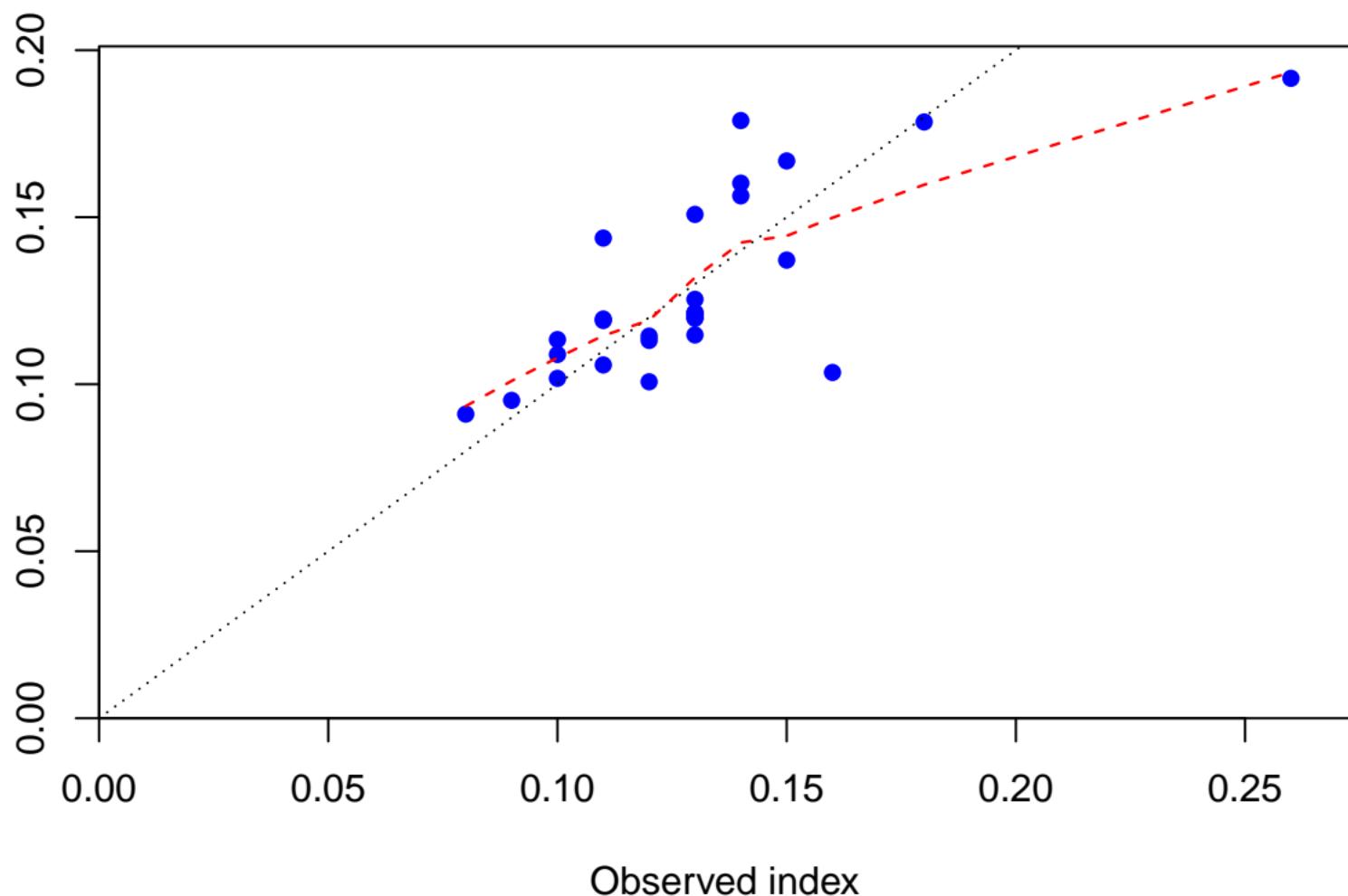




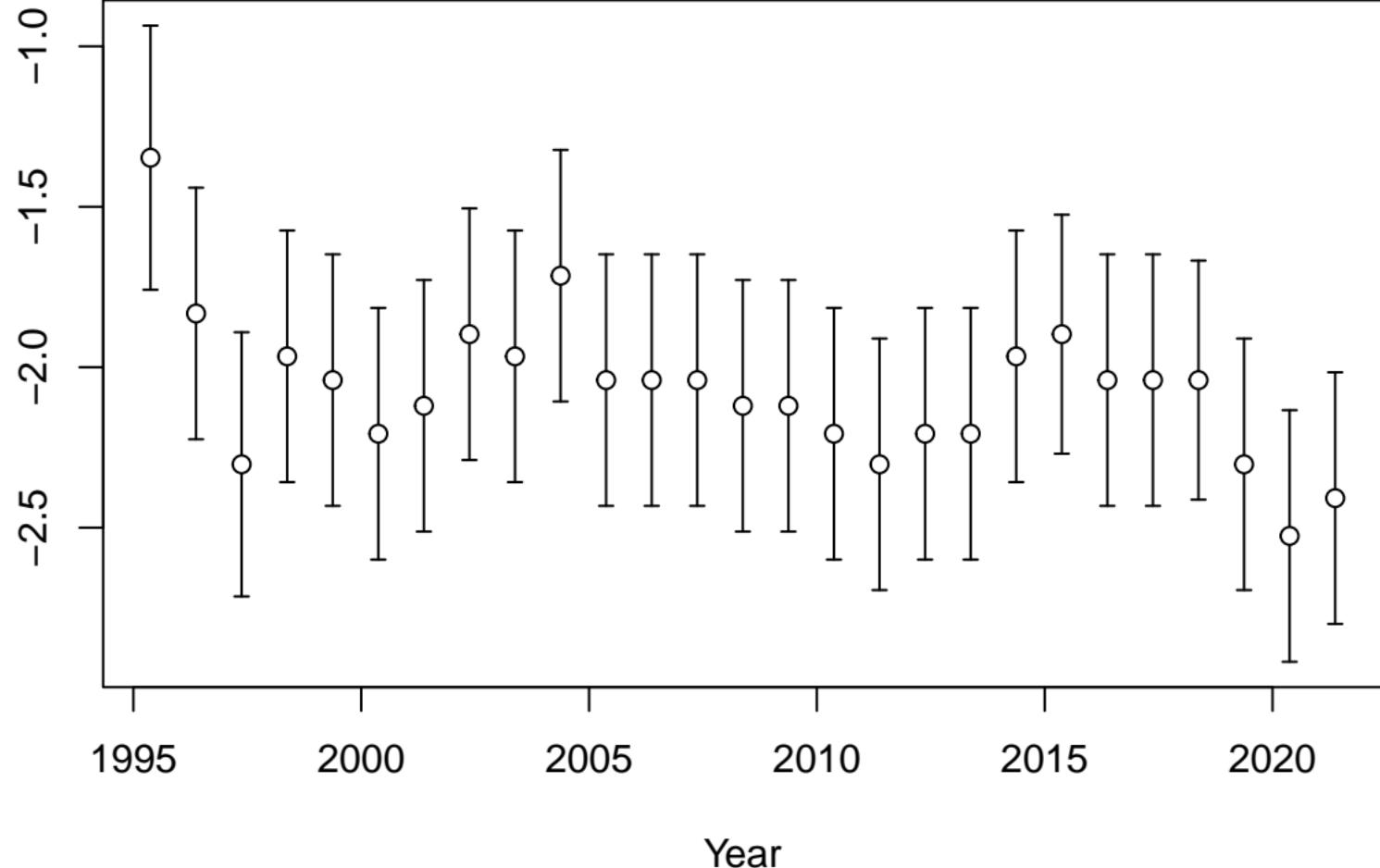


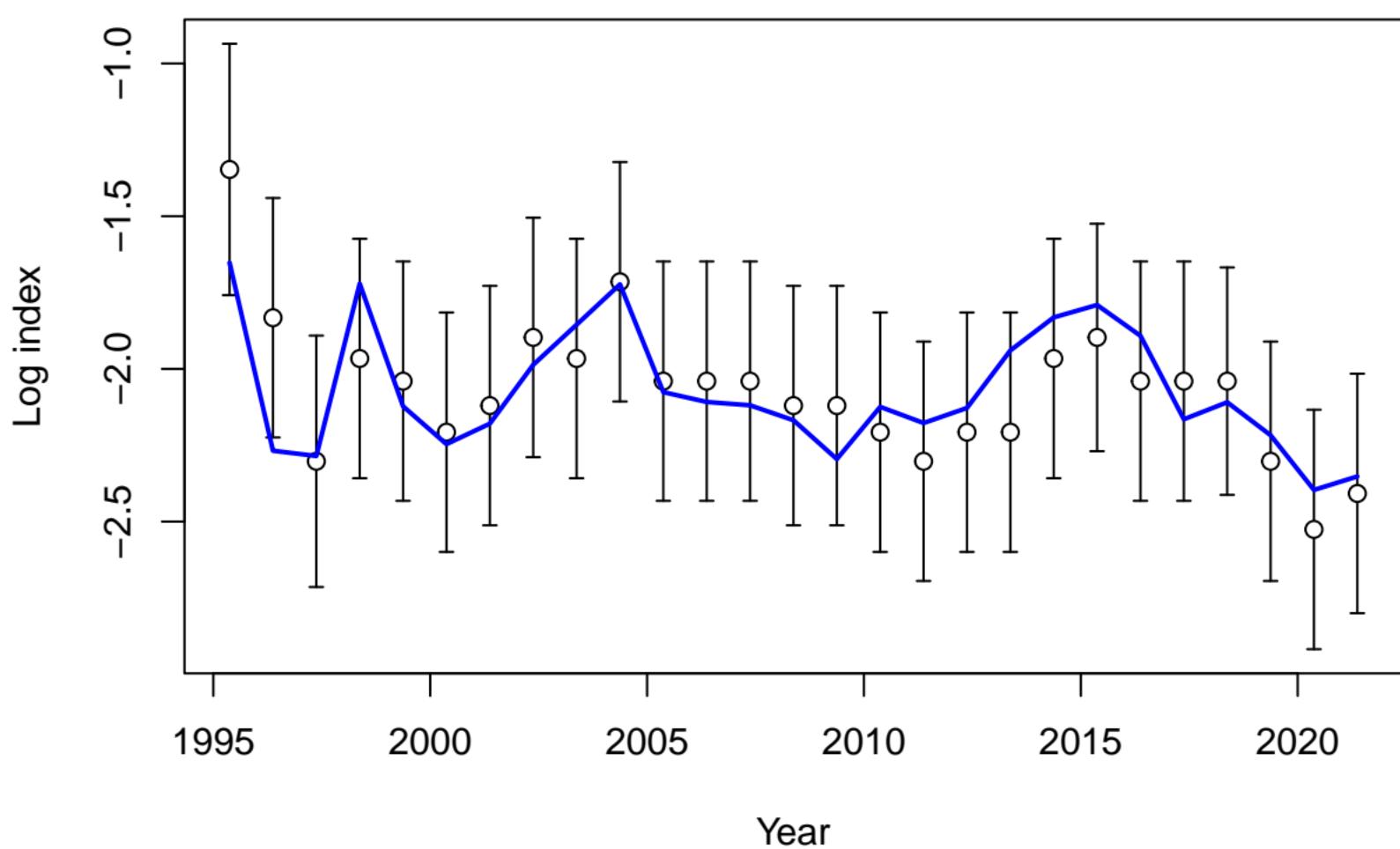


Expected index



Log index





Log expected index

-2.4 -2.0 -1.8

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

-2.4

-2.2

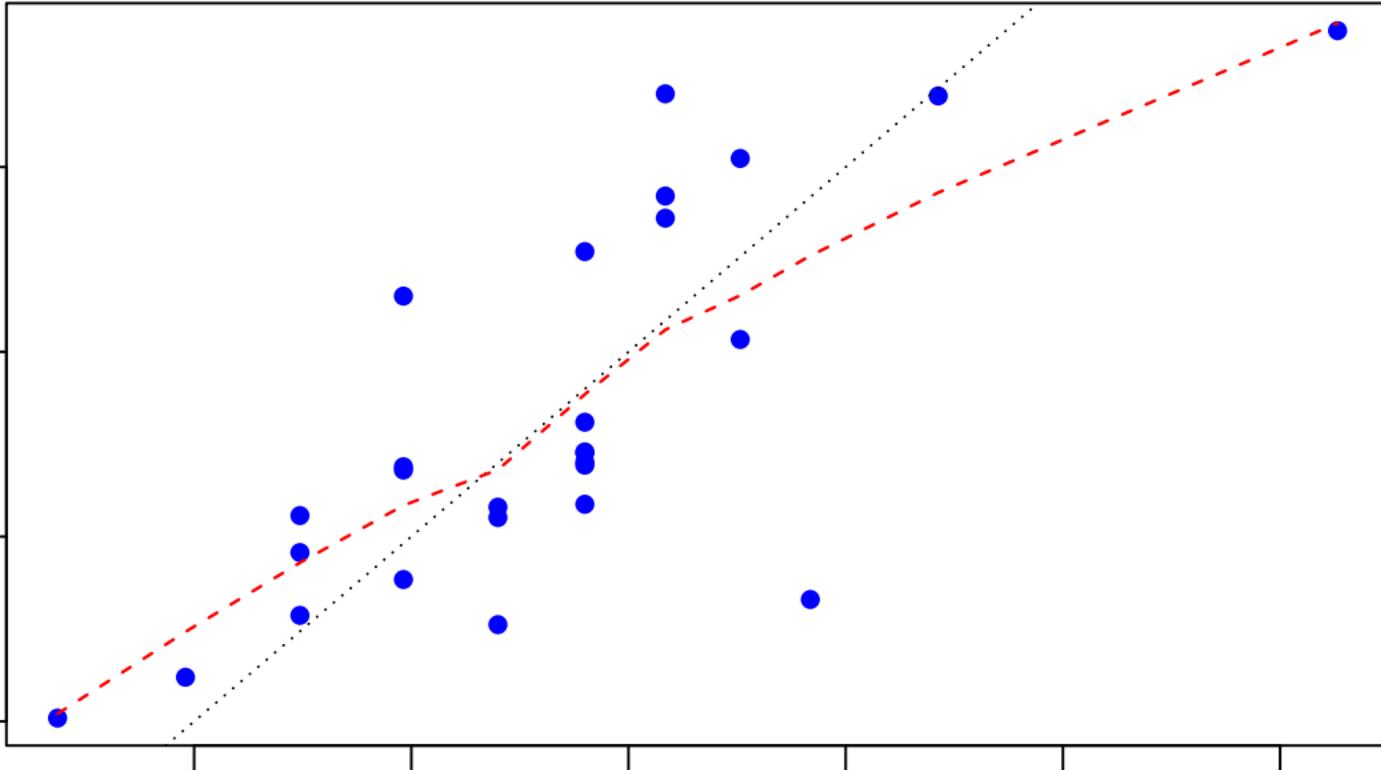
Log observed index

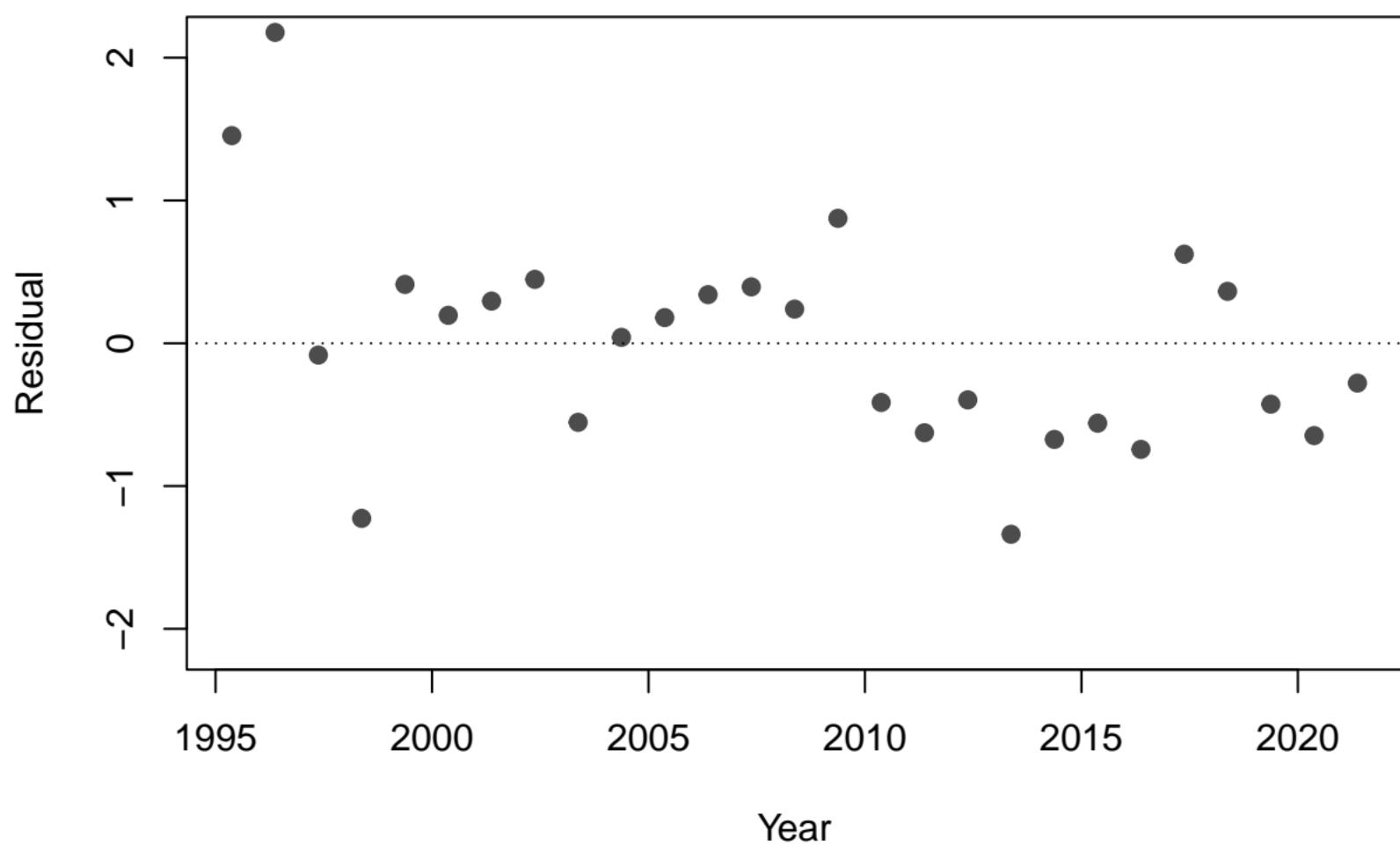
-2.0

-1.8

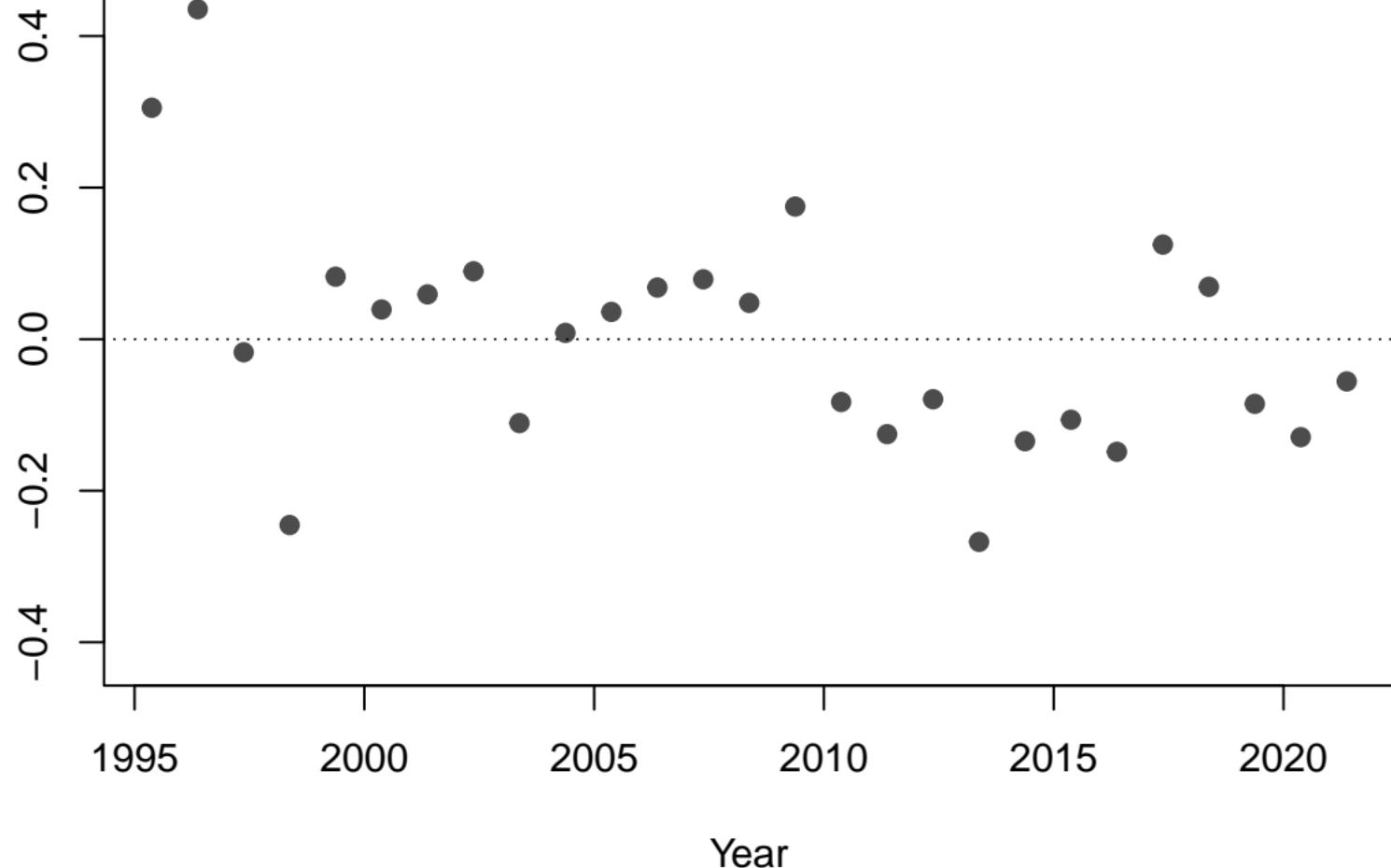
-1.6

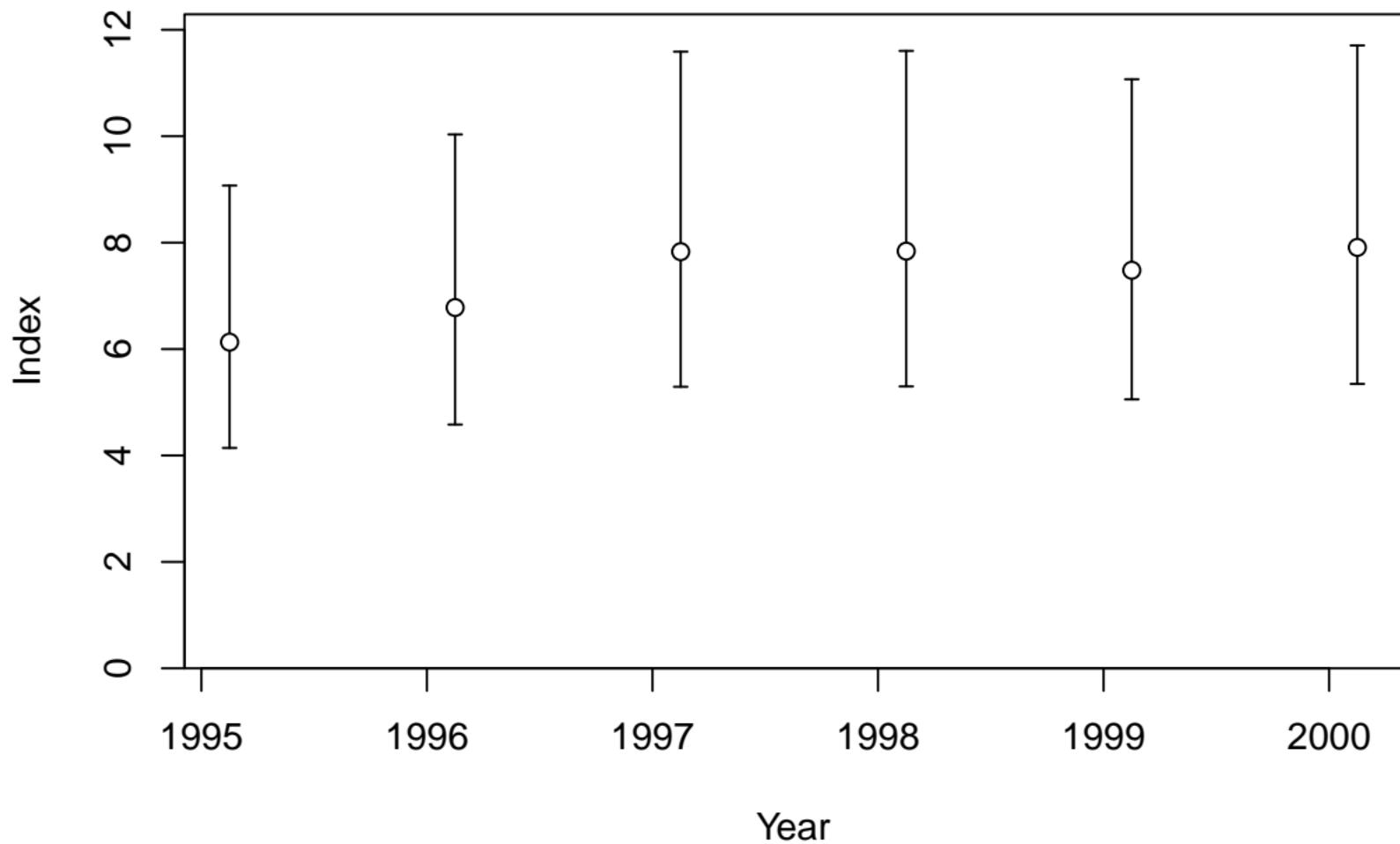
-1.4

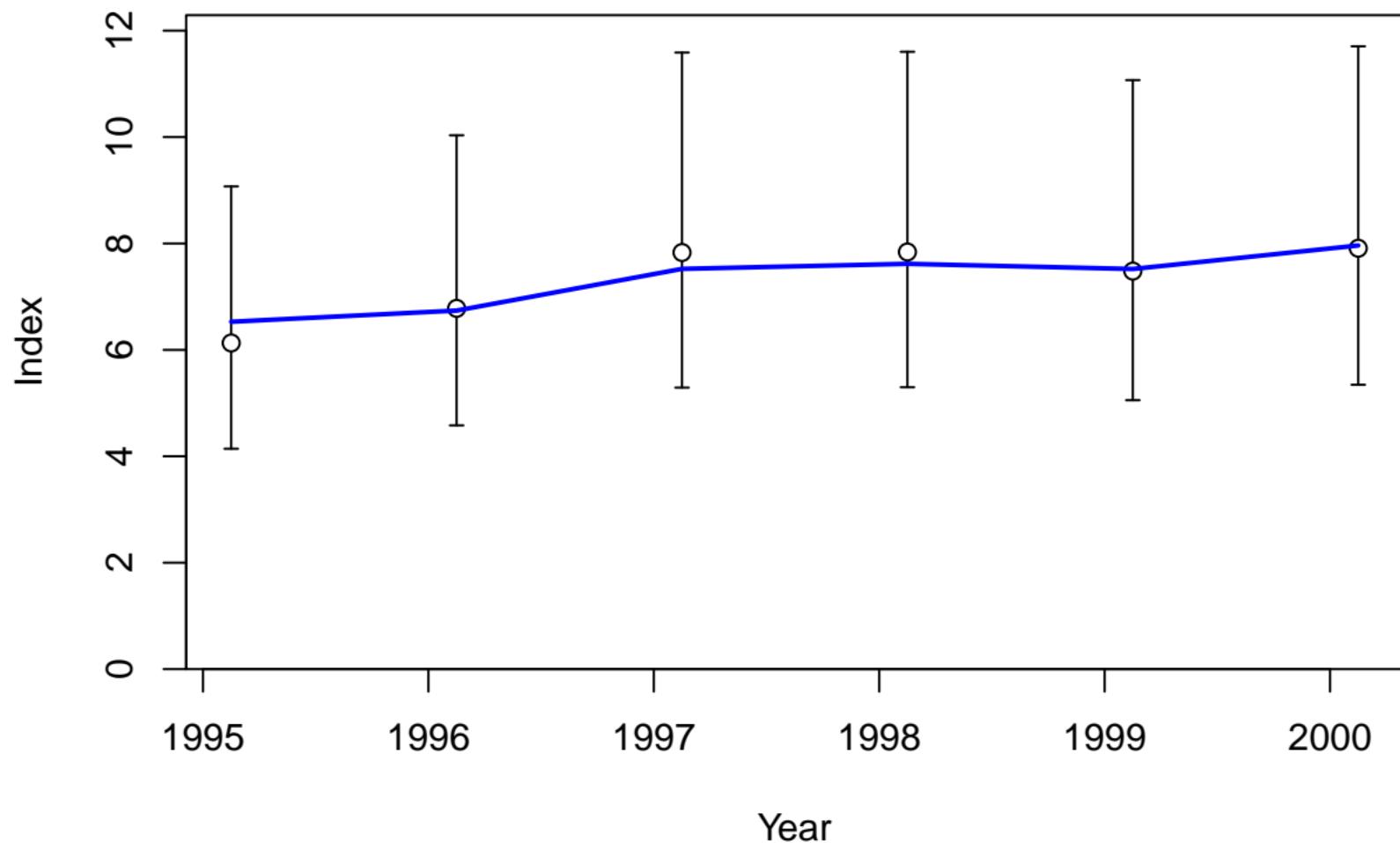




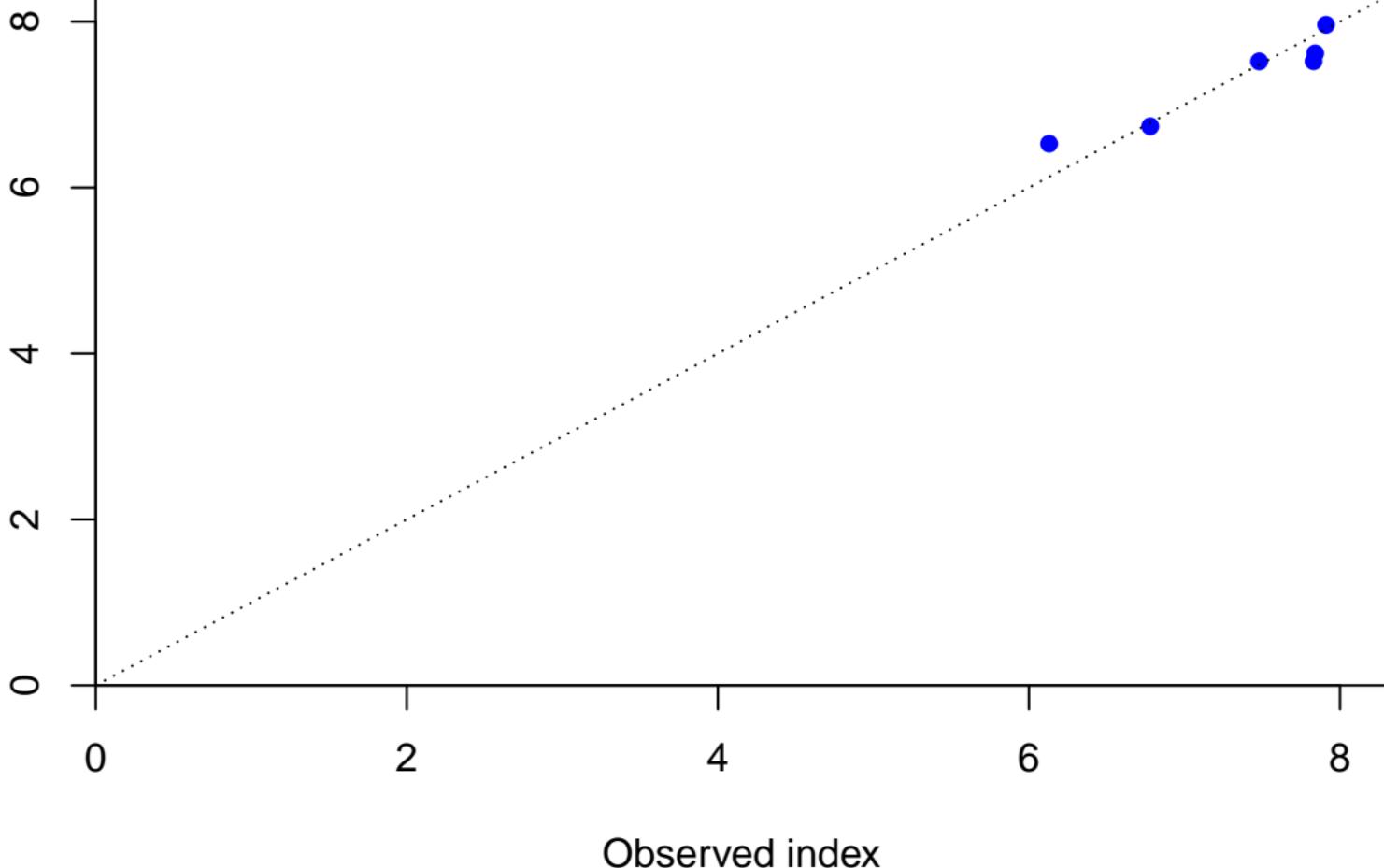
Deviation







Expected index

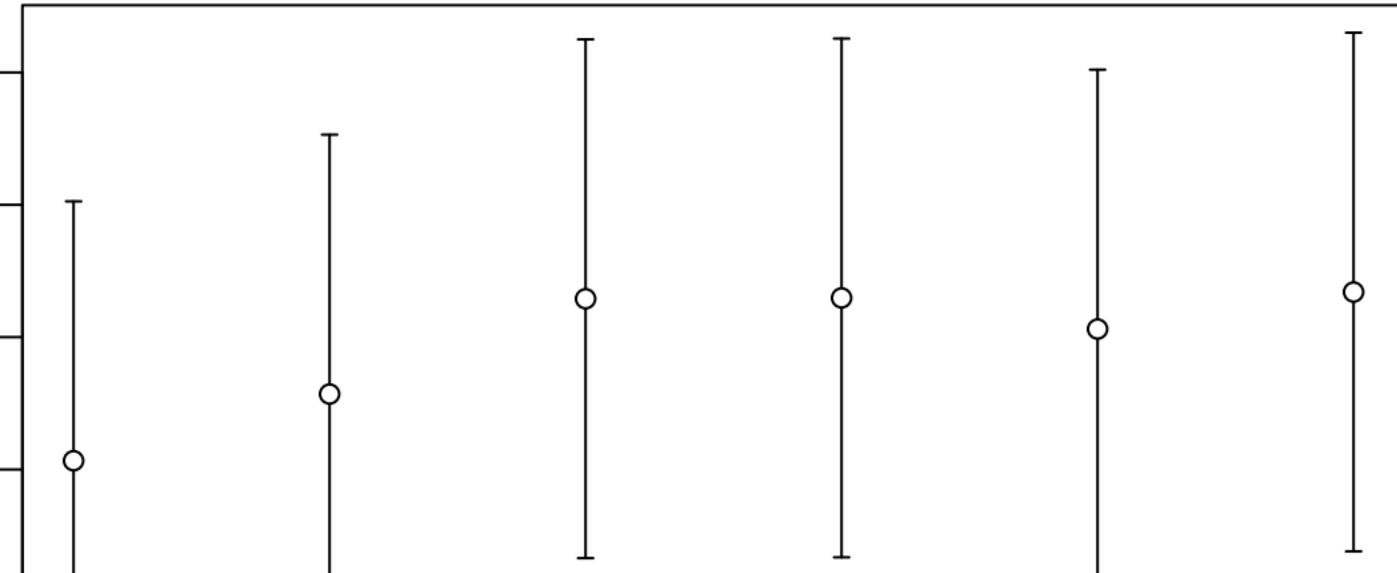


Log index

2.4
2.2
2.0
1.8
1.6
1.4

1995 1996 1997 1998 1999 2000

Year

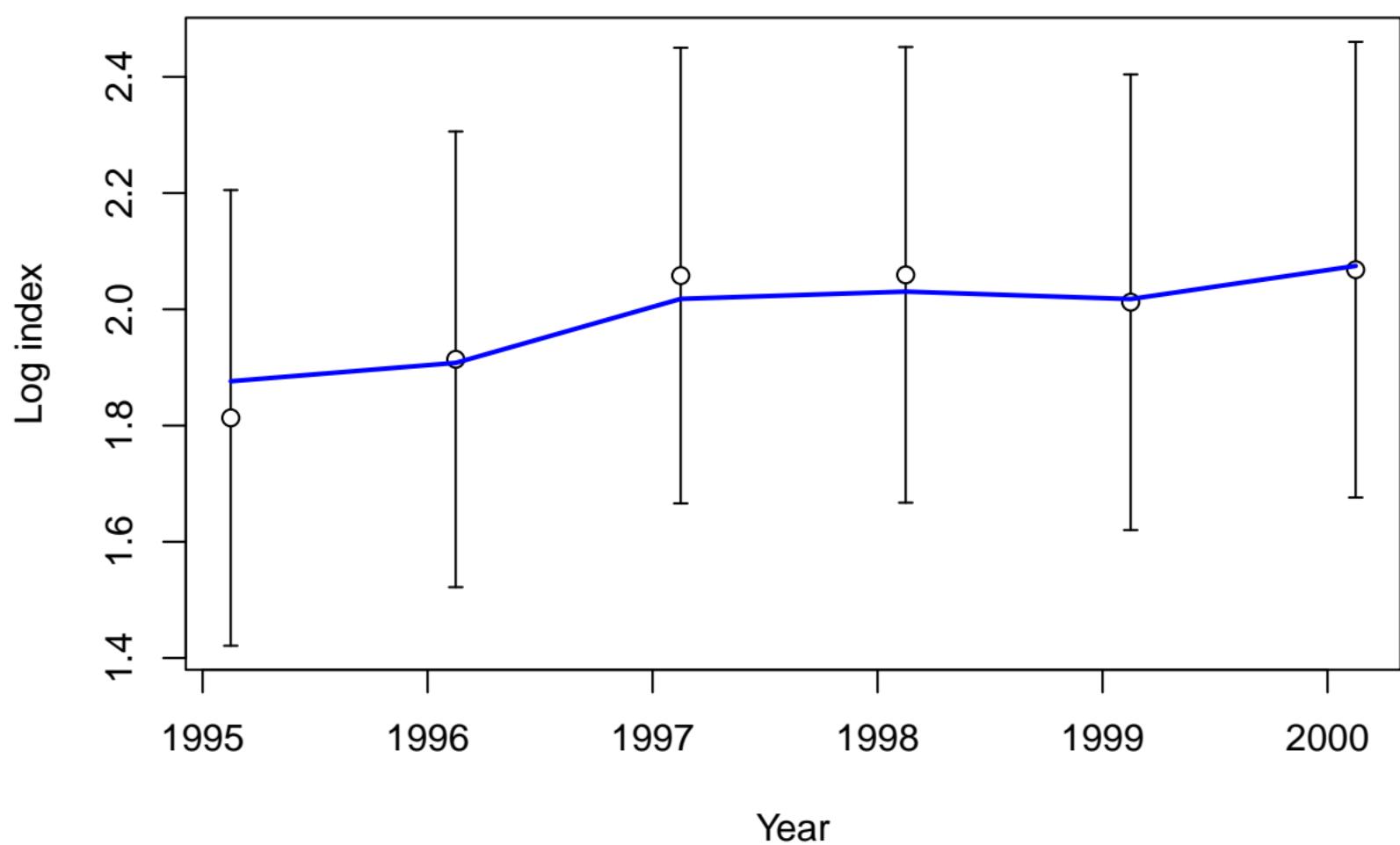


Log index

2.4
2.2
2.0
1.8
1.6
1.4

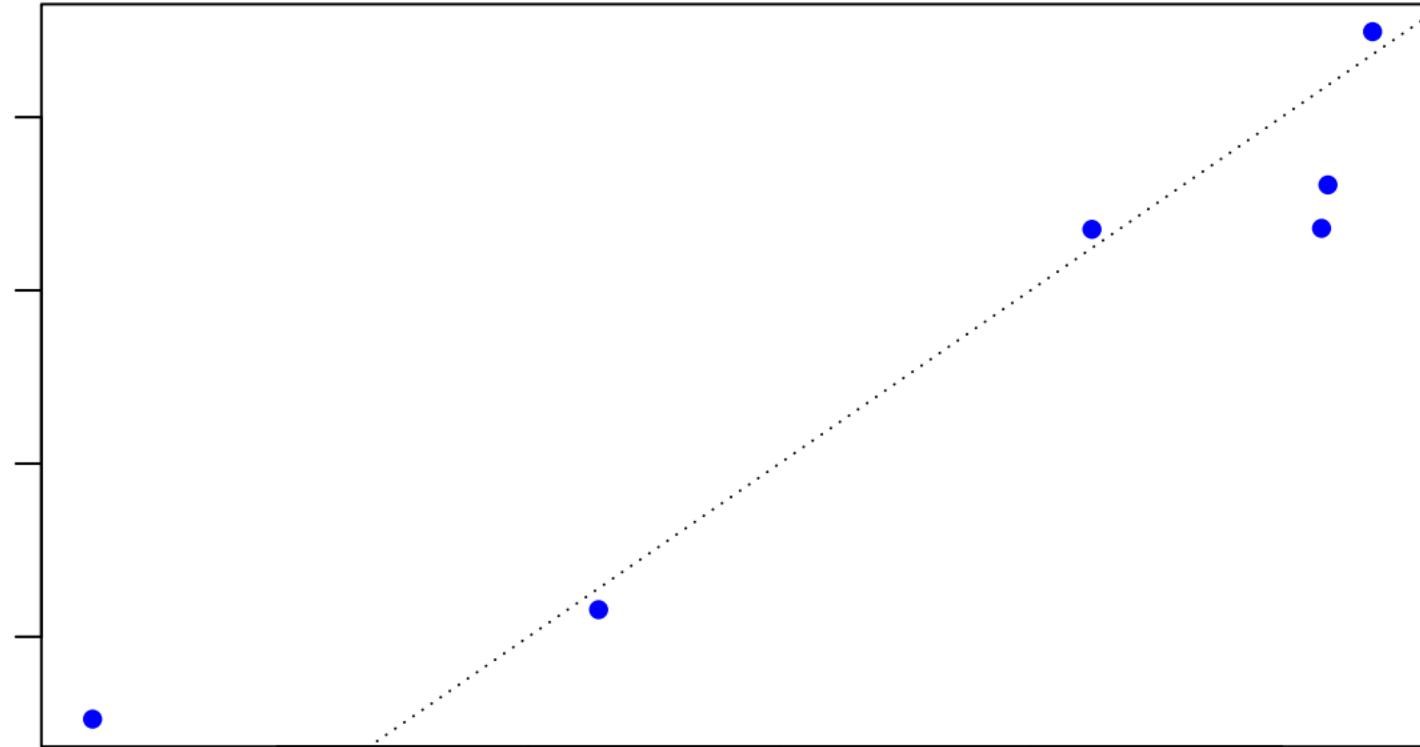
1995 1996 1997 1998 1999 2000

Year



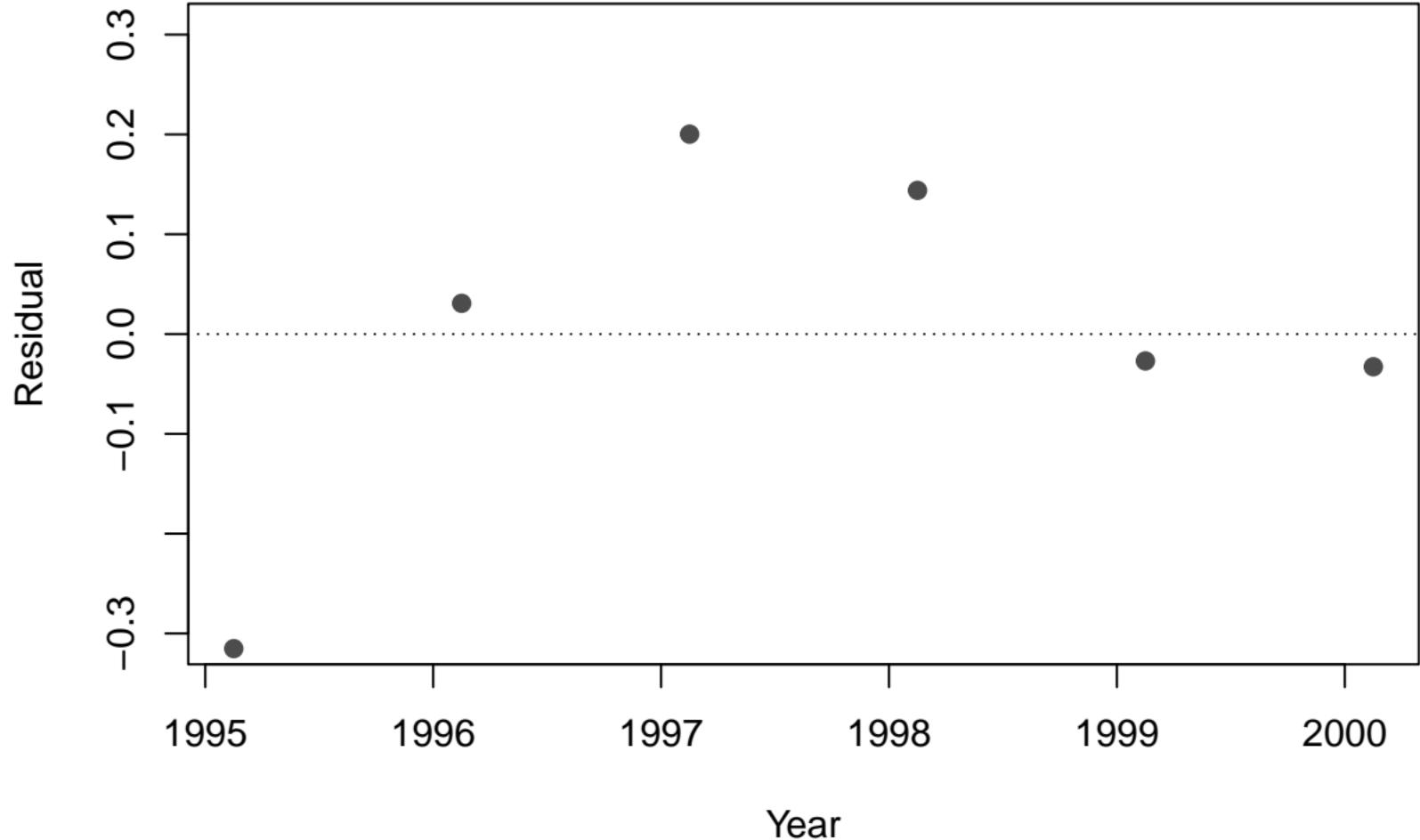
Log expected index

2.05
2.00
1.95
1.90



Log observed index

2.05



Deviation

0.06

0.02

-0.02

-0.06

1995

1996

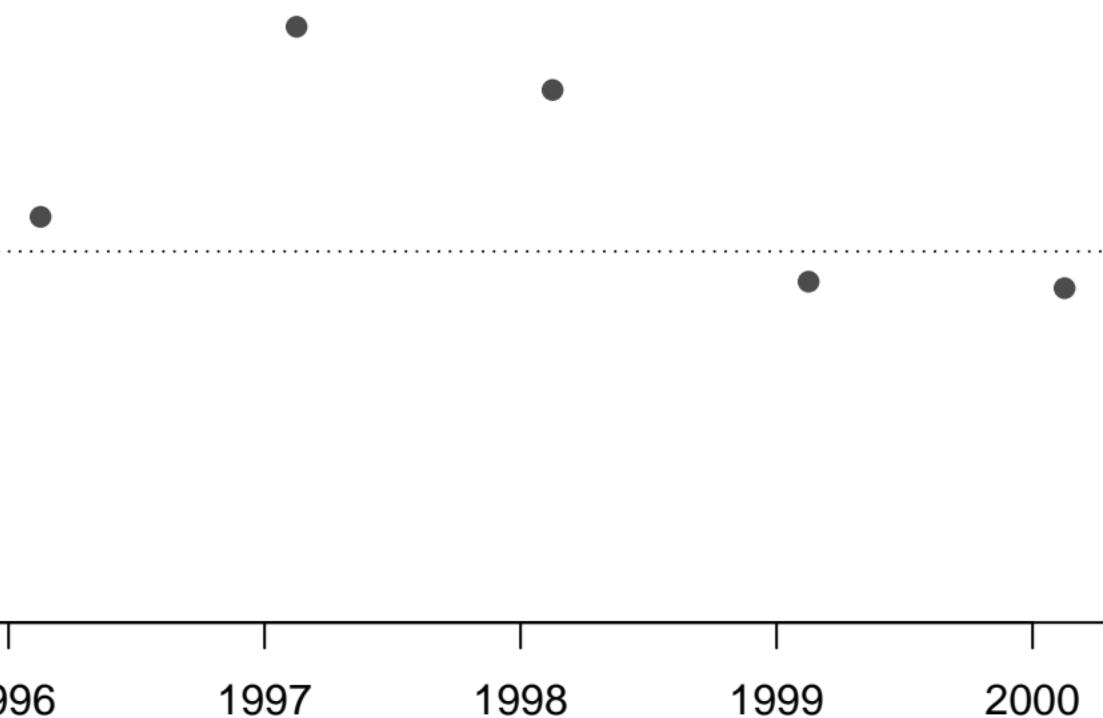
1997

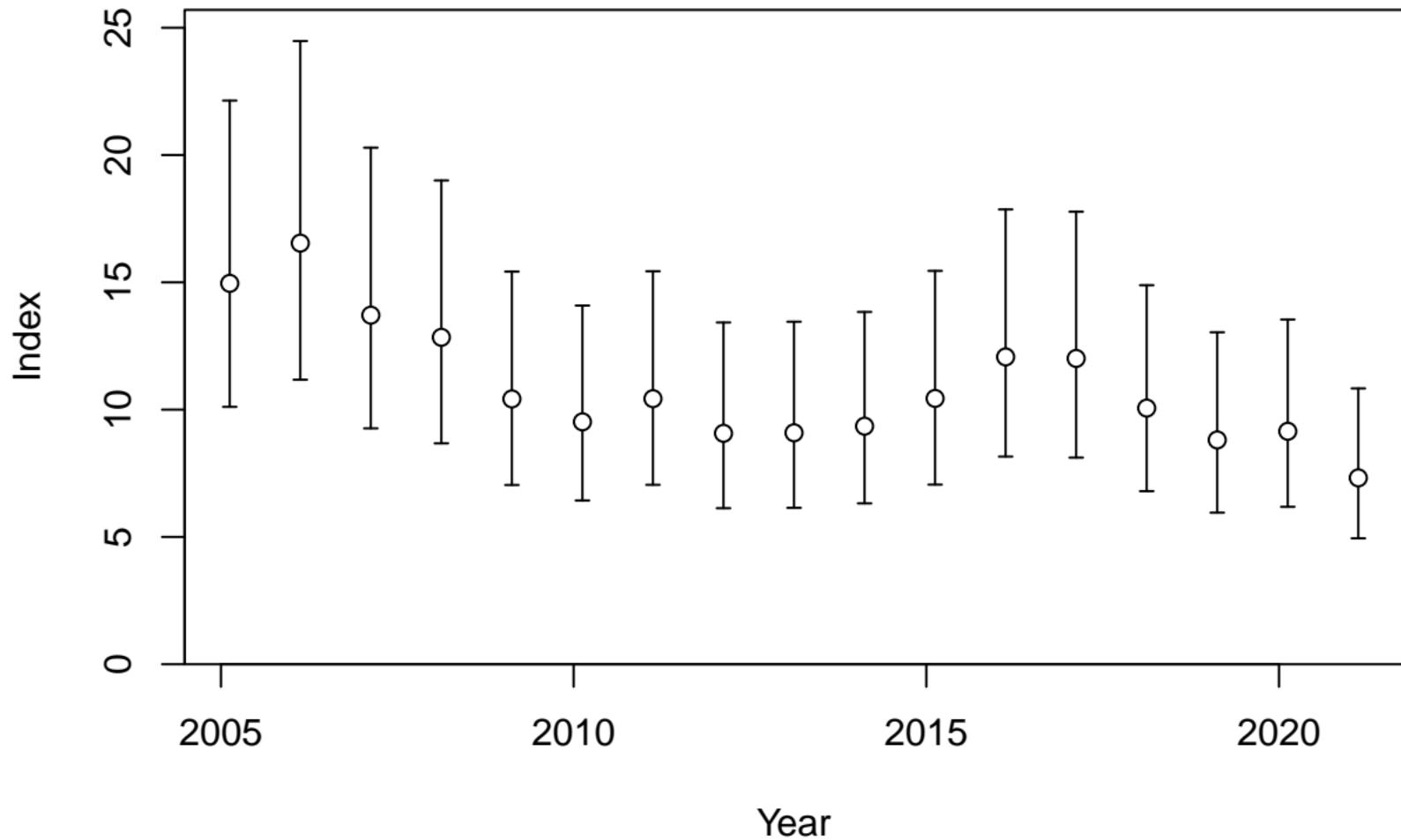
1998

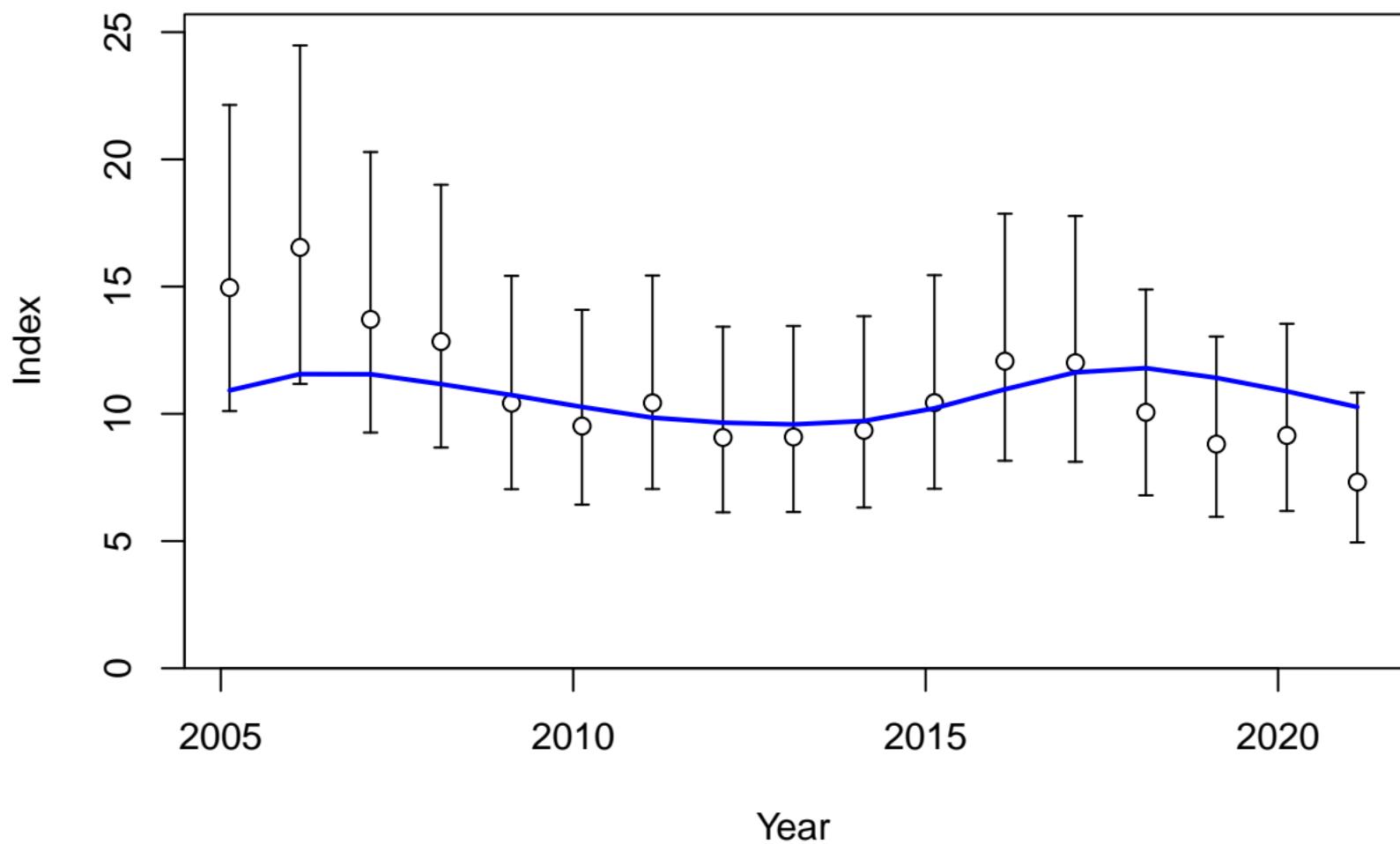
1999

2000

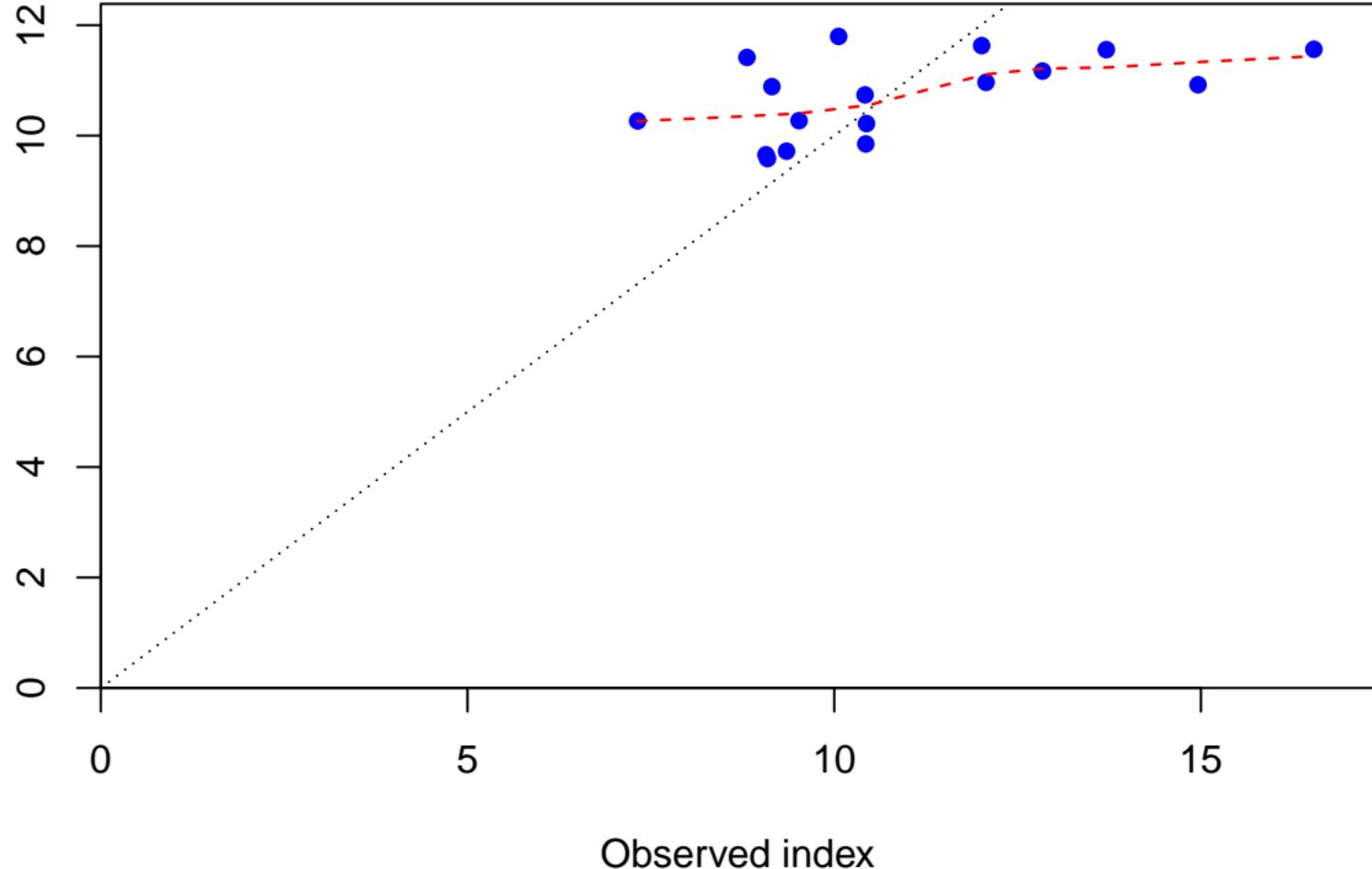
Year







Expected index



Log index

3.0
2.5
2.0

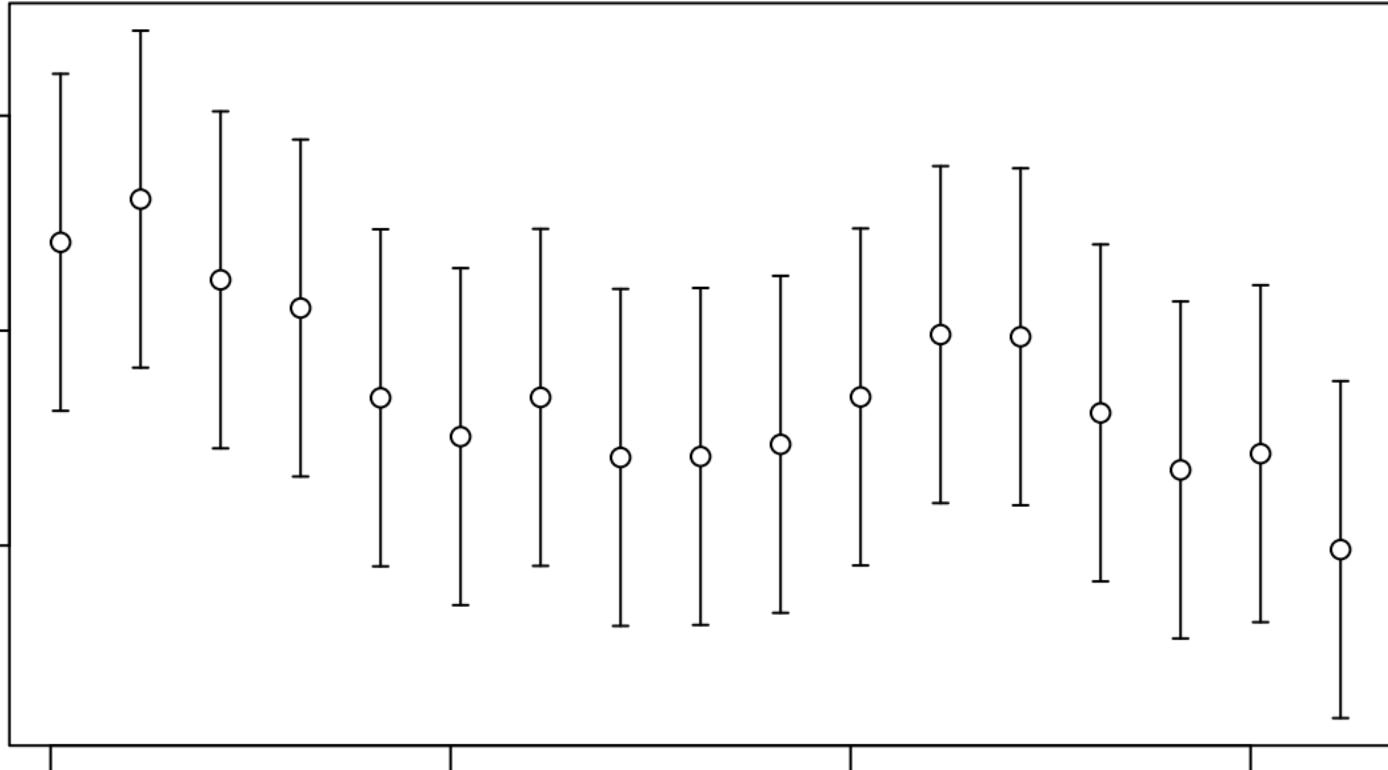
2005

2010

2015

2020

Year

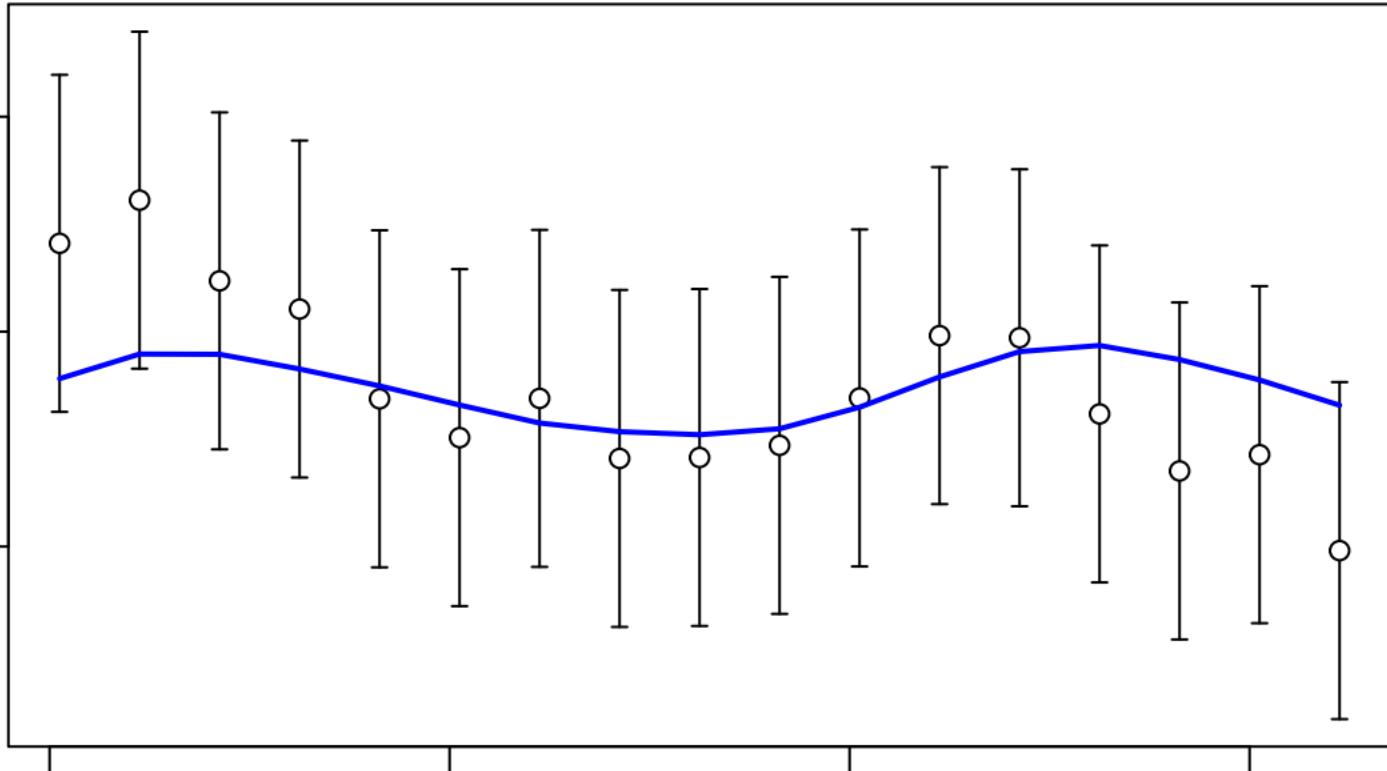


Log index

3.0
2.5
2.0

2005 2010 2015 2020

Year



Log expected index

2.30 2.35 2.40 2.45

2.0

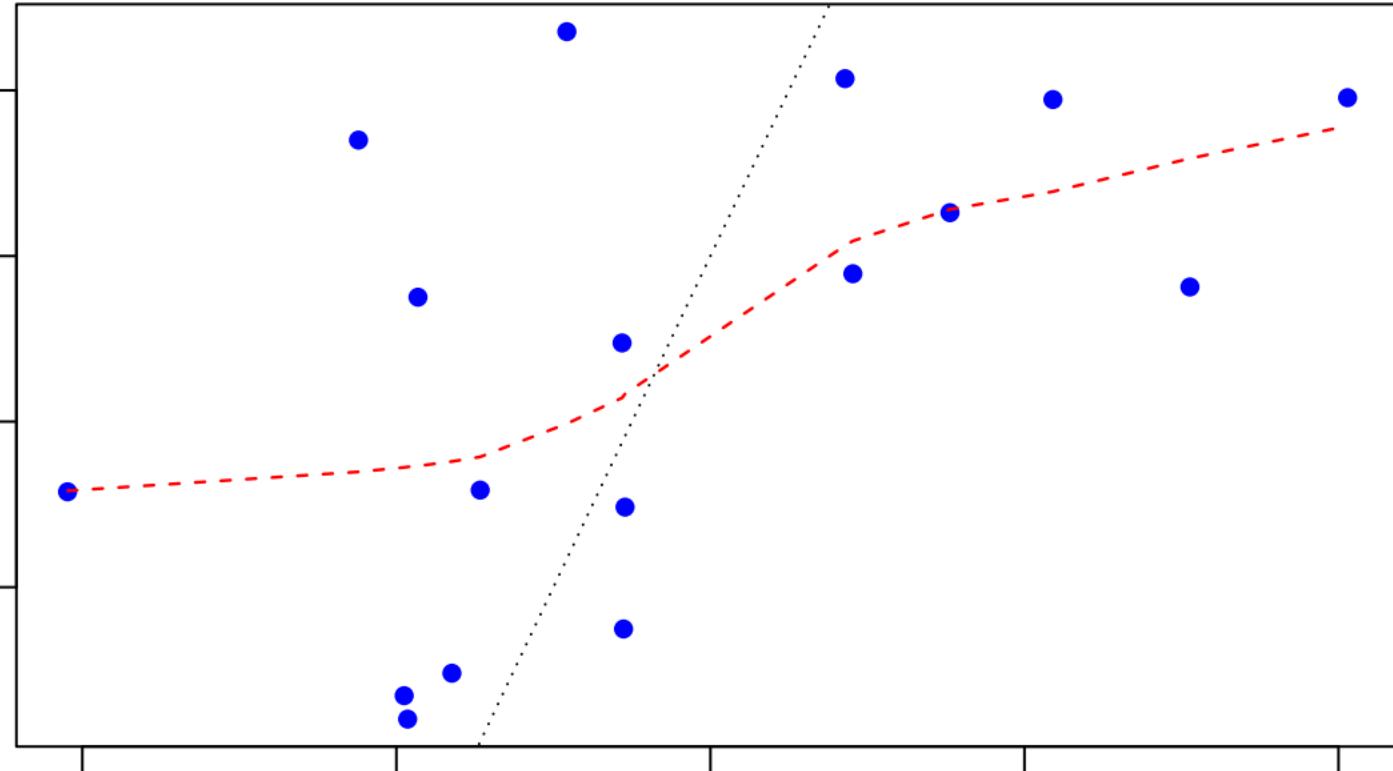
2.2

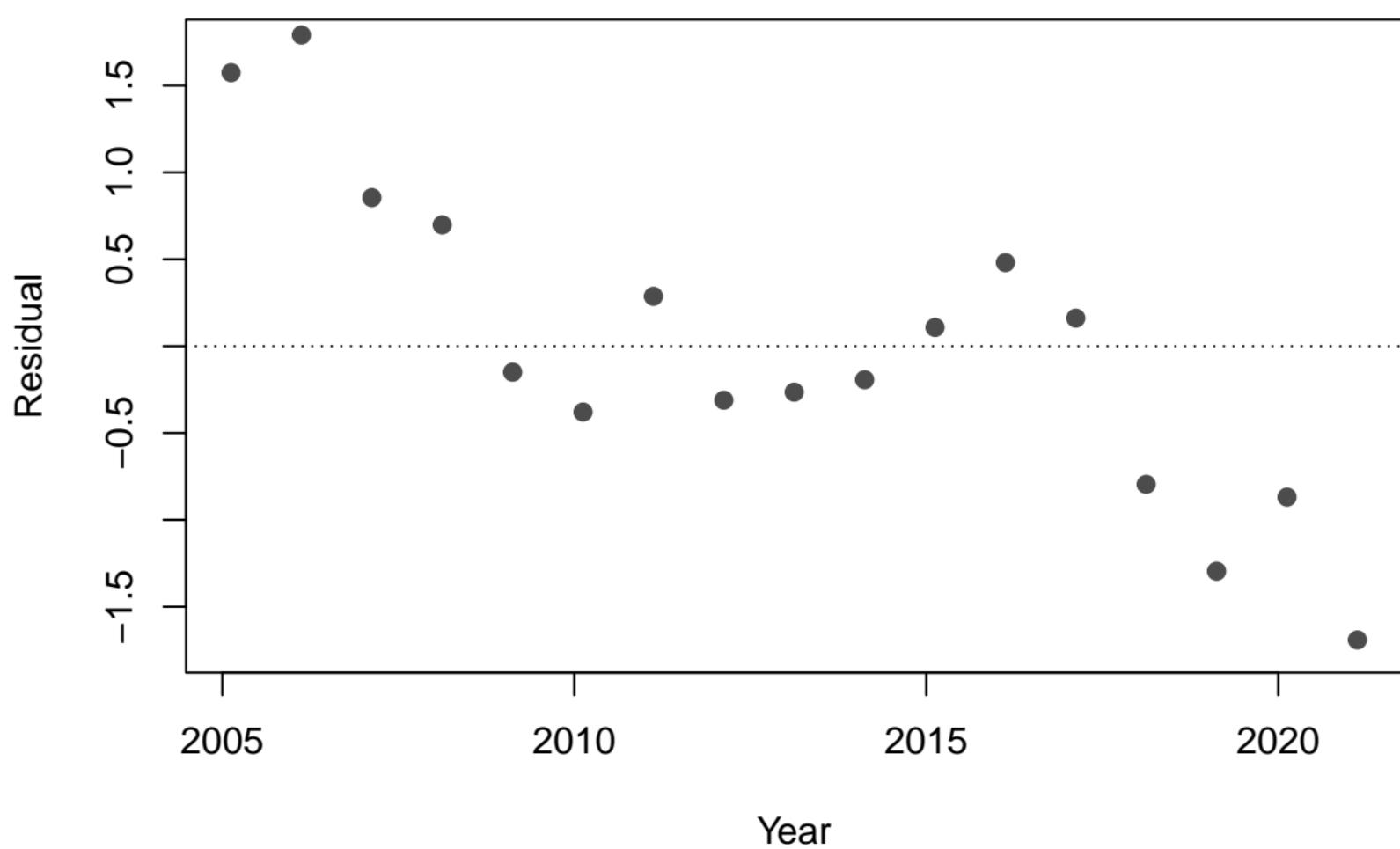
2.4

2.6

2.8

Log observed index



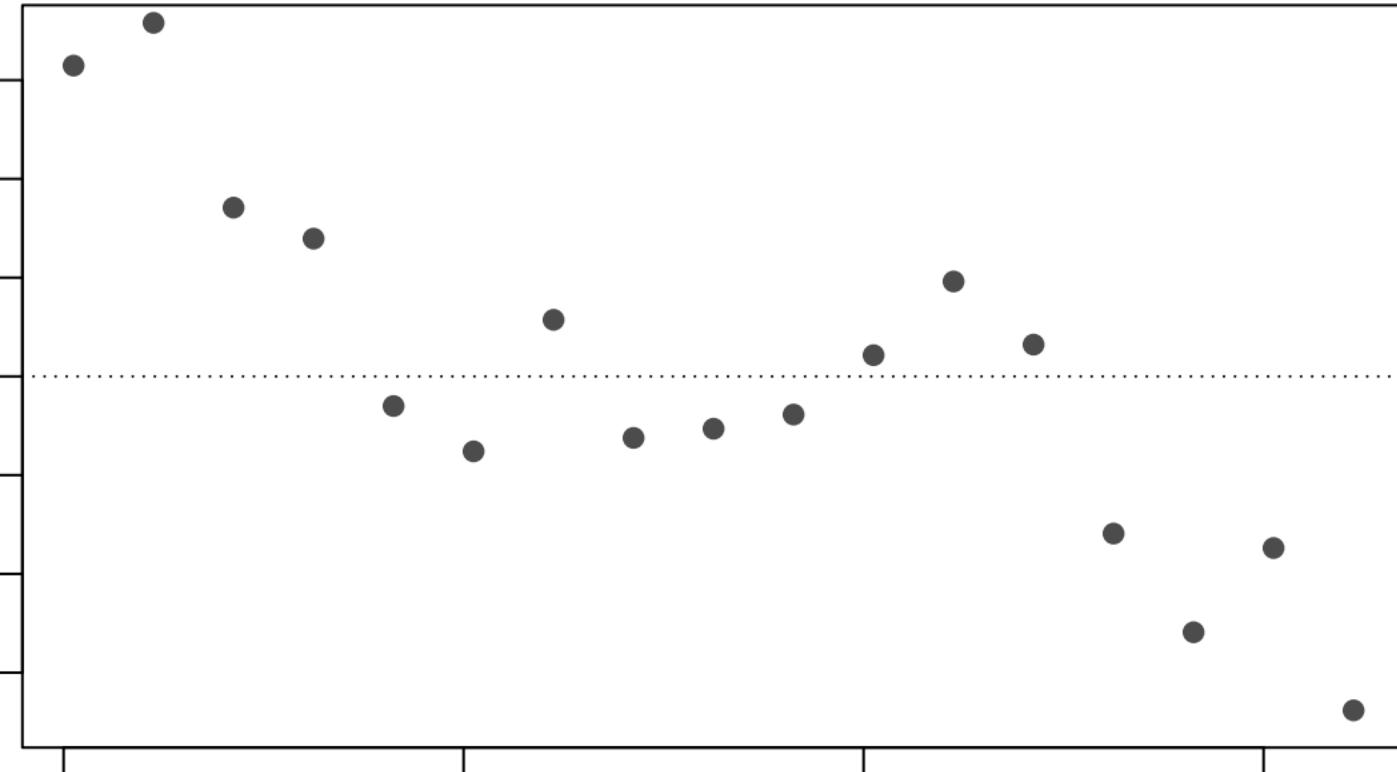


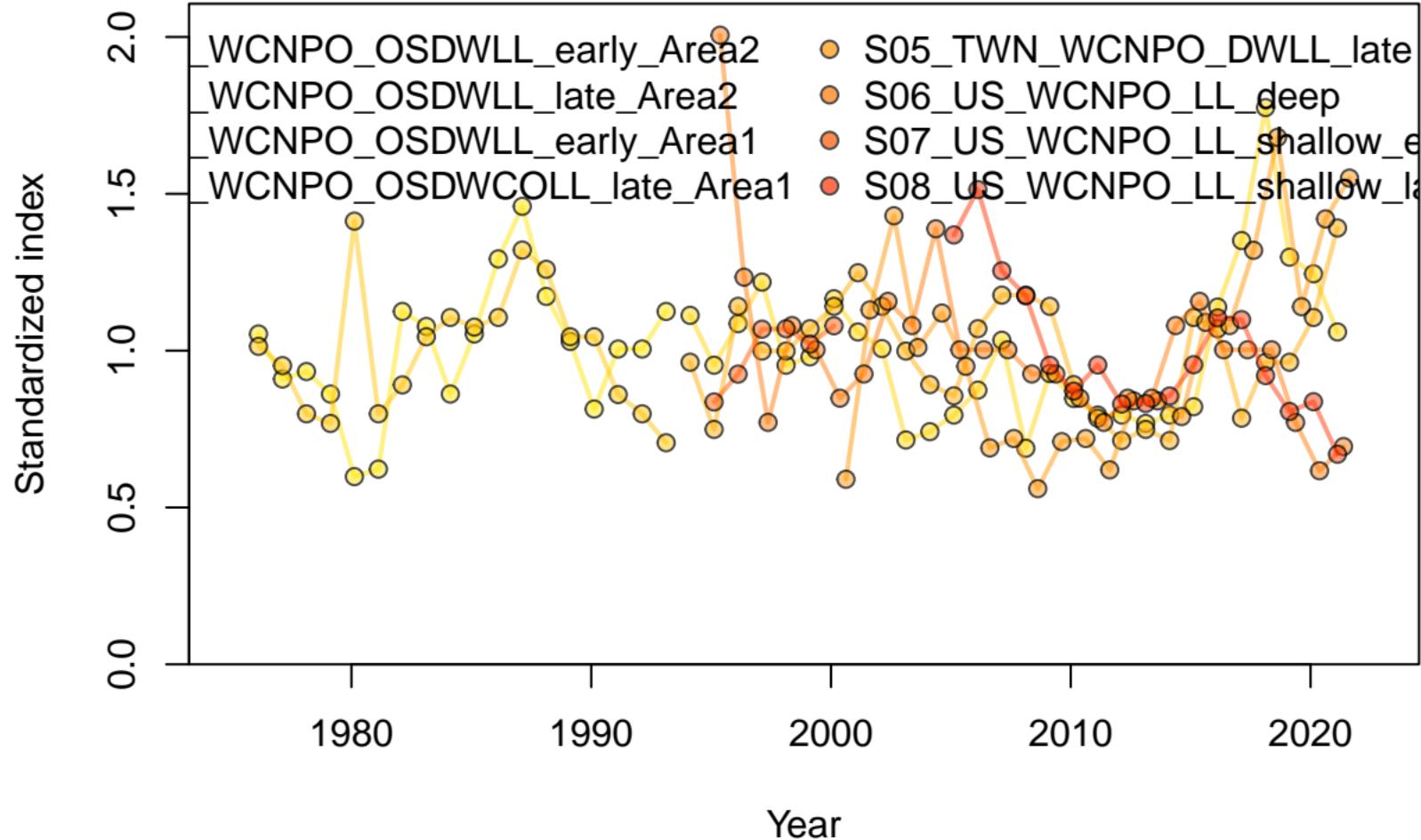
Deviation

0.3
0.2
0.1
0
-0.1
-0.2
-0.3

2005 2010 2015 2020

Year



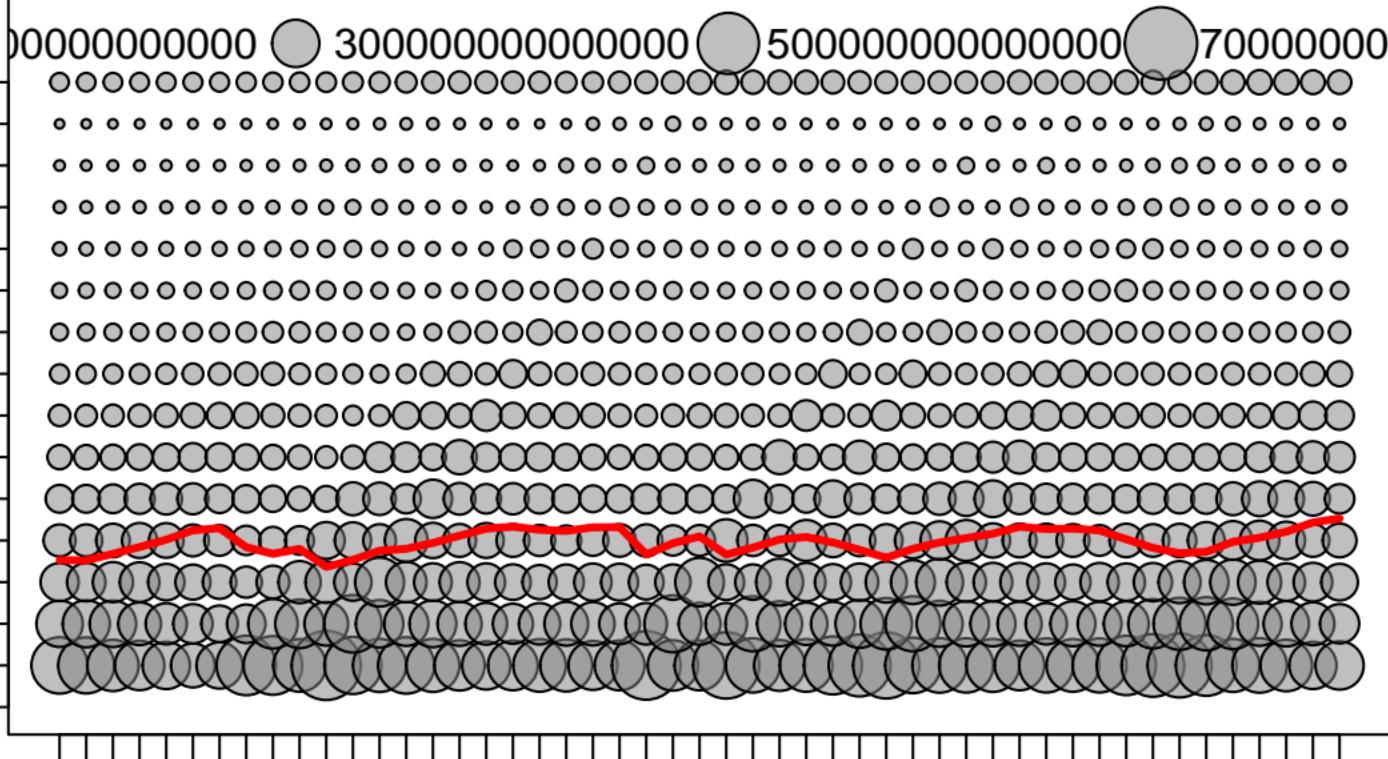


Age

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

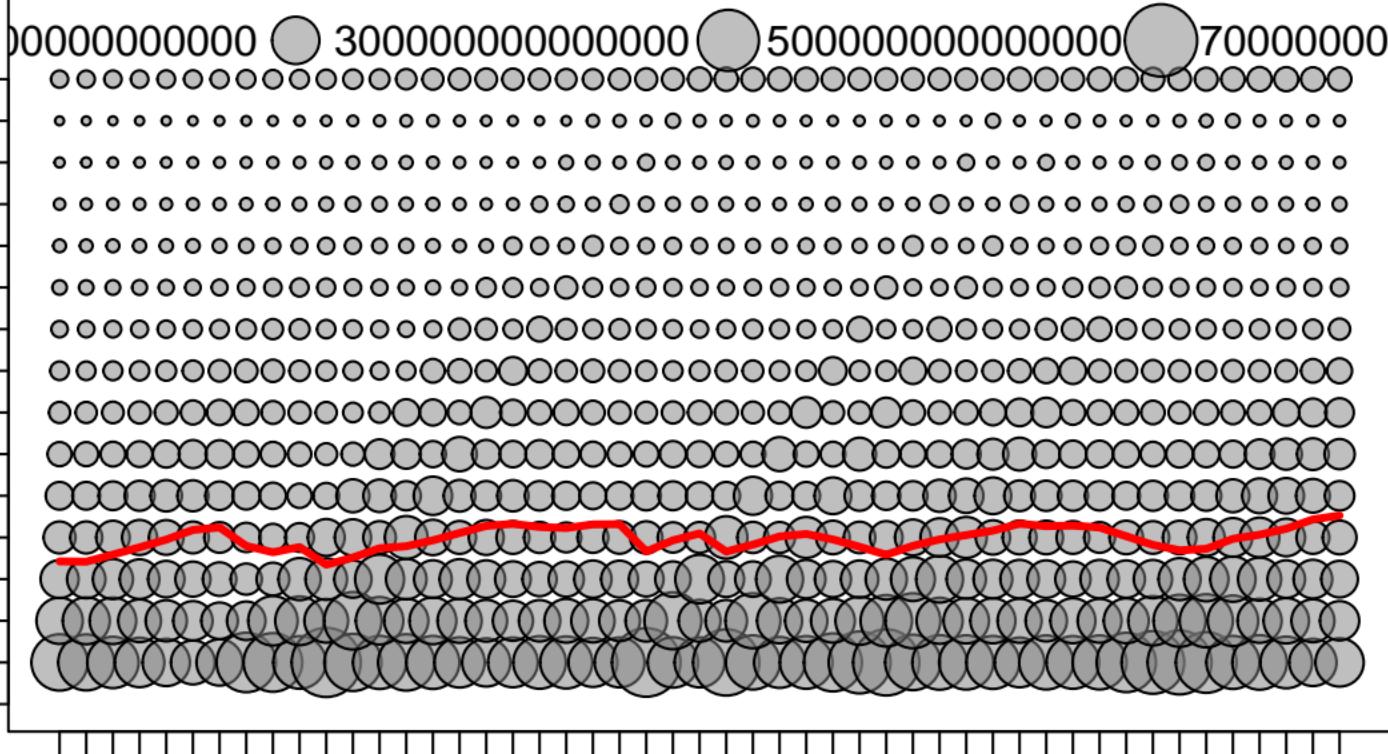


Age

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



Mean age (yr)

4
3
2
1
0

- -○- Females
—×— Males

1980 1990 2000 2010 2020

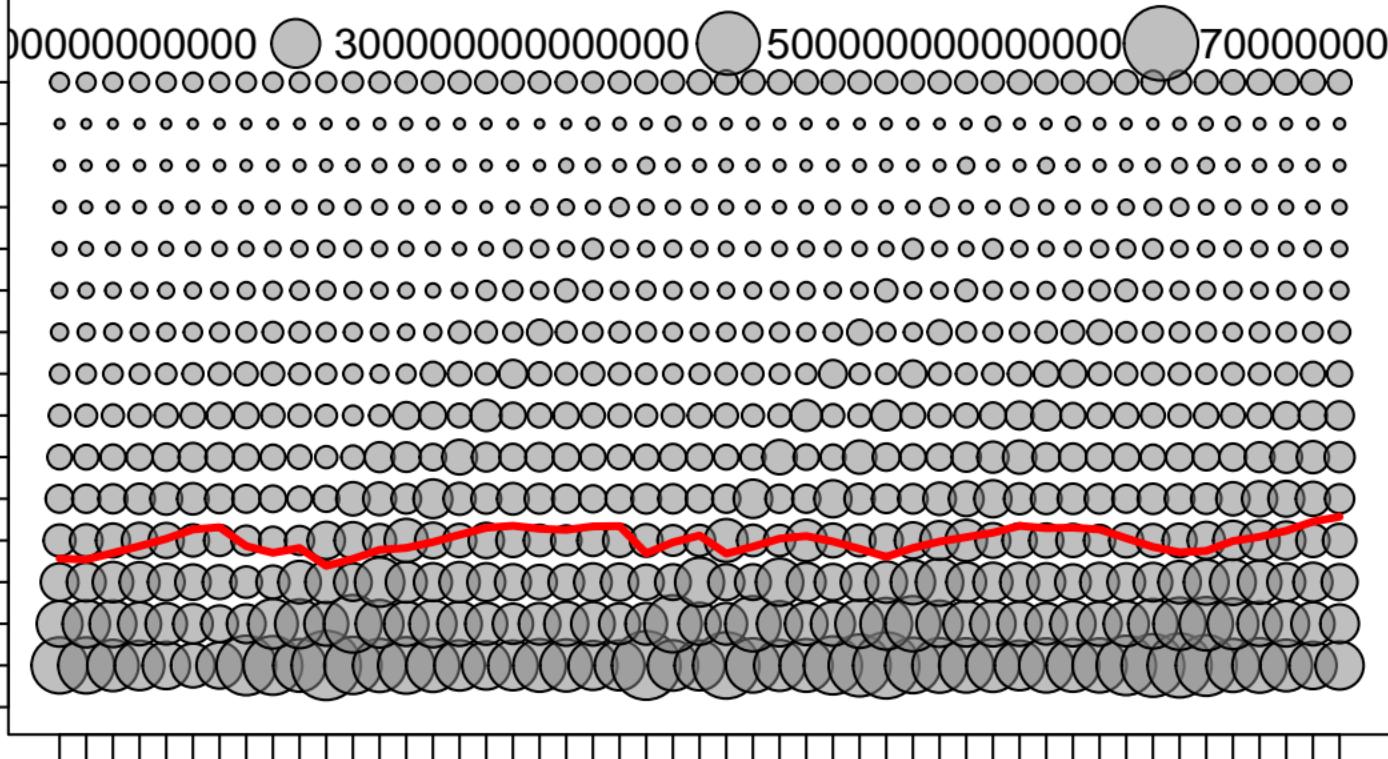
Year

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

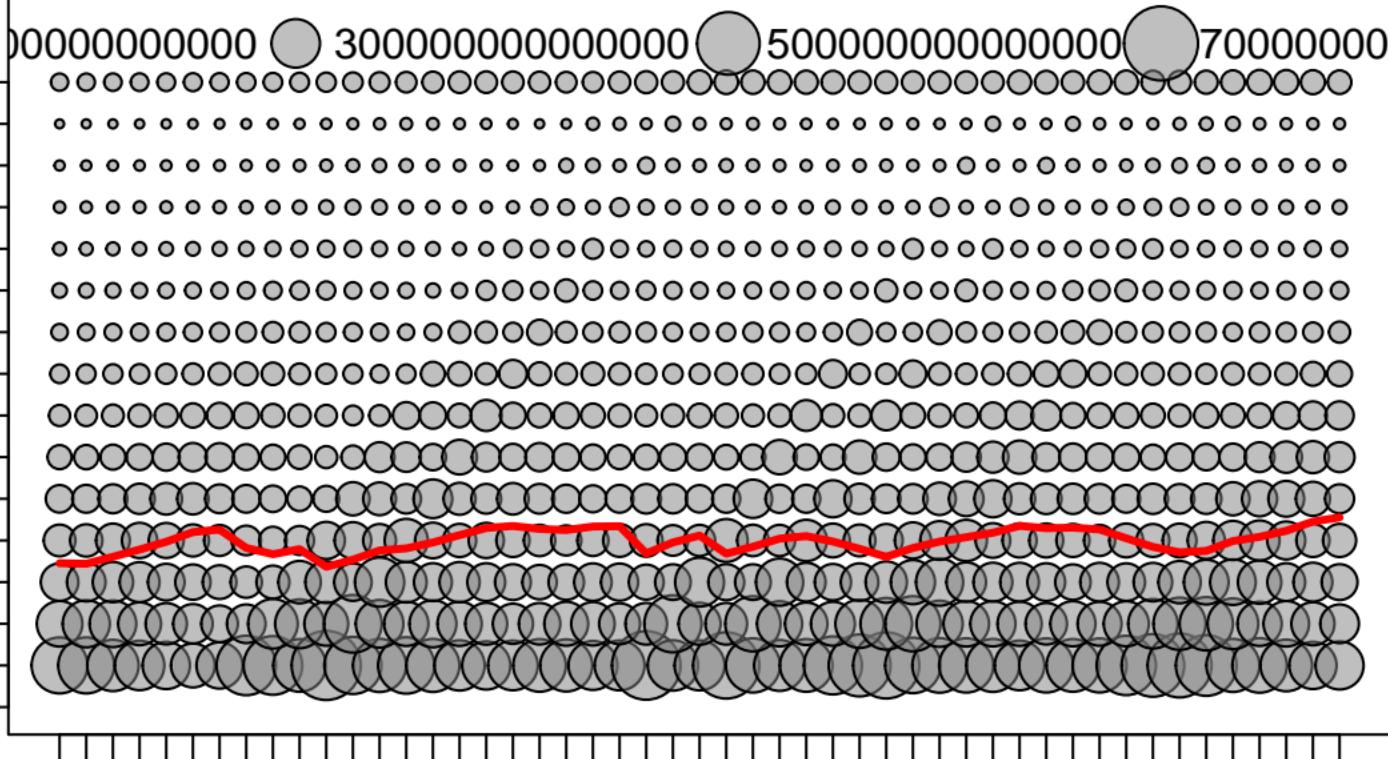


Age

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



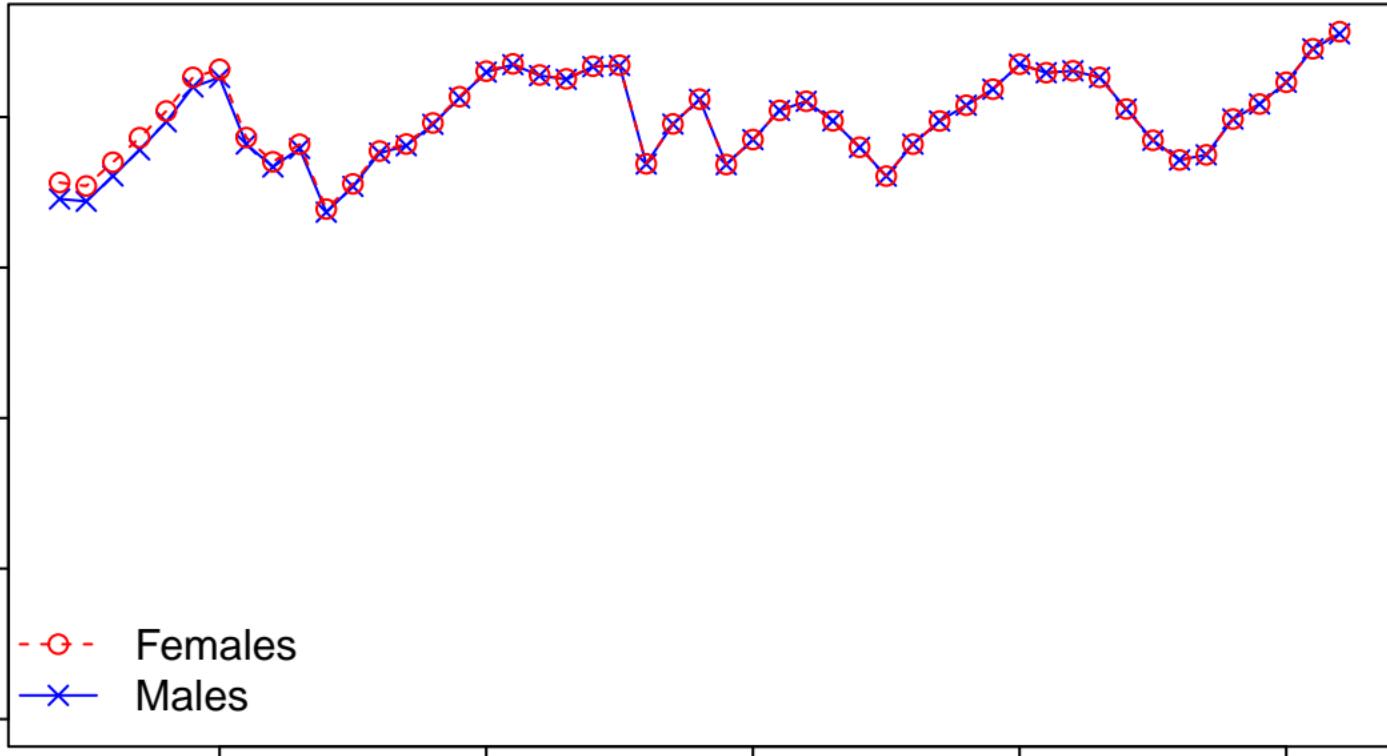
Mean age (yr)

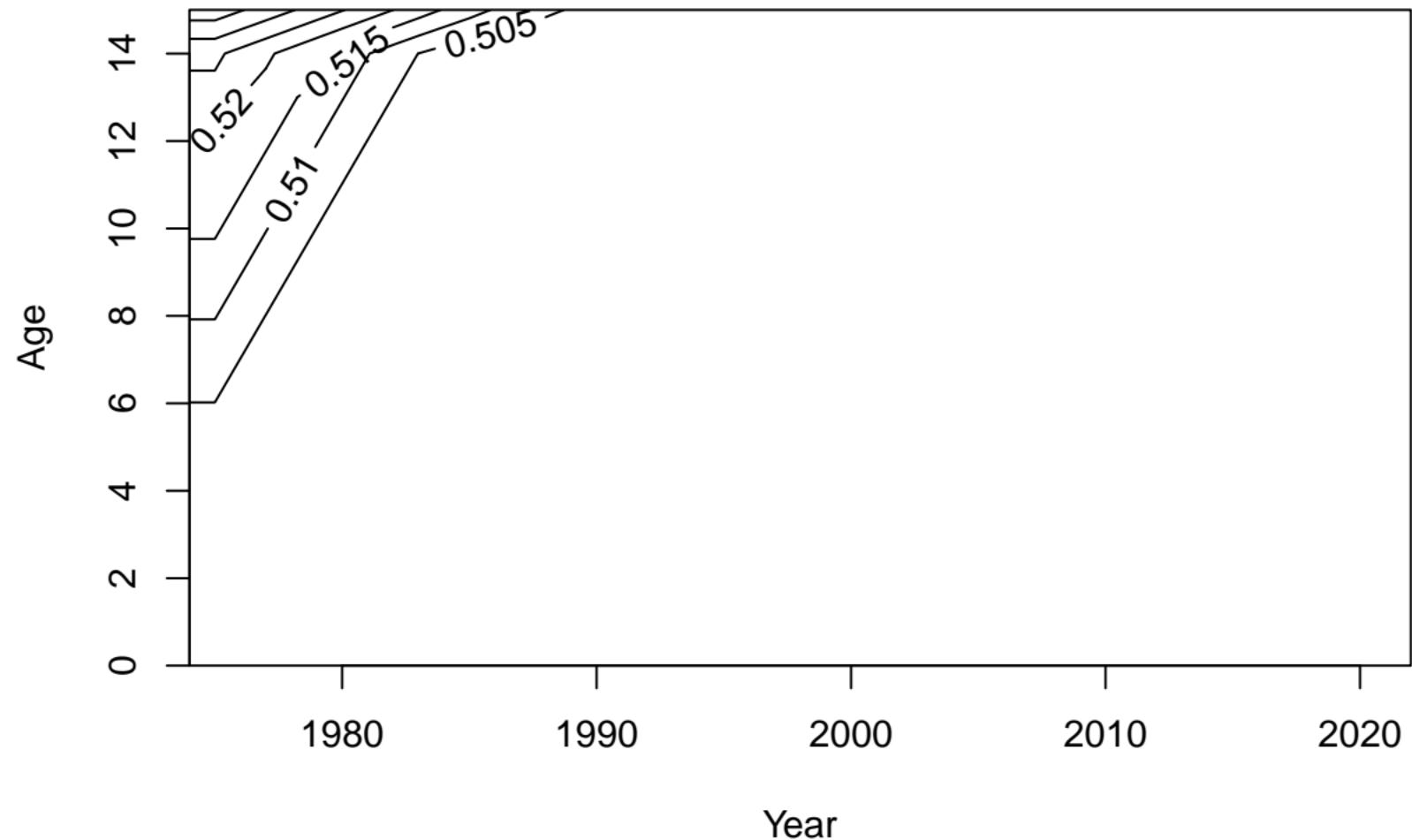
4
3
2
1
0

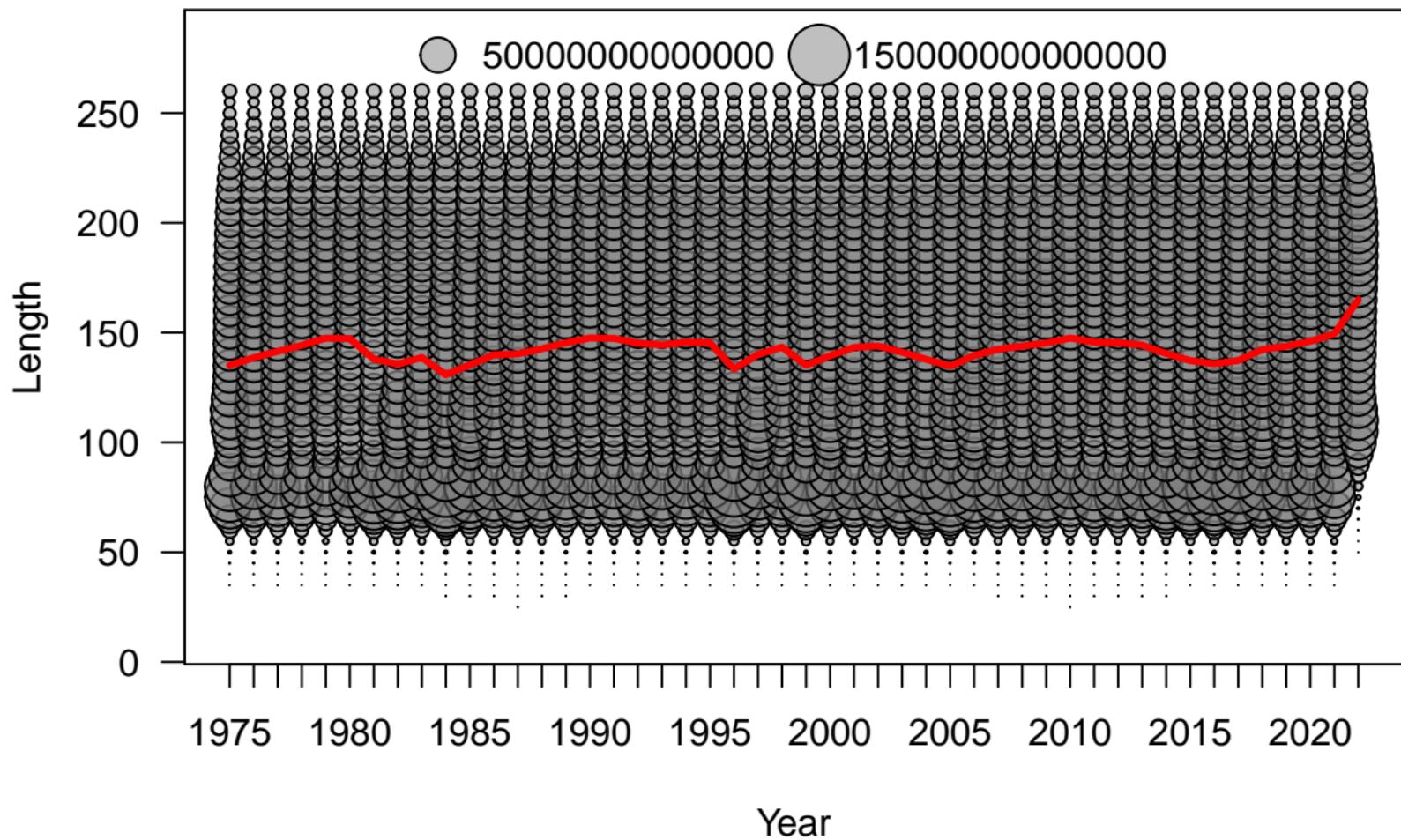
- -○- Females
—×— Males

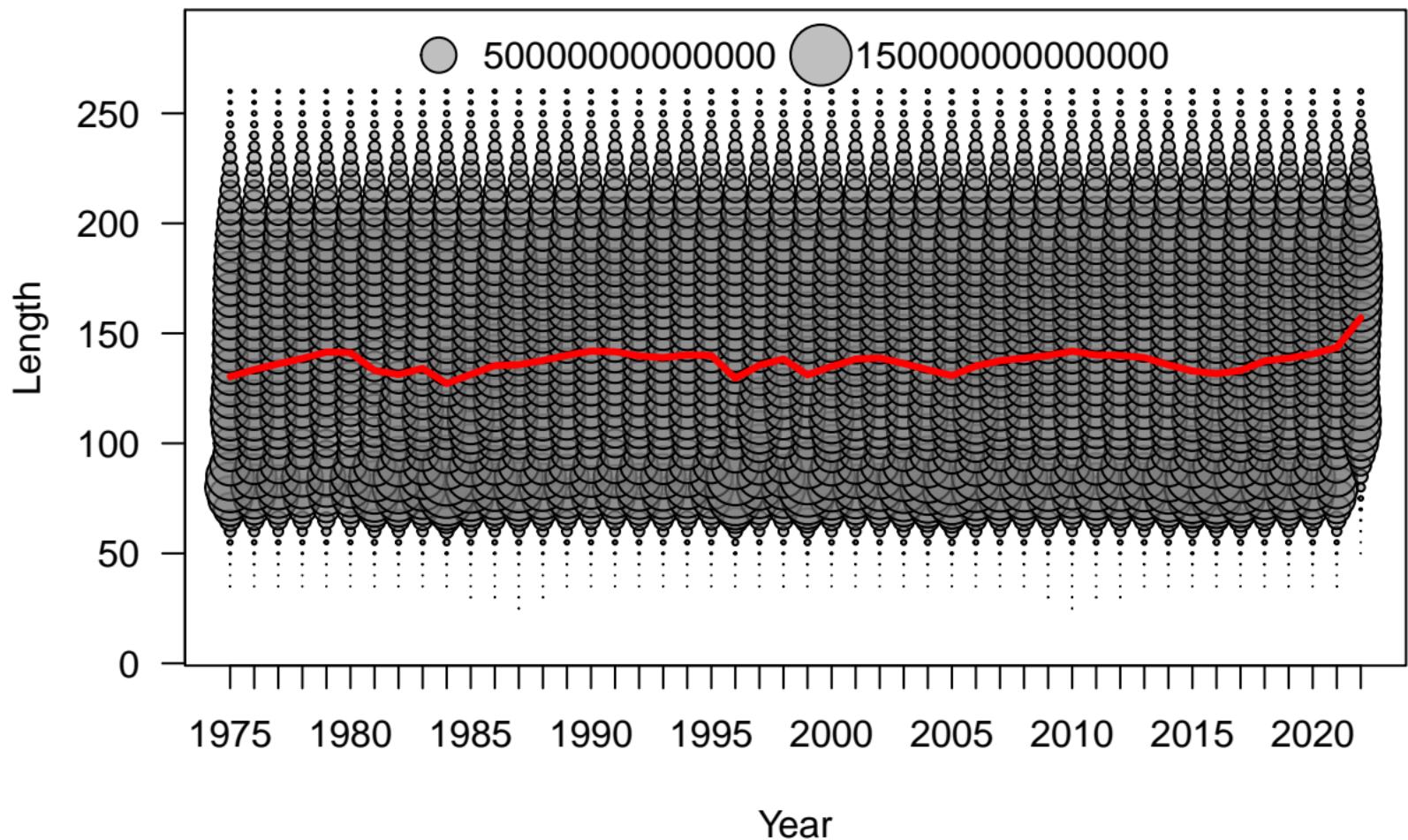
1980 1990 2000 2010 2020

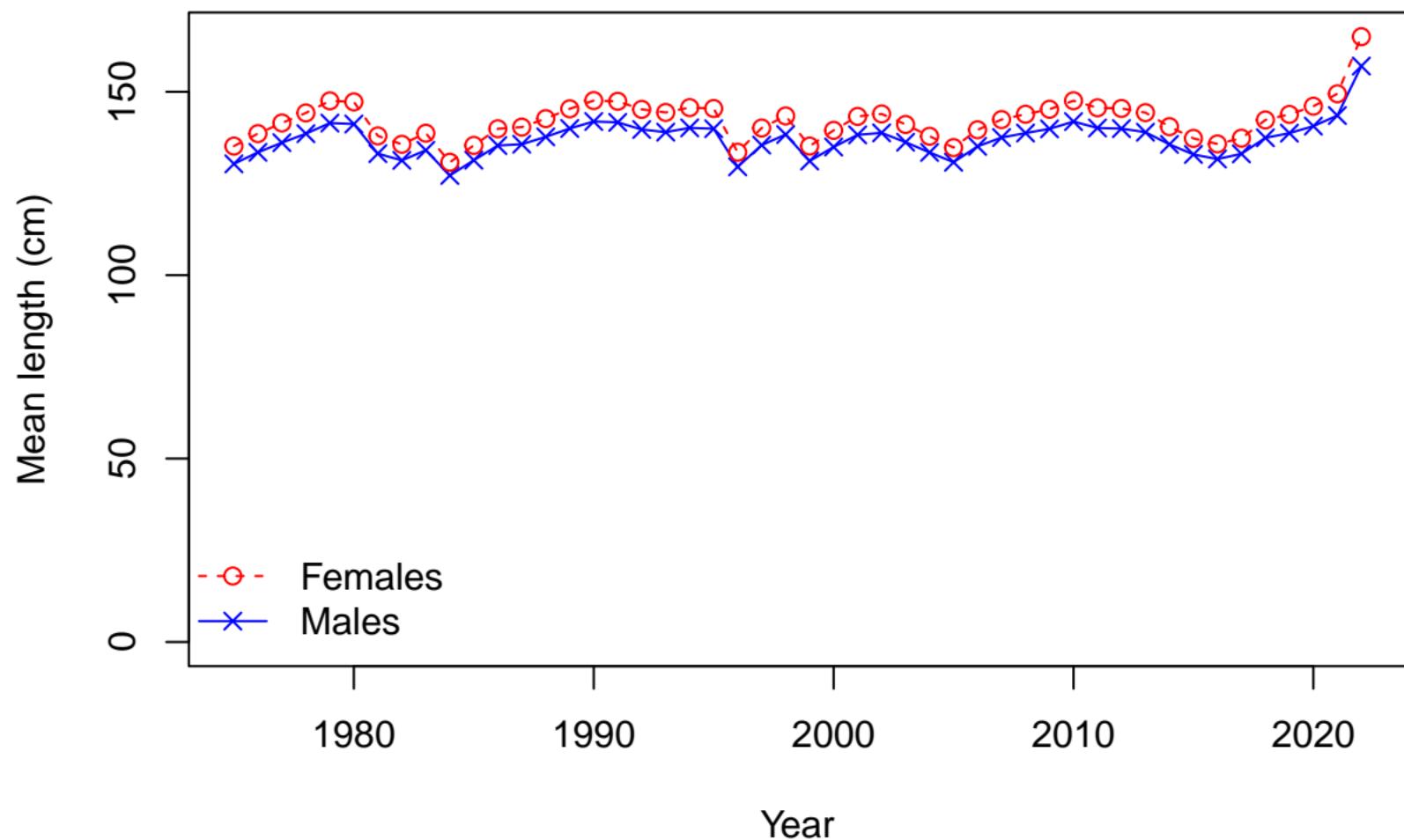
Year

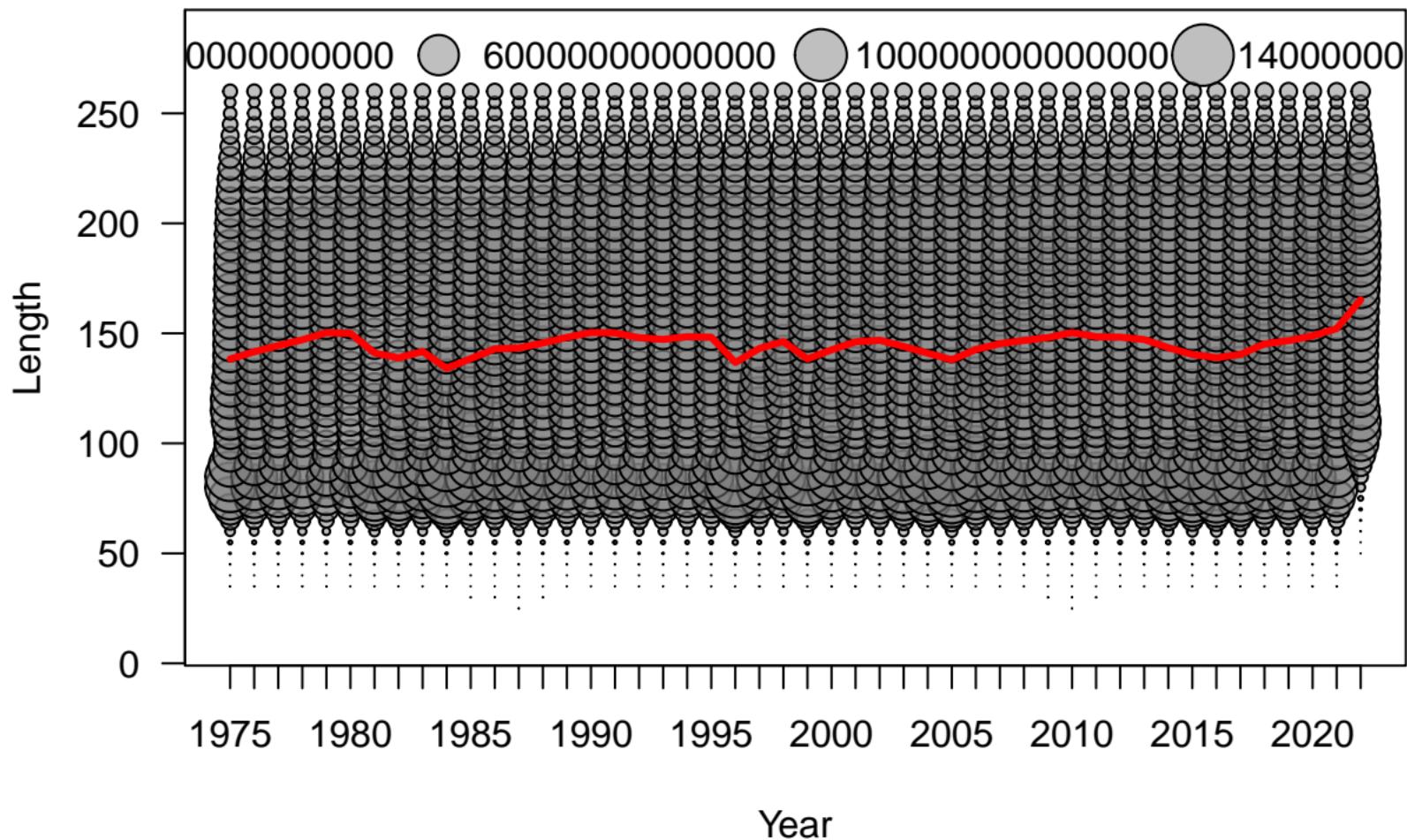


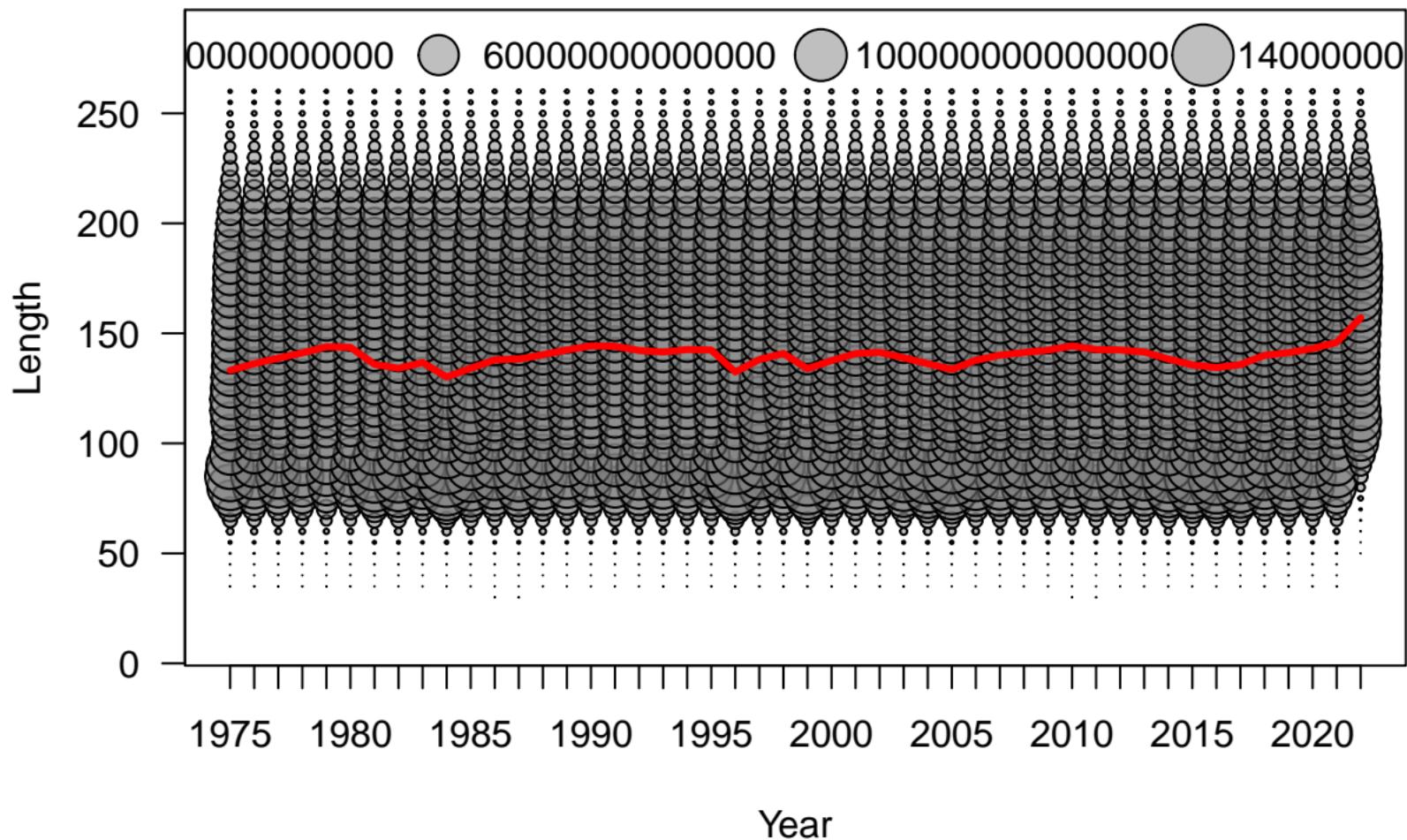


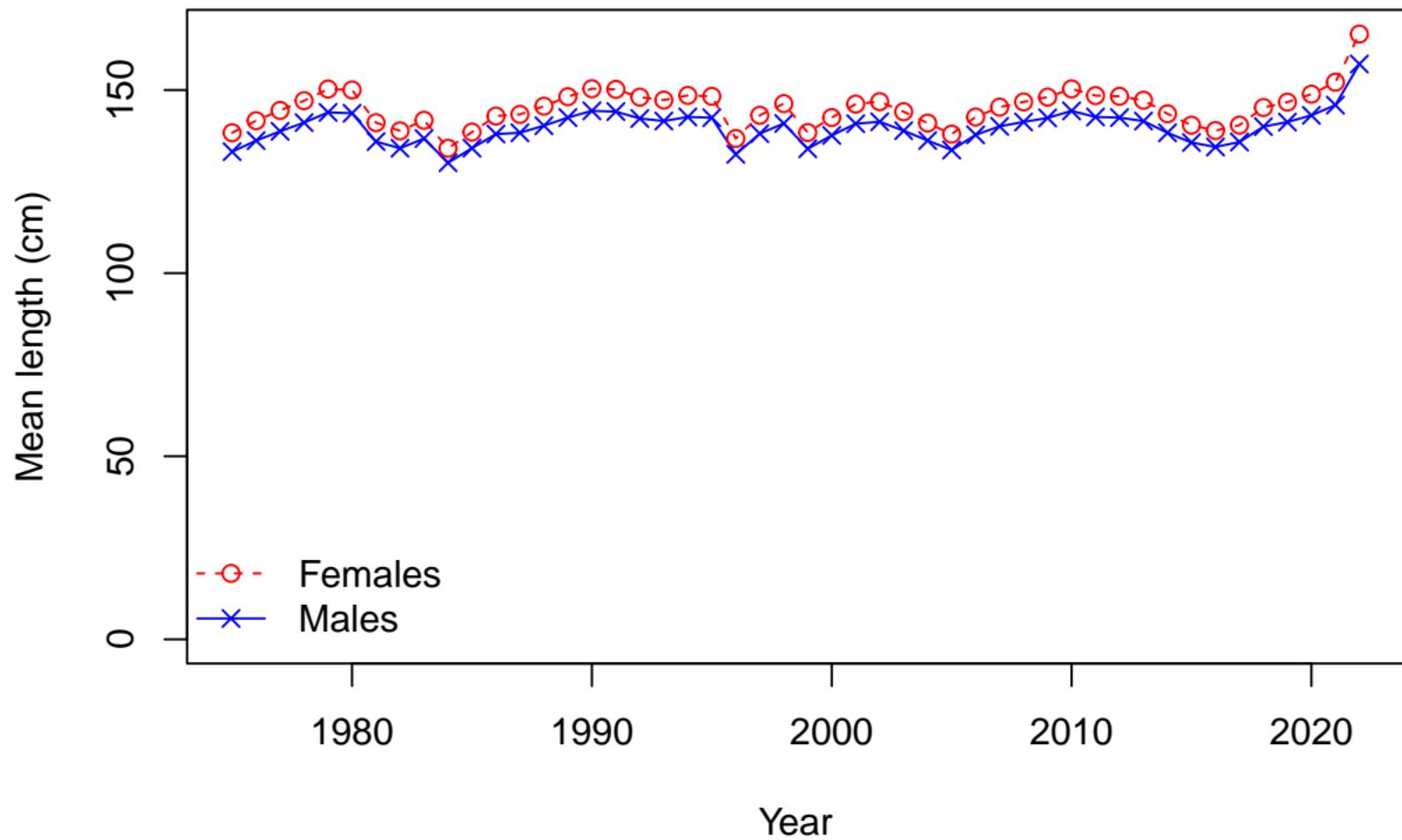


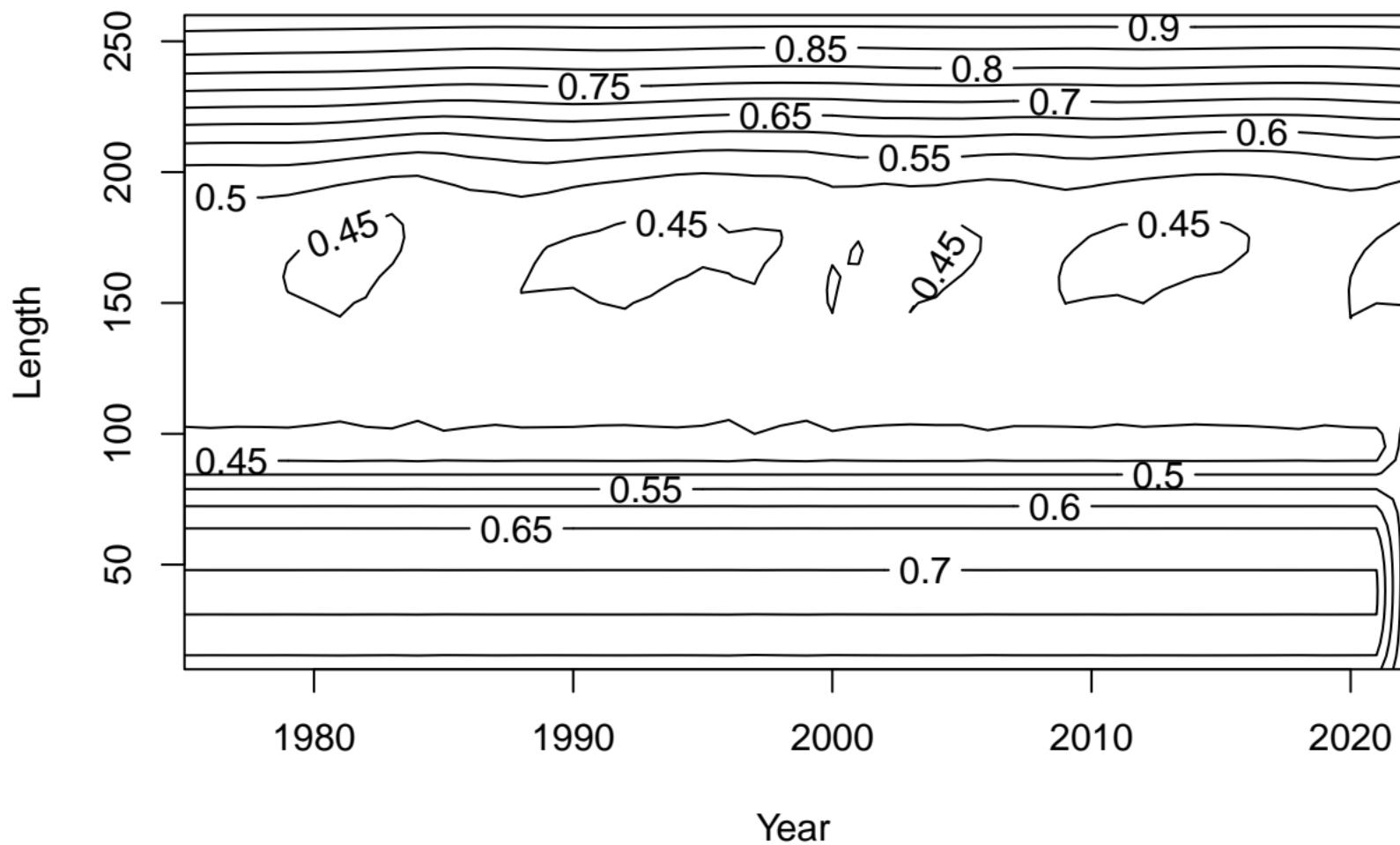




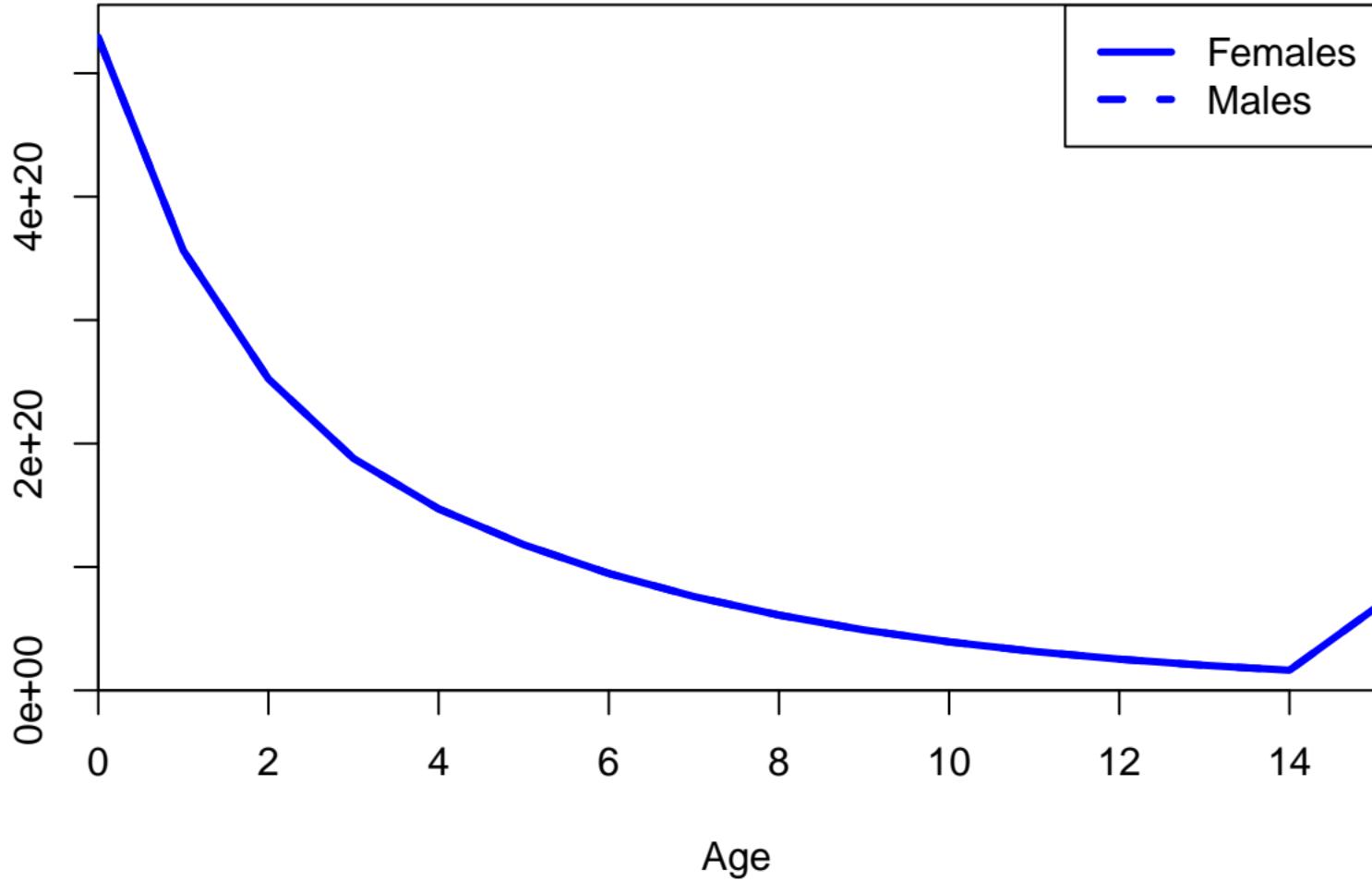




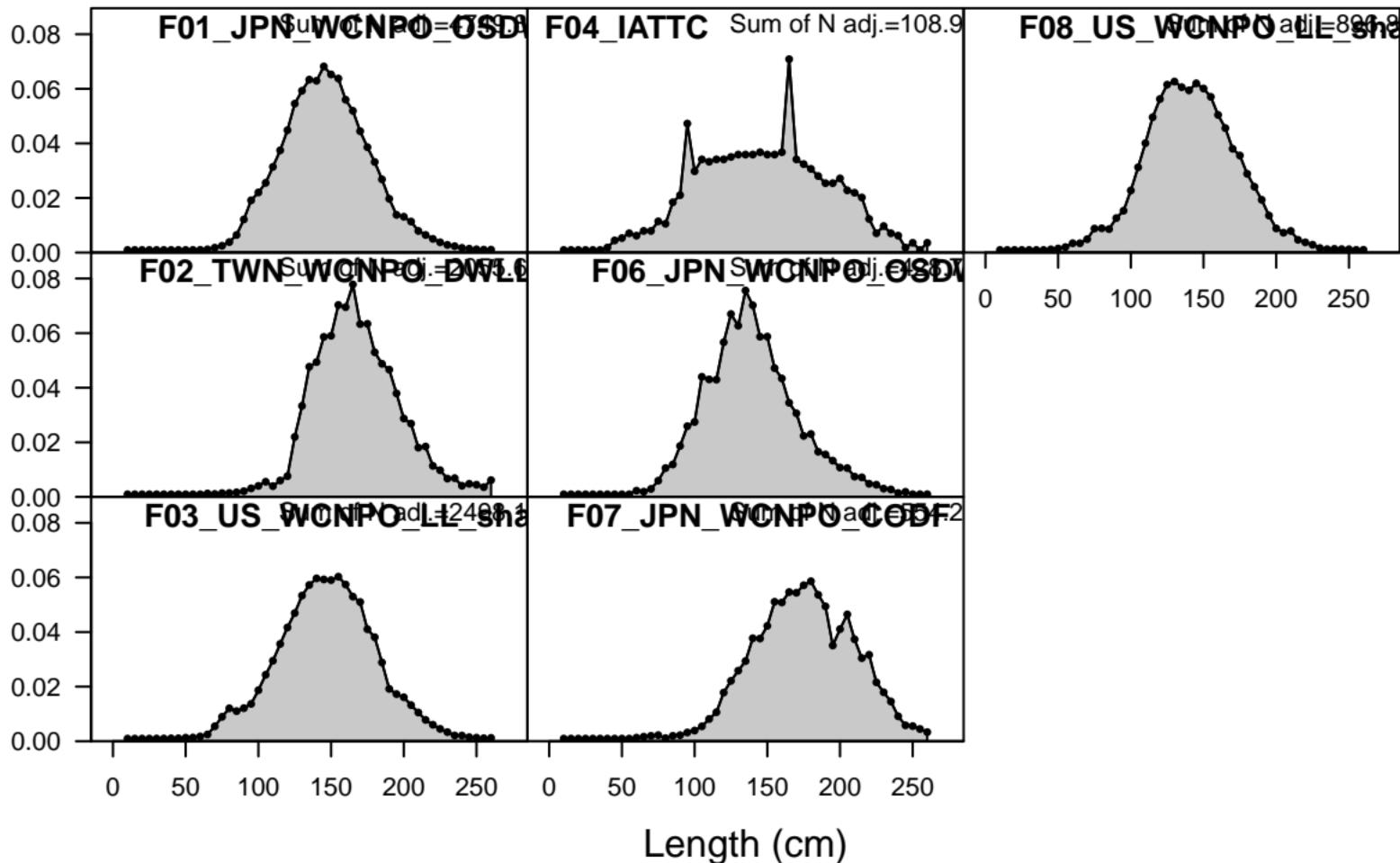


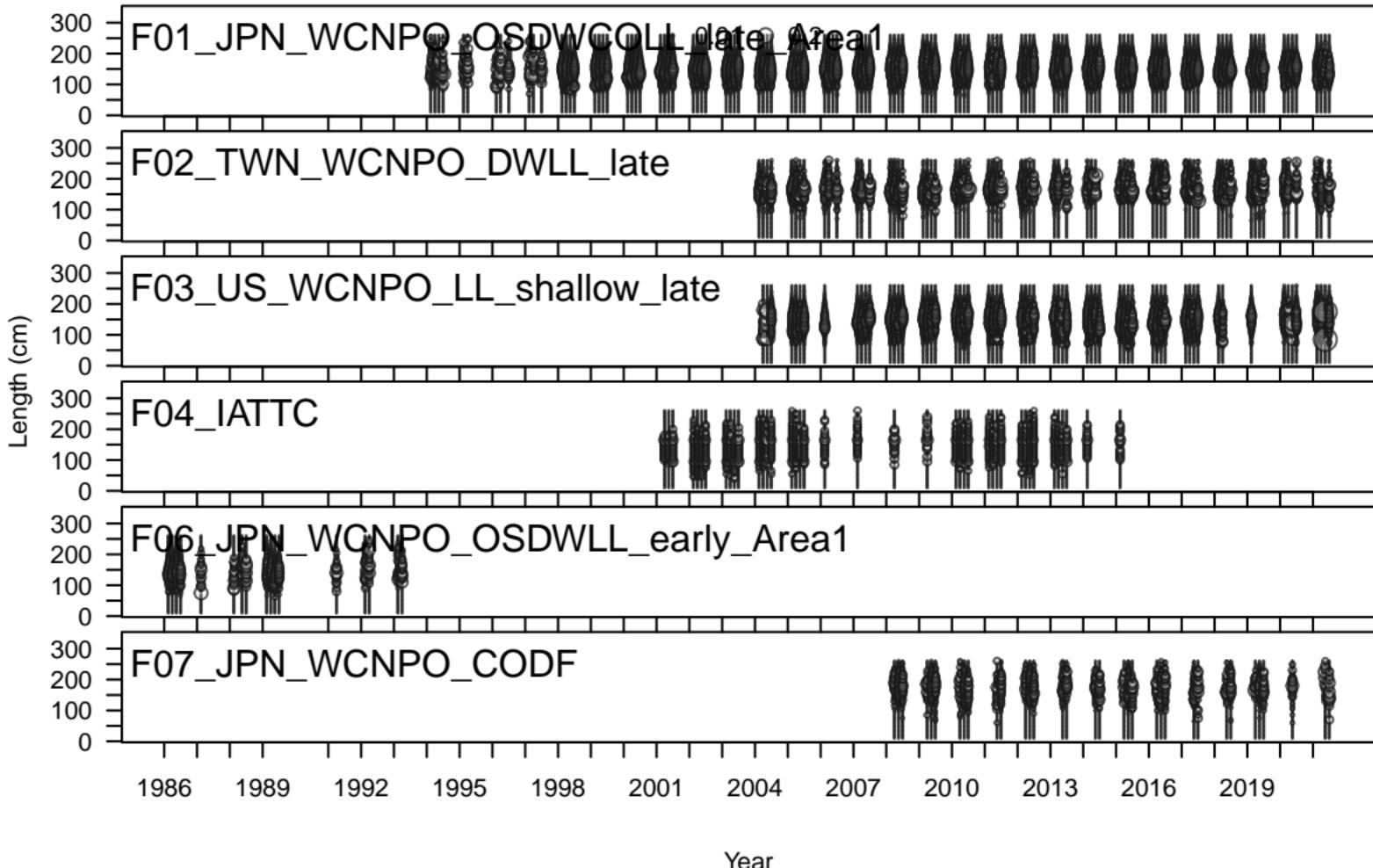


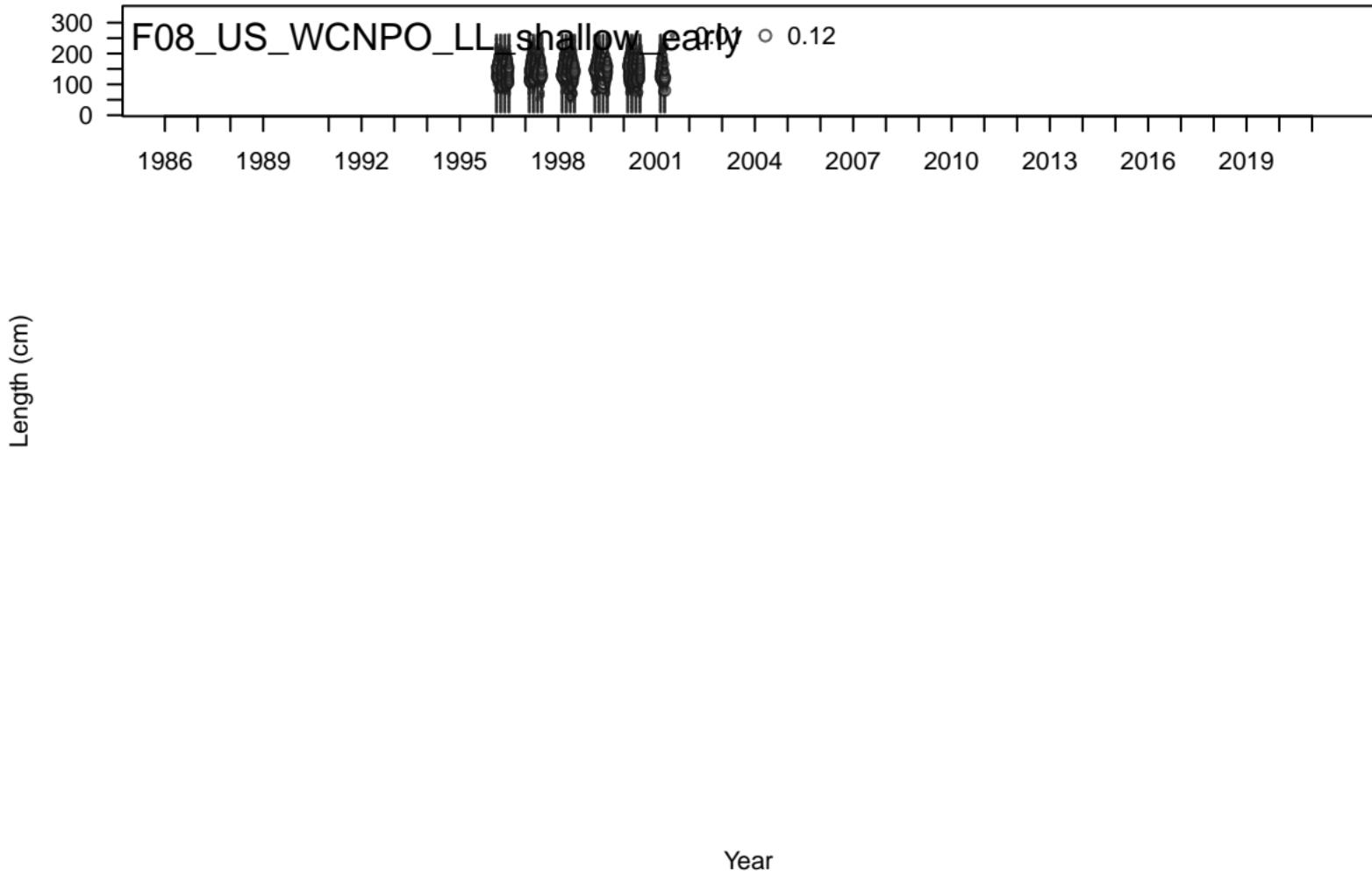
Numbers at age at equilibrium



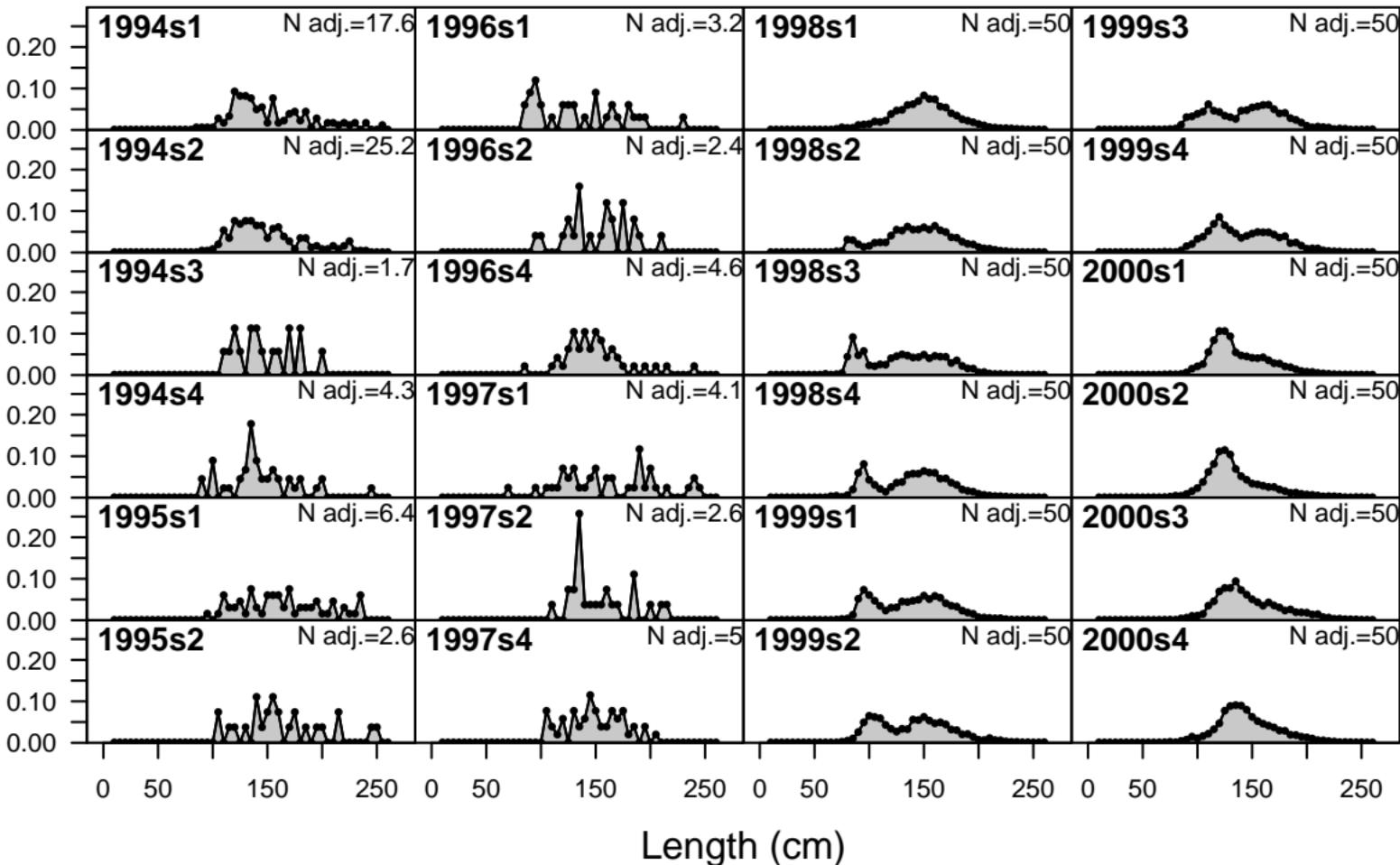
Proportion



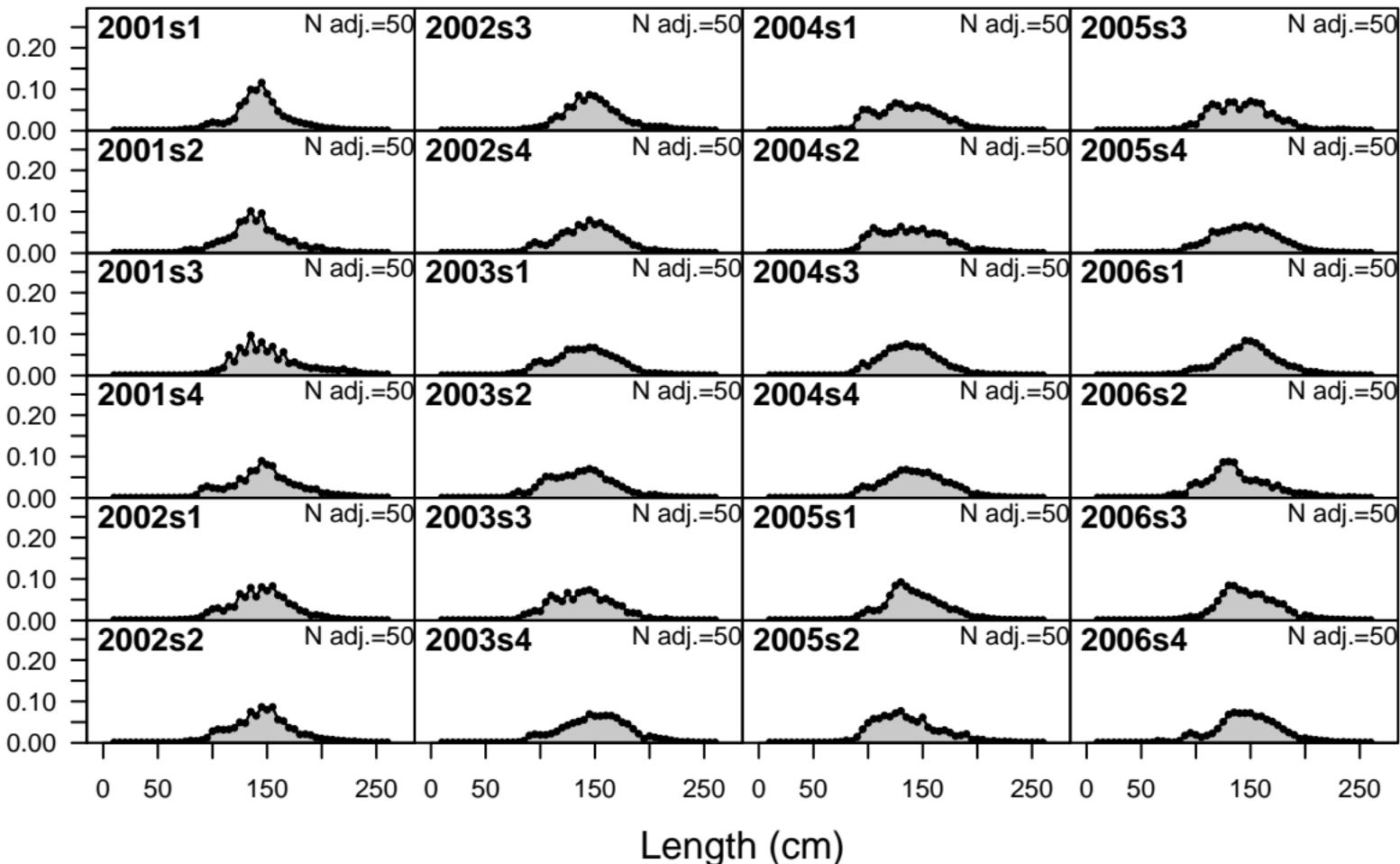




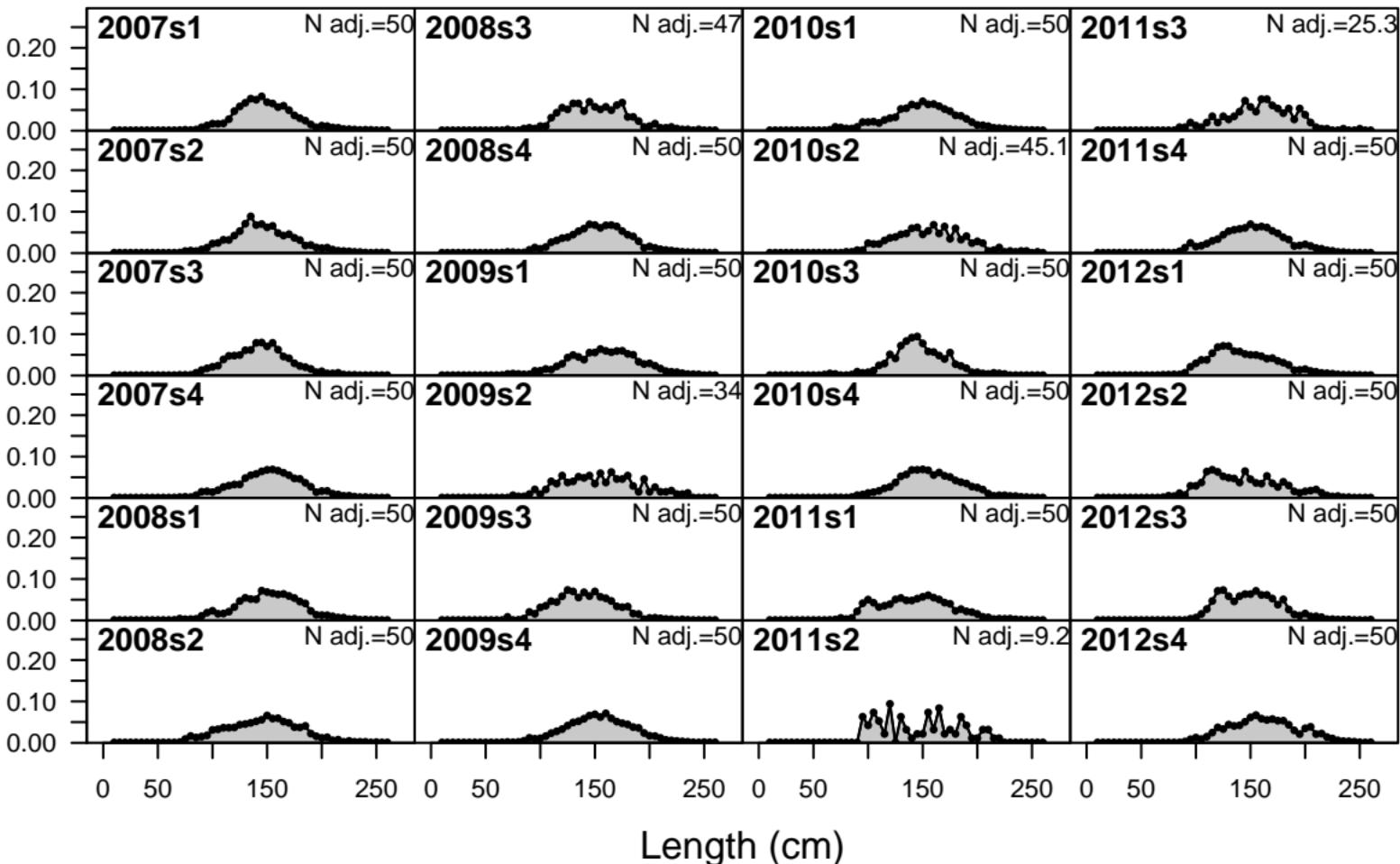
Proportion



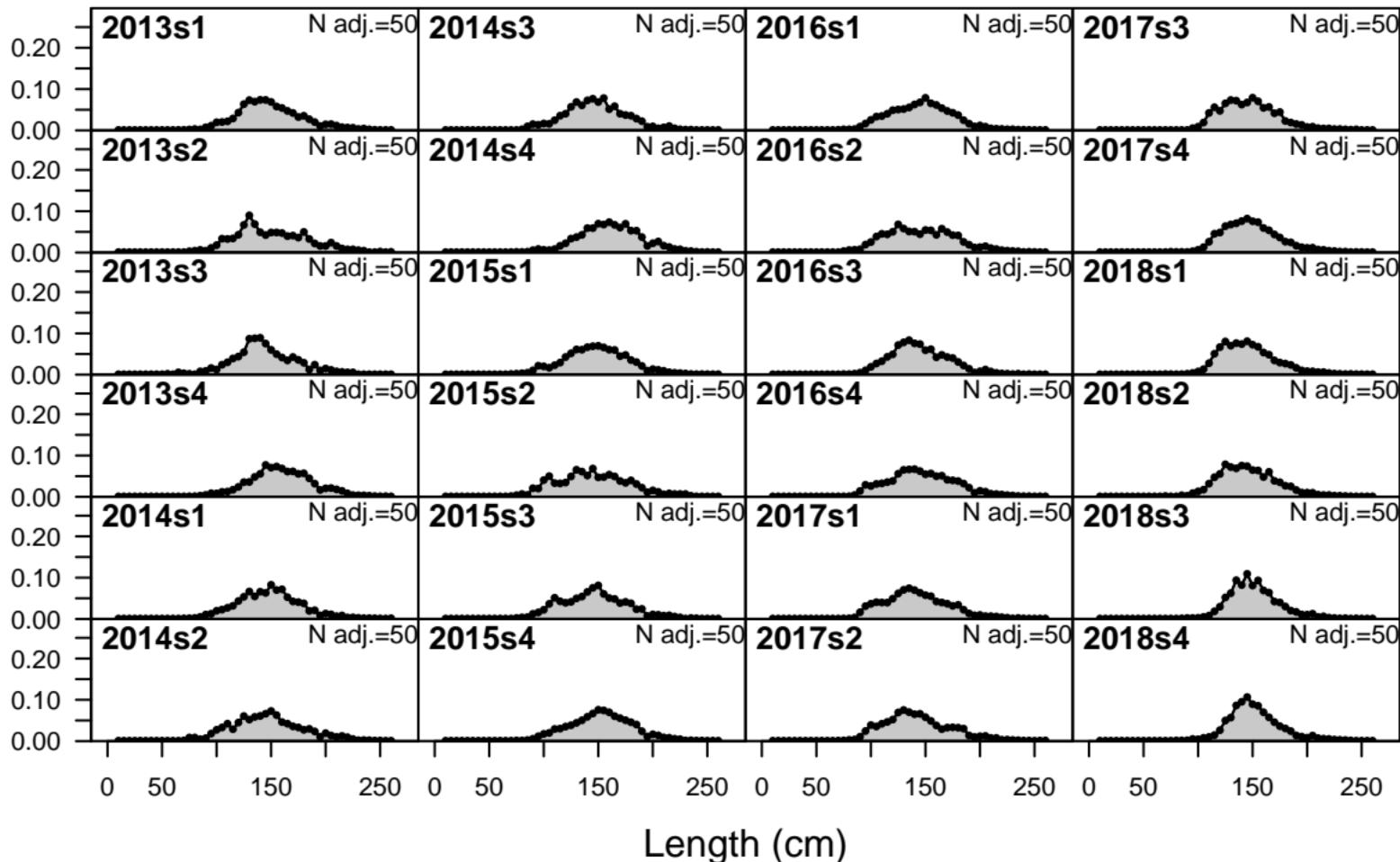
Proportion



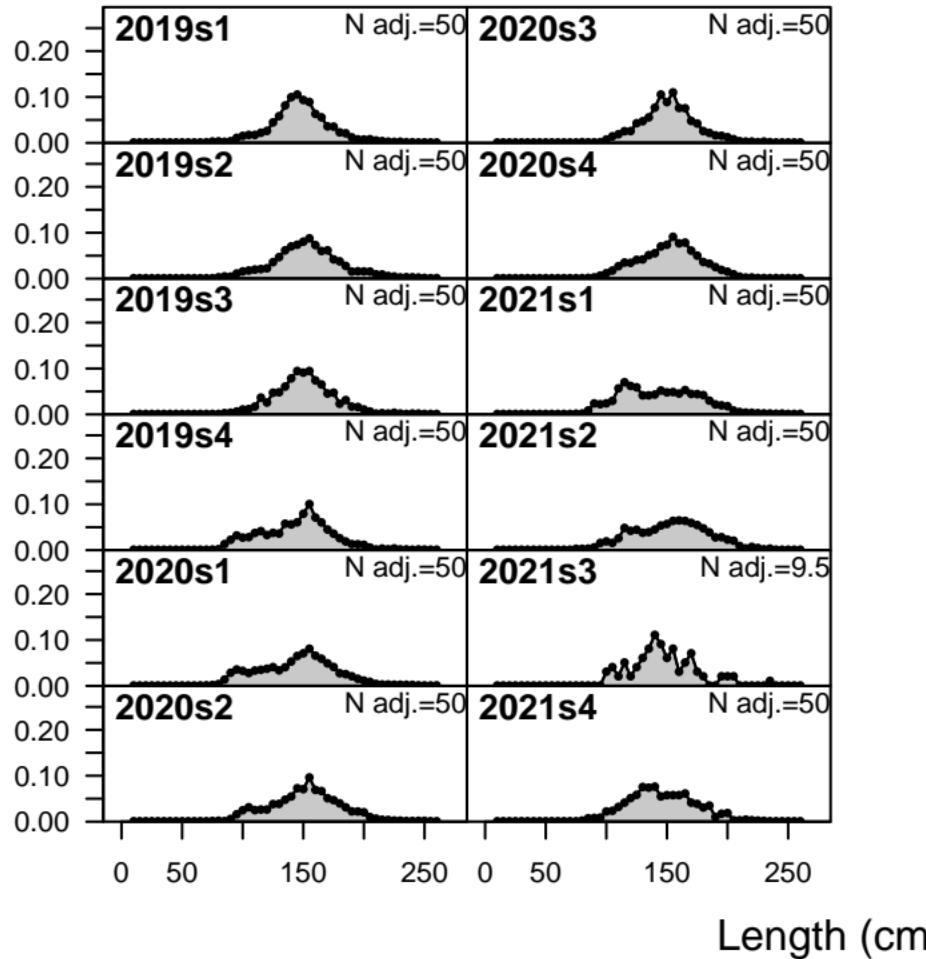
Proportion

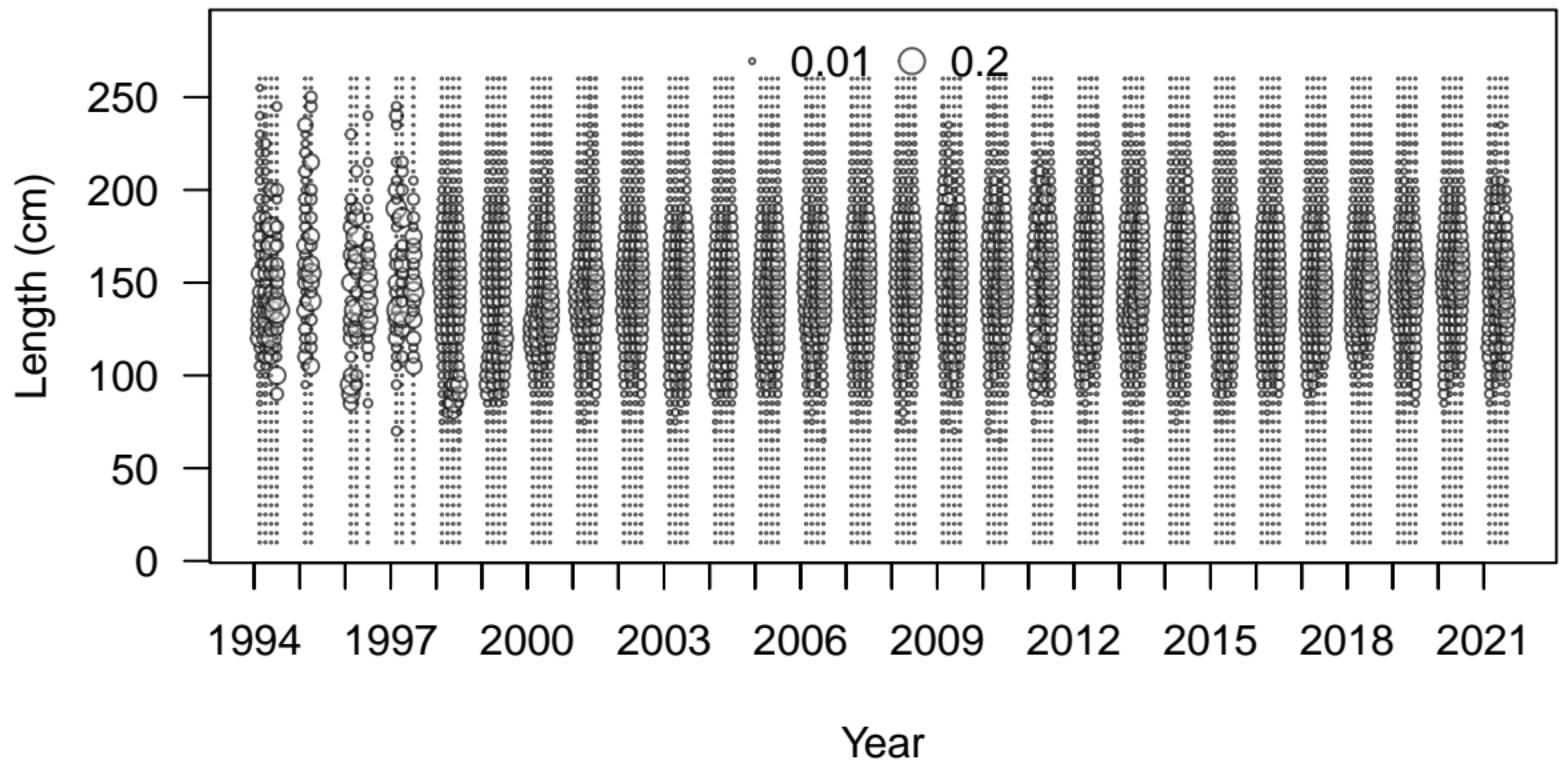


Proportion

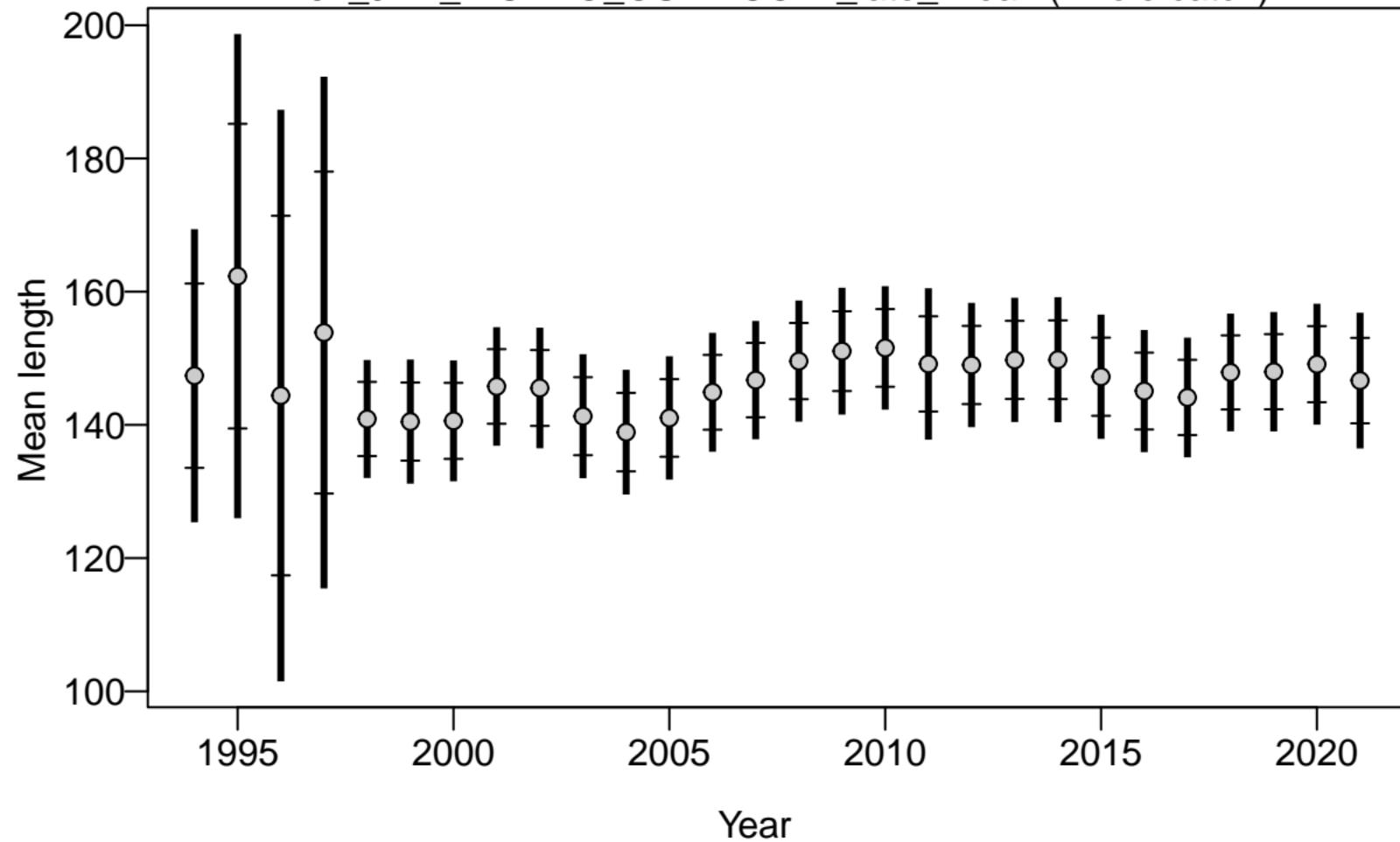


Proportion

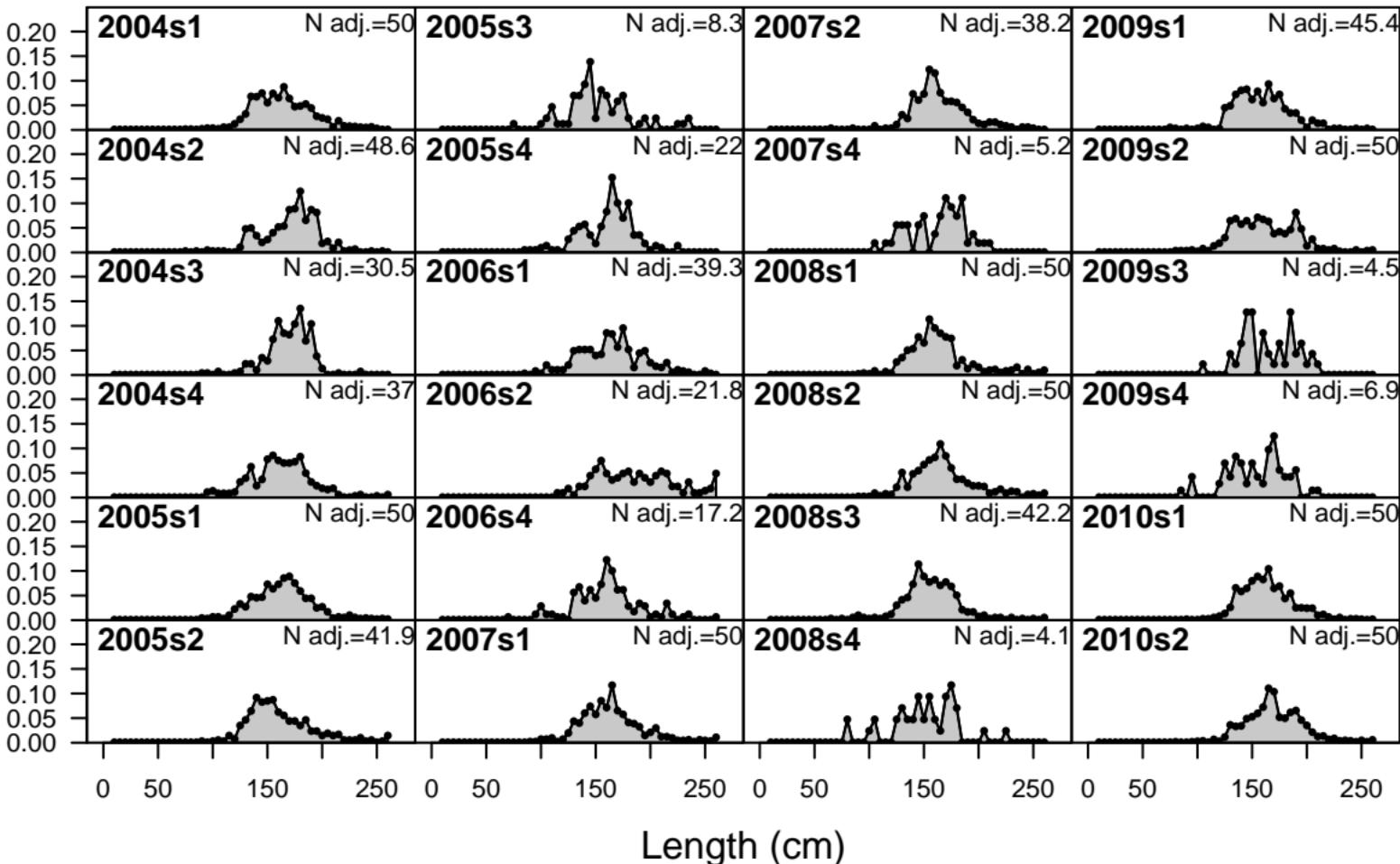




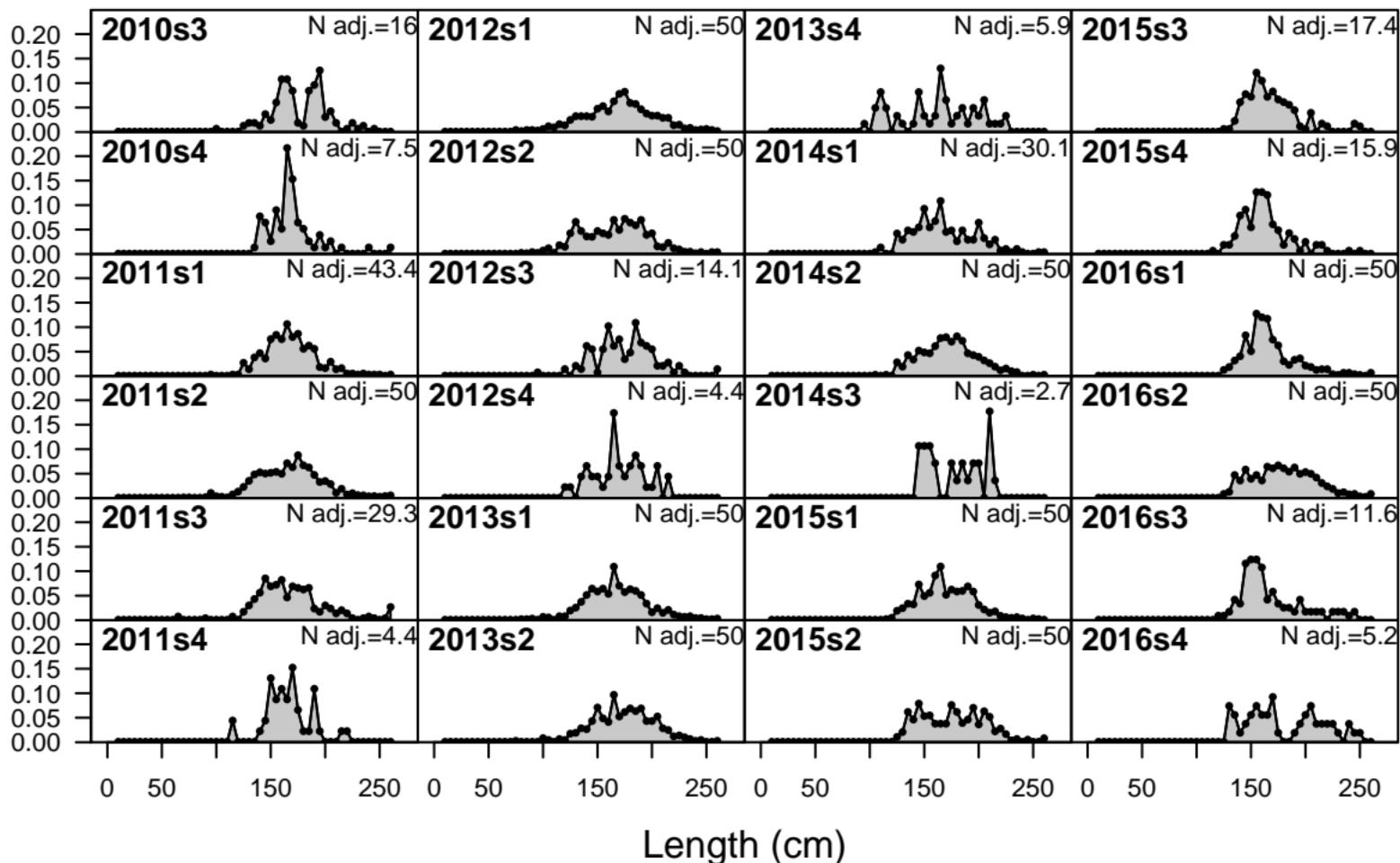
F01_JPN_WCNPO OSDWCOLL_late_Area1 (whole catch)



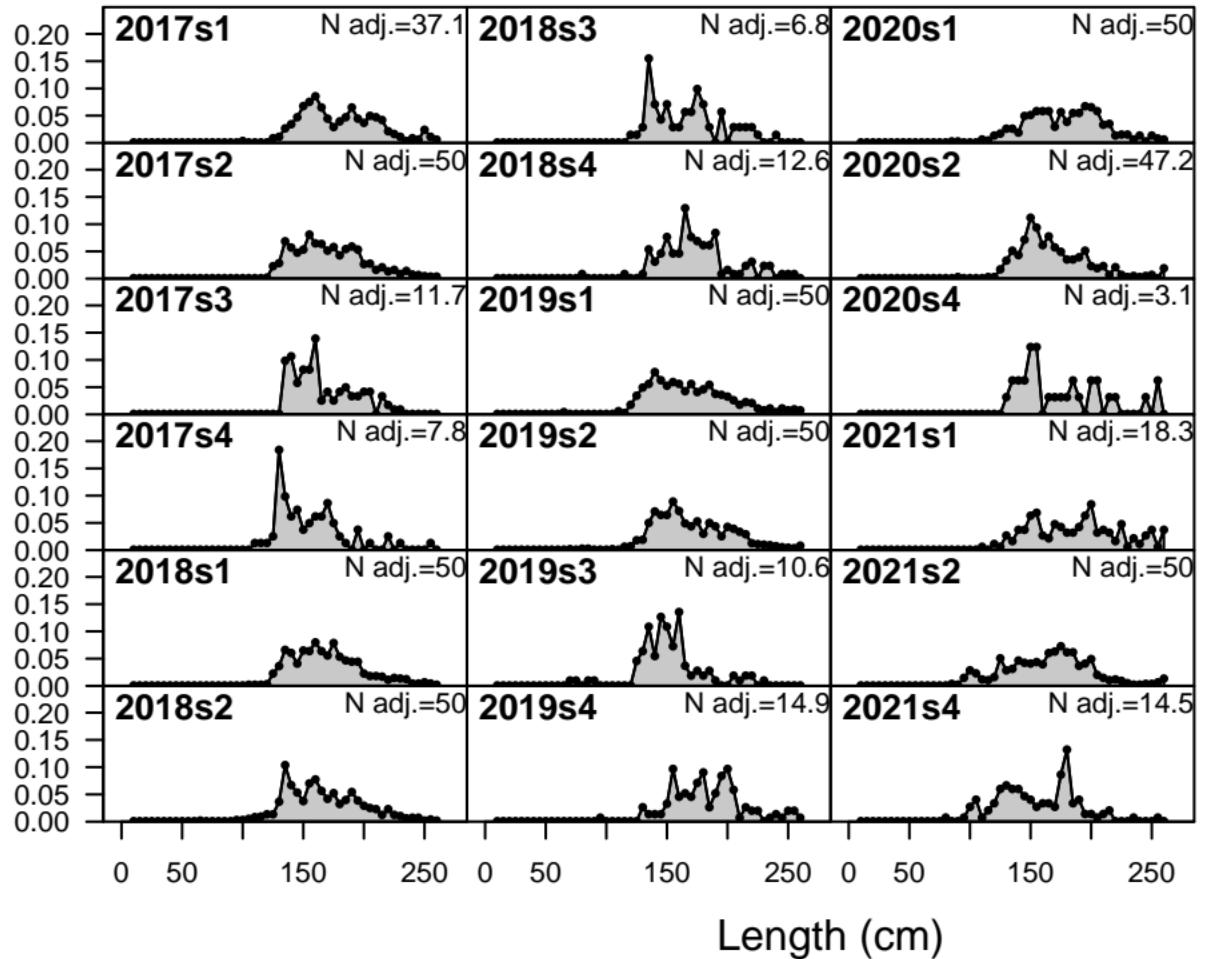
Proportion

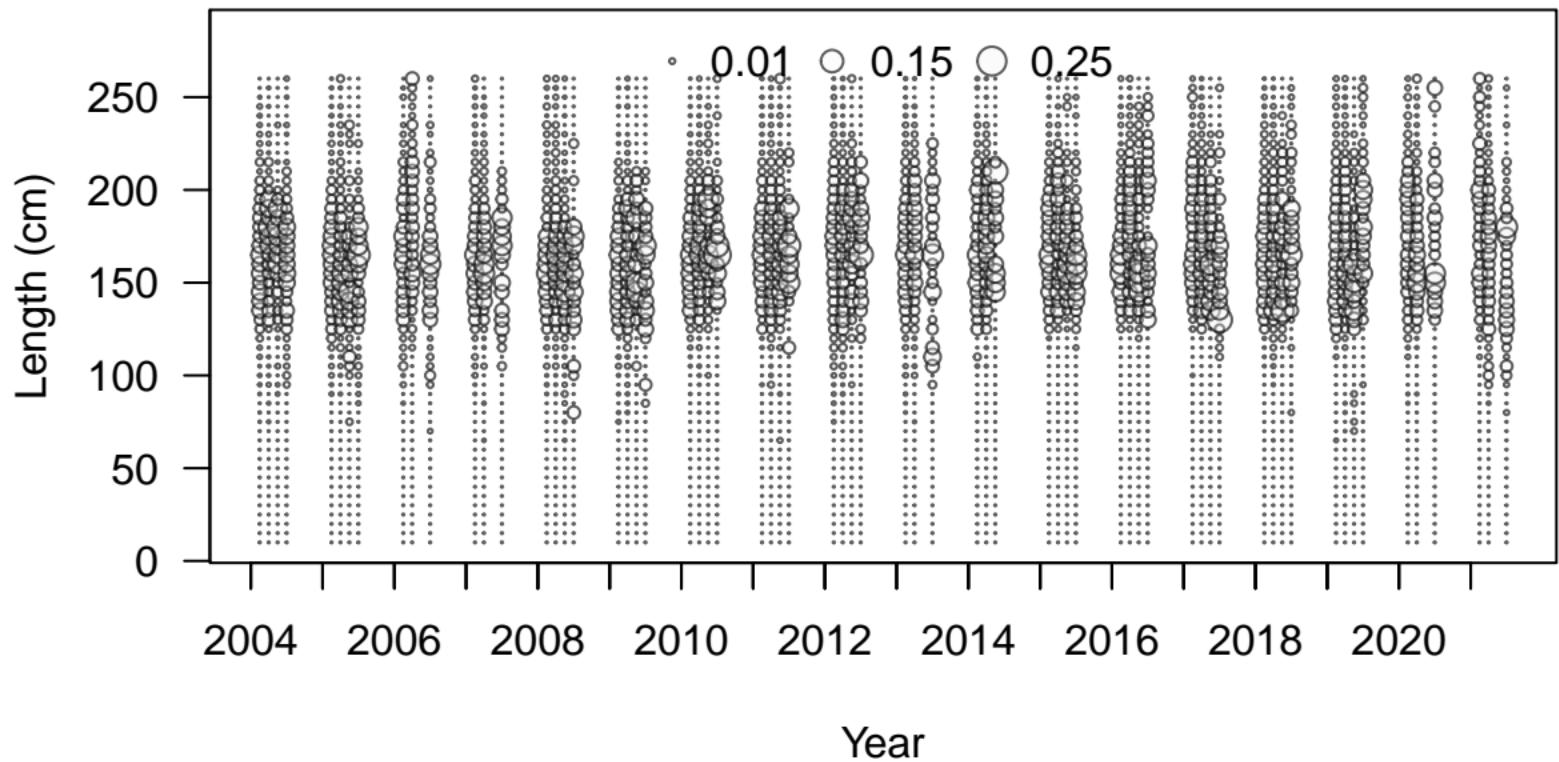


Proportion

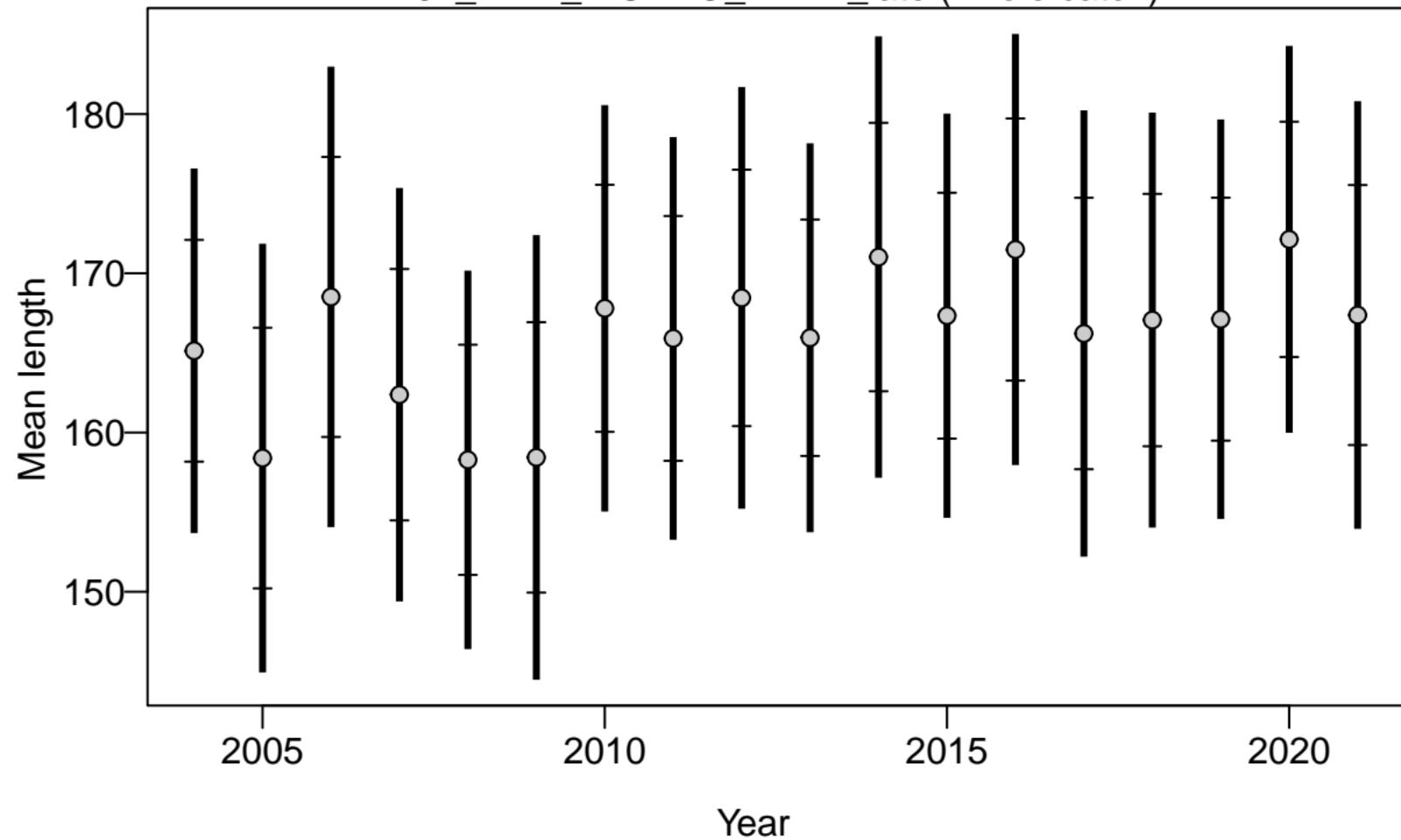


Proportion

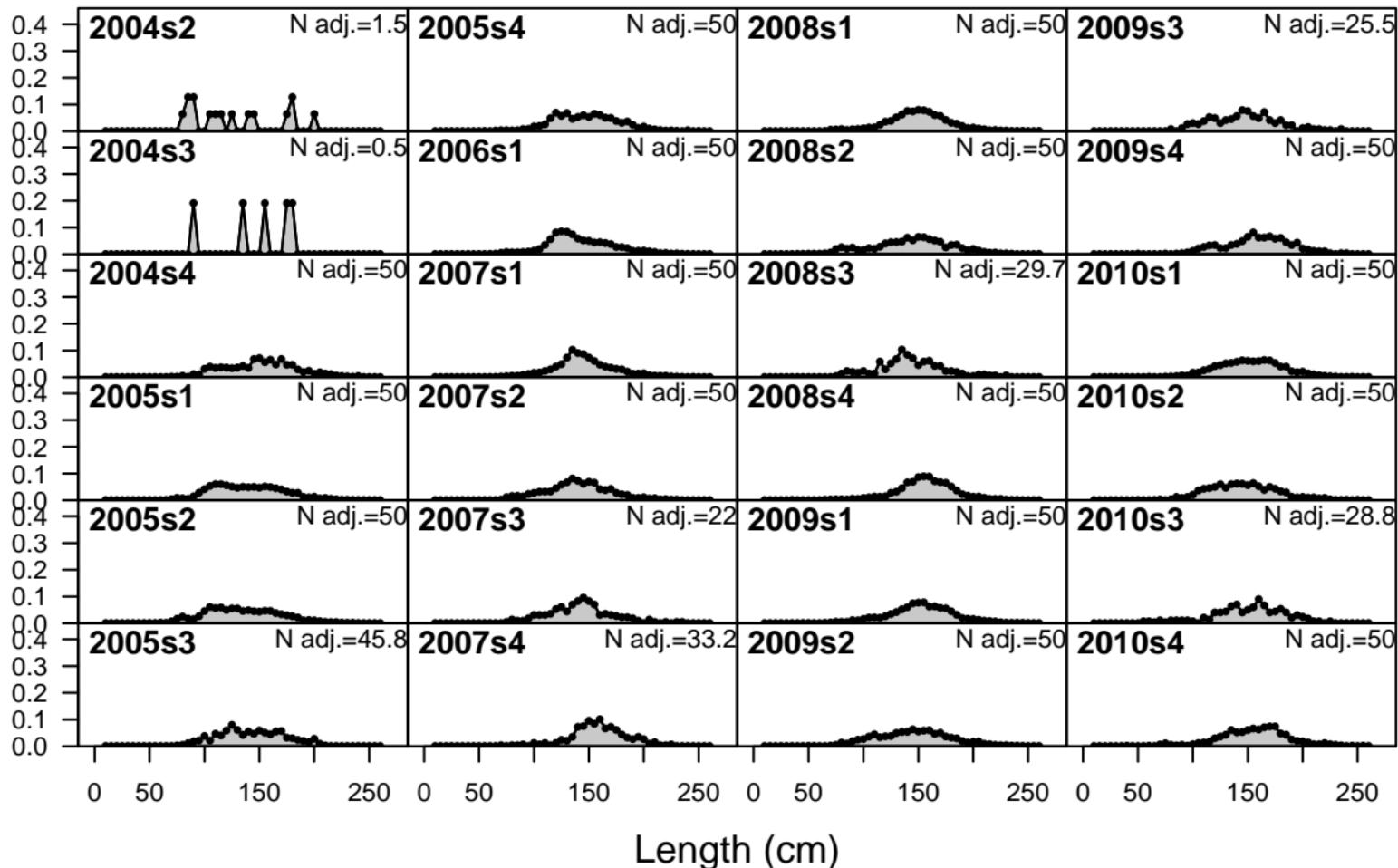




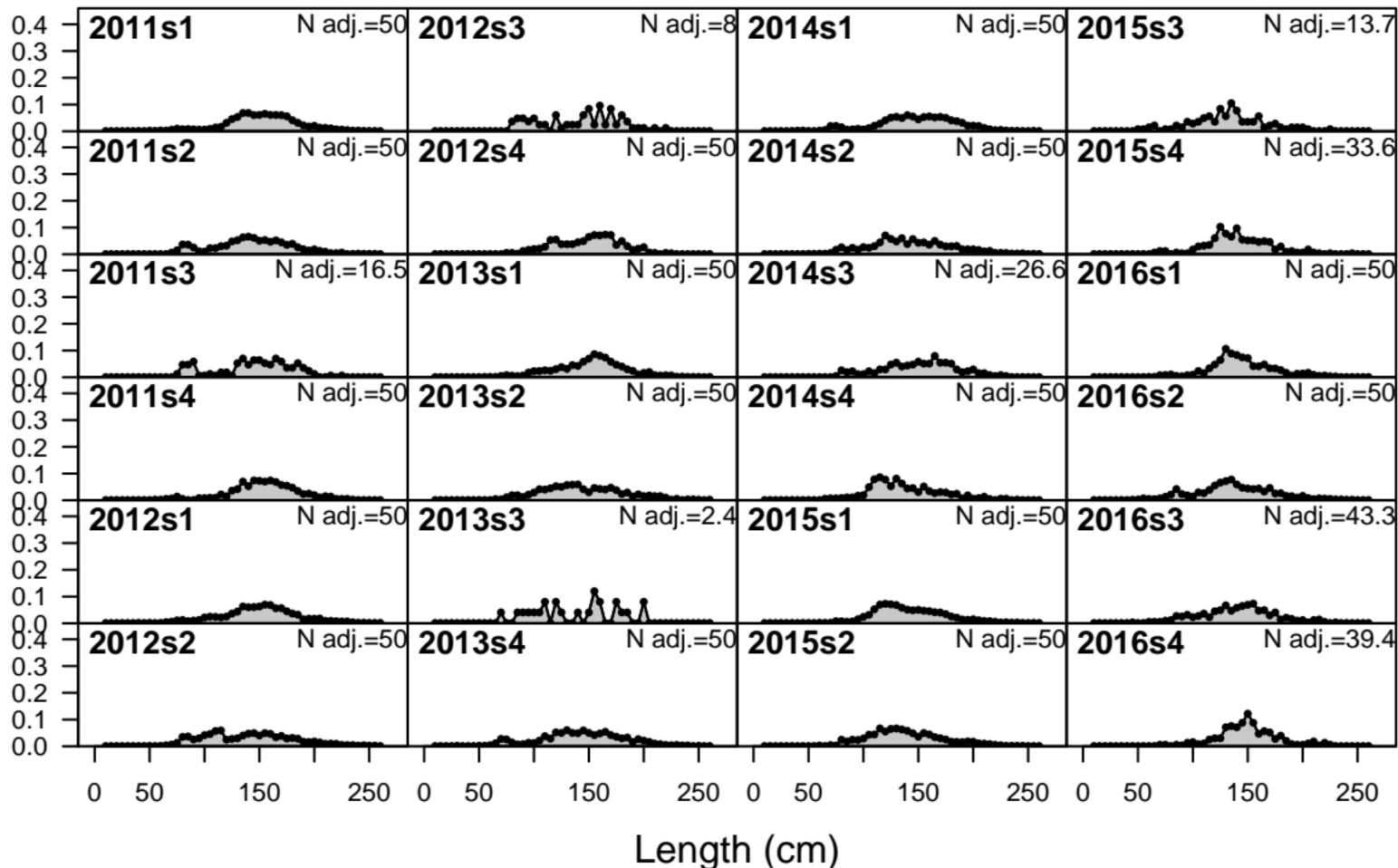
F02_TWN_WCNPO_DWLL_late (whole catch)



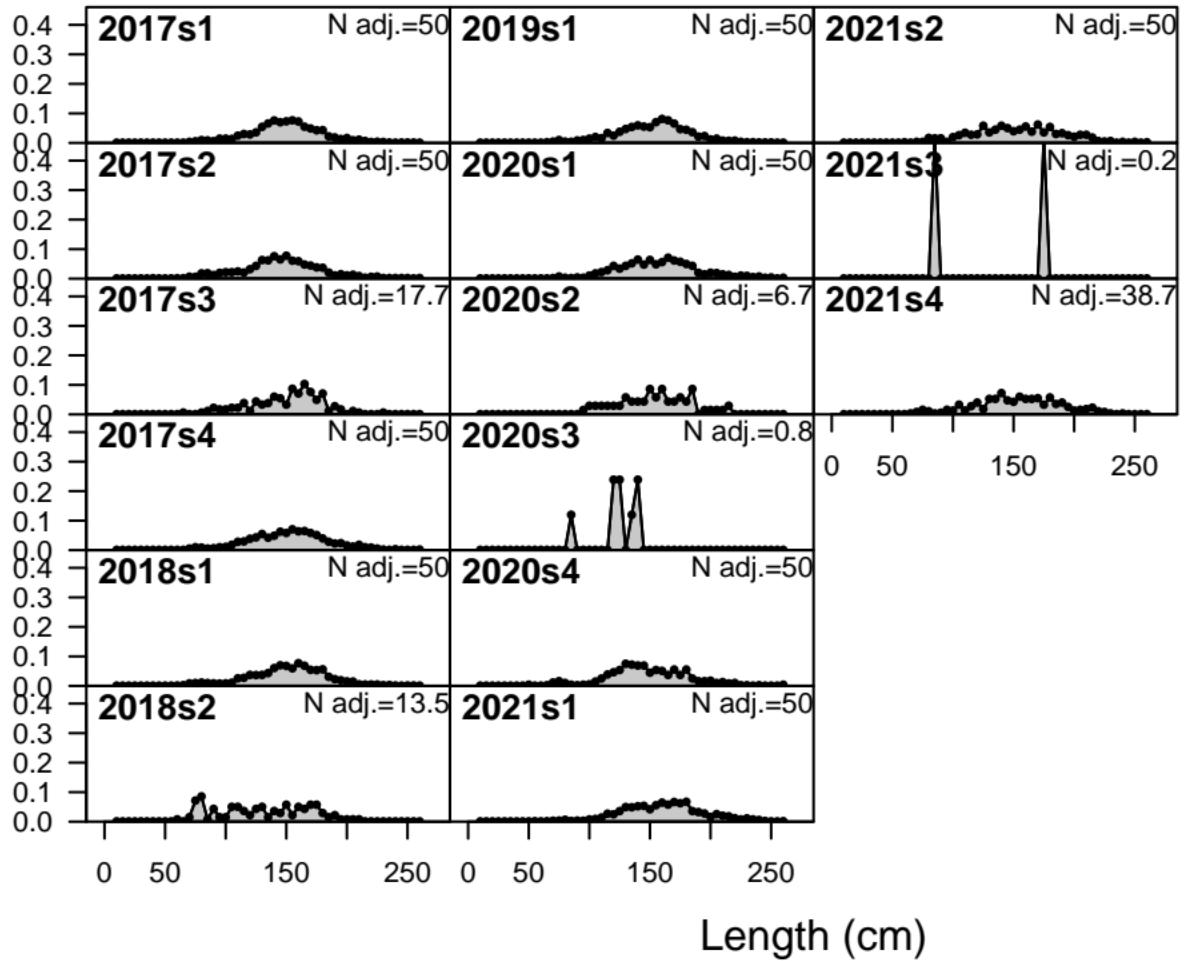
Proportion

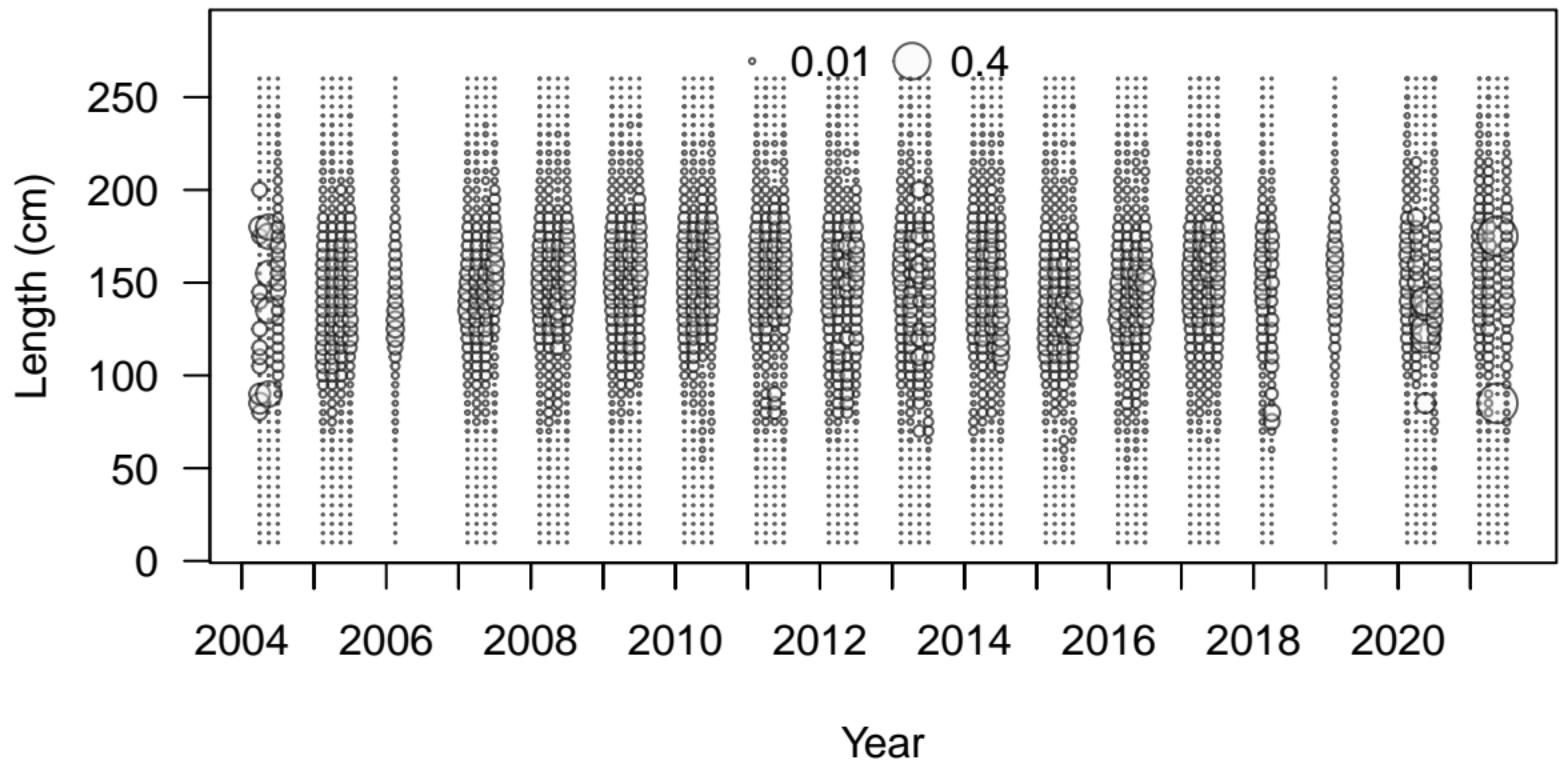


Proportion

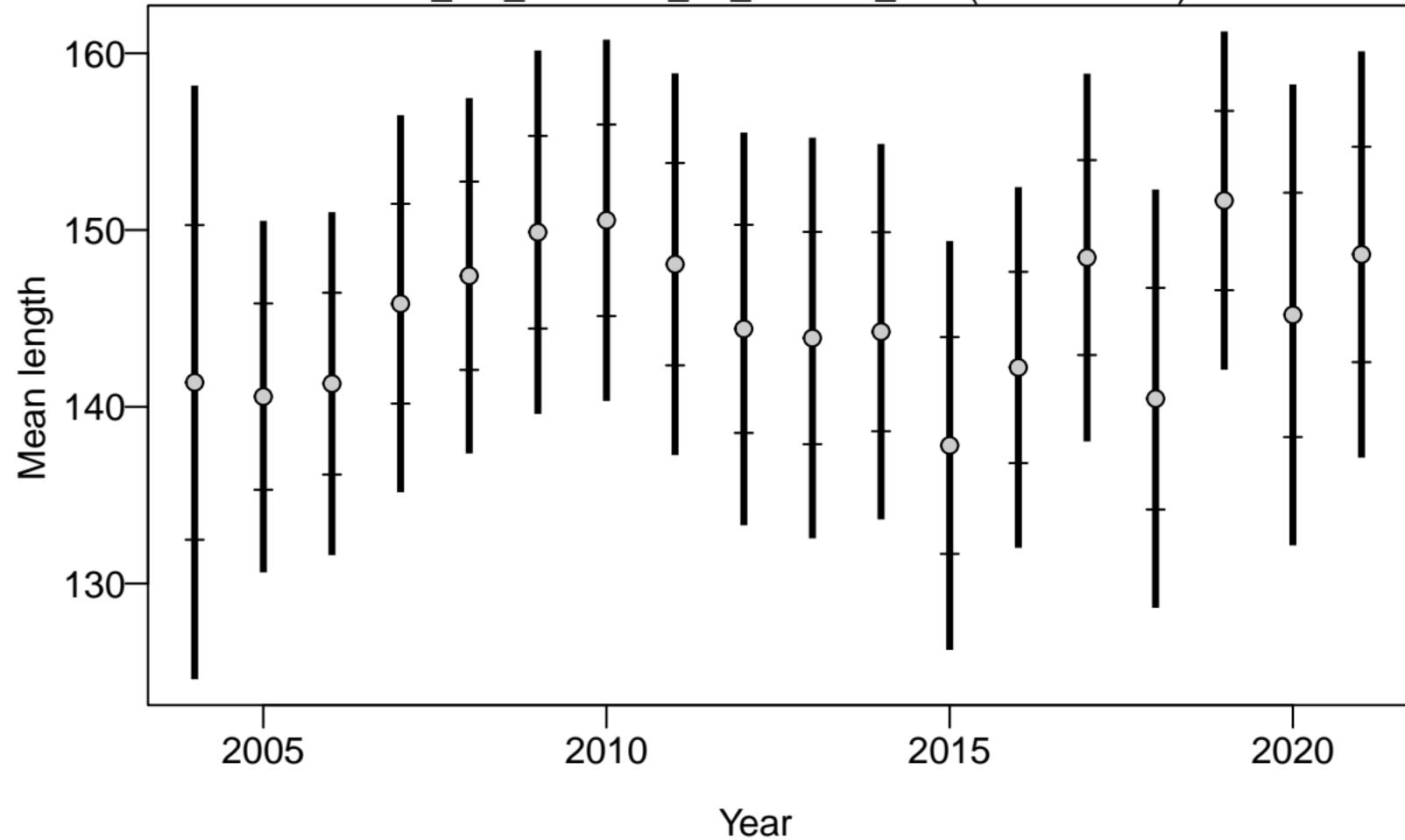


Proportion

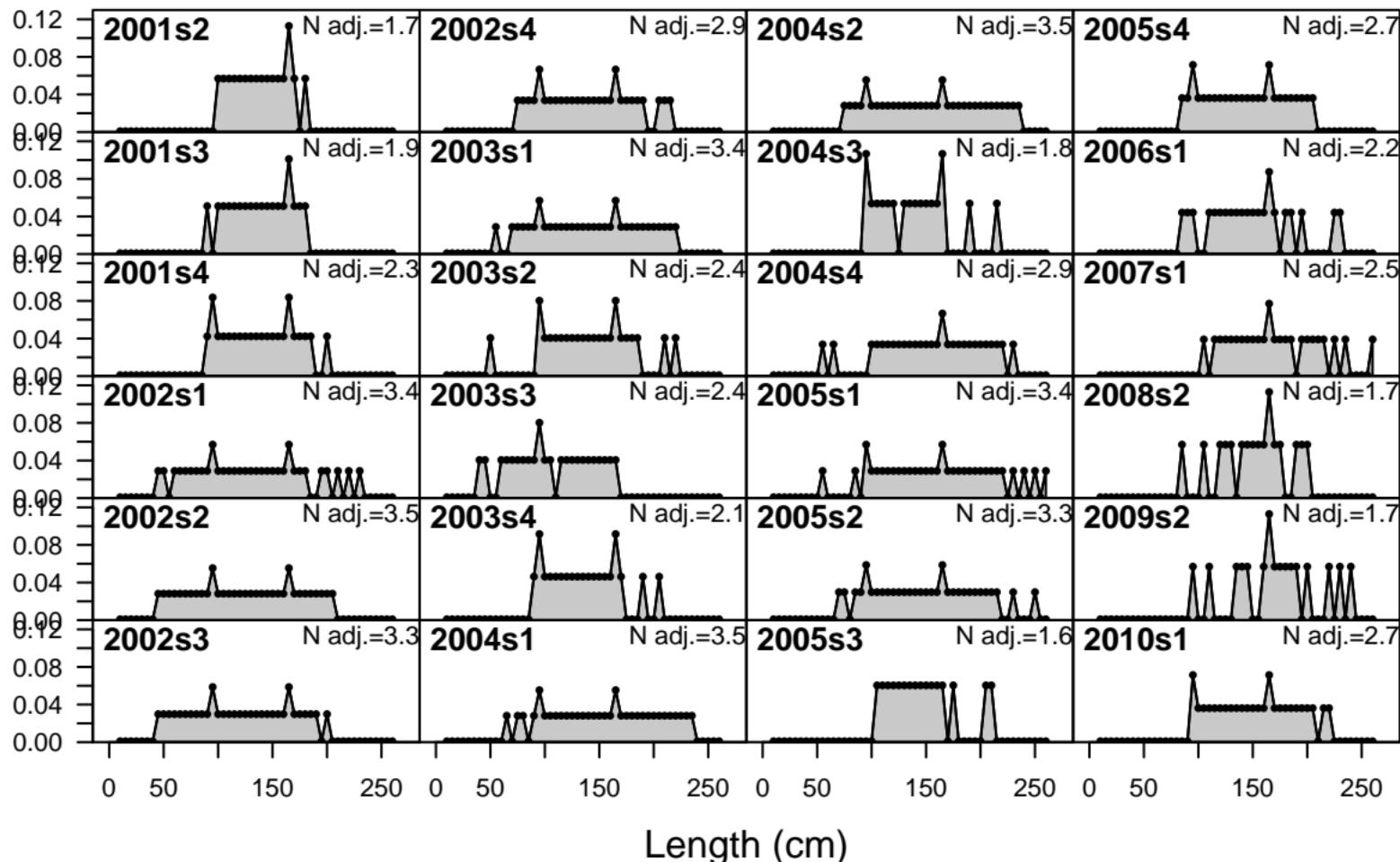




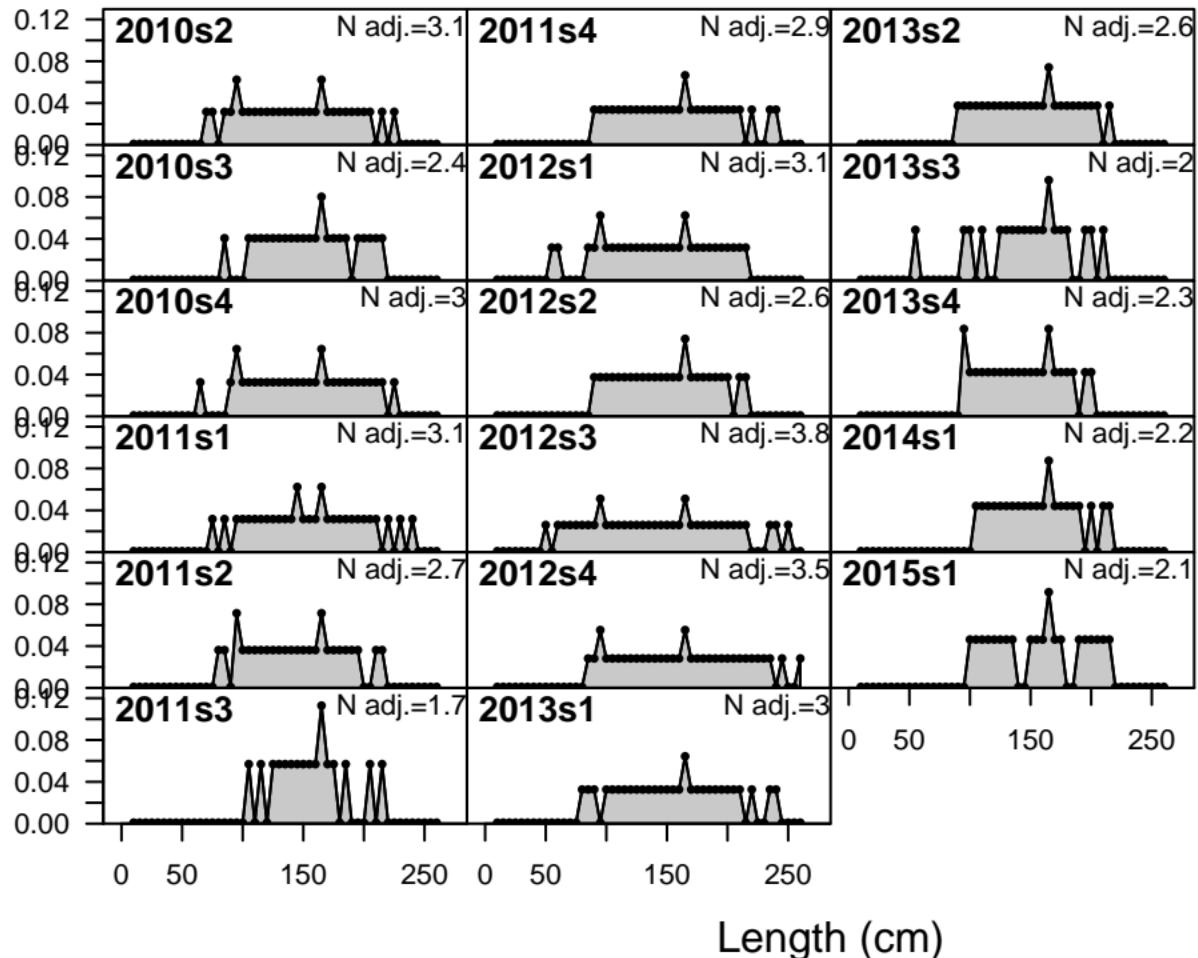
F03_US_WCNPO_LL_shallow_late (whole catch)

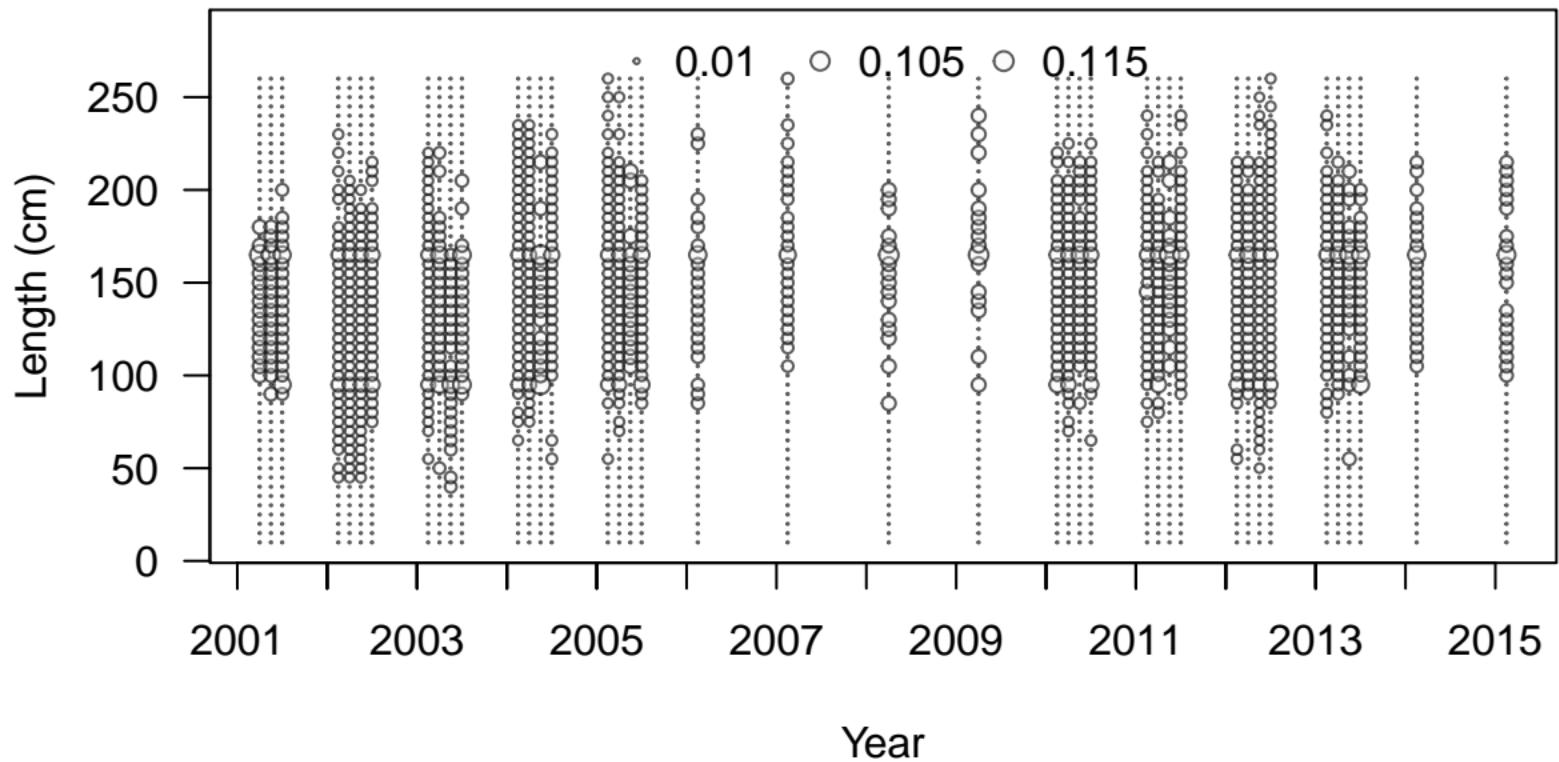


Proportion

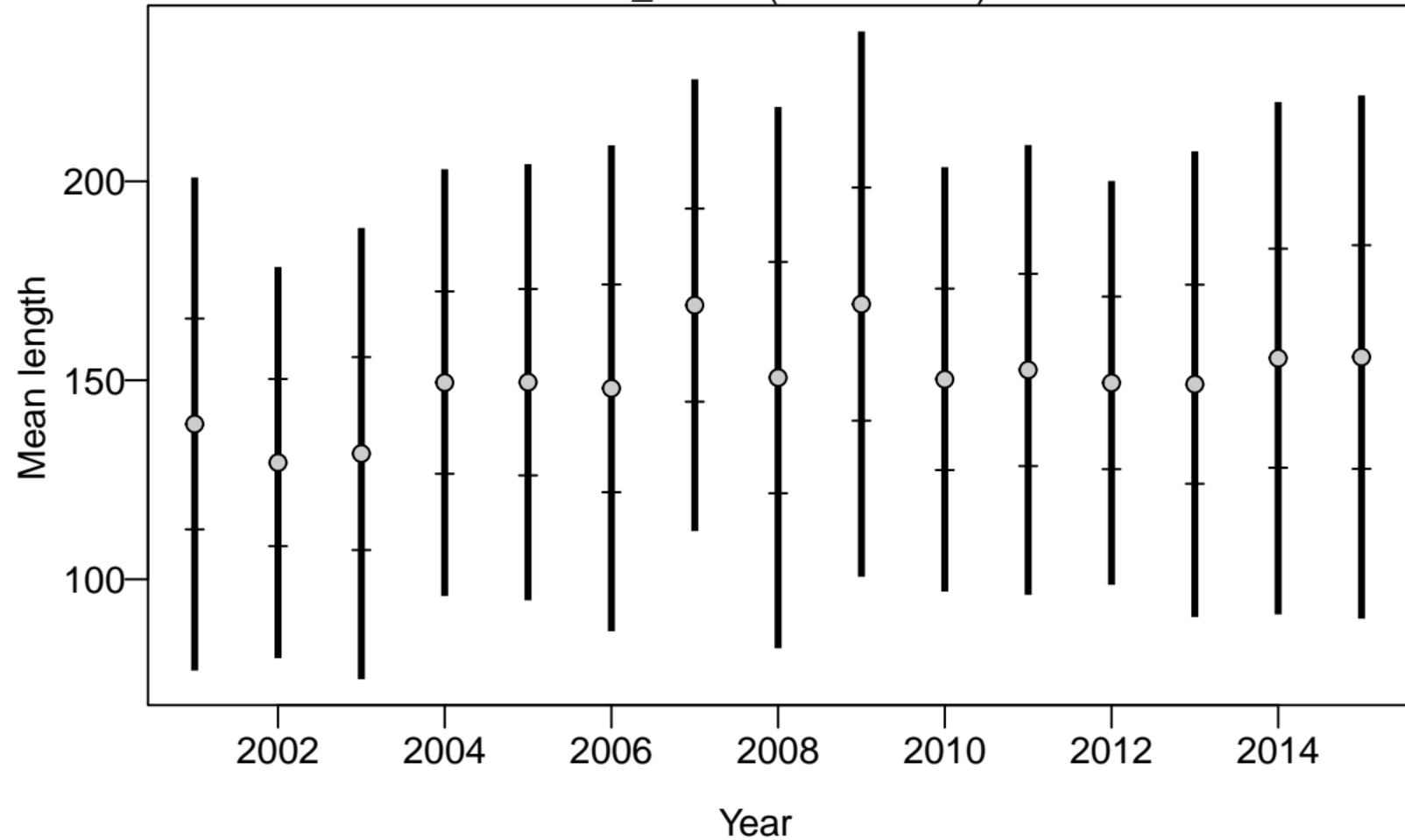


Proportion

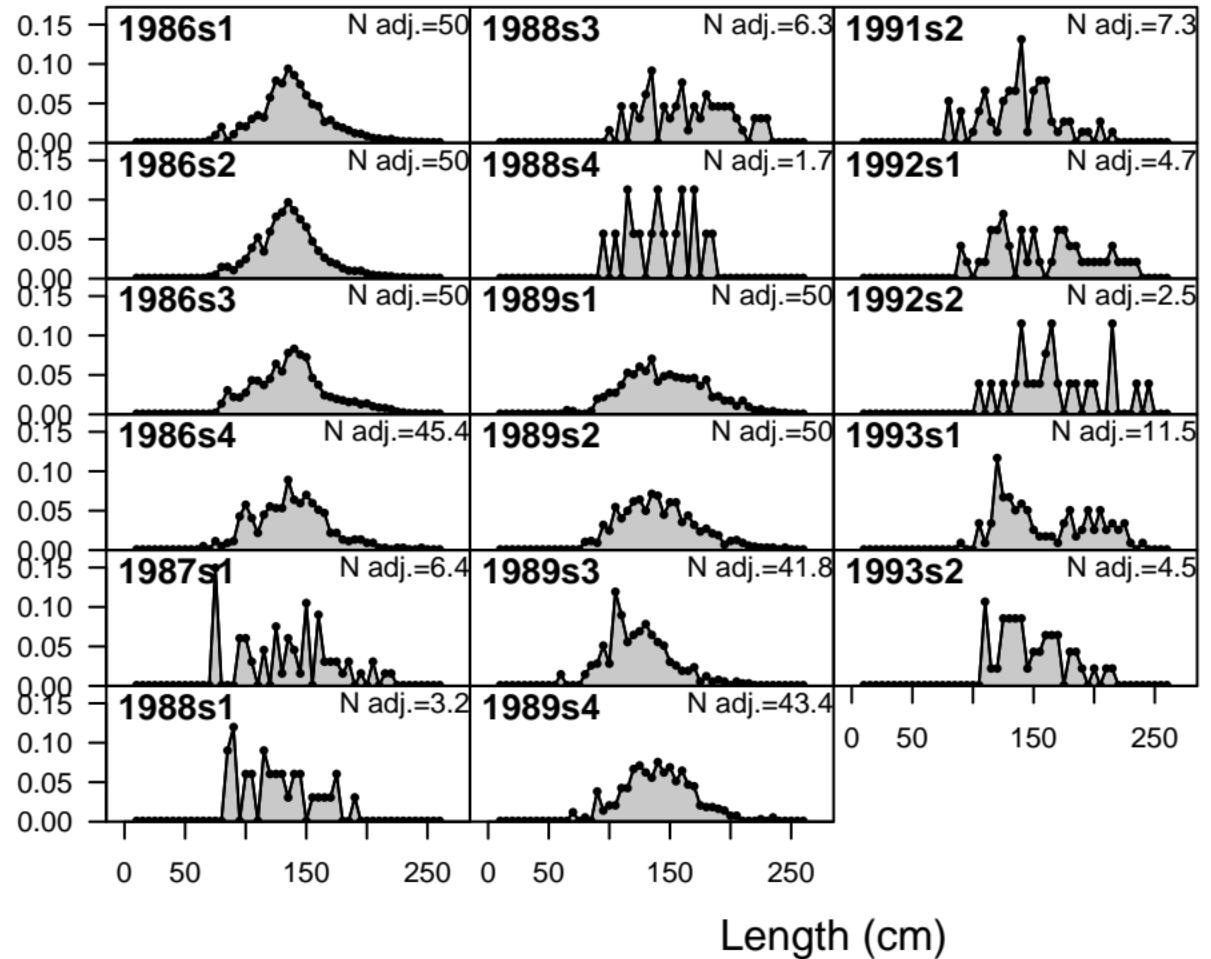


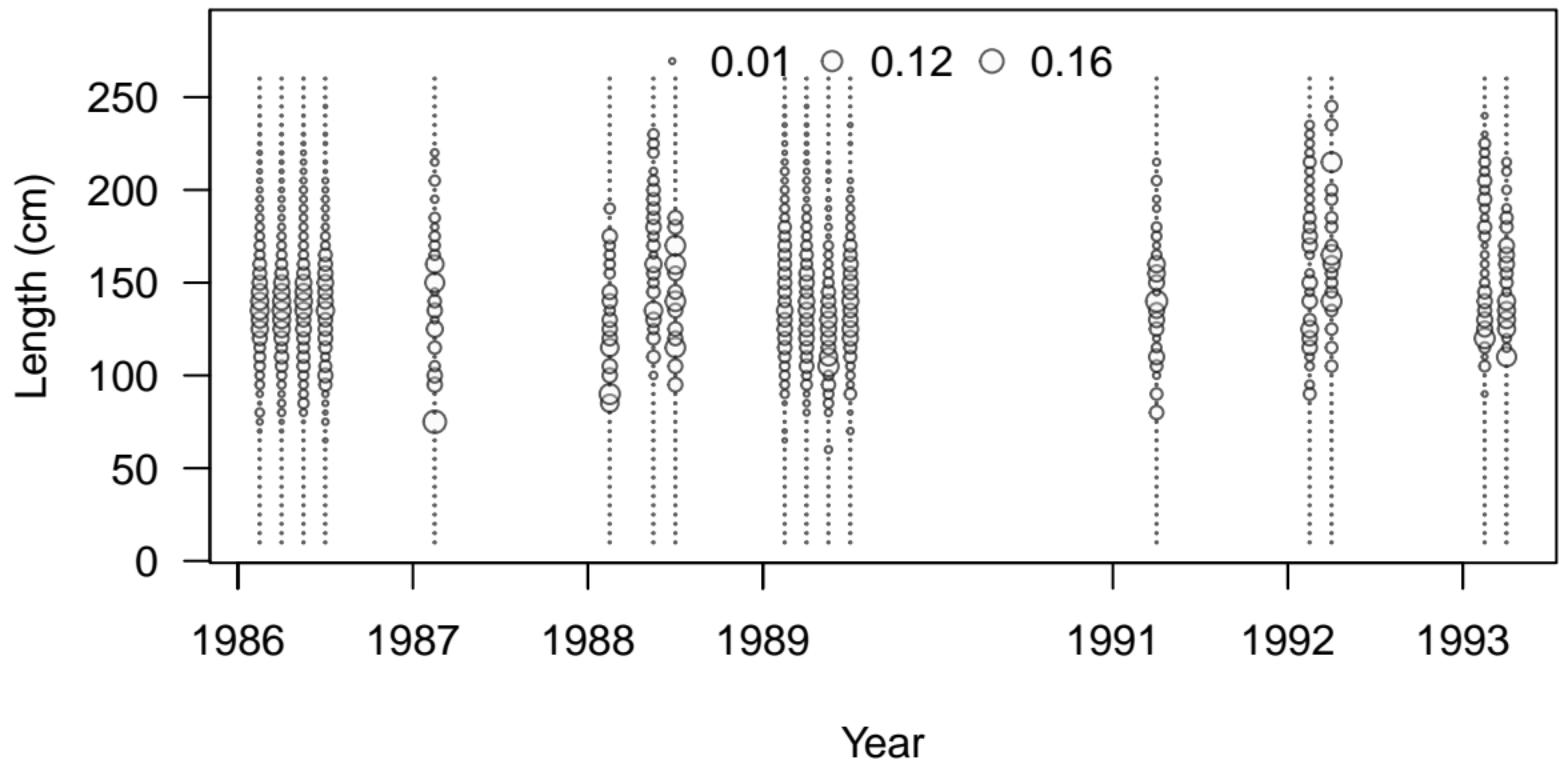


F04_IATTC (whole catch)

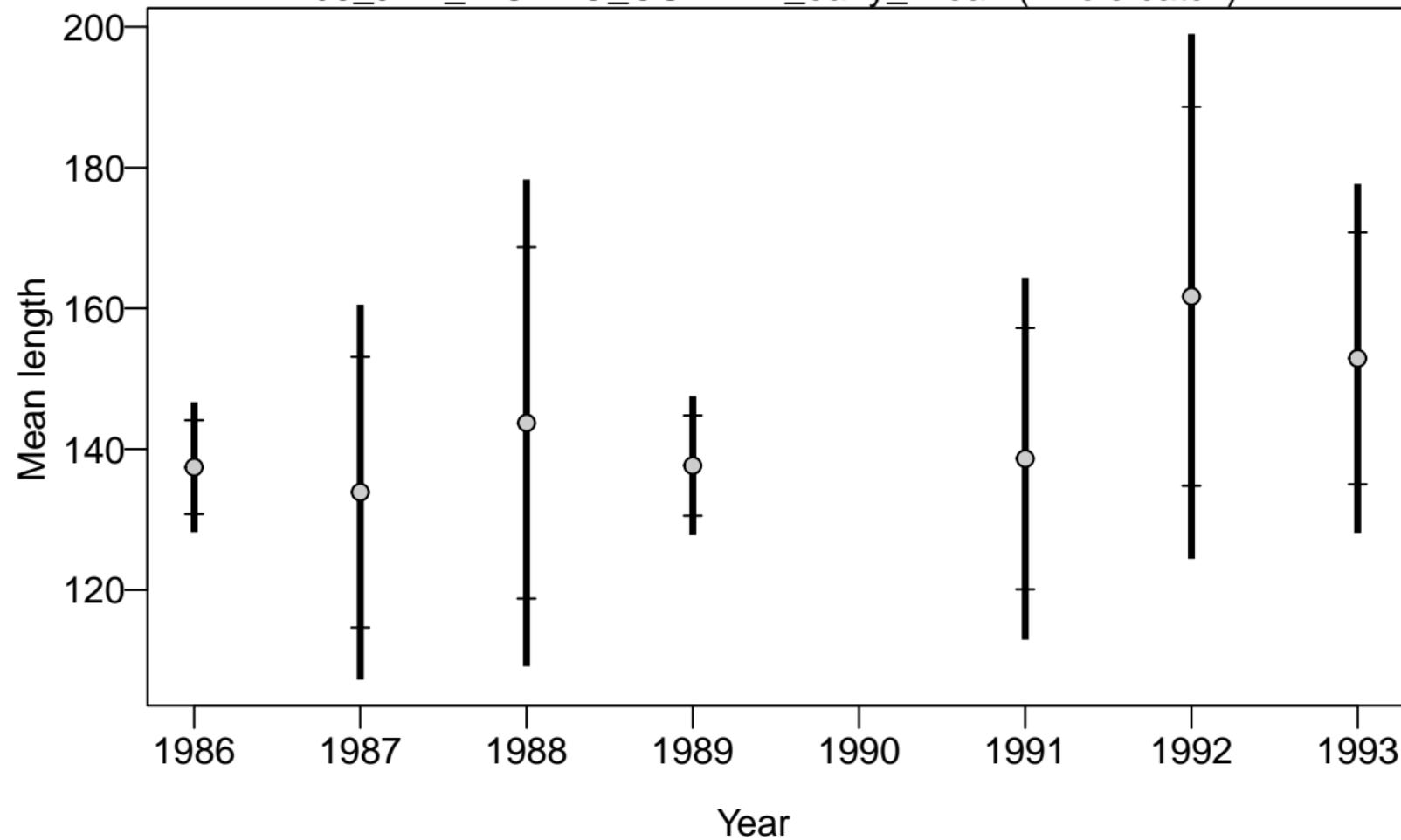


Proportion

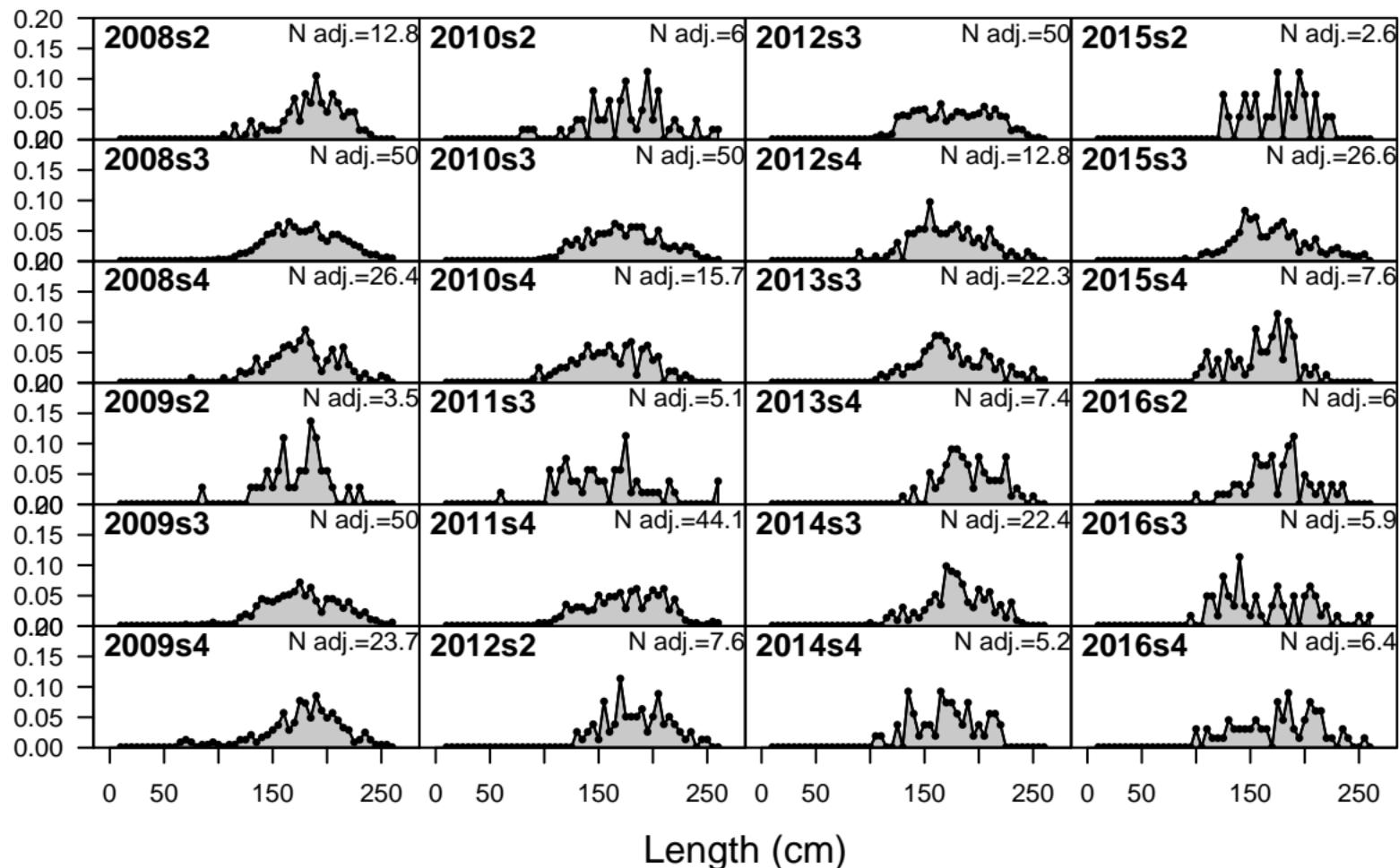




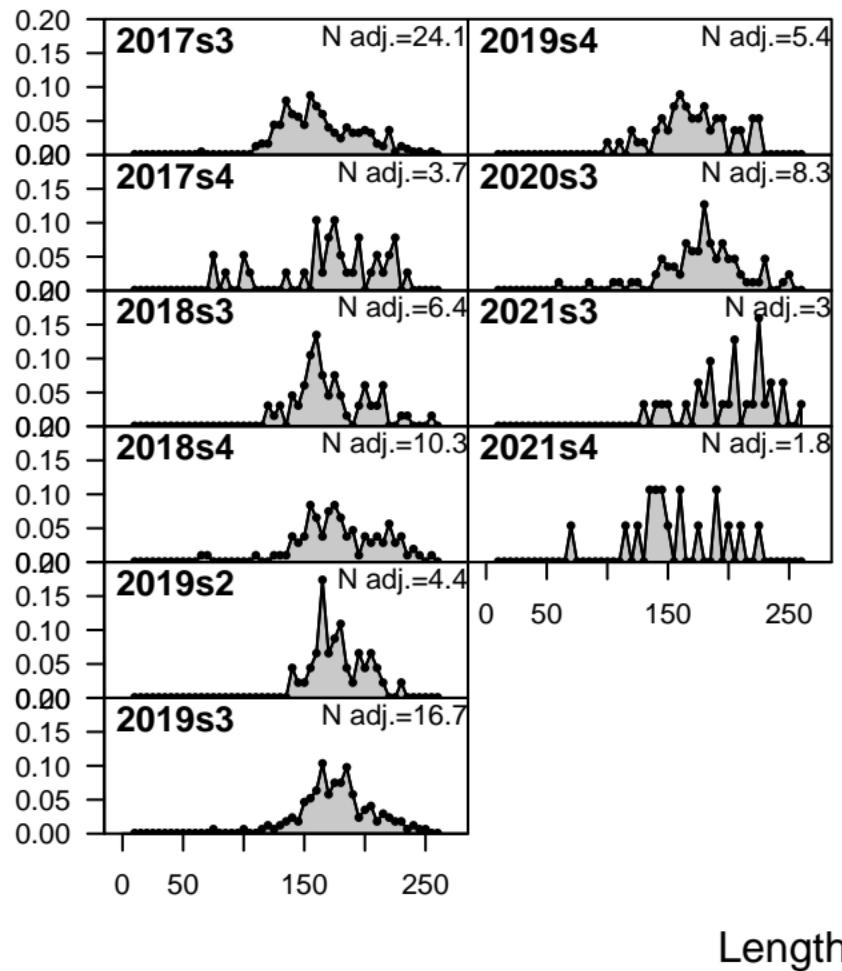
F06_JPN_WCNPO_OSDWLL_early_Area1 (whole catch)

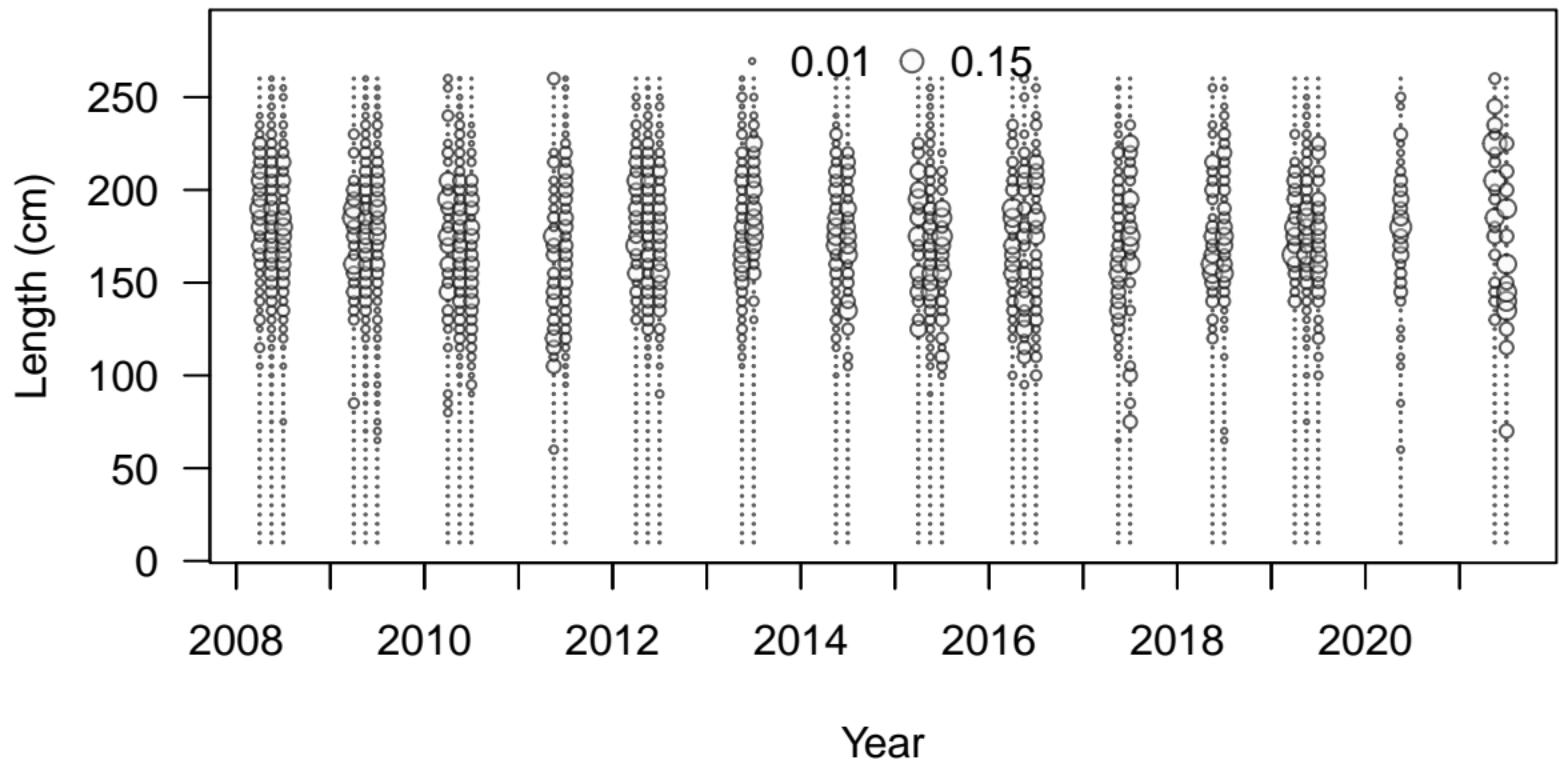


Proportion

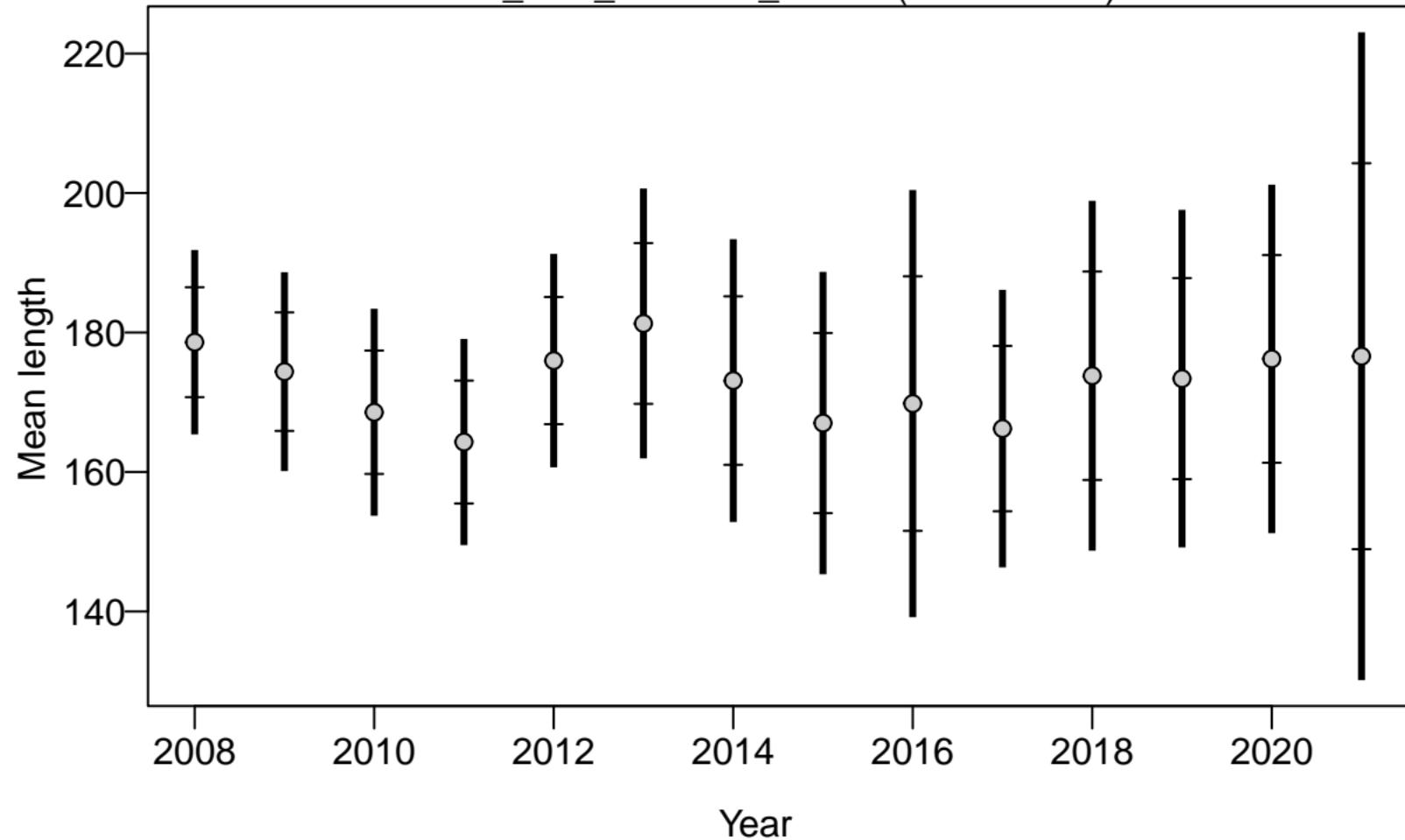


Proportion

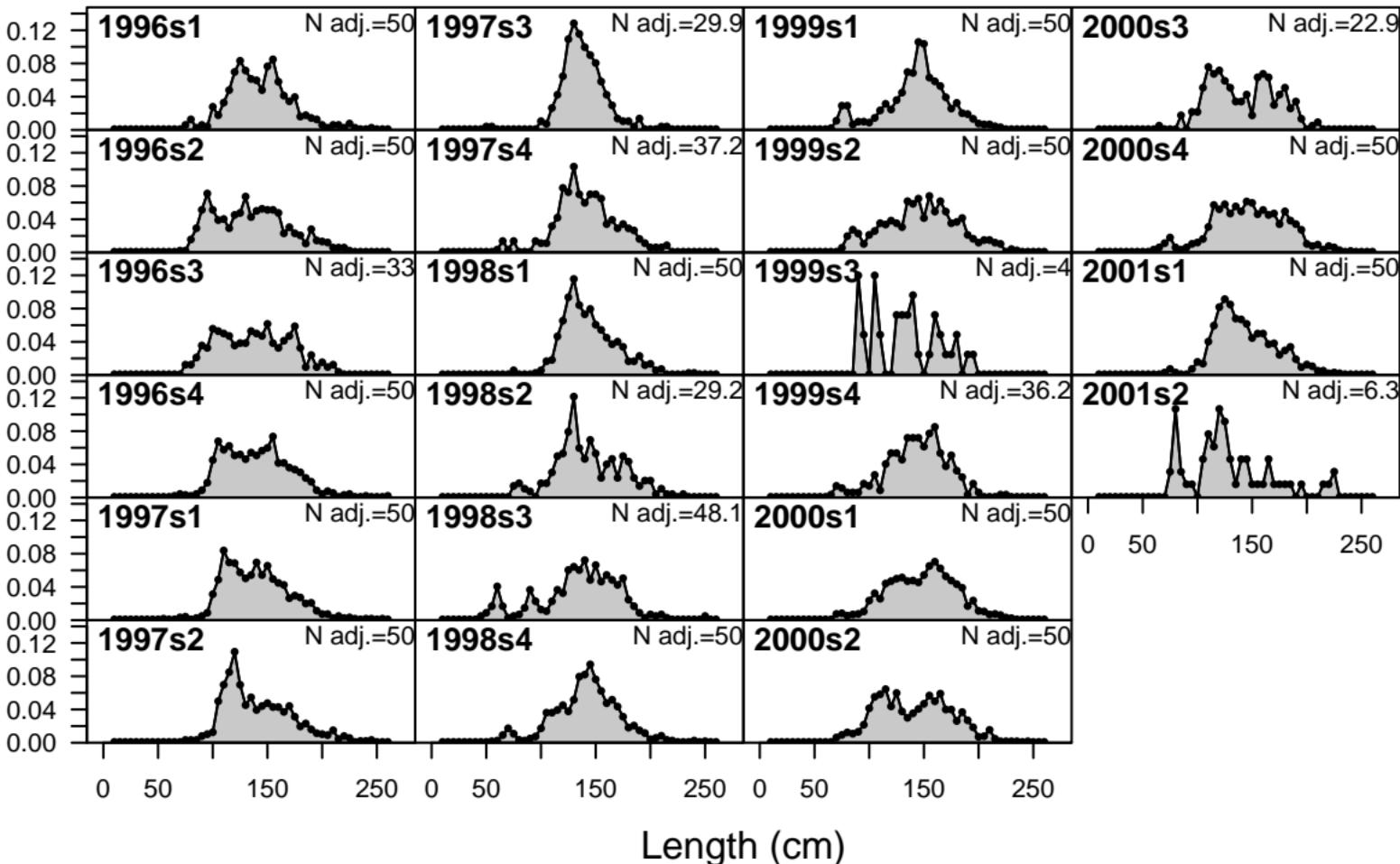


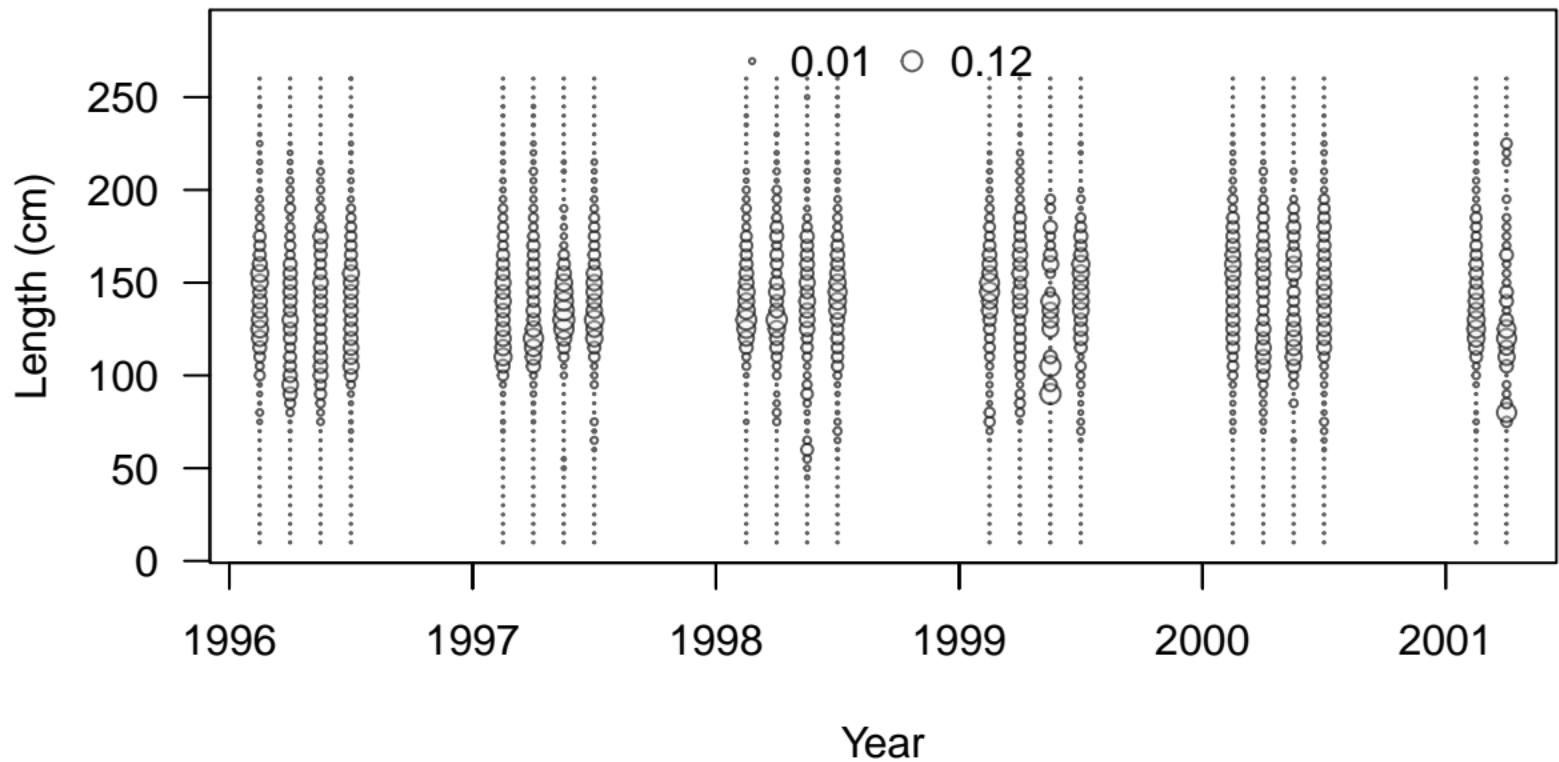


F07_JPN_WCNPO_CODF (whole catch)

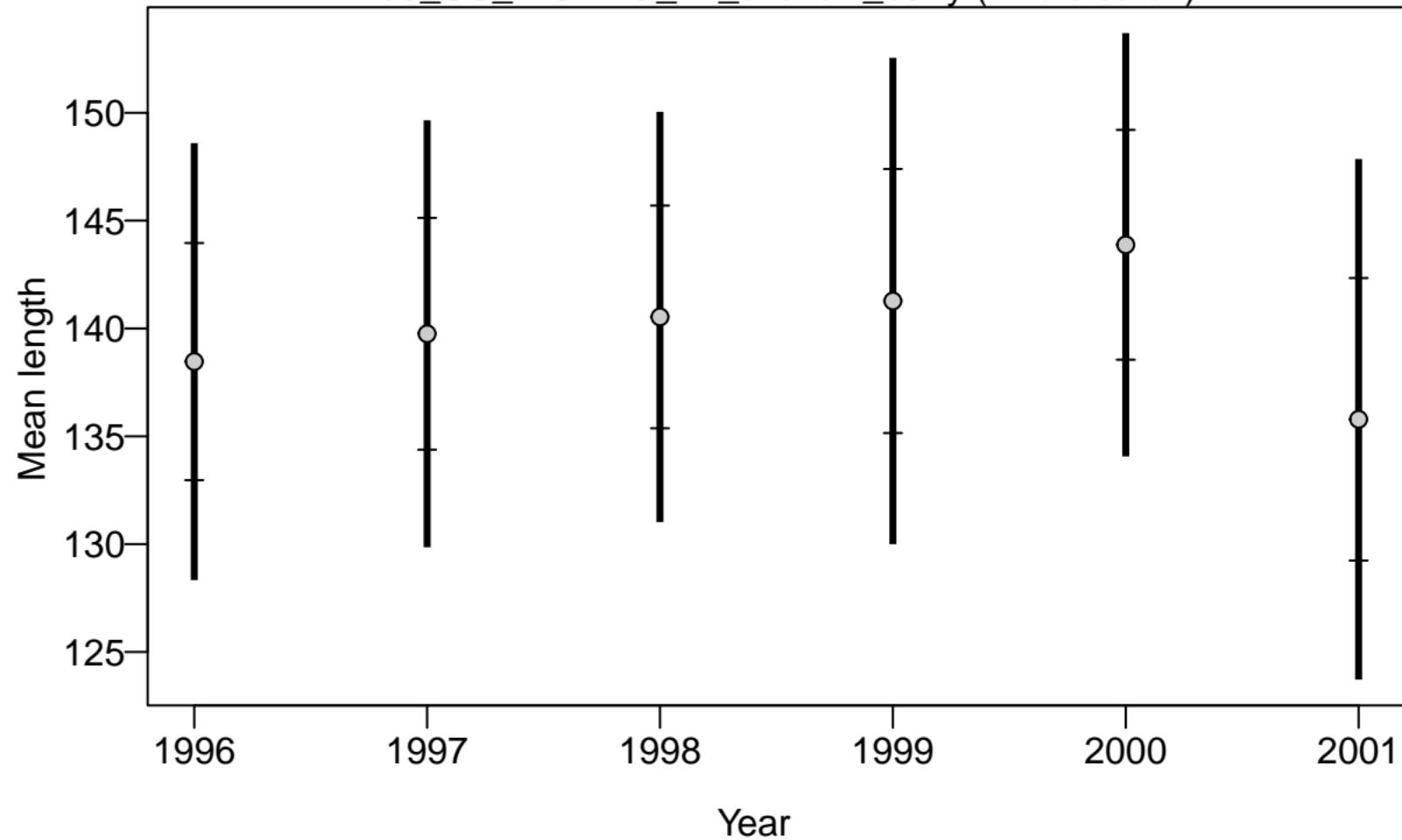


Proportion

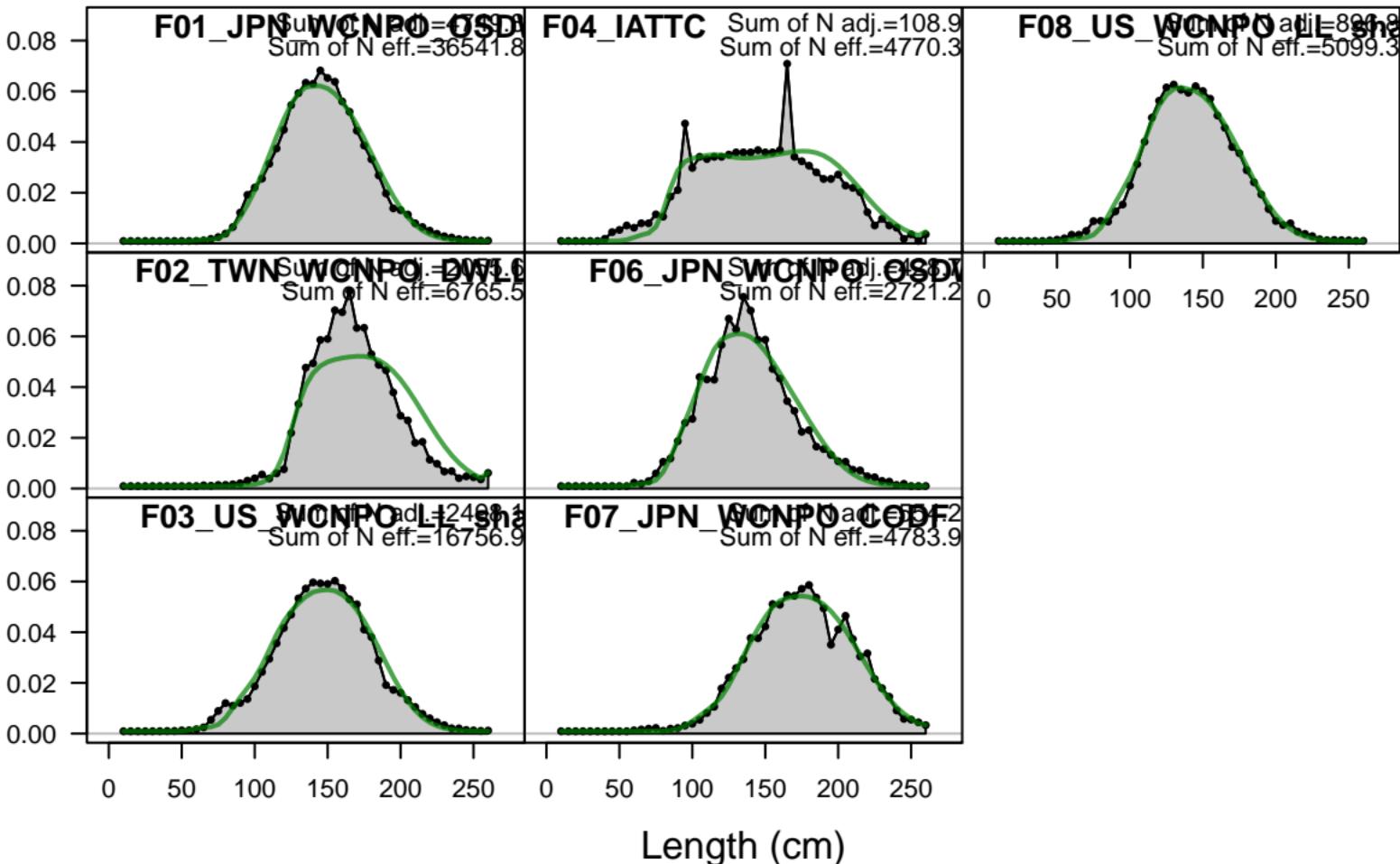


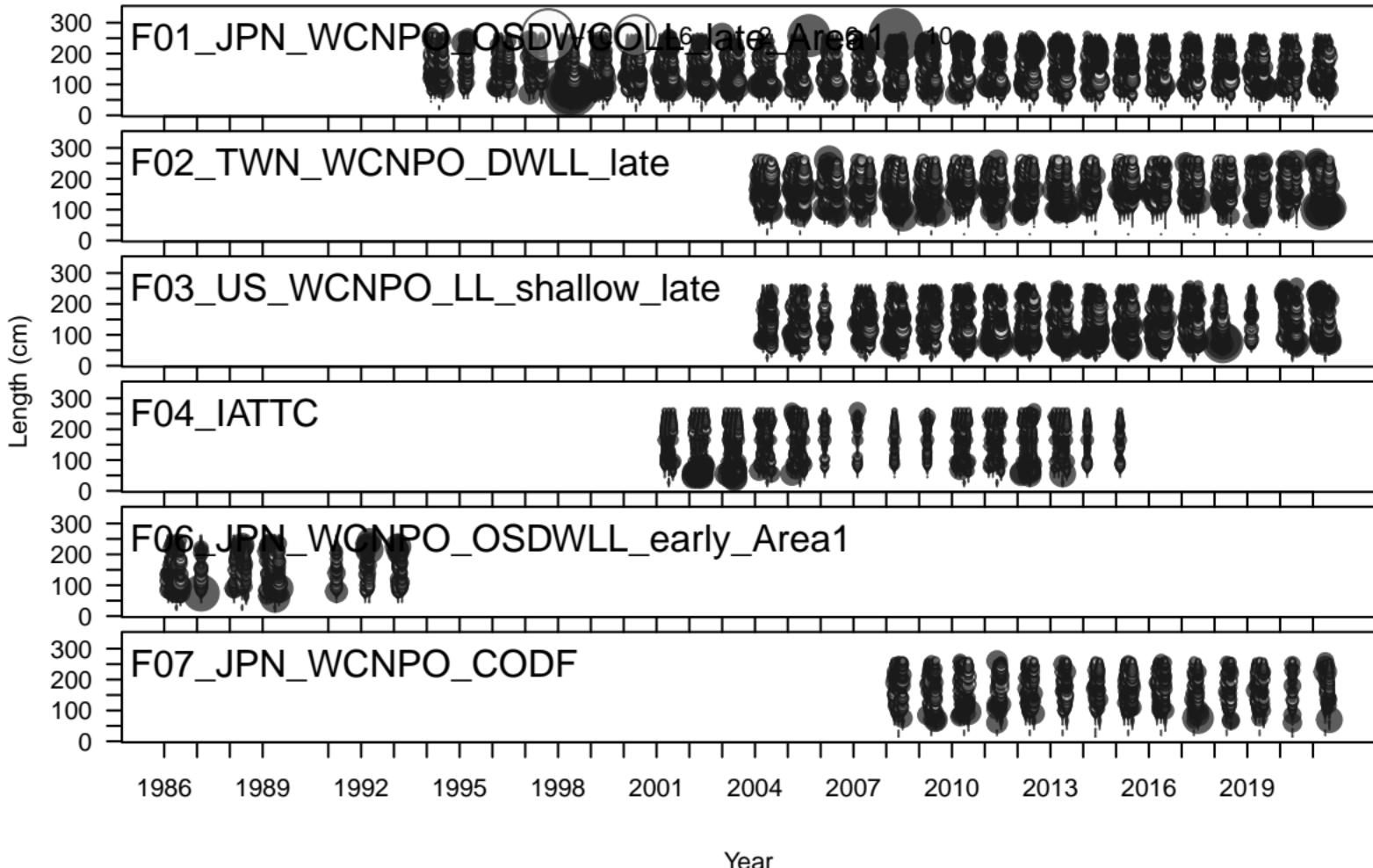


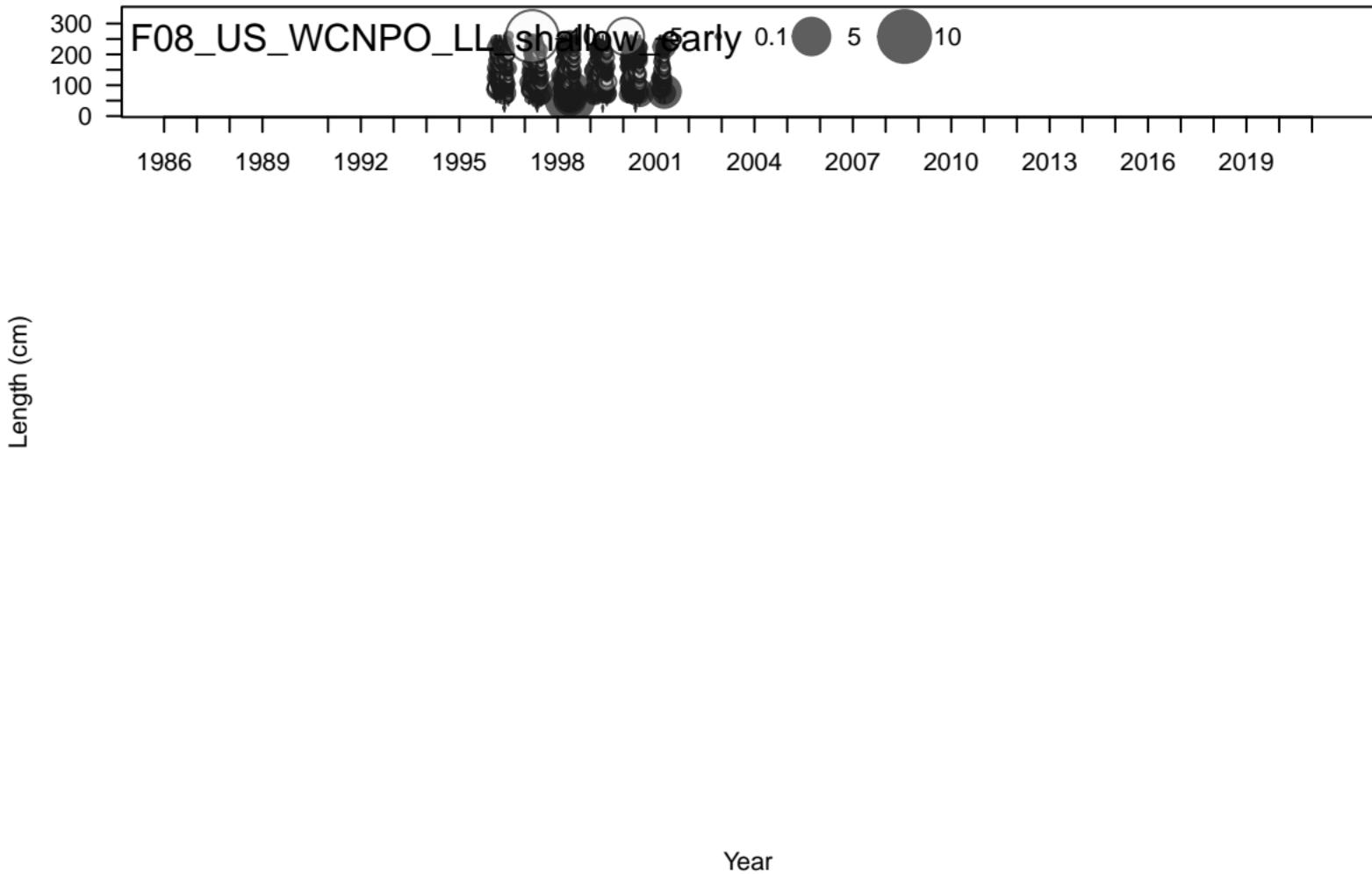
F08_US_WCNPO_LL_shallow_early (whole catch)



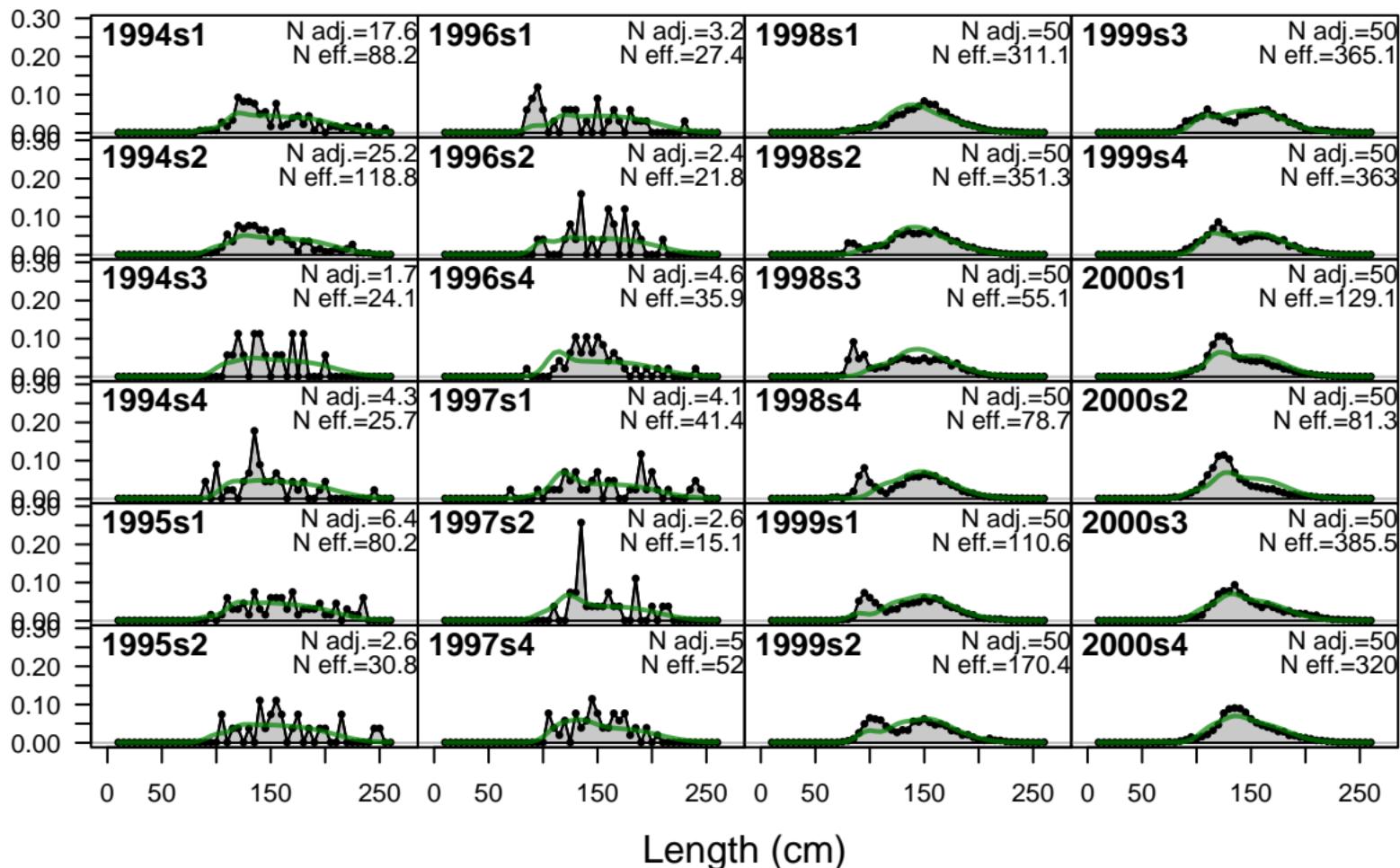
Proportion



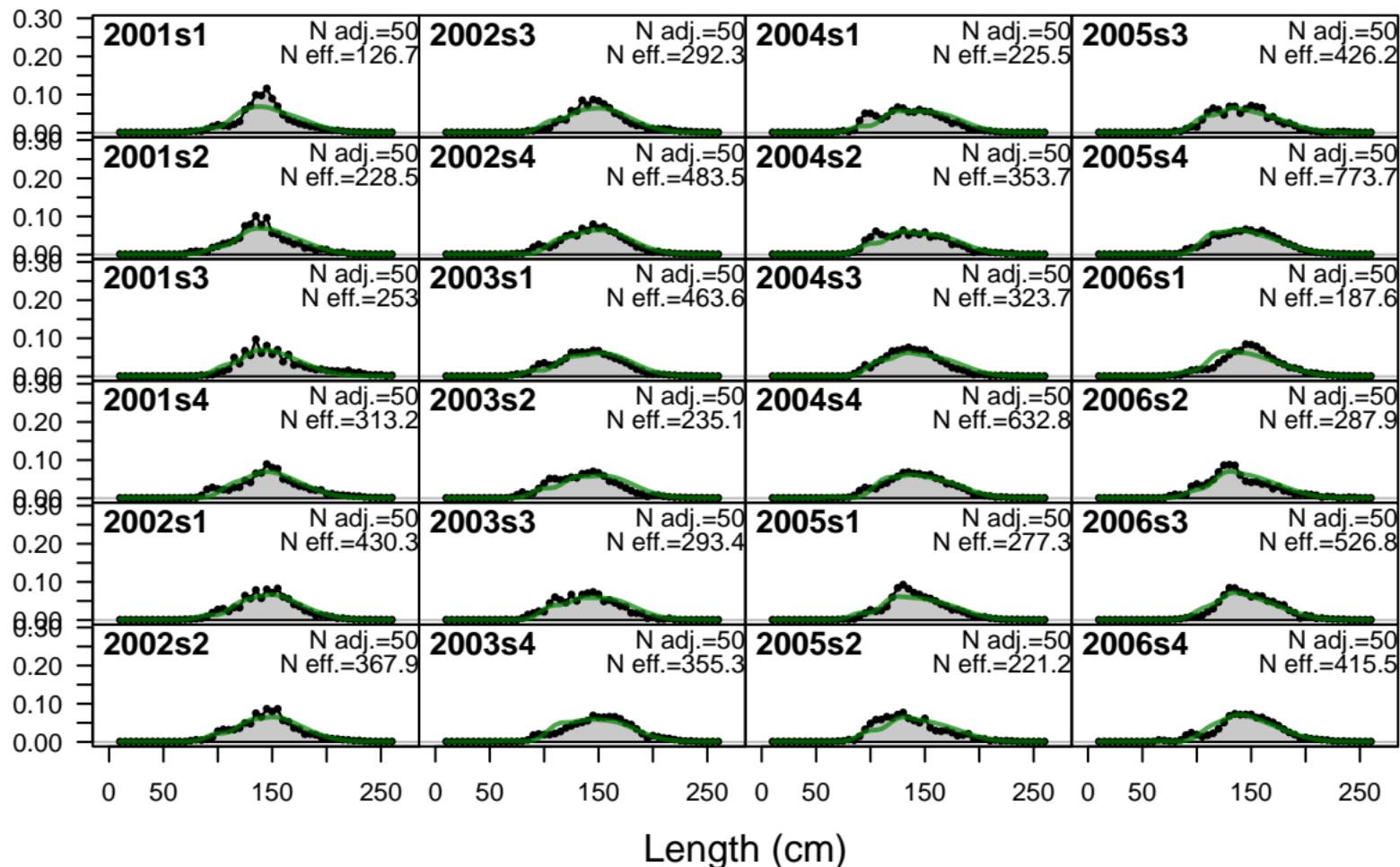




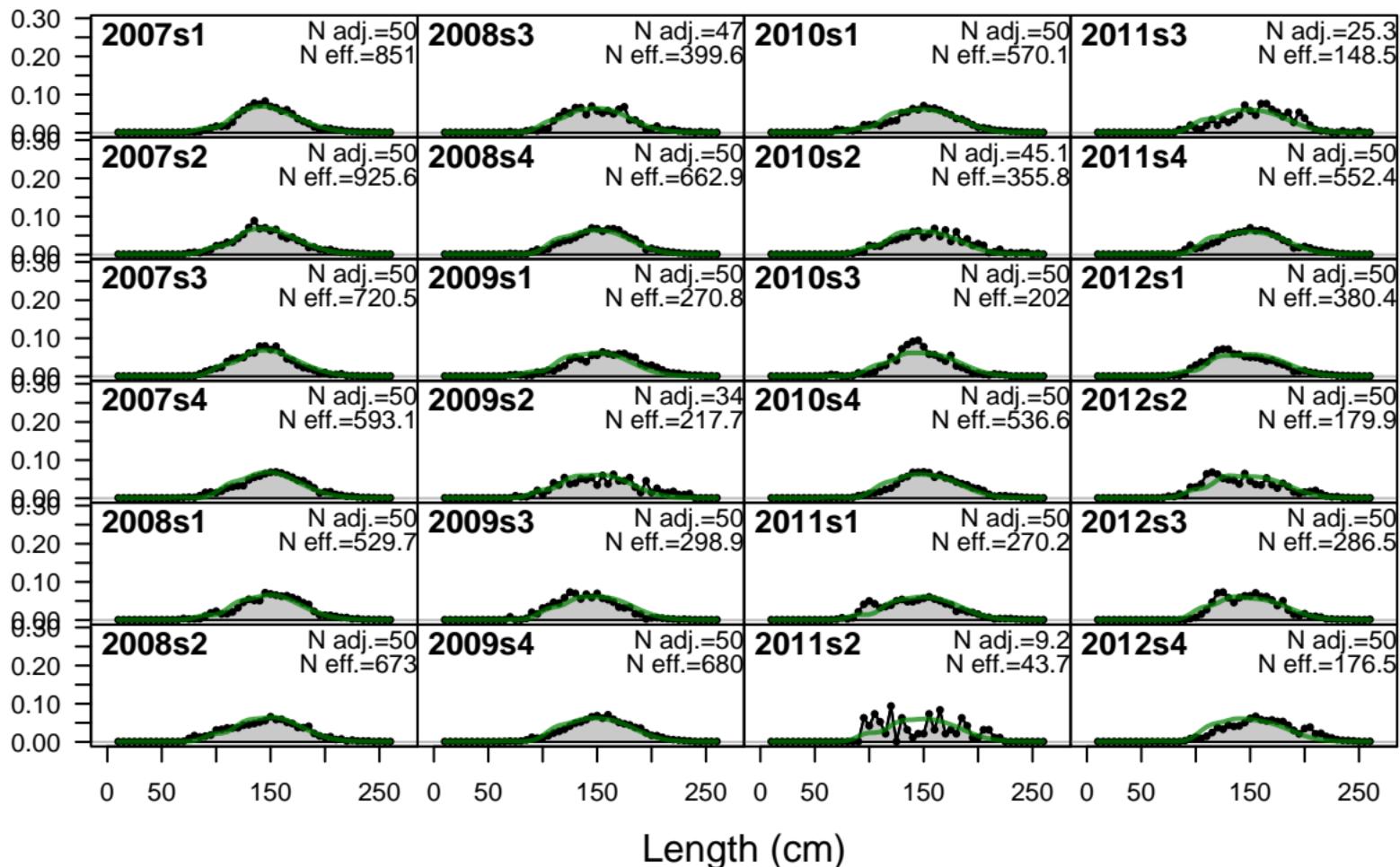
Proportion



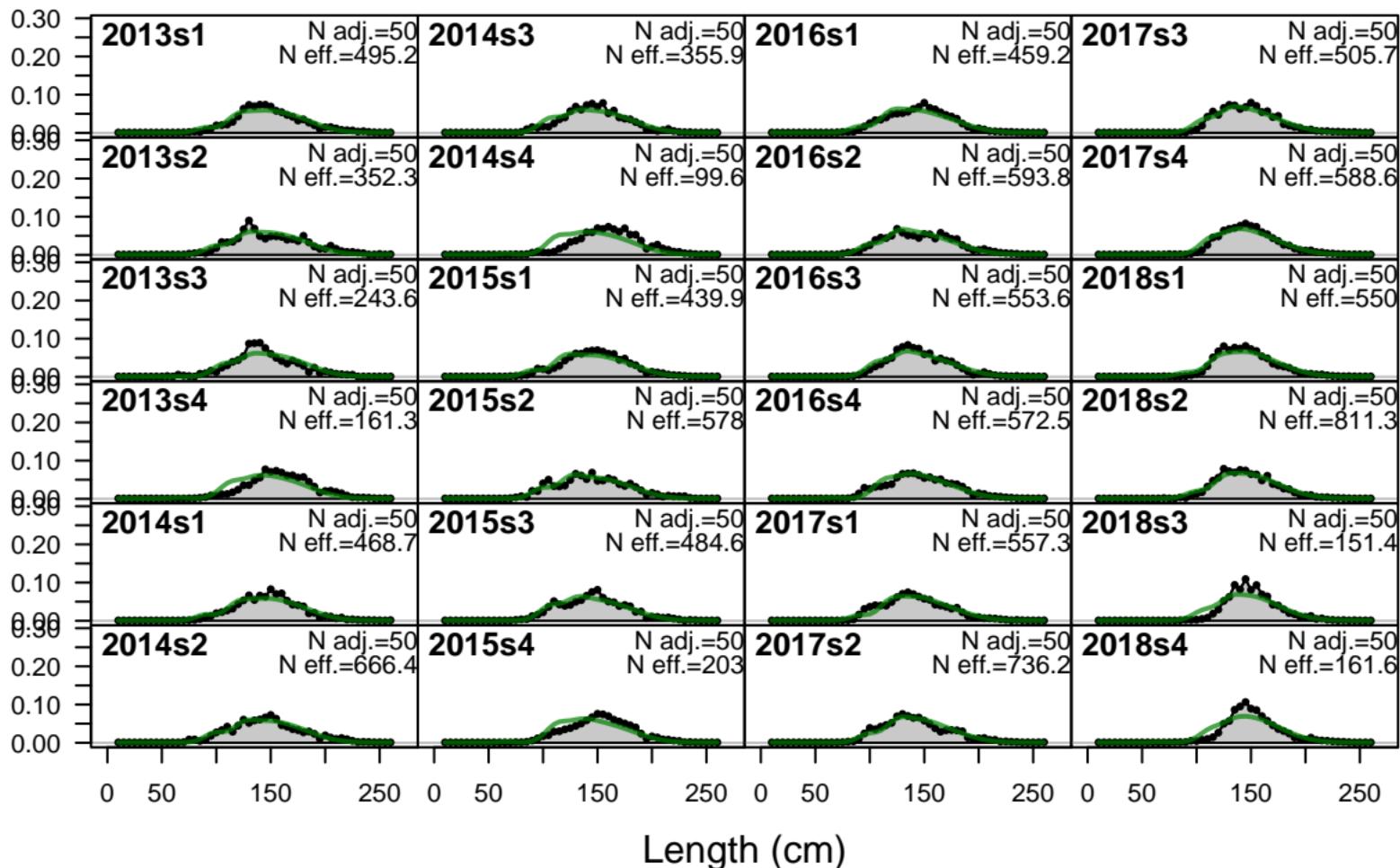
Proportion



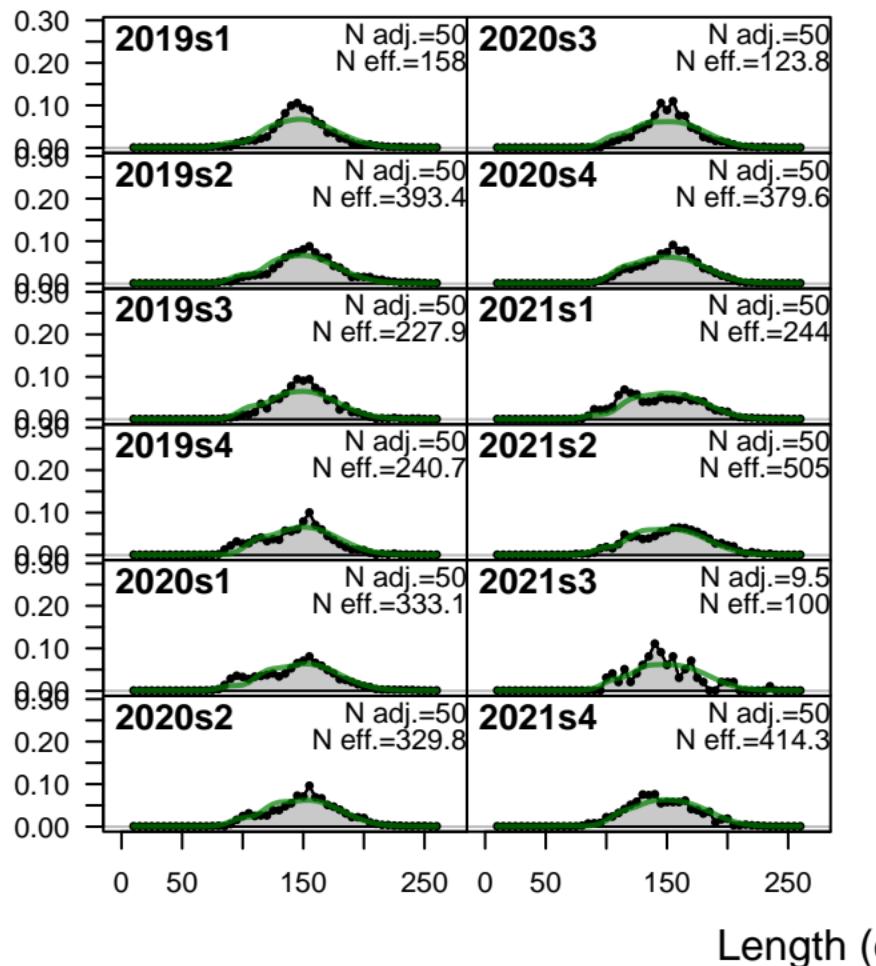
Proportion

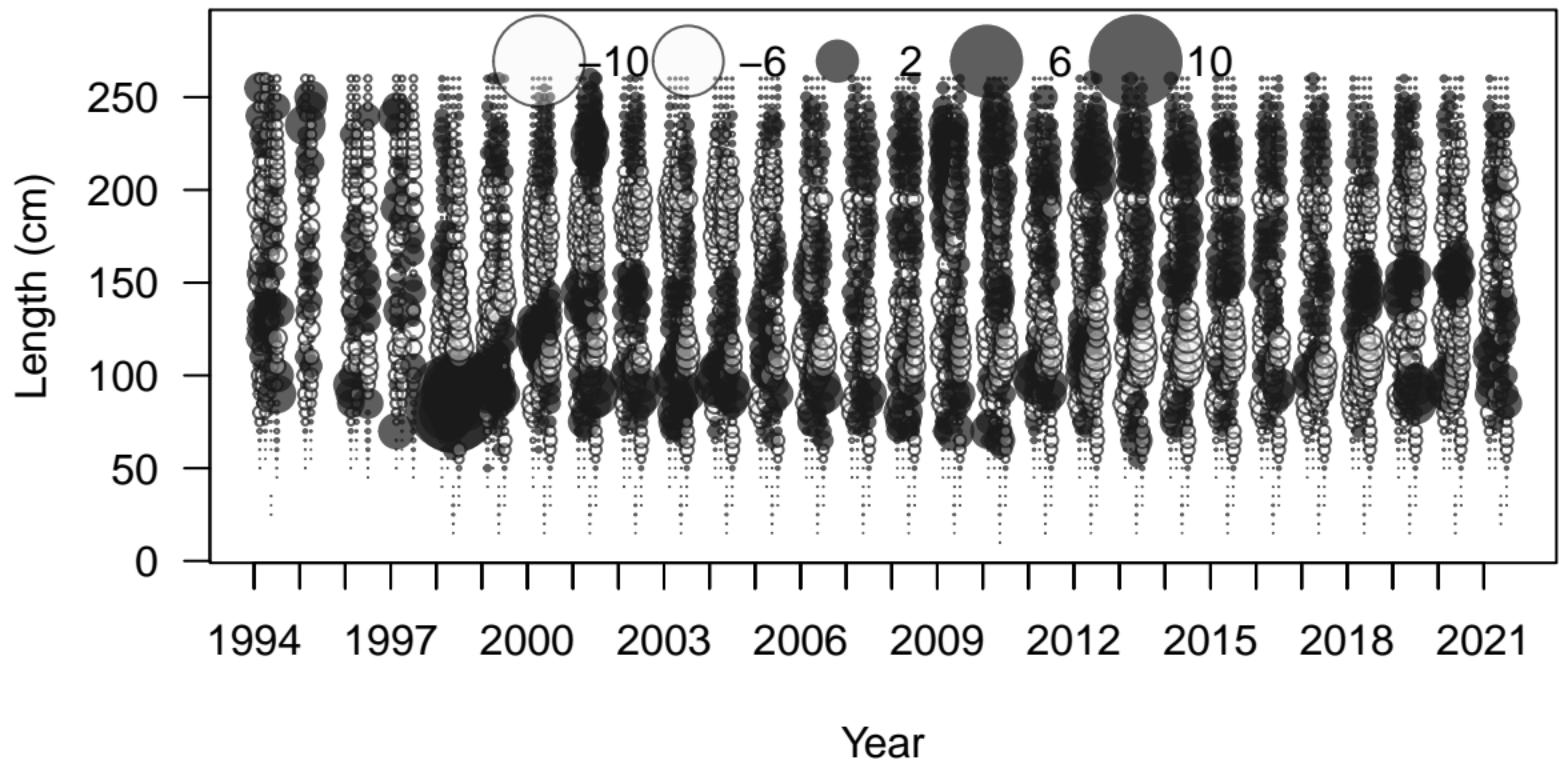


Proportion

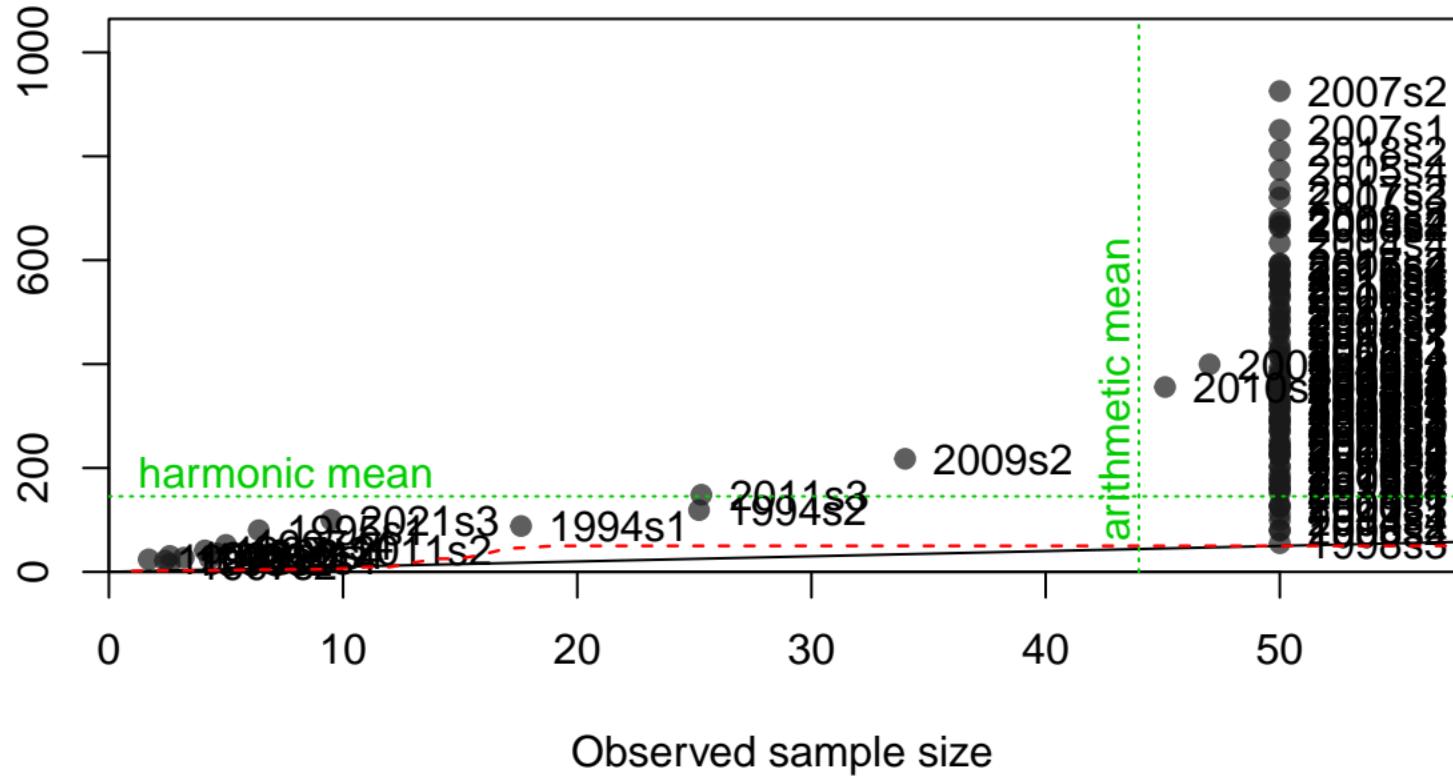


Proportion

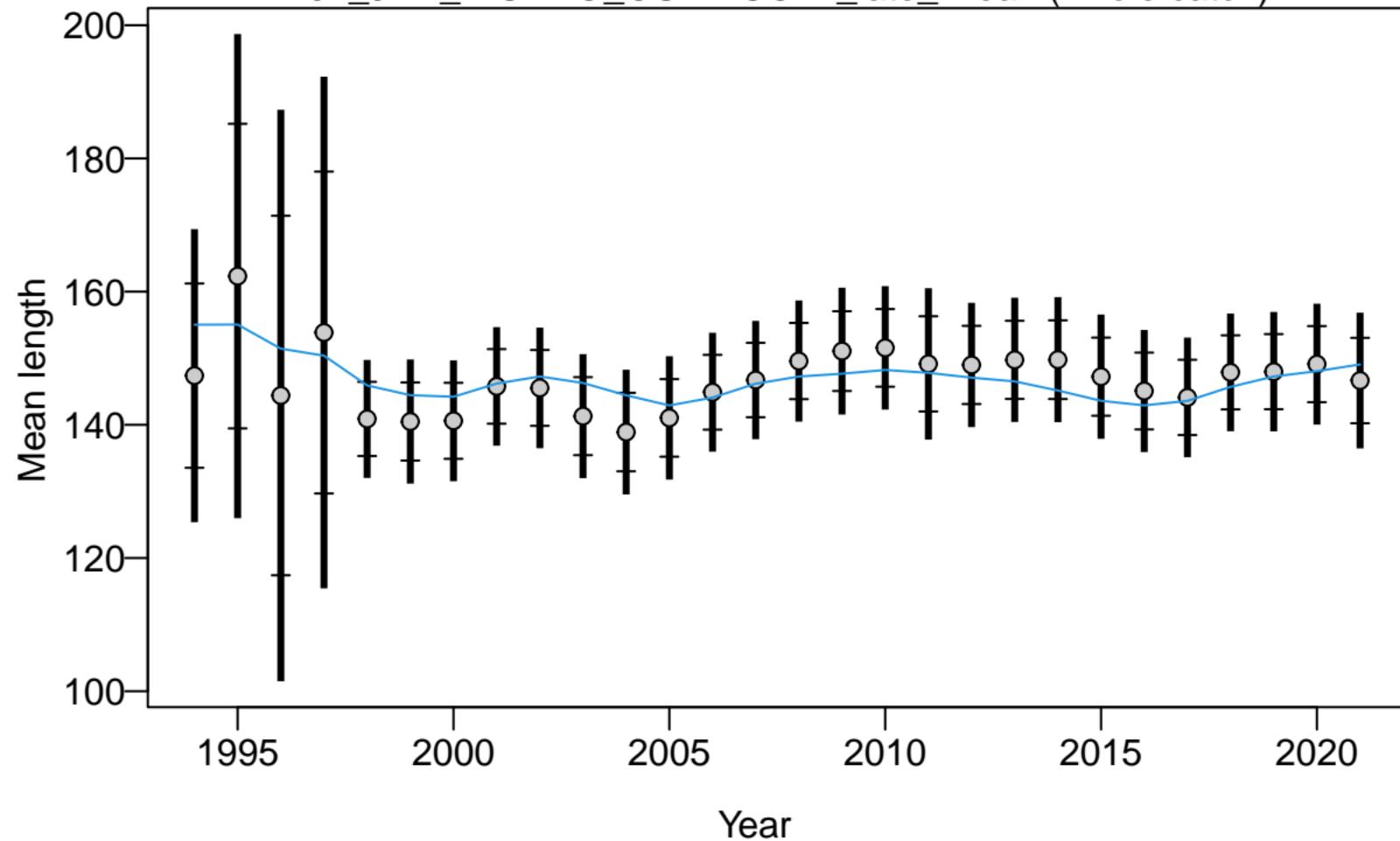




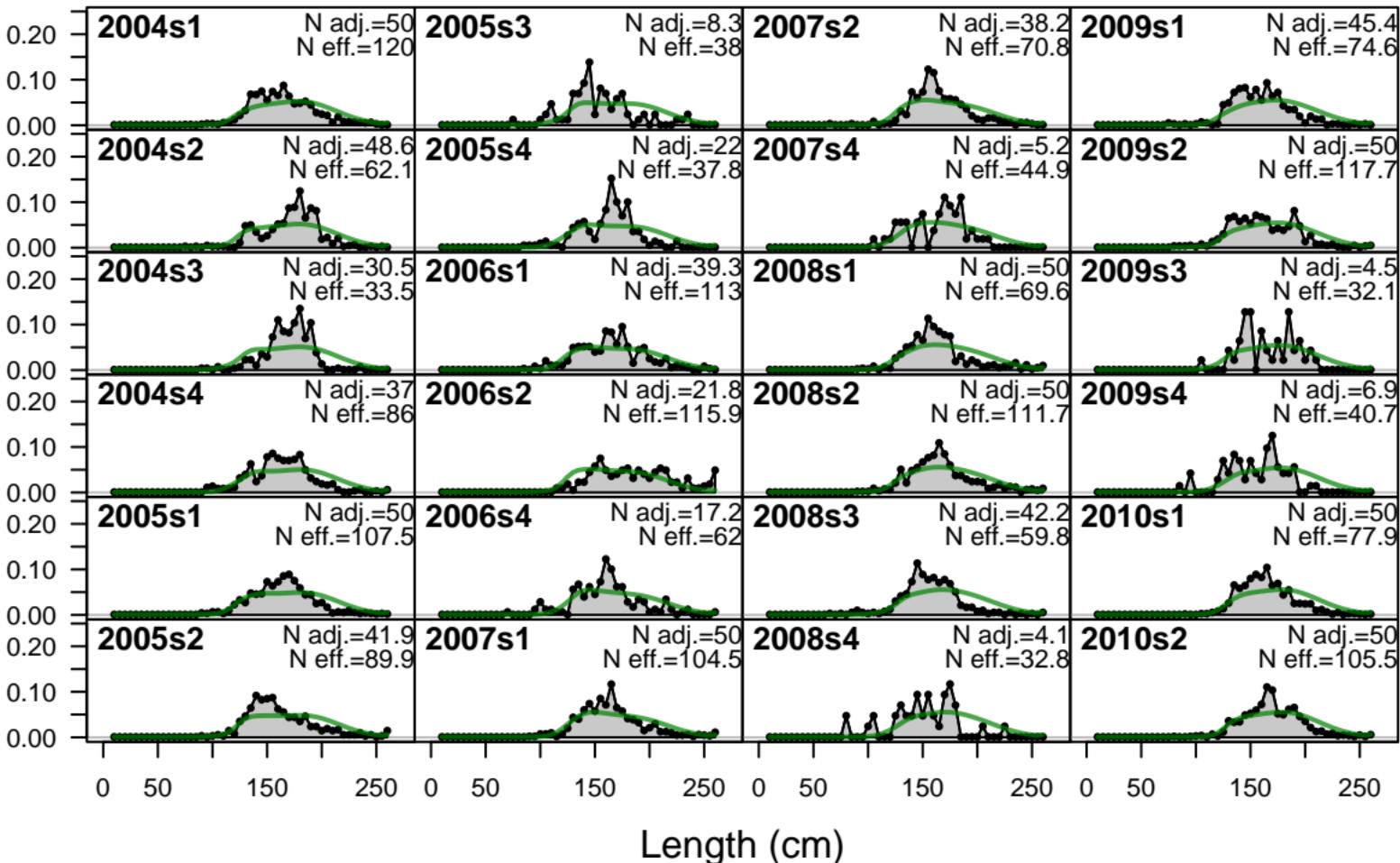
Effective sample size



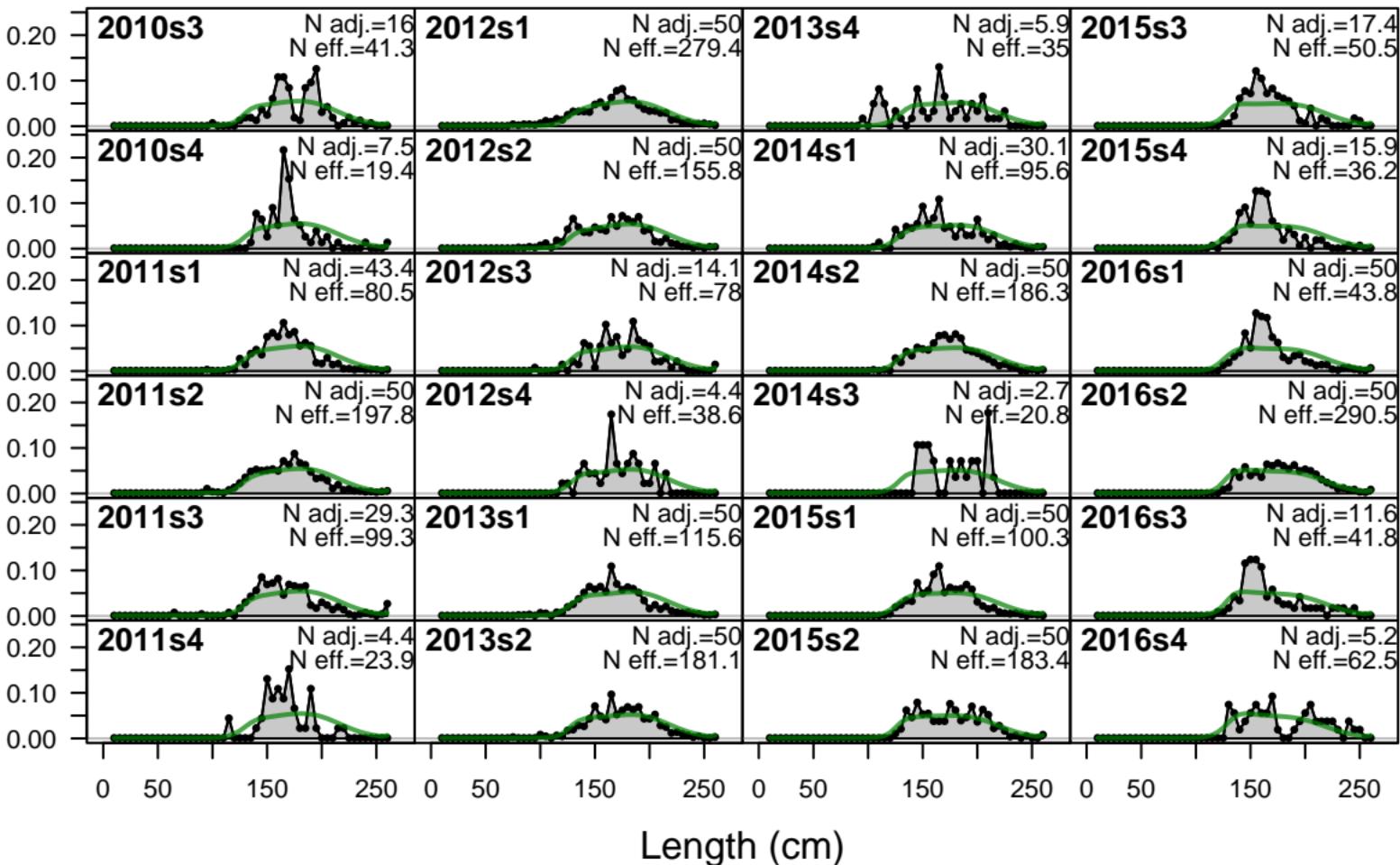
F01_JPN_WCNPO OSDWCOLL_late_Area1 (whole catch)



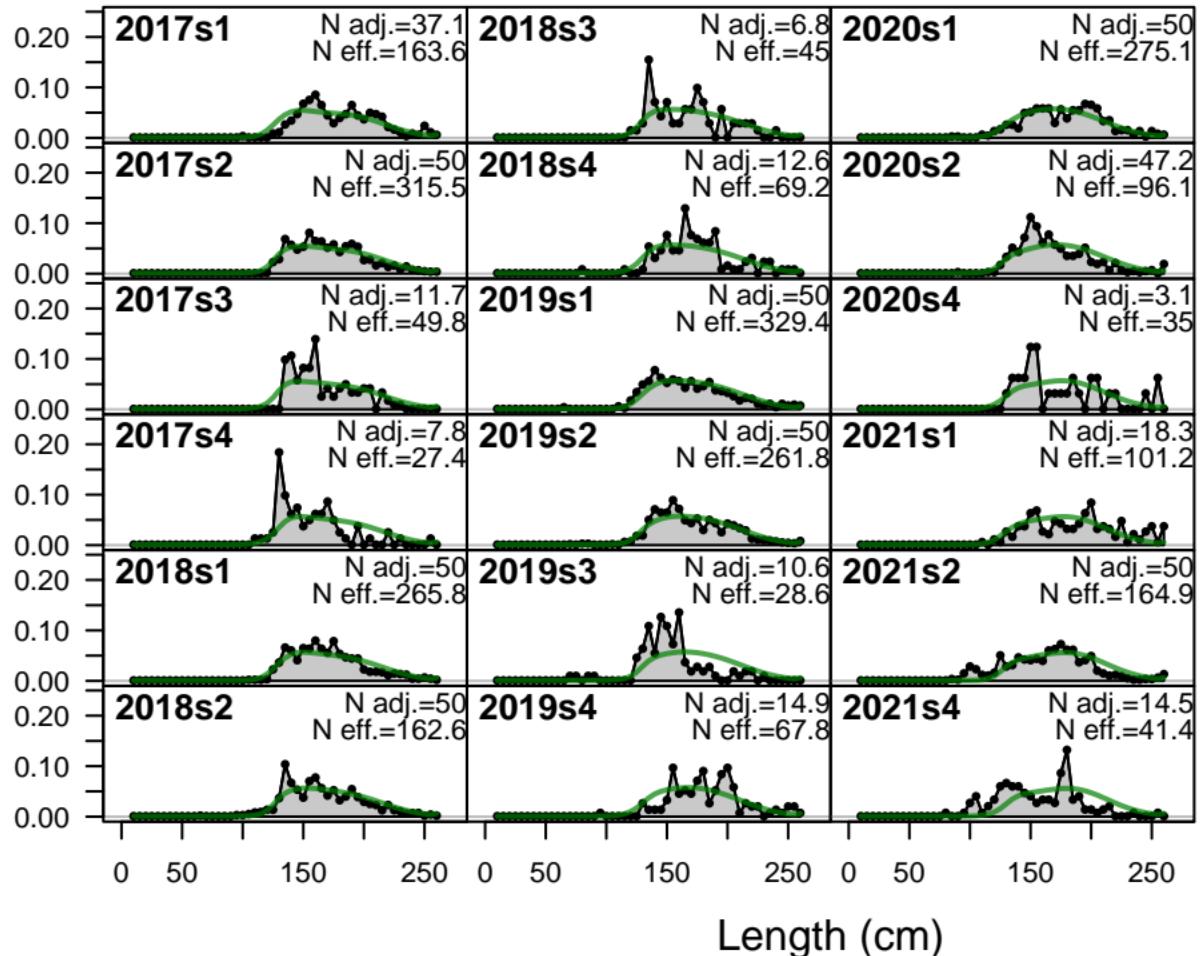
Proportion

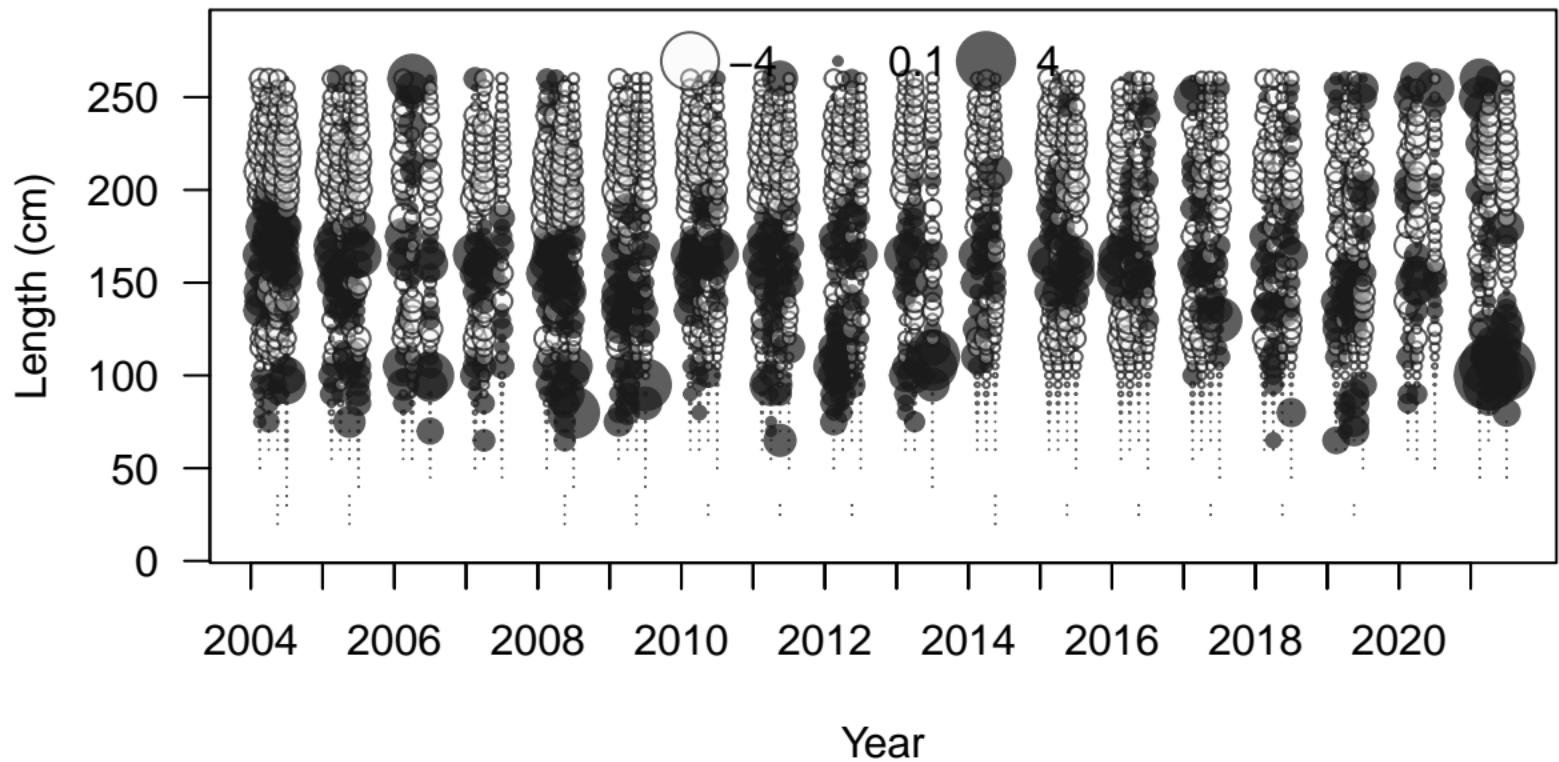


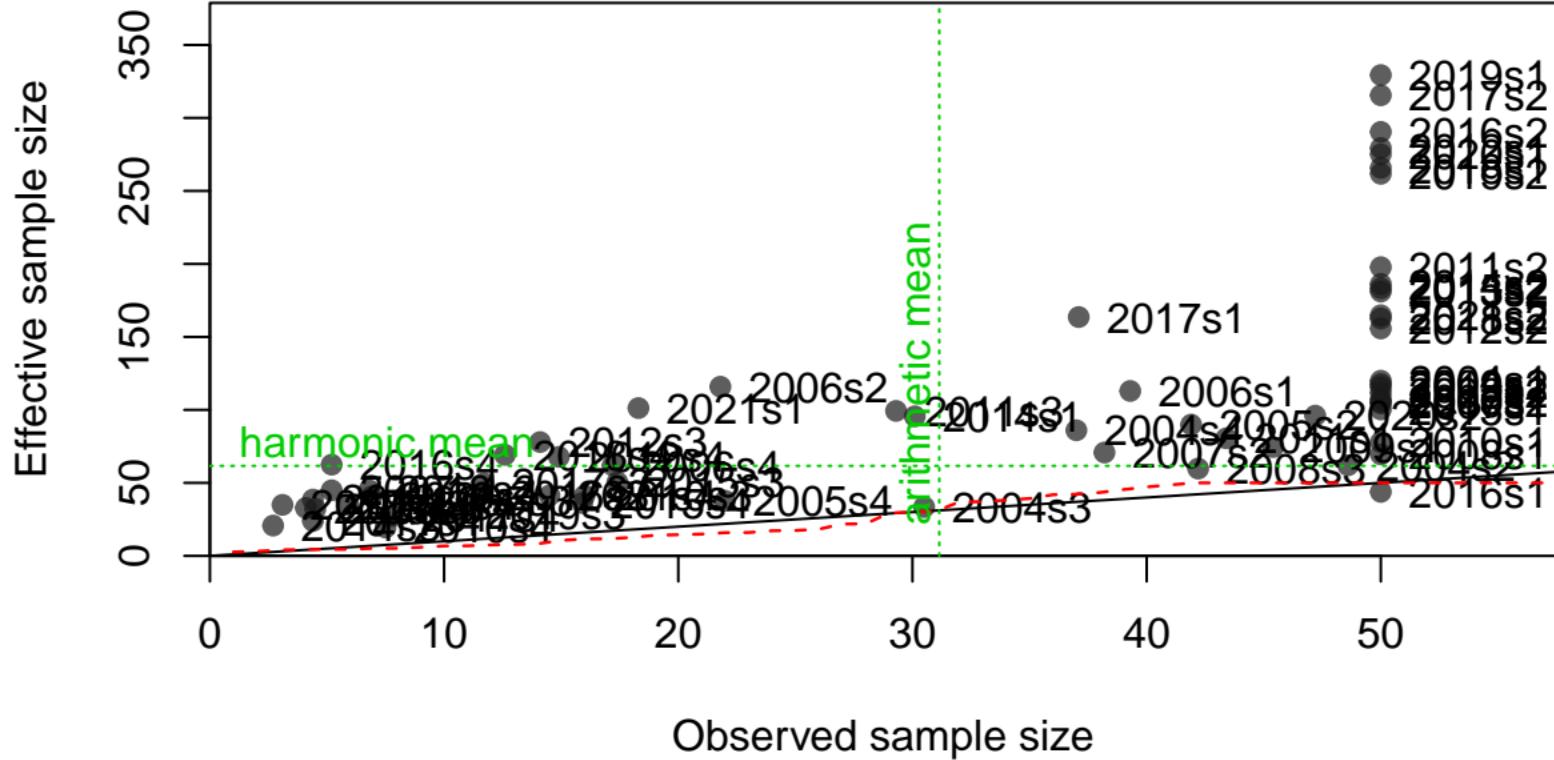
Proportion



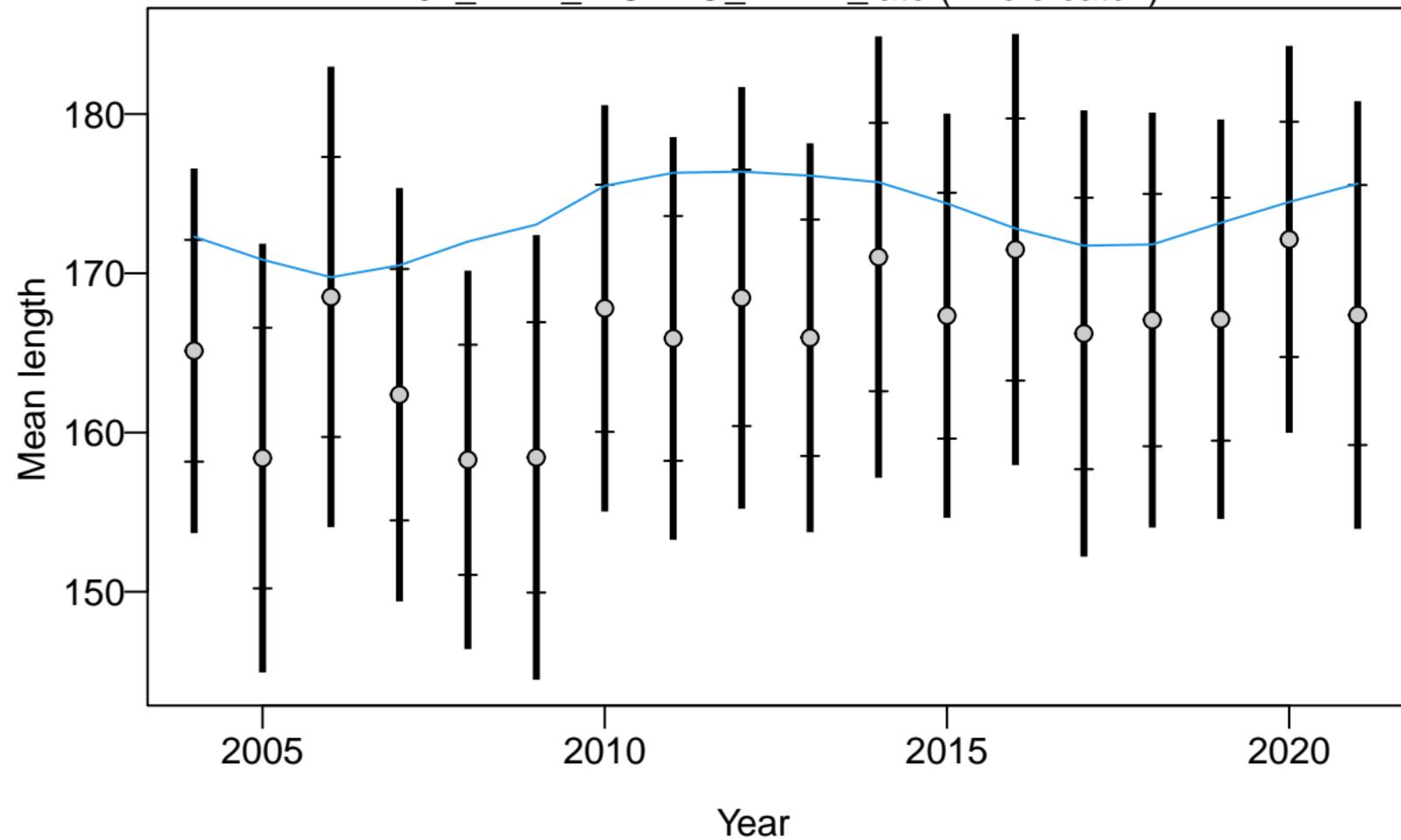
Proportion



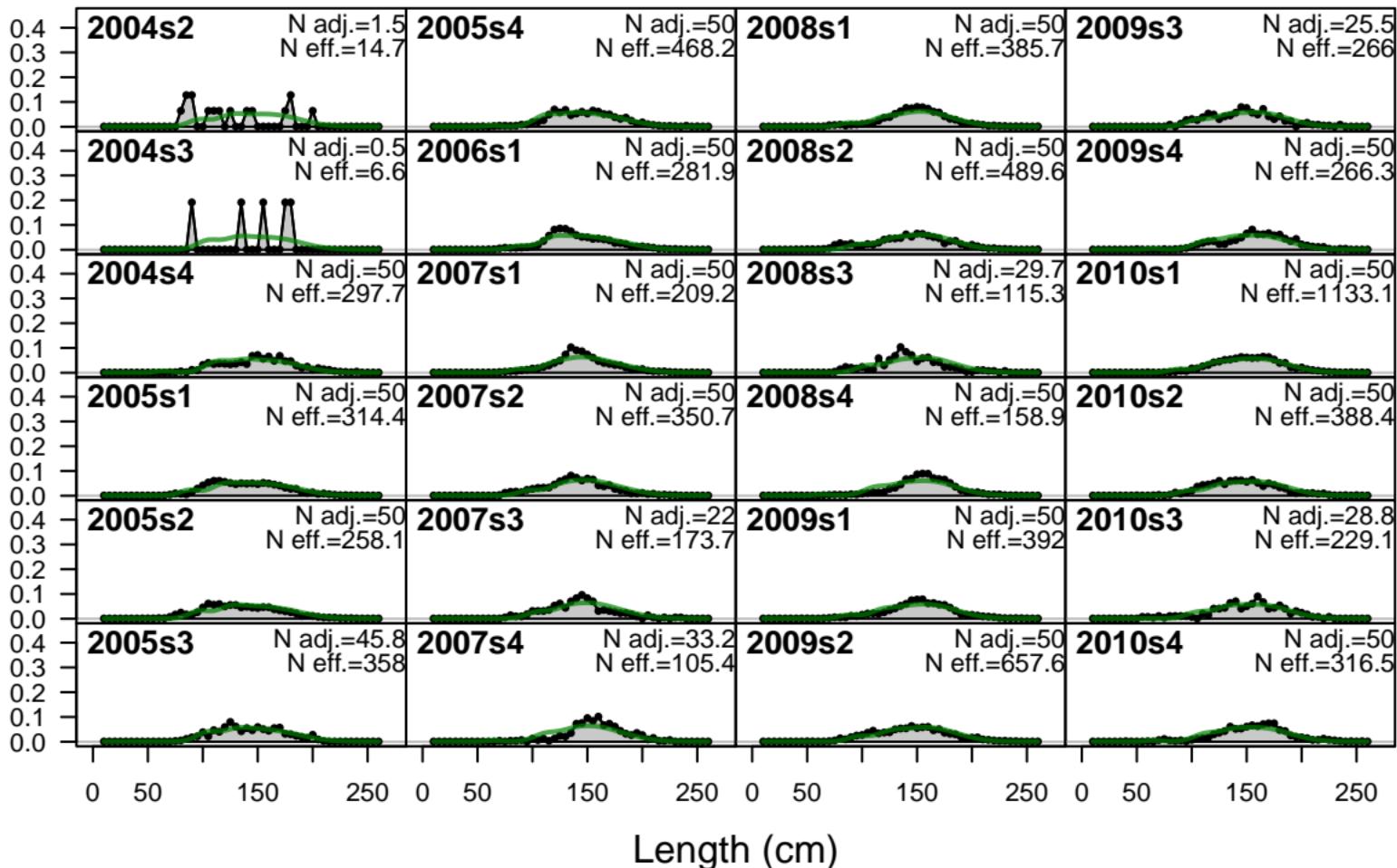




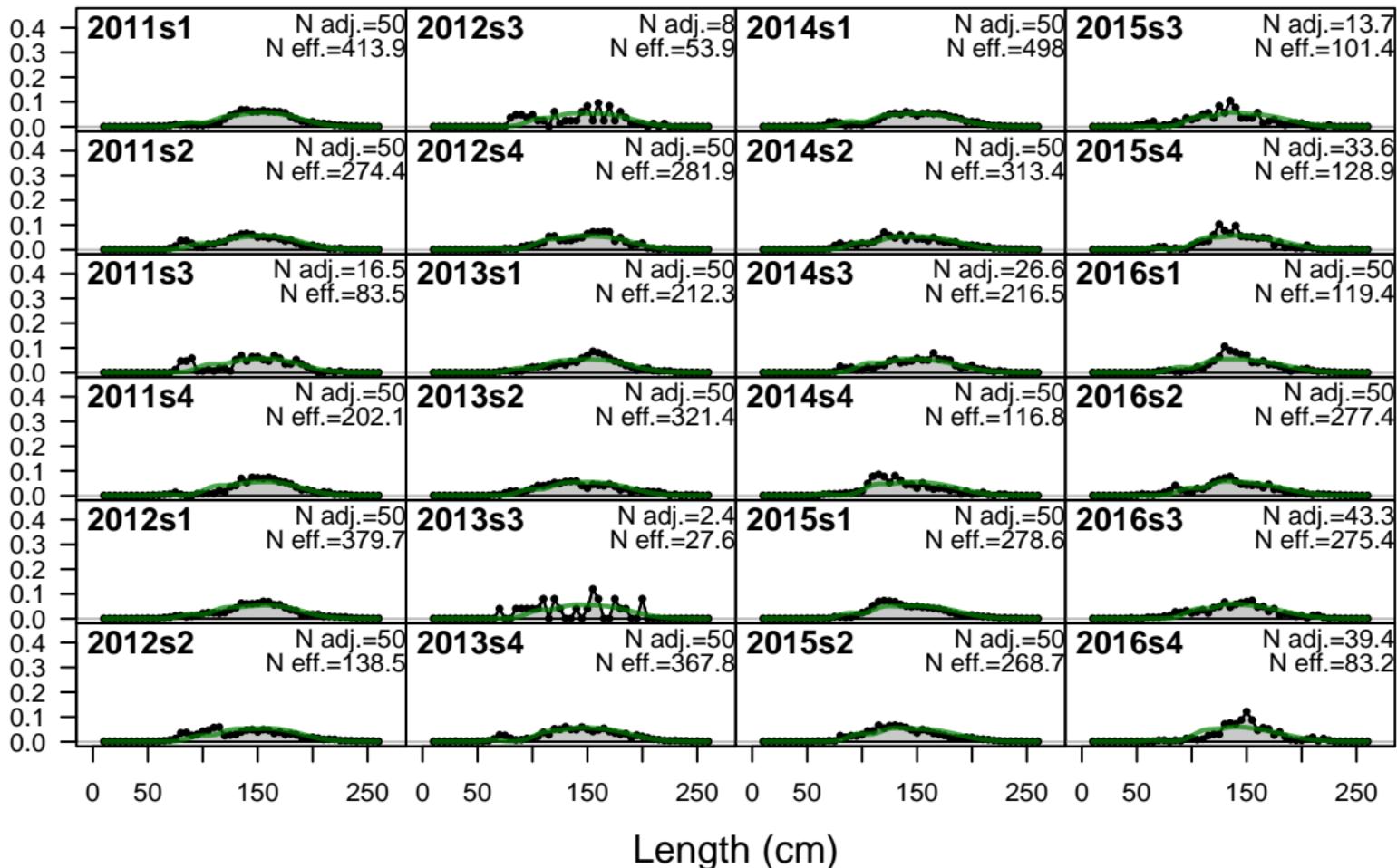
F02_TWN_WCNPO_DWLL_late (whole catch)



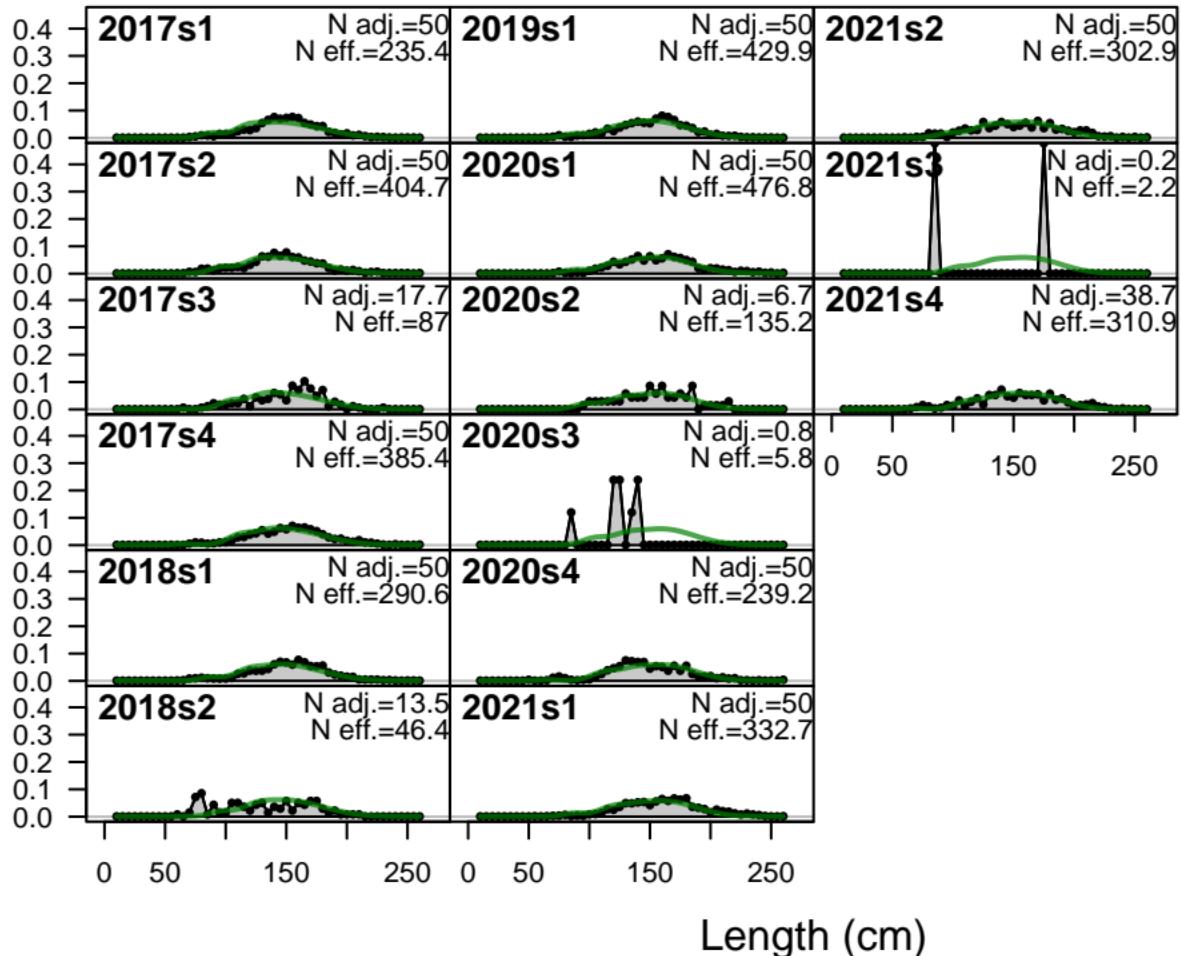
Proportion

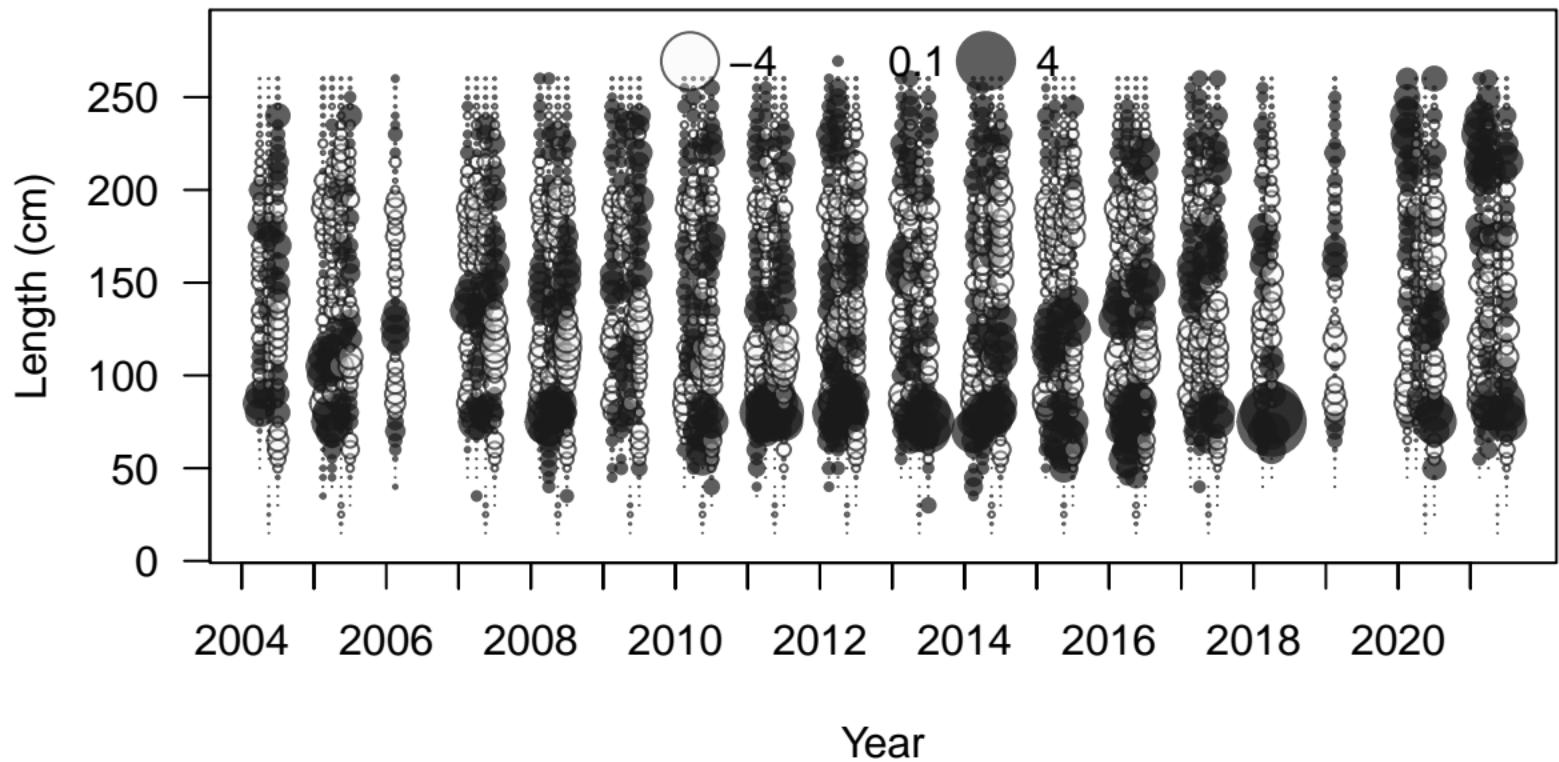


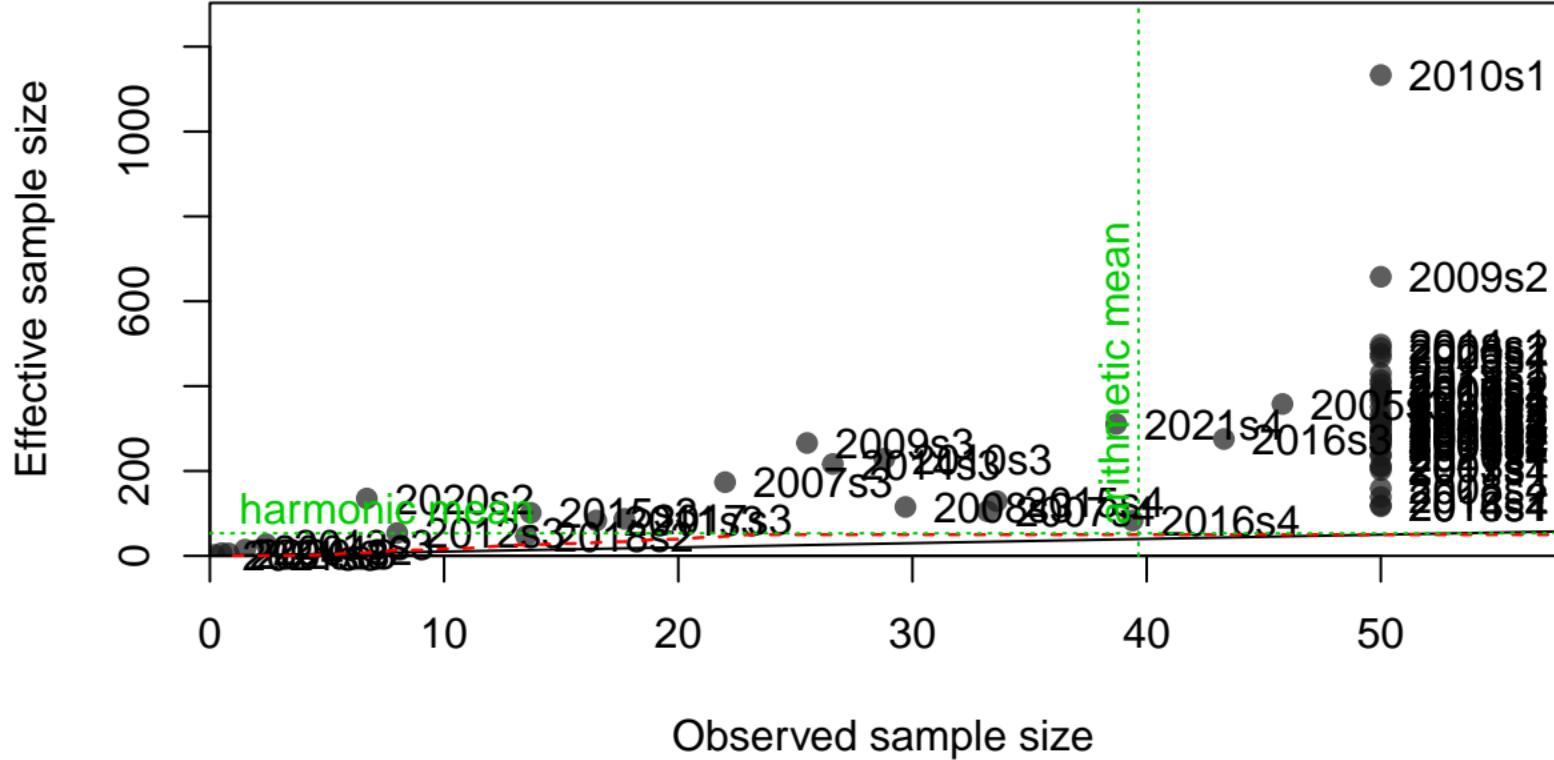
Proportion



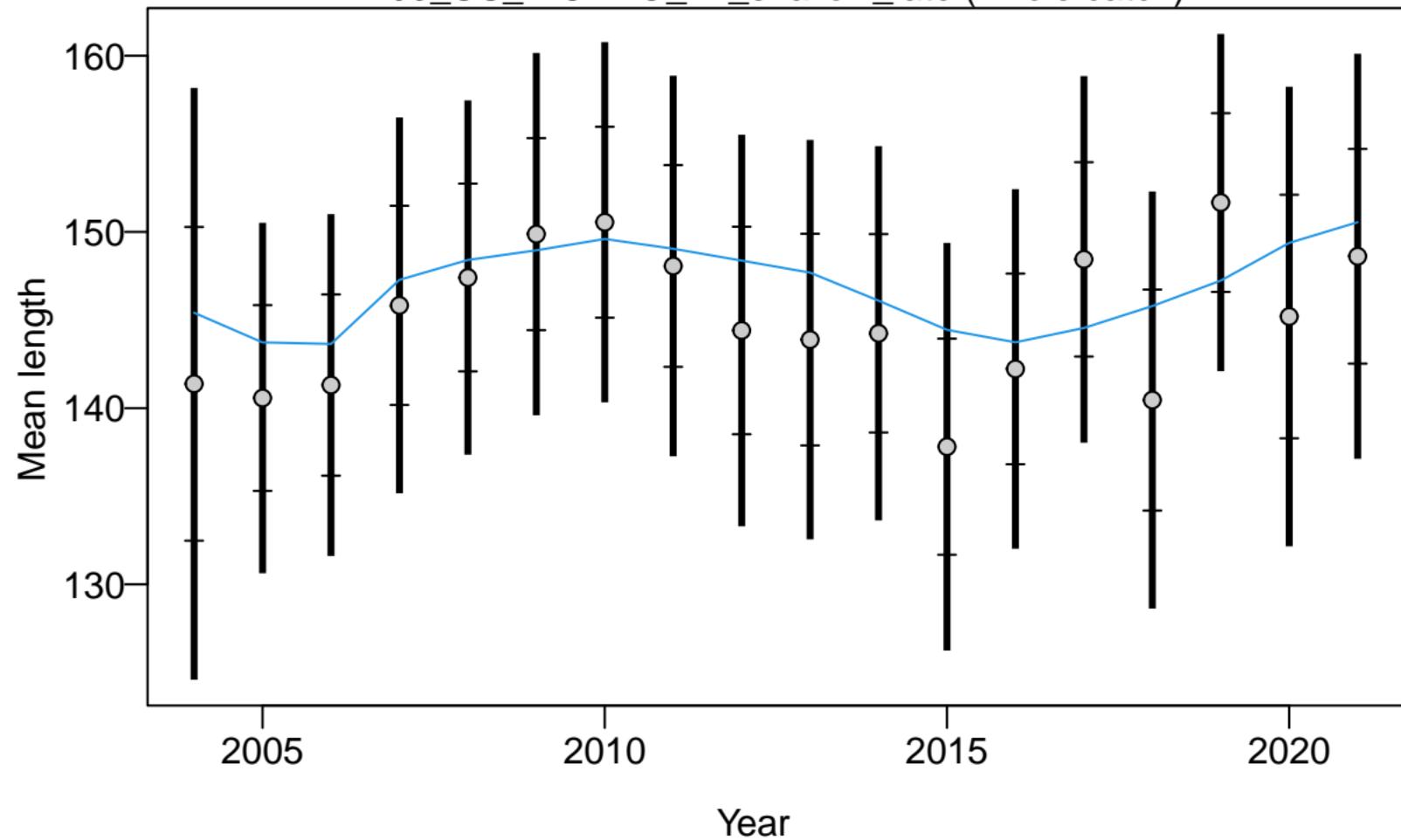
Proportion



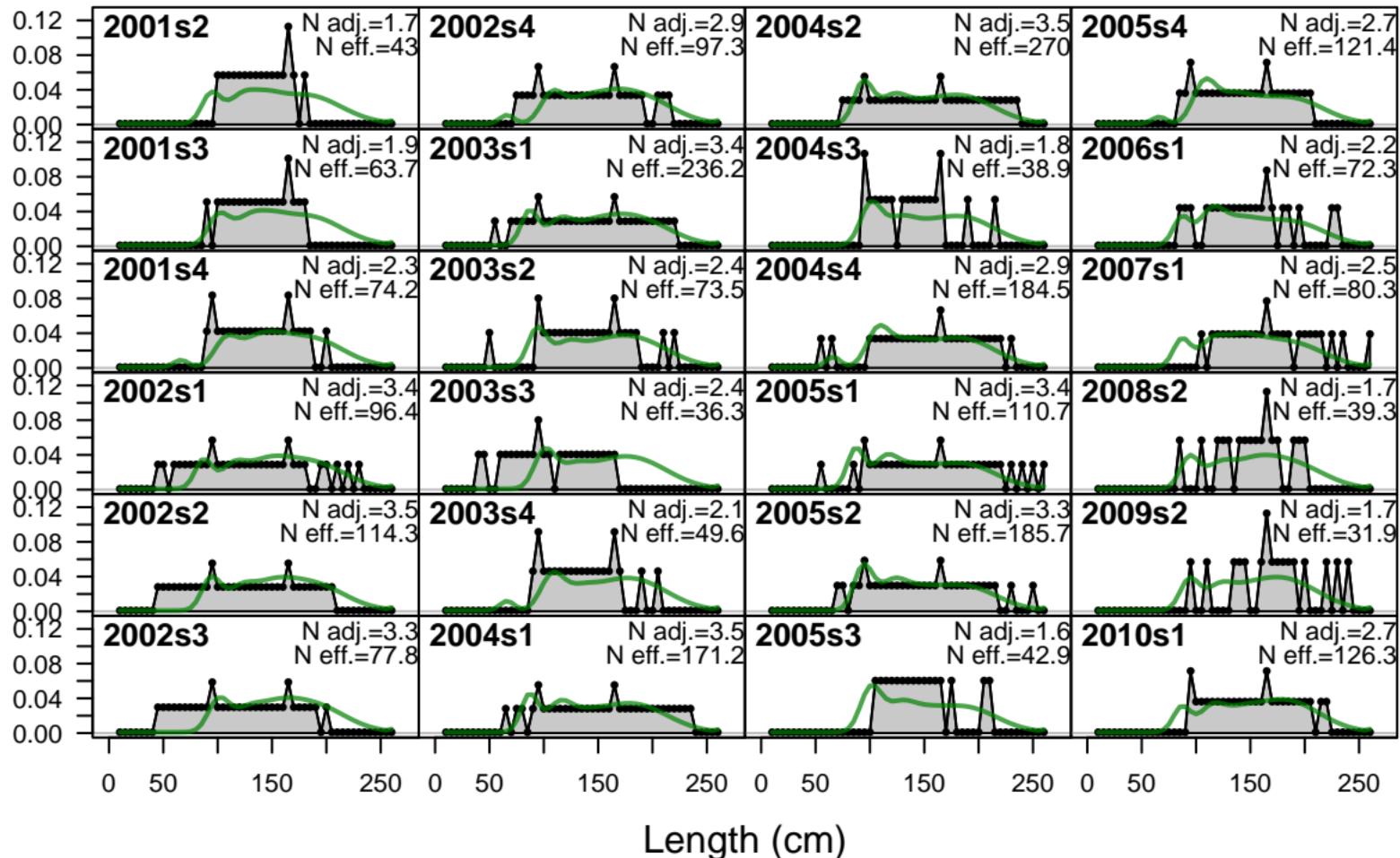




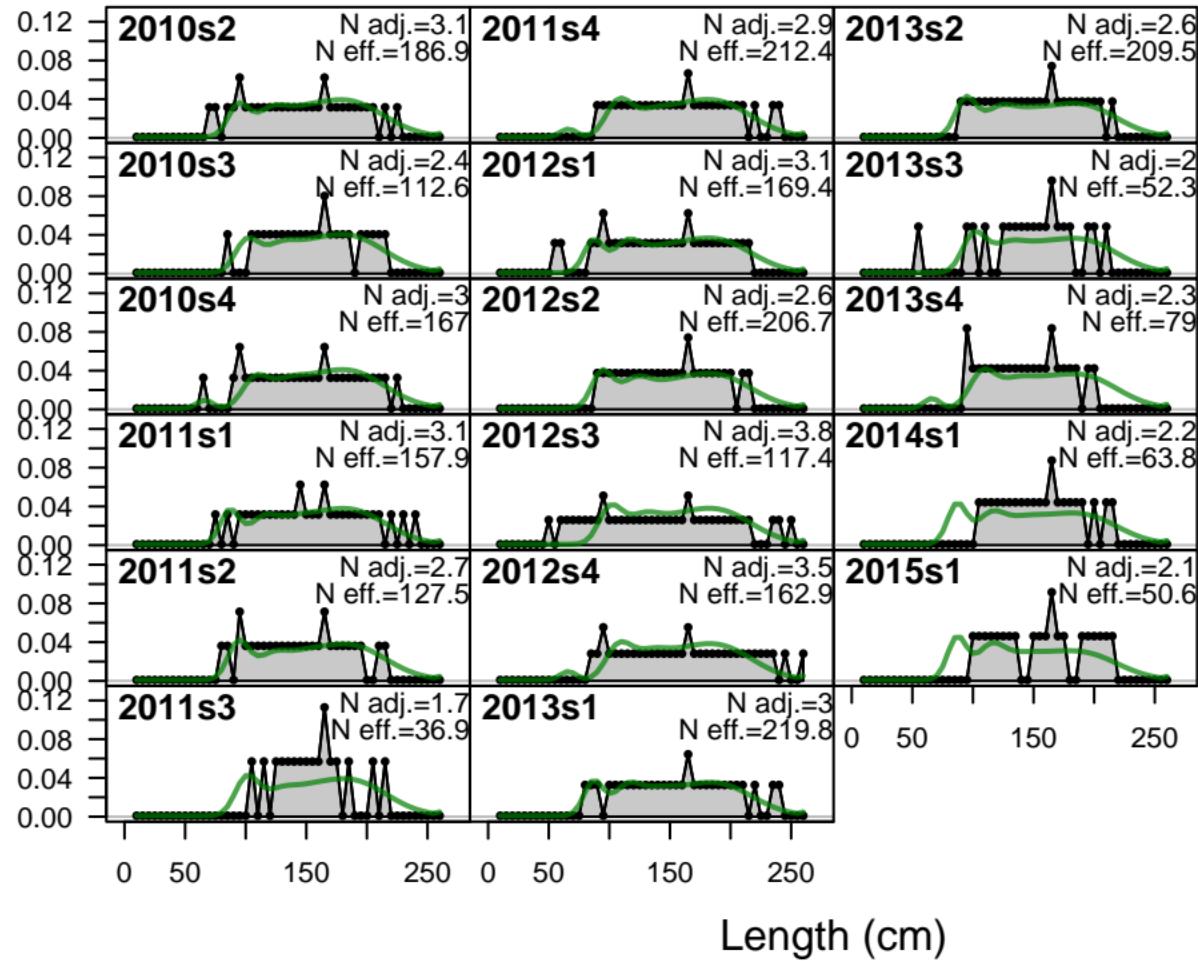
F03_US_WCNPO_LL_shallow_late (whole catch)

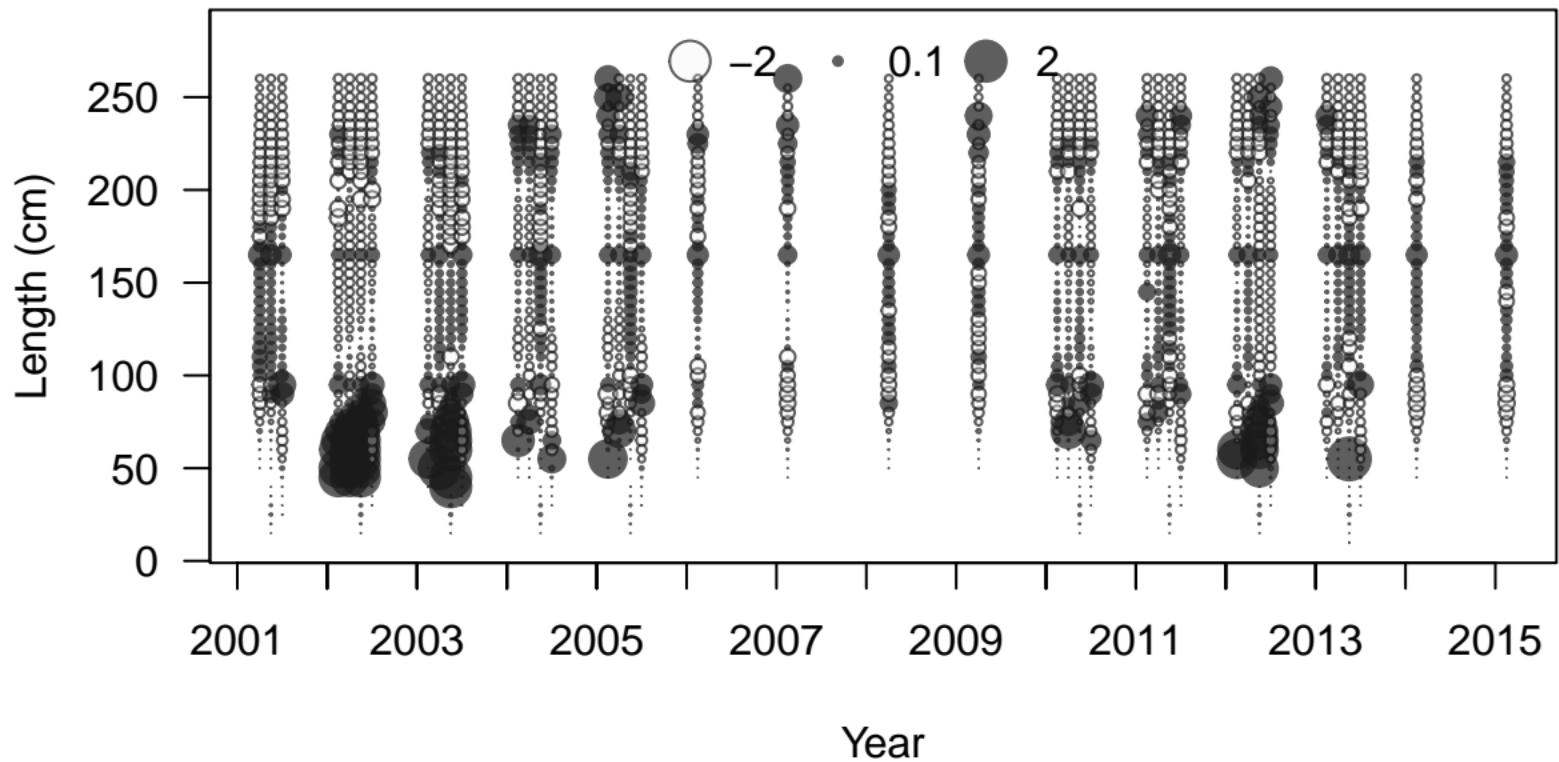


Proportion

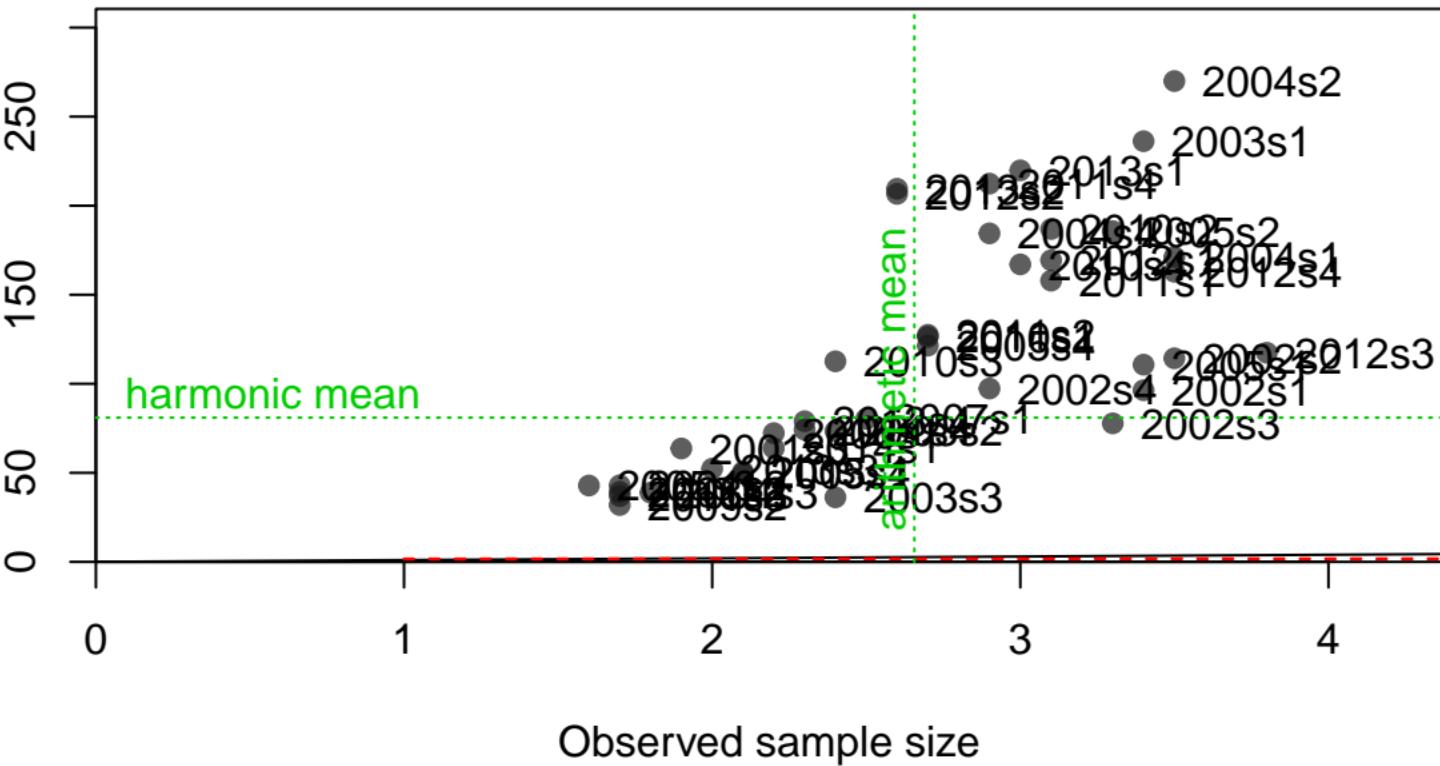


Proportion

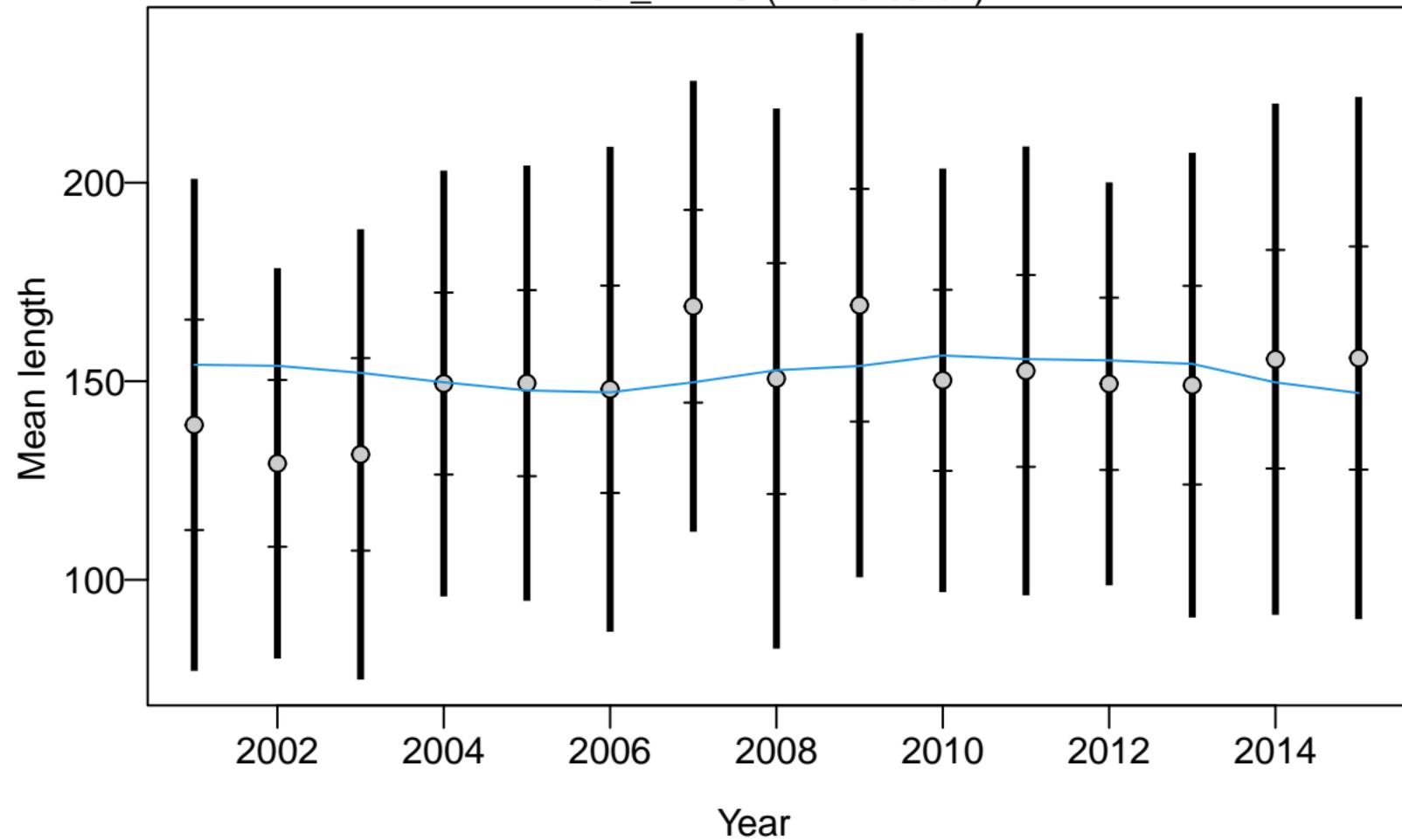




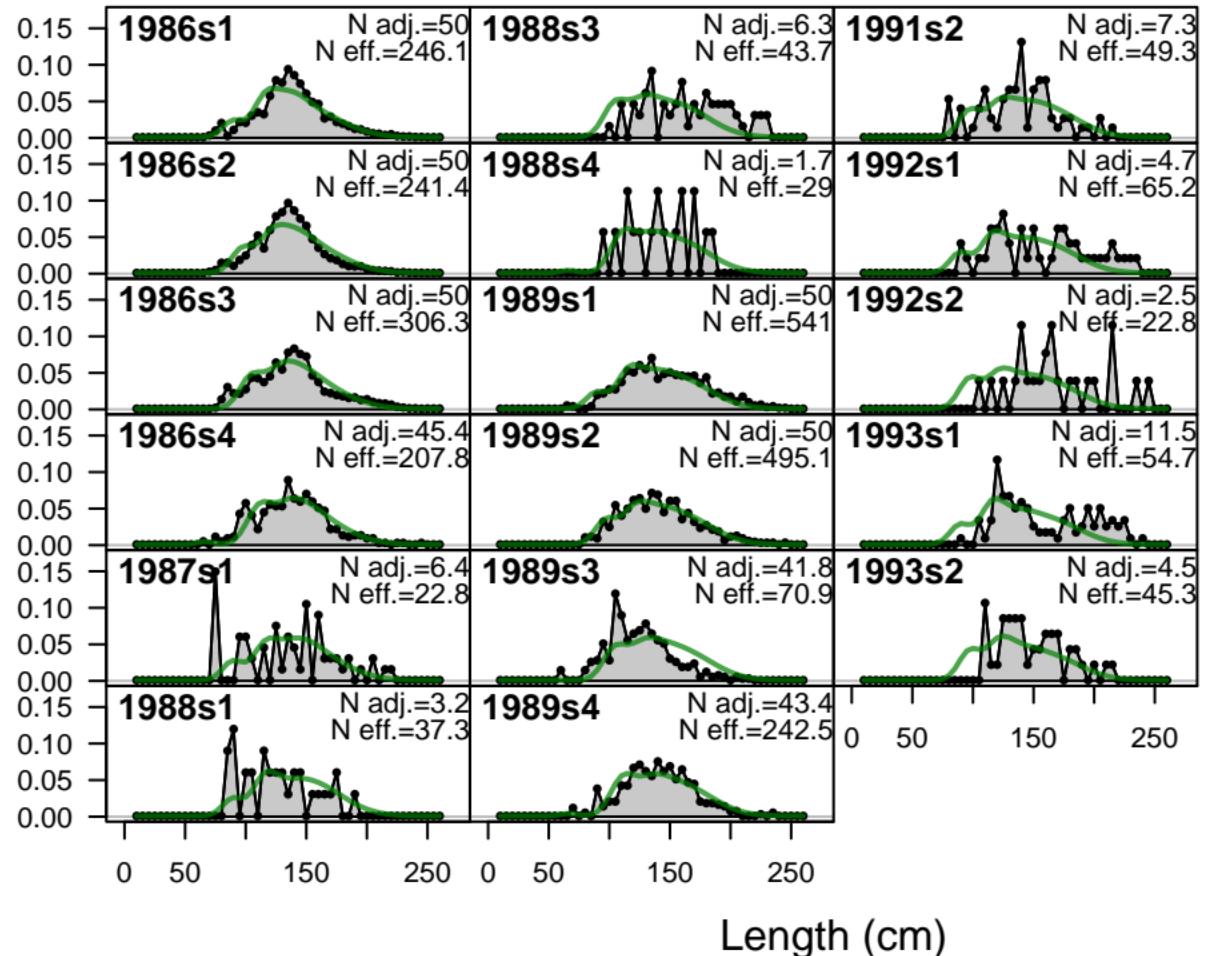
Effective sample size

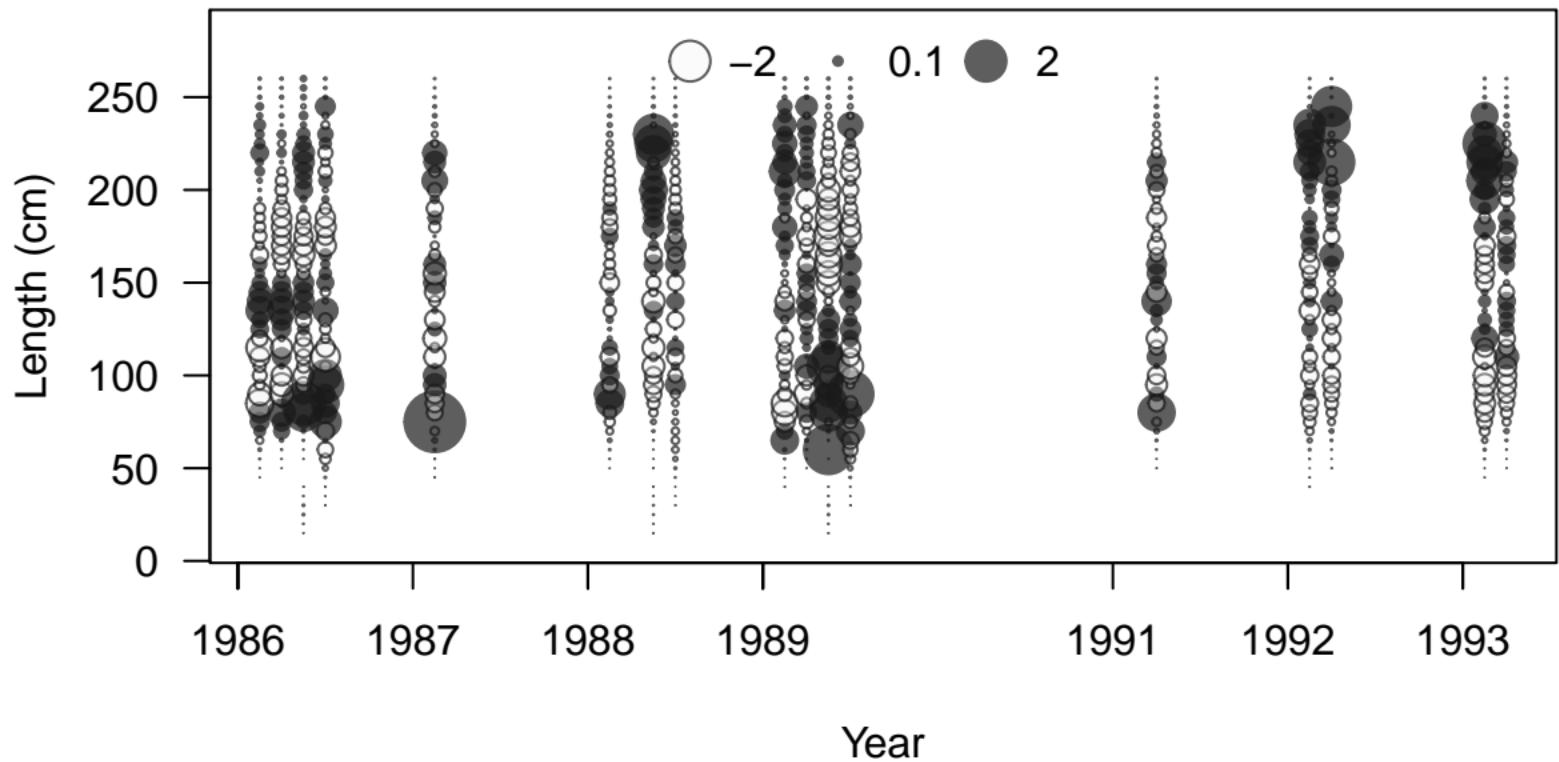


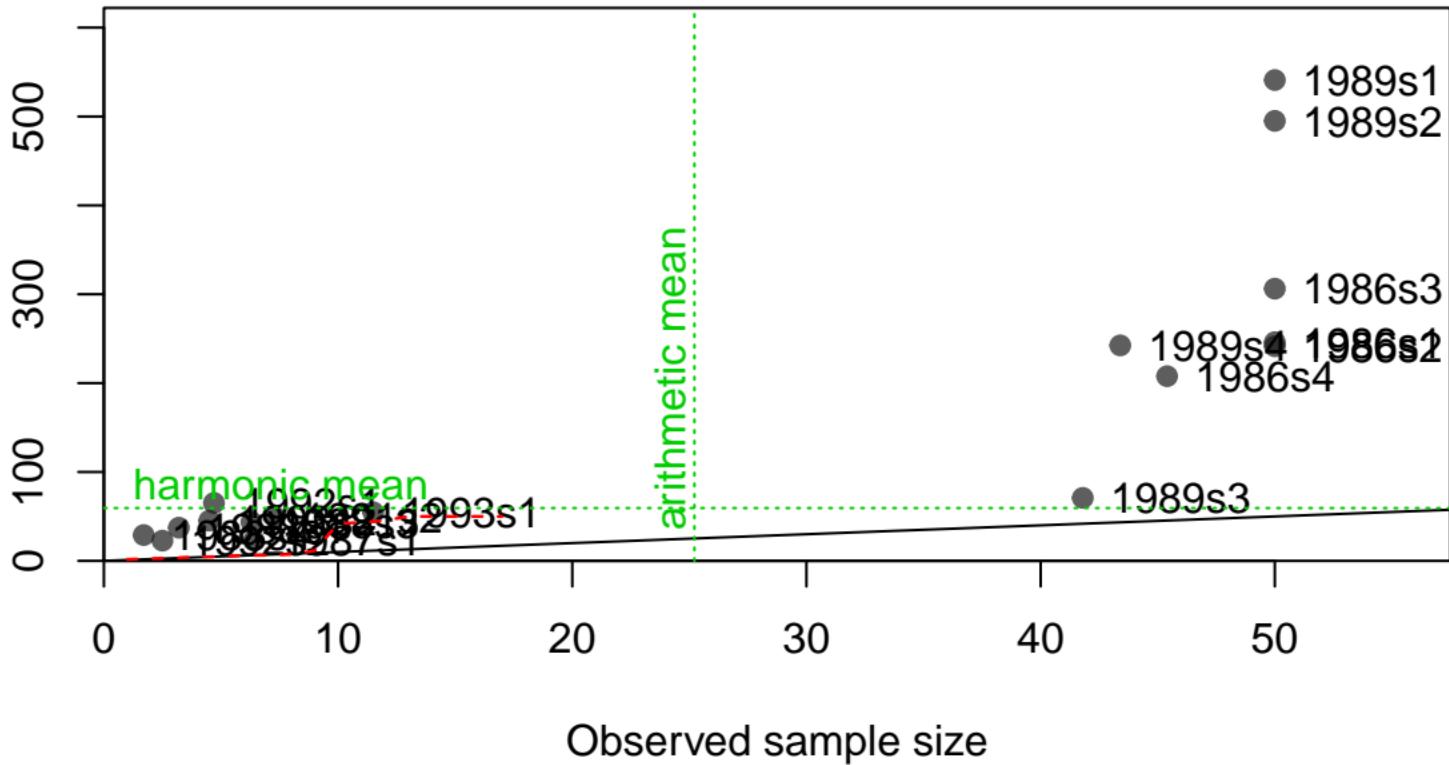
F04_IATTC (whole catch)



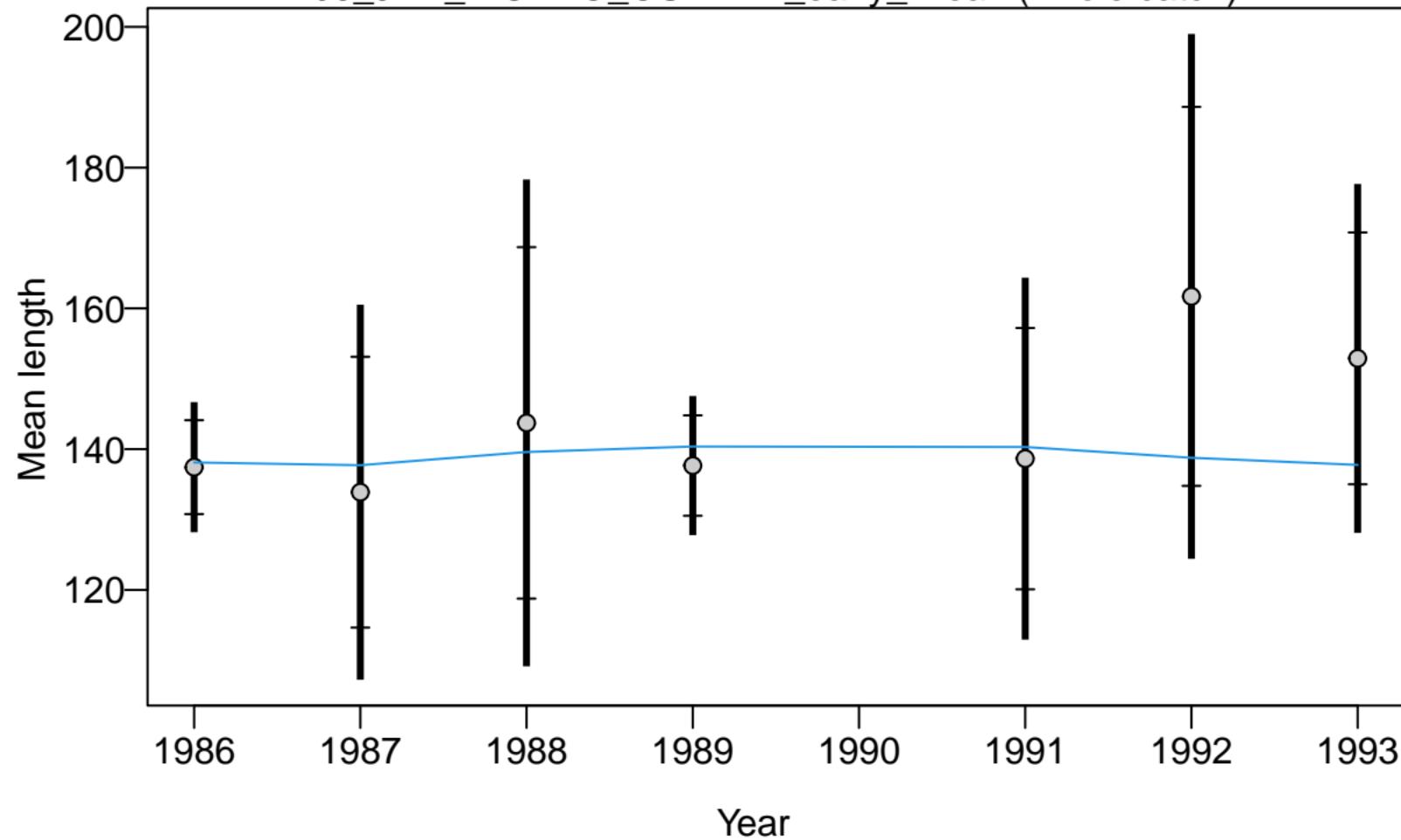
Proportion



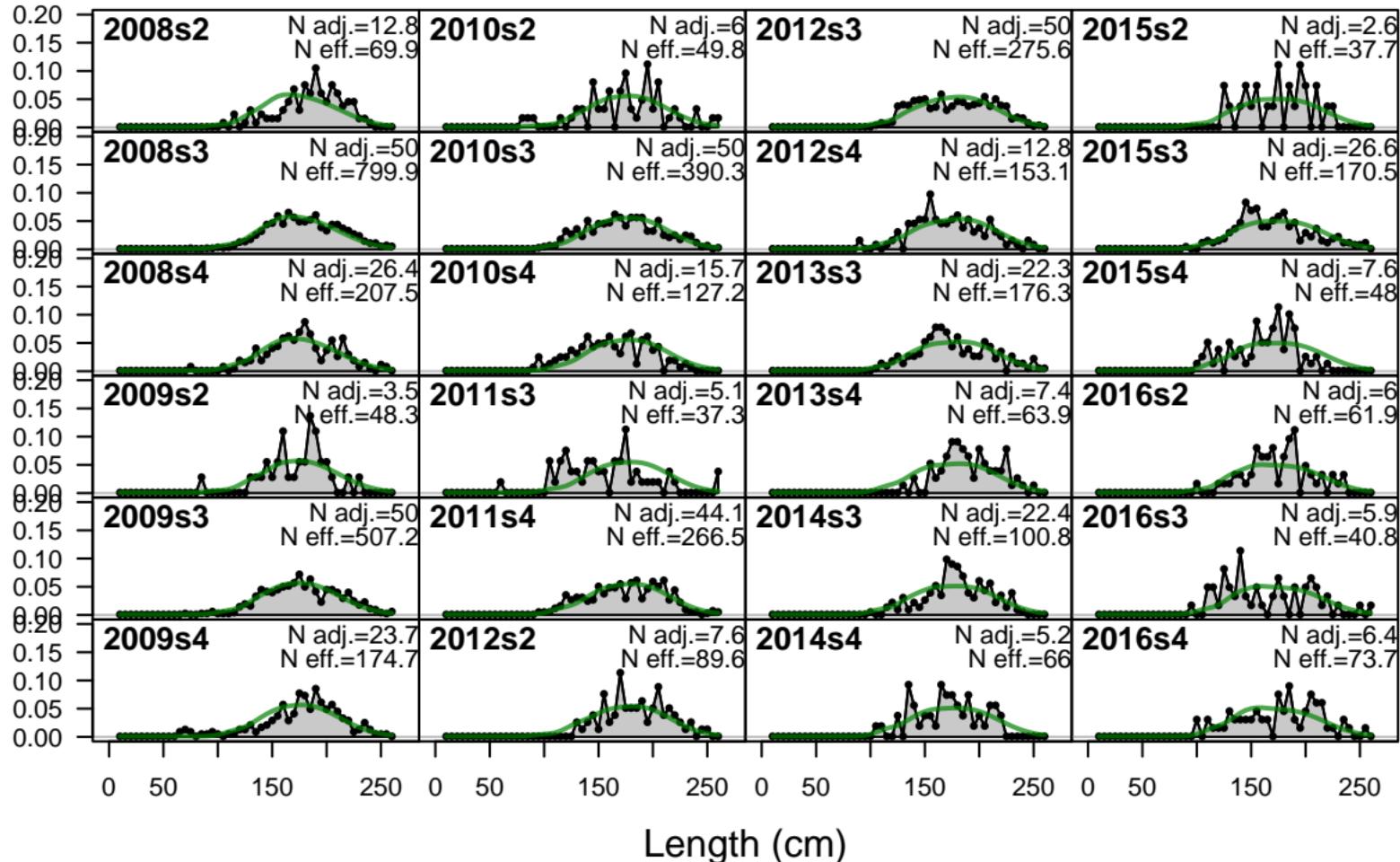




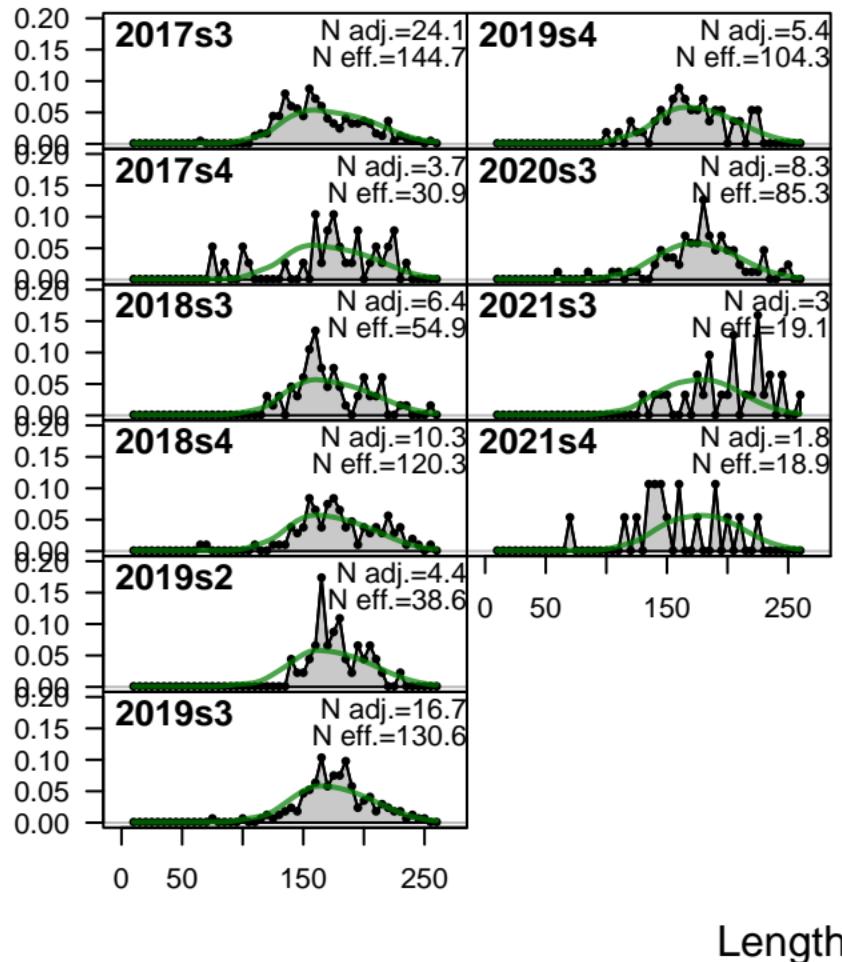
F06_JPN_WCNPO_OSDWLL_early_Area1 (whole catch)

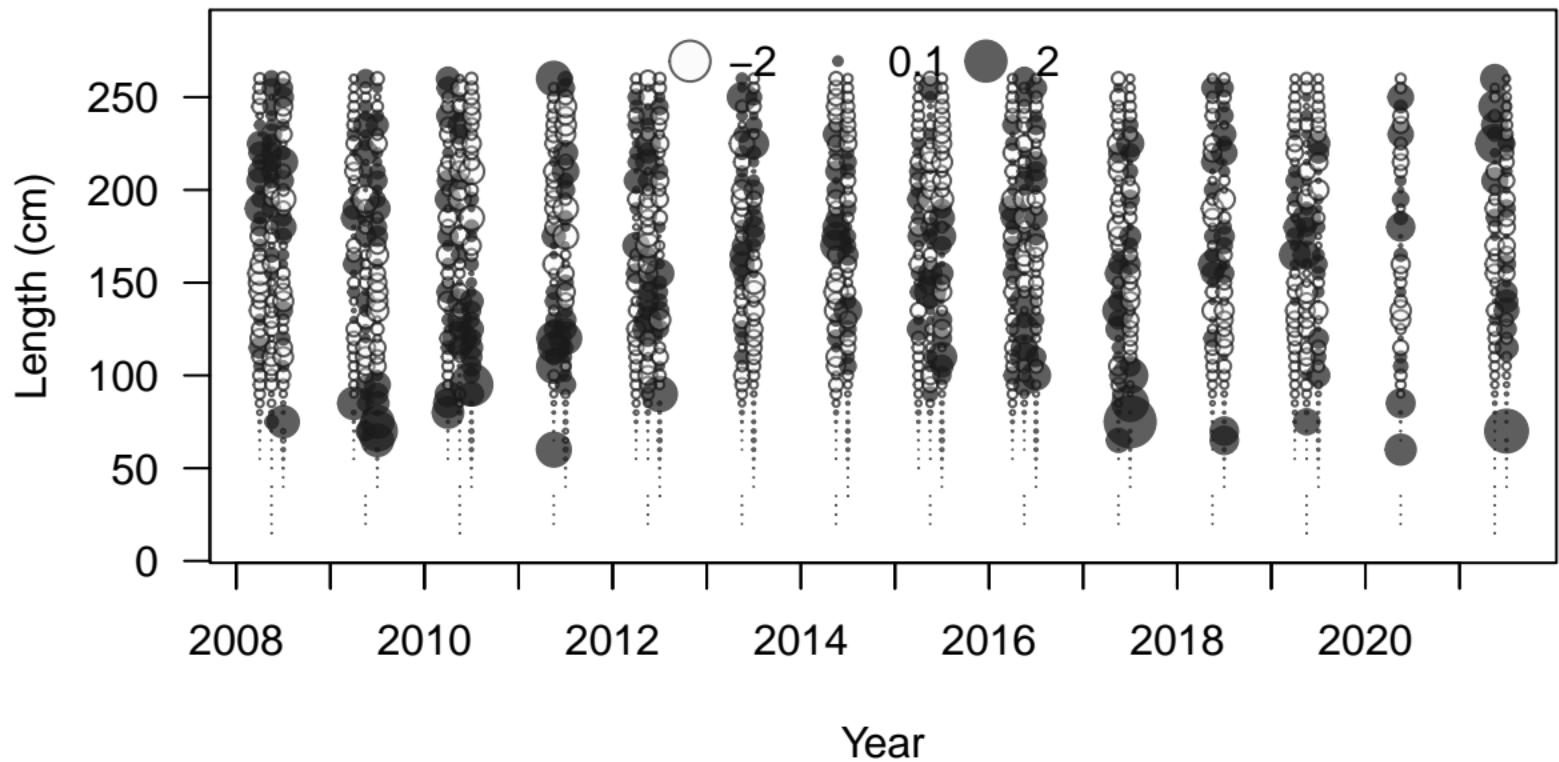


Proportion

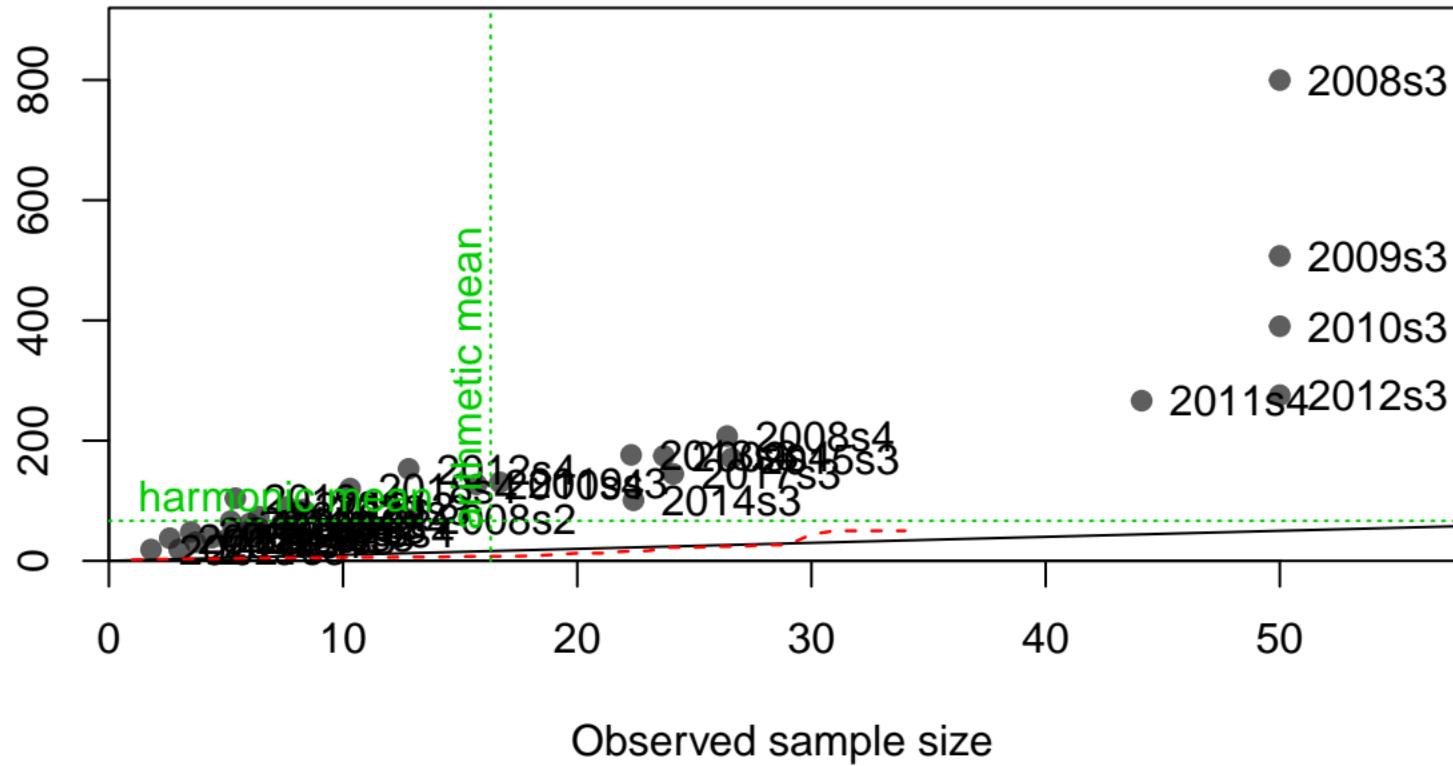


Proportion

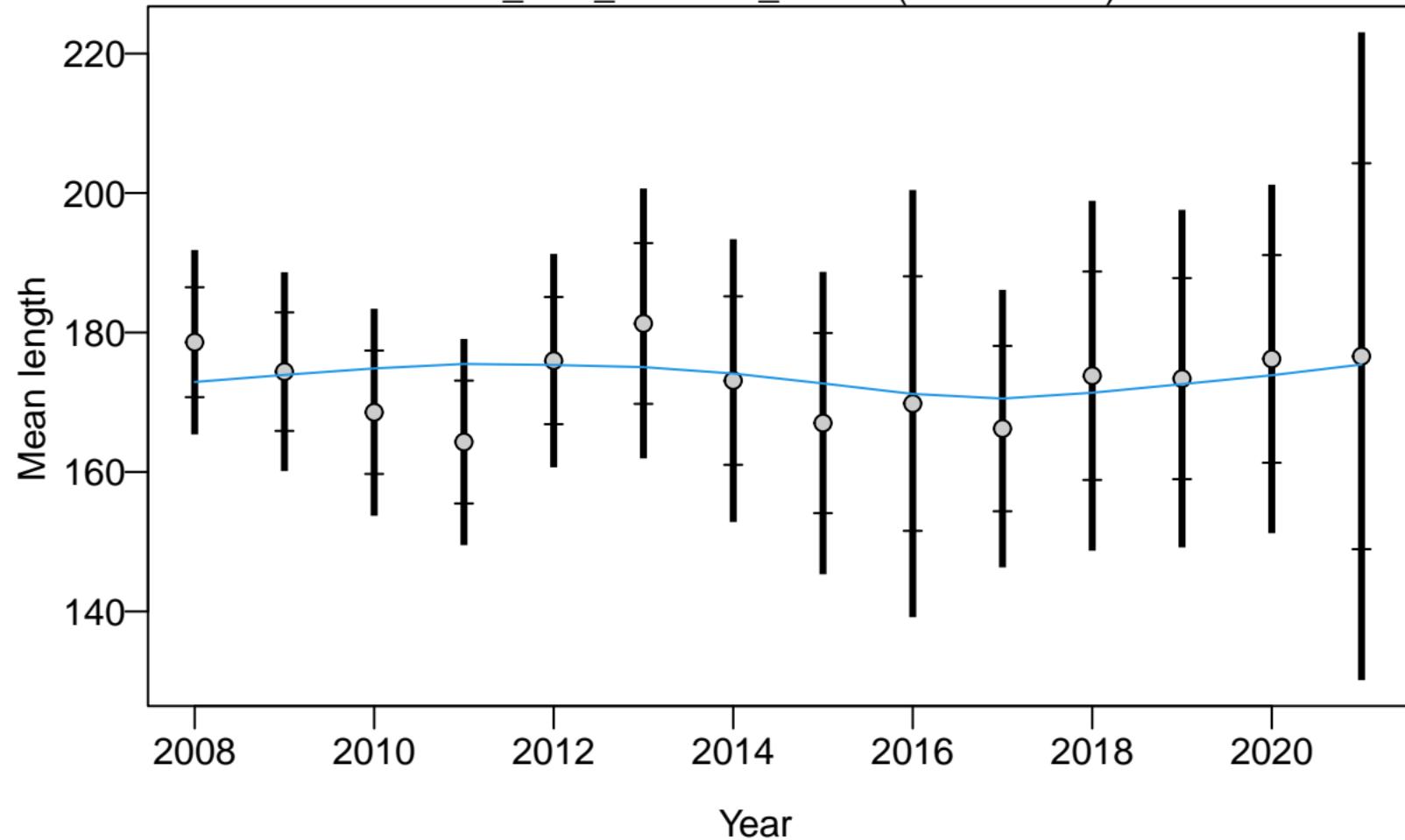




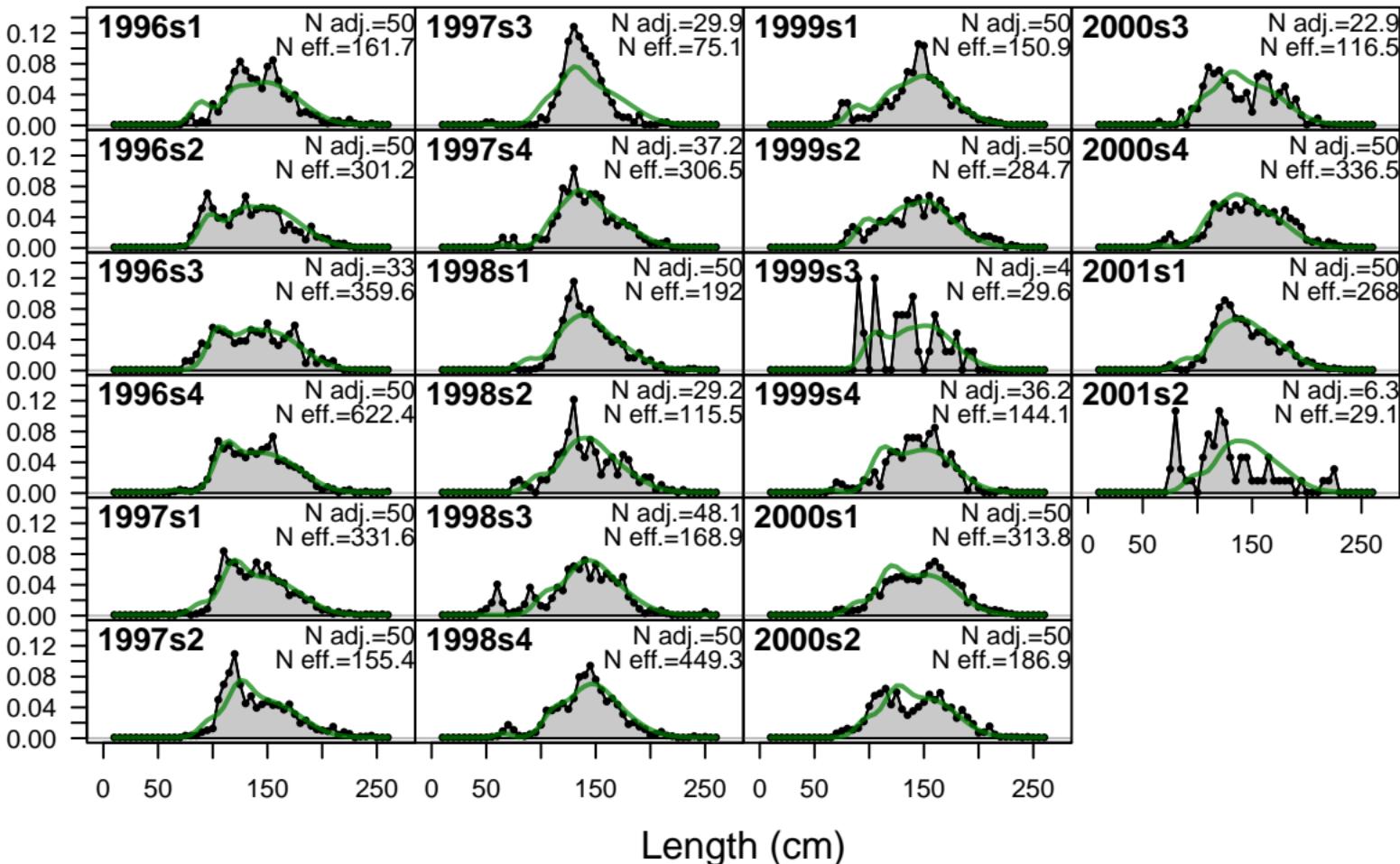
Effective sample size

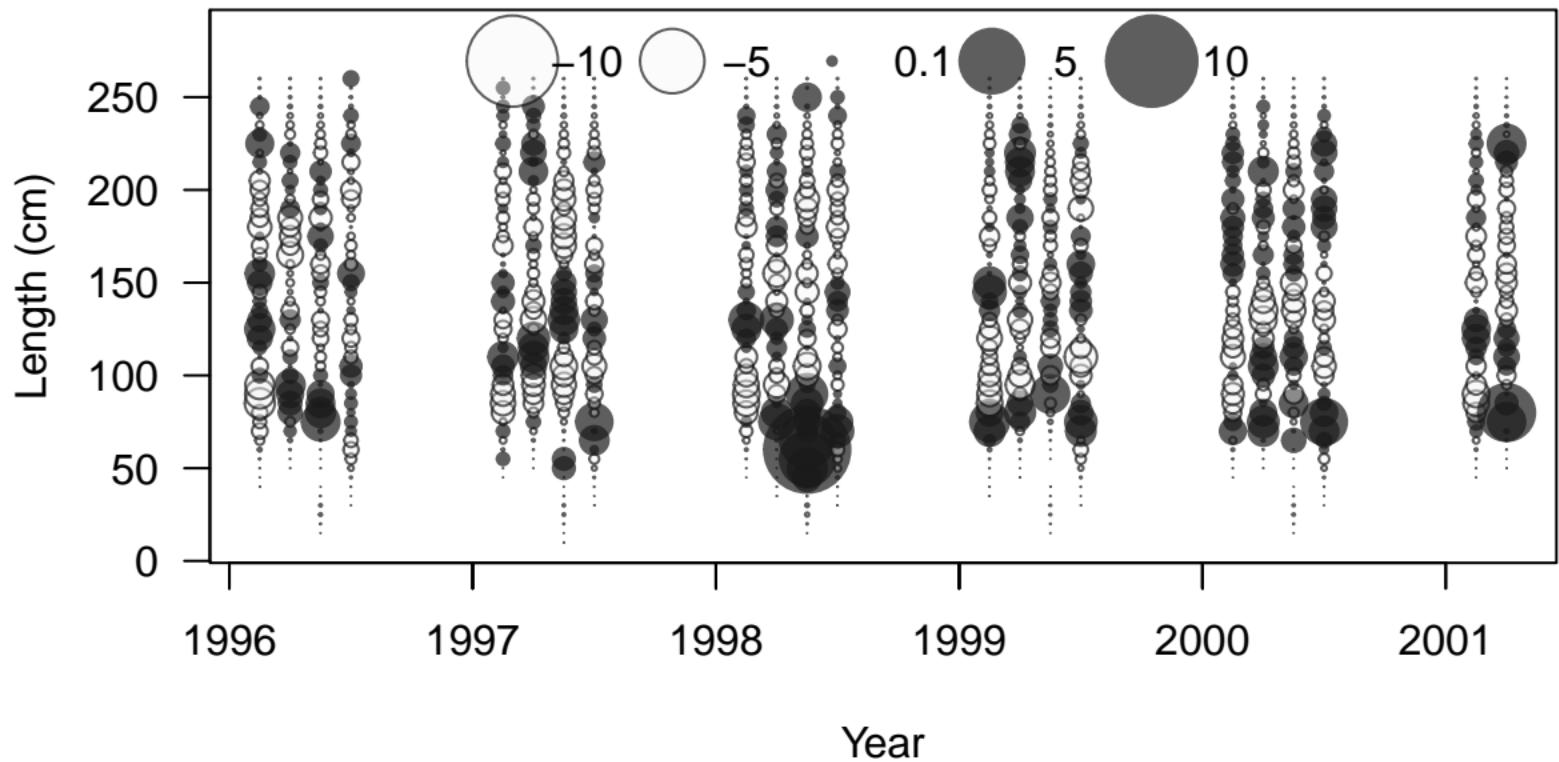


F07_JPN_WCNPO_CODF (whole catch)

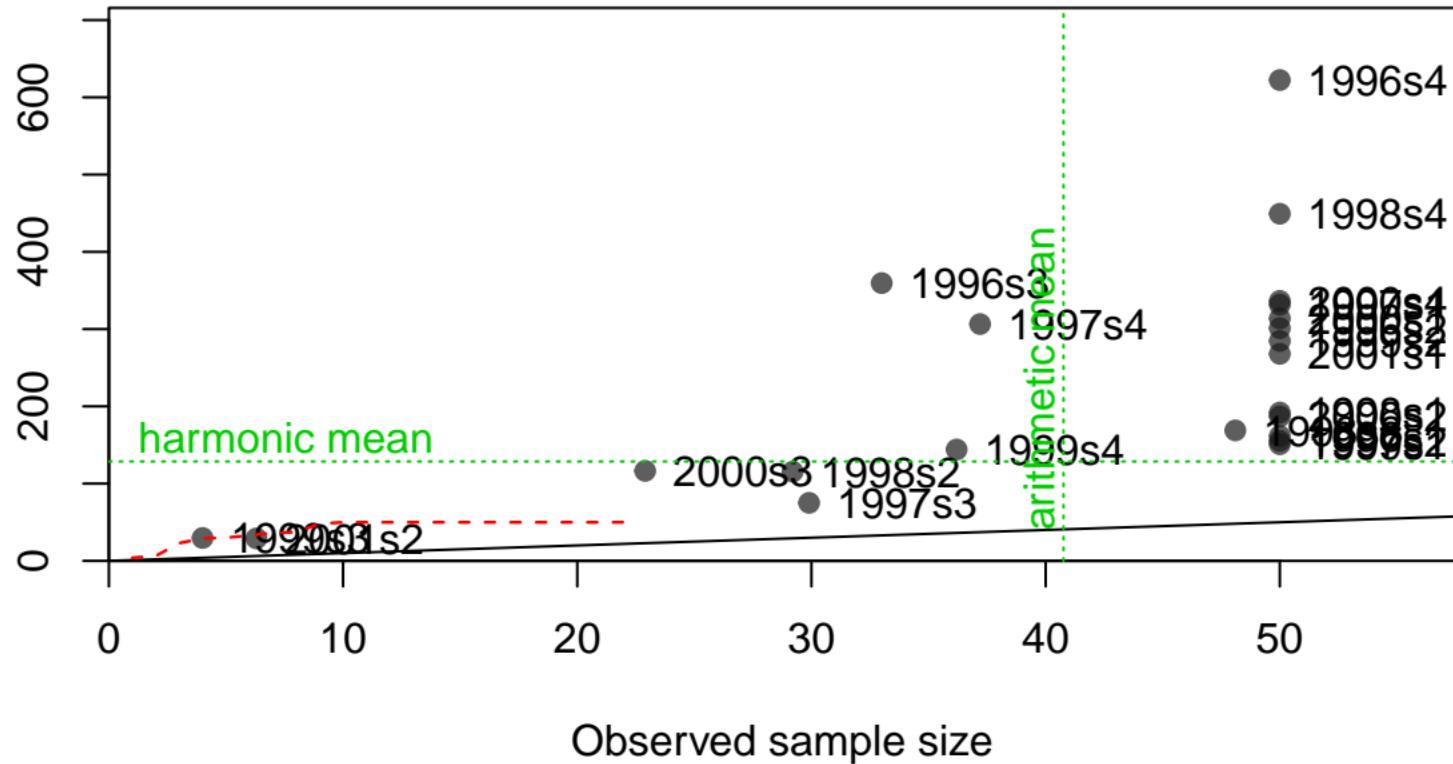


Proportion

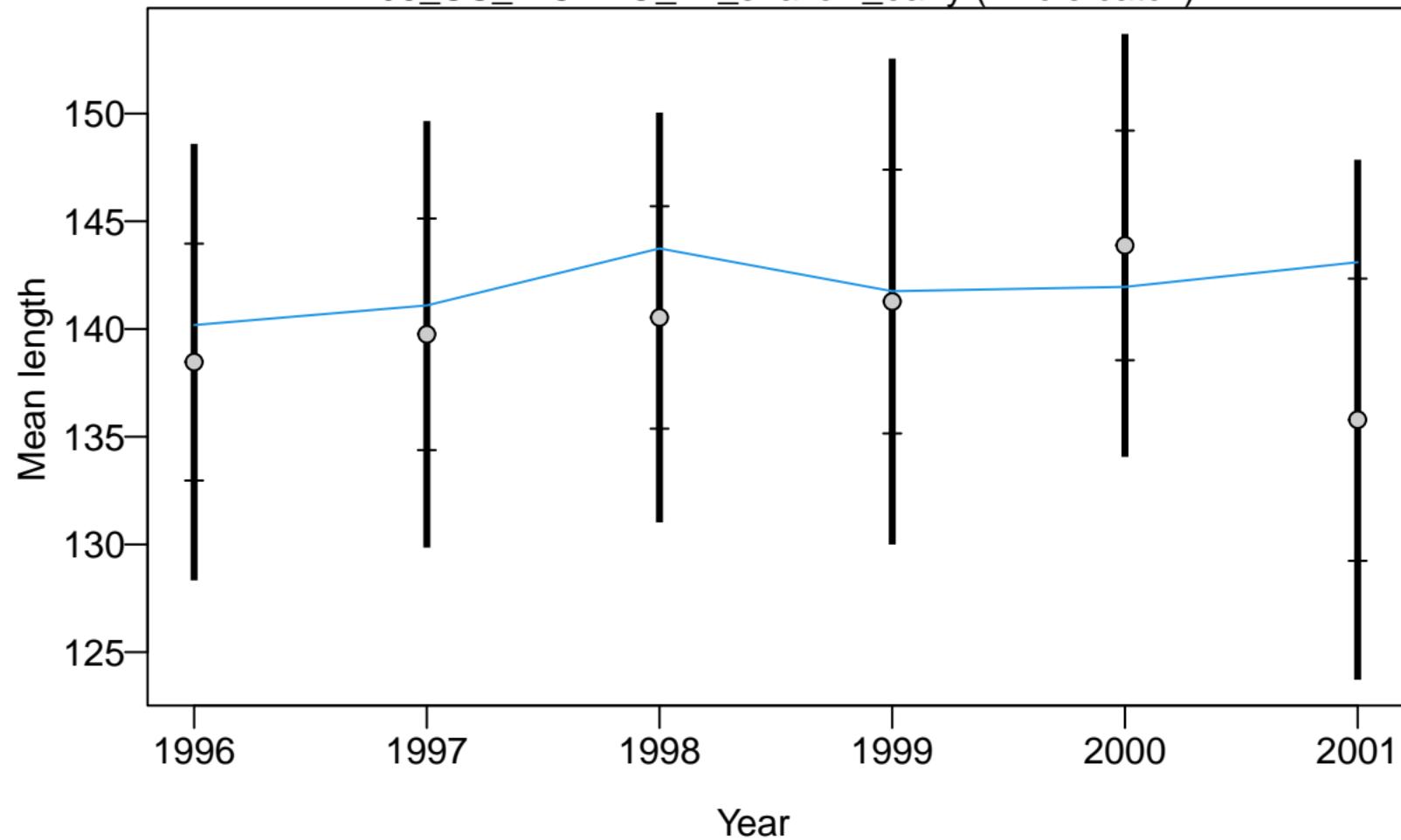




Effective sample size



F08_US_WCNPO_LL_shallow_early (whole catch)



Equilibrium yield (mt)

1.0e+22

0.0e+00

0.0

0.2

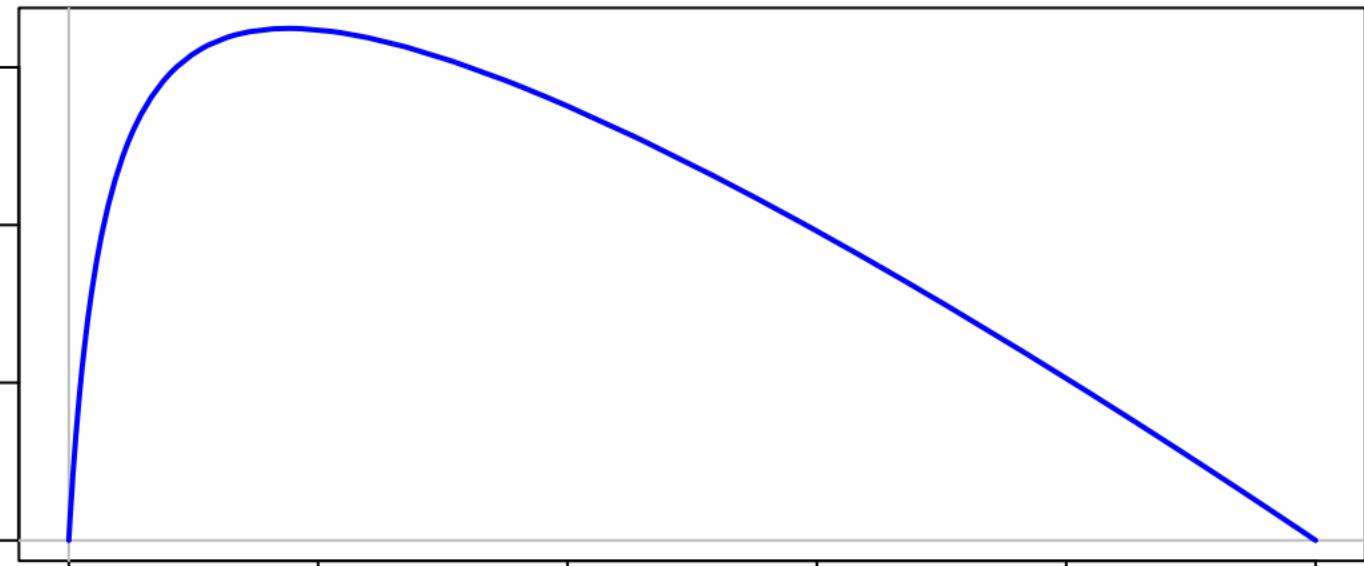
0.4

0.6

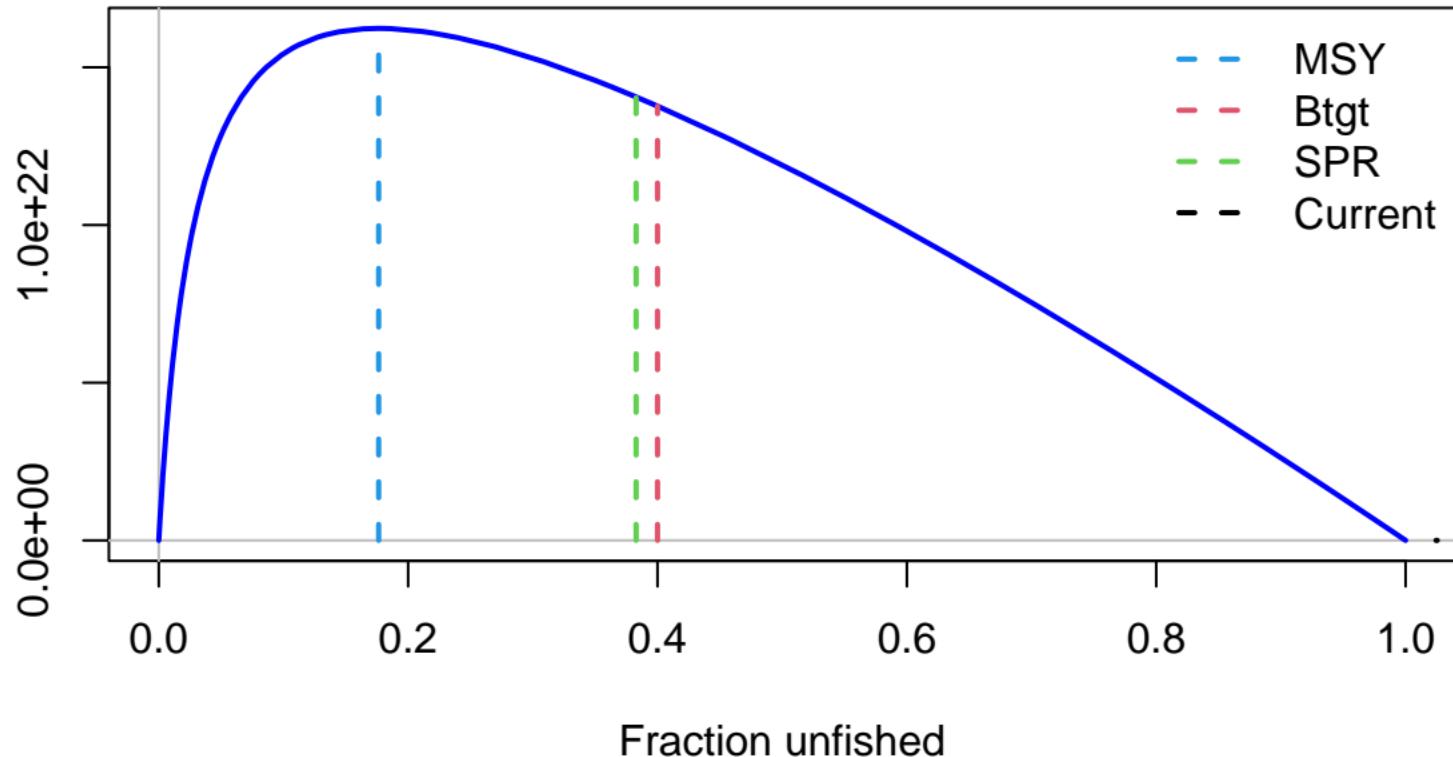
0.8

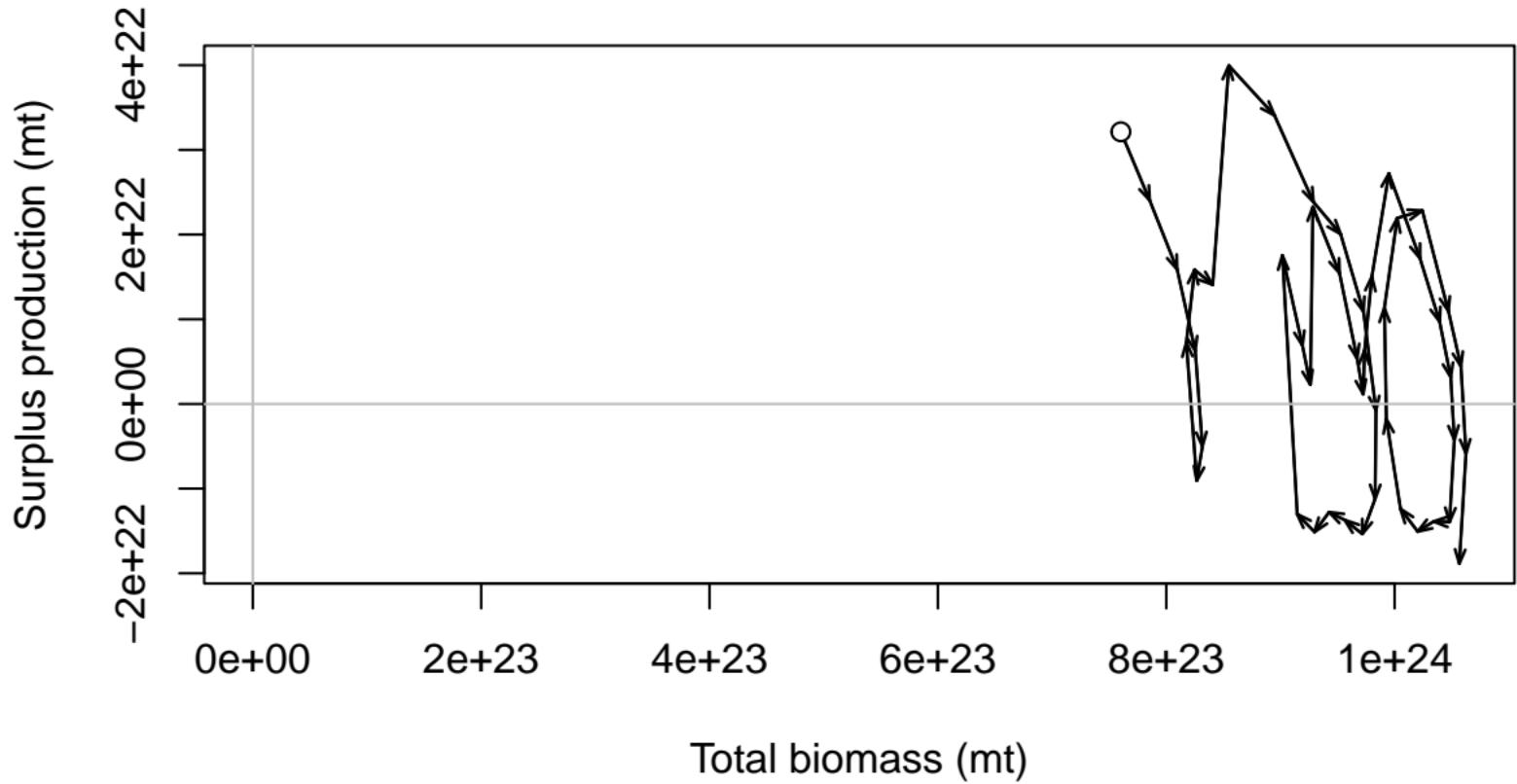
1.0

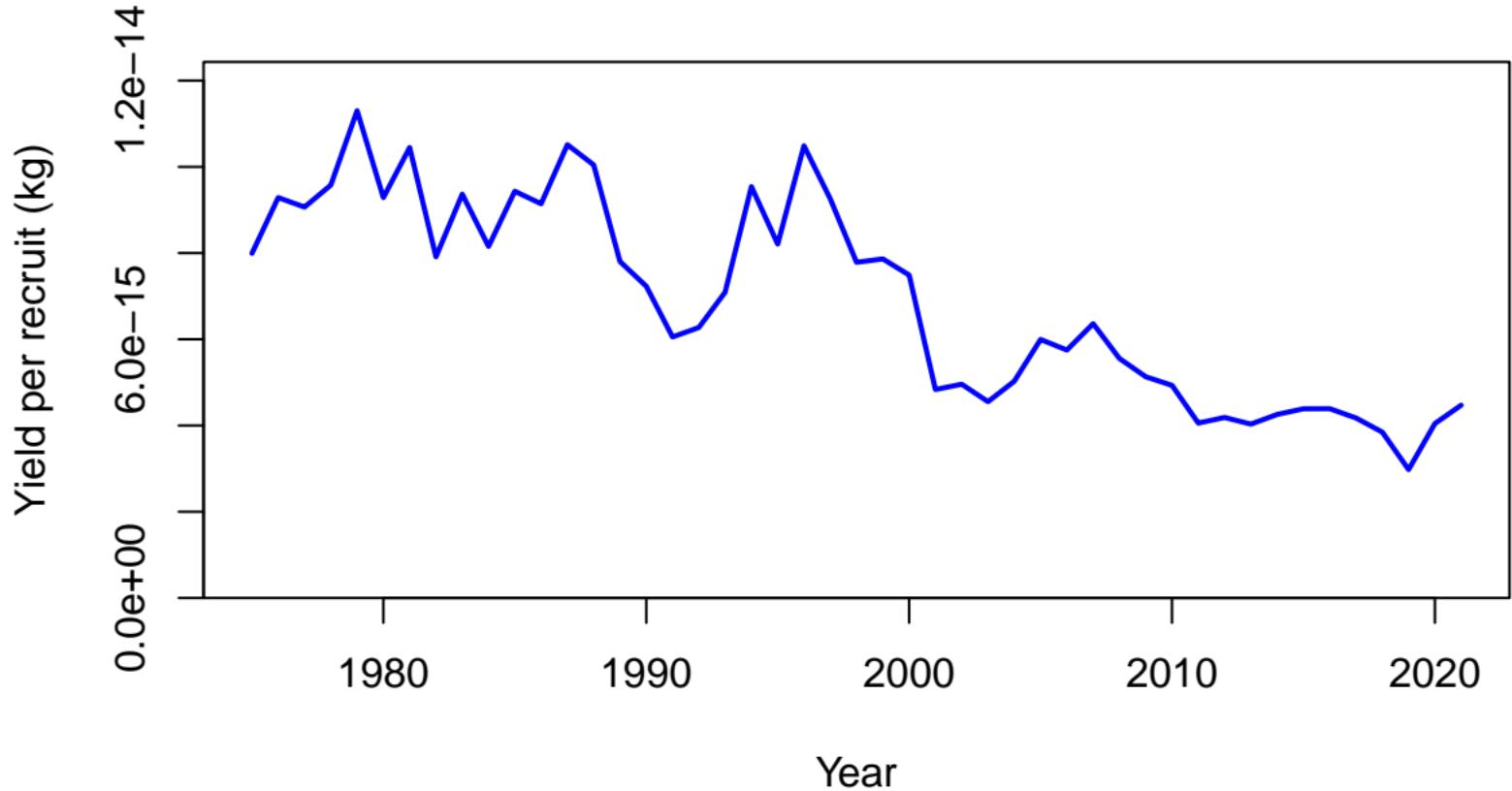
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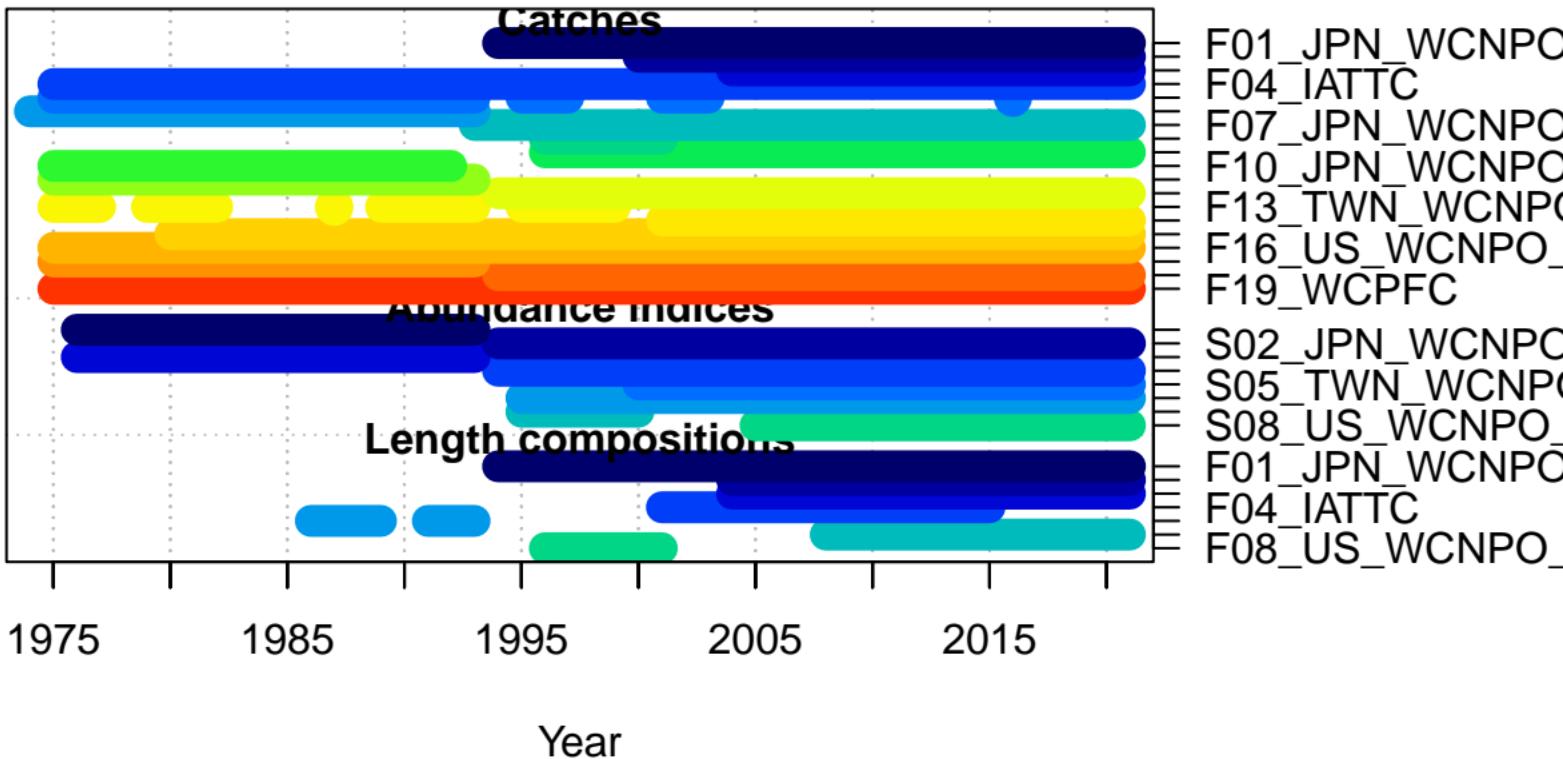


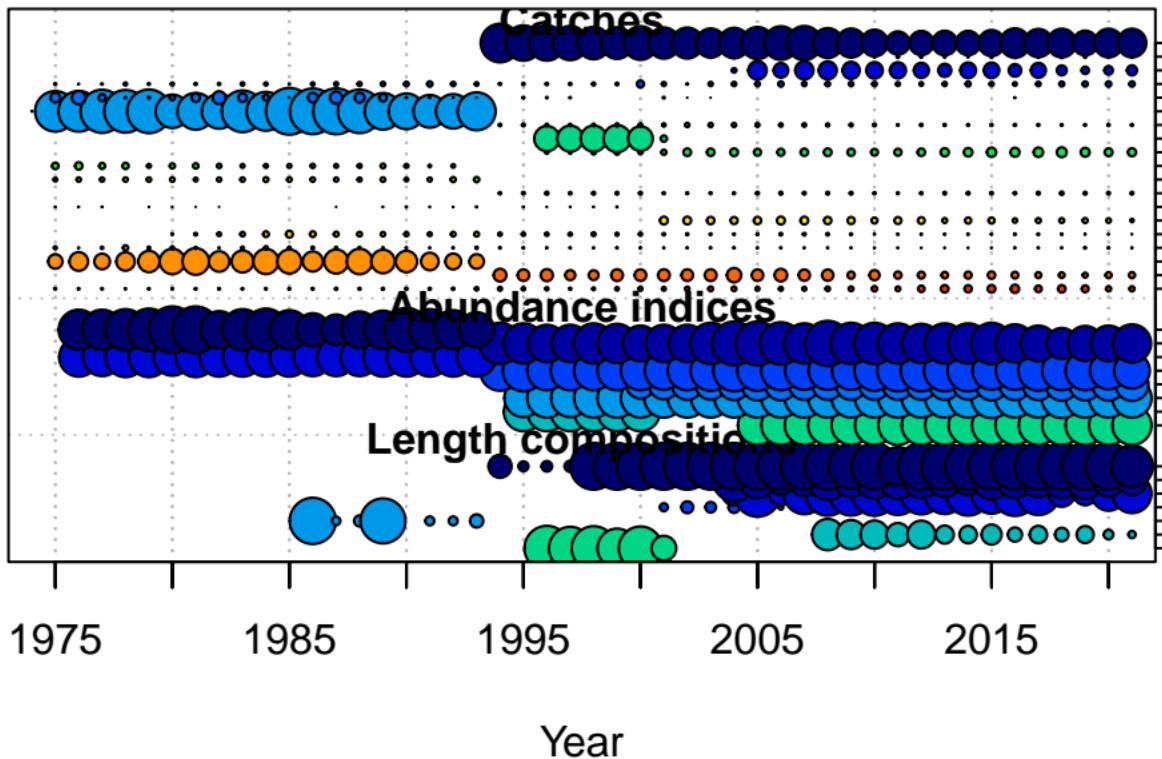
Equilibrium yield (mt)



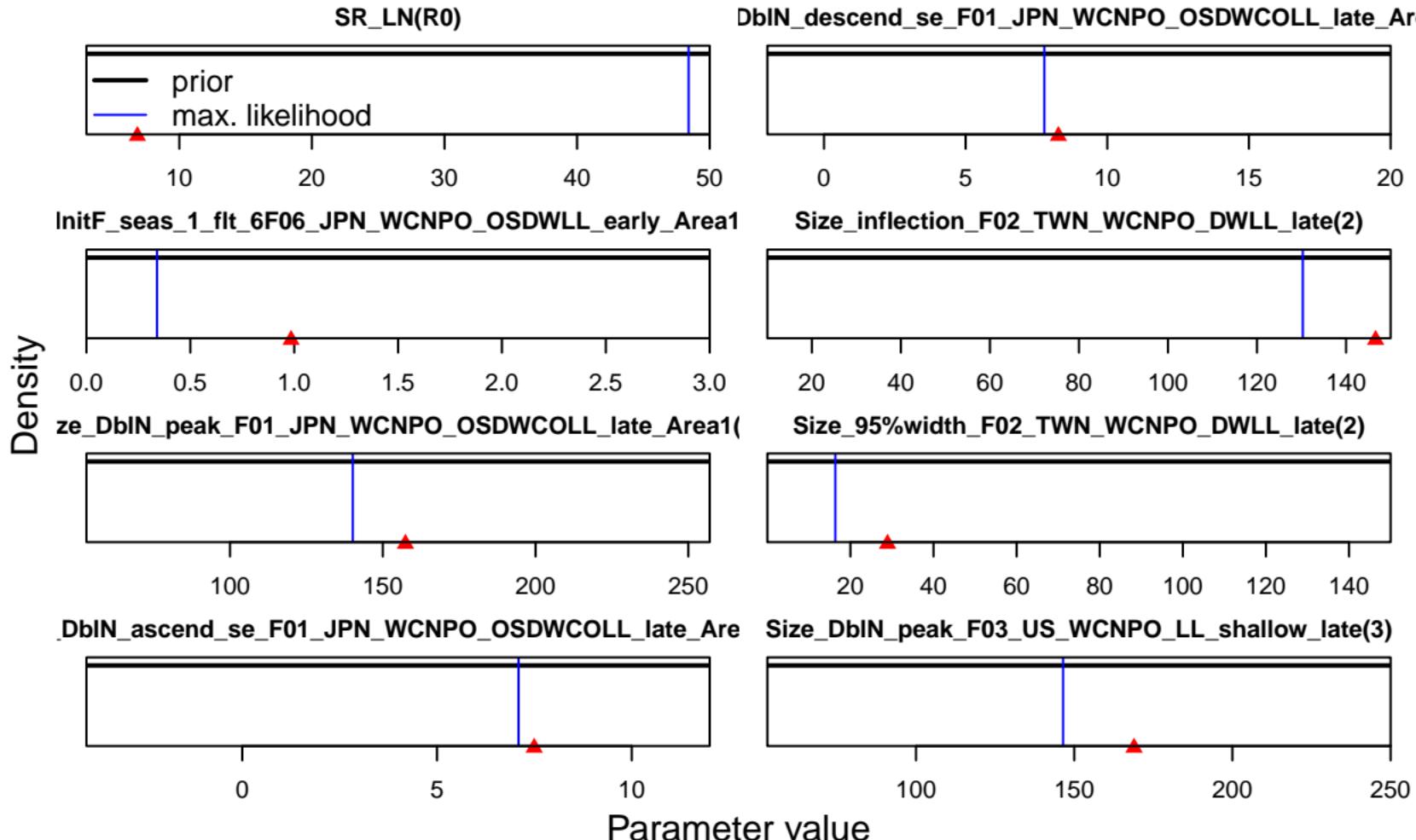


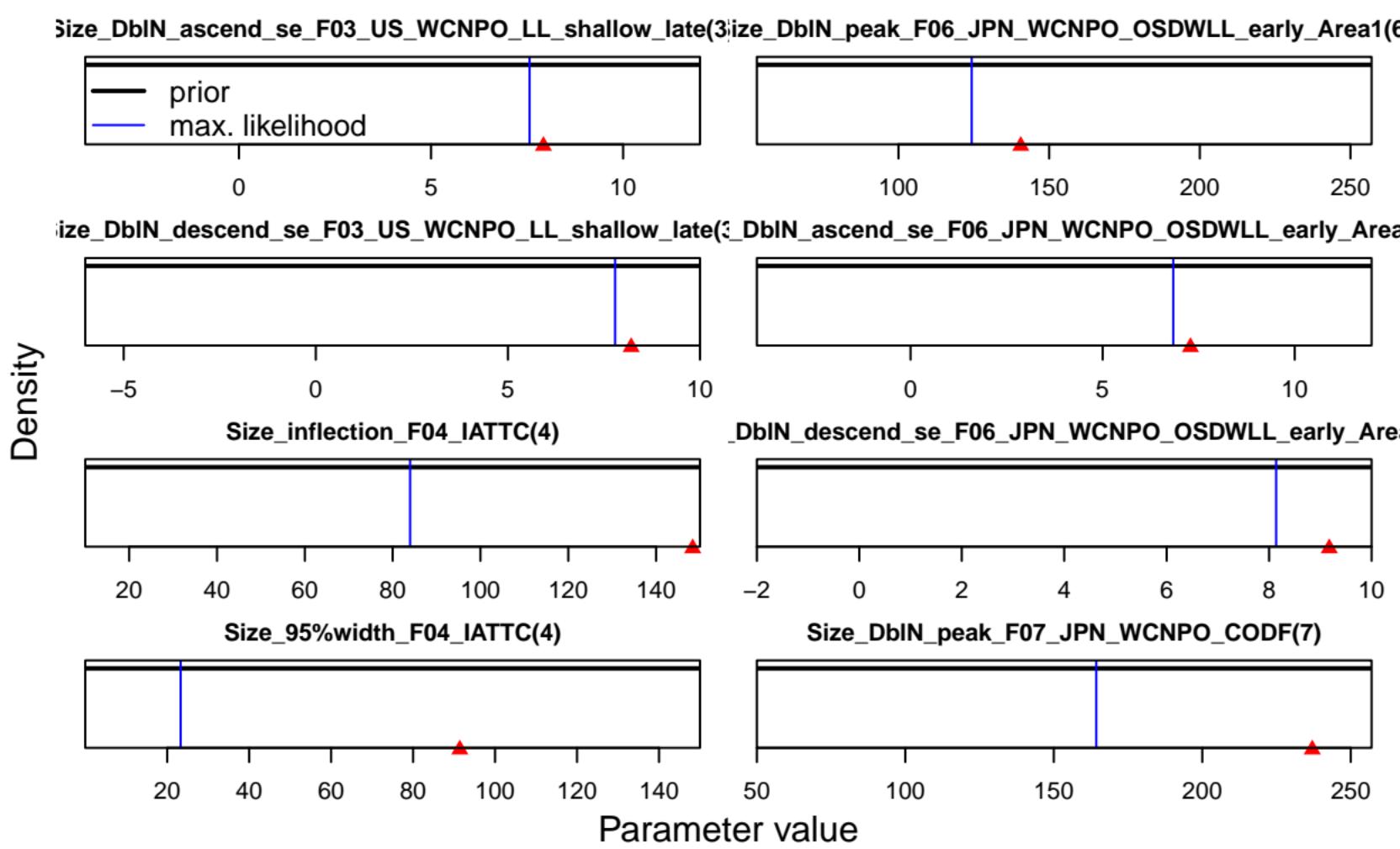




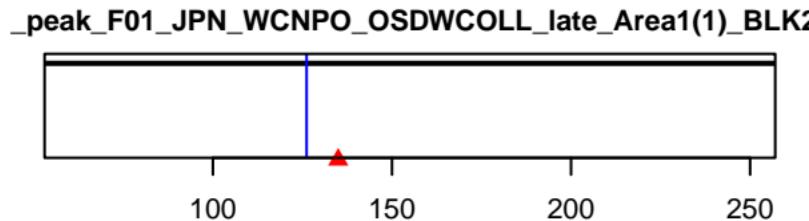
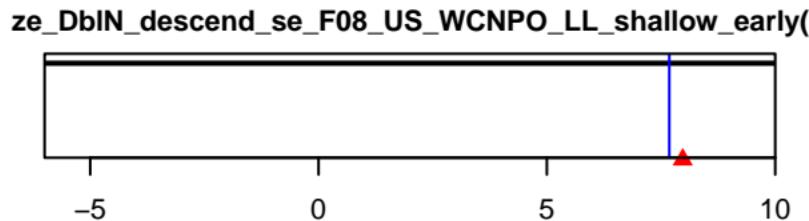
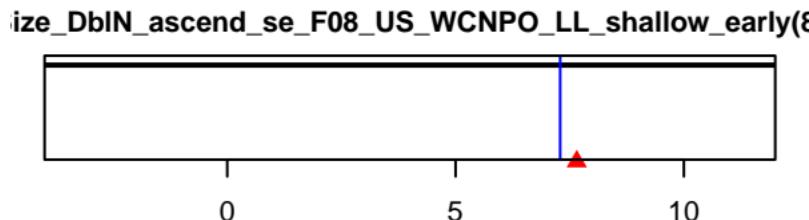
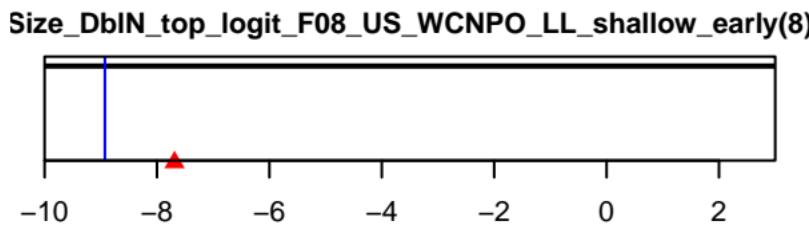
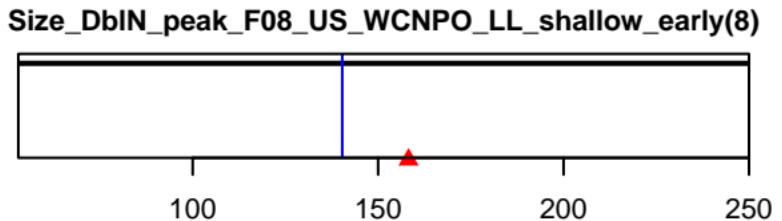
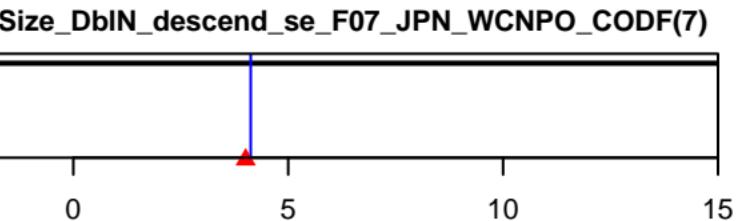
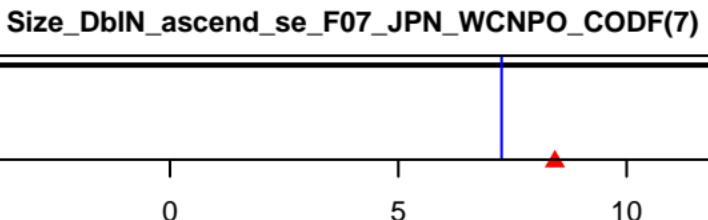
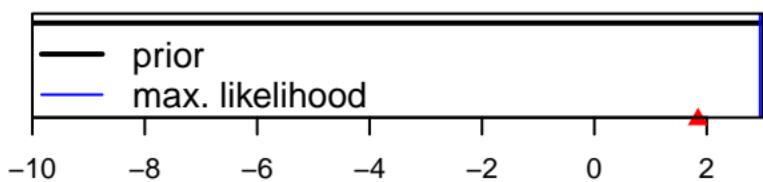


F01_JPN_WCNPO
F04_IATTC
F07_JPN_WCNPO
F10_JPN_WCNPO
F13_TWN_WCNPO
F16_US_WCNPO
F19_WCPFC
S02_JPN_WCNPO
S05_TWN_WCNPO
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F01_JPN_WCNPO
F04_IATTC
F08_US_WCNPO



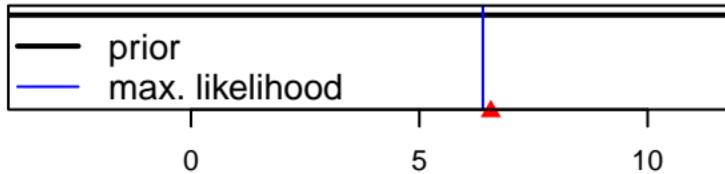


Density

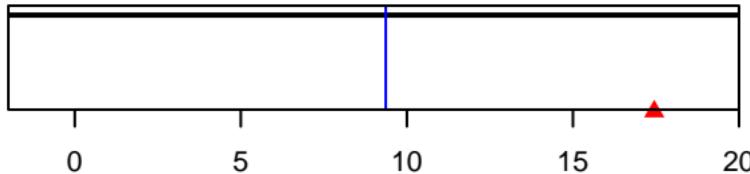


Parameter value

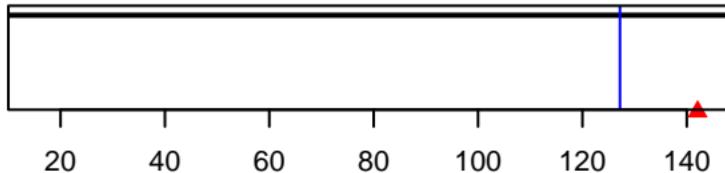
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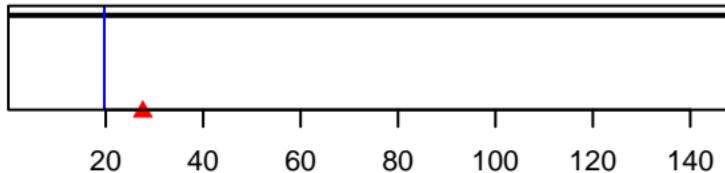
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e_inflection_F02_TWN_WCNPO DWLL_late(2)_BLK1repl_2



e_95%width_F02_TWN_WCNPO DWLL_late(2)_BLK1repl_2



Parameter value