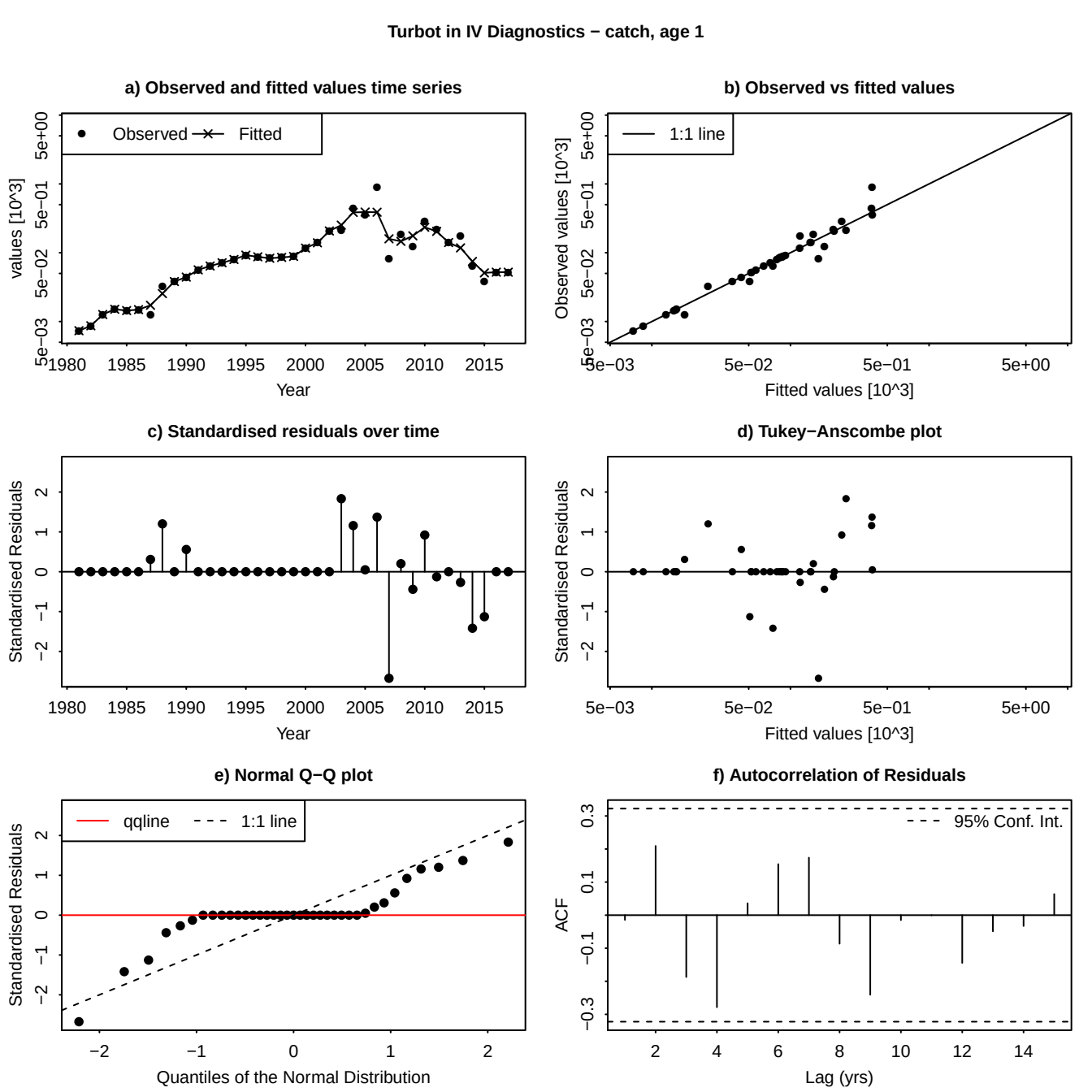
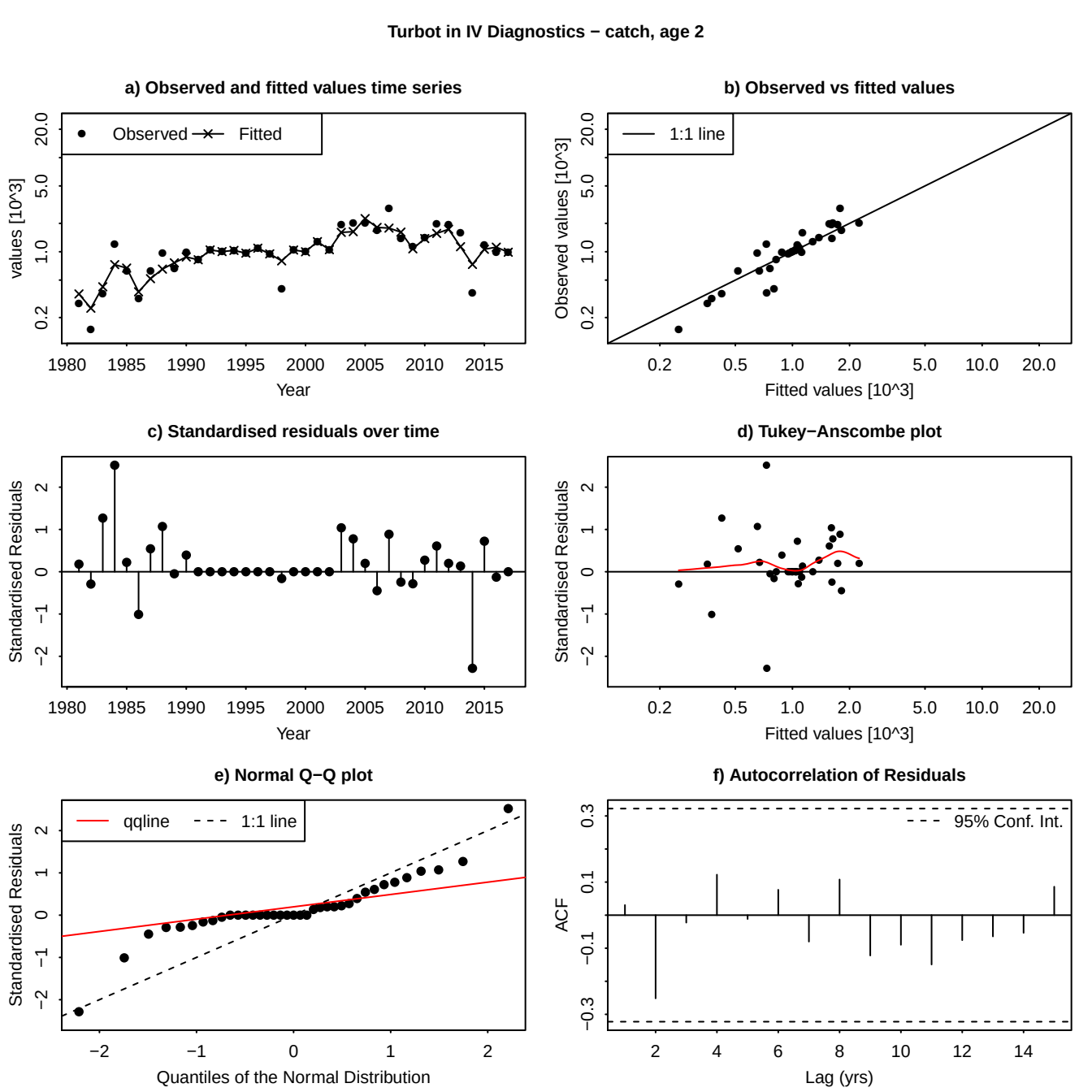
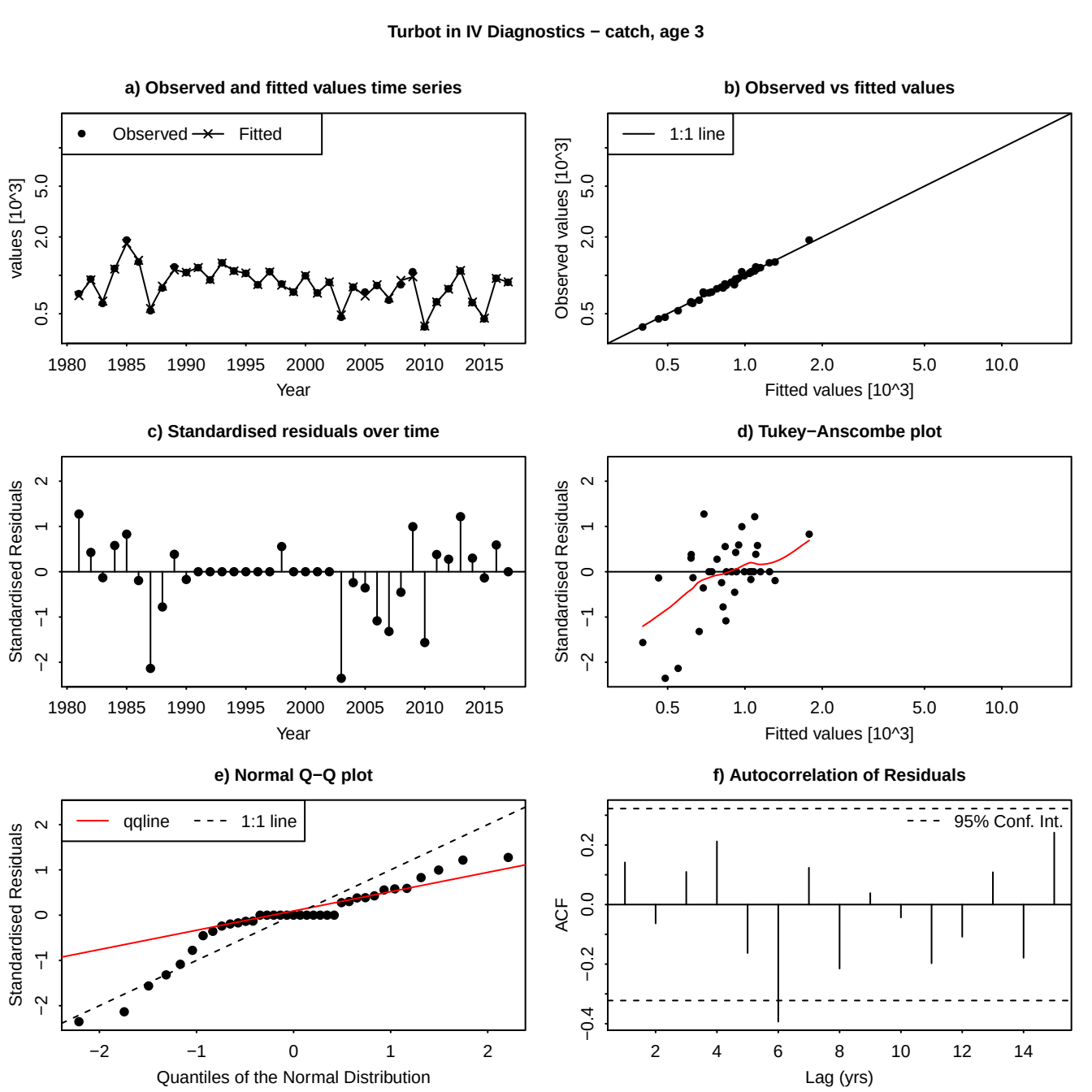
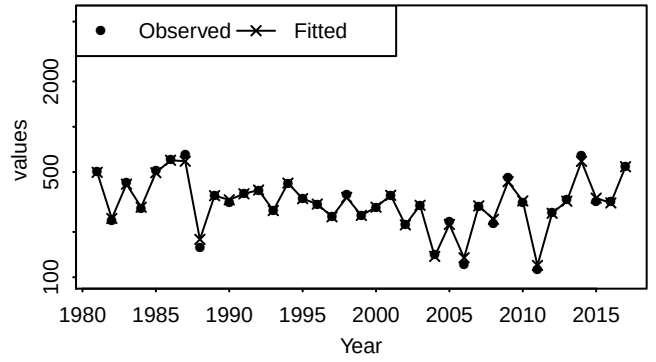

Turbot in IV Diagnostics − catch, age 1
a) Observed and fitted values time series
Observed
Fitted
values [10^3]
5e−03
5e−02
5e−01
5e+00
1980
1985
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values [10^3]
Fitted values [10^3]
c) Standardised residuals over time
Standardised Residuals
−2
−1
0
1
2
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
0.3
0.1
−0.1
−0.3
2
4
6
8
10
12
14
Lag (yrs)


Turbot in IV Diagnostics − catch, age 2
a) Observed and fitted values time series
Observed
Fitted
values [10^3]
20.0
5.0
1.0
0.2
1980
1985
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values [10^3]
Fitted values [10^3]
0.2
0.5
1.0
2.0
5.0
10.0
20.0
c) Standardised residuals over time
Standardised Residuals
2
1
0
−1
−2
Year
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
1:1 line
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
0.3
0.1
−0.1
−0.3
2
4
6
8
10
12
14
Lag (yrs)

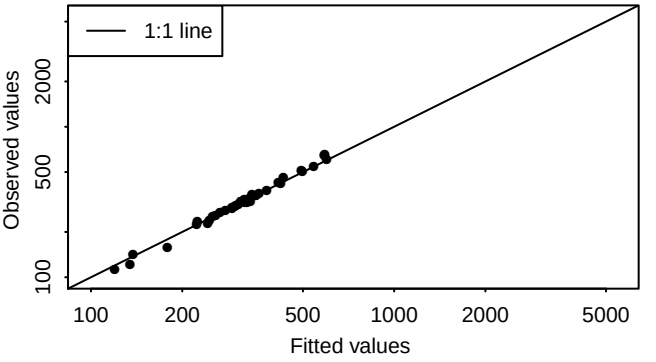

Turbot in IV Diagnostics − catch, age 3
a) Observed and fitted values time series
Observed
Fitted
values [10^3]
0.5
2.0
5.0
1980
1985
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values [10^3]
Fitted values [10^3]
c) Standardised residuals over time
Standardised Residuals
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
Lag (yrs)

Turbot in IV Diagnostics − catch, age 4

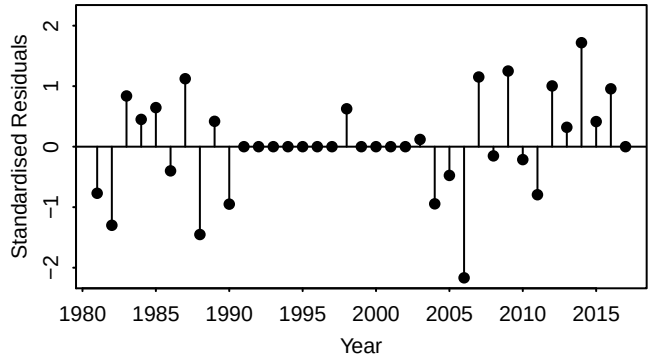
a) Observed and fitted values time series



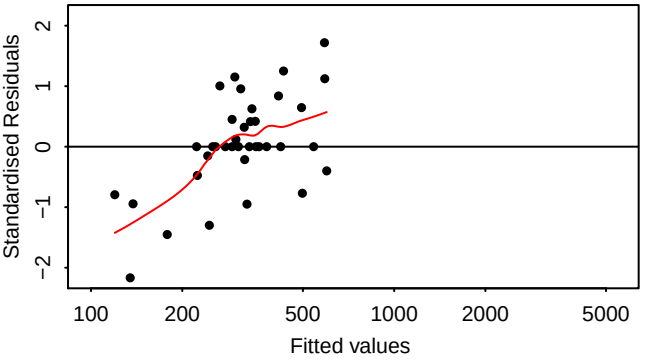
b) Observed vs fitted values



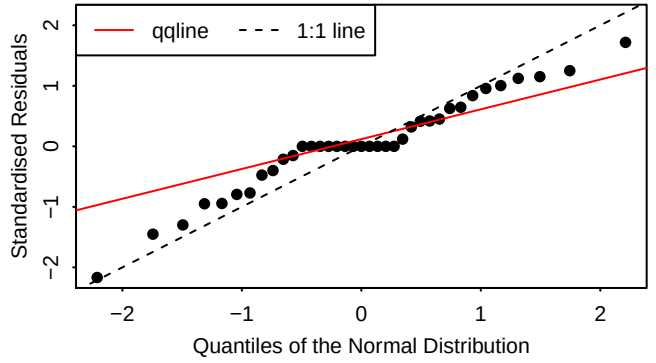
c) Standardised residuals over time



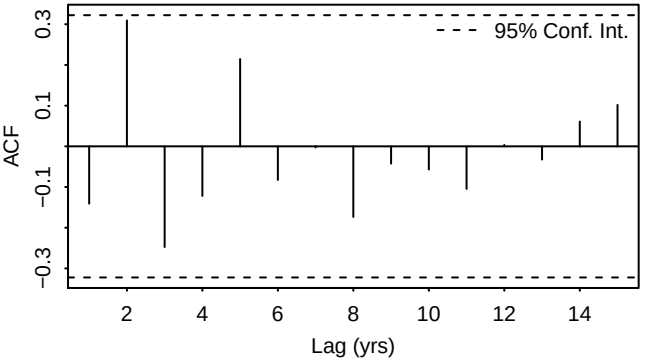
d) Tukey−Anscombe plot



e) Normal Q−Q plot

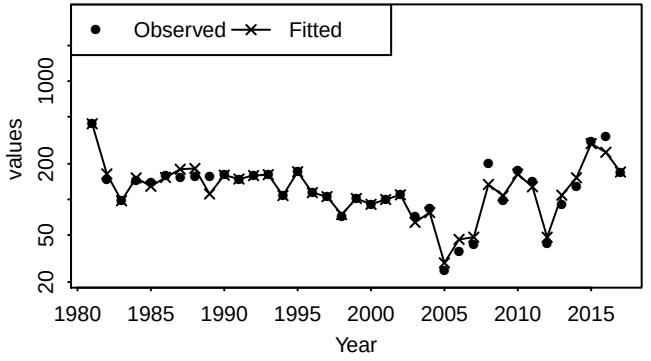


f) Autocorrelation of Residuals

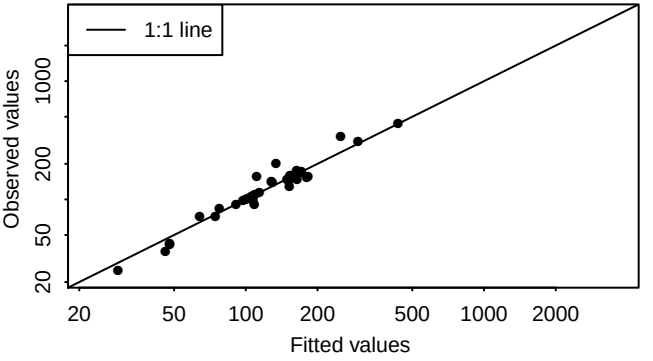


Turbot in IV Diagnostics − catch, age 5

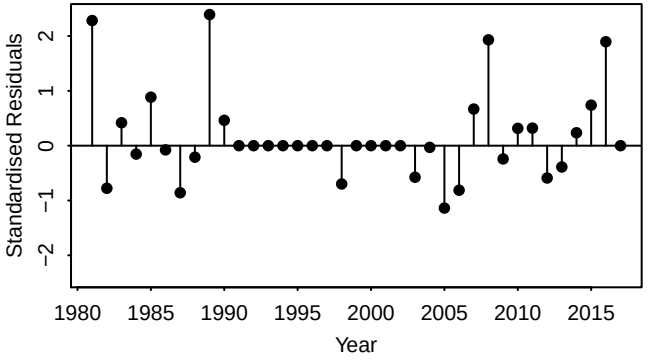
a) Observed and fitted values time series



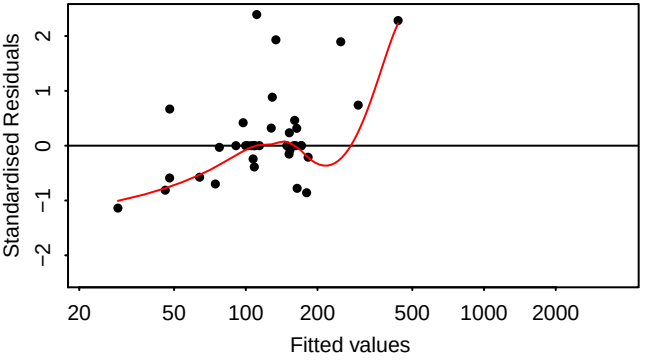
b) Observed vs fitted values



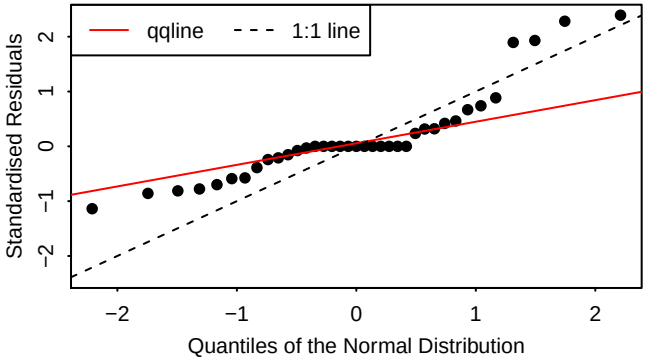
c) Standardised residuals over time



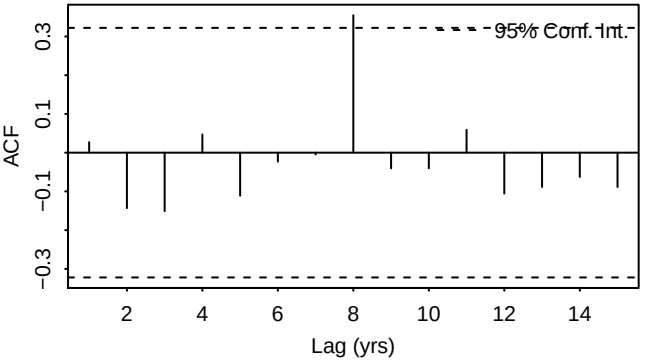
d) Tukey−Anscombe plot



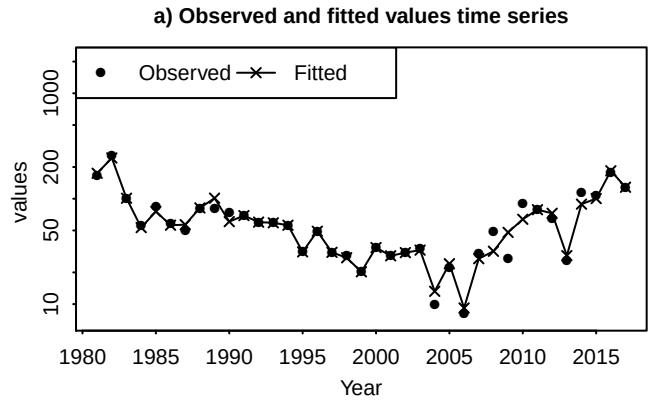
e) Normal Q−Q plot

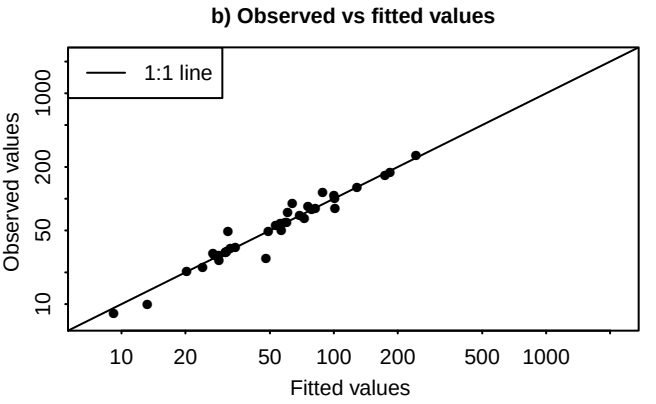


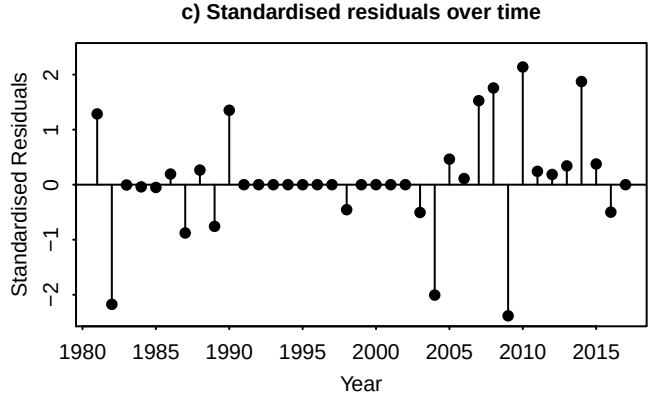
f) Autocorrelation of Residuals

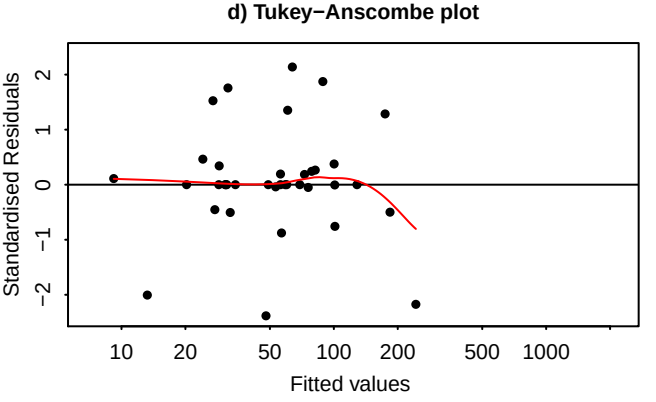


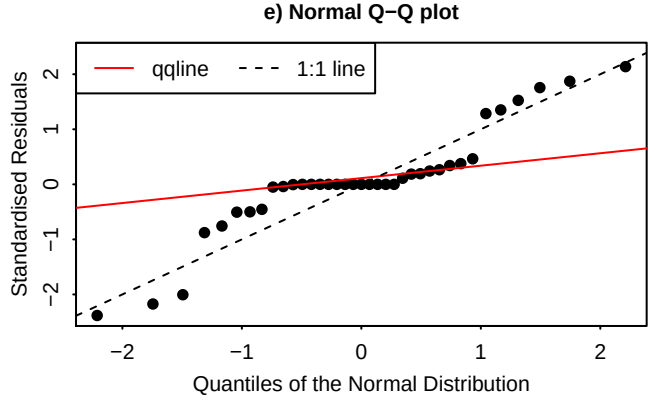
Turbot in IV Diagnostics − catch, age 6

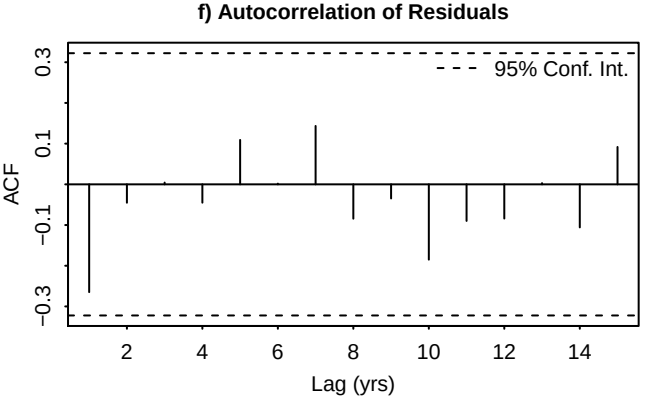


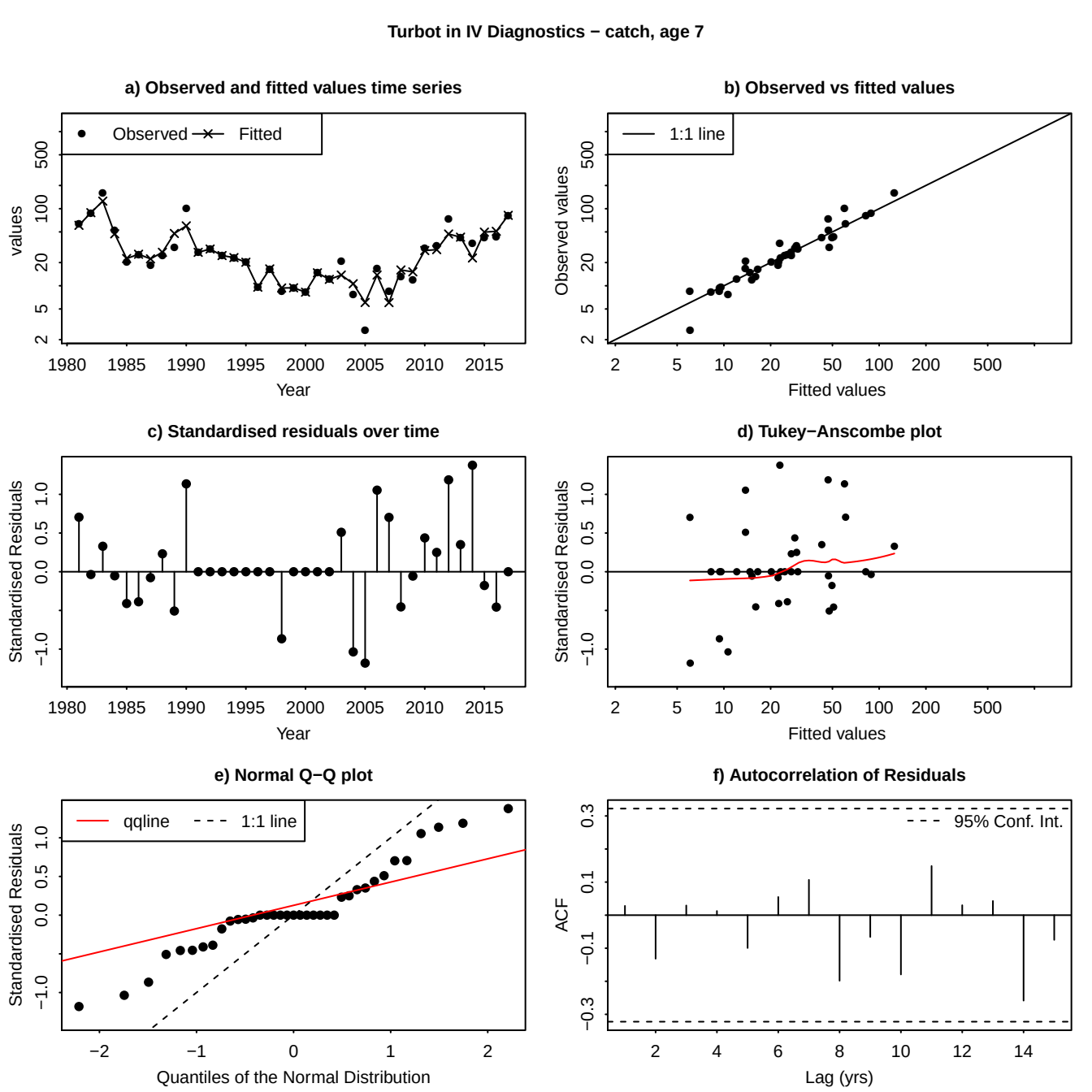


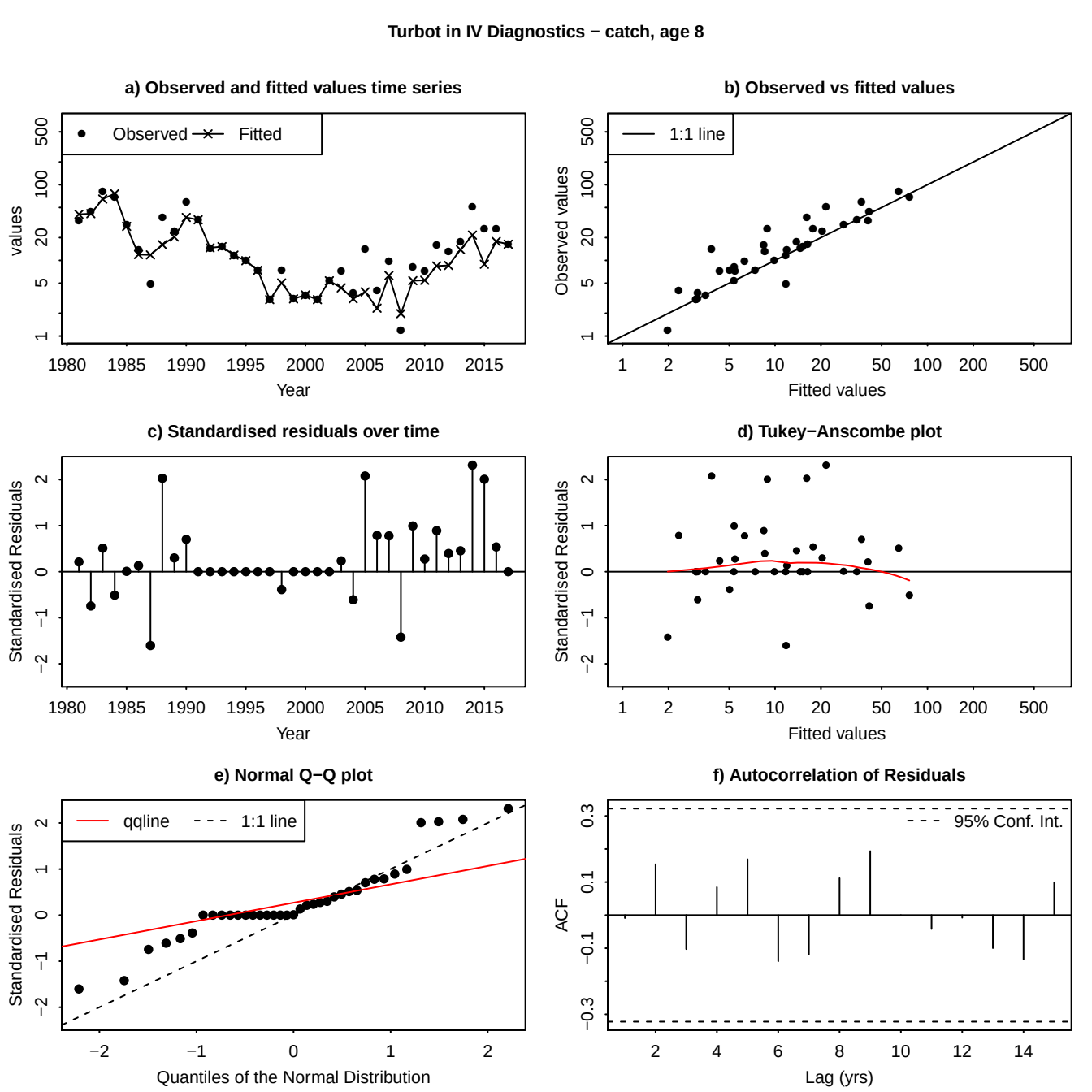




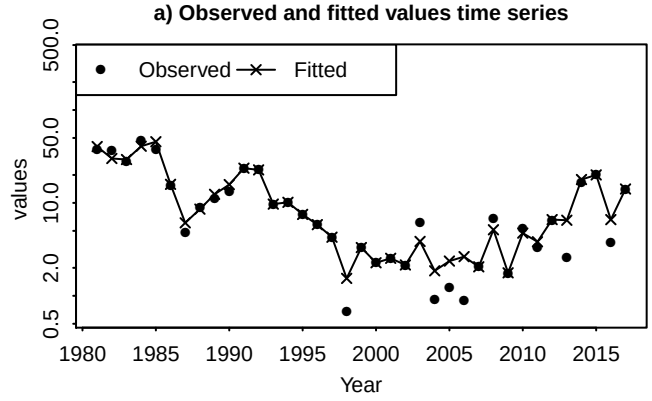


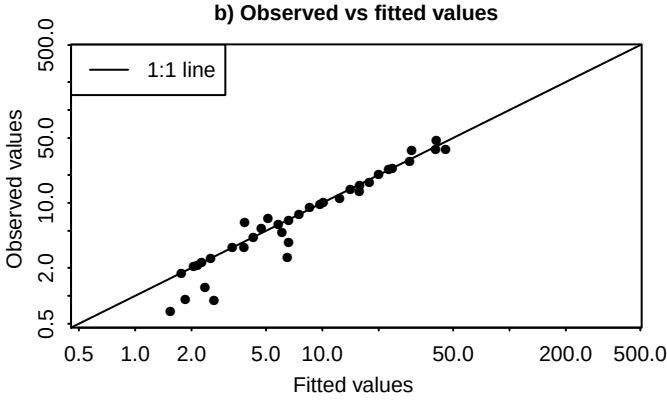


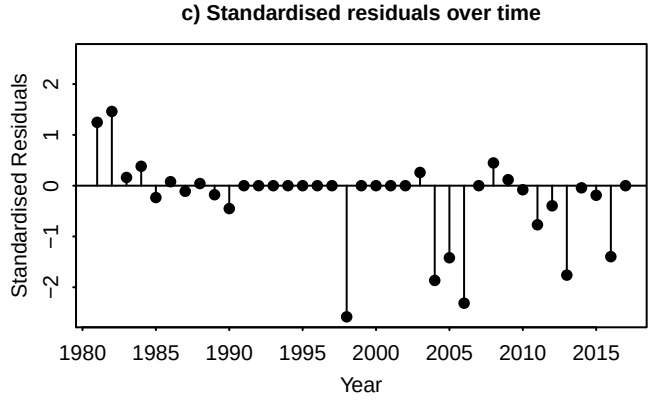

Turbot in IV Diagnostics − catch, age 7
a) Observed and fitted values time series
Observed
Fitted
values
2
5
20
100
500
1980
1985
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
2
5
10
20
50
100
200
500
c) Standardised residuals over time
Standardised Residuals
−1.0
0.0
0.5
1.0
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
−2
−1
0
1
2
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
−0.3
−0.1
0.1
0.3
2
4
6
8
10
12
14
Lag (yrs)

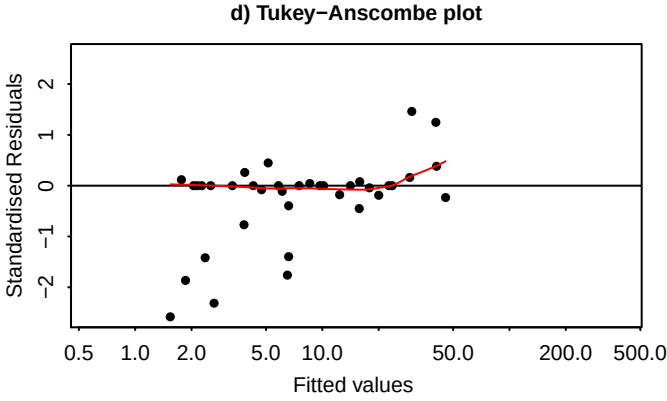

Turbot in IV Diagnostics − catch, age 8
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
Lag (yrs)

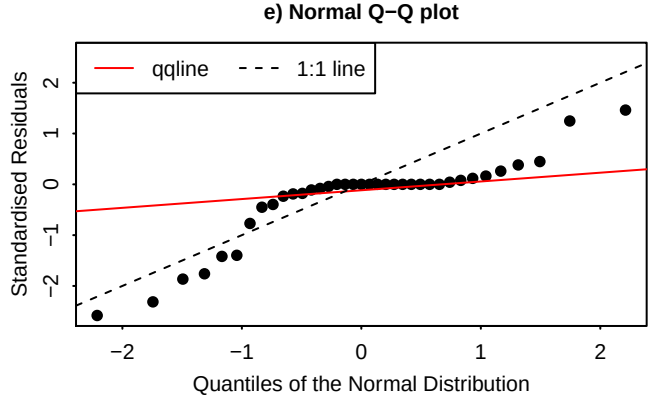
Turbot in IV Diagnostics − catch, age 9

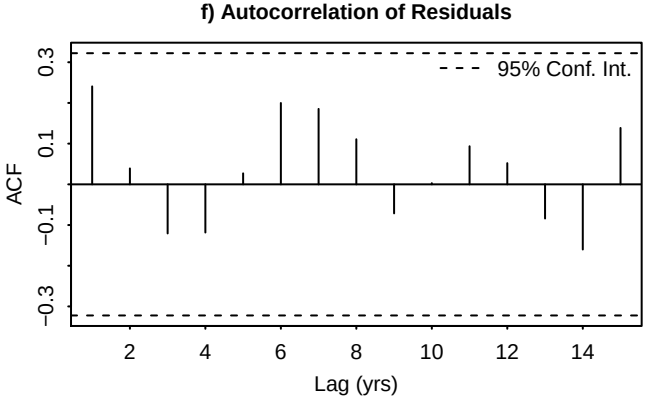


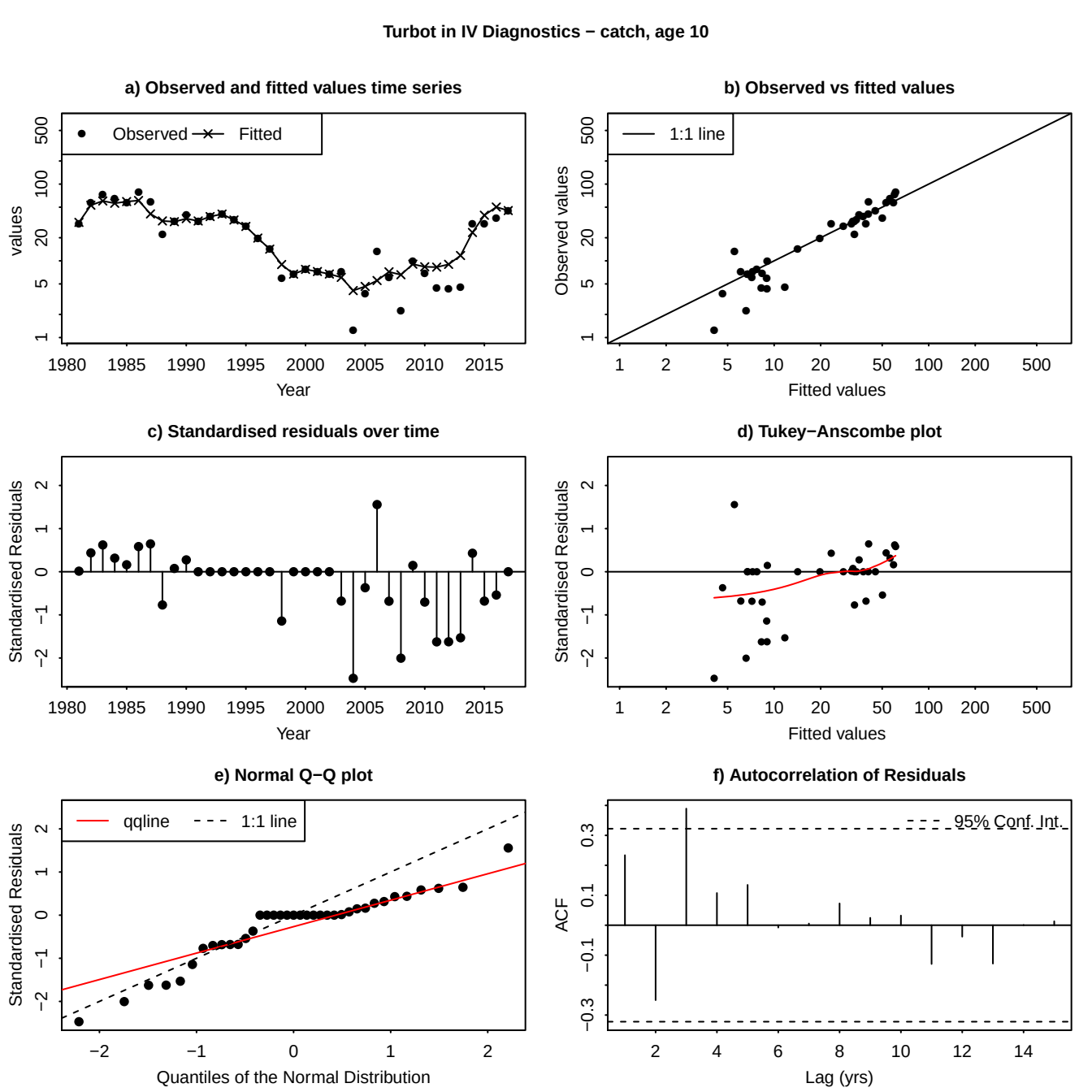


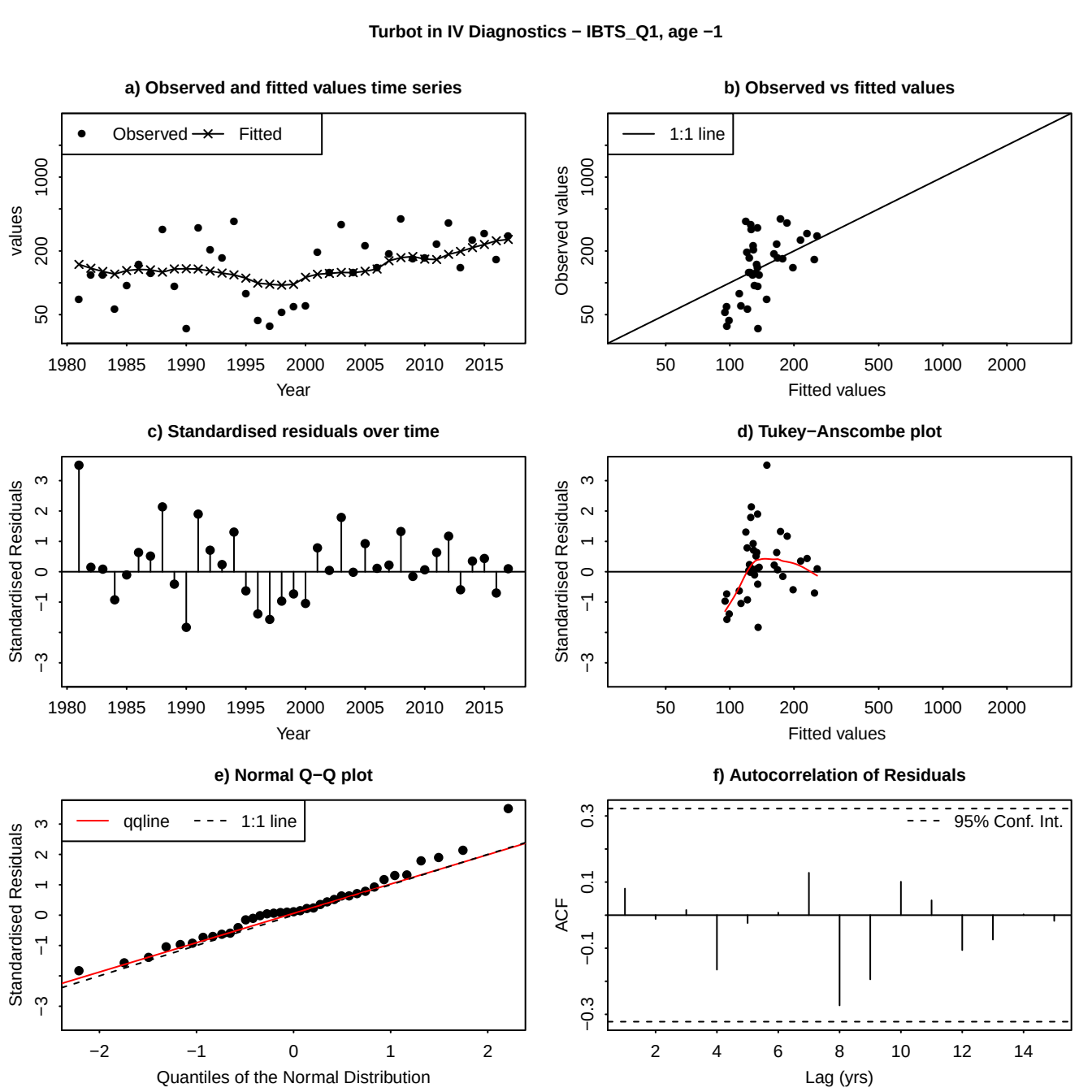


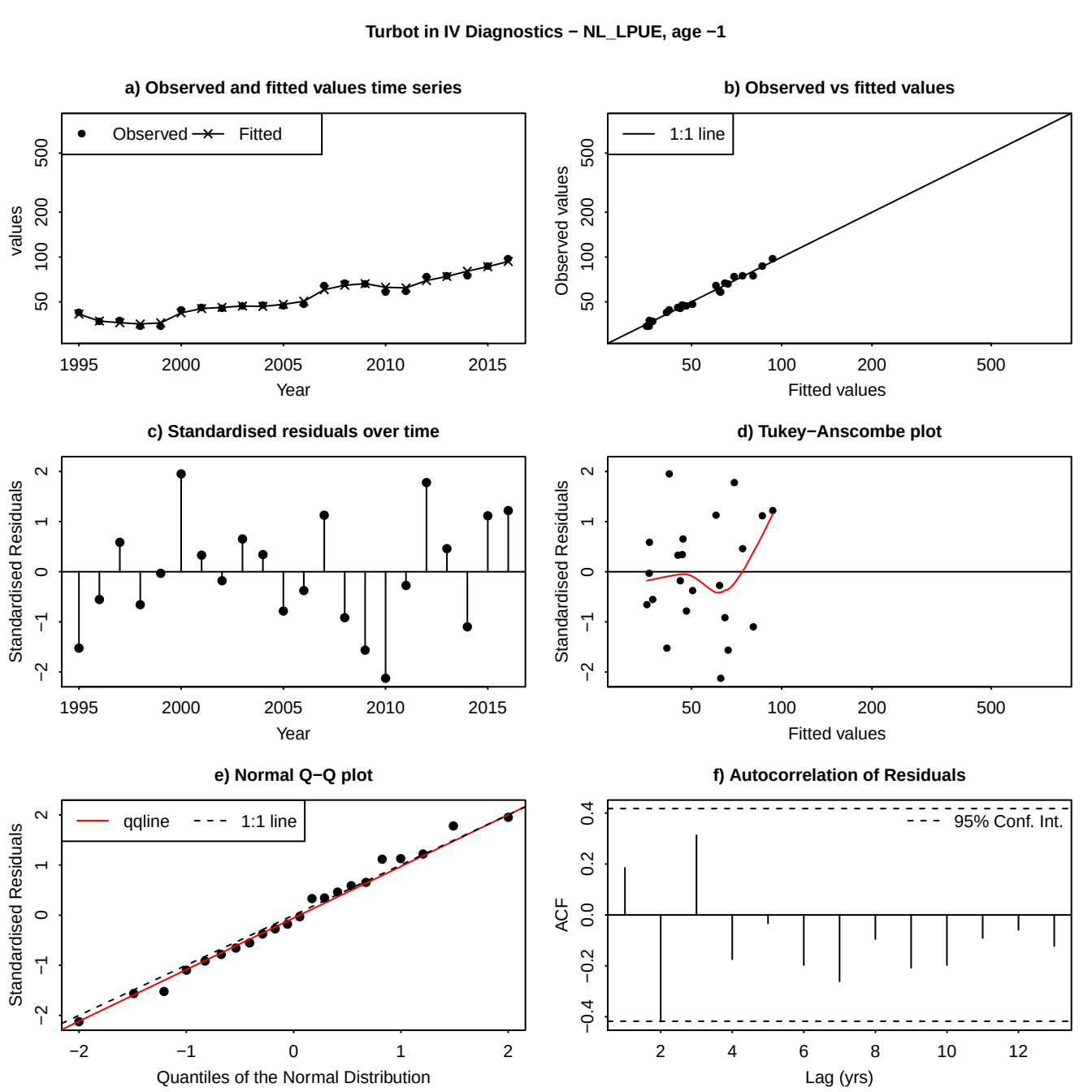


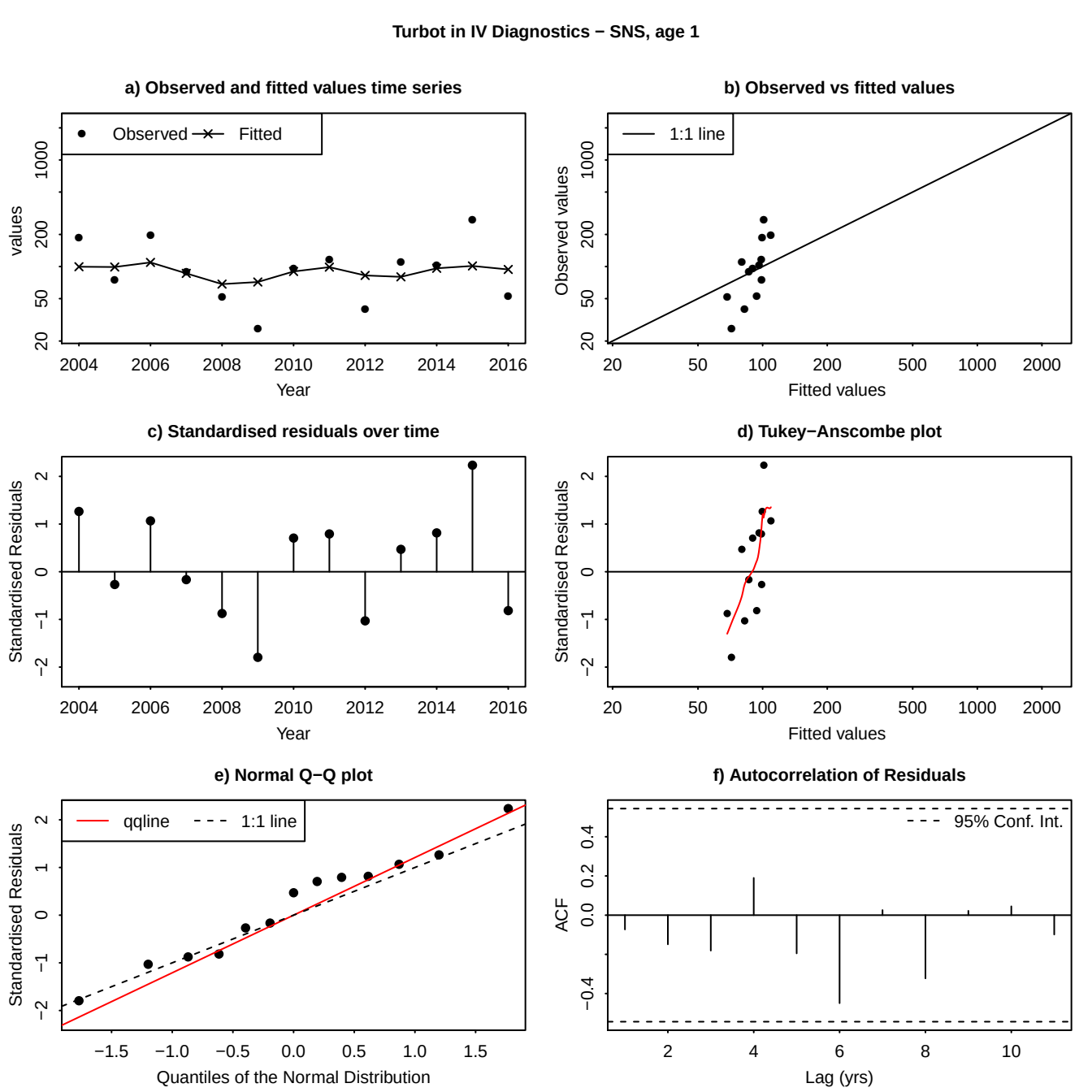


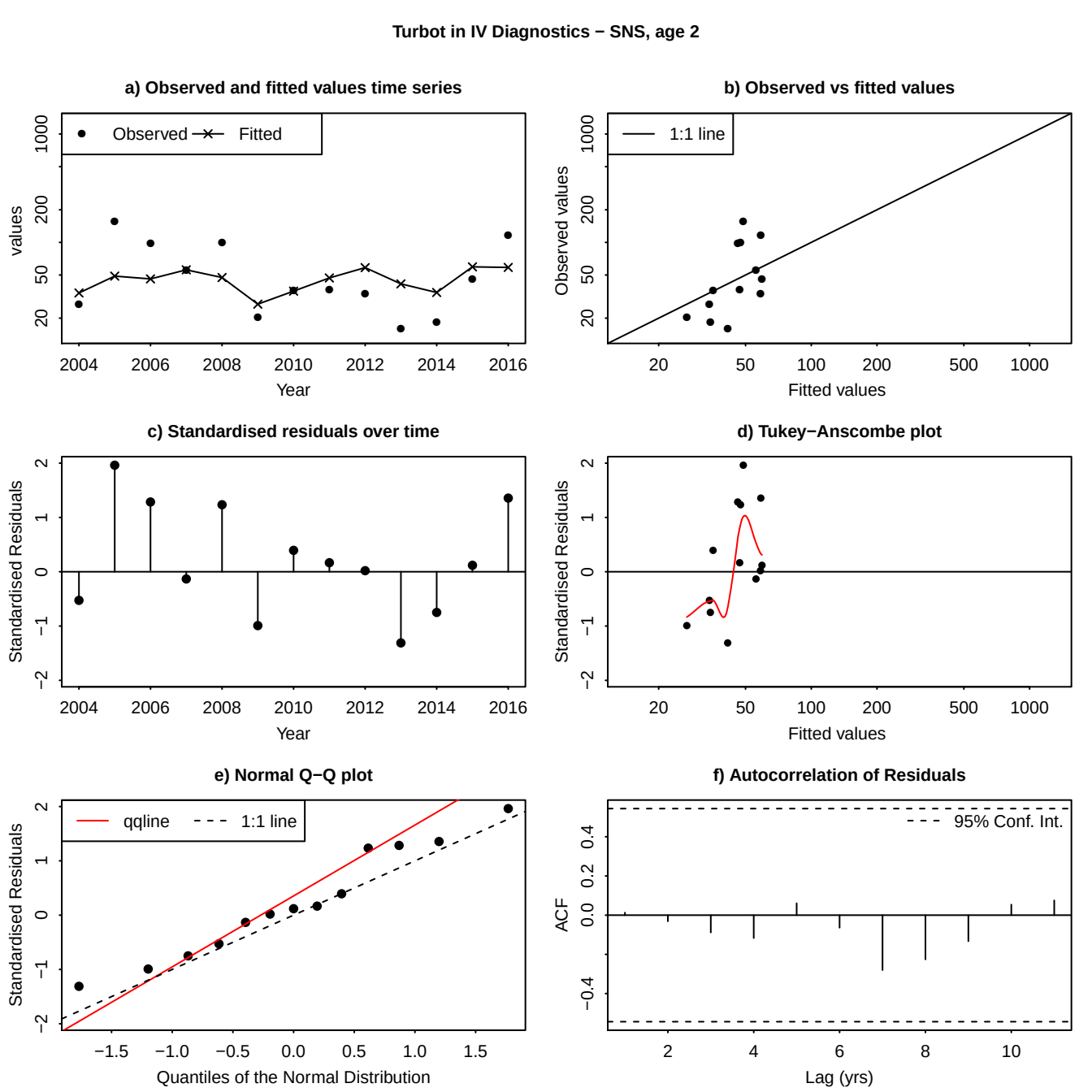


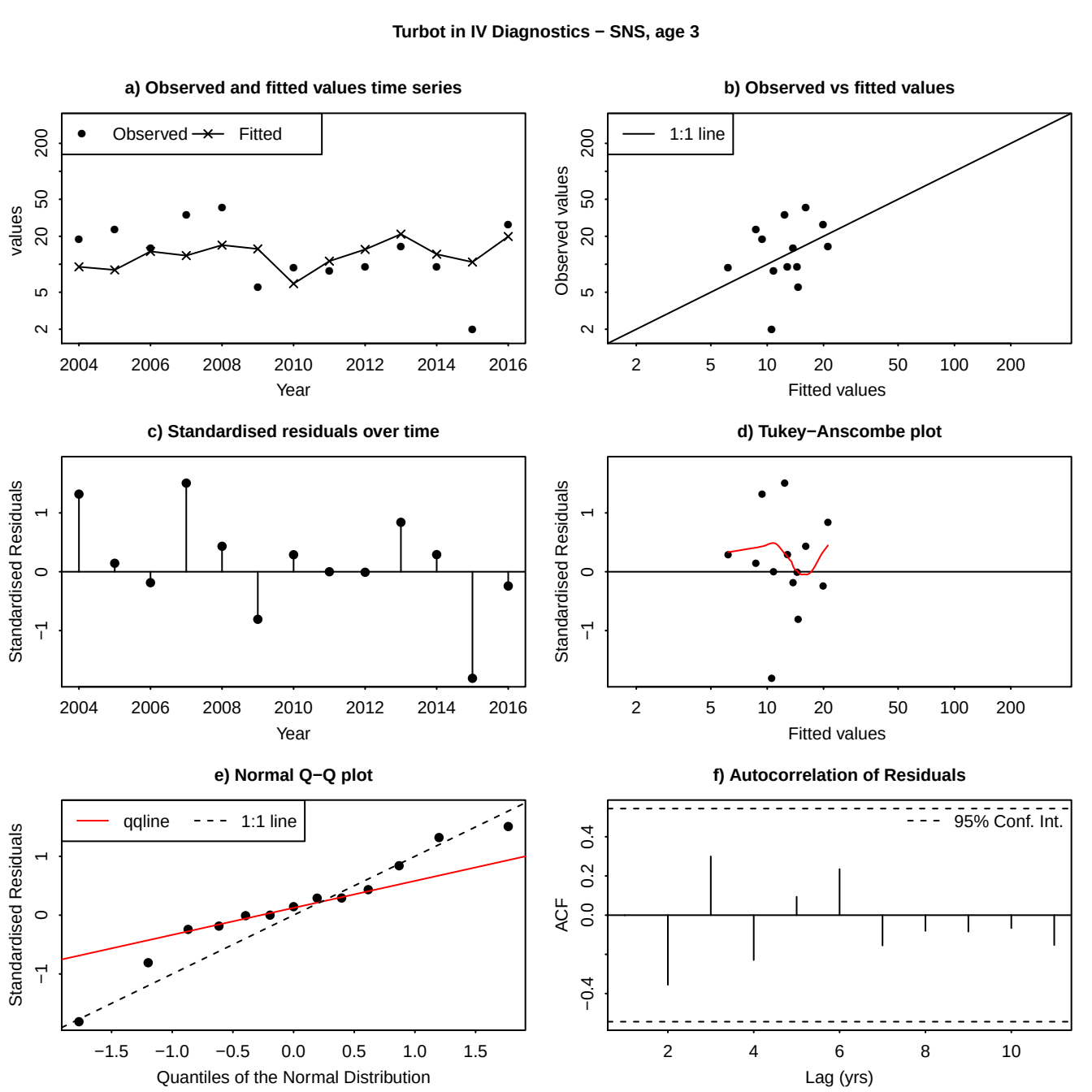

Turbot in IV Diagnostics − catch, age 10
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
Lag (yrs)

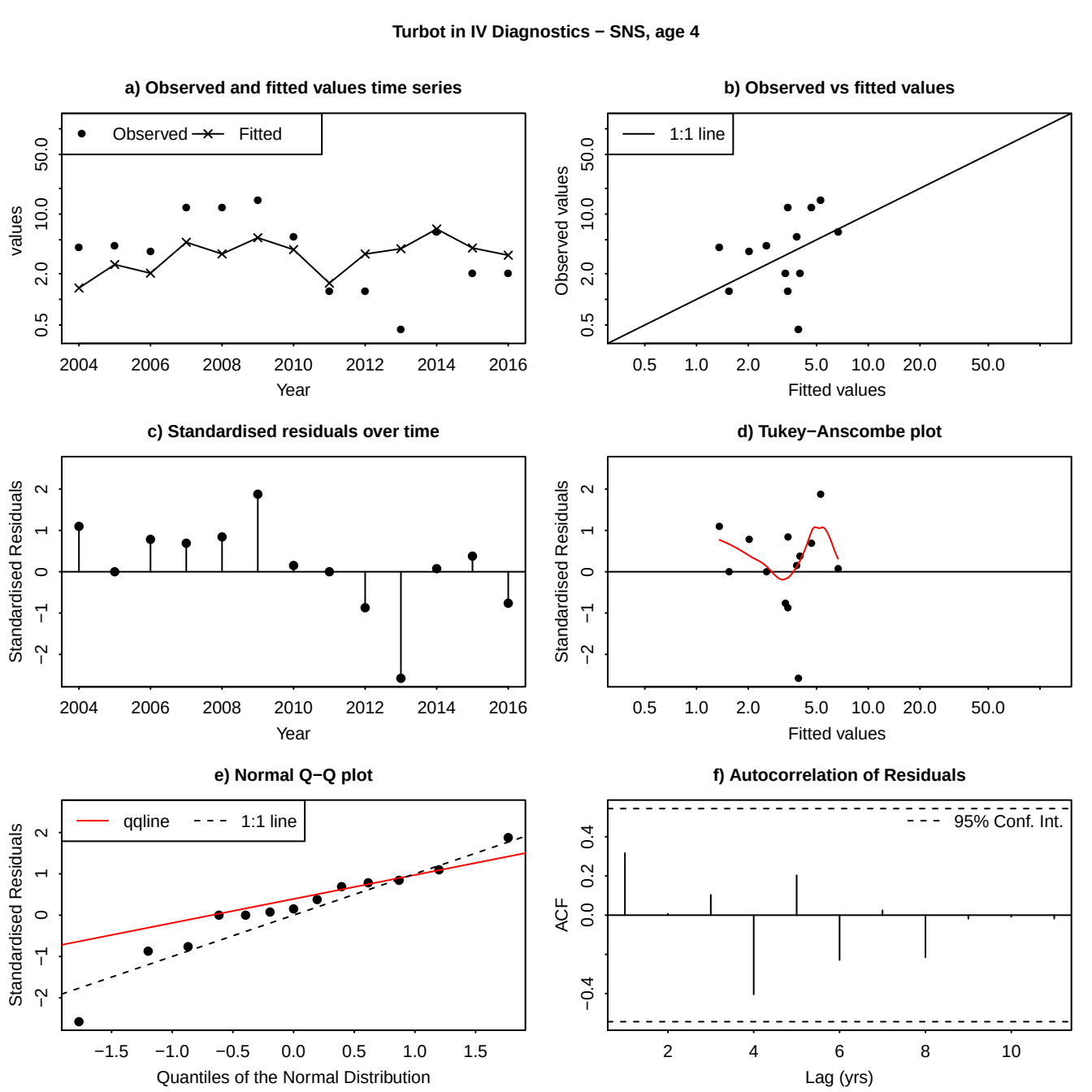

Turbot in IV Diagnostics − IBTS_Q1, age −1
a) Observed and fitted values time series
Observed
Fitted
values
50
200
1000
1980
1985
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values
50
100
200
500
1000
2000
Fitted values
c) Standardised residuals over time
Standardised Residuals
−3
−1
0
1
2
3
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
−2
−1
0
1
2
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
−0.3
−0.1
0.1
0.3
2
4
6
8
10
12
14
Lag (yrs)

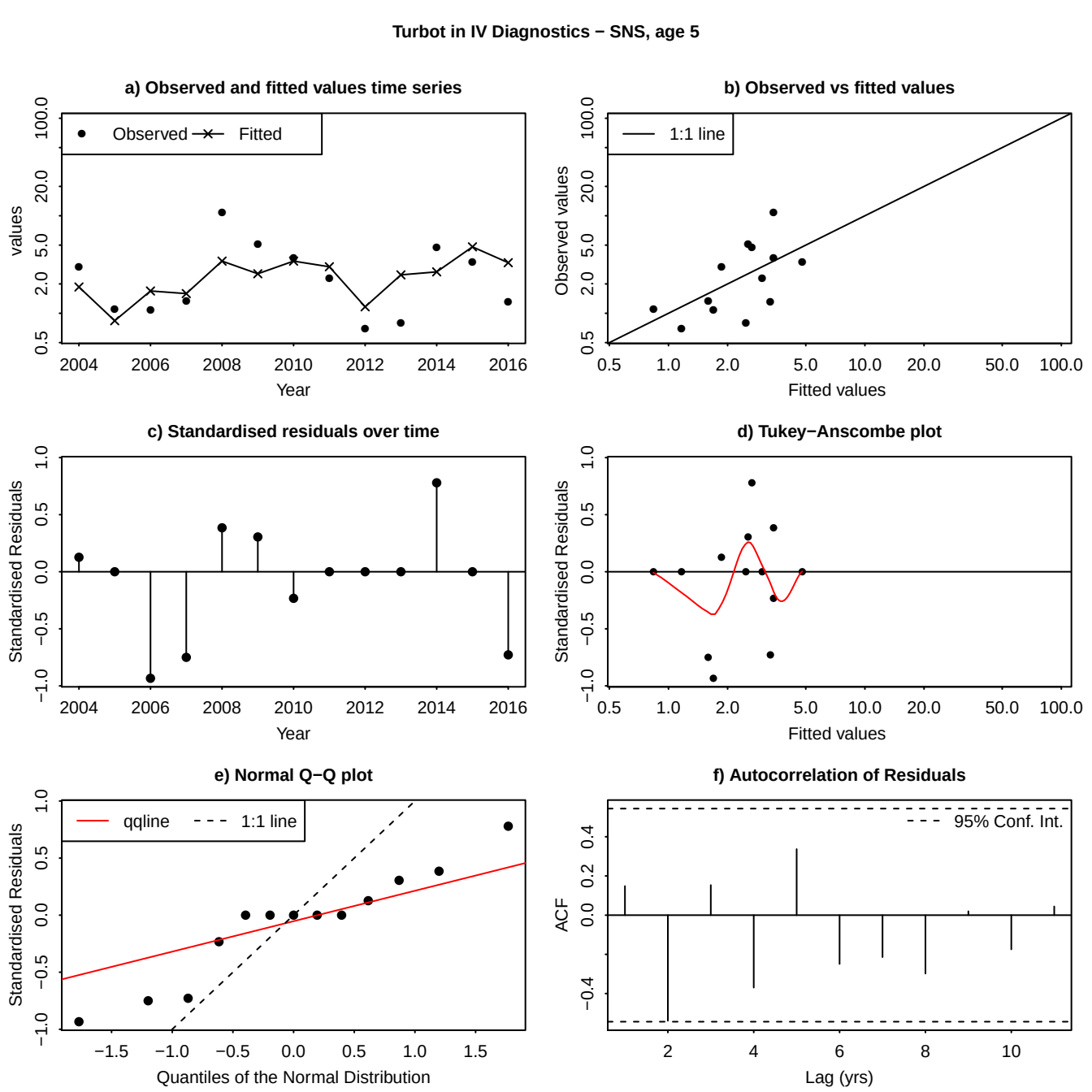

Turbot in IV Diagnostics − NL_LPUE, age −1
a) Observed and fitted values time series
Observed
Fitted
values
50
100
200
500
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
−2
−1
0
1
2
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
−0.4
−0.2
0.0
0.2
0.4
Lag (yrs)


Turbot in IV Diagnostics − SNS, age 1
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
Lag (yrs)

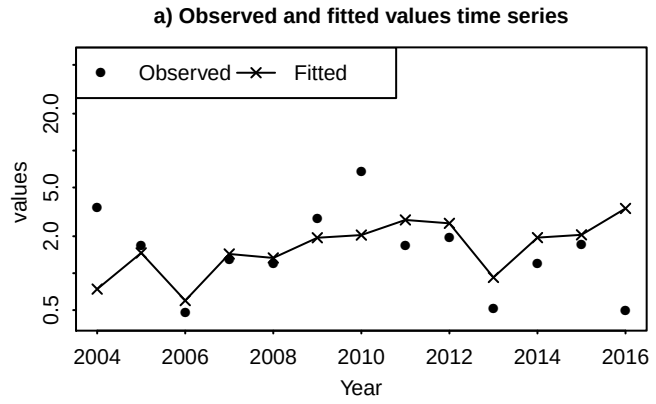

Turbot in IV Diagnostics − SNS, age 2
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
Lag (yrs)

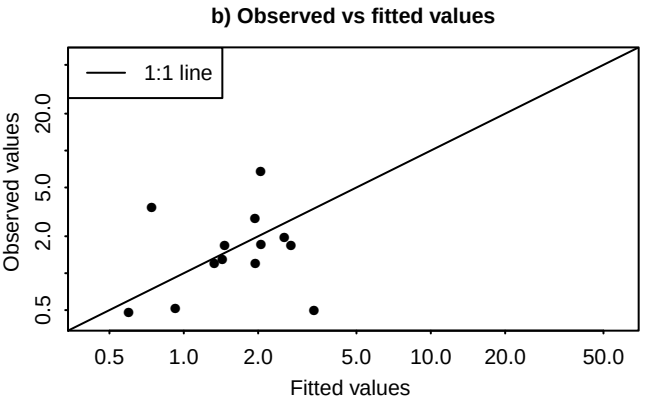

Turbot in IV Diagnostics − SNS, age 3
a) Observed and fitted values time series
Observed
Fitted
values
2
5
20
50
200
2004
2006
2008
2010
2012
2014
2016
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
−1
0
1
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
1:1 line
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
−0.4
0.0
0.2
0.4
2
4
6
8
10
Lag (yrs)

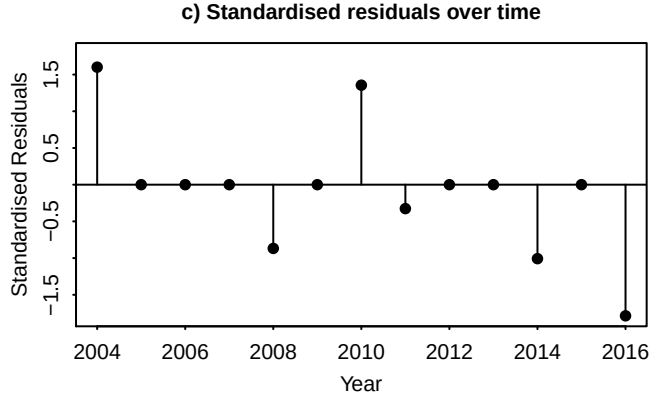

Turbot in IV Diagnostics − SNS, age 4
a) Observed and fitted values time series
Observed
Fitted
values
0.5
2.0
10.0
50.0
2004
2006
2008
2010
2012
2014
2016
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
0.5
1.0
2.0
5.0
10.0
20.0
50.0
c) Standardised residuals over time
Standardised Residuals
−2
−1
0
1
2
Year
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
1:1 line
Quantiles of the Normal Distribution
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
−0.4
0.0
0.2
0.4
2
4
6
8
10
Lag (yrs)

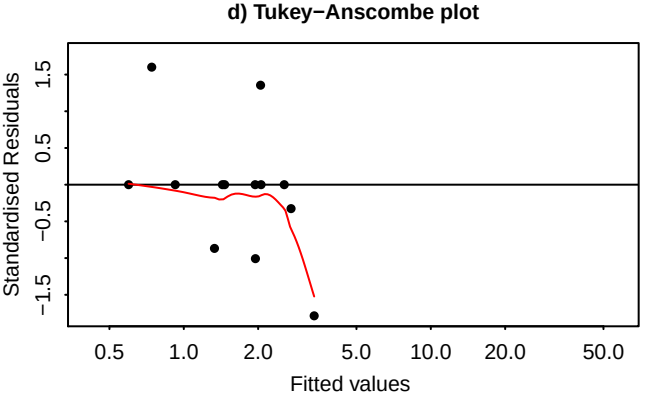

Turbot in IV Diagnostics − SNS, age 5
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
Lag (yrs)

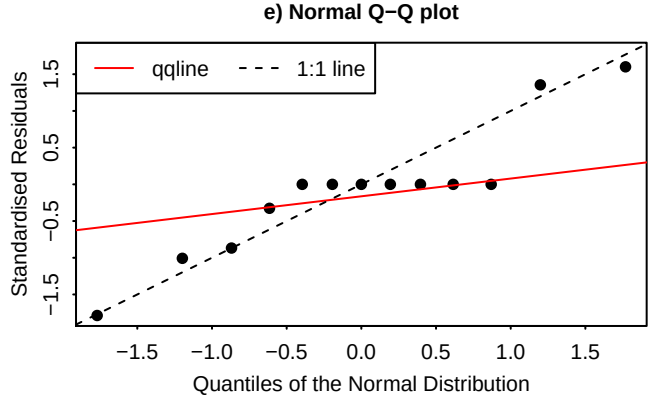
Turbot in IV Diagnostics − SNS, age 6

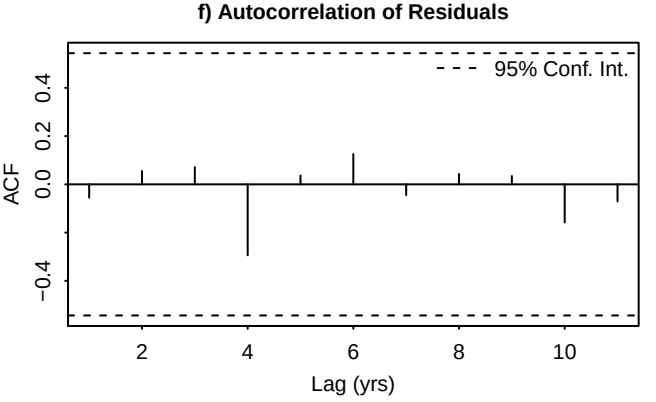


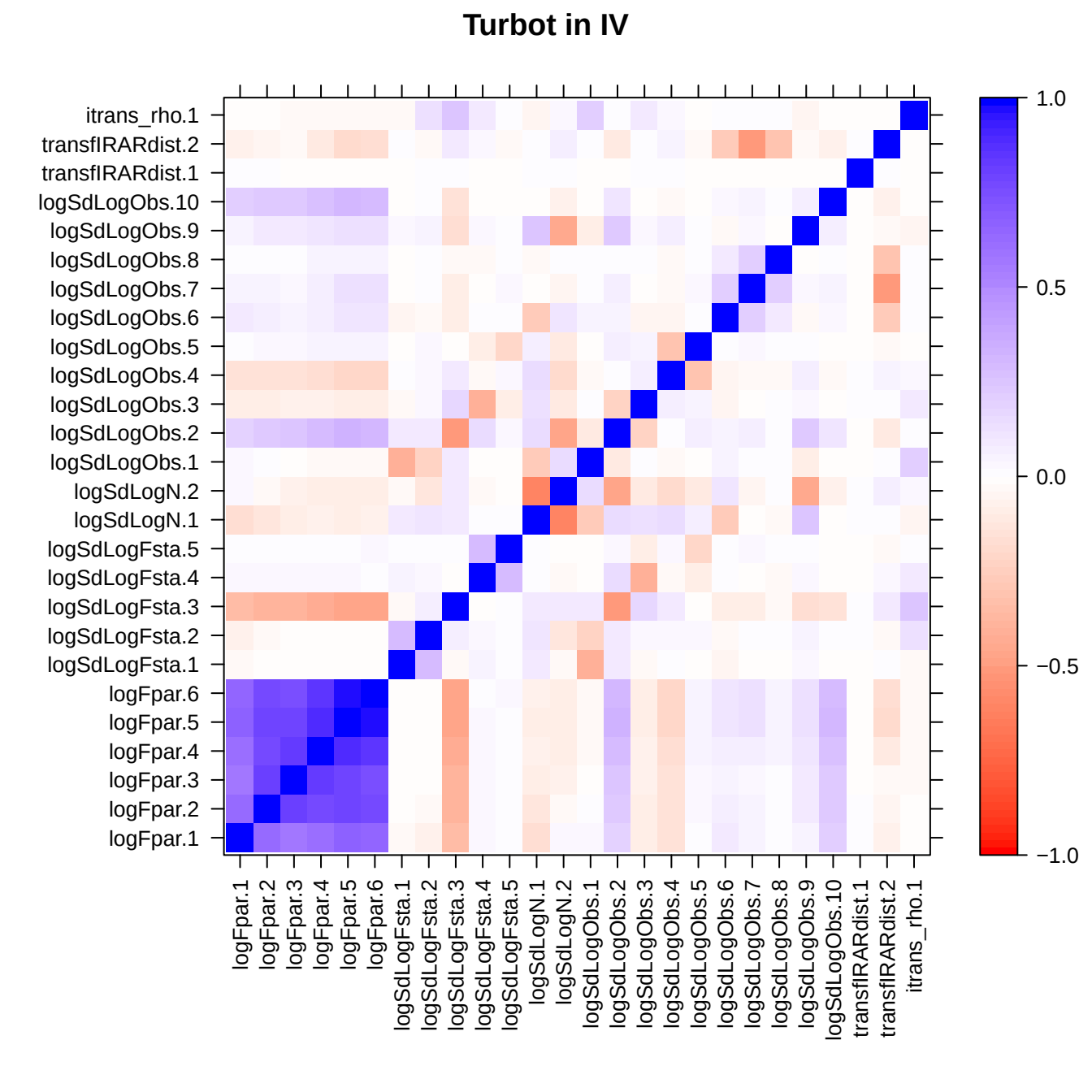


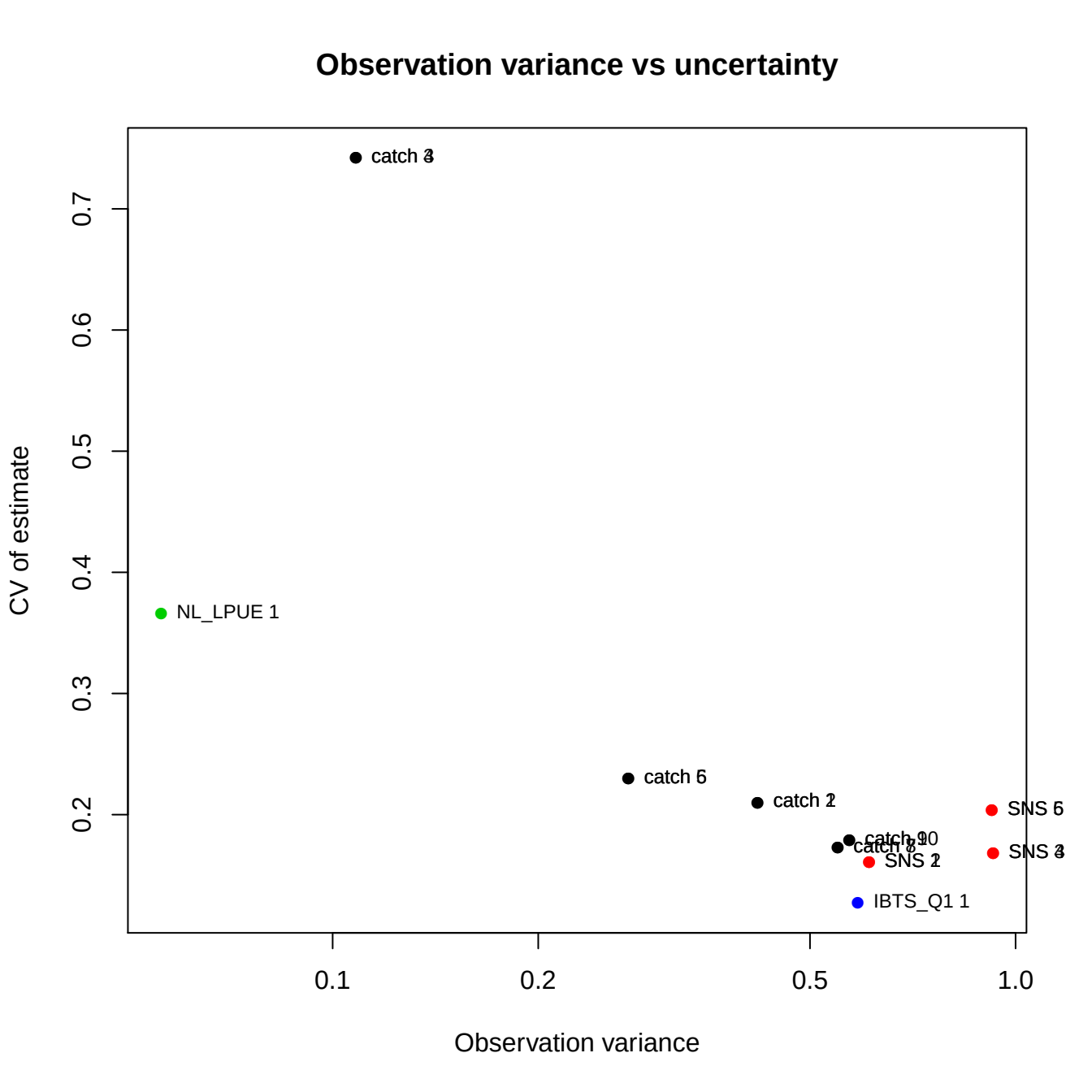


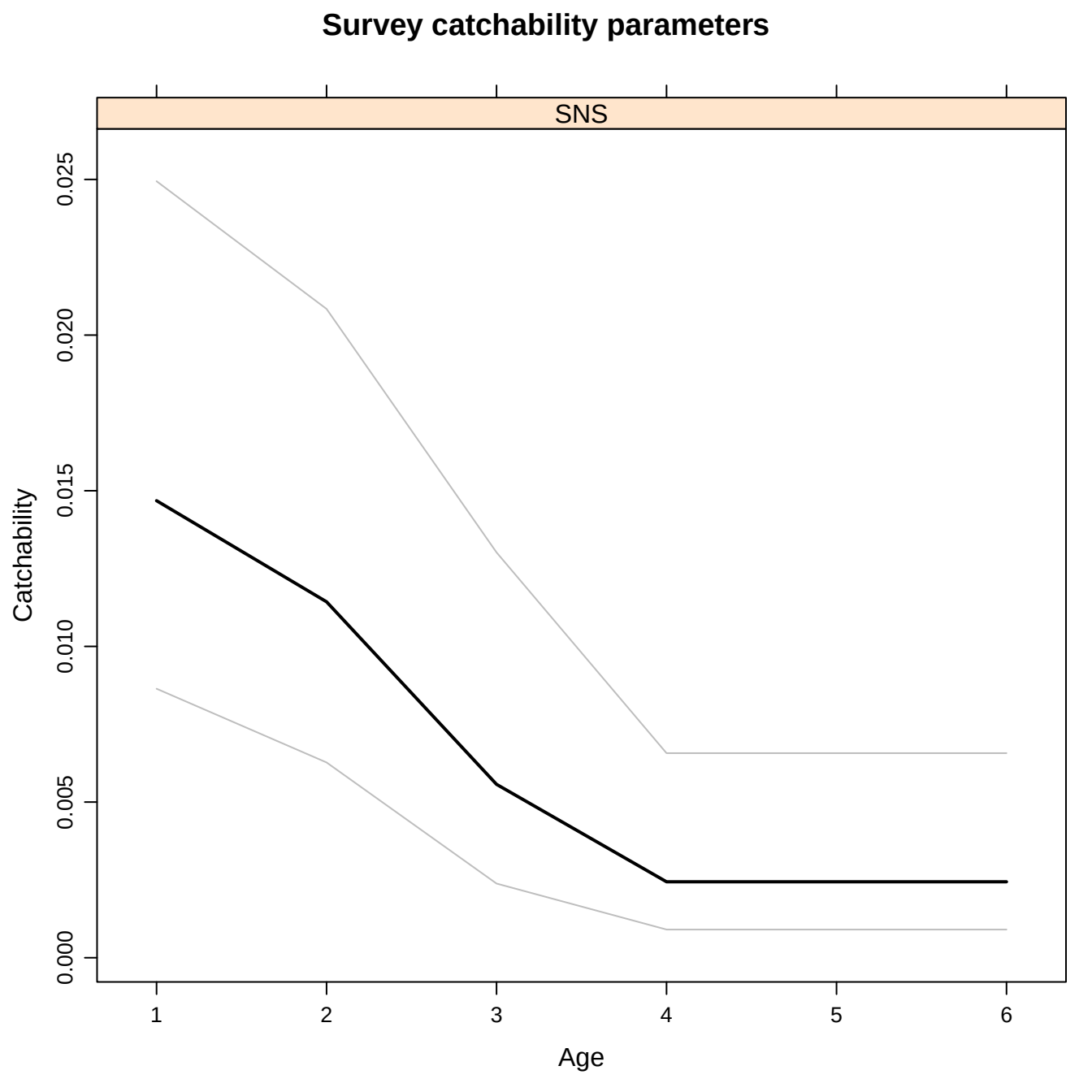


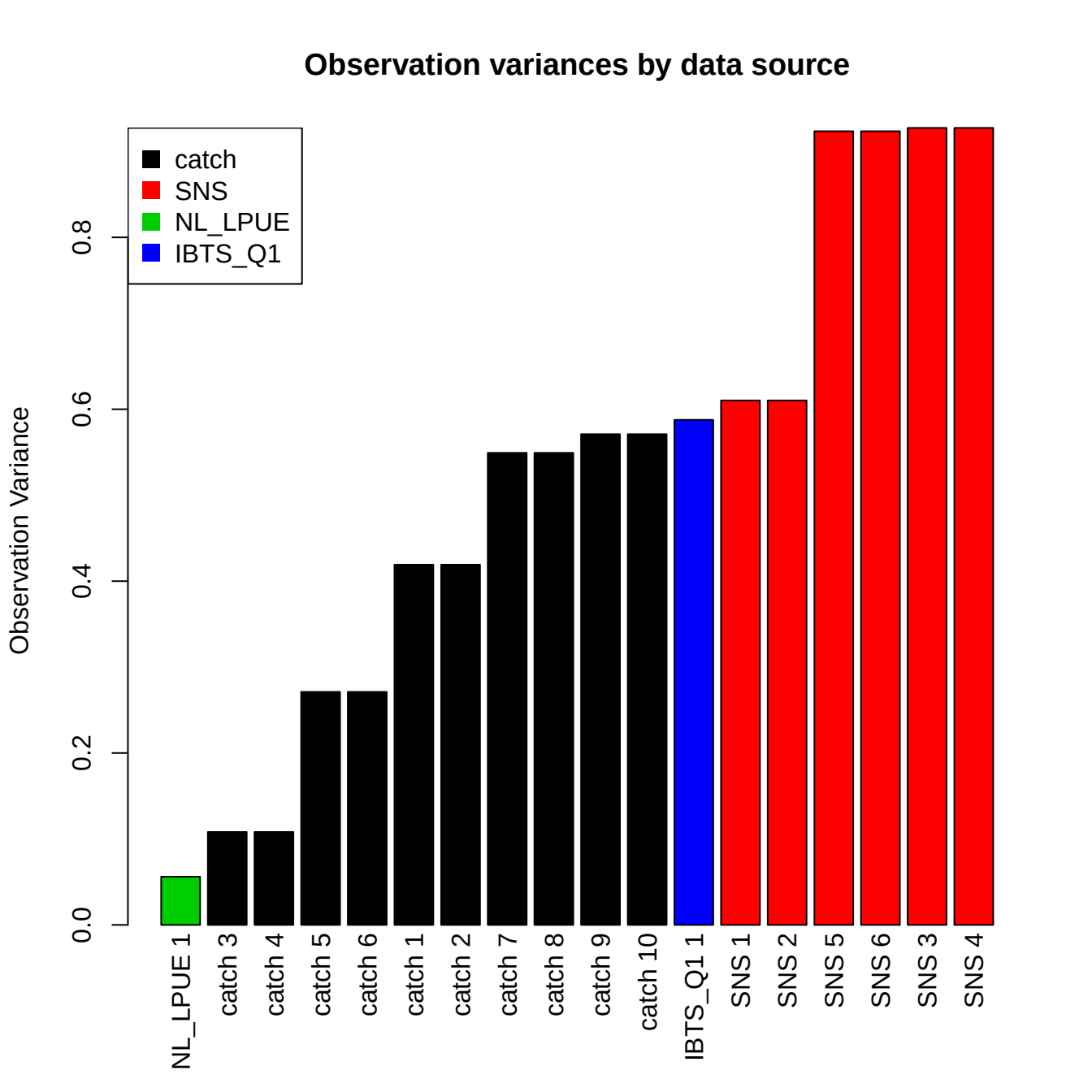


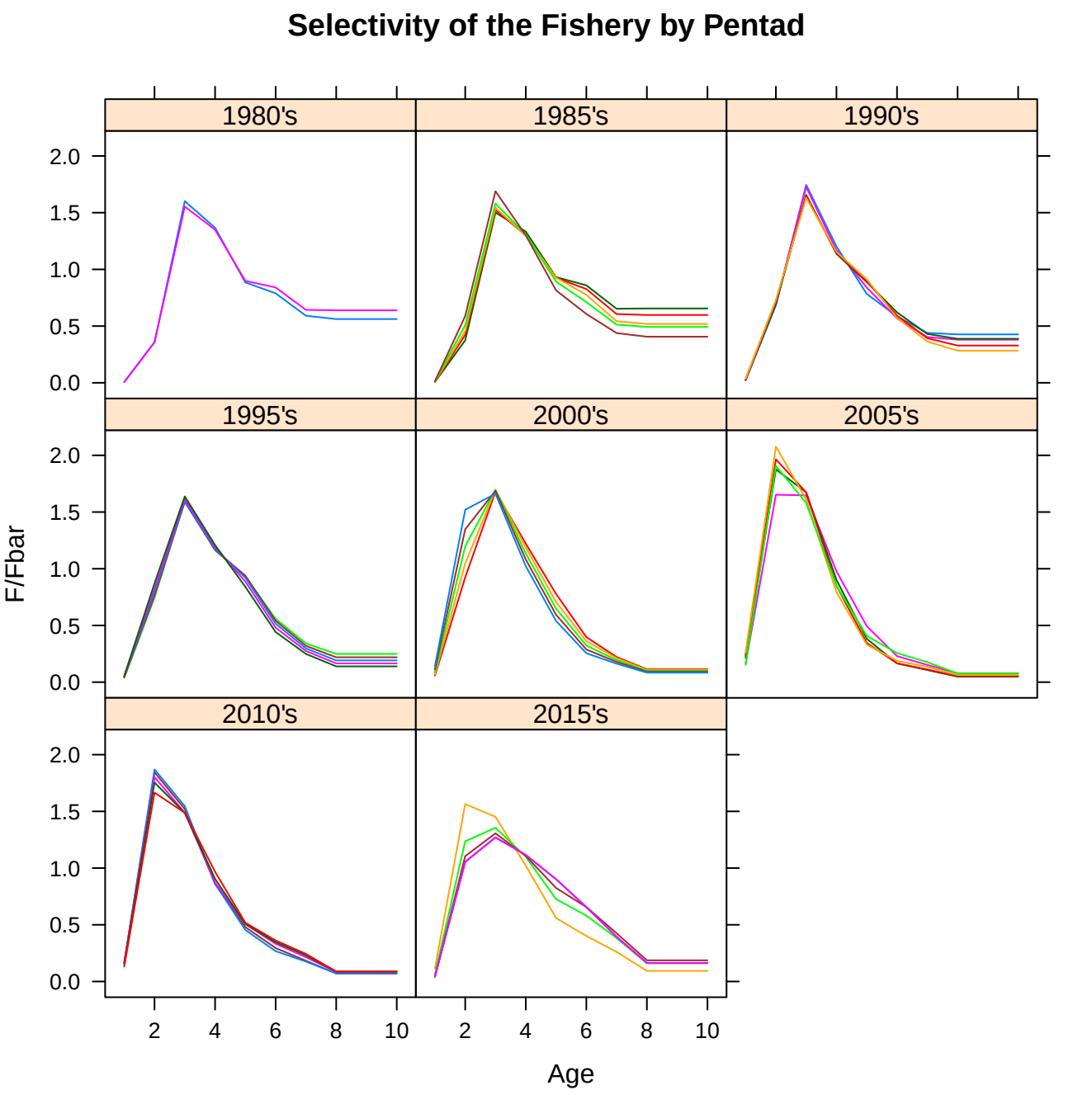


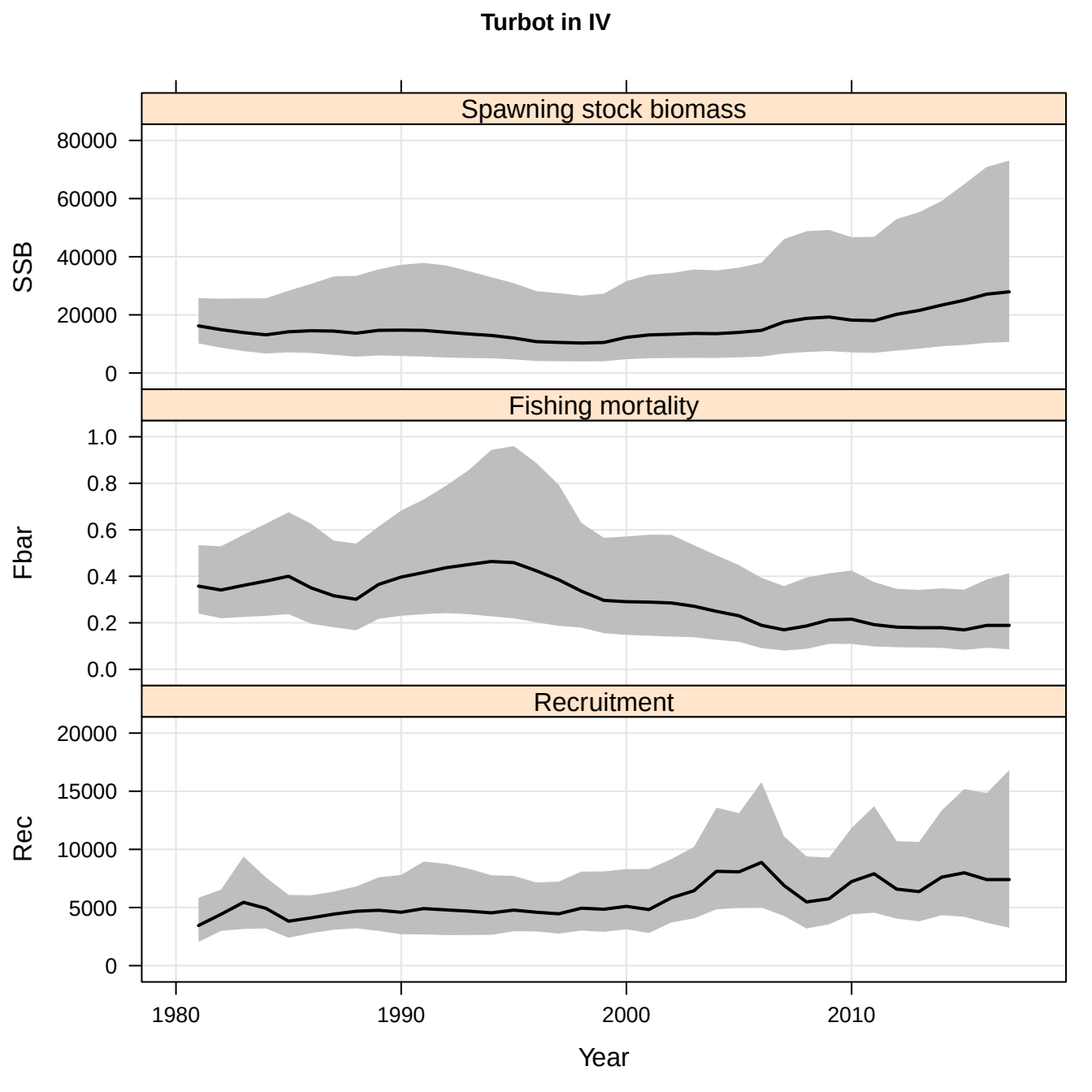

Turbot in IV
itrans_rho.1
transfIRARdist.2
transfIRARdist.1
logSdLogObs.10
logSdLogObs.9
logSdLogObs.8
logSdLogObs.7
logSdLogObs.6
logSdLogObs.5
logSdLogObs.4
logSdLogObs.3
logSdLogObs.2
logSdLogObs.1
logSdLogN.2
logSdLogN.1
logSdLogFsta.5
logSdLogFsta.4
logSdLogFsta.3
logSdLogFsta.2
logSdLogFsta.1
logFpar.6
logFpar.5
logFpar.4
logFpar.3
logFpar.2
logFpar.1
logFpar.1
logFpar.2
logFpar.3
logFpar.4
logFpar.5
logFpar.6
logSdLogFsta.1
logSdLogFsta.2
logSdLogFsta.3
logSdLogFsta.4
logSdLogFsta.5
logSdLogN.1
logSdLogN.2
logSdLogObs.1
logSdLogObs.2
logSdLogObs.3
logSdLogObs.4
logSdLogObs.5
logSdLogObs.6
logSdLogObs.7
logSdLogObs.8
logSdLogObs.9
logSdLogObs.10
transfIRARdist.1
transfIRARdist.2
itrans_rho.1
1.0
0.5
0.0
−0.5
−1.0

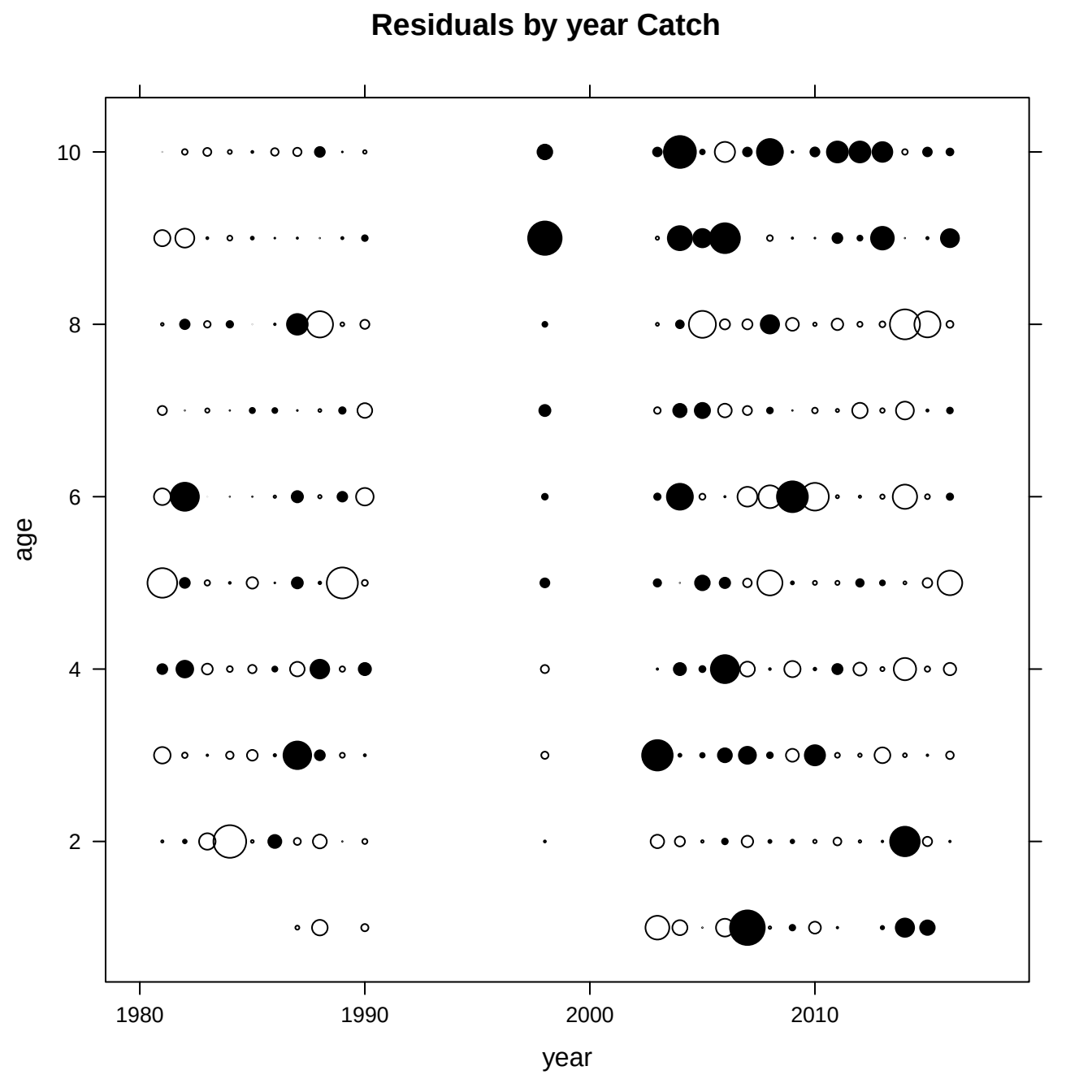

Observation variance vs uncertainty
CV of estimate
0.2
0.3
0.4
0.5
0.6
0.7
0.1
0.2
0.5
1.0
Observation variance
catch 3
NL_LPUE 1
catch 6
catch 2
catch 10
catch 8
SNS 2
SNS 6
SNS 3
IBTS_Q1 1

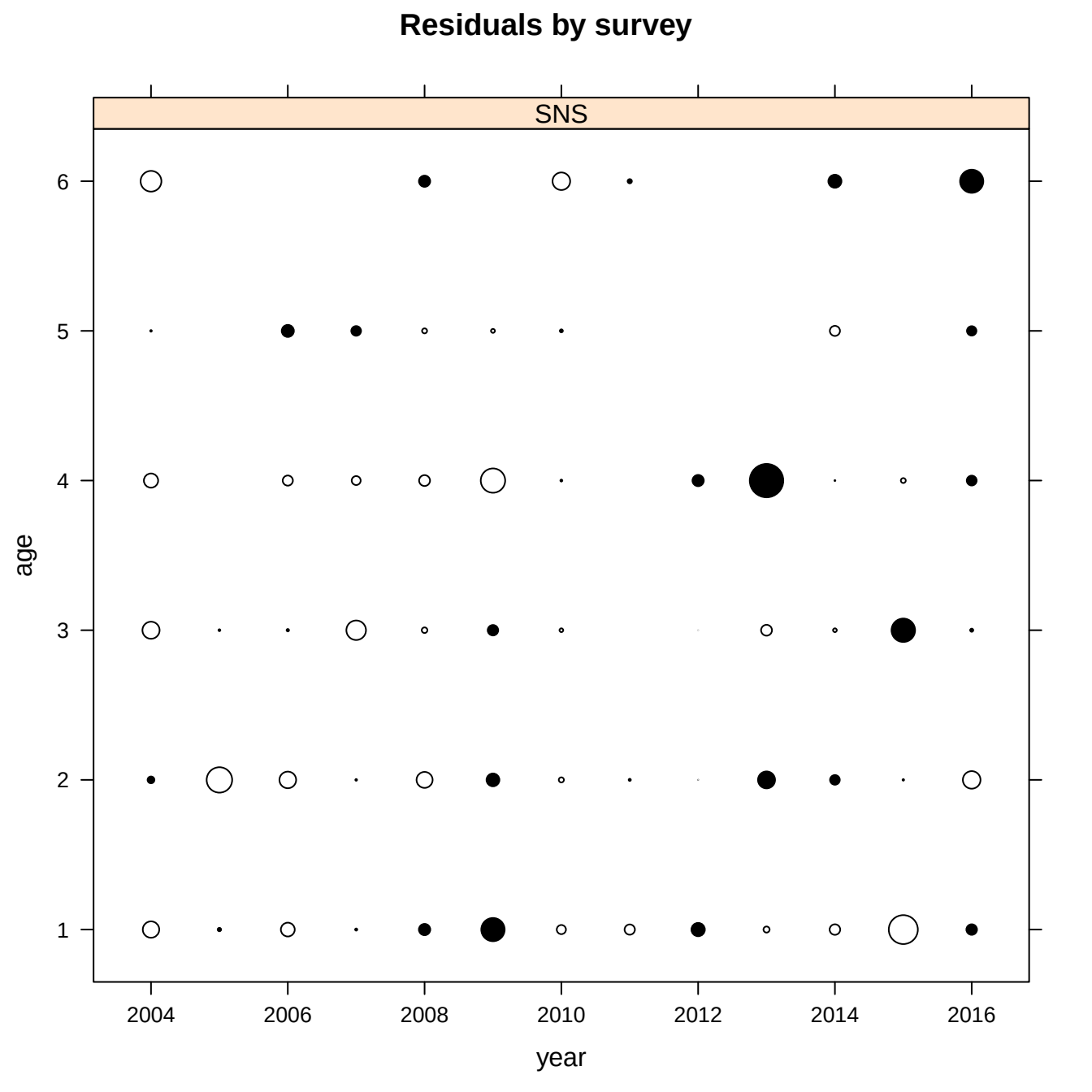

Survey catchability parameters
SNS
Catchability
0.000
0.005
0.010
0.015
0.020
0.025
1
2
3
4
5
6
Age


Observation variances by data source
Observation Variance
0.0
0.2
0.4
0.6
0.8
catch
SNS
NL_LPUE
IBTS_Q1
NL_LPUE 1
catch 3
catch 4
catch 5
catch 6
catch 1
catch 2
catch 7
catch 8
catch 9
catch 10
IBTS_Q1 1
SNS 1
SNS 2
SNS 5
SNS 6
SNS 3
SNS 4

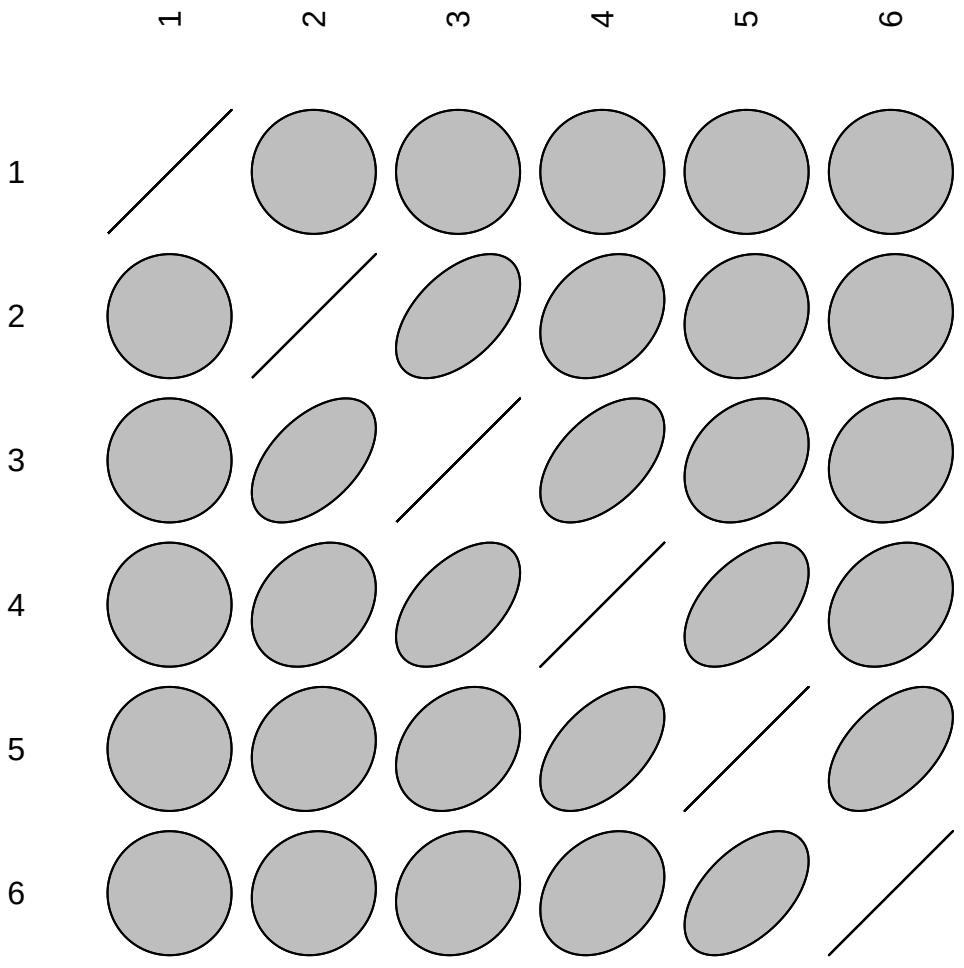

Selectivity of the Fishery by Pentad
1980's
1985's
1990's
1995's
2000's
2005's
2010's
2015's
F/Fbar
Age
0.0
0.5
1.0
1.5
2.0
2
4
6
8
10

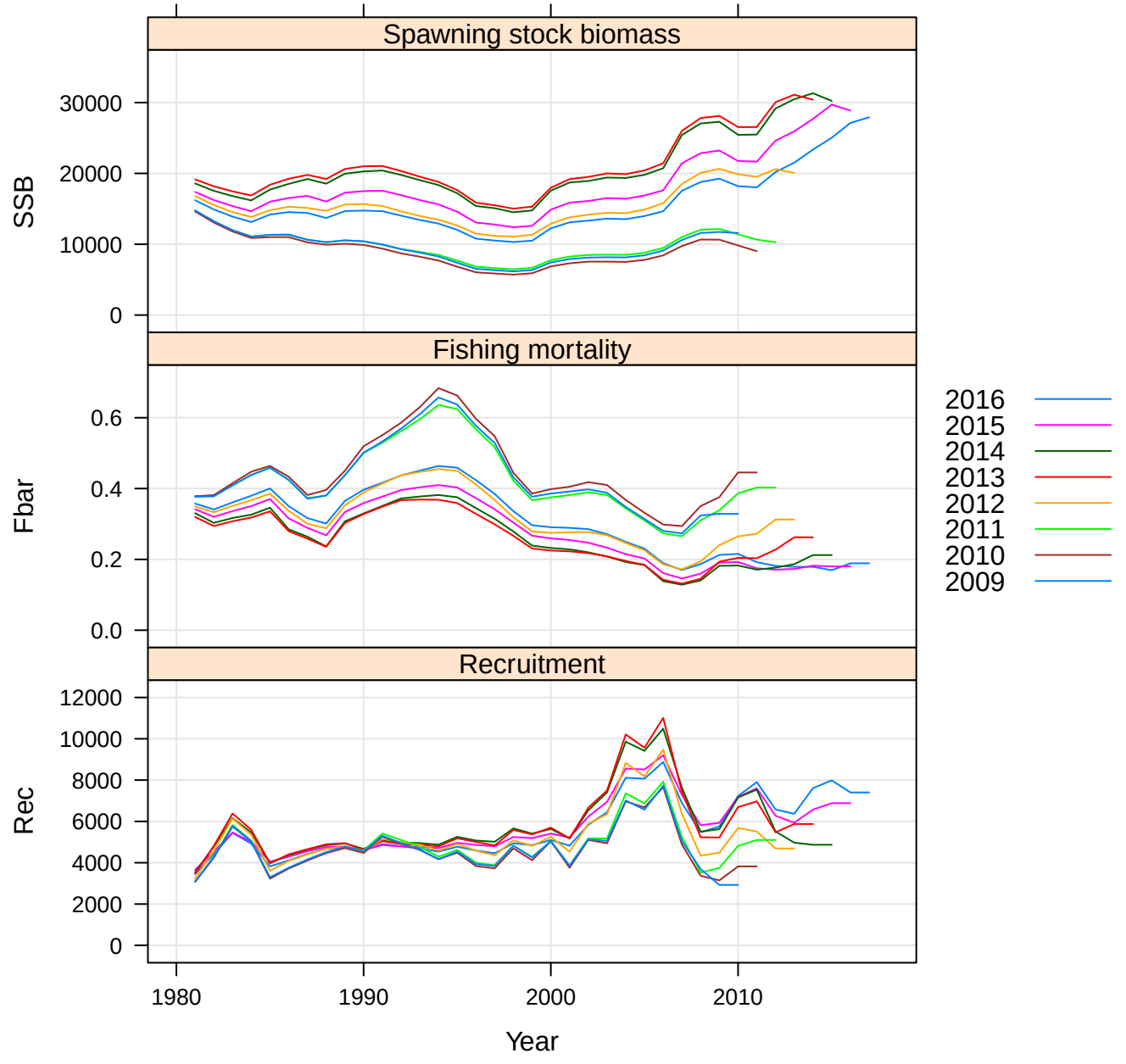

Turbot in IV
Spawning stock biomass
SSB
80000
60000
40000
20000
0
Fishing mortality
Fbar
1.0
0.8
0.6
0.4
0.2
0.0
Recruitment
Rec
20000
15000
10000
5000
0
1980
1990
2000
2010
Year

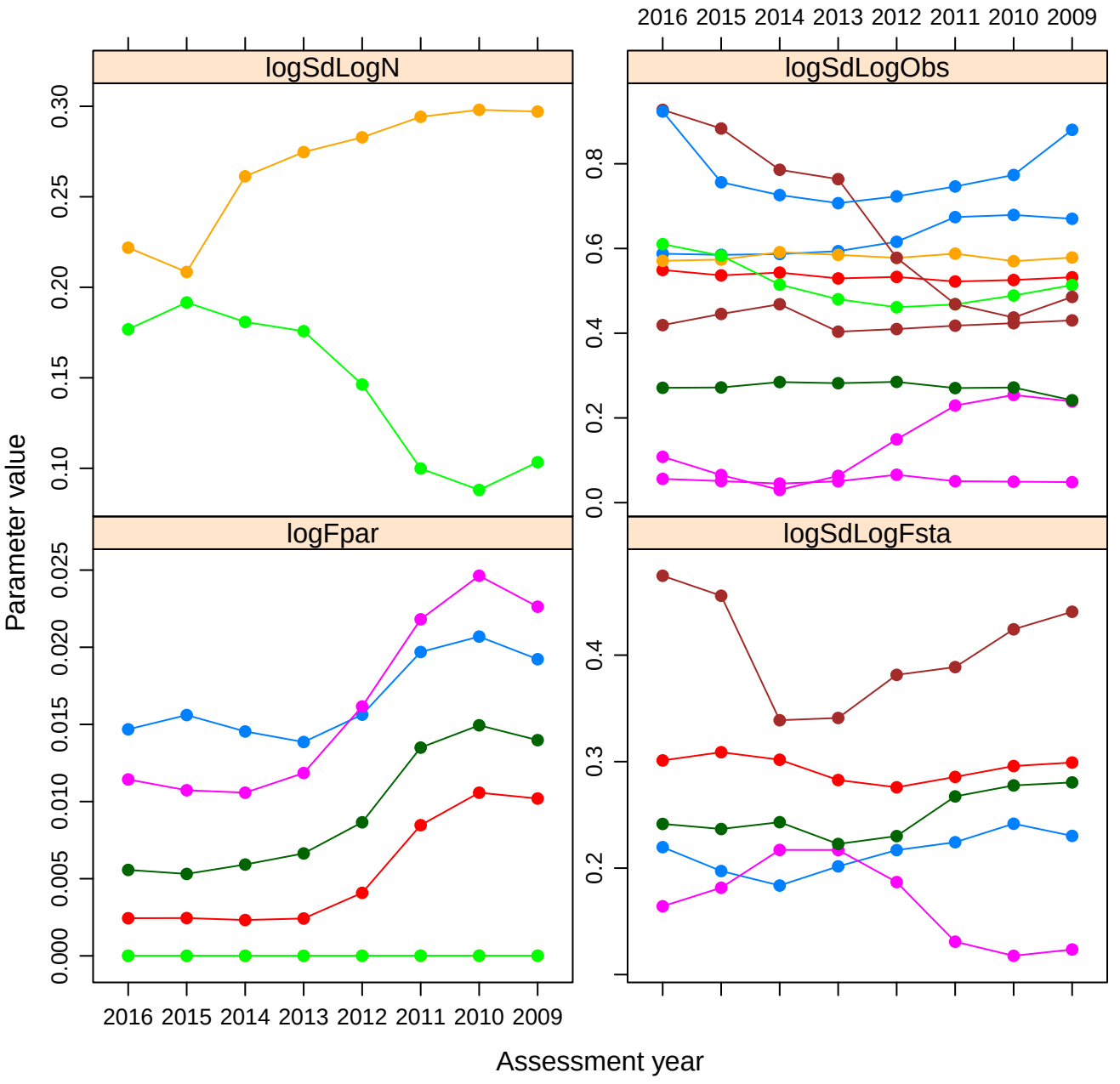

Residuals by year Catch
10
8
6
4
2
age
1980
1990
2000
2010
year

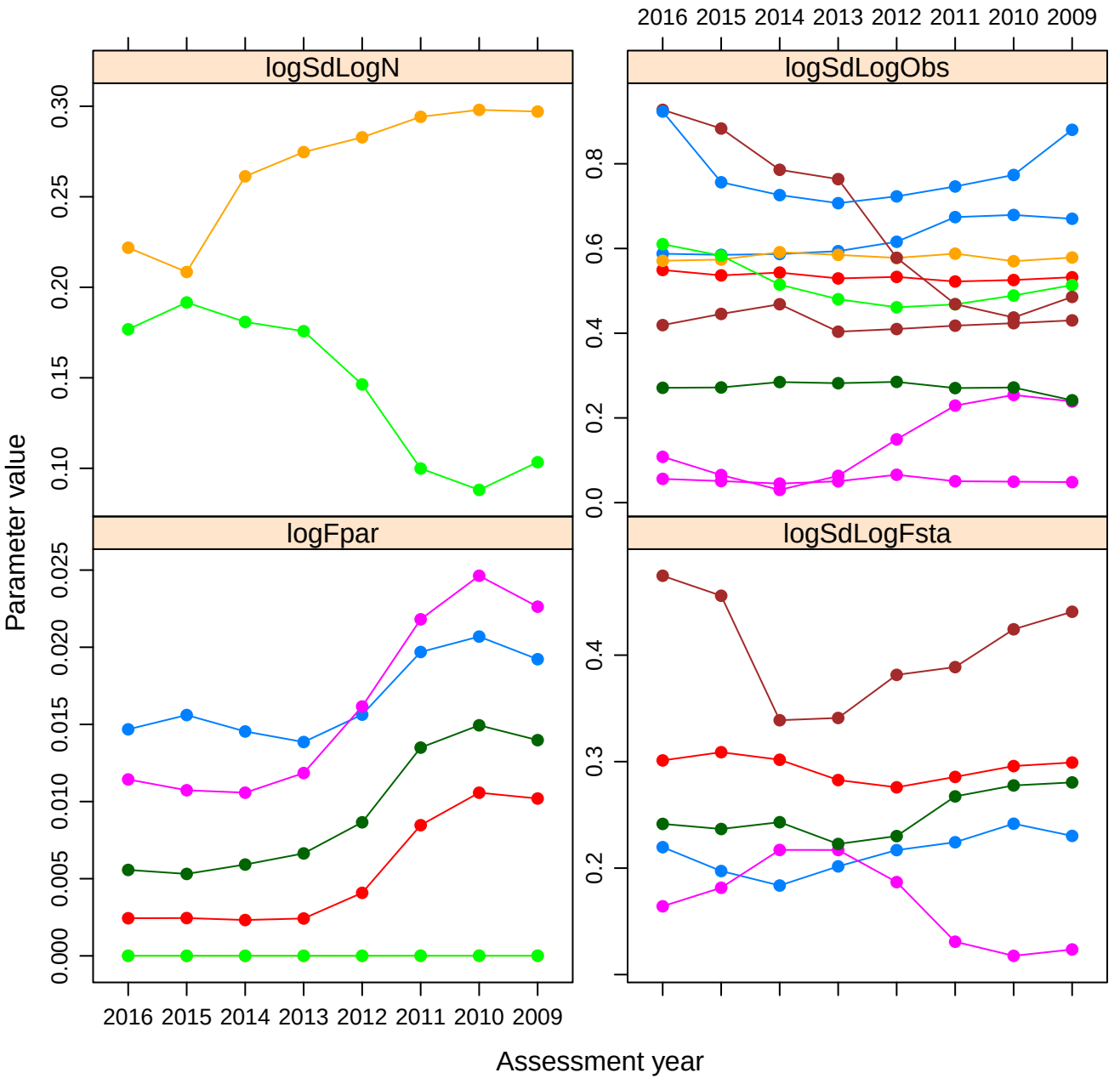

Residuals by survey
SNS
age
year
1
2
3
4
5
6
2004
2006
2008
2010
2012
2014
2016

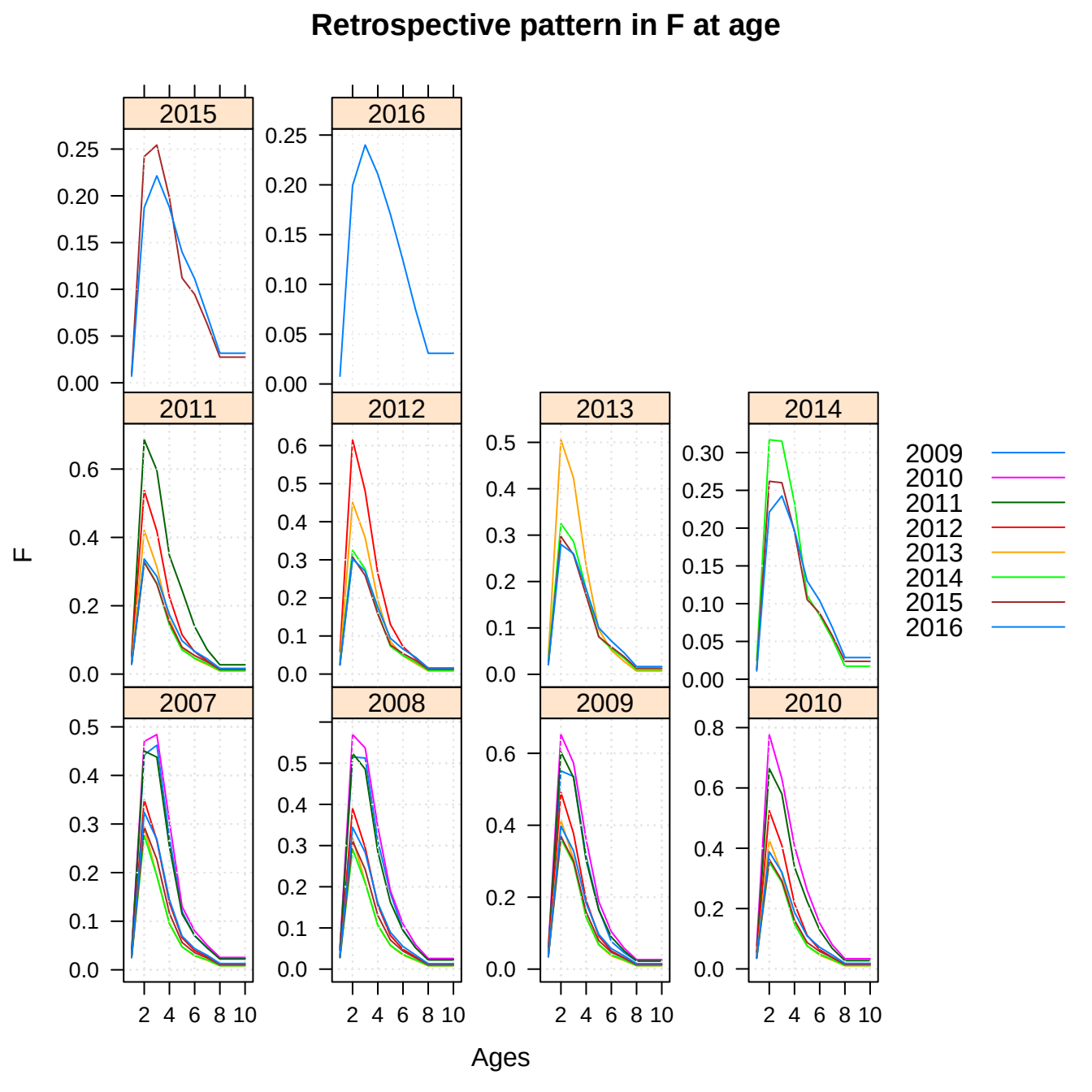
SNS

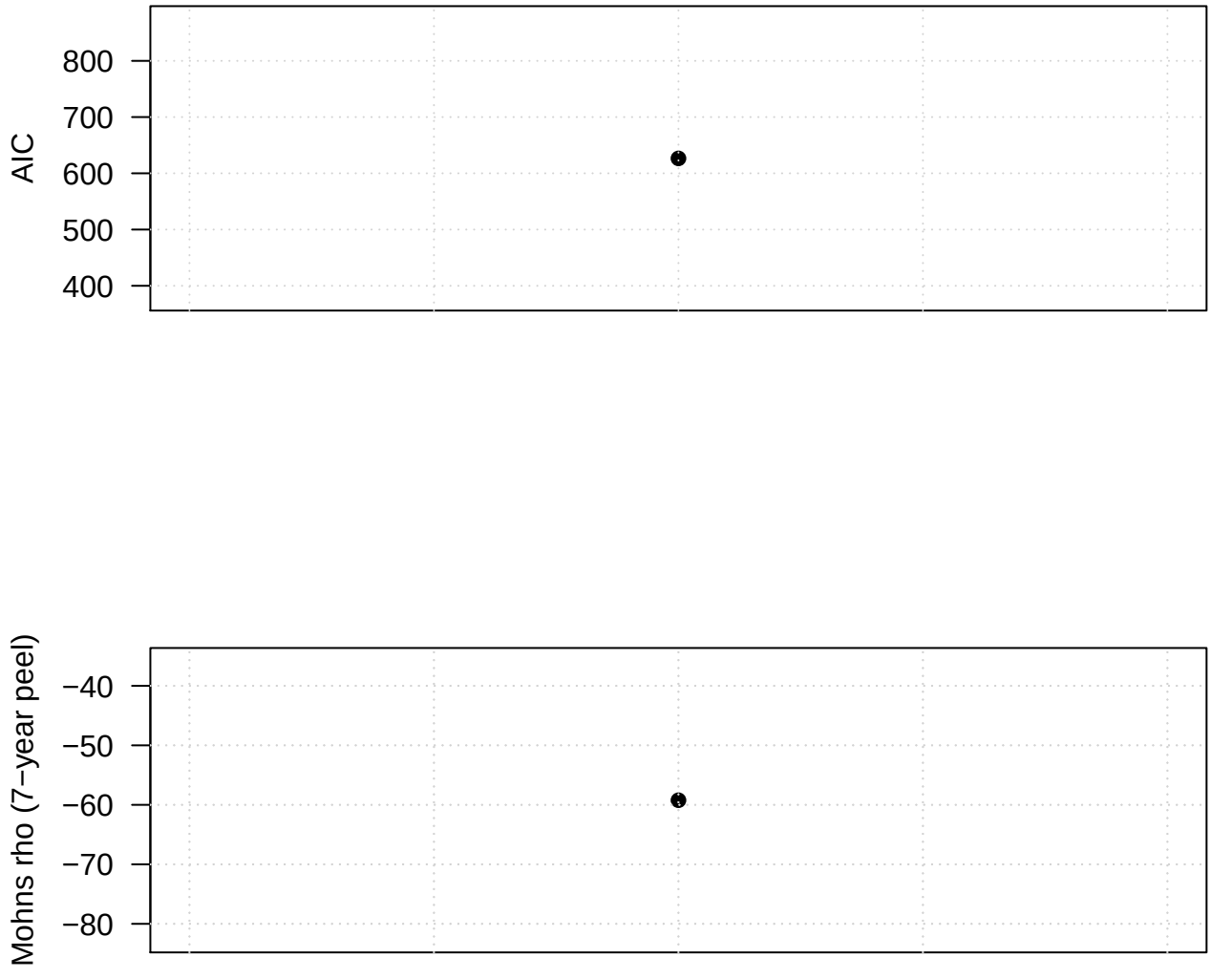



Spawning stock biomass
SSB
30000
20000
10000
0
Fishing mortality
Fbar
0.6
0.4
0.2
0.0
Recruitment
Rec
12000
10000
8000
6000
4000
2000
0
1980
1990
2000
2010
Year
2016
2015
2014
2013
2012
2011
2010
2009


logSdLogN
logSdLogObs
logFpar
logSdLogFsta
Parameter value
Assessment year
2016 2015 2014 2013 2012 2011 2010 2009
0.10 0.15 0.20 0.25 0.30
0.0 0.2 0.4 0.6 0.8
0.000 0.005 0.010 0.015 0.020 0.025
0.2 0.3 0.4


logSdLogN
logSdLogObs
logFpar
logSdLogFsta
Parameter value
Assessment year
2016 2015 2014 2013 2012 2011 2010 2009
0.10 0.15 0.20 0.25 0.30
0.0 0.2 0.4 0.6 0.8
0.000 0.005 0.010 0.015 0.020 0.025
0.2 0.3 0.4


Retrospective pattern in F at age
2015
2016
2011
2012
2013
2014
2007
2008
2009
2010
F
Ages
2009
2010
2011
2012
2013
2014
2015
2016


AIC
800
700
600
500
400
Mohns rho (7−year peel)
−40
−50
−60
−70
−80