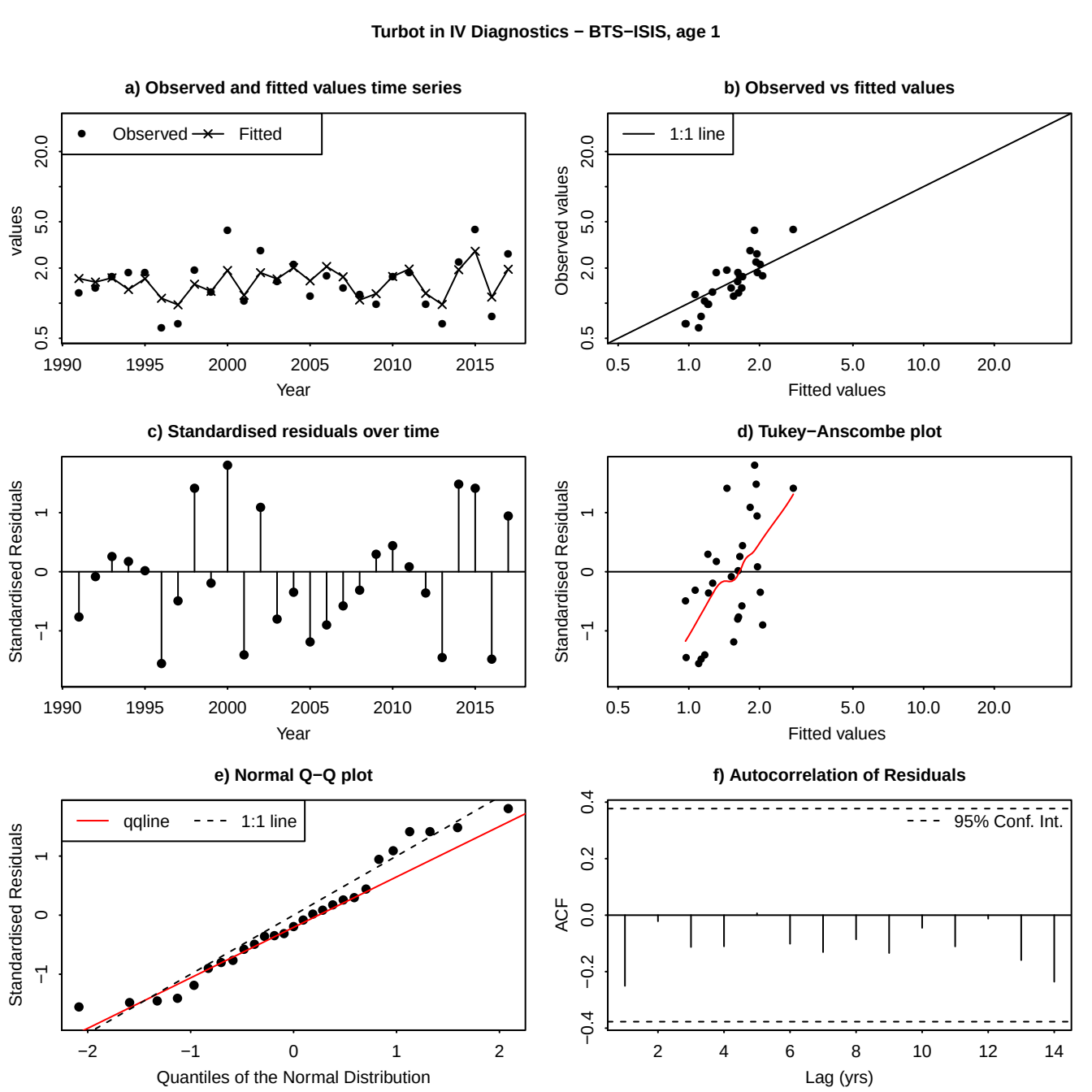
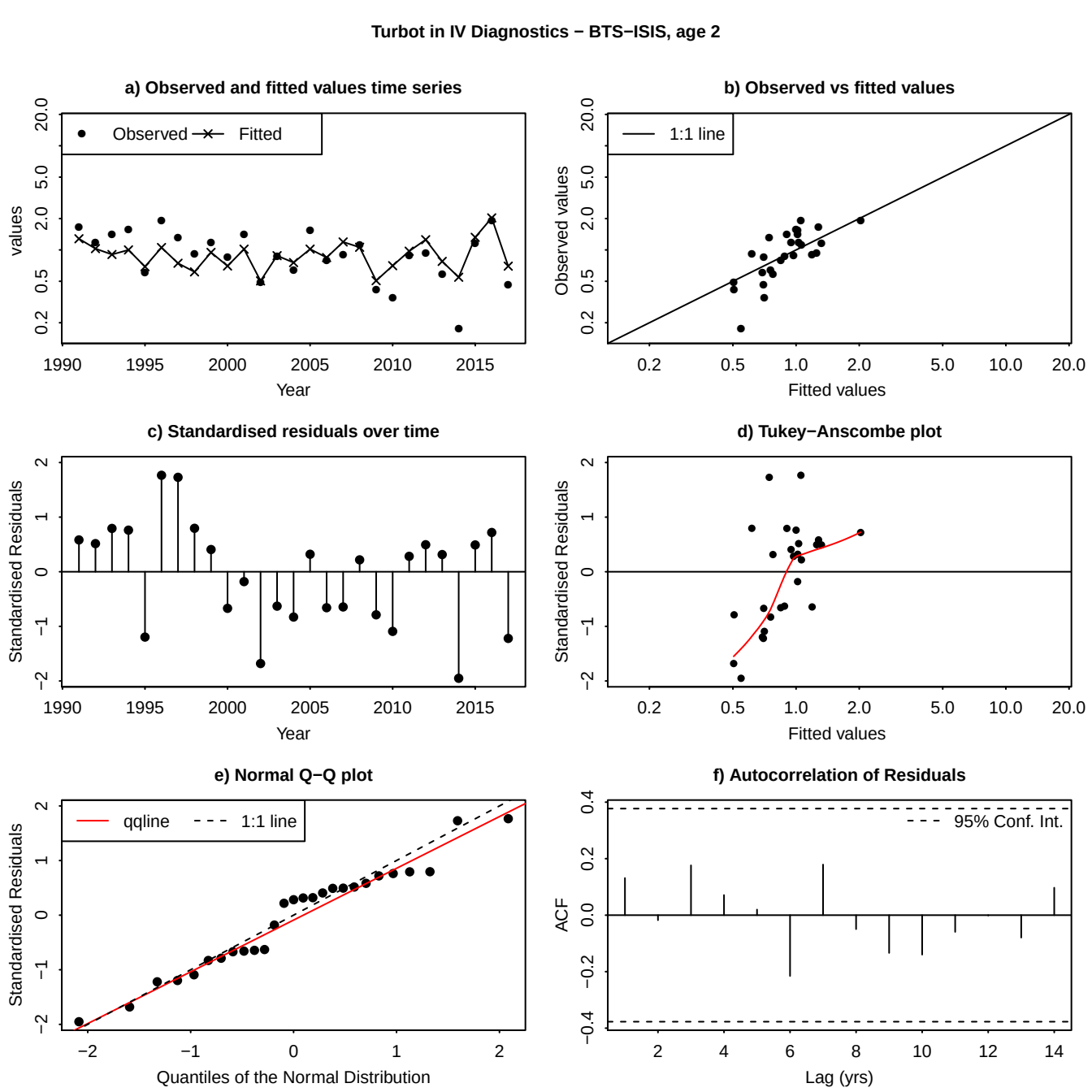
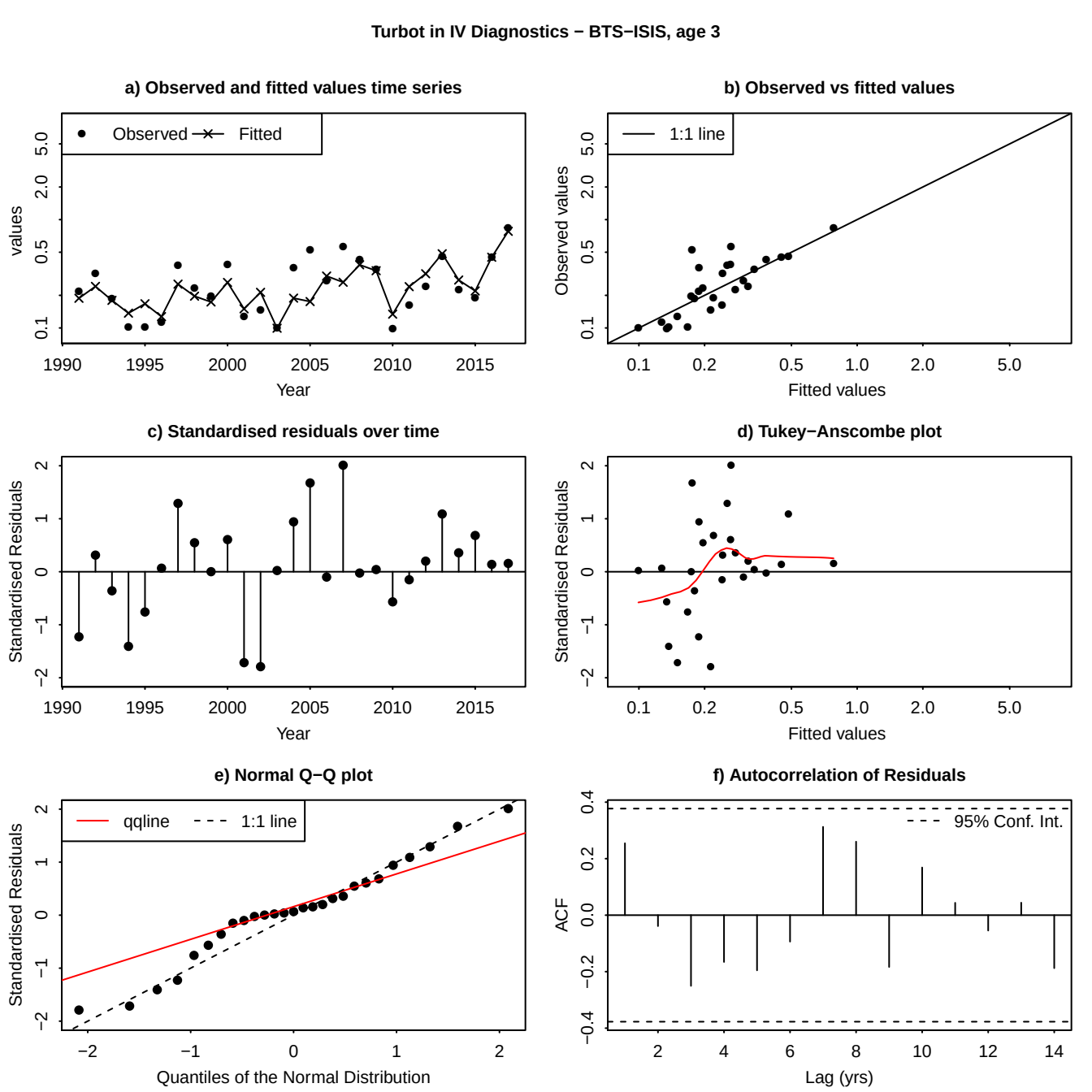
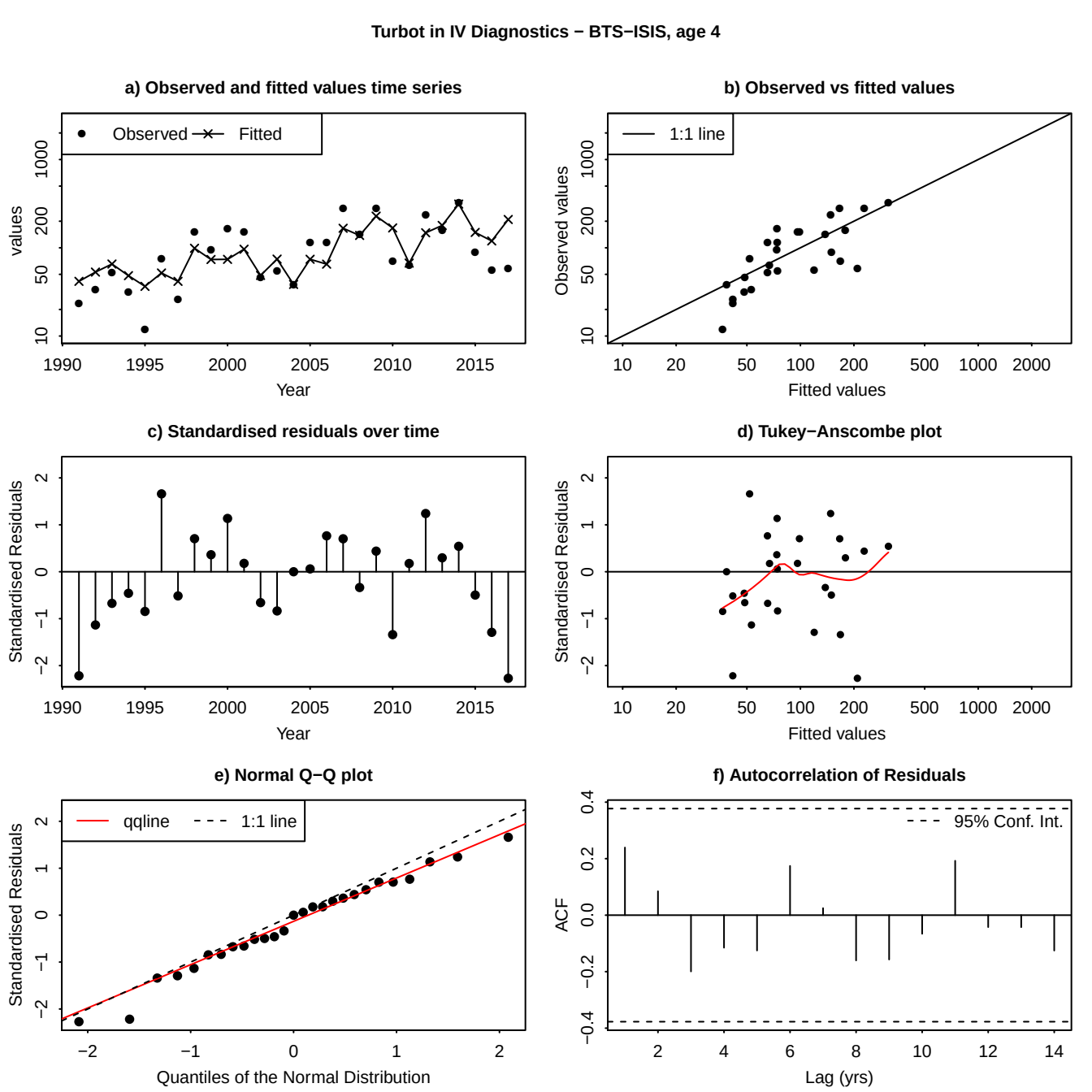
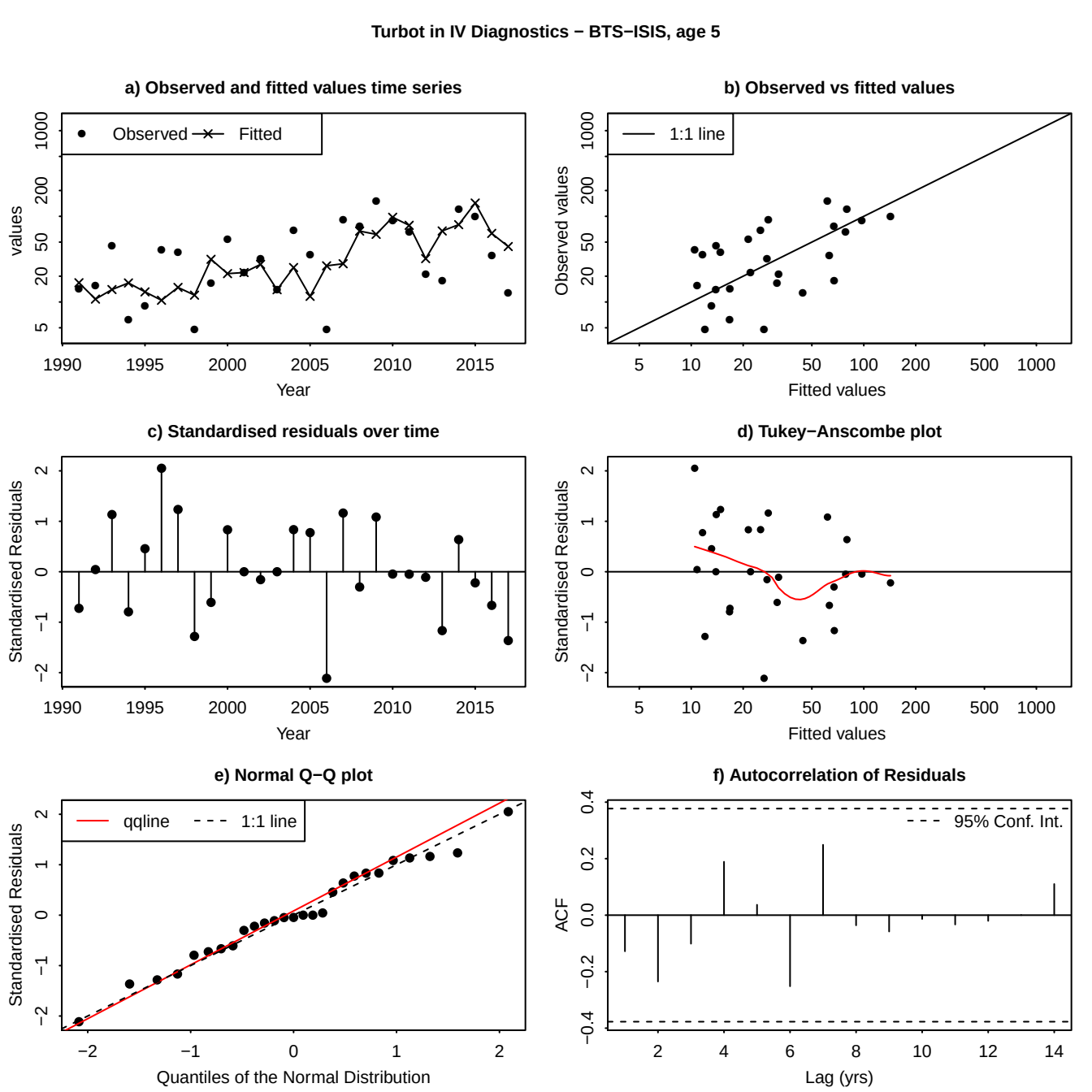
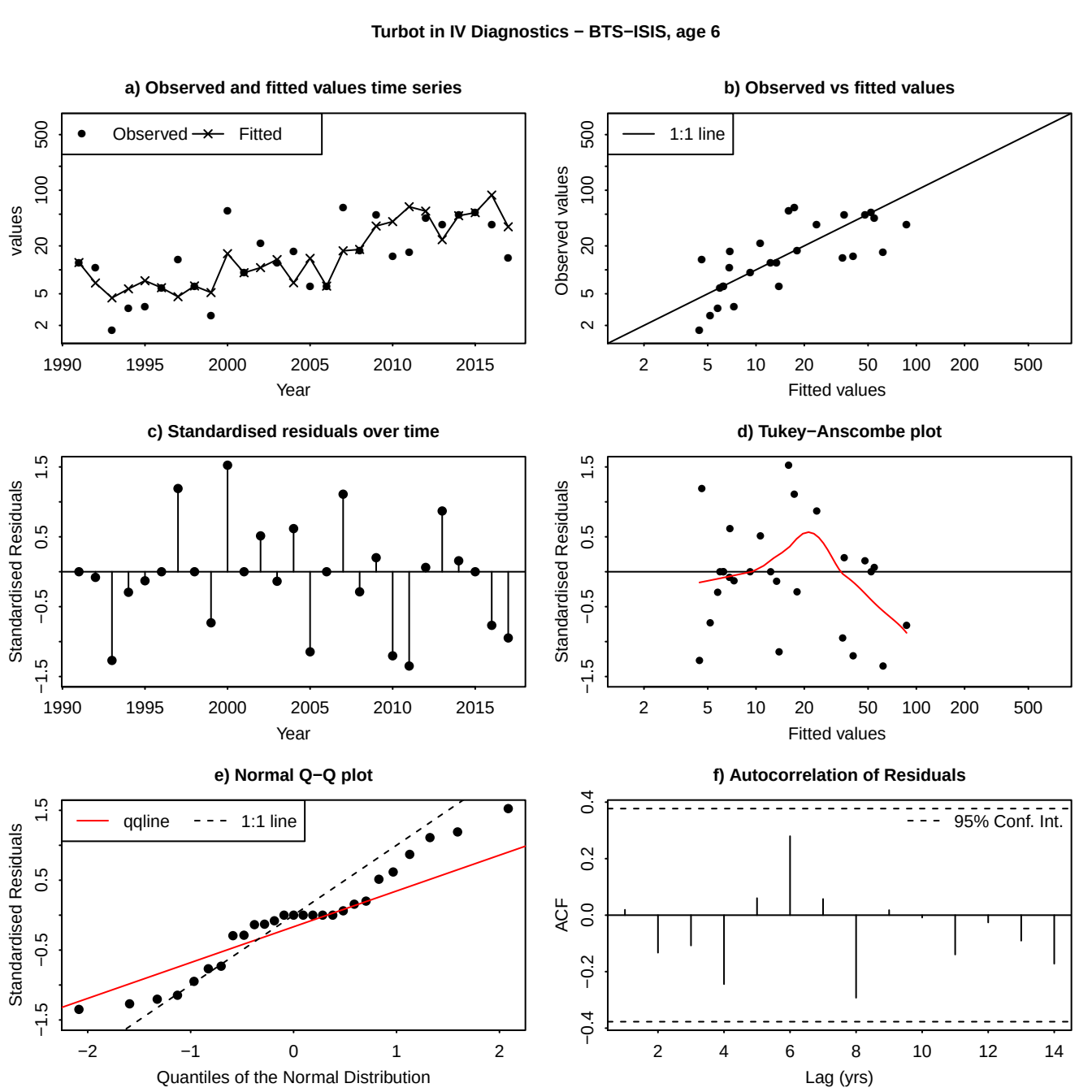

Turbot in IV Diagnostics − BTS−ISIS, age 1
a) Observed and fitted values time series
Observed
Fitted
values
0.5
2.0
5.0
20.0
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
0.5
1.0
2.0
5.0
10.0
20.0
c) Standardised residuals over time
Standardised Residuals
−1
0
1
Year
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
1:1 line
Quantiles of the Normal Distribution
−2
−1
0
1
2
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
−0.4
−0.2
0.0
0.2
0.4
2
4
6
8
10
12
14
Lag (yrs)

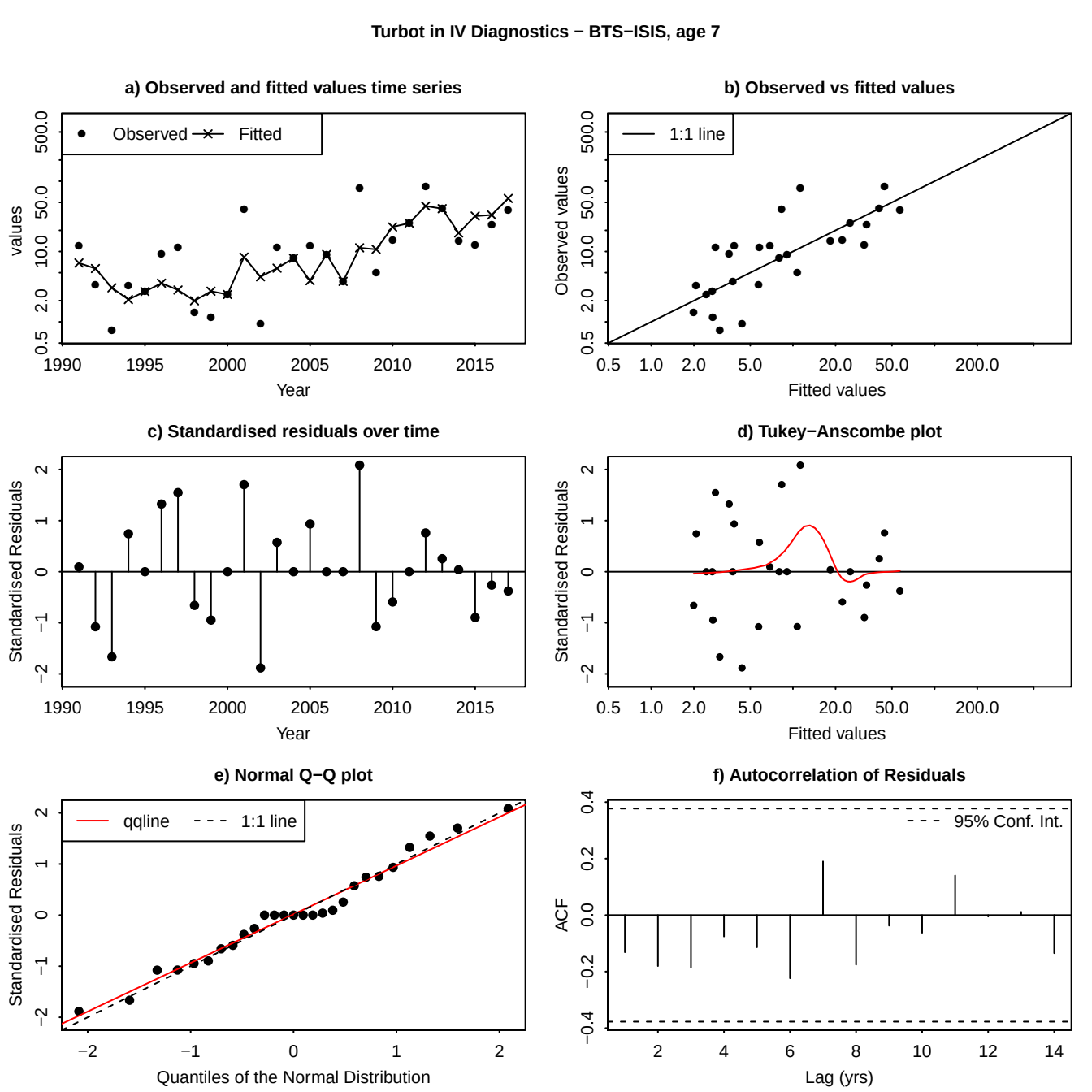

Turbot in IV Diagnostics − BTS−ISIS, age 2
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
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)

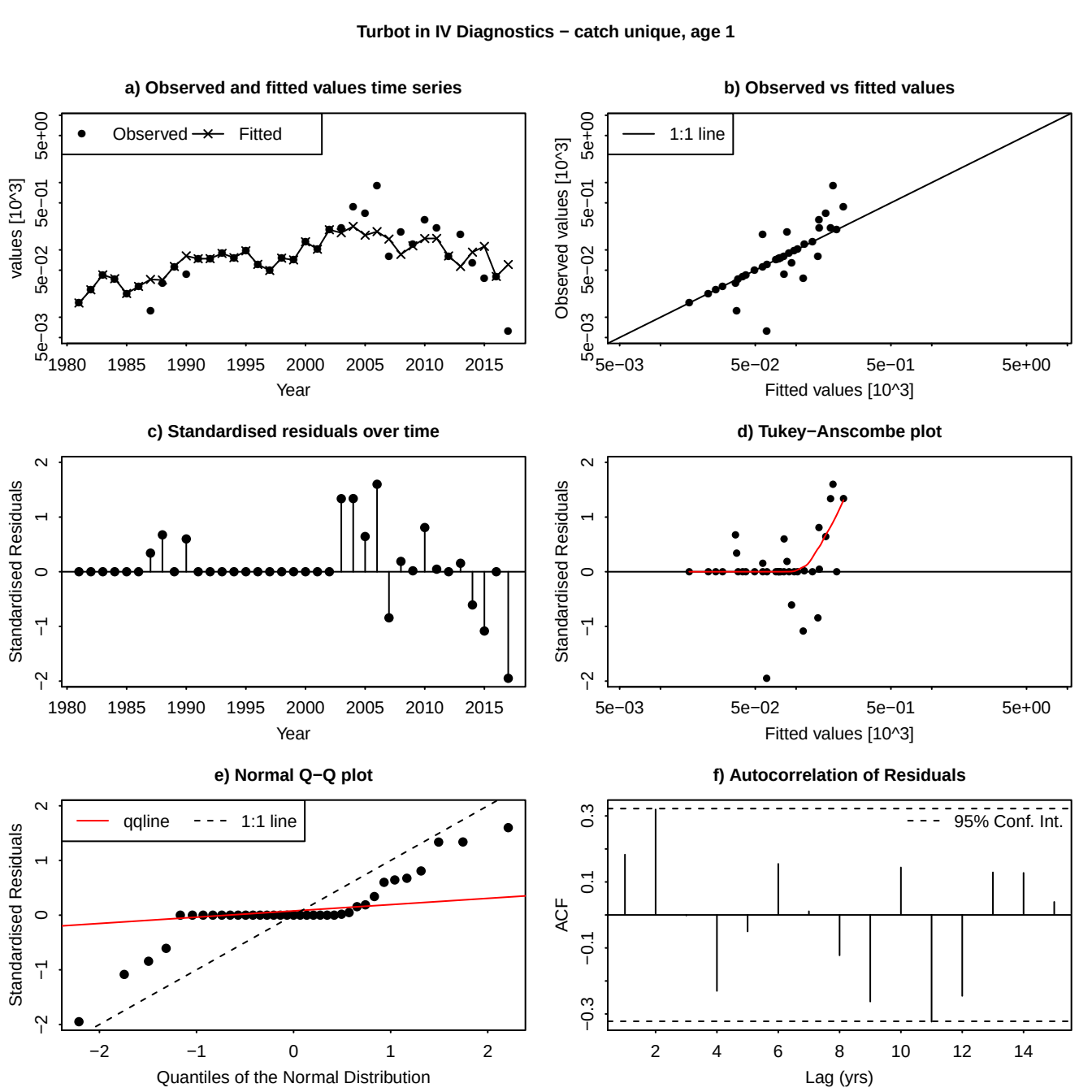

Turbot in IV Diagnostics − BTS−ISIS, age 3
a) Observed and fitted values time series
Observed
Fitted
values
5.0
2.0
0.5
0.1
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
0.1
0.2
0.5
1.0
2.0
5.0
c) Standardised residuals over time
Standardised Residuals
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
0.4
0.2
0.0
−0.2
−0.4
2
4
6
8
10
12
14
Lag (yrs)


Turbot in IV Diagnostics − BTS−ISIS, age 4
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)

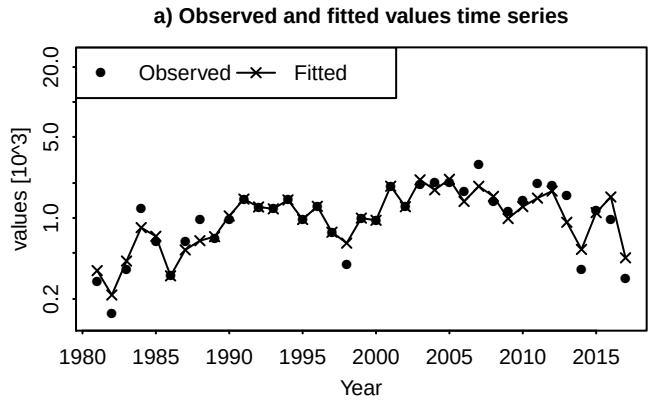

Turbot in IV Diagnostics − BTS−ISIS, age 5
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
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)

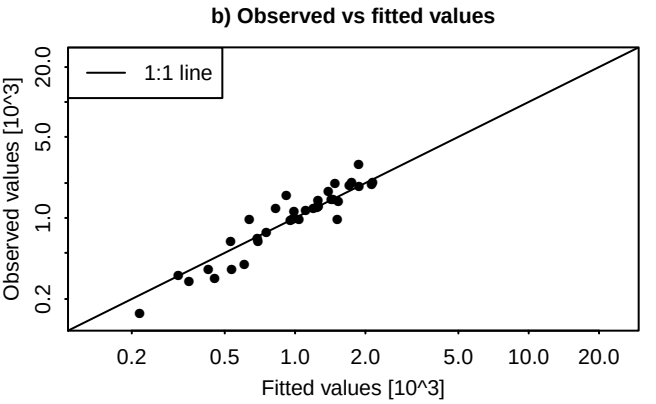

Turbot in IV Diagnostics − BTS−ISIS, age 6
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
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)

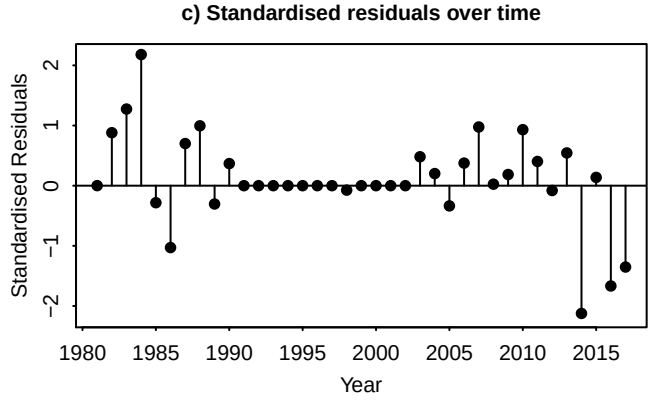

Turbot in IV Diagnostics − BTS−ISIS, age 7
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
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)

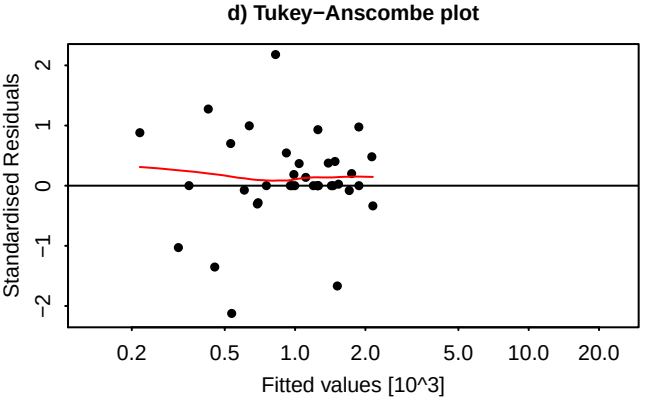

Turbot in IV Diagnostics − catch unique, age 1
a) Observed and fitted values time series
Observed
Fitted
values [10^3]
5e−03
5e−02
5e−01
5e+00
1980
1985
1990
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values [10^3]
Fitted values [10^3]
c) Standardised residuals over 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)

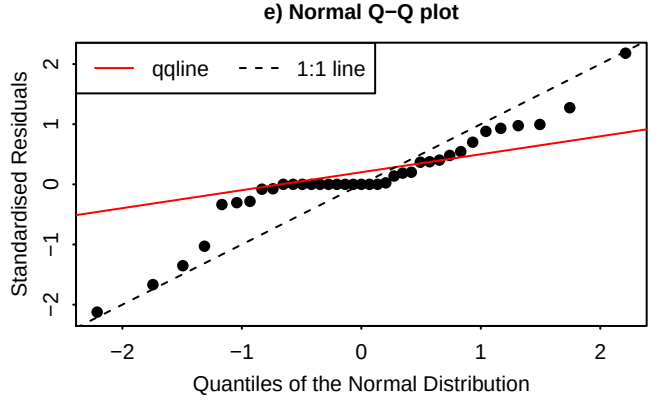
Turbot in IV Diagnostics − catch unique, age 2

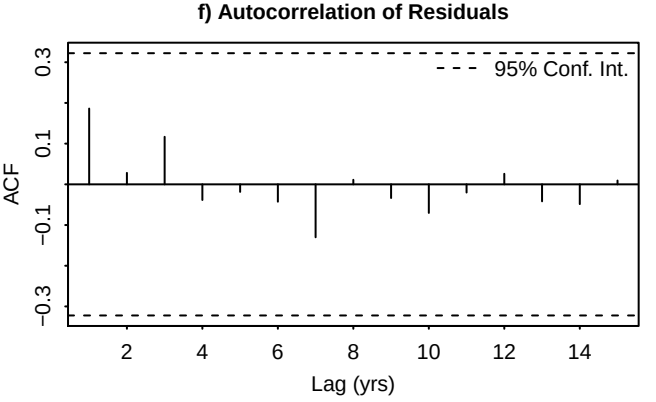




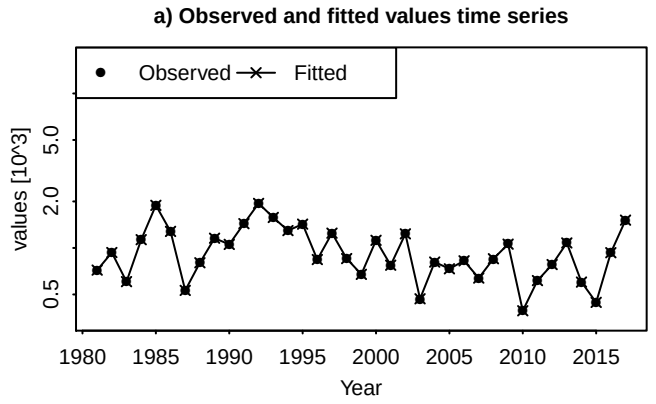


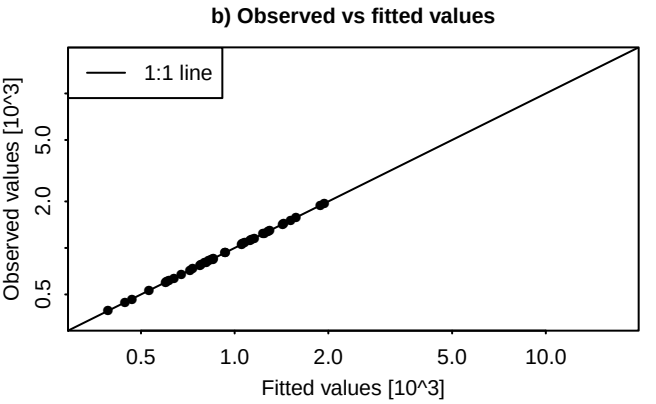


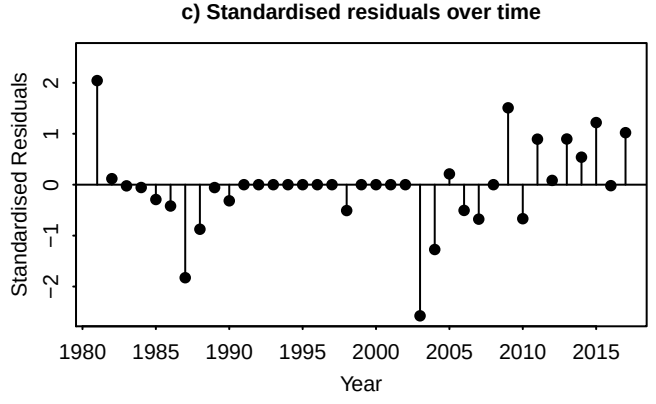


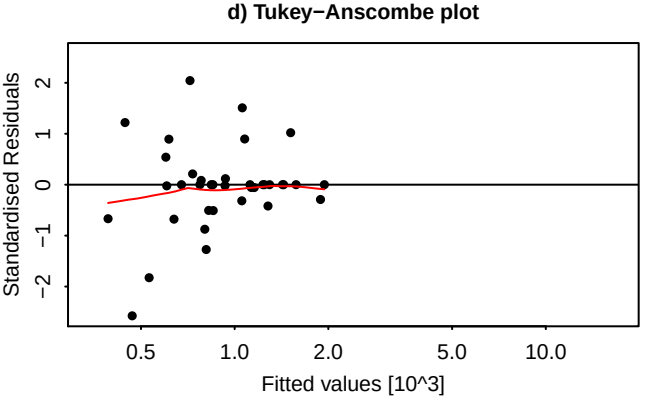


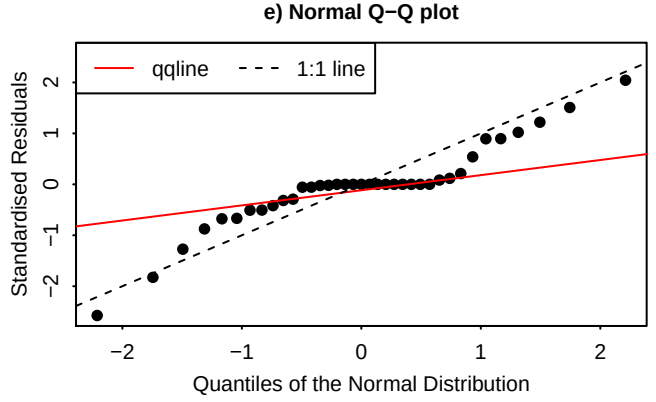
Turbot in IV Diagnostics − catch unique, age 3

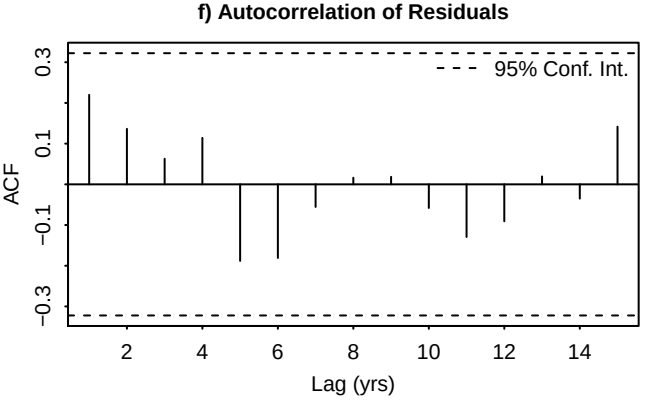




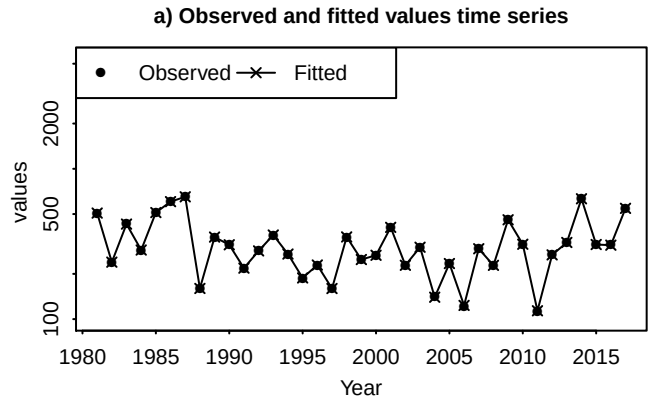


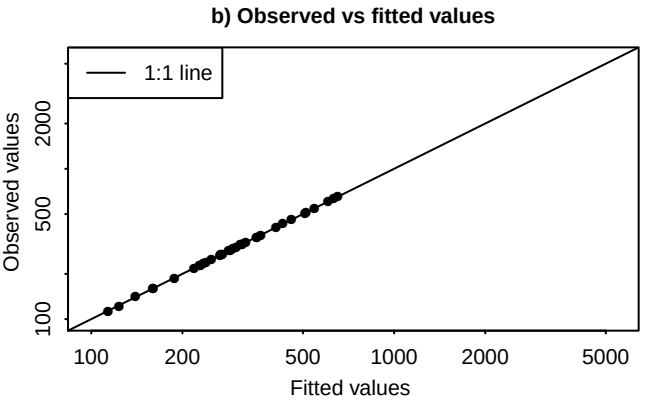


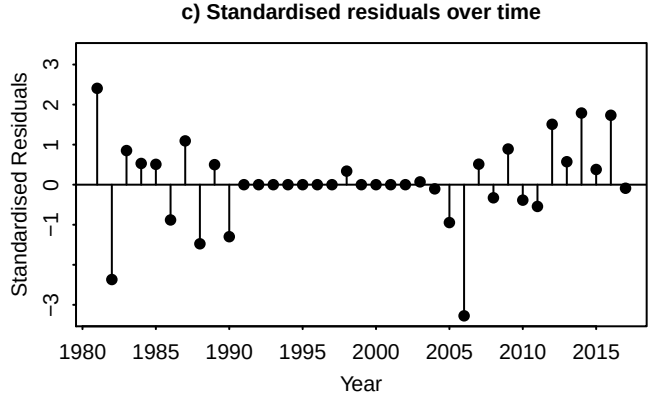


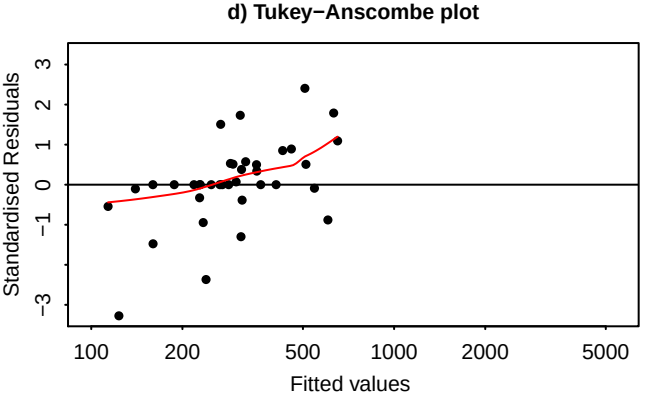


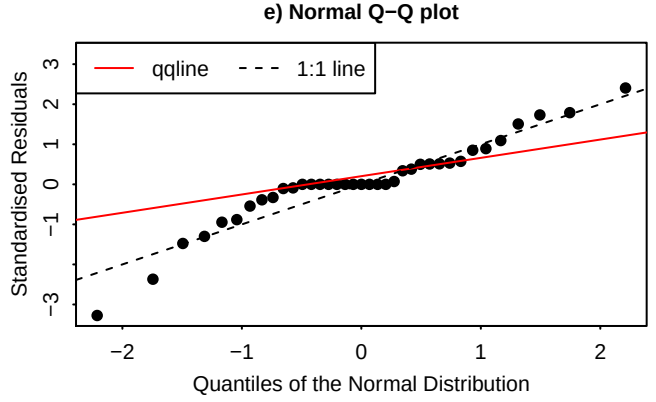
Turbot in IV Diagnostics − catch unique, age 4

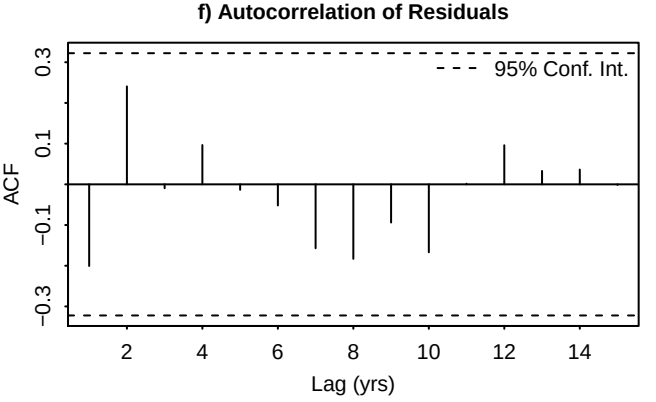




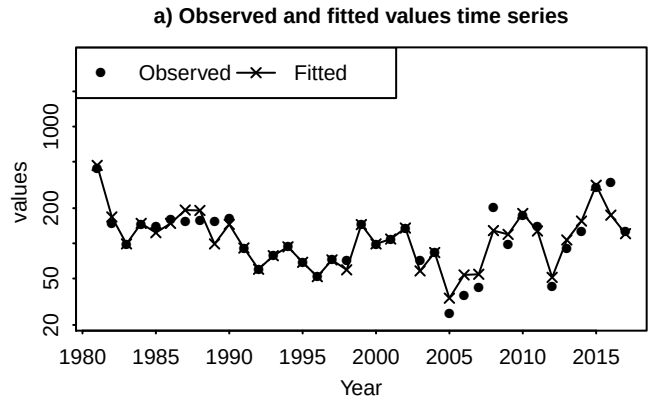


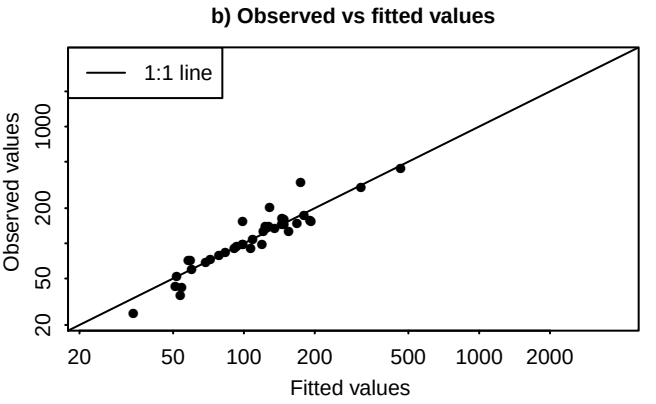


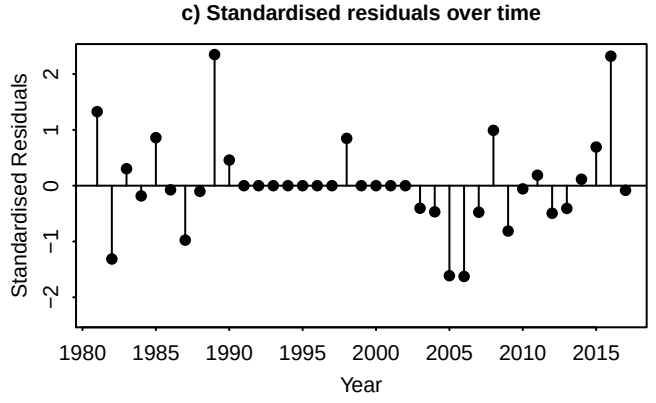


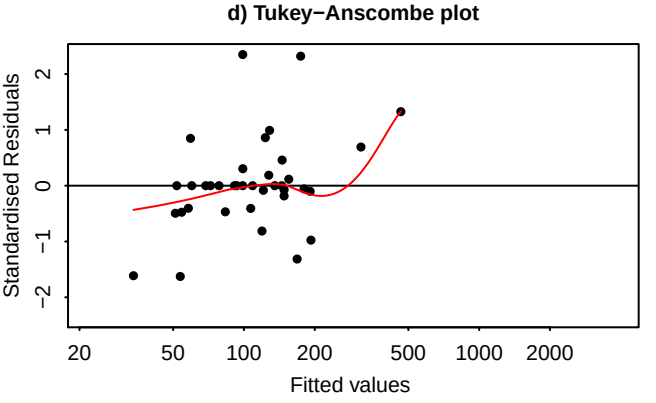


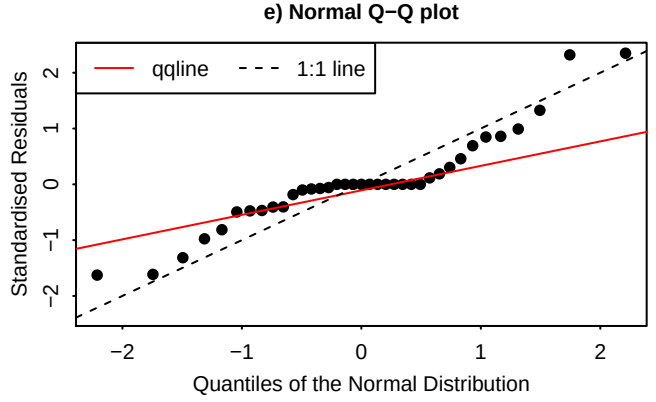
Turbot in IV Diagnostics − catch unique, age 5

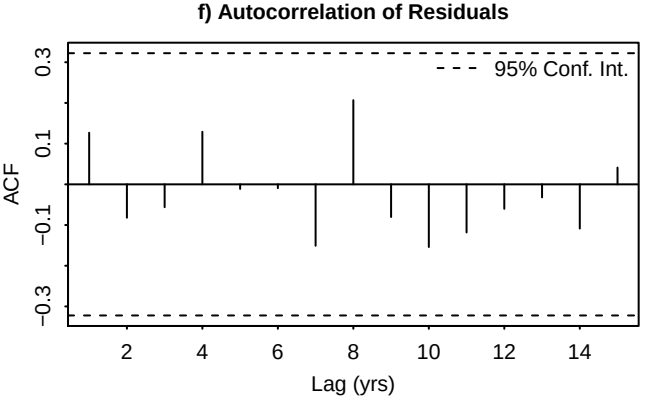


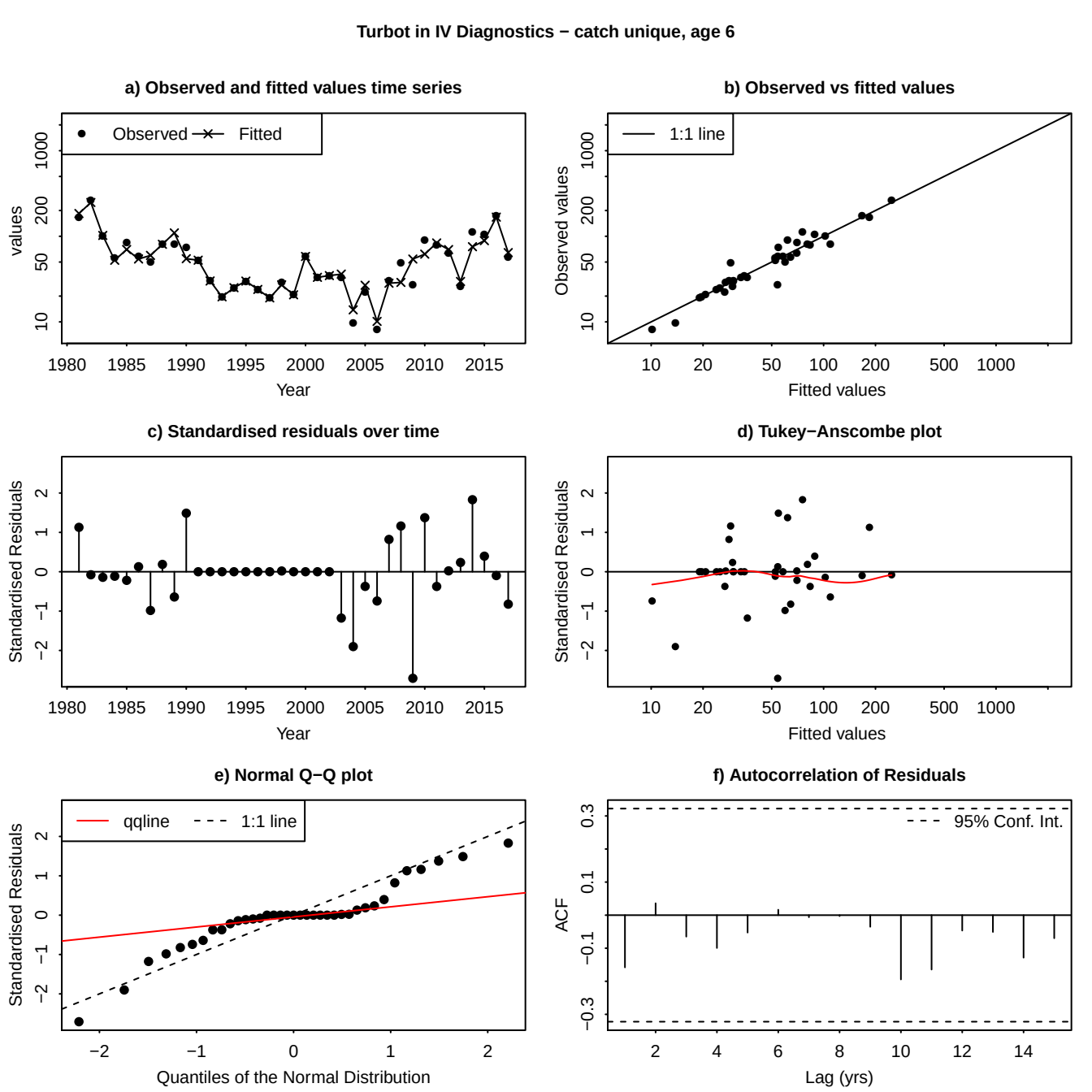




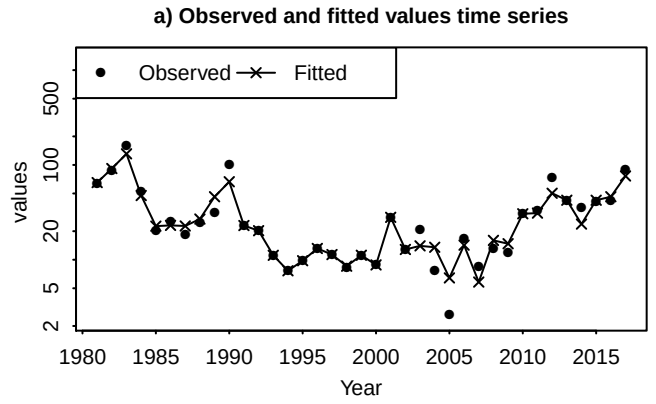


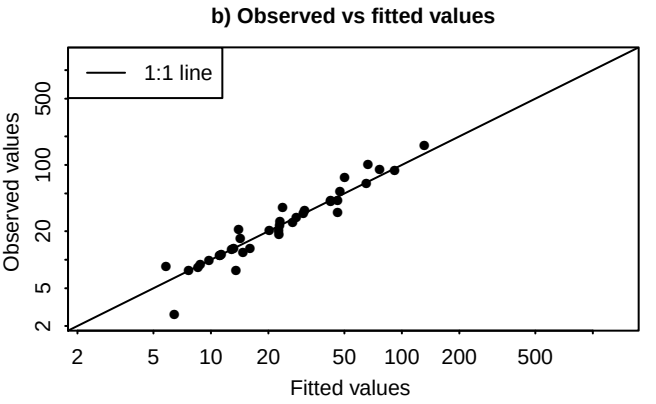


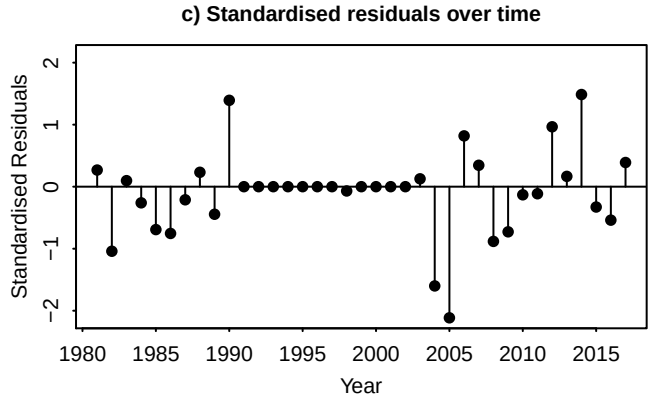


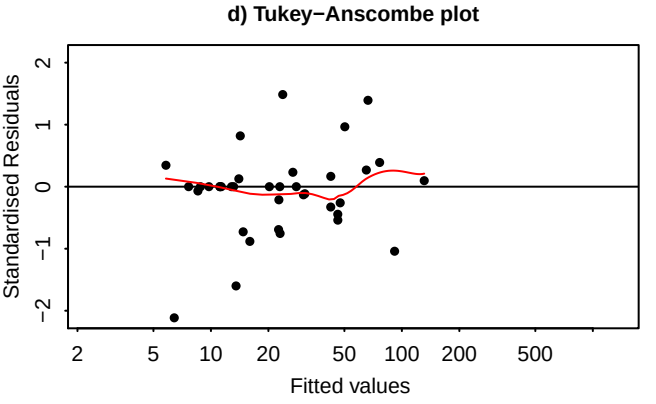

Turbot in IV Diagnostics − catch unique, age 6
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted 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)

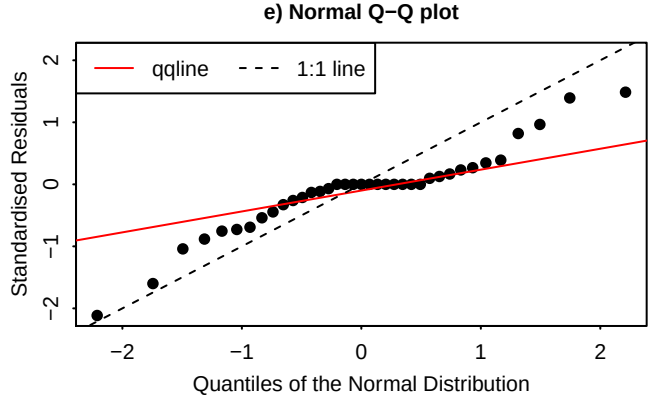
Turbot in IV Diagnostics − catch unique, age 7

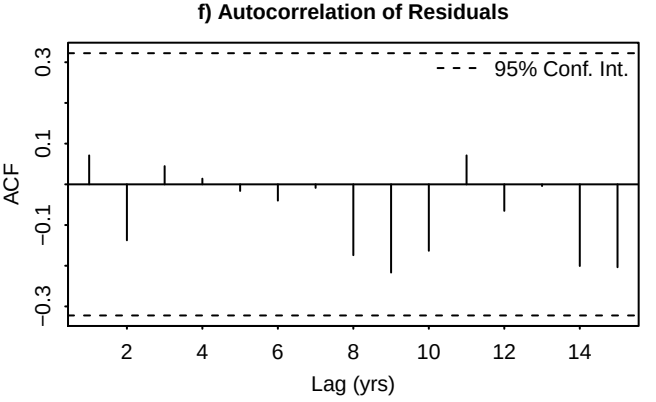




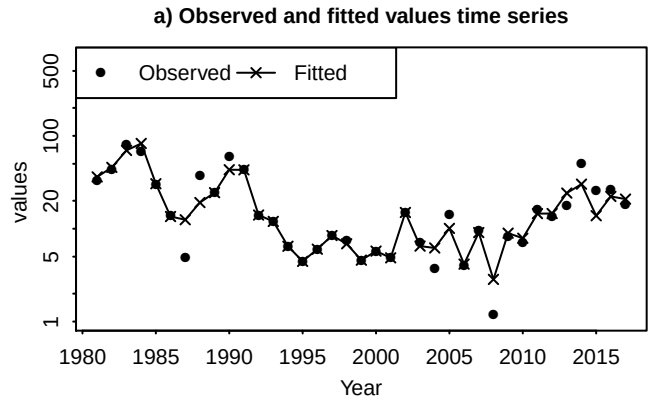


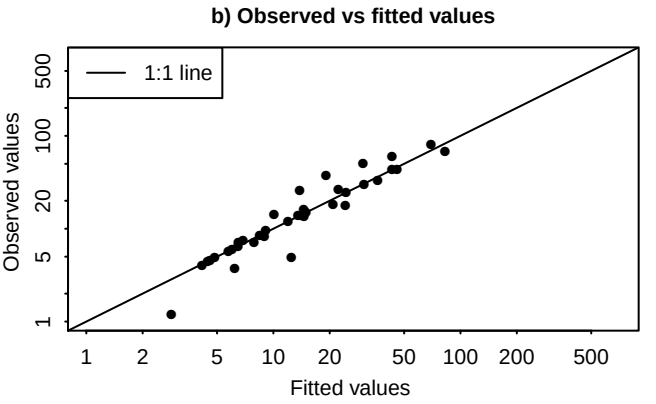


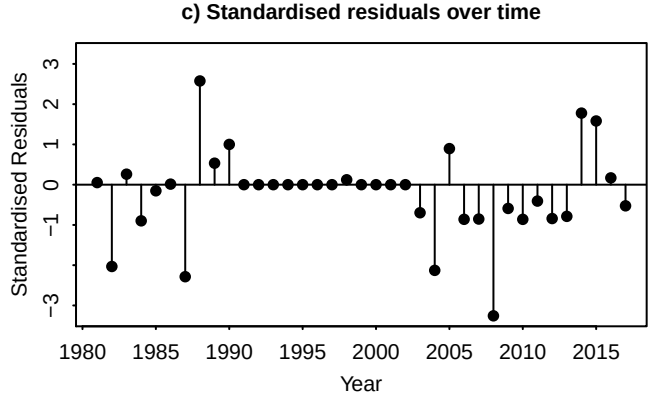


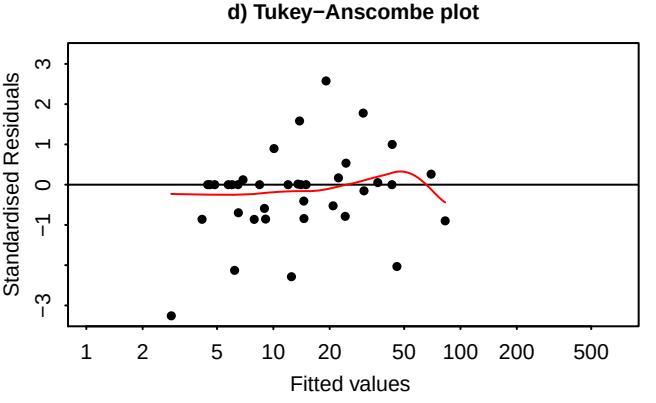


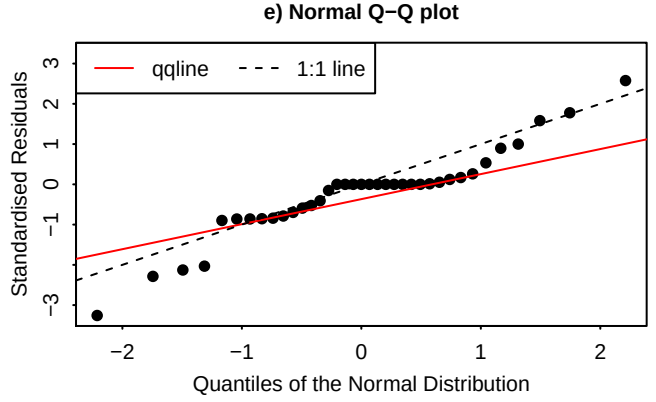
Turbot in IV Diagnostics − catch unique, age 8

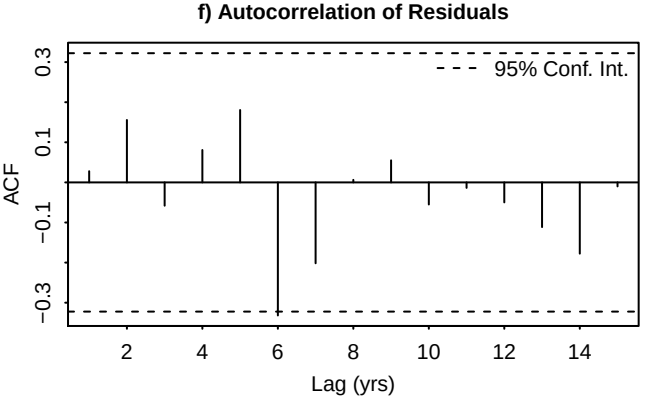




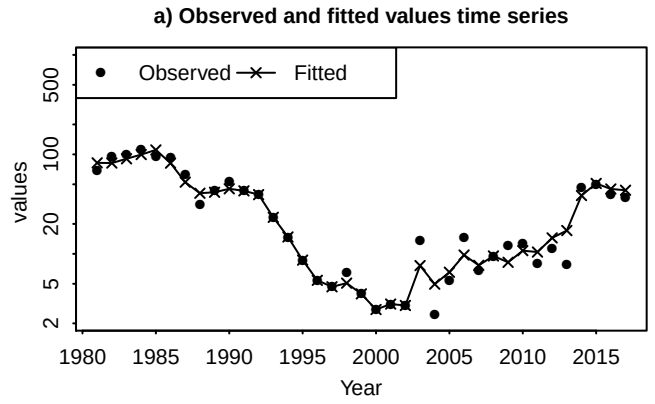


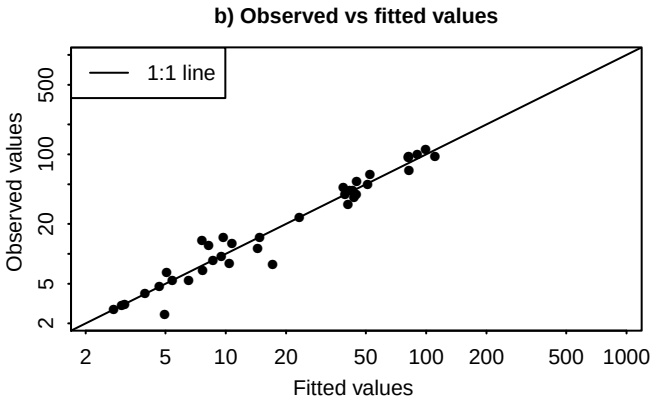


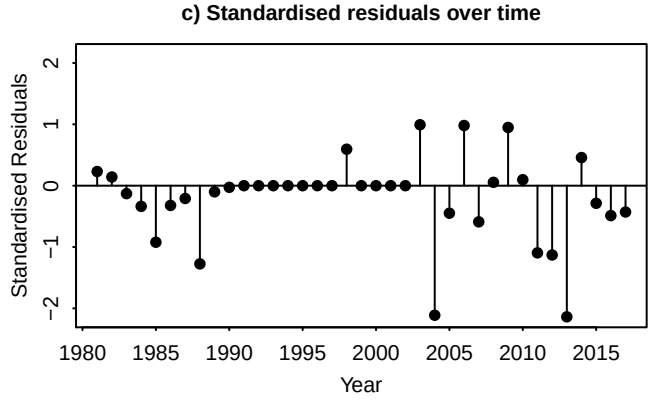


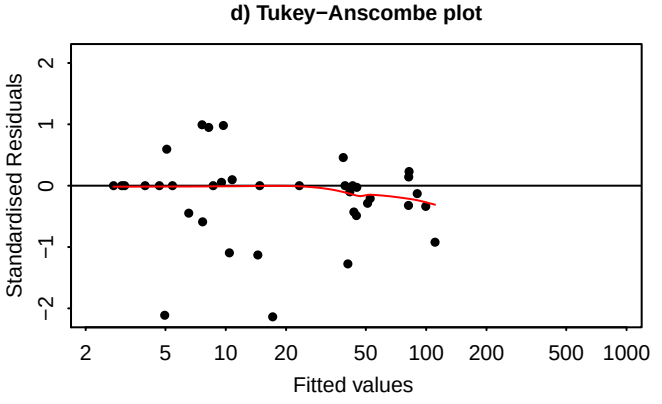


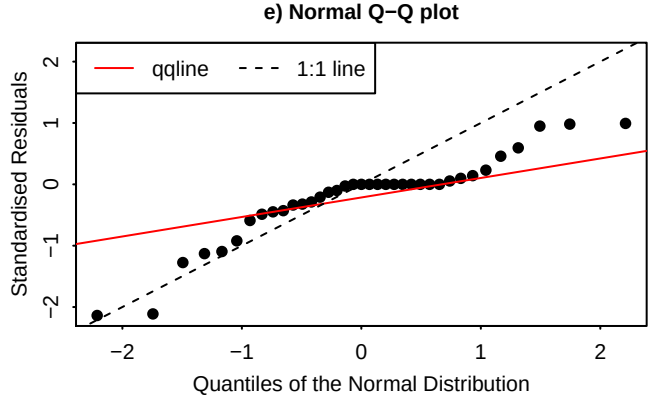
Turbot in IV Diagnostics − catch unique, age 9

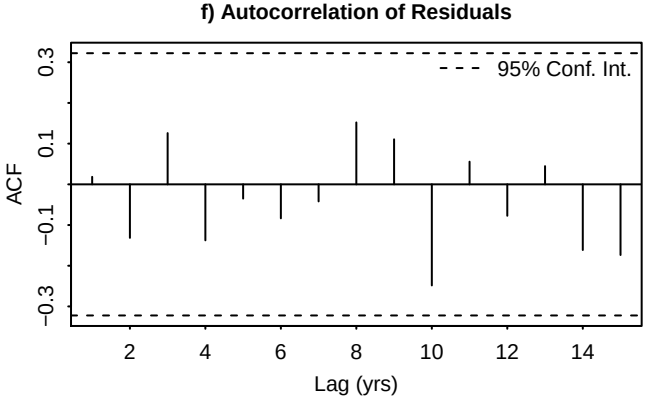


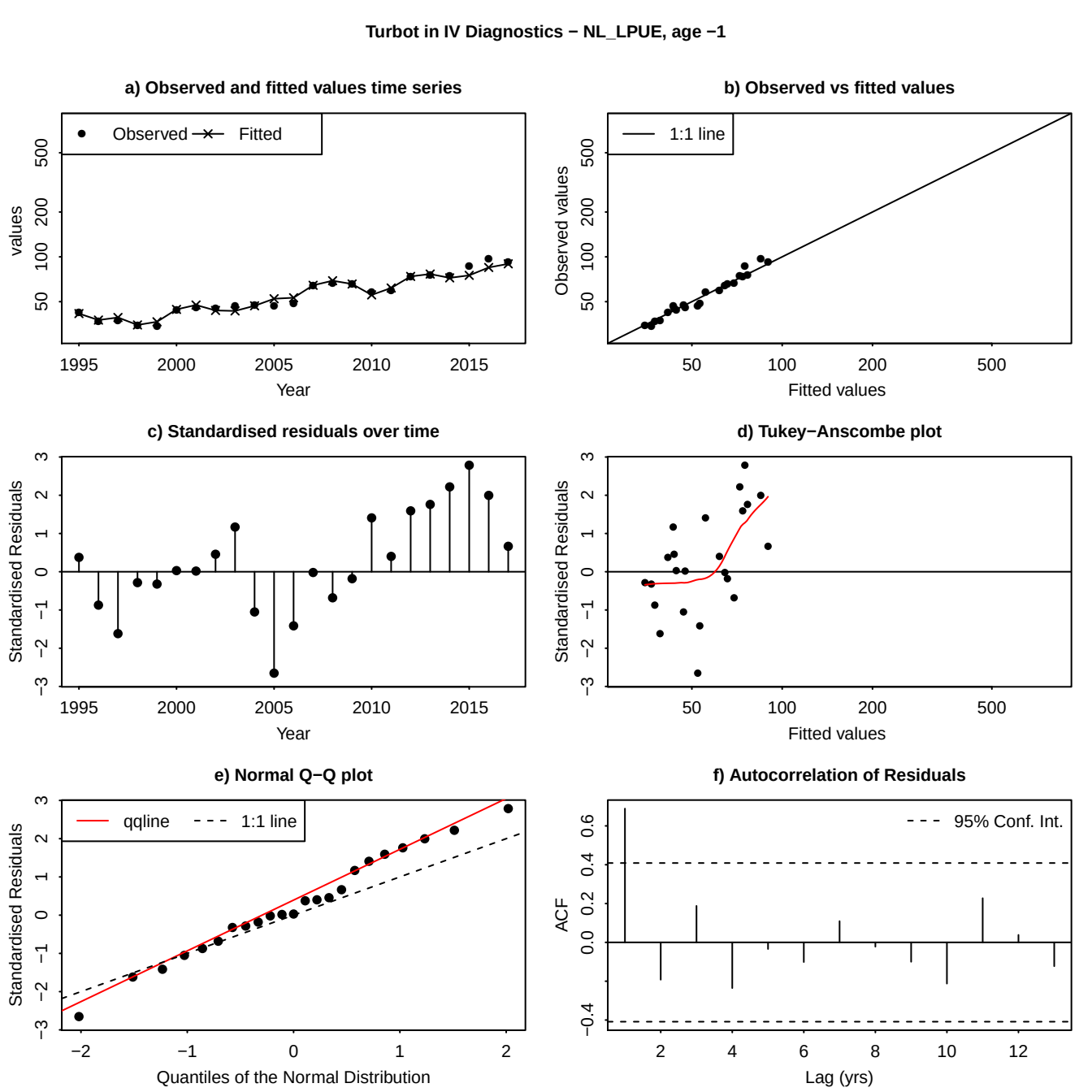


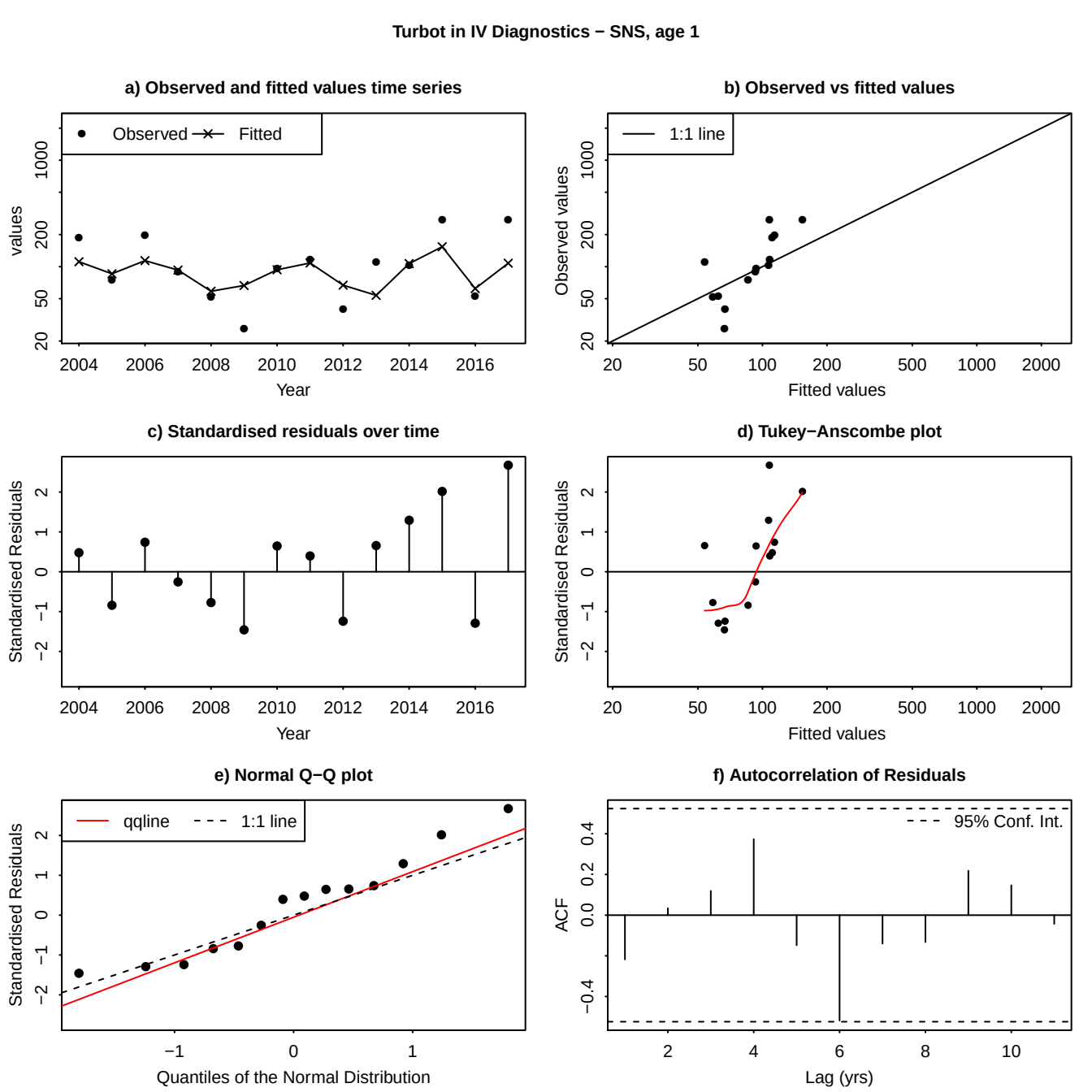




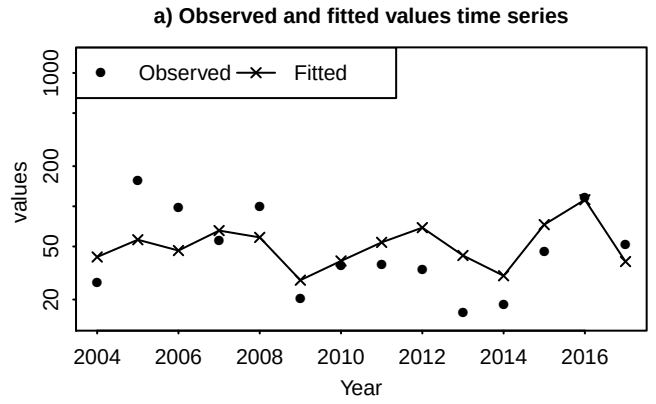


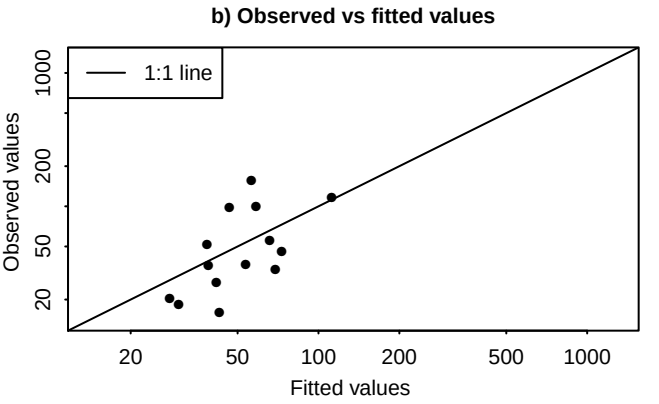


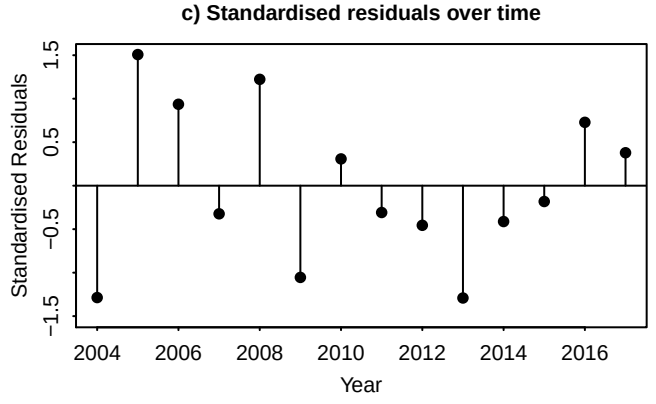

Turbot in IV Diagnostics − NL_LPUE, age −1
a) Observed and fitted values time series
Observed
Fitted
values
50
100
200
500
1995
2000
2005
2010
2015
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
−3
−2
−1
0
1
2
3
d) Tukey−Anscombe plot
e) Normal Q−Q plot
qqline
1:1 line
Quantiles of the Normal Distribution
f) Autocorrelation of Residuals
95% Conf. Int.
ACF
0.0
0.2
0.4
0.6
Lag (yrs)

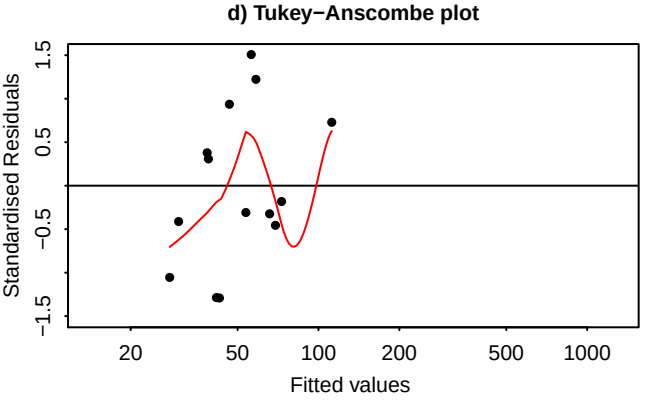

Turbot in IV Diagnostics − SNS, age 1
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) 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)

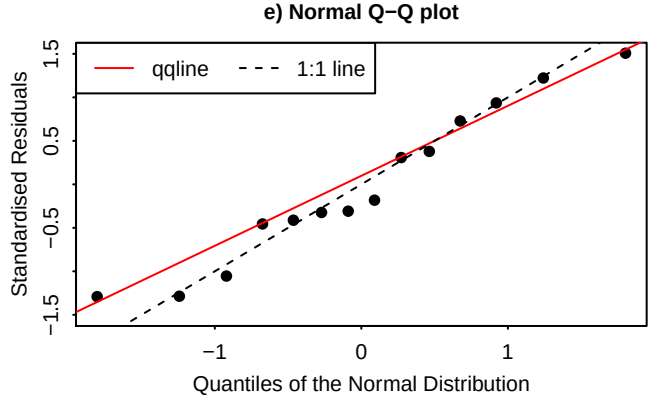
Turbot in IV Diagnostics − SNS, age 2

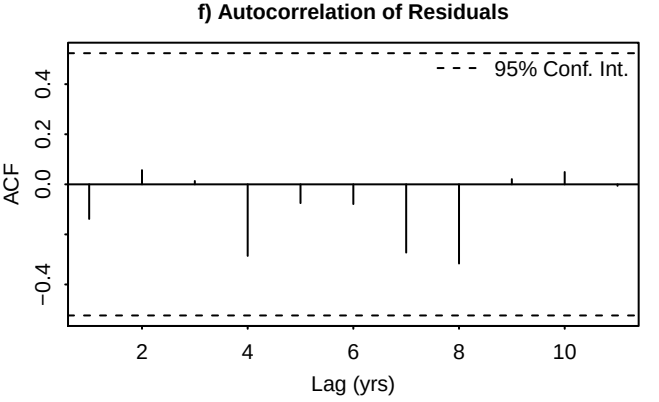


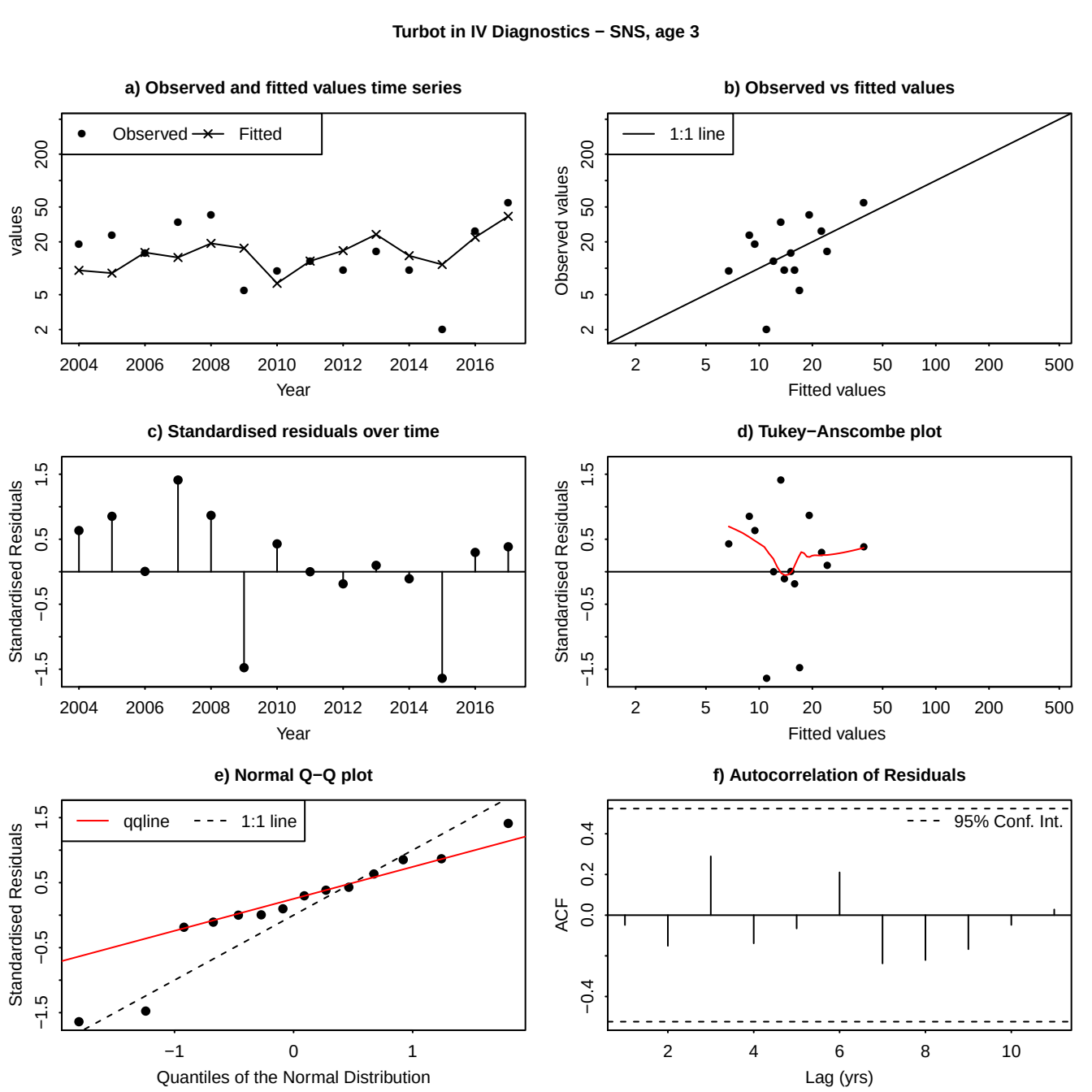


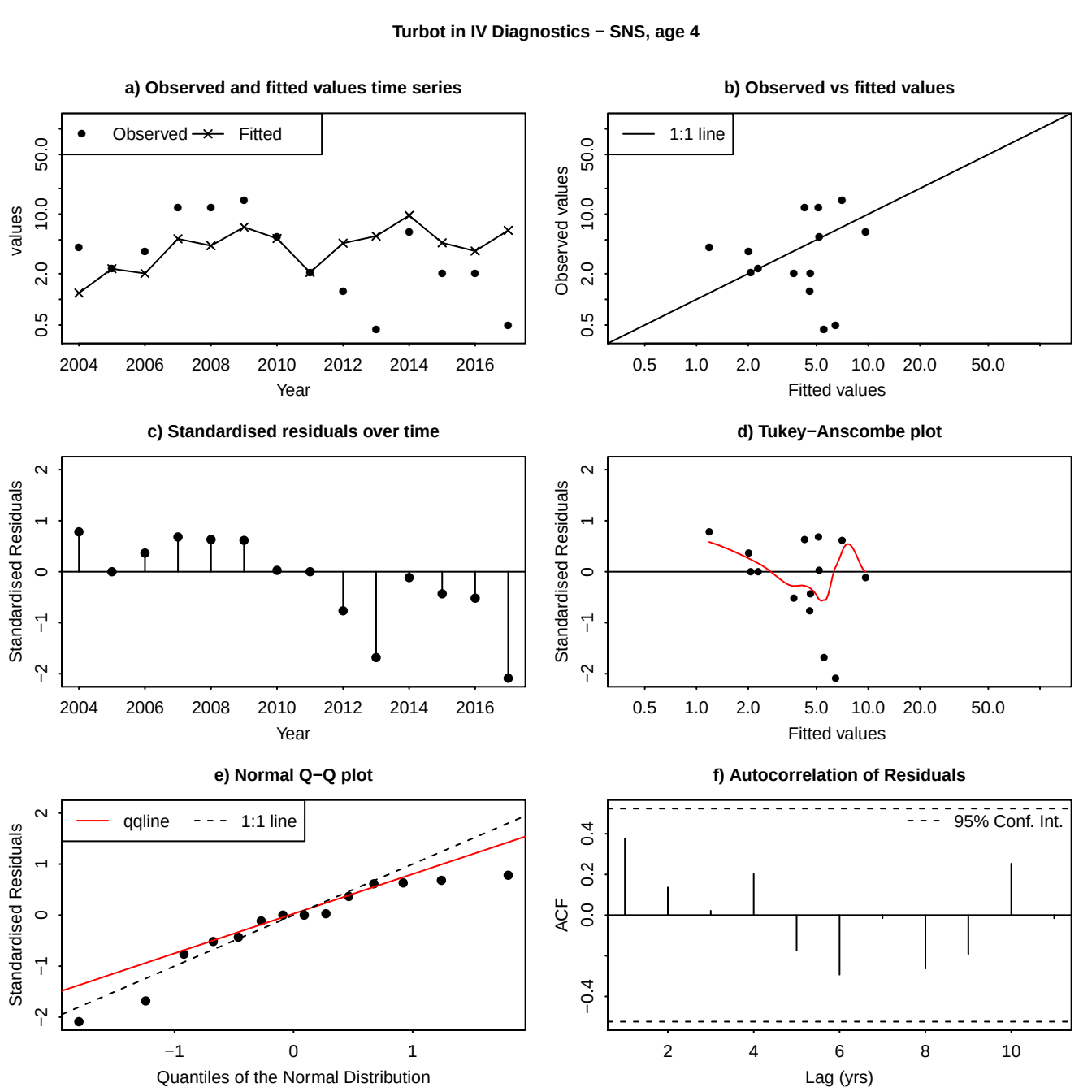


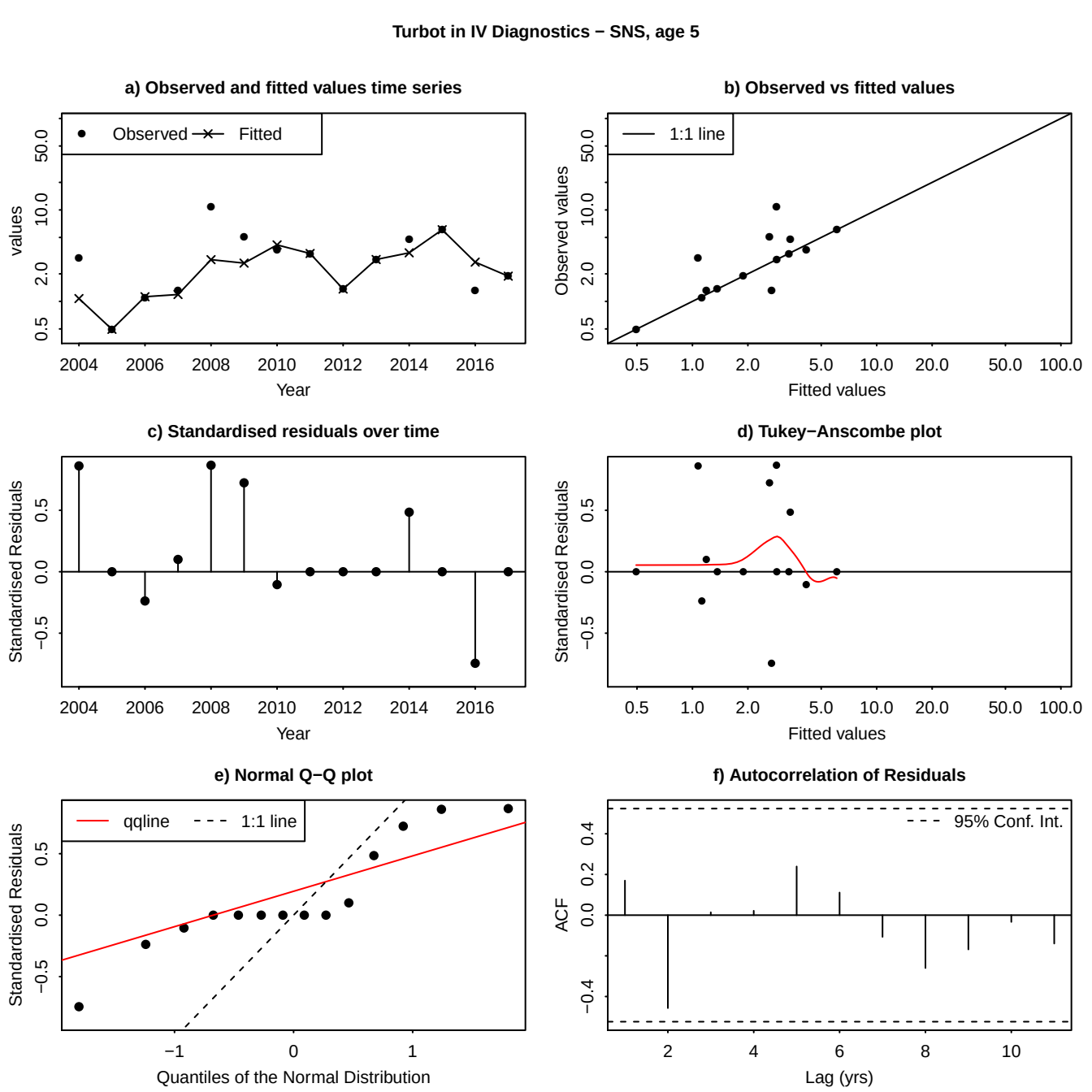


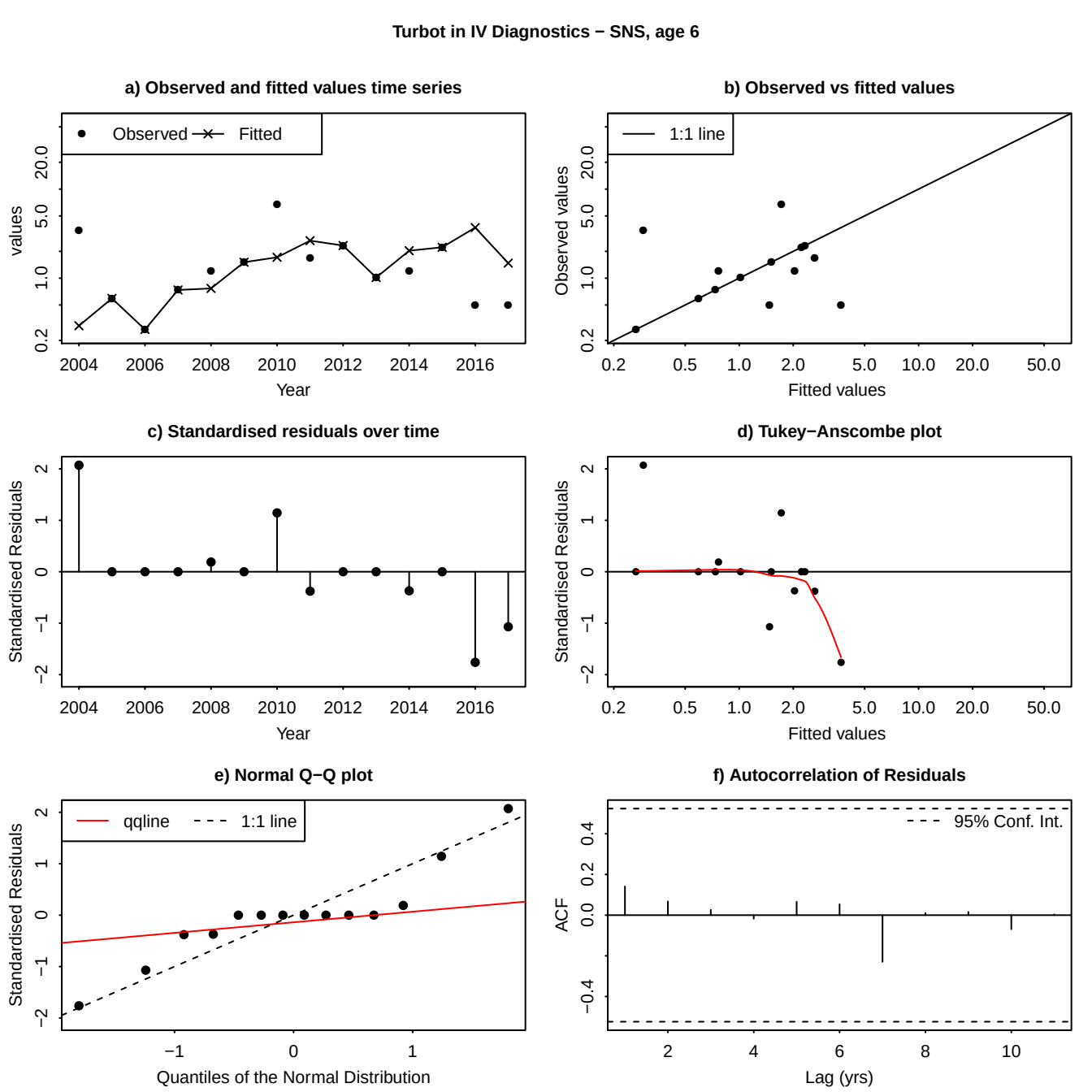


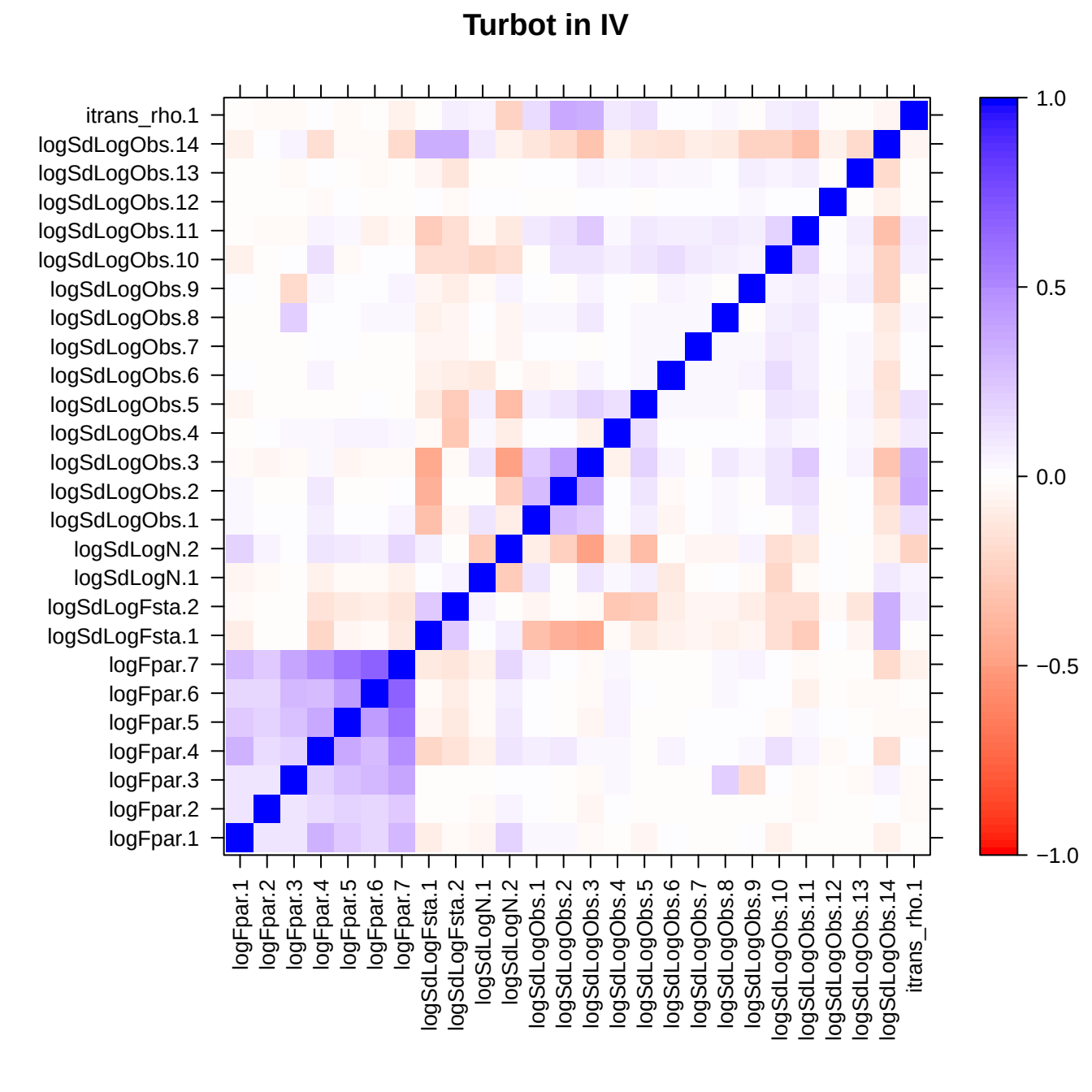


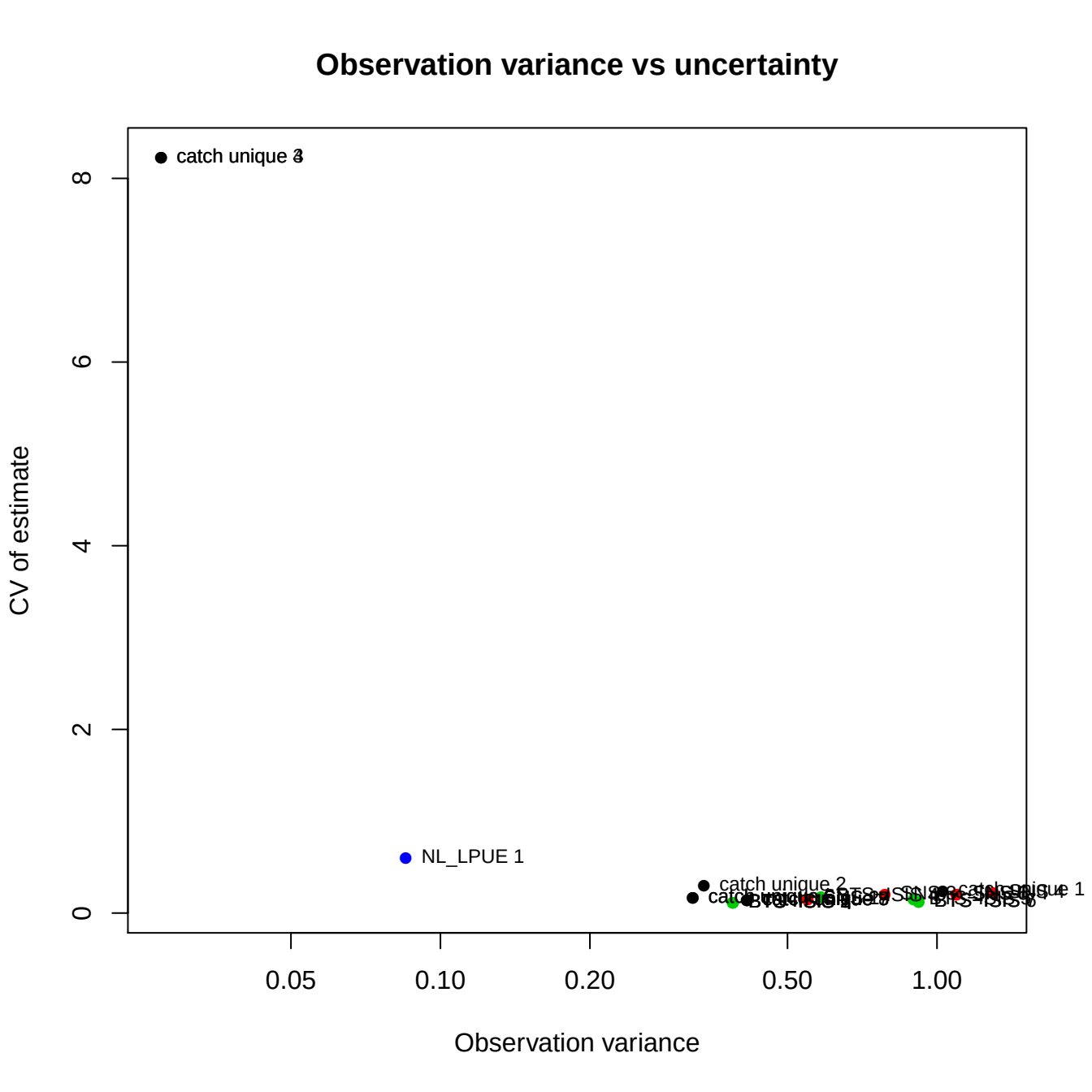

Turbot in IV Diagnostics − SNS, age 3
a) Observed and fitted values time series
Observed
Fitted
values
2
5
20
50
200
2004
2006
2008
2010
2012
2014
2016
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
−1.5
−0.5
0.5
1.5
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
−0.4
0.0
0.2
0.4
Lag (yrs)

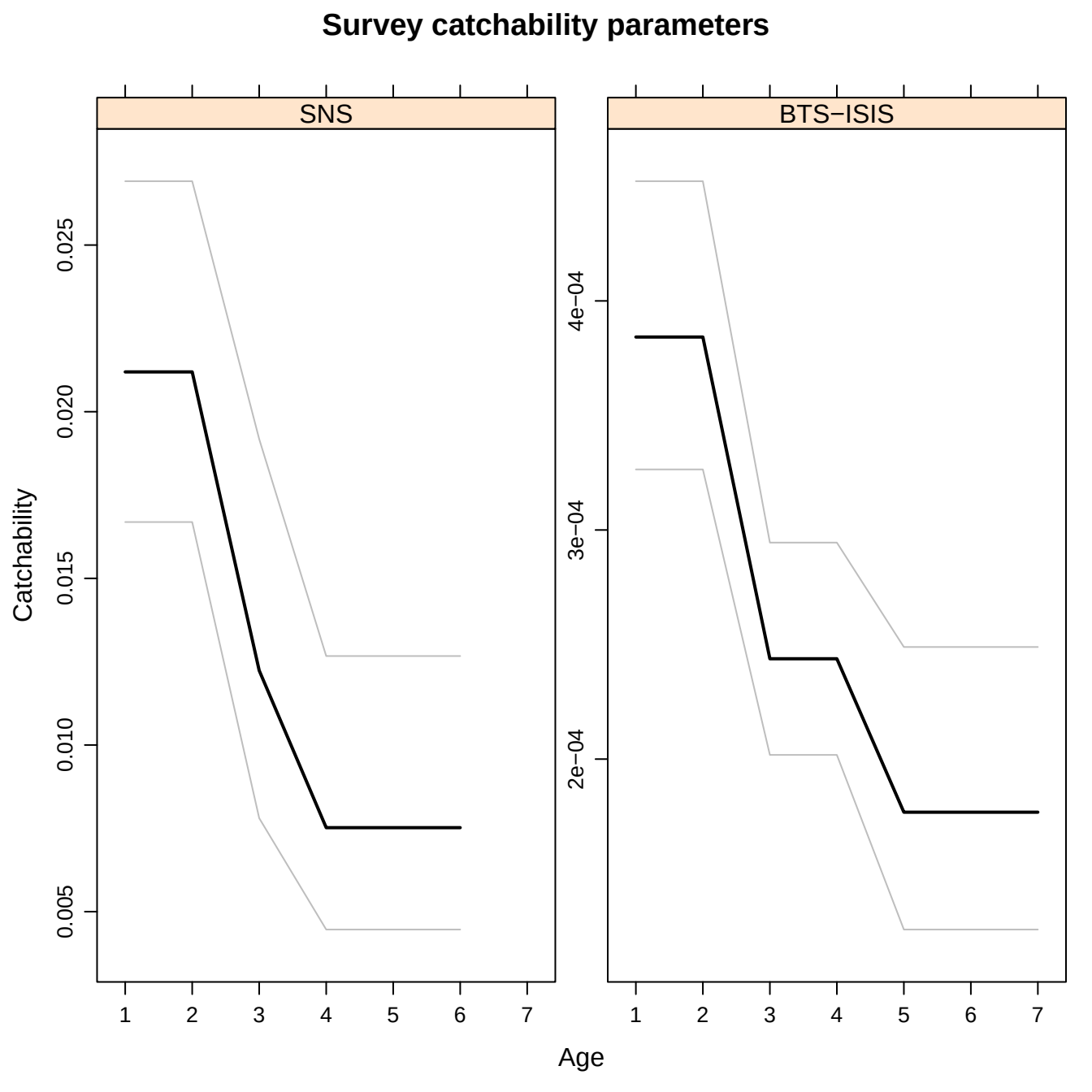

Turbot in IV Diagnostics − SNS, age 4
a) Observed and fitted values time series
Observed
Fitted
values
Year
b) Observed vs fitted values
1:1 line
Observed values
Fitted values
c) Standardised residuals over time
Standardised Residuals
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) 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)

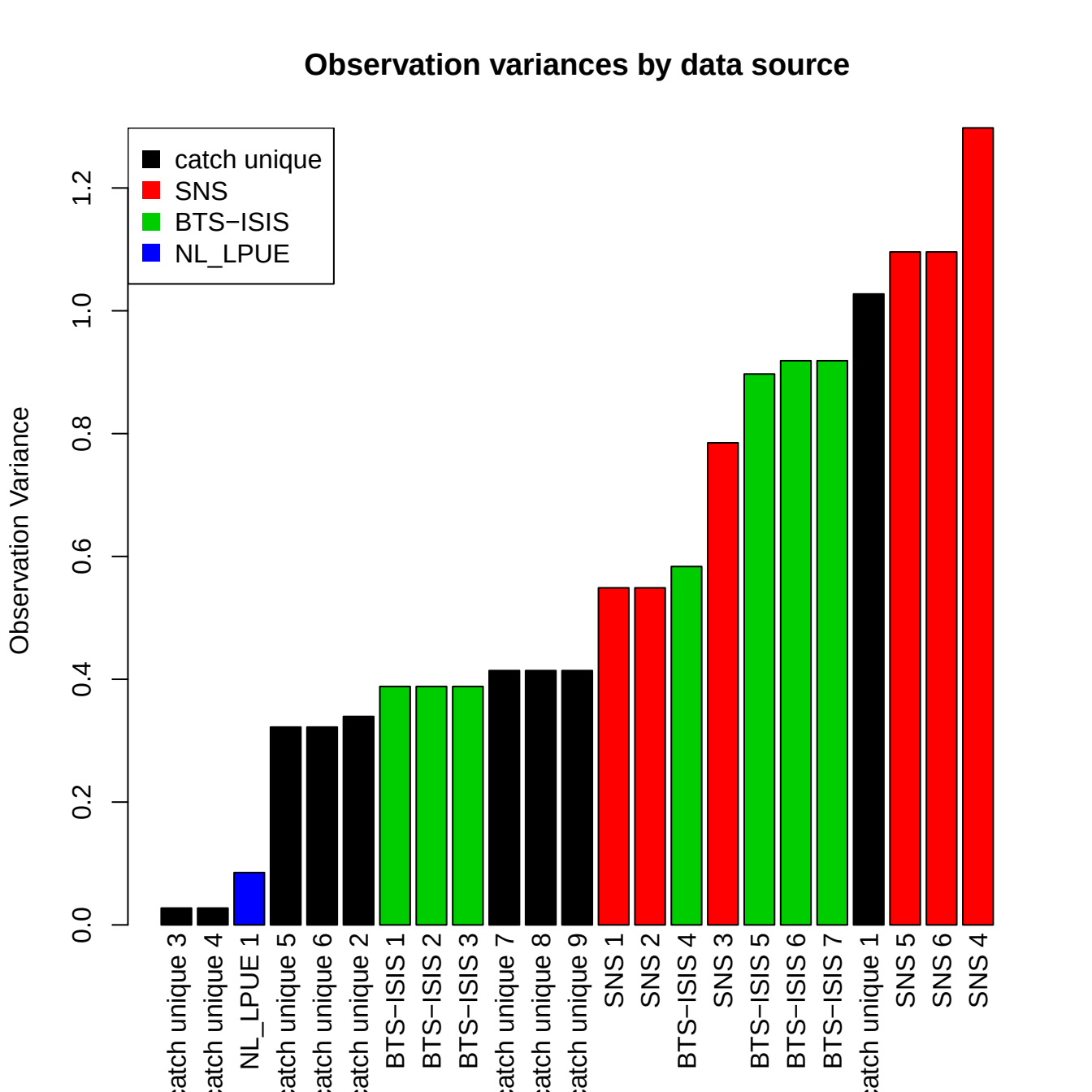

Turbot in IV Diagnostics − SNS, age 5
a) Observed and fitted values time series
Observed
Fitted
values
0.5
2.0
10.0
50.0
2004
2006
2008
2010
2012
2014
2016
Year
b) Observed vs fitted values
1:1 line
Observed values
0.5
1.0
2.0
5.0
10.0
20.0
50.0
100.0
Fitted values
c) Standardised residuals over time
Standardised Residuals
−0.5
0.0
0.5
Year
d) Tukey−Anscombe plot
Standardised Residuals
Fitted values
e) Normal Q−Q plot
qqline
1:1 line
Standardised Residuals
−1
0
1
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)

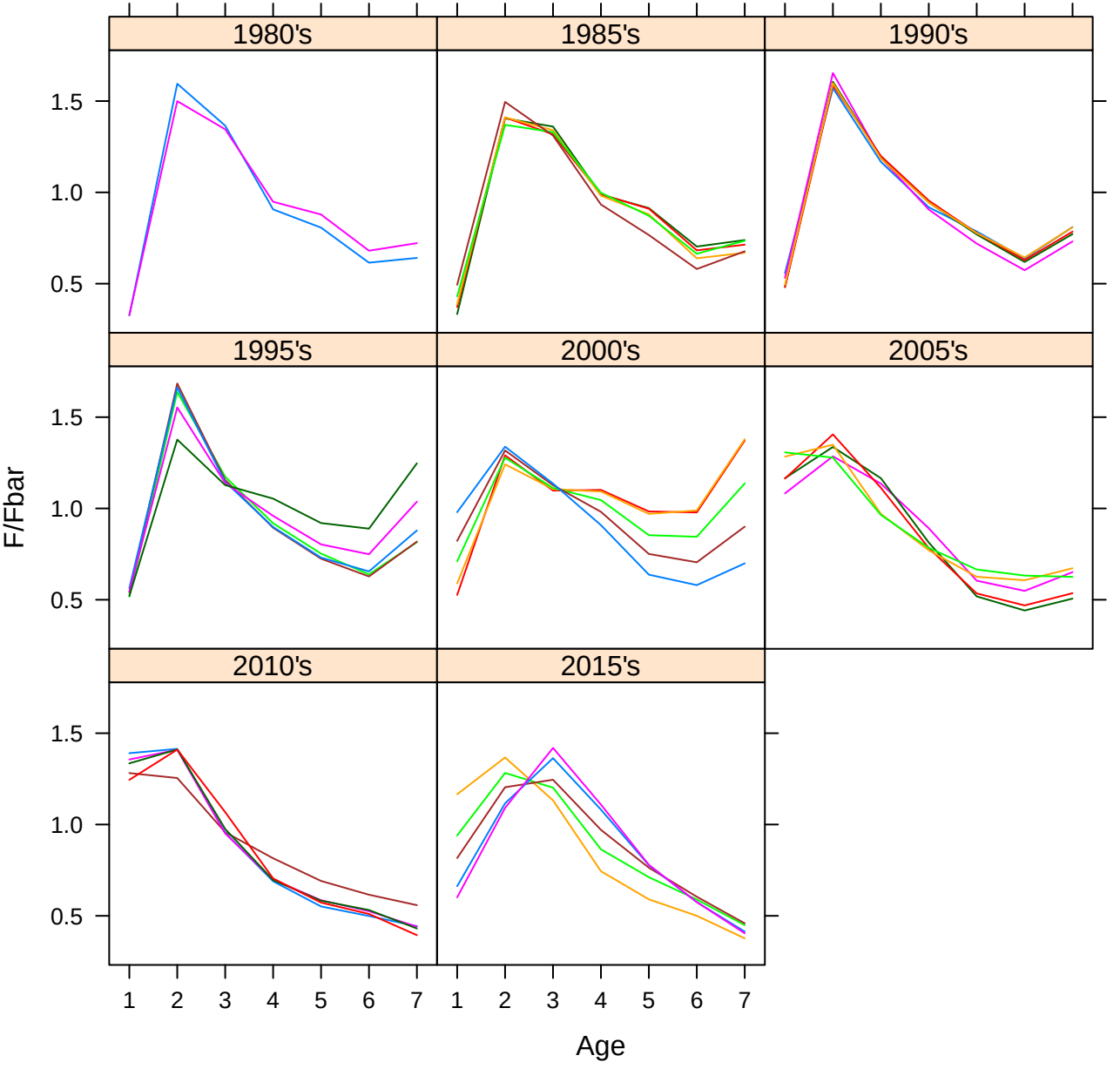

Turbot in IV Diagnostics − SNS, age 6
a) Observed and fitted values time series
Observed
Fitted
values
20.0
5.0
1.0
0.2
2004
2006
2008
2010
2012
2014
2016
Year
b) Observed vs fitted values
1:1 line
Observed values
20.0
5.0
1.0
0.2
0.2
0.5
1.0
2.0
5.0
10.0
20.0
50.0
Fitted values
c) Standardised residuals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

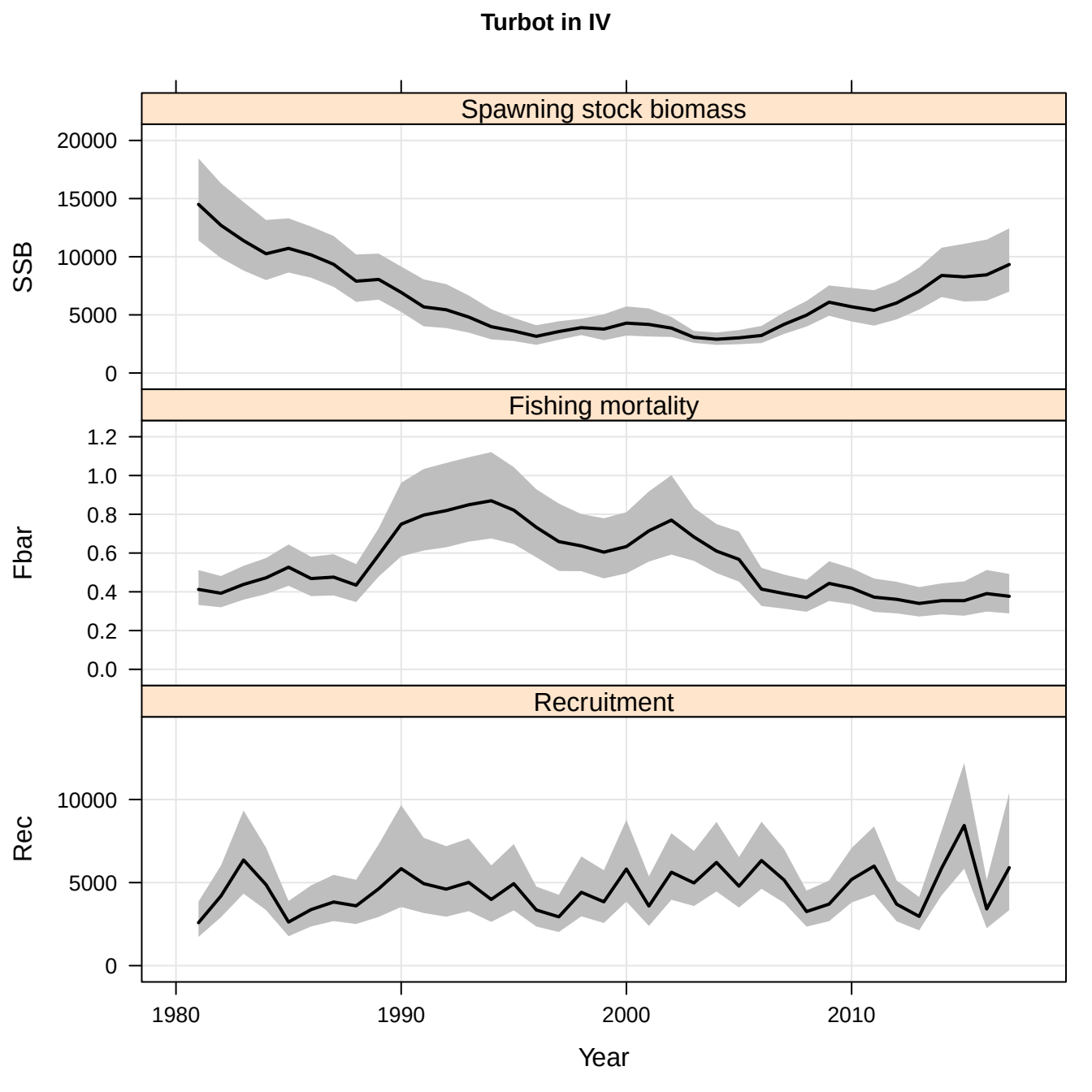

Turbot in IV
itrans_rho.1
logSdLogObs.14
logSdLogObs.13
logSdLogObs.12
logSdLogObs.11
logSdLogObs.10
logSdLogObs.9
logSdLogObs.8
logSdLogObs.7
logSdLogObs.6
logSdLogObs.5
logSdLogObs.4
logSdLogObs.3
logSdLogObs.2
logSdLogObs.1
logSdLogN.2
logSdLogN.1
logSdLogFsta.2
logSdLogFsta.1
logFpar.7
logFpar.6
logFpar.5
logFpar.4
logFpar.3
logFpar.2
logFpar.1
logFpar.1
logFpar.2
logFpar.3
logFpar.4
logFpar.5
logFpar.6
logFpar.7
logSdLogFsta.1
logSdLogFsta.2
logSdLogN.1
logSdLogN.2
logSdLogObs.1
logSdLogObs.2
logSdLogObs.3
logSdLogObs.4
logSdLogObs.5
logSdLogObs.6
logSdLogObs.7
logSdLogObs.8
logSdLogObs.9
logSdLogObs.10
logSdLogObs.11
logSdLogObs.12
logSdLogObs.13
logSdLogObs.14
itrans_rho.1
1.0
0.5
0.0
−0.5
−1.0

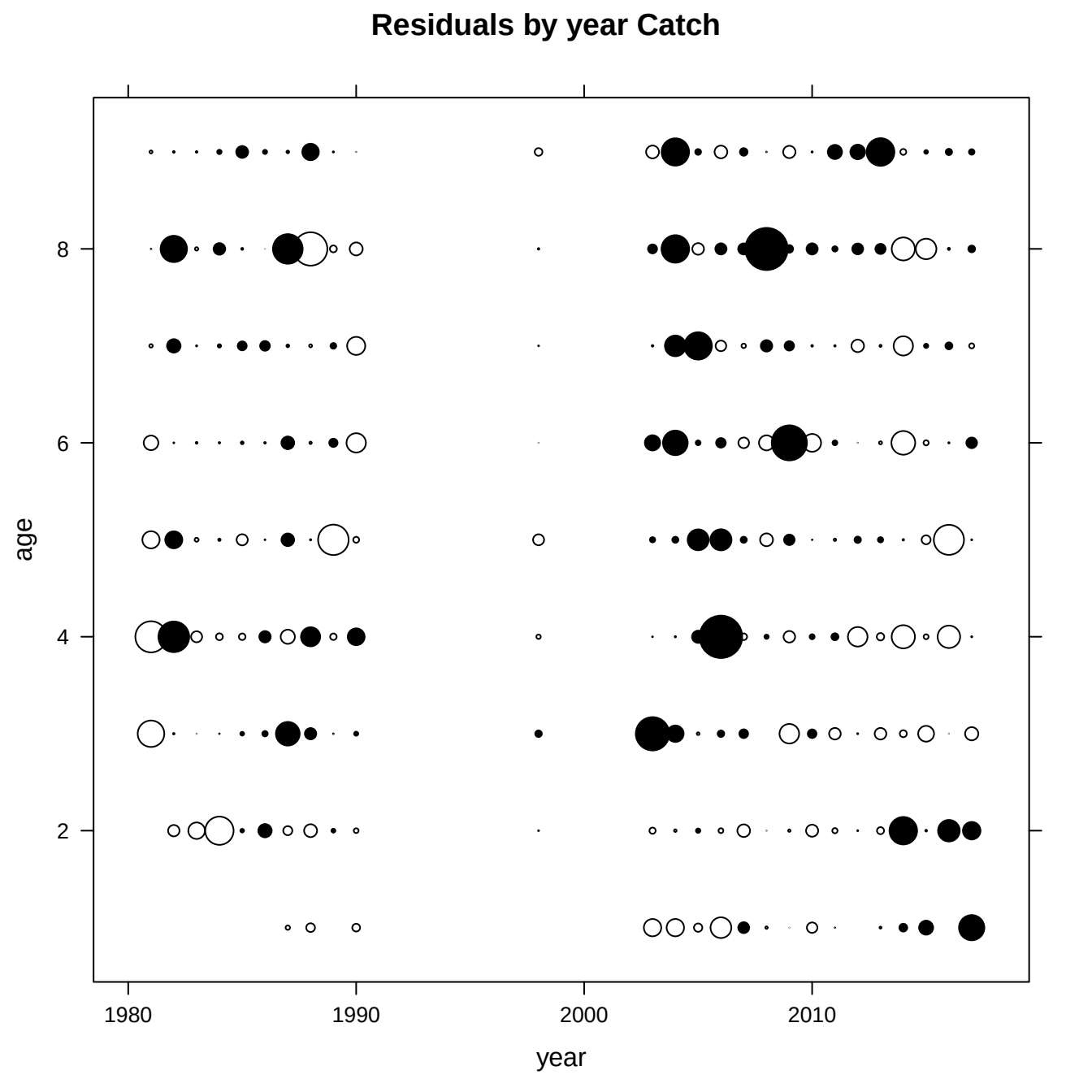

Observation variance vs uncertainty
CV of estimate
Observation variance
0
2
4
6
8
0.05
0.10
0.20
0.50
1.00
catch unique 3
NL_LPUE 1
catch unique 2

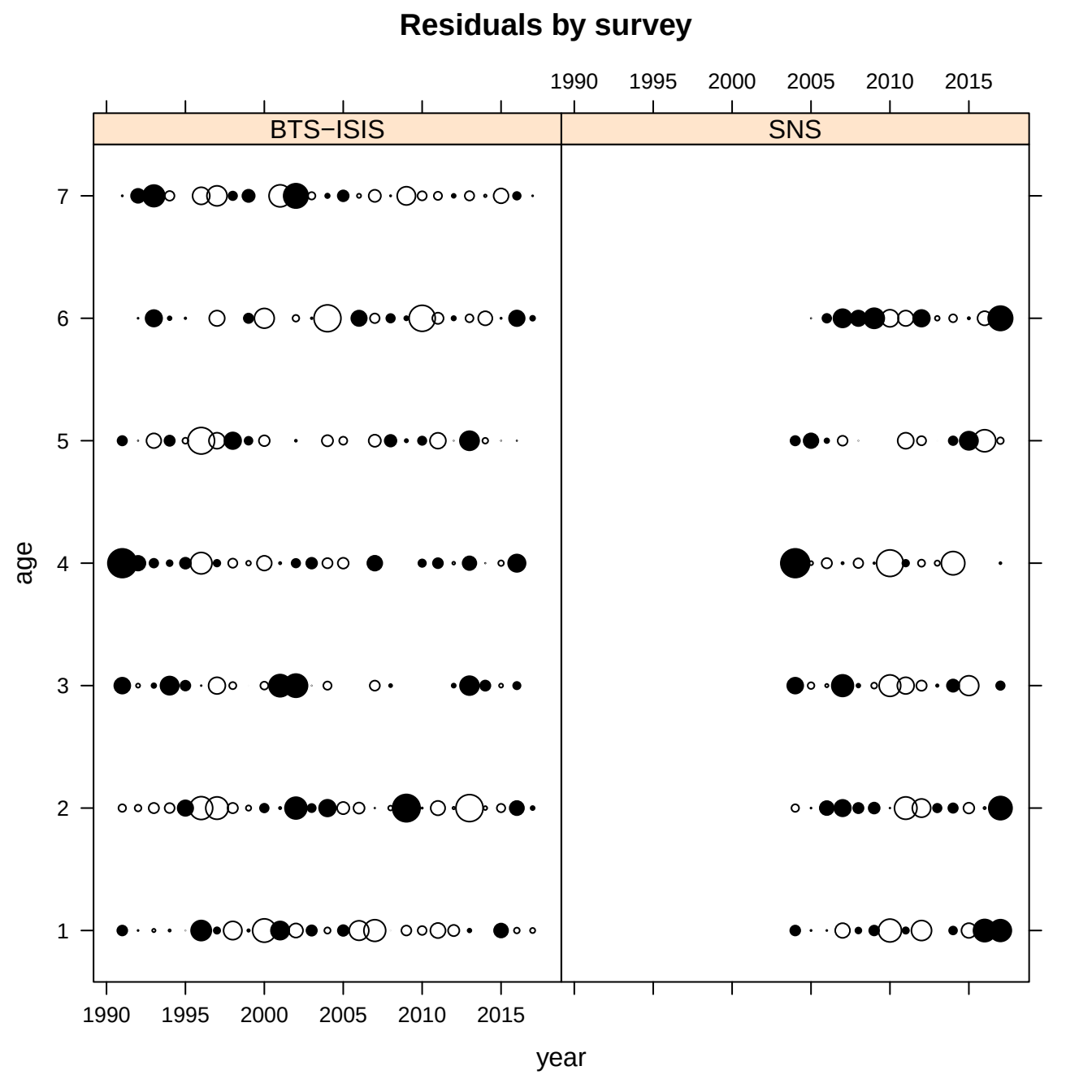

Survey catchability parameters
SNS
BTS−ISIS
Catchability
0.005
0.010
0.015
0.020
0.025
2e−04
3e−04
4e−04
1
2
3
4
5
6
7
Age

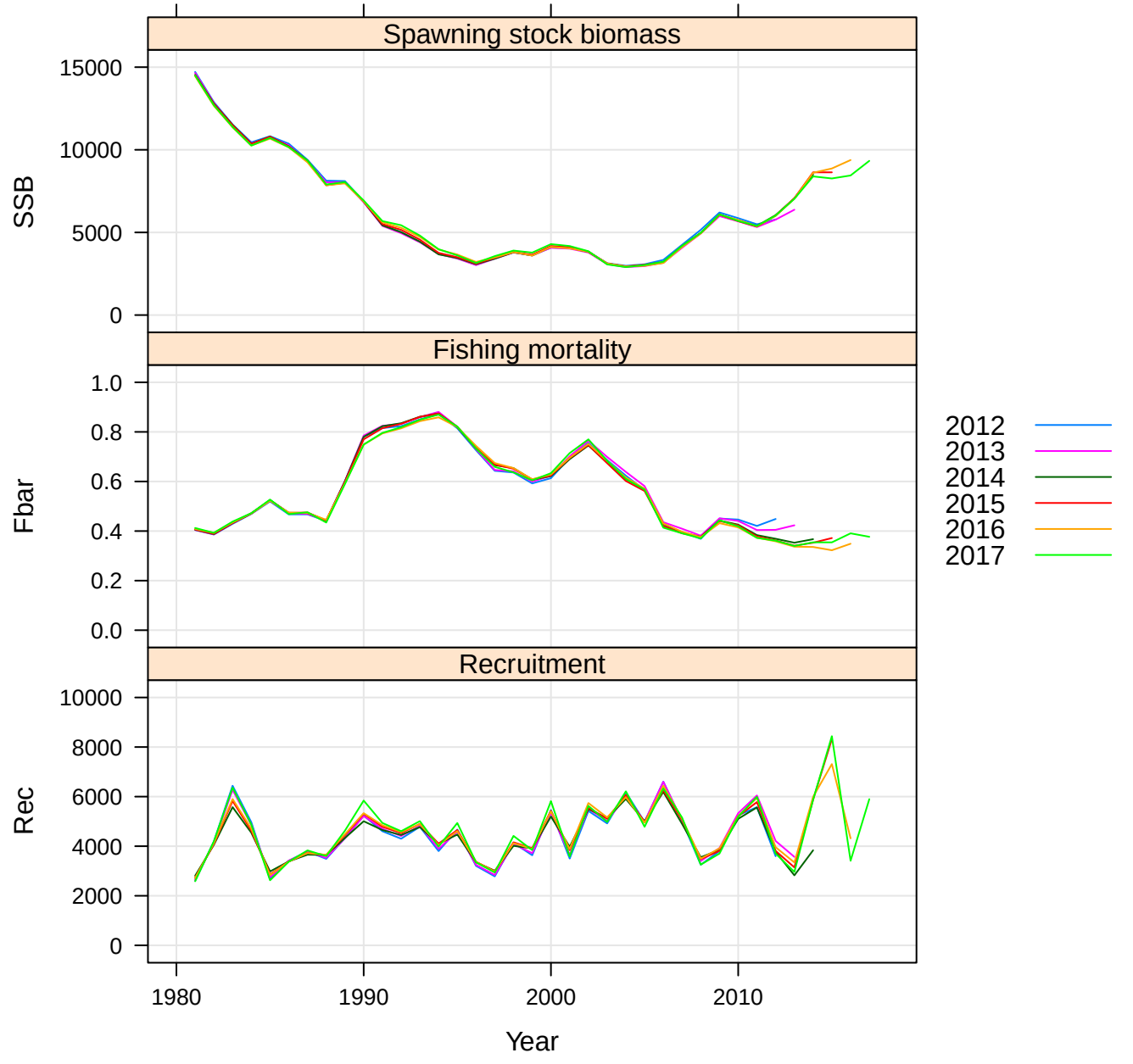

Observation variances by data source
Observation Variance
0.0
0.2
0.4
0.6
0.8
1.0
1.2
catch unique
SNS
BTS−ISIS
NL_LPUE
catch unique 3
catch unique 4
NL_LPUE 1
catch unique 5
catch unique 6
catch unique 2
BTS−ISIS 1
BTS−ISIS 2
BTS−ISIS 3
catch unique 7
catch unique 8
catch unique 9
SNS 1
SNS 2
BTS−ISIS 4
SNS 3
BTS−ISIS 5
BTS−ISIS 6
BTS−ISIS 7
catch unique 1
SNS 5
SNS 6
SNS 4

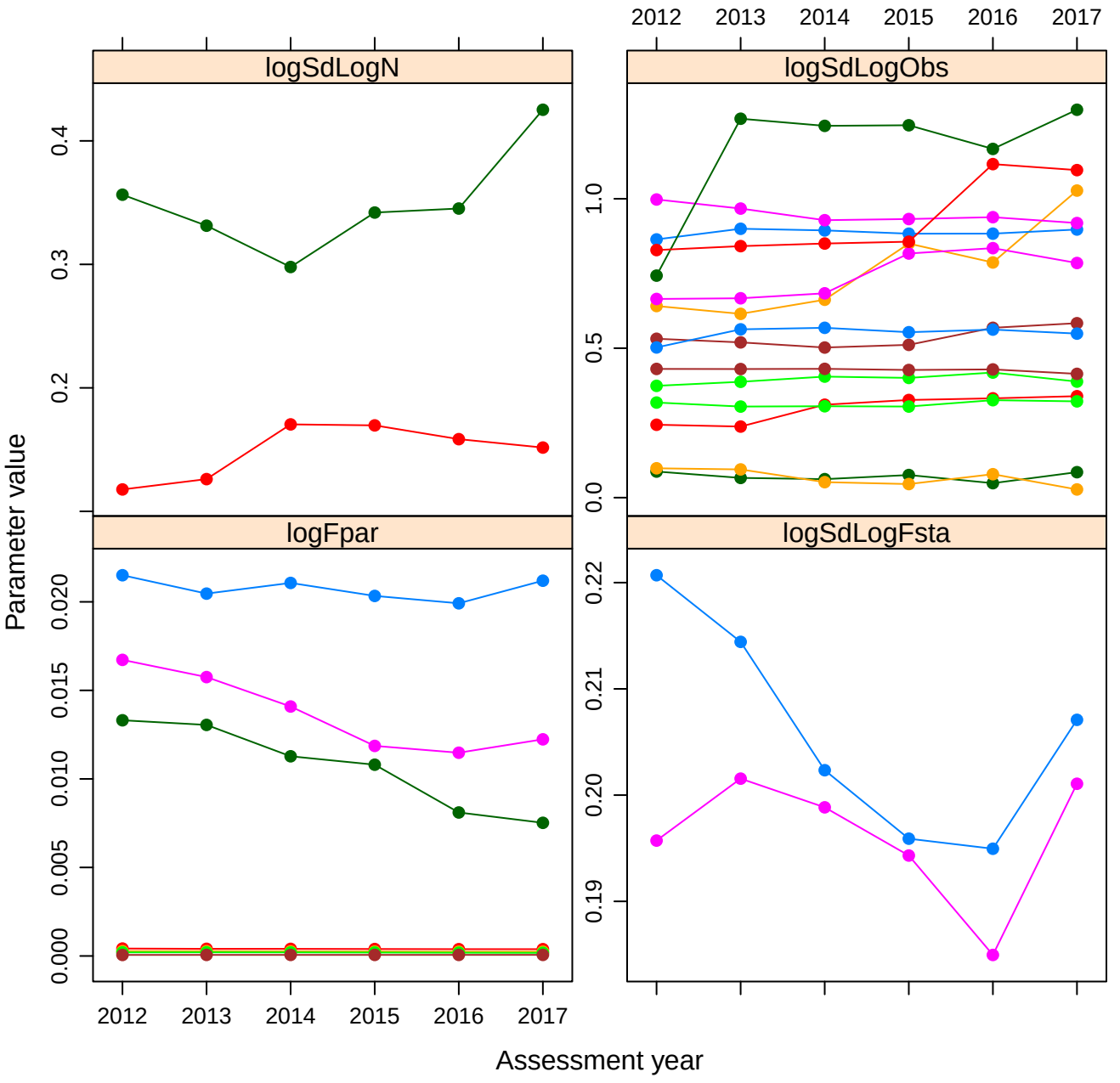

Selectivity of the Fishery by Pentad
1980's
1985's
1990's
1995's
2000's
2005's
2010's
2015's
F/Fbar
0.5
1.0
1.5
1
2
3
4
5
6
7
Age

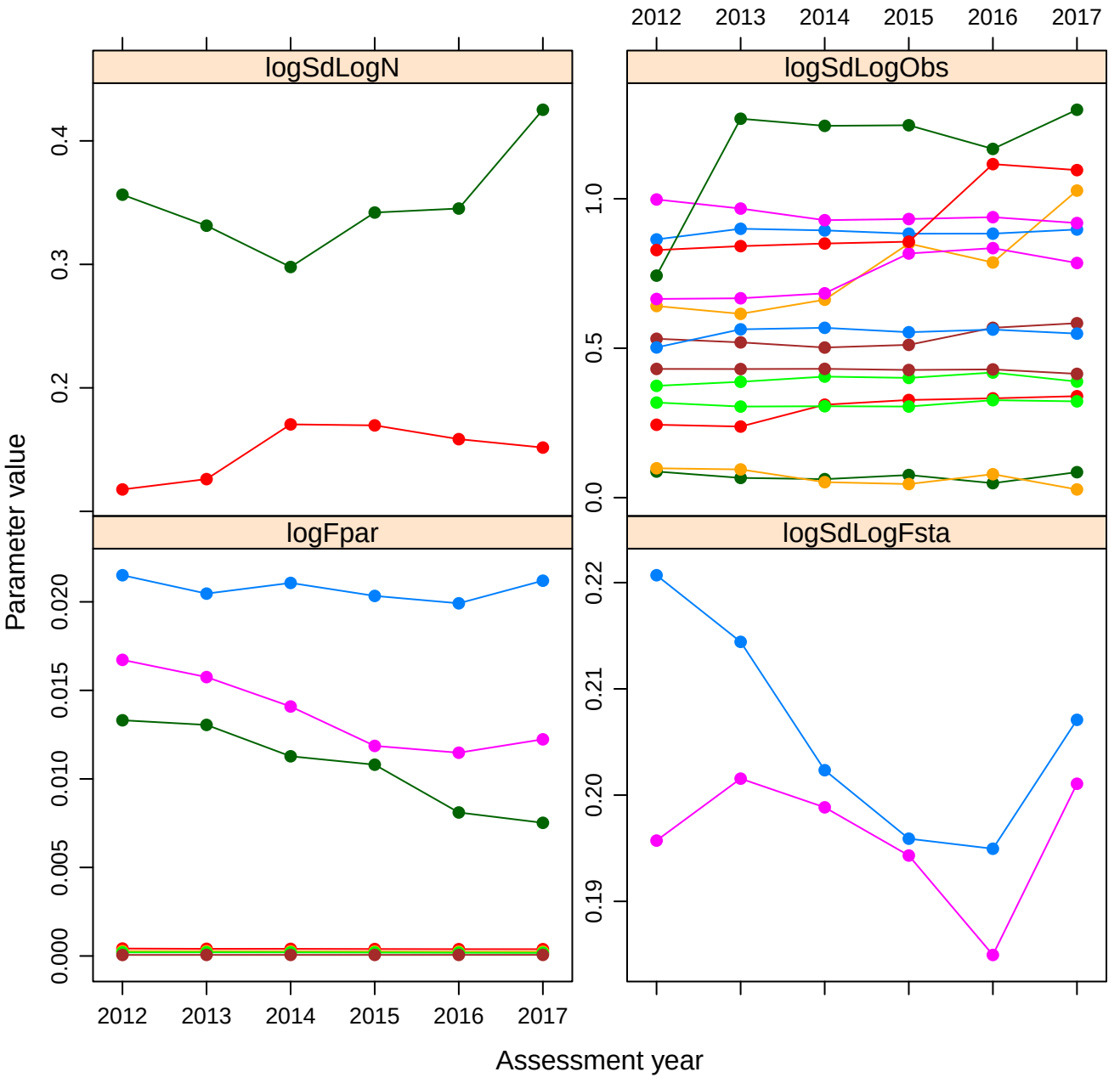

Turbot in IV
Spawning stock biomass
SSB
20000
15000
10000
5000
0
Fishing mortality
Fbar
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Recruitment
Rec
10000
5000
0
1980
1990
2000
2010
Year

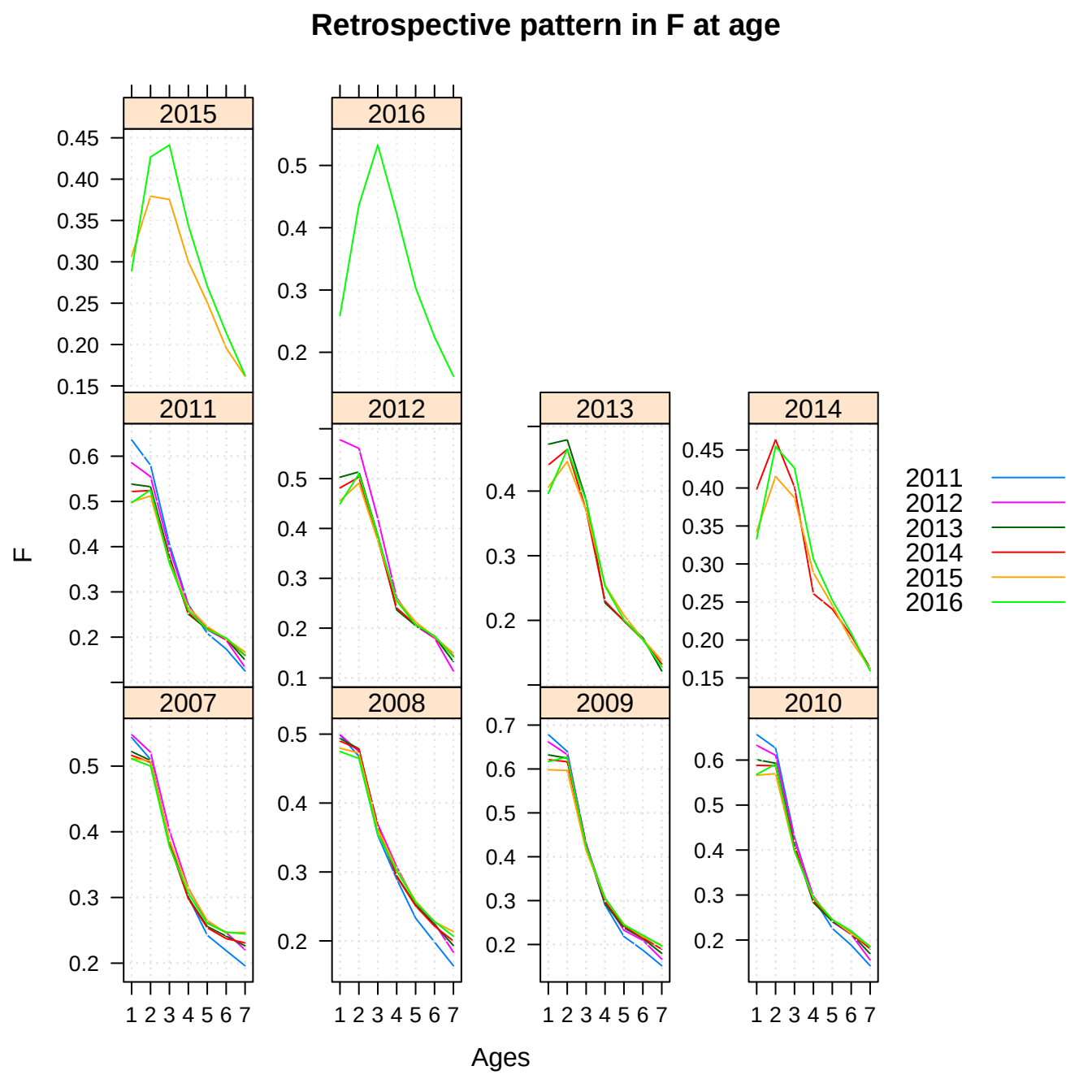

Residuals by year Catch
8
6
4
2
age
1980
1990
2000
2010
year

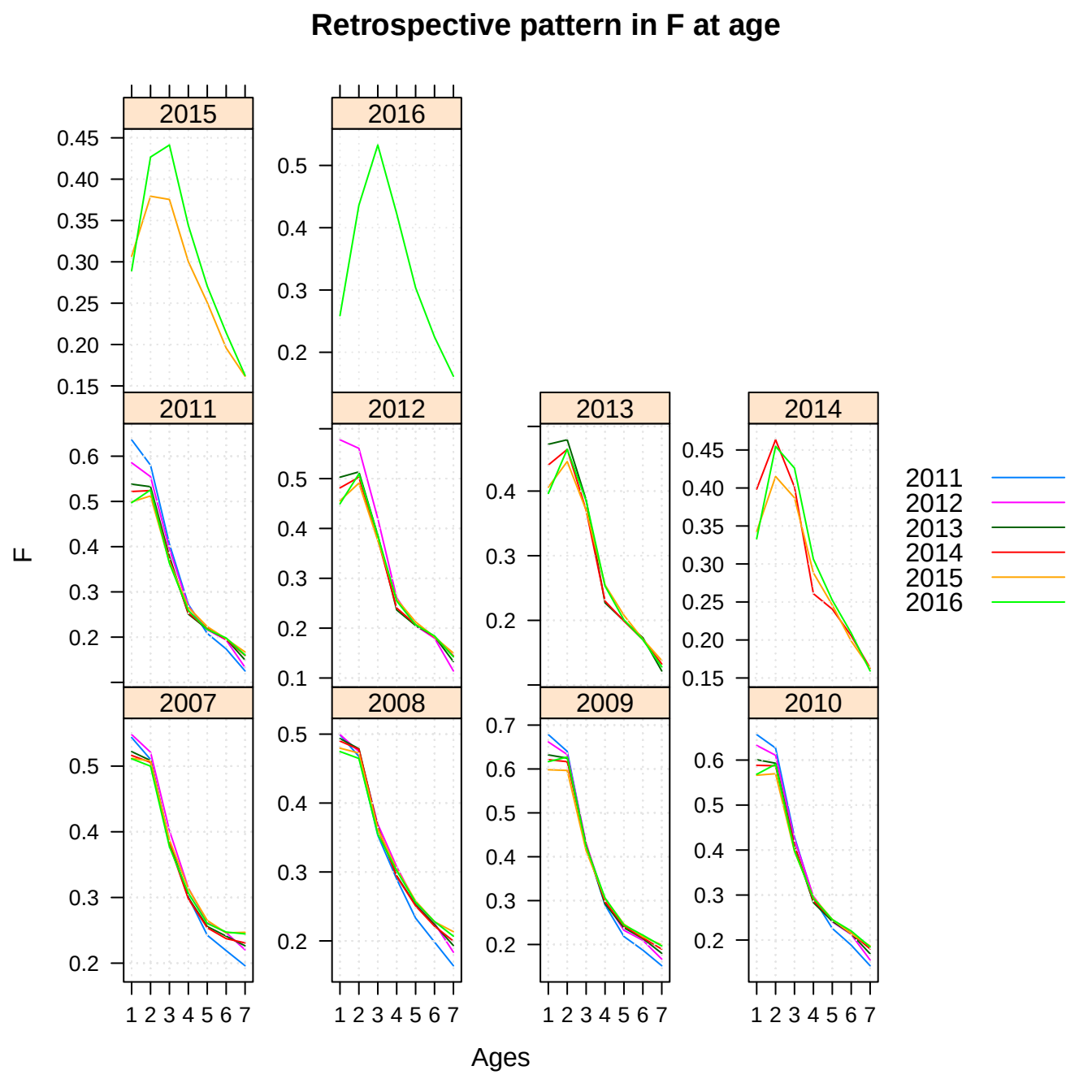

Residuals by survey
BTS−ISIS
SNS
1990
1995
2000
2005
2010
2015
7
6
5
4
3
2
1
age
year


Spawning stock biomass
SSB
15000
10000
5000
0
Fishing mortality
Fbar
1.0
0.8
0.6
0.4
0.2
0.0
Recruitment
Rec
10000
8000
6000
4000
2000
0
1980
1990
2000
2010
Year
2012
2013
2014
2015
2016
2017


logSdLogN
logSdLogObs
logFpar
logSdLogFsta
Parameter value
Assessment year
2012
2013
2014
2015
2016
2017
0.2
0.3
0.4
0.0
0.5
1.0
0.000
0.005
0.010
0.015
0.020
0.19
0.20
0.21
0.22


logSdLogN
logSdLogObs
logFpar
logSdLogFsta
Parameter value
Assessment year
2012
2013
2014
2015
2016
2017
0.2
0.3
0.4
0.0
0.5
1.0
0.000
0.005
0.010
0.015
0.020
0.19
0.20
0.21
0.22


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


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