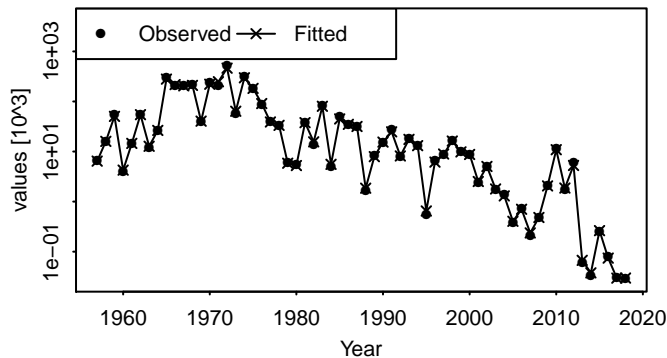
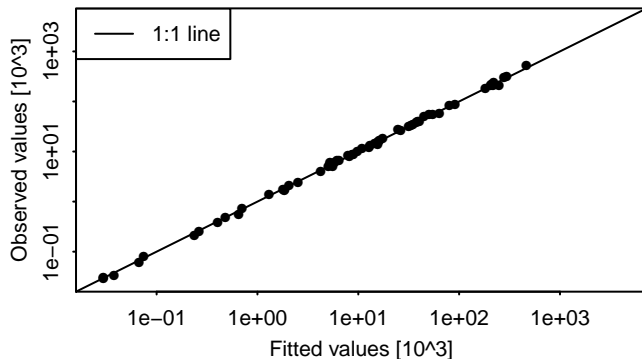


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 1

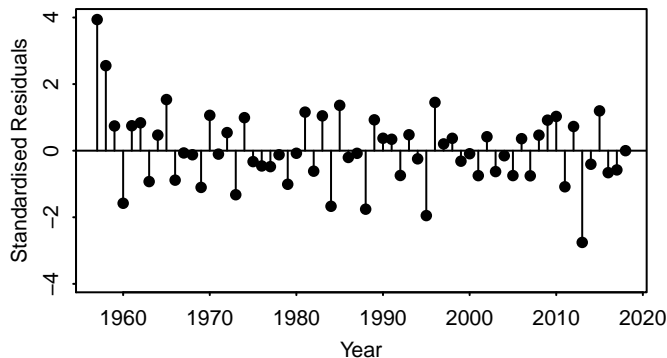
a) Observed and fitted values time series



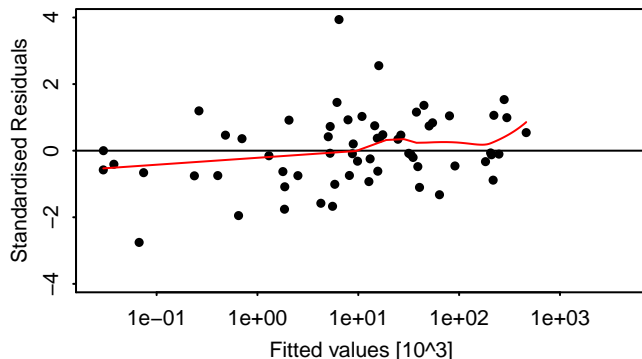
b) Observed vs fitted values



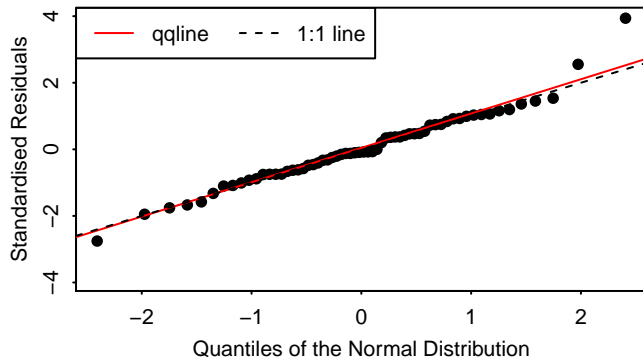
c) Standardised residuals over time



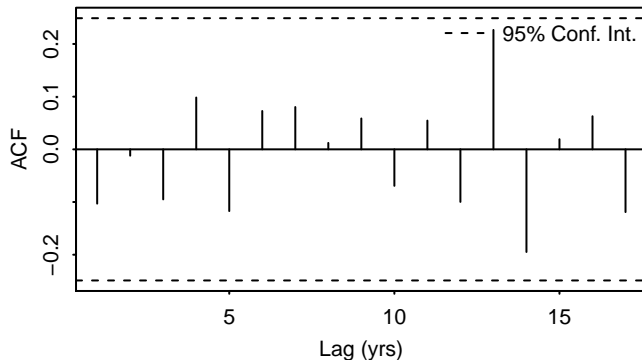
d) Tukey–Anscombe plot



e) Normal Q–Q plot

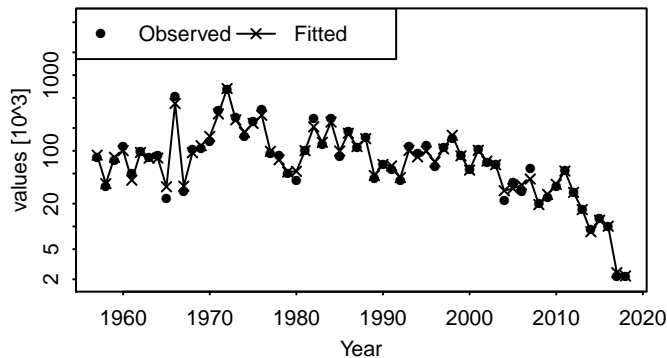


f) Autocorrelation of Residuals

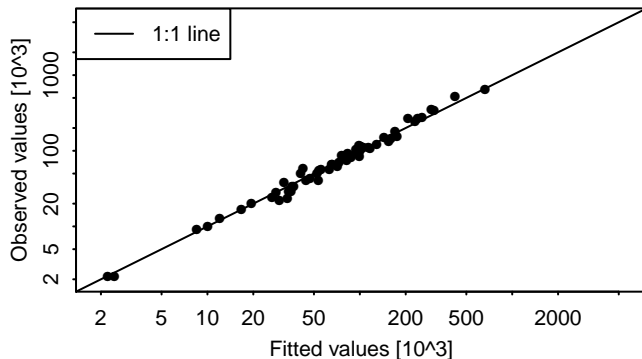


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 2

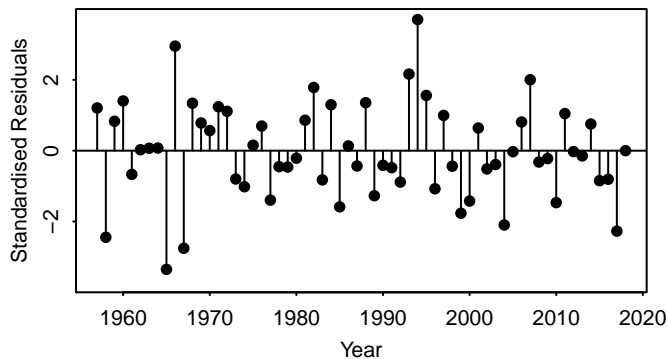
a) Observed and fitted values time series



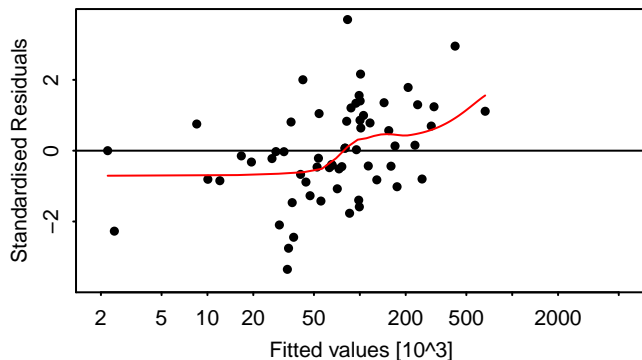
b) Observed vs fitted values



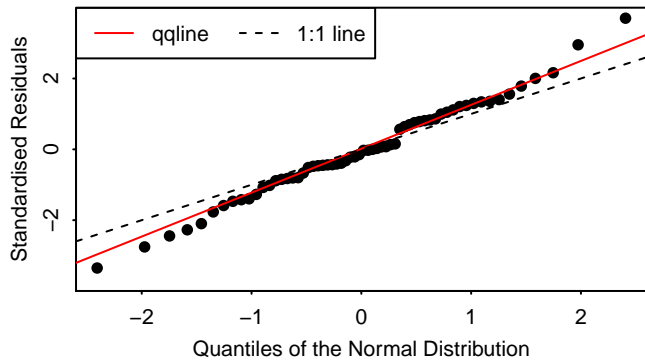
c) Standardised residuals over time



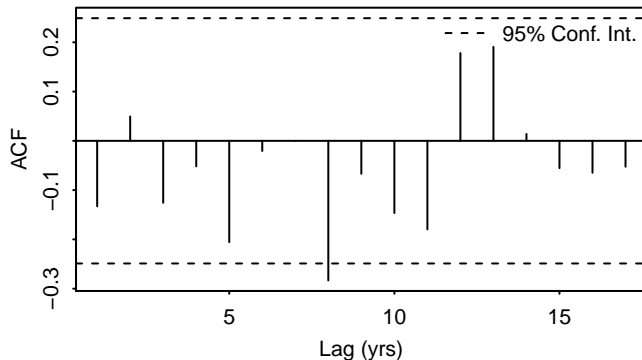
d) Tukey–Anscombe plot



e) Normal Q–Q plot

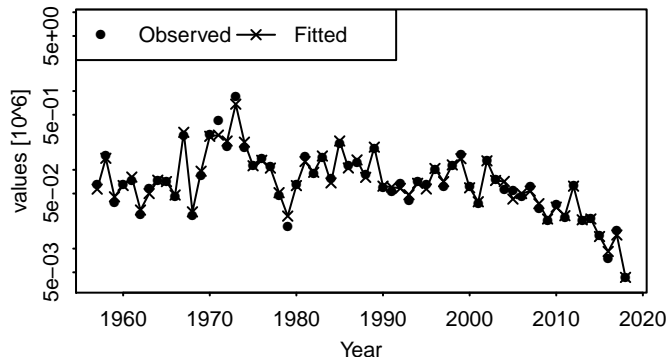


f) Autocorrelation of Residuals

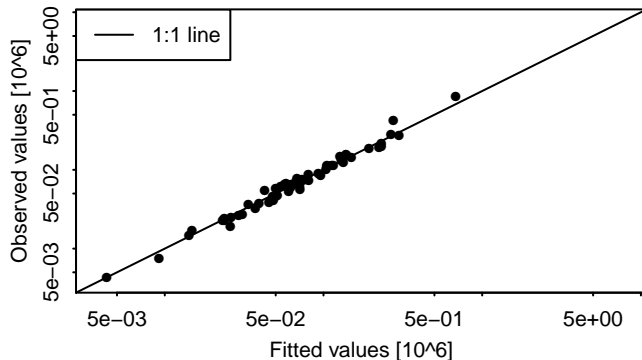


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 3

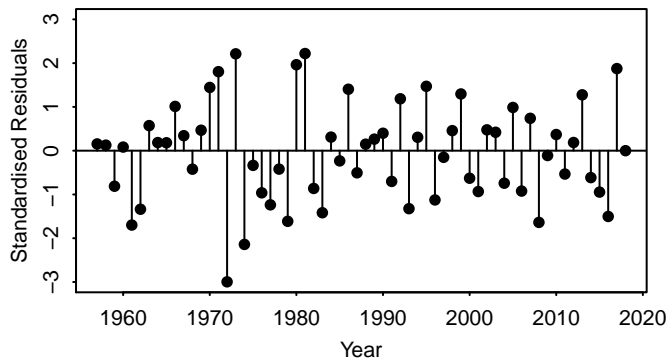
a) Observed and fitted values time series



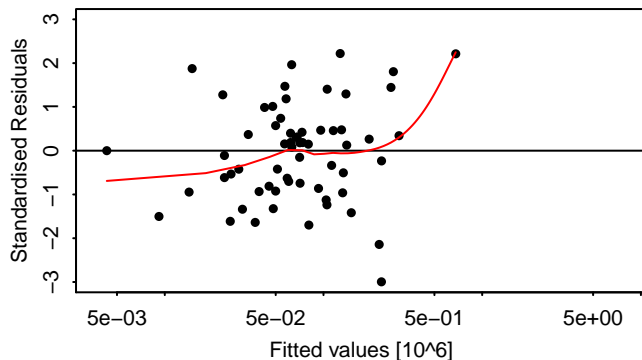
b) Observed vs fitted values



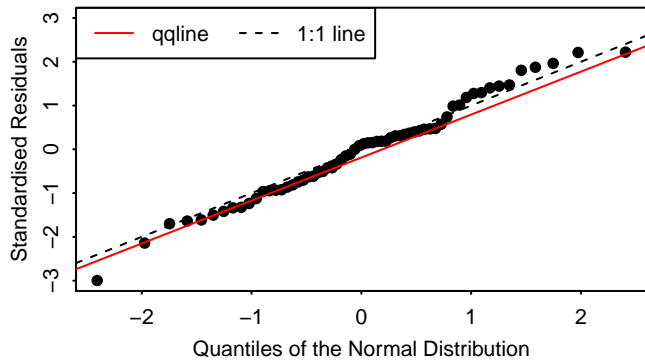
c) Standardised residuals over time



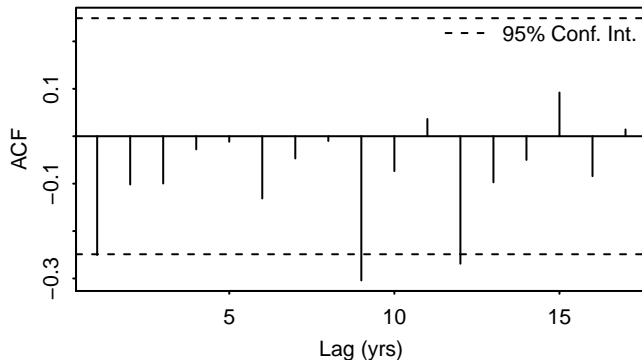
d) Tukey–Anscombe plot



e) Normal Q–Q plot

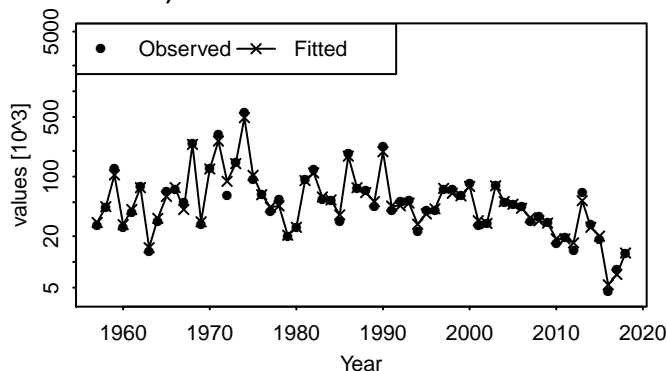


f) Autocorrelation of Residuals

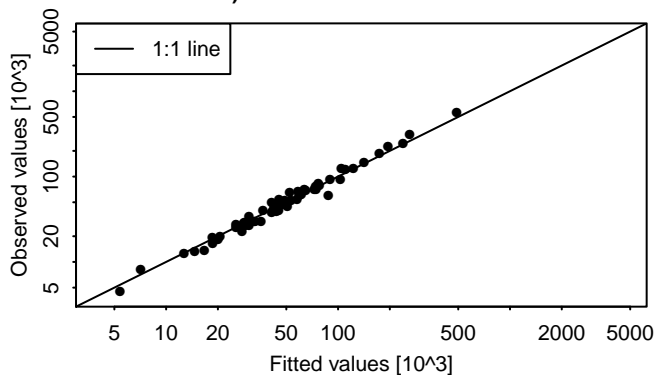


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 4

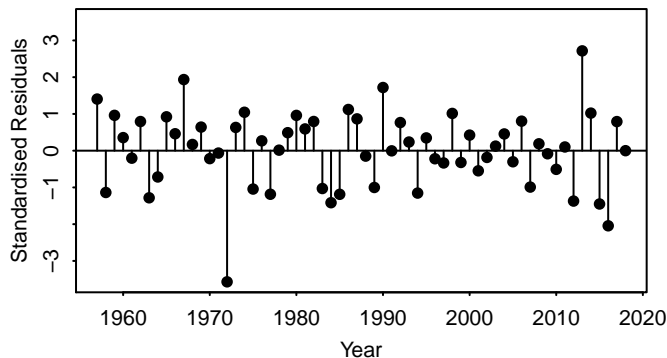
a) Observed and fitted values time series



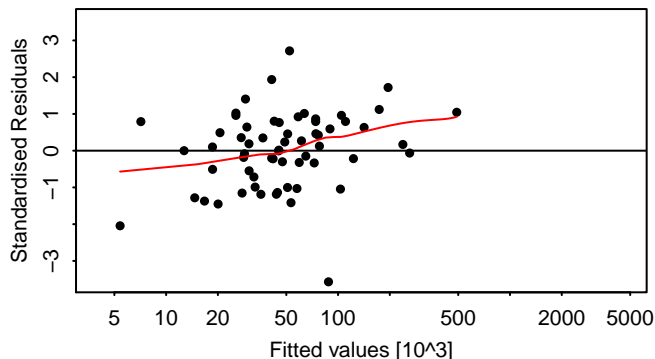
b) Observed vs fitted values



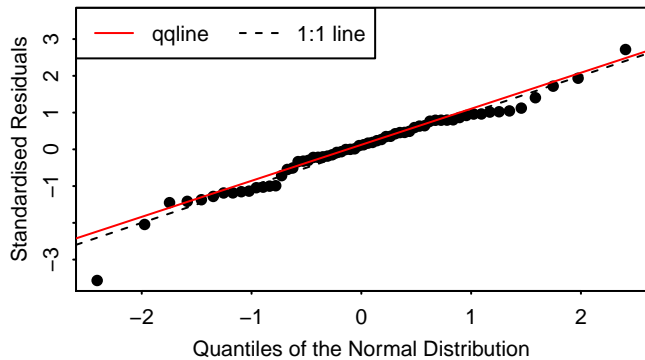
c) Standardised residuals over time



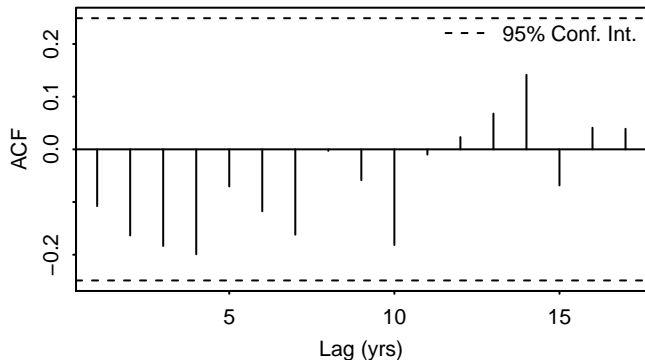
d) Tukey–Anscombe plot



e) Normal Q–Q plot

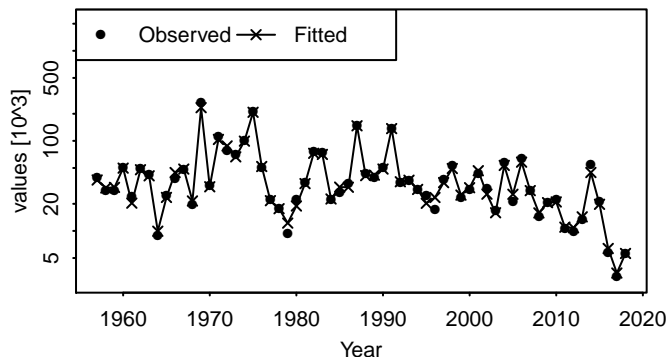


f) Autocorrelation of Residuals

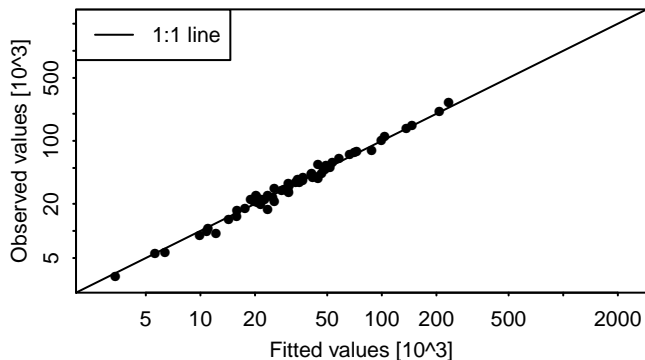


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 5

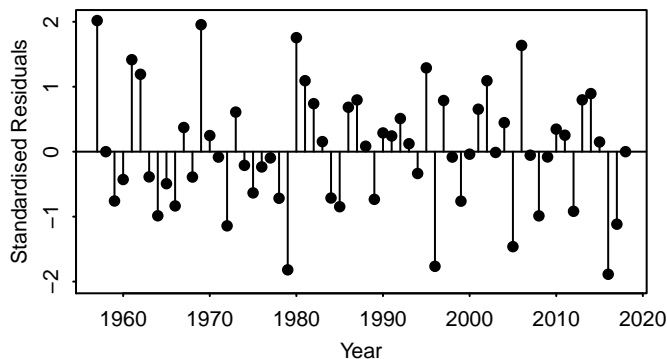
a) Observed and fitted values time series



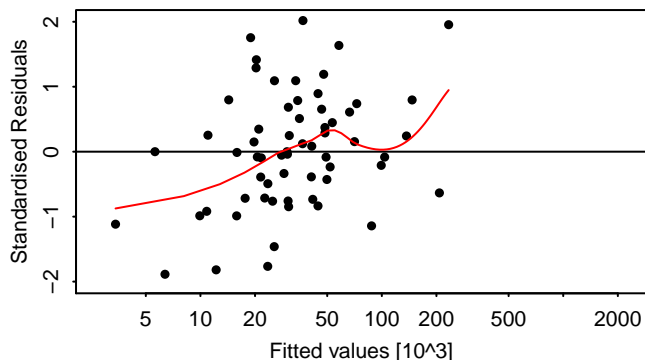
b) Observed vs fitted values



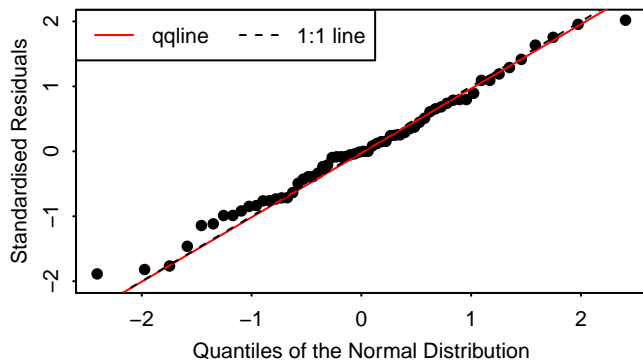
c) Standardised residuals over time



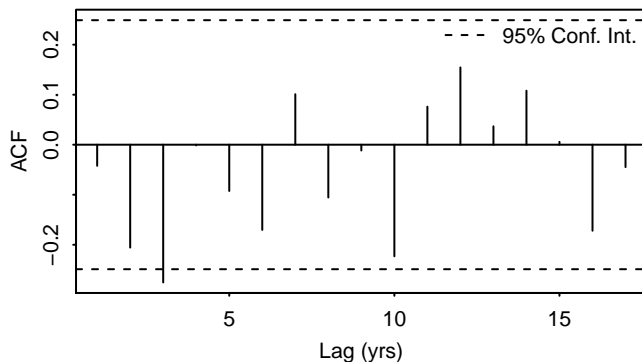
d) Tukey–Anscombe plot



e) Normal Q–Q plot

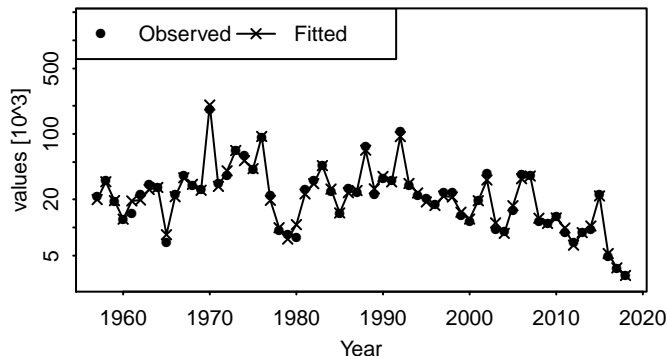


f) Autocorrelation of Residuals

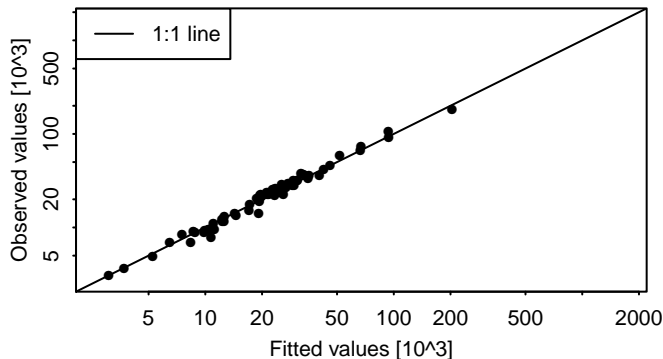


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 6

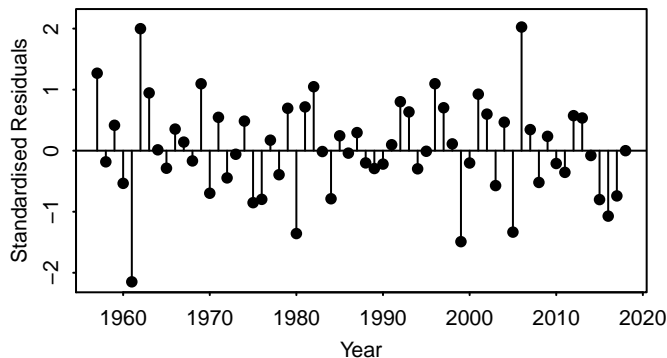
a) Observed and fitted values time series



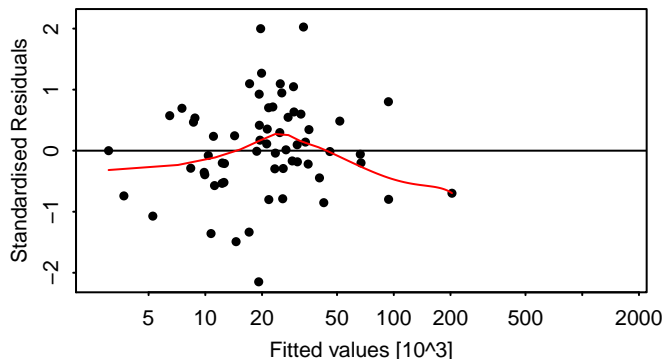
b) Observed vs fitted values



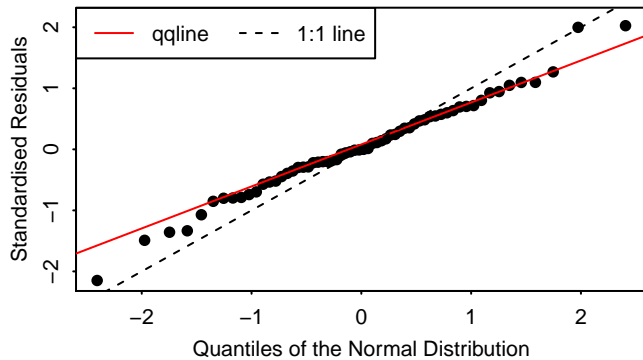
c) Standardised residuals over time



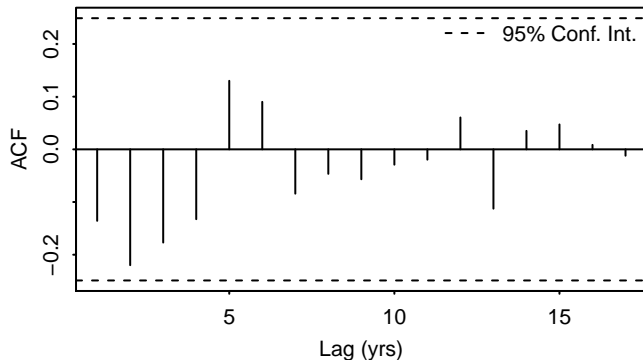
d) Tukey–Anscombe plot



e) Normal Q–Q plot

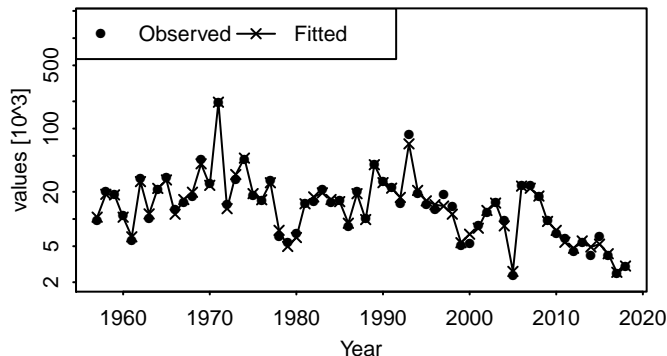


f) Autocorrelation of Residuals

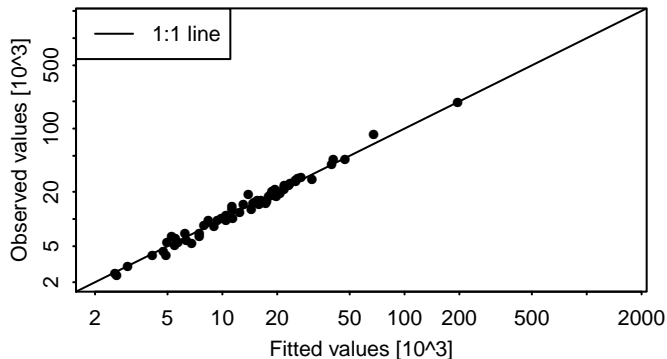


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 7

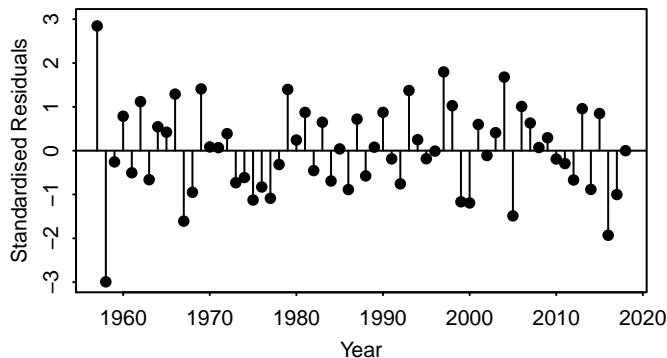
a) Observed and fitted values time series



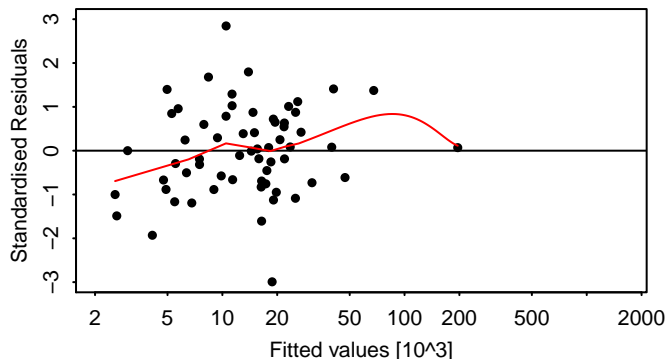
b) Observed vs fitted values



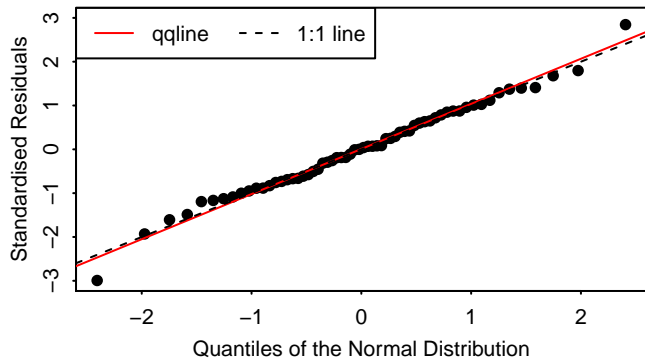
c) Standardised residuals over time



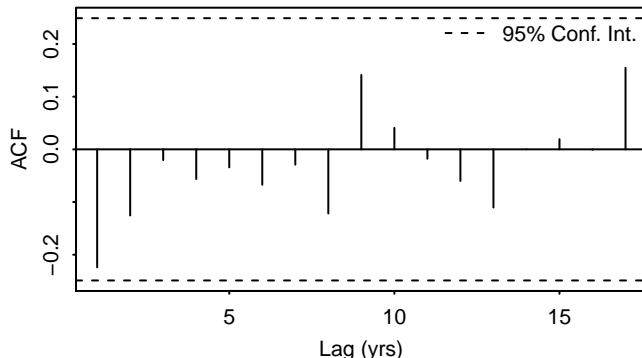
d) Tukey–Anscombe plot



e) Normal Q–Q plot

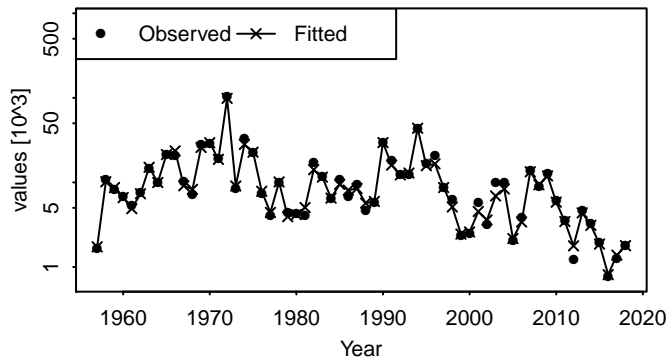


f) Autocorrelation of Residuals

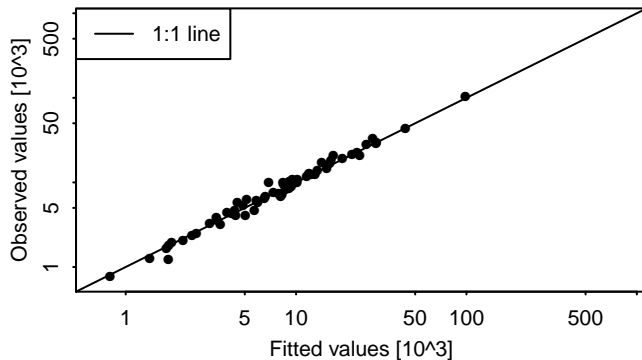


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 8

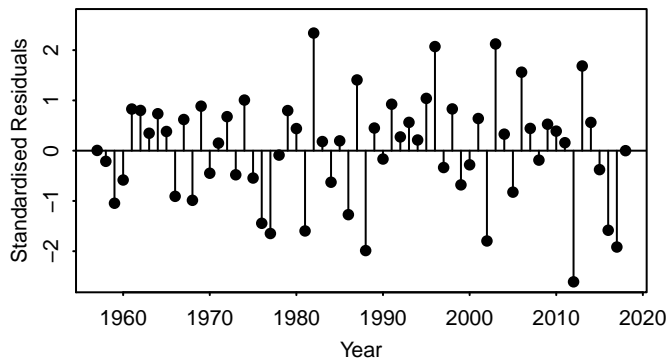
a) Observed and fitted values time series



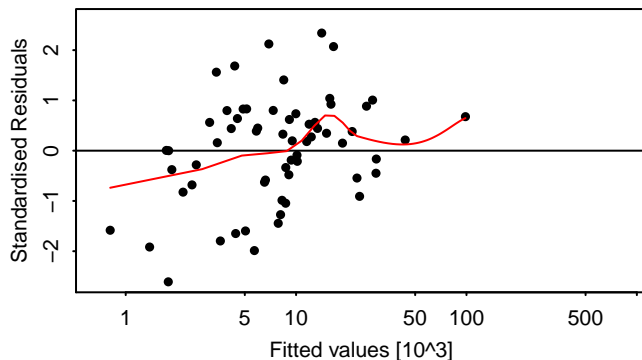
b) Observed vs fitted values



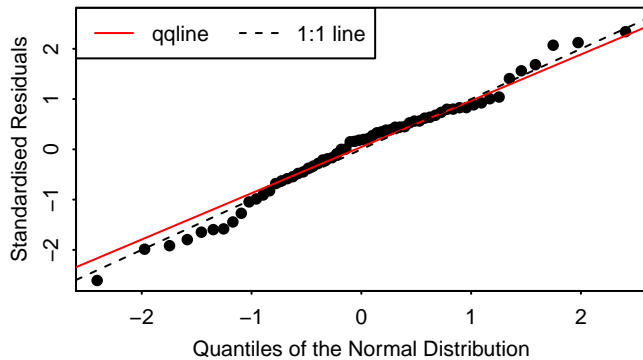
c) Standardised residuals over time



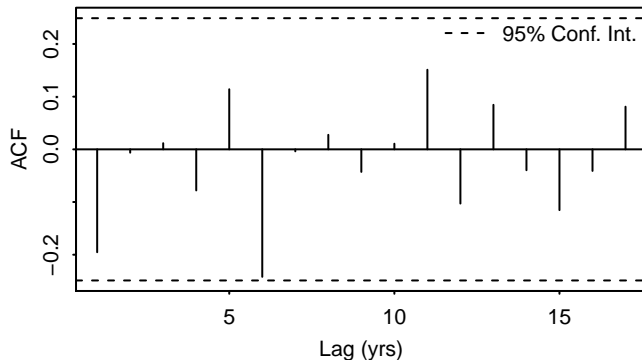
d) Tukey–Anscombe plot



e) Normal Q–Q plot

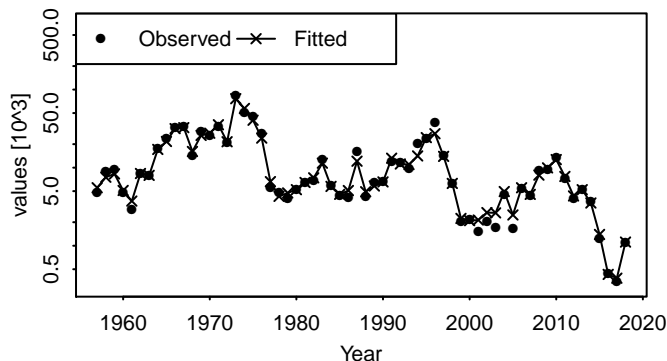


f) Autocorrelation of Residuals

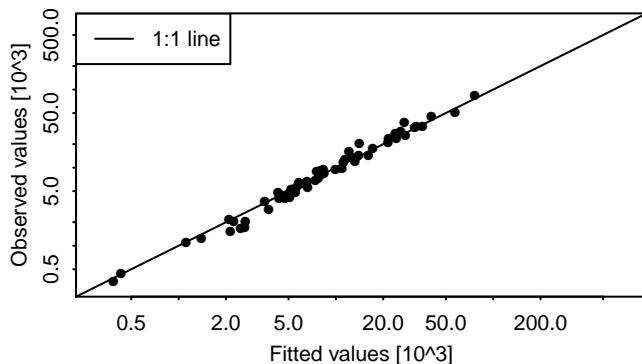


Herring in Vla (combined) and VIIbc Diagnostics – catch unique, age 9

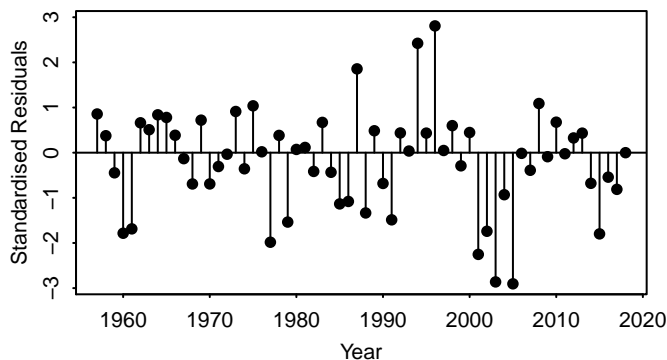
a) Observed and fitted values time series



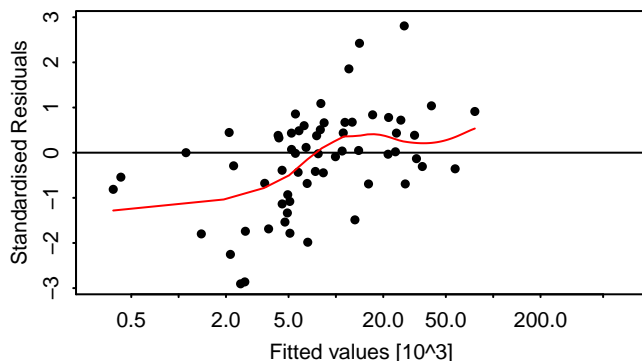
b) Observed vs fitted values



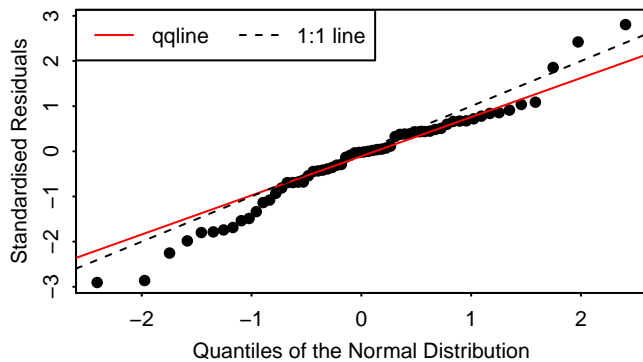
c) Standardised residuals over time



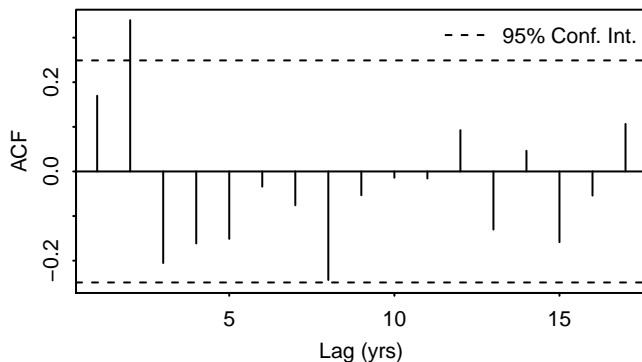
d) Tukey–Anscombe plot



e) Normal Q–Q plot

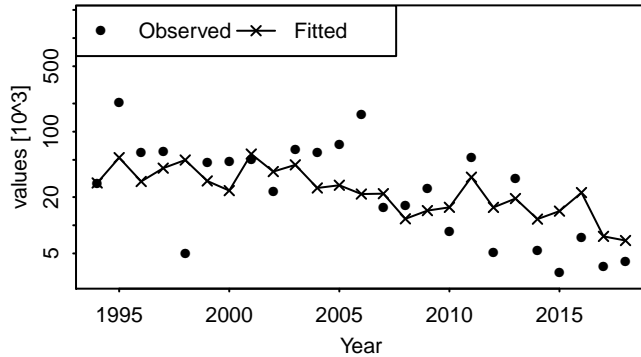


f) Autocorrelation of Residuals

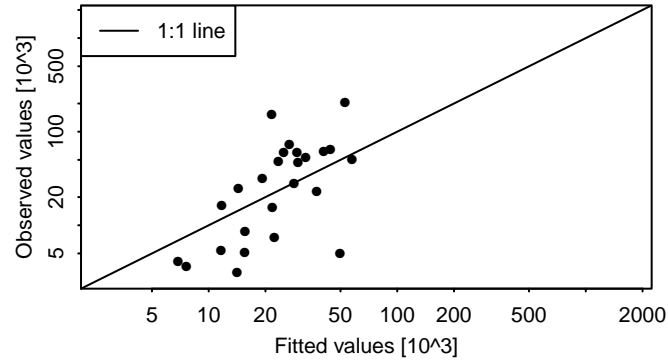


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 2

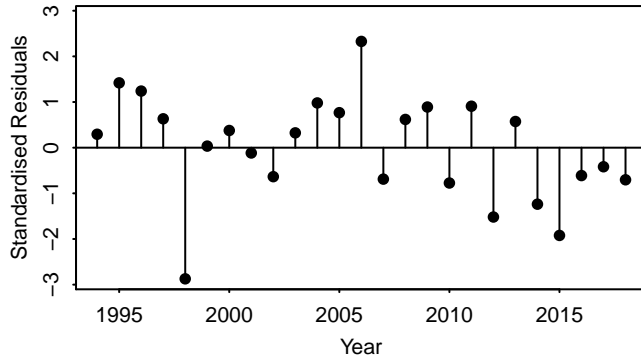
a) Observed and fitted values time series



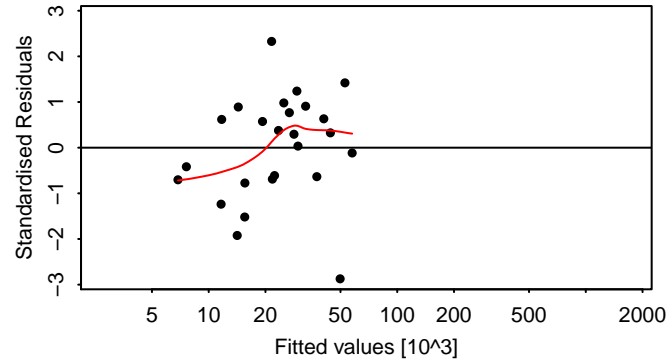
b) Observed vs fitted values



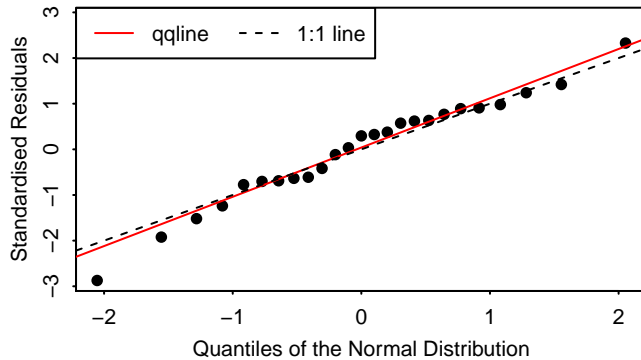
c) Standardised residuals over time



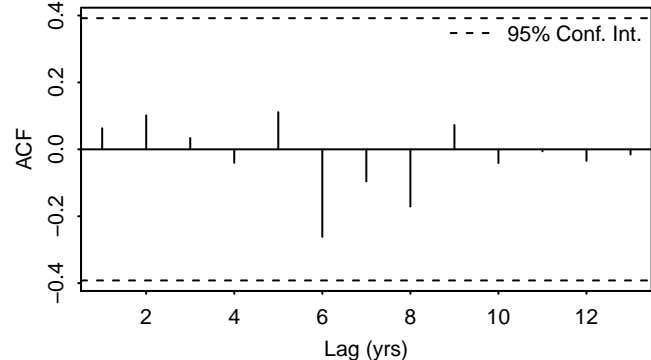
d) Tukey–Anscombe plot



e) Normal Q–Q plot

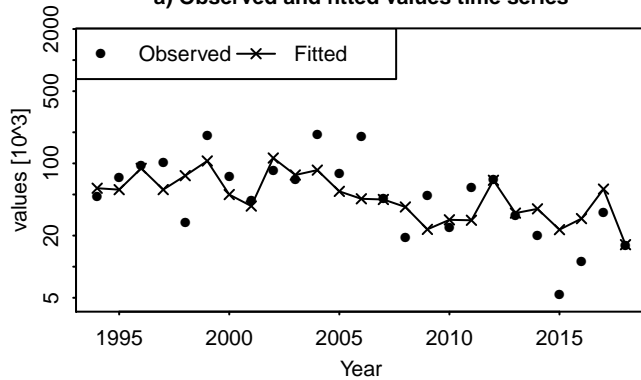


f) Autocorrelation of Residuals

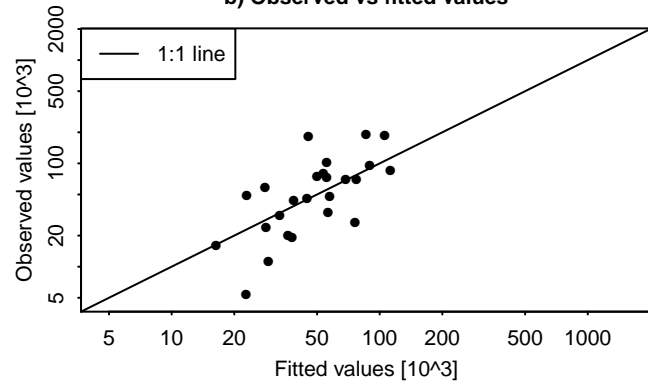


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 3

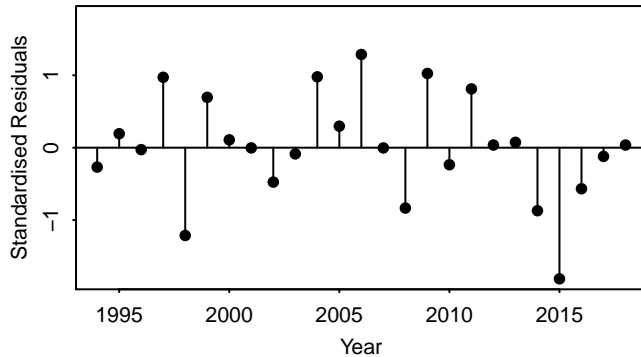
a) Observed and fitted values time series



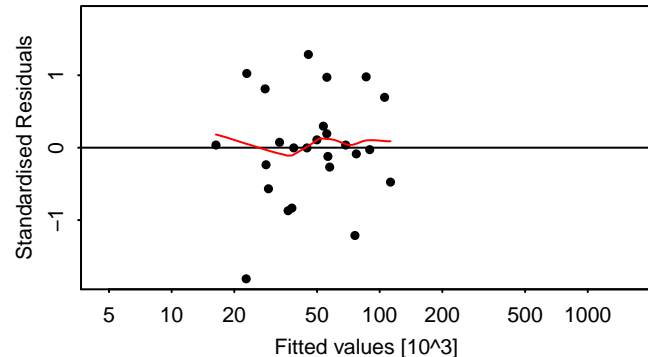
b) Observed vs fitted values



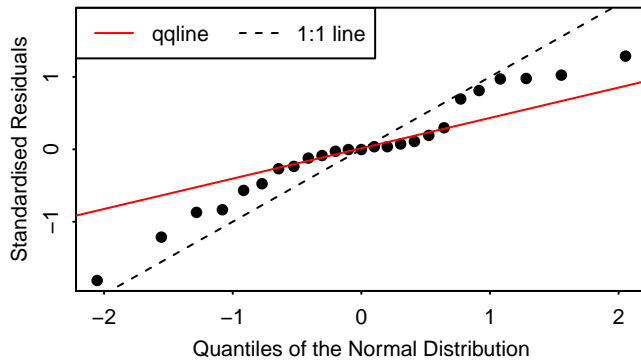
c) Standardised residuals over time



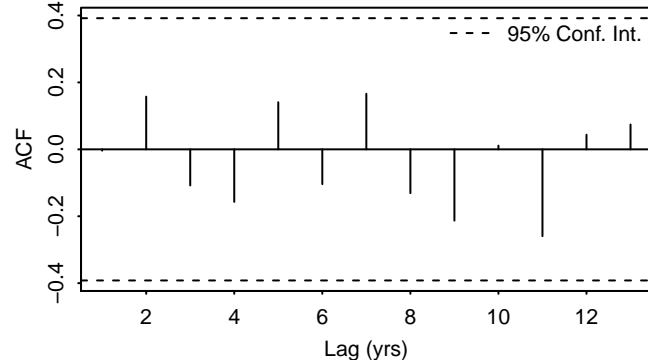
d) Tukey–Anscombe plot



e) Normal Q–Q plot

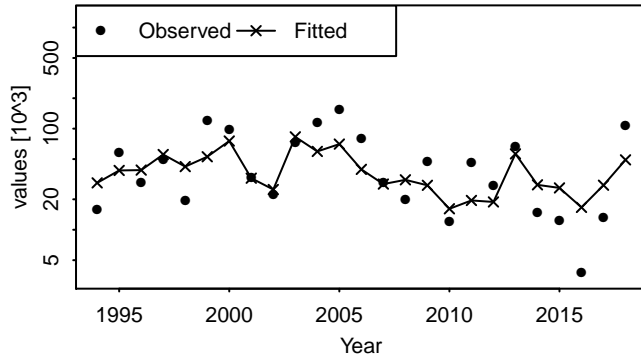


f) Autocorrelation of Residuals

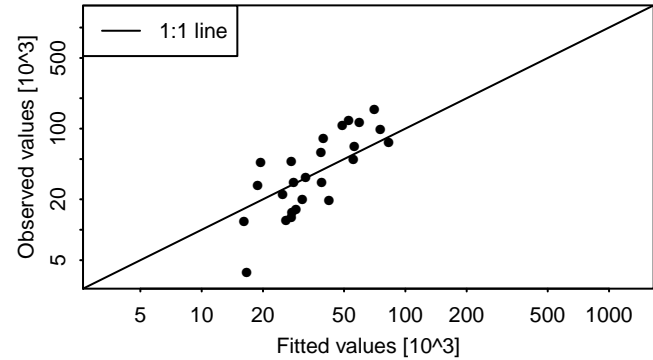


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 4

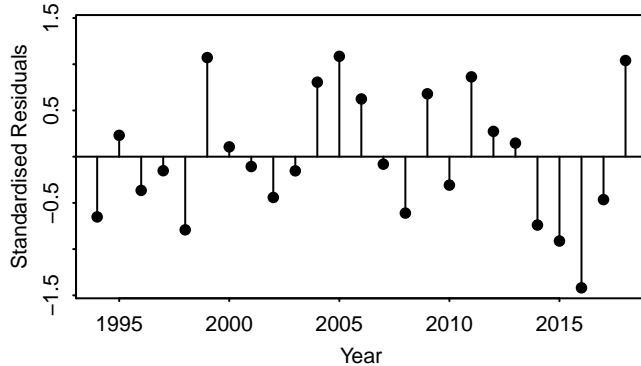
a) Observed and fitted values time series



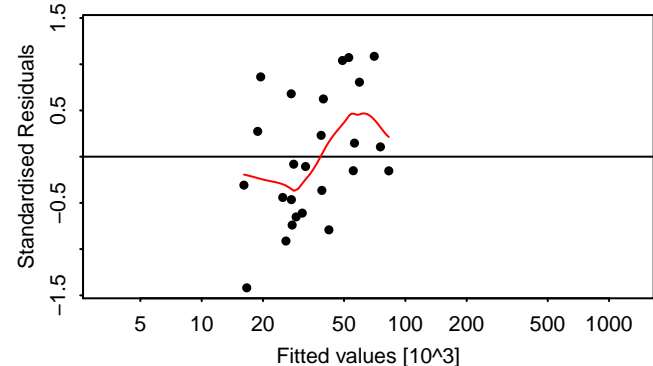
b) Observed vs fitted values



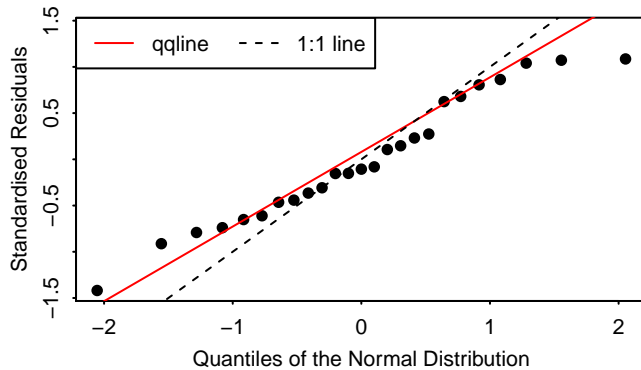
c) Standardised residuals over time



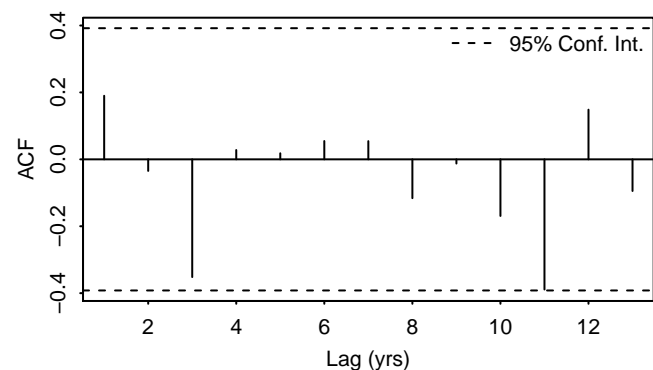
d) Tukey–Anscombe plot



e) Normal Q–Q plot

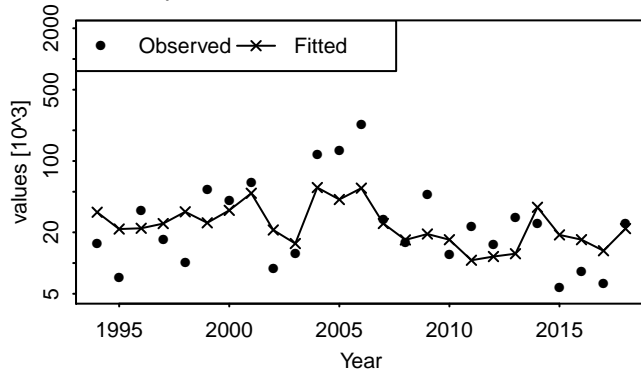


f) Autocorrelation of Residuals

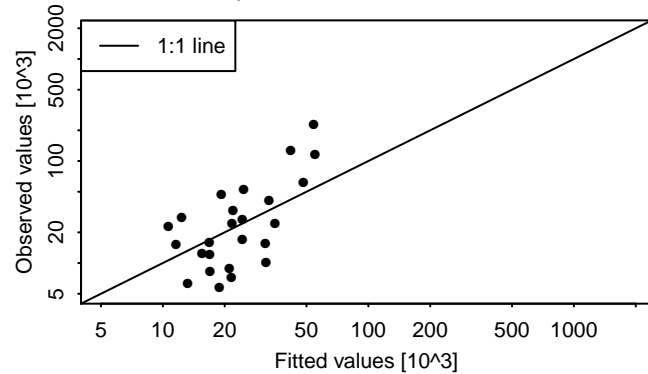


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 5

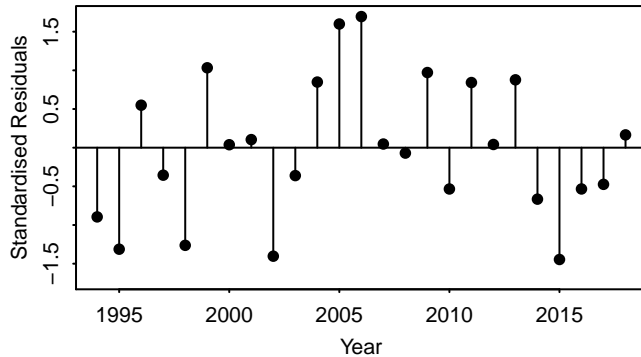
a) Observed and fitted values time series



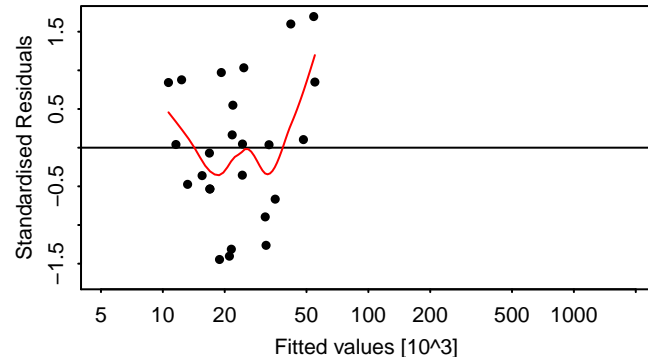
b) Observed vs fitted values



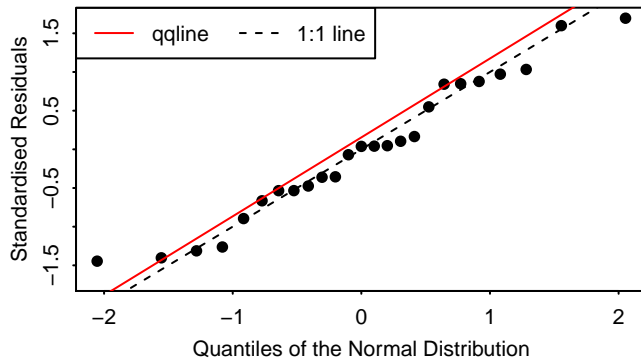
c) Standardised residuals over time



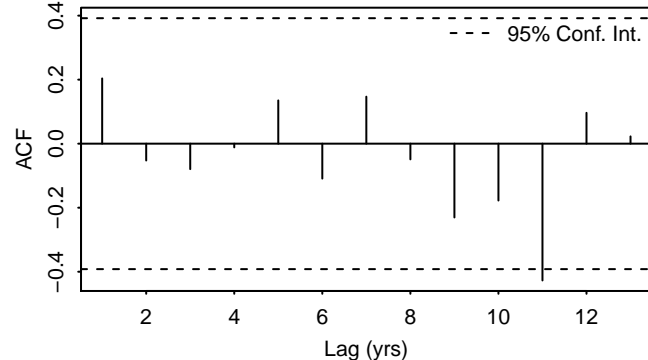
d) Tukey–Anscombe plot



e) Normal Q–Q plot

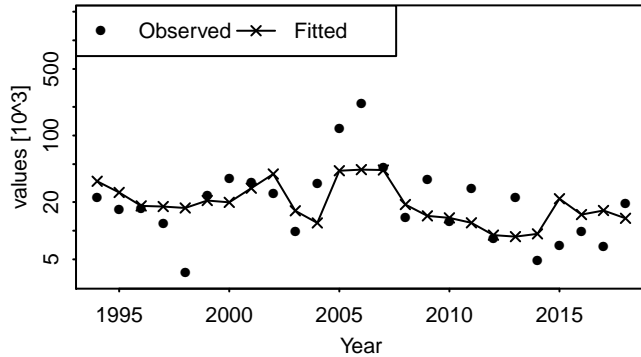


f) Autocorrelation of Residuals

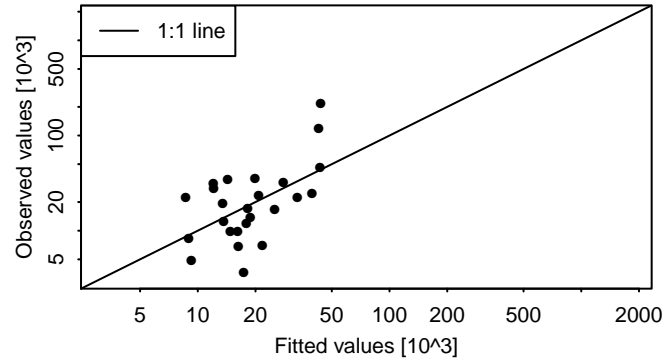


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 6

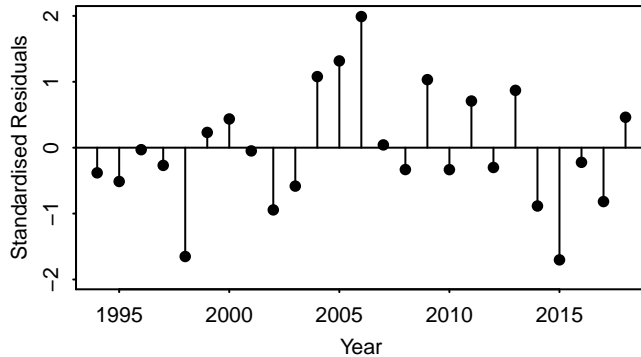
a) Observed and fitted values time series



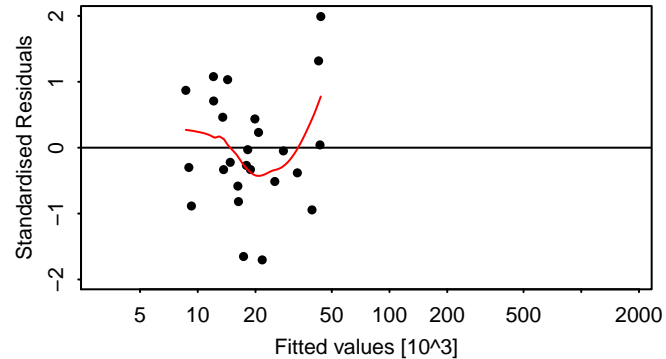
b) Observed vs fitted values



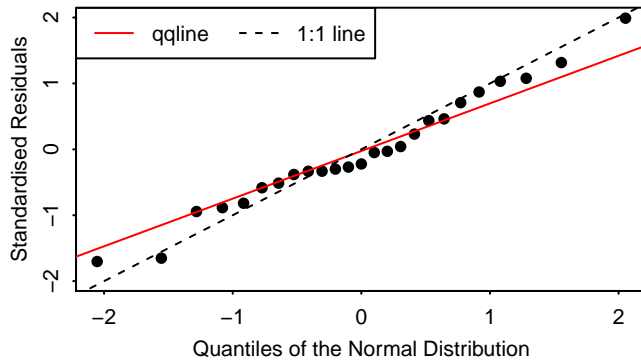
c) Standardised residuals over time



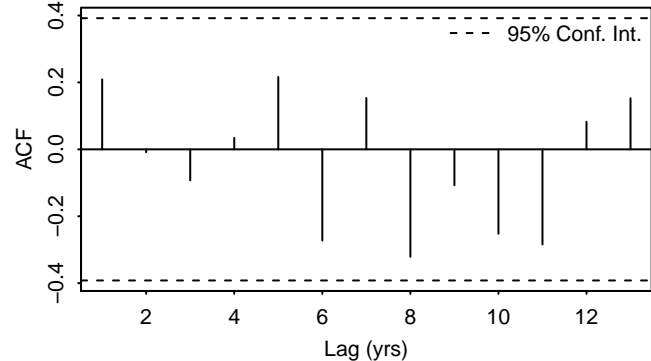
d) Tukey–Anscombe plot



e) Normal Q–Q plot

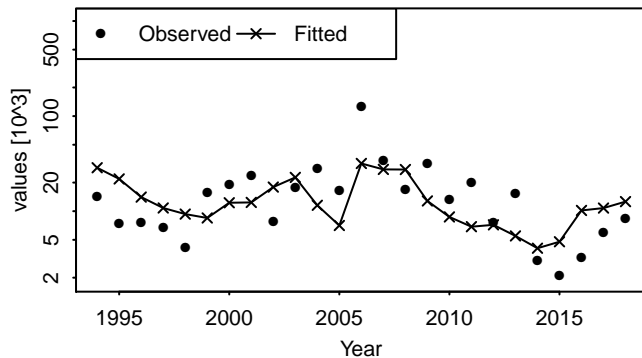


f) Autocorrelation of Residuals

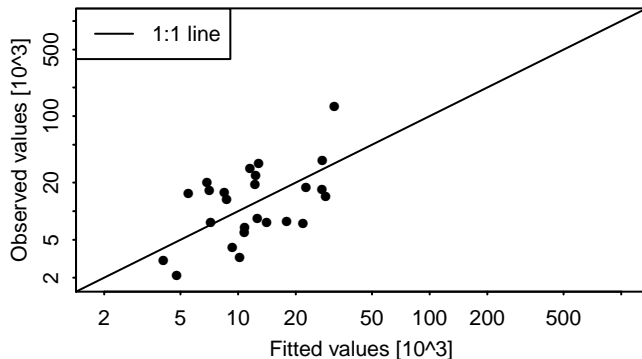


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 7

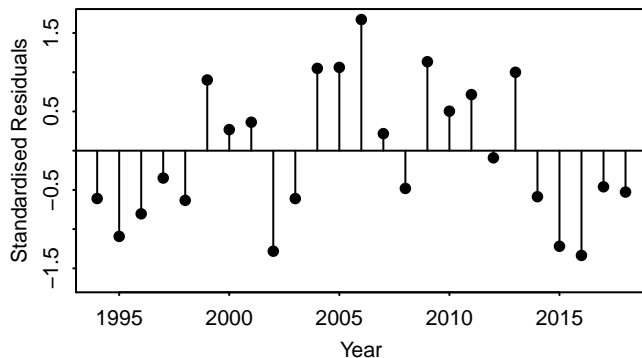
a) Observed and fitted values time series



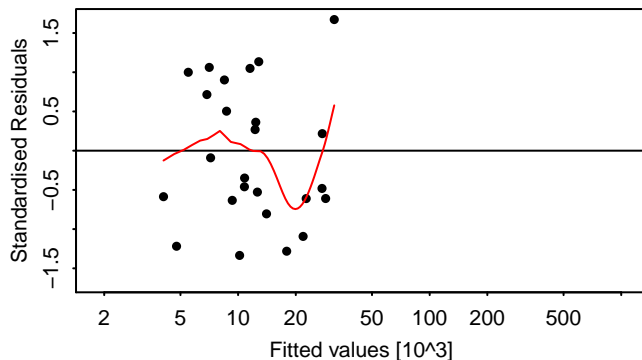
b) Observed vs fitted values



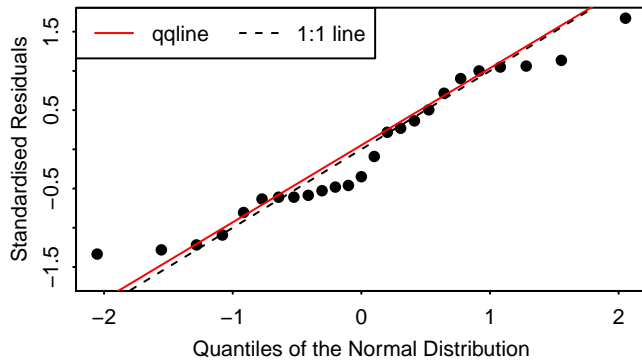
c) Standardised residuals over time



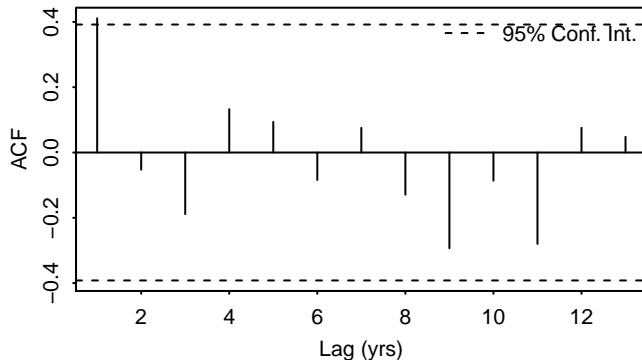
d) Tukey–Anscombe plot



e) Normal Q–Q plot

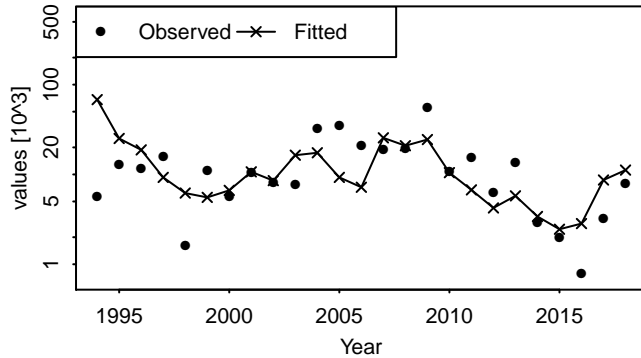


f) Autocorrelation of Residuals

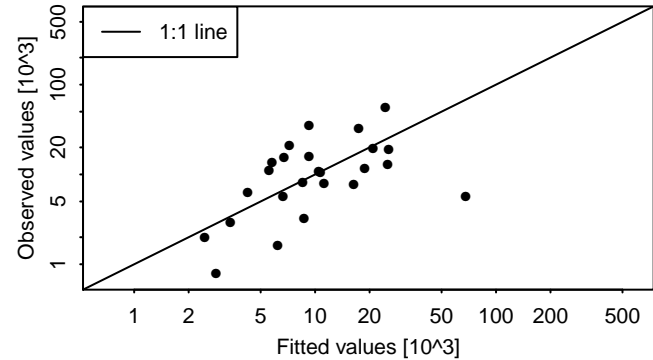


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 8

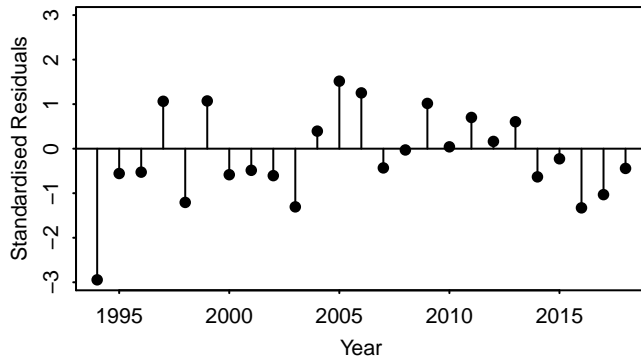
a) Observed and fitted values time series



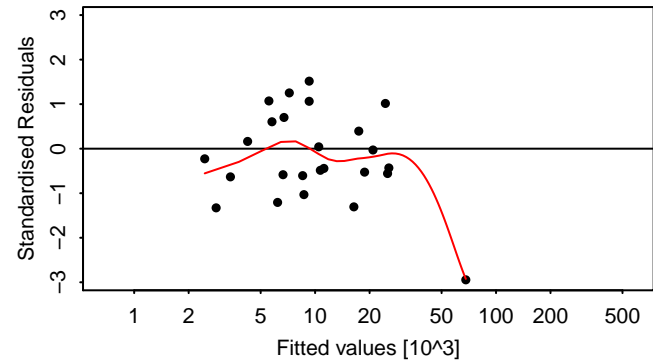
b) Observed vs fitted values



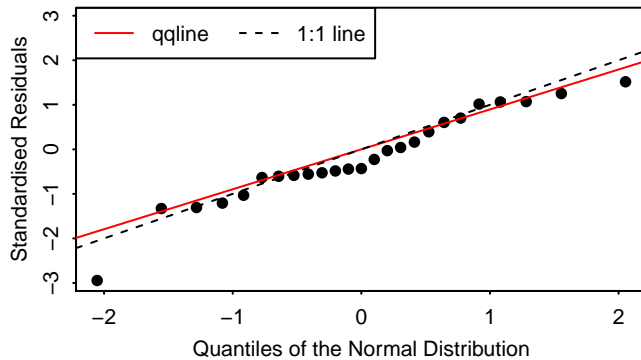
c) Standardised residuals over time



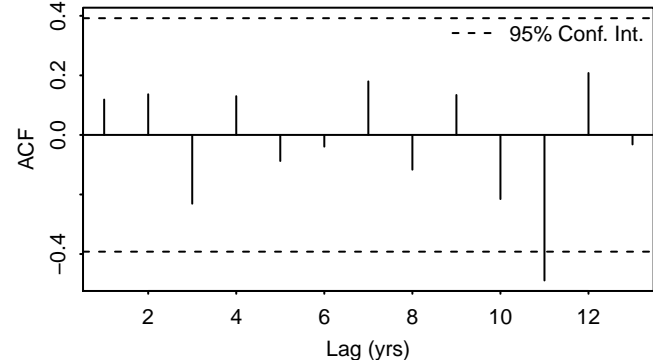
d) Tukey–Anscombe plot



e) Normal Q–Q plot

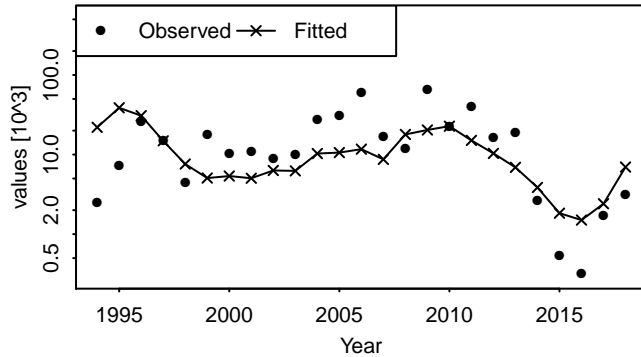


f) Autocorrelation of Residuals

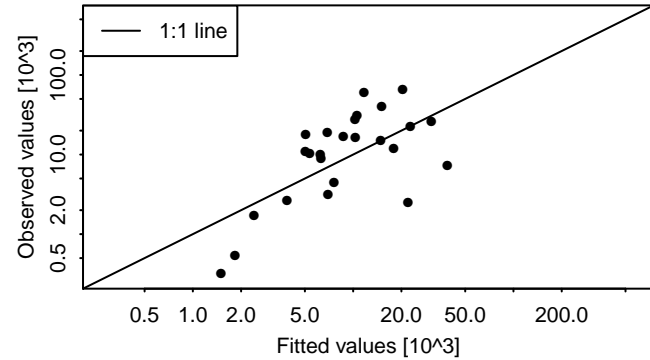


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q1, age 9

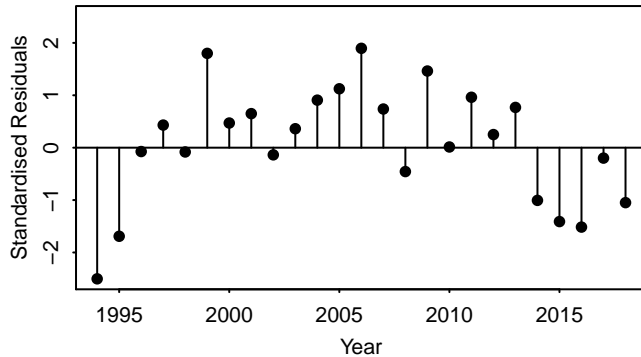
a) Observed and fitted values time series



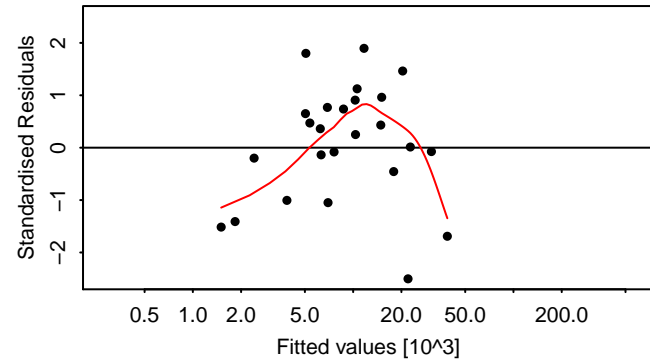
b) Observed vs fitted values



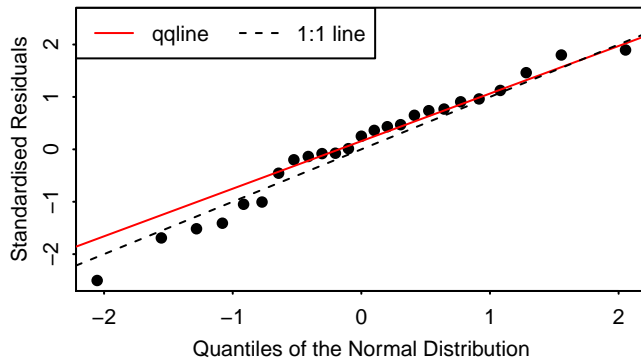
c) Standardised residuals over time



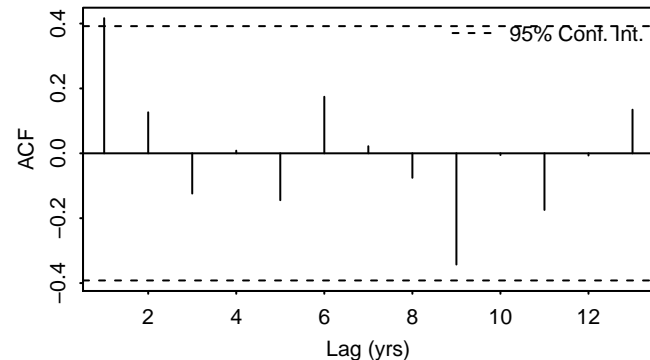
d) Tukey–Anscombe plot



e) Normal Q–Q plot

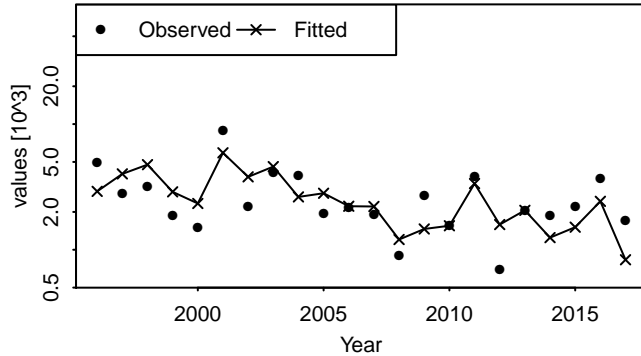


f) Autocorrelation of Residuals

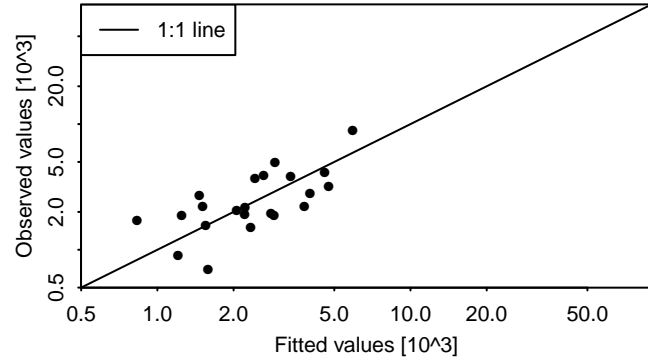


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 2

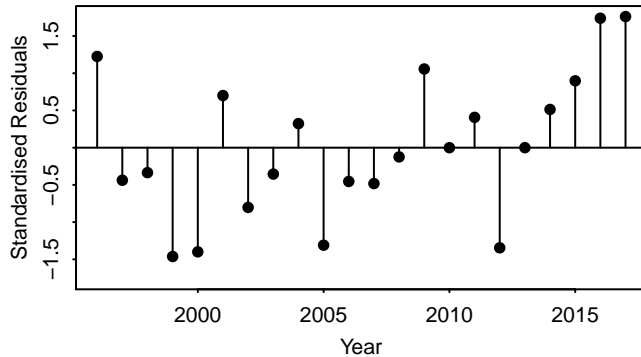
a) Observed and fitted values time series



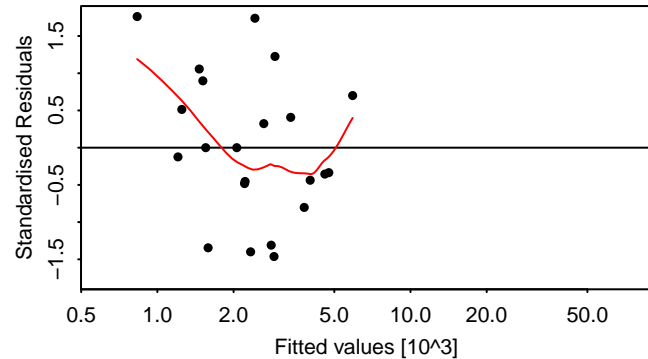
b) Observed vs fitted values



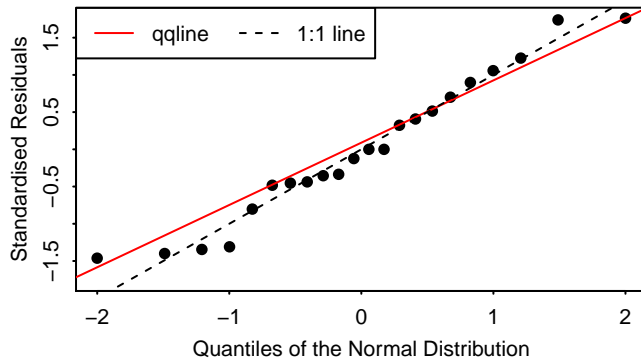
c) Standardised residuals over time



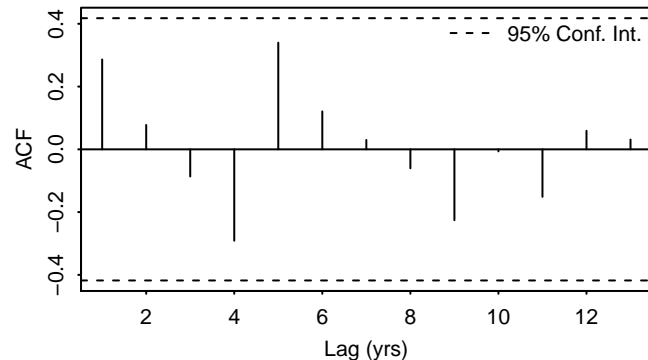
d) Tukey–Anscombe plot



e) Normal Q–Q plot

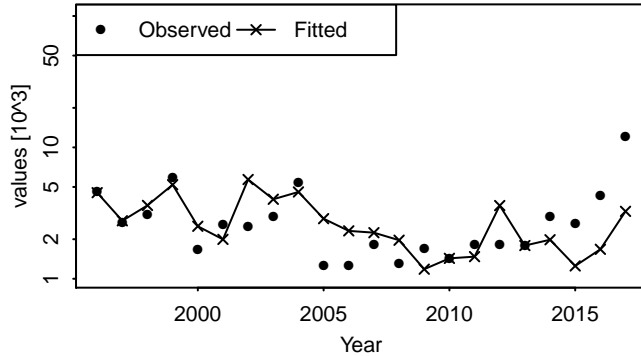


f) Autocorrelation of Residuals

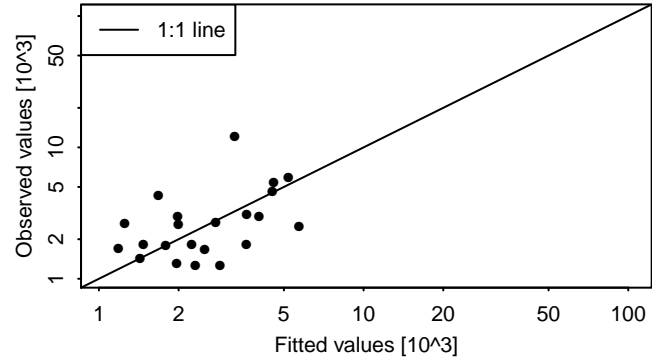


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 3

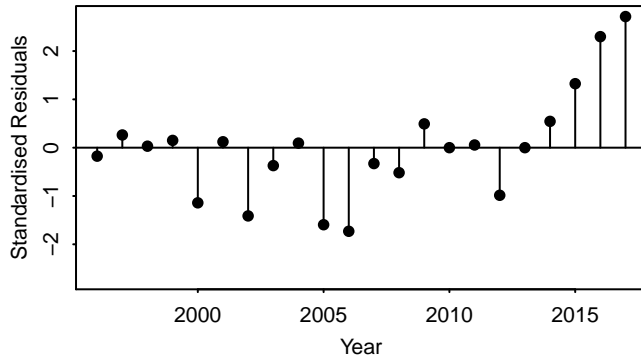
a) Observed and fitted values time series



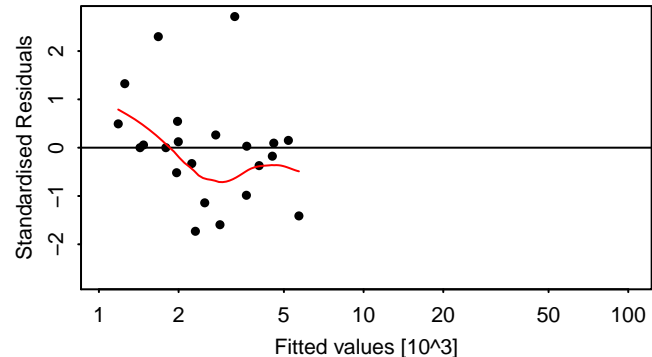
b) Observed vs fitted values



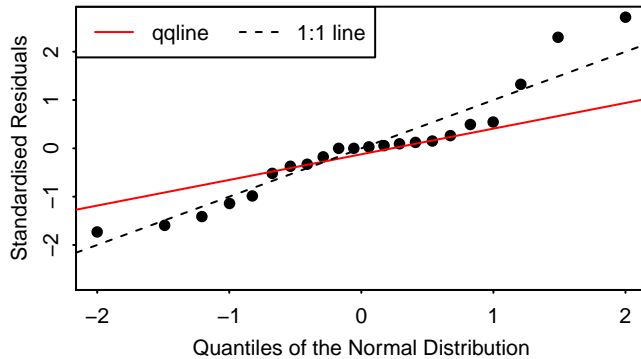
c) Standardised residuals over time



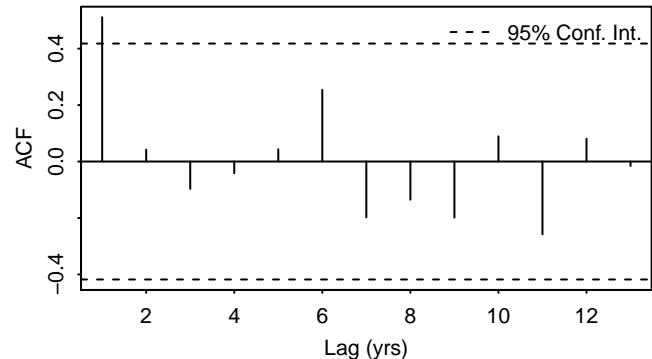
d) Tukey–Anscombe plot



e) Normal Q–Q plot

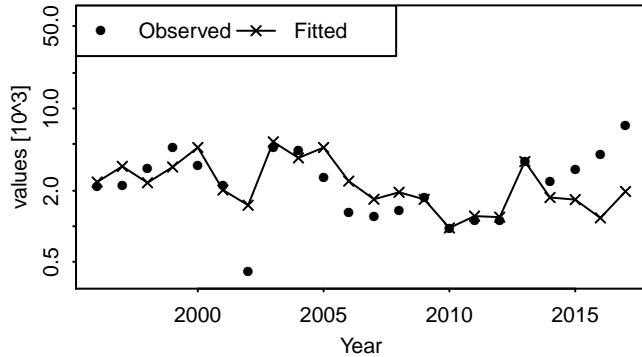


f) Autocorrelation of Residuals

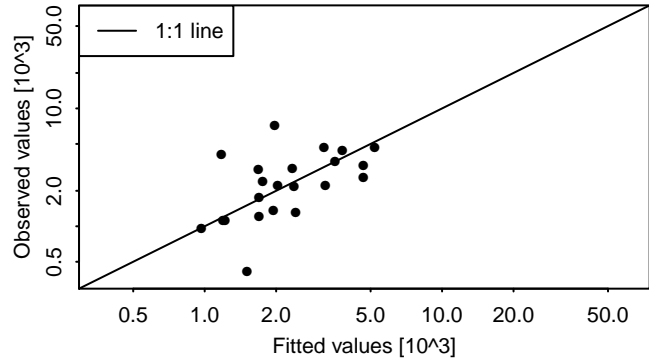


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 4

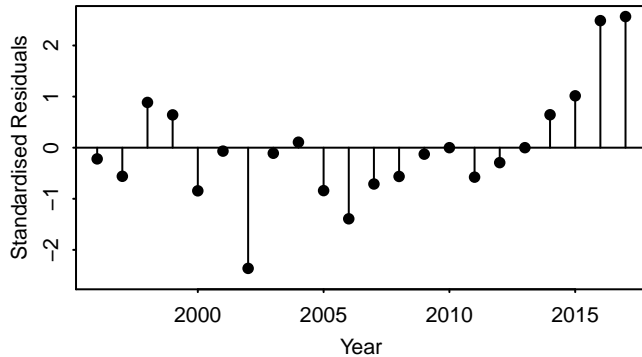
a) Observed and fitted values time series



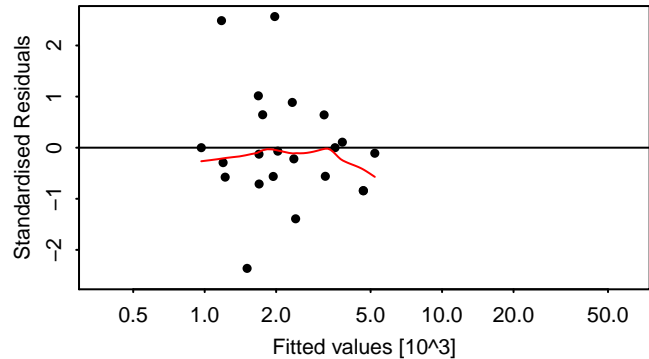
b) Observed vs fitted values



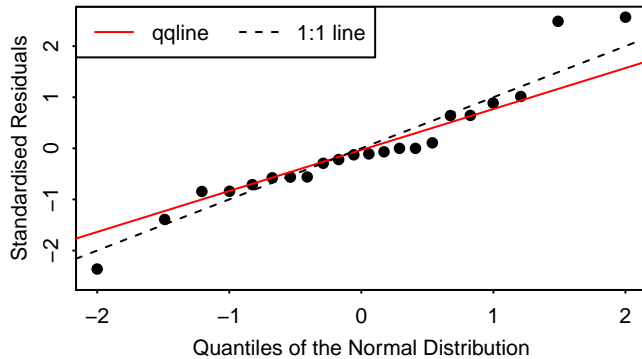
c) Standardised residuals over time



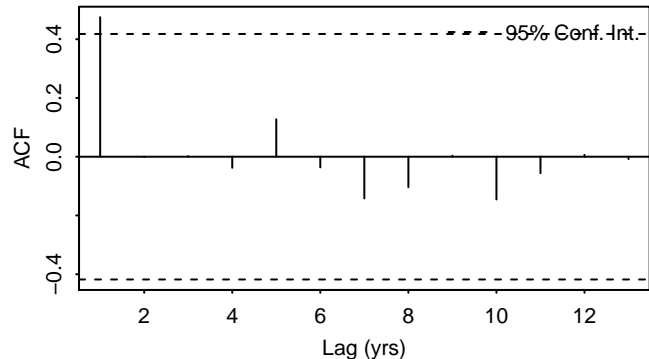
d) Tukey–Anscombe plot



e) Normal Q–Q plot

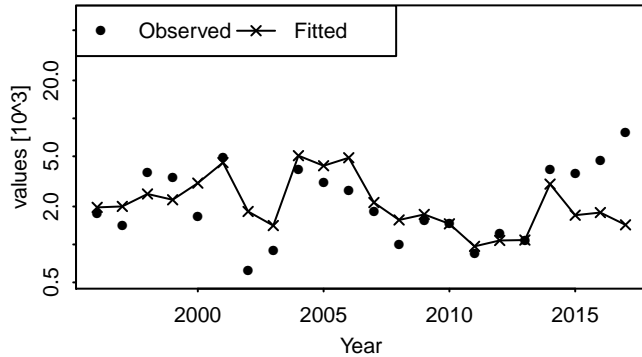


f) Autocorrelation of Residuals

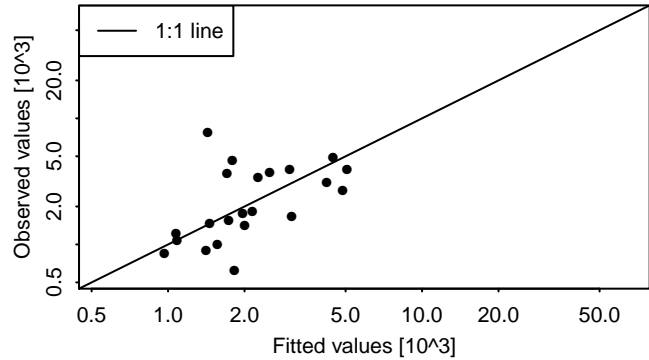


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 5

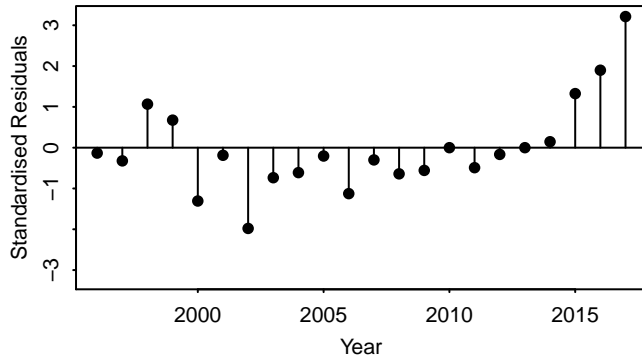
a) Observed and fitted values time series



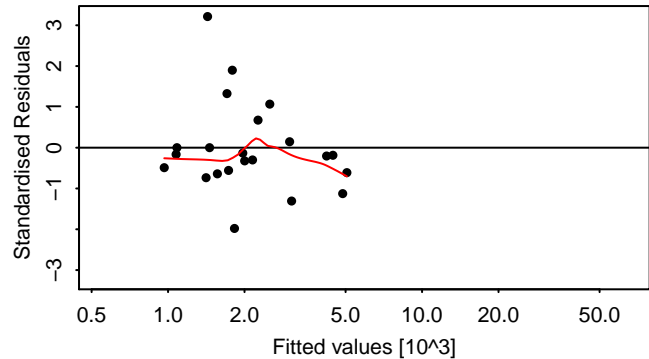
b) Observed vs fitted values



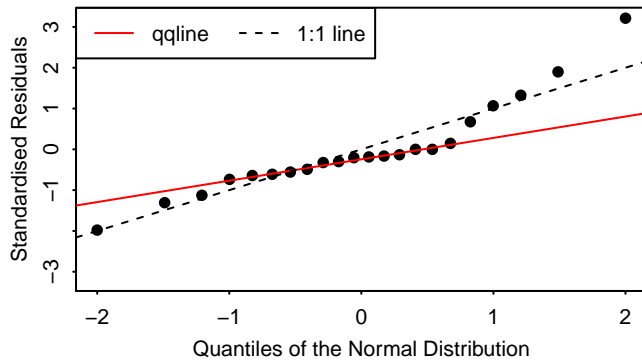
c) Standardised residuals over time



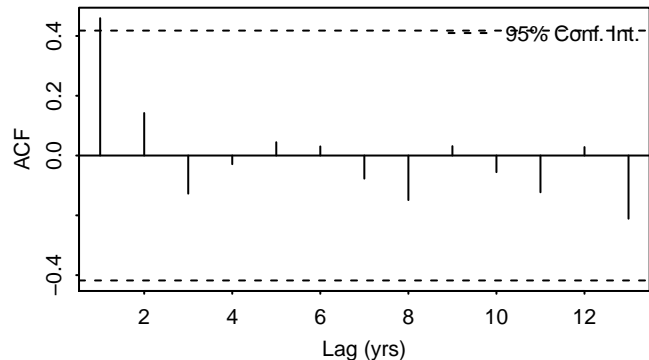
d) Tukey–Anscombe plot



e) Normal Q–Q plot

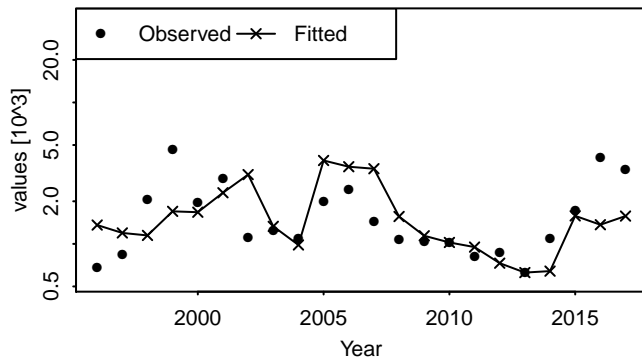


f) Autocorrelation of Residuals

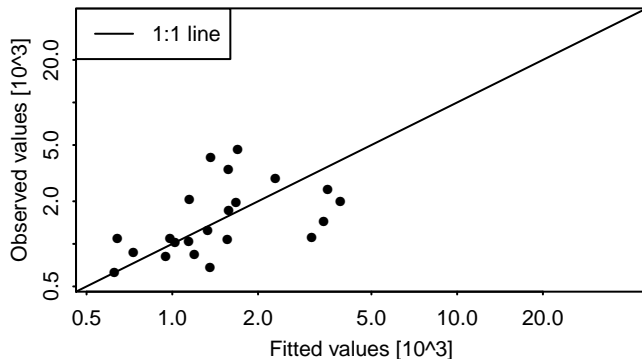


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 6

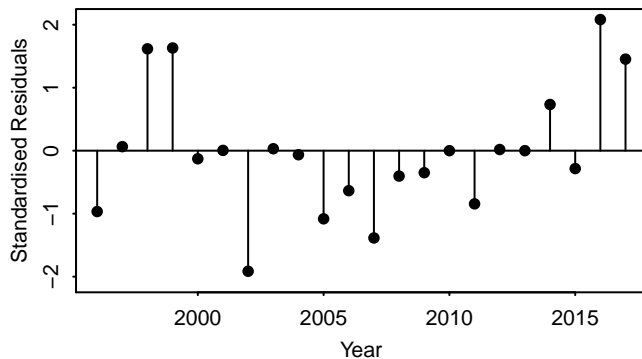
a) Observed and fitted values time series



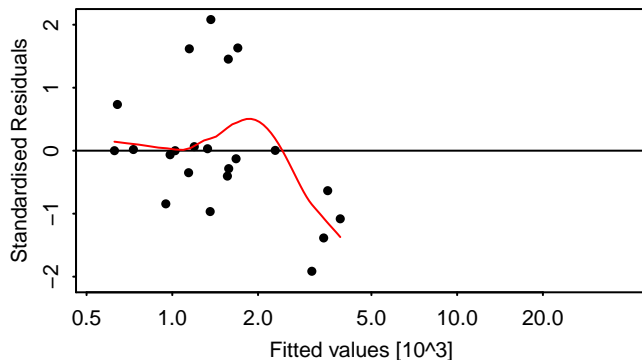
b) Observed vs fitted values



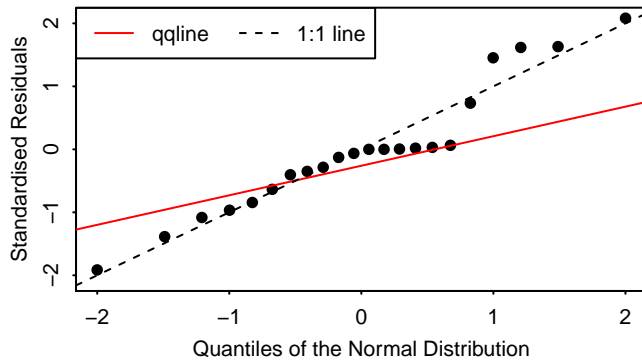
c) Standardised residuals over time



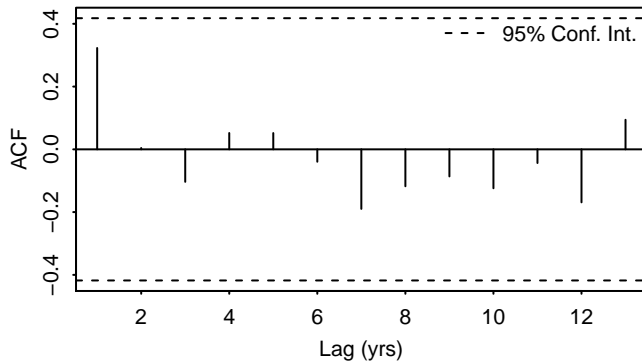
d) Tukey–Anscombe plot



e) Normal Q–Q plot

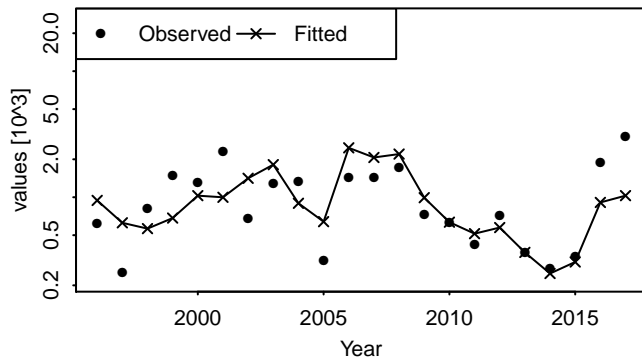


f) Autocorrelation of Residuals

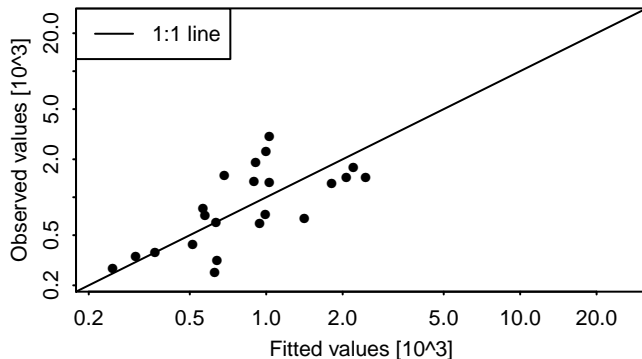


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 7

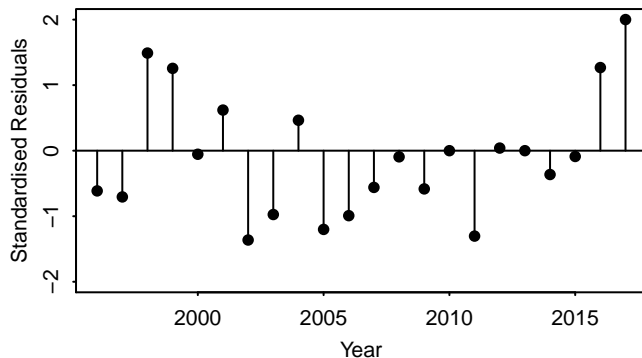
a) Observed and fitted values time series



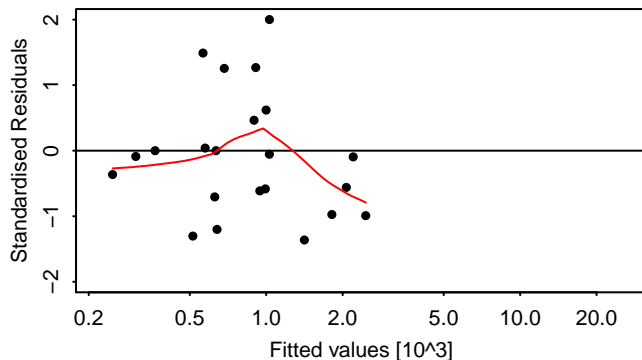
b) Observed vs fitted values



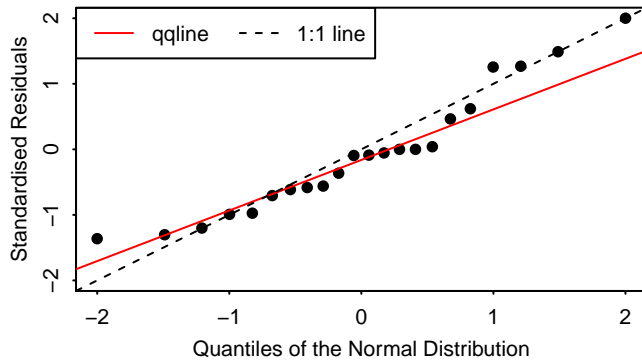
c) Standardised residuals over time



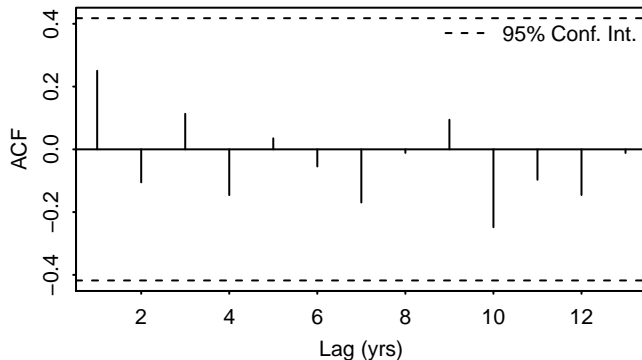
d) Tukey–Anscombe plot



e) Normal Q–Q plot

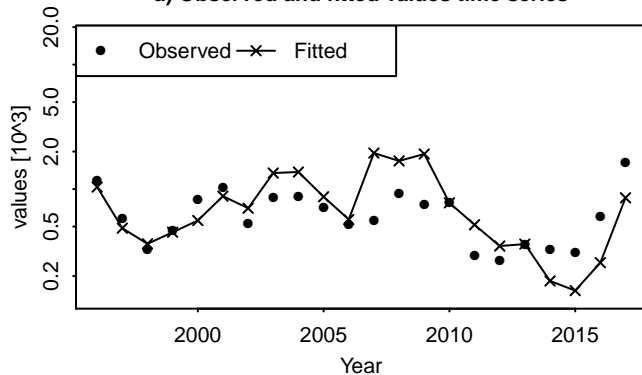


f) Autocorrelation of Residuals

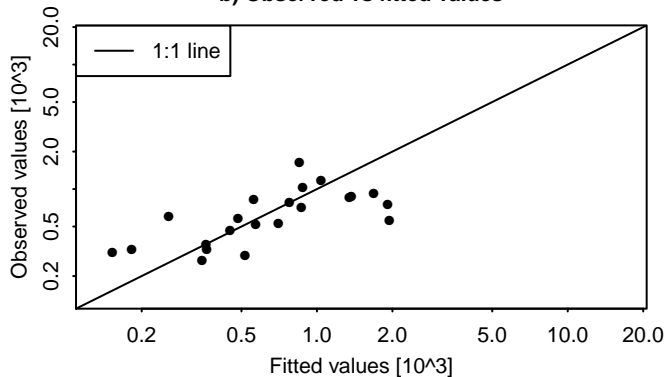


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 8

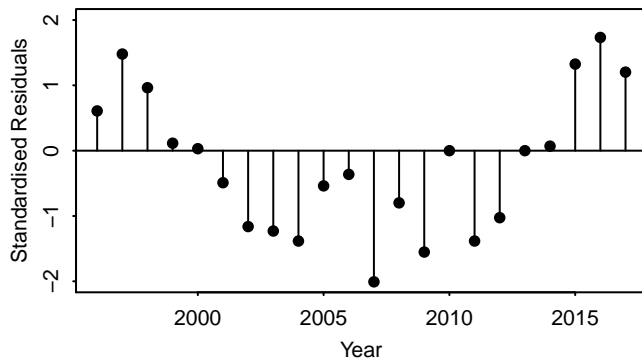
a) Observed and fitted values time series



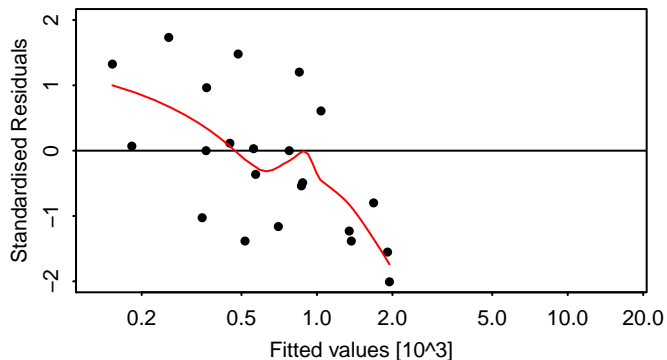
b) Observed vs fitted values



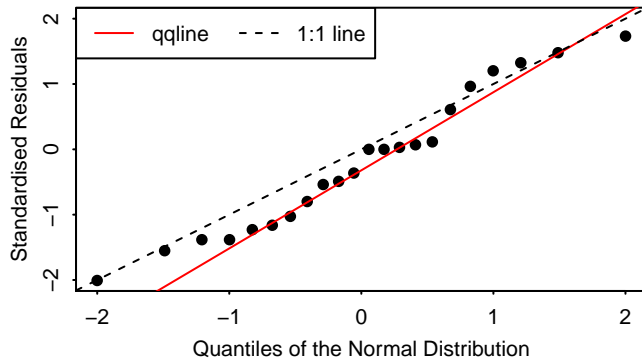
c) Standardised residuals over time



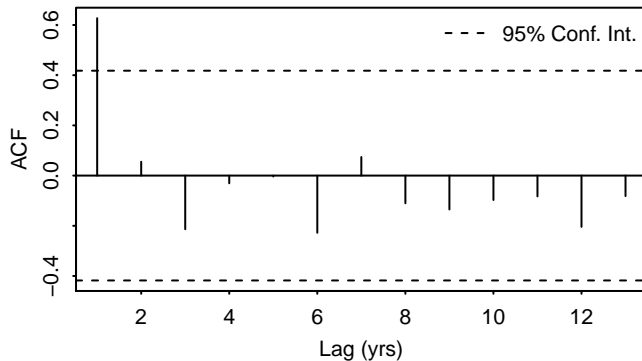
d) Tukey–Anscombe plot



e) Normal Q–Q plot

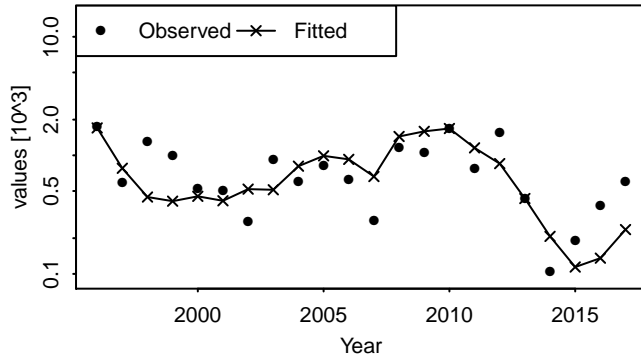


f) Autocorrelation of Residuals

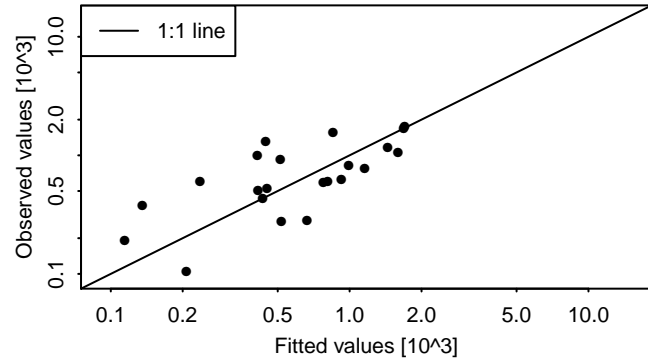


Herring in Vla (combined) and VIIbc Diagnostics – IBTS_Q4, age 9

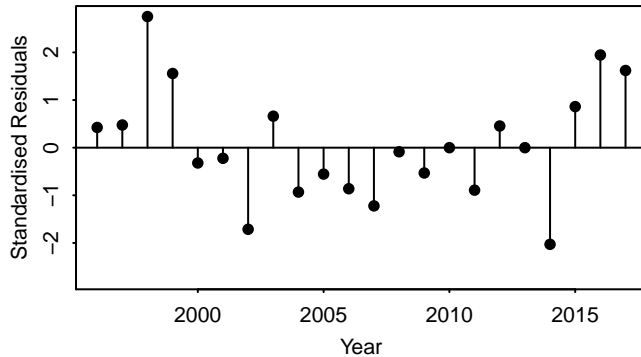
a) Observed and fitted values time series



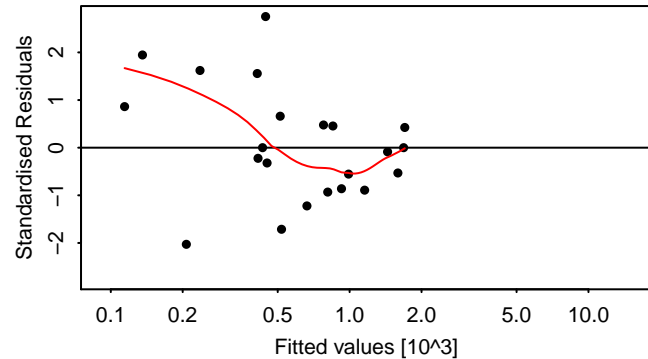
b) Observed vs fitted values



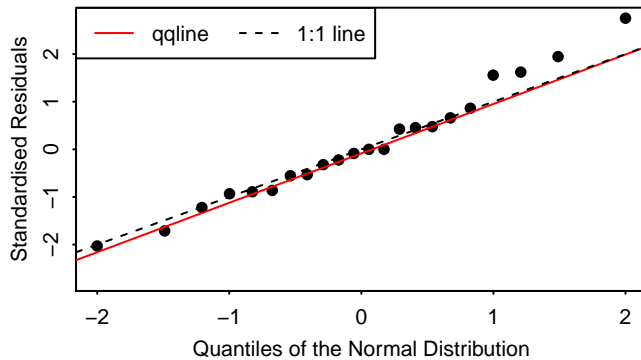
c) Standardised residuals over time



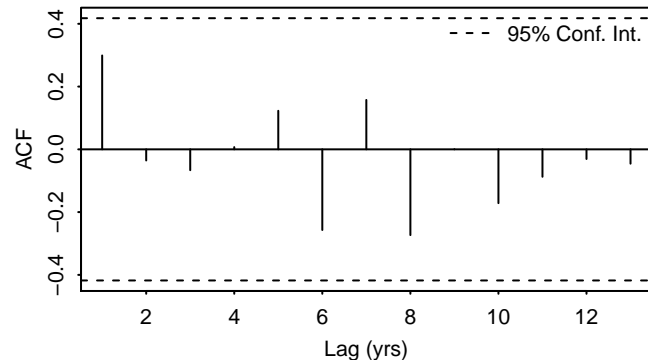
d) Tukey–Anscombe plot



e) Normal Q–Q plot

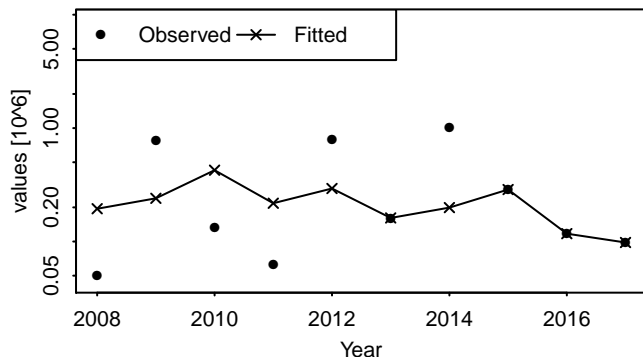


f) Autocorrelation of Residuals

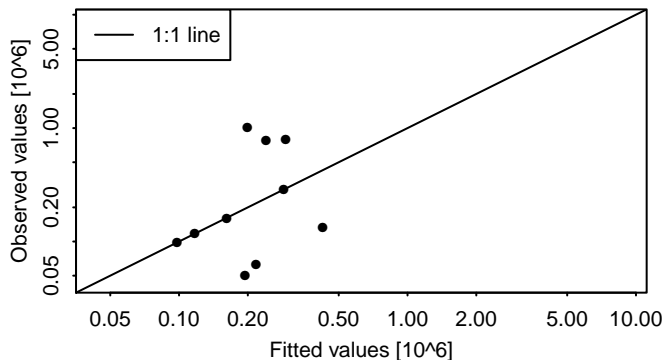


Herring in Vla (combined) and VIIbc Diagnostics – MS HERAS, age 1

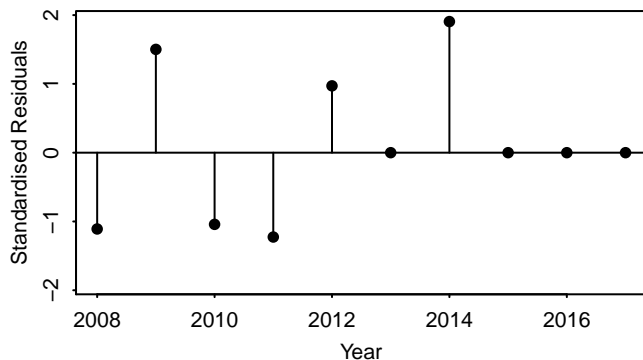
a) Observed and fitted values time series



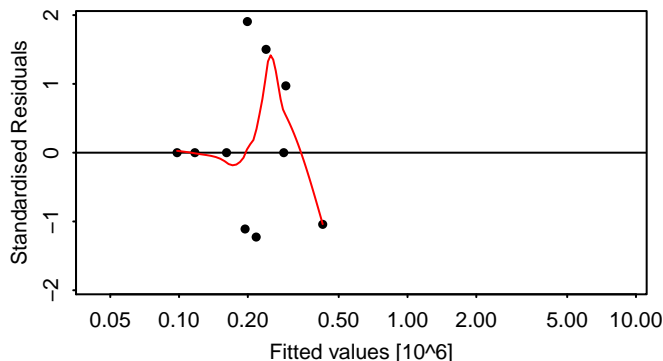
b) Observed vs fitted values



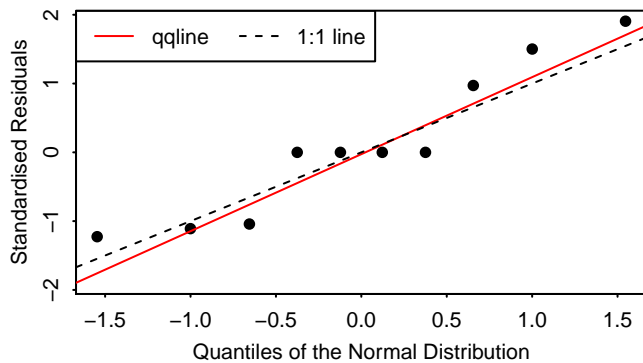
c) Standardised residuals over time



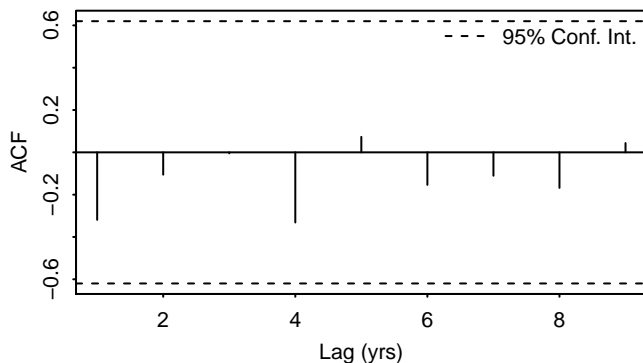
d) Tukey–Anscombe plot



e) Normal Q–Q plot

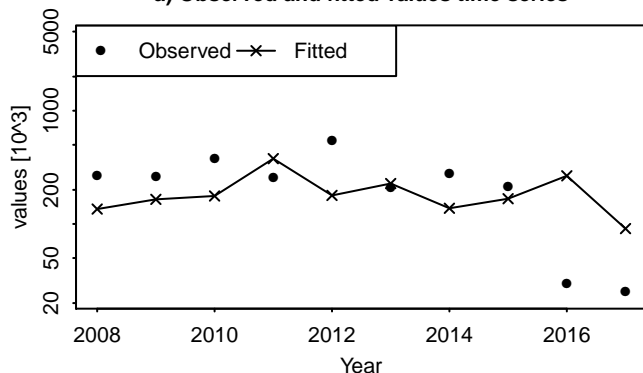


f) Autocorrelation of Residuals

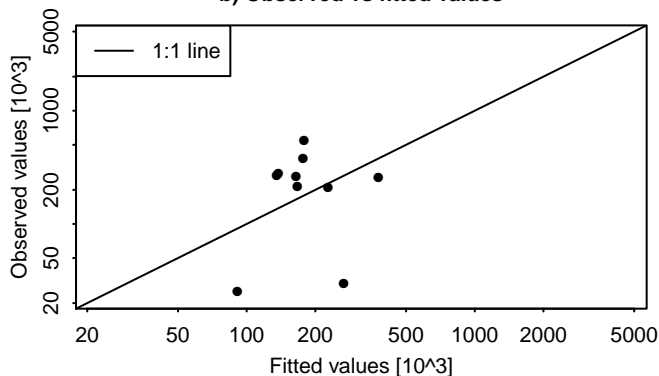


Herring in Vla (combined) and VIIbc Diagnostics – MS HERAS, age 2

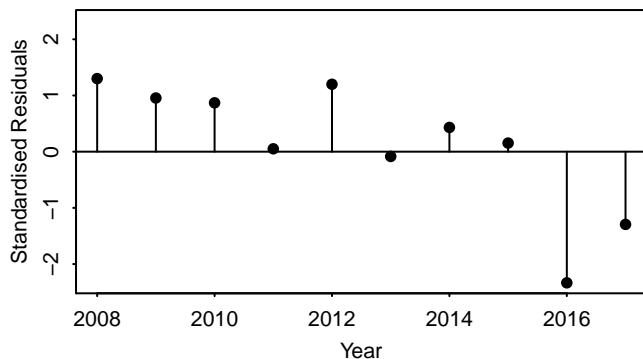
a) Observed and fitted values time series



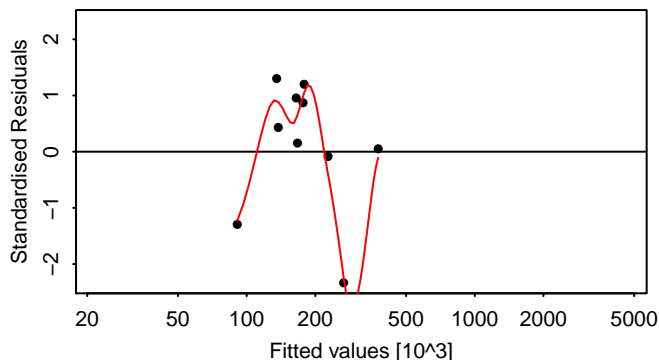
b) Observed vs fitted values



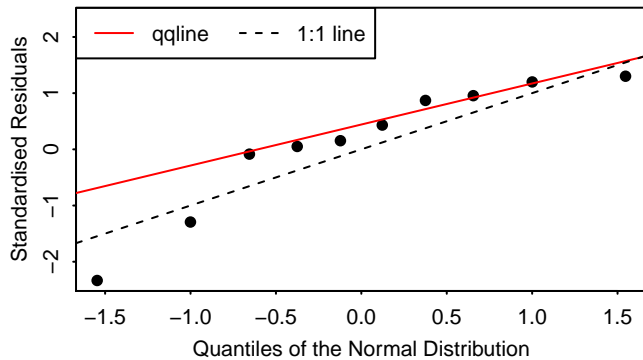
c) Standardised residuals over time



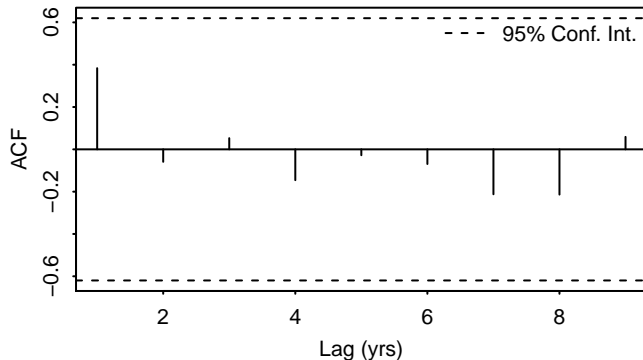
d) Tukey–Anscombe plot



e) Normal Q–Q plot

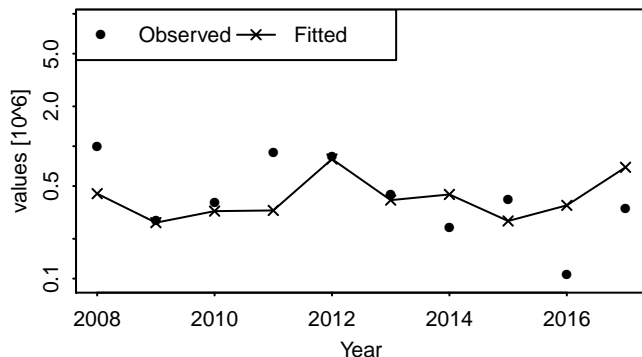


f) Autocorrelation of Residuals

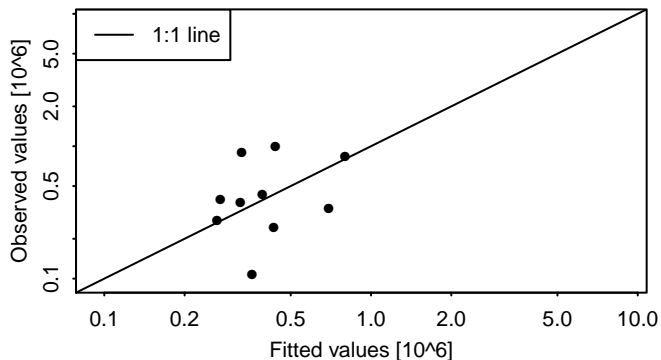


Herring in V1a (combined) and VIIbc Diagnostics – MS HERAS, age 3

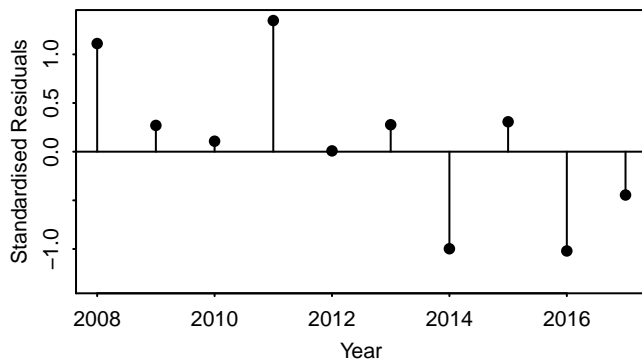
a) Observed and fitted values time series



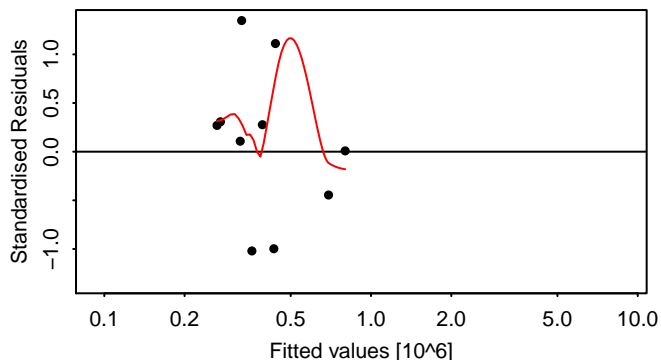
b) Observed vs fitted values



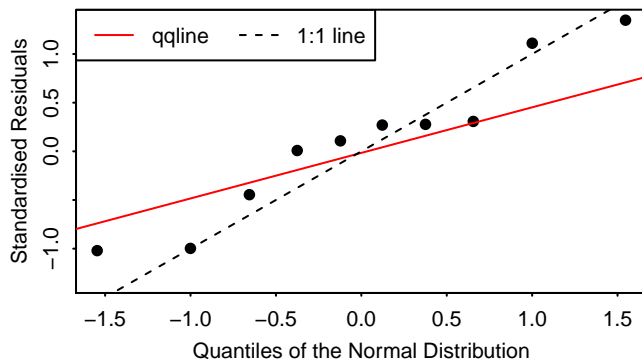
c) Standardised residuals over time



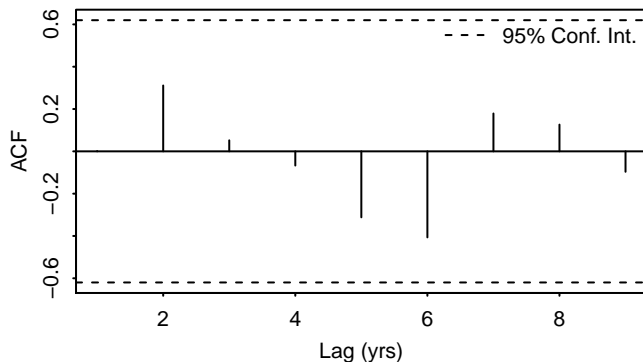
d) Tukey–Anscombe plot



e) Normal Q–Q plot

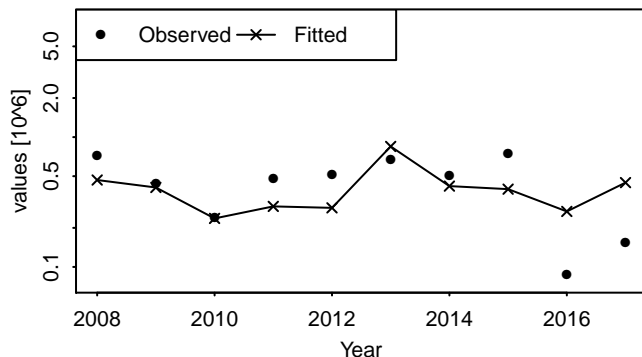


f) Autocorrelation of Residuals

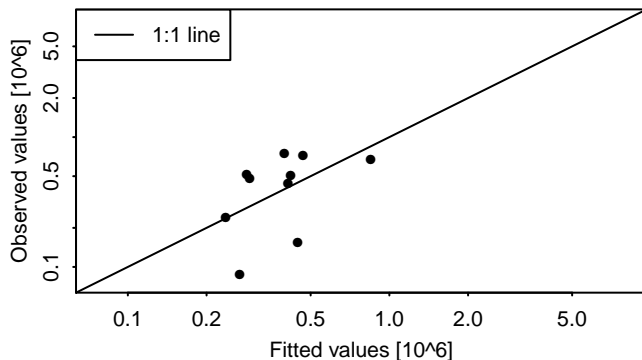


Herring in Vla (combined) and VIIbc Diagnostics – MS HERAS, age 4

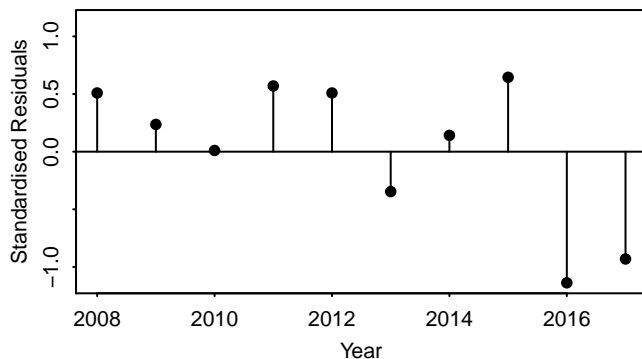
a) Observed and fitted values time series



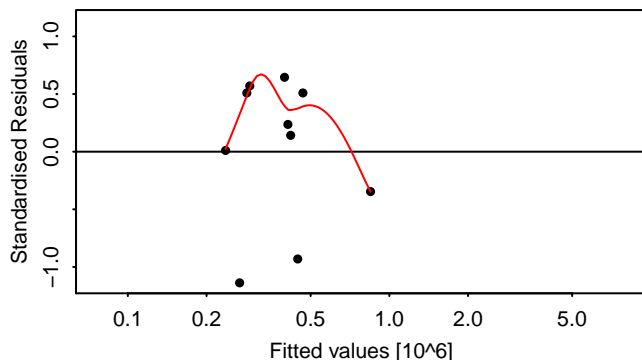
b) Observed vs fitted values



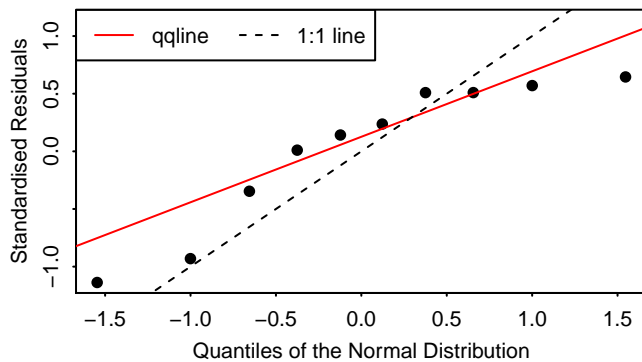
c) Standardised residuals over time



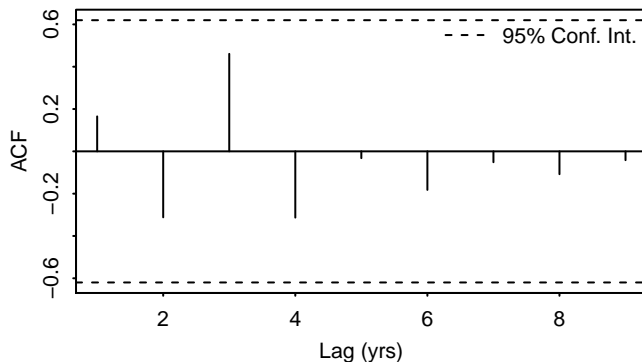
d) Tukey–Anscombe plot



e) Normal Q–Q plot

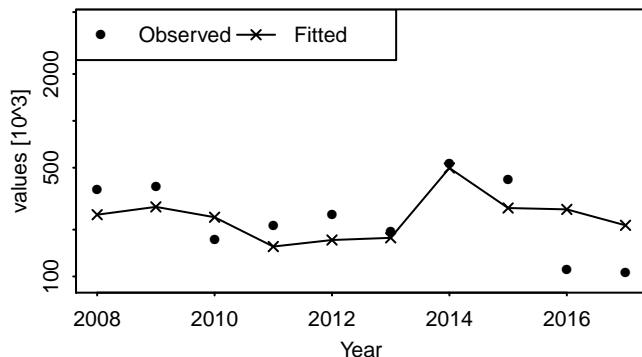


f) Autocorrelation of Residuals

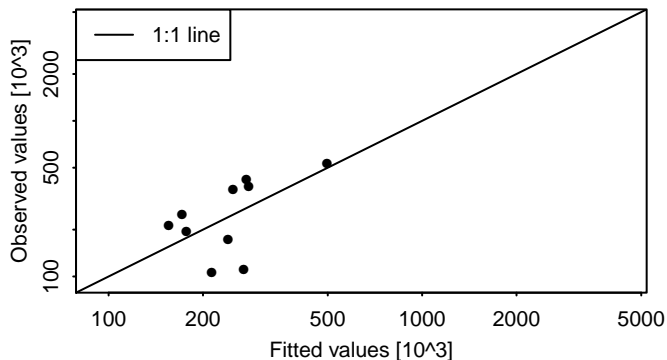


Herring in Vla (combined) and VIIbc Diagnostics – MS HERAS, age 5

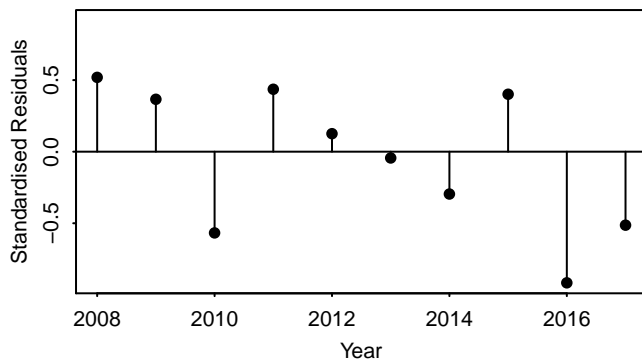
a) Observed and fitted values time series



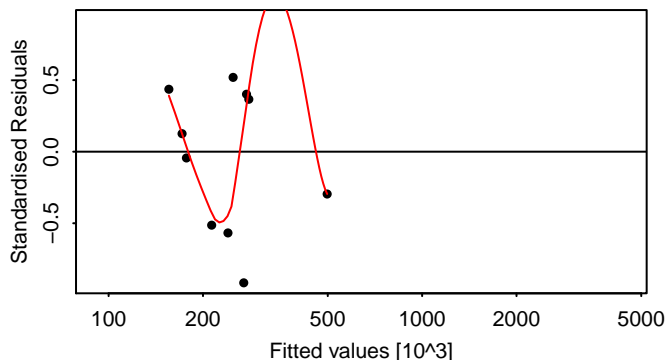
b) Observed vs fitted values



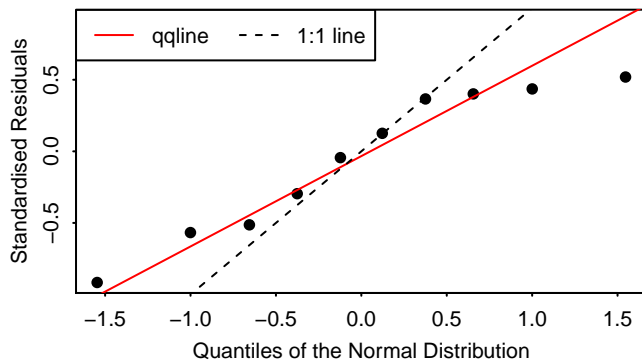
c) Standardised residuals over time



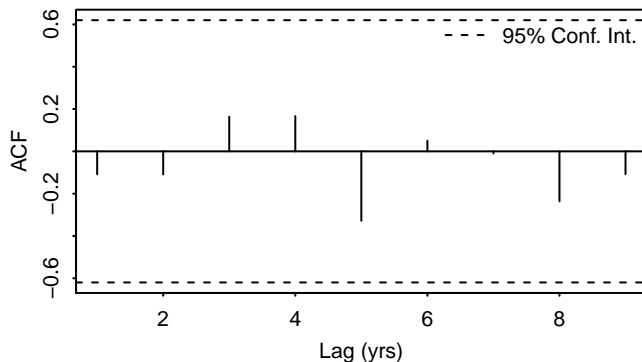
d) Tukey–Anscombe plot



e) Normal Q–Q plot

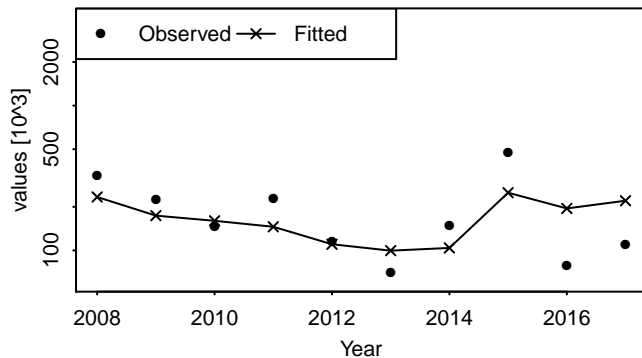


f) Autocorrelation of Residuals

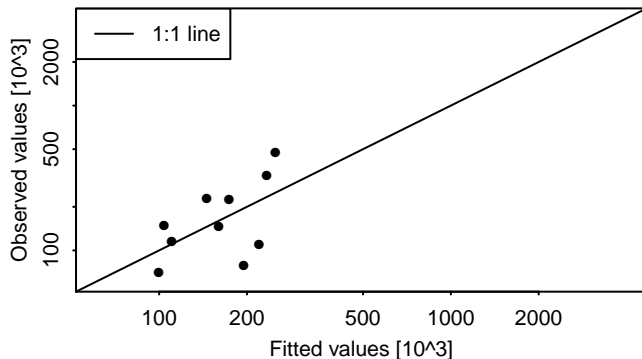


Herring in V1a (combined) and VIIbc Diagnostics – MS HERAS, age 6

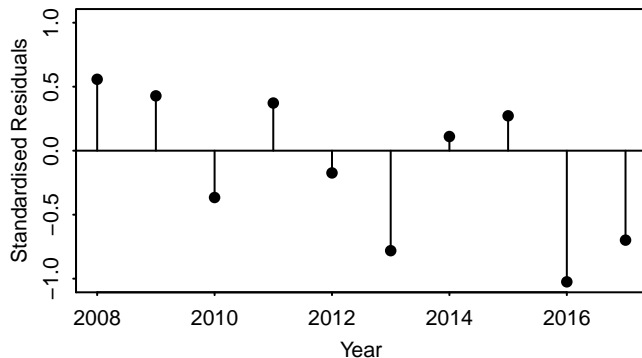
a) Observed and fitted values time series



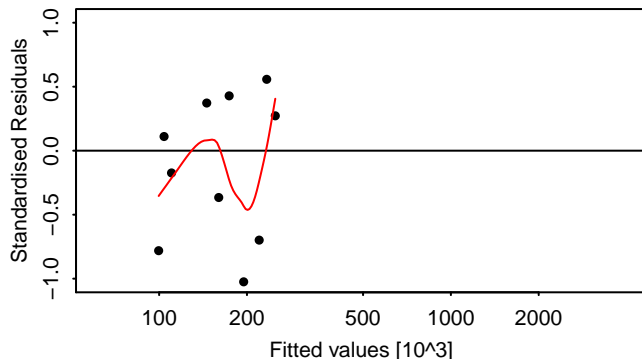
b) Observed vs fitted values



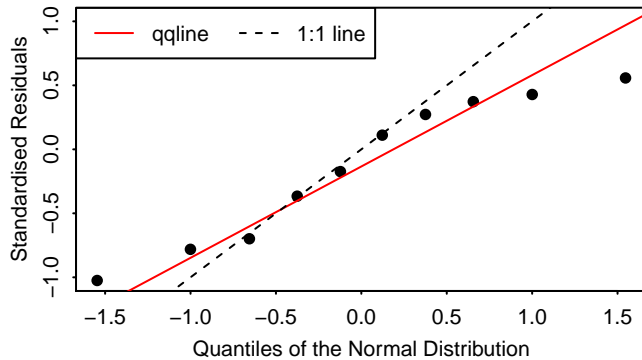
c) Standardised residuals over time



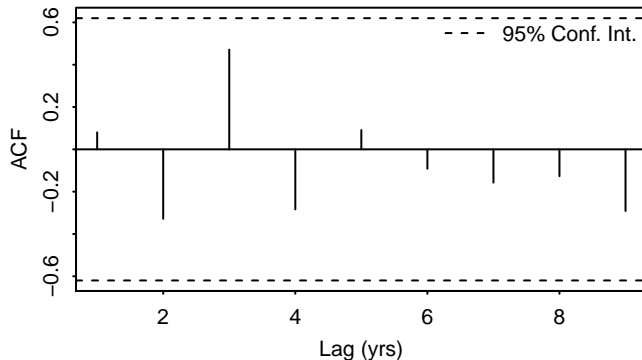
d) Tukey–Anscombe plot



e) Normal Q–Q plot

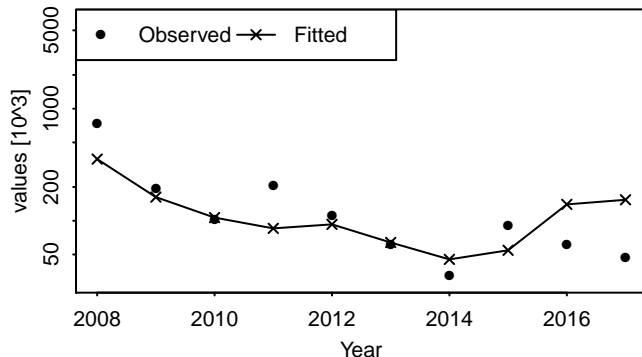


f) Autocorrelation of Residuals

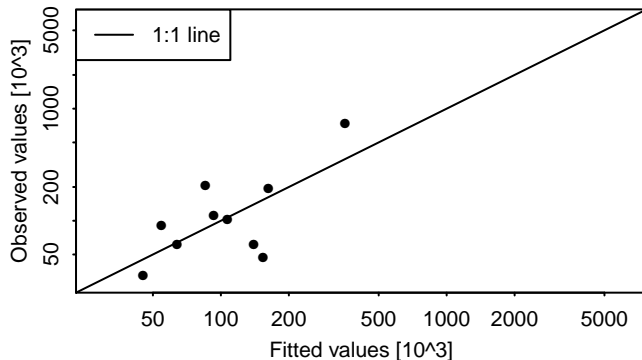


Herring in V1a (combined) and VIIbc Diagnostics – MS HERAS, age 7

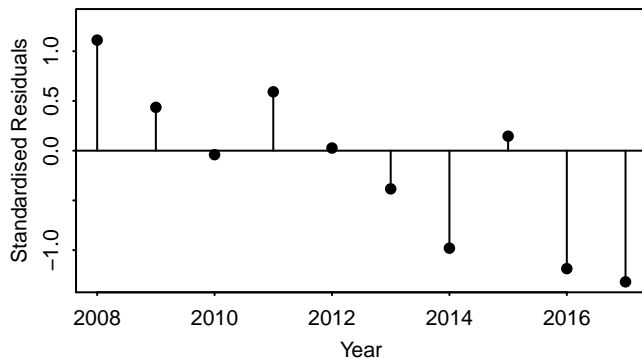
a) Observed and fitted values time series



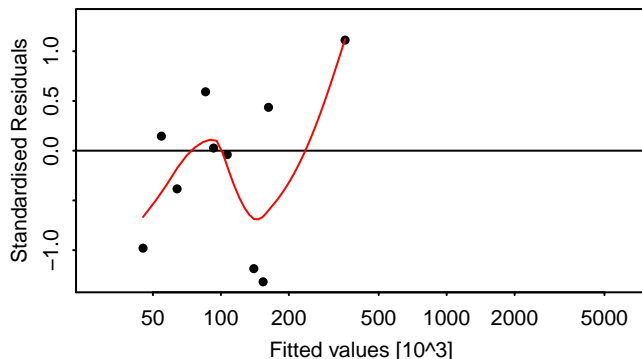
b) Observed vs fitted values



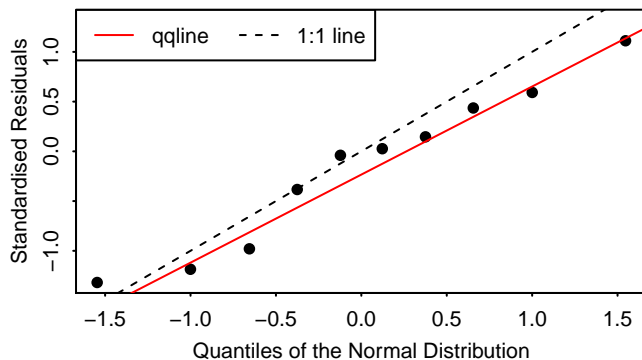
c) Standardised residuals over time



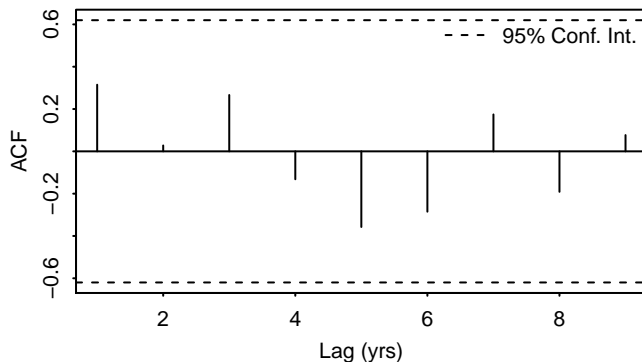
d) Tukey–Anscombe plot



e) Normal Q–Q plot

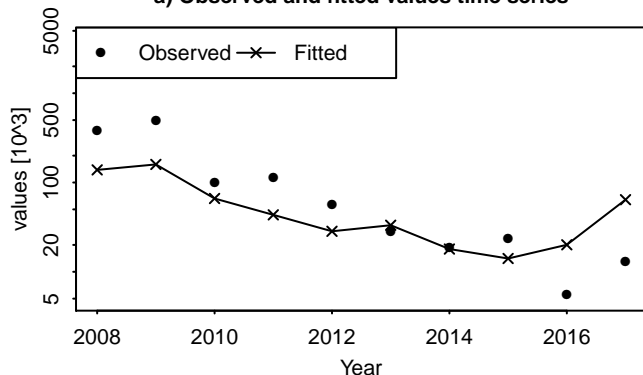


f) Autocorrelation of Residuals

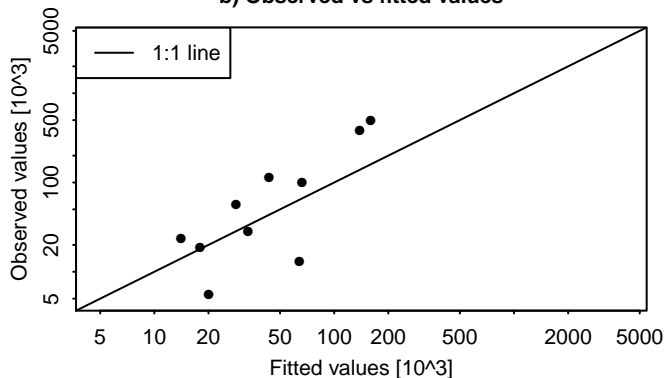


Herring in Vla (combined) and VIIbc Diagnostics – MS HERAS, age 8

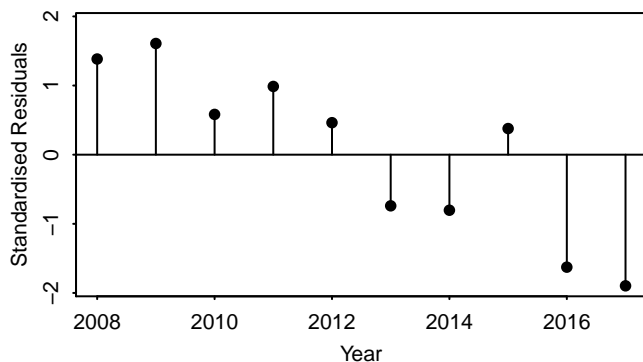
a) Observed and fitted values time series



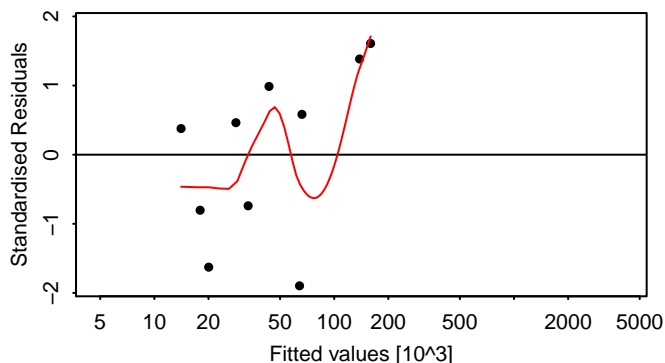
b) Observed vs fitted values



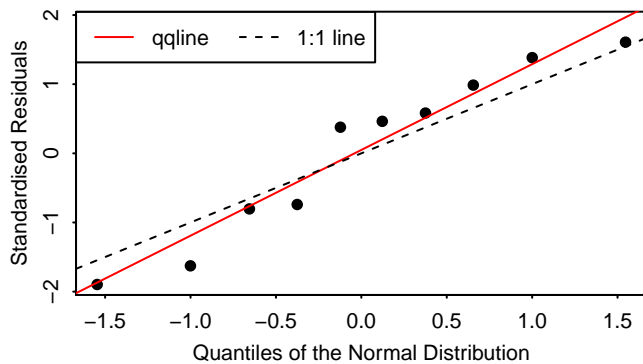
c) Standardised residuals over time



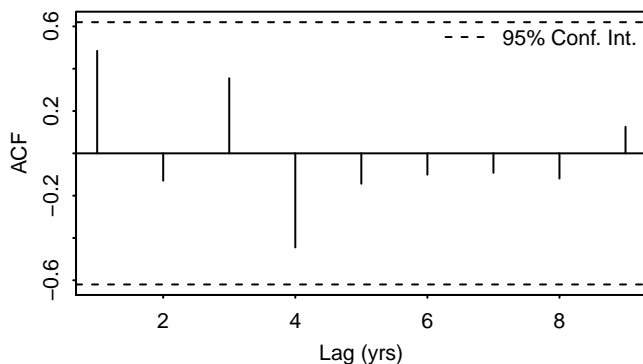
d) Tukey–Anscombe plot



e) Normal Q–Q plot

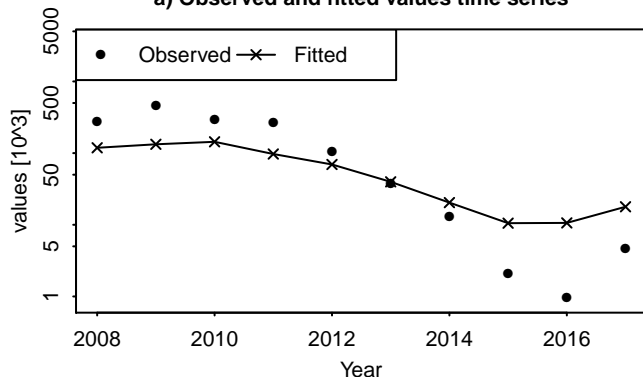


f) Autocorrelation of Residuals

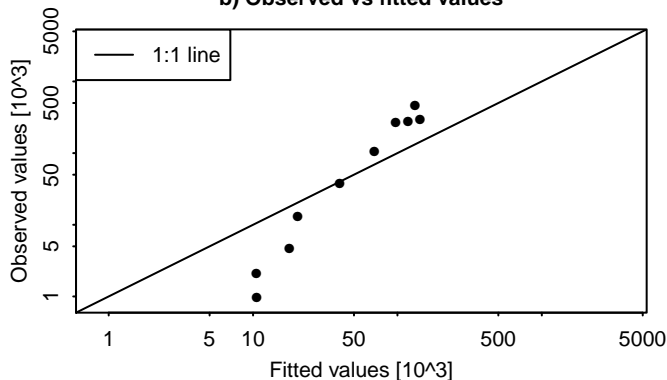


Herring in Vla (combined) and VIIbc Diagnostics – MS HERAS, age 9

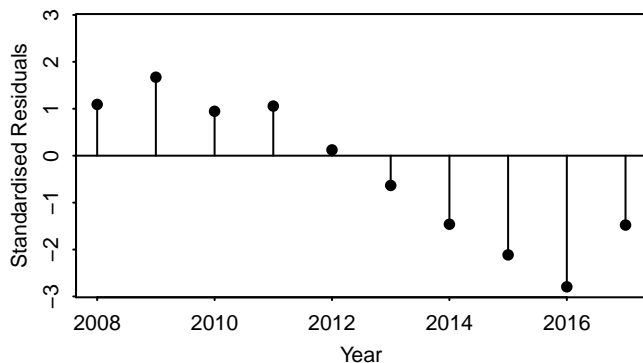
a) Observed and fitted values time series



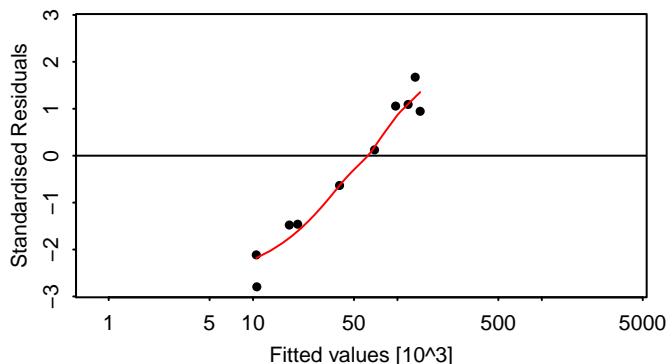
b) Observed vs fitted values



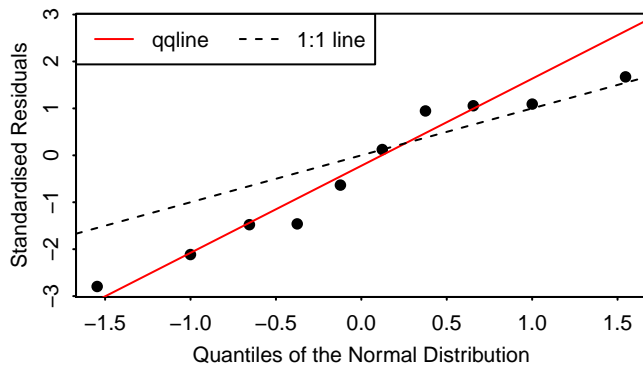
c) Standardised residuals over time



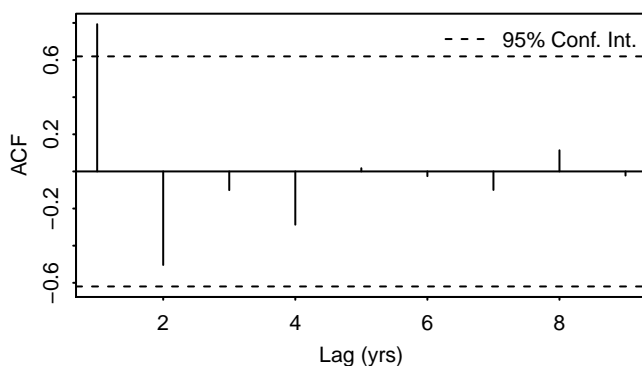
d) Tukey–Anscombe plot



e) Normal Q–Q plot

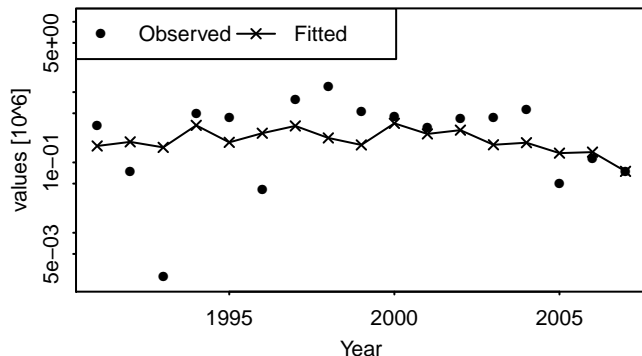


f) Autocorrelation of Residuals

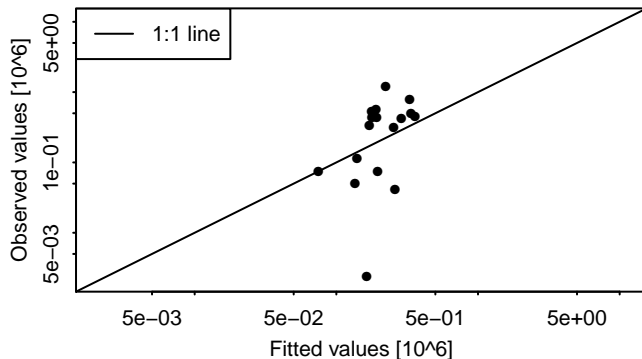


Herring in V1a (combined) and V11bc Diagnostics – WoS HERAS, age 1

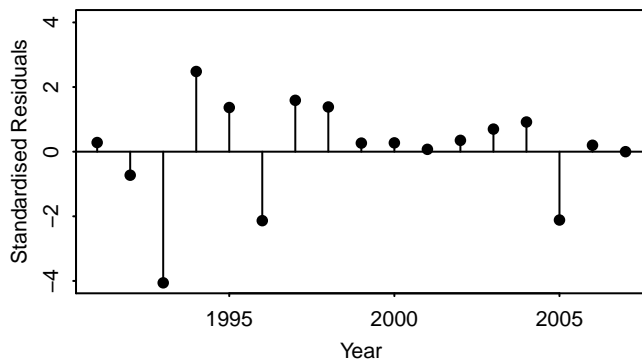
a) Observed and fitted values time series



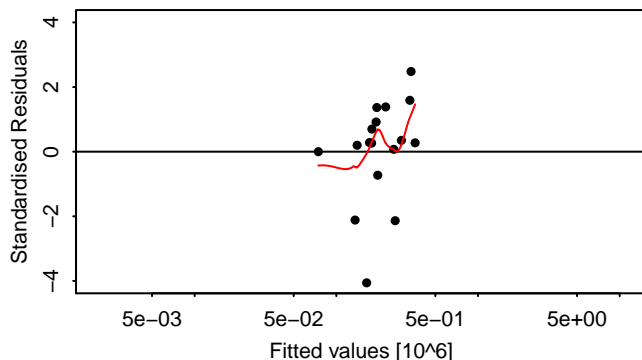
b) Observed vs fitted values



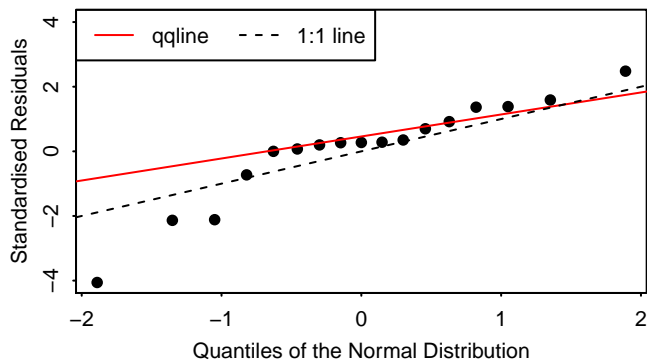
c) Standardised residuals over time



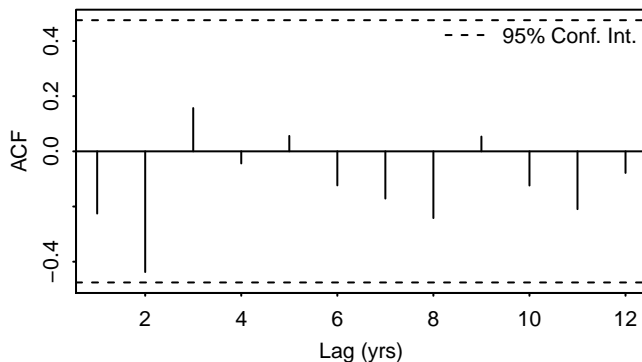
d) Tukey–Anscombe plot



e) Normal Q–Q plot

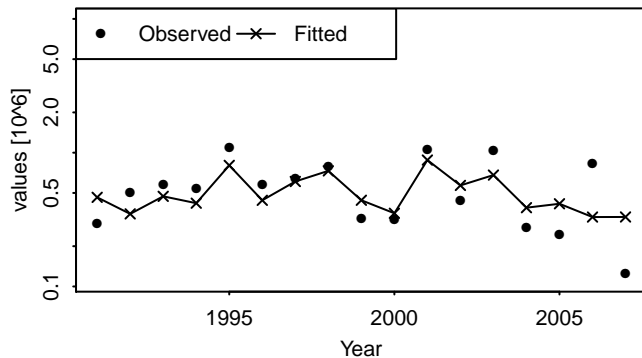


f) Autocorrelation of Residuals

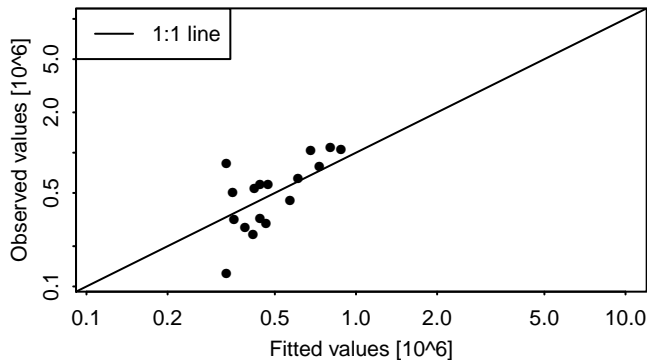


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 2

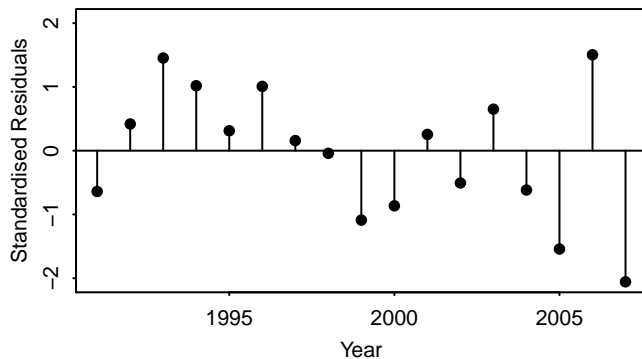
a) Observed and fitted values time series



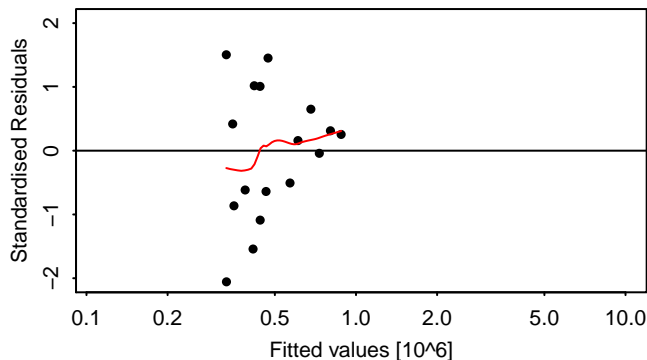
b) Observed vs fitted values



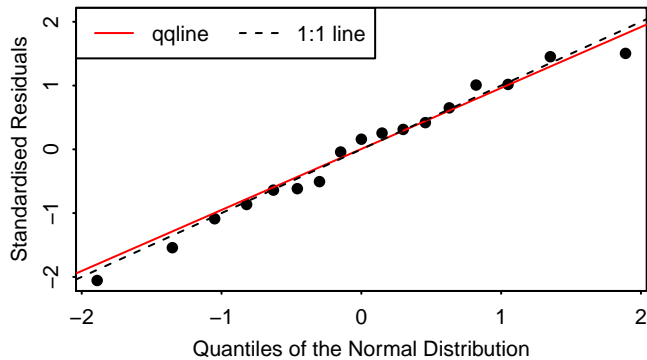
c) Standardised residuals over time



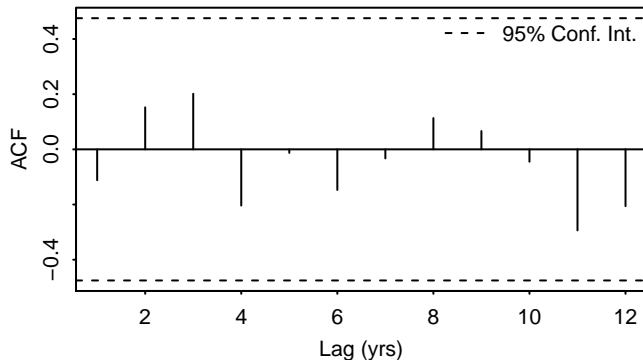
d) Tukey–Anscombe plot



e) Normal Q–Q plot

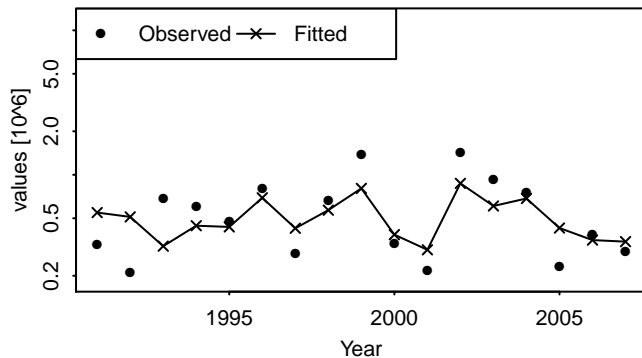


f) Autocorrelation of Residuals

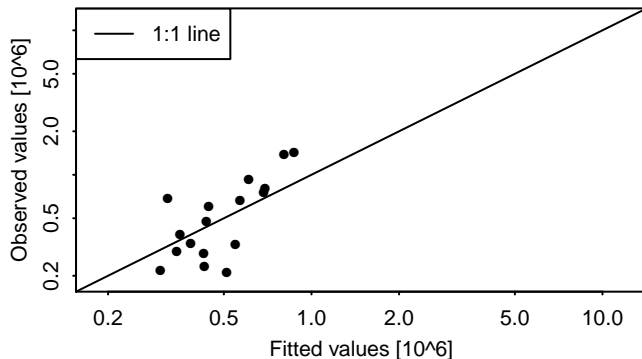


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 3

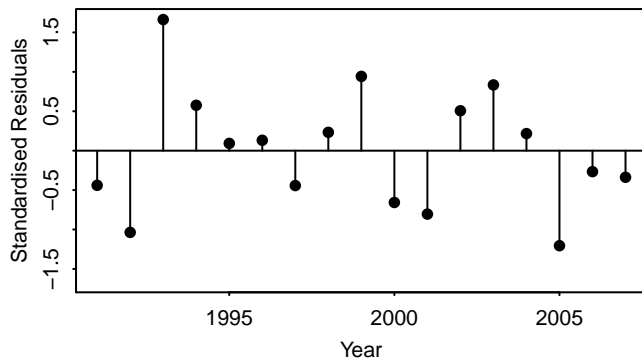
a) Observed and fitted values time series



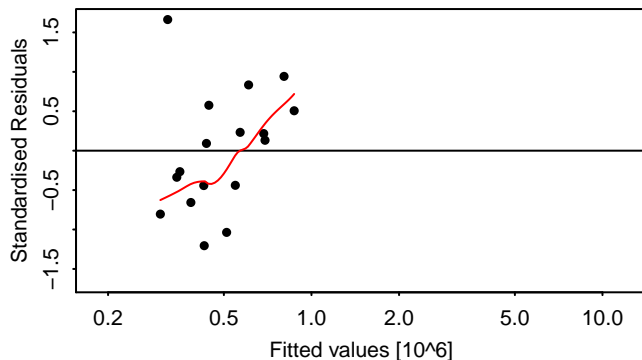
b) Observed vs fitted values



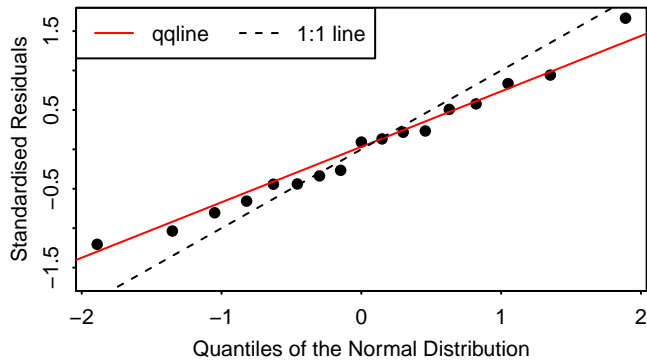
c) Standardised residuals over time



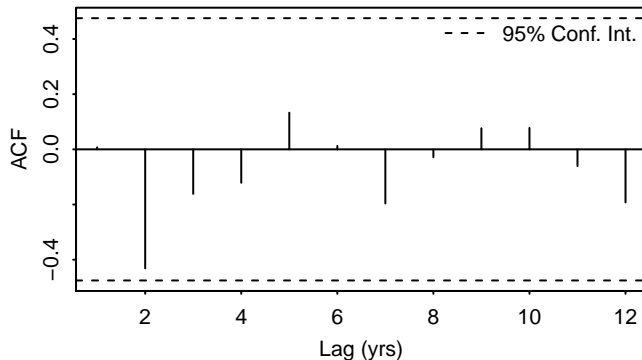
d) Tukey–Anscombe plot



e) Normal Q–Q plot

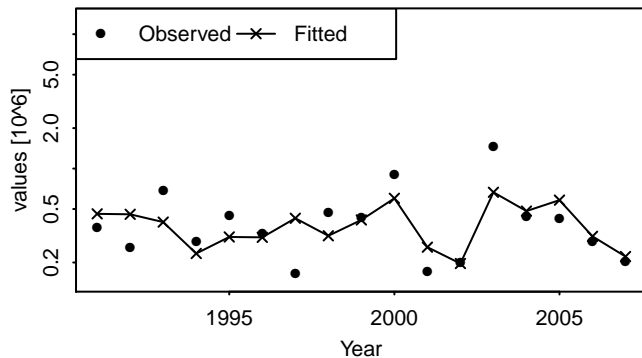


f) Autocorrelation of Residuals

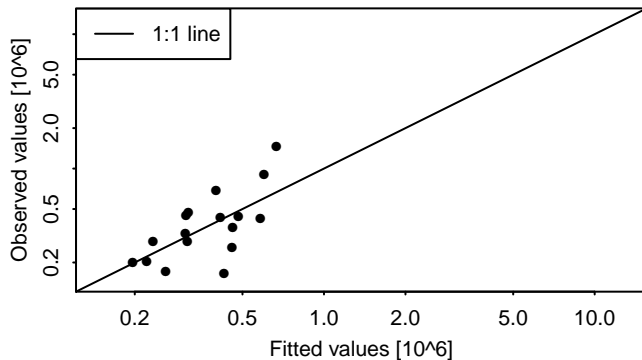


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 4

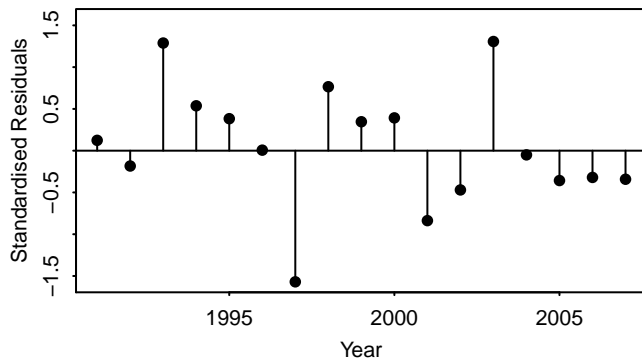
a) Observed and fitted values time series



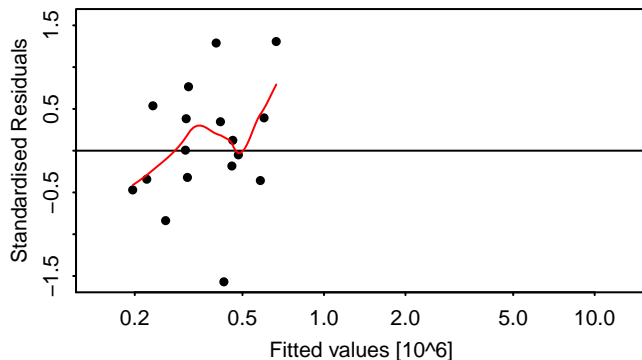
b) Observed vs fitted values



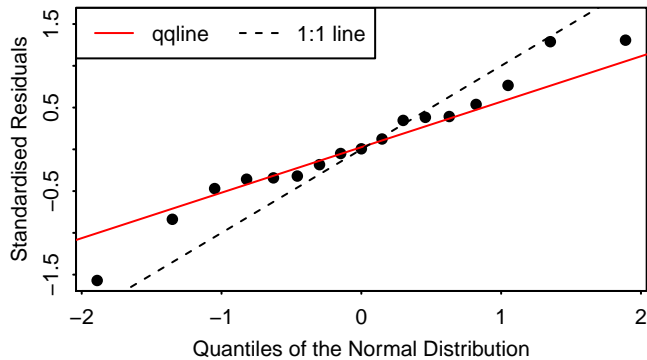
c) Standardised residuals over time



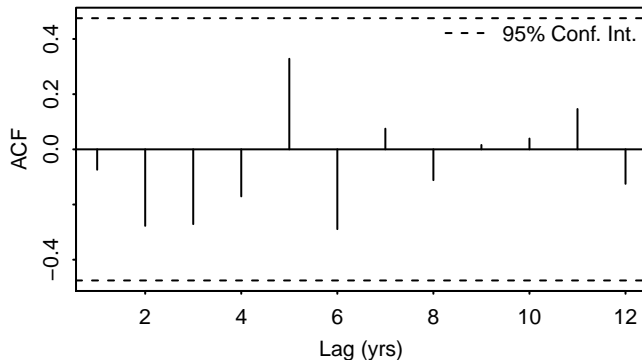
d) Tukey–Anscombe plot



e) Normal Q–Q plot

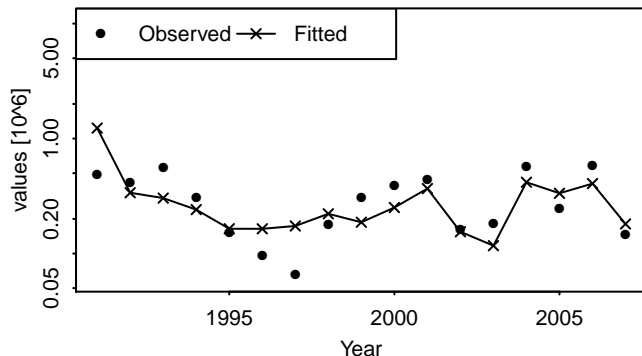


f) Autocorrelation of Residuals

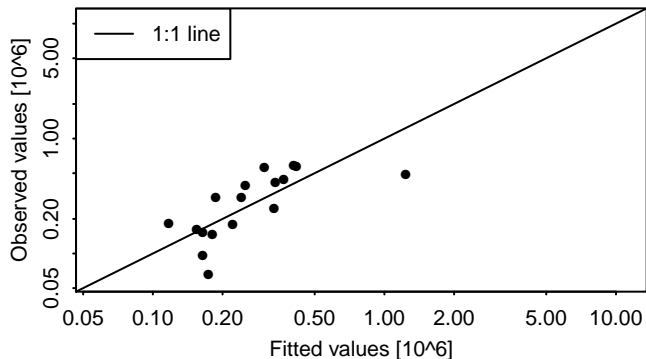


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 5

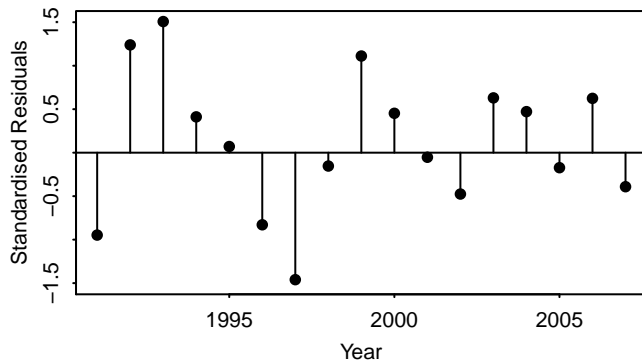
a) Observed and fitted values time series



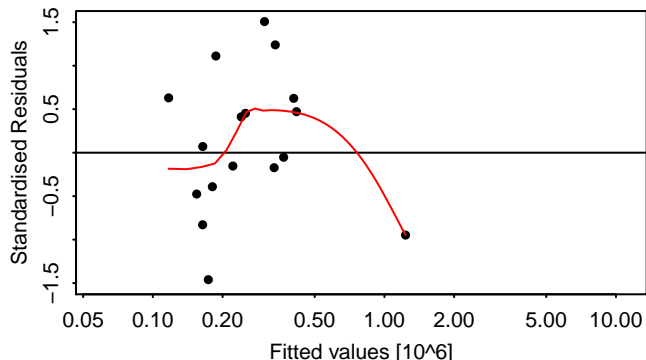
b) Observed vs fitted values



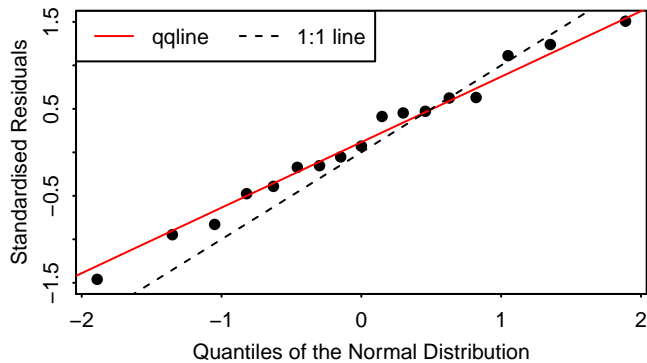
c) Standardised residuals over time



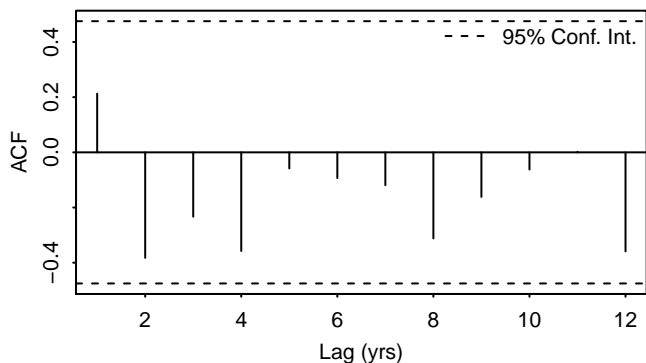
d) Tukey–Anscombe plot



e) Normal Q–Q plot

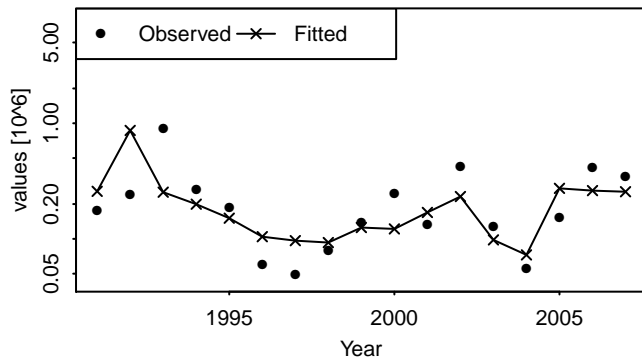


f) Autocorrelation of Residuals

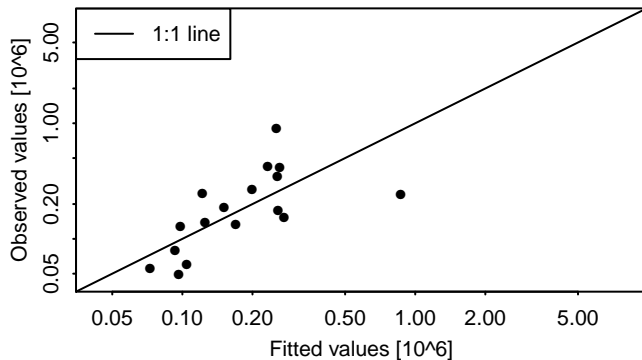


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 6

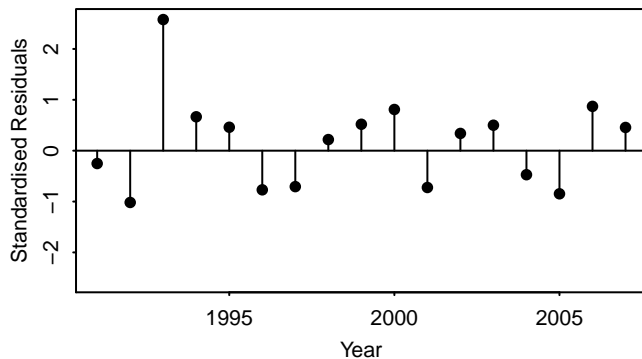
a) Observed and fitted values time series



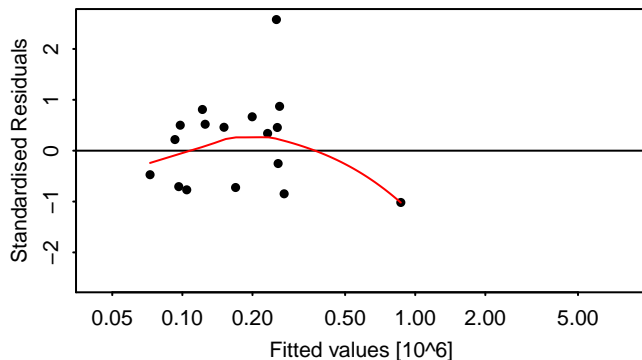
b) Observed vs fitted values



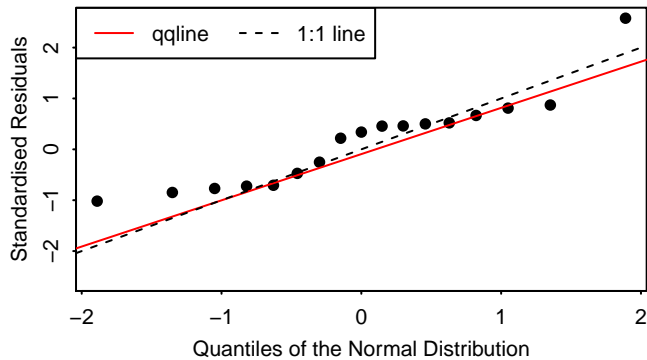
c) Standardised residuals over time



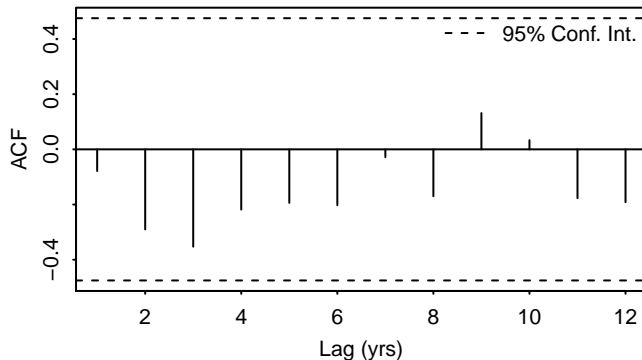
d) Tukey–Anscombe plot



e) Normal Q–Q plot

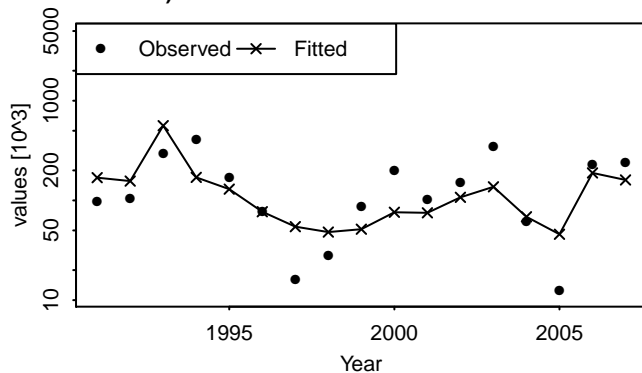


f) Autocorrelation of Residuals

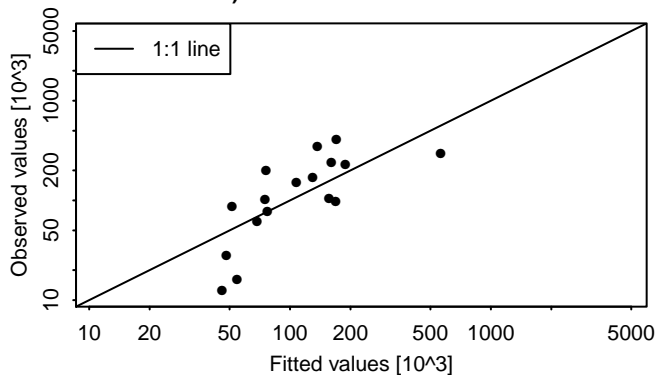


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 7

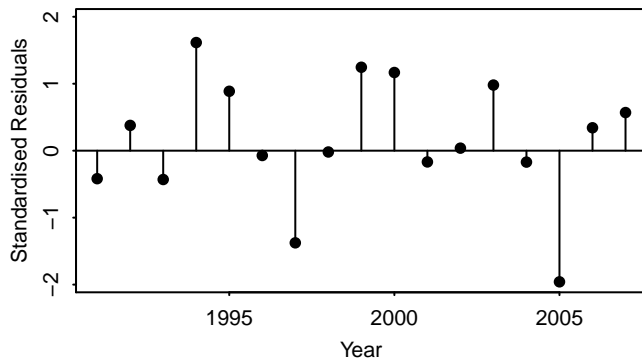
a) Observed and fitted values time series



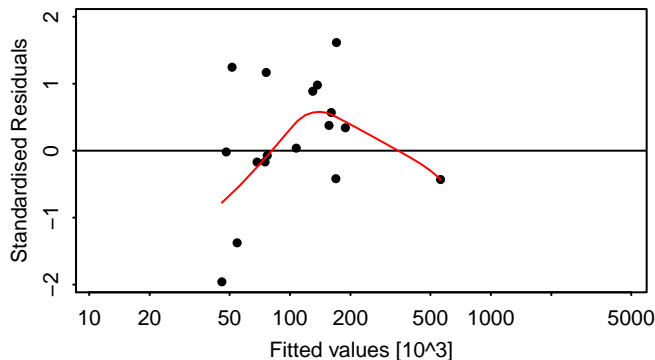
b) Observed vs fitted values



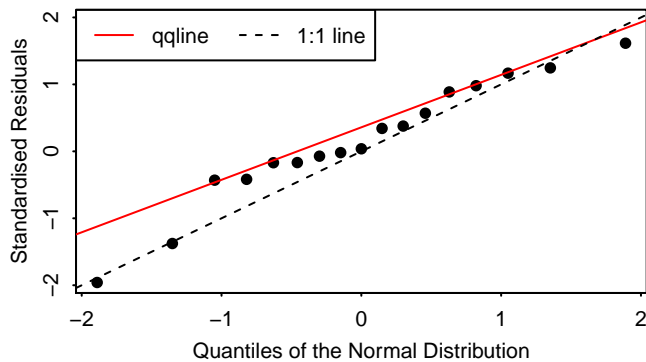
c) Standardised residuals over time



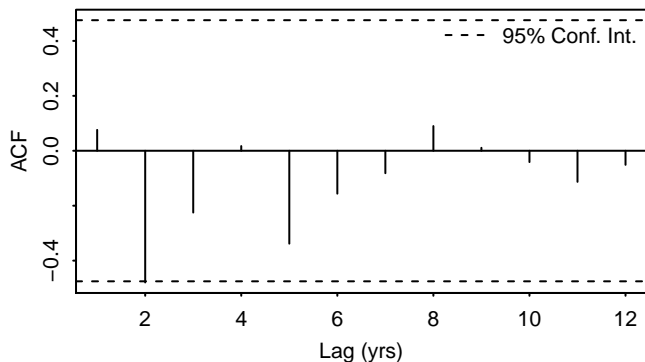
d) Tukey–Anscombe plot



e) Normal Q–Q plot

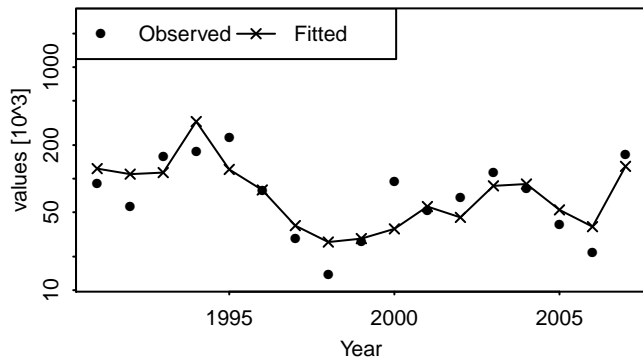


f) Autocorrelation of Residuals

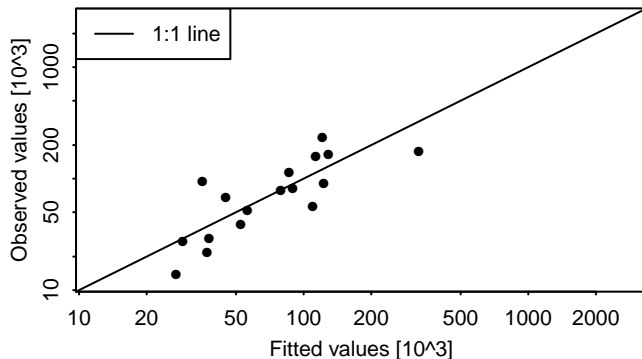


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 8

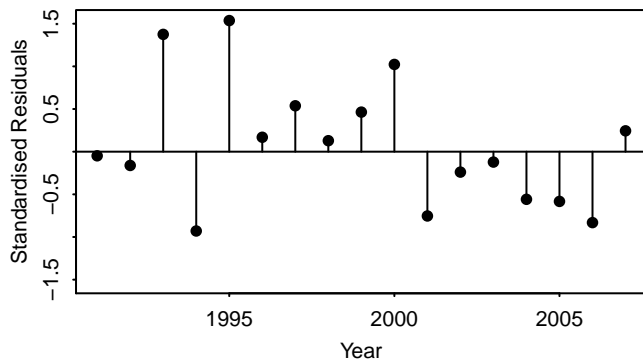
a) Observed and fitted values time series



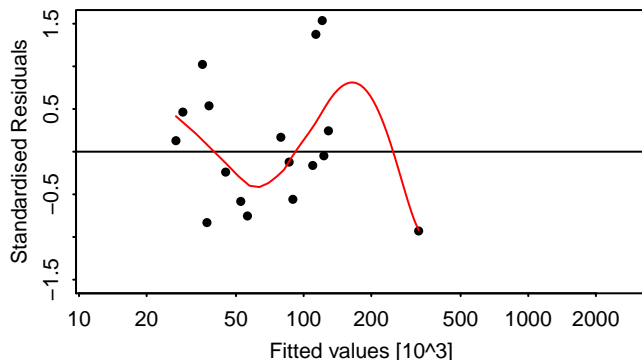
b) Observed vs fitted values



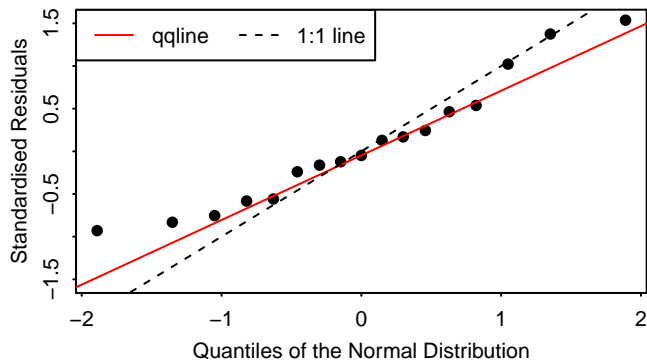
c) Standardised residuals over time



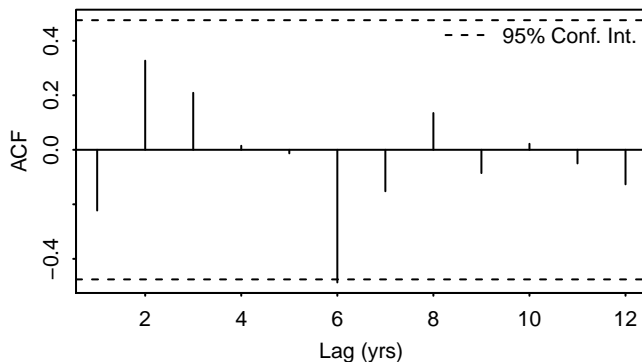
d) Tukey–Anscombe plot



e) Normal Q–Q plot

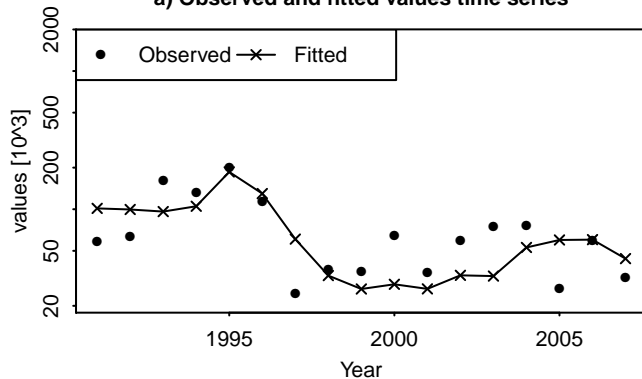


f) Autocorrelation of Residuals

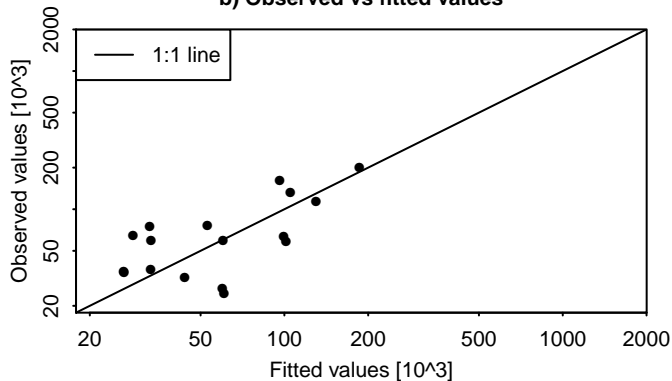


Herring in Vla (combined) and VIIbc Diagnostics – WoS HERAS, age 9

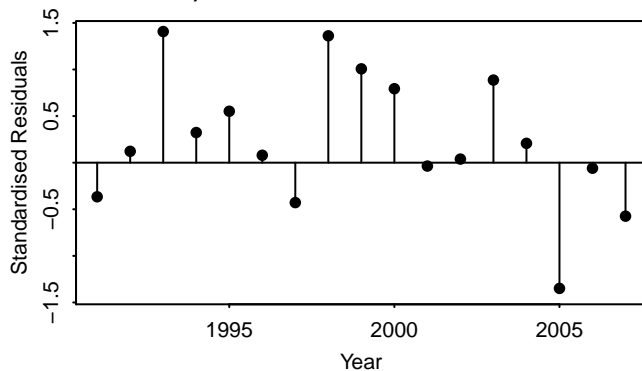
a) Observed and fitted values time series



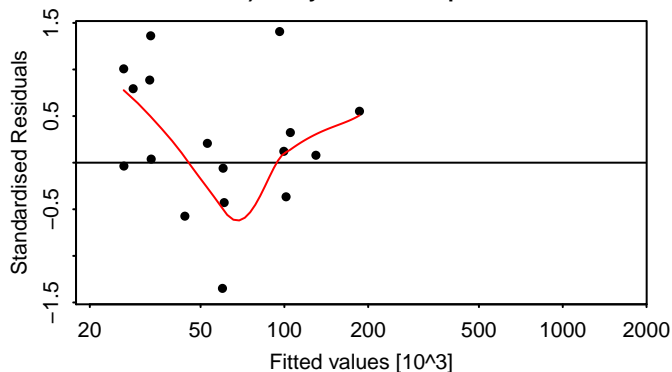
b) Observed vs fitted values



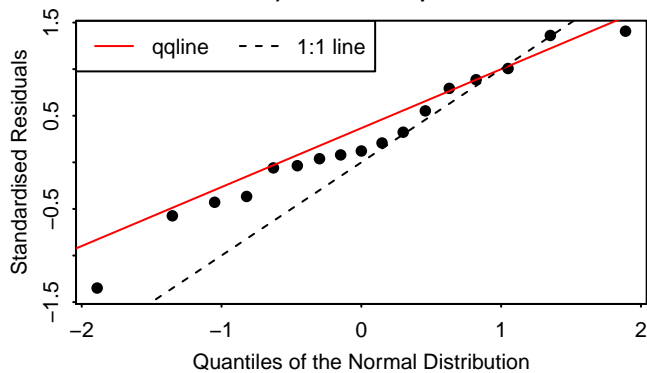
c) Standardised residuals over time



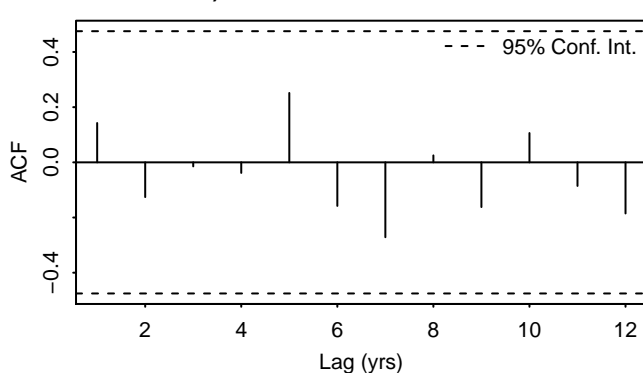
d) Tukey–Anscombe plot



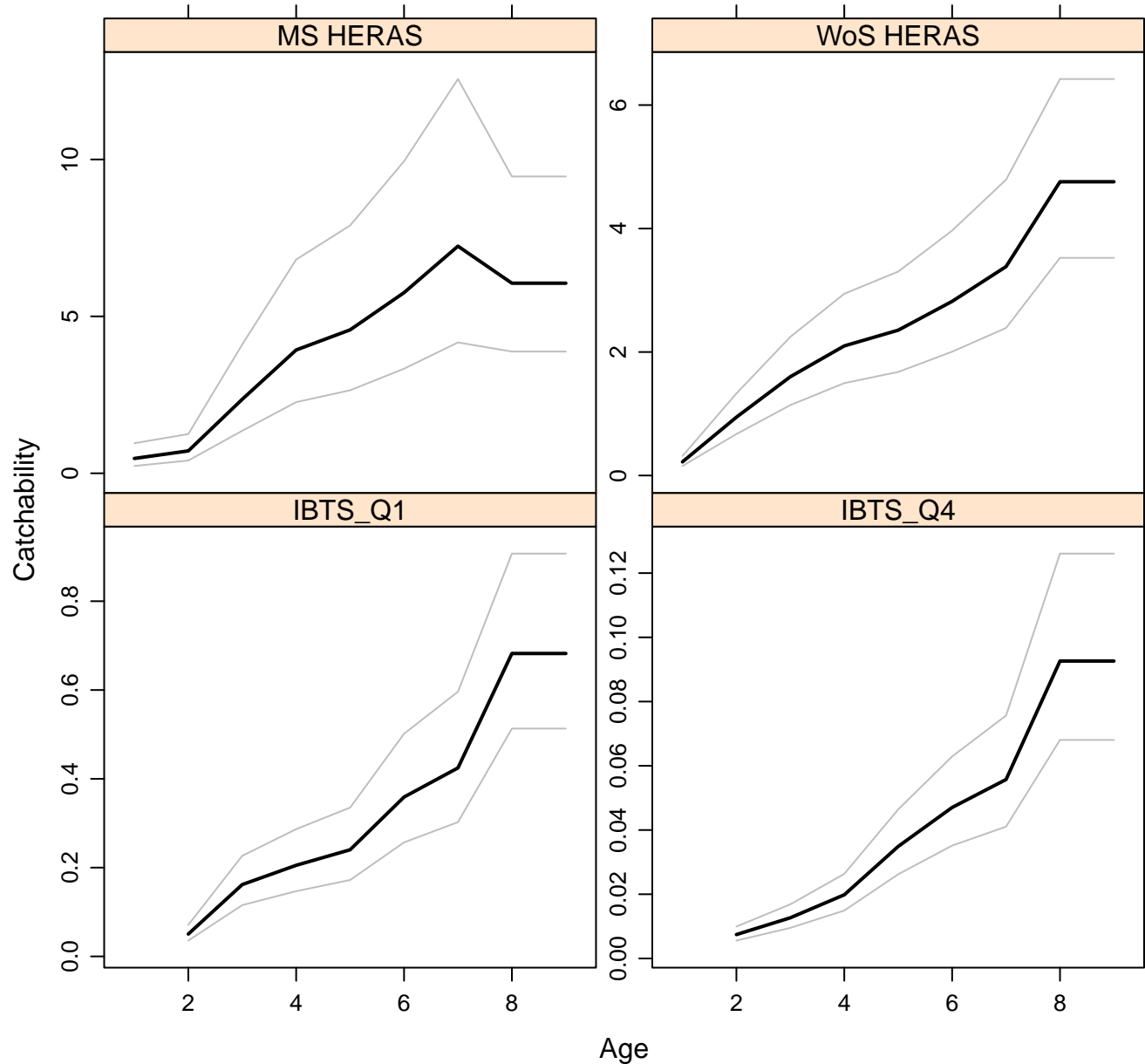
e) Normal Q–Q plot



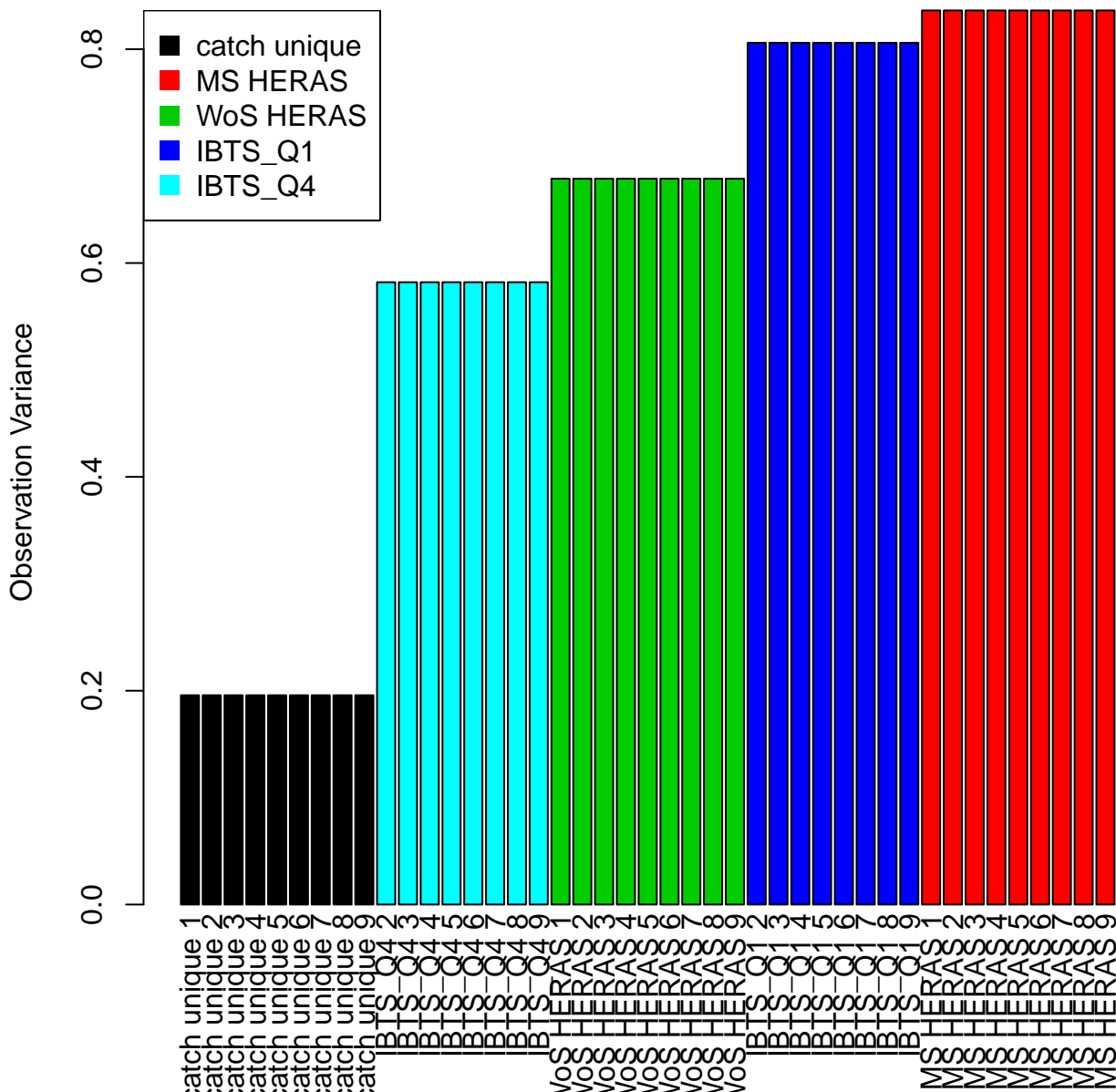
f) Autocorrelation of Residuals



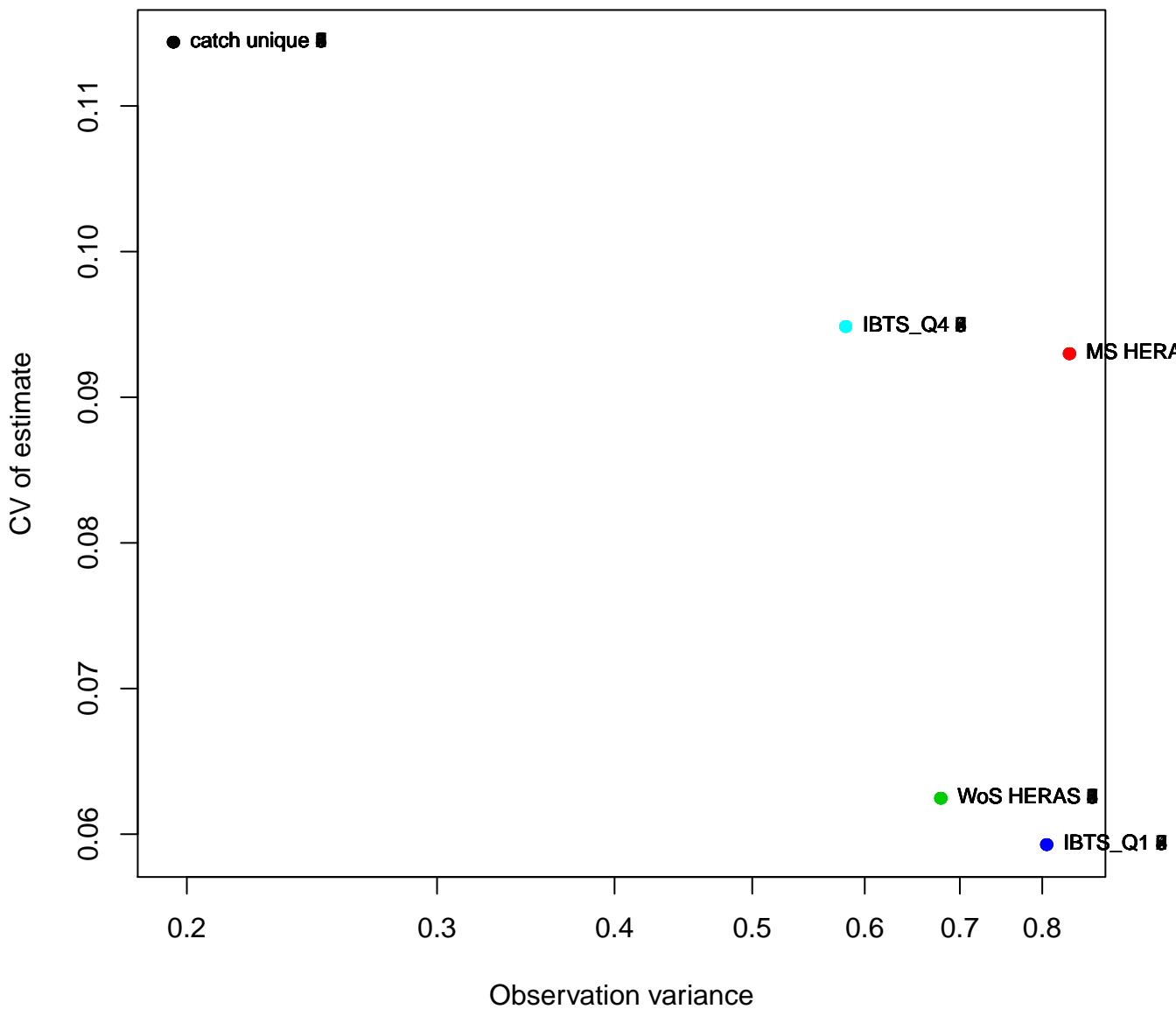
Survey catchability parameters



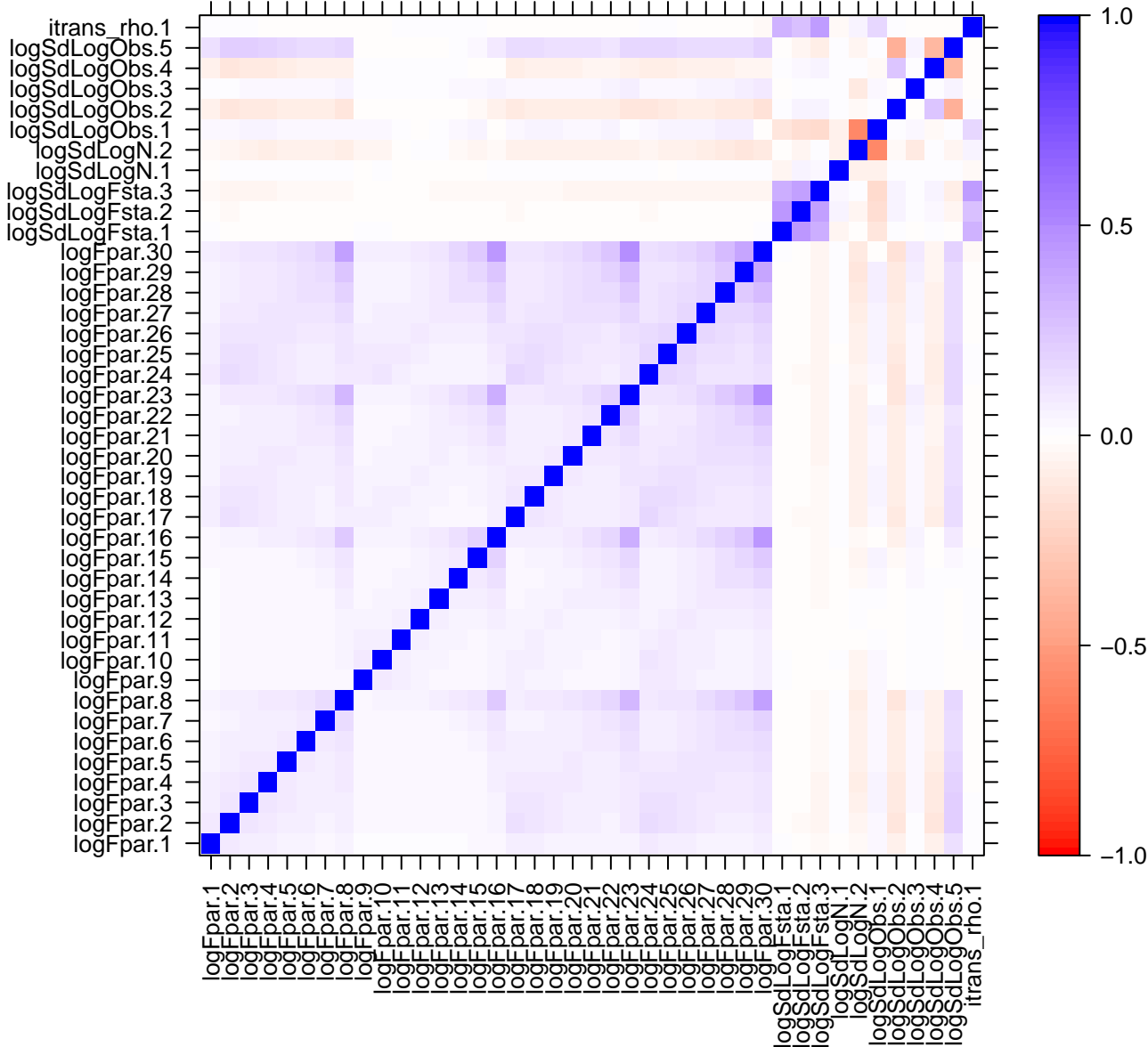
Observation variances by data source



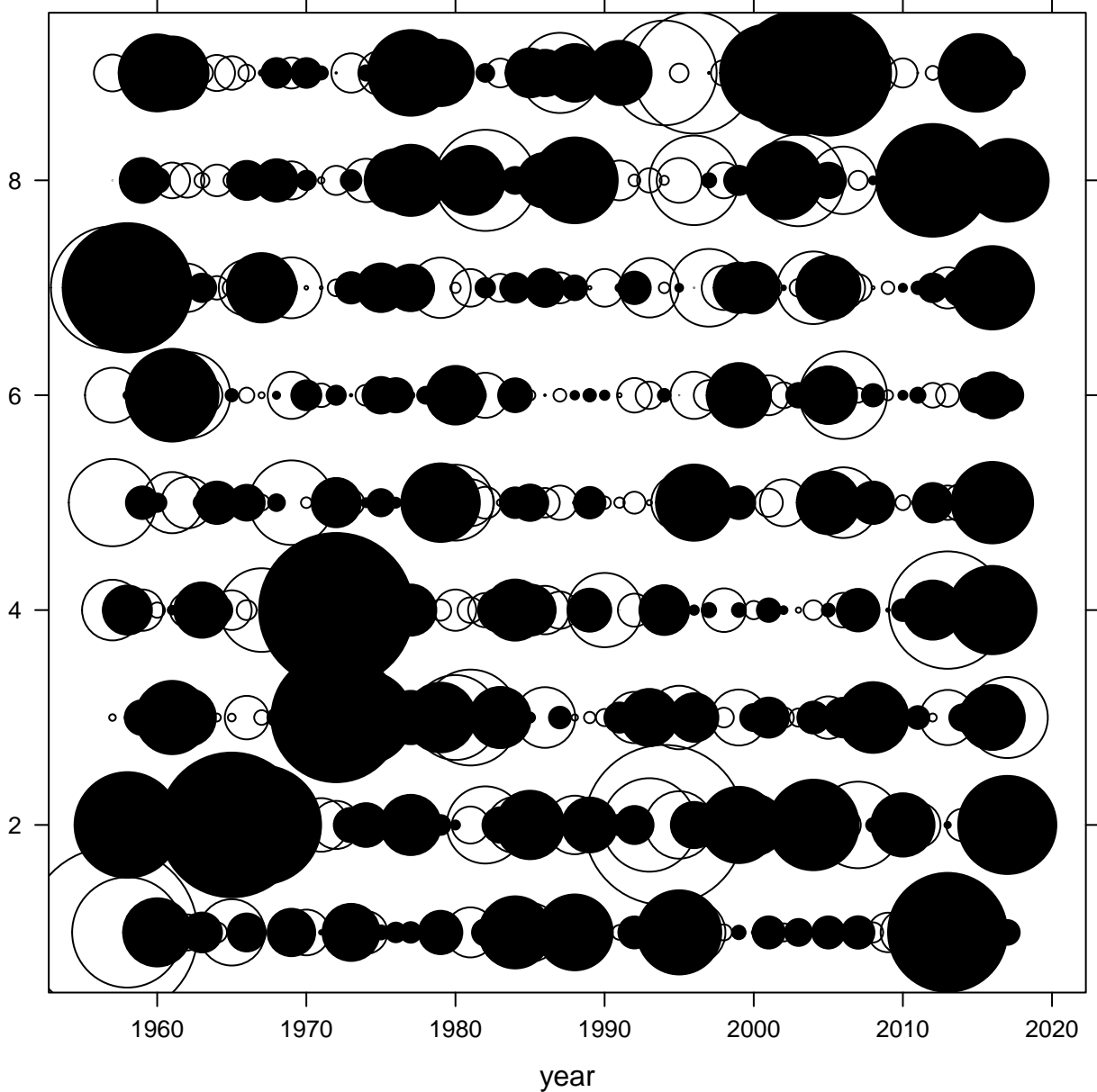
Observation variance vs uncertainty



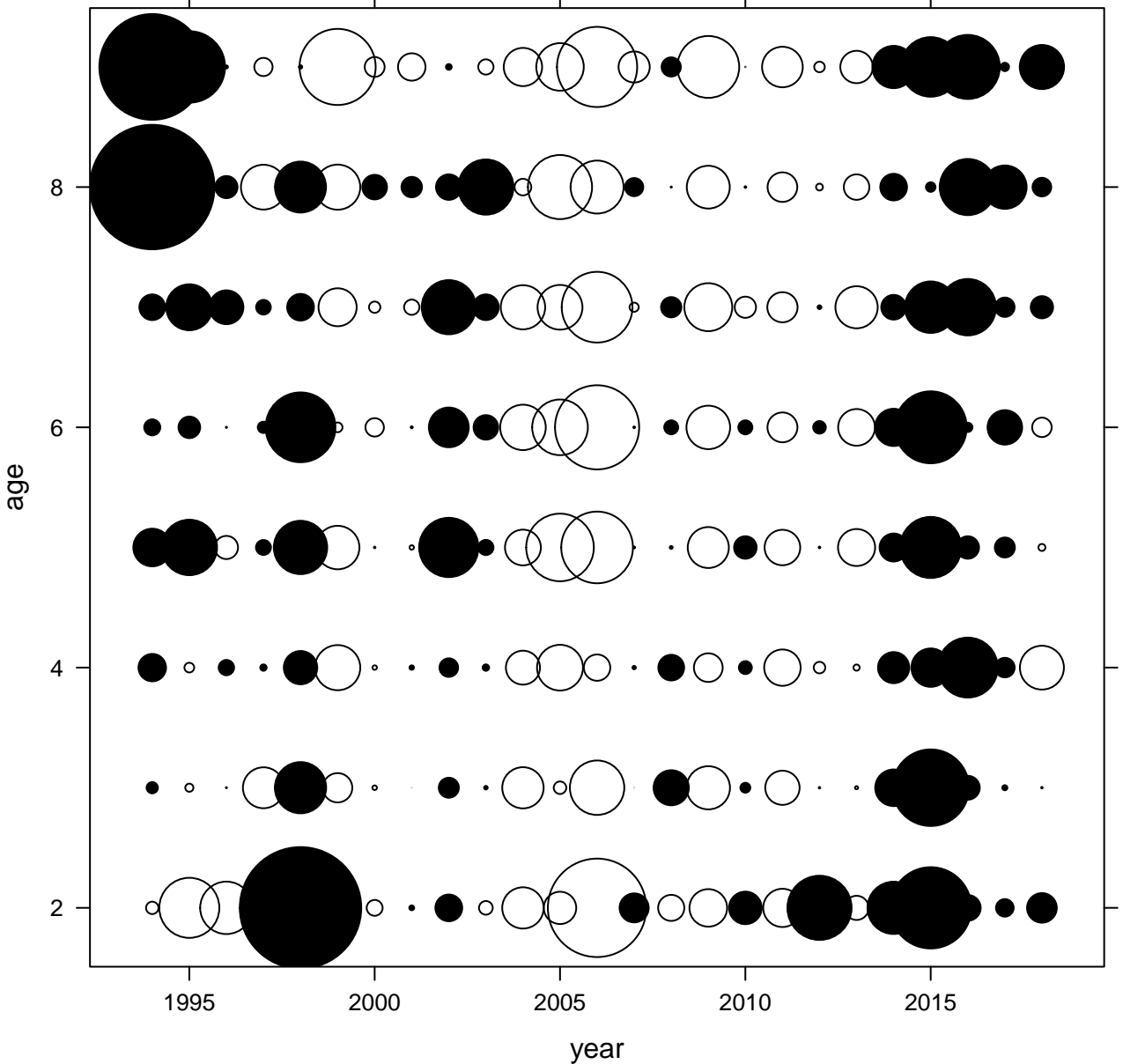
Herring in Vla (combined) and VIIbc



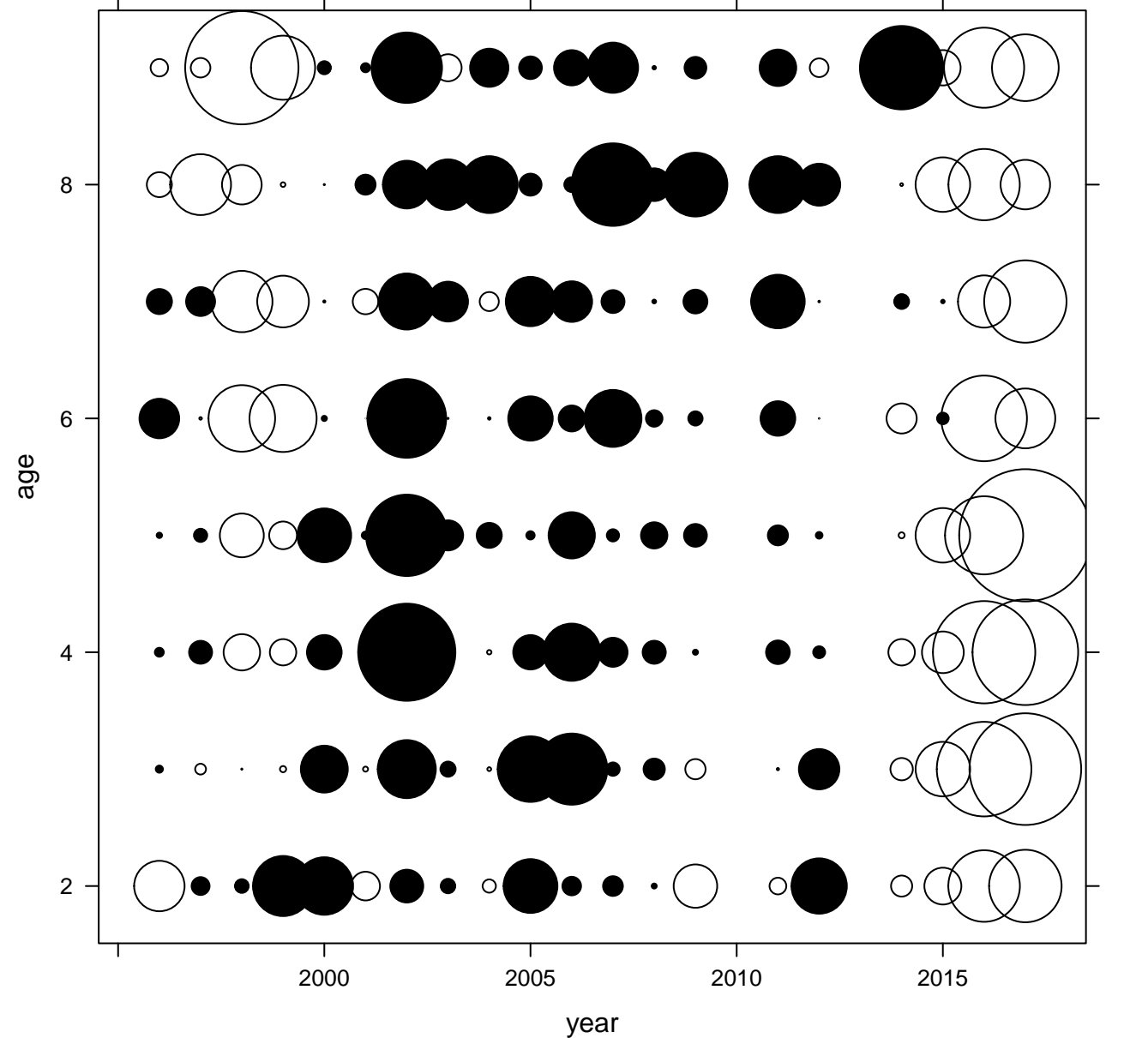
Residuals by year Catch



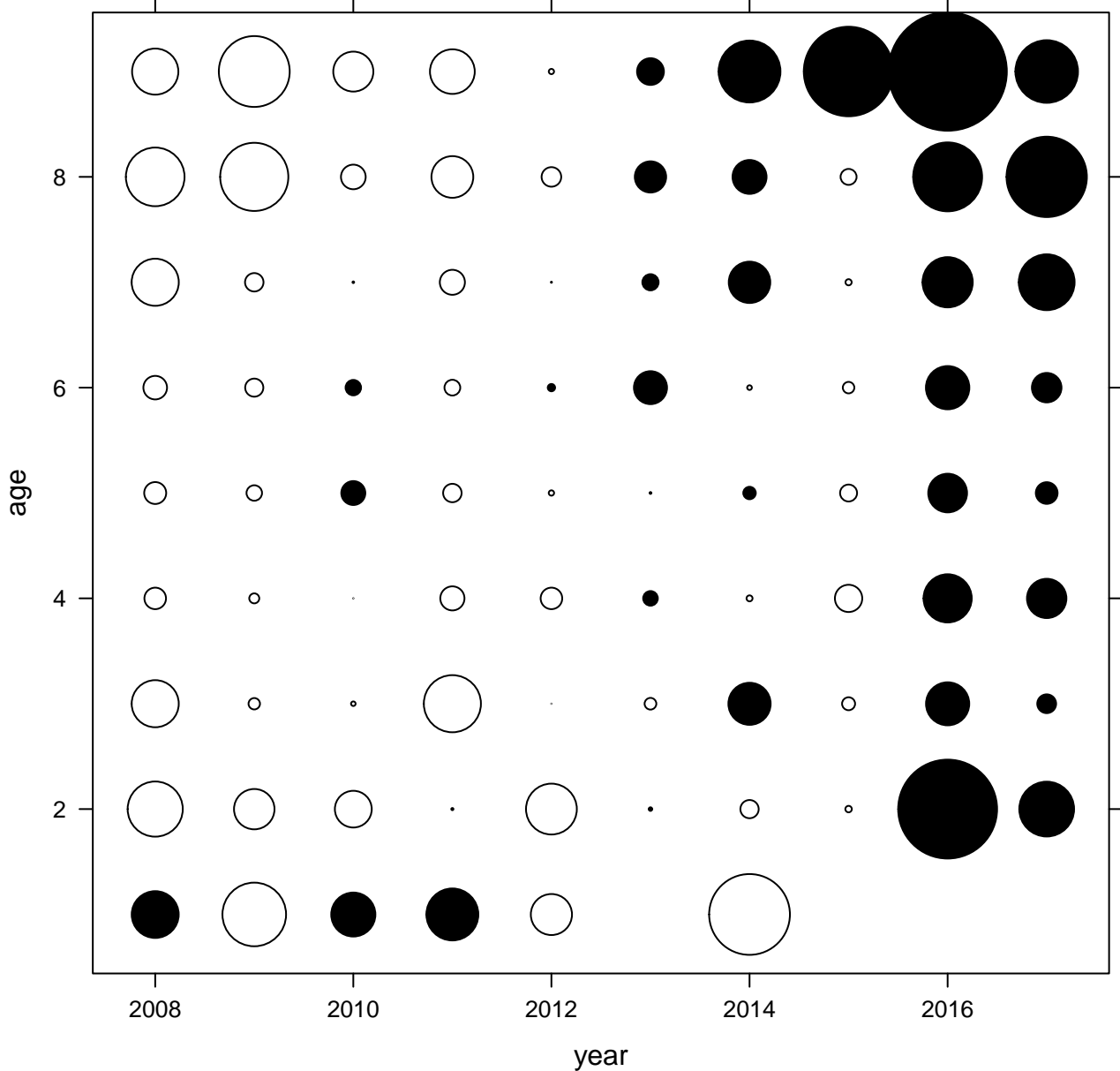
Residuals by year IBTS_Q1



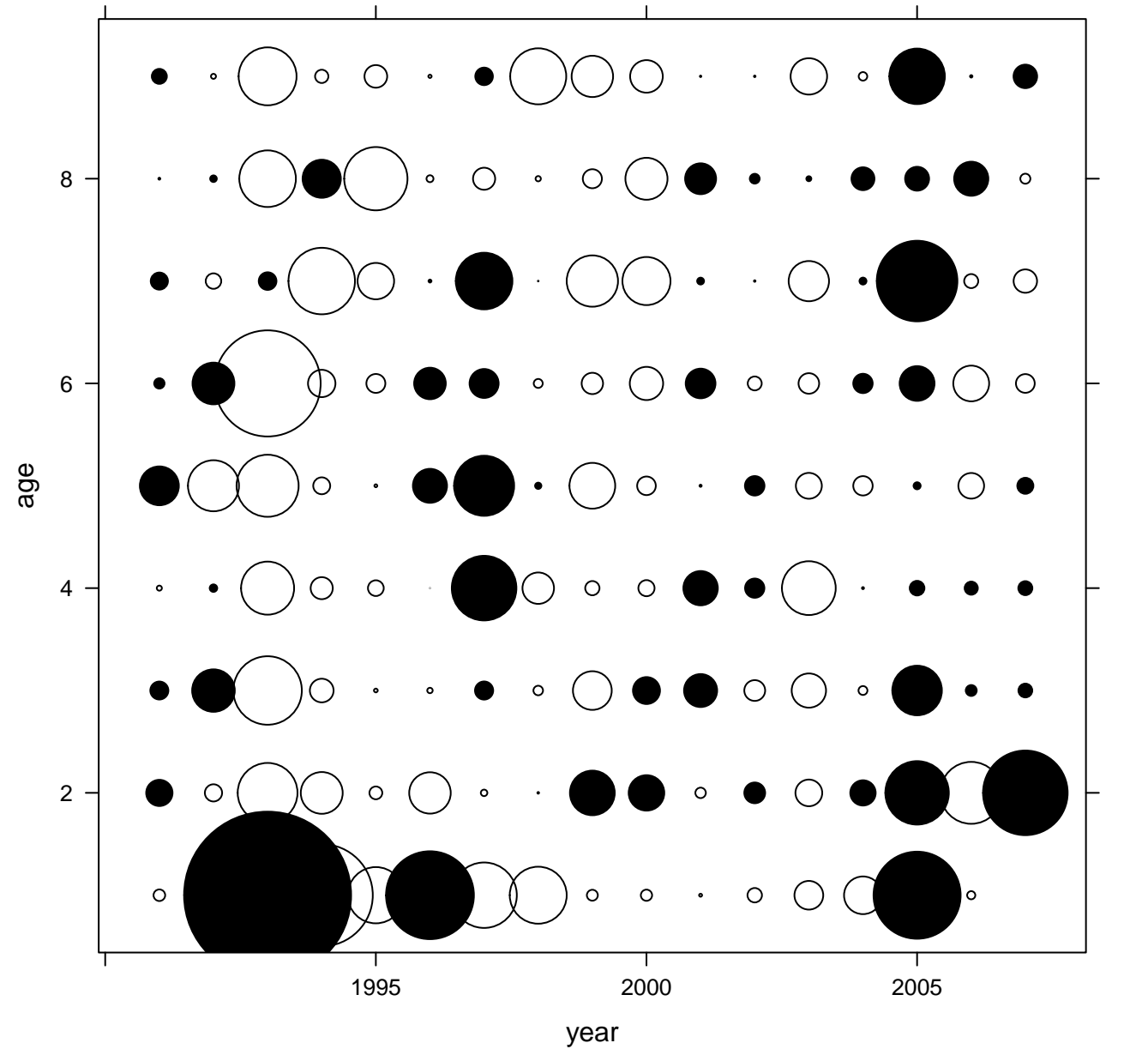
Residuals by year IBTS_Q4



Residuals by year MS HERAS

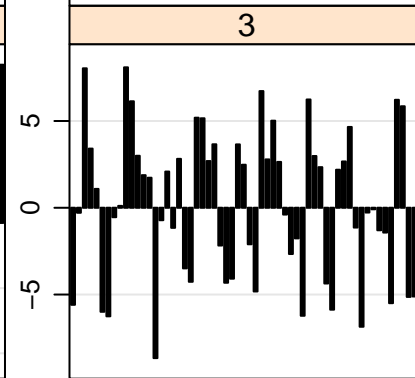
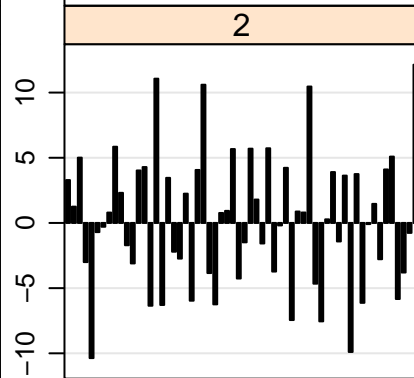
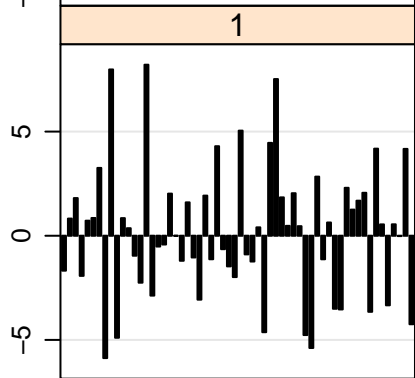
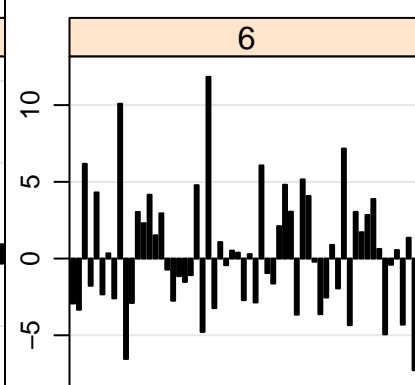
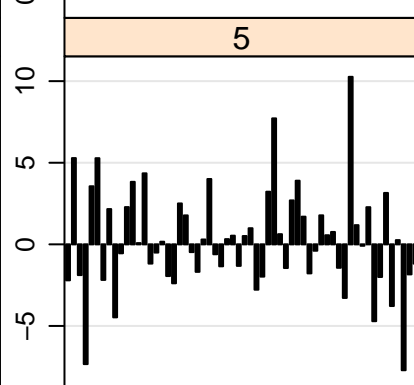
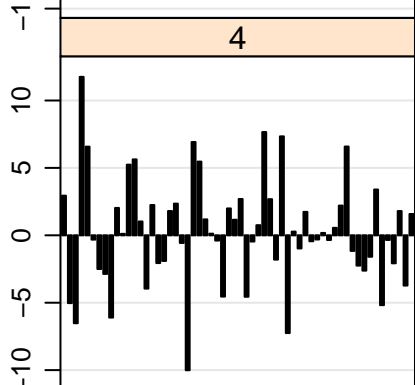
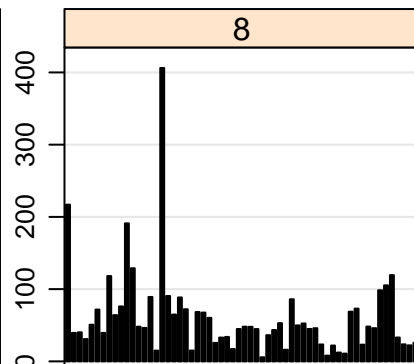
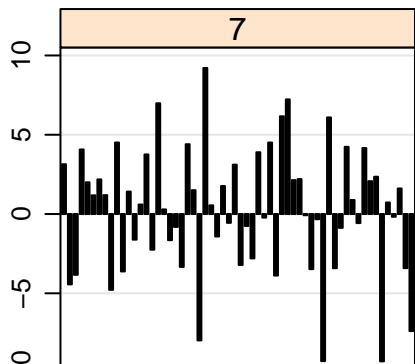


Residuals by year WoS HERAS



Process error deviation in N

% difference numbers at age



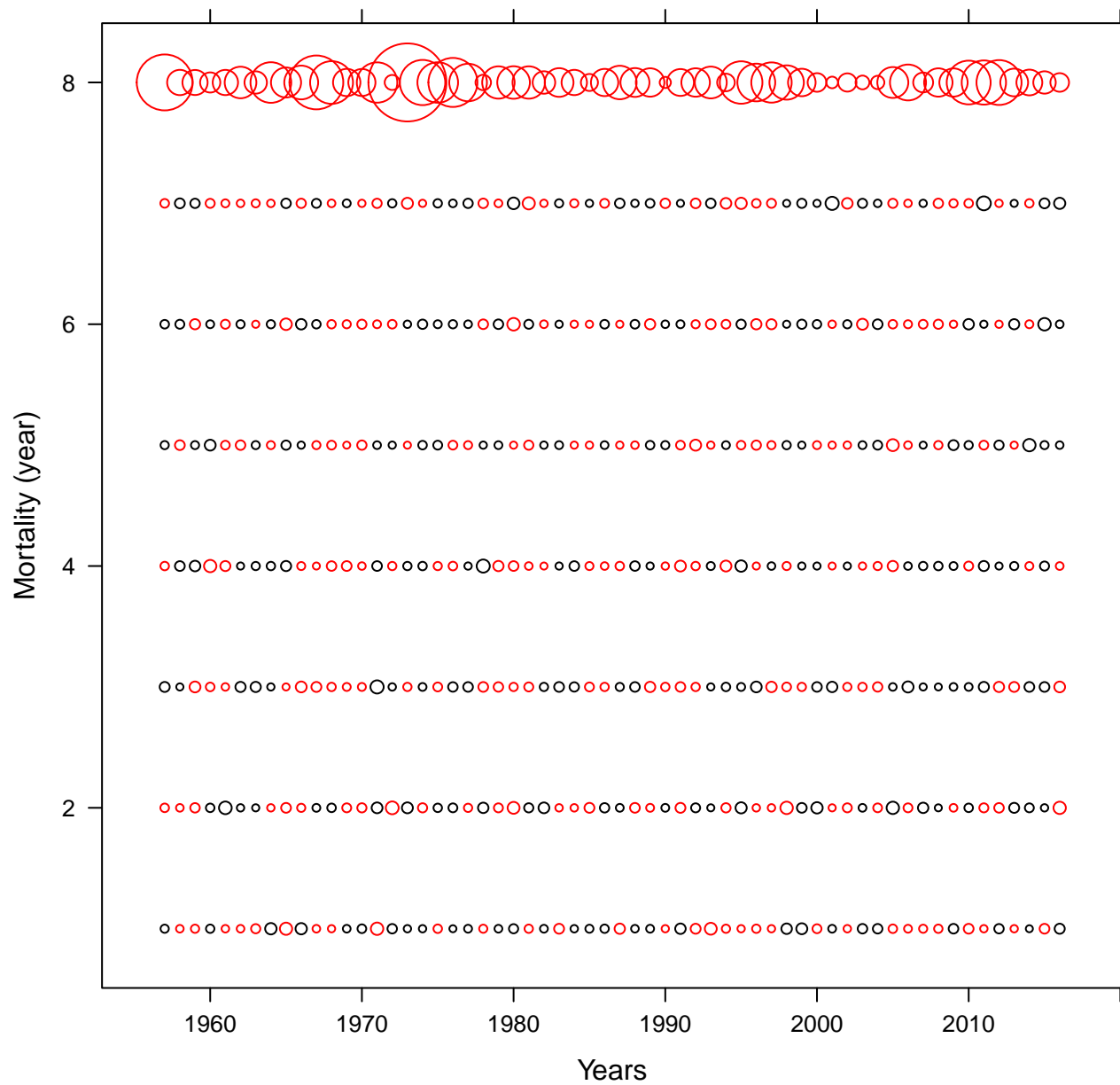
1960 1970 1980 1990 2000 2010

1960 1970 1980 1990 2000 2010

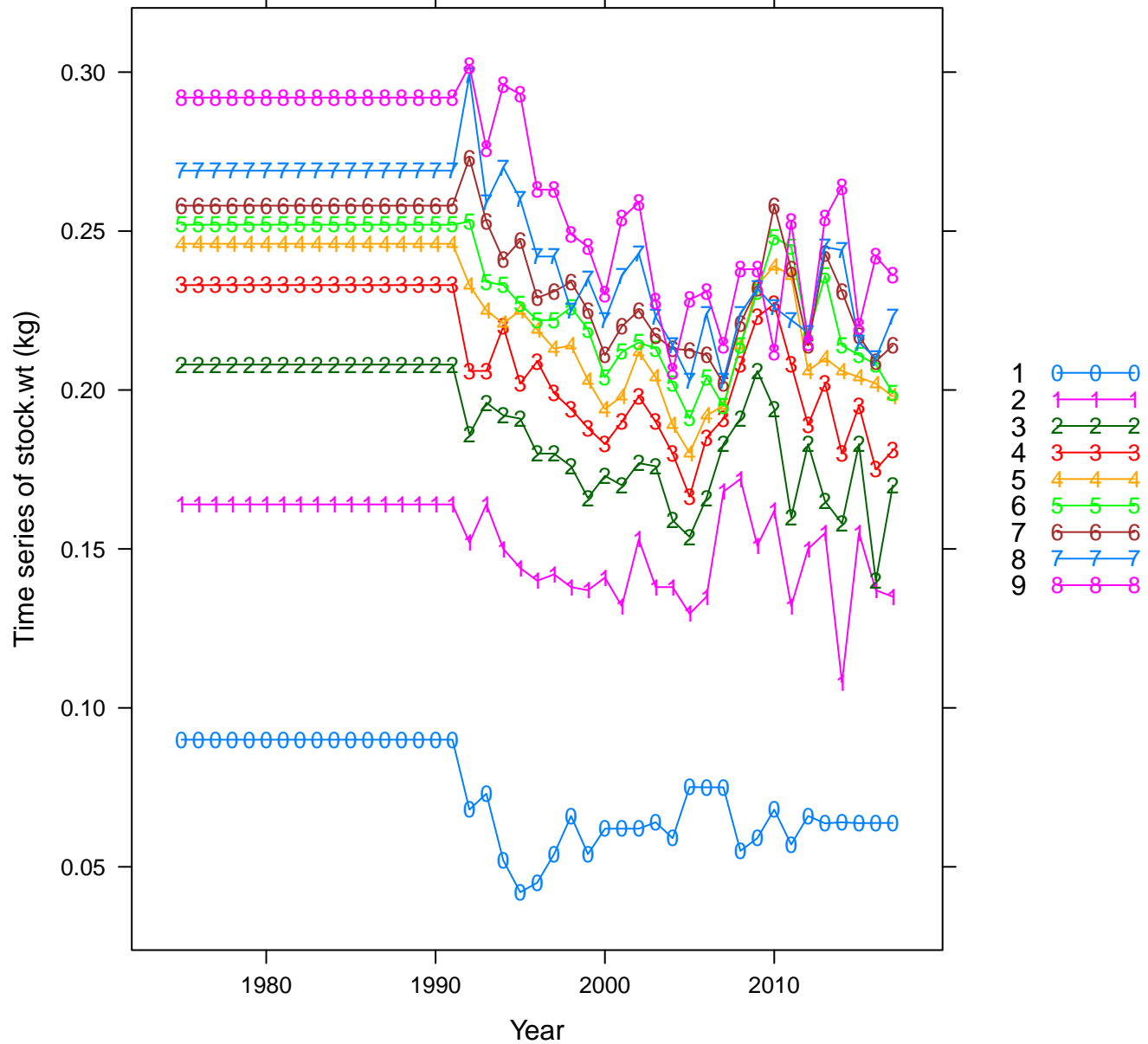
1960 1970 1980 1990 2000 2010

Year

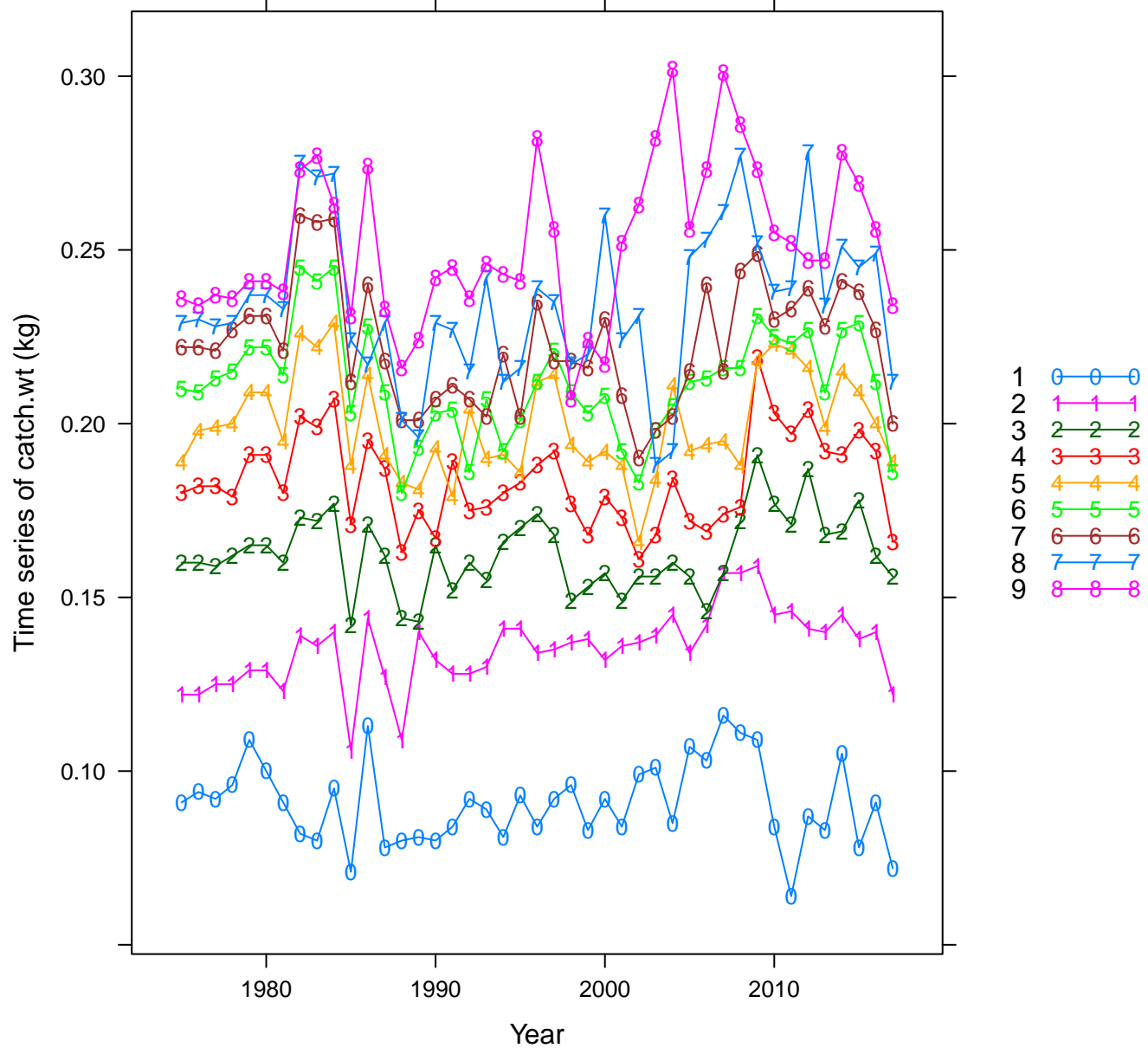
Process error deviation in M



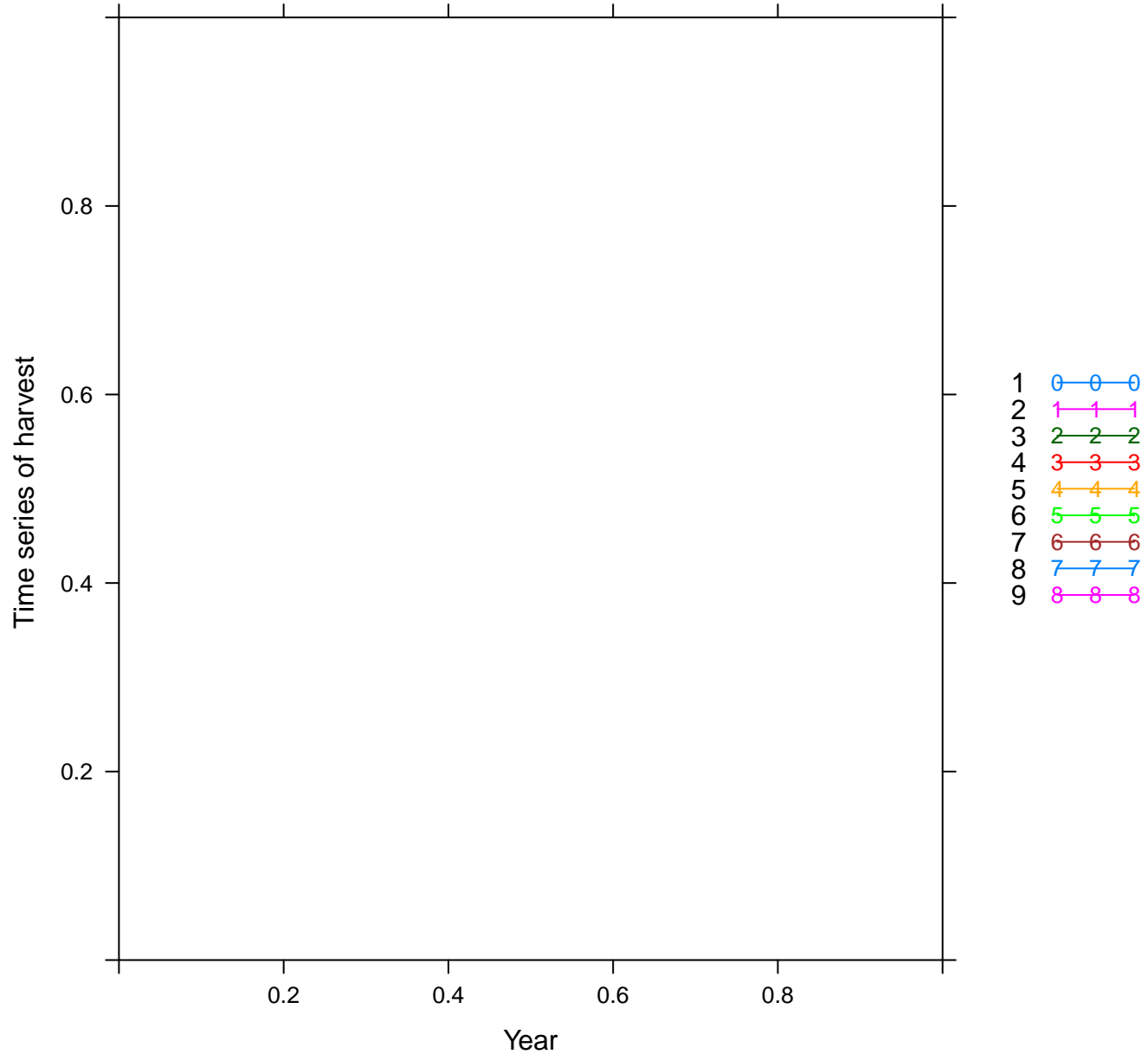
Herring in Vla (combined) and VIIbc timeseries of stock.wt



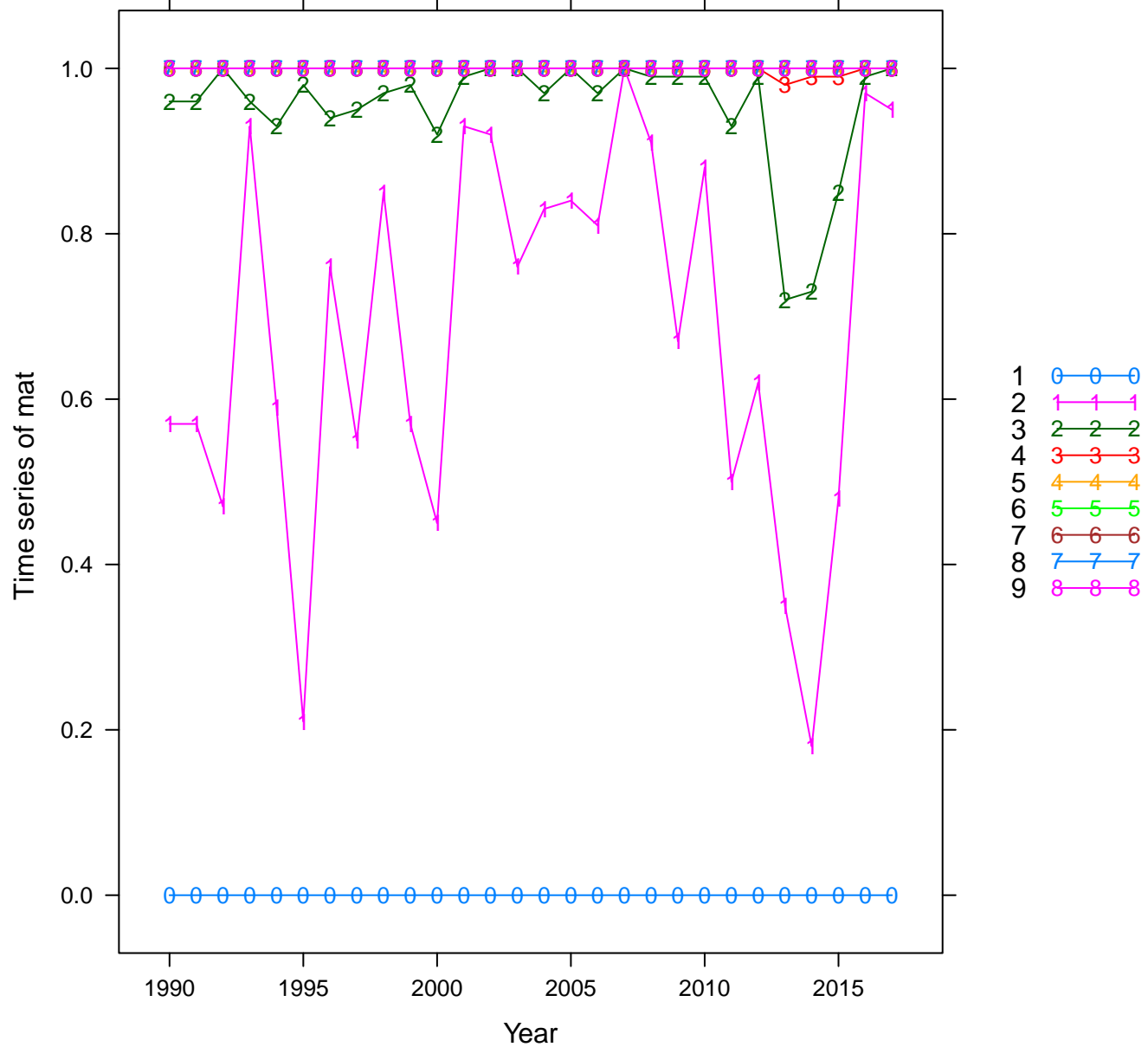
Herring in Vla (combined) and VIIbc timeseries of catch.wt



Herring in Vla (combined) and VIIbc timeseries of harvest



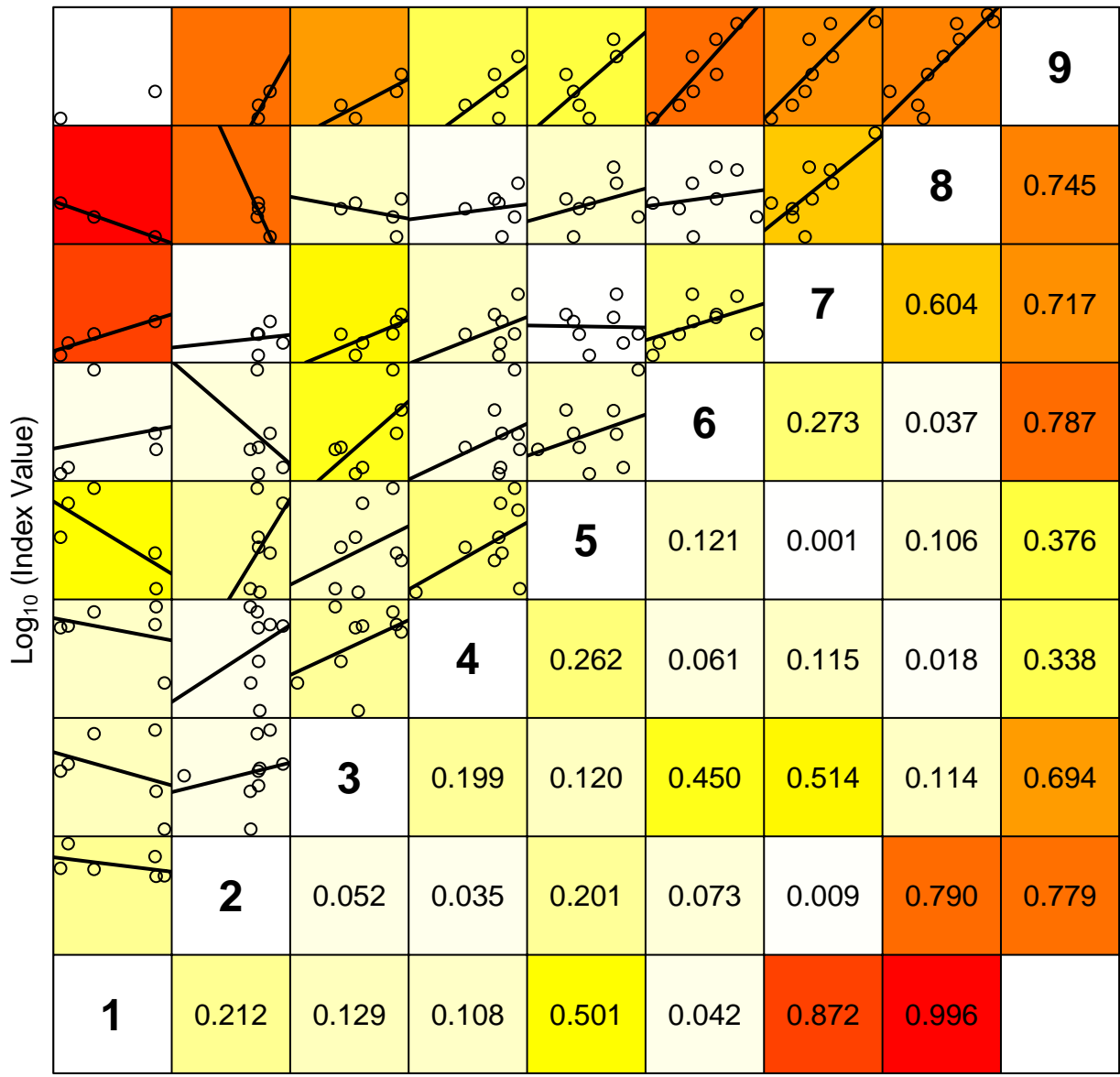
Herring in Vla (combined) and VIIbc timeseries of mat



Herring in Vla (combined) and VIIbc timeseries of m

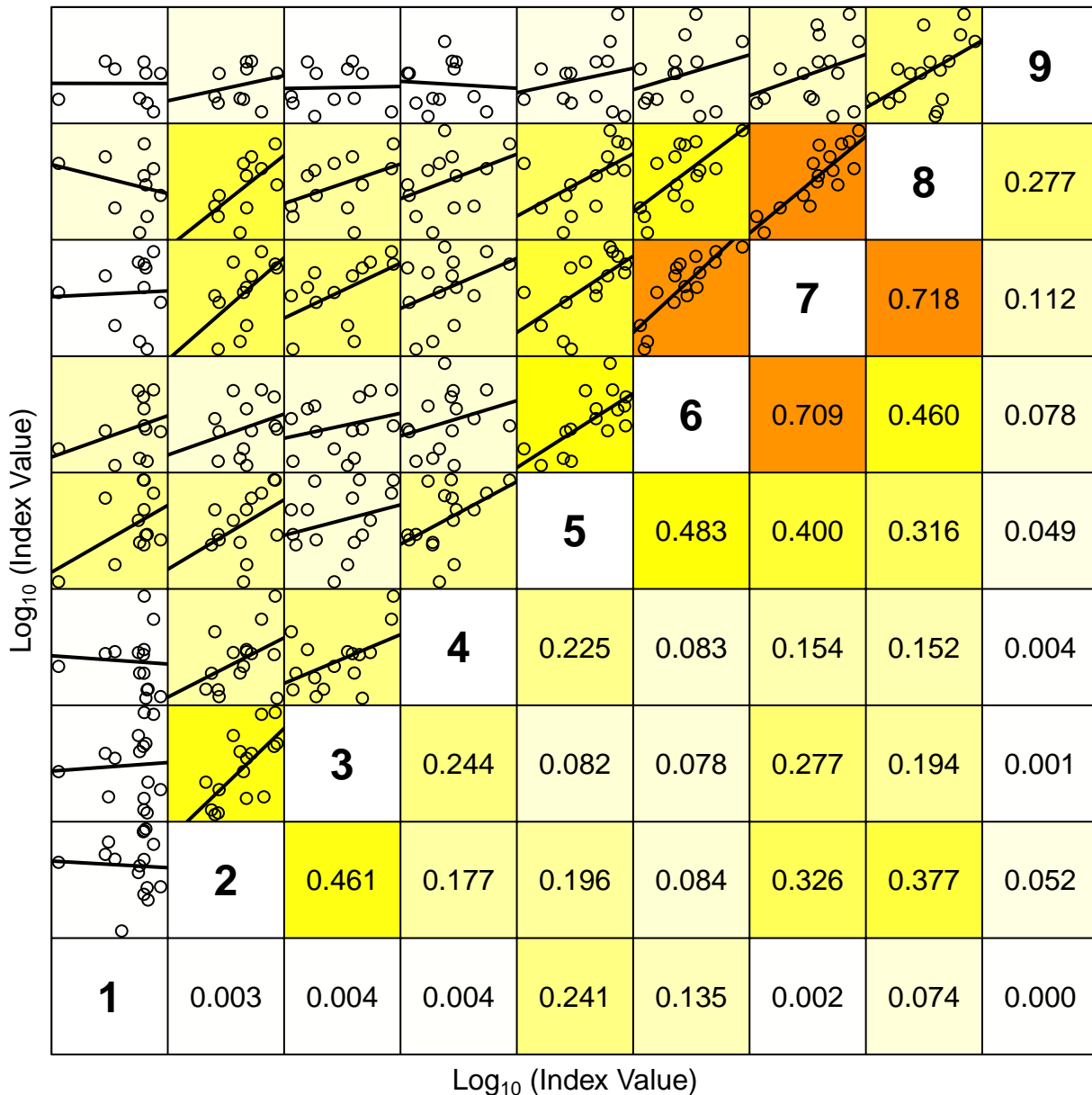


MS HERAS



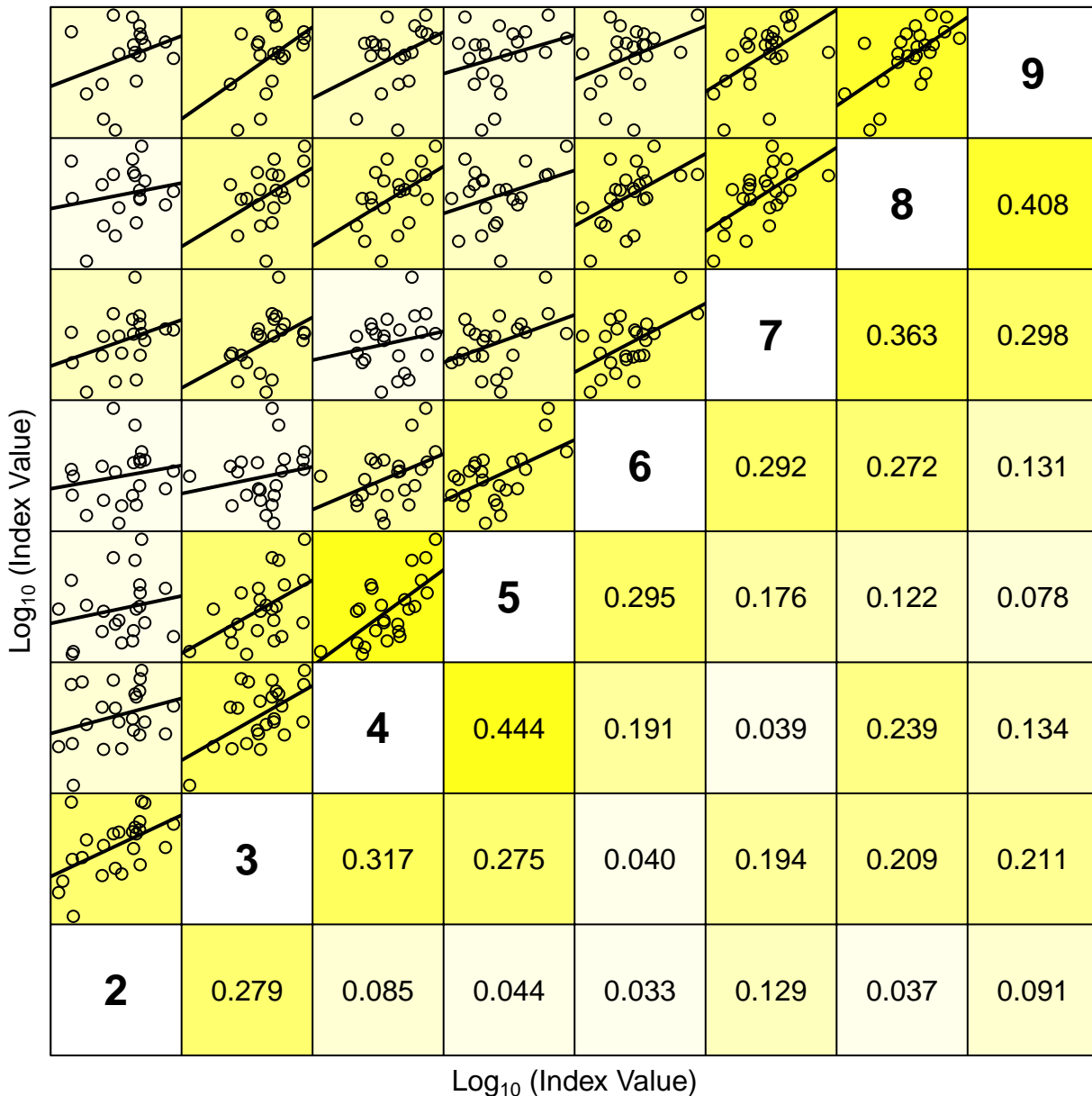
Lower right panels show the Coefficient of Determination (r^2)

WoS HERAS



Lower right panels show the Coefficient of Determination (r^2)

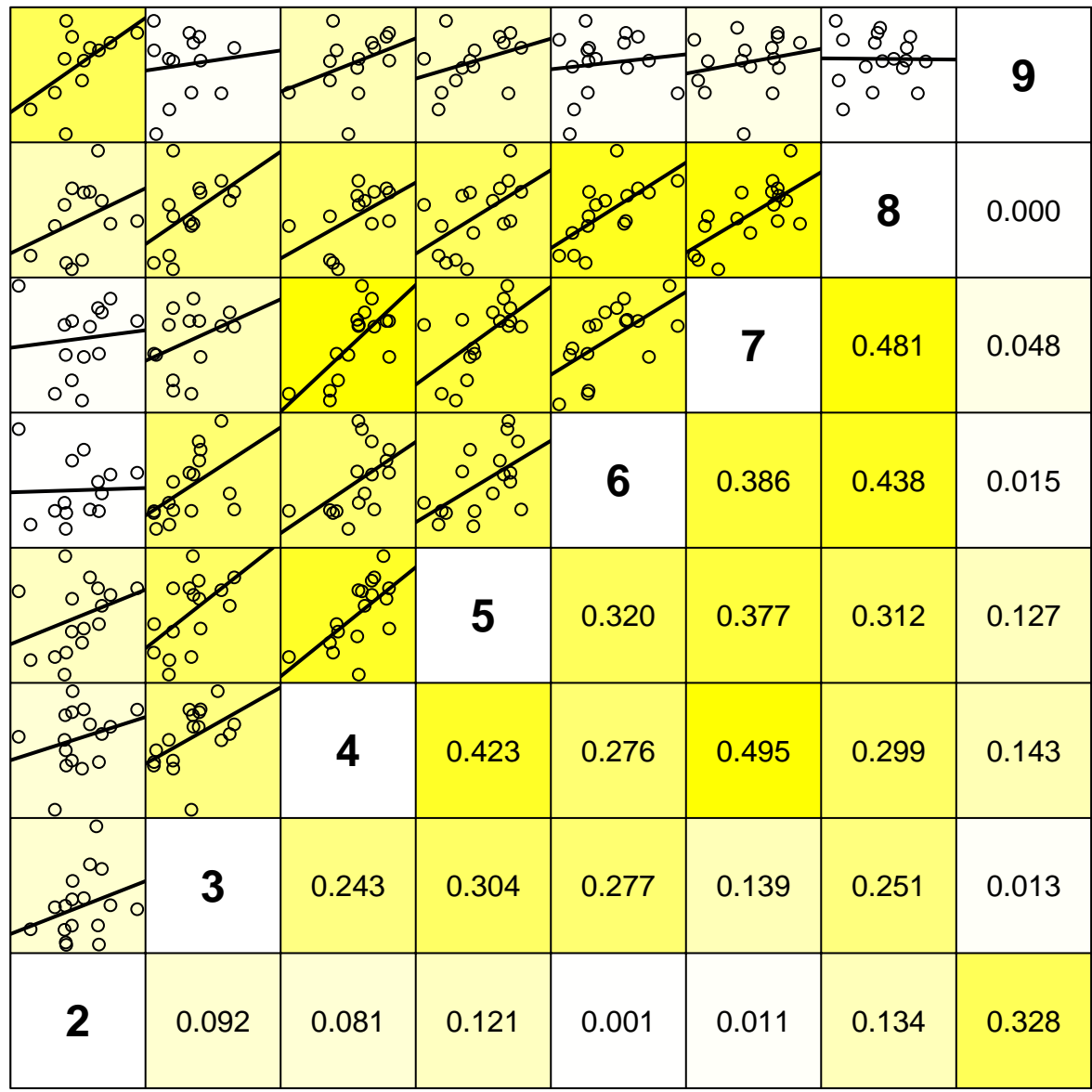
IBTS-Q1



Lower right panels show the Coefficient of Determination (r^2)

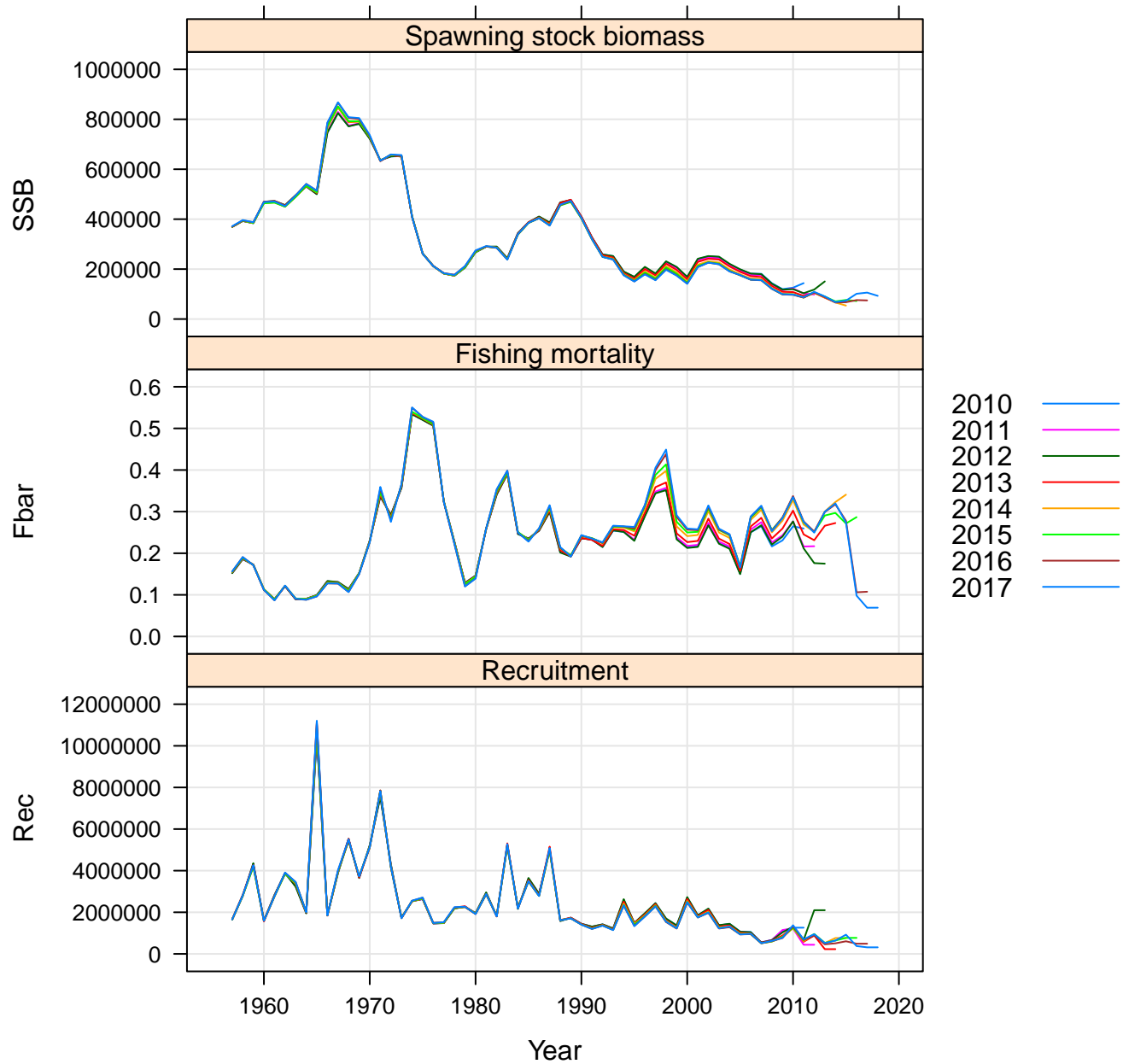
IBTS-Q4

Log₁₀ (Index Value)

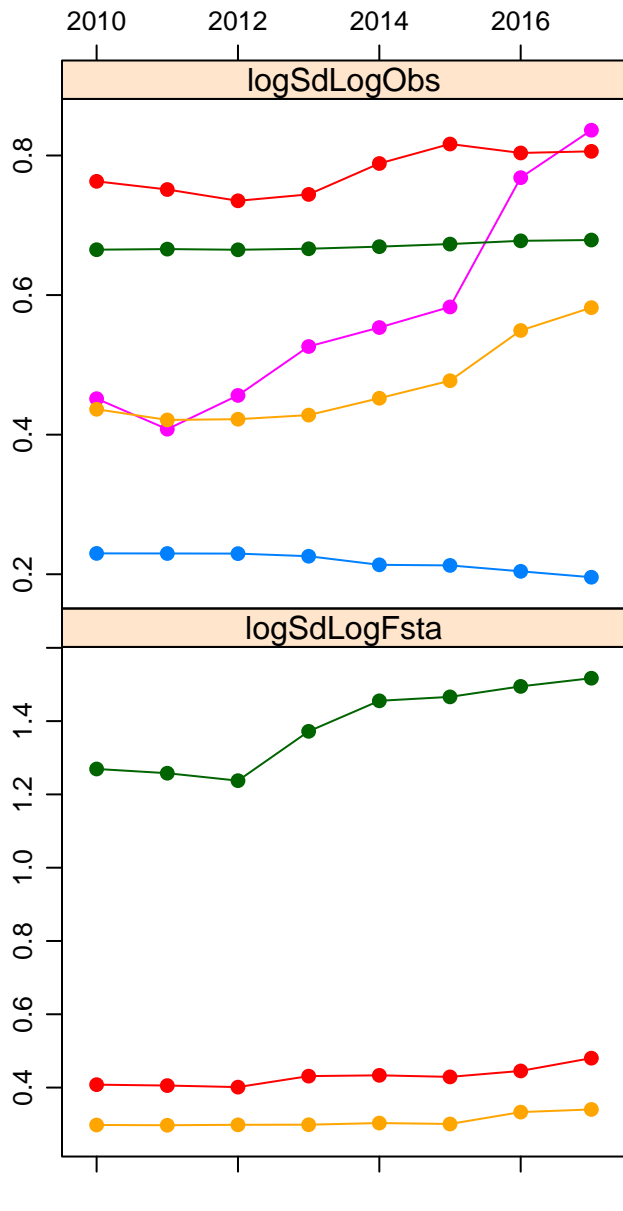
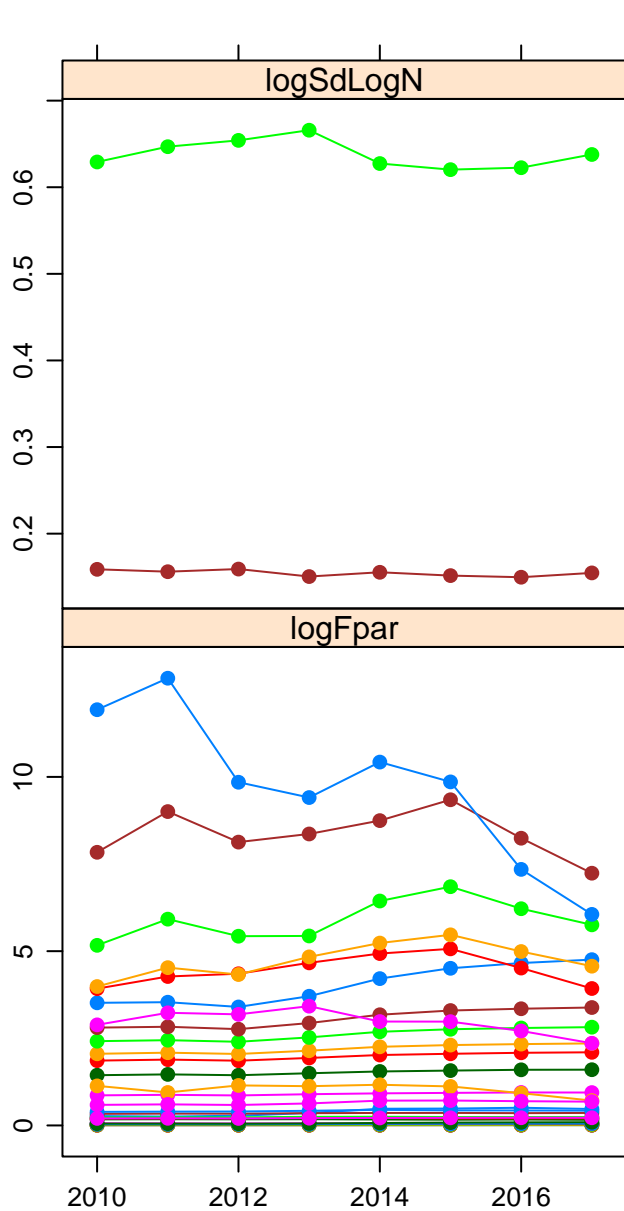


Log₁₀ (Index Value)

Lower right panels show the Coefficient of Determination (r^2)



Parameter value



Retrospective pattern in F at age

