SUPPLEMENT 2
Catch per unit effort (CPUE) analyses and characterisation of the North Island commercial freshwater eel fishery, 1990–91 to 2014–15

Appendices G to M: Plots of eel fishery characterisation and CPUE analyses by ESA. The plots relating to shortfin are shown first followed by longfin.

APPENDIX G: HAWKE'S BAY (ESA AG)

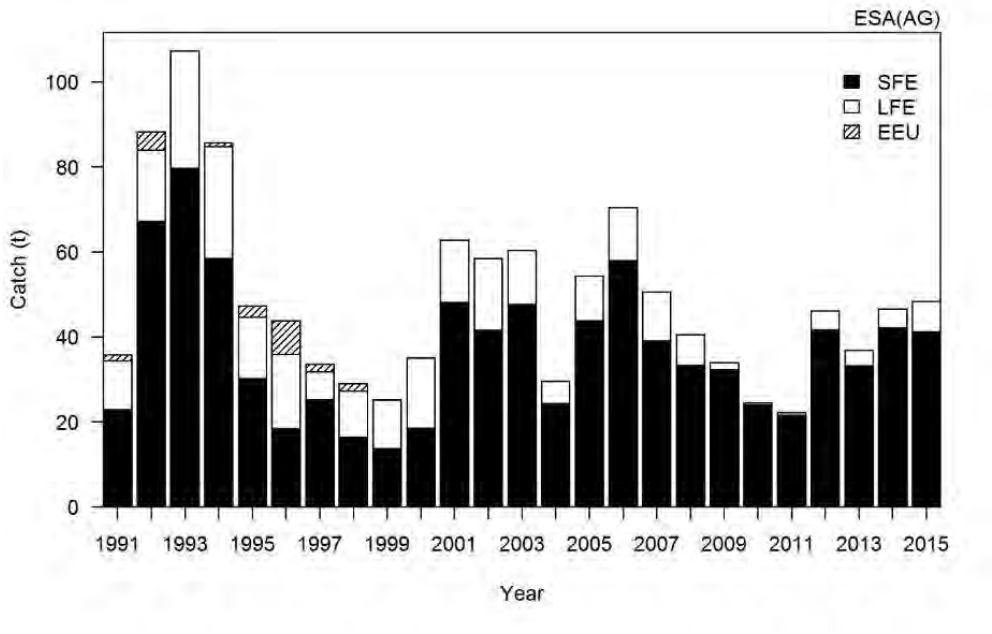


Figure G1: Total estimated commercial catch of shortfin (SFE), longfin (LFE), and unclassified eel catch (EEU) for the years 1990–91 to 2014–15 (ESA AG).

Figure G2: Shortfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AG).

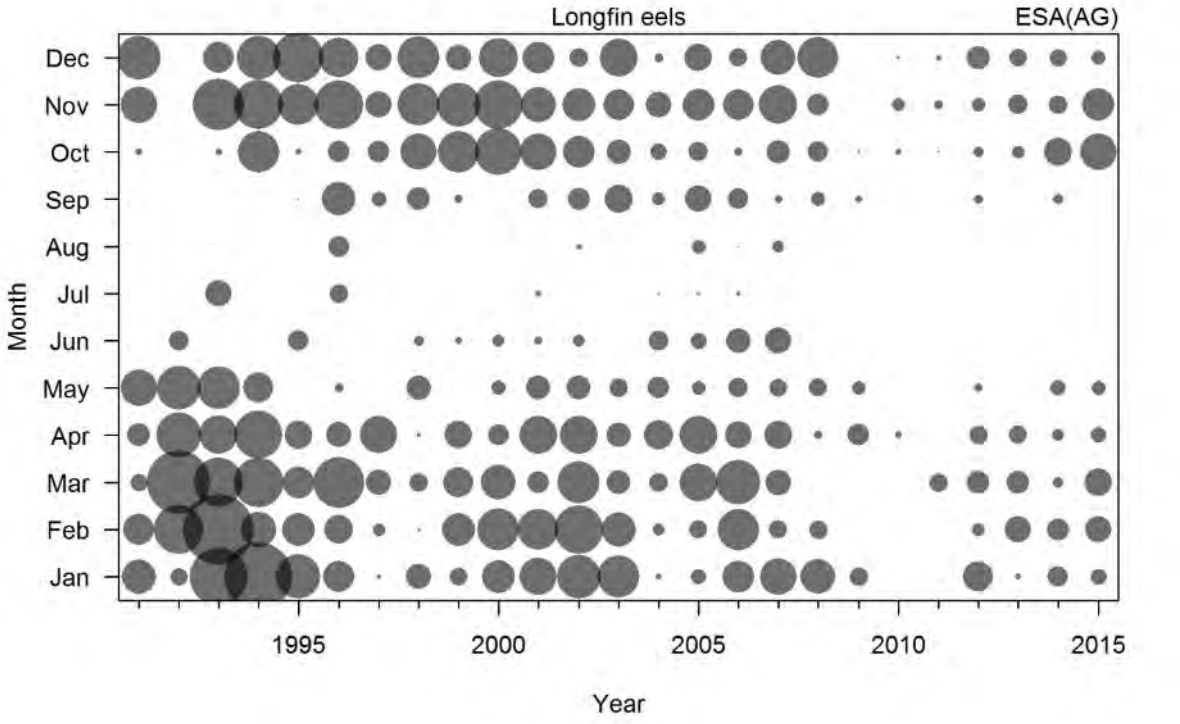


Figure G3: Longfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AG).

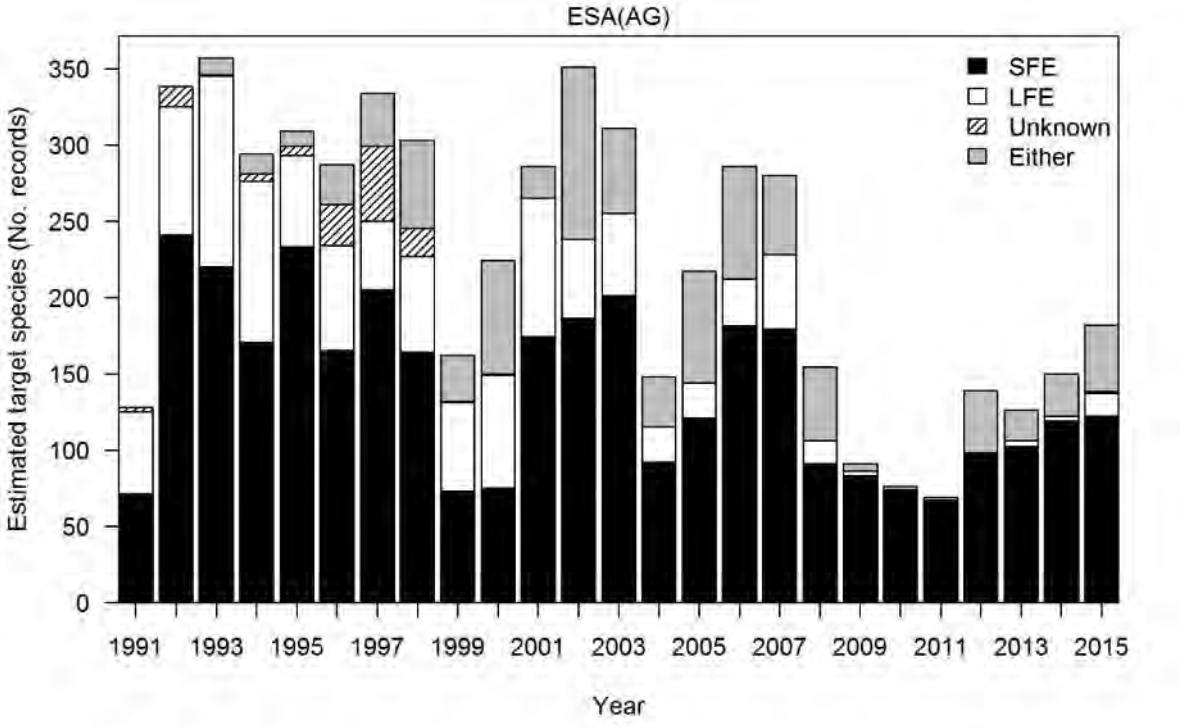


Figure G4: Reconstructed target species for the years 1990–91 to 2014–15 (ESA AG).

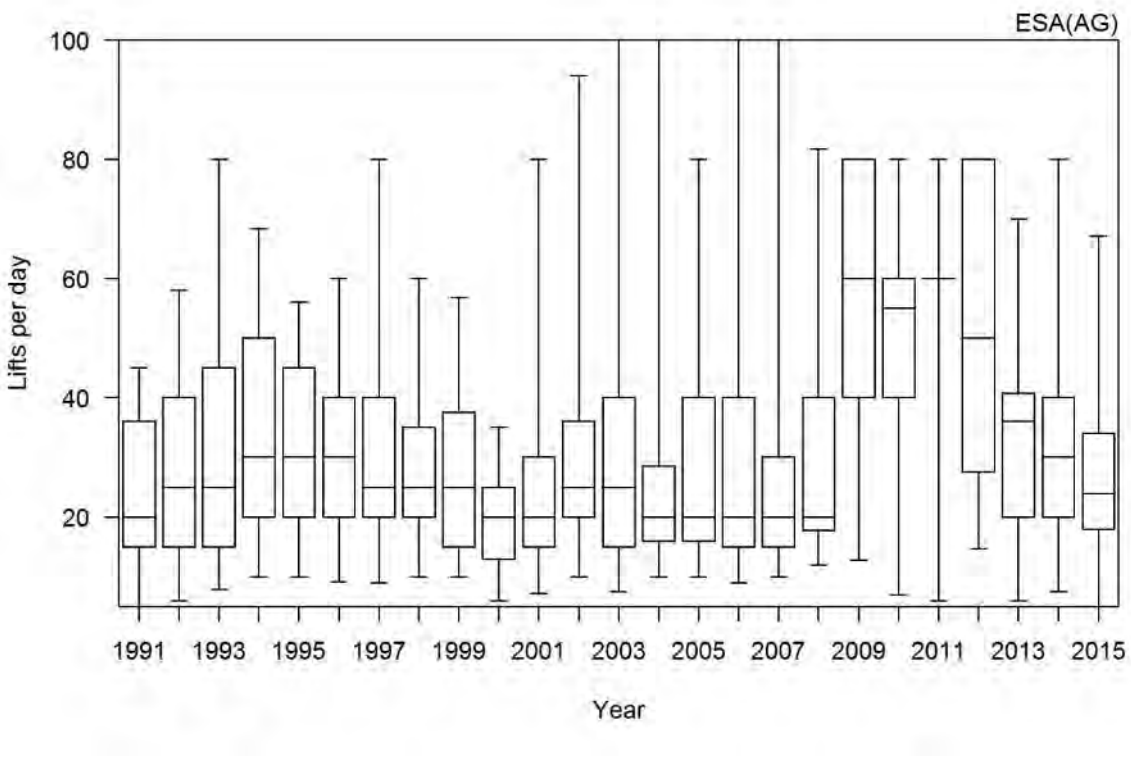


Figure G5: Total lifts per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AG).

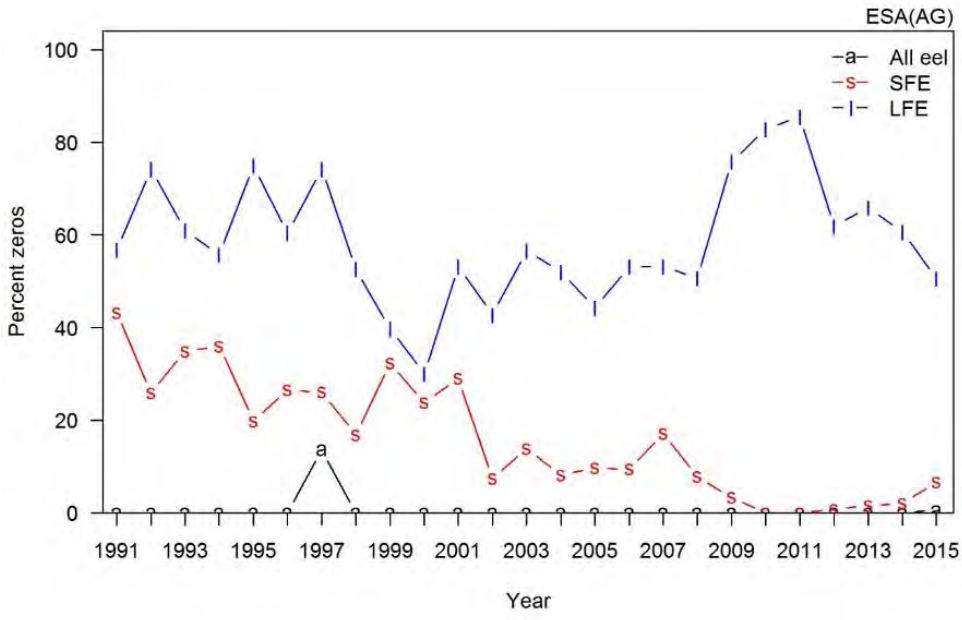


Figure G6: Proportion of valid zero records for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15. Excludes zeros associated with reporting EEU (unclassified) (ESA AG).

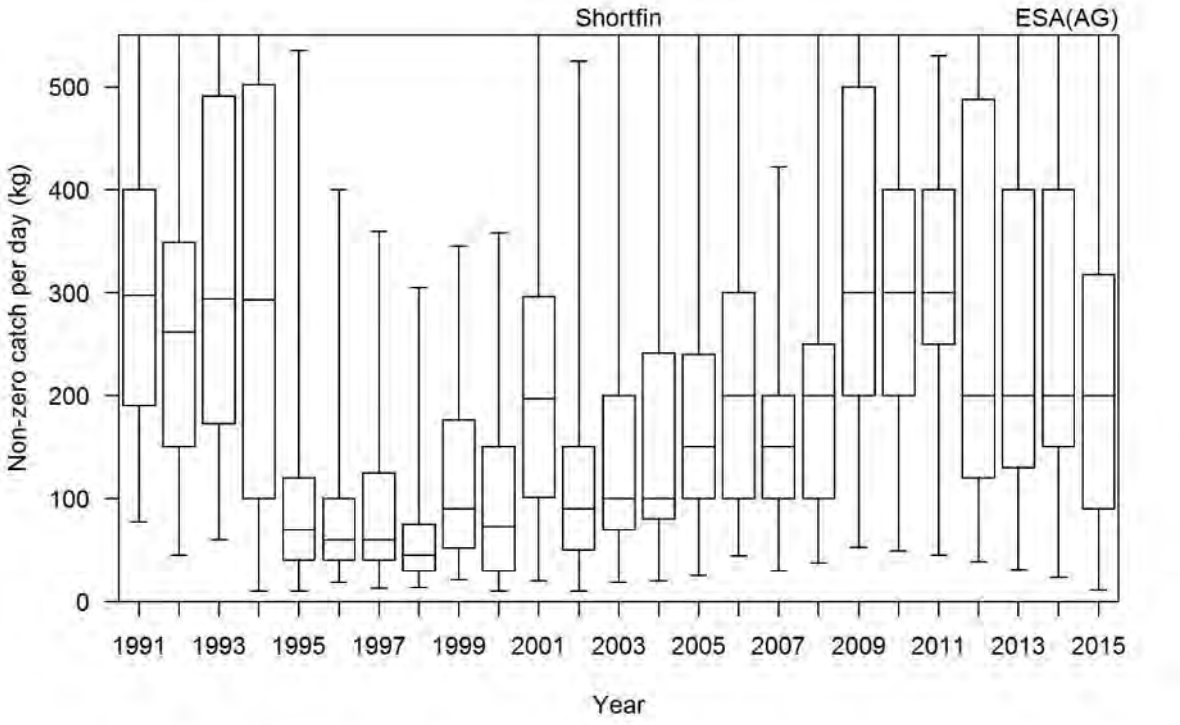


Figure G7: Shortfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AG).

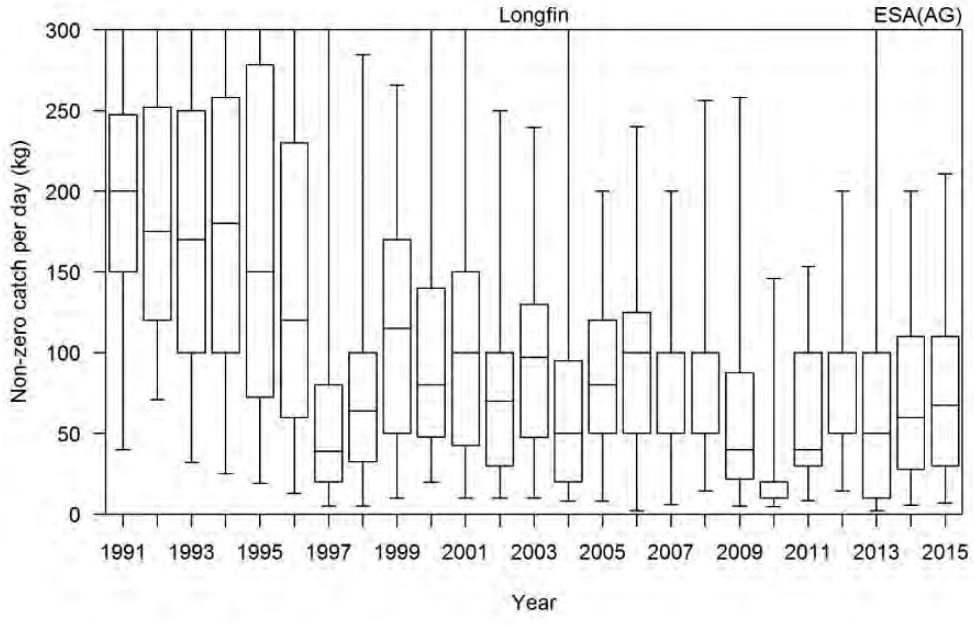


Figure G8: Longfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AG).

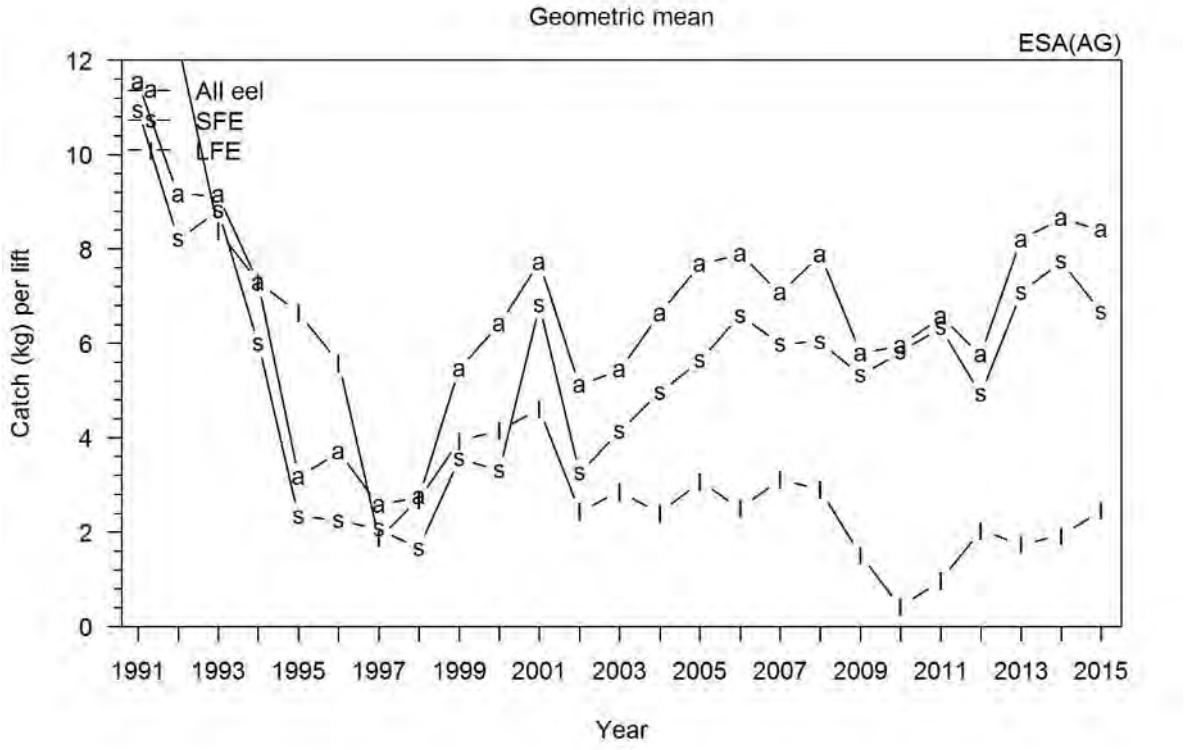


Figure G9: Unstandardised CPUE (geometric mean of catch per lift) for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15 (ESA AG).

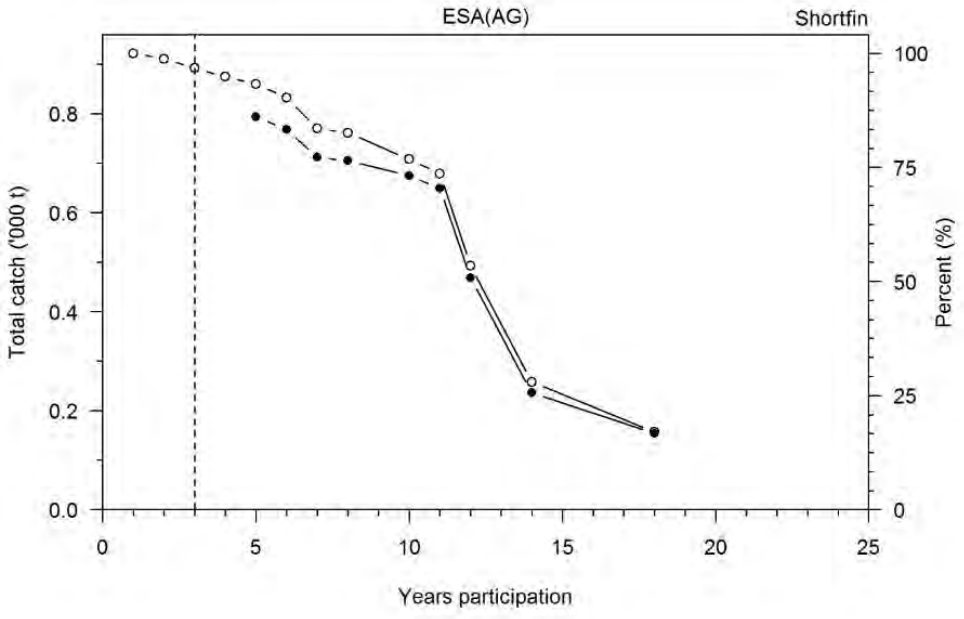


Figure G10: Relationship between years of participation in the fishery and shortfin total catch. The open circles represent all shortfin catch and the closed circles shortfin catch data from fishers who 1) caught shortfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core shortfin fisher analyses for the years 1990–91 to 2014–15 (ESA AG).

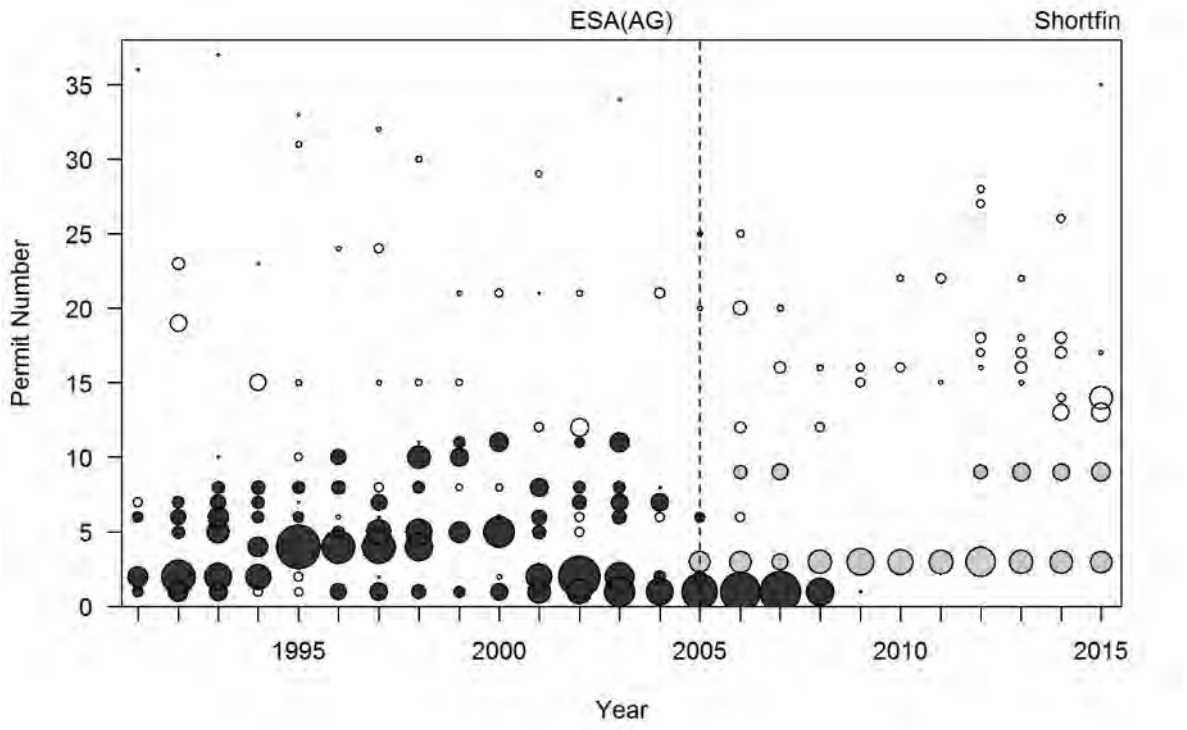


Figure G11: Relative catch of shortfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AG).

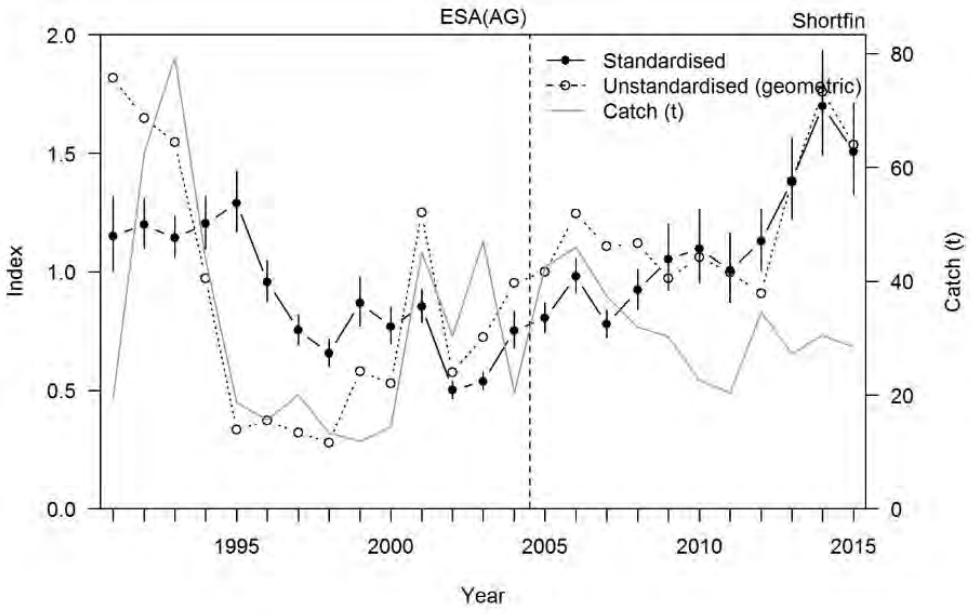


Figure G12: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for shortfin core fishers for the years 1990–91 to 2014–15. The shortfin catch by core fishers is also plotted (ESA AG).

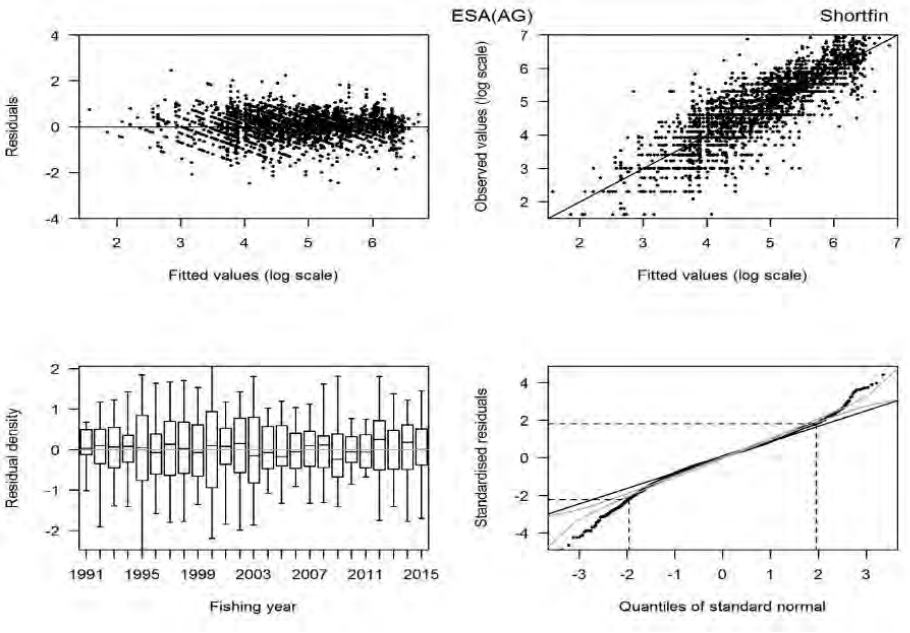


Figure G13: Residual diagnostic plots for the shortfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AG).

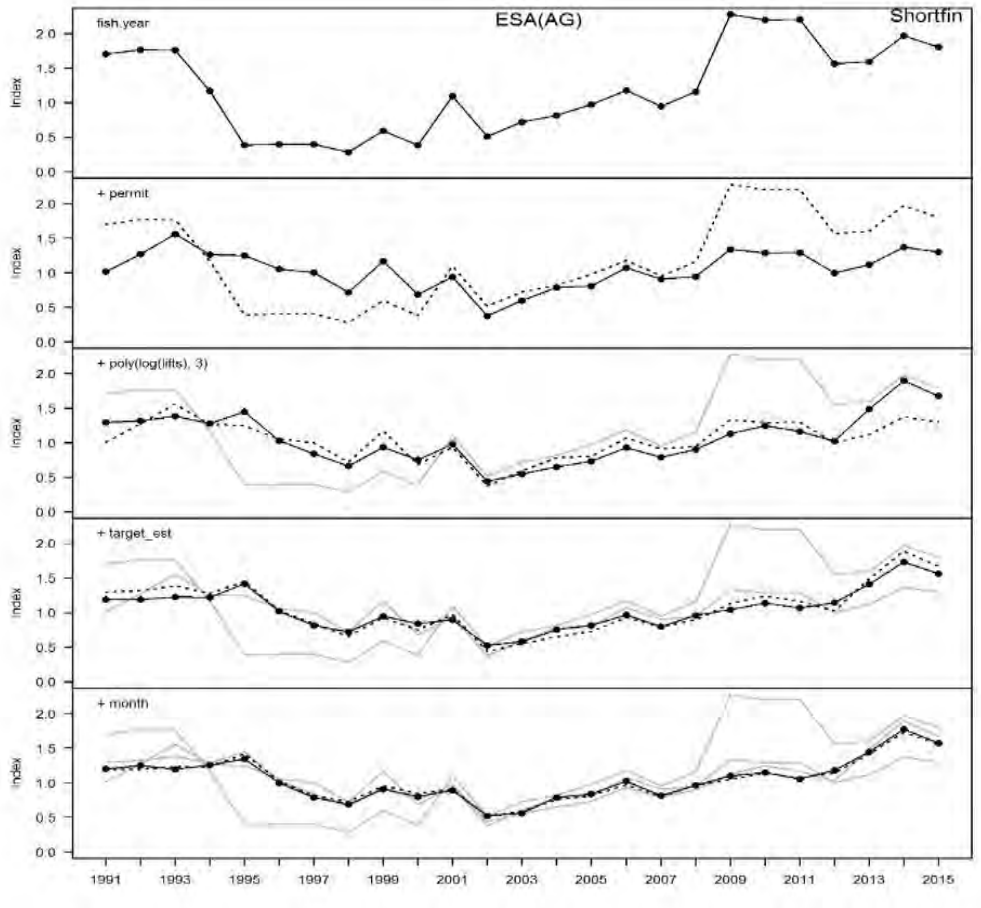


Figure G14: Step plot for the shortfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AG).

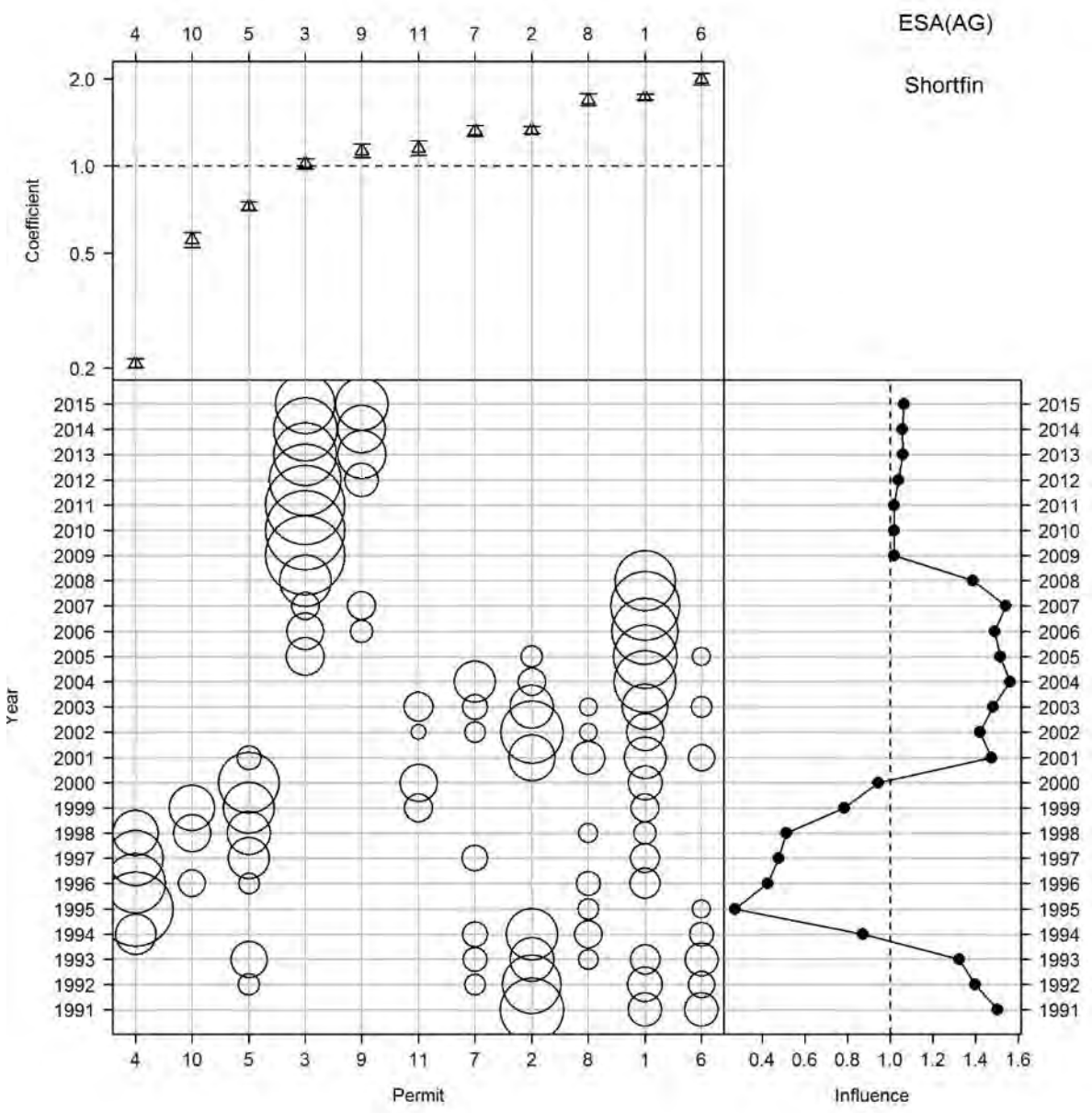


Figure G15: Influence of permit for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

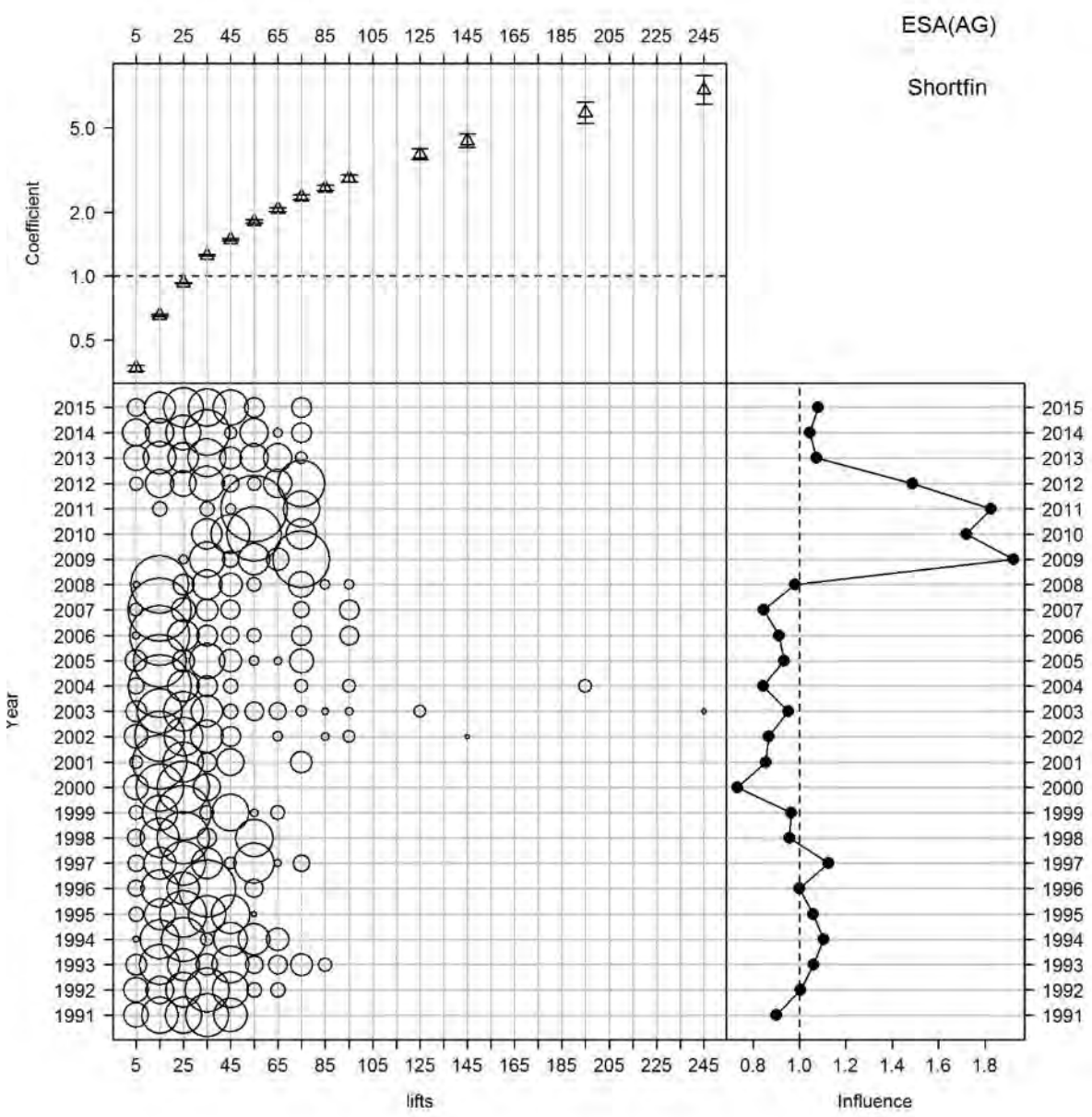


Figure G16: Influence of lifts for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

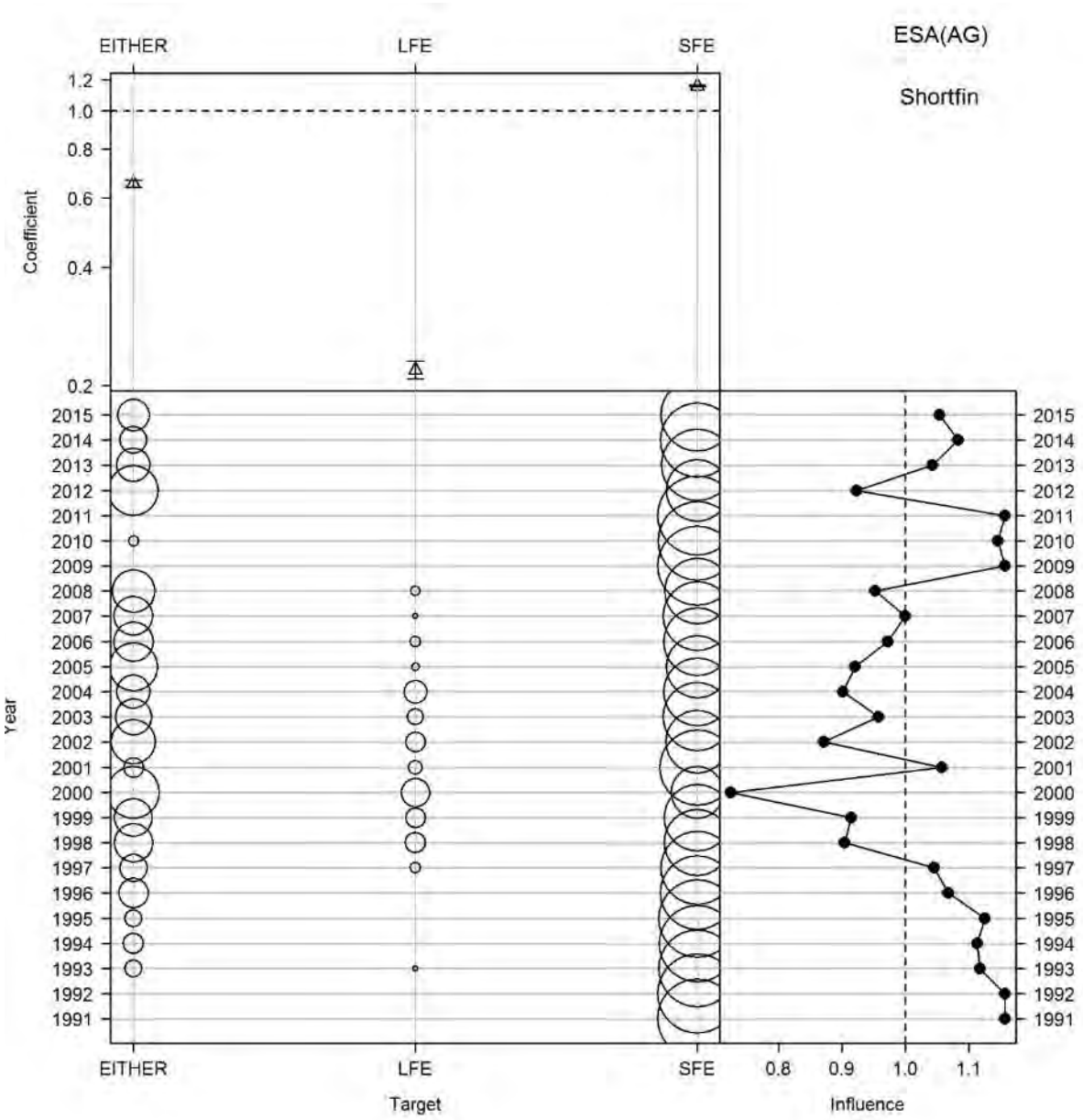


Figure G17: Influence of target for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

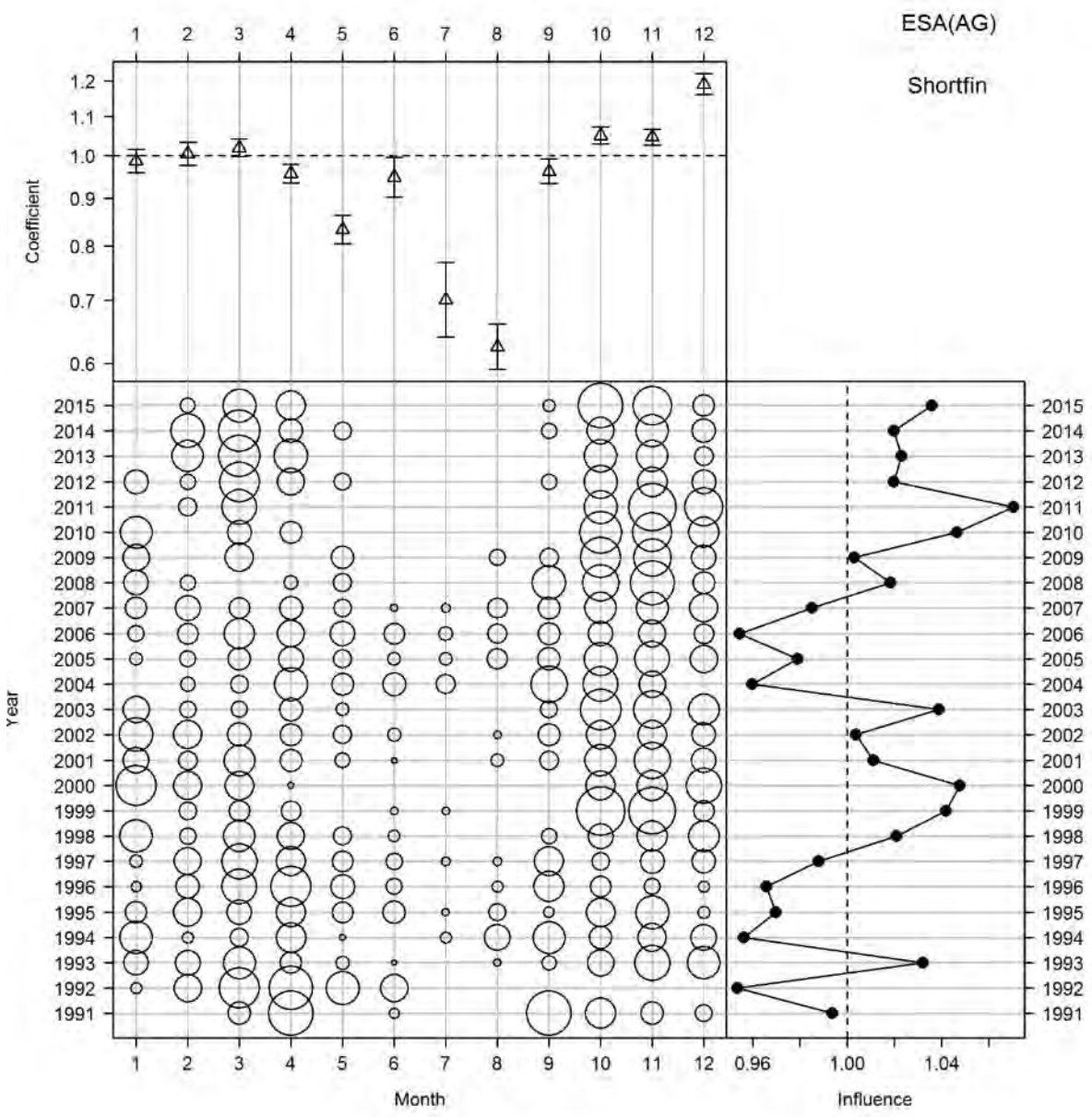


Figure G18: Influence of month for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

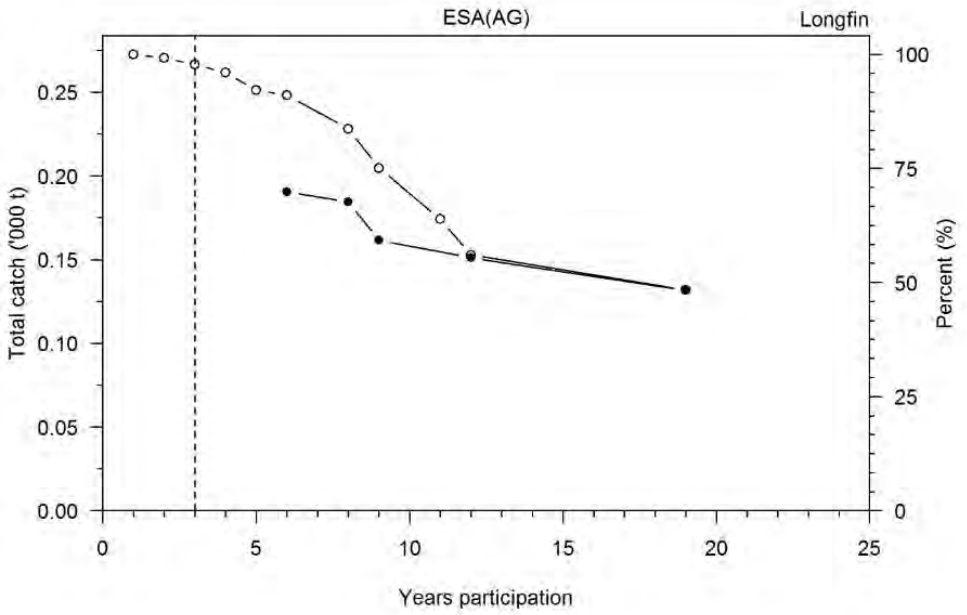


Figure G19: Relationship between years of participation in the fishery and longfin total catch. The open circles represent all longfin catch and the closed circles longfin catch data from fishers who 1) caught longfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core longfin fisher analyses for the years 1990–91 to 2014–15 (ESA AG).

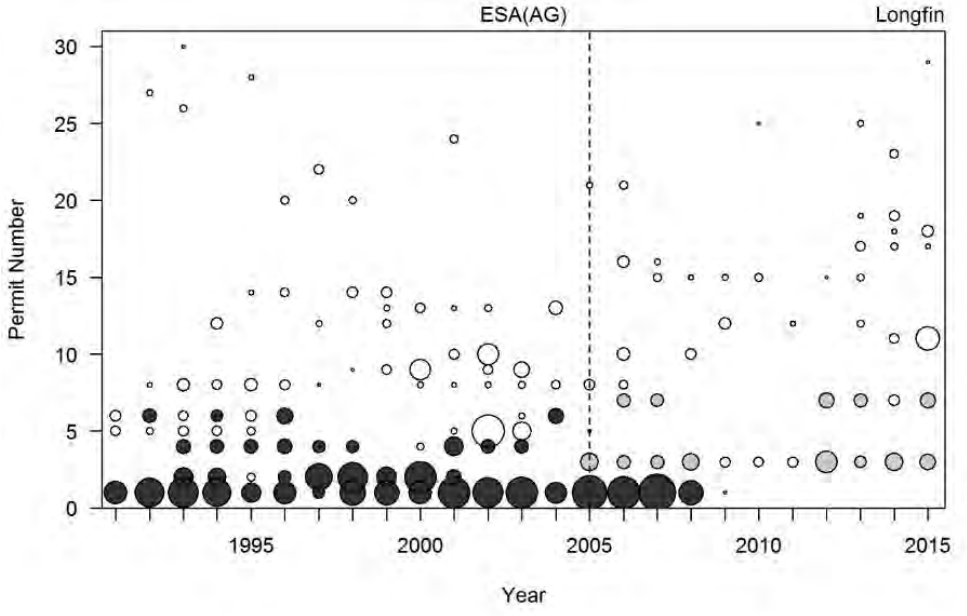


Figure G20: Relative catch of longfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AG).

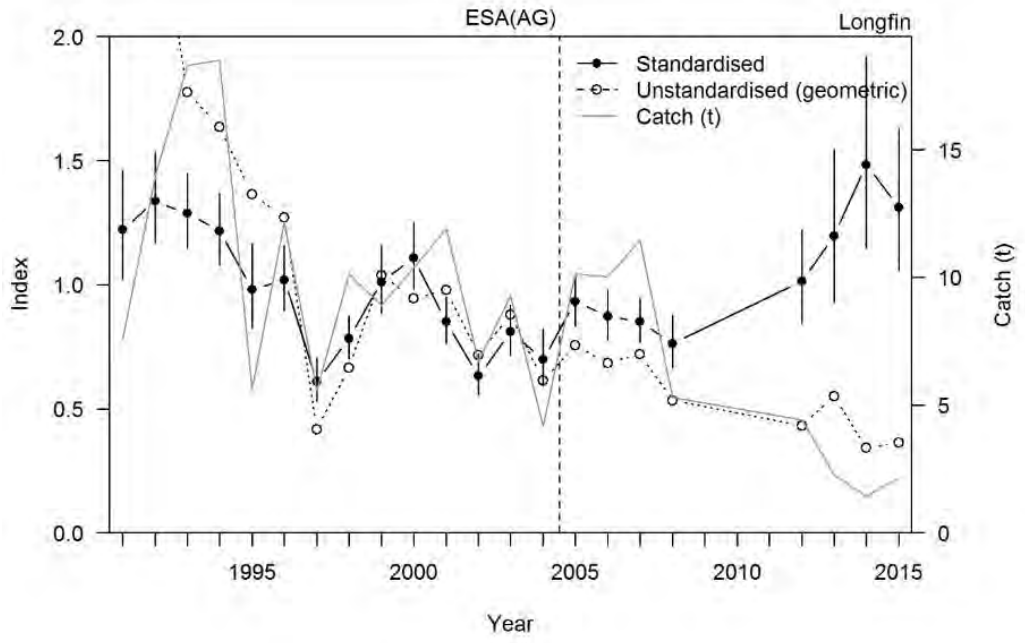


Figure G21: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for longfin core fishers for the years 1990–91 to 2014–15. The longfin catch by core fishers is also plotted (ESA AG).

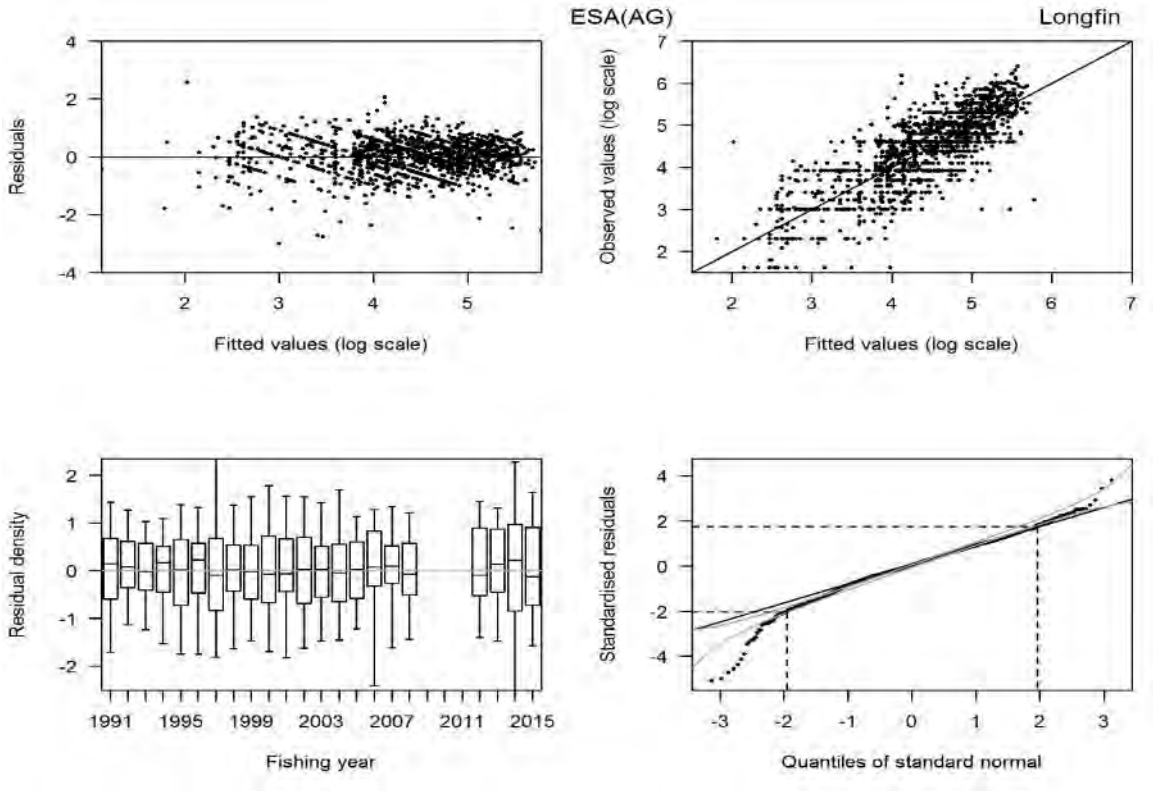


Figure G22: Residual diagnostic plots for the longfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AG).

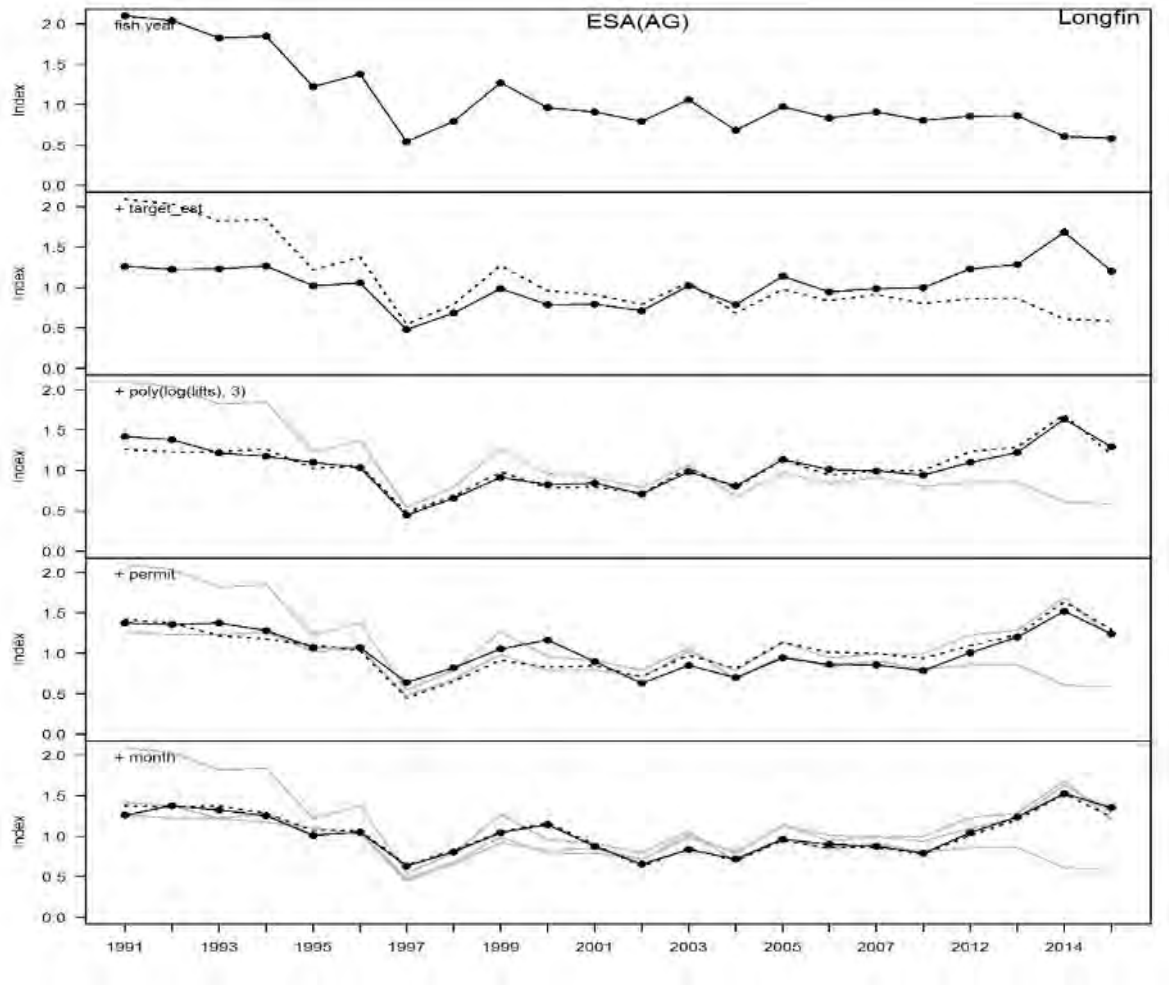


Figure G23: Step plot for the longfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AG).

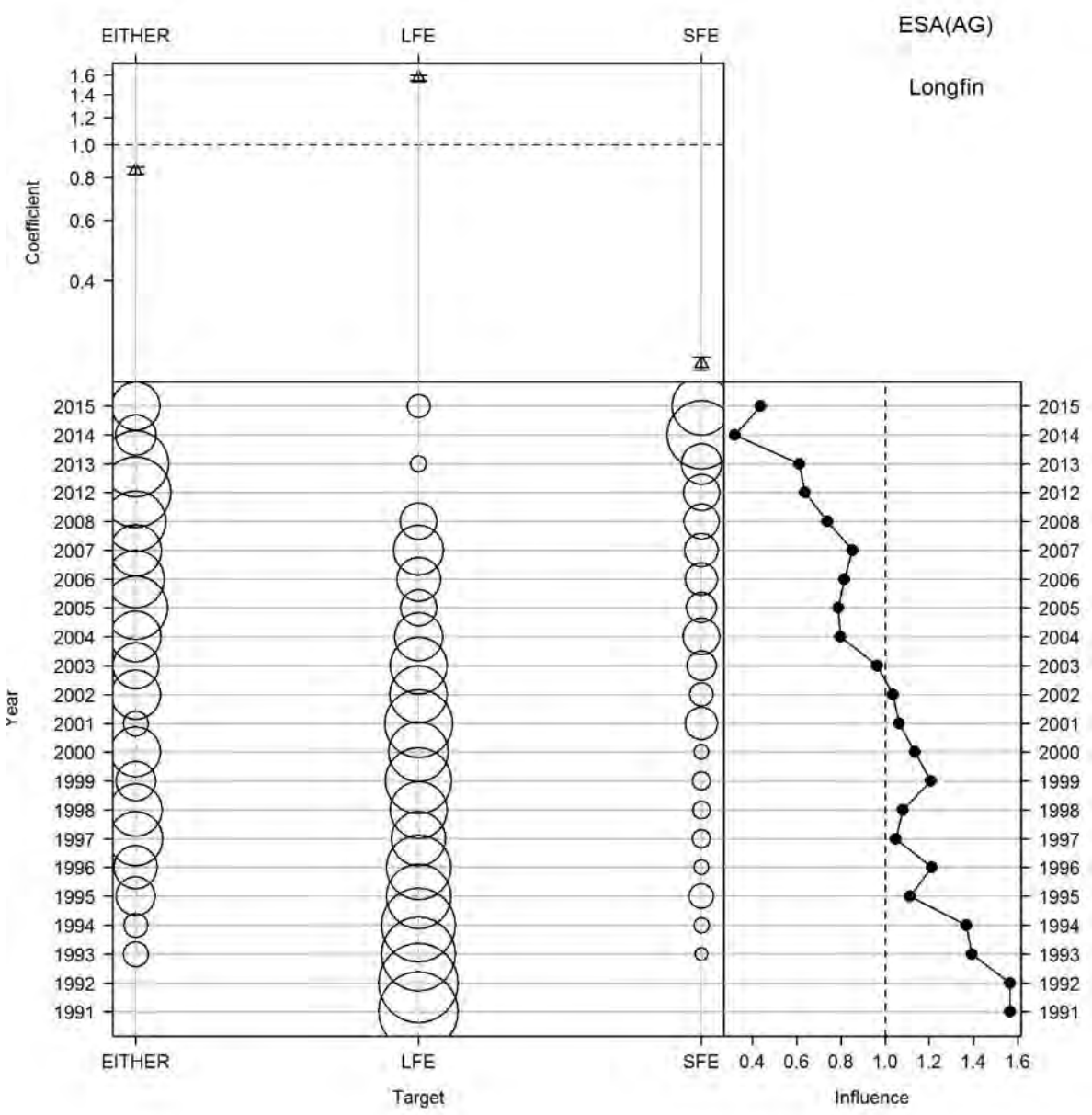


Figure G24: Influence of target for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

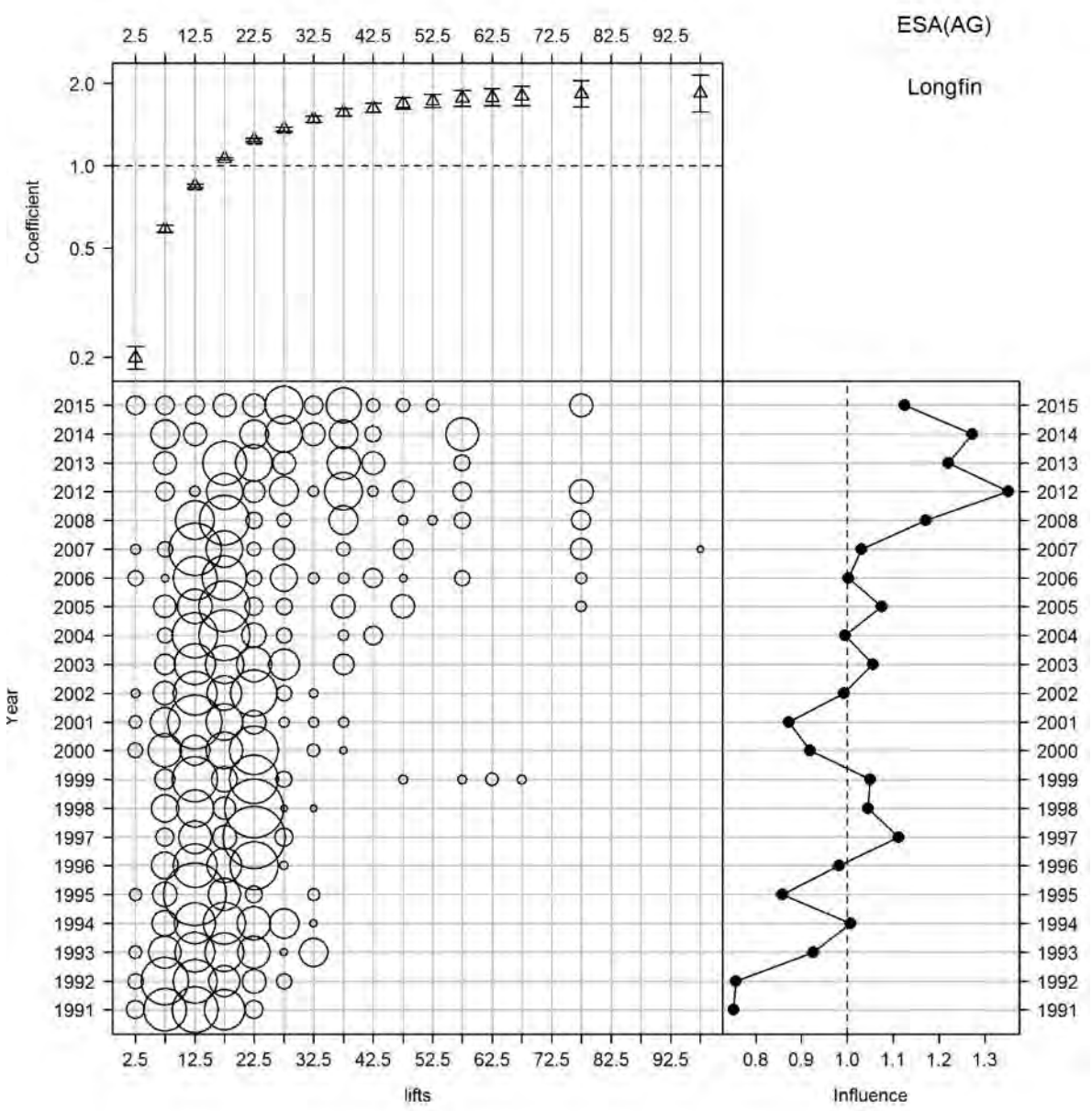


Figure G25: Influence of lifts for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

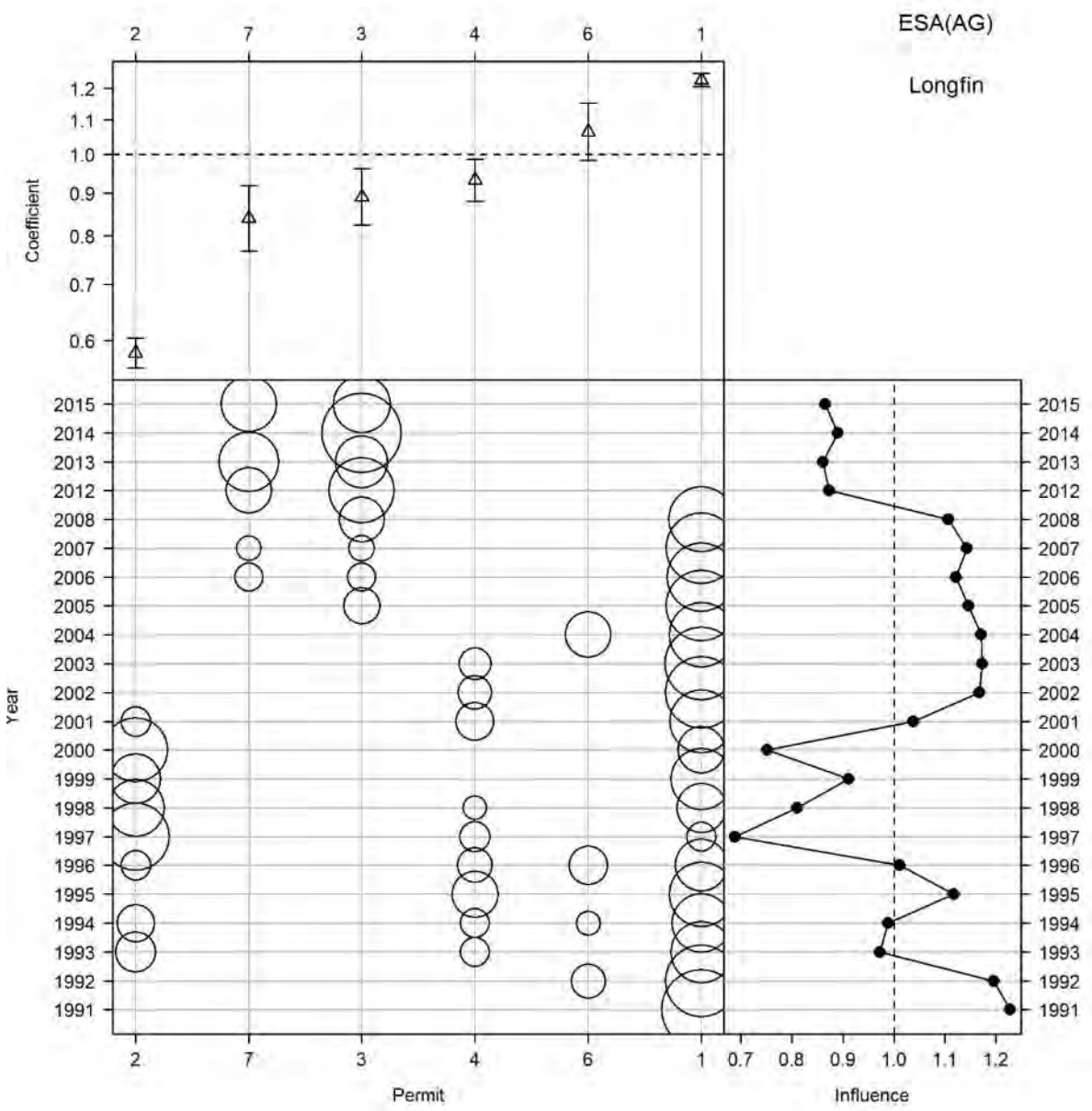


Figure G26: Influence of permit for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

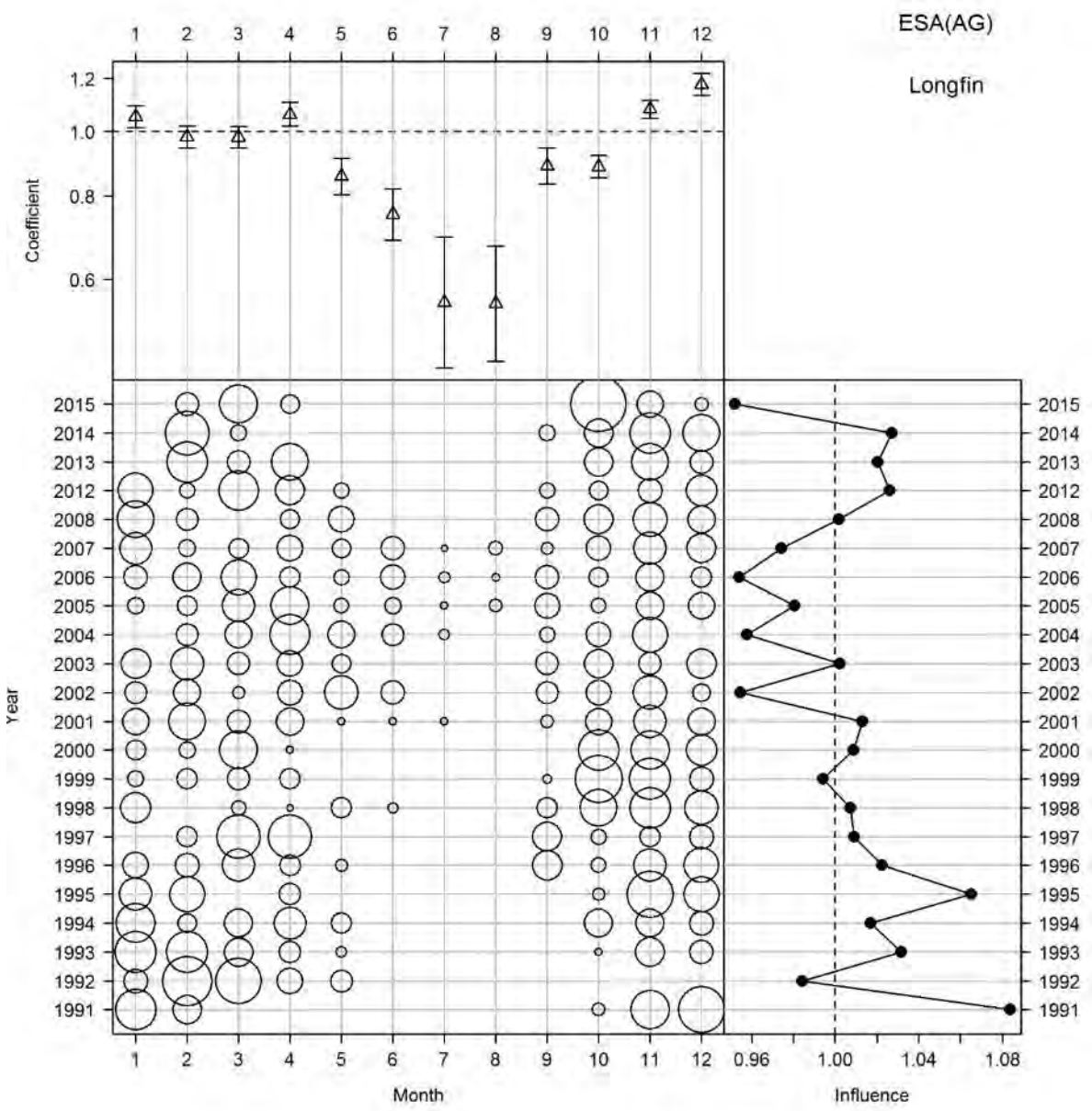


Figure G27: Influence of month for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AG).

APPENDIX H: RANGITIKEI-WHANGANUI (ESA AH)

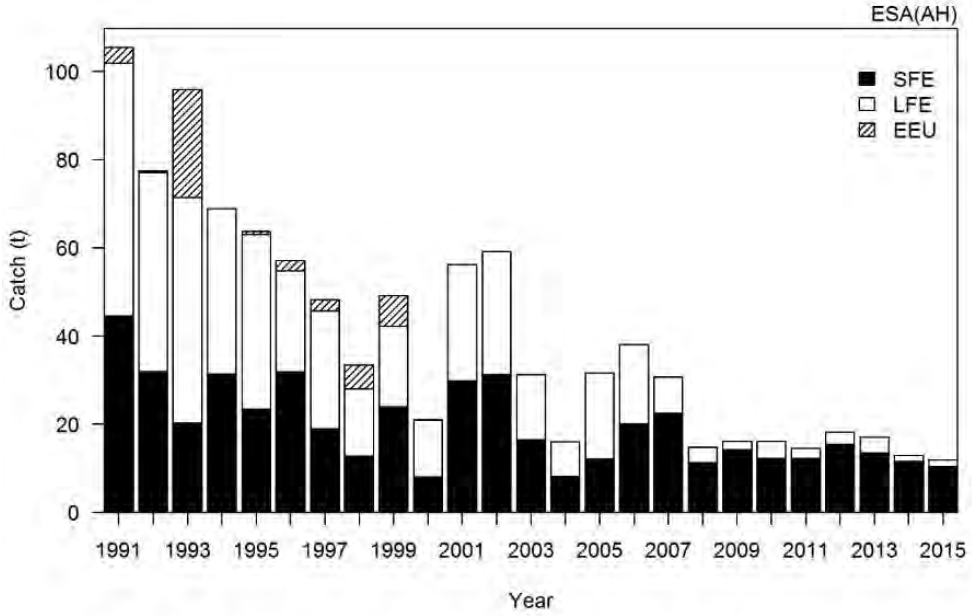


Figure H1: Total estimated commercial catch of shortfin (SFE), longfin (LFE), and unclassified eel catch (EEU) for the years 1990–91 to 2014–15 (ESA AH).

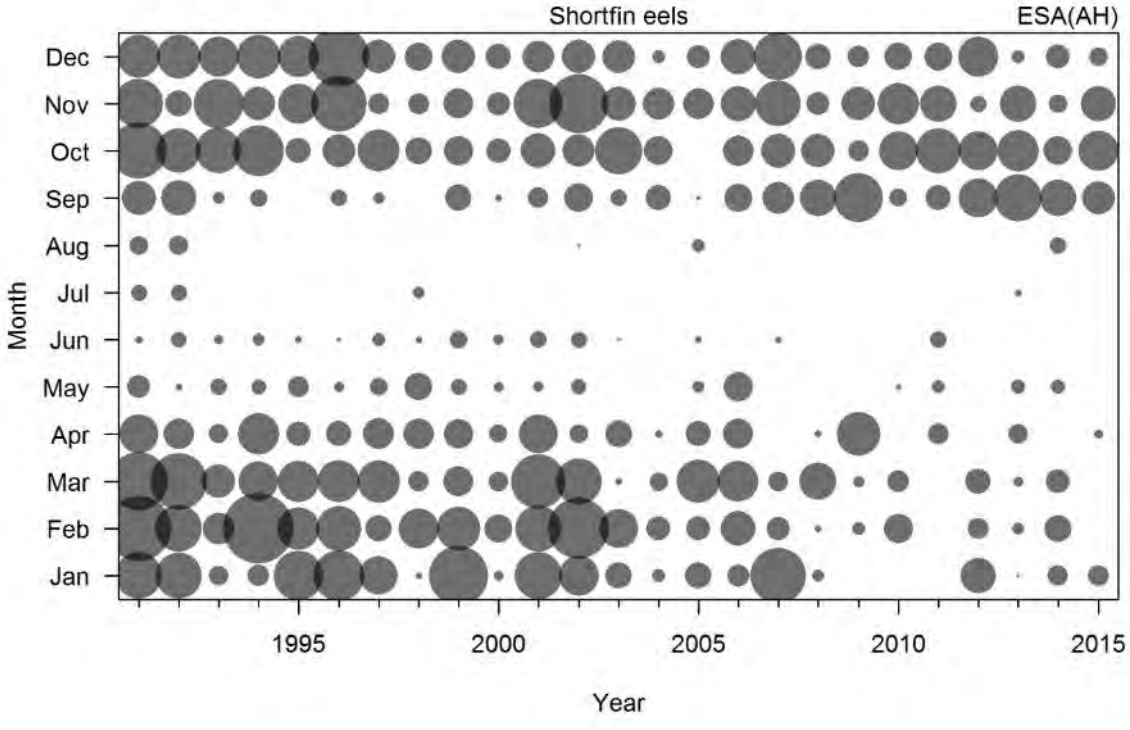


Figure H2: Shortfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AH).

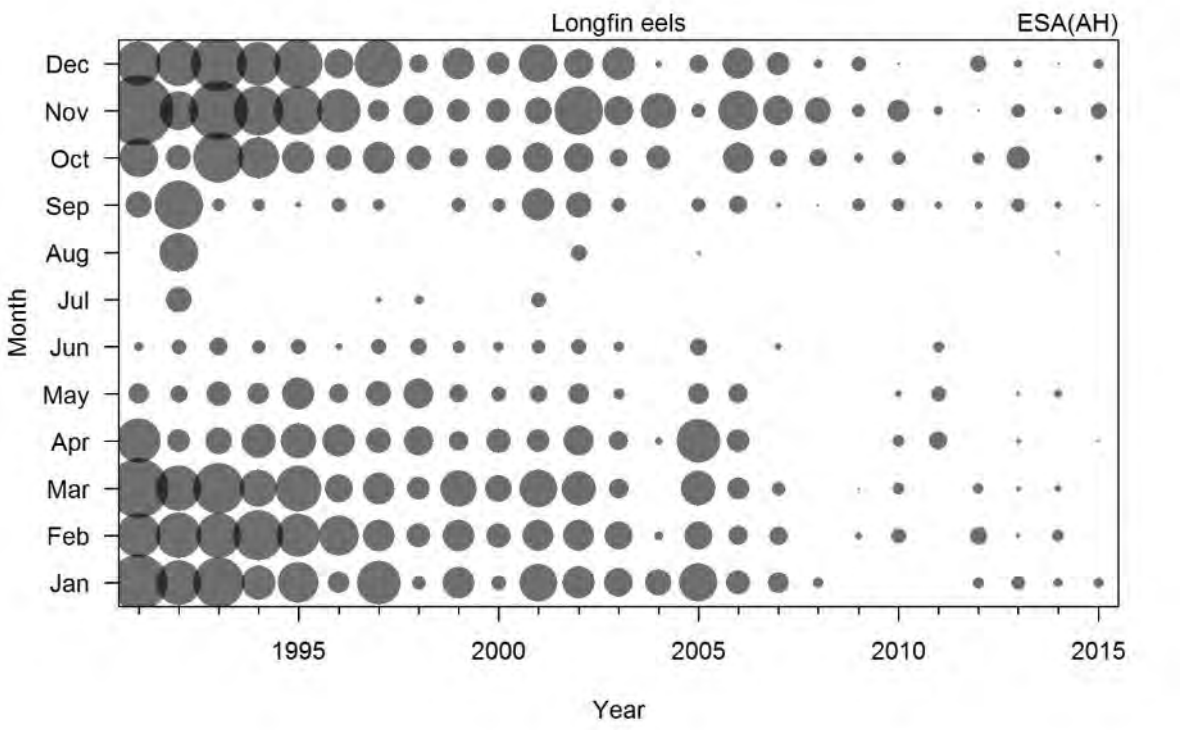


Figure H3: Longfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AH).

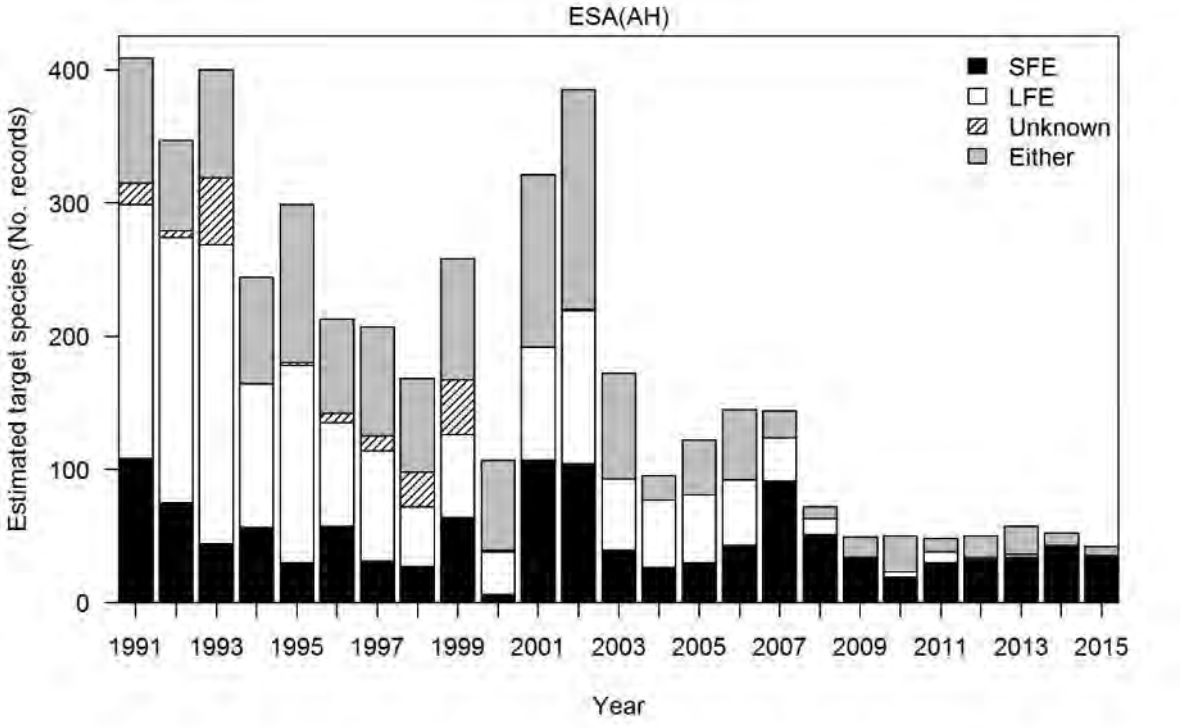


Figure H4: Reconstructed target species for the years 1990–91 to 2014–15 (ESA AH).

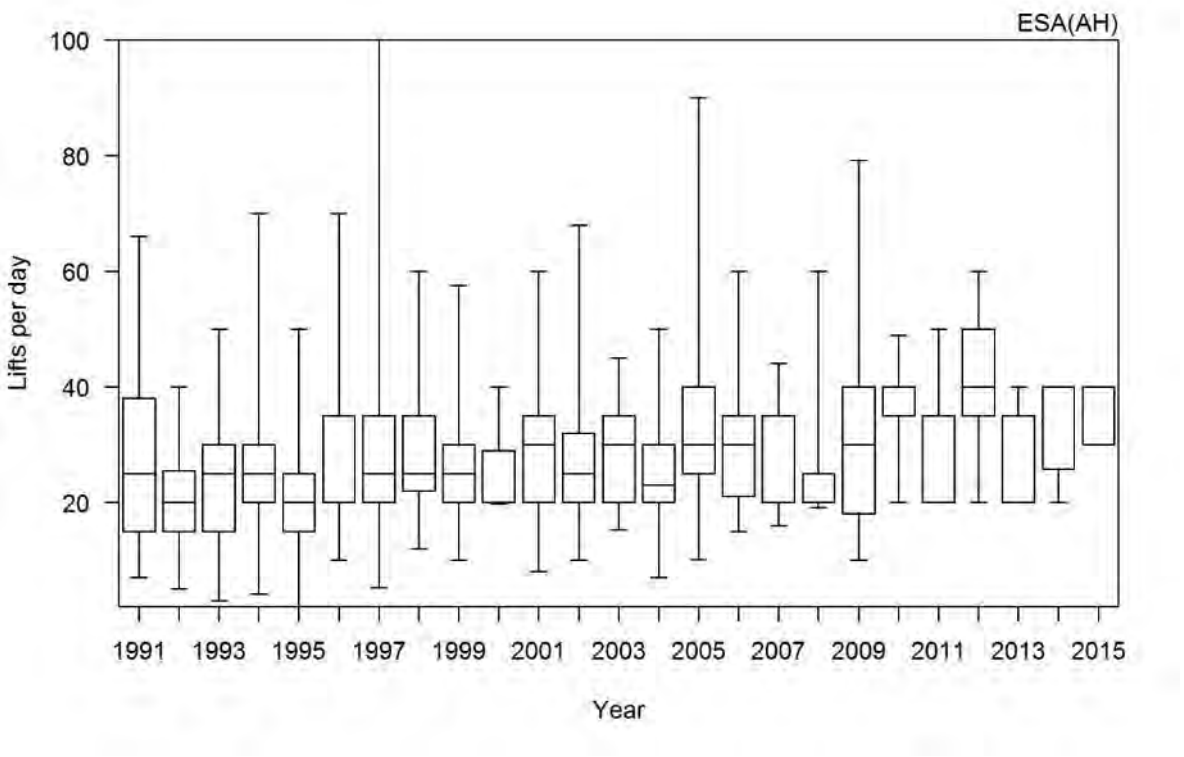


Figure H5: Total lifts per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AH).

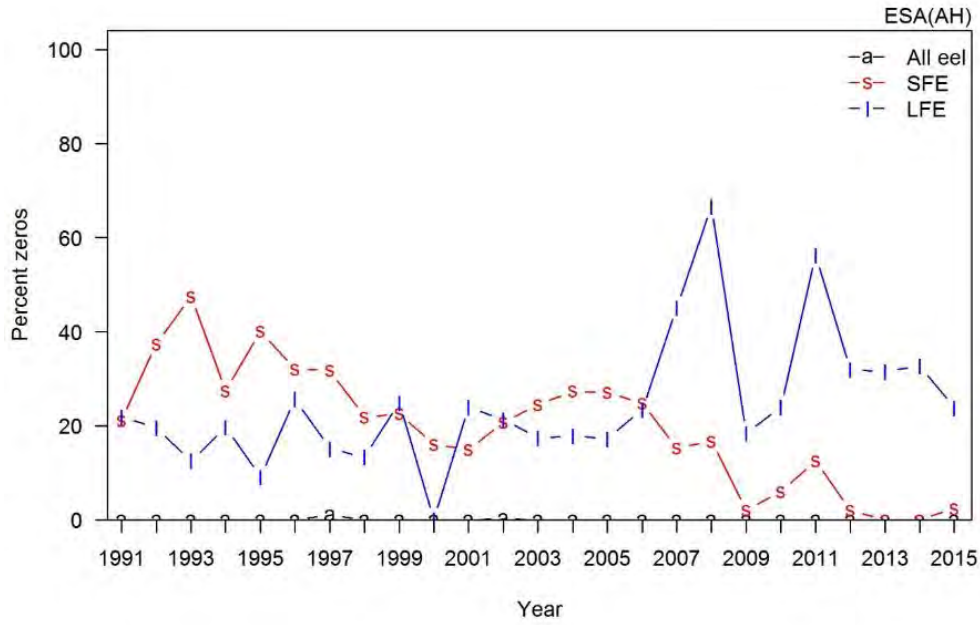


Figure H6: Proportion of valid zero records for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15. Excludes zeros associated with reporting EEU (unclassified) (ESA AH).

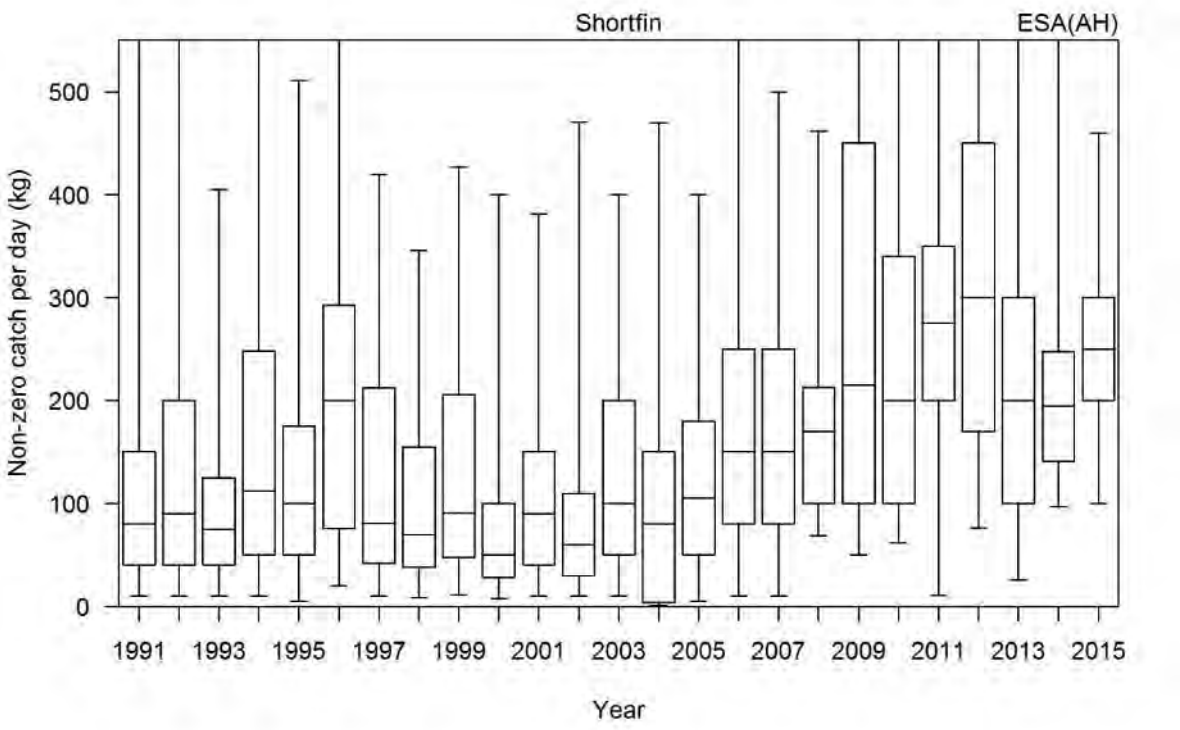


Figure H7: Shortfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AH).

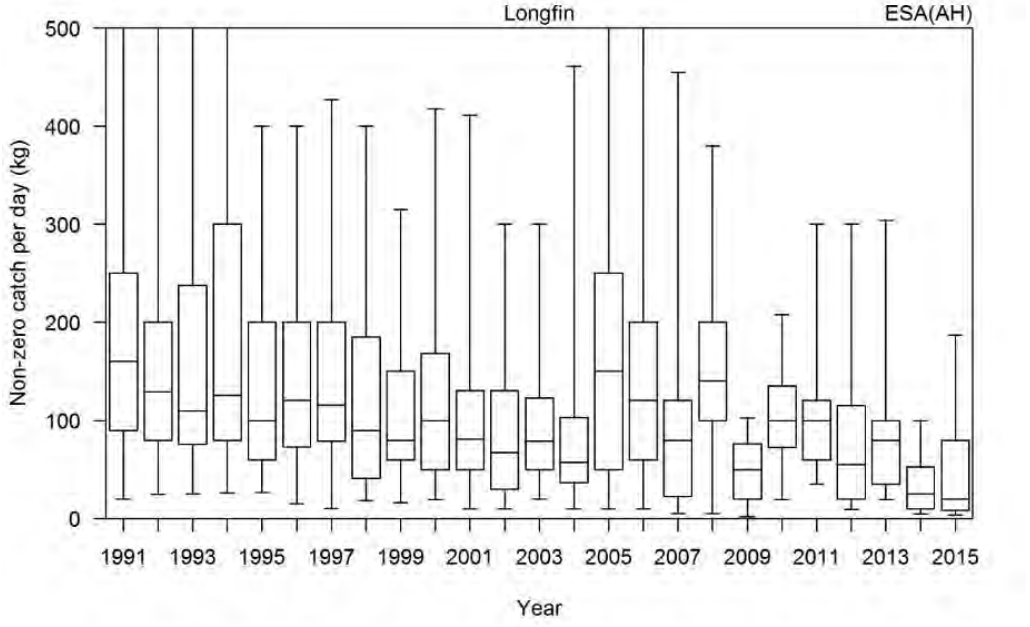


Figure H8: Longfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AH).

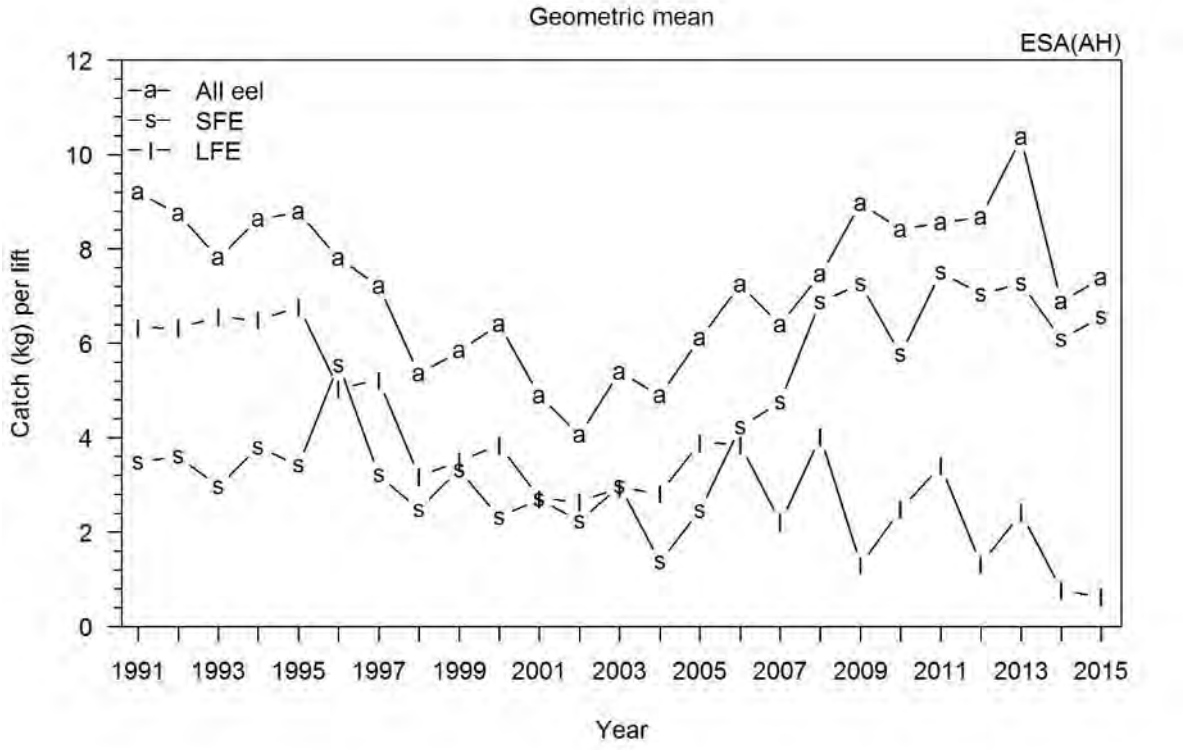


Figure H9: Unstandardised CPUE (geometric mean of catch per lift) for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15 (ESA AH).

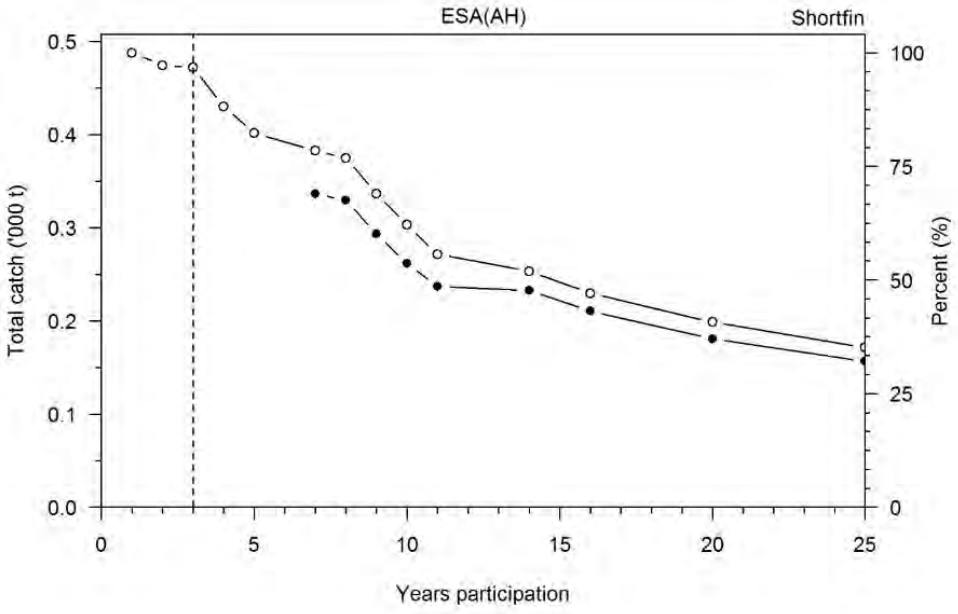


Figure H10: Relationship between years of participation in the fishery and shortfin total catch. The open circles represent all shortfin catch and the closed circles shortfin catch data from fishers who 1) caught shortfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core shortfin fisher analyses for the years 1990–91 to 2014–15 (ESA AH).

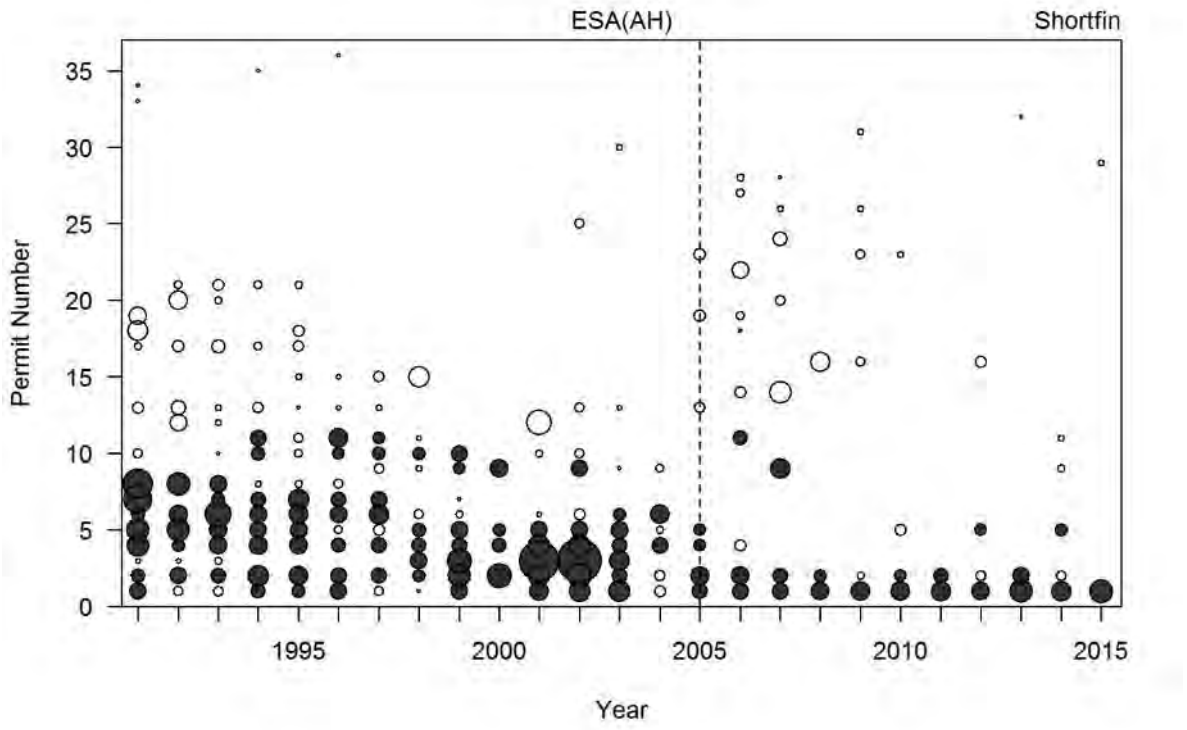


Figure H11: Relative catch of shortfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AH).

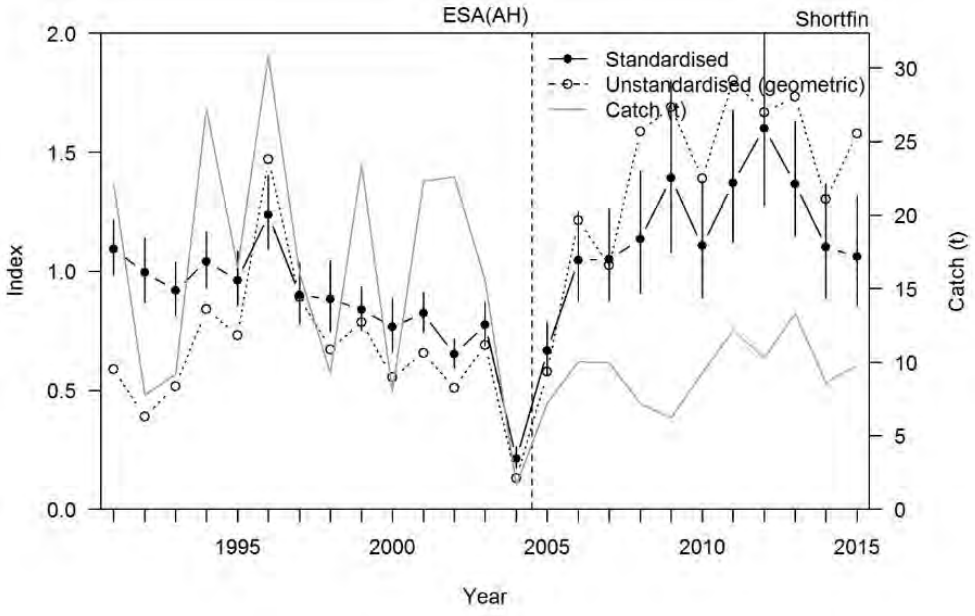


Figure H12: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for shortfin core fishers for the years 1990–91 to 2014–15. The shortfin catch by core fishers is also plotted (ESA AH).

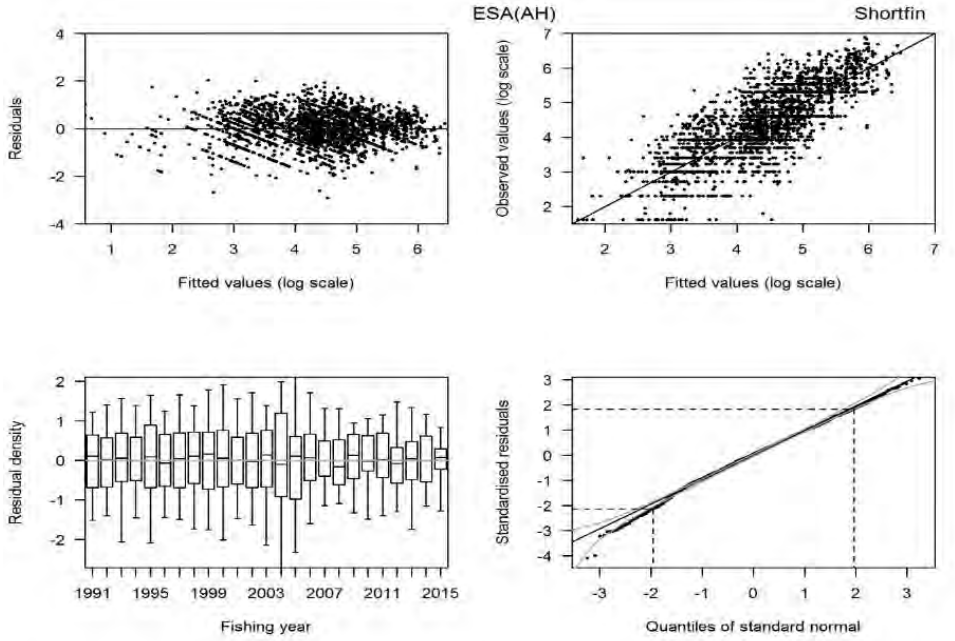


Figure H13: Residual diagnostic plots for the shortfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AH).

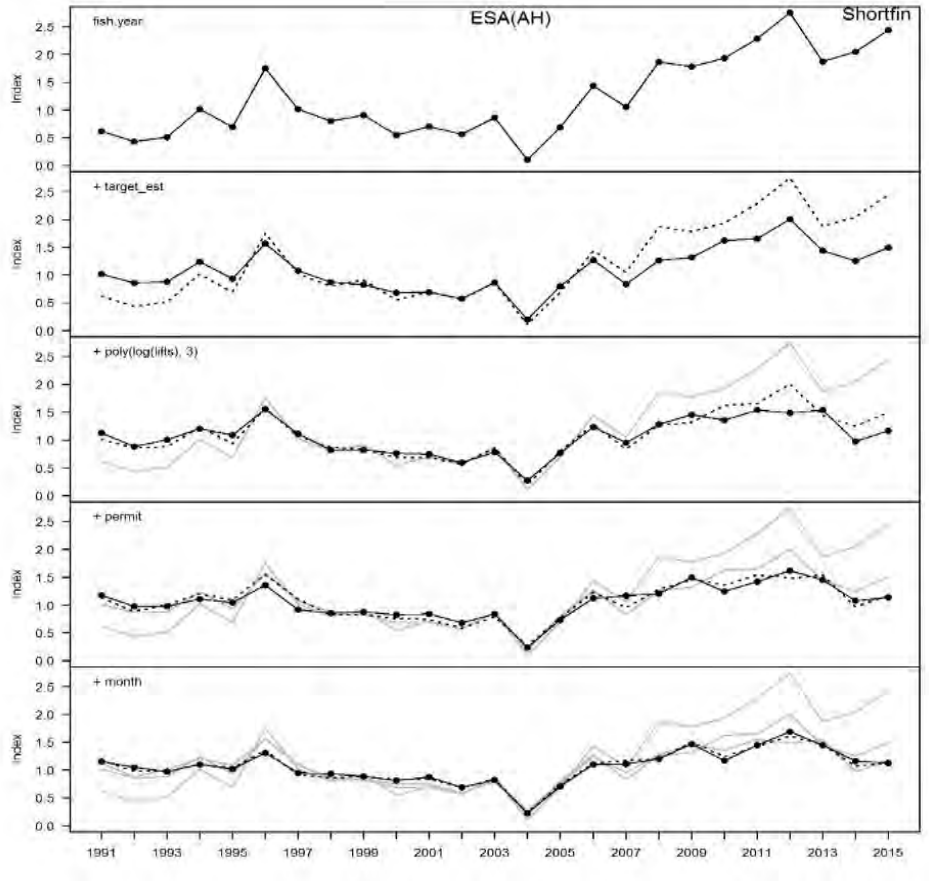


Figure H14: Step plot for the shortfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AH).

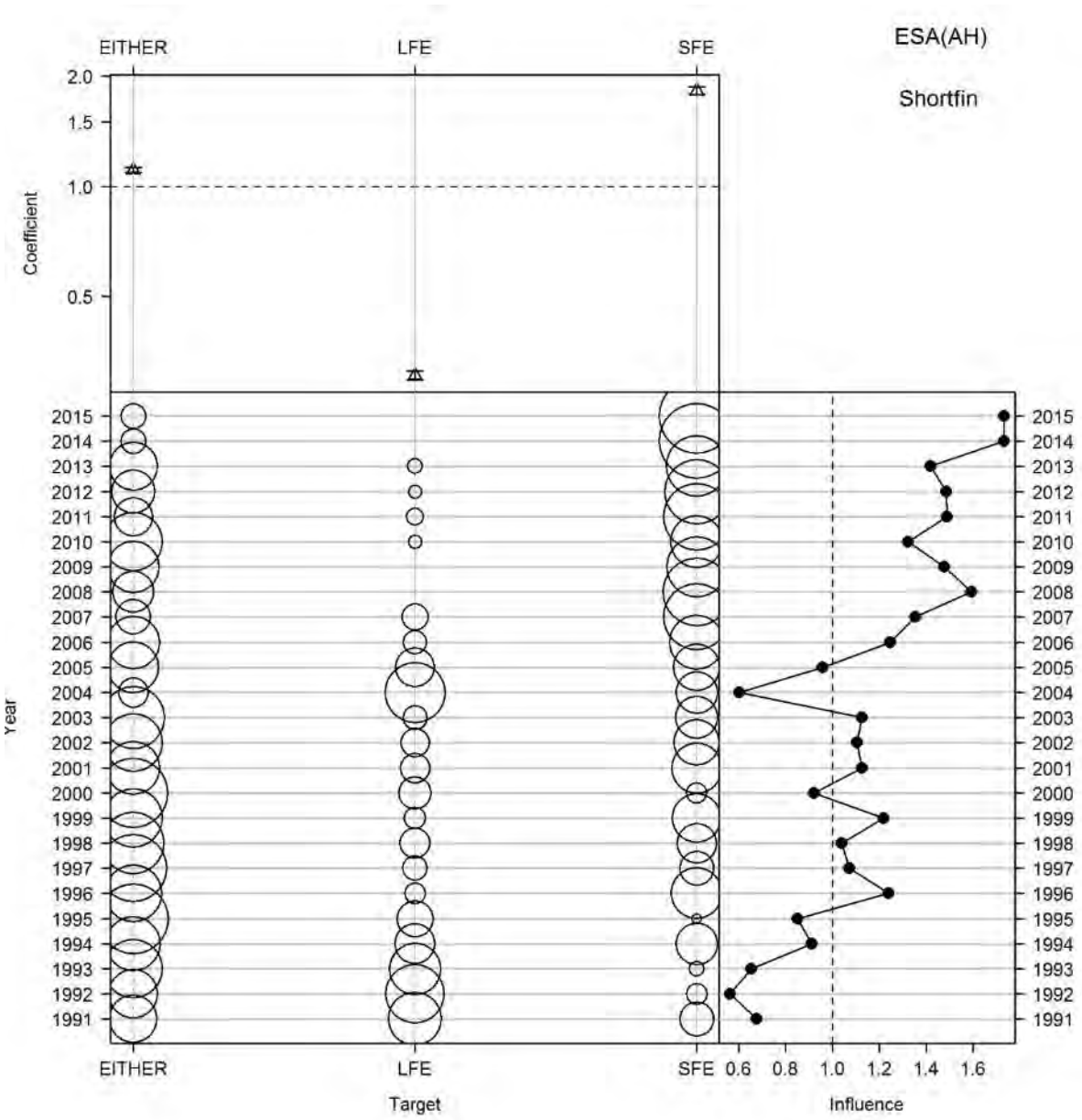


Figure H15: Influence of target for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

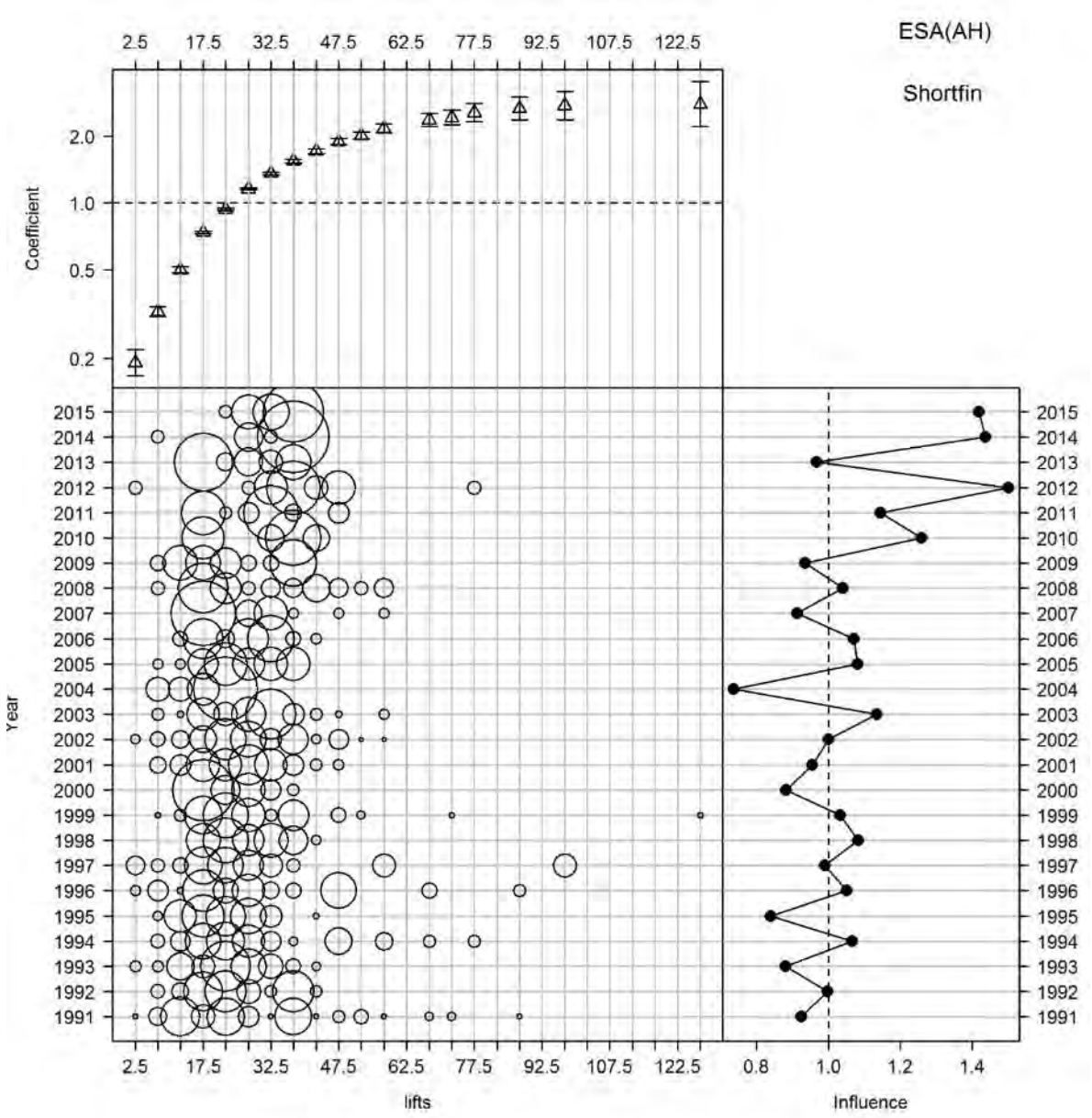


Figure H16: Influence of lifts for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

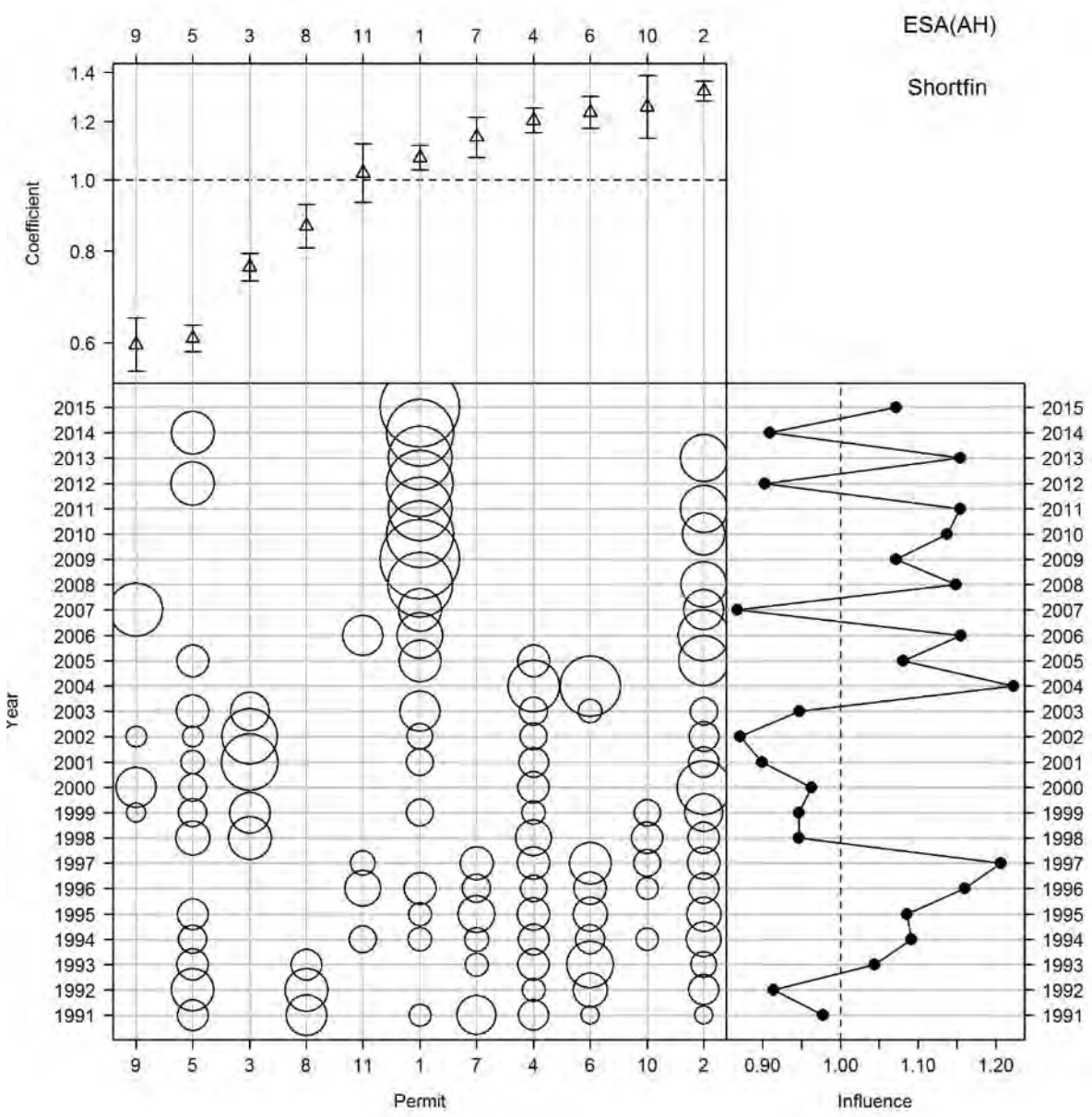


Figure H17: Influence of permit for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

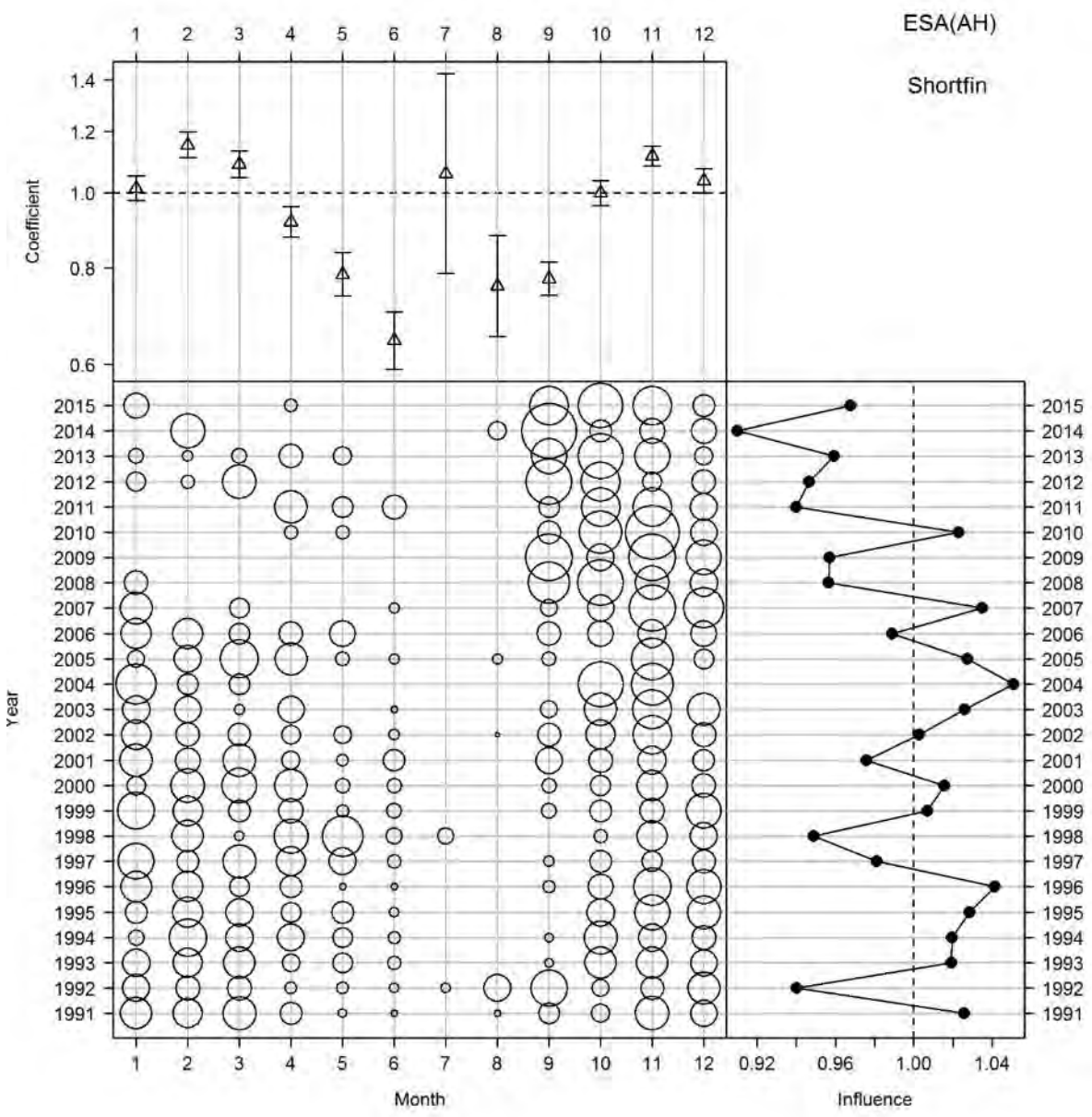


Figure H18: Influence of month for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

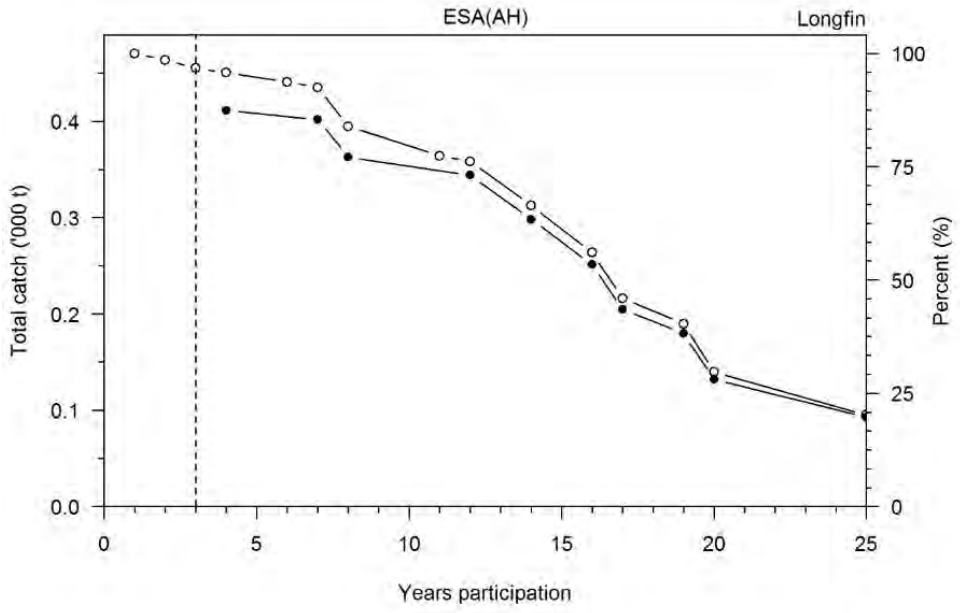


Figure H19: Relationship between years of participation in the fishery and longfin total catch. The open circles represent all longfin catch and the closed circles longfin catch data from fishers who 1) caught longfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core longfin fisher analyses for the years 1990–91 to 2014–15 (ESA AH).

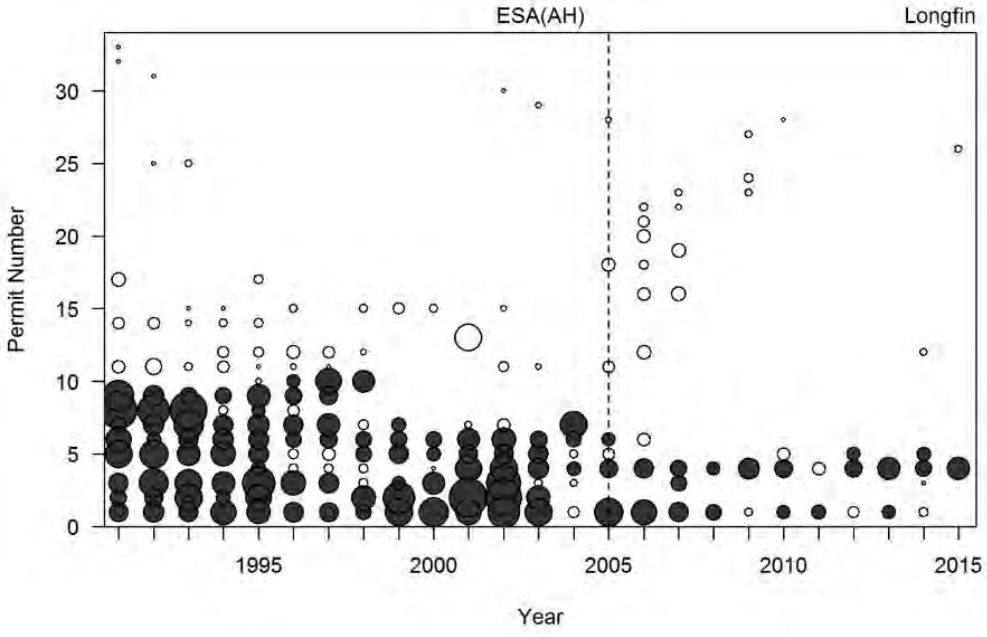


Figure H20: Relative catch of longfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AH).

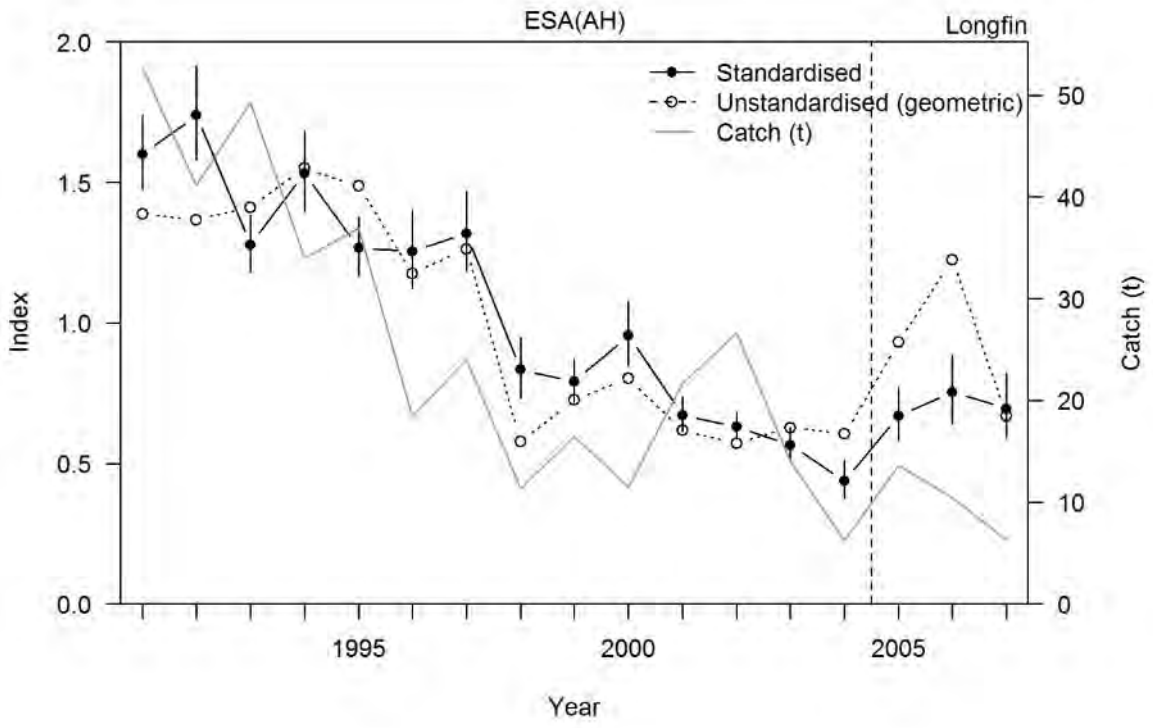


Figure H21: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for longfin core fishers for the years 1990–91 to 2014–15. The longfin catch by core fishers is also plotted (ESA AH).

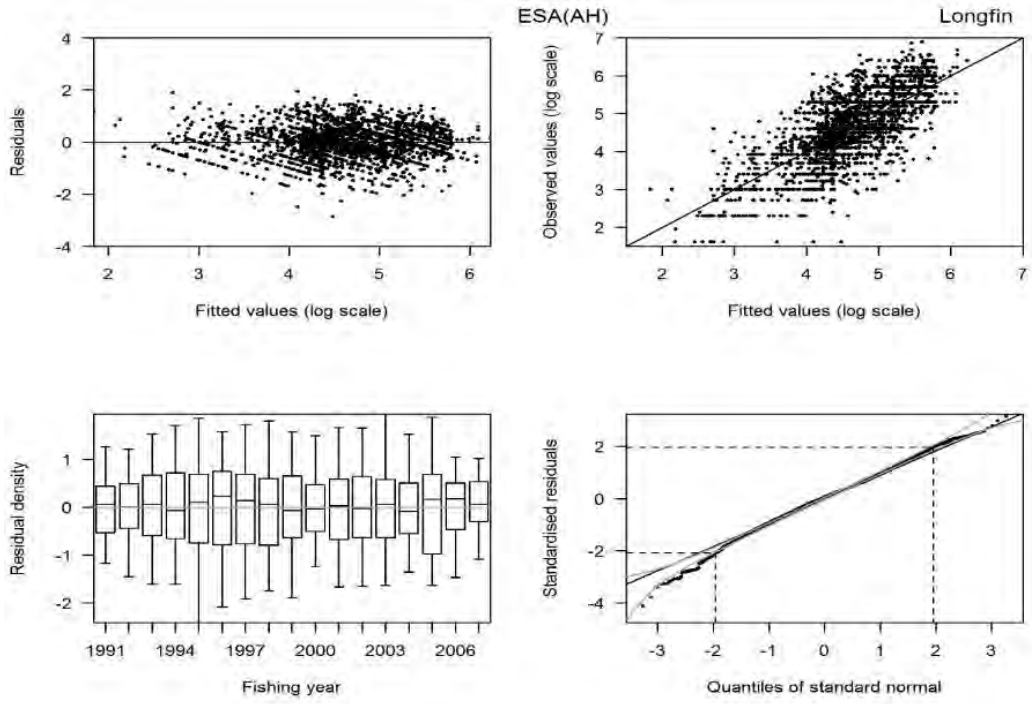


Figure H22: Residual diagnostic plots for the longfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AH).

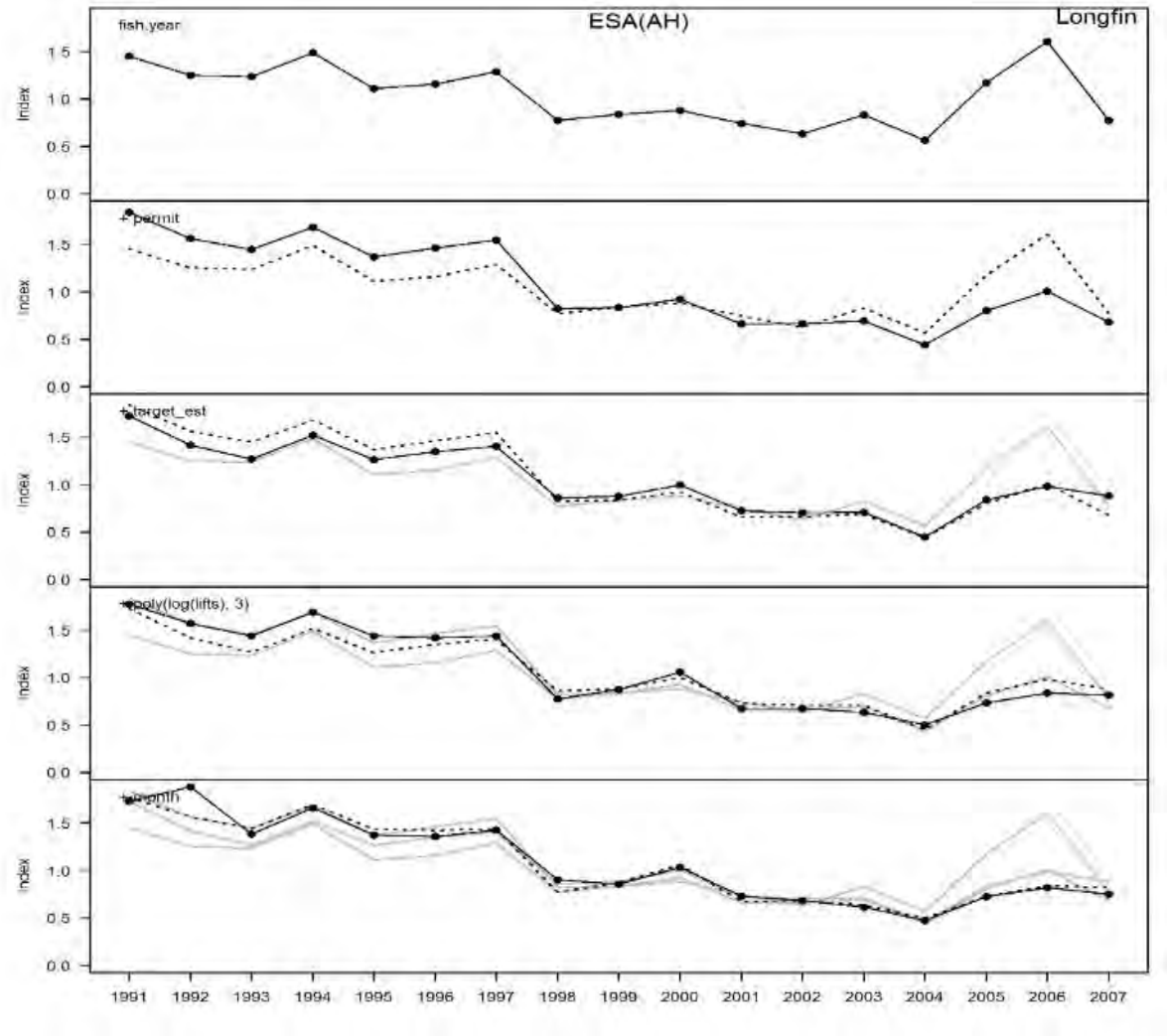


Figure H23: Step plot for the longfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AH).

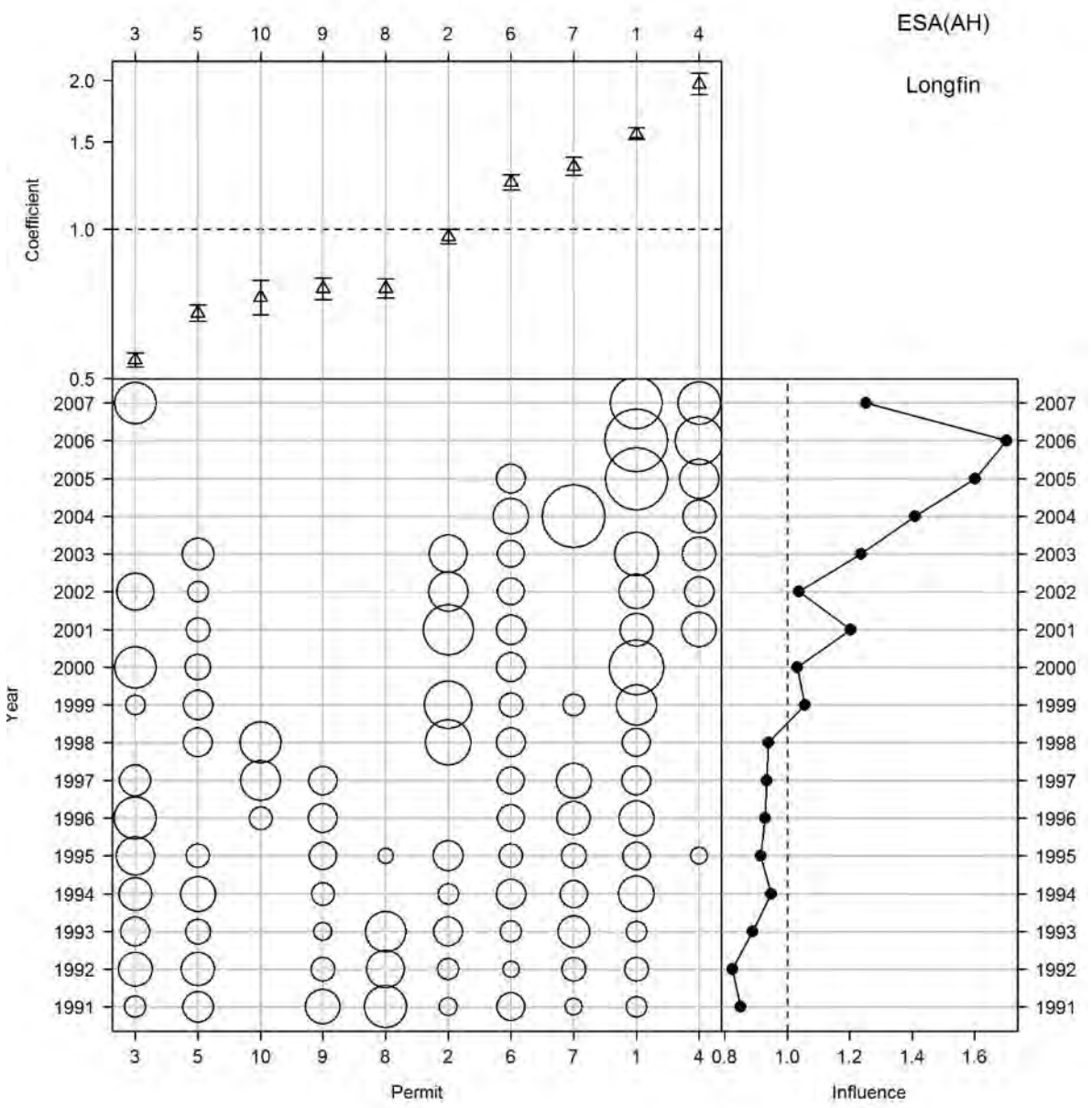


Figure H24: Influence of permit for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

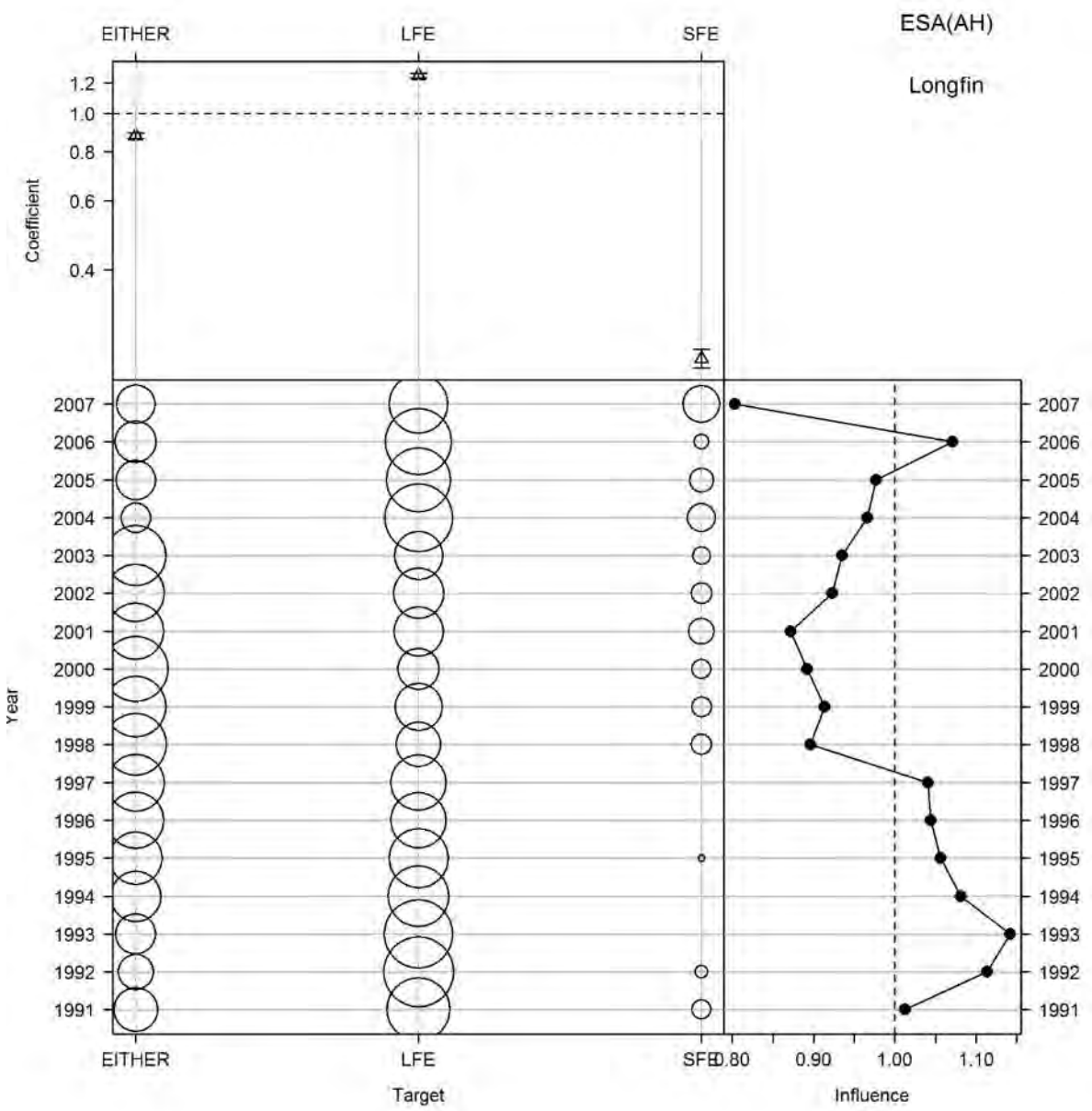


Figure H25: Influence of target for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

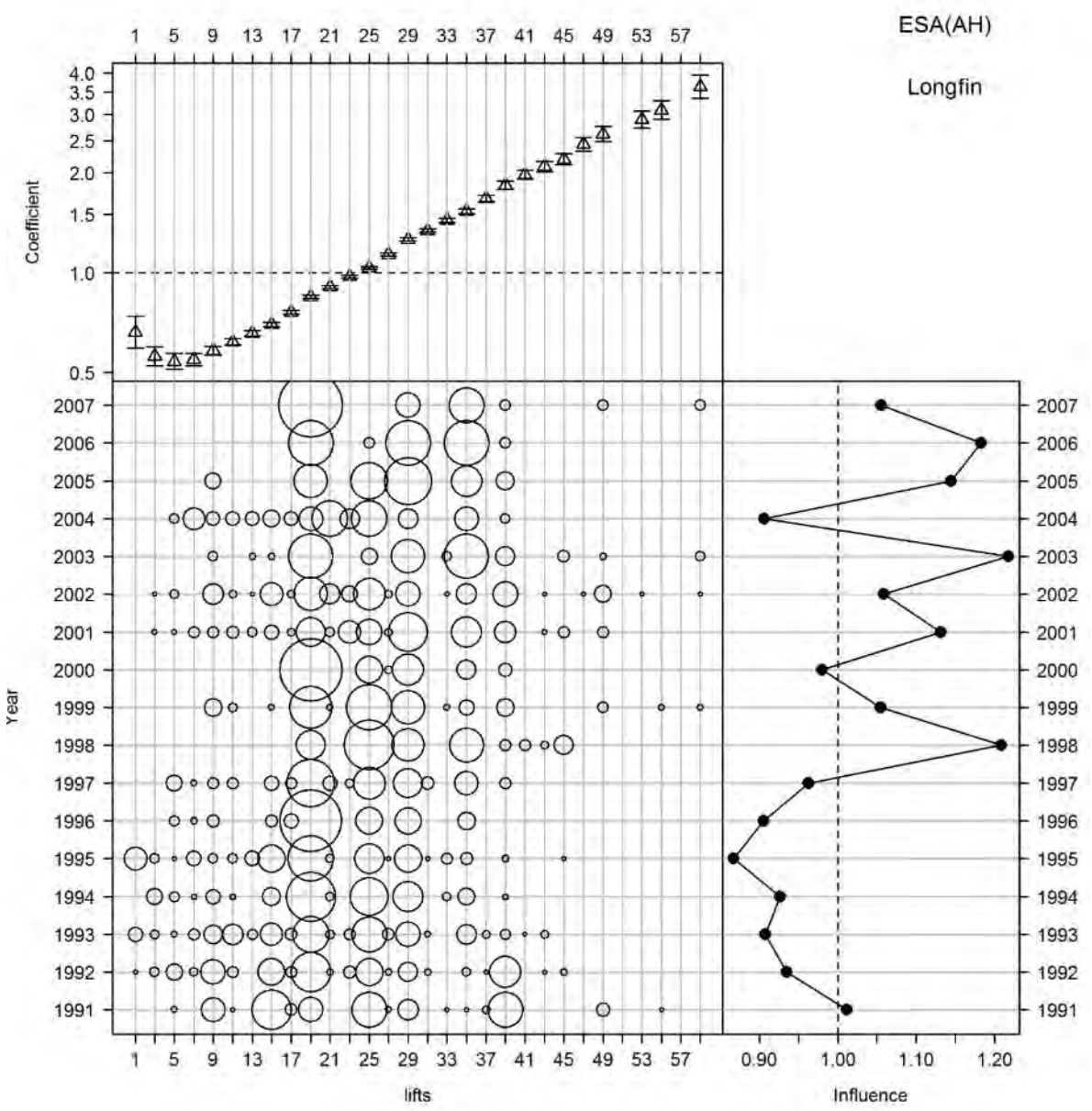


Figure H26: Influence of lifts for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

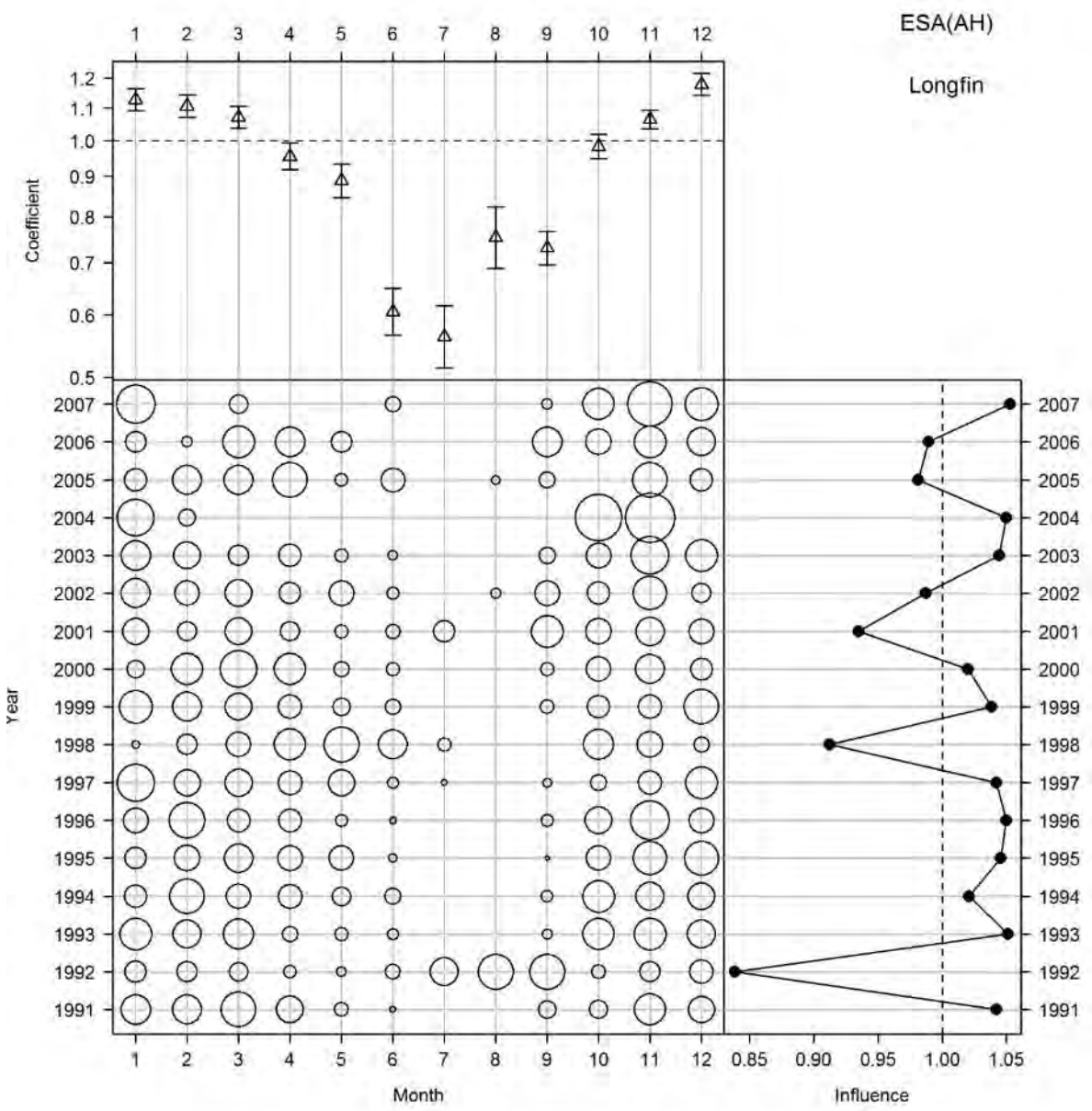


Figure H27: Influence of month for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AH).

APPENDIX J: TARANAKI (ESA AJ)

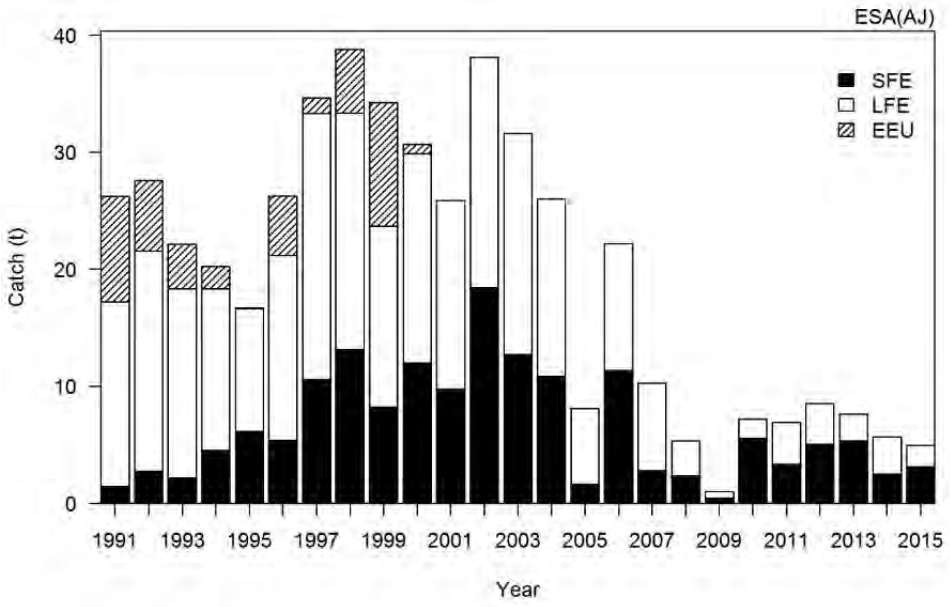


Figure J1: Total estimated commercial catch of shortfin (SFE), longfin (LFE), and unclassified eel catch (EEU) for the years 1990–91 to 2014–15 (ESA AJ).

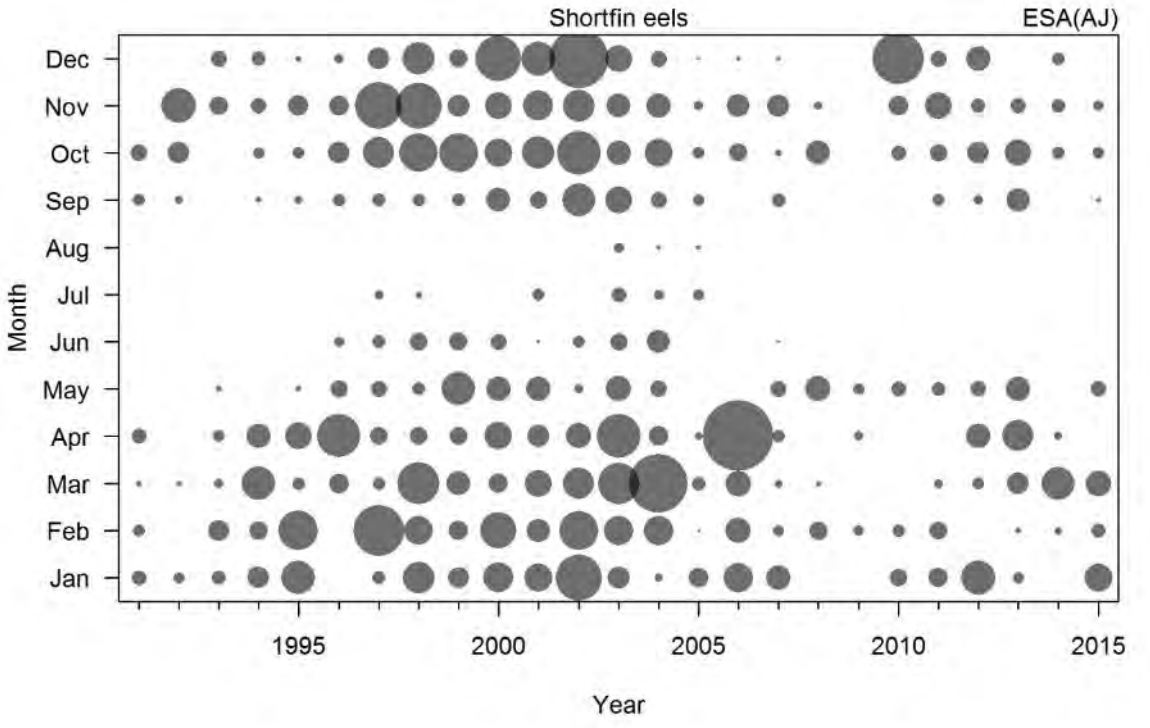


Figure J2: Shortfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AJ).

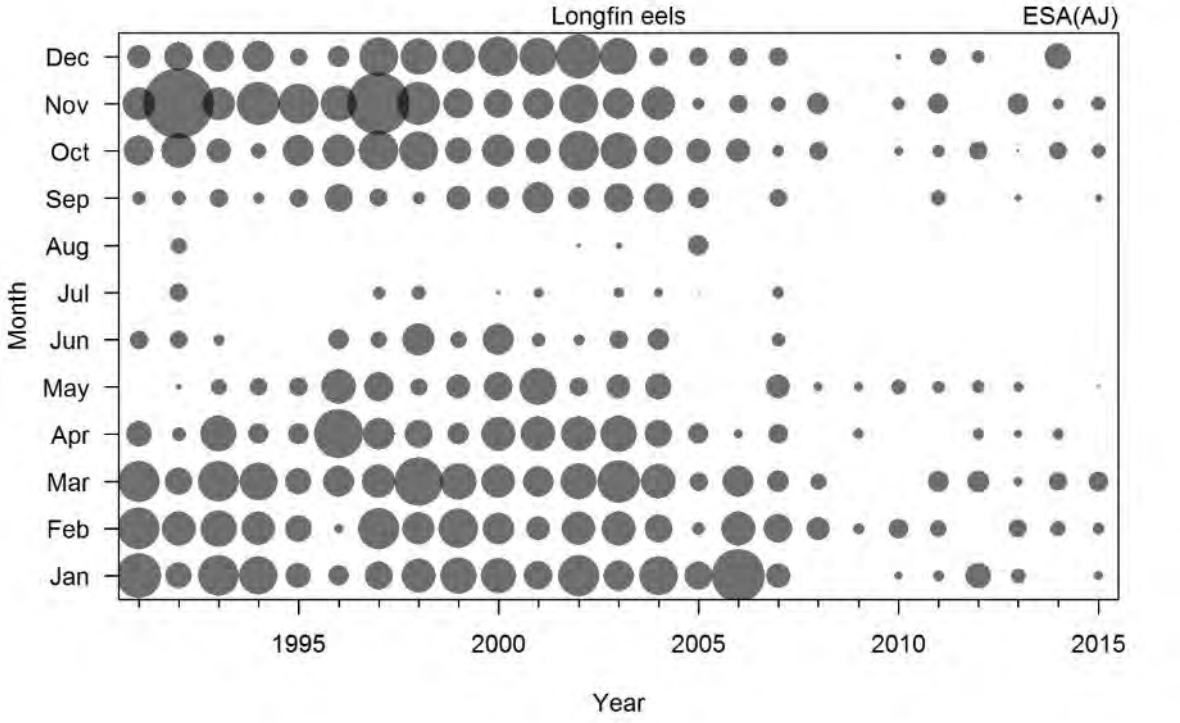


Figure J3: Longfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AJ).

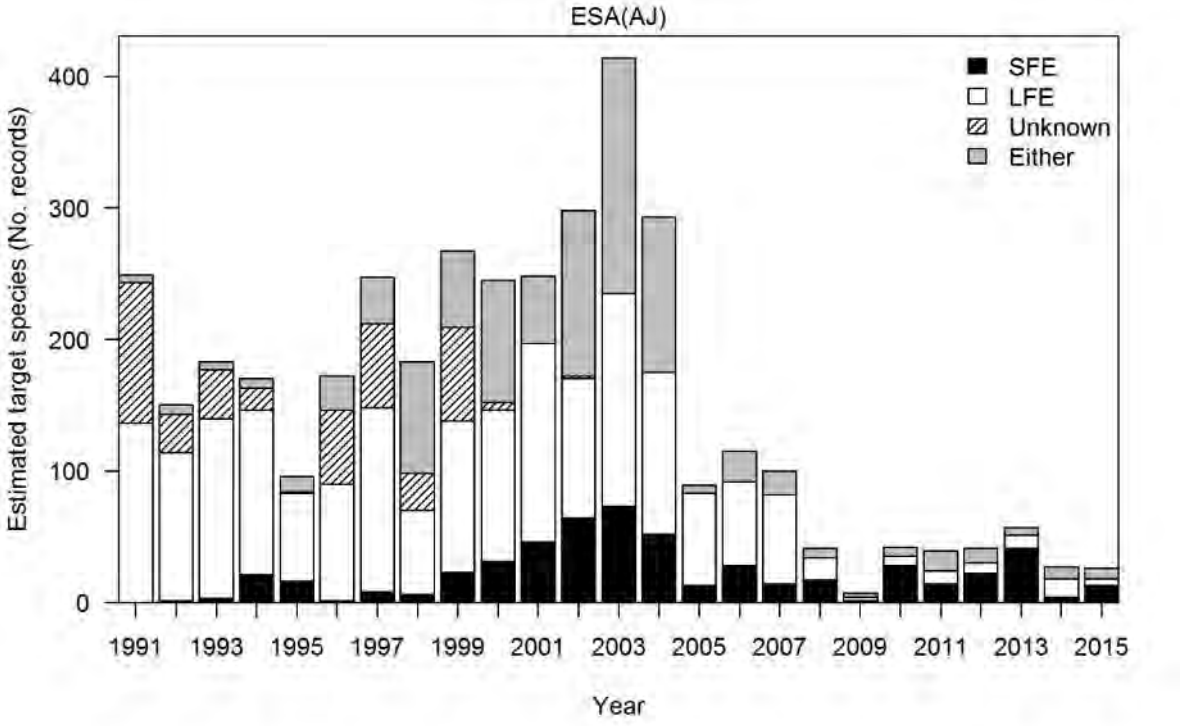


Figure J4: Reconstructed target species for the years 1990–91 to 2014–15 (ESA AJ).

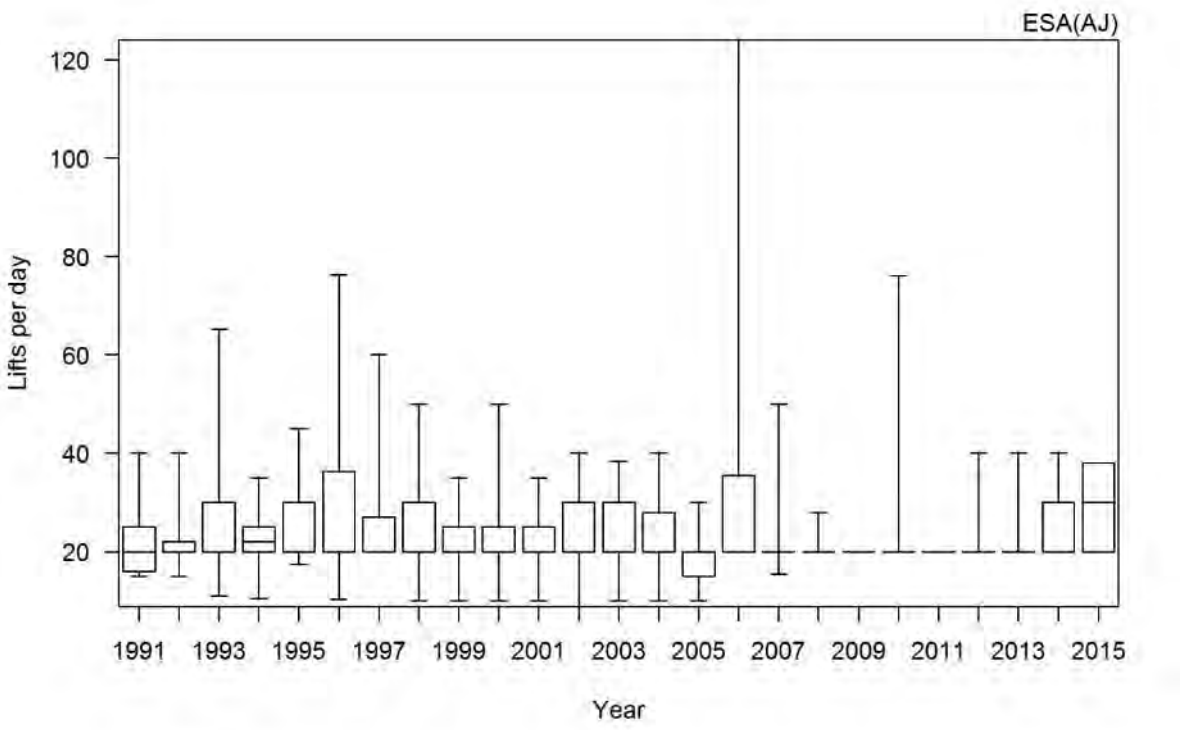


Figure J5: Total lifts per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AJ).

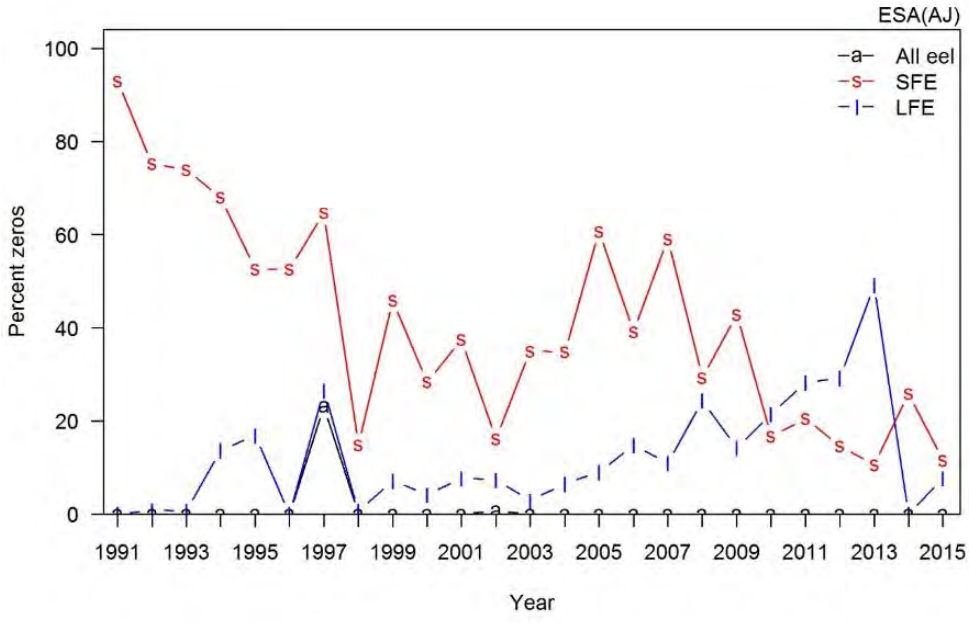


Figure J6: Proportion of valid zero records for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15. Excludes zeros associated with reporting EEU (unclassified) (ESA AJ).

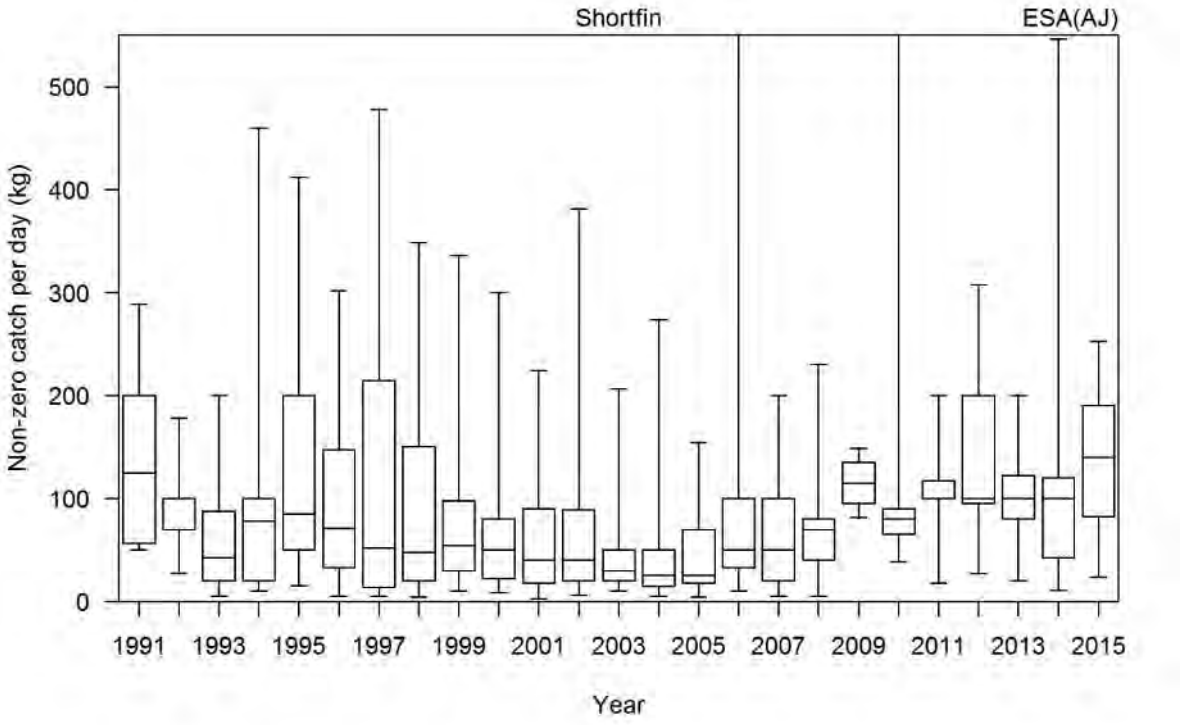


Figure J7: Shortfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AJ).

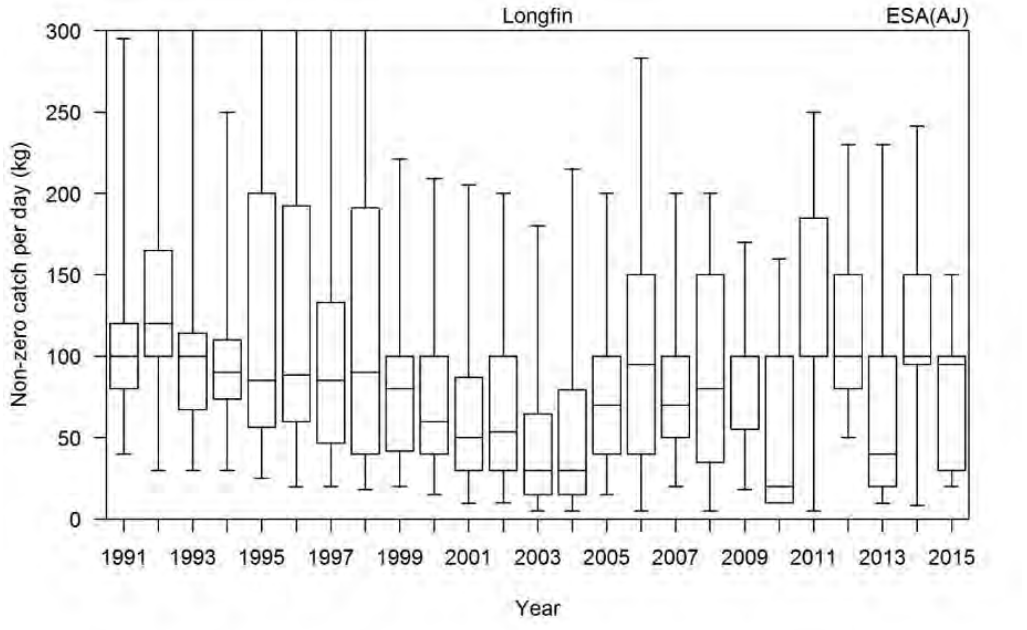


Figure J8: Longfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AJ).

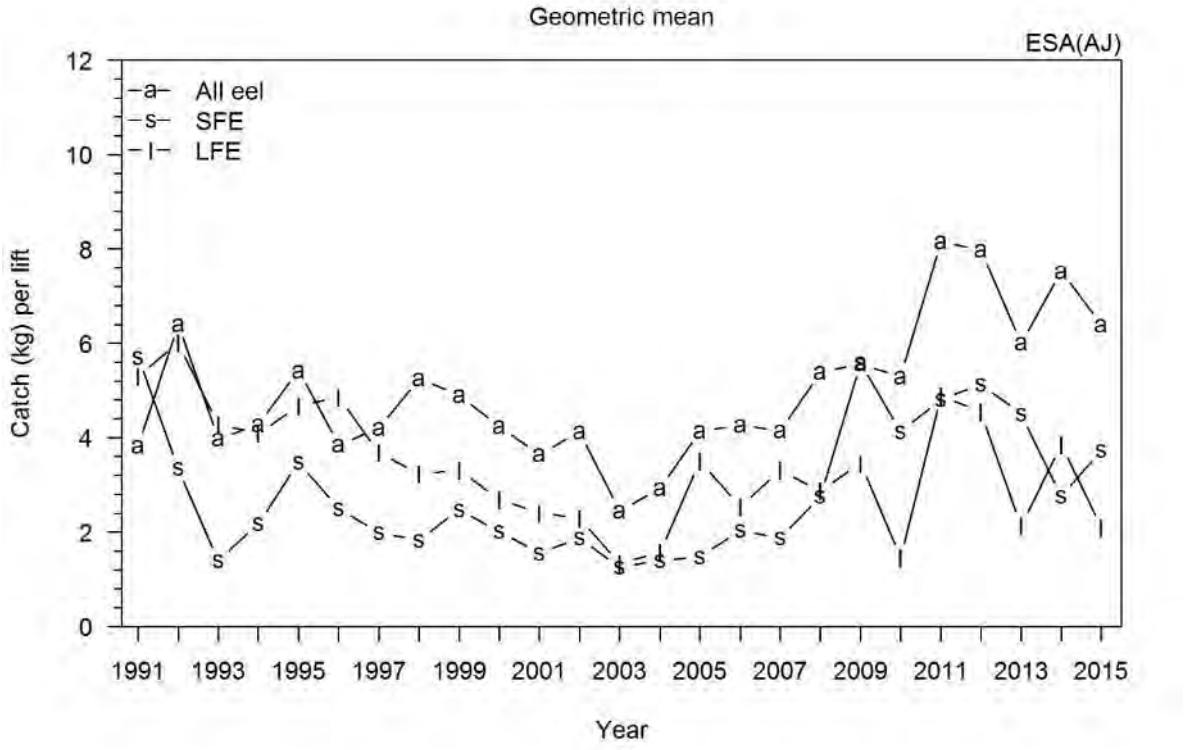


Figure J9: Unstandardised CPUE (geometric mean of catch per lift) for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15 (ESA AJ).

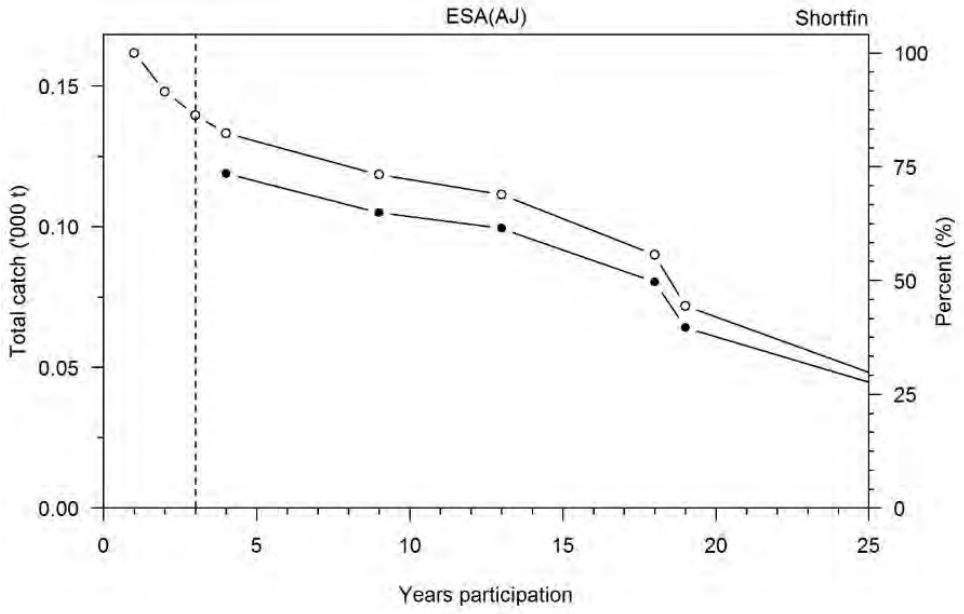


Figure J10: Relationship between years of participation in the fishery and shortfin total catch. The open circles represent all shortfin catch and the closed circles shortfin catch data from fishers who 1) caught shortfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core shortfin fisher analyses for the years 1990–91 to 2014–15 (ESA AJ).

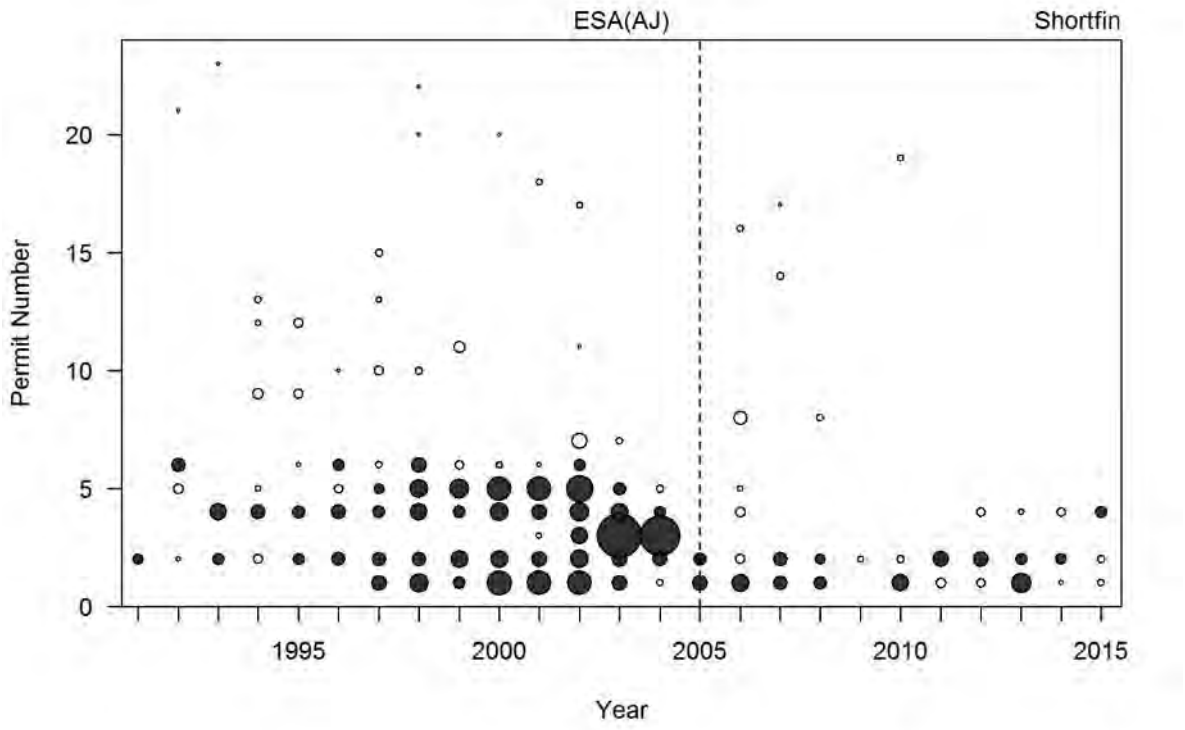


Figure J11: Relative catch of shortfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AJ).

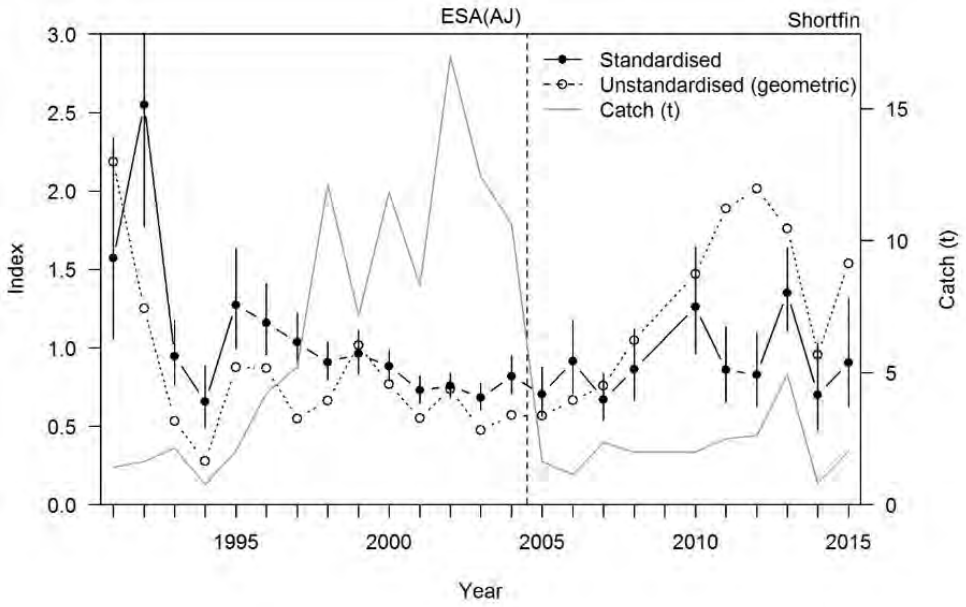


Figure J12: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for shortfin core fishers for the years 1990–91 to 2014–15. The shortfin catch by core fishers is also plotted (ESA AJ).

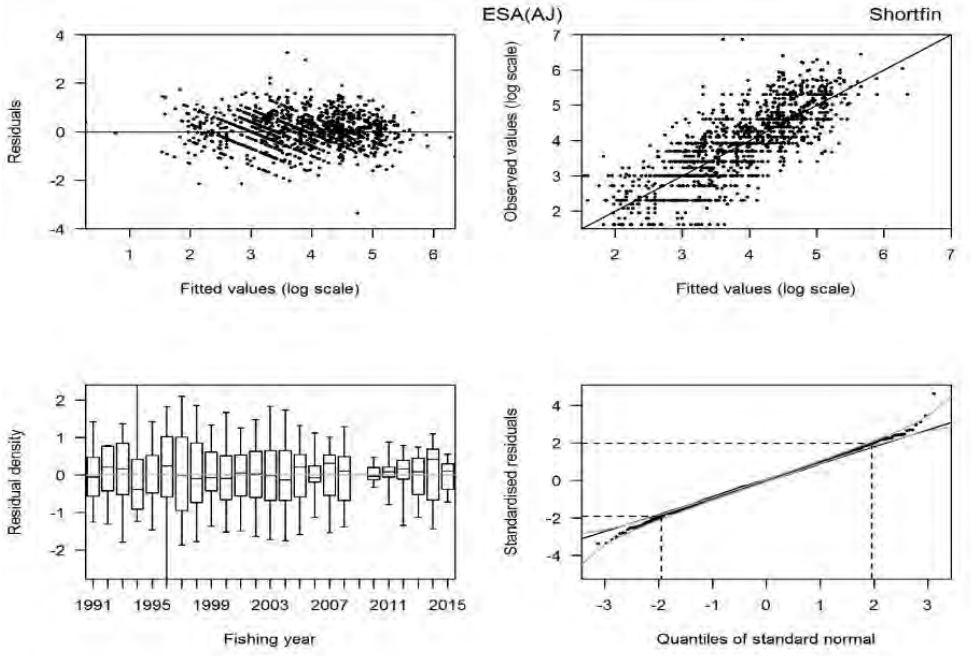


Figure J13: Residual diagnostic plots for the shortfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AJ).

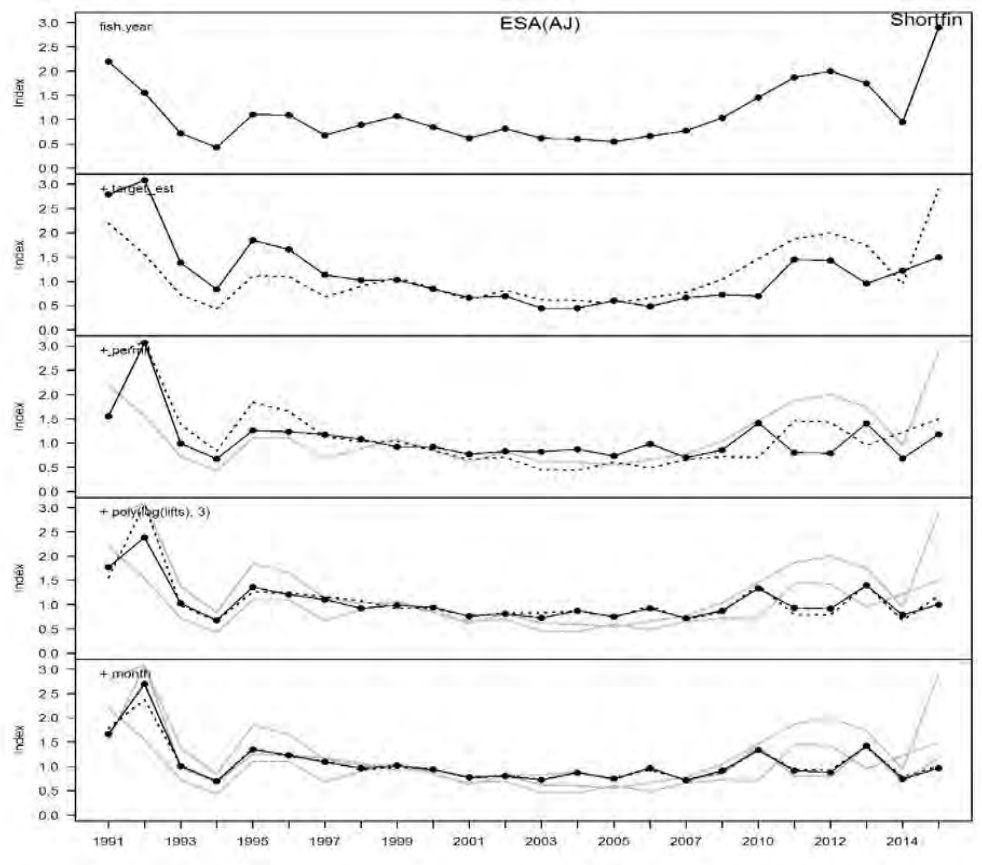


Figure J14: Step plot for the shortfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AJ).

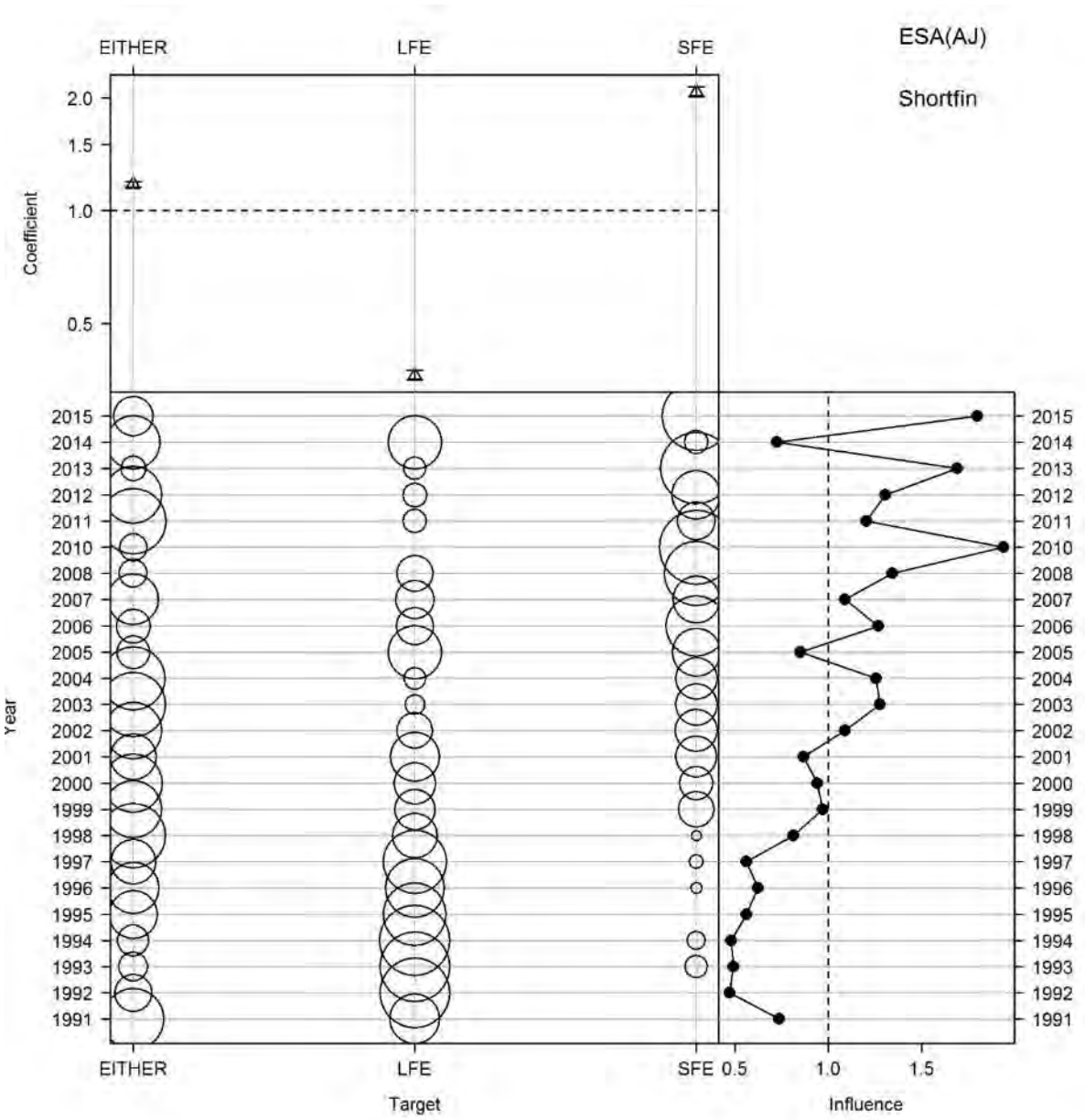


Figure J15: Influence of target for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

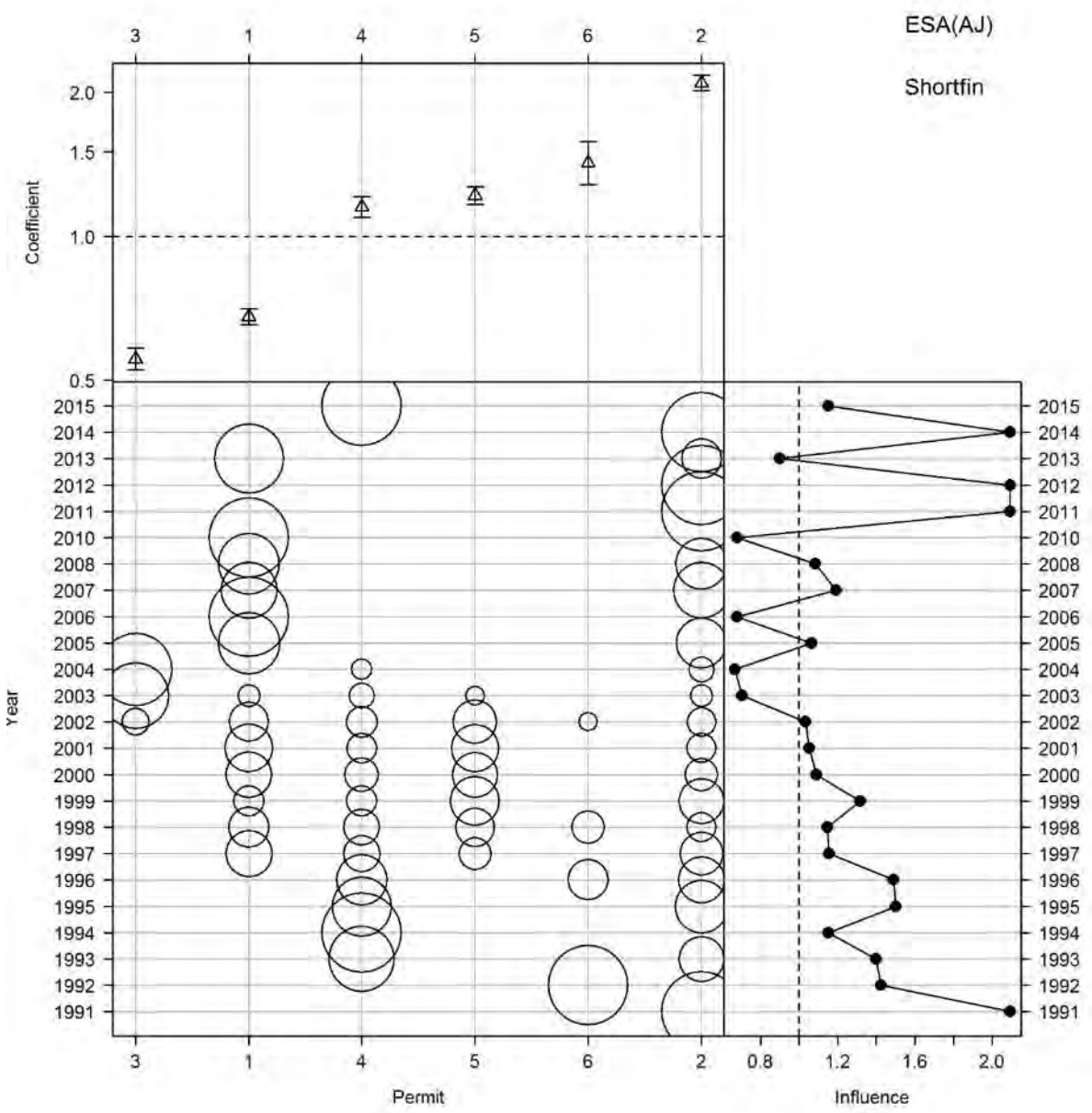


Figure J16: Influence of permit for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

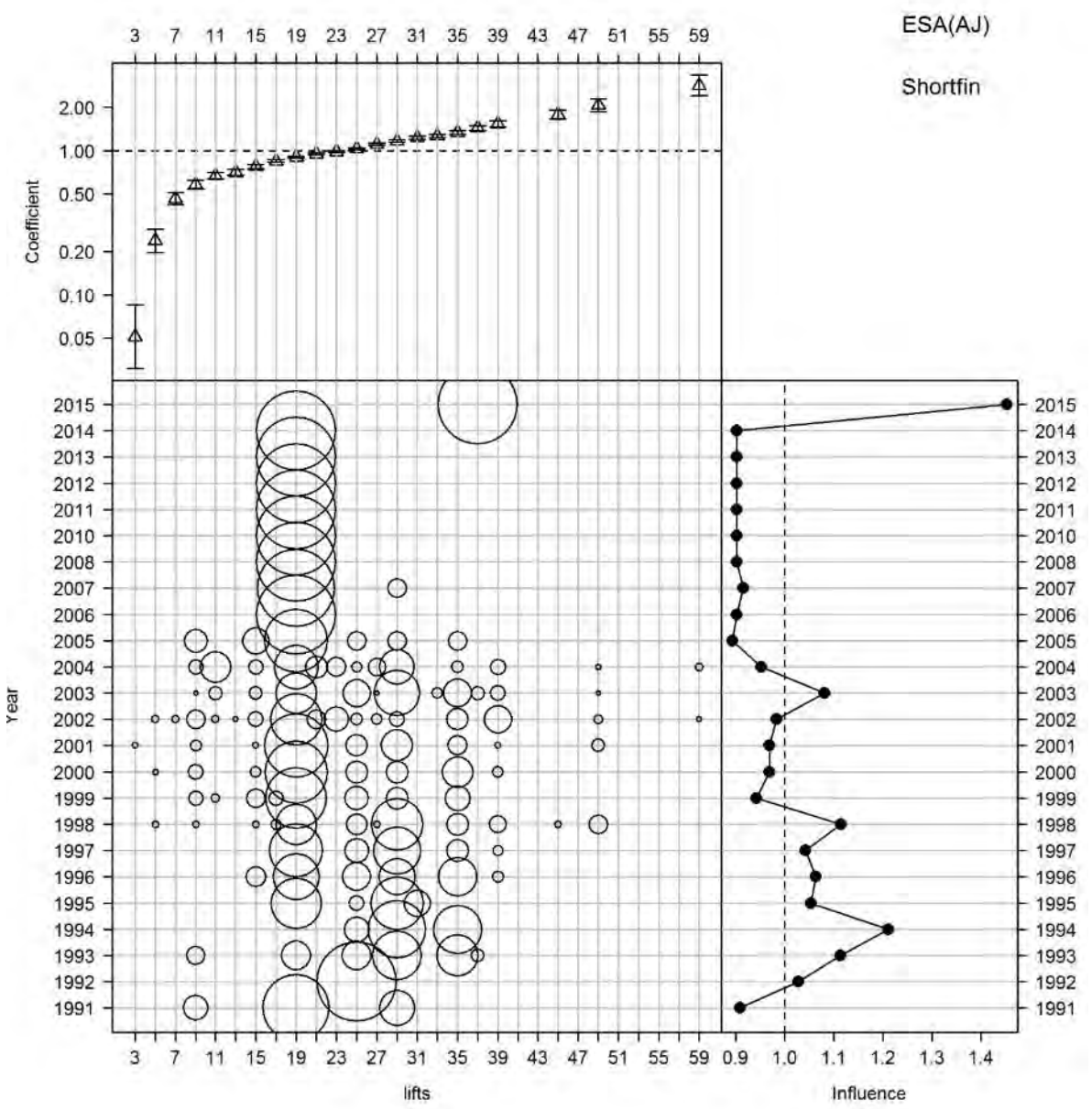


Figure J17: Influence of lifts for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

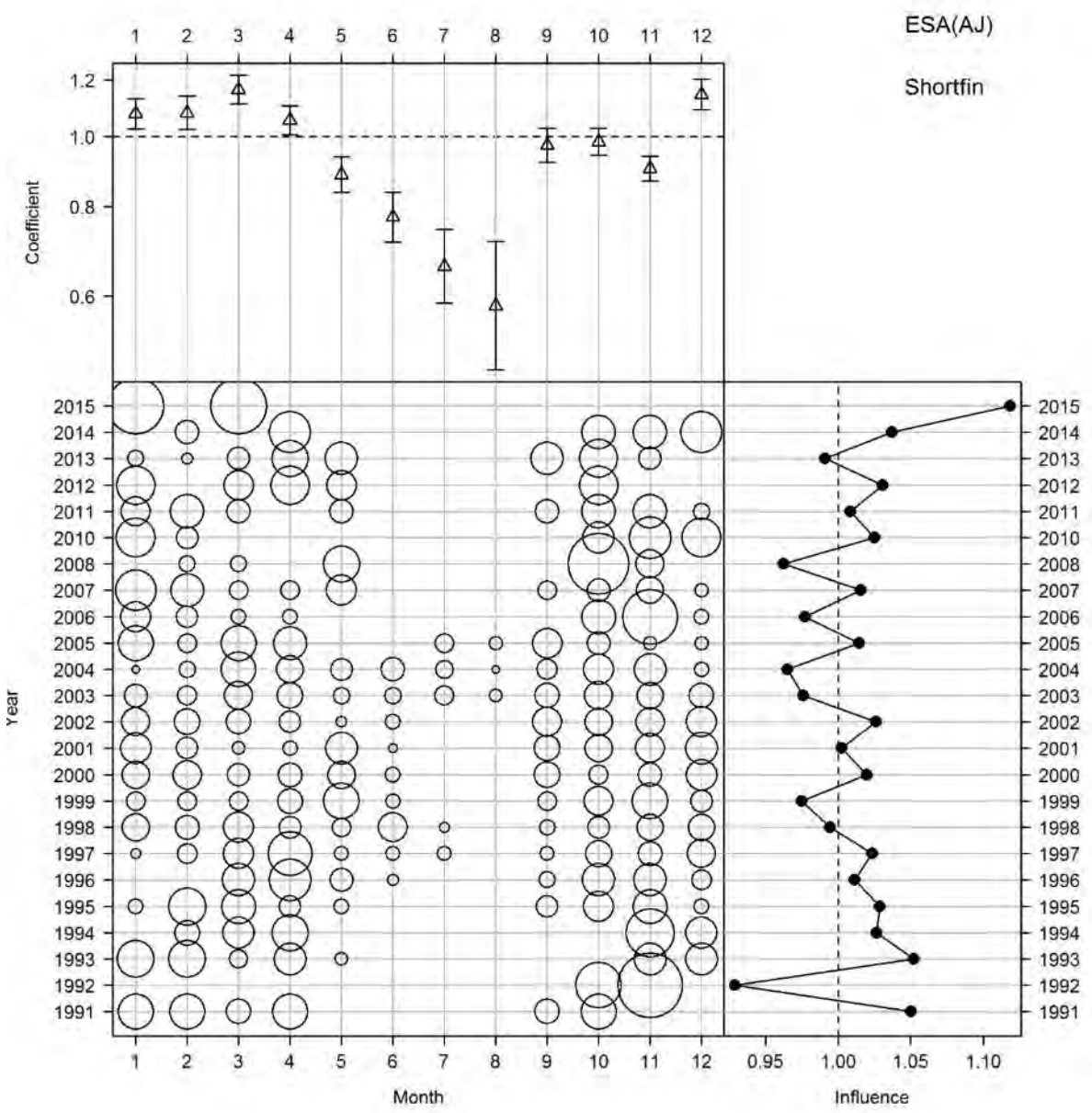


Figure J18: Influence of month for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

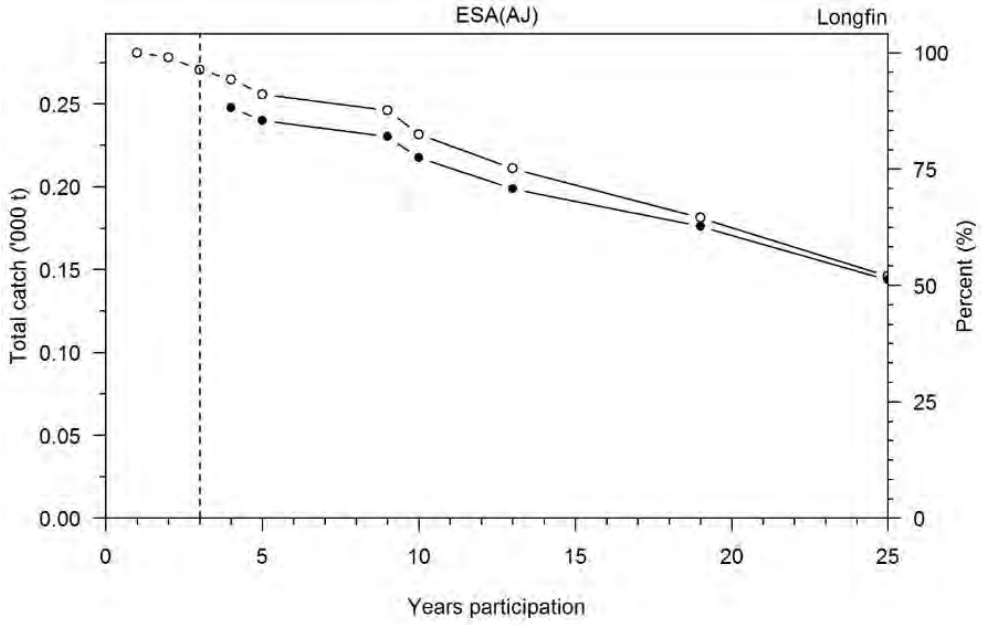


Figure J19: Relationship between years of participation in the fishery and longfin total catch. The open circles represent all longfin catch and the closed circles longfin catch data from fishers who 1) caught longfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core longfin fisher analyses for the years 1990–91 to 2014–15 (ESA AJ).

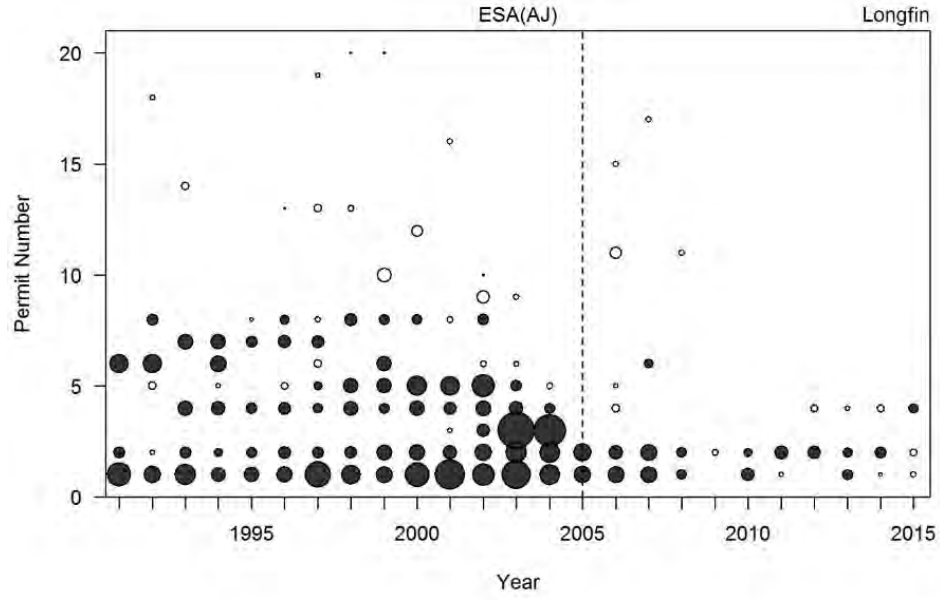


Figure J20: Relative catch of longfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AJ).

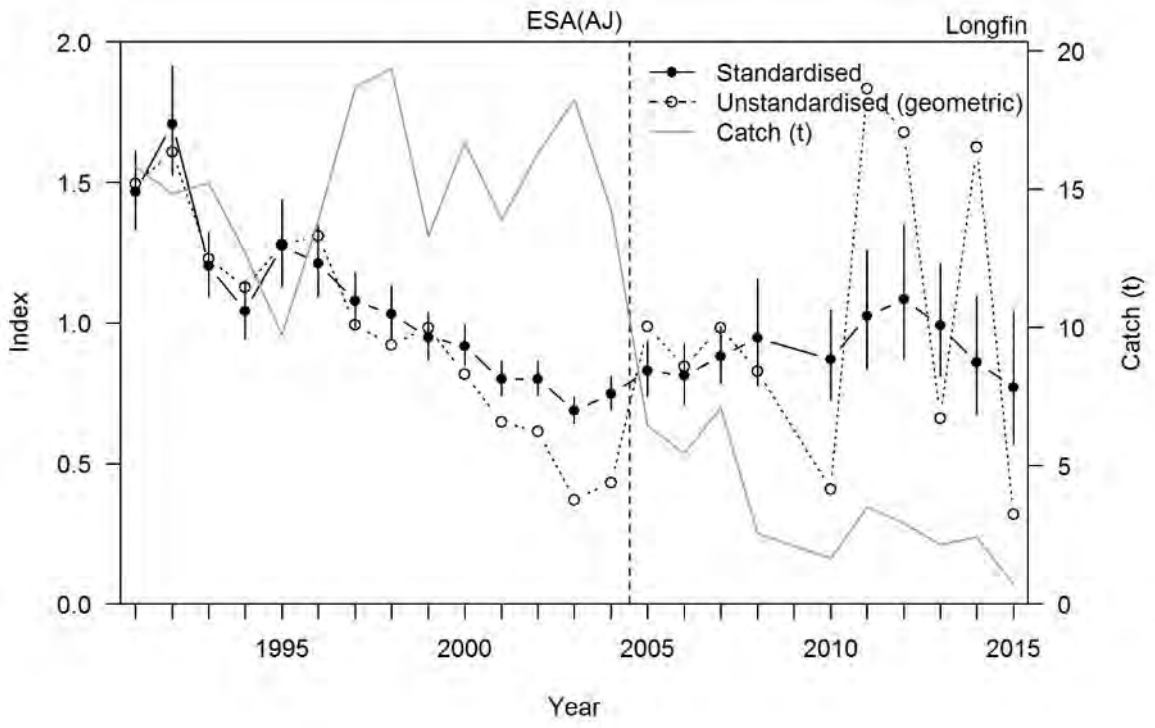


Figure J21: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for longfin core fishers for the years 1990–91 to 2014–15. The longfin catch by core fishers is also plotted (ESA AJ).

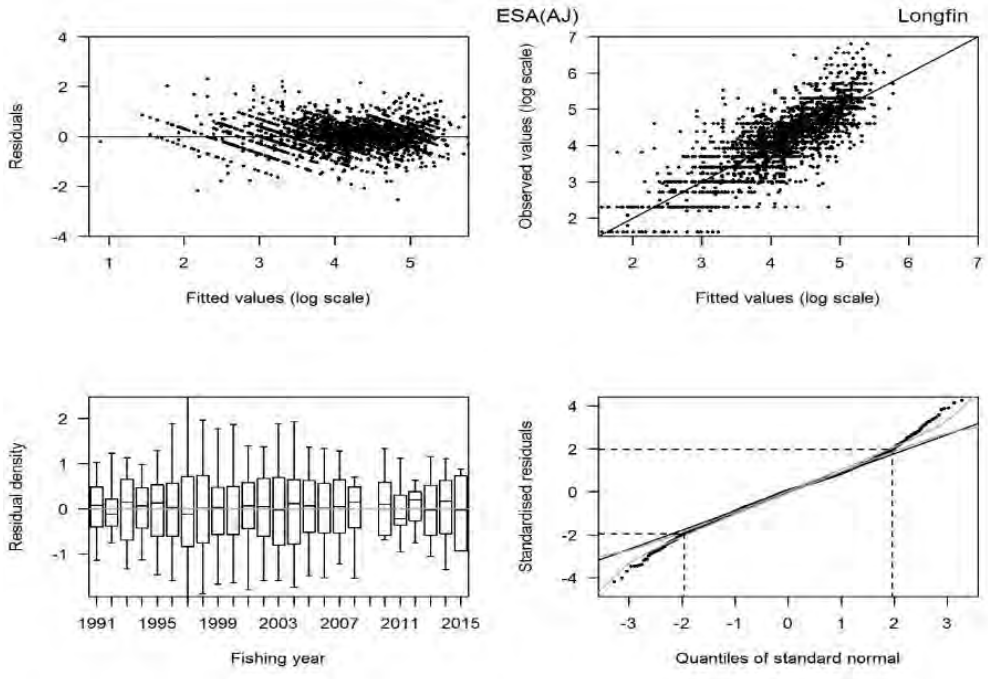


Figure J22: Residual diagnostic plots for the longfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AJ).

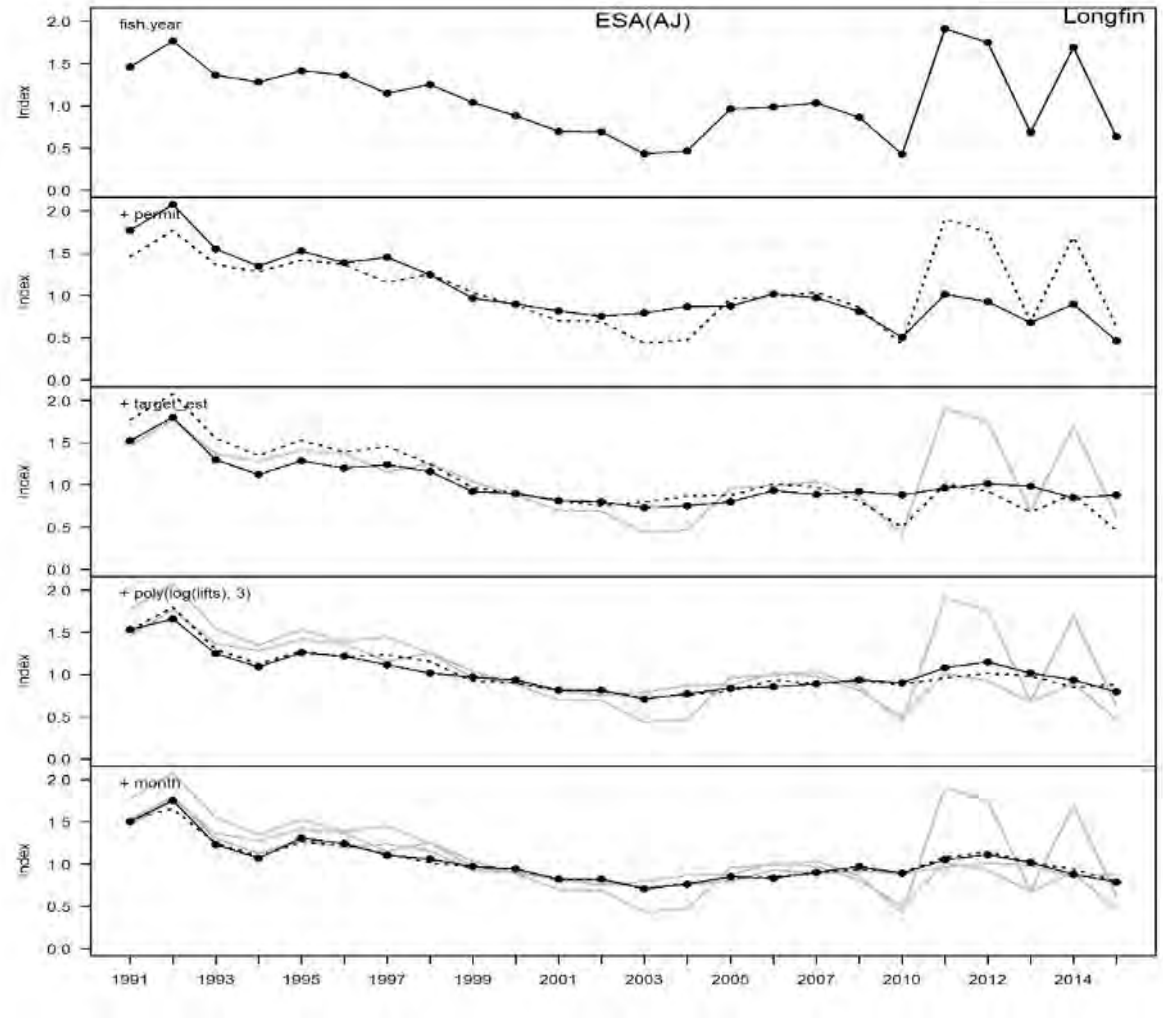


Figure J23: Step plot for the longfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AJ).

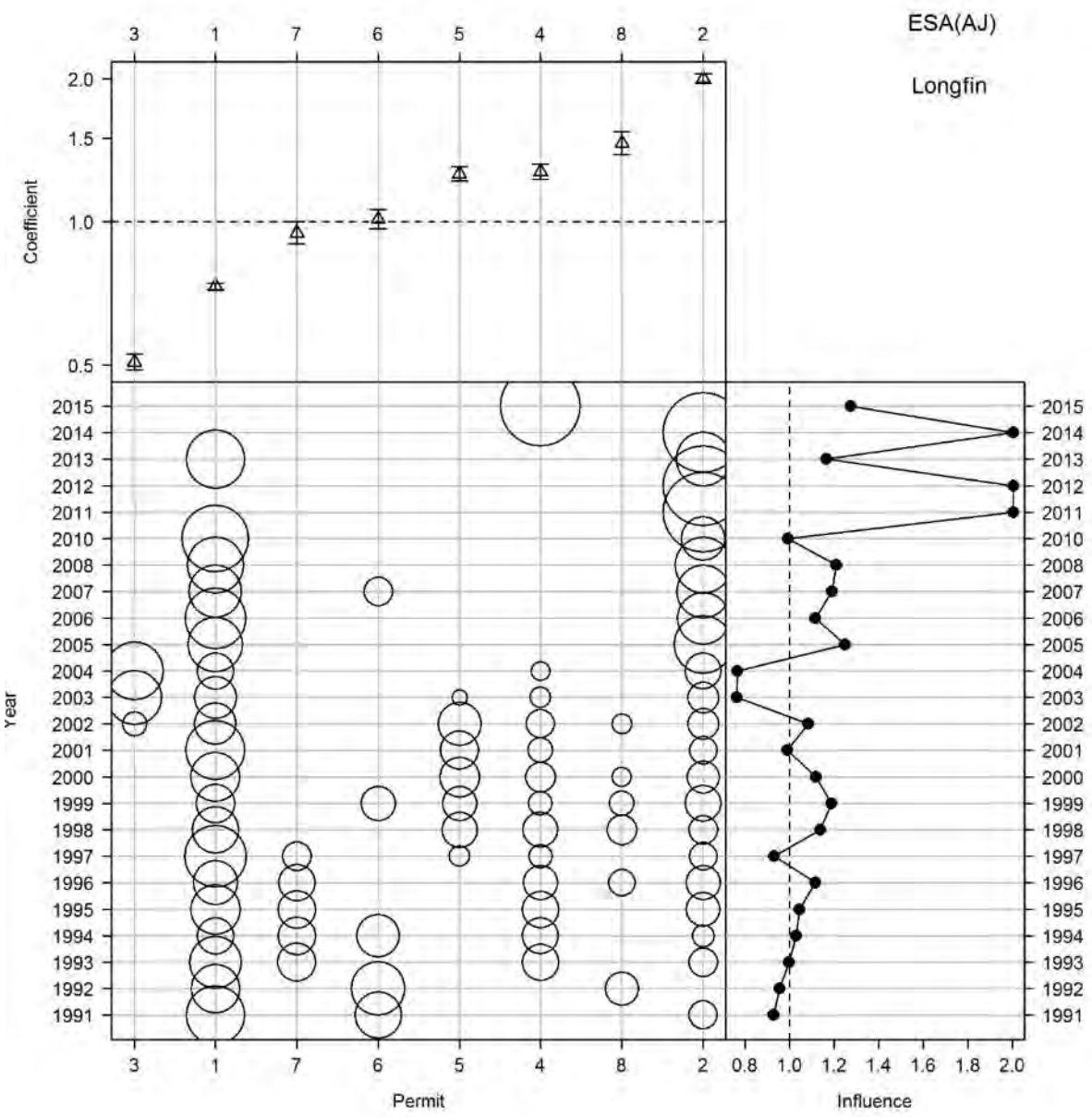


Figure J24: Influence of permit for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

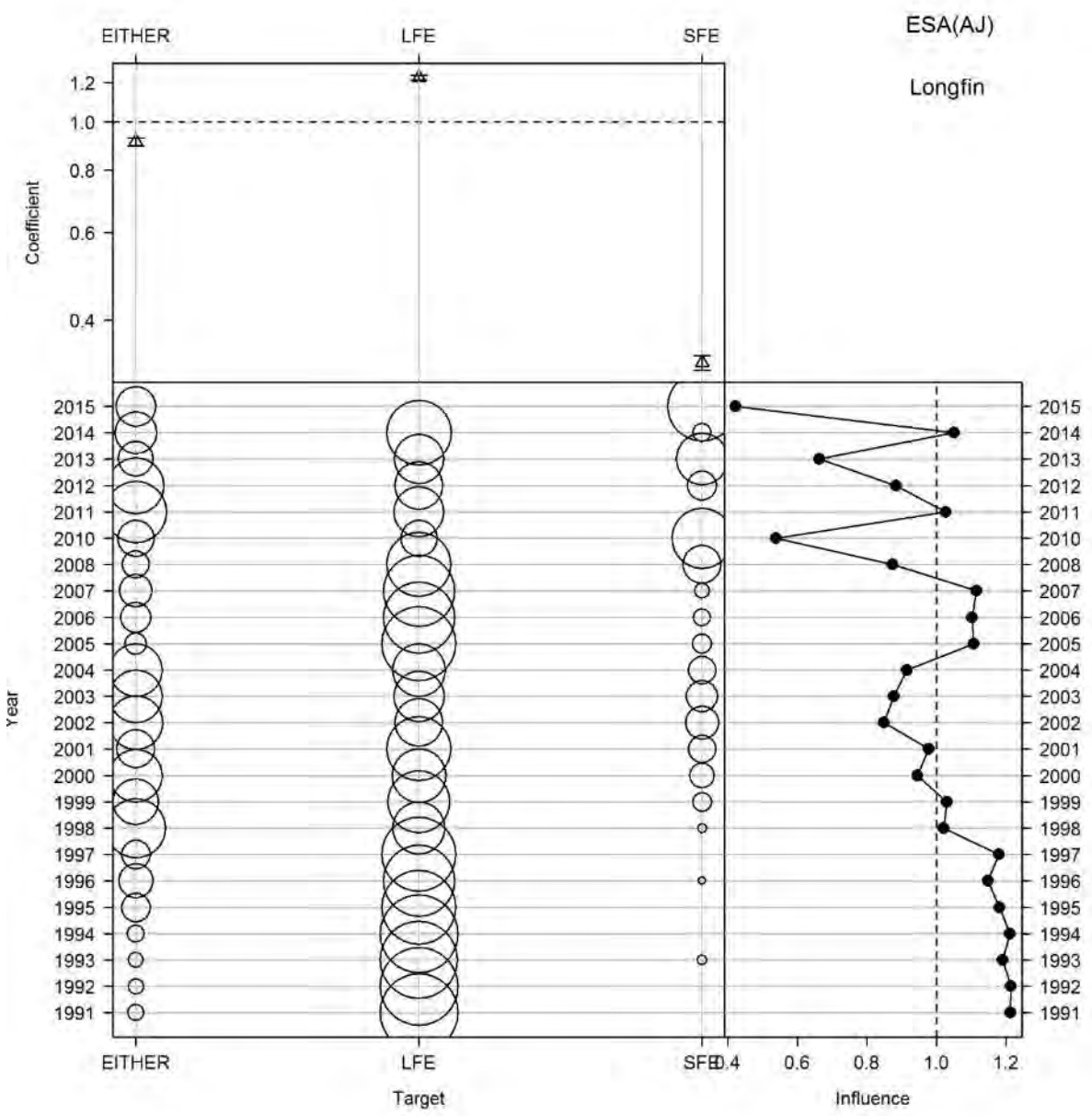


Figure J25: Influence of target for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

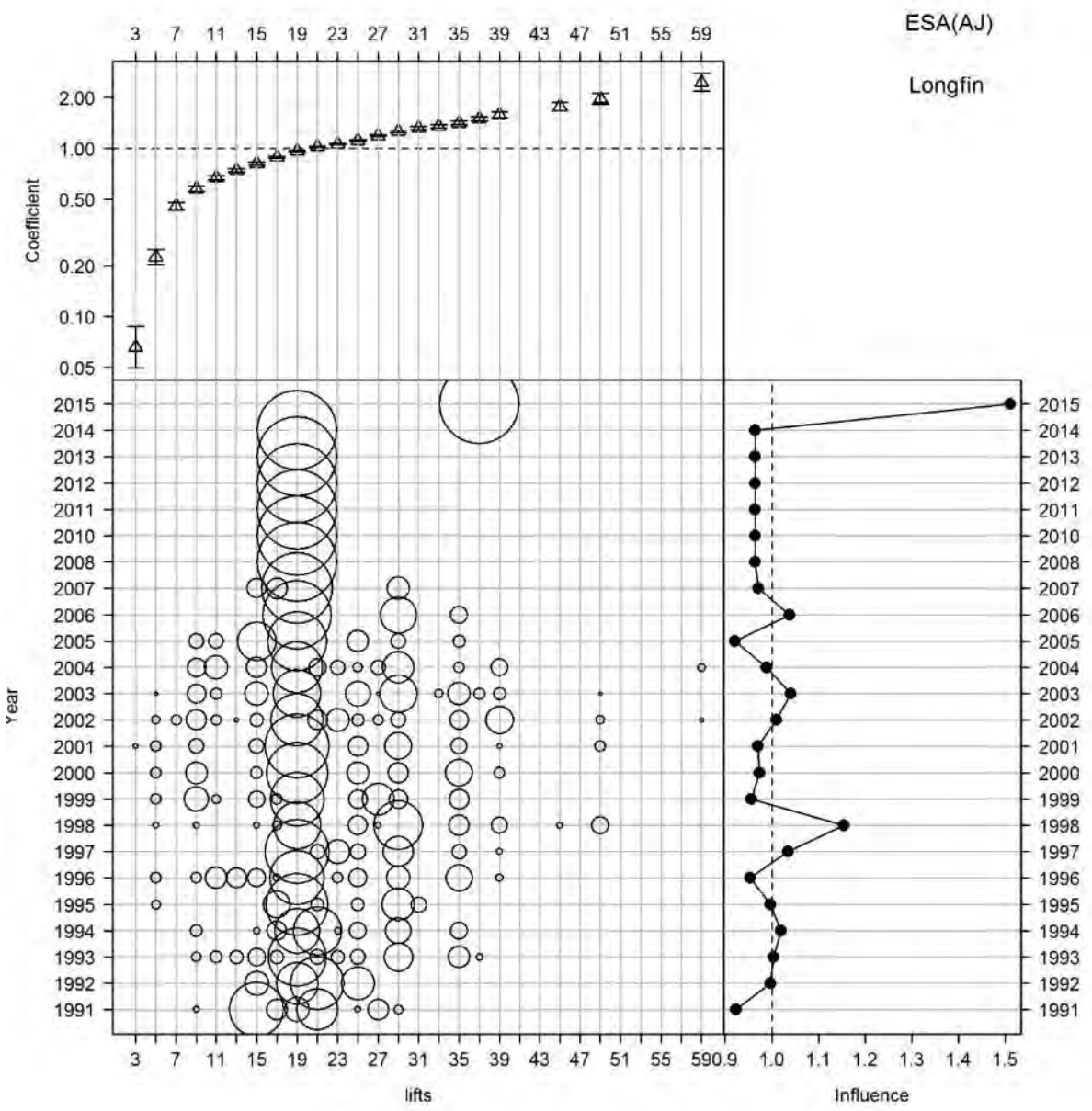


Figure J26: Influence of lifts for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

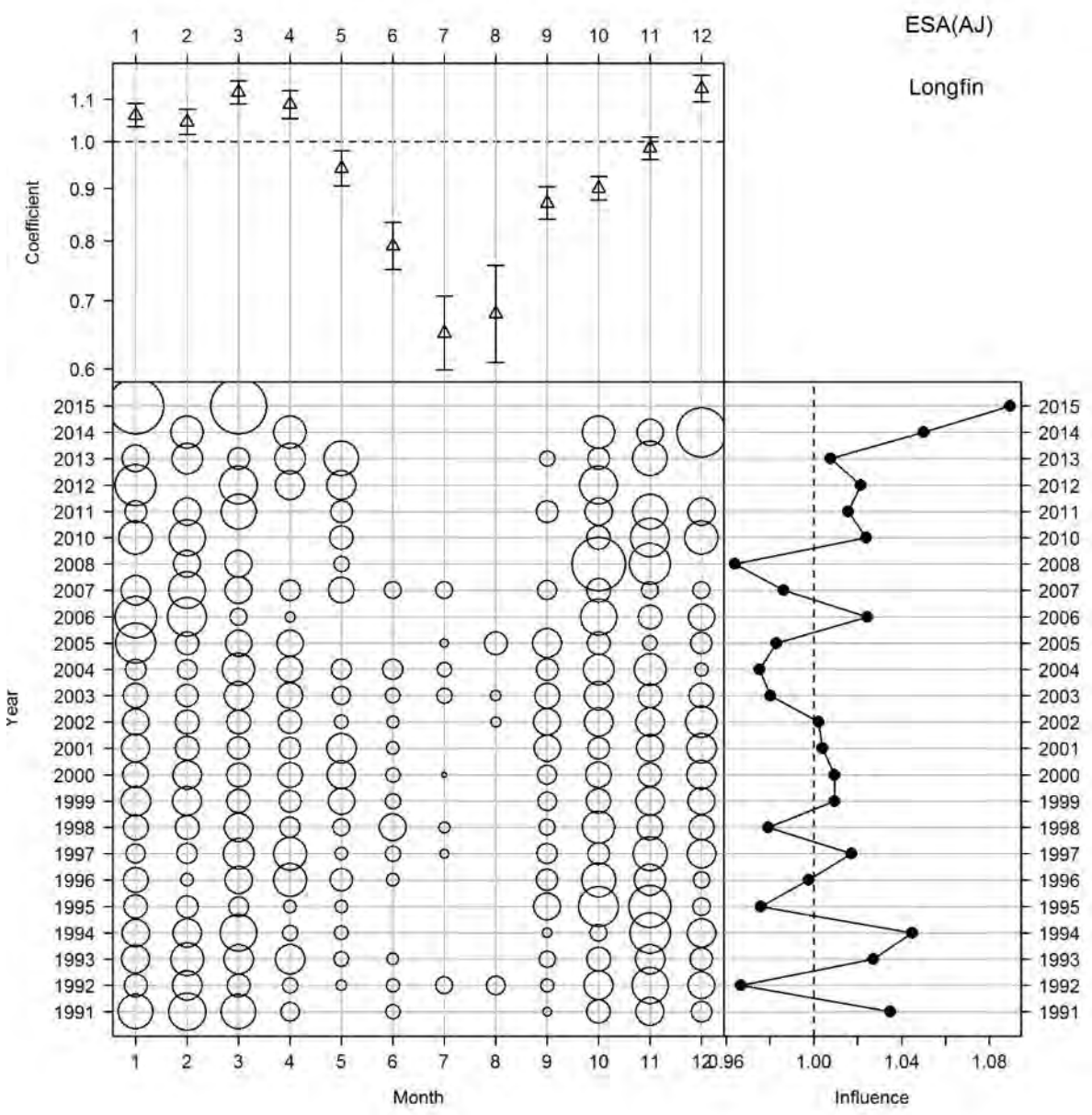


Figure J27: Influence of month for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AJ).

APPENDIX K: MANAWATU (ESA AK)

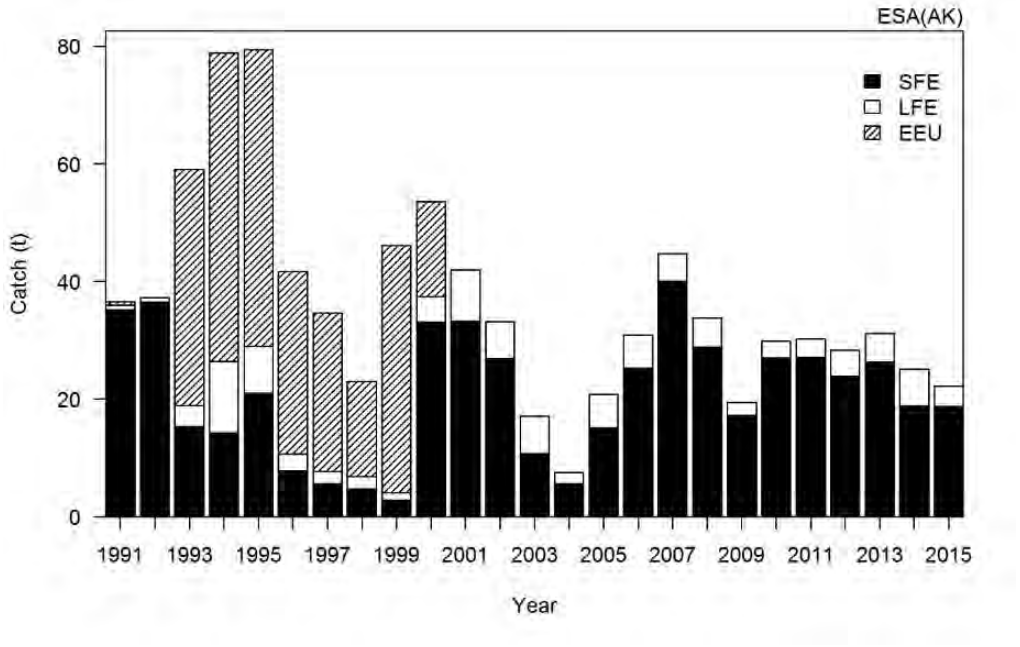


Figure K1: Total estimated commercial catch of shortfin (SFE), longfin (LFE), and unclassified eel catch (EEU) for the years 1990–91 to 2014–15 (ESA AK).

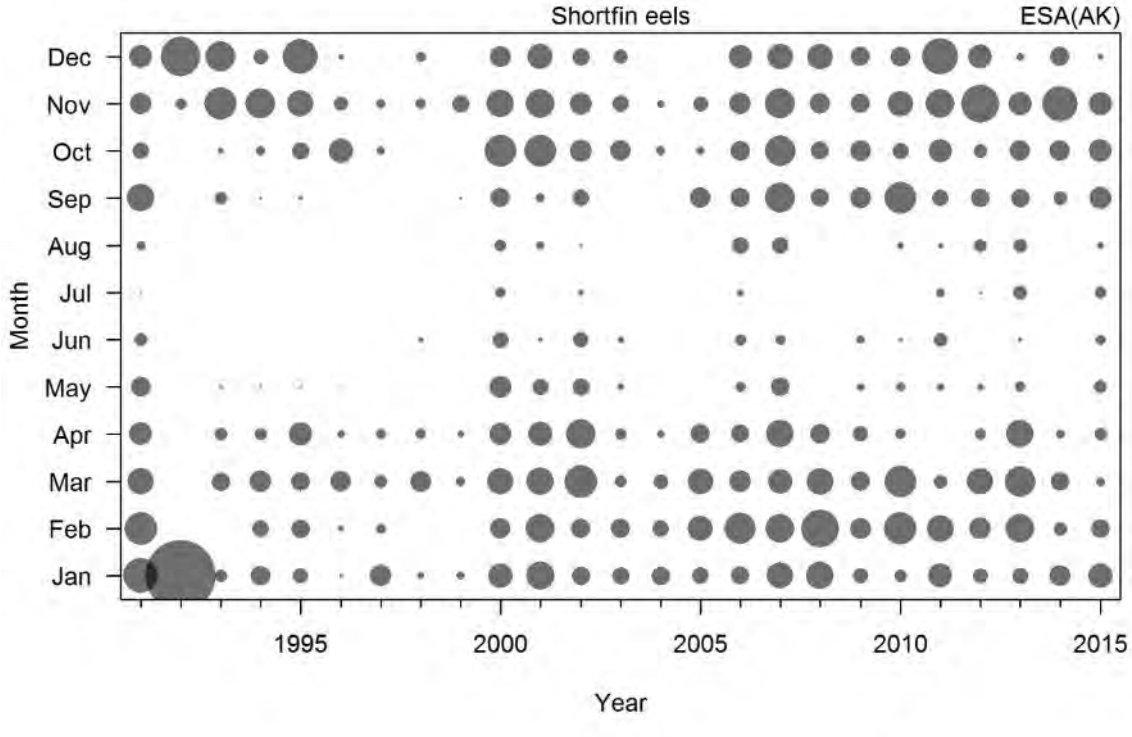


Figure K2: Shortfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AK).

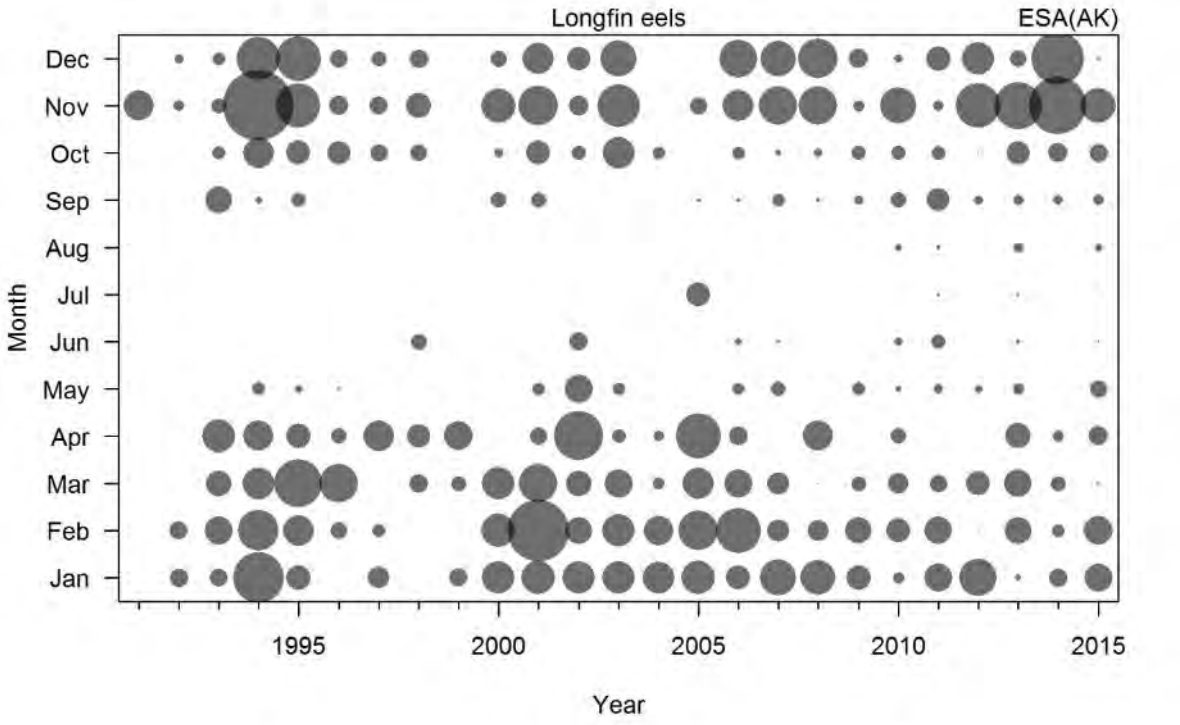


Figure K3: Longfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AK).

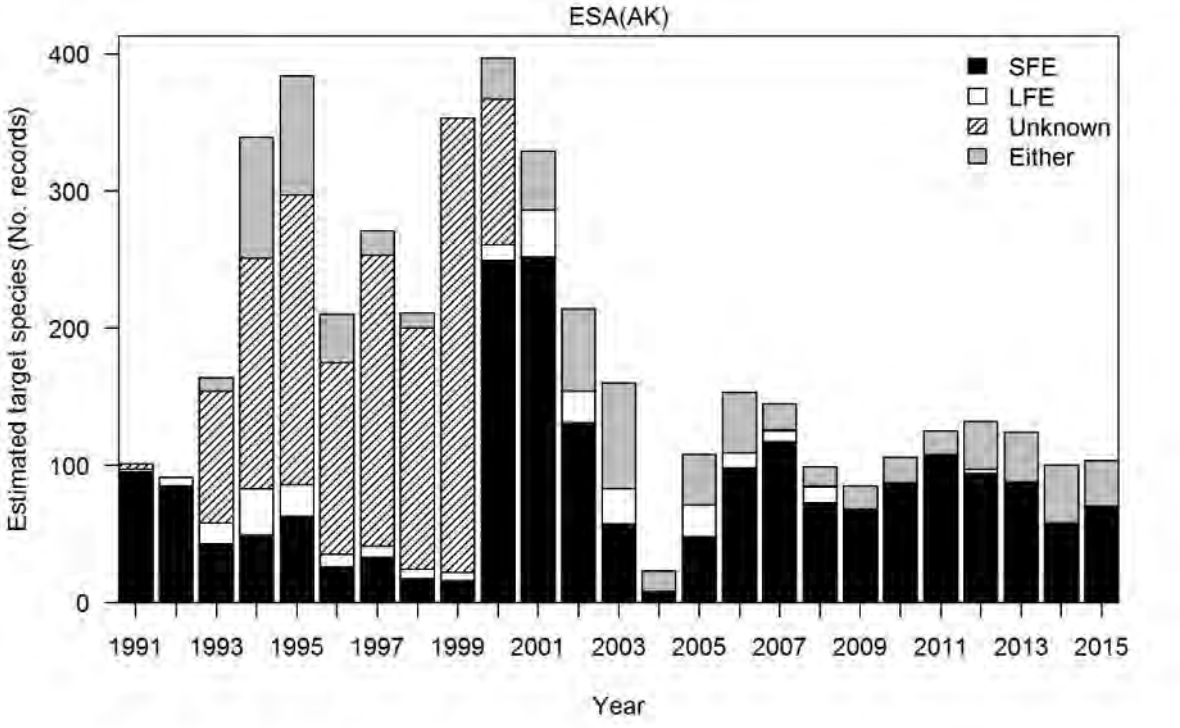


Figure K4: Reconstructed target species for the years 1990–91 to 2014–15 (ESA AK).

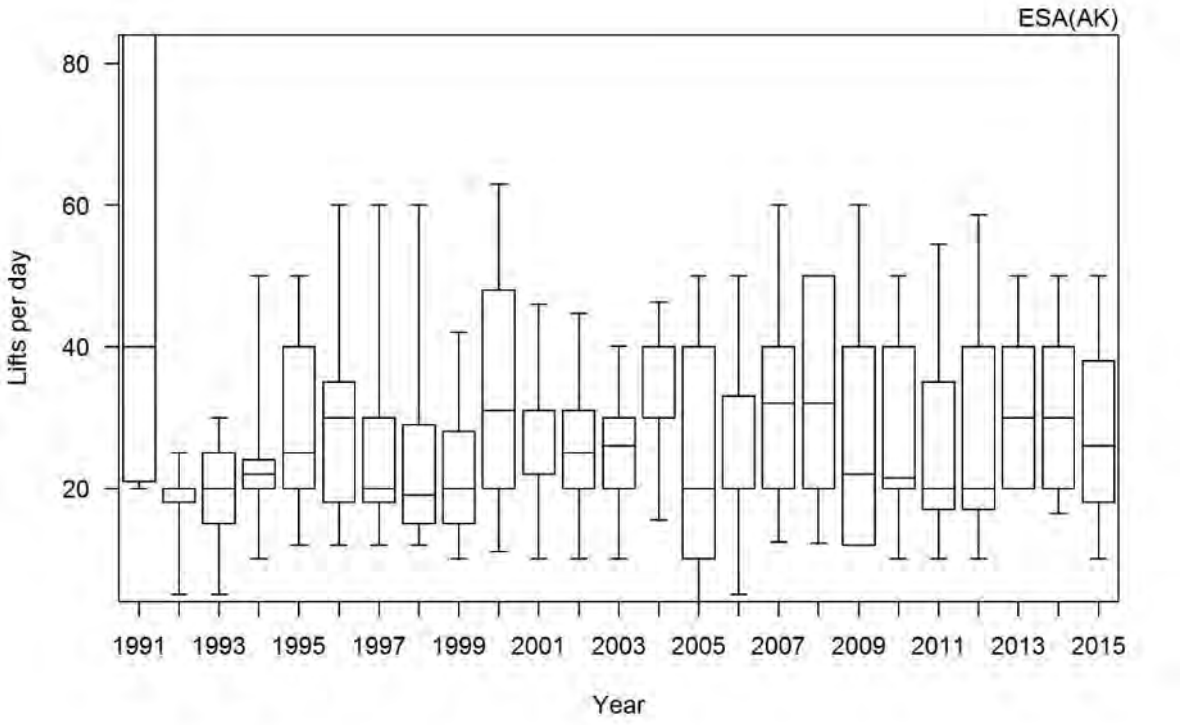


Figure K5: Total lifts per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AK).

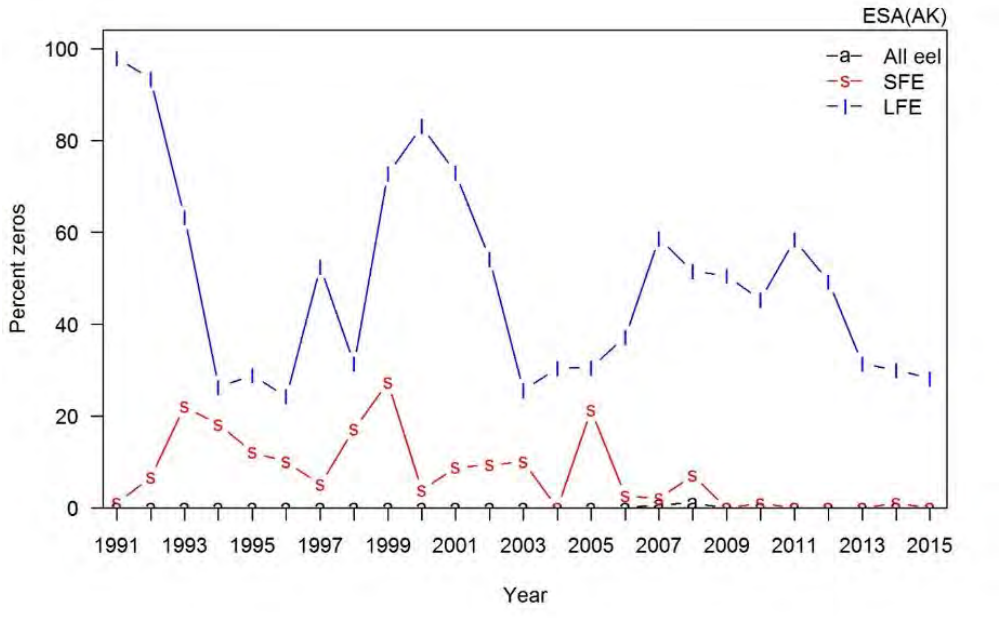


Figure K6: Proportion of valid zero records for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15. Excludes zeros associated with reporting EEU (unclassified) (ESA AK).

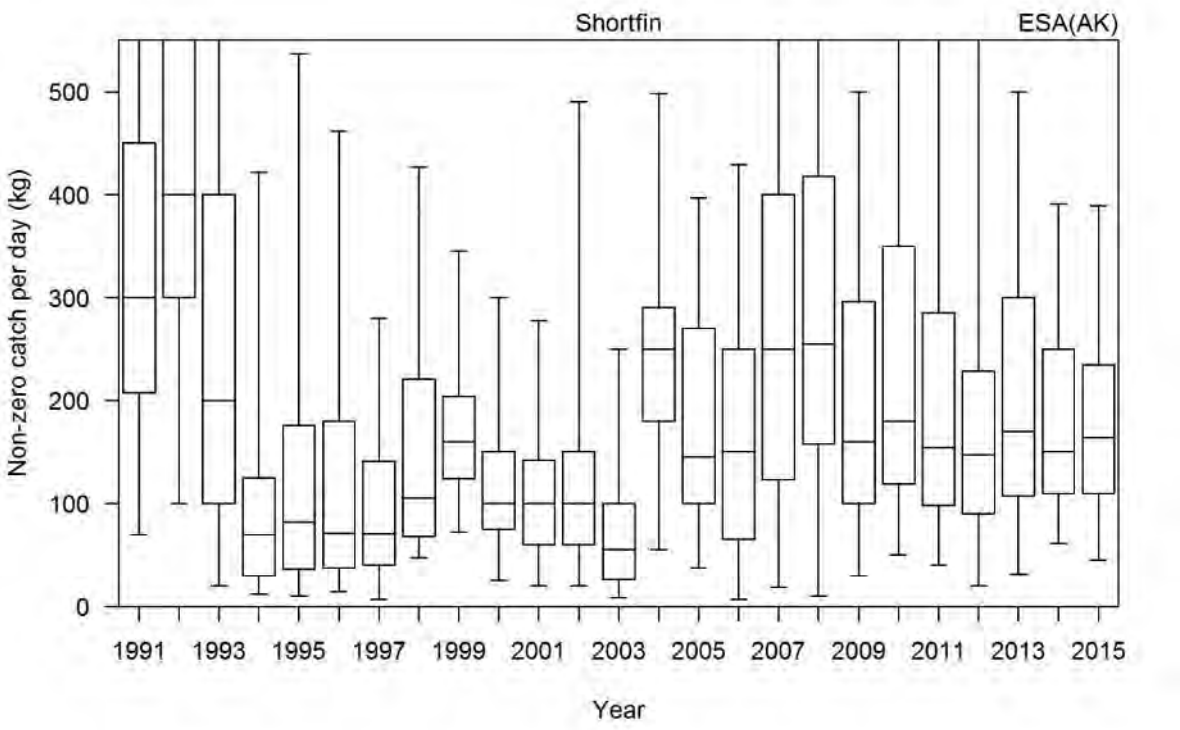


Figure K7: Shortfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AK).

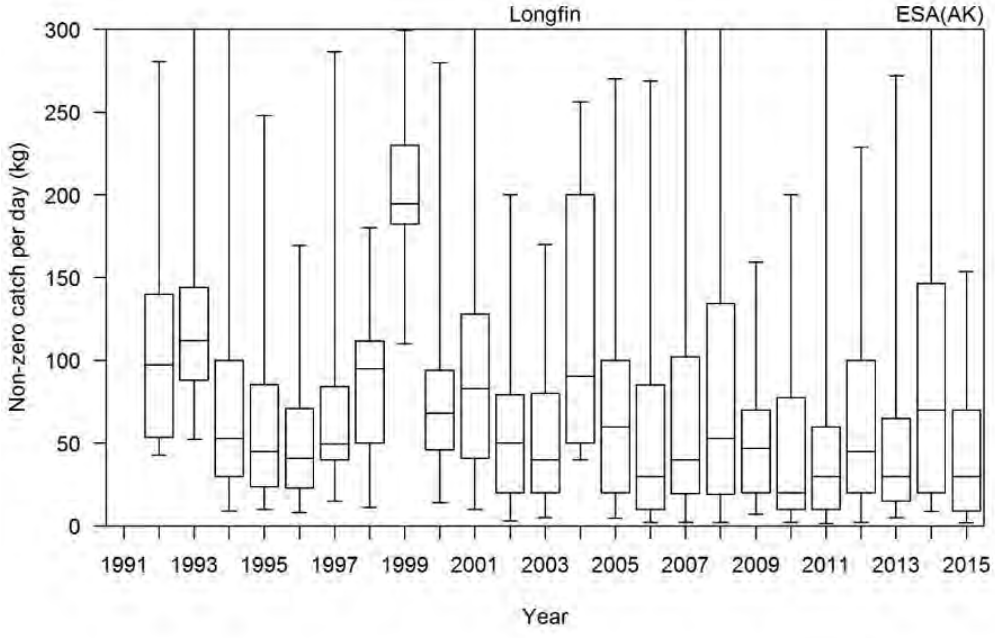


Figure K8: Longfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AK).

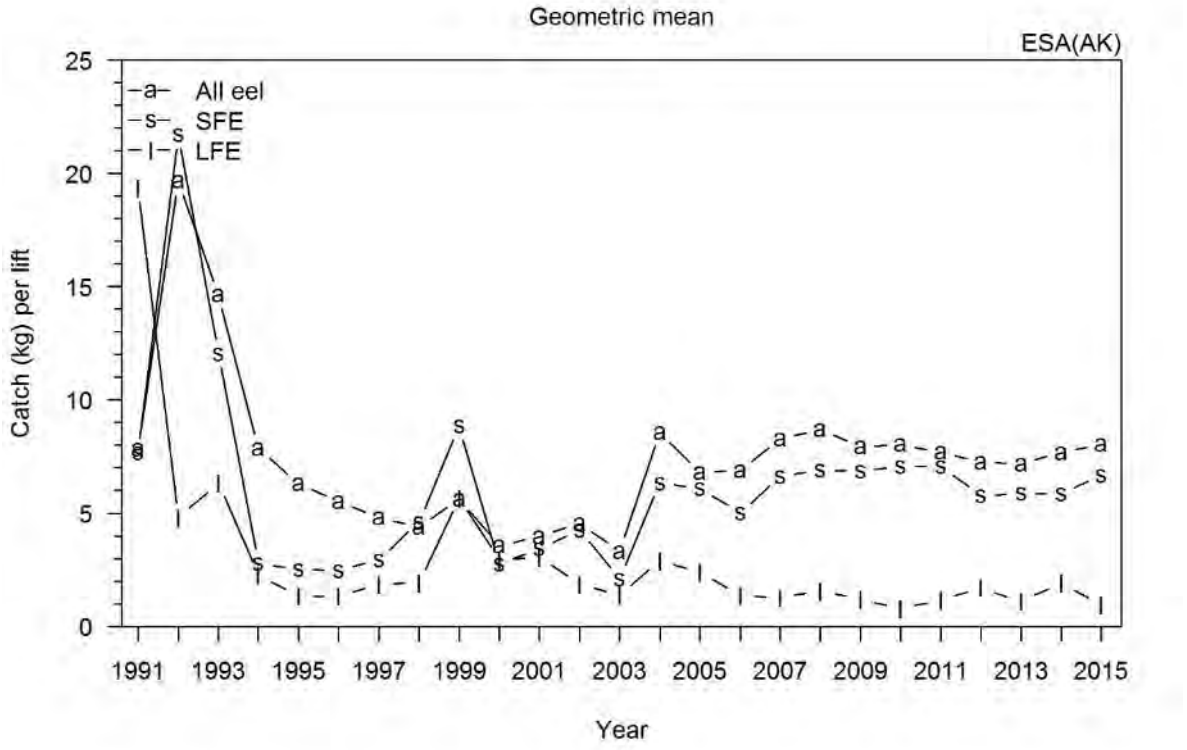


Figure K9: Unstandardised CPUE (geometric mean of catch per lift) for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15 (ESA AK).

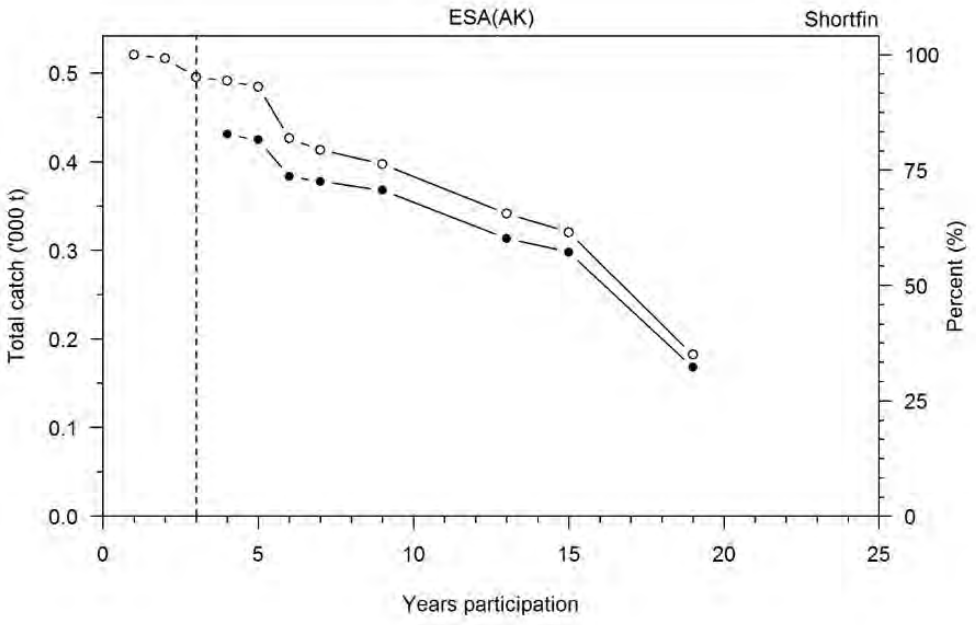


Figure K10: Relationship between years of participation in the fishery and shortfin total catch. The open circles represent all shortfin catch and the closed circles shortfin catch data from fishers who 1) caught shortfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core shortfin fisher analyses for the years 1990–91 to 2014–15 (ESA AK).

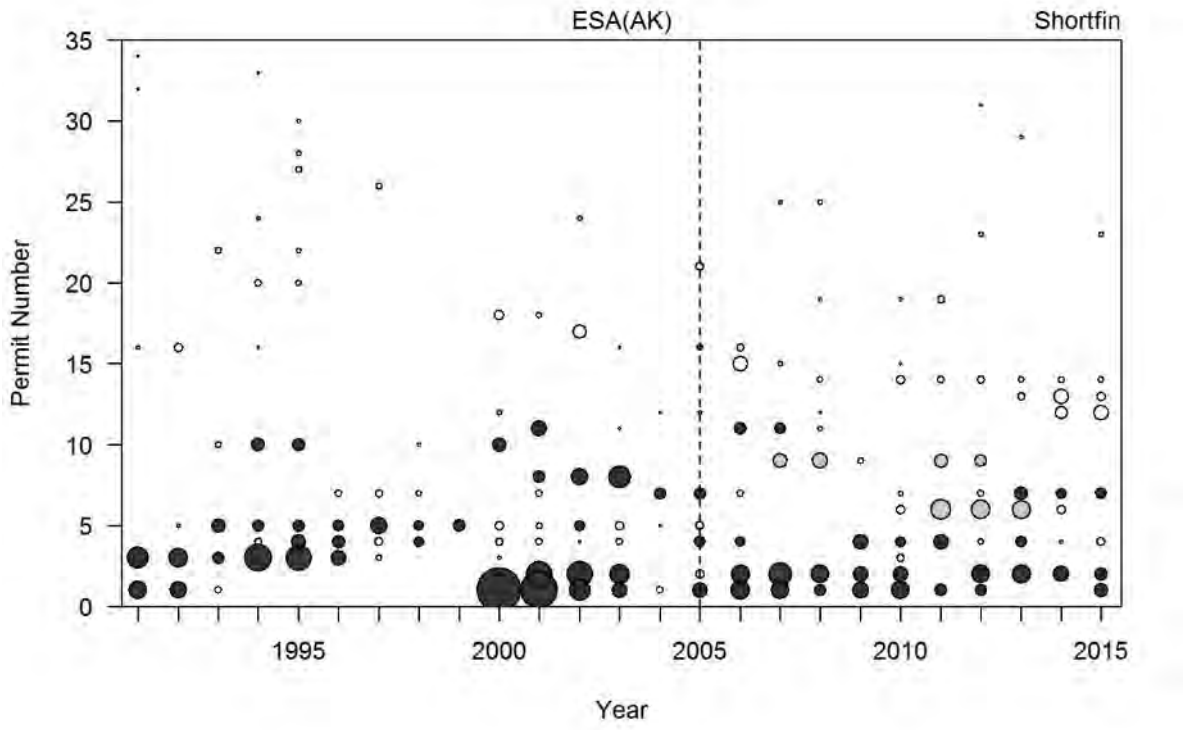


Figure K11: Relative catch of shortfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AK).

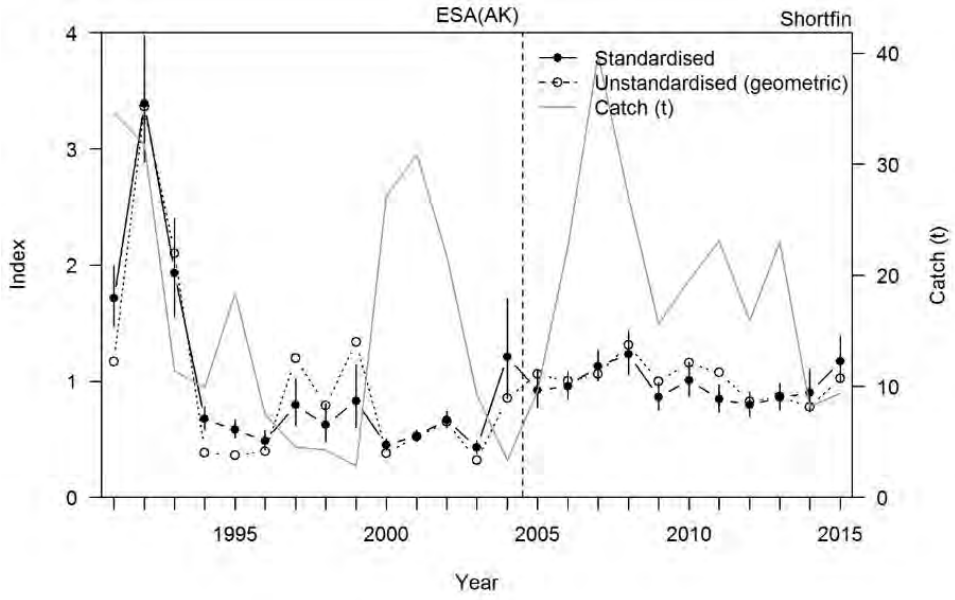


Figure K12: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for shortfin core fishers for the years 1990–91 to 2014–15. The shortfin catch by core fishers is also plotted (ESA AK).

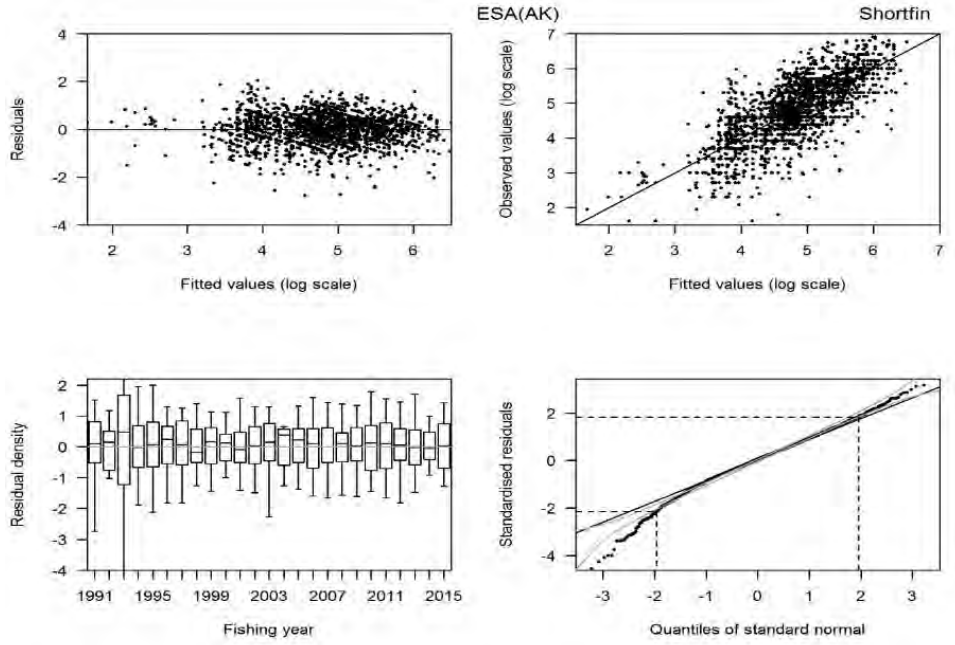


Figure K13: Residual diagnostic plots for the shortfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AK).

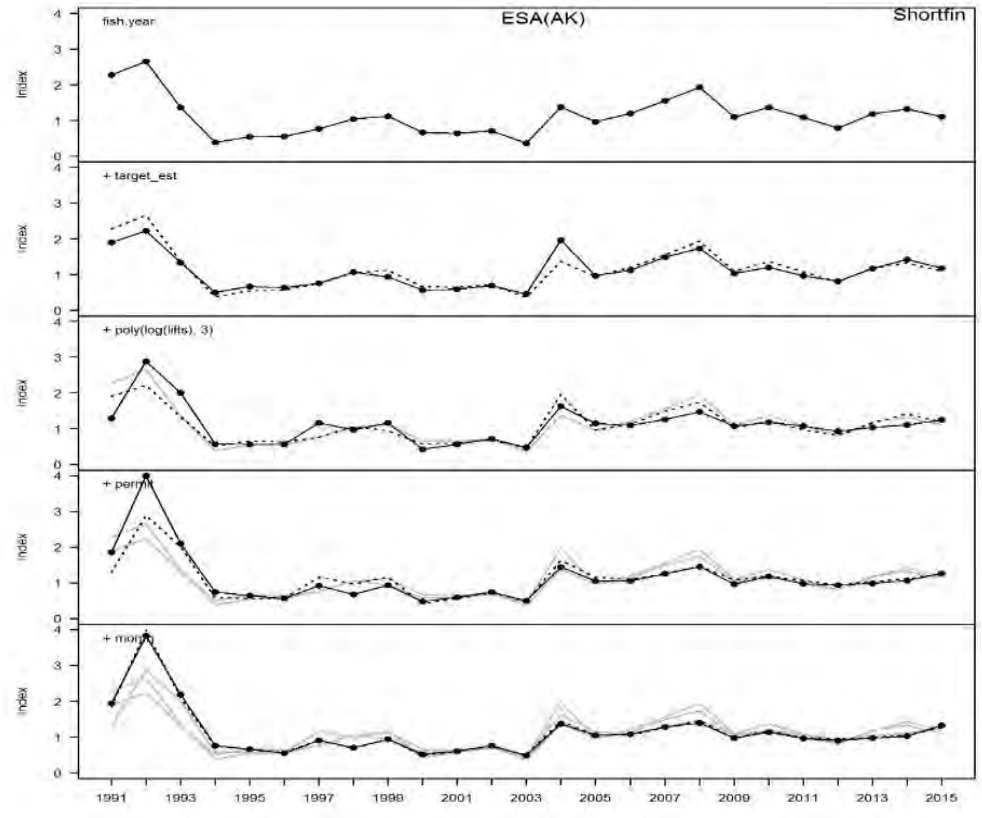


Figure K14: Step plot for the shortfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AK).

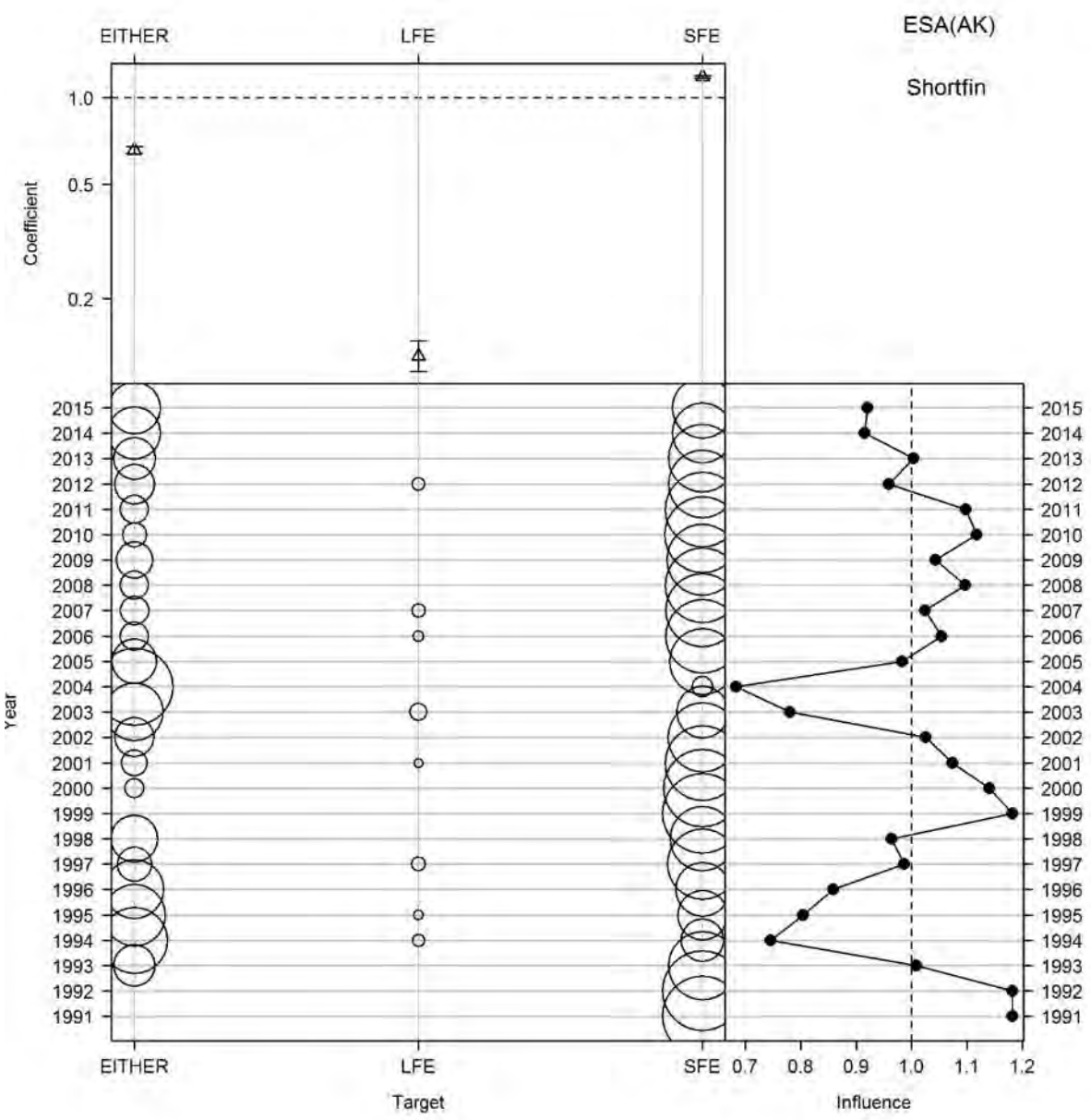


Figure K15: Influence of target for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

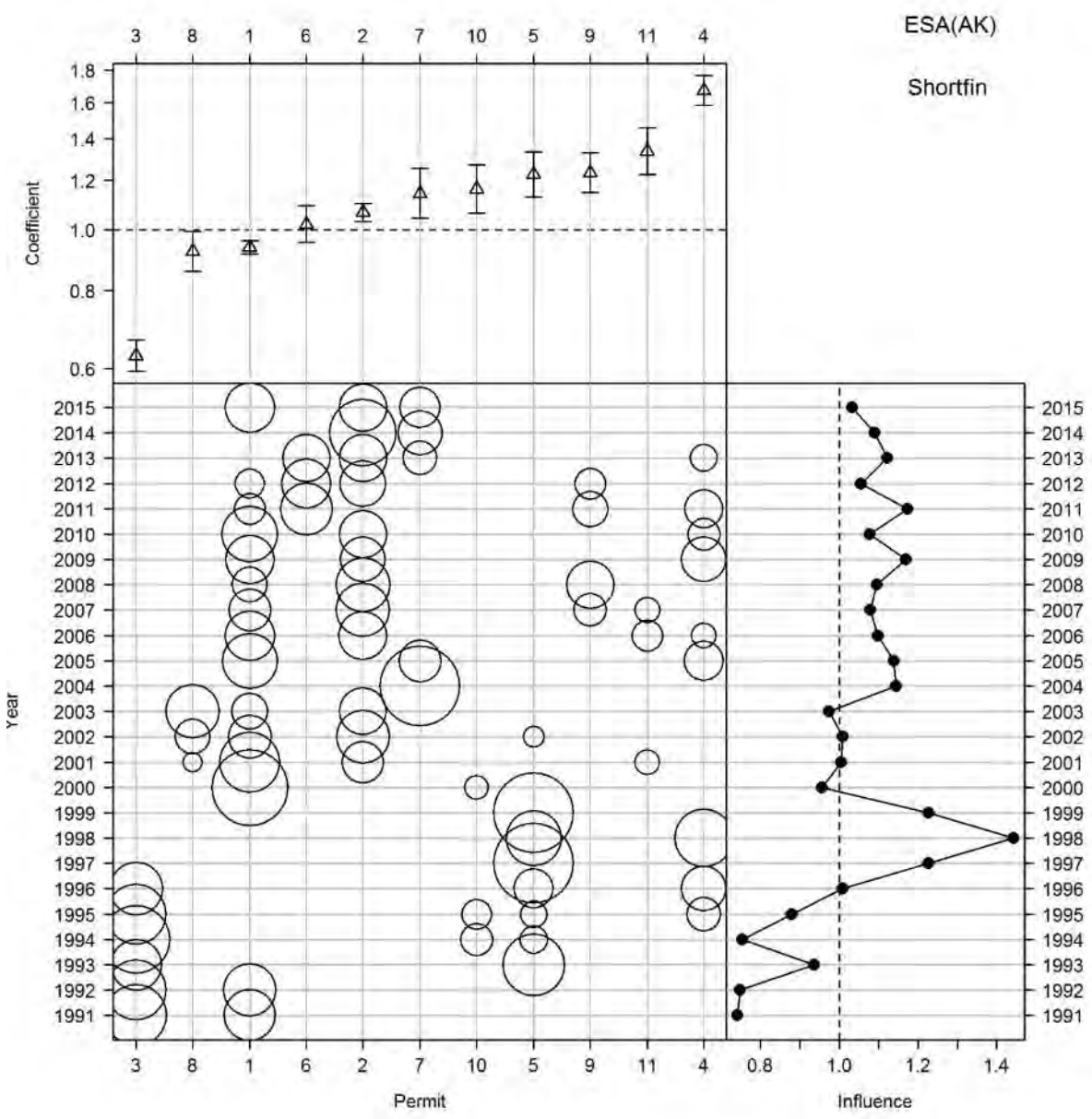


Figure K16: Influence of permit for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

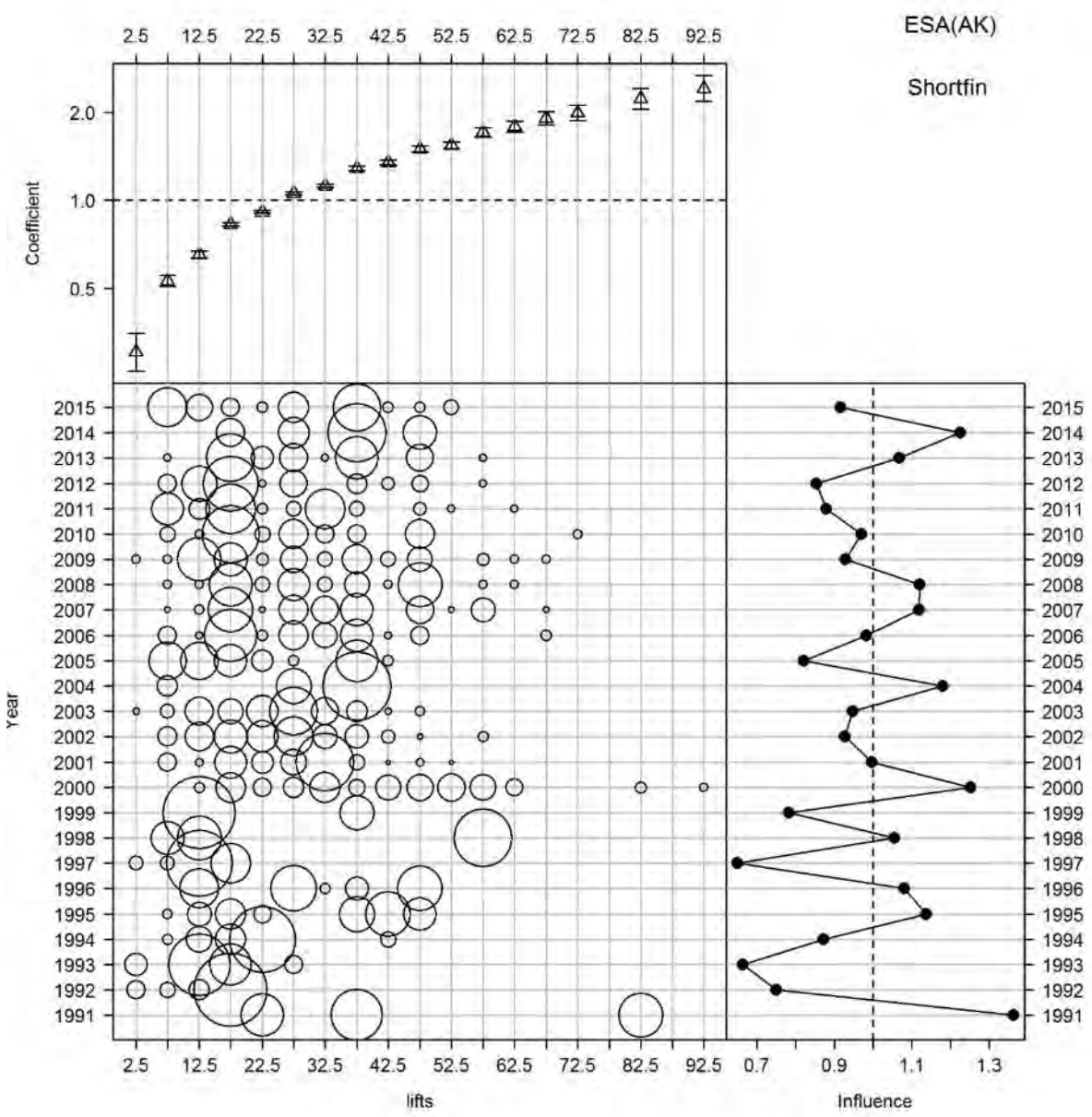


Figure K17: Influence of lifts for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

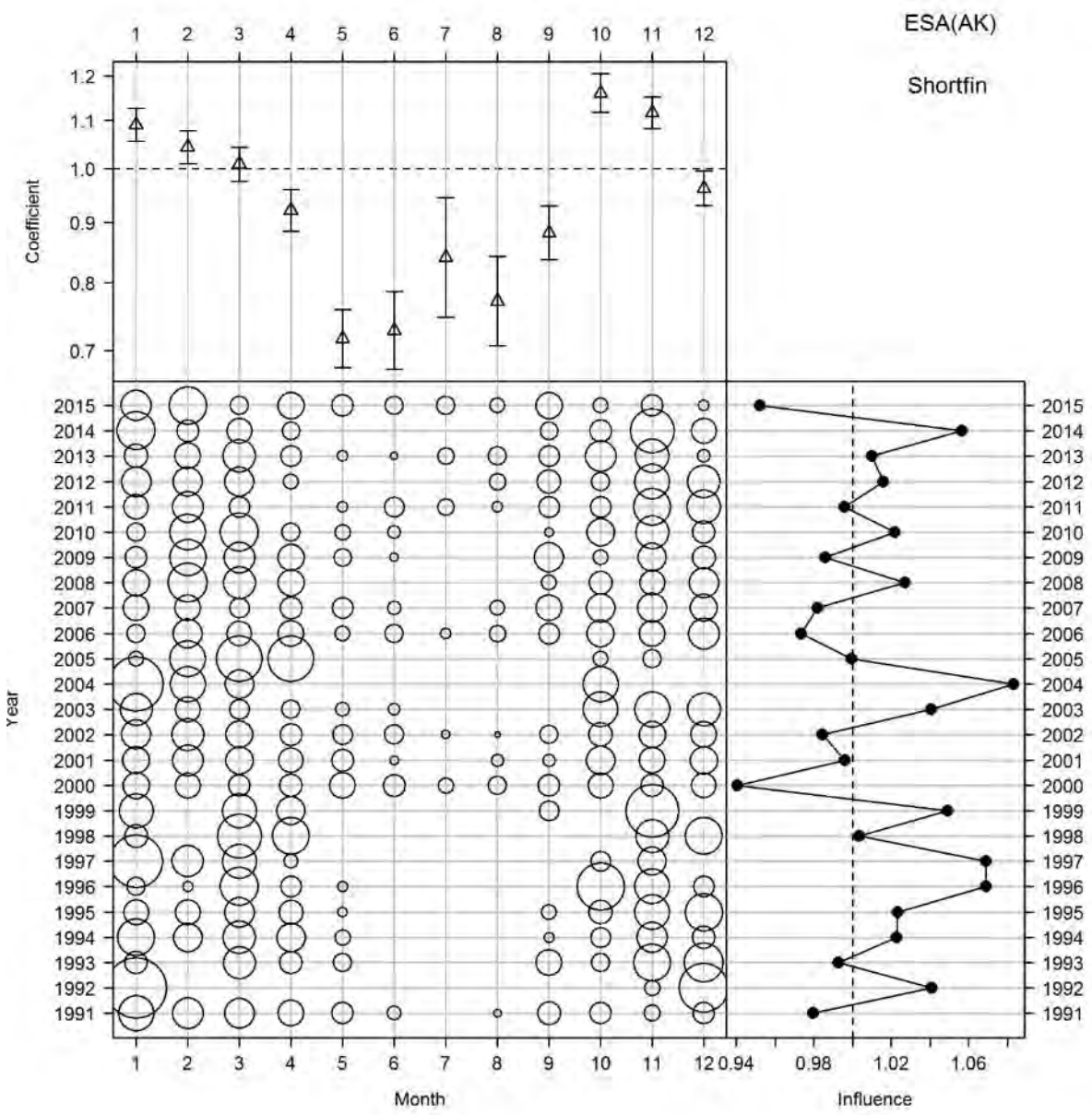


Figure K18: Influence of month for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

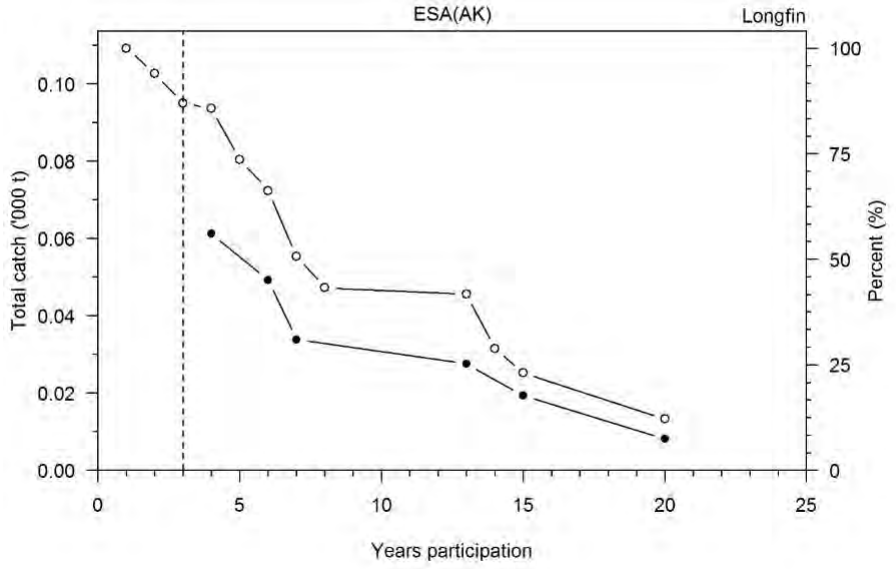


Figure K19: Relationship between years of participation in the fishery and longfin total catch. The open circles represent all longfin catch and the closed circles longfin catch data from fishers who 1) caught longfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core longfin fisher analyses for the years 1990–91 to 2014–15 (ESA AK).

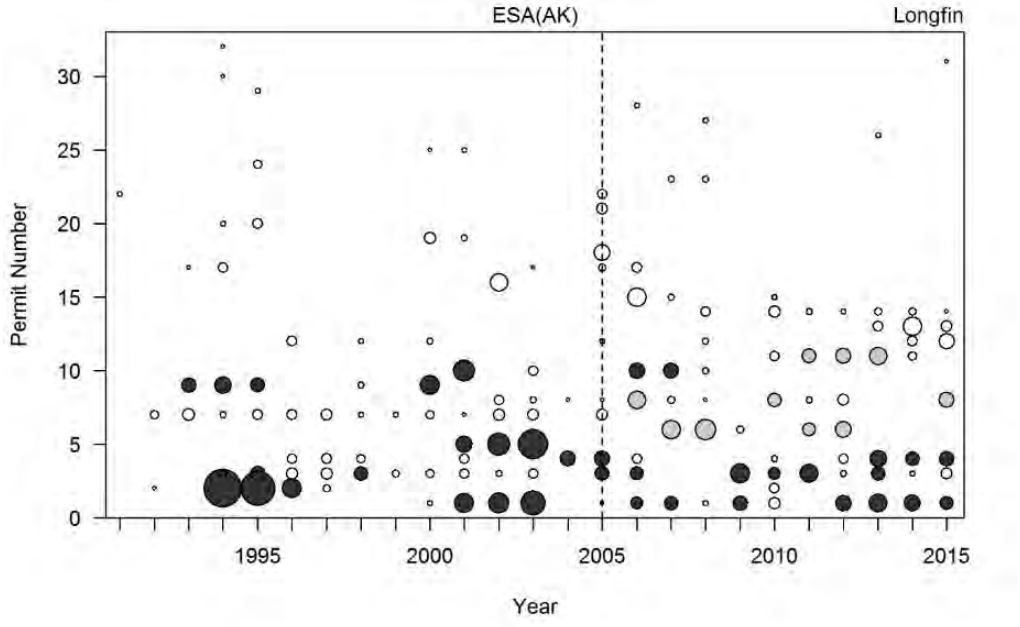


Figure K20: Relative catch of longfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AK).

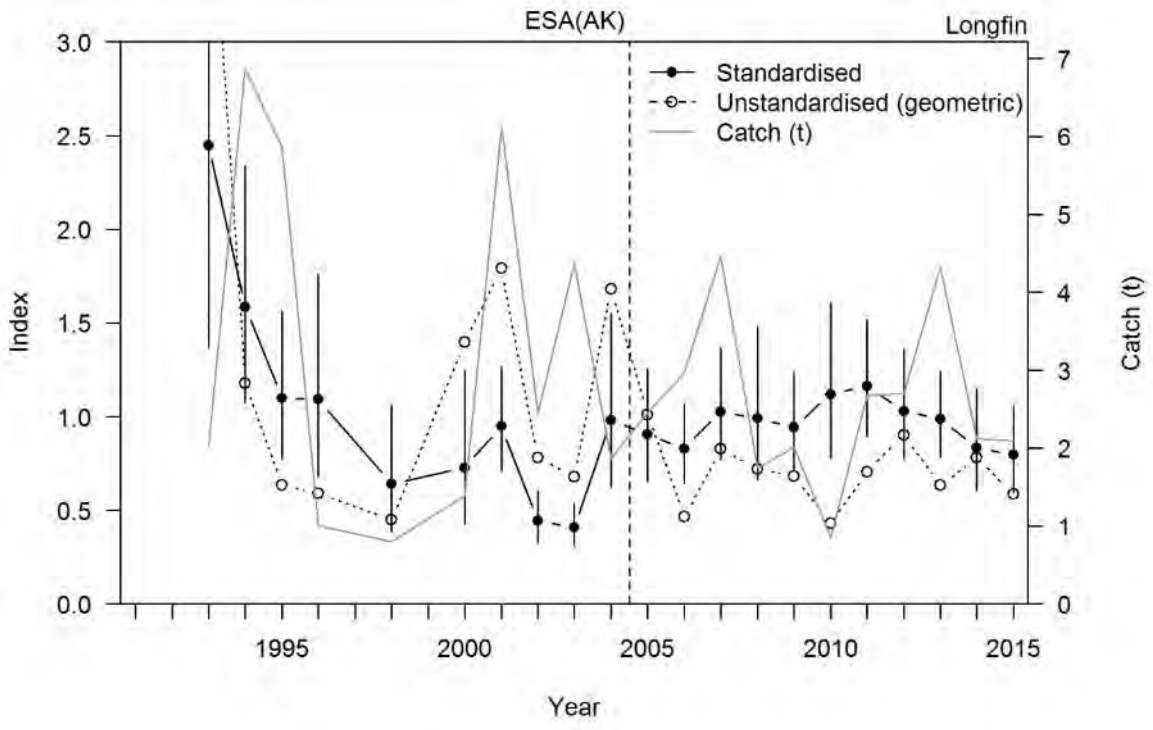


Figure K21: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for longfin core fishers for the years 1990–91 to 2014–15. The longfin catch by core fishers is also plotted (ESA AK).

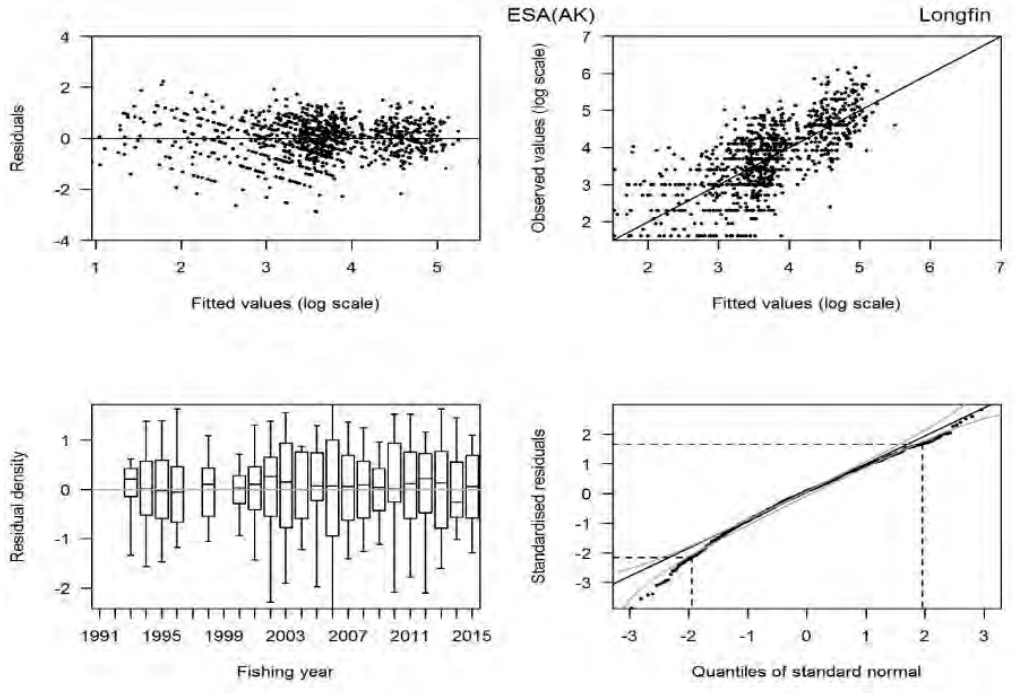


Figure K22: Residual diagnostic plots for the longfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AK).

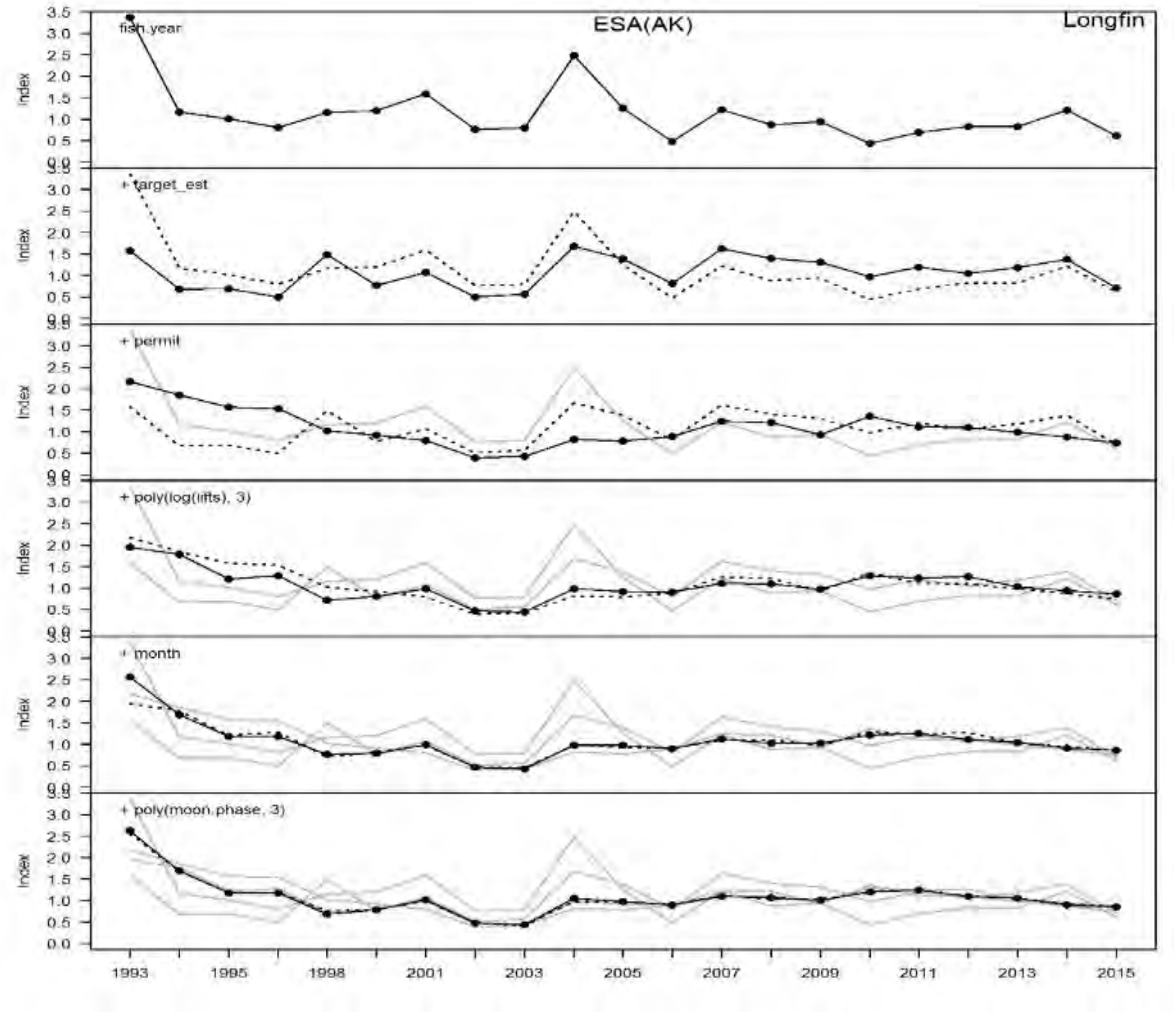


Figure K23: Step plot for the longfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AK).

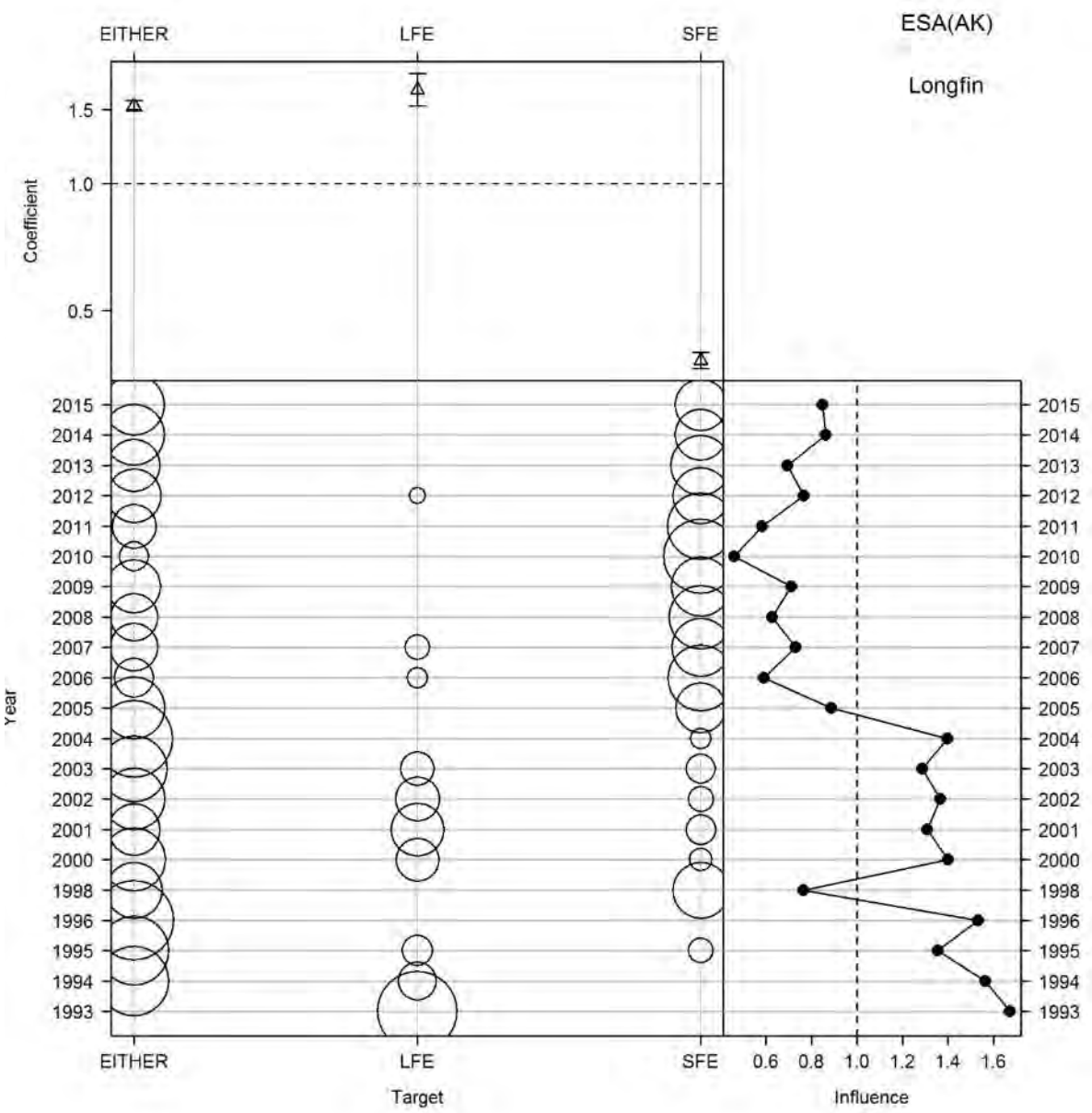


Figure K24: Influence of target for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

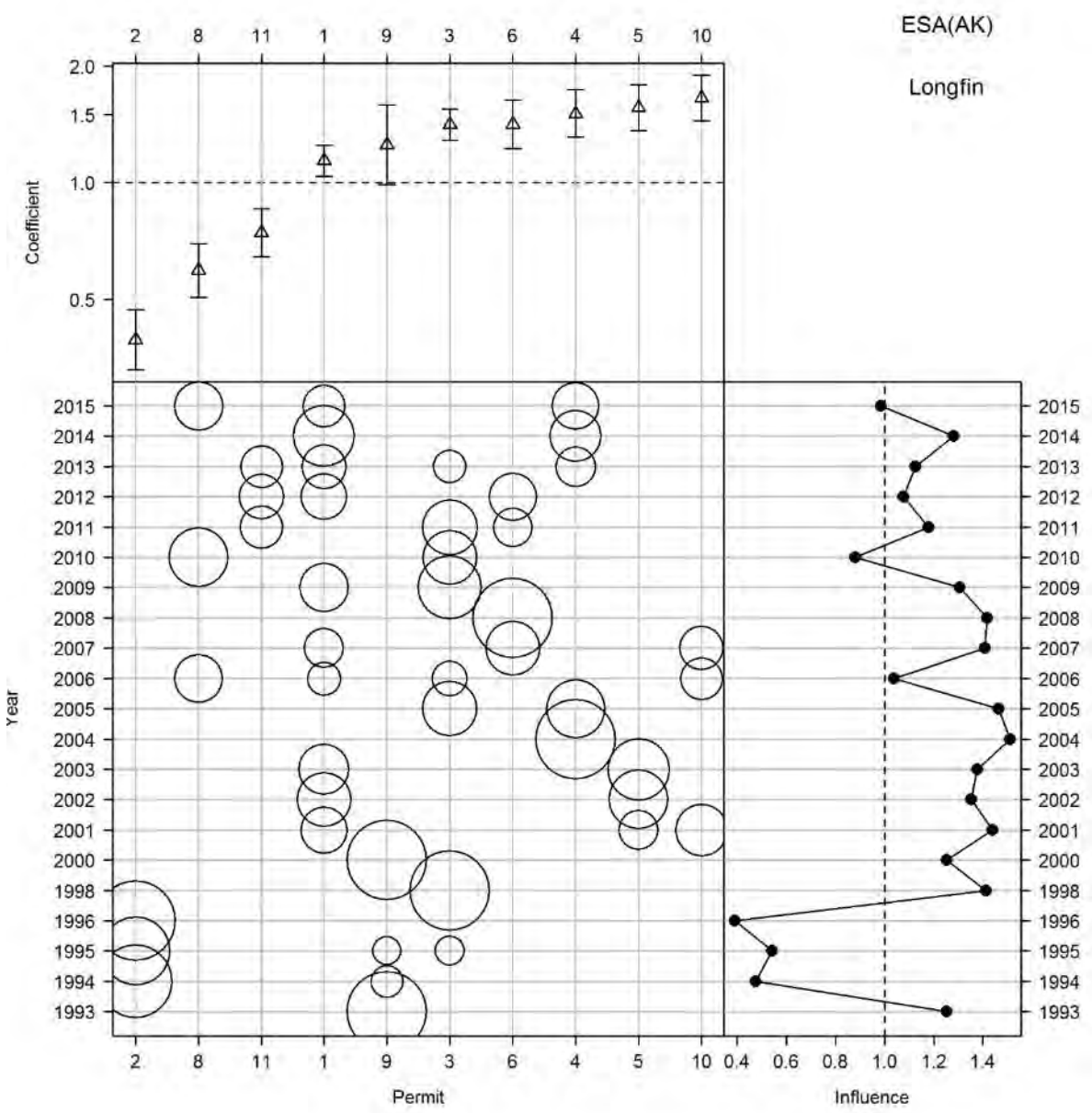


Figure K25: Influence of permit for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

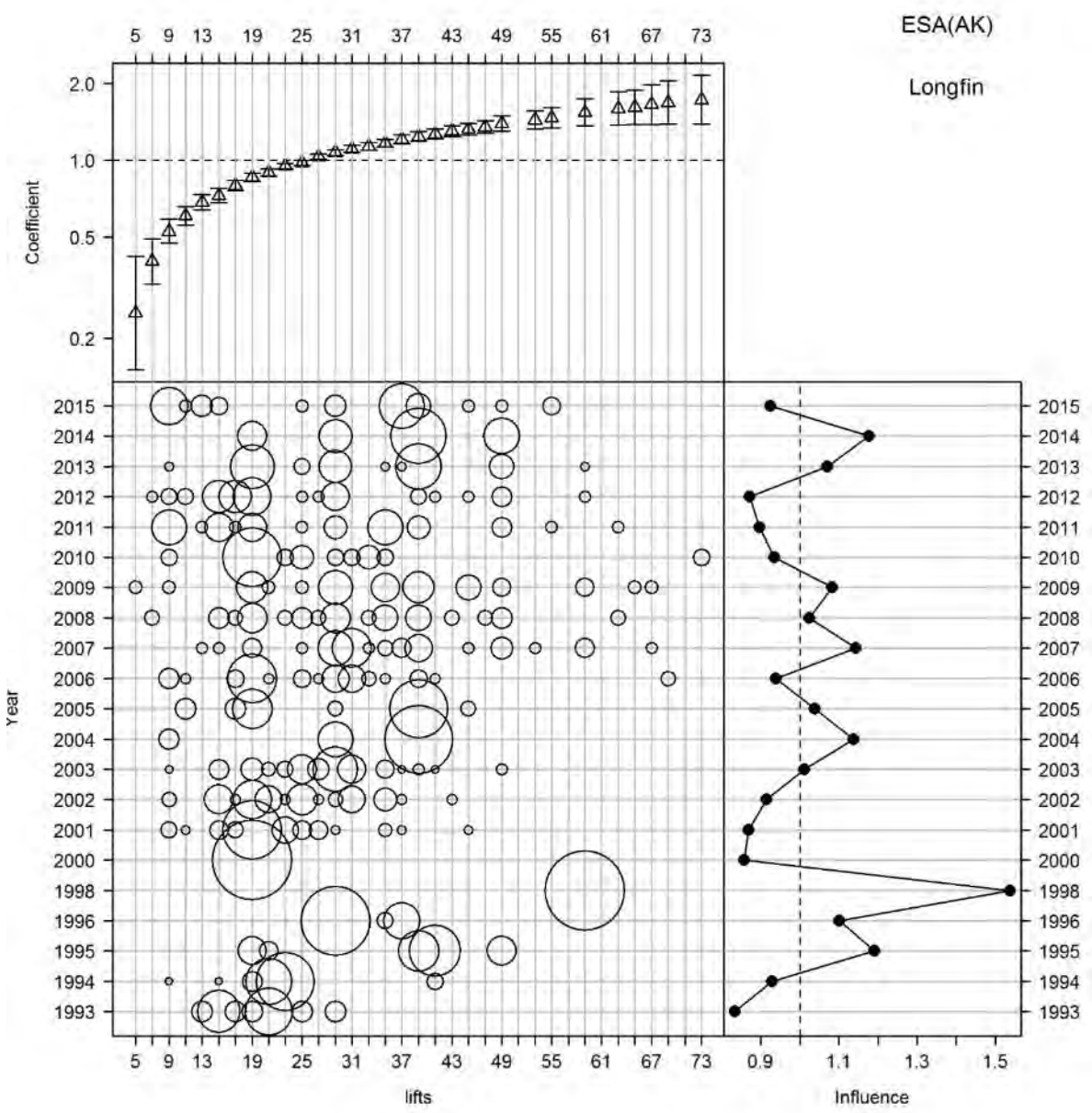


Figure K26: Influence of lifts for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

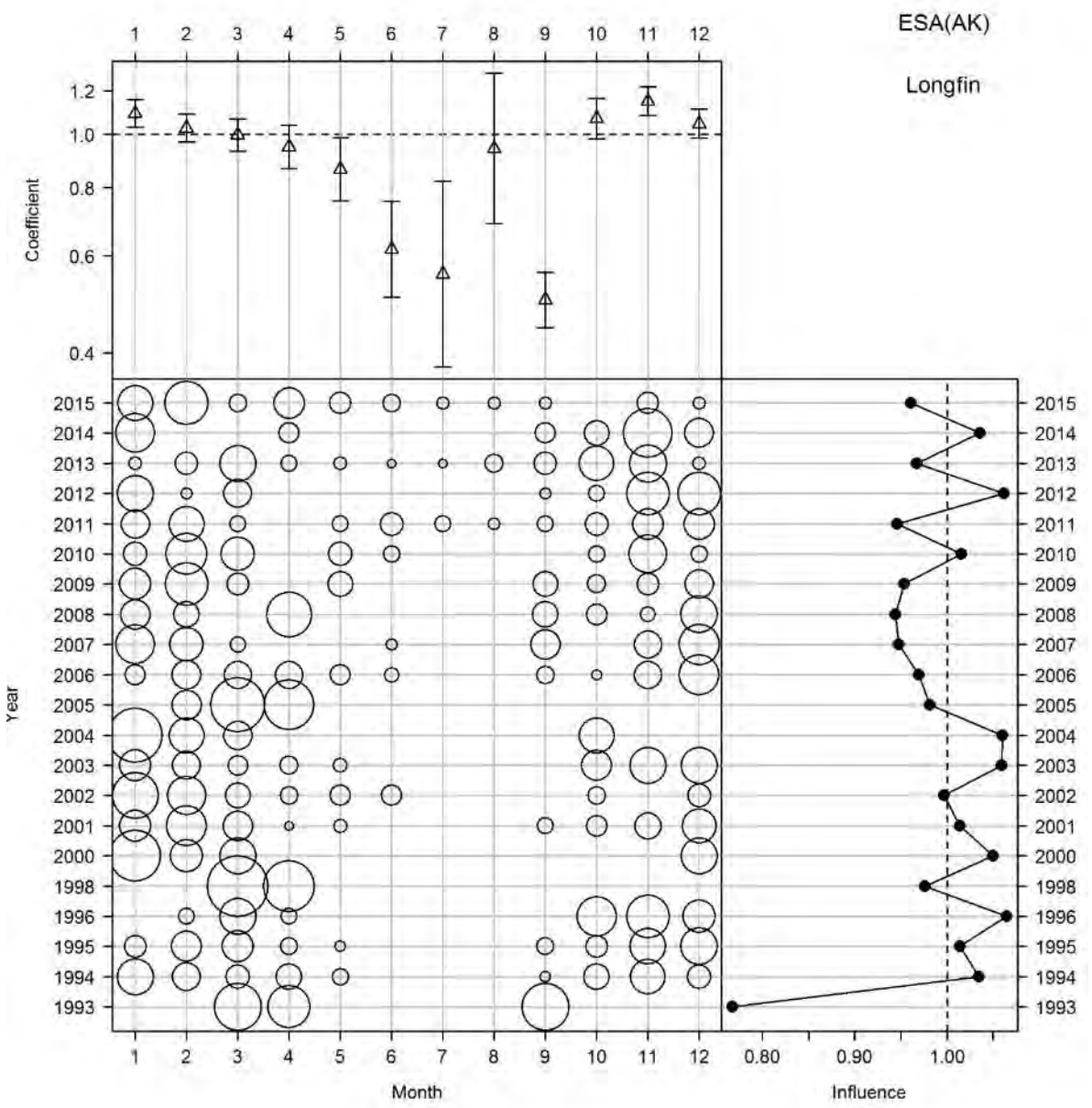


Figure K27: Influence of month for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AK).

APPENDIX L: WAIRARAPA (ESA AL)

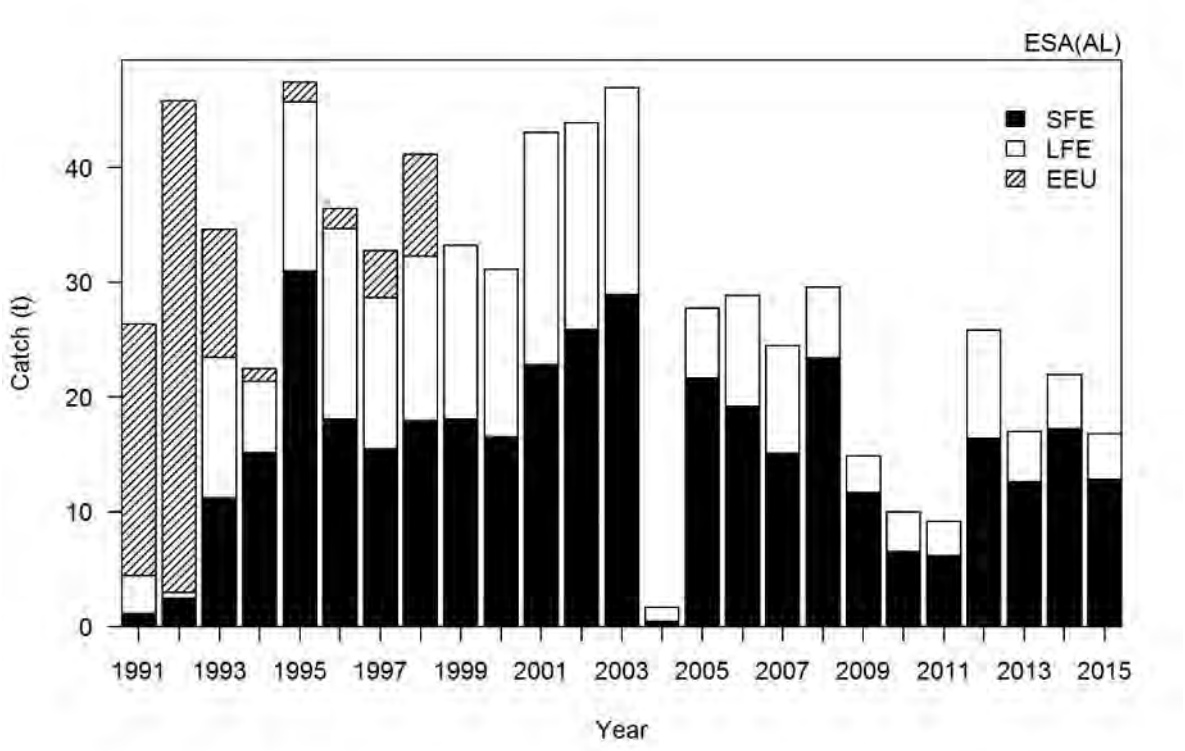


Figure L1: Total estimated commercial catch of shortfin (SFE), longfin (LFE), and unclassified eel catch (EEU) for the years 1990–91 to 2014–15 (ESA AL).

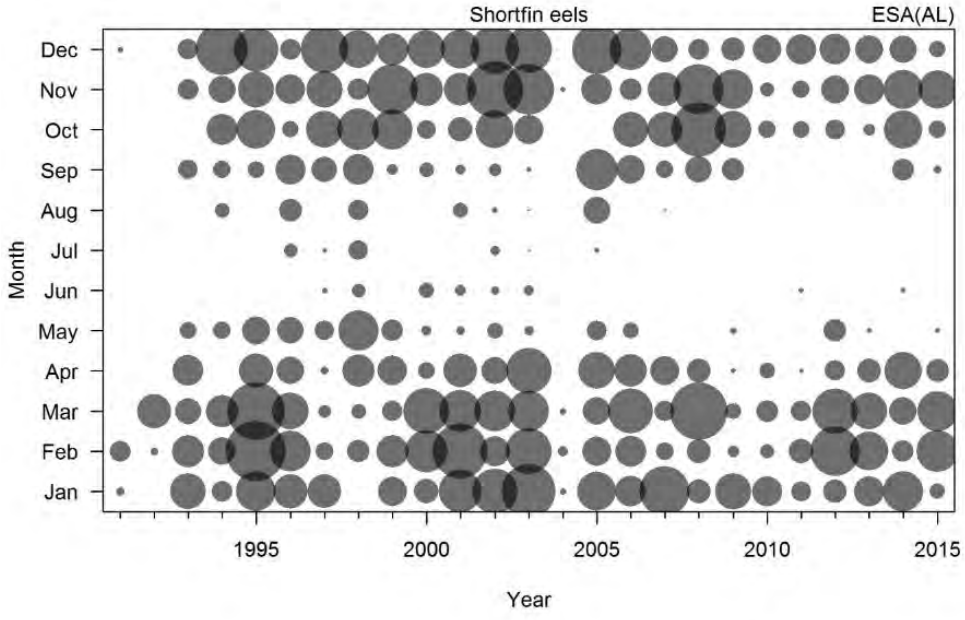


Figure L2: Shortfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AL).

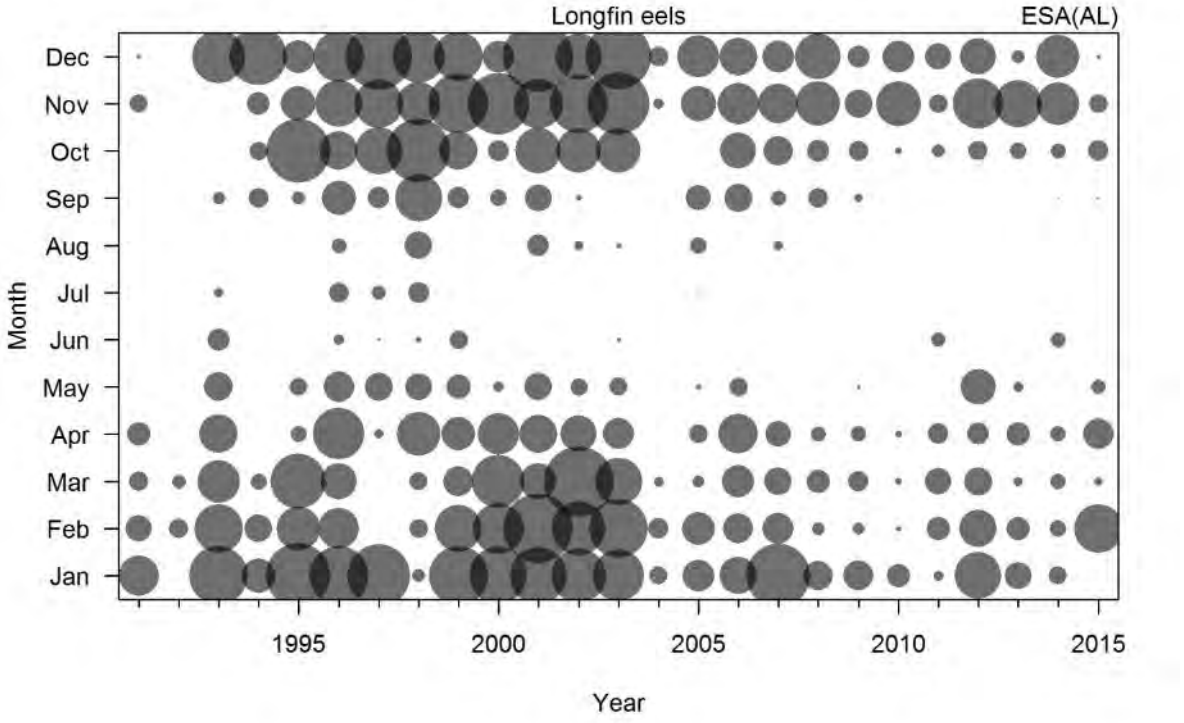


Figure L3: Longfin eel catch by month for the years 1990–91 to 2014–15. The catch before 2002 is missing an unknown amount that was recorded as EEU (ESA AL).

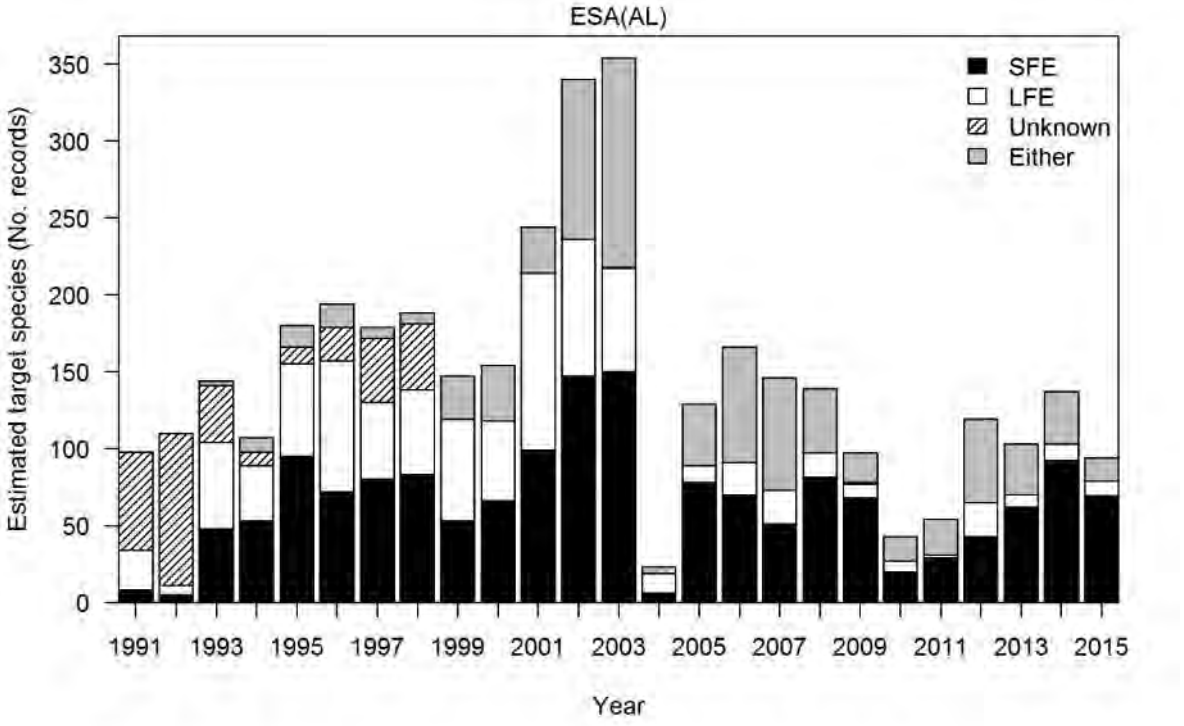


Figure L4: Reconstructed target species for the years 1990–91 to 2014–15 (ESA AL).

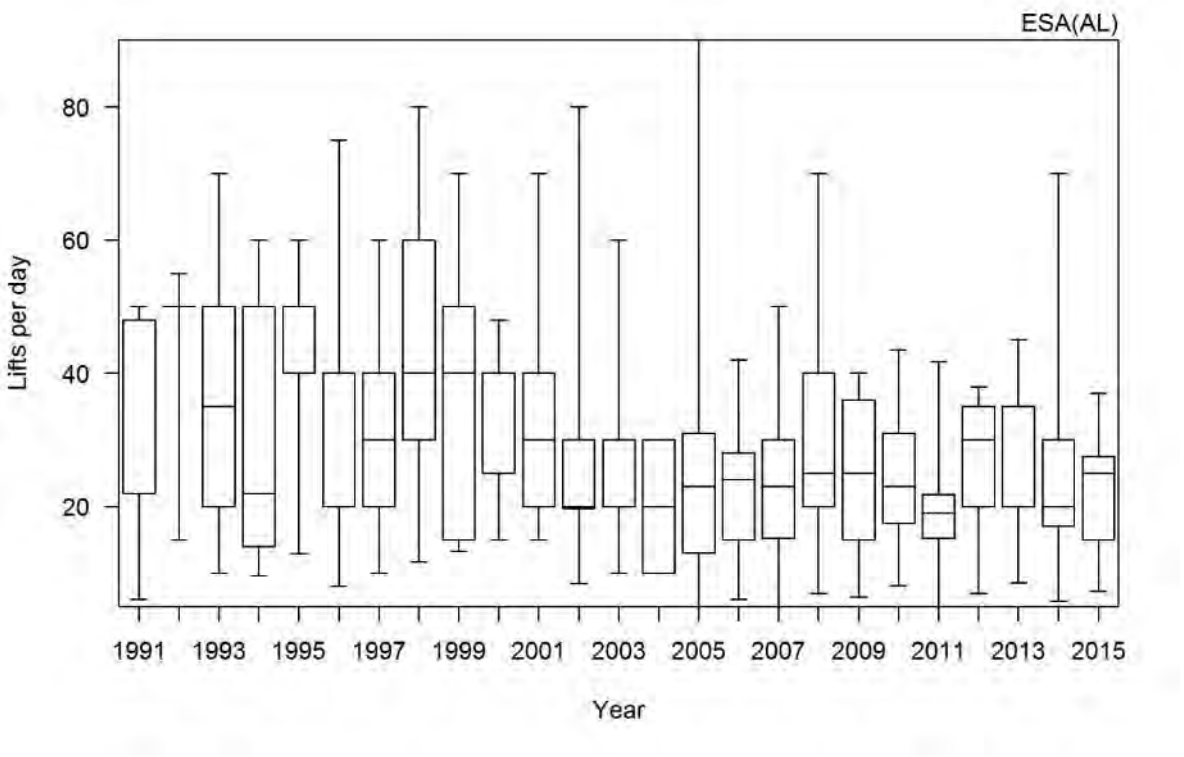


Figure L5: Total lifts per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AL).

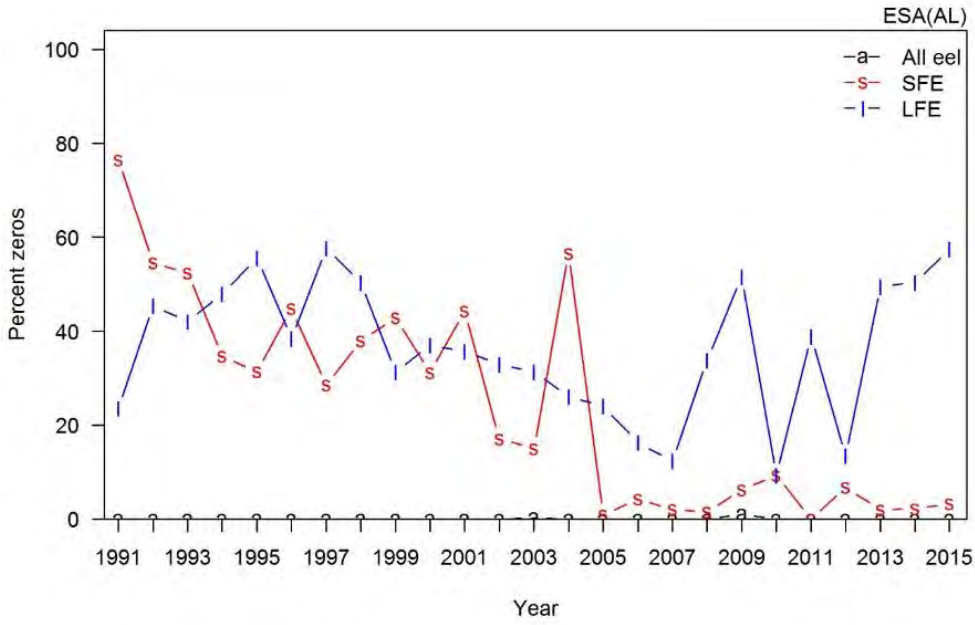


Figure L6: Proportion of valid zero records for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15. Excludes zeros associated with reporting EEU (unclassified) (ESA AL).

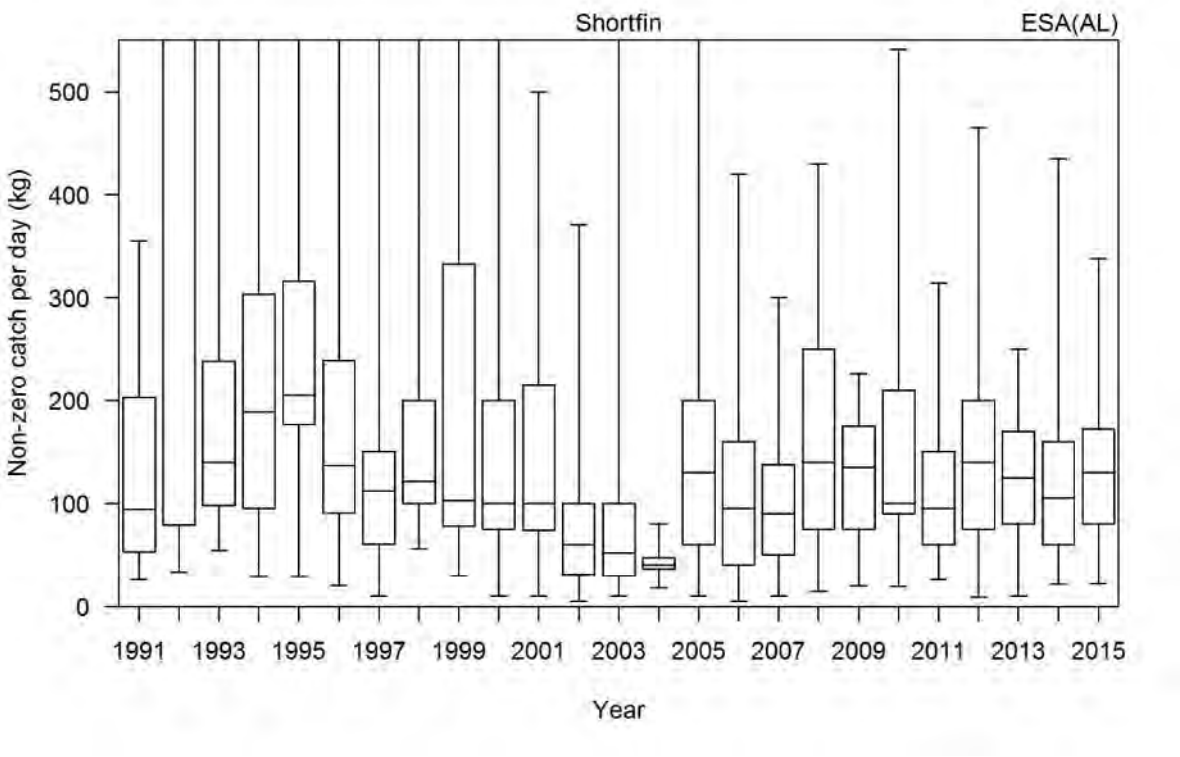


Figure L7: Shortfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AL).

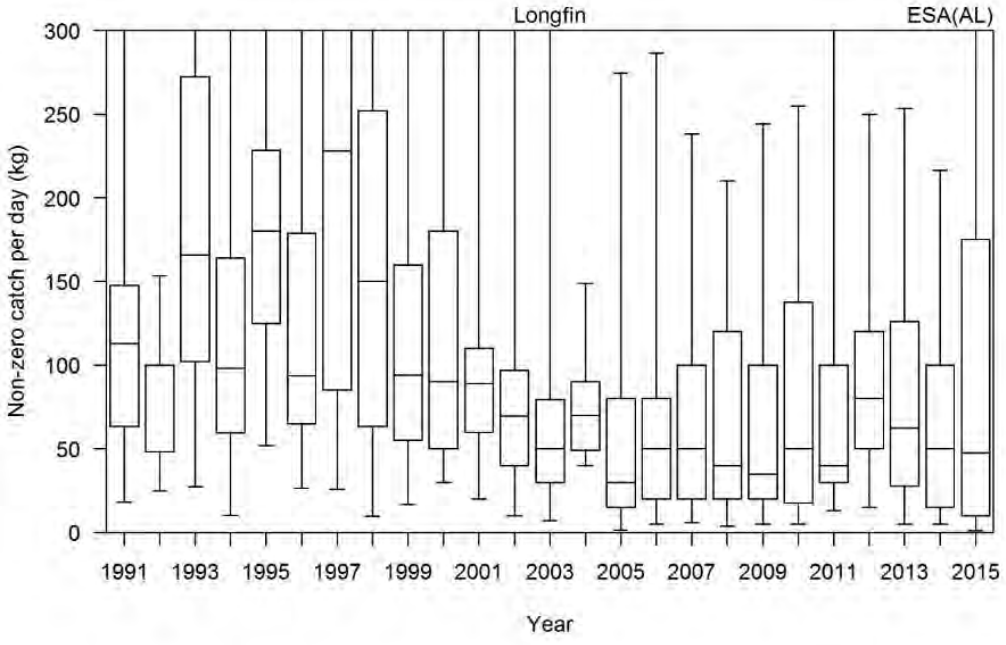


Figure L8: Longfin non-zero catch per day for the years 1990–91 to 2014–15. The horizontal line is the median, the top and bottom of the box are the interquartiles (25th and 75th), and error bars are the 95th percentile range (ESA AL).

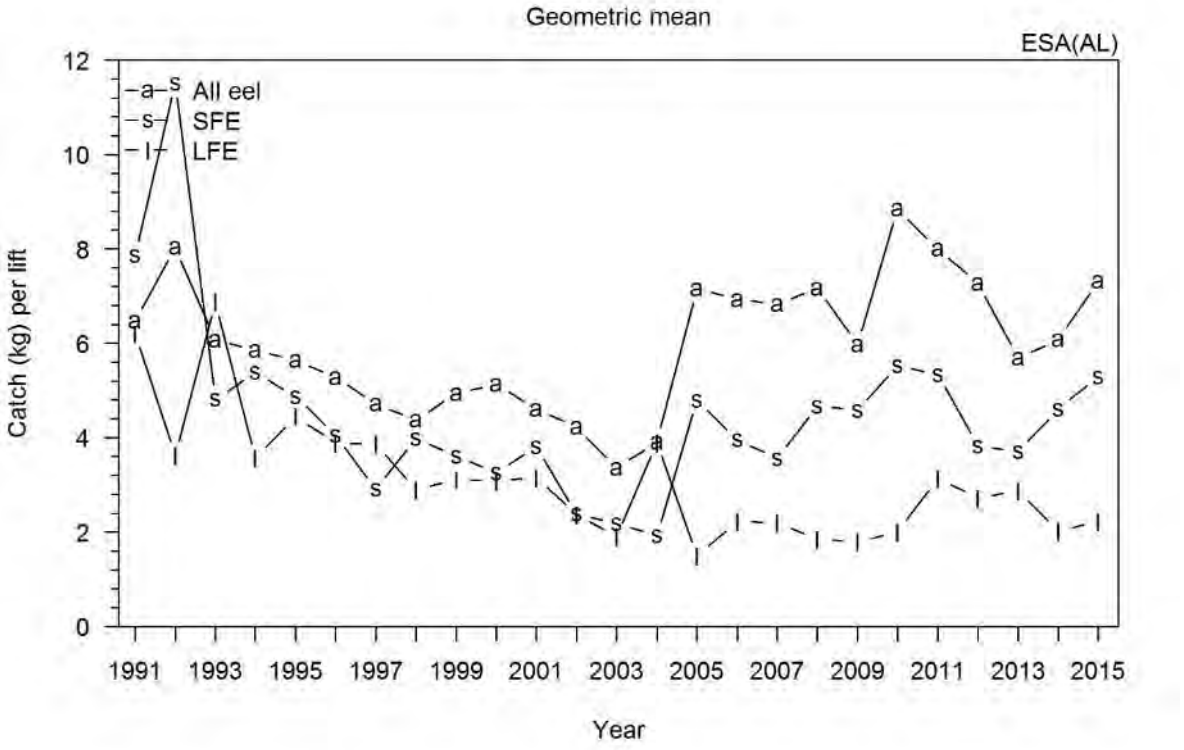


Figure L9: Unstandardised CPUE (geometric mean of catch per lift) for all eels, shortfin (SFE), and longfin (LFE) for the years 1990–91 to 2014–15 (ESA AL).

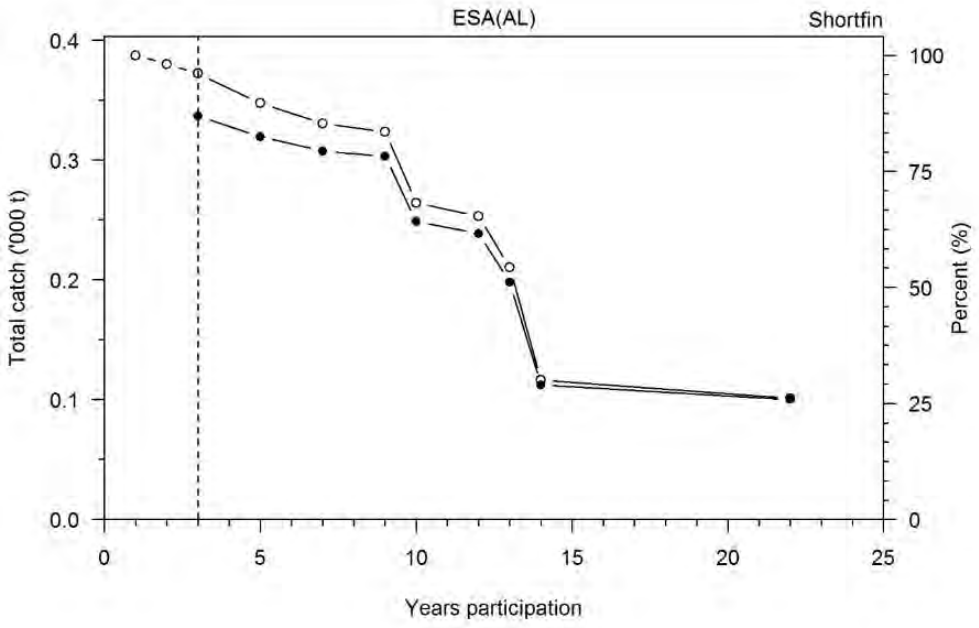


Figure L10: Relationship between years of participation in the fishery and shortfin total catch. The open circles represent all shortfin catch and the closed circles shortfin catch data from fishers who 1) caught shortfin in at least three years in each of which fishing took place in 10 days or more, and 2) caught more than 1000 kg over all years. Dotted vertical line represents 3 years participation and indicates the data included in the core shortfin fisher analyses for the years 1990–91 to 2014–15 (ESA AL).

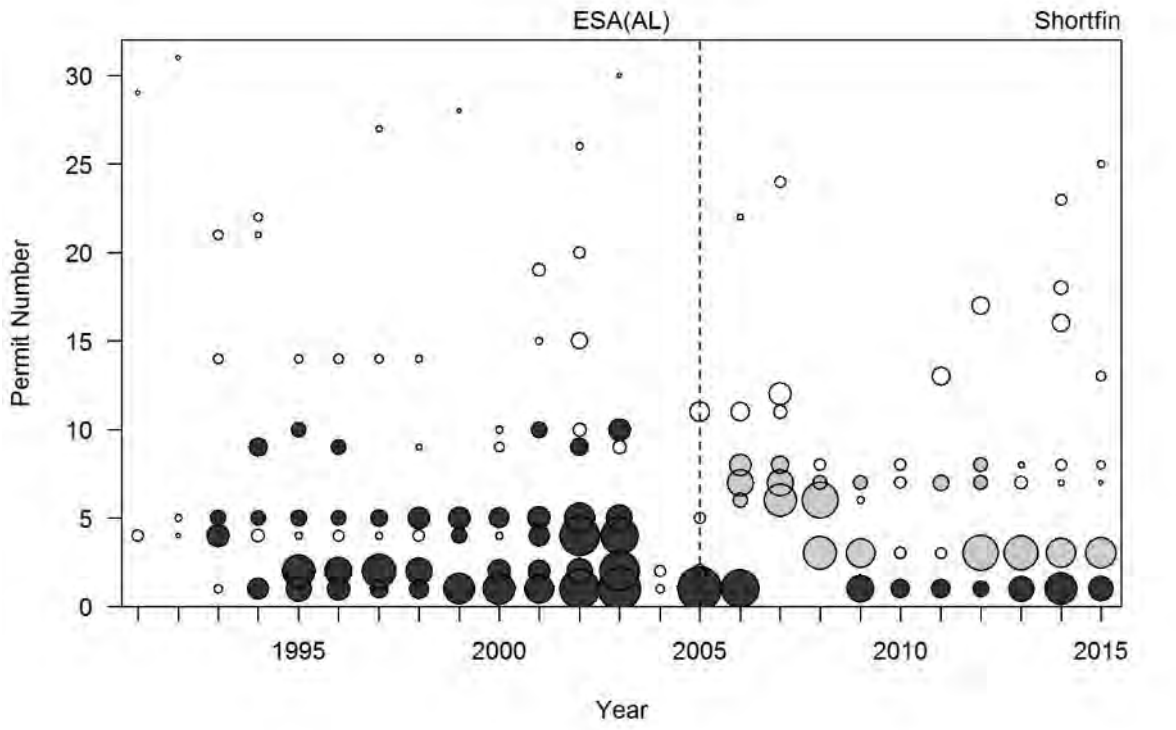


Figure L11: Relative catch of shortfin from all fishers (all circles) for the years 1990–91 to 2014–15, and for core fishers (dark and grey shaded circles) included in the catch per unit effort analyses. The vertical dotted line demarks introduction of the QMS in 2004–05. The dark shaded circles post-QMS are existing fishers and the grey, new entrants (ESA AL).

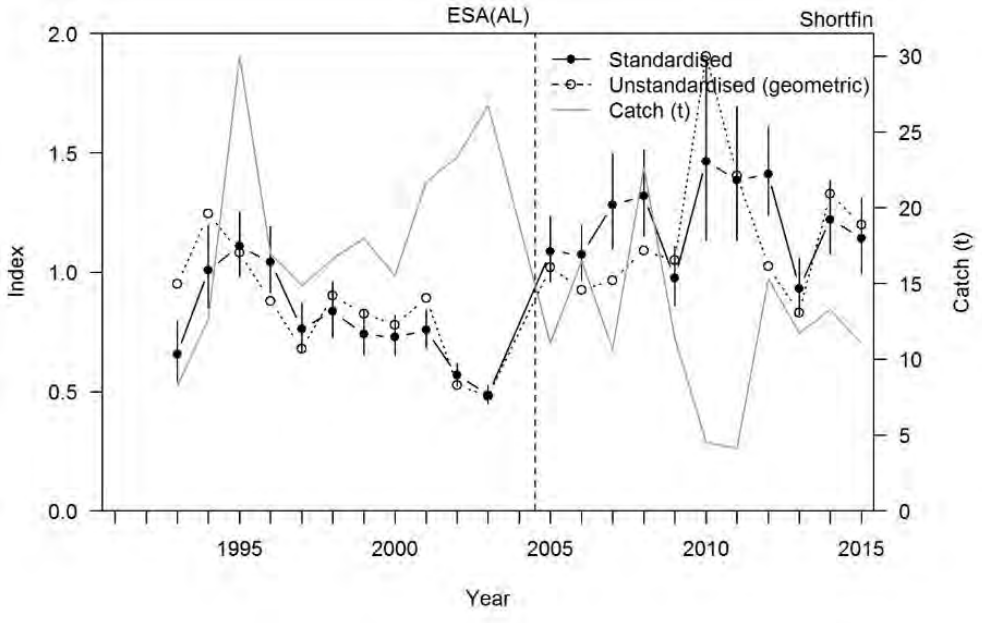


Figure L12: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for shortfin core fishers for the years 1990–91 to 2014–15. The shortfin catch by core fishers is also plotted (ESA AL).

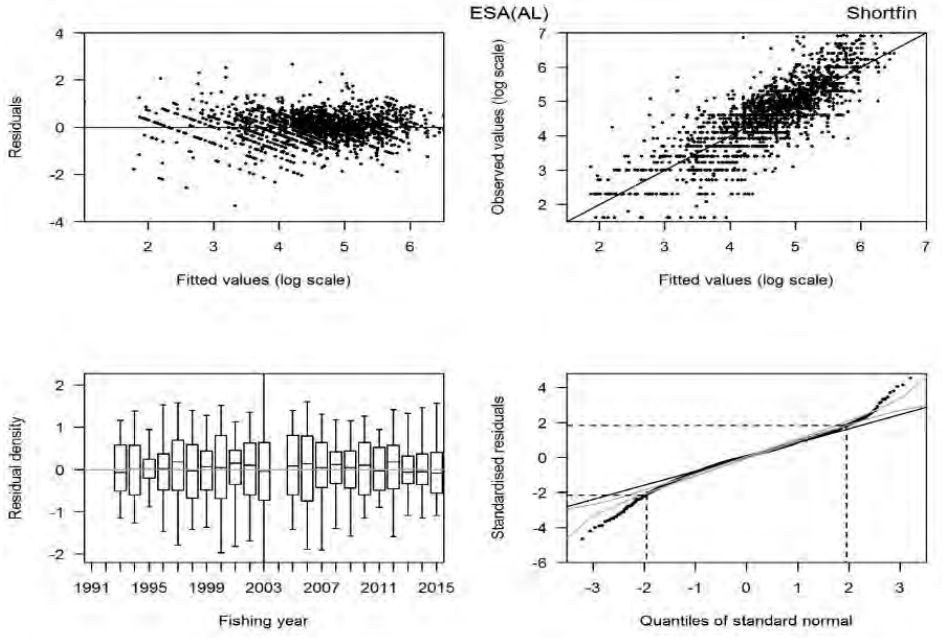


Figure L13: Residual diagnostic plots for the shortfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AL).

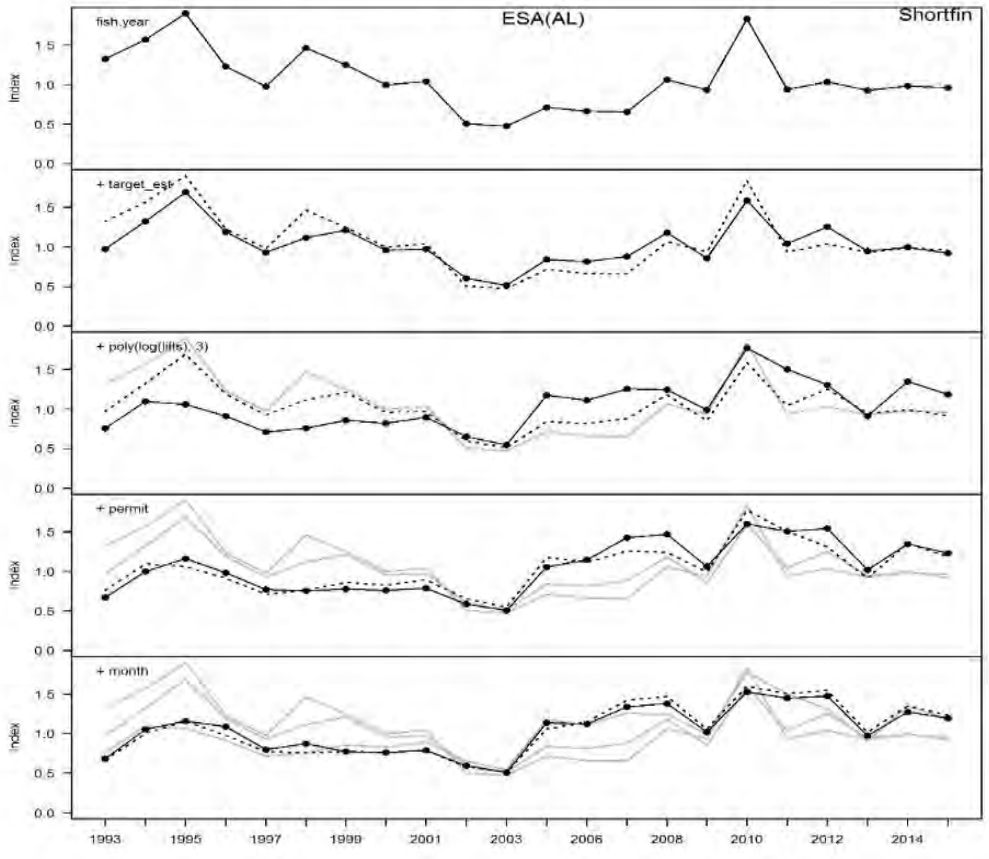


Figure L14: Step plot for the shortfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AL).

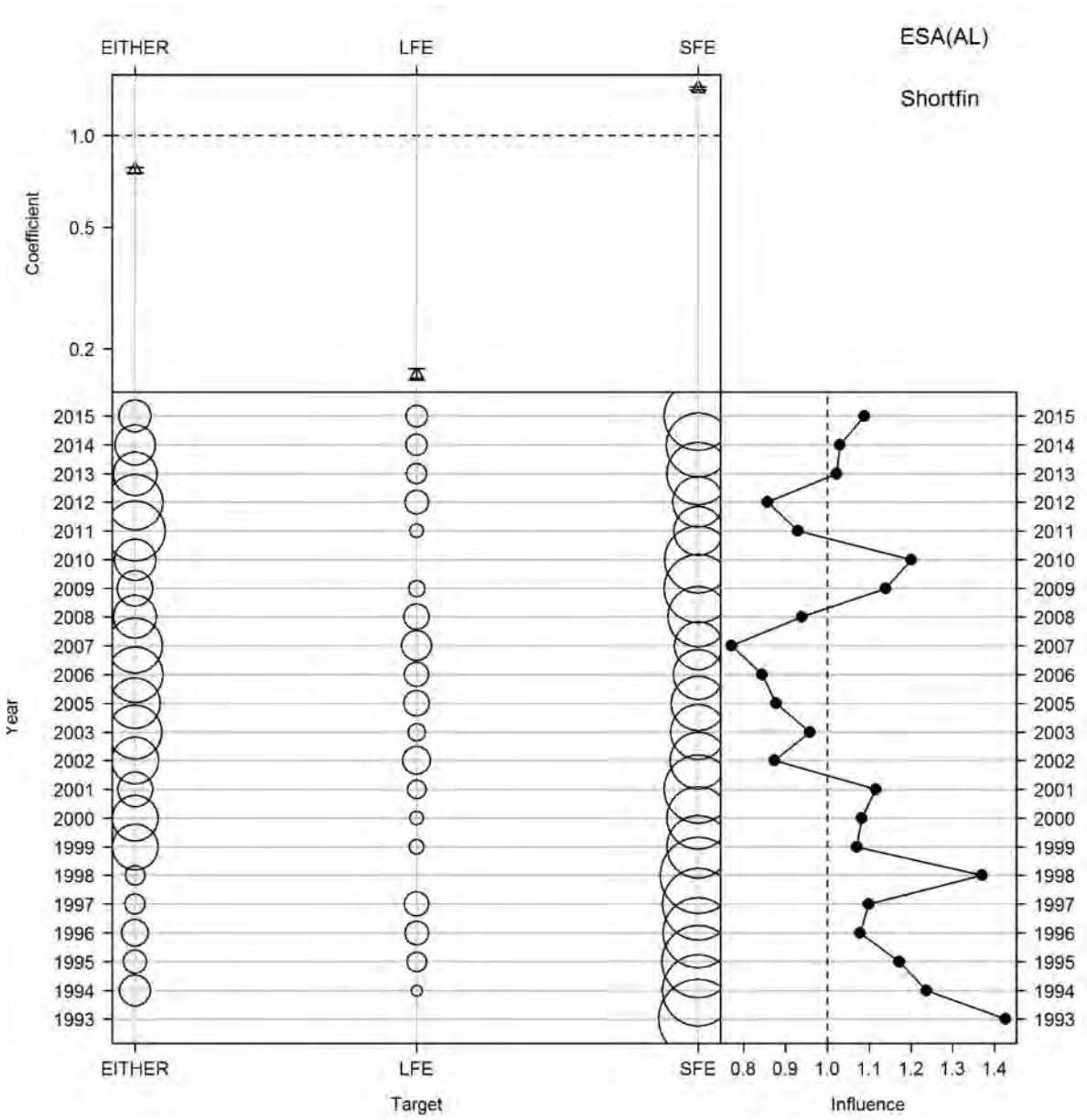


Figure L15: Influence of target for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

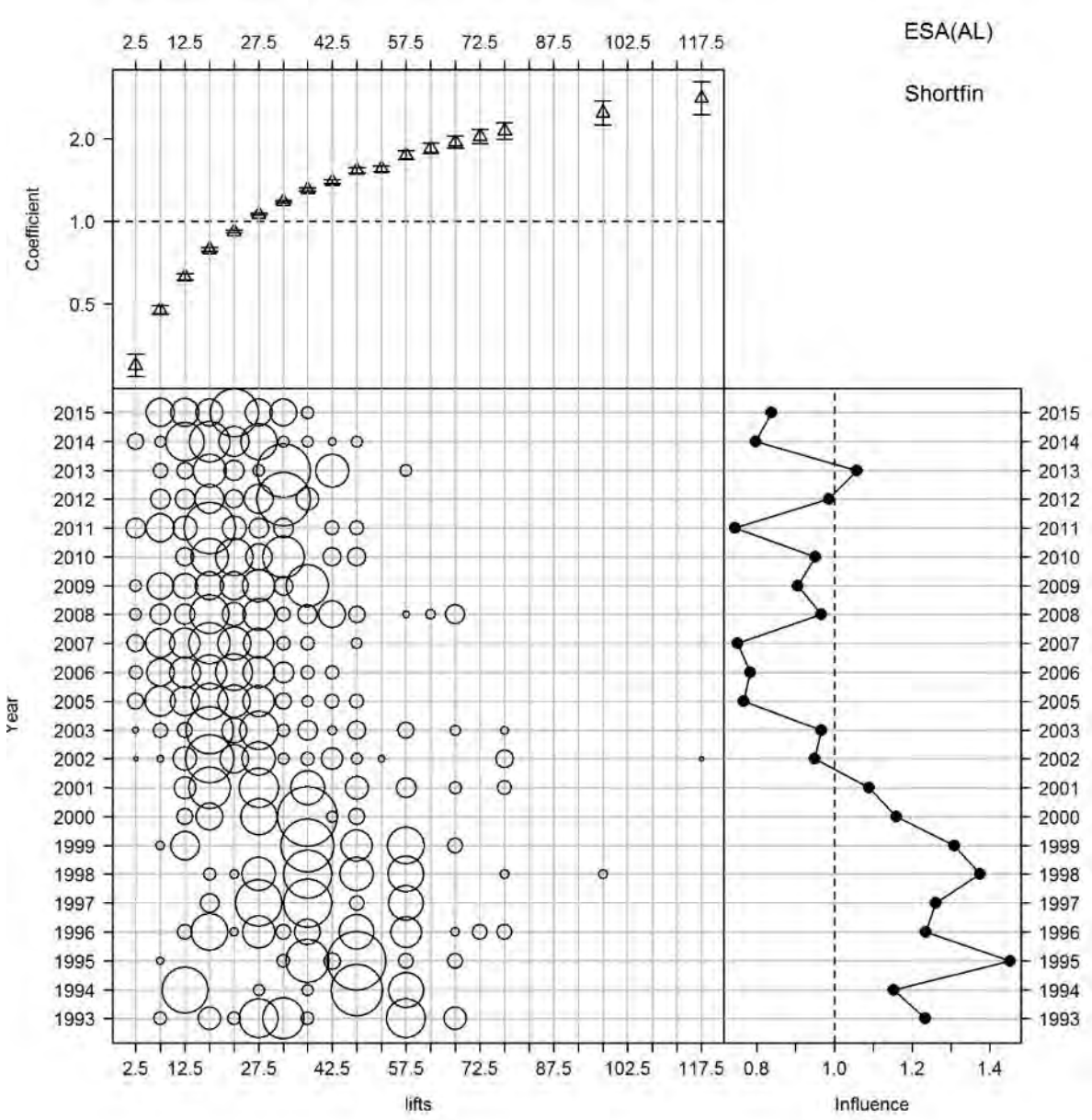


Figure L16: Influence of lifts for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

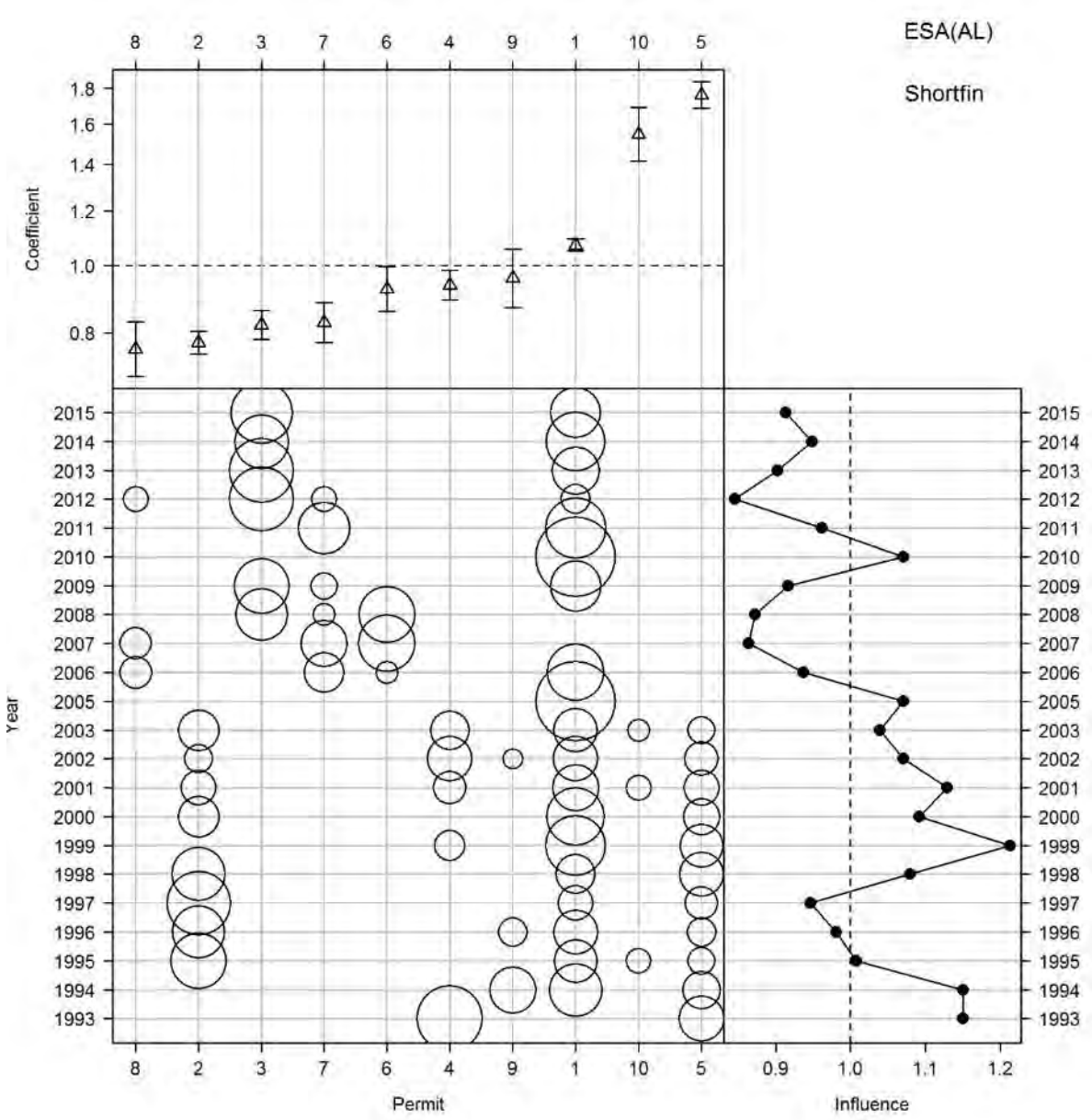


Figure L17: Influence of permit for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

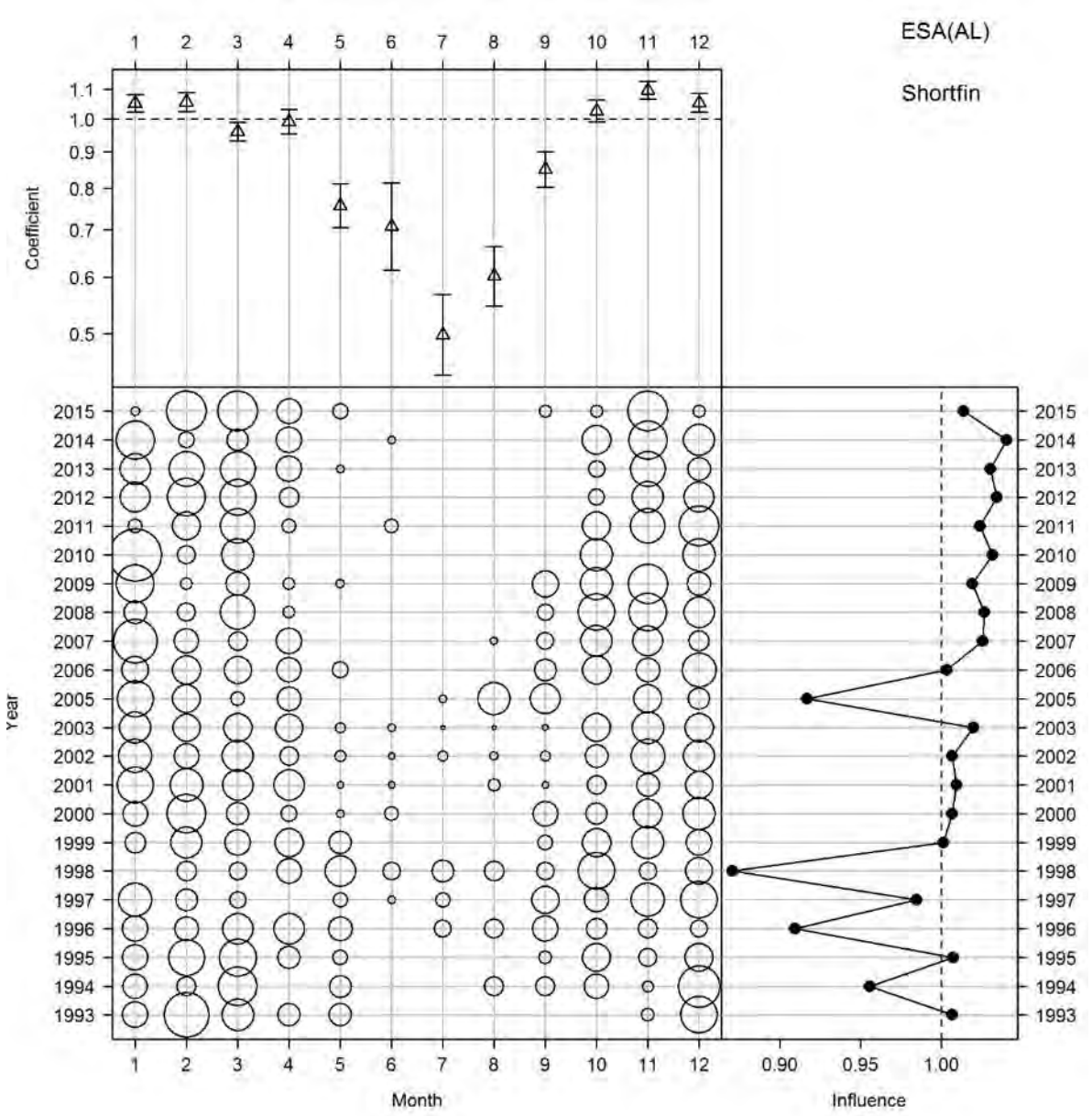
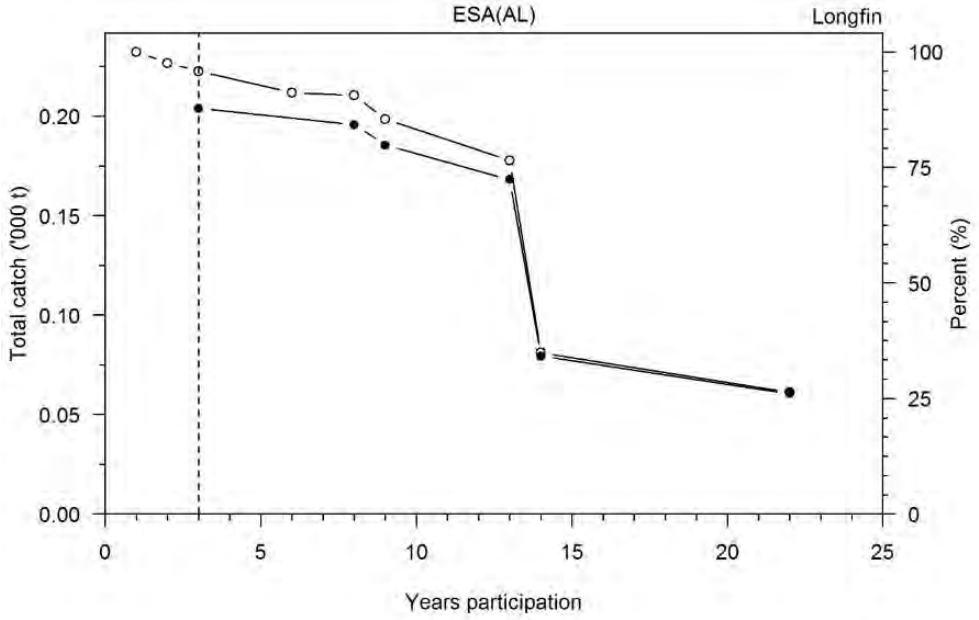


Figure L18: Influence of month for the shortfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).



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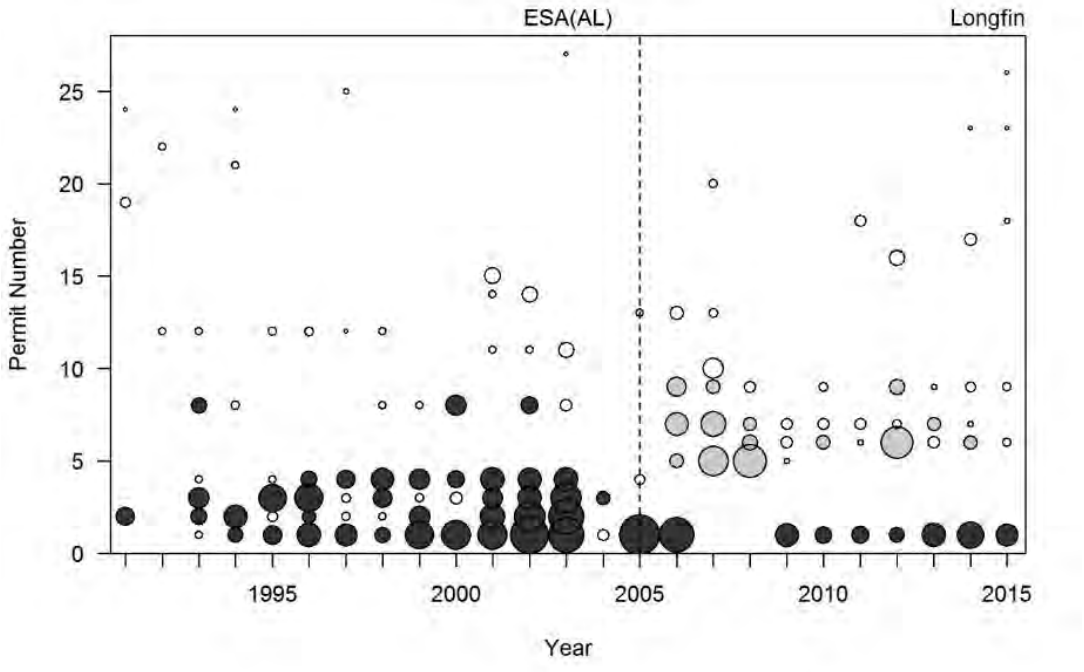

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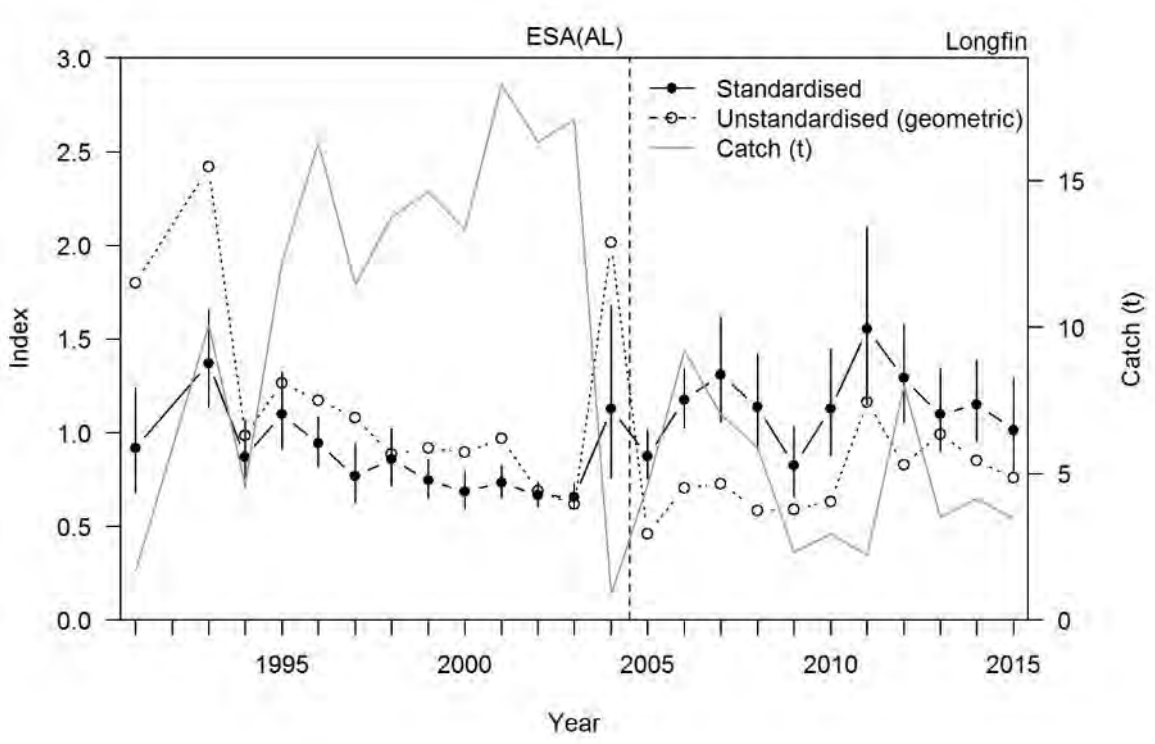

Figure L21: Indices of unstandardised (geometric mean of catch per lift) and standardised CPUE for longfin core fishers for the years 1990–91 to 2014–15. The longfin catch by core fishers is also plotted (ESA AL).

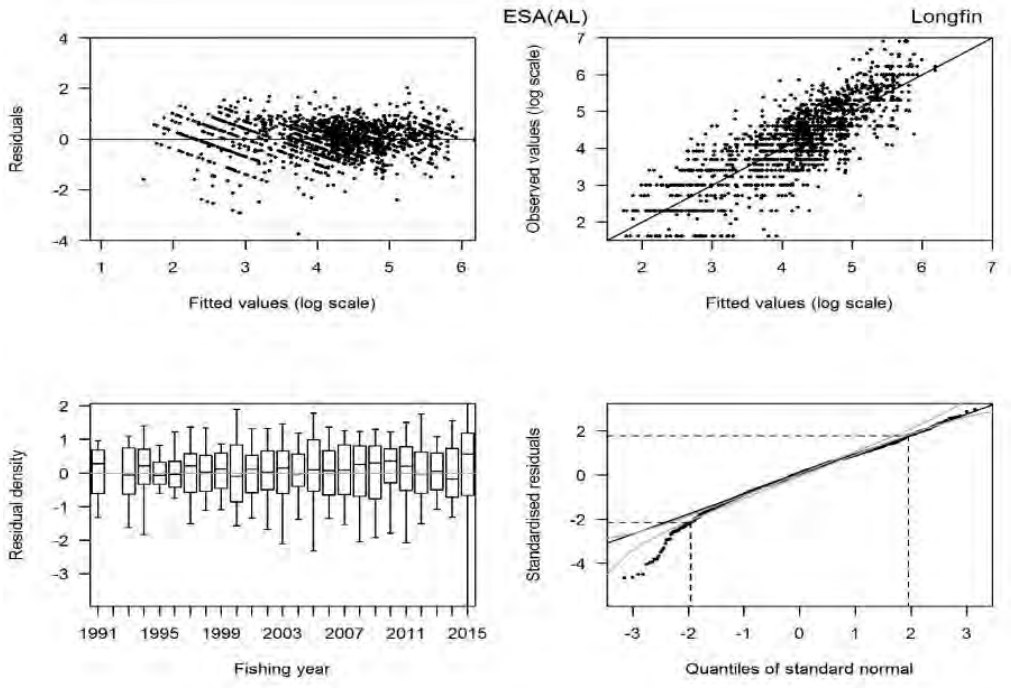

Figure L22: Residual diagnostic plots for the longfin eel CPUE model for the years 1990–91 to 2014–15. The grey lines on the quantile-quantile plot represent the 95% confidence envelopes of a standard normal distribution (ESA AL).

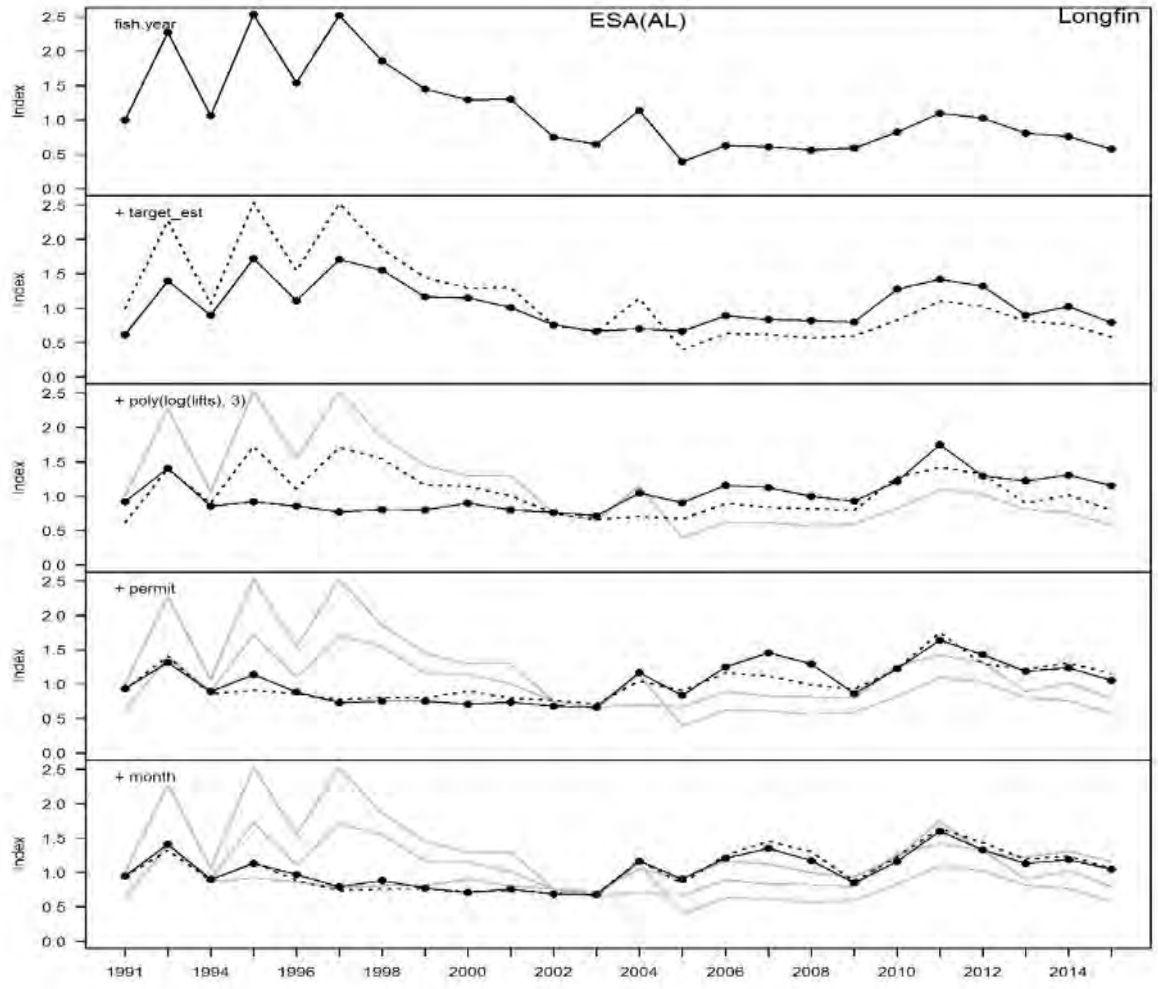

Figure L23: Step plot for the longfin eel CPUE model for the years 1990–91 to 2014–15. Each panel shows the standardised CPUE index as each explanatory variable is added to the model with the previous index shown by the dotted line and the grey lines for steps before that (ESA AL).

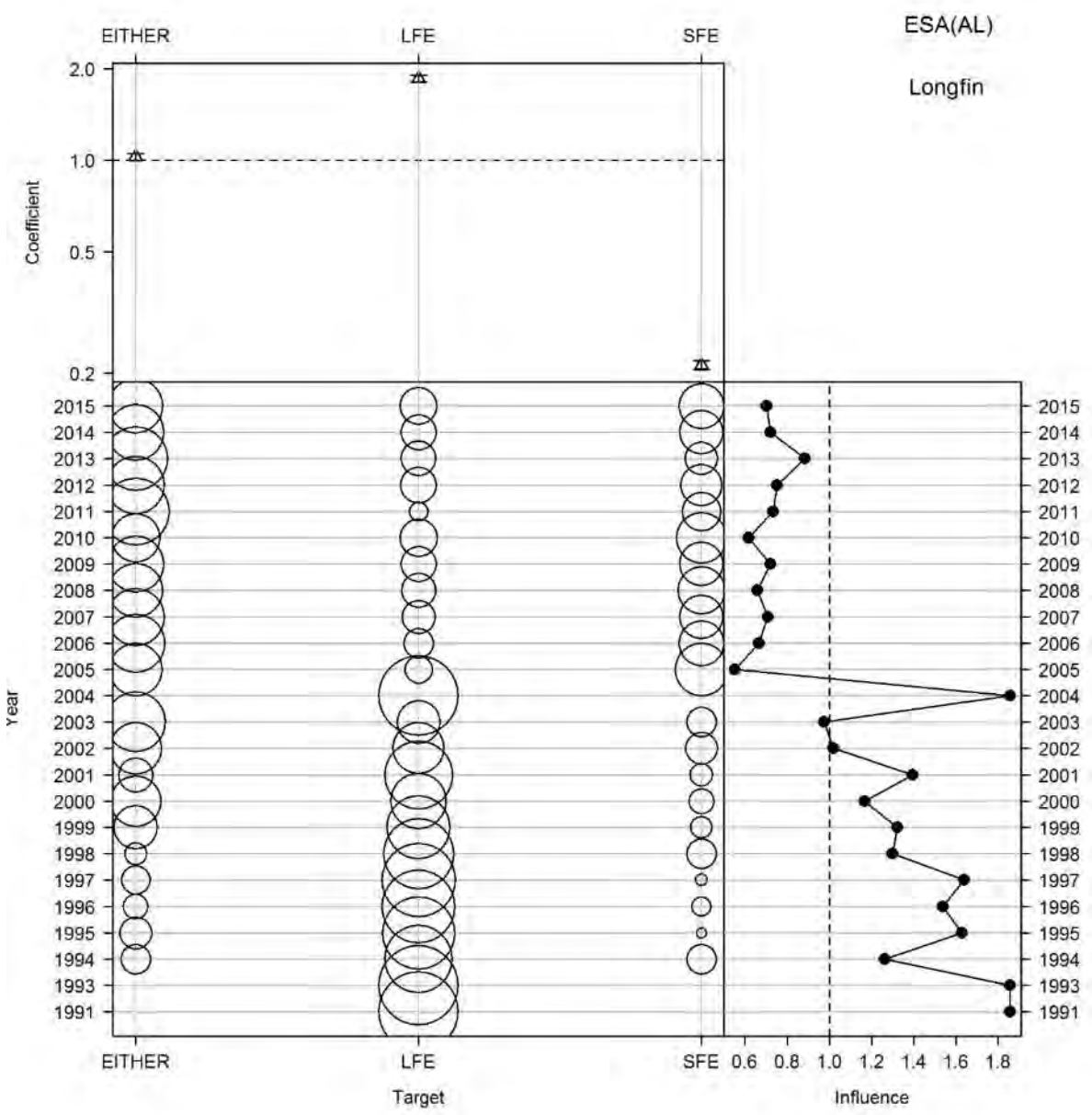

Figure L24: Influence of target for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

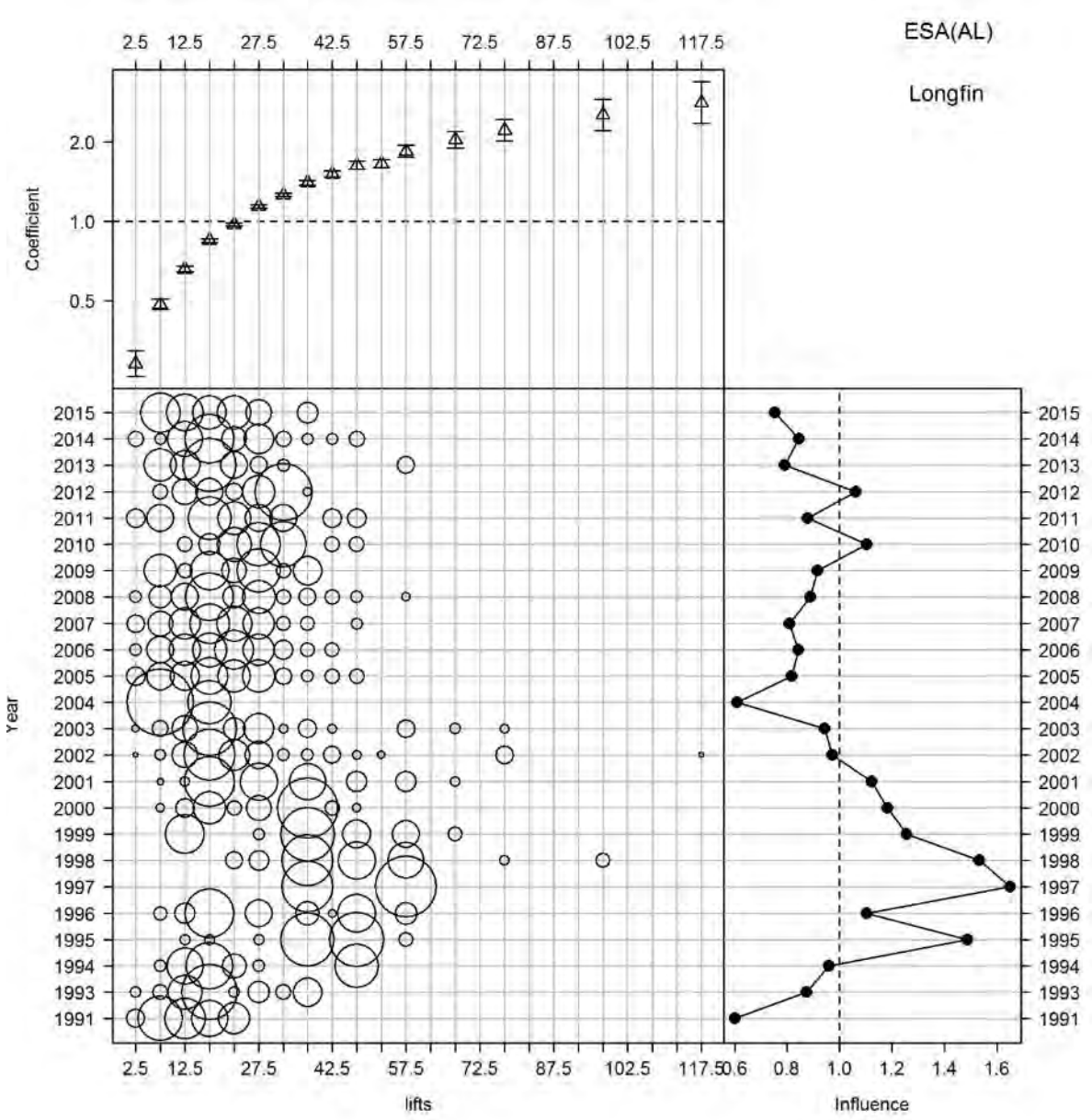

Figure L25: Influence of lifts for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

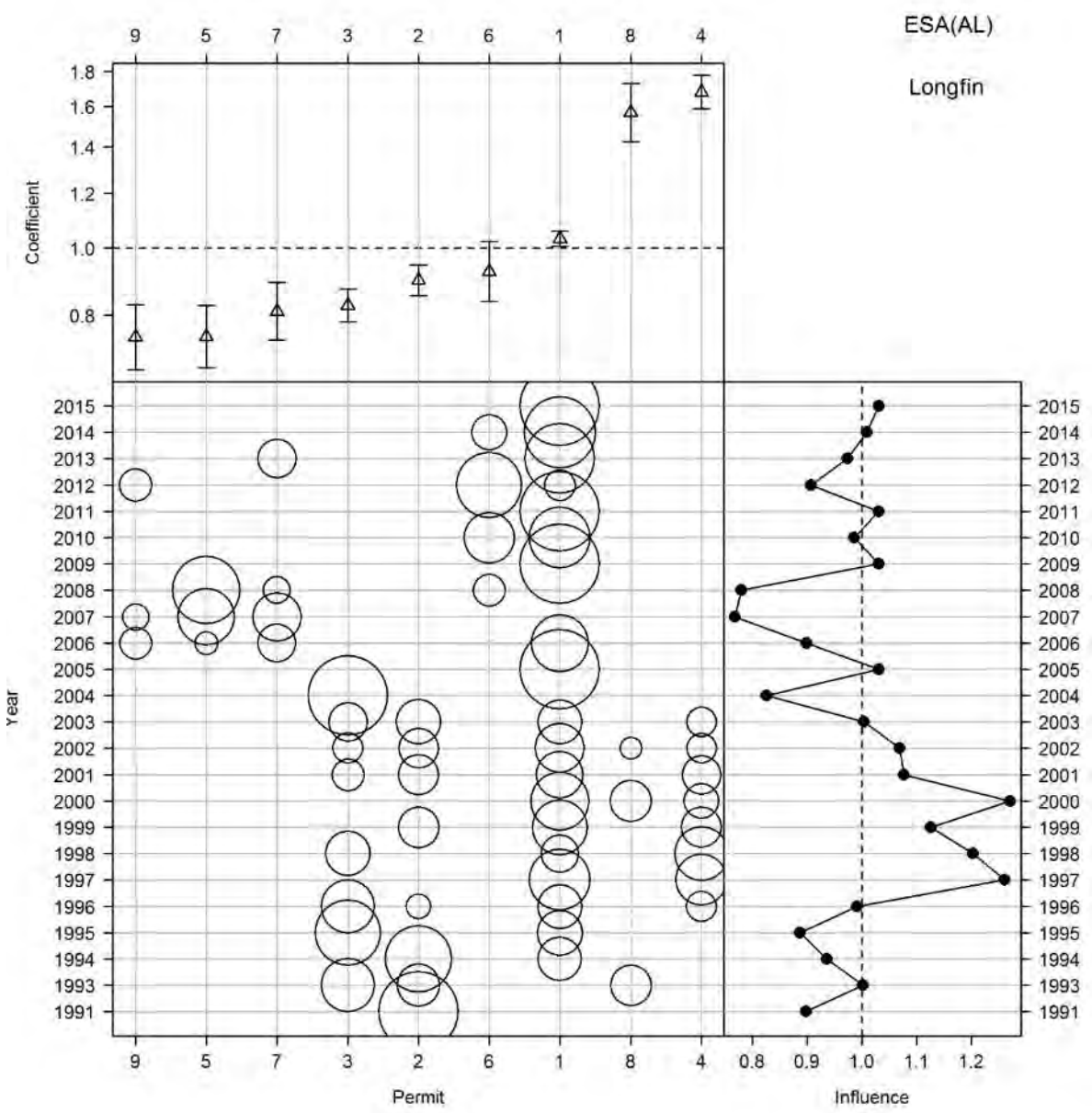

Figure L26: Influence of permit for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

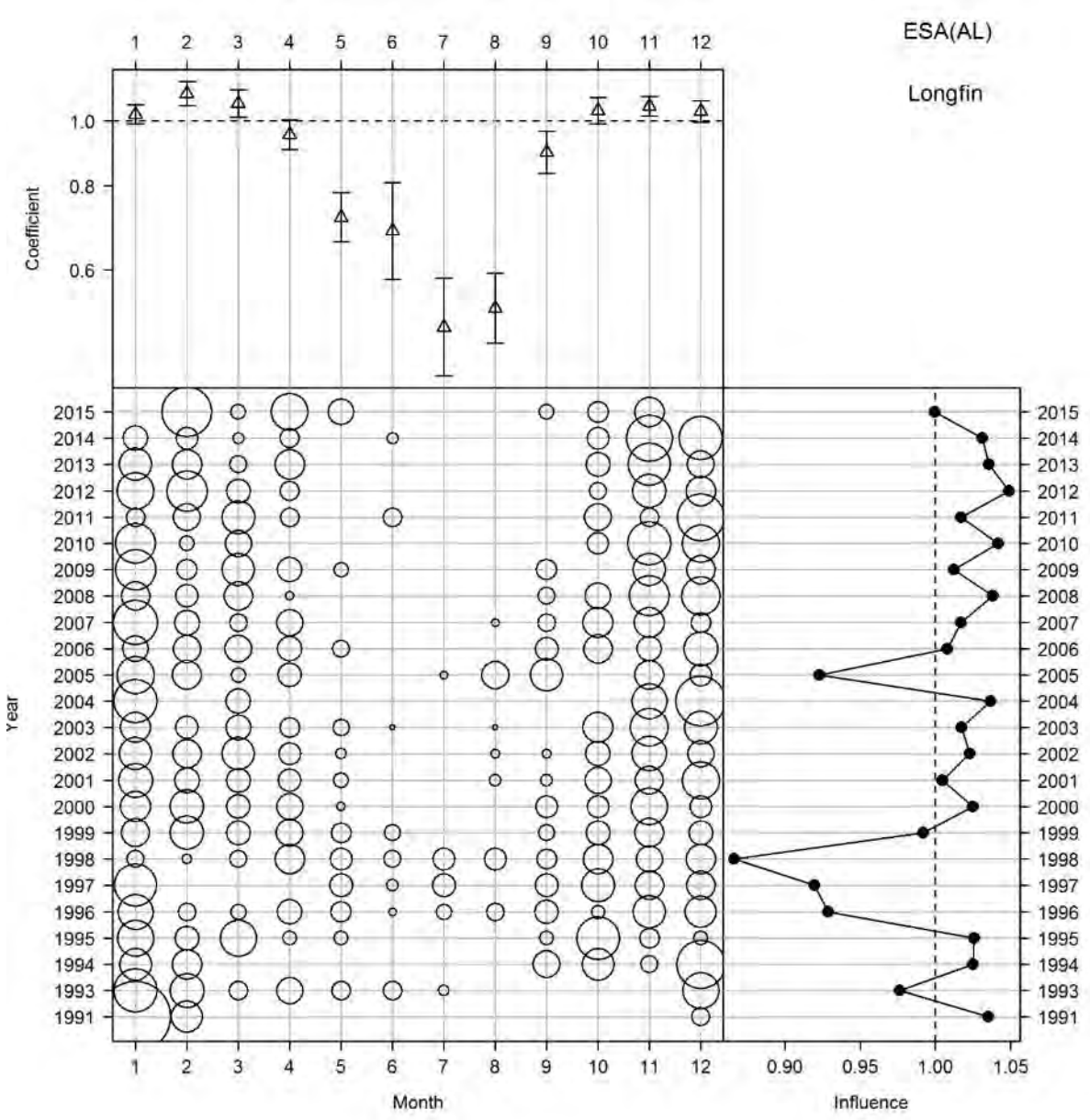

Figure L27: Influence of month for the longfin CPUE model for the years 1990–91 to 2014–15 (ESA AL).

APPENDIX M: WELLINGTON (ESA AM)

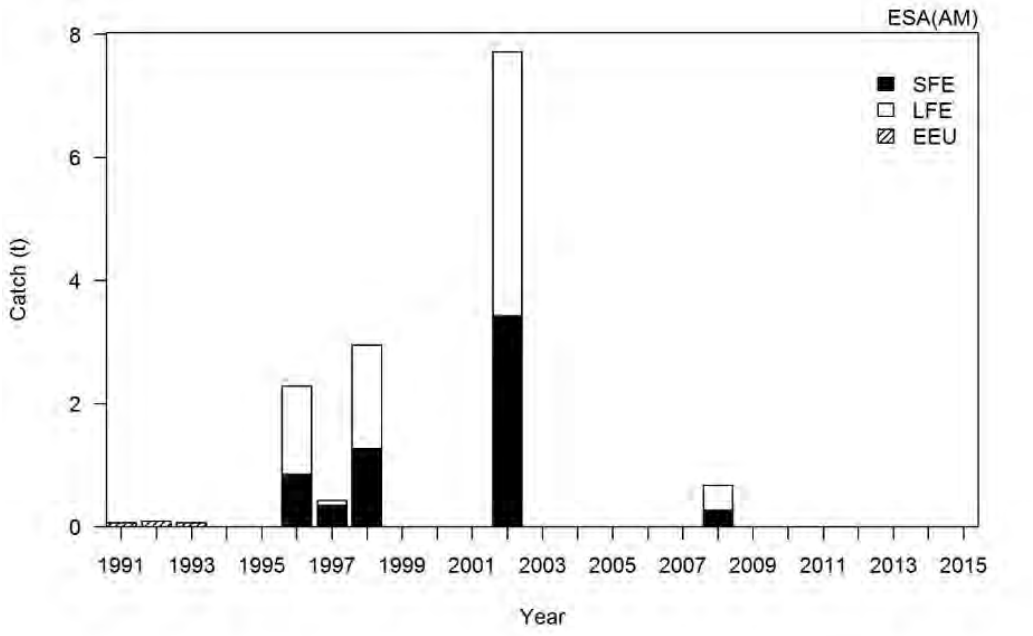

Figure M1: Total estimated commercial catch of shortfin (SFE), longfin (LFE), and unclassified eel catch (EEU) for the years 1990–91 to 2014–15 (ESA AM).

APPENDIX 1

Daily river flow and water quality data used in the standardised CPUE analyses. WQ, water quality.

ESA	River	Site/Location	Flow source	Flow data	WQ data
AA (1)	Manganui River	46651, Permanent Station	Northland Regional Council	yes	no
	Wairoa River	8516 Tourist Rd	Auckland Council	yes	no
	Wairua River	46647	Northland Regional Council	yes	no
	Wairua River	@Purua	N/A	no	yes
	Mangakahia River	@ titoki Br	N/A	no	yes
AB (2)	Hoteo River	45703, Gubbs	Auckland Council	yes	yes
AC (3)	Piako River	9175, Kiwitahi	Waikato Regional Council	yes	no
	Waihou River	9205 Te Aroha	Waikato Regional Council	yes	yes
AD (4)	Waikato River	43402, Ngaruawahia C/W	Waikato Regional Council	yes	yes
	Waipa River	43433 Whatawhata	Waikato Regional Council	yes	yes
AE (5)	Rangitaiki River	15412, Te Teko	NIWA/Trust Power	yes	yes
	Whirinaki River	15410, Galatea	NIWA/Trust Power	yes	yes
AF (6)	Motu River	16501, Houpoto	NIWA	yes	yes
	Waipaoa River	19716, Kanakanaia C/W	NIWA	yes	yes
AG (7)	Ngaruroro River	23150 Chesterhope	NIWA	yes	yes
	Tukituki River	23201 Red Br	NIWA	yes	yes
AH (8)	Whanganui River	33301, Paetawa	NIWA	yes	yes
	Rangitikei River	32702 Mangaweka	Horizons Regional Council	yes	yes
AJ (9)	Waitara River	39503, Bertrand Rd	Taranaki Regional Council	yes	yes
	Patea River	34308, Skinner Rd	Taranaki Regional Council	yes	no
AK (10)	Manawatu River	1032560, Teachers College	Horizons Regional Council	yes	yes
AL (11)	Ruamahanga River	29202, Waihenga	Greater Wellington Regional Council	yes	yes
AM (12)	Otaki River	31807, Pukehinau	NIWA	yes	no

APPENDIX 2

For each area, the number of records, fishers and catch in all and core datasets. Records do not include those with zero catch. The number of pre-QMS and post-QMS (new entrants and existing) core fishers are shown as well as the percent of the fishers and catch that were included in the core fishers' data. SFE, shortfin; LFE, longfin; QMS, quota management system; ESA, eel statistical area. [Continued on next page]

					Number of core fishers			Percent retained	
ESA	Dataset	Records	Fishers	Catch (kg)	Pre-QMS	Post-QMS (existing)	Post-QMS (new)	Fishers	Catch
ESA(AA)	All SFE	18 733	75	1 671 283					
	Core SFE	17 136	26	1 551 427	20	11	6	34.7	92.8
	All LFE	10 110	68	494 140.5					
	Core LFE	8 849	20	442 051.5	14	7	6	29.4	89.5
ESA(AB)	All SFE	6 651	47	843 222					
	Core SFE	6 022	16	763 692	12	5	4	34.0	90.6
	All LFE	3 755	40	250 846.5					
	Core LFE	3 270	15	208 389.5	10	3	5	37.5	83.1
ESA(AC)	All SFE	7 671	36	694 023					
	Core SFE	7 312	14	663 204	8	2	6	36.8	95.6
	All LFE	3 604	33	114 761					
	Core LFE	3 184	9	89 483	6	2	3	27.3	78.0
ESA(AD)	All SFE	23 239	52	1 520 287					
	Core SFE	22 824	27	1 488 519	21	9	6	51.9	97.9
	All LFE	15 528	48	549 308					
	Core LFE	15 051	25	524 870	20	9	5	52.1	95.6
ESA(AE)	All SFE	2 759	20	315 846					
	Core SFE	2 335	8	269 152	5	1	3	40.0	85.2
	All LFE	1 839	19	127 445					
	Core LFE	1 526	8	110 335	5	0	3	42.1	86.6
ESA(AF)	All SFE	726	14	164 924					
	Core SFE	571	5	130 000	4	1	1	35.7	78.8
	All LFE	455	11	50 505					
	Core LFE	298	3	35 328	3	1	0	27.3	69.9
ESA(AG)	All SFE	4 496	37	921 907					
	Core SFE	3 853	11	793 705	9	1	2	29.7	86.1
	All LFE	2 350	30	272 641					
	Core LFE	1 686	6	190 315	4	1	2	20.0	69.8
ESA(AH)	All SFE	3 199	36	487 553.5					
	Core SFE	2 492	11	336 437	11	5	0	30.6	69.0

[Continued]:

ESA	Dataset	Records	Fishers	Catch (kg)	Number of core fishers			Percent retained	
					Pre-QMS	Post-QMS (existing)	Post-QMS (new)	Fishers	Catch
	All LFE	3 388	33	470 527					
	Core LFE	2 730	10	394 627	10	4	0	30.3	83.9
ESA(AJ)	All SFE	1 959	23	161 712					
	Core SFE	1 668	6	118 910	6	3	0	26.1	73.5
	All LFE	3 130	20	280 916					
	Core LFE	2 870	8	247 750	8	4	0	40.0	88.2
ESA(AK)	All SFE	2 872	34	520 795					
	Core SFE	2 837	11	430 982	9	5	2	32.4	82.8
	All LFE	1 491	32	109 240					
	Core LFE	984	10	61 200	7	4	3	31.1	56.0
ESA(AL)	All SFE	2 634	31	387 454					
	Core SFE	2 251	10	336 957	6	1	4	32.3	87.0
	All LFE	2 138	27	232 358					
	Core LFE	1 823	9	203 887	5	1	4	33.3	87.7
ESA(AM)	All SFE	103	6	6 151					
	Core SFE	–	–	–	–	–	–	–	–
	All LFE	66	6	7 904					
	Core LFE	–	–	–	–	–	–	–	–

APPENDIX 3

Predictor variables, degrees of freedom, and R^2 values from GLM stepwise regression analysis for CPUE analyses for shortfin and longfin eels by area. Variables are shown in order of acceptance by the model with associated cumulative R^2 value. Only variables entered into the model are shown. ESA, eel statistical area. [Continued on next page]

ESA	Shortfin			Longfin		
	Predictors	DF	R^2	Predictors	DF	R^2
ESA(AA)	fish.year	24	0.034	fish.year	24	0.125
	target_est	2	0.277	target_est	2	0.549
	permit	25	0.408	permit	19	0.593
	poly(log(lifts), 3)	3	0.503	poly(log(lifts), 3)	3	0.623
				month	11	0.628
ESA(AB)	fish.year	24	0.079	fish.year	24	0.116
	permit	15	0.424	target_est	2	0.56
	target_est	2	0.559	permit	16	0.643
	poly(log(lifts), 3)	3	0.643	poly(log(lifts), 3)	3	0.676
ESA(AC)	fish.year	24	0.046	fish.year	24	0.147
	poly(log(lifts), 3)	3	0.186	target_est	2	0.501
	target_est	2	0.322	poly(log(lifts), 3)	3	0.556
	permit	13	0.385	permit	8	0.579
	month	11	0.396			
	poly(waihou_flow,	3	0.405			
ESA(AD)	fish.year	24	0.061	fish.year	24	0.074
	permit	26	0.33	target_est	2	0.456
	target_est	2	0.463	permit	24	0.629
	poly(log(lifts), 3)	3	0.489	poly(log(lifts), 3)	3	0.649
	month	11	0.501	month	11	0.656
	poly(waipa_flow, 3)	3	0.508			
ESA(AE)	fish.year	24	0.293	fish.year	23	0.16
	poly(log(lifts), 3)	3	0.52	target_est	2	0.502
	target_est	2	0.599	poly(log(lifts), 3)	3	0.642
	permit	7	0.612	permit	6	0.658
	month	11	0.619	month	11	0.665
ESA(AF)	fish.year	13	0.32	fish.year	8	0.159
	target_est	2	0.476	target_est	2	0.459
	poly(log(lifts), 3)	3	0.595	poly(log(lifts), 3)	3	0.647
	month	11	0.635	month	10	0.688
	permit	4	0.641	poly(waipaoa_flow,	3	0.701
				poly(motu_flow, 3)	3	0.708
				poly(moon.phase, 3)	3	0.714
ESA(AG)	fish.year	24	0.372	fish.year	21	0.162
	permit	10	0.545	target_est	2	0.496
	poly(log(lifts), 3)	3	0.672	poly(log(lifts), 3)	3	0.586
	target_est	2	0.751	permit	5	0.632
	month	11	0.761	month	11	0.647
ESA(AH)	fish.year	24	0.231	fish.year	16	0.109
	target_est	2	0.494	permit	9	0.291
	poly(log(lifts), 3)	3	0.613	target_est	2	0.409
	permit	10	0.654	poly(log(lifts), 3)	3	0.524
	month	11	0.667	month	11	0.552

[Continued]:

ESA	Shortfin			Longfin		
	Predictors	DF	R^2	Predictors	DF	R^2
ESA(AJ)	fish.year	23	0.101	fish.year	23	0.232
	target_est	2	0.398	permit	7	0.542
	permit	5	0.591	target_est	2	0.637
	poly(log(lifts), 3)	3	0.627	poly(log(lifts), 3)	3	0.686
	month	11	0.64	month	11	0.699
ESA(AK)	fish.year	24	0.31	fish.year	20	0.109
	target_est	2	0.412	target_est	2	0.396
	poly(log(lifts), 3)	3	0.518	permit	9	0.511
	permit	10	0.562	poly(log(lifts), 3)	3	0.539
	month	11	0.579	month	11	0.561
				poly(moon.phase, 3)	3	0.568
ESA(AL)	fish.year	21	0.162	fish.year	23	0.199
	target_est	2	0.49	target_est	2	0.52
	poly(log(lifts), 3)	3	0.646	poly(log(lifts), 3)	3	0.636
	permit	9	0.684	permit	8	0.662
	month	11	0.698	month	11	0.675

APPENDIX 4

CPUE indices by ESA for shortfin and longfin. CI, 95% confidence intervals; s.e., standard error; CV, coefficient of variation; Dates shown represent the end of the fishing year i.e. 1991 = 1990–91 fishing year. [Continued on next pages]

Northland (ESA AA)

Shortfin						Longfin					
Year	Index	Lower	Upper	s.e.	CV	Year	Index	Lower	Upper	s.e.	CV
1991	0.74	0.72	0.77	0.02	0.02	1991	1.19	1.12	1.27	0.03	0.03
1992	0.68	0.65	0.71	0.02	0.02	1992	1.03	0.97	1.10	0.03	0.03
1993	0.70	0.67	0.73	0.02	0.02	1993	1.10	1.02	1.18	0.04	0.04
1994	0.64	0.61	0.67	0.02	0.02	1994	1.05	0.97	1.13	0.04	0.04
1995	0.84	0.81	0.88	0.02	0.02	1995	1.03	0.96	1.10	0.03	0.03
1996	0.90	0.85	0.94	0.02	0.02	1996	1.09	1.01	1.19	0.04	0.04
1997	0.87	0.83	0.91	0.02	0.02	1997	0.92	0.84	1.01	0.05	0.05
1998	0.96	0.92	1.00	0.02	0.02	1998	1.12	1.04	1.21	0.04	0.04
1999	1.11	1.06	1.16	0.02	0.02	1999	1.20	1.13	1.28	0.03	0.03
2000	1.07	1.03	1.12	0.02	0.02	2000	1.11	1.05	1.17	0.03	0.03
2001	1.10	1.06	1.14	0.02	0.02	2001	1.21	1.15	1.28	0.03	0.03
2002	1.02	0.99	1.05	0.02	0.02	2002	1.07	1.02	1.12	0.02	0.02
2003	1.00	0.97	1.03	0.02	0.02	2003	0.99	0.95	1.04	0.02	0.02
2004	1.06	1.02	1.10	0.02	0.02	2004	1.05	0.99	1.10	0.03	0.03
2005	1.01	0.97	1.06	0.02	0.02	2005	0.99	0.93	1.05	0.03	0.03
2006	1.06	1.01	1.11	0.02	0.02	2006	1.01	0.94	1.07	0.03	0.03
2007	1.16	1.11	1.22	0.02	0.02	2007	1.02	0.96	1.09	0.03	0.03
2008	1.16	1.11	1.21	0.02	0.02	2008	0.98	0.93	1.04	0.03	0.03
2009	1.09	1.03	1.14	0.03	0.03	2009	0.73	0.67	0.79	0.04	0.04
2010	1.22	1.16	1.29	0.03	0.03	2010	0.83	0.77	0.90	0.04	0.04
2011	1.19	1.13	1.25	0.03	0.03	2011	0.86	0.80	0.93	0.04	0.04
2012	1.19	1.13	1.25	0.03	0.03	2012	0.85	0.79	0.92	0.04	0.04
2013	1.23	1.16	1.30	0.03	0.03	2013	0.99	0.91	1.08	0.04	0.04
2014	1.16	1.10	1.22	0.03	0.03	2014	0.82	0.76	0.89	0.04	0.04
2015	1.28	1.21	1.36	0.03	0.03	2015	0.95	0.86	1.05	0.05	0.05

Auckland (ESA AB)

Shortfin						Longfin					
Year	Index	Lower	Upper	s.e.	CV	Year	Index	Lower	Upper	s.e.	CV
1991	1.28	1.05	1.57	0.10	0.10	1991	0.70	0.53	0.93	0.14	0.14
1992	0.85	0.77	0.93	0.05	0.05	1992	1.24	1.03	1.50	0.09	0.09
1993	0.79	0.72	0.86	0.05	0.05	1993	1.11	0.95	1.29	0.08	0.08
1994	0.97	0.87	1.09	0.06	0.06	1994	1.10	0.92	1.31	0.09	0.09
1995	1.03	0.94	1.12	0.04	0.04	1995	1.22	1.03	1.45	0.08	0.08
1996	1.08	0.99	1.18	0.04	0.04	1996	0.93	0.76	1.12	0.10	0.10
1997	0.81	0.75	0.86	0.03	0.03	1997	0.93	0.83	1.06	0.06	0.06
1998	1.01	0.94	1.09	0.04	0.04	1998	1.26	1.14	1.40	0.05	0.05
1999	1.21	1.12	1.30	0.04	0.04	1999	1.29	1.12	1.49	0.07	0.07
2000	0.89	0.84	0.95	0.03	0.03	2000	1.11	1.01	1.23	0.05	0.05
2001	0.87	0.81	0.94	0.03	0.03	2001	1.25	1.13	1.39	0.05	0.05
2002	0.75	0.71	0.80	0.03	0.03	2002	0.92	0.83	1.01	0.05	0.05
2003	0.75	0.71	0.80	0.03	0.03	2003	0.91	0.82	1.01	0.05	0.05
2004	0.88	0.82	0.94	0.04	0.04	2004	0.98	0.88	1.08	0.05	0.05
2005	0.92	0.82	1.04	0.06	0.06	2005	1.15	0.94	1.42	0.10	0.10
2006	0.96	0.88	1.05	0.04	0.04	2006	0.81	0.71	0.93	0.07	0.07
2007	1.04	0.95	1.12	0.04	0.04	2007	1.01	0.91	1.13	0.05	0.05
2008	1.27	1.12	1.43	0.06	0.06	2008	1.00	0.85	1.19	0.08	0.08
2009	1.04	0.93	1.16	0.05	0.05	2009	0.82	0.70	0.95	0.08	0.08
2010	1.11	1.00	1.23	0.05	0.05	2010	0.91	0.78	1.07	0.08	0.08
2011	1.15	1.07	1.23	0.04	0.04	2011	0.82	0.72	0.94	0.07	0.07
2012	1.11	1.04	1.20	0.04	0.04	2012	1.00	0.89	1.13	0.06	0.06
2013	1.15	1.08	1.24	0.04	0.04	2013	0.97	0.86	1.09	0.06	0.06
2014	1.17	1.08	1.27	0.04	0.04	2014	0.94	0.83	1.08	0.07	0.07
2015	1.22	1.11	1.34	0.05	0.05	2015	0.89	0.78	1.03	0.07	0.07

Hauraki (ESA AC)

Shortfin						Longfin					
Year	Index	Lower	Upper	s.e.	CV	Year	Index	Lower	Upper	s.e.	CV
1991	1.12	1.03	1.21	0.04	0.04	1991	1.70	1.48	1.96	0.07	0.07
1992	0.97	0.91	1.04	0.03	0.03	1992	1.77	1.56	2.01	0.06	0.06
1993	1.09	1.02	1.16	0.03	0.03	1993	1.52	1.35	1.71	0.06	0.06
1994	0.98	0.91	1.05	0.04	0.04	1994	1.11	0.96	1.27	0.07	0.07
1995	1.09	1.03	1.16	0.03	0.03	1995	1.30	1.18	1.43	0.05	0.05
1996	1.05	0.98	1.13	0.03	0.03	1996	1.44	1.25	1.66	0.07	0.07
1997	0.81	0.76	0.87	0.03	0.03	1997	1.17	1.03	1.33	0.06	0.07
1998	0.75	0.69	0.81	0.04	0.04	1998	0.92	0.81	1.05	0.06	0.06
1999	0.70	0.65	0.75	0.04	0.04	1999	0.99	0.85	1.16	0.08	0.08
2000	0.85	0.80	0.89	0.03	0.03	2000	1.00	0.91	1.10	0.05	0.05
2001	0.81	0.77	0.86	0.03	0.03	2001	0.78	0.71	0.86	0.05	0.05
2002	1.09	1.03	1.15	0.03	0.03	2002	0.81	0.73	0.89	0.05	0.05
2003	0.94	0.89	1.00	0.03	0.03	2003	0.85	0.77	0.94	0.05	0.05
2004	1.09	1.02	1.17	0.03	0.03	2004	0.82	0.74	0.92	0.05	0.05
2005	0.96	0.91	1.02	0.03	0.03	2005	1.05	0.94	1.18	0.06	0.06
2006	1.02	0.97	1.08	0.03	0.03	2006	0.91	0.83	1.00	0.04	0.04
2007	0.87	0.82	0.92	0.03	0.03	2007	0.82	0.74	0.91	0.05	0.05
2008	0.90	0.84	0.96	0.03	0.03	2008	0.83	0.74	0.93	0.06	0.06
2009	0.92	0.85	1.00	0.04	0.04	2009	0.82	0.70	0.96	0.08	0.08
2010	0.94	0.86	1.03	0.05	0.05	2010	0.77	0.64	0.94	0.10	0.10
2011	1.23	1.12	1.36	0.05	0.05	2011	0.84	0.71	1.01	0.09	0.09
2012	1.36	1.27	1.46	0.04	0.04	2012	1.05	0.94	1.18	0.06	0.06
2013	1.32	1.23	1.42	0.04	0.04	2013	0.95	0.84	1.07	0.06	0.06
2014	1.38	1.28	1.48	0.04	0.04	2014	1.01	0.88	1.17	0.07	0.07
2015	1.13	1.04	1.23	0.04	0.04	2015	0.63	0.50	0.79	0.11	0.12

Waikato (ESA AD)

Shortfin						Longfin					
Year	Index	Lower	Upper	s.e.	CV	Year	Index	Lower	Upper	s.e.	CV
1991	0.85	0.75	0.97	0.06	0.06	1991	1.11	1.02	1.22	0.05	0.05
1992	0.89	0.78	1.01	0.06	0.06	1992	1.21	1.09	1.33	0.05	0.05
1993	1.00	0.91	1.10	0.05	0.05	1993	0.98	0.87	1.09	0.06	0.06
1994	1.11	1.00	1.23	0.05	0.05	1994	1.16	1.03	1.31	0.06	0.06
1995	1.13	1.04	1.23	0.04	0.04	1995	1.26	1.15	1.39	0.05	0.05
1996	1.20	1.13	1.28	0.03	0.03	1996	1.07	0.99	1.16	0.04	0.04
1997	1.07	1.01	1.13	0.03	0.03	1997	0.99	0.92	1.05	0.03	0.03
1998	1.06	1.00	1.11	0.03	0.03	1998	0.88	0.82	0.95	0.04	0.04
1999	0.93	0.89	0.98	0.02	0.02	1999	0.83	0.78	0.88	0.03	0.03
2000	0.81	0.78	0.84	0.02	0.02	2000	0.86	0.82	0.90	0.02	0.02
2001	0.80	0.77	0.83	0.02	0.02	2001	0.93	0.89	0.97	0.02	0.02
2002	0.84	0.81	0.87	0.02	0.02	2002	0.84	0.81	0.87	0.02	0.02
2003	0.76	0.74	0.79	0.02	0.02	2003	0.87	0.83	0.91	0.02	0.02
2004	0.93	0.90	0.97	0.02	0.02	2004	0.97	0.93	1.01	0.02	0.02
2005	0.96	0.93	1.00	0.02	0.02	2005	0.96	0.92	1.00	0.02	0.02
2006	1.04	1.00	1.08	0.02	0.02	2006	0.92	0.88	0.97	0.02	0.02
2007	1.03	0.99	1.07	0.02	0.02	2007	0.99	0.94	1.04	0.03	0.03
2008	1.08	1.03	1.12	0.02	0.02	2008	0.97	0.92	1.02	0.03	0.03
2009	1.15	1.10	1.20	0.02	0.02	2009	1.00	0.95	1.06	0.03	0.03
2010	1.20	1.16	1.25	0.02	0.02	2010	1.08	1.03	1.14	0.03	0.03
2011	1.23	1.18	1.28	0.02	0.02	2011	1.07	1.01	1.13	0.03	0.03
2012	1.04	1.00	1.08	0.02	0.02	2012	1.13	1.07	1.19	0.03	0.03
2013	1.02	0.98	1.07	0.02	0.02	2013	1.08	1.03	1.14	0.03	0.03
2014	1.02	0.97	1.06	0.02	0.02	2014	0.96	0.91	1.01	0.03	0.03
2015	1.05	1.01	1.10	0.02	0.02	2015	1.04	0.98	1.10	0.03	0.03

Bay of Plenty (ESA AE)

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.09	0.89	1.33	0.10	0.10
1992	0.78	0.65	0.94	0.09	0.09
1993	0.70	0.60	0.82	0.08	0.08
1994	0.77	0.64	0.92	0.09	0.09
1995	0.92	0.79	1.08	0.08	0.08
1996	0.98	0.83	1.17	0.09	0.09
1997	0.79	0.65	0.95	0.10	0.10
1998	0.51	0.44	0.60	0.08	0.08
1999	0.77	0.62	0.96	0.11	0.11
2000	0.49	0.40	0.59	0.10	0.10
2001	0.64	0.53	0.77	0.09	0.09
2002	0.45	0.38	0.54	0.08	0.08
2003	0.64	0.55	0.75	0.08	0.08
2004	0.74	0.63	0.87	0.08	0.08
2005	1.12	0.91	1.39	0.11	0.11
2006	1.18	0.95	1.46	0.11	0.11
2007	1.23	1.04	1.44	0.08	0.08
2008	1.50	1.21	1.85	0.11	0.11
2009	1.66	1.25	2.20	0.14	0.14
2010	1.59	1.27	2.00	0.11	0.11
2011	1.73	1.39	2.16	0.11	0.11
2012	2.31	1.77	3.01	0.13	0.13
2013	1.94	1.50	2.50	0.13	0.13
2014	1.39	1.11	1.74	0.11	0.11
2015	1.69	1.25	2.28	0.15	0.15

Longfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.78	1.37	2.32	0.13	0.13
1992	1.24	1.02	1.50	0.10	0.10
1993	1.03	0.91	1.16	0.06	0.06
1994	1.05	0.89	1.26	0.09	0.09
1995	0.99	0.85	1.15	0.08	0.08
1996	0.74	0.60	0.91	0.10	0.10
1997	0.67	0.55	0.82	0.10	0.10
1998	0.76	0.65	0.89	0.08	0.08
1999	1.31	1.08	1.59	0.10	0.10
2000	0.59	0.50	0.70	0.08	0.08
2001	1.32	1.12	1.55	0.08	0.08
2002	0.81	0.71	0.93	0.07	0.07
2003	0.86	0.74	1.00	0.08	0.08
2004	1.06	0.92	1.23	0.07	0.07
2005	0.82	0.71	0.95	0.07	0.07
2006	1.10	0.92	1.32	0.09	0.09
2007	0.94	0.80	1.10	0.08	0.08
2008	1.02	0.83	1.25	0.10	0.10
2009	1.35	1.00	1.82	0.15	0.15
2010	0.84	0.65	1.09	0.13	0.13
2011	1.33	1.05	1.68	0.12	0.12
2012	1.23	0.96	1.58	0.12	0.13
2013	1.36	0.97	1.90	0.17	0.17
2014	0.69	0.55	0.85	0.11	0.11

Poverty Bay (ESA AF)

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1993	0.92	0.75	1.12	0.10	0.10
1994	0.63	0.44	0.90	0.18	0.18
1995	0.93	0.77	1.12	0.09	0.09
1996	1.17	0.92	1.48	0.12	0.12
1997	0.71	0.56	0.89	0.11	0.11
2000	0.95	0.67	1.34	0.17	0.17
2001	1.29	0.94	1.75	0.16	0.16
2002	0.82	0.69	0.98	0.09	0.09
2003	0.46	0.30	0.72	0.22	0.23
2004	1.37	0.86	2.19	0.23	0.24
2005	0.73	0.51	1.06	0.19	0.19
2006	1.54	0.93	2.55	0.25	0.26
2007	1.19	0.87	1.62	0.16	0.16
2009	2.64	1.52	4.57	0.27	0.28

Longfin

Year	Index	Lower	Upper	s.e.	CV
1993	0.74	0.59	0.93	0.11	0.11
1994	1.10	0.75	1.60	0.19	0.19
1995	0.74	0.63	0.87	0.08	0.08
1996	0.69	0.49	0.97	0.17	0.17
2000	0.92	0.63	1.34	0.19	0.19
2001	1.16	0.81	1.68	0.18	0.19
2002	1.10	0.89	1.36	0.10	0.11
2005	1.11	0.73	1.69	0.21	0.21
2007	1.83	1.31	2.54	0.17	0.17

Hawke's Bay (ESA AG)

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.20	1.05	1.37	0.07	0.07
1992	1.25	1.15	1.36	0.04	0.04
1993	1.19	1.10	1.29	0.04	0.04
1994	1.25	1.14	1.38	0.05	0.05
1995	1.34	1.22	1.48	0.05	0.05
1996	1.00	0.91	1.09	0.05	0.05
1997	0.79	0.72	0.85	0.04	0.04
1998	0.68	0.63	0.75	0.04	0.04
1999	0.91	0.80	1.02	0.06	0.06
2000	0.80	0.73	0.88	0.05	0.05
2001	0.89	0.82	0.97	0.04	0.04
2002	0.52	0.48	0.56	0.04	0.04
2003	0.56	0.52	0.60	0.04	0.04
2004	0.78	0.71	0.87	0.05	0.05
2005	0.84	0.78	0.91	0.04	0.04
2006	1.02	0.95	1.10	0.04	0.04
2007	0.81	0.75	0.87	0.04	0.04
2008	0.96	0.88	1.06	0.05	0.05
2009	1.10	0.96	1.25	0.07	0.07
2010	1.14	0.99	1.32	0.07	0.07
2011	1.05	0.91	1.21	0.07	0.07
2012	1.18	1.05	1.32	0.06	0.06
2013	1.44	1.28	1.63	0.06	0.06
2014	1.77	1.56	2.02	0.06	0.06
2015	1.57	1.38	1.79	0.06	0.06

Longfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.26	1.05	1.51	0.09	0.09
1992	1.38	1.20	1.58	0.07	0.07
1993	1.33	1.18	1.49	0.06	0.06
1994	1.25	1.11	1.41	0.06	0.06
1995	1.01	0.85	1.20	0.09	0.09
1996	1.05	0.92	1.19	0.06	0.06
1997	0.63	0.54	0.73	0.07	0.07
1998	0.81	0.72	0.90	0.06	0.06
1999	1.04	0.91	1.19	0.07	0.07
2000	1.14	1.01	1.29	0.06	0.06
2001	0.88	0.78	0.98	0.06	0.06
2002	0.65	0.57	0.74	0.06	0.06
2003	0.83	0.74	0.94	0.06	0.06
2004	0.72	0.61	0.85	0.08	0.08
2005	0.96	0.86	1.08	0.06	0.06
2006	0.90	0.80	1.01	0.06	0.06
2007	0.88	0.79	0.97	0.05	0.05
2008	0.79	0.68	0.90	0.07	0.07
2012	1.05	0.87	1.26	0.09	0.09
2013	1.23	0.96	1.59	0.13	0.13
2014	1.53	1.18	1.98	0.13	0.13
2015	1.35	1.09	1.68	0.11	0.11

Rangitikei-Whanganui (ESA AH)

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.16	1.04	1.29	0.05	0.05
1992	1.05	0.92	1.20	0.07	0.07
1993	0.97	0.86	1.10	0.06	0.06
1994	1.10	0.98	1.23	0.06	0.06
1995	1.02	0.90	1.15	0.06	0.06
1996	1.31	1.15	1.48	0.06	0.06
1997	0.95	0.82	1.10	0.07	0.07
1998	0.93	0.79	1.10	0.08	0.08
1999	0.89	0.80	0.99	0.05	0.05
2000	0.81	0.70	0.94	0.07	0.07
2001	0.87	0.79	0.96	0.05	0.05
2002	0.69	0.63	0.76	0.05	0.05
2003	0.82	0.73	0.92	0.06	0.06
2004	0.22	0.18	0.28	0.11	0.11
2005	0.70	0.60	0.83	0.08	0.08
2006	1.10	0.92	1.32	0.09	0.09
2007	1.11	0.93	1.33	0.09	0.09
2008	1.20	0.96	1.50	0.11	0.11
2009	1.47	1.14	1.90	0.13	0.13
2010	1.17	0.94	1.46	0.11	0.11
2011	1.45	1.18	1.77	0.10	0.10
2012	1.69	1.35	2.12	0.11	0.11
2013	1.45	1.21	1.72	0.09	0.09
2014	1.16	0.94	1.44	0.11	0.11
2015	1.12	0.90	1.39	0.11	0.11

Longfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.73	1.59	1.88	0.04	0.04
1992	1.88	1.71	2.07	0.05	0.05
1993	1.38	1.28	1.49	0.04	0.04
1994	1.66	1.51	1.82	0.05	0.05
1995	1.37	1.26	1.49	0.04	0.04
1996	1.36	1.21	1.52	0.06	0.06
1997	1.43	1.28	1.59	0.05	0.05
1998	0.90	0.79	1.03	0.06	0.06
1999	0.86	0.78	0.94	0.05	0.05
2000	1.03	0.92	1.17	0.06	0.06
2001	0.73	0.66	0.80	0.05	0.05
2002	0.68	0.63	0.74	0.04	0.04
2003	0.61	0.55	0.68	0.05	0.05
2004	0.47	0.40	0.55	0.08	0.08
2005	0.72	0.63	0.83	0.07	0.07
2006	0.82	0.69	0.96	0.08	0.08
2007	0.75	0.64	0.89	0.08	0.08

Taranaki (ESA AJ)

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.66	1.12	2.48	0.20	0.20
1992	2.70	1.87	3.88	0.18	0.18
1993	1.00	0.81	1.24	0.11	0.11
1994	0.69	0.52	0.94	0.15	0.15
1995	1.35	1.05	1.73	0.12	0.12
1996	1.23	1.01	1.49	0.10	0.10
1997	1.09	0.92	1.29	0.08	0.08
1998	0.96	0.84	1.10	0.07	0.07
1999	1.02	0.88	1.18	0.07	0.07
2000	0.93	0.83	1.04	0.06	0.06
2001	0.77	0.68	0.87	0.06	0.06
2002	0.80	0.72	0.89	0.05	0.05
2003	0.72	0.64	0.82	0.06	0.06
2004	0.87	0.75	1.00	0.07	0.07
2005	0.74	0.60	0.93	0.11	0.11
2006	0.97	0.75	1.24	0.13	0.13
2007	0.71	0.57	0.88	0.11	0.11
2008	0.91	0.70	1.19	0.13	0.13
2010	1.33	1.02	1.74	0.13	0.13
2011	0.91	0.69	1.20	0.14	0.14
2012	0.88	0.66	1.16	0.14	0.14
2013	1.43	1.17	1.74	0.10	0.10
2014	0.74	0.51	1.09	0.19	0.19
2015	0.96	0.66	1.39	0.19	0.19

Longfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.50	1.37	1.65	0.05	0.05
1992	1.75	1.56	1.96	0.06	0.06
1993	1.23	1.12	1.36	0.05	0.05
1994	1.07	0.97	1.18	0.05	0.05
1995	1.31	1.16	1.47	0.06	0.06
1996	1.24	1.12	1.38	0.05	0.05
1997	1.10	1.01	1.21	0.05	0.05
1998	1.06	0.96	1.16	0.05	0.05
1999	0.97	0.89	1.06	0.04	0.04
2000	0.94	0.87	1.02	0.04	0.04
2001	0.82	0.76	0.89	0.04	0.04
2002	0.82	0.76	0.89	0.04	0.04
2003	0.71	0.66	0.75	0.03	0.03
2004	0.77	0.71	0.83	0.04	0.04
2005	0.85	0.76	0.96	0.06	0.06
2006	0.83	0.73	0.95	0.07	0.07
2007	0.90	0.81	1.01	0.06	0.06
2008	0.97	0.80	1.19	0.10	0.10
2010	0.89	0.74	1.07	0.09	0.09
2011	1.05	0.85	1.29	0.10	0.10
2012	1.11	0.89	1.38	0.11	0.11
2013	1.02	0.83	1.24	0.10	0.10
2014	0.88	0.69	1.12	0.12	0.12
2015	0.79	0.58	1.07	0.15	0.15

Manawatu (ESA AK)

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1991	1.94	1.67	2.25	0.08	0.08
1992	3.83	3.26	4.49	0.08	0.08
1993	2.18	1.76	2.72	0.11	0.11
1994	0.76	0.66	0.88	0.07	0.07
1995	0.66	0.58	0.75	0.07	0.07
1996	0.55	0.46	0.65	0.09	0.09
1997	0.90	0.70	1.16	0.13	0.13
1998	0.71	0.55	0.91	0.13	0.13
1999	0.94	0.68	1.29	0.16	0.16
2000	0.51	0.46	0.57	0.05	0.05
2001	0.60	0.54	0.66	0.05	0.05
2002	0.75	0.68	0.84	0.05	0.05
2003	0.48	0.42	0.55	0.07	0.07
2004	1.37	0.97	1.93	0.17	0.17
2005	1.04	0.88	1.24	0.09	0.09
2006	1.08	0.95	1.22	0.06	0.06
2007	1.28	1.13	1.44	0.06	0.06
2008	1.39	1.20	1.62	0.08	0.08
2009	0.97	0.84	1.12	0.07	0.07
2010	1.14	0.98	1.31	0.07	0.07
2011	0.96	0.83	1.10	0.07	0.07
2012	0.90	0.78	1.03	0.07	0.07
2013	0.97	0.85	1.11	0.07	0.07
2014	1.02	0.83	1.24	0.10	0.10
2015	1.32	1.11	1.57	0.09	0.09

Longfin

Year	Index	Lower	Upper	s.e.	CV
1993	2.63	1.46	4.71	0.29	0.30
1994	1.70	1.15	2.51	0.19	0.20
1995	1.18	0.83	1.68	0.18	0.18
1996	1.17	0.73	1.88	0.24	0.24
1998	0.69	0.42	1.14	0.25	0.26
2000	0.78	0.46	1.33	0.27	0.27
2001	1.02	0.76	1.36	0.14	0.14
2002	0.48	0.35	0.65	0.15	0.15
2003	0.44	0.33	0.58	0.14	0.14
2004	1.05	0.67	1.66	0.23	0.23
2005	0.97	0.70	1.34	0.16	0.16
2006	0.89	0.69	1.15	0.13	0.13
2007	1.10	0.83	1.46	0.14	0.14
2008	1.06	0.71	1.59	0.20	0.20
2009	1.01	0.77	1.33	0.14	0.14
2010	1.20	0.84	1.72	0.18	0.18
2011	1.25	0.96	1.63	0.13	0.13
2012	1.10	0.83	1.46	0.14	0.14
2013	1.06	0.84	1.33	0.12	0.12
2014	0.89	0.65	1.23	0.16	0.16
2015	0.85	0.64	1.14	0.15	0.15

Shortfin

Year	Index	Lower	Upper	s.e.	CV
1993	0.68	0.56	0.83	0.10	0.10
1994	1.05	0.89	1.25	0.09	0.09
1995	1.16	1.03	1.31	0.06	0.06
1996	1.09	0.95	1.24	0.07	0.07
1997	0.80	0.70	0.91	0.07	0.07
1998	0.87	0.76	1.00	0.07	0.07
1999	0.77	0.68	0.88	0.06	0.06
2000	0.76	0.67	0.86	0.06	0.06
2001	0.79	0.71	0.88	0.05	0.05
2002	0.59	0.55	0.65	0.04	0.04
2003	0.51	0.47	0.55	0.04	0.04
2005	1.13	1.00	1.29	0.06	0.06
2006	1.12	1.01	1.25	0.05	0.05
2007	1.34	1.14	1.56	0.08	0.08
2008	1.38	1.20	1.58	0.07	0.07
2009	1.02	0.90	1.16	0.06	0.06
2010	1.53	1.18	1.97	0.13	0.13
2011	1.45	1.18	1.77	0.10	0.10
2012	1.47	1.29	1.68	0.07	0.07
2013	0.97	0.85	1.10	0.06	0.06
2014	1.27	1.12	1.44	0.06	0.06
2015	1.19	1.04	1.37	0.07	0.07
1993	0.68	0.56	0.83	0.10	0.10
1994	1.05	0.89	1.25	0.09	0.09
1995	1.16	1.03	1.31	0.06	0.06

Longfin

Year	Index	Lower	Upper	s.e.	CV
1991	0.95	0.70	1.28	0.15	0.15
1993	1.41	1.17	1.70	0.09	0.09
1994	0.90	0.73	1.10	0.10	0.10
1995	1.13	0.94	1.36	0.09	0.09
1996	0.97	0.84	1.11	0.07	0.07
1997	0.79	0.65	0.97	0.10	0.10
1998	0.88	0.74	1.05	0.09	0.09
1999	0.77	0.67	0.88	0.07	0.07
2000	0.71	0.61	0.82	0.07	0.07
2001	0.75	0.67	0.85	0.06	0.06
2002	0.69	0.62	0.76	0.05	0.05
2003	0.68	0.61	0.75	0.05	0.05
2004	1.16	0.78	1.73	0.20	0.20
2005	0.90	0.77	1.04	0.07	0.07
2006	1.21	1.05	1.38	0.07	0.07
2007	1.35	1.09	1.67	0.11	0.11
2008	1.17	0.93	1.46	0.11	0.11
2009	0.85	0.67	1.07	0.11	0.12
2010	1.16	0.90	1.49	0.12	0.13
2011	1.60	1.18	2.16	0.15	0.15
2012	1.33	1.09	1.63	0.10	0.10
2013	1.13	0.93	1.38	0.10	0.10
2014	1.18	0.98	1.42	0.09	0.09
2015	1.04	0.82	1.33	0.12	0.12