

# Appendix C: Generalised additive modelling (GAM) results

## Hunter River at Muswellbrook Bridge (210002)

Family: gaussian  
 Link function: identity

Formula:  
 ec210002\_OR ~ s(logflow210002) + s(logflow\_lag1\_210002) + s(time) + sin\_time + cos\_time

Parametric coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	488.6429	0.9951	491.062	<2e-16 ***
sin_time	-27.4416	1.4138	-19.410	<2e-16 ***
cos_time	1.5884	1.4347	1.107	0.268

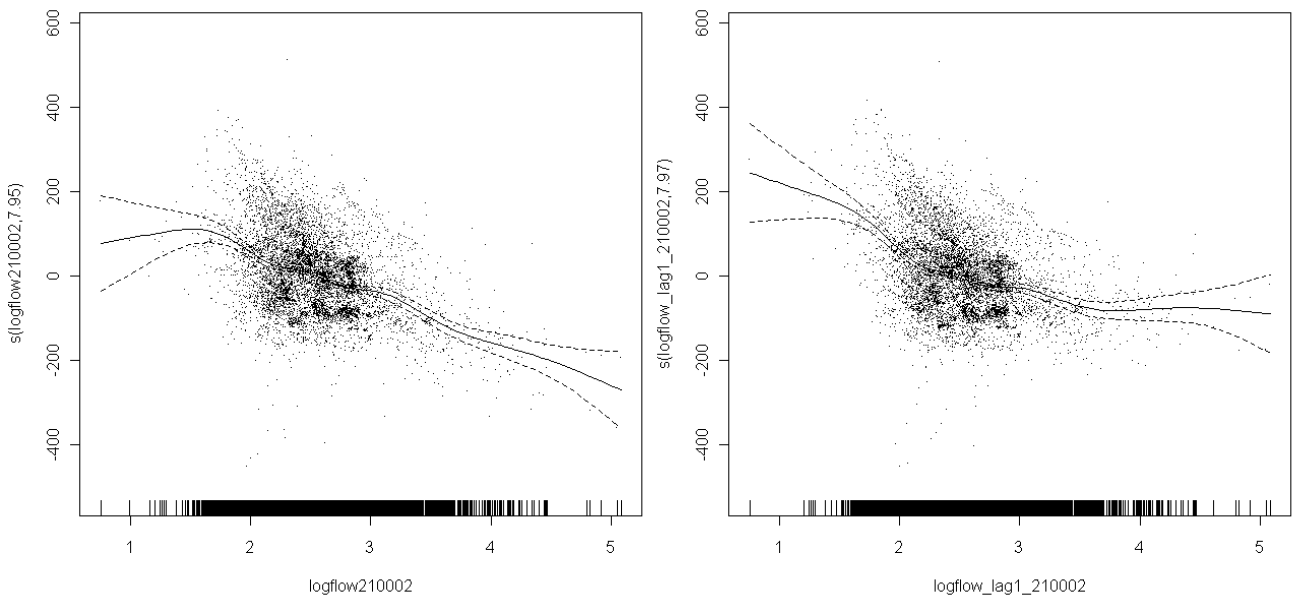
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 Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Approximate significance of smooth terms:

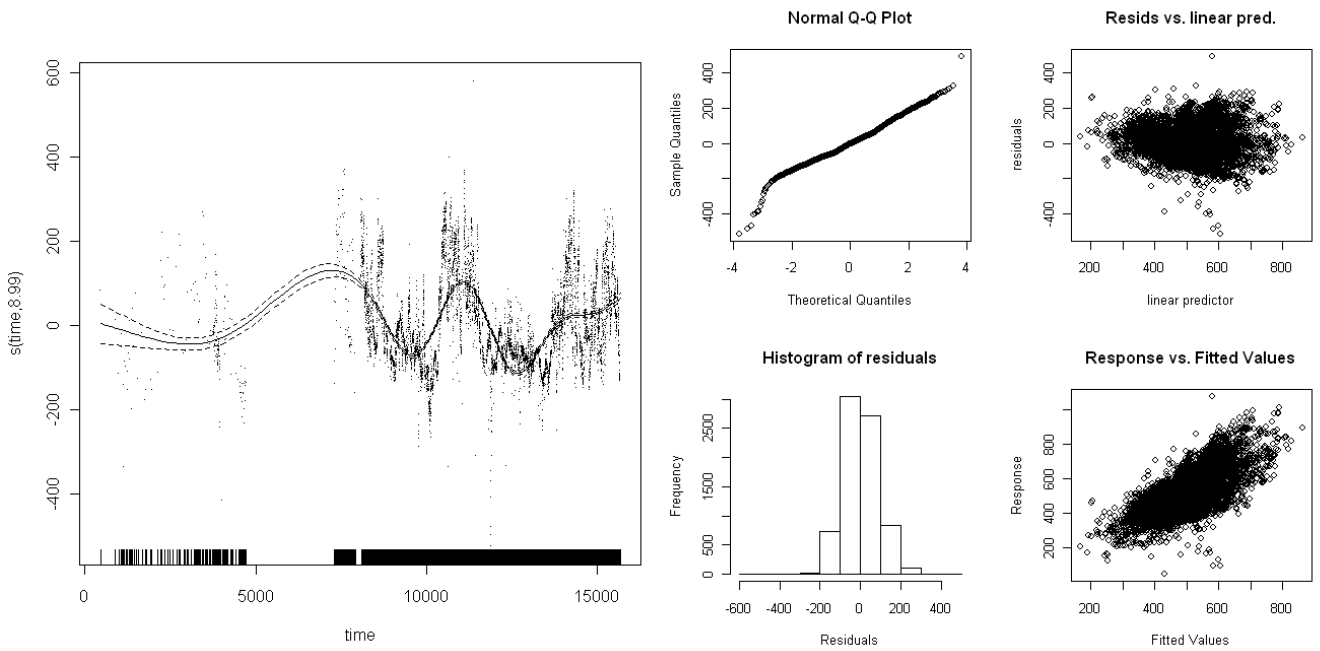
	edf	Ref.df	F	p-value
s(logflow210002)	7.946	8.446	35.60	<2e-16 ***
s(logflow_lag1_210002)	7.970	8.470	21.68	<2e-16 ***
s(time)	8.989	9.489	387.56	<2e-16 ***

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 Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

R-sq.(adj) = 0.556    Deviance explained = 55.8%  
 GCV score = 7427.4    Scale est. = 7399.7    n = 7482  
 One extreme outlier removed due to its high influence.



**Figure C1. Non-linear trend for flow (left) and lag1 flow (right) for Hunter River at Muswellbrook Bridge (Station 210002)**



**Figure C2. Non-linear trend for time (left) and GAM diagnostics (right) for Hunter River at Muswellbrook Bridge (Station 210002)**

### Hunter River at Singleton (210129, with early EC data from 210001)

Family: gaussian

Link function: identity

Formula:

```
ec_singleton ~ s(logflow210001) + s(logflow_lag1_210001) +
s(time) + sin_time + cos_time
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Parametric coefficients:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	657.440	1.500	438.18	<2e-16	***
sin_time	-44.795	2.135	-20.98	<2e-16	***
cos_time	-22.307	2.155	-10.35	<2e-16	***

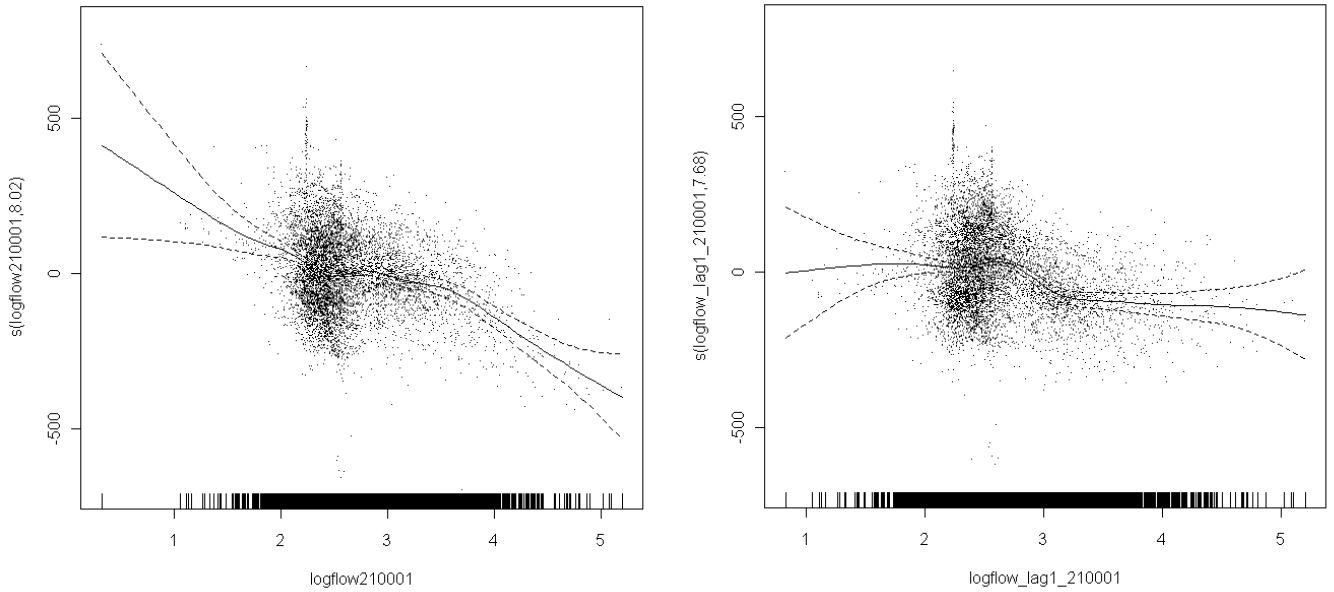
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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Approximate significance of smooth terms:

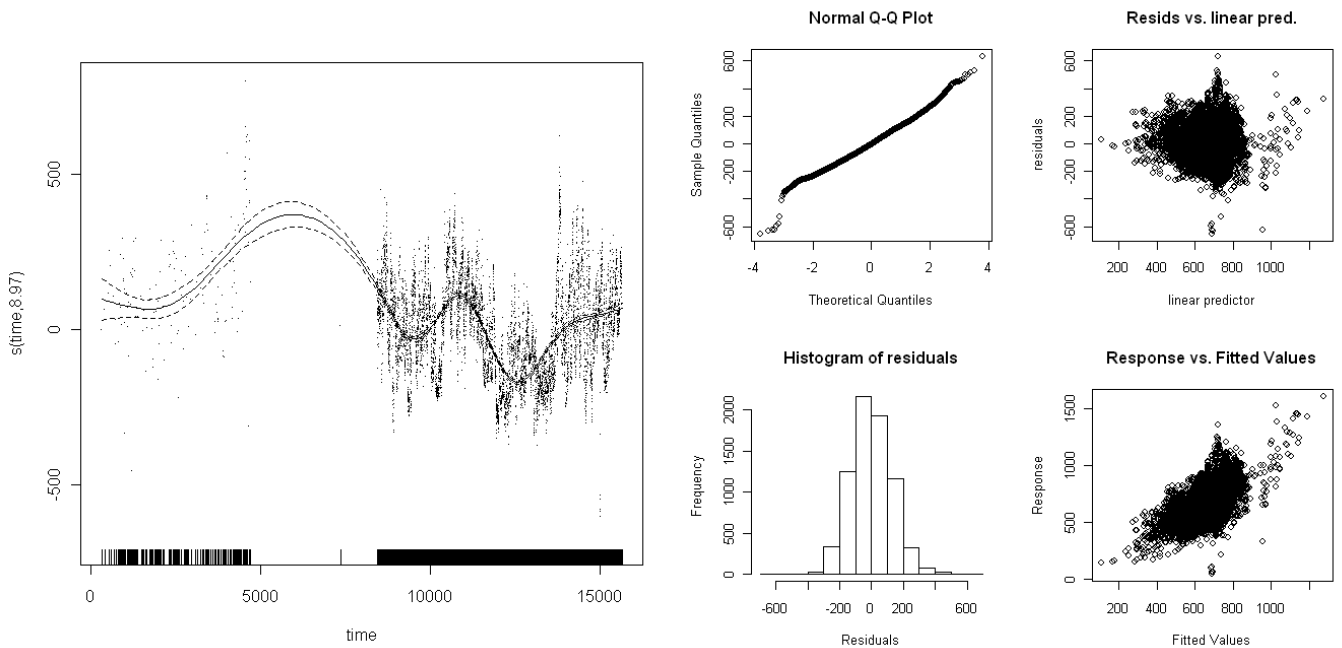
	edf	Ref.df	F	p-value	
s(logflow210001)	8.016	8.516	16.57	<2e-16	***
s(logflow_lag1_210001)	7.684	8.184	11.73	<2e-16	***
s(time)	8.974	9.474	290.64	<2e-16	***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

R-sq.(adj) = 0.398    Deviance explained = 40%  
 GCV score = 16460    Scale est. = 16398    n = 7287



**Figure C3. Non-linear trend for flow (left) and lag1 flow (right) for Hunter River at Singleton (Station 210129/210001)**



**Figure C4. Non-linear trend for time (left) and GAM diagnostics (right) for Hunter River at Singleton (Station 210129/210001)**

Note: Further more detailed modelling using GAMs could potentially improve the fit of these models (see also Wood 2006 for a more detailed description of the GAM methodology employed and interpretation of plots). Insufficient time was available to pursue more detailed statistical modelling, but the time trends presented above appear to be reasonable estimates of potential trends and these appear to agree with the assessments in Appendix B.